

# Communications Signal Analyzer

## CSA 803A



### FEATURES

#### CSA 803A

- DC to 50 GHz Bandwidth
- Automatic Statistical Analysis
- 38 Industry Standard Masks (ITU-T and ANSI)
- High Resolution and Repeatability
- 7 ps Rise Time (SD32)
- Modularity Through Sampling Heads
- Triggering to 10 GHz (Prescaler)
- TDR for Precision Impedance Analysis
- FFT for Spectral Analysis
- Extinction Ratio Measured Automatically
- Built-in Automatic Eye Pattern and Pulse Template Testing

### APPLICATIONS

- Optical Standards Compliance Testing
- Electrical Standards Compliance Testing
- Timing Analysis
- Pass/Fail Mask Measurements for Telecom (SDH/SONET) and Datacomm (FDDI/Fiberchannel)

## **CSA 803A**

The CSA 803A communications signal analyzer offers the highest bandwidth and time resolution of the 11000 Series. In addition to the easy-to-use, touch-screen user interface and powerful automatic measurement system common to all 11000 Series instruments, the CSA 803A adds single-ended and differential TDR and TDT, timing resolution to 0.01 ps, and up to 50 GHz bandwidth (depending on the sampling head used). This unmatched performance and feature set makes the unit ideal for semiconductor device testing. TDR characterization of circuit boards, IC packages, cables and high-speed digital communication measurements.

The CSA 803A accepts up to two dual-channel SD Series sampling heads and has built-in trigger capability of up to 10 GHz through the prescaler.

### **RESOLUTION AND REPEATABILITY**

The state-of-the-art digital time base in the CSA 803A provides unmatched timing resolution, with sample intervals to 10 femtoseconds (0.01 ps) and measurement repeatability to 1 ps. In addition, the vertical system provides 8-Bits of vertical resolution at all deflection factors (80  $\mu$ V LSB at 2 mV/div). Powerful on-board waveform processing allows expansion with averaging to sensitivities in the 100  $\mu$ V/div range and beyond.

### **NON-VOLATILE STORAGE**

Waveforms, settings and user defined masks are preserved in battery backed-up memory for added convenience.

### **FAST FOURIER TRANSFORM (FFT)**

FFT allows for analysis of both spectral magnitude and phase of acquired waveforms.

### **FASTEST ACQUISITION**

The CSA 803A, with its multiprocessor-based architecture and high-speed analog, error-sample feedback-loop technology, has the highest sample rate of any sampling oscilloscope. The 200 kHz sampling rate gives the CSA 803A a “real time” feel for waveform controls and allows high-speed data capture for histograms and automated measurements.

### **MODULARITY MAKES ROOM FOR GROWTH**

In the Tektronix tradition, the CSA 803A can be tailored through modular plug-in sampling heads for a variety of applications. Modularity also offers a path for growth and expansion as new sampling heads become available. For example, for applications requiring superior noise performance, the SD-22 Sampling Head offers two channels of acquisition at 12.5 GHz with 450  $\mu$ V (typical) of noise. High bandwidth acquisition and TDR are available in the SD-24 sampling head, which offers two channels with 20 GHz bandwidth and two polarity-selectable TDR step generators. The complete SD Series of sampling heads is listed on the Sampling Head pages.

## STATISTICAL MEASUREMENTS

A built-in statistical database allows the instruments to accumulate three-dimensional waveform data-time, voltage, and sample density. The database is a 512 x 256 x 16-Bit data array which accumulates waveform data by counting the number of times each pixel in the display is activated. This information is then displayed in a color-graded format that gives you an instant qualitative view of the acquired waveform. The power of the statistical database is the measurement capabilities - time and voltage histograms and automatic statistical measurements.

## COMMUNICATION APPLICATIONS USING THE STATISTICAL DATABASE

Time and voltage histograms are powerful statistical tools for measuring noise and jitter in communication signals. The histograms include useful information such as mean, RMS deviation, and pk-pk, displayed and continuously updated at a user selectable rate. High sample rates make it possible to analyze data concurrent with acquisition rather than in a batch mode later on. The statistical database allows you to change histogram parameters without reacquiring data.

For the first time you can make jitter and noise measurements with one simple selection from an on-screen menu. Controls are provided for adjusting left and right limits, selecting RMS or pk-pk and absolute or relative measurements. For eye diagram measurements you can choose either the eye crossing or the mesial level for jitter measurement location. Either top line or base line can be selected for noise measurements. The CSA does the rest, and displays the jitter and noise measurements in the status menu at the bottom of the screen.

