Digital Phosphor Oscilloscopes

TDS3000C Series Datasheet

The TDS3000C Series provides 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.

Key performance specifications

- 100 MHz, 300 MHz, and 500 MHz bandwidth models
- 2 or 4 analog channel models
- Sample rates up to 5 GS/s real time on all channels
- 10k record length on all channels
- 3,600 wfms/s continuous waveform capture rate
- Suite of advanced triggers

Key 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

Applications

- Digital design and debug
- Video installation and service
- Power supply design
- Education and training
- Telecommunications mask testing
- Manufacturing test
- General bench testing

DPOs provide greater level of insight into complex signals

The TDS3000C Series offers fast waveform capture rates on a continuous basis that save you 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 has been 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.
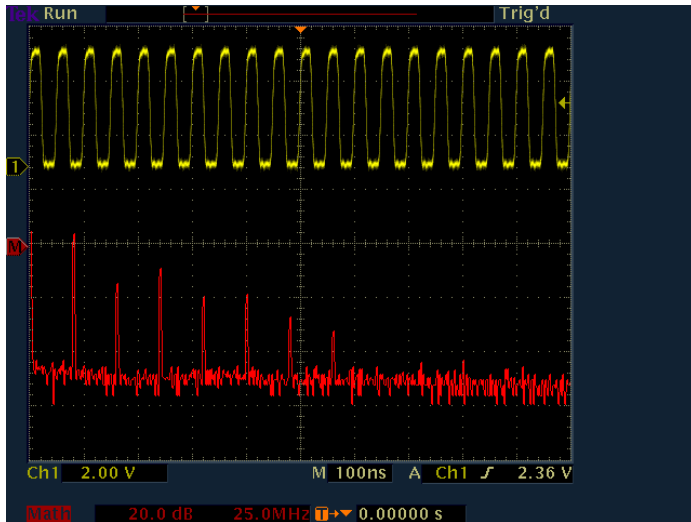
Look for unintentional circuit noise with the TDS3000C series' FFT capability.
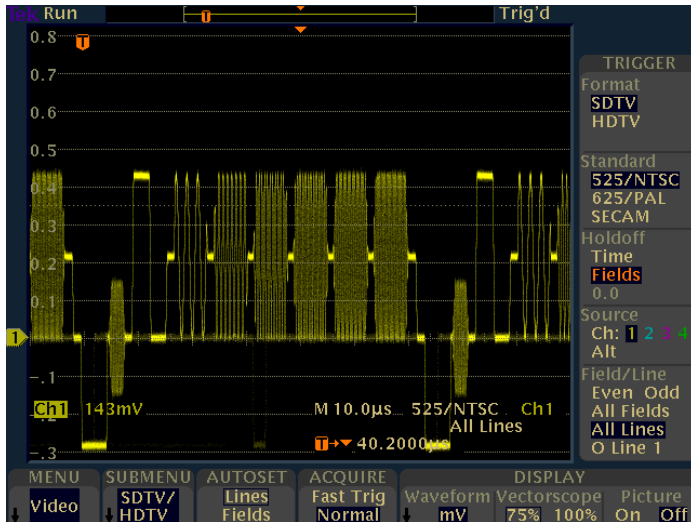

Custom video triggering allows the TDS3000C Series to trigger on standards such as RS-343 (26.2 kHz scan rate).
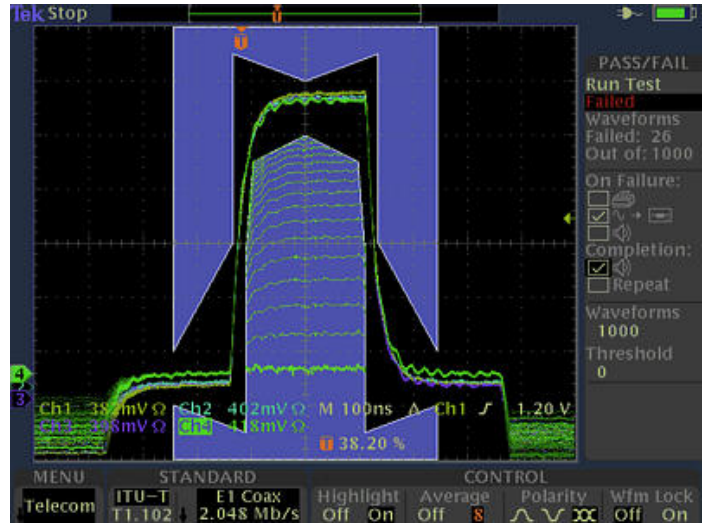

The TDS3000C Series provides breakthrough test speeds for telecommunications line card testing. The telecom QUICKMENU puts all the commonly used telecom test functions on a single menu.

