

Appendix A: Specifications

This appendix contains complete specifications for the TDS 340A, TDS 360, and TDS 380. The specifications are divided into three subsections, one for each of three classes of traits: *Warranted Characteristics*, *Typical Characteristics*, and *Nominal Traits*.

Warranted Characteristics

Warranted characteristics are described in terms of quantifiable performance limits that are warranted. This subsection lists only warranted characteristics.

NOTE. In these tables, those warranted characteristics that are checked in the Performance Tests, starting on page 0–5, appear in **boldface type** under the column **Name**.

Performance Conditions

The electrical characteristics found in these tables of warranted characteristics apply when the oscilloscope has been adjusted at an ambient temperature between +20° C and +30° C, has had a warm-up period of at least 20 minutes, and is operating at an ambient temperature between –10° C and +55° C (unless otherwise noted).

Table A–1: Warranted characteristics — signal acquisition system

The minimum single pulse widths for guaranteed 50% or greater amplitude capture are as follows:

Name	Description	
Accuracy, DC Voltage Measurement, Average Acquisition Mode	Measurement type	DC accuracy
	Average of ≥16 waveforms	$\pm(2.0\% \times (\text{reading} - \text{Net Offset}^1) + \text{Offset Accuracy} + 0.1 \text{ div})$
	Delta volts between any two averages of ≥16 waveforms acquired under the same setup and ambient conditions	$\pm(2.0\% \times \text{reading} + 0.15 \text{ div} + 0.3 \text{ mV})$
Accuracy, DC Gain, Sample or Average Acquisition Modes	±2%	
Pulse Response, Peak Detect and Envelope Mode	Sec/Div setting	Minimum pulse width
	5 s/div – 25 μs/div	10 ns
	TDS 340A: 10 μs/div – 5 ns/div TDS 360: 10 μs/div – 2.5 ns/div TDS 380: 10 μs/div – 1 ns/div	The greater of 10 ns or $0.02 \times \text{sec/div setting}$

Table A-1: Warranted characteristics — signal acquisition system (Cont.)

The minimum single pulse widths for guaranteed 50% or greater amplitude capture are as follows:

Name	Description	
Accuracy, Offset	Volts/Div setting	Offset accuracy
	2 mV/div – 99.5 mV/div	$\pm(0.4\% \times \text{Net Offset}^1 + 3 \text{ mV} + 0.1 \text{ div} \times \text{V/div setting})$
	100 mV/div – 995 mV/div	$\pm(0.4\% \times \text{Net Offset}^1 + 30 \text{ mV} + 0.1 \text{ div} \times \text{V/div setting})$
	1 V/div – 10 V/div	$\pm(0.4\% \times \text{Net Offset}^1 + 300 \text{ mV} + 0.1 \text{ div} \times \text{V/div setting})$
Analog Bandwidth, DC Coupled	TDS 340A: DC – ≥ 100 MHz TDS 360: DC – ≥ 200 MHz; DC – ≥ 180 MHz for 2 mV/div TDS 380: DC – ≥ 400 MHz; DC – ≥ 250 MHz for 2 mV/div	
Cross Talk (Channel Isolation)	$\geq 100:1$ at 50 MHz with equal Volts/Div settings on each channel	
Input Impedance, DC-Coupled	TDS 340A: $1 \text{ M}\Omega \pm 1\%$ in parallel with $20 \text{ pF} \pm 2.0 \text{ pF}$ TDS 360: $1 \text{ M}\Omega \pm 1\%$ in parallel with $20 \text{ pF} \pm 2.0 \text{ pF}$ TDS 380: $1 \text{ M}\Omega \pm 1\%$ in parallel with $12 \text{ pF} \pm 2.0 \text{ pF}$	
Input Voltage, Maximum	$\pm 300 \text{ V}$ (DC or AC) CAT II; derate at 20 dB/decade above 100 kHz to 13 V peak AC at 3 MHz and above	
Lower Frequency Limit, AC Coupled ²	$\leq 10 \text{ Hz}$	

¹ **Net Offset = Offset – (Position \times Volts/Div).** Net offset is the voltage level at the center of the A-D converter dynamic range. Offset Accuracy is the accuracy of this voltage level.

² The AC Coupled Lower Frequency Limits are reduced by a factor of 10 when 10X, passive probes are used.

