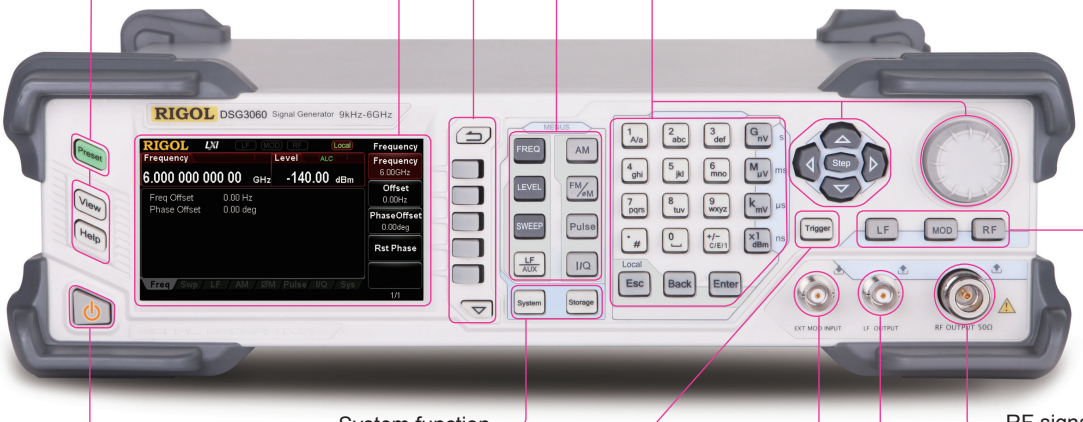
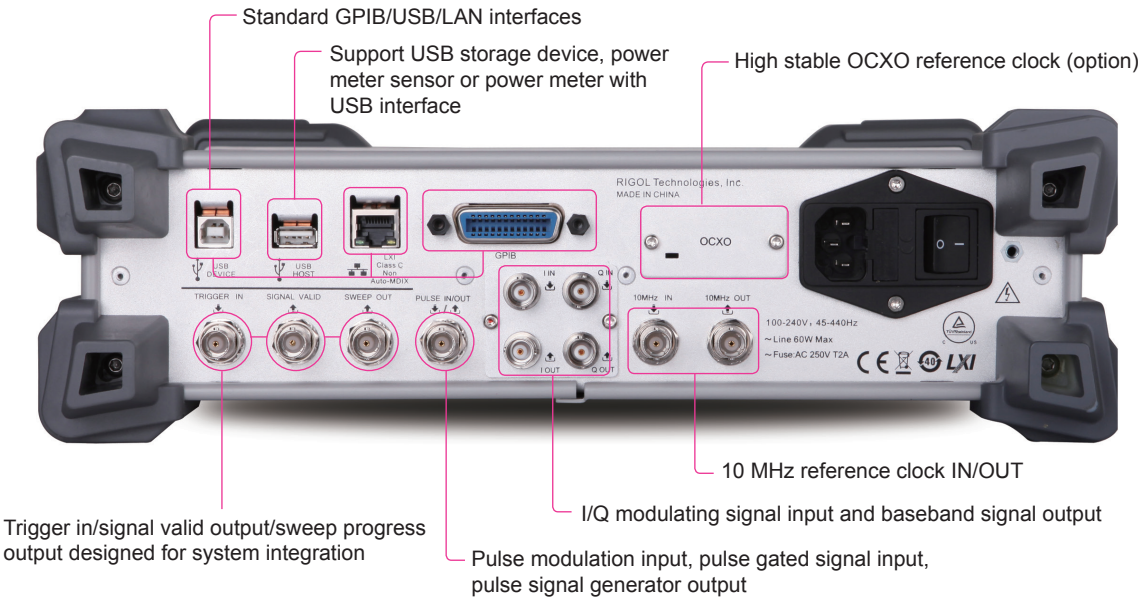
RIGOL
Innovation or nothing

DSG3000 Series
RF Signal Generator

- Highest frequency: 3GHz/6GHz
- Amplitude accuracy: <0.5dB (typical)
- Output amplitude range: -130 dBm to +13 dBm
- High signal purity, phase noise: <-110dBc/Hz@20kHz (typical)
- Standard 0.5ppm internal clock; 5ppb high stable clock for option
- Standard AM/FM/ΦM analog modulation
- Standard pulse modulation; on/off ratio up to 80dB; pulse train generator for option
- I/Q modulation and I/Q baseband output
- All modulations support internal and external modulation modes
- Standard 2U height design to save rack space; rack mount kit is available
- Standard USB/LAN/GPIB remote control interfaces; support SCPI command set
- Wear-free electronic attenuator design
- Well-designed automatic flatness calibration function (Cables, attenuators, amplifiers and so on) for test system with power meter control

DSG3000 Series RF Signal Generator





Dimensions: W × H × D = 364 mm × 112 mm × 420 mm; Weight: 6.4kg (without packag)

▶ Main Functions

9kHz~3/6GHz
+25dBm~−140dBm
CW

LF — Sine, Square, Triangle, Ramp, Swp-Sine

Frequency sweep, Amplitude sweep, Frequency and amplitude sweep
Sweep

PMC — Power meter controller, Test system automatic calibration

Internal modulation, External modulation
AM

FM ΦM — Internal modulation, External modulation

Internal modulation, External modulation, Pulse train generator, Pulse generator
Pulse

I/Q — Internal modulation, External modulation, I/Q baseband generator, Baseband output

Specifications

Specifications are valid under the following conditions: the instrument in the calibration cycle is stored at least two hours at 0°C to 50°C temperature, and 40 minutes warm up. The specifications include measurement uncertainty. Data represented in this manual are specifications unless otherwise noted.

Typical (typ.): describes characteristic performance, which 80 percent of the measurement results will meet at room temperature (approximately 25 °C). This data is not warranted, does not include measurement uncertainty.

Nominal (nom.): indicates the expected mean or average performance, or an attribute whose performance is by design, such as the 50Ω connector. This data is not warranted and is measured at room temperature (approximately 25 °C).

Measured (meas.): describes an attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs. time. This data is not warranted and is measured at room temperature (approximately 25 °C).

