Ceyear

1434 series

Vector Signal Generator

1434AV/ 1434BV
(9kHz - 3/6GHz /7.5GHz)

Ceyear Technologies Co., Ltd

Product Overview

The 1434AV/BV is an economical vector signal generator with a frequency range of 9kHz to 3GHz/6GHz/7.5GHz and a maximum modulation bandwidth of 240MHz. It features a built-in baseband signal generator that supports real-time generation of over 30 common digital modulation formats, including PSK, QAM, FSK, and MSK. It also features arbitrary waveform playback and, when used with signal simulation software, can generate signals for various communication protocols, including 5GNR, LTE, WCDMA, GSM, WLAN, and Bluetooth.

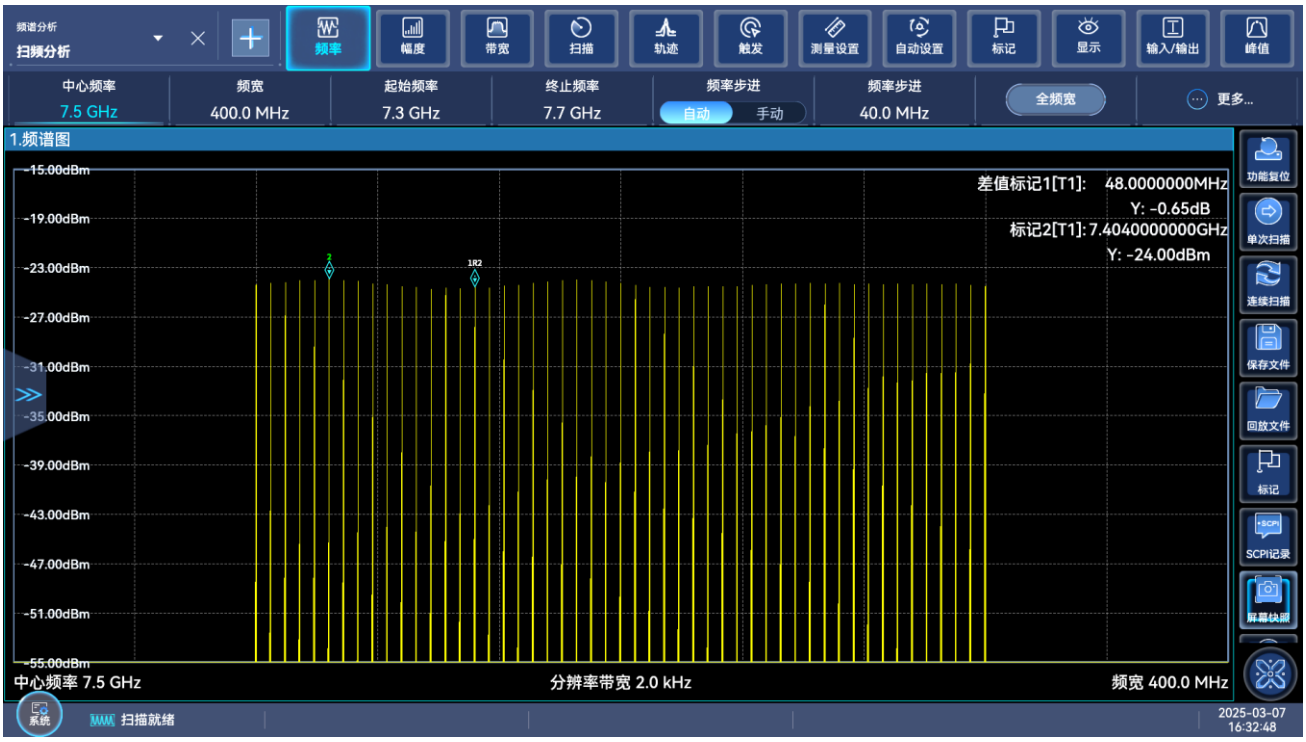
Its narrow 2U chassis weighs as little as 4kg, offering excellent portability and compactness, meeting the cost-effective testing needs of various fields and scenarios, including communications, industrial electronics, and universities.

Main Features

- Frequency range of 9kHz to 3/6GHz and 7.5GHz
- Large dynamic range power output
- Standard 120MHz modulation bandwidth. The Maximum modulation bandwidth can be 240MHz
- Comes standard with real-time generation of over 30 standard digital modulation patterns
- Supports download and playback of user-defined simulation data, capable of generating signals for various communication protocols, including 5G NR, LTE, WCDMA, GSM, WLAN, and Bluetooth
- Excellent vector modulation performance, with an EVM of 0.5% (5G NR, 3.5GHz, measured value)
- Standard features include frequency modulation, phase modulation, amplitude modulation, and pulse modulation.
- Reverse power burnout protection, DC-50V, AC-50W (1GHz).
- Supports cross-platform client and browser access control.
- Supports USB power meter for test display and power flatness calibration.
- Supports SCPI command recording and generates programmable example projects in Qt, C#, and C++.
- Supports programmable control via USB and LAN interfaces.
- 2U narrow chassis design allows for side-by-side deployment of two units in a standard 19-inch cabinet. Weighing as little as 4kg, it's easy to move.

