



# 1466-V Series Vector Signal Generator

1466C/D/E/G/H/L-V

(6kHz to 13GHz/20GHz/33GHz/45GHz/53GHz/67GHz)



**Ceyear Technologies Co., Ltd**

# Product Overview

Ceyear 1466-V series signal generator is a general-purpose test instrument for microwave and millimeter-wave cutting-edge testing, with wide frequency coverage, large RF modulation bandwidth, high signal spectral purity, output power with high accuracy and large dynamic range, and excellent vector modulation accuracy and ACPR performance, with single-machine dual-RF channel and multi-machine cascade design, can meet your various test requirements. Rich built-in functions such as analog modulation, digital modulation, fading simulation, and AWGN make daily testing more convenient. Cooperate with simulation software to realize multi-scenario signal simulation, which makes it easy to support complex scenarios such as wireless communication, mobile communication.

The new upgrade of human-computer interaction, with large screen touch graphics guided interaction, mobile browser access control, multi-manufacturer power meter connection identification, multi-client deployment, SCPI command recording, control interface customization and a series of new functions to bring user's test happiness. The Ceyear 1466-V series signal generator is ideal for high standard testing from component level to system level.



## Main Features

### Excellent RF Performance

- Coaxial frequency coverage: 6kHz to 13GHz/ 20GHz/ 33GHz/ 45GHz/ 53GHz/ 67GHz;
- Excellent spectral purity: SSB < -132 dBc/Hz (typ.10 GHz carrier at 10kHz)

offset), Spurious < -80 dBc (10 GHz carrier);

- Brilliant wideband noise floor, SSB < -161 dBc/Hz (typ. 20GHz carrier at 30MHz offset);
- Large dynamic range of high output power: settable power ranges from -150dBm to +25dBm;
- Maximum 2GHz RF modulation bandwidth, optional 500MHz/1GHz/2GHz bandwidth;
- Outstanding vector modulation accuracy: EVM < 0.8% (5G NR, FR2 28GHz);

## Various Built-in Functions

- Rich modulation functions, covering analog modulation, pulse modulation and 30+ digital modulation formats
- Support playback function of user-defined arbitrary wave data sample rate
- Support CW multi-tone and complex multi-carrier modulation functions
- TestModel/FRC covering more than 600 mobile communication protocols such as 5G NR, LTE etc .
- Integrated WLAN standard wireless connection signal analog function
- Multi-type noise addition and real-time fading simulation function

## Multi-scenario signal simulation

- Supports flexible editing simulation of various communication protocol signals
- Single-machine dual-channel + multi-machine cascade, multi-channel independent or phase-coherent output can be flexibly configured

## Newly updated interactive interface

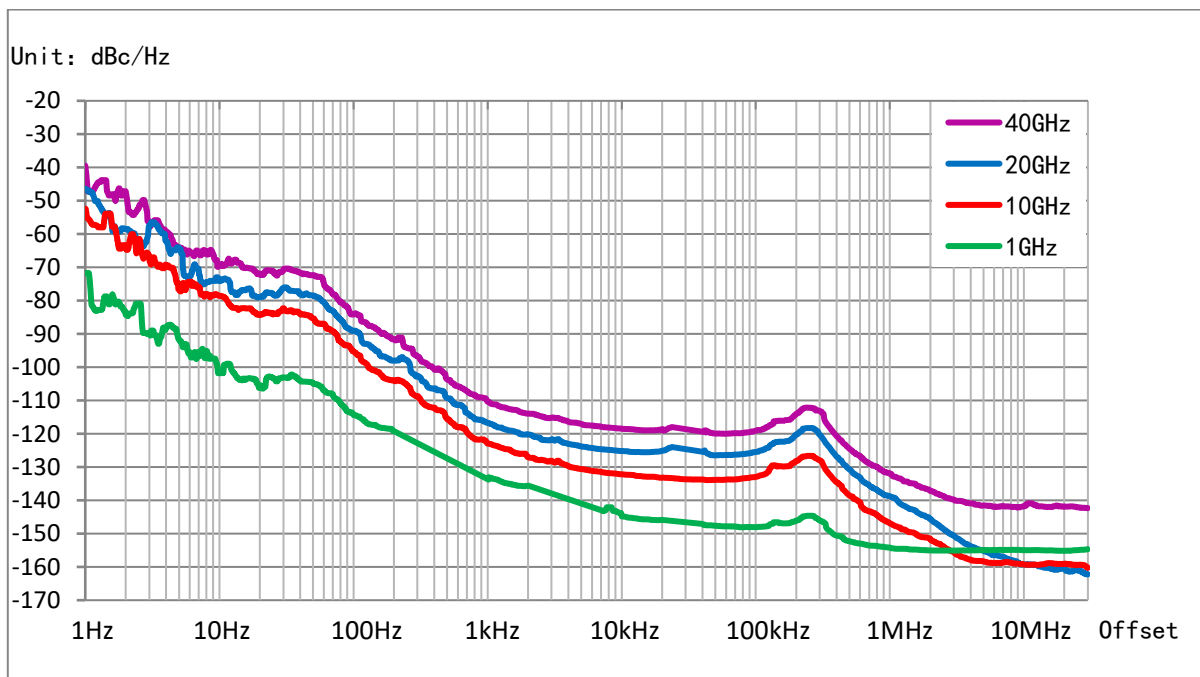
- Large-screen touch graphics guide interaction, support user-defined menus
- Cross-platform client and browser access control
- SCPI real-time recorder and code generator for generating executable remote control code from manual operating steps



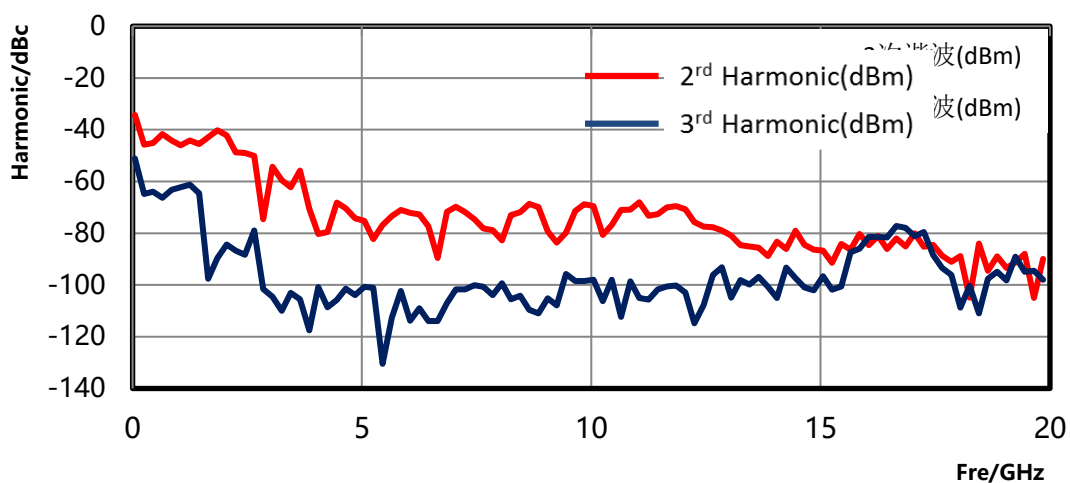
## Excellent RF Performance

### Excellent spectral purity, making cutting-edge testing easier

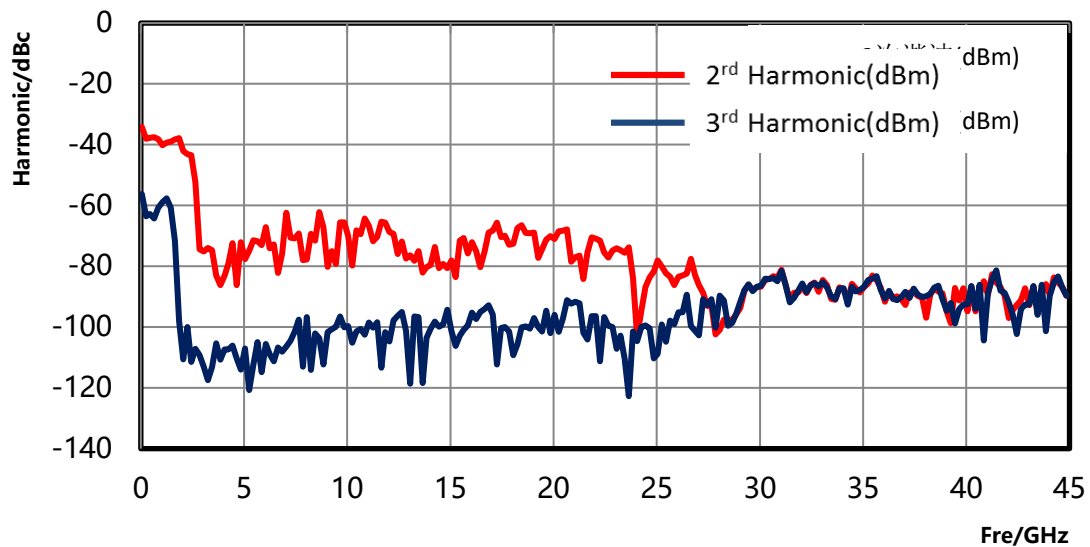
Ceyear 1466-V series signal generator supports high spectral purity output signal, SSB phase noise:  $-145\text{dBc/Hz}$  @10kHz offset at 1GHz carrier,  $-132\text{dBc/Hz}$  @10kHz offset at 10GHz carrier, Wideband noise floor:  $-161\text{dBc/Hz}$  @30MHz offset at 20GHz carrier, spurious  $< -80\text{dBc}$  at 10GHz carrier, harmonics  $< -55\text{dBc}$ . The purer signal makes you no longer troubled by interfering signals when testing microwave and millimeter wave components, systems and OTA.



