Digital Real Time Oscilloscopes
TDS 310 • TDS 320 • TDS 350

◤ Features

TDS 310
- 50 MHz Bandwidth
- 200 MS/s Sampling Rate

TDS 320
- 100 MHz Bandwidth
- 500 MS/s Sampling Rate

TDS 350
- 200 MHz Bandwidth
- 1 GS/s Sampling Rate

COMMON FEATURES
- Two Input Channels
- 2 mV to 10 V/div
- GPIB/RS-232 Programmability, Parallel Printer Interface and VGA Output with Opt. 14
- 8-Bit Vertical Resolution
- 1 K Record Length
- Roll Mode
- Printer Pack Option
- Vector Accumulate and Dot Accumulate Display Modes
- 2% Vertical Accuracy
- 21 Automatic Measurements
- 10 ns Peak Detect Mode for High-speed Glitch Capture
- Autosetup

Ⓐ Application
- Service
- Education
- Design
- Manufacturing Test

Product(s) available through your local Tektronix Distributor listed in the back of this catalog.
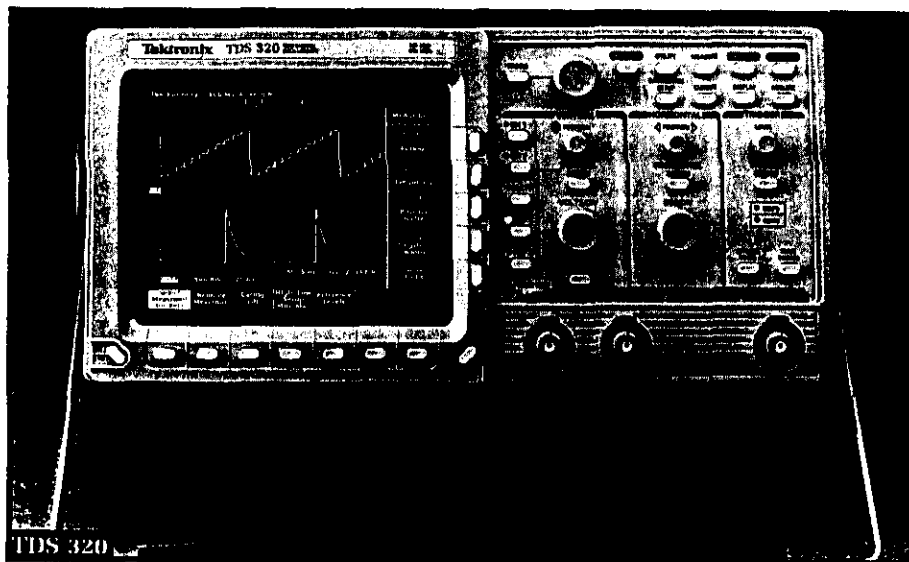
GPIB *The TDS Series complies with IEEE Standard 488.1-1987, and with Tektronix Standard Codes and Formats.*

See Tektronix on the World Wide Web: http://www.tek.com

ISO 9001 *Tektronix Measurement products are manufactured in ISO registered facilities.*

TDS 320

TDS 300 Series

The TDS 300 Series redefines the low-cost digital oscilloscope. By sampling the signal at up to five times the analog bandwidth on both channels simultaneously, you can be assured of true acquisitions, minimizing aliasing or other digital sampling effects. Unlike other DSOs, the TDS 300 Series easily gathers enough samples to display waveforms accurately to their full bandwidth. They are the only scopes in their class that can reliably acquire high-speed transient or single-shot events to their fastest sweep speed.

Many low-cost DSOs offer only dot displays, which can be hard to interpret by those used to analog scopes. The TDS 300 Series has Dot, Dot Accumulate, Vector, and Vector Accumulate display modes – another advantage over the competition.

The Accumulate modes gather multiple waveforms for a user-defined time (500 ms to ∞), after which the screen is cleared. Vector Accumulate mode uses bright vectors to superimpose the current acquisition over the accumulated waveforms. Dot accumulate mode is recommended for viewing video and other complex waveforms. The display is erased at the time set or when the acquisition setting is changed. These modes are useful for doing worst-case analysis or signal monitoring. Long-term monitoring may be done easily by setting the erase time to infinity.

OVERSAMPLING MINIMIZES ALIASING

When aliasing occurs, the scope displays a waveform record with a lower frequency than the actual input signal. Aliasing occurs because the oscilloscope cannot acquire the signal fast enough to construct an accurate waveform record. To acquire a signal, it must be sampled at least twice as fast as the highest frequency component. For example, with a 500 MS/s sampling rate, the TDS 320 gathers two and a half times the number of samples needed to acquire a 100 MHz signal in real-time, assuring users of accuracy up to the fastest sweep speed. This degree of oversampling not only minimizes aliasing, it provides a higher resolution waveform.

ACQUISITION POWER

With edge triggering and basic video triggering as standard features, the TDS 300 Series can capture the waveforms that designers and service technicians most need to see. In addition to 21 automatic waveform measurements, the TDS 300 Series offers four acquisition modes: Sample, Peak Detect, Envelope, and Average. Sample mode provides real-time sampling and has the highest throughput rate. Peak Detect locates glitches as small as 10 ns and reveals aliasing. Envelope mode, by including the highest and lowest points over many acquisitions, shows variations in the signal over time. Average mode uses several acquisitions to calculate an average value for each waveform point, reducing random noise in repetitive signals.

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ANALOG SIMPLICITY, DIGITAL PRODUCTIVITY
By balancing the use of on-screen menus with dedicated buttons and knobs, the user-friendly interface retains traditional analog simplicity yet gives quick access to the wide range of digital functions. Frequently used functions, like position and trigger level, are controlled directly with knobs; secondary functions are menu driven, eliminating the profusion of buttons found on most low-cost scopes.