Table A-2: Warranted characteristics — time base system

Name	Description
Accuracy, Long Term Sample Rate and Delay Time	± 100 ppm over any ≥ 1 ms interval
Accuracy, Delta Time Measurements^{1, 2}	For single-shot acquisitions using sample acquisition mode and a bandwidth limit setting of FULL: $\pm(1 \text{ WI} + 100 \text{ ppm} \times \text{Reading} + 0.6 \text{ ns})$ For repetitive acquisitions using average acquisition mode with ≥ 16 averages and a bandwidth limit setting of FULL: $\pm(1 \text{ WI} + 100 \text{ ppm} \times \text{Reading} + 0.4 \text{ ns})$

¹ For input signals ≥ 5 divisions in amplitude and a slew rate of ≥ 2.0 divisions/ns at the delta time measurement points. Signal must be acquired at a volts/division setting ≥ 5 mV/division.

² The WI (waveform interval) is the time between the samples in the waveform record. Also, see the footnotes for *Sample Rate Range* and *Equivalent Time or Interpolated Waveform Rates* in Table A-11 on page A-8.

Table A–3: Warranted characteristics — triggering system

Name	Description	
Accuracy, Trigger Level, DC Coupled	Trigger source	Sensitivity
	CH1 or CH2	$\pm(3\% \text{ of } \text{Setting} - \text{Net Offset}^1 + 0.2 \text{ div} \times \text{volts/div setting} + \text{Offset Accuracy})$
	External	$\pm(6\% \text{ of } \text{Setting} + 20 \text{ mV})$
	External/10	$\pm(6\% \text{ of } \text{Setting} + 200 \text{ mV})$
Sensitivity, Edge-Type Trigger, DC Coupled	Trigger source	Sensitivity
	CH1 or CH2	TDS 340A: 0.35 division from DC to 20 MHz, increasing to 1 div at 100 MHz TDS 360: 0.35 division from DC to 50 MHz, increasing to 1 div at 200 MHz TDS 380: 0.35 division from DC to 50 MHz, increasing to 1 div at 400 MHz
	External	TDS 340A: 50 mV from DC to 20 MHz, increasing to 150 mV at 100 MHz TDS 360: 50 mV from DC to 50 MHz, increasing to 150 mV at 200 MHz TDS 380: 50 mV from DC to 50 MHz, increasing to 500 mV at 400 MHz
	External/10	TDS 340A: 500 mV from DC to 20 MHz, increasing to 1.5 V at 100 MHz TDS 360: 500 mV from DC to 50 MHz, increasing to 1.5 V at 200 MHz TDS 380: 500 mV from DC to 50 MHz, increasing to 5.0 V at 400 MHz
Input Impedance, External Trigger	1 M Ω \pm 2% in parallel with 20 pF \pm 2 pF	
Maximum Input Voltage, External Trigger	\pm 300 V (DC or AC) CAT II; derate at 20 dB/decade above 100 kHz to 13 V peak AC at 3 MHz and above	

¹ **Net Offset = Offset – (Position \times Volts/Div). Net Offset is the voltage level at the center of the A-D converter dynamic range. Offset Accuracy is the accuracy of this voltage level.**

Table A–4: Power Requirements

Name	Description
Source Voltage and Frequency	90 to 132 VAC _{RMS} , continuous range, for 47 Hz through 440 Hz 132 to 250 VAC _{RMS} , continuous range, for 47 Hz through 63 Hz
Power Consumption	\leq 65 Watts (120 VA)

Table A-5: Warranted characteristics — environmental

Name	Description
Atmospherics	<p>Temperature without diskette in floppy disk drive:</p> <p>+4° C to +50° C, operating; –22° C to +60° C, non-operating</p> <p>Temperature with diskette in floppy disk drive:</p> <p>+10° C to +50° C, operating or non-operating</p> <p>Relative humidity without diskette in floppy disk drive:</p> <p>to 80% at or below +29° C, or to 20% from +30° C to +50° C, operating; to 90% at or below +40° C, or to 5% from +41° C to +50° C, non-operating;</p> <p>Relative humidity with diskette in floppy disk drive:</p> <p>to 80% at or below +29° C, or to 20% from +30° C to +50° C, operating or non-operating</p> <p>Altitude:</p> <p>To 15,000 ft (4570 m), operating; to 40,000 ft (12190 m), non-operating</p>
Dynamics	<p>Random vibration without diskette in floppy disk drive:</p> <p>0.31 g_{RMS}, from 5 to 500 Hz, 10 minutes each axis, operating; 2.46 g_{RMS}, from 5 to 500 Hz, 10 minutes each axis, non-operating</p>