Option H04-2: SSB Phase noise measured value



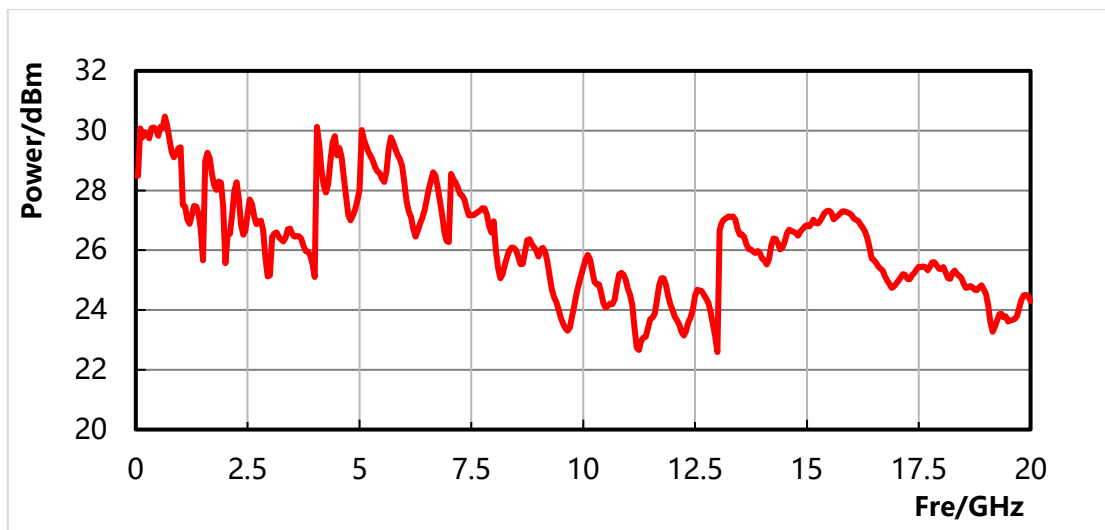
1466D-V Harmonic measured value



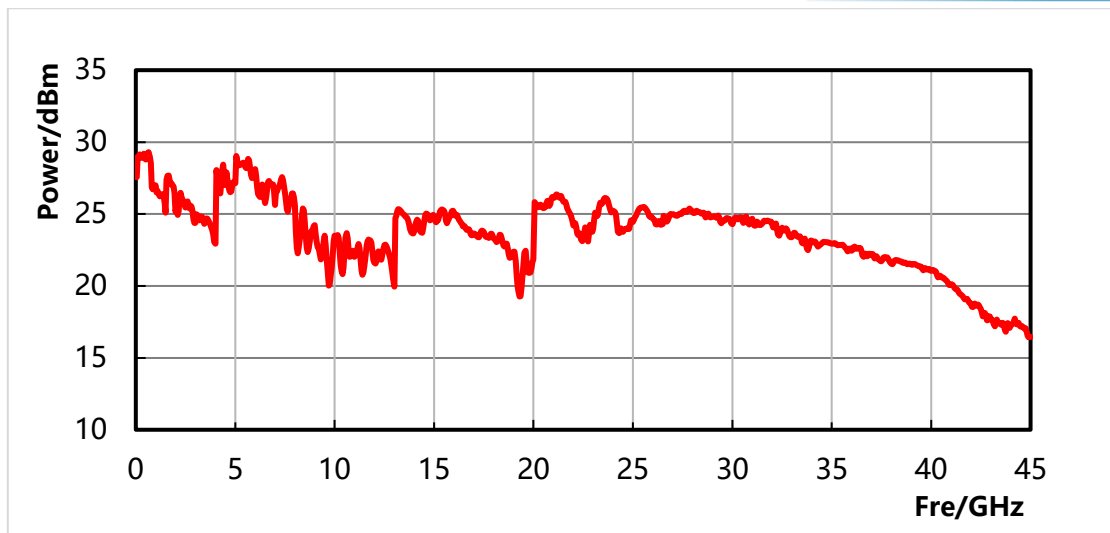
1466G-V Harmonic measured value

### Large dynamic range, high accuracy power output

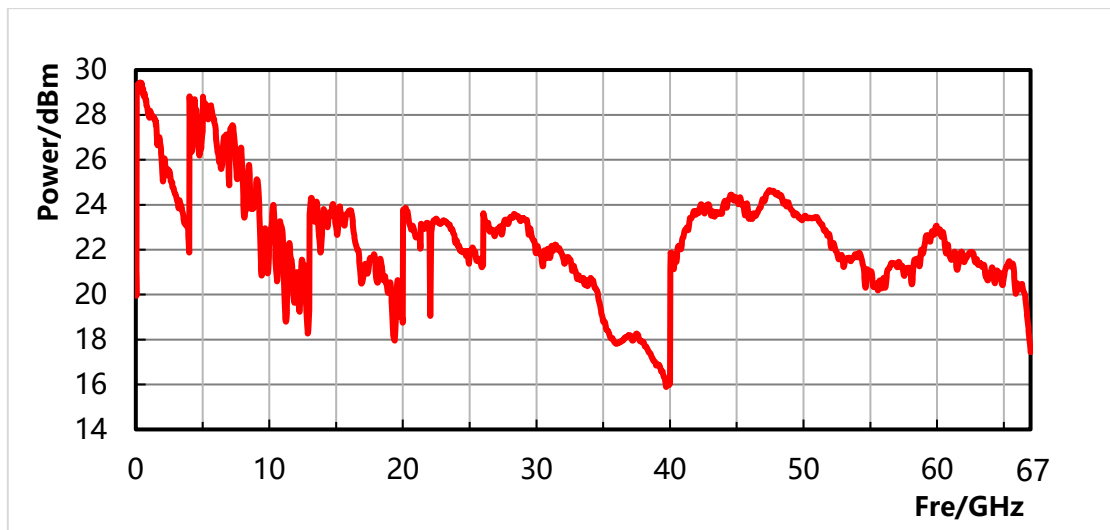
Ceyear 1466-V series signal generator maximum output power(typ): +27dBm @5GHz, +24dBm@ 20GHz, +25dBm @30GHz, +22dBm@ 60GHz. Minimum settable output power can up to -150dBm, dynamic range of output power can reach 170dB. Industry-leading power accuracy specifications:<0.5dB below 20GHz(typ).



1466D-V Max.output power measured value (High power option H05-20)



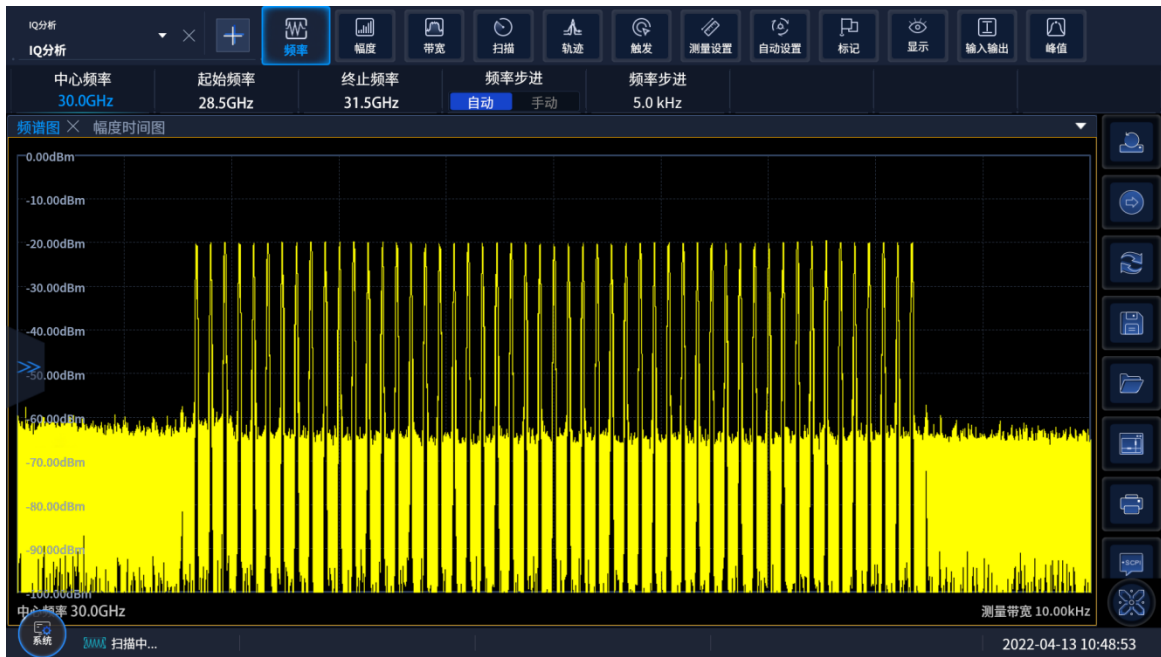
**1466G-V Max.output power measured value (High power option H05-45)**



**1466L-V Max.output power measured value (High power option H05-67)**

## 2GHz RF modulation bandwidth

Ceyear 1466-V series signal generator can provide a maximum 2GHz RF modulation bandwidth. According to different application scenarios, it supports flexible selection of 500MHz, 1GHz and 2GHz bandwidth. When using an external broadband baseband signal input, the RF modulation bandwidth is up to 5GHz. Regardless of the current 5G communication or the future 6G communication, the superior modulation bandwidth performance can easily meet the test challenges.



