

# Data Sheet

## SMS3000X Series Spectrum Analyzer

◆ SMS3032X

◆ SMS3021X



### General Description

SMS3000X series spectrum analyzer has a frequency range from 9 kHz up to 2.1 GHz/3.2 GHz, it is light weight and small size, with an user friendly interface, concise style of display, reliable measurement precision and plenty of RF measurement functions. Applicable to research and development, education, production, maintenance and other related fields, that meets a wider range of application requirements.

## Features and Benefits

- ◆ All-Digital IF Technology
- ◆ Frequency Range from 9 kHz up to 3.2 GHz
- ◆ Min. -161 dBm/Hz Displayed Average Noise Level (Typ.)
- ◆ Min. <-98 dBc/Hz @10kHz Offset Phase Noise (1 GHz, Typ.)
- ◆ Total Amplitude Accuracy < 0.7 dB
- ◆ 10 Hz Minimum Resolution Bandwidth (RBW)
- ◆ Standard Preamplifier
- ◆ Up to 3.2 GHz Tracking Generator Kit (Opt.)
- ◆ Advanced Measurement Kit (Opt.)
- ◆ Reflection Measurement Kit (Opt.)
- ◆ EMI Pre-compliance Test Kit (Opt.)
- ◆ 10.1 Inch WVGA (1024x600) Display

## Model and Main index

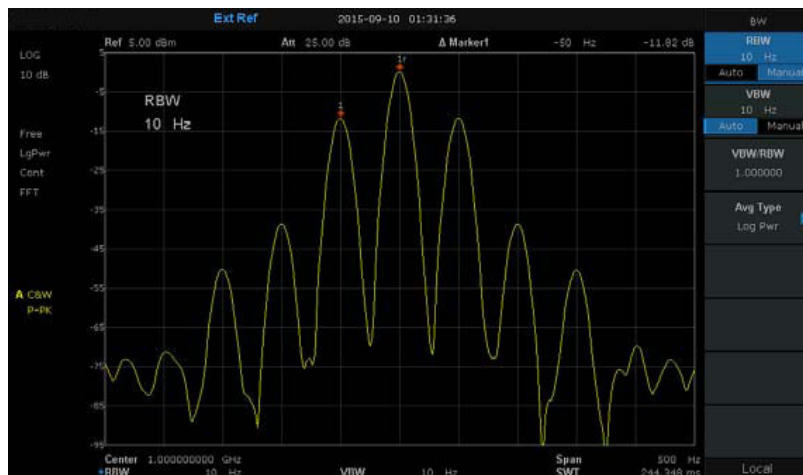
Model	SMS3032X	SMS3021X
Frequency Range	9 kHz~3.2 GHz	9 kHz~2.1 GHz
Resolution Bandwidth	10 Hz~1 MHz , in 1-3-10 sequence	
Displayed Average Noise Level	-161 dBm/Hz, Normalize to 1 Hz (typ.)	
Phase Noise	<-98 dBc/Hz @1 GHz, 10 kHz offset	
Amplitude Precision	< 0.7dB	

## Design features

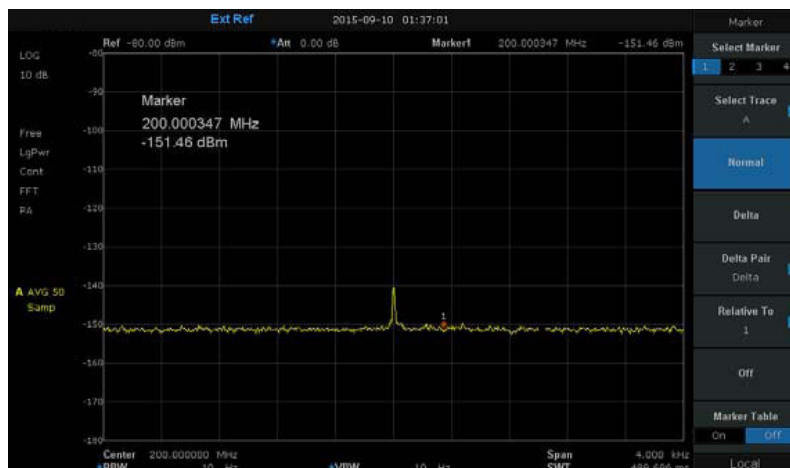
Supports four traces and cursors independently



