

8200 Series Sampling Oscilloscopes

► CSA8200 Communications Signal Analyzer • TDS8200 Digital Sampling Oscilloscope



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.

► 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

► Applications

Signal Integrity, Advanced Jitter, Noise and BER Analysis

Characterization of Next-generation Digital Designs

Design Characterization and Manufacturing Compliance Test of Telecom, Datacom, Storage Area Network, Computer and High-speed Backplane Designs

TDR, Impedance Characterization, and Cross Talk Measurements for PCBs, Cables and IC Packages

^{*1} Bandwidth is determined by plug-in modules and may exceed 70 GHz as higher speed modules become available in the future.

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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 acquisition of differential electrical signals even when there is no trigger available. Electrical modules are available with bandwidths up to 70 GHz. Differential and single-ended passive hand probes are available with bandwidths up to 18 GHz. An adapter for the popular TekConnect® probing system brings the performance of Tektronix' state-of-the-art high impedance differential and single-ended probes to the

8200 Series Sampling Oscilloscope. A differential electrical clock recovery module covering most popular data rates between 50 Mb/s and 12.6 Gb/s is also available. Optical modules provide complete optical test solutions for both telecom (SONET/SDH) and Datacom (Ethernet, and Fibre Channel) applications with data rates from 155 Mb/s to 43 Gb/s. Integrated clock recovery is also available on most optical modules.

Extremely Low Trigger Jitter, Flexible Signal Acquisition Solution

The 82A04 Phase Reference Module extends the capability of the 8200 Series Sampling Platform by providing extremely low jitter/low drift sample position information to the mainframe. This sample position information is based on the phase of a clock the user provides to the 82A04 input. The benefits of using the sample position information based on a clock signal are two-fold – an extremely low Jitter of $<200 \text{ fS}_{\text{RMS}}$ (typical), and the possibility of a trigger-less acquisition. Typical application is 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^*1 .

*1 Typical performance, some settings will lower the throughput.

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.

The 8200 Series' True differential TDR with 28 ps reflected rise time enables complete TDR/TDT/Crosstalk measurements on complex assemblies. With system capacity of up to four dual channel modules, four differential signal pairs can be driven simultaneously. For TDR probing, the P8018 single-ended probe and the new P80318 differential probes support full TDR bandwidth, while the 80A02 module provides protection from damage by electrostatic discharge. These features enable even measurements performed in the manufacturing environment to achieve highly precise results, while protecting the TDR module itself. Add the available IConnect® software and you have an 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 testing and fault isolation. IConnect provides an integrated simulate-and-compare link between SPICE/IBIS simulators and TDR/T or VNA S-parameter measurements. This capability 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 flex-boards, packages, sockets, connectors, cable assemblies and at the input die capacitance.

► Optical Modules

Module	Opt. Bandwidth (GHz)	Wavelength Range (nm)	Fiber Input (µm)	Mask Test Sensitivity (dBm)	# of channels	155 M/bs	622 M/bs	1063 M/bs	1250 M/bs	2125 M/bs	2488 M/bs	2500 M/bs	3.125 G/bs	3.188 G/bs	3.32 G/bs	4.25 G/bs	9.95 G/bs	10.31 G/bs	10.52 G/bs	10.66 G/bs	10.71 G/bs	11.1 G/bs	39.81 G/bs	43.02 G/bs	
80C02	—	30	1100 to 1650	9	-9	1											■								
	CR	30	1100 to 1650	9	-9	1											◆								
80C07B	F1	2.5	700 to 1650	9 & 62.5	-22	1	■	■			■	■													
	F2	2.5	700 to 1650	9 & 62.5	-22	1	■		■		■	■													
	F3	2.5	700 to 1650	9 & 62.5	-22	1	■			■	■	■													
	F4	2.5	700 to 1650	9 & 62.5	-22	1	■				■	■	■												
	F5	2.5	700 to 1650	9 & 62.5	-22	1		■	■			■	■												
	F6	2.5	700 to 1650	9 & 62.5	-22	1		■		■		■	■												
	F7	2.5	700 to 1650	9 & 62.5	-22	1		■			■	■	■												
	F8	2.5	700 to 1650	9 & 62.5	-22	1			■	■		■	■												
	F9	2.5	700 to 1650	9 & 62.5	-22	1			■		■	■	■												
	F10	2.5	700 to 1650	9 & 62.5	-22	1				■	■	■	■												
	CR1	2.5	700 to 1650	9 & 62.5	-22	1	◆	◆	◆	◆	◆	◆	◆												
80C08C	—	10	700 to 1650	9 & 62.5	-16	1											■	■	■	■	■	■			
	CR1	10	700 to 1650	9 & 62.5	-16	1											◆	◆							
	CR2	10	700 to 1650	9 & 62.5	-16	1												◆	◆						
	CR4	10	700 to 1650	9 & 62.5	-16	1												◆	◆	◆	◆	◆	◆		
80C10	—	65	1290 to 1330 1539 to 1570	9	0	1																	■	■	
80C11	—	30	1100 to 1650	9	-9	1											■	■	■	■	■	■			
	CR1	30	1100 to 1650	9	-9	1											◆								
	CR2	30	1100 to 1650	9	-9	1											◆		◆						
	CR3	30	1100 to 1650	9	-9	1											◆				◆				
	CR4	30	1100 to 1650	9	-9	1											◆	◆	◆	◆	◆	◆			
80C12	F1	4.25	700 to 1650	9 & 62.5	-15	1			■		■					■									
	F2	9	700 to 1650	9 & 62.5	-15	1				■						■									
	F3	9	700 to 1650	9 & 62.5	-15	1			■		■														
	F4	4.25	700 to 1650	9 & 62.5	-15	1					■		■	■		■									
	F5	9	700 to 1650	9 & 62.5	-15	1						■	■		■										
	F6	9	700 to 1650	9 & 62.5	-15	1				■			■	■											
	FC	9	700 to 1650	9 & 62.5	-15	1						■	■	■											
	10G	10	700 to 1650	9 & 62.5	-12	1											■	■	■	■	■	■			
(80C12 CR using 80A05)						◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆									
(80C12 CR using 80A05 with Opt. 10G)						◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

Optical Modules

Electrical Clock Recovery

80A05								⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕								
10G								⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕

Electrical Modules

	80E01	80E02	80E03	80E04	80E06
Bandwidth	50	12.5	20	20	70
Number of Channels	1	2	2	2	1

Rates Supported: ■=Filter

◆=Optical Clock Recovery

⊕=Electrical Clock Recovery