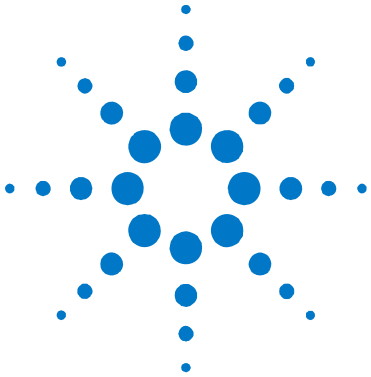

Agilent Technologies N6700 Series Power Modules

Models N6731B - N6784A

Specifications Guide

Agilent Technologies

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Where to Find the Latest Information

This document provides specification and supplemental characteristic information for the following instruments:

- Agilent N6731B through N6782A Power Modules

These power modules can be installed in the following mainframes:

- Agilent N6700 Series Modular Power System
- Agilent N6705 DC Power Analyzer

The web contains the most up to date version of this manual. Go to www.agilent.com/find/N6705 or www.agilent.com/find/N6700 to obtain the latest version of the manual.

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Contents

Chapter 1
Agilent Models N673xB/N674xB

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55°C after a 30-minute warm-up period. Specifications apply at the output terminals, with each module's sense terminals internally connected to its output terminals (local sensing).

Refer to the Agilent N6700 or N6705 Service Guide for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or by type testing. All supplemental characteristics are typical unless otherwise noted.

Performance Specifications

	N6731B/ N6741B	N6732B/ N6742B	N6733B/ N6743B	N6734B/ N6744B	N6735B/ N6745B	N6736B/ N6746B
DC Output Ratings:						
Voltage	5 V	8 V	20 V	35 V	60 V	100 V
Current [NOTE 1]	10 A / 20 A	6.25 A / 12.5 A [NOTE 2]	2.5 A / 5 A	1.5 A / 3 A	0.8 A / 1.6 A	0.5 A / 1 A
Power	50 W / 100 W	50 W / 100 W	50 W / 100 W	52.5W / 105W	50 W / 100 W	50 W / 100 W
Output Ripple and Noise (PARD): (from 20 Hz – 20 MHz)						
CV peak-to- peak	10 mV / 20 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 Effect (Regulation): (Applies for any output load change, with a maximum load-lead drop of 1V/lead. The load lead drop reduces the maximum available voltage at the load.)						
Voltage	5 mV	6 mV	9 mV	11 mV	13 mV / 16 mV	20 mV / 30 mV
Current	2 mA	2 mA	2 mA	2 mA	2 mA	2 mA
Source Effect (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
Programming Accuracy: (@ 23 °C ±5 °C after 30 minute warm-up. Applies from minimum to maximum programming range at any load.)						
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% + 10mA
Voltmeter/Ammeter Measurement 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
Load Transient Recovery 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	±0.08 V / 0.1 V [NOTE 3]	±0.08 V / 0.1 V [NOTE 3]	± 0.2 V / 0.3 V	± 0.2 V / 0.3 V	± 0.4 V / 0.5 V	± 0.5 V / 1.0 V
Time	< 200 µs	< 200 µs	< 200 µs	< 200 µs	< 200 µs	< 200 µs

[1] Output current is derated 1% per °C above 40°C.
[2] When relay Option 760 is installed on Model N6742B, the maximum output current will be limited to 10 A.
[3] When relay Option 760 or 761 is installed, the settling band is ±0.10V/0.125 V. Option 760 is not available on Model N6741B.

Supplemental Characteristics

	N6731B/ N6741B	N6732B/ N6742B	N6733B/ N6743B	N6734B/ N6744B	N6735B/ N6745B	N6736B/ N6746B
Programming Ranges:						
Voltage	15 mV – 5 .1 V	15 mV – 8 .16 V	30 mV – 20.4 V	40 mV – 35.7 V	70 mV – 61.2 V	100 mV – 102 V
Current	60 mA – 10.2 A/ 60 mA – 20.4 A	40 mA –6.375 A/ 40 mA – 12.75 A	10 mA – 2.55 A/ 10 mA – 5.1 A	5 mA – 1.53 A/ 5 mA – 3.06 A	2.5mA – 0.85 A/ 2.5m A – 1.7 A	1.5 mA – 0.51A/ 1.5 mA – 1.02 A
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
Measurement Resolution:						
Voltage	3 mV	4 mV	10 mV	18 mV	30 mV	50 mV
Current	10 mA	7 mA	3 mA	2 mA	1 mA	0.5 mA
Programming Temperature Coefficient per °C:						
Voltage	0.005% + 0.1mV	0.005% + 0.1 mV	0.005% + 0.2 mV	0.005% + 0.5 mV	0.005% + 0.5 mV	0.005% + 1 mV
Current	0.005% + 1 mA	0.005% + 0.5 mA	0.005% + 0.1 mA	0.005% + 0.05 mA	0.005% + 0.02 mA	0.005% + 0.02 mA
Measurement Temperature Coefficient per °C:						
Voltage	0.01% + 0.1mV	0.01% + 0.1 mV	0.01% + 0.2 mV	0.01% + 0.2 mV	0.01% + 0.5 mV	0.01% + 0.5 mV
Current	0.01% + 1 mA	0.01% + 0.5 mA	0.01% + 0.1 mA	0.01% + 0.05 mA	0.01% + 0.02 mA	0.01% + 0.02 mA
Oscilloscope Measurement Accuracy: (@t 23 °C ±5 °C; accuracy of any individual point in the trace) NOTE 1						
Voltage	0.1% + 25 mV	0.1% + 30 mV	0.1% + 45 mV	0.1% + 75 mV	0.1% + 130 mV	0.1% + 190 mV
Current – Correction On	0.15% + 70 mA	0.15% + 40 mA	0.15% + 20 mA	0.15% + 14 mA	0.15% + 12 mA	0.15% + 7 mA
Current	0.15% + 50 mA	0.15% + 30 mA	0.15% + 15 mA	0.15% + 10 mA	0.15% + 9 mA	0.15% + 5 mA
Up-programming and Down-programming Time with full resistive load: (time from 10% to 90% of total voltage excursion; for voltage setting from 0V to full scale and full scale to 0V)	20 ms	20 ms	20 ms	20 ms	20 ms	20 ms
Up-programming and Down-programming Settling Time with full resistive load: (time from start of voltage change to 0.1% of full-scale value; for voltage setting from 0V to full scale and full scale to 0V)	100 ms	100 ms	100 ms	100 ms	100 ms	100 ms
Over-voltage Protection:						
Accuracy	0.25% + 50mV	0.25% + 50 mV	0.25% + 75 mV	0.25% + 100 mV	0.25% + 200 mV	0.25% + 250 mV
Accuracy w/opt 760	0.25%+600mV	0.25% + 600 mV	0.25% + 350 mV	0.25% + 250 mV	0.25% + 300 mV	0.25% + 300 mV
Accuracy w/opt 761	0.25%+600mV	0.25% + 600 mV	0.25% + 350 mV	0.25% + 250 mV	0.25% + 300 mV	0.25% + 300 mV
Maximum setting	7.5 V	10 V	22 V	38.5 V	66 V	110 V
Response time	50 µs from occurrence of over-voltage condition to start of output shutdown					
Output Ripple and Noise (PARD):						
CC rms	8 mA	4 mA	2 mA	2 mA	2 mA	2 mA
Common Mode Noise: (from 20 Hz – 20 MHz; from either output to chassis)						
Rms	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Peak-to- peak	< 15 mA	< 10 mA	< 10 mA	< 10 mA	< 10 mA	< 10 mA
Remote Sense Capability:	Outputs can maintain specifications with up to a 1-volt drop per load lead. The load lead drop reduces the maximum available voltage at the load.					
Series and Parallel Operation:	Identically rated outputs can be operated directly in parallel or can be connected for straight series operation. Auto-series and auto-parallel operation is not available.					
Minimum Output Turn-On Delay: (time from when any Output On command is received until the output starts turning on)						
Without relay option	32 ms	32 ms	32 ms	32 ms	32 ms	32 ms
With relay Option 760	58 ms	58 ms	58 ms	58 ms	58 ms	58 ms

[1] Correction On compensates for current flowing into the output capacitor during voltage transients. See chapter 6 for details.

