August 2011

Power Products Catalog

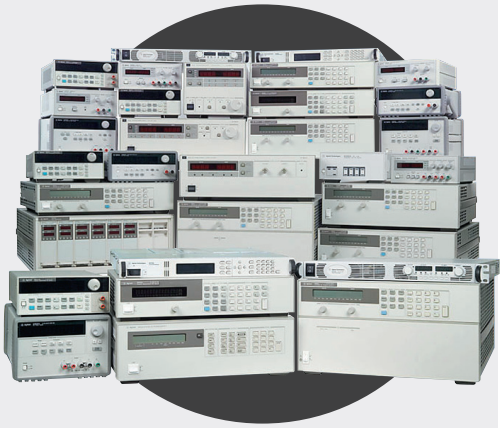
Detailed specifications,
application briefs and more for:

DC Power Supplies
DC Electronic Loads
AC Power Solutions

Agilent Technologies

Solutions

to match your new test and measurement challenges. Choosing from over 200 models of power supplies with confidence. Because Agilent knows how to make power products.



One quick browse through this catalog will convince you that Agilent power products offer so much more than simple power generation. In each power product category, we've integrated the capabilities you need for a complete solution. Agilent Technologies' broad selection of both bench-friendly and system-ready instruments can meet your testing challenges — from basic to complex — with a wealth of available capabilities. With over 40 years of leadership in power test solutions, Agilent continues to introduce a variety of dependable products to help you decrease your test time and speed design validation.

This catalog includes easy to use selection guides for each power product category to help you select the best power supply for your application. For the most comprehensive product information, we've provided a unique URL to each product's website where you can find data sheets and application notes, download drivers, and view videos and interactive demos.

Products you can count on year after year

We've been a leader in the power and measurement business for more than four decades because engineers like you know they can count on Agilent performance and reliability. We specify and guarantee performance for the entire integrated system, so you know what you're really dealing with–unlike the typical "rack-and-stack" setup. Plus, every Agilent product in this catalog has a global warranty.

We know you have more important things to do than shop around for power products. That's why we've made such a wide range of products available through Agilent. The experienced engineers at Agilent can help you select just the right solutions for your application and your budget, then arrange fast shipping so you can get to work in a hurry.

New Products

N6705B DC Power Analyzer

N6705B DC Power Analyzer
The Agilent N6705B DC power analyzer provides unrivaled productivity gains for sourcing and measuring DC voltage and current into the DUT by integrating up to 4 advanced power supplies with DMM, Scope, Arb, and Data logger features. The N6705B eliminates the need to gather multiple pieces of equipment and create complex test setups including transducers (such as current probes and shunts) to measure current into your DUT. The DC Power Analyzer also eliminates the need to develop and debug programs to control a collection of instruments and take useful measurements because all functions and measurements are available at the front panel. When automated bench setups are required, the N6705B is fully programmable over GPIB, USB, LAN and is LXI Class C Compliant.

For even greater control and analysis functions, the DC Power Analyzer can be used with the 14585A Control and Analysis Software. The 14585A software compliments the front panel of the N6705 DC power analyzer, offering advanced functionality such as statistical analysis tools and PC control. It is a flexible R&D tool for any application that can be utilized to control any of the N6700 family's greater than 20 DC power modules with the N6705.

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N6780 Source Measure Units

N6780 Source Measure Units
The N6781A 2-quadrant source measure unit for battery drain analysis offers the features required to accurately capture the power consumption of portable, battery-powered devices. When used with the new Agilent 14585A software, the N6781A becomes an even more powerful battery drain analysis solution offering greater measurement insight.

The N6782A 2-quadrant source measure unit for functional test can modulate its output up to 100 kHz and provides 2-quadrant operation. This makes the SMU a perfect fit for advanced functional test of a variety of devices including DC/DC converters, power management units, and power amplifiers.

The N6784A 4-quadrant source measure unit provides precise sourcing and measurement for your general purpose needs.

The new SMUs are a part of the N6700 modular power system, which consists of the N6700 low-profile mainframes for ATE and the N6705 DC power analyzer mainframe for R&D.

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New Products (continued)

N8700 Series
System DC Power Supplies

N8700 Series System DC Power Supplies
The Agilent Technologies N8700 series system DC power supplies give you just the right performance — at just the right price — in a compact (2 U) package. This family of affordable 3300 W and 5000 W single-output programmable DC power supplies consists of 21 models for simple DC power applications.

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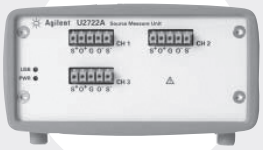
U2722A/U2723A USB Modular
Source Measure Unit



U2722A/U2723A USB Modular Source Measure Unit
The U2722A/U2723A three-channel SMU is a versatile device that allows you to perform sweep and measurement from different operating regions without needing extra configurations. The four-quadrant operation makes the U2722A/U2723A SMU well suited for a wide range of test applications, including leakage measurement, solar cell measurement, forward/reverse voltage and IV curve tracing.

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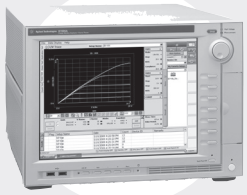
B1505A Power Device Analyzer/
Curve Tracer



B1505A Power Device Analyzer/Curve Tracer
The Agilent B1505A Power Device Analyzer/Curve Tracer is the only single box solution available today with the capability to characterize high power devices from the sub-picoamp level up to 3000 volts and 40 amps. This capability covers evaluation for new power devices using wide band gap materials such as SiC or GaN. The B1505A software environment allows users to check device characteristics and detect device faults with the easy convenience of a curve tracer.

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B2900A Series
Precision Source/Measure Unit

B2900A Series Precision Source/Measure Unit
The Agilent B2900A Series of Precision Source/Measure Units are compact and cost-effective bench-top Source/Measure Units (SMUs) with the capability to source and measure both voltage and current. These capabilities make the B2900A series ideal for a wide variety of IV (current versus voltage) measurement tasks that require both high resolution and accuracy. The B2900A Series possess a superior color LCD graphical user interface (GUI). In addition, several task-based viewing modes dramatically improve productivity for test, debug and characterization.

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New Products (continued)

N6783A Series
Application Specific Modules

N6783A Series Application Specific Modules
The N6783A-BAT and N6783A-MFG modules can be used with the N6700 low-profile mainframes for automated test and with the N6705 DC power analyzer mainframe for R&D. The N6783A–BAT is optimized for basic battery charge/discharge applications. The N6783A–MFG is optimized for mobile device manufacturing test. Both provide fast transient response that ensures stable power supply output voltage, and a dynamic measurement system for accurate current measurements.

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More detailed specifications at **www.agilent.com/find/power**

DC Power Supply Selection Index

Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
3	300	900	1	*	**6671A-J08**	Performance	58
3.3	1000	3300	1	*	**6680A-J04**	Performance	68
5	10	50	up to 4	*	**N6731B**	Basic	79
5	20	100	up to 4	*	**N6741B**	Basic	81
5	875	4400	1	*	**6680A**	Performance	68
5.7	20	100	up to 8	*	**66101A-J03**	Performance	84
6	2.5	15	3		**E3630A**	Basic	19
6	3	18	up to 4	*	**N6783A-MFG**	Performance	91
6	5	30	3	*	**E3631A**	Basic	20
6	60	360	1	*	**6551A-J03**	Performance	54
6	60	360	1	*	**6651A-J03**	Performance	50
6	100	600	1	*	**N5741A**	Basic	28
6	180	1080	1	*	**N5761A**	Basic	31
6.7	30	200	1	*	**6033A**	Autoranging	25
7	0.015	0.11	2	*	**6625A**	Performance	74
7	0.015	0.11	4	*	**6626A**	Performance	74
7	5	35	3	*	**6623A**	Performance	72
7	5	35	4	*	**6624A**	Performance	72
7	10	70	2	*	**6621A**	Performance	72
7	10	70	3	*	**6623A**	Performance	72
7	120	1000	1	*	**6031A**	Autoranging	25
8	3	24	1		**E3610A**	Basic	17
8	3	24	1	*	**E3640A**	Basic	23
8	3	24	2	*	**E3646A**	Basic	24
8	3	24	up to 4	*	**N6783A-BAT**	Performance	88, 91
8	5	40	1	*	**6611C**	Performance	39
8	5	40	1	*	**E3642A**	Basic	23
8	5	40	2	*	**E3648A**	Basic	24
8	6	48	1		**E3614A**	Basic	17
8	6.25	50	up to 4	*	**N6732B**	Basic	79
8	8	80	1	*	**E3644A**	Basic	23
8	10	80	1	*	**6631B**	Performance	41
8	12.5	100	up to 4	*	**N6742B**	Basic	81
8	16	128	up to 8	*	**66101A**	Performance	83

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DC Power Supply Selection Index (Continued)

Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
8	20	160	1		**6541A**	Performance	46
8	20	160	1	*	**6641A**	Performance	43
8	20	160	1	*	**E3633A**	Basic	21
8	50	400	1		**6551A**	Performance	53
8	50	400	1	*	**6651A**	Performance	49
8	90	720	1	*	**N5742A**	Basic	28
8	165	1320	1	*	**N5762A**	Basic	31
8	220	1760	1		**6571A**	Performance	64
8	220	1760	1	*	**6671A**	Performance	57
8	400	3200	1	*	**N8731A**	Basic	33
8	580	4600	1	*	**6681A**	Performance	68
10	5	50	1	*	**6611C-J05**	Performance	39
10	50	500	1		**6551A-J01**	Performance	54
10	50	500	1	*	**6651A-J01**	Performance	49
10	200	2000	1		**6571A-J04**	Performance	65
10	200	2000	1	*	**6671A-J04**	Performance	58
10	330	3300	1	*	**N8732A**	Basic	33
12	1.5	18	2	*	**66309B**	Mobile communications	94
12	1.5	18	2	*	**66309D**	Mobile communications	94
12	1.5	18	2	*	**66319B**	Mobile communications	94
12	1.5	18	2	*	**66319D**	Mobile communications	94
12	12	150	up to 8	*	**66101A-J05**	Performance	84
12.5	60	750	1	*	**N5743A**	Basic	28
12.5	120	1500	1	*	**N5763A**	Basic	31
13	15.3	200	1		**6541A-J04**	Performance	47
13	15.3	200	1	*	**6641A-J04**	Performance	44
14	150	2000	1		**6571A-J03**	Performance	64
14	150	2000	1	*	**6671A-J03**	Performance	58
15	2	30	1		**E3610A**	Basic	17
15	3	45	2	*	**66309B**	Mobile communications	94
15	3	45	2	*	**66309D**	Mobile communications	94
15	3	45	1	*	**66311B**	Mobile communications	94
15	3	45	2	*	**66319B**	Mobile communications	94
15	3	45	2	*	**66319D**	Mobile communications	94
15	3	45	2	*	**66321B**	Mobile communications	94
15	3	45	2	*	**66321D**	Mobile communications	94

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DC Power Supply Selection Index (Continued)

Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
15	7	105	1	*	**E3632A**	Basic	21
15	10	150	up to 8	*	**66102A-J05**	Performance	84
15	120	1800	1		**6571A-J17**	Performance	65
15	120	1800	1	*	**6671A-J17**	Performance	58
15	220	3300	1	*	**N8733A**	Basic	33
15	440	6600	1	*	**6690A**	Performance	70
16	0.2	3.2	2	*	**6625A**	Performance	74
16	0.2	3.2	4	*	**6626A**	Performance	74
16	0.2	3.2	2	*	**6628A**	Performance	74
16	0.2	3.2	4	*	**6629A**	Performance	74
17	30	510	1	*	**6651A-J09**	Performance	50
20	0.12	2.4	1		**U2722A**	Source measure unit	111
20	0.12	2.4	1		**U2723A**	Source measure unit	111
20	0.5	10	3		**E3630A**	Basic	19
20	1.5	30	1		**E3611A**	Basic	17
20	1.5	30	1	*	**E3640A**	Basic	23
20	1.5	30	2	*	**E3646A**	Basic	24
20	2	40	1	*	**6612C**	Performance	39
20	2	40	3	*	**6623A**	Performance	72
20	2	40	4	*	**6624A**	Performance	72
20	2	40	4	*	**6627A**	Performance	72
20	2.5	50	1	*	**E3642A**	Basic	23
20	2.5	50	2	*	**E3648A**	Basic	24
20	2.5	50	up to 4	*	**N6733B**	Basic	79
20	3	20	up to 4	*	**N6781A**	Source measure unit	88, 106
20	3	20	up to 4	*	**N6782A**	Source measure unit	88, 106
20	3	20	up to 4	*	**N6784A**	Source measure unit	88, 106
20	3	60	1		**E3615A**	Basic	18
20	4	80	2	*	**6621A**	Performance	72
20	4	80	2	*	**6622A**	Performance	72
20	4	80	3	*	**6623A**	Performance	72
20	4	80	1	*	**E3644A**	Basic	23
20	5	100	1	*	**6632B**	Performance	41
20	5	100	1	*	**66332A**	Mobile communications	94
20	5	100	up to 4	*	**N6743B**	Basic	81
20	7.5	150	up to 8	*	**66102A**	Performance	83
20	10	200	1	*	**6033A**	Autoranging	25
20	10	200	1	*	**6038A**	Autoranging	25
20	10	200	1		**6542A**	Performance	46
20	10	200	1	*	**6642A**	Performance	43

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DC Power Supply Selection Index (Continued)

Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
20	10	200	1	*	**E3633A**	Basic	21
20	15	300	1	*	**6651A-J09**	Performance	50
20	15	300	up to 4	*	**N6773A**	Basic	78
20	25	500	1		**6552A**	Performance	53
20	25	500	1	*	**6652A**	Performance	49
20	38	760	1	*	**N5744A**	Basic	28
20	50	300	up to 4	*	**N6753A**	Performance	76
20	50	1000	1	*	**6031A**	Autoranging	25
20	50	1000	1	*	**6032A**	Autoranging	25
20	76	1520	1	*	**N5764A**	Basic	31
20	100	2000	1		**6572A**	Performance	64
20	100	2000	1	*	**6672A**	Performance	57
20	165	3300	1	*	**N8734A**	Basic	33
20	250	5000	1	*	**N8754A**	Basic	36
21	240	5000	1	*	**6682A**	Performance	68
24	6	100	up to 8	*	**66103A-J12**	Performance	85
24	85	2000	1	*	**6672A-J04**	Performance	58
25	1	25	2		**E3620A**	Basic	19
25	1	25	3	*	**E3631A**	Basic	20
25	7	175	1	*	**E3634A**	Basic	21
27	20	540	1	*	**6652A-J03**	Performance	50
28	5	140	up to 8	*	**66103A-J09**	Performance	85
30	3	90	1		**U8001A**	Basic	15
30	3.3	100	1	*	**66332A-J01**	Mobile communications	94
30	4	120	1	*	**E3632A**	Basic	21
30	5	150	1		**U8002A**	Basic	15
30	17.5	500	1	*	**6653A-J17**	Performance	50
30	17.5	525	1		**6553A-J17**	Performance	54
30	25	750	1	*	**N5745A**	Basic	28
30	50	1500	1	*	**N5765A**	Basic	31
30	110	3300	1	*	**N8735A**	Basic	33
30	170	5100	1	*	**N8755A**	Basic	36
30	220	6600	1	*	**6691A**	Performance	70
32	160	5100	1	*	**6683A**	Performance	68
35	0.8	28	1	*	**E3641A**	Basic	23
35	0.8	28	2	*	**E3647A**	Basic	24
35	0.85	30	1		**E3611A**	Basic	17
35	1.25	40	up to 8	*	**66105A-J01**	Performance	85
35	1.4	49	1	*	**E3643A**	Basic	23
35	1.4	49	2	*	**E3649A**	Basic	24
35	1.5	50	up to 4	*	**N6734B**	Basic	79
35	1.7	60	1		**E3616A**	Basic	18
35	2.2	80	1	*	**E3645A**	Basic	24
35	3	80	3	*	**6623A-J03**	Performance	72

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DC Power Supply Selection Index (Continued)

Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
35	3	100	up to 4	*	**N6744B**	Basic	81
35	4.5	150	up to 8	*	**66103A**	Performance	83
35	6	210	1		**6543A**	Performance	46
35	6	210	1	*	**6643A**	Performance	43
35	8.5	300	up to 4	*	**N6774A**	Basic	78
35	15	525	1		**6553A**	Performance	53
35	15	525	1	*	**6653A**	Performance	49
35	60	2100	1		**6573A**	Performance	64
35	60	2100	1	*	**6673A**	Performance	57
37	4	150	up to 8	*	**66103A-J01**	Performance	84
37.5	45	1690	1		**6573A-J03**	Performance	65
37.5	45	1690	1	*	**6673A-J03**	Performance	58
40	3.6	100	up to 8	*	**66103A-J02**	Performance	84
40	5	200	1	*	**6643A-J11**	Performance	44
40	12.5	500	1		**6553A-J04**	Performance	54
40	12.5	500	1	*	**6653A-J04**	Performance	50
40	19	760	1	*	**N5746A**	Basic	28
40	38	1520	1	*	**N5766A**	Basic	31
40	50	2000	1		**6573A-J08**	Performance	65
40	50	2000	1	*	**6673A-J08**	Performance	59
40	85	3400	1	*	**N8736A**	Basic	33
40	125	5000	1	*	**N8756A**	Basic	36
40	128	5100	1	*	**6684A**	Performance	68
50	0.5	25	2	*	**6625A**	Performance	74
50	0.5	25	4	*	**6626A**	Performance	74
50	0.8	40	3	*	**6623A**	Performance	72
50	0.8	40	4	*	**6624A**	Performance	72
50	0.8	40	4	*	**6627A**	Performance	72
50	1	50	1	*	**6613C**	Performance	39
50	1	50	2	*	**6625A**	Performance	74
50	1	50	4	*	**6626A**	Performance	74
50	1	50	2	*	**6628A**	Performance	74
50	1	50	4	*	**6629A**	Performance	74
50	1.5	50	up to 4	*	**N6761A**	Performance	76, 88
50	2	80	2	*	**6622A**	Performance	72
50	2	100	1	*	**6633B**	Performance	41
50	3	100	up to 4	*	**N6762A**	Performance	76, 88
50	4	200	1	*	**E3634A**	Basic	21
50	5	50	up to 4	*	**N6751A**	Performance	76, 87
50	10	100	up to 4	*	**N6752A**	Performance	76, 87
50	10	500	1		**6554A-J05**	Performance	55
50	10	500	1	*	**6654A-J05**	Performance	51
50	42	2000	1		**6574A-J07**	Performance	65
50	42	2000	1	*	**6674A-J07**	Performance	59
55	3	165	1	*	**66104A-J09**	Performance	85

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Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
56	38	2000	1		**6574A-J03**	Performance	65
56	38	2000	1	*	**6674A-J03**	Performance	59
58	9.3	497.6	up to 2	*	**E4361A-J01**	Solar array simulator	101
60	0.5	30	1		**E3612A**	Basic	17
60	0.5	30	1	*	**E3641A**	Basic	23
60	0.5	30	2	*	**E3647A**	Basic	24
60	0.8	48	1	*	**E3643A**	Basic	23
60	0.8	48	2	*	**E3649A**	Basic	24
60	0.8	50	up to 4	*	**N6735B**	Basic	79
60	1	60	1		**E3617A**	Basic	18
60	1.3	80	1	*	**E3645A**	Basic	24
60	1.6	100	up to 4	*	**N6745B**	Basic	81
60	2.5	150	up to 8	*	**66104A**	Performance	83
60	3.3	200	1	*	**6038A**	Autoranging	25
60	3.5	210	1		**6544A**	Performance	46
60	3.5	210	1	*	**6644A**	Performance	43
60	5	300	up to 4	*	**N6775A**	Basic	78
60	9	540	1		**6554A**	Performance	53
60	9	540	1	*	**6654A**	Performance	49
60	12.5	750	1	*	**N5747A**	Basic	30
60	17	1200	1	*	**6030A**	Autoranging	25
60	17.5	1200	1	*	**6032A**	Autoranging	25
60	20	300	up to 4	*	**N6754A**	Performance	76, 87
60	25	1500	1	*	**N5767A**	Basic	32
60	35	2100	1		**6574A**	Performance	64
60	35	2100	1	*	**6674A**	Performance	57
60	55	3300	1	*	**N8737A**	Basic	35
60	85	5100	1	*	**N8757A**	Basic	36
60	110	6600	1	*	**6692A**	Performance	70
65	8.5	510	up to 2	*	**E4361A**	Solar array simulator	101
70	3	200	1		**6544A-J09**	Performance	47
70	3	200	1	*	**6644A-J09**	Performance	44
70	7.5	500	1		**6554A-J04**	Performance	55
70	7.5	500	1	*	**6654A-J04**	Performance	51
80	6	480	1		**6554A-J12**	Performance	55
80	6	500	1	*	**6654A-J12**	Performance	51
80	9.5	760	1	*	**N5748A**	Basic	30
80	19	1520	1	*	**N5768A**	Basic	32
80	42	3360	1	*	**N8738A**	Basic	35
80	65	5200	1	*	**N8758A**	Basic	36
100	0.5	50	1	*	**6614C**	Performance	39
100	0.5	50	up to 4	*	**N6736B**	Basic	79
100	1	100	1	*	**6634B**	Performance	41

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Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
100	1	100	up to 4	*	**N6746B**	Basic	81
100	2.2	200	up to 2	*	**E5262A**	Source measure unit	117
100	3	300	up to 4	*	**N6776A**	Basic	78
100	7.5	750	1	*	**N5749A**	Basic	30
100	15	1500	1	*	**N5769A**	Basic	32
100	22	2000	1	*	**6675A-J08**	Performance	60
100	33	3300	1	*	**N8739A**	Basic	35
100	50	5000	1	*	**N8759A**	Basic	37
110	20	2000	1		**6575A-J09**	Performance	66
110	20	2000	1	*	**6675A-J09**	Performance	60
117	5.5	594	up to 2	*	**E4362A-J01**	Solar array simulator	101
120	0.25	30	1		**E3612A**	Basic	17
120	1.25	150	up to 8	*	**66105A**	Performance	83
120	1.5	180	1		**6545A**	Performance	46
120	1.5	180	1	*	**6645A**	Performance	43
120	4	540	1	*	**6655A**	Performance	49
120	4.5	540	1		**6555A**	Performance	53
120	5.4	594	up to 2	*	**E4362A-J02**	Solar array simulator	101
120	18	2160	1		**6575A**	Performance	64
120	18	2160	1	*	**6675A**	Performance	57
130	5	600	up to 2	*	**E4362A**	Solar array simulator	101
135	16	2000	1		**6575A-J06**	Performance	66
135	16	2000	1	*	**6675A-J06**	Performance	59
150	1.2	150	1		**6545A-J05**	Performance	47
150	1.2	150	1	*	**6645A-J05**	Performance	44
150	3.2	500	1	*	**6655A-J05**	Performance	51
150	5	750	1	*	**N5750A**	Basic	30
150	10	1500	1	*	**N5770A**	Basic	32
150	15	2000	1	*	**6675A-J11**	Performance	60
150	15	2250	1		**6575A-J11**	Performance	66
150	22	3300	1	*	**N8740A**	Basic	35
150	34	5100	1	*	**N8760A**	Basic	37
156	3	500	1		**6555A-J10**	Performance	55
156	3	500	1	*	**6655A-J10**	Performance	51
160	13	2000	1		**6575A-J04**	Performance	66
160	13	2000	1	*	**6675A-J04**	Performance	59
170	1	170	1	*	**6645A-J06**	Performance	44
200	0.75	150	up to 8	*	**66106A**	Performance	83
200	2.2	200	up to 2	*	**E5263A**	Source measure unit	119

DC Power Supply Selection Index (Continued)

Maximum volts	Maximum amps	Maximum watts	Number of outputs	GPIB	Model number	Type	Page number
200	4	200	up to 8	*	**E5260A**	Source measure unit	115
200	4	200	up to 8	*	**E5270B**	Source measue unit	121
200	4.2	200	up to 10	*	**B1500A**	Device analyzer/ curve tracer	123
200	5	1000	1	*	**6035A**	Autoranging	25
200	5	1200	1	*	**6030A**	Autoranging	25
200	11	2000	1		**6575A-J07**	Performance	66
200	11	2000	1	*	**6675A-J07**	Performance	60
210	3.03	31.8	1	*	**B2901A**	Source measure unit	109
210	3.03	31.8	2	*	**B2902A**	Source measure unit	109
210	3.03	31.8	1	*	**B2911A**	Source measure unit	109
210	3.03	31.8	2	*	**B2912A**	Source measure unit	109
300	2.5	750	1	*	**N5751A**	Basic	30
300	5	1500	1	*	**N5771A**	Basic	32
300	11	3300	1	*	**N8741A**	Basic	35
300	17	5100	1	*	**N8761A**	Basic	37
500	2	1000	1	*	**6035A**	Autoranging	25
600	1.3	780	1	*	**N5752A**	Basic	30
600	2.6	1560	1	*	**N5772A**	Basic	32
600	5.5	3300	1	*	**N8742A**	Basic	35
600	8.5	5100	1	*	**N8762A**	Basic	37
70/80	30/26	2000	1	*	**E4356A**	Performance	62

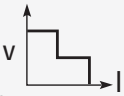
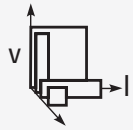
More detailed specifications at **www.agilent.com/find/power**

DC Power Supply
Feature Description Index

		6030 Series Autorangers	6610 & 6630 Series Single-Output	6620 Series Multiple-Output	6620 Series Precision Multiple-Output	6640 & 6650 Series Single-Output	6670-6690 Series Single-Output	66000 Modular Power Systems	66300 Series Mobile Communications	E3630 & E3640 Series Single & Multiple-Output	N5700 & 8700 Series Single-Output	N6700 Series
DC range	**Max power**	200 W-1000 W	40 W-100 W	40 W & 80 W	25 W & 50 W	200 W-500 W	2000 W-6600 W	1200 W	40 W-100 W	30 W-200 W	700 W-5000 W	20 W-300 W
	Max voltage	500 V	100 V	50 V	50 V	120 V	120 V	200 V	20 V	60 V	600 V	100 V
	Max current	120 A	10 A	10 A	2 A	50 A	875 A	16 A	5 A	20 A	400 A	20 A
	Page	25	39, 41	72	74	43, 49	57, 68, 70	83	94	21, 23	28	79
Configuration Features												
"One-box" solution To preserve rack space and interconnections, the voltage and current programmers, current shunt, and DVM are built-in to one package.		•	•	•	•	•	•	•	•	•	•	•
Modular power system (multiple reconfigurable outputs) Modules can be installed into a mainframe, and configuration can be changed at any time.								• Up to 8				• Up to 4
Multiple non-reconfigurable outputs Up to four outputs are included in one package, and they share one GPIB address.				•	•				66309 B/D 66319 B/D	•		
Serial link Up to 16 power supply outputs can share one GPIB address when connected with a telephone style cable.		•				•	•	•				
Relay connect, disconnect, & polarity reversal Optionally integrated with the power supply								•	• 66332A Only	•		• Module dependent
Auto-parallel, auto-series, parallel, and series operation When connected in auto-parallel or auto-series, only one unit has to be programmed to take advantage of the full power from all. **AP**=auto-parallel **AS**=auto-series **S**=series **P**=parallel		S AP		S P up to 2 identical outputs	S P up to 2 identical outputs	S AP	S AP	S, P		S, P	•	•
Analog programming and monitoring ports Analog programming ports allow the power supply to be used as a power amplifier, responding to an external voltage signal. Monitoring ports allow an external DMM to monitor the power-supply outputs.		•				•	•				•	

For more detailed specifications see the product manual at **www.agilent.com/find/power**

DC Power Supply Feature Description Index
(Continued)

		6030 Series Autorangers	6610 & 6630 Series Single-Output	6620 Series Multiple-Output	6620 Series Precision Multiple-Output	6640 & 6650 Series Single-Output	6670-6690 Series Single-Output	66000 Modular Power Systems	66300 Series Mobile Communications	E3630 & E3640 Series Single & Multiple-Output	N5700 & 8700 Series Single-Output	N6700 Series
DC range	**Max power**	200 W-1000 W	40 W-100 W	40 W & 80 W	25 W & 50 W	200 W-500 W	2000 W-6600 W	1200 W	40 W-100 W	30 W-200 W	700 W-5000 W	20 W-300 W
	Max voltage	500 V	100 V	50 V	50 V	120 V	120 V	200 V	20 V	60 V	600 V	100 V
	Max current	120 A	10 A	10 A	2 A	50 A	875 A	16 A	5 A	20 A	400 A	20 A
	Page	25	39, 41	72	74	43, 49	57, 68, 70	83	94	21, 23	28	79
Output Voltage and Current Range Changing												
Single range The output voltage is limited by a single maximum value. The output current is limited by a single maximum value. 			•			•	•	•			•	• N6730 N6740 N6770
Single range + peak current pulse A limited amplitude and limited width current pulse can be sourced beyond the maximum static current limit. 									•			
Auto-ranging A wide, continuous range of voltage and current combinations are available automatically at the maximum power level. 		•										• N6750 N6760
Multiple-output range changing Automatic range changing gives maximum power to two different voltage and current combinations. 				•	•					•		• N6760
Precision multiple-output range changing Voltage and current ranges can be chosen independently to provide greater resolution. 					•							• N6760 N6780*
Performance Characteristics												
Output ripple and noise (Peak-to-peak, 20 Hz to 20 MHz)		30-160 mV	3 mV (10 mV to 25 mV in fast mode)	3 mV	3 mV	3 mV-7 mV	7 mV-25 mV	5-50 mV	3-10 mV	2-5 mV	60-500 mV	6 mV N6750 N6760 12 mV N6780 10-30 mV N6730 N6740
Output programming response time Rise and fall time with full resistive load (10 to 90% and 90 to 10%) Does not include command processing time.		200 W: (100 ms-200 ms) 1000 W: (300 ms-2000 ms)	2 ms (0.4 ms in fast mode)	2-6 ms	6 ms	15 ms	9 ms-195 ms	20 ms-50 ms	0.4 ms-2 ms	11 ms-95 ms	0.08 s to 0.50 s	*
Programming resolution (percent of full scale)		0.025%	0.025%	0.03%	0.007%	0.025%	0.025%	0.03%	0.025%	0.025%/ 0.007%	*	*

*See datasheet or user's guide for complete details

For more detailed specifications see the product manual at **www.agilent.com/find/power**

DC Power Supply Feature Description Index
(Continued)

		6030 Series Autorangers	6610 & 6630 Series Single-Output	6620 Series Multiple-Output	6620 Series Precision Multiple-Output	6640 & 6650 Series Single-Output	6670-6690 Series Single-Output	66000 Modular Power Systems	66300 Series Mobile Communications	E3630 & E3640 Series Single & Multiple-Output	N5700 & 8700 Series Single-Output	N6700 Series
DC range	**Max power**	200 W-1000 W	40 W-100 W	40 W & 80 W	25 W & 50 W	200 W-500 W	2000 W-6600 W	1200 W	40 W-100 W	30 W-200 W	700 W-5000 W	20 W-300 W
	Max voltage	500 V	100 V	50 V	50 V	120 V	120 V	200 V	20 V	60 V	600 V	100 V
	Max current	120 A	10 A	10 A	2 A	50 A	875 A	16 A	5 A	20 A	400 A	20 A
	Page	25	39, 41	72	74	43, 49	57, 68, 70	83	94	21, 23	28	79
GPIB Programming Features												
GPIB programming of voltage and current Self-documenting programming commands mean that programming is done in units of volts and amps, not in percentages or binary representations.		•	•	•	•	•	•	•	•	•	• GPIB LAN USB	• GPIB LAN USB
Measured voltage and current read-back over the GPIB The output is read back in units of volts and amps.		•	•	•	•	•	•	•	•	•	•	•
Store-recall states Complete operating states can be stored in nonvolatile memory. Each state specifies not only the output voltage and current, but also many of the programmable protection features.												
	Number nonvolatile states (One of these states is automatically accessed on turn-on)	0	4	0	4	5	6670-5 6680-4 6690-4	5	4	E363x-3 E364x-5	1	2
	Number volatile states	16/5	0	10	7	0	0	5	0	0	16	0
Standard Commands for Programmable Instruments (SCPI) SCPI is the standard language for test and measurement equipment. Standard codes make a software writing and maintenance more efficient. For example, using this standard, the output voltage of the power supply is measured with the same command (MEASURE: VOLTAGE?) by either a DMM or a power supply.		•	•			•	•	•	•	•	•	•
Protection Features												
GPIB programmable overvoltage protection Can be enabled to quickly down-program the output and set SRQ and/or DFI/RI. **T** = Can generate trigger. **M** = Overvoltage, the level is set manually with a front-panel control.		M	•	T	T	•	•	T	•	•	T M	T
GPIB programmable overcurrent protection Can be enabled to quickly down-program the output and set SRQ and/or DFI/RI. **T** = Can generate trigger.		•	•	•	•	•	•	T	•	E3632A E3633A E3634A	T	T
Overtemperature protection Will down-program the output and can be enabled to set SRQ and/or DFI. **T** = Can generate trigger.		•	•	•	•	•	•	T	•		T	T

For more detailed specifications see the product manual at **www.agilent.com/find/power**

DC Power Supply Feature Description Index
(Continued)

DC range		6030 Series Autorangers	6610 & 6630 Series Single-Output	6620 Series Multiple-Output	6620 Series Precision Multiple-Output	6640 & 6650 Series Single-Output	6670-6690 Series Single-Output	66000 Modular Power Systems	66300 Series Mobile Communications	E3630 & E3640 Series Single & Multiple-Output	N5700 & 8700 Series Single-Output	N6700 Series
	Max power	200 W-1000 W	40 W-100 W	40 W & 80 W	25 W & 50 W	200 W-500 W	2000 W-6600 W	1200 W	40 W-100 W	30 W-200 W	700 W-5000 W	20 W-300 W
	Max voltage	500 V	100 V	50 V	50 V	120 V	120 V	200 V	20 V	60 V	600 V	100 V
	Max current	120 A	10 A	10 A	2 A	50 A	875 A	16 A	5 A	20 A	400 A	20 A
	Page	25	39, 41	72	74	43, 49	57, 68, 70	83	94	21, 23	28	79
Protection Features (Continued)												
Discrete fault indicator/ remote inhibit (DFI/RI) Using these digital ports, power supplies can be connected independently of the GPIB. If any one experiences an error condition (overvoltage, for example), it can signal the other units to also downprogram their outputs. **O** = Optional		•	•	O	O	•	•	•	•		•	•
SRQ Almost any fault condition or change of state of the power supply can be enabled to generate an SRQ. This signals the computer to take the appropriate action.		•	•	•	•	•	•	•	•		•	•
Local lockout Front-panel or keyboard control can be disabled. This keeps unauthorized operators from changing the programmed states.		•	•	•	•	•	•	•	•	•	•	•
Fan-speed control Controls the fan-speed to provide only the required cooling, reducing unnecessary acoustic noise. **O** = Optional			•			•	•	•	•		•	•
Active down-programming Active circuits quickly drain the energy from the output when unit is programmed to a lower voltage. This means that a unit under test can be safely removed from its test fixture without danger of arcing. **F** = Full-rated output current **P** = Less than 100% rated output current		P	6610-P 6630-F	F	F	P	P	P	P			P N6750 N6760 N6783 only F N6780
Maintenance Features												
Electronic calibration in the rack Calibration requires no internal adjustments.			•	•	•	•	•	•	•	•	•	•
Calibration security Units can be protected from accidental access to calibration routines by either a password (P) or an internal jumper (J) or switch (s).			P, S	J	J	P, J	P, J	P, S	P, S	P, J	* P	* P
Self-test Extensive self-test is triggered automatically on power-up. Additional tests can be initialed by user programming or front-panel control.		•	•	•	•	•	•	•	•	•	•	•

*A nonvolatile status in SCPI mode only.

For more detailed specifications see the product manual at **www.agilent.com/find/power**

Basic DC Power Supplies...

essential features for a tight budget

Agilent basic DC power supplies are the right choice for many applications. They provide quiet, stable DC power for both manual and automatic testing, in R&D and in manufacturing environments, where speed and accuracy are low considerations. At their price level, they have a surprising level of capability.

If you do not need the performance level and features of Agilent high performance DC power supplies, then choose Agilent basic DC power supplies. This summary table will help you decide which family of DC power supplies best meets your needs.

Comparison Summary	Agilent basic DC power supplies	Agilent high performance DC power supplies
Output power	30 W-1500 W	40 W-6600 W
Number of outputs	1-3	1-8
GPIB programming and measurement speed	Moderate	Fast
Output rise/fall time	Moderate	Fast
Convenient 1/2-rack size for bench-top use	Yes	No
Active downprogrammer for enhanced test throughput	No	Yes
Stored wake-up state	No	Yes
Programmable capabilities	Moderate	Extensive
Protection for the DUT	Moderate	Extensive

More detailed specifications at **www.agilent.com/find/power**

U8001A-U8002A

Single-Output
90-150 W

90 W to 150 W outputs, up to 30 V and 5 A
Single output models in half rack width size
Low noise, linear regulation
Single range output provides more current at lower voltage settings

More protection, more convenience — for less

It's often difficult to find a power supply that is just right for your test requirements and your budget. Whether you're manufacturing consumer products, testing electronic components, or simply looking for reliable, affordable power, Agilent's family of basic power supplies now includes single output, non-programmable models in the 90 W to 150 W power range. With capabilities typically found only in programmable supplies, you get excellent value along with great efficiency in your work. As a result, you can minimize setup time and measurement errors and maximize device reliability. You'll get the right power with a difference – backed by stringent safety certifications and Agilent quality standards – at an affordable price.

The Agilent U8000 Series offers 90 W to 150 W single output, non-programmable DC power supplies that include features typically found only in costly programmable supplies. The U8000 Series delivers excellent value by providing reliable DC power, efficient setup capabilties, and important security features that let you address a variety of applications in electronics manufacturing and educational settings.

Specifications (at 0° to 40°C unless otherwise specified)	**U8001A**	**U8002A**
Output ratings (at 0°C to 40°C)	0 to +30 V 0 to 3 A	0 to +30 V 0 to 5 A
Line and load regulation	CV: <0.01% +2 mV CC: <0.02% +2 mA	CV: <0.01% +2 mV CC: <0.02% +2 mA
Ripple and noise (25°C ±5°C)	CV: 12 mVp-p, <1 mVrms; CC: 3 mArms	CV: 12 mVp-p, <1 mVrms; CC: 3 mArms
Load transient response time (within 15 mV from full load to half load and from half load to full load)	<50 µs	<50 µs
Programming accuracy[1] (25°C ±5°C)	<0.35% +20 mV <0.35% +20 mA	<0.35% +20 mV <0.35% +20 mA
Readback accuracy[1] (25°C ±5°C)	<0.35% +20 mV <0.35% +20 mA	<0.35% +20 mV <0.35% +20 mA
Meter resolution	Voltage: 10 mV Current: 10 mA	Voltage: 10 mV Current: 10 mA
Maximum output float voltage	±240 VDC	±240 VDC
Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)		
Temperature coefficient (for 12 months)	CV: <100 ppm/ °C CC: <380 ppm/ °C	CV: <100 ppm/ °C CC: <380 ppm/ °C
Output voltage overshoot (during turn-on or turn-off of AC power state with the output control set to less than 1 V)	<1 V	<1 V
Voltage programming speed, to within 1% of total excursion		
Up full load No load	150 ms 100 ms	150 ms 100 ms
Down full load No load	30 ms 450 ms	30 ms 450 ms
Last memory setting enabled	Yes	Yes
Overvoltage protection response time	<1.5 ms when the trip voltage is equal to or greater than 3 V and <10 ms when the trip voltage is less than 3 V (average time for output to drop from 90% of output voltage to 1 V after OVP condition occurred)	

More detailed specifications at **www.agilent.com/find/lowcostpower**

Single-Output: 90-150 W (Continued)

Power that's suitable for your application requirements

The U8000 Series with power ranging from 90 W to 150 W provides performance that is suitable for electronics manufacturing for computers and peripherals, communication systems and peripherals, aircraft/avionics systems, electronic components, and more. The U8000 Series complements the Agilent E3600 DC power supplies family to provide a wider range of power source alternatives.

Differentiated features typically found only in programmable power supplies

The U8000 Series offers fully integrated over voltage protection (OVP) and over current protection (OCP) to prevent damage to the device-under-test (DUT). Using the capability to save and recall three memory states, you can minimize errors and reduce set-up time. The U8000 Series also provides security features such as keypad lock to prevent measurement errors due to accidental front panel usage. When the keypad lock is activated, the knob and all the buttons on the front panel are disabled except the keypad lock button. The physical lock mechanism found at the rear panel of the power supply provides secure instrument storage. The LCD display with backlight on/off options enables brighter display for data viewing.

Solid, reliable performance in its class

The U8000 Series provides excellent load and line regulation (Constant Voltage, CV: < 0.01% +2 mV; Constant Current, CC: < 0.02% +2 mA) to ensure stable output even when the load changes. With the fast 50 µsec transient response, test times and manufacturing cost are significantly reduced. The U8000 Series comes with low output noise of 1 mVrms, 3 mArms from 20 Hz to 20 MHz, providing clean output and minimizing the interference in the DUT.

Supplemental characteristics for all model numbers

Size: U8001A-U8002A:
212.3 mm W x 88.1 mm H x 394.3 mm D
(8.4 in x 3.5 in x 15.5 in);

Weight:
U8001A: 7.3 kg (16.1 lbs)
U8002A: 8.3 kg (18.3 lbs)

Warranty: One year

Ordering information

Opt 0E9: 90 to 110 Vac, 47 to 63 Hz
Opt 0EM: 104 to 126 Vac, 47 to 63 Hz
Opt 0E3: 207 to 253 Vac, 47 to 63 Hz
Opt UK6: Commercial calibration with test result data
Opt 1CM: Rack mount kit

More detailed specifications at **www.agilent.com/find/lowcostpower**

E3610A-E3617A

Single-Output
30-60 W

Small, compact size for bench use
Low-noise and excellent regulation
Dual-range outputs (E3610A/11A/12A)
Overvoltage protection to ensure DUT safety

These linear-regulated DC power supplies provide reliable and convenient DC power on a lab bench. The 10-turn pots and clear voltage and current meters allow fine adjustments to be made easily. These models are CV/CC, so they can serve as either voltage or current sources. The "CC Set" button allows the current setting to be viewed, allowing easy adjustment of a current limit. Either the positive or negative terminal may be connected to ground, creating a positive or negative voltage, or floated up to 240 V from ground.

E3610A, E3611A, E3612A
These flexible 30 watt DC power supplies have 2 ranges, providing more current at lower voltage levels.

E3614A, E3615A, E3616A, E3617A
These DC power supplies provide remote sensing to eliminate the errors in voltage regulation due to voltage drops in the load leads. Delicate loads are protected by the overvoltage protection feature. Remote voltage signals can be used to control the power supply's output voltage and current levels.

Specifications (at 0° to 55°C unless otherwise specified)		**E3610A** ☎	**E3611A** ☎	**E3612A** ☎	**E3614A** ☎
Number of output ranges		2	2	2	1
GPIB		No	No	No	No
Output ratings[1]					
Range 1		0 to 8 V, 0 to 3 A[1]	0 to 20 V, 0 to 1.5 A[1]	0 to 60 V, 0 to 0.5 A[1]	0 to 8 V, 0 to 6 A
Range 2		0 to 15 V, 0 to 2 A[1]	0 to 35 V, 0 to 0.85 A[1]	0 to 120 V, 0 to 0.25 A[1]	—
Power (max)		30 W	30 W	30 W	48 W
Load and line regulation		0.01% + 2 mV	0.01% + 2 mV	0.01% + 2 mV	0.01% + 2 mV
Ripple and noise from 20 Hz to 20 MHz					
Voltage rms		200 µV	200 µV	200 µV	200 µV
peak-peak		2 mV	2 mV	2 mV	1 mV
Supplemental Characteristics		(Non-warranted characteristics determined by design that are useful in applying the product)			
Control mode		CV/CC	CV/CC	CV/CC	CV/CC
Meter resolution	Voltage	10 mV	100 mV	100 mV	10 mV
(minimum change using front-panel controls)	Current	10 mA	10 mA	1 mA	10 mA

☎ For 0ff-the-shelf shipment
[1] Maximum current is derated 1% per °C between 40° to 55°C.

Application notes

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

More detailed specifications at **www.agilent.com/find/E3600**

Single-Output: 30-60 W (Continued)

Supplemental characteristics for all model numbers

Size: E3610A-E3612A: 91 mm H x 213 mm W x 319 mm D (3.6 in x 8.4 in x 12.6 in); E3614A-E3617A: 91 mm H x 213 mm W x 373 mm D (8.4 in x 3.6 in x 14.7 in)

Weight: E3610A-E3612A: 3.8 kg (8.4 lb) net, 5.1 kg (11.3 lb) shipping; E3614A-E3617A: 5.5 kg (12.1 lb) net, 6.75 kg (14.9 lb) shipping

Warranty: One year

Ordering information

Opt 0E9 90 to 110 VAC, 47 to 63 Hz (Japan only)
Opt 0EM 104 to 126 VAC, 47 to 63 Hz
Opt 0E3 207 to 253 VAC, 47 to 63 Hz
Opt 1CM Rack mount kit (E3614A-E3617A only)
Opt 0L2 Extra documentation package

Specifications (at 0° to 55°C unless otherwise specified)		**E3615A** ☎	**E3616A** ☎	**E3617A** ☎
Number of output ranges		1	1	1
GPIB		No	No	No
Output ratings[1]				
Range 1		0 to 20 V, 0 to 3 A	0 to 35 V, 0 to 1.7 A	0 to 60 V, 0 to 1 A
Range 2		—	—	—
Power (max)		60 W	60 W	60 W
Load and line regulation		0.01% + 2 mV	0.01% + 2 mV	0.01% + 2 mV
Ripple and noise from 20 Hz to 20 MHz				
Voltage rms		200 µV	200 µV	200 µV
peak-peak		1 mV	1 mV	1 mV
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)		
Control mode		CV/CC	CV/CC	CV/CC
Meter resolution	Voltage	10 mV (0-20 V), 100 mV (>20 V)	10 mV (0-20 V), 100 mV (>20 V)	10 mV (0-20 V), 100 mV (>20 V)
(minimum change using front-panel controls)	Current	10 mA	1 mA	1 mA

☎ For 0ff-the-shelf shipment
[1] Maximum current is derated 1% per °C between 40° to 55°C.

More detailed specifications at **www.agilent.com/find/E3600**

E3620A, E3630A

Multiple-Output
35 W and 50 W

Dual and triple outputs
Small, compact size for bench use
Low-noise and excellent regulation
Overload indicator to monitor output
Autotracking for outputs synchronization

These linear-regulated DC power supplies provide reliable and convenient DC power on a lab bench. Voltage and current can be monitored simultaneously on the front panel meters. There is also an overload indicator for each output.

E3620A
The E3620A has two isolated, independent, CV/CL 25 volt outputs. It is easy to make precise adjustments using the 10-turn pots.

E3630A
The E3630A triple output power supply has two 20 volt outputs and one 6 volt output. The +6 V output is an isolated constant-voltage/current-foldback output, and both the +20 volt output and the -20 volt output are constant-voltage/current-limit. An autotracking feature lets you use one voltage control to adjust both 20 volt outputs. These outputs track each other to within one percent, making it easy to adjust the power supply for circuits requiring balance voltages. The ±20 volt outputs are referenced together to a floating common.

Application notes

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Specifications (at 0° to 55°C unless otherwise specified)	E3620A ☎	E3630A ☎
Number of outputs	2	3
GPIB	No	No
Output ratings*		
Output 1	0 to 25 V, 0 to 1 A	0 to 6 V, 0 to 2.5 A*
Output 2	0 to 25 V, 0 to 1 A	0 to +20 V, 0 to 0.5 A
Output 3	—	0 to -20 V, 0 to 0.5 A
Power (max)	50 W	35 W
Load regulation	0.01% + 2 mV	0.01% + 2 mV
Ripple and noise from 20 Hz to 20 MHz		
Normal mode voltage rms	350 µV	350 µV
peak-to-peak	1.5 mV	1.5 mV
Common mode current	1 µArms	1 µArms
Control mode	CV/CL	CV/CL (±20 V), CV/CF (6 V)
Meter resolution (Minimum change using front-panel controls)		
Voltage	10 mV (0-20 V), 100 mV, (>20 V)	10 mV
Current	1 mA	10 mA
Input power	115 Vac ± 10%, 47 to 63 Hz	115 Vac, ± 10%, 47 to 63 Hz

*Maximum current is derated 3.3% per °C from 40°C to 55°C
☎ For off-the-shelf shipment

Supplemental characteristics

Size: E3620A:
213 mm W x 91 mm H x 401 mm D
(8.4 in x 3.6 in x 15.8 in)
E3630A:
213 mm W x 92 mm H x 320 mm D
(8.4 in x 3.6 in x 12.6 in)

Weight: E3620A: 5.5 kg (12.1 lbs)
E3630A: 3.8 kg (8.4 lbs)

Warranty: One year

Ordering information

Opt 0E9 90 to 110 VAC, 47 to 63 Hz (Japan only)
Opt 0EM 104 to 126 VAC, 47 to 63 Hz
Opt 0E3 207 to 253 VAC, 47 to 63 Hz
Opt 1CM rack mount kit
Opt 0L2 extra documentation package

More detailed specifications at **www.agilent.com/find/E3600**

E3631A

Triple-Output
80 W GPIB

Small, compact size for bench use
Low output ripple and noise
Built-in measurements and basic programmable features
Over-voltage protection to ensure DUT safety
Three memory states to ease test setup

This is the DC power supply for every engineer's or electronic technician's lab bench. It has two tracking 25 V outputs, which are together referenced to a floating common, and an isolated 6 volt output. It is easy to control from the front panel, or with industry standard SCPI commands via the GPIB or RS232. VXI*Plug&Play* drivers are available to further simplify computer control. Up to 3 complete states can be stored for later recall. The low noise, excellent regulation, and built-in voltmeter/ammeter make this reliable power supply well suited for the needs of the R&D lab.

Application notes

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Supplemental characteristics for all model numbers

Product regulation: Designed to comply with UL1244, IEC 1010-1; certified with CSA 22.2
Meets requirements for CE regulation

Software driver:
- IVI-COM
- VXI*Plug&Play*
- IntuiLink Connectivity Software

Specifications
(at 0° to 55°C unless otherwise specified)

	E3631A		
DC outputs			
Voltage	0 to +25 V	0 to -25 V	0 to 6 V
Current	0 to 1 A	0 to 1 A	0 to 5 A
Load regulation			
Voltage	<0.01% + 2 mV	<0.01% + 2 mV	<0.01% + 2 mV
Current	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA
Line regulation			
Voltage	<0.01% + 2 mV	<0.01% + 2 mV	<0.01% + 2 mV
Current	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA
Ripple and noise from 20 Hz to 20 MHz			
Normal-mode voltage	<350 µVrms/2 mVp-p	<350 µVrms/2 mVp-p	<350 µVrms/2 mVp-p
Normal-mode current	<500 µArms	<500 µArms	<2 mArms
Common-mode current	<1.5 µArms	<1.5 µArms	<1.5 µArms
Programming accuracy at 25°C ±5°C			
Voltage	0.05% + 20 mV	0.05% + 20 mV	0.1% + 5 mV
Current	0.15% + 4 mA	0.15% + 4 mA	0.2% + 10 mA
Readback accuracy at 25°C ±5°C			
Voltage	0.05% + 10 mV	0.05% + 10 mV	0.1% + 5 mV
Current	0.15% + 4 mA	0.15% + 4 mA	0.2% + 10 mA
Resolution			
Program/readback	1.5 mV, 0.1 mA	1.5 mV, 0.1 mA	0.5 mV, 0.5 mA
Meter	10 mV, 1 mA	10 mV, 1 mA	1 mV, 1 mA
Transient response	50 µs for output to recover to within 15 mV following a change in output current from full load to half load or vice versa		

☎ For off-the-shelf shipment

Size: E3631A:
213 mm W x 133 mm H x 348 mm D
(8.4 in. x 5.2 in. x 14.2 in.)

Weight: E3631A: 8.2 kg (18 lbs)

Warranty: One year

Ordering information

Opt 0E9 90 to 110 VAC, 47 to 63 Hz (Japan only)
Opt 0EM 104 to 126 VAC, 47 to 63 Hz
Opt 0E3 207 to 253 VAC, 47 to 63 Hz
Opt 1CM Rack mount kit
Opt 0L2 Extra documentation package

More detailed specifications at **www.agilent.com/find/E3600**

E3632A-E3634A

Single-Output
120 W to 200 W GPIB

- Dual range outputs
- Small, compact size for bench use
- Low output ripple and noise
- Built-in measurements and basic programmable features
- Protection features to ensure DUT safety

These dual range DC power supplies provide the stable, accurate, and reliable DC power that the R&D engineer needs. These models are CV/CC, so they can serve as either voltage or current sources. They can be used either for manual or automated testing where moderate speed and accuracy are required. VXI*Plug&Play* drivers further simplify computer control.

These DC power supplies have many features to help the R&D engineer to quickly and easily bias and monitor prototype circuitry. Remote sensing eliminates the errors in voltage regulation due to voltage drops in the load leads. Delicate prototypes are protected by overvoltage and overcurrent protection features. Up to 3 frequently used operating states may be stored for later recall. The output is isolated from chassis ground.

For applications where even higher accuracy is needed, or speed must be optimized, see the Agilent 6600 series of performance DC power supplies.

Specifications (at 0° to 55°C unless otherwise specified)	**E3632A** ☎	**E3633A** ☎	**E3634A** ☎
Number of outputs	1	1	1
GPIB	Yes	Yes	Yes
Output ratings			
Range 1	0 to 15 V, 7 A	0 to 8 V, 20 A	0 to 25 V, 7 A
Range 2	0 to 30 V, 4 A	0 to 20 V, 10 A	0 to 50 V, 4 A
Load regulation			
Voltage	<0.01% + 2 mV	<0.01% + 2 mV	<0.01% + 2 mV
Current	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA
Line regulation			
Voltage	<0.01% + 2 mV	<0.01% + 2 mV	<0.01% + 2 mV
Current	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA
Ripple and noise from 20 Hz to 20 MHz			
Normal-mode voltage	<350 µVrms/2 mVp-p	<350 µVrms/3 mVp-p	<500 µVrms/3 mVp-p
Normal-mode current	<2 mArms	<2 mArms	<2 mArms
Common-mode current	<1.5 µArms	<1.5 µArms	<1.5 µArms
Programming accuracy at 25°C ±5°C			
Voltage	0.05% + 10 mV	0.05% + 10 mV	0.05% + 10 mV
Current	0.2% +10 mA	0.2% +10 mA	0.2% +10 mA
Readback accuracy at 25°C ±5°C			
Voltage	0.05% + 5 mV	0.05% + 5 mV	0.05% + 5 mV
Current	0.15% + 5 mA	0.15% + 5 mA	0.15% + 5 mA
Resolution			
Program	1 mV, 0.5 mA	1 mV, 1 mA	3 mV, 0.5 mA
Readback	0.5 mV, 0.1 mA	0.5 mV, 1 mA	1.5 mV, 0.5 mA
Meter	1 mV, 1 mA	1 mV, 1 mA (<10 A/10 mA (≥10 A))	1 mV, 1 mA (<10 A/10 mA (≥10 A))
Transient response	50 µs for output to recover to within 15 mV following a change in output current from full load to half load or vice versa		

*Maximum current is derated 1% per °C from 40°C to 55°C %

☎ For off-the-shelf shipment

More detailed specifications at **www.agilent.com/find/E3600**

Single-Output: 120 W to 200 W (Continued)

Application notes

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Modern Connectivity - Using USB and LAN I/O Converters (AN 1475-1)
5989-0123EN

Supplemental characteristics for all model numbers

Product regulation: Designed to comply with UL1244, IEC 61010-1; certified with CSA 22.2
Meets requirements for CE regulation

Software driver:
- IVI-COM
- VXI*Plug&Play*
- IntuiLink Connectivity Software

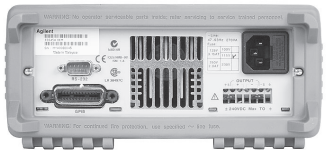
Size: 213 mm W x 133 mm H x 348 mm D (8.4 in. x 5.2 in. x 13.7 in.)

Weight: 9.5 kg (21 lbs)

Warranty: One year

Ordering information

Opt 0E9 90 to 110 VAC, 47 to 63 Hz (Japan only)
Opt 0EM 104 to 126 VAC, 47 to 63 Hz
Opt 0E3 207 to 253 VAC, 47 to 63 Hz
Opt 1CM Rack mount kit
Opt 0L2 Extra documentation package



E3640A-E3649A

Single & Dual Output
30-100 W GPIB

- Dual range outputs
- Small, compact size for bench and system use
- Low output ripple and noise
- Built-in measurements and basic programmable features
- Over-voltage protection to ensure DUT safety

These isolated dual range DC power supplies provide the stable and reliable DC power that the manufacturing test system designer needs. These models offer constant-voltage/constant-current outputs, so they can serve as either voltage or current sources. They can be used either for manual or automated testing, and have VXI*Plug&Play* drivers to further simplify computer control.

The E3640A series DC power supplies can be quickly integrated into a test system. Both front and rear panel terminals are provided for easy wiring. Remote sensing eliminates the errors in voltage regulation due to voltage drops in the load leads. Delicate DUTs are protected by overvoltage protection. Up to 5 operating states can be stored for later recall.

The E3640A series DC power supplies are intended for manufacturing test systems where moderate speed and accuracy are required. For systems which require even higher accuracy for programming or measurement, or where test throughput must be optimized, consider the Agilent 6600A and N6700 series of performance DC power supplies.

Specifications (at 0° to 55°C unless otherwise specified)	**E3640A**	**E3641A**	**E3642A**	**E3643A**	**E3644A**
Number of outputs	1	1	1	1	1
GPIB	Yes	Yes	Yes	Yes	Yes
DC outputs					
Voltage Current	0 to 8 V 3 A	0 to 35 V 0.8 A	0 to 8 V 5 A	0 to 35 V 1.4 A	0 to 8 V 8 A
Voltage Current	0 to 20 V 1.5 A	0 to 60 V 0.5 A	0 to 20 V 2.5 A	0 to 60 V 0.8 A	0 to 20 V 4 A
Power (max)	30 W	30 W	50 W	50 W	80 W
Load and line regulation					
Voltage	<0.01% + 3 mV	<0.01% + 3 mV	<0.01% + 3 mV	<0.01% + 3 mV	<0.01% + 3 mV
Current	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA	<0.01% + 250 µA
Ripple and noise from 20 Hz to 20 MHz					
Normal-mode voltage	<500 µVrms 5 mVp-p	<1 mVrms 8 mVp-p	<500 µVrms 5 mVp-p	<1 mVrms 8 mVp-p	<500 µVrms 5 mVp-p
Normal-mode current	<4.0 mArms	<4.0 mArms	<4.0 mArms	<4.0 mArms	<4.0 mArms
Common-mode current	<1.5 µArms	<1.5 µArms	<1.5 µArms	<1.5 µArms	<1.5 µArms
Programming accuracy at 25°C ±5°C					
Voltage <0.05% +	10 mV	10 mV	10 mV	10 mV	10 mV
Current <0.2% +	10 mA	10 mA	10 mA	10 mA	10 mA
Readback accuracy at 25°C ±5°C					
Voltage <0.05% +	5 mV	5 mV	5 mV	5 mV	5 mV
Current <0.15% +	5 mA	5 mA	5 mA	5 mA	5 mA
Program resolution					
Voltage	5 mV	5 mV	5 mV	5 mV	5 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA
Readback resolution					
Voltage	2 mV	2 mV	2 mV	2 mV	2 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA
Meter resolution					
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA
Transient response	<50 µs for output to recover to within 15 mV following a change in output current from full load to half load or vice versa.				

*Maximum current is derated 1% per °C from 40°C to 55°C

More detailed specifications at **www.agilent.com/find/E3600**

Single & Dual Output: 30-100 W GPIB (Continued)

Application notes

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Modern Connectivity - Using USB and LAN I/O Converters (AN 1475-1)
5989-0123EN

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to 1 V can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Settling time: Less than 90 ms for the output voltage to change from 1% to 99% or vice versa following the receipt of VOLTage or APPLy command via direct GPIB or RS-232 interface.

Product regulation:
Designed to comply with UL3111-1; certified to CSA 22.2 No. 1010.1; conforms to IEC 1010-1; complies with EMC directive 89/336/EEC(Group1, Class A)

OVP accuracy: 0.5% + 0.5 V, activation time: ≥3 V, <1.5 ms, and <3 V, <10 ms

Isolation: ±240 VDC

Stability: Voltage <0.02% + 2 mV; Current <0.1% + 1 mA

Temperature coefficient: <0.01% + 3 mV, <0.02% + 3 mA change per °C over operating range 0-40 °C after 30 minute warm-up

Software driver:
- IVI-COM
- VXI*Plug&Play*
- IntuiLink Connectivity Software

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)	**E3645A**	**E3646A**	**E3647A**	**E3648A**	**E3649A**
Number of outputs	1	2	2	2	2
GPIB	Yes	Yes	Yes	Yes	Yes
DC outputs					
Voltage Current	0 to 35 V 2.2 A	0 to 8 V 3 A	0 to 35 V 0.8 A	0 to 8 V 5 A	0 to 35 V 1.4 A
Voltage Current	0 to 60 V 1.3 A	0 to 20 V 1.5 A	0 to 60 V 0.5 A	0 to 20 V 2.5 A	0 to 60 V 0.8 A
Power (max)	80 W	60 W	60 W	100 W	100 W
Load and line regulation					
Voltage <0.01% +	3 mV	3 mV	3 mV	3 mV	3 mV
Current <0.01% +	250 µA	250 µA	250 µA	250 µA	250 µA
Ripple and noise from 20 Hz to 20 MHz					
Normal-mode voltage	<1 mVrms 8 mVp-p	<500 µVrms 5 mVp-p	<1 mVrms 8 mVp-p	<500 µVrms 5 mVp-p	<1 mVrms 8 mVp-p
Normal-mode current	<4.0 mArms	<4.0 mArms	<4.0 mArms	<4.0 mArms	<4.0 mArms
Common-mode current	<1.5 µArms	<1.5 µArms	<1.5 µArms	<1.5 µArms	<1.5 µArms
Programming accuracy at 25°C ±5°C					
Voltage <0.05% + (<0.1% + 25 mA for output 2)	10 mV	10 mV	10 mV	10 mV	10 mV
Current <0.2% +	10 mA	10 mA	10 mA	10 mA	10 mA
Readback accuracy at 25°C ±5°C					
Voltage <0.05% + (<0.1% + 25 mV for output 2)	5 mV	5 mV	5 mV	5 mV	5 mV
Current <0.15% + (<0.15% + 10 mA for output 2)	5 mA	5 mA	5 mA	5 mA	5 mA
Program resolution					
Voltage	5 mV	5 mV	5 mV	5 mV	5 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA
Readback resolution					
Voltage	2 mV	2 mV	2 mV	2 mV	2 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA
Meter resolution					
Voltage	10 mV	10 mV	10 mV	10 mV	10 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA
Transient response	<50 µs for output to recover to within 15 mV following a change in output current from full load to half load or vice versa.				

*Maximum current is derated 1% per °C from 40°C to 55°C

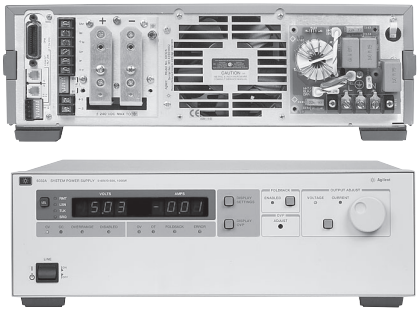
Size: E3640A-E3645A:
213 mm W x 88 mm H x 348 mm D
(8.4 in x 3.5 in x 13.7 in)
E3646A-E3649A:
213 mm W x 133 mm H x 348 mm D
(8.4 in. x 5.2 in. x 13.7 in.)

Weight: E3640A, E3641A: 5.3 kg (11.7 lbs)
E3642A, E3643A: 6.2 kg (13.7 lbs)
E3644A, E3645A: 6.7kg (14.7 lbs)
E3646A, E3647A: 7.4 kg (16.1 lbs)
E3648A, E3649A: 9.5 kg (20.3 lbs)

Ordering Information

Opt 0E3 207 to 253 VDC, 47 to 63 Hz
Opt 0E9 90 to 110 VDC, 47 to 63 Hz (Japan only)
Opt 0EM 104 to 126 VDC, 47 to 63 Hz
Opt 1CM Rack mount kit (E3640A-E3645A: p/n5063-9240; E3646A-E3649A: p/n 5063-9243)
Opt 0L2 Extra documentation package
Opt 0B0 Delete documentation

More detailed specifications at **www.agilent.com/find/E3600**

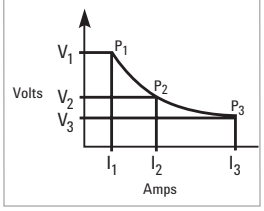


6030A, 6031A, 6032A, 6033A, 6035A, 6038A

Single-Output, Autoranging
200 W and 1000 W GPIB

- Autoranging outputs provide maximum power at a variety of operating voltages
- Analog/resistance control of output voltage and current
- Series and auto-parallel connections of multiple supplies
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

Autoranging Output:



This series of 200 watt and 1000 watt DC power supplies take the place of multiple power supplies in your test system by providing maximum power at a variety of operating points.

Industry standard SCPI commands and VXI*Plug&Play* drivers make system integration easy. Using the serial link, up to 16 power supplies can be connected through one GPIB address. These power supplies have excellent electrical efficiency, making them a good choice for large systems.

