RIGOL
Beyond Measure

2012 No.2

DSA1000 series Spectrum Analyzer

- All-Digital IF Technology
- 9 kHz - 2 or 3 GHz Frequency Range
- Up to -138dBm Displayed Average Noise Level (DANL)
- -80dBc/Hz @ 10kHz Oset Phase Noise
- < 1.5dB Total Amplitude Accuracy
- 100Hz Minimum Resolution Bandwidth (RBW)
- 3GHz Tracking Generator (DSA1030-TG)
- Optional Advanced Measurement functions
- Complete Connectivity: LAN,USB host,USB device,VGA ,GPIB (option)
- Battery Option
- 8.5 Inch WVGA (800x480) Display
- Compact Size,Light weight design

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.

RIGOL TECHNOLOGIES, INC.

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

The LCD display is an 8.5 inch widescreen with 800 x 480 high resolution and fine spectral lines for displaying large data sets (601 display points in normal and 751 points in full screen mode)

Special menu design keeps many of the operation menus in the same interface without paging

Clear keyboard division and button layout bring better usability to the instrument

One-key for saving results

common shortcut key design including L-Peak and R-Peak enhance your working efficiency

designed with broad uses in mind, the knob gives users more freedom with parameter modification and cursor positioning

Incomparable Value

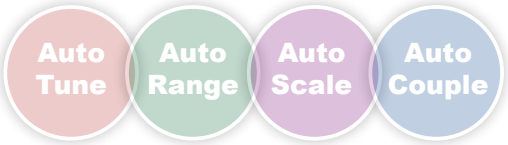
With the Series DSA1000 get a high quality spectrum analyzer without the price tag. This lowers the investment whether you are in stages related to research and development or manufacturing and maintenance. Don't let instrumentation costs dictate resource allocation. With our available calibration and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

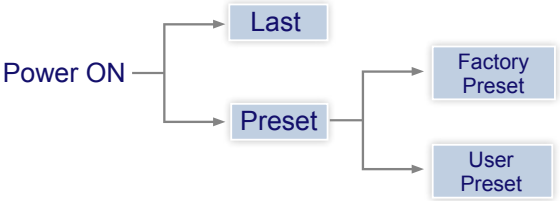
Breadth of measurement functions and automatic settings provide ultimate flexibility

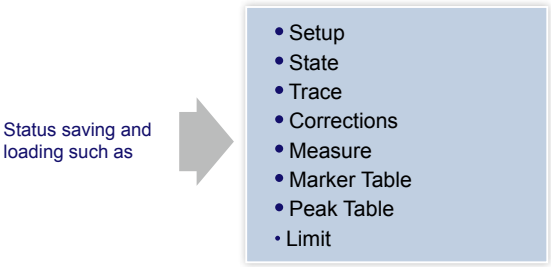
DSA1000 provides a series of automatic setting functions such as Auto Tune, Auto Range, Auto Scale and Auto Couple that enable the analyzer to acquire signals and match parameters automatically, instead of the manual process used by a traditional analyzer. In addition, the User and Factory settings under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

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 100 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.

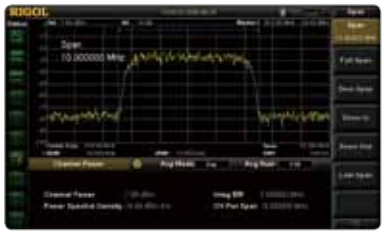


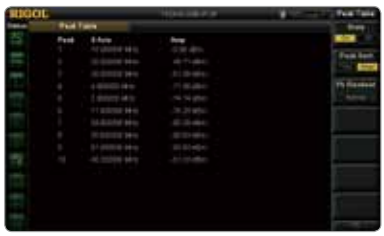


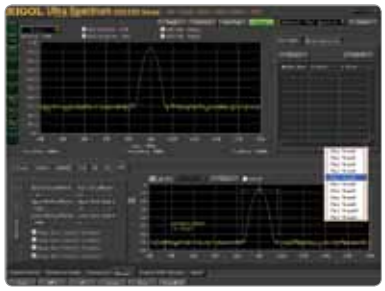


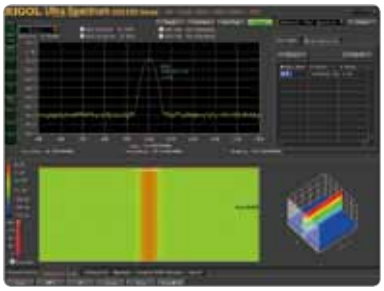
Breadth of measurement functions enhance value:

