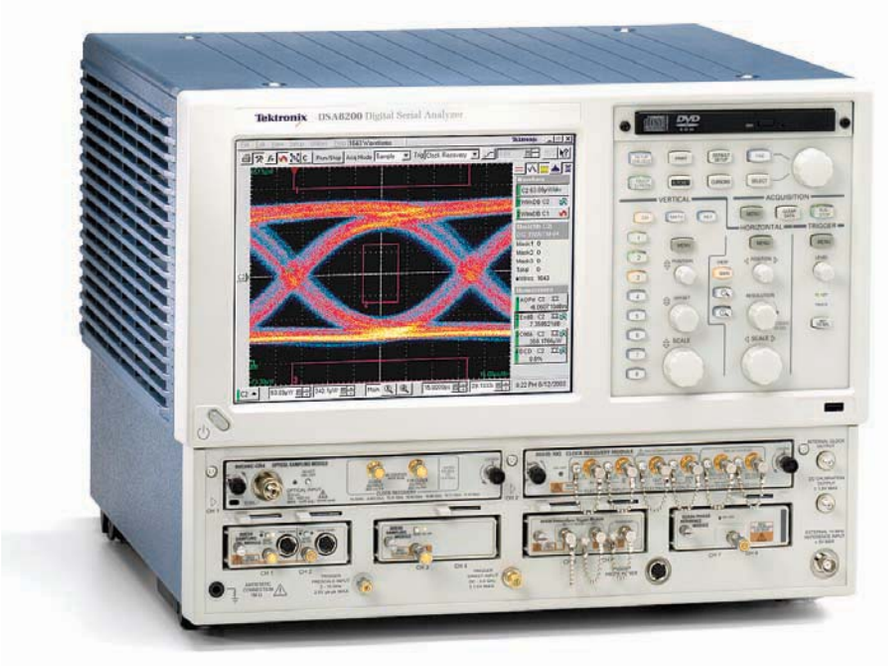
Digital Serial Analyzer Sampling Oscilloscope

DSA8200



Features & Benefits

State of the art sampling oscilloscope for communication signal analysis, TDR/TDT/Serial data network analysis, acquisition and measurements of repetitive ultrafast signals
- Acquisition of Spread Spectrum Clocking (SSC) signals
- Industry's only mainframe to support up to eight input channels for increased flexibility and throughput
- Four color graded, variable persistence waveform databases
- Measurement system with over 100 automated measurements
- Complete suite of communications measurements includes both types of OMA, SSC profile and many others
- Automated ITU/ANSI/IEEE mask testing
- Masks and measurements for SONET/SDH, FC, ethernet and other standards built-in
- Mask updates can be loaded from factory-supplied file
- Mask margin testing for guard banding production testing

Acquisition Modules
- Fully integrated multi-rate optical modules
- Optical modules up to 80+GHz 80C10B*1
- High accuracy "ER Calibrated" measurement available in some modules
- Electrical modules to 70+ GHz bandwidth and 5 ps measured rise time (10 to 90%)
- Flexible rate clock recovery
- Clock recovery with SSC (Spread Spectrum Clocking) support available

Jitter, Noise, BER and Serial Data Link Analysis
- Measures and separates deterministic data dependent jitter from random jitter
- Measures vertical noise separating deterministic data dependent noise from random noise
- Highly accurate BER and eye contour estimation, support for latest measurements – DDPWS, TWDP
- FFE/DFE equalization, transmitter equalization
- Channel emulation for channels with >30 dB of loss
- Linear filter for fixture de-embedding, Linear Filtering

TDR (Time Domain Reflectometry)
- Up to 50 GHz TDR bandwidth with 15 ps reflected rise time and 12 ps incident rise time
- Lowest noise for accurate repeatable TDR measurement results – 600 μV_{RMS} at 50 GHz
- Independent sampler deskew ensures easy fixture and probe de-embedding
- Industry's only mainframe to accommodate up to four true differential TDR or electrical channel pairs for increased system versatility

S-parameters Measurements
- Up to 50 GHz differential, single-ended, mixed-mode; insertion, return loss, frequency domain crosstalk
- PCI Express, Serial ATA, infiniband, gigabit ethernet manufacturing and standard compliance testing for gigabit signal path and interconnects – including eye mask tests
- Intuitive, easy and accurate for serial data, gigabit digital design and signal integrity
- Fast and accurate automated multi-port S-parameter measurements with command line interface

Industry's best standard timebase jitter performance, 800 fs_{RMS}

Industry leading timebase jitter performance, <200 fsRMS*2 available with phase reference mode

Fast acquisition rate and high throughput

True differential remote sampler enabling placement near DUT for superior signal fidelity

FrameScan™ acquisition mode with eye diagram averaging:
- Isolate data dependent faults
- Examine low-power signals

MS Windows XP operating system

Advanced connectivity to third-party software

Applications

Design/verification of Telecom and datacom components and systems

Manufacturing/testing for ITU/ANSI/IEEE/SONET/SDH conformance

High-performance true differential TDR measurements

Advanced jitter, noise and BER analysis

Impedance characterization and Network Analysis for Serial Data Applications Including S-parameters

Channel and eye diagram simulation and measurement-based SPICE modeling

*1 80C10B specifications preliminary.

*2 Typical, with the Phase Reference module, some conditions apply. Without the module, the jitter is <800 fsRMS (typical).

Tektronix®

Superior Performance with Extraordinary Versatility

For developing today's high-speed serial devices, the DSA8200 Digital Serial Analyzer sampling oscilloscope is the most versatile tool for communication, computer and consumer electronics gigabit transmitter and signal path characterization and compliance verification. With exceptional bandwidth, signal fidelity and the most extensible modular architecture, the DSA8200 provides the highest performance TDR and interconnect analysis, most accurate analysis of signal impairments and BER calculations for current and emerging serial data technology.

The DSA8200 provides unmatched measurement system fidelity with ultra-low jitter floor that ensures the most accurate acquisition of high-speed signals. You get advanced analysis benefits from the 200 fs acquisition jitter with the Phase Reference module. And in another step forward for a sampling oscilloscope, with the help of the Phase Reference module, the DSA8200 can acquire and measure SSC (Spread Spectrum Clocking) signals.The multi-processor architecture, with dedicated per-slot digital signal processors (DSPs), provides fast waveform acquisition rates, reducing the test times necessary for reliable characterization and compliance verification.

The DSA8200's versatile modular architecture supports a large and growing family of plug-ins enabling you to configure your measurement system with a wide variety of electrical, optical and accessory modules that best suit your application now and in the future. With six module slots, the DSA8200 can simultaneously accommodate a clock recovery module, a precision Phase Reference module and multiple acquisition modules, electrical or optical, so you can match system performance to your evolving needs.

Featuring industry leading signal fidelity, the family of electrical modules includes bandwidth performance from 12 GHz to 70+ GHz. Two true differential time domain reflectometer (TDR) modules, with remote samplers, offer up to 50 GHz bandwidth and 15 ps reflected rise time and 12 ps incident rise time. The family of low-noise variable bandwidth electrical modules provides the industry's best noise performance with remote samplers, featuring 450 μV_{RMS} noise at 60 GHz and 300 μV_{RMS} at 30 GHz.

DSA8200 optical modules provide complete optical test solutions with superior system fidelity from 125 Mb/s to 43 Gb/s and beyond. The modules cover a range of wavelengths for both single and multi-mode fibers. Each module can be optionally configured with a number of selectable data rate filters/optical reference receivers (ORR) and/or a full bandwidth path. The 80C07B, 80C08C and 80C11 can be configured with a number of available flexible integrated clock recovery options. The 80C12 multi-rate module clock recovery support is achieved with an electrical output for use with the 80A05 or 80A07 Electrical Clock Recovery Modules.

The DSA8200's popular FrameScan™ acquisition mode can be used with patterns from DUTs, BERTs and other sources, to isolate pattern dependent effects in transmitters or show the bit sequence preceding a mask violation. FrameScan automatically sequences the timebase so that each bit of the data stream is acquired in time order. When used in combination with mask testing conditional acquisition features of the DSA8200, such as stop after mask hits, FrameScan can automatically identify at which bit a pattern-dependent failure occurred.

TDR and electrical modules with fully integrated remote sampler.

Small form factor remote sampler enables placement near DUT assuring optimal signal fidelity.

In addition, specialized modules supporting features such as single-ended and differential electrical clock recovery, electrostatic protection for the TDR and connectivity to the popular TekConnect® probing system brings you the performance of Tektronix' state-of-the-art probes for high impedance and differential probing. Low impedance probes for 50 Ω probing and for TDR probing are also available.

Jitter, Noise, BER and Serial Data Link Analysis

80SJNB Jitter, Noise, BER and Serial Data Link Analysis software package is a comprehensive application for serial data link analysis and for measurements of jitter and noise. Highly accurate BER estimation based on both (jitter and noise) impairments is also built in, with accuracy higher than simple jitter-based bathtub estimation and with analysis capability unavailable on a BERT.

Available in the package also is a unique, state-of-the-art combination of FFE/DFE equalization, channel emulation and fixture de-embedding tools. When combined with the DSA8200's modular flexibility, uncompromised performance and unmatched system fidelity, this Serial Data Link Analysis (SDLA) toolbox provides the ideal solution for next generation high-speed serial data design validation and compliance testing.

See the 80SJNB Datasheet for more information.

TDR (Time Domain Reflectometry)

The DSA8200 is the industry's highest performance fully integrated time domain reflectometry (TDR) measurement system. Offering true differential TDR measurements up to 50 GHz bandwidth with 15 ps reflected rise time and 12 ps incident rise time, you are able to keep pace with today's most demanding serial data network analysis (SDNA) requirements.

The new 80E10 and 80E08 TDR modules feature a fully integrated independent dual-channel two-meter remote sampler system to minimize fixturing and assure optimal system fidelity. Independent sampler deskew ensures fast and easy fixture and probe de-embedding. The user can characterize differential crosstalk by using TDR steps from a differential module to drive one line pair while monitoring a second line pair with a second differential module.

The DSA8200 is the industry's most versatile TDR measurement system, accommodating up to four dual-channel true differential TDR modules for fast accurate multi-lane impedance characterization.

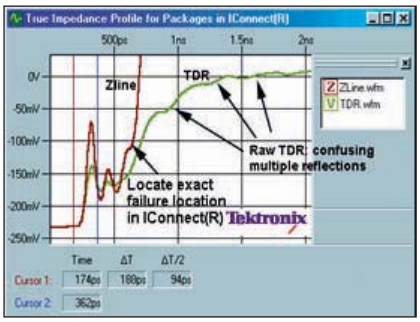
The P80318 True Differential TDR probe and P8018 single-ended passive handheld TDR probe provide high-performance probing solutions for circuit board impedance and electrical signal characterization. The P80318, an 18 GHz 100 Ω input impedance differential TDR hand probe, enables high-fidelity impedance measurements of differential transmission lines. The adjustable probe pitch enables a wide variety of differential line spacing and impedances. The P8018 is a 20 GHz single-ended passive handheld TDR probe. Both the P80318 and P8018 can be used as stand alone probes but are especially designed to work with the 80A02 for the control of EOS/ESD protection.

