Chapter 9 Specifications

9.1 Technical Specifications

All specifications herein mentioned apply to the DSO1000S series oscilloscopes. Before checking an oscilloscope from HANTEK to see if it complies with these specifications, make sure it meets the following conditions:

- The oscilloscope must have been operating continuously for twenty minutes under the specified operating temperature.
- The Do Self Cal operation must be performed through the Utility menu if the operating temperature changes by more than 5℃.
- The oscilloscope must be within the factory calibration interval.

All specifications are guaranteed unless noted 'typical'.

Oscilloscope Specifications

Horizontal

<table>
<tr><td>Sample Rate Range</td><td colspan="2">1GS/s</td></tr>
<tr><td>Waveform Interpolation</td><td colspan="2">(sin x)/x</td></tr>
<tr><td>Record Length</td><td colspan="2">Maximum 1M samples per single-channel; maximum 512K samples per dual-channel (4K,16K,40K optional)</td></tr>
<tr><td rowspan="2">TIME/DIV Range</td><td>DSO1062S
DSO1122S</td><td>DSO1202S</td></tr>
<tr><td>4ns/div to 40s/div, in a 2, 4, 8 sequence</td><td>2ns/div to 40s/div, in a 2, 4, 8 sequence</td></tr>
<tr><td>Sample Rate and Delay Time Accuracy</td><td colspan="2">±50ppm over any ≥1ms time interval</td></tr>
<tr><td rowspan="3">Delta Time Measurement Accuracy
(Full Bandwidth)</td><td colspan="2">Single-shot, Normal mode
± (1 sample interval +100ppm × reading + 0.6ns)</td></tr>
<tr><td colspan="2">>16 averages
± (1 sample interval + 100ppm × reading + 0.4ns)</td></tr>
<tr><td colspan="2">Sample interval = s/div ÷ 200</td></tr>
<tr><td rowspan="6">Position Range</td><td colspan="2">DSO1062S
DSO1122S</td></tr>
<tr><td>4ns/div to 8ns/div</td><td>(-8div × s/div) to 20ms</td></tr>
<tr><td>20ns/div to 80μs/div</td><td>(-8div × s/div) to 40ms</td></tr>
<tr><td>200μs/div to 40s/div</td><td>(-8div × s/div) to 400s</td></tr>
<tr><td colspan="2">DSO1202S</td></tr>
<tr><td>2ns/div to 10ns/div</td><td>(-4div × s/div) to 20ms</td></tr>
</table>

Vertical

<table>
<tr><td>A/D Converter</td><td colspan="3">8-bit resolution,
each channel sampled simultaneously</td></tr>
<tr><td>VOLTS Range</td><td colspan="3">2mV/div to 5V/div at input BNC</td></tr>
<tr><td>Position Range</td><td colspan="3">2mV/div to 200mV/div, ±2V
>200mV/div to 5V/div, ±50V</td></tr>
<tr><td>Analog Bandwidth in Normal and Average modes at BNC or with probe, DC Coupled</td><td colspan="3">2mV/div to 20mV/div, ±400mV
50mV/div to 200mV/div, ±2V
500mV/div to 2V/div, ±40V
5V/div, ±50V</td></tr>
<tr><td>Selectable Analog Bandwidth Limit, typical</td><td colspan="3">20MHz</td></tr>
<tr><td>Low Frequency Response (-3db)</td><td colspan="3">≤10Hz at BNC</td></tr>
<tr><td rowspan="2">Rise Time at BNC, typical</td><td>DSO1062S</td><td>DSO1122S</td><td>DSO1202S</td></tr>
<tr><td><5.8ns</td><td>< 3.5ns</td><td><1.8ns</td></tr>
<tr><td>DC Gain Accuracy</td><td colspan="3">±3% for Normal or Average acquisition mode, 5V/div to 10mV/div
±4% for Normal or Average acquisition mode, 5mV/div to 2mV/div</td></tr>
<tr><td rowspan="2">DC Measurement Accuracy, Average Acquisition Mode</td><td colspan="3">Measurement Type: Average of ≥16 waveforms with vertical position at zero
Accuracy: ± (3% × reading + 0.1div + 1mV) when 10mV/div or greater is selected</td></tr>
<tr><td colspan="3">Measurement Type: Average of ≥16 waveforms with vertical position not at zero
Accuracy: ± [3% × (reading + vertical position) + 1% of vertical position + 0.2div]
Add 2mV for settings from 2mV/div to 200mV/div; add 50mV for settings from 200mV/div to 5V/div</td></tr>
<tr><td>Volts Measurement Repeatability, Average Acquisition Mode</td><td colspan="3">Delta volts between any two averages of ≥16 waveforms acquired under same setup and ambient conditions</td></tr>
</table>

Note: Bandwidth reduced to 6MHz when using a 1X probe.

