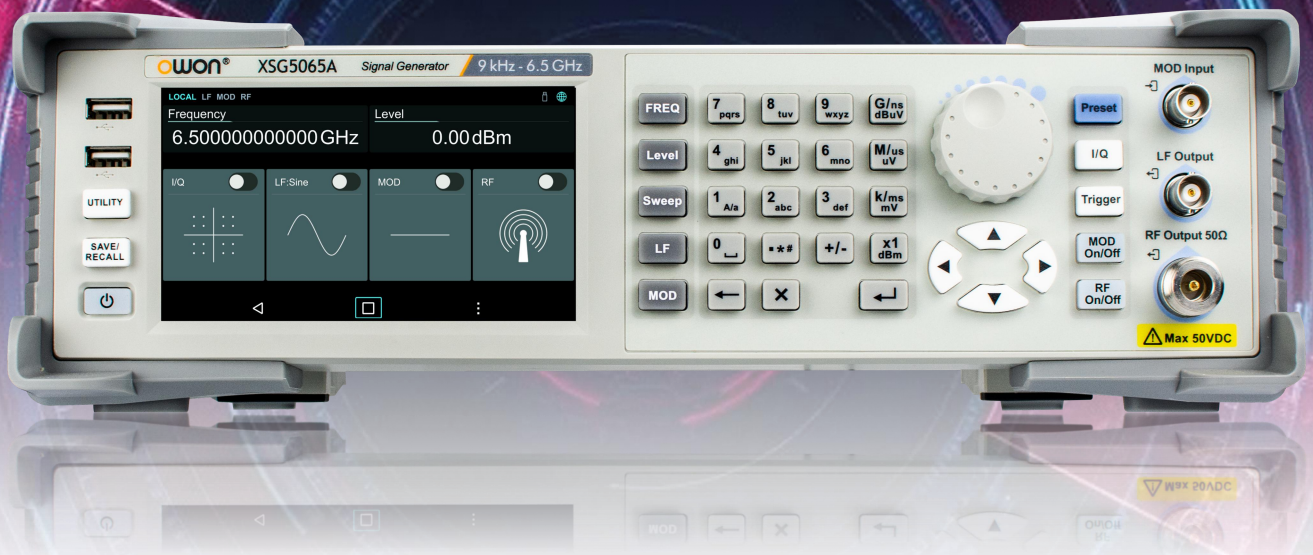
owon®



XSG5000 Series

RF Signal Generator

Features

- Frequency range: **9 kHz to 6.5 GHz**, for RF devices, receivers and communication links
- Output frequency resolution: 0.001 Hz
- Level range: **-140 dBm to +24 dBm**, from weak signals to high-level RF drive
- Phase noise < -120 dBc/Hz at 1 GHz, 20 kHz offset (typ.)
- Typical amplitude accuracy: **≤0.7 dB**
- Internal/external **AM/FM/PM analog modulation**
- Supports **pulse modulation, pulse trains and custom pulse sequences** for pulsed RF/time response tests
- Frequency/level sweeps and multiple triggers for automated sweeps and system tests
- Includes **reverse power** and **DC voltage protection** against RF output damage from accidental DC input
- Built-in reference plus **optional OCXO** (+/-30 ppb initial accuracy) for high frequency stability
- Standard **USB Host, USB Device, LAN** (VXI-11, Socket, Telnet) and **Web remote control**
- 5-inch capacitive touchscreen for intuitive operation

Product Overview

XSG5000A is a general-purpose RF signal generator for R&D, production testing, teaching labs and RF system validation. Its **9 kHz to 6.5 GHz** range covers common test bands. A wide output range of **-140 dBm to +24 dBm** at 1 MHz to 4 GHz supports weak-signal simulation and high-level RF drive.

XSG5000A offers **CW, AM/FM/PM analog and pulse modulation**, **frequency/level sweeps** and multiple triggers for receiver sensitivity, device gain/frequency response, filter, RF link and communication module tests. Resolutions of 0.001 Hz and 0.01 dB enable fine control. Typical phase noise is **< -120 dBc/Hz at 1 GHz, 20 kHz offset**; common-band level error is ≤ 0.7 dB, reducing the impact of source noise and output error on test results.

A 5-inch capacitive touchscreen, keys, numeric keypad and knob offer intuitive, precise frequency, level and modulation setup. **External 10 MHz reference I/O, a high-stability OCXO** and **Web remote control**, with **USB Host, USB Device and LAN**, support synchronization, remote control and integration with spectrum analyzers, receivers and automated systems.

