Digital Phosphor Oscilloscopes

TDS7000 Series

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Print Product Summary

(498 kB)

TDS7254 Product Summary

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Characteristics

Vertical System

Tektronix Print Catalog 2001 Correction - on page 67 the table states that the TDS7404 has a Hardware Bandwidth Limits of 250MHz or 20 MHz. The TDS7404 does not have a Hardware Bandwidth limit feature.

	TDS7054	TDS7104	TDS7254	TDS7404
Input Channels	4	4	4	4
Analog Bandwidth (-3 dB)	500 MHz	1 GHz	2.5 GHz	4 GHz
Calculated Risetime 10 mV/div - 1 V/div	800 ps	400 ps	160 ps, typical	100 ps
Hardware Bandwidth Limits	250 MHz or 20 MHz			
Input Coupling	AC, DC, Gnd		DC, Gnd	
Input Impedance	1 megaohm ±0.5% or 50 Ohm ±1%		50 Ohm ±2.5%	
Input Sensitivity, 1 megaohm	1 mV/div to 10 V/div			
Input Sensitivity, 50 Ohm	1 mV/div to 1 V/div		2 mV/div to 1 V/div	
Vertical Resolution	8-Bits (>11-Bits w/averaging)			
Max Input Voltage, 1 megaohm	±150 V CAT I Derate at 20 dB/decade to 9 V_{RMS} above 200 kHz			

Max Input Voltage, 50 Ohm	5 V_{RMS}, with peaks less than ±30 Volts	Determined by TekConnect Accessory
DC Gain Accuracy	1.00%	±(2% + (2% * offset))
Offset Range	1 mV/div - 100 mV/div ±1 V 101 mV/div - 1 V/div ±10 V 1.01 V/div - 10 V/div ±100 V	2 mV - 50 mV/div ±0.5 V 50.5 mV - 99.5 mV ±0.25 V 100 mV - 500 mV ±5 V 505 mV - 1 V/div ±2.5 V
Channel-to-channel Isolation Any Two Channels at Equal Vertical Scale Settings	≥100:1 at 100 MHz and ≥30:1 at the Rated Bandwidth	≥100:1 at <2-5 GHz and ≥40:1 at 4 GHz

Timebase System

	TDS7054	**TDS7104**	**TDS7254**	**TDS7404**
Timebase Range	200 ps/div - 40 s/div		50 ps - 10 s/div	
Timebase Delay Time Range	16 ns to 250 s			
Channel to Channel Deskew Range	±25 ns			
Delta Time Measurement Accuracy	±(0.30 sample interval) + (15 ppm * reading)		0.06/ sample rate + 2.5 ppm * reading RMS	0.06/ sample rate + 1.5 ppm * reading RMS
Trigger Jitter (RMS)	8 ps RMS (typical)		6 ps RMS (typical)	6 ps RMS (typical)

Long Term Sample Rate and Delay Time Accuracy	±15 ppm over ≥1 ms interval	±1.5 ppm over any ≥100 ms interval

Acquisition System

	TDS7054	TDS7104	TDS7254	TDS7404
Real-time Sample Rates				
1 channel (max)	5 GS/s	10 GS/s	20 GS/s	20 GS/s
2 channels (max)	5 GS/s	5 GS/s	10 GS/s	10 GS/s
3-4 channels (max)	2.5 GS/s	2.5 GS/s	5 GS/s	5 GS/s
Equivalent Time Sample Rate (max)	250 GS/s	250 GS/s	250 GS/s	250 GS/s
Maximum record length per channel with standard memory	400 k (1 ch), 200 k (2 ch), 100 k (4 ch)			
with Opt. 1M	2 M (1 ch), 1 M (2 ch), 500 k (4 ch)			
with Opt. 2M	8 M (1 ch), 4 M (2 ch), 2 M (4 ch)			
with Opt. 3M	16 M (1 ch), 8 M (2 ch), 4 M (4 ch)			
with Opt. 4M			32 M (1 ch), 16 M (2 ch), 8 M (4 ch)	

Maximum Duration at Highest Real-time Resolution (1 ch)

	TDS7054	TDS7104	TDS7254	TDS7404

Time Resolution (Single-shot)	200 ps (5 GS/s)	100 ps (10 GS/s)	50 ps (20 GS/s)	50 ps (20 GS/s)
Max Duration with Standard Memory	80 µs	40 µs	20 µs	20 µs
Max Duration with Opt. 1M	400 µs	200 µs	100 µs	100 µs
Max Duration with Opt. 2M	1.6 ms	800 µs	400 µs	400 µs
Max Duration with Opt. 3M	3.2 ms	1.6 ms	800 µs	800 µs
Max Duration with Opt. 4M			1.6 ms	1.6 ms