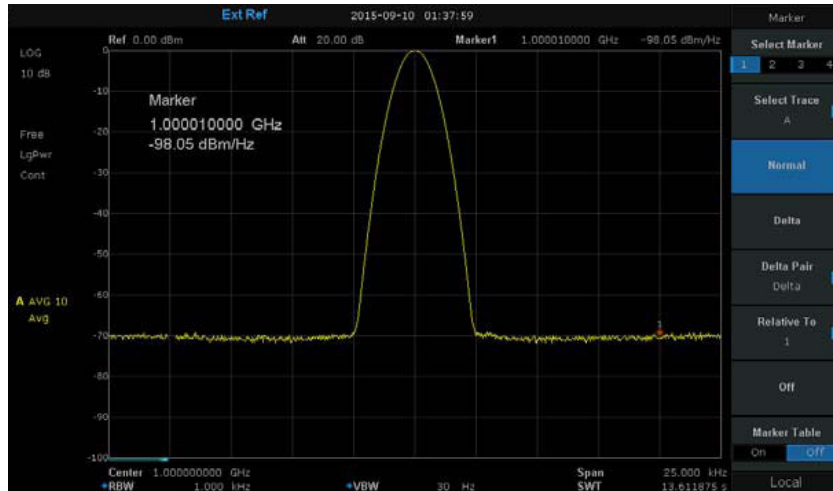
10 Hz Minimum Resolution Bandwidth (RBW)



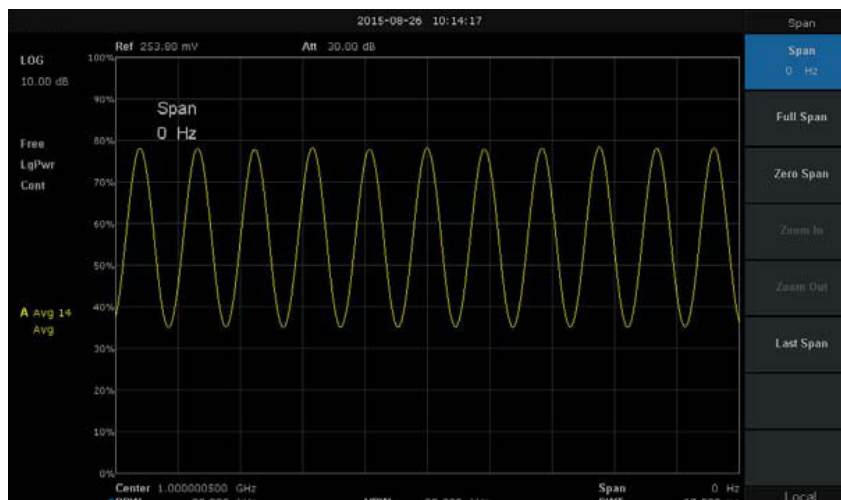
-151 dBm Displayed Average Noise Level (RBW=10 Hz)



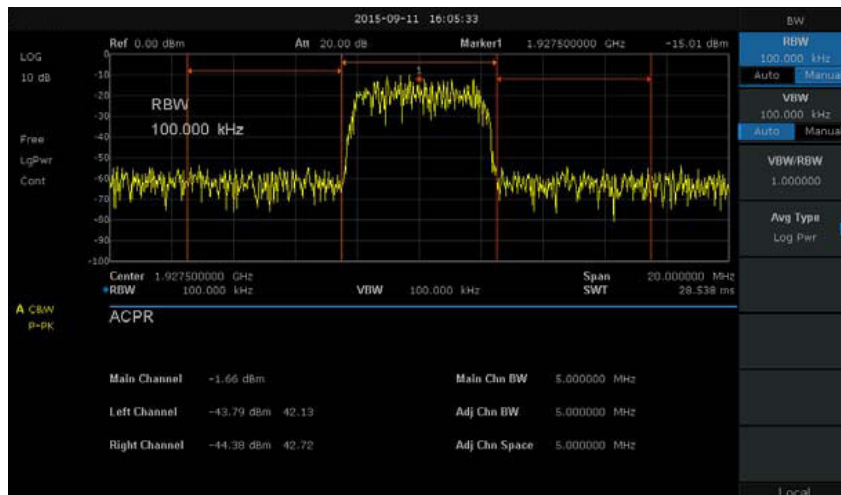
Phase noise -98dBc/Hz @1GHz, offset 10kHz