NOTE: All charts represented in this manual are the measurement results of multiple instruments at room temperature unless otherwise noted.

Frequency

Frequency		
Frequency range	DSG3030	9kHz to 3GHz
	DSG3060	9kHz to 6GHz
Frequency resolution	0.01Hz	
Setting time	<10ms[1] (typ.)	
Phase offset	Adjustable in 0.01° steps (nom.)	

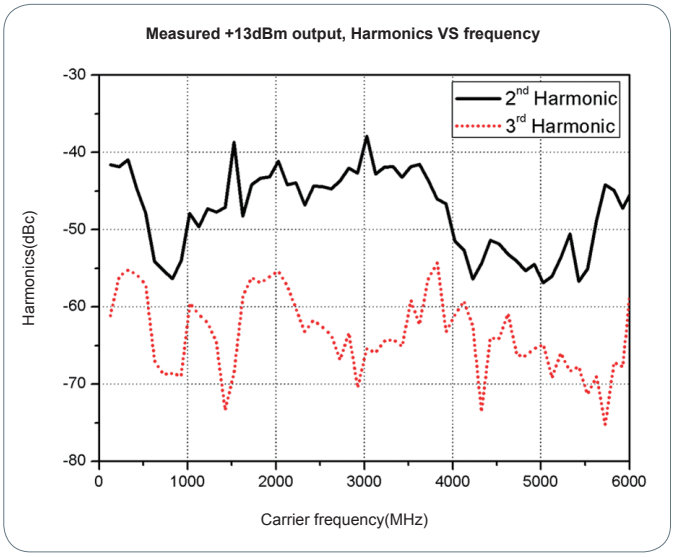
Frequency Band[2]		
Band	Frequency	N
1	f ≤ 23.4375MHz	1
2	23.4375MHz < f ≤46.875MHz	0.03125
3	46.875MHz < f ≤ 93.75MHz	0.0625
4	93.75MHz < f ≤ 187.5MHz	0.125
5	187.5MHz < f ≤ 375MHz	0.25
6	375MHz < f ≤ 750MHz	0.5
7	750MHz < f ≤ 1500MHz	1
8	1500MHz < f ≤ 3000MHz	2
9	3000MHz < f ≤ 6000MHz	4

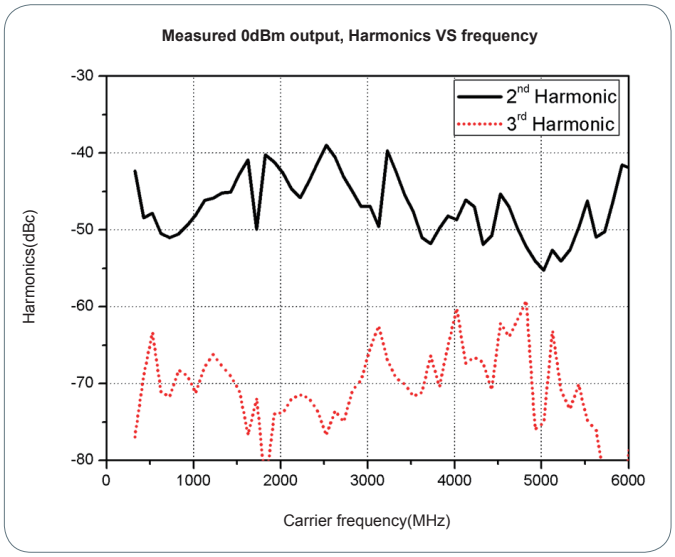
Internal Reference Frequency		
Reference frequency	10MHz	
Temperature stability	In temperature range 0˚C to 50˚C , reference to 25˚C	< 0.5ppm
	With OCXO-A08 option	< 5ppb
Aging rate		< 1ppm/year
	With OCXO-A08 option	< 30ppb/year
Output for internal reference frequency	Frequency	10MHz
	Level	+8dBm (typ.)
	Output impedance	50Ω (nom.)
Input for external reference frequency	Frequency	10MHz
	Level	0dBm to +10dBm
	Maximum deviation	±5ppm
	Input impedance	50Ω (nom.)

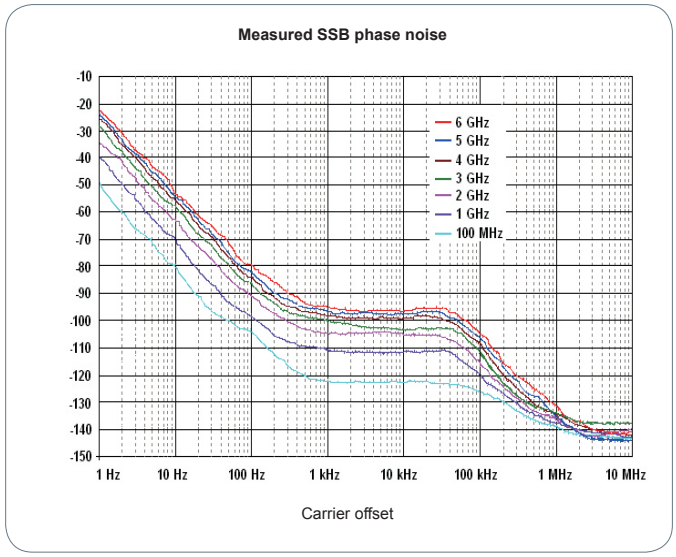
Frequency Sweep		
Operating mode	Step sweep (equally or logarithmically spaced frequency steps) List sweep (the list of arbitrary frequency steps)	
Sweep mode	Single, continuous	
Sweep range	Full frequency range	
Sweep shape	Triangle, ramp	
Step change	Linear or logarithmic	
Number of points	Step sweep	2 to 65535
	List sweep	1 to 6001
Dwell time range	20ms to 100s	
Triggering	Auto, trigger key, external, bus (GPIB, USB, LAN)	

NOTE: [1] Except in the case of the band1 is switched with another band.
[2] N is a factor used to help define certain specifications within the document.