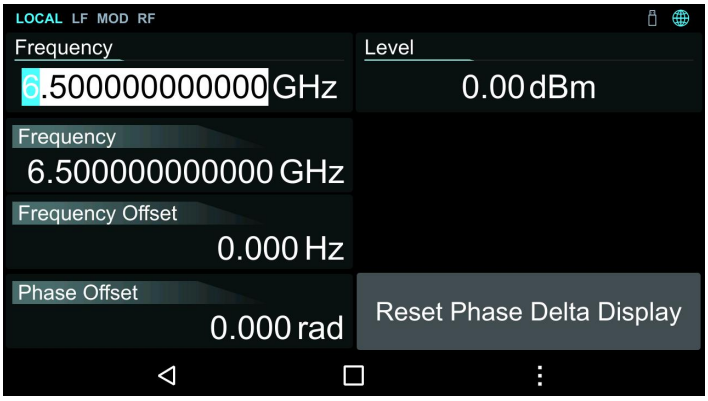
Panels

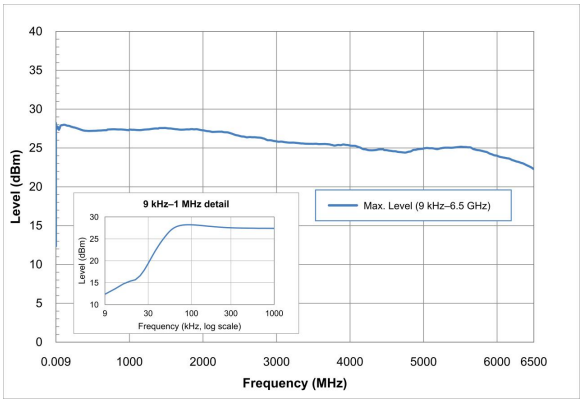
1. Function keys
2. USB Host
3. Modulation input
4. LF output
5. RF output
6. AC power input
7. OCXO ref. (option)
8. LAN port
9. USB Device port
10. USB Host port
11. 10 MHz sync input
12. 10 MHz sync output
13. RF signal valid
14. Pulse mod. I/O
15. Trigger I/O
16. Ground



A Wide Frequency and Output Level Ranges

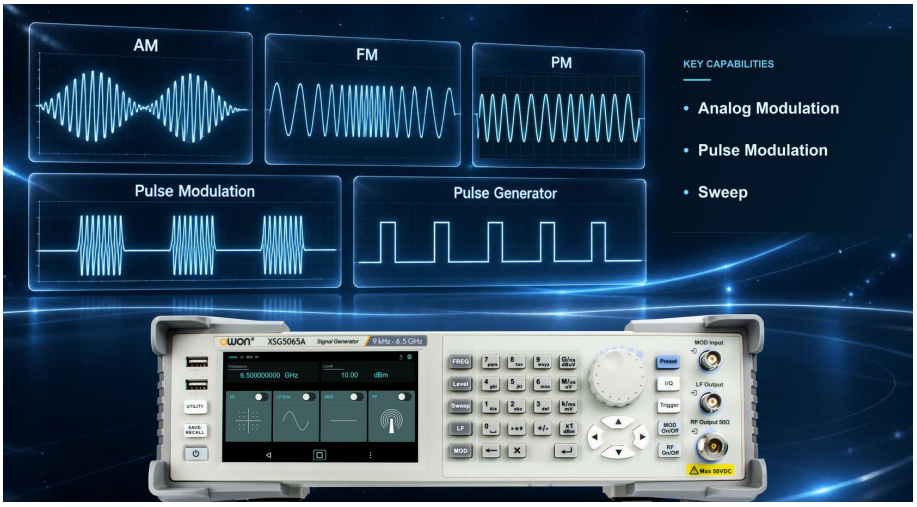
The **9 kHz to 6.5 GHz** range covers 433 MHz, 2.4 GHz, 5 GHz, and 5.8 GHz for frequency response, gain, and sensitivity tests on receivers, communication modules, filters, amplifiers, and RF links. From 1 MHz to 4 GHz, **-140 dBm to +24 dBm** output spans weak signals to high-level RF stimulus for receiver sensitivity, component gain, link loss, and module verification.





