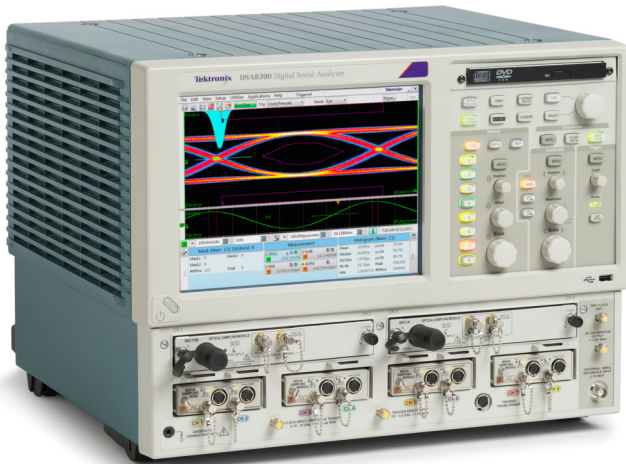


# Digital Serial Analyzer Sampling Oscilloscope

## DSA8300 Data Sheet



The DSA8300 is a state-of-the-art Equivalent Time Sampling Oscilloscope that provides the highest fidelity measurement and analysis capabilities for Communications Signal Analysis, Serial Data Network Analysis, and Serial Data Link Analysis applications.

## Features & Benefits

### Highest Fidelity Signal Capture

- Very Low Time-base Jitter
  - 425 fs Typical on up to 8 Simultaneously Acquired Channels
  - <200 fs Typical on up to 6 Channels with 82A04 Phase Reference Module
- Best Vertical Resolution – 16 bit A/D
  - Electrical Resolution: <20  $\mu\text{V}$  LSB (for 1 V full range)
  - Optical Resolution depends on the Dynamic Range of the Optical Module – Ranges from <20 nW for the 80C07B (1 mW full range) to <0.6  $\mu\text{W}$  for the 80C10B (30 mW full range)

### Flexible Configurations

- With Today's Sampling Module Portfolio, the DSA8300 supports up to 8 Simultaneously Acquired Signals
- A Wide Variety of Optical, Electrical, and Accessory Modules to support your Specific Testing Requirements
- **Optical Modules**
  - Fully Integrated Optical Modules that support all Standard Optical Data Rates from 155 Mb/s to 100 Gb/s
  - Certified Optical Reference Receivers Support Specified Requirements for Standards-mandated Compliance Testing
  - Optical Bandwidths to >80 GHz

- High Optical Sensitivity and Low Noise as well as the Wide Dynamic Range of the Optical Sampling Modules allows Accurate Testing and Characterization of Short-reach to Long-haul Optical Communications Standards
- Fully Calibrated Clock Recovery Solutions – No need to manually calibrate for data pick-off losses
- Calibrated Extinction Ratio Measurements ensure Repeatability of Extinction Ratio Measurements to <0.5 dB among Systems with Modules with this Factory Calibration Option

### ■ Electrical Modules

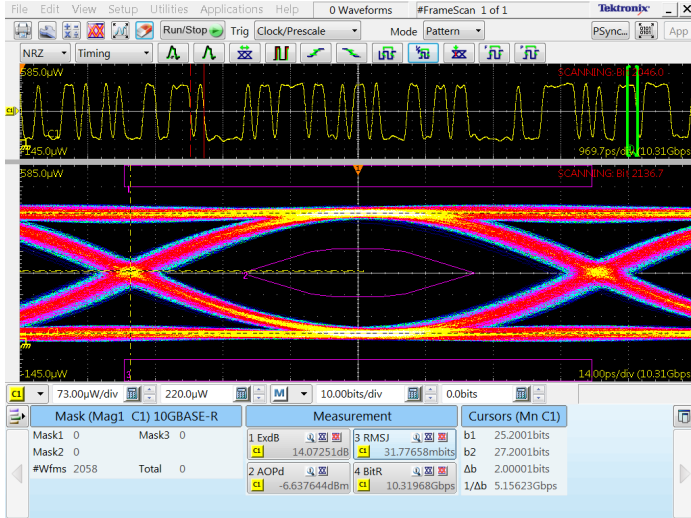
- Electrical Bandwidths to >70 GHz
- Very Low-noise Electrical Samplers (280  $\mu\text{V}$  at 20 GHz, 450  $\mu\text{V}$  at 60 GHz, typical)
- Selectable Bandwidths (with 80E07, 08, 09, 10) allow the User to Trade-off Sampler Bandwidth and Noise for Optimal Data Acquisition Performance
- Remote Samplers (80E07, 08, 09, 10) or Compact Sampling Extender Module Cables support Minimal Signal Degradation by allowing the Sampler to be Located in Close Proximity to the Device Under Test
- World's Highest-performance Integrated TDR (10 ps typical step rise time) supports Exceptional Impedance Discontinuity Characterization and High Dynamic Range for S-parameter Measurements to 50 GHz

### Analysis

- Standard Analysis Capabilities
  - Complete Suite of over 120 Automated Measurements for NRZ, RZ, and Pulse Signal Types
  - Automated Mask Testing with over 80 Industry-standard Masks. New Masks can be Imported into the DSA8300 to support New Emerging Standards. In Addition, Users can Define their own Masks for Automated Mask Testing
  - Vertical and Horizontal Histograms for Statistical Analysis of Acquired Waveforms
  - Vertical, Horizontal, and Waveform Cursors (with measurements)
- Jitter, Noise, BER, and Serial Data Link Analysis is provided through the 80SJNB Basic and Advanced Software Application Options
- Advanced TDR Analysis, S-parameter Measurements, Simulation Model Extraction, and Serial Link Simulation Capabilities are provided through the IConnect® Software Application Options

### High Test Throughput

- High Sample Acquisition Rate up to 300 kS/s per channel
- Efficient Programmatic Interface (IEEE-488, Ethernet, or local processor access) enable High Test Throughput