The Advanced Measurement Kit (DSA1000-AMK) for DSA1030 provides many advanced measurement functions, including Time domain Power, Channel Power, Adjacent-channel Power, Occupied Bandwidth, Carrier to Noise Ratio, Harmonic Distortion, Intermodulation Distortion, Pass/Fail, Frequency Count, N dB, Noise Marker and so on, to meet the requirements of a broad set of user's measurements. In addition, the DSA PC Software(Ultra Spectrum) could provide more analysis and diaplay functions such as the waterfall curves to expand the measurement capabilities to even more applications.









Flexible connectivity

With the available interfaces for the Series DSA1000, remote control is easy through USB, LAN, or GPIB. Integrate a test system quickly with standard SCPI commands.

USB host	USB host is available to use a USB flash device to save the instrument settings and history data as well as for firmware updates
USB device	USB device is available for printing with a PictBridge printer, or to connect as a TMC instrument
LAN	LXI-C is standard and support for VISA control over ethernet is included
GPIB	Add a GPIB port with a USB-GPIB module (optional)
VGA	Connection for extending screen to an external monitor is provided for demonstrations and training

Compact and rugged design

The compact and rugged design makes the Series DSA1000 ideal for many portable and field applications. Spot tests are easier than ever with a small, light weight analyzer, easy carry system, and extra storage space (nonvolatile memory) onboard as well as the ability to store data directly to a USB flask device.

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.

Frequency

Frequency		
Frequency Range	DSA1020	9 kHz to 2 GHz
	DSA1030	9 kHz to 3 GHz
Frequency Resolution		1 Hz
Internal Frequency Reference		
Reference Frequency		10 MHz
Aging Rate		<3 ppm/year
Temperature Drift	20℃ to 30℃	<3 ppm
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	DSA1020	0 Hz, 100 Hz to 2 GHz
Uncertainty	DSA1030	0 Hz, 100 Hz to 3 GHz
		±span / (sweep points-1)
SSB phase noise		
Carrier Offset	10 kHz	<-80 dBc/Hz

Note: typical fc = 500 MHz, RBW≤1 kHz, sample detector, and trace average≥50.

Bandwidths		
Resolution Bandwidth (-3 dB)		100 Hz to 1 MHz, in 1-3-10 sequence
RBW Uncertainty		< 5%, nominal
Resolution Filter Shape Factor (60 dB: 3 dB)		< 5, nominal
Video Bandwidth (-3 dB)		1 Hz to 3 MHz, in 1-3-10 sequence

Amplitude

Measurement Range (DSA1030)		
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
Measurement Range (DSA1020)		
Range	10 MHz to 2 GHz	DANL to +30 dBm
	1 MHz to 10 MHz	DANL to +21 dBm
	9 kHz to 1 MHz	DANL to +17 dBm
Maximum rated input level		
DC Voltage		50 V
CW RF Power	RF attenuation ≥ 20 dB	30 dBm (1W)
Max. Damage Level		40 dBm (10W)

Note: when input level >33 dBm, the protection switch will be on.

1dB Gain Compression		
Total power at Input Mixer	fc ≥ 50 MHz, preamplifier off	>0 dBm

Note:Mixer power level(dBm) = imput power(dBm) – input attenuation(dB).

Displayed Average Noise Level (DSA1020)		
0 dB RF Attenuation, RBW=100 Hz, VBW=10 Hz, Sample Detector, Trace Average ≥ 50, Input Impedance=50 Ω.		
DANL	100 kHz to 10 MHz	<-75 dBm-3 × (f/1 MHz) dB, typ. -115 dBm
	10 MHz to 2 GHz	<-117 dBm+3 × (f/1 GHz) dB, typ. -120 dBm

