8200 Series Sampling Oscilloscopes

**Features & Benefits**

- DC to 70+ GHz*1 Bandwidth
- Industry-leading Timebase Accuracy
  - Jitter <200 fs RMS with 82A04
  - 800 fs RMS Standard
- Modular Architecture with Up to Eight Acquisition Channels
- Advanced Jitter, Noise and BER analysis
  - Analysis of High-speed Serial Data Rates from 1 Gb/s to 60 Gb/s Provides Insight into Precise Causes of Eye Closure
  - Separation of Both Jitter and Noise Provides Highly Accurate Extrapolation of BER and Eye Contour
- High performance TDR/TDT
  - True Differential Step Generator and Signal Acquisition
  - <28 ps Reflected Rise Time
  - Up to 4 Differential Pairs (8 channels)
  - High Fidelity Differential and Single-ended Probing
- Automated Standards Mask Testing
  - Communications Standards Including Sonet/SDH, Ethernet, OIF and Fibre Channel
  - Computer Standards Including SATA, SAS, PCI Express and Rapid IO
- Automated Measurement System with Over 100 NRZ, Pulse and RZ Measurements
- FrameScan® Acquisition Mode
  - Isolate Data Dependent Faults
  - Signal Averaging to Examine Low-power Signal
- Four Color Graded Variable Persistence Waveform Databases
- Microsoft Windows 2000 Operating System

**State-of-the-art Acquisition System**

The CSA8200 and TDS8200 Sampling Oscilloscopes are comprehensive acquisition and measurement instruments for research, design evaluation and manufacturing test in the fields of datacom and telecom components, transceiver subassemblies, and transmission systems, computer and storage-based high speed electrical serial data, semiconductor test, TDR-based impedance characterization and other applications requiring bandwidths into tens of GHz. The 8200 Series 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 measurements for both RZ and NRZ signals. Compliance-based mask testing of high speed optical and electrical communications, and computer standards such as SDH/SONET, Ethernet, Fibre Channel is included. Color-grading and gray-scale grading of waveform data adds a third dimension, sample density, to signal acquisition and analyses. The industry’s first variable persistence database allows exact data and measurement aging on all of the functions, and facilitates dynamic update on DUTs under adjustment.

The 8200 Series combines very low time-base jitter with very fast acquisition rate. It can acquire the data in several time windows, each with its own acquisition parameters and display window. It provides a comprehensive suite of measurement capabilities to evaluate the data, as well as acquisition math and waveform math functionality to further process the results with histograms, mask testing and statistics.

The 8200 Series provides great data storage flexibility with four 3D databases available simultaneously; the databases offer an industry-first variable persistence with accurate data aging. Color-grading of waveform data adds a third dimension, sample density, to signal acquisitions and analyses.

The CSA8200 and TDS8200 models share the same capabilities; either model, for example, may be configured with any combination of sampling modules.

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*1 Bandwidth is determined by plug-in modules and may exceed 70 GHz as higher speed modules become available in the future.
Powerful Jitter, Noise and BER Analysis Capabilities
When equipped with the available 80SJNB Advanced Jitter, Noise and BER Analysis software, the 8000, 8000B or 8200 Series oscilloscopes become a comprehensive serial data signal impairment characterization tool. 80SJNB speeds up the identification of the underlying causes of both horizontal and vertical eye closure through separation of both jitter and noise. With its unique insight into the constituent components of both jitter and noise, 80SJNB provides highly accurate and complete BER extrapolations and eye contour.

When you combine Jitter, Noise and BER Analysis with the 8000 Series’ modular flexibility, uncompromised performance and unmatched signal fidelity you get the ideal solution for next generation high-speed serial data design and validation, from 1 Gb/s to 60 Gb/s.

Modularity and Flexibility
The CSA8200 and TDS8200 oscilloscopes support a large and growing family of electrical and optical plug-in modules. This modular architecture lets you configure the instrument to meet your needs today and protects your investment by allowing you to add additional modules in the future. With its differential clock recovery module, the instrument can be used for the acquisition and analysis of very high speed optical and electrical signals in high-speed communication devices and systems, and similar areas. The 82A04, together with the CSA/TDS8200, implements the phase reference timebase functionality in a novel way, giving the user the freedom to select from timebase and acquisition modes without compromises; any phase-reference frequency within the operating range is accommodated, and even advanced features, such as FrameScan® remain available. The separate DSP per acquisition slot architecture of the CSA/TDS8200 enables the acquisition rate in the phase reference mode to reach over 40 kS/s**.

Superior Performance
With its industry-best horizontal timebase stability, signal sensitivity and noise performance, the 8200 Series ensures the most accurate representation of your signal.

* Typical performance, some settings will lower the throughput.
The CSA/TDS8200 implements the popular FrameScan® acquisition mode, which can be used for scanning of the data bits to isolate pattern-dependent effects, viewing sub-harmonic interference or capturing the sequence leading to a mask violation. Innovative features such as averaging of eye diagrams allow the user to view an averaged eye diagram for applications such as evaluating Inter-Symbol Interference or separating pattern-related Deterministic Jitter from Random Jitter.

8200 Series Sampling Oscilloscope Optical Modules

80C02 High-performance Telecom Optical Sampling Module
The 80C02 module is optimized for testing of long-wavelength (1100 to 1650 nm) signals at 9.953 Gb/s (SONET OC-192/SDH STM-64). With its high optical bandwidth of 28 GHz, it is also well suited for high-performance optical component testing. The 80C02 can be configured with integrated clock recovery that supports 9.953 Gb/s standards. A superset of this module’s functionality has been integrated into the flexible new 80C11 module.