Easy to 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.
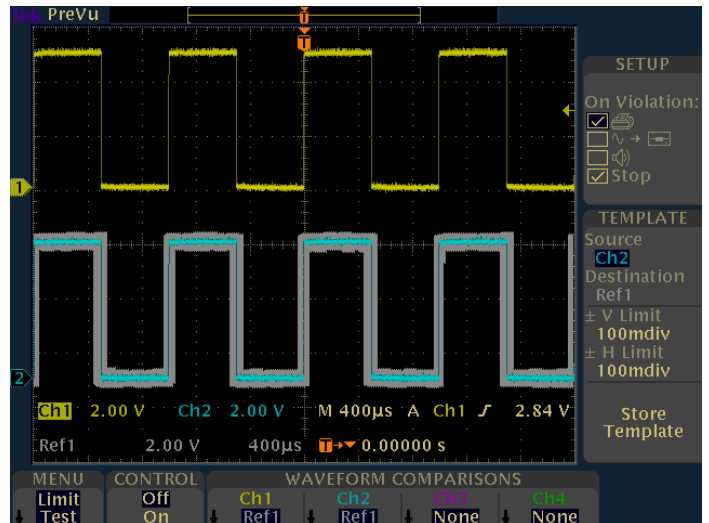
The TDS3000C series with the TDS3LIM module is ideal for manufacturing test applications where fast Go/No-Go decisions are required.
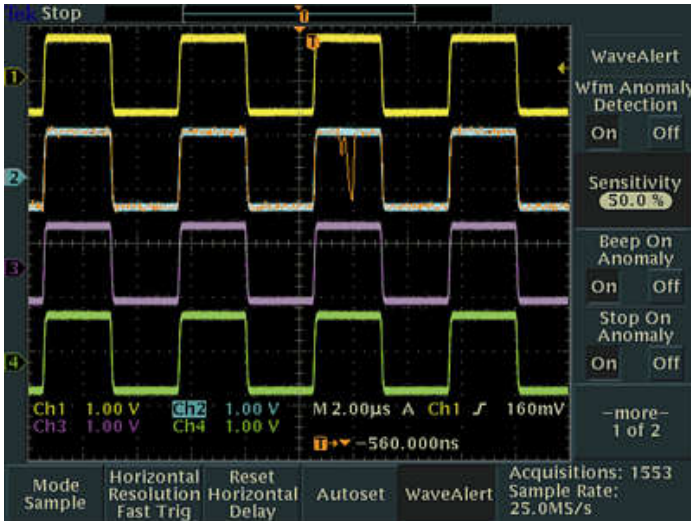
WaveAlert waveform anomaly detection alerts you to any waveform that deviates from the "normal" input such as the glitch on channel 2.
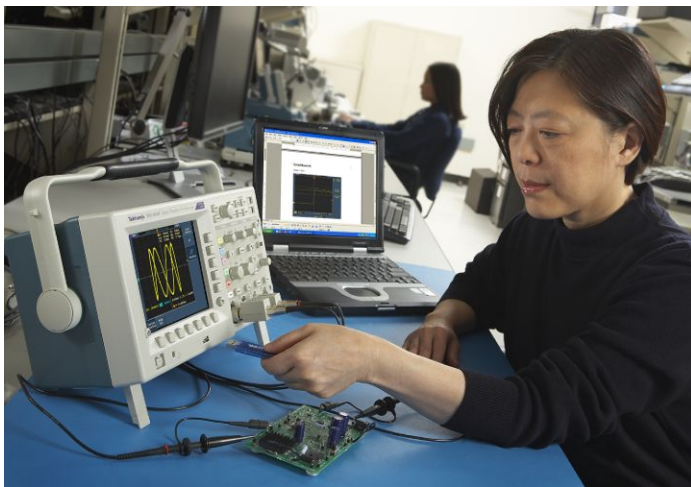
Easily transfer, document, and analyze data on your PC.

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.

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.