Arbitrary Waveform Generator Maximum Bandwidth

NOTE The information in this section only applies when the power modules are installed in an Agilent N6705 DC Power Analyzer.

The following tables characterize the maximum bandwidth of the arbitrary waveform generator. The maximum bandwidth is based on a sine wave into a resistive load and apples to any output current. The following definitions apply in the frequency tables:

V p-p = Voltage peak-to-peak

3 dB max. = Max. frequency where the voltage drops to 3 dB below its setting

6 dB max. = Max. frequency where the voltage drops to 6 dB below its setting

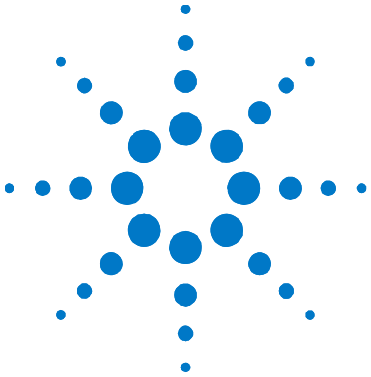
THD 3 dB = The total harmonic distortion at 3 dB max. frequency

THD 6 dB = The total harmonic distortion at 6 dB max. frequency

Voltage	3 dB max	THD 3 dB	6 dB max	THD 6 dB
	N6731B & N6741B			
0.1 Vp-p	175 Hz	1.0%	260 Hz	3.0%
0.1 Vp-p	125 Hz	1.0%	175 Hz	3.0%
0.3 Vp-p	75 Hz	6.0%	100 Hz	6.0%
0.5 Vp-p	40 Hz	9.0%	55 Hz	9.0%
5.0 Vp-p	20 Hz	10%	37 Hz	10%
	N6732B & N6742B			
0.1 Vp-p	125 Hz	1.0%	200 Hz	3.0%
0.2 Vp-p	125 Hz	1.0%	180 Hz	3.0%
0.4 Vp-p	75 Hz	6.0%	100 Hz	6.0%
0.8 Vp-p	40 Hz	8.5%	60 Hz	8.5%
8.0 Vp-p	20 Hz	10%	37 Hz	10%
	N6733B & N6743B			
Voltage	3 dB max	THD 3 dB	6 dB max	THD 6 dB
0.2 Vp-p	110 Hz	1.0%	190 Hz	3.0%
0.4 Vp-p	110 Hz	1.0%	160 Hz	3.0%
1.0 Vp-p	72 Hz	6.0%	95 Hz	6.0%
2.0 Vp-p	40 Hz	8.0%	55 Hz	8.5%
20.0 Vp-p	20 Hz	10%	37 Hz	10%
	N6734B & N6744B			
Voltage	3 dB max	THD 3 dB	6 dB max	THD 6 dB
0.4 Vp-p	125 Hz	1.0%	200 Hz	1.0%
0.7 Vp-p	125 Hz	1.0%	175 Hz	3.5%
1.8 Vp-p	72 Hz	6.0%	100 Hz	6.0%
3.5 Vp-p	40 Hz	8.0%	55 Hz	8.5%
35.0 Vp-p	20 Hz	8.0%	37 Hz	8.5%

Arbitrary Waveform Generator Maximum Bandwidth (continued)

Voltage	3 dB max	THD 3 dB	6 dB max	THD 6 dB
	N6735B & N6745B			
0.6 Vp-p	100 Hz	1.0%	180 Hz	1.0%
1.2 Vp-p	100 Hz	1.0%	160 Hz	3.0%
3.0 Vp-p	70 Hz	5.5%	92 Hz	5.5%
6.0 Vp-p	40 Hz	8.0%	55 Hz	8.0%
60.0 Vp-p	20 Hz	8.0%	37 Hz	8.0%
	N6736B & N6746B			
1.0 Vp-p	90 Hz	1.0%	160 Hz	1.5%
2.0 Vp-p	90 Hz	1.0%	150 Hz	3.0%
5.0 Vp-p	62 Hz	4.5%	85 Hz	6.0%
10.0 Vp-p	37 Hz	8.0%	50 Hz	8.0%
100 Vp-p	20 Hz	8.0%	35 Hz	8.0%



Chapter 2
Agilent Models N675xA/N676xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55°C after a 30-minute warm-up period. Specifications apply at the output terminals, with each module's sense terminals internally connected to its output terminals (local sensing).

Refer to the Agilent N6700 or N6705 Service Guide for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or by type testing. All supplemental characteristics are typical unless otherwise noted.

Performance Specifications

	N6751A / N6752A	N6753A	N6754A	N6761A / N6762A
DC Output Ratings:				
Voltage	50 V	20 V	60 V	50 V
Current (derated 1% per °C above 40°C)	5 A / 10A	50 A	20 A	1.5 A / 3 A
Power	50 W / 100 W	300 W	300 W	50 W / 100 W
Output Ripple and Noise (PARD): (from 20 Hz – 20 MHz)				
CV peak-to-peak	4.5 mV	5 mV	6 mV	4.5 mV
CV rms	0.35 mV	1 mV	1 mV	0.35 mV
Load Effect (Regulation): (Applies for any output load change, with a maximum load-lead drop of 1V/lead. The load lead drop reduces the maximum available voltage at the load.)				
Voltage	2 mV	2 mV	2 mV	0.5 mV
Current	2 mA	12 mA	5 mA	30 µA (@ 0 – 7 V) 65 µA (@ 7 – 50 V)
Source Effect (Regulation):				
Voltage	1 mV	0.5 mV	1.2 mV	0.5 mV
Current	1 mA	5 mA	2 mA	30 µA
Programming Accuracy: (@ 23 °C ±5 °C after 30 min. warm-up. Applies from minimum to maximum programming range at any load.)				
Voltage high range	0.06% + 19 mV	0.06% + 10 mV	0.06% + 25 mV	0.016% + 6 mV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	0.016% + 1.5 mV
Current high range	0.1% + 20 mA	0.1% + 30 mA	0.1% + 12 mA	0.04% + 200 µA
Current low range (≤ 100mA, @ 0 - 7 V)	N/A	N/A	N/A	0.04% + 15 µA
(≤ 100mA, @ 7 - 50 V)	N/A	N/A	N/A	0.04% + 55 µA
Measurement Accuracy: (at 23 °C ±5 °C)				
Voltage high range	0.05% + 20 mV	0.05% + 10 mV	0.05% + 25 mV	0.016% + 6 mV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	0.016% + 1.5 mV
Current high range	0.1% + 4 mA	0.1% + 30 mA	0.1% + 8 mA	0.04% + 160 µA
Current low range (≤ 100mA, @ 0 - 7 V)	N/A	N/A	N/A	0.03% + 15 µA NOTE 1
(≤ 100mA, @ 7 - 50 V)	N/A	N/A	N/A	0.03% + 55 µA
200 µA current range (Option 2UA)	N/A	N/A	N/A	0.5% + 100 nA
Load Transient Recovery 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, N6753A, & N6754A.)				
Voltage settling band	± 75 mV NOTE 2	± 30 mV NOTE 3	± 90 mV NOTE 4	± 75 mV
Time	< 100 µs	< 100 µs	< 100 µs	< 100 µs

[1] Applies when measuring 4096 data points (SENSe:SWEep:POINts = 4096).
[2] When relay option 761 is installed on Model N6752A, the settling band is ±125 mV.
[3] When relay option 760 or 761 is installed on Model N6753A, the settling band is ±200 mV.
[4] When relay option 760 or 761 is installed on Model N6754A, the settling band is ±350 mV.

