

6. Specification

This chapter lists the technical specifications and general technical specifications of the spectrum analyzer. Unless otherwise stated, the technical specifications apply to the following conditions:

- The instrument has been preheated for 30 minutes before use.
- The instrument is in the calibration cycle and has been self-calibrated.

"Typical" and "nominal" for this product are defined as follows

- Typical: Refers to the performance of the product under certain conditions.
- Nominal: Refers to the approximate value under product application process.

Frequency		
Frequency Range	HSA1016 (TG)	9 kHz to 1.600000000 GHz
	HSA1036 (TG)	9 kHz to 3.600000000 GHz
	HSA1075 (TG)	9 kHz to 7.500000000 GHz
Frequency	1 Hz	
Internal Frequency Reference		
Reference Frequency	10 MHz	
Reference Frequency Accuracy	$\pm [(\text{days since last calibrate} \times \text{freq aging rate}) + \text{temperature stability} + \text{initial accuracy}]$	
Temperature stability	<1 ppm	
Aging rate	0°C to 50°C, reference is 25°C	
	<0.5 ppm	
Reference Frequency	<1 ppm/year	
Frequency reading accuracy		
Reference	10.000000 MHz	
Reference Frequency Accuracy	$\pm [(\text{days since last calibrate} \times \text{freq aging rate}) + \text{temperature stability} + \text{initial accuracy}]$	
Frequency counter		

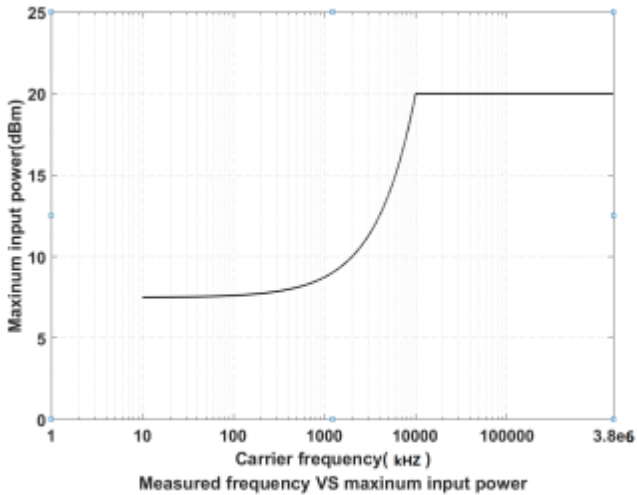
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Counter resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Counter uncertainty	\pm (frequency indication \times frequency reference accuracy + counter resolution)	
Frequency Span		
Span Range	0 Hz, 100 Hz to max frequency of instrument	
Span Uncertainty	\pm span / (sweep points-1)	
SSB Phase Noise (20°C to 30°C, $f_c=1\text{GHz}$)		
Carrier Offset	10 kHz	< -106 dBc/Hz (Typical)
	100 kHz	< -104 dBc/Hz (Typical)
	1 MHz	< -115 dBc/Hz (Typical)
<p style="text-align: center;">Carrier frequency(MHz) Measured phase noise@10kHz</p>		
Residual frequency modulation 20°C to 30°C, RBW=VBW= 1 kHz		
Residual frequency modulation	< 50 Hz (nominal)	
Bandwidth		
Resolution Bandwidth (-3 dB)	1 Hz to 1 MHz, step by 1-3-5-10	
RBW Accuracy	< 5% (nominal)	

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Resolution Shape Factor (60 dB: 3 dB)	Filter	<5 (nominal)
Video Bandwidth (-3 dB)		10 Hz to 3MHz, step by 1-3-5-10
Resolution Bandwidth (-6 dB) (EMI option)		200 Hz, 9 kHz, 120 kHz, 1 MHz
Amplitude		
Measurement range		
Ra ng e	HSA1016 (TG)	DANL to +10 dBm, 100 kHz~ 10 MHz, Preamp Off DANL to +20 dBm, 10 MHz~ 1.6 GHz, Preamp Off
	HSA1036 (TG)	DANL to +10 dBm, 100 kHz~ 10 MHz, Preamp Off DANL to +20 dBm, 10 MHz~ 3.6 GHz, Preamp Off
	HSA1075 (TG)	DANL to +10 dBm, 100 kHz~ 10 MHz, Preamp Off DANL to +20 dBm, 10 MHz~ 7.5 GHz, Preamp Off
Maximum input voltage		
DC voltage	50V	
Continuou s wave RF power	Attenuator is 40 dB	
	+20 dBm (100 mW)	
Maximum damage level	+30 dBm (1 W)	

