Digital Phosphor Oscilloscopes

▶ TDS3000C Series



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.

▶ 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 lbs/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

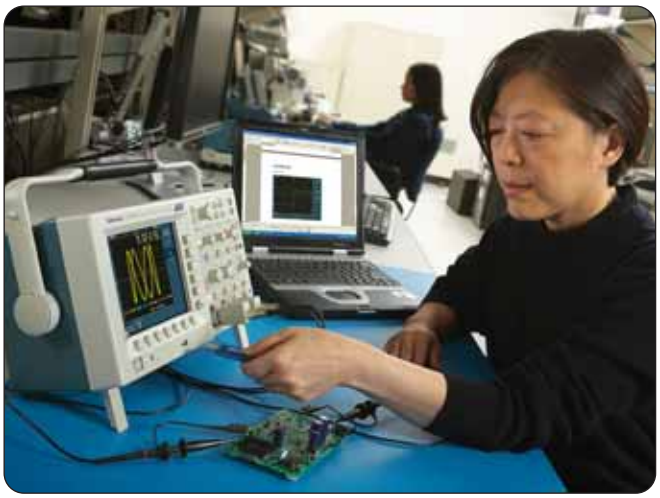
Telecommunications mask testing

Manufacturing test

General bench testing

Tektronix

Enabling Innovation



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



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

Easy Setup and Use

When working under tight deadlines, you need your oscilloscope to be intuitive; you want to minimize time spent learning and re-learning 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 stand-alone 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 bench-top space. And when you need to move your oscilloscope to another lab, its portable 7 lbs (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.

► Characteristics

► TDS3000C Series Electrical Characteristics

	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 k points					
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 impedence > 1 MΩ in parallel with 17 pF; max input voltage is 150 V_{RMS}

Acquisition Modes

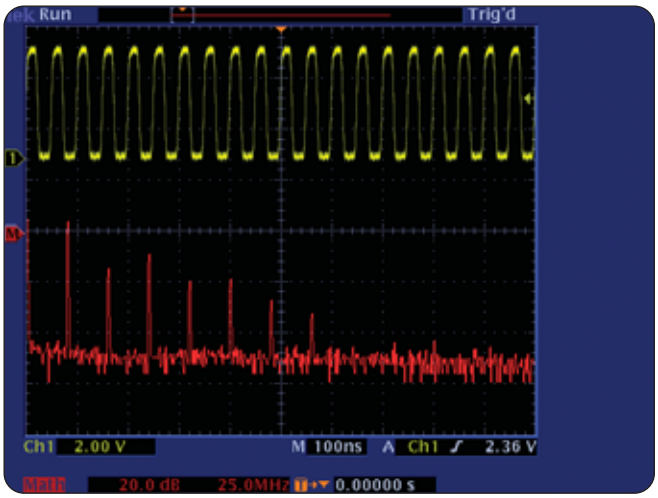
DPO – Captures and displays complex waveforms, random events and subtle patterns in actual signal behavior. DPOs provide 3 dimensions of signal information in real time: Amplitude, time and the distribution of amplitude over time.
Peak Detect – High frequency and random glitch capture. Captures glitches 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

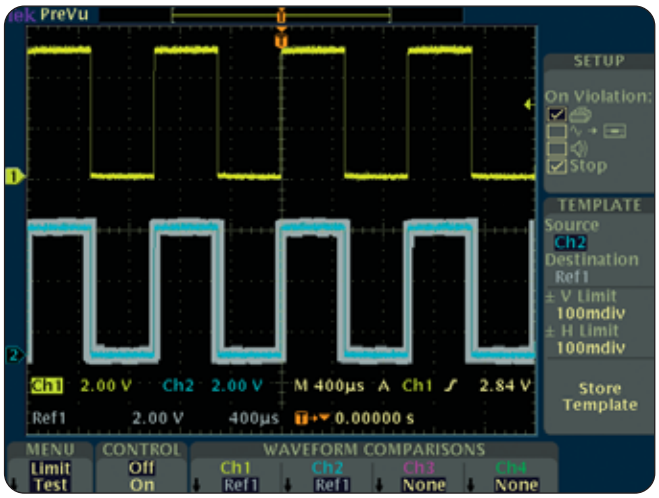
Main Trigger Modes – Auto (supports Roll Mode for 40 ms/div and slower), Normal, Single Sequence.
B Trigger – Trigger after time or events.
Trigger After Time Range – 13.2 ns to 50 s.
Trigger After Events Range – 1 to 9,999,999 events.

