

TDS 520
TDS 540

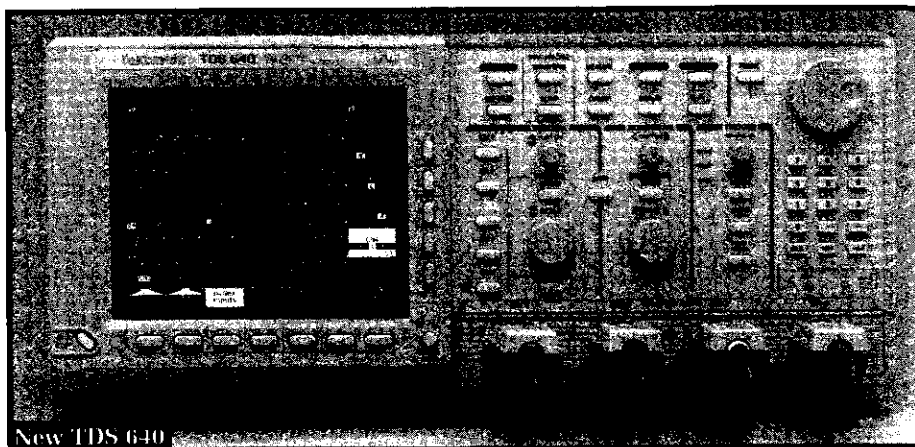
TDS 620
TDS 640

Digitizing Oscilloscopes

Designed to keep pace with evolving needs in digital design as well as manufacturing test, R&D and telecommunication applications.

TDS 520/TDS 540
TDS 620/TDS 640

- 500 MHz Bandwidth
- Sample Rates to 2 GS/s
- 2 and 4 Input Channels
- Time Interval, 2 ns Glitch, Runt, Pattern and State Triggering
- 1 mV/div to 10 V/div Sensitivity
- Infinite and Variable Persistence Displays
- Record Lengths to 50,000 Points
- 8 Bit Vertical Resolution and Up to 15 Bit Resolution with Hi-Res Acquisition Mode
- Vertical Accuracy to 1%
- FFT, Integration and Differentiation Option
- 25 Automatic Measurements
- 2 pF FET Probes Standard on TDS 600



SIGNAL ACQUISITION SYSTEM

	TDS 520/620	TDS 540/640
Channels	2 + 2 auxiliary	4
Samplers	2	4
Bandwidth	500 MHz	500 MHz
Sensitivity		
CH 1, CH 2	1 mV to 10 V/div	1 mV to 10 V/div
CH 3, CH 4	NA	Same as CH 1 and CH 2
AUX 1, AUX 2 (TDS 520)	100 mV, 1.0 V, 10 V/div	NA
AUX 1, AUX 2 (TDS 620)	Same as CH 1 and CH 2	NA
Position Range	± 5 Divisions	± 5 Divisions
Offset		
CH 1, CH 2	±1 V from 1 to 99.5 mV/div	±1 V from 1 to 99.5 mV/div
AUX1, AUX2 (TDS 620)	±10 V from 100 mV to 995 mV/div ±100 V from 1 to 10 V/div	±10 V from 100 mV to 995 mV/div ±100 V from 1 to 10 V/div
CH 3, CH 4	NA	Same as CH 1 and CH 2
AUX 1, AUX 2 (TDS 520)	100 mV/div ± 5 V 1 V/div ± 5.0 V 10 V/div ± 50 V	NA

Maximum Sample Rate -

	TDS 520	TDS 540	TDS 620	TDS 640
Single Channel	500 MS/s	1 GS/s	2 GS/s	2 GS/s
Dual Channels	250 MS/s	500 MS/s	2 GS/s	2 GS/s
Four Channels	NA	250 MS/s	NA	2 GS/s

VERTICAL SYSTEM

DC Gain Accuracy - TDS 500 ±1.0%;
TDS 600 ±1.5%.

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

Analog Bandwidth Selections - 20 MHz, 100 MHz, and full (Except Aux 1 and Aux 2 on TDS 520 are full BW only).

Input Coupling - AC, DC or GND.

Input Impedance Selections - 1 MΩ in parallel with 10 pF, or 50 Ω (AC and DC coupling).

Maximum Input Voltage - ±400 V (DC + peak AC). Derate at 20 dB/decade above 1 MHz. 1 MΩ or GND coupled.