Trigger

<table>
<tr><td rowspan="5">Trigger Sensitivity (Edge Trigger Type)</td><td>Coupling</td><td colspan="3">Sensitivity</td></tr>
<tr><td rowspan="2">DC</td><td>Source</td><td>DSO1062S
DSO1122S</td><td>DSO1202S</td></tr>
<tr><td>CH1
CH2</td><td>1div from DC to 10MHz;
1.5div from 10MHz to Full</td><td>1.5div from 10MHz to 100MHz;
2div from 100MHz to Full</td></tr>
<tr><td>AC</td><td colspan="3">Attenuates signals below 10Hz</td></tr>
<tr><td>HF Reject</td><td colspan="3">Attenuates signals above 80kHz</td></tr>
<tr><td>LF Reject</td><td colspan="3">Same as the DC-coupled limits for frequencies above 150kHz; attenuates signals below 150kHz</td></tr>
<tr><td rowspan="2">Trigger Level Range</td><td>Source</td><td colspan="3">Range</td></tr>
<tr><td>CH1, CH2</td><td colspan="3">±8 divisions from center of screen</td></tr>
<tr><td rowspan="2">Trigger Level Accuracy, typical (Accuracy is for signals having rise and fall times ≥20ns)</td><td>Source</td><td colspan="3">Accuracy</td></tr>
<tr><td>CH1 、CH2</td><td colspan="3">0.2div × volts/div within ±4 divisions from center of screen</td></tr>
<tr><td>Set Level to 50%, typical</td><td colspan="4">Operates with input signals ≥50Hz</td></tr>
</table>

Note: Bandwidth reduced to 6MHz when using a 1X probe.

Video Trigger Type	Source	Range
	CH1, CH2	Peak-to-peak amplitude of 2 divisions
Signal Formats and Field Rates, Video Trigger Type	Supports NTSC, PAL and SECAM broadcast systems for any field or any line	
Holdoff Range	100ns to 10s	

Pulse Width Trigger	
Pulse Width Trigger Mode	Trigger when < (Less than), > (Greater than), = (Equal), or ≠ (Not Equal); Positive pulse or Negative pulse
Pulse Width Trigger Point	Equal: The oscilloscope triggers when the trailing edge of the pulse crosses the trigger level. Not Equal: If the pulse is narrower than the specified width, the

	trigger point is the trailing edge. Otherwise, the oscilloscope triggers when a pulse continues longer than the time specified as the Pulse Width. Less than: The trigger point is the trailing edge. Greater than (also called overtime trigger): The oscilloscope triggers when a pulse continues longer than the time specified as the Pulse Width.
Pulse Width Range	Selectable from 20ns to 10s
Slope Trigger	
Slope Trigger Mode	Trigger when < (Less than), > (Greater than), = (Equal), or ≠ (Not Equal); Positive slope or Negative slope
Slope Trigger Point	Equal: The oscilloscope triggers when the waveform slope is equal to the set slope. Not Equal: The oscilloscope triggers when the waveform slope is not equal to the set slope. Less than: The oscilloscope triggers when the waveform slope is less than the set slope. Greater than: The oscilloscope triggers when the waveform slope is greater than the set slope.
Time Range	Selectable from 20ns to 10s
Overtime Trigger	The leading edge: Rising edge or Falling edge; Time Setting: 20-10s

Swap Trigger	
CH1	Internal Trigger: Edge, Pulse Width, Video, Slope
CH2	Internal Trigger: Edge, Pulse Width, Video, Slope

Trigger Frequency Counter	
Readout Resolution	6 digits
Accuracy (typical)	±30ppm (including all frequency reference errors and ±1 count errors)
Frequency Range	AC coupled, from 4Hz minimum to rated bandwidth
Signal Source	Pulse Width or Edge Trigger modes: all available trigger sources The Frequency Counter measures trigger source at all times, including when the oscilloscope acquisition pauses due to changes in the run status, or acquisition of a single shot event has completed. Pulse Width Trigger mode: The oscilloscope counts pulses of significant magnitude inside the 1s measurement window that qualify as triggerable events, such as narrow pulses in a PWM pulse train if set to < mode and the width is set to a relatively small time. Edge Trigger mode: The oscilloscope counts all edges of sufficient magnitude and correct polarity. Video Trigger mode: The Frequency Counter does not work.

Acquisition

Acquisition Modes	Normal, Peak Detect, and Average	
Acquisition Rate, typical	Up to 2000 waveforms per second per channel (Normal acquisition mode, no measurement)	
Single Sequence	Acquisition Mode	Acquisition Stop Time
	Normal, Peak Detect	Upon single acquisition on all channels simultaneously
	Average	After N acquisitions on all channels simultaneously, N can be set to 4, 8, 16, 32, 64 or 128

Inputs

Inputs		
Input Coupling	DC, AC or GND	
Input Impedance, DC coupled	1MΩ±2% in parallel with 20pF±3pF	
Probe Attenuation	1X, 10X	
Supported Probe Attenuation Factors	1X, 10X, 100X, 1000X	
Maximum Input Voltage	Overvoltage Category	Maximum Voltage
	CAT I and CAT II	$300V_{RMS}$ (10×), Installation Category
	CAT III	$150V_{RMS}$ (1×)
	Installation Category II: derate at 20dB/decade above 100kHz to 13V peak AC at 3MHz* and above. For non-sinusoidal waveforms, peak value must be less than 450V. Excursion above 300V should be of less than 100ms duration. RMS signal level including all DC components removed through AC coupling must be limited to 300V. If these values are exceeded, damage to the oscilloscope may occur.	

