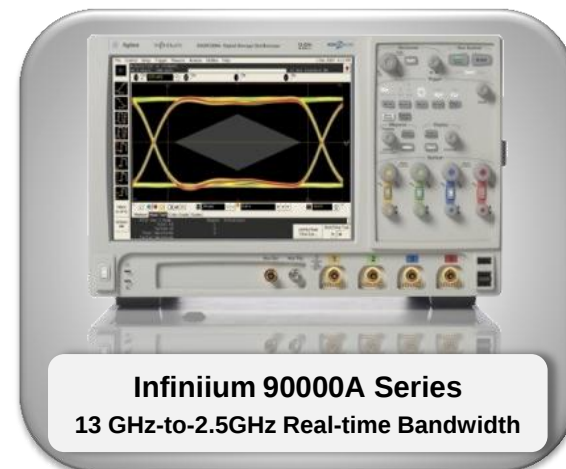




Infiniium 86100D DCA-X
Optical/Electrical Sampling Scopes



Infiniium 90000 X-Series
32 GHz-to-16 GHz Real-time Bandwidth



Infiniium 90000A Series
13 GHz-to-2.5GHz Real-time Bandwidth



Infiniium DSO/MSO 9000A
4 GHz-to-600 MHz Real-time Bandwidth



InfiniiVision DSO/MSO 7000B
1 GHz-to-100 MHz Real-time Bandwidth



InfiniiVision DSO/MSO X-Series
500 MHz-to-70 MHz Real-time Bandwidth

Infiniium 90000 X-Series DSO/DSA

True analog bandwidth that delivers



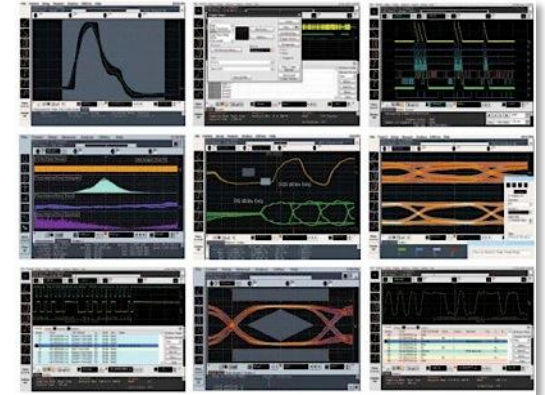
The highest measurement accuracy

- So you don't waste your jitter budget



The industry's first 30 GHz probing system

- Get your highest measurement performance – all of the way to the probe tip



The most comprehensive measurement software

- Faster insight into problem areas of your design

www.agilent.com - Infiniium 90000 X-Series



Agilent Technologies



Infiniium 90000 X-Series Oscilloscopes

True analog bandwidth that delivers



DSOX/DSAX Model	93204A	92804A	92504A	92004A	91604A
Analog Bandwidth	33 GHz	28 GHz	25 GHz	20 GHz	16 GHz
Sample Rate (2/4 ch)	80 GSa/s / 40 GSa/s				
Standard Memory	20 Mpts on all channels (50 Mpts for DSAX models)				
Maximum Memory	2 Gpts on all channels / 4 Gpts segmented memory				
Noise @ 100 mV/div	3.98 mVrms	3.70 mVrms	3.35 mVrms	2.85 mVrms	2.55 mVrms
Jitter Measurement Floor	150 fs				
Base Price (DSO/DSA)	\$266,000/ \$286,000	\$232,780/ \$245,000	\$204,970/ \$217,000	\$161,000/ \$178,000	\$137,550/ \$148,920
Max Probe Bandwidth	30 GHz	28 GHz	25 GHz	20 GHz	16 GHz
Upgradeable Bandwidth	Yes – scope and probes				N/A

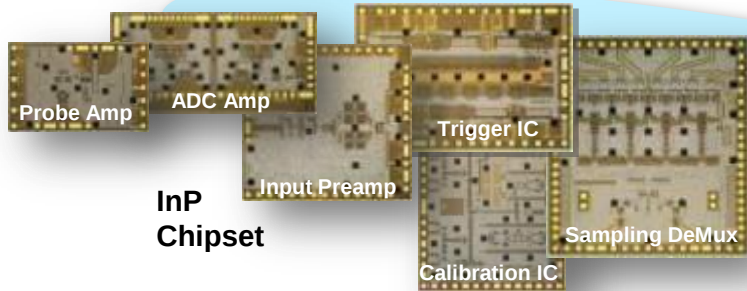
DSAX models include 20 Mpts, SDA, EZJIT+, NR



Agilent Technologies

The Highest Measurement Accuracy

Delivering innovative solutions



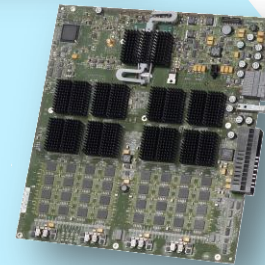
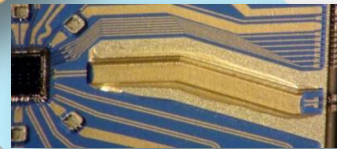
Differentiating Technology...

- Exclusive 33 GHz InP chipset
- Packaged for highest signal integrity
- Pipelined A/D architecture

Enables Differentiating Performance...

- True-analog bandwidth to 33 GHz
- Industry leading low-noise & jitter
- Industry's only 30 GHz probing system

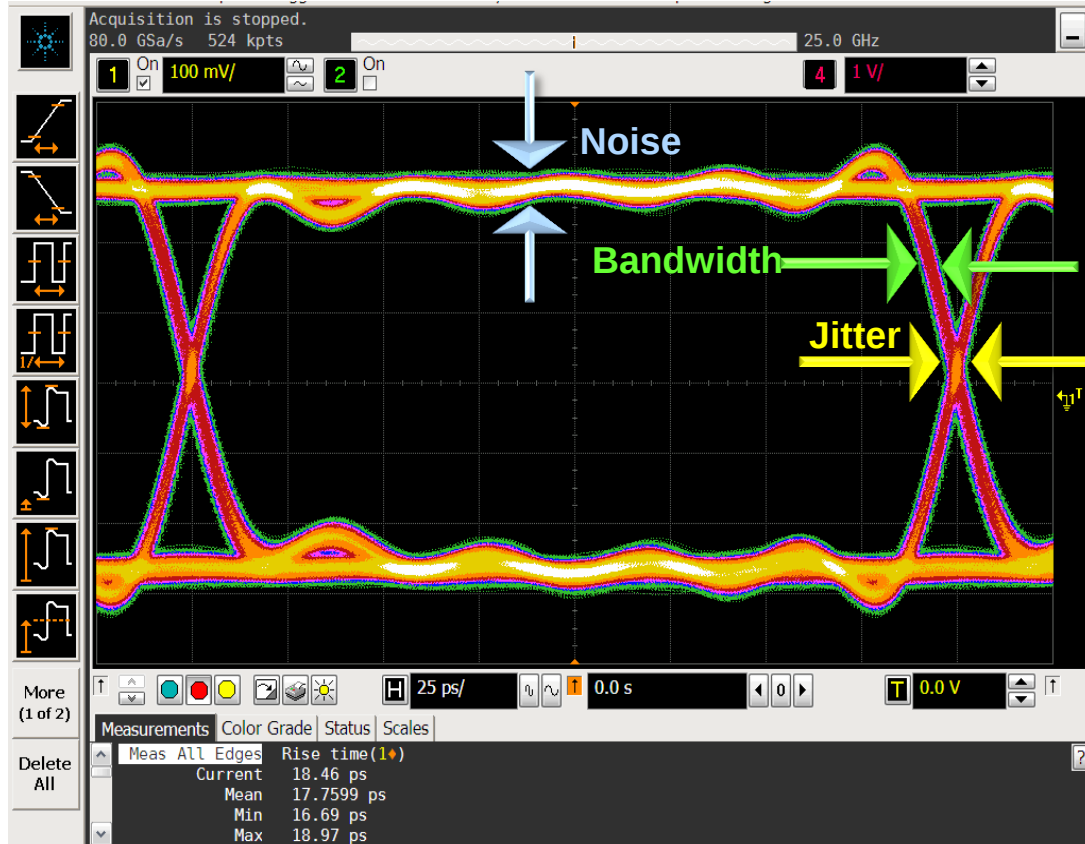
In The World's Fastest and Most Accurate Scope



Agilent Technologies

The Highest Measurement Accuracy

3 specifications to consider



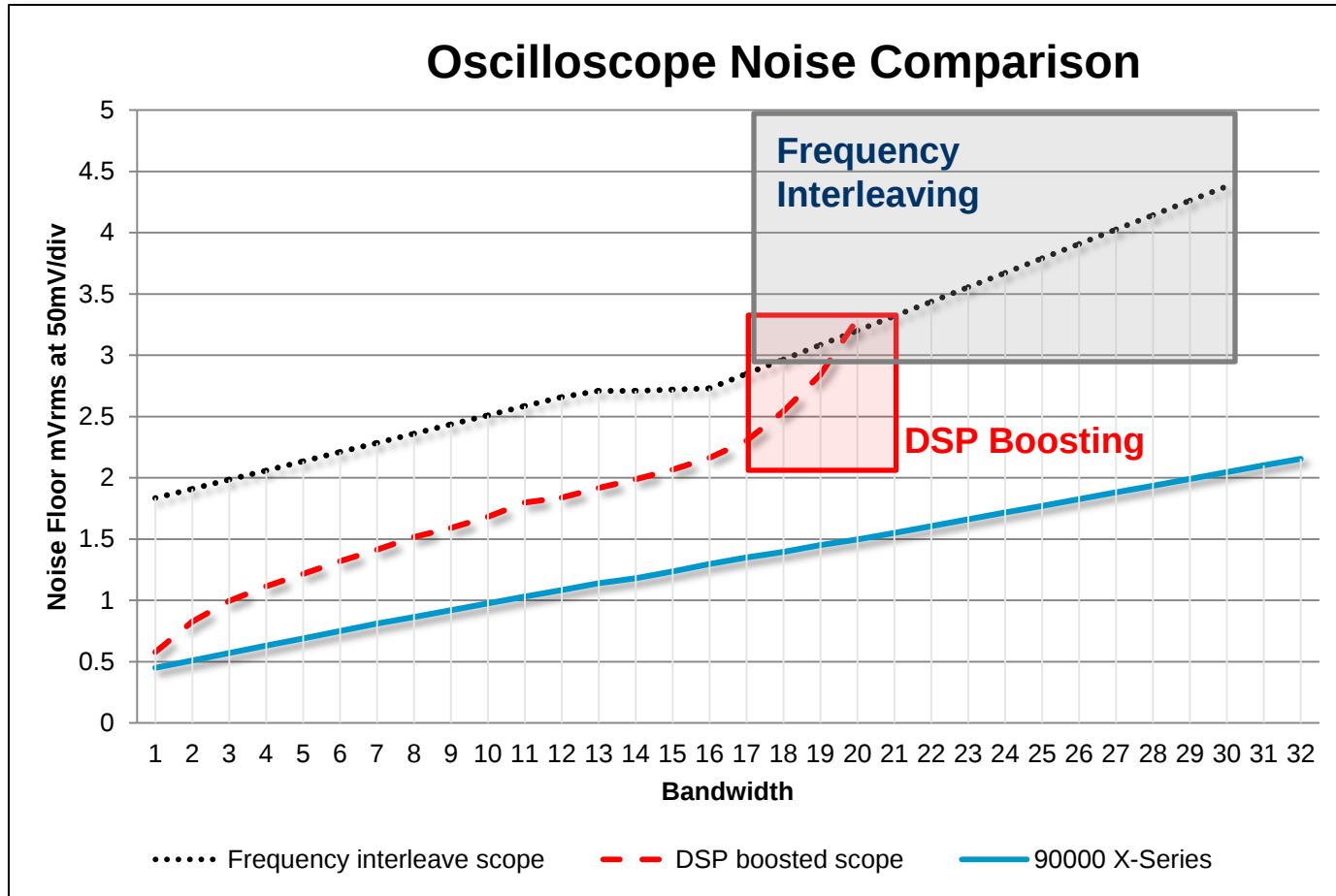
Measurement accuracy requires precise placement of signal transition points

- Bandwidth – for accurate edge depiction
- Noise – for voltage threshold accuracy
- Jitter floor – putting it all together



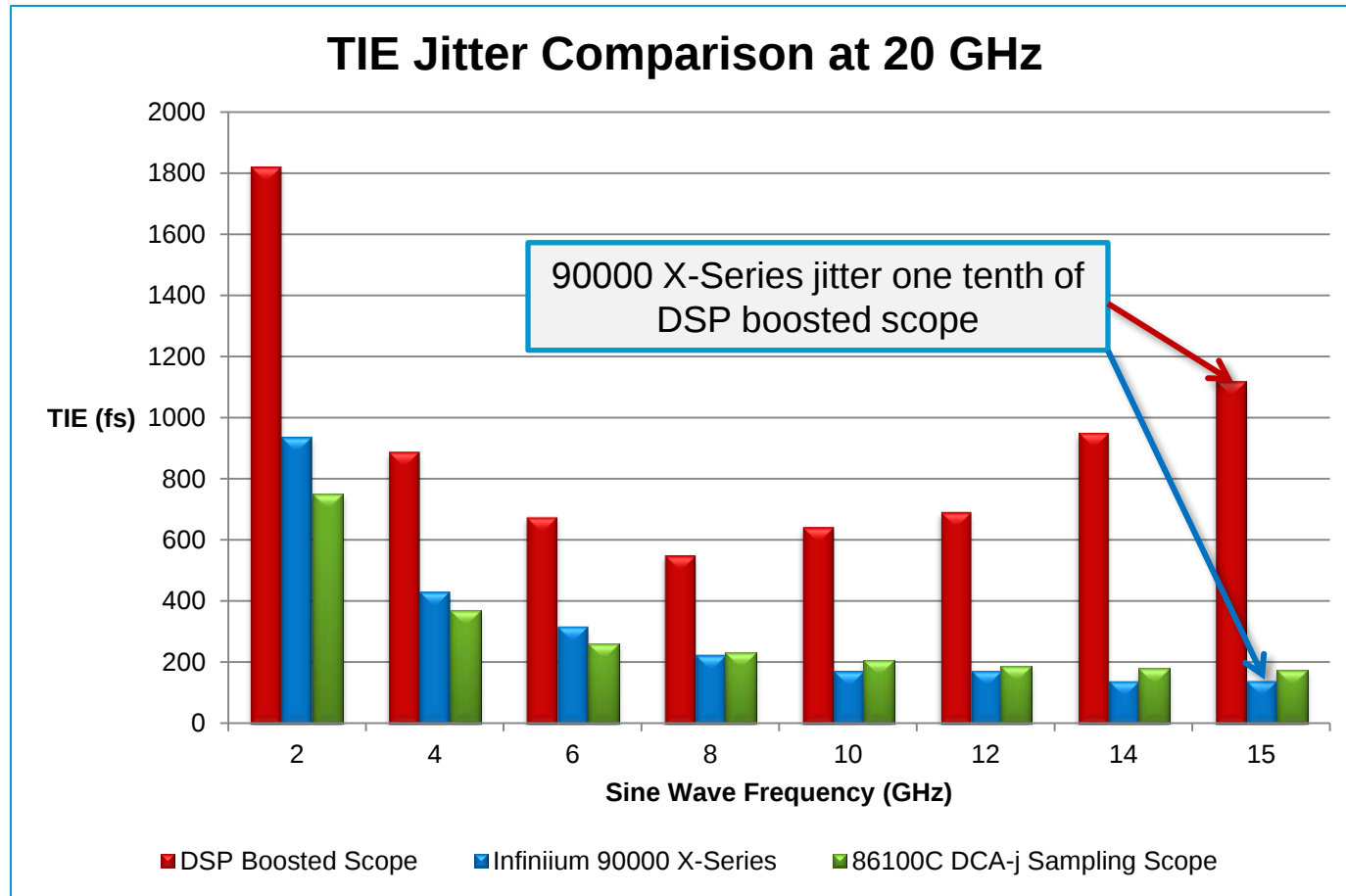
The Highest Measurement Accuracy

Noise floor comparisons



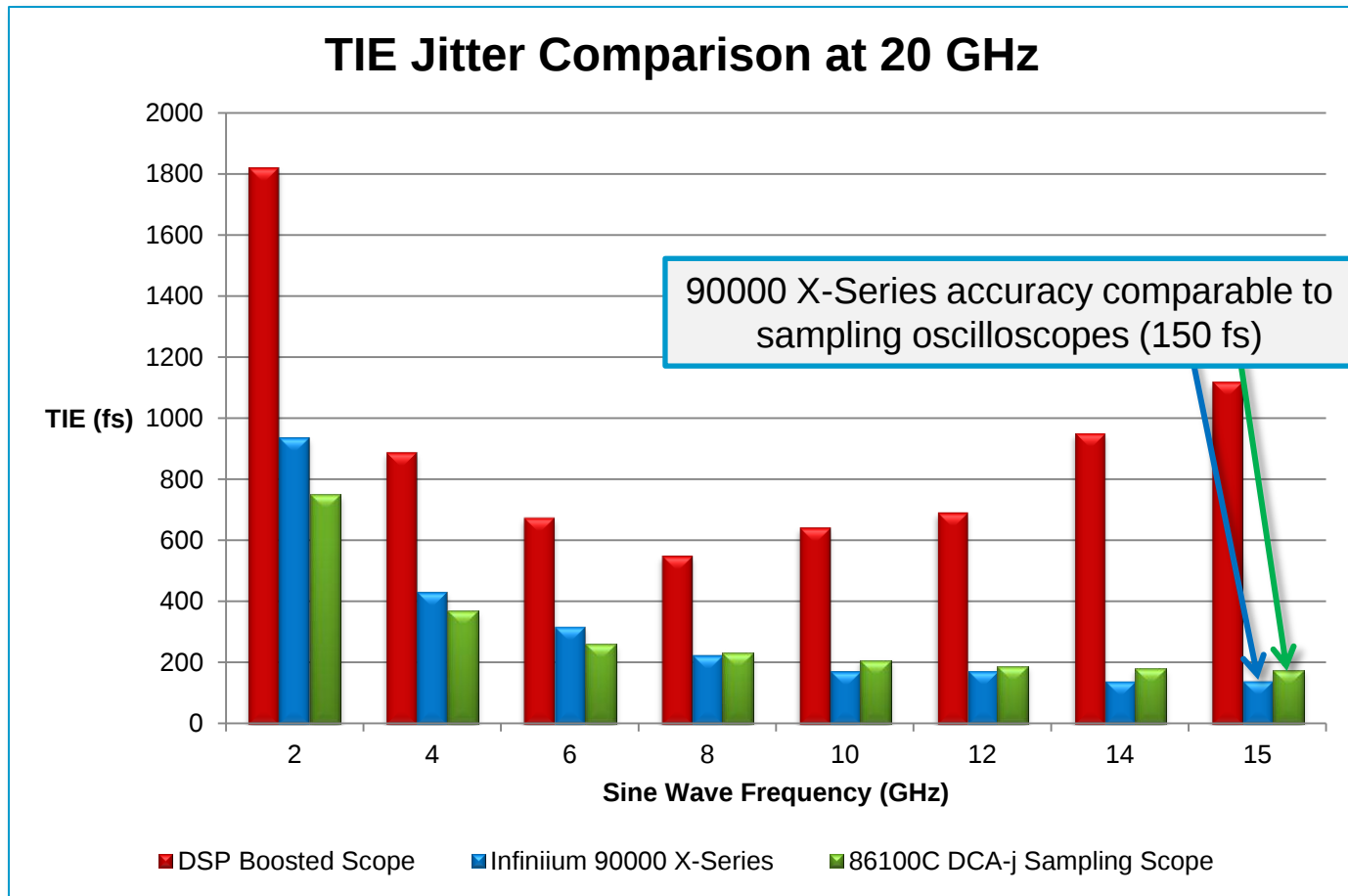
The Highest Measurement Accuracy

Scope jitter comparisons



The Highest Measurement Accuracy

Scope jitter comparisons



The Industry's First 30 GHz Probing System

InfiniiMax III probe amp/probe head architecture

Probe Amplifier

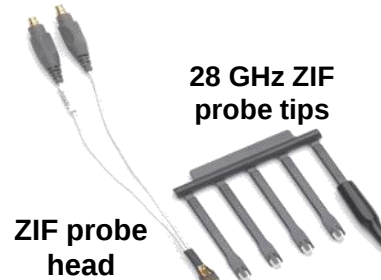


Performance
verification and
de-skew fixture



Probe Heads

30 GHz Browser
with LED Headlight



16 GHz solder-in
probe head



28 GHz
2.92mm/3.5mm/SMA
probe head



Probe Adapters

Sampling scope
adapter



High impedance
probe adapter



Precision BNC 50
ohm adapter
adapter



Agilent Technologies



The Most Comprehensive Measurement Software

Analysis

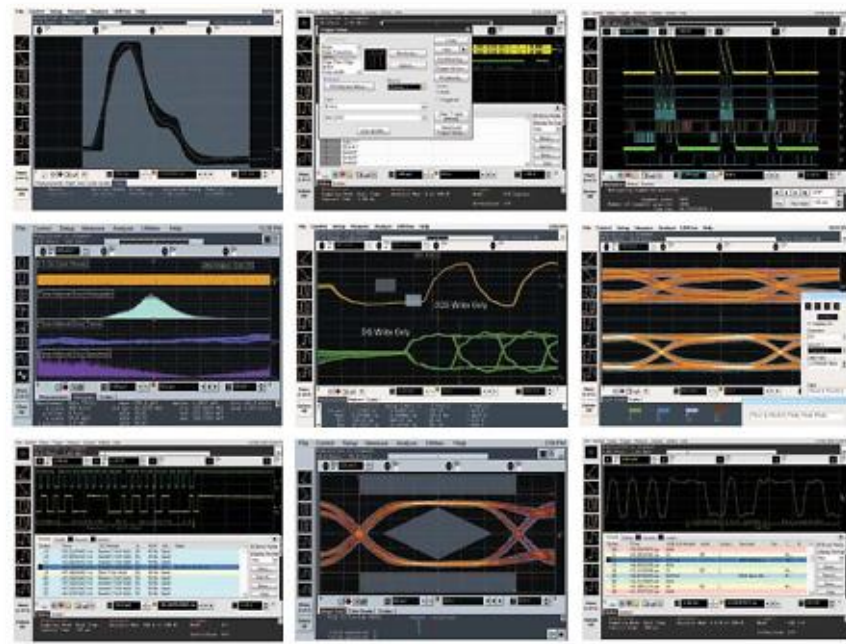
- EZJIT+ jitter analysis
- Serial analysis/clock recovery
- Serial data equalization
- Signal de-embedding
- MATLAB

Compliance Testing

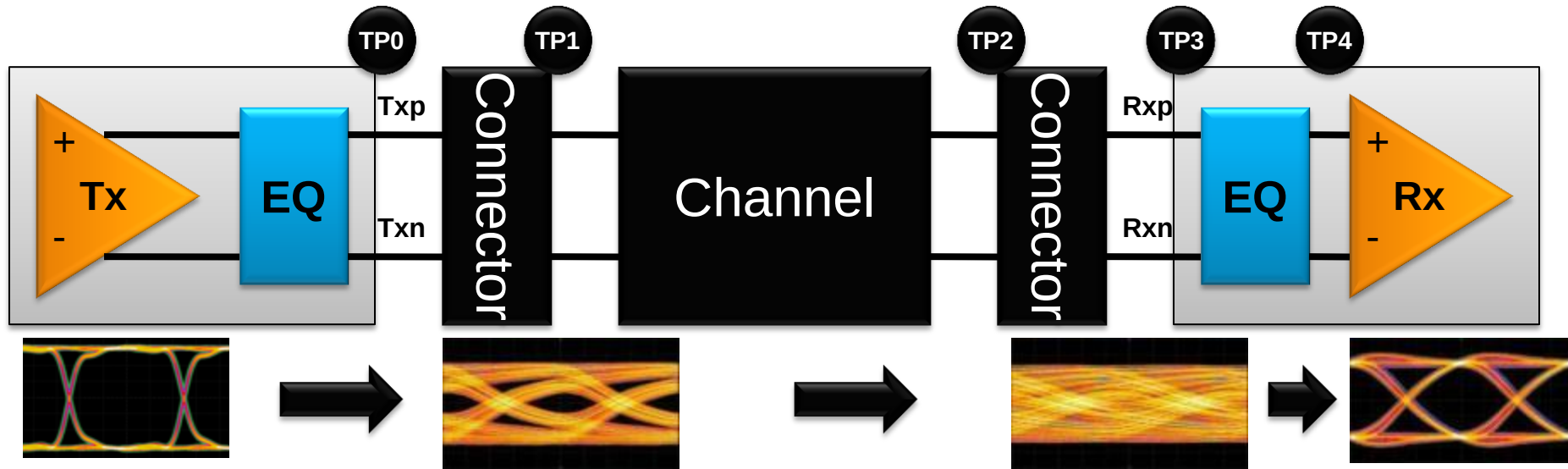
- USB SuperSpeed 3.0
- PCI Express
- DDR1/2/3
- SAS/SATA
- HDMI
- DisplayPort

Protocol Analysis

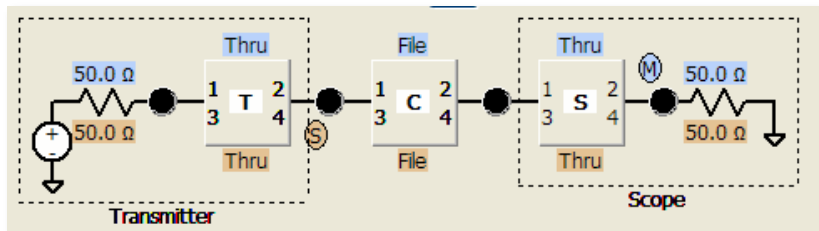
- USB
- PCI Express
- SAS/SATA
- I2C/SPI
- MIPI D-PHY



InfiniiSim hardware accelerated de-embedding



Combine measurements and transmission line models to view simulated scope measurements at any location in your design



Intuitive GUI speeds setup

Combine measurements and models
to view and measure waveforms at
any location in your design.



The Most Comprehensive Measurement Software

First-to-market compliance applications

Memory
Perry Keller

USB
Jim Choate

Computer
Rick Eads

Storage
Min Jie Chong

Consumer Electronics
Brian Fetz

Board of Directors
JEDEC

PHY C&I Chair
WiMedia

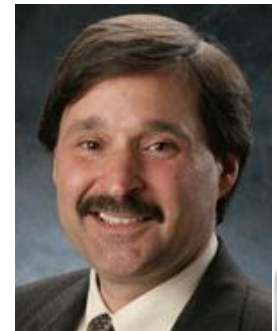
Technical Lead
USB-IF Compliance
Committee

Primary Representative
WiMedia Compliance
Review Board

Board of Directors
PCI-SIG

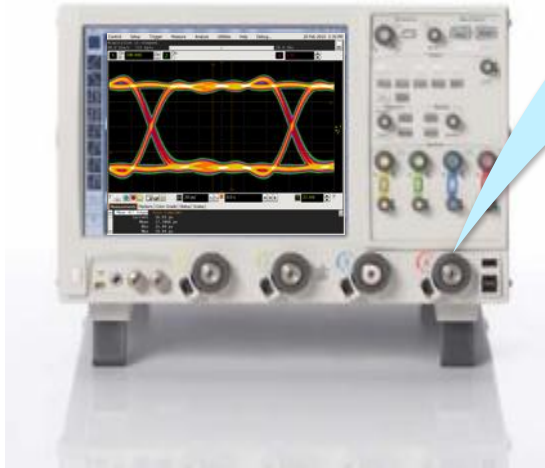
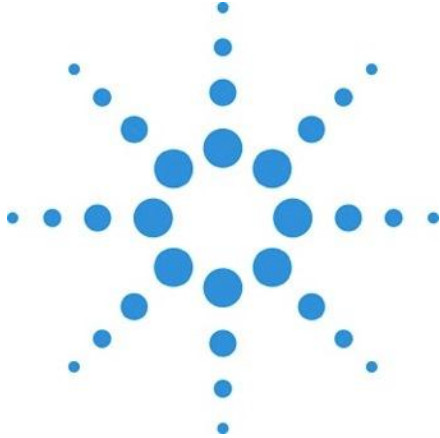
Contributor
Serial ATA Working
Group

Board of Directors
VESA



Agilent Technologies

Why Buy the Agilent Infiniium 90000 X-Series?



