Digital Phosphor Oscilloscopes

TDS3000C Series Data Sheet

Features & Benefits

Key Performance Specifications

- 100 MHz, 300 MHz, and 500 MHz Bandwidth Models
- 2 or 4 Channels
- Sample Rates up to 5 GS/s Real Time on All Channels
- 10 k Standard Record Length on All Channels
- 3,600 wfms/s Continuous Waveform Capture Rate
- Suite of Advanced Triggers

Ease-of-Use Features

- Front-panel USB Host Port for Easy Storage and Transfer of Measurement Data
- 25 Automatic Measurements
- FFT Standard
- Multiple Language User Interface
- WaveAlert® Automatic Waveform Anomaly Detection
- TekProbe® Interface Supports Active, Differential, and Current Probes for Automatic Scaling and Units

Portable Design

- Lightweight Design (only 7 lb./3.2 kg) for Easy Transport
- Optional Internal Battery Operation Provides up to Three Hours Without Line Power

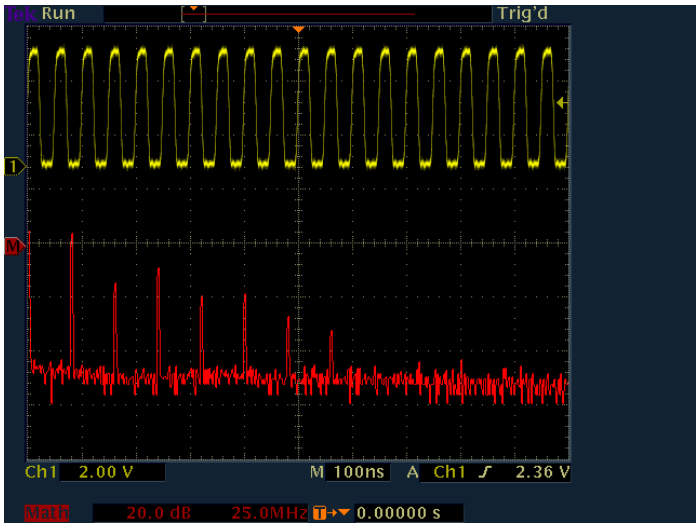
Application Modules for Specialized Analysis

- Advanced Analysis Module
- Limit Testing Module
- Telecommunications Mask Testing Module
- Extended Video Module
- 601 Serial Digital Video Module

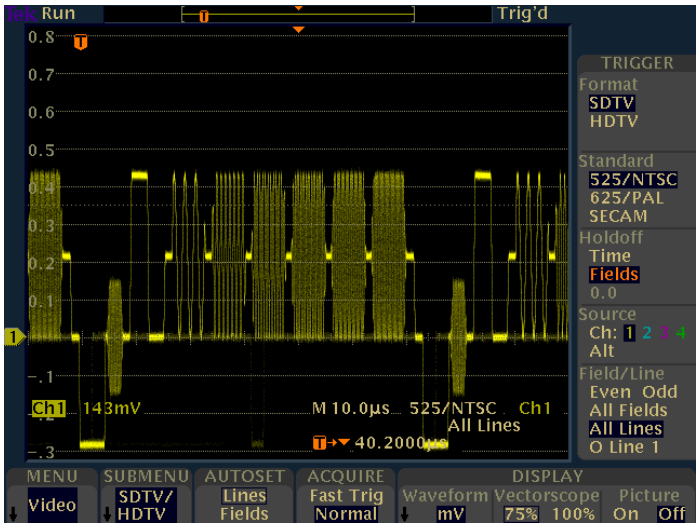
Applications

- Digital Design and Debug
- Video Installation and Service
- Power Supply Design
- Education and Training
- Telecommunications Mask Testing
- Manufacturing Test
- General Bench Testing

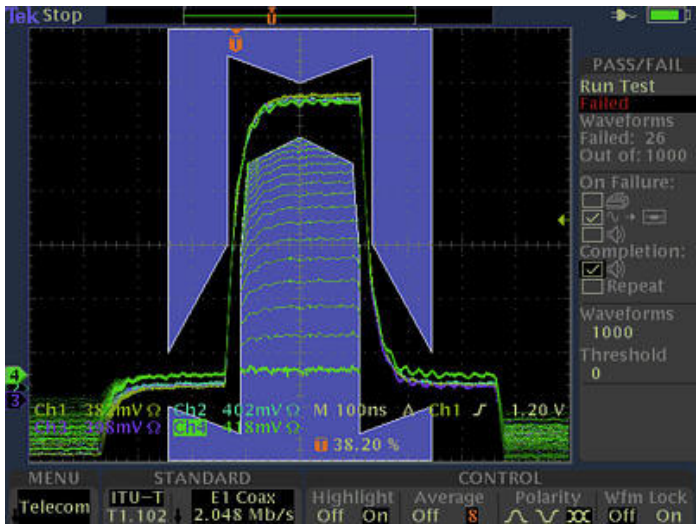
Tektronix®



Look for unintentional circuit noise with the TDS3000C Series' FFT capability.