## MASK TESTING

For Compliance test to ITU-T and ANSI standards, 38 predefined telecom masks are available by adding Option 1T. The CSA 803A settings are all automatically determined by pressing AUTOSET while the desired mask is displayed. See table for a complete listing of masks.

In addition, you can define and edit up to 10 masks simultaneously. These masks (polygons) may each have up to 50 vertices. The CSA 803A then counts the individual and total samples that fall in each of the defined masks. Once defined the masks can be stored for future use.

### Predefined Standard ITU-T and ANSI Eye Pattern and Pulse Masks

ITU-T SDH AND ANSI SONET OPTICAL STANDARDS		
OC-1 51.84 Mb/s	OC-3/STM-1 155.52 Mb/s	OC-9 466.56 Mb/s
OC-12/STM-4 622.08 Mb/s	OC-18 933.12 Mb/s	OC-24 1.2442 Gb/s
OC-36 1.8662 GB	OC-48/STM-16 2.4883 Gb/s	

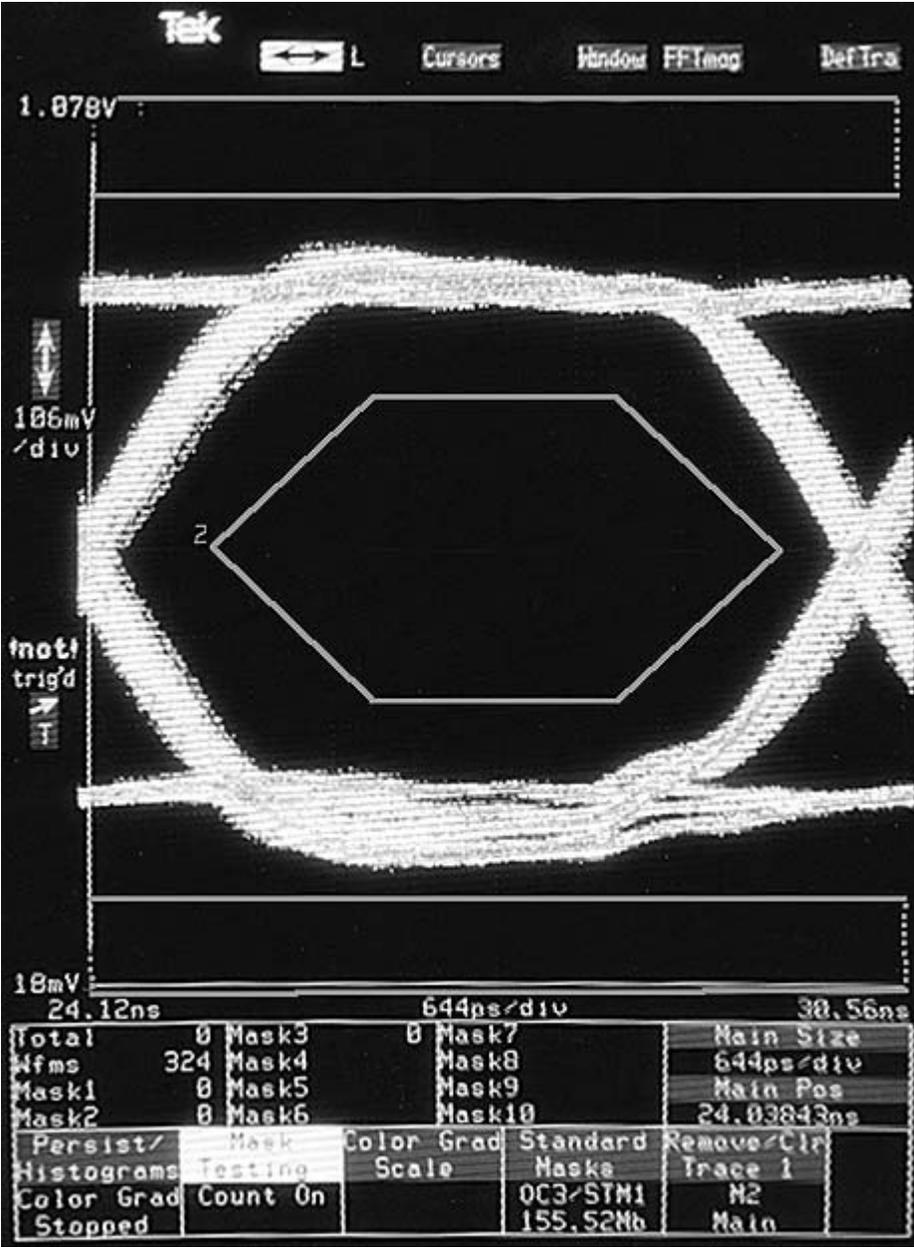
<b>ANSI T1.102 ELECTRICAL STANDARDS</b>		
DS1 1.544 Mb/s	DS1 (old) 1.544 Mb/s	DS1C 3.152 Mb/s
DS2 6.312 Mb/s	DS3 44.736 Mb/s	DS4NA 139.26 Mb/s
DS4XNA 139.26 Mb/s	STS1 51.84 Mb/s	STS3 155.52 Mb/s
STSX3 155.52 Mb/s		
<b>ITU-T G.703 ELECTRICAL STANDARDS</b>		
Single Pulse 64 Kb/s	Double Pulse 64 Kb/s	Data Pulse 64 Kb/s
Timing Pulse 64 Kb/s	Pulse 1.544 Mb/s	Sym. Pair 2.048 Mb/s
Coax Pair 2.048 Mb/s	Sym. Pair 6.312 Mb/s	Coax Pair 6.312 Mb/s
Pulse 8.448 Mb/s	Coax Pair 32.064 Mb/s	Pulse 34.368 Mb/s
Coax Pair 44.736 Mb/s	Pulse 97.728 Mb/s	Zero Pulse 139.26 Mb/s
One Pulse 139.26 Mb/s	STM1 155.52 Mb/s	CEPT 565 Mb/s
<b>OTHER MASKS</b>		
FDDI 125 Mb/s	User Programmable (default is OC-192/STM-64)	

