Quality&**Precise**

MAXWELLON 1435

9kHz~3GHz/6GHz/12GHz/20GHz/40GHz

Signal Generator

2023

Maxwellon

Based on innovative technologies, the 1435 series signal generator achieves balance in terms of performance, economy and volumetric weight. It also has excellent spectral purity, with a single side band (SSB) phase noise of -136dBc/Hz (when the carrier is 1GHz and the frequency offset is 10kHz) or -116dBc/Hz (when the carrier is 10GHz and the frequency offset is 10kHz).

It provides a high power output and a large dynamic range, with the maximum output power up to 20dBm@20GHz and an output power dynamic range greater than 150dB. It responds fast and switches to another frequency in only 1ms, which shortens the test time and improves test efficiency, meeting the needs of massive data testing; in addition, it also has excellent analog modulation and pulse modulation functions. By adopting advanced frequency synthesis and RF channel signal processing technologies, it can achieve high performance while reducing the cost. Besides, The 1435 series signalgenerator can meet both the test requirements for high performance in the R&D phase and the test requirements for high efficiency in the production phase.

Key Feature

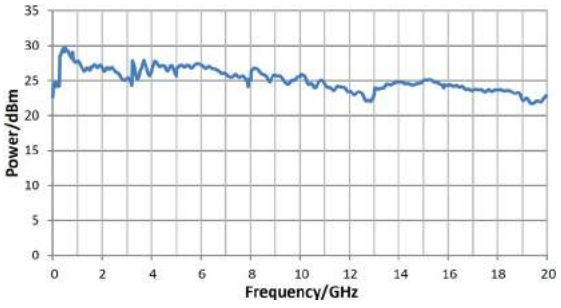
- Wide frequency coverage
- High output power
- Excellent SSB phase noise
- Extremely short frequency switching time
- High performance pulse modulation
- Built-in multi-function function generator
- Small size and light weight
- High-sensitivity LED touch screen

Wide Frequency Coverage

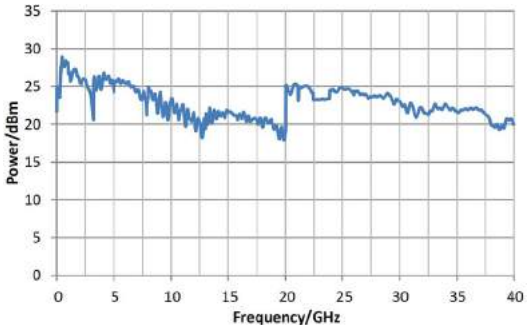
The 1435A/B/C/D/F series signal generator provides a frequency range of 9kHz~3GHz/6GHz/12GHz/20GHz/40GHz. Its lowest frequency can be as low as 9kHz and its highest frequency can be as high as 40GHz, which can meet the needs of wide frequency band testing.

High Output Power

When the H08 high-power output option is selected, the measured value of the full-band output power of the 1435A/B/C/D series signal generator can be above 20dBm and the full-band output power of the 1435F series signal generator can be above 17dBm. In the test where high-power excitation signals are required, the 1435 series signal generator can be used to obtain the required test signal without an external amplifier.



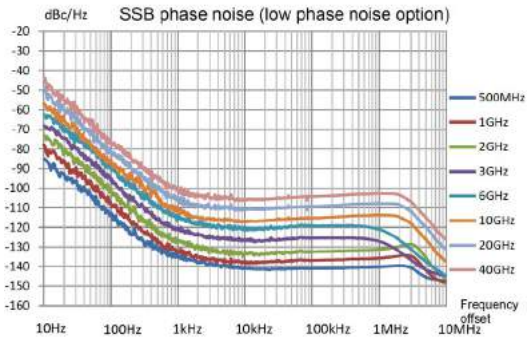
1435D maximum output power (option H08)



1435F maximum output power (option H08)

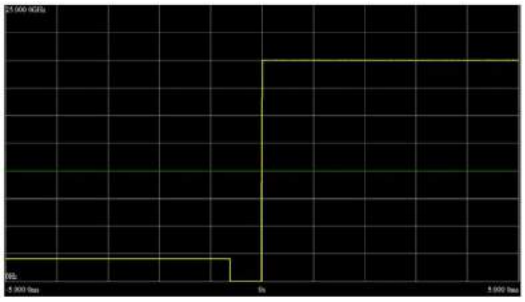
Excellent SSB Phase Noise

The 1435 series signal generator provides two steps of SSB phase noise for users. The standard SSB phase noise is measured at -101dBc/Hz (10GHz@10kHz), and the SSB phase noise can be as low as -116dBc/Hz (10GHz@10kHz) when the low phase noise option is selected. Users can select the phase noise as required to achieve the optimal cost performance.