Custom video triggering allows the TDS3000C Series to trigger on standards such as RS-343 (26.2 kHz scan rate).



The TDS3000C Series provides breakthrough test speeds for telecommunications line card testing. The telecom QUICKMENU puts all the commonly used telecom test functions on a single menu.

Performance You Need at a Price You Can Afford

Performance in an Affordable Package

The TDS3000C Series Digital Phosphor Oscilloscopes (DPO) provide you with the performance you need at a price you can afford. Bandwidths range from 100 MHz to 500 MHz, with up to 5 GS/s sample rates for accurate representation of your signal.

DPOs Provide a Greater Level of Insight into Complex Signals

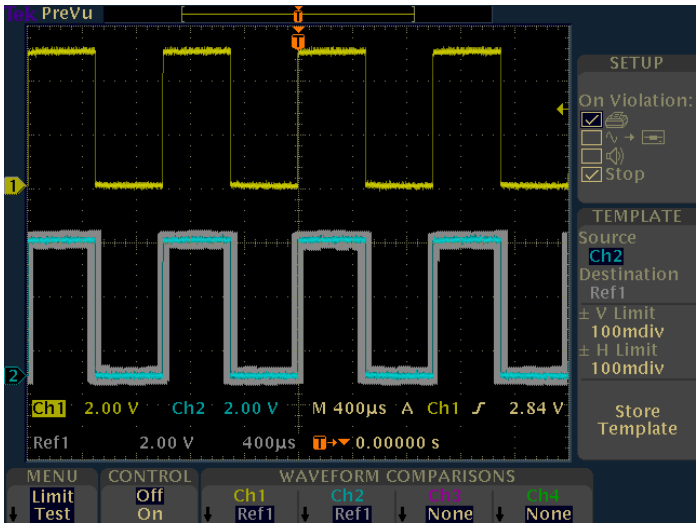
To solve a problem, first you need to see it. The TDS3000C Series combines 3,600 wfms/s continuous waveform capture rate and real-time intensity grading so you can see the problem and solve it.

Fast waveform capture rates on a continuous basis save time by quickly revealing the nature of faults so advanced triggers can be applied to isolate them.

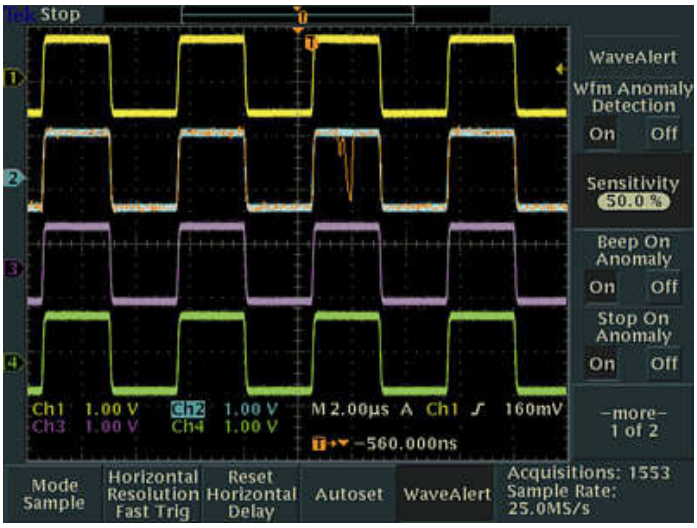
Real-time intensity grading highlights the details about the history of a signal's activity, making it easier to understand the characteristics of the waveforms you've captured. Unlike other comparable oscilloscopes, the history remains even after the acquisition is stopped.

Quickly Debug and Characterize Signals with DRT Sampling Technology and sin(x)/x Interpolation

The TDS3000C Series combines unique digital real-time (DRT) sampling technology with sin(x)/x interpolation to allow you to accurately characterize a wide range of signal types on all channels simultaneously. With the TDS3000C Series there is no change in sampling rate when additional channels are turned on, unlike other comparable oscilloscopes. This sampling technology makes it possible to capture high-frequency information, such as glitches and edge anomalies, that elude other oscilloscopes in its class, while sin(x)/x interpolation ensures precise reconstruction of each waveform.