80C07B Multi-rate, Telecom/Datacom Optical Sampling Module
The 80C07B module is a broad wavelength (700 to 1650 nm), single-mode/multi-mode, high sensitivity optical sampling module optimized for the testing of telecom and datacom signals. Support for OC-48/STM-16 (2.488 Gb/s), InfiniBand 2 GbE (2.500 Gb/s), is standard; the user may select two additional reference receiver filters from the following list to be included in the product: 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), or 2G Fibre Channel (2.125 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 80C07B can be configured with a number of integrated clock recovery solutions, including continuous rate clock recovery from 9.8 Gb/s to 12.5 Gb/s.

80C10 65 GHz 40 Gb/s Optical Sampling Module
The 80C10 module provides long-wavelength, single-mode fiber support at 1310 nm and 1550 nm and integrated and selectable reference receiver filtering for conformance testing at 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, the user may also choose selectable bandwidths of 65 GHz or 30 GHz for optimal noise versus bandwidth performance for accurate signal characterization.
8200 Series Sampling Oscilloscopes
CSA8200 Communications Signal Analyzer • TDS8200 Digital Sampling Oscilloscope

80C11 High-performance Multi-rate Optical Sampling Module
The 80C11 module is optimized for testing of long-wavelength (1100 to 1650 nm) signals on single-mode fiber, for all telecom and datacom rates around 10 Gb/s. Additionally, the high optical bandwidth of 30 GHz (typical) is well suited for general-purpose high-performance optical component testing. The 80C11 can be configured with integrated continuous rate clock recovery from 9.8 to 12.5 Gb/s that supports all current rates in the 10 Gb/s band (9.953 Gb/s, 10.3125 Gb/s, 10.51875 Gb/s, 10.664 Gb/s, 10.709 Gb/s and others).

80C12 High Flexibility Multi-rate Optical Sampling Module
The 80C12 module is a broad wavelength (700 to 1650 nm), single-mode/multi-mode, multi-rate, high sensitivity optical sampling module optimized for the testing of telecom and datacom signals. Several reference receiver filter options are available. Filter selections include OC-3/STM-1 (155 Mb/s), OC-12/STM-4 (622 Mb/s), Fibre Channel (1.063 Gb/s), 2G Fibre Channel (2.125 Gb/s) and 4G Fibre Channel (4.25 Gb/s), Fibre Channel (2.50 Gb/s), 10 GbE by four (10GBASE-x4 at 3.125 Gb/s), as well as 10GFC by four at 3.125 Gb/s. Clock recovery for the 80C12 is provided by the 80A05. The 80C12 provides an electrical output that can be used as an input for the 80A05 Electrical Clock Recovery module.

8200 Series Sampling Oscilloscope Electrical Modules

80E01 50 GHz Electrical Sampling Module
The 80E01 is a single channel 50 GHz bandwidth sampling module with a measured rise time of 7.0 ps or less. Displayed noise is typically 1.8 mV RMS. The front-panel connector is female 2.4 mm and an adapter is provided (2.4 mm male to 2.92 mm female) to maintain compatibility with SMA connector systems.

80E02 12.5 GHz Low-noise Electrical Sampling Module
The 80E02 is a dual-channel 12.5 GHz sampling module specifically designed for low-noise measurements in digital communications and device characterization applications. It provides measured rise time of 28 ps and typically 400 µVRMS of displayed noise. The 80E02 is the ideal instrument for low-power applications. Common applications for the 80E02 are capturing and displaying switching characteristics of high-speed communications circuits, making accurate statistical measurements of signal noise and signal timing jitter and obtaining stable timing measurements of fast digital ICs.

80E03 20 GHz Electrical Sampling Module
The 80E03 is a dual channel 20 GHz sampling module. This sampling module provides an acquisition rise time of 17.5 ps.

80E04 20 GHz TDR Electrical Sampling Module
The 80E04 is a dual-channel 20 GHz sampling module with a TDR step generator for each channel. The TDR step generators operate in either positive or negative polarity, allowing for simultaneous operation for true differential and true common mode measurements. The 17 ps (typical) incident rise time and 28 ps (typical) reflected rise time enable superior timing and special resolution. 80E04 acquisition capabilities match those of the 80E03 module.

80E06 70+ GHz Electrical Sampling Module
The 80E06 is a single channel 70+ GHz (typical) sampling module with 5 ps calculated rise time. Typical RMS noise is 2.0 mV. This sampling module provides a 1.85 mm (Type V) front-panel connector, and a precision adapter to 2.92 mm with a 50 Ω SMA termination.

Extender Cables
1 meter and 2 meter length extender cables are available for remote operation of the electrical sampling modules. Use of extender cables allows the electrical module to be located near the DUT, and minimizes cable length between the DUT and the electrical module.
8200 Series Sampling Oscilloscopes

80A018 Single-ended Handheld TDR Probe

The P8018 Handheld TDR Probe is a greater than 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 the control for EOS/ESD protection.

80A03 TekConnect® Probe Interface Module

The 80A03 enables the use of two Tektronix P7000 Series probes on the CSA/TDS8200 Series sampling oscilloscopes. The 80A03 plugs into any of the mainframe's four small sampling module slots. 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 80A02 the control for EOS/ESD protection.