Spectral Purity[1]		
Harmonic	CW mode, 1MHz ≤ f ≤ 6GHz, level ≤ +13dBm	<-30dBc
Sub harmonic	CW mode	
	f ≤ 3GHz	<-65dBc, <-80dBc (typ.)
	3GHz < f ≤ 6GHz	<-52dBc, <-70dBc (typ.)
Non harmonic	CW mode, level > -10dBm, carrier offset > 10kHz	
	f ≤ 1.5GHz	<-64dBc, <-70dBc (typ.)
	1.5GHz < f ≤ 3GHz	<-58dBc, <-64dBc (typ.)
	3GHz < f ≤ 6GHz	<-52dBc, <-58dBc (typ.)
SSB phase noise	CW mode, at 20kHz carrier offset, 1Hz measurement bandwidth	
	f = 100MHz	<-120dBc/Hz
	f = 1GHz	<-108dBc/Hz, <-110dBc/Hz (typ.)
	f = 3GHz	<-102dBc/Hz, <-104dBc/Hz (typ.)
	f = 6GHz	<-96dBc/Hz, <-98dBc/Hz (typ.)
Residual FM	CW mode, RMS value at f = 1GHz	
	0.3kHz to 3kHz	<5Hz rms, <1Hz rms (typ.)
	0.03kHz to 20kHz	<30Hz rms, <8Hz rms (typ.)



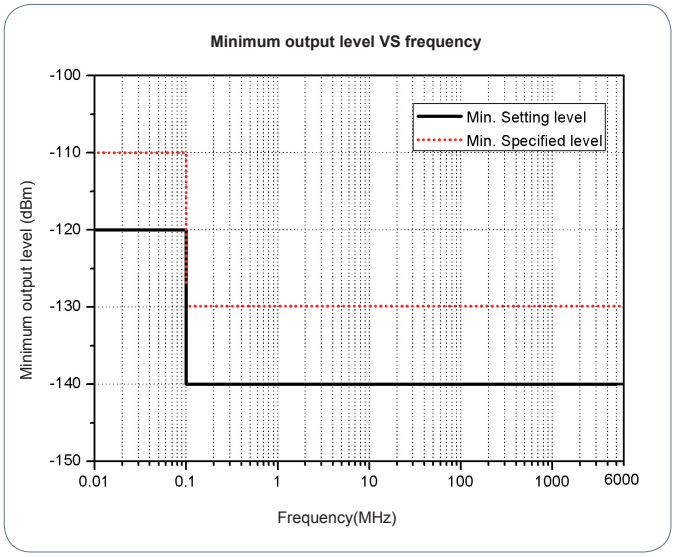


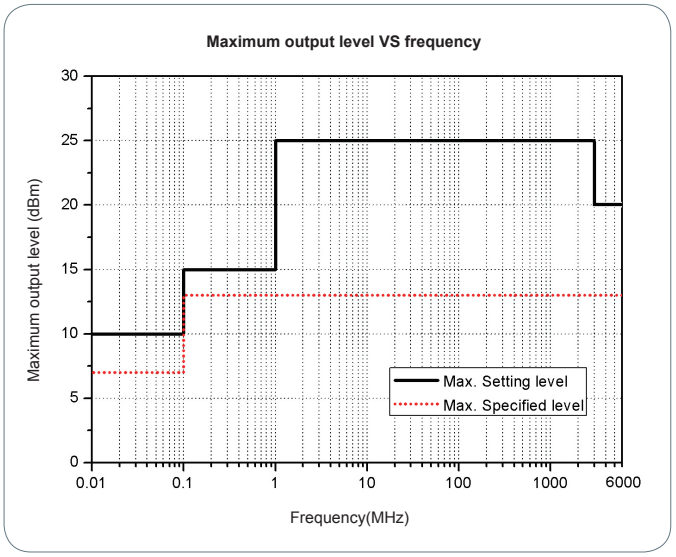


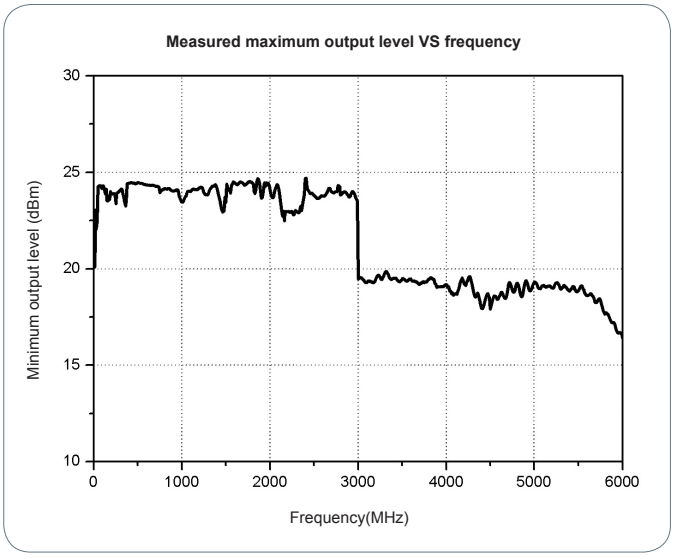
NOTE: [1] Without IQ-DSG3000 option.

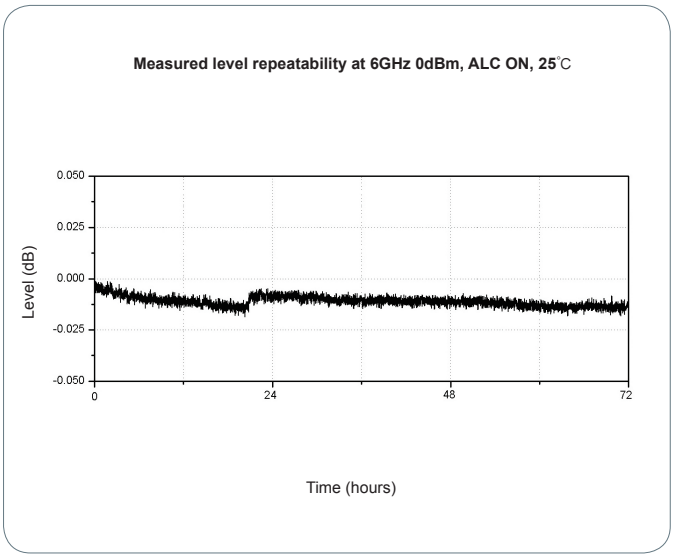
Level

Setting Range			
		Specification level range	Setting range
Maximum output level	9kHz ≤ f <100kHz	+7dBm	+10dBm
	100kHz ≤ f <1MHz	+13dBm	+15dBm
	1MHz ≤f ≤3GHz	+13dBm	+25dBm
	3GHz <f ≤6GHz	+13dBm	+20dBm
Minimum output level	9kHz ≤ f <100kHz	-110dBm	-120dBm
	100kHz ≤ f ≤ 6GHz	-130dBm	-140dBm
Setting resolution	0.01dB		



