InstaVu™ Acquisition Oscilloscopes

TDS 500C * TDS 700C

This product is discontinued.
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Characteristics

TDS 500C/700C SERIES ELECTRICAL CHARACTERISTICS

	TDS 784C	TDS 754C	TDS 724C	TDS 580C	TDS 540C	TDS 520C
Bandwidth	1 GHz*1	500 MHz*2	500 MHz*2	1 GHz*4	500 MHz*2	500 MHz*2
# Channels	4	4	2 + 2 aux.	4	4	2 + 2 aux.
# Samplers	4	4	2		4	2
Max Real-time Sample Rate						
1 channel	4 GS/s	2 GS/s	1 GS/s	4 GS/s	2 GS/s	1 GS/s
2 channels	2 GS/s	2 GS/s	500 MS/s	2 GS/s	1 GS/s	500 MS/s
3-4 channels	1 GS/s	1 GS/s	NA	1 GS/s	500 MS/s	NA
Equivalent-time Sample Rate	250 GS/s max.	100 GS/s max.	100 GS/s max.	250 GS/s max.	100 GS/s max.	100 GS/s max.
Maximum Record Length						
1 channel	50 K (opt. 1M: 500 K, opt. 2M: 8 M)	50 K (opt. 1M: 500 K, opt. 2M: 8 M)	50 K (opt. 1M: 250 K, opt. 2M: 4 M)	50 K. Up to 8M on one channel	50 K (opt. 1M: 500 K, opt. 2M: 8 M)	50 K (opt. 1M: 250 K, opt. 2M: 4 M)
2 channels	50 K (opt. 1M: 250 K, opt. 2M: 4 M)	50 K (opt. 1M: 250 K, opt. 2M: 4 M)	50 K (opt. 1M: 130 K, opt. 2M: 2 M)		50 K (opt. 1M: 250 K, opt. 2M: 4 M)	50 K (opt. 1M: 130 K, opt. 2M: 2 M)
3-4 channels	50 K (opt. 1M: 130 K, opt. 2M: 2 M)	50 K (opt. 1M: 130 K, opt. 2M: 2 M)	NA		50 K (opt. 1M: 130 K, opt. 2M: 2 M)	NA
Max Sample	2 ms	4 ms	4 ms	4 ms	4 ms	4 ms

Rate Window*3						
Display	NuColor™	NuColor™	NuColor™	monochrome	monochrome	monochrome

*1 *In 50 Ohm mode: 5 mV/div: 750 MHz, 2 mV/div: 600 MHz, 1 mV/div: 500 MHz. Reduce the upper bandwidth frequencies by 5 MHz for each °C above 30°C.*
*2 *In 50 Ohm mode: 1 mV/div: 450 MHz. Reduce the upper bandwidth frequencies by 2.5 MHz for each °C above 30°C.*
*3 *Single-channel operating at full sample rate and maximum record length (Opt. 2M).*
*4 *>/= 10 mV/div in 50 Ohm mode*

TDS 500C/700C SERIES VERTICAL SYSTEM

	TDS 784C	TDS 754C	TDS 724C	TDS 580C	TDS 540C	TDS 520C
Sensitivity	1 mV/div to 10 V/div (1 megohm mode), 1 mV/div to 1 V/div (50 Ohm mode)					
DC Gain Accuracy	± 1.0% (± 0.7% typical)	± 1.0% (± 0.7% typical)	± 1.0% (± 0.7% typical)	± 1.0%	± 1.0% (± 0.7% typical)	± 1.0% (± 0.7% typical)
Effective Bits (typical)	5.5 (1 GHz @ 4 GS/s), 9.7 with Hi-res (1 MHz @ 10 MS/s)	6.8 (500 MHz @ 2 GS/s), 9.7 with Hi-res (1 MHz @ 10 MS/s)	6.5 (490 MHz @ 1 GS/s), 9.7 with Hi-res (1 MHz @ 10 MS/s)		6.8 (500 MHz @ 2 GS/s), 9.7 with Hi-res (1 MHz @ 10 MS/s)	6.5 (490 MHz @ 1 GS/s), 9.7 with Hi-res (1 MHz @ 10 MS/s)
Vertical Resolution	8-Bits (256 levels on 10.25 divisions), >11-Bits with averaging, >13-Bits typical with Hi-res (TDS 784C, TDS 580C), >12-Bits typical with Hi-res (TDS 754C, TDS 724C, TDS 540C, TDS 520C)					
Position Range	± 5 divisions	± 5 divisions	± 5 divisions	± 5 divisions	± 5 divisions	± 5 divisions
Offset Range	± 1 V from 1 mV to 100 mV/div, ± 10 V from 101 mV to 1 V/div, ± 100 V from 1.01 V to 10 V/div					
Analog Bandwidth Selections	20 MHz, 250 MHz, full	20 MHz, 250 MHz, full	20 MHz, 250 MHz, full	20 MHz, 250 MHz, full	20 MHz, 250 MHz, full	20 MHz, 250 MHz, full
Input Coupling	AC, DC, GND	AC, DC, GND	AC, DC, GND	AC, DC, GND	AC, DC, GND	AC, DC, GND
Input Impedance Selections	1 megohm in parallel with 10 pF, or 50 Ohm (AC and DC coupling)					
AC-coupled Low Frequency Limit	</=10 Hz when AC 1 megohm coupled. </=200 kHz when AC 50 Ohm coupled.					
Channel Isolation	>100:1 at 100 MHz and >30:1 at the rated bandwidth for any 2 channels having equal V/div settings					