Gigabit Signal Path Characterization and Analysis – Serial Data Network Analysis (SDNA)

As clock speeds and rise times of digital circuits increase, interconnect signal integrity dramatically affects digital system performance. Accurate and efficient serial data network analysis (SDNA) of the signal path and interconnects in time and frequency domains is critical to predict signal losses, jitter, crosstalk, terminations and ringing, digital bit errors and eye diagram degradation, ensuring reliable system operation.

Tektronix offers several true differential TDR modules, which in combination with IConnect® software, allow S-parameters measurements with up to –70 dB of dynamic range. This performance assures accurate repeatable measurement in serial data analysis, digital design, signal integrity and electrical compliance testing applications.

TDR Module	S-parameter Measurement Bandwidth Performance
80E10	50 GHz
80E08	30 GHz
80E04	20 GHz



Quickly identify the exact location of faults with the 80E10's sub-millimeter resolution and IConnect True Impedance Profile.

The table above summarizes the S-parameter measurement bandwidth performance when IConnect and the true differential TDR modules are used in combination.

With the long record length acquisitions, IConnect provides great flexibility for obtaining the desired frequency range and frequency step when performing S-parameter measurements. Up to 1,000,000 points can be acquired.*[1]

When you employ IConnect Signal Integrity TDR and S-parameter software with the DSA8200 you have an efficient, easy-to-use and cost-effective solution for measurement-based performance evaluation of multi-gigabit interconnect links and devices, including signal integrity analysis, impedance, S-parameter and eye diagram tests and fault isolation. IConnect can help you complete interconnect analysis tasks in minutes instead of days, resulting in faster system design time and lower design costs. IConnect also enables impedance, S-parameters and eye diagram compliance testing as required by many serial data standards, as well as, full channel analysis, Touchstone (SnP) file output and SPICE modeling for gigabit interconnects.

*[1] Long record lengths are supported only on DSA8200, CSA8200, TDS8200, CSA8000 and TDS8000 platforms.

Failure Analysis – Quickly Identify Fault Location

The new 80E10 provides superior resolution enabling the fastest and most efficient fault isolation in package, circuit board and on-chip failure analysis applications.

Advanced Communication Signal Analysis

Specifically designed for ultra-high-performance optical and electrical serial data applications, the DSA8200 is the ideal tool for design characterization and validation, as well as manufacturing test of datacom and telecom components, transceiver subassemblies and transmission systems. The DSA8200 generates measurement results, not just raw data, with time and amplitude histograms, mask testing and statistical measurements. It provides a communications-tailored measurement set that includes jitter, noise, duty cycle, overshoot, undershoot, OMA, extinction ratio, Q-factor, mean optical power and amplitude. In addition, you can do mask testing of SONET/SDH, ten Gigabit, Gigabit Ethernet and other electrical and optical standards compliance verification. Color-grading and gray-scale grading of waveform data adds a third dimension, sample density, to your signal acquisitions and analyses to provide visual insight. In addition, the variable persistence database feature enables exact data aging to all of the functions and facilitates eye measurements on DUTs under adjustment.

OpenChoice Software Enables Familiar Tools to Extend Your Measurement System

The DSA8200 provides an open Windows environment offering new levels of data analysis on the instrument using your favorite commercially available third party software packages. Additionally, TekVISA,™ a standard software accessory, allows the instrument to be placed under the control of software applications (such as LabVIEW, LabWindows, Visual Basic, Microsoft Excel, C, etc.) running on the instrument or on external PC workstations network connected to the instrument without the need of a GPIB hardware interface. Plug and play drivers for LabVIEW and other programs are also supplied.

The DSA8200 combines the familiarity of Microsoft's Windows XP operating system with world-class waveform acquisition technology. This platform provides a wide array of standard instrumentation and communications interfaces, including: GPIB, parallel printer port, RS-232-C, USB serial ports and an Ethernet LAN connection. In addition, the platform includes a DVD-CD/RW combo drive and removable hard drive for storage of waveforms, setups and analysis results.

155 Mb/s to 12+ Gb/s Optical Test

Tektronix optical modules for DSA8200 offer highest level of integration in the industry, with corresponding higher repeatability and transferability of the result. A particularly method-sensitive measurement, Extinction Ratio (ER) is now also available as ER Calibrated, with additional layer of improvement to the portability of the result (80C08C and 80C11 modules only).

80C08C 10 GHz Broad Wavelength Multi-rate 10 Gb/s Optical Module

The 80C08C is a broad wavelength (700 to 1650 nm) multi-rate optical sampling module providing datacom rate testing for 10GbE applications at 9.95, 10.31, 11.09 Gb/s and 10G Fibre Channel applications at 10.51 Gb/s. The 80C08C also provides telecom rate testing with several filters between 9.95 and 11.3 Gb/s. With its amplified O/E design, this module provides excellent signal to-noise performance and high optical sensitivity, allowing users to examine low power level optical signals. The 80C08C can be optionally configured with clock recovery options that can support any standard or user-defined rate in a continuous range from 9.8 to 12.6 Gb/s.

80C12 Up to 10 GHz Broad Wavelength Multi-rate 1 Gb/s to 10 Gb/s Optical Module

The 80C012 is a broad wavelength (700 to 1650 nm) multi-rate optical sampling module providing 1G, 2G and 4G telecom and datacom testing. This highly flexible module can be configured to support either lower data rate applications (1 to 4 Gb/s) or a wide variety of 10 Gb/s applications. The low data rate applications include: 1, 2, 4 and 8 Fibre Channel and "by 4" wavelength division multiplex standards such as 10G Base-X4 and 4-Lane 10 Gb/s Fibre Channel. The supported 10 Gb/s applications include both datacom and telecom. The supported 10 Gb/s datacom applications include 10GbE at 9.95, 10.31, 11.09 Gb/s, 8G Fibre Channel and 10G Fibre Channel applications at 8.5 Gb/s, 10.51 and 11.3 Gb/s. The 80C12 also provides telecom rate testing at 9.95, 10.66 and 10.70 Gb/s. With its amplified O/E design, this module provides excellent signal-to-noise performance and high optical sensitivity, allowing users to examine low power level optical signals. Clock recovery for the 80C12 is provided via the 80A05 or 80A07 clock recovery modules (sold separately).

80C11 30 GHz Long Wavelength Multi-rate 10 Gb/s Optical Module

The 80C11 is optimized for testing of long-wavelength signals (1100 to 1650 nm) at a number of rates around 10 Gb/s with a highly flexible multi-rate filter. Additionally the high optical bandwidth of 30 GHz (typical) and the excellent frequency response of its full bandwidth path is well suited for general-purpose high-performance optical component testing. The 80C11 can be configured with clock recovery options that supports any standard or user-defined rate from 9.8 to 12.6 Gb/s.

80C07B 2.5 GHz Broad Wavelength Multi-rate 155 Mb/s to 2.5 Gb/s Optical Module

The 80C07B is a broad wavelength (700 to 1650 nm) multi-rate optical sampling module optimized for testing datacom/telecom signals from 155 to 2500 Mb/s. With its amplified O/E design, this module provides excellent signal-to-noise performance, allowing users to examine low-power optical signals. The 80C07B can be optionally configured with multi-rate clock recovery that operates from 155 to 2.7 Mb/s.

40 Gb/s Optical Test

80C10B 80+ GHz Long Wavelength 40 Gb/s Optical Module

The 80C10B provides integrated and selectable reference receiver filtering and is the only solution to offer conformance testing at either 1310 nm or 1550 nm for 39.813 Gb/s (OC-768/STM-256) and 43.018 Gb/s (43 Gb/s ITU-T G.709 FEC) rates. In addition to the filter rates, you can choose selectable bandwidths of 30 GHz or 80+ GHz for optimal noise vs. bandwidth performance for accurate signal characterization.

Optical Modules: 80C07B

Module	80C07B										
Opt.	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	CR1
Bandwidth (GHz)	2.5										
Wavelength range (nm)	700 to 1650										
Fiber input (µm)	9 and 62.5										
Mask test sensitivity (dBm)	–22										
Number of Channels											
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery											
155 Mb/s	■	■	■	■							◆
622 Mb/s	■				■	■	■				◆
1063 Mb/s		■			■			■	■		◆
1250 Mb/s			■			■		■		■	◆
2125 Mb/s				■			■		■	■	◆
2488 Mb/s	■	■	■	■	■	■	■	■	■	■	◆
2500 Mb/s	■	■	■	■	■	■	■	■	■	■	◆
3.125 Gb/s											
3.188 Gb/s											
3.32 Gb/s											
4.25 Gb/s											
9.95 Gb/s											

Optical Modules: 80C08C, 80C10B, 80C11

Module	80C08C				80C10B	80C11				
Opt.	–	CR1	CR2	CR4	–	–	CR1	CR2	CR3	CR4
Bandwidth (GHz)	10				80+ (65)	30				
Wavelength range (nm)	700 to 1650				1290 to 1330 1539 to 1570	1100 to 1650				
Fiber input (µm)	9 and 62.5				9	9				
Mask test sensitivity (dBm)	–16				–4 (–2)	–9				
Number of Channels	1									
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery										
9.95 Gb/s	■	◆		◆		■	◆	◆	◆	◆
10.31 Gb/s	■	◆	◆	◆		■				◆
10.52 Gb/s	■		◆	◆		■				◆
10.66 Gb/s	■			◆		■		◆		◆
10.71 Gb/s	■			◆		■			◆	◆
11.1 Gb/s	■			◆		■				◆
11.3 Gb/s	■			◆		■				◆
39.81 Gb/s					■					
43.02 Gb/s					■					

Optical Modules: 80C12

Module	80C12									
Opt.	F1	F2	F3	F4	F5	F6	FC	10G	CR*[1]	CR*[2]
Bandwidth (GHz)	4.25	9		4.25		9		10	–	–
Wavelength range (nm)	700 to 1650								–	–
Fiber input (µm)	9 and 62.5								–	–
Mask test sensitivity (dBm)	–15							–12	–	–
Number of Channels	1								–	–
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery										
155 Mb/s									◆	◆
622 Mb/s									◆	◆
1063 Mb/s	■		■						◆	◆
1250 Mb/s									◆	◆
2125 Mb/s	■	■	■	■		■			◆	◆
2488 Mb/s									◆	◆
2500 Mb/s									◆	◆
3.125 Gb/s				■	■	■	■		◆	◆
3.188 Gb/s				■	■	■	■		◆	◆
3.32 Gb/s							■		◆	◆
4.25 Gb/s	■	■		■	■				◆	◆
9.95 Gb/s								■		◆
8.5 Gb/s		■	■		■	■	■	■		80A07
10.31 Gb/s								■		◆
10.52 Gb/s								■		◆
10.66 Gb/s								■		◆
10.71 Gb/s								■		◆
11.1 Gb/s								■		◆
11.3 Gb/s								■		◆

*[1] With 80A05 or 80A07.