The Highest Measurement Accuracy

So you don't waste your jitter budget

The Industry's First 30 GHz Probing System

So that you get the highest measurement performance – all the way to the probe tip

The Most Comprehensive Measurement Software

Faster insight into problem areas of your design

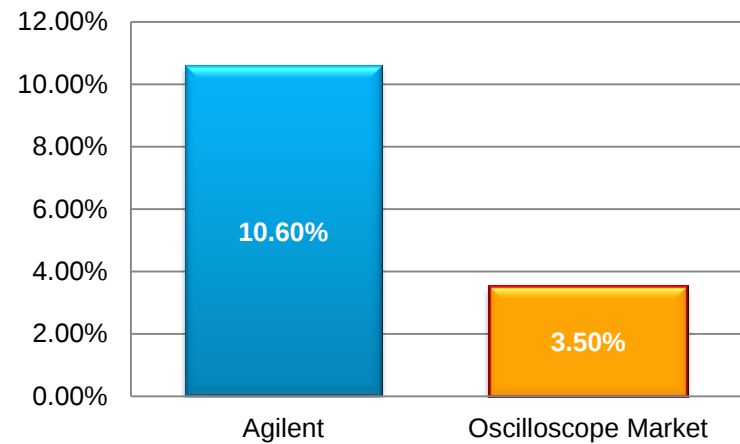


Agilent Technologies



Fastest Growing Scope Company

Oscilloscope Market Growth
Source: Prime Data (2002-2010) CAGR*



Entry



Handheld
U1600B

USB
U2700

InfiniiVision Series



2000X
DSO/MSO

3000X
DSO/MSO

6000A
DSO/MSO

7000B
DSO/MSO

Infiniium Series



9000A
DSO/MSO

90000A
DSO/DSA

90000X
DSO/DSA

DCA-X
Sampling



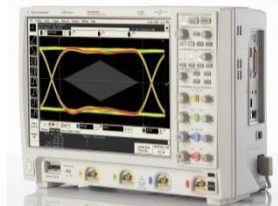
Buy the Best. Get Rewarded.



Begins
Sept 1, 2011
Ends
Feb 29, 2012

Purchase any of the following “parent” products:

Eligible Product Families	Models
<u>Any</u> PXA Signal Analyzer	N9030A
<u>Any</u> PNA-X Network Analyzer	N5241A/AS, N5242A/AS, N5244A/AS, N5245A/AS
<u>Any</u> Infiniium Oscilloscope	9000A, 90000A, 90000X, 86100D DCA-X



Automatically receive a free
InfiniiVision DSOX3034A 4 ch 350 MHz scope



Agilent Technologies



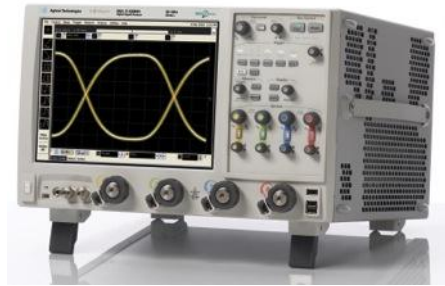
Comparison to Tektronix DPO 70000C/D



	Agilent Infiniium 90000 X-Series		Tektronix DPO/DSA70000C/D	
Bandwidth	33 GHz true analog	✓	33 GHz	✗
Analog bandwidth	33 GHz	✓	33 GHz	✗
Max upgradeable bandwidth	33 GHz	✓	20 GHz	✗
Max sample rate	80 GSa/s	✗	100 GSa/s	✓
Max 4 ch sample rate	40 GSa/s	✗	50 GSa/s	✓
Max memory depth	2 Gpts	✓	250 Mpts	✗
Noise floor	<2.1 mV at 32 GHz	✓	>3.5 mV at 20 GHz	✗
Jitter measurement floor	150 fs	✓	500 fs	✗
Effective bits	5.8 at 20 GHz	✓	4.8 at 20 GHz	✗
Max probing bandwidth	30 GHz	✓	20 GHz	✗
Mixed Signal Oscilloscope	No	✗	Yes (20 GHz and below)	✓



Comparison to LeCroy WaveMaster 8 Zi

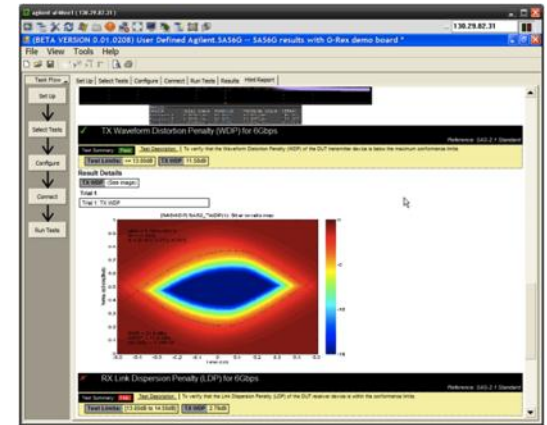
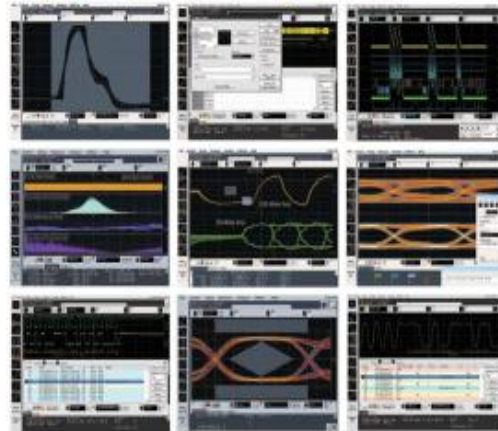


	Agilent Infiniium 90000 X-Series		LeCroy WaveMaster 8 Zi	
Maximum Bandwidth (2 ch)	33 GHz true analog	✓	30 GHz Frequency Interleaving	✗
Maximum Bandwidth (4 ch)	16 GHz	✓	16 GHz	✓
Max. sample rate	80 GSa/s	✓	80 GSa/s	✓
Max memory depth	2 Gpts (4 ch)	✓	512 Mpts (2 ch)	✗
Noise floor at 30 GHz (50 mV/div)	2.02 mV _{rms}	✓	4.38 mV _{rms}	✗
Jitter measurement floor	150 fs	✓	200 fs	✗
Max probing bandwidth	30 GHz	✓	25 GHz	✗
Compliance applications	>20	✓	<10	✗



Infiniium 90000A Series Oscilloscopes

Engineered for unmatched measurement accuracy



The highest measurement accuracy

- So you don't waste your jitter budget

Pass Compliance Tests Quickly

- Shorten product development time

Debug Your Designs with Confidence

- Get the analysis and automation that you need

www.agilent.com - Infiniium 90000A Series



Agilent Technologies



Infiniium 90000A Series DSO/DSA

Engineered for unmatched measurement accuracy



DSO/DSA Model	91304A	91204A	90804A	90604A	90404A	90254A
Analog Bandwidth	13 GHz	12 GHz	8 GHz	6 GHz	4 GHz	2.5 GHz
Sample Rate (4 ch)	40 GSa/s	40 GSa/s	40 GSa/s	20 GSa/s	20 GSa/s	20 GSa/s
Standard Memory	20 Mpts on all channels (50 Mpts for DSA models)					
Maximum Memory	1 Gpts on all channels					
Noise @ 100 mV/div	3.01 mV _{rms}	2.48 mV _{rms}	1.96 mV _{rms}	1.70 mV _{rms}	1.44 mV _{rms}	1.21 mV _{rms}
Base Price (DSO/DSA)	\$115,065/ \$128,854	\$112,661/ \$125,816	\$88,848/ \$98,269	\$71,165/ \$81,164	\$62,604/ \$69,645	\$39,350/ \$47,962
Max Probe Bandwidth	13 GHz	12 GHz	12 GHz	8 GHz	4 GHz	4 GHz
Upgradeable Bandwidth	Yes (to 33 GHz with the purchase of N5471F)					

DSA models include 50 Mpts, SDA, EZJIT+, NR



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The Highest Measurement Accuracy

3 specifications to consider



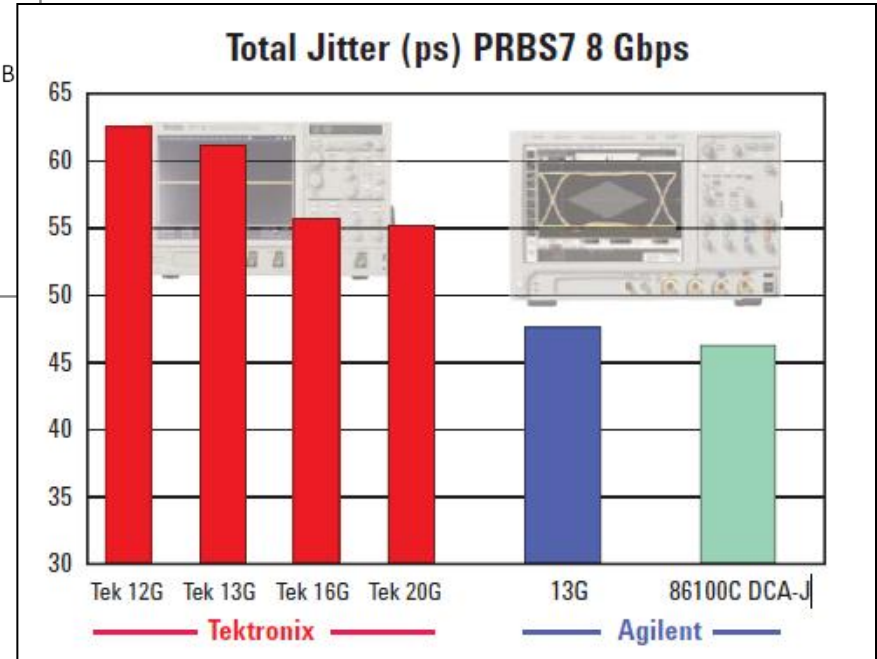
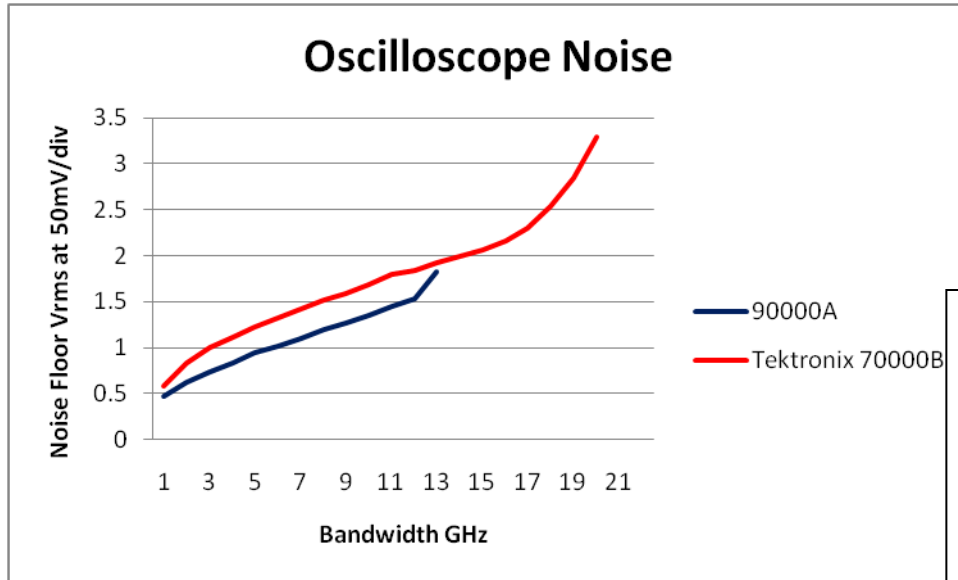
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- Bandwidth – for accurate edge depiction
- Noise – for voltage threshold accuracy
- Jitter floor – putting it all together



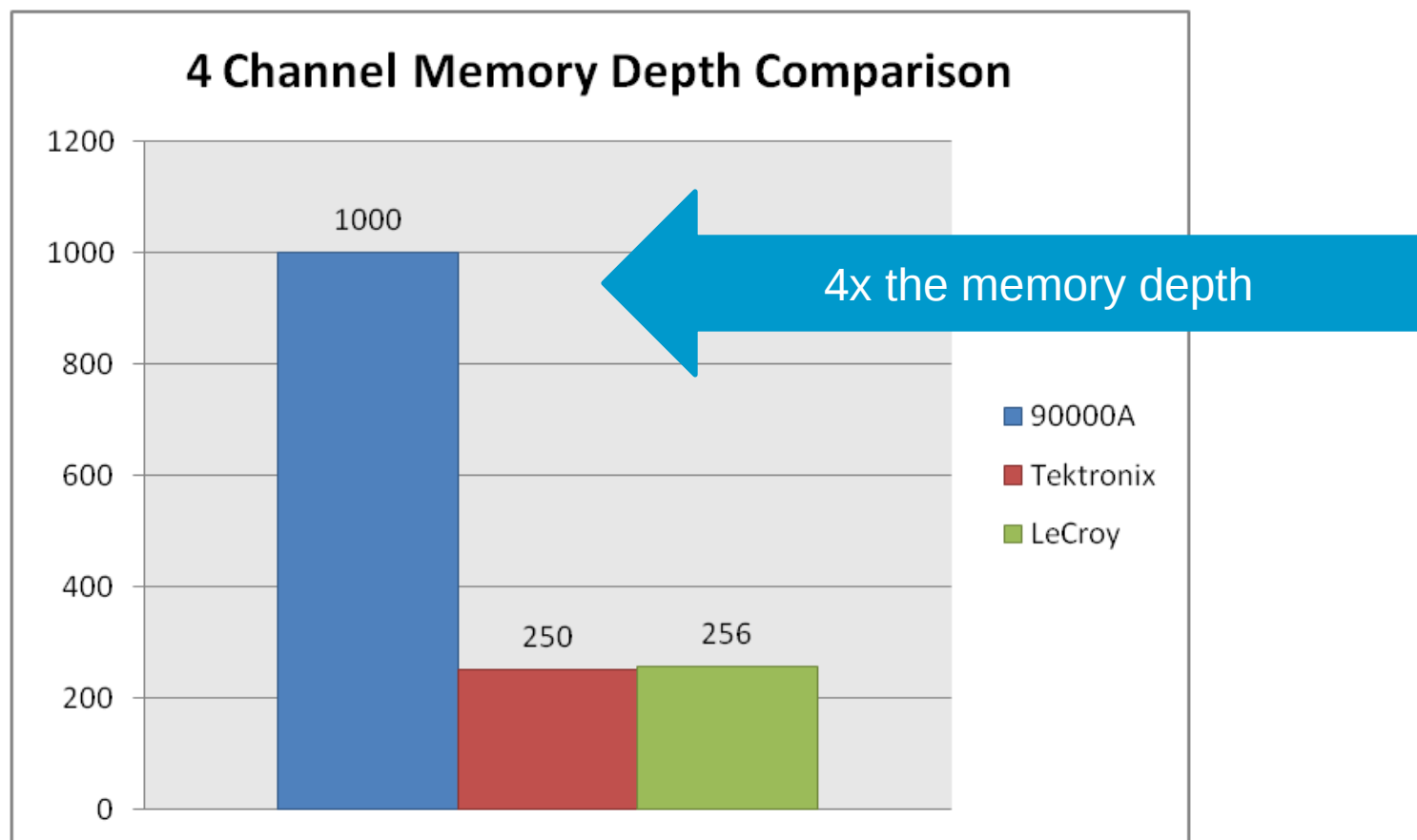
The Highest Measurement Accuracy

Noise floor and jitter measurement comparisons



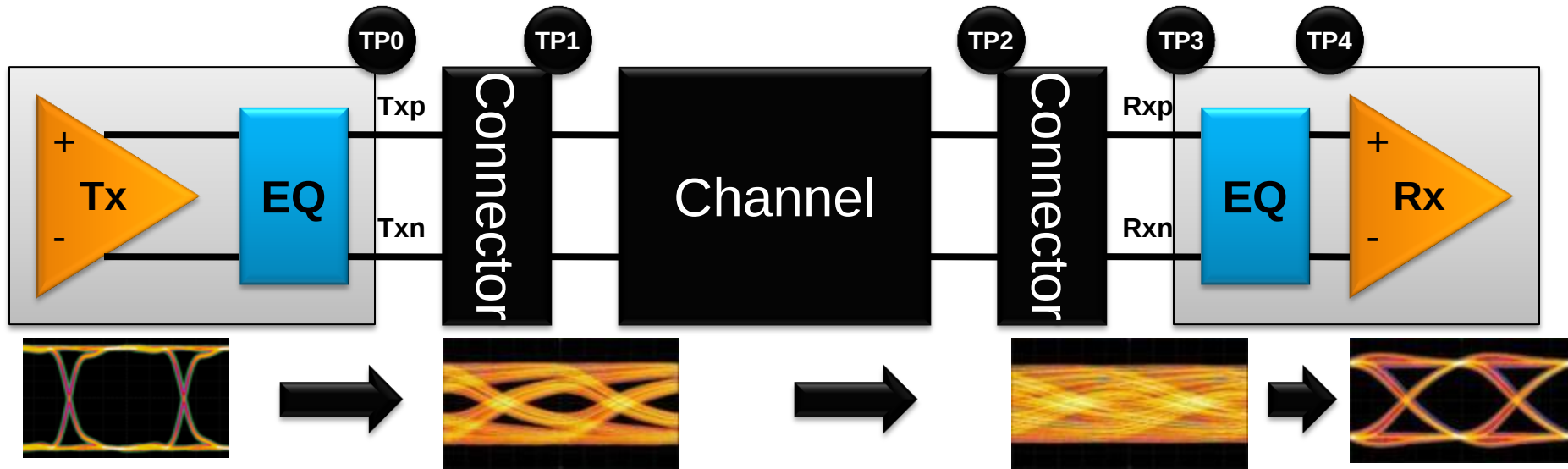
The Highest Measurement Accuracy

Deep and Accurate Jitter Separation

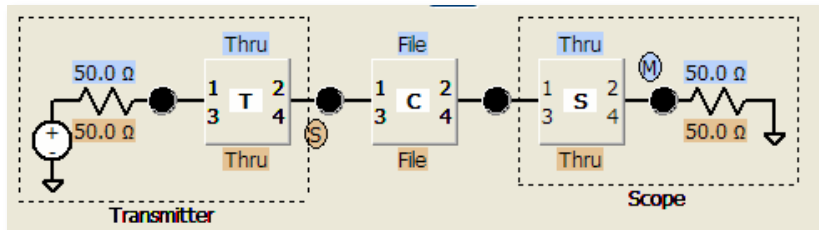


The Highest Measurement Accuracy

InfiniiSim hardware accelerated de-embedding



Combine measurements and transmission line models to view simulated scope measurements at any location in your design



Intuitive GUI speeds setup

Combine measurements and models to view and measure waveforms at any location in your design.



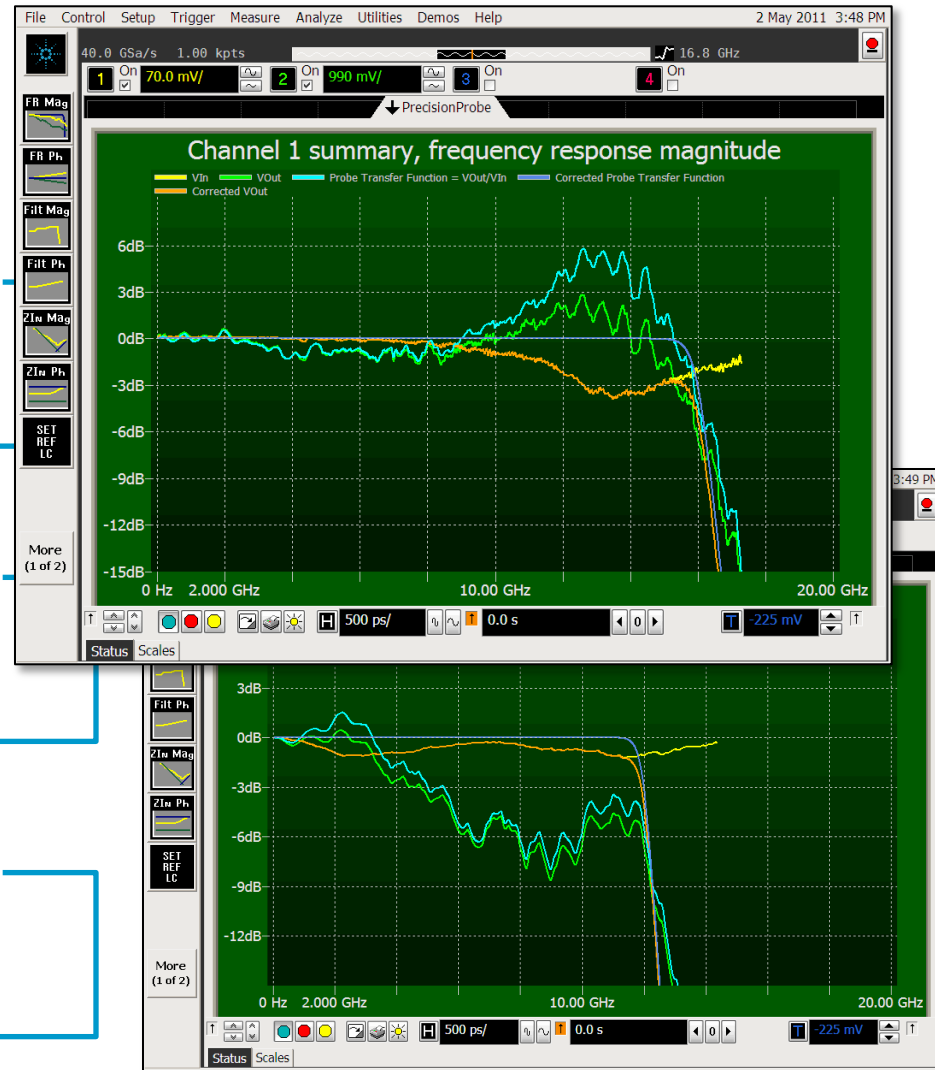
PrecisionProbe and Cable

Characterizes and Corrects for:

Frequency response of any probe

Insertion loss caused by cables and fixtures

Insertion loss caused by switches



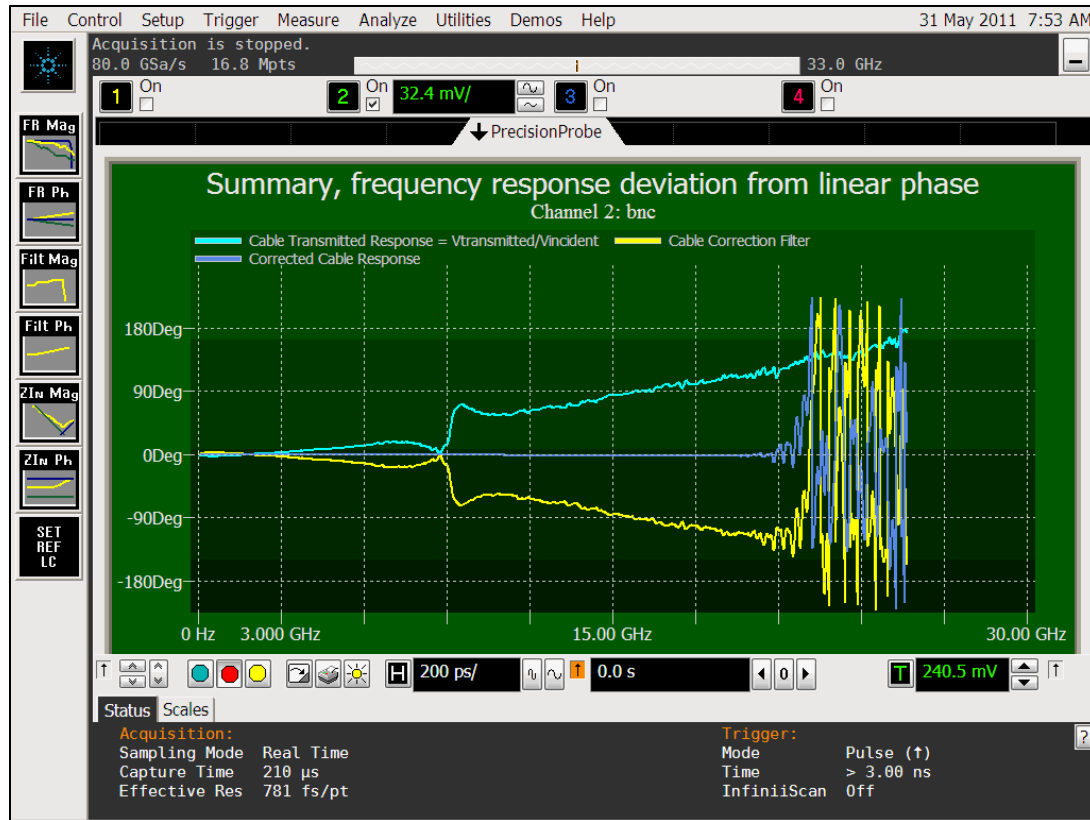
Agilent Technologies

PrecisionProbe and Cable

Additional capabilities

PrecisionProbe:

1. Measures and compensates for phase non-linearity
2. Provides the S21 characterization in an s2p file to be used by InfiniiSim or ADS
3. Provides individual cal files to be shared across scope channels and scopes
4. Characterizes the impedance of your probing system
5. Allows you to see where the changeover is from inductive to capacitive and what the loading of the probe is without a VNA



