

HSA2000 Series Spectrum Technical Specifications

Unless otherwise stated, all technical specifications are applicable to the probe with the attenuation switch set to 10X and this series of oscilloscopes. The oscilloscope must first meet the following two conditions to meet these specifications and standards:

- The instrument must be operated continuously for more than 30 minutes at the specified operating temperature.
- If the operating temperature variation range reaches or exceeds 5 °C , the system function menu must be opened to execute the "automatic correction" program.

All specifications are guaranteed except those marked "typical".

Oscilloscope

Characteristics		Description	
Vertical resolution		8 bits	
Channel		2	
Sampling	Sampling method	Sampling, peak detection	
	Real-time sampling rate	HSA2307	125 MSa/s (Dual Channel) 250 MSa/s (Single Channel)
		HSA2310	500 MSa/s
		HSA2320	1 GSa/s
	Waveform refresh rate	10,000 wfms/s	
Input	Input coupling	DC, AC, ground	
	Input impedance (DC coupling)	1 MΩ±2%, in parallel with 16 pF±10 pF	
	Probe attenuation	1X 、 10X、 100X、 1000X 、 10000X	
	Maximum input voltage	400 V (DC + AC ,PK - PK)	
	Bandwidth limit	20 MHz, Full bandwidth	
Horizontal	Sampling rate range	0.25 Sa/s~250 MSa/s	
	Waveform interpolation	(Sinx)/x	
	Sweep speed range (S/div)	HSA2307	5ns/div - 1000s/div,Stepping in the 1-2-5 way
		HSA2310 HSA2320	2ns/div - 1000s/div,Stepping in the 1-2-5 way
	Time base accuracy	±100 ppm	
	Record length	8K or 4K optional	
Vertical	Sensitivity (Volt/div) range	10 mV/div~10 V/div	
	Displacement range	HSA2307	±6 div
		HSA2310	±2 V (10 mV/div – 200 mV/div);
		HSA2320	±100 V (500 mV/div – 10V/div)
	Analog bandwidth	HSA2307	70 MHz
		HSA2310	100 MHz

Characteristics			Description	
			HSA2320	200 MHz
	Single bandwidth		Full bandwidth	
	Low frequency response (AC coupling, -3dB)		≥10 Hz	
	Rise time (typical on BNC)		HSA2307	≤ 5 ns
			HSA2310	≤ 3.5 ns
			HSA2320	≤ 1.75 ns
	DC gain accuracy		3%	
Measurement	Cursor		ΔV, ΔT	
	Automatic		Period, Frequency, Mean, PK-PK, Max, Min, Amplitude, RMS, Rise Time, Fall Time, +PulseWidth, -PulseWidth	
Triggering	Source		CH1, CH2	
	Type		Edge	
	Coupling		DC, AC	
	Trigger type		Auto, normal, single	
	Trigger electrical level range		±4 div from the center of the screen	
	Trigger electrical level accuracy		±0.3 div	
	Trigger displacement		According to Record length and time base	
	Edge triggering	Slope	Rising edge, falling edge	

The output of the probe compensator:

Characteristics	Description
Output voltage (typical)	3.3Vpp, High-Z
Frequency (typical)	Square wave 1 kHz (±1%)

Multimeter

Characteristics	Description
Digital display	20,000 readings
Measurement type	Voltage, current, resistance, capacitance, on/off, diode
Maximum Input voltage	AC : 750V DC : 1000V
Maximum Input current	AC : 10A DC : 10A

Basic function	Range	Minimum resolution	Accuracy
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Basic function	Range	Minimum resolution	Accuracy
DC voltage	20.000mV	0.001mV	±(0.5%+15dig)
	200.00mV	0.01mV	±(0.3%+10dig)
	2.0000V	0.1mV	±(0.3%+5dig)
	20.000V	1mV	
	200.00V	0.01V	
	1000.0V	0.1V	
AC voltage ^[1]	20.000mV	0.001mV	±(0.8%+10dig)
	200.00mV	0.01mV	
	2.0000V	0.1mV	
	20.000V	1mV	
	200.00V	0.01V	
	750.0V	0.1V	±(1.0%+10dig)
	Frequency range: 40Hz-1000Hz		
DC current	20.000mA	0.001mA	±(1.0%+10dig)
	200.00mA	0.01mA	±(0.8%+10dig)
	2.0000A	0.0001A	±(2.5%+10dig)
	10.000A	1mA	
	Overload protection: mA function: self-healing fuse 400 mA/250 V; Ampere function: 10 A/600 V, D5.2*20, fast-acting fuse		
AC current ^[1]	20.000mA	0.001mA	±(1.2%+10dig)
	200.00mA	0.01mA	±(1.0%+10dig)
	2.0000A	0.0001A	±(2.8%+10dig)
	10.000A	1mA	
	Frequency range: 40Hz-1000Hz Overload protection: mA function: self-healing fuse 400 mA/250 V; Ampere function: 10 A/600 V, D5.2*20, fast-acting fuse		
Resistance	200.00Ω	0.01Ω	±(0.8%+10dig)
	2.0000kΩ	0.1Ω	±(0.8%+5dig)
	20.000kΩ	1Ω	±(0.8%+3dig)
	200.00kΩ	10Ω	
	2.0000MΩ	0.1kΩ	
	20.000MΩ	1kΩ	±(1.0%+3dig)
	100.00MΩ	0.01MΩ	±(5.0%+10dig)
Capacitance ^[1]	2.000nF	1pF	±(3.0%+10dig)
	20.00nF	10pF	
	200.0nF	100pF	
	2.000μF	1nF	
	20.00μF	10nF	
	200.0μF	100nF	
	2.000mF	1uF	