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Displays the average noise level (DANL)

Frequency		Attenuator is 0 dB, Resolution Bandwidth and Video Bandwidth are 100 Hz, sample detection, trace average number	
Pr ea mp Off	HSA1016 (TG)	9 kHz to 1 MHz	-95 dBm (Typical) , <-88 dBm
		1 MHz to 500 MHz	-140 dBm(Typical) , <-130 dBm
		500 MHz to 1.6 GHz	-138 dBm(Typical) , <-128 dBm
	HSA1036 (TG)	9 kHz to 1 MHz	-95 dBm (Typical) , <-88 dBm
		1 MHz to 500 MHz	-140 dBm (Typical) , <-130dBm
		500 MHz to 3.6 GHz	-138 dBm (Typical), <-128 dBm
	HSA1075 (TG)	9 kHz to 1 MHz	-95 dBm (Typical) , <-88 dBm
		1 MHz to 500 MHz	-140 dBm Typical) , <-130dBm
		500 MHz to 3.6 GHz	-138 dBm (Typical), <-128 dBm
		3.6 GHz to 6 GHz	-134 dBm (Typical), <-124 dBm

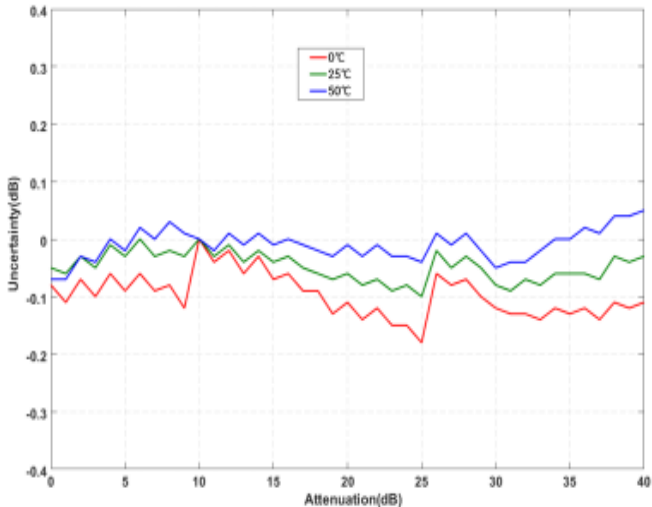
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		6 GHz to 7.5 GHz	-129 dBm (Typical), <-119 dBm
Pr ea mp On	HSA1016 (TG)	100 kHz to 1 MHz	-135 dBm (Typical), <-128 dBm
		1 MHz to 500 MHz	-160 dBm (Typical), <-150dBm
		500 MHz to 1.6 GHz	-158 dBm (Typical), <-148 dBm
	HSA1036 (TG)	100 kHz to 1 MHz	-135 dBm (Typical), <-128 dBm
		1 MHz to 500 MHz	-160 dBm (Typical), <-150dBm
		500 MHz to 3.6 GHz	-158 dBm (Typical), <-148 dBm
	HSA1075 (TG)	100 kHz to 1 MHz	-135 dBm (Typical), <-128 dBm
		1 MHz to 500 MHz	-160 dBm (Typical), <-150dBm
		500 MHz to 3.6 GHz	-158 dBm (Typical), <-148 dBm
		3.6 GHz to 6 GHz	-154 dBm (Typical), <-144 dBm
6 GHz to 7.5 GHz		-149 dBm (Typical), <-139 dBm	
Display level			
Log scale		0.01 dB to 1000 dB	
Line scale		0 to reference level	
Display point		801	
Trace number		5	
Detection mode		Pos detection, Neg detection, Normal, Sample, RMS, Average voltage	
		Quasi-peak value (EMI option)	
Trace function		Clear write, Max Hold, Min Hold, Average, View, Close, trace operation	
Scale unit		dBm, dBμW, dBpW, dBmV, dBμV, W, V	
Frequency response			