30GHz carrier 2GHz Modulation bandwidth multi-tone signal spectrum



## Excellent vector modulation accuracy

Ceyear 1466-V series signal generator has excellent vector modulation accuracy, QPSK modulation EVM measured value 0.4% (2GHz carrier). 5GNR ACPR (typical value,  $< -55\text{dBc}@2\text{GHz}$  carrier,  $< -45\text{dBc}@42.5\text{GHz}$  carrier). The signal generator is capable of performing performance evaluation in communication equipment research and development and communication equipment performance testing in production lines.



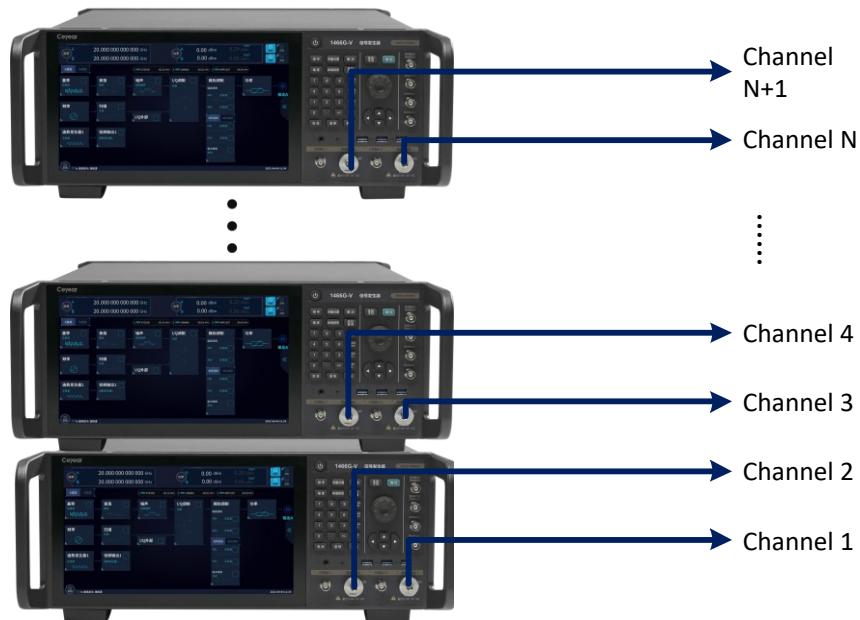
QPSK modulation EVM measured value



2GHz carrier 5G NR ACPR measured value

## Multi-machine cascade for multi-source phase reference excitation

Support multi-machine cascading, providing solutions for MIMO, beamforming, and signal diversity testing.



1466-V series signal generator multi-machine cascade

## Rich Built-in Functions

### Full range of analog modulation

Amplitude modulation, frequency modulation, phase modulation and pulse modulation are supported. It has complex pulse modulation functions such as double pulse, pulse train, PRF jittering, PRF staggering, and PRF sliding.



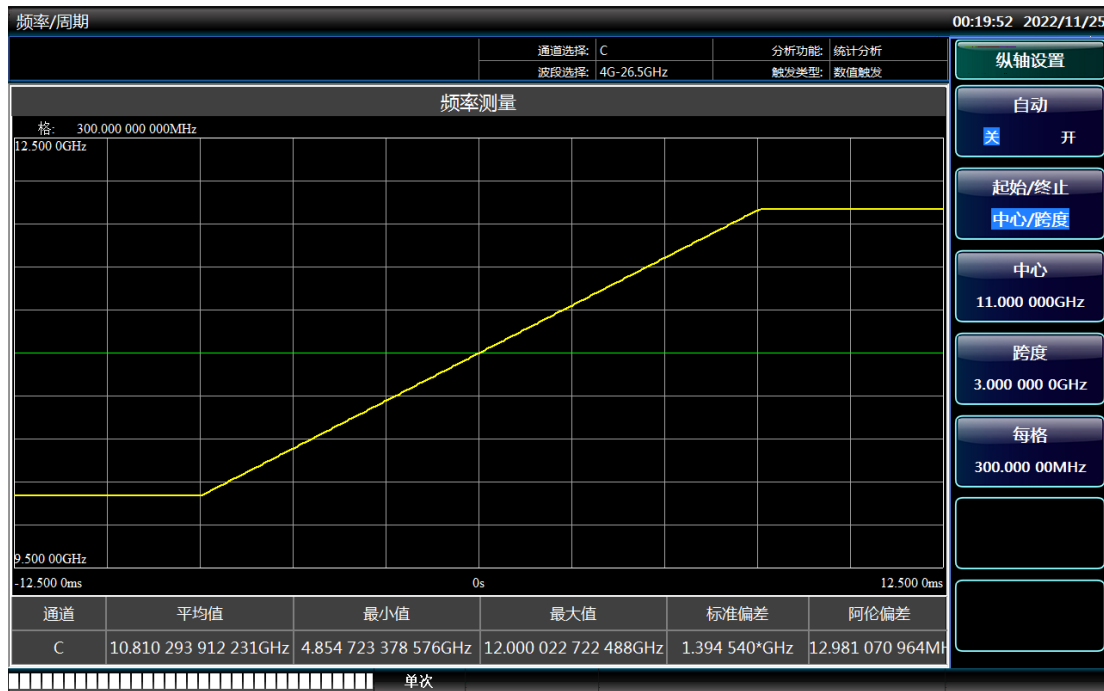
Analog modulation interface

## Multi-style sweep mode

Support Step sweep, List sweep, ramp sweep and power sweep functions.



Step sweep measured value



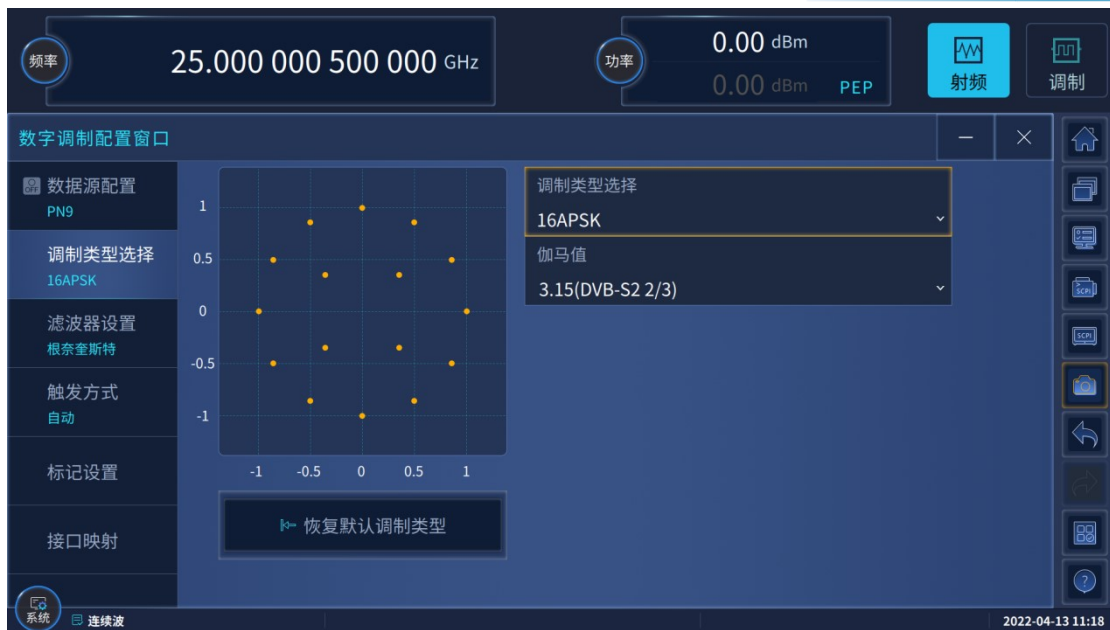
Analog sweep (ramp sweep) measured value

### Comprehensive standard digital modulation styles

Generation of up to 30+ digital standard modulation signals (PSK, FSK, QAM, APSK), covering all important frequency bands and modulation styles for digital communications.