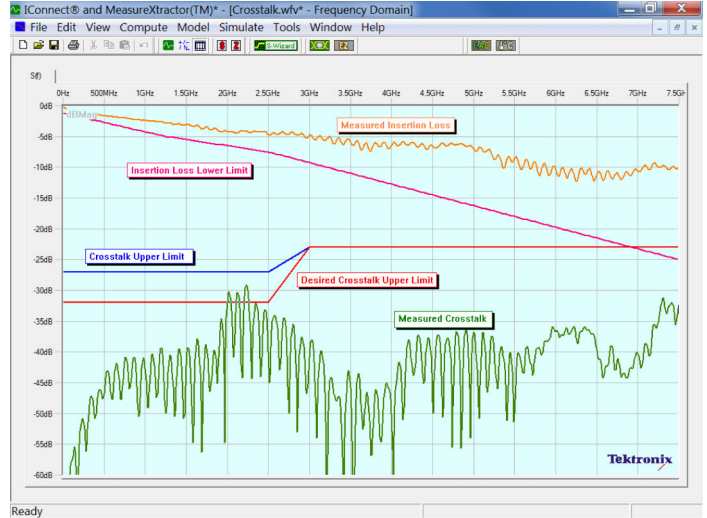
Optical Eye Diagram Testing



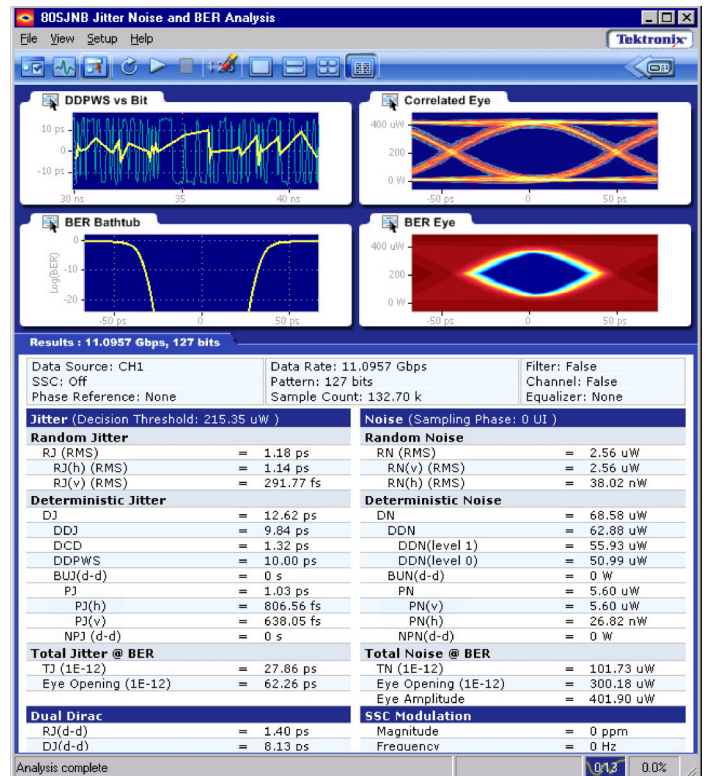
Passive Interconnect Test

## Applications

- Design/Verification of Telecom and Datacom Components and Systems
- Manufacturing/Testing for ITU/ANSI/IEEE/SONET/SDH Compliance
- High-performance True-differential TDR Measurements
- Impedance Characterization and Network Analysis for Serial Data Applications including S-parameters
- Advanced Jitter, Noise, and BER Analysis
- Channel and Eye Diagram Simulation and Measurement-based SPICE Modeling



Serial Data Network Analysis



Jitter, Noise, and BER Analysis

## Superior Performance with Extraordinary Versatility

The DSA8300 Digital Serial Analyzer is the most versatile tool for developing and testing communications, computers, and consumer electronics which utilize multi-gigabit data transmission. It is used for optical and electrical transmitter characterization as well as compliance verification for devices, modules, and systems used in these products.

In addition, the DSA8300 is well-suited for electrical signal path characterization, whether for packages, PCBs, or electrical cables. With exceptional bandwidth, signal fidelity, and the most extensible modular architecture, the DSA8300 provides the highest-performance TDR and interconnect analysis, most accurate analysis of signal impairments, and BER calculations for current and emerging serial data technology.

Finally, with its exceptional signal fidelity and resolution, the DSA8300 is the gold standard for electrical and optical applications which require ultra-high bandwidths, very fine vertical resolution, low jitter, and/or exceptional time interval accuracy.

The DSA8300 provides unmatched measurement system fidelity with the lowest native instrument jitter floor (425 fs RMS, typical for serial data signals at rates >1.25 Gb/s) that ensures the most accurate acquisition of up to 8 high-bandwidth signals simultaneously. You get additional analysis benefits from the 200 fs acquisition jitter with the Phase Reference module.

The multiprocessor 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 DSA8300'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 6 module slots, the DSA8300 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 20 GHz to >70 GHz, while the optical modules support optical testing from 125 Mb/s to 100 Gb/s and beyond with optical bandwidth exceeding 80 GHz. The DSA8300 supports all of the legacy 8000 Series electrical and optical sampling modules and accessories\*<sup>1</sup>.

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

The raw acquisition performance of the DSA8300 and its sampling modules and accessories is further augmented by the comprehensive measurement and analysis capabilities of the DSA8300 and its associated software applications. For example, the IConnect® software applications provide complete TDR, S-parameter, and signal integrity analysis for passive electrical interconnects (packages, printed circuit boards, backplanes, cable, etc.) while the 80SJNB applications provide complete jitter, noise, and bit error rate analysis as well as channel and equalization analysis and emulation for both optical and electrical serial data links.

\*<sup>1</sup> The DSA8300 does not support the 80A06 Pattern Synchronization module as this capability is superseded by the integrated Advance Trigger option (Option ADVTRIG) for the DSA8300.

## Jitter, Noise, BER, and Serial Data Link Analysis

High-speed serial data link measurements and analysis are supported with three software solutions: 80SJARB, 80SJNB Essentials, and 80SJNB Advanced.\*2

- 80SJARB (Option JARB) is a basic jitter measurement tool capable of measuring jitter on any waveform – random or repetitive. The simplicity of acquisition limits the amount of analysis possible so only the simplest decomposition can be used; repeatability is pattern dependent
- 80SJNB Essentials (Option JNB) offers complete analysis of jitter, noise, and BER, with decomposition of components for clear understanding of a signal's problems and margins. The acquisition methodology requires a repetitive pattern. Both accuracy and repeatability are improved relative to 80SJARB since the tool has access to the complete signal pattern
- 80SJNB Advanced (Option JNB01) adds features to 80SJNB Essentials for serial data link analysis – de-embedding of fixture, channel emulation, FFE/DFE equalization, and pre-emphasis/de-emphasis

### Jitter Analysis of Arbitrary Data (80SJARB)

The 80SJARB jitter measurement application software for the DSA8300 Series addresses IEEE 802.3ba applications requiring the J2 and J9 jitter measurements. It also enables basic jitter measurements for NRZ data signals including PRBS31, random traffic, and scrambled data. This provides an entry-level jitter analysis capability with simple Dual Dirac model jitter analysis and no pattern synchronization requirement. 80SJARB can acquire continuously in Free Run mode, delivering acquisitions and updates beyond the IEEE minimum requirement of 10,000 data points. Plots include jitter bathtub curves for both measured and extrapolated data, as well as a histogram of the acquired data.

### 80SJARB Jitter Analysis

Measurement	Description
J2	Total jitter for BER = $2.5e^{-3}$
J9	Total jitter for BER = $2.5e^{-10}$
Tj	Total jitter for BER = $1.0e^{-12}$
DJdd	Deterministic jitter (Dual Dirac model)
RJdd	Random jitter (Dual Dirac model)

**Free Run Mode:** For continuous acquisitions and updates beyond the IEEE minimum requirement of 10,000 data points.

**Plots:** Jitter / Eye Opening Bathtub, Histogram of Acquired Data.

## 80SJNB Jitter and Noise Analysis Measurements

### 80SJNB Jitter Analysis

Measurement	Description
TJ at BER	Total jitter at specified BER
J2	Total jitter for BER = $2.5e^{-3}$
J9	Total jitter for BER = $2.5e^{-10}$
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 at BER	Horizontal eye opening at specified BER
BUJ	Bounded uncorrelated jitter
NPJ	Non-periodic jitter (uncorrelated and bounded)
SSCMagnitude	Magnitude of SSC modulation in ppm
SSCFrequency	Frequency of SSC modulation in ppm

### 80SJNB Noise Analysis

Measurement	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 at BER	Vertical eye opening at specified BER
BUN	Bounded uncorrelated noise
NPN	Non-periodic noise

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

\*2 These software applications can be purchased to install on currently owned DSA8300 oscilloscopes with the DSA83UP upgrade kits.



## TDR (Time Domain Reflectometry) Applications

The DSA8300 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<sup>\*3</sup>, the DSA8300 enables you to keep pace with today's most demanding Serial Data Network Analysis (SDNA) requirements.

The 80E10 and 80E08 TDR modules feature a fully integrated independent dual-channel 2-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 DSA8300 is the industry's most versatile TDR measurement system, accommodating up to 4 dual-channel true-differential TDR modules for fast, accurate multilane impedance and S-parameter characterization.

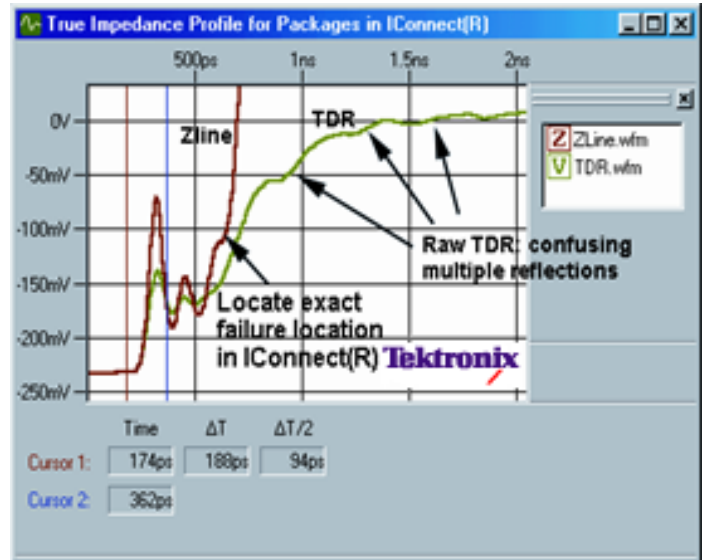
The P80318 True-differential TDR probe and P8018 Single-ended Passive Handheld TDR probe provide high-performance probing solutions for circuit board impedance and electrical signal characterization. The P80318, an 18 GHz 100  $\Omega$  input-impedance differential TDR hand probe, enables high-fidelity 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.