Supplemental Characteristics

	N6751A / N6752A	N6753A	N6754A	N6761A / N6762A
Programming Ranges:				
Voltage high range	20 mV – 51 V	10 mV – 20.4V	25 mV- 61.2V	15 mV – 51 V
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	12 mV – 5.5 V
Current high range	10 mA – 5.1A/10 mA- 10.2A	50 mA – 51A	20 mA- 20.4A	1 mA–1.53 A/1 mA–3.06 A
Current low range (≤ 0.1 A)	N/A	N/A	N/A	0.1 mA – 0.1 A NOTE 1
Programming Resolution:				
Voltage high range	3.5 mV	1.5 mV	4.2 mV	880 µV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	90 µV
Current high range	3.25 mA	16.3 mA	6.5 mA	60 µA
Current low range (≤ 0.1 A)	N/A	N/A	N/A	2 µA
Measurement Resolution:				
Voltage high range	1.8 mV	0.8 mV	2.2 mV	440 µV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	44 µV
Current high range	410 µA	2.05 mA	0.82 mA	30 µA
Current low range (≤ 0.1 A)	N/A	N/A	N/A	1 µA
200 µA current range (Option 2UA)	N/A	N/A	N/A	4 nA
Programming Temperature Coefficient per °C:				
Voltage high range	18 ppm + 160 µV	20 ppm + 20 µV	20 ppm + 50 µV	18 ppm + 140 µV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	40 ppm + 70 µV
Current high range	100 ppm + 45 µA	60ppm + 500 µA	60ppm + 200 µA	33 ppm + 10 µA
Current low range (≤ 0.1 A)	N/A	N/A	N/A	60 ppm + 1.5 µA
Measurement Temperature Coefficient per °C:				
Voltage high range	25 ppm + 35 µV	20 ppm + 20 µV	20 ppm + 50 µV	23 ppm + 40 µV
Voltage low range (≤ 5.5 V)	N/A	N/A	N/A	30 ppm + 40 µV
Current high range	60 ppm + 3 µA	60 ppm + 30 µA	60 ppm + 12 µA	40 ppm + 0.3 µA
Current low range (≤ 0.1 A)	N/A	N/A	N/A	50 ppm + 0.3 µA
200 µA current range (Option 2UA)	N/A	N/A	N/A	100 ppm + 3 nA/°C
Oscilloscope Measurement Accuracy: (@ 23 °C ±5 °C, accuracy of any individual point in the trace) NOTE 2				
Voltage	0.05% + 32 mV	0.05% + ?? mV	0.05% + 34 mV	0.016% + 16 mV
Current high range – w/Correction On	0.1% + 14 mA	0.1% + ?? mA	0.1% + 16 mA	0.04% + 10 mA
Current high range	0.1% + 8 mA	0.1% + ?? mA	0.1% + 16 mA	0.04% + 1 mA
Current low range	N/A	N/A	N/A	0.03% + 0.175 mA
Up-programming Time with full resistive load: (time from 10% to 90% of total voltage excursion)				
Small voltage step	0 V to 10 V	0 V to 6 V	0 V to 15 V	0 V to 10 V
Time	0.2 ms	0.4 ms	0.35 ms	0.6 ms
Large voltage step	0 V to 50 V	0 V to 20 V	0 V to 60 V	0 V to 50 V
Time	1.5 ms	1.5 ms	2 ms	2.2 ms

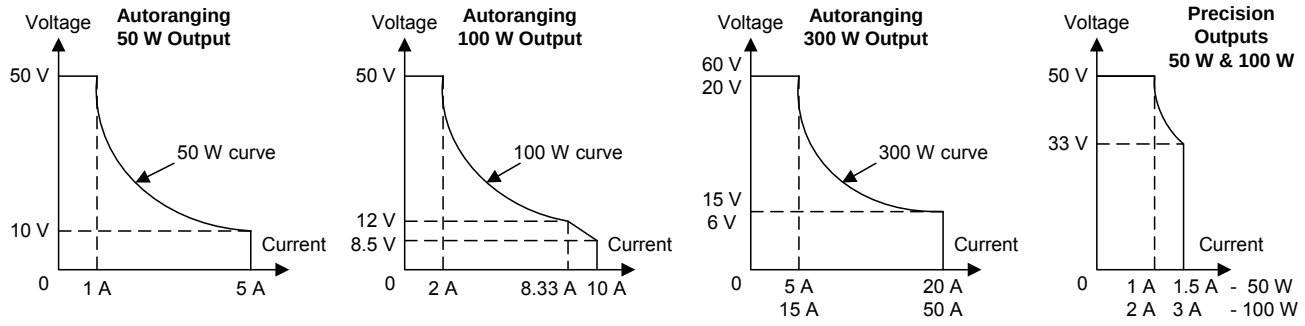
[1] If you are operating the unit below 255 µA in constant current mode, the output may become unregulated with the following load conditions: The load resistance is <175 mΩ **and** the load inductance is >20 µH. If this occurs, an UNRegulated flag will be generated and the output current may rise above the programmed value but will remain less than 255 µA.
[2] Correction On compensates for current flowing into the output capacitor during voltage transients. See chapter 6 for details.

Supplemental Characteristics (continued)

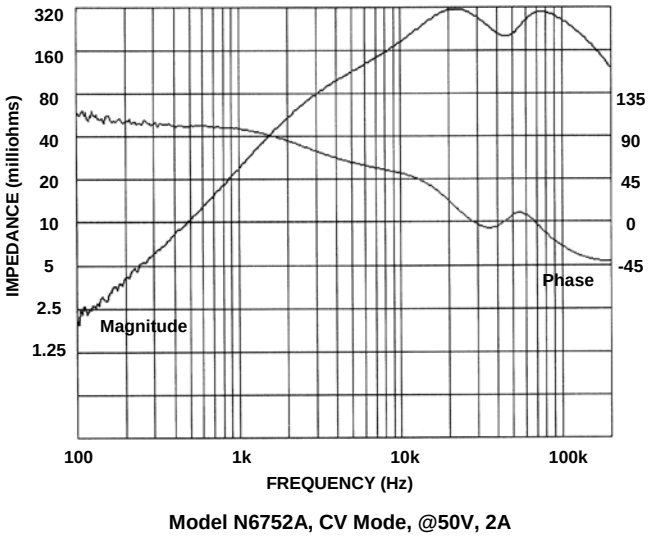
	N6751A / N6752A	N6753A	N6754A	N6761A / N6762A
Up-programming Settling Time with full resistive load: (time from start of voltage change to 0.1% of full scale value)				
Small voltage step	0 V to 10 V	0 V to 6 V	0 V to 15 V	0 V to 10 V
Time	0.5 ms	0.8 ms	0.8 ms	0.9 ms
Large voltage step	0 V to 50 V	0 V to 20 V	0 V to 60 V	0 V to 50 V
Time	4 ms	3 ms	4.2 ms	4 ms
Down-programming Time with no load: (time from start of voltage change to output voltage < 0.5 V)				
Small voltage step	10 V to 0 V	6 V to 0 V	15 V to 0 V	10 V to 0 V
Time	0.3 ms	0.55 ms	0.6 ms	0.3 ms
Large voltage step	50 V to 0 V	20 V to 0 V	60 V to 0 V	50 V to 0 V
Time	1.3 ms	1.8 ms	2.2 ms	1.3 ms
Down-programming Settling Time with no load: (time from start of voltage change to 0.1% of full scale value)				
Small voltage step	10 V to 0 V	6 V to 0 V	15 V to 0 V	10 V to 0 V
Time	0.45 ms	0.8 ms	0.8 ms	0.45 ms
Large voltage step	50 V to 0 V	20 V to 0 V	60 V to 0 V	50 V to 0 V
Time	1.4 ms	2 ms	2.3 ms	1.4 ms
Down-programming Time with Capacitive load: (time from start of voltage change to output voltage < 0.5 V)				
Small voltage step	10 V to 0 V	6 V to 0 V	15 V to 0 V	10 V to 0 V
Time	2.1 ms	2.2 ms	2.3 ms	4.5 ms
Large voltage step	50 V to 0 V	20 V to 0 V	60 V to 0 V	50 V to 0 V
Time	11 ms	8.5 ms	10 ms	23 ms
Capacitive load	1000μF NOTE 2	4700μF NOTE 3	680μF NOTE 4	1000μF NOTE 2
Down-programming Capability:				
Continuous power	7 W	12.5 W	12.5 W	7 W
Peak current	7 A	15 A	6 A	3.8 A
Over-voltage Protection:				
Accuracy	0.25% + 0.25 V	0.25% + 0.45V	0.25% + 0.6V NOTE 5	0.25% + 0.25 V
Maximum setting	55 V	22 V	66 V	55 V
Response time	50 μs from occurrence of over-voltage condition to start of output shutdown			
Output Ripple and Noise: (PARD)				
CC rms:	2 mA	10 mA	4 mA	2 mA
Common Mode Noise: (from 20 Hz – 20 MHz; from either output to chassis)				
rms	500 μA	500 μA	750 μA	500 μA
peak-to-peak	< 2 mA	< 2 mA	< 3 mA	< 2 mA
Remote Sense Capability:	Outputs can maintain specifications with up to a 1-volt drop per load lead.			
Series and Parallel Operation:	Identically rated outputs can be operated directly in parallel or be connected for straight series operation. Auto-series and auto-parallel operation is not available.			
Minimum Output Turn-On Delay: (time from when any Output On command is received until the output starts turning on)				
Without relay option	25 ms	18 ms	18 ms	32 ms NOTE 6
With relay Option 760	51 ms	44 ms	44 ms	58 ms NOTE 6