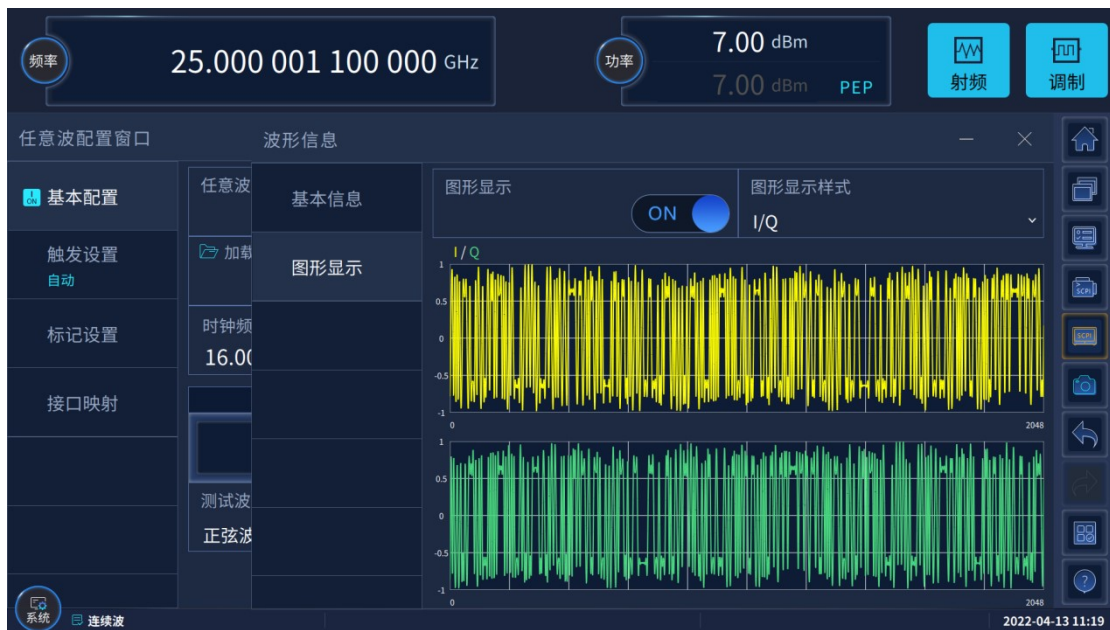
4096QAM modulation interface



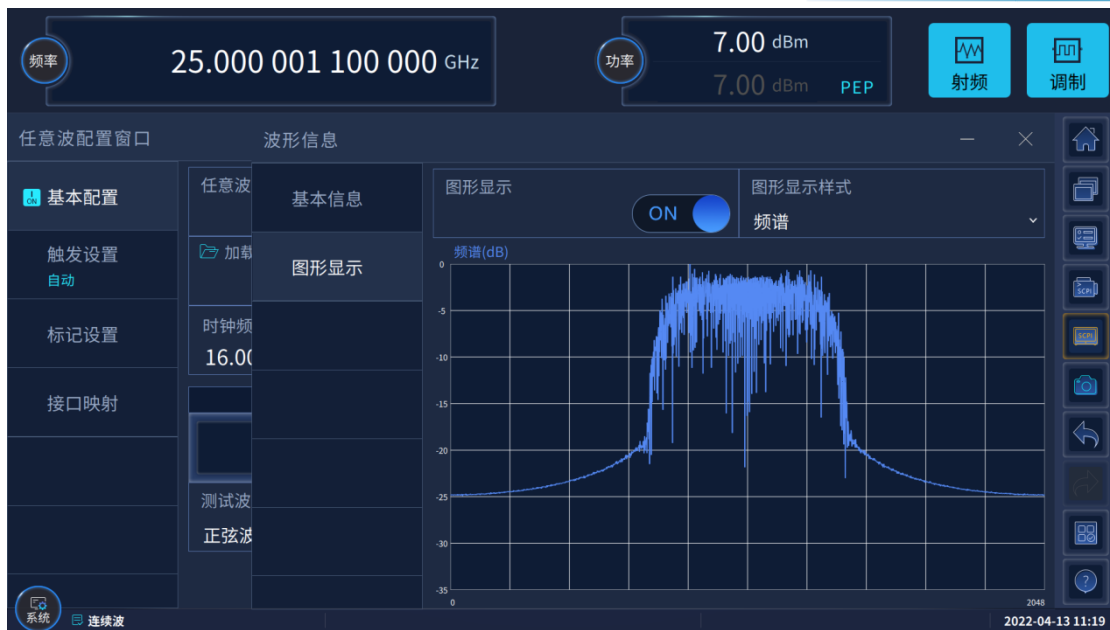
16APSK modulation interface

## Arbitrary wave playback

Support user-defined arbitrary waveform data variable sampling rate playback function. With the convenient baseband preview function, it is convenient for you to verify the correctness of the data in the time domain and frequency domain at the first time.



Arbitrary wave IQ data display interface



Arbitrary wave IQ data spectrum display interface

## Multicarrier signal generation

Support continuous wave multi-tone and complex multi-carrier modulation functions to make complex signal scene construction easier.



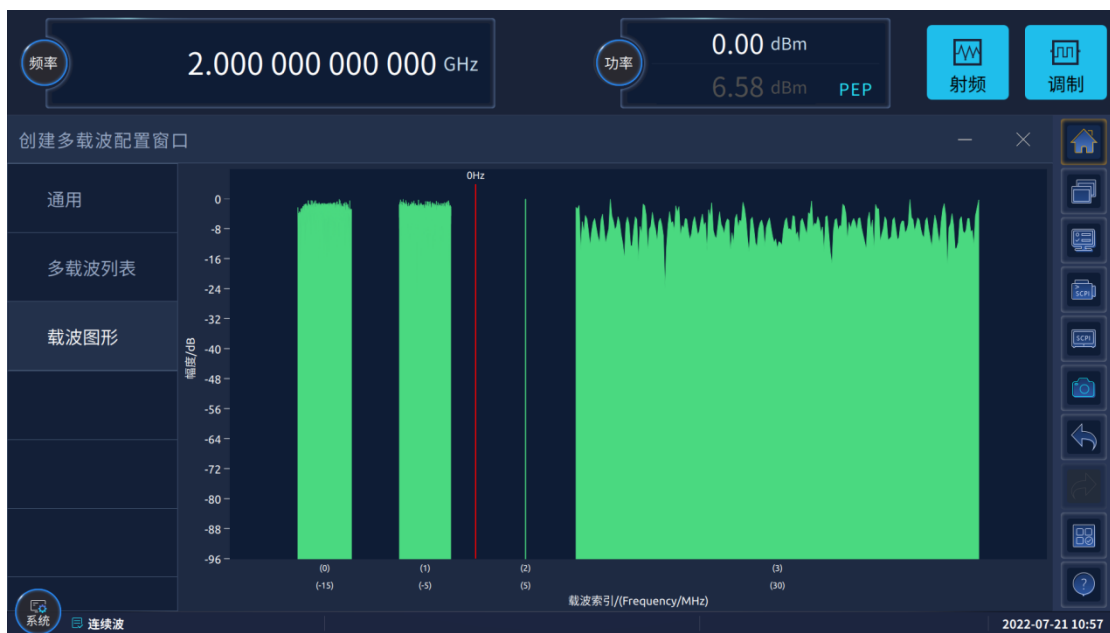
Multi-tone modulation interface

创建多载波配置窗口

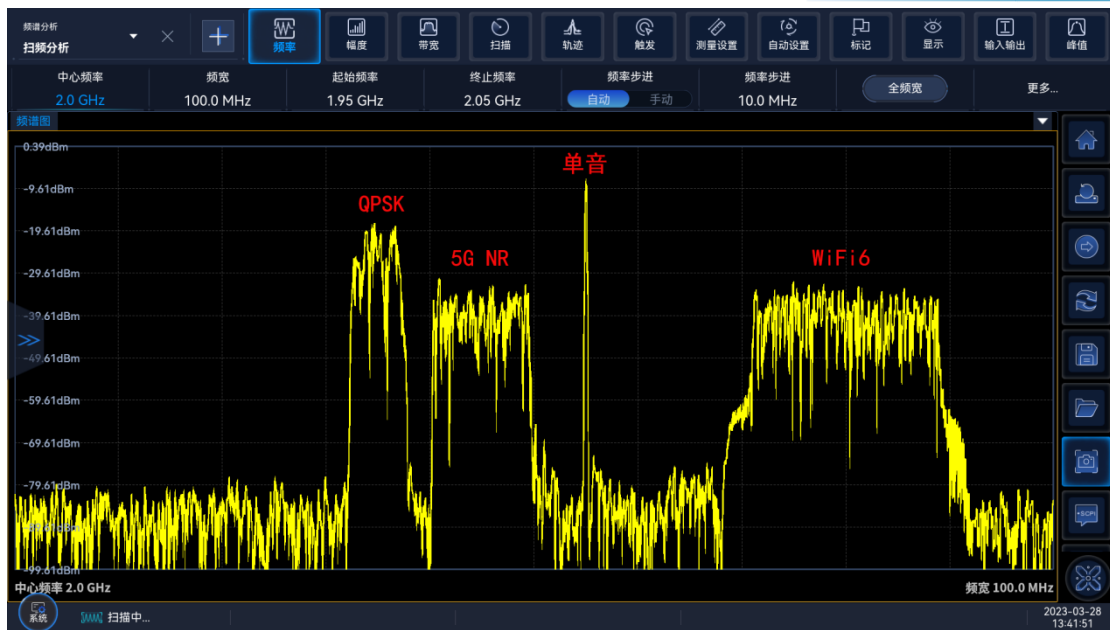
通用	载波个数 4								
多载波列表	序号	状态	频偏(MHz)	增益(dB)	相位(deg)	延迟(ns)	文件名	信息	标识
载波图形	0	ON	-15.000 000 000	0.00	0.00	0	4MQPSK_16MClk.seg	信息	
	1	ON	-5.000 000 000	0.00	0.00	0	NR_FR1_fdd_10MHz.seg	信息	
	2	ON	5.000 000 000	0.00	0.00	0	Tone.seg	信息	
	3	ON	30.000 000 000	0.00	0.00	0	WLAN_ax_HE_SU_20MHz.seg	信息	

系统 连续波 2022-07-21 10:57

Complex multi carrier modulation interface



Complex multi-carrier modulation graphical attribute interface



Different modulation types of multi-carrier test map

## Multiple types of noise addition methods

Support pure noise, additive Gaussian noise, continuous wave interference and other noise adding functions.



Additive Gaussian noise interface



## Intra-pulse modulation

Supports multiple types of intrapulse modulation including linear frequency modulation, Barker code, phase modulation code, etc.



