



## Digitizing Oscilloscopes

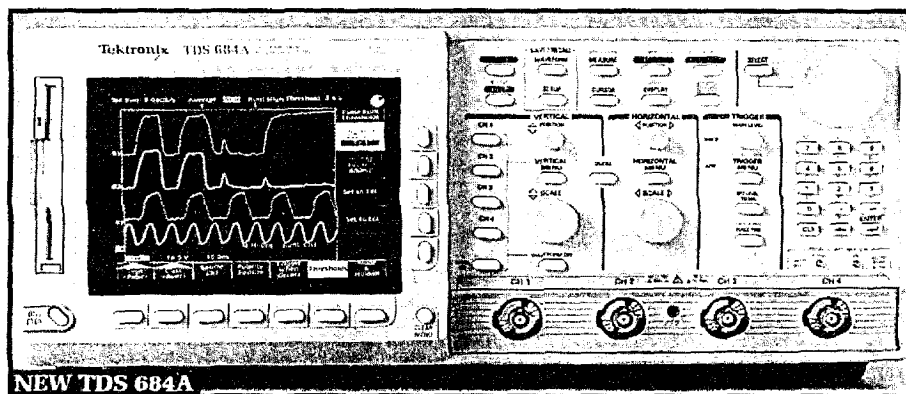
DIGITIZING OSCILLOSCOPES

- TDS 684A
- TDS 644A
- TDS 640A
- TDS 620A

High-performance, digital real-time oscilloscopes combine high bandwidth with ultra fast sampling across all channels to streamline performance verification and debug of high speed digital circuits.

### TDS 684A/TDS 644A/ TDS 640A/TDS 620A

- 1 GHz and 500 MHz Bandwidth
- 5 GS/s and 2 GS/s Sample Rates
- 4 and 2 Input Channels
- 8-bit Vertical Resolution
- Greater than 11-bits with Averaging
- Record Length to 15,000 Points
- 1 mV/div to 10 V/div Sensitivity
- 1.5% Vertical Accuracy
- Waveform Math and Advanced Waveform DSP
- Fully Automated Measurement System
- Waveform Pass/Fail Template Testing
- Color VGA Display
- 3.5 in. DOS Format Floppy Drive
- RS-232, Centronics, GPIB and VGA I/O Ports



**NEW TDS 684A**

The newest addition to the TDS 600A Series is the TDS 684A. The 1 GHz bandwidth is supported by 5 GS/s sampling on all channels making it the fastest 4-channel digital real-time oscilloscope available.

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. The Digital Real-Time architecture of the TDS 600A

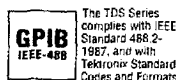
Series simplifies capturing intermittent signals or non-recurring problems like glitches or metastables caused by setup and hold time violations.

Additional features and specifications of the TDS 600A Series are explained in the TDS Reference section beginning on page 50.

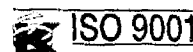
### CHARACTERISTICS

	TDS 620A	TDS 640A	TDS 644A	TDS 684A
Total Channels	2 + 2 aux.	4	4	4
Sample Rate (all channels simultaneously)	2 GS/s	2 GS/s	2 GS/s	5 GS/s
Real-Time Bandwidth	500 MHz	500 MHz	500 MHz	1 GHz
Maximum Record Length per Channel	2,000 pts	2,000 pts	2,000 pts	15,000 pts
Vertical Resolution	8-bits; >11-bits with averaging			
Time Measurement Accuracy	<110 ps @ 2 GS/s	<110 ps @ 2 GS/s	<110 ps @ 2 GS/s	<50 ps @ 5 GS/s
Advanced Waveform DSP/Math	Opt.	Opt.	Std.	Std.
Standard Probes	2 P6205	4 P6205	4 P6205	None
Display Type	7 in. mono	7 in. mono	7 in. color	7 in. color
Disk Drive	Opt.	Opt.	Std.	Std.
GPIB Port	Std.	Std.	Std.	Std.
RS-232 & Centronics Printer Ports	Opt.	Opt.	Std.	Std.
VGA I/O Port	Std. Mono	Std. Mono	Std. Color	Std. Color

Product(s) available through your local Tektronix representative (listed in the back of this catalog) or call 1-800-426-2200.



The TDS Series complies with IEEE Standard 488.2-1987, and with Tektronix Standard Codes and Formats.



Tektronix Measurement products are manufactured in ISO registered facilities.