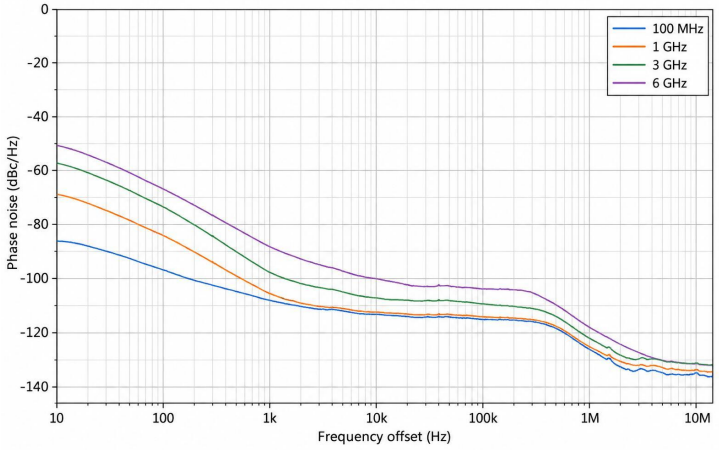
B Modulation Sweep and Trigger Functions

CW, AM/FM/PM analog modulation, and pulse modulation combine with frequency and level **sweeps** and multiple **trigger** modes. Simulate varied RF inputs to verify modulation response, frequency response, gain variation, and dynamic performance.



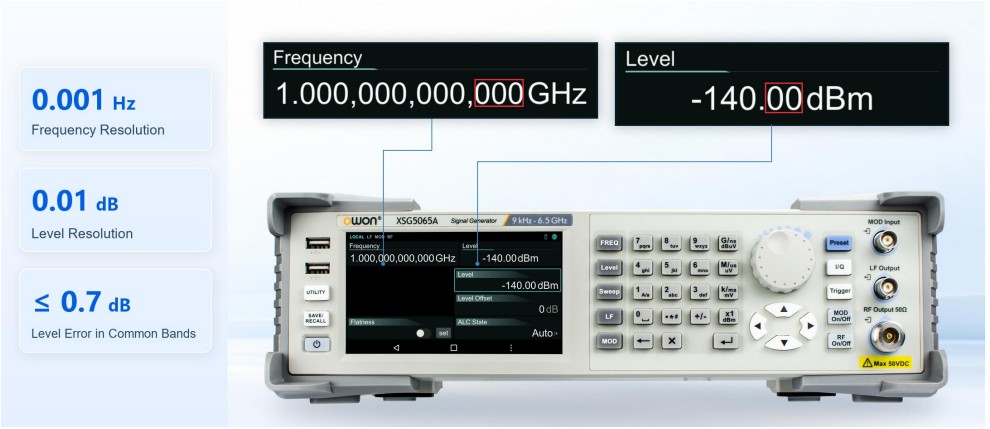
C Low Phase Noise Reduces Source Interference

Typical phase noise **< -120 dBc/Hz at 1 GHz, 20 kHz offset**, reduces close-in source noise and its effect on receiver sensitivity, frequency selectivity, narrowband filter, and RF link tests, helping reveal actual DUT performance.



D Fine Resolution and Accurate Level Control

Fine **0.001 Hz** frequency and **0.01 dB** level resolution let engineers vary inputs precisely and observe DUT response in sensitivity, frequency response, gain variation, and threshold tests. Level error **≤0.7 dB** in common bands keeps output close to the set value, improving accuracy, repeatability, and consistency across production batches.



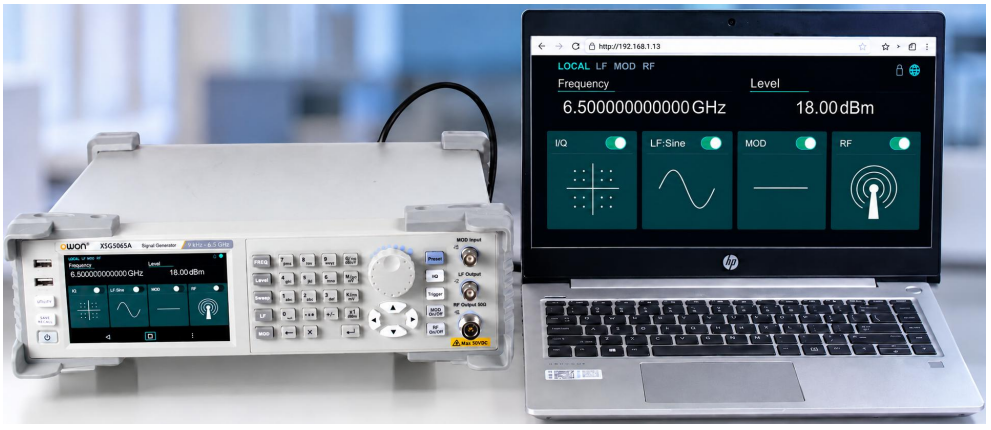
E Stable Reference for Instrument Synchronization

An internal reference is standard. The optional oven-controlled crystal oscillator (OCXO) offers **±30 ppb** initial accuracy, reducing temperature effects and long-term drift for narrowband receiver, filter, communication module, and stable RF tests.External **10 MHz reference I/O** synchronizes spectrum analyzers, receivers, and other instruments to a shared frequency reference.