80A04 Phase Reference Module

The 82A04 module enables a sub-200 fs_RMS extremely low jitter timebase on the 8200 Series mainframes. This capability requires the use of a user-provided reference clock source. Input frequency range of the reference clock is continuous from 2 to 60+ GHz. An external filter may be required for non-sinusoidal clocks below 8 GHz.

80A05 Electrical Clock Recovery Module

The 80A05 Electrical Clock Recovery Module provides clock recovery for electrical signals and internal triggering on the recovered clock. The module recovers clock from serial data streams for all of the most common electrical standards from 50 Mb/s to 12.6 Gb/s. Option 10G adds support for standard rates up to 12.6 Gb/s. The module accepts either single-ended or differential signals as its input. The signal is split, with half of the signal being routed to clock recovery circuitry and half being routed out the front of the module to be used as input to an electrical module. This module also serves as the clock recovery module for the 80C12. The 80C12 has an electrical signal output that may be routed to the 80A05 for clock recovery purposes.

80A06 PatternSync Trigger Module

The 82A06 PatternSync Trigger Module extends the capability of the CSA/TDS8200 mainframe by creating a pattern trigger from any data-related clock: a recovered clock, user-supplied clock, sub-rate clock or super-rate clock. The module is required for advanced jitter, noise and BER analysis using the 80SJNB software package.
SlotSaver Small Module Extender Cable
This cable can be used to power and operate one 80A01, 80A02 or 80A06 accessory module, 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 into the ‘Probe Power’ connector on most electrical sampling modules.

8200 Series Sampling Oscilloscope Application Software

80SJNB Advanced Jitter, Noise and BER Analysis
80SJNB is a comprehensive jitter, noise and bit error ratio (BER) analysis application for serial data signal impairment characterization. 80SJNB is the first oscilloscope-based application software package that goes beyond jitter analysis to provide jitter, noise and BER analysis for today’s high-speed serial data rates from 1 Gb/s to 60 Gb/s. 80SJNB speeds up 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 highly accurate and complete BER extrapolation and eye-contour analysis.

80SICON IConnect® Interconnect Analysis and Modeling Software
IConnect software is the efficient, easy-to-use and cost-effective solution for measurement-based performance evaluation of gigabit interconnect links and devices, including signal integrity analysis, impedance, S-parameter and eye-diagram compliance tests and fault isolation. IConnect provides an integrated simulate-and-compare link between SPICE/IBIS simulators and TDR/T, and allows the designer to quickly extract and validate gigabit interconnect models and to predict eye-diagram degradation, jitter, losses, crosstalk, reflections and ringing in PCBs and flexboards, packages, sockets, connectors, cable assemblies and at the input die capacitance.
IConnect provides simple and efficient algorithms for computing single-ended and differential S-parameters, insertion and return loss from TDR/T measurement, which enable very cost-effective and efficient specification compliance testing for gigabit interconnects. Eye mask, eye opening and jitter measurements allow easy eye analysis. IConnect true impedance profile improves the oscilloscope resolution and accuracy, and helps locate failures more easily.

80SICMX IConnect Interconnect MeasureXtractor™ Model Extraction Software
IConnect MeasureXtractor automatic model extraction tool then converts TDR/T or S-parameters into an exact interconnect model, compatible with any SPICE or IBIS simulator. These models then allow the designer to quickly perform system level analysis of the interconnect link with transmitter and receiver.
80SICMX includes both IConnect and MeasureXtractor.

80SSPAR IConnect S-Parameter
IConnect S-parameters is the efficient and easy-to-use tool for digital designers, operating at gigabit speeds, to perform single-ended, differential and mixed-mode S-parameter measurements of their interconnects, measure insertion loss, return loss and frequency domain crosstalk and conduct interconnect electrical compliance testing. IConnect S-parameters is the most cost-efficient and fast-throughput approach for S-parameter measurements in digital design, signal integrity analysis and interconnect compliance testing, providing 50 percent cost savings compared to traditional S-parameter measurement equipment of the same bandwidth, and dramatically speeding up the measurements. The simplicity of S-parameter calibration using a reference waveform (open, short or through), or an optional 50 Ω load waveform make the measurement itself, fixture de-embedding and moving the reference plane a snap.
### Optical Modules

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<td>F1 4.25</td>
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<td>FC 9</td>
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<td>9 &amp; 62.5</td>
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<td>700 to 1650</td>
<td>9 &amp; 62.5</td>
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</table>

#### Electrical Clock Recovery

- **80A05**
  - Filter
  - Optical Clock Recovery
  - Electrical Clock Recovery

#### Electrical Modules

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>80E01</th>
<th>80E02</th>
<th>80E03</th>
<th>80E04</th>
<th>80E06</th>
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<tbody>
<tr>
<td>50</td>
<td>12.5</td>
<td>20</td>
<td>20</td>
<td>70</td>
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</tbody>
</table>

| Number of Channels | 1 | 2 | 2 | 1 |

Rates Supported:
- ■=Filter
- ●=Optical Clock Recovery
- ○=Electrical Clock Recovery
Characteristics

CSA8200 and TDS8200 Sampling Oscilloscope

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 appropriate the two channels associated with the slot).
Population of the Ch 1/Ch 2 large slot with any module other than the 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 phase reference (clock) 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\(^2\) 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 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).

\(^1\) When using the 82A04 Phase Reference Module.

\(^2\) Conventional mode – not using the 82A04 Phase Reference Timebase Module.