Intra-pulse modulation interface

## Real-time fading simulation

Maximum 20 fading paths, supporting fading types such as pure Doppler, Rayleigh, Rice, Rayleigh + lognormal, etc., supporting preset fading scene modes, and simulating fading channel models defined by 3GPP.



**Real-time fading simulation interface**

## Multi-scenario signal simulation

The 1466-V signal generator combines simulation software to support multi-type signal simulation and RF output.

### Mobile Communication Signal Simulation

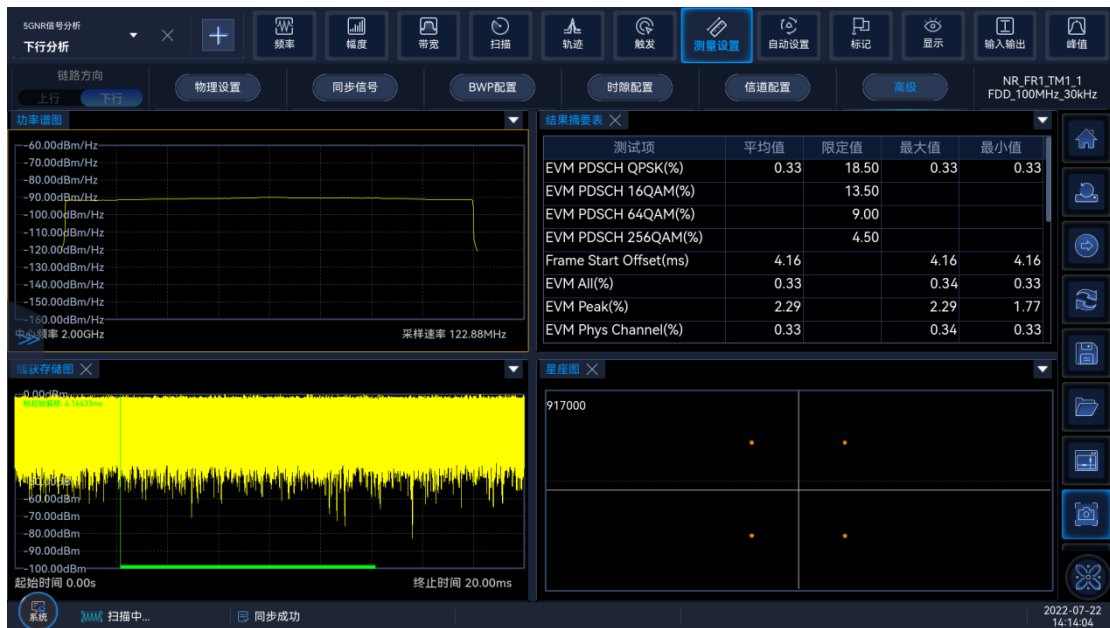
For the development and production of mobile communication base stations or terminals, as well as the radio frequency conformance test necessary for the verification and approval of mobile communication equipment network access, the Ceyear 1466-V signal generator supports standard protocol signals through embedded more than 600 TestModel/FRC including 5G NR one-click simulation. At the same time, with the mobile communication signal simulation software, it can realize flexible editing and simulation of various communication protocol signals.



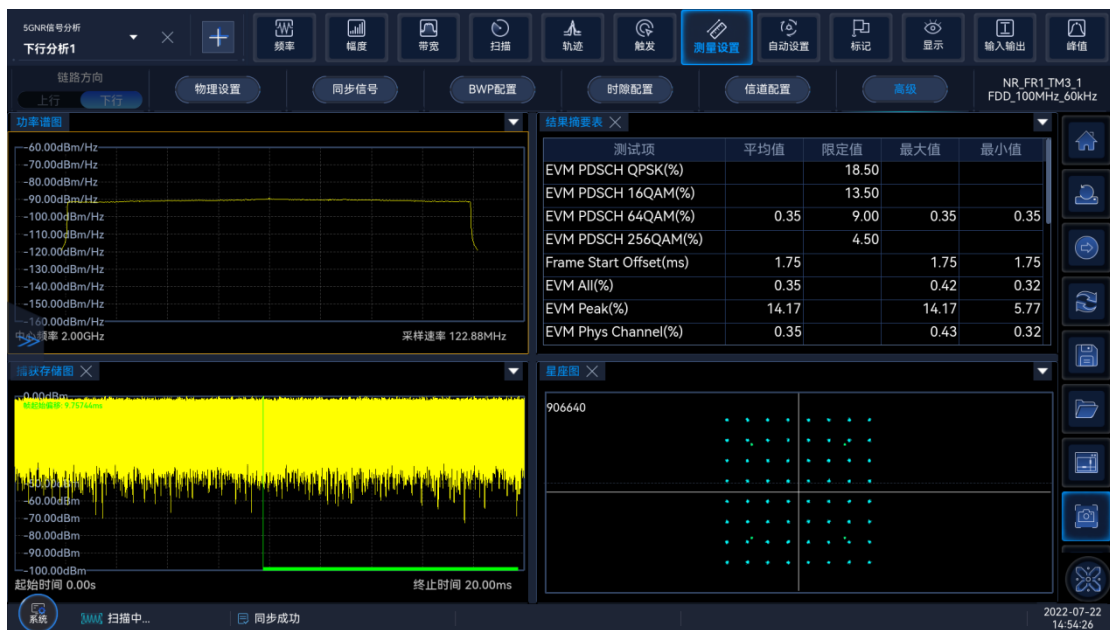
5G NR TM sample interface



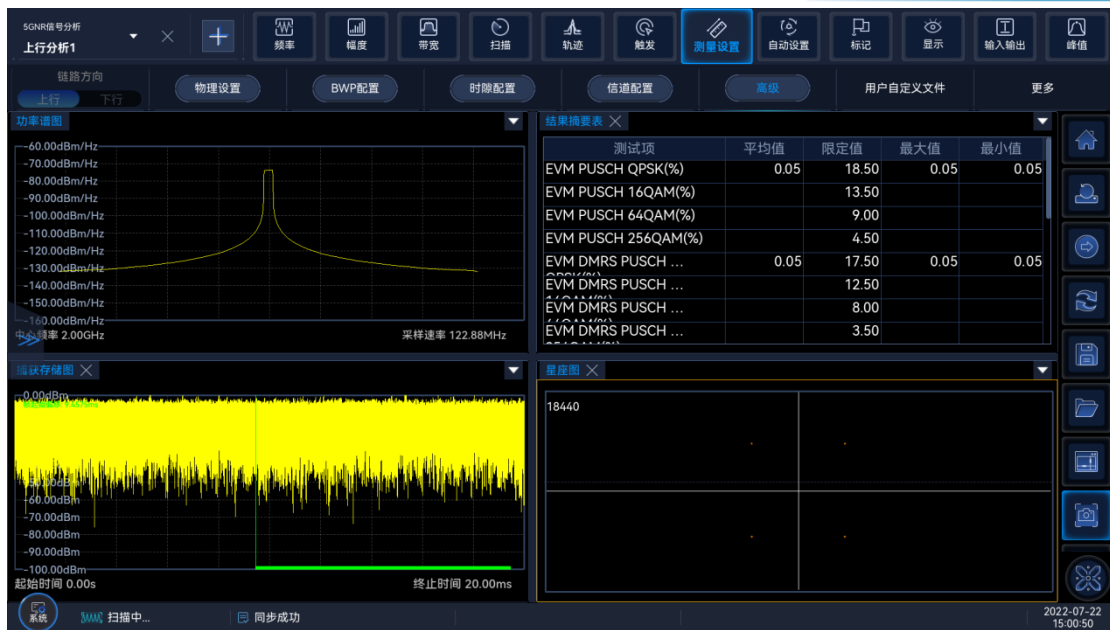
## Downlink scheduling Settings



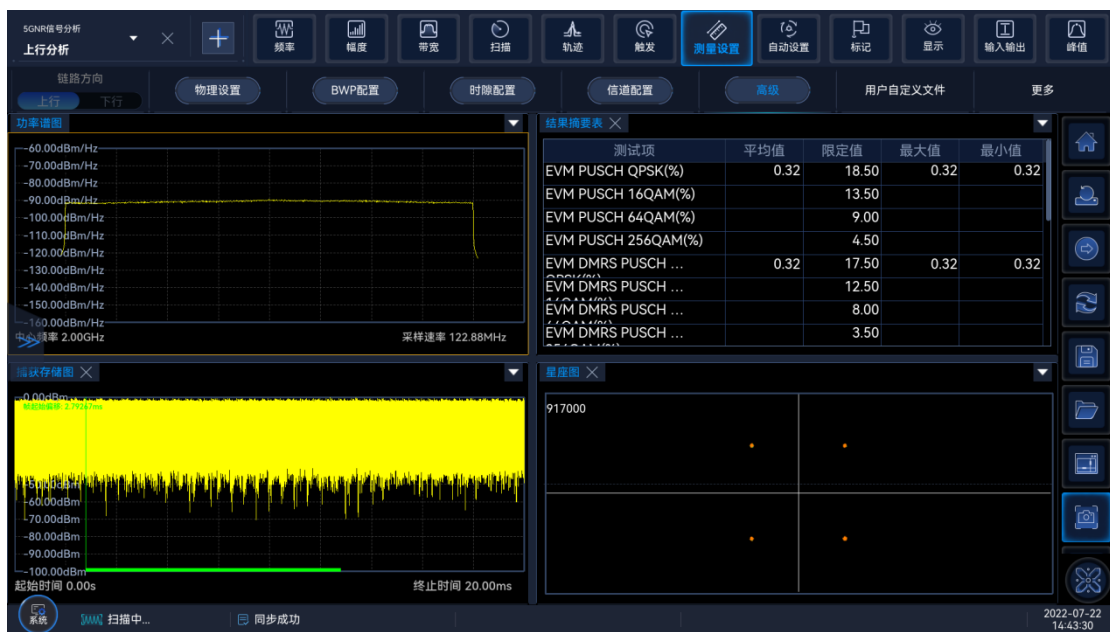
FR1-TM1\_1\_FDD\_100MHz\_30kHz measured value



FR1-TM3\_1\_FDD\_100MHz\_60kHz measured value



FRC-FR1-100MHz\_A1-8 measured value



UL\_FR1\_FDD\_100MHz measured value

## WLAN Signal Simulation

For the development, production and testing of wireless communication terminals, it has 802.11a/b/g/n/ac/ax wireless connection PPDU, MPDU, A-MPDU and other signal simulations, and supports physical frames composed of multiple PPDUs with different modulation and coding methods Block signal simulation.