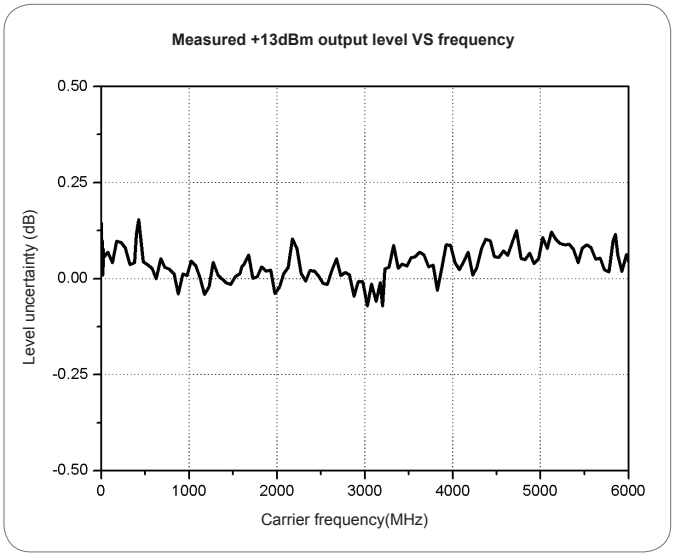


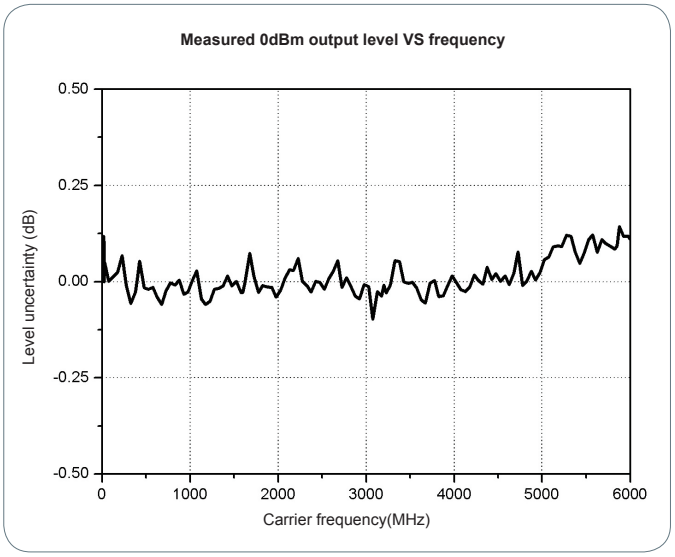


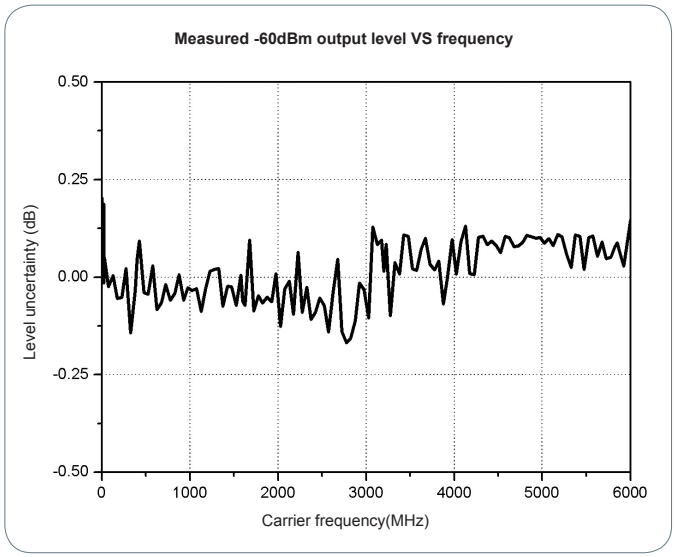


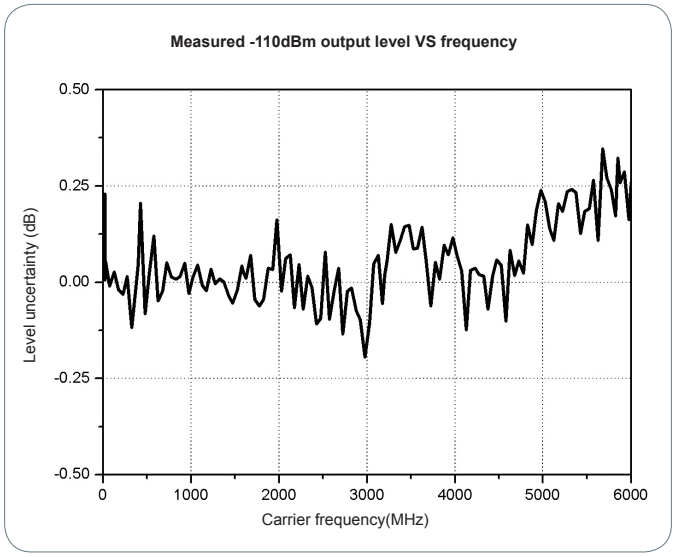
Absolute Level Uncertainty[1]				
		+13 to -60dBm	-60 to -110dBm	-110 to -130dBm
Level uncertainty	9kHz ≤ f <100kHz	≤ 0.5dB (typ.)	≤ 0.7dB (typ.)	
	100kHz ≤ f ≤3GHz	≤ 0.7dB, ≤0.5 (typ.)	≤0.9dB, ≤0.5 (typ.)	≤0.7dB (typ.)
	3GHz < f ≤6GHz	≤ 0.9dB, ≤0.5 (typ.)	≤1.1dB, ≤0.5 (typ.)	≤0.9dB (typ.)
VSWR[2]	1MHz ≤ f ≤6GHz	<1.8 (typ.)		