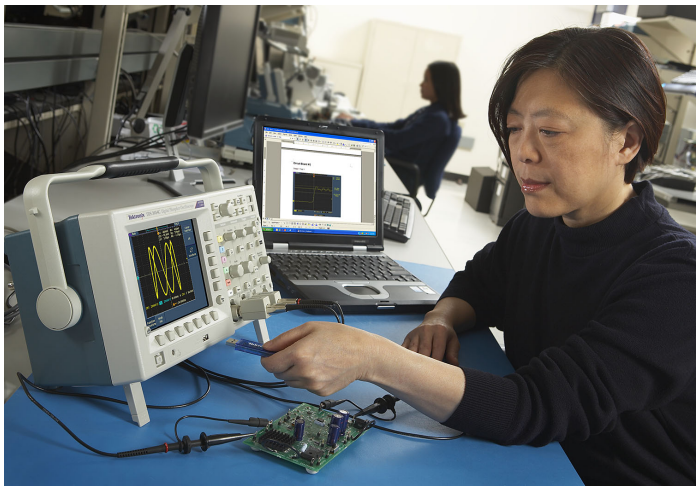


The TDS3000C Series with the TDS3LIM module is ideal for manufacturing test applications where fast Go/No-Go decisions are required.



WaveAlert waveform anomaly detection alerts you to any waveform that deviates from the "normal" input such as the glitch on channel 2.

Trace and identify ITU-R BT.601 video signals with the TDS3SDI 601 Serial Digital Video Module.



Easily transfer, document, and analyze data on your PC.

Easy Setup and Use

When working under tight deadlines, you need your oscilloscope to be intuitive; you want to minimize time spent learning and relearning how to use it. The TDS3000C Series oscilloscopes help reduce your learning curve. Simple navigation and dedicated front-panel controls get you to where you want to be quickly, so that you spend less time learning and more time on the task at hand.

Simple Documentation and Analysis

The TDS3000C Series comes equipped with a USB host port so you can easily store and transfer measurement information to your PC.

OpenChoice® PC Communication Software allows you to simply pull screen images and waveform data into a standalone desktop application or directly into Microsoft Word and Excel.

To complement OpenChoice, National Instruments LabVIEW SignalExpress™ Tektronix Edition Software provides you with extended capabilities including advanced analysis, data logging, remote instrument control, and live waveform analysis.

If you prefer not to use a PC for analysis, the TDS3000C Series comes standard with 25 automatic measurements, waveform add, subtract, divide, and multiply math functions, and Fast Fourier Transform (FFT). Unlike other comparable oscilloscopes, the TDS3000C Series math and measurement allows you to use the full acquisition record length or isolate a specific occurrence within an acquisition.

Instrument Control

Utilizing the built-in Ethernet port, e*Scope web-based remote control allows you to a control TDS3000C Series oscilloscope from anywhere, using the Internet and your PC.

Work Where you Need to

The TDS3000C Series packs the power of a DPO in a compact design that is only 5.9 in. (149 mm) deep, freeing up valuable benchtop space. And when you need to move your oscilloscope to another lab, its portable 7 lb. (3.2 kg) design makes for easy transport.

If your work demands even more mobility, then the optional battery pack will give you up to three hours of operation without line power.

TDS3BATC provides you with up to three hours of portable battery operation.

