# Digital Phosphor Oscilloscopes

▶ **TDS3012B • TDS3014B • TDS3024B • TDS3032B • TDS3034B • TDS3044B • TDS3052B • TDS3054B • TDS3064B**



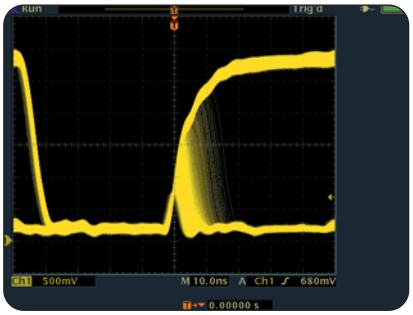
## The TDS3000B Series of Digital Phosphor Oscilloscopes Provides Unmatched Performance and Portability at an Affordable Price

The TDS3000B packs the power of a DPO, digital real-time (DRT) sampling technology, WaveAlert waveform anomaly detection, OpenChoice documentation and analysis solutions and five application-specific modules into a lightweight, battery-capable design.

### A DPO Provides a Greater Level of Insight into Complex Signals

The TDS3000B Series DPO delivers 3,600 wfms/s continuous waveform capture rate to capture glitches and infrequent events three times faster than comparable oscilloscopes. Some oscilloscope vendors claim high waveform capture rates for short bursts of time, but only DPOs can deliver these fast waveform capture rates on a continuous basis – saving minutes, hours or even days by quickly revealing the nature of faults so advanced triggers can be applied to isolate them.

In addition, the TDS3000B DPO's 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.



▶ The TDS3000B DPO provides unmatched insight into complex signal behavior, such as metastable events.

## ▶ Features & Benefits

100 to 600 MHz Bandwidths

5 GS/s Maximum Real-time Sample Rate, with Sin(x)/x Interpolation

3,600 wfms/s Continuous Waveform Capture Rate

2 or 4 Channels

Full VGA Color LCD

25 Automatic Measurements

FFT Standard

Multi-language User Interface

QuickMenu Graphical User Interface for Easy Operation

WaveAlert® Automatic Waveform Anomaly Detection

OpenChoice® Solutions Simplify Instrument Control, Documentation and Analysis
- e*Scope® Web-based Remote Control
- Built-in Ethernet Port
- GPIB, RS232, VGA
- TDSPCS1 OpenChoice Software
- WaveStar™ Software
- Integration with Third-party Software

Application Modules for Specialized Analysis
- Advanced Analysis Module
- Limit Testing Module
- Telecommunications Mask Testing Module
- Extended Video Module
- 601 Serial Digital Video Module

Optional Internal Battery Operation up to 3 Hours

Plug-in Printer for Portable Documentation of Results

TekProbe™ Interface Supports Active, Differential and Current Probes for Automatic Scaling and Units

## ▶ Applications

Digital Design, Debug and Test

Video Installation and Service

Power Supply Design

Education and Training

Telecommunications Mask Testing

Manufacturing Test

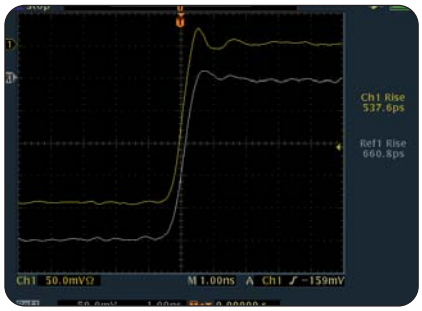
Tektronix
Enabling Innovation

### Higher Speeds Demand Greater Bandwidth

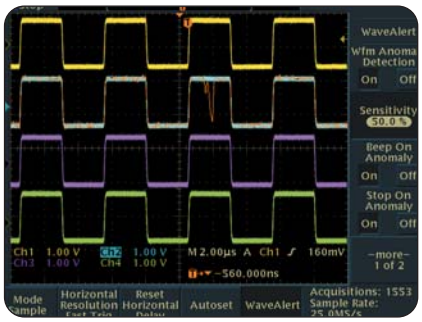
You face faster clock rates and edge speeds, increasingly complex signals and mounting time-to-market pressures. The higher the bandwidth of your oscilloscope, the more accurate the reproduction of your signal. The TDS3000B Series offers a wide range of bandwidths from 100 MHz to 600 MHz to best suit the needs of your most demanding projects, so that you can complete your tasks on time and with confidence.