Basic function	Range	Minimum resolution	Accuracy
Others	On/Off test	$\sqrt{}$ (<50 Ω)	
	Diode test	$\sqrt{}$ (<0-2V)	
	Auto range	$\sqrt{}$	
	TRMS	$\sqrt{}$	

[1] : When measuring AC voltage/current or capacitance, accuracy guarantee range is 5% to 100% of the range.

Spectrum

Characteristics	Description	
Frequency		
Range	9 kHz to 3.0 GHz	
Resolution	100 Hz	
Frequency Span		
Range	Zero span, 300 Hz to maximum bandwidth	
Uncertainty	± Span / (number of sweep points -1)	
Bandwidth		
Resolution Bandwidth	0.2, 1, 3, 10, 30, 100, 300, 600, 850 kHz	
Max. Input Level		
Input DC voltage	50V	
Continuous power	Attenuator= 30 dB	
	+20 dBm (100 mW)	
Max. damage level	+20 dBm (100 mW)	
Display Average Noise Level (DANL)		
Frequency	(Input attenuation 0dB,PA OFF,100kHz resolution bandwidth, normalize to 1Hz, 20°C - 30°C)	
Preamp Off	10MHz to 1 GHz	<-120 dBm
	1 GHz to 2 GHz	<-120 dBm
	2 GHz to 3 GHz	<-115 dBm
Preamp On	10MHz to 1 GHz	<-140 dBm
	1 GHz to 2 GHz	<-140 dBm
	2 GHz to 3 GHz	<-135 dBm
Level display		
Logarithmic level	0.01 dB to 99 dB	
Linear level	0 to reference level	
Number of display points	301	
Number of traces	1	
Units	dBm, dBmV, dBμV, W, V	
Input attenuation error		
Setting range	0 dB to 30 dB, step by 1 dB	
Switching	fc= 50 MHz, relative to 10 dB, 20°C to 30°C	

	<2.5 dB	
Absolute Amplitude Uncertainty		
Uncertainty	fc = 50 MHz, preamplifier off, attenuation = 10 dB, input signal level = -10dBm, 20℃ to 30℃	
	<1.5 dB	
RBW Switching Uncertainty		
Uncertainty	relative to 10 kHz RBW	
	<2.0dB	
Reference level		
Range	-80dBm to +20 dBm, step by 1 dB	
Pre-amplifier		
Gain	20 dB (typical value)	
Level Measurement Uncertainty (95% confidence level, S/N > 20 dB, RBW = VBW = 1 kHz, preamplifier off, attenuation = 10 dB, -50 dBm < input level ≤ 0 dBm, fc > 10 MHz, 20℃ to 30℃)		
Uncertainty	<2.0 dB	
RF input VSWR (Attenuator setting≥ 10 dB)		
VSWR	< 2.0	
Spurious		
Residual response	The input ports is connected to a 50 Ω load,with attenuator set to 0 dB, 20℃ to 30℃	
	< -90 dBm, typical	
IF feedthrough	< -60 dBc	
Input-related spurious signals	The mixer level is -30 dBm	
	< -50 dBc	
Connector		
RF Input	Impedance	50 Ω, typical
	Connector	SMA female connector

General Technical Specifications

Display

Characteristics	Description
Display type	3.5-inch color LCD display
Display resolution	320 horizontal × 240 vertical pixels
Display color	65536 colors
Display Contrast	Adjustable

Power supply

Characteristics	Description	
Power supply	DC INPUT: 5VDC, 2A	
Power consumption	HSA2307 HSA2310	<5 W
	HSA2320	≤6 W
Battery	HSA2307	2200mAh*2 (3.7V, 18650)
	HSA2310 HSA2320	2600mAh*2 (3.7V, 18650)

Surroundings

Characteristics	Description
Temperature	Working temperature: 0℃ - 40℃ Storage temperature: -20℃- +60℃
Relative humidity	≤90%
Height	Operating: 3,000 meters Non-operating: 15,000 meters
Cooling method	Natural cooling

Mechanical specifications

Characteristics	Description
Dimensions	198 mm (length) × 96mm (height) × 38 mm (width)
Weight	About 0.6 kg (main unit, without battery)

Calibration interval: The recommended calibration interval is one year.



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