Characteristics

TDS3000C Series Electrical Characteristics

Characteristic	TDS3012C	TDS3014C	TDS3032C	TDS3034C	TDS3052C	TDS3054C
Bandwidth	100 MHz	100 MHz	300 MHz	300 MHz	500 MHz	500 MHz
Calculated Rise Time (typical)	3.5 ns	3.5 ns	1.2 ns	1.2 ns	0.7 ns	0.7 ns
Input Channels	2	4	2	4	2	4
External Trigger Input	Included on all models					
Sample Rate on each channel	1.25 GS/s	1.25 GS/s	2.5 GS/s	2.5 GS/s	5 GS/s	5 GS/s
Record Length	10 kpoints					
Vertical Resolution	9 bits					
Vertical Sensitivity, 1 MΩ	1 mV/div to 10 V/div					
Vertical Sensitivity, 50 Ω	1 mV/div to 1 V/div					
Input Coupling	AC, DC, GND					
Input Impedance	1 MΩ in parallel with 13 pF or 50 Ω					
DC Gain Accuracy	±2%					
Maximum Input Voltage, 1 MΩ	150 V_{RMS} with peaks at ≤400 V					
Maximum Input Voltage, 50 Ω	5 V_{RMS} with peaks at ≤30 V					
Position Range	±5 div					
Bandwidth Limit	20 MHz	20 MHz	20 MHz, 150 MHz	20 MHz, 150 MHz	20 MHz, 150 MHz	20 MHz, 150 MHz
Time Base Range	4 ns to 10 s	4 ns to 10 s	2 ns to 10 s	2 ns to 10 s	1 ns to 10 s	1 ns to 10 s
Time Base Accuracy	±20 ppm over any 1 ms time interval					
Input/Output Interfaces						
Ethernet Port	RJ-45 connector, supports 10Base-T LAN					
USB Port	Front-panel USB 2.0 host port Supports USB flash drive					
GPIB Port	Full talk/listen modes, setting and measurements (Optional with TDS3GV Communications Module)					
RS-232-C Port	DB-9 male connector, full talk/listen modes; control of all modes, settings and measurements Baud rates up to 38,400 (Optional with TDS3GV Communications Module)					
VGA Video Port	DB-15 female connector, monitor output for direct display on large VGA-equipped monitors (Optional with TDS3GV Communications Module)					
External Trigger Input	BNC connector, input impedance >1 MΩ in parallel with 17 pF; max input voltage is 150 V_{RMS}					

Acquisition Modes

Mode	Description
DPO	Captures and displays complex waveforms, random events and subtle patterns in actual signal behavior. DPOs provide 3 dimensions of signal information in real time: Amplitude, time, and the distribution of amplitude over time
Peak Detect	High-frequency and random glitch capture. Captures glitches as narrow as 1 ns (typical) using acquisition hardware at all time base settings
WaveAlert®	Monitors the incoming signals on all channels and alerts the user to any waveform that deviates from the normal waveform being acquired
Sample	Sample data only
Average	Waveform averaged, selectable from 2 to 512
Envelope	Min-max values acquired over one or more acquisitions
Single Sequence	Use the Single Sequence button to capture a single triggered acquisition sequence at a time

Trigger System

Characteristic	Description
Main Trigger Modes	Auto (supports Roll Mode for 40 ms/div and slower), Normal, Single Sequence
B Trigger	Trigger after time or events
Trigger After Time Range	13.2 ns to 50 s
Trigger After Events Range	1 to 9,999,999 events

Trigger Types

Trigger	Description
Edge	Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: AC, DC, Noise Reject, HF Reject, LF Reject
Video	Trigger on all lines or individual lines, odd/even or all fields on NTSC, PAL, SECAM
Extended Video	Trigger on specific lines in broadcast and non-broadcast (custom) standards and on analog HDTV formats (1080i, 1080p, 720p, 480p). Requires TDS3VID or TDS3SDI application module
Pulse Width (or Glitch)	Trigger on a pulse width <, >, =, ≠ to a selectable time limit ranging from 39.6 ns to 50 s
Runt	Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again
Slew Rate	Trigger on pulse edge rates that are either faster or slower than a set rate. Edges can be rising, falling, or either
Pattern	Specifies AND, OR, NAND, NOR when true or false for a specific time
State	Any logic state. Triggerable on rising or falling edge of a clock. Logic triggers can be used on combinations of 2 inputs (not 4)
Comm	Provides isolated pulse triggering required to perform DS1/DS3 telecommunications mask testing per ANSI T1.102 standard. Requires TDS3TMT application module
Alternate	Sequentially uses each active channel as a trigger source

Waveform Measurements

Characteristic	Description
Cursors	Amplitude, Time
Automatic Measurements	Display any four measurements from any combination of waveforms. Or display all measurements with measurement snapshot feature. Measurements include Period, Frequency, +Width, -Width, Rise time, Fall time, +Duty cycle, -Duty cycle, +Overshoot, High, Low, Max, Min, Peak-to-peak, Amplitude, Mean, Cycle mean, RMS, Cycle RMS, Burst width, Delay, Phase, Area*1, Cycle Area*1
Measurement Statistics	Mean, Min, Max, Standard deviation. Requires TDS3AAM application module
Thresholds	User-definable thresholds for automatic measurements; settable in percent or voltage
Gating	Isolate a specific occurrence within an acquisition to take measurements, using either the screen or cursors

*1 Requires TDS3AAM application module.

