

DSA1000 series Spectrum Analyzer

- All Digital IF Technology
- Frequency Range: 9 kHz to 2 GHz or 3 GHz
- Displayed Average Noise Level Up to -148 dBm (DSA1030A)
- Phase Noise up to -88 dBc/Hz @10 kHz offset (DSA1030A)
- Total Amplitude Uncertainty <1.0 Db(DSA1030A)
- Minimum Resolution Bandwidth (RBW) : 10 Hz (DSA1030A)
- Quasi-Peak Detector & EMI Filter (Standard)
- 3 GHz Tracking Generator (for DSA1030-TG and DSA1030A-TG)
- Advanced measurement functions (option for DSA1030 and DSA1030-TG, standar for DSA1030A and DSA1030A-TG)
- 8.5 inch widescreen display (800X480)
- Complete Connectivity: LAN, USB Host&Device, VGA, USB-GPIB (optional)
- Compact size, light weight

DSA1000 series is one of RIGOL's compact size,light weight economic spectrum analyzers, the digital IF technology guarantees its reliability and performance to meet the most demanding RF applications.

Unique widescreen display, friendly interface and easy-to-use operations



Product Dimensions: Width X Height X Depth = 399 mm × 223 mm × 159 mm Weight: 6.2 kg (Without Package)

Advanced Performance and stability

Stability and precision is the primary design goal of the DSA1000 Series. We started with an all digital IF core. With the minimum 10Hz resolution bandwidth, -88 dBc/Hz phase noise (typical) at 10 kHz offset, up to -148 dBm displayed average noise level (10 Hz RBW, standard preamplifier on) and less than 1.0 dB total amplitude error, the DSA1000 Series makes high precision measurements easier than ever whether the application calls for low noise or narrow resolution.

Incomparable Value

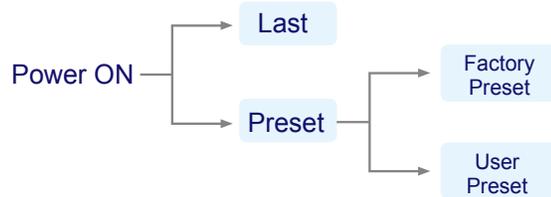
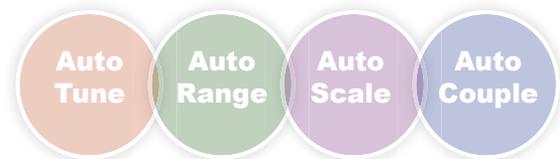
With the DSA1000 Series get a high quality spectrum analyzer without the price tag. This lowers the investment whether you are in stages related to research and development or manufacturing and maintenance. Don't let instrumentation costs dictate resource allocation. With our available calibration and maintenance training as well as firmware updates never regret a purchase because of total cost of ownership.

Benefits of Rigol's all digital IF design

1. The ability to measure smaller signals: on the basis of this technology, the IF filter enables smaller bandwidth settings, which greatly reduce the displayed average noise level.
2. The ability to distinguish between small signals by frequency: using the IF filter with the smallest bandwidth setting it is possible to make out signals with a frequency difference of only 10 Hz.
3. High precision amplitude readings: this technology almost eliminates the errors generated by filter switching, reference level uncertainty, scale distortion, as well as errors produced in the process of switching between logarithmic and linear display of amplitude when using a traditional analog IF design.
4. Higher reliability: compared with traditional analog designs, the digital IF greatly reduces the complexity of the hardware, the system instability caused by channel aging, and the temperature sensitivity that can contribute to parts failure.
5. High measurement speed: the use of digital IF technology improves the bandwidth precision and selectivity of the filter, minimizing the scanning time and improving the speed of the measurement.

Breadth of measurement functions and automatic settings provide ultimate flexibility

DSA1000 Series provides a series of automatic setting functions such as Auto Tune, Auto Range, Auto Scale and Auto Couple that enable the analyzer to acquire signals and match parameters automatically, instead of the manual process used by a traditional analyzer. In addition, the User and Factory settings under the Preset function enable users to quickly and easily recall previous measurement settings.

