



# DSG800 Series RF Signal Generator

—New Generator, New Standard



DSG800 Series  
RF Signal Generator

# DSG800 product overview

The DSG800 establishes a new standard in economical RF signal generators. Combined with the RIGOL DSA800 economical spectrum analyzer, the product pair provides a powerful solution for RF test and measurement applications.



DSG800



DSA800

The DSG800 offers outstanding performance at an affordable price point. There are two models available that cover output frequencies from 9kHz to 1.5GHz or 9kHz to 3GHz. Maximum output power is +20 dBm (typical). Phase noise reaches -105 dBc/Hz (typical). The DSG800 also provides frequency and level sweep functions, AM/FM/ØM analog modulations as well as powerful pulse modulation function. With all of these features, the DSG800 is an excellent source for high quality signals (including RF, LF, sweep, pulse and a variety of analog modulated signals), and for use as a stable reference.

Compared with similar products, the DSG800 occupies the very little workbench space and is light in weight. Due to its outstanding portability, it is the perfect choice for various fields such as education laboratories, industrial production lines, as well as research and development labs.

- Frequency range from 9 kHz to 1.5 GHz or 3 GHz
- Up to +20 dBm (typical) maximum output power
- Special digital ALC circuit ensuring its stability and reliability
- Complete AM/FM/ØM analog modulation functions
- Powerful pulse modulation function; provides optional pulse train generator
- Portable; Weight is approx. 4.2 kg and the dimensions (W × H × D) are only 261.5 mm × 112 mm × 318.4 mm

An ideal match: The combination of the DSG800 RF signal generator and DSA800 spectrum analyzer can provide complete and thoroughly reliable solutions for RF test and measurement applications.



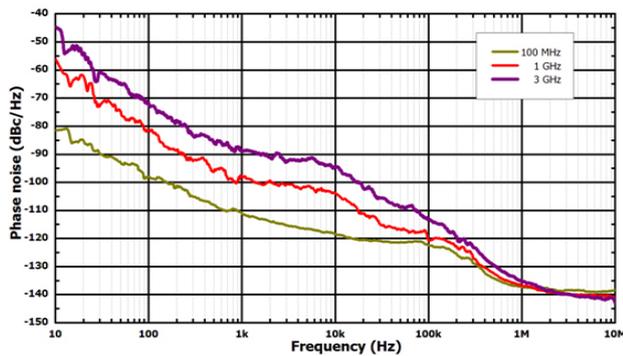
# Highly cost-effective economical RF signal generator

The DSG800 has superior performance and maximum value. Its core specifications (such as signal purity, maximum output power, and amplitude accuracy) deliver fantastic performance in an economical RF signal generator.

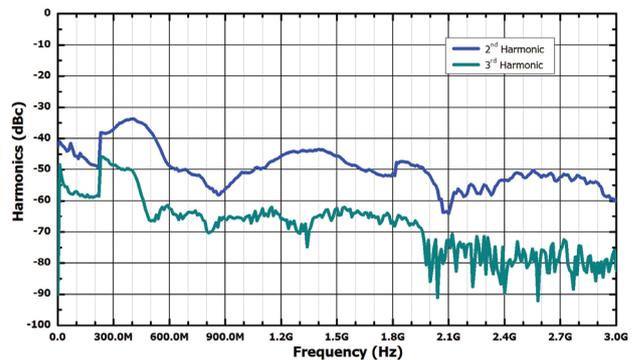
- Up to -105 dBc/Hz (typical) phase noise
- Up to +20 dBm (typical) maximum output power
- High amplitude accuracy, up to 0.5 dB (typical)
- Superb signal stability

RF signal generators are mainly used as an excitation sources for systems and components where harmonics, phase noise, and residual FM can affect the final testing results. Due to its low SSB phase noise and minimized harmonics, the DSG800 can output high purity signals with performance that exceeds the requirements of most conventional tests.