Maximum 240MHz Modulation Bandwidth

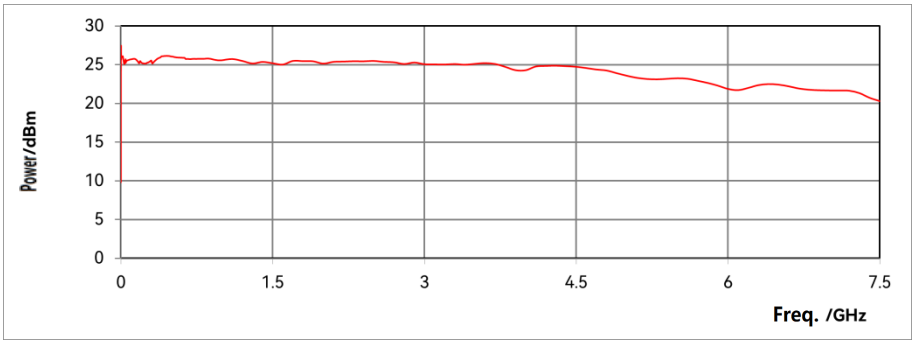
1434AV/BV vector signal generator offers a standard 120MHz and maximum 240MHz modulation bandwidth. The frequency response is better than 1dB. It supports flexible bandwidth options of 120MHz and 240MHz to meet diverse communication testing needs, including those for 4G and 5G.



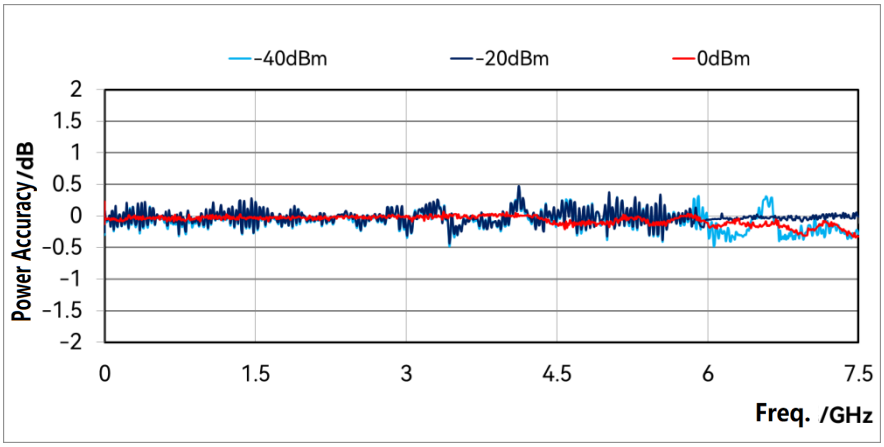
1434BV 240MHz modulation bandwidth multi-tone signal spectrum (7.5GHz)

High-Reliability, High-Dynamic Power Output

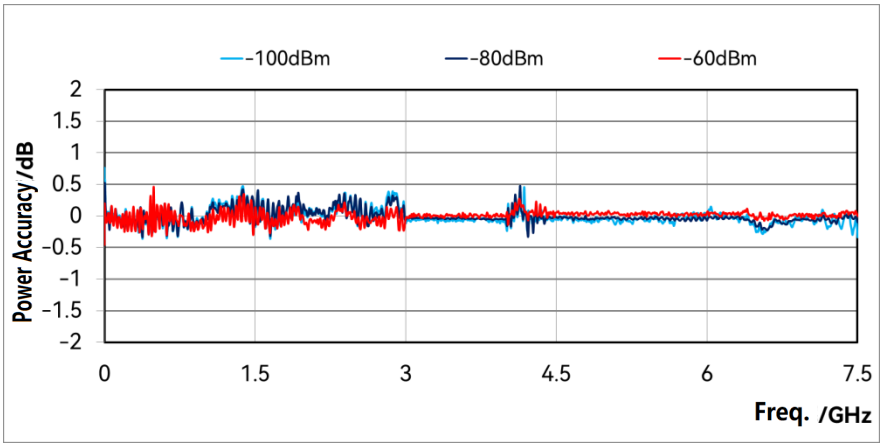
The standard high-reliability, high-dynamic electronic attenuator delivers a maximum output power of +25dBm (measured) and a minimum output power of -120dBm, with a power accuracy of <0.5dB (measured).