Application notes

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

Specifications (at 0° to 55°C unless otherwise specified)		**6030A**	**6031A**	**6032A**	**6033A**	**6035A**	**6038A**
Number of outputs		1	1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes	Yes
Output ratings							
Output voltage		0 to 200 V	0 to 20 V	0 to 60 V	0 to 20 V	0 to 500 V	0 to 60 V
Output current		0 to 17 A	0 to 120 A	0 to 50 A	0 to 30 A	0 to 5 A	0 to 10 A
Maximum power watts		1,200 W	1,064 W	1,200 W	242 W	1,050 W	240 W
Auto-ranging output	V_1, I_1	200 V, 5 A	20 V, 50 A	60 V, 17.5 A	20 V, 10 A	500 V, 2 A	60 V, 3.3 A
	V_2, I_2	120 V, 10 A	14 V, 76 A	40 V, 30 A	14 V, 17.2 A	350 V, 3 A	40 V, 6 A
	V_3, I_3	60 V, 17 A	7 V, 120 A	20 V, 50 A	6.7 V, 30 A	200 V, 5 A	20 V, 10 A
Programming accuracy at 25°C ±5°C	Voltage	0.035% +145 mV	0.035% +15 mV	0.035% +40 mV	0.035% +9 mV	0.25% +400 mV	0.035% +40 mV
	Current	0.2% +25 mA	0.25% +250 mA	0.2% +85 mA	0.15% +20 mA	0.3% +63 mA	0.09% +10 mA
Ripple and noise 20 Hz to 20 MHz	Voltage rms	22 mV	8 mV	8 mV	3 mV	50 mV	3 mV
	p-p	50 mV	50 mV	40 mV	30 mV	160 mV	30 mV
	Current rms	15 mA	120 mA	25 mA	30 mA	50 mA	5 mA
Readback accuracy at 25°C ±5°C	Voltage	0.08% +80 mV	0.08% +7 mV	0.08% +20 mV	0.07% +6 mV	0.5% +200 mV	0.07% +50 mV
	Current	0.36% +15 mA	0.4% +100 mA	0.36% +35 mA	0.3% +25 mA	0.5% +50 mA	0.2% +11 mA
Load regulation							
Voltage	0.01%+	5 mV	3 mV	5 mV	2 mV	40 mV	3 mV
Current		0.01%+ 10 mA	0.01%+ 15 mA	0.01%+ 10 mA	0.01%+ 9 mA	0.03%+ 34 mA	0.01%+ 5 mA
Line regulation							
Voltage		0.01%+ 5 mV	0.01%+ 2 mV	0.01%+ 3 mV	0.01%+ 1 mV	0.03%+ 17 mV	0.01%+ 2 mV
Current		0.01%+ 5 mA	0.01%+ 25 mA	0.01%+ 10 mA	0.01%+ 6 mA	0.03%+ 17 mA	0.01%+ 2 mA
Transient response time 10% step change	Time	2 ms	2 ms	2 ms	1 ms	5 ms	1 ms
	Level	150 mV	100 mV	100 mV	50 mV	200 mV 7	5 mV

More detailed specifications at **www.agilent.com/find/6030**

Autoranging: 200 W and 1000 W GPIB (Continued)

Specifications (at 0° to 55°C unless otherwise specified)	6030A	6031A	6032A	6033A	6035A	6038A

Supplemental characteristics for all model numbers

Remote sensing: Up to 2 V drop in each lead. Voltage regulation specification met with up to 0.5 V drop, but degrades for greater drops.

Modulation: (analog programming of output voltage and current)
Input signal: 0 to 5 V or 0 to 4 kΩ

Software driver:
VXI*Plug&Play*

Size: 6030A–32A, 6035A:
425.5 mm W x 132.6 mm H x 503.7 mm D
(16.75 in x 5.25 in x 19.83 in).
6033A, 6038A:
212.3 mm W x 177.0 mm H x 516.4 mm D
(8.36 in x 6.97 in x 17.87 in).

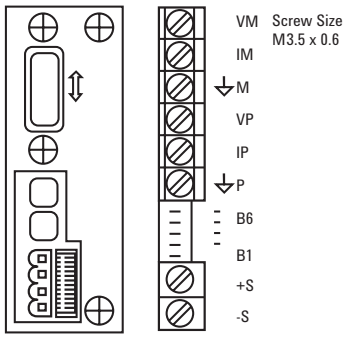
Warranty: One year

Supplemental Characteristics (Non-warranted characteristics determined by design and useful in applying the product)

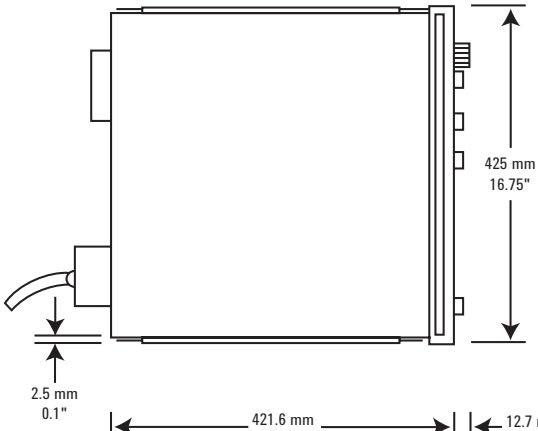
		6030A	6031A	6032A	6033A	6035A	6038A
Programming resolution	Voltage	50 mV	5 mV	15 mV	5 mV	125 mV	15 mV
	Current	4.25 mA	30 mA	12.5 mA	7.5 mA	1.25 mA	2.5 mA
DC floating voltage either terminal can be grounded or floated from chassis ground		±550 V	±240 V	±240 V	±240 V	±550 V	±240 V
AC input current	100 VAC	24 A	24 A	24 A	6 A	24 A	6 A
	120 VAC	24 A	24 A	24 A	6.5 A	24 A	6.5 A
	220 VAC	15 A	15 A	15 A	3.8 A	15 A	3.8 A
	240 VAC	14 A	14 A	14 A	3.6 A	14 A	3.6 A
Weight	Net	16.3 kg (36 lb)	17.2 kg (38 lb)	16.3 kg (36 lb)	9.6 kg (21 lb)	16.3 kg (36 lb)	9.6 kg (21 lb)
	Shipping	21.8 kg (48 lb)	22.7 kg (50 lb)	21.8 kg (48 lb)	11.4 kg (25 lb)	21.8 kg (48 lb)	11.4 kg (25 lb)

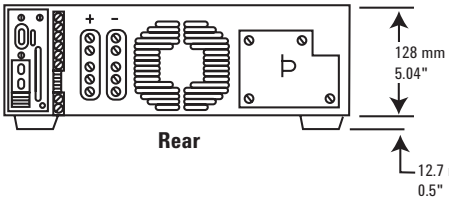
Agilent Models: 6030A, 6031A, 6032A, 6035A

Terminal Strip Detail



Top





Rear

More detailed specifications at **www.agilent.com/find/6030**

Autoranging: 200 W and 1000 W GPIB (Continued)

Ordering information

Opt 001 Front panel has only line switch, line indicator, and OVP adjust (6030A–33A and 6038A only)

Opt 100 87 to 106 VAC, 48 to 63 Hz (power supply output is derated to 75%)

Opt 120 104 to 127 VAC, 47 to 63 Hz

Opt 220 191 to 233 VAC, 48 to 63 Hz

Opt 240 209 to 250 VAC, 48 to 63 Hz

Opt 800 Rack-mount kit for two half-rack units side by side. Lock link kit p/n 5061-9694 and 7-in rack adapter kit 5063-9215

* **Opt 908** Rack-mount kit for a single half-rack unit 6033A and 6038A (with blank filler panel); p/n 5062-3960, 6030A–32A and 6035A; p/n 5062-3977

* **Opt 909** Rack-mount kit with handles. For 6030A–32A, 6035A; p/n 5062-3983

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B3 Service manual

Opt 0B0 Full documentation on CD-ROM only

Opt J01 Stabilization for loads up to 10 Henries (not available on 6033A)

A line cord option must be specified, see the AC line voltage and cord section.

* Support rails required

Accessories

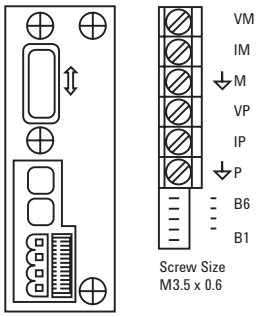
5080-2148 Serial link cable, 2 m (6.6 ft)

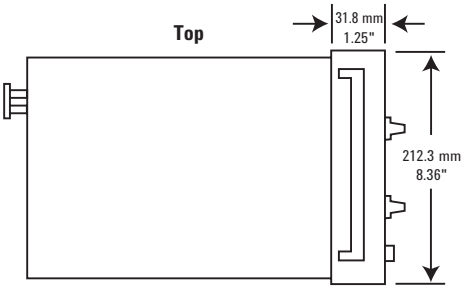
1494-0060 Rack slide kit

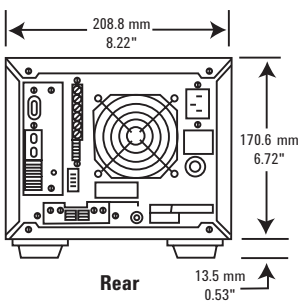
E3663AC Support rails for Agilent rack cabinets

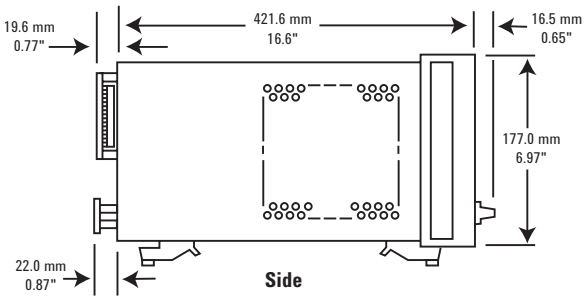
Agilent Models: 6033A, 6038A

Terminal Strip Detail









More detailed specifications at **www.agilent.com/find/6030**

Single-Output
750-1500 W GPIB, LAN, USB, LXI Class C

N5741A*

N5741A - N5772A

- Small size: 1U high
- Universal AC input (85-265 VAC)
- Analog/resistance control of output voltage and current
- Parallel and series connection of multiple supplies
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety
- LXI class C compliant

The N5700 Series is a family of affordable 750 W and 1500 W switching regulated, single-output programmable DC power supplies. They offer 24 models for simple DC power application where speed and accuracy are not the primary concern. They provide stable output power, built-in voltage and current measurement, and output voltage and current from 6 V to 600 V and 1.3 A to 180 A.

Small, high-density package
The N5700 provides up to 1500 W in a small space-saving 1U high, 19-inch wide package. Its air vents are in the front, side and rear (not on the top or bottom), so you can stack other instruments directly above or below it to save valuable rack space.

Universal AC input
All models have universal AC input so they can be automatically operated from any AC mains input worldwide. They can be operated from line voltages of 85 – 265 VAC, 47 to 63 Hz, with no switch to set or fuses to change when you switch from one voltage standard to another. They also provide power factor correction.

Specifications (at 0° to 55°C unless otherwise specified)		N5741A	N5742A	N5743A	N5744A	N5745A	N5746A
Number of outputs		1	1	1	1	1	1
GPIB, LAN, USB		Yes	Yes	Yes	Yes	Yes	Yes
Ouput Ratings							
Voltage		6 V	8 V	12.5 V	20 V	30 V	40 V
Current		100 A	90 A	60 A	38 A	25 A	19 A
Power		600 W	720 W	750 W	760 W	750 W	760 W
Programming accuracy							
Voltage	0.05%+	3 mV	4 mV	6.25 mV	10 mV	15 mV	20 mV
Current	0.1%+	100 mA	90 mA	60 mA	38 mA	25 mA	19 mA
Output ripple and noise							
CV p-p (Up to 20 MHz)		60 mV	60 mV	60 mV	60 mV	60 mV	60 mV
CV rms (From 5 Hz – 1 MHz)		8 mV	8 mV	8 mV	8 mV	8 mV	8 mV
Readback accuracy							
Voltage	0.1%+	6 mV	8 mV	12.5 mV	20 mV	30 mV	40 mV
Current	0.1%+	300 mA	270 mA	180 mA	114 mA	75 mA	57 mA
Load regulation (change from 10% to 90%)							
Voltage		2.6 mV	2.8 mV	3.25 mV	4 mV	5 mV	6 mV
Current		25 mA	23 mA	17 mA	12.6 mA	10 mA	8.8 mA
Line regulation (change from 85-132 VAC input or 170-265 VAC input)							
Voltage		2.6 mV	2.8 mV	3.25 mV	4 mV	5 mV	6 mV
Current		12 mA	11 mA	8 mA	5.8 mA	4.5 mA	3.9 mA
Transient response time[1]							
Time		≤1.5 ms	≤1.5 ms	≤1.5 ms	≤1 ms	≤1 ms	≤1 ms

Notes:

[1] Time for output voltage to recover within 0.5% of its rated output for a load change from 10 to 90% of its rated output current. Voltage set point from 10% to 100% of rated output

* AC input connector: IEC 320 connector for 750 W models, and wire clamp connector for 1500 W models

More detailed specifications at **www.agilent.com/find/N5700**

Single-Output 750 W & 1500 W GPIB, LAN, USB (Continued)

Extensive device protection
To safeguard your device from damage, the N5700 series power supplies provide over-temperature, over-current and over-voltage protect (OVP) to shut down the power supply output when a fault occurs. They also offer an undervoltage limit (UVL) that prevents adjustment of the output voltage below a certain limit. The combination of UVL and OVP capabilities lets you create a protection window for sensitive load circuitry.

Simplify system connection
The N5700 offers many system oriented features to simplify and accelerate test system development. They support the industry standard SCPI commands and come standard with software drivers.

With built-in GPIB, Ethernet/LAN, and USB 2.0 interfaces, the N5700 gives you the flexibility to use your I/O interface of choice today and in the future.

Additionally, the built-in Web server lets you operate, configure, and monitor the N5700 remotely via a standard browser such as Microsoft Internet Explorer.

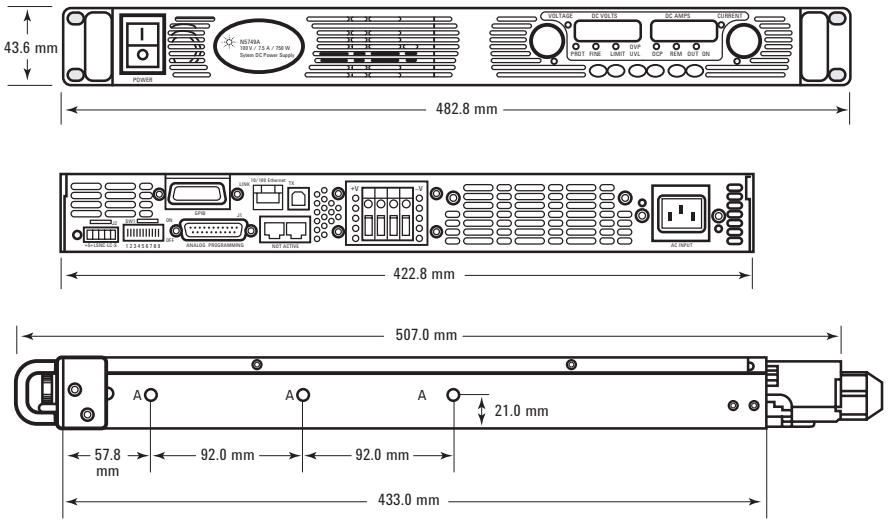
Command compatibility
The N5700 includes a compatibility command set for the Xantrex XFR series power supplies, the Sorensen DLM series power supplies, and the Agilent 603x series power supplies. This simplifies system integration when converting to the N5700.

Specifications (at 0° to 55°C unless otherwise specified)	N5741A	N5742A	N5743A	N5744A	N5745A	N5746A
Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)						
Output response time (settle to within ±1.0% of the rated output, with a resistive load)						
Up, full load	0.08 s	0.08 s	0.08 s	0.08 s	0.08 s	0.08 s
Down, full load	0.05 s	0.05 s	0.05 s	0.05 s	0.08 s	0.08 s
Down, no load	0.5 s	0.6 s	0.7 s	0.8 s	0.9 s	1.0 s
Remote sense compensation						
Volts/load lead	1 V	1 V	1 V	1 V	1.5 V	2 V
Output ripple and noise[2]						
CC rms	200 mA	180 mA	120 mA	76 mA	63 mA	48 m
Programming resolution/ measurement resolution						
Voltage	0.72 mV	0.96 mV	1.5 mV	2.4 mV	3.6 mV	4.8 mV
Current	12 mA	10.8 mA	7.2 mA	4.56 mA	3 mA	2.3 mA

Notes:

[2] From 5 Hz – 1 MHz, at 10% to 100% of output voltage at full load (for 6 V units from 33% to 100% of output voltage)

Agilent Models: N5741A - N5772A



More detailed specifications at **www.agilent.com/find/N5700**

Single-Output 750 W & 1500 W GPIB, LAN, USB (Continued)

Analog/resistance programming
For greater programming flexibility and to minimize the time associated with computer interaction, both the output voltage and current can be controlled by an external voltage or resistance programming signal.

Connect multiple units in parallel and series
Should you need greater output power, the N5700 series power supplies give you the flexibility to connect in parallel up to four similarly rated units for greater output current and connect two similarly rated units in series for greater output voltage (see DC float voltage information)

Fan speed control
Lab bench use is enhanced by the fan speed control, which helps to minimize the acoustic noise.

Application notes

Side-by-Side Comparison: Agilent N5700 System DC Source and Sorensen DLM Power Supply
5989-1628EN

Side-by-Side Comparison: Agilent N5700 System DC Source and Xantrex XFR DC Power Supply
5989-1630EN

Trends in Programmable Medium Power (~1 kW) System DC Power Supplies
5989-1331EN

Specifications (at 0° to 55°C unless otherwise specified)	N5747A	N5748A	N5749A	N5750A	N5751A	N5752A
Number of outputs	1	1	1	1	1	1
GPIB, LAN, USB	Yes	Yes	Yes	Yes	Yes	Yes
Ouput ratings						
Voltage	60 V	80 V	100 V	150 V	300 V	600 V
Current	12.5 A	9.5 A	7.5 A	5 A	2.5 A	1.3 A
Power	750 W	760 W	750 W	750 W	750 W	780 W
Programming accuracy						
Voltage 0.05%+	30 mV	40 mV	50 mV	75 mV	150 mV	300 mV
Current 0.1%+	12.5 mA	9.5 mA	7.5 mA	5 mA	2.5 mA	1.3 mA
Output ripple and noise						
CV p-p (Up to 20 MHz)	60 mV	80 mV	80 mV	100 mV	150 mV	300 mV
CV rms (From 5 Hz – 1 MHz)	8 mV	8 mV	8 mV	12 mV	20 mV	60 mV
Readback accuracy						
Voltage 0.1%+	60 mV	80 mV	100 mV	150 mV	300 mV	600 mV
Current 0.1%+	37.5 mA	28.5 mA	22.5 mA	15 mA	7.5 mA	3.9 mA
Load regulation (change from 10% to 90%)						
Voltage	8 mV	10 mV	12 mV	17 mV	32 mV	62 mV
Current	7.5 mA	6.9 mA	6.5 mA	6 mA	5.5 mA	5.26 mA
Line regulation (change from 85-132 VAC input or 170-265 VAC input)						
Voltage	8 mV	10 mV	12 mV	17 mV	32 mV	62 mV
Current	3.25 mA	2.95 mA	2.75 mA	2.5 mA	2.25 mA	2.13 mA
Transient response time[1]						
Time	≤ 1 ms	≤ 1 ms	≤ 1 ms	≤ 2 ms	≤ 2 ms	≤ 2 ms

Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)						
Output response time (settle to within ±1.0% of the rated output, with a resistive load)						
Up, full load	0.08 s	0.15 s	0.15 s	0.15 s	0.15 s	0.25 s
Down, full load	0.08 s	0.15 s	0.15 s	0.15 s	0.15 s	0.30 s
Down, no load	1.1 s	1.2 s	1.5 s	2.0 s	3.0 s	4.0 s
Remote sense compensation						
Volts/load lead	3 V	4 V	5 V	5 V	5 V	5 V
Output ripple and noise[2]						
CC rms	38 mA	29 mA	23 mA	18 mA	13 mA	8 mA
Programming resolution/ measurement resolution						
Voltage	7.2 mV	9.6 mV	12 mV	18 mV	36 mV	72 mV
Current	1.5 mA	1.14 mA	0.9 mA	0.6 mA	0.3 mA	0.156 mA

Notes:

1 Time for output voltage to recover within 0.5% of its rated output for a load change from 10 to 90% of its rated output current. Voltage set point from 10% to 100% of rated output

2 From 5 Hz – 1 MHz, at 10% to 100% of output voltage at full load (for 6 V units from 33% to 100% of output voltage)

More detailed specifications at **www.agilent.com/find/N5700**

Single-Output 750 W & 1500 W GPIB, LAN, USB (Continued)

Supplemental characteristics for all model numbers

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 55 ms.

DC floating voltage:

6 V to 60 V units
No output terminal may be more than ±60 VDC from any other terminal or chassis ground

80 V to 600 V units
No output terminal may be more than ±600 VDC from any other terminal or chassis ground

Modulation: (Analog programming of output voltage and current)

Input signal: selectable, 0 to 5 V/0 to 10 V full scale

Input impedance: selectable, 0 to 5 kΩ/0 to 10 kΩ full scale

I/O interface: GPIB, LAN, USB standard

Software driver:

- IVI-COM
- LabVIEW

AC input:

Input range: 85 – 265 VAC; 47 – 63 Hz

Input current 750 W: 10.5 A at 100 VAC nominal; 5 A at 200 VAC nominal

Input current 1500 W: 21 A at 100 VAC nominal; 11 A at 200 VAC nominal

Notes:

1 Time for output voltage to recover within 0.5% of its rated output for a load change from 10 to 90% of its rated output current. Voltage set point from 10% to 100% of rated output

2 From 5 Hz – 1 MHz, at 10% to 100% of output voltage at full load (for 6 V units from 33% to 100% of output voltage)

Specifications (at 0° to 55°C unless otherwise specified)		**N5761A**	**N5762A**	**N5763A**	**N5764A**	**N5765A**	**N5766A**
Number of outputs		1	1	1	1	1	1
GPIB, LAN, USB		Yes	Yes	Yes	Yes	Yes	Yes
Ouput ratings							
Voltage		6 V	8 V	12.5 V	20 V	30 V	40 V
Current		180 A	165 A	120 A	76 A	50 A	38 A
Power		1080 W	1320 W	1500 W	1520 W	1500 W	1520 W
Programming accuracy							
Voltage	0.05%+	3 mV	4 mV	6.25 mV	10 mV	15 mV	20 mV
Current	0.1%+	180 mA	165 mA	120 mA	76 mA	50 mA	38 mA
Output ripple and noise							
CV p-p (Up to 20 MHz)		60 mV	60 mV	60 mV	60 mV	60 mV	60 mV
CV rms (From 5 Hz – 1 MHz)		8 mV	8 mV	8 mV	8 mV	8 mV	8 mV
Readback accuracy							
Voltage	0.1%+	6 mV	8 mV	12.5 mV	20 mV	30 mV	40 mV
Current	0.1%+	540 mA	495 mA	360 mA	228 mA	150 mA	114 mA
Load regulation (change from 10% to 90%)							
Voltage		2.6 mV	2.8 mV	3.25 mV	4 mV	5 mV	6 mV
Current		41 mA	38 mA	29 mA	20.2 mA	15 mA	12.6 mA
Line regulation (change from 85-132 VAC input or 170-265 VAC input)							
Voltage		2.6 mV	2.8 mV	3.25 mV	4 mV	5 mV	6 mV
Current		20 mA	18.5 mA	14 mA	9.6 mA	7 mA	5.8 mA
Transient response time[1]							
Time		≤ 1.5 ms	≤ 1.5 ms	≤ 1.5 ms	≤ 1 ms	≤ 1 ms	≤ 1 ms

Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)

Output response time (settle to within ±1.0% of the rated output, with a resistive load)							
Up, full load		0.08 s	0.08 s	0.08 s	0.08 s	0.08 s	0.08 s
Down, full load		0.05 s	0.05 s	0.05 s	0.05 s	0.08 s	0.08 s
Down, no load		0.5 s	0.6 s	0.7 s	0.8 s	0.9 s	1.0 s
Remote sense compensation							
Volts/load lead		1 V	1 V	1 V	1 V	1.5 V	2 V
Output ripple and noise[2]							
CC rms		360 mA	330 mA	240 mA	152 mA	125 mA	95 mA
Programming resolution/ measurement resolution							
Voltage		0.72 mV	0.96 mV	1.5 mV	2.4 mV	3.6 mV	4.8 mV
Current		21.6 mA	19.8 mA	14.4 mA	9.12 mA	6 mA	4.6 mA

More detailed specifications at **www.agilent.com/find/N5700**

Single-Output 750 W & 1500 W GPIB, LAN, USB (Continued)

Power factor: 0.99 at nominal input and rated output power

Regulatory compliance: European EMC directive 89/336/EEC for Class A products, Australian C-Tick mark, this ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada. European Low Voltage Directive 73/23/EEC.

Size: 43.6 mm H x 422.8 mm W x 432.8 mm D (1.72 in x 16.65 in x 17.04 in), excluding connectors and handles

Weight: Net, 750 W – 7 Kg (15.4 lbs); 1500 W – 8.5 Kg (18.7 lbs)

Warranty: One year

Ordering information

For N574x and N575x (750 W Models)

Opt 900 Power Cord, United Kingdom

Opt 902 Power Cord, Europe

Opt 903 Power Cord, USA, Canada

Opt 918 Power Cord, Japan

Opt 922 Power Cord, China

For N576x and N577x (1500 W Models)

Opt 861 Unterminated power cord, USA, Canada, China, Japan, Other

Opt 862 Harmonized unterminated power cord, Europe

Accessories for all N5700 Models

N5740A Rack mount slide kit (required for rack mounting; standard system II rack mounting hardware will not work).

Specifications (at 0° to 55°C unless otherwise specified)	N5767A	N5768A	N5769A	N5770A	N5771A	N5772A
Number of outputs	1	1	1	1	1	1
GPIB, LAN, USB	Yes	Yes	Yes	Yes	Yes	Yes
Ouput ratings						
Voltage	60 V	80 V	100 V	150 V	300 V	600 V
Current	25 A	19 A	15 A	10 A	5 A	2.6 A
Power	1500 W	1520 W	1500 W	1500 W	1500 W	1560 W
Programming accuracy						
Voltage 0.05%+	30 mV	40 mV	50 mV	75 mV	150 mV	300 mV
Current 0.1%+	25 mA	19 mA	15 mA	10 mA	5 mA	2.6 mA
Output ripple and noise						
CV p-p (Up to 20 MHz)	60 mV	80 mV	80 mV	100 mV	150 mV	300 mV
CV rms (From 5 Hz – 1 MHz)	8 mV	8 mV	8 mV	12 mV	20 mV	60 mV
Readback accuracy						
Voltage 0.1%+	60 mV	80 mV	100 mV	150 mV	300 mV	600 mV
Current 0.1%+	75 mA	57 mA	45 mA	30 mA	15 mA	7.8 mA
Load regulation (change from 10% to 90%)						
Voltage	8 mV	10 mV	12 mV	17 mV	32 mV	62 mV
Current	10 mA	8.8 mA	8 mA	7 mA	6 mA	5.5 mA
Line regulation (change from 85-132 VAC input or 170-265 VAC input)						
Voltage	8 mV	10 mV	12 mV	17 mV	32 mV	62 mV
Current	4.5 mA	3.9 mA	3.5 mA	3 mA	2.5 mA	2.26 mA
Transient response time[1]						
Time	≤ 1 ms	≤ 1 ms	≤ 1 ms	≤ 2 ms	≤ 2 ms	≤ 2 ms

Supplemental Characteristics (Non-warranted characteristics determined by design and useful in applying the product)

Output response time (settle to within ±1.0% of the rated output, with a resistive load)						
Up, full load	0.08 s	0.15 s	0.15 s	0.15 s	0.15 s	0.25 s
Down, full load	0.08 s	0.15 s	0.15 s	0.15 s	0.15 s	0.30 s
Down, no load	1.1 s	1.2 s	1.5 s	2.0 s	3.0 s	4.0 s
Remote sense compensation						
Volts/load lead	3 V	4 V	5 V	5 V	5 V	5 V
Output ripple and noise[2]						
CC rms	75 mA	57 mA	45 mA	35 mA	25 mA	12 mA
Programming resolution/ measurement resolution						
Voltage	7.2 mV	9.6 mV	12 mV	18 mV	36 mV	72 mV
Current	3 mA	2.28 mA	1.8 mA	1.2 mA	0.6 mA	0.312 mA

Notes:

1 Time for output voltage to recover within 0.5% of its rated output for a load change from 10 to 90% of its rated output current. Voltage set point from 10% to 100% of rated output

2 From 5 Hz – 1 MHz, at 10% to 100% of output voltage at full load (for 6 V units from 33% to 100% of output voltage)

More detailed specifications at **www.agilent.com/find/N5700**

Single-Output
3.3-5.2 KW GPIB, LAN, USB, LXI Class C

N8740*

N8731A - N8762A

21 Models: 3300 W and 5200 W output power
Up to 600 V and up to 400 A
Small, high density 2U package
Built-in voltage and current measurement
Full protection from over-voltage and over-current
Flexible AC input voltage options
LAN, USB, and GPIB interfaces standard
Fully compliant to LXI Class C specification

The Agilent Technologies N8700 series system DC power supplies give you just the right performance – at just the right price – in a compact (2 U) package. This family of affordable 3300 W and 5000 W single-output programmable DC power supplies consists of 21 models for simple DC power applications.

They provide stable output power, built-in voltage and current measurement, and output voltage and current from 8 V to 600 V and 5.5 A to 400 A.

Small, high-density package
The N8700 provides up to 5200 W in a small space-saving 2U high, 19-inch wide package. Its air vents are in the front and rear (not on the top or bottom), so you can stack other instruments directly above or below it to save valuable rack space.

Flexible AC input voltage options
The N8700 models offer flexible AC input voltage options. Every N8700 model can be purchased with either a 208 V 3-phase or 400 V 3-phase voltage input option. The 3.3 kW models have the additional option of a 230 V single-phase AC input voltage. Choose the one that best fits your operating environment. They also provide power factor correction.

Specifications (at 0° to 55°C unless otherwise specified)		N8731A	N8732A	N8733A	N8734A	N8735A	N8736A
Number of outputs		1	1	1	1	1	1
GPIB, LAN, USB		Yes	Yes	Yes	Yes	Yes	Yes
Ouput Ratings							
Voltage[1]		8 V	10 V	15 V	20 V	30 V	40 V
Current[2]		400 A	330 A	220 A	165 A	110 A	85 A
Power		3200 W	3300 W	3300 W	3300 W	3300 W	3400 W
Programming accuracy							
Voltage[1]	0.05%+	4 mV	5 mV	7.5 mV	10 mV	15 mV	20 mV
Current[2, 6]	0.1%+	800 mA	660 mA	440 mA	330 mA	220 mA	170 mA
Output ripple and noise							
CV p-p (Up to 20 MHz)		60 mV	60 mV	60 mV	60 mV	60 mV	60 mV
CV rms (From 5 Hz – 1 MHz)		8 mV	8 mV	8 mV	8 mV	8 mV	8 mV
Measurement accuracy							
Voltage	0.1%+	8 mV	10 mV	15 mV	20 mV	30 mV	40 mV
Current[6]	0.1%+	1200 mA	990 mA	660 mA	495 mA	330 mA	255 mA
Load effect							
CV load regulation[3]		6.2 mV	6.5 mV	7.25 mV	8 mV	9.5 mV	11 mV
CC load regulation[4]		85 mA	71 mA	49 mA	38 mA	27 mA	22 mA
Source effect							
CV line regulation[5]		2.8 mV	3 mV	3.5 mV	4 mV	5 mV	6 mV
CC line regulation[5]		42 mA	35 mA	24 mA	18.5 mA	13 mA	10.5 mA
Load transient recovery time							
Time[7]		<1 ms	<1 ms	<1 ms	<1 ms	<1 ms	<1 ms

Notes:

1 Minimum voltage is guaranteed to maximum 0.2% of rated output voltage.

2 Minimum current is guaranteed to maximum 0.4% of rated output current.

3 From no-load to full-load, constant input voltage. Maximum drop in remote sense.

4 For load voltage change equal to the unit voltage rating, constant input voltage

5 Single-phase and 3-Phase 208 V models: 170~265 VAC, constant load.
3-Phase 400 V models: 342~460 VAC, constant load.

6 The constant current programming readback and monitoring accuracy does not include the warm-up and load regulation thermal drift.

7 Time for output voltage to recover within 0.5% of its rated output for a load change 10 - 90% of rated output current, local sense.

* Rear panel with wire clamp connectors for 150 V to 600 V models (shown with 400 V 3-phase AC input option)

More detailed specifications at **www.agilent.com/find/N8700**

Single-Output 3.3-5.2 KW GPIB, LAN, USB (Continued)

Extensive device protection
To safeguard your device from damage, the N8700 series power supplies provide over-temperature, over-current and over-voltage protect (OVP) to shut down the power supply output when a fault occurs. They also offer an undervoltage limit (UVL) that prevents adjustment of the output voltage below a certain limit. The combination of UVL and OVP capabilities lets you create a protection window for sensitive load circuitry.

Simplify system connection
The N8700 offers many system oriented features to simplify and accelerate test system development. They support the industry standard SCPI commands and come standard with software drivers.

With built-in GPIB, Ethernet/LAN, and USB 2.0 interfaces, the N8700 gives you the flexibility to use your I/O interface of choice today and in the future.

Additionally, the built-in Web server lets you operate, configure, and monitor the N8700 remotely via a standard browser such as Microsoft® Internet Explorer.

Analog programming and monitoring
The output voltage and current can be programmed from zero to full scale by either an analog voltage 0 to 5 V or 0 to 10 V or by resistance of 0 to 5 kΩ or 0 to 10 kΩ.

Specifications (at 0° to 55°C unless otherwise specified)	N8731A	N8732A	N8733A	N8734A	N8735A	N8736A
Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)						
Output response time						
Up-prog response time[8]	80 ms	80 ms	80 ms	80 ms	80 ms	80 ms
Down-prog response time Full-load[8]	20 ms	100 ms	100 ms	100 ms	160 ms	160 ms
Down-prog response time No-load[9]	500 ms	600 ms	700 ms	800 ms	900 ms	1000 ms
Remote sense compensation	2 V	2 V	2 V	2 V	5 V	5 V
Output ripple and noise						
CC rms[10]	1300 mA	1200 mA	880 mA	660 mA	300 mA	200 m
Programming resolution **Measurement resolution**						
Voltage	0.96 mV	1.2 mV	1.8 mV	2.4 mV	3.6 mV	4.8 mV
Current	48 mA	39.6 mA	26.4 mA	19.8 mA	13.2 mA	10.2 mA

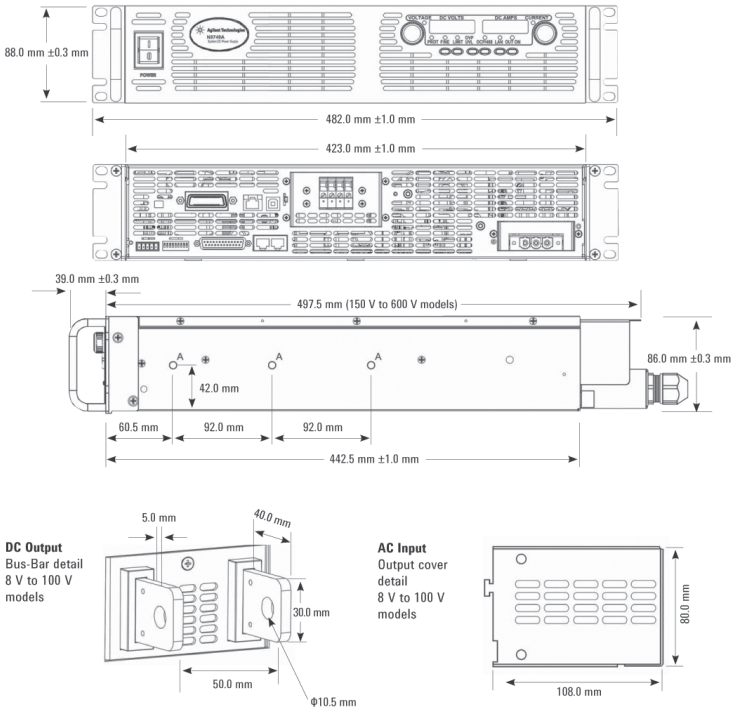
Notes:

8 From 10% to 90% or 90% to 10% of rated output voltage, with rated, resistive load.

9 From 90% to 10% of rated output voltage.

10 For 8 V - 15 V models the ripple is measured from 2 V to rated output voltage and rated output current. For other models, the ripple is measured at 10 - 100% of rated output voltage and rated output current.

Agilent Models: N8731A-42A, N8754A-62A



More detailed specifications at **www.agilent.com/find/N8700**

Single-Output 3.3-5.2 KW GPIB, LAN, USB (Continued)

Connect multiple units in parallel and series

Should you need greater output power, the N8700 series power supplies give you the flexibility to connect in parallel up to four identical units (same model number) for greater output current or connect two identical units (same model number) in series for greater output voltage (see output terminal isolation information).

Fan speed control

Lab bench use is enhanced by the fan speed control, which helps to minimize the acoustic noise.

Application notes

Selecting DC Sources for Telecommunications Equipment Test Systems
5990-4370EN

Power Sources for Energy-Efficient High Input Voltage Telecommunications Equipment Development
5990-4371EN

Notes:

1 Minimum voltage is guaranteed to maximum 0.2% of rated output voltage.

2 Minimum current is guaranteed to maximum 0.4% of rated output current.

3 From no-load to full-load, constant input voltage. Maximum drop in remote sense.

4 For load voltage change equal to the unit voltage rating, constant input voltage

5 Single-phase and 3-Phase 208 V models: 170~265 VAC, constant load. 3-Phase 400 V models: 342~460 VAC, constant load.

6 The constant current programming readback and monitoring accuracy does not include the warm-up and load regulation thermal drift.

7 Time for output voltage to recover within 0.5% of its rated output for a load change 10 - 90% of rated output current, local sense.

8 From 10% to 90% or 90% to 10% of rated output voltage, with rated, resistive load.

9 From 90% to 10% of rated output voltage.

10 For 8 V - 15 V models the ripple is measured from 2 V to rated output voltage and rated output current. For other models, the ripple is measured at 10 - 100% of rated output voltage and rated output current.

Specifications (at 0° to 55°C unless otherwise specified)		N8737A	N8738A	N8739A	N8740A	N8741A	N8742A
Number of outputs		1	1	1	1	1	1
GPIB, LAN, USB		Yes	Yes	Yes	Yes	Yes	Yes
Ouput ratings							
Voltage[1]		60 V	80 V	100 V	150 V	300 V	600 V
Current[2]		55 A	42 A	33 A	22 A	11 A	5.5 A
Power		3300 W	3360 W	3300 W	3300 W	3300 W	3300 W
Programming accuracy							
Voltage[1]	0.05%+	30 mV	40 mV	50 mV	75 mV	150 mV	300 mV
Current[2, 6]	0.1%+	110 mA	84 mA	66 mA	44 mA	22 mA	11 mA
Output ripple and noise							
CV p-p (Up to 20 MHz)		60 mV	80 mV	100 mV	100 mV	300 mV	500 mV
CV rms (From 5 Hz – 1 MHz)		8 mV	25 mV	25 mV	25 mV	100 mV	120 mV
Measurement accuracy							
Voltage	0.1%+	60 mV	80 mV	100 mV	150 mV	300 mV	600 mV
Current[6]	0.1%+	165 mA	126 mA	99 mA	66 mA	33 mA	16.5 mA
Load effect							
CV load regulation[3]		14 mV	17 mV	20 mV	27.5 mV	50 mV	95 mV
CC load regulation[4]		16 mA	13.4 mA	11.6 mA	9.4 mA	7.2 mA	6.1 mA
Source effect							
CV line regulation[5]		8 mV	10 mV	12 mV	17 mV	32 mV	62 mV
CC line regulation[5]		7.5 mA	6.2 mA	5.3 mA	4.2 mA	3.1 mA	2.6 mA
Load transient recovery time							
Time[7]		≤ 1 ms	≤ 1 ms	≤ 1 ms	≤ 2 ms	≤ 2 ms	≤ 2 ms

Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)

Output response time							
Up-prog response time[8]		150 ms	150 ms	150 ms	150 ms	150 ms	250 ms
Down-prog response time Full-load[8]		160 ms	300 ms	300 ms	300 ms	300 ms	500 ms
Down-prog response time No-load[9]		1100 ms	1200 ms	1500 ms	2000 ms	3500 ms	4000 ms
Remote sense compensation		5 V	5 V	5 V	5 V	5 V	5 V
Output ripple and noise							
CC rms[10]		100 mA	80 mA	70 mA	60 mA	20 mA	10 mA
Programming resolution							
Measurement resolution							
Voltage		7.2 mV	9.6 mV	12 mV	18 mV	36 mV	72 mV
Current		6.6 mA	5 mA	4 mA	2.6 mA	1.3 mA	0.66 mA

More detailed specifications at **www.agilent.com/find/N8700**

Single-Output 3.3-5.2 KW GPIB, LAN, USB (Continued)

Supplemental characteristics for all model numbers

Command response time: Average time required for the output voltage to begin to change following receipt of digital data is 100 ms.

Output terminal isolation:

8 V to 60 V units
No output terminal may be more than ±60 VDC from any other terminal or chassis ground

80 V to 600 V units
No positive output terminal may be more than ± 600 VDC from any other terminal or chassis ground.

No negative output terminal may be more than ± 400 VDC from any other terminal or chassis ground.

Modulation: (Analog programming of output voltage and current)

Input signal: selectable, 0 to 5 V/0 to 10 V full scale

Input impedance: selectable, 0 to 5 kΩ/0 to 10 kΩ full scale

I/O interface: GPIB, LAN, USB standard

Software driver:

- IVI-COM
- LabVIEW

AC input:

Input range:
230 VAC single-phase option
170 - 265 VAC; 47 - 63 Hz;
3.3 kW models only

208 VAC 3-phase option
170 - 265 VAC; 47 - 63 Hz

400 VAC 3-phase option
342 - 460 VAC; 47 - 63 Hz

Input current:
230 VAC single-phase
3.3 kW models only: 23 - 24 A Max @ 100% load

208 VAC 3-phase option
3.3 kW models: 13.6 - 14.5 A Max @ 100% load
5 kW models: 21-22 A max @ 100% load

400 VAC 3-phase option
3.3 kW models: 6.8 - 7.2 A Max @ 100% load
5 kW models: 10.5 - 12 A Max @ 100% load

Specifications (at 0° to 55°C unless otherwise specified)		**N8754A**	**N8755A**	**N8756A**	**N8757A**	**N8758A**
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Voltage[1]		20 V	30 V	40 V	60 V	80 V
Current[2]		250 A	170 A	125 A	85 A	65 A
Power		5000 W	5100 W	5000 W	5100 W	5200 W
Programming accuracy						
Voltage[1]	0.025% +	15 mV	22.5 mV	30 mV	45 mV	60 mV
Current[2, 6]	0.1% +	750 mA	510 mA	375 mA	255 mA	195 mA
Output ripple and noise						
CV p-p (Up to 20 MHz)		75 mV	75 mV	75 mV	75 mV	100 mV
CV rms (From 5 Hz – 1 MHz)		10 mV	10 mV	10 mV	10 mV	15 mV
Measurement accuracy						
Voltage	0.025% +	25 mV	37.5 mV	50 mV	75 mV	100 mV
Current[6]	0.15% +	750 mA	510 mA	375 mA	255 mA	195 mA
Load effect						
CV load regulation[3]		8 mV	9.5 mV	11 mV	14 mV	17 mV
CC load regulation[4]		250 mA	170 mA	125 mA	85 mA	65 mA
Source effect						
CV line regulation[5]		2 mV	3 mV	4 mV	6 mV	8 mV
CC line regulation[5]		125 mA	85 mA	62.5 mA	42.5 mA	32.5 mA
Load transient recovery time						
Time[7]		<1 ms	<1 ms	<1 ms	<1 ms	<1 ms
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Output response time						
Up-prog response time[8]		30 ms	30 ms	30 ms	50 ms	50 ms
Down-prog response time Full-load[8]		50 ms	80 ms	80 ms	80 ms	100 ms
Down-prog response time No-load[9]		700 ms	800 ms	900 ms	1000 ms	1200 ms
Remote sense compensation		2 V	5 V	5 V	5 V	5 V
Output ripple and noise						
CC rms[10]		1000 mA	460 mA	300 mA	150 mA	120 mA
Programming resolution **Measurement resolution**						
Voltage		2.4 mV	3.6 mV	4.8 mV	7.2 mV	9.6 mV
Current		30 mA	20.4 mA	15 mA	10.2 mA	7.8 mA

Notes:

1 Minimum voltage is guaranteed to maximum 0.2% of rated output voltage.

2 Minimum current is guaranteed to maximum 0.4% of rated output current.

3 From no-load to full-load, constant input voltage. Maximum drop in remote sense.

4 For load voltage change equal to the unit voltage rating, constant input voltage

5 Single-phase and 3-Phase 208 V models: 170~265 VAC, constant load.
3-Phase 400 V models: 342~460 VAC, constant load.

6 The constant current programming readback and monitoring accuracy does not include the warm-up and load regulation thermal drift.

7 Time for output voltage to recover within 0.5% of its rated output for a load change 10 - 90% of rated output current, local sense.

8 From 10% to 90% or 90% to 10% of rated output voltage, with rated, resistive load.

9 From 90% to 10% of rated output voltage.

10 For 8 V - 15 V models the ripple is measured from 2 V to rated output voltage and rated output current. For other models, the ripple is measured at 10 - 100% of rated output voltage and rated output current.

More detailed specifications at **www.agilent.com/find/N8700**

Single-Output 3.3-5.2 KW GPIB, LAN, USB (Continued)

Power factor: 230 VAC single-phase option 3.3 kW models only: 0.99 at nominal input and rated output power

208 & 400 VAC 3-phase options 3.3 kW models: 0.95 at nominal input and rated output power 5 kW models: 0.94 at nominal input and rated output power

Regulatory compliance: European EMC directive 89/336/EEC for Class A products, Australian C-Tick mark, this ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada. European Low Voltage Directive 73/23/EEC.

Size: 88 mm H x 423 mm W x 442.5 mm D (3.46 in x 16.65 in x 17.42 in), excluding connectors and handles

Weight: Net, 3.3 kW – 13 Kg (28.6 lbs); 5 kW – 16 Kg (35.2 lbs)

Warranty: One year

Ordering information

Opt 861 Unterminated line cord for 208 V 3-phase AC input voltage (Option 208)

Opt 862 Unterminated line cord for 400 V 3-phase AC input voltage (Option 400)

Opt 831 Unterminated line cord for 230 V single-phase AC input voltage (Option 230)

Opt 832 Unterminated, harmonized line cord for Europe for 230 V single-phase AC input voltage (Option 230)

Opt 208 190-240 V, 3-phase AC, 50/60 Hz input (use with line cord Opt 861)

Opt 400 380-415 V, 3-phase AC, 50/60 Hz input (use with line cord Opt 862)

Opt 230 190-240 V, single-phase AC, 50/60 Hz input (use with line cord Opt 831 or 832)

Accessories for all N8700 Models

N5740A Rack mount slide kit (required for rack mounting; standard system rack mounting hardware will not work).

Specifications (at 0° to 55°C unless otherwise specified)		**N8759A**	**N8760A**	**N8761A**	**N8762A**
Number of outputs		1	1	1	1
GPIB		No	No	No	No
Output ratings					
Voltage[1]		100 V	150 V	300 V	600 V
Current[2]		50 A	34 A	17 A	8.5 A
Power		5000 W	5100 W	5100 W	5100 W
Programming accuracy					
Voltage[1]	0.025%+	75 mV	112.5 mV	225 mV	450 mV
Current[2, 6]	0.1% +	150 mA	102 mA	51 mA	25.5 mA
Output ripple and noise					
CV p-p (Up to 20 MHz)		100 mV	120 mV	300 mV	500 mV
CV rms (From 5 Hz – 1 MHz)		15 mV	25 mV	60 mV	120 mV
Measurement accuracy					
Voltage	0.025%+	125 mV	187.5 mV	375 mV	750 mV
Current[6]	0.1%+	150 mA	102 mA	51 mA	25.5 mA
Load effect					
CV load regulation[3]		20 mV	27.5 mV	50 mV	95 mV
CC load regulation[4]		50 mA	34 mA	17 mA	8.5 mA
Source effect					
CV line regulation[5]		10 mV	15 mV	30 mV	60 mV
CC line regulation[5]		25 mA	17 mA	8.5 mA	4.3 mA
Load transient recovery time					
Time[7]		<1 ms	<2 ms	<2 ms	<2 ms
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)			
Output response time					
Up-prog response time[8]		50 ms	50 ms	50 ms	100 ms
Down-prog response time Full-load[8]		100 ms	100 ms	100 ms	200 ms
Down-prog response time No-load[9]		1500 ms	2000 ms	2500 ms	3000 ms
Remote sense compensation		5 V	5 V	5 V	5 V
Output ripple and noise					
CC rms[10]		100 mA	90 mA	30 mA	15 mA
Programming resolution **Measurement resolution**					
Voltage		12 mV	18 mV	36 mV	72 mV
Current		6 mA	4.1 mA	2 mA	1 mA

Notes:

1 Minimum voltage is guaranteed to maximum 0.2% of rated output voltage.

2 Minimum current is guaranteed to maximum 0.4% of rated output current.

3 From no-load to full-load, constant input voltage. Maximum drop in remote sense.

4 For load voltage change equal to the unit voltage rating, constant input voltage

5 Single-phase and 3-Phase 208 V models: 170~265 VAC, constant load. 3-Phase 400 V models: 342~460 VAC, constant load.

6 The constant current programming readback and monitoring accuracy does not include the warm-up and load regulation thermal drift.

7 Time for output voltage to recover within 0.5% of its rated output for a load change 10 - 90% of rated output current, local sense.

8 From 10% to 90% or 90% to 10% of rated output voltage, with rated, resistive load.

9 From 90% to 10% of rated output voltage.

10 For 8 V - 15 V models the ripple is measured from 2 V to rated output voltage and rated output current. For other models, the ripple is measured at 10 - 100% of rated output voltage and rated output current.

More detailed specifications at **www.agilent.com/find/N8700**

High Performance DC Power Supplies...

speed and accuracy for test optimization

Agilent high performance DC power supplies provide the features and performance necessary to satisfy the most demanding requirements. For system designers who are striving to shorten test time and maximize production throughput, the Agilent high performance DC power supplies will help them achieve their goals.

Multiple output power supplies reduce rack space. The advanced programmable capabilities allow for efficient system design and maintenance. Also their programming and measurement accuracy, and their DUT protection features, make them an excellent value for the R&D lab.

Comparison Summary	Agilent basic DC power supplies	Agilent high performance DC power supplies
Output power	30 W-1500 W	40 W-6600 W
Number of outputs	1-3	1-8
GPIB programming and measurement speed	Moderate	Fast
Output rise/fall time	Moderate	Fast
Convenient 1/2 rack-size for bench-top use	Yes	No
Active downprogrammer for enhanced test throughput	No	Yes
Stored wake-up state	No	Yes
Programmable capabilities	Moderate	Extensive
Protection for the DUT	Moderate	Extensive

More detailed specifications at **www.agilent.com/find/power**

6611C - 6614C

Single-Output
40-50 W GPIB

Small, compact size for bench and system use
Fast, low-noise outputs
Dual-range, precision low current measurement
Built-in measurements and advanced programmable features
Protection features to ensure DUT safety

This series of linear-regulated 40-50 W DC power supplies is designed to maximize the throughput of DUTs through the manufacturing test process with fast programming and measurement, and also active downprogramming. It offers many advanced programmable features including stored states and status reporting. Programming is done using industry standard SCPI commands via the GPIB or RS-232. Test system integration is further simplified by using the VXI*Plug&Play* drivers. The optional relays simplify system design and troubleshooting.

The half-rack size of the 6610A series makes it a convenient DC power supply for the R&D lab bench. The built-in microamp measurement system helps the engineer to easily and accurately monitor the output voltage and current without a complicated test setup.

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

Specifications (at 0° to 55°C unless otherwise specified)		**6611C**	**6612C**	**6613C**	**6614C**	**6611C-J05** Special order option
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Voltage		0 to 8 V	0 to 20 V	0 to 50 V	0 to 100 V	0 to 10 V
Current		0 to 5 A	0 to 2 A	0 to 1 A	0 to 0.5 A	0 to 5 A
Programming accuracy (at 25°C ±5°C)						
Voltage		5 mV	10 mV	20 mV	50 mV	5 mV
+Current	0.05% +	2 mA	1 mA	0.75 mA	0.5 mA	2 mA
Ripple and noise 20 Hz to 20 MHz, with outputs ungrounded or with either terminal grounded						
Voltage	rms	0.5 mV	0.5 mV	0.5 mV	0.5 mV	0.5 mV
	peak -to-peak	3 mV	3 mV	4 mV	5 mV	3 mV
Normal mode	rms	2 mA	1 mA	1 mA	1 mA	2 mA
DC measurement accuracy via GPIB or front-panel meters with respect to actual output at 25°C ±5°C						
Voltage	0.03% +	2 mV	3 mV	6 mV	12 mV	2 mV
Low current range -20 mA to + 20 mA	0.1% +	2.5 µA	2.5 µA	2.5 µA	2.5 µA	2.5 µA
High current range +20 mA to + rated 1	0.2% +	0.5 mA	0.25 mA	0.2 mA	0.1 mA	0.5 mA
-20 mA to - rated 1	0.2% +	1.1 mA	0.85 mA	0.8 mA	0.7 mA	1.1 mA
Load regulation						
Voltage		2 mV	2 mV	4 mV	5 mV	2 mV
Current		1 mA	0.5 mA	0.5 mA	0.5 mA	1 mA
Line regulation						
Voltage		0.5 mV	0.5 mV	1 mV	1 mV	0.5 mV
Current		0.5 mA	0.5 mA	0.25 mA	0.25 mA	0.5 mA

Transient response time Less than 100 µs for the output to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of the output current rating of the supply

Supplemental Characteristics	(Non-warranted characteristics determined by design and useful in applying the product)				
Average programming resolution					
Voltage	2 mV	5 mV	12.5 mV	25 mV	3 mV
Current	1.25 mA	0.5 mA	0.25 mA	0.125 mA	1.25 mA
Sink current	3 A	1.2 A	0.6 A	0.3 A	3 A

More detailed specifications at **www.agilent.com/find/6610**

Single-Output: 40-50 W GPIB (Continued)

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC maximum from chassis ground

Remote sensing: Up to two volts dropped in each load lead. Add 2 mV to the voltage load regulation specification for each one volt change in the postive output lead due to load current change.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital date is 4 ms for the power supplies connected directly to the GPIB.

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 2 ms. The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 6 ms.

GPIB interface capabilities: IEEE-488.2, SCPI command set, and 6630A Series programming compatability

Input power: (full load): 1.6 A, 100 W (6611C: 2.2 A, 120 W)

Regulatory compliance: Complies with EMC directive 89/336/EEC (ISM 1B).

Software driver:
VXI*Plug&Play*

Size: 212.8 mm W x 88.1 mm H x 368.3 mm D (8.4 in x 3.5 in x 14.5 in)

Weight: 8.2 kg (18.16 lb) net; 10.6 kg (23.5 lb) shipping

Warranty: One year

Ordering information

Opt 100 87 to 106 VAC, 47 to 63 Hz
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 63 Hz
Opt 230 207 to 253 VAC, 47 to 63 Hz
Opt 760 Isolation and reversal relays
* **Opt ICM** Rack-mount kit (p/n 5063-9240)
* **Opt AXS** Rack-mount kit side-by-side mounting of two units, Lock-link kit p/n 5061-9694; Flange kit p/n 5062-3974
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

*Support rails required

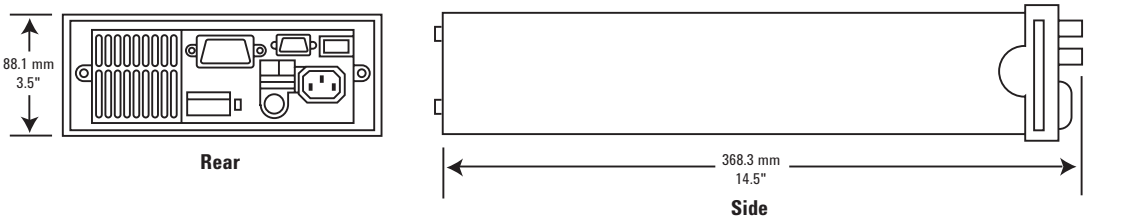
Accessories

Rack-mount and slide for two side-by-side units of different lengths p/n 1494-0015, 5063-9255 and filler panel 5002-3999

Rack-mount slide and support for one instrument p/n 1494-0015, 5063-9255 and filler panel 5002-3999

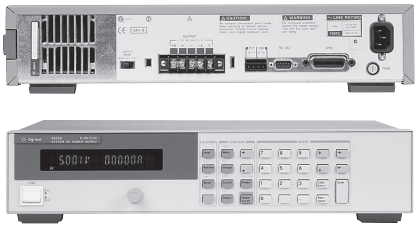
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6611C, 6612C, 6613C, 6614C



More detailed specifications at **www.agilent.com/find/6610**

Single-Output
80-100 W GPIB



6631B - 6634B

- Fast, low-noise outputs
- Programmable active down-programmer sinks the full rated current
- Dual-range, precision low current measurement
- Optional isolation and polarity reversal relays
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

This series of linear-regulated 80-100 W DC power supplies is designed to maximize the throughput of DUTs through the manufacturing test process. Both programming and measurement are optimized for speed. The active downprogrammer can sink up to the full rated current of the power supply, which quickly brings the power supply output to zero volts. The 6630B series offers many advanced programmable features including stored states and status reporting. Programming is done using industry standard SCPI commands via the GPIB or RS-232. Test system integration is further simplified by using the VXI*Plug&Play* drivers. The optional relays simplify system design and troubleshooting.

The optional front panel binding posts make the 6630B series convenient on the R&D lab bench. The built-in microamp measurement system helps the engineer to easily and accurately monitor the output voltage and current without a complicated test setup.

Specifications (at 0° to 55°C unless otherwise specified)			6631B	6632B	6633B	6634B
Number of outputs			1	1	1	1
GPIB			Yes	Yes	Yes	Yes
Output ratings						
Voltage			0 to 8 V	0 to 20 V	0 to 50 V	0 to 100 V
Current			0 to 10 A	0 to 5 A	0 to 2 A	0 to 1 A
Programming accuracy at 25°C ±5°C						
Voltage			5 mV	10 mV	20 mV	50 mV
+ Current		0.05% +	4 mA	2 mA	1 mA	0.5 mA
Ripple and noise (20 Hz to 20 MHz, with outputs ungrounded or with either terminal grounded)						
Voltage normal mode		rms	0.3 mV	0.3 mV	0.5 mV	0.5 mV
		peak-to-peak	3 mV	3 mV	3 mV	3 mV
Fast mode		rms	1 mV	1 mV	1 mV	2 mV
		peak-to-peak	10 mV	10 mV	15 mV	25 mV
Current		rms	3 mA	2 mA	2 mA	2 mA
DC measurement accuracy via GPIB or front panel meters with respect to actual output at 25°C ±5°C						
Voltage		0.03% +	2 mV	3 mV	6 mV	12 mV
Low current range	–20 mA to +20 mA	0.1% +	2.5 µA	2.5 µA	2.5 µA	2.5 µA
High current range	+20 mA to + rated I	0.2% +	1 mA	0.5 mA	0.25 mA	0.25 mA
	–20 mA to –rated I	0.2% +	1.6 mA	1.1 mA	0.85 mA	0.85 mA
Load regulation						
Voltage			2 mV	2 mV	4 mV	5 mV
Current			2 mA	1 mA	1 mA	1 mA
Line regulation						
Voltage			0.5 mV	0.5 mV	1 mV	1 mV
Current			1 mA	0.5 mA	0.25 mA	0.25 mA

Transient response time Less than 100 µs (50 µs in the fast mode) for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV) following any step change in load current of up to 50% of the output current rating of the supply.

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

More detailed specifications at **www.agilent.com/find/6630**

Single-Output: 80-100 W GPIB (Continued)

Specifications

(at 0° to 55°C unless otherwise specified)

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC maximum from chassis ground

Remote sensing: Up to two volts dropped in each load lead. Add 2 mV to the voltage load regulation specification for each one volt change in the positive output lead due to load current change.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 4 ms for the power supplies connected directly to the GPIB. (Display disabled).

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 2 ms (400 µs in fast mode). The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 6 ms (2 ms in the fast mode).

GPIB interface capabilities: IEEE-488.2, SCPI command set and 6630A Series programming compatability

Software driver: VXI*Plug&Play*

Measurement time: Average time to make a voltage or current measurement is 50 ms.

Input power (full load): 3.5 A, 250 W

Regulatory compliance: Complies with EMC directive 89/336/EEC (ISM 1B).

Size: 425.5 mm W x 88.1 mm H x 364.4 mm D (16.8 in x 3.5 in x 14.3 in).

Weight: Net, 12.7 kg (28 lb) net; 15.0 kg (33 lb) shipping

Warranty: One year

Supplemental Characteristics

(Non-warranted characteristics determined by design and useful in applying the product)

	6631B	6632B	6633B	6634B
Average programming resolution				
Voltage	2 mV	5 mV	12.5 mV	25 mV
Current	2.5 mA	1.25 mA	0.5 mA	0.25 mA
Sink current	10 A	5 A	2 A	1 A
Sink current tracking				
SCPI mode	0.4% + 4 mA	0.4% + 2 mA	0.4% + 1 mA	0.4% + 0.5 mA
Compatability mode	-500 mA	-250 mA	-100 mA	-50 mA
Minimum current in constant current mode*	40 mA	20 mA	8 mA	4 mA

*When programming in the 6630A Series language compatibility mode.

Ordering Information

Opt 100 87 to 106 VAC, 47 to 63 Hz

Opt 120 104 to 127 VAC, 47 to 63 Hz

Opt 220 191 to 233 VAC, 47 to 63 Hz

Opt 230 207 to 253 VAC, 47 to 63 Hz

Opt 020 Front-panel binding posts (N/A on 6631B)

Opt 760 Isolation and reversal relays, only available at time of order (N/A on 6631B)

* **Opt 1CM** Rack-mount kit, p/n 5063-9212

* **Opt 1CP** Rack-mount kit with handles, p/n 5063-9219

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B0 Full documentation on CD-ROM only

Opt 0B3 Service manual

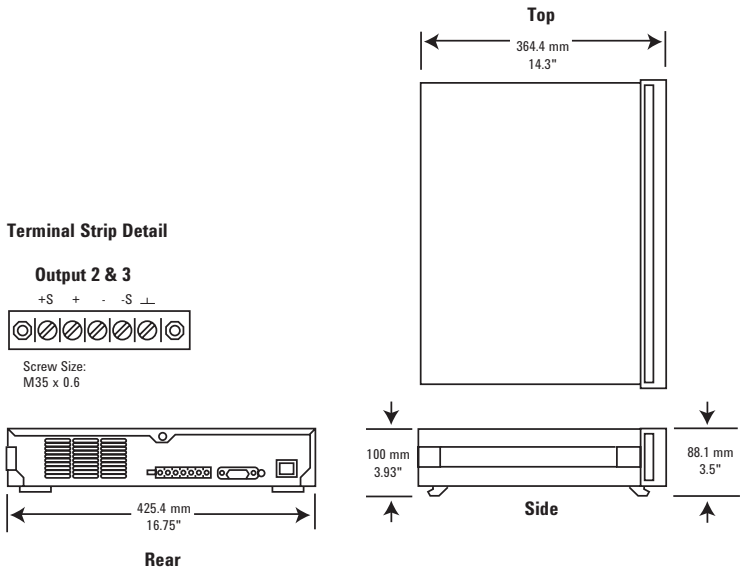
* Support rails required

Accessories

p/n 1494-0060 Rack slide kit

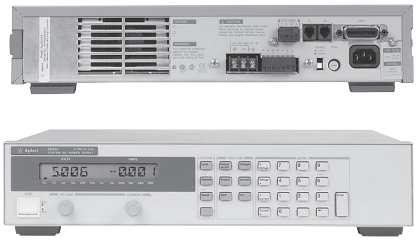
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6631B, 6632B, 6633B, 6634B



More detailed specifications at **www.agilent.com/find/6630**

Single-Output
200 W GPIB



6641A - 6645A

- Fast, low-noise outputs
- Analog control of output voltage and current
- Fan-speed control to minimize acoustic noise
- Parallel and series connections of multiple units
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

This series of 200 W linear-regulated DC power supplies is designed to maximize the throughput of DUTs through the manufacturing test process with fast up and down programming time.

Valuable assemblies can be destroyed by a minor component failure that can allow a surge of voltage or current to flow to the DUT. Fast protection features, including fast crowbar, mode cross-over protection, and the ability to connect the protection circuitry of multiple power supplies can increase production yield.

Programming of the DC output and the protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified be using the VXI*Plug&Play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

Lab bench use is enhanced by the fan speed control, which helps to minimize the acoustic noise.