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).

- 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.
  - Horizontal scale: ≥21 ps/div:
    - 2 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.

- Record Length –
  -20, 50, 100, 250, 500, 1000, 2000 or 4000 samples.

- Magnification Views –
  In addition to the main timebase, the CSA/TDS8200 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.
8200 Series Sampling Oscilloscopes

- CSA8200 Communications Signal Analyzer • TDS8200 Digital Sampling Oscilloscope

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 electrical clock recovery module — signal from the module (pre-scaled above 2.7 Gb/s) internally connected.

Phase Reference*1 timeout 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 to 3 GHz (guaranteed).

Pre-scaled Trigger Input –
200 mVpk-pk to 800 mVpk-pk,
2 to 12.5 GHz (guaranteed).

Jitter

Phase Reference*1 Timebase –
System jitter of 200 fsRMS typical on a 10 GHz or faster acquisition module, with f ≥ 8 GHz, 0.6V ≤ VREF ≤ 1.8 V Phase Reference Signal.

Jitter: system jitter of 280 fsRMS typical on a 10 GHz or faster acquisition module, in CSA/TDS8200 mainframe, with 2 GHz ≤ f ≤ 8 GHz, 0.6V ≤ 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 –
≤ 0.8 ps RMS + 0.04 ppm of position (typical).
≤ 2.5 ps RMS + 0.01 ppm of position (max.).

*1 When using the 82A04 Phase Reference Module.

Internal Clock –
Adjustable from 25 to 200 kHz (drives TDR, internal clock output and calibrator).

Trigger Level Range – ± 1.0 V.

Trigger Holdoff –
Adjustable 5 µs to 100 ms in 0.5 µs increments.

External Trigger Gate (Optional) –
TTL logic 1 enables gate, a TTL logic 0 disables gate, maximum non-destruct input level ±5 V.

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 monitor.

Math/Measurement

System Measurements

The CSA/TDS8200 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, OMA, +Overshoot, –Overshoot, Mean, Cycle Area, AC RMS, Gain, Extinction Ratio (Ratio, %, dB), Suppression Ratio (Ratio, %, dB), Peak-to-Peak Noise, RMS Noise, O-Factor, SNR, Average Optical Power (dBm, watts), OMA.

Timing Measurements –
Rise, Fall, Period, Bit Rate, Bit Time, Frequency, Crossing (rising, falling, time), +Cross, –Cross, Jitter (Peak-to-Peak, RMS), Eye Width, +Width, –Width, Burst Width, +Cycle, –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

In addition to user-defined masks, the following predefined masks are built-in:

- Standard Rate (Gb/s) unless otherwise noted –
  STM-0/OC-1 51.8 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 38.813.
  FEC 2.666 2.666.
  FEC 10.66 10.664.
  FEC 10.709 10.709.
  FEC 49 Gb/s 49.018.
  FED 42.66 42.657.
  FC-100 10.51875.
  FC-133 132.8 Mb/s.
  FC-266 265.6 Mb/s.
  FC-531 531.2 Mb/s.
  FC-1063 1063.063.
  FC-2125 2125.0.
  FC-4250 4250.0.
  10 G BASE-X 3.125.
  10 G BASE-X 10.3125.
  InfiniBand 2.500.
  Gigabit Ethernet 1.2500.
  XAUI 3.125.
## Optical Sampling Module Characteristics

Optical Sampling Module Characteristics (Refer to Optical Sampling Modules User Manual for more detailed information)

<table>
<thead>
<tr>
<th>Application Type</th>
<th>Standards and Supported Filtering Rates</th>
<th>Number of Input Channels</th>
<th>Effective Wavelength Range</th>
<th>Calibrated Wavelengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>80C02 10 Gb/s Telecom</td>
<td>OC-12/STM-64 (9.953 Gb/s) 10GBASE-W (9.953 Gb/s)</td>
<td>1</td>
<td>1100 nm to 1650 nm</td>
<td>1310 nm and 1550 nm (±20 nm)</td>
</tr>
<tr>
<td>80C07B Tributary Datacom/Telecom</td>
<td>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 Mbit/s), OC-12/STM-4 (622 Mbit/s), Fibre Channel (1.063 Gb/s), GbE (1.250 Gb/s), 2G Fibre Channel (2.125 Gb/s)</td>
<td>1</td>
<td>700 nm to 1650 nm</td>
<td>780 nm, 850 nm, 1310 nm, and 1550 nm (±20 nm)</td>
</tr>
<tr>
<td>80C10 40 Gb/s Telecom</td>
<td>OC-768/STM-256 (39.813 Gb/s), ITU-T G.709 (43.018 Gb/s), ITU-T G.975 FEC (46.664 Gb/s)</td>
<td>1</td>
<td>1310 nm and 1550 nm</td>
<td>1310 nm and 1550 nm (±20 nm)</td>
</tr>
<tr>
<td>80C12 1 to 4.5 Gb/s Datacom/Telecom</td>
<td>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), 10GFC-X4 (3.1875 Gb/s), VSR5-3318 (3.318 Gb/s)</td>
<td>1</td>
<td>700 nm to 1650 nm</td>
<td>850 nm, 1310 nm and 1550 nm (±20 nm)</td>
</tr>
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</table>
### Optical Sampling Module Characteristics (continued)