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

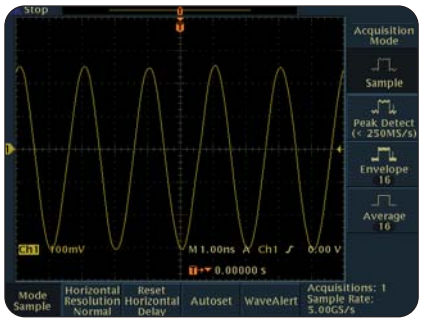
The TDS3000B Series combines unique digital real-time (DRT) sampling technology with sin(x)/x interpolation to allow you to accurately characterize a wide range of signal types on all channels simultaneously. This sampling technology makes it possible to capture high-frequency information, such as glitches and edge anomalies, that eludes other oscilloscopes in its class, while sin(x)/x interpolation ensures precise reconstruction of each waveform. The result – a complete view of your signal to speed debug and characterization.



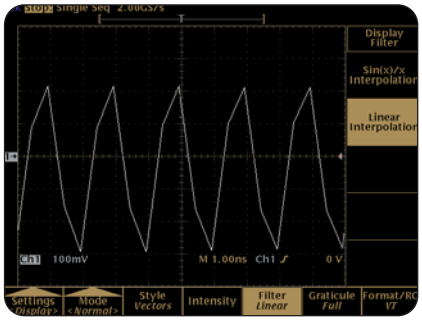

▶ An increase in performance from 500 to 600 MHz bandwidth offers a 20% improvement in rise-time measurement accuracy, as illustrated with these measurements of a 20 ps rising edge. The lower trace is a reference waveform, showing the rise-time performance of a 500 MHz oscilloscope. The upper trace shows the improved performance of a 600 MHz oscilloscope.




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



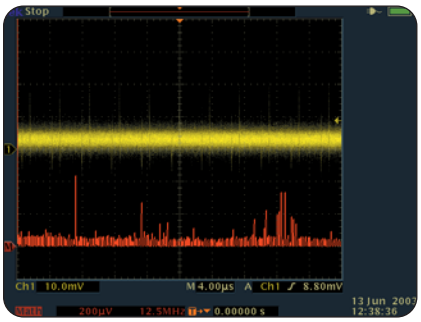

▶ The TDS3054B's 5 GS/s real-time sample rate and sin(x)/x interpolation ensure accurate reconstruction of a 500 MHz sine wave.



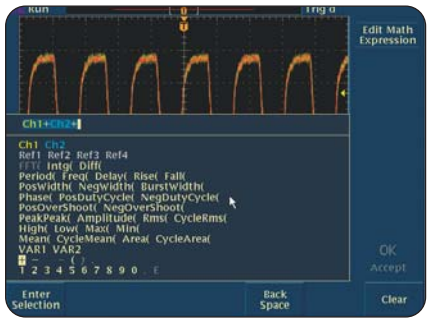

▶ Even with 2 GS/s sample rate, which exceeds the Nyquist requirement of 2X oversampling, this 500 MHz oscilloscope with linear interpolation does not provide accurate reconstruction of the same 500 MHz sine wave.

### Enhanced Troubleshooting Ability

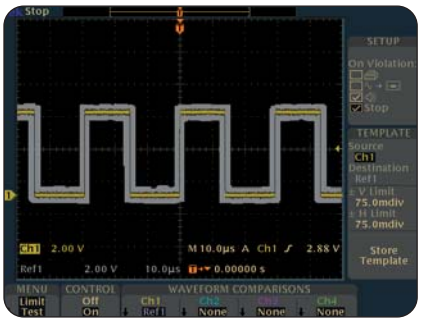
WaveAlert® waveform anomaly detection speeds your troubleshooting tasks by helping you find those elusive problems faster. WaveAlert detection monitors the incoming signals on all channels and will detect and highlight any waveform that deviates from the normal waveform being acquired. Because the TDS3000B oscilloscope can stop acquisition, sound a beep, make a hard copy or save the waveform when it detects an anomaly, you can run tests over long time periods – even unattended – to find those challenging, very infrequent failures.