*[2] With 80A05 Option 10G or 80A07.

TDR Module Summary Table

	Typical TDR Rise Time at Full Bandwidth		Bandwidth Performance*2	RMS Noise at Bandwidth*2	Remote Sampler
	Incident*1	Reflected*1			
80E10	*12 ps*	15 ps	50 GHz, 40 GHz and 30 GHz (user-selectable)	50 GHz: *600 µV* 40 GHz: *370 µV* 30 GHz: *300 µV*	Yes, fully integrated two-meter cable
80E08	*18 ps*	20 ps	30 GHz, 20 GHz (user-selectable)	30 GHz: *300 µV* 20 GHz: *280 µV*	Yes, fully integrated two-meter cable
80E04	*23 ps*	28 ps	20 GHz	*600 µV*	No, optional 80N01 two-meter extende

cable

*1 Values shown are warranted unless printed in an italic typeface which represents a typical value.

*2 Calculated from .35 bandwidth rise time product.

DSA8200 Electrical Modules

TDR Modules: 80E10, 80E08 and 80E04

The 80E10, 80E08 and 80E04 are dual-channel time domain reflectometry (TDR) sampling modules, providing up to 12 ps incident and 15 ps reflected rise time. Each channel of these modules is capable of generating a fast impulse for use in TDR mode and the acquisition portion of the sampling module monitors the incident step and any reflected energy. The polarity of each channel's step can be selected independently. This allows for true differential or common-mode TDR or S-parameters testing of two coupled lines, in addition to the independent testing of isolated lines. The independent step generation for each channel allows true differential measurements, which ensures measurement accuracy of non-linear differential devices.

80E10 and 80E08 feature a small form-factor, fully integrated independent two-meter remote sampler system, enabling the location of the sampler near the DUT for the best system fidelity. The modules characterize crosstalk by using TDR steps to drive one line (or line pair for differential crosstalk) while monitoring a second line (or line pair) with the other channel (or another module for differential crosstalk). The "rise time filter" function on the DSA8200 mainframe can be used with TDR or crosstalk measurements to characterize expected system performance with slower edge speeds. An optional two-meter extender cable for the 80E04 is available, which enables placement of the module near the DUT for the best system fidelity.

All modules have independent incident step and receiver deskew to remove the affect of fixtures and probes, enabling faster and easier deskew. The 80E10 sampling module provides an acquisition rise time of 7 ps, with up to 50 GHz user-selectable equivalent bandwidth (with 50 GHz, 40 GHz and 30 GHz settings). 80E08 sampling bandwidth is 30 GHz (user-selectable with 30 GHz and 20 GHz settings) and 80E04 sampling bandwidth is 20 GHz. The 20 GHz P8018 single-ended and the 18 GHz P80318 differential variable pitch TDR handheld probes provide excellent performance, ensuring easy and accurate backplane and package measurements.

Electrical Module Summary Table

Electrical Module	Step Response @ Full Bandwidth (10% to 90%)*1	Number Of Channels	Bandwidth*1, *2	RMS Noise @ Bandwidth	Remote Sampler
80E09	5.8 ps	2	60 GHz/40 GHz/30 GHz) (user-selectable	60 GHz: *450 µV* 40 GHz: *330 µV* 30 GHz: *300 µV*	Yes, fully integrated two-meter cable
80E07	11.7 ps	2	30 GHz/20 GHz (user-selectable)	30 GHz: *300 µV* 20 GHz: *280 µV*	Yes, fully integrated two-meter cable
80E06	5.0 ps	1	*70+ GHz*	1.8 mV	No, optional 80N01 – two-meter extender cable
80E03	17.5 ps	2	20 GHz	*600 µV*	No, optional 80N01 – two-meter extender cable
80E01	7 ps	1	50 GHz	*1.8 mV*	No, optional 80N01 – two-meter extender cable

*1 Values shown are warranted unless printed in an italic typeface which represents a typical value.

*2 Calculated from .35 bandwidth rise time product.

Electrical Modules: 80E09, 80E07, 80E06, 80E03 and 80E01

The 80E09 and 80E07 are dual-channel modules with remote samplers, capable of noise as low as 450 μV_{RMS} at 60 GHz bandwidth and 300 μV_{RMS} noise at 30 GHz bandwidth. Each small form factor remote sampler is attached to a two-meter cable to minimize the effects of cables, probes and fixtures to ensure the best system fidelity. User-selectable bandwidth settings (60/40/30 on 80E09 and 30/20 on 80E07) offer optimal noise/bandwidth trade-off.

80E06 and 80E01 are single channel 70+ and 50 GHz bandwidth sampling modules respectively. 80E06 provides the widest bandwidth and fastest rise time with world-class system fidelity. Both 80E06 and 80E01 provide a superior maximum operating range of ±1.6 V. Both modules can be used with the optional two-meter extender cable, ensuring superior system fidelity and measurement flexibility.

The 80E03 is a dual-channel 20 GHz sampling module. This module provides an acquisition rise time of 17.5 ps or less. An optional two meter extender cable is available.

When used with Tektronix 80SJNB Jitter, Noise and BER Analysis software, these modules enable separation of both jitter and noise into their constituent components, for insight into the underlying causes of eye closure and obtain highly accurate calculation of BER and 3-D eye contour. When used with 82A04 phase reference module, timebase accuracy can be improved down to 200 fs_{RMS} jitter which, together with the 300 μV_{RMS} noise floor and 14 bits of resolution, ensures the highest signal fidelity for your measurements.

DSA8200 Accessory Modules

82A04 Phase Reference Module

The 82A04 Phase Reference Module enhances the DSA8200 sampling oscilloscope from the industry's standard timebase jitter performance of 800 fs_{RMS}, to the extremely low timebase jitter of <200 fs_{RMS}. Typical application for the Phase Reference module is the acquisition and analysis of very high-speed optical and electrical signals in communication devices and systems. The 82A04 supports both the Triggered mode of operation, which is similar to usual acquisition and the un-triggered Free Run mode where all timing information comes from the customer-supplied clock alone (no trigger signal necessary). When the external clock is not available the module can accept the clock signal from the clock recovery output of the 80Cxx modules, as well as from the 80A05 or 80A07 clock recovery modules. Additionally 82A04 supports SSC (Spread Spectrum Clocking) operation.

80A05 Electrical Clock Recovery Module

The 80A05 Electrical Clock Recovery Module enables clock recovery for electrical signals, as well as internal triggering on the recovered clock. The module recovers clocks from serial data streams for all of the most common electrical standards in the 50 Mb/s to 4.25 Gbs, around 5 to 6 Gb/s and from 9.953 Gb/s to 12.5 Gb/s ranges. The module accepts either single-ended or differential signals as its input, providing clock recovery for both. The signal(s) is/are then passed on to the output connectors (at about 50% of the input level) and can be connected to sampling module(s) for differential or single-ended sampling. Option 10G is required for support of standard rates from 9.953 Gb/s to 12.6 Gb/s. The 80A05 and 80A07 can also serve as the clock recovery module for the 80C12 Optical Sampling Module.

80A06 PatternSync Module

The 80A06 PatternSync Trigger Module, when used in combination with 80SJNB software, enables characterizing jitter, noise and BER performance of high-speed serial designs from 1 Gb/s to 60 Gb/s data rates. It extends the capability of the DSA8200 sampling oscilloscope by creating a pattern trigger from any data-related clock – a recovered clock, user-supplied clock, sub-clock or super-clock. The PatternSync Trigger Module is programmable to pattern lengths of up to 2^{23} bits and accepts a user-supplied clock signal from 150 MHz to 12.5 GHz. The 80A06 module is required with the DSA8200 when using 80SJNB Advanced Jitter, Noise and BER Analysis software package. This module can be used in combination with the 82A04 Phase Reference module for the best timebase accuracy or for acquisition of signals under SSC (Spread Spectrum Clocking).

80A07 Clock Recovery Module

80A07 recovers clocks from serial data streams for all of the most common electrical standards in the continuous 100 Mb/s to 12.5 GB/s range. Auto locking capability is selectable from the user interface or programmatic interface, so the design and test engineers can search and lock onto signals of undefined or unknown data rate. The module accepts either single-ended or differential signals as its input, providing clock recovery for both. The signal(s) is/are then passed on to the output connectors and can be connected to sampling module(s) for differential or single-ended sampling. 80A07 offers complete configurability and state-of-the-art specifications and is the preferred solution for most serial data standards due to excellent stability, superior jitter and slew rate tolerance for recovering clocks from stressed or degraded signals and unequaled PLL bandwidth and roll-off shape control for either Golden PLL compliance testing or custom PLL response. 80A07 also locks on spread-spectrum signals. The 80A07 can also serve as the clock recovery module for the 80C12 Optical Sampling Module.

P80318 Differential Handheld TDR Probe

The P80318 is an 18 GHz 100 Ω input impedance differential TDR hand probe. This probe enables high-fidelity impedance measurements of differential transmission lines. The adjustable probe pitch from 0.5 mm to 4.2 mm enables a wide variety of differential line spacing and impedances. The P80318 probe also includes two precision SMA cables with parallel control lines that provides the 80A02 module the control for EOS/ESD protection.

P8018 Single-ended Handheld TDR Probe

The P8018 Handheld TDR Probe is a 20 GHz, 50 Ω input impedance, single-ended passive probe that provides a high-performance solution for electrical sampling, TDR circuit board impedance characterization and high-speed electrical signal analysis applications. The P8018 probe also includes a precision SMA cable and parallel control line that provides the 80A02 module the control for EOS/ESD protection.

80A02 EOS/ESD Protection Module

The 80A02 EOS/ESD Protection module protects the sampling bridge of Tektronix electrical sampling module inputs from damage by electrostatic charge. The 80A02 is intended for use in applications such as electrical TDR circuit board testing and cable testing where large static charges can be stored in the DUT.

When used with the matching P8018 20 GHz single-ended handheld probe or the P80318 differential handheld probe (both with probe tip pressure actuating feature) the 80A02 provides a superior technique and performance capability for electrical module EOS/ESD protection of acquired electrical signals and TDR measurements (two 80A02 modules required for differential applications).

