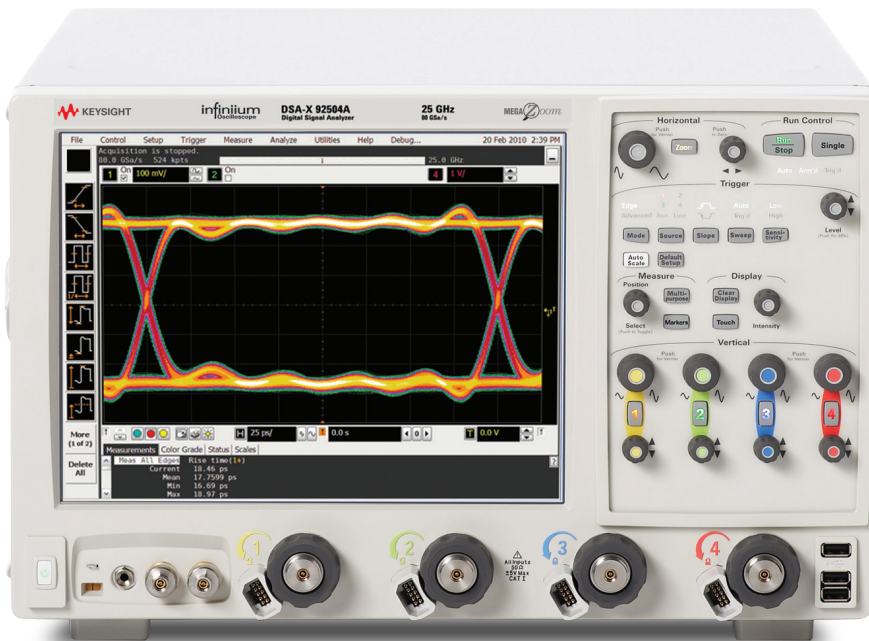


Keysight Technologies

90000 X-Series Real-Time Oscilloscopes

Engineered for 33 GHz true analog bandwidth that delivers

Configuration Guide



This configuration guide will help you determine which options, accessories, probes, and software to include with your new 90000 X-Series Oscilloscope, or to add as upgrades to an existing X-Series scope.

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Configure your high performance real-time oscilloscope solution today

This step-by-step process will help you configure your 90000 X-Series Oscilloscope. Capabilities that are listed as standard come with the instrument at no additional charge. Use option numbers when ordering at the time of purchase. Use model numbers to add to an existing scope. For detailed specifications, refer to the 90000 X-Series data sheet (5990-5271EN).



- DSO & MSO models come with 20 Mpts memory standard
- DSA models come with 50 Mpts memory, EZJIT, EZJIT+, EZJIT
- Complete and Serial Data Analysis standard
- MSO models come with a fully integrated 16 channel logic analyzer standard
- 13, 16, and 20 GHz models come with adapters rated to 25 GHz standard, all other models come with adapters rated to 35 GHz

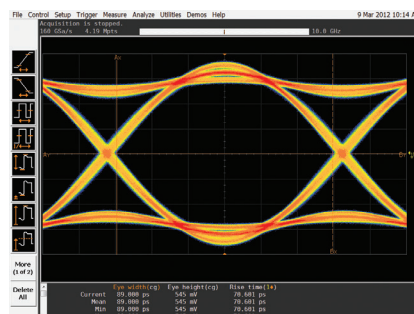
Bandwidth	Analysis Package	Model Number
13 GHz	Digital Signal Oscilloscope	DSOX91304A
	Digital Signal Analyzer	DSAX91304A
	Mixed Signal Oscilloscope	MSOX91304A
16 GHz	Digital Signal Oscilloscope	DSOX91604A
	Digital Signal Analyzer	DSAX91604A
	Mixed Signal Oscilloscope	MSOX91604A
20 GHz	Digital Signal Oscilloscope	DSOX92004A
	Digital Signal Analyzer	DSAX92004A
	Mixed Signal Oscilloscope	MSOX92004A
25 GHz	Digital Signal Oscilloscope	DSOX92504A
	Digital Signal Analyzer	DSAX92504A
	Mixed Signal Oscilloscope	MSOX92504A
28 GHz	Digital Signal Oscilloscope	DSOX92804A
	Digital Signal Analyzer	DSAX92804A
	Mixed Signal Oscilloscope	MSOX92804A
33 GHz	Digital Signal Oscilloscope	DSOX93204A
	Digital Signal Analyzer	DSAX93204A
	Mixed Signal Oscilloscope	MSOX93204A