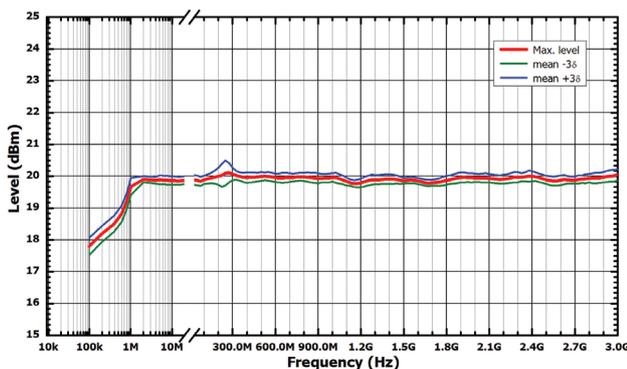
Measured SSB phase noise



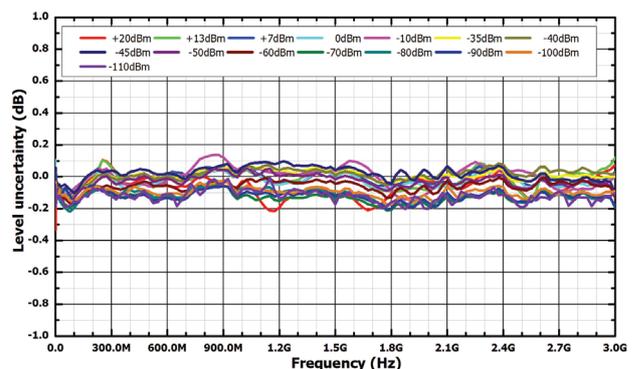
Measured at 0 dBm, harmonics vs. frequency



Measured maximum level vs. frequency



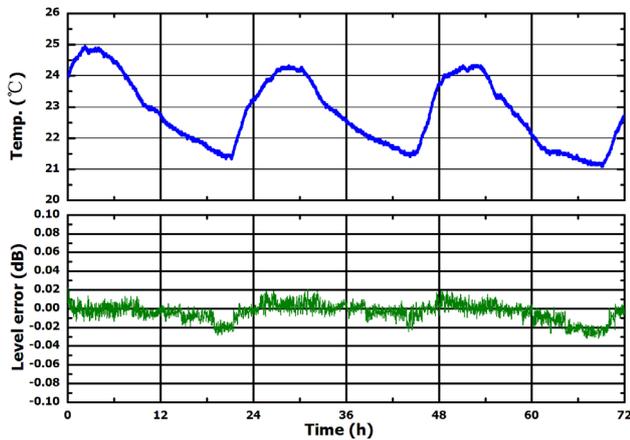
Level uncertainty vs. frequency



Output power with accuracy is another excellent performance feature of the DSG800. With a maximum output power of + 20 dBm (typical) and an amplitude accuracy of 0.5dB (typical), the DSG800 is perfect for

distortion tests of components (such as amplifiers and mixers) and systems. The DSG800 provides maximum power output ability in a small form factor without sacrificing accuracy.

### Measured level repeatability @ 1 GHz, 0 dBm



When the RF signal generator is used as a reference source, we often pay more attention to the amplitude stability and frequency stability of the output signal. Amplitude stability is mainly determined by the internal ALC (Automatic Level Control) circuit of the RF signal generator. The ALC circuit is used to compensate for the amplitude deviation that may result from temperature changes. The DSG800 features a specially designed digital ALC scheme that ensures high precision and stability of the output signal. Frequency stability is mainly determined by the internal reference clock stability. The frequency stability of the DSG800 can reach 5 ppb by installing high stable reference clock option OCXO-B08. The high stability reference clock can also output a signal used as the frequency benchmark of the entire test system so as to enhance the overall level of frequency stability.

## All of the functions of a high-level RF signal generator at a fraction of the cost

The DSG800 provides conventional sweep and analog modulation functions as well as a pulse train generation function normally reserved for high-level signal sources.

- Flexible frequency and amplitude sweep functions
- Complete AM/FM/ØM analog modulation functions
- Standard LF output function
- Powerful pulse modulation function
- System flatness calibration function
- Simple and easy to operate

### Flexible frequency and amplitude sweep functions

The DSG800 supports frequency and amplitude sweeping with step, list, logarithmic, and linear functions as well as continuous and single sweep modes. The RF signal generator can be configured to perform step sweeps for amplitude and frequency characterization of RF components. It can also sweep according to a user definable sweep list.