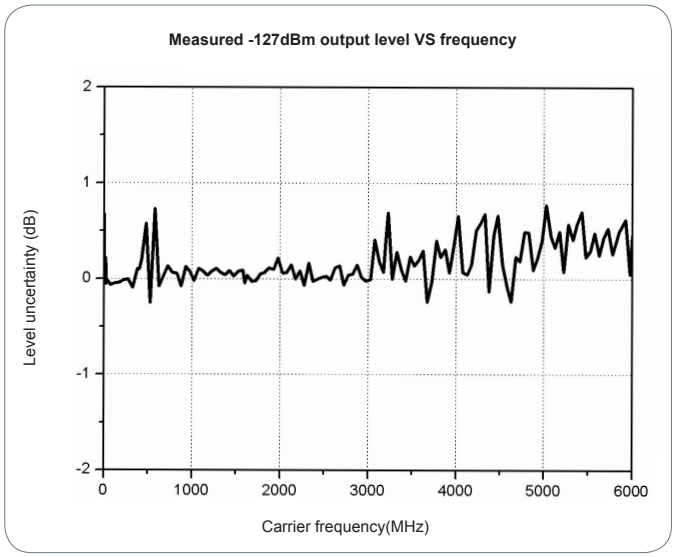
NOTE: [1] ALC state: on or auto mode, 20℃ to 30℃
[2] In 50Ω system, typical, level ≤-10dBm, ATT auto mode

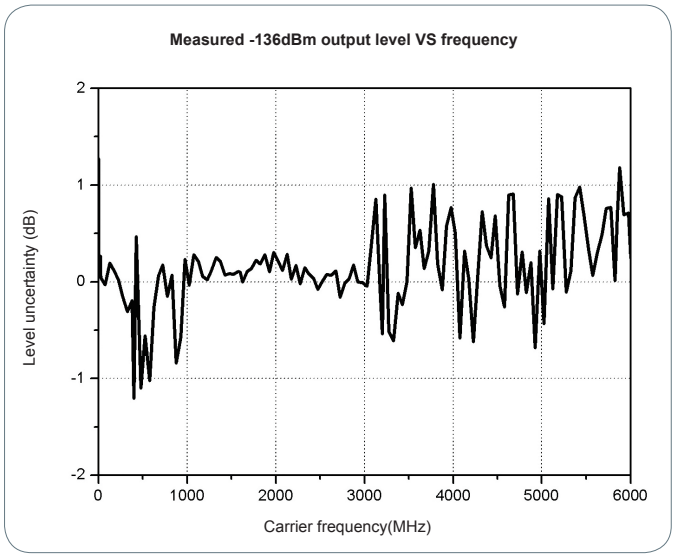

Measured +13dBm output level VS frequency
Level uncertainty (dB)
0.50
0.25
0.00
-0.25
-0.50
0
1000
2000
3000
4000
5000
6000
Carrier frequency(MHz)


Measured 0dBm output level VS frequency
Level uncertainty (dB)
0.50
0.25
0.00
-0.25
-0.50
0
1000
2000
3000
4000
5000
6000
Carrier frequency(MHz)


Measured -60dBm output level VS frequency
Level uncertainty (dB)
0.50
0.25
0.00
-0.25
-0.50
0
1000
2000
3000
4000
5000
6000
Carrier frequency(MHz)


Measured -110dBm output level VS frequency
Level uncertainty (dB)
0.50
0.25
0.00
-0.25
-0.50
0
1000
2000
3000
4000
5000
6000
Carrier frequency(MHz)


Measured -127dBm output level VS frequency
Level uncertainty (dB)
2
1
0
-1
-2
0
1000
2000
3000
4000
5000
6000
Carrier frequency(MHz)


Measured -136dBm output level VS frequency
Level uncertainty (dB)
2
1
0
-1
-2
0
1000
2000
3000
4000
5000
6000
Carrier frequency(MHz)

Level Setting		
Setting time	ALC state on, frequency fixed, temperature range: 20˚C to 30˚C	≤ 5ms (typ.)
Uninterrupted level setting range	ATT fixed mode, ALC state on, level range -110dBm to +13dBm	>20dB (typ.)

Max. Reverse Power		
Max. reverse Power	Max. DC voltage	50V
	1MHz < f ≤ 6GHz	10W

Level Sweep		
Operating mode	Step sweep (equally spaced level steps) List sweep (the list of arbitrary level steps)	
Sweep mode	Single, continuous	
Sweep range	Full level range	
Sweep shape	Triangle, ramp	
Step change	Linear	
Number of points	Step sweep	2 to 65535
	List sweep	1 to 6001
Dwell time range	20ms to 100s	
Triggering	Auto, trigger key, external, bus(GPIB, USB, LAN)	

Internal Modulation Generator (LF)

Internal Modulation Generator (LF)		
Waveform	Sine, square, triangle, ramp, sine sweep	
Frequency range	Sine, sine sweep	0.1Hz to 1MHz
	Square	0.1Hz to 20kHz
	Triangle, ramp	0.1Hz to 100kHz
Resolution	0.01Hz	
Frequency error	Same as RF reference source	
Output voltage[1]	Setting range	1mV to 3V
	Resolution	1mV
Output impedance	50Ω (nom.)	
Sine sweep	Sweep mode	Single, continuous
	Sweep range	Frequency range of LF output
	Sweep time	1ms to 1000s
	Sweep shape	Triangle, ramp
	Triggering	Auto, trigger key, external, bus (GPIB, USB, LAN)

Modulation[2]

Simultaneous Modulation	AM	FM	ØM	Pulse mod.	I/Q mod. (option)
AM	–	○	○	△	×
FM	○	–	×	○	○
ØM	○	×	–	○	○
Pulse mod.	△	○	○	–	○
I/Q mod.(option)	×	○	○	○	–

NOTE: ○:compatible; ×: incompatible; △:compatible with AM performance reduced

Amplitude Modulation		
Modulation source	Internal, external, internal + external	
Modulation depth[3]	0% to 100%	
Resolution	0.1%	
Modulation accuracy	f_{mod} = 1kHz	<4% of setting+1%
AM distortion	f_{mod} = 1kHz, m ≤ 30%, level = 0dBm	<3% (typ.)
Modulation frequency response	m ≤ 80%, 10Hz to 50kHz	<3dB (nom.)
Sensitivity when using external input	f_{mod} = 1kHz	1Vpp for indicated depth[4] (nom.)