Pass Compliance Tests Quickly

Analysis

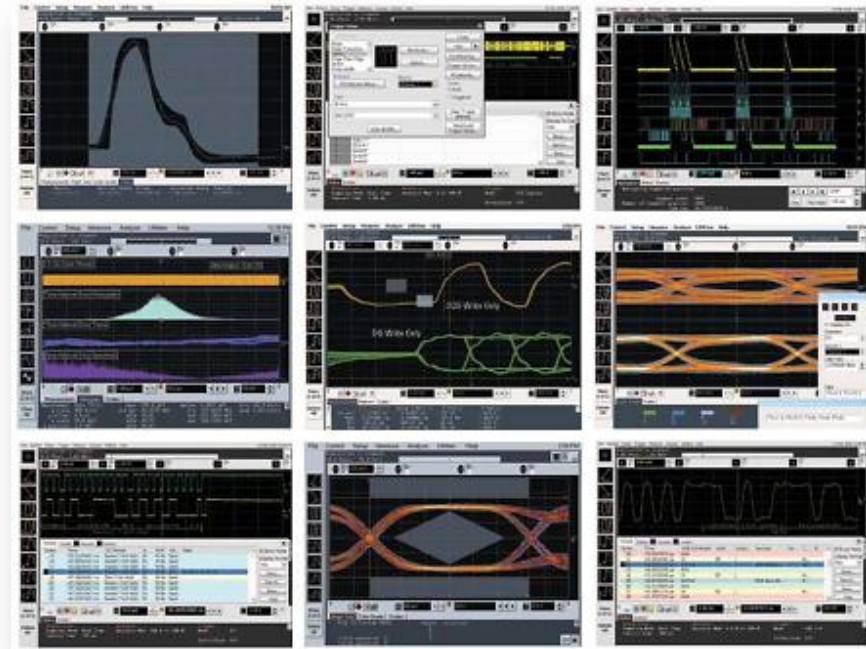
- EZJIT+ jitter analysis
- Serial analysis/clock recovery
- Serial data equalization
- Signal de-embedding
- MATLAB

Compliance Testing

- USB SuperSpeed 3.0
- PCI Express
- DDR1/2/3
- SAS/SATA
- HDMI
- DisplayPort

Protocol Analysis

- USB
- PCI Express
- SAS/SATA
- I2C/SPI
- MIPI D-PHY



Pass Compliance Tests Quickly

First-to-market compliance applications

Memory
Perry Keller

USB
Jim Choate

Computer
Rick Eads

Storage
Min Jie Chong

Consumer Electronics
Brian Fetz

Board of Directors
JEDEC

PHY C&I Chair
WiMedia

Technical Lead
USB-IF Compliance
Committee

Primary Representative
WiMedia Compliance
Review Board

Board of Directors
PCI-SIG

Contributor
Serial ATA Working
Group

Board of Directors
VESA

JEDEC

USB

**PCI
SIG**

**SERIAL
ATA
6Gb/s**

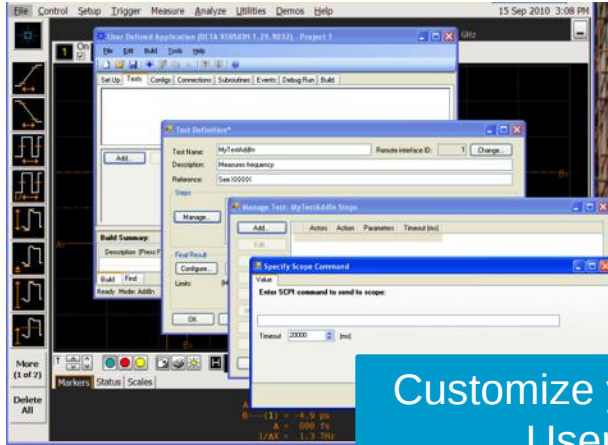
VESA
Video Electronics Standards Association



Agilent Technologies

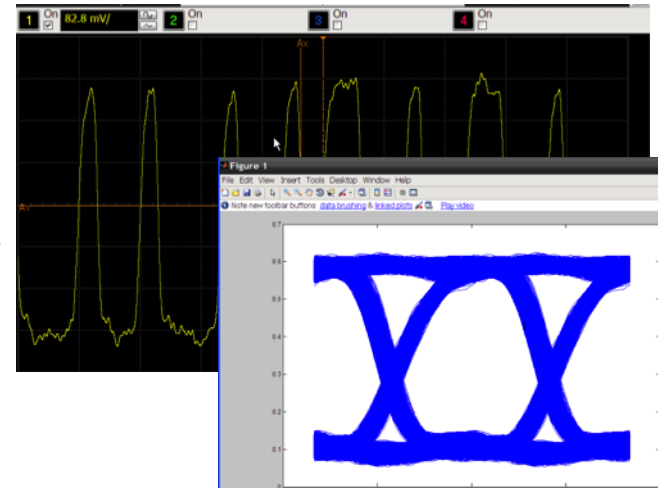
Debug Your Designs with Confidence

Fully customizable testing solution

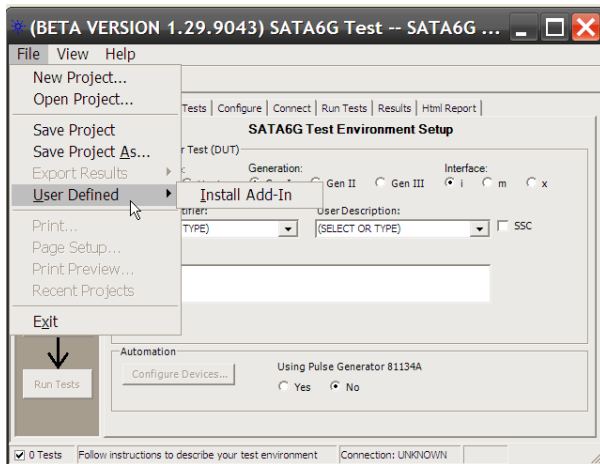


Create customized automated applications with User Defined Application

Customize your measurements with User Defined Function



Customize Agilent's compliance apps, with the world's only add-in capability



Agilent Technologies



InfiniiMax Probing System

Unrivalled performance and real-world usability



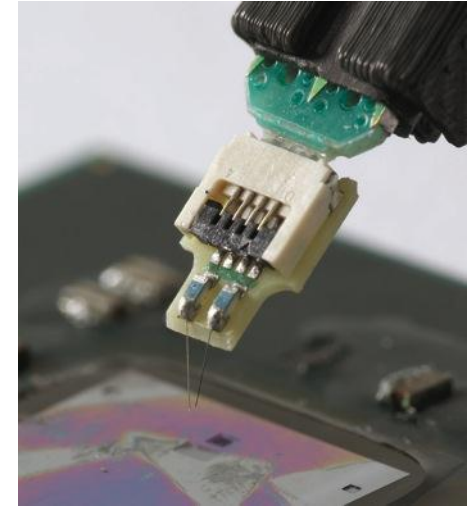
Highest performance differential/SE probe

- Lowest noise floor
- Damping resistor in probe tip eliminates in-band resonance
- Controlled transmission line in probe head delivers maximum performance



Superior connectivity

- Interchangeable probe head connections without a tradeoff in performance
- Fully characterized performance for all probe heads
- Variable spaced probe tips with minimal response change



Other unique probing solutions

- -55 to 150 deg C chamber test solution
- Wafer probing with N2884A fine wire head
- Wide dynamic range up to 30V with the in-line attenuator
- Economical lead-free solder-in probing with ZIF probe heads



Agilent Technologies



Infiniium 90000A Series Probes and Accessories

Wide range of compatible probes and accessories



InfiniiMax System

(1130A-34A,
1168A, 1169A)

- 6 probe amps, 20 probe heads
- Single-ended or differential
- Up to 13 GHz



Single-ended Active

(1157A, 58A)

- Up to 4 GHz
- Damped accessories for low loading
- Small probe head



Current

(N2780A-83A,
N2779A,
E2697A)

- Up to 100 MHz ac/dc
- Steady state and peak current



InfiniiMax Accessories

- Deskew/PV kit
- Hi Z adapter
- BGA probe adapter
- High temp ext cable



Other Accessories

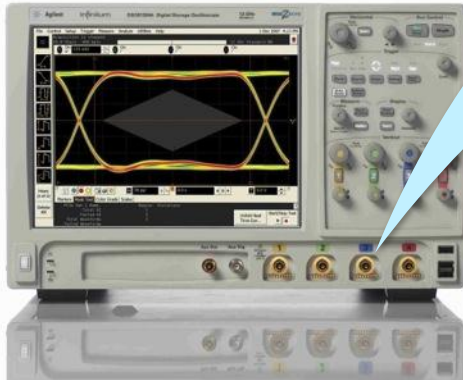
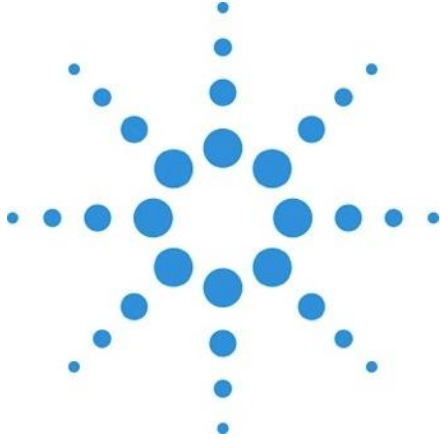
- TekProbe[®] adapter
- Probe positioners
- Rack mount kit



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Why Buy the Agilent Infiniium 90000A Series?



The Highest Measurement Accuracy

So you don't waste your jitter budget

Pass Today's Demanding Compliance Tests More Quickly

Shorten product development time

Debug Your Toughest Designs with Confidence

Get the analysis and automation that you need

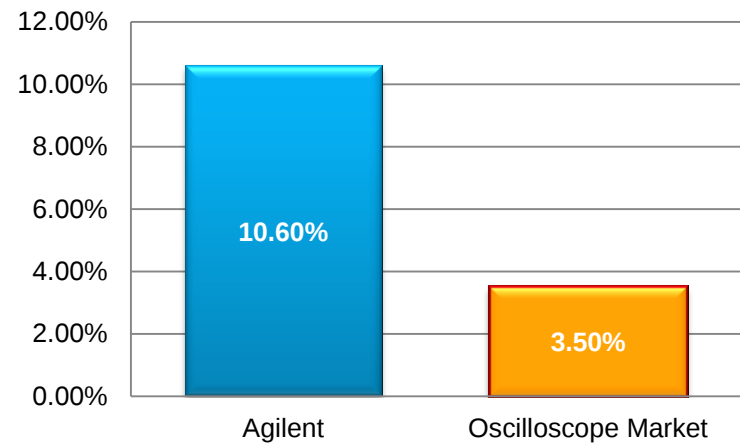


Agilent Technologies



Fastest Growing Scope Company

Oscilloscope Market Growth
Source: Prime Data (2002-2010) CAGR*



Entry



Handheld
U1600B

USB
U2700

InfiniiVision Series



2000X
DSO/MSO

3000X
DSO/MSO

6000A
DSO/MSO

7000B
DSO/MSO

Infiniium Series



9000A
DSO/MSO

90000A
DSO/DSA

90000X
DSO/DSA

DCA-X
Sampling



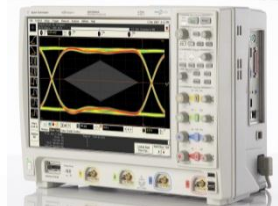
Buy the Best. Get Rewarded.



Begins
Sept 1, 2011
Ends
Feb 29, 2012

Purchase any of the following “parent” products:

Eligible Product Families	Models
<u>Any</u> PXA Signal Analyzer	N9030A
<u>Any</u> PNA-X Network Analyzer	N5241A/AS, N5242A/AS, N5244A/AS, N5245A/AS
<u>Any</u> Infiniium Oscilloscope	9000A, 90000A, 90000X, 86100D DCA-X



Automatically receive a free
InfiniiVision DSOX3034A 4 ch 350 MHz scope



Agilent Technologies



Comparison to Tektronix DPO/DSA70000C



	Agilent Infiniium 9000A Series		Tektronix DPO/DSA70000C	
Bandwidth	13 GHz	✓	12.5 GHz	✓
Max upgradeable bandwidth	32 GHz	✓	20 GHz	✗
Max sample rate	40 GSa/s	✗	100 GSa/s	✓
Max memory depth	1 Gpts	✓	250 Mpts	✗
MSO	No	✗	Yes (+\$22k)	✓
Noise floor	<2.1 mV at 32 GHz	✓	>3.5 mV at 20 GHz	✗
Update rate (waveforms/sec)	>1,000	✓	<300	✗
De-embedding (models)	Up to 27 blocks	✓	Up to 2 links	✗
Compliance applications	>25	✓	>20	✗
Compliance flexibility	UDA add-in capability	✓	None	✗



Comparison to LeCroy WaveMaster 8 Zi



	Agilent Infiniium 9000A Series		LeCroy WaveMaster 8Zi	
Bandwidth	13 GHz	✓	13 GHz	✓
Max upgradeable bandwidth	32 GHz	✓	30 GHz	✗
Max sample rate	40 GSa/s	✗	80 GSa/s	✓
Max memory depth	1 Gpts	✓	256 Mpts	✗
Noise floor	<2.1 mV at 32 GHz	✓	>3.5 mV at 12 GHz	✗
Update rate (waveforms/sec)	>1,000	✓	<300	✗
De-embedding (models)	27 blocks	✓	>30 blocks	✓
Compliance applications	>25	✓	>15	✗
Compliance flexibility	UDA add-in capability	✓	None	✗



Infiniium 9000A Series DSO/MSO

Engineered for the broadest measurement capability



Best 3-in-1 instrument

- Easily see analog, digital and protocol

Broadest range of applications

- Faster insight into problem areas of your design

Best fit for your workspace

- Powerful, yet takes up little of your bench space

www.agilent.com - Infiniium 9000A Series



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Infiniium 9000A Series DSO/MSO

Engineered for the broadest measurement capability

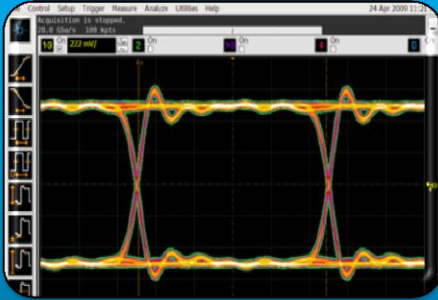


	MSO 9404A	DSO 9404A	MSO 9254A	DSO 9254A	MSO 9104A	DSO 9104A	MSO 9064A	DSO 9064A
Bandwidth	4 GHz		2.5 GHz		1 GHz		600 MHz	
Sample rate	10 GSa/s per channel; 20 GSa/s half-channel interleaved						5 GSa/s per channel; 10 GSa/s half-ch interleaved	
Memory	20 Mpts per channel; 40 Mpts half-channel interleaved							
Max memory (4/2 ch)	500 Mpts per channel; 1 Gpts half-channel interleaved							
MSO channels	16		16		16		16	
Upgradeable	Bandwidth, MSO, memory, applications							
Price	\$39,000	\$35,000	\$30,200	\$26,200	\$24,600	\$20,600	\$19,000	\$16,200



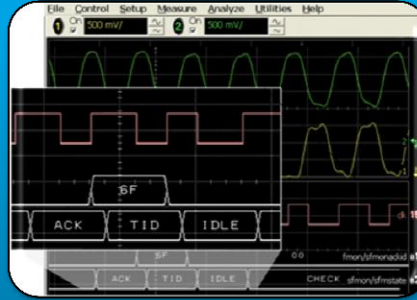
Best 3-in-1 Instrument

Scope, logic analyzer, protocol analyzer



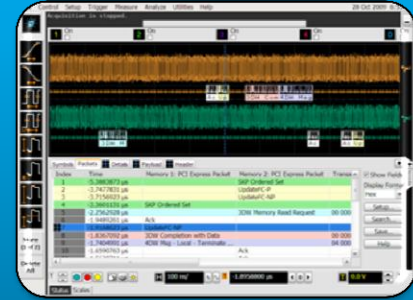
Scope

- ✓ Up to 4 GHz BW
- ✓ Up to 20 GSa/s SR
- ✓ Up to 1 Gpts memory
- ✓ Powerful triggering



Logic

- ✓ 16 integrated ch
- ✓ Up to 2 GSa/s SR
- ✓ 128 Mpts memory
- ✓ Precise cross-triggering with scope



Protocol

- ✓ Common serial buses
- ✓ Serial protocol triggering and decode
- ✓ Phy-to-protocol time correlation



Agilent Technologies



Broadest Range of Applications

Analysis

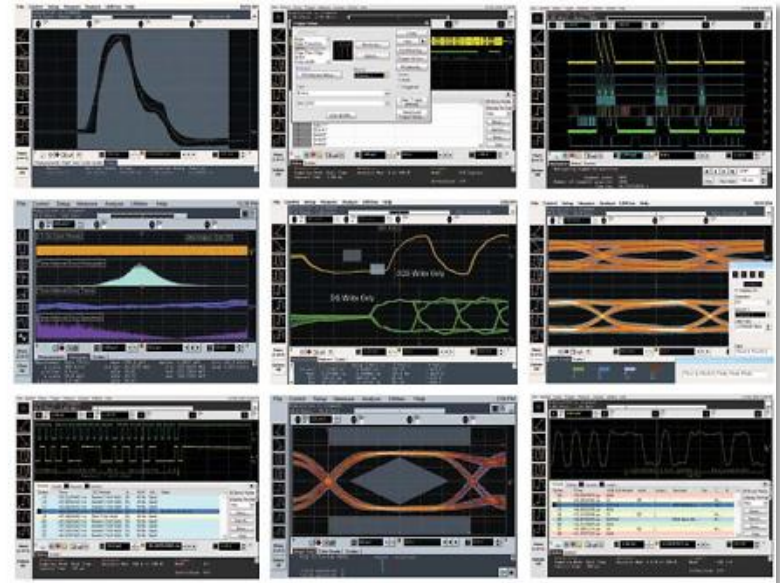
- EZJIT+ jitter analysis
- Serial data analysis/clock recovery
- Serial data equalization
- InfiniiScan
- MATLAB
- Power analysis

Compliance Testing

- USB2.0
- Ethernet
- MIPI D-Phy
- DDR1/2/3 validation

Protocol Triggering and Decode

- I2C/SPI
- RS-232/UART
- CAN, LIN, FlexRay
- USB2.0
- PCI Express
- SATA
- 8B/10B
- JTAG
- MIPI D-Phy



Best Fit for Your Workspace

Powerful, yet takes up little of your bench space



Large Display

- 15-inch XGA touch screen display
- Easily see analog, digital & protocol



Small Footprint

- 9-inch depth



Lightweight

- 26 lbs.
- Mobile



Agilent Technologies

Infiniium 9000A Series Probes and Accessories

Wide range of compatible probes and accessories



Standard Passive Probes (N287xA)

- Low cost, rugged design
- Variety of access.
- Families up to 1.5 GHz



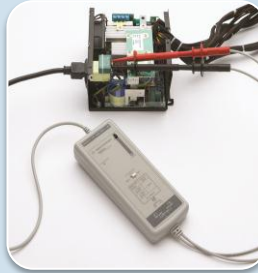
Single-ended Active (N2795-96A)

- 1 & 2 GHz bandwidth
- 1 M Ω R
- 16 Vp-p dynamic range
- ± 12 V offset



InfiniiMax System (1130-34A)

- Low cost, rugged design
- Variety of access.
- Up to 1.5 GHz



HV Differential (N2790-93A, N2891A)

- Up to 800 MHz
- Up to 7 kV



Current (N2780-83A, N2893A, 1147A)

- AC/DC clamp-on
- Up to 100MHz, 500A



Other Accessories

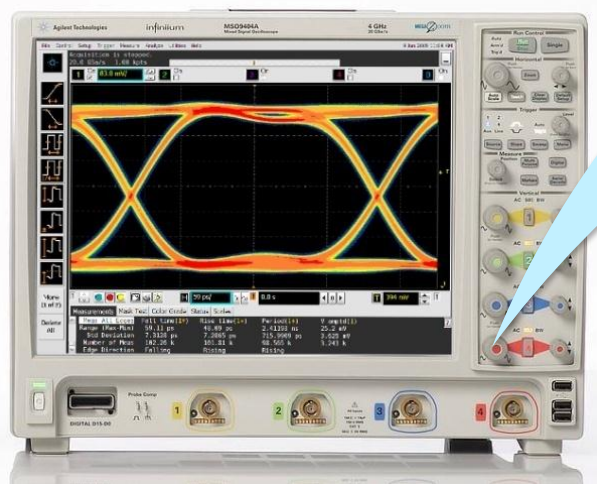
- TekProbe[®] adapter
- Probe positioners
- GPIB-to-LAN converter
- Carrying case
- Test mobile



Agilent Technologies



Why Buy the Agilent Infiniium 9000A Series?



Best 3-in-1 instrument

Easily see analog, digital and protocol

Broadest Range of Applications

Faster insight into problem areas of your design

Best Fit for your Workspace

Powerful, yet takes up little bench space

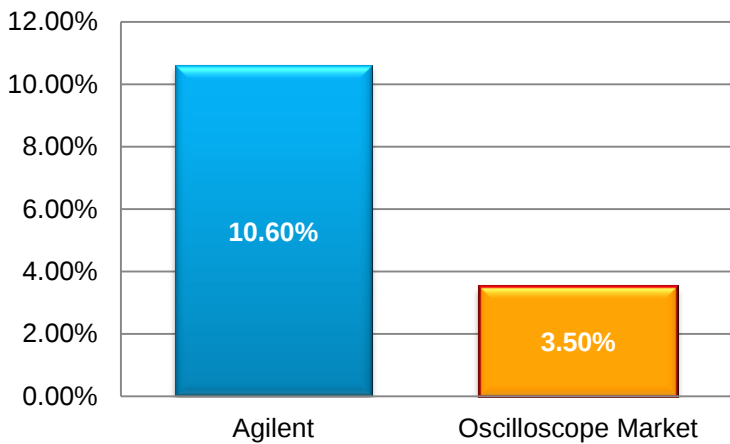


Agilent Technologies



Fastest Growing Scope Company

Oscilloscope Market Growth
Source: Prime Data (2002-2010) CAGR*



Entry



Handheld
U1600B

USB
U2700

InfiniiVision Series



2000X
DSO/MSO

3000X
DSO/MSO

6000A
DSO/MSO

7000B
DSO/MSO

Infiniium Series



9000A
DSO/MSO

90000A
DSO/DSA

90000X
DSO/DSA

DCA-X
Sampling



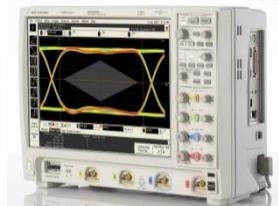
Buy the Best. Get Rewarded.



Begins
Sept 1, 2011
Ends
Feb 29, 2012

Purchase any of the following “parent” products:

Eligible Product Families	Models
<u>Any</u> PXA Signal Analyzer	N9030A
<u>Any</u> PNA-X Network Analyzer	N5241A/AS, N5242A/AS, N5244A/AS, N5245A/AS
<u>Any</u> Infiniium Oscilloscope	9000A, 90000A, 90000X, 86100D DCA-X



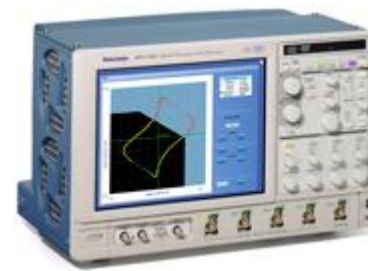
Automatically receive a free
InfiniiVision DSOX3034A 4 ch 350 MHz scope



Agilent Technologies



Comparison to Tektronix DPO7000 Series



	Agilent Infiniium 9000A Series		Tektronix DPO7000	
Maximum Bandwidth	4 GHz true analog	✓	3.5 GHz DSP enhanced	✗
Max Analog bandwidth	4 GHz	✓	2.5 GHz	✗
Upgradeable bandwidth	Yes	✓	No	✗
Maximum memory	500 Mpts on 4 ch 1 Gpts on 2 ch	✓	50 Mpts on 4 ch 100 Mpts on 2 ch	✗
Upgradeable bandwidth	Yes	✓	No	✗
Mixed Signal Oscilloscope	Yes	✓	No	✗
Protocol triggering and decode	PCIe, USB, SATA, MIPI, JTAG	✓	No	✗
InfiniiScan Zone-Qualified Measurements	Yes	✓	No	✗
Fast Update rate with deep 10 Mpts	Yes. 380 wf/s	✓	No. 1 wf/s	✗



Comparison to LeCroy WavePro 6 Zi Series



	Agilent Infiniium 9000A Series		LeCroy WavePro 6 Zi	
Upgradeable bandwidth	Yes	✓	No	✗
Maximum memory	500 Mpts on 4 ch 1 Gpts on 2 ch	✓	128 Mpts on 4 ch 256 Mpts on 2 ch	✗
Display size	15-inch (+65%)	✓	12-inch	✗
Front panel volts/division controls	4–1 per ch	✓	1–muxed across 4 ch	✗
Integrated MSO	Yes	✓	No – external box	✗
InfiniiScan Zone Triggering	Yes	✓	No	✗
12-bit vertical resolution	No	✗	Yes (400/600 HRO)	✓



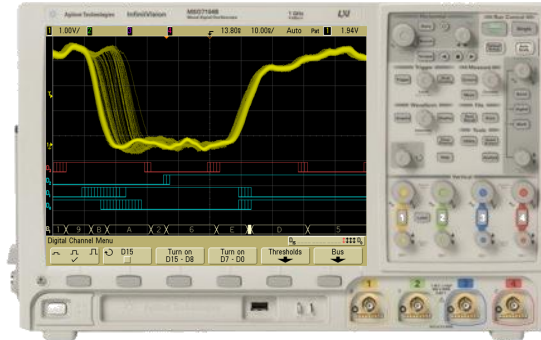
InfiniiVision 7000B DSO/MSO

Engineered for the best signal visibility



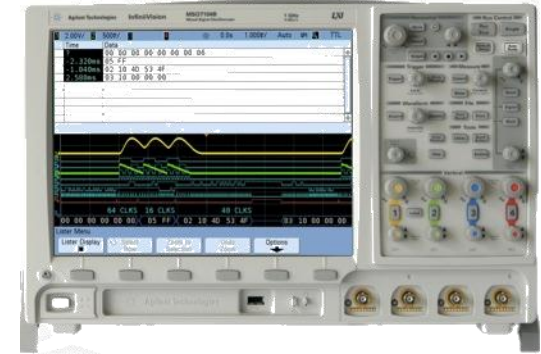
Attractive Form Factor

- Easily see analog, digital and protocol



Fastest Update Rate

- Catch problems before you ship your new design



Smart Applications

- Faster insight into problem areas of your design

www.agilent.com - InfiniiVision 7000B Series



Agilent Technologies



InfiniiVision 7000B Series DSO/MSO

Engineered for the best signal visibility

MSO	7104B	7054B	7052B	7034B	7032B	7014B	7012B
Bandwidth	1 GHz	500 MHz		350 MHz		100 MHz	
Channels	4	4	2	4	2	4	2
MSO Ch	16 channels @ 2 GSa/s with 128 Mpts of memory						
Memory	8 Mpts						
Price	\$19,500	\$15,691	\$14,042	\$12,285	\$7,671	\$8,855	\$7,482

DSO	7104B	7054B	7052B	7034B	7032B	7014B	7012B
Bandwidth	1 GHz	500 MHz		350 MHz		100 MHz	
Channels	4	4	2	4	2	4	2
Memory	8 Mpts						
Price	\$15,466	\$12,725	\$9,856	\$9,609	\$10,290	\$6,666	\$5,494

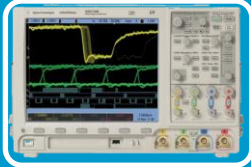
Aftermarket DSO-to-MSO upgrades available



Agilent Technologies

InfiniiVision Series DSO/MSO

Attractive Form Factors



7000B

- 12-in XGA display – 256 intensity levels
- 100/350/500 MHz and 1 GHz, DSO/MSO
- Search and navigate



6000A

- Smaller form factor
- 100/300/500 MHz and 1 GHz, DSO/MSO
- Battery option



6000L

- 1U high rack mount version
- 100/300/500 MHz and 1 GHz versions
- DSO and MSO versions