1434BV maximum output power (Mesaured value)



1434BV output power accuracy at 0, -20, -40 dBm (Mesaured value)

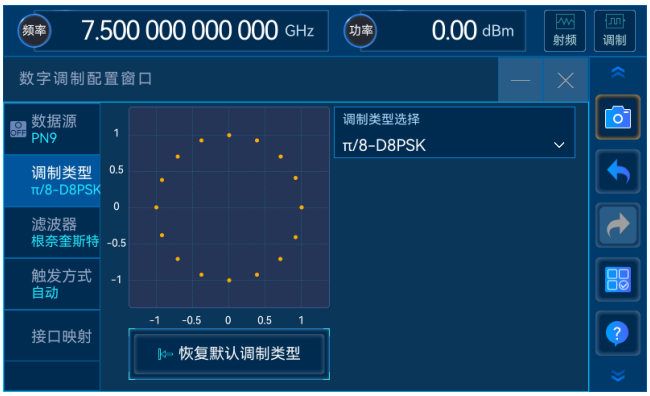


1434BV output power accuracy at -60, -80, -100 dBm (Mesaured value)

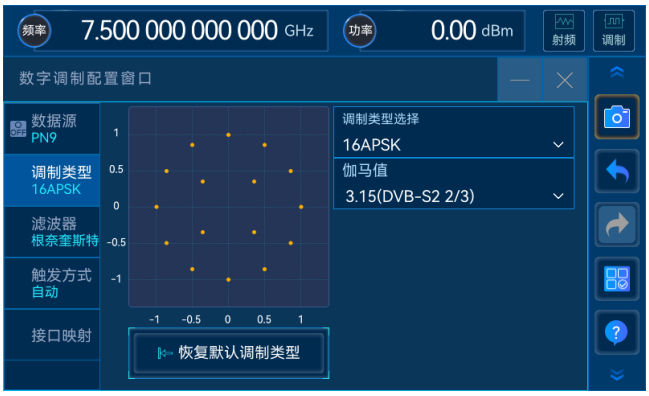
Supports real-time generation of standard digital modulation signals

The standard real-time generation of over 30 standard digital modulation patterns significantly reduces generation time compared to arbitrary waveform methods, offering a significant speed advantage in high-speed testing scenarios.

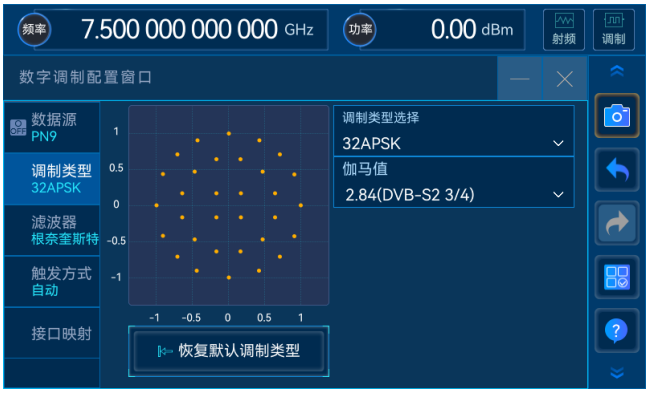
- PSK: BPSK, QPSK, QPSK 45° offset, QPSK EDGE, AQPSK, OQPSK, π/4-QPSK, π/2-DBPSK, π/4-DQPSK, π/8-D8PSK, 8PSK, 8PSK EDGE
- QAM: 16, 32, 64, 128, 256, 512, 1024, 2048, 4096
- FSK: 2, 4, 8, 16, 32, 64, customized FSK
- APSK: 16APSK, 32APSK
- ASK, MSK, custom IQ files