Waveform Math

Characteristic	Description
Arithmetic	Add, subtract, multiply, and divide waveforms
FFT	Spectral magnitude. Set FFT vertical scale to Linear RMS or dBV RMS, and FFT window to Rectangular, Hamming, Hanning, or Blackman-Harris
Advanced Math*1	Integrate, Differentiate, Define extensive algebraic expressions including analog waveforms, math functions, scalars, up to two user-adjustable variables and results of parametric measurements. For example: (Intg (Ch1-Mean(Ch1)) × 1.414 × VAR1) **Note**: Requires TDS3AAM application module.

*1 Requires TDS3AAM application module.

Waveform Processing

Characteristic	Description
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo autoset
Deskew	Channel-to-channel deskew ±10 ns may be manually entered for better timing measurements and more accurate math waveforms

Display Characteristics

Characteristic	Description
Display Type	6.5 in. (165.1 mm) liquid-crystal TFT color display
Display Resolution	640 horizontal × 480 vertical pixels (VGA)
Interpolation	Sin(x)/x
Waveform styles	Dots, vectors, variable persistence, infinite persistence
Graticules	Full, grid, crosshair, and frame. NTSC, PAL, SECAM, and vectorscope (100% and 75% color bars) with optional TDS3VID or TDS3SDI application modules
Format	YT, XY, and Gated XYZ (XY with Z-axis blanking available on 4-channel instruments only)

Power Source

Characteristic	Description
AC line power	
Source voltage	100 V_{RMS} to 240 V_{RMS} ±10%
Source frequency	45 Hz to 440 Hz from 100 V to 120 V 45 Hz to 66 Hz from 120 V to 240 V
Power consumption	75 W maximum
Battery power	Requires TDS3BATC, rechargeable lithium ion battery pack
Operating time, typical	3 hours

Environmental and Safety

Characteristic	Operating	Non-operating
Temperature	0 ºC to +50 ºC	-40 ºC to +71 ºC
Humidity	Operating and Nonoperating: Up to 95% RH at or below +30 ºC Operating and Nonoperating: Up to 45% RH +30 ºC up to +50 ºC	
Altitude	To 3,000 m	15,000 m
Electromagnetic Compatibility	Meets or exceeds EN61326 Class A, Annex D radiated and conducted emissions and immunity; EN6100-3-2 AC Powerline Harmonic Emissions; EN6100-3-3 Voltage Changes, Fluctuation, and Flicker; FCC 47 CFR, Part 15, Subpart B, Class A; Australian EMC framework	
Safety	UL61010B-1, CSA1010.1, IEC61010-1, EN61010-1	

Physical Characteristics

Instrument

Dimensions	mm	in.
Width	375.0	14.8
Height	176.0	6.9
Depth	149.0	5.9
Weight	**kg**	**lb.**
Instrument only	3.2	7.0
with accessories	4.5	9.8

Instrument Shipping

Package Dimensions	mm	in.
Width	502.0	19.8
Height	375.0	14.8
Depth	369.0	14.5

Rackmount (RM3000)

Dimension	mm	in.
Width	484.0	19.0
Height	178.0	7.0
Depth	152.0	6.0

Ordering Information

TDS3000C Series Digital Phosphor Oscilloscopes

Model	Description
TDS3012C	100 MHz, 2 Channel, 1.25 GS/s
TDS3014C	100 MHz, 4 Channel, 1.25 GS/s
TDS3032C	300 MHz, 2 Channel, 2.5 GS/s
TDS3034C	300 MHz, 4 Channel, 2.5 GS/s
TDS3052C	500 MHz, 2 Channel, 5 GS/s
TDS3054C	500 MHz, 4 Channel, 5 GS/s

Standard Accessories

Accessory	Description
One P6139A, 500 MHz, 10x passive probe per channel	
User Manual and Translated Front-panel Overlay	Please specify preferred language option - see chart below
Power Cord	Please specify plug option - see chart below
Accessory Tray	
Protective Front Cover	
OpenChoice® PC Communication Software	Enables fast and easy communication between Windows PC and the TDS3000C Series through LAN, GPIB, or RS-232. Transfer and save settings, waveforms, measurements, and screen images
NI LabVIEW SignalExpress™ Tektronix Edition LE	A fully interactive measurement software environment optimized for the TDS3000C Series. Enables you to acquire, generate, analyze, compare, import, and save measurement data and signals using an intuitive drag-and-drop user interface that does not require any programming. Standard TDS3000C Series support for acquiring, controlling, viewing, and exporting your live signal data is permanently available through the software. A 30-day trial period of the full version provides additional signal processing, advance analysis, mixed signal, sweeping, limit testing, and user-defined step capabilities. Order SIGEXPTE for permanent full version capability
Traceable Certificate of Calibration	NIM/NIST
Documentation CD	
3 Year Warranty	Covering all labor and parts excluding probes and accessories

