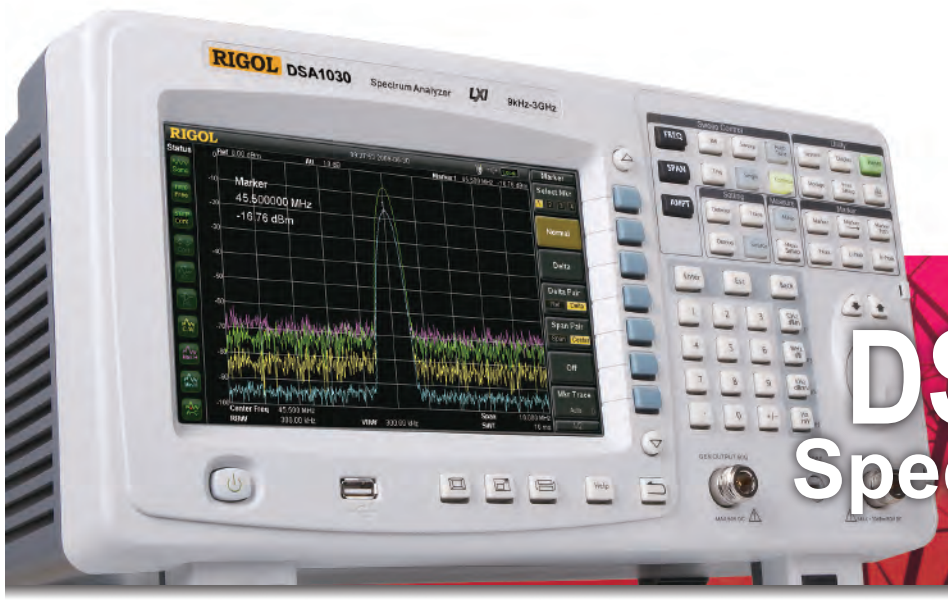
RIGOL
Beyond Measure

2010




# DSA1000 series Spectrum Analyzer

- 9 kHz to 2 GHz or 3 GHz Frequency Range
- -138 dBm Displayed Average Noise Level
- -80 dBc/Hz @10 kHz offset Phase Noise
- Total Amplitude Uncertainty <1.5 dB
- 100 Hz Minimum Resolution Bandwidth (RBW)
- 3 GHz Tracking Generator (DSA1030 optional)
- Built-in lithium battery that can provide 3 hours continuous operation (optional)
- Advanced measurement functions (DSA1030 optional) and automatic settings provide ultimate flexibility
- 8.5 inch widescreen display with clear, vivid, and easy to use graphical interface
- Various interface options such as LAN\USB Host, USB Device, VGA or GPIB (optional)
- Compact design with a weight of only 13.7 lbs (without battery)

DSA1000 series is a compact and light spectrum analyzer with premium performance for portable applications. Our use of digital IF technologly guarantees 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 761 points in full screen mode)

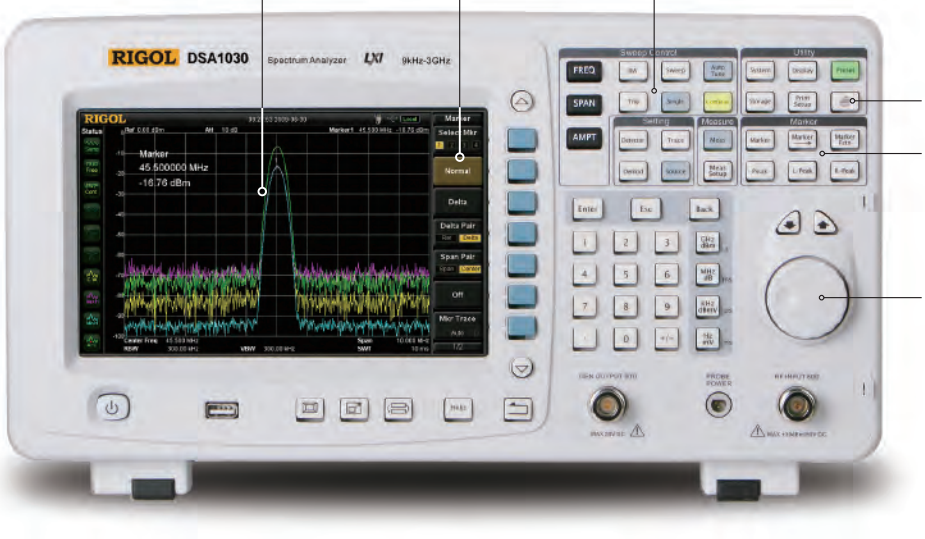
Special menu design keeps many of the operation menus in the same interface without paging

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

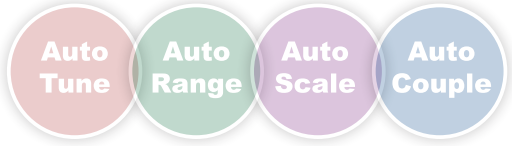



## Incomparable Value

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.