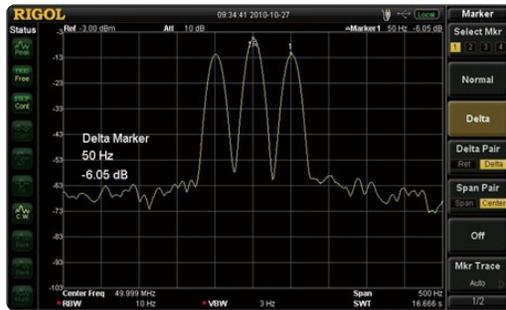


Status saving and loading such as

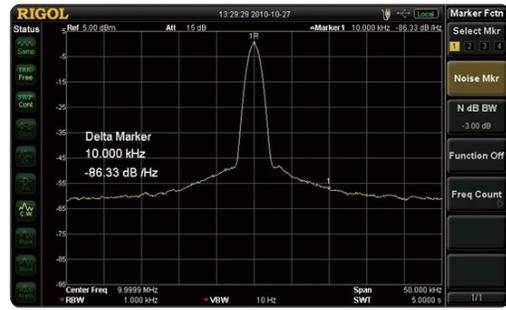
- Setup
- State
- Trace
- Corrections
- Measure
- Marker Table
- Peak Table
- Limit

► Features and Benefits

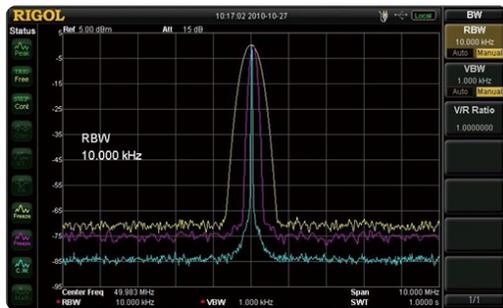
Distinguish the two nearby signals clearly with the 10Hz RBW



Readout the signal's Phase Noise directly by using the standard Noise Marker function



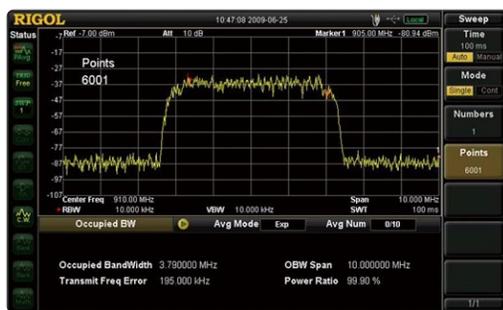
Compare the spectrums with different color trace



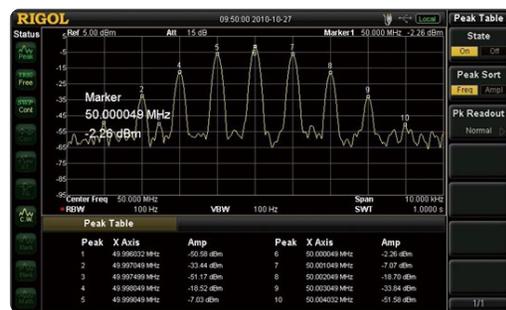
The advanced Channel Power measurement function



The advanced Occupied Bandwidth measurement function



Readout the Spectrum Peak values with the Peak table function



The advanced Harmonic distortion measurement function



Quasi-Peak Detector & EMI Filter (Standard)



► Specifications

Specifications are valid after 30 minute warm up time with a valid calibration.

Typical value and nominal value are defined as follows.

- Typical value: defined as the specifications when the product is under specified conditions.
- Nominal value: defined as the approximate quantity in the application of the product.