80A03 TekConnect® Probe Interface Module

The 80A03 provides probe power and control for up to two Tektronix P7000 series probes. The 80A03 is powered through the oscilloscope and requires no user adjustments or external power cords. An electrical sampling module can be plugged directly into the slot on the 80A03 to provide the optimum system fidelity and a short electrical path. Using the 80A03 designers can benefit from Tektronix' industry-leading active and differential probes to measure signals on SMD pins and other challenging circuit features.

SlotSaver Small Module Extender Cable

This cable can be used to power and operate one 80A01,*[1] 80A02 or 80A06 accessory modules, eliminating the need to consume a small form factor mainframe slot. The SlotSaver extender cable plugs into the "Trigger Power" connector on the mainframe or (for 80A01 and 80A02) into the "Probe Power" connector on most electrical sampling modules.

*[1] Now obsolete module useful with older versions of the mainframe, but not needed with the 8200 series mainframes.

DSA8200 Application Software

80SJNB Jitter, Noise, BER and Serial Data Link Analysis (SDLA) Software

80SJNB speeds the identification of the underlying causes of both horizontal and vertical eye closure through separation of jitter and noise. With its unique insight into the constituent components of both jitter and noise, 80SJNB provides a highly accurate and complete BER calculation and eye contour analysis.

Additionally available in the software package is the first-ever set of features addressing the design issues of modern Serial Data Links: equalization with either FFE or DFE, channel emulation, support for fixture de-embedding, as well as full support for SSC – Spread Spectrum Clocking. When you combine Jitter, Noise and BER analysis with the DSA8200 modular flexibility, uncompromised performance and unmatched signal fidelity you get the ideal solution for next generation high-speed serial data design validation and compliance testing. 80SJNB requires the 80A06 PatternSync module, which creates a trigger pulse on each complete pattern. 80SJNB may be used with the 82A04 phase reference module for enhanced accuracy or for SSC signals or without it depending on your requirements. SSC max. amplitude 5000 ppm (6000 ppm) at 30+/–3 kHz. Current version V 2.1 of 80SJNB supports save and recall of the complete signal description. Also added is a new measurement DDPWS (Data Dependent Pulse Width Shrinkage) and a corresponding graph. 80SJNB also supports the Transmitter Waveform Dispersion Penalty (TWDP) measurement (download the free U80TWDP_LRM utility from www.tektronix.com).

80SJNB Jitter and Noise Analysis Measurements

Jitter Analysis

Measurements	Description
TJ@BER	Total jitter at specified BER
RJ	Random jitter
RJ(h)	Horizontal component of random jitter
RJ(v)	Vertical component of random jitter
RJ(d-d)	Random jitter according to the dual Dirac model
DJ	Deterministic jitter
DDJ	Data dependent jitter
DDPWS	Data dependent pulse width shrinkage
DCD	Duty cycle distortion
DJ(d-d)	Deterministic jitter computed in the dual-Dirac model
PJ	Periodic jitter
PJ(h)	Horizontal component of periodic jitter
PJ(v)	Vertical component of periodic jitter
EO@BER	Horizontal eye opening at specified BER
SSC Magnitude	Magnitude of SSC modulation in ppm
SSC Frequency	Frequency of SSC modulation in ppm (profile: see 80SJNB for information)

80SJNB Noise Analysis

Measurements	Description
RN	Random noise
RN(v)	Vertical component of random noise
RN(h)	Horizontal component of random noise
DN	Deterministic noise
DDN1	Data dependent noise on logical level 1
DDN0	Data dependent noise on logical level 0
PN	Periodic noise
PN(v)	Vertical component of periodic noise
PN(h)	Horizontal component of periodic noise
EO@BER	Vertical eye opening at specified BER

New: 80SJNB Advanced Supports:

- FFE (Feed-Forward Equalization) to 100 Taps
- DFE (Decision Feedback Equalization) to 40 Taps
- Filter for Support of Linear Filters from Fixture De-embed to Transmitter Equalization. Channel Emulation supported for channels with >30 dB of loss at 1st harmonic frequency.

IConnect® Signal Integrity TDR and S-parameter Software

Operating on the DSA8200 TDR platform, IConnect S-parameters is the most cost-effective and highest throughput approach for S-parameter measurements in digital design, signal integrity analysis and interconnect compliance testing, providing as much as 50% cost savings compared to similar bandwidth

VNAs and dramatically speeding up measurements. You can also take advantage of IConnect® S-parameters command line interface, which automates the S-parameter measurements, to the overall suite of manufacturing tests you perform using your TDR instrument significantly reducing test time while increasing measurement repeatability.

The simplicity of S-parameter calibration using a reference (open, short or through) and an optional 50 Ω load makes the measurement, fixture de-embedding and moving the reference plane a snap. Touchstone file format output enables easy S-parameter file sharing for further data analysis and simulations.

Tektronix offers several true differential TDR modules, which in combination with IConnect offers S-parameter measurements to 50 GHz with up to –70 dB of dynamic range. This performance exceeds requirements for serial data analysis, digital design and signal integrity applications, resolving down to 1% (–40 dB) accuracy of crosstalk, whereas electrical compliance testing masks typically call for the measurements in the –10 to –30 dB range.

IConnect software allows you to quickly and easily generate SPICE and IBIS models for your PCBs, flex-boards, connectors, cables, packages, sockets and I/O buffer inputs directly from TDR/T or VNA S-parameter measurements. IConnect allows you to display eye-diagram degradation, jitter, loss, crosstalk, reflections and ringing in your digital system. IConnect Linear Simulator allows the designer to link several interconnect channels together to evaluate the total time, frequency domain performance and eye diagram of the overall channel. IConnect substantially simplifies the signal integrity analysis of the interconnect link, equalization and emphasis component design and analysis of the interconnect link with transmitter and receiver.

Characteristics

Signal Acquisition

Acquisition Modes –
Sample (Normal), Envelope and Average.
Number of Sampling Modules Accommodated – Up to four dual-channel electrical; up to two optical sampling modules. (Both single- and dual-channel modules are appropriate for the two channels associated with the slot).
Population of the Ch 1/Ch 2 large slot with any module other than one requiring *power only* displaces functionality of the Ch 1/Ch 2 small slot; population of the Ch 3/Ch 4 large slot with any module other than one requiring *power only* displaces functionality of the Ch 3/Ch 4 small slot.
Number of Simultaneously Acquired Inputs – Eight channels maximum.

Vertical Systems

Rise Time/Bandwidth – Determined by the sampling modules used.
Vertical Resolution – 14 bits over the sampling modules' dynamic range.

Horizontal System

Four timebase modes are available:

Triggered Phase Reference*1 Timebase Mode – Timing information extracted from a user-supplied or from clock recovery signal significantly improves timebase accuracy and jitter performance of the triggered acquisition. Horizontal position is referenced to the trigger signal as with a traditional timebase.

Free Run Phase Reference*1 Timebase Mode – All timing is based on a phase reference signal; accuracy and jitter as above; no trigger is needed and correspondingly there is no timing relation to trigger signal.

Short term optimized Sequential*2 Timebase Mode – Best short-delay performance for acquisitions without the external phase reference signal.

Locked to 10 MHz Reference Sequential Timebase – Provides the best long-delay performance for acquisitions without the external phase reference signal. The Lock is selectable between Lock to Internal 10 MHz and Lock to External 10 MHz for highest frequency accuracy.

Main and Magnification View Timebases – 100 fs/div to 5 ms/div in 1-2-5 sequence or 100 fs increments.
Maximum Trigger Rate – 200 kHz; in Phase Reference mode: 50 kHz.
Typical Acquisition Rate – 150 ks/s per channel (standard sequential timebase); 50 ks/s (Phase Reference modes).

Time Interval Accuracy (Standard Timebase) and Timing Deviation (Phase Reference Modes)

Phase Reference Timebase –
Triggered: Maximum timing deviation relative to phase reference signal:
Horizontal position >40 ns after trigger event: 0.2% of phase reference signal period (typical).
Horizontal position 40 ns after trigger event: 0.4% of phase reference signal period (typical).
Note: The performance depends on stable clock supplied to the Phase Reference module. Performance under SSC is lower and depends on modulation shape.
Phase Reference Timebase –
Free Run: Maximum timing deviation relative to phase reference signal:
0.1% or better of phase reference signal period (typical).
Sequential Timebase*2 –
Time Interval Accuracy, Horizontal scale:
<21 ps/div – 1 ps + 1% of interval.
≥21 ps/div – 8 ps + 0.1% of interval (Short-term optimized mode).
8 ps + 0.01% of interval (Locked to 10 MHz mode).
Horizontal Deskew Range Available (Sequential Timebase Only) – –500 ps to +100 ns on any individual channel in 100 fs increments.
DSA8200 Record Length –
20, 50, 100, 250, 500, 1000, 2000 or 4000 samples; Longer records available as follows:

DSA8200 Record Length with IConnect – 1,000,000 points.

DSA8200 Record Length with 80SJNB Jitter, Noise and BER Analysis Software – 3,200,000 points.

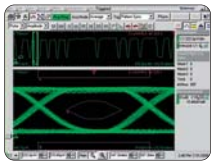
Waveform Databases – 4 independently accumulated waveform records of up to 4 G waveform points. Variable waveform database mode with true first-in first-out of 2000 waveforms available on each of four waveform databases.
Magnification Views – In addition to the main timebase, the DSA8200 supports two magnification views. These magnifications are independently acquired using separate timebase settings which allow same or faster time/div than that of the main timebase.

*1 When using the 82A04 Phase Reference module.

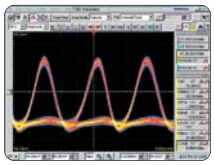
*2 Traditional mode - *not* using the 82A04 Phase Reference module.

Digital Serial Analyzer Sampling Oscilloscope
DSA8200

Communications Signal Analysis

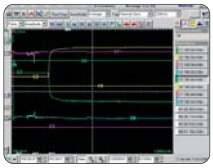


▶ 10 GbE manufacturing compliance testing and design verification.

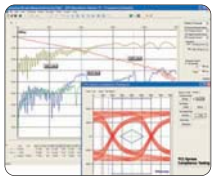


▶ The 80C10, the only solution for 40 Gb/s optical reference receivers (ORR) at 39.81 GB/s and 43.02 Gb/s and full bandwidth of 65 GHz.

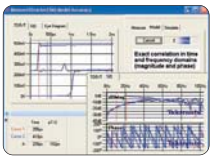
TDR and Serial Data Network Analysis



▶ Keep pace with ultra-fast serial data rates; up to four True Differential 50 GHz TDR channels with 15 ps reflected rise time.