Channel Isolation - >100:1 at 100 MHz and >30:1 at bandwidth for any two channels having equal Volts/div settings.

AC Coupled Low Frequency Limit - ≤10 Hz when AC-1 MΩ coupled. ≤200 kHz when AC 50 Ω coupled.

To order, contact your local sales office (listed on the inside back cover) or call the National Marketing Center at 1-800-426-2200, Ext. 99



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TDS 540

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TIME BASE SYSTEM

	TDS 520/540	TDS 620/640
Time Bases	Main, Delayed	Main, Delayed
Time/Division Range	500 ps to 10 s/div	500 ps to 5 s/div.
Time Base Accuracy	0.0025% over any interval ≥ 1 ms	0.01% over any interval ≥ 1 ms
Record Length	500 to 15000 pts. (50K pts optional)	500 to 2000 pts.
Pre-Trigger Position	0 to 100% of record	20% to 80% of record

TRIGGER TYPES

Edge (main and delayed)		Conventional level driven trigger. Positive or negative slope on any channel or rear panel auxiliary input (Except TDS 520). Coupling Selections: DC, AC, noise reject, HF reject, LF reject.
Pulse (main)	Width	Trigger on width of positive or negative pulse either within or not within selectable time limits. Time limits settable from 2 ns to 1 s.
	Glitch	Trigger on or reject glitches of positive, negative or either polarity. Minimum glitch width threshold is 2.0 ns, with 200 ps resolution.
	Runt	Trigger on a pulse that crosses one threshold but fails to cross a second threshold before returning across the first.
Logic (main)	Pattern	Specifies a logical combination (AND, OR, NAND, NOR) of the four input channels (Hi, Lo, Don't Care). Trigger when pattern stays True or False for user specified time.
	State	Any logical pattern of channels 1, 2 and 3 plus clock edge on channel 4. Triggerable on positive or negative clock edge.

ACQUISITION MODES

Peak Detect (TDS 520/540 only) – High frequency and random glitch capture. Captures glitches of 4 ns using acquisition hardware at all real-time sampling rates.

Sample – Sample data only.

Envelope – Max/min values acquired over one or more acquisitions.

Average – Waveform averages selectable from 2 to 10000.

Hi-Res (TDS 520/540 only) – Vertical resolution improvement and noise reduction on low-frequency signals, e.g. 15 bits at 5 ms/div and slower.

TRIGGERING SYSTEM

Triggers – Main, Delayed.

Main Trigger Modes – Auto, Normal, Single.

Delayed Trigger – Delayed by time and/or events.

Time Delay Range – 16 ns to 250 s (time/div ≤ 10 μ s); 15.1 ns to 250 s (time/div ≥ 25 μ s).

Events Delay Range – 1 to 9,999,999 events.

External Rear Input – (except TDS 520) >1.5 k Ω ; Max input voltage is ± 20 V (DC + AC peak).

DISPLAY

Waveform Style – Dots or vectors. Infinite and variable persistence selectable from 250 ms to 10 s.

Gray Scaling – With variable persistence selected, waveform points gradually decay through 16 levels of intensity, providing "z-axis" information about rapidly changing waveforms.

Update Rate – 200 waveforms per sec (TDS 500), 100 waveforms per sec (TDS 600). 500 point waveforms with infinite persistence display mode selected.

Graticules – Full, grid, cross hair, frame.

Format – YT and XY.

CRT Type – 7 in. diagonal, magnetic deflection. Horizontal raster-scan. P4 White phosphor.

CRT Resolution – 640 horizontal by 480 vertical displayed pixels.

ZOOM

The zoom feature allows waveforms to be expanded, compressed and positioned in both vertical and horizontal axes. Allows precise comparison and study of fine waveform detail without affecting ongoing acquisitions. When used with Hi-Res or Average acquisition modes, Zoom provides an effective vertical dynamic range of 1000 divisions or 100 screens.

