

# Digital Real-Time™ Oscilloscopes

TDS 684C • TDS 680C • TDS 654C • TDS 620B • TDS 640A



## Features and Benefits

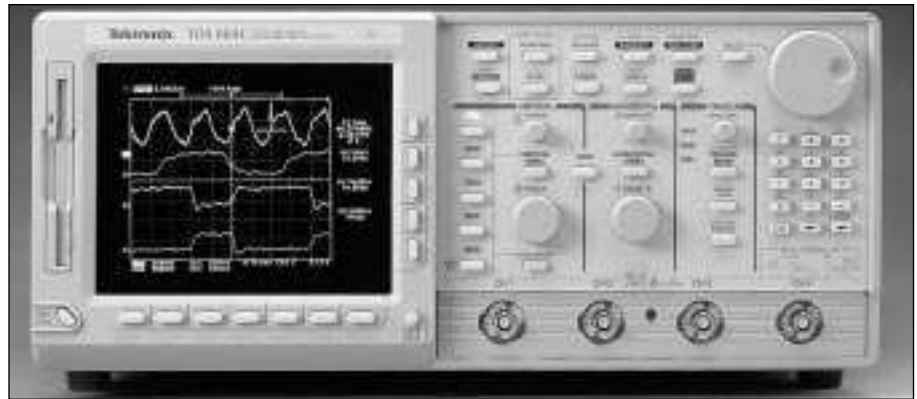
TDS 684C/TDS 680C/TDS 654C/TDS 620B/  
TDS 640A

- 1 GHz and 500 MHz Bandwidth Performance to Work with Fast Signals in Today's Digital Designs
- 5 GS/s Sample Rates\*
- Record Length to 15,000 Points
- 1 mV/div to 10 V/div Sensitivity
- 1.5% Vertical Accuracy
- Histograms and Measurement Statistics to More Fully Characterize Design Performance
- Support for Java Applications Packages
- Hard Disk Drive Storage (option)
- Support for External Zip Drive
- Waveform Math and Advanced Waveform DSP
- 1 ns Peak Detect (not available w/TDS640A)
- Channel Deskew (not available w/TDS640A)
- Fully Automated Measurement System
- Waveform Pass/Fail Template Testing
- Color Display (TDS654C, TDS684C)
- RS-232, Centronics, and GPIB



## Applications

- Digital Design and Characterization
- Telecommunications/Datacommunications
- Transient Event Capture
- High Energy Physics



### TDS 684C

Your designs may be digital but at today's speeds, many of your toughest problems aren't. Crosstalk noise. Transmission effects. Ground bounce. Not to mention sub-nanosecond edges. Today's design problems require high bandwidth oscilloscopes that can measure up to these challenges. The Digital Real-Time™ architecture of the TDS 600 Series simplifies capturing intermittent signals or non-recurring problems like glitches or metastable states caused by setup and hold time violations.

TDS 600 Series provides design engineers excellent single shot accuracy for multi-channel, high speed signal characterization. Additional features and specifications of the TDS 600 Series are explained in the TDS Reference section available at [http://www.tek.com/Measurement/Products/catalog/scopes/tds\\_series](http://www.tek.com/Measurement/Products/catalog/scopes/tds_series).

	TDS 640A	TDS 620B	TDS 654C	TDS 680C	TDS 684C
Total Channels	4	2 + 2	4	2 + 2	4
Sample Rate (all channels simultaneously)	2 GS/s	2.5 GS/s	5 GS/s	5 GS/s	5 GS/s
Real-time Bandwidth	500 MHz	500 MHz	500 MHz	1 GHz	1 GHz
Maximum Record Length per Channel	2,000 pts	15,000 pts	15,000 pts	15,000 pts	15,000 pts
Vertical Resolution	8-Bits; >11-Bits with averaging				
Time Measurement Accuracy	<110 ps @ 2 GS/s	<100 ps @ 2.5 GS/s	<50 ps @ 5 GS/s	<50 ps @ 5 GS/s	<50 ps @ 5 GS/s
Advanced Waveform DSP/Math	Std.	Std.	Std.	Std.	Std.
Histograms and Measurement Statistics	N/A	N/A	Std.	Std.	Std.
Standard Probes	4 P6139A	2 P6139A	4 P6243	None	None
Display Type	7 in. mono	7 in. mono	7 in. color	7 in. mono	7 in. color
Floppy Drive	Std.	Std.	Std.	Std.	Std.
GPIB Port	Std.	Std.	Std.	Std.	Std.
RS-232 & Centronics	Std.	Std.	Std.	Std.	Std.
VGA I/O Port	Std. Mono	Std. Mono	Std. Color	Std. Mono	Std. Color
Printer Ports					
Hard Disk Drive	N/A	N/A	Opt.	Opt.	Opt.

\* Not available with TDS620B or TDS640A



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



Tektronix measurement products are manufactured in ISO registered facilities.