<table>
<thead>
<tr>
<th></th>
<th>Clock Recovery Outputs</th>
<th>Unfiltered Optical Bandwidth (GHz)</th>
<th>Absolute Maximum Nondestructive Optical Input</th>
<th>Internal Fiber Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>80C02</strong></td>
<td>Clock, Clock/16, Data</td>
<td>28</td>
<td>5 mW average; 10 mW peak power at wavelength of highest relative responsivity</td>
<td>9 µm/125 µm singe-mode</td>
</tr>
<tr>
<td><strong>80C07B</strong></td>
<td>±Clock, ±Data</td>
<td>2.5</td>
<td>5 mW average; 10 mW peak power at wavelength of highest responsivity</td>
<td>62.5 µm/125 µm multi-mode</td>
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<tr>
<td><strong>80C08C</strong></td>
<td>Clock, Clock/16</td>
<td>10</td>
<td>1 mW average; 10 mW peak power at wavelength of highest responsivity</td>
<td>62.5 µm/125 µm multi-mode</td>
</tr>
<tr>
<td><strong>80C10</strong></td>
<td>Future Upgradeable</td>
<td>65</td>
<td>20 mW average; 60 mW peak power at wavelength of highest relative responsivity</td>
<td>9 µm/125 µm single-mode</td>
</tr>
<tr>
<td><strong>80C11</strong></td>
<td>CR1: Clock, Clock/16,</td>
<td>28</td>
<td>5 mW average; 10 mW peak power at wavelength of highest responsivity</td>
<td>9 µm/125 µm single-mode</td>
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<tr>
<td><strong>80C12</strong></td>
<td>ELECTRICAL SIGNAL OUT</td>
<td>9 (for all options except 10G)</td>
<td>1 mW average; 10 mW peak power at wavelength of highest responsivity</td>
<td>62.5 µm/125 µm multi-mode</td>
</tr>
</tbody>
</table>

*Values shown are warranted unless printed in an italic typeface, which represents a typical value.*
<table>
<thead>
<tr>
<th>Optical Return Loss</th>
<th>Fiber Input Accepted</th>
<th>RMS Optical Noise (typical)</th>
<th>RMS Optical Noise (maximum)</th>
<th>Independent Channel Deskew</th>
</tr>
</thead>
<tbody>
<tr>
<td>80C02  &gt;30 dB</td>
<td>Single-mode</td>
<td>6.0 µW at 9.953 Gb/s, 12.5 GHz; 10.0 µW at 20 GHz; 15.0 µW at 30 GHz</td>
<td>10.0 µW at 9.953 Gb/s, 12.5 GHz mode; 15 µW at 20 GHz; 30 µW at 30 GHz</td>
<td>Standard</td>
</tr>
<tr>
<td>80C07B &gt;14 dB (multi-mode) &gt;24 dB (single-mode)</td>
<td>Single- or multi-mode</td>
<td>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</td>
<td>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</td>
<td>Standard</td>
</tr>
<tr>
<td>80C08C &gt;14 dB (multi-mode) &gt;24 dB (single-mode)</td>
<td>Single- or multi-mode</td>
<td>1.7 µW at all filter rates</td>
<td>3.0 µW at all filter rates</td>
<td>Standard</td>
</tr>
<tr>
<td>80C10  &gt;30 dB</td>
<td>Single-mode</td>
<td>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); 30 µW at 30 GHz mode (1550 nm); 55 µW at 30 GHz mode (1310 nm); 85 µW at 65 GHz mode (1550 nm); 150 µW at 65 GHz mode (1310 nm)</td>
<td>60 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 110 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 50 µW at 30 GHz (1550 nm); 90 µW at 30 GHz (1310 nm); 120 µW at 65 GHz (1550 nm); 220 µW at 65 GHz (1310 nm)</td>
<td>Standard</td>
</tr>
<tr>
<td>80C11  &gt;30 dB</td>
<td>Single-mode</td>
<td>5.5 µW at all filter rates; 10.0 µW at 20 GHz; 20.0 µW at 30 GHz</td>
<td>8.0 µW at all filter rates; 14.0 µW at 20 GHz; 30.0 µW at 30 GHz</td>
<td>Standard</td>
</tr>
<tr>
<td>80C12  &gt;14 dB (multi-mode) &gt;24 dB (single-mode)</td>
<td>Single- or multi-mode</td>
<td>1.7 µW (all filters except Option 10G) 3.4 µW (Full BW and Option 10G filters)</td>
<td>3.0 µW (all filters except Option 10G) 6.0 µW (Full BW and Option 10G filters)</td>
<td>Standard</td>
</tr>
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</table>
## Optical Sampling Module Characteristics (continued)