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InfiniiVision Series DSO/MSO

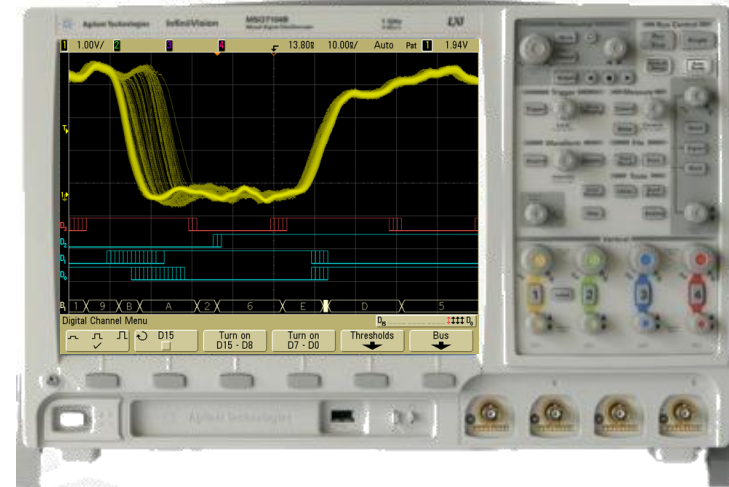
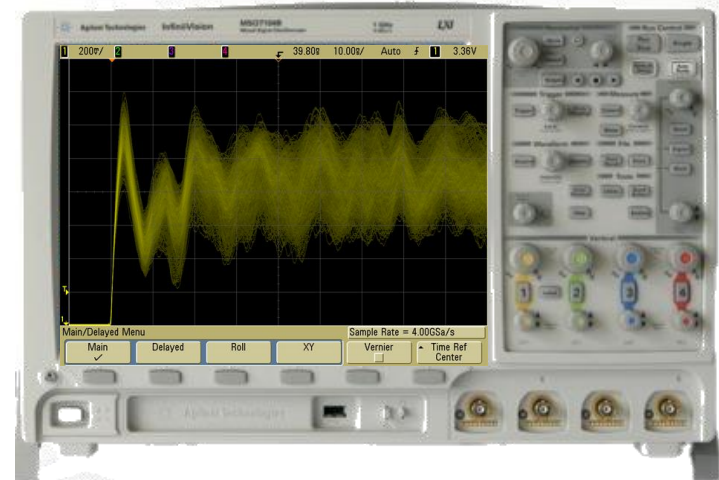
Fastest update rate

MEGA **Z**oom III



Patented MegaZoom III Custom ASIC technology

- 100,000 waveforms/sec update rate
- Capture infrequent, difficult to find events
- Fast response to front panel control changes

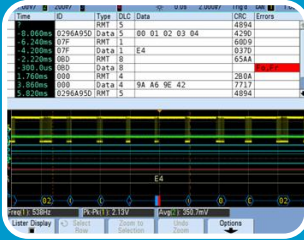


Agilent Technologies



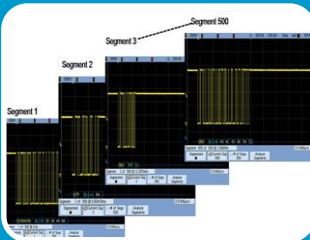
InfiniiVision Series DSO/MSO

Smart applications



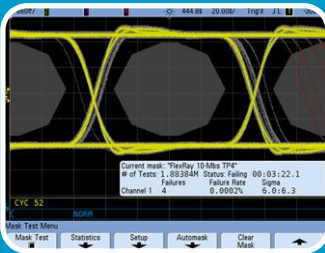
Serial applications

- I2C, SPI, RS232/UART, CAN, LIN, FlexRay, I2S, Mil-Std 1553
- Serial search and navigate
- Hardware-based serial decode



Segmented Memory

- Smartly captures just the signal of interest
- Conserves memory
- Measures the time between segments



Mask testing

- Pass/fail testing
- 100,000 waveforms tested per second



Agilent Technologies

InfiniiVision 7000B Series Probes and Accessories

Wide range of compatible probes and accessories



Miniature Passive Probes Family (N287xA)

- 7 probe families
- 4 accessory kits
- Ideal for fine-pitch probing



Single-ended Active Probes (N2795-96A)

- 1 or 2 GHz bandwidth
- 1 M Ω Input R
- 16 V_{p-p} dynamic range
- ± 12 V offset



Differential Probes (N2790-93A)

- 200 and 800 MHz GP
- 100 MHz, 1.4 kV



Probe Positioners (N2786/87A)

- Quick and easy to use
- Hands-free probing



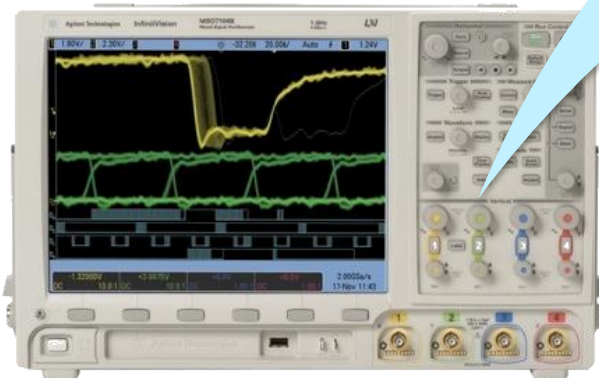
Other Accessories

- TekProbe[®] adapter
- GPIB-to-LAN interface



Agilent Technologies

Why Buy the Agilent InfiniiVision 7000B Series?



Attractive form factor

Easily see analog, digital and protocol with the large display

Fastest Update

Catch problems before you ship your new design

Smart Applications

Faster insight into problem areas of your design

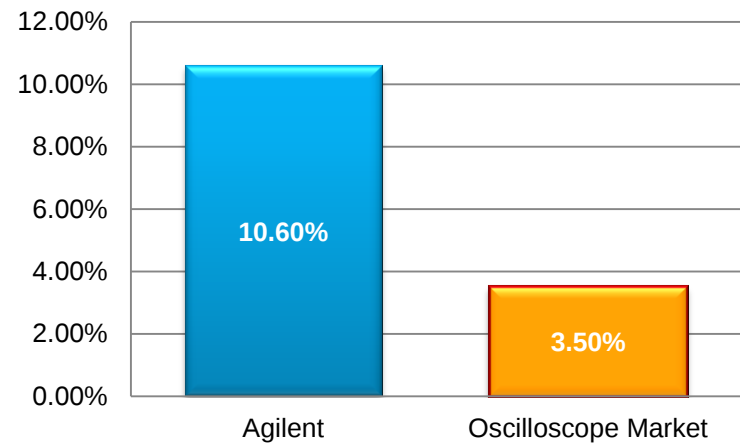


Agilent Technologies



Fastest Growing Scope Company

Oscilloscope Market Growth
Source: Prime Data (2002-2010) CAGR*



Entry



Handheld
U1600B

USB
U2700

InfiniiVision Series



2000X
DSO/MSO

3000X
DSO/MSO

6000A
DSO/MSO

7000B
DSO/MSO

Infiniium Series



9000A
DSO/MSO

90000A
DSO/DSA

90000X
DSO/DSA

DCA-X
Sampling



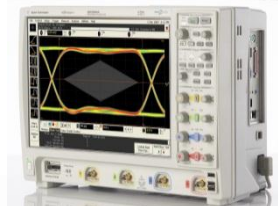
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Begins
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Feb 29, 2012

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Eligible Product Families	Models
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<u>Any</u> PNA-X Network Analyzer	N5241A/AS, N5242A/AS, N5244A/AS, N5245A/AS
<u>Any</u> Infiniium Oscilloscope	9000A, 90000A, 90000X, 86100D DCA-X



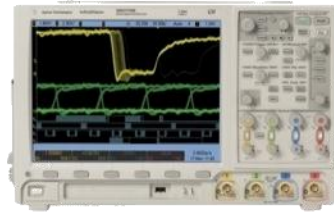
Automatically receive a free
InfiniiVision DSOX3034A 4 ch 350 MHz scope



Agilent Technologies



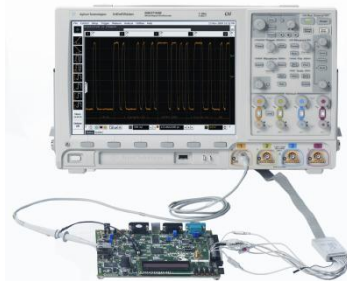
Comparison to Tektronix DPO/MSO4000



	Agilent InfiniiVision 7000B Series		Tektronix DPO/MSO4000 Series	
Bandwidth	100 MHz to 1 GHz	✓	350 MHz to 1 GHz	✗
Integrated MSO	Yes, 16 ch	✓	Yes, 16 ch	✓
MSO Upgradeable	Yes	✓	No	✗
Sample Rate – 1 GHz model	4 GSa/s (2 ch) 2 GSa/s (4 ch)	✗	5 GSa/s (4 ch)	✓
Memory Depth	8 Mpts	✗	10 Mpts	✓
Update Rate (waveforms/sec)	100,000	✓	5 – 50,000 (special mode)	✗
Display	12.1-inch XGA 256 intensity levels	✓	10.4-inch XGA ≤16 intensity levels	✗
Mask Testing	Yes	✓	No	✗
Segmented Memory	Yes	✓	No	✗
Hardware serial trigger/decode	Yes	✓	No	✗



Comparison to LeCroy WaveSurfer Xs-A, MXs-A

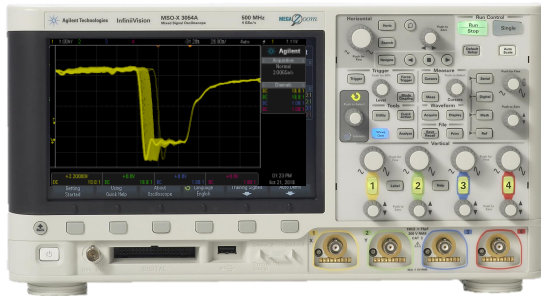


	Agilent InfiniiVision 7000B Series		LeCroy WaveSurfer Xs-A, MXs-A	
Bandwidth	100 MHz to 1 GHz	✓	200 MHz to 1 GHz	✗
Operating system	Embedded	✓	Windows	✓
Integrated MSO	Yes	✓	No (external)	✗
MSO Upgradeable	Yes	✓	Yes (external)	✓
Sample Rate – 1 GHz model	4 GSa/s (2 ch) 2 GSa/s (4 ch)	✗	Xs-A: 2.5 GSa/s (4 ch); 5 GSa/s (2 ch) MXs-A: 5 GSa/s (4 ch)	✓
Memory Depth	8 Mpts	✗	Xs-A: 5 Mpts MXs-A: 10 Mpts	✗ ✓
Update Rate (waveforms/sec)	100,000	✓	60	✗
Display/intensity levels	12.1" XGA/256	✓	10.4" SVGA/256	✗
Hardware serial trigger/decode	Yes	✓	No	✗



InfiniiVision X-Series DSO/MSO

Breakthrough technology delivers more scope for the same budget



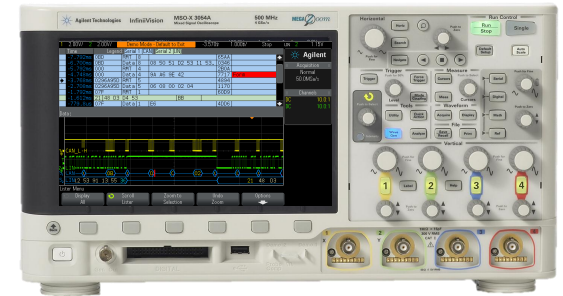
See More

- See more of your signal, more of the time



Do More

- Power of 4 instruments-in-1



Get More

- Investment protection with the industry's only fully upgradable scope

www.agilent.com - InfiniiVision 3000 X-Series



InfiniiVision 3000 X-Series DSO/MSO

Breakthrough technology delivers more scope for the same budget

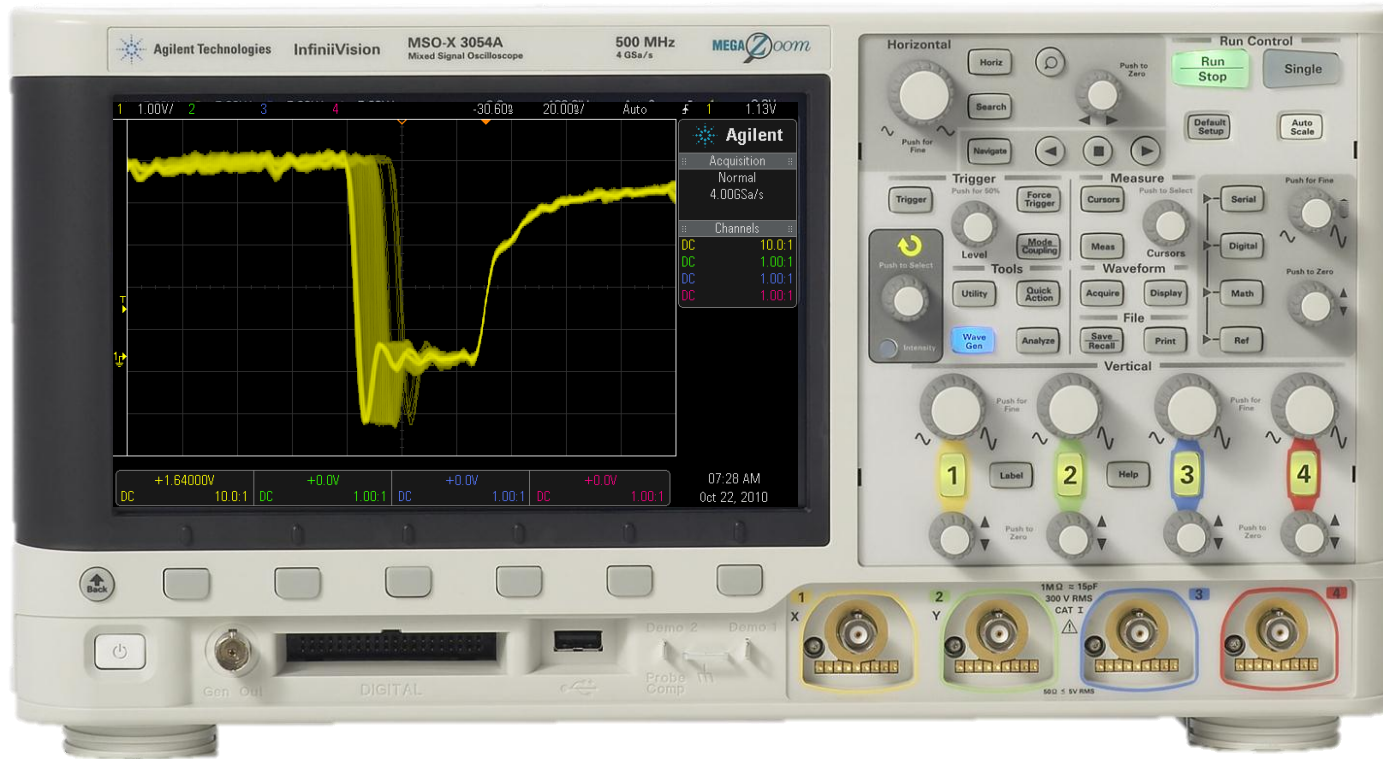


DSOX/MSOX	3054A	3052A	3034A	3032A	3024A	3014A	3012A
Bandwidth	500 MHz		350 MHz		200 MHz	100 MHz	
Analog channels	4	2	4	2	4	4	2
MSO channels	16 logic timing analyzer channels						
Sample Rate	2 GSa/s, 4 GSa/s half-channel interleaved						
Max Memory	2 Mpts per channel, 4 Mpts half-channel interleaved						
WaveGen	0.1 Hz – 20 MHz sine, square, pulse, triangle, ramp, noise, DC, ARB						
Upgradability	Bandwidth, MSO, WaveGen and measurement applications						
Update Rate	1,000,000 waveforms/sec						
DSO Price	\$10,440	\$8,000	\$7,677	\$6,381	\$4,060	\$3,380	\$2,810
MSO Price	\$11,590	\$9,150	\$8,827	\$7,531	\$5,210	\$4,530	\$3,960



See More

See more of your signal, more of the time



8.5-inch WVGA display – large, high-resolution display

Fastest waveform update rate – dramatically reduced dead time

Up to 4 Mpts of MegaZoom IV memory – fast and deep

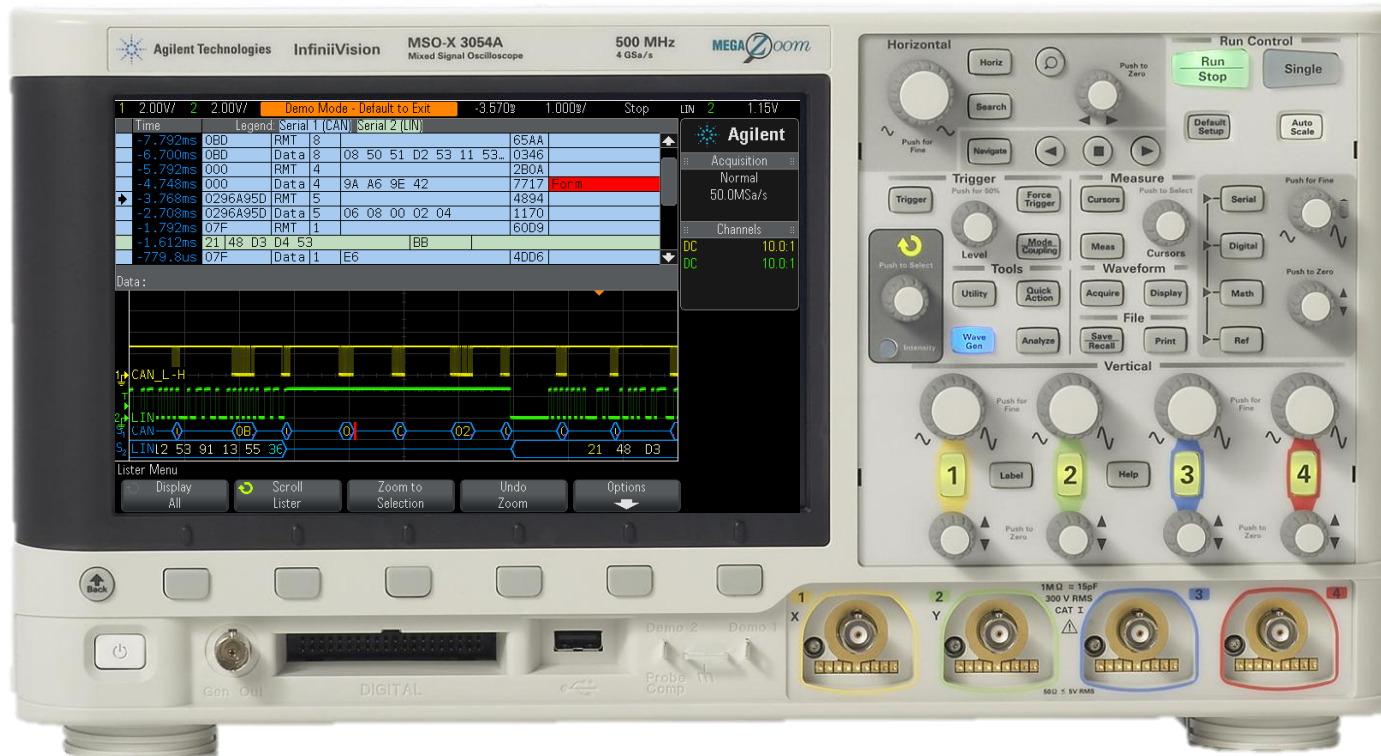


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Do More

Power of 4-instruments-in-1



Best-in-class Oscilloscope

Mixed Signal Oscilloscope (MSO)

Industry's first integrated Function Generator (WaveGen)

Hardware-based Protocol Analysis

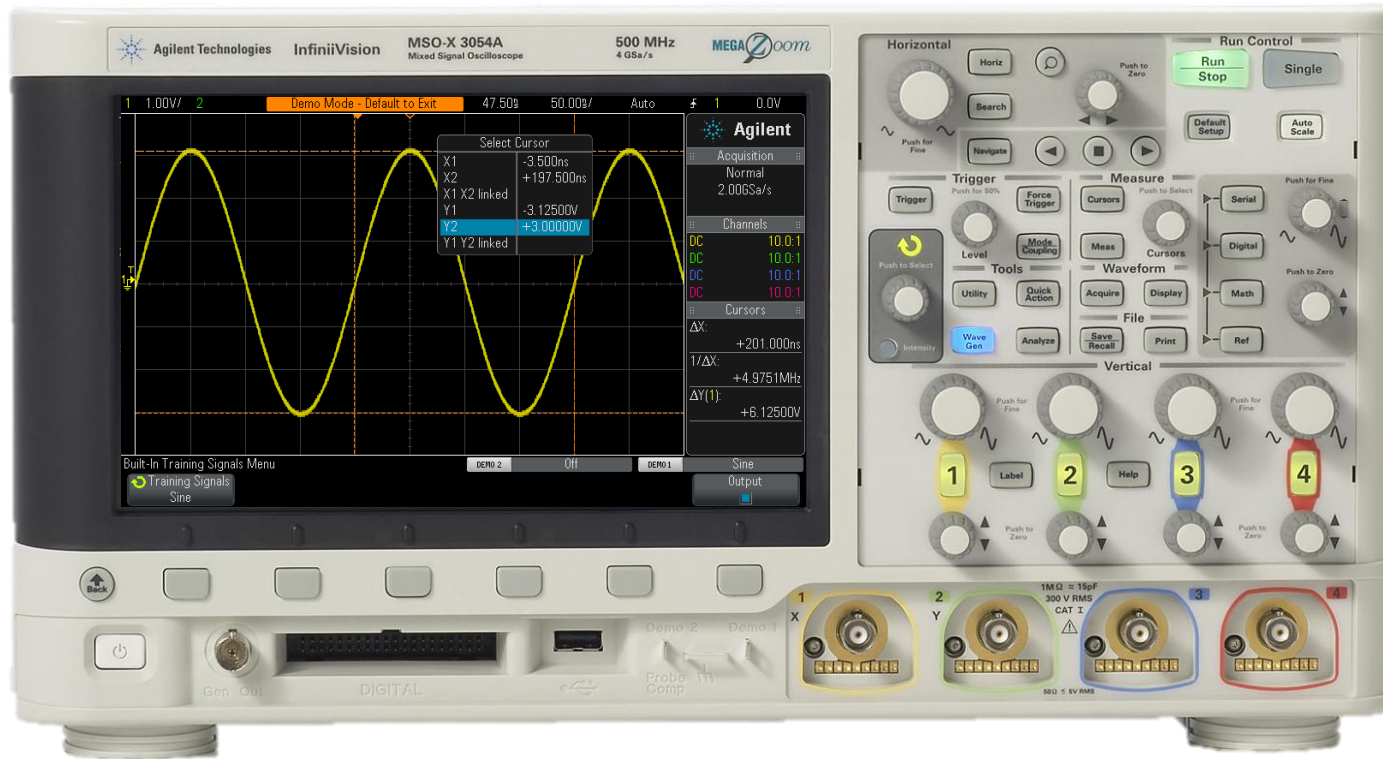


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Get More

Investment protection with the industry's first fully upgradable scope



Upgradable Bandwidth

Upgradable MSO

Upgradable WaveGen

Upgradable Measurement Applications

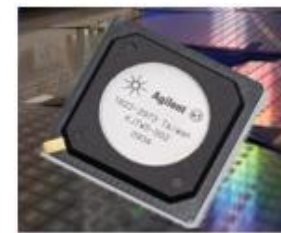


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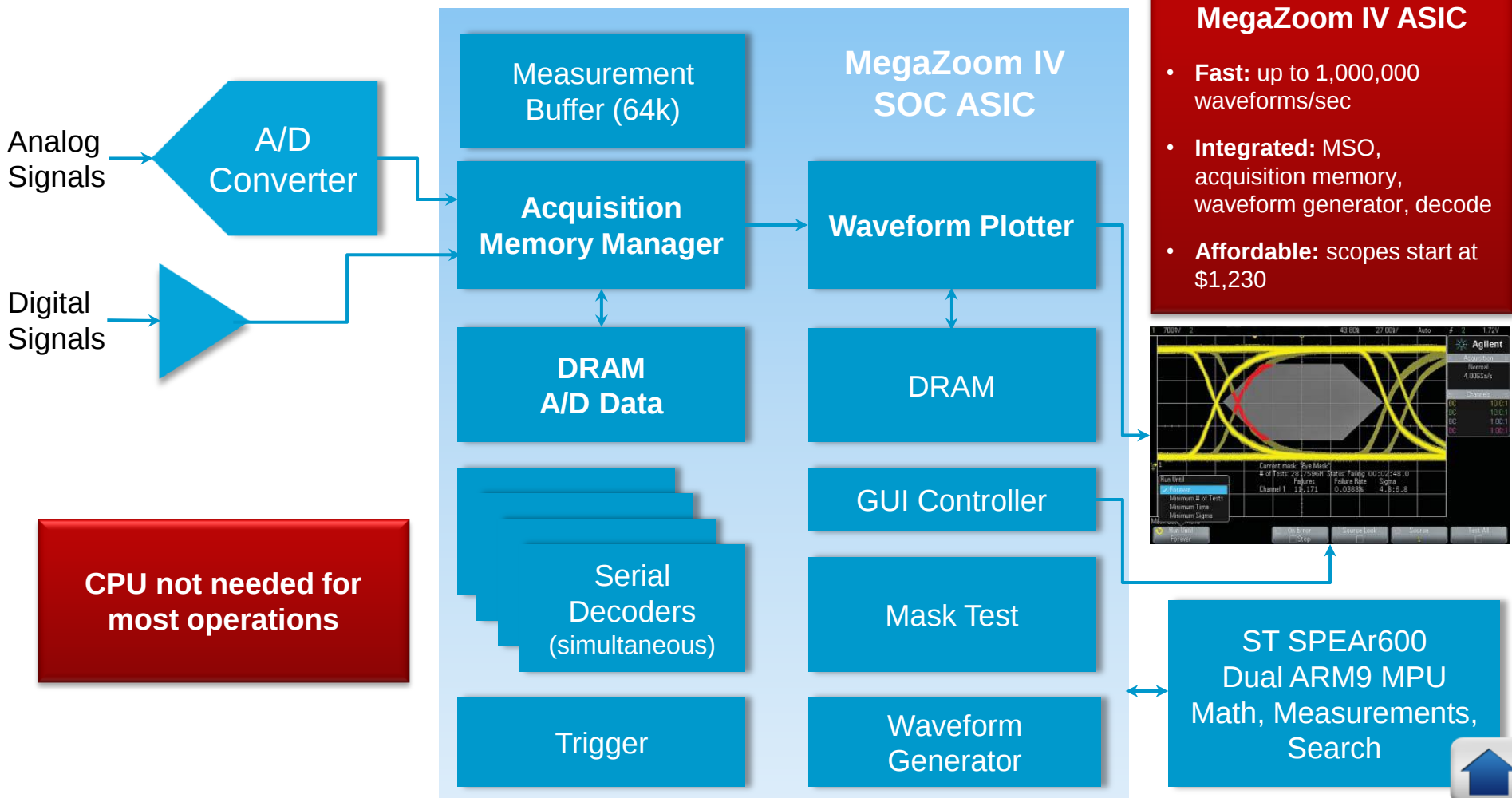
InfiniiVision MegaZoom IV SOC ASIC