Product(s) complies with IEEE Standard 488.2-1987, and with Tektronix Standard Codes and Formats.

### TIME BASE SYSTEM

**Time Bases** – Main and Delayed.

**Time/div Range** – 200 ps/div to 10 s/div.  
Except TDS 640A: 500 ps/div to 5 s/div.

**Time Base Accuracy** – Over Any Interval  
>1ms ±100 ppm.

**Record Length per Channel** – 500 to 15,000 pts. Except TDS 640A: 500 to 2,000 pts.

**Pre-Trigger Position** – 0% to 100% of Record.

### VERTICAL SYSTEM

**Vertical Resolution** – 8-Bits (>11-Bits with averaging).

**Vertical Sensitivity** – 1 mV/div to 10 V/div.

**Maximum Input Voltage** – 300 V CAT II; ±400 V peak. Derate at 20 dB/decade above 1 MHz.

**DC Gain Accuracy** – 1.50%.

**Position Range** – ±5 divs.

**Offset** – Primary channels: ±1 V from 1 to 99.5 mV/div, ±10 V from 100 mV to

# Digital Real-Time™ Oscilloscopes

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## CHARACTERISTICS

995 mV/div,  $\pm 100$  V from 1 V to 10 V/div.  
Aux. 1, Aux. 2 (TDS 620B, TDS 680C only):  
same as primary channels.

**Bandwidth Selections** – 20 MHz, 250 MHz,  
and Full.

**Input Impedance Selections** – 1 M $\Omega$  in paral-  
lel with 10 pF, or 50  $\Omega$  (AC and DC coupling).

**Input Coupling** – AC, DC or GND.

**AC Coupled Low Frequency Limit** – <10 Hz  
when AC, 1 M $\Omega$  coupled. <200 kHz when AC,  
50  $\Omega$  coupled.

**Channel Isolation** – >100:1 at 100 MHz and  
>30:1 at BW for any two channels having  
equal V/div settings.

### ACQUISITION MODES

Peak Detect\*<sup>1</sup>, Sample, Single Sequence,  
Envelope, Average.

### TRIGGERING SYSTEM

**Triggers** – Edge (main and delayed); Pulse

(Width, Glitch, Runt, Slew Rate\*<sup>1</sup>, Time Out\*<sup>1</sup>);  
Logic (Pattern, State, and Setup & Hold Time  
Violation\*<sup>1</sup>); HDTV Video (optional).

**Main Trigger Modes** – Auto, Normal, Single.

**Delayed Trigger** – Delay by time, events, or  
events and time.

**Delay by Time Range** – 16 ns to 250 s. Except  
TDS 640A: 16 ns to 250 s for t/div setting <10  
 $\mu$ s; 15.1 to 250 s for t/div setting >25  $\mu$ s.

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

**External Trigger Input** – Input Impedance:  $\geq 1.5$   
k $\Omega$ ; Max. Input Voltage:  $\pm 20$  V (DC + peak AC).

### DISPLAY

**Color CRT Monitor (TDS 654C/684C)** – 7 in.  
diagonal NuColor™ liquid crystal full-color  
shutter, 256 levels.

**Monochrome CRT Monitor (TDS 620B/680C/  
640A)** – 7 in. diagonal, magnetic deflection.  
Horizontal raster-scan. P4 white phosphor.

### MEASUREMENT SYSTEM

**Automatic Measurements** – 25 (on entire  
record or gated region).

**Measurement Accuracy** – TDS  
654C/680C/684C: <50 ps typical @ 5 GS/s  
single shot; TDS 620B: <100 ps typical @ 2.5  
GS/s single shot. TDS 640A: <110 ps @ 2  
GS/s single shot.

**Cursors Measurement** – Absolute, Delta;  
volts, time, frequency, NTSC IRE units and  
line number with Video Trigger Option.

### WAVEFORM PROCESSING

**Waveform Functions** – Interpolation (sin(x)/x  
or linear), Average, Envelope, Auto Setup.

**Advanced Waveform Functions** – FFT,  
Integration, Differentiation, Waveform (math  
or acquired) Limit Testing.

\*<sup>1</sup> Not available in TDS 640A

## ORDERING INFORMATION

### TDS 684C

Four-channel Color 1 GHz, 5 GS/s Per Channel  
Digital Real-Time Oscilloscope.

### TDS 680C

Two-channel Monochrome 1 GHz, 5 GS/s Per  
Channel Digital Real-Time Oscilloscope.

### TDS 654C

Four-channel Color 500 MHz, 5 GS/s Per Channel  
Digital Real-Time Oscilloscope. **Includes:** four  
P6243 FET Probes.

### TDS 684C, TDS 680C, TDS 654C INCLUDE

User Manual (070-0130-00); User Supplement (071-  
0273-00); Quick Reference Guide (020-2235-00);  
Programmer's Manual in MS-Help format on floppy  
disk (063-3120-00); Technical Reference Manual  
(071-0272-00).