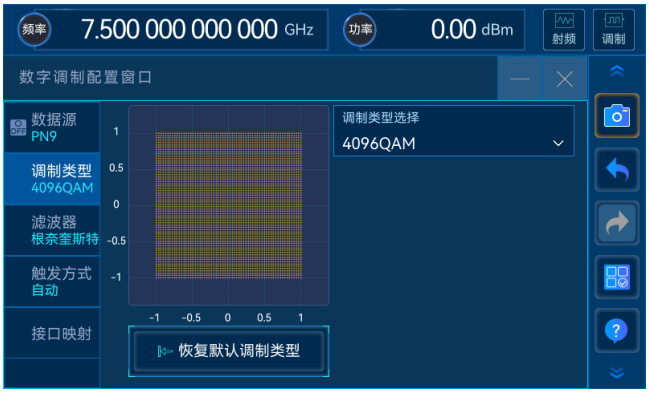
π/8-D8PSK modulation



16APSK modulation



32APSK modulation

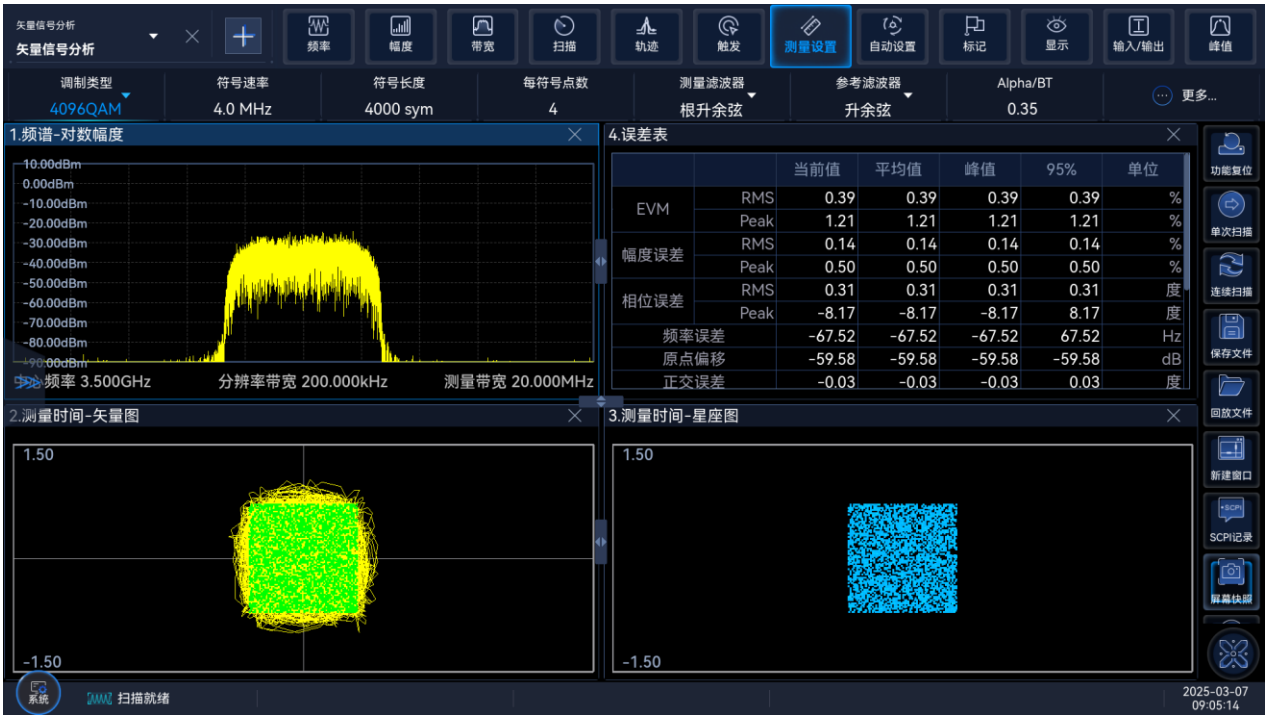


4096QAM modulation

Excellent Vector Modulation Accuracy

The 1434AV/BV vector signal generator offers exceptional vector modulation accuracy, with an EVM of 0.5% (5G NR, 3.5GHz carrier, measured) and an ACLR of -55dBc (5G NR, 3.5GHz carrier, measured). This makes it suitable for performance evaluation in communications equipment R&D and performance testing in production lines.

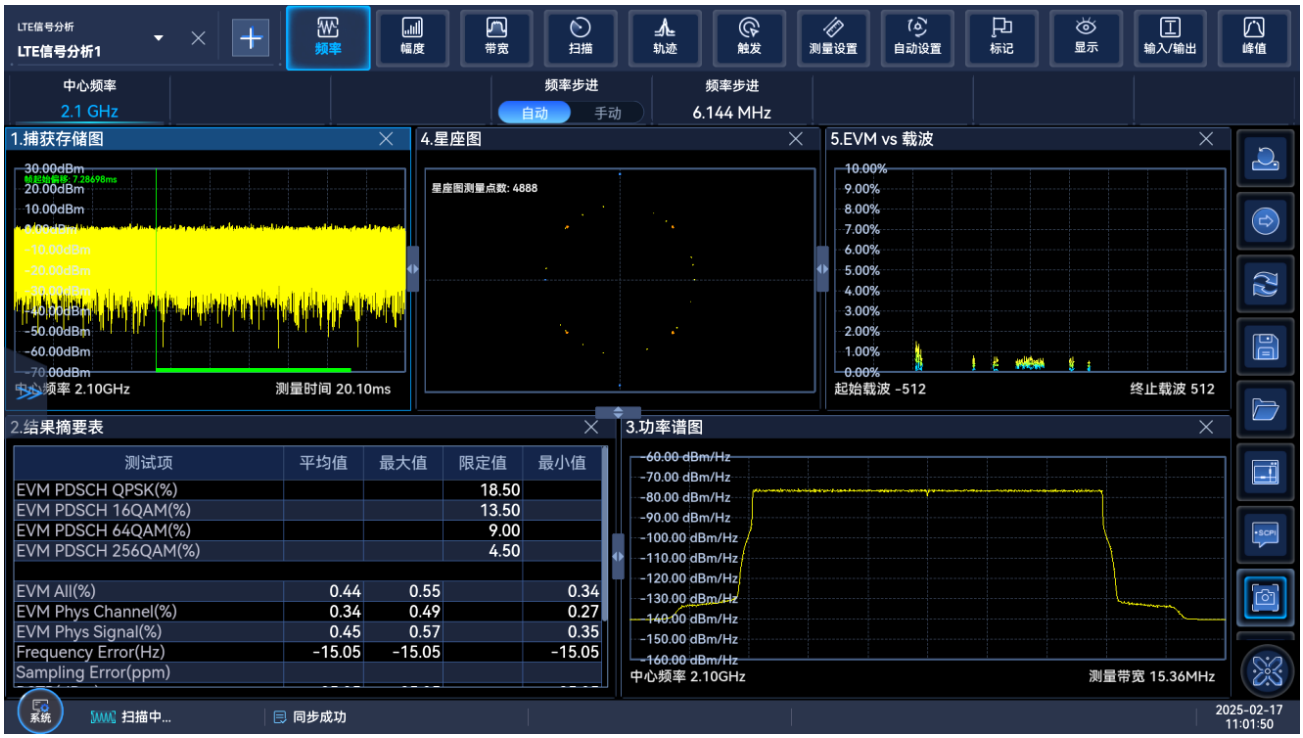
EVM Measurment Results（2.2GHz，QPSK，4Msps）