<table>
<thead>
<tr>
<th>Offset Capability</th>
<th>Power Meter</th>
<th>Power Meter Range</th>
<th>Power Meter Accuracy</th>
<th>Mask Test Optical Sensitivity&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>80C02</td>
<td>Standard</td>
<td>+4 dBm to -30 dBm</td>
<td>5% of reading</td>
<td>–9 dBm at 9.953 Gb/s; –7 dBm at 20 GHz; –4 dBm at 30 GHz</td>
</tr>
<tr>
<td>80C07B</td>
<td>Standard</td>
<td>+4 dBm to -30 dBm</td>
<td>5% of reading</td>
<td>–22 dBm at 155 Mb/s, 622 Mb/s; –20 dBm at 2488/2500 Mb/s</td>
</tr>
<tr>
<td>80C08C</td>
<td>Standard</td>
<td>0 dBm to -30 dBm</td>
<td>5% of reading</td>
<td>–16 dBm at all filter rates</td>
</tr>
<tr>
<td>80C10</td>
<td>Standard</td>
<td>+13 dBm to -21 dBm</td>
<td>5% of reading</td>
<td>0 dBm at 39.813 Gb/s, 43.018 Gb/s; 0 dBm at 30 GHz; +3 dBm at 65 GHz</td>
</tr>
<tr>
<td>80C11</td>
<td>Standard</td>
<td>+4 dBm to -30 dBm</td>
<td>5% of reading</td>
<td>–10 dBm at all filter rates; –7 dBm at 20 GHz; –4 dBm at 30 GHz</td>
</tr>
<tr>
<td>80C12</td>
<td>Standard</td>
<td>0 dBm to -30 dBm</td>
<td>5% of reading</td>
<td>–15 dBm (for all options except Option 10G); –12 dBm (for Option 10G)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Smallest power level for mask test. Values represent theoretical typical sensitivity of NRZ eyes for competitive comparison purposes. Assumptions instrument peak-peak noise consumes most of the mask margin.

## Physical Characteristics for Optical Sampling Modules

<table>
<thead>
<tr>
<th>Dimensions (mm/Inches)</th>
<th>Weight (kg/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>80C02</td>
<td>165/6.5</td>
</tr>
<tr>
<td>80C07B</td>
<td>165/6.5</td>
</tr>
<tr>
<td>80C08C</td>
<td>165/6.5</td>
</tr>
<tr>
<td>80C10</td>
<td>165/6.5</td>
</tr>
<tr>
<td>80C11</td>
<td>165/6.5</td>
</tr>
<tr>
<td>80C12</td>
<td>165/6.5</td>
</tr>
</tbody>
</table>
### Electrical Sampling Module Characteristics

<table>
<thead>
<tr>
<th>Application Type</th>
<th>Channels</th>
<th>Input Impedance</th>
<th>Channel Input Connector</th>
<th>Bandwidth&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave General Purpose</td>
<td>1</td>
<td>50 ±0.5 Ω</td>
<td>2.4 mm female precision adapter to 2.92 mm included with 50 Ω SMA termination</td>
<td>50 GHz</td>
</tr>
<tr>
<td>Low-level Signals</td>
<td>2</td>
<td>50 ±0.5 Ω</td>
<td>3.5 mm female</td>
<td>12.5 GHz&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Device Characterization</td>
<td>2</td>
<td>50 ±0.5 Ω</td>
<td>3.5 mm female</td>
<td>20 GHz&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>TDR Impedance Characterization with single-ended, common, differential TDR capability</td>
<td>2</td>
<td>50 ±0.5 Ω</td>
<td>3.5 mm female</td>
<td>20 GHz&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>High-speed Electrical Device Characterization</td>
<td>1</td>
<td>50 ±0.5 Ω</td>
<td>1.85 mm female precision adapter to 2.92 mm included with 50 Ω SMA termination</td>
<td>70+ GHz</td>
</tr>
</tbody>
</table>

<sup>1</sup> Values shown are warranted unless printed in an italic typeface which represents a non-warranted characteristic value that the instrument will typically perform to.

<sup>2</sup> Calculated from 0.35 bandwidth rise time product.

### Electrical Sampling Module Characteristics (continued)

<table>
<thead>
<tr>
<th>Rise Time (10% to 90%)</th>
<th>Dynamic Range</th>
<th>Offset Range</th>
<th>Maximum Input Voltage</th>
<th>Vertical Number of Digitized Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>80E01</td>
<td>7 ps (typical)&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.0 V&lt;sub&gt;p-p&lt;/sub&gt;</td>
<td>±1.6 V</td>
<td>±2.0 V</td>
</tr>
<tr>
<td>80E02</td>
<td>≤28 ps</td>
<td>1.0 V&lt;sub&gt;p-p&lt;/sub&gt;</td>
<td>±1.6 V</td>
<td>±3.0 V</td>
</tr>
<tr>
<td>80E03</td>
<td>≤17.5 ps</td>
<td>1.0 V&lt;sub&gt;p-p&lt;/sub&gt;</td>
<td>±1.6 V</td>
<td>±3.0 V</td>
</tr>
<tr>
<td>80E04</td>
<td>≤17.5 ps</td>
<td>1.0 V&lt;sub&gt;p-p&lt;/sub&gt;</td>
<td>±1.6 V</td>
<td>±3.0 V</td>
</tr>
<tr>
<td>80E06</td>
<td>5.0 ps&lt;sup&gt;4&lt;/sup&gt;</td>
<td>1.0 V&lt;sub&gt;p-p&lt;/sub&gt;</td>
<td>±1.6 V</td>
<td>±2.0 V</td>
</tr>
</tbody>
</table>

<sup>3</sup> Calculated from 0.35 bandwidth rise time product.