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Preamp Off	$f_c \geq 9$ kHz, attenuator is 10 dB, Relative to 50 MHz, 20°C to 30°C
	< 0.7 dB
Preamp On	$f_c \geq 100$ kHz, attenuator is 10 dB, Relative to 50 MHz, 20°C to 30°C
	< 1.0 dB
<p>The graph plots Frequency response (dB) on the y-axis (from -1 to 1) against Carrier frequency (MHz) on the x-axis (from 0 to 3800). Two data series are shown: 'PA Off' (red line) and 'PA On' (green line). The PA Off response is consistently higher than the PA On response, with a significant peak near 1520 MHz. The PA On response shows a sharp dip around 1520 MHz, mirroring the peak in the PA Off response. Both responses fluctuate between approximately -0.8 dB and 0.2 dB across the frequency range.</p>	
Input attenuation error	
Setting range	0 dB to 40 dB, step by 1 dB
Switching uncertainty	$f_c = 50$ MHz, relative to 10 dB, 20°C to 30°C
	< 0.5 dB

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Absolute amplitude accuracy			
Uncertainty	fc= 50 MHz, Peak detector, Preamp off, attenuator is 10 dB, Input signal level =-10 dBm, 20°C to 30°C		
	<0.4 dB		
Resolution bandwidth switch			
Uncertainty	Relative to 10 kHz RBW		
	<0.1 dB		
Reference level			
Range	-80dBm to +30 dBm, step by 1 dB		
Resolution	Log scale	0.01 dB	
	Line scale	4 digits	
Preamp			
Gain	HSA 1016 (T G)	100 kHz to 1.6 GHz	20 dB (nominal)

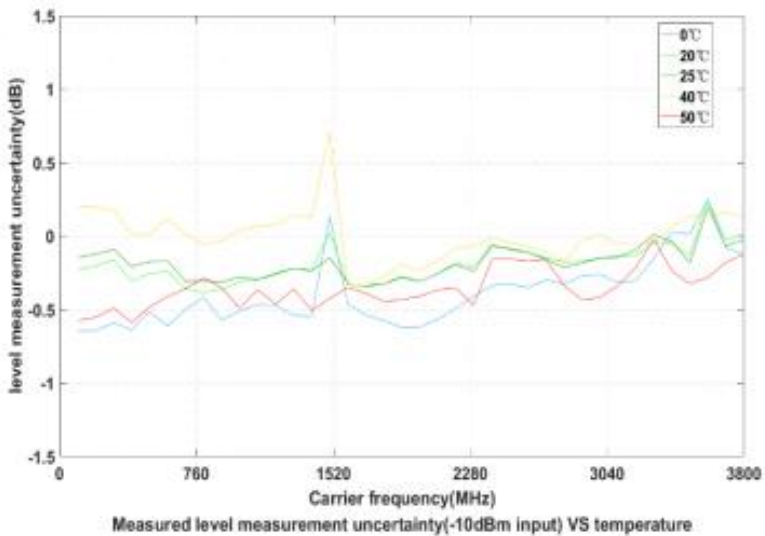
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	HSA 1036 (TG)	100 kHz to 3.6GHz
	HSA 1075 (TG)	100 kHz to 7.5 GHz

Level measurement uncertainty (95% Confidence degree, S/N>20 dB, resolution bandwidth and Videobandwidth are 1 kHz, Preamp off, attenuator is 10 dB)