<sup>\*3</sup> Rise times are 10-90%. Typical reflected rise times for the 80E10 are <10 ps.

## Multi-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<sup>®</sup> software allow S-parameter measurements with up to -70 dB of dynamic range. This performance assures accurate, repeatable measurements in serial data analysis, digital design, signal integrity, and electrical compliance testing applications.



Quickly identify the exact location of faults with the 80E10 sub-millimeter resolution and IConnect<sup>®</sup> True Impedance Profile.

### TDR Module Performance with IConnect<sup>®</sup>

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

With the long record length acquisitions, IConnect<sup>®</sup> 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.

When you employ IConnect<sup>®</sup> Signal Integrity TDR and S-parameter software with the DSA8300 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<sup>®</sup> can help you complete interconnect analysis tasks in minutes instead of days, resulting in faster system design time and lower design costs. IConnect<sup>®</sup> 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 multi-gigabit interconnects.

## Failure Analysis – Quickly Identify Fault Location

The 80E10, with its 12 ps typical TDR rise time, provides superior resolution enabling the fastest and most efficient fault isolation in package, circuit board, and on-chip failure analysis applications.

## IConnect® Signal Integrity TDR and S-parameter Software

Operating on the DSA8300 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 the 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  $\Omega$  load makes measurements, 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 up 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, while electrical compliance testing masks typically call for 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

For more information regarding the IConnect® software applications, see the "IConnect® Signal Integrity, TDR, and S-Parameter SW – 80SICMX • 80SICON • 80SSPAR" data sheet.

## High-speed Optical Test Solutions

The DSA8300 with its highly configurable mainframe and a wide variety of optical modules provide complete optical test solutions with superior system fidelity from 125 Mb/s to 100 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 Optical Reference Receiver (ORR) filters and/or a full bandwidth path. Each module also supports fully calibrated clock recovery solutions (whether integrated into

the module or through a data pick-off routed to an external clock recovery module or stand-alone clock recovery instrument).

Shown below is a brief description of each available optical sampling module as well as a selection guide with the key specifications for each module. For more complete information on these modules, see the “Optical Sampling Modules – 80C07B • 80C08C • 80C10B • 80C11 • 80C12B • 80C25GBE” data sheet.

### Optical Sampling Modules

Module	Description
80C07B Multirate Datacom and Telecom	The 80C07B module is a broad-wavelength (700 to 1650 nm) multirate optical sampling module optimized for testing datacom/telecom signals from 125 Mb/s to 2.5 Gb/s. With its amplified O/E converter design, this module provides excellent signal-to-noise performance, allowing users to examine low-power optical signals. The 80C07B can be optionally configured with fully calibrated internal clock recovery that supports 125, 155, 622, 1063, 1250, 2125, 2488, 2500, and 2666 Mb/s rates.
80C08C Multirate, Broad Wavelength, High Sensitivity 10 Gb/s	The 80C08C module is a broad-wavelength (700 to 1650 nm) multirate optical sampling module providing datacom rate testing for 10GbE, 40GbE-R4, 100GbE-SR10 applications at 9.953, 10.3125, 11.0957 Gb/s and 10G Fibre Channel applications at 10.51875 and 11.317 Gb/s. The 80C08C also provides telecom rate testing at 9.953, 10.664, and 10.709 Gb/s. With its amplified O/E converter 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 an integrated clock recovery option that supports acquiring signals at any standard- or user-specified rate from 9.8 to 12.6 Gb/s.
80C10B Multirate Datacom and Telecom 40 Gb/s and 100 Gb/s	The 80C10B module provides integrated and selectable-reference receiver filtering, enabling conformance testing at either 1310 or 1550 nm for 39.813 Gb/s (OC-768/STM-256, VSR2000 G.693, 40G NRZ G.959.1), 41.25 Gb/s (40GBASE-FR), and 43.018 Gb/s [G.709 FEC, OTU3, (4×10G LAN PHY)] rates. In addition to these rates, the user may also choose selectable bandwidths of 30, 65, and 80 GHz on the 80C10B for optimal noise vs. bandwidth performance and accurate signal characterization. Option F1 for the 80C10B extends filter selections to include 27.739 Gb/s (100GBASE-LR4 + FEC and 100GBASE-ER4 + FEC) and 25.781 Gb/s (100GBASE-LR4 and 100GBASE-ER4). When equipped with Option CRTP, an electrical signal pick-off is provided for clock recovery. Clock recovery to 28.6 Gb/s for the 80C10B is provided using the CR286A clock recovery instrument (sold separately). The 80C10B is also optionally available in a bundled ordering configuration which includes a 70+ GHz electrical sampling channel.
80C11 Multirate 10 Gb/s Datacom and Telecom	The 80C11 module is a long-wavelength (1100 to 1650 nm) multirate optical sampling module optimized for testing 10 Gb/s datacom and telecom standard rates at 9.953, 10.3125, 10.51875, 10.664, 10.709, 11.0957, 11.317, and 14.025 Gb/s. With its high optical bandwidth of up to 30 GHz (typical) it is well-suited for general-purpose high-performance 10 Gb/s optical component testing. The 80C11 can be optionally configured with clock recovery that can support any standard or user-defined rate in the continuous range from 9.8 to 12.6 Gb/s.
80C12B Multirate Datacom and Telecom	The 80C12B module is a broad wavelength (700 to 1650 nm) multirate optical sampling module providing telecom and datacom testing for standards from 155 Mb/s to 11.4 Gb/s. This highly flexible module can be configured to support a wide variety of 10 Gb/s applications, lower data rate applications (155 Mb/s to 7.4 Gb/s), or a combination of 10G and lower data rate standards. The low data rate applications include: Telecom applications from 155 to 2666 Mb/s, 1G, 2G, and 4G Fibre Channel, multilane standards such as 10GBASE-X4 and 4-Lane 10 Gb/s Fibre Channel, and Infiniband SDR and DDR rates. The supported 10 Gb/s application includes both datacom and telecom standards. The supported 10 Gb/s datacom applications include 10GbE, 40GbE-R4, 100GbE-SR10 applications at 9.953, 10.3125, 11.0957 Gb/s, and 10G Fibre Channel applications at 10.51875 Gb/s and 11.317 Gb/s. The 80C12B also provides telecom rate testing at 9.953, 10.664, and 10.709 Gb/s. With its amplified O/E converter design, this module provides excellent signal-to-noise performance and high optical sensitivity, allowing users to examine low-power optical signals. Clock recovery for the 80C12B is provided using the 80A05 module or CR125A clock recovery instrument (sold separately).
80C14 Multirate Datacom and Telecom	The 80C14 module is a broad-wavelength (700 to 1650 nm) multirate optical sampling module providing 8G, 10G, and 16G telecom and datacom testing. The supported 10 Gb/s datacom applications include: 10GbE, 40GbE-R4, 100GbE-SR10 applications at 9.953, 10.3125, and 11.0957 Gb/s. Fibre Channel applications include: 8.500, 10.51875, 11.317, and 14.025 Gb/s. The 80C14 also provides telecom rate testing at 9.953, 10.664, 10.709, and 12.5 Gb/s. With its amplified O/E converter 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 80C14 is provided by the CR175A or CR286A (sold separately).
80C25GBE Multirate Datacom 100 Gb/s (4 × 25 Gb/s)	The 80C25GBE module provides 65 GHz full-bandwidth, integrated, and selectable-reference receiver filtering, enabling conformance testing at either 1310 or 1550 nm for 27.739G (100GBASE-LR4+FEC and 100GBASE-ER4+FEC) and 25.781G (100GBASE-LR4 and 100GBASE-ER4). When equipped with Option CRTP an electrical signal pick-off is provided for clock recovery. Clock recovery for the 80C25GBE is provided using the CR286A clock recovery instrument (sold separately).