Achieve Your Real Edge

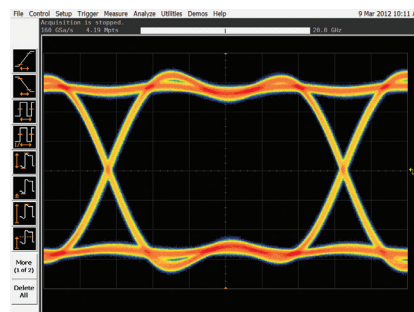
Having the right amount of oscilloscope bandwidth ensures accurate measurements. If you have too much bandwidth, oscilloscope noise becomes a contributor in your measurement. With too little bandwidth, rise times are improperly depicted. Use the chart below to find the correct oscilloscope bandwidth for the devices you are measuring.

Recommended scope bandwidth

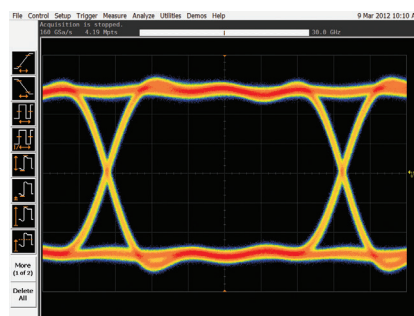
Technology	Data rate	Fastest rise time	Scope BW
Ethernet 10base-T	10 Mbps	30 ns	600 MHz
Ethernet 100base-T	100 Mbps	3 ns	600 MHz
Ethernet 1000base-T	250 Mbps x 4	1.2 ns	1 GHz
USB 2.0	480 Mbps	300 ps	2.5 G
USB 3.0	5 Gbps	50 ps	12 GHz
DDR1	400 MT/s	500 ps	2 GHz
DDR2	1066 MT/s	250 ps	4 GHz
DDR3	2133 MT/s	100 ps	8 GHz
DDR4	3200 MT/s	75 ps	12 GHz
GDDR5	8 Gbps	30 ps	16 GHz
SATA 3G	3 Gbps	67 ps	12 GHz
SATA 6G	6 Gbps	33 ps	16 GHz
SAS-2	6 Gbps	42 ps	16 GHz
SAS-3	12 Gbps	21 ps	30 GHz
16G FibreChannel	14.025 Gbps	24 ps	35 GHz
HDMI 1.4	3.4 Gbps	50 ps	8 GHz
DisplayPort 1.2	5.4 Gbps	50 ps	13 GHz
10G Ethernet	10 Gbps	60 ps	12 GHz
10Gbase-KR	10.3125 Gbps	24 ps	25 GHz
XAUI	3.75 Gbps	60 ps	12 GHz
MIPI M-Phy	5.83 Gbps	17.2 ps	24 GHz
MIPI D-Phy	1.5 Gbps	100 ps	6 GHz
PCI Express 2	5 Gbps	30 ps	12.5 GHz
PCI Express 3	8 Gbps	25 ps (est.)	16 GHz
28/32G FibreChannel	28 Gbps	18 ps	45 GHz
Thunderbolt 10G	10.3125 Gbps	22 ps	25 GHz
SFP +	10 Gbps	34 ps	16 GHz
MHL	3.0 Gbps	75 ps	8 GHz
InfiniBand DDR	2.5 Gbps, 5 Gbps	75 ps	8 GHz
DVI	1.65 Gbps	75 ps	5 GHz



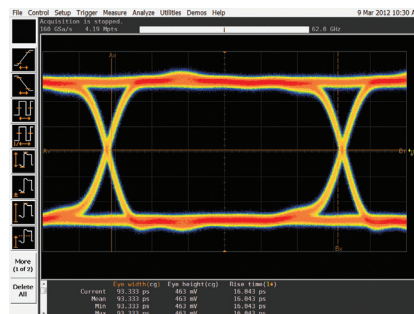
10 Gbps eye captured with 10 GHz of bandwidth