Specifications (at 0° to 55°C unless otherwise specified)		**6641A**	**6642A**	**6643A**	**6644A**	**6645A**
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V
Output current (40°C)		0 to 20 A	0 to 10 A	0 to 6 A	0 to 3.5 A	0 to 1.5 A
Maximum current (50°C/55°C)		18 A/17 A	9 A/8.5 A	5.4 A/5.1 A	3.2 A/3 A	1.4 A/1.3 A
Programming accuracy at 25°C ±5°C						
Voltage	0.06% +	5 mV	10 mV	15 mV	26 mV	51 mV
Current	0.15% +	26 mA	13 mA	6.7 mA	4.1 mA	1.7 mA
Ripple and noise from 20 Hz to 20 MHz						
Voltage	rms	300 µV	300 µV	400 µV	500 µV	700 µV
	peak-peak	3 mV	3 mV	4 mV	5 mV	7 mV
Current	rms	10 mA	5 mA	3 mA	1.5 mA	1 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed)						
Voltage	0.07% +	6 mV	15 mV	25 mV	40 mV	80 mV
+Current	0.15% +	18 mA	9.1 mA	5 mA	3 mA	1.3 mA
-Current	0.35% +	40 mA	20 mA	12 mA	6.8 mA	2.9 mA
Load regulation						
Voltage		1 mV	2 mV	3 mV	4 mV	5 mV
Current		1 mA	0.5 mA	0.25 mA	0.25 mA	0.25 mA
Line regualtion						
Voltage		0.5 mV	0.5 mV	1 mV	1mV	2 mV
Current		1 mA	0.5 mA	0.25 mA	0.25 mA	0.25 mA

Transient response time Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current

Supplemental Characteristics	(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution					
Voltage	2 mV	5 mV	10 mV	15 mV	30 mV
Current	6 mA	3 mA	2 mA	1.2 mA	0.5 mA
OVP	13 mV	30 mV	54 mV	93 mV	190 mV
OVP accuracy	160 mV	400 mV	700 mV	1.2 V	2.4 V

More detailed specifications at **www.agilent.com/find/6640**

Single-Output: 200 W GPIB (Continued)

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

Modern Connectivity - Using USB and LAN I/O Converters (AN 1475-1)
5989-0123EN

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for the power supplies connected directly to the GPIB

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 15 ms. The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 60 ms.

Down programming: An active down programmer sinks approximately 20% of the rated output current

Modulation: (Analog programming of output voltage and current)
Input Signal: 0 to -5 V
Input Impedance: 10 kΩ nominal

Specifications (at 0° to 55°C unless otherwise specified)		**6641A-J04** Special order option	**6643A-J11** Special order option	**6644A-J09** Special order option	**6645A-J05** Special order option	**6645A-J06** Special order option
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Output voltage		13 V	40 V	70 V	150 V	170 V
Output current (40°C)		15.3 A	5 A	3 A	1.2 A	1 A
Maximum current (50°C/55°C)		13.77 A/13 A	4.5 A/4.25 A	2.7 A/2.55 A	1.08 A/1.02 A	0.9 A/0.85 A
Programming accuracy at 25°C ±5°C						
Voltage	0.06% +	8.5 mV	17.5 mV	31 mV	65 mV	74 mV
Current	0.15% +	21 mA	6.7 mA	4.1 mA	1.7 mA	1.7 mA
Ripple and noise						
from 20 Hz to 20 MHz						
Voltage rms		300 µV	450 µV	600 µV	900 µV	1 mV
peak-peak		3 mV	3.5 mV	6 mV	9 mV	10 mV
Current rms		8 mA	3 mA	1.5 mA	1 mA	1 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed)						
Voltage	0.07% +	10 mV	30 mV	47 mV	100 mV	140 mV
+Current	0.15% +	15 mA	5 mA	3 mA	1.3 mA	1.3 mA
–Current	0.35% +	40 mA	12 mA	6.8 mA	2.9 mA	2.9 mA
Load regulation						
Voltage		1 mV	3 mV	4.5 mV	7 mV	8 mV
Current		1 mA	0.25 mA	0.25 mA	0.25 mA	0.25 mA
Line regulation						
Voltage		0.5 mV	1 mV	1.5 mV	2.5 mV	3 mV
Current		1 mA	0.25 mA	0.25 mA	0.25 mA	0.25 mA

Transient response time Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current

Supplemental Characteristics	(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution					
Voltage	3.5 mV	12 mV	1.4 mV	37.5 mV	42.5 mV
Current	5 mA	2 mA	1.2 mA	0.5 mA	0.5 mA
OVP	23 mV	62 mV	110 mV	250 mV	285 mV
OVP accuracy	260 mV	800 mV	1.5 mV	3 V	3.4 V

More detailed specifications at **www.agilent.com/find/6640**

Single-Output: 200 W GPIB (Continued)

AC input: (AC input frequency 47 to 63 Hz)

Voltage	100 VAC	120 VAC	220 VAC	240 VAC
Current	4.4 A	3.8 A	2.2 A	2.0 A

Input power 480 VA, 400 W at full load; 60 W at no load

GPIB interface capabilities SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, E1, and C0. IEEE-488.2 and SCPI-compatible command set

Software driver:
- IVI-COM
- VXI*Plug&Play*

Regulatory compliance: Complies with UL 3111-1, IEC 61010-1.

Size: 425.5 mm W x 88.1 mm H x 439 mm D (16.75 in x 3.5 in x 17.3 in)

Weight: Net, 14.2 kg (31.4 lb); shipping, 16.3 kg (36 lb)

Warranty: One year

Ordering information

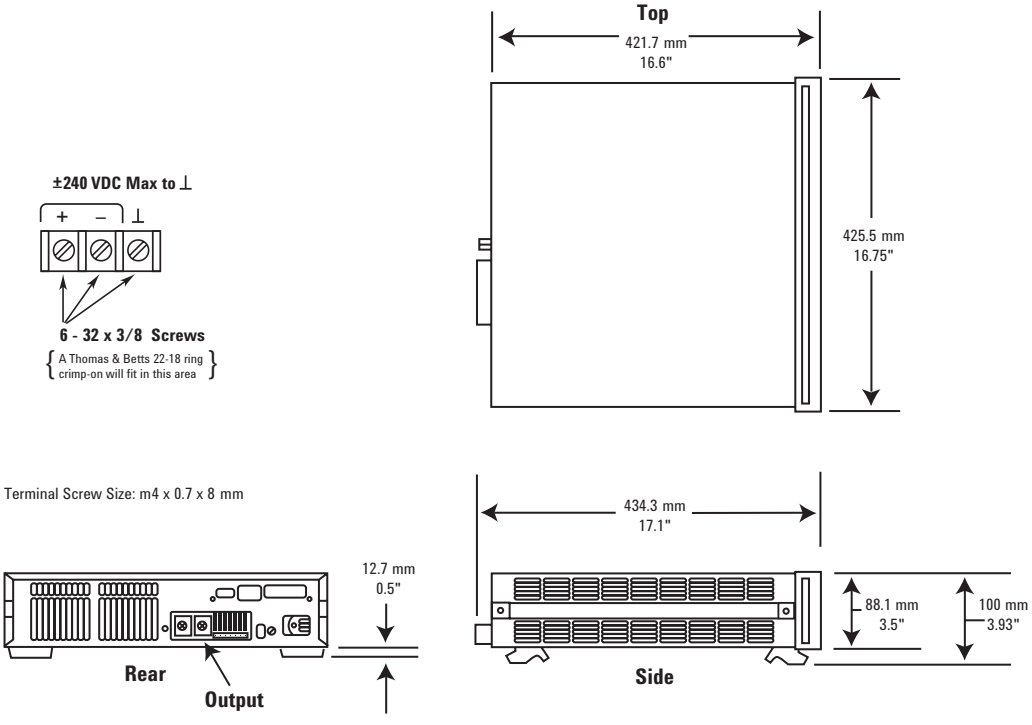
Opt 100 87 to 106 VAC, 47 to 63 Hz
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 63 Hz
Opt 240 209 to 250 VAC, 47 to 63 Hz
* **Opt 908** Rack-mount kit (p/n 5063-9212)
* **Opt 909** Rack-mount kit with handles (p/n 5063-9219)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

Accessories

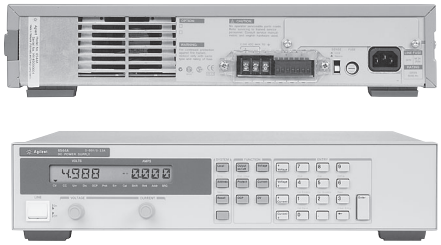
p/n 1494-0060 Accessory slide kit
p/n 1252-3698 7-pin analog plug
p/n 1252-1488 4-pin digital plug
p/n 5080-2148 Serial link cable 2 m (6.6 ft)
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6641A, 6642A, 6643A, 6644A, 6645A



More detailed specifications at **www.agilent.com/find/6640**

Single-Output
200 W



6541A-6545A

- Front panel and analog control of output voltage and current
- Fast, low-noise outputs
- Fan-speed control to minimize acoustic noise
- Protection features to ensure DUT safety

This reliable series of 200 W DC power supplies can be controlled either from the front panel or via an analog programming voltage. When used in a test system, the fast up and down programming helps decrease test time. Quickly reacting protection features, including fast crowbar, CV/CC mode crossover and over-voltage protection help protect your valuable assemblies from damage. The linear topology produces very low ripple and noise, which allows you to make extremely accurate measurements of the devices which you are testing.

Lab bench use is enhanced by the fan speed control, which helps to minimize the acoustic noise.

Specifications (at 0° to 55°C unless otherwise specified)		**6541A**	**6542A**	**6543A**	**6544A**	**6545A**
Number of outputs		1	1	1	1	1
GPIB		No	No	No	No	No
Output ratings						
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V
Output current (40°C)		0 to 20 A	0 to 10 A	0 to 6 A	0 to 3.5 A	0 to 1.5 A
Maximum current (50°C/55°C)		18 A/17 A	9 A/8.5 A	5.4 A/5.1 A	3.2 A/3 A	1.4 A/1.3 A
Programming accuracy	at 25°C ±5°C					
Voltage	0.06% +	5 mV	10 mV	15 mV	26 mV	51 mV
Current	0.14% +	26 mA	13 mA	6.7 mA	4.1 mA	1.7 mA
Ripple and noise						
from 20 Hz to 20 MHz						
Voltage rms		300 µV	300 µV	400 µV	500 µV	700 µV
peak-peak		3 mV	3 mV	4 mV	5 mV	7 mV
Current rms		10 mA	5 mA	3 mA	1.5 mA	1 mA
Load regulation						
Voltage		1 mV	2 mV	3 mV	4 mV	5 mV
Current		1 mA	0.5 mA	0.25 mA	0.25 mA	0.25 mA
Line regulation						
Voltage		0.5 mV	0.5 mV	1 mV	1mV	2 mV
Current		1 mA	0.5 mA	0.25 mA	0.25 mA	0.25 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current				
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution						
Voltage		2 mV	5 mV	10 mV	15 mV	30 mV
Current		6 mA	3 mA	2 mA	1.2 mA	0.5 mA
OVP		13 mV	30 mV	54 mV	93 mV	190 mV
OVP accuracy		160 mV	400 mV	700 mV	1.2 V	2.4 V

More detailed specifications at **www.agilent.com/find/6540**

Single-Output: 200 W (Continued)

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Understanding Linear Power Supply Operation (AN1554)
5989-2291EN

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 15 ms. The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 60 ms.

Down programming: An active down programmer sinks approximately 20% of the rated output current

Modulation: (Analog programming of output voltage and current)
Input Signal: 0 to -5 V
Input Impedance: 10 kΩ nominal

AC input: (AC input frequency 47 to 63 Hz)

Voltage	100 VAC	120 VAC	220 VAC	240 VAC
Current	4.4 A	3.8 A	2.2 A	2.0 A

Input power: 480 VA, 400 W at full load; 60 W at no load

Regulatory compliance: Conforms to UL1244 and IEC 61010-1.

Size: 425.5 mm W x 88.1 mm H x 439 mm D (16.75 in x 3.5 in x 17.3 in)

Weight: Net, 14.2 kg (31.4 lb); shipping, 16.3 kg (36 lb)

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)		**6541A-J04** Special order option	**6544A-J09** Special order option	**6545A-J05** Special order option
Number of outputs		1	1	1
GPIB		No	No	No
Output ratings				
Output voltage		13 V	70 V	150 V
Output current (40°C)		15.3 A	3 A	1.2 A
Maximum current (50°C/55°C)		13.77 A/13 A	2.7 A/2.55 A	1.08 A/1.02 A
Programming accuracy at 25°C ±5°C				
Voltage	0.06% +	8.5 mV	31 mV	65 mV
Current	0.15% +	21 mA	4.1 mA	1.7 mA
Ripple and noise				
from 20 Hz to 20 MHz				
Voltage rms		300 µV	600 µV	900 µV
peak-peak		3 mV	6 mV	9 mV
Current rms		8 mA	1.5 mA	1 mA
Load regulation				
Voltage		1 mV	4.5 mV	7 mV
Current		1 mA	0.25 mA	0.25 mA
Line regulation				
Voltage		0.5 mV	1.5 mV	2.5 mV
Current		1 mA	0.25 mA	0.25 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current		
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)		
Average resolution				
Voltage		3.5 mV	1.4 mV	37.5 mV
Current		5 mA	1.2 mA	0.5 mA
OVP		23 mV	110 mV	250 mV
OVP accuracy		260 mV	1.5 mV	3 V

More detailed specifications at **www.agilent.com/find/6540**

Single-Output: 200 W (Continued)

Ordering information

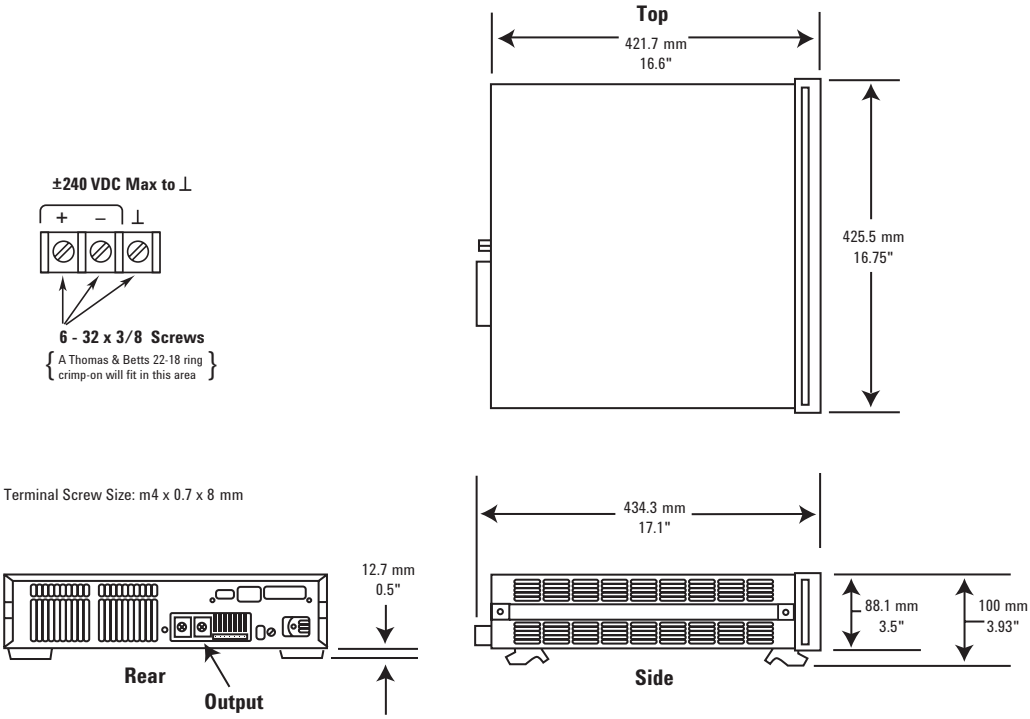
Opt 100 87 to 106 VAC, 47 to 63 Hz
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 63 Hz
Opt 240 209 to 250 VAC, 47 to 63 Hz
* **Opt 908** Rack-mount kit (p/n 5063-9212)
* **Opt 909** Rack-mount kit w/handles (p/n 5063-9219)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

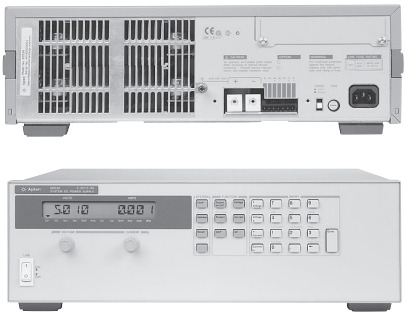
Accessories

p/n 1494-0060 Accessory slide kit
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6541A, 6542A, 6543A, 6544A, 6545A



More detailed specifications at **www.agilent.com/find/6540**



6651A-6655A

Single-Output
500 W GPIB

- Fast, low-noise outputs
- Analog control of output voltage and current
- Fan-speed control to minimize acoustic noise
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

This series of 500 W linear-regulated DC power supplies is designed to maximize the throughput of DUTs through the manufacturing test process with fast up and down programming time.

Valuable assemblies can be destroyed by a minor component failure that causes a surge of current to flow into the DUT. Fast protection features, including fast crowbar, mode crossover protection, and the ability to connect the protection circuitry of multiple power supplies can increase production yield.

Programming of the DC output and the protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified be using the VXI*Plug&Play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

Lab bench use is enhanced by the fan speed control, which helps to minimize the acoustic noise.

Specifications (at 0° to 55°C unless otherwise specified)		**6651A**	**6652A**	**6653A**	**6654A**	**6655A**	**6651A-J01** Special order option
Number of outputs		1	1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes	Yes
Output ratings							
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V	10 V
Output current (40°C)		0 to 50 A	0 to 25 A	0 to 15 A	0 to 9 A	0 to 4 A	50 A
Maximum current (50°C/55°C)		45 A/42.5 A	22.5 A/21.3 A	13.5 A/12.8 A	8.1 A/7.7 A	3.6 A/3.4 A	45 A/42.5 A
Programming accuracy at 25°C ±5°C							
Voltage	0.06% +	5 mV	10 mV	15 mV	26 mV	51 mV	6 mV
Current	0.15% +	60 mA	25 mA	13 mA	8 mA	4 mA	60 mA
Ripple and noise							
from 20 Hz to 20 MHz							
Voltage rms		300 µV	300 µV	400 µV	500 µV	700 µV	300 µV
peak-peak		3 mV	3 mV	4 mV	5 mV	7 mV	3 mV
Current rms		25 mA	10 mA	5 mA	3 mA	2 mA	25 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed) System models only							
Voltage	0.07% +	6 mV	15 mV	25 mV	40 mV	80 mV	7.5 mV
+Current	0.15% +	67 mA	26 mA	15 mA	7 mA	3 mA	67 mA
–Current	0.35% +	100 mA	44 mA	24 mA	15 mA	7 mA	100 mA
Load regulation							
Voltage		1 mV	2 mV	3 mV	4 mV	5 mV	1 mV
Current		2 mA	1 mA	0.5 mA	0.5 mA	0.5 mA	2 mA
Line regulation							
Voltage		0.5 mV	0.5 mV	1 mV	1 mV	2 mV	0.5 mV
Current		2 mA	1 mA	0.75 mA	0.5 mA	0.5 mA	2 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current					
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)					
Average resolution							
Voltage		2 mV	5 mV	10 mV	15 mV	30 mV	2.5 mV
Current		15 mA	7 mA	4 mA	2.5 mA	1.25 mA	15 mA
OVP		12 mV	30 mV	54 mV	93 mV	190 mV	16 mV
OVP accuracy		160 mV	400 mV	700 mV	1.2 V	2.4 V	200 mV

More detailed specifications at **www.agilent.com/find/6650**

Single-Output: 500 W GPIB (Continued)

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Understanding Linear Power Supply Operation
(AN1554)
5989-2291EN

Modern Connectivity - Using USB and LAN I/O Converters
(AN 1475-1)
5989-0123EN

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

Specifications (at 0° to 55°C unless otherwise specified)		**6651A-J03** Special order option	**6651A-J09** Special order option	**6652A-J03** Special order option	**6653A-J04** Special order option	**6653A-J17** Special order option
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Output voltage		6 V	17 V/20 V	27 V	40 V	30 V
Output current (40°C)		60 A	30 A/15 A	18.5 A	12.5 A	17.5 A
Maximum current (50°C/55°C)		54 A/51 A	27 A/25.5 A 13.5 A/12.75 A	16.65 A/15.72 A	11.25 A/10.6 A	15.75 A/14.87 A
Programming accuracy at 25°C ±5°C						
Voltage	0.06% +	5 mV	10 mV	13.5 mV	17.5 mV	15 mV
Current	0.15% +	75 mA	36 mA	25 mA	13 mA	16 mA
Ripple and noise						
from 20 Hz to 20 MHz						
Voltage rms		300 µV	300 µV	450 µV	1.6 mV	400 µV
peak-peak		3 mV	4 mV	4.5 mV	5 mV	4 mV
Current rms		30 mA	13 mA	10 mA	5 mA	6 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed) System models only						
Voltage	0.07% +	6 mV	15 mV	20.5 mV	30 mV	25 mV
+Current	0.15% +	80 mA	40 mA	26 mA	15 mA	18 mA
–Current	0.35% +	150 mA	55 mA	44 mA	24 mA	28 mA
Load regulation						
Voltage		1 mV	2 mV	2 mV	3.5 mV	3 mV
Current		6.5 mA	2 mA	1 mA	1 mA	0.5 mA
Line regulation						
Voltage		0.5 mV	0.5 mV	0.5 mV	1 mV	1 mV
Current		2 mA	2 mA	2 mA	0.75 mA	0.75 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current				
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution						
Voltage		2 mV	5 mV	6.75 mV	12 mV	10 mV
Current		18 mA	9 mA	7 mA	4 mA	5 mA
OVP		12 mV	30 mV	30 mV	65 mV	54 mV
OVP accuracy		160 mV	500 mV	400 mV	750 mV	700 mV

More detailed specifications at **www.agilent.com/find/6650**

Single-Output: 500 W GPIB (Continued)

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for the power supplies connected directly to the GPIB

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 15 ms. The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 60 ms.

Down programming: An active down programmer sinks approximately 20% of the rated output current

Modulation: (Analog programming of output voltage and current)
Input signal: 0 to -5 V
Input impedance: 10 kΩ nominal

AC input: (AC input frequency 47 to 63 Hz)

Voltage	100 VAC	120 VAC	220 VAC	240 VAC
Current	12 A	10 A	5.7 A	5.3 A

Input power: 1,380 VA, 1,100 W at full load; 120 W at no load

GPIB interface capabilities: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, E1, and C0. IEEE-488.2 and SCPI-compatible command set.

Software driver:
- IVI-COM
- VXI*Plug&Play*

Regulatory compliance: Listed to UL 1244; conforms to IEC 61010-1.

Size: 425.5 mm W x 132.6 mm H x 497.8 mm D (16.75 in x 5.22 in x 19.6 in)

Weight: Net, 25 kg (54 lb); shipping, 28 kg (61 lb)

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)		**6654A-J04** Special order option	**6654A-J05** Special order option	**6654A-J12** Special order option	**6655A-J05** Special order option	**6655A-J10** Special order option
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Output voltage		70 V	50 V	80 V	150 V	156 V
Output current (40°C)		7.5 A	10 A	6 A	3.2 A	3 A
Maximum current (50°C/55°C)		6.75 A/6.37 A	9 A/8.5 A	5.4 A/5.1 A	2.88 A/2.72 A	2.7 A/2.55 A
Programming accuracy at 25°C ±5°C						
Voltage	0.06% +	30 mV	26 mV	35 mV	64 mV	71 mV
Current	0.15% +	7 mA	9 mA	7 mA	3.5 mA	4 mA
Ripple and noise from 20 Hz to 20 MHz						
Voltage rms		600 µV	500 µV	700 µV	800 µV	900 µV
peak-peak		6 mV	5 mV	7 mV	8 mV	8 mV
Current rms		5 mA	4 mA	3 mA	2 mA	3 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed) System models only						
Voltage	0.07% +	50 mV	40 mV	58 mV	100 mV	110 mV
+Current	0.15% +	6 mA	8 mA	6 mA	2.5 mA	3 mA
–Current	0.35% +	13 mA	17 mA	16 mA	6.5 mA	7.5 mA
Load regulation						
Voltage		4 mV	4 mV	4 mV	6 mV	7 mV
Current		0.5 mA	0.5 mA	0.5 mA	0.5 mA	1 mA
Line regulation						
Voltage		1 mV	1 mV	4.5 mV	2 mV	2 mV
Current		0.5 mA	0.5 mA	0.5 mA	0.5 mA	1 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current				
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution						
Voltage		17.5 mV	15 mV	20 mV	37.5 mV	39.5 mV
Current		1.9 mA	2.75 mA	1.7 mA	8 mA	8 mA
OVP		110 mV	93 mV	130 mV	240 mV	250 mV
OVP accuracy		1.4 V	1.2 V	1.6 V	3 V	3.3 V

More detailed specifications at **www.agilent.com/find/6650**

Single-Output: 500 W GPIB (Continued)

Ordering information

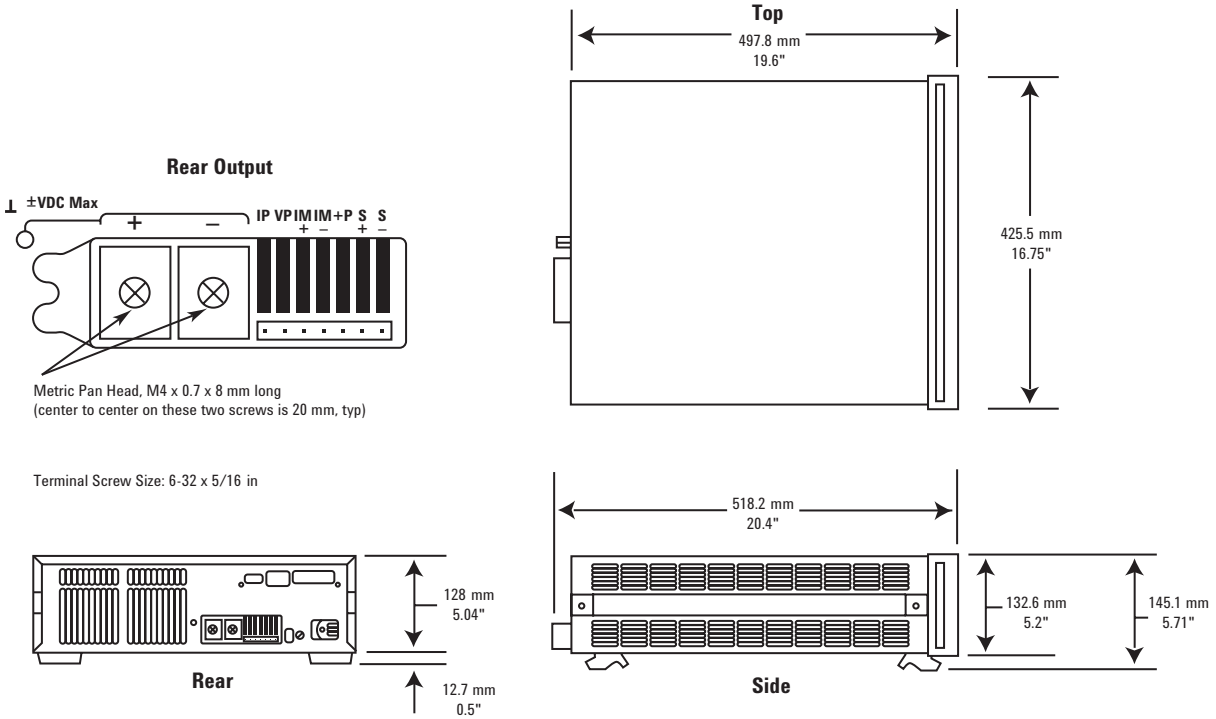
Opt 100 87 to 106 VAC, 47 to 63 Hz
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 63 Hz
Opt 240 209 to 250 VAC, 47 to 63 Hz
* **Opt 908** Rack-mount kit (p/n 5062-3977)
* **Opt 909** Rack-mount kit w/handles (p/n 5063-9221)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

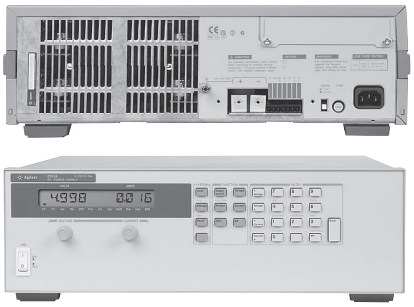
Accessories

p/n 1494-0059 Accessory slide kit
p/n 1252-3698 7-pin analog plug
p/n 1252-1488 4-pin digital plug
p/n 5080-2148 Serial link cable 2 m (6.6 ft)
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6651A, 6652A, 6653A, 6654A, 6655A



More detailed specifications at **www.agilent.com/find/6650**



6551A-6555A

Single-Output
500 W

Front panel and analog control of output voltage and current

Fast, low-noise outputs

Fan-speed control to minimize acoustic noise

Protection features to ensure DUT safety

This reliable series of 500 W DC power supplies can be controlled either from the front panel or via an analog programming voltage. When used in a test system, the fast up and down programming helps decrease test time. Quickly reacting protection features, including fast crowbar, CV/CC mode crossover and over-voltage protection help protect your valuable assemblies from damage. The linear topology produces very low ripple and noise, which allows you to make extremely accurate measurements of the devices which you are testing.

Lab bench use is enhanced by the fan speed control, which helps to minimize the acoustic noise.

Specifications (at 0° to 55°C unless otherwise specified)		6551A	6552A	6553A	6554A	6555A
Number of outputs		1	1	1	1	1
GPIB		No	No	No	No	No
Output ratings						
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V
Output current (40°C)		0 to 50 A	0 to 25 A	0 to 15 A	0 to 9 A	0 to 4 A
Maximum current (50°C/55°C)		45 A/42.5 A	22.5 A/21.3 A	13.5 A/12.8 A	8.1 A/7.7 A	3.6 A/3.4 A
Programming accuracy at 25°C ±5°C						
Voltage	0.06% +	5 mV	10 mV	15 mV	26 mV	51 mV
Current	0.15% +	60 mA	25 mA	13 mA	8 mA	4 mA
Ripple and noise from 20 Hz to 20 MHz						
Voltage rms		300 µV	300 µV	400 µV	500 µV	700 µV
peak-peak		3 mV	3 mV	4 mV	5 mV	7 mV
Current rms		25 mA	10 mA	5 mA	3 mA	2 mA
Load regulation						
Voltage		1 mV	2 mV	3 mV	4 mV	5 mV
Current		2 mA	1 mA	0.5 mA	0.5 mA	0.5 mA
Line regulation						
Voltage		0.5 mV	0.5 mV	1 mV	1 mV	2 mV
Current		2 mA	1 mA	0.75 mA	0.5 mA	0.5 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current				
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution						
Voltage		2 mV	5 mV	10 mV	15 mV	30 mV
Current		15 mA	7 mA	4 mA	2.5 mA	1.25 mA
OVP		12 mV	30 mV	54 mV	93 mV	190 mV
OVP accuracy		160 mV	400 mV	700 mV	1.2 V	2.4 V

More detailed specifications at **www.agilent.com/find/6550**

Single-Output: 500 W (Continued)

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Understanding Linear Power Supply Operation
(AN1554)
5989-2291EN

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

Specifications (at 0° to 55°C unless otherwise specified)		**6551A-J01** Special order option	**6551A-J03** Special order option	**6553A-J04** Special order option	**6553A-J17** Special order option
Number of outputs		1	1	1	1
GPIB		No	No	No	No
Output ratings					
Output voltage		10 V	6 V	40 V	30 V
Output current (40°C)		50 A	60 A	12.5 A	17.5 A
Maximum current (50°C/55°C)		45 A/42.5 A	54 A/51 A	11.25 A/10.6 A	15.75 A/14.87 A
Programming accuracy at 25°C ±5°C					
Voltage	0.06% +	6 mV	5 mV	17.5 mV	15 mV
Current	0.15% +	60 mA	75 mA	13 mA	16 mA
Ripple and noise from 20 Hz to 20 MHz					
Voltage rms		300 µV	300 µV	1.6 mV	400 µV
peak-peak		3 mV	3 mV	5 mV	4 mV
Current rms		25 mA	30 mA	5 mA	6 mA
Load regulation					
Voltage		1 mV	1 mV	3.5 mV	3 mV
Current		2 mA	6.5 mA	1 mA	0.5 mA
Line regulation					
Voltage		0.5 mV	0.5 mV	1 mV	1 mV
Current		2 mA	2 mA	0.75 mA	0.75 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current			
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)			
Average resolution					
Voltage		2.5 mV	2 mV	12 mV	10 mV
Current		15 mA	18 mA	4 mA	5 mA
OVP		16 mV	12 mV	65 mV	54 mV
OVP accuracy		200 mV	160 mV	750 mV	700 mV

More detailed specifications at **www.agilent.com/find/6550**

Single-Output: 500 W (Continued)

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 15 ms. The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 60 ms.

Down programming: An active down programmer sinks approximately 20% of the rated output current

Modulation: (Analog programming of output voltage and current)
Input signal: 0 to -5 V
Input impedance: 10 kΩ nominal

AC input: (AC input frequency 47 to 63 Hz)

Voltage	100 VAC	120 VAC	220 VAC	240 VAC
Current	12 A	10 A	5.7 A	5.3 A

Input power: 1,380 VA, 1,100 W at full load; 120 W at no load

Regulatory compliance: Listed to UL 1244; certified to CSA556B; conforms to IEC 61010-1.

Size: 425.5 mm W x 132.6 mm H x 497.8 mm D (16.75 in x 5.22 in x 19.6 in)

Weight: Net, 25 kg (54 lb); shipping, 28 kg (61 lb)

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)		**6554A-J04** Special order option	**6554A-J05** Special order option	**6554A-J12** Special order option	**6555A-J10** Special order option
Number of outputs		1	1	1	1
GPIB		No	No	No	No
Output ratings					
Output voltage		70 V	50 V	80 V	156 V
Output current (40°C)		7.5 A	10 A	6 A	3 A
Maximum current (50°C/55°C)		6.75 A/6.37 A	9 A/8.5 A	5.4 A/5.1 A	2.7 A/2.55 A
Programming accuracy at 25°C ±5°C					
Voltage	0.06% +	38 mV	26 mV	35 mV	71 mV
Current	0.15% +	7 mA	9 mA	7 mA	4 mA
Ripple and noise from 20 Hz to 20 MHz					
Voltage rms		600 µV	500 µV	700 µV	900 µV
peak-peak		6 mV	5 mV	5 mV	8 mV
Current rms		5 mA	4 mA	3 mA	3 mA
Load regulation					
Voltage		4 mV	4 mV	4 mV	7 mV
Current		0.5 mA	0.5 mA	0.5 mA	1 mA
Line regulation					
Voltage		1 mV	1 mV	4.5 mV	2 mV
Current		0.5 mA	0.5 mA	0.5 mA	1 mA
Transient response time		Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current			
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)			
Average resolution					
Voltage		17.5 mV	15 mV	20 mV	39.5 mV
Current		1.9 mA	2.75 mA	1.7 mA	8 mA
OVP		110 mV	93 mV	130 mV	250 mV
OVP accuracy		1.4 V	1.2 V	1.6 V	3.3 V

More detailed specifications at **www.agilent.com/find/6550**

Single-Output: 500 W (Continued)

Ordering Information

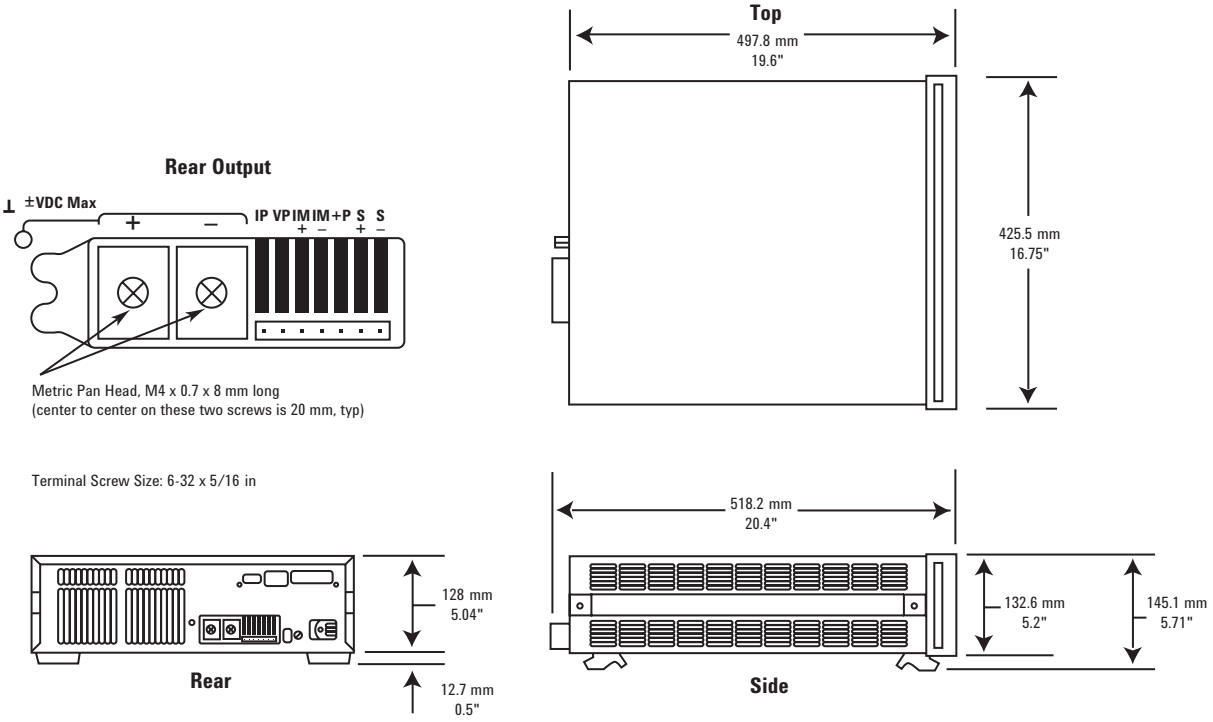
Opt 100 87 to 106 VAC, 47 to 63 Hz
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 63 Hz
Opt 240 209 to 250 VAC, 47 to 63 Hz
* **Opt 908** Rack-mount kit (p/n 5062-3977)
* **Opt 909** Rack-mount kit w/handles (p/n 5063-9221)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

Accessories

p/n 1494-0059 Accessory slide kit
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6551A, 6552A, 6553A, 6554A, 6555A



More detailed specifications at **www.agilent.com/find/6550**

6671A - 6675A

Single-Output
2000 W GPIB

- Fast, low-noise outputs
- Analog control of output voltage and current
- Fan-speed control to minimize acoustic noise
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

This series of 2000 watt DC power supplies has the exceptional, proven reliability that test system engineers look for. It also has the unusual combination of high efficiency and low noise operation.

Programming of the DC output and the extensive protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified be using the VXI*Plug&Play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

Lab-bench use is enhanced by the fan-speed control, which minimizes acoustic noise. The extremely low ripple and noise helps the built-in measurement system make extremely accurate current and voltage measurements.

Specifications (at 0° to 55°C unless otherwise specified)		**6671A**	**6672A**	**6673A**	**6674A**	**6675A**
Number of outputs		1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes
Output ratings						
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V
Output current		0 to 220 A	0 to 100 A	0 to 60 A	0 to 35 A	0 to 18 A
Programming accuracy at 25°C ±5°C						
Voltage	0.04% +	8 mV	20 mV	35 mV	60 mV	120 mV
Current	0.1% +	125 mA	60 mA	40 mA	25 mA	12 mA
Ripple and noise						
from 20 Hz to 20 MHz						
Voltage rms		650 µV	750 µV	800 µV	1.25 mV	1.9 mV
Voltage peak to peak		7 mV	9 mV	9 mV	11 mV	16 mV
Current rms		200 mA	100 mA	40 mA	25 mA	12 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed)						
Voltage	0.05% +	12 mV	30 mV	50 mV	90 mV	180 mV
±Current	0.1% +	150 mA	100 mA	60 mA	35 mA	18 mA
Load and line regulation						
Voltage	0.002%+	300 µV	650 µV	1.2 mV	2 mV	4 mV
Current	0.005%+	10 mA	7 mA	4 mA	2 mA	1 mA
Transient response time		Less than 900 µs for the output voltage to recover 100 mV following a change in load from 100% to 50% or 50% to 100% of the output current rating of the supply				
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution						
Voltage		2 mV	5 mV	10 mV	15 mV	30 mV
Current		55 mA	25 mA	15 mA	8.75 mA	4.5 mA
OVP		15 mV	35 mV	65 mV	100 mV	215 mV
Output Voltage programming response time*						
(excluding command processing time)		30 ms	60 ms	130 ms	130 ms	195 ms

* Full load programming rise/fall time (10% to 90% or 90% to 10%) with full resistive load equal to rated output voltage/rated output current.

More detailed specifications at **www.agilent.com/find/6670**

Single-Output: 2000 W GPIB (Continued)

Application notes

6671A/72A/81A/82A/90A System DC Power Supplies Product Overview
5988-3050EN

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Specifications (at 0° to 55°C unless otherwise specified)		**6671A-J03** Special order option	**6671A-J04** Special order option	**6671A-J08** Special order option	**6671A-J17** Special order option	**6672A-J04** Special order option	**6673A-J03** Special order option
Number of outputs		1	1	1	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes	Yes
Output ratings							
Output voltage		14 V	10 V	3 V	15 V	24 V	37.5 V
Output current		150 A	200 A	300 A	120 A	85 A	45 A
Programming accuracy at 25°C ±5°C							
Voltage	0.04%+	14 mV	10 mV	4 mV	15 mV	25 mV	37.5 mV
Current	0.1%+	90 mA	125 mA	250 mA	90 mA	60 mA	40 mA
Ripple and noise							
from 20 Hz to 20 MHz							
Voltage rms		1.5 mV	750 µV	1 mV	1.5 mV	1 mV	800 µV
Voltage peak to peak		15 mV	9 mV	25 mV	15 mV	11 mV	9 mV
Current rms		150 mA	200 mA	275 mA	150 mA	100 mA	40 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed) System models only							
Voltage	0.05% +	25 mV	15 mV	6 mV	27 mV	40 mV	53.5 mV
±Current	0.1% +	110 mA	150 mA	250 mA	110 mA	100 mA	60 mA
Load and line regulation							
Voltage	0.002%+	600 µV	300 µV	300 µV	650 µV	650 µV	1.2 mV
Current	0.005%+	7 mA	10 mA	15 mA	7 mA	7 mA	4 mA
Transient response time		Less than 900 µs for the output voltage to recover 100 mV following a change in load from 100% to 50% or 50% to 100% of the output current rating of the supply					
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)					
Average resolution							
Voltage		4 mV	2.5 mV	1 mV	4 mV	6 mV	10 mV
Current		40 mA	55 mA	75 mA	35 mA	22 mA	15 mA
OVP		28 mV	20 mV	8 mV	30 mV	42 mV	65 mV
Output voltage programming response time*							
(excluding command programming processing time)		30 ms	35 ms	30 ms	35 ms	70 ms	130 ms

* Full load programming rise/fall time (10% to 90% or 90% to 10%) with full resistive load equal to rated output voltage/rated output current.

More detailed specifications at **www.agilent.com/find/6670**

Single-Output: 2000 W GPIB (Continued)

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Output common-mode noise current: (to signal ground binding post) 500 µArms, 4 mA peak-to-peak

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for the power supplies connected directly to the GPIB.

Modulation: (Analog programming of output voltage and current)
- **Input signal:** 0 to -4 V for voltage, 0 to 7 V for current
- **Input impedance:** 60 kΩ or greater

Input power: 3,800 VA, 2,600 W at full load; 170 W at no load

GPIB interface capabilities: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, E1, and C0. IEEE-488.2 and SCPI-compatible command set

Software driver:
- IVI-COM
- VXI*Plug&Play*

Regulatory compliance: Listed to UL1244; certified to CSA556B; conforms to IEC 61010-1.

Size: 425.5 mm W x 132.6 mm H x 640 mm D (16.75 in x 5.22 in x 25.2 in)

Weight: Net, 28.2 kg (62 lbs); shipping, 31.8 kg (70 lbs)

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)	**6673A-J08** Special order option	**6674A-J03** Special order option	**6674A-J07** Special order option	**6675A-J04** Special order option	**6675A-J06** Special order option
Number of outputs	1	1	1	1	1
GPIB	Yes	Yes	Yes	Yes	Yes
Output ratings					
Output voltage	40 V	56 V	50 V	160 V	135 V
Output current	50 A	38 A	42 A	13 A	16 A
Programming accuracy at 25°C ±5°C					
Voltage 0.04%+	40 mV	60 mV	60 mV	160 mV	125 mV
Current 0.1%+	35 mA	28 mA	30 mA	10 mA	12 mA
Ripple and noise					
from 20 Hz to 20 MHz					
Voltage rms	1 mV	1.25 mV	1.25 mV	2.8 mV	2 mV
Voltge peak to peak	10.5 mV	11 mV	11 mV	20 mV	18 mV
Current rms	40 mA	28 mA	25 mA	18 mA	12 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed) System models only					
Voltage 0.05%+	60 mV	90 mV	90 mV	240 mV	185 mV
±Current 0.1%+	60 mA	38 mA	42 mA	14 mA	18 mA
Load and line regulation					
Voltage 0.002%+	1.4 mV	2 mV	2 mV	6 mV	4 mV
Current 0.005%+	4 mA	2 mA	2 mA	1 mA	4 mV
Transient response time	Less than 900 µs for the output voltage to recover 100 mV following a change in load from 100% to 50% or 50% to 100% of the output current rating of the supply				
Supplemental Characteristics	(Non-warranted characteristics determined by design and useful in applying the product)				
Average resolution					
Voltage	10.5 mV	14 mV	12 mV	40 mV	34 mV
Current	12.5 mA	9.5 mA	11 mA	3.25 mA	4 mA
OVP	75 mV	100 mV	85 mV	300 mV	242 mV
Output voltage programming response time*					
(excluding command programming processing time)	130 ms	130 ms	130 ms	280 ms	250 ms

* Full load programming rise/fall time (10% to 90% or 90% to 10%) with full resistive load equal to rated output voltage/rated output current.

More detailed specifications at **www.agilent.com/find/6670**

Single-Output: 2000 W GPIB (Continued)

Ordering information

Opt 200 174 to 220 VAC, 47 to 63 Hz (Japan only)

Opt 230 191 to 250 VAC, 47 to 63 Hz

* **Opt 908** Rack-mount kit (p/n 5062-3977)

* **Opt 909** Rack-mount kit w/handles (p/n 5063-9221)

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B0 Full documentation on CD-ROM only

Opt 0B3 Service manual

A line cord option must be specified, see the AC line voltage and cord section.

* Support rails required

Accessories

p/n 1494-0059 Accessory slide kit

p/n 1252-3698 7-pin analog plug

p/n 1252-1488 4-pin digital plug

p/n 5080-2148 Serial link cable 2 m (6.6 ft)

E3663AC Support rails for Agilent rack cabinets

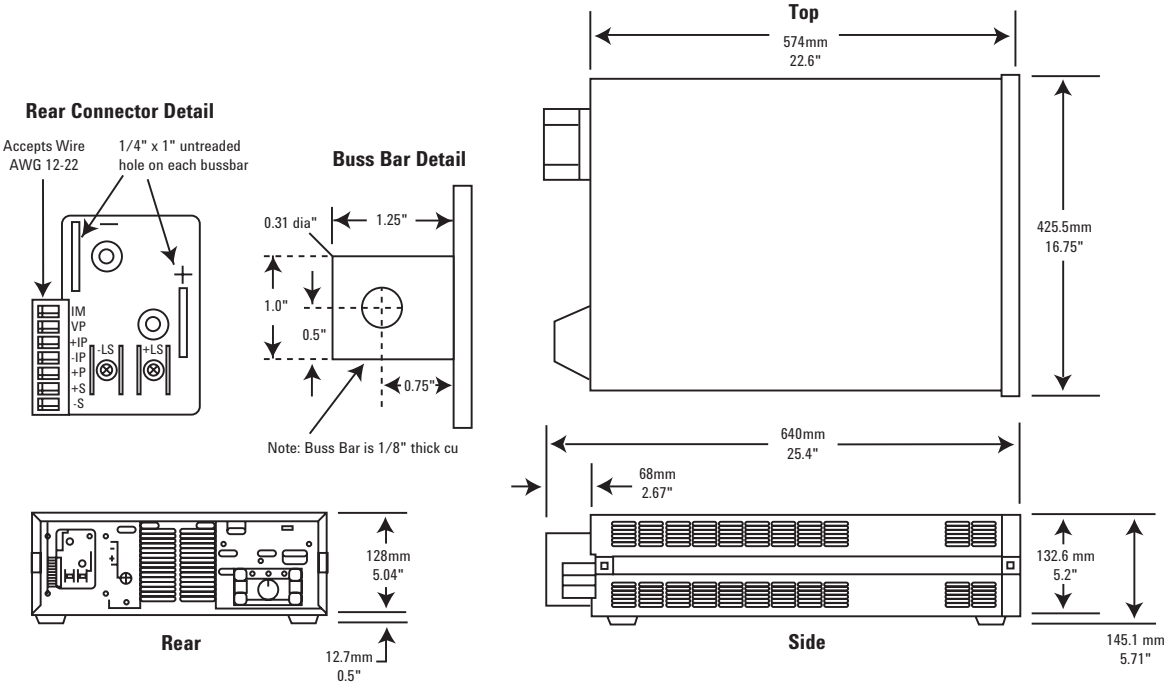
Specifications (at 0° to 55°C unless otherwise specified)		**6675A-J07** Special order option	**6675A-J08** Special order option	**6675A-J09** Special order option	**6675A J11** Special order option
Number of outputs		1	1	1	1
GPIB		Yes	Yes	Yes	Yes
Output ratings					
Output voltage		200 V	100 V	110 V	150 V
Output current		11 A	22 A	20 A	15 A
Programming accuracy at 25°C ±5°C					
Voltage	0.04%+	200 mV	120 mV	120 mV	150 mV
Current	0.1%+	8 mA	15 mA	13.5 mA	11 mA
Ripple and noise					
from 20 Hz to 20 MHz					
Voltage rms		3.5 mV	1.9 mV	1.9 mV	2.5 mV
Voltge peak to peak		25 mV	16 mV	16 mV	18 mV
Current rms		15 mA	15 mA	13.5 mA	12 mA
Readback accuracy at 25°C ±5°C (percent of reading plus fixed) System models only					
Voltage	0.05%+	300 mV	180 mV	180 mV	225 mV
±Current	0.1%+	12 mA	22 mA	20 mA	15 mA
Load and line regulation					
Voltage	0.002% +	7 mV	4 mV	4 mV	6 mV
Current	0.005% +	1 mA	4 mV	4 mV	1 mA
Transient response time		Less than 900 µs for the output voltage to recover 100 mV following a change in load from 100% to 50% or 50% to 100% of the output current rating of the supply			
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)			
Average resolution					
Voltage		50 mV	30 mV	30 mV	37.5 mV
Current		2.75 mA	4.5 mA	4.5 mA	3.75 mA
OVP		360 mV	215 mV	215 mV	270 mV
Output voltage programming response time*					
(excluding command programming processing time)		350 ms	195 ms	195 ms	250 ms

* Full load programming rise/fall time (10% to 90% or 90% to 10%) with full resistive load equal to rated output voltage/rated output current.

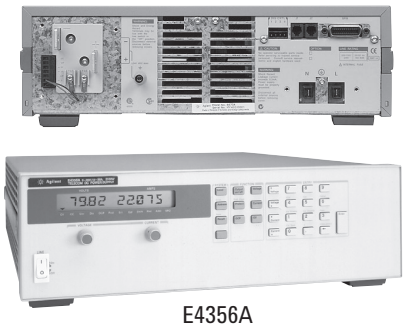
More detailed specifications at **www.agilent.com/find/6670**

Single-Output: 2000 W GPIB (Continued)

Agilent Models: 6671A, 6672A, 6673A, 6674A, 6675A



More detailed specifications at **www.agilent.com/find/6670**



E4356A

Single-Output
2000 W GPIB

Dual range output
Fast, low-noise outputs
Analog control of output voltage and current
Fan-speed control to minimize acoustic noise
Built-in measurements and advanced programmable features
Protection features to ensure DUT safety

This 2000 W DC power supply provides over 2000 watts at either 70 or 80 volts. This makes it particularly suitable for a variety of test scenarios for 48 volt systems. Telephone network equipment is one example of such a 48 volt bus application. It also has the unusual combination of high efficiency and low noise operation.

Programming of the DC output and the extensive protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified by using the VXI*Plug&Play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

Lab-bench use is enhanced by the fan-speed control, which minimizes acoustic noise. The extremely low ripple and noise helps the built-in measurement system make extremely accurate current and voltage measurements.

Specifications (at 0° to 55°C unless otherwise specified)	**E4356A**
Number of outputs	1
GPIB	Yes
Output ratings	
Voltage	0 to 70 V/0 to 80 V
Current	0 to 30 A/0 to 26 A
Programming accuracy at 25°C ±5°C (% of setting plus fixed)	
Voltage	0.04% + 80 mV
+Current	0.1% + 25 mA
Ripple and noise	
20 Hz to 20 MHz	
Voltage rms	2 mV
peak-peak	16 mV
Current rms	25 mA
DC measurement accuracy (via GPIB or front panel meters with respect to actual output at 25°C ±5°C	
Voltage	0.05% + 120 mV
Current	0.1% + 35 mA
Transient response time Time for the output voltage to recover to within 20 mV or 0.1% of the voltage rating of the unit following a change in load current of up to 50% of the output current rating.	<900 µs

Application notes

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC maximum from chassis ground.

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

More detailed specifications at **www.agilent.com/find/E4356**

Single-Output: 2000 W GPIB
(Continued)

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for the power supplies connected directly to the GPIB. (Display disabled.)

Output voltage rise time/fall time: 100 ms/200 ms for output to change from 90% to 10% or from 10% to 90% of its total excursion with full resistive load (excludes command processing time).

Modulation: (Analog programming of output voltage and current)
Input signal: 0 to -4 V for voltage and current
Input impedance: 60 kΩ nominal

Input power: 3800 VA, 2600 W at full load; 100 W at no load

GPIB interface capabilities: SH1, AH1, TE6, LE4, SR1, RL1, PP0, DC1, DT1, E1 and C0. IEEE-488.2 and SCPI-compatible command set

Software driver:
- IVI-COM
- VXI*Plug&Play*

Regulatory compliance: Listed to UL1244; certified to CSA556B, conforms to EN61010.

Warranty: One year

Size: 425.5 mm W x 132.6 mm H x 640 mm D
See page 102 for more details

Weight: 27.7 kg (61 lbs) net, 31.4 kg (69 lbs) shipping.

Ordering information

Opt 200 174 to 220 VDC, 47 to 63 Hz (Japan only)
Opt 230 191 to 250 VDC, 47 to 63 Hz
* **Opt 908** Rack-mount kit (p/n 5062-3977)
* **Opt 909** Rack-mount kit w/handles (p/n 5063-9221)

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

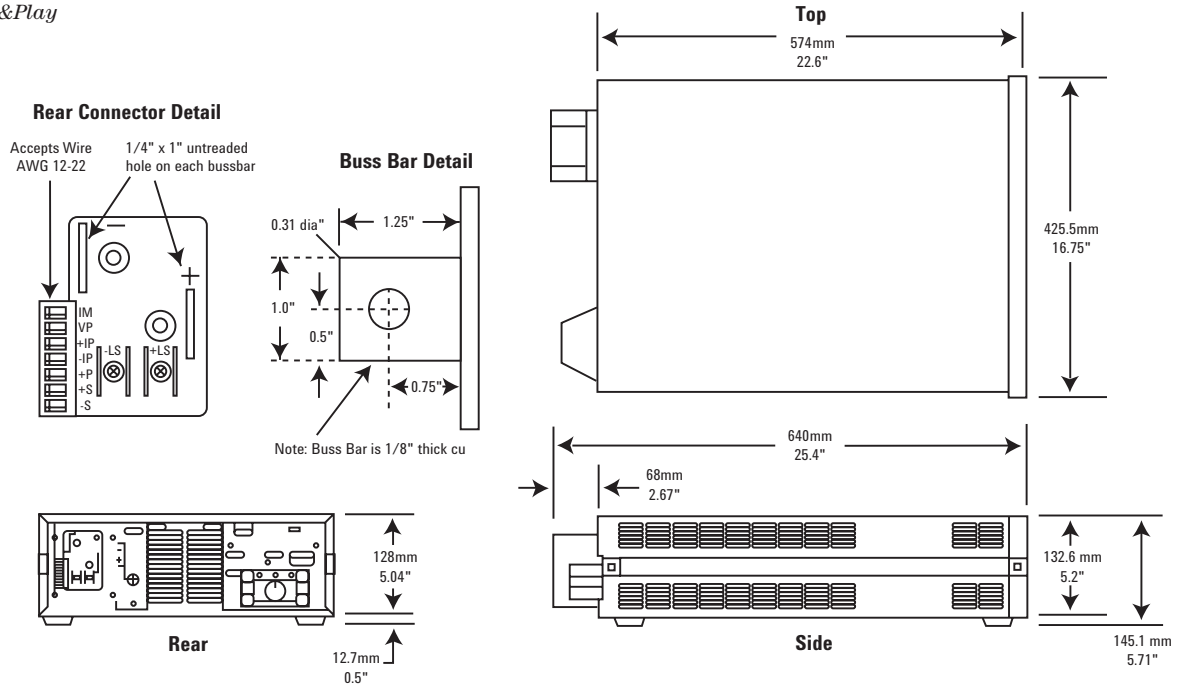
A line cord option must be specified, see the AC line voltage and cord section.

* Support rails required

Accessories

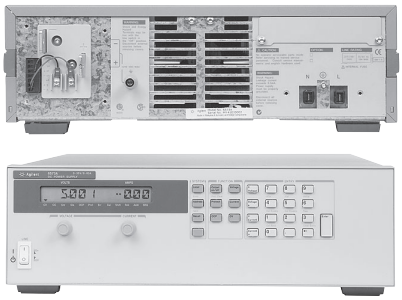
p/n 1494-0059 Accessory slide kit
p/n 1252-3698 7-pin analog plug
p/n 1252-1488 4-pin digitial plug
p/n 5080-2148 Serial link cable 2 m (6.6 ft)
E3663AC Support rails for Agilent rack cabinets

Agilent Models: E4356A



More detailed specifications at **www.agilent.com/find/E4356**

Single-Output
2000 W



6571A-6575A

- Front panel and analog control of output voltage and current
- Fast, low-noise outputs
- Fan-speed control to minimize acoustic noise
- Protection features to ensure DUT safety

This series of 2000 watt DC power supplies has the exceptional, proven reliability that test system engineers look for. It also has the unusual combination of high efficiency and low noise operation.

These DC power supplies can be controlled either from the front panel or via an analog programming voltage. When used in a test system, the fast up and down programming helps decrease test time. Quickly reacting protection features, including CV/CC mode crossover and over-voltage protection help protect your valuable assemblies from damage.

Lab-bench use is enhanced by the fan-speed control, which minimizes acoustic noise. The extremely low ripple and noise helps the test engineer make extremely accurate current and voltage measurements.

Specifications (at 0° to 55°C unless otherwise specified)		6571A	6572A	6573A	6574A	6575A	6571A-J03 Special order option
Number of outputs		1	1	1	1	1	1
GPIB		No	No	No	No	No	No
Output ratings							
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V	14 V
Output current		0 to 220 A	0 to 100 A	0 to 60 A	0 to 35 A	0 to 18 A	150 A
Programming accuracy at 25°C ±5°C							
Voltage	0.04% +	8 mV	20 mV	35 mV	60 mV	120 mV	14 mV
Current	0.1% +	125 mA	60 mA	40 mA	25 mA	12 mA	90 mA
Ripple and noise from 20 Hz to 20 MHz							
Voltage rms		650 µV	750 µV	800 µV	1.25 mV	1.9 mV	1.5 mV
peak-peak		7 mV	9 mV	9 mV	11 mV	16 mV	15 mV
Current rms		200 mA	100 mA	40 mA	25 mA	12 mA	150 mA
Load regulation and line regulation							
Voltage	0.002%+	300 µV	650 µV	1.2 mV	2 mV	4 mV	600 µV
Current	0.005%+	10 mA	7 mA	4 mA	2 mA	1 mA	7 mA
Transient response time		Less than 900 µs for the output voltage to recover 100 mV following a change in load from 100% to 50% or 50% to 100% of the output current rating of the supply					
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)					
Average resolution							
Voltage		2 mV	5 mV	9 mV	15 mV	30 mV	4 mV
Current		55 mA	25 mA	15 mA	8.75 mA	4.5 mA	40 mA
OVP		15 mV	35 mV	65 mV	100 mV	215 mV	28 mV
Output voltage programming response time*							
*Full load programming rise/fall time (10% to 90% or 90% to 10%) with full resistive load equal to rated output voltage/rated output current.		30 ms	60 ms	130 ms	130 ms	195 ms	30 ms

More detailed specifications at **www.agilent.com/find/6570**

Single-Output: 2000 W (Continued)

Application notes

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Output common-mode noise current: (to signal ground binding post) 500 µArms, 4 mA peak-to-peak

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Modulation: (Analog programming of output voltage and current)
Input signal: 0 to -4 V for voltage, 0 to 7 V for current
Input impedance: 30 kΩ or greater

Input power: 3,800 VA, 2,600 W at full load; 170 W at no load

Regulatory compliance: Listed to UL1244; certified to CSA556B; conforms to IEC 61010-1.

Size: 425.5 mm W x 132.6 mm H x 640 mm D (16.75 in x 5.22 in x 25.2 in)

Weight: Net, 28.2 kg (62 lb); shipping, 31.8 kg (70 lb)

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)		**6571A-J04** Special order option	**6571A-J17** Special order option	**6573A-J03** Special order option	**6573A-J08** Special order option	**6574A-J03** Special order option	**6574A-J07** Special order option
Number of outputs		1	1	1	1	1	1
GPIB		No	No	No	No	No	No
Output ratings							
Output voltage		10 V	15 V	37.5 V	40 V	56 V	50 V
Output current		200 A	120 A	45 A	50 A	38 A	42 A
Programming accuracy at 25°C ±5°C							
Voltage	0.04% +	10 mV	15 mV	37.5 mV	40 mV	60 mV	60 mV
Current	0.1% +	125 mA	90 mA	40 mA	35 mA	28 mA	30 mA
Ripple and noise from 20 Hz to 20 MHz							
Voltage rms		750 µV	1.5 mV	800 µV	1 mV	1.25 mV	1.25 mV
peak-peak		9 mV	15 mV	9 mV	10.5 mV	11 mV	11 mV
Current rms		200 mA	150 mA	40 mA	40 mA	28 mA	25 mA
Load regulation and line regulation							
Voltage	0.002%+	300 uV	650 uV	1.2 mV	1.4 mV	2 mV	2 mV
Current	0.005%+	10 mA	7 mA	4 mA	4 mA	2 mA	2 mA
Transient response time		Less than 900 µs for the output voltage to recover 100 mV following a change in load from response time 100% to 50% or 50% to 100% of the output current rating of the supply					
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)					
Average resolution							
Voltage		2.5 mV	4 mV	10 mV	10.5 mV	14 mV	12 mV
Current		55 mA	35 mA	15 mA	12.5 mA	9.5 mA	11 mA
OVP		20 mV	30 mV	65 mV	75 mV	100 mV	85 mV
Output voltage programming response time*							
*Full load programming rise/fall time (10% to 90% or 90% to 10%) with full resistive load equal to rated output voltage/rated output current.		35 ms	35 ms	130 ms	130 ms	130 ms	130 ms

More detailed specifications at **www.agilent.com/find/6570**

Single-Output: 2000 W (Continued)

Ordering information

Opt 200 174 to 220 VAC, 47 to 63 Hz (Japan only)
Opt 230 191 to 250 VAC, 47 to 63 Hz
* **Opt 908** Rack-mount kit (p/n 5062-3977)
* **Opt 909** Rack-mount kit w/handles (p/n 5063-9221)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual
A line cord option must be specified, see the AC line voltage and cord section.

