

VSG20XX Series Vector Signal Generator



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1. Product Introduction



Saluki vector signal source products have a frequency range of 100kHz to 3/6/12/20/44/50/67GHz, an output power range of -110dBm to +15dBm, a phase noise of -138dBc/Hz@1GHz, a frequency offset of 10kHz, ultra-low phase noise and spurious, an internal baseband real-time modulation bandwidth of up to 1GHz, and an external IQ input with a maximum modulation bandwidth of up to 2GHz. It supports the generation of a variety of modulation signals and has functions such as pre-distortion calibration.

Key Features:

- ✧ Frequency range:
100kHz~3/6/12/20/44/50/67GHz
- ✧ Output power range: -110dBm to +15dBm
- ✧ Phase noise: -138dBc/Hz@1GHz frequency offset
10kHz
- ✧ Internal baseband maximum modulation
bandwidth: 1GHz
- ✧ External baseband maximum modulation
bandwidth: 2GHz
- ✧ Support digital modulation
- ✧ Support multi-tone signal
- ✧ Support multi-carrier digital modulation
- ✧ Support pulse radar
- ✧ Support continuous wave radar
- ✧ Support Gaussian noise
- ✧ Support frequency hopping signal
- ✧ Support pre-distortion calibration and other
functions
- ✧ Ultra-low phase noise and spurious

2. Frequency technical indicators

Frequency range	VSG2003A	100kHz to 3GHz
	VSG2006A	100kHz to 6GHz
	VSG2012A	100kHz to 12GHz
	VSG2020A	100kHz to 20GHz
	VSG2044A	100kHz to 44GHz
	VSG2050A	100kHz to 50GHz
	VSG2067A	100kHz to 67GHz
Resolution	0.01Hz	
Frequency switching speed	≤20ms	

3. Power technical indicators

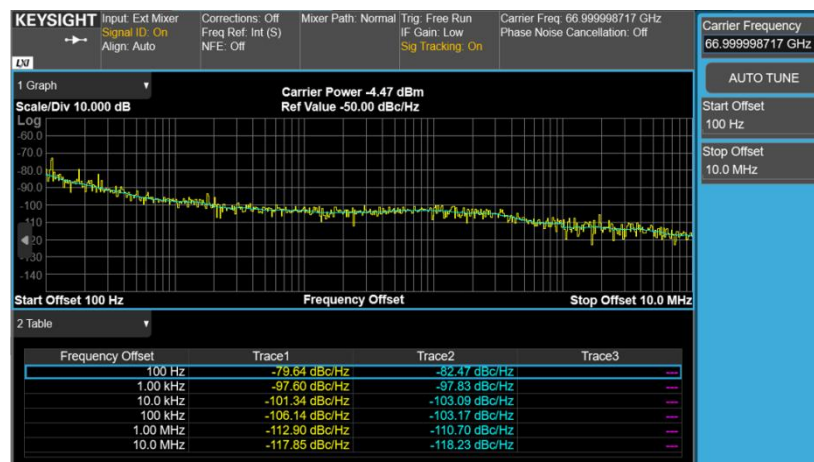
Maximum output power ≥15dBm		
Minimum output power -110dBm		
Power resolution	0.01dB	
Step Attenuator	0 to 110dB (10dB Mechanical Step)	
Absolute level accuracy	100KHz to 20GHz	±0.5dB @ ≥-20dBm
		±1.0dB @ < -20~-65dBm
		±1.5dB @ < -65dBm
	20GHz to 40GHz	±0.8dB @ ≥-20dBm
		±1.5dB @ < -20~-65dBm
		±3.0dB @ < -65dBm
VSWR	40GHz to 67GHz	±1dB @ ≥-20dBm
		±2.0dB @ < -20~-65dBm
		±3.0dB @ < -65dBm
	100kHz to 2GHz	< 1.40: 1@attenuation 10dB
	2GHz to 20GHz	< 1.50: 1@attenuation 10dB
	20GHz to 44GHz	< 1.80: 1@attenuation 10dB
	44GHz to 67GHz	< 2.0: 1@attenuation 10dB

4. Spectral purity technical indicators

4.1 Phase Noise

Phase noise dBc/Hz (output power: 0dBm)

Frequency/Offset	100Hz	1kHz	10kHz	100kHz	1MHz	10MHz
1GHz	-105	-125	-138	-138	-138	-145
5GHz	-92	-114	-124	-124	-126	-145
10GHz	-86	-108	-120	-120	-120	-140
20GHz	-80	-102	-114	-114	-114	-134
40GHz	-75	-95	-105	-105	-110	-120
67GHz	-74	-95	-98	-100	-108	-115