Acquisition Modes

	TDS7054	**TDS7104**	**TDS7254**	**TDS7404**
FastAcq Acquisition	FastAcq optimizes the instrument for analysis of dynamic signals and capture of infrequent events			
Maximum FastAcq Waveform Capture Rate	>200,000 wfms/sec	>200,000 wfms/sec	>400,000 wfms/sec	>400,000 wfms/sec
Sample	Acquire sampled values			
Peak Detect	Captures narrow glitches at all real-time sampling rates			
Minimum Peak Detect Pulse Width	≤1 ns	≤1 ns	400 ps	400 ps
Averaging	From 2 to 10,000 waveforms included in average			

Envelope	From 2 to $2x10^9$ waveforms included in min-max envelope
Hi-Res	Real-time boxcar averaging reduces random noise and increases resolution
FastFrame Acquisition	Acquisition memory divided into segments; maximum trigger rate >150,000 waveforms per second. Time of arrival recorded with each event

Trigger System

	TDS7054	TDS7104	TDS7254	TDS7404
Sensitivity Internal DC Coupled	0.35 div DC to 50 MHz increasing to 1 div at 500 MHz	0.35 div DC to 50 MHz increasing to 1 div at 1 GHz	0.35 div DC to 50 MHz increasing to 1.5 div at 3 GHz	0.35 div DC to 50 MHz increasing to 1.5 div at 3 GHz
External (Auxiliary Input)	400 mV from DC to 50 MHz increasing to 750 mV at 100 MHz	250mV from DC to 50 MHz increasing to 500mV at 100 MHz	250mV from DC to 50 MHz increasing to 350mV at 500 MHz	250mV from DC to 50 MHz increasing to 350mV at 500 MHz
Main Trigger Modes	Auto, Normal and Single			
Trigger Sequences	Main, Delayed by Time, Delayed by Events. All sequences can include separate horizontal delay after the trigger event to position the acquisition window in time			
Trigger Level range				
Internal	±12 divisions from center of screen			
External (Auxiliary In)	±8 V			
Line	fixed at 0 V			
Trigger Coupling	DC, AC (attenuate < 60 Hz), HF Rej (attenuate >30 kHz), LF Rej (attenuates < 80 kHz), Noise Reject (reduce sensitivity)			

Trigger Holdoff Range	250 ns minimum to 12 s maximum

Trigger Modes

Edge - Positive or negative slope on any channel or front panel auxiliary input. Coupling includes DC, AC, noise reject, HF reject and LF reject.

Glitch - Trigger on or reject glitches of positive, negative or either polarity. Minimum glitch width is 1.0 ns with 200 ps resolution.

Width - Trigger on width of positive or negative pulse either within or out of selectable time limits (1 ns to 1 s).

Runt - Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Optional time qualification.

Timeout - Trigger on an event which remains high, low or either, for a specified time period, selectable from 1 ns to 1 s with 200 ps resolution.

Transition - Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative or either.

Setup/Hold - Trigger on violations of both setup time and hold time between clock and data present on any two input channels.

Pattern - Trigger when pattern goes false or stays true for specified period of time. Pattern (AND, OR, NAND, NOR) specified for four input channels defined as HIGH, LOW or Don't Care.

State - Any logical pattern of channels (1, 2, 3) clocked by edge on channel 4. Trigger on rising or falling clock edge.

Trigger Delay by Time - 16 ns to 250 seconds.

Trigger Delay by Events - 1 to 10,000,000 Events.

Waveform Measurements

Amplitude - Amplitude, High, Low, Maximum, Minimum, Peak to Peak, Mean, Cycle Mean, RMS, Cycle RMS, Positive Overshoot, Negative Overshoot.

Time - Rise time, Fall time, Positive Width, Negative Width,

Positive Duty Cycle, Negative Duty Cycle, Period, Frequency, Delay.

Combination - Area, Cycle Area, Phase, Burst Width.

Histogram-related - Waveform count, Hits in box, Peak hits, Median, Maximum, Minimum, Peak to Peak, Mean (µ), Standard Deviation (sigma), µ+1 (sigma), µ+2 (sigma), µ+3 (sigma).

Waveform Processing/Math

Algebraic Expressions - Define extensive algebraic expressions including waveforms, scalars and results of parametric measurements e.g. (Integral (Ch1-Mean(Ch1))*1.414.

Arithmetic - Add, subtract, multiply, divide waveforms and scalars.

Calculus - Integrate, differentiate.

Frequency Domain Functions - Spectral magnitude and phase, real and imaginary spectra.

Vertical Units - Magnitude: Linear, dB, dBm; Phase: degrees, radians.

Window Functions - Rectangular, Hamming, Hanning, Kaiser-Bessel, Blackman-Harris, Gaussian, Flattop2, Tek Exponential.

Display Characteristics

Display Type - Liquid crystal active-matrix color display.

Display Size - 211.2 mm (W) x 158.4 mm (H), 264 mm (10.4 in) diagonal.