F Remote Control and Test System Integration

A 5-inch capacitive touchscreen, **web remote control**, **USB Host, USB Device, and LAN** support easy operation and automated test integration. Remote interfaces support VXI-11, Socket, and Telnet.



Specifications apply within the calibration period, after at least two hours at room temperature and 40 minutes of warm-up. Unless stated otherwise, the data are specifications including measurement uncertainty.

Specifications: Guaranteed performance at normal room temperature, unless stated otherwise.

Typical: Met by 80% of test results at ~25℃, 95% confidence. Not guaranteed; excludes measurement uncertainty.

Nominal: Expected mean/design performance (e.g. 50Ω connectors) at ~25℃. Not guaranteed; excludes measurement uncertainty.

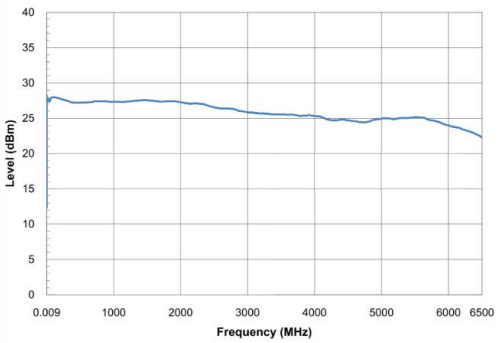
Frequency Characteristics

Frequency Characteristics			
Frequency			
Frequency range	XSG5015A	CW MODE	9 kHz – 1.5 GHz
	XSG5025A	CW MODE	9 kHz – 2.5 GHz
	XSG5045A	CW MODE	9 kHz – 4.5 GHz
	XSG5065A	CW MODE	9 kHz – 6.5 GHz
Frequency resolution	0.001 Hz		
Settling time	<5 ms (typ.), ALC ON <10 ms (typ.), ALC OFF (S&H)		
Phase offset resolution	0.1°		
Frequency Bands[1]			
Band	Frequency range		N
1	9 kHz ≤ f < 250 MHz		0.25
2	250 MHz ≤ f < 500 MHz		0.125
3	500 MHz ≤ f < 1000 MHz		0.25
4	1000 MHz ≤ f < 2000 MHz		0.5
5	2000 MHz ≤ f < 4000 MHz		1
6	4000 MHz ≤f ≤ 6500 MHz		2
Note: [1] N is the factor used to determine the specifications.			
Internal Reference			
	Standard		10M_OCXO option
Reference frequency	10.000000 MHz		
Initial accuracy	< 1 ppm		±30 ppb
Temperature stability	< 0.5 ppm，0℃~50℃		±1 ppb，0℃~50℃
Aging rate	<1 ppm/1 year		30 ppb/1 year
Frequency Sweep			
Sweep type	Step sweep (linear or logarithmic frequency steps) List sweep (arbitrary frequency steps)		
Sweep range	Within instrument frequency range		
Sweep shape	Triangle, sawtooth		
Sweep mode	Single, continuous		
Step spacing	Linear or logarithmic		
Sweep points	Step sweep		2-4096
	List sweep		1-500
Dwell time	10 ms-100 s		
Dwell time resolution	0.1 ms		
Trigger type	Auto, key, external, bus (USB, LAN)		
Trigger edge	Rising or falling; applies to external trigger only		

