Digital Real Time Oscilloscopes

These Products are sold through distributors in the US only.

New TDS 340A • New TDS 360 • New TDS 380

◢◣ Features

TDS 340A
- 100 MHz Bandwidth
- 500 MS/s Sampling Rate

TDS 360
- 200 MHz Bandwidth
- 1 GS/s Sampling Rate

TDS 380
- 400 MHz Bandwidth
- 2 GS/s Sampling Rate

COMMON FEATURES
- Two Input Channels
- 3.5" Floppy Disk Drive
- 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
- FFT Analysis
- 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
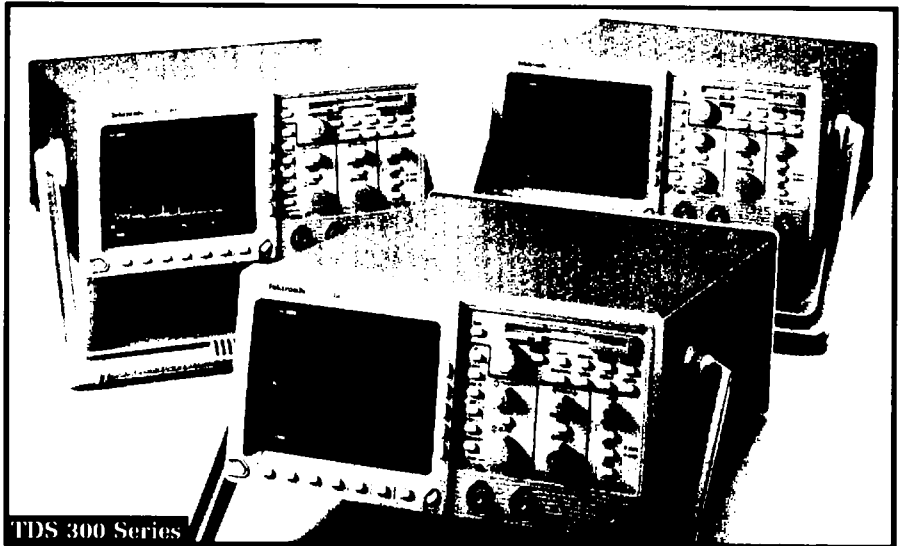
TDS 300 Series

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.

3.5" FLOPPY DISK DRIVE
All three models include a 3.5 inch, DOS-compatible floppy disk drive. Simply save screen images or data to disk, then insert the disk into your PC for importing to desktop publishing or spread sheet programs.

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.

ADVANCED MATH SIGNAL PROCESSING/FFT
Waveform functions are extended through the addition of "live" FFT analysis of waveforms. This added function makes the TDS 300 Series ideal for research and analysis applications, such as power supply design and mechanical analysis where power line harmonic distortion and resonance are critical measurements.

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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). TIF. 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.

Characteristics

SIGNAL ACQUISITION SYSTEM

Bandwidth – 100 MHz (TDS 340A). 200 MHz (TDS 360), 400 MHz (TDS 380).

Sample Rate – 500 MS/s on each channel (TDS 340A), 1 GS/s on each channel (TDS 360), 2 GS/s on each channel (TDS 380).

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 5 s/div (inclusive).

TIME BASE SYSTEM (MAIN AND DELAYED)

Time/Division Range – 10 ns to 5 s/div (TDS 340A), 2.5 ns to 5 s/div (TDS 360). 1 ns to 5 s/div (TDS 380).

Record Length – 1000 sample points per channel.

Time Base Accuracy – ±0.01%.

Roll Mode – 0.1 s/div and slower when Auto Trigger Mode is selected.

TRIGGERING SYSTEM (MAIN ONLY)

Trigger Types – Edge. Video.

Trigger Modes – Auto. Normal.

Trigger Inputs – CH1. CH2. Line. External.

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

Sin(x)/x Interpolation

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

FFT Analysis – A mixed radix FFT routine is applied to the time domain waveforms to analyze frequency content. A Hanning Window is always applied to the acquired signal. The display uses dBV_{RMS} vertical scaling.

Arithmetic Operators – Add. Subtract, Multiply.

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

NON-VOLATILE STORAGE

Waveforms – Two 1000 point reference waveforms.

Setups – 10 front panel setups.

Floppy Drive – 3.5'. 1.44 MB or 720 KB DOS-compatible: PC formats: .BMP, .TIF, .PCX, .EPS: spreadsheet formats: Excel™, Lotus123™, and MathCAD™ for mathematical modeling and analysis.

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 38,400. 9-Pin. DTE.

Video Output – Standard analog VGA output to external monitors.

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

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

Printer Formats – ThinkJet. DeskJet. LaserJet, Epson (9 & 24-Pin). Seiko DPU 411/II (HC411). DPU 412. DC power provided for Seiko printers.

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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 3111-1 Listed. Category Certified CAN/CSA C-22.2 No. 1010.1-92.

PHYSICAL CHARACTERISTICS

Dimensions	TDS 340A/TDS 360/TDS 380		Rackmount	
	mm	in.	mm	in.
Width with handle	362	14.3	483	19
Height with feet, pouch	191	7.5	--	–
without pouch	165	6.5	178	7
Depth (stand alone)	472	18.6	472	18.6
with front cover	490	19.3	–	–
with handle(s)	564	22.2	518	20.4
Weight	**kg**	**lb.**	**kg**	**lb.**
TDS 300	6.9	15.5	–	
Domestic Shipping	13.1	29	14.4*	32*

Weight of Conversion Kit only