#### **AUTOMATED MEASUREMENTS MAKE IT EASY**

The CSA 803A offers a comprehensive, accurate, and automatic measurement system. Up to six measurements can be displayed on screen at any time, all updated continuously. Any number of measurements may be made over the GPIB or RS-232C interfaces.

You can make automatic jitter and noise measurements using the statistical measurement mode. Statistical measurements allow automatic pulse parameter measurements on random signals such as eye diagrams and allow you to make stable and accurate measurements even in the presence of jitter and noise.

All measurement parameters are user-controllable and measurement levels may be set in relative (i.e., percentage) or absolute terms. Measurements are also fully annotated so there is no question about which part of the waveform is used for making the measurements.



*Predefined masks (Option 1T) allow for complete compliance testing without the need for an external computer. See table for a complete mask listing.*

Measurements include extinction ratio; amplitude measurements, such as mean, RMS, p-p, and overshoot; timing measurements, such as width, propagation delay, and phase; and energy measurements that provide direct area or energy results! Measurement statistics are also available to evaluate the stability of any measurement result.

**ON-BOARD WAVEFORM PROCESSING**

The extensive on-board waveform processing capability of the CSA 803A not only provides smooth “real time” update rate and control response, it also allows complex waveform calculations to be performed and displayed in the same continuously updated fashion. Calculated waveforms can be as simple as addition of two channels, or more complex, from basic operators (+, -, x ÷) to specialized math functions such as square root, differentiate, log, envelope, and filter. Calculations can include acquired waveforms, stored waveforms, and constants.

All measurement functions except hardware measurements are allowed on calculated traces. In addition, the instrument can be set to stop acquisition after certain conditions, such as when a specified number of averages have been completed.

#### **WINDOWING SHOWS THE DETAILS**

The CSA 803A offers another first for sampling oscilloscopes - windows. Similar to the delayed sweep on conventional oscilloscopes, windows allow viewing a long interval on one trace while examining the details of a section of the waveform on a second trace.

Up to seven windows can be created on a single main trace, each with independent positions. The instrument can even be programmed to automatically locate a window on a specified transition within the main waveform. Like the other oscilloscopes in the 11000 Series, windows in the CSA 803A are actually re-acquired with a higher resolution than the main waveform - not just digitally expanded from the main trace, as in some lower performance instruments.



Product(s) complies with IEEE Standard 488.1-1987, RS-232C, and with Tektronix Standard Codes and Format



Tektronix Measurement products are manufactured in ISO registered facilities.