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

	TDS3012C	TDS3014C	TDS3032C	TDS3034C	TDS3052C	TDS3054C
Input channels	2	4	2	4	2	4
Bandwidth	100 MHz	100 MHz	300 MHz	300 MHz	500 MHz	500 MHz
Rise time (typical)	3.5 ns	3.5 ns	1.2 ns	1.2 ns	0.7 ns	0.7 ns
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 system

Hardware bandwidth limits	TDS3012C	TDS3014C	TDS3032C	TDS3034C	TDS3052C	TDS3054C
	20 MHz	20 MHz	20 MHz, 150 MHz	20 MHz, 150 MHz	20 MHz, 150 MHz	20 MHz, 150 MHz

Input coupling AC, DC, GND

Input impedance 1 MΩ in parallel with 13 pF or 50 Ω

Input sensitivity range

    1 MΩ 1 mV/div to 10 V/div

    50 Ω 1 mV/div to 1 V/div

Vertical resolution 9 bits

Maximum input voltage

    1 MΩ 150 V_{RMS} with peaks at ≤400 V

    50 Ω 5 V_{RMS} with peaks at ≤30 V

DC gain accuracy ±2%

Position range ±5 div

Horizontal system

Seconds/division range	TDS3012C	TDS3014C	TDS3032C	TDS3034C	TDS3052C	TDS3054C
	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

Trigger system

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 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
Rise/fall time	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

Acquisition system

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
Sample	Sample data only
Average	Waveform averaged, selectable from 2 to 512
Envelope	Min-max values acquired over one or more acquisitions
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
Single sequence	Use the Single Sequence button to capture a single triggered acquisition sequence at a time

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	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) [2]

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 system

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 application module
Format	YT, XY, and Gated XYZ (XY with Z-axis blanking available on 4-channel instruments only)

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[1] Requires TDS3AAM application module.

[2] Requires TDS3AAM application module.

Input/output ports

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-232C 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	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}

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

Physical characteristics

Dimensions

	mm	inches
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

Package dimensions

	mm	inches
Width	502.0	19.8
Height	375.0	14.8
Depth	369.0	14.5

Rackmount (RM3000)

	mm	inches
Width	484.0	19.0
Height	178.0	7.0
Depth	152.0	6.0

Datasheet

EMC, environment and safety

Temperature

Operating	0 ℃ to +50 ℃
Non-operating	-40 ℃ to +71 ℃

Humidity (Operating and non-operating)

At or below +30 ℃	Up to 95% RH
+30 ℃ up to +50 ℃	Up to 45% RH

Altitude

Operating	To 3,000 meters
Non-operating	15,000 meters

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

Ordering information

TDS3000C family

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

Please specify a language option and a power plug option from the lists that follow.

Standard accessories

Probes

P6139B	500 MHz 10x passive probe, one per channel

Accessories

Front protective cover	
Accessory tray	
Documentation CD	Contains User Manuals in all languages
Front panel overlay	Translated front panel overlay. Specify language option.
Installation and Safety Manual	
Power cord	Specify power plug option.
OpenChoice® PC connectivity 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
Traceable Certificate of Calibration	NIM/NIST

Warranty
Three year warranty covering all labor and parts, excluding probes and accessories

Instrument options

Power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A4	North America power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

Language options

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

Language options include translated front-panel overlay for the selected language(s).

Service options

Available at time of purchase	
Opt. D1	Calibration data report
Opt. R5	Repair service - 5 year

Available after purchase	
TDS30xxC-R5DW	Repair service coverage 5 years (includes product warranty period); 5-year period starts at time of customer instrument purchase

Recommended accessories

Probes

ADA400A	100x, 10x, 1x, 0.1x high-gain differential amplifier
P5100A	2.5 kV, 100x high-voltage passive probe
P5205A	1.3 kV, 100 MHz high-voltage differential probe
P5210A	5.6 kV, 50 MHz high-voltage differential probe
P6243	1 GHz, ≤1 pF input C 10x active probe
TCP202A	50 MHz, 15 A AC/DC current probe
TCP303	15 MHz, 150 A current probe [3]
TCP305A	50 MHz, 50 A current probe [3]
TCP312A	100 MHz, 30 A current probe [3]
TCPA300	100 MHz probe amplifier

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[3] Requires TCPA300 probe amplifier.

| TCPA400 | 50 MHz probe amplifier |
| TCP404XL | 2 MHz, 500 A current probe [4] |

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 [5] mode, HDTV format trigger graticules, and more
TDS3BATC	Lithium-ion battery pack for up to 3 hours continuous operation without line power
TDS3ION	Battery charger
AC3000	Soft case for carrying instrument
HCTEK4321	Hard plastic case for carrying instrument (requires AC3000)
RM3000	Rackmount kit
071-2507-xx	Service manual (English only)

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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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[4] Requires TCPA400 probe amplifier.

[5] Vectorscope does not support composite video.

Datasheet

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.tek.com.

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