### APPLICATIONS

- Digital Design and Debug
- Telecommunications
- Transient Event Capture
- High Energy Physics

# Digitizing Oscilloscopes

**TDS 684A**  
**TDS 644A**  
**TDS 640A**

DIGITIZING OSCILLOSCOPES

## TRIGGERING TYPES COMPARISON

	TDS 620A	TDS 640A	TDS 644A	TDS 684A
Edge	Yes	Yes	Yes	Yes
Time Qualified Edge (Slew Rate)	-	-	-	Yes
Pulse Width, Runt Pulse, Glitch	Yes	Yes	Yes	Yes
Time Qualified Pattern	Yes	Yes	Yes	Yes
Clock Qualified State	Yes	Yes	Yes	Yes
Setup/Hold Time	-	-	-	Yes
<b>Triggering Conditioning</b>				
HF, LF and Noise Reject	Yes	Yes	Yes	Yes
<b>Triggering Modes</b>				
Main Trigger				
Auto, Normal, Single	Yes	Yes	Yes	Yes
Delay Trigger				
Delay by Time, Delay by Events, Delay by Time and Events	Yes	Yes	Yes	Yes
Delay by Time Range		16 ns to 250 S for t/div setting <10 us 15.1 ns to 250 S for t/div setting >25 us		
Delay by Events Range		1 to 9,999,999 events		
<b>External Trigger Input</b>				
Input Impedance		> 1.5 k $\Omega$		
Maximum Input Voltage		$\pm 20$ V (DC plus Peak AC)		

## TIME BASE SYSTEM

	TDS 620A/640A/644A	TDS 684A
Time Bases	Main and Delayed	Main and Delayed
Time/div Range	500 ps/div to 5 s/div	200 ps/div to 10 s/div
Time Base Accuracy over any interval >1ms	$\pm 100$ ppm	$\pm 100$ ppm
Record Length per Channel	500 to 2,000 pts	500 to 15,000 pts
Pre-Trigger Position	20% to 80% of Record	20% to 80% of Record

## VERTICAL SYSTEM

**Vertical Resolution** – 8-bits (<11-bits with averaging).

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

**Maximum Input Voltage** –  $\pm 400$  V (DC + peak AC). Derate at 20 dB/decade above 1 MHz.

**DC Gain Accuracy** – 1.5%

**Position Range** –  $\pm 5$  divs.

**Offset** – Primary channels  $\pm 1$  V from 1 to 99.5 mV/div,  $\pm 10$  V from 100 mV to 995 mV/div,  $\pm 100$  V from 1 V to 10 V/div. Aux. 1, Aux. 2 (TDS 620A only)  $\pm 10$  V from 100 mV to 995 mV/div,  $\pm 100$  V from 1 V to 10 V/div.

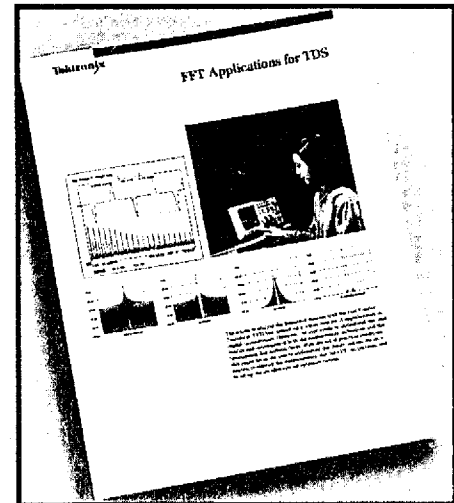
**Bandwidth Selections** – 20 MHz, 100 MHz (250 MHz TDS 684A), and Full.

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

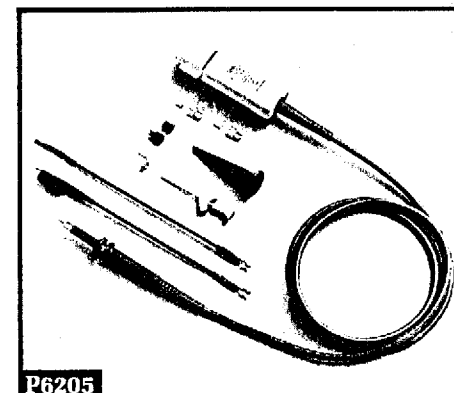
**Input Coupling** – AC, DC or GND.

**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.



A wide selection of application notes and technical briefs have been written to help ease your understanding and use of specific instrument features. Contact your local sales office for details.



**P6205**

## Accessory

### P6205

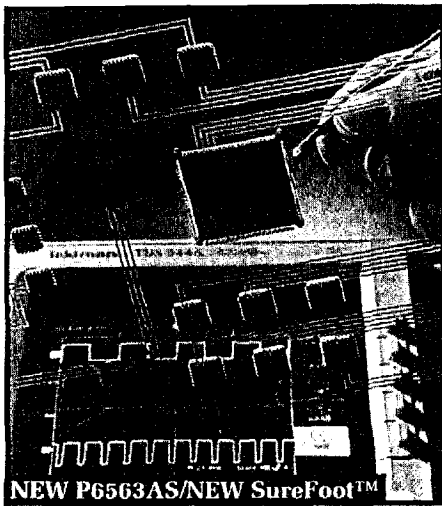
*Lower Circuit Under Test Loading*

- FET Probe performance at a lower cost
- <2 pF/1 M $\Omega$  provides lower circuit loading than conventional passive probes
- Wide bandwidth (DC to 750 MHz)

For complete selection information on all Accessory products, see page 446.