Extremely Short Frequency Switching Time

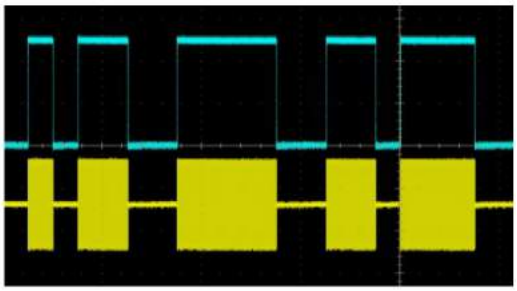
The 1435 series signal generator can realize fast frequency switching in the full frequency band, and the measured frequency switching time is 0.67ms, which can meet the test requirements for high speed.



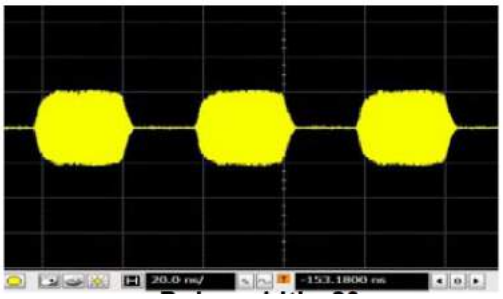
2GHz to 20GHz frequency switching time

High Performance Pulse Modulation

The pulse switch ratio is greater than 80dB, and the rise and fall time is shorter than 10ns. When the narrow pulse option H04 with a minimum pulse width of 20ns, a pulse width range of 20ns~42s-10ns and a step of 10ns is selected, it supports various triggering modes such as gating and external triggering.It's also equipped with the pulse string required in radar test.



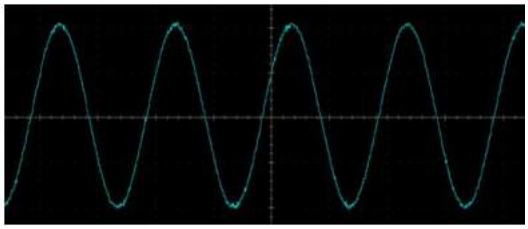
Pulse string



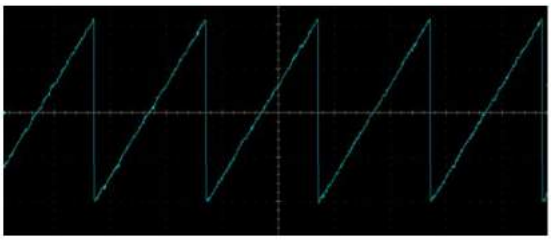
Pulse width: 20ns

Multi-Function Function Generator

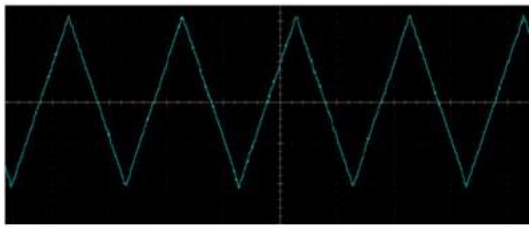
The multi-function function generator consists of seven waveform generators for generating AM/FM/ΦM modulated signals and low-frequency output signals. Two waveform generators can generate a dual-tone modulated signal by internal addition and are used for AM/FM/ΦM. The seven waveform generators include two standard function generators, one double-function generator, one scan function generator, two noise generators, and one DC generator. The DC generator generates DC levels, which can only be used for low frequency output. For the waveform generator, its sine wave frequency range is 0.1Hz~10MHz, and its frequency range of triangle wave, square wave, sawtooth wave and pulse is 0.1Hz~1MHz, and the frequency resolution is 0.1Hz.