* Support rails required

Accessories

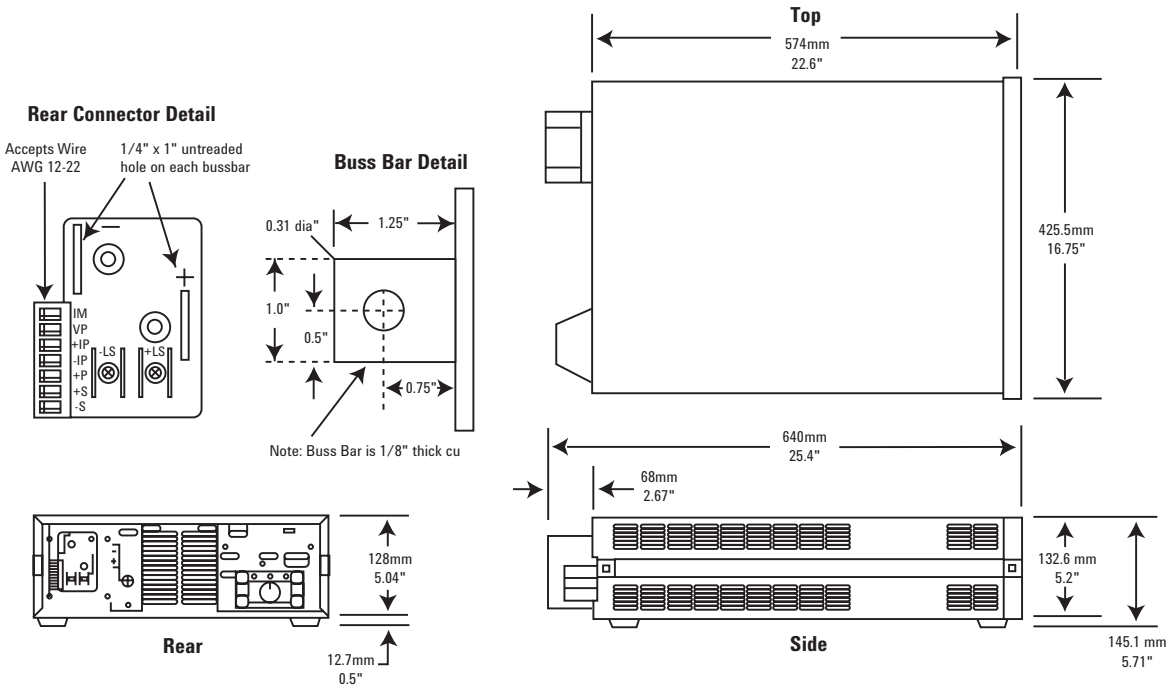
p/n 1494-0059 Accessory slide kit
E3663AC Support rails for Agilent rack cabinets

Specifications (at 0° to 55°C unless otherwise specified)		**6575A-J04** Special order option	**6575A-J06** Special order option	**6575A-J07** Special order option	**6575A-J08** Special order option	**6575A-J09** Special order option	**6575A-J11** Special order option
Number of outputs		1	1	1	1	1	1
GPIB		No	No	No	No	No	No
Output ratings							
Output voltage		160 V	135 V	200 V	100 V	110 V	150 V
Output current		13 A	16 A	11 A	22 A	20 A	15 A
Programming accuracy at 25°C ±5°C							
Voltage	0.04% +	160 mV	125 mV	200 mV	120 mV	120 mV	150 mV
Current	0.1% +	10 mA	12 mA	8 mA	15 mA	13.5 mA	11 mA
Ripple and noise from 20 Hz to 20 MHz							
Voltage rms		2.8 mV	2 mV	3.5 mV	1.9 mV	1.9 mV	2.5 mV
peak-peak		20 mV	18 mV	25 mV	16 mV	16 mV	18 mV
Current rms		18 mA	12 mA	15 mA	15 mA	13.5 mA	12 mA
Load regulation and line regulation							
Voltage	0.002%+	6 mV	4 mV	7 mV	4 mV	4 mV	6 mV
Current	0.005%+	1 mA	4 mV	1 mA	4 mV	4 mV	1 mA
Transient response time		Less than 900 µs for the output voltage to recover 100 mV following a change in load from response time 100% to 50% or 50% to 100% of the output current rating of the supply					
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)					
Average resolution							
Voltage		40 mV	34 mV	50 mV	30 mV	30 mV	37.5 mV
Current		3.25 mA	4 mA	2.75 mA	4.5 mA	4.5 mA	3.75 mA
OVP		300 mV	242 mV	360 mV	215 mV	215 mV	270 mV
Output voltage programming response time*							
*Full load programming rise/fall time (10% to 90% or 90%to 10%) with full resistive load equal to rated output voltage/rated output current.		280 ms	250 ms	350 ms	195 ms	195 ms	250 ms

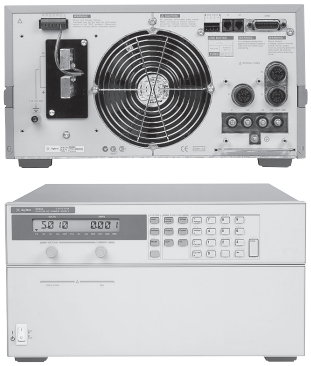
More detailed specifications at **www.agilent.com/find/6570**

Single-Output: 2000 W (Continued)

Agilent Models: 6571A, 6572A, 6573A, 6574A, 6575A



More detailed specifications at **www.agilent.com/find/6570**



6680A-6684A

Single-Output
5000 W GPIB

Low output ripple and noise
Selectable compensation for inductive loads
Analog control of output voltage and current
Fan-speed control to minimize acoustic noise
Built-in measurements and advanced programmable features
Protection features to ensure DUT safety

Reliable DC power for manufacturing test and long-term burn-In

This series of 5000 watt DC power supplies has the exceptional, proven reliability that test system engineers look for. It also has the features needed for easy test system integration.

Programming of the DC output and the extensive protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified by using the VXI*Plug&Play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

The 6680A series has extremely low ripple and noise for a 5000 watt DC power supply. This helps the built-in measurement system make extremely accurate current and voltage measurements.

Selectable compensation is provided for problem-free powering of inductive loads.

Specifications (at 0° to 55°C unless otherwise specified)	**6680A**	**6681A**	**6682A**	**6683A**	**6684A**	**6680A-J04** Special order option
Number of outputs	1	1	1	1	1	1
GPIB	Yes	Yes	Yes	Yes	Yes	Yes
Output ratings						
Voltage	0 to 5 V	0 to 8 V	0 to 21 V	0 to 32 V	0 to 40 V	0 to 3.3 V
Current (40°C then derate linearly 1%/°C from 40°C to 55°C)	0 to 875 A	0 to 580 A	0 to 240 A	0 to 160 A	0 to 128 A	0 to 1000 A
Programming accuracy at 25°C ±5°C						
Voltage 0.04% +	5 mV	8 mV	21 mV	32 mV	40 mV	5 mV
Current 0.1% +	450 mA	300 mA	125 mA	85 mA	65 mA	450 mV
Ripple and noise constant voltage mode from 20 Hz to 20 MHz						
rms	1.5 mV	1.5 mV	1.5 mV	1.0 mV	1.0 mV	3.4 mV
peak to peak	10 mV	10 mV	10 mV	10 mV	10 mV	15 mV
Readback accuracy at 25°C ±5°C	(percent of reading plus fixed)					
Voltage 0.05% +	7.5 mV	12 mV	32 mV	48 mV	60 mV	7.5 mV
Current 0.1% +	600 mA	400 mA	165 mA	110 mA	90 mA	600 mA
Load and line regulation						
Voltage 0.002% +	0.19 mV	0.3 mV	0.65 mV	1.1 mV	1.5 mV	0.19 mV
Current 0.005% +	65 mA	40 mA	17 mA	12 mA	9 mA	77 mA
Transient response time	Less than 900 µs for the output voltage to recover within 150 mV following a change in load from 100% to 50%, or 50% to 100% of the output current rating of the supply					
Supplemental Characteristics	(Non-warranted characteristics determined by design that are useful in applying this product)					
Ripple and noise constant current mode from 20 Hz to 20 MHz						
rms	290 mA	190 mA	40 mA	28 mA	23 mA	—
Average programming resolution						
Voltage	1.35 mV	2.15 mV	5.7 mV	8.6 mV	10.8 mV	12 mV
Current	235 mA	155 mA	64 mA	43 mA	34 mA	260 mA
OVP	30 mV	45 mV	120 mV	180 mV	225 mV	25 mV
Output voltage programming response time	9 ms	12 ms	45 ms	60 ms	60 ms	9 ms
(excludes command-processing time)	Full-load progrmming rise or fall time (10 to 90% or 90 to 10%, resistive load)					
Output common-mode noise current rms	1.5 mA	1.5 mA	3 mA	3 mA	3 mA	2.0 mA
(to signal-ground binding post) peak-to-peak	10 mA	10 mA	20 mA	20 mA	20 mA	12.5 mA

More detailed specifications at **www.agilent.com/find/6680**

Single-Output: 5000 W GPIB (Continued)

Application notes

6671A/72A/81A/82A/90A System DC Power Supplies Product Overview
5988-3050EN

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±60 VDC maximum from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for power supplies connected directly to the GPIB

Modulation: (analog programming of output voltage and current):
Input signal: 0 to -5 V for voltage, 0 to +5 V for current
Input impedance: 30 kΩ/or greater

AC Input (47 to 63 Hz): 180 to 235 VAC (line-to-line, 3 phase), 27.7 Arms maximum worst case, 21.4 Arms nominal; 360 to 440 Vac, 14.3 Arms maximum worst case, 10.7 Arms nominal (maximum line current includes 5% unbalanced phase voltage condition.) Output voltage derated 5% at 50 Hz and below 200 Vac.

Input power: 7350 VA and 6000 W maximum; 160 W at no load

GPIB interface capabilities: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, E1, and C0. IEEE-488.2 and SCPI command set.

Software driver:
- IVI-COM
- VXI*Plug&Play*

Size: 425.5 mm W x 221.5 mm H x 674.7 mm D (16.75 in x 8.75 in x 25.56 in)

Weight: Net, 51.3 kg (113 lbs); shipping, 63.6 kg (140 lbs)

Warranty: One year

Ordering information

Opt 208 180 to 235 VAC, 3 phase, 47 to 63 Hz

Opt 400 360 to 440 VAC, 3 phase, 47 to 63 Hz

Opt 602 Two bus bar spacers for paralleling power supplies (p/n 5060-3514)

* **Opt 908** Rack-mount kit (p/n 5062-3977 and p/n 5062-3974)

* **Opt 909** Rack-mount kit with handles (p/n 5063-9221 and p/n 5063-9219).

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B0 Full documentation on CD-ROM only

Opt 0B3 Service manual

* Support rails required

Accessories

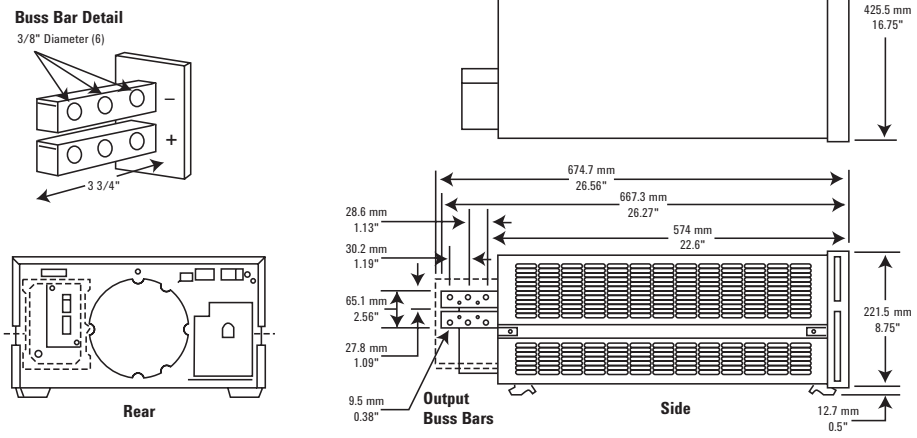
p/n 5060-3513 Three 30-A replacement fuses for 180 to 235 VAC line

p/n 5060-3512 Three 16-A replacement fuses for 360 to 440 VAC line

E3663AC Support rails for Agilent rack cabinets

p/n 5080-2148 Serial link cable 2 m (6.6 ft.)

Agilent Models: 6680A, 6681A, 6682A, 6683A, 6684A



More detailed specifications at **www.agilent.com/find/6680**

6690A-6692A

Single-Output
6600 W GPIB

- Low output ripple and noise
- Analog control of output voltage and current
- Fan-speed control to minimize acoustic noise
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

Reliable DC power for manufacturing test and long-term burn-in

This series of 6600 watt DC power supplies has the exceptional, proven reliability that test system engineers look for. It also has the features needed for easy test system integration.

Programming of the DC output and the extensive protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified by using the VXI*plug&play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

The 6690A series has extremely low ripple and noise for a 6600 watt DC power supply. This helps the built-in measurement system make extremely accurate current and voltage measurements.

Specifications (at 0° to 55°C unless otherwise specified)		**6690A**	**6691A**	**6692A**
Number of outputs		1	1	1
GPIB		Yes	Yes	Yes
Output ratings				
Voltage		0 to 15 V	0 to 30 V	0 to 60 V
Current (derated linearly 1%/°C from 40°C to 55°C)		0 to 440 A	0 to 220 A	0 to 110 A
Programming accuracy at 25°C ±5°C				
Voltage	0.04% +	15 mV	30 mV	60 mV
Current	0.1% +	230 mA	125 mA	65 mA
Ripple and noise constant voltge mode from 20 Hz to 20 MHz				
	rms	2.5 mV	2.5 mV	2.5 mV
	peak to peak	15 mV	25 mV	25 mV
Readback accuracy at 25°C ±5°C (percent of reading plus fixed offset) System models only				
Voltage	0.05% +	22.5 mV	45 mV	90 mV
Current	0.1% +	300 mA	165 mA	80 mA
Load regulation				
Voltage	0.002% +	0.65 mV	1.1 mV	2.2 mV
Current	0.005% +	40 mA	17 mA	9 mA
Line regulation				
Voltage	0.002% +	0.65 mV	0.65 mV	0.65 mV
Current	0.005% +	40.5 mA	17 mA	9 mA
Transient response time		Less than 900 µs for the output voltage to recover within 150 mV following a change in load from 100% to 50%, or 50% to 100% of the output current rating of the supply		

Application notes

6671A/72A/81A/82A/90A System DC Power Supplies Product Overview
5988-3050EN

Using Agilent 6690A Series System DC Power Supplies for Testing Data Storage Control Boards
(PN 6690A-1)
5988-3062EN

Using Agilent 6690A Series System DC Power Supplies for Automobile Battery Simulation
(PN 6690A-2)
5988-3061EN

More detailed specifications at **www.agilent.com/find/6690**

Single-Output: 6600 W GPIB (Continued)

Specifications (at 0° to 55°C unless otherwise specified)	**6690A**	**6691A**	**6692A**

Supplemental characteristics for all model numbers

DC floating voltage: Output terminal can be floated up to ±60 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available at the load.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for power supplies connected directly to the GPIB.

Modulation: (analog programming of output voltage and current):
Input signal: 0 to -5 V for voltage, and 0 to +5 V for current.
Input impedance: 30 kΩ or greater.

AC input (47 to 63 Hz): 180 to 235 VAC (line-to-line 3 phase) 36 Arms maximum worst case, 28 Arms nominal; 360 to 440 VACX, 18 Arms maximum worst case, 14 Arms nominal. (Maximum line current includes 5% unbalanced phase voltage condition).

Software driver:
- IVI-COM
- VXI*Plug&Play*

Input power: 9000 VA and 7950 W maximum; 175 W at no load.

Size: 425.5 mm W x 221.5 mm H x 674.7 mm D (16.75 in x 8.75 in x 25.56 in).

Warranty: One year

Ordering information

Opt 208 180 to 235 VAC, 3 phase, 47 to 63 Hz

Opt 400 360 to 440 VAC, 3 phase, 47 to 63 Hz

Opt 602 Two bus bar spacers for paralleling power supplies (p/n 5060-3514)

* **Opt 908** Rack-mount kit (p/n 5062-3977 and p/n 5063-9212)

* **Opt 909** Rack-mount kit with handles (p/n 5063-9221 and p/n 5063-9219).

Supplemental Characteristics	(Non-warranted characteristics determined by design that are useful in applying this product)		
Ripple and noise constant current mode from 20 Hz to 20 MHz			
rms	200 mA	50 mA	30 mA
Average programming resolution			
Voltage	4.1 mV	8.1 mV	16 mV
Current	118.5 mA	59 mA	30 mA
OVP	90 mV	170 mV	330 mV
Output voltage programming response time (excludes command-processing time) Full-load progrmming rise or fall time (10 to 90% or 90 to 10%, resistive load)	45 ms	60 ms	100 ms
Output common-mode noise current rms	3 mA	3.5 mA	4 mA
(to signal-ground binding post) peak-to-peak	20 mA	20 mA	25 mA

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B0 Full documentation on CD-ROM only

Opt 0B3 Service manual

* Support rails required

Accessories

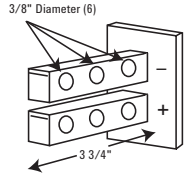
p/n 5065-6935 Replacement fuse kit for 360-440 VAC line.

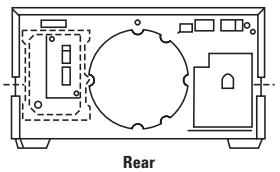
p/n 5065-6934 Replacement fuse kit for 180-235 VAC line.

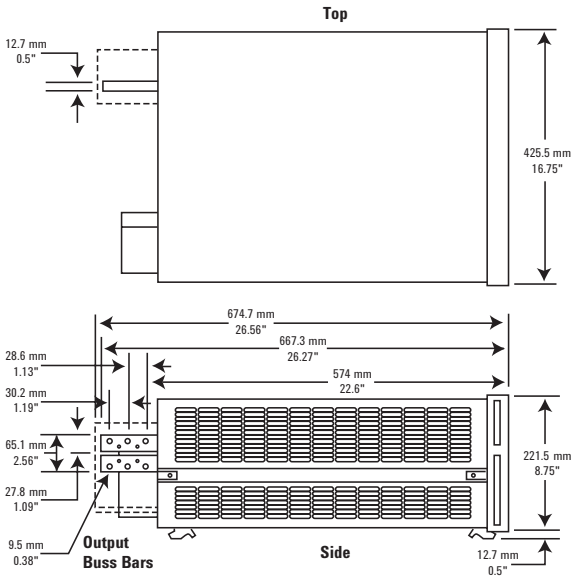
E3663AC Support rails for Agilent rack cabinets.

p/n 5080-2148 Serial link cable 2 m (6.6 ft.)

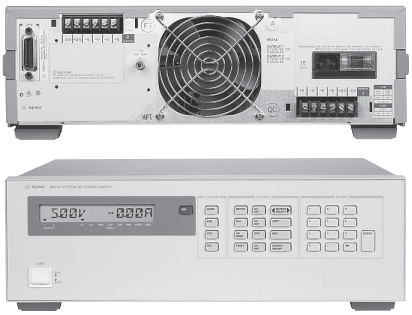
Agilent Models: 6690A, 6691A, 6692A







More detailed specifications at **www.agilent.com/find/6690**



6621A-6624A, 6627A

Multiple-Output
40 W-105 W GPIB

Up to four fully isolated power supplies in a 3U package
Dual-range outputs
Fast, low-noise outputs
Built-in measurements and advanced programmable features
Protection features to ensure DUT safety

Two, three, or four isolated outputs are integrated into one package, conserving rack space and GPIB addresses. Most of the outputs also provide dual ranges, for more current at lower voltage levels. The outputs can be connected in parallel or series to further increase the flexibility that these products offer the system designer.

Programming is done using industry standard SCPI commands. Test system integration can be further simplified by using the VXI*Plug&Play* drivers. These power supplies help reduce test time with fast up and down programming, which is enhanced by an active downprogrammer which can sink the full rated current.

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Understanding Linear Power Supply Operation
(AN1554)
5989-2291EN

Modern Connectivity - Using USB and LAN I/O Converters
(AN 1475-1)
5989-0123EN

Specifications (at 0° to 55°C unless otherwise specified)		40 W output	40 W output	80 W output	80 W output	105 W output
Output power	Low-range volts, amps	0 to 7 V, 0 to 5 A	0 to 20 V, 0 to 2 A	0 to 7 V, 0 to 10 A	0 to 20 V, 0 to 4 A	0-35 V, 0-3 A
	High range volts, amps	0 to 20 V, 0 to 2 A	0 to 50 V, 0 to 0.8 A	0 to 20 V, 0 to 4 A	0 to 50 V, 0 to 2 A	— —
Output combinations for each model (total number of outputs)	**6621A (2)**	—	—	2	—	—
	6622A (2)	—	—	—	2	—
	6623A (3)	1	1	1	—	—
	6624A (4)	2	2	—	—	—
	6627A (4)	—	4	—	—	—
	6623A-J03 (3) Special order option	—	2	—	—	1
Programming accuracy	Voltage	19 mV + 0.06%	50 mV + 0.06%	19 mV + 0.06%	50 mV + 0.06%	35 mV + 0.06%
	Current	50 mA + 0.16%	20 mA + 0.16%	100 mA + 0.16%	40 mA + 0.16%	30 mA + 0.16%
Readback accuracy (at 25°C ±5°C)	Voltage	20 mV + 0.05%	50 mV + 0.05%	20 mV + 0.05%	50 mV + 0.05%	35 mV + 0.05%
	+Current	10 mA + 0.1%	4 mA + 0.1%	20 mA + 0.1%	8 mA + 0.1%	6 mA + 0.1%
	-Current	25 mA + 0.2%	8 mA + 0.2%	50 mA + 0.2%	20 mA + 0.2%	15 mA + 0.2%
Ripple and noise (peak-to-peak, 20 Hz to 20 MHz; rms, 20 Hz to 10 MHz)						
	Constant voltage rms	500 µV	500 µV	500 µV	500 µV	500 µV
	peak-to-peak	3 mV	3 mV	3 mV	3 mV	3 mV
	Constant current rms	1 mA	1 mA	1 mA	1 mA	1 mA
Load regulation	Voltage	2 mV	2 mV	2 mV	2 mV	2 mV
	Current	1 mA	0.5 mA	2 mA	1 mA	2 mA
Load cross regulation	Voltage	1 mV	2.5 mV	1 mV	2.5 mV	N/A
	Current	1 mA	0.5 mA	2 mA	1 mA	N/A
Line regulation	Voltage	0.01% + 1 mV	0.01% + 1 mV	0.01% + 1 mV	0.01% + 1 mV	0.01% + 1 mV
	Current	0.06% + 1 mA	0.06% + 1 mA	0.06% + 1 mA	0.06% + 1 mA	0.06% + 1 mA

Transient response time Less than 75 µs for the output to recover to within 75 mV of nominal value following a load change within specfications

More detailed specifications at **www.agilent.com/find/6620**

Multiple-Output: 40 W-105 W GPIB (Continued)

Specifications

(at 0° to 55°C unless otherwise specified)

		40 W output	40 W output	80 W output	80 W output	105 W output
Supplemental Characteristics		(Non-warranted characteristics determined by design and useful in applying the product)				
Average programming resolution	Voltage	6 mV	15 mV	6 mV 20 mV (high)	6 mV 20 mV (high)	10.5 mV
	Current	25 mA	10 mA	50 mA 20 mA (high)	50 mA 20 mA (high)	15 mA
OVP		100 mV	250 mV	100 mV 2	50 mV	175 mV
Output programming response time (time to settle within 0.1% of full scale output, after Vset command has been processed)		2 ms	6 ms	2 ms	6 ms	6 ms

Supplemental characteristics for all model numbers

DC floating voltage: All outputs can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to 1 V drop per load lead. The drop in the load leads is subtracted from the voltage available for the load.

Command processing time: 7 ms typical with front-panel display disabled

Down programming: Current sink limits are fixed approximately 10% higher than source limits for a given operating voltage above 2.5 V

Input power: 550 W max., 720 VA max.

GPIB interface capabilities: SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT0.

Software driver: VXI*Plug&Play*

Regulatory compliance: Listed to UL1244; conforms to IEC 61010-1; carries the CE mark.

Size: 425.5 mm W x 132.6 mm H x 497.8 mm D (16.75 in x 5.22 in x 19.6 in)

Weight: Net, 17.4 kg (38 lb); shipping, 22.7 kg (50 lb)

Warranty: One year

Ordering information

Opt 100 87 to 106 VAC, 47 to 66 Hz input, 6.3 A (Japan only)
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 66 Hz, 3.0 A
Opt 240 209 to 250 VAC, 47 to 66 Hz, 3.0 A
Opt 750 Relay Control and DFI/RI
Opt S50 similar to option 750, however the remote inhibit does not latch
* **Opt 908** Rack-mount kit (p/n 5062-3977)
* **Opt 909** Rack-mount kit with handles (p/n 5063-9221)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

Accessories

p/n 1494-0059 Rack slide kit
E3663A Support rails for Agilent rack cabinets

Agilent Models: 6621A, 6622A, 6623A, 6624A, 6627A

Terminal Strip Detail

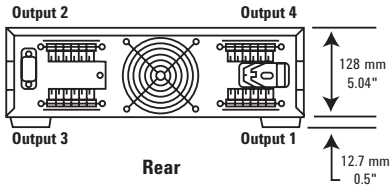
Output 2 & 3

-0 V +0 V -S -V +V +S

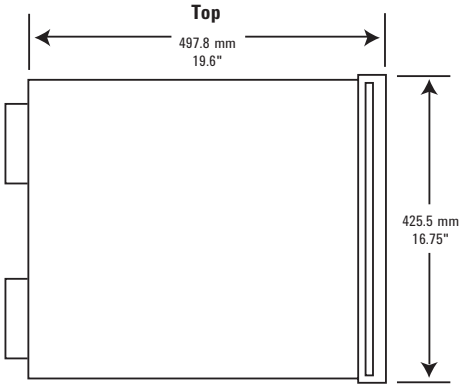
Screw Size: M3.5 x 0.6

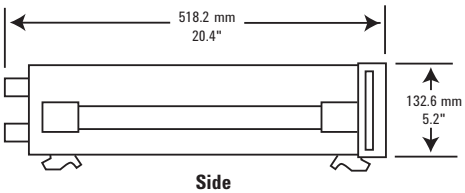
Output 1 & 4

+S +V -V +S +0 V -0 V



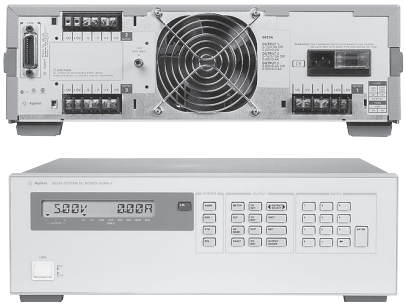
Rear





Side

More detailed specifications at **www.agilent.com/find/6620**



6625A, 6626A, 6628A, 6629A

Precision Multiple-Output
25 W-50 W GPIB

Up to four fully isolated power supplies in a 3U package
Fast, low-noise outputs
Dual-range, precision low current measurement
Built-in measurements and advanced programmable features
Protection features to ensure DUT safety

Two or four isolated outputs are integrated into one package, conserving rack space and GPIB addresses. Dual ranges allow for more current at lower voltage levels. The outputs can be connected in parallel or series to further increase the flexibility that these products offer the system designer. Programming is done using industry standard SCPI commands and test system integration can be further simplified be using the VXI*Plug&Play* drivers. These power supplies help reduce test time with fast up and down programming, which is enhanced by the active down-programmer which can sink the full rated current.

These power supplies are very useful on the R&D bench. The accuracy of both the programming and the measurement systems allow precise control and monitoring of prototype bias power. The extensive protection features protect valuable prototypes, including very fast CV/CC crossover. The power supply can be controlled from either the front panel keypad or, for automated testing, from the GPIB.

Specifications (at 0° to 55°C unless otherwise specified)		**25 W output**	**50 W output**
Output power	Low-range volts, amps	0 to 7 V, 0 to 15 mA	0 to 16 V, 0 to 200 mA
	High range volts, amps	0 to 50 V, 0 to 500 mA	0 to 50 V, 0 to 1 A or 0 to 16 V, 0 to 2 A
Output combinations for each model (total number of outputs)	**6625A (2) precision**	1	1
	6626A (4) precision	2	2
	6628A (2) precision	—	2
	6629A (4) precision	—	4
Programming accuracy (at 25°C ±5°C)	Voltage	1.5 mV + 0.016% (low) 10 mV + 0.016% (high)	3 mV + 0.016% (low) 10 mV + 0.016% (high)
	Current	15 µA + 0.04% (low) 100 µA + 0.04% (high)	185 µA + 0.04% (low) 500 µA + 0.04% (high)
Readback accuracy (at 25°C ±5°C)	Voltage	0.016% + 2 mV (low) 0.016% + 10 mV (high)	0.016% + 3.5 mV (low) 0.016% + 10 mV (high)
	±Current	0.03% + 15 µA (low) 0.03% + 130 µA (high)	0.04% + 250 µA (low) 0.04% + 550 µA (high)
Ripple and noise	Constant voltage rms	500 µV	500 µV
(peak-to-peak, 20 Hz to 20 MHz; rms, 20 Hz to 10 MHz)	peak-to-peak	3 mV	3 mV
	Constant current rms	0.1 mA	0.1 mA
Load regulation	Voltage	0.5 mV	0.5 mV
	Current	0.005 mA	0.01 mA
Load cross regulation	Voltage	0.25 mV	0.25 mV
	Current	0.005 mA	0.01 mA
Line regulation	Voltage	0.5 mV	0.5 mV
	Current	0.005 mA	0.01 mA
Transient response time change within specfications	Less than 75 µs for the output to recover to within 75 mV of nominal value following a load		
Supplemental Characteristics	(Non-warranted characteristics determined by design and useful in applying the product)		
Average programming resolution	Voltage	460 µV (low)	1 mV (low)
		3.2 mV (high)	3.2 mV (high)
	Current	1 µA (low)	13 µA (low)
		33 µA (high)	131 µA (high)
	OVP	230 mV	230 mV
Output programming response time		6 ms	6 ms
(time to settle within 0.1% of full scale output, after Vset command has been processed)			

More detailed specifications at **www.agilent.com/find/6620**

Precision Multiple-Output: 25 W-50 W GPIB (Continued)

Application notes

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Understanding Linear Power Supply Operation
(AN1554)
5989-2291EN

Modern Connectivity - Using USB and LAN I/O Converters
(AN 1475-1)
5989-0123EN

Supplemental characteristics for all model numbers

DC floating voltage: All outputs can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to 10 V drop per load lead. The drop in the load leads is subtracted from the voltage available for the load.

Command processing time: 7 ms typical with front-panel display disabled

Input power: 550 W max., 720 VA max.

GPIB interface capabilities: SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT0, C0, E1.

Software driver:
VXI*Plug&Play*

Regulatory compliance: Listed to UL 1244; conforms to IEC 61010-1.

Size: 425.5 mm W x 132.6 mm H x 497.8 mm D (16.75 in x 5.22 in x 19.6 in)

Weight: 6626A, 6629A: Net, 17.4 kg (38 lb); shipping, 22.7 kg (50 lb) 6625A, 6628A: Net, 15.5 kg (34 lb); shipping, 20.8 kg (46 lb)

Warranty: One year

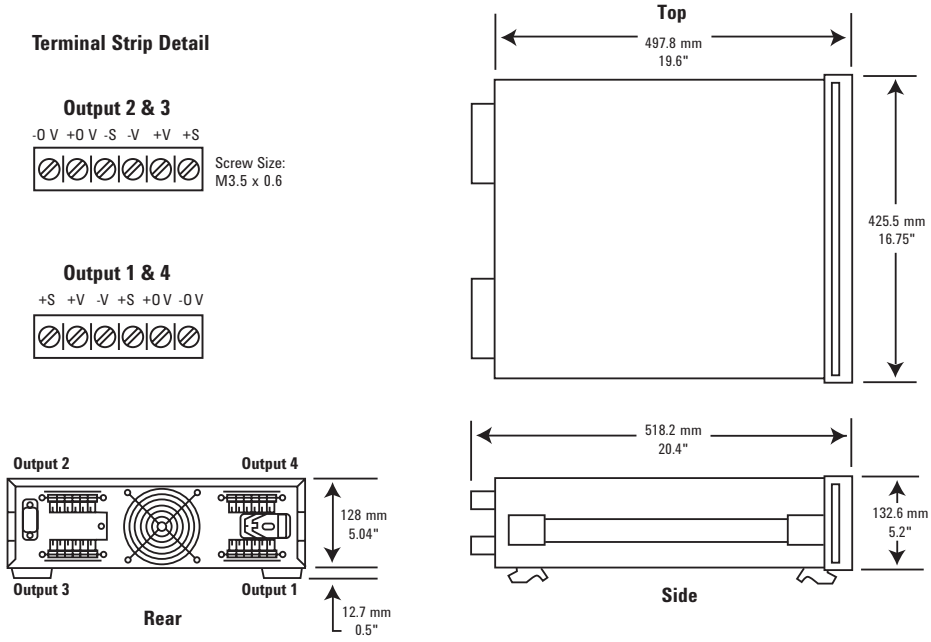
Ordering information

Opt 100 87 to 106 VAC, 47 to 66 Hz input, 6.3 A (Japan only)
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 66 Hz, 3.0 A
Opt 240 209 to 250 VAC, 47 to 66 Hz, 3.0 A
Opt 750 Relay control and DFI/RI
Opt S50 Similar to option 750, however the remote inhibit does not latch
* **Opt 908** Rack-mount kit (p/n 5062-3977)
* **Opt 909** Rack-mount kit with handles (p/n 5063-9221)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

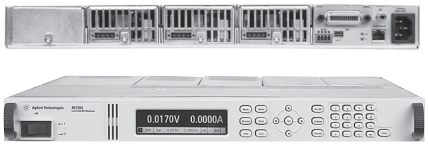
Accessories
p/n 1494-0059 Rack slide kit
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6625A, 6626A, 6628A, 6629A



More detailed specifications at **www.agilent.com/find/6620**

Low-Profile Modular Power System
20-300 W GPIB, LAN, USB, LXI Class C



N6700B, N6701A, N6702A, N6731-36B, N6741B-46B, N6751A-N6754A, N6761A-62A, N6773A-N6776A, N6781A-84A (page 106)

- Small size: up to 4 outputs in 1U of rack space
- More than 20 DC power modules: basic, performance and precision models
- Fast output programming with active downprogramming
- Ultra fast command processing time
- Output sequencing and advanced triggering system
- Optional LIST mode, built-in digitizer and disconnect relays
- N6780 SMU and application specific modules available (pages 91, 106)

The Agilent N6700 low-profile modular power system (MPS) is a switching regulated, multiple-output programmable DC power supply system with the performance of a linear power supply. The N6700 is a flexible modular platform that allows you to mix and match more than 20 different DC power modules to create a 1- to 4-channel DC power system to optimized performance, power and price to match test needs. Test system engineers can invest in high-performance outputs where speed and accuracy are needed, or purchase basic performance outputs for simple DC power requirements.

Small size

The Agilent N6700 MPS uses an advanced switching power supply design that fits within 1U of rack space. It has side air vents (no top or bottom air vents) so other instruments can be mounted directly above or below it. (Requires rack mount kit).

Protection features

Each N6700 module is protected against over-voltage, over-current, and over-temperature. A fault condition in one module can be detected within 10 microseconds by other modules so that they can be quickly shut down to avoid hazardous conditions on your DUT.

Specifications (at 0° to 55°C, and derated above 40°C)	**N6751A**	**N6752A**	**N6753A**	**N6754A**	**N6761A**	**N6762A**
Output ratings						
Voltage	50 V	50 V	20 V	60 V	50 V	50 V
Current	5 A	10 A	50 A	20 A	1.5 A	3 A
Power	50 W	100 W	300 W	300 W	50 W	100 W
Programming accuracy (at 23°C ±5°C)						
Voltage high range	0.06% + 19 mV	0.006% + 19 mV	0.06% + 10 mV	0.06% + 25 mV	0.016% + 6 mV	0.016% + 6 mV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	N/A	0.016% + 1.5 mV	0.016% + 1.5 mV
Current high range	0.1% + 20 mA	0.1% + 20 mA	0.1% + 30 mA	0.1% + 8 mA	0.04% + 200 µA	0.04% + 200 µA
Current low range ≤ 100 mA, @ 0 - 7 V	N/A	N/A	N/A	N/A	0.04% + 15 µA	0.04% + 15 µA
≤ 100 mA, @ 0 - 50 V	N/A	N/A	N/A	N/A	0.04% + 55 µA	0.04% + 55 µA
≤ 200 µA, @ 0 - 50 V	N/A	N/A	N/A	N/A	0.5% + 100 nA	0.5% + 100 nA
Readback accuracy (at 23°C ±5°C)						
Voltage high range	0.05% + 20 mV	0.05% + 20 mV	0.05% + 10 mV	0.05% + 25 mV	0.016% + 6 mV	0.016% + 6 mV
Voltage low range ≤ 5.5 V	N/A	N/A	N/A	N/A	0.016% + 1.5 mV	0.016% + 1.5 mV
Current high range	0.1% + 4 mA	0.1% + 4 mA	0.1% + 30 mA	0.1% + 8 mA	0.04% + 160 µA	0.04% + 160 µA
Current low range ≤ 100 mA, @ 0 - 7 V[1]	N/A	N/A	N/A	N/A	0.03% + 15 µA	0.03% + 15 µA
≤ 100 mA, @ 0 - 50 V	N/A	N/A	N/A	N/A	0.03% + 55 µA	0.03% + 55 µA
Output ripple and noise (PARD) (from 20 Hz to 20 MHz)						
CV peak-to-peak	4.5 mV	4.5 mV	5 mV	6 mV	4.5 mV	4.5 mV
CV rms	350 µV	350 µV	1 mV	1 mV	350 µV	350 µV
Load regulation						
Voltage	2 mV	2 mV	2 mV	2 mV	0.5 mV	0.5 mV
Current	2 mA	2 mA	12 mA	5 mA	65 µA	65 µA
Line regulation						
Voltage	1 mV	1 mV	0.5 mV	1.2 mV	0.5 mV	0.5 mV
Current	1 mA	1 mA	5 mA	2 mA	30 µA	30 µA

[1] Applies when measuring 4006 data points (SENSe:SWEep:POINts = 4096).

More detailed specifications at **www.agilent.com/find/N6700**

Low-Profile Modular Power System
20-300 W GPIB (Continued)

Connectivity
The N6700 offers many system oriented features to simplify and accelerate test system development. They support the industry standard SCPI commands and come standard with software drivers.

The N6700 MPS comes standard with GPIB, USB 2.0, and 10/100 Base-T Ethernet LAN interfaces. While GPIB is best suited for use with existing systems, Agilent offers USB and LAN to allow you to take advantage of the availability, speed, and ease-of-use of common computer industry standard interfaces.

The N6700 is designed to comply with the LXI class C specification. The N6700 contains a Web server that provides Web pages for monitor, control and setup of the MPS.

Output sequencing
Each DC power module can be individually set to turn on or to turn off with a delay. By adjusting the delay times and then commanding the N6700 to turn on/off, you can set the N6700 modules to sequence on/off in a particular order.

Programmable voltage slew
For some applications, like inrush limiting or powering rate-sensitive devices, it is necessary to slow down and control the speed of the power supply to maintain a specific voltage slew rate. The N6700 provides programmable voltage slew rate, so that with a single command, you can generate a zero to full-scale voltage change controllable from 1 millisecond to 10 seconds.

Specifications (at 0° to 55°C, and derated above 40°C)	N6751A	N6752A	N6753A	N6754A	N6761A	N6762A
Transient response time (time to recover to within the settling band following a load change)						
from 60% to 100% and from 100% to 60% of full load for models N6751A & N6761A						
from 50% to 100% and from 100% to 50% of full load for models N6752A & N6762A						
Voltage settling band	± 75 mV	± 75 mV	± 30 mV	± 90 mV	± 75 mV	± 75 mV
Time	< 100 µs	< 100 µs	< 100 µs	< 100 µs	< 100 µs	< 100 µs
Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)						
Programming resolution						
Voltage high range	3.5 mV	3.5 mV	1.5 mV	4.2 mV	880 µV	880 µV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	N/A	90 µV	90 µV
Current high range	3.25 mA	3.25 mA	16.3 mA	6.5 mA	60 µA	60 µA
Current low range (≤ 0.1 A)	N/A	N/A	N/A	N/A	2 µA	2 µA
Output ripple and noise (PARD)						
CC rms	2 mA	2 mA	10 mA	4 mA	2 mA	2 mA
Over-voltage protection						
Accuracy	0.25% + 250 mV	0.25% + 250 mV	0.25% ± 150 mV	0.25% ± 300 mV	0.25% + 250 mV	0.25% + 250 mV
Response Time	50 µs from occurence of over-voltage condition to start of output shutdown					
Down-programming capability						
Continuous power	7 W	7 W	12.5 W	12.5 W	7 W	7 W
Peak current	7 A	7 A	15 A	6 A	3.8 A	3.8 A
Modules can discharge a 1000 µF capacitor from 50 V to 0 V at a rate of 4 times/second.						
Maximum up-programming time with full resistive load: (time from 10% to 90% of total voltage excursion)						
Voltage setting from 0 V to 10 V	0.2 ms	0.2 ms	0.3 ms	0.3 ms	0.6 ms	0.6 ms
Voltage setting from 0 V to 50 V	1.5 ms	1.5 ms	1.5 ms	2.0 ms	2.2 ms	2.2 ms
Maximum up-programming settling time with full resistive load: (time from start of voltage change to within 50 mV of final value)						
Voltage setting from 0 V to 10 V	0.5 ms	0.5 ms	2.0 ms	2.0 ms	0.9 ms	0.9 ms
Voltage setting from 0 V to 50 V	4.0 ms	4.0 ms	3.0 ms	4.0 ms	4.0 ms	4.0 ms
Maximum down-programming time with no load: (time from start of voltage change to output voltage <0.5 V)						
Voltage setting from 10 V to 0 V	0.3 ms	0.3 ms	0.5 ms	0.6 ms	0.3 ms	0.3 ms
Voltage setting from 50 V to 0 V	1.3 ms	1.3 ms	1.6 ms	2.0 ms	1.3 ms	1.3 ms
Maximum down-programming settling time with no load: (time from start of voltage change to within 50 mV of final value)						
Voltage setting from 10 V to 0 V	0.45 ms	0.45 ms	0.7 ms	0.7 ms	0.45 ms	0.45 ms
Voltage setting from 50 V to 0 V	1.4 ms	1.4 ms	3.0 ms	3.0 ms	1.4 ms	1.4 ms
Down-programming with 1000 µF load:[1] (time from start of voltage change to output voltge <0.5 V)						
Voltage setting from 10 V to 0 V	2.1 ms	2.1 ms	0.5 ms	0.6 ms	4.5 ms	4.5 ms
Voltage setting from 50 V to 0 V	11 ms	11 ms	1.6 ms	2.0 ms	23 ms	23 ms
Down-programming capability:						
Continuous power	7 W	7 W	12.5 W	12.5 W	7 W	7 W
Peak current	7 A	7 A	15 A	6 A	3.8 A	3.8 A

[1] Modules can discharge a 1000 µF capacitor from 50 V to 0 V at a rate of 4 times/second

More detailed specifications at **www.agilent.com/find/N6700**

Low-Profile Modular Power System
20-300 W GPIB (Continued)

Power management feature allows you to allocate mainframe power
To further optimize your investment you may choose to save money configuring a system where the sum of the power modules installed in a mainframe exceeds the total power available from the mainframe. In this case, the new power management features of the N6700 allows you to allocate mainframe power to the outputs where it's needed and reduce power to the outputs where it is not needed, achieving maximum asset utilization and flexibility. This feature provides the safety from unexpected and dangerous shutdowns that can occur with power systems without power management when operated in a similar way.

Series and parallel operation
To increase the available power, similarly rated outputs can be operated in series for greater output voltage or in parallel for greater output current.

To simplify parallel operation, the N6700 offers virtual channels, a firmware based feature that allows the N6700 system to treat up to 4 channels as a single, synchronized channel. Once configured, all functions (sourcing, measurements, triggering, protection, and status monitoring) behave as if there is 1 channel of up to 4 times the capacity of a single channel, without writing a single line of code to manage the interaction and synchronization of the paralleled power supplies.

Specifications (at 0° to 55°C, and derated above 40°C)	N6773A	N6774A	N6775A	N6776A
Output ratings				
Voltage	20 V	35 V	60 V	100 V
Current[1]	15 A[2]	8.5 A	5 A	3 A
Power	300 W	300 W	300 W	300 W
Programming accuracy (at 23°C ±5°C)				
Voltage	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV	0.1% + 100 mV
Current	0.15% + 60 mA	0.15% + 60 mA	0.15% + 60 mA	0.15% + 30 mA
Readback accuracy (at 23°C ±5°C)				
Voltage	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV	0.1% + 100 mV
Current	0.15% + 15 mA	0.15% + 12 mA	0.15% + 12 mA	0.15% + 6 mA
Output ripple and noise (PARD) (from 20 Hz to 20 MHz)				
CV peak-to-peak	20 mV	22 mV	35 mV	45 mV
CV rms	3 mV	5 mV	9 mV	18 mV
Load regulation[4]				
Voltage	13 mV	16 mV	24 mV	45 mV
Current	6 mA	6 mA	6 mA	6 mA
Line regulation				
Voltage	2 mV	4 mV	6 mV	10 mV
Current	1 mA	1 mA	1 mA	1 mA
Transient response time (time to recover to within the settling band following a load change from 50% to 100% and from 100% to 50% of full load.)				
Voltage settling band	± 0.3 V[3]	± 0.3 V[3]	± 0.5 V	± 1.0 V
Time	<250 µs	<250 µs	<250 µs	<250 µs
Programming resolution				
Voltage	7 mV	10 mV	18 mV	28 mV
Current	9 mA	6 mA	3 mA	1.5 mA
Output ripple and noise (PARD)				
CC rms	6 mA	6 mA	6 mA	6 mA
Over-voltage protection				
Accuracy	0.25% + 100 mV	0.25% + 130 mV	0.25% + 260 mV	0.25% + 650 mV
Accuracy w/opt 760	0.25% + 700 mV	0.25% + 700 mV	0.25% + 400 mV	0.25% + 650 mV
Accuracy w/opt 761	0.25% + 500 mV	0.25% + 350 mV	0.25% + 350 mV	0.25% + 650 mV
Maximum setting	22 V	38.5 V	66 V	110 V
Response Time	50 µs from ocurence of 0 V condition to start of output shutdown			
Maximum up-programming time with full resistive load: (time from 10% to 90% of total voltage excursion)				
Voltage setting from 0 V to 10 V	20 ms	20 ms	20 ms	20 ms
Maximum up-programming settling time with full resistive load: (time from start of voltage change to within 50 mV of final value)				
Voltage setting from 0 V to 10 V	100 ms	100 ms	100 ms	100 ms

[1] Output current is derated 1% per °C above 40°C.
[2] When relay Option 760 is installed, the maximum output current will be limited to 10 A.
[3] When relay Option 760 or 761 is installed, the settling band is ±0.35 V.
[4] With output change from no load to full load, up to a maximum load-lead drop of 1 V/lead.

More detailed specifications at **www.agilent.com/find/N6700**

Low-Profile Modular Power System
20-300 W GPIB (Continued)

Specifications (at 0° to 55°C, and derated above 40°C)	N6731B	N6732B	N6733B	N6734B	N6735B	N6736B
Output ratings						
Voltage	5 V	8 V	20 V	35 V	60 V	100 V
Current	10 A	6.25 A	2.5 A	1.5 A	0.8 A	0.5 A
Power	50 W	50 W	50 W	50 W	50 W	50 W
Programming accuracy[2] (at 23°C ±5°C)						
Voltage	0.1% + 19 mV	0.1% + 19 mV	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV	0.1% + 100 mV
Current	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 10 mA
Readback accuracy (at 23°C ±5°C)						
Voltage	0.1% + 20 mV	0.1% + 20 mV	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV	0.1% + 100 mV
Current	0.15% + 20 mA	0.15% + 10 mA	0.15% + 5 mA	0.15% + 4 mA	0.15% + 4 mA	0.15% + 2 mA
Output ripple and noise (PARD) (from 20 Hz – 20 MHz)						
CV peak-to-peak	10 mV	12 mV	14 mV	15 mV	25 mV	30 mV
CV rms	2 mV	2 mV	3 mV	5 mV	9 mV	18 mV
Load regulation[1]						
Voltage	5 mV	6 mV	9 mV	11 mV	13 mV	20 mV
Current	2 mA	2 mA	2 mA	2 mA	2 mA	2 mA
Line regulation						
Voltage	1 mV	2 mV	2 mV	4 mV	6 mV	10 mV
Current	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Transient response time	(time to recover to within the settling band following a load change from 50% to 100% and from 100% to 50% of full load.)					
Voltage settling band	± 80 mV	± 80 mV	± 200 mV	± 200 mV	± 400 mV	± 500 mV
Time	200 µs	200 µs	200 µs	200 µs	200 µs	200 µs

[1] With an output change from no load to full load, up tp a maximum load-lead drop of 1 V per lead.
[2] Applies from minimum to maximum programming range. (see Supplemental Characteristics)

Triggering
The N6700 MPS mainframe has hardware trigger in/trigger out signals which permit the N6700 to be synchronized with external events.

Output disconnect relays
Modules in the N6700 can be individually ordered with optional Output Disconnect Relays (option 761) or Output Disconnect/Polarity Reversal Relays (option 760). With option 761, Output Disconnect Relays, mechanical relays disconnect both the plus and minus side of the power supply, including the sense leads. With option 760, Output Disconnect/Polarity Reversal Relays switch the leads on both the plus and minus side of the power supply, including the sense leads, resulting in a voltage polarity reversal at the DUT.

Universal AC input
The N6700 has a universal input that operates from 100-240 VAC, 50/60/400 Hz. There are no switches to set or fuses to change when switching from one voltage standard to another. The AC input employs power factor correction.

Choosing the Right DC Power Modules to Meet Your ATE Needs

N6750 family
The Agilent N6750 family of high-performance, autoranging DC power modules provides low noise, high accuracy and includes, auto-ranging output capabilities enabling one power supply to do the job of several traditional power supplies. In addition, it includes optional high-speed test extensions that offers an oscilloscope-like digitizer and ultra-fast programming speed.

N6760 family
The Agilent N6760 family of precision DC power modules provides precise control and measurements in the milliampere and microampere region with the ability to simultaneously digitize voltage and current, and capture those measurements in an oscilloscope-like data buffer. These precision DC power modules offer dual ranges on both programming and measurement and are ideally suited for semiconductor and passive device testing.

N6750/60 low noise outputs
This switching power supply outperforms most linear power supplies on the market with low normal and common mode noise.

More detailed specifications at **www.agilent.com/find/N6700**

Low-Profile Modular Power System
20-300 W GPIB (Continued)

Specifications (at 0° to 55°C, and derated above 40°C)	N6731B	N6732B	N6733B	N6734B	N6735B	N6736B

Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)

Programming resolution						
Voltage	3.5 mV	4 mV	7 mV	10 mV	18 mV	28 mV
Current	7 mA	4 mA	3 mA	2 mA	1 mA	0.5 mA
Output ripple and noise (PARD)						
CC rms	8 mA	4 mA	2 mA	2 mA	2 mA	2 mA
Over-voltage protection						
Accuracy (without relay option)	0.25% + 50 mV	0.25% + 50 mV	0.25% + 75 mV	0.25% + 100 mV	0.25% + 200 mV	0.25% + 250 mV
Response time	50 µs from occurence of 0 V condition to start of output shutdown					
Maximum up-programming and down-programming time with full resistive load: (time from 10% to 90% of total voltage excursion)						
Voltage setting from 0 V to full scale and full scale to 0 V	20 ms	20 ms	20 ms	20 ms	20 ms	20 ms
Maximum up-programming and down-programming settling time with full resistive load: (time from start of voltage change until voltage settles within 0.1% of the full-scale voltage of its final value)						
Voltage setting from 0 V to full scale and full scale to 0 V	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms

N6750/60 output programming speed
The N6750/60 achieves performance unlike a typical DC power supply with up to 10 to 50 times faster than other programmable power supplies. Thanks to an active down-programming circuit to rapidly pull down the output when lowering the module's output voltage, the N6750/60 can rapidly program both up and down in voltage. These output speeds allow the N6750/60 to give maximum system throughput when your test calls for frequent changes in power supply voltage settings.

N6750/60 autoranging for flexibility
The N6750/60 gives test system designers even more flexibility by providing autoranging outputs. This autoranging capability provides maximum output power at any output voltage up to 50 V. This allows one power supply to do the job of several power supplies because its operating range covers low voltage, high current as well as high voltage, low current operating points.

N6750/60 high-speed test extensions
To make your testing go even faster, the N6750/60 offer high-speed test extensions (HSTE) which comes standard on the N6760 and optional on the N6750. This enhancement to the N6750/60 DC power modules extends the capabilities to include features similar to a built-in arbitrary waveform generator and a built-in oscilloscope. Through the LIST mode of HSTE, you can download up to 512 setpoints of voltage and current. In LIST mode, you can program the output to execute a LIST of voltage and current setpoints. For each setpoint, a dwell time can be specified and the power supply will stay (i.e., dwell) at that setpoint for the programmed dwell time value.

The HSTE also provides an oscilloscope-like digitizer built into the power module to capture voltage and current measurements.

N6730/40/70 family
The Agilent N6730, N6740, and N6770 families of DC power modules provide programmable voltage and current, measurement and protection features at a very economical price, making these modules suitable to power the DUT or to provide power for ATE system resources, such as fixture control. The N6730/40/70 families give you clean, reliable DC power without advanced features, plus gives you the added benefits of being apart of the N6700 MPS including small size (true 1U), mix-and-match with other N6700 DC power modules when you need performance along with basic DC outputs, connectivity via LAN, USB, and GPIB, and fast command processing time of less than 1 ms.

Low-Profile Modular Power System
20-300 W GPIB (Continued)

See Application Specific DC Power Supplies section for additional models
Mobile Communications
DC Sources page 91

Source Measure Units page 106

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Output can maintain specifications with up to 1-volt drop per load lead

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is ≤ 1ms.

High speed test extentions:

List mode:

- Number of steps = 1 to 512
- Dwell time = 1 to 262 s
- Maximum list repetitions = 256, or infinite

Digitizer:

- Measurement points = 1 to 4096
- Sample rate = 0.000025 Hz to 50 kHz

I/O interface:

GPIB, LAN, USB standard

Software driver:

- IVI-COM
- VXI*Plug&Play*

AC input:

- Input range: 85 – 265 VAC; 50/60/400 Hz
- Power consumption:
  - N6700B–1000 VA typical (with power factor correction)
  - N6701A–1500 VA typical (with power factor correction)
  - N6702A–3000 VA typical (with power factor correction)

Specifications (at 0° to 55°C, and derated above 40°C)	**N6741B**	**N6742B**	**N6743B**	**N6744B**	**N6745B**	**N6746B**
Ouput ratings						
Voltage	5 V	8 V	20 V	35 V	60 V	100 V
Current	20 A	12.5 A	5 A	3 A	1.6 A	1 A
Power	100 W	100 W	100 W	100 W	100 W	100 W
Programming accuracy[2] (at 23°C ±5°C)						
Voltage	0.1% + 19 mV	0.1% + 19 mV	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV	0.1% + 100 mV
Current	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.15% + 10 mA
Readback accuracy (at 23°C ±5°C)						
Voltage	0.1% + 20 mV	0.1% + 20 mV	0.1% + 20 mV	0.1% + 35 mV	0.1% + 60 mV	0.1% + 100 mV
Current	0.15% + 20 mA	0.15% + 10 mA	0.15% + 5 mA	0.15% + 4 mA	0.15% + 4 mA	0.15% + 2 mA
Output ripple and noise (PARD) (from 20 Hz – 20 MHz)						
CV peak-to-peak	11 mV	12 mV	14 mV	15 mV	25 mV	30 mV
CV rms	2 mV	2 mV	3 mV	5 mV	9 mV	18 mV
Load regulation[1]						
Voltage Current	5 mV 2 mA	6 mV 2 mA	9 mV 2 mA	11 mV 2 mA	16 mV 2 mA	30 mV 2 mA
Line regulation						
Voltage Current	1 mV 1 mA	2 mV 1 mA	2 mV 1 mA	4 mV 1 mA	6 mV 1 mA	10 mV 1 mA
Transient response time	(time to recover to within the settling band following a load change from 50% to 100% and from 100% to 50% of full load.)					
Voltage settling band	± 100 mV	± 100 mV	± 300 mV	± 300 mV	± 500 mV	± 1000 mV
Time	200 µs	200 µs	200 µs	200 µs	200 µs	200 µs
Programming resolution						
Voltage	3.5 mV	4 mV	7 mV	10 mV	18 mV	28 mV
Current	7 mA	4 mA	3 mA	2 mA	1 mA	0.5 mA
Output ripple and noise (PARD)						
CC rms	8 mA	4 mA	2 mA	2 mA	2 mA	2 mA
Over-voltage protection						
Accuracy (without relay option)	0.25% + 50 mV	0.25% + 50 mV	0.25% + 75 mV	0.25% + 100 mV	0.25% + 200 mV	0.25% + 250 mV
Response time	50 µs from occurence of O V condition to start of output shutdown					
Maximum up-programming and down-programming time with full resistive load: (time from 10% to 90% of total voltage excursion)						
Voltage setting from 0 V to full scale and full scale to 0 V	20 ms	20 ms	20 ms	20 ms	20 ms	20 ms
Maximum up-programming and down-programming settling time with full resistive load: (time from start of voltage change until voltage settles within 0.1% of the full-scale voltage of its final value)						
Voltage setting from 0 V to full scale and full scale to 0 V	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms

[1] With an output change from no load to full load, up tp a maximum load-lead drop of 1 V per lead.
[2] Applies from minimum to maximum programming range. (see Supplemental Characteristics)

More detailed specifications at **www.agilent.com/find/N6700**

Low-Profile Modular Power System
20-300 W GPIB (Continued)

Specifications (at 0° to 55°C, and derated above 40°C)	N6700B	N6701A	N6702A
Supplemental Characteristics (Non-warranted characteristics determined by design and useful in applying the product)			
Maximum total output power (= Sum of total module output power)	400 W when operating from 100 -240 VAC input	600 W when operating from 100 -240 VAC input	1200 W when operating from 200 -240 VAC input
			600 W when operating from 100 -120 VAC input

Regulatory compliance: European EMC directive 89/336/EEC for Class A products, Australian C-Tick mark, This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada. European Low Voltage Directive 73/23/EEC.

Size:

- Height 44.45 mm; 1.75 in
- Width 432.5 mm; 17.03 in
- Depth (including handles)
  585.6 mm; 23.06 in (N6700B/N6701A)
  633.9 mm; 24.96 in (N6702A)

Weight:

- N6700B with 4 installed modules
  Net: 12.73 kg; 28 lbs.
- N6701A with 4 installed modules
  Net: 11.82 kg; 26 lbs.
- N6702A with 4 installed modules
  Net: 14.09 kg; 31 lbs.
- Single power module
  Net: 1.23 kg; 2.71 lbs.

Warranty: One year

Ordering information

Options for N6700 mainframes

Opt 908 Rack mount kit

Opt FLR Filler panel kit

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B0 Full documentation on CD-ROM only

Opt 900 Power cord, United Kingdom

Opt 901 Power cord, Australia

Opt 902 Power cord, Europe

Opt 903 Power cord, USA, Canada, 120 V

Opt 904 Power cord, USA, Canada, 240 V

Opt 906 Power cord, Switzerland

Opt 912 Power cord, Denmark

Opt 917 Power cord, South Africa, India

Opt 918 Power cord, Japan

Opt 919 Power cord, Israel

Opt 920 Power cord, Argentina

Opt 921 Power cord, Chile

Opt 922 Power cord, China

Opt 927 Power cord, Thailand

Accessories for N6700 mainframes

N6709A Rack mount kit (Opt 908) Required for rack mounting of N6700B, N6701A, N6702A. (Standard rack mount hardware will not work)

N6708A Filler panel kit (Opt FLR) Required when you have < 4 modules in an N6700B, N6701A, or N6702A. Each filler panel kit contains 3 filler panels.

Options for modules

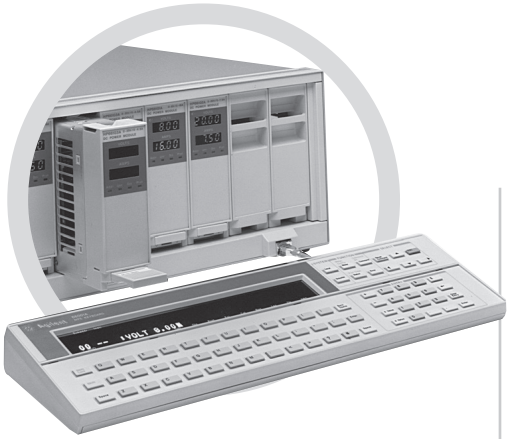
Opt 760 Open/close and polarity reverse relays (only available at time of order on models N6731B-N6736B, N6742B-N6746B, N6773A-N6776A)

Opt 761 Output disconnect relays (only available at time of order)

Opt UK6 Commercial calibration with test result data

Opt 1A7 ISO 17025 Cal Certificate

Opt 054 High-Speed Test Extension (N675x only) Comes standard on the N676xA, not available on N673x/4x/7x



Modular Power System
1200 W per mainframe GPIB

Modular system permits up to 8 outputs of 150 W per output in 4U of rack space
Reconfigure fast with easily swappable modules
Fast, low-noise outputs
LIST mode and advance triggering system
Optional isolation and polarity reversal relays
Built-in measurements and advanced programmable features
Protection features to ensure DUT safety

66000A (mainframe)
66001A (keyboard)

66000 Modular Power System

The Agilent 66000 modular power system simplifies test-system assembly, cabling, programming, debugging and operation. It is ideal for ATE and production test environments, where it can supply bias power and stimulus to subassemblies and final products. The modular power system saves rack space, the 7-inch-high (4-EIA units) mainframe can accommodate up to eight DC power modules.

Key features

- GPIB-programmable voltage and current
- Programmable over-voltage and over-current protection
- Self-test initiated at power-up or from GPIB command
- Electronic calibration over GPIB or from keyboard
- Over-temperature protection
- Discrete fault indicator/remote inhibit (DFI/RI)
- Five nonvolatile store-recall states per output
- User-definable power-on state

Multiple Mainframes at One GPIB Address

The Agilent serial link feature will allow you to control up to 16 outputs at one GPIB address by connecting an auxiliary mainframe. The serial link cable comes standard with the

Specifications (at 0° to 55°C unless otherwise specified)		66101A	66102A	66103A	66104A	66105A	66106A
Output ratings at 40°C							
Output voltage		0 to 8 V	0 to 20 V	0 to 35 V	0 to 60 V	0 to 120 V	0 to 200 V
Output current		0 to 16 A	0 to 7.5 A	0 to 4.5 A	0 to 2.5 A	0 to 1.25 A	0 to 0.75 A
Maximum power		128 W	150 W	150 W	150 W	150 W	150 W
Programming accuracy at 25°C ±5°C							
Voltage	0.03% +	3 mV	8 mV	13 mV	27 mV	54 mV	90 mV
Current	0.03% +	6 mA	3 mA	2 mA	1.2 mA	0.6 mA	0.4 mA
Readback accuracy (via GPIB or keyboard display at 25°C ±5°C)							
Voltage	0.02%+	2 mV	5 mV	8 mV	16 mV	32 mV	54 mV
Current	0.02%+	6 mA	3 mA	2 mA	1 mA	0.6 mA	0.3 mA
Ripple and noise (20 Hz to 20 MHz)							
Constant voltage rms		2 mV	3 mV	5 mV	9 mV	18 mV	30 mV
peak-peak		5 mV	7 mV	10 mV	15 mV	25 mV	50 mV
Constant current rms		8 mA	4 mA	2 mA	1 mA	1 mA	1 mA
Line regulation							
Voltage		0.5 mV	0.5 mV	1 mV	2 mV	3 mV	5 mV
Current		0.75 mA	0.5 mA	0.3 mA	0.1 mA	50 µA	30 µA
Load regulation							
Voltage		1 mV	1 mV	1 mV	2 mV	4 mV	7 mV
Current		0.5 mA	0.2 mA	0.2 mA	0.1 mA	50 µA	30 µA
Transient response time		Less than 1 ms for the output voltage to recover within 100 mV of its previous level following any step change in load current up to 10 percent of rated current					
Supplemental Characteristics		(Non-warranted characteristics determined by design that are useful in applying the product)					
Average resolution							
Voltage		2.4 mV	5.9 mV	10.4 mV	18.0 mV	36.0 mV	60.0 mV
Current		4.6 mA	2.3 mA	1.4 mA	0.75 mA	0.39 mA	0.23 mA
Output voltage programming (OVP)		50 mV	120 mV	200 mV	375 mV	750 mV	1.25 mV
OVP accuracy		250 mV	500 mV	800 mV	1 V	1.5 V	2.5 V

More detailed specifications at **www.agilent.com/find/66000**

Modular Power System
1200 W per mainframe GPIB (Continued)

66000 MPS mainframe. For applications with a broader range of power requirements, one 66000 mainframe can be connected with up to eight of the 6640, 6650, 6670, 6680, 6690 or 6030 series of system power supplies. This solution provides power ranges from 150 watts to 5000 watts at one primary GPIB address.

Output connections

System assembly is simplified thanks to a quick-disconnect connector assembly on each module. Once your wires are connected to the load, the connector design permits the modules to be removed from the front of the mainframe without disconnecting cabling or removing the mainframe from the rack. One connector assembly is shipped with each module.

Output sequencing

Increase test throughput by using the output sequencing feature of the 66000 MPS. This powerful feature allows you to download up to 20 voltage, current, and dwell-time parameter sets per output. This sequence can be paced by the programmed dwell times. As an alternative, triggers can be used to step through the output list. The output sequences can be executed without controller intervention, thereby increasing overall test system throughput. More detailed information on the triggering and output sequencing capabilities can be obtained by ordering the 66000 Modular Power System Product Note (p/n 5091-2497E).