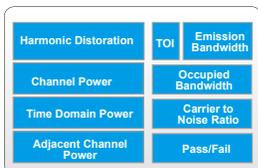
Model	DSA1030A/DSA1030A-TG	DSA1030/DSA1030-TG	DSA1020
Frequency			
Frequency			
Frequency Range	9 kHz to 3 GHz		9 kHz to 2 GHz
Frequency Resolution	1 Hz		
Internal Frequency Reference			
Reference Frequency	10 MHz		
Aging Rate	<3 ppm/year		
Temperature Drift	<3 ppm, 20 °C to 30 °C		
Frequency Readout Accuracy			
Marker Resolution	span/(sweep points-1)		
Marker Uncertainty	± (frequency indication × frequency reference uncertainty + 1% × span + 10% × resolution bandwidth + marker resolution)		
Marker Frequency Counter			
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz		
Uncertainty	±(frequency indication × frequency reference uncertainty + counter resolution) Note: Frequency Reference Uncertainty= (aging rate × period since adjustment + temperature drift).		
Frequency Span			
Range	0 Hz, 100 Hz to 3 GHz		0 Hz, 100 Hz to 2 GHz
Uncertainty	±span/(sweep points-1)		
SSB Phase Noise			
SSB Phase Noise Note: Typical $f_c = 500\text{MHz}$, $\text{RBW} \leq 1\text{kHz}$, sample detector, and trace average ≥ 50 .	Carrier Offset 10 kHz: <-88 dBc/Hz, nominal Carrier Offset 100 kHz: <-100 dBc/Hz, nominal Carrier Offset 1 MHz: <-110 dBc/Hz, nominal	Carrier Offset 10 kHz: <-80 dBc/Hz	
Bandwidths			
Resolution Bandwidth (-3dB)	10 Hz to 1 MHz, in 1-3-10 sequence	100 Hz to 1 MHz, in 1-3-10 sequence	
Bandwidth (-6dB)	200Hz, 9kHz, 120kHz, 1 MHz	200Hz, 9kHz, 120kHz, 1 MHz	
RBW Uncertainty	<5%, nominal		
Resolution Filter Shape Factor (60dB: 3dB)	<5, nominal		
Video Bandwidth (-3dB)	1 Hz to 3 MHz, in 1-3-10 sequence		
Amplitude			
Measurement Range			
Range	10 MHz to 3 GHz*: DANL to +30 dBm 1 MHz to 10 MHz: DANL to +21 dBm 9 kHz to 1 MHz: DANL to +17 dBm Note*: 2 GHz for DSA1020.		
Maximum rated input level Note: When input level >33 dBm, the protection switch will be on.			
DC Voltage	50 V		
CW RF Power	30 dBm (1 W) (RF attenuation ≥ 20 dB)		
Max. Damage Level	40 dBm (10 W)		
1dB Gain Compression			
$f_c \geq 50\text{MHz}$, preamplifier off			
Total Power at Input Mixer	>0 dBm Note: Mixer power level (dBm) = input power (dBm) – input attenuation (dB).		

Displayed Average Noise Level (DANL)			
	0 dB RF Attenuation, RBW=10 Hz, VBW=1Hz, RMS Average Detector, Trace Average \geq 50, Input Impedance=50 Ω , Tracking Generator Off.	0 dB RF Attenuation, RBW=100 Hz, VBW=1Hz, RMS Average Detector, Trace Average \geq 50, Input Impedance=50 Ω , Tracking Generator Off.	
DANL (Preamplifier Off)	100 kHz to 10 MHz: <-85 dBm-3 x (f/1 MHz) dB, typical -125 dBm 10 MHz to 2.5 GHz: <-127 dBm+3 x (f/1GHz) dB, typical -130 dBm 2.5 GHz to 3 GHz: <-115 dBm	100 kHz to 10 MHz: <-75 dBm-3 x (f/1 MHz) dB, typical -115 dBm 10 MHz to 2.5 GHz: <-117 dBm+3 x (f/1 GHz) dB, typical -120 dBm 2.5 GHz to 3 GHz: <-105 dBm	100 kHz to 10 MHz: <-75 dBm-3 x (f/1 MHz) dB, typical -115 dBm 10 MHz to 2 GHz: <-117 dBm+3 x (f/1 GHz) dB, typical -120 dBm
DANL (Preamplifier On)	100 kHz to 1 MHz: <-103 dBm 1 MHz to 10 MHz: <-103 dBm-3 x (f/1 MHz) dB, typical -143 dBm 10 MHz to 2.5 GHz: <-145 dBm+3 x (f/1 GHz) dB, typical -148 dBm 2.5 GHz to 3 GHz: <-133 dBm	100 kHz to 1 MHz: <-93 dBm 1 MHz to 10 MHz: <-93 dBm-3 x (f/1 MHz) dB, typical -133 dBm 10 MHz to 2.5 GHz: <-135 dBm+3 x (f/1 GHz) dB, typical -138 dBm 2.5 GHz to 3 GHz: <-123 dBm	
Level Display Range			
Log Scale	1 dB to 200 dB		
Linear Scale	0 to Reference Level		
Number of Display Points	Normal: 601; Full Screen: 751		
Number of Traces	3 + Math Trace		
Trace Detectors	Normal, Positive-peak, Negative-peak, Sample, RMS, Voltage Average, Quasi-Peak		
Trace Functions	Clear Write, Max Hold, Min Hold, Average, Freeze, Blank		
Scale Units	dBm, dBmV, dB μ V, V, W		
Frequency Response			
10 dB RF Attenuation, Relative to 50 MHz, 20°C to 30°C			
Frequency Response	Preamplifier Off , 100 kHz to 3 GHz: <0.7 dB Preamplifier On , 1 MHz to 3 GHz: <1.0 dB	Preamplifier Off , 100 kHz to 3 GHz: <1.0 dB Preamplifier On , 1 MHz to 3 GHz: <1.4 dB	100 kHz to 2 GHz: <1.0 dB
Input Attenuation Switching Uncertainty			
Setting Range	0 to 50 dB, in 1 dB step		
Switching Uncertainty (fc=50 MHz, relative to 10 dB, 20 °C to 30 °C)	< (0.3 + 0.01 x attenuator setting) dB	<0.8 dB	
Absolute Amplitude Uncertainty			
Uncertainty (fc=50 MHz, peak detector, preamplifier off, 10 dB RF attenuation, input signal=-10 dBm, 20 °C to 30 °C)	\pm 0.4 dB		
RBW Switching Uncertainty			
	10 Hz to 1 MHz, relative to 1 kHz RBW	100 Hz to 1 MHz, relative to 1 kHz RBW	
Uncertainty	<0.1 dB		
Reference Level			
Range	-100 dBm to +30 dBm, in 1 dB step		
Resolution	Log Scale: 0.01 dB; Linear Scale: 5 digits		
Level Measurement Uncertainty			
95% confidence level, S/N>20 dB, RBW=VBW=1 kHz, preamplifier off, 10 dB RF attenuation, -50 dBm<reference level<0,10 MHz<fc<2 GHz(DSA1020), 10 MHz<fc<3 GHz(DSA1030A/DSA1030A-TG/DSA1030/DSA1030-TG), 20 °C to 30 °C			
Level Measurement Uncertainty	<1.0 dB, nominal		<1.5 dB, nominal