▶ Interconnect characterization and compliance test with S-parameter measurements to 50 GHz.



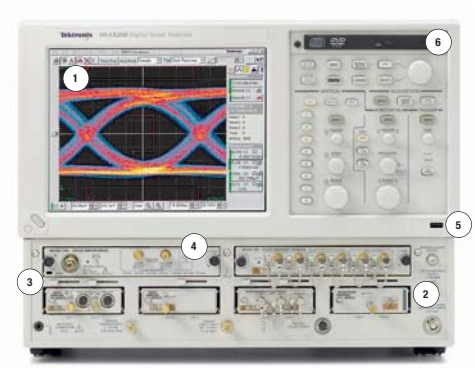
▶ Advanced analysis and modeling speeds product development and time to market.

Jitter, Noise and BER Analysis

▶ 80SJNB. Separation of both jitter and noise provides insight into root cause of eye closure and signal impairments.

▶ Highly accurate BER and eye contour analysis with separation of jitter and noise.

▶ Large and growing family of optical modules.



▶ Large and growing family of electrical and TDR modules.

1
10 Gb/s compliance test. Tektronix optical modules provide the industry's widest dynamic range and lowest noise floor for accurate measurements.

2
Phase Reference module provides extremely low 200 fs_{RMS} timebase jitter for signal analysis applications.

3
With six slots, the DSA8200 is the industry's most extensible mainframe; it accommodates four true differential TDR or electrical modules.

4
Electrical and optical clock recovery for data communication and telecom standards to 10 Gb/s and beyond.

5
USB port on the front panel for storage and transport of data. Four additional ports on the rear panel.

6
DVD/R-CD/RW combo drive on the front panel and removable disk drive on the rear panel.

Trigger System

Trigger Sources

External direct trigger.
External pre-scaled trigger.
Internal clock trigger: Internally connected to direct trigger.
Clock recovery triggers from optical sampling modules and from the 80A05 or 80A07 electrical clock recovery modules; signal from the 80A05 module (pre-scaled above 2.7 Gb/s) internally connected.
Phase Reference*[1] timebase supports acquisitions without a trigger signal in its Free Run mode.

Trigger Sensitivity

External Direct Trigger Output – 50 mV, DC to 4 GHz (typical).
100 mV, DC – 3 GHz (guaranteed).
Trigger Level Range – ±1.0 V.
Trigger Input Range – ±1.5 V.
Trigger Holdoff – Adjustable 5 µs to 100 ms in 0.5 ns increments.
External Trigger Gate (optional) – TTL logic 1 enables gate, a TTL logic 0 disables gate, maximum non-destruct input level ±5 V.
Pre-scaled Trigger Input – 200 mV_{p-p} to 800 mV_{p-p}, 2 to 12.5 GHz (guaranteed).

Timebase Jitter

Phase Reference*[2] Timebase – System jitter of 200 fs_{RMS} typical on a 10 GHz or faster acquisition module, with f ≥ 8 GHz, 0.6 V ≤ VREF ≤ 1.8 V Phase Reference Signal.
Jitter: system jitter of 280 fs_{RMS} typical on a 10 GHz or faster acquisition module, in DSA8200 mainframe, with 2 GHz ≤ f ≤ 8 GHz, 0.6 V ≤ VREF ≤ 1.8 V Phase Reference Signal.
The Phase Reference timebase remains operational to 100 mV (typical) with increased jitter.
Short-term Jitter Optimized Sequential Mode –
800 fs_{RMS} +5 ppm of position (typical).
1.2 ps_{RMS} +10 ppm of position (max.)
Locked to 10 MHz Reference Sequential Mode –
1.6 ps_{RMS} +0.04 ppm of position (typical).
2.5 ps_{RMS} +0.01 ppm of position (max.).
Internal Clock – Adjustable from 25 to 200 kHz (drives TDR, internal clock output and calibrator).

*[1] When using the 82A04 Phase Reference module.

*[2] When using the 82A04 Phase Reference module performance under SSC is lower and depends on modulation shape, clock recovering setting and cabling lengths.

Display Features

Touch Screen Display –
264 mm/10.4 in. diagonal, color.
Colors – 16,777,216 (24 bits).
Video Resolution – 640 horizontal by 480 vertical displayed pixels.
Monitor Type – LCD.

Math/Measurement

System Measurements – The DSA8200 supports up to eight simultaneous measurements, updated three times per second with optional display of per measurement statistics (min, max, mean and standard deviation).
Measurement Set – Automated Measurements include RZ, NRZ and Pulse signal types and the following:
Amplitude Measurements – High, Low, Amplitude, Max, Mid, Min, +Width, Eye Height, Eye Opening Factor, Pulse Symmetry, Peak-to-Peak, P-P, OMA, +Overshoot, –Overshoot, Mean, +Duty Cycle, Cycle Mean, RMS, Cycle RMS, AC RMS, Gain, Extinction Ratio (Ratio, %, dB), Suppression Ratio (Ratio, %, dB), Peak-to-Peak Noise, RMS Noise, Q-Factor, SNR, Average Optical Power (dBm, watts), OMA.
Timing Measurements –
Rise, Fall, Period, Bit Rate, Bit Time, Frequency, Crossing (%, Level, Time), +Cross, –Cross, Jitter (P-P, RMS), Eye Width, +Width, –Width, Burst Width, +Duty Cycle, –Duty Cycle, Duty Cycle Distortion, Delay, Phase.
Area Measurements – Area, Cycle Area.

Cursors

Dot, vertical bar and horizontal bar cursors.

Waveform Processing

Up to eight math waveforms can be defined and displayed using the following math functions: Add, Subtract, Multiply, Divide, Average, Differentiate, Exponentiate, Integrate, Natural Log, Log, Magnitude, Min, Max, Square Root and Filter. In addition, measurement values can be utilized as scalars in math waveform definitions.

Mask Testing

Custom masks (a new FW feature) can be used to distribute new, Tektronix factory created, NRZ, updated masks as a file loadable by the firmware. User-defined masks allow the user the create (via UI or PI) user masks. For most applications mask will be found in, the following list of predefined, built-in masks:

Standard Rate (Gb/s) unless otherwise noted –
STM-0/OC-1 51 Mb/s.
STM-1/OC-3 155 Mb/s.
STM-4/OC-12 622 Mb/s.
STM-16/OC-48 2.488.
STM-64/OC-192 9.953.
STM-256/OC-768 39.813.
FEC 2.666 2.666.
FEC 10.66 10.664.
FEC 10.709.
FEC 11.100.
FEC 43 Gb/s G.709 43.018.
FEC 42.66 42.657.
FC-10 G 10.5188 – optical only.
FC-133 132.813 Mb/s – optical and electrical.
FC-266 265.6 Mb/s – optical and electrical.
FC-531 531.2 Mb/s – optical and electrical.
FC-1063 1.063 – optical and electrical.
FC-2125 2.125 – optical and electrical.
FC-4250 4.250 – optical and electrical.
FC-8500 8.500 – optical and electrical, optical.
10GFC, FEC 11.3.
10 G BASE-X4 3.125.
10 G BASE-W 9.953.
10 G BASE-R 10.313, FEC 11.1.
InfiniBand 2.500 – optical and electrical.
Gigabit Ethernet 1.250.
Gigabit Ethernet 2.5 Gb/s.
XAUI, XFI.
PCI-Express 2.5G.
PCI-Express 5.0G.
SAS XR 3.0G.
SAS XR AASJ 3.0G.
SATA G1Tx 1.5G.
SATA G1Rx 1.5G.
SATA G2Tx 3.0G.
SATA G2Rx 3.0G.
SATA G3Tx 6.0G.
SATA G3Rx 6.0G.
Rapid I/O 1.25G.
Rapid I/O 2.50G.
Rapid I/O 3.125.

Optical Sampling Module Characteristics

Refer to Optical Sampling Modules User Manual for more detailed information.

	Application Type	Standards and Supported Filtering Rates*[1]	Number of Input Channels	Effective Wavelength Range	Calibrated Wavelengths
80C07B	Tributary Datacom/Telecom	Standard Included: OC-48/STM-16 (2.488 Gb/s), Infiniband, 2 GbE (2.500 Gb/s); Optional (choose any two): OC-3/STM-1 (155 Mb/s), OC-12/STM-4 (622 Mb/s), Fibre Channel (1.063 Gb/s), GbE (1.250 Gb/s), 2G Fibre Channel (2.125 Gb/s)	1	700 nm to 1650 nm	780 nm, 850 nm, 1310 nm and 1550 nm (±20 nm)
80C08C	10 Gb/s Datacom/Telecom	OC-192/STM-64 (9.953 Gb/s), 10GBASE-W (9.953 Gb/s), 10GBASE-R (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s)	1	700 nm to 1650 nm	780 nm, 850 nm, 1310 nm and 1550 nm (±20 nm)
80C10B*[1]	40 Gb/s Telecom	OC-768/STM-256 (39.813 Gb/s), ITU-T G.709 FEC (43.018 Gb/s)		1	1310 nm and 1550 nm 1310 nm and 1550 nm (±20 nm)
80C11	10 Gb/s Datacom/Telecom	OC-192/STM-64 (9.953 Gb/s), 10GBASE-W (9.953 Gb/s), 10GBASE-R (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s)	1	1100 nm and 1650 nm	1310 nm and 1550 nm (±20 nm)
80C12	1 to 8.5 Gb/s Datacom/Telecom	Fibre Channel (1.063 Gb/s) 2G Fibre Channel (2.125 Gb/s) 4G Fibre Channel (4.250 Gb/s) 10GBase-X4 (3.125 Gb/s) 8G Fibre Channel (8.50 Gb/s) 10GFC-X4 (3.1875 Gb/s) VSR5-3318 (3.318 Gb/s)	1	700 nm to 1650 nm	850 nm, 1310 nm, and 1550 nm (±20 nm)
	10 Gb/s Datacom/Telecom	OC-192/STM-64 (9.953 Gb/s), 10GBASE-W (9.953 Gb/s), 10GBASE-R (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s)			

*[1] Bandwidths shown are warranted unless printed in an italic typeface which represents a typical value. 80C08C, 80C12: Bandwidths and optical filters valid for OMA ≤ 500 mW (1550/1310 nm), OMA ≤860 (850 nm), OMA ≤1020 (780 nm).