Specifications (at 0° to 55°C unless otherwise specified)		66101A-J03 Special order option	66101A-J05 Special order option	66102A-J05 Special order option	66103A-J01 Special order option	66103A-J02 Special order option
Output ratings at 40°C						
Output voltage		5.7 V	12 V	15 V	37 V	40 V
Output current		20 A	12 A	10 A	4.5 A	3.6 A
Maximum power		114 W	144 W	150 W	167 W	144 W
Programming accuracy at 25°C ±5°C						
Voltage	0.03% +	2.5 mV	5 mV	8 mV	13 mV	15 mV
Current	0.03% +	8 mA	6 mA	4 mA	2 mA	2 mA
Readback accuracy (via GPIB keyboard display at 25°C ±5°C)						
Voltage	0.02% +	2 mV	3 mV	5 mV	8 mV	9.2 mV
Current	0.02% +	8 mA	6 mA	4 mA	2 mA	2 mA
Ripple and noise (20 Hz to 20 MHz)						
Constant voltage rms		2 mV	3 mV	3 mV	5.3 mV	6 mV
peak-peak		5 mV	7 mV	7 mV	10.6 mV	11.5 mV
Constant current rms		10 mA	8 mA	6 mA	2 mA	2 mA
Line regulation						
Voltage		0.5 mV	0.5 mV	0.5 mV	1 mV	1 mV
Current		0.5 mA	0.75 mA	0.5 mA	0.3 mA	0.3 mA
Load regulation						
Voltage		1 mV	1 mV	1 mV	1 mV	1 mV
Current		1 mA	0.5 mA	0.3 mA	0.2 mA	0.2 mA
Transient response time		Less than 1 ms for the output voltage to recover within 100 mV of its previous level following any step change in load current up to 10 percent of rated current				
Supplemental Characteristics		(Non-warranted characteristics determined by design that are useful in applying the product)				
Average resolution						
Voltage		2 mV	3.6 mV	4.5 mV	11 mV	12 mV
Current		6 mA	4.6 mA	3.1 mA	1.4 mA	1.2 mA
OVP		45 mV	75 mV	90 mV	200 mV	230 mV
OVP accuracy		250 mV	375 mV	375 mV	850 mV	920 mV

Application notes

66000 Modular Power System Product Note
5988-2800EN

10 Practical Tips You Need to Know About Your Power Products
5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time
5968-6359E

Agilent DC Power Supplies for Base Station Testing
5988-2386EN

More detailed specifications at **www.agilent.com/find/66000**

Modular Power System
1200 W per mainframe GPIB (Continued)

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ±240 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped across each load lead. Add 2 mV to the voltage load regulation specification for each 1–V change in the negative output lead caused by a load current change.

Command processing time: The average time for the output voltage to change after getting an GPIB command is 20 ms.

Output programming response time (with full resistive load): The rise and fall time (10% to 90% and 90% to 10%) of the output voltage is less than 20 ms. The output voltage change settles within 0.1% of the final value in less than 120 ms.

Down programming: An active down-programmer sinks approximately 10% of the rated output current

Calibration interval: One year

AC input of system mainframe

Voltage	100 VAC	120 VAC	200 VAC	220 VAC	230 VAC	240 VAC
Max. current	29 A	25 A	16 A	16 A	15 A	15 A

Input power of system mainframe: 3200 VA (max.), 1800 W (max.), 1600 W (typ.)

GPIB capabilities: SH1, AH1, TE6, LE4, SR1, RL1, PP0, DC1, DT1, E1, and C0, and a command set compatible with IEEE-488.2 and SCPI

Software driver: VXI*Plug&Play*

Regulatory compliance: Listed to UL 1244; certified to CSA 22.2 No. 231; conforms to IEC 61010-1.

Weight: Net, 66000A, 15 kg (33 lb); 66001A, 1.05 kg (2.3 lb); 66101-66106A, 2.8 kg (6 lb). Shipping, 66000A, 19 kg (42 lb); 66001A, 1.34 kg (2.95 lb); 66101–66106A, 4.1 kg (9 lb).

Size: 66000A: 425.7 mm W x 192 mm H x 677.93 mm D (16.76 in x 7.28 in x 26.69 in), including feet and rear connectors

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)		**66103A-J09** Special order option	**66103A-J12** Special order option	**66104A-J09** Special order option	**66105A-J01** Special order option
Output ratings at 40°C					
Output voltage		28.5 V	24 V	55 V	35 V
Output current		5.5 A	6 A	3 A	1.25 A
Maximum power		157 W	144 W	165 W	44 W
Programming accuracy at 25°C ±5°C					
Voltage	0.03% +	13 mV	13 mV	25 mV	15 mV
Current	0.03% +	3 mA	3 mA	1.5 mA	0.6 mA
Readback accuracy (via GPIB or keyboard display at 25°C ±5°C)					
Voltage	0.02% +	8 mV	8 mV	15 mV	9 mV
Current	0.02% +	3 mA	3 mA	1.2 mA	0.6 mA
Ripple and noise (20 Hz to 20 MHz)					
Constant voltage rms		5 mV	5 mV	9 mV	6 mV
peak-peak		10 mV	10 mV	15 mV	11.5 mV
Constant current rms		4 mA	4 mA	1.2 mA	1 mA
Line regulation					
Voltage		1 mV	1 mV	2 mV	1 mV
Current		0.3 mA	0.3 mA	0.1 mA	50 µA
Load regulation					
Voltage		1 mV	1 mV	2 mV	1 mV
Current		0.2 mA	0.2 mA	0.1 mA	50 µA
Transient response time		Less than 1 ms for the output voltage to recover within 100 mV of its previous level following any step change in load current up to 10 percent of rated current			
Supplemental Characteristics		(Non-warranted characteristics determined by design that are useful in applying the product)			
Average resolution					
Voltage		10.4 mV	8 mV	16.5 mV	2 mV
Current		2 mA	2 mA	0.9 mA	1.2 mA
OVP		200 mV	150 mV	350 mV	230 mV
OVP accuracy		800 mV	600 mV	950 mV	920 mV

More detailed specifications at **www.agilent.com/find/66000**

Modular Power System
1200 W per mainframe GPIB (Continued)

Ordering information

66000A MPS mainframe
* **Opt 908** Rack-mount kit (p/n 5063-9215)
* **Opt 909** Rack-mount kit with handles (p/n 5063-9222)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual
* **Note:** Options 908 and 909 require cabinet rails (E3663AC) or a slide kit (p/n 1494-0059) to support the loaded mainframe's weight.
A line cord option must be specified, see the AC line voltage and cord section.

66001A MPS keyboard includes 2 m (6 ft) cables
66002A Rack kit for 66001A keyboard

Module options

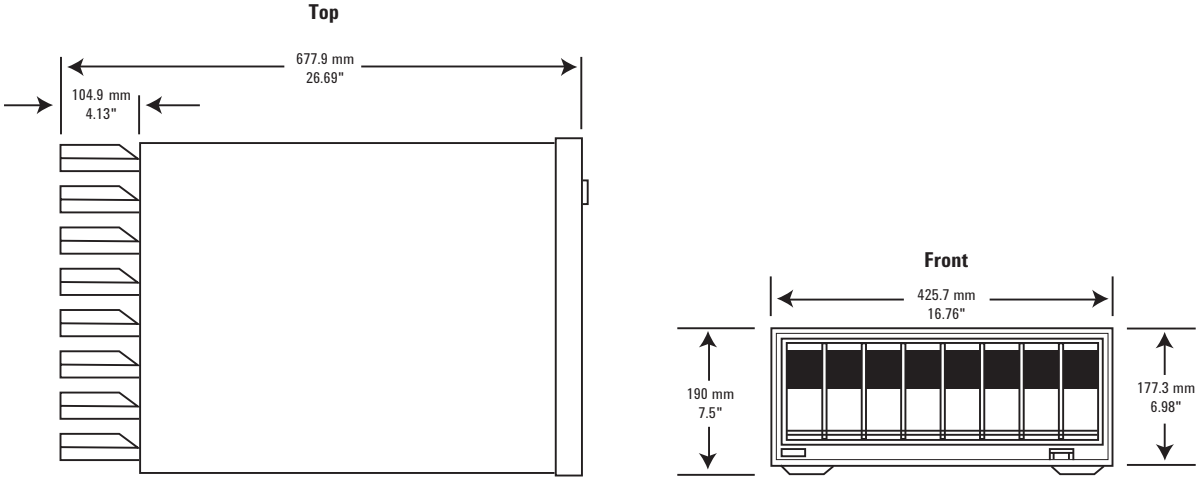
Opt 760 Open/close and polarity reversal relays
Opt J17 External Imon
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

Accessories

p/n 5060-3351 Field-installable relay kit
p/n 5060-3386 Standard connector assembly
p/n 5060-3387 Standard connector assembly with installed relays (Option 760)

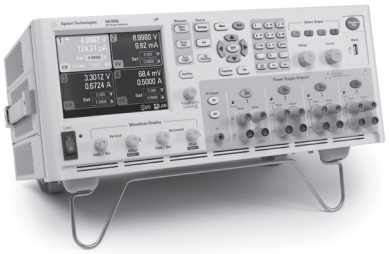
p/n 66000-90001 Mainframe Installation Guide
p/n 5959-3360 DC Power Module User's Guide
p/n 5959-3362 DC Power Module Programming Guide
p/n 66000-90003 Mainframe Service Manual
p/n 5959-3364 DC Power Module Service Manual
p/n 1252-1488 4-Pin FLT/inhibit connector
E3663AC Support rails for Agilent rack cabinets

Agilent Models: 66000A



More detailed specifications at **www.agilent.com/find/66000**

Modular DC Power Analyzer
600 W GPIB, LAN, USB, LXI Class C



N6705B

Flexible configuration to meet your power sourcing and analysis requirements
4-slot mainframe that accepts up to 4 DC power modules
600 W total DC power module output power
The modules are ordered separately

New instrument category
The Agilent N6705 DC Power Analyzer represents an entirely new instrument category for R&D engineers. It provides unrivaled productivity gains when sourcing and measuring DC voltage and current into a DUT. Using the Agilent N6705 DC Power Analyzer, R&D engineers can gain insights into the DUT's power consumption in minutes without writing a single line of code. It provides an easy-to-use interface, with all sourcing and measuring functions available from the front panel. When automated bench setups are required, the N6705B is fully programmable over GPIB, USB, LAN and is LXI Class C Compliant.

Modular System Based on DC Power Supply Outputs
The Agilent N6705B DC power analyzer is a modular system that is tailorable to meet specific test needs. At the heart of the DC power analyzer is the DC power module. The Agilent N6705B DC power analyzer is a mainframe that has four slots to accept one to four DC power modules. Each DC power module takes one slot, except for the N6753A and N6754A 300 W high performance autoranging DC power modules, which occupy two slots. The N6705B accepts the same modules as N6700 Low-Profile Modular Power System. Select from more than 20 different DC power modules ranging in capability from basic to high precision/source measure unit, and in power from 20 W to 300 W. This modular design gives you the flexibility to mix and match over twenty different DC power modules to create a solution optimized to meet specific test requirements.

Specifications (at 0° to 55°C unless otherwise specified)	N6730B	N6740B	N6770A	N6751A N6752A	N6753A Note	N6754A
Output ratings						
Voltage	6 models 5 V to 100 V	6 models 5 V to 100 V	4 models 20 V to 100 V	50 V	20 V	60 V
Current	6 models 0.5 A to 10 A	6 models 1 A to 20 A	4 models 3 A to 15 A	5 A 10 A	50 A	20 A
Power	50 W	100 W	300 W	50 W 100 W	300 W	300 W
Autoranging	No	No	No	Yes	Yes	Yes
Measurement accuracy						
Voltage	0.1% + 50 mV	0.1% + 50 mV	0.1% + 50 mV	0.05% + 20 mV	0.05% + 10 mV	0.06% + 25 mV
Current	0.15% + 20 mA	0.15% + 20 mA	0.15% + 20 mA	0.1% + 4 mA	0.1% + 30 mA	0.1% + 8 mA
Noise (20 Hz to 20 MHz)	20 mVpp	20 mVpp	40 mVpp	0.35 mVrms 4.5 mVpp	1 mVrms 5 mVpp	1 mVrms 6 mVpp
Polarity reverse relays	Optional	Optional	Optional	Not available	Optional	Optional
Output relays	Optional	Optional	Optional	Optional	Optional	Optional

***Key Specifications** (Approximate values for families of modules – see data sheet for specifics)

Scope: Up to 100 kHz digitizer for N673x, N674x, N675x, N676x, N677x, and N6783 modules; Up to 200 kHz for N678x SMUs

ARB: Approx max bandwidth = 5 kHz for N675x and N676x modules; 500 Hz for N673x, 4x, 7x, and 83 modules; 100 kHz for N678x SMUs

Note: Requires special installation. Instructions ship with the module.

More detailed specifications at **www.agilent.com/find/N6705B**

Modular DC Power Analyzer
600 W GPIB, LAN, USB, LXI Class C (Continued)

The Agilent N6705 DC power analyzer saves time

- Provides unrivaled productivity gains for sourcing and measuring DC voltage and current into your DUT by integrating up to four advanced power supplies with DMM, scope, arb, and data logger features.
- Eliminates the need to gather multiple pieces of equipment, create complex test setups including transducers (such as current probes and shunts) to measure current into your DUT.
- Eliminates the need to develop and debug programs to control a collection of instruments and take useful measurements because all the functions and measurements are available at the front panel.

Agilent N6705 DC power analyzer makes these tasks easy, right from the front panel

- Setup and view critical turn-on/ turn-off sequences
- Measure and display voltage, current versus time to visualize power into the DUT
- Control DC bias supply ramp-up/ down rates
- Generate DC bias supply transients and disturbances
- Log data for seconds, minutes, hours, or even days to see current consumption or capture anomalies
- Save data and screen shots to internal storage or external USB memory devices
- Save and name your setup and tests for easy re-use
- Share setups with colleagues

Specifications (at 0° to 55°C unless otherwise specified)	N6761A N6762A	N6783A -BAT	N6781A	N6782A	N6784A
Output ratings					
Voltage	50 V	8 V	+20 V	+20 V	±20 V
Current	1.5 A 3 A	+3 A -2 A	±3 A	±3 A	±3 A
Power	50 W 100 W	24 W	20 W	20 W	20 W
Autoranging	Yes	No	No	No	No
Measurement accuracy					
Voltage	0.016% + 6 mV	0.05% + 5 mV	0.025% + 1.2 mV	0.025% + 1.2 mV	0.025% + 1.2 mV
Current	0.04% + 160 µA**	0.1% + 600 µA	0.03% + 250 µA	0.03% + 250 µA	0.03% + 250 µA
Noise (20 Hz to 20 MHz)	0.35 mVrms 4.5 mVpp	1.5 mVrms 8 mVpp	1.2 mVrms 12 mVpp	1.2 mVrms 12 mVpp	1.2 mVrms 12 mVpp
Polarity reverse relays	Not available	Not available	Not available	Not available	Not available
Output relays	Optional	Optional	Available	Available	Available

***Key Specifications** (Approximate values for families of modules – see data sheet for specifics)

** 0.5% + 100 nA with Option 2UA

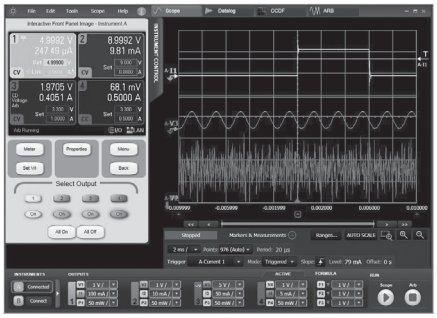
Scope: Up to 100 kHz digitizer for N673x, N674x, N675x, N676x, N677x, and N6783 modules; Up to 200 kHz for N678x SMUs

ARB: Approx max bandwidth = 5 kHz for N675x and N676x modules; 500 Hz for N673x, 4x, 7x, and 83 modules; 100 kHz for N678x SMUs

New 14585A control and analysis software saves even more time

The new 14585A Control and Analysis Software is a companion PC application that gives you control of up to four N6705 mainframes from a single PC control screen. With this software, you get improved data visualization and data management.

Visit **www.agilent.com/find/14585** for more information.



More detailed specifications at **www.agilent.com/find/N6705B**

Modular DC Power Analyzer
600 W GPIB, LAN, USB, LXI Class C (Continued)

Ordering information

Mainframe

N6705B DC power analyzer mainframe Holds 1 to 4 modules. Total available output power = 600 W.

The N6705B mainframe and various modules can be ordered as separate products such that you can configure the system as needed.

N6715B build-to-order DC power analyzer system consists of 1 N6705B mainframe with total available power of 600 W.

The N6715B system is a build-to-order DC power analyzer system that is shipped as a fully assembled multiple-output power supply. Modules are ordered as options to the mainframe.

N6705U Upgrade Model
For more information, see **www.agilent.com/find/N6705U**

Options for N6705B/15B mainframes

Opt 908 Rack mount kit

Opt AKY Delete front/rear USB. This option removes all USB capability from the DC power analyzer. Both the front panel USB port and the rear panel USB port are removed.

Opt 055 Delete Data logger This option disables the data logger functionality in the DC power analyzer firmware. The DC power analyzer hardware is unchanged. To enable the data logger functionality at a later time, order the N6705U upgrade kit.

Opt 056 Add 14585A Software License

Opt ABA Full documentation on CD-ROM and printed Users Guide

Opt 0B0 Full documentation on CD-ROM only; no printed documentation package

Opt 900 Power Cord, United Kingdom

Opt 901 Power Cord, Australia, New Zealand

Opt 902 Power Cord, Europe, Korea

Opt 903 Power Cord, USA, Canada, 120 V

Opt 904 Power Cord, USA, Canada, 240 V

Opt 906 Power Cord, Switzerland

Opt 912 Power Cord, Denmark

Opt 917 Power Cord, South Africa, India

Opt 918 Power Cord, Japan, 100 V

Opt 919 Power Cord, Israel

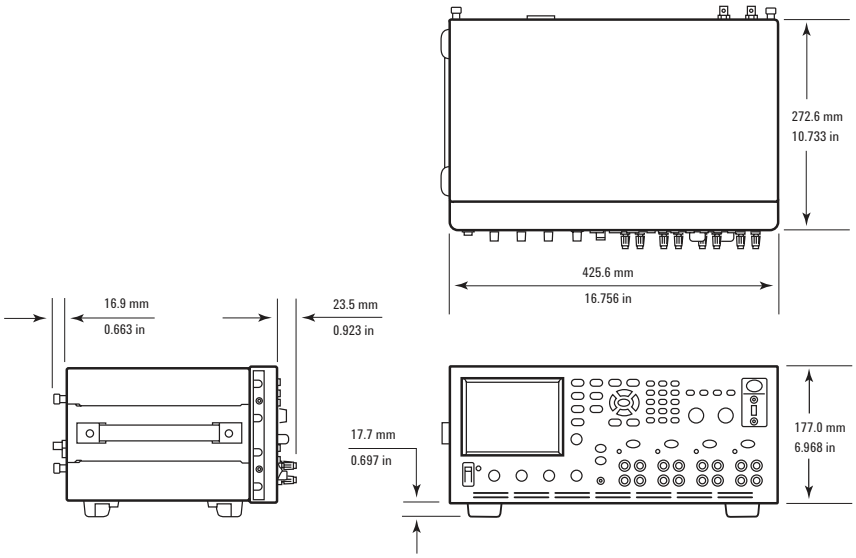
Opt 920 Power Cord, Argentina

Opt 921 Power Cord, Chile

Opt 922 Power Cord, China

Opt 927 Power Cord, Thailand, Brazil

Agilent Models: N6705B, N6715B



More detailed specifications at **www.agilent.com/find/N6705B**

Application Specific DC Power Supplies...

tailored solutions for specific needs

Some applications require specialized DC power supplies. This section contains DC power supplies that provide the solutions needed to solve some very specific application problems.

Mobile Communication DC Sources

Battery life is a critical parameter for battery powered digital mobile communications devices such as cell phones, WLAN and Bluetooth™ enabled appliances. The pulsed characteristics of battery drain create unique powering and measuring requirements. With fast transient response, to react to pulsed current draw, and a flexible and fast measurement system, these DC sources are optimized for the needs of digital mobile communications devices.

Solar Array Simulators

Solar panels consisting of multiple solar arrays provide power to satellites. They have unique V-I characteristics. Since the output power of a solar array varies with environmental conditions (i.e. temperature, darkness, light intensity), a specialized power supply must be used for accurate simulation.

Source Measure Units

A Source/Measure Unit, or SMU, is a source and measurement instrument for test applications requiring high accuracy, high resolution and measurement flexibility. An SMU can precisely force voltage or current and simultaneously measure voltage and/or current. SMUs are sometimes also referred to as source monitor units.

Device Analyzer/Curve Tracers

Device analyzer/curve tracer series of products provide precision voltage and current plus make very low current and voltage measurements for semiconductor devices and new materials.

Application Specific Modules
N6783A-BAT, N6783A-MFG

N6783A-BAT, N6783A-MFG

Optimized for basic battery charge/discharge applications (N6783A-BAT)
Optimized for mobile device manufacturing test (N6783A-MFG)
Fast transient response ensures stable power supply output voltage
Digitizing measurement system for flexible, accurate current measurements
USB, LAN, and GPIB interfaces

Solution for battery-powered device designers

The Agilent N6783A-BAT Battery Charge/Discharge Module is a basic, 2-quadrant module designed to be used by battery-powered (mobile) device designers. During the research and development of a mobile device it is necessary to properly validate the battery that will be used in the final design, especially if the design calls for the battery to be permanently installed. Battery validation requires charging and discharging the battery while making measurements of voltage and current to ensure it meets its specifications and will operate in the device as expected.

The N6783A-BAT's 2-quadrant operation allows it to act as a power supply to charge the battery or as an electronic load to discharge the battery. Its built-in, digitizing measurement system allows accurate measurements over the short and

Mainframe Characterisics	N6700B	N6701B	N6702B	N6705B
Power (sum of module output)	400 W	600 W	1200 W	600 W
Configuration	Flexible / reconfigurable			
Available slots	4 - mainframe accepts up to 4 DC power modules			
Instrument control	GPIB, USB, LAN (LXI Class C Compliant)			

Module Specifications		N6783A-BAT	N6783A-MFG
DC output ratings			
Voltage		8 V	6 V
Current (derated 1% per °C above 40°C)		+3 A/-2[1]	+3 A/-2[1]
Power		24 W	18 W
Output voltage ripple & noise (PARD) (from 20 Hz - 20 MHz)			
CV peak-to-peak		8 mV	8 mV
CV rms		1.5 mV	1.5 mV
Load effect (Regulation) (for any output load change, with a maximum load-lead drop of 0.5 V/lead)			
Voltage		6 mV	6 mV
Current		2 mA	2 mA
Source effect (Regulation)			
Voltage		2 mV	2 mV
Current		1 mA	1 mA
Programming accuracy (At 23 °C ±5 °C after 30 min. warm-up)			
Voltage	0.1% +	10 mV	10 mV
Positive Current	0.1% +	1.8 mA	1.8 mA
Negative Current @ -2 A	0.2% +	1.8 mA	N/A

Notes:

[1] Output may provide peak currents up to 5 A for a maximum of 0.5 second

More detailed specifications at **www.agilent.com/find/N6783A-BAT**
www.agilent.com/find/N6783A-MFG

Application Specific Modules
N6783A-BAT, N6783A-MFG (Continued)

long-term. When used in the N6705B DC Power Analyzer mainframe short and long-term measurements for battery validation are made easy.

The N6783A-BAT can also be used to condition batteries for test in mobile devices by charging or discharging the battery to a specific level in order to see how the device performs under specific conditions. This allows R&D engineers to understand real-world operation of their designs during different levels of charge.

The N6783A-BAT can be used for battery charge/discharge only. For advanced battery test, battery drain analysis and battery emulation use the N6781A 2-Quadrant SMU for Battery Drain Analysis.

Solution for battery powered device manufacturers

The N6783A-MFG Mobile Communications DC Power Module offers advanced features specifically for testing battery-powered (mobile) devices in manufacturing. The N6783A-MFG's excellent voltage transient response ensures a stable output voltage is maintained at the device under test (DUT) during load transients. This maximizes system throughput by eliminating inadvertent device shutdowns that occur if the voltage is allowed to droop too low, such as when a non-specialized power supply is used. The built-in digitizer also allows for maximum throughput by providing fast, accurate, flexible measurements that are customizable to the level of speed and accuracy desired.

Module Specifications		N6783A-BAT	N6783A-MFG
Measurement Accuracy (At 23 °C ±5 °C)			
Voltage	0.05% +	5 mV[2]	5 mV[2]
Current high range	0.1% +	600 µA[2]	600 µA[2]
Current low range (≤ 150 mA)		75 µA[2]	75 µA[2]
Programming Resolution			
Voltage		2.5 mV	2.5 mV
Positive Current		1 mA	1 mA
Negative Current		10 mA	N/A
Maximum Up-Programming and Down-Programming Time with Full Resistive Load (time from 10% to 90% of total voltage excursion)			
Voltage Settling from 0 V to Full Scale		4.0 ms	4.0 ms
Voltage Settling from Full Scale to 0 V		4.0 ms	4.0 ms
Maximum Up-Programming and Down-Programming Settling Time with Full Resistive Load (time from start of voltage change until voltage settles within 0.1% of the full-scale voltage of its final value)			
Voltage Settling from 0 V to Full Scale		20 ms	20 ms
Voltage Settling from Full Scale to 0 V		20 ms	20 ms
Over-voltage Protection			
Accuracy without disconnect relays	0.25% +	75 mV	75 mV
Accuracy with disconnect relays	0.25% +	275 mV	275 mV
Nominal range		0 – 10 V	0 – 10 V
Programmable delay time (from occurrence of over-voltage condition to start of output shutdown)		60 µs – 5 ms	60 µs – 5 ms
Over-Current Protection			
Programmable delay time		0 – 255 ms	0 – 255 ms
Nominal Range		5 mA – 3.06 A	5 mA – 3.06 A
Output Ripple and Noise: (PARD)			
CC rms		4 mA	4 mA
Common Mode Noise (from 20 Hz–20 MHz; from either output to chassis)			
Rms		1 mA	1 mA
Peak-to-peak		6 mA	6 mA

Notes:

[2] Applies when measuring the default value of 1024 data points

More detailed specifications at **www.agilent.com/find/N6783A-BAT**
www.agilent.com/find/N6783A-MFG

Application Specific Modules
N6783A-BAT, N6783A-MFG (Continued)

The N6783A-MFG, when used in the N6700B Low-Profile mainframe, offers industry-leading output density with up to 4 outputs in 1U of rack space. GPIB, LAN, USB, and LXI Class C compliance are standard.

Part of a Modular Power System
The N6783A-BAT and N6783A-MFG modules can be used with the N6700 low-profile mainframes for automated test and with the N6705 DC power analyzer mainframe for R&D. Select from more than 20 different DC power modules ranging in capability from basic to high precision, and in power from 20-300 W; see N6700 Low Profile Modular Power System section for details.

Ordering Information

N6783A-BAT Battery Charge/Discharge Module

N6782A-MFG Mobile Communications DC Power Module

N6705B-056 Software License to Control N6705A/B with 14585A Control and Analysis Software (Option to the N6705B when ordered new)

N6705U-056 Upgrade an N6705A/B DC Power Analyzer with14585A Software License

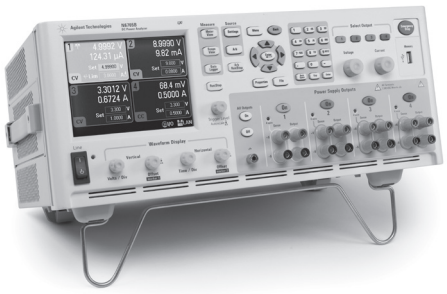
Supplemental Characteristics	N6783A-BAT	N6783A-MFG
Load Transient Recovery (assumes standard GSM pulse test as defined in the figure below)		
Transient Voltage Dip[3]	75 mV	75 mV
Time[4]	< 45 µs	< 45 µs
Transient Voltage Dip with Disconnect Rely installed	90 mV	90 mV
Time with Disconnect Relay Installed[4]	< 75 µs	< 75 µs
Remote Sense Capability Outputs can maintain DC specifications with up to a 0.5-volt drop per load lead. Maximum sense lead resistance is limited to 300 mΩ/lead.		
Down-programming Capability		
Continuous power	12 W	12 W
Continuous current[5]	2 A	2 A

Notes:

[3] Voltage measured at the sense point

[4] Time for the output to recover to 20 mV below its final setting

[5] Applies above 0.50 V out



N6705B

N6700B - N6702B

More detailed specifications at **www.agilent.com/find/N6783A-BAT**
www.agilent.com/find/N6783A-MFG

Mobile Communications DC Sources
40-100 W

66319B/D, 66321B/D

Ideal for testing wireless and battery powered devices

Several times improvement in measurement throughput over general purpose DC sources

Superior output transient performance with short or long load leads (up to 6 meters)

Dynamic measurement system for accurate battery current drain measurement

New easy-to-use Graphical User Interface and analysis tools for bench top use

Overcome battery powered device testing challenges

Digital communications devices and digital battery powered devices present a unique testing challenge: they draw rapid pulses of current. By offering superior transient performance, unmatched in the marketplace, the Agilent mobile communications DC sources dramatically reduce the transient voltage drop due to pulse loading characteristics of digital communications devices. The Agilent mobile communications DC sources enable you to maximize test throughput by minimizing test interruption due to false trigger of device low voltage shutdown.

Dynamic measurement capabilities

The Agilent mobile communications DC sources offer a built-in advanced measurement system to accurately measure battery current drains when the device operates in different modes (such as talk mode, active mode, standby mode, and off/sleep mode). Measurements made during these modes are critical for ensuring that your devices are operating properly and that you are getting the most out of the battery.

Simulate both main battery and charger

Single output models are recommended when you need to provide power as a replacement to your

Specifications (at 0° to 55°C unless otherwise specified)		66309B/D	66311B	66319B/D	66321B/D	66332A[1]	66332A-J01 Special order option
Number of outputs		2	1	2	1	1	1
GPIB		Yes	Yes	Yes	Yes	Yes	Yes
Output ratings							
Voltage		0 to 15 V	0 to 15 V	0 to 15 V	0 to 15 V	0 to 20 V	0 to 30 V
Current		0 to 3 A	0 to 3 A	0 to 3 A	0 to 3 A	0 to 5 A	0 to 3.3 A
Peak current for up to 7 ms		5 A	5 A	5 A	5 A	5 A	3.3 A
Programming accuracy at 25°C ±5°C (% of setting plus fixed)							
Voltage	0.05%+	10 mV	10 mV	10 mV	10 mV	10 mV	15 mV
+Current	0.05%+	1.33 mA	1.33 mA	1.33 mA	1.33 mA	2 mA	2 mA
Ripple and noise (20 Hz to 20 MHz)							
Voltage	rms	1 mV	1 mV	1 mV	1 mV	0.3 mV	0.5 mV
	peak-to-peak	6 mV	6 mV	6 mV	6 mV	3 mV	5 mV
Current	rms	2 mA	2 mA	2 mA	2 mA	2 mA	2 mA
DC measurement accuracy							
Voltage	0.03%+	5 mV	5 mV	5 mV	5 mV	3 mV	5 mV
+20 mA to + rated current	0.2%+	0.5 mA[2]	0.5 mA[2]	—	—	0.5 mA	0.5 mA
-20 mA to - rated current	0.2%+	1.1 mA	1.1 mA	—	—	1.1 mA	1.1 mA
-3 A to + 5 A	0.2%	—	—	0.5 mA[2]	0.5 mA[2]	—	—
-1 A to + 1 A	0.1%	—	—	0.2 mA	0.2 mA	—	—
-20 mA to + 20 mA range	0.1%+	2.5 µA	2.5 µA	2.5 µA	2.5 µA	2.5 µA	2.5 µA
Dynamic measurement system							
Buffer size		4096 points	4096 points	4096 points	4096 points	4096 points	4096 points
Sampling interval		15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s
Transient response time		<35 µs[3]	<35 µs[3]	<20 µs[3]	<20 µs	<100 µs[4]	<100 µs[4]
Transient voltage dip (typical with up to 15 feet 22 AWG wiring)		70 mV	70 mV	40 mV	40 mV	500 mV	650 mV

Notes:

1 66332A also has RS-232 interface.

2 Applies with current detector set to DC.

3 Time for the output voltage to recover to within 20 mV of final value after 0.1 to 1.5 A load change in high capacitance compensation range.

4 Time for the output voltage to recover to within 20 mV or 0.1% of the voltage rating of the unit following a change in load current of up to 50% of the output current rating.

More detailed specifications at **www.agilent.com/find/66300**

Mobile Communications DC Sources
40-100 W (Continued)

device's main battery during testing. Dual output models are recommended when you need to provide power as a replacement to your device's main battery and when you need to simulate the battery charger power; Use one output to supply current to the battery charger input port and the second output to connect in place of the main battery (which sinks current to simulate the main battery being charged).

Performs like a battery

With their battery emulation features, the Agilent 66319B/D and 66321B/D allow you to test your devices under the same power conditions that exist in actual use. Emulating the battery is key when characterizing battery operating life and detecting early product failures. These DC sources simulate the effects of internal resistance of the battery, enabling them to emulate the operation of various battery types or batteries in different charge states. Plus, these DC sources can simulate negative resistance so that you can compensate for voltage drop due to wiring in a fixture.

Feature summary

Agilent has designed in the capability and flexibility that is required for accurately testing today's communications devices as well as your next generation designs for cell phones (formats include: 3G, cdma2000, WCDMA, CDMA, TDMA, GSM, PCS, DECT, TETRA, PHS, NADC), PDAs, *Bluetooth*™ enabled devices, and Wireless LAN access devices.

Specifications (at 0° to 55°C unless otherwise specified)		66309B/D	66311B	66319B/D	66321B/D	66332A	66332A-J01 Special order option
Programmable output resistance							
Range		—-	—	-40 mΩ to +1 Ω	-40 mΩ to +1 Ω	—	—
Programming accuracy		—	—	0.5% + 2 mΩ	0.5% + 2 mΩ	—	—
Resolution		—	—	1 mΩ	1 mΩ	—	—
Voltmeter input (66309D, 66319D, and 66321D only)							
Input range		-25 to +25 VDC	— —	-25 to +25 VDC	-25 to +25 VDC	— —	— —
DC readback accuracy (at 25°C ±5°C)		0.04% + 5 mV	— —	0.04% + 5 mV	0.04% + 5 mV	— —	— —
AC + DC readback accuracy (at 25°C ±5°C) with DC plus a sinewave input > 25 mVrms		1% + 5 mV (60 Hz to 10 kHz)	— — — —	1% + 5 mV (60 Hz to 10 kHz)	1% + 5 mV (60 Hz to 10 kHz)	— — — —	— — — —
Auxilary output (66309B/D and 66319B/D)							
Output ratings	Voltage	0 to 12 V	—	0 to 12 V	—	—	—
	Current	0 to 1.5 A	—	0 to 1.5 A	—	—	—
Programming accuracy	Voltage	0.2% + 40 mV	—	0.2% + 40 mV	—	—	—
	+Current	0.2% + 4.5 mA	—	0.2% + 4.5 mA	—	—	—
DC measurement accuracy	Voltage	0.2% + 15 mV	—	0.2% + 15 mV	—	—	—
	+Current	0.2% + 3 mA	—	0.2% + 3 mA	—	—	—
Ripple and noise (20 Hz to 20 MHz)							
Voltage	rms	1 mV	—	1 mV	—	—	—
	peak-to-peak	6 mV		6 mV			
Current	rms	2 mA	—	2 mA	—	—	—

Supplemental Characteristics (Non-warranted characteristics determined by design and useful in applying the product)

DC floating voltage
Output terminals can be floated up to ±50 VDC maximum from chassis ground (±240 VDC for 66332A)

Remote sensing voltage drop
For 66332A: Up to 2 V can be dropped in each load lead. Add 2 mV to the load regulation specification for each 1 V drop in the positive output lead. For 66309B/D, 66311B: Up to 4 V can be dropped in each load lead. Add 2 mV to the load regulation specification for each 1 V drop in the positive output lead. For 66319B/D main output, 66321B/D main output: Up to 3 V total can be dropped in both load leads. For 66319B/D auxiliary output, 66321B/D auxiliary output: Up to 4 V total can be dropped in both load leads.

Command processing time
Average time required for the output voltage to begin to change following receipt of GPIB data is 4 ms (with display disabled).

More detailed specifications at **www.agilent.com/find/66300**

Mobile Communications DC Sources
40-100 W (Continued)

All models offer:

- Fast output response technology
- Programmable output response compensation
- Advanced DSP-based dynamic measurements
- Current sinking for testing and calibrating charger circuitry
- Extensive protection features (including broken sense lead detection)
- GPIB Interface, SCPI (Standard Commands for Programmable Instruments), VXI*plug&play* drivers

In addition, the 66319B/D and 66321B/D high performance models offer:

- Output resistance programming (positive and negative)
- Superior output stability with up to 6 meters of load leads
- Excellent transient voltage drop (typically < 30 mV)
- Three current measurement ranges
- NEW! Additional advanced battery drain measurements (CCDF, long term battery drain)

The new and improved 66319B/D and 66321B/D high performance models are recommended for new automated test system platforms and for R&D applications. The 66309B/D and the 66311B are available for those customers who need to replicate existing test platforms and who do not want to re-engineer existing automated test system designs.

Supplemental Characteristics (Non-warranted characteristics determined by design and useful in applying the product)

(Continued)

Output programming response time
For 66332A: The rise and fall time (10/90% and 90/10%) of the output voltage is < 2 ms (400 µs in fast mode). The output voltage change settles within 1 LSB (0.025% x full scale voltage) of final value in < 6 ms (2 ms in fast mode). For 66311B, 66321B/D, 66309B/D output 1, 66319B/D output 1: The rise and fall time (10/90% and 90/10%) of the output voltage is < 200 µs.

Measurement time
Average time to process query, calculate measurement parameter and return data is 50 ms (includes the default time of 30 ms for acquiring data and 20 ms data processing overhead).

GPIB interface capabilities
IEEE-488.2, SCPI command set, 6630A series programming capability (not supported in 66309B/D, 66319B/D, 66321B/D)

Software driver
- VXI*Plug&Play*
- IntuiLink Connectivity Software

Input power
(at worst case conditions:
full load, 100 VAC mains)
For 66311B, 66321B/D: 1.7 A, 125 W.
For 66309B/D, 66319B/D: 2 A, 170 W.
For 66332A: 3.5 A, 250 W.

Regulatory compliance
Complies with EMC directive 89/336/EEC (ISM 1B).

Warranty: One year

Size
For 66309B/D, 66311B, 66319B/D, 66321B/D: 212.8 mm W x 88.1 mm H x 435 mm D (8.4 in x 3.5 in x 17.13 in).
For 66332A: 425.5 mm W x 88.1 mm H x 364.4 mm D (16.8 in x 3.5 in x 14.3 in).

Weight
For 66309B/D, 66311B, 66319B/D, 66321B/D: 9.07 kg (20 lb) net, 11.1 kg (24.5 lb) shipping. For 66332A: 12.7 kg (28 lb) net, 15.0 kg (33 lb) shipping.

Application notes

Mobile Communications Device Testing
(AN 1310)
5968-2424EN

Evaluating Battery Run-down Performance Using the Agilent 66319D or 66321D with Option #053 14565A Device Characterization Software
(AN 1427)
5988-8157EN

Using Battery Drain Analysis to Improve Mobile-Device Operating Time
5988-7772EN

Current Drain Analysis Enhances WLAN Network Card Design and Test
(AN 1468)
5989-0565EN

More detailed specifications at **www.agilent.com/find/66300**

Mobile Communications DC Sources
40-100 W (Continued)

Ordering information

Opt 100 87 to 106 Vac, 47 to 63 Hz
Opt 120 104 to 127 Vac, 47 to 63 Hz
Opt 220 191 to 233 Vac, 47 to 63 Hz
Opt 230 207 to 253 Vac, 47 to 63 Hz
Opt 004 Make "Hi Compensation Mode" as default setting
Opt 007 Extra 5-pin output connectors (2 x p/n 0360-2604
Opt 020 Front-panel binding posts (66332A only)
Opt UJ0 No front panel binding posts (66332A only)
Opt 521 Solid state relays (66309B/D, 66319B/D)
Opt AYK No solid state relays (66309B/D,66319B/D)
Opt 760 Isolation and reversal relays (66332A only)
Opt 8ZJ Delete feet
Opt 8ZL Include feet

* **Opt 1CM** Rack-mount kit 66309B/D, 66311B, 66319B/D, 66321B/D: p/n 5062-3972; 66332A: p/n 5062-1912
* **Opt 1CP** Rack-mount kit with handles, p/n 5062-3975 (66332A only)
* **Opt AXS** Rack-mount kit for side-by-side mounting, (N/A for 66332A); Locking kit p/n 5061-9694; Flange kit p/n 5062-3974
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

*Support rails required

Accessories

p/n 1494-0060 Rack slide kit (66332A only)

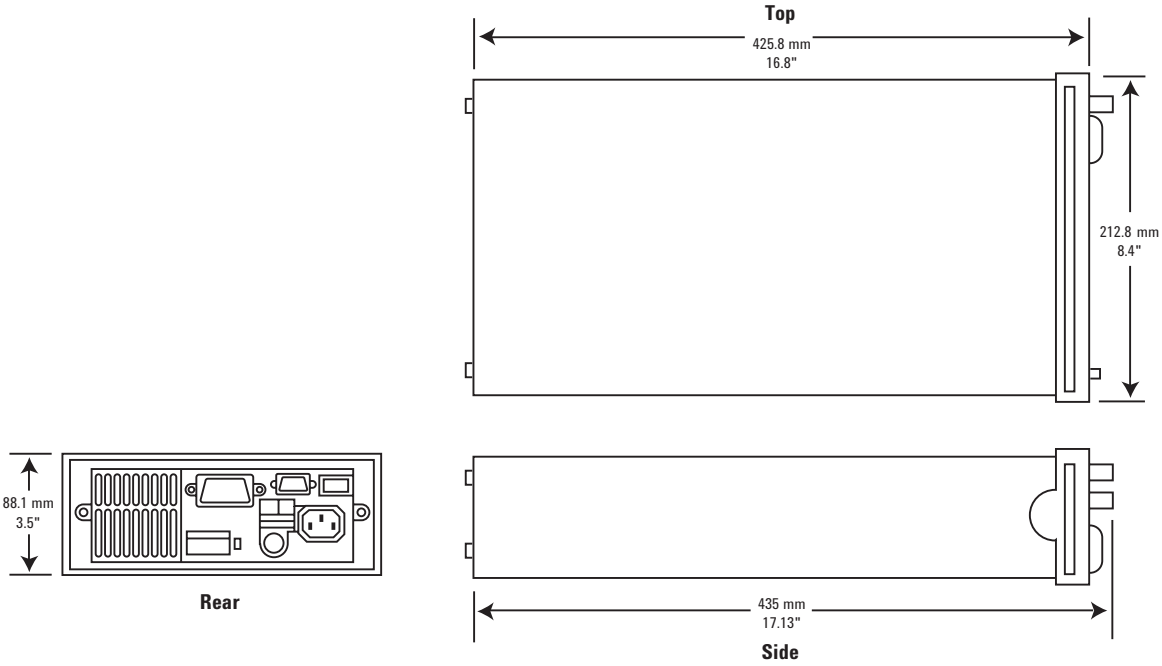
E3663AC Support rails for Agilent rack cabinets

14565B Device Characterization with Battery Drain Analysis & Test Automation

14565U Device Characterization Software Upgrade (provides upgrade from 14565A to 14565B Software)

Note: Battery Drain Analysis means Data Logging and CCDF measurements. These capabilities require models 66319B, 66319D, 66321B or 66321D with version A.03.00 firmware or higher and 14565B or 14565A software version 3.01 or higher.

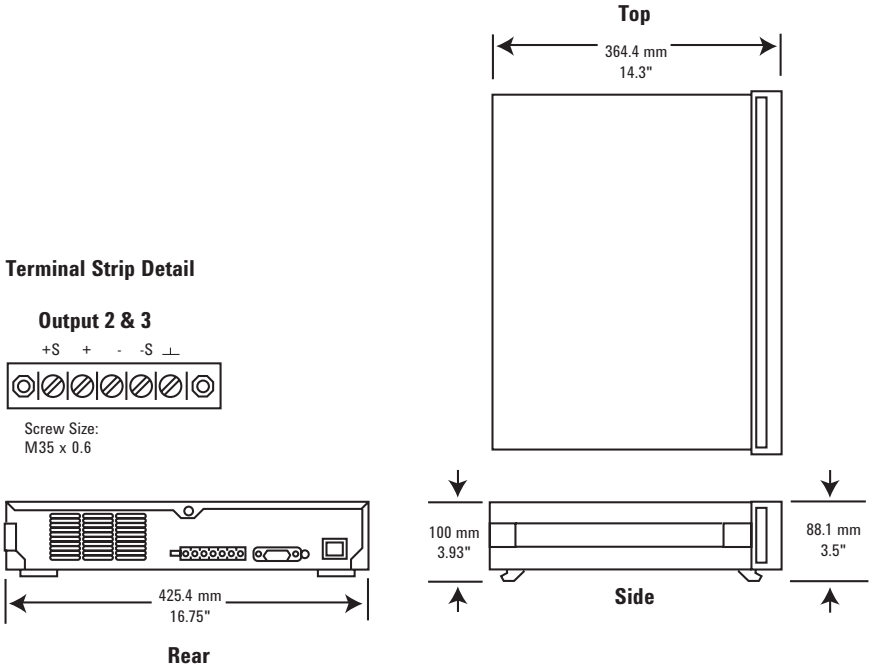
Agilent Models: 66309B/D, 66311B, 66319B/D, 66321B/D



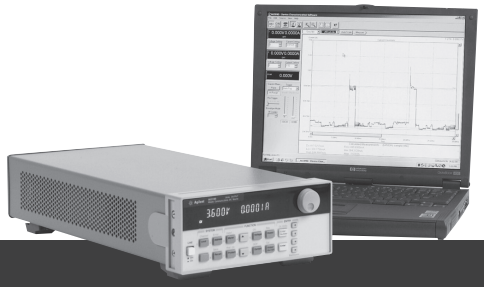
More detailed specifications at **www.agilent.com/find/66300**

Mobile Communications DC Sources
40-100 W (Continued)

Agilent Models: 66332A



Mobile Communications DC Sources
14565B Device Characterization Software



- Ideal for testing wireless and battery powered devices
- Converts mobile communications DC source into a powerful bench-top tool for R&D and Repair
- Easy-to-use Graphical User Interface and analysis tools
- No programming required

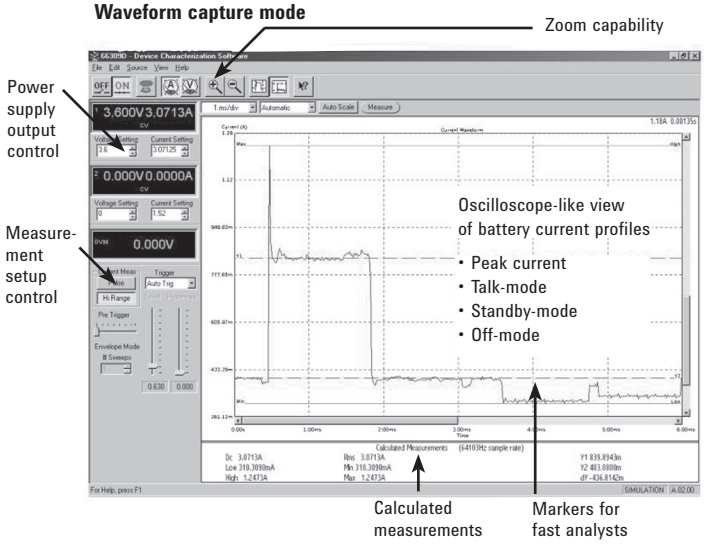
Simplify test and analysis in R&D or on the repair bench

With the Agilent 14565B Device Characterization Software, testing, analyzing, and troubleshooting wireless and battery powered devices is made simple. The 14565B provides a graphical user interface that lets you easily control the mobile communications DC sources.

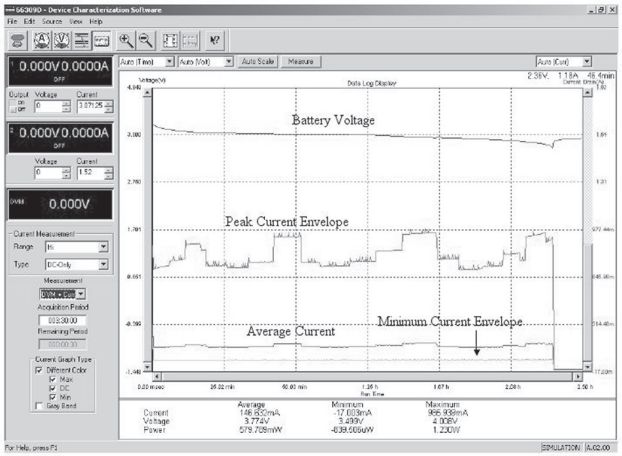
It gives you access to the mobile communications DC source's high-powered measurement system and provides an oscilloscope-like view of the voltage or current waveforms of the device under test. The 14565B provides reference waveform save/recall, and provides oscilloscope-like measurement and analysis including voltage and current waveform parameter measurements, triggering, markers, zoom control, and more.

By using the advanced capabilities built into the power supply, you can spend more time testing and analyzing instead of configuring and reconfiguring multiple pieces of test equipment, such as a current shunt, oscilloscope, current probe, DMM, and datalogger.

Waveform capture mode



Data logging mode



More detailed specifications at **www.agilent.com/find/14565B**

Mobile Communications DC Sources
Device Characterization Software (Continued)

When coupled with the 66319B/D or the 66321B/D, the 14565B also provides Battery Drain Analysis capabilities. More than just measuring battery run time, Battery Drain Analysis allows you to characterize current out of the battery and make tradeoffs in design that impact the current drain and battery life. By providing CCDF measurements and long-term battery drain data logging, the 14565B and 66319/21 provide a complete solution for analyzing current drain so that you can optimize your device designs to achieve maximum battery run time.

Save time with test automation

New capability makes it easy to automate battery current drain analysis. The 14565B can be controlled from various programs and programming languages such as the Agilent Wireless Test Manager, NI LabView™, Agilent VEE, Microsoft Visual Basic, Microsoft Excel and others. Save valuable resource and time by automating time consuming, repetitive tasks associated with characterizing battery current drains during real world operation (like video streaming, music downloads, text messaging). The 14565B Device Characterization Software with test automation reduces setup and test time, reduces manual intervention, and provides battery drain measurement and analysis.

Key features

For R&D

- Fast and easy test setup
- Digitize current waveforms
- Accurately log battery current drain measurements from 10 seconds to 1000 hours at 64,000 measurements per second
- New automation capability provides operational control from many test applications
- Test designs simulating different battery conditions with programmable output resistance
- Zoom capability for analyzing waveform anomalies
- Adjust markers for fast measurements on digitized waveforms
- Easily document your test results
- Record test data to files for archive or analysis by other software packages

For repair

- Compact design with multiple instrument functionality
- Fast and easy test setup
- Graphical user software, no programming required
- Dual DC outputs for replacing the main battery and the power adapter/charger power source
- Electronic load for testing the battery charger circuitry
- Programmable soft limits to protect against incorrect voltage settings

Ordering information

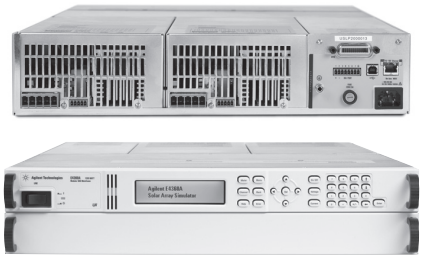
14565B Device Characterization with Battery Drain Analysis & Test Automation

14565U Device Characterization Software Upgrade (provides upgrade from 14565A to 14565B Software)

Note: Battery Drain Analysis means Data Logging and CCDF measurements. These capabilities require models 6319B, 66319D, 66321B or 66321D with version A.03.00 firmware or higher and 14565B or 14565A software version 3.01 or higher.

More detailed specifications at **www.agilent.com/find/14565B**

Modular Solar Array Simulators
1200 W



E4360A, E4361A, E4362A,
E4361A-J01, E4362A-J01, E4362A-J02

- Accurate simulation of any type of solar array
- Small size: up to 2 outputs in 2U of rack space
- High output power – up to 600 W per output
- Fast I-V curve change and fast recovery switching time
- Easy to simulate environmental conditions
- LAN, USB, and GPIB interfaces standard
- Custom turn-key system or individual instruments available

Solar Array Simulation
Solar panels consisting of multiple solar arrays provide power to satellites. They have unique I-V characteristics. Since the output power of a solar array varies with environmental conditions (i.e. temperature, darkness, light intensity), a specialized power supply like a solar array simulator must be used for accurate simulation.

Next Generation Solar Array Simulator
The Agilent E4360 modular solar array simulator (SAS) is a dual output programmable DC power source that simulates the output characteristics of a solar array. The E4360 SAS is primarily a current source with very low output capacitance and is capable of quickly simulating the I-V curve of different arrays under different conditions (ex. temperature, age etc.). It provides up to 2 outputs and up to 1200 W in a small 2U-high mainframe.

Whether you build your own test system requiring instrument only or if you want a full turn-key system with all the instruments and software integrated and installed, Agilent gives you the flexibility you need. The E4360 SAS is readily available as an off-the-shelf instrument and also is available from Agilent integrated into a full turn-key solar array simulator system configured to your exact specification.

Specifications (at 0° to 40°C unless otherwise specified)	**E4361A**	**E4362A**	**E4361A-J01**	**E4362A-J01**	**E4362A-J02**
Output ratings Simulator and table mode					
Max. Power	510 W	600 W	497.6 W	594 W	594 W
Max. Open Circuit Voltage (V_{oc})	65 V	130 V	58 V	117 V	120 V
Max. Voltage Point (V_{mp})	60 V	120 V	53.5 V	108 V	110 V
Line Voltage: 200 V/230 V/240 V					
Max. Short Circuit Current (I_{sc})	8.5 A	5.0 A	9.3 A	5.5 A	5.4 A
Max. Circuit Point (I_{mp})[1]	8.5 A	5.0 A	9.3 A	5.5 A	5.4 A
Line Voltage: 100 V/120 V[1]					
Max. Short Circuit Current (I_{sc})	4.25 A	2.5 A	4.65 A	2.75 A	2.7 A
Max. Circuit Point (I_{mp})	4.25 A	2.5 A	4.65 A	2.75 A	2.7 A
Output Ratings (Fixed Mode)					
Voltage	0 - 60 V	0 - 120 V	0 - 53.5 V	0 - 108 V	0 - 110 V
Line Voltage: 200 V/230 V/240 V					
Current	0 - 8.5 A	0 - 5.0 A	0 - 9.3 A	0 - 5.5 A	0 - 5.4 A
Line Voltage: 100 V/120 V[1]					
Current	0 - 4.25 A	0 - 2.5 A	0 - 4.65 A	0 - 2.75 A	0 - 2.7 A
Output Voltage Ripple & Noise (from 20 Hz to 20 MHz with a resistive load, outputs ungrounded, or either output grounded)					
Simulator/Table mode	20 mV_{rms}	24 mV_{rms}	20 mV_{rms}	24 mV_{rms}	24 mV_{rms}
	125 mV_{p-p}	195 mV_{p-p}	125 mV_{p-p}	195 mV_{p-p}	195 mV_{p-p}
Fixed mode (constant voltage)	24 mV_{rms}	30 mV_{rms}	24 mV_{rms}	30 mV_{rms}	30 mV_{rms}
	150 mV_{p-p}	150 mV_{p-p}	150 mV_{p-p}	150 mV_{p-p}	150 mV_{p-p}
Programming Accuracy[1,2] (@ 23°C ±5°C)					
Fixed Mode Voltage	0.075% + 25 mV	0.075% + 50 mV	0.075% + 22 mV	0.075% + 50 mV	0.075% + 50 mV
Fixed Mode Current	0.2% + 20 mA	0.2% + 10 mA	0.2% + 22 mA	0.2% + 11 mA	0.2% + 11 mA

1 There is no current derating when only one output module is installed in the mainframe.

2 In Simulator mode, the output current is related to the readback output voltage by an internal algorithm. In Table mode, the output current is related to the readback output voltage by interpolation between points that are entered by the user.

3 The unit may go out of specification when subjected to RF fields of 3 volts/meter in the frequency range of 26 MHz to 1 GHz.

More detailed specifications at **www.agilent.com/find/E4360**

Modular Solar Array Simulators: 1200 W (Continued)

Multiple Simulation Modes

The E4360 SAS provides three operating modes, Simulator, Table and Fixed modes. To accurately simulate the I-V cure of a solar array, use simulation or table modes. When a standard power supply is needed, use fixed mode.

1. Simulator Mode:

The E4360 SAS internally generates a 4,096 I-V point table. An internal algorithm is used to approximate an I-V curve. This can be done via the I/O interfaces or from the front panel where a PC is not needed. These four input parameters are needed to establish a curve in this mode:

- V_{oc} - open circuit voltage
- I_{sc} - short circuit current
- I_{mp} - current at the peak power point on the curve
- V_{mp} - voltage at the peak power point on the curve

2. Table Mode:

The I-V curve is determined by a user-defined table of points. A table can have a minimum of 3 points, up to a maximum of 4000 points. A point corresponds to a specific value of I and V. As many as 30 tables may be stored in each of the E4360 SAS built-in volatile and non-volatile memory. The tables (I-V curve) stored in this non-volatile memory will be retained when the power is turned off, while those stored in volatile memory will be erased after power is removed.

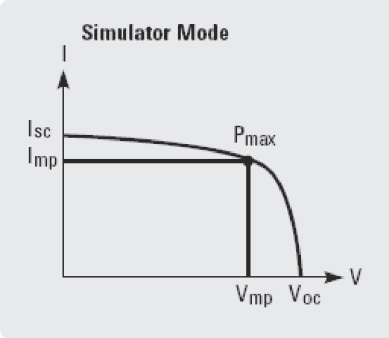
Additionally, current and voltage offsets can be applied to the selected table to simulate a change in the operating conditions of the solar array.

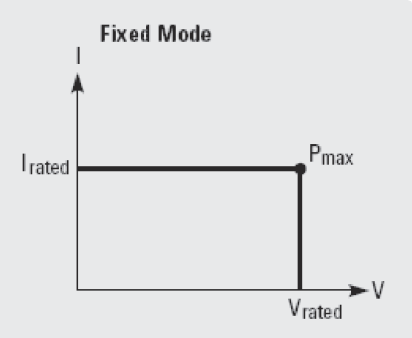
3. Fixed Mode:

This is the default mode when the unit is powered on. The unit has the rectangular I-V characteristics of a standard power supply.

E4360A Modular Solar Array Simulator mainframe

Maximum Total Output Power (= sum of total module output power)	1200 W
AC Line Voltage Ratings	
Nominal Input Range	100 VAC - 240 VAC; 50/60 Hz/400 Hz
Input Range	86 VAC - 264 VAC
Maximum Input Power with two modules installed	2000 VA; 2000 W
Maximum AC Line Current Ratings	Reduced output power 100 VAC range, 12 Arms
with two modules installed	(300 W per module) 120 VAC range, 10 Arms
Full output power	220 VAC range, 9.7 Arms 230 VAC range, 8.4 Arms 240 VAC range, 8.4 Arms
Command Processing Time	≤1 ms from receipt of command to start of output change
Protection Response Characteristics	INH input, 5 µs from receipt of inhibit to start of shutdown Fault on coupled outputs, <10 µs from receipt of fault to start of shutdown





Modular Solar Array Simulators:
1200 W (Continued)

Fast I-V Curve Changes

The E4360 offers fast curve changes to enable better simulation of solar arrays under various environmental conditions, like eclipse and spin. The resolution of the I-V curve can be set to optimize the I-V curve for resolution or fast curve change. In simulation mode and table mode, you can select high resolution which uses a 4,096 point table to generate a smoother I-V curve within 250 msec. For fast I-V curve generation, you can select the 256 point table that quickly generates an I-V curve within 30 msec. All the E4360 SAS in the system can be synchronized to change their I-V curves at the same time using the hardware trigger, such that I-V curves can be changed on up to 100 outputs within 30 msec or 250 msec based on resolution setting.

I-V Curve List

The E4360 offers a LIST mode that lets you pre-program a LIST of up to 512 I-V curves. Program up to 512 sets of points, where each set of points include curve parameters: V_{oc}, V_{mp}, I_{sc}, and I_{mp}. A dwell time of 30 ms to 65 seconds with 1 ms resolution can be specified and the E4360 SAS will stay (i.e. dwell) at the set point for the programmed dwell time value. Alternately, the LIST can be paced (advanced to the next set point) by a bus trigger or it can be paced by a trigger signal which enables synchronization of the LIST with an external event. Utilizing I-V curve lists speed up test execution by removing the computer I/O from the process and simplifies I-V curve change more easily simulating the solar array under various conditions.

Supplemental Characteristics

Interface Capabilities

GPIB, SCPI - 1993, IEEE 488.2 compliant interface

LXI Compliance, Class C (only applies to units with LXI label on front panel)

USB 2.0, Requires Agilent IO Library version M.01.01 and up, or 14.0 and up

10/100 LAN, Requires Agilent IO Library version L.01.01 and up, or 14.0 and up

Built-in Web server, Requires Internet Explorer 5+ or Netscape 6.2+

Environmental Conditions

Operating environment: Indoor use, installation category II (for AC input), pollution degree 2

Temperature range: 0°C to 55°C (current is derated 1% per °C above 40°C ambient temperature)

Relative humidity: Up to 95%

Altitude: Up to 2000 meters

Storage temperature: -30°C to 70°C

LED statement: Any LEDs used in this product are Class 1 LEDs as per IEC 825-1

Calibration Interval

1 year

Regulatory Compliance

EMC:

Complies with the European EMC directive 89/336/EEC for Class A test and measurement products.

Complies with the Australian standard and carries the C-Tick mark.

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Electronic discharges greater than 1 kV near the I/O connectors may cause the unit to reset and require operator intervention.

Safety

Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking.

This product also complies with the US and Canadian safety standards for test and measurement products.

Acoustic Noise Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive, from 18 January 1991.

Sound Pressure Lp < 70 dB(A), *At Operator Position, *Normal Operation, *According to EN 27779 (Type Test).

Schalldruckpegel Lp <70 dB(A), *Am Arbeitsplatz, *Normaler Betrieb, *Nach EN 27779 (Typprüfung).

Output Terminal Isolation

±240 VDC (maximum from chassis ground)

Dimensions

Height	88.9 mm (3.5 in.)
Width	432.5 mm (17.03 in.)
Depth	633.9 mm (24.96 in.)

Weight

Mainframe with 2 modules: 38.4 lbs (17.6 kg)

Single output module: 7.2 lbs (3.3 kg)

More detailed specifications at **www.agilent.com/find/E4360**

Modular Solar Array Simulators:
1200 W (Continued)

Small Size

The Agilent E4360 provides up to 1200 W in a small 2U high, 19 inch wide package. It has side air vents (no top or bottom air vents) so other instruments can be mounted directly above or below it. This saves valuable rack space.

Ordering Information

Mainframe E4360A
Modular Solar Array Simulator Main-frame, 1200 W, Holds up to 2 modules

Available options to the E4360A Mainframe

Opt 908 Rack Mount Kit
Required for rack mounting. Standard rack mount hardware will not work.

Opt FLR Filler Panel Kit
Required when you have only 1 module in a mainframe. Each filler panel kit contains one filler panel.

Opt 0L1 Full documentation on CD-ROM and printed Users Guide

Opt 0B0 Full documentation on CD-ROM only. No printed documentation package.

Opt 0L2 Extra copy of standard printed documentation package

Opt 900 Power Cord, United Kingdom

Opt 901 Power Cord, Australia, New Zealand

Opt 902 Power Cord, Europe

Opt 903 Power Cord, USA, Canada – 120 V

Opt 904 Power Cord, USA, Canada – 240 V

Opt 906 Power Cord, Switzerland

Opt 912 Power Cord, Denmark

Opt 917 Power Cord, India

Opt 918 Power Cord, Japan

Opt 919 Power Cord, Israel

Opt 920 Power Cord, Argentina

Opt 921 Power Cord, Chile

Opt 922 Power Cord, China

Opt 923 Power Cord, South Africa

Opt 927 Power Cord, Brazil, Philippine, Thailand

Opt 931 Power Cord, Taiwan

Opt 932 Power Cord, Cambodia

Modules

E4361A Solar Array Simulator DC Module 60 V, 8.5 A, 500 W

E4362A Solar Array Simulator DC Module 120 V, 5 A, 600 W

Options for the Modules

Opt 1A7 ISO 17025 Calibration Certificate

Opt A6J ANSI/NCSL Z540 Calibration Certificate

Opt UK6 Commercial calibration with test results data

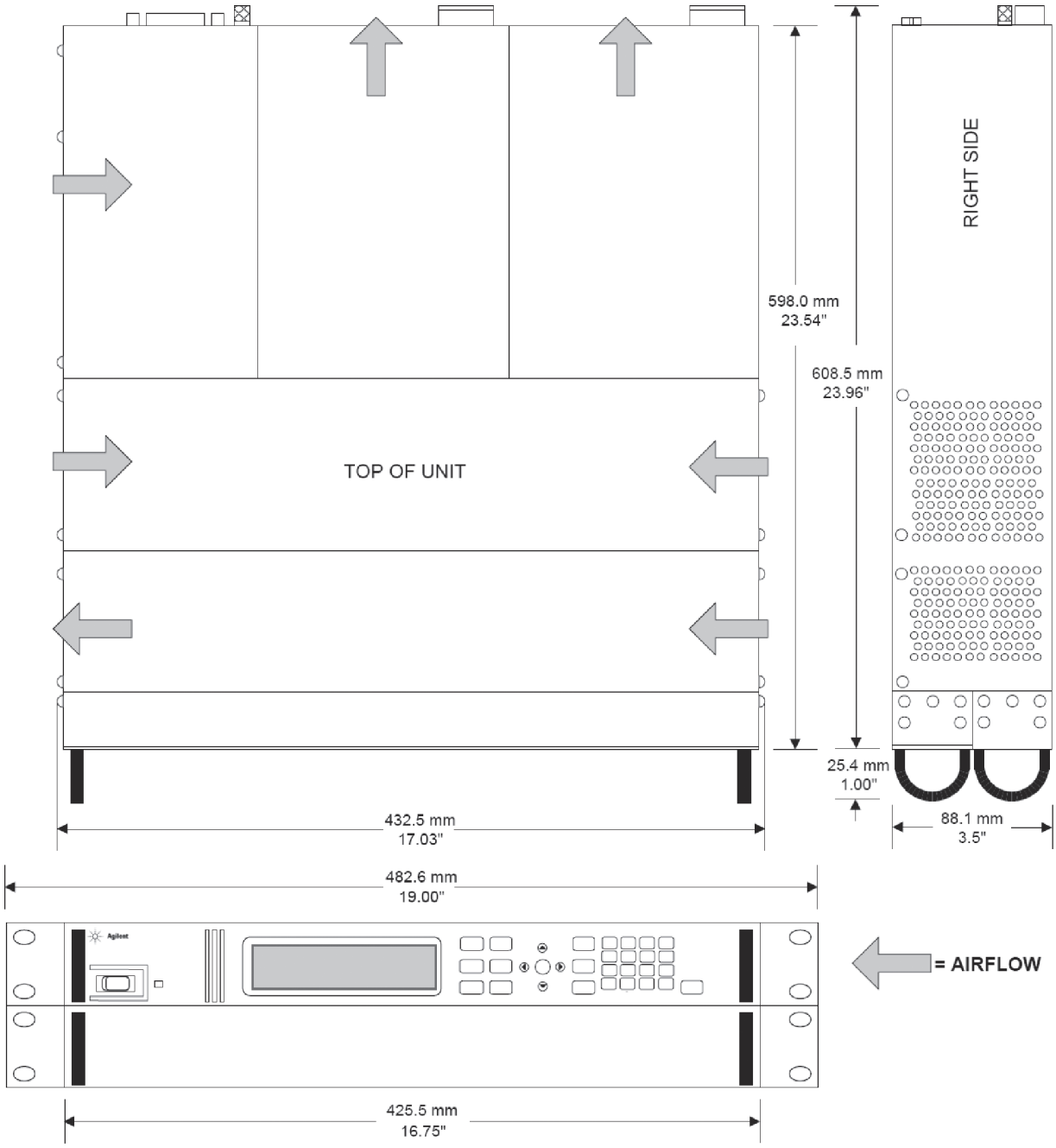
Preconfigured Mainframes

E4367A Configured E4360A SAS Mainframe with 2 E4361A Modules

E4368A Configured E4360A SAS Mainframe with 2 E4362A Modules

Modular Solar Array Simulators:
1200 W (Continued)

Agilent Models: E4361A, E4362A, E4362A-J01, E4362A-J02



More detailed specifications at **www.agilent.com/find/E4360**

N6781A, N6782A, N6784A

Source Measure Units

N6780 Series Source/Measure Units

Seamless, dynamic measurements down to nA and µV (N6781A and N6782A only)
Glitch-free operation – change sourcing or measurement ranges without any glitches
Excellent transient response for stable output voltage with dynamic loads
2 or 4-quadrant operation: use as a DC power supply or electronic load
Fast modulation of DC output to create arbitrary waveforms up to 100 kHz
Supported in any of the N6700 mainframes; ideally suited for N6705B mainframe

Advanced Measurement Features Offer More Design Insights
The N6781A and N6782A 2-quadrant SMUs offer advanced sourcing and measurement capabilities required to overcome test challenges associated with optimizing power consumption and maximizing battery life of battery-powered devices and their components.