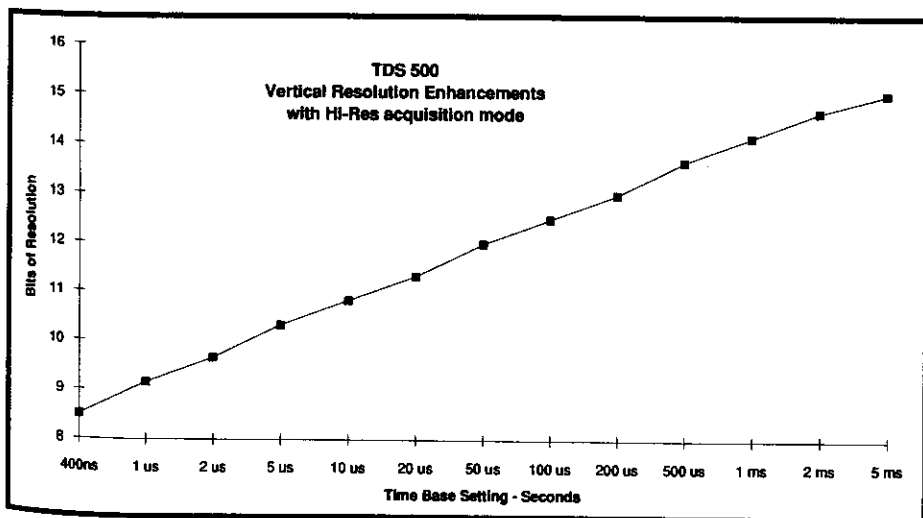
MEASUREMENT SYSTEM

Automatic waveform measurements –

Period	Frequency
High	Low
+ Width	– Width
Maximum	Minimum
Rise	Fall
Peak to Peak	Amplitude
+ Duty cycle	– Duty cycle
+ Overshoot	– Overshoot
Propagation delay	Burst Width
Mean	Cycle Mean
RMS	Cycle RMS
Area	Cycle Area
Phase	

Continuous update of up to four measurements on any combination of waveforms.

Continued on next page.



TDS 520
TDS 540

TDS 620
TDS 640

Digitizing Oscilloscopes

Thresholds – Settable in percentage or voltage.

Gated – Any region of the record may be isolated for measurement using vertical bars.

Snapshot – Performs all measurements on any one waveform showing results from one instant in time.

Cursor Measurements – Absolute, delta; Volts, Time, Frequency.

Cursor Types – Horizontal bars (volts); Vertical bars (time); operated independently or in tracking mode.

WAVEFORM PROCESSING

Waveform Functions – Interpolate-selectable $\sin(x)/x$ or linear, Average, Envelope.

Optional Advanced Waveform Functions – FFT, Integration, Differentiation.

FFT – Frequency Range: DC to 500 MHz. Amplitude Display: Power is dBV RMS, Linear RMS. Phase is degrees, radians. Signal to Noise: 55 to 65 dB (Avg or HiRes). Transform Size: 500 to 10,000 points selectable.

Windowing: Rectangular, Hamming, Hanning, Blackman – Harris.

Arithmetic Operators – Add, Subtract, Multiply, Invert.

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

Waveform Limit Testing – Compares incoming waveform to a reference waveform's upper and lower limits.

COMPUTER INTERFACE

GPIB (IEEE-488.2) Programmability – Full talk/listen modes. Control of all modes, settings, and measurements.

HARD COPY/DESKTOP PUBLISHING

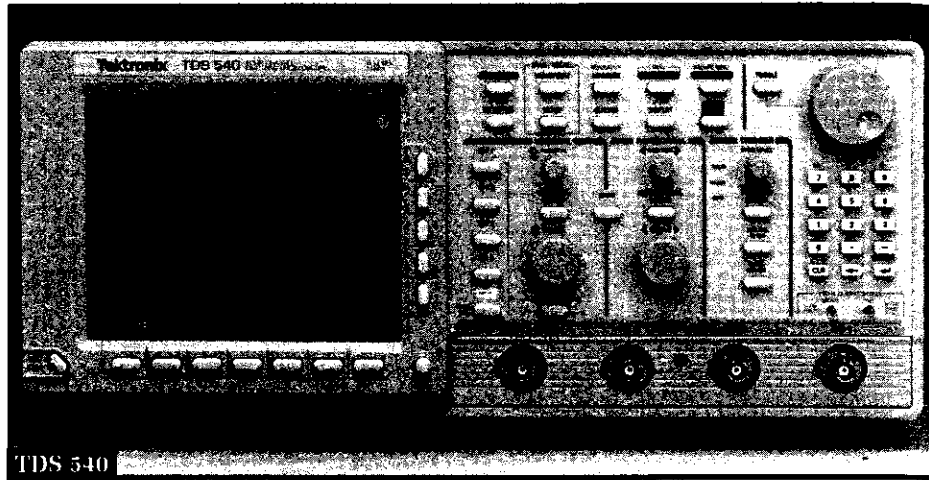
Printer – HP Thinkjet, Epson, PostScript, Deskjet, Laserjet.