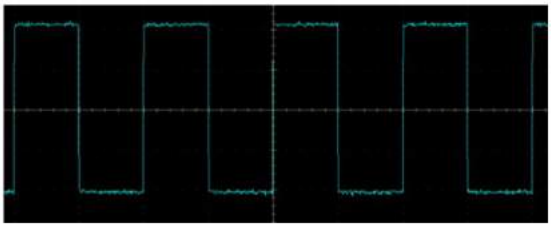
Sine wave



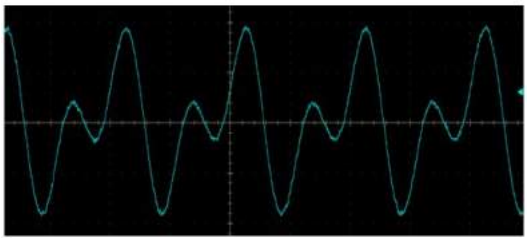
Sawtooth wave



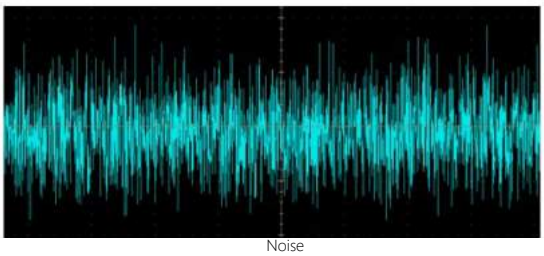
Triangle wave



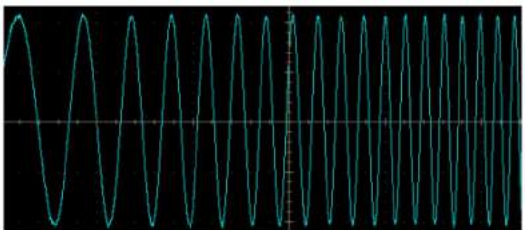
Square wave



Double sine wave



Noise



Frequency sweep sine

Small Size And Light Weight

By adopting the portable 3U-high chassis design, the 1435ABCDF series signal generator has its weight and volume greatly reduced (compared to bench instruments). The heaviest model of this series is 10.9kg, and the lightest model is 7.4kg.

High-Sensitivity Led Touch Screen

The 7-inch wide LED display which supports a resolution of 800 × 480 pixels clearly shows the instrument status information. The combination of the capacitive screen and the tailored window interface enables the 1435ABCDF series signal generator to respond sensitively and accurately to users' touch operations. In addition to the touch screen, the user can also operate the instrument by the panel buttons, the rotary knobs (with the Enter function), and the external keyboard and mouse conveniently and quickly.

Typical Applications

General Test

The 1435 series signal generator provides complete functions and a frequency range of 9kHz~40GHz. It provides AM, FM, ΦM, and PM analog modulation functions and supports step scan and list scan. Also, it has excellent performance. By adopting a design which realizes the balance between performance, economy and volumetric weight, it supports free configuration of various options, which makes it widely available. In respect of cost, it can be used for teaching; in respect of performance, it can be used in laboratory tests.

Defense Test

The 1435 series signal generator supports high-performance pulse modulation, with a pulse-to-modulation switch ratio greater than 80dB, the rise and fall time less than 10ns, and the minimum pulse width of 20ns. It supports various pulse patterns such as pri stagger, prf jittering and pulse string, which is suitable for radar system testing. It has excellent phase noise performance and is available for receiver testing. It has a small size and can be carried along for field testing.

Production Line Test

The 1435 series signal generator takes only 1ms to switch to another frequency. It provides a high test speed, shortens the test time, and improves the test efficiency, thus meeting the requirements of massive data test. It provides a high power output and needs no external power amplifier, thus saving the space and cost. It supports multiple control interfaces such as USB, LAN and GPIB, which facilitates the formation of an automated test system and is suitable for production line test.