[3] Modules can discharge a 1000μF capacitor from full scale to 0V at a rate of 4 times/second.
[4] Modules can discharge a 680μF capacitor from full scale to 0V at a rate of 4 times/second.
[5] Accuracy is 0.25% + 600 mV with relay option 760 or 761 installed.
[6] In Current priority mode, minimum delay is 23 ms without relays and 45 ms with relay Option 760.

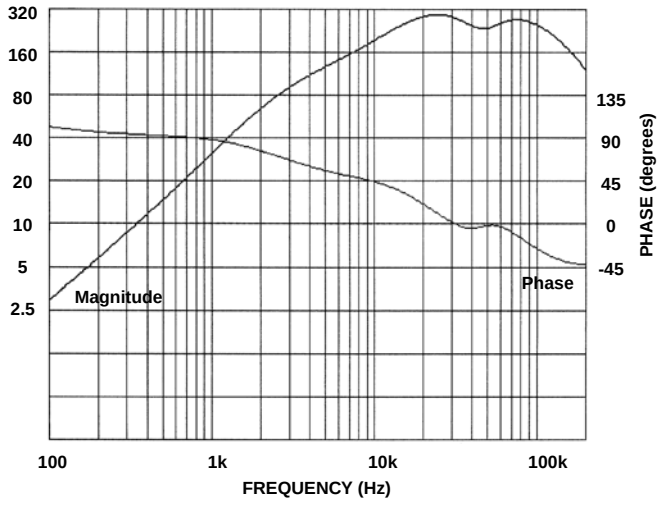
Autoranging Characteristic



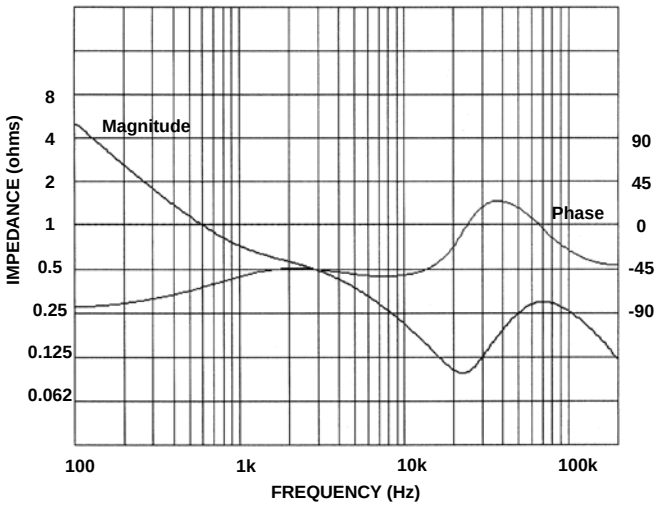
Output Impedance Graphs



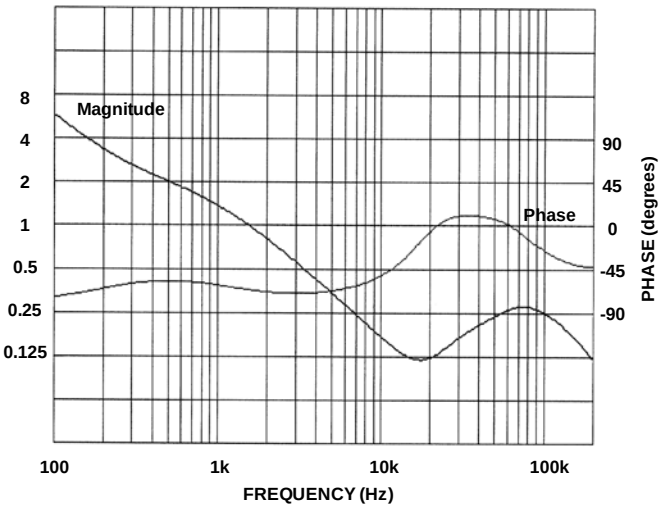
Model N6752A, CV Mode, @50V, 2A



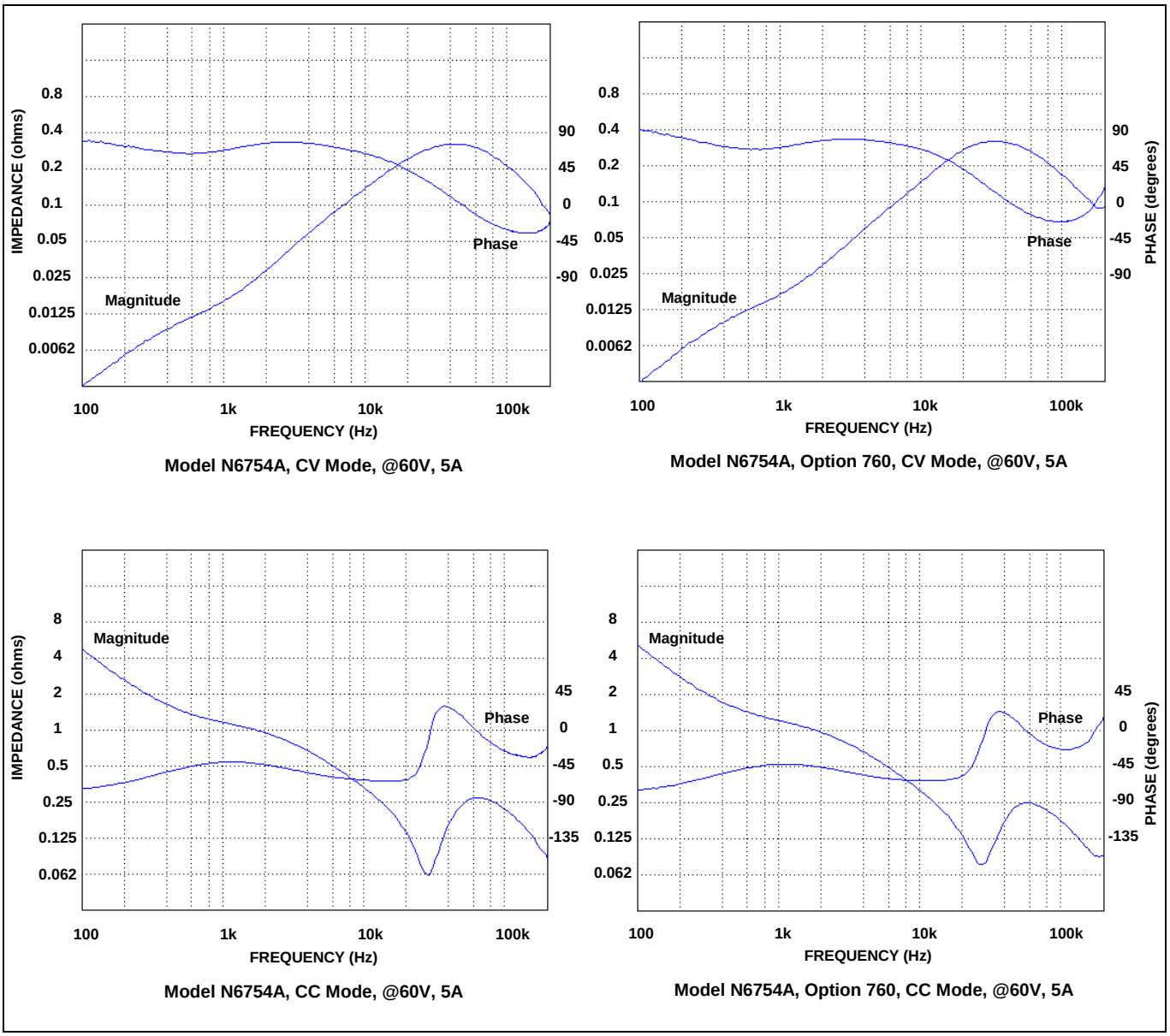
Model N6762A, CV Mode, @50V, 2A



Model N6752A, CC Mode, @50V, 2A



Model N6762A, CC Mode, @50V, 2A


IMPEDANCE (ohms)
0.8
0.4
0.2
0.1
0.05
0.025
0.0125
0.0062
Magnitude
Phase
90
45
0
-45
-90
100
1k
10k
100k
FREQUENCY (Hz)
PHASE (degrees)
Model N6754A, CV Mode, @60V, 5A
Model N6754A, Option 760, CV Mode, @60V, 5A
8
4
2
1
0.5
0.25
0.125
0.062
-135
Model N6754A, CC Mode, @60V, 5A
Model N6754A, Option 760, CC Mode, @60V, 5A

Arbitrary Waveform Generator Maximum Bandwidth

NOTE The information in this section only applies when the power modules are installed in an Agilent N6705 DC Power Analyzer.

The following tables characterize the maximum bandwidth of the arbitrary waveform generator. The maximum bandwidth is based on a sine wave into a resistive load and apples to any output current. The following definitions apply in the frequency tables:

V p-p = Voltage peak-to-peak

3 dB max. = Max. frequency where the voltage drops to 3 dB below its setting

THD 3 dB = The total harmonic distortion at 3 dB max. frequency

THD < 1.5% = The frequency below which the THD is less than 1.5%.

Voltage	3 dB max	THD 3 dB	THD < 1.5%	3 dB max	THD 3 dB	THD < 1.5%
	N6751 & N6752A			N6761 & N6762A		
0.5 Vp-p	4000 Hz	12%	440 Hz	4500 Hz	14%	450 Hz
1.0 Vp-p	2200 Hz	21%	440 Hz	3600 Hz	14%	450 Hz
2.5 Vp-p	900 Hz	25%	265 Hz	1300 Hz	25%	340 Hz
5.0 Vp-p	500 Hz	27%	160 Hz	600 Hz	25%	250 Hz
50.0 Vp-p	340 Hz	22%	25 Hz	350 Hz	22%	30 Hz
	N6754A					
0.6 Vp-p	3600 Hz	6.0%	2100 Hz			
1.2 Vp-p	2600 Hz	10%	1280 Hz			
3.0 Vp-p	1700 Hz	17%	800 Hz			
6.0 Vp-p	1000 Hz	17%	480 Hz			
60.0 Vp-p	340 Hz	22%	30 Hz			

Chapter 3
Agilent Models N677xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55°C after a 30-minute warm-up period. Specifications apply at the output terminals, with each module's sense terminals internally connected to its output terminals (local sensing).

Refer to the Agilent N6700 or N6705 Service Guide for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or by type testing. All supplemental characteristics are typical unless otherwise noted.

Performance Specifications

	N6773A	N6774A	N6775A	N6776A
DC Output Ratings:				
Voltage	20 V	35 V	60 V	100 V
Current NOTE 1	15 A NOTE 2	8.5 A	5 A	3 A
Power	300 W	300W	300 W	300 W
Output Ripple and Noise (PARD): (from 20 Hz – 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 Effect (Regulation): (Applies for any output load change, with a maximum load-lead drop of 1V/lead. The load lead drop reduces the maximum available voltage at the load.)				
Voltage	13 mV	16 mV	24 mV	45 mV
Current	6 mA	6 mA	6 mA	6 mA
Source Effect (Regulation):				
Voltage	2 mV	4 mV	6 mV	10 mV
Current	1 mA	1 mA	1 mA	1 mA