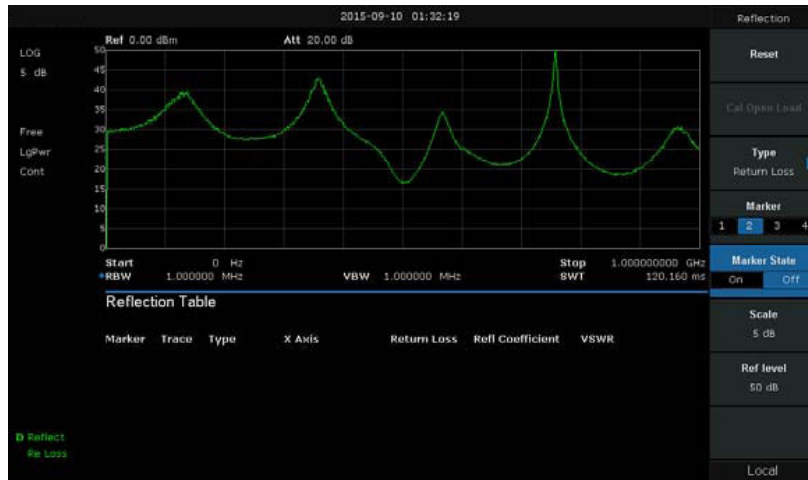
Demodulation at the zero span



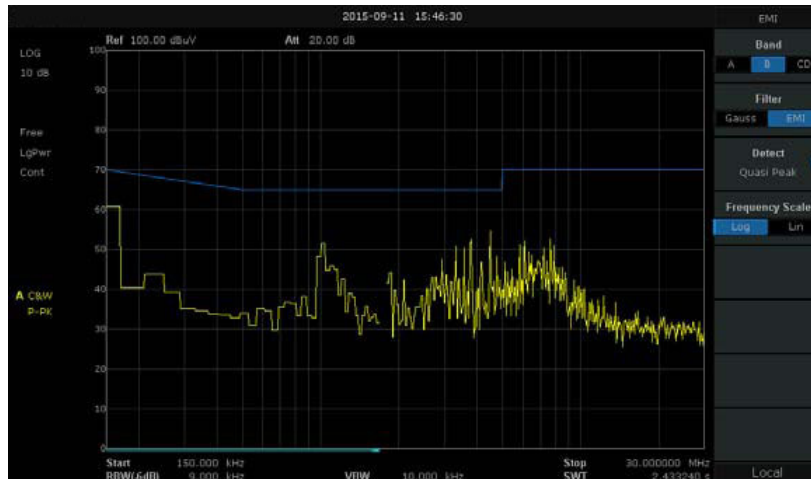
Advanced power measurement, calculate the ACPR parameters



Reflection measurement, acquire characteristic curve of the Return Loss



EMI filter, Quasi-Peak detector with limit template following CISPR 16



## Specifications

Specifications are valid under the following conditions: the instrument is within the calibration period, is stored for at least two hours at 0 °C to 50 °C temperature, and is warmed up 40 minutes. In addition tracking generator indicators, the specifications in this manual include the measurement uncertainty.

**Technical index:** All products guaranteed performance parameters, apply to 5 °C to 45 °C temperature range.

**Typical:** 80 percent of the measurement result will meet at room temperature (approximately 25 °C ).It has 95th percentile reliability. This date is not warranted and does not include the measurement uncertainty.

**Nominal:** The expected mean or average performance or a designed attribute such as the 50 Ω connector. This date is not warranted and does not include the measurement uncertainty. This measurement meet at room temperature (approximately 25 °C ).

Frequency Characteristic		
Frequency	SMS3032X	SMS3021X
Frequency range	9 kHz-3.2 GHz	9 kHz-2.1 GHz
Frequency resolution	1 Hz	1 Hz
Frequency Span		
Range	0Hz, 100 Hz to 3.2 GHz	0Hz, 100 Hz to 2.1 GHz
Accuracy	$\pm \text{span} / (\text{number of sweep points} - 1)$	
Internal Reference Source		
Reference frequency	10.000000 MHz	
frequency reference accuracy	$\pm [(\text{time since last adjustment} \times \text{frequency aging rate}) + \text{temperature stability} + \text{calibration accuracy}]$	
Initial calibration accuracy	<0.2 ppm	
Temperature stability	<1 ppm/year, 0°C~50°C	
Frequency aging rate	<0.5 ppm/first year, 3.0 ppm/20 years	
Marker		
Marker resolution	$\text{span} / (\text{number of sweep points} - 1)$	
Marker uncertainty	$\pm [\text{frequency indication} \times \text{frequency reference uncertainty} + 1\% \times \text{span} + 10\% \times \text{resolution bandwidth} + \text{marker resolution}]$	
Frequency counter resolution	1 Hz	
Frequency counter uncertainty	$\pm [\text{frequency indication} \times \text{frequency reference accuracy} + \text{counter resolution}]$	

Bandwidths	
Resolution bandwidth (-3dB)	10 Hz~1 MHz,in 1-3-10 sequence
Resolution filter shape factor	<4.8:1(60 dB:3 dB),Gaussian-like
RBW uncertainty	<5%
Video bandwidth (-3dB)	1Hz ~3MHz,in 1-3-10 sequence
VBW uncertainty	<5%