This modern interface dramatically flattens the learning curve, appealing to users regardless of their digital experience. The TDS 300 Series' interface simplifies scope operation without limiting the instrument's capabilities.

COMMUNICATION OPTION
The I/O Interface (Option 14) includes GPIB, RS-232 I/O interface and a Centronics-type parallel printer port. With this option you can use a remote computer to control the scope for automated testing, or to exchange waveform or measurement data for documentation and analysis. In addition, a VGA monitor output is provided for classroom viewing or other applications requiring a monitor.

Interleaf (.img), TIFF, PCX, BMP, and EPS file formats allow screen captures to be placed directly into desktop publishing documents. Or, at the push of a button, a screen shot can be output directly to a variety of compatible printers.

The Printer Kit, provides a single-handle solution to the portable printer problem. A quiet thermal printer, mounted in a pouch attached to the scope, makes clear four-inch hardcopies while you continue working.

For service, education, and design work, the TDS 300 Series is without peer among low-cost DSOs.

Characteristics

SIGNAL ACQUISITION SYSTEM
Bandwidth – 50 MHz (TDS 310), 100 MHz (TDS 320), 200 MHz (TDS 350).

Sample Rate – 200 MS/s on each channel (TDS 310), 500 MS/s on each channel (TDS 320), 1 GS/s on each channel (TDS 350).

Channels – Two identical channels, each with invert function.

Sensitivity – 2 mV to 10 V/div (with calibrated fine adjust).

Position Range – ±5 divisions.

Calibrated Offset Ranges –

V/div setting	Offset Range
2 mV – 99.5 mV/div	±1 V
100 mV – 995 mV/div	±10 V
1 – 10 V/div	±100 V

DC Gain Accuracy – ±2%.

Vertical Resolution – 8-Bits (256 levels over 10.24 vertical divisions).

ACQUISITION MODES
Sample, Envelope, Average, Peak Detect – High frequency and random glitch capture. Captures glitches as narrow as 10 ns using acquisition hardware at all time/div settings between 25 µs/div and 2.5 s/div (inclusive).

TIME BASE SYSTEM (MAIN AND DELAYED)
Time/Division Range – 10 ns to 5 s/div (TDS 310), 5 ns to 5 s/div (TDS 320), 2.5 ns – 5 s/div (TDS 350).

Record Length – 1000 sample points per channel.

Time Base Accuracy – ±0.01%.

TRIGGERING SYSTEM (MAIN ONLY)
Trigger Types – Edge, Video.

Trigger Modes – Auto, Normal.

Video Trigger Types – Triggers on Field 1, Field 2, Any Field (non-interlaced systems), or Lines; from Sync-negative composite video. Triggers on broadcast standard NTSC, PAL, or SECAM video, and other interlaced and non-interlaced video with horizontal line rates from 15kHz to 65 kHz (in 5 ranges) and field rates from 50 to 60 Hz.

DISPLAY
Vector – Connects sample points to display a continuous waveform.

Dots – Displays sample dots only.

Vector Accumulate Mode – Accumulates waveform points over a pre-set period of time (500 ms to ∞) and superimposes the current waveform with bright vectors.

Dot Accumulate Mode – Accumulates waveform points over a pre-set period of time (500 ms to ∞).

Format – YT and XY.

AUTOMATIC MEASUREMENTS
Period, Frequency, + Width, – Width, Rise Time, Fall Time, + Duty Cycle, – Duty Cycle, + Overshoot, – Overshoot, High, Low, Max, Min, Pk-Pk, Amplitude, Mean, Cycle Mean, RMS, Cycle RMS, Burst Width.

Cursors – Horizontal bars, vertical bars, paired (volts @ time).

Readouts – Absolute volts, Δ volts, time, and frequency.

WAVEFORM PROCESSING
Arithmetic Operators – Add, Subtract, Multiply.

Autosetup – Single button automatic setup on selected input signal for vertical, horizontal, and trigger systems.

OPT. 14 (I/O INTERFACE): COMPUTER INTERFACE AND HARDCOPY CAPABILITY
GPIB (IEEE-488.2) Programmability – Full talk/listen modes. Control of all modes, settings, and measurements.

RS-232 Interface Programmability – Full talk/listen modes. Control of all modes, settings, and measurements. Baud rate up to 19,200. 9-Pin, DTE.

Video Output – Standard analog VGA output to external monitors.

Hardcopy Port – Centronics-type parallel or RS-232.

Graphics Interface File Formats – Interleaf (.img), TIFF, PCX (PC Paintbrush), BMP (Microsoft Windows), and Encapsulated Postscript (EPS).

Printer Formats – ThinkJet, DeskJet, LaserJet, Epson (9 & 24-Pin), Seiko DPU 411/II, DPU 412. DC power provided for Seiko printers.

WAVEFORM STORAGE
Waveforms – Two 1000 point reference waveforms.

Setups – 10 front-panel setups.

POWER REQUIREMENTS
Maximum Power Consumption – 65 watts.

MECHANICAL
Cooling Method – Forced air circulation with no air filter.

ENVIRONMENTAL AND SAFETY
Temperature –
–10°C to +55°C (operating);
–51°C to +71°C (nonoperating).

Humidity – Up to 95% RH at or below +40°C; up to 75% RH from 41°C to 55°C (operating and nonoperating).

Altitude – To 15,000 ft./4570 m (operating); To 40,000 ft./12,190 m (nonoperating).

Electromagnetic Compatibility – Meets EN50081-1; VFG 0243; FCC Rules and Regs, 47 CFR, Part 15, Subpart B, Class A.

Safety – UL 1244 Listed, Category Certified CAN/CSA C-22.2 no. 231 Series M89.