Displayed Average Noise Level (DSA1030, DSA1030-TG)		
0 dB RF Attenuation, RBW=100Hz, VBW=10Hz, Sample Detector, Trace Average ≥ 50, Input Impedance=50 Ω, Tracking Generator Off.		
DANL (Preamplifier Off)	100 kHz to 10 MHz	<-75 dBm-3 × (f/1 MHz) dB, typ. -115 dBm
	10 MHz to 2.5 GHz	<-117 dBm+3 × (f/1 GHz) dB, typ. -120 dBm
	2.5 GHz to 3 GHz	<-105 dBm
DANL (Preamplifier On)	100 kHz to 1 MHz	<-93 dBm
	1 MHz to 10 MHz	<-93 dBm-3 × (f/1 MHz) dB, typ. -133 dBm
	10 MHz to 2.5 GHz	<-135 dBm+3 × (f/1 GHz) dB, typ. -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
Trace Functions		Clear Write, Max Hold, Min Hold, Average, Freeze, Blank
Scale Units		dBm, dBmV, dBμV, V, W
Frequency Response (DSA1020)		
10 dB RF attenuation, relative to 50 MHz, 20℃ to 30℃		
Frequency Response	100 kHz to 2 GHz	<1.0 dB
Frequency Response (DSA1030)		
10 dB RF attenuation, relative to 50 MHz, 20℃ to 30℃		
Frequency Response (Peamplifier Off)	100 kHz to 3 GHz	<1.0 dB
Frequency Response (Peamplifier On)	1 MHz to 3 GHz	<1.4 dB
Input Attenuation Switching Uncertainty		
Setting Range		0 to 50 dB, in 1 dB step
Switching Uncertainty	fc=50 MHz, relative to 10dB, 20℃ to 30℃	< 0.8 dB
Absolute Amplitude Uncertainty		
Uncertainty	fc=50 MHz, peak detector, preamplifier off, 10 dB RF attenuation, input signal=-10 dBm, 20℃ to 30℃	±0.4 dB
RBW Switching Uncertainty		
Uncertainty	100 Hz to 1 MHz, relative to 1 kHz RBW	<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		
Overall Amplitude Measurement Uncertainty	95% confidence level, S/N>20 dB, RBW=VBW=1kHz, preamplifier off, 10 dB RF attenuation, -50 dBm<Reference level<0, 10 MHz<fc<2GHz (DSA1020) , 10 MHz<fc<3GHz (DSA1030/DSA1030-TG), 20 ºC to 30 ºC	<1.5 dB, nominal
RF Input VSWR (DSA1020)		
10 dB RF attenuation		
VSWR	100 kHz to 10 MHz	<1.8, nominal
	10 MHz to 2 GHz	<1.5, nominal
RF Input VSWR (DSA1030)		
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
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		<-85 dBm, typical
System-related	Referenced to local oscillators,	<-60 dBc
Sideband	referenced to A/D conversion,	
	referenced to subharmonic of first LO,	
	referenced to harmonic of first LO	
Input Related Spurious	Mixer level: -30 dBm	<-60 dBc, typical

Sweep

Sweep (DSA1020)		
Sweep Time Range	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 ≤ 2 GHz)	5%, nominal
	Zero span (1 ms to 2000 s)	5%, nominal
Sweep Mode		Continuous, single
Sweep (DSA1030)		
Sweep Time Range	100 Hz ≤ Span ≤ 3 GHz	10 ms to 3000 s
	Span = 0 Hz	20 μs to 3000 s
Sweep Time Uncertainty	Non-zero span (100 Hz ≤ Span ≤ 3 GHz)	5%, nominal
	Zero span (1 ms to 3000 s)	5%, nominal
Sweep Mode		Continuous, single

Trigger Functions

Trigger Source		Free run, Video, Extemal
External Trigger Level		5V TTL level, nominal

Tracking Generator (for DSA1030-TG)

TG Output		
Frequency Range		9 kHz to 3 GHz
Output Level		-20 dBm to 0 dBm, in 1 dB steps
Output Flatness	10 MHz to 3 GHz,	±3 dB
	referenced to 50 MHz	

Inputs and Outputs

RF Input		
Impedance		50 Ω, nominal
Connector		N-type, female
TG out		
Impedance		50 Ω, nominal
Connector		N-type, female

Probe Power		
Voltage/Current		+15 V, <10% at 150 mA
		-12.6 V, <10% at 150 mA

10MHz REF In / 10MHz REF Out / External Trigger In		
Connector		BNC female
10MHz REF Amplitude		0dBm to 10dBm
Trigger Voltage		5V TTL level, nominal
USB		
	USB Host	
Connector		B plug
Protocol		Version2.0
	USB Device	
Connector		A plug
Protocol		Version2.0

