

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

Test equipment Solutions Ltd
Unit 8 Elder Way
Waterside Drive
Langley
Berkshire
SL3 6EP

T: +44 (0)1753 596000
F: +44 (0)1753 596001

Email: info@TestEquipmentHQ.com
Web: www.TestEquipmentHQ.com



Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024



► Features & Benefits

60 MHz, 100 MHz, and
200 MHz Bandwidths

Sample Rates up to 2 GS/s

2 or 4 Channels

Color or Monochrome
LCD Display

CompactFlash® Mass
Storage Option with
TDS2MEM Module

Autoset Menu with
Waveform Selection

Probe Check Wizard to
Ensure Correct Probe Usage

Context-sensitive Help

Dual Time Base

Advanced Triggers,
Including Pulse Width
Trigger and Line-Selectable
Video Trigger

11 Automatic Measurements

Multi-language User Interface

Waveform and
Setup Memories

FFT Standard on All Models

OpenChoice™ Solutions
Speed Documentation and
Analysis of Measurement
Results

- TDS2CMAX Communication Module
- TDS2MEM Storage Memory and Communication Module
- TDSPCS1 OpenChoice Software
- WaveStar™ Software
- Integration with Third-party Software

► Applications

Design and Debug

Education and Training

Manufacturing Test
and Quality Control

Service and Repair

TDS1000 and TDS2000 Series Oscilloscopes. Colorful Performance at a Black and White Price.

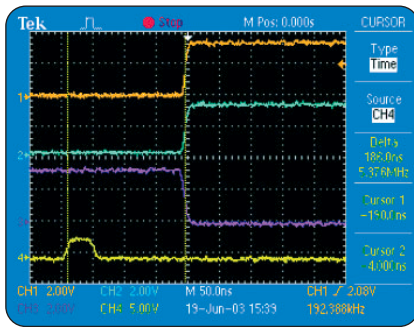
The TDS1000 Series and TDS2000 Series digital storage oscilloscopes deliver an unbeatable combination of superior performance, unmatched ease-of-use, and affordability in an ultra lightweight, portable package.

Affordable Digital Precision

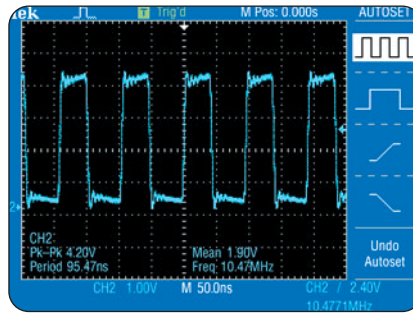
With up to 200 MHz bandwidth and 2 GS/s maximum sample rate, no other color digital storage oscilloscope offers as much bandwidth and sample rate for the price. The TDS1000 and TDS2000 Series oscilloscopes provide accurate real-time acquisition up to their full bandwidth, advanced triggers to isolate signals of interest, and 11 standard automatic measurements on all models. Their Fast Fourier Transform (FFT) math function allows the user to analyze, characterize and troubleshoot circuits by viewing frequency and signal strength (standard on all models).

Digital Storage Oscilloscopes

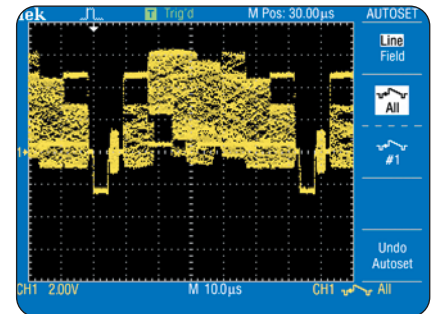
► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024



- Unparalleled measurement accuracy with up to 200 MHz bandwidth and 2 GS/s maximum sample rate.



- Automatically detects sine waves, square waves and video signals, with readouts of relevant measurements and additional user-selectable views of the signal.



- Pulse-width and field- and line-selectable video triggers make the oscilloscope ideal for a wide range of applications.

Ultra-fast Setup and Use

The simple user interface with classic, analog-style controls makes these instruments easy to use, reducing learning time and increasing efficiency. Innovative features, such as the autoset menu, probe check wizard, context-sensitive help menu and color LCD display (TDS2000 Series) optimize instrument setup and operation.