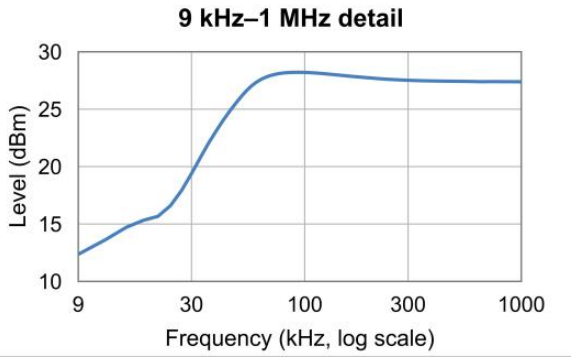
Level Characteristics

Level Characteristics				
Level setting range				
Level setting range	9 kHz ≤ f < 100 kHz	-110 dBm~9 dBm		
	100 kHz ≤ f < 1 MHz	-110 dBm~18 dBm		
	1 MHz ≤ f ≤ 4 GHz	-140 dBm~24 dBm		
	4 GHz < f ≤ 6 GHz	-130 dBm~22 dBm		
	6 GHz < f ≤ 6.5 GHz	-130 dBm~18 dBm		
Setting resolution	0.01 dB			
Specified Level Range				
Specified Level Range	9 kHz ≤ f < 100 kHz	-110 dBm~7 dBm		
	100 kHz ≤ f < 1 MHz	-110 dBm~15 dBm		
	1 MHz ≤ f ≤ 4 GHz	-130 dBm~22 dBm		
	4 GHz < f ≤ 6 GHz	-120 dBm~20 dBm		
	6 GHz < f ≤ 6.5 GHz	-120 dBm~15 dBm		
Level Error (ALC ON, 20°C–30°C)				
	Specified level to -40 dBm	-40 dBm~-90 dBm	-90dBm~-110 dBm	-110dBm~-120dBm
9 kHz ≤ f <100 kHz	≤0.7 dB	≤0.9 dB	≤1.1 dB	
100 kHz ≤ f <1 MHz	≤0.7 dB	≤0.7 dB	≤1.1 dB	
1 MHz ≤ f ≤ 4 GHz	≤0.7 dB	≤0.7 dB	≤1.1 dB ≤0.7 dB (typ.)	≤1.6 dB
4 GHz <f ≤ 6.5GHz	≤0.7 dB	≤0.7 dB	≤1.1 dB ≤0.7 dB (typ.)	≤2 dB
Additional error	ALC State Off (S&H)	< 0.2 dB		
VSWR				
level ≤0 dBm，ALC State ON				
VSWR	1 MHz ≤ f ≤ 6.5 GHz			≤1.8 (nom.)
Level Setting				
Settling time	ALC ON, fixed frequency, 20°C–30°C			< 5 ms
	ALC OFF (S&H), fixed frequency, 20°C–30°C			< 10 ms
Maximum Reverse Power				
Max. DC voltage	50 V			
Reverse input power	1 MHz ≤ f ≤ 6.5 GHz			30 dBm
Level Sweep				
Sweep type	Step sweep (equally spaced levels) List sweep (arbitrary level steps)			
Sweep range	Within instrument level range			
Sweep shape	Triangle, sawtooth			
Trigger mode	Single, continuous			
Step spacing	Linear			
Sweep points	Step sweep	2-4096		
	List sweep	1-500		
Dwell time	10 ms-100 S			
Dwell time resolution	0.1 ms			
Trigger type	Auto, key, external, bus			
Trigger edge	Rising or falling; applies to external trigger only			

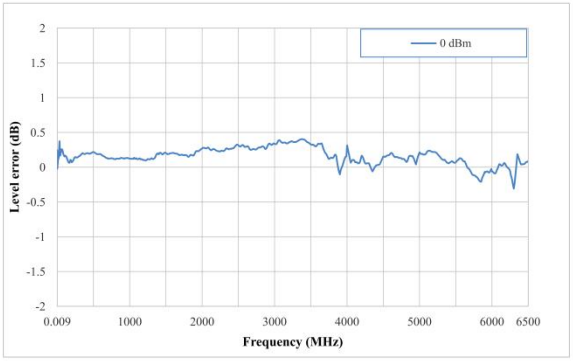
Max. output power vs. frequency, f ≥ 1 MHz



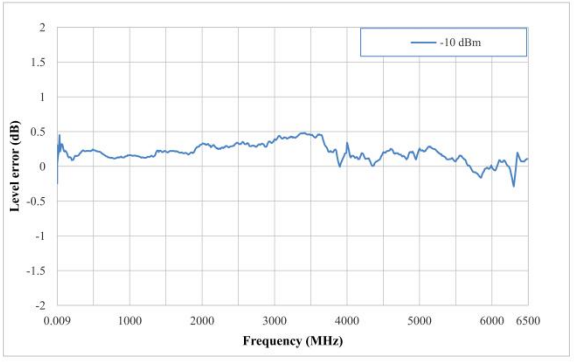
Max. output power vs. frequency, f < 1 MHz



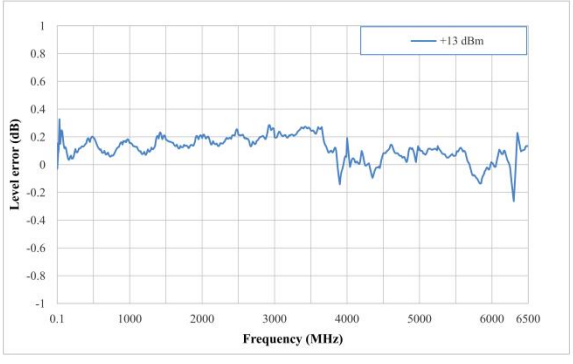
Level error vs. frequency, output = 0 dBm