EVM Measurment Results（3.5GHz，4096QAM，4Msps）

EVM Measurment Results（5GNR FR1,100MHz,256QAM,30kHz SCS，3.5GHz）

ACLR Measurment Results（5GNR FR1,100MHz,256QAM,30kHz SCS，3.5GHz）



EVM Measurment Results（LTE, 10MHz LTE E-TM3.1,2.1GHz）

ACLR Measurment Results（LTE, 10MHz LTE E-TM3.1,2.1GHz）

Downloading and playback of user-defined simulation data, enabling simulation of various communication protocol signals.

The 1434AV/BV vector signal generator, when paired with signal simulation software, can generate and automatically download signals for various communication protocols, including 5GNR, LTE, WCDMA, GSM, WLAN, LoRa, and Bluetooth.

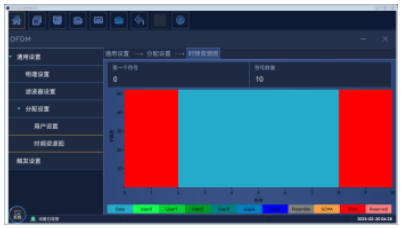
1434AV/BV supports signal simulation software

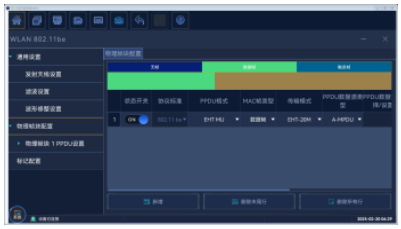

Simulation of 5G NR


Simulation of LTE/LTE-Advanced


Simulation of WCDMA


Simulation of GSM


Simulation of OFDM


Simulation of WIFI6


Simulation of eMTC


Simulation of UWB


Simulation of LoRa

Supports USB power meters for test display and power flatness calibration and compensation

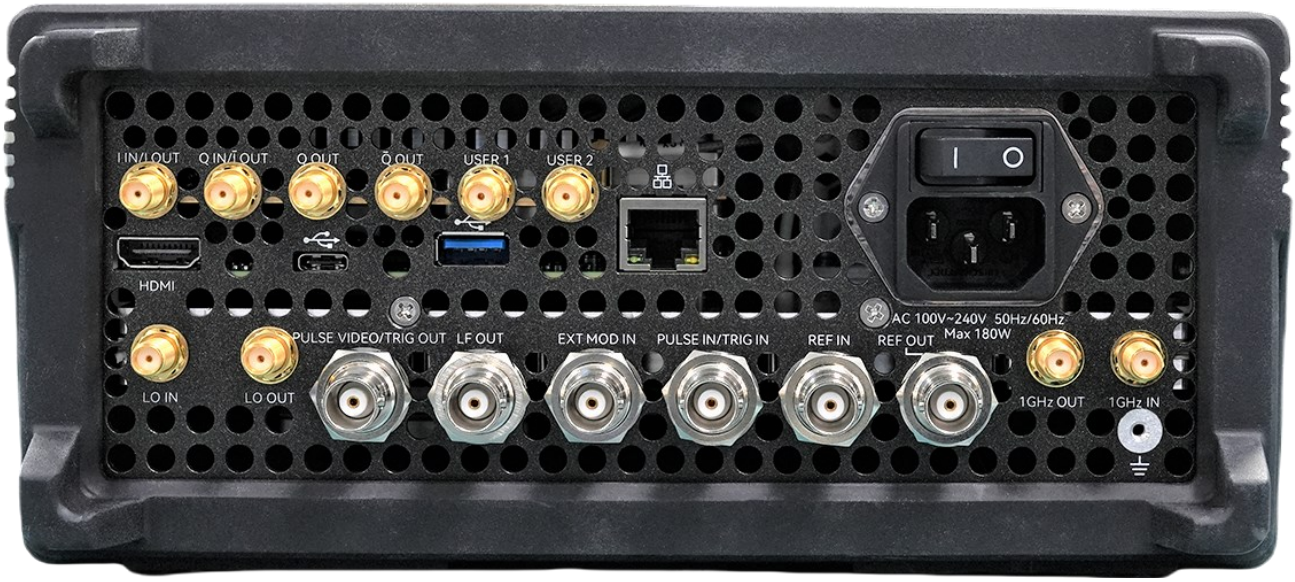
The 1434AV/BV vector signal generator supports power sensors from various manufacturers, including CSI Technology, for test display and can perform power flatness calibration and compensation using these sensors.