Programming Accuracy: (@ 23 °C ±5 °C after 30 minute warm-up. Applies from minimum to maximum programming range at any load.)				
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
Voltmeter/Ammeter Measurement 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
Load Transient Recovery 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 NOTE 3	± 0.3 V NOTE 3	± 0.5 V	± 1.0 V
Time	< 250 μs	< 250 μs	< 250 μs	< 250 μs

[1] Output current is derated 1% per °C above 40°C.

[2] When relay Option 760 is installed on Model N6773A, 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.

Supplemental Characteristics

	N6773A	N6774A	N6775A	N6776A
Programming Ranges:				
Voltage	30 mV – 20.4 V	40 mV – 35.7 V	70 mV – 61.2 V	100 mV – 102 V
Current	30 mA – 15.3 A	15 mA – 8.67 A	7.5 mA – 5.1 A	4.5 mA – 3.06 A
Programming Resolution:				
Voltage	7 mV	10 mV	18 mV	28 mV
Current	9 mA	6 mA	3 mA	1.5 mA
Measurement Resolution:				
Voltage	10 mV	18 mV	30 mV	50 mV
Current	9 mA	6 mA	3 mA	1.5 mA
Programming Temperature Coefficient per °C:				
Voltage	0.01% + 0.2 mV	0.01% + 0.5 mV	0.01% + 0.5 mV	0.01% + 1 mV
Current	0.01% + 0.5 mA	0.01% + 0.5 mA	0.01% + 0.1 mA	0.01% + 0.1 mA
Measurement Temperature Coefficient per °C:				
Voltage	0.01% + 0.2 mV	0.01% + 0.2 mV	0.01% + 0.5 mV	0.01% + 0.5 mV
Current	0.01% + 0.5 mA	0.01% + 0.5 mA	0.01% + 0.05 mA	0.01% + 0.05 mA
Oscilloscope Measurement Accuracy: (@ 23 °C ±5 °C; accuracy of any individual point in the trace) NOTE 1				
Voltage	0.1% + 45 mV	0.1% + 75 mV	0.1% + 120 mV	0.1% + 160 mV
Current – Correction On	0.15% + 45 mA	0.15% + 27 mA	0.15% + 22 mA	0.15% + 12 mA
Current	0.15% + 35 mA	0.15% + 22 mA	0.15% + 19 mA	0.15% + 9 mA
Up-programming and Down-programming Time with full resistive load: (time from 10% to 90% of total voltage excursion; for voltage setting from 0V to full scale and full scale to 0V)	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 to 0.1% of full-scale value; for voltage setting from 0V to full scale and full scale to 0V)	100 ms	100 ms	100 ms	100 ms
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 occurrence of over-voltage condition to start of output shutdown			
Output Ripple and Noise (PARD):				
CC rms	6 mA	6 mA	6 mA	6 mA
Common Mode Noise: (from 20 Hz – 20 MHz; from either output to chassis)				
Rms	2 mA	2 mA	2 mA	2 mA
Peak-to- peak	< 20 mA	< 20 mA	< 20 mA	< 20 mA
Remote Sense Capability:	Outputs can maintain specifications with up to a 1-volt drop per load lead. The load lead drop reduces the maximum available voltage at the load.			
Series and Parallel Operation:	Identically rated outputs can be operated directly in parallel or can be connected for straight series operation. Auto-series and auto-parallel operation is not available.			
Minimum Output Turn-On Delay: (time from when any Output On command is received until the output starts turning on)				
Without relay option	32 ms	32 ms	32 ms	32 ms
With relay Option 760	58 ms	58 ms	58 ms	58 ms

[1] Correction On compensates for current flowing into the output capacitor during voltage transients. See chapter 6 for details.

Arbitrary Waveform Generator Maximum Bandwidth

NOTE The information in this section only applies when the power modules are installed in an Agilent N6705 DC Power Analyzer.