10 Gbps eye captured with 20 GHz of bandwidth



10 Gbps eye captured with 30 GHz of bandwidth



10 Gbps signal captured with 62 GHz of bandwidth, notice the faster rise time and wider eye measurements

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Description	DSO/MSO Options	DSA Options	Model Number
20 Mpts/ch memory	Standard	–	
50 Mpts/ch memory	DSOX90000A-050	Standard	N2810A-050
100 Mpts/ch memory	DSOX90000A-100	DSOX90000A-100	N2810A-100
200 Mpts/ch memory	DSOX90000A-200	DSOX90000A-200	N2810A-200
500 Mpts/ch memory	DSOX90000A-50	DSOX90000A-500	N2810A-500
1 Gpt/ch memory	DSOX90000A-01G	DSOX90000A-01G	N2810A-01G
2 Gpt/ch memory	DSOX90000A-02G	DSOX90000A-02G	N2810A-02G

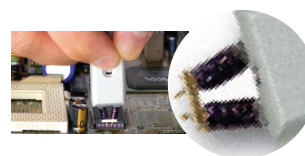


Probe Amps	Model Number
30 GHz InfiniiMax III probe amp	N2803A
25 GHz InfiniiMax III probe amp	N2802A
20 GHz InfiniiMax III probe amp	N2801A
16 GHz InfiniiMax III probe amp	N2800A

(All InfiniiMax III probes are upgradable.)



ZIF Probing	Model Number
ZIF Probe Head	N5439A
450 Ω 28 GHz ceramic ZIF tip replacement (set of 5)	N5440A
450 Ω 25 GHz PCB ZIF tip replacement (set of 5)	N2838A
250 Ω ZIF tip replacement (set of 5)	N5447A



Browser Probing	Model Number
Browser (hand held) probe head	N5445A
Browser tip replacement (set of 4)	N5476A



Solder-In Probing	Model Number
26 GHz Solder-in probe head	N2836A
16 GHz Solder-in probe head	N5441A

Probing Accessories	Model Number
3.5 mm/2.92 mm/SMA probe head	N5444A
High impedance probe adapter	N5449A
Performance verification/des skew fixture**	N5443A
Precision BNC adapter, adds compatibility to InfiniiMax II probes	N5442A
Sampling scope adapter	N5477A
High impedance probe adapter	N5449A



** Can also be ordered as option DSOX90000-808

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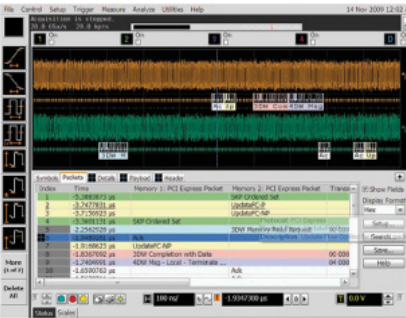
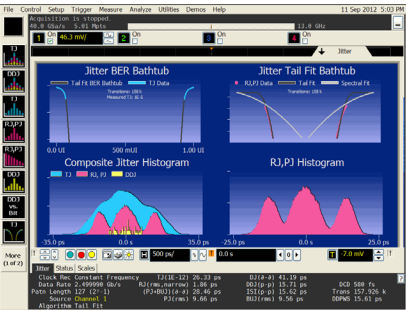
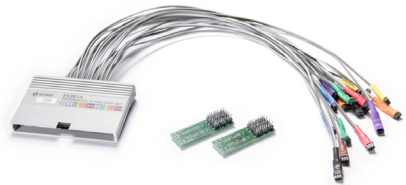
Description	Model Number
Soft touch connectorless 90-pin cable connectors**	N2815A
Pro series soft touch connectorless 90-pin cable	E5405A
Samtec probe-differential wth 90-pin cable connectors	E5379A
Differential flying leads with 90-pin cable connector	E5381A
Single-ended flying leads with 90-pin cable connector	E5382A

** Comes standard with MSO models

Description	Model Number
35 GHz 2.92 mm cable	N2812A
2.92 mm head flex cable for extension of 2.92mm probe head	N5448A
Connector Assembly – 3.5 mm Female to Female	5061-5311