Specification[1]

Frequency Properties			
Frequency Range	1435A:9kHz~3GHz 1435B:9kHz~6GHz 1435C:9kHz~12GHz 1435D:9kHz~20GHz 1435F:9kHz~40GHz	Frequency	N (Internal YO harmonic number)
		9kHz≤f<250MHz	1/8
		250MHz<f≤375MHz	1/16
		375MHz<f≤750MHz	1/8
		750MHz<f≤1.5GHz	1/4
		1.5GHz<f≤3GHz	1/2
		3GHz<f≤6GHz	1
		6GHz<f≤12GHz	2
		12GHz<f≤24GHz	4
		24GHz<f≤40GHz	8
Frequency Resolution	0.001Hz		
Frequency Switching Time	<1ms(typical value[2])		
Timebase Aging Rate (typical value)	Standard: $\pm5\times10^{-7}$/year (after continuous switch-on for 30 days)		
	High Stability Time Base option H10: $\pm5\times10^{-10}$/day (after 30-day continuous power-on)		
Reference Output	Frequency	10MHz	
	Power	>+4dBm to 50 Ω load	
Reference Input	Frequency	1-50MHz, 1Hz step	
	Power	0dBm~+7dBm, 50Ω impedance	
Sweep Properties			
Sweep Mode	Step Sweep, List Sweep		
Scan Dwell Time	100μs~100s		
Power Features			
Min. Power	Standard:-15dBm (can be set -20dBm)		
	Option H01:-110dBm (can be set -135dBm)		

Max. Power (25±10°C)	Frequency Range	Standard	High Power Output Option H08
	1435A/B		
	9kHz≤f≤3GHz	18dBm	22dBm
	3GHz<f≤5GHz	16dBm	20dBm
	5GHz<f≤6GHz	15dBm	18dBm
	1435C/D		
	9kHz≤f≤3GHz	16dBm	21dBm
	3GHz<f≤20GHz	15dBm	20dBm
	1435F		
	9kHz≤f≤3GHz	14dBm	20dBm
	3GHz<f≤17GHz	13dBm	17dBm
	17GHz<f≤40GHz	11dBm	15dBm

Power Accuracy (25±10°C)	Standard			
	Power (dBm) / Frequency	10~Max. Power	-10 ~ 10	-15 ~ 10
	9kHz≤f≤2GHz	±0.8dB	±0.6dB	±1.5dB
	2GHz<f≤20GHz	±0.9dB	±0.7dB	±1.5dB
	20GHz<f≤40GHz	±0.9dB	±0.8dB	±1.8dB

Power Accuracy (25±10°C)	H01A/B Programmable Step Attenuator Option				
	Power (dBm) / Frequency	10~Max. Power	-10 ~ 10	-70 ~ 10	-90 ~ 70
	9kHz<f≤2GHz	±0.8dB	±0.6dB	±0.7dB	±1.4dB
	2GHz<f≤20GHz	±0.9dB	±0.7dB	±0.7dB	±1.6dB
	20GHz<f≤40GHz	±0.9dB	±0.8dB	±1.1dB	±2.0dB

Power Resolution	0.01dB	
Output Impedance	50Ω (rated value[3])	
Source Standing Wave Ratio,VSWR (Internal Fixed Amplitude) (Typical Value)	9kHz≤f≤3GHz	<1.7
	3GHz<f≤13GHz	<1.6
	13GHz<f≤20GHz	<1.8
	20GHz<f≤40GHz	<1.6
Max. Reverse Power	0.5W (0V DC) (rated value)	

Spectral Purity[4]

Harmonic Wave (at +10dBm)	9kHz≤f≤10MHz	<-23dBc
	10MHz<f≤2GHz	<-30dBc
	2GHz<f≤6GHz (1435B)	<-30dBc
	2GHz<f≤20GHz	<-55dBc
	20GHz<f≤40GHz	<-50dBc (typical value)
Subharmonic Wave (at +10dBm)	9kHz≤f≤6GHz	None
	6GHz<f≤12GHz	<-60dBc
	12GHz<f≤24GHz	<-55dBc
	24GHz<f≤40GHz	<-50dBc

Non-Harmonic Wave (at 0dBm, 10kHz Frequency Offset)	Frequency	Standard	Low Phase Noise Option
	9kHz≤f≤250MHz	<-54dBc	<-60dBc
	250MHz<f≤3GHz	<-62dBc	<-77dBc
	3GHz<f≤6GHz	<-56dBc	<-71dBc
	6GHz<f≤12GHz	<-50dBc	<-65dBc
	12GHz<f≤24GHz	<-44dBc	<-59dBc
	24GHz<f≤40GHz	<-38dBc	<-53dBc