Level measurement uncertainty

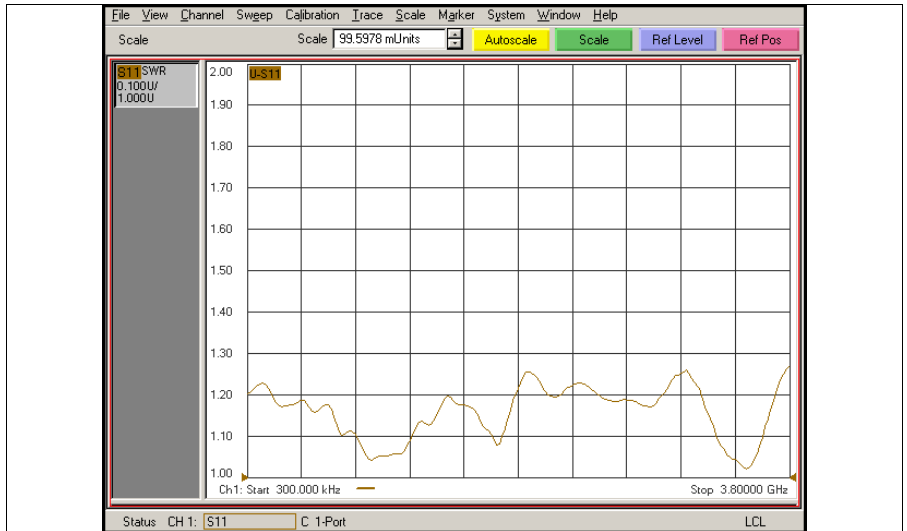
<0.7 dB



Radio frequency input VSWR (Set attenuator≥10dB)

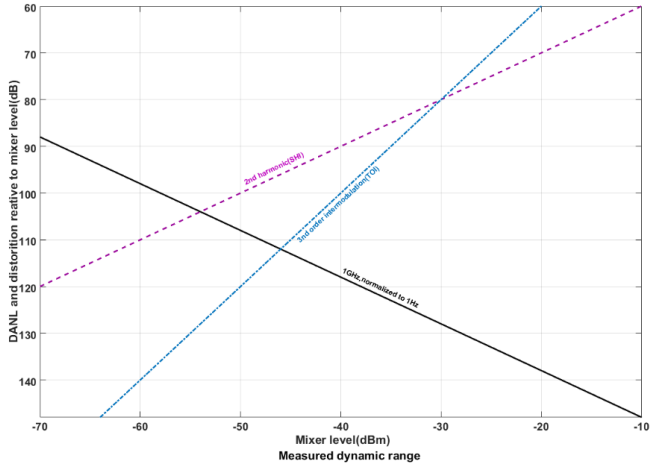
VS WR	HSA1016 (TG)	300 kHz to 1.6 GHz	<1.8 (nominal)
	HSA1036 (TG)	300 kHz to 3.6 GHz	
	HSA1075 (TG)	300 kHz to 7.5 GHz	

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Distortion	
Second harmonic cut-off point	
Second harmonic cut-off point (SHI)	$f_c \geq 50$ MHz, input signal level is -20 dBm, attenuator is 10 dB $> +45$ dBm
Third order intermodulation cut-off point	
Third order intermodulation cut-off point (TOI)	$f_c \geq 50$ MHz, two magnitudes are -20 dBm, frequency interval 200 kHz Two-tone signal input mixer, attenuator is 0 dB $> +14$ dBm (Typical)
1dB Gain compression	
Input the 1dB compression point of the mixer (P1dB)	$f_c \geq 50$ MHz, attenuator is 0 dB > -2 dBm (nominal)

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Spurious response	
Residual response	Input port connected to 50 Ω load, attenuator is 0 dB, 20°C to 30°C <-90 dBm, Typical
Medium frequency	< -60 dBm
System dependent sideband	Local oscillator correlation, A/D transformation correlation, harmonics and subharmonics of the first oscillator are related < -60 dBc
Input dependent spurious	Mixer level is -30 dBm < -80 dBm
Sweep	
Sweep Time	Sweep bandwidth ≥ 100 Hz: 10 ms to 3000
Sweep Time uncertainly	Sweep bandwidth ≥ 100 Hz : 5% (nominal) Zero Sweep (Sweep time set vakue >1 ms) :
Sweep Mode	Continuous, Single
Trigger	
Trigger source	liberty, video, external