The following tables characterize the maximum bandwidth of the arbitrary waveform generator. The maximum bandwidth is based on a sine wave into a resistive load and apples to any output current. The following definitions apply in the frequency tables:

V p-p = Voltage peak-to-peak

3 dB max. = Max. frequency where the voltage drops to 3 dB below its setting

6 dB max. = Max. frequency where the voltage drops to 6 dB below its setting

THD 3 dB = The total harmonic distortion at 3 dB max. frequency

THD 6 dB = The total harmonic distortion at 6 dB max. frequency

Voltage	3 dB max	THD 3 dB	6 dB max	THD 6 dB
	N6773A			
0.2 Vp-p	125 Hz	1.5%	210 Hz	4.0%
0.4 Vp-p	125 Hz	1.5%	180 Hz	4.0%
1.0 Vp-p	75 Hz	6.0%	95 Hz	6.0%
2.0 Vp-p	42 Hz	9.0%	60 Hz	9.0%
20.0 Vp-p	20 Hz	10%	37 Hz	10%
	N6774A			
0.4 Vp-p	125 Hz	1.0%	200 Hz	1.0%
0.7 Vp-p	125 Hz	1.0%	160 Hz	3.0%
1.8 Vp-p	75 Hz	6.0%	95 Hz	6.0%
3.5 Vp-p	40 Hz	8.5%	55 Hz	8.5%
35.0 Vp-p	20 Hz	10%	37 Hz	10%
	N6775A			
0.6 Vp-p	120 Hz	1.0%	200 Hz	1.0%
1.2 Vp-p	120 Hz	1.0%	160 Hz	3.0%
3.0 Vp-p	70 Hz	5.0%	95 Hz	6.0%
6.0 Vp-p	40 Hz	8.5%	55 Hz	8.5%
60.0 Vp-p	20 Hz	10%	35 Hz	10%
	N6776A			
1.0 Vp-p	75 Hz	1.0%	160 Hz	1.0%
2.0 Vp-p	75 Hz	1.0%	150 Hz	3.0%
5.0 Vp-p	55 Hz	4.0%	75 Hz	6.0%
10.0 Vp-p	35 Hz	8.0%	45 Hz	8.0%
100 Vp-p	N/A	N/A	35 Hz	8.0%

Chapter 4
Agilent Models N678xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55°C after a 30-minute warm-up period. Unless otherwise noted, specifications apply at the mainframe output terminals, with each module's sense terminals internally connected to its output terminals (local sensing).

Refer to the Agilent N6700 or N6705 Service Guide for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or by type testing. All supplemental characteristics are typical unless otherwise noted.

Performance 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
N6781A Auxiliary Voltage Measurement Input:			
Voltage rating	± 20 V	N/A	N/A
Output Voltage Ripple & Noise (PARD) from 20 Hz – 20 MHz:			
(Measured at front panel terminals, with no load, in Voltage Priority mode. Output Bandwidth setting = Low)			
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 range	700 µV	700 µV	700 µV
Voltage, 6 V range	400 µV	400 µV	400 µV
Current, 3 A range	100 µA	100 µA	100 µA
Current, 1 A range	50 µA	50 µA	50 µA
Current 300 mA range	50 µA	50 µA	N/A
Current 100 mA & 10 mA range [1]	N/A	N/A	1 µA
Source Effect (Line regulation):			
Voltage, all ranges	300 µV	300 µV	300 µV
Current, all ranges	60 µA	60 µA	60 µA
Programming Accuracy @ 23 °C ±5 °C:			
(After 30 minute warm-up; from minimum to maximum programming range at any load.)			
Voltage, 20 V range	0.025% + 1.8 mV	0.025% + 1.8 mV	0.025% + 1.8 mV
Voltage, 6V range	0.025% + 600 µV	0.025% + 600 µV	0.025% + 600 µV
Voltage 600 mV range [1]	0.025% + 200 µV	0.025% + 200 µV	0.025% + 200 µV
Current 3 A & 1 A range	0.04% + 300 µA	0.04% + 300 µA	0.04% + 300 µA
Current 300 mA range [1]	0.03% + 150 µA	0.03% + 150 µA	N/A
Current 100 mA range [1]	N/A	N/A	0.03% + 12 µA
Current 10 mA range [1]	N/A	N/A	0.025% + 5 µA
Resistance for 20 V, 1 A output range	0.1% + 3 mΩ	N/A	N/A
Resistance for 6 V, 3 A output range	0.1% + 1.5 mΩ	N/A	N/A
Measurement Accuracy @ 23 °C ±5 °C:			
Voltage 20 V range	0.025% + 1.2 mV	0.025% + 1.2 mV	0.025% + 1.2 mV
Voltage 1 V range	0.025% + 75 µV	0.025% + 75 µV	0.025% + 75 µV
Voltage 100 mV range	0.025% + 50 µV	0.025% + 50 µV	0.025% + 50 µV
Current 3 A range	0.03% + 250 µA	0.03% + 250 µA	0.03% + 250 µA
Current 100 mA range	0.025% + 10 µA	0.025% + 10 µA	0.025% + 10 µA
Current 1 mA range	0.025% + 100 nA (110 nA) [2]	0.025% + 100 nA (110 nA) [2]	0.025% + 100 nA (110 nA) [2]
Current 10 µA range	0.025% + 8 nA (20 nA) [2]	0.025% + 8 nA (20 nA) [2]	0.025% + 8 nA (20 nA) [2]
N6781A Auxiliary Voltage Measurement	0.025% + 5 mV	N/A	N/A
Load Transient Response Time in Voltage Priority mode:			
(Time to recover to within settling band for a load change from 0.1 A to 0.9 A in the 20 V range; from 0.1 A to 1.5 A in the 6 V range.)			
Settling band for 20 V, 1 A output range	± 10 mV	± 10 mV	± 10 mV
Settling band for 6 V, 3 A output range	± 20 mV	± 20 mV	± 20 mV
Recovery time	≤ 35 µs	≤ 35 µs	≤ 35 µs

[1] 600 mV range is only available in Voltage Priority mode; 300 mA, 100 mA, 10 mA ranges are only available in Current Priority mode.

[2] Values in parentheses apply when power modules are installed in Agilent N6705A mainframes.

Supplemental Characteristics

	N6781A, N6782A	N6784A
Programming Range & Resolution:		
Voltage, 20 V range	0 to 20.4 V; 200 µV	-20.4 V to 20.4 V; 200 µV
Voltage, 6 V range	0 to 6.12 V; 60 µV	-6.12 V to 6.12 V; 60 µV
Voltage, 600 mV range	0 to 612 mV; 6 µV	-612 mV to 612 mV; 6 µV
Current, 3 A range	-3.06 A to 3.06 A; 50 µA	-3.06 A to 3.06 A; 50 µA
Current, 1 A range	-1.02 A to 1.02 A; 50 µA	-1.02 A to 1.02 A; 50 µA
Current, 300 mA range	-306 mA to 306 mA; 3 µA	N/A
Current, 100 mA range	N/A	-102 mA to 102 mA; 1 µA
Current, 10 mA range	N/A	-10.2 mA to 10.2 mA; 0.1 µA
N6781A Resistance Programming Range & Resolution:		
For 20 V, 1 A output range	-40mΩ to +1Ω; 0.5mΩ	N/A
For 6 V, 3 A output range	-40mΩ to +1Ω; 0.25mΩ	N/A
Programming Accuracy Temperature Coefficient (per °C):		
Voltage, 20 V range	0.002% +120uV	0.002% +120uV
Voltage, 6 V range	0.0015% +40uV	0.0015% +40uV
Voltage, 600 mV range	0.0015% +10uV	0.0015% +10uV
Current, 3 A range	0.0025% +22uA	0.0025% +22uA
Current, 1 A range	0.0025% +22uA	0.0025% +22uA
Current, 300 mA range	0.0025% +14uA	N/A
Current, 100 mA range	N/A	0.0025% +1uA
Current, 10 mA range	N/A	0.0025% +0.5 µA
Measurement Resolution:		
Voltage, 20 V range	200 µV	200 µV
Voltage, 1 V range	10 µV	10 µV
Voltage, 100 mV range	1 µV	1 µV
Current, 3 A range	50 µA	50 µA
Current, 100 mA range	1 µA	1 µA
Current, 1 mA range	10 nA	10 nA
Current, 10 µA range	0.1 nA	0.1 nA
N6781A Auxiliary Voltage Measurement Input	800 µV	N/A
Measurement Accuracy Temperature Coefficient (per °C):		
Voltage, 20 V range	0.0025% +25 uV	0.0025% +25 uV
Voltage, 1 V range	0.002% +2.5 uV	0.002% +2.5 uV
Voltage, 100 mV range	0.0025% +2.5 uV	0.0025% +2.5 uV
Current, 3 A range	0.0025% +14 uA	0.0025% +14 uA
Current, 100 mA range	0.0025% +0.4 uA	0.0025% +0.4 uA
Current, 1 mA range	0.002% +5 nA	0.002% +5 nA
Current, 10 µA range	0.002% +0.55 nA	0.002% +0.55 nA
N6781A Auxiliary Voltage Measurement Input	0.0007% +5 mV	N/A