SSB Phase Noise (dBc/Hz at +10dBm)	Standard				
	Frequency	100Hz	10kHz		
	100MHz	-83	-115		
	250 MHz	-93	-127		
	500MHz	-89	-121		
	1 GHz	-83	-115		
	2 GHz	-77	-109		
	3GHz	-74	-105		
	4 GHz	-71	-103		
	6 GHz	-68	-99		
	10 GHz	-63	-95		
	20 GHz	-57	-89		
	40 GHz	-51	-83		
	Low Phase Noise Option				
	Frequency	100Hz	1kHz	10kHz	100kHz
	100MHz	-83	-112	-131	-131
	250 MHz	-93	-123	-139	-139
	500MHz	-89	-119	-135	-135
	1 GHz	-83	-113	-132	-132
	2 GHz	-77	-107	-126	-126
	3GHz	-74	-104	-121	-121
	4 GHz	-71	-101	-120	-120
	6 GHz	-68	-98	-115	-115
	10 GHz	-63	-93	-113	-113
	20 GHz	-57	-87	-107	-107
	40 GHz	-51	-81	-101	-101
Modulation Features					
Frequency Modulation[5] (Option H02)	Maximum frequency offset: N × 16MHz (N is the number of fundamental harmonic wave) Accuracy (1kHz modulation rate, frequency offset: N × 500kHz): ± (2% × set frequency offset + 20Hz) Modulation rate (3dB bandwidth, frequency offset: N × 500kHz): DC-7MHz Distortion (1kHz rate, frequency offset: N × 500kHz): <0.4%				
Phase Modulation[5] (Option H02)	Maximum phase offset: N × 16rad (N is the number of fundamental harmonic wave) Accuracy (1kHz modulation rate, frequency offset: N × 500kHz): ± (2% × set phase offset + 0.01rad) Modulation rate (3dB bandwidth, phase offset: N × 8rad): DC-1MHz Distortion (1kHz modulation rate, phase offset: N × 8rad): <0.4%				
Amplitude Modulation[5] (Option H02)	Maximum depth: >90% Amplitude modulation accuracy: (1kHz modulation rate, 30% modulation depth): ±(4% × set depth +1%) Amplitude modulation bandwidth(bandwidth: 3dB; modulation depth: 30%; frequency test points: 1GHz, 5GHz, 20GHz, 40GHz): DC~100kHz Distortion (1kHz modulation rate, linear mode, total harmonic distortion, 30% modulation depth): <2%				
Pulse Modulation[6] (Option H03)	Switching ratio	>80dB			
	Rise and fall time	<10ns			
	Minimum pulse of internal fixed amplitude	1μs			
	Minimum pulse of non-fixed amplitude	100ns			
Narrow Pulse Modulation[6] (Option H04)	Switching ratio	>80dB			
	Rise and fall time	<10ns			
	Minimum pulse of internal fixed amplitude	1μs			
	Minimum pulse of non-fixed amplitude	20ns			

Internally Modulated Signal Generator (Option H02)	It provides three independent signals for frequency/phase modulation, amplitude modulation and low frequency output signals **Waveform:** sine wave, square wave, triangle wave, sawtooth wave **Frequency range:** sine wave 0.1Hz~10MHz Square wave, triangle wave, sawtooth wave 0.1Hz~1MHz **Frequency resolution:** 0.1Hz **Low frequency output:** amplitude 0~5V peak (rated value), to 50Ω load
Internal Pulse Generator (Option H03)	Pulse width: 20ns~(42s-10ns) (rated value) Pulse period: 40ns~42s (rated value) Resolution: 10ns
Multi-Function Function Generator	The Multi-function generator consists of 7 waveform generators. The generator can be set separately or five generators can be set simultaneously by using the AM, FM/ΦM and the composite modulation features in the low-frequency output. **Waveform:** Function generator 1: sine wave, triangle wave, square wave, sawtooth wave, pulse Function generator 2: sine wave, triangle wave, square wave, sawtooth wave, pulse Dual function generator: sine wave, triangle wave, square wave, sawtooth wave,pulse, phase offset and amplitude ratio of audio 2 relative to audio 1; Scan function generator: sine wave, triangle wave, square wave, sawtooth wave; Noise generator 1: uniform, Gaussian; Noise generator 2: uniform, Gaussian; DC: LF output only; **Frequency Parameters:** Sine wave: 0.1Hz to 10MHz; Triangle wave, square wave, sawtooth wave, pulse: 0.1Hz to 1MHz; Resolution: 0.1Hz;
General Features	
RF Output Port	1435A/B/C: N type (negative), impedance 50Ω 1435D: 3.5mm (positive), N type (negative) (option H91), impedance 50Ω 1435F: 2.4mm (positive), impedance 50Ω
Maximum Dimensions (width × height × depth)	330mm × 147mm × 397mm (excluding the handle)
	420mm × 147mm × 445mm (including the handle)
Weight	<12kg (the weight varies with the model and option configuration)
Power Supply	100~120VAC, 50~60Hz; or 200~240VAC, 50~60Hz (self-adaptive)
Power Consumption	Less than 300W
Temperature Range	Operating temperature: 0°C~+50°C; storage temperature: -40°C~+70°C