USB power measurement screen

Supports SCPI command recording

The 1434AV/BV vector signal generator supports SCPI command recording. This feature automatically generates programmable example projects in Qt, C#, and C++, making programmable control easier.

SCPI command recording



Rear Panel of 1434AB/BV Signal Generator

1434AV/BV Vector Signal Generator (9kHz – 3/6GHz, 7.5GHz)

Technical Specifications

<table>
<tr><th colspan="6">Frequency Characteristics</th></tr>
<tr><td rowspan="7">Frequency range</td><td colspan="2" rowspan="7">1434AV:
9kHz ~ 3GHz
9kHz ~ 6GHz (1434AV-H20-06)
1434BV: 9kHz ~ 7.5GHz</td><td>Frequency range</td><td colspan="2">N (YO Harmonic Order)</td></tr>
<tr><td>9kHz≤f≤250MHz</td><td colspan="2">1/8</td></tr>
<tr><td>250MHz < f≤312.5MHz</td><td colspan="2">1/32</td></tr>
<tr><td>312.5MHz < f≤625MHz</td><td colspan="2">1/16</td></tr>
<tr><td>625MHz < f≤1.25GHz</td><td colspan="2">1/8</td></tr>
<tr><td>1.25GHz < f≤2.5GHz</td><td colspan="2">1/4</td></tr>
<tr><td>2.5GHz < f≤5GHz</td><td colspan="2">1/2</td></tr>
<tr><td>Frequency Resolution</td><td colspan="5">0.001Hz</td></tr>
<tr><td>Frequency accuracy</td><td colspan="5">±3×10^{-8} (Factory calibration accuracy, 25℃±10℃)</td></tr>
<tr><td>Switching speed</td><td colspan="5">≤5ms</td></tr>
<tr><td>Aging rate
(Typical [1])</td><td colspan="5">±5×10^{-10} /day (Powered after 30 days), ±5×10^{-8} /year</td></tr>
<tr><td rowspan="2">Reference output</td><td>Frequency</td><td colspan="2">10MHz</td><td colspan="2">1GHz</td></tr>
<tr><td>Power</td><td colspan="2">>+4dBm，impedance 50Ω</td><td colspan="2">Power>-10dBm，impedance 50Ω</td></tr>
<tr><td rowspan="2">Reference input</td><td>Frequency</td><td colspan="2">1 ~ 100MHz，step 1MHz</td><td colspan="2">1GHz</td></tr>
<tr><td>Power</td><td colspan="2">-5dBm ~ +10dBm，
impedance 50Ω</td><td colspan="2">-10dBm ~ +5dBm，impedance 50Ω</td></tr>
<tr><th colspan="6">Sweep Characteristics</th></tr>
<tr><td>Sweep mode</td><td colspan="5">Step sweep, List sweep</td></tr>
<tr><th colspan="6">Power Characteristics</th></tr>
<tr><td>Minimum Output Power
(25℃±10℃)</td><td colspan="5">9kHz≤f≤100kHz: -90.0dBm
f > 100kHz: -120.0dBm</td></tr>
<tr><td rowspan="5">Maximum Output Power
(CW，25±10℃)</td><td colspan="2">Freuency</td><td colspan="3">Standard configuration</td></tr>
<tr><td colspan="2">9kHz≤f≤100kHz</td><td colspan="3">≥+5.0 dBm</td></tr>
<tr><td colspan="2">100kHz < f≤1MHz</td><td colspan="3">≥+15.0 dBm</td></tr>
<tr><td colspan="2">1MHz < f≤3GHz</td><td colspan="3">≥+20.0 dBm</td></tr>
<tr><td colspan="2">3GHz < f≤7.5GHz</td><td colspan="3">≥+15.0 dBm</td></tr>
<tr><td rowspan="3">Power Accuracy [2]
(25±10℃)</td><td>Powe(dBm)
Freq.</td><td>-120 ≤ P≤-90
(Typical [2])</td><td>-90 < P ≤-50</td><td colspan="2">-50 < P ≤ P_{max}</td></tr>
<tr><td>9kHz≤f≤1MHz</td><td>—</td><td>±0.9dB</td><td colspan="2">±0.7dB</td></tr>
<tr><td>1MHz < f≤7.5GHz</td><td>(±1.6dB)</td><td>±0.9dB</td><td colspan="2">±0.7dB</td></tr>
<tr><td>Power resolution</td><td colspan="5">0.01dB</td></tr>
<tr><td>Impendance</td><td colspan="5">50Ω (Rated [3])</td></tr>
<tr><td rowspan="2">VSWR
(internal ALC on) (typ)</td><td colspan="3">100kHz≤f≤6GHz</td><td colspan="2">< 1.6</td></tr>
<tr><td colspan="3">6GHz < f≤7.5GHz</td><td colspan="2">< 1.8</td></tr>
<tr><td rowspan="4">Maximum reverse power (Rated)</td><td>Frequency</td><td colspan="2">AC</td><td colspan="2">DC</td></tr>
<tr><td>1MHz≤f≤1GHz</td><td colspan="2">50W</td><td colspan="2">50V</td></tr>
<tr><td>1GHz < f≤2GHz</td><td colspan="2">25W</td><td colspan="2">50V</td></tr>
<tr><td>2GHz < f≤7.5GHz</td><td colspan="2">10W</td><td colspan="2">50V</td></tr>
</table>

