

TDS8000

Digital Sampling Oscilloscope

The products on this datasheet are no longer being sold by Tektronix.

FEATURES

- DC to 50 GHz Bandwidth
- Exceptional Trigger Jitter and Horizontal Timebase Stability
- Modular Architecture
- Up to Eight Channels Acquisition
- High Resolution and Measurement Repeatability
- Comprehensive, Accurate, Automatic Measurement System
- Intuitive User Interface
 - Large Display (10.4 in.)
 - Microsoft Windows-based Graphical User Interface

APPLICATIONS

- Semiconductor Testing
- Impedance and Crosstalk Characterization (using TDR)
- High-Speed Digital Data Communications

The TDS8000 digital sampling oscilloscope offers the widest range of on-board measurement and waveform-processing capabilities of any ultra-high bandwidth oscilloscope. With excellent measurement repeatability, exceptional vertical resolution and fast waveform acquisition and display update rates, the TDS8000 is a powerful measurement tool for semiconductor testing, TDR characterization of circuit boards, IC packages and cables and high-speed digital communications.

State-of-the-art Waveform Acquisition

The 8000 Series state-of-the-art timebase provides equivalent time sweep speeds from 0.5 ps/div to 5 ms/div with record lengths from 20 to 4000 points and a sample interval of 10 femtoseconds (0.01 ps). In addition, 8000 Series sampling oscilloscopes' timebases can be locked to a 10 MHz reference providing greater long-term stability. This capability also allows multiple TDS8000s to be synchronized to other test equipment and/or the device-under-test.

The TDS8000 offers two magnification windows, whereby sections of the main trace are re-acquired at higher resolution for closer examination of details.

The TDS8000 boasts the highest sample rate among sampling oscilloscopes. Its multi-processor architecture, with dedicated per channel Digital Signal Processors (DSP), guarantees the highest waveform acquisition rates regardless of the number of channels acquired or waveform processing done.

Modularity and Flexibility

The TDS8000 supports a large and growing family of [electrical](#) and [optical plug-in modules](#). This modular architecture lets you configure the instrument with the right features for your application both now and in the future.

The electrical plug-ins include a variety of modules with bandwidths up to 50 GHz and with specialized features such as TDR for Impedance and Crosstalk Characterizations. High bandwidth probes are also available for constructing a total acquisition solution.

The available optical modules provide complete optical test solutions for both telecom (155 Mb/s to 40 Gb/s) and datacom (Fibre Channel and Gigabit Ethernet) applications as well as general-purpose optical signal testing.

Unmatched TDR Capabilities

With the 80E04 TDR sampling module, the TDS8000 offers unmatched TDR performance on up to eight channels simultaneously. Each channel has an independent polarity selectable step-generator offering unmatched 35 ps reflected rise time*1. The TDS8000 provides the only true differential TDR system available today. Automatic, transparent correction for variations in step amplitude and baseline offset guarantee accuracy and repeatability of impedance measurements.

8000 Series Sampling Oscilloscope Platform

The TDS8000 is built on Tektronix' new sampling oscilloscope platform that combines familiar MS Windows-based PC technologies with world-class waveform acquisition technology.

This platform provides a wide array of standard instrumentation and communications interfaces (such as GPIB, Parallel Printer Port, RS-232-C and USB Serial Ports and an Ethernet LAN connection). In addition, the platform includes several mass storage devices (floppy disk, removable hard drive and CD-ROM).

The TDS8000 is equipped with a large, full-color display that helps you discriminate waveform details. Color-grading of waveform data adds a third dimension - sample density - to your signal acquisitions and analysis.

Finally, since the system supports an open MS Windows environment, new levels of data analysis can be done directly on the instrument using commercially available software packages.

CHARACTERISTICS

Signal Acquisition

- **Acquisition Modes** - Sample (normal), envelope and average.
- **Number of Sampling Modules Accommodated** - Up to four dual-channel electrical and two single-channel optical sampling modules.
- **Number of Simultaneously Acquired Inputs** - 8 channels maximum (8 electrical or 2 optical and 6 electrical).

Vertical Systems

- **Rise Time/Bandwidth** - Determined by the sampling modules used.
- **Vertical Resolution** - 14-Bit over the sampling module's dynamic range.
- Horizontal System

Main and Magnification View Timebases - 1 ps/div to 5 ms/div in 1-2-5 sequence or 1 ps increments.

Time Interval Accuracy –

- Horizontal sensitivity < 21 ps: 1 ps +1% of interval.
- Horizontal sensitivity >21 ps:
- Horizontal deskew range : -500 ps to +100 ns on any individual channel in 1 ps increments.

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

Magnification Views - In addition to the main timebase, the TDS8000 supports two magnification views. These magnifications are independently acquired using separate timebase settings.

Maximum Trigger Rate - 200 kHz.

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): internally connected to pre-scaled trigger.

Trigger Sensitivity -

External direct trigger input:

Pre-scaled trigger input:

Jitter -

Short-term jitter optimized mode:

Locked to 10 MHz reference:

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

Trigger Level Range - ± 1.0 V.

Trigger Input Range - ± 1.5 V.

Trigger Holdoff - Adjustable 5 μ s to 100 ms in 2 ns increments.

Display Features

Touchscreen Display - 10.4 in. diagonal, color.

Colors - 16,777,216 (24 bits).

Video Resolution - 640 horizontal by 480 vertical displayed pixels.

Math/Measurement System Measurements

The TDS8000 supports up to eight simultaneous measurements, updated 3 times per second with optional display of per measurement statistics (min, max, mean and standard deviation).

Measurement Set -

Amplitude measurements: High, Low, Amplitude, Max, Mid, Min, Peak-to-Peak, + Overshoot, - Overshoot, Mean, Cycle Mean, RMS, Cycle RMS, AC RMS, Gain.

Timing measurements: Rise, fall, period, frequency, + cross, - cross, + width, - width, + duty cycle, - duty cycle, burst width, delay, phase.

Area measurements: Area, Cycle Area.

Eye pattern/optical measurements: Extinction Ratio (Ratio, %, dB), Eye Width, Eye Height, Crossing %, Duty Cycle Distortion, Jitter (pk-pk, RMS), Noise (pk-pk, RMS), Q-Factor, SNR, Average Optical Power.

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.

TDR System (TDS8000 with 80E04 Electrical Module)

TDR Channels - 2 per 80E04.

TDR Amplitude - 250 mV.

TDR System Rise Time - < 35 ps.

Time Coincidence Between TDR Steps - < 1 ps.

Source Resistance - 50 $\pm$ 0.5 Ohm.

Typical Aberrations (at +250 mV amplitude) -

10 ns to 20 ps before step: +3% or less.

< 400 ps after step: +10%, -5%.

400 ps to 5 ns after step: +3%.

Elsewhere: +1%.

Power Requirements

Line-voltage Ranges - 90 to 132 V_{RMS}, 180 to 250 V_{RMS}.

Line Frequency - 48 to 440 Hz.

Environmental

Temperature -

Operating: +10°C to +40°C.

Nonoperating: -22°C to +60°C.

Relative Humidity -

Operating: Floppy disk and CD ROM not installed: 20% to 80% at or below 40°C (upper limit de-rates to 45% relative humidity at 40°C).

Nonoperating: 5% to 90% at or below 60°C (upper limit de-rates to 20% relative humidity at +60°C).

Altitude - Operating: 3048 m (10,000 ft.); nonoperating: 12190 m (40,000 ft.).

Safety - UL 3111-1, CSA-22.2 No. 1010.1, EN 61010-1.

Physical Characteristics

*1 The observed rise time of a reflection from a short circuit.