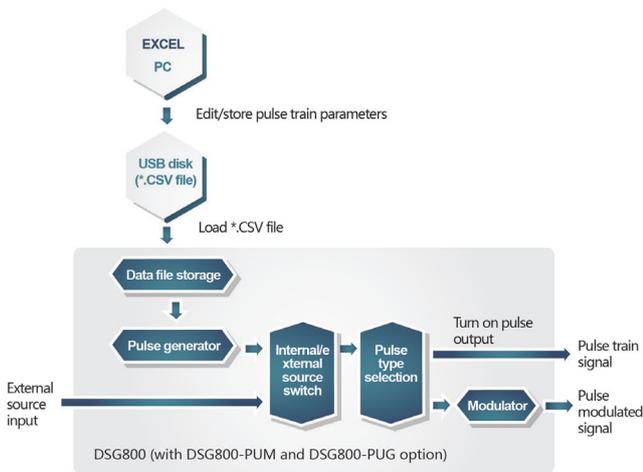


## Complete AM/FM/ØM analog modulation functions

The DSG800 comes fully equipped, even in its standard configuration. The AM/FM/ØM analog modulations are included and the instrument also supports internal and external modulation sources. The optional input impedance of the external modulation can match the impedance change of an external load. In addition, the external modulation supports AC and DC coupling modes to adapt to different types of modulation signals. The DSG800 can also modulate two different modulation sources (internal or external source) at the same time. Thus, it can produce a hybrid modulated signal similar to FM + AM.

## Standard LF output function

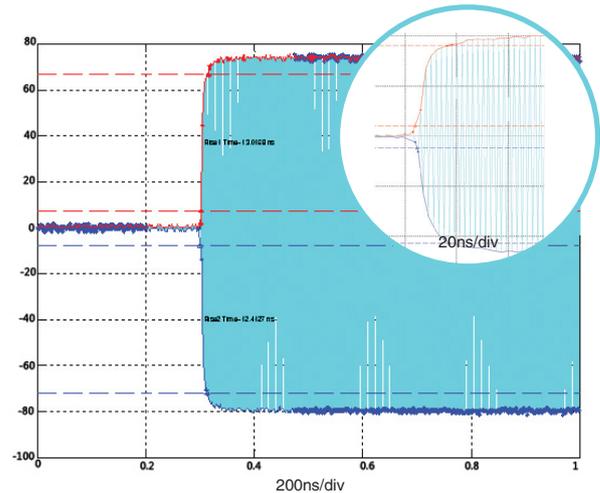
The DSG800 can output the LF signal (such as DC, sine and square waveforms) via the LF connector for a variety of simulation testing environments. The LF signal and the internal modulating signal are independent of each other. Both the RF and LF signal sources can be enabled at the same time.



## Powerful pulse modulation function

The DSG800 not only supports external pulse modulation, but also features an internal pulse generator which can produce baseband signals with adjustable cycle and pulse widths. In addition, it can also load a user-defined pulse list to generate a pulse train. The pulse train can be used as the modulating signal of pulse modulation and can also be output as an independent pulse generator.

The DSG800 can produce high quality pulse modulated signals. The rise/fall time is less than 10 ns, and the on-off ratio is greater than 70 dB.



## System flatness calibration function

The flatness calibration function can compensate for external amplitude loss caused by cables, RF switches, adapters or other devices.

The DSG800 provides a user-defined flatness correction list function. You can download and activate the function by generating a CSV format file using a spreadsheet like Microsoft Excel© on a computer. With the help of a computer, users can flexibly edit calibration points and easily adjust the amplitude calibration over the desired frequency range.

## Simple and easy to operate

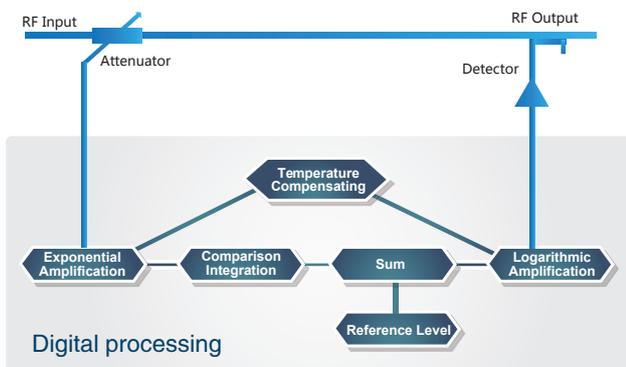
The DSG800 provides a simple and easy operating experience. The clear panel layout, simple user interface, and the informative error messages fully reflect the instruments ease-of-use. The current settings of the frequency and amplitude as well as the main switch state are displayed on the main interface of the instrument. The modulation modes and modulation source types are concentrated in the modulation window, so that all the major information is easily viewable.