67GHz phase noise test chart

4.2 Harmonic and clutter suppression

Harmonic suppression (output power: +10dBm)

100kHz to 5MHz < -30dBc

5MHz to 200MHz < -40dBc

200MHz to 33.5GHz < -50dBc

Clutter suppression (output power: 0dBm)

10MHz to 2GHz < -70dBc

2GHz to 10GHz < -65dBc

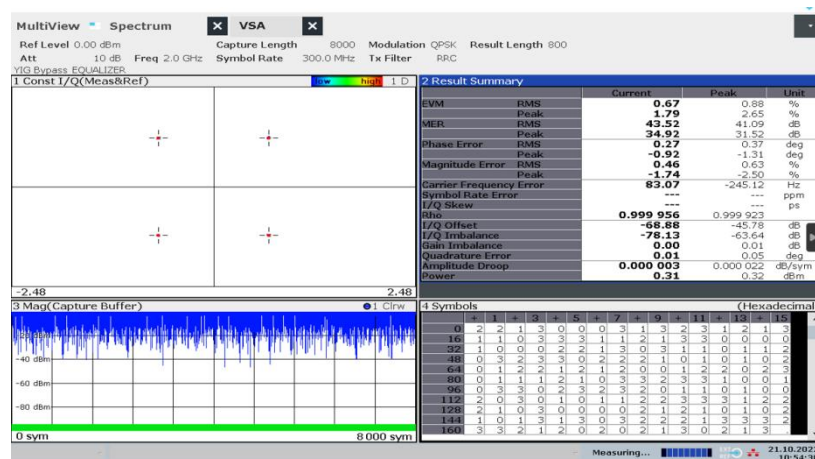
10GHz to 20GHz < -60dBc

20GHz to 44GHz < -55dBc

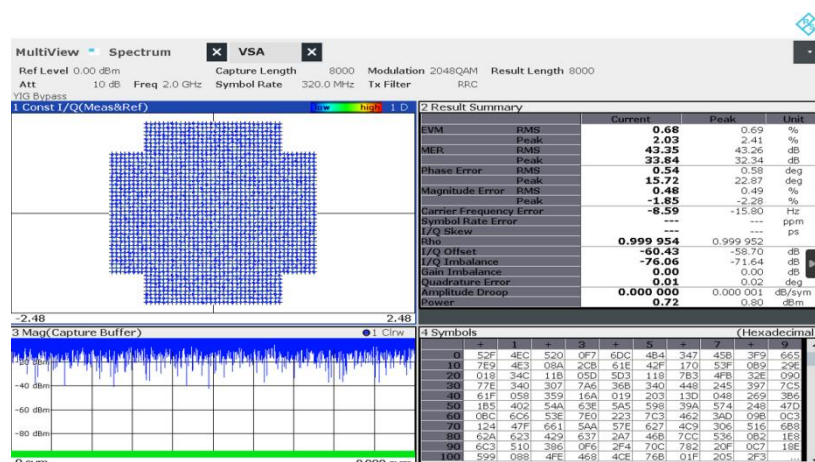
44GHz to 67GHz < -50dBc

5. Digital modulation technical indicators

Working Mode	Internal baseband IQ or external baseband IQ
Internal modulation bandwidth max.	1GHz
External modulation bandwidth max.	2GHz
EVM	< 1% Symbol rate 200MHz
Storage Depth	512Msa
Modulation format	
QAM	4、16、32、64、128、256、1024、2048、4096
PSK	BPSK、QPSK、OQPSK、UQPSK、SQPSK、APSK
FSK	2-FSK、4-FSK、8-FSK、16-FSK、32-
Analog Modulation	FSK AM、FM、PM



2GHz QPSK Symbol Rate 300MHz EVM



2GHz 2048QAM Symbol Rate 320MHz EVM

6. Pulse modulation technical indicators

General Features	
On-off ratio	> 70dB
Minimum pulse width	50ns
Minimum cycle	100ns
External pulse input	
Input Impedance	DC coupled, high impedance
Level Logic	3.3V-CMOS
Internal pulse generator	
Square wave rate	0.1Hz to 5MHz
Pulse period	100ns to 10s
Pulse Width	50ns to 10s
Resolution	5ns
Adjustable trigger delay	5ns to 10s
Level Logic	3.3V-CMOS

7. Reference Characteristics

With internal and external 10MHz reference switching function	
Internal reference frequency stability	$\pm 2e-8$ 0°C ~ +50°C
External reference input power	5dBm $\pm$ 3dBm
Internal reference output power	+10dBm $\pm$ 3dB