Breakthrough technology delivers the fastest scopes



MegaZoom IV ASIC

- **Fast:** up to 1,000,000 waveforms/sec
- **Integrated:** MSO, acquisition memory, waveform generator, decode
- **Affordable:** scopes start at \$1,230



Agilent Technologies

InfiniiVision X-Series Probes and Accessories

Wide range of compatible probes and accessories

NEW



Passive Probes

(N2862/3B,
N2889/90A)

- 4 probe families
- Low cost
- Rugged design

NEW



Single-ended Active Probes

(N2795A)

- 1 GHz
- 1 M Ω input R
- 1 pF input C
- Built-in headlight
- ± 8 V dynamic range
- ± 8 V offset range

NEW



Differential Probes

(N2790A/91A/92
A/93A/N2891A)

- Up to 800 MHz, 7 kV
- Low cost, GP
- Ideal for power supply, differential serial buses

NEW



Current Probes

(1146A/47A/N289
3A, N2780A-03A)

- Up to 100 MHz, 500A
- AC/DC clamp-on
- Low noise



Other Accessories

- TekProbe[®] adapter
- LAN/VGA module
- GPIB module
- Carrying case
- Test mobile
- Probe positioners



Agilent Technologies

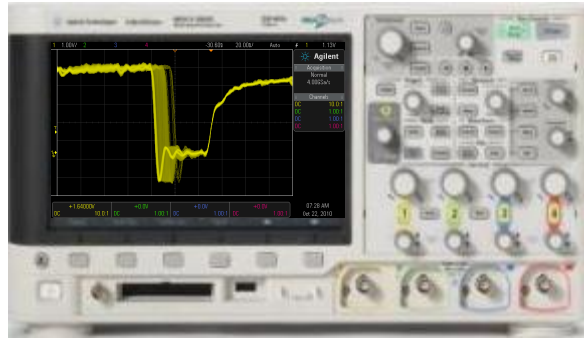


InfiniiVision 3000 / 2000 X-Series

Two families—26 models

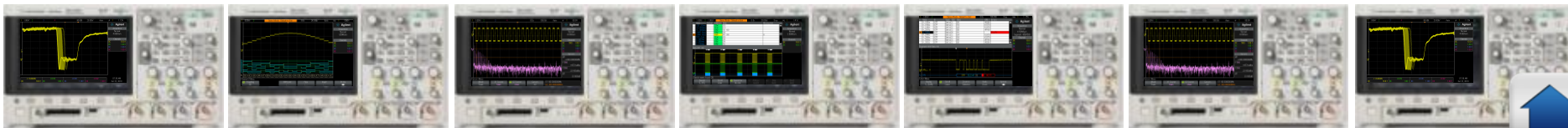
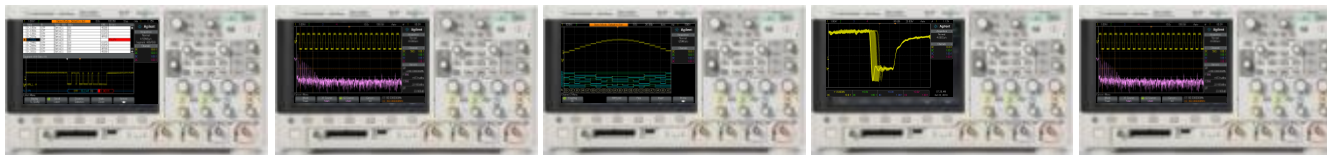
InfiniiVision 3000 X-Series

- 100 MHz–500 MHz DSOs & MSOs
- 1,000,000 waveforms/sec
- HW-based measurements/decode
- Starting at \$2,810



InfiniiVision 2000 X-Series

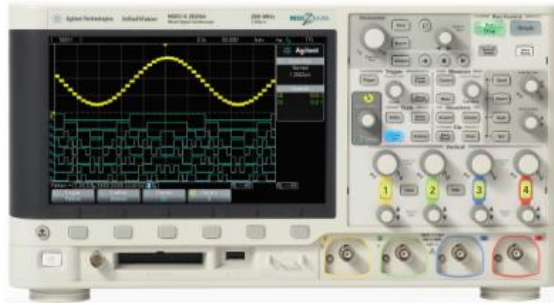
- 70 MHz–200 MHz DSOs & MSOs
- 50,000 waveforms/sec
- Industry-first integrated MSO
- Integrated WaveGen
- Starting at \$1,230



Agilent Technologies

InfiniiVision 2000 X-Series DSOs and MSOs

Breakthrough technology delivers more scope for the same budget

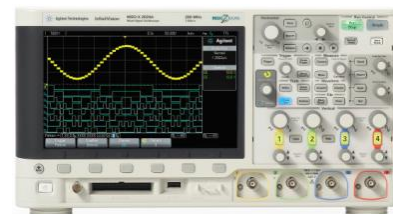
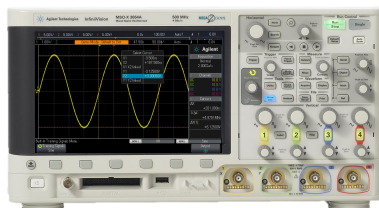


DSOX/MSOX	2024A	2022A	2014A	2012A	2004A	2002A
Bandwidth	200 MHz		100 MHz		70 MHz	
Analog channels	4	2	4	2	4	2
MSO channels	8 logic timing analyzer channels					
Sample rate	1 GSa/s per channel, 2 GSa/s half-channel interleaved					
Memory	100 kpts					
WaveGen	0.1 Hz–20 MHz, sine, square, pulse, triangle, ramp, noise, DC, ARB					
Upgradability	Bandwidth, MSO, WaveGen and measurement applications					
Update rate	50,000 waveforms/sec					
DSO Price	\$2,616	\$2,125	\$2,215	\$1,494	\$1,875	\$1,234
MSO Price	\$3,316	\$2,825	\$2,915	\$2,194	\$2,575	\$1,930



3000X versus 2000X-Series

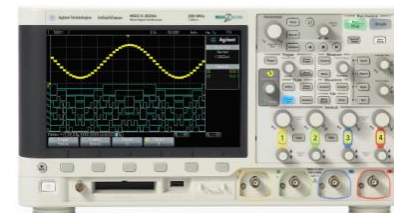
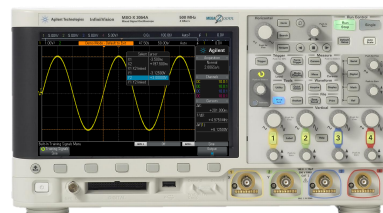
Comparison of performance characteristics



	InfiniiVision 3000X	InfiniiVision 2000X
Bandwidth	100 MHz – 500 MHz	70 MHz – 200 MHz
Analog Channels	2 or 4	2 or 4
Sample Rate	2 GSa/s per channel, 4 GSa/s half-channel interleaved	1 GSa/s per channel, 2 GSa/s half-channel interleaved
Memory	2 Mpts per channel, 4 Mpts half-channel interleaved	100 kpts
Input Impedance	1 M Ω or 50 Ω AutoProbe interface	1 M Ω No probe ID
MSO	16 channels	8 channels
Update Rate	1,000,000 waveforms/sec	50,000 waveforms/sec
Triggering	Edge, pulse width, pattern, video, rise/fall time, nth edge burst, runt, setup & hold, USB, serial 1, serial 2	Edge, pulse width, pattern, video
Serial decode	Optional	No
Search and navigate	Yes	No



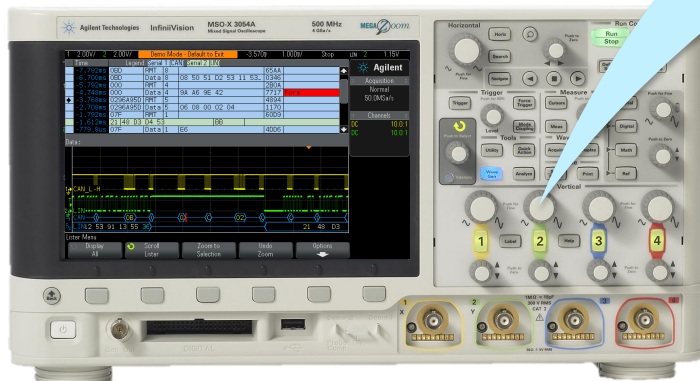
Applications and options



	InfiniiVision 3000 X-Series	InfiniiVision 2000 X-Series
Mask limit testing	\$715 (DSOX3MASK)	\$300 (DSOX2MASK)
Segmented memory	\$715 (DSOX3SGM)	\$300 (DSOX2SGM)
Power measurements and analysis	\$1,500 (DSOX3PWR)	N/A
FlexRay serial triggering and analysis	\$1,500 (DSOX3FLEX)	N/A
MIL-STD 1553, ARINC 429 serial triggering and analysis	\$1,500 (DSOX3AERO)	N/A
Advanced waveform math	\$300 (DSOX3ADVMATH)	N/A
Enhanced video triggering HDTV	\$715 (DSOX3VID)	N/A
Audio serial triggering (I2S)	\$715 (DSOX3AUDIO)	N/A
Embedded serial triggering and analysis (I2C, SPI)	\$715 (DSOX3EMBD)	N/A
Computer serial triggering and analysis (RS232/422/485/UART)	\$715 (DSOX3COMP)	N/A
Automotive serial triggering and analysis (CAN, LIN)	\$715 (DSOX3AUTO)	N/A
GPIB connection module	\$500 (DSOXGPIB)	
VGA/LAN module	\$395 (DSOXLAN)	
WavGen waveform generator upgrade	\$715 (DSOX3WAVEGEN)	\$500 (DSOX2WAVEGEN)
MSO upgrade (8 ch for 2000X; 16 ch for 3000X)	\$1,150 (DSOX3MSO)	\$700 (DSOX2MSO)
4 Mpts memory upgrade	\$500 (DSOX3MemUp)	N/A



Why Buy the Agilent InfiniiVision X-Series?



See More

of your signal, more
of the time with the
industry's fastest
waveform update
rate

Do More

with the power of
4-instruments-in-1:
scope, logic
analyzer, function
generator and
protocol analyzer

Get More

investment
protection with
the industry's
only fully
upgradable
scope, including
bandwidth

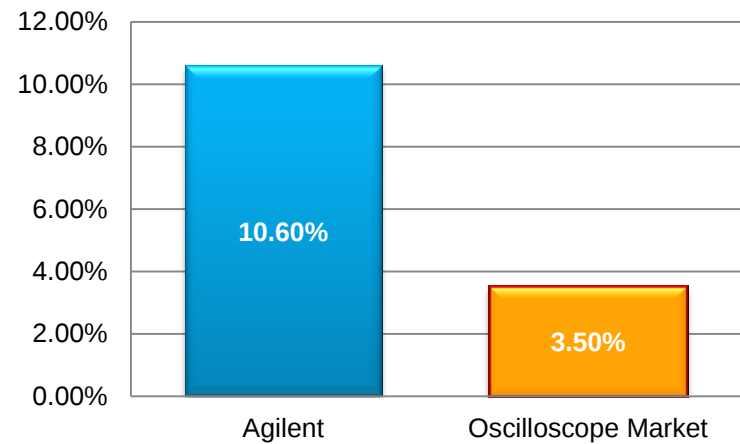


Agilent Technologies



Fastest Growing Scope Company

Oscilloscope Market Growth
Source: Prime Data (2002-2010) CAGR*



Entry



Handheld
U1600B

USB
U2700

InfiniiVision Series



2000X
DSO/MSO

3000X
DSO/MSO

6000A
DSO/MSO

7000B
DSO/MSO

Infiniium Series



9000A
DSO/MSO

90000A
DSO/DSA

90000X
DSO/DSA

DCA-X
Sampling



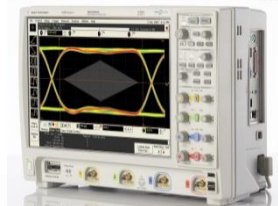
Buy the Best. Get Rewarded.



Begins
Sept 1, 2011
Ends
Feb 29, 2012

Purchase any of the following “parent” products:

Eligible Product Families	Models
<u>Any</u> PXA Signal Analyzer	N9030A
<u>Any</u> PNA-X Network Analyzer	N5241A/AS, N5242A/AS, N5244A/AS, N5245A/AS
<u>Any</u> Infiniium Oscilloscope	9000A, 90000A, 90000X, 86100D DCA-X



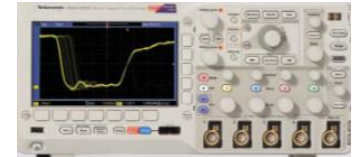
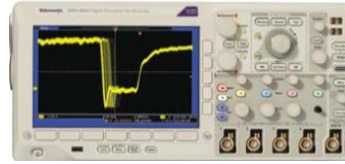
Automatically receive a free
InfiniiVision DSOX3034A 4 ch 350 MHz scope



Agilent Technologies



Agilent 3000X vs. Tektronix DPO3000/2000

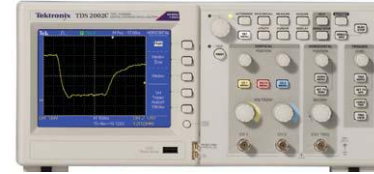


	Agilent 3000X		Tektronix DPO3000		Tektronix DPO2000	
Bandwidths	100, 200, 350, 500 MHz	✓	100, 300, 500 MHz	✗	100, 200 MHz	✗
Upgradable bandwidth	Yes	✓	No	✗	No	✗
Max sample rate	4 GSa/s	✓	2.5 GSa/s	✗	1 GSa/s	✗
Max memory depth	4 Mpts (2 ch - opt)	✗	5 Mpts per ch	✓	1 Mpts per ch	✗
Display	8.5-inch WVGA (800x480)	✓	9-inch WQVGA (320x240)	✗	7-inch WQVGA (320x240)	✗
Waveform update rate	1,000,000 waveforms/sec	✓	55,000 waveforms/sec	✗	5,000 waveforms/sec	✗
Function generator	Yes	✓	No	✗	No	✗
HW-based serial decode	Yes	✓	No	✗	No	✗
HW-based mark testing	Yes	✓	No	✗	No	✗
Segmented memory	Yes	✓	No	✗	No	✗
Price	Look→	✓	Higher than Agilent	✗	Similar to Agilent	✓



Agilent Technologies

Agilent 2000X vs. Tektronix TDS2000C



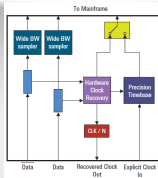
	Agilent 2000X		Tektronix TDS2000C	
Bandwidths	70, 100, 200 MHz	✓	50, 70, 100, 200 MHz	✓
Upgradable bandwidth	Yes	✓	No	✗
Max sample rate	2 GSa/s	✓	2 GSa/s	✓
Max memory depth	100 kpts per ch	✓	2.5 kpts	✗
Display	8.5-inch WVGA (800x480)	✓	5.7-inch QVGA (320x240)	✗
Update rate	50,000 waveforms/sec	✓	180 waveforms/sec	✗
Function generator	Yes	✓	No	✗
Integrated MSO	Yes	✓	No	✗
HW-based mask test	Yes	✓	No	✗
Segmented memory	Yes	✓	No	✗
Price	Look→	✓	Similar to Agilent	✓



Sampling Oscilloscopes



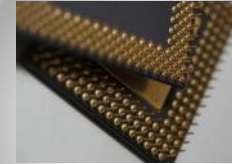
28G/40G
ASICs/FPGAs



10 Gb Ethernet
8G/16G FC



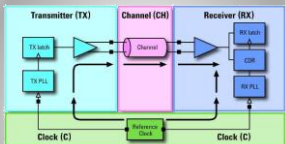
Optical
Transceivers



Virtual Device
Demonstration



Signal Integrity
(TDR, S-Parameters)



PLL & Clock
Analysis



Research
(Scope/Matlab)



Parallel Optics
(Verification & Mfg)



PRBS-31
Live Traffic



86100D DCA-X
and Modules



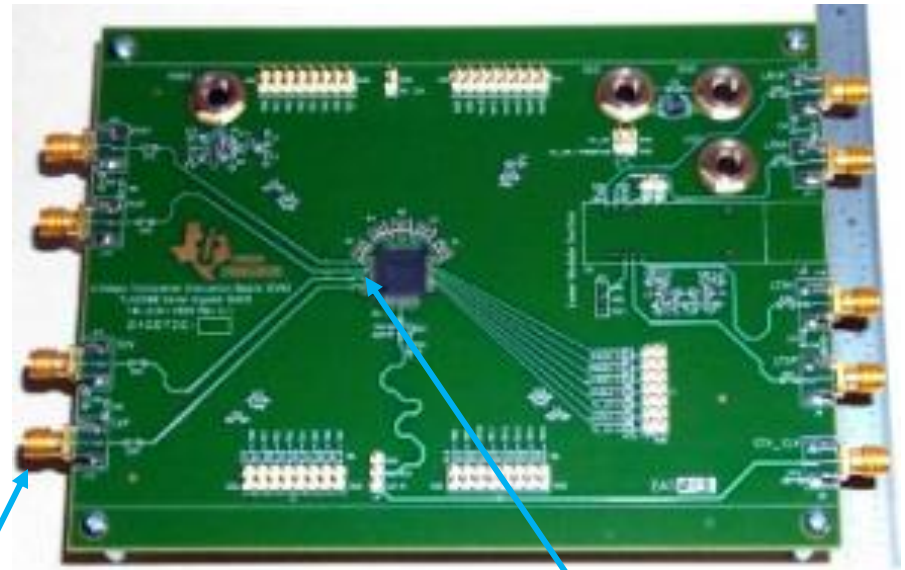
28G and 40G ASICs/FPGAs

IC Designers

See what the performance looks like inside your package – at the balls / pins of your IC.

Serial Bus Designers

Add a 'virtual' cable (e.g., SAS, SATA), 'virtual' channel on a target PCB, or remove fixture effects.



Measure performance here

Predict performance here



28G and 40G ASICs/FPGAs Configurations

Base Configuration (~\$100k)

86100D #ETR	Mainframe
86117A	Dual 50 GHz Electrical Module
86107A	Precision Timebase



Best Configuration (~\$150k)

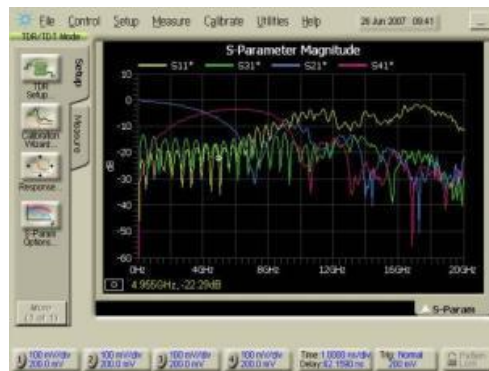
86100D #ETR	Mainframe
86118A #H01	Dual 70 GHz Electrical Remote Heads
86107A #040	Precision Timebase
86100D #200, 300	Jitter and Amplitude Analysis Software
86100D #201	Advanced Waveform Analysis
86100DU #400	PLL and Jitter Spectrum Analysis
86100DU #401	Advanced Eye Analysis



28G and 40G ASICs/FPGAs

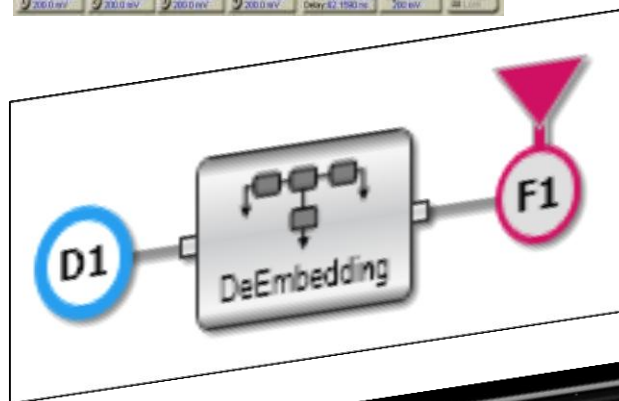
1. Measure S-Parameters using the DCA-X

(S-Parameters may come from VNA, ADS or any other source)

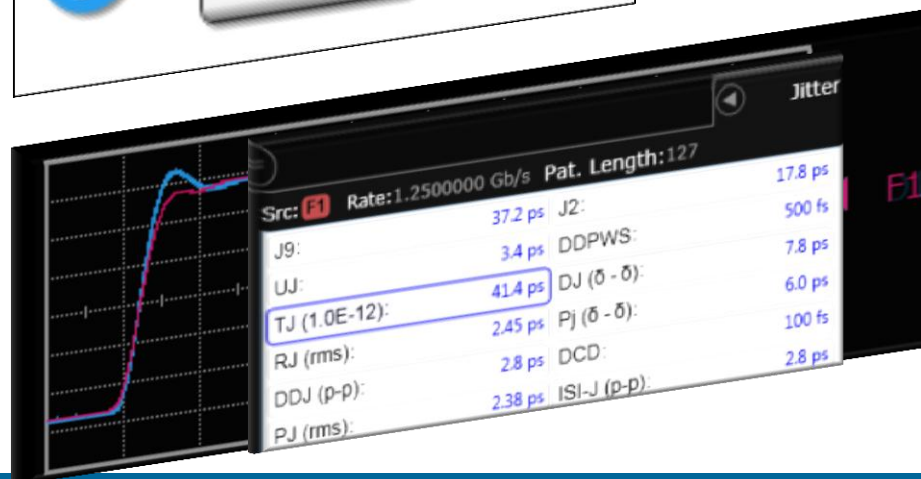


Watch the video!

2. Configure your De-embed /Embed Simulation

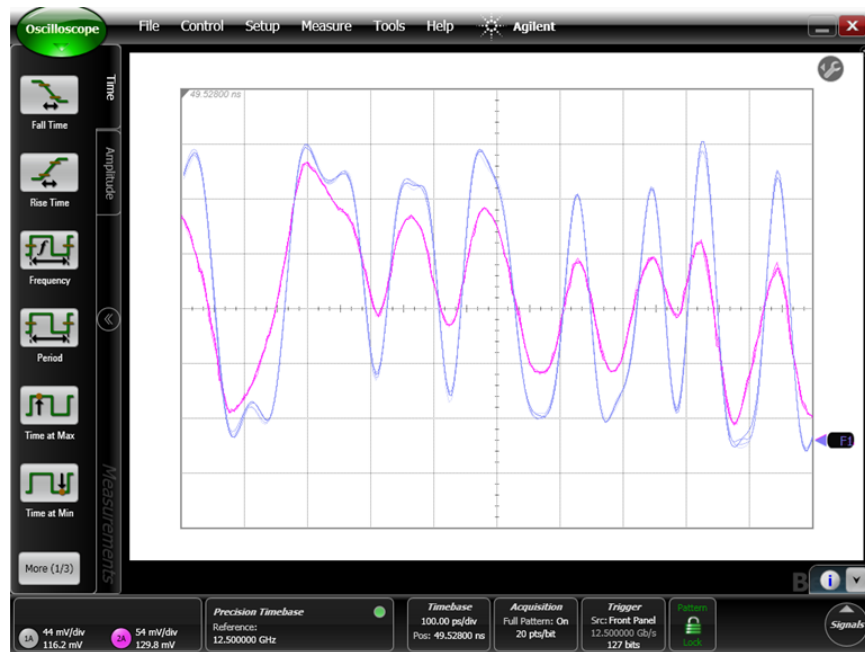


3. Analyze the results

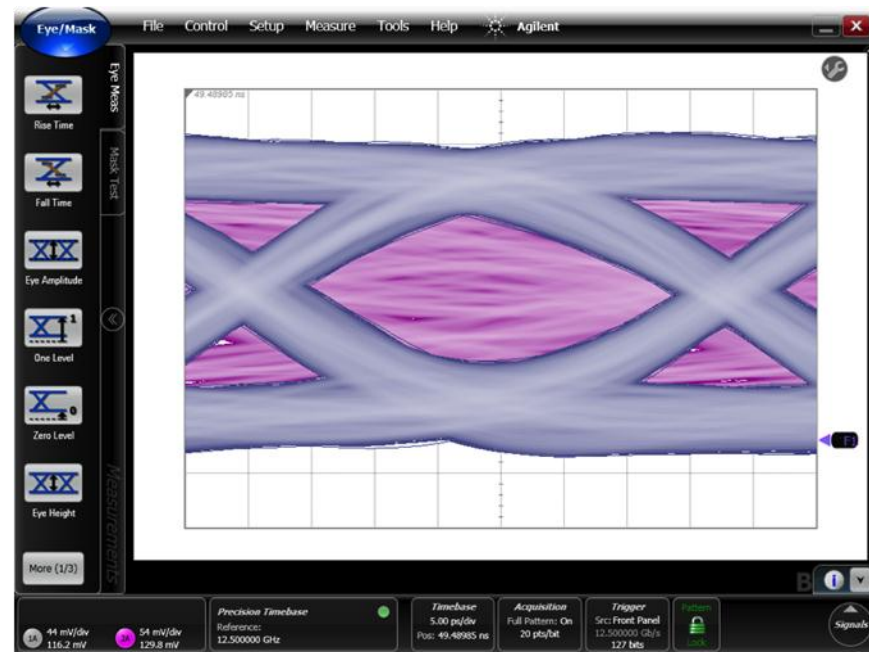


Agilent Technologies

28G and 40G ASICs/FPGAs



25G waveform before (pink) and after (blue) de-embedding



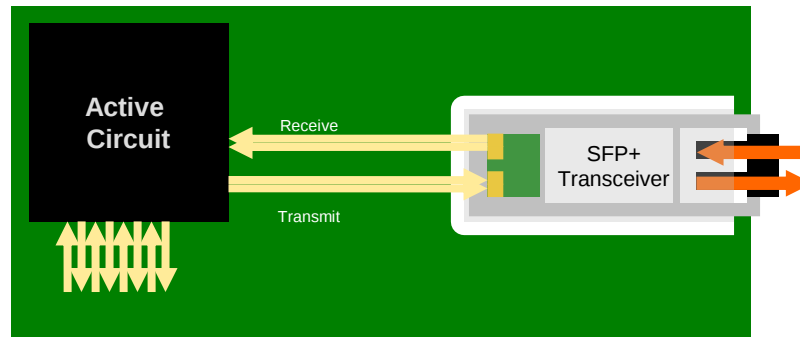
25G eye before (pink) and after (blue) de-embedding

More accurate insights in shorter time help you to:

- Emulate the signal at the chip and in your customer's system
- Optimize component designs for highest performance or best yield
- Accelerate time-to-market and get a competitive head start
- Reduce time to troubleshoot issues and down times



10 Gb Ethernet, 8G/16G FC

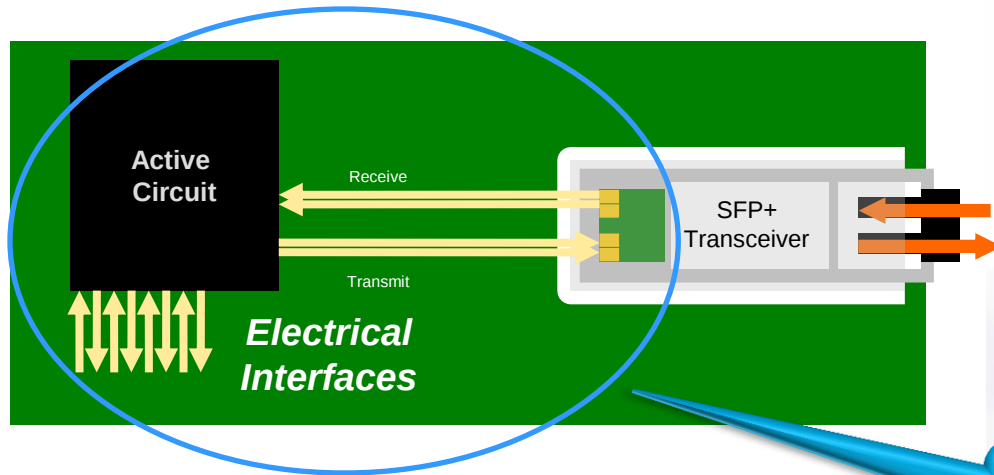


SAN/LAN technology highly standardized:

- IEEE 802.3ae 10 Gb Ethernet over multimode and single-mode fibers
- IEEE 802.3aq 10 GbE over installed multimode fiber
- IEEE 803.3ba 40/100 GbE (4x 10G or 10x 10G or 4x 25G)
- INCITS FC-PI-4 8G Fibre Channel (8.5 Gbps)
- INCITS FC-PI-5 16G Fibre Channel (14.025 Gbps)
- INCITS FC-BB-5 Fibre Channel over Ethernet
- SFF-8431 SFP+ Electrical Interface
- SFF-8436 Quad SFP+ Copper And Optical Transceivers
- SFF-8461 SFP+ Active Cable Specifications



10 Gb Ethernet, 8G/16G FC (Electrical)



Most accurate scope on the market for 1.0 to 14.2 Gbps differential signals

Base Configuration (\$35k to \$60k)

86100D	Mainframe
86112A	Dual electrical module – OR –
86108A	Precision Waveform Analyzer

Optional Components (\$2k to \$27k)

86108A #001	Pair of phase trimmers (skew adjustment)
86100D #200, 300	Jitter and Amplitude Analysis Software
86100D #201	Advanced Waveform Analysis
86100DU #400	PLL and Jitter Spectrum Analysis
86100DU #401	Advanced Eye Analysis



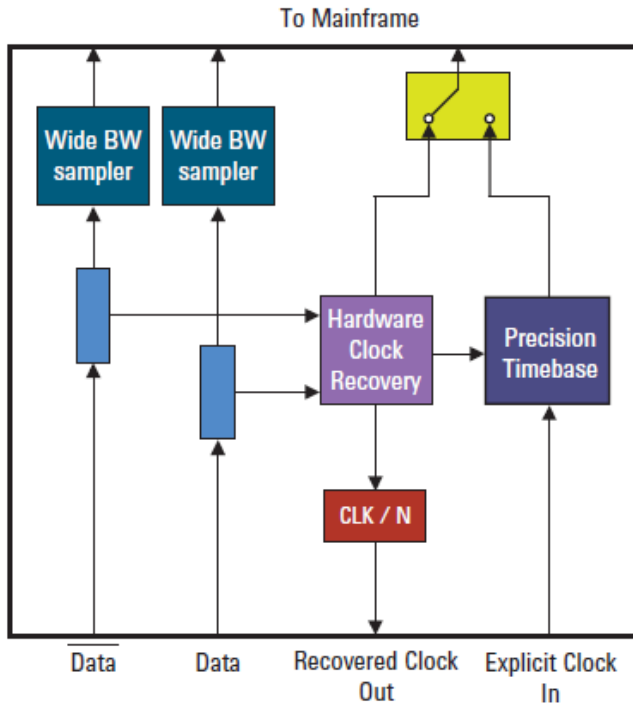
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10 Gb Ethernet, 8G/16G FC (Electrical)

Precision Waveform Analyzer

Watch the video!