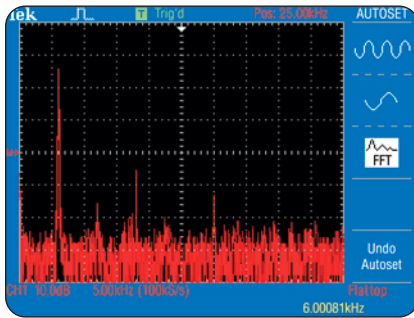
Simple, Speedy Documentation and Analysis

OpenChoice™ solutions deliver simple, seamless integration between the oscilloscope and the personal computer, providing you with multiple choices to easily document and analyze your measurement results.

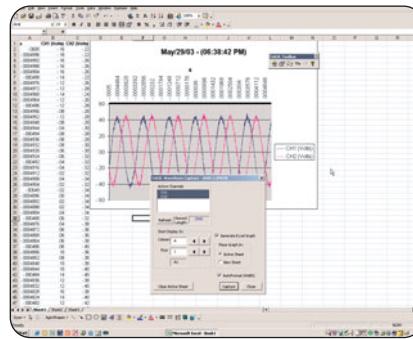
Choose from optional communication modules, CompactFlash® mass storage capability, OpenChoice software and integration with third-party software.

Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024



- Precisely analyze, characterize and troubleshoot circuits – at the push of a button with the autoset menu.



- Easily document and analyze measurement results using OpenChoice™ software.



- Quickly transfer waveforms and measurement data to an external PC or between oscilloscopes.

► Characteristics

► TDS1000 and TDS2000 Series Electrical Characteristics

	TDS1002	TDS1012	TDS2002	TDS2012	TDS2014	TDS2022	TDS2024
Display (1/4 VGA LCD)	Mono	Mono	Color	Color	Color	Color	Color
Bandwidth* ¹	60 MHz	100 MHz	60 MHz	100 MHz	100 MHz	200 MHz	200 MHz
Channels	2	2	2	2	4	2	4
External Trigger Input	Yes on all models						
Sample Rate on each channel	1.0 GS/s	1.0 GS/s	1.0 GS/s	1.0 GS/s	1.0 GS/s	2.0 GS/s	2.0 GS/s
Record Length	2.5-K points on all models						
Vertical Resolution	8-bits						
Vertical Sensitivity	2 mV to 5 V/div on all models with calibrated fine adjustment						
DC Vertical Accuracy	±3% on all models						
Vertical Zoom	Vertically expand or compress a live or stopped waveform						
Max Input Voltage	300 V _{RMS} CAT II; derated at 20 dB/decade above 100 kHz to 13 V _{p-p} AC at 3 MHz and above						
Position Range	2 mV to 200 mV/div ±2 V; >200 mV to 5 V/div ±50 V						
BW Limit	20 MHz for all models						
Input Coupling	AC, DC, GND on all models						
Input Impedance	1 MΩ in parallel with 20 pF						
Time Base Range	5 ns to 50 sec/div	5 ns to 50 sec/div	5 ns to 50 sec/div	5 ns to 50 sec/div	5 ns to 50 sec/div	2.5 ns to 50 sec/div	2.5 ns to 50 sec/div
Time Base Accuracy	50 ppm						
Horizontal Zoom	Horizontally expand or compress a live or stopped waveform						

*¹ Bandwidth is 20 MHz at 2 mV/div, all models.

Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024

Acquisition Modes

Peak Detect – High frequency and random glitch capture. Captures glitches as narrow as 12 ns typical using acquisition hardware at all time/div settings from 5 μ s/div to 50 s/div.

Sample – Sample data only.

Average – Waveform averaged, selectable: 4, 16, 64, 128.

Single Sequence – Use the Single Sequence button to capture a single triggered acquisition sequence at a time.

Trigger System (Main Only)

Trigger Modes – Auto, Normal, Single Sequence.

Trigger Types

Edge (rising or falling) – 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 line, odd/even or all fields from composite video, or broadcast standards (NTSC, PAL, SECAM).

Pulse Width (or Glitch) – Trigger on a pulse width less than, greater than, equal to, or not equal to a selectable time limit ranging from 33 ns to 10 sec.

Trigger Source

2-channel models – CH1, CH2, Ext, Ext/5, AC Line.

4-channel models – CH1, CH2, CH3, CH4, Ext, Ext/5, AC Line.

Trigger View

Displays trigger signal while trigger view button is depressed.