▶ Optical Sampling Module Characteristics (continued)

	Clock Recovery (Optional)	Clock Recovery Outputs	Unfiltered Optical Bandwidth*1	Absolute Maximum Nondestructive Optical Input	Internal Fiber Diameter
80C07B	Option CR1: 155 Mb/s, 622 Mb/s, 1.063 Gb/s, 1.250 Gb/s, 2.125 Gb/s, 2.488 Gb/s, 2.500 Gb/s, 2.666 Gb/s	±Clock, ±Data	*2.5 GHz*	5 mW average; 10 mW peak power at wavelength of highest responsivity	62.5 µm/125 µm multi-mode
80C08C	Option CR1: 9.953 Gb/s, 10.31 Gb/s; Option CR2: 10.31 Gb/s, 10.52 Gb/s; Option CR4: Continuous from 9.8 Gb/s to 12.6 Gb/s	Clock, Clock/16	*10 GHz*	1 mW average; 10 mW peak power at wavelength of highest responsivity	62.5 µm/125 µm multi-mode
80C10B*2			*80+ GHz*	20 mW average; 60 mW peak power at wavelength of highest relative responsivity	9 µm/125 µm single-mode
80C11	Option CR1: 9.953 Gb/s; Option CR2: 9.953 Gb/s, 10.664 Gb/s; Option CR3: 9.953 Gb/s, 10.709 Gb/s; Option CR4: Continuous between 9.8 Gb/s to 12.6 Gb/s	CR1: Clock, Clock/16, Data; CR2, CR3, CR4: Clock, Clock/16	28 GHz	5 mW average; 10 mW peak power at wavelength of highest responsivity	9 µm/125 µm single-mode
80C12	Provided by 80A05 or 80A07 (sold separately)	ELECTRICAL SIGNAL OUT	*9 GHz* (for all options except 10G) 10GHz (option 10G)	1 mW average; 10 mW peak power at wavelength of highest responsivity	62.5 µm/125 µm multi-mode

Optical Sampling Module Characteristics (continued)

	Optical Return Loss	Fiber Input Accepted	RMS Optical RMS Noise (typical)	Optical Noise (maximum)	Independent Channel Deskew
80C07B	>14 dB (multi-mode) >24 dB (single-mode)	single- or multi-mode	0.50 µW at 155 Mb/s, 622 Mb/s, 1063 Mb/s, 1250 Mb/s; 0.70 µW at 2.488/2.500 Gb/s	1.0 µW at 155 Mb/s, 622 Mb/s, 1063 Mb/s, 1250 Mb/s; 1.5 µW at 2.488/2.500 Gb/s	Standard
80C08C	>14 dB (multi-mode) >24 dB (single-mode)	single- or multi-mode	1.7 µW at all filter rates (1550/1310 nm)	3.0 µW at all filter rates (1550/1310 nm)	Standard
80C10B*2	>30 dB	single-mode	25 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 45 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 20 µW at 30 GHz mode (1550 nm); 40 µW at 30 GHz mode (1310 nm); 40 µW at 65 GHz mode (1550 nm); 75 µW at 65 GHz mode (1310 nm); 85 µW at 80+ GHz mode (1550 nm); 150 µW at 80+ GHz mode (1310 nm);	40 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 75 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 35 µW at 30 GHz (1550 nm); 65 µW at 30 GHz (1310 nm); 60 µW at 65 GHz (1550 nm); 110 µW at 65 GHz (1310 nm); 120 µW at 80+ GHz (1550 nm); 220 µW at 80+ GHz (1310 nm)	Standard
80C11	>30 dB	single-mode	5.5 µW at all filter rates; 10.0 µW at 20 GHz 20.0 µW at 30 GHz	8.0 µW at all filter rates; 14.0 µW at 20 GHz 30.0 µW at 30 GHz	Standard
80C12	>14 dB (multi-mode) >24 dB (single-mode)	single- or multi-mode	1.7 µW (all filters except option 10G) 3.4 µW ('Full BW' and option 10G)	3.0 µW (all filters except option 10G filters) 6.0 µW ('Full BW' and option 10G filters)	Standard

*1 Bandwidths shown are warranted unless printed in an italic typeface which represents a typical value. 80C08C, 80C12: Bandwidths and optical filters valid for OMA ≤ 500 mW (1550/1310 nm), OMA ≤860 (850 nm), OMA ≤1020 (780 nm).

*2 80C10B specifications preliminary.

Optical Sampling Module Characteristics (continued)

	Offset Capability	Power Meter	Power Meter Range	Power Meter Accuracy	Mask Test Optical Sensitivity*1
80C07B	Standard	Standard	+4 dBm to -30 dBm	5% of reading	–22 dBm at 155 Mb/s, 622 Mb/s; –20 dBm at 2488/2500 Mb/s
80C08C	Standard	Standard	0 dBm to –30 dBm	5% of reading	–16 dBm at all filter rates
80C10B	Standard	Standard	+13 dBm to –21 dBm	5% of reading	–4 dBm at 39.813 Gb/s, 43.018 Gb/s; (1550 nm); –1 dBm (1310 nm)
80C11	Standard	Standard	+4 dBm to –30 dBm	5% of reading	–10 dBm at all filter rates; –7 dBm at 20 GHz; –4 dBm
80C12	Standard	Standard	0 dBm to –30 dBm	5% of reading	–15 dBm (for all options except option 10G) –12 dBm (for option 10G)

Physical Characteristics for Optical Sampling Modules

	Dimensions (mm/inches)			Weight (kg/lb.)
	Width	Height	Depth	Net
80C07B	165/6.5	25/1.0	305/12.0	<1.36/<3.0
80C08C	165/6.5	25/1.0	305/12.0	<1.22/<2.7
80C10B	165/6.5	25/1.0	305/12.0	<2.61/<5.75
80C11	165/6.5	25/1.0	305/12.0	<1.22/<2.7
80C12	165/6.5	25/1.0	305/12.0	<2.61/<5.75

Electrical Sampling Module Characteristics

	Application Type	Channels	Input Impedance	Channel Input Connector	Bandwidth*2
80E10	True Differential TDR, S-parameters and fault isolation	2	50 ±1.0 Ω	1.85 mm female, precision adapter to 2.92 mm included with 50 Ω SMA termination	50/40/30 GHz*3, *4
80E09	High frequency, low noise signal acquisition and jitter characterization	2	50 ±1.0 Ω	1.85 mm female, precision adapter to 2.92 mm included with 50 Ω SMA termination	60/40/30 GHz*3, *4
80E08	True Differential TDR and S-parameters	2	50 ±1.0 Ω	2.92 mm female	30/20 GHz*3, *4
80E07	Optimal noise/performance trade off for jitter characterization	2	50 ±1.0 Ω	2.92 mm female	30/20 GHz*3, *4
80E06	High-speed Electrical Device Characterization	1	50 ±0.5 Ω	1.85 mm female, precision adapter to 2.92 mm included with 50 Ω SMA termination	*70+ GHz*
80E04	TDR Impedance and Crosstalk Characterization	2	50 ±0.5 Ω	3.5 mm female	20 GHz*3
80E03	Device Characterization	2	50 ±0.5 Ω	3.5 mm female	20 GHz*3
80E01	High frequency, high maximum operating range signal acquisition	1	50 ±0.5 Ω	2.4 mm female, precision adapter to 2.92 mm included with 50 Ω SMA termination	50 GHz

*1 Smallest power level for mask test. Values represent theoretical typical sensitivity of NRZ eyes for comparison purposes. Assumes instrument peak-peak noise consumes most of the mask margin.

*2 Values shown are warranted unless printed in an italic typeface which represents a non-warranted characteristic value that the instrument will typically perform to.

*3 Calculated from .35 bandwidth rise time product.

*4 User selectable.

Electrical Sampling Module Characteristics (continued)

	Rise Time (10-90%)	Dynamic Range	Offset Range	Maximum Operating Voltage	Maximum Non-Destruct Voltage, DC+AC$_{p-p}$	Vertical Number of Digitized Bits
80E10	7 ps*1	1.0 V_{p-p}	±1.1 V	±1.1 V	2.0 V	14 bits full scale
80E09	5.8 ps*1	1.0 V_{p-p}	±1.1 V	±1.1 V	2.0 V	14 bits full scale
80E08	11.7 ps*1	1.0 V_{p-p}	±1.1 V	±1.1 V	2.0 V	14 bits full scale
80E07	11.7 ps*1	1.0 V_{p-p}	±1.1 V	±1.1 V	2.0 V	14 bits full scale
80E06	5.0 ps*2	1.0 V_{p-p}	±1.6 V	±1.6 V	2.0 V	14 bits full scale
80E04	≤17.5 ps	1.0 V_{p-p}	±1.6 V	±1.6 V	3.0 V	14 bits full scale
80E03	≤17.5 ps	1.0 V_{p-p}	±1.6 V	±1.6 V	3.0 V	14 bits full scale
80E01	11.7 ps*1	1.0 V_{p-p}	±1.6 V	±1.6 V	2.0 V	14 bits full scale

Electrical Sampling Module Characteristics (continued)

	Vertical Sensitivity Range	DC Vertical Voltage Accuracy, single point, within ±2 °C of compensated temperature	Typical Step Response Aberrations	RMS Noise*3
80E10	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value - Offset)]	*±1% or less over the zone 10 ns to 20 ps before step transition;* *+6%, –10% or less for the first 400 ps following step transition;* *+0%, –4% or less over the zone 400 ps following step transition;* *400 ps to 3 ns following step transition;* *+1%, –2% or less over the zone 3 ns to 100 ns following step transition;* *±1% after 100 ns following step transition*	*50 GHz:* 600 µV, ≤700 µV 40 GHz: *370 µV, ≤480 µV* 30 GHz: 300 µV, ≤410 µV
80E09	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±1% or less over the zone 10 ns to 20 ps before step transition;* *+6%, –10% or less for the first 400 ps following step transition;* *+0%, –4% or less over the zone 400 ps to 3 ns following step transition;* *+1%, –2% or less over the zone 3 ns to 100 ns following step transition;* *±1% after 100 ns following step transition*	*60 GHz:* 450 µV, ≤600 µV 40 GHz: *330 µV, ≤480 µV* *30 GHz:* 300 µV, ≤410 µV
80E08	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±1% or less over the zone 10 ns to 20 ps before step transition;* *+6%, –10% or less for the first 400 ps following step transition;* *+0%, –4% or less over the zone 400 ps to 3 ns following step transition;* *+1%, –2% or less over the zone 3 ns to 100 ns following step transition;* *±1% after 100 ns following step transition*	*30 GHz:* 300 µV, ≤410 µV 20 GHz: *280 µV, ≤380 µV*
80E07	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±1% or less over the zone 10 ns to 20 ps before step transition;* *+6%, –10% or less for the first 400 ps following step transition;* *+0%, –4% or less over the zone 400 ps to 3 ns following step transition;* *+1%, –2% or less over the zone 3 ns to 100 ns following step transition;* *±1% after 100 ns following step transition*	*30 GHz:* 300 µV, ≤410 µV 20 GHz: *280 µV, ≤380 µV*
80E06*3	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±5% or less for first 300 ps following step transition*	*1.8 mV ≤2.4 mV (maximum)*
80E04	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±3% or less over the zone 10 ns to 20 ps before step transition;* +10%, –5% or less for the first 300 ps following step transition; *±3% or less over the zone 300 ps to 5 ns following step transition;* ±1% or less over the zone 5 ns to 100 ns following step transition; *0.5% after 100 ns following step transition*	600 µV, ≤1.2 mV (maximum)
80E03	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±3% or less over the zone 10 ns to 20 ps before step transition;* +10%, –5% or less for the first 300 ps following step transition; *±3% or less over the zone 300 ps to 5 ns following step transition;* ±1% or less over the zone 5 ns to 100 ns following step transition; *±0.5% after 100 ns following step transition*	600 µV, ≤1.2 mV (maximum)
80E01	10 mV to 1.0 V full scale	± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]	*±3% or less over the zone 10 ns to 20 ps before step transition;* *+12%, –5% or less for the first 300 ps following step transition;* *+5.5%, –3% or less over the zone 300 ps to 3 ns following step transition;* *±1% or less over the zone 3 ns to 100 ns following step transition;* *±0.5% after 100 ns following step transition*	1.8 mV, ≤2.3 mV (maximum)

*1 Calculated from .35 bandwidth rise time product.