Export File Formats – EPS(Encapsulated PostScript), Interleaf, TIFF, PCX, BMP.

Plotter Support – HPGL.

Standard Interface – GPIB.

Optional Hardcopy Interface – Centronics and RS-232C (Talk only).



STORAGE

Waveforms – (TDS 520/540) 4 full 5000 point records. 50,000 points total. (TDS 620/640) 4 full 2000 point waveforms.

Setups – 10 front panel setups.

POWER REQUIREMENTS

Line Voltage Range – 90 to 250 V RMS.

Line Frequency – 47 to 63 Hz.

Power Consumption – 300 Watts max.

ENVIRONMENTAL AND SAFETY

Temperature – Operating: 0 to +50°C. Nonoperating: -40 to +75°C.

Humidity – Operating and nonoperating: Up to 95% relative humidity at or below +40°C; to 75% relative humidity from +41 to +50°C.

Altitude – Operating: 14,000 ft., nonoperating: 40,000 ft.

Electromagnetic Compatibility – Meets MIL-STD-461C, CE-03, Part 4, Curve # 1, RE-02, Part 7; meets VDE 0871, Category B, FCC rules and regulations, Part 15, Subpart J, Class A.

Safety – Listed UL 1244, CSA Bulletin 556B, Sept. 1973; Tektronix self-certification to comply with IEC 348 recommendations.

PROBES

Active Probes – 10 x, 2 pF, 750 MHz FET (standard with TDS 600).

Passive Probes – 10 x, 8 pF, 500 MHz (standard with TDS 500).

PHYSICAL CHARACTERISTICS

Dimensions	mm	In.
Height with feet	236	9.3
without feet	193	7.6
Width with handle	445	17.5
Depth with front cover installed	432	17.0
Weight	kg	lbs.
Net ≈	12.3	27
Shipping ≈	20.0	44

Digitizing Oscilloscopes

TDS 520
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DIGITIZING OSCILLOSCOPES

ORDERING INFORMATION

TDS 520
2 Channel Digitizing Oscilloscope.....**\$9,490**

TDS 540
4 Channel Digitizing Oscilloscope.....**\$14,340**

Both include: 2 ea P6139A Probes (TDS 520); 4 ea P6139A Probes (TDS 540); Quick Reference Guide (070-8316-00); Tutorial/User Manual (070-8317-00); Programmer's Manual (070-8318-02); Front Cover (200-3696-00); U.S. Power Cord (161-0230-01)

TDS 620
2 Channel Digitizing Oscilloscope.....**\$13,540**

TDS 640
4 Channel Digitizing Oscilloscope.....**\$20,980**

Both include: 2 ea P6205 FET Probes (TDS 620); 4 ea P6205 FET Probes (TDS 640); Quick Reference Guide (070-8505-00); Tutorial/User Manual (070-8506-00); Programmer's Manual (070-8318-02); Front Cover (200-3696-00); U.S. Power Cord (161-0230-01)

Opt. 1K - K218 Scope Cart with Opt. 05 (No Power Strip).....**+\$695**

Opt. 1M (TDS 520/540 only) - 50K Memory Length

TDS 520.....**+\$1,500**

TDS 540.....**+\$1,950**

Opt. 1P - HC100 4 pen plotter with Opt. 01.....**+\$1,180**

Opt. 1R - Rack Mount.....**+\$400**

Opt. 2D (TDS 620 only) - Delete 2 ea P6205 Active Probes.....**-\$990**

Opt. 2F - Extended Waveform Math; FFT, Integration, Differentiation.....**+\$1,495**