Trigger Signal Frequency Readout

Provides a frequency readout of the trigger source.

Cursors

Types – Voltage, Time.

Measurements – $[\Delta]T$, $1/[\Delta]T$ (frequency), $[\Delta]V$.

Measurement System

Automatic Waveform Measurements – Period, Frequency, +Width, –Width, Rise Time, Fall Time, Max, Min, Peak-to-Peak, Mean, Cycle RMS.

Waveform Processing

Operators – Add, Subtract, FFT.

FFT – Windows: Hanning, Flat Top, Rectangular; 2048 sample points.

Sources – 2-channel models: CH1 - CH2, CH2 - CH1, CH1 + CH2.

4-channel models: CH1 - CH2, CH2 - CH1, CH3 - CH4, CH4 - CH3, CH1 + CH2, CH3 + CH4.

Autoset Menu – Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo autoset.

► Autoset Menu for Multiple Signal Types

Signal Type	Autoset Menu Choices
Square Wave	Single-cycle, Multi-cycle, Rising or Falling Edge
Sine Wave	Single-cycle, Multi-cycle, FFT Spectrum
Video (NTSC, PAL, SECAM)	Field: All, Odd or Even Line: All or Selectable Line Number

Display Characteristics

Display –

Monochrome models: 1/4 VGA, backlit passive LCD with adjustable multi-level contrast and inverse video selectable from front panel.

Color models: 1/4 VGA, passive color LCD with color on black background with adjustable multi-level contrast.

Interpolation – $\sin(x)/x$.

Display Types – Dots, vectors.

Persistence – Off, 1 sec, 2 sec, 5 sec, infinite.

Format – YT and XY.

► I/O Interface

I/O interface	TDS2CMAX Communication Module	TDS2MEM Storage Memory and Communication Module
Compatibility	TDS200, TDS1000, TDS2000 Series Oscilloscopes	TDS1000, TDS2000 Series Oscilloscopes
Printer Port	Centronics-type Parallel	
Printer Capability (Requires Module)	Graphics File Formats – TIFF, PCX (PC Paint Brush), BMP (Microsoft Windows), EPS (Encapsulated Postscript) and RLE Printer Formats – Bubble Jet, DPU-411, DPU-412, DPU-3445, Thinkjet, Deskjet, Laser Jet, Epson Dot (9- or 24-pin)* ² , Epson C60* ² , Epson C80 Layout – Landscape and Portrait	
RS-232 Programmability	Full talk/listen modes. Control of all modes, settings and measurements. Baud rate up to 19,200. 9-pin DTE RS-232 Cable (012-1651-00) included	
GPIO (IEEE std. 488-1987) Programmability	Full talk/listen modes. Control of all modes, settings and measurements.	Not Available
Mass Storage CompactFlash® Memory	Not Available	<ul style="list-style-type: none"> • Type 1 CompactFlash memory card supplied with Module*³ • Accepts any Type 1 CompactFlash card, up to and including 1 GB <ul style="list-style-type: none"> • Built-in Clock/Calendar • Includes CompactFlash to USB Memory Card Reader for use with Personal Computer
OpenChoice™ PC Communications Software	<ul style="list-style-type: none"> • TDSPCS1 OpenChoice PC Communications Software included with each Module <ul style="list-style-type: none"> • Seamless connection from oscilloscope to PC through GPIO and RS-232 • Transfer and save settings, waveforms, measurements, and screen images • Includes a Windows desktop data transfer application in addition to convenient Microsoft Word and Excel Toolbar Add-ins 	

*²Requires instrument firmware version 2.12/4.12 or higher to support Epson C60/C80 printer formats.

*³Supplied Type 1 CompactFlash memory card storage capacity 8 MB or greater.

Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024

► Nonvolatile Storage

Nonvolatile Storage	Standard		Optional TDS2MEM Storage Memory and Communication Module*4
Reference Waveform Display	Two 2500 point reference waveforms		Same as instrument only
Waveform Storage	2 Channel Models Two 2500 point reference waveforms	4 Channel Models Four 2500 point reference waveforms	96 or more reference waveforms per 8 MB
Setups	10 front panel setups		4000 or more front panel setups per 8 MB
Screen Images	N/A		128 or more screen images per 8 MB (the number of images depends on file format selected)
Save All	N/A		12 or more Save All operations per 8 MB. A single Save All operation creates 2 to 9 files (setup, image, plus one file for each displayed waveform)

*4 Supplied with Type 1 CompactFlash® memory card, storage capacity 8 MB or greater.