Description	DSO/MSO Options	DSA Options	Model Number
PrecisionProbe	DSOX90000-001	DSOX90000-001	N2809A-001
EZJIT jitter analysis	DSOX90000-002	Standard	E2681A
EZJIT Plus jitter analysis	DSOX90000-004	Standard	N5400A
EZJIT Complete jitter analysis	DSOX90000-070	Standard	N8823A
High Speed SDA and clock recovery	DSOX90000-003	Standard	E2688A
InfiniiSim basic signal de-embedding	DSOX90000-013	DSOX90000-013	N5465A-001
InfiniiSim advanced signal de-embedding	DSOX90000-014	DSOX90000-014	N5465A-002
Serial data equalization	DSOX90000-012	DSOX90000-012	N5461A

Description	Options	Model Number
InfiniiScan software triggering	DSOX90000-009	N5414B
CAN/FlexRay decode	DSOX90000-063	N8803A
I ² C/SPI decode	DSOX90000-007	N5391A
MIPI D-PHY protocol	DSOX90000-019	N8802A
PCI-Express protocol	DSOX90000-017	N5463A
RS-232/UART decode	DSOX90000-015	N5462A
SATA/SAS protocol	DSOX90000-018	N8801A
USB 2.0 protocol	DSOX90000-016	N5464A



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Memory	Options	Model Number
DDR1 and LPDDR compliance	DSOX90000-031	U7233A
DDR2 and LPDDR2 compliance	DSOX90000-033	N5413A
DDR3 up to 1660 MHz compliance	DSOX90000-032	U7231A
DDR4 compliance	DSOX90000-058	N6462A

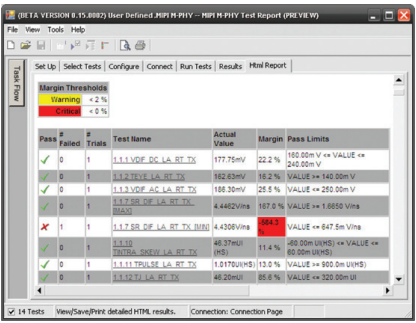
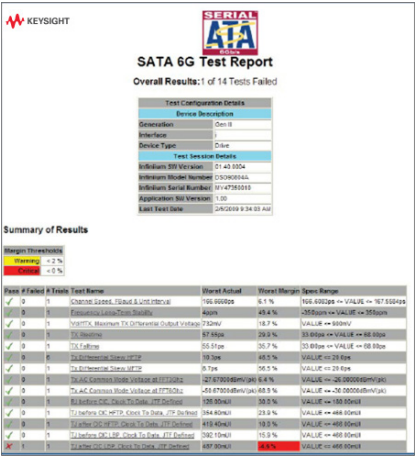
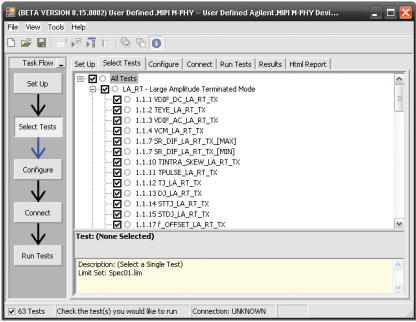
Display	Options	Model Number
DisplayPort compliance	DSOX90000-045	U7232B
HDMI compliance	DSOX90000-023	N5399B

Ethernet	Options	Model Number
Ethernet compliance	DSOX90000-021	N5392A
Xaui compliance	DSOX90000-030	N5431A
10 GBASE-T Ethernet automated test	DSOX90000-036	U7236A

Storage	Options	Model Number
SAS compliance	DSOX90000-027	N5412A
SAS-2 compliance	DSOX90000-043	N5412B
SATA 6 Gb/s compliance	DSOX90000-038	N5411B

Computer/Mobile	Options	Model Number
USB 3.0 compliance	DSOX90000-041	U7243A
PCI Express compliance	DSOX90000-022	N5393B
PCI Express for 1.0/2.0/3.0 compliance test	DSOX9000-044	N5393C
MIPI D-PHY compliance	DSOX90000-035	U7238A
User-defined application	DSOX90000-040	N5467A

