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Tektronix

# TDS 210,TDS 220,TDS 224 Digital Real-Time™ Oscilloscopes



FEATURES AND BENEFITS

**60 MHz or 100 MHz with 1 GS/s Sample Rate on all Channels**

**Dual Timebase**

**Automatic Measurements**

**Multi-Language User Interface**

**Autoset**

**Waveform and Setup Memories**

**Extended Capabilities are Provided with Optional Modules, Software and Probing**

APPLICATIONS

**Design/Debug**

**Service and Repair**

**Manufacturing Test and Quality Control**

**Education/Training**

### Tektronix' Most Popular DSO

The TDS 200 Oscilloscopes have quickly become the benchmark for low-cost oscilloscopes. Offering an unbeatable combination of performance, reliability and versatility, the TDS 200 Series offers breakthrough digital and real-time advantages at low-cost analog oscilloscope prices. And with the introduction of the TDS 224, Tektronix now brings the digital performance of the TDS 200 to customers that need four full-featured channels.

### Affordable Digital Performance

No other digital oscilloscope offers as much bandwidth and sample rate for the price. By sampling at 10 and 16 times their bandwidths on all channels, the TDS 200 Series oscilloscopes provide accurate real-time acquisition up to their full bandwidth.

### Versatility and Flexibility

The portable form factor provides increased versatility, allowing the instrument to be easily moved or safely stored away when not in use.

### Easy to Use

The user interface is similar to that of an analog oscilloscope, but with improvements that reduce learning time and increase efficiency

### The Personal Oscilloscope

The TDS 200 Series oscilloscopes are designed for people who demand the ultimate in oscilloscope value. If an inexpensive yet high performance oscilloscope is needed for the bench, production line, or training lab, a TDS 200 Series Digital Real-Time Oscilloscope is the best choice.

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# TDS 200 Series Characteristics

## SIGNAL ACQUISITION SYSTEM

**Bandwidth –**
TDS 210: 60MHz.
TDS 220: 100MHz.
TDS 224: 100MHz.

**Sample Rate –**
1 GS/s on each channel.

**Channels –**
TDS 210 and TDS 220: 2 identical channels plus external trigger.
TDS 224: 4 identical channels.

**Sensitivity (with calibrated fine adjustment) –**
2 mV to 5V/div (bandwidth limited to 20 MHz at 2 mV/div and 5 mV/div, in all modes, and 20 MHz at 10 mV/div in Peak Detect mode).

**Vertical Zoom –**
Vertically expand or compress a live or stopped waveform.

## CALIBRATED POSITION RANGE

| Volts/Div Setting | Offset Range |
|---|---|
| 2 mV to 200 mV/div | ±2 V |
| >200 mV to 5 V/div | ±50 V |

**DC Gain Accuracy –** ± 3%. (± 4% at 2 mV/div and 5 mV/div)

**Vertical Resolution –**
8 bits (256 levels over 10.24 vertical divisions).

## AUTOMATIC MEASUREMENTS

Period, Frequency, Cycle RMS, Mean, Peak to Peak.

## ACQUISITION MODES

**Sample, Average, Peak Detect –** High frequency and random glitch capture; captures glitches as narrow as 10 ns using acquisition hardware at all time/div settings between 5 µs/div and 5 s/div.

## TIME BASE SYSTEM (MAIN AND WINDOW)

**Horizontal Zoom –** Horizontally expand or compress a live or stopped waveform.

**Time/Division Range –** 5 ns to 5 s/div.

**Record Length –** 2500 sample points per channel.

**Horizontal Accuracy –** ± 0.01%.

## NON-VOLATILE STORAGE

**Waveform Display –** Two 2500 point reference waveforms.

**Waveform Storage –** Two 2500 point reference waveforms (TDS 210, TDS 220), four 2500 point reference waveforms (TDS 224).

**Setups –** 5 front panel setups.

## TRIGGERING SYSTEM (MAIN ONLY)

**Trigger Type –** Edge (Rising or Falling), Video, Set to 50%.

**Video Trigger Type –** Triggers on Fields or Lines from sync-negative composite video; triggers on broadcast standard NTSC, PAL, or SECAM video.

**Trigger Modes –** Auto, Normal, Single Sweep.

**Trigger Source –**
TDS 210 and TDS 220: CH1, CH2, Ext, Ext/5.
TDS 224: CH1, CH2, CH3, CH4

**Trigger View –** Displays trigger signal while trigger view button depressed.

## CURSORS

**Types –** Voltage, Time.

**Measurements –** ΔT, 1/ΔT, ΔV.

## WAVEFORM PROCESSING

**Arithmetic Operators –** Add, Subtract.

**Sources –** CH1±CH2, CH3±CH4.

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

## DISPLAY SYSTEM

Robust, backlit LCD with adjustable multi-level contrast.

**Interpolation –** Sin(x)/x.

**Modes –** Vector, Dots, Dot Persistence.

**Format –** YT and XY.

## HARDCOPY CAPABILITY

**Printer/File Formats –** Thinkjet, Deskjet, Laserjet, Epson (9 or 24 pin), BMP, PCX, IMG, EPS, DPU 411, DPU 412.

**Hardcopy Layout –** Landscape or Portrait.

## TDS2CM COMMUNICATIONS EXTENSION MODULE

**Centronics-type Parallel Port**

**RS-232 Programmability –** Full talk/listen modes. Control of all modes, settings, and measurements. Baud Rate up to 19,200. 9-Pin, DTE.