Opt. 4D (TDS 640 only) - Delete 4 ea P6205 Active Probes.....**-\$1,980**

Opt. 13 - Add RS-232C and Centronics Hardcopy Interfaces.....**+\$495**

Opt. 9C - NIST and MIL-STD-45662A Calibration Certificate.....**+\$125**

Opt. 22 (TDS 520/540 only) - Two Additional P6139A Probes.....**+\$500**

Opt. 23 (All except TDS 640) - Add 2 ea P6205 Active Probes.....**+\$990**

Opt. 24 (TDS 620/640 only) - Add 4 ea P6139A Probes.....**+\$1,000**

Opt. 29 - TD100 Data Manager.....**+\$2,495**

Opt. B1 - Module Level Service Manual.....**+\$125**

INTERNATIONAL POWER PLUG OPTIONS

Opt. A1 - Universal Euro 220 V, 50 Hz.....**NC**

Opt. A2 - UK 240 V, 50 Hz.....**NC**

Opt. A3 - Australian 240 V, 50 Hz.....**NC**

Opt. A4 - North American 240 V, 60 Hz.....**NC**

Opt. A5 - Switzerland 220 V, 50 Hz.....**NC**

See General Customer Information Section for additional description.

WARRANTY-PLUS SERVICE OPTIONS

Three years warranty, covering all labor and parts, including CRT, and excluding probes.

Opt. M2 - Repair Protection.

TDS 520.....**+\$595**

TDS 540.....**+\$750**

TDS 620.....**+\$710**

TDS 640.....**+\$1,095**

Opt. M8 - Calibration Service.

TDS 520.....**+\$290**

TDS 540.....**+\$390**

TDS 620.....**+\$370**

TDS 640.....**+\$575**

SOFTWARE

TDS Data Manager Software - for TDS400, TDS500, TDS600 and TDS800 Scopes with Manual. For use on RIC386 and 2402A controllers or other DOS computers that have a National Instruments PCI/PCIIA GPIB cards. Does not support National Instrument PC-AT or PC-MC GPIB cards.

Order S34TDS1.....**\$795**

PROBES

See Probe Section on page 423 for complete descriptions and full line of probes.

Active - 750 MHz, 2 pF/1 M Ω , 1.5 m. Order P6205.....**\$495**

Differential - 100 MHz, Active Differential, 6 ft. Order P6046.....**\$2,195**

High Voltage -

100X, 120 MHz, 1500 V, 2.5 pF/10 M Ω , 9 ft. Order P6009.....**\$265**

1000X, 75 MHz, 20 kV, 3.0 pF/100 M Ω , 10 ft. Order P6015A.....**\$895**

General Purpose -

1X, 15 MHz, 54 pF/1 M Ω , 2m. Order P6101B.....**\$60**

10X, 500 MHz, 8.0 pF/10 M Ω , 1.3m. Order P6139A.....**\$250**

50 Ω Divider - 50 Ω Inputs, 2 Tips: 10X, 100X.

10X: 3.5 GHz, 1 pF/500 Ω , 1.5m;

100X: 3 GHz, 1 pF/5000 Ω , 1.5m. Order P6156 with Opt. 25.....**\$325**

Logic - 20 MHz, 17 bit, Word Recognizer/Trigger.

Order P6408.....**\$425**

Micro/Fixed - See Probe Section, pages 440-441.

Spring Contact - See Probe Section, pages 440-441.

Current - (AC only), 120 Hz to 60 MHz, 7.5 A peak.

Order P6021.....**\$545**

(AC only), 935 kHz to 120 MHz, 3 A peak. Order P6022.....**\$595**

(DC & AC), DC-50 MHz System. Includes AM503A, A6302 20A probe, TM502A. Order AM503S.....**\$2,595**

Carts - Order K218.....**\$695**

TDS Scope with TDS100 - with Keyboard Tray.

Order K220 and 436-0240-00.....**\$775**

CAMERAS/HARD COPY DEVICE

Camera - Order C-9 with Opt 05 and Opt. 1A.....**\$710**

Hood Adapter - Order 016-1145-00.....**\$60**

Plotter - with GPIB and Centronics Interface.

Order HC100 with Opt. 01.....**\$1,180**

ADDITIONAL ACCESSORIES

Security Cable - Order 012-1388-00.....**\$42**

Soft-sided Carrying Case

TDS 500,600,800. Order 016-0909-00.....***1**

With TD100/RIC386. Order 016-1095-00.....**\$330**

Transit Case - With TD100/RIC386. Order 016-1135-00.....**\$550**

*1 Contact your local Tektronix representative for price information.

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