<sup>4</sup> 80E06 rise time is calculated from formula rise time = 0.35 (typical bandwidth).
### Electrical Sampling Module Characteristics (continued)

<table>
<thead>
<tr>
<th>Vertical Sensitivity Range</th>
<th>Vertical Voltage DC Accuracy, Single Point, Within ±2 °C of Compensated Temperature</th>
<th>Typical Step Response Aberrations&lt;sup&gt;1&lt;/sup&gt;</th>
<th>RMS Noise&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>80E01</strong> 10 mV to 1.0 V full scale</td>
<td>± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]</td>
<td>±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</td>
<td>1.8 mV ±2.3 mV (maximum)</td>
</tr>
<tr>
<td><strong>80E02</strong> 10 mV to 1.0 V full scale</td>
<td>± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]</td>
<td>±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</td>
<td>400 µV ±800 µV (maximum)</td>
</tr>
<tr>
<td><strong>80E03</strong> 10 mV to 1.0 V full scale</td>
<td>± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]</td>
<td>±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</td>
<td>600 µV ±1.2 mV (maximum)</td>
</tr>
<tr>
<td><strong>80E04</strong> 10 mV to 1.0 V full scale</td>
<td>± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]</td>
<td>±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</td>
<td>600 µV ±1.2 mV (maximum)</td>
</tr>
<tr>
<td><strong>80E06</strong> 10 mV to 1.0 V full scale</td>
<td>± [2 mV + 0.007 (Offset) + 0.02 (Vertical Value – Offset)]</td>
<td>±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</td>
<td>1.8 mV ±2.4 mV (maximum)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Values shown are warranted unless printed in an italic typeface which represents a non-warranted characteristic value that the instrument will typically perform to.
8200 Series Sampling Oscilloscopes

Physical Characteristics for Electrical Sampling Modules

<table>
<thead>
<tr>
<th>Dimensions (mm/in.)</th>
<th>Weight (kg/lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>80E01</td>
<td>79/3.1</td>
</tr>
<tr>
<td>80E02</td>
<td>79/3.1</td>
</tr>
<tr>
<td>80E03</td>
<td>79/3.1</td>
</tr>
<tr>
<td>80E04</td>
<td>79/3.1</td>
</tr>
<tr>
<td>80E06</td>
<td>79/3.1</td>
</tr>
</tbody>
</table>

Electrical TDR System (80E04 only) Characteristics

- Channels: 2
- Input Impedance: 50 ±0.5 Ω
- Channel Input Connector: 3.5 mm
- Bandwidth: 20 GHz
- TDR Step Amplitude: 250 mV (polarity of either step may be inverted)
- TDR System Reflected Rise Time: 28 ps typical
- TDR System Incident Rise Time: 17 ps typical
- TDR Step Maximum Repetition Rate: 200 kHz
- TDR System Step Response Aberrations:
  - ±3% or less over the zone 10 ns to 20 ps before step transition;
  - +10%, −5% or less typical for the first 400 ps following step transition;
  - ±3% or less over the zone 400 ps to 5 ns following step transition;
  - ±1% or less after 5 ns following step transition

* Values shown are warranted unless printed in an italic typeface which represents a non-warranted characteristic value that the instrument will typically perform to.
### 80A05 Electrical Clock Recovery Module

<table>
<thead>
<tr>
<th>Enumerated Standards</th>
<th>Standard</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Basic equipment)</td>
<td>OC3/STM1</td>
<td>155.52 Mb/s</td>
</tr>
<tr>
<td></td>
<td>OC12/STM4</td>
<td>622.08 Mb/s</td>
</tr>
<tr>
<td></td>
<td>Fibre Channel</td>
<td>1.063 Gb/s</td>
</tr>
<tr>
<td></td>
<td>Gigabit Ethernet</td>
<td>1.250 Gb/s</td>
</tr>
<tr>
<td></td>
<td>Gigabit Fibre Channel</td>
<td>2.125 Gb/s</td>
</tr>
<tr>
<td></td>
<td>OC48/STM16</td>
<td>2.488 Gb/s</td>
</tr>
<tr>
<td></td>
<td>2 Gigabit Ethernet</td>
<td>2.500 Gb/s</td>
</tr>
<tr>
<td></td>
<td>Infiniband</td>
<td>2.500 Gb/s</td>
</tr>
<tr>
<td></td>
<td>2.5 G.709 FEC</td>
<td>2.666 Gb/s</td>
</tr>
<tr>
<td></td>
<td>4 Gigabit Fibre Channel</td>
<td>4.250 Gb/s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clock Recovery Ranges</th>
<th>Range</th>
<th>Emerging Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Basic equipment, for user-specified rates)</td>
<td>50 Mb/s to 2.700 Gb/s</td>
<td>VSRS</td>
</tr>
<tr>
<td></td>
<td>3.00 Gb/s to 3.188 Gb/s</td>
<td>PCI Express, SATA, SATA-2, XAUI, 4-Lane 10FC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enumerated Standards</th>
<th>Standard</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Added with Option 10G)</td>
<td>OC192/STM64</td>
<td>9.953 Gb/s</td>
</tr>
<tr>
<td></td>
<td>10GBase-W</td>
<td>9.953 Gb/s</td>
</tr>
<tr>
<td></td>
<td>10GBase-R</td>
<td>10.31 Gb/s</td>
</tr>
<tr>
<td></td>
<td>10G Fibre Channel</td>
<td>10.51 Gb/s</td>
</tr>
<tr>
<td></td>
<td>G.975 FEC</td>
<td>10.66 Gb/s</td>
</tr>
<tr>
<td></td>
<td>G.709 FEC</td>
<td>10.71 Gb/s</td>
</tr>
<tr>
<td></td>
<td>10 GBE with FEC</td>
<td>11.10 Gb/s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clock Recovery Ranges</th>
<th>Range</th>
<th>Emerging Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Added with Option 10G, for user-specified rates)</td>
<td>2.7 Gb/s to 3.0 Gb/s</td>
<td>SATA-3, 2x XAUI, PCI Express 2, OC192 Super FEC</td>
</tr>
<tr>
<td></td>
<td>3.267 Gb/s to 4.250 Gb/s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.900 Gb/s to 6.375 Gb/s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.800 Gb/s to 12.60 Gb/s</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Differential</th>
<th>Single-ended</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Mb/s to 2.70 Gb/s</td>
<td>≤8 mV&lt;sub&gt;p-p&lt;/sub&gt; on each input</td>
<td>10 mV&lt;sub&gt;p-p&lt;/sub&gt;</td>
</tr>
<tr>
<td>2.70 Gb/s to 11.19 Gb/s</td>
<td>≤12 mV&lt;sub&gt;p-p&lt;/sub&gt; on each input</td>
<td>15 mV&lt;sub&gt;p-p&lt;/sub&gt;</td>
</tr>
<tr>
<td>11.19 Gb/s to 12.60 Gb/s</td>
<td>≤15 mV&lt;sub&gt;p-p&lt;/sub&gt; on each input</td>
<td>20 mV&lt;sub&gt;p-p&lt;/sub&gt;</td>
</tr>
</tbody>
</table>
8200 Series Sampling Oscilloscopes