NOTE: [1] Measurement in high-impedance state.
[2] The modulation source is sine waveform unless otherwise noted.
[3]Peak power of the envelope is no more than the maximum value of the specification output range.
[4] To ensure the modulation performance, the input amplitude of the external modulating signal should be less than ±0.5V.

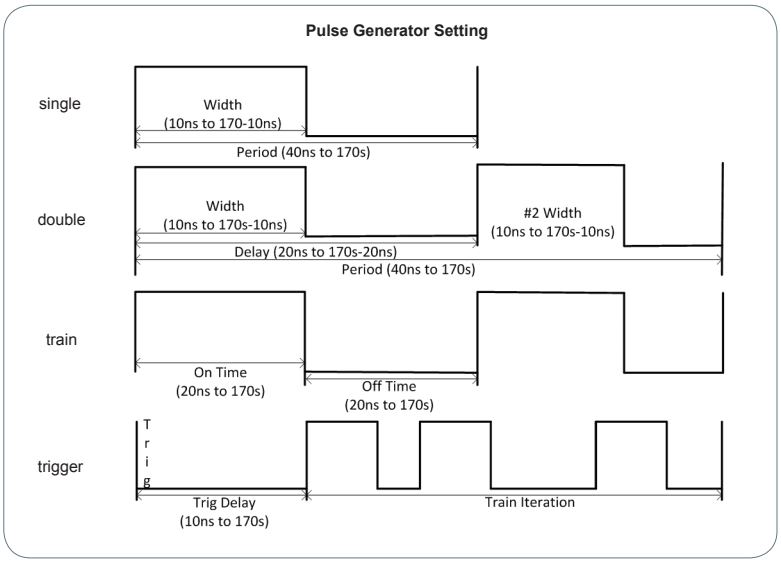
Frequency Modulation		
Modulation source	Internal, external, internal + external	
Maximum deviation	N × 1MHz (nom.)	
Resolution	< 0.1% of deviation, or 1Hz, which ever is greater (nom.)	
Modulation accuracy	f_{mod} = 1kHz, internal mode	<2% of setting + 20Hz
FM distortion	f_{mod} = 1kHz, deviation = N × 50kHz	<2% (typ.)
Modulation frequency response[5]	10Hz to 100kHz	<3dB (nom.)
Sensitivity when using external input	f_{mod} = 1kHz	1Vpp for indicated deviation[4] (nom.)

Phase Modulation		
Modulation source	Internal, external, internal + external	
Maximum deviation	f ≤ 23.4375MHz	3rad (nom.)
	f > 23.4375MHz	N × 5rad (nom.)
Resolution	< 0.1% of deviation, or 0.01rad, which ever is greater (nom.)	
Modulation accuracy	f_{mod} = 1kHz, internal modulation source	< 1% of setting + 0.1rad
ØM distortion	f_{mod} = 1kHz, deviation = 5rad	< 1% (typ.)
Modulation frequency response[6]	10Hz to 100kHz	< 3dB (nom.)
Sensitivity when using external input	f_{mod} = 1kHz	1Vpp for indicated deviation[4] (nom.)

Pulse Modulation		
Modulation source	External, internal	
On/off ratio	25MHz ≤ f < 3GHz	>80dB
	3GHz ≤ f ≤ 6GHz	>70dB
Rise/fall time (10%/90%)	<50ns[7], 10ns (typ.)	
Pulse repetition frequency	DC to 1MHz	

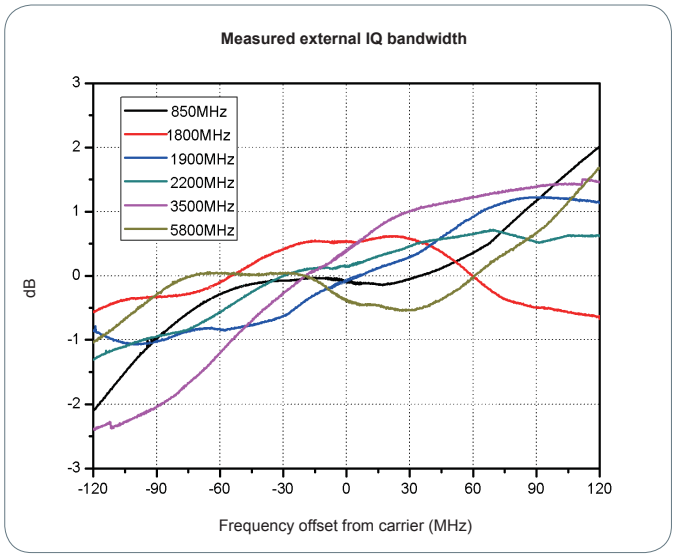
Pulse Generator		
Operating mode	Single pulse, double pulse, pulse train(option PUG-DSG3000)	
Pulse period	Setting range	40ns to 170s
	Resolution	10ns
Pulse width	Setting range	10ns to (170s-10ns)
	Resolution	10ns
Trigger delay	Setting range	10ns to 170s
	Resolution	10ns
Double-pulse spacing	Setting range	20ns to (170s-20ns)
	Resolution	10ns
Triggering	Auto, external trigger, external gate, trigger key, bus (GPIB, USB, LAN)	