Environmental and Safety

Temperature –

Operating: 0 °C to +50 °C.

Nonoperating: –40 °C to +71 °C.

Humidity –

Operating and Nonoperating: up to 90% RH at or below +30 °C.

Operating: up to 60% RH up to 50 °C.

Nonoperating: up to 60% RH up to 55 °C.

Altitude – Operating and Nonoperating: up to 3,000 m.

Electromagnetic Compatibility – Meets Directive 89/336/EEC, amended by 93/68/EEC, meets or exceeds EN55011 Class A Radiated and Conducted Emissions; FCC 47 CFR, Part 15, Subpart B, Class A; Australian EMC Framework, demonstrated per Emission Standard AS/NZS 2064; Russian GOST EMC regulations.

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

Physical Characteristics

INSTRUMENT

Dimensions	mm	in.
Width	323.8	12.75
Height	151.4	5.96
Depth	124.5	4.90
Weight	kg	lbs.
Instrument only	2.0	4.4
with accessories	2.2	4.9

INSTRUMENT SHIPPING

Package Dimensions	mm	in.
Width	476.2	18.75
Height	266.7	10.50
Depth	228.6	9.00

RM2000 RACKMOUNT

Dimensions	mm	in.
Width	482.6	19.00
Height	177.8	7.00
Depth	108.0	4.25

► Ordering Information

TDS1002, TDS1012, TDS2002, TDS2012, TDS2014, TDS2022, TDS2024

Standard Accessories

Probes – P2200 200 MHz 10X - 1X Switchable Passive Probes (one per channel).

Documentation – User manual.

Power cord.

NIM/NIST-Traceable Certificate of Calibration.

Please specify the power plug and language options when ordering.

Recommended Accessories

TDS2CMAX – Communication Module (GPIO, RS-232, Centronics-type Printer Port) includes: TDSPCS1 OpenChoice™ PC Communication Software, RS-232 cable (012-1651-00), Programmers manual.

TDS2MEM – Storage Memory and Communication Module (RS-232, Centronics-type Printer Port) includes: Type 1 CompactFlash® memory card (156-9413-00), CompactFlash to USB Memory Card Reader (119-6827-00), TDSPCS1 OpenChoice PC Communication Software, RS-232 cable (012-1651-00), Programmers manual.

Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024

CompactFlash to USB Memory Card Reader – (119-6827-00).

TDSPCS1 OpenChoice PC Communication

Software – A collection of programs that enable fast and easy transfer communication between MS Windows PCs and TDS3000B, TDS2000, TDS1000, and TDS200 Series oscilloscopes; included with TDS2CMAX and TDS2MEM communication modules.

Minimum System Requirements:

- 500 MHz Pentium equivalent or greater
- 128 MB
- 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
- Keyboard and mouse
- LAN, GPIB or serial connector

WaveStar™ Software for Oscilloscopes

(WSTRO) – Windows 98/2000/ME/NT 4.0 application for waveform capture, analysis, documentation, and control from your PC. Provides enhanced oscilloscope data measurement, analysis, remote-setup, and charting features. Connects to a wide variety of Tektronix oscilloscopes over GPIB, RS-232, and Ethernet connections.

AD007 – LAN/WAN GPIB converter.

AC220 – Soft case for carrying instrument.

HCTDS32 – Hard plastic case for carrying instrument (requires AC220).

RM2000 – Rackmount kit.

Service Manual (TDS1000 and TDS2000 Series Digital Storage Oscilloscopes) – English Only (071-1076-00).

Programmer Manual (TDS200, TDS1000 and TDS2000 Series Digital Storage Oscilloscopes) – English only (071-1075-01).

Operator Training Kit – Extensive instructions and step-by-step lab exercises provide education about the operation of the TDS1000 and TDS2000 Series oscilloscopes. Kit includes a self-paced CD-ROM-based manual and signal source board (TNGTDS01). Optional hard copy manual is available for order separately.

Recommended Probes

P2200 – 10X - 1X switchable passive probe (200 MHz when 10X is selected).

P6015A – 1000X high voltage passive probe (75 MHz).

P5100 – 100X high voltage passive probe (250 MHz).