Max. Input Voltage	300 V CAT II ± 400 V (peak). Derate at 20 dB/decade above 1 MHz. 1 megohm or GND coupled.	300 V CAT II ± 400 V (peak). Derate at 20 dB/decade above 1 MHz. 1 megohm or GND coupled.	300 V CAT II ± 400 V (peak). Derate at 20 dB/decade above 1 MHz. 1 megohm or GND coupled.	± 400 V (DC + peak AC). Derated at 20 dB/decade above 1 MHz, 1 megohm or GND coupled.	300 V CAT II ± 400 V (peak). Derate at 20 dB/decade above 1 MHz. 1 megohm or GND coupled.	300 V CAT II ± 400 V (peak). Derate at 20 dB/decade above 1 MHz. 1 megohm or GND coupled.

TDS 500C/700C SERIES TIMEBASE SYSTEM

	TDS 784C/TDS 580C	TDS 754C / TDS 724C / TDS 540C/TDS 520C
Time Bases	Main, delayed	Main, delayed
Time Base Range	200 ps to 10 s/div	500 ps to 10 s/div
Time Base Accuracy	± 25 ppm (over any interval >/=1 ms)	
Pre-trigger Position	0% to 100% of any record	
Delay Between Channels	</=50 ps (any 2 channels with equal V/div and coupling)	

ACQUISITION MODES

InstaVu - Instantaneous capture of random glitches and changing signals. Captures over 400,000 waveforms per second (TDS 784C, TDS 754C, TDS 580C, and TDS 540C) or 180,000 wfms/s (TDS 724C and TDS 520C). Uses color grading (TDS 700Cs) to show relative occurrence of events.
Peak Detect - High frequency and random glitch capture. Captures glitches of 1 ns using acquisition hardware at all real-time sampling rates.
Sample - Sample data only.
Envelope - Max/min values acquired over one or more acquisitions.
Average - Waveform data from 2 to 10,000 (selectable) is averaged.
Hi -res - Vertical resolution improvement and noise reduction on low-frequency signal (e.g., 13-Bits typical for the TDS 784C at 50 ms/div and slower, 12-Bits typical for the other TDS 700C/500C instruments).
FastFrame™ - Acquisition memory size segmentable with trigger rate up to 50,000 per second from 50 to 5,000 points per frame (independent of the number of channels).
Single Sequence - Use RUN/STOP button to capture a single triggered acquisition at a time, which may be automatically saved to NVRAM with AutoSave.

TRIGGER SYSTEM

Triggers - Main and delayed.
Main Trigger Modes - Auto, Normal, Single.
Delayed Trigger - Delayed by time, events, or events and time.
Time Delay Range - 16 ns to 250 s.
Events Delay Range - 1 to 9,999,999 events.
External Rear Input - >/=1.5 kW ; Max input voltage is ± 20 V (DC + peak AC).