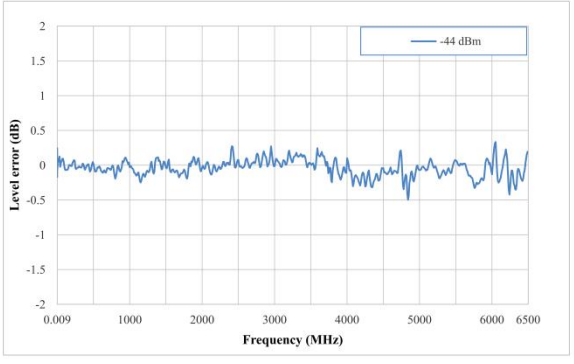
Level error vs. frequency, output = -10 dBm



Level error vs. frequency, output = 13 dBm

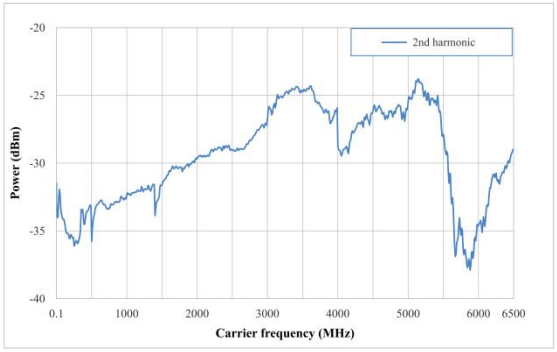


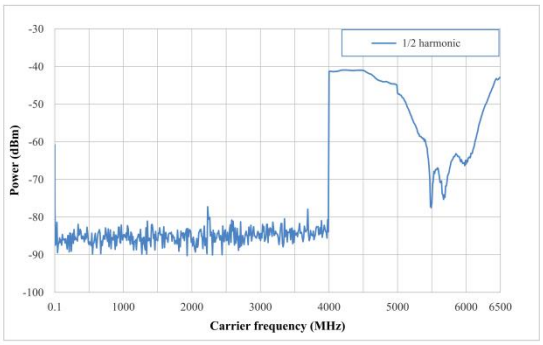
Level error vs. frequency, output = -44 dBm



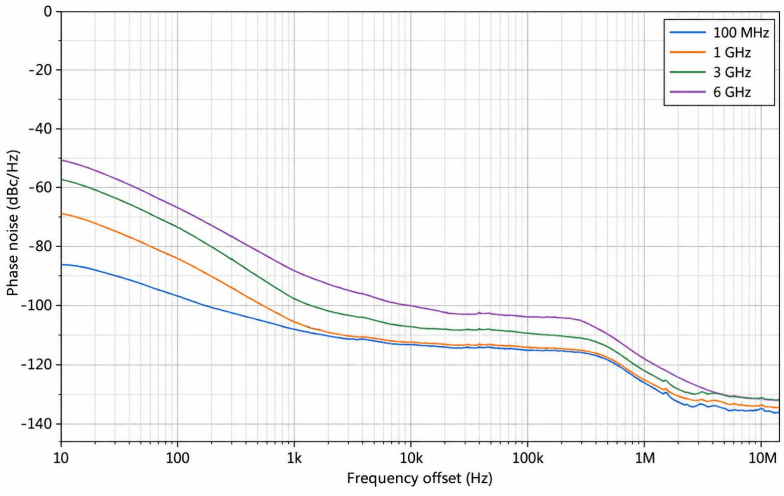
Spectral Purity		
Harmonics	CW, 1 MHz < f ≤ 6 GHz, output ≤13 dBm	< -30 dBc
Subharmonics	CW, 1 MHz < f ≤ 6 GHz, output ≤13 dBm	< -55 dBc
Nonharmonics	CW, carrier offset >10 kHz, 1 MHz < f ≤ 4 GHz	< -65 dBc
	CW, carrier offset >10 kHz, 4 GHz < f ≤ 6 GHz	< -60 dBc
SSB phase noise	CW, carrier offset = 20 kHz, 1 Hz measurement bandwidth	
	f=100 MHz	< -122 dBc/Hz (typ.)
	f=1 GHz	< -120 dBc/Hz (typ.)
	f=4 GHz	< -106 dBc/Hz (typ.)
	f=6 GHz	< -105 dBc/Hz (typ.)