**Optical Sampling Module Selection Guide**

In the table below is shown the key specifications for each of the current optical sampling modules available for use with the DSA8300 to assist you in selecting the optical module(s) most appropriate for your optical testing application. Detailed specifications are available in the 80Cxx Optical Sampling Modules data sheet.

Characteristic	80C07B*4	80C08C	80C12B*5		80C14	80C11	80C25GBE	80C10B*6	
			Opt. F0-F12	Opt. 10G/10GP				Std.	Opt. F1
Wavelength Range (nm)	700-1650	700-1650	700-1650	700-1650	700-1650	1100-1650	1290-1330 1520-1620	1290-1330 1520-1620	1290-1330 1520-1620
Unfiltered Optical Bandwidth (GHz)	2.5	10	12*7	12*7	12	30	65	80	65
Fiber Input (µm)	9, 50, 62.5	9, 50, 62.5	9, 50, 62.5	9, 50, 62.5	9, 50, 62.5	9	9	9	9
Mask Test Sensitivity (dBm)	-22	-16*8	-19	-15	-15	-9	-8*9	-7*9	-8*9
Optical Reference Receivers Supported									
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	■		■						
2.66 Gb/s			■						
3.125 Gb/s			■						
3.188 Gb/s			■						
4.250 Gb/s			■						
5.000 Gb/s			■						
6.144 Gb/s			■						
7.373 Gb/s			■						
8.500 Gb/s				■	■	■			
9.953 Gb/s		■		■	■	■			
10.31 Gb/s		■		■	■	■			
10.51 Gb/s		■		■	■	■			
10.66 Gb/s		■		■	■	■			
10.71 Gb/s		■		■	■	■			
11.1 Gb/s		■		■	■	■			
11.3 Gb/s		■		■	■	■			
14.025 Gb/s					■	■			
14.063 Gb/s					■	■			
25.78 Gb/s							■		■
27.74 Gb/s							■		■
39.81 Gb/s								■	■
41.25 Gb/s								■	■
43.02 Gb/s								■	■

\*4 There are specific reference receiver groupings supported for the 80C07B, see the 80Cxx Optical Module data sheet for detailed information.

\*5 There are specific reference receiver groupings supported for the 80C12B, see the 80Cxx Optical Module data sheet for detailed information.

\*6 The clock recovery trigger pick-off (Option CRTP) for the 80C10B can support trigger pick-off for data rates to >43 Gb/s.

\*7 The full 12 GHz bandwidth for the 80C12B is only available with Option F0, 10G, or 10GP.

\*8 Mask test sensitivity of the 80C08C reduced by -1 dBm with internal clock recovery options.

\*9 Mask test sensitivity of the 80C10B and 80C25GBE reduced by -0.6 dBm with internal clock recovery trigger pick-off (Option CRTP).



## Clock Recovery for Optical Testing

In many optical applications, there is no data clock directly available to provide a reference signal for acquiring the signals from the device under test. In these situations, it is necessary to recover the clock from the data signal. The Tektronix 8000 Series of sampling oscilloscope products provides a complete complement of clock recovery solutions to meet this need. Each of these solutions is fully calibrated so that users do not need to do any manual calibration of the system to take into account any losses due to data pick-off being routed to the input of the clock recovery unit. Shown below is a clock recovery solutions selection guide with the key

specifications for each solution to assist you in selecting the solution(s) most appropriate for your application. For more detailed information on these solutions, see the 80Cxx Optical Sampling Modules data sheet (for clock recovery options integrated into the 80C07B, 80C08C, or 80C11) or the appropriate clock recovery data sheets for stand-alone clock recovery modules or instruments.

**Note:** The stand-alone clock recovery modules/instruments have electrical inputs and can be used to recover clocks from electrical signals as well as from the electrical data pick-off outputs from the 8000 Series optical sampling modules.

### Integrated Clock Recovery Options\*10

Characteristic	80C07B	80C08C			80C11			
	Opt. CR1	Opt. CR1	Opt. CR2	Opt. CR4	Opt. CR1	Opt. CR2	Opt. CR3	Opt. CR4
Continuously Variable Rate Range (Gb/s)	Fixed Rates	Fixed Rates	Fixed Rates	9.8 - 12.6	Fixed Rates	Fixed Rates	Fixed Rates	9.8 - 12.6
Clock Recovery Sensitivity (dBm)*11	-22	-15	-15	-15	-9	-9	-9	-9
Standard Rates Supported								
125, 155 Mb/s	■							
622 Mb/s	■							
1063 Mb/s	■							
1250 Mb/s	■							
2125 Mb/s	■							
2488, 2500 Mb/s	■							
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				■				■
14.025 Gb/s								
14.063 Gb/s								
25.78 Gb/s								
27.74 Gb/s								

\*10 Clock recovery is integrated into the optical module and controllable from the Trigger Setup menu of the 8000 Series scope.

\*11 Electrical clock recovery sensitivity is for differential input and varies with the input clock rate. See clock recovery data sheets for more information.

**Stand-alone (Electrical) Clock Recovery Modules/Instruments**

Characteristic	80A05* <sup>12</sup>		CR125A* <sup>13</sup>	CR175A* <sup>13</sup>	CR286A* <sup>13</sup>
	Std.	Opt. 10G			
Continuously Variable Rate Range (Gb/s)	50 - 3.188, 4.25	50 - 3.188, 3.267 - 4.25, 4.900 - 6.375, 9.8 - 12.6	0.1 - 12.5	0.1 - 17.5	0.1 - 28.6
Clock Recovery Sensitivity (mV <sub>p-p</sub> )* <sup>11</sup>	≤15	≤15	15	15	15
Adjustable Clock Recovery Loop Bandwidth and Peaking* <sup>14</sup>			■	■	■
Standard Rates Supported					
125, 155 Mb/s	■	■	■	■	■
622 Mb/s	■	■	■	■	■
1063 Mb/s	■	■	■	■	■
1250 Mb/s	■	■	■	■	■
2125 Mb/s	■	■	■	■	■
2488, 2500 Mb/s	■	■	■	■	■
2.66 Gb/s	■	■	■	■	■
3.125, 3.188 Gb/s	■	■	■	■	■
4.25 Gb/s	■	■	■	■	■
5.00 Gb/s	■	■	■	■	■
6.14 Gb/s	■	■	■	■	■
7.37 Gb/s	■	■	■	■	■
8.50 Gb/s	■	■	■	■	■
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	■	■	■	■	■
14.025 Gb/s	■	■	■	■	■
14.063 Gb/s	■	■	■	■	■
25.78 Gb/s	■	■	■	■	■
27.74 Gb/s	■	■	■	■	■

\*<sup>11</sup> Electrical clock recovery sensitivity is for differential input and varies with the input clock rate. See clock recovery data sheets for more information.

\*<sup>12</sup> The clock recovery module plugs into one of the 8000 Series scope's large module slots and is controllable from the Trigger Setup menu.

\*<sup>13</sup> Stand-alone clock recovery instrument; controllable from the BERTScope clock recovery instrument control application, accessible from the App menu of the 8000 Series scope.

\*<sup>14</sup> For more information on clock recovery loop bandwidth and peaking, see clock recovery data sheets.

**Measurement and Analysis Tools for Optical Testing Applications**

The DSA8300 includes a wide variety of measurement and analysis tools which specifically address optical testing applications. In addition to the standard amplitude and timing parametric measurements (e.g. rise/fall times, amplitude, RMS jitter, RMS noise, frequency, period, etc.) the measurement suite for the DSA8300 includes measurements specifically tailored to measuring optical signals (average optical power, extinction ratio, eye height, eye width, optical modulation amplitude (OMA), etc.). For a complete list of measurements, see the Math/Measurement section of this data sheet.