*2 Calculated from formula rise time = 0.35/(typical bandwidth).

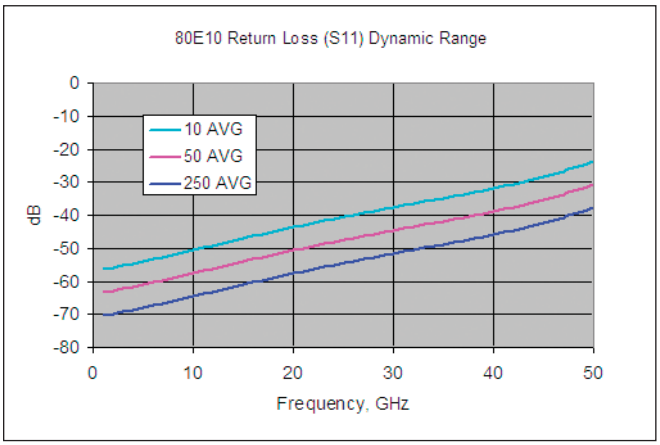
*3 Values shown are warranted unless printed in an italic typeface which represents a typical value.

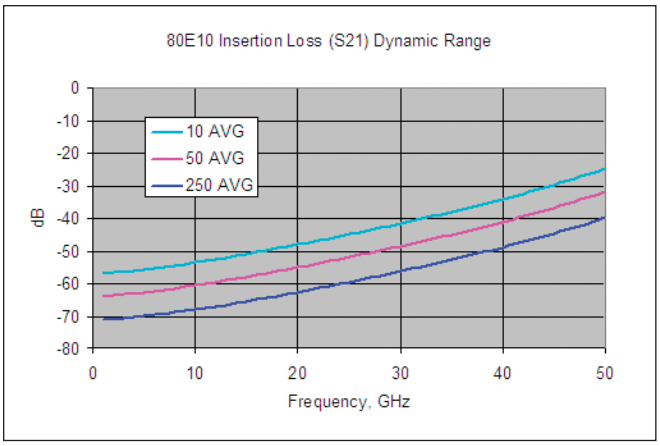
TDR System (80E10, 80E08, 80E04 only)

	80E10	80E08	80E04
Channels	2	2	2
Input Impedance	50 Ω nominal	50 Ω nominal	50 Ω nominal
Channel Input Connector	1.85 mm	2.92 mm	3.5 mm
Bandwidth	50 GHz	30 GHz	20 GHz
TDR Step Amplitude	250 mV (polarity of either step may be inverted)	250 mV (polarity of either step may be inverted)	250 mV (polarity of either step may be inverted)
TDR System Reflected Rise Time	*15 ps*	20 ps	*28 ps*
TDR System Incident Rise Time	*12 ps*	18 ps	*23 ps*
TDR Step Deskew Range	*±250 ps*	±250 ps	±50 ps
TDR Sampler Deskew Range	*±250 ps*	±250 ps	*+100 ns –500 ps (slot deskew only)*
TDR Step Maximum Repetition Rate	200 kHz	200 kHz	200 kHz

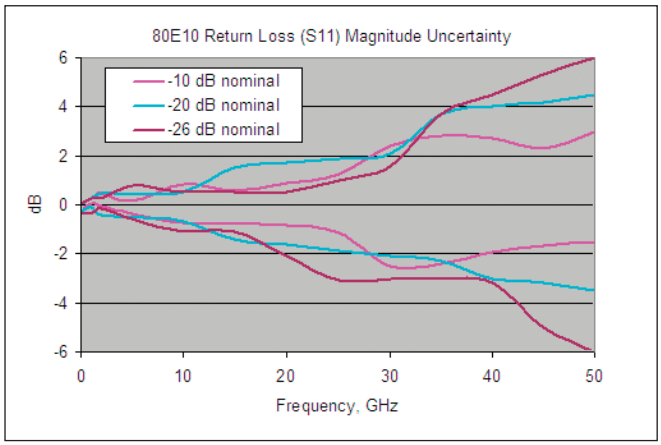
S-parameter Performance Characteristics (80E10)

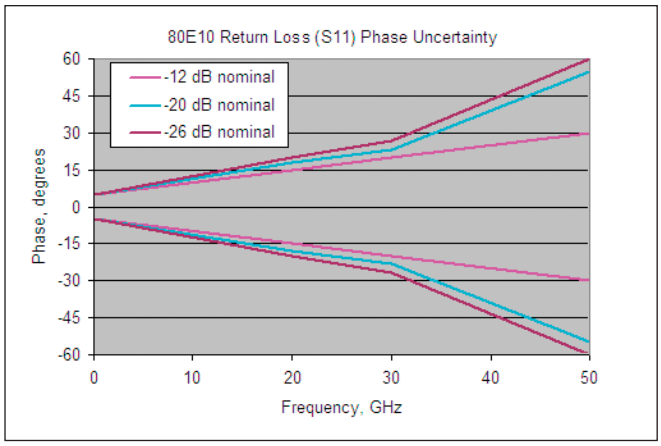
Dynamic range





Uncertainty





Measurement Conditions

- All measurements were performed after proper warm up as specified in the DSA8200 manual
- Standard S-parameter dynamic range measurement practices were used to determine the dynamic range of the module
- Uncertainty results were derived from a wide range of devices, with 250 averages
- Better dynamic range can be achieved by selecting lower bandwidth settings on the 80E10 module due to lower RMS noise floor
- Results apply to single-ended or differential measurements

Physical Characteristics for Electrical Sampling Modules

	Dimensions (mm/in.)			Weight (kg/lbs.)
	Width	Height	Depth	Net
80E10*1	55/2.2	25/1.0	75/3.0	0.175/0.37
80E09*1	55/2.2	25/1.0	75/3.0	0.175/0.37
80E08*1	55/2.2	25/1.0	75/3.0	0.175/0.37
80E07*1	55/2.2	25/1.0	75/3.0	0.175/0.37
80E06	79/3.1	25/1.0	135/5.3	0.4/0.87
80E04	79/3.1	25/1.0	135/5.3	0.4/0.87
80E03	79/3.1	25/1.0	135/5.3	0.4/0.87
80E01	79/3.1	25/1.0	135/5.3	0.4/0.87

80A05 and 80A07 Electrical Clock Recovery Module

Product Feature/Characteristic		80A05		80A07
		Standard	Option 10G	
Supported Specifications				
Enumerated standards				
OC3/STM1	155.52 Mb/s	■	■	◆*2
OC12/STM4	622.08 Mb/s	■	■	■
FibreChannel	1.063 Gb/s	■	■	■
Gigabit Ethernet	1.25 Gb/s	■	■	■
SAS Gen I	1.50 Gb/s	◆*3	◆*3	■
2 GB FibreChannel	2.125 Gb/s	■	■	■
OC48/STM16	2.488 Gb/s	■	■	■
2 GB Ethernet	2.50 Gb/s	■	■	■
PCI Express I	2.50 Gb/s	◆*3	◆*3	■
Infiniband®	2.50 Gb/s	■	■	◆*2
2.5G G.709 FEC	2.666 Gb/s	■	■	◆*2
SAS Gen II	3.0 Gb/s	◆*3	◆*3	■
XAUI, 10GBase-X	3.125 Gb/s	■	■	◆*2
10 GB FibreChannel x4	3.188 Gb/s	■	■	◆*2
4 GB FibreChannel	4.25 Gb/s	■	■	■
FB-DIMM1	3.2, 4.0, 4.8 Gb/s		◆*2, *3	■
PCI Express II	5.0 Gb/s		◆*2, *3	■
FB-DIMM2	4.8, 6.4, 8.0, 9.6 Gb/s		◆*2, *3	■
OIF CEI	6+ Gb/s		◆*2	■
2x XAUI	6.25 Gb/s		■	◆*2
8 GB FibreChannel	8.50 Gb/s			■
OC192/STM64	9.953 Gb/s		■	■
XFP/XFI	9.95-11.2 Gb/s		◆*2	■
10GBase-W	9.953 Gb/s		■	◆*2
10GBase-R	10.31 Gb/s		■	■
10 GB FibreChannel	10.51 Gb/s		■	◆*2
G.975 FEC	10.66 Gb/s		■	◆*2
G.709 FEC	10.71 Gb/s		■	◆*2
OIF CEI	11+ Gb/s		◆*2	■
10 GbE w/FEC	11.10 Gb/s		■	◆*2
Super FEC	12.50 Gb/s		■	◆*2

*1 Remote module characteristics.

*2 The standard is not enumerated but is supported as a custom rate.

*3 No Spread Spectrum Clocking support.

80A05 and 80A07 Electrical Clock Recovery Module (continued)

Product Feature/Characteristic	80A05		80A07
	Standard	Option 10G	
Additional enumerated standard rates are supported with 8000 series Firmware Releases higher than 2.4.x			
Clock Recovery Ranges for custom (user specified) rates (in addition to enumerated lists above)	50 Mb/s to 3.188 Gb/s 4.25 Gb/s	50 Mb/s to 3.188 Gb/s 3.267 to 4.25 Gb/s 4.900 to 6.375 Gb/s 9.800 to 12.60 Gb/s	100 Mb/s to 12.5 Gb/s continuous
Sensitivity (clock recovery will lock, differential data is given for each input)			
Lowest supported rate to 2.70 Gb/s	Differential ≤ 8 mV_{p-p} Single-ended 10 mV_{p-p}		Differential 15 mV (typ) Single-ended 30 mV (typ)
2.70 to 11.19 Gb/s		Differential ≤ 12 mV_{p-p} Single-ended 15 mV_{p-p}	
11.19 to 12.60 Gb/s		Differential ≤ 15 mV_{p-p} Single-ended 20 mV_{p-p}	

DSA8200 Mainframe Physical Characteristics

Dimensions (mm/in)			Weight (kg./lbs.)
Width	Height	Depth	Net
457 mm (18.0 in.)	343 mm (13.5 in.)	419 mm (16.5 in.)	21 kg. (46 lbs.)