8. Interface and structure

RF Output	2.92/2.4/1.85mm , output impedance 50 Ω internal
Pulse output	BNC
External pulse input	BNC
External reference input	BNC
Internal reference output	BNC
External trigger input	BNC
External IQ Input	BNC
Internal IQ output	BNC
Control interface	RJ-45 (TCP/IP over Ethernet) / RS422
Powered by	AC,198 ~ 242VAC, 45Hz ~ 55Hz, 150W (MAX)
Weight	$\leq$ 10kg

9. Signal generation software

The signal generation software mainly includes functional units such as general digital modulation, multi-carrier digital modulation, pulse radar, continuous wave radar, multi-target radar, multi-tone signal, Gaussian noise, single-tone signal, complex electromagnetic environment, frequency hopping signal, and pre-distortion calibration.

9.1 Radar Signals

Radar signal

Create one or more pulse groups

Define each pulse group independently, and use different pulse groups to simulate the scenario where multiple target echoes arrive at the same time

Define frequency and amplitude between and within pulses

Define all pulse parameters, including start time, rise time, end time, fall time, pulse width, etc.

Defining the PRI

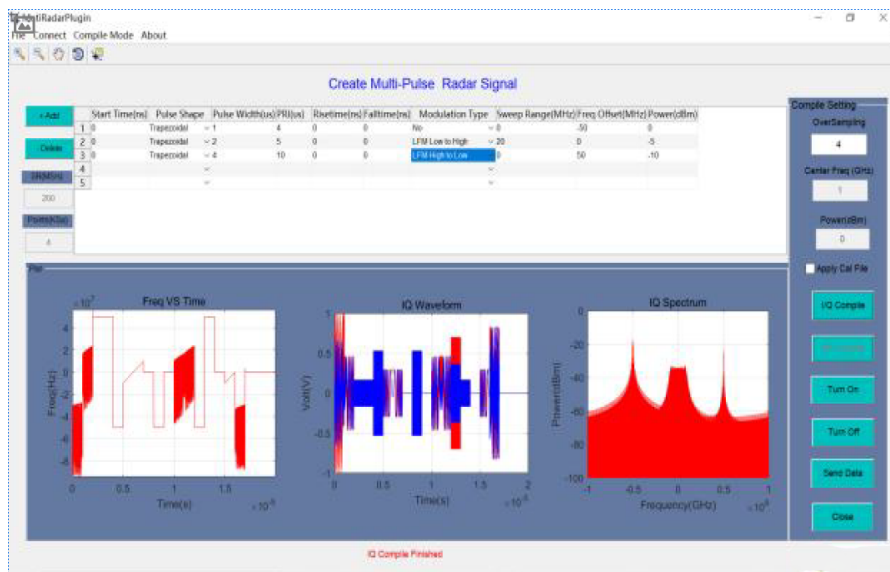
Creating a custom pulse sequence

Supports various types of intra-pulse modulation, including linear frequency modulation, Barker code, Frank, FMCW frequency modulation continuous wave, etc.

Support frequency sliding, frequency diversity, etc.

Supports frequency stagger, frequency sliding, frequency group change, etc.





9.2 Communication Signals

Communication Signal

Define baseband IQ signals, IF signals, and RF signals using various modulation schemes

Generate single or multi-carrier modulated signals, each carrier can be defined independently

Supports multiple modulation formats, including BPSK, Pi/2 BPSK, QPSK, OQPSK, Pi/4-QPSK, Pi/2-QPSK, 8-PSK, O-8PSK, Pi/2-8PSK, 16-PSK, QAM16, Pi/2-QAM16, QAM32, QAM64, QAM128, QAM256, QAM512, QAM1024, QAM2048, QAM4096, APSK16, APSK32, APSK64, APSK128, APSK256, PAM4, QAM8, CPM, DPSK, DQPSK, Pi/2-DPSK, Pi/4-DQPSK, 8-DPSK, 16-DPSK, PAM8, PAM16, 2-FSK, 4-FSK, 8-FSK, 16-FSK, 32-FSK, ASK, OOK, MSK,