频率: 2.400 000 000 000 GHz

功率: -10.00 dBm, 21.57 dBm PEP

射频 调制

WLAN

通用配置

物理帧块配置

	状态开关	协议标准	PPDU格式	MAC帧类型	传输模式	PPDU数据源类型	PPDU数据选择/设置
1	ON	802.11 ax	HE单用户	信标帧	HE-20MHz	A-MPDU	
2	ON	802.11 ax	HE多用户	数据帧	HE-20MHz	A-MPDU	
3	ON	802.11 ax	HE单用户扩展	触发帧	HE-20MHz	A-MPDU	
4	ON	802.11 ax	HE基于触发	数据帧	HE-20MHz	A-MPDU	
5	ON	802.11 ax	HE探测NDP	数据帧	HE-20MHz	A-MPDU	

新增 删除末尾行 删除所有行

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WLAN Physical frame block interface

频率: 2.400 000 000 000 GHz

功率: -10.00 dBm, 5.28 dBm PEP

射频 调制

WLAN

通用配置

物理帧块配置 → 物理帧块1 PPDU设置 → PPDU前导设置

链路方向	BSS color	保护间隔
下行	5	0.8 us
HE-LTF持续时间	TXOP持续时间	多普勒效应
6.4 us	127	<input type="checkbox"/> 关
FEC前的填充因子	PE消歧比特	空间复用值
3	0	0
SIG-B MCS	SIG-B双载波调制	
1	<input type="checkbox"/> 关	

HE-SIG-A域  
802.11 ax

Data Symbols = 36

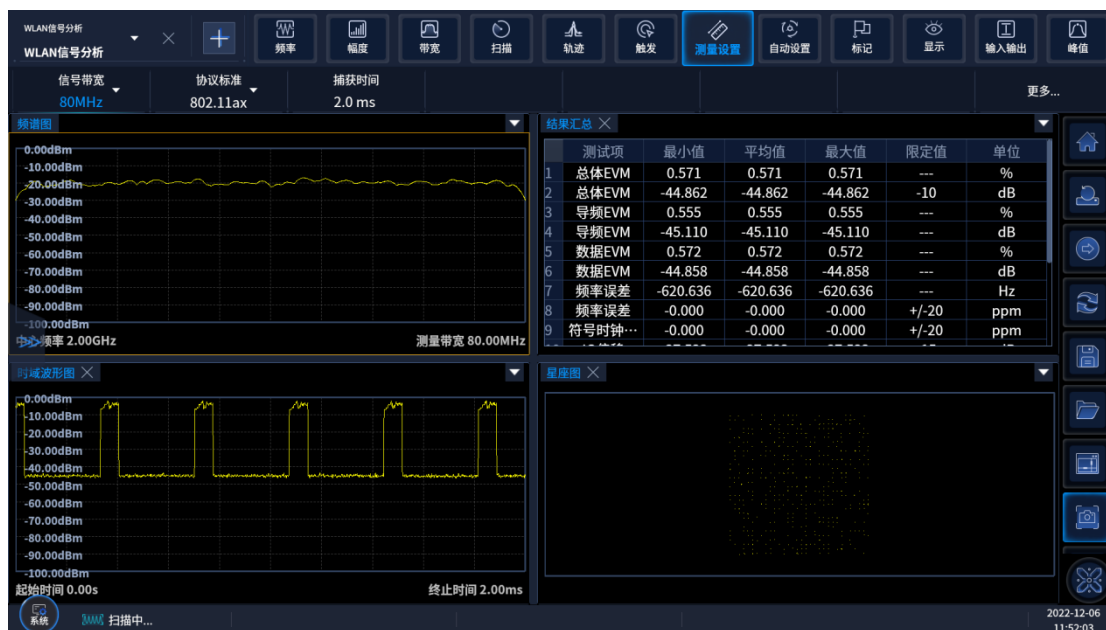
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PPDU interface



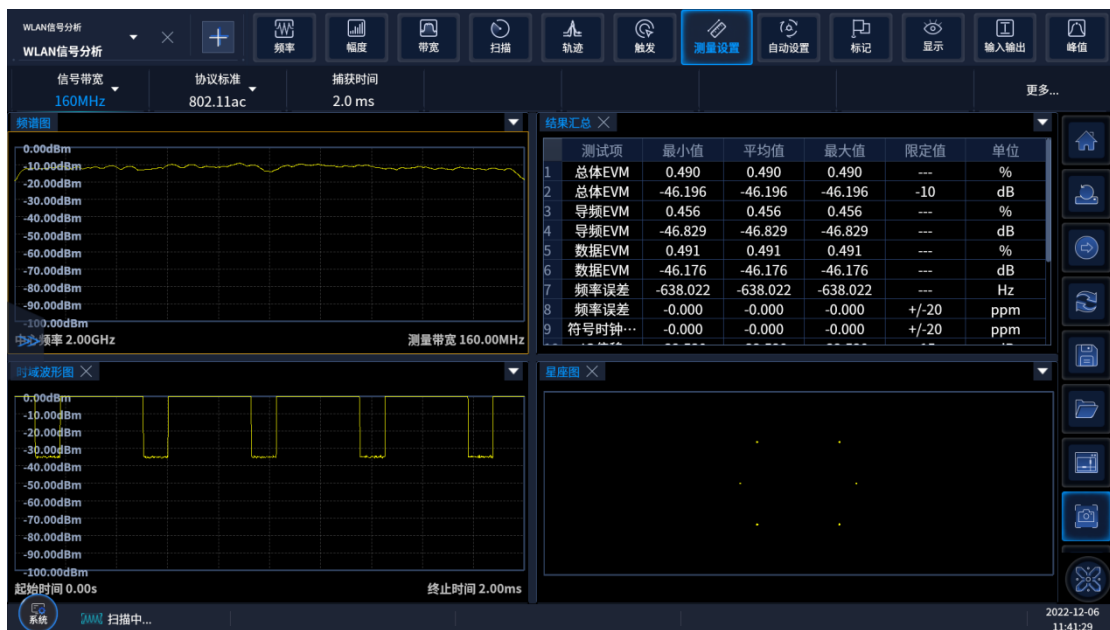
**IEEE 802.11ax single user PPDU signal demodulation EVM**  
**80MHz transmission bandwidth, 256QAM**



**IEEE 802.11ax single user PPDU signal demodulation EVM**  
**80MHz transmission bandwidth, 1024QAM**



**IEEE 802.11ac single user PPDU signal demodulation EVM**  
**80MHz transmission bandwidth, QPSK+BPSK**



**IEEE 802.11ac single user PPDU signal demodulation EVM**  
**160MHz transmission bandwidth, QPSK+BPSK**



## Newly upgraded human-machine interaction

### Touchable graphic guide interaction

The 11.6-inch high-resolution touch screen is used to clearly display the main parameters and instrument status information, and with the signal flow diagram guidance interface, the display is more intuitive and the interaction is more friendly.



### Flexible editable user control interface

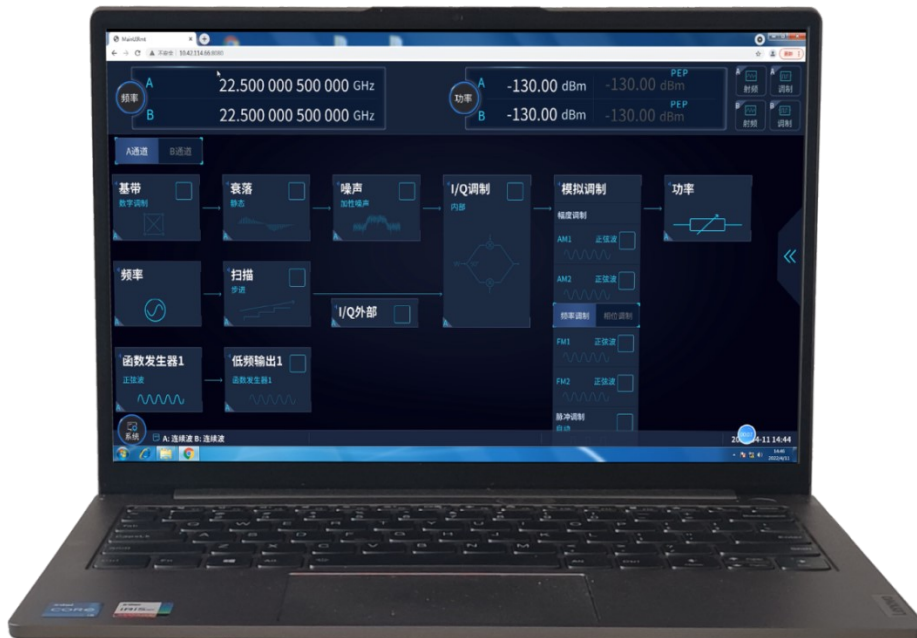
Support user-defined menus, tailor-made personalized user control interface according to test habits, realize multi-functional operations in one window, and avoid the trouble of too deep menus and repeated searches.