TDS 684A  
TDS 644A  
TDS 640A  
TDS 620A

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## Accessories

### P6563AS

*Direct Access to SMD Packages*

- SMD package support: 50 mil, 25 mil JEDEC, 0.65 mm, 0.5 mm EIAJ
- Low mass probe body and cable system
- DC to 500 MHz bandwidth, 5 pF/9.5 MΩ loading, 20X attenuation

### P6245

*Active FET Probe for SMDs*

- Low DUT loading ( $\leq 1$  pF/1 MΩ)
- Low mass probe head/cable
- 1.5 GHz bandwidth

### SureFoot™

*Easier Access to SMT Circuitry*

- Handheld probing made easier
- No shorting
- No slipping off
- Direct tip connection

*For complete selection information on all Accessory products, see page 446.*

## ORDERING INFORMATION

<b>TDS 684A</b> 5 GS/s, 1 GHz, 4 Channel.....	<b>\$29,495</b>	<b>Opt. 4D</b> – (TDS 644A/640A only) Delete Standard Four P6205 Probes.....	<b>-\$2,380</b>
<b>TDS 644A</b> 2 GS/s, 500 MHz, 4 Channel.....	<b>\$19,895</b>	<b>Opt. 95</b> – Calibration Data Report.....	<b>+\$150</b>
<b>TDS 640A</b> 2 GS/s, 500 MHz, 4 Channel.....	<b>\$18,250</b>	<b>Opt. 96</b> – Calibration Certificate.....	<b>+\$50</b>
<b>TDS 620A</b> 2 GS/s, 500 MHz, 2 Channel.....	<b>\$11,995</b>	<b>INTERNATIONAL POWER PLUG OPTIONS</b>	
<b>All Include (except where noted):</b> Four Each P6205 FET Probes (TDS 644A/TDS 640A); Two Each P6205 FET Probes (TDS 620A); Reference Manual (TDS 644A/640A/620A: 070-8711-01, TDS 684: 070-8999-00); User Manual (TDS 644A/640A/620A: 070-8711-01, TDS 684A: 070-8991-01); Programmer's Manual (070-8709-04); Front Cover (200-3696-00); North American Power Cord (161-0230-01); Accessory Pouch (TDS 684A: 016-1268-00).		<b>Opt. A1</b> – Universal Euro 220 V, 50 Hz.....	<b>NC</b>
<b>Opt. 05</b> – Video Trigger, NTSC, PAL, HDTV, FlexFormat™.....	<b>+\$1,495</b>	<b>Opt. A2</b> – UK 240 V, 50 Hz.....	<b>NC</b>
<b>Opt. 13</b> – (TDS 640A/620A only) RS-232C/Centronics Hardcopy Ports.....	<b>+\$495</b>	<b>Opt. A3</b> – Australian 240 V, 50 Hz.....	<b>NC</b>
<b>Opt. 1F</b> – (TDS 640A/620A only) 3.5 in. 1.44 MB Floppy Drive.....	<b>+\$495</b>	<b>Opt. A4</b> – North American 240 V, 60 Hz.....	<b>NC</b>
<b>Opt. 1K</b> – Model K420 Instrument Cart.....	<b>+\$730</b>	<b>Opt. A5</b> – Switzerland 220 V, 50 Hz.....	<b>NC</b>
<b>Opt. 1R</b> – Rackmount Kit.....	<b>+\$400</b>	See General Customer Information Section for additional description.	
<b>Opt. 2D</b> – (TDS 620A only) Delete Standard Two P6205 Probes.....	<b>-\$1,190</b>	<b>SERVICE ASSURANCE OPTIONS</b>	
<b>Opt. 22</b> – (TDS 620A only) Add Two P6139A 10X Passive Probes.....	<b>+\$560</b>	<b>Opt. R2</b> – Adds two years of post-warranty Repair Protection TDS 620A.....	<b>+\$400</b>
<b>Opt. 23</b> – (TDS 620A only) Add Two P6205 10X, 2pF FET Probes.....	<b>+\$1,190</b>	TDS 640A/644A/684A.....	<b>+\$590</b>
<b>Opt. 24</b> – (TDS 684A/644A/640A only) Add Four P6139A 10X Passive Probes.....	<b>+\$1,120</b>	<b>Opt. C5</b> – Adds five years of Calibration Services TDS 620A.....	<b>+\$1,050</b>
<b>Opt. 25</b> – (TDS 644A/640A only) Add Four P6563AS 20X SMD Probes.....	<b>+\$825</b>	TDS 640A/644A/684A.....	<b>+\$1,225</b>
<b>Opt. 26</b> – (TDS 684A only) Add Four P6245 1 GHz, 1pF FET Probes.....	<b>+\$5,580</b>	<b>PRODUCT UPGRADES</b>	
<b>Opt. 2F</b> – (TDS 640A/620A only) Advanced Waveform DSP Math.....	<b>+\$995</b>	<b>Advanced DSP Math</b> – FFT, integration, differentiation. For TDS 620/620A or TDS 640/640A. Order TDS6F2F.....	<b>\$1,295</b>
<b>Opt. 2P</b> – (TDS 684A/644A only) Color Printer, Tektronix Phaser™ 200e Thermal Wax Transfer.....	<b>+\$2,695</b>	<b>Hardcopy I/O Ports</b> – RS-232 and Centronics. For TDS 620/620A or TDS 640/640A. Order TDS6F13.....	<b>\$595</b>

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