Amplitude Characteristic			
Amplitude and Level			
Measurement range	DANL to +10 dBm,100 kHz~1 MHz, preamplifier off DANL to +20 dBm,1 MHz~3.2 GHz, preamplifier off		
Reference level	-100 dBm to +30 dBm,1dB steps		
Preamplifier	20 dB (nom.), 9 kHz~3.2GHz		
Input attenuation	0~51 dB,1dB steps		
Maximum input DC voltage	+/- 50 V <sub>DC</sub>		
Maximum series RF power	33 dBm,3 minutes, input attenuation>20 dB		
Displayed Average Noise Level (DANL)			
	20°C~30°C,attenuation=0dB,sample detector, trace average >50		
PA off		RBW=10 Hz	Normalization to 1 Hz
	9 kHz~100 kHz	-100 dBm (nom.)	-110 dBm (nom.)
	100 KHz ~1 MHz	-97 dBm, -101 dBm (typ.)	-107 dBm,-111 dBm (typ.)
	1 MHz~10 MHz	-122 dBm, -126 dBm (typ.)	-132 dBm,-136 dBm (typ.)
	10 MHz~200 MHz	-127 dBm,-131 dBm (typ.)	-137 dBm,-141 dBm (typ.)
	200 MHz~2.1 GHz	-125 dBm, -129 dBm (typ.)	-135 dBm,-139 dBm (typ.)
	2.1 GHz~3.2 GHz	-116 dBm, -122 dBm (typ.)	-126 dBm,-132 dBm (typ.)
PA on	9 kHz~100 kHz	-107 dBm (nom.)	-117 dBm (nom.)
	100 kHz ~1 MHz	-122 dBm, -127 dBm (typ.)	-132 dBm,-137 dBm (typ.)
	1 MHz~10 MHz	-138 dBm,-141 dBm (typ.)	-148 dBm,-154 dBm (typ.)
	10 MHz~200 MHz	-146 dBm, -151 dBm (typ.)	-156 dBm,-161 dBm (typ.)
	200 MHz~2.1 GHz	-145 dBm, -148 dBm (typ.)	-155 dBm,-158 dBm (typ.)
	2.1 GHz~3.2 GHz	-135 dBm, -139 dBm (typ.)	-145 dBm,-149 dBm (typ.)

<b>Phase Noise</b>		
	20°C~30°C,fc=1 GHz	
Phase noise	<-95 dBc/Hz @10kHz offset,<-98 dBc/Hz (typ.)	
	<-96 dBc/Hz @100 kHz offset,<-97 dBc/Hz (typ.)	
	<-115 dBc/Hz @1 MHz offset,<-117 dBc/Hz (typ.)	
<b>Level Display</b>		
Logarithmic level axis	10 dB to 100 dB	
Linear level axis	0 to reference level	
Units of level axis	dBm, dBmV, dBuV, V, W	
Number of display points	751	
Number of traces	4	
Trace detectors	Positive-peak, Negative-peak, Sample, Normal, Average(Voltage/RMS/Video),Quasi-peak(with EMI option)	
Trace functions	Clear write, Max Hold, Min Hold, View, Blank, Average	
<b>Frequency Response</b>		
	20°C to 30°C, 30% to 70% relative humidity, attenuation=20 dB, reference frequency 50 MHz	
PA off	±0.8 dB,±0.4 dB, (typ.)	
PA on	±0.9 dB,±0.5 dB, (typ.)	
<b>Error and Accuracy</b>		
Resolution bandwidth	10 KHz RBW	
switching uncertainty	Logarithmic resolution ±0.2 dB, liner resolution ±0.01,nominal	
Input attenuation	20□ to 30 □ , fc=50 MHz, preamp off, Relative to 20 dB, 1 to 51	
switching uncertainty	dB attenuation, ±0.5 dB	
Absolute amplitude accuracy	20°C to 30°C , fc=50 MHz, RBW=1 kHz, VBW=1 kHz, peak detector, attenuation = 20 dB, 95th percentile reliability	
	preamp off	±0.4 dB, input signal -20dBm
	preamp on	±0.5 dB, input signal -40dBm
Total amplitude accuracy	20 °C to 30 °C , Fc>100 kHz, input signal -50dBm~0dBm, RBW=1 kHz, VBW=1 kHz, peak detector, attenuation = 20 dB, preamp off, 95th percentile reliability	
	±0.7dB	
RF input VSWR	<1.5 (nom.) , input attenuation 10dB, 1MHz~3.2GHz	