## User defined menu

### Support cross-platform client control

Cross-platform client and browser access control. Support multiple clients to connect at the same time, and the working status of the instrument is refreshed synchronously. Supports web browser access control for mobile devices.



## Browser access

### Simultaneous recording of SCPI commands and one-click script generation

Not only can you export recorded SCPI commands with one click, but also automatically generate VS (C++, C#), Qt, Matlab, LabView program control example projects, making program control easier.



## SCPI command record

# Technical Specifications

Frequency characteristics			
Frequency	1466C-V:6kHz to 13GHz 1466D-V: 6kHz to 20GHz 1466E-V: 6kHz to 33GHz 1466G-V: 6kHz to 45GHz 1466H-V: 6kHz to 53GHz 1466L-V: 6kHz to 67GHz	Frequency range	N1 (Internal YO harmonic number)
		6kHz≤f≤10MHz	-
		10MHz<f≤50MHz	-
		50MHz<f≤62.5MHz	1/256
		62.5MHz<f≤125MHz	1/128
		125MHz<f≤250MHz	1/64
		250MHz<f≤500MHz	1/32
		500MHz<f≤1GHz	1/16
		1GHz<f≤2GHz	1/8
		2GHz<f≤4GHz	1/4
		4GHz<f≤8GHz	1/2
		8GHz<f≤20GHz	1
		20GHz<f≤40GHz	2
40GHz<f≤67GHz	4		
Resolution	0.001Hz		
Switching speed	<15ms		
Aging rate(typ)	±5×10 <sup>-10</sup> /day after 30 days		
Reference output	Frequency	10MHz	
	Amplitude	>+4dBm into 50Ω load	
Reference input	Frequency	1 to 100MHz,step:1Hz	
	Amplitude	-5dBm to +10dBm,impedance: 50Ω	
Sweep characteristics			
Sweep mode	Step sweep List sweep Ramp(analog) sweep (option S15) Power sweep(option S16)		
Ramp(analog) sweep (Option S15)	Maximum sweep rate	f>4GHz	400MHz/ms
	Frequency accuracy	±0.05% of span (at 100ms sweep time, for sweep spans less than maximum values given above)	
Output characteristics			
Minimum output power	Model	standard	Option H01-90/120/130
	1466C/D/E/G(-V)	-10dBm(can be set as -20dBm)	Option H01-130: -120.0dBm(can be set as -150dBm)
	1466H/L(-V)	-10dBm(can be set as -20dBm)	Option H01-90:-90.0dBm(can be set as -110dBm) Option H01-120: -90.0dBm(can be set as -140dBm)
Maximum output power (CW, 25±10°C)	1466C-V		

Configuration Frequency range	Standard	Programmable step attenuator Option H01-130, H01-B130	High output power (option H05-13, H05-B13)	High output power and programmable step attenuator (option H01-130, H05-13, H01-B130, H05-B13)
	$\geq+15.0$	$\geq+15.0$	$\geq+15.0$	$\geq+15.0$
	$6\text{kHz} \leq f \leq 50\text{MHz}$	$\geq+15.0$	$\geq+15.0$	$\geq+20.0$
<b>1466D-V</b>				
Configuration Frequency range	Standard	Programmable step attenuator Option H01-130, H01-B130	High output power (option H05-20, H05-B20)	High output power and programmable step attenuator (option H01-130, H05-20, H01-B130, H05-B20)
	$\geq+15.0$	$\geq+15.0$	$\geq+15.0$	$\geq+15.0$
	$6\text{kHz} \leq f \leq 50\text{MHz}$	$\geq+15.0$	$\geq+15.0$	$\geq+20.0$
<b>1466E-V</b>				
Configuration Frequency range	Standard	Programmable step attenuator Option H01-130, H01-B130	High output power (option H05-33, H05-B33)	High output power and programmable step attenuator (option H01-130, H05-33, H01-B130, H05-B33)
	$\geq+8.0$	$\geq+8.0$	$\geq+8.0$	$\geq+8.0$
	$6\text{kHz} \leq f \leq 50\text{MHz}$	$\geq+12.0$	$\geq+12.0$	$\geq+20.0$
	$50\text{MHz} < f \leq 6\text{GHz}$	$\geq+12.0$	$\geq+12.0$	$\geq+18.0$
	$6\text{GHz} < f \leq 18\text{GHz}$	$\geq+12.0$	$\geq+12.0$	$\geq+17.0$
	$18\text{GHz} < f \leq 30\text{GHz}$	$\geq+12.0$	$\geq+12.0$	$\geq+18.0$
<b>1466G-V</b>				
Configuration Frequency range	Standard	Programmable step attenuator Option H01-130, H01-B130	High output power (option H05-45, H05-B45)	High output power and programmable step attenuator (option H01-130, H05-45, H01-B130, H05-B45)
	$\geq+8.0$	$\geq+8.0$	$\geq+8.0$	$\geq+8.0$
	$6\text{kHz} \leq f \leq 50\text{MHz}$	$\geq+12.0$	$\geq+12.0$	$\geq+20.0$
$50\text{MHz} < f \leq 6\text{GHz}$				

	6GHz<f≤18GHz	≥+12.0	≥+12.0	≥+18.0	≥+18.0	
	18GHz<f≤30GHz	≥+12.0	≥+12.0	≥+17.0	≥+17.0	
	30GHz<f≤40GHz	≥+12.0	≥+12.0	≥+18.0	≥+18.0	
	40GHz<f≤45GHz	≥+12.0	≥+12.0	≥+14.0	≥+14.0	
<b>1466H-V</b>						
	<b>Configuration</b>		<b>Programmable step attenuator Option H01-90/120, H01-B90/120</b>	<b>High output power (option H05-53, H05-B53)</b>	<b>High output power and programmable step attenuator (option H01-90/120+H05-53, H01-B90/120+H05-B53)</b>	
	<b>Frequency range</b>	<b>Standard</b>				
	6kHz≤f≤50MHz	≥+8.0	≥+8.0	≥+8.0	≥+8.0	
	50MHz<f≤35GHz	≥+8.0	≥+8.0	≥+17.0	≥+16.0	
	35GHz<f≤40GHz	≥+8.0	≥+8.0	≥+15.0	≥+13.0	
	40GHz<f≤53GHz	≥+8.0	≥+8.0	≥+20.0	≥+18.0	
<b>1466L-V</b>						
	<b>Configuration</b>		<b>Programmable step attenuator Option H01-90/120, H01-B90/B120</b>	<b>High output power (option H05-67, H05-B67)</b>	<b>High output power and programmable step attenuator (option H01-90/120+H05-53, H01-B90/120+H05-B53)</b>	
	<b>Frequency range</b>	<b>Standard</b>				
	6kHz≤f≤50MHz	≥+8.0	≥+8.0	≥+8.0	≥+8.0	
	50MHz<f≤35GHz	≥+8.0	≥+8.0	≥+17.0	≥+16.0	
	35GHz<f≤40GHz	≥+8.0	≥+8.0	≥+15.0	≥+13.0	
	40GHz<f≤53GHz	≥+8.0	≥+8.0	≥+20.0	≥+18.0	
	53GHz<f≤65GHz	≥+8.0	≥+8.0	≥+18.0	≥+16.0	
	65GHz<f≤67GHz	≥+8.0	≥+8.0	≥+15.0	≥+12.0	
<b>Level accuracy (25±10°C)</b>	<b>Standard</b>					
		<b>Power(dBm)</b>	<b>-10dBm&lt;P≤+10dBm</b>	<b>+10dBm&lt;P≤+25dBm</b>	<b>+25dBm&lt;P</b>	
		<b>Frequency</b>				
		6kHz≤f≤50MHz	±1.0dB	±1.0dB	—	
		50MHz<f≤3GHz	±0.5dB	±0.5dB	±1.0dB	
		3GHz<f≤20GHz	±0.9dB	±0.9dB	±1.2dB	
		20GHz<f≤40GHz	±1.0dB	±1.0dB	—	
		40GHz<f≤50GHz	±1.3dB	±1.3dB	—	
		50GHz<f≤67GHz	±1.8dB	±1.8dB	—	
	<b>H01-130/120/90/50/B130 programmable step attenuator option</b>					
		<b>Power(dBm)</b>	<b>+120dBm&lt;P≤-90dBm</b>	<b>-90dBm&lt;P≤-50dBm</b>	<b>-50dBm&lt;P≤+10dBm</b>	<b>+10dBm&lt;P≤+25dBm</b>
		<b>Frequency</b>				
		6kHz≤f≤50MHz	—	±1.5dB	±1.0dB	±1.0dB
		50MHz<f≤3GHz	±1.2dB	±0.7dB	±0.5dB	±0.5dB
		3GHz<f≤20GHz	±1.8dB	±0.9dB	±0.9dB	±0.9dB
	20GHz<f≤40GHz	—	±1.2dB	±1.0dB	±1.0dB	
	40GHz<f≤50GHz	—	±1.5dB	±1.3dB	±1.3dB	
	50GHz<f≤67GHz	—	±2.0dB	±1.8dB	±1.8dB	