### TDS 640A

Four-channel Monochrome 500 MHz, 2.0 GS/s Per  
Channel Digital Real-Time Oscilloscope.

**Includes:** Four P6139A Passive Probes. User  
Manual (070-8715-04); Quick Reference Guide  
(070-8711-02); Programmer's Manual in MS-Help  
format on floppy disk (070-8709-07); Technical  
Reference Manual (070-8717-02).

### TDS 620B

Two-channel Monochrome 500 MHz, 2.5 GS/s Per  
Channel Digital Real-Time Oscilloscope.

**Includes:** Two P6139A Passive Probes. User  
Manual (071-0130-00); Quick Reference Guide  
(020-2235-00); Programmer's Manual in MS-Help  
format on floppy disk (063-3002-00); Technical  
Reference Manual (071-0135-00).

### ALL INCLUDE

Front Cover (200-3696-00); North American Power  
Cord (161-0230-01); Accessory Pouch (TDS  
654C/TDS 684C Only) 016-1268-00.

### OPTIONS AVAILABLE (EXCEPT WHERE NOTED)

**Opt. 05** – Video Trigger, NTSC, PAL, HDTV,  
FlexFormat™.

**Opt. 1K** – Model K420 Instrument Cart.

**Opt. 1R** – Rackmount Kit.

**Opt. 2D** – (TDS 620B only) Delete Standard two  
P6139A Probes.

**Opt. 33** – (TDS684C/TDS680C only) Add 1 ea.  
P6158 Low Capacitance Probe.

**Opt. 34** – (TDS684C/680C/654C Only) Add 1 ea.  
P6247 differential Probe.

**Opt. 35** – (TDS654C Only) Add 1 ea. P6243 Active  
Probe.

**Opt. 36** – (TDS684C/680C/654C Only) Add 1 ea.  
P6139A Passive Probe.

**Opt. 37** – (TDS684C/680C Only) add 1 ea. P6245  
Active Probe.

**Opt. HD** – (TDS684C/680C/654C Only) Internal Hard  
Disk Drive.

**Opt. D1** – Calibration Data Report.

### INTERNATIONAL POWER PLUG OPTIONS

**Opt. A1** – Universal Euro 220 V, 50 Hz.

**Opt. A2** – UK 240 V, 50 Hz.

**Opt. A3** – Australian 240 V, 50 Hz.

**Opt. A4** – North American 240 V, 60 Hz.

**Opt. A5** – Switzerland 220 V, 50 Hz.

### MEASUREMENT SERVICE OPTIONS

**Opt. C3** – Three years of Calibration Services.

**Opt. C5** – Five years of Calibration Services.

**Opt. D3** – Test Data (requires Opt. C3).

**Opt. D5** – Test Data (requires Opt. C5).

**Opt. R5** – Repair warranty extended to cover five  
years.

### RECOMMENDED ACCESSORIES

**WSTRO** – WaveStar™ software for Oscilloscopes,  
Windows 95/NT application for waveform capture,  
analysis, documentation and control from your PC.

**P6563A** – 500 MHz, 20X SMD Probe

**SureFoot** – Surface Mount Device Interconnects.

### For further information, contact Tektronix:

**World Wide Web:** <http://www.tek.com>; **ASEAN Countries** (65) 356-3900; **Australia & New Zealand** 61 (2) 888-7066; **Austria, Eastern Europe, & Middle East** +43 2236 8092 0; **Belgium** +32 (2) 715.89.70;  
**Brazil and South America** 55 (11) 3741-8360; **Canada** 1 (800) 661-5625; **Denmark** +45 (44) 850 700; **Finland** +358 (9) 4783 400; **France & North Africa** +33 1 69 86 81 81; **Germany** + 49 (221) 94 77 400;  
**Hong Kong** (852) 2585-6688; **India** (91) 80-2275577; **Italy** +39 (2) 25086 501; **Japan (Sony/Tektronix Corporation)** 81 (3) 3448-3111; **Mexico, Central America, & Caribbean** 52 (5) 666-6333;  
**The Netherlands** +31 23 56 95555; **Norway** +47 22 07 07 00; **People's Republic of China** 86 (10) 6235 1230; **Republic of Korea** 82 (2) 528-5299; **South Africa** (27 11)651-5222; **Spain & Portugal** +34 (1) 372 6000;  
**Sweden** +46 (8) 629 6503; **Switzerland** +41 (41) 729 36 40; **Taiwan** 886 (2) 2722-9622; **United Kingdom & Eire** +44(0)1628 403400; **USA** 1 (800) 426-2200.

**From other areas, contact:** Tektronix, Inc. Export Sales, P.O. Box 500, M/S 50-255, Beaverton, Oregon 97077-0001, USA 1 (503) 627-6877.

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