Display Resolution - 640 horizontal x 480 vertical pixels.

Waveform Styles - Vectors, Dots, Intensified Samples, Variable Persistence, Infinite Persistence.

Computer System and Peripherals

CPU - Intel Celeron Processor, 500 MHz.

PC System Memory - 128 MB.

Hard Disk Drive - Rear-panel, removable hard disk drive, >4.3 GB capacity.

Floppy Disk Drive - Front panel 3.5 in floppy disk drive, 1.44 MB capacity.

CD-ROM Drive - Rear panel CD-ROM drive.

Mouse - Logitech thumb wheel model included, USB interface.

Keyboard - Order 119-6297-00 (USB interface).

Input/Output Ports

Probe Compensator Output - Front panel BNC connector, requires Probe Cal-Deskew Fixture (included) for probe attachment. Amplitude 200 mV ±20% into a ≥50 Ohm load, frequency 1 kHz ±5%.

Analog Signal Output Amplitude - Front-panel BNC connector, provides a buffered version of the signal that is attached to the Channel 3 input when Ch 3 is selected as trigger source. 20 mV/div ±20% into a 1 megaohm load, 10 mV/div ±20% into a 50 Ohm load.

Analog Signal Output Bandwidth, Typical -
TDS7054, TDS7104: 100 MHz into a 50 Ohm load.
TDS7254, TDS7404: 1 GHz into a 50 Ohm load.

Auxiliary Output Levels - Front-panel BNC connector, provides a TTL-compatible, polarity switchable pulse when the oscilloscope triggers.

Parallel Port - IEEE 1284, DB-25 connector.

Audio Ports - Miniature phone jacks for stereo microphone input and stereo line output.

USB Port - Allows connection or disconnection of USB keyboard and/or mouse while oscilloscope power is on.

Keyboard Port - PS-2 compatible.

Mouse Port - PS-2 compatible.

LAN Port - RJ-45 connector, supports 10Base-T and 100Base-T.

Serial Port - DB-9 COM1 port.

SVGA Video Port - DB-15 female connector; connect a second monitor to use dual-monitor display mode. Supports basic requirements of PC99 specifications.

GPIB Port - IEEE 488.2 standard.

Scope VGA Video Port - DB-15 female connector, 31.6 kHz sync, EIA RS-343A compliant, connect to show the oscilloscope display, including live waveforms on an external monitor or projector.

Power Source

Power - 100-240 V_{RMS}, ±10%, 50/60 Hz; 115 V_{RMS} ±10%, 400 Hz; CAT II, <300 W (450VA).

Physical Characteristics Benchtop Configuration

Dimensions	**mm**	**in.**
Height	277	10.9
Width	455	17.9
Depth	425	16.75
Weight	**kg**	**lbs.**
Net	18	39
Shipping	37	80

Physical Characteristics Rackmount Configuration

Dimensions	**mm**	**in.**
Height	277	10.5
Width	502	19.75
Depth	486	19.125
Weight	**kg**	**lbs.**
Net	19	41
Kit	5.6	12.25

Mechanical

Cooling - Required Clearance.

	in.	**mm**
Top	0 or >3	76
Bottom	0	0
Left side	3	76
Right side	3	76

Front	0	0
Rear	0	0

Environmental

Temperature

Operating - 0°C to +50°C, excluding floppy disk and CD-ROM drives; +10°C to +45°C, including floppy disk and CD-ROM drives.

Nonoperating - -22°C to +60°C.

Humidity

Operating - 20% to 80% relative humidity with a maximum wet bulb temperature of +29°C at or below +50°C, noncondensing. Upper limit derated to 25% relative humidity at +50°C.

Nonoperating - With no diskette in floppy disk drive. 5% to 90% relative humidity with a maximum wet bulb temperature of +29°C at or below +60°C, noncondensing. Upper limit derated to 20% relative humidity at +60°C.

Altitude

Operating - 10,000 ft. (3,048 m).

Nonoperating - 40,000 ft. (12,190 m).

Random Vibration

Operating - 0.00015 G^2/Hz from 5 to 350 Hz, -3 dB/octave from 350 to 500 Hz, 0.000105 G^2/Hz at 500 Hz. Overall level of 0.27 G_{RMS}.

Nonoperating - 0.0175 G^2/Hz from 5 to 100 Hz, -3 dB/octave from 100 to 200 Hz, 0.00875 G^2/Hz from 200 to 350 Hz, -3 dB/octave from 350 to 500 Hz, 0.006132 G^2/Hz at 500 Hz. Overall level of 2.28 G_{RMS}.

Electromagnetic Compatibility - 89/336/EEC.

Safety

UL 3111-1, CSA-22.2 No. 1010.1, EN61010-1, IEC 61010-1.

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Tektronix Measurement products are manufactured in ISO registered facilities.

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