Spectrum Purity Characteristics [4]			
Harmonics (dBc at +10dBm or maximum specified output power, whichever is lower)	100kHz≤f≤6GHz	< -30dBc	
	6GHz < f≤7.5GHz	< -55dBc	
Sub-harmonics (at +10dBm or maximum specified output power, whichever is lower)	9kHz≤f≤6GHz	<-80dBc	
	6GHz < f≤7.5GHz	<-55dBc	
Non-harmonics (dBc at 0dBm, for offset > 10kHz)	9kHz≤f≤250MHz	< -56dBc	
	250MHz < f≤5GHz	< -70dBc	
	5GHz < f≤7.5GHz	< -64dBc	
SSB phase noise (dBc/Hz, at +10dBm or maximum specified output power, whichever is lower)	Offset / Frequency	10kHz/20kHz	
	100MHz	< -119	
	500MHz	< -122	
	1GHz	< -122	
	3GHz	< -108	
	6GHz	< -102	
	7.5GHz	< -102	
Modulation Characteristics			
Frequency modulation (f≥10MHz)	Maximum deviation: N×4MHz (N: YO harmonic number) Accuracy (1kHz modulation rate, Freu. Offset: N×500kHz): < ±(2.0%× set frequency offset +20Hz) Modulation rate (3dB bandwidth, N×500kHz frequency offset)): DC ~ 100kHz Distortion (at 1kHz modulation rate, Frequency Offset ×500kHz): < 0.4%		
Phase modulation (f≥10MHz)	Maximum phase deviation: N×5rad (N: YO harmonic number) Accuracy (1kHz modulation rate, phase offset N×5rad) : < ±(2.0%× setting deviation +0.01 rad) Modulation rate (3dB bandwidth, Phase offset N×5rad) : DC ~ 100kHz Distortion (1kHz modulation rate, phase offset N×5rad) : < 0.4%		
Amplitude modulation (f≥10MHz)	Maximum depth: > 90% Accuracy (1kHz modulation rate,30% modulation depth): ± (4%×Setting depth+1%) Modution rate (3 dB bandwidth, 30% modulation depth: DC ~ 100kHz Distortion (1kHz modulation rate, 30% modulation depth) : < 2.0%		
Pulse modulation (f≥50MHz)	On/Off ratio	≥80dB	
	Rise/fall times	≤15ns	
	Repetition frequency	0.023Hz to 25MHz	
	Minimum pulse width	20ns	
Low Frequency Out	Waveform	sina, square, triangle, sawtooth, noise, double sine, sweep sine	
	Frequency	sine, double sine, sweep sine	0.1Hz ~ 10MHz
		square, triangle, swatooth	0.1Hz ~ 1MHz
	Amplitude	1mVpp ~ 5Vpp	
Vector modulation accuracy	Common modulation formats (symbol rate 4 Msps, root Nyquist filter, α = 0.3, QPSK format): <1.0% (100 MHz < f ≤ 7.5 GHz)		