Notes:

1. The 1435 series signal generator can be stored at ambient temperature for 2 hours. After preheating for 30 minutes, the attenuator is automatically coupled (or ALC power is greater than -5dBm) to meet the performance of each indicator within a given working range.

2. The typical value is a supplementary feature given based on the stereotype value, which is only for user reference, and will not be assessed.

3. The rated value refers to the expected performance, or describes the product performance that is useful in the product but is not included in the product warranty.

4. The spectral purity indicates that the point frequency has no modulation mode.

5. The technical specifications of frequency modulation, phase modulation and amplitude modulation are applicable to frequencies above 10MHz.

6. The technical specifications of pulse modulation and narrow pulse modulation are applicable to frequencies above 50MHz.

Ordering Information

Model

Model	Name	Description
1435A	Vector Signal Generator	9kHz~3GHz
1435B	Vector Signal Generator	9kHz~6GHz
1435C	Vector Signal Generator	9kHz~12GHz
1435D	Vector Signal Generator	9kHz~20GHz
1435F	Vector Signal Generator	9kHz~40GHz

Standard

No.	Name	Description
1	Power Cord	Standard three core power cord
2	Product certificate	

Options

Option Model	Name	Description
1435-H01	115dB Programmable Step Attenuator	Expand the output power dynamic range.
1435-H02	Analog Modulation	Increase analog modulation functions, including AM, FM, ΦM, and low frequency output.
1435-H03	Pulse Modulation	Increase the pulse modulation function with a minimum pulse width of 100ns.
1435-H04	Narrow Pulse Modulation	Increase the pulse modulation function with a minimum pulse width of 20ns.
1435-H05	Multi-function Function Generator	Add a richer analog modulation signal format. (Note: The H05 option is available after the H02 analog modulation option is selected).
1435-H06	Low Phase Noise	Optimize SSB phase noise, 10GHz@10kHz:-113dBc/Hz.
1435-H08	High Power Output	Increase the maximum output power.
1435-H10	High Stability Time Base Option	Internal time base aging rate.
1435-H50	Calibration Certificate	Instrument calibration.
1435-H91	N type Connector for RF Output	N type connector for RF output, applicable to 1435D.
1435-H92	RF Output Moving to the Rear Panel	RF output on rear panel.
1435-H93	Portable Handle	3U handle.
1435-H94	Rack Mount Kit	Mounting kit for the upper cabinet.
1435-H95	Aluminum alloy Transport Case	High-strength lightweight aluminum alloy transport case with handle and universal roller for easy transportation.
1435-H98	English Kit	English panel, English manual, English operation interface and English operating system.
1435-S01	Arbitrary Wave	Support arbitrary wave data download and broadcast, generate baseband signal or realize signal replay, only for 1435-V
1435-S02	Linear Frequency Modulation	Support linear frequency modulation function, only for 1435-V
1435-S03	White Gaussian Noise	Support pure noise generation, additive noise, continuous wave interference function, only for 1435-V

Maxwellon Electronic Instruments Co.,LTD.

Factory: No.6 XiangJiang Road, Qingdao 266000, China
Tel: 0086 13816527810

Sales Office: NO.153 Zhuzhou Rd.,Laoshan District, Qingdao 266100, China.
Tel: 0086-532-80977508
Fax: 0086-532-80977508

Sales: Sales@Maxwellon.com
Web: www.maxwellon.com