## Reliability and durability come standard

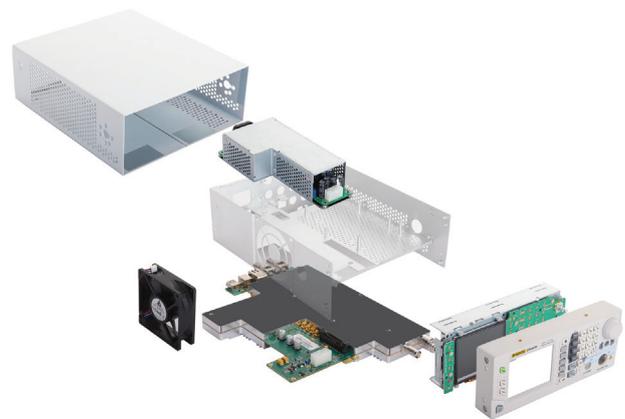
- Electronic attenuator avoids physical wear
- Specially designed protection functions
- Digital ALC circuit
- Solid design

The DSG800 is designed on the basis of a digital ALC (Automatic Level Control) circuit. Older designs utilize analog feedback circuits that were sensitive to environmental changes. The digital ALC of the DSG800 improves the accuracy of control and guarantees the stability of the output level. The replacement of many of the traditional analog circuits also decreases overall size and increases the reliability of the instrument.



Enhanced protection circuitry on the DSG800 RF output limits reverse power and DC signals that could damage the instrument. In addition, all interfaces adopt anti-static measures to minimize damage due to static discharge. The DSG800 also features a no-wear electronic attenuator. This all electronic design is superior to a mechanical attenuator because the output level will remain stable and as-set, even if an application requires frequent level switching.

The modular design of the DSG800 greatly reduces the average failure time and improves the reliability. The number of modules is small, each module is independent, and the connection is simple.



We stand behind our design and quality. The DSG800 also includes the standard RIGOL three-year warranty. If something happens, we will take care of it.

# Small in size, Big on features



- Small footprint maximizes workbench space
- Occupies less rack space
- Light weight; the handle offers comfortable grip

The dimension of DSG800 is only 261.5 mm × 112 mm × 318.4 mm (W × H × D) and the special foot pad design facilitates stacking multiple instruments which can greatly save space on the workbench. For education laboratories, development, and maintenance application fields, this kind of compact RF signal generator will be the best choice.



In addition, the DSG800 is designed with a standard height of 2U and half cabinet width which saves rack space. The rack mount kit not only provides side-by-side installation mode, but also vertical parallel installation mode which will reduce the line length and complexity in application fields (such as intermodulation distortion) that require more than one RF source.



The light weight (about 4.2 kg) and comfortable handle make transporting the source easy. Add in the instruments small size, and you have a perfect instrument for field test applications.

# New Possibilities



## Education

With complete functions, practical price, robust and reliable performance, the DSG800 is suitable for being installed in every RF laboratory workbench. Coupled with the RIGOL DSA815 Spectrum Analyzer, it can form a complete and powerful RF test bench and fully meet the teaching and lab requirements (such as high frequency circuit, communications, and electronics courses).

## Hobbyists and Makers

The DSG800 has complete functions (LF output, frequency & level sweep, AM/FM/ØM internal and external modulation and pulse modulation, etc.) that can match those of high-level RF signal generators at a price that can be afforded by individuals. Hobbyists and Makers can use the DSG800 and DSA815 to establish their own RF studio which can satisfy the various application requirements of electronic development and innovation.



## Research and development

In order to reduce the cost-of-test, most RF test and measurement equipment is installed in the laboratory for the development team to share. With the complete functions and excellent performance (high output power and high stability), the smallest workbench space, and the affordable price tag, engineers can "monopolize" a DSG800 of their own. With "one on each bench", Engineers can be free from the trouble of booking test equipment time. This allows them to start their own research and development work at any time and improve their development efficiency.

## Production line application

The DSG800 features full remote control capability for integration into Automated Test Environments (ATE). The common remote control commands are compatible with most mainstream products. It can easily replace older equipment in existing production lines so as to shorten the replacement cycle of the equipment. In addition, the DSG800 is designed to be reliable, stable over temperature, the standard height of 2U, all with low procurement and maintenance holding costs, which can expand production line. This is all backed by the standard RIGOL 3-year warranty. The DSG800 is production line worthy, without worry.



## System integration

Users can program and control the RF signal generator using instrument specific SCPI commands over USB and LAN and is LXI Core 2011 compliant. The DSG800 is portable and occupies little rack space. It can be used in radio, television, communications and other integrated test system, and EMC immunity testing system.