(EVM, RMS%, after calibration, 0dBm, 25℃ ±10℃)	WCDMA (symbol rate 3.84 Msps, root Nyquist filter, α = 0.22, QPSK format): <1.0% (2 GHz, 0 dBm) 5GNR: (Test Model 3.1a, 100 MHz, 256QAM, 30 kHz SCS): <1.0% (100 MHz, 3 GHz)
Adjacent channel power ratio (ACLR, after calibration, 25℃±10℃)	WCDMA: (Symbol rate 3.84Msps, Root Nyquist filter, α = 0.22, QPSK format) >60dBc (2GHz, 0dBm) 5GNR: (Test Model 3.1a, 100MHz, 256QAM, 30kHz SCS) >50dBc (3.5GHz, 0dBm)
Internal Modulation Bandwidth	Internal Modulation Bandwidth (Carrier 900MHz, 1.8GHz, 2.4GHz, 6GHz, 7.5GHz) Standard: 120MHz (multi-tone, 51 tones, carrier ≥ 300MHz, frequency spacing 2.4MHz); Option H31-240: 240MHz (multi-tone, 51 tones, carrier ≥ 900MHz, frequency spacing 4.8MHz)
External modulation bandwidth	External modulation bandwidth (carrier 3GHz, 7GHz) Standard: 240MHz (leveled open-loop, I channel input 500mVpp sine wave, frequency response ±5.0dB)
Internal baseband signal generator (Rated)	Number of channels: 2 (I and Q) Maximum symbol rate: Standard: 37.5Msps Option H31-240: 75Msps Baseband waveform memory: 1G samples (4GByte storage capacity) EVM: <0.5% (typical) (RMS%, symbol rate 4Mps, root Nyquist filter, α = 0.3, QPSK) Baseband Modes: Digital Modulation, Multi-Tone Modulation, Arbitrary Waveform, Intra-Pulse Modulation Digital Modulation Generation Method: Real-Time Baseband Digital Modulation Data Source: PN Sequence, Custom Sequence, File Stream Digital Modulation Formats: PSK：BPSK、QPSK、QPSK 45° offset、QPSK EDGE、AQPSK、OQPSK、π/4-QPSK、π/2-DBPSK、π/4-DQPSK、π/8-D8PSK、8PSK、8PSK EDGE QAM：16、32、64、128、256、512、1024、2048、4096 FSK：2、4、8、16、32、64、Self-defined FSK APSK：16APSK、32APSK ASK、MSK、Self-defined IQ files Maximum frequency interval for multi-tone modulation (H31-240): 240 MHz Maximum clock frequency for arbitrary waveform modulation (H31-240): 300 MHz
	Trigger modes: Continuous, Single, Gated Trigger sources: Key, External Trigger types: Auto, Trigger, Real-time, Single-shot with repetitive triggering ignored, Single-shot buffered repetitive triggering, Single-shot real-time repetitive triggering, Gated active high, Gated active low
	Arbitrary Waveform Markers: Number of Marker Interfaces: 2 Marker Types: Constant (with custom header), Start, Pulse, Predefined Pattern, Fixed On/Off Ratio

General Characteristics	
RF output port	N Type(femal), Impendance 50Ω
Dimension (W×H×D)	Dimension (Excludes handle and protective bottom corner) (213.0±1.2) mm× (88.1±0.8) mm× (300.0±1.2) mm
Weight	< 6kg (weight depend on product model and options)
Power Supply	100 ~ 120VAC，50 ~ 60Hz；or 200 ~ 240VAC，50 ~ 60Hz（automatic adaptive）
Power Consumption	< 100W
Temperature Range	Operating temperature: 0℃ ~ +40℃；Storage temperature：-40℃ ~ +70℃

Remarks:

1. Typical values refer to product performance information outside the guaranteed specifications. These specifications are achieved by approximately 80% of instruments within the temperature range of 20℃ to 30℃. Typical values exclude measurement uncertainty.

2. Measured values are actual data from a specific instrument and are representative. They are provided for user reference only and are not subject to verification.

3. Rated values indicate expected performance or describe product performance that is useful in a product but is not covered by the warranty.

4. Spectral purity specifications are under point-frequency, unmodulated mode.

Ording Information

Mainframe Unit

1434AV Signal Generator: 9kHz ~ 3GHz (Standard Configuration)
9kHz ~ 6GHz (Option of 1434A-H20-06)

1434BV Signal Generator: 9kHz ~ 7.5GHz

Standard Configuration

No.	Description	Remarks
1	Power cable assembly	
2	The Product certificate of conformity	/

Options

No.	Options	Opotion Name	Function and performance descriptions
1	1434-H04	Low Phase Noise	Optimized phase noise, 10GHz@10kHz: -112dBc/Hz.
2	1434AV-H20-06	Frequency Extension	To expand the frequency to 6GHz for 1434A signal generator.
3	1434-H31-240	240MHz Modulaton Bandwidth	Internal Modulaton Bandwidth 240MHz, for 1434AV/BV
4	1434-H94-212	Rack mount kit	Mount kit for rack of 1434AV/BV
5	1434-H98	English version	English version of front/rear panel and software.
6	1434-H100	User Manual paper version	A detailed user manual in hard copy is provided.
7	1434AV-JL	Metrology Certificate	Metrolgoy Certificate Report. For 1434AV
8	1434BV-JL	Metrology Certificate	Metrolgoy Certificate Report. For 1434BV
9	1434AV-EWT1	Extend 1 year warranty	Extend 1 year warranty after 3 years standard warranty. For 1434AV
10	1434BV-EWT1	Extend 1 year warranty	Extend 1 year warranty after 3 years standard warranty. For 1434BV

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