2nd harmonic vs. carrier frequency, level = 10 dBm	1/2 subharmonic vs. carrier frequency, level = 10 dBm





Phase Noise



Internal Modulation Source (LF)		
Waveform	Sine, square, triangle, sawtooth, DC	
Frequency range	Sine	0.01 Hz-1 MHz[2]
	Square, triangle, sawtooth	0.01 Hz-20 kHz
Frequency resolution	0.01 Hz	
Frequency error	Same as RF reference	
Frequency response	≤0.3 dB	
Amplitude offset	Setting range	Min(2.5V-$\frac{1}{2}$LEVEL,2V)
	Offset resolution	0.01 V
AC output voltage[3]	Setting range	1 mVpp-3 Vpp
	Voltage resolution	1 mVpp
DC voltage error	1% × setting ± 3 mV	
Output impedance	50Ω (nom.)	

Note: [2] Simultaneous modulation sources restrict frequency range and waveform type.
[3] Measured into a 50Ω load.

LF Frequency Sweep	
Sweep type	Linear
	Logarithmic
Sweep shape	Sawtooth, triangle
Sweep direction	Up, down
Sweep time	1 ms-500 s
Sweep frequency range	0.01 Hz-1 MHz
Trigger type	Auto, key, external, bus

Modulation Characteristics

Modulation Characteristics				
Simultaneous Modulation				
	AM	FM	PM	Pulse
AM		●	●	(●)
FM	●		×	●
PM	●	×		●
Pulse	(●)	●	●	
● Compatible; × Incompatible; (●) Limited. Pulse modulation degrades AM. With IQ modulation, RF blanking disables pulse modulation.				
AM				
Modulation source	Internal, external, internal + external			
Modulation depth[4]	0 %-100 %			
Resolution	0.1 %			
Depth error	fmod=1 kHz, level=0 dBm		< setting × 4 % + 1 %	
AM distortion	fmod=1 kHz, m<30 %, level=0 dBm		< 3 %	
Response	m < 80 %, 10 Hz-100 kHz,		<3 dB (nom.)	
Note: [4] With AM enabled, peak power is below the specified maximum output level.				
FM				
Modulation source	Internal, external, internal + external			
Max. dev.	N*1 MHz			
Resolution	< max(0.1 % of deviation, 1 Hz)			
Deviation error	fmod=1 kHz, internal modulation		< setting × 2 % + 20 Hz (nom.)	
FM distortion	fmod=1 kHz, deviation≤N×1 MHz		<0.5 % (nom.)	
Response	10 Hz-100 kHz		<3 dB (nom.)	
PM				
Modulation source	Internal, external, internal + external			
Max. dev.	N*5 rad			
Resolution	< max(0.1 % of deviation, 0.01 rad)			
Deviation error	fmod=1 kHz, internal, deviation≤N×5 rad		< setting × 2 % (nom.)	
PM distortion	fmod=1 kHz, deviation≤N×5 rad		<0.5 % (nom.)	
Response	10 Hz-100 kHz		<3 dB (nom.)	
Pulse				
Modulation source	Internal, external			
Carrier frequency	1 MHz < f ≤ 6.5 GHz			
On/off ratio	1 MHz < f ≤6.5 GHz		>70 dBc (typ.)	
Rise/fall time (10 %/90 %)	<15 ns (typ.)			
Pulse period setting	40 ns-300 s			
Pulse Generator				
Modulation source	Internal, external			
Pulse type	Single, double			
Pulse period	Setting range		40 ns-300 s	
	Resolution		10 ns	
Pulse width	Setting range		20 ns-300 s	
	Resolution		10 ns	
Double-pulse spacing	Setting range		20 ns-300 s	
	Resolution		10 ns	
Pulse #2	Setting range		20 ns-300s	
	Resolution		10 ns	

Trigger type	Auto, external, ext. gate, key, bus (USB, LAN)	
Trigger edge	Rising, falling	
Trigger polarity	Positive, negative	
Trigger delay range	External trigger	140 ns-300 s
Trigger delay resolution	External trigger	10 ns
Pulse Train Generator		
Pulse Train Generator	Pulse count	1-512
	On/off time	20 ns-300 s
	Repetitions	1-512