P5200 – High voltage active differential probe (25 MHz).

P6021 – 60 MHz AC current probe.

P6022 – 120 MHz AC current probe.

A621 – 2000 A AC current probe/BNC.

A622 – 100 A AC/DC current probe/BNC.

AM503S – AC/DC current probe system.

Power Plug Options

Opt. A0 – North America power.

Opt. A1 – Universal EURO power.

Opt. A2 – United Kingdom power.

Opt. A3 – Australia power.

Opt. A5 – Switzerland power.

Opt. A99 – No power cord or AC adapter.

Opt. AC – China power.

Accessory Cables

GPIB, 1 m (3.3 ft.) – Order 012-0991-01.

GPIB, 2 m (6.6 ft.) – Order 012-0991-00.

RS-232, 9-Pin female to 25-Pin male, 4.6 m (15 ft.), for Modems – Order 012-1241-00.

RS-232, 9-Pin female to 9-Pin female, null modem, for computers – Order 012-1651-00.

RS-232, 9-Pin female to 25-Pin female, null modem, for computers – Order 012-1380-00.

RS-232, 9-Pin female to 25-Pin male, null modem, for printers – Order 012-1298-00.

Centronics, 25-Pin male to 36-Pin Centronics, 2.4 m (8 ft.), for Parallel Printer Interfaces – Order 012-1214-00.



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

International User Manual (TDS1000 and TDS2000 Series Digital Storage Oscilloscopes, includes TDS2CMAX*1 user information)

Opt. L0 – English (071-1064-00).

Opt. L1 – French (071-1065-00).

Opt. L2 – Italian (071-1066-00).

Opt. L3 – German (071-1067-00).

Opt. L4 – Spanish (071-1068-00).

Opt. L5 – Japanese (071-1069-00).

Opt. L6 – Portuguese (071-1070-00).

Opt. L7 – Simplified Chinese (071-1071-00).

Opt. L8 – Traditional Chinese (071-1072-00).

Opt. L9 – Korean (071-1073-00).

Opt. LR – Russian (071-1074-00).

Translated front panel overlays included with their respective user manuals.

Warranty Information

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

*1 The user information for the TDS2CMA communication module that appears in this manual also applies to the TDS2CMAX communication module.

Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024

► A Critical Component of the Complete Measurement Solution.

The AFG300 Series arbitrary function generator pairs with the TDS3000B, TDS2000 and TDS1000 Series digital oscilloscopes to deliver the two elements of a complete measurement solution – stimulus and acquisition. This instrument 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 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
- Industry-leading, turn-around service time
- 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

Depend on Tektronix. Visit www.tektronix.com/support



Contact Tektronix:

ASEAN / Australasia / Pakistan (65) 6356 3900

Austria +43 2236 8092 262

Belgium +32 (2) 715 89 70

Brazil & South America 55 (11) 3741-8360

Canada 1 (800) 661-5625

Central Europe & Greece +43 2236 8092 301

Denmark +45 44 850 700

Finland +358 (9) 4783 400

France & North Africa +33 (0) 1 69 86 80 34

Germany +49 (221) 94 77 400

Hong Kong (852) 2585-6688

India (91) 80-2275577

Italy +39 (02) 25086 1

Japan 81 (3) 3448-3010

Mexico, Central America & Caribbean 52 (55) 56666-333

The Netherlands +31 (0) 23 569 5555

Norway +47 22 07 07 00

People's Republic of China 86 (10) 6235 1230

Poland +48 (0) 22 521 53 40

Republic of Korea 82 (2) 528-5299

Russia, CIS & The Baltics +358 (9) 4783 400

South Africa +27 11 254 8360

Spain +34 (91) 372 6055

Sweden +46 8 477 6503/4

Taiwan 886 (2) 2722-9622

United Kingdom & Eire +44 (0) 1344 392400

USA 1 (800) 426-2200

USA (Export Sales) 1 (503) 627-1916

For other areas contact Tektronix, Inc. at: 1 (503) 627-7111

Updated 20 September 2002

Our most up-to-date product information is available at:
www.tektronix.com

Product(s) are manufactured
in ISO registered facilities.



Copyright © 2003, Tektronix, Inc. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. TEKTRONIX and TEK are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks or registered trademarks of their respective companies.

06/03 HB/SFI

40W-15314-2