Supports I-Q impairments such as quadrature error and gain imbalance

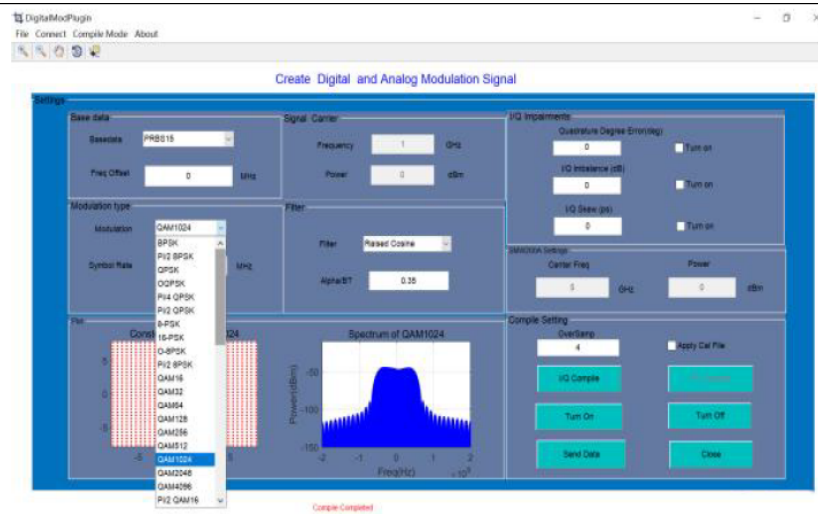
Supports shaping filter types: raised cosine, rectangular, RMS raised cosine, Gaussian, etc.

Up to 50 modulation formats

Support multi-carrier modulation

Define baseband IQ signals, IF signals, and RF signals using various modulation schemes

Generate single or multi-carrier modulated signals, each carrier can be defined independently



9.3 Multi-tone Signal

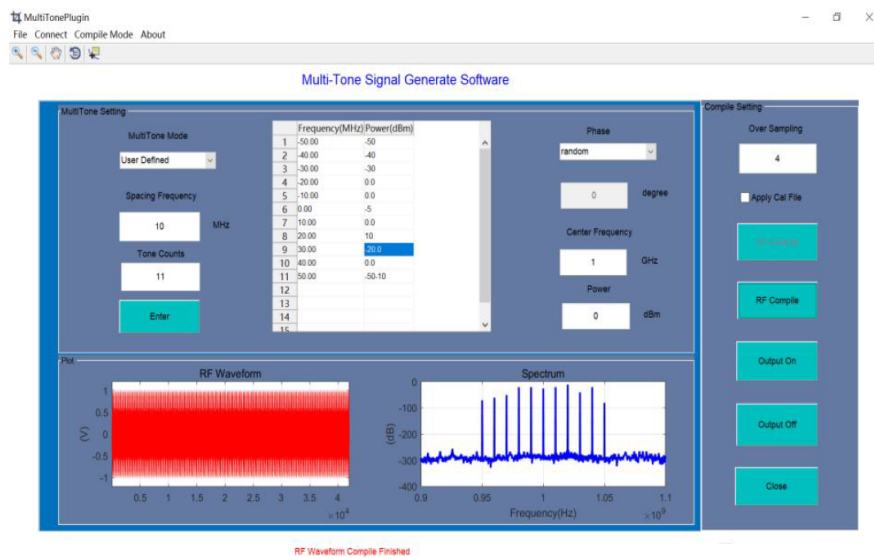
Multi-tone signal

Multi-tone signals can define baseband IQ signals, IF signals, and RF signals

The number of polyphonic sounds and the frequency steps of polyphonic sounds can be customized

The frequency and power of each tone can be customized

You can set the starting phase: random phase or custom phase



9.4 Noise Signal

Noise signal

Noise signals define baseband IQ signals, IF signals, and RF signals

The center frequency and bandwidth of the noise signal can be set

The noise power can be set



9.5 Complex Electromagnetic Environment Signals

Complex electromagnetic environment signals

Communication Signal

Radar signal

Multi-tone signal

Noise signal

Single tone signal

Custom Signals



9.6 Predistortion Calibration

Predistortion Calibration

Supports baseband IQ signal, IF signal and direct AWG signal

The start and end frequencies of the calibration can be set

The frequency step of calibration can be set

The number of iterations can be set

Automatically save pre-distortion calibration data files

External custom data files can be loaded for pre-distortion compensation

The difference in amplitude-frequency and phase characteristics before and after pre-distortion calibration can be compared

Automatic online system calibration can be performed through simple and convenient operation to improve system broadband performance



9.7 Frequency Hopping Signal

Frequency Hopping Signal

Creating Custom Frequency Hopping

Creating pseudo-random frequency hopping

Create custom frequency random hopping

Definable skip speed

Frequency hopping with different intervals can be defined

The power of each hopping frequency can be defined

The frequency hopping start frequency, end frequency and frequency hopping step can be defined



10. General parameters

Power supply	220 to 240Vac, 50 to 60Hz, 280W max
Operating temperature	0 to 55°C
Storage temperature	-40 to 70°C
Relative humidity	20% ~ 80% (+30°C)
Recommended calibration	36 months
ISO Certification	The instrument is manufactured by an ISO9001 certified unit and complies with the quality system requirements

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