Supplemental Characteristics (continued)

	N6781A, N6782A				N6784A			
Voltage Programming Speed & Settling Time:								
At the specified Bandwidth setting.	Low	High1	High2	High3	Low	High1	High2	High3
Rise Time (from 10% to 90% of step)								
20 V range with a 0-10 V step	300 µs	15 µs	20 µs	120 µs	300 µs	15 µs	20 µs	120 µs
6 V range with a 0-4 V step	300 µs	20 µs	22 µs	50 µs	300 µs	20 µs	22 µs	50 µs
600mV range with a 0-500 mV step	400 µs	75 µs	30 µs	50 µs	400 µs	75 µs	30 µs	50 µs
Settling Time (to 0.1% of step)								
20 V range with a 0-10 V step	850 µs	45 µs	65 µs	240 µs	850 µs	45 µs	65 µs	240 µs
6 V range with a 0-4 V step	850 µs	55 µs	65 µs	160 µs	850 µs	55 µs	65 µs	160 µs
600mV range with a 0-500 mV step	1.2 ms	220 µs	85 µs	170 µs	1.2 ms	220 µs	85 µs	170 µs
High Frequency Output Voltage Noise:								
At the specified Bandwidth setting.	Low	High1	High2	High3	Low	High1	High2	High3
CV peak-to-peak (from 20 Hz – 20 MHz;)								
20 V range with no load	12 mV	12 mV	4 mV	4 mV	12 mV	12 mV	4 mV	4 mV
6 V & 600 mV range with no load	12 mV	12 mV	4 mV	3 mV	12 mV	12 mV	4 mV	3 mV
CV rms (from 20 Hz – 20 MHz;)								
20 V range with no load	1.2 mV	1.2 mV	0.5 mV	0.5 mV	1.2 mV	1.2 mV	0.5 mV	0.5 mV
6 V & 600 mV range with no load	1 mV	1 mV	0.3 mV	0.3 mV	1 mV	1 mV	0.3 mV	0.3 mV
Low Frequency Output Voltage Noise:								
CV peak to peak (from 0.1 Hz – 10 Hz)								
20 V range	N/A				100 µV			
6 V range	N/A				50 µV			
600 mV range	N/A				20 µV			
CV rms (from 0.1 Hz – 10 Hz)								
20 V range	N/A				20 µV			
6 V range	N/A				10 µV			
600 mV range	N/A				5 µV			
Voltage Programming Small Signal Bandwidth: (All ranges)								
At the specified Bandwidth setting.	Low	High1	High2	High3	Low	High1	High2	High3
3 dB typical								
with no load cap	DC to 1.4 kHz	29 kHz	N/A	N/A	1.4 kHz	29 kHz	N/A	N/A
with 1µF load cap	DC to N/A	60 kHz	21 kHz	N/A	N/A	60 kHz	21 kHz	N/A
with 6.8µF load cap	DC to N/A	N/A	40 kHz	8.6 kHz	N/A	N/A	40 kHz	8.6 kHz
with 150µF load cap	DC to 2.9 kHz	N/A	N/A	14 kHz	2.9 kHz	N/A	N/A	14 kHz
1 dB typical								
with no load cap	DC to 700 Hz	15 kHz	N/A	N/A	700 Hz	15 kHz	N/A	N/A
with 1µF load cap	DC to N/A	22 kHz	11 kHz	N/A	N/A	22 kHz	11 kHz	N/A
with 6.8µF load cap	DC to N/A	N/A	14 kHz	4.3 kHz	N/A	N/A	14 kHz	4.3 kHz
with 150µF load cap	DC to 1 kHz	N/A	N/A	6 kHz	1 kHz	N/A	N/A	6 kHz
Voltage Measurement Noise:								
Peak value with a 5.12 µs time interval								
20 V range	3 mV				3 mV			
1 V range	250 µV				250 µV			
100 mV range	50 µV				50 µV			

Supplemental Characteristics (continued)

	N6781A, N6782A				N6784A			
Voltage Measurement Settling Time: (All ranges)								
Settling Time with no range change	40 µs				40 µs			
Voltage Measurement Small Signal Bandwidth: (All ranges)								
3 db typical with seamless ranging Off	DC to 30 kHz				DC to 30 kHz			
with seamless ranging On	DC to 27 kHz				N/A			
1 db typical with seamless ranging Off	DC to 17 kHz				DC to 17 kHz			
with Seamless ranging On	DC to 15 kHz				N/A			
N6781A Auxiliary Voltage Measurement Input:								
Differential input resistance	10 MΩ				N/A			
Maximum continuous differential input without damage	± 60 V				N/A			
Maximum voltage from chassis common	± 240 VDC				N/A			
Voltage Priority Transient Characteristic: (6 V range only)								
At the specified Bandwidth setting.	Low	High1	High2	High3	Low	High1	High2	High3
At the specified Settling band.	40 mV	50 mV	30 mV	20 mV	40 mV	50 mV	30 mV	20 mV
Recovery time								
with no load cap	30 µs	10 µs	N/A	N/A	30 µs	10 µs	N/A	N/A
with 1µF load cap	N/A	20 µs	10 µs	N/A	N/A	20 µs	10 µs	N/A
with 6.8µF load cap	N/A	N/A	25 µs	15 µs	N/A	N/A	25 µs	15 µs
with 150µF load cap	140 µs	N/A	N/A	35 µs	140 µs	N/A	N/A	35 µs
Current Programming Speed & Settling Time:								
Rise Time (from 10% to 90% of step)								
3 A range with a 0-3 A step	2.8 µs				2.8 µs			
1 A range with a 0-1 A step	3.2 µs				3.2 µs			
300 mA range with a 0-300mA step	3.5 µs				N/A			
100 mA range with a 0-100mA step	N/A				4 µs			
10 mA range with a 0-10mA step	N/A				5 µs			
Settling Time (to 0.1% of step)								
3 A range with a 0-3 A step	30 µs				30 µs			
1 A range with a 0-1 A step	30 µs				30 µs			
300 mA range with a 0-300mA step	40 µs				N/A			
100 mA range with a 0-100mA step	N/A				30 µs			
10 mA range with a 0-10mA step	N/A				30 µs			
High Frequency Output Current Noise: (All ranges)								
CC rms (from 20 Hz – 20 MHz;)	200 µA				200 µA			
Low Frequency Output Current Noise:								
CC rms (from 0.1 Hz – 10 Hz)								
3 A & 1 A ranges	N/A				2 µA			
100 mA range	N/A				50 nA			
Current Programming Small Signal Bandwidth: (All ranges)								
3 dB - for all except 100 mA & 10 mA ranges	DC to 120 kHz				DC to 120 kHz			
- for 100 mA & 10 mA ranges	N/A				DC to 100 kHz			
1 dB - for all except 100 mA & 10 mA ranges	DC to 75 kHz				DC to 75 kHz			
- for 100 mA & 10 mA ranges	N/A				DC to 50 kHz			

Supplemental Characteristics (continued)