RF Input VSWR		
10 dB RF Attenuation		
VSWR	100 kHz to 10 MHz: <1.8, nominal 10 MHz to 2.5 GHz: <1.5, nominal 2.5 GHz to 3 GHz: <1.8, nominal	100 kHz to 10 MHz: <1.8, nominal 10 MHz to 2 GHz: <1.5, nominal
Intermodulation		
Second Harmonic Intercept (SHI)	+35 dBm	
Third-order Intermodulation (TOI)	fc >30 MHz: +7 dBm	
Spurious Responses		
Image Frequency	<-60 dBc	
Intermediate Frequency	<-60 dBc	
Spurious Response	<-88 dBm, typical	<-85 dBm, typical
System-related Sideband (Referenced to local oscillators, referenced to A/D conversion, referenced to subharmonic of first LO, referenced to harmonic of first LO)	<-60 dBc	
Input Related Spurious (Mixer level: -30 dBm)	<-60 dBc, typical	
Sweep		
Sweep		
Sweep Time Range	100 Hz ≤ Span ≤ 3 GHz: 10 ms to 3000 s Span=0 Hz: 20 μs to 3000 s	100 Hz ≤ Span ≤ 2 GHz: 10 ms to 2000 s Span=0 Hz: 20 μs to 2000 s
Sweep Time Uncertainty	Non-zero Span (100 Hz ≤ Span ≤ 3 GHz): 5%, nominal Zero Span (1 ms to 3000 s): 5%, nominal	Non-zero Span (100 Hz ≤ Span ≤ 2 GHz): 5%, nominal Zero Span (1 ms to 2000 s): 5%, nominal
Sweep Mode	Continuous, single	
Trigger Functions		
Trigger		
Trigger Source	Free Run, Video, External	
External Trigger Level	5 V TTL level, nominal	
Tracking (for DSA1030A-TG and DSA1030-TG)		
TG Output		
Frequency Range	10 MHz to 3 GHz , 9 kHz settable	
Output Level	-20 dBm to 0 dBm, in 1 dB steps	
Output Flatness (10 MHz to 3 GHz, referenced to 50 MHz)	±3 dB	
Inputs/Outputs		
RF Input		
Impedance	50 Ω, nominal	
Connector	N female	
TG Out		
Impedance	50 Ω, nominal	
Connector	N female	
Probe Power		
Voltage/Current	+15 V, <10% at 150 mA -12.6 V, <10% at 150 mA	
10 MHz REF In / 10 MHz REF Out / External Trigger In		
Connector	BNC female	
10 MHz REF Amplitude	0 dBm to 10 dBm	
Trigger Voltage	5 V TTL level, nominal	
USB		
USB Host		
Connector	A Plug	
Protocol	Version 2.0	
USB Device		
Connector	B Plug	
Protocol	Version 2.0	
VGA		
Connector	VGA compatible, 15-pin mini D-SUB	