The Precision Waveform Analyzer (PWA) allows simple connection to differential signals, yet performs very complex analyses.

PWA: 3 modules-in-one

- Dual 35 GHz electrical
- Clock recovery
- Precision timebase

Integration: ultra-low jitter

TJ(1E-12):	800 fs	DJ(δ - δ):	230 fs	RJ(rms):	41 fs
PJ(δ - δ):	230 fs	DDJ(p-p):	0.0 s	DCD:	-----
PJ(rms):	103 fs			ISIJ(p-p)	0.0 s



Agilent Technologies



10 Gb Ethernet, 8G/16G FC (Electrical)

Precision Waveform Analyzer

PWA offers the most accurate waveform measurements	Benefits of PWA
• Lowest jitter • Minimized cabling effects • Wide bandwidth • Low noise	• Confidence in compliance testing • Higher yield – not obscured by test equipment uncertainties • More competitive specifications for your products – command higher prices



Optical Transceiver Manufacturing



*The best is getting **even better***

- **Optical transceivers are now high-volume products**
 - Popular designs: SFP/SFP+, XFP, PON, XENPAK, GBIC & more
- **Standard compliance essential to succeed in the marketplace**
- **Transceiver manufacturers under pressure to reduce cost of test**
- **Solution: test multiple devices in parallel**
 - Less CAPEX required to test same number of devices/year

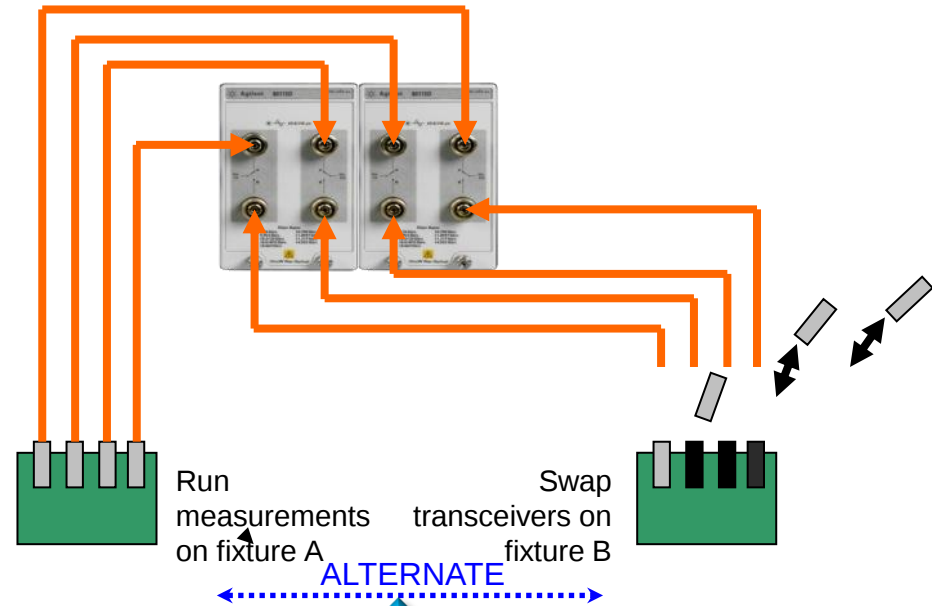


Agilent Technologies

Optical Transceiver Manufacturing



Agilent's DCA – the industry standard for over 15 years



High Volume Manufacturing:
8 optical ports/mainframe

Best Flexibility (\$50k-\$90k)

- 86100C/D with 86105C
- 1 optical & 1 electrical port
- 155 Mb/s to 11.3 Gb/s

Lowest Cost of Test (\$85k-\$195k)

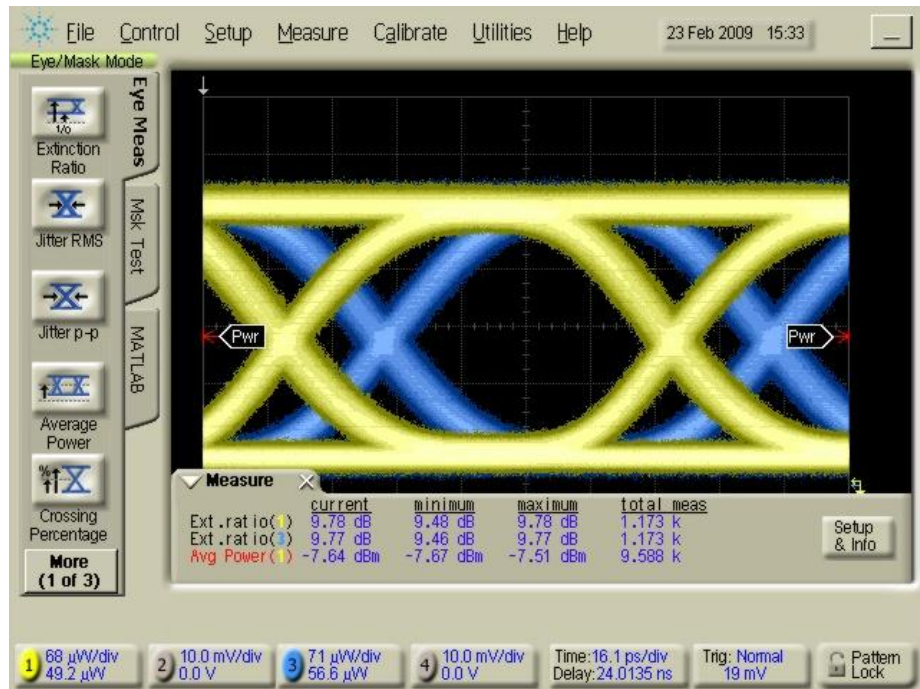
- 86100C/D with 86115D
- 2 to 8 optical ports
- 8.5 Gb/s to 14 GB/s



Agilent Technologies

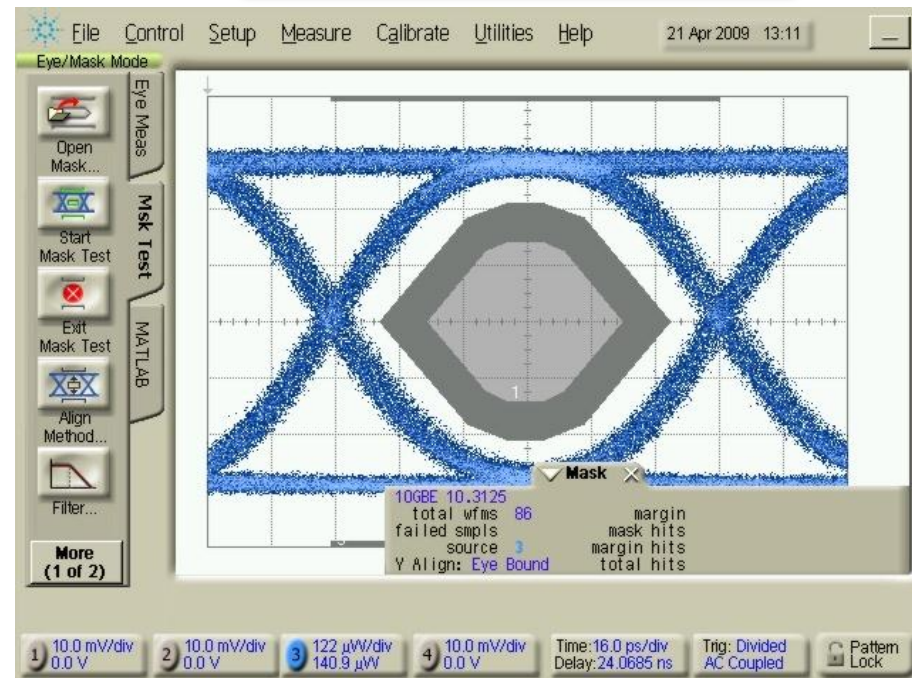


Optical Transceiver Manufacturing



Fast ER tuning on multiple channels

Mask margin measurement



Agilent Technologies

Optical Transceiver Manufacturing

86105C: Highest Flexibility

- 155 Mb/s to 11.3 Gb/s
- test a wide range of transceivers
- up to 11 reference receivers in just one module – highest number in the industry



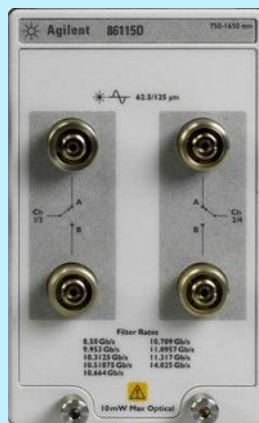
86105D: Highest Accuracy

- 8.5 Gb/s to 14.025 Gb/s
- Standard compliance testing
- 8G/16G FC & 10 GbE manufacturing



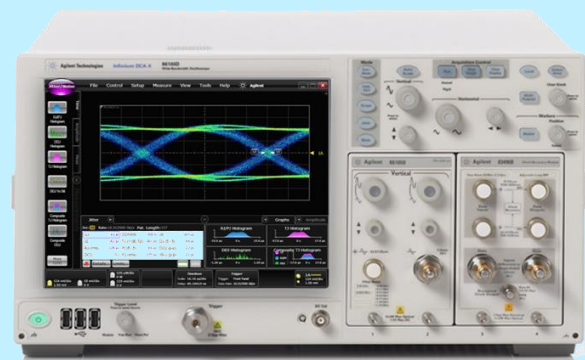
86115D: Lowest Cost Per Test

- Lowest price/optical port
- Least CAPEX required (high volume SFP/SFP+ manufacturing)



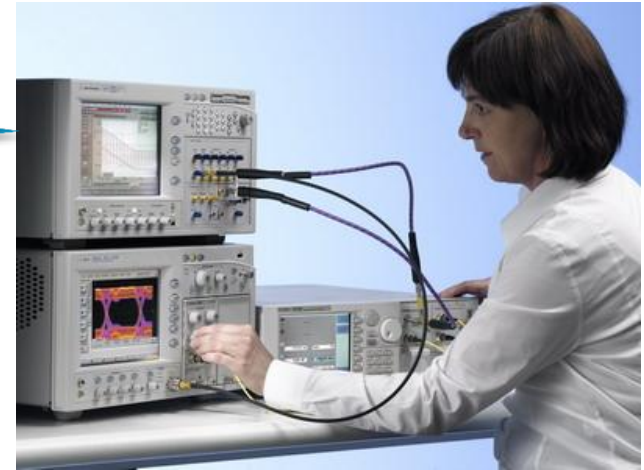
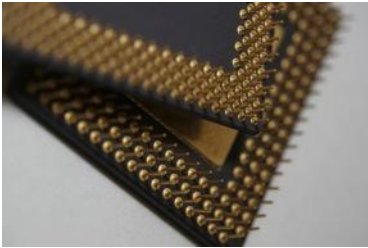
DCA Family: De-Facto Standard

- *Contributes only **\$0.01 to \$0.10** to manufacturing cost of optical TRX*



Virtual Device Demonstration

How can a salesperson take a lab bench of equipment to their customers in order to demo a new chipset?



FlexDCA software uses saved measurement data in offline mode, allowing anyone with a laptop to make measurements and answer customer questions.



Agilent Technologies

Virtual Device Demonstration

N1010A FlexDCA Software (\$500) – base configuration, then add:

N1010A #200/300

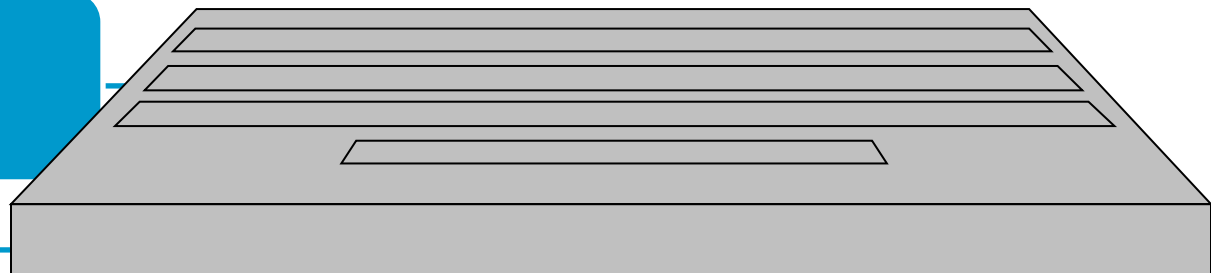
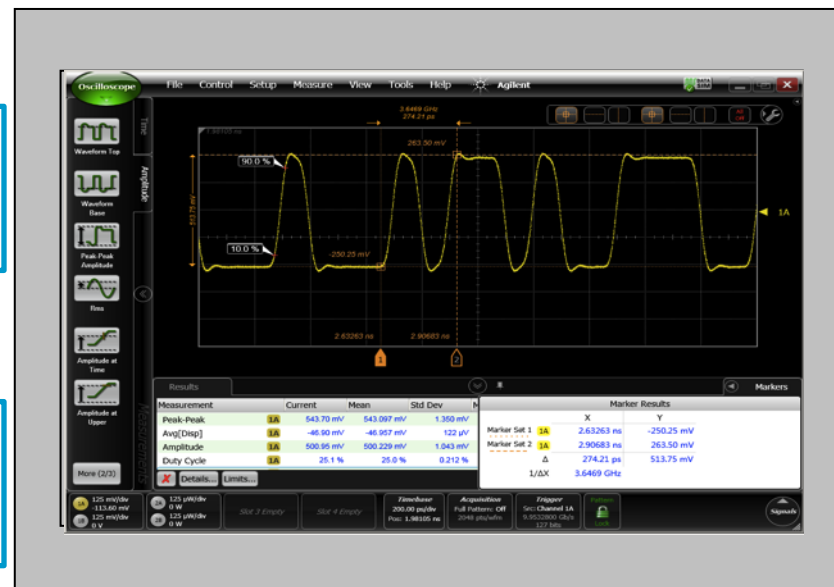
Jitter and Amplitude Analysis

N1010A #201

Advanced Waveform Analysis

N1010A #SIM

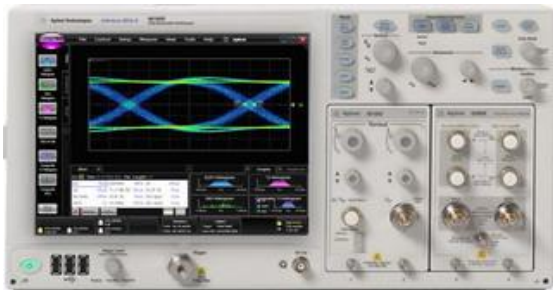
InfiniiSim DCA software



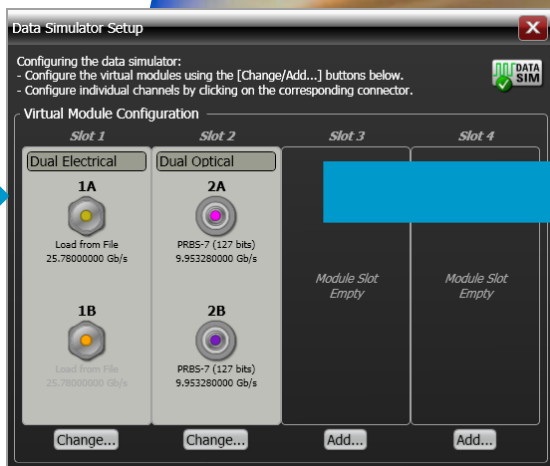
Agilent Technologies



Virtual Device Demonstration

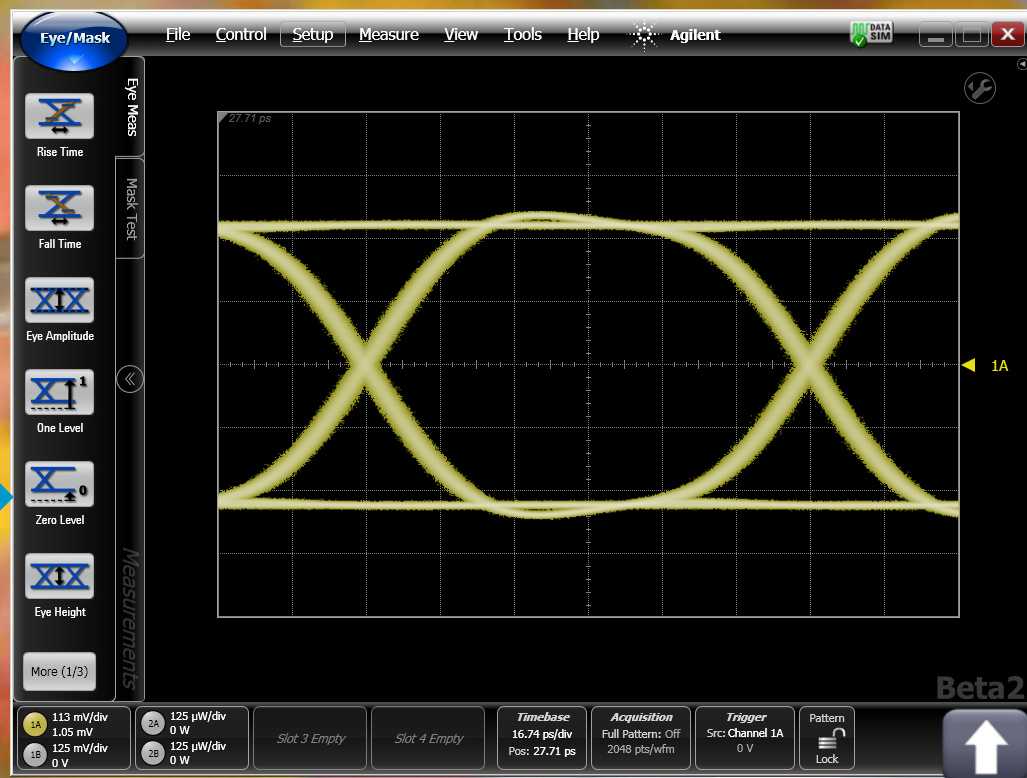


Make measurements
in factory / lab



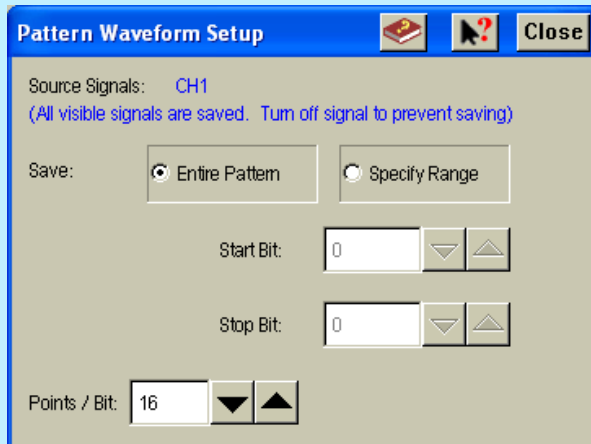
Transfer /
email data

FlexDCA (field/laptop)
(with/without LAN connection to DCA-X)



Virtual Device Demonstration

Factory/Lab: capture data



Field/Laptop: Import signals

- From file (receive captured data by email)
- Via LAN (remote connection to DCA-X)
- Integrate IBIS-AMI models (SystemVue)
- “Live” signal including jitter and noise
- Make most scope measurements



Oscilloscope Measurements



Jitter/Noise Measurements



Signal Integrity

Devices

- Printed circuit boards
- Backplanes
- Motherboards
- Connectors
- IC packages, sockets



Channel Characterization

- Time-domain (TDR/TDT)
- Frequency domain (S-parameters)



Troubleshooting

- Fault location
- Short/open/mismatch



Signal Integrity



Base Configuration (\$35k to \$60k)

- 86100C/D mainframe
- 54754A TDR/TDT module (2 for differential TDT)
- N1024A calibration kit

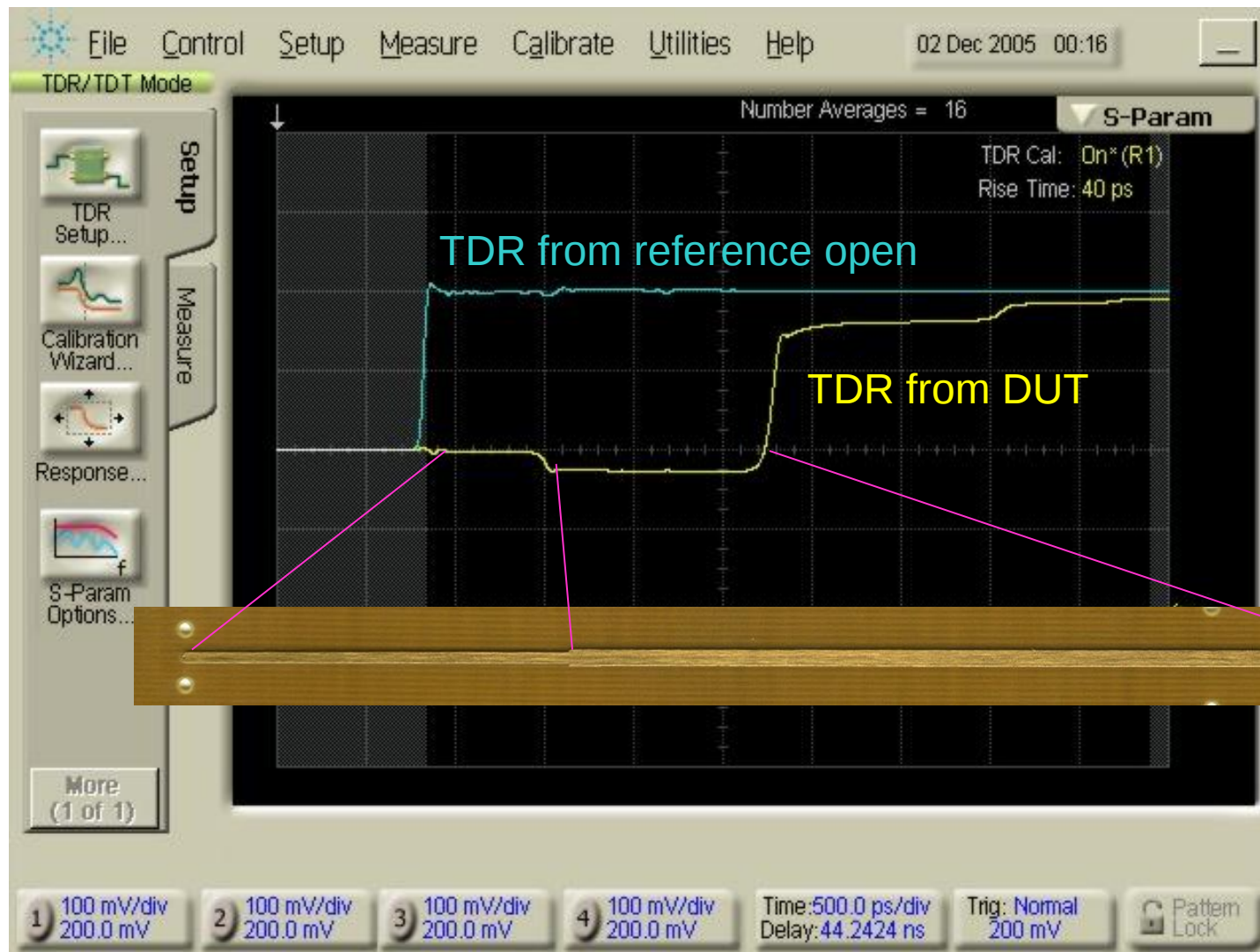
Optional Components (\$6k to \$14k)

- 86100C/D #202 Enhanced impedance and S-parameter software
- N1021B TDR probe
- N2787A probe holder