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External trigger level	5 V TTL level	
Trace source (option)		
Trace source output		
Frequency range	HSA1016 (TG)	100 kHz to 1.6 GHz
	HSA1036 (TG)	100 kHz to 3.6 GHz
	HSA1075 (TG)	100 kHz to 7.5 GHz
Output level range	-40 dBm to 0 dBm	
Output level resolution	1 dB	
Output flatness	Relative to 50 MHz	
	±3 dB (nominal)	
Tracking source stray	Harmonic stray: -20 dBc (Typical) (Output power of the tracking source is -10 dBm时) ; Non-Harmonic stray: -20 dBc (Typical) (Output power of the tracking source is -10 dBm时) ;	
Tracking source to Input isolation	-60 dBm (Output power of the tracking source is 0 dBm)	
Input/Output		
Front panel connector		
Radio frequency input	Resistance	50 Ω, nominal
	Connector	N-type negative head
Trace source output	Resistance	50 Ω, nominal
	Connector	N-type negative head
Internal/External reference		
Internal	Frequency	10 MHz

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reference	Output level	+3 dBm to +10 dBm, +8 dBm (Typical)
	Resistance	50 Ω (nominal)
	Connector	BNC negative head
External reference	Frequency	10 MHz \pm 5 ppm
	Output level	0 dBm to + 10 dBm
	Resistance	50 Ω (nominal)
	Connector	BNC negative head
External trigger output		
External trigger input	Resistance	1 k Ω (nominal)
	Connector	BNC negative head
Audio interface	Resistance	30 Ω (nominal)
	Connector	3.5 mm
Communication interface		
USB master terminal		
USB Host	Connector	A plug
	Treaty	USB 2.0
USB device end		
USB Device	Connector	Micro USB
	Treaty	2.0 version
LAN		10/100Base, RJ-45
General technical specification		
Display		
Display type		TFT LCD
Display resolution		1024*768
Screen size		8 inches
Screen color		65536
Mass storage		
Mass storage		Flash disk (internal storage 50 MByte), USB
Environment		
Temperat	Operating temperature	0 $^{\circ}$ C to 50 $^{\circ}$ C

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ure	range	
	Storage temperature range	-20 °Cto 70 °C
Humidity	0°C to 30°C	≤ 95% relative humidity
	30°C to 40°C	≤ 75% relative humidity
Altitude	Altitude operation	3000 below
Appearance		
Dimension		265 mm (width)×190 mm (high)×58 mm (depth)
Weight		Approx. 2.5 kg (main engine)
Calibration interval time		
Recommended calibration interval		18 months

7. Troubleshooting

Typical issues that may occur when using your spectrum analyzer:

- Power on malfunction
- No signal displays
- Wrong measurement results or poor frequency or amplitude precision.

1. Power on malfunction

Power on malfunction can include a situation where the screen is still dark (no display) after switch on.

If the screen is still dark after power on, please check:

- 1) If the power supply has been connected correctly and if the power supply voltage range is within the specification.
- 2) If the power switch has been turned on.

2. No signal displays

If there is no signal display at any wave band. Please try the following: set a signal generator at 30 MHz frequency and -10 dBm power and connect it to the spectrum analyzer RF input connector. If there is still no signal display, there may be a problem with the spectrum analyzer hardware circuit. Please contact us for service.

3. Wrong measurement results or poor signal frequency precision

If the display contents shake a lot or the frequency readout exceeds the error range during measurements, check if the signal source is stable. If so, check if spectrum analyzer reference is precise. Select internal or external frequency reference according to measurement conditions: press **FREQ** bottom softkey → [**Freq Ref Int Ext**]. If the frequency is still not precise, then the spectrum analyzer LO has lost its phase lock, please contact us for service.

4. Wrong measurement results or poor readout amplitude precision

If signal amplitude readout is not precise, perform a calibration. If amplitude readout is still not precise, then it may be a problem with internal circuit, please contact us for service.

8. Appendix

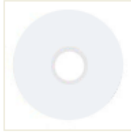
Appendix A: Enclosure

(The accessories subject to final delivery.)

Standard Accessories



Power Cord



CD Rom



Quick Guide



USB Cable



AC-DC Adapter



GPS Antenna



Metal Case

Options



N-N Cable



N-SMA Cable



SMA-SMA Cable



SMA Adaptor



N-SMA Adaptor



Near Field Probe includes: Four near-field probes,
N-SMA adaptor, SMA-SMA cable
(Frequency range: 30 MHz – 3 GHz)



Carrying Case