**GPIB Programmability –** Full talk/listen modes. Control of all modes, settings, and measurements (IEEE Std 488-1987).

## TDS2MM MEASUREMENT EXTENSION MODULE

**FFT –** Windows: Hanning, Flat Top, Rectangular.
Sample points: 2048.

**Automatic Measurements –** Rise/Fall Time, Positive/Negative Pulse Width.

**Interface –** Centronics, RS-232, GPIB.

## ENVIRONMENTAL AND SAFETY

**Temperature –**
0° C to +50° C (operating).
-20° C to +60° C (non-operating).

**Humidity –**
Up to 90% RH at or below +40° C;
Up to 60% RH from 41° C to 50° C (operating and non-operating).

**Altitude –**
Up to 2000 m (operating).

**Electromagnetic Emissions –**
Meets Directive 89/336/EEC for Electromagnetic Compatibility;
FCC Code of Federal Regulations, 47 CFR, Part 15, Subpart B, Class A.

**Safety –** UL 3111, EN61010, CAN/CSA-C22.2 No. 1010.1-92.

## PHYSICAL CHARACTERISTICS

| Dimensions | mm | in. |
|---|---|---|
| Width | 304.8 | 12.0 |
| Height | 151.4 | 5.96 |
| Depth | 120.7 | 4.75 |

| Weight | kg | lb. |
|---|---|---|
| oscilloscope only | 1.5 | 3.25 |
| w/accessories | 1.7 | 3.75 |

## TDS 200 Series Ordering Information

### TDS 200 Digital Real-Time™ Oscilloscopes

#### Standard Accessories

P6112 100MHz 10X Passive Probes (one per channel).

#### Warranty Information

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

#### International Power Plug Options

**Standard –** U.S. 115V, 60 Hz (161-0230-01).

**Opt. A1 –** Universal Euro 220 V, 50 Hz (161-0104-06).

**Opt. A2 –** United Kingdom 240 V, 50 Hz (161-0104-07).

**Opt. A3 –** Australia 240 V, 50Hz (161-0104-05).

**Opt. A4 –** North America 240 V, 60Hz (161-0104-08).

**Opt. A5 –** Switzerland 220 V, 50 Hz (161-0167-00).

**Opt. AC –** China 240 V, 50Hz (161-0306-00).

#### International User Manuals (TDS 200 Series Oscilloscopes)

**Standard –** English (071-0398-00).

**Opt. L1 –** French (071-0400-00).

**Opt. L2 –** Italian (071-0401-00).

**Opt. L3 –** German (071-0402-00).

**Opt. L4 –** Spanish (071-0399-00).

**Opt. L5 –** Japanese (071-0405-00).

**Opt. L6 –** Portuguese (071-0403-00).

**Opt. L7 –** Simplified Chinese (071-0406-00).

**Opt. L8 –** Traditional Chinese (071-0407-00).

**Opt. L9 –** Korean (071-0408-00).

**Opt. LR –** Russian (071-0404-00).

Translated front panel overlays included with their respective user manuals. (except Russian)

#### International User Manuals (TDS2xM Extension Modules)

**Standard –** English (071-0409-00).

**Opt. L1 –** French (071-0483-00).

**Opt. L2 –** Italian (071-0484-00).

**Opt. L3 –** German (071-0485-00).

**Opt. L4 –** Spanish (071-0482-00).

**Opt. L5 –** Japanese (071-0488-00).

**Opt. L6 –** Portuguese (071-0486-00).

**Opt. L7 –** Simplified Chinese (071-0489-00).

**Opt. L8 –** Traditional Chinese (071-0490-00).

**Opt. L9 –** Korean (071-0491-00).

**Opt. LR –** Russian (071-0487-00).

#### Instrument Accessories

**TDS2CM –** Communications Extension Module.

**TDS2MM –** Measurement Extension Module.

**TR210 –** Huntron Tracker®.

**AD007 –** LAN/WAN GPIB Converter.

**AC220 –** Soft Carrying Case.

**RM200 –** Rackmount Kit.

**Service Manual (TDS 200 Series) –** English only (071-0492-00).

**TDS2CM and TDS2MM Programmer's Manual –** English only (071-0493-00).

#### Software

**WSTRO –** WaveStar™ software for Oscilloscopes, Windows 95/NT application for waveform capture, analysis, documentation and control from your PC.

**WSTROU –** Upgrade from WSTR31 to WSTRO.

**WSTR31 –** WaveStar™ software for Windows 3.1 (TDS 210, TDS 220).

**WSTR31U –** Upgrade from DocuWave® software to WSTR31 (TDS 210, TDS 220).

#### Probes

**P6015A –** 1000X High Voltage Probe.

**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.

**P5100 –** 100X High Voltage Passive Probe.

**P5200 –** High Voltage Differential Probe.

**P6101B –** 1X Passive Voltage Probe (15 MHz).

**P6243S –** Active FET Probing System (1 GHz).

**P6408 –** Word Recognizer/Trigger Probe.

**P6561A –** SMD Small Geometry Probe.

**AM503S –** AC/DC Current Probe System.

#### 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 9-Pin female connectors, null modem, 76 in. (1.9 m), for AT style computers –** Order 012-1379-00.

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

**Centronics, 25-Pin male to 36-Pin Centronics, 2.4 m (8 ft), for parallel printer interfaces –** Order 012-1214-00.

For further information, contact Tektronix:

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