The DSA8300 also includes standard compliance testing masks for all of the common optical standards from 155 Mb/s to 100 Gb/s. Users can also create their own masks for automated mask testing. Histograms and cursor measurements are also available to analyze optical signals acquired by the DSA8300.

Finally, the 80SJNB applications support complete jitter, noise, and BER analysis for optical signals. The advanced version of this software (Option JNB01) supports evaluating the emphasis and equalization on impaired signals.

## High-performance Electrical Test Solutions

The DSA8300 is also well-suited for a variety of high-performance electrical applications. With the modular system, users can configure their DSA8300 with a variety of electrical modules that are best suited to their requirements. In the table below is the key specifications for each of the current electrical

sampling modules available for use with the DSA8300 to assist you in selecting the electrical module(s) most appropriate for your application. Detailed specifications are available in the 80Exx Electrical Sampling Modules data sheet.

### Electrical Sampling Module Selection Guide

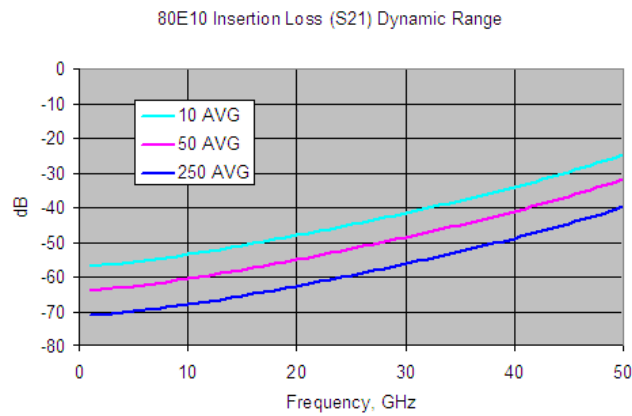
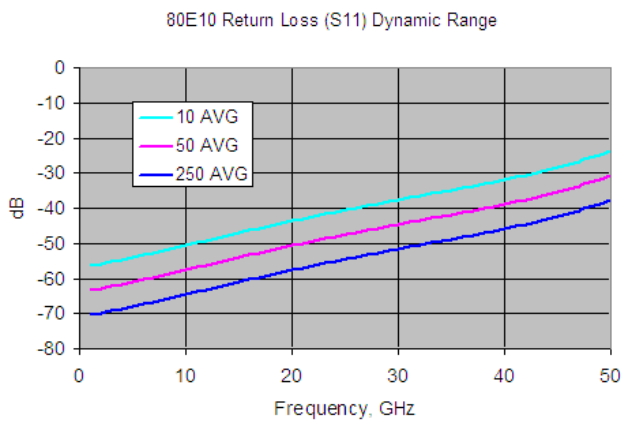
Characteristic	80E01	80E03	80E06	80E07	80E09	TDR Modules		
						80E04	80E08	80E10
Channels	1	2	1	2	2	2	2	2
Bandwidth	50 GHz	20 GHz	70+ GHz	20/30 GHz (user selectable)	30/40/60 GHz (user selectable)	20 GHz	20/30 GHz (user selectable)	30/40/50 GHz (user selectable)
Step Response at Full Bandwidth (10-90%)	7 ps	17.5 ps	5.0 ps	11.7 ps	5.8 ps	17.5 ps	11.7 ps	7 ps
RMS Noise	1.8 mV	600 $\mu$ V	1.8 mV	280 $\mu$ V at 20 GHz 300 $\mu$ V at 30 GHz	300 $\mu$ V at 30 GHz 330 $\mu$ V at 40 GHz 450 $\mu$ V at 20 GHz	600 $\mu$ V	280 $\mu$ V at 20 GHz 300 $\mu$ V at 30 GHz	300 $\mu$ V at 30 GHz 370 $\mu$ V at 40 GHz 600 $\mu$ V at 60 GHz
Incident TDR Step Rise Time (10-90%)	—	—	—	—	—	23 ps	18 ps	12 ps
Reflected TDR Step Rise Time (10-90%)	—	—	—	—	—	28 ps	20 ps	15 ps
Remote Sampling Capability	w/ optional 2 m 80N01 extender cable	w/ optional 2 m 80N01 extender cable	w/ optional 2 m 80N01 extender cable	Fully integrated 2 m remote cable	Fully integrated 2 m remote cable	w/ optional 2 m 80N01 extender cable	Fully integrated 2 m remote cable	Fully integrated 2 m remote cable

## S-parameter Performance Characteristics (80E10)

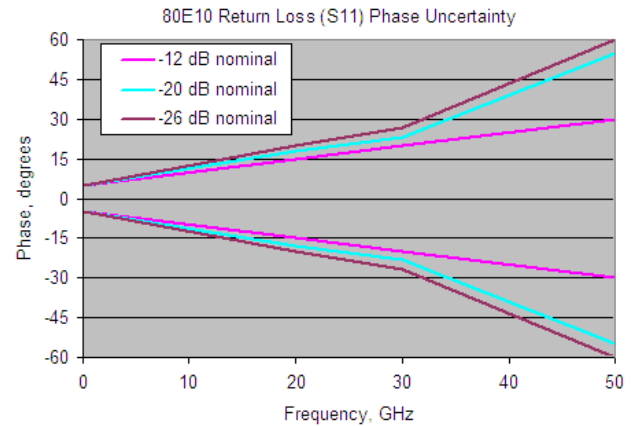
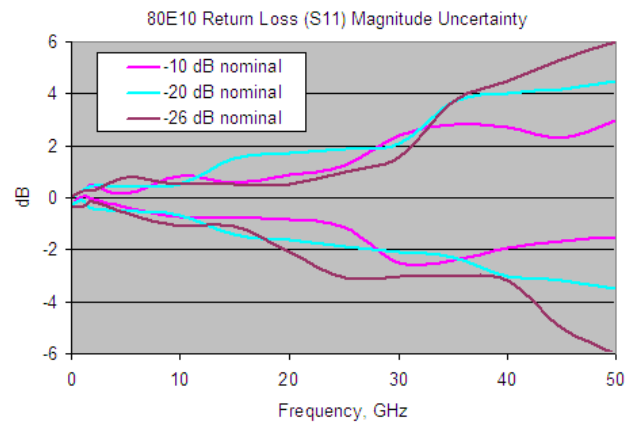
### Measurement Conditions

- All measurements were performed after proper warm up as specified in the DSA8300 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 a lower RMS noise floor
- Results apply to single-ended or differential measurements

### Dynamic Range



### Uncertainty



## Specifications

Product specifications and descriptions in this document are subject to change without notice.

### Signal Acquisition

Characteristic	Description
Acquisition Modes	Sample (Normal), Envelope, and Average
Number of Sampling Modules Accommodated	Up to 4 dual-channel electrical; up to 2 optical sampling modules. (Both single- and dual-channel modules are appropriate for the two channels associated with the slot) Population of the CH1/CH2 large slot with any module other than one requiring power only displaces functionality of the CH1/CH2 small slot; population of the CH3/CH4 large slot with any module other than one requiring power only displaces functionality of the CH3/CH4 small slot
Number of Simultaneously Acquired Inputs	8 channels maximum
Maximum Acquisition Rate	300 kS/s per channel in TDR mode; 200 kS/s per channel in all other non-phase reference modes; 120 kS/s per channel in phase reference modes
Vertical Systems	
Rise Time / Bandwidth	Determined by the sampling modules used
Vertical Resolution	16 bits over the sampling modules' dynamic range Electrical Resolution: <20 $\mu$ V LSB (for 1 V full range)  Optical resolution depends on the dynamic range of the optical module – ranges from <20 nW for the 80C07B (1 mW full range) to <0.6 $\mu$ W for the 80C10B (30 mW full range)
Horizontal System	
Main and Magnification View Time Bases, Horizontal Scale	100 fs/div to 1 ms/div in 1-2-5 sequence or 100 fs increments
Time Interval Accuracy	
Trigger Direct (Front Panel) Input	Horizontal scale >20 ps/div, right-most point of measurement interval <150 ns; Mean Accuracy: 0.1% of interval, STDEV: $\leq 1$ ps Horizontal scale $\leq 20$ ps/div, right-most point of measurement interval <150 ns; Mean Accuracy: 1 ps + 0.5% of interval
Clock Input/Prescale Trigger (Front Panel), Eye or Pattern Mode	Mean accuracy determined by clock input accuracy STDEV: <0.7 ps (max); <0.1 ps (typical)