CSA8200 Communications Signal Analyzer • TDS8200 Digital Sampling Oscilloscope

Power Requirements
Line Voltage and Frequency –
100 to 240 VAC ±10% 50/60 Hz.
115 V AC ±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
8200 Series Mainframes
TDS8200 Digital Sampling Oscilloscope
Includes: User manual, quick reference card, Microsoft Windows 2000 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.

CSA8200 Communications Signal Analyzer
Includes: User manual, quick reference card, Microsoft Windows 2000 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.

8200 Series Mainframe Options
Option 1K – Cart.
Option 1R – Rackmount kit (includes: hardware, tooling and instructions for converting bench model to rackmount configuration).
Option GT – Gated Trigger.
Option JNB – Advanced Jitter, Noise and BER Analysis Software.
Option ICON – Interconnect Analysis and Modeling Software.
Option IMESX – Model Extraction Software.
Option ISPAR – S-Parameter Software.

Service Options
Opt. C5 – Calibration Service 5 Years.
Opt. D3 – Calibration Data Report 3 Years (with Option C3).
Opt. D5 – Calibration Data Report 5 Years (with Option C3).

International Power Plug Options
Other Accessories

- **Calibration Step Generator with Power Cords** – 
  - Std: US: 067-1338-00.
  - A1, Europe: 067-1338-01.
  - A2, UK: 067-1338-02.
  - A3, Australia: 067-1338-03.
  - A5, Switzerland: 067-1338-05.
  - A6, Japan: 067-1338-06.

- **Sampling Module Extender Cable (1 meter)** – Order 012-1568-00.
- **Sampling Module Extender Cable (2 meter)** – Order 012-1569-00.

- **SlotSaver: Small Module Extender Cable** – Order 012-1569-00.

- **P6150 – 8 GHz Passive Probe**

- **P7260 – 6 GHz Active FET Probe**

- **P7350 – 5 GHz Active FET Probe**

- **P7350SMA – 5 GHz 50 Ω Differential-to-Single-ended Active Probe**

- **P7380SMA – 8 GHz 50 Ω Differential-to-Single-ended Active Probe**

- **P6150 – 9 GHz Passive Probe**

- **P8018 – 20 GHz Single-ended TDR Probe**

- **80A05 – Electrical clock recovery module/clock recovery for the 80C12**

- **80A06 – PatternSync Trigger module. Provides user-programmable divide ratios to optimize high-speed recovered clocks for CSA/TSA82000 sample rate range.**

- **K4000 – Mobile Workstation.**

Interconnect Cables

- **Tektronix recommends using quality high performance interconnect cables with these high bandwidth products in order to minimize measurement degradation and variations.**

All sampling modules listed below are compatible with the 2.92 mm, 2.4 mm and 1.85 mm connector interface of the 80E0x modules. Assemblies can be ordered by contacting Gore by phone at (800) 556-4622 or on the web at www.goreelectronics.com (click on “Contact Us”).

**Bench Top Test Cable Assemblies**

- **TEK40PF18PP** – Frequency: 40 GHz; Connectors: 2.92 mm male; Length: 18.0 inches.
- **TEK50PF18PP** – Frequency: 50 GHz; Connectors: 2.4 mm male; Length: 18.0 inches.
- **TEK65PF18PP** – Frequency: 65 GHz; Connectors: 1.85 mm male; Length: 18.0 inches.

**High Frequency Interconnect Cables for Electrical Sampling Modules**

- **TEK40HP06PP** – Frequency: 40 GHz; Connectors: 2.92 mm male; Length: 6.0 inches.
- **TEK50HP06PS** – Frequency: 50 GHz; Connectors: 2.4 mm male; Length: 6.0 inches.
- **TEK65HP06PS** – Frequency: 65 GHz; Connectors: 1.85 mm male; Length: 6.0 inches.
- **TEK65HP06PS** – Frequency: 65 GHz; Connectors: 1.85 mm female; Length: 6.0 inches.
8200 Series Sampling Oscilloscopes

- CSA8200 Communications Signal Analyzer
- TDS8200 Digital Sampling Oscilloscope

Our most up-to-date product information is available at:

www.tektronix.com

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USA  1 (800) 426-2200

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Updated 15 June 2005