Trigger Types

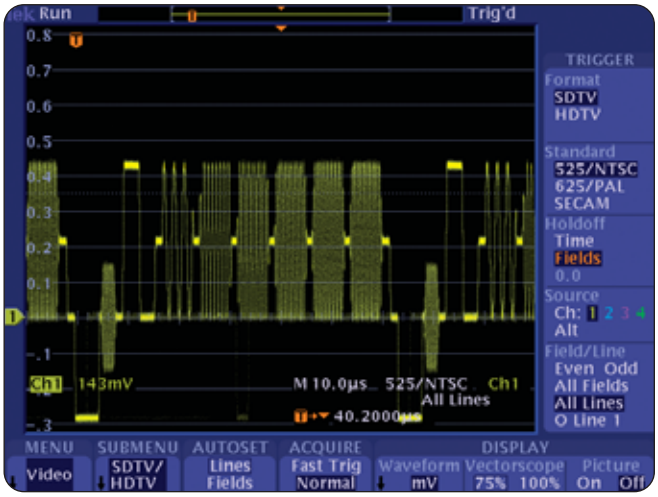
Edge – Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: AC, DC, Noise Reject, HF Reject, LF Reject.
Video – Trigger on all lines or individual lines, odd/even or all fields on NTSC, PAL, SECAM.
Extended Video – Trigger on specific lines in broadcast and 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.



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



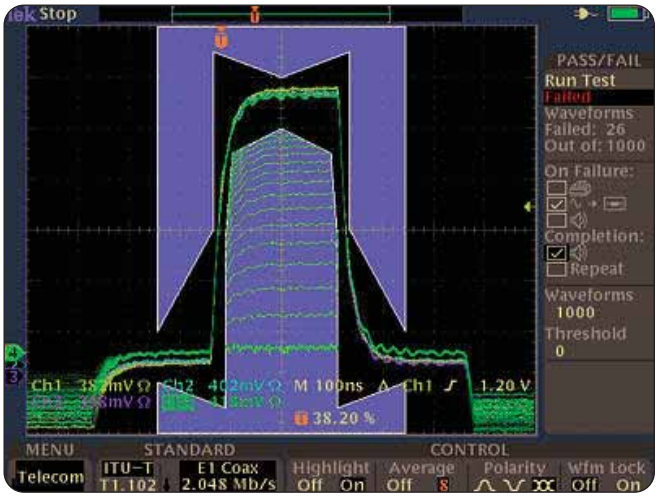
► The TDS3000C Series with the TDS3LIM module is ideal for manufacturing test applications where fast Go/No-Go decisions are required.



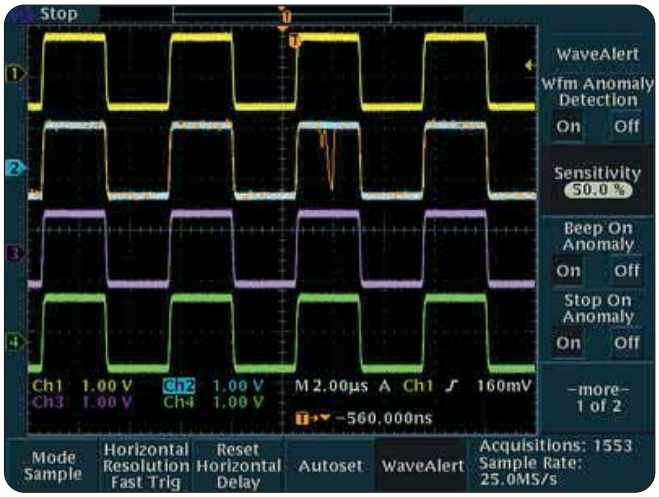
► Custom video triggering allows the TDS3000C Series to trigger on standards such as RS-343 (26.2 kHz scan rate).