The N6784A 4-quadrant SMU offers advanced sourcing and measurement capabilities in all four quadrants. It is designed to be a versatile tool for general purpose applications.

Seamless Dynamic Measurements (N6781A and N6782A only)
Seamless measurement ranging eliminates the challenges of measuring dynamic currents. With seamless measurement ranging, engineers can precisely measure dynamic currents without any glitches or disruptions to the measurement. As the current drawn by the DUT changes, the SMU automatically and instantaneously detects which current measurement range will return the most precise measurement and changes to that range seamlessly. When combined with the SMU's built-in 18-bit digitizer, seamless measurement ranging enables unprecedented effective vertical resolution of approximately 28-bits. This provides unrivaled productivity gains

Mainframe Characteristics	N6705B DC Power Analyzer
Configuration	Flexible/reconfigurable
Available slots	4 - mainframe accepts up to 4 DC power modules
Power	600 W total DC module output power
Instrument control	GPIB, USB, LAN (LXI Class C Compliant)

SMU Module Specifications		N6781A	N6782A	N6784A
DC output ratings				
Voltage		+20 V	+20 V	±20 V
Current (derated 1% per °C above 30° C)		±3 A	±3 A	±3 A
Power		20 W	20 W	20 W
Output voltage ripple & noise (PARD) (from 20 Hz - 20 MHz, at full load)				
CV peak-to-peak		12 mV	12 mV	12 mV
CV rms		1.2 mV	1.2 mV	1.2 mV
Load effect (load regulation) (For any load change, based on a load lead drop 1.0 V. The load lead drop reduces the maximum available voltage at the load.)				
Voltage, 20 V, 6 V, 600 mV ranges		700 µV	700 µV	700 µV
Current, 3 A, 1 A, & 300 mA ranges		100 µA	100 µA	100 µA
Source effect (line regulation)				
Voltage		300 µV	300 µV	300 µV
Current		60 µA	60 µA	60 µA
Programming accuracy (At 23 °C ±5 °C after 30 min. warm-up. Applies from minimum to maximum programming range at any load.)				
Voltage, 20 V range	0.025% +	1.8 mV	1.8 mV	1.8 mV
Voltage, 6 V range	0.025% +	600 µV	600 µV	600 µV
Voltage, 600 mV range	0.025% +	200 µV	200 µV	200 µV
Current, 3 A & 1 A range	0.04% +	300 µA	300 µA	300 µA
Current, 300 mA range	0.03% +	150 µA	150 µA	N/A

More detailed specifications at **www.agilent.com/find/N6781A**
www.agilent.com/find/N6782A
www.agilent.com/find/N6784A

Source Measure Units

N6780 Series Source/Measure Units (Continued)

and insights into power consumption by enabling engineers to see the complete current waveform they have never seen before, from nA to A, in one pass and one picture.

Designed for both R&D and Automated Test Environments (ATE)

The new SMUs are a part of the N6700 modular power system, which consists of the N6700 low-profile mainframes for ATE and the N6705 DC power analyzer mainframe for R&D. The product family has four mainframes and more than 25 DC power modules to choose from providing a complete spectrum of solutions, from R&D through design validation and manufacturing.

Key features

Apply to all models unless otherwise noted

- Seamless, dynamic measurements down to nA and µV (N6781A and N6782A only)
- Glitch-free operation – change sourcing ranges or measurement ranges without any glitches
- Four current programming ranges – precisely source current down to µA (N6784A only)
- Excellent transient response for stable output voltage with dynamic loads
- 2-quadrant operation – use as an advanced power supply or electronic load (N6781A and N6782A only)
- 4-quadrant operation – use as an advanced bipolar power supply or bipolar electronic load (N6784A only)
- Stable operation with capacitive loads up to 150 µF
- High-speed output can slew at 10 V per µs into a resistive load
- Fast modulation of DC output – create arbitrary waveforms up to 100 kHz (sine) into a resistive load
- High-speed digitized measurements – capture/view the power consumption of the DUT up to every 5 µs with built-in 200 kHz digitizer
- Auxiliary voltage measurement input for battery run down test (N6781A only)
- Programmable output resistance from -40 mΩ to +1 Ω to simulate internal resistance of a battery (N6781A only)

SMU Module Specifications		N6781A	N6782A	N6784A
Programming accuracy (At 23 °C ±5 °C after 30 min. warm-up. Applies from minimum to maximum programming range at any load.)				
Current, 100 mA range	0.03% +	N/A	N/A	12 µA
Current, 10 mA range	0.025% +	N/A	N/A	5 µA
Resistance (in 20 V output range)	0.1% +	3 mΩ	N/A	N/A
Resistance (in 6 V output range)	0.1% +	1.5 mΩ	N/A	N/A
Measurement accuracy (at 23 °C ±5 °C)				
Voltage, 20 V range	0.025% +	1.2 mV	1.2 mV	1.2 mV
Voltage, 1 V range	0.025% +	75 µV	75 µV	75 µV
Voltage, 100 mV range	0.025% +	50 µV	50 µV	50 µV
Current, 3 A range	0.03% +	250 µA	250 µA	250 µA
Current, 100 mA range	0.025% +	10 µA	10 µA	10 µA
Current, 1 mA range	0.025% +	100 nA	100 nA	100 nA
Current, 10 µA range	0.025% +	8 nA	8 nA	8 nA
Load transient response time – voltage priority In the 20 V output range: the time to recover to within the settling band for a load change from 0.1 A to 0.5 A. In the 6 V output range: the time to recover to within the settling band for a load change from 0.1 A to 1.5 A.				
Voltage settling band (20 V output range)		± 10 mV	± 10 mV	± 10 mV
Voltage settling band (6 V output range)		± 20 mV	± 20 mV	± 20 mV
Recovery time		≤ 35 µs	≤ 35 µs	≤ 35 µs

More detailed specifications at **www.agilent.com/find/N6781A**
www.agilent.com/find/N6782A
www.agilent.com/find/N6784A

Source Measure Units

N6780 Series Source/Measure Units (Continued)

Applications

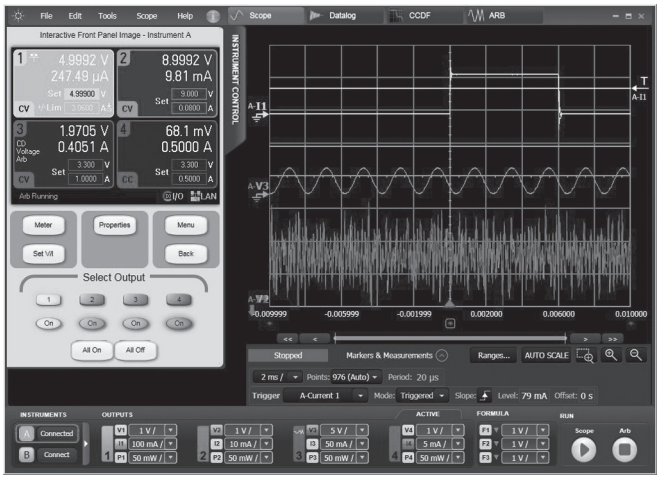
N6781A SMU is tuned for battery drain analysis of any and all battery powered devices including e-Book readers, MP3 players, wireless mice, and mobile phones.

N6782A SMU is tuned for functional tests of devices such as DC/DC converters, PMUs, PMICs, and power amplifiers.

N6784A SMU is designed to be a versatile tool for general-purpose applications in automated test systems or on an R&D bench.

14585A Control and Analysis Software
The software for the DC power analyzer compliments the front panel of the N6705 mainframe, offering advanced functionality and PC control. It is a flexible R&D tool for any application. When used to control an N6781A SMU, it can be used for advanced battery drain analysis applications.

- Control and analyze data from up to four N6705 DC power analyzers and any installed modules at once
- Easily create complex waveforms to stimulate or load down a DUT by inputting a formula, choosing from built-in, or importing waveform data.
- Data log measurements directly to a PC
- Perform statistical analysis of power consumption



Ordering information

N6781A 2-Quadrant Source/Measure Unit for Battery Drain Analysis

N6782A 2-Quadrant Source/Measure Unit for Functional Test

N6784A 4-Quadrant General Purpose Source/Measure Unit

N6705B-056 Software License to Control N6705A/B with 14585A Control and Analysis Software (Option to the N6705B when ordered new)

N6705U-056 Upgrade an N6705A/B DC Power Analyzer with 14585A Software License

More detailed specifications at **www.agilent.com/find/N6781A**
www.agilent.com/find/N6782A
www.agilent.com/find/N6784A

B2900A

Source Measure Units

B2900A Series Precision Source/Measure Units

Innovative bench-top SMU provides superior performance and rapid measurement results

Test up to 210 V and 3 A (DC) or 10.5 A (pulsed) with a single instrument

Source and measurement resolution down to 10 fA and 100 nV

Innovative GUI facilitates fast bench-top test, debug and characterization

Ultrafast throughput lowers cost-of-test

The Agilent B2900A Series of Precision Source/Measure Units are compact and cost-effective bench-top Source/Measure Units (SMUs) with the capability to source and measure both voltage and current. These capabilities make the B2900A series ideal for a wide variety of IV (current versus voltage) measurement tasks that require both high resolution and accuracy.

The B2900A SMUs can source and measure voltages of ±210 V and currents of ±3 A (DC) or ±10.5 A (pulsed). This versatility allows you to standardize on a single SMU model and minimize support costs.

The B2901A and B2902A possess 100 fA and 100 nV measurement resolution and 1 pA and 1 µV sourcing resolution. The B2911A and B2912A precision versions possess 10 fA and 100 nV of resolution for both measurement and sourcing. All members of the Agilent B2900A series support popular banana jack style inputs for cost effective and flexible connectivity; for low-current measurements below 1 nA, banana jack to triaxial adapters are available.

The B2900A front panel has many features that make interactive use fast and friendly. The 4.3'' color display supports both graphical and numerical view modes, and enables rapid test setup and results checking.

The innovative graphical user interfaces, such as single view, dual view, graph view, roll view and zoom, dramatically improve usability and productivity of bench-top tests, debug and characterization.

The Agilent B2900A series is also well-suited for production test. It can achieve excellent accuracy and repeatability at even short integration times. The B2900A series possesses the fastest measurement speed of any SMU in its class.

Specifications (at 0° to 55°C unless otherwise specified)		**B2901A**	**B2902A**	**B2911A**	**B2912A**
Number of channels		1	2	1	2
Max Output					
Voltage		210 V	210 V	210 V	210 V
Current	DC	3.03 A	3.03 A	3.03 A	3.03 A
	Pulsed	10.5 A	10.5 A	10.5 A	10.5 A
Power		31.8 W	31.8 W	31.8 W	31.8 W
Source					
Max digits	Digits	5½	5½	6½	6½
Min resolution	Voltage	1 µV	1 µV	100 nV	100 nV
	Current	1 pA	1 pA	10 fA	10 fA
Measurement					
Max digits	Digits	6½	6½	6½	6½
Min resolution	Voltage	100 nV	100 nV	100 nV	100 nV
	Current	100 fA	100 fA	10 fA	10 fA
Min programmable interval for list sweep/AWG waveform (Max number of steps/s)		20 µs (50 k steps/s)	20 µs (50 k steps/s)	20 µs (100 k steps/s)	20 µs (100 k steps/s)
Min trigger interval for digitzing (Max sample rate)		20 µs (50,000 pts/s)	20 µs (50,000 pts/s)	10 µs (100,000 pts/s)	10 µs (100,000 pts/s)
View Mode					
Single view		X	X	X	X
Dual view			X		X
Graph view		X	X	X	X
Roll view				X	X

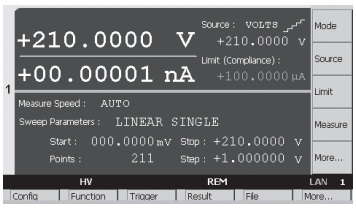
More detailed specifications at **www.agilent.com/find/B2900A**

Source Measure Units

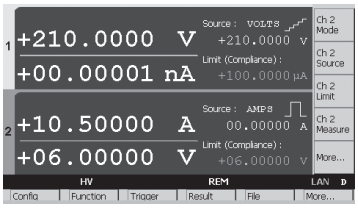
B2900A Series Precision Source/Measure Units (Continued)

Graphical User Interface (GUI) image:

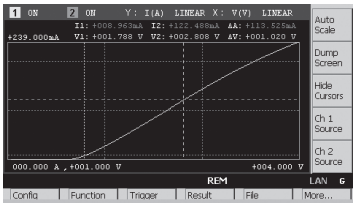
Single view mode



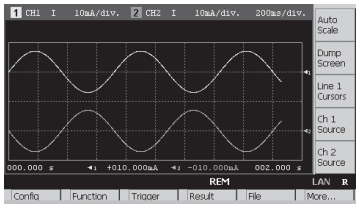
Dual view mode



Graph view mode



Roll view mode



Key features and benefits:

- **Integration of 4-quadrant sourcing and measuring capabilities:** Easily and accurately measure current and voltage using a single instrument without the need to manually change any connections.
- **Measurement range:** ±210 V, ±3 A (DC), ±10.5 A (pulsed): A single SMU product covers both high voltage and high current measurement needs, allowing for more standardization and simplifying inventory and support concerns.
- **Source and measurement resolution down to 10 fA and 100 nV:** Can make low-level measurements using a low-cost bench-top SMU that were previously only possible using a more expensive semiconductor device analyzer.
- **User-friendly front panel GUI with 4.3 inch color LCD display supports both graphical and numerical view modes:** Can quickly and easily perform measurements and display data on the front panel, thereby greatly speeding up interactive test, characterization and debug operations.
- **10 microsecond digitizing capability:** Can capture low frequency phenomena in addition to DC characteristics.
- **Free PC-based control software:** Can make measurements remotely from a PC without the need to program.
- **Supports both conventional and default SCPI commands:** Conventional SCPI commands provide some compatibility with older SMU code (such as Keithley 2400 series) to minimize code conversion work. Default SCPI commands support advanced B2900A series features.
- **Small form factor with USB2.0, LAN, GPIB and digital I/O interfaces:** Easy integration into rack and stack systems.

Key B2900A series accessories:

N1294A-001 Banana - Triax Adapter for 2-wire (non Kelvin) connection

N1294A-002 Banana - Triax Adapter for 4-wire (Kelvin) connection

N1294A-011 Interlock cable for 16442B (1.5 m)

N1294A-012 Interlock cable for 16442B (3.0 m)

N1295A Device/Component Test Fixture

Ordering information:

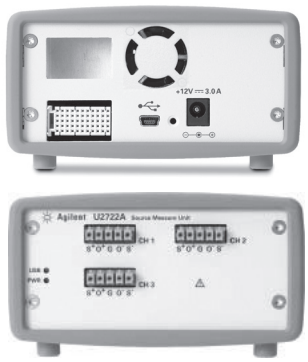
B2901A Precision Source/Measure Unit, 1ch, 100 fA, 210 V, 3 A DC/10.5 A pulse

B2902A Precision Source/Measure Unit, 2ch, 100 fA, 210 V, 3 A DC/10.5 A pulse

B2911A Precision Source/Measure Unit, 1ch, 10 fA, 210 V, 3 A DC/10.5 A pulse

B2912A Precision Source/Measure Unit, 2ch, 10 fA, 210 V, 3 A DC/10.5 A pulse

More detailed specifications at **www.agilent.com/find/B2900A**



U2700

Source Measure Units

U2700 Series USB Modular Source Measure Units

3-Channel source measure unit
4-Quadrant (±20 V)
High current sensitivity of 100 pA with 16 bit resolution
0.1% basic accuracy
Low current measurement capability down to nA levels
Voltage and current programming/readback
High-speed USB 2.0, USBTMC-USB488 standard
(compatible with Microsoft® Windows® operating systems only.)
Standalone and modular capabilities

Three-channel, four-quadrant (±20 V, ±120 mA)
The U2722A/U2723A three-channel SMU is a versatile device that allows you to perform sweep and measurement from different operating regions without needing extra configurations. The four quadrant operation makes the U2722A/U2723A SMU well suited for a wide range of test applications, including leakage measurement, solar cell measurement, forward/reverse voltage and IV curve tracing.

Increase the efficiency of your tests
With a high measurement sensitivity of 100 pA at 16-bit resolution for pico-level measurement and 0.1% accuracy, the U2722A/U2723A USB modular source measure unit provides more detailed and accurate analysis and measurement results. U2722A/U2723A supports SCPI and IVI-COM. The SMU is compatible with a wide range of Application Development Environments, minimizing your work time and increasing your software options. Save time and effort with the bundled Agilent Measurement Manager (AMM) software, which coverts SCPI commands into snippets of VEE, VB, C++ and C# code with the command logger function.

Specifications (at 0° to 55°C unless otherwise specified)		**U2722A**	**U2723A**
Number of outputs		3	3
Output ratings (at 0 °C to 50 °C)			
Voltage		–20 V to 20 V	–20 V to 20 V
Current		–120 mA to 120 mA	–120 mA to 120 mA
Performance specification			
Voltage programming 12 months (at 25 °C ± 3 °C), ±(% of output + offset)			
Accuracy[1]	Range ±2 V	0.075% + 1.5 mV	0.075% + 1.5 mV
	Range ±20 V	0.05% + 10 mV	0.05% + 10 mV
Resolution	Range ±2 V	0.1 mV	0.1 mV
	Range ±20 V	1 mV	1 mV
Current programming 12 months (at 25 °C ± 3 °C), ±(% of output + offset)			
Accuracy[1]	Range ±1 µA	0.085% + 0.85 nA	0.085% + 0.85 nA
	Range ±10 µA	0.085% + 8.5 nA	0.085% + 8.5 nA
	Range ±100 µA	0.075% + 75 nA	0.075% + 75 nA
	Range ±1 mA	0.075% + 750 nA	0.075% + 750 nA
	Range ±10 mA	0.075% + 7.5 µA	0.075% + 7.5 µA
	Range ±120 mA	0.1% + 100 µA	0.1% + 100 µA
Resolution	Range ±1 µA	100 pA	100 pA
	Range ±10 µA	1 nA	1 nA
	Range ±100 µA	10 nA	10 nA
	Range ±1 mA	100 nA	100 nA
	Range ±10 mA	1 µA	1 µA
	Range ±120 mA	20 µA	20 µA

[1] Accuracy measurments are based on NPLC 10.

More detailed specifications at **www.agilent.com/find/U2722A**
www.agilent.com/find/U2723A

Source Measure Units

U2700A Series USB Modular Source Measure Units (Continued)

Pre-define test configurations and execute commands automatically

The U2723A USB modular source measure unit provides an embedded test script to help you pre-define test configurations or duplicate tests easily without spending too much time on programming. Each channel in the U2723A USB modular SMU is allocated two memory lists, each capable of storing up to 200 commands and results individually. Stored commands in active memory will be executed accordingly while the measurement results obtained are automatically stored in the result buffer.

Supplemental characteristics

Remote interface:
- Hi-Speed USB 2.0*
- USBTMC-USB488[1]

Power consumption:
- +12 VDC, 3 A maximum
- Isolated ELV supply source

Operating environment:
- Operating temperature from 0 °C to +50 °C
- Relative humidity at 20% to 85% RH (non-condensing)
- Altitude up to 2000 meters
- Pollution Degree 2
- For indoor use only

Storage compliance: –20 °C to 70 °C

Safety compliance

Certified with:
- IEC 61010-1:2001/EN 61010-1:2001 (2nd Edition)
- USA: ANSI/UL 61010-1:2004
- Canada: CSA C22.2 No.61010-1:2004

EMC compliance:
- IEC 61326-1:2005/EN61326-1:2006
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR 11:2004

[1] Compatible with Microsoft® Windows® operating systems only.

* If remote connections are necessary, a E5813A USB/LAN hub can be used. Please go to the product's user guide for more information.

Specifications (at 0° to 55°C unless otherwise specified)		**U2722A**	**U2723A**
Performance specification (continued)			
Voltage readback 12 months (over USB with respect to the actual output at 25 °C ± 3 °C), ±(% of output + offset)			
Accuracy[1]	Range ±2 V	0.075% + 1.5 mV	0.075% + 1.5 mV
	Range ±20 V	0.05% + 10 mV	0.05% + 10 mV
Resolution	Range ±2 V	0.1 mV	0.1 mV
	Range ±20 V	1 mV	1 mV
Current readback 12 months (over USB with respect to the actual output at 25 °C ± 3 °C), ±(% of output + offset)			
Accuracy[1]	Range ±1 µA	0.085% + 0.85 nA	0.085% + 0.85 nA
	Range ±10 µA	0.085% + 8.5 nA	0.085% + 8.5 nA
	Range ±100 µA	0.075% + 75 nA	0.075% + 75 nA
	Range ±1 mA	0.075% + 750 nA	0.075% + 750 nA
	Range ±10 mA	0.075% + 7.5 µA	0.075% + 7.5 µA
	Range ±120 mA	0.1% + 100 µA	0.1% + 100 µA
Resolution	Range ±1 µA	100 pA	100 pA
	Range ±10 µA	1 nA	1 nA
	Range ±100 µA	10 nA	10 nA
	Range ±1 mA	100 nA	100 nA
	Range ±10 mA	1 µA	1 µA
	Range ±120 mA	20 µA	20 µA
Rise/fall time (ms)[2]			
For resistive measurement[2]	±1 µA	170.0	15.0
	±10 µA	18.0	5.0
	±100 µA	6.0	1.0
	±1 mA	1.0	1.0
	±10 mA	1.0	1.0
	±120 mA	1.0	1.0

[1] Accuracy measurments are based on NPLC 10.

[2] Drive 50% of 1 V or 10 V output with a resistive load. Rise time is from 10% to 90% of program voltage change at maximum current. Fall time is from 90% to 10% of program voltage change at maximum current.

More detailed specifications at **www.agilent.com/find/U2722A**
www.agilent.com/find/U2723A

Source Measure Units

U2700A Series USB Modular Source Measure Units (Continued)

Supplemental characteristics (continued)

Shock and vibration:
Tested to IEC/EN 60068-2

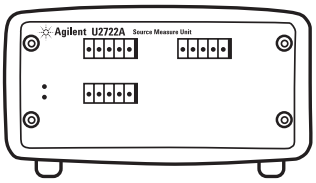
IO connector: Output connectors

Dimension (W × D × H):
Module:
- 120 mm x 183 mm x 66 mm (with bumpers)
- 105 mm x 175 mm x 50 mm (without bumpers)

Weight:
- 700 g (with bumpers)
- 650 g (without bumpers)

Warranty:
- One year for U2722A/U2723A
- Three months for standard shipped accessories

Front



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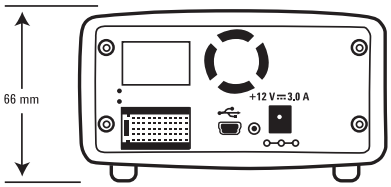

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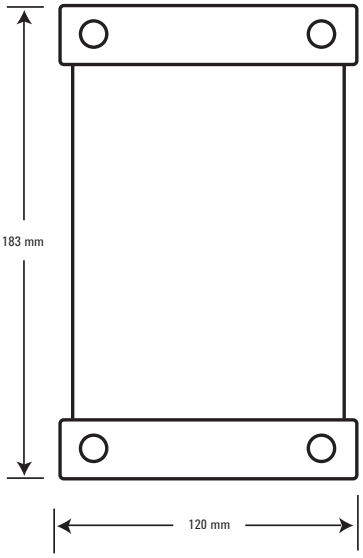
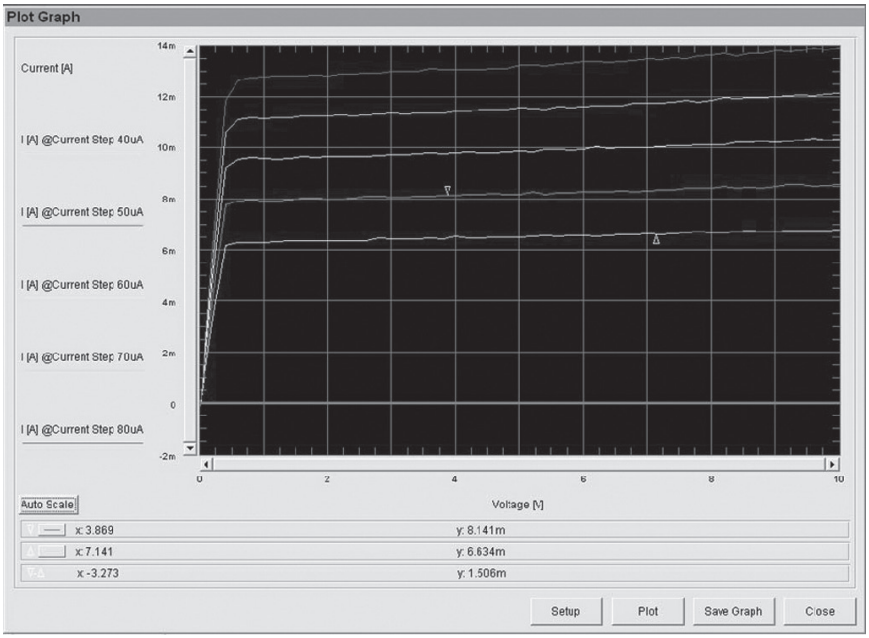


View IV curves in minutes with U2942A Parametric Measurement Manager Pro

If you are looking for a basic yet complete IV curve tracer solution for component devices, then the new Agilent U2722P and U2723P Parametric Measurement solution is up to the task. The bundled U2942A software works with the U2722A/U2723A USB modular source measure unit to analyze discrete semiconductor, then plots, and displays the results in an IV curve.



More detailed specifications at **www.agilent.com/find/U2722A**
www.agilent.com/find/U2723A

Source Measure Units

U2700A Series USB Modular Source Measure Units (Continued)

Optional accessories for the U2700 Series

U2921A-101 USB secure cable, 2 m

Optional accessories for the U2941A parametric test fixture

U2941A-101 Pin plug-to-pin plug cable, black

U2941A-102 Pin plug-to-pin plug cable, red

U2941A-103 Pin plug-to-pin plug cable, blue

U2941A-104 Pin plug-to-miniature clip cables, black

U2941A-105 Pin plug-to-miniature clip cables, red

U2941A-106 Pin plug-to-miniature clip cables, blue

U2941A-107 BNC to two-wire, 1 m

U2941A-201 Assembly Teflon plate
- Insulation board with minimal leakage current; suitable for extremely low-current measurement

U2941A-202 28-pin dual-in-line package (DIP) socket module
- Lever actuated zero insertion force (ZIF) socket

U2941A-203 0.1-inch universal socket module
- 0.1-inch pitch; suitable for virtually any device such as components, DIP IC or small scale circuit

U2941A-204 0.075-inch universal socket module
- 0.075-inch pitch; suitable for virtually any device such as components, DIP IC or small scale circuit

U2941A-205 0.05-inch universal socket module
- 0.05-inch pitch; suitable for any device such as components, DIP IC or small scale circuit

Ordering Information

U2722A USB modular source measure unit

U2723A USB modular source measure unit with embedded test scripts

U2941A Parametric test fixture, shipped with:
- Assembly Teflon plate
- 28-pin dual-in-lin package (DIP) socket module
- 0.1-inch universal socket module
- 0.075-inch universal socket module
- 0.05-inch universal socket module
- Pin plug-topin plug cables, black (4 pcs)
- Pin plug-topin plug cables, red (4 pcs)
- Pin plug-topin plug cables, blue (4 pcs)
- Pin plug-to-miniature clip cables, black (4 pcs)
- Pin plug-to-miniature clip cables, red (4 pcs)
- Pin plug-to-miniature clip cables, blue (4 pcs)
- PCB jumper pin
- BNC to two-wire cable, 1 m (3 pcs)
- Agilent Parametric Measurement Manager CD (includes installation and operation guide)

U2942A Parametric Measurement Manager Pro software

U2722P* U2722A USB modular source measure unit and U2942A Parametric Measurement Manager Pro bundle

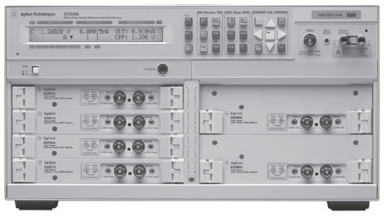
U2723P* U2723A USB modular source measure unit and U2942A Parametric Measurement Manager Pro bundle

* Only available in Europe and Asia (excluding Japan)

More detailed specifications at **www.agilent.com/find/U2722A**
www.agilent.com/find/U2723A

Source Measure Units

E5260A 8-Slot High Speed Measurement Mainframe



E5260A

Perform high-speed, DC parametric measurements

Eight slots for plug-in modules

Code compatible with 4142B

Mainframe Characteristics	E5260A 8-Slot Precision Measurement Mainframe
Available slots	8
Ground Unit (GNDU) Sink Capability	4.0 A
Instrument control	GPIB
External trigger inputs/outputs	1 BNC trigger in; 1 BNC trigger out; 8 programmable trigger in/out

Module Selection Guide	E5290A High Speed HPSMU	E5291A High Speed MPSMU
Required slots	2	1
Maximum force voltage	± 200 V	± 100 V
Maximum force current	± 1 A	± 200 mA
Voltage measurement resolution	100 µV	100 µV
Current measurement resolution	5 pA	5 pA

Fast measurement that lowers cost-of-test

The fast measurement speed and modular nature of the E5260A makes it an ideal choice for high-speed production test. For technologically advanced devices of today and tomorrow, the Agilent E5260A lowers your cost-of-test with a high-speed parametric test solution for semiconductor, RFIC, and optical component testing. Based on well-proven Agilent 4070 Series system technology, the E5260A provides superior measurement throughput that is several times faster than earlier products such as the Agilent 4142B. The instrument is modular, which enables customization now and provides for future expansion as requirements change. A number of innovative design elements help to improve the efficiency of complex testing, such as expanded program memory to accelerate the measurement process, and 16 digital I/O lines for sophisticated triggering requirements. Moreover, historically encountered power limitations on the instrument mainframe (such as often occur with the 4142B) have been eliminated.

Modular design enables customization now and provides for future expansion

The flexible, modular configuration has eight slots available for plug-in modules. Currently available source/monitor unit (SMU) types are a medium power SMU (MPSMU) – requiring one slot – and a high-power SMU (HPSMU) – requiring two slots. Easily expand into the E5260A from your current environment because commands developed on the 4142B can also run on the new system.

High measurement speed

The E5260A performs DC measurements of current and voltage through measurement speeds of SMUs that are 2-3 times faster than that of the Agilent 4142B.

Innovative design elements support complex testing and improve efficiency

Program memory has been greatly enhanced, with storage capacity for up to 40,000 command lines, which accelerates the measurement process. A fast and flexible advanced triggering

More detailed specifications at **www.agilent.com/find/E5260A**

Source Measure Units

E5260A 8-Slot High Speed Measurement Mainframe (Continued)

scheme, based upon 16 digital I/O lines, in addition to the BNC trigger-in & trigger-out connectors, is ideal for sophisticated triggering requirements. Also, trigger signals are routed through hardware rather than firmware, resulting in the fastest instrument response possible. To enable parallel testing, each SMU is equipped with its own analog-to-digital converter (ADC) therefore no bottlenecks. Engineers can perform and report spot measurements easily via a simple front-panel interface, without programming. In addition, you can use the same user interface to view other items of interest, such as error messages when debugging the instrument performance under automated control.

Designed to withstand heavyweight power demands

Alternative testing solutions may present power limitations, but not the E5260A. No matter which type or how many modules are installed into the E5260A mainframe, all installed modules can output maximum voltage or current at the same time. For example, if 4 HPSMUs are installed in the E5260A, then each HPSMU can output 1 Amp. A 4.0 Amp ground unit is resident in the instrument mainframe to ensure that you can sink the current output of these 4 HPSMUs without having to worry about resistive ground rise issues. In addition, each MPSMU can source and sink up to 200 mA each, which is twice the capability typically found in a MPSMU.

Key features and benefits:

- **Eight module slots:** Flexibility now and expandability in the future
- **SMUs that measure several times faster than 4142B SMUs:** Faster test times and improved throughput, resulting in a lower cost-of-test
- **Code compatible with the 4142B:** Replace current 4142Bs with the E5260A and enjoy a large throughput improvement with only minimal test code modification
- **6 digital I/O lines for instrument triggering in addition to BNC trigger-in & trigger-out connectors:** Sophisticated triggering schemes involving multiple instruments can easily be created
- **All trigger signals are processed via hardware rather than firmware:** Fastest possible trigger response from the instrument
- **Front panel control:** Can conveniently perform and report spot measurements via a simple front-panel interface, without programming. View other items of interest, such as error messages, valuable when debugging the instrument performance under automated control.
- **When 4 HPSMUs are installed then each HPSMU can output 1 A:** No power restrictions; no need to think about mainframe power restrictions when developing applications
- **4.0 Amp Ground unit (GNDU):** Sink the current output of 4 HPSMUs without worrying about resistive ground rise issues

Key E5260A accessories and cables:

N1254A-100 Ground unit to Kelvin adapter

16442B Test fixture

16494A-001/002 Triaxial cable (1.5 meter/3 meter)

Ordering information:

The E5260A does not have any base configuration. All desired modules, accessories, and cables must be specified at the time of order.

Note: Since the E5260A is a modular product, you can add new modules to it at any time after initial purchase as long as you have open slots.

More detailed specifications at **www.agilent.com/find/E5260A**

Source Measure Units

E5262A 2-Channel (Medium Power, Medium Power) High Speed Source Monitor Unit

E5262A

Perform high-speed, DC parametric measurements

Fixed-configuration dual SMU instrument

Mainframe Characteristics	E5262A 2-Channel High Speed Source Monitor Unit
Available slots	Two channel (2X MPSMU) configuration
Ground Unit (GNDU) Sink Capability	2.2 A
Instrument control	GPIB
External trigger inputs/outputs	1 BNC trigger in; 1 BNC trigger out; 8 programmable trigger in/out

Included Module	E5291A High Speed MPSMU
Maximum force voltage	±100 V
Maximum force current	± 200 mA
Voltage measurement resolution	100 µV
Current measurement resolution	5 pA

Fast measurement that lowers cost-of-test

The fast measurement speed of the E5262A makes it an ideal choice for high-speed production test in situations requiring only one or two SMUs. Based on Agilent 4070 Series system technology, the Agilent E5262A lowers your cost-of-test with a high-speed parametric test solution for semiconductor, RFIC, and optical component testing. Two MPSMU modules and a ground unit are included in the E5262A, providing just enough test capability for many component-testing needs. The E5262A provides superior measurement throughput, several times faster than earlier products such as the Agilent 4142B. A number of innovative design elements help to improve the efficiency of complex testing, such as expanded program memory to accelerate the measurement process, and 16 digital I/O lines for sophisticated triggering requirements.

High measurement speed

The E5262A performs DC measurements of current and voltage and achieves measurement speeds that are 2-3 times faster than that of the Agilent 4142B. Easily migrate from your current 4142B test environment to the E5262A because programs developed for the 4142B can run on the E5262A with only minor modification.

Innovative design elements support complex testing and improve efficiency

Program memory has been greatly enhanced, with storage capacity for up to 40,000 command lines, which accelerates the measurement process. A fast and flexible advanced triggering scheme, based upon 16 digital I/O lines, in addition to the BNC trigger-in & trigger-out connectors, is ideal for sophisticated triggering requirements. Also, trigger signals are routed through hardware rather than firmware, resulting in the fastest instrument response possible. To enable parallel testing, each SMU is equipped with its own analog-to-digital converter (ADC) therefore no bottlenecks. Engineers can perform and report spot measurements easily via a simple front-panel interface, without programming. In addition, you can use the same user interface to view other items of interest, such as error messages when debugging the instrument performance under automated control.

Cost-effective solution for simple parametric test requirements

Many component measurements, such as laser diode and photo diode characterization, require only one or two source/monitor units. The configuration of the E5262A provides the ideal balance of functionality for such tasks at an affordable price.

More detailed specifications at **www.agilent.com/find/E5262A**

Source Measure Units

E5262A 2-Channel High Speed Source Monitor Unit (Continued)

Key features and benefits:

- **Two MPSMU configuration:** Cost effective solution provides just enough test capability
- **SMUs that measure several times faster than 4142B SMUs:** Faster test times and improved throughput, resulting in a lower cost-of-test
- **Code compatible with the 4142B:** Replace current 4142Bs with the E5262A and enjoy a large throughput improvement with only minimal test code modification
- **16 digital I/O lines for instrument triggering in addition to BNC trigger-in & trigger-out connectors:** Sophisticated triggering schemes involving multiple instruments can easily be created
- **All trigger signals are processed via hardware rather than firmware:** Fastest possible trigger response from the instrument
- **Front panel control:** Can conveniently perform and report spot measurements via a simple front-panel interface, without programming. View other items of interest, such as error messages, valuable when debugging the instrument performance under automated control.

Accessories and cables:

N1254A-100 Ground unit to Kelvin adapter

16442B Test fixture

16494A-001/002 Triaxial cable (1.5 meter/3 meter)

Ordering information:
The E5262A is a fixed-configuration product; there are no options or required accessories.

More detailed specifications at **www.agilent.com/find/E5262A**

Source Measure Units

E5263A 2-Channel (High Power, Medium Power) High Speed Source Monitor Unit

E5263A

Perform high-speed, DC parametric measurements

Fixed-configuration dual SMU instrument

Mainframe Characteristics	E5263A 2-Channel High Speed Source Monitor Unit
Available slots	Two channel (HPSMU and MPSMU) configuration
Ground Unit (GNDU) Sink Capability	2.2 A
Instrument control	GPIB
External trigger inputs/outputs	1 BNC trigger in; 1 BNC trigger out; 8 programmable trigger in/out

Included Module	E5290A High Speed HPSMU	E5291A High Speed MPSMU
Maximum force voltage	±200 V	±100 V
Maximum force current	±1 A	±200 mA
Voltage measurement resolution	100 µV	100 µV
Current measurement resolution	5 pA	5 pA

Fast measurement that lowers cost-of-test

The fast measurement speed of the E5263A makes it an ideal choice for high-speed production test in situations requiring only one or two SMUs. Based on Agilent 4070 Series system technology, the Agilent E5263A lowers your cost-of-test with a high-speed parametric test solution for semiconductor, RFIC, and optical component testing. HPSMU and MPSMU modules and a ground unit are included in the E5263A, providing just enough test capability for many component-testing needs. The E5263A provides superior measurement throughput, several times faster than earlier products such as the Agilent 4142B. A number of innovative design elements help to improve the efficiency of complex testing, such as expanded program memory to accelerate the measurement process, and 16 digital I/O lines for sophisticated triggering requirements.

High measurement speed

The E5263A performs DC measurements of current and voltage and achieves measurement speeds that are 2-3 times faster than that of the Agilent 4142B. Easily migrate from your current 4142B test environment to the E5263A because programs developed for the 4142B can run on the E5263A with only minor modification.

Innovative design elements support complex testing and improve efficiency

Program memory has been greatly enhanced, with storage capacity for up to 40,000 command lines, which accelerates the measurement process. A fast and flexible advanced triggering scheme, based upon 16 digital I/O lines, in addition to the BNC trigger-in & trigger-out connectors, is ideal for sophisticated triggering requirements. Also, trigger signals are routed through hardware rather than firmware, resulting in the fastest instrument response possible. To enable parallel testing, each SMU is equipped with its own analog-to-digital converter (ADC) therefore no bottlenecks. Engineers can perform and report spot measurements easily via a simple front-panel interface, without programming. In addition, you can use the same user interface to view other items of interest, such as error messages when debugging the instrument performance under automated control.

Cost-effective solution for simple parametric test requirements

Many component measurements, such as laser diode and photo diode characterization, require only one or two source/monitor units. The configuration of the E5263A provides the ideal balance of functionality for such tasks at an affordable price.

More detailed specifications at **www.agilent.com/find/E5263A**

Source Measure Units

E5263A 2-Channel High Speed Source Monitor Unit (Continued)

Key features and benefits:

- **One HPSMU and one MPSMU configuration:** Cost effective solution provides just enough test capability
- **SMUs that measure several times faster than 4142B SMUs:** Faster test times and improved throughput, resulting in a lower cost-of-test
- **Code compatible with the 4142B:** Replace current 4142Bs with the E5263A and enjoy a large throughput improvement with only minimal test code modification
- **16 digital I/O lines for instrument triggering in addition to BNC trigger-in & trigger-out connectors:** Sophisticated triggering schemes involving multiple instruments can easily be created
- **All trigger signals are processed via hardware rather than firmware:** Fastest possible trigger response from the instrument
- **Front panel control:** Can conveniently perform and report spot measurements via a simple front-panel interface, without programming. View other items of interest, such as error messages, valuable when debugging the instrument performance under automated control.

Accessories and cables:

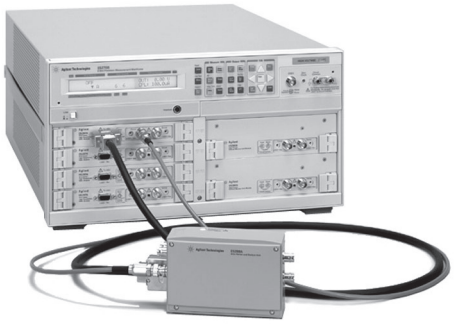
N1254A-100 Ground unit to Kelvin adapter

16442B Test fixture

16494A-001/002 Triaxial cable (1.5 meter/3 meter)

Ordering information:
The E5263A is a fixed-configuration product; there are no options or required accessories.

More detailed specifications at **www.agilent.com/find/E5263A**



E5270B

Source Measure Units

E5270B 8-Slot Precision Measurement Mainframe

Perform precision DC parametric measurements

Eight slots for plug-in modules

Code compatible with 4142B

Mainframe Characteristics	E5270B 8-Slot Precision Measurement Mainframe
Available slots	8
Ground Unit (GNDU) Sink Capability	4.0 A
Instrument control	GPIB
External trigger inputs/outputs	1 BNC trigger in; 1 BNC trigger out; 8 programmable trigger in/out

Module Selection Guide	E5280B HPSMU	E5281B MPSMU	E5287A HRSMU	E5288A ASU
Required Slots	2	1	1	N/A
Maximum force voltage	±200 V	±100 V	±100 V	±100 V
Maximum force current	±1 A	±100 mA	±100 mA	±100 mA
Voltage measurement resolution	2 µV	0.5 µV	0.5 µV	0.5 µV
Current measurement resolution	10 fA	10 fA	1 fA	0.1 fA

Solves the most extreme parametric measurement challenges

For engineers and scientists working on current and future semiconductor process technologies, the E5270B provides a solution that both meets their needs and lowers their cost of test. The wide variety of available modules and advanced measurement features provide a complete solution for parametric measurement and analysis. Both a VXI*plug&play* driver and TIS commands are provided as programming aids for customers who choose to use their own software instead of software provided by Agilent.

Unlike solutions that include both the system controller and measurement resources combined, the E5270B gives you the freedom to manage these resources separately, thereby avoiding the expensive problem of the system controller becoming obsolete years before other elements. The E5270B can be controlled from MS Windows-based, UNIX-based, or even LINUX-based operating system environments. Because you can upgrade your system controller hardware or software without losing the use of your instrument, your investment is protected against unforeseeable technology shifts.

Key features and benefits:

- **Ultra low current measurement without cumbersome external preamplifiers**
- **The E5270B HRSMU supplies 1-femtoamp measurement resolution** without the need for cumbersome external preamplifiers, providing an extremely efficient solution for situations not requiring ultra low current measurement. This innate capability enables you to meet the measurement challenges posed by the vast majority of current and future devices. The HRSMU (and redesigned MPSMU) also provides voltage measurement resolution down to 0.5 microvolts. The HRSMU (as well as the redesigned MPSMU) also supports new 0.5 V and 5 V measurement ranges, which improve measurement accuracy for modern lower-voltage transistors. Advanced measurement features include multi-channel sweep mode with parallel test capability, linear/binary search, range management, and force value self-monitoring.

More detailed specifications at **www.agilent.com/find/E5270B**

Source Measure Units

E5270B 8-Slot Precision Measurement Mainframe (Continued)

- **Flexibility to provide stable 100 attoamp measurements**
- **The HRSMU accepts an optional atto sense and switch unit (ASU),** which increases the low current measurement resolution to 100 attoamps. This is invaluable for certain extreme characterization needs such as memory cell leakage testing. In addition, the ASU allows you to make voltage measurements and force both voltage and current up to the limits of the HRSMU specification.
- **Switch between CV and IV measurement without wasting time swapping cables**
- **The ASU enables switching between 100 attoamp measurement and precise capacitance measurement without changing any cabling.** The ASU includes two BNC inputs that are compatible with the outputs of a capacitance meter. Simple software commands enable you to switch between SMU based measurement (IV) and capacitance meter based measurement (CV) without having to change any cabling. You can also use the BNC inputs with other instruments such as a digital voltmeter (DVM) or a pulse generator unit (PGU). No matter what your configuration, the ASU provides better switching measurement performance than an external switching matrix, and offers improved ease of use.
- **Cost-effective alternative that takes advantage of your own testing software**
- **Agilent provides an industry-standard VXI*plug&play* driver,** a high-level programming interface that saves time by allowing your programmers to avoid having to learn the detailed programming of the instrument. In addition, the TIS – test instruction set – interface enables code developed for the lab environment to be used in production. Specifically, TIS allows you to write algorithms for subsequent transfer to the Agilent 4070 production test environment.
- **No embedded controller in the instrument:** Manage your instrument measurement resources separately from your controller and software resources, ensuring that your test investment does not become obsolete too quickly.
- **HRSMU has 1 femtoamp current measurement resolution:** Can meet the measurement challenges posed by the vast majority of current and future devices, without the need for external preamplifiers.
- **HRSMU combines with optional atto sense and switch unit (ASU) to achieve 100 attoamp current measurement resolution:** Stable 100 attoamp current resolution via remote sensing meets the most demanding ultra low current measurement requirements.
- **Switch between CV and IV measurements on positioners via software commands:** No need to physically change cabling or move to a different probe station when changing from CV to IV measurement.
- **MPSMU and HRSMU can measure voltage with 0.5 microvolt resolution. Both SMUs also support new 0.5 V and 5 V measurement ranges:** Enables you to perform very demanding component matching and metal line resistance voltage measurements with ease.
- **Includes industry-standard VXI*plug&play* driver:** Ideal when you choose to use your own software, instead of Agilent-provided software. Improves programmer productivity by removing the need to learn detailed programming of the instrument.
- **TIS (Test Instruction Set) commands supported for both BASIC and C:** Develop algorithms on an instrument that you can then easily transport into your 4070 Series-based production test environment.

Accessories and cables:

N1254A-100 Ground unit to Kelvin adapter

16442B Test fixture

16494A-001/002 Triaxial cable (1.5 meter/3 meter)

Ordering information:
The E5270B does not have any base configuration. All desired modules, accessories, and cables must be specified at the time of order.

Note: Since the E5270B is a modular product, you can add new modules to it at any time after initial purchase as long as you have open slots.

More detailed specifications at **www.agilent.com/find/E5270B**

B1500A

Device Analyzer/Curve Tracers

B1500A Semiconductor Device Analyzer

PC-based instrument with Windows® XP Professional OS

Single-box solution for current-voltage (IV), capacitance-voltage (CV), pulse generation, fast IV, and time-domain measurement

Ten module slots for source monitor units (SMUs) and other module types (MFCMU, HV-SPGU and WGFMU)

Offline data analysis and application test development via Desktop EasyEXPERT software

The Agilent B1500A semiconductor device analyzer is a modular instrument with a ten-slot configuration that supports both IV and CV measurements and also fast high-voltage pulsing. Its familiar, Microsoft® Windows® user interface supports Agilent's EasyEXPERT software, which provides a new, more intuitive task-oriented approach to device characterization. Because of its extremely low-current, low-voltage, and integrated capacitance measurement capabilities, the Agilent B1500A can be used for a wide range of semiconductor device characterization needs (IC-CAP supports the B1500A). It is also an excellent solution for non-volatile memory cell characterization and high-speed device characterization (including advanced NBTI measurement).

Key features and benefits:

- Superior IV measurement performance: 0.1 fA/0.5 μV measurement resolution
- Optional, integrated capacitance module supports CV measurements up to 5 MHz
- Over 230 predefined application tests to get you up and running quickly
- EasyEXPERT software provides an innovative, task-based approach to parametric test

Mainframe Characteristics	B1500A Semiconductor Device Analyzer
Available slots	10
Ground unit (GNDU) sink capability	4.2 A
USB ports	2 front and 2 rear
Instrument control	GPIB
Networking	100BASE-TX/10BASE-T LAN Port
External trigger inputs/outputs	1 BNC trigger in; 1 BNC trigger out; 8 programmable trigger in/out

Module Selection Guide	Required slot	Main specification
B1510A HPSMU	2	Up to 200 V, 1 A force. 10 fA current resolution
B1511A MPSMU	1	Up to 100 V, 100 mA force, 10 fA current resolution
B1517A HRSMU	1	Up to 100 V, 100 mA force, 1 fA current resolution
E5288A ASU	NA	Up to 100 V, 100 mA force, 100 Aa current resolution
B1520A MFCMU	1	1 kHz to 5 MHz, up to 100 V DC bias with SMU
B1525A HV-SPGU	1	Min 12.5 ns pulse width, 10 ns transition time, up to 40 V with 3 level pulse
B1530A WGFMU	1	Min 100 ns pulse width, 10 V peak-to-peak output, 5 ns current or voltage measurement sampling speed

More detailed specifications at **www.agilent.com/find/B1500A**

Device Analyzer/Curve Tracers
B1500A Semiconductor Device Analyzer (Continued)

Key features and benefits (Continued):

- Optional positioner-based CV-IV switching solutions available with 0.5 µV voltage measurement resolution and 10 fA, 1 fA or 0.1 fA current measurement resolution capability
- Easy test automation with built-in semiautomatic wafer prober drivers and test sequencing without programming via the Quick Test mode
- Optional high-voltage semiconductor pulse generator unit (HV-SPGU) available with 10 ns programmable pulse widths and ±40 V (80 V peak-to-peak) output
- Optional waveform generator/fast measurement unit (WGFMU) available with ALWG and fast current or voltage measurement capabilities
- 10 ns pulsed IV solution is available for characterizing high-k gate dielectric and SOI (silicon-on-insulator) transistors
- A Classic Test mode is available to provide the look, feel, and terminology of the 4155/4156 interface while enhancing user interaction by taking full advantage of Microsoft Windows GUI features

Key B1500A accessories:

N1254A-100 Ground unit to Kelvin adapter

N1300-001 Capacitance measurement unit cable (1.5 m)

N1300-002 Capacitance measurement unit cable (3 m)

N1301A-100 SMU CMU unify unit (SCUU)

N1301A-102 SCUU cable (3 m)

N1301A-110 SCUU magnetic stand

N1301A-200 Guard switch unit (GSWU)

N1301A-201 Guard switch unit cable (1 m)

N1301A-202 Guard switch unit cable (3 m)

Ordering information:

B1500A-015 1.5 m cable (cable length is set to 1.5 m for standard and add-on packages)

B1500A-030 3.0 m cable (cable length is set to 3.0 m for standard and add-on packages)

B1500A-A6J ANSI Z540 compliant calibration

B1500A-UK6 commercial calibration certificate with test data

B1500A-ABA English paper document

B1500A-ABJ Japanese paper document

B1500A-A00 empty package for custom solution

B1500A-A01 standard package (MPSMU 4 ea. & cables)

B1500A-A02 high resolution package (HRSMU 4 ea. & cables)

B1500A-A03 high power package (HPSMU 2 ea, MPSMU 2 ea & cables)

B1500A-A04 basic flash memory cell package (MPSMU 4 ea, SPGU, accessories)

B1500A-A10 HPSMU add-on (HPSMU 1 ea. & cables)

B1500A-A11 MPSMU add-on (MPSMU 1 ea. & cables)

B1500A-A17 HRSMU add-on (HRSMU 1 ea. & cables)

B1500A-A20 MFCMU add-on (MFCMU, cable)

B1500A-A25 HVSPGU add-on (HVSPGU 1 ea. & cables)

B1500A-A28 ASU (atto sense unit) add-on (ASU 1 ea. & cables)

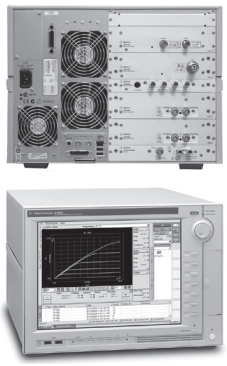
B1500A-A30 WGFMU add-on (WGFMU 1ea. RSU 2 ea. & cables)

B1500A-A31 WGFMU add-on with connector adapter (WGFMU 1 ea, RSU 2 ea, cables & connector adapter)

B1500A-A3P WGFMU probe cable kit (8 probe cables. WGFMU is not included)

B1500A-A5F test fixture for packaged device measurement (16442B 1 ea)

More detailed specifications at **www.agilent.com/find/B1500A**



B1505A

Device Analyzer/Curve Tracers

B1505A Power Device Analyzer/Curve Tracer

PC-based instrument with Windows® XP Professional OS

Single-box solution for current-voltage (IV) from sub-pA up to 3000 V and 40 A, and capacitance-voltage (CV) at up to 3000 V of DC bias.

Ten module slots for SMUs (HPSMU, HCSMU, HVSMU) and Multi Frequency Capacitance Measurement Unit (MFCMU)

Offline data analysis and application test development via Desktop EasyEXPERT software

The Agilent B1505A Power Device Analyzer / Curve Tracer is the only single box solution available today with the capability to characterize high power devices from the sub-picoamp level at up to 3000 volts and 40 amps. This capability covers evaluation for new power device using wide band gap materials such as SiC GaN. The B1505A software environment allows users to check device characteristics and detect device faults with the easy convenience of a curve tracer. Just like on a curve tracer, the B1505A supports rotary knob control of the independent sweep variable for intuitive and real-time evaluation of parameters such as breakdown voltage. The B1505A's test fixture can accept a wide variety of devices, such as power MOSFETs, diodes and IGBTs, regardless of their size or shape via a large fixture adapter with customizable fixture modules. In addition, the test fixture's built-in interlock mechanism ensures that high voltages and currents can be applied to test devices safely.

Mainframe Characteristics	B1505A Power Device Analyzer/Curve Tracer
Available slots	10
Ground unit (GNDU) sink capability	4.2 A
USB ports	2 front and 2 rear
Instrument control	GPIB
Networking	100BASE-TX/10BASE-T LAN Port
External trigger inputs/outputs	1 BNC trigger in; 1 BNC trigger out; 8 programmable trigger in/out

Module Selection Guide	Required slot	Main specification
B1510A HPSMU	2	Up to ±200 V, ±1 A force, 10 fA current resolution
B1512A HCSMU	2	Up to ±40 V, ±1 A force, 10 pA current resolution
B1513A HVSMU	2	Up to ±3000 V, ±4 mA force, 10 fA current resolution
B1520A MFCMU	1	1 kHz to 5 MHz, up to 3000 V DC bias with HVSMU

More detailed specifications at **www.agilent.com/find/B1505A**

Device Analyzer/Curve Tracers

B1505A Power Device Analyzer/Curve Tracer (Continued)

Key features and benefits:

- One box solution for accurate and easy power device evaluation and analysis
- Accurate power device characterization across the entire operating range
- Unique high-voltage (3000 V) capacitance measurement capability
- Flexible and expandable architecture protects your investment
- Accurately characterize SiC, GaN and diamond devices at up to 3000 V
- Support modeling software reduces development times
- Up to 40 A current capabilities facilitate advanced device characterization
- True curve tracer knob sweep functionality combined with PC data management
- New features improve curve tracer functionality and boosts productivity
- EasyEXPERT software provides a task-oriented approach to power device testing
- Powerful auto-analysis functions
- Safe and supported packaged device testing at 3000 V and 40 A
- On-wafer measurement and automation capabilities reduce cycle times

Key B1505A accessories:

N1258A Module selector

N1259A Test fixture

N1260A High voltage bias-T

N1261A Protection adapter

N1262A Resistor box

Ordering information:

The B1505A does not have any automatic "base" configuration. All desired modules, accessories, and cables must be distinctly specified at the time of order.

Note: Since the B1505A is a modular product, you can add new modules to it at any time after initial purchase if the configuration is allowed.

More detailed specifications at **www.agilent.com/find/B1505A**

DC Electronic Loads...

maximize thoughput with real life loading conditions

Agilent DC electronic loads provide solutions for the problems of testing DC power sources.

Multiple Input Electronic Loads

The Agilent N3300A series of DC electronic loads has been optimized for the needs of high volume manufacturing test. Test throughput is maximized with both faster speed and specialized programming and measurement capabilities. The accuracy is enhanced over previous Agilent electronic loads, to meet the needs of testing today's smaller power supplies.

Single Input Electronic Loads

The 6060B and 6063B are single input DC electronic loads. They are convenient for testing of one single output DC power supply. They provide a total solution, with built-in measurement functions. However, to maximize either speed or accuracy, the N3300A series electronic loads are recommended.

Multiple-Input
150 W to 600 W

Standard DC connectors

Option UJ1 8 mm screw connectors

N3300A-N3307A

- Decrease system development time
- Increase system reliability
- Increase system flexibility
- DC connection terminal for ATE applications
- Lower cost of ownership
- Increase test system throughput
- Stable operation down to zero volts

Increase Test Throughput

Today's high volume manufacturing requires optimization of test system throughput, to maximize production volume without increasing floor-space. The N3300A series electronic loads can help you in a number of ways to achieve this goal.

Reduced command processing time
Commands are processed more than 10 times faster than previous electronic loads.

Automatically execute stored command sequences
"Lists" of downloaded command sequences can execute independent of the computer, greatly reducing the electronic load command processing time and computer interaction time during product testing.

Programmable delay allows for either simultaneous or sequential load changes
This is the most efficient way to conduct testing of multiple output DC power supplies, simulating real-life loading patterns, with a minimum of programming commands.

Buffer measurement data
Voltage, current, and power measurements can be buffered for later readback to the computer, reducing computer interaction.

Control measurement speed vs. accuracy
Decrease the number of measurement samples to achieve greater measurement speed, or increase the number of samples to achieve higher measurement accuracy. You can optimize your measurements for each test.

Control rising and falling slew rates separately
Reduce rate of loading change when necessary for DUT stability or to simulate real life conditions, but otherwise change load values at maximum rate.

Increase System Flexibility... for Both Present and Future Requirements

Most power supply and battery charger test systems designed today need to test a variety of products and/or assemblies. In the future, additional products or assemblies may be needed. A flexible family of electronic loads makes present system design and future growth much easier.

Test low voltage power supplies
The N3300A series electronic loads operate with full stability down to zero volts. Many other electronic loads available today have been found to become unstable in the operating region below one volt. When designing power supply test platforms, the trend towards lower voltage requirements should be taken into account. Refer to the specification and supplemental characteristic tables for details of lower voltage operating characteristics.

Choose DC load connection method
Automatic test systems need consistency and reliability. Option UJ1 8 mm screw connectors provide a simple screw onto which your wires, terminated with insulated ring terminals, may be securely mounted. This optional connector is specifically designed for test systems. Wires may exit the plastic cover in any direction, and multiple wires may be placed on each screw terminal for easy parallel load connections. Up to AWG 4 wire may be used.

Applications which require repeated connections/disconections are better suited to the standard connector. The standard connector accepts an unterminated wire, and may be hand-tightened. This connector is specifically designed for bench applications and short-term automated tests.

More detailed specifications at **www.agilent.com/find/N3300**

Multiple-Input: 150 W to 600 W (Continued)

Design a system to test a variety of products
This series consists of 2 mainframes and 5 modules. The N3300A mainframe is full rack width. It has 6 slots. The N3301A mainframe is half rack width. It has 2 slots. Any assortment of the 5 different modules can be configured into these mainframes, up to the slot capacity. The N3302A (150 watts), N3303A (250 watts), N3307A (250 watts) and N3304A (300 watts) each require one slot. The N3305A (500 watts) and the N3306A (600 watts) each require 2 slots. The electronic load can be configured to supply exactly what you need now, and this modular design also allows for easy future reconfiguration.

Test high current power supplies
Electronic load modules can be operated in parallel to provide addition current sinking capability.

Control the electronic load how you want to
GPIB, RS232, and manual use of the front panel all provide complete control of these electronic loads. There are also analog programming and monitoring ports for those applications that utilize non-standard interfaces, require custom waveforms, or utilize process control signals. Custom waveforms can also be created by downloading a "List" of load parameters. In addition, there is a built-in transient generator, which operates in all modes.

Quickly create powerful and consistent software
All Agilent Technologies electronic loads use the SCPI (Standard Commands for Programmable Instruments) command set. This makes learning the commands easy, because they are the same format as all other SCPI instruments. The resulting code is virtually self-documenting, and therefore easier to troubleshoot and modify in the future. *Plug-n-Play* drivers are also available to help you to integrate the loads into your standard software packages.

Make Measurements Easily and Accurately

The 16-bit voltage, current and power measurement system provides both accuracy and convenience. The alternative is using a dmm (digital multimeter) and MUX (multiplexer) along with a precision current shunt and a lot of extra wiring. Avoiding this complexity increases system reliability and makes the system easier to design and support. Current measurements in particular are more consistently accurate using the electronic load's internal system, because the wiring associated with an external precision current shunt may pick up noise.

Measure with all load modules simultaneously
Testing multiple-output DC power supplies and DC-DC converters can be very time consuming if each output must be tested sequentially. If measurements are being made through a MUX using one DMM, this is what will happen. Using the built-in measurement capabilities of the N3300A electronic loads, all outputs can be measured simultaneously. Alternatively, multiple single output power sources can be tested simultaneously.

Measure voltage and current simultaneously
The N3300A measurement system has individual but linked current and voltage measurement systems. This means that voltage and current measurements are taken exactly simultaneously, which gives a true picture of the power supply under test's output at a particular moment in time. Some other electronic loads which feature internal measurement systems actually take current and voltage measurements sequentially, and therefore do not give as accurate a picture of momentary power.

Observe transient behavior using waveform digitization
Transient response and other dynamic tests often require an oscilloscope. The N3300A has a flexible waveform digitizer with a 4096 data point buffer for voltage and a 4096 data point buffer for current. Under many circumstances, this internal digitizer will be adequate for power supply test needs. Current and voltage are digitized simultaneously, and the sampling rate and sample window are programmable. Some analysis functions are provided, including RMS, max and min.

More detailed specifications at **www.agilent.com/find/N3300**

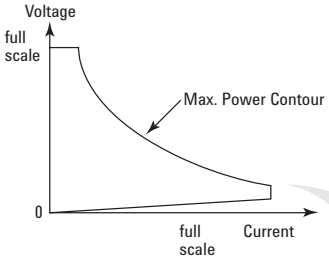
Multiple-Input: 150 W to 600 W (Continued)

Table A-1 Specifications

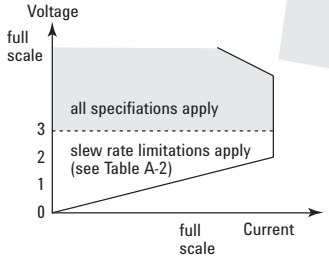
Table A-1 lists the specifications for the different load models. Specifications indicate warranted performance in the 25°C ±5°C region of the operating temperature range. Specifications apply to normal and transient modes unless otherwise noted.

