Digital Real-Time™ Oscilloscopes

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

Features and Benefits

TDS 684/C/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 Deskel (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.

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 >1 ms ±100 ppm.
Record Length per Channel – 500 to 15,000 points.
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 div.
Offset – Primary channels: ±1 V from 1 to 99.5 V/div, ±10 V from 100 mV to

Specifications:

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

* Not available with TDS620B or TDS640A

See Tektronix on the World Wide Web: http://www.tek.com
**Digital Real-Time™ Oscilloscopes**

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

**CHARACTERISTICS**

995 mV/div, ±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 MΩ in parallel with 10 pF, or 50 Ω (AC and DC coupling).

**Input Coupling**

- AC, DC, or GND.

**AC Coupled Low Frequency Limit**

- <10 Hz when AC, 1 MΩ coupled, <200 kHz when AC, 50 Ω coupled.

**Channel Isolation**

- >100:1 at 100 MHz and equal V/div settings.

**ACQUISITION MODES**

- Peak Detect*, Sample, Single Sequence, Diagonal NuColor™ liquid crystal full-color shutter, 256 levels.

**TRIGGERING SYSTEM**

- Triggers – Edge (main and delayed); Pulse (Width, G glitch, Runt, Slope Rate*, Time Cut*1);
- Logic (Pattern, State, and Setup & Hold Time Violation*1), 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 µs; 15.1 to 250 s for t/div setting >25 µs.

**Delay by Events Range**

- 1 to 9,999,999 events.

**External Trigger Input**

- Input Impedance: ±1.5 kΩ; Max. Input Voltage: ±20 V (DC peak-to-peak).

**DISPLAY**

- Color CRT Monitor (TDS 654C/684C) – 7 in. diagonal NiColor™ 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 640C: 100 µV/div, ±20 V from 1 V to 10 V/div.

**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.

**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.
- TDS 640A
  - Four-channel Monochrome 500 MHz, 2.0 GS/s Per Channel Digital Real-Time Oscilloscope.
- TDS 640A

For further information, 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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