Characteristic	Description
Clock Input/Prescale Trigger (Front Panel), Other Mode	Horizontal scale >20 ps/div, right-most point of measurement interval <150 ns; Mean Accuracy: 0.1% of interval, STDEV: $\leq 3$ ps Horizontal scale $\leq 20$ ps/div, right-most point of measurement interval <150 ns; Mean Accuracy: 1 ps + 0.5% of interval
TDR Clock Trigger (Lock to External 10 MHz Clock)	Horizontal scale >20 ps/div, right-most point of measurement interval <150 ns; Mean Accuracy: 0.01% of interval, STDEV: $\leq 1$ ps (0.1 ps typical)
Random Phase Corrected Mode* <sup>15</sup> (Clock Input to 82A04)	Maximum timing deviation 0.1% of phase reference signal period, typical, relative to phase reference signal
Triggered Phase Corrected Mode (Clock Input to 82A04)	Maximum timing deviation relative to phase reference signal: >40 ns after trigger event: 0.2% of phase reference signal period, typical $\leq 40$ ns after trigger event 0.4% of phase reference signal period, typical
Horizontal Deskew Range Available* <sup>16</sup>	-500 ps to +100 ns on any individual channel in 100 fs increments
DSA8300 Record Length	50, 100, 250, 500, 1000, 2000, 4000, 8000, or 16000 samples (magnification views have maximum record length of 4000 samples)
Longer Records Available	ICConnect®: 1M samples 80SJNB Jitter, Noise, and BER Analysis Software: 10M samples (100k unit intervals, 100 samples per unit interval)
Waveform Databases	4 independently accumulated waveform records of up to 4M waveform points each. Variable waveform database mode with true first-in/first-out of up to 2000 waveforms available on each of 4 waveform databases (2M samples maximum / waveform database)
Magnification Views	In addition to the main time base, the DSA8300 supports two magnification views. These magnifications are independently acquired using separate time-base settings which allow same or faster time/div than that of the main time base

\*<sup>15</sup> For more information on phase reference modes of operation, see the "Phase Reference Module for the DSA8300 Sampling Oscilloscope" data sheet.

\*<sup>16</sup> Mainframe slot deskew only – the 80E07, 80E08, 80E09, and 80E10 remote sampling modules include additional channel deskew range.



## Trigger System

Characteristic	Description
Trigger Sources	Clock Input/Prescale Trigger (front panel) TDR clock (generated internally) Clock recovery triggers from Optical Sampling modules and Electrical Clock Recovery modules (internally connected) Phase Reference*17 time base supports acquisitions without a trigger signal in its Free Run mode Trigger Direct Input (front panel)
Clock Input / Prescale Trigger Input	
Clock Input Sensitivity	100 mV <sub>p-p</sub> , 0.15 to 20 GHz (typical) 200 mV <sub>p-p</sub> , 0.15 to 15 GHz (guaranteed)
Minimum Slew Rate	≥2 V/ns
Clock Input Range	1.0 V <sub>p-p</sub> (max) – AC coupled
Pattern Lengths Supported (for Pattern Triggering with ADVTRIG Option)	2 to 2 <sup>23</sup> (8,388,608) inclusive
Clock Input Jitter in Clock-eye and Clock-pattern Trigger Modes (Typical)	0.15 - 0.40 GHz: 900 fs (RMS) 0.40 - 1.25 GHz: 800 fs 1.25 - 20 GHz: 425 fs
Clock Input Jitter in Clock-eye and Clock-pattern Trigger Modes (Max)	0.80 - 1.25 GHz: 900 fs (RMS) 1.25 - 11.20 GHz: 500 fs 11.20 - 15.0 GHz: 600 fs
TDR Trigger	
TDR Step Rate	Selectable from 25 to 200 kHz in 1 kHz steps*18
TDR Trigger Jitter	1.3 ps RMS (typical) 1.8 ps RMS (max)
Phase Reference Time Base	
Phase Reference Input Range*19	Standard 82A04: 8 - 25 GHz (guaranteed), 2 - 25 GHz (typical) 82A04 Option 60G: 8 - 60 GHz (guaranteed), 2 - 70 GHz (typical)
Phase Reference Input Sensitivity	Best jitter performance is with the clock input to the 82A04 in the following range: 0.6 - 1.8 V. The phase reference time base remains operational to 100 mV (typical) with increased jitter
Jitter	f ≥8 GHz: 200 fs RMS, typical on a 10 GHz or faster sampling module 2 GHz ≤ f ≤ 8 GHz*19: 280 fs RMS, typical on a 10 GHz or faster acquisition module
Trigger Direct Input	
Trigger Sensitivity	50 mV, DC - 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 50 ms in 0.5 ns increments
Trigger Direct Input Jitter	1.1 ps RMS + 5 ppm of horizontal position (typical) 1.5 ps RMS + 10 ppm of horizontal position (max)

\*17 When using the 82A04 Phase Reference module.

\*18 Actual TDR step rate may vary by up to 2% from requested rate.

\*19 For clock frequencies &lt;8 GHz, it may be necessary to filter the clock input to eliminate harmonics from the clock signal (see Other Accessories 020-2566-xx, 020-2567-xx, and 020-2568-xx).

## Math/Measurement System

Characteristic	Description
System Measurements	The DSA8300 supports up to 8 simultaneous measurements, updated 3 times per second with optional display of per-measurement statistics (min, max, mean, and standard deviation)
Measurement Set	Over 120 automated measurements include RZ, NRZ, and pulse signal types, and the following measurement types:
Amplitude Measurements	High, Low, Amplitude, Peak-to-Peak, Max, Mid, Min, Mean, +Overshoot, –Overshoot, P-P, Average Optical Power (dBm, watts), Noise, RMS Noise, SNR, Eye Height, Eye Opening Factor, Extinction Ratio (Ratio, %, dB), Suppression Ratio (Ratio, %, dB), OMA, Q-factor, RMS, AC RMS, Cycle RMS, Cycle Mean, Gain, Crossing %, Crossing Level
Timing Measurements	Rise, Fall, Period, Bit Rate, Bit Time, Frequency, Crossing Time, +Cross, –Cross, Jitter (P-P, RMS), Eye Width, +Width, –Width, Burst Width, +Duty Cycle, –Duty Cycle, Duty Cycle Distortion, Delay, Phase, Pulse Symmetry
Area Measurements	Area, Cycle Area
Cursors	Dot, vertical bar, and horizontal bar cursors
Waveform Processing	Up to 8 math waveforms can be defined and displayed using the following math functions: Add, Subtract, Multiply, Divide, Average, Differentiate, Exponential, 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	For many applications, standard masks are available as predefined, built-in masks. Many of the most commonly used standard masks are listed below. To get a list of all currently available masks contact your local Tektronix representative. Unless otherwise noted, file-based masks are used to distribute new, Tektronix factory-created, updated masks as a file loadable by the firmware. User-defined masks allow the user to create (through UI or PI) user masks
Ethernet	100BASE-LX10 125.0 Mb/s 100BASE-BX10 125.0 Mb/s Gigabit Ethernet 1.250 Gb/s 1000BASE-KX 1.250 Gb/s 2 GBE 2.500 Gb/s 10GBASE-X4 3.125 Gb/s 10GBASE-W 9.95328 Gb/s 10GBASE-R 10.3125 Gb/s FEC11.10 11.095728 Gb/s 10GBASE-LRM 10.31250 Gb/s 40GBASE-FR 41.25 Gb/s 40GBASE-LR4 10.3125 Gb/s 40GBASE-SR4 10.3125 Gb/s 100GBASE-ER4 25.71825 Gb/s 100GBASE-LR4 25.71825 Gb/s 100GBASE-SR10 10.3125 Gb/s