Resolution	800 * 600 @ 60Hz
General Specifications	
Display	
Type	TFT LCD
Resolution	800 * 480
Size	8.5"
Colors	65536
Printer Supported	
Protocol	PictBridge
Remote Control	
USB	USB TMC
LAN	10/100 Base , RJ-45
IEC/IEEE Bus (GPIB) (with opt. USB-GPIB)	IEEE 488.2
Mass Memory	
Mass Memory	Flash Disk (internal), USB Disk (not supplied)
Data Storage Space	1G Bytes
Power Supply	
Input Voltage Range, AC	100 V to 240 V, nominal
AC Supply Frequency	45 Hz to 440 Hz
Power Consumption	Typical 35 W, Max 60 W with all options.
Operation Time at DC Power Supply	About 3 hours, nominal
Temperature	
Operating temperature range	5 °C to 40 °C
Storage temperature range	-20 °C to 70 °C
Dimensions	
Dimensions (W x H x D)	399 mm x 223 mm x 159 mm (15.7 inches x 8.78 inches x 6.26 inches), approximate
Weight	
Weight	Without battery pack: 6.2 kg (13.7 lbs), approximate; With battery pack: 7.4 kg (16.3 lbs) , approximate

► Options and Accessories



Advanced Measurement Kit
(DSA1000-AMK)



Rack Mount Kit
(DSA1000-RMSA)



Lithium Battery Set
(China Only)



Soft Carrying
Bag(DSA1000-SCBA)



VSWR Bridge
(VB1020/VB1040)



USB to GPIB Converter
(USB-GPIB)



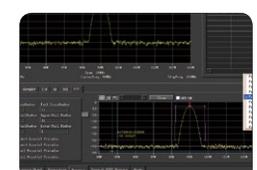
Desk Mount Instrument Arm
(ARM)



RF Demo Kit
(TX1000)



DSA Accessories
(DSA Utility Kit)



DSA PC Software
(Ultra Spectrum)

► Ordering Information

	Description	Order Number
Model	Spectrum Analyzer, 9 kHz to 3 GHz, with preamplifier)	DSA1030A
	Spectrum Analyzer, 9 kHz to 3 GHz, with preamplifier,with track generator,factory installed.	DSA1030A-TG
	Spectrum Analyzer, 9 kHz to 2 GHz	DSA1020
	Spectrum Analyzer, 9 kHz to 3 GHz	DSA1030
	Spectrum Analyzer, 9 kHz to 3 GHz, with track generator, factory installed.	DSA1030-TG
Standard Accessories	Front Panel Cover	FPCS-DSA1000
	Quick Guide (Hard Copy)	-
	CDROM (User Guide, Programming Guide)	-
	USB Cable	CB-USBA-USBB-FF-150
	Power Cable	-
Options	DSA PC Software	Ultra Spectrum
	Preamplifier (not applied for DSA1020)	PA-DSA1030
	Advanced Measurement Kit (for DSA1030 , DSA1030-TG)	AMK-DSA1000
	VSWR Bridge (2GHz)	VB1020
	VSWR Bridge (4GHz)	VB1040
	USB to GPIB Interface Converter for Instrument	USB-GPIB
	11.1 V, 147 Wh Li-ion Battery Pack (only China)	BAT
	RF Demo Kit(Transmitter)	TX1000
Optional Accessories	DSA Accessories Package	DSA Utility Kit
	Rack Mount Kit	RM-DSA1000
	Front Panel Cover	FPCS-DSA1000
	Soft Carrying Bag	BAG-DSA1000
	Desk Mount Instrument Arm	ARM

Warranty

Three –year warranty, excluding accessories.

Headquarter

RIGOL TECHNOLOGIES, INC.
No.156,Cai He Village,
Sha He Town,
Chang Ping District, Beijing,
102206 P.R.China
Tel:+86-10-80706688
Fax:+86-10-80705070
Email: info@rigol.com

USA

RIGOL TECHNOLOGIES , USA
INC.
7401 First Place, Suite N
Oakwood Village
OH 44146, USA
Toll free: 877-4-RIGOL-1 ×111
Tel: 440-232-4488 ×111
Fax: 440-232-4499
Email: beyondmeasure@
rigoltech.com

Europe

RIGOL TECHNOLOGIES EU,
GmbH
Lindbergh str. 4
82178 Puchheim, Germany
Tel: +49(0)89-8941895-0
Email: info-europe@
rigoltech.com



RIGOL® is the registered trademark of RIGOL Technologies, Inc. Product information in this document subject to update without notice. For the latest information about RIGOL's products, applications and services, please contact local RIGOL office or access RIGOL official website: www.rigol.com

July, 2013