▶ Look for unintentional circuit noise with the TDS3000B Series' FFT capability.




▶ TDS3AAM Advanced Analysis Module delivers advanced waveform math.




▶ The TDS3000B DPO with the TDS3LIM Limit Testing Module is ideal for manufacturing test applications where fast Go/No-Go decisions are required.

### Simple, Speedy Documentation and Analysis

OpenChoice® solutions deliver simple, seamless integration between the oscilloscope and the PC. Using a standard built-in Ethernet port, e*Scope® web-based remote control allows you to control your TDS3000B oscilloscope from anywhere, using the Internet and your PC. With the optional TDS3GV Communication Module, floppy disk, TDSPCS1 OpenChoice Software and integration with third-party software, the TDS3000B Series provides you with multiple choices to easily capture, transfer, document and analyze your measurement results. This seamless integration extends the power and value of these brilliantly engineered, affordable oscilloscopes.

### Flexible Features for Every Application

Optional application modules enable you to transform your oscilloscope into a specialized tool for limit testing, telecommunications mask testing, and video troubleshooting.

And, with its lightweight, compact size and battery pack, the TDS3000B Series oscilloscope can go wherever it is needed. It weighs only 4.5 kilograms (9.8 lbs), with battery installed. Use the optional plug-in thermal printer to instantly document your work, even in the field.

**TDS3AAM Advanced Analysis Module –** Adds extended math capability, arbitrary math expressions, measurement statistics and additional automated measurements.

**TDS3LIM Limit Testing Module –** Offers fast, accurate Go/No-Go verification that tested circuits are operating within intended parameters.

**TDS3TMT Telecommunications Mask Testing Module –** Pass/Fail compliance of ITU-T G.703 and ANSI T1.102 standards, custom mask testing and more.

**TDS3VID Extended Video Editing Module –** Adds Video QuickMenu, autoset, holdoff, line count trigger, video picture mode, vectorscope mode[*1], HDTV format triggering graticules and more.

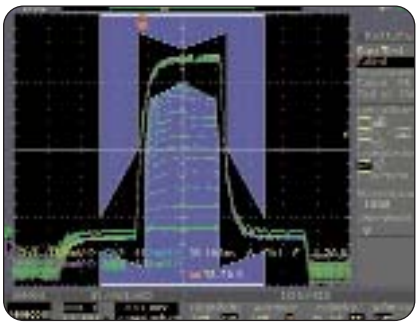
**TDS3SDI 601 Serial Digital Video Module –** Identify and analyze ITU-R BT.601 video signals, video picture mode with bright line select, vectorscope mode[*1], HDTV format triggering and more.

[*1] Vectorscope does not support composite video.