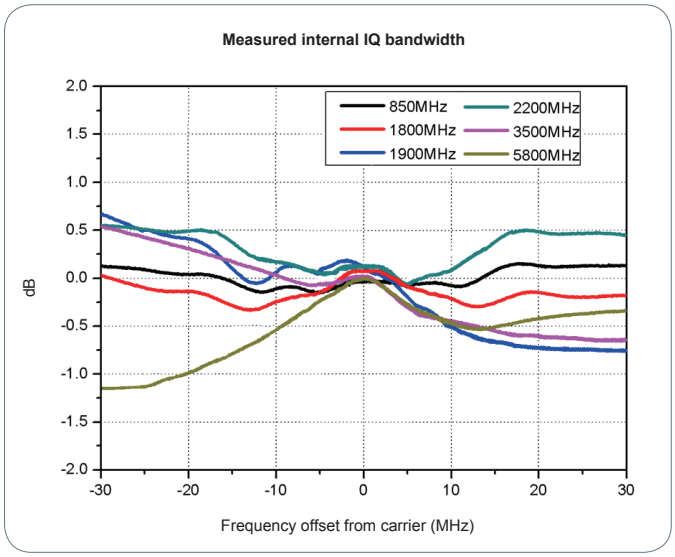
Pulse Train Generator (Option PUG-DSG3000)		
Pulse train generator	Number of pulse patterns	1 to 2047
	On/off time range	20ns to 170s
	Repetition per pattern	1 to 256

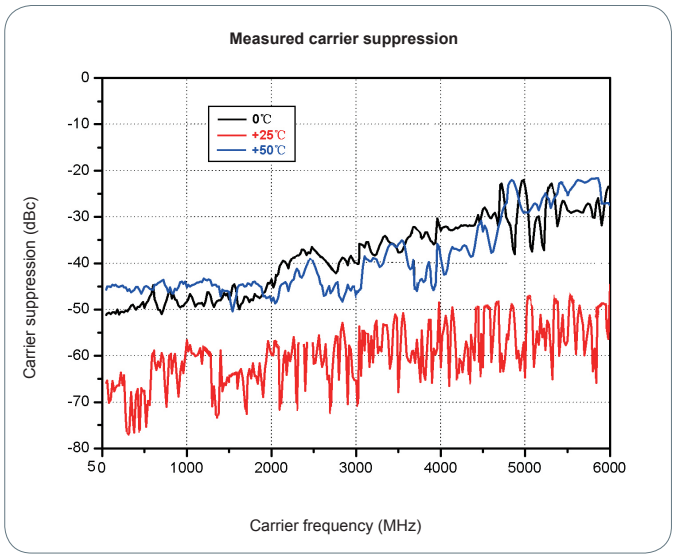


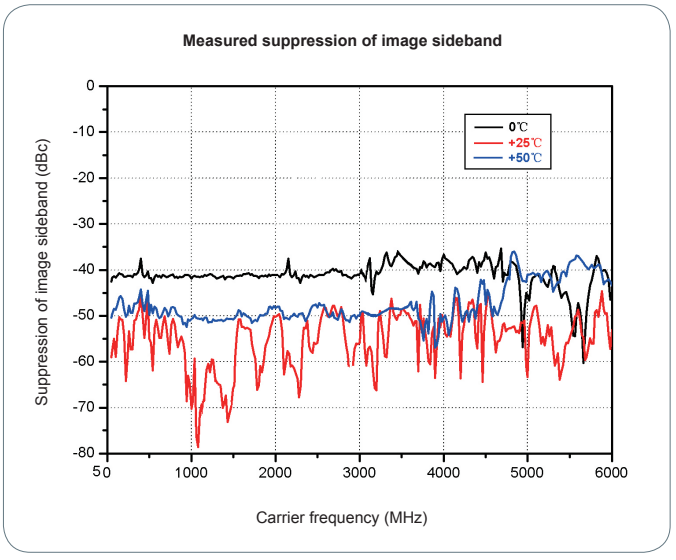
NOTE: [5] External operating mode, measured at 100kHz deviation.
[6] External operating mode, measured at 5rad deviation.
[7] The state of ALC is off.

I/Q Modulation (Option IQ-DSG3000)		
Modulation source	External, internal	
Bandwidth.(RF)	External modulation	
	Baseband (I or Q)	≤120MHz (nom.)
	RF (I + Q)	≤240MHz (nom.)
	Internal modulation	
	Baseband (I or Q)	≤30MHz (nom.)
	RF (I + Q)	≤60MHz (nom.)
Carrier suppression[1]	Carrier frequency range:50MHz ≤ f ≤ 6GHz	≥40dBc (typ.)
Suppression of image sideband[2]	Modulation bandwidth up to ±10MHz	≥40dBc (typ.)
External I/Q input	VSWR	<1.5
	Full scale input	$\sqrt{I^2+Q^2}=0.5Vrms$
Internal modulation		
EVM	16QAM , root cosine filter (α = 0.22), 4MSps	
	50MHz ≤ f ≤ 3GHz (level ≤ 4dBm)	≤ 0.7%rms (typ.)
	3GHz < f ≤ 6GHz (level ≤ 0dBm)	≤ 1.2%rms (typ.)
	QPSK , root cosine filter (α = 0.22), 4MSps	
	50MHz ≤ f ≤ 3GHz (level ≤ 4dBm)	≤ 0.7%rms (typ.)
	3GHz < f ≤ 6GHz (level ≤ 0dBm)	≤ 1.2%rms (typ.)
External modulation		
EVM	CDMA2000/1xEV-D0,1.2288 Mcps, frequency 800 to 900MHz, 1800 to 1900MHz, level≤4dBm	≤ 1.2%, ≤ 0.8% (typ.)
ACPR		≥ 70dB









NOTE: [1] [2]The parameter is measured at room temperature. When the temperature is difference from room temperature, the specification will deteriorate.