Options

Option	Description
Opt. A0	North America
Opt. A1	Universal Euro
Opt. A2	United Kingdom
Opt. A3	Australia
Opt. A5	Switzerland
Opt. A6	Japan
Opt. A10	China
Opt. A11	India
Opt. A99	No power cord

Language Options

Option	Description
Opt. L0	English
Opt. L1	French
Opt. L2	Italian
Opt. L3	German
Opt. L4	Spanish
Opt. L5	Japanese
Opt. L6	Portuguese
Opt. L7	Simplified Chinese
Opt. L8	Traditional Chinese
Opt. L9	Korean
Opt. L10	Russian
Opt. L99	No manual

Recommended Accessories

Accessory	Description
TDS3GV	GPIB, VGA, RS-232 interface
TDS3AAM	Advanced Analysis Module. Adds extended math capability, arbitrary math expressions, measurement statistics, and additional automated measurements
TDS3LIM	Limit Testing Module. Adds custom waveform limit testing capabilities
TDS3TMT	Telecom Mask Testing Module. Adds pass/fail compliance of ITU-T G.703 and ANSI T1.102 standards, custom mask testing, and more
TDS3VID	Extended Video Analysis Module. Adds video quickmenu, autoset, hold, line count trigger, video picture mode, vectorscope*2 mode, HDTV format trigger graticules, and more
TDS3SDI	Serial/Digital Video Module. Adds 601 serial digital video to analog video conversion, video picture, vectorscope*2, and analog HDTV triggering capabilities, and more
TDS3BATC	Lithium-ion battery pack for up to 3 hours continuous operation without line power
TDS3CHG	Fast charger for battery pack
AC3000	Soft case for carrying instrument
HCTEK4321	Hard plastic case for carrying instrument (requires AC3000)
RM3000	Rackmount kit
SIGEXPTE	NI LabVIEW SignalExpress™ Tektronix Edition Software full version
Service Manual	English only (071-2507-xx)
TNGTDS01	Extensive instructions and step-by-step lab exercises provide education about the operation of TDS3000C Series Oscilloscopes. Kit includes self-paced CD-ROM based manual and signal source board. Optional hardcopy manual available for order separately

*2 Vectorscope does not support composite video.

Recommended Probes

Probe	Description
P6243	1 GHz, ≤1 pF input C 10x active probe
P5205	1.3 kV, 100 MHz high-voltage differential probe
P5210	5.6 kV, 50 MHz high-voltage differential probe
P5100	2.5 kV, 100x high-voltage passive probe
TCP202	50 MHz, 15 A AC/DC current probe
TCP303*3	15 MHz, 150 A current probe
TCP305*3	50 MHz, 50 A current probe
TCP312*3	100 MHz, 30 A current probe
TCPA300	100 MHz probe amplifier
TCP404XL*4	2 MHz, 500 A current probe
TCPA400	50 MHz probe amplifier
ADA400A	100x, 10x, 1x, 0.1x high-gain differential amplifier

*3 Requires TCPA300 probe amplifier.

*4 Requires TCPA400 probe amplifier.

Service Options

Option	Description
Available at time of purchase	
Opt. CA1	Provides a single calibration event or coverage for the designated calibration interval, whichever comes first
Opt. C3	Calibration Service - 3 years
Opt. C5	Calibration Service - 5 years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report - 3 years (with Opt. C3)
Opt. D5	Calibration Data Report - 5 years (with Opt. C5)
Opt. R5	Repair Service - 5 year
Available after purchase	
TDS30xxC-CA1	Provides a single calibration event or coverage for the designated calibration interval, whichever comes first
TDS30xxC-R1PW	Repair service coverage 1 year post warranty
TDS30xxC-R2PW	Repair service coverage 2 years post warranty
TDS30xxC-R5DW	Repair service coverage 5 years (includes product warranty period); 5-year period starts at time of customer instrument purchase

CE

ISO 9001 Product(s) are manufactured in ISO registered facilities.

GPIB IEEE-488 Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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Updated 30 October 2008

For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

15 Jul 2009 41W-12482-17