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



► 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.



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



1 Digital Phophor Oscilloscope – Discover and troubleshoot design problems faster with TDS3000C Series' 3,600 waveforms/second continuous waveform capture rate and real-time intensity grading. Continuous high waveform capture rate saves time by quickly revealing the nature of faults so advanced triggers can be applied to isolate them.

Real-time intensity grading exposes the "history" of a signal's activity as they accumulate. The digital phosphor display makes it easier to understand the characteristics of the transients you have captured. It intensifies the areas where the signal trace occurs more frequently.

2 Digital Real-Time Sampling – Quickly debug and characterize a wide range of signal types on four channels simultaneously with Tektronix' unique digital real-time (DRT) sampling technology. This acquisition technology allows you to capture high-frequency, non-repetitive information, such as glitches and edge anomalies, that elude other oscilloscopes.

3 Optional Application Modules – Transform your oscilloscope into a specialized instrument for limit testing, telecommunications mask testing and video troubleshooting.

TDS3AAM Advanced Analysis Module
TDS3LIM Limit Testing Module
TDS3TMT Telecommunications Mask Testing Module
TDS3VID Extended Video Analysis Module
TDS3SDI 601 Serial/Digital Video Module

4 Simple Setup and Operation – Simplify setup with Autoset function which adjusts controls to produce a usable display of the input signal.

The most frequently used functions have been brought forth to the panel for direct accessibility (for example single sequence button, print button, zoom and reference).

5 USB Host Port – Conveniently use your USB flash drive to store your personal oscilloscope setups, screen shots and waveform data for later use. Also use the USB host port to easily update your instrument firmware.



6 Compact 149.0 mm (5.9 in) Depth – Free up valuable space on your bench or desktop.

7 Robust Handle – Easily carry your lightweight (3.2 kg [7.0 lb] without optional battery) portable instrument into the field or to another room on a different floor of your building.

8 Battery – Use your instrument for up to 3 hours without line power (requires TDS3BATC).

Waveform Measurements

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.

Waveform Math

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)) x 1.414 x VAR1).

Waveform Processing

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

Display Type – 6.5 in. (165.1 mm) liquid crystal TFT color display.

Display Resolution – 640 horizontal x 480 vertical pixels (VGA).

Interpolation – Sin(x)/x.

Waveform styles – Dots, vectors, variable persistence, infinite persistence.

Graticules – Full, grid, cross-hair 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

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

	Operating	Non-operating
Temperature	0 °C to +50 °C	–40 °C to +71 °C
Humidity	Operating and Non-operating: up to 95% RH at or below +30 °C Operating and Non-operating: up to 45% RH +30 °C up to +50 °C	
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	14.8
Height	176	6.9
Depth	149	5.9

Weight	kg	lbs.
Instrument only	3.2	7
with accessories	4.5	9.8

Instrument Shipping

Package Dimensions	mm	in.
Width	502	19.8
Height	375	14.8
Depth	369	14.5

Rackmount (RM3000)

Dimension	mm	in.
Width	484	19
Height	178	7
Depth	152	6

*[1] Requires TDS3AAM application module.

► Ordering Information

TDS3000C Series Digital Phosphor Oscilloscopes

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

P6139A – 500 MHz, 10x passive probe (one per channel).

User Manual and Translated Front Panel Overlay – Please specify preferred language option.
Power Cord – Please specify plug option.
Accessory Tray
Protective Front Cover
OpenChoice® PC Communication Software – Enables fast and easy communication between Windows PC and the TDS3000C series via 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 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

International Power Plug Options

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

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

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 (071-2507-00).
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 hard copy manual available for order separately.

Recommended Probes

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.

Service Options

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 Option C3).
Opt. D5 – Calibration Data Report – 5 years (with Option 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.

*2 Vectorscope does not support composite video.

*3 Requires TCPA300 probe amplifier.

*4 Requires TCPA400 probe amplifier.

Digital Phosphor Oscilloscopes

► TDS3000C Series

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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

Product(s) are manufactured in ISO registered facilities.

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

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Enabling Innovation