<b>Distortion and Spurious Responses</b>	
Second harmonic distortion(SHI)	fc≥50 MHz, mixer level -30 dBm, attenuation= 0 dB, preamp off, 20°C to 30°C, -65 dBc
Third-order intercept(TOI)	fc≥50 MHz, two -20 dBm tones at input mixer spaced by 100 kHz, attenuation =0 dB, preamp off, 20 °C to 30 °C +10 dBm
1dB Gain Compression	fc≥50 MHz, attenuation= 0 dB, preamp off, 20 °C to 30 °C >-5 dBm (nom.)
Residual response	input termination = 50Ω, attenuation = 0dB,20°C to 30°C <-90 dBm (typ.)
Input related spurious	Mixer level =-30 dBm, 20°C to 30°C <-65 dBc

<b>Sweep and Trigger</b>		
Sweep time	1 ms to 3000 s, Span ≥ 100 Hz 1 μs to 3000 s, Span = 0 Hz, RBW ≥ 100 kHz	
Sweep accuracy	Accuracy, Speed	
Sweep mode	Sweep, FFT	
Sweep rule	Single, Continuous	
Trigger source	Free, Video, External	
External trigger	5V TTL level, rising edge/falling edge	
<b>Tracking Generator(Option)</b>		
	SMS3032X	SMS3021X
Frequency range	100 kHz~3.2 GHz	100 kHz~2.1 GHz
Output level	-20 dBm~0 dBm	
Output level resolution	1dB	
Output flatness	+/-3dB	
Output maximum reverse level	Mean power:30 dBm DC:±50V <sub>DC</sub>	

<b>EMI Receiver Measurement (Option)</b>			
Resolution bandwidth(6dB)	200 Hz	9 kHz	120 kHz
Detector	Quasi-peak		
<b>Reflection Measurement (Option)</b>			
Function	VSWR, Return loss		

<b>Advanced Measurement (Option)</b>	
Function	Channel power, adjacent channel power ratio, time domain power, occupied bandwidth

<b>External input and external output</b>	
Front panel RF input	50 $\Omega$ ,N-female
Front panel tracking generator output	50 $\Omega$ ,N-female
10MHz reference output	10MHz, >0dBm, 50 $\Omega$ , BNC-female
10MHz reference input	10 MHz, -5dBm~+10dBm, 50 $\Omega$ , BNC-female
External Trigger input	1 k $\Omega$ , 5V TTL , BNC-female
<b>Communication Interface</b>	
USB Host	USB-A 2.0 +
USB Device	USB-B 2.0
LAN	LAN(VXI11) , 10/100Base, RJ-45
<b>General Specifications</b>	
Display	TFT LCD, 1024×600 (waveform area 751×501), 10.1 inch
Storage	Internal (Flash) 256 MByte, External (USB storage device) 32 GByte
Source	Input voltage range (AC)100V~240V, AC frequency supply 45Hz~440Hz, Power consumption 30W
Temperature	Working temperature 0°C to 50°C, Storage temperature -20°C to 70°C
Humidity	0°C to 30°C, ≤95% Relative humidity; 30°C to 50°C, ≤75% Relative humidity
Dimensions	393mm×207mm×116.5mm (W×H×D)
Weight	Contain tracking generator 4.60 kg (10.1 lb)
<b>Electromagnetic Compatibility and Safety</b>	
EMC	EN 61326-1:2013
Electrical safety	EN 61010-1:2010
<b>Standard Accessories</b>	
User Manual, Power Cord, USB Cable, CD (Including user manual, Data Sheet and Application Software)	

## Ordering Information

Product Description	SMS3032X Spectrum Analyzer	Order Number
Product code	Spectrum Analyzer, 9 kHz~3.2 GHz	SMS3032X
	Spectrum Analyzer, 9 kHz~3.2 GHz, with TG	SMS3032X-TG
	Spectrum Analyzer, 9kHz~2.1GHz	SMS3021X
	Spectrum Analyzer, 9kHz~2.1GHz, with TG	SMS3021X-TG
Standard configurations	User Manual, A Power Cable, A USB Cable, A CD (Including Quick Start, Data Sheet and Application Software), A Calibration Certificate	
Options	EMI measurement kit	SMS3000X-EMI
	Advanced measurement kit	SMS3000X-AMK
	Reflect measurement kit	SMS3000X-Refl
	Reflection Bridge Kit-SSA3000X, RB (1 MHz~2 GHz), N (M) -N (M) adaptor (2 pcs)	SMS3000X-RB

SMS3000X\_Lit\_V1.0\_1215

Subject to change

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