Description	Options	Model Number
User-defined application	DSOX90000A-040	N5467A
User-defined function	DSOX90000-010	N5430A
MATLAB basic digital analysis package	DSOX90000-061	-
MATLAB standard digital analysis package	DSOX90000-062	-
InfiniiView offline analysis engine	-	N8900A



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Description	Options	Model Number
ANSI Z540 compliant calibration	DSOX90000-A6J	–
ISO 17025 calibration	DSOX90000-1A7	N5430A

Description	Options	Model Number
DVD RW	DSOX90000-820	N5473A
GPIO card-interface	DSOX90000-805	82350B
PCI Express card-interface	DSOX90000-823	N4866A
Removable solid state drive with Windows 7	DSOX90000-801	–
Additional removable solid state drive with Windows 7	(Requires option 801)	N2892A
Rack mount kit option	DSOX90000-1CM	N5470A
Sub- 7 ps calibration pulse generator	–	N2806A



Instrument Upgrades

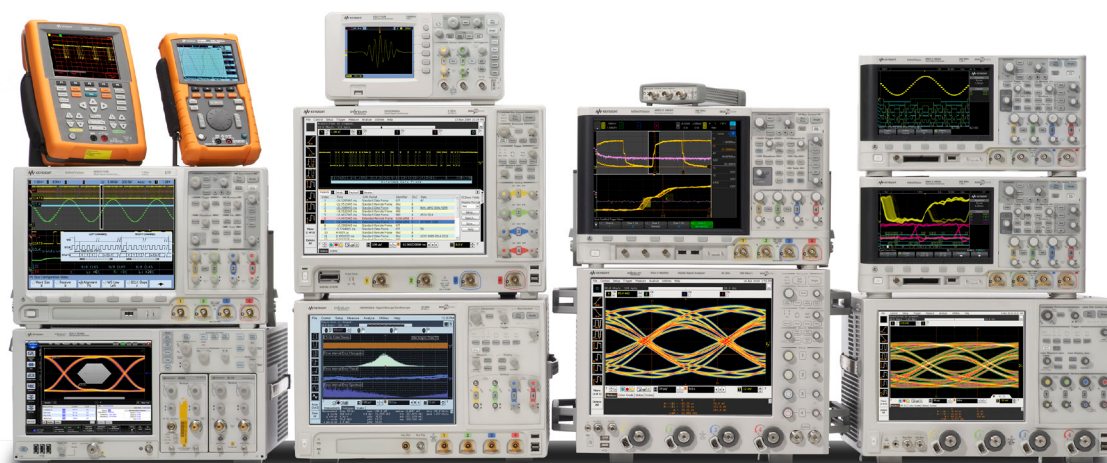
Upgrade your existing 90000 X-Series Oscilloscope

Bandwidth Upgrades	Model Number
13 GHz to 16 GHz Bandwidth upgrade	N5471M
16 GHz to 20 GHz Bandwidth upgrade	N5471G
20 GHz to 25 GHz Bandwidth upgrade	N5471H
25 GHz to 28 GHz Bandwidth upgrade	N5471I
28 GHz to 33 GHz Bandwidth upgrade	N5471J

Memory Upgrades	Model Number
Upgrade 20 Mpts/ch to 50 Mpts/ch memory	N2810A-050
Upgrade 50 Mpts/ch to 100 Mpts/ch memory	N2810A-100
Upgrade 100 Mpts/ch to 200 Mpts/ch memory	N2810A-200
Upgrade 200 Mpts/ch to 500 Mpts/ch memory	N2810A-500
Upgrade 500 Mpts/ch to 1 Gpt/ch memory	N2810A-01G
Upgrade 1 Gpt/ch to 2 Gpts/ch memory	N2810A-02G

Operating System Upgrades	Model Number
Windows 7 for 90000 X-Series	N2753A

MSO Upgrades	Model Number
Upgrade to MSOX90000 – chassis included	N2834A-002
Upgrade to MSOX90000 – board only	N2834A-001



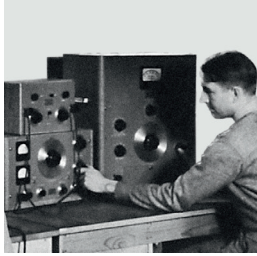
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