Agilent Technologies

Signal Integrity



TDR measures impedance as a function of time or distance

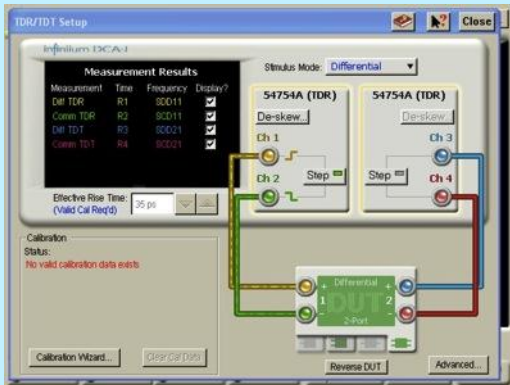
Top trace is the reflection from the end of the cable

Bottom trace is the reflected signal from the DUT

Signal Integrity

Ease Of Use

- Setup wizard eliminates errors



TDR calibration

- Most accurate results
- Variable edge speed – 15 to 500 ps
- Markers in time (sec) or distance (mm)



Live S-Parameters

- Magnitude, phase & group delay
- Save data in Touchstone format

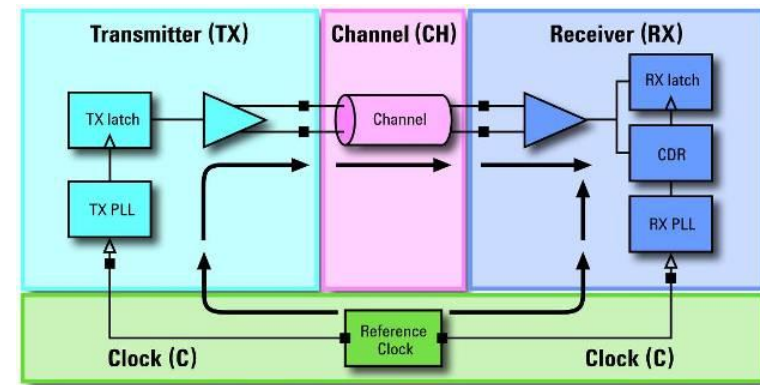


Differential TDR Probe

- Hardened tips - > 10,000 touchdown
- Ergonomic design



PLL and Clock Analysis



PLLs are used throughout high-speed communications

Clocks and PLLs affect jitter performance / BER of system

Standards specifying PLL performance

- PCI Express 1.1 / 2.0 / 3.0
- SONET/SDH
- Gigabit Ethernet
- Fibre Channel



PLL and Clock Analysis

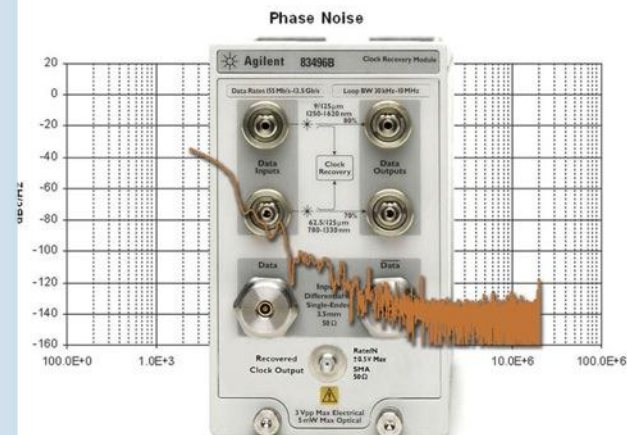


Base Configuration (\$42k to \$90k)

- 86100C/D mainframe
- 83496B clock recovery module
- 86100CU #400 PLL and jitter spectrum measurement software

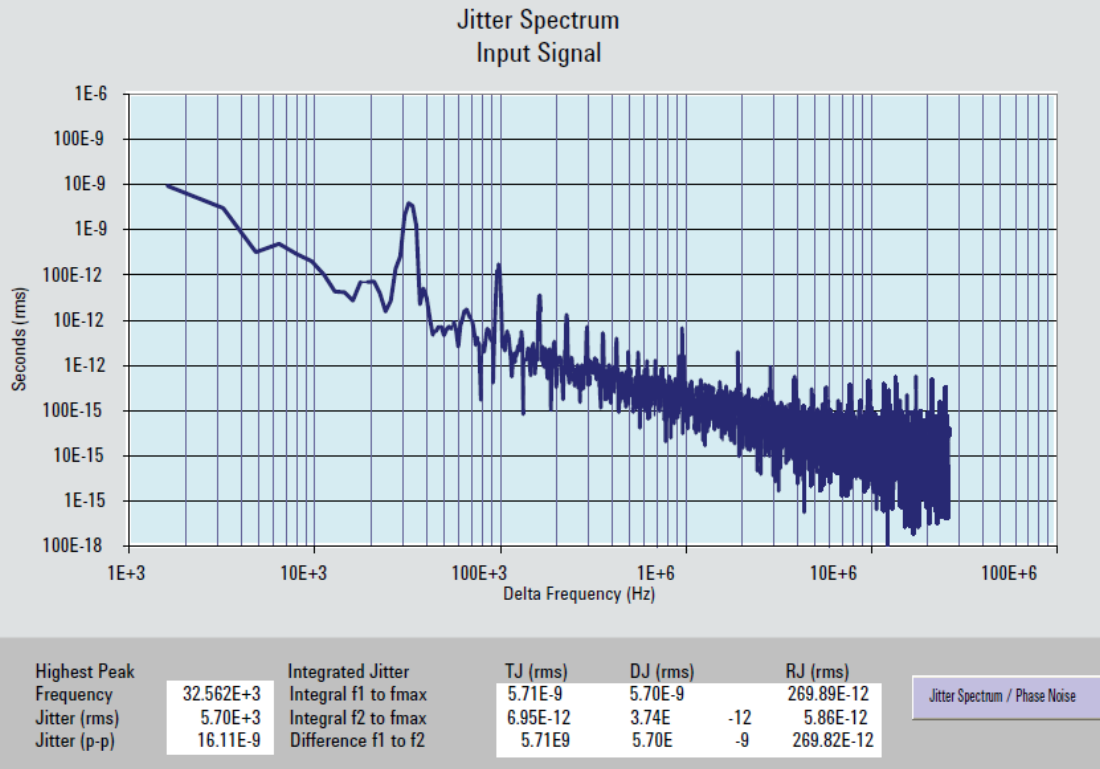
Optimal for 1 to 14 Gb/s (\$80k to \$150k)

- 86100C/D mainframe
- 86112A or 86117A 2-channel module
- 86100C/D #200/300 Jitter and amplitude analysis software
- 86108A Precision waveform analyzer
- 86108A #001 Pair of phase trimmers (skew adjustment)
- 86100C/D #200/300 Jitter and amplitude analysis software
- 86100C/D #201 Advanced waveform analysis
- 86100CU #400 PLL and jitter spectrum measurement software



PLL and Clock Analysis

Standard compliance test report



The phase noise plot provides valuable insights into the nature of random jitter. Different noise mechanisms have different profiles.



Agilent Technologies

PCI Express 2.0 Add-In Card
PLL Jitter Transfer Results

Test Summary: **PASS**

Vendor Details

Company Name	Agilent Test	Data Rate	9GT/s
Vendor ID	234234	De-Emphasis	3.5dB
Vendor Device ID	NX800GT Series		

Test Procedure

Agilent 86100C DCA-J Method

Software Revision 1.01.13

Test Date 6/11/2008 11:22

Test Equipment

86100C Serial # MY46520627

Module Serial # P1-3

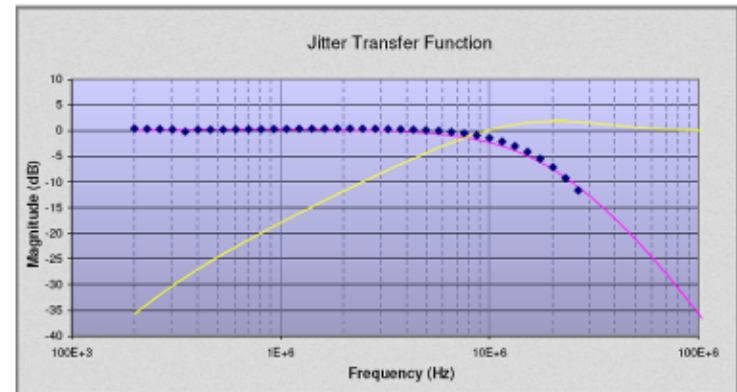
N4903A Serial # DE46B00332

Test Results:

	Measured Values	Status	Specifications	
			min	max
Data Rate	5.000E+9	N/A	N/A	N/A
Bandwidth	13.43E+6	PASS	5.0E+6	16.0E+6
Peaking (dB)	0.44	PASS	-	3

Jitter Transfer Function Model (FYI Only)

f_zero	f_gain	f_pole
000.00E+0	13.7E+39	7.6E+18



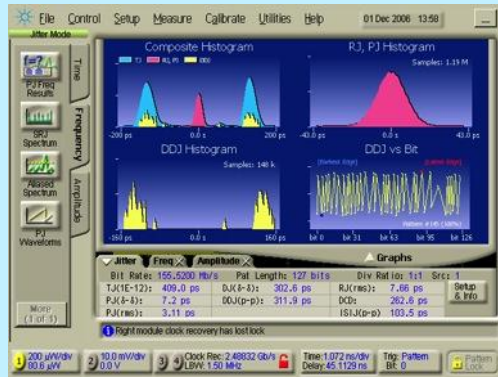
Agilent Technologies



PLL and Clock Analysis

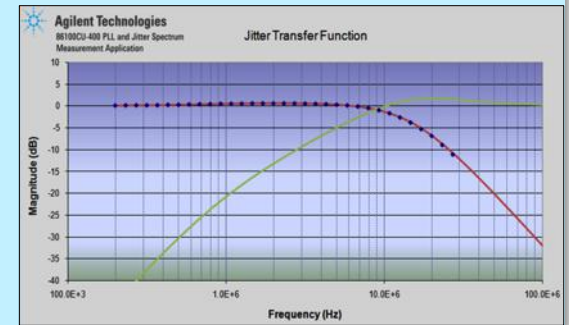
Jitter Separation

Automated jitter analysis helps identifying root causes



PLL Bandwidth & Peaking (Jitter Transfer)

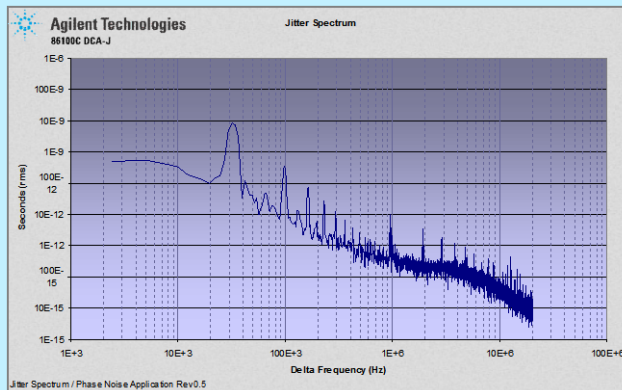
Automated PLL analysis can save hours of test time



Unique to the DCA: jitter spectrum/phase noise on *both* data and clock signals

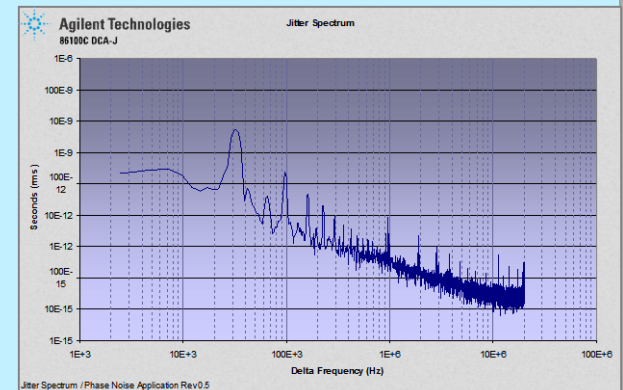
Jitter Spectrum of Data

Automated characterization of signals with spread-spectrum clocks (SSC)



Phase Noise of Clock

Automated characterization of clocks with spread-spectrum clocks (SSC)



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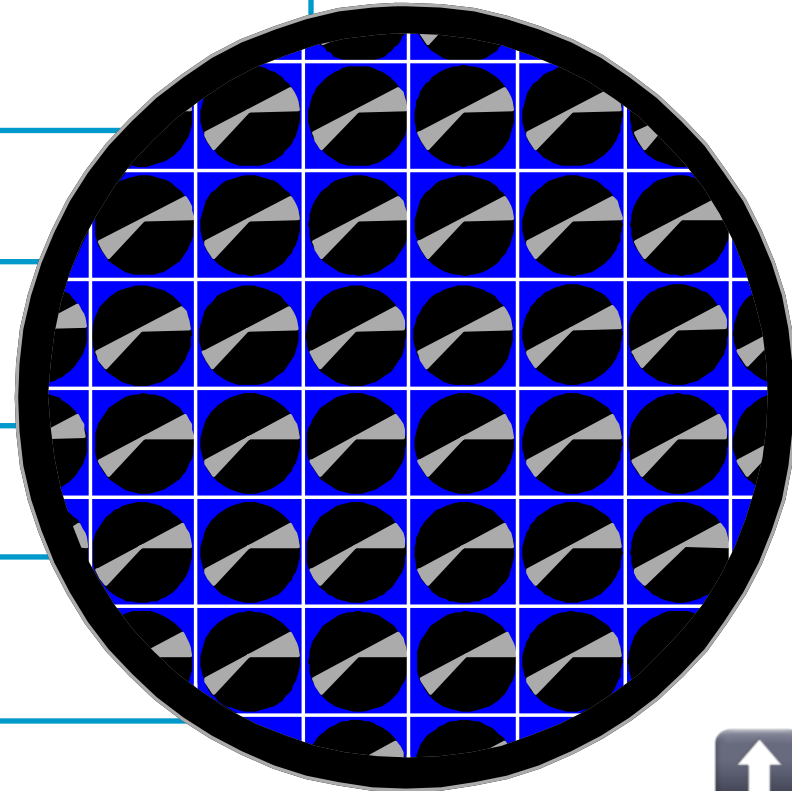
Research

$$r = \frac{\sum_{i=1}^n (x_i - x_m)(y_i - y_m)}{(n-1)x_s y_s}$$

Research often pushes the edge of technology where commercial measurement solutions have not been developed

Flexibility of measurement tools is essential to make progress

Modularity and custom measurement algorithms are desirable



Research

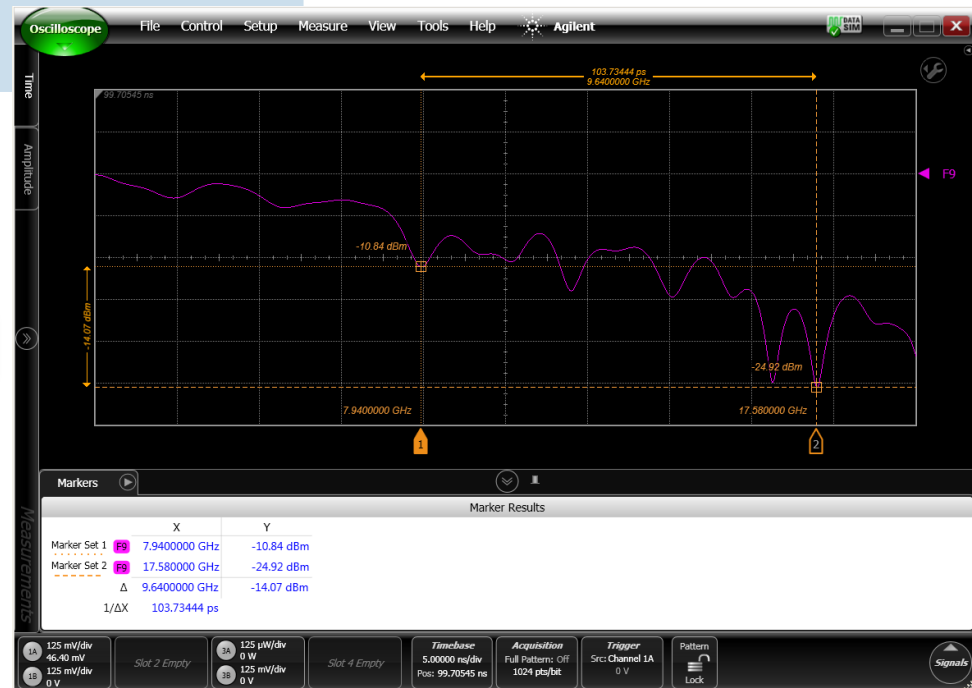
Base Configuration

- 86100C/D
- 86100C/D # 061/062 MATLAB® software
- 86100C/D Advanced waveform analysis
- Measurement module

Optional

- 83496B Clock recovery
- 86107A Precision timebase

FFT plot of measured waveform



Research

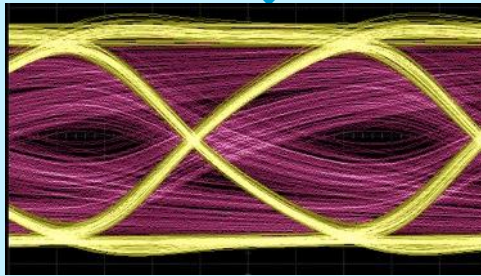
Raw waveform



MATLAB®



Processed waveform



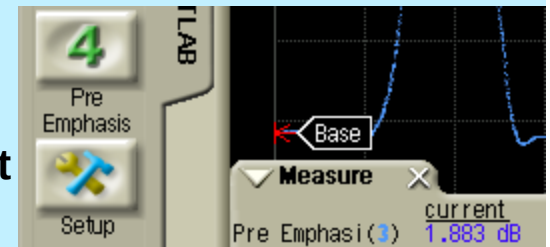
Raw data



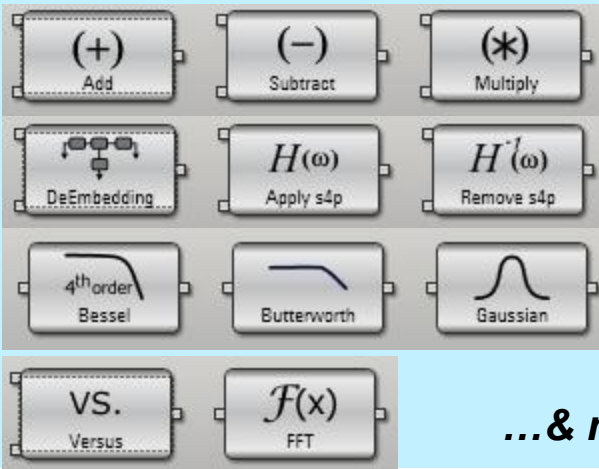
MATLAB®



User-defined Measurement
(Pre-Emphasis)

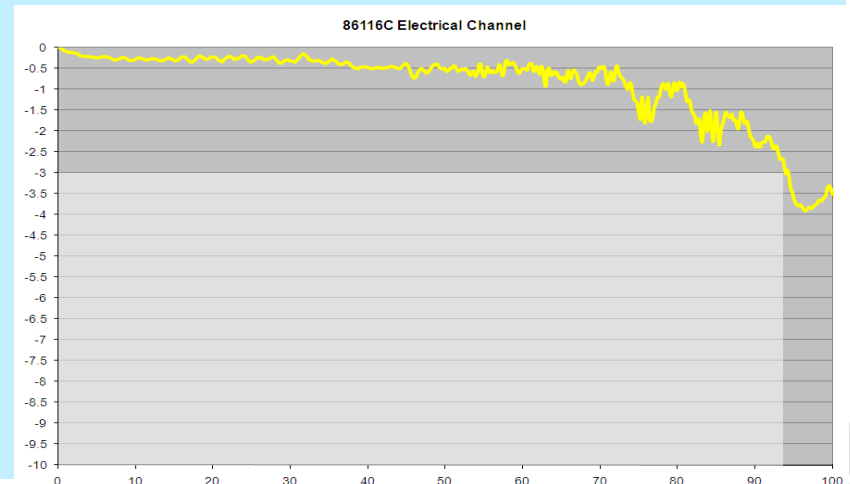


Common signal processing tasks



...& more!

Ultra-wide bandwidth – DC to >93 GHz

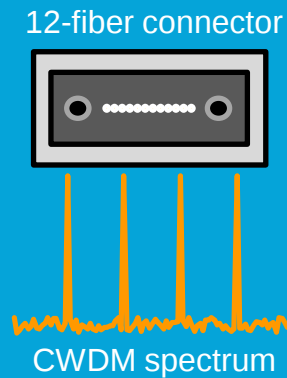


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Parallel Optics

Fundamental architectures

- N optical signals, each in its own optical fiber
- Coarse wavelength-domain multiplexing (CWDM)
(different “colors” in one fiber)



Typical configurations

- 4 x 10 Gbps
- 12 x 10 Gbps
- 4 x 25 Gbps
- Proprietary standards (≥ 240 Gbps aggregate)



Parallel Optics



Base configuration (\$90k - \$110k)	Advanced configurations (\$110k - \$200k)
• 86100C/D mainframe • 86115D #002 Dual optical module • [Optional] 86112A Dual electrical module	• 86100C/D mainframe • 2x 86115D #002 Dual optical module • 1x or 2x 86115D #004 Quad optical module



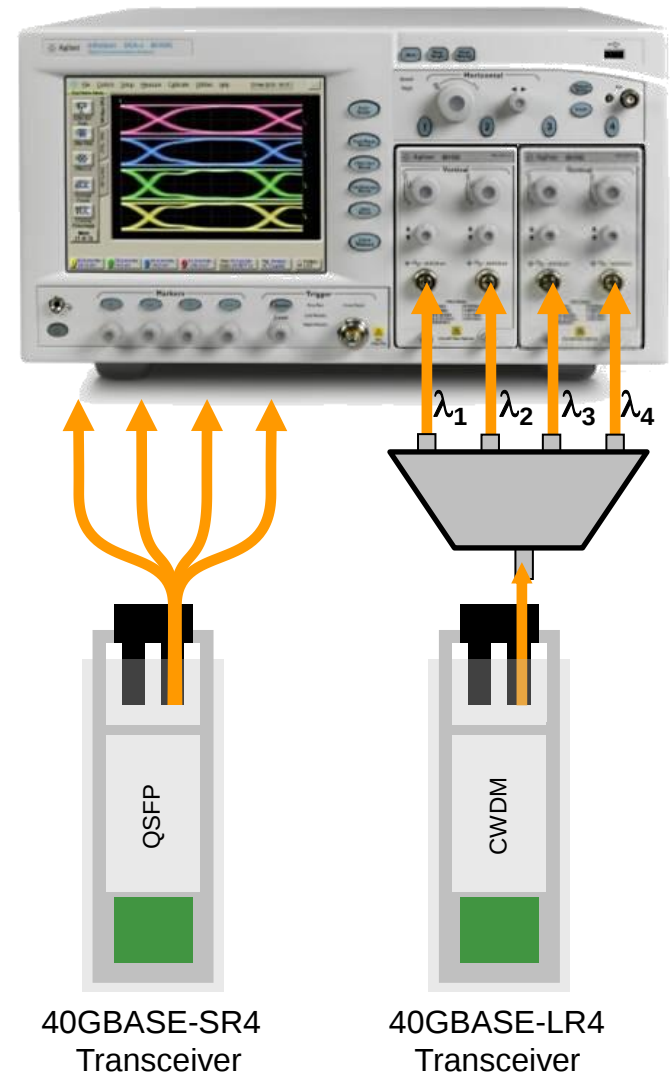
Parallel Optics

Connectivity

- Breakout patch cords for QSFP devices
- Demultiplexer for CWDM devices
- Multiple DCAs or optical switches required for higher channel counts

Measurement

- Acquire four databases in parallel (10-60 sec)
- Analyze eyes sequentially (~1 sec each)



Parallel Optics

Reduced CAPEX

- Modules share common mainframes
- 2 or 4 optical ports/module (up to 8 per mainframe)
- Effective cost/port as low as \$24k – lowest cost test solution in industry)

Reduced total test time

- Test times dominated by data acquisition
- DCA allows you to acquire data on 4 channels simultaneously with no reduction in throughput
- 3x to 4x throughput improvement over single port configuration

86100C/D mainframe plus...	Opt. Ports	Ele. Ports	\$/Opt.Port
86105D (Qty 1)	1	1	\$ 64,278
86105C/200 (Qty 1)	1	1	\$ 56,009
86105D (Qty 2)	2	2	\$ 53,719
86105C/200 (Qty 2)	2	2	\$ 45,450
86115D/002 (Qty 1)	2	0	\$ 42,559
86115D/002 (Qty 2)	4	0	\$ 37,280
86115D/004 (Qty 1)	4	0	\$ 26,780
86115D/004 (Qty 2)	8	0	\$ 24,140

Expandable (12-channel example)

- 2x 86100C/D mainframes
- 3x 86115D Quad optical modules
- *86112A Dual Electrical or 83496B Clock Recovery

* Desirable for troubleshooting

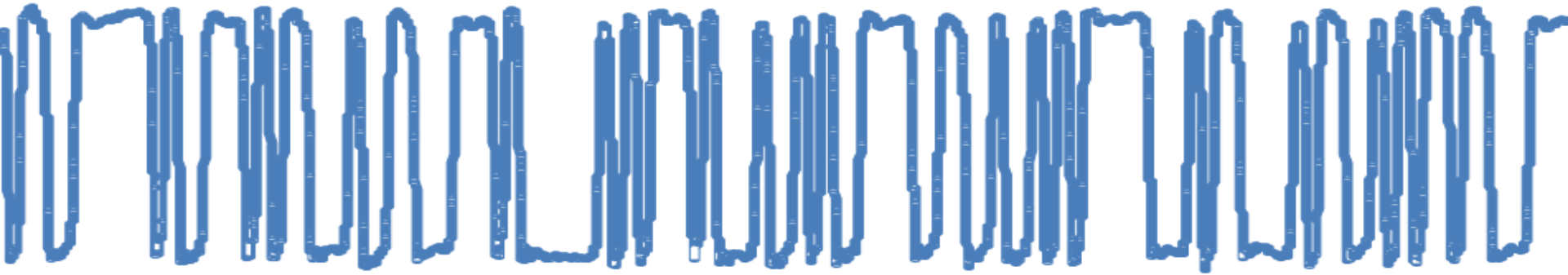


PRBS-31 / Live Traffic

Some standards require jitter analysis using test patterns such as PRBS-31 or scrambled/non-repeating data

Long patterns or non-repeating signals exceed the capabilities of conventional jitter analysis on sampling scopes (limit: PRBS-16)

Long pattern capability often requested from current DCA owners



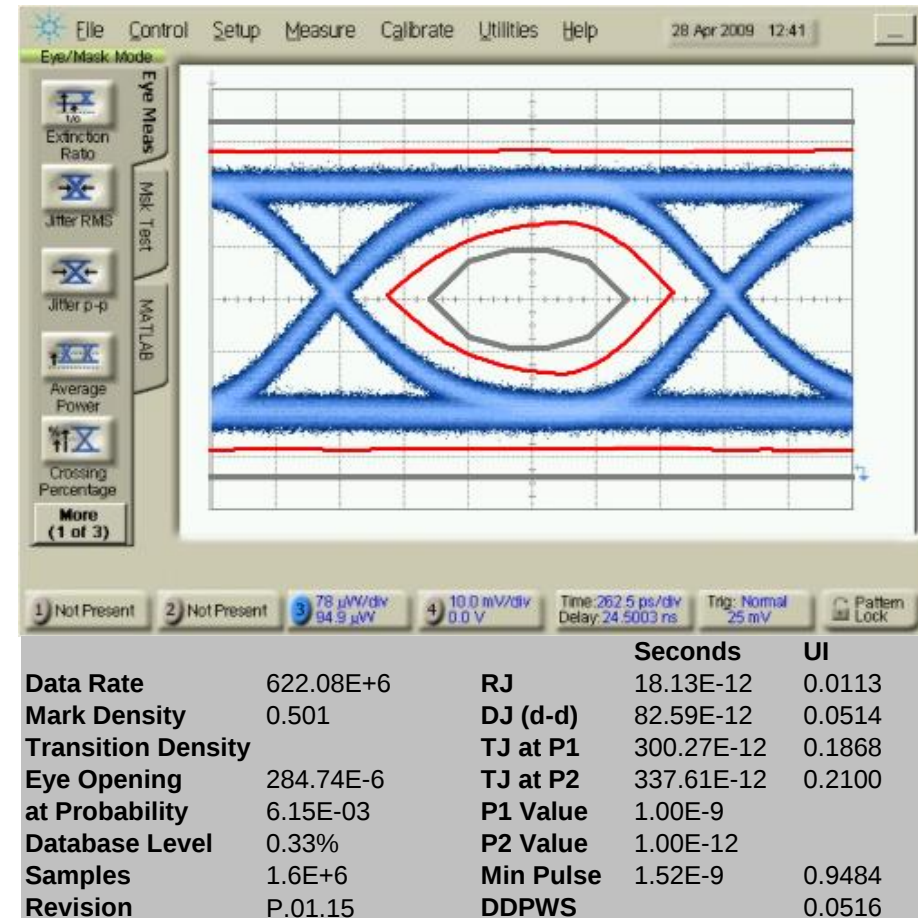
PRBS-31 / Live Traffic

Base Configuration

- 86100C/D Mainframe
- Module with electrical or optical channels
- 86100C/D #401 Advanced Eye Analysis
- LAN or GP-IB connection to 86100C/D running FW rev 8.1 or higher

Optional Configuration

- 86100C/D #200 Jitter analysis
- 86100C/D #300 Amplitude analysis



PRBS-31 / Live Traffic

Advanced Eye Analysis is an external software application that combines the measurement capabilities of the DCA with the analysis power of Microsoft Excel®

Data collection via LAN or GP-IB

Advanced analysis

Numerical and graphical reports



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PRBS-31 / Live Traffic

Advanced Eye Analysis

- Allows jitter analysis of any data signal – including **live traffic** (non-repeating patterns)
- Enhanced accuracy using 86100C/D-200:
 - Run DCA Jitter Mode on a short pattern to extract highly accurate RJ information
 - Switch to long pattern or live traffic and extract DJ
 - Complete analysis and report TJ

Key Features

- Jitter includes RJ, DJ, TJ, J2, J9
- Amplitude Interference includes RN, DI, and TI
- Data Dependent Pulse Width Shrinkage (DDPWS)
- BER contour mask testing
 - Standards compliant or user-defined masks

Major Standards

- 10/40/100 Gigabit Ethernet (GbE)
- 8G/16G Fibre Channel
- OIF-CEI
- SFP+



86100D Infiniium DCA-X Mainframe – What's New?