I/Q Baseband Generator (Option IQ-DSG3000)			
Output impedance	50Ω (nom.)		
Output voltage	Setting range		$0.1V_{pp}$ to $1.5V_{pp}$
	Resolution		1mV
Frequency response	Referenced to 1MHz	≤ 10MHz	<0.5dB (nom.)
		≤ 30MHz	<1dB (nom.)
I/Q imbalance	Magnitude	≤ 10MHz	<0.1dB (nom.)
		≤ 30MHz	<0.2dB (nom.)
	Nonlinear phase	≤ 10MHz	200ps (nom.)
		≤ 30MHz	500ps (nom.)
SFDR	Sine	≤ 30MHz	>50dB (nom.)
Waveform memory	Waveform length		1 sample to 16 Msample in one-sample steps
	Resolution		14 bits
	Loading time 1Msample		<10 s[1] (nom.)
	Nonvolatile memory		1G Bytes
Sample rate	Setting range		1 kHz to 50 MHz,100 MHz
	Resolution		0.01 Hz
Trigger	Triggering		Auto, trigger key, external, bus(GPIB, USB, LAN)
	Operating modes		Retrig, armed auto, armed retrig, single
	External trigger delay		
	Setting range		0 to $(2^{16} - 1)$
	Resolution		1
	External trigger inhibit		
	Setting range		0 to $(2^{16} - 1)$
	Resolution		1
	External trigger pulse width		>20 ns (nom.)

Input and Output

Front Panel Connector		
RF output	Impedance	50Ω (nom.)
	Connector	N female
External modulation signal input	Impedance	100kΩ (nom.)
	Connector	BNC female
Internal modulation generator.(LF) output	Impedance	50Ω (nom.)
	Connector	BNC female

Rear Panel Connector		
External trigger in	Impedance	1kΩ (nom.)
	Connector	BNC female
	Trigger voltage	5V TTL level
Signal valid output	Connector	BNC female
	Output voltage	0V/3.3V (nom.)
Sweep out	Connector	BNC female
	Output voltage	0 to 10V (nom.)
Pulse input or output	Impedance	50Ω (nom.)
	Input/output voltage	0V/3.3V (nom.)
10MHz in (external frequency reference input)	Impedance	50Ω (nom.)
	Connector	BNC female
10MHz out (external frequency reference output)	Impedance	50Ω (nom.)
	Connector	BNC female
I/Q baseband input/output (option IQ-DSG3000)	Impedance	50Ω (nom.)
	Connector	BNC female

Rear Panel Communication Interface		
USB host	Connector	A plug
	Protocol	Version2.0
USB device	Connector	B plug
	Protocol	Version2.0
LAN	LXI Core 2011 Device	10/100Base, RJ-45
IEC/IEEE bus (GPIB)		IEEE488.2

NOTE: [1] Load from flash internal non-volatile memory.

General Specifications

Display	
Type	TFT LCD
Resolution	480*272
Size	4.3”

Mass Memory		
Mass memory	Flash non-volatile memory (internal); USB disk (not supplied)	
Data storage space	Flash non-volatile memory (internal)	1G Bytes

Electromagnetic Compatibility and Safety		
EMC	In line with EMC instruction (2014/30/EU), In line with or exceed IEC61326-1:2013/EN61326-1:2013 Group 1 Class A standard	
	CISPR 11/EN 55011	
	IEC 61000-4-2:2008/EN 61000-4-2	±4.0kV (contact discharge), ±4.0kV (air discharge)
	IEC 61000-4-3:2002/EN 61000-4-3	3V/m (80MHz to 1GHz) 3V/m (1.4GHz to 2GHz) 1V/m (2.0GHz to 2.7GHz)
	IEC 61000-4-4:2004/EN 61000-4-4	1kV power lines
	IEC 61000-4-5:2001/EN 61000-4-5	0.5kV (phase to Neutral) 1kV (phase to PE) 1kV (neutral to PE)
	IEC 61000-4-6:2003/EN 61000-4-6	3V, 0.15-80MHz
	IEC 61000-4-11:2004/EN 61000-4-11	Voltage dip: 0% UT during half cycle 0% UT during 1 cycle 70% UT during 25 cycles Short interruption: 0% UT during 250 cycles
Safety	In line with IEC 61010-1:2010 (Third Edition)/EN 61010-1:2010, UL 61010-1:2012 R4.16 and CAN/CSA-C22.2 NO. 61010-1-12+ GI1+ GI2	

Environmental		
Temperature	Operating temperature range	0˚C to 50˚C
	Storage temperature range	-20˚C to 70˚C
Humidity	0˚C to 30˚C	≤95% rel. humidity
	30˚C to 40˚C	≤75% rel. humidity
Altitude	Operating height	Up to 3,048m (10000ft)

Dimensions	
(W × H × D)	364 mm × 112 mm × 420 mm (14.33 in × 4.41 in × 16.54 in)

Weight	
	6.4kg (14.1lb)
With IQ-DSG3000 option	6.7kg (14.8lb)

Calibration Interval	
Recommended calibration interval	18 months

▶ Ordering Information

	Description	Order Number
Model	Signal Generator, 9kHz to 3GHz	DSG3030
	Signal Generator, 9kHz to 6GHz	DSG3060
Standard accessories	Quick Guide (Hard Copy)	-
	Power Cable	-
Options	Pulse Train Generator	PUG-DSG3000
	High Stable OCXO Reference Clock	OCXO-A08
	I/Q Modulation, Baseband Output	IQ-DSG3000
	Rack Mount Kit	RM-DSG3000
	Power Meter Controller	PMC-DSG3000
Optional accessories	Include: N(F)-N(F) adaptor (1pcs), N(M)-N(M) adaptor (1pcs), N(M)-SMA(F) adaptor (2pcs), N(M)-BNC(F) adaptor (2pcs), SMA(F)-SMA(F) adaptor (1pcs), SMA(M)-SMA(M) adaptor (1pcs), BNC T type adaptor (1pcs), 50 Ω SMA load (1pcs), 50 Ω BNC impedance adaptor (1pcs)	RF Adaptor Kit
	Include: 50 Ω to 75 Ω adaptor (2pcs)	RF CATV Kit
	Include: 6dB attenuator (1pcs), 10dB attenuator (2pcs)	RF Attenuator Kit
	N(M)-N(M) RF cable	CB-NM-NM-75-L-12G
	N(M)-SMA(M) RF cable	CB-NM-SMAM-75-L-12G
	RF demo kit (receiver)	RX1000

NOTE: All instruments, accessories and options can be ordered from your local RIGOL distributors.

Warranty

Three –year warranty, excluding probes and accessories.

RIGOL

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July 2017