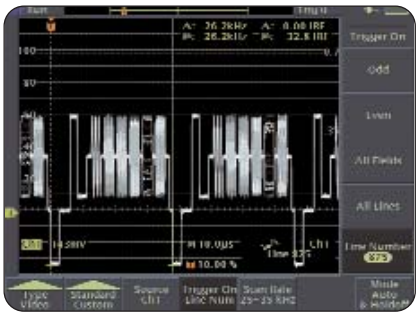
# ▸ Characteristics

## ▸ TDS3000B Series Electrical Characteristics

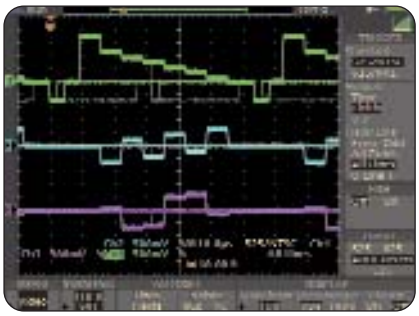
| | TDS3012B | TDS3014B | TDS3024B | TDS3032B | TDS3034B | TDS3044B | TDS3052B | TDS3054B | TDS3064B |
|---|---|---|---|---|---|---|---|---|---|
| Bandwidth | 100 MHz | 100 MHz | 200 MHz | 300 MHz | 300 MHz | 400 MHz | 500 MHz | 500 MHz | 600 MHz |
| Channels | 2 | 4 | 4 | 2 | 4 | 4 | 2 | 4 | 4 |
| Sample Rate on Each Channel | 1.25 GS/s | 1.25 GS/s | 2.5 GS/s | 2.5 GS/s | 2.5 GS/s | 5 GS/s | 5 GS/s | 5 GS/s | 5GS/s |
| Maximum Record Length | 10 K points on all models | | | | | | | | |
| Vertical Resolution | 9 Bits on all models | | | | | | | | |
| Vertical Sensitivity (/div) | 1 mV to 10 V on all models | | | | | | | | |
| Vertical Accuracy | ±2% on all models | | | | | | | | |
| Max Input Voltage (1 MΩ) | 150 $V_{RMS}$ CAT I on all models (300 V CAT II with standard 10X probe) | | | | | | | | |
| Position Range | ±5 div on all models | | | | | | | | |
| BW Limit | 20 MHz | 20 MHz | 20, 150 MHz | 20, 150 MHz | 20, 150 MHz | 20, 150 MHz | 20, 150 MHz | 20, 150 MHz | 20, 150 MHz |
| Input Coupling | AC, DC, GND on all models | | | | | | | | |
| Input Impedance Selections | 1 MΩ in parallel with 13 pF or 50 Ω on all models | | | | | | | | |
| Time Base Range | 4 ns to 10 s/div | 4 ns to 10 s/div | 2 ns to 10 s/div | 2 ns to 10 s/div | 2 ns to 10 s/div | 1 ns to 10 s/div | 1 ns to 10 s/div | 1 ns to 10 s/div | 1 ns to 10 s/div |
| Time Base Accuracy | 20 ppm on all models | | | | | | | | |
| Display Monitor (VGA) | Color active matrix LCD on all models | | | | | | | | |



▶ TDS3000B DPO provides breakthrough test speeds for telecommunications line card testing. The telecom QUICKMENU puts all the commonly used telecom testing functions on a single menu.



▶ Custom video trigger allows the TDS3000B to trigger on standards such as RS343 (26.2 kHz scan rate).



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

### Acquisition Modes

**DPO –** Captures and displays complex waveforms, random events and subtle patterns in actual signal behavior. DPOs are able to 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.

**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.

**Envelope –** Max/Min values acquired over one or more acquisitions.

**Average –** Waveform data from 2 to 512 (selectable) acquisitions is averaged.

**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.

**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.

**External Trigger Input –** >1 MΩ in parallel with 17 pF; Max input voltage is 150 $V_{RMS}$.

### Trigger Types

**Edge –** Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: DC, noise reject, HF reject, LF reject.

**Video –** Trigger on all lines, odd, even or all fields. With TDS3VID or TDS3SDI, trigger on individual lines and on analog HDTV formats (1080i, 1080p, 720p, 480p).

**Logic –**
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).

**Pulse –**
WIDTH (or GLITCH): Trigger on pulse width less than, greater than, equal to or not equal 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.
**Comm (requires TDS3TMT) –** Provides isolated pulse triggering required to perform DS1/DS3 telecommunications mask testing per ANSI T1.102 standard.
**Alternate –** Sequentially uses each active channel as a trigger source.

### Measurement System

**Automatic Waveform Measurements –**
Period, Frequency, +Width, –Width, Rise Time, Fall Time, +Duty Cycle, –Duty Cycle, +Overshoot, –Overshoot, High, Low, Max, Min, Peak-to-Peak, Amplitude, Mean, Cycle Mean, RMS, Cycle RMS, Burst Width, Delay, Phase, Area*2, Cycle Area*2. Display any four measurements from any combination of waveforms. Or display all measurements with measurement snapshot feature. Measurement statistics*2.

**Thresholds –** Settable in percentage or voltage.

**Gating –** Measurements can be gated using the screen or vertical cursors.

*2 Requires TDS3AAM module.

### Waveform Processing

**Deskew –** Channel-to-channel deskew ±10 ns may be manually entered for better timing measurements and more accurate math waveforms.