Measurements

Cursors	Voltage difference between cursors: △V Time difference between cursors: △T Reciprocal of △T in Hertz (1/ΔT)

Automatic Measurements	Frequency, Period, Mean, Peak-to-peak, Cycle RMS, Minimum, Maximum, Rise Time, Fall Time, Positive Width, Negative Width

General Specifications

Display		
Display Type	5.7 Inch width TFT Display	
Display Resolution	480 (Vertical) X 640(Horizontal) pixels	
Display Contrast	Adjustable (16 gears) with the progress bar	
Probe Compensator Output		
Output Voltage, typical	About 5Vpp into ≥1MΩ load	
Frequency, typical	1kHz	
Power Supply		
Switching Adatper	AC Input:100-240VAC$_{RMS}$,0.6A MAX,50Hz-60Hz; DC Output:9V,2A	
DC Input	DC8.5-15V,2A	
Power Consumption	<30W	
Environmental		
Temperature	Operating: 32°F to 122°F (0°C to 50°C)	
	Nonoperating: -40°F to 159.8°F (-40°C to +71°C)	
Cooling Method	Convection	
Humidity	+104°F or below (+40°C or below): ≤90% relative humidity	
	106°F to 122°F (+41°C to 50°C): ≤60% relative humidity	
Altitude	Operating and Nonoperating	3,000m (10,000 feet)
	Random Vibration	0.31g$_{RMS}$ from 50Hz to 500Hz, 10 minutes on each axis
	Nonoperating	2.46g$_{RMS}$ from 5Hz to 500Hz, 10 minutes on each axis
Mechanical Shock	Operating	50g, 11ms, half sine
Mechanical		
Size	Length	245mm
	Height	163mm
	Depth	52mm
Weight		1.2 Kg

Meter Mode

Maximum Resolution	6000 Counts

DMM Testing Modes	Voltage,Current,Resistance,Capacitance,Diode & Continuity
Maximum Input Voltage	AC : 600V DC : 800V
Maximum Input Current	AC : 10A DC : 10A
Input Impedance	10MΩ

Meter Specification

Range		Accuracy	Resolution
DC Voltage	60.00mV(manual)	±1%±1digit	10uV
	600.0mV		100uV
	6.000V		1mV
	60.00V		10mV
	600.0V		100mV
	800V		1V
AC Voltage	60.00mV(manual)	±1%±3digit	10uV
	600.0mV(manual)		100uV
	6.000V		1mV
	60.00V		10mV
	600.0V		100mV
DC Current	60.00mA	±1.5%±1digit	10uA
	600.0mA	±1%±1digit	100uA
	6.000A	±1.5%±3digit	1mA
	10.00A		10mA
AC Current	60.00mA	±1.5%±3digit	10uA
	600.0mA	±1%±1digit	100uA
	6.000A	±1.5%±3digit	1mA
	10.00A		10mA
Resistance	600.0	±1%±1digit	0.1Ω
	6.000K		1Ω
	60.00K		10Ω
	600.0K		100Ω
	6.000M		1KΩ
	60.00M	±1.5%±3digit	10KΩ
Capacitance	40.00nF	±1%±1digit	10pF
	400.0nF		100pF
	4.000uF		1nF
	40.00uF		10nF
	400.0uF		100nF
	Attention:The smallest capacitance value that can be measured is 5nF.		
Diode	0V~2.0V		
On-off Test	< 10Ω		

Isolation

The float voltage between BNC and Grand	600V CAT76 1000V CAT 76
The float voltage between each channel	600V CAT76 1000V CAT 76
The float voltage between multimeter and Grand	1000V
Between input Ports directly	400V CAT 76
Input by 10:1 probe	600V CAT76 1000V CAT 76

Linux Feature

Kernel Version	Linux2.6.30.4
Supported File system	Yaffs, Fat32
Drivers	Sound Driver, Buzzer Driver, FPGA Driver, SPI Driver, USB Host Driver, LCD Driver, USB massstorage、gadget Driver
Linux Applications	busybox1.18.4, mplayer, watchdog, gnupg1.4.11
U_boot Version	u-boot-1.1.6
Sourcecode download website	www.hantek.com./download/handscope.zip

9.2 Accessories

All the following accessories are available by contacting your local HANTEK distributor.

Standard Accessories

Sketch	Description
	X1, X10 two passive probes. The passive probes have a 6MHz bandwidth (rated 100Vrms CAT III) when the switch is in the X1 position, and a maximum bandwidth (rated 300Vrms CAT II) when the switch is in the X10 position. Each probe consists of all necessary fittings.