# Key specifications

| Frequency                                 |   |                                     |    |                   |
|---|---|-------------------------------------|----|-------------------|
| Frequency range                           | DSG815  | 9 kHz to 1.5 GHz                    |    |                   |
|   | DSG830  | 9 kHz to 3 GHz                      |    |                   |
| Setting time                              | < 10 ms (typ.)                                    |                                     |    |                   |
| Temperature stability                     | With option OCXO-B08                              | < 5 ppb                             |    |                   |
| Aging rate                                | With option OCXO-B08                              | < 30 ppb/year                       |    |                   |
| Amplitude                                 |   |                                     |    |                   |
| Maximum output level                      | 100 kHz ≤ f ≤ 3 GHz                               | +13 dBm, +20 dBm (typ.)             |    |                   |
| Level uncertainty                         | 100 kHz ≤ f ≤ 3 GHz, +13 dBm to -60 dBm           | ≤ 0.9 dB, ≤ 0.5 (typ.)              |    |                   |
|   | 100 kHz ≤ f ≤ 3 GHz, -60 dBm to -110 dBm          | ≤ 1.1 dB, ≤ 0.7 (typ.)              |    |                   |
| Setting time                              | Fixed frequency, 20°C to 30°C                     | ≤ 5 ms (typ.)                       |    |                   |
| Max. reverse power                        | Max. DC voltage                                   | 50 V                                |    |                   |
| Spectral Purity                           |   |                                     |    |                   |
| Harmonic                                  | CW mode, 1 MHz ≤ f ≤ 3 GHz, level ≤ +13 dBm       | < -30 dBc                           |    |                   |
| Non-harmonic                              | CW mode, level > -10 dBm, carrier offset > 10 kHz |                                     |    |                   |
|   | 100 kHz ≤ f ≤ 1.5 GHz                             | < -60 dBc, < -70 dBc (typ.)         |    |                   |
| SSB phase noise                           | CW mode, carrier offset = 20 kHz                  |                                     |    |                   |
|   | 100 kHz ≤ f ≤ 1.5 GHz                             | < -100 dBc/Hz, < -105 dBc/Hz (typ.) |    |                   |
| Sweep                                     |   |                                     |    |                   |
| Sweep manner                              | Frequency sweep, level sweep                      |                                     |    |                   |
| Sweep type                                | Step sweep, list sweep                            |                                     |    |                   |
| Analog Modulation                         |   |                                     |    |                   |
| Modulation type                           | AM, FM, ØM, Pulse mod.                            |                                     |    |                   |
| Modulation source                         | Internal, external                                |                                     |    |                   |
| External modulation signal coupling       | AC, DC  |                                     |    |                   |
| AM modulation depth                       | 0% to 100%  |                                     |    |                   |
| FM Max. deviation                         | 1 MHz   |                                     |    |                   |
| ØM Max. deviation                         | 5 rad   |                                     |    |                   |
| Pulse modulation rise/fall time (10%/90%) | < 50 ns, 10 ns (typ.)                             |                                     |    |                   |
| Simultaneous Modulation                   |   |                                     |    |                   |
|   | AM  | FM                                  | ØM | Pulse mod. (opt.) |
| AM  | —   | ○                                   | ○  | △                 |
| FM  | ○   | —                                   | ×  | ○                 |
| ØM  | ○   | ×                                   | —  | ○                 |
| Pulse mod. (opt.)                         | △   | ○                                   | ○  | —                 |

For more information, please refer to DSG800 Data Sheet.

# Ordering information

|                      | Description                             | Order Number |
|----------------------|---|--------------|
| Models               | RF Signal Generator, 9 kHz to 1.5 GHz   | DSG815       |
|                      | RF Signal Generator, 9 kHz to 3 GHz     | DSG830       |
| Standard Accessories | Quick Guide (Hard Copy)                 | --           |
|                      | CDROM (User's Guide, Programming Guide) | --           |
|                      | Power Cable                             | --           |
| Options              | Pulse Modulation, Pulse Generator       | DSG800-PUM   |
|                      | Pulse Train Generator <sup>[1]</sup>    | DSG800-PUG   |
|                      | High Stable Reference Clock             | OEXO-B08     |
|                      | Rack Mount Kit (For one Instrument)     | RM-1-DG1000Z |
|                      | Rack Mount Kit (For two Instruments)    | RM-2-DG1000Z |

Note: [1] The option DSG800-PUM will be installed automatically after this option is installed.



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