Larger 10.4-inch Display

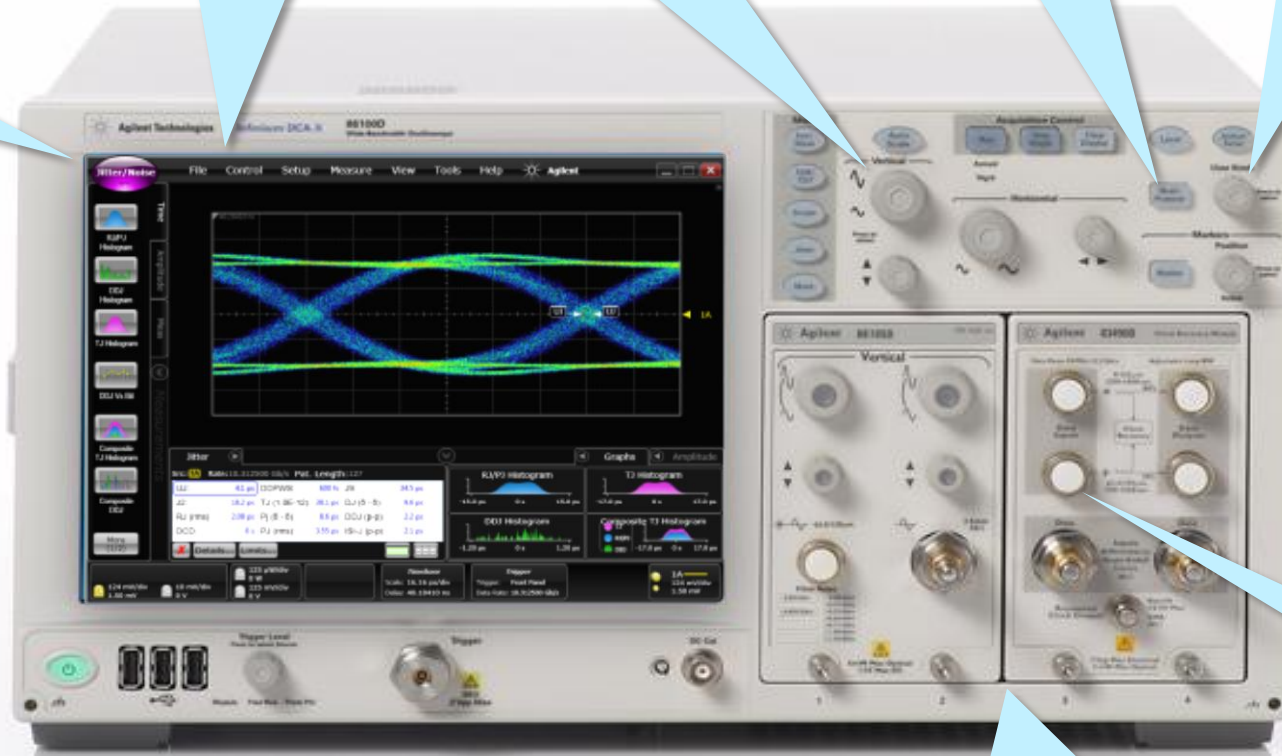
Mappable Vertical Controls

Multi-purpose Button

User Definable Knob

Dual user interfaces

FlexDCA Remote Access SW



InfiniiSim De-embedding / embedding

100 fs intrinsic jitter (86107A)

Backwards compatible with all legacy DCA modules

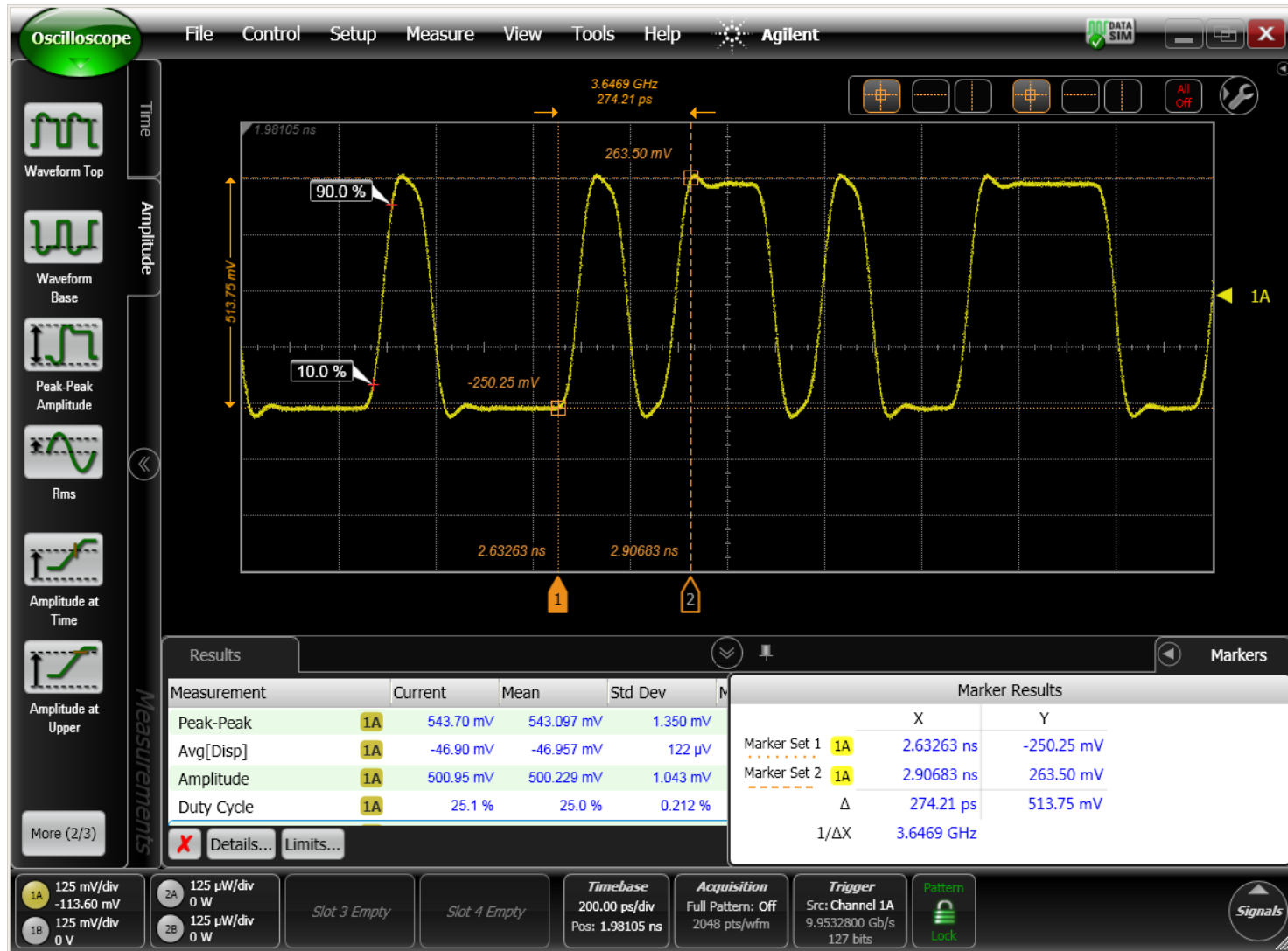
Up to 16 parallel measurement channels



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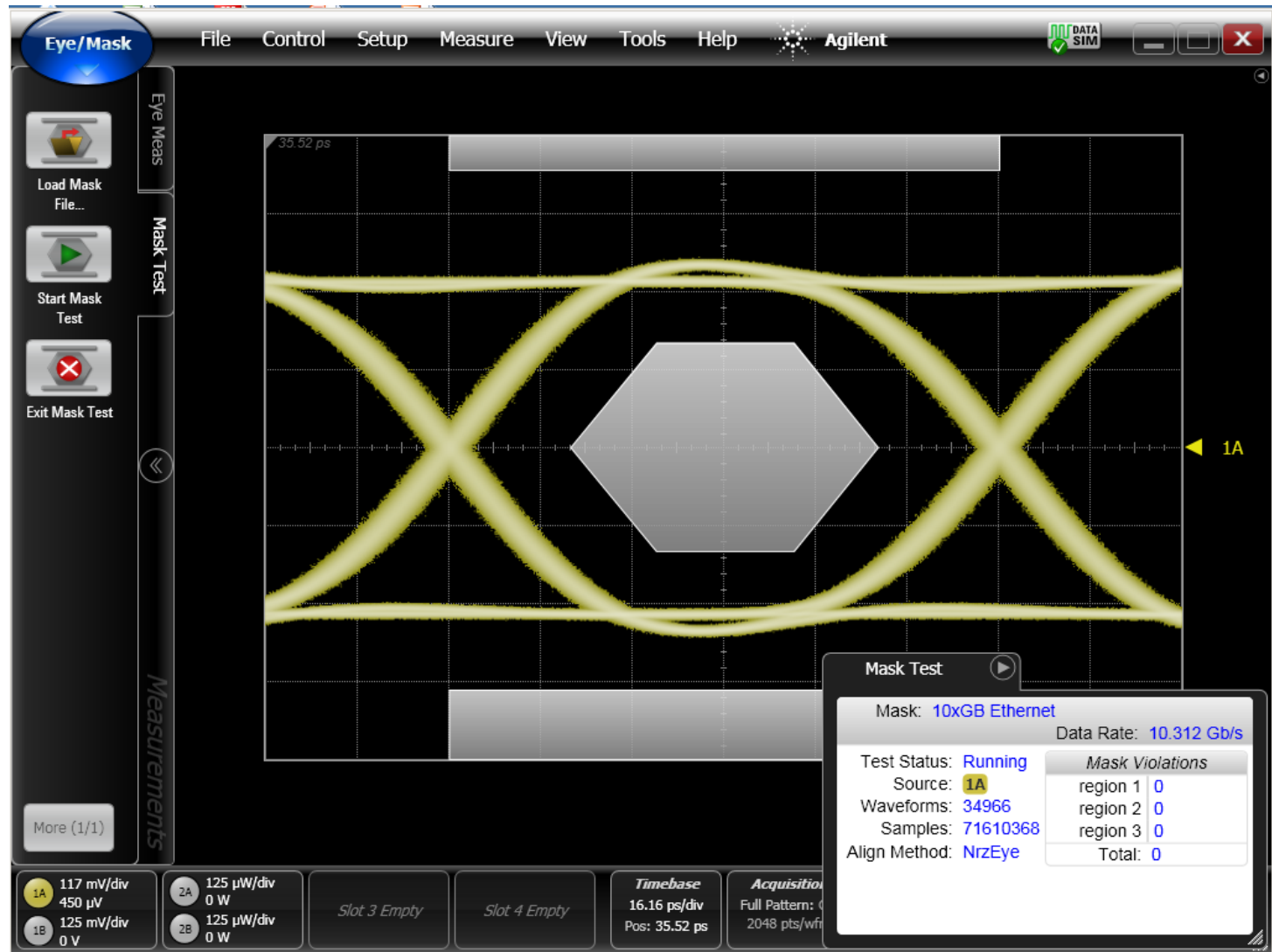
FlexDCA User Interface – OSC Mode



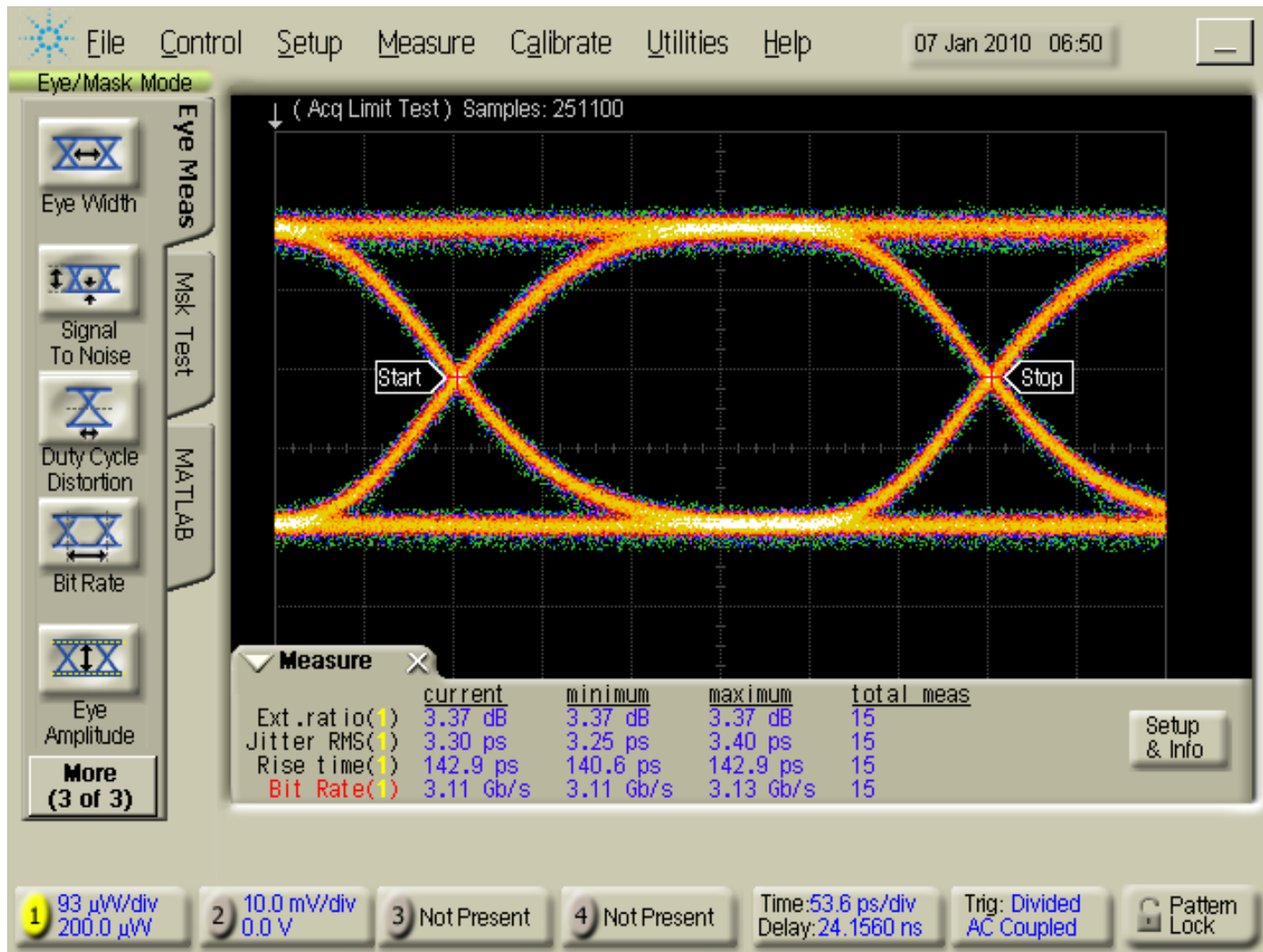
FlexDCA User Interface – Jitter Mode



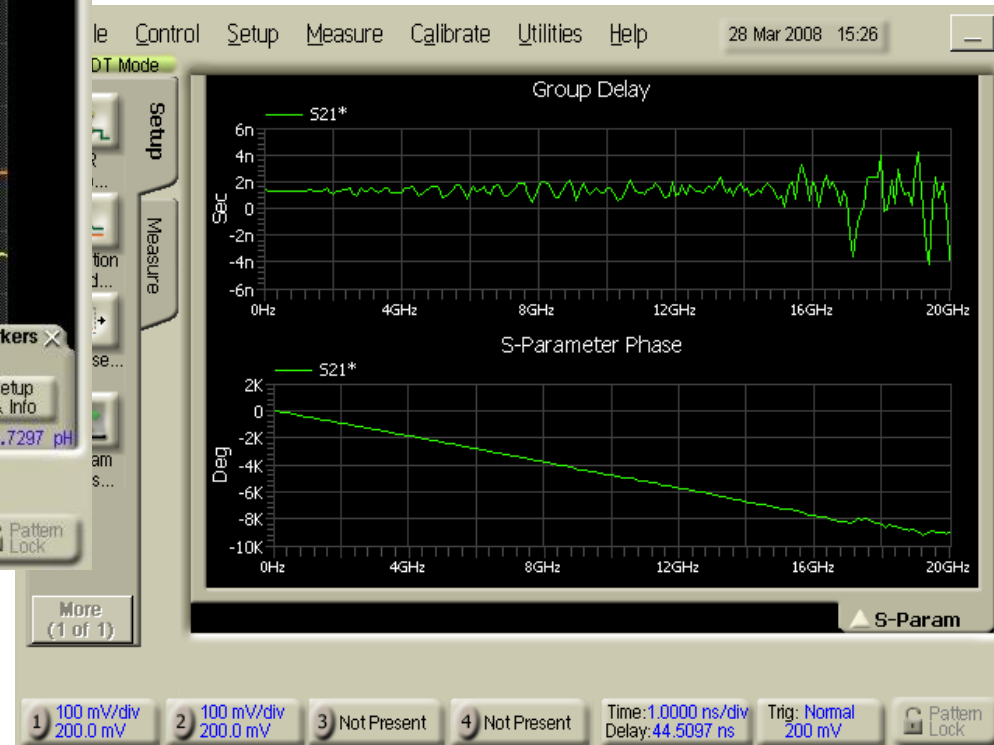
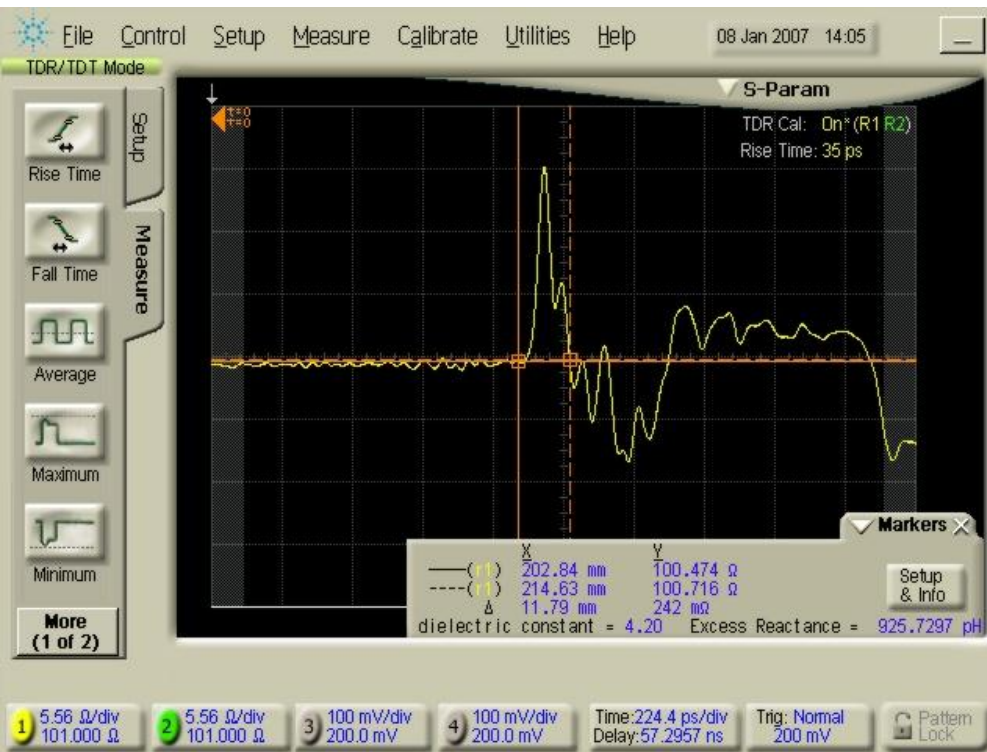
FlexDCA User Interface – EYE Mode



Classic User Interface



TDR and S-parameters



Optical Modules

86105C Optical/Electrical Module

- 9 GHz amplified optical channel
 - 750-1600 nm
- 9/125 to 62.5/125 m fibers
- 155 Mbps to 11.3 Gbps options
- 20 GHz electrical channel

Optimized for greatest **flexibility**



86105D Optical/Electrical Module

- 20 GHz optical channel
 - 750-1650 nm
- 9/125 to 62.5/125 μm fibers
- 8.5 Gbps to 14.025 Gbps
- 35 GHz electrical channel

Optimized for best **accuracy**



86116C Optical/Electrical Module

- Option 25: 45 GHz (typical) optical
- Option 40: 70 GHz (typical) optical
 - 750-1600 nm
- 9/125 fiber (single-mode)
- 93 GHz (typical) electrical channel

Optimized for highest **bandwidth**



86115D Dual/Quad Optical Module

- 20 GHz optical channels
 - 750-1650 nm
- 9/125 to 62.5/125 μm fibers
- 8.5 Gbps to 14.025 Gbps

Optimized for lowest **cost of test**



Electrical Modules

86112A Dual Electrical Module

- 20 GHz electrical channel
- Characteristic rms noise:
 - 0.25 mV (12 GHz BW)
 - 0.5 mV (20 GHz BW)



86117A Dual Electrical Module

- 50 GHz electrical channel
- Characteristic rms noise:
 - 0.4 mV (30 GHz BW)
 - 0.6 mV (50 GHz BW)



86118A Dual Remote Heads

- 70 GHz electrical channel
- Characteristic rms noise:
 - 0.4 mV (30 GHz BW)
 - 1.3 mV (70 GHz BW)
- Cable length
 - 2 m (each head)



86108A Precision Waveform Analyzer

- Combines 2 electrical channels, clock recovery and precision timebase into one module
- <60 fs intrinsic jitter
- >33 GHz bandwidth
- PLL characterization, loop BW/jitter transfer
- Easy differential setup for PCI-EXPRESS®, SATA



Specialty Modules

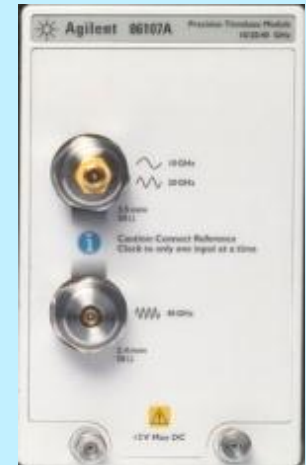
83496B Clock Recovery Module

- Option 100: Electrical Only
- Option 101: Optical & Electrical
- Continuous 0.05 to 14.2 Gbps
- Adjustable loop bandwidth
- PLL and Jitter Spectrum Analysis



86107A Precision Timebase

- <100 fs jitter (86100D mainframe)



54754A Differential TDR Module

- 18 GHz electrical channel
- 35 ps step generators
(*effective rise time software adjustable from 15 to 500 ps*)
- Single-ended or differential
- TDR or TDT operation
- Can be used as a 2-channel receiver module



Application Software

- 200: Jitter Analysis
- 201: Advanced Waveform Analysis
- 202: Enhanced Impedance and S-Parameters
- 300: Amplitude Analysis
- 400: PLL and Jitter Spectrum
- 401: Advanced Eye Analysis
- SIM: InfiniiSim-DCA Waveform Transformation



Infiniium DCA Probing

InfiniiMax III probe amp/probe head architecture

Probe Amplifier



Performance
verification and
de-skew fixture

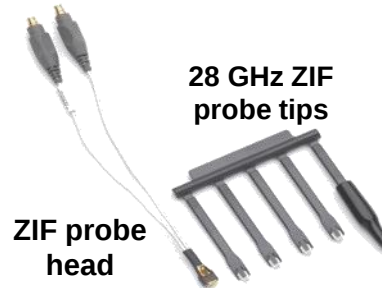


Probe Heads

30 GHz Browser
with LED Headlight



28 GHz ZIF
probe tips



16 GHz solder-in
probe head



28 GHz
2.92mm/3.5mm/SMA
probe head



Probe Adapters

Sampling scope
adapter



High impedance
probe adapter



Precision BNC 50
ohm adapter
adanner



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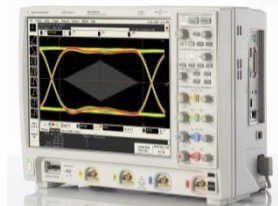
Buy the Best. Get Rewarded.



Begins
Sept 1, 2011
Ends
Feb 29, 2012

Purchase any of the following “parent” products:

Eligible Product Families	Models
<u>Any</u> PXA Signal Analyzer	N9030A
<u>Any</u> PNA-X Network Analyzer	N5241A/AS, N5242A/AS, N5244A/AS, N5245A/AS
<u>Any</u> Infiniium Oscilloscope	9000A, 90000A, 90000X, 86100D DCA-X



Automatically receive a free
InfiniiVision DSOX3034A 4 ch 350 MHz scope



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