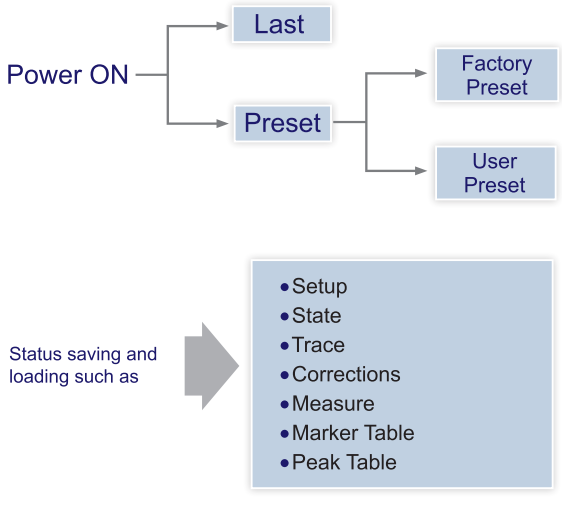
## Breadth of measurement functions and automatic settings provide ultimate flexibility

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.



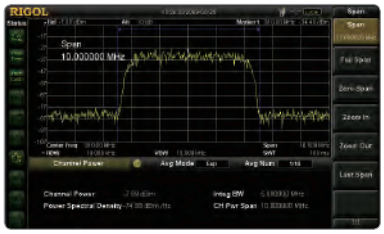

## Benefits of Rigol's all digital IF design

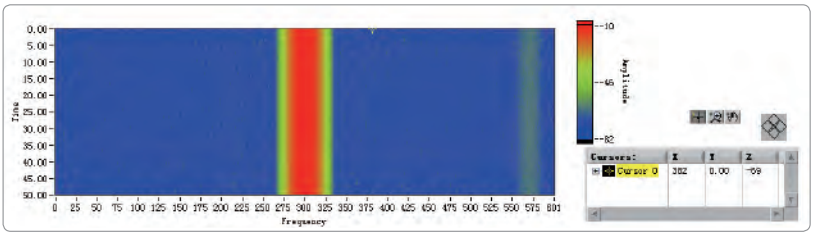
1. The ability to measure smaller signals: on the basis of this technology, the IF filter enables smaller bandwidth settings, which greatly reduce the displayed average noise level.
2. The ability to distinguish between small signals by frequency: using the IF filter with the smallest bandwidth setting 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.

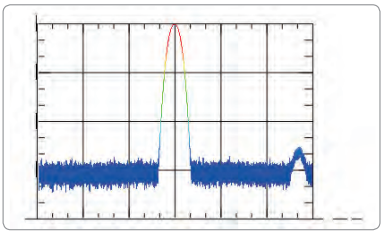


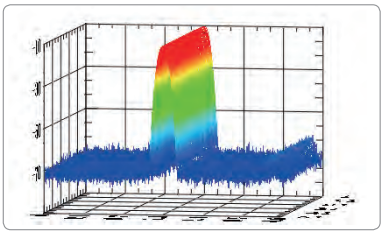
## Breadth of measurement functions enhance value:

The advanced measurement kit for DSA1030 has many measurement functions, including Time domain Power, Channel Power, Adjacent-channel Power, Occupied Bandwidth, Carrier to Noise Ratio, Harmonic Distortion, Intermodulation Distortion, Frequency Count, N dB, Noise Marker and so on, to meet the requirements of a broad set of user's measurements. In addition the software displays 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.