TRIGGER TYPES

EDGE (Main and Delayed) -
Conventional level-driven trigger. Positive or negative slope on any channel or rear panel auxiliary input. Coupling selections: DC, AC, noise reject, HF reject, LF reject.
LOGIC (Main) -
PATTERN: Specifies a logical combination (AND, OR, NAND, NOR) of the four input channels (high, low, don't care). Trigger when pattern stays true or false for a specified time.
STATE: Any logical pattern of channels 1, 2, and 3 (AUX1 on 2-CH products) plus a clock edge on channel 4 (AUX2 on 2-CH products). Triggerable on rising or falling clock edge.
SETUP/HOLD: Trigger on violations of both setup time and hold time between clock and data which are on two input channels.
PULSE (Main) -
GLITCH: Trigger on or reject glitches of positive, negative, or either polarity. Minimum glitch width is 1.0 ns with 200 ps resolution.
RUNT: Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again.
WIDTH: Trigger on width of positive or negative pulse either within or out of selectable time limits (1 ns to 1 s).
SLEW RATE: Trigger on pulse edge rates that are either faster or slower than a set rate. Edges can be rising, falling, or either.
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.
COMM (Optional) -
AMI: Trigger on standard communications signals (including DS1, DS1A, DS1C, DS2, DS3, E1, E2, E3, STS-1, or a custom bit rate). Select between "isolated ones" (positive or negative) and eye diagrams.
CMI: Trigger on standard communications signals (including STS-3, STM1E, DS4NA, E4, or a custom bit rate). Select between positive or negative one pulses, zero pulses, and eye diagrams.
NRZ: Trigger on standard communications signals (including OC1/STM0, OC3/STM1, OC12/STM4, E5, FC133, FC266, FC531, FC1063, FDDI HALT, 143 Mb/s serial digital composite video, 270 Mb/s serial digital component video, or a custom bit rate). Select between an eye diagram, rising or falling edges, or any of eight 3-Bit serial patterns.
VIDEO (Optional) -
Trigger on a particular line of individual, odd/even, or all fields. Trigger on a specific pixel of a line by using the video trigger with delay by events. Choose positive or negative horizontal sync polarity.
525/NTSC: Choose monochrome or color (studio-quality NTSC) sync formats.625/PAL: Choose color or monochrome (studio-quality PAL) sync formats.HDTV: Choose from 1125/60, 1050/60, 1250/50, and 787.5/60 HDTV formats.
FlexFormat™ - Define HDTV-type formats by defining frame rep rate, numbers of lines and fields, and vertical sync timing structure.

MEASUREMENT SYSTEM

Automatic Waveform Measurements -
Period, frequency, + width, - width, rise time, fall time, + duty cycle, - duty cycle, delay, phase, burst width, high, low, max. min, peak to peak, amplitude, + overshoot, - overshoot, mean, cycle mean, RMS, cycle RMS, area, cycle area, extinction ratio (ratio, dB, %), and mean optical power. Continuous update of up to four measurements on any combination of waveforms.
Time Measurement Accuracy - (single-shot, typical) < 38 ps @ 4 GS/s (TDS 784C), <80 ps @ 2 GS/s (TDS 754C, TDS 540C), <150 ps @ 1 GS/s (TDS 724C, TDS 520C), **NEED SPEC ON (TDS 580C)**.
Measurement Statistics - Display minimum and maximum or mean and standard deviation on any displayed single-waveform measurements.
Thresholds - Settable in percentage or voltage.
Gating - Any region of the waveform may be isolated for measurement using vertical bars.
Snapshot - Performs all measurements on any one waveform showing results from one instant in time.
Cursor Measurements - Absolute, Delta: Volts, Time, Frequency, and NTSC IRE and line number (with video trigger option).
Cursor Types - Horizontal bars (volts), vertical bars (time); operated independently or in tracking mode.

WAVEFORM PROCESSING

Waveform Functions - Sin(x)/x or linear interpolation, Average, Envelope.

Advanced Waveform Functions (optional on TDS 500C) - FFT, Integration, Differentiation.
Arithmetic Operators - Add, Subtract, Multiply, Divide, Invert.
Autoset - Single-button, automatic setup on selected input signal for vertical, horizontal, and trigger systems. Also automatically normalizes signals to standard masks when used with the mask testing option.
Waveform Limit Testing - Compares incoming or math waveform to a reference waveform's upper and lower limits.
Waveform Histograms - Both vertical and horizontal histograms, with periodically updated measurements, allow statistical distributions to be analyzed over any region of the signal.
Mask Testing (Optional) - In addition to the standard communication masks in the instrument, the masks can be edited on the screen. Together with automatic waveform scaling, the mask tests give rapid verification of a digital bit stream's conformance to pulse templates and eye pattern masks. For optical conformance testing, the internal Fibre Channel and SONET/SDH optical reference receiver filters provide convenient test setup which is compliant to industry standards.

ZOOM CHARACTERISTICS

The zoom feature allows waveforms to be expanded or compressed in both vertical and horizontal axes. Allows precise comparison and study of fine waveform detail without affecting ongoing acquisitions. When used with Hi-res or Average acquisition modes, Zoom provides an effective vertical dynamic range or 1000 divisions or 100 screens.
Dual Window Zoom - Dual graticules simultaneously show selected and zoomed waveforms. Up to two zoom boxes show areas on the selected trace that are being magnified, and the two magnified areas can be overlapped for quick comparison. Color of zoomed trace matches selected trace.