**Arithmetic Operators –** Add, subtract, multiply, divide, arbitrary math expressions*2.

**Autoset –** Single-button, automatic setup on selected input signal for vertical, horizontal and trigger systems.

### Display Characteristics

**Waveform Style –**
Dots, vectors and variable persistence.

**Graticules –** Full, grid, cross-hair, and frame.
NTSC, PAL, SECAM, and vectorscope (100% and 75% color bars) with optional TDS3VID and TDS3SDI video application modules.
**Format –** YT, XY and Gated XYZ (XY with Z-axis blanking available on TDS30X4B only).

### I/O Interface

**Hard Copy Port (standard) –**
Centronics-type parallel.

**Ethernet Port (standard) –**
10base-T LAN, RJ-45 female.

**TDS3GV Communications Module –** GPIB (IEEE 488.2) programmability: Full talk/listen modes; control of all modes, settings and measurements. VGA: Monitor output for direct display on large VGA-equipped monitors. DB-15 female connector, 31.6 kHz sync rate, EIA RS-343A compliant. RS-232-C interface programmability: Full talk/listen modes; control of all modes, settings and measurements. Baud Rate up to 38,400. DB-9 male connector. Programmer manual: 071-0381-02.

*2 Requires TDS3AAM module.

### Hard Copy Capability

**Graphics File Formats –** Interleaf (.img), TIF, PCX (PC Paintbrush), BMP (Microsoft Windows) and Encapsulated Postscript (EPS).

**Printer Formats –** Bubblejet, DPU-3445, Thinkjet, Deskjet, Laserjet, Epson (9- and 24-Pin).

### Environmental and Safety

**Temperature –** +5 ºC to +50 ºC (operating), –20 ºC to +60 ºC (nonoperating).

**Humidity –** 20% to 80% RH below 32 ºC, derate to 30% RH at 45 ºC (operating), 5% to 90% RH below 41 ºC, derate to 30% RH at 60 ºC (nonoperating).

**Altitude –**
To 3,000 m (operating), 15,000 m (nonoperating).

**Electromagnetic Compatibility –** Meets or exceeds EN55011 Class A radiated and conducted emissions; EN50082-1; FCC 47 CFR, Part 15, Subpart B, Class A; Australian EMC framework; Russian GOST EMC regulations.

**Safety –**
UL3111-1, CSA1010.1, EN61010-1, IEC61010-1.

### Physical Characteristics

| Instrument Dimensions | mm | in. |
|---|---|---|
| Width | 375.0 | 14.8 |
| Height | 176.0 | 6.9 |
| Depth | 149.0 | 5.9 |
| **Weight** | **kg** | **lbs.** |
| Instrument only | 3.2 | 7.0 |
| w/battery installed | 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 Dimensions** | **mm** | **in.** |
| Width | 484.0 | 19.0 |
| Height | 178.0 | 7.0 |
| Depth | 152.0 | 6.0 |

## ▸ Ordering Information

**TDS3012B, TDS3014B, TDS3024B, TDS3032B, TDS3034B, TDS3044B, TDS3052B, TDS3054B, TDS3064B**

### Standard Accessories

**Probes:** 2 each P3010 10X passive probes (TDS3012B), 4 each P3010 10X passive probes (TDS3014B), 2 each P6139A 10X passive probes (TDS3032B and TDS3052B), 4 each P6139A 10X passive probes (TDS3024B, TDS3034B, TDS3044B, TDS3054B and TDS3064B).

**Documentation:** User Manual, quick reference manual and programmer's manual.

**Power cord.**

**Accessory tray.**

**Protective front cover:** Has holder for user manual and/or 3.5 in. floppy disks.

**NIST-Traceable Certificate of Calibration.**

Please specify power plug and manual version when ordering.

### Recommended Option

**Option PB –** Available on all TDS3014B, TDS3024B, TDS3034B, TDS3044B, TDS3054B and TDS3064B models. Includes TDS3GV Communication Module with TDSPCS1 OpenChoice® Software, TDS3AAM Advanced Analysis Module and TDS3LIM Limit Testing Module.