Characteristic	Description
SONET/SDH	OC-1/STM-0 51.84 Mb/s
	OC-3/STM-1 155.52 Mb/s
	OC-12/STM-4 622.08 Mb/s
	OC-48/STM-16 2.48832 Gb/s
	FEC2.666 2.6660571 Gb/s
	OC-192/STM-64 9.95328 Gb/s
	FEC10.66 10.6642 Gb/s
	FEC10.71 10.709225 Gb/s
	OC-768/STM-256 39.81312 Gb/s
	FEC42.66 42.6569 Gb/s
FEC43.02 43.018414 Gb/s	
Fibre Channel Optical	FC133 132.81 Mb/s
	FC266 265.6 Mb/s
	FC531 531.2 Mb/s
	FC1063 1.0625 Gb/s
	FC2125 2.125 Gb/s
	FC4250 4.250 Gb/s
	8GFC 8.500 Gb/s
	10GFC 10.518750 Gb/s
	FC11317 11.3170 Gb/s
	16GFC MM r6.1 14.025 Gb/s
16GFC SM r6.1 14.025 Gb/s	
Fibre Channel Electrical	FC133 132.81 Mb/s
	FC266 265.6 Mb/s
	FC531 531.2 Mb/s
	FC1063 1.0625 Gb/s
	FC2125E 2.125 Gb/s
	Abs, Beta, Tx
	Abs, Beta, Rx
	Abs, Gamma, Tx
	Abs, Gamma Rx
	FC4250E 4.250 Gb/s
Abs, Beta, Tx	
Abs, Beta, Rx	
Abs, Gamma, Tx	
Abs, Gamma Rx	
FC8500E 8.500 Gb/s	
Abs, Beta, Tx	
Abs, Beta, Rx	
Abs, Gamma, Tx	
Abs, Gamma Rx	
SATA	G1 1.500 Gb/s
	Tx
	Rx
	G2 3.000 Gb/s
	Tx
	Rx
G3 6.000 Gb/s	
Tx	
Rx	

## General Specifications

Specifications describe warranted performance over the temperature range of +10 to +40 °C (unless otherwise noted). The specifications are applicable for the temperature after the instrument has been turned on for 20 minutes and while the instrument and module compensation is valid. Generally, compensation is valid so long as the temperature delta since the last compensation is <5 °C.

## DSA8300 Physical Characteristics

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

## Computer System and Peripherals

Characteristic	Description
Operating System	Windows 7 Ultimate (32-bit)
CPU	3 GHz Intel Core™ 2 Duo CPU
PC System Memory	4 GB
Hard Disk Drive	Rear-panel, removable hard disk drive, 160 GB capacity
Optical Drive	Front-panel DVD Read Only / CD Read-Write drive with CD-creation software application

## Display Features

Characteristic	Description
Touch Screen Display	264 mm / 10.4 in. diagonal, color
Colors	16,777,216 (24 bits)
Video Resolution	1024 horizontal by 768 vertical displayed pixels
Monitor Type	LCD

## Input/Output Ports

Characteristic	Description
Front Panel	
USB 2.0 Port	One USB 2.0 connector
Anti-static Connection	Banana-jack connector, 1 MΩ
Trigger Direct Input	See Trigger System specification
Clock Input / Prescale Trigger	See Trigger System specification
TDR Clock Output	See Trigger System specification
DC Calibration Output	±1.25 V maximum
Rear Panel	
USB Ports	4 USB 2.0 connectors
LAN Port	RJ-45 connector, supports 10BASE-T, 100BASE-T, 1000BASE-T
Serial Ports	DB-9 COM1, COM2 ports
GPIB	IEEE488.2 connector
DVI-I Video Port	Connect to show the oscilloscope display, including live waveforms on an external monitor or projector. The primary Windows desktop can also be displayed on an external monitor using these ports. Alternatively, the DVI-I port can be configured to show the secondary Windows desktop (also called extended desktop or dual-monitor display). DVI connector, female. DVI to VGA 15-pin D-sub connector adapter provided
PS2 Serial Ports	Mouse and keyboard inputs
Audio Ports	1/8 in. microphone input and line output

**Operating Requirements**

Characteristic	Description
<b>Power Requirements</b>	
Line Voltage and Frequency	90 to 250 V 50 to 400 Hz
Power Consumption	205 W, typical, mainframe only 330 W, typical, fully loaded 600 W, maximum
<b>Environmental Characteristics</b>	
<b>Temperature</b>	
Operating	+10 to +40 °C
Nonoperating	-22 to +60 °C
<b>Altitude</b>	
Operating	3,048 m (10,000 ft.)
Nonoperating	12,190 m (40,000 ft.)
<b>Relative Humidity</b>	
Operating (CD-ROM not installed)	20% to 80% at or below 40 °C (upper limit de-rates to 45% relative humidity at 40 °C)
Electromagnetic Compatibility	89/336/EEC
Safety	UL3111-1, CSA1010.1, EN61010-1, IEC61010-1

**Ordering Information****DSA8300**

Digital Serial Analyzer Sampling Oscilloscope.

**Includes:** User manual, quick reference card, MS Windows 7 compatible keyboard and mouse, touch screen stylus, online help, programmer online guide, power cord, one-year warranty.

**Options**

Option	Description
ADVTRIG	Add advanced triggers with pattern sync
ICMX	IConnect® and MeasureXtractor Signal Integrity and Failure Analysis Software
ICON	IConnect® Signal Integrity and Failure Analysis Software
JARB	Add 80SJARB (included with Option JNB or JNB01)
JNB	Add 80SJNB Essentials
JNB01	Add 80SJNB Advanced
SPAR	IConnect® S-parameters Software

**Service Options**

Option	Description
CA1	Single Calibration or Functional Verification
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
D1	Calibration Data Report
D3	Calibration Data Report 3 Years (with Opt. C3)
D5	Calibration Data Report 5 Years (with Opt. C5)
R3	Repair Service 3 Years (including warranty)
R5	Repair Service 5 Years (including warranty)
IF	Upgrade Installation Service

**International Power Plug Options**

Option	Description
A0	North America power
A1	Universal Euro power
A2	United Kingdom power
A3	Australia power
A4	240 V, North America power
A5	Switzerland power
A6	Japan power
A10	China power
A11	India power
A12	Brazil power
A99	No power cord or AC adapter

**Language Options**

Option	Description
L0	English manual
L7	Simple Chinese manual
L8	Standard Chinese manual
L10	Russian manual

**DSA83UP – DSA8300 Digital Serial Analyzer Upgrade Kit**

Option	Description
ADVTRIG	Add advanced triggers with pattern sync
JARB	Add 80SJARB (included with Option JNB or JNB01)
JNB	Add 80SJNB Essentials
JNB01	Add 80SJNB Advanced
ADDJNB01	Upgrade 80SJNB Essentials to 80SJNB01 Advanced

### Optical Modules

Optical modules plug directly into large slot of DSA8300 sampling oscilloscope mainframe. See the “Optical Sampling Modules – 80C07B • 80C08C • 80C10B • 80C11 • 80C12B • 80C25GBE” data sheet for more details.

All optical modules have FC/PC connectors installed. Other connector adapters available as options are: ST/PC, D4/PC, Biconic, SMA 2.5, SC/PC, DIN/PC, HP/PC, SMA, DIAMOND 3.5.