## 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 (13.7 lbs plus the battery) analyzer with 3 hour battery operation, easy carry system, and extra storage space (nonvolatile memory) onboard as well as the ability to store data directly to a USB flask device.


| | |
|---|---|
| **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 |

# Specifications

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

## 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 |
| 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 typ. |

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

| | | |
|---|---|---|
| Bandwidths | | |
| Resolution Bandwidth (-3 dB) | | 10 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 | | |
| Range | | DANL to +30 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) | | |
| 0dB RF attenuation, RBW=100Hz, VBW=10Hz, sample detector, trace average ≥ 50 | | |
| 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) | | |
| 0dB RF attenuation, RBW=100Hz, VBW=10Hz, sample detector, trace average ≥ 50 | | |
| DANL (Peamplifier 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 (Peamplifier 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, View, Blank |
| Scale Units | | dBm, dBmV, dBμV, nV, μV, mV, V, nW, μW, mW, 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 | 4 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), 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 |
| | 10 MHz to 2.5 GHz | <1.5 |
| RF Input VSWR (DSA1030) | | |
| 10 dB RF attenuation | | |
| VSWR | 100 kHz to 10 MHz | <1.8 |
| | 10 MHz to 2.5 GHz | <1.5 |
| | 2.5 GHz to 3 GHz | <1.8 |
| 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, Inherent | | <-85 dBm, typ. |
| Spurious Response, Others | 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, typ. |

## 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 | 100 Hz ≤ Span ≤ 2 GHz | 5%, nominal |
| | Span = 0 Hz | 0.5%, 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 | 100 Hz ≤ Span ≤ 3 GHz | 5%, nominal |
| | Span = 0 Hz | 0.5%, nominal |
| Sweep Mode | | Continuous, single |

## Trigger Functions

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

## Tracking Generator (Option for DSA1030)

| | | |
|---|---|---|
| TG Output | | |
| Frequency Range | | 9 kHz to 3 GHzr |
| 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 and Outputs

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

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

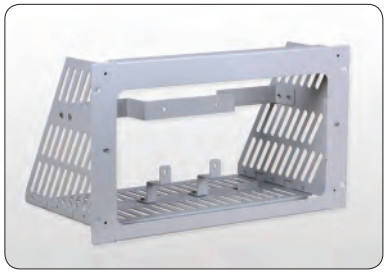
| | | |
|---|---|---|
| 10MHz REF In / 10MHz REF Out / External Trigger In | | |
| Connector | | BNC female |
| 10MHz REF Amplitude | | 0dBm to 10dBm |
| Trigger Voltage | | 5V TTL level |
| USB | | |
| | USB Host | |
| Connector | | B plug |
| Protocol | | Version2.0 |
| | USB Device | |
| Connector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

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

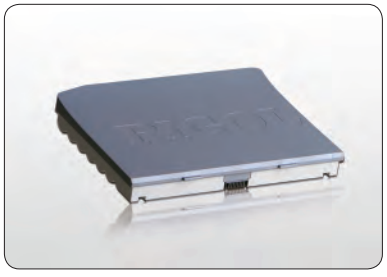
## General Specifications

| | | |
|---|---|---|
| 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 |
| Input Voltage Range, DC | | 10 V to 18 V, norminal |
| Power Consumption | | Typ. 35 W,Max 60 W with all options. |
| Operation Time at DC Power Supply | | About 3 hours |
| 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) |
| Weight | | |
| | Without battery pack | 6.2 kg (13.7 lbs) |
| | With battery pack | 7.4 kg (16.3 lbs) |

## Options and Accessories



Rack Mount Kit (DSA1000-RMSA)



Battery option(BAT)

Soft Carring Bag(DSA1000-SCBA)

USB to GPIB Converter(USB-GPIB)

Desk Mount Instrument Arm(ARM)

## Ordering Information

| | Description | Order Number |
|---|---|---|
| Model | Spectrum Analyzer, 9 kHz to 2 GHz | DSA1020 |
| Standard Accessories | Spectrum Analyzer, 9 kHz to 3 GHz | DSA1030 |
| | Front Panel Cover | |
| | Quick Guide (Hard Copy) | |
| | CDROM (User Guide, Programming Guide) | |
| | USB Cable | |
| Options | Power Cable | |
| | 3 GHz Tracking Generator (for DSA1030) | DSA1030-TG3 |
| | Preamplifier (for DSA1030) | DSA1030-PA |
| | Advanced Measurement Kit (for DSA1030) | DSA1000-AMK |
| Optional Accessories | Rack Mount Kit | DSA1000-RMSA |
| | Front Panel Cover | DSA1000-FPCS |
| | Soft Carrying Bag | DSA1000-SCBA |
| Orderable Manuals (Hard Copy) | USB to GPIB Interface Converter for Instrument | USB-GPIB |
| | 11.1 V, 147 Wh Li-ion Battery Pack | BAT |
| | Desk Mount Instrument Arm | ARM |
| | 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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