Inputs and Outputs

Front Panel Connectors		
RF output	Impedance	50 Ω
	Connector	N-type female
Internal modulation generator (LF) output	Impedance	50 Ω
	Connector	BNC female
Rear Panel Connectors		
External trigger input	Impedance	100 kΩ
	Connector	BNC female
	Trigger voltage	5 VTTL
External modulation input	Impedance	High impedance
	Connector	BNC female
Pulse input/output	Impedance	Input: high impedance; output: 50 Ω
	Connector	BNC female
	Input/output voltage	CMOS 3.3 V
10 MHz external reference input	Impedance	50 Ω
	Connector	BNC female
	Input level range	-5 dBm~10 dBm
10 MHz reference output	Impedance	50 Ω
	Connector	BNC female
	Output level range	>0 dBm
Signal valid output	Impedance	50 Ω
	Connector	BNC female
	Output level	CMOS 3.3 V
Interfaces		
USB-HOST	USB-A 2.0	
USB-DEVICE	USB-B 2.0	
LAN	10/100Base，RJ-45	

General Specifications

Power Supply		
AC input voltage	100 V-240 V，50/60 Hz	
Power consumption	All options active	100 W
Display		
Type	TFT LCD, 800 (RGB) × 480, 5-inch capacitive touchscreen	
Mechanical		
Dimensions	W×H×D=338×113×369 mm	
Net weight	Approx. 5.3 kg	

Mass Storage		
Mass Storage	Nonvolatile FLASH (internal), USB drive	
Data storage capacity	Nonvolatile FLASH (internal)	8G Bytes
Operating Environment		
Humidity	0–30°C, <95 % RH 30°C to 50°C, <75 % RH	
Temperature range	Operating: 0°C–50°C; storage: -20°C–70°C	
EMC and Safety		
EN 61326-1: 2013 / EN 61000-3-2: 2014	Class A	
EN 61000-3-3: 2013	Plt : 0.65 Pst : 1.00; dmax : 4.00 % dc : 3.00 %; dtLim: 3.30 % dt>Lim: 500 ms	
IEC 61000-4-2: 2008	AD ±8.0 kV, CD ±4.0 kV	
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	80 MHz to 1000 MHz: 10 V/m; 1.4 GHz to 2.0 GHz:3 V/m; 2.0 GHz to 2.7 GHz: 1 V/m	
IEC 61000-4-4: 2004 + A1: 2010	AC Line: +/- 1.00 kV	
IEC 61000-4-5: 2005	Line to Line: 1.0 kV, Line to Earth: 2.0 kV	
IEC 61000-4-6: 2008	0.15-80 MHz:3V 1 kHz 80 % AM	
IEC 61000-4-8: 2009	30 A/m, 50/60 Hz	
IEC 61000-4-11: 2004	Voltage Dips:0%/0.5P; 40%/10P; 70%/25P; Short Interruptions Test Level%UT:0%/250P	
Safety		
IEC 61010-1:2010/EN 61010-1:2010		
Canada: CAN/CSA-C22.2 No.61010-1:2012		
RoHS		
2011/65/EU		

Ordering Information and Warranty

Ordering Information	Order No.
Main Unit	
Frequency range: 9 kHz to 1.5 GHz (CW mode)	XSG5015A
Frequency range: 9 kHz to 2.5 GHz (CW mode)	XSG5025A
Frequency range: 9 kHz to 4.5 GHz (CW mode)	XSG5045A
Frequency range: 9 kHz to 6.5 GHz (CW mode)	XSG5065A
Optional Features	
High-stability OCXO reference	7OCXO
Standard Accessories	
Quick guide	————
Power cord (local standard)	————
USB Device cable	7ULD10
N-BNC adapter	7AN-B-6
Optional General Measurement Accessories	
N-N cable, 1 m long, 4.9 mm diameter, 6 GHz	7LN-N-610
N- SMA cable, 1 m long, 4.9 mm diameter, 6 GHz	7LN-SAM-610
SMA-SMA cable, 1 m long, 4.9 mm diameter, 6 GHz	7LSAM-S-610
SMA female adapter	7ASMA-KK-6
N-SMA adapter, 6 GHz	7AN-SAM-6
N-SMA adapter, 3 GHz	7AN-SAM-3
433 MHz receiving antenna	7SAL433
Optional EMI Measurement Accessories	
Near-field probe kit, 1 MHz to 6 GHz: 3 H-field probes (45 mm, 30 mm, 13 mm), 1 E-field probe (3 mm)	ORF5060
Warranty	
3-year main-unit warranty; probes and accessories excluded.	

Note: Order all main units, accessories, and options from your local OWON distributor or OWON.

owon®

Fujian Lilliput Optoelectronics Technology Co., Ltd.

No. 19, Heming Road, Lantian Industrial Zone Zhangzhou 363005 P.R. China
Tel : +86.596.213.0430 E-mail: info@owon.com.cn www.owon.com