DISPLAY CHARACTERISTICS

Waveform Style - Dots, vectors, variable persistence from 32 ms to 10 s, infinite persistence, and intensified samples.
Color (TDS 784C, TDS 754C, TDS 724C) - Standard palettes and user-definable color for waveforms, text, graticules, and cursors. Measurement text and cursor colors matched to waveform. Waveform collision areas highlighted with different color. Statistical waveform distribution shown with color grading through variable persistence.
Color Grading (TDS 784C, TDS 754C, TDS 724C) - With variable persistence selected, historical timing information is represented by temperature or spectral color scheme providing "z-axis" information about rapidly-changing waveforms.
Gray Scaling (TDS 580C, TDS 540C, TDS 520C) - With variable persistence selected, waveform points time-decay through 16 levels of intensity.
Waveform Capture Rate - For 500-point waveforms with infinite persistence mode selected: typically 150 wfms/s (TDS 700C and TDS 500C). With InstaVu™ on: >400,000 wfms/s (TDS 784C, TDS 754C, TDS 580C, TDS 540C) and >180,000 wfms/s (TDS 724C and TDS 520C).
Graticules - Full, grid, cross-hair, frame, and NTSC and PAL (with video trigger option).
Format - YT and XY.
Fit to Screen - Entire acquisition memory displayed on screen.
Type - 7 in. diagonal, NuColor™ liquid crystal full color shutter display, 256 color levels (TDS 700C); 7 in. diagonal, magnetic deflection, horizontal raster-scan monitor with P4 white phosphor (TDS 500C).
Resolution - 640 horizontal by 480 vertical displayed pixels (VGA).

COMPUTER INTERFACE

GPIB (IEEE-488.2) Programmability - Full talk/listen modes. Control of all modes, settings, and measurements.

HARDCOPY

Printer - HP Thinkjet, Deskjet, Laserjet, Epson, Interleaf, PostScript, TIFF, PCX, BMP, DPU411/412, RLE.
Plotter - HPGL.
Data - MathCad, spreadsheet formats.
Interface - GPIB standard.
Hardcopy Interface (optional on TDS 500C) - Centronics and RS-232 (talk only).

STORAGE

Non-volatile Waveform Storage - 4 full 50 K records (Opt. 1M or 2M: 4 full 130 K records, 2 full 250 K records, or 1 compressed 500 K record) (TDS 784C, TDS 754C, TDS 580C, TDS 540C); 2 full 50 K records (Opt. 1M or 2M: 2 full 130 K records or 1 full 250 K record) (TDS 724C, TDS 520C).
Non-volatile storage for setups - 10 front panel setups.
Floppy Disk Drive - Store reference waveforms, setups, and image files on 3.5 in. 1.44 MB or 720 K DOS-format floppy disk.
Hard Disk Drive - Store reference waveforms, setups, and image files on internal >/=170 MB hard disk.

POWER REQUIREMENTS

Line Voltage Range - 90 to 250 V RMS.
Line Frequency - 45 to 440 Hz.
Power Consumption - 300 W max.

ENVIRONMENTAL AND SAFETY

Temperature -
Operating: +4° C to +50° C (floppy not used), +10° C to +50° C (floppy in use). Nonoperating: -22Þ C to +60Þ C.
Humidity -
Operating: To 80% RH at </=32° C. Derates to 30% RH at +45° C. Nonoperating: To 90% RH at </=40° C. Derates to 30% RH at +60° C.
Altitude -
Operating: 15,000 ft. (hard disk not used), 10,000 ft. (hard disk in use). Nonoperating: 40,000 ft.
Electromagnetic Compatibility - Meets or exceeds EN55011 Class A Radiated and Conducted Emissions; EN 50081-1; EN60555-2 Power Harmonics; FCC 47 CFR, Part 15. Subpart B, Class A; Australian EMC Framework; EN 50082-1
Safety - UL 3111-1, CSA-22.2 No. 1010.1

PHYSICAL CHARACTERISTICS

Dimensions	**mm**	**in.**
Height with feet	193	7.6
Height without feet	178	7
Width with handle	445	17.5
Depth with front cover installed	434	17.1
Weight	**kg**	**lbs.**
Net approximately	14.1	31
Shipping Weight approximately	25.4	56

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

Tektronix Measurement products are manufactured in ISO registered facilities.

CE

49A-10733-1Ap68
06/1997, 01/21/1998

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