Input characteristic

Operating contour



Derated current detail



Notes

1 Maximum continuous power available is derated linearly from 100% of maximum at 40°C, to 75% of maximum at 55°C.

2 Specification is ± (% of reading + fixed offset). Measurement is 1000 samples. Specification may degrade when the unit is subject to an RF field of 3 V/meter, the unit is subject to line spikes of 500 V, or an 8 kV electrostatic discharge.

3 DC current accuracy specifications apply 30 seconds after input current is applied.

	N3302A	N3303A	N3304A	N3305A	N3306A	N3307A
Input ratings						
Current	0 - 30 A	0 - 10 A	0 - 60 A	0 - 60 A	0 - 120 A	0 - 30 A
Voltage	0 - 60 V	0 - 240 V	0 - 60 V	0 - 150 V	0 - 60 V	0 - 150 V
Maximum power @ 40°C[1]	150 W	250 W	300 W	500 W	600 W	250 W
Specified current @ low voltage operation						
2.0 V	30 A	10 A	60 A	60 A	120 A	30 A
1.5 V	22.5 A	7.5 A	45 A	45 A	90 A	22.5 A
1.0 V	15 A	5 A	30 A	30 A	60 A	15 A
0.5 V	7.5 A	2.5 A	15 A	15 A	30 A	7.5 A
0 V	0 A	0 A	0 A	0 A	0 A	0 A
Typical minimum operating voltage @ full scale current	Table A-1 states that maximum current is available down to 2 volts. Typically, however under normal operating conditions, the load can sink the maximum current down to the following voltages:					
	1.2 V	1.2 V	1.2 V	1.4 V	1.4 V	1.4 V
Constant current mode[2]						
Low range/high range	3 A/30 A	1 A/10 A	6 A/60 A	6 A/60 A	12 A/120 A	3 A/30 A
Regulation	10 mA	8 mA	10 mA	10 mA	10 mA	10 mA
Low range accuracy 0.1% +	5 mA	4 mA	7.5 mA	7.5 mA	15 mA	7.5 mA
High range accuracy 0.1% +	10 mA	7.5 mA	15 mA	15 mA	37.5 mA	15 mA
Constant voltage mode[2]						
Low range/high range	6 V/60 V	24 V/240 V	6 V/60 V	15 V/150 V	6 V/60 V	15 V/150 V
Regulation	5 mV	10 mV	10 mV	10 mV	20 mV	10 mV
Low range accuracy 0.1% +	3 mV	10 mV	3 mV	10 mV	3 mV	10 mV
High range accuracy 0.1% +	8 mV	40 mV	8 mV	20 mV	8 mV	20 mV
Constant resistance mode[2]						
Range 1 (I >10% of current rating)	0.067-4 Ω	0.2-48 Ω	0.033-2 Ω	0.033-5 Ω	0.017-1 Ω	0.067-10 Ω
Range 2 (I >1% of current rating)	3.6-40 Ω	44-480 Ω	1.8-20 Ω	4.5-50 Ω	0.9-10 Ω	9-100 Ω
Range 3 (I >0.1% of current rating)	36-400 Ω	440-4800 Ω	18-200 Ω	45-500 Ω	9-100 Ω	90-1000 Ω
Range 4 (I >0.01% of current rating)	360-2000 Ω	4400-12000 Ω	180-2000 Ω	450-2500 Ω	90-1000 Ω	900-2500 Ω
Transient generator						
Frequency range	0.25 Hz-10 kHz	0.25 Hz-10 kHz	0.25 Hz-10 kHz	0.25 Hz-10 kHz	0.25 Hz 10 kHz	0.25 Hz-10 kHz
Pulse width	50 µs ±1% to 4 seconds ±1%	50 µs ±1% to 4 seconds ±1%	50 µs ±1% to 4 seconds ±1%	50 µs ±1% to 4 seconds ±1%	50 µs ±1% to 4 seconds ±1%	50 µs ±1% to 4 seconds ±1%
Current measurement[2]						
Low range/high range	3 A/30 A	1 A/10 A	6 A/60 A	6 A/60 A	12 A/120 A	3 A/30 A
Low range accuracy[3] 0.05% +	3 mA	2.5 mA	5 mA	5 mA	10 mA	3 mA
High range accuracy[3] 0.05% +	6 mA	5 mA	10 mA	10 mA	20 mA	6 mA
Voltage measurement[2]						
Low range/high range	6 V/60 V	24 V/240 V	6 V/60 V	15 V/150 V	6 V/60 V	15 V/150 V
Low range accuracy 0.05% +	3 mV	10 mV	3 mV	8 mV	3 mV	8 mV
High range accuracy 0.05% +	8 mV	20 mV	8 mV	16 mV	8 mV	16 mV
Power measurement[2]						
Accuracy 0.1% +	0.5 W	1.2 W	0.5 W	1.5 W	1.2 W	0.5 W

More detailed specifications at **www.agilent.com/find/N3300**

Multiple-Input: 150 W to 600 W (Continued)

Table A-2 Supplemental Characteristics

Table A-2 lists the supplemental characteristics, which are not warranted but are descriptions of typical performance determined either by design or type testing.

Notes

[1] Slew rate bands are the ranges of programmable slew rates available. When you program a slew rate value outside the indicated bands, the electronic load will automatically adjust the slew rate to fit within the band that is closest to the programmed value. It is not necessary to specify the band, only the slew rate itself.

Below 3 volts, the maximum bandwidth of the electronic load is reduced by a factor of ten to one. For example, in the current range for Model N3302A, the maximum slew rate is specified as 2.5 MA/s, below 3 volts the maximum slew rate would be 250 kA/s. Any slew rate programmed between 2.5 MA/s and 250 kA/s would produce a slew rate of 250 k/s. Slew rates programmed slower than 250 kA/s would still correctly reflect their programmed value. Note that if you are using transient mode to generate a high frequency pulse train, a reduced slew rate might cause the load to never reach the upper programmed value before beginning the transition to the lower programmed value. So even though the transient mode is still operational at lower voltages, a fast pulse train with large transitions may not be achievable.

		N3302A	N3303A	N3304A	N3305A	N3306A	N3307A
Programming resolution							
Constant current mode		0.05 mA/ 0.5 mA	0.02 mA/ 0.2 mA	0.1 mA/ 1 mA	0.1 mA/ 1 mA	0.2 mA/ 2 mA	0.05 mA/ 0.5 mA
Constant voltage mode		0.1 mV/1 mV	0.4 mV/4 mV	0.1 mV/1 mV	0.25 mV/2.5 mV	0.1 mV/1 mV	0.25 mV/2.5 mV
Constant resistance mode		0.07/0.7/ 7/70 mΩ	0.82/8.2/ 82 mΩ	0.035/0.35/ 3.5/35 mΩ	0.085/0.85/ 8.5/85 mΩ	0.0175/0.175/ 1.75/17.5 mΩ	0.17/1.7/ 17/170 mΩ
Readback resolution							
Current		0.05 mA/ 0.5 mA	0.02 mA/ 0.2 mA	0.1 mA/ 1 mA	0.1 mA/ 1 mA	0.2 mA/ 2 mA	0.05 mA/ 0.5 mA
Voltage		0.1 mV/ 1 mV	0.4 mV/ 4 mV	0.1 mV/ 1 mV	0.25 mV/ 2.5 mV	0.1 mV/ 1 mV	0.25 mV/ 2.5 mV
Programmable slew rate[1]							
Current ranges	Slow band	500 A/s - 25 kA/s	167 A/s - 8330 A/s	1 kA/s - 50 kA/s	1 kA/s - 50 kA/s	2 kA/s - 100 kA/s	500 A/s - 25 kA/s
	Fast band ≥3 V	50 kA/s - 2.5 MA/s	16.7 kA/s - 833 kA/s	100 kA/s - 5 MA/s	100 kA/s - 5 MA/s	200 kA/s - 10 MA/s	50 kA/s - 2.5 MA/s
	Fast band <3 V	50 kA/s - 250 kA/s	16.7 kA/s - 83.3 kA/s	100 kA/s - 500 kA/s	100 kA/s - 500 kA/s	200 kA/s - 1 MA/s	50 kA/s - 250 kA/s
Voltage ranges	Slow band	1 kV/s - 50 kV/s	4 kV/s - 200 kV/s	1 kV/s - 50 kV/s	2.5 kV/s - 125 kV/s	1 kV/s - 50 kV/s	2.5 kV/s - 125 kV/s
	Fast band ≥3 V	100 kV/s - 500 kV/s	400 kV/s - 2 MV/s	100 kV/s - 500 kV/s	250 kV/s - 1.25 MV/s	100 kV/s - 500 kV/s	250 kV/s - 1.25 MV/s
	Fast band <3 V	100 kV/s - 50 kV/s	400 kV/s - 200 kV/s	100 kV/s - 50 kV/s	250 kV/s - 125 kV/s	100 kV/s - 50 kV/s	250 kV/s - 125 kV/s
Resistance range 1	Slow band	44 Ω/s - 1125 Ω/s	540 Ω/s - 13.5 kΩ/s	22 Ω/s - 560 Ω/s	55 Ω/s - 1400 Ω/s	11 Ω/s - 280 Ω/s	110 Ω/s - 2800 Ω/s
	Fast band ≥3 V	2250 Ω/s - 34 kΩ/s	27 kΩ/s - 408 kΩ/s	1120 Ω/s - 17 kΩ/s	2800 Ω/s - 42.5 kΩ/s	560 Ω/s - 8.5 kΩ/s	5600 Ω/s - 85 kΩ/s
	Fast band <3 V	2250 Ω/s - 3.4 kΩ/s	27 kΩ/s - 40.8 kΩ/s	1120 Ω/s - 1.7 kΩ/s	2800 Ω/s - 4.25 kΩ/s	560 Ω/s - 850 Ω/s	5600 Ω/s - 8.5 kΩ/s
Resistance range 2	Slow band	440 Ω/s - 11.25 kΩ/s	5.4 kΩ/s - 135 kΩ/s	220 Ω/s - 5600 Ω/s	550 Ω/s - 14 kΩ/s	110 Ω/s - 2800 Ω/s	1.1 kΩ/s - 28 kΩ/s
	Fast band ≥3 V	22.5 kΩ/s - 340 kΩ/s	270 kΩ/s - 4.08 MΩ/s	11.2 kΩ/s - 170 kΩ/s	28 kΩ/s - 425 kΩ/s	5600 Ω/s - 85 kΩ/s	56 kΩ/s - 850 kΩ/s
	Fast band <3 V	22.5 kΩ/s - 34 kΩ/s	270 kΩ/s - 408 kΩ/s	11.2 kΩ/s - 17 kΩ/s	28 kΩ/s - 42.5 kΩ/s	5600 Ω/s - 8.5 kΩ/s	56 kΩ/s - 85 kΩ/s
Resistance range 3	Slow band	4.4 kΩ/s - 112.5 kΩ/s	54 kΩ/s - 1.35 MΩ/s	2.2 kΩ/s - 56 kΩ/s	5.5 kΩ/s - 140 kΩ/s	1.1 kΩ/s - 28 kΩ/s	11 kΩ/s - 280 kΩ/s
	Fast band ≥3 V	225 kΩ/s - 3.4 MΩ/s	2.7 MΩ/s - 40.8 MΩ/s	112 kΩ/s - 1.7 MΩ/s	280 kΩ/s - 4.25 MΩ/s	56 kΩ/s - 850 kΩ/s	560 kΩ/s - 8.5 MΩ/s
	Fast band <3 V	225 kΩ/s - 340 kΩ/s	2.7 MΩ/s - 4.08 MΩ/s	112 kΩ/s - 170 kΩ/s	280 kΩ/s - 425 kΩ/s	56 kΩ/s - 85 kΩ/s	560 kΩ/s - 850 kΩ/s
Resistance range 4	Slow band	44 kΩ/s - 1.125 MΩ/s	540 kΩ/s - 13.5 MΩ/s	22 kΩ/s - 560 kΩ/s	55 kΩ/s - 1.4 MΩ/s	11 kΩ/s - 280 kΩ/s	110 kΩ/s - 2.8 MΩ/s
	Fast band ≥3 V	2.25 MΩ/s - 34 MΩ/s	27 MΩ/s - 408 MΩ/s	1.12 MΩ/s - 17 MΩ/s	2.8 MΩ/s - 42.5 MΩ/s	560 kΩ/s - 8.5 MΩ/s	5.6 MΩ/s - 85 MΩ/s
	Fast band <3 V	2.25 MΩ/s - 3.4 MΩ/s	27 MΩ/s - 40.8 MΩ/s	1.12 MΩ/s - 1.7 MΩ/s	2.8 MΩ/s - 4.25 MΩ/s	560 kΩ/s - 850 kΩ/s	5.6 MΩ/s - 8.5 MΩ/s

Multiple-Input: 150 W to 600 W (Continued)

Table A-2 (Continued) Supplemental Characteristics

Table A-2 lists the supplemental characteristics, which are not warranted but are descriptions of typical performance determined either by design or type testing.

Notes

[2] Applies to all ranges.

	N3302A	N3303A	N3304A	N3305A	N3306A	N3307A
Programmable short	66 mΩ max.	200 mΩ max.	33 mΩ max.	33 mΩ max.	17 mΩ max.	33 mΩ max.
	40 mΩ typical	100 mΩ typical	20 mΩ typical	25 mΩ typical	12 mΩ typical	20 mΩ typical
Programmable open	≥20 kΩ	≥80 kΩ	≥20 kΩ	≥20 kΩ	≥20 kΩ	≥80 kΩ
Command processing time						
Using discrete commands	3 ms	3 ms	3 ms	3 ms	3 ms	3 ms
Using list commands	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms
List dwell characteristics						
Range	0 - 10 s	0 - 10 s	0 - 10 s	0 - 10 s	0 - 10 s	0 - 10 s
Resolution	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms
Accuracy	5 ms	5 ms	5 ms	5 ms	5 ms	5 ms
Measurement time						
1000 samples (default)	20 ms (with specified measurement accuracy)	20 ms (with specified measurement accuracy)	20 ms (with specified measurement accuracy)	20 ms (with specified measurement accuracy)	20 ms (with specified measurement accuracy)	20 ms (with specified measurement accuracy)
200 samples	10 ms (with <6% additional fixed offset)	10 ms (with <6% additional fixed offset)	10 ms (with <6% additional fixed offset)	10 ms (with <6% additional fixed offset)	10 ms (with <6% additional fixed offset)	10 ms (with <6% additional fixed offset)
100 samples	9 ms (with <10% additional fixed offset)	9 ms (with <10% additional fixed offset)	9 ms (with <10% additional fixed offset)	9 ms (with <10% additional fixed offset)	9 ms (with <10% additional fixed offset)	9 ms (with <10% additional fixed offset)
20 points	7 ms (with <30% additional fixed offset)	7 ms (with <30% additional fixed offset)	7 ms (with <30% additional fixed offset)	7 ms (with <30% additional fixed offset)	7 ms (with <30% additional fixed offset)	7 ms (with <30% additional fixed offset)
<20 points	7 ms (with >30% additional fixed offset)	7 ms (with >30% additional fixed offset)	7 ms (with >30% additional fixed offset)	7 ms (with >30% additional fixed offset)	7 ms (with >30% additional fixed offset)	7 ms (with >30% additional fixed offset)
Ripple and noise (20 Hz - 10 MHz)						
Current (rms/peak to peak)	2 mA/20 mA	1 mA/10 mA	4 mA/40 mA	4 mA/40 mA	6 mA/60 mA	2 mA/20 mA
Voltage (rms)	5 mV_{rms}	12 mV_{rms}	6 mV_{rms}	10 mV_{rms}	8 mV_{rms}	10 mV_{rms}
External analog programming						
Voltage programming accuracy[2]	0.5% + 12 mV	0.5% + 48 mV	0.5% + 12 mV	0.5% + 30 mV	0.5% + 12 mV	0.5% + 30 mV
Current programming accuracy[2]	0.25% + 4.5 mA	0.25% + 1.5 mA	0.25% + 9 mA	0.25% + 9 mA	0.25% + 18 mA	0.25% + 4.5 mA
External monitor ports						
Voltage monitor accuracy	0.25% + 12 mV	0.25% + 48 mV	0.25% + 12 mV	0.25% + 30 mV	0.25% + 12 mV	0.25% + 30 mV
Current monitor accuracy	0.1% + 4.5 mA	0.1% + 1.5 mA	0.1% + 9 mA	0.1% + 9 mA	0.1% + 18 mA	0.1% + 4.5 mA

Multiple-Input: 150 W to 600 W (Continued)

Table A-3 Supplemental Characteristics

	N3300A	N3301A
Operating temperature range	0°C to 55°C	0°C to 55°C
Input ratings		
Operating range	100 - 250 VAC 48 - 63 Hz	100 - 250 VAC 48 - 63 Hz
Input current	4.2 A @ 100 - 127 VAC 2.2 A @ 200 - 250 VAC	2.3 A @ 100 - 250 VAC
Input VA	440 VA	230 VA
Inrush current	38 A	18 A @ 115 VAC 36 A @ 230 VAC

Application notes

Agilent AN 372-1 Power Supply Testing
(AN 372-1)
5952-4190

Agilent AN 372-2 Battery Testing
(AN 372-2)
5952-4191

Increasing DC Power Supply Test System Throughput with Agilent Technologies N3300A DC Electronic Loads
5980-0233E

Agilent Zero Volt Electronic Load
5968-6360E

Making Fuel Cell AC Impedance Measurements Utilizing Agilent N3300A Series Electronic Loads
5988-5358EN

Supplemental characteristics for all model numbers

Analog programming bandwidth:
10 kHz (-3 db frequency) in CC mode only

Analog programming voltage:
Voltage: 0 - 10 V
Current: 0 - 10 V

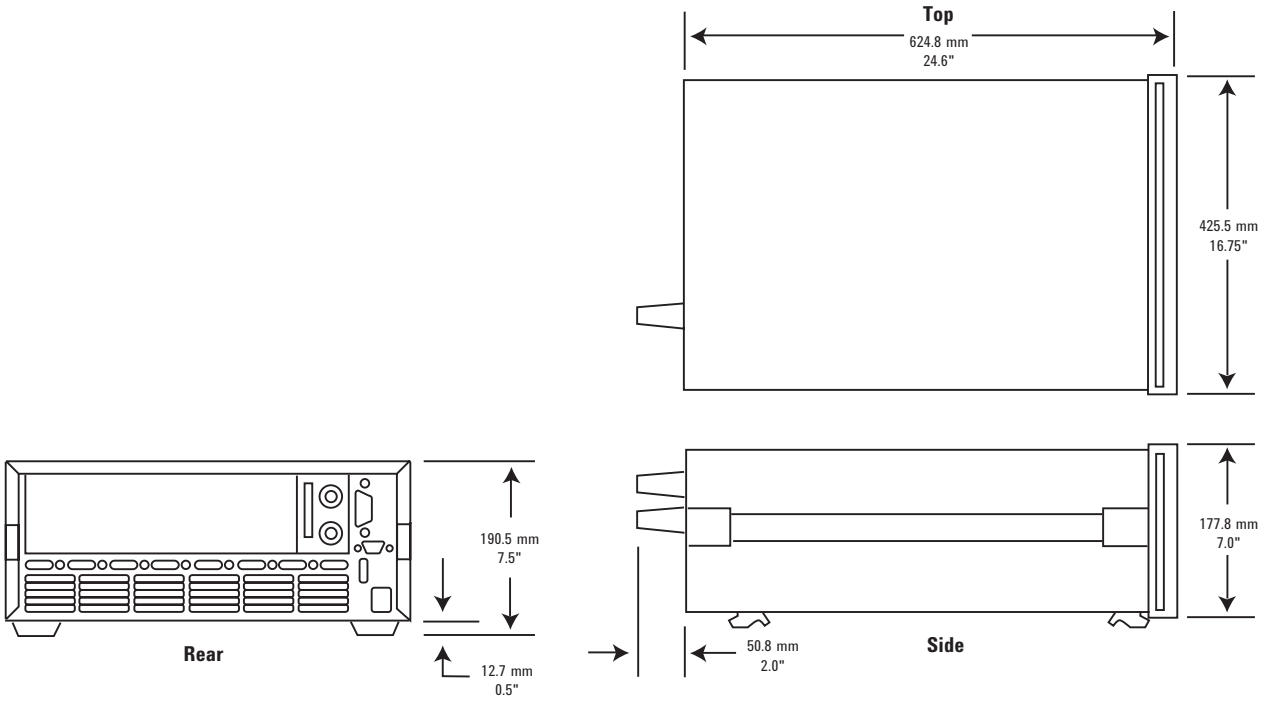
Analog monitor ports:
Voltage: 0 - 10 V
Current: 0 - 10 V

Remote sensing:
5 VDC between sense and load input

Digital/trigger inputs:
V_{il} = 0.9 V max at I_{il} = -1 mA
V_{ih} - 3.15 V min
(pull-up resistor on input)

Digital/trigger outputs:
V_{ol} = 0.72 V max at I_{ol} = 1 mA
V_{oh} = 4.4 V min at I_{oh} = -20 µA

Agilent Models: N3300A



More detailed specifications at **www.agilent.com/find/N3300**

Multiple-Input: 150 W to 600 W (Continued)

Software driver:
VXI*Plug&Play*

Net weight:
N3300A: 13.2 kg (29 lb); N3301A: 7.3 kg (16 lb); N3302A, N3303A or N3304A: 2.7 kg (6 lb); N3305A or N3306A: 4.6 kg (10 lb), N3307A 2.7 kg (6 lb)

Shipping weight:
N3300A: 17 kg (38 lb); N3301A: 9.1 kg (20 lb) N3302A, N3303A, or N3304A: 4.1 kg (9 lb) N3305A or N3306A: 6.8 kg (15 lb), N3307A 4.1 kg (9 lb)

Warranty: One year

Ordering information

Opt. UJG: Standard finger twist connector

Opt. UJ1: 8 mm screw terminal connector (available on all load modules N3302A-N3307A)

Opt. 800: Rack-mount kit for two N3301A mainframes mounted side-by-side (p/n 5061-9694 and 5062-3978).

Opt. 908: Rack-mount kit (two p/n 5062-3974C for a N3300A, or p/n 5062-3960 for one N3301A). For the N3301A, the kit includes a blank filler panel.

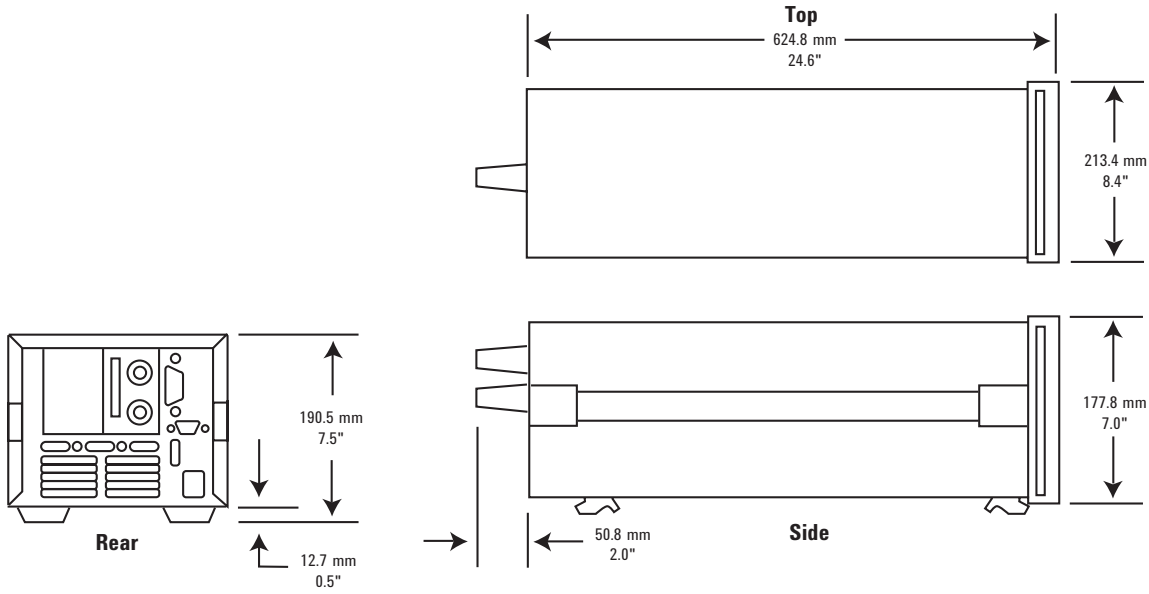
Opt. 909: Rack-mount kit with handles for N3300A (two p/n 5062-3975 and 5063-9219)

Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 0B0 Full documentation on CD-ROM only

Agilent Models: N3301A



More detailed specifications at **www.agilent.com/find/N3300**

Single-Input
250 W to 300 W

6060B and 6063B

Cost-effective for single input applications

Convenient optional front panel input connection

The 6060B and 6063B each provides one load input. This is more convenient for single input applications than a mainframe product.

These electronic loads are particularly suited for the lab bench. Entering commands manually using the front panel keypad is simpler because the channel does not need to be specified, as in a mainframe configuration. The keypad entry is further simplified because these products do not have the downloadable LIST feature of the N3300A Series, which helps to maximize production throughput. Extensive protection is included to help protect your valuable prototypes under test. This includes overvoltage, overcurrent, overtemperature, overpower, and reverse polarity.

These loads are suitable for manufacturing test systems where maximizing speed is not critical. They use industry standard SCPI instructions, and also have VXI*Plug&Play* drivers to simplify system design. For the greatest speed and accuracy in programming and measurement, see the N3300A series of DC electronic loads.

Specifications	6060B	6063B
Amperes	0 to 60 A	0 to 10 A
Volts	3 to 60 V	3 to 240 V
Maximum power (at 40° C)	300 W	250 W
Constant current mode		
Ranges	0 to 6 A, 0 to 60 A	0 to 1 A, 0 to 10 A
Accuracy	0.1% ±75 mA	0.15% ±10 mA
Regulation	10 mA	8 mA
Constant voltage mode		
Accuracy	0.1% ±50 mV	0.12% ±120 mV
Regulation (w/remote sense)	10 mV	10 mV
Constant resistance mode	0.033 to 1.0 Ω	0.20 to 24.0 Ω
Ranges	1 to 1,000 Ω 10 to 10,000 Ω	24 to 10,000 Ω 240 to 50,000 Ω
Accuracy	1 Ω: 0.8% ±8 mΩ (with ≥6 A at input) 1 KΩ: 0.3% ±8 mS (with ≥6 V at input) 10 KΩ: 0.3% ±8 mS (with ≥6 V at input)	24 Ω: 0.8% ±200 mΩ (with ≥1 A at input) 10 KΩ/: 0.3% ±0.3 mS (with ≥24 V at input) 50 KΩ: 0.3% ±0.3 mS (with ≥24 V at input)
Transient generator		
Frequency range Accuracy	0.25 Hz to 10 kHz 3%	0.25 Hz to 10 kHz 3%
Duty cycle range Accuracy	3 to 97% (0.25 Hz to 1 kHz) 6 to 94% (1 to 10 kHz) 6% of setting ±2%	3 to 97% (0.25 Hz to 1 kHz) 6 to 94% (1 to 10 kHz) 6% of setting ±2%
Current level high range Accuracy	60-A range: 0.1% ±350 mA	10-A range: 0.18% ±50 mA
Current level low range Accuracy	6-A range: 0.1% ±80 mA	1-A range: 0.18% ±13 mA
Voltage level Voltage level accuracy	3 to 60 V 0.1% ±300 mV	3 to 240 V 0.15% ±1.1 V
Readback specifications		
Current readback accuracy Voltage readback accuracy	0.05% ±65 mA ±(0.05% + 45 mV)	0.12% ±10 mA ±(0.1% + 150 mV)
Ripple and noise (20 Hz to 10 MHz noise) Current Voltage	 4 mArms 40 mA peak-to-peak 6 mVrms	 1 mArms 10 mA peak-to-peak 6 mVrms

More detailed specifications at **www.agilent.com/find/6060**

Single-Input: 250 W to 300 W (Continued)

Specifications	6060B	6063B

Notes:

1. Operating temperature range is 0° to 55°C. All specifications apply for 25°C ±5°C, except as noted.
2. Maximum continuous power available is derated linearly from 40°C to 75% of maximum at 55°C.
3. DC current accuracy specifications apply 30 seconds after input is applied.

Supplemental Characteristics	(Non-warranted characteristics determined by design that are useful in applying the product)	
Constant current mode	60-A range: 16 mA	10-A range: 2.6 mA
Resolution	6-A range: 1.6 mA	1-A range: 0.26 mA
Temperature coefficient	100 ppm/°C ±5 mA/°C	150 ppm/°C ±1 mA/°C
Constant voltage mode		
Resolution	16 mV	64 mV
Temperature coefficient	100 ppm/°C ±5 mV/°C	120 ppm/°C ±10 mV/°C
Constant resistance mode Resolution	1 Ω : 0.27 mΩ 1 KΩ: 0.27 ms 10 KΩ: 0.027 ms	24 Ω: 6 mΩ 10 KΩ: 0.011 ms 50 KΩ: 0.001 ms
Temperature coefficient	1 Ω: 800 ppm/°C ±0.4 mΩ/°C 1 KΩ: 300 ppm/°C ±0.6 ms/°C 10 KΩ: 300 ppm/°C ±0.6 ms/°C	24 Ω: 800 ppm/°C ±10 mΩ/°C 10 KΩ: 300 ppm/°C ±0.03 ms/°C 50 KΩ: 300 ppm/°C ±0.03 ms/°C
Transient generator		
Frequency range Resolution	0.25 Hz to 10 kHz 4% or less	0.25 Hz to 10 kHz 4% or less
Duty cycle range Resolution	3 to 97% (0.25 Hz to 1 kHz) 6 to 94% (1 to 10 kHz) 4%	3 to 97% (0.25 Hz to 1 kHz) 6 to 94% (1 to 10 kHz) 4%
Current level high range Resolution	60-A range: 260 mA	10-A range: 43 mA
Current level low range Resolution	6-A range: 26 mA	1-A range: 4 mA
Current temperature coefficient	100 ppm/°C ±7 mA/°C	180 ppm/°C ±1.2 mA/°C
Voltage level resolution	260 mV	1 V
Voltage temperature coefficient	150 ppm/°C ±5 mV/°C	120 ppm/°C ±10 mV/°C
Programmable slew rate	60-A range: 1 A/ms to 5 A/µs 6-A range: 0.1 A/ms to 0.5 A/µs	10-A range: 0.17 A/ms to 0.83 A/µs 1-A range: 17 A/ms to 83 A/ms
Rise/fall time	12 µs to 8 ms	16 µs to 8 ms
Analog programming bandwidth	10 kHz (–3 dB frequency)	10 kHz (–3 dB frequency)
Analog programming accuracy		
Current (low range)	4.5% ±75 mA	3% ±8 mA
Current (high range)	4.5% ±250 mA	3% ±20 mA
Temperature coefficient	100 ppm/°C ±6 mA/°C	150 ppm/°C ±1 mA/°C
Voltage	0.8% ±200 mV	0.5% ±150 mV
Temperature coefficient	100 ppm/°C ±1 mV/°C	120 ppm/°C ±10 mV/°C
Analog programming voltage	0 to 10 V	0 to 10 V
Readback specifications	17 mA (via GPIB)	2.7 mA (via GPIB)
Current readback resolution	20 mA (front panel)	10 mA (front panel)
Temperature coefficient	50 ppm/°C ±5 mA/°C	100 ppm/°C ±1 mA/°C
Voltage readback resolution	17 mV (via GPIB) 20 mV (front panel)	67 mV (via GPIB) 100 mV (front panel)
Temperature coefficient	50 ppm/°C ±1.2 mV/°C	100 ppm/°C ±8 mV/°C

More detailed specifications at **www.agilent.com/find/6060**

Single-Input: 250 W to 300 W (Continued)

Notes:

1. Operating temperature range is 0° to 55°C. All specifications apply for 25°C ±5°C, except as noted.
2. Maximum continuous power available is derated linearly from 40°C to 75% of maximum at 55°C.
3. DC current accuracy specifications apply 30 seconds after input is applied.

Supplemental Characteristics (Continued)

(Non-warranted characteristics determined by design that are useful in applying the product)

Specifications	6060B	6063B
Analog monitor accuracy		
Current monitor (0 to 10 V_{out})	4% ±85 mA	3% ±10 mA
Temperature coefficient	50 ppm/°C ±6 mA/°C	100 ppm/°C ±1 mA/°C
Voltage monitor (0 to 10 V_{out})	0.25% ±40 mV	0.4% ±240 mV
Temperature coefficient	50 ppm/°C ±0.2 mV/°C	70 ppm/°C ±1.2 mV/°C
Remote sensing	5-VDC maximum between sense and load input	5-VDC maximum between sense and load input
Minimum operating voltage (at full rated current)	2 volts (1.2 V typical)	2 volts (1.2 V typical)
Programmable short	0.033 Ω (0.020 Ω typical)	0.20 Ω (0.10 Ω typical)
Programmable open (typical)	20 kΩ	80 kΩ
Drift (over 8-hour interval)		
Current	0.03% ±10 mA	0.03% ±15 mA
Voltage	0.01% ±10 mV	0.01% ±20 mV
DC isolation voltage	±240 VDC, between any input and chassis ground	±240 VDC, between any input and chassis ground
Digital inputs	V_{IL} = 0.9 V_{max} at I_{IL} = –1 mA / V_{IH} = 3.15 V_{min} (pull-up resistor on input)	V_{IL} = 0.9 V_{max} at I_{IL} = –1 mA / V_{IH} = 3.15 V_{min} (pull-up resistor on input)
Digital outputs	V_{OL} = 0.72 V_{max} at I_{OL} = 1 mA / V_{OH} = 4.4 V_{min} at I_{OH} = –20 µA	V_{OL} = 0.72 V_{max} at I_{OL} = 1 mA / V_{OH} = 4.4 V_{min} at I_{OH} = –20 µA
Net weight (approx.)	6.12 kg (13.5 lb)	6.12 kg (13.5 lb)
Shipping weight	8.16 kg (18 lb)	8.16 kg (18 lb)

More detailed specifications at **www.agilent.com/find/6060**

Single-Input: 250 W to 300 W (Continued)

Application notes

Agilent AN 372-1 Power Supply Testing
(AN 372-1)
5952-4190

Agilent AN 372-2 Battery Testing
(AN 372-2)
5952-4191

Pulsed Characterization of Power Semiconductors Using Electronic Loads
(AN 1246)
5091-7636E

Supplemental characteristics for all model numbers

Software driver:
VXI*Plug&Play*

Weight: 6.12 kg (13.5 lb) net;
8.16 kg (18 lb) shipping

Size: 425.5 mm W x 88.1 mm H x
396 mm D (16.75 in x 3.5 in x 13.7 in)

Warranty: One year

Ordering information

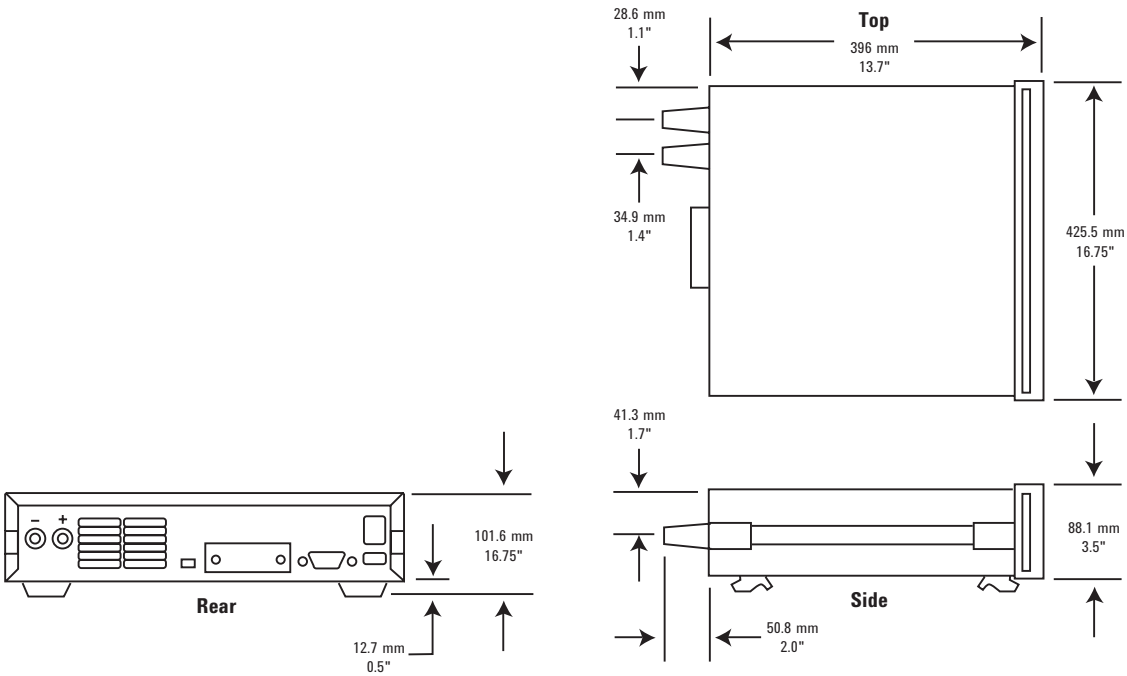
Opt 020 Front panel DC input connectors
Opt 100 87 to 106 VAC, 47 to 66 Hz input (for Japan only)
Opt 120 104-127 VAC, 47 to 66 Hz
Opt 220 191 to 233 VAC, 47 to 66 Hz input
Opt 240 209 to 250 VAC, 47 to 66 Hz input
* **Opt 908** Rack-mount kit (p/n 5062-3974C)
* **Opt 909** Rack-mount kit with handles (p/n 5063-9219)
Opt 0L1 Full documentation on CD-ROM, and printed standard documentation package
Opt 0L2 Extra copy of standard printed documentation package
Opt 0B0 Full documentation on CD-ROM only
Opt 0B3 Service manual

* Support rails required

Accessories

E3663AC Support rails for Agilent rack cabinets

Agilent Models: 6060B, 6063B



More detailed specifications at **www.agilent.com/find/6060**

AC Power Source/Analyzers...

an integrated AC power solution

Agilent AC power source/analyzers provide a complete AC test solution. As AC sources, they combine the capabilities of a power amplifier and an arbitrary waveform generator. This allows you to simulate normal waveforms and many types of distorted power waveforms. The built-in power analyzer combines the capabilities of a multimeter, oscilloscope, harmonic analyzer and power analyzer. These instruments may also be used to produce DC power, either alone or as a DC offset to an AC waveform.

AC Power Source/Analyzers
375-1750 VA

6811B, 6812B, 6813B

Provides a complete AC and DC power and measurement solution

Protect valuable DUTs with extensive protection features

Easy to use Graphical User Interface (GUI)

The Complete AC Power Test Solution

Since your product will have to operate in the real world of unpredictable AC power, you need to design and verify its correct operation under a wide range of AC power inputs. Brownouts, dropouts, sags, and other irregularities are not unusual in many communities today. Agilent AC sources have the features needed to easily accomplish this test goal either in an R&D environment or on the manufacturing test floor. If you plan to sell your products in a worldwide market, you will also need to test them at the line voltages and frequencies that they will eventually operate at. There is also additional testing needed to meet regulatory requirements for sale into some countries.

Agilent AC sources offer a complete solution for AC power testing, helping you to simplify this important task. These instruments combine the features of a power amplifier and arbitrary waveform generator to give you the ability to do all of the tests that you need. There are many standard preprogrammed waveforms, or you can use the transient generation system to simulate sophisticated and repeatable AC line disturbances. DC power can also be generated, either as a DC offset or as a pure DC signal.

Powerful Built-in Measurement Capabilities

Agilent AC sources have extensive 16-bit precision measurement capabilities which would normally require a number of complex measurement instruments, including a DMM (digital multimeter), oscilloscope, power analyzer, and harmonic analyzer. The precision measurements include:

- rms, DC, AC + DC voltage and current
- peak voltage and current
- real, apparent, and reactive power
- harmonic analysis of voltage and current waveforms providing amplitude and phase up to the 50th harmonic
- THD (total harmonic distortion)
- Triggered acquisition of digitized voltage and current

Using the measurement capabilities of an Agilent AC source simplifies your test setups and helps you obtain accurate data quickly.

Dual Power Analyzer Option 020

The powerful built-in power meter/analyzer in Agilent AC sources provides everything that you need to make AC measurements at the AC input to your DUT. For many test scenarios, this is the extent of the AC analysis required.

Some test scenarios, however, require AC measurements to be made at both the AC input and the AC output of the DUT. Option 020 provides an additional power analyzer, complete with a precision current shunt, which can be connected anywhere you need it. This second analyzer can even be used for tests where the AC source is not providing power, thus expanding the usefulness of this instrument to many more test configurations. The additional analyzer is equivalent in specifications and capabilities to the standard analyzer.

More detailed specifications at **www.agilent.com/find/6800**

AC Power Source/Analyzers: 375-1750 VA (Continued)

Using the dual power analyzer option instead of an additional power analyzer instrument externally is more than just convenient. Measurements on all four measurement channels (AC source output voltage and current, and dual power analyzer voltage and current inputs) are inherently synchronized with the AC source output waveform. This precision would be difficult to achieve using separate measurement instruments.

Examples dual power analyzer applications

- Complete testing of uninterruptible power sources (UPS)
- Efficiency testing of DC power supplies
- Efficiency testing of AC power sources
- Efficiency testing of transformers
- Safety testing of transformers
- Line disturbance and brownout testing of DC power supplies
- Line disturbance and brownout testing of AC power sources
- Sleep mode current monitoring
- Independent power analyzer

Sleep mode current monitoring

Many electronic products have power-saving or sleep modes. In this mode, the device draws only enough power to be able to recognize a "wake-up" signal, and then execute a smooth "wake-up". The power drawn in this mode is a critical parameter, and the ability to accurately monitor it is important.

The accessory precision current shunt that is supplied with option 020 is mounted in such a way to make it easy for you to replace it with a precision resistor of your choice. By doing this, you can configure the system to accurately monitor extremely low currents. This provides an easy way for you to profile the current draw in all modes of your product's operation. Since Agilent 6811B-6813B AC sources produce DC power as well as AC power, portable battery operated products can also be tested with this configuration.

UPS (uninterruptible power source) testing

The Dual Power Analyzer Option provides many important benefits for UPS testing. Since the key to correct UPS operation is having the output react properly to changes on the input, being able to monitor the output relative to the input simplifies testing. For example, commands are available to enable calculation of UPS transfer time, and the phase difference between the UPS input and output voltage. Agilent AC sources also have programmable output impedance, enabling the UPS designer to verify product stability over a wide range of AC line impedance.

Free Graphical User Interface (GUI)

When you need to run a variety of tests, study the results carefully, and then run more tests with slightly varied conditions, writing computer programs using the extensive SCPI command set may seem burdensome. This is when you should download the latest copy of the free Agilent AC Source Graphical User Interface from www.agilent.com.

The Agilent AC source GUI makes it quick and easy to set the output of your Agilent AC source, be it from a stored waveform or with a waveform that you create using your mouse. The GUI also allows you to see the output of the AC source in graphical form, save the results, or dump them directly into a Microsoft Excel file.

Microsoft Excel link

The direct Excel link feature was recently added to meet the current needs of R&D engineers. It makes it easy to keep the results of many tests, and makes them easily retrievable. With it, the test records resulting from changing conditions can be kept in one place and easily compared.

Access to raw data often helps in fully understanding test results. For example, small local peaks may not be evident in processed data. V, I and phase results from harmonic measurements are particularly susceptible to not showing the complete story in a graphical representation.

AC Power Source/Analyzers: 375-1750 VA (Continued)

Microsoft Excel offers a wide variety of data manipulation and graphical capabilities that can help an engineer gain the fullest understanding from the test data.

Test Suite for avionics equipment
Agilent AC sources are well suited for testing equipment intended for use in the avionics industry which operate at nominally 400 Hz. One of the special requirements that many manufacturers in this industry must concern themselves with is testing to meet RTCA DO-160 standards. These standards involve both AC and DC immunity tests. The Agilent AC source GUI includes a section devoted to these tests. By using this tool, you can quickly step through the required set-ups with confidence.

Extensive Protection to Prevent Load Damage

In addition to overcurrent, overvoltage, overpower and overtemperature protection, the 6800 series offers output disconnect relays and remote inhibit capability (quickly disabling the output of the AC source via a TTL signal) to protect the device under test.

The 6800 series is backed by a three-year warranty and Agilent's worldwide network of support and service centers.

Application Information

The 6800 series can help you test and improve your products. You can easily perform:

1. Static testing–generating and measuring voltage, frequency, and line current for meeting worldwide specifications.
2. Dynamic testing–generating AC line transients for limit testing and design verification.
3. Specialty testing–measuring current harmonic content and creating custom AC power waveforms (such as a combined AC + DC signal to simulate a telephone ring).
4. Precompliance regulatory testing–measuring current harmonics, voltage fluctuations and flicker emissions and generating voltage and frequency disturbances and interharmonics to determine product immunity.

Development engineers and test professionals in a wide variety of industries use AC power source/analyzers. Here are a few examples:

Avionics
Instrumentation, ATE test stations

Computer products
Computers, monitors, peripherals

Consumer products
Home appliances, audio and video equipment, heating/cooling controls

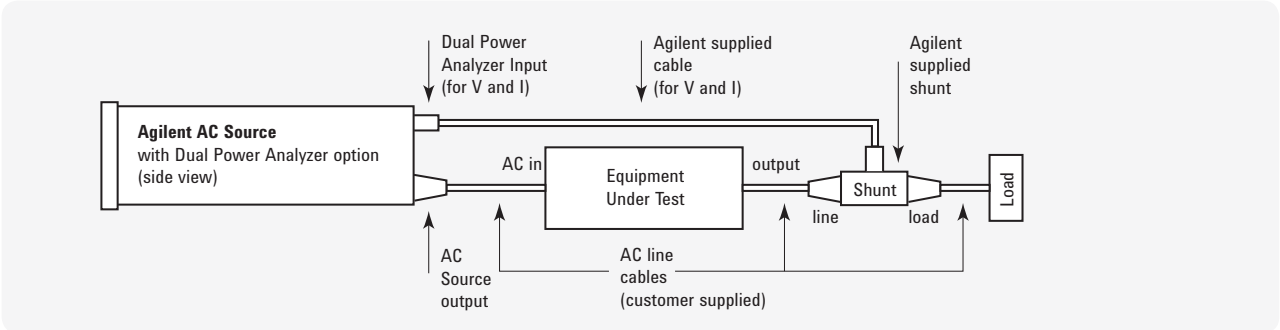
Electrical products
Relays, transformers, power components, fire alarms

Lighting products
Electronic ballasts, compact flourescent bulbs, timers

Motors
AC motors, electronic controllers

Power products
AC/DC adapters, AC/DC power supplies, PBX power supplies, Uninterruptible power supplies

Telecom products
RF amplifiers, CATV devices, MUX's, routers, switches

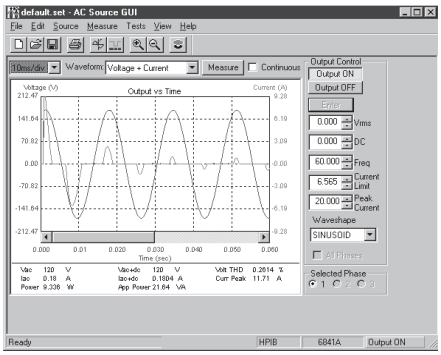


Test configuration of efficiency measurement using an Agilent AC source with the 020 Dual Power Analyzer Option.

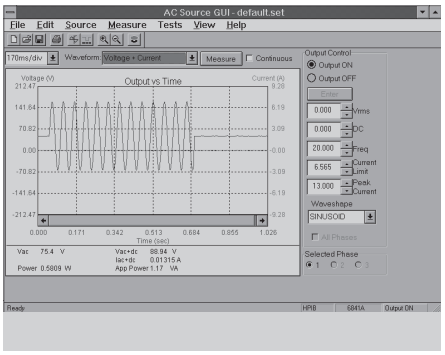
More detailed specifications at **www.agilent.com/find/6800**

AC Power Source/Analyzers: 375-1750 VA (Continued)

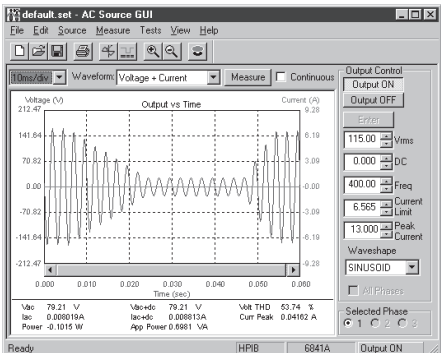
AC Source Graphical User Interface



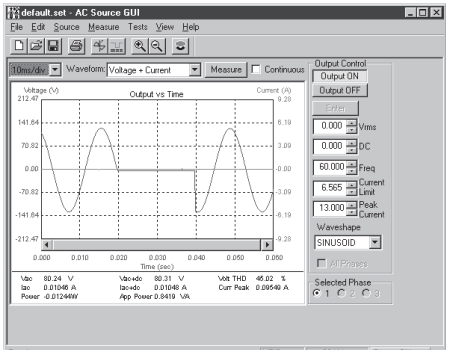
Inrush current measurement



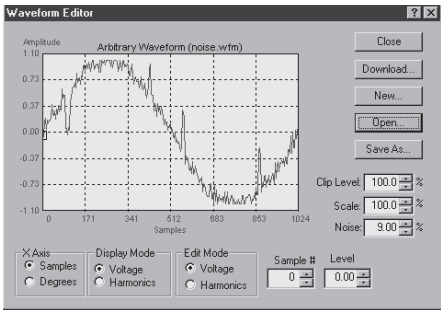
Ringer voltage (DC + AC) generation



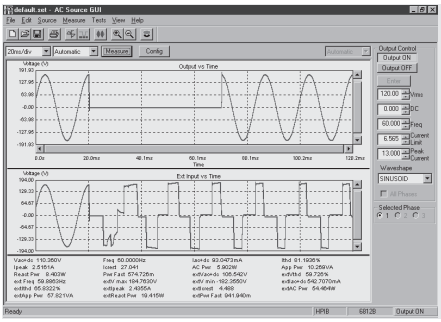
Voltage slew control (brownout)



One cycle AC mains dropout



User defined waveform: noise with spikes



Testing of UPS input and output using dual power analyzer Option 020

More detailed specifications at **www.agilent.com/find/6800**

AC Power Source/Analyzers: 375-1750 VA (Continued)

For a sine wave with a resistive load at 0° to 40°C, within an output frequency range of 45 Hz to 1000 Hz, and in AC coupled mode after a 30 minute warm-up unless otherwise noted.

Notes:

[1] Product may be operated between DC and 45 Hz subject to certain deratings. Measurements may be extended to 4.5 Hz at full accuracy only by selecting a digitization rate of 250 µs per point. Frequency content of the measured signal must be limited to 4 kHz or less to avoid aliasing effects.

Specifications (at 0° to 55°C unless otherwise specified)	**6811B**	**6812B**	**6813B**
Number of phases	1	1	1
Output ratings (Maximum)			
Power	375 VA	750 VA	1750 VA
rms voltage	300 V	300 V	300 V
rms current	3.25 A	6.5 A	13 A
Repetitive & non-repetitive peak current	40 A	40 A	80 A
Crest factor	12	6	6
Load power factor capability	0 to 1	0 to 1	0 to 1
DC power	285 W	575 W	1350 W
DC voltage	±425 V	±425 V	±425 V
DC current	2.5 A	5.0 A	10.0 A
Output frequency range[1]	DC; 45 Hz to 1 kHz	DC; 45 Hz to 1 kHz	DC; 45 Hz to 1 kHz
Constant voltage ripple and noise (20 kHz to 10 MHz)	-60 dB (relative to full scale)	-60 dB (relative to full scale)	-60 dB (relative to full scale)
Line regulation (% of full scale)	0.1%	0.1%	0.1%
Load regulation (% of full scale)	0.5%	0.5%	0.5%
Maximum total harmonic distortion	0.25% at 50/60 Hz 1% worst case 45 to 1 kHz	0.25% at 50/60 Hz 1% worst case 45 to 1 kHz	0.25% at 50/60 Hz 1% worst case 45 to 1 kHz
Programming accuracy	(25° ± 5°C)		
RMS voltage (% of output + offset)	0.15% + 0.3 V (45 - 100 Hz) 0.5% + 0.3 V (>100 - 500 Hz) 1% + 0.3 V (> 500 - 1000 Hz)	0.15% + 0.3 V (45 - 100 Hz) 0.5% + 0.3 V (>100 - 500 Hz) 1% + 0.3 V (> 500 - 1000 Hz)	0.15% + 0.3 V (45 - 100 Hz) 0.5% + 0.3 V (>100 - 500 Hz) 1% + 0.3 V (> 500 - 1000 Hz)
DC voltage	0.1% + 0.5 V	0.1% + 0.5 V	0.5% + 0.3 V
Frequency	0.01% + 10 µHz	0.01% + 10 µHz	0.01% + 10 µHz

More detailed specifications at **www.agilent.com/find/6800**

AC Power Source/Analyzers: 375-1750 VA (Continued)

For a sine wave with a resistive load at 0° to 40° C, within an output frequency range of 45 Hz to 1000 Hz, and in AC coupled mode after a 30 minute warm-up unless otherwise noted.

Notes:

[1] Product may be operated between DC and 45 Hz subject to certain deratings. Measurements may be extended to 4.5 Hz at full accuracy only by selecting a digitization rate of 250 µ seconds per point. Frequency content of the measured signal must be limited to 4 kHz or less to avoid aliasing effects.

[2] Select low measurement range for improved accuracy (10:1) for lower power measurements.

Specifications (at 0° to 55°C unless otherwise specified)	**6811B**	**6812B**	**6813B**
Measurement Accuracy	(25°C ±55°C)		
Rms. voltage (45 - 100 Hz)	0.03% + 100 mV[1]	0.03% + 100 mV[1]	0.03% + 100 mV[1]
DC voltage	0.05% + 150 mV[1]	0.05% + 150 mV[1]	0.05% + 150 mV[1]
RMS current (45 - 100 Hz)[2]			
High range	0.05% + 10 mA	0.05% + 10 mA	0.05% + 10 mA
Low range	0.05% + 1.5 mA	0.05% + 1.5 mA	0.05% + 1.5 mA
Power (VA) (45-100 Hz)[2]	0.1% + 1.5 VA + 12 mVA/V	0.1% + 1.5 VA + 12 mVA/V	0.1% + 1.5 VA + 12 mVA/V
High range	0.1% + 1.5 VA + 1.2 mVA/V	0.1 % + 1.5 VA + 1.2 mVA/V	0.1% + 1.5 VA + 1.2 mVA/V
Low range			
Power (watts) (45-100 Hz)[2]	0.1% + 0.3 W + 12 mW/V	0.1% + 0.3 W + 12 mW/V	0.1% + 0.3 W + 12 mW/V
High range	0.1% + 0.3 W + 1.2 mW/V	0.1% + 0.3 W + 1.2 mW/V	0.1% + 0.3 W + 1.2 mW/V
Low range			
Frequency	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz
Power factor	0.01	0.01	0.01
Current magnitude Fundamental	0.03% + 1.5 mA	0.03% + 1.5 mA	0.03% + 1.5 mA
Low range Harmonics 2-49	0.03% + 1 mA + 0.2%/kHz	0.03% + 1 mA + 0.2%/kHz	0.03% + 1 mA + 0.2%/kHz
Current magnitude Fundamental	0.05% + 5 mA	0.05% + 5 mA	0.05% + 5 mA
High range Harmonics 2-49	0.05% + 3 mA + 0.2%/kHz	0.05% + 3 mA + 0.2%/kHz	0.05% + 3 mA + 0.2%/kHz
Supplemental Characteristics	(Non-warranted characteristics determined by design that are useful in applying the product)		
Average programming accuracy (% of output + offset) rms current	1.2% + 50 mA	1.2% + 50 mA	1.2% + 50 mA
Average programming resolution			
rms voltage	125 mV	125 mV	125 mV
DC voltage	250 mV	250 mV	250 mV
Overvoltage programming (OVP)	2 V peak	2 V peak	2 V peak
rms current	2 mA	4 mA	4 mA
Peak current	12.5 mA	25 mA	25 mA
Output frequency	10 µHz	10 µHz	10 µHz
Phase	N/A	N/A	N/A

More detailed specifications at **www.agilent.com/find/6800**

AC Power Source/Analyzers: 375-1750 VA (Continued)

For a sine wave with a resistive load at 0° to 40° C, within an output frequency range of 45 Hz to 1000 Hz, and in AC coupled mode after a 30 minute warm-up unless otherwise noted.

AC input ratings notes:

[1] Measured at low line

[2] Measured at high line

Application notes

Agilent 6800 Series AC Power Source/Analyzer
5963-7044E

Testing Uninterruptible Power Supplies Using Agilent 6800 Series AC Power Source/Analyzers
5967-6056E

Simplify your Avionics Testing with a 400 Hz Single Phase Power Source that includes a Built-in 26 V reference signal
5989-3700EN

Software driver:
VXI*Plug&Play*

Warranty: One year

Specifications (at 0° to 55°C unless otherwise specified)	6811B	6812B	6813B
Supplemental Characteristics (Continued)	(Non-warranted characteristics determined by design that are useful in applying the product)		
Average measurement resolution			
rms voltage	10 mV	10 mV	10 mV
rms current	2 mA	2 mA	2 mA
Programmable output impedance			
Resistance	0-1 Ω	0-1 Ω	0-1 Ω
Inductance	20 µh - 1 mh	20 µh - 1 mh	20 µh - 1 mh
Remote sense capability	Up to 1 Vrms can be dropped across each load lead.	Up to 1 Vrms can be dropped across each load lead.	Up to 1 Vrms can be dropped across each load lead.
Isolation to ground	300 Vrms/425 VDC	300 Vrms/425 VDC	300 Vrms/425 VDC
Net weight	28.2 kg (62 lb)	28.2 kg (62 lb)	32.7 kg (72 lb)
Shipping weight	31.8 kg (70 lb)	31.8 kg (70 lb)	36.4 kg (80 lb)
Dimensions	See drawings on page 105		
AC Input Ratings			
Voltage range (VAC) *default factory setting	87 to 106 VAC *104 to 127 VAC 174 to 220 VAC 191 to 254 VAC	87 to 106 VAC *104 to 127 VAC 174 to 220 VAC 191 to 254 VAC	174 to 220 VAC *191 to 254 VAC
Maximum input current (rms)[1]	12 A (100 VAC) 10 A (120 VAC) 7.5 A (200/208 VAC) 6.5 A (230 VAC)	28 A (100 VAC) 24 A (120 VAC) 15 A (200/208 VAC) 13 A (230 VAC)	22 A (200/208 VAC) 20 A (230 VAC)
Input power (max)[2]	1000 VA/700 W	2500 VA/1400 W	3800 VA/2600 W
Input frequency	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz

AC Power Source/Analyzers: 375-1750 VA (Continued)

Ordering information

Opt 019 2000 VA AC power source/ analyzer (6813B only)

Opt 020 Dual power analyzer option

Opt 026 26 Volt, 0.1A auxiliary 45 to 100 Hz only reference output (6812B and 6813B)

Opt 0B0 Full documentation on CD-ROM only

Opt 0L1 Full documentation on CD-ROM, and/with printed standard documentation package

Opt 0L2 Extra copy of standard printed documentation package

Opt 1CM Rack-mount kit, p/n 5062-3977 (quantity 2) (support rails required)

Opt 1CP Rack-mount kit with handles, p/n 5062-3983 (support rails required) 6811B, 6812B, 6813B only

Support rails, p/n 12679B, required when rack mounting the 6811B, 6812B, and 6813B Opt 1CM and Opt 1CP. E3664AC non Agilent rack. E3663AS for Agilent rack.

Opt 100 (6811B and 6812B only) 87 to 106 VAC (100 VAC nominal), 47-63 Hz, Japan only

Opt 120 104-127 VAC (120 VAC nominal), 47-63 Hz

Opt 200 (6813B only) 174-220 VAC (200 VAC nominal), 47-63 Hz, Japan only

Opt 208 (6811B and 6812B only) 174 to 220 VAC (208 VAC nominal), 47-63 Hz

Opt 230 191 to 254 VAC (230 VAC nominal), 24-63 Hz

Opt 831 12 AWG, 200 to 240 VAC, unterminated (6812B, 6813B only)

Opt 832 4 mm^2 wire size, unterminated (6813B only)

Opt 833 1.5 mm^2 wire size, 200 to 240 VAC, unterminated (6812B only)

Opt 834 10 AWG, 100 to 120 VAC, unterminated (6812B only)

Opt 841 Line cord with NEMA L6-20P; 20 A, 250 V plug (6812B only)

Opt 842 Line cord with IEC 309; 32 A, 220 V plug (6813B only)

Opt 844 Line cord with NEMA L6-30P; 30 A, 250 V locking plug (6813B only)

Opt 845 Line cord with IEC 309; 16 A, 220 V plug (6812B only)

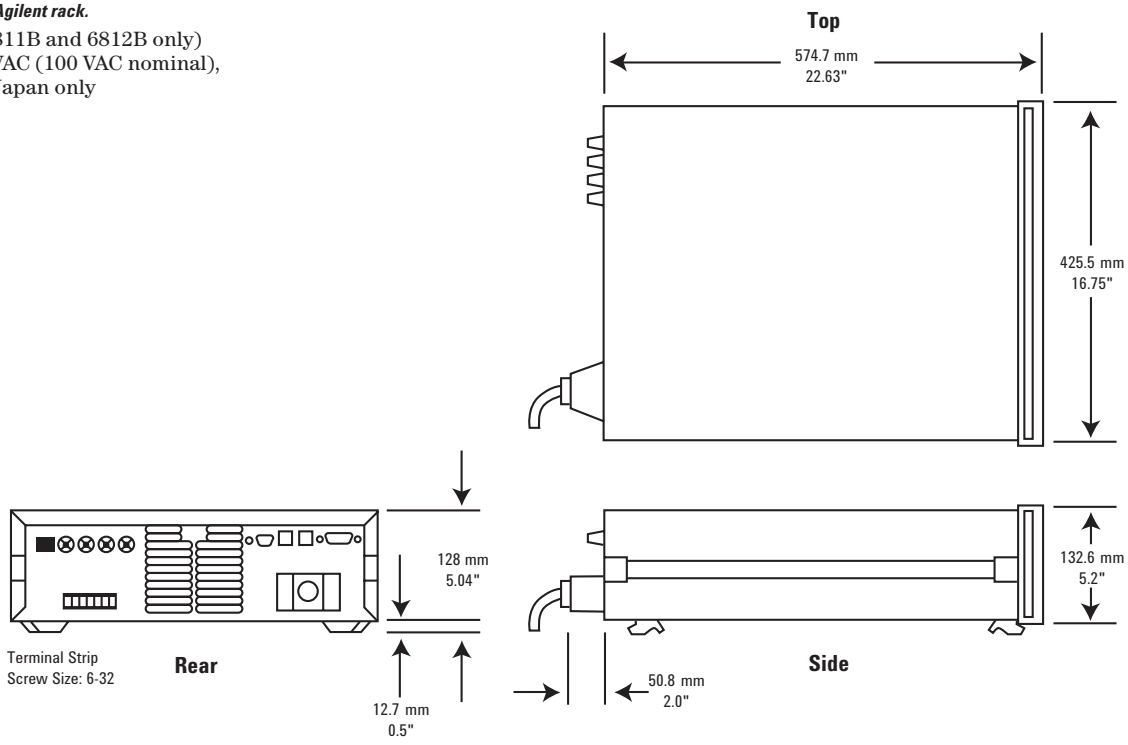
Opt 846 Line cord with NEMA L6-30P; 30 A, 120 V plug (6812B only)

Opt 847 Line cord with CEE 7/7; 16 A, 220 V plug (6812B only)

Opt 848 Line cord with BS 546; 15 A, 240 V plug (6812B only)

See the AC line voltage and cord section, for more details on line cords.

Agilent Models: 6811B, 6812B, 6813B



More detailed specifications at **www.agilent.com/find/6800**

Choosing AC Line Voltage and Cord Options for your Agilent Power Products

DC Power Supplies, DC Electronic Loads, and AC Sources

Choosing AC Line Voltage and Cord Options for Your Power Product

Power distribution systems, regulations, and connection techniques vary greatly among geographic regions as a result of local AC electrical standards. Most Agilent products, including power products which draw less than 500 watts of power from the AC line, can be readily adjusted to accept different line voltages or frequencies.

Line voltage and frequency for certain power products may not be field changeable. Choosing the correct voltage option for these products requires care. This is especially true for higher power products.

4 Easy Steps for Choosing Line Cord Options

Step 1

Go to the tables. Find the model number and the correct line cord option of the product you are ordering.

Line cords for low power products

Step 2

If your model number requires a 900 series line cord, the correct one will automatically be shipped for the destination country on the purchase order. DONE!

Line cords for high power products

Step 3

If your model number requires an 800 series line cord, determine if there is a line cord with plug that matches your outlet receptacle. If not, choose the appropriate unterminated line cord.

Step 4

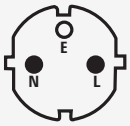
Add the option number for the appropriate line cord to your purchase order. DONE!

Low power products

For lower power products, a universal receptacle on the rear panel accepts a wide range of line cords to meet local regulatory requirements. The tables containing the 900 series line cords show a range of standard line cords that Agilent offers, with option numbers and part numbers.