	N6781A, N6782A	N6784A
Current Measurement Noise:		
Peak value		
3 A range with a 5.12 µs time interval	400 µA	400 µA
100 mA range with a 5.12 µs time interval	20 µA	20 µA
1 mA range with a 5.12 µs time interval	2 µA	2 µA
10 µA range with a 5.12 µs time interval	20 nA	20 nA
Current Measurement Settling Time:		
Settling Time with no range change or when up-ranging		
3 A range	45 µs	45 µs
100 mA range	45 µs	45 µs
1 mA range	0.5 ms	0.5 ms
10 µA range (up- ranging N/A)	1.5 ms	1.5 ms
Settling Time when down-ranging		
down-ranging to 100 mA range	45 µs	45 µs
down-ranging to 1 mA range	200 µs	200 µs
down-ranging to 10 µA range	3.5 ms	3.5 ms
Current Measurement Small Signal Bandwidth: [1]		
3 dB typical with seamless ranging Off		
3 A range	DC to 29 kHz	DC to 27 kHz
100 mA range	DC to 29 kHz	DC to 27 kHz
1 mA range	DC to 10 kHz	DC to 10 kHz
10 µA range	DC to 750 Hz	DC to 750 Hz
3 dB typical with seamless ranging On		
3 A range	DC to 26 kHz	N/A
100 mA range	DC to 26 kHz	N/A
1 mA range	DC to 10 kHz	N/A
10 µA range	N/A	N/A
1 dB typical with seamless ranging Off		
3 A range	DC to 16 kHz	DC to 16 kHz
100 mA range	DC to 16 kHz	DC to 16 kHz
1 mA range	DC to 6 kHz	DC to 6.5 kHz
10 µA range	DC to 400 Hz	DC to 400 Hz
1 dB typical with seamless ranging On		
3 A range	DC to 14 kHz	N/A
100 mA range	DC to 14 kHz	N/A
1 mA range	DC to 6 kHz	N/A
10 µA range	N/A	N/A
Common Mode Current from 20 Hz – 20 MHz: (With –output connected to chassis)		
CC peak-to-peak	< 1 mA	< 1 mA
CC rms	<100 µA	<100 µA

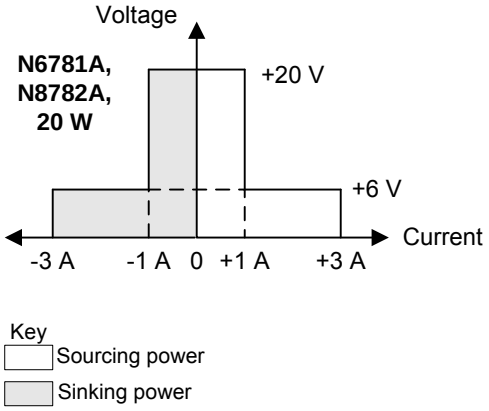
Note 1: When using an Agilent N6705A mainframe and connecting through the front panel binding posts, additional output capacitance causes large measurement peaking/overshoots when the load impedance is greater than ~1 kΩ. This does not apply to Agilent N6705B mainframes. When using an N6705A or N6705B mainframe and connecting **directly** to the module connector, there are slight measurement peaking/overshoots when the load impedance is greater than ~10 kΩ.

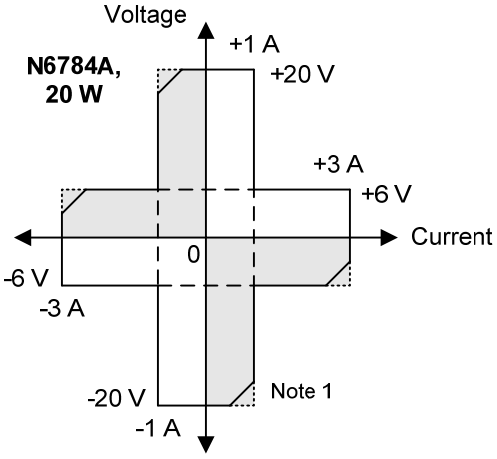
Supplemental Characteristics (continued)

	N6781A, N6782A	N6784A
Current Priority Transient Characteristic: (3 A range)		
Voltage step	1 V to 4 V	1 V to 4 V
Current settling band	5 mA	5 mA
Recovery time	12 µs (24 µs) [2]	12 µs (24 µs) [2]
Current Priority Transient Characteristic: (1 A range)		
Voltage step	0.5 V to 20 V	0.5 V to 20 V
Current settling band	10 mA	10 mA
Recovery time	12 µs (24 µs) [2]	12 µs (24 µs) [2]
Over-voltage Protection:		
Accuracy	0.05% + 20 mV	0.05% + 20 mV
Maximum setting	24 V	24 V
Response time (from occurrence of over-voltage to start of shutdown)	<30 µs	<30 µs
Remote Sense Capability: Outputs can maintain specifications with up to a 1-volt drop per load lead. The load lead drop reduces the maximum available voltage at the load.		
Parallel/Series Operation: Not supported		
Minimum Output Turn-on Delay: (Time from when any Output On command is received until the output starts turning on.)		
With output turn-off mode set to Low impedance	25.6 ms	25.6 ms
With output turn-off mode set to High impedance	24.7 ms	24.7 ms

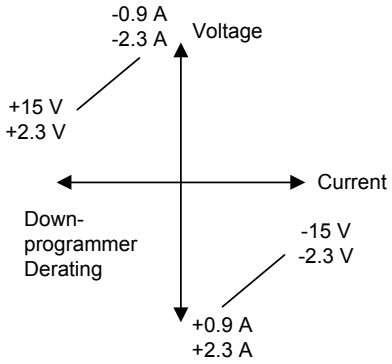
Note 2: Values in parentheses apply when power modules are installed in Agilent N6705A mainframes.

Output Quadrant Characteristic

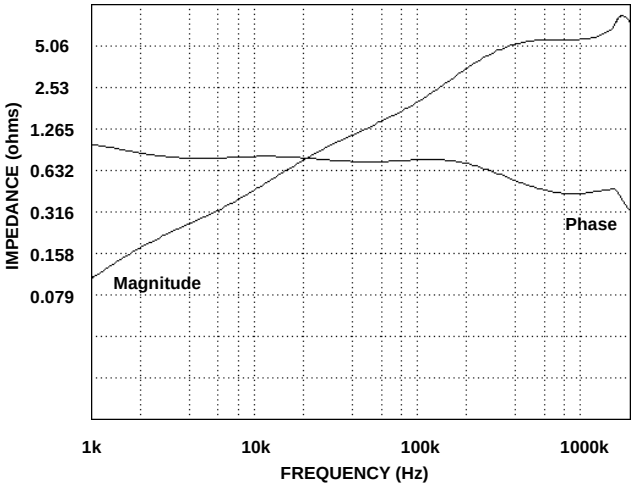




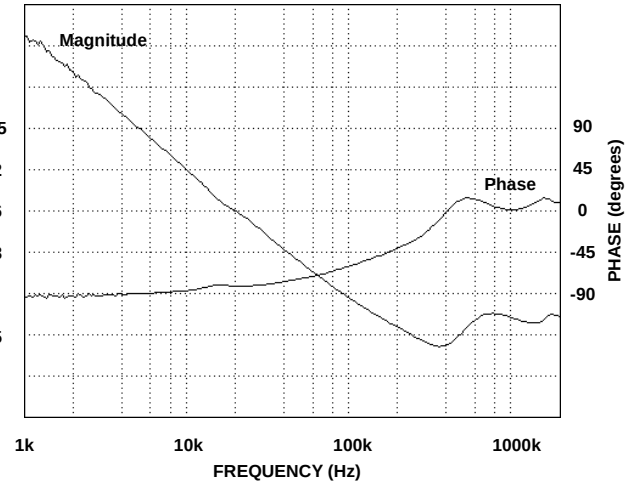
Note 1. When sinking power, Agilent Model N6784A can operate at the maximum rated output power for only a limited amount of time. The unit monitors the temperature of the internal power devices and latches the output off if the output power has exceeded its safe limits. A protect clear is required to resume normal operation. The condition is annunciated by the OT status bit. Refer to the downprogrammer derating figure for the values of the safe limit boundaries.



Output Impedance Graphs



Models N678xA, CV Mode, Bandwidth=LOW, @20V, 1A



Models N678xA, CC Mode, @20V, 1A