### Recommended Accessories

**TDS3TMT –** Telecom Mask Testing Module.

**TDS3AAM –** Advanced Analysis Module.

**TDS3LIM –** Limit Testing Module.

**TDS3VID –** Extended Video Module.

**TDS3SDI –** 601 Serial Digital Video Module. Requires a 4-channel TDS3000B Series oscilloscope.

**TDS3GV –** GPIB, VGA, RS-232 interfaces and TDSPCS1 OpenChoice® PC Communication Software.

**TDSPCS1 OpenChoice PC Communication Software –** A collection of programs that enable fast and easy transfer communication between MS Windows PCs and Tektronix oscilloscopes. Available in single-license packages and included in TDS3GV communication module. Minimum system requirements: MS Windows 98 SE, XP Professional, ME, or 2000. MS Office 2000 or XP (for TDS toolbars only) – Excel 2000 or 2002; Word 2000 or 2002.



▶ TDS3BATB – Lithium Ion battery pack delivers up to 3 hours continuous operation without line power.



▶ TDS3PRT – Plug-in printer provides instant, portable documentation of your work.



▶ Tektronix probes are expressly designed for your oscilloscope, with identical quality standards and built-in compatibility for optimum performance.

**WaveStar™ Software for Oscilloscopes –** Microsoft Windows 98/ME/2000/NT 4.0 Application.

**TDS3BATB –** Lithium Ion battery pack for up to 3 hours continuous operation without line power.

**TDS3CHG –** Fast charger for battery pack.

**TDS3PRT –** Plug-in printer adds easy, portable documentation capability to your TDS3000B oscilloscope.

**016-1907-00 –** 5-roll pack of paper for TDS3PRT plug-in thermal printer.

**AC3000 –** Soft case for carrying instrument.

**HCTEK321 –** Hard plastic case for carrying instrument.

**RM3000 –** Rackmount kit.

**Service Manual (TDS3000B Series) –** English only (071-0972-00).

**TNGTDS01 –** Self-paced self-study operator training kit.

For customer training on this product outside the U.S. call 1-503-627-7510, inside the U.S. call 1-800-833-9200 ext. 77510.

### Recommended Probes

**ADA400A –** 100X, 10X, 1X, 0.1X high gain differential amplifier.

**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.

### International Power Plugs

**Opt. A0 –** North America power.

**Opt. A1 –** Universal EURO power.

**Opt. A2 –** United Kingdom power.

**Opt. A3 –** Australia power.

**Opt. A5 –** Switzerland power.

**Opt. A6 –** Japan power.

**Opt. A10 –** China power.

**Opt. A99 –** No power cord.

[*3] Requires TCPA300 probe amplifier.

[*4] Requires TCPA400 probe amplifier.

### Language Options

(includes front panel overlay)

**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. LR –** Russian.

**Opt. L99 –** No Manual.

### Service

**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 Years.

### Warranty

Three year warranty covering all labor and parts, excluding probes.

# Digital Phosphor Oscilloscopes

▶ **TDS3012B • TDS3014B • TDS3024B • TDS3032B • TDS3034B**
**TDS3044B • TDS3052B • TDS3054B • TDS3064B**



**A Critical Component of the Complete Measurement Solution.** The AFG300 Series arbitrary function generator with ArbExpress™ waveform editing software pairs with the TDS3000B, TPS2000, TDS2000 and TDS1000 Series digital oscilloscopes to deliver the two elements of a complete measurement solution – stimulus and acquisition. The AFG300 combines the capabilities of a function generator with the power of an arbitrary waveform generator, offering the performance needed to accurately verify, validate and characterize designs with ease and confidence, all at a price you can afford.

**Tektronix Support Completes the Solution.** We know you depend on Tektronix instrument solutions when you make and meet critical commitments. So we make and meet a support commitment you can depend on. Anytime you need support, anywhere in the world, Tektronix Support gives you the lowest possible exposure to inconvenience, delay or disruption of operations.

- ▶ Unsurpassed technical expertise and experience with 24-hour response to technical questions
- ▶ Interactive, online support to request assistance, check service status or arrange for training
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- ▶ Credible, reliable support with demonstrated on-time delivery
- ▶ 90-day unconditional service warranty
- ▶ No fine print, no exclusions, no surprises
- ▶ Global support in more than 50 countries

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