Part numbers are needed to order a line cord separately.

For products which use the 900 series line cords, the appropriate type is automatically selected at time of shipment, based on the country to which the product is being shipped. If you plan to use your power products in a different country or region than the country to which the product is being shipped, you will need to specify the appropriate line voltage and line cord options on your order, so that we can provide the appropriate configuration. Contact your local Agilent Field Engineer for assistance.

Cord Options	900	901	902	903	904
Product/Family					
	United Kingdom	Australia New Zealand	Europe Korea	United States Canada	United States Canada
6033A, 38A	8120-1351	8120-1369	8120-1689	8120-4383	8120-0698
6060B, 63B	8120-1351	8120-1369	8120-1689	8120-4383	8120-0698
6541A - 45A	8120-1351	8120-1369	8120-1689	8120-4383	8120-0698
6551A - 55A	8120-1351	8120-5412	8120-5413	8120-5337	8120-5421
6611C - 14C	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
6621A - 6629A	8120-1351	8120-1369	8120-1689	8120-4383	8120-0698
6631B - 34B	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
6641A - 45A	8120-1351	8120-1369	8120-1689	8120-4383	8120-0698
6651A - 55A	8120-1351	8120-5412	8120-5413	8120-5337	8120-5421
6811B	8120-1351	8120-5412	8120-1689	8120-5337	8120-5421
66309B/D	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
66311B	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
66319B/D	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
66321B/D	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
66332A	8120-8705	8120-1369	8120-1689	8120-4383	8120-0698
E3610 - 17A	8120-1351	8120-1369	8120-8768	8120-8767	8120-0698
E3620A	8120-1351	8120-1369	8120-8768	8120-8767	8120-0698
E3630A	8120-1351	8120-1369	8120-8768	8120-8767	8120-0698
E3631 - 34A	8120-1351	8120-1369	8120-8768	8120-8767	8120-0698
E3640 - 49A	8120-1351	8120-1369	8120-8768	8120-8767	8120-0698
E4360A	8120-1351	8120-1369	8120-1689	8120-5337[1]	8120-5338
N5741A - 52A	8120-1351	N/A	8120-1689	8120-4383	N/A
N6700B, N6701A - 02A N6705B	8120-1351	8120-1369	8120-1689	8120-4383[1]	8120-0698
N3300A - 31A	8120-1351	8120-1369	8120-1689	8120-4383	8120-0698

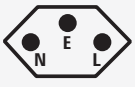
L = Line or active conductor (also called "live" or "hot")
N = Neutral or identified conductor
E = Earth or safety ground

[1] For models E4360A and N6702A: Using 100-120 VAC limits total output power to 600 W. 200-240 VAC line is required to permit full 1200 W operation.

For more detailed specifications see the product manual at **www.agilent.com/find/power**

Choosing AC Line Voltage and Cord Options for your Agilent Power Products

DC Power Supplies, DC Electronic Loads, and AC Sources (Continued)

Cord Options	906	912	917	918	919
Product/Family					
	Switzerland	Denmark	South Africa India	Japan	Israel
6033A, 38A	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6060B, 63B	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6541A - 45A	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6551A - 55A	8120-2104	8120-2956	8120-5414	8120-5342	8120-6800
6611C - 14C	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6621A - 6629A	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6631B - 34B	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6641A - 45A	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
6651A - 55A	8120-2104	8120-2956	8120-5414	8120-5342	8120-6800
6811B	8120-2104	8120-2956	8120-5414	8120-5342	8120-6800
66309B/D	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
66311B	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
66319B/D	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
66321B/D	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
66332A	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800
E3610 - 17A	8120-2104	8120-2956	8120-4211	8120-4753	8120-5181
E3620A	8120-2104	8120-2956	8120-4211	8120-4753	8120-5181
E3630A	8120-2104	8120-2956	8120-4211	8120-4753	8120-5181
E3631 - 34A	8120-2104	8120-2956	8120-4211	8120-4753	8120-5181
E3640 - 49A	8120-2104	8120-2956	8120-4211	8120-4753	8120-5181
E4360A	8120-2104	8120-2956	8120-4211	8120-5342[1]	8120-6800
N5741A - 52A	N/A	N/A	N/A	8120-4753	N/A
N6700B, N6701A - 02A N6705B	8120-2104	8120-2956	8120-1689	8120-5342	8120-6800
N3300A, 31A	8120-2104	8120-2956	8120-4211	8120-4753	8120-6800

L = Line or active conductor (also called "live" or "hot")
N = Neutral or identified conductor
E = Earth or safety ground

[1] For models E4360A and N6702A: Using 100-120 VAC limits total output power to 600 W. 200-240 VAC line is required to permit full 1200 W operation.

For more detailed specifications see the product manual at **www.agilent.com/find/power**

Choosing AC Line Voltage and Cord Options for your Agilent Power Products

DC Power Supplies, DC Electronic Loads, and AC Sources (Continued)

Cord Options	920	921	922	927
Product/Family				
	Argentina	Chile	China	Brazil Thailand
6033A, 38A	8120-6869	8120-6980	8120-8376	8120-8871
6060B, 63B	8120-6869	8120-6980	8120-8376	8120-8871
6541A - 45A	8120-6869	8120-6980	8120-8376	8120-8871
6551A - 55A	8120-6869	8120-6980	8120-8376	8120-8871
6611C - 14C	8120-6869	8120-6980	8120-8376	8120-8871
6621A - 6629A	8120-6869	8120-6980	8120-8376	8120-8871
6631B - 34B	8120-6869	8120-6980	8120-8376	8120-8871
6641A - 45A	8120-6869	8120-6980	8120-8376	8120-8871
6651A - 55A	8120-6869	8120-6980	8120-8376	8120-8871
6811B	8120-6869	8120-6980	8120-8376	8120-8871
66309B/D	8120-6869	8120-6980	8120-8376	8120-8871
66311B	8120-6869	8120-6980	8120-8376	8120-8871
66319B/D	8120-6869	8120-6980	8120-8376	8120-8871
66321B/D	8120-6869	8120-6980	8120-8376	8120-8871
66332A	8120-6869	8120-6980	8120-8376	8120-8871
E3610 - 17A	8120-6869	8120-6980	8120-8376	8120-8871
E3620A	8120-6869	8120-6980	8120-8376	8120-8871
E3630A	8120-6869	8120-6980	8120-8376	8120-8871
E3631 - 34A	8120-6869	8120-6980	8120-8376	8120-8871
E3640 - 49A	8120-6869	8120-6980	8120-8376	8120-8871
E4360A	8120-6869	8120-6980	8120-8376	8120-8871
N5741A - 52A	N/A	N/A	8120-8376	N/A
N6700B, N6701A - 02A N6705B	8120-6869	8120-6980	8120-8376	8120-8871
N3300A, 31A	8120-6869	8120-6980	8120-8376	8120-8871

L = Line or active conductor (also called "live" or "hot")
N = Neutral or identified conductor
E = Earth or safety ground

For more detailed specifications see the product manual at **www.agilent.com/find/power**

High power products

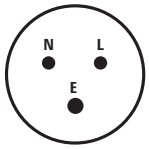
There are several factors which limit the amount of power which can be readily drawn from a normal branch circuit. For example, in the U.S., the typical 115/120 VAC branch circuit has a circuit breaker rated for 15 A. For industrial applications, 20 A service is commonly available.

Linear power supplies with outputs over 500 watts and switching supplies rated over 750 watts will generally exceed the capability of a 15 A branch circuit. Connecting power products above these power levels will require installing either a higher voltage or higher current service. Some practical examples are:

- standard line voltage for 2 kW products such as the 667XA is 230 VAC; they can not be powered off a 120 VAC line
- the 1KW 601XA and 603XA products cannot be powered off a standard 15 A/120 VAC circuit; they can operate off a 30 A/ 120 VAC service, or they can be configured for 208/240 VAC operation

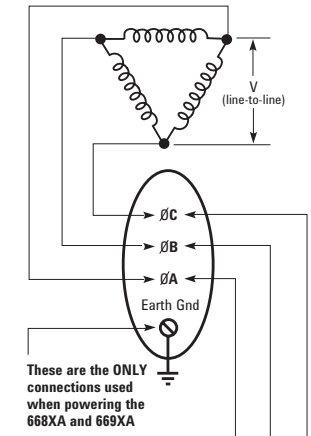
Agilent offers a range of 800 series line cords for many higher power products to mate with the wall receptacles commonly specified for these higher power services. Refer to the tables to determine if there is a 800 series line cord for your product with a plug that meets the local requirements. If not, you must order an unterminated line cord.

Cord Options	831	832	833	834
Product/Family	**No Plug #12AWG**	**No Plug 4 mm²**	**No Plug 1.5 mm²**	**No Plug #10AWG**
6030A, 31A, 32A, 35A	8120-5573	N/A	8120-5568	8120-5566
6571A - 75A	8120-5488	8120-5490	N/A	8120-5545
6671A - 75A	8120-5488	8120-5490	N/A	8120-5545
6812B	8120-5573	N/A	8120-5568	8120-5566
6813B	8120-5573	8120-6502	N/A	8120-5566
66000A	8120-5573	N/A	8120-5568	8120-5566
E4356A	8120-5488	8120-5490	N/A	8120-5545
N8731A-42A	8121-1949	8121-1331	N/A	N/A

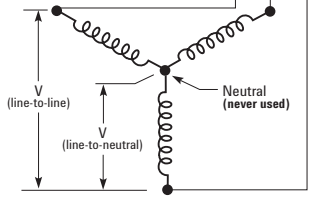
Cord Options	861	862	841	842
Product/Family	**No Plug (AWG)** N/S America, (AWG wire)	**No Plug (Metric)** Asia, Europe, Harmonized (metric wire)	 **NEMA 6-20P #12AWG** N/S America Japan	 **IEC 309 32-A 4 mm²** Europe Korea
6030A, 31A, 32A, 35A	N/A	N/A	8120-5572	N/A
6571A - 75A	N/A	N/A	N/A	8120-5489
6671A - 75A	N/A	N/A	N/A	8120-5489
6680A - 84A	8121-6203	8120-6204	N/A	N/A
6690A - 92A	8121-0694	8121-0695	N/A	N/A
6812B	N/A	N/A	8120-5572	N/A
6813B	N/A	N/A	N/A	8120-6506
66000A	N/A	N/A	8120-5572	N/A
E4356A	N/A	N/A	N/A	8120-5489
N5761A-72A	8121-1330	8121-1331	N/A	N/A
N8731A-62A	8121-1946	8121-1948	N/A	N/A

Often, higher power products (over 1 kW) are hardwired, i.e. connected directly to a breaker panel or distribution box. The line cord may also be hard wired to the back of the power supply where a universal receptacle is impractical. Typically, a local electrician should be consulted to determine the best alternative to connect a high power product to the AC line.

Delta

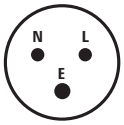
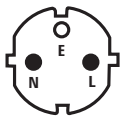


Wye



In a wye system

$$V_{(line\text{-}to\text{-}neutral)} = \frac{V_{(line\text{-}to\text{-}line)}}{\sqrt{3}}$$

Cord Options	844	845	846	847	848
Product/Family					
	NEMA L6-30P #10AWG N/S America Japan	**IEC 309 16-A 1.5 mm²** Denmark Switzerland Austria, China	**NEMA L5-30P #10AWG** N. America	**CEE 7/7 16-A 1.5 mm²** Europe Korea	**BS 546 15-A 1.5 mm²** India South Africa
6030A, 31A, 32A, 35A	N/A	8120-5570	8120-5565	8120-5567	8120-5569
6571A - 75A	8120-5546	N/A	N/A	N/A	N/A
6671A - 75A	8120-5546	N/A	N/A	N/A	N/A
6812B	N/A	8120-5570	8120-5565	8120-5567	8120-5569
6813B	8120-6507	N/A	N/A	N/A	N/A
66000A	N/A	8120-5570	8120-5565	8120-5567	8120-5569
E4356A	8120-5546	N/A	N/A	N/A	N/A

Note:
The countries or regions indicated here are for general guidance only. Local electrical codes governing wire size, wire type (AWG or metric) and plug type should be consulted to determine which of these available line cords/plugs is correct in your country to make proper connection to your AC mains. Please consult a qualified, licensed electrician for more information.

Products with 3-phase inputs
Some of the higher power products exceed the capability of a single phase line. Agilent offers several power products which require 3-phase inputs, including the 5 kW 668XA and 6.6 kW 669XA DC source family. For 3-phase power distribution up to the building, there are two different distribution systems in wide use: delta, predominantly used in the US; and wye predominantly used in Europe. However, for service inside the building, the 5 wire wye is the predominant configuration. Products which are delta loads, are compatible with either delta or wye. Agilent 3-phase products are delta loads.

In selecting the correct operating voltage for 3-phase products you need to distinguish between the line-to-line and the line-to-neutral voltages. The line-to-line voltage is the square root of 3 x the line-to-neutral voltage. It is the line-to-line voltage that is used to specify the input voltage to be applied to Agilent power products.

Power Products Applications Information

10 Most frequently asked questions about using DC power products

1

How do I put the power supply in the constant current mode?

The power supply cannot be "put" into the constant current mode. The output settings of the power supply combined with the ohmic value of the particular load determine whether or not the power supply is in constant current.

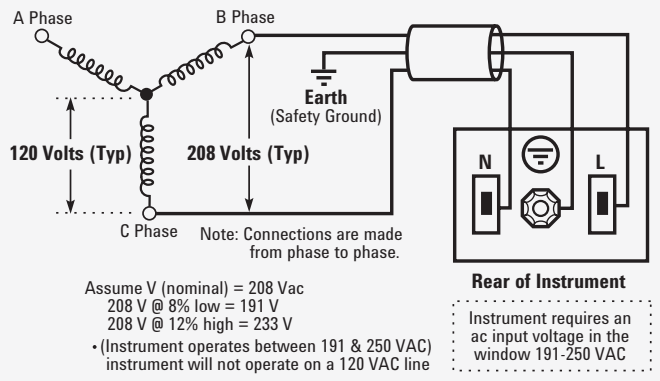
ie: The power supply inherently resides in the constant voltage mode. If the output voltage were set to 24 volts and a 6 Ω load were placed across the output terminals, Ohm's Law would require that 4 amps would flow (24 V/6 Ω). This presumes that the constant current setting of the power supply were set to a value greater than 4 amps; lets say 5 amps. Now, if the 6 Ω load were replaced by a 2 Ω load, Ohm's Law would suggest that 12 amps (24 V/ 2 Ω) would flow. However, the power supply is set to go into constant current at 5 amps. Therefore, the actual output voltage would be 10 volts (2 Ω x 5 A). The power supply will now remain in constant current for values of load = 0 Ω ≤ R < 4.8 Ω. Once the ohmic value of the load becomes greater than 4.8 Ω (24 V/5 A), the power supply will again revert to constant voltage operation at the value of 24 volts.

2

I have 208 VAC, 3ϕ phase power; can it be used to operate a product requiring 208 V single phase?

Yes, see below.

657xA/667xA connection to a 3-phase line



3

Why are the required Watts and VA so different?

Watts is a scalar quantity which is frequently used to measure system efficiency. It is the energy supplied by the utility company over a given period of time and is commonly referred to as power. Except for heavy industrial users, the utility company only bills users for the watts consumed. Watts are directly convertible into mechanical work or BTUs (British Thermal Units) of heat. Wasted power is paid for a second time in terms of additional loading on the user's air-conditioning system. Mathematically, it is a scalar quantity resulting from the vector product of two vector quantities (volts and amps). It is NOT the simple algebraic product of the rms volts times rms current.

VA on the other hand IS the scalar quantity resulting from multiplying the magnitudes (rms) of the vector

quantities (volts and amps). This resulting quantity will never be smaller than the watts demanded by an instrument. Uninformed users incorrectly use VA to assess the device's over-all efficiency and power demands. VA is most frequently and correctly used by electricians to determine proper AC mains conductor gage and circuit breaker sizing.

4

How much cooling do I need for my power supply?

Users frequently rack power supplies into an enclosure to supply power to some remotely located external load. Under these conditions, to properly determine the cooling requirements, the systems integrator needs thermal data from the manufacturer for the specific enclosure in question. This data is generally in the form of a curve which relates the rise of the enclosure's internal air temperature to the amount of power (or BTU's) dissipated within the enclosure.

The difference between the maximum power demanded by the external load, and the AC power demanded by the power supply to support the load's needs, is the power dumped into the internal air of the enclosure. Using this number and data for the enclosure, the internal rise can be determined. The internal rise added to the external ambient temperature will determine the temperature of the environment for the power supply. This must be within the ratings of the product or premature failure will occur.

A valuable conversion factor between Watts and BTU's is listed below:

1 BTU/Hr = 0.293 Watt

The N57xxA family draws cooling air from the outside of the rack. Thus, the air temperature is equal to that of the room's environment. Heated, cooling air is then exhausted into the inside of the rack. As a result, these instruments will not properly cool if the inside of the rack is "pressurized". The static air pressure within the rack must be equal to or less than the air pressure in the room's ambient.

5

Can Agilent power supplies sink current?

Yes! Sinking, or downprogramming, is the ability of a power supply to pull current into the positive power terminal. Sinking is necessary to discharge the power supply's own output capacitor, or the capacitors that are part of an external load.

Sinking is particularly important, for example, in printed circuit board test systems. The relays in test board systems typically must be switched only when the power supplies have discharged to zero volts, to avoid arcing and burn-out of the relay contacts. Sinking allows the power supply outputs to go to zero quickly, thus providing faster test times, an important factor for reducing overall test cost.

The value of the sink current is fixed and is not programmable, with the exception of the 6630 series, where sink current is set to the same value that is programmed for source current.

In general, sinking is provided to improve a power supply's transition time from a higher to a lower constant voltage operating level, and is not intended to be a steady-state operating condition.

Other models not listed here do not have high powered down programmers. Instead, they are capable of discharging the power supply output capacitors but not sinking current from the device under test.

Series	Current Sinking Capability
6620 Multiple Output	110% of source current rating
6630 100 Watt	110% of source current rating
6030 Autorangers	50 W/actual output voltage in volts or actual voltage in volts/0.05 ohms, whichever is less
6640 200 Watt	25% of source current rating
6650 500 Watt	20% of source current rating
6750/6760 50/100 Watt	Dynamically controlled to maximize output down-programming speed. 7 W continuous dissipation, 300 W peak.

Series	Current Sinking Capability
6670 2000 Watt	50 W/actual output voltage in volts or actual output voltage in volts/ 0.05 ohms, whichever is less
6680 5000 Watt	50 W/actual output voltage in volts or actual output voltage in volts/0.05 ohms, whichever is less
6690 6600 Watt	50 W/actual output voltage in volts or actual output voltage in volts/0.05 ohms, whichever is less

6

I want to put a microswitch on the safety cover over my UUT so that lifting the cover will program my ATE power supplies to zero volts and protect the operator from harm. Do Agilent power supplies have this capability?

Yes, many Agilent power supplies have a feature called "Remote Inhibit" (RI).

When connected to the RI input on the rear of the power supply, a contact closure or TTL low signal causes the output of the supply to shutdown and be programmed to zero volts. The power supply can also be set to generate a service request (SRQ) via the GPIB in the event that RI is pulled low.

7

Can I use Agilent electronic loads in series and in parallel?

Agilent electronic loads are designed to be operated in parallel for more current, but NOT in series for more voltage. Loads are fully protected against damage from current overloads, but will be damaged by voltage above the maximum voltage rating.

8

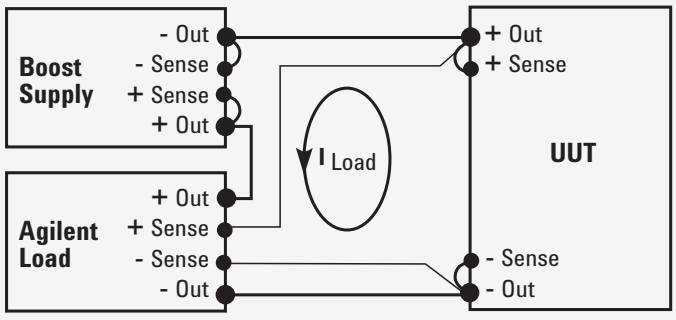
I must test a 1 volt power supply using a constant current load and I want to use Agilent electronic loads. But the Agilent load meets all of its dynamic specs with no derating on down to 3 volts. Below 2 volts, the Agilent load current must be linearly derated. What can I do?

Use a boost supply in series with the UUT. The load will now meet all its specs with no derating, because it always operates above 3 volts. (see the illustration below)

The boost supply can be a low-cost fixed output 3 V or 5 V supply with a current rating at least as high as the maximum peak load current needed. The 6641A (8 V, 20 A), 6651A (8 V, 50 A), 6671A (8 V, 220 A), or 6681A (8 V, 580 A) are all excellent choices.

The voltage setting of a programmable boost supply should be set to 3 volts, and the current limit set to full scale.

Select a boost power supply with low p-p ripple and noise. The constant current load will compensate for low-frequency p-p ripple and noise below a few kHz, but high frequency ripple and noise from the boost will appear across the UUT.



9

Why are Agilent's electronic loads constant resistance resolution speced in ohms on the low resistance range, but in mSiemens on the two higher ranges?

In general, Agilent's electronic loads are not a conventional "resistor". The loads consist of IC's, capacitors, resistors, FETs, etc. They were designed with two major circuits, a CV and CC circuit. These circuits are used to simulate resistance on the two upper ranges.

First, it is necessary to understand why there is a difference in the way in which the ranges are specified (mohms or ms). The constant resistance (CR) mode in the load actually operates using either the constant current (CC) or constant voltage (CV) circuits inside the load. The lowest CR range uses the CV regulating circuits, while the two higher ranges use the CC regulating circuits. It is because of these differences in the circuits used to regulate the load input that the specifications need to be different.

When the CV circuits are used, the load can be viewed as many resistors, all the same value (the resolution), in series to produce the desired resistance. Then, changing the resistance is like changing the number of discrete resistors in series. Therefore, the resolution is the value of one of these series resistors, and putting resistors in series changes the resistance measured in ohms. For the N3302A, the "discrete resistor" or resolution that can be programmed is 0.54 mohms in the 2 ohm range.

When the CC circuits are used, the load can be viewed as many resistors, all the same value (the resolution), in parallel to produce the desired resistance. Then, changing the resistance is like changing the number of discrete resistors in parallel. Therefore, the resolution is the value of one of these parallel resistors, and putting resistors in parallel changes the conductance measured in siemens. For the 60501B, the "discrete resistor" or resolution that can be programmed is 0.14 ms (=7.14 kohms).

For example, in the 2 kohm range, you can program the load input from 2 ohms to 2 kohms (0.5 s to 0.5 ms) with a resolution of 0.14 ms. This would be the equivalent of starting with about 3568 7.143 kohm resistors in parallel with each other, and in parallel with a 2 kohm resistor, and removing one at a time until you had only the 2 kohm resistor left.

Note that the resolution of the conductance is constant at 0.14 ms, however, the resolution of the total parallel resistance is not constant. It depends on how many resistors you have in parallel.

If you have two 7.143 kohm resistors in parallel and remove one, the resolution looks like 3571.5 ohms. If you have 3568 7.143 kohm resistors in parallel and remove one, the resolution looks like (7143/3567) - (7143/3568) = 0.561 mohms. But the conductance resolution is constant at 0.14 ms.

10

Can Agilent power supplies be programmed from 0 to full output voltage using a 0 to 10 V signal source?

Yes, many Agilent power supplies feature remote voltage programming or analog programming capability. However, there is a potential danger in analog programming any power supply, especially a high voltage supply. If the 0 to 10 V programming source is a typical, non-isolated, low-cost, digital-to-analog converter (DAC), it is probably grounded through its digital inputs and/or through the computer's internal power supplies, which are grounded through the computer's power cord. It's easy to overlook this, and the mistake can be very expensive.

If the DAC is non-isolated (or isolated only up to 42 V above ground) and one of the output terminals of the power supply is grounded, either directly or through the UUT, the output capacitor of the power supply can discharge through the computer backplane, motherboard, and the I/O common through the computer power cord ground. The resulting high current may even last long enough to vaporize the thin ground tracks on some or all of the printed circuit boards in the PC.

Be sure the programming source is electrically isolated, is operated from isolated power supplies, and is rated for floating voltages up to the full output voltage of the programmed supply. This is necessary so no one is hurt, and no equipment is damaged, no matter which output terminal of the power supply or UUT is grounded.

For additional questions and answers visit our web site at www.agilent.com/find/answers

AC Power and Load Connections

A modern stabilized DC power supply is a versatile high performance instrument capable of delivering a constant or controlled output reliably and with little attention. But to take full advantage of the performance characteristics designed into a supply, certain basic precautions must be observed when connecting it for use on the lab bench or installing it in a system. Factors such as wire ratings, system grounding techniques, and the particular way that AC input, DC output, and remote error sensing connections are made can contribute materially to obtaining the stable, low noise output expected by the user. Careful attention to the following guidelines can help to ensure the trouble free operation of your Agilent power supply.

AC Power Input Connections

Wire Rating

RULE 1. When connecting AC power to a power supply, always use a wire size rated to carry at least the maximum power supply input current.

If a long cable is involved, make an additional check to determine whether a still larger wire size might be required to retain a sufficiently low impedance from the service outlet to the power supply input terminals. As a general guideline, input cables should be of sufficient size to ensure that the voltage drop at maximum rated power supply input current will not exceed 1% of the nominal line voltage.

Continuity

RULE 2. Maintain the continuity of the AC, acc, and grounding wires from the AC power outlet to the power supply input terminals without an accidental interchange.

Interchanging the AC and grounding wires may result in the power supply chassis being elevated to an AC potential equal to the input line voltage. If the chassis is grounded elsewhere, the result may be no worse than some blown fuses. But if the chassis is not grounded, the result could be a potentially lethal shock hazard. Confirm that the chassis is grounded by the grounding wire.

Transformers

RULE 3. If an autotransformer or an isolation transformer is connected between the AC power source and the power supply input terminals, it should be rated for at least 200% of the maximum rms current required by the power supply.

The transformer must have a higher rating than would be suggested by the supply's rms input current because a power supply input circuit does not draw current continuously. Input current peaks can cause a smaller transformer to saturate, resulting in failure of the supply to meet its specifications at full output.

RULE 4. Be sure to connect the common terminal of an autotransformer to the acc (and not the AC) terminals of both the power supply and the input power line.

If acc is not connected to the common terminal of the autotransformer, the power supply's input acc terminal will have a higher than normal AC voltage connected to it, contributing to a shock hazard and, in some instances, a greater output ripple.

AC Line Regulator

RULE 5. Do not use an AC line regulator at the input to a regulated power supply without first checking with the power supply manufacturer.

Some regulators tend to increase the impedance of the line in a resonant fashion and can cause power supplies to malfunction, particularly if they use SCR or switching regulators or preregulators. Moreover, since the control action of many line voltage regulators is accompanied by a change in the output waveshape, their advantage in providing a constant rms input to a power supply is small. In fact these changes in waveshape are often just as disruptive in causing power supply output changes as the original line voltage amplitude changes would have been.

Load and Remote Error Sensing Connections

Making Load Connections to One Power Supply

The simplest and most common example of improper load wiring is shown in Figure 1. The voltage at each load depends on the current drawn by the other loads and the voltage drops they cause in some portion of the load leads. Since most load currents vary with time, an interaction among the loads results. This interaction can sometimes be ignored, but in most applications the resulting noise, pulse coupling, or tendency toward inter-load oscillation is unacceptable. The following thirteen steps describe a recommended procedure for connecting the load wiring, grounding the system in a manner that avoids troublesome ground loops, and making connections for remote error sensing.

STEP 1. Select a load wire size that, as an absolute minimum, is heavy enough to carry the power supply output current that would flow if the load terminals were short-circuited.

This is the minimum, however. Impedance and coupling considerations usually dictate the use of load wires larger than would be required just to satisfy current rating requirements. In general, the power supply performance degradation seen at the load terminals becomes significant when the wire size and length result in a load wire impedance comparable to or greater than the effective output impedance of the power supply. Refer to a copper wire resistance table to see if a larger wire size might have to be used to attain an impedance comparable to or smaller than the output impedance of the power supply.

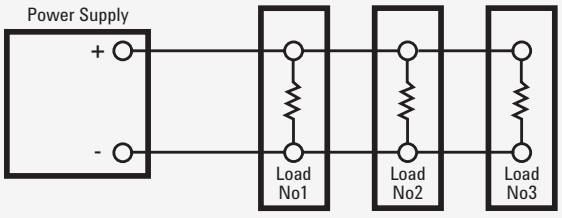


Figure 1
Improper load connections

If multiple loads are supplied from a pair of DC distribution terminals not located at the power supply terminals, it is necessary to consider separately the mutual impedance of the wires connecting the power supply to the distribution terminals and the additional impedance of the wires to each individual load. The mutual impedance presents an opportunity for a variation of one load current to cause a DC voltage variation at another load. Fortunately this mutual impedance can be effectively reduced at DC and at low frequencies by using remote error sensing, as will be described later.

Connect the Load Wiring

STEP 2. Designate a single pair of terminals as the positive and negative DC distribution terminals.

These two terminals might be the power supply output terminals, the load terminals, or a separate pair of terminals established expressly for distribution. If the power supply is a short distance from the load and remote sensing will not be used, locate the DC distribution terminals as near as possible to the power supply output terminals. Using the power supply output terminals themselves as the distribution terminals results in optimum performance.

If remote sensing is to be used, locate the DC distribution terminals as near as possible to the load terminals. Later in the procedure, sensing leads will be connected from the power supply sensing terminals to the DC distribution terminals as shown in Figure 2.

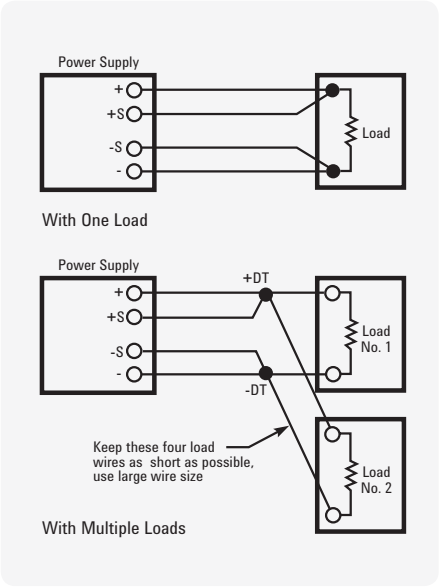


Figure 2
Location of DC distribution terminals with remote sensing (distribution terminals are shown solid)

STEP 3. Connect one pair of wires directly from the power supply output terminals to the DC distribution terminals, and connect a separate pair of wires from the distribution terminals to each load.

There should be no direct connection from one load to another except by way of the DC distribution terminals. (Although for clarity the diagrams show the load and sensing leads as straight lines, some immunity against pick-up from stray magnetic fields can be obtained by twisting each pair of load leads and shielding all sensing leads.)

Decouple Multiple Loads

STEP 4. If required, connect a local decoupling capacitor across each pair of distribution and load terminals.

Load decoupling capacitors are often needed when multiple loads draw pulse currents with short rise times. To reduce high frequency mutual coupling effects under these circumstances, capacitors must be connected directly across the load and distribution terminals. The capacitors used for decoupling must be selected to have a high frequency impedance that is lower than the impedance of the wires connected to the same load, and their connecting leads must be kept as short as possible to minimize impedance.

Grounding the System

Since no two ground points have exactly the same potential, the idealized concept of a single ground potential is a snare and a delusion. In many cases the potential difference is small, but a difference in two ground potentials of even a fraction of a volt could cause amperes of current to flow through a complete ground loop. (Ground loop is a term used to describe any conducting path formed by two separate connections to ground). Ground loops can cause serious interference problems when voltages developed by these currents are coupled into sensitive signal circuits.

To avoid ground loop problems, there must be only one ground return point in a power supply system. (A power supply system includes the power supply, all of its loads, and all other power supplies connected to the same loads). The selection of the best ground return point depends on the nature and complexity of the DC wiring. In large systems, practical problems frequently tend to force compromises with the ideal grounding concept. For example, a rack mounted system consisting of separately mounted power supplies and loads generally has multiple ground connections. Each instrument usually has its own chassis tied to the third grounding wire of its power cord, and the rack is often connected by a separate wire

to ground. With the instrument panels fastened to the rack frame, circulating ground currents are inevitable. However, as long as these ground currents are confined to the ground system and do not flow through any portion of the power supply DC distribution wiring, their effect on system performance is usually negligible. To repeat, separating the DC distribution circuits from any conductive paths in common with ground currents will in general reduce or eliminate ground loop problems. The only way to avoid such common paths is to connect the DC distribution system to ground with only one wire. Figure 3 illustrates this concept: DC and signal currents circulate within the DC system, while ground loop currents circulate within the ground system. Steps, 5, 6, and 7 make specific recommendations for avoiding ground loop problems.

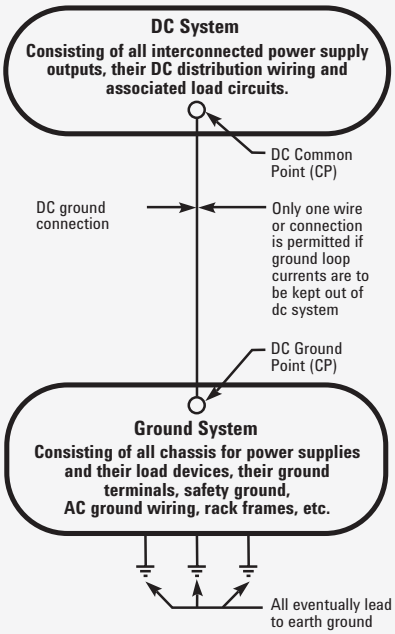


Figure 3
Isolating ground loop paths from the DC system

Select the DC Common Point

STEP 5. Designate one of the DC distribution terminals as the DC common point.
There should be only one DC common point in a DC system. If the supply is to be used as a positive source, then the negative DC distribution terminal is the DC common point. If it is to be a negative source, then the positive DC distribution terminal is the DC common point. Here are some additional suggestions for selecting the best DC common point for five different classes of loads:

a. Single isolated load.
A single isolated load exists when a power supply is connected to only one load and the load circuit has no internal connections to the chassis or ground. If the power supply output terminals are to be used as the DC distribution terminals, then the DC common point will be either the positive or negative power supply output terminal (Figure 4A). If remote sensing is to be used and the load terminals will serve as the distribution terminals, then either the positive or negative load terminal will be the DC common point (Figure 4B).

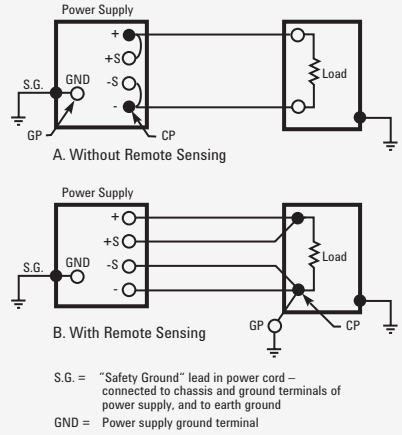


Figure 4
Preferred ground connections for a single isolated load

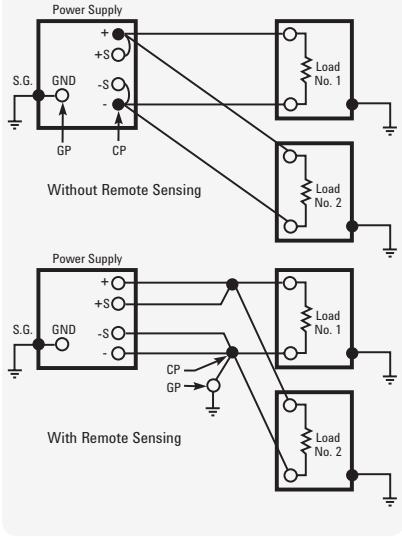


Figure 5
Preferred ground connections for multiple ungrounded loads

b. Multiple ungrounded loads.
This alternative applies when separate pairs of load leads connect two or more loads and none of the load circuits has an internal connection to chassis or ground (Figure 5). Use the positive or negative DC distribution terminal as the DC common point.

c. Single grounded load.
When a power supply is connected to a single load that has a necessary internal connection to chassis or ground as in Figure 6, or when a supply is connected to multiple loads only one of which has a necessary internal connection to chassis or ground as in Figure 7, the load terminals of the grounded load must be designated the DC distribution terminals, and the grounded load terminal is necessarily the DC common point.

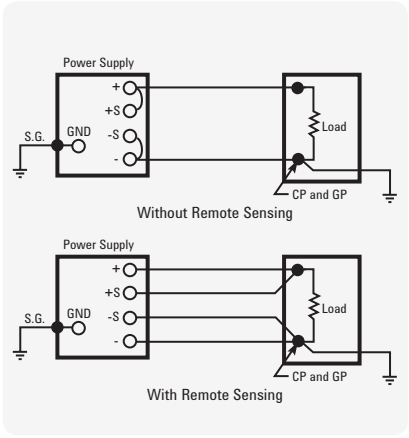


Figure 6
Preferred ground connections for a single grounded load

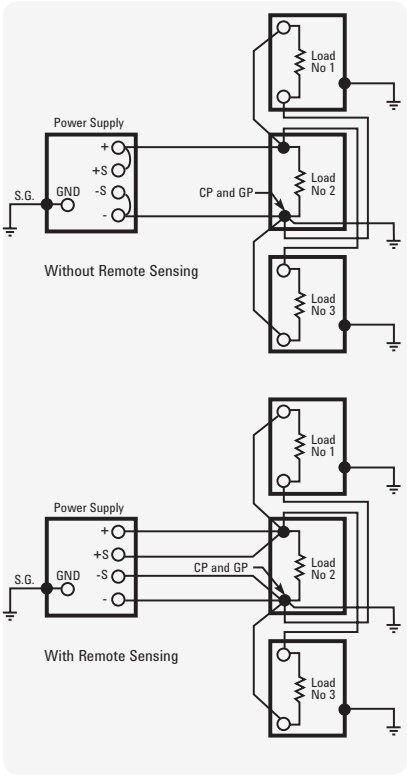


Figure 7
Preferred ground connections for multiple loads, only one of which is grounded internally

d. Multiple Loads, Two or More of Which are Individually Grounded.
This undesirable situation must be eliminated if at all possible. Ground loop currents circulating through the DC and load wiring cannot be avoided so long as separate loads connected to the same power supply or DC system have separate ground returns as shown in Figure 8.

One possible solution is to break the ground connection in all of the loads and then select the DC common point using the multiple ungrounded load alternative as in (b) above. Another would be to break the ground connection in all but one of the loads and select the DC common point as in alternative (c). If there are two or more loads with ground connections that cannot be removed and the system is susceptible to ground loop problems, then the only satisfactory solution is to increase the number of power supplies and to operate each grounded load from a separate supply. Each combination of power supply and grounded load would be treated as in alternative (c).

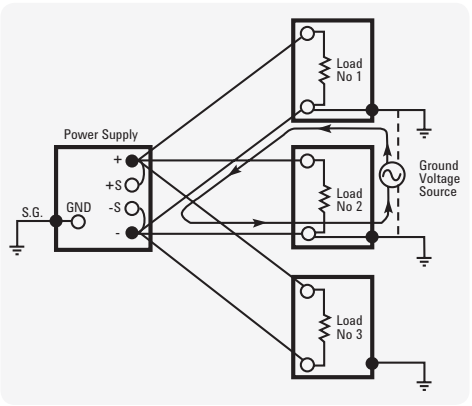


Figure 8
Improperly connected DC distribution system with two grounded loads forming a ground loop

e. Load system floated at a DC potential above ground.
It is sometimes necessary to operate the power supply output at a fixed voltage above or below ground potential. The usual procedure in these circumstances is to designate a DC common point using whichever of the preceding four alternatives is appropriate, just as though conductive grounding were to be used. Then connect this DC common point to the DC ground point through a 1 microfarad capacitor as shown in Figure 9.

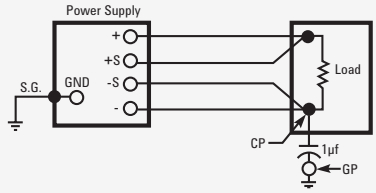


Figure 9
Floating a load system at a DC potential above ground

Select the DC Ground Point

STEP 6. Designate the terminal that is connected to ground as the DC ground point.

The DC ground point can be any single terminal, existing or added, that is conductively connected to the ground of the building wiring system and then eventually to earth ground.

STEP 7. Connect the DC common point to the DC ground point, making certain there is only one conductive path between these two points.

Make this connection as shown in Figures 4, 5, 6, or 7. Make the connection as short as possible and use a wire size such that the total impedance from the DC common point to the DC ground point is not large compared with the impedance from the ground point to earth ground. Flat braided leads are sometimes used to further reduce the high frequency component of the ground lead impedance.

Making Remote Error Sensing Connections

Normally a power supply operating in the constant voltage mode achieves its optimum line and load regulation, its lowest output impedance, drift, and PARD, and its fastest transient recovery performance at the power supply output terminals. If the load is separated from the output terminals by any lead length (as in Figure 10), some of these performance characteristics will be degraded at the load terminals-usually by an amount proportional to the impedance of the load leads compared with the output impedance of the power supply.

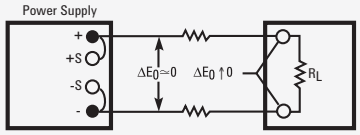


Figure 10
Load voltage variations caused by load lead voltage drops when remote error sensing is not used

With remote error sensing, a feature included in nearly all Agilent power supplies, it is possible to connect the input of the voltage feedback amplifier directly to the load terminals so that the regulator performs its function with respect to the load terminals rather than with respect to the power supply output terminals. Thus, the voltage at the power supply output terminals shifts by whatever amount is necessary to compensate for the voltage drop in the load leads, thereby maintaining the voltage at the load terminals constant (Figure 11).

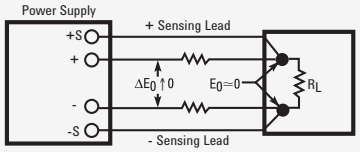


Figure 11
Regulated power supply with remote error sensing

Making the Sensing Connections

STEP 8. Remove the jumper connections between the power supply sensing and output terminals, and connect the power supply sensing terminals to the DC distribution terminals as shown in Figure 12.

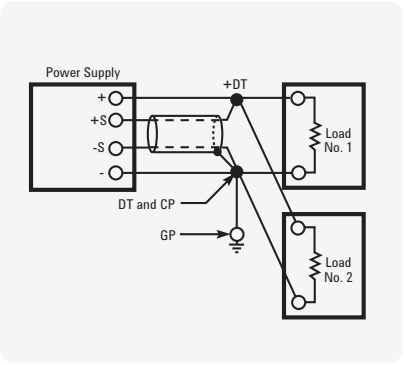


Figure 12
Properly grounded power supply system with remote error sensing

Use an insulated shielded pair for the sensing leads. Do not use the shield as one of the sensing conductors.

STEP 9. Connect one end of the sensing lead shield to the DC common point and leave the other end unconnected.

In nearly all cases this method of connecting the sensing shield minimizes ripple at the DC distribution terminals.

Protect Against Open Sensing Leads Step

STEP 10. Avoid the possibility of an open remote sensing path, either on a long-term or a transient basis.

Opening a sensing lead causes the power supply output voltage to increase. Protective circuits in the supply provide some load protection by limiting the amount of the increase, but eliminating all switch, relay, or connector contacts from the remote sensing path helps to minimize the possibility of any loss of regulation due to this cause.

Check the Load Wire Rating

STEP 11. Verify that the voltage drop in the load leads does not exceed the capabilities of the remote sensing circuit.

Most well regulated power supplies have an upper limit to the load lead voltage drop around which remote sensing can be connected without losing regulation. This maximum voltage drop is typically 0.5, 1, or 2 volts, and may apply to the positive, the negative, or both the positive and negative output leads. See the instruction manual for the exact load lead voltage drop limitations of a particular power supply.

Remember too, that any voltage drop lost in the load leads reduces the maximum voltage available for use at the load. Either of these limitations sometimes dictates the use of a larger wire size than would be required by wire current rating or impedance considerations.

Check for Power Supply Oscillation

STEP 12. Verify that the power supply does not oscillate when remote sensing is connected.

Although DC and low frequency performance are improved by remote sensing, phase shifts associated with long load and sensing leads can affect the stability of the feedback loop seriously enough to cause oscillation. This problem can frequently be corrected by readjusting a "transient recovery" or "loop stability" control inside the supply if the circuit includes one; follow the adjustment procedure in the manual. Another remedy that is often effective is to disconnect the output capacitor inside the power supply (some models have a rear panel jumper that can be removed for this purpose) and to connect a similar capacitor across the DC distribution terminals.

Check for Proper Current Limit Operation

STEP 13. Check that the operating point of the current limit circuit has not been affected by the remote sensing connections.

With some power supply designs, the resistance of one of the output conductors adds to the resistance used for current limit monitoring when remote sensing is used. This reduces the threshold value at which current limiting begins and makes readjustment of the current limit

circuit necessary. To determine whether connecting remote sensing has changed the current limit setting, turn off the supply, short terminal -S to -OUT and +S to +OUT at the power supply, and check whether the current limit value differs from the value without these terminals shorted. If it does differ significantly, the current limit control needs readjustment.

Making Load Connections to Two or More Power Supplies in the Same System

The following four rules must also be observed in extending the preceding techniques to systems containing two or more power supplies.

DC Distribution Terminals

RULE 1. There must be only one point of connection between the DC outputs of any two power supplies in the multiple power supply system. This point must be designated as one of the two DC distribution terminals for those two power supplies.

Thus there are always exactly (N+1) DC distribution terminals in any system, where N is the number of power supplies. (This is true unless parallel supplies share the same distribution terminals, or supplies are connected in series with no other connections to their intermediate terminals).

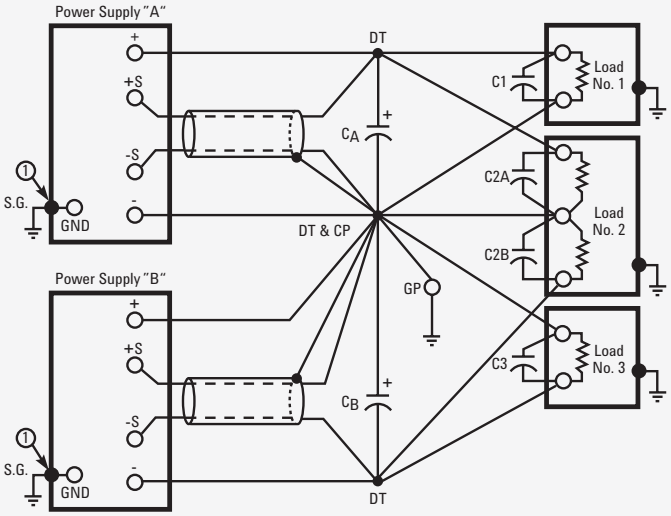


Figure 13
A properly connected multiple power supply system

DC Common Point

RULE 2. One of the (N+1) DC distribution terminals must be designated as the DC common point for the system.

There can be only one DC common point allowed in a system.

DC Ground Point

RULE 3. There must be only one DC ground point in a multiple power supply system.

This rules out the possibility of connecting two grounded loads in the same system.

RULE 4. There must be only one conductive path between the system DC common point and the system DC ground point.

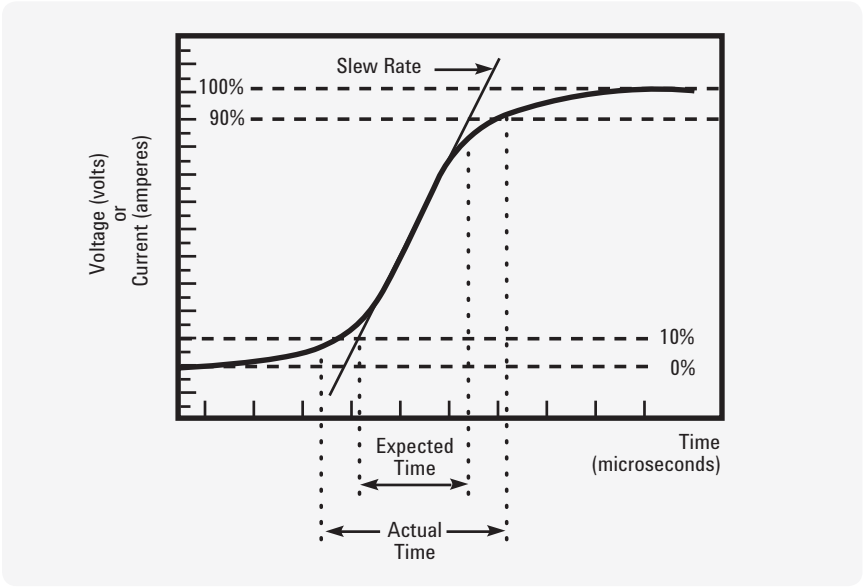
This rule is repeated from Step 7 above as a reminder because of the far greater number of possible paths to ground in a multiple power supply system. Figure 13 shows an example of a properly connected and grounded multiple power supply system.

Power Products Terms

AC input current: the maximum current into the power supply or electronic load. The current specified is worst case (low line voltage, full output).

Actual transition time: for an electronic load, either the total slew time (voltage or current change divided by slew rate - time) or the minimum transition time, whichever is longer.

Auto-parallel operation: a master-slave connection of the outputs of two or more supplies or the inputs of two or more electronic loads used for obtaining a current rating greater than can be obtained from a single load or supply. Only supplies that have the same voltage and current ratings should be paralleled.



Risetime transition limitation

Ambient temperature: the temperature of the air immediately surrounding the power supply or electronic load.

Analog programming: controlling the output voltage and/or current with an analog signal. This signal could be a voltage, current or resistance. This is similar to using the power supply as an amplifier.

Auto-ranging power supply: a power supply that can provide maximum rated power over a wide and continuous range of voltage and current settings.

Auto-series operation: a master-slave connection of the outputs of two or more supplies used for obtaining a voltage greater than can be obtained from one supply. Only supplies that have the same voltage and current ratings should be connected in series.

Auto-tracking operation: a master-slave connection of two or more supplies each of which has one of its output terminals in common with one of the output terminals of all of the other supplies.

Command processing time: the average time required for a power supply output voltage, or electronic load input voltage or current, to begin to change following receipt of a voltage or current set command over GPIB. This is effectively the time it takes for the power supply or electronic load to interpret the voltage set command and initiate a response.

Common mode noise: the current flowing from either output terminal (+ and –) through the power supply to chassis ground.

Compliance voltage: the output voltage of a power supply operating in the constant-current mode.

Constant-current (CC) mode: a power supply that stabilizes output current with respect to changes in load impedance. Thus, for a change in load resistance, the output current remains constant while the output voltage changes by whatever amount necessary to accomplish this.

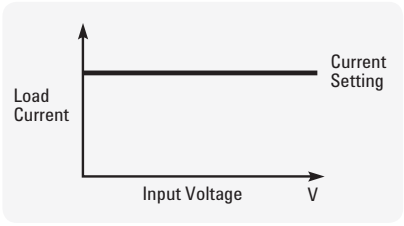
Power Products Terms (Continued)

Constant-current/voltage/resistance mode electronic load: an electronic load that can operate in one of the following ways:

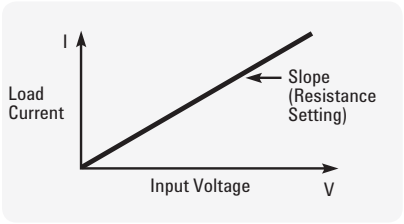
CC= ratio of voltage to current in accordance with the programmed value regardless of the input voltage

CV= ratio of voltage to current in accordance with the programmed value regardless of the input current

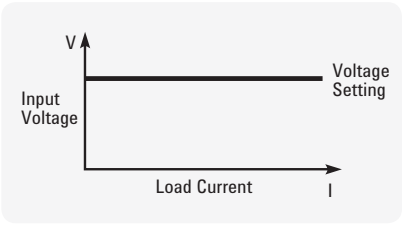
CR= ratio of voltage to current while maintaining the programmed resistance value



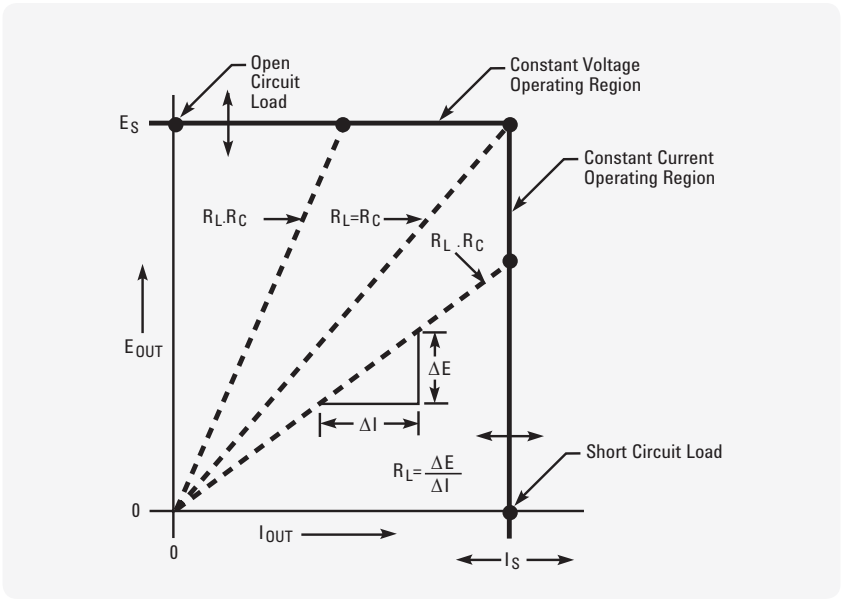
Constant-current mode



Constant-resistance mode



Constant-voltage mode



Constant-voltage/constant-current output characteristics

Constant-current/voltage/resistance regulation: the change in the steady-state value of the stabilized electronic load input voltage, current, or resistance resulting from a full scale source change, with all other influence quantities held constant.

Constant-voltage (CV) mode: a power supply that stabilizes output voltage with respect to changes in influence quantities. Thus, for a change in load resistance, the output voltage remains constant while the output current changes by whatever amount necessary to accomplish this.

Constant-voltage/constant current (CV/CC) power supply: a power supply that operates as a constant-voltage power supply or a constant-current power supply, depending on load conditions. The supply acts as a constant-voltage source for comparatively large values of load resistance and as a constant-current source for comparatively small values of load resistance.

Power Products Terms (Continued)

Constant-voltage/current limiting (CV/CL) power supply: a power supply similar to a constant-voltage/constant-current supply except that at comparatively small values of load resistance, its output current is limited instead of being stabilized.

Crest factor: the ratio of the zero-to-peak value to the rms value of a waveform. This term is often used to specify the maximum peak amplitude that an AC power supply can source (relative to its maximum rms rating) without distortion.

Crowbar: see overvoltage protection.

Current limiting: the action, under overload or short-circuit conditions, of limiting the output current of a constant-voltage supply to some predetermined maximum value (fixed or adjustable) and automatically restoring the output voltage to its normal value when the overload or short circuit is removed. There are three types of current limiting:

- by constant-voltage/constant-current crossover
- by decreasing the output voltage as the current increases
- by decreasing both voltage and current as the load resistance decreases.

DFI: a TTL compatible output signal that can be used as an alarm and automatically initiates an action for multiple power supply or electronic load shutdown. The DFI signal is commonly connected to RI of the next supply. (See RI)

Downprogramming: the ability of a power supply to discharge its output capacitors independently of load. The use of an active down programming device can reduce the fall time of the output voltage.

Drift: the maximum change of a power supply output or load input voltage or current during an 8-hour period following a 30-minute warmup, with all influence and control quantities maintained constant during the warm-up time and the period of drift measurement. Drift includes both periodic and random deviations over the bandwidth from zero frequency (DC) to a specified upper frequency limit.

Efficiency: expressed in percent, efficiency is the total output power of the supply divided by the active input power. Unless otherwise specified, Agilent measures efficiency at maximum rated output power and at worst case conditions of the AC line voltage.

Electromagnetic interference (EMI): any type of electromagnetic energy that could degrade the perfomance of electrical equipment. The EMI generated by a power supply can be propagated either by conduction (via the input and output leads) or bt radiation from the units' case. The terms "noise" and "radio-frequency interference" (RFI) are sometimes used in the same context.

Electronic load: an active device which absorbs power. Loads are used for the testing of the power producing products.

Foldback: immediate shutdown of the power supply output when a crossover between constant voltage and constant current mode occurs. Both the voltage and current levels are reduced (folded back).

Harmonics: the occurrence of this type of distortion is based upon the mathematical principle that all periodic waveforms are made up of a series of sine waves. As a result, harmonic distortion is produced at frequencies that are integer multiples of the fundamental or desired signal frequency. When viewed in the frequency domain, harmonics have an amplitude (often expressed in db), frequency, and phase characteristic relative to the fundamental.

Isolation: the maximum voltage (including output voltage) either output terminal may be floated from earth ground.

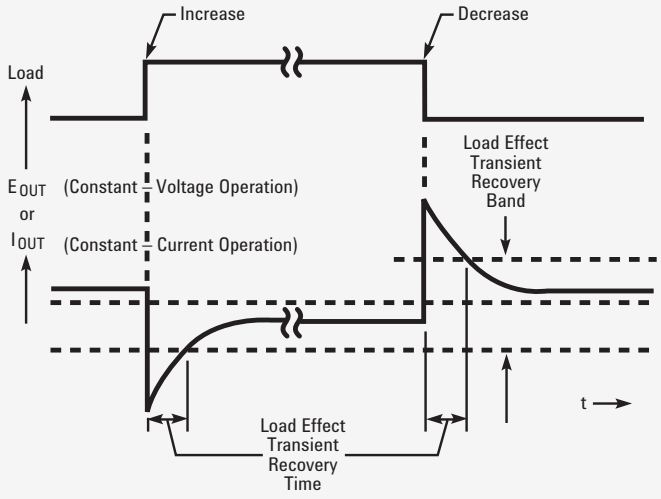
Load cross regulation: the affect on one output of a multiple output power supply when another output is programmed from zero to full rated current.

Power Products Terms (Continued)

Load effect: also known as "load regulation". Load effect is the change in the steady-state value of the stabilized output voltage or current resulting from a full-load change in the load current of a constant-voltage supply or the load voltage of a constant-current supply, with all other influence quantities maintained constant.

Load effect transient recovery time: the time interval between a specified step change in the load current of a constant-voltage supply (usually a full-load or 5-amp change, whichever is smaller) or in the load voltage of a constant-current supply and the instant when the stabilized output quantity returns to and stays within a specified transient recovery band.

Master-slave operation: a method of interconnecting two or more supplies or electronic loads such that one of them (the master) serves to control the others (the slaves). The outputs of the slave supplies or inputs of the slave electronic loads always remain equal to or proportional to the output of the master. The outputs of the master supply and of one or more slaves may be connected in series, in parallel, or with just their negative or positive output terminals in common. (See also "complementary tracking"). The inputs of the master electronic load and one or more slaves may be connected in parallel only.



Load effect transient recovery waveforms

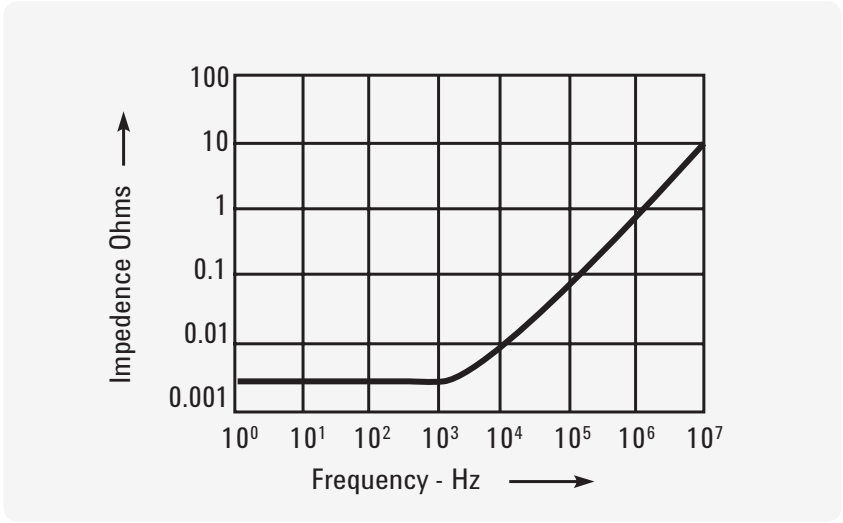
Minimum transition time: the shortest possible time in which an electronic load input can change from one level to another. This is determined by the small signal bandwidth of the load.

Modulation: analog programming of the output voltage and/or current. The output programming response time determines the maximum slew rate at which the power supplies output can be programmed.

Nominal value: the value that exists "in name only"; not the actual value. For example, in the case of a power supply with a calibrated output control, the nominal value is the value indicated by the control setting. For a supply with a fixed output, the nominal output is the output indicated on the nameplate. The nominal value of a 120-volt ±10% line voltage is 120 volts.

"One-box": a power supply that can be controlled by direct connection to a computer (with no additional programmers) and that can provide measured data to a computer without external voltmeters or ammeters.

Power Products Terms (Continued)



Typical output impedence of a constant voltage power supply

Output impedance: at any frequency of load change, ΔEout/ΔIout. Strictly speaking, the definition applies only for a sinusoidal load disturbance, unless the measurement is made at zero frequency (DC). The output impedance of an ideal constant voltage power supply would be zero at all frequencies, while the output impedance for an ideal constant current power supply would be infinite at all frequencies.

Overcurrent protection: protection of the power supply, electronic load and/or connected equipment against excessive output current.

Overvoltage protection: protection of the power supply, electronic load and/or connected equipment against excessive output voltage. Overvoltage protection is usually by means of a crowbar protection circuit, which rapidly places a low resistance shunt across the supply's output terminals to reduce output voltage to a low value if a predetermined voltage is exceeded. A supply equipped with an overvoltage crowbar must also be protected by a means for limiting or interrupting the output current.

Peak-to-peak noise: is the range between maximum and minimum noise level. Sometimes called noise "spikes." Peak-to-peak noise is typically low in energy and does not show up in a RMS measurement, 20-20 Mhz.

Phase angle: specifies the time domain phase relationship between two sine waves. The unit of phase angle is the degree, with one cycle corresponding to 360 degrees of phase.

Programming speed: the maximum time required for the programmed output voltage or current to change from a specified initial value (usually zero or maximum output) to a value within a specified tolerance band of a specified newly programmed value (for most models 99.9% or 0.1% of maximum output, respectively) following the onset of a step change in an analog programming signal, or the gating of a digital signal.

Readback: the ability of a power supply or electronic load to measure its actual output voltage and/or current, and provide the reading to a computer.

Remote sensing: remote sensing, or remote error sensing, is a means by which a power supply or electronic load monitors the stabilized voltage directly at the load or source respectively, using extra sensing leads. The resulting circuit action compensates for voltage drops up to a specified limit in the load leads.

Resolution: for a bench supply, the smallest change in output voltage or current that can be obtained using the front panel controls. For a system supply or electronic load, the smallest change that can be obtained using either the front panel controls, or a computer.

Reverse voltage protection: protection of the power supply or electronic load against reverse voltage applied at the outputor input terminals.

Power Products Terms (Continued)

RI (discrete fault indicator/remote inhibit): a rear-panel port that can be used to disable the power supply output independently of the GPIB. This port can also be used to chain multiple power supplies together such that an emergency shutdown of one output automatically signals the other supplies to disable their outputs.

Ripple and noise (dB): a term often used to specify rms or peak AC source noise relative to the maximum rms or peak output rating. The specification is calculated as follows: dB = 20 Log (V_{noise}/V_{rating}).

Rms (or effective) amplitude or noise: an average signal or noise level based on energy content. The root mean square (rms) content is often called the AC component.

SCPI (Standard Commands for Programmable Instruments): is a programming language for controlling instrument functions over the GPIB (IEEE 488) instrument bus. The same SCPI commands and parameters control the same functions in different classes of instruments.

Serial link: a means by which up to 16 power supplies with this feature can share one GPIB primary address. The power supplies can be connected with cables similar to U.S. modular telephone cables. They are independently controlled using GPIB secondary addressing.

Series regulation: power supplies designed with this topology have fast programming speeds and low noise. Also referred to as a "linear" topology.

Slave operation: see "master-slave operation".

Slew rate: for any given electronic load input transition, the change in current or voltage over time.

Source effect: also known as "line regulation", source effect is the change in the steady-state value of the stabilized output or input voltage or current resulting from any change in the AC source voltage within its specified range, with all other influence quantities maintained constant. Source effect may be measured at any output or input voltage and current within rating.

Specifications: describe the power supply or electronic load warranted performance.

Supplemental characteristics: give typical but nonwarranted performance parameters.

Switching regulation supplies: power supplies designed with this topology are efficient and can have laboratory-grade specifications.

Temperature effect coefficient: the maximum steady-state change in a power supply's output voltage or current or electronic load's input voltage or current per degree Celsius following a change in the ambient temperature within specified limits, with all other influence quantities maintained constant.

Total harmonic distortion: the ratio of the rms sum of the harmonic components to the rms value of a periodic waveform. This is typically expressed as a percent or in decibels (dB).

Voltage limiting: the action of limiting the output voltage of a constant-current supply to some predetermined maximum value (fixed or adjustable) and automatically restoring the output current to its normal value when the load conditions are restored to normal. There are two types of voltage limiting:

- by constant voltage/constant current crossover
- by decreasing the output current as the voltage increases

Warm-up time: the time interval from when a power supply or electronic load is turned on until its output complies with all performance specifications.

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More detailed specifications at **www.agilent.com/find/power**

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* These products are closest in ratings to the discontinued model, but are not identical. Refer to the catalog for the features and specifications of the suggested alternative products.

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