Computer System and Peripherals

Operating System – Windows XP.
CPU – Intel Celeron 2.93 GHz processor.
PC System Memory – 512 MB.
Hard Disk Drive – Rear-panel, removable hard disk drive, 40 GB capacity.
DVD-ROM/CD-RW Drive – Front-panel DVD-ReadOnly/CD-ReadWrite drive with CD creation software application.

Input/Output Ports

Front Panel

USB 2.0 Port – One USB2.0 connector.
Anti-static Connection –
Banana-jack connector, 1 MΩ.
Trigger Direct Input –
See Trigger System specification.
Trigger Pre-scale Input –
See Trigger System specification.
Internal Clock Output –
See Trigger System specification.
External 10 MHz Reference Input –
±5 V Maximum.
DC Calibration Output – ±1.25 V Maximum.

Rear Panels

USB Ports – 4 USB2.0 connectors.
Parallel Port – IEEE 1284, DB-25 connector.
LAN Port – RJ-45 connector, supports 10Base-T, 100Base-T.
Serial Port – DB-9 COM1 port.
GPIB – IEEE488.2 connector.
VGA Video Port – DB-15 female connector; connect a second monitor to use dual-monitor display mode.
Oscilloscope VGA Video Port – DB-15 female connector, connect to show the oscilloscope display, including live waveforms on an external monitor or projector.
Gated Trigger Input – (Option GT only); See Trigger System specification.

Power Requirements

Line Voltage and Frequency –
100 to 240 VAC ±10% 50/60 Hz.
115 VAC ±10% 400 Hz.

Environmental Characteristics

Temperature

Operating – +10 ºC to +40 ºC.
Nonoperating – –22 ºC to +60 ºC.

Relative Humidity

Operating (Floppy disk and CD-ROM not installed) – 20% to 80% at or below 40 ºC (upper limit de-rates to 45% relative humidity at 40 ºC).
Nonoperating – 5% to 90% at or below 60 ºC (upper limit de-rates to 20% relative humidity at +60 ºC).

Altitude

Operating – 3,048 m (10,000 ft.).
Nonoperating – 12,190 m (40,000 ft.).
Electromagnetic Compatibility – 89/336/EEC.
Safety – UL3111-1, CSA1010.1, EN61010-1, IEC61010-1.

Ordering Information

DSA8200 Digital Serial Analyzer Sampling Oscilloscope

Includes: User manual, quick reference card, MS Windows XP compatible keyboard and mouse, touch screen stylus, online help, programmer online guide, power cord.

With OpenChoice® software, Tektronix provides enhanced test and measurement analysis with the capability of full integration of third-party software on the open Windows oscilloscopes. By working with the industry leaders, National Instruments and The MathWorks, examples of software programs from these companies are featured on all Tektronix open Windows oscilloscopes.

Options

Opt. GT – Gated Trigger.

Opt. JNB/Opt. JNB01 – Essential and Advanced Jitter, Noise and BER Analysis Software. See 80SJNB Essentials and 80SJNB Advanced for more information.

Service Options

Opt. C3 – Calibration Service 3 Years.

Opt. C5 – Calibration Service 5 Years.

Opt. D1 – Calibration Data Report.

Opt. D3 – Calibration Data Report 3 Years (with Option C3).

Opt. D5 – Calibration Data Report 5 Years (with Option C5).

Opt. R3 – Repair Service 3 Years.

Opt. R5 – Repair Service 5 Years.

International Power Plug Options

Opt. A0 – North America Power.

Opt. A1 – Universal EURO Power.

Opt. A2 – United Kingdom Power.

Opt. A3 – Australia Power.

Opt. A4 – 240 V, North America Power.

Opt. A5 – Switzerland Power.

Opt. A10 – China Power.

Opt. A99 – No Power Cord.

Other Accessories

Sampling Module Extender Cable (two-meter) – Order 80N01 (not compatible with 80E10, 80E09, 80E08 or 80E07 modules).

SlotSaver Adapter Extender Cable – Brings power and control to the 80A06 when operated externally from the mainframe, saving slot space (compatible with 80A06 and 80A02). Order 174-5230-00.

82A04 Filter 2 GHz – Filter kit for non-sinusoidal phase reference clock signal with frequency between 2 GHz and 4 GHz. Order 020-2566-00.

82A04 Filter 4 GHz – Filter kit for non-sinusoidal phase reference clock signal with frequency between 4 GHz and 6 GHz. Order 020-2567-00.

82A04 Filter 6 GHz – Filter kit for non-sinusoidal phase reference clock signal with frequency between 6 GHz and 8 GHz. Order 020-2568-00.

2X Attenuator (SMA male-to-female) – DC to 18 GHz. Order 015-1001-01.

5X Attenuator (SMA male-to-female) – DC to 18 GHz. Order 015-1002-01.

Connector Adapter – (2.4 mm or 1.85 mm male to 2.92 mm female) DC to 40 GHz. Order 011-0157-00.

Power Divider – 50 Ω, impedance matching power divider, SMA male to two SMA females. Order 015-0705-00.

Rackmount Kit – Order 016-1791-01.

Wrist strap (antistatic) – Order 006-3415-04.

P7513/P7516 – 13 GHz and 16 GHz TriMode™ Differential probes. Requires 80A03 interface module.

P7260 – 6 GHz Active FET Probe. Requires 80A03 interface module.

P7350 – 5 GHz Active FET Probe. Requires 80A03 interface module.

P7350SMA – 5 GHz 50 Ω Differential-to-Single-ended Active Probe. Requires 80A03 interface module. Note that the P7380 probes are recommended over the P7350 probes for sampling purposes due to their higher bandwidth and signal fidelity.

P7380SMA – 8 GHz 50 Ω Differential-to-Single-ended Active Probe. Requires 80A03 interface module.

P6150 – 9 GHz Passive Probe; the probe consists of a very high quality 20 GHz probe tip, plus an extremely flexible SMA cable. For higher frequency performance the 015-0560-00 or some of the accessory cables listed can be used.

P8018 – 20 GHz Single-Ended TDR Probe. 80A02 module recommended for static protection of the sampling or TDR module.

P80318 – 18 GHz 100 Ω Differential Impedance TDR Hand Probe.

80A01 – Pre-scaled Trigger Amplifier. Not required on the DSA8200, CSA8200 or TDS8200 mainframes with their increased sensitivity pre-scaler. The Amplifier enhances pre-scaler sensitivity on the older TDS8000B and CSA8000B mainframes.

80A02 – DSA8200 EOS/ESD Protection Module (1 channel). P8018 TDR probe recommended.

80A03 – Enables the use of two Tektronix P7000 Series TekConnect® probes on the DSA8200 or 8000 Series sampling oscilloscopes.

82A04 – Phase Reference module for low jitter acquisition (with or without trigger). Accepts signals from 2 GHz to 25 GHz (external filter might be required below 8 GHz) or to 60 GHz with Option 60G.

80A05 – Electrical clock recovery module/clock recovery. Applicable to electrical signals and for the 80C12.

The standard version of 80A05 supports signals in the following ranges:
- 50 Mb/s to 2.700 Gb/s.
- 2.700 Gb/s to 3.188 Gb/s.
- rate of 4 Gigabit Fibre Channel 4.250 Gb/s.

The Option 10G adds the ranges of:
- 3.267 Gb/s to 4.250 Gb/s.
- 4.900 Gb/s to 6.375 Gb/s.
- 9.800 Gb/s to 12.60 Gb/s.

80A06 – PatternSync module for 80SJNB jitter analysis package. Programmable divider for creating a trigger pulse from patterns up to 2^{23} in length.

80A07 – Electrical clock recovery module. 80A07 recovers clocks from serial data streams for all of the most common electrical standards in the continuous 100 Mb/s to 12.5 GB/s range. Applicable to electrical signals and for 80C12.

80SJNB Essentials – 80SJNB Essentials with Jitter, Noise and BER Analysis software. Provides separation of jitter and noise into their constituent components and provides highly accurate eye-opening and BER calculations. Also see Opt. JNB/JNB01.

80SJNB Advanced – 80SJNB Advanced adds Equalization, Channel emulation, Fixture de-embedding. Also see Opt. JNB/JNB01.

Interconnect Cables

015-0560-00 (450 mm/18 inch; 1 dB loss at 20 GHz) cable is a high quality cable recommended for work to 20 GHz.

Interconnect Cables (Third Party)

Tektronix recommends using quality high-performance interconnect cables with these high-bandwidth products in order to minimize measurement degradation and variations. The W.L. Gore and Associates' cable assemblies listed below are compatible with the 2.92 mm, 2.4 mm and 1.85 mm connector interface of the 80Exx modules.

Assemblies can be ordered by contacting Gore by phone at (800) 356-4622 or on the web at www.gore.com/tektronix.

Calibration Kits and Accessories (Third Party)

To facilitate S-parameter measurements with the new 80E10, 80E08 and 80E04 electrical TDR modules and IConnect® software, we recommend precision calibration kits, adapter kits, connector savers, airlines, torque wrenches and connector gauges from Maury Microwave. These components, accessible at www.maurymw.com/tektronix.htm, are compatible with the 2.92 mm, 2.4 mm and 1.85 mm connector interface of the 80Exx modules. Cal kits and other components can be ordered by contacting Maury Microwave.

	Frequency	Connectors	Length
Bench Top Test Cable Assemblies			
TEK40PF18PP	40 GHz	2.92 mm male	18.0 inches
TEK50PF18PP	50 GHz	2.4 mm male	18.0 inches
TEK65PF18PP	65 GHz	1.85 mm male	18.0 inches
High-Frequency Interconnect Cables for Electrical Sampling Modules			
TEK40HF06PP	40 GHz	2.92 mm male	6.0 inches
TEK40HF06PS	40 GHz	2.92 mm male; 2.92 mm female	6.0 inches
TEK50HF06PP	50 GHz	2.4 mm male	6.0 inches
TEK50HF06PS	50 GHz	2.4 mm male; 2.4 mm female	6.0 inches
TEK65HF06PP	65 GHz	1.85 mm male	6.0 inches
TEK65HF06PS	65 GHz	1.85 mm male, 1.85 mm female	6.0 inches

Digital Serial Analyzer Sampling Oscilloscope

DSA8200

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