Product	Description
80C07B	2.5 GHz single-mode and multi-mode, amplified (750 to 1650 nm) optical module for multirate datacom and telecom applications w/ optional integrated clock recovery
80C08C	9 GHz optical channel; single-mode and multi-mode, amplified (750 to 1650 nm) optical module optimized for 8.5 to 12.5 Gb/s applications with optional integrated clock recovery
80C10B	65/80 GHz; single-mode (1290 to 1330 nm and 1520 to 1620 nm) optical module with reference receiver filters for multirate datacom and telecom 40 Gb/s and 100 Gb/s (4 × 25 Gb/s) applications with optional calibrated trigger pick-off for use with external clock recovery instruments (such as the CR286A)
80C11	30 GHz, single-mode (100 to 1650 nm) optical module with reference receiver filters for 8.5 to 14.1 Gb/s telecom and datacom standards. Optional, integrated clock recovery for 8.5 to 12.6 Gb/s applications
80C12B	12 GHz optical channel; single-mode and multi-mode, amplified (750 to 1650 nm) optical module with optical reference receivers to support 155 Mb/s to 12.5 Gb/s applications with calibrated trigger pick-off for use with external clock recovery instruments (such as the 80A05 or CR125A)
80C14	12 GHz optical channel; single-mode and multi-mode, amplified (750 to 1650 nm) optical module optimized for 8.5 to 12.5 Gb/s applications with calibrated trigger pick-off for use with external clock recovery instruments (such as the CR175A or CR286A)
80C25GBE	65 GHz; single-mode (1290 to 1330 nm and 1520 to 1620 nm) optical module with reference receiver filters for multirate datacom and telecom 100 Gb/s (4 × 25 Gb/s) applications with optional calibrated trigger pick-off for use with external clock recovery instruments (such as the CR286A)

### Electrical Modules

Electrical modules plug directly into one of four small slots of the DSA8300 sampling oscilloscope mainframe. See the “Electrical Sampling Modules – 80E10 • 80E09 • 80E08 • 80E07 • 80E06 • 80E04 • 80E03 • 80E01” data sheet for more details.

Product	Description
80E10	Remote* <sup>20</sup> Sampling Module – 50/40/30* <sup>21</sup> GHz electrical, dual-channel with true-differential TDR capabilities
80E09	Remote* <sup>20</sup> Sampling Module – 60/40/30* <sup>21</sup> GHz electrical, dual-channel
80E08	Remote* <sup>20</sup> Sampling Module – 30/20* <sup>21</sup> GHz electrical, dual-channel with true-differential TDR capabilities
80E07	Remote* <sup>20</sup> Sampling Module – 30/20* <sup>21</sup> GHz electrical, dual-channel
80E06* <sup>22</sup>	70+ GHz, single-channel electrical sampler
80E04* <sup>21</sup>	20 GHz electrical sampler, dual-channel with true-differential TDR capabilities
80E03* <sup>21</sup>	20 GHz electrical sampler, dual-channel
80E01* <sup>21</sup>	50 GHz, single-channel electrical sampler

\*<sup>20</sup> Each remote sampler/TDR generator is on a separate 2-meter remote cable for easy co-location with the device under test and best acquired signal fidelity.

\*<sup>21</sup> User-selectable bandwidth.

\*<sup>22</sup> For remote sampling use the 80N01 Electrical Sampling Module Extender Cable.

### Phase Reference Module

The 82A04 Phase Reference module, when installed in the DSA8300 and provided with a clock synchronous with the data to be acquired, provides a very low-jitter time base for acquiring signals from the device under test. It can accommodate clocks from 2 GHz\*<sup>19</sup> to >60 GHz.

Product	Description
82A04	Phase Reference Module – Standard module supports clocks up to 20 GHz. With Option 60G it supports clocks to >60 GHz

\*<sup>19</sup> For clock frequencies <8 GHz, it may be necessary to filter the clock input to eliminate harmonics from the clock signal (see Other Accessories 020-2566-xx, 020-2567-xx, and 020-2568-xx).

### Clock Recovery Modules/Instruments

Product	Description
80A05	Electrical Clock Recovery module. Applicable to electrical signals and for the 80C12B The standard version of 80A05 supports signals in the following ranges: 50 Mb/s - 2.700 Gb/s 2.700 Gb/s - 3.188 Gb/s 4.250 Gb/s (4 Gigabit Fibre Channel)  Option 10G adds the ranges of: 3.267 Gb/s - 4.250 Gb/s 4.900 Gb/s - 6.375 Gb/s 9.800 Gb/s - 12.60 Gb/s
CR125A	Electrical Clock Recovery instrument. CR125A 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 80C12B
CR175A	Electrical Clock Recovery instrument. CR175A recovers clocks from serial data streams for all of the most common electrical standards in the continuous 100 Mb/s to 17.5 Gb/s range. Applicable to electrical signals and for 80C12B and 80C14
CR286A	Electrical Clock Recovery instrument. CR286A recovers clocks from serial data streams for all of the most common electrical standards in the continuous 100 Mb/s to 28.6 Gb/s range. Applicable to electrical signals and for 80C12B, 80C14, 80C10B* <sup>23</sup> , and 80C25GBE

\*<sup>23</sup> For rates up to 28.6 Gb/s.

## Other Accessories

Product	Description
Electrical Sampling Module Extender Cable (2 m)	Order 80N01. For use with the 80E01, 80E02, 80E03, 80E04, 80E06, and 82A04 modules – not compatible with the 80E07, 80E08, 80E09, or 80E10 remote samplers
Slot Saver Adapter Extender Cable	Provides power to 80A02 when operated externally from the mainframe, saving slot space. Order 174-5230-xx
82A04 Filter, 2 GHz	Filter kit for non-sinusoidal phase reference clock signal with frequency between 2 and 4 GHz. Order 020-2566-xx
82A04 Filter, 4 GHz	Filter kit for non-sinusoidal phase reference clock signal with frequency between 4 and 6 GHz. Order 020-2567-xx
82A04 Filter, 6 GHz	Filter kit for non-sinusoidal phase reference clock signal with frequency between 6 and 8 GHz. Order 020-2568-xx
2X Attenuator (SMA male-to-female)	DC to 18 GHz. Order 015-1001-xx
5X Attenuator (SMA male-to-female)	DC to 18 GHz. Order 015-1002-xx
Connector Adapter	2.4 mm or 1.85 mm male to 2.92 mm female. DC to 40 GHz. Order 011-0157-xx
Power Divider	50 $\Omega$ , impedance-matching power divider, SMA male to two SMA females. Order 015-0705-xx
Rackmount Kit	Order 016-1791-xx
Wrist Strap (Anti-static)	Order 006-3415-04
P7513/P7516	13 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 $\Omega$ 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 $\Omega$ 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 tips, plus an extremely flexible SMA cable. For higher frequency performance the 015-0560-xx 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 $\Omega$ Differential Impedance TDR hand probe
80A02	DSA8300 EOS/ESD Protection module (1 channel). P8018 TDR probe recommended
80A03	Enables the use of two Tektronix P7000 Series TekConnect® probes on the 8000 Series sampling oscilloscopes
Interconnect Cables	450 mm / 18 in., 1 dB loss at 20 GHz. A high-quality cable recommended for work up to 20 GHz. Order 015-0560-xx

## Interconnect Cables (3rd 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](http://www.gore.com/tektronix)

Cable	Frequency	Connectors	Length
<b>Bench Top Test Cable Assemblies</b>			
TEK40PF18PP	40 GHz	2.92 mm male	18.0 in.
TEK50PF18PP	50 GHz	2.4 mm male	18.0 in.
TEK65PF18PP	65 GHz	1.85 mm male	18.0 in.
<b>High-frequency Interconnect Cables for Electrical Sampling Modules</b>			
TEK40HF06PP	40 GHz	2.92 mm male	6.0 in.
TEK40HF06PS	40 GHz	2.92 mm male 2.92 mm female	6.0 in.
TEK50HF06PP	50 GHz	2.4 mm male	6.0 in.
TEK50HF06PS	50 GHz	2.4 mm male 2.4 mm female	6.0 in.
TEK65HF06PP	65 GHz	1.85 mm male	6.0 in.
TEK65HF06PS	65 GHz	1.85 mm male 1.85 mm female	6.0 in.

## Calibration Kits and Accessories (3rd Party)

To facilitate S-parameter measurements with the 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](http://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.



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.





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\* European toll-free number. If not accessible, call: +41 52 675 3777

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**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com)



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