VGA		
Connector		VGA compatible, 15-pin mini D-SUB
Resolution		800×600, 60 Hz

General Specifications

Display		
Type		TFT LCD
Resolution		800×480
Size		8.5”
Colors		65536
Printer Supported		
Protocol		PictBridge
Remote Control		
USB		USB TMC
LAN Interface		10/100 Base-T, RJ-45
IEC/IEEE bus (GPIB)	with opt. USB-GPIB	IEEE488.2
Mass Memory		
Mass Memory		Flash disk (internal),
		USB Disk (not supplied)
Data Storage Space	Flash disk (internal)	1 G Bytes
Power Supply		
Input Voltage Range, AC		100 V to 240 V, norminal
AC supply frequency		45 Hz to 440 Hz
Power Consumption		Typ. 35 W,Max 60 W with all options.
Operation Time at DC Power Supply		About 3 hours, nominal

Temperature		
Operating temperature range		5 ℃ to 40 ℃
Storage temperature range		-20 ℃ to70 ℃
Dimensions		
	(W × H × D)	399 mm × 223 mm × 159 mm
		(15.7 inches× 8.78 inches × 6.26 inches), approximate
Weight		
	Without battery pack	6.2 kg (13.7 lbs), approximate
	With battery pack	7.4 kg (16.3 lbs), approximate

Options and Accessories

Tracking Generator(DSA1030-TG)


Advanced Measurement Kit(DSA1000-AMK)


Rack Mount Kit (DSA1000-RMSA)


Front Panel Cover

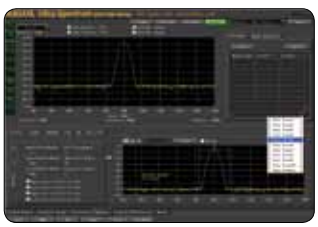

Soft Carring Bag(DSA1000-SCBA)


USB to GPIB Converter(USB-GPIB)

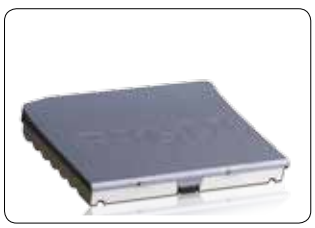

Desk Mount Instrument Arm(ARM)

RF Demo Kit(TX1000)


DSA Accessories(DSA Utility Kit)


DSA PC Software(Ultra Spectrum)


VSWR Bridge(VB1020/VB1030)


Lithium Battery Set (BAT)

► DSA Utility Kit include:

Name	Qty	Description
N-SMA Adapter	1	Female N Connector to Female SMA Connector
75Ω-50Ω Adapter	1	Used to connect the measured system and the spectrum analyzer
		when the output impedance of the measured system is 75Ω.
BNC-BNC Cable	1	Black coaxial cable one of whose terminals is female BNC connector
		and the other is male BNC connector.
N-BNC Adapter	1	Male N Connector to Female BNC Connector
N-SMA Cable	1	One of its terminals is female N connector and the other is male SMA connector
Antenna	2	Frequency: 900 MHz /1.8 GHz.
Antenna	2	Frequency: 2.4GHz.

► Ordering Information

	Description	Order Number
Model	Spectrum Analyzer, 9 kHz to 2 GHz	DSA1020
	Spectrum Analyzer, 9 kHz to 3 GHz	DSA1030
	Spectrum Analyzer, 9 kHz to 3 GHz, with Preamplifier & Tracking Generator(Factory Installed)	DSA1030-TG
Standard Accessories	Front Panel Cover	
	Quick Guide (Hard Copy)	
	CDROM (User Guide, Programming Guide)	
	USB Cable	
	Power Cable	
Options	DSA PC Software	Ultra Spectrum
	Preamplifier (for DSA1030 and DSA1030-TG)	DSA1030-PA
	Advanced Measurement Kit (for DSA1030 and DSA1030-TG)	DSA1000-AMK
	VSWR Bridge（2GHz）	VB1020
	VSWR Bridge（3GHz）	VB1030
	11.1 V, 147 Wh Lithium Battery Set	BAT
	RF Demo Kit (Transmitter)	TX1000
	DSA Accessories Package	DSA Utility Kit
	USB to GPIB Interface Converter for Instrument	USB-GPIB
Optional Accessories	Rack Mount Kit	DSA1000-RMSA
	Front Panel Cover	DSA1000-FPCS
	Soft Carrying Bag	DSA1000-SCBA
	Desk Mount Instrument Arm	ARM
Orderable Manuals (Hard Copy)	Quick Guide, Chinese	QGD020
	Quick Guide, English	QGD021
	User Guide, Chinese	UGD020
	User Guide, English	UGD021
	Programming, Chinese	PGD020
	Programming, English	PGD021

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July,2012