<b>Power resolution</b>	0.01dB								
<b>Temperature stability</b>	0.02dB/°C (typ)								
<b>Output impedance</b>	50Ω(nom)								
<b>VSWR(internal leveled)(typ)</b>	100kHz≤f≤20GHz	<1.6							
	20GHz<f≤40GHz	<1.8							
	40GHz<f≤67GHz	<2.0							
<b>Maximum reverse power</b>	0.5W(0V DC)(nom)								
<b>Spectral purity characteristics</b>									
<b>Harmonics (dBc at +10dBm or maximum specified output power, whichever is lower)</b>	<b>Frequency</b>				<b>Standard</b>				
	6kHz≤f≤3GHz				<-30dBc				
	3GHz<f≤67GHz				<-55dBc				
<b>Sub-harmonics(at +10dBm or maximum specified output power, whichever is lower)</b>	100kHz≤f≤20GHz				<-80dBc				
	20GHz<f≤40GHz				<-60dBc				
	40GHz<f≤67GHz				<-50dBc				
<b>Non-harmonics(dBc at 0dBm, for offset &gt;3kHz)</b>	<b>Frequency</b>		<b>Option H04-1</b>			<b>Option H04-2</b>			
	6kHz≤f≤250MHz		<-58dBc			<-68dBc			
	250MHz<f≤4GHz		<-70dBc			<-80dBc			
	4GHz<f≤10GHz		<-70dBc			<-80dBc			
	10GHz<f≤20GHz		<-64dBc			<-74dBc			
	20GHz<f≤40GHz		<-58dBc			<-68dBc			
	40GHz<f≤67GHz		<-45dBc			<-45dBc			
<b>SSB phase noise (dBc/Hz, at +10dBm or maximum specified output power, whichever is lower)</b>	<b>Offset from carrier</b>	<b>10Hz</b>	<b>100Hz</b>	<b>1kHz</b>	<b>10kHz</b>	<b>100kHz</b>	<b>1MHz</b>	<b>10MHz</b>	
	<b>H04-1 low phase noise option</b>								
	100MHz	—	<-118	<-141	<-148	<-150	—	—	
	250MHz<f≤500MHz	—	<-111	<-130	<-145	<-143	—	—	
	0.5 GHz<f≤1GHz	—	<-105	<-124	<-140	<-138	—	—	
	1 GHz<f≤2GHz	—	<-100	<-118	<-134	<-132	—	—	
	2 GHz<f≤4GHz	—	<-93	<-113	<-128	<-126	—	—	
	4GHz<f≤10GHz	—	<-85	<-105	<-120	<-118	—	—	
	10GHz<f≤20GHz	—	<-79	<-99	<-114	<-112	—	—	
	20GHz<f≤40GHz	—	<-73	<-93	<-108	<-106	—	—	
	40GHz<f≤67GHz	—	<-67	<-87	<-103	<-101	—	—	
	67GHz<f≤110GHz	—	<-61	<-81	<-97	<-95	—	—	
	<b>H04-2 ultra low phase noise option</b>								
	100MHz	<-102	<-120	<-141	<-148	<-150	<-152	<-152	
	250MHz<f≤500MHz	<-92	<-112	<-135	<-146	<-148	<-150	<-150	
	0.5GHz<f≤1GHz	<-90	<-110	<-134	<-144	<-147	<-150	<-150	
	1GHz<f≤2GHz	<-88	<-104	<-127	<-138	<-142	<-148	<-148	
	2 GHz<f≤4GHz	<-82	<-99	<-122	<-135	<-136	<-146	<-148	
	4GHz<f≤10GHz	<-77	<-91	<-115	<-128	<-128	<-140	<-154	
10GHz<f≤20GHz	<-71	<-85	<-109	<-122	<-122	<-134	<-152		

	20GHz<f≤40GHz	<-63	<-79	<-99	<-116	<-116	<-128	<-142
	40GHz<f≤67GHz	<-57	<-73	<-94	<-110	<-110	<-122	<-136
<b>Modulation characteristics</b>								
<b>Frequency modulation (50MHz&lt;f≤50GHz, Option S11)</b>	Maximum deviation: N×20MHz(N: YO harmonic number) Accuracy (at 1kHz, N×20kHz≤deviation<N×800kHz): <± (2.5%× set frequency offset +20Hz) Modulation rate (3dB bandwidth, N×500kHz frequency offset):DC-10MHz Distortion (at 1kHz, N×20kHz≤deviations<N×800kHz):<1%							
<b>Phase modulation (50MHz&lt;f≤50GHz, Option S11)</b>	Maximum deviation: Normal mode: N×20.0rad(N: YO harmonic number) Broadband mode: N×2rad Low noise mode: N×0.2rad Accuracy (at 1kHz, N×0.2rad≤phase deviations<N×8rad,normal mode): <± (3% of setting deviation+0.01 rad) Modulation rate (3dB bandwidth, broadband mode): DC to 10MHz(typ) Distortion (at 1kHz, N×0.8rad≤deviations<N×8rad, THD): <0.8%							
<b>Amplitude modulation (10MHz&lt;f≤50GHz, Option S11)</b>	Maximum depth:>90% Modulation rate (3 dB bandwidth, 30% modulation depth): DC to 100kHz Accuracy(1kHz modulation rate,30% modulation depth):±(5% of setting+1%) Distortion (1kHz modulation rate, Linear mode,THD,30% modulation depth):<1.0%							
<b>Pulse modulation (f&gt;50MHz, option S13 will cover option S12)</b>	<b>Option S12: Pulse modulation</b>							
	On/off ratio		>80dB					
	Rise/fall times		<20ns					
	Repetition frequency		0Hz to 25MHz					
	Minimum pulse width		0.1μs					
	<b>Option S13: Narrow Pulse modulation</b>							
	On/off ratio		>80dB					
	Rise/fall times		<10ns					
	Repetition frequency		0Hz to 25MHz					
	Minimum pulse width		20ns					
<b>LF out/Function generator(option S14)</b>	Support frequency/phase modulation, amplitude modulation output Waveform: sina, square, triangle, sawtooth, noise, double sine, sweep sine Frequency range: DC to 10MHz for sine, double sine, sweep sine waveform; 0.1Hz to 1MHz for square, triangle, swatooth waveform. Frequency resolution:0.1Hz Low frequency output: amplitude: 0 to 5Vpp(nom), into 50Ω load							

<p><b>Vector accuracy(EVM,RMS%,after calibration,0dBm,25°C±10°C)</b></p>	<p>Basic modulation types (symbol rate 4 Msym/s,root Nyquist filter,<math>\alpha=0.3</math>,QPSK format,<math>f&gt;100</math>MHz):  100MHz&lt;<math>f\leq</math>4GHz &lt;0.8%  4GHz&lt;<math>f\leq</math>20GHz &lt;1.0%  20GHz&lt;<math>f\leq</math>40GHz &lt;1.2%  40GHz&lt;<math>f\leq</math>67GHz &lt;1.4%  CDMA (symbol rate 3.84 Msym/s,root Nyquist filter,<math>\alpha=0.22</math>,QPSK format):  &lt;0.7% (2GHz)  5GNR:(Test Model 3.1a,100MHz,256QAM,30kHz SCS, Option S01):  &lt;0.85% (100MHz,3.5GHz)  &lt;1.0% (100MHz,10GHz)  &lt;1.2% (100MHz,28GHz)  &lt;1.8% (100MHz,42.5GHz)</p>
<p><b>Adjacent Channel Power Ratio(ACPR,after calibration ,25°C±10°C)</b></p>	<p>CDMA:(symbol rate 3.84 Msym/s, root Nyquist filter, <math>\alpha=0.22</math>,QPSK format)  &gt;64dBc (2GHz)  5GNR:(Test Model 3.1a,100MHz,256QAM,30kHz SCS, option S01)  1466C/D/E/F-V:  &gt;52dBc (100MHz,3.5GHz,0dBm)  &gt;51dBc (100MHz,10GHz,0dBm)  &gt;48dBc (100MHz,28GHz,0dBm)  &gt;42dBc (100MHz,42.5GHz,0dBm)  1466H/L-V:  &gt;52dBc (100MHz,3.5GHz,0dBm)  &gt;51dBc (100MHz,10GHz,0dBm)  &gt;46dBc (100MHz,28GHz,+5dBm)  &gt;41dBc (100MHz,42.5GHz,+5dBm)</p>
<p><b>Internal modulation bandwidth</b></p>	<p>(Carrier:900MHz, 2.6GHz, 3.5GHz, 10GHz, 28GHz, 42.5GHz, option S01/02)  H31-500/H31-B500 option:500MHz(Multitone,number of tones:51,Frequency interval:10MHz,frequency response: &lt;3.0dB);  H31-1000/H31-B1000 option:1GHz (Multitone, number of tones:51, carrier: <math>\geq</math>2.6GHz,frequency interval: 20MHz,frequency response: &lt;4.0dB);  H31-2000/H31-B2000 option:2GHz (Multitone, number of tones:51 carrier: <math>\geq</math>3.5GHz, frequency interval: 40MHz,frequency response: &lt;5.0dB).</p>
<p><b>External modulation bandwidth</b></p>	<p>(carrier: 10GHz, 28GHz,42.5GHz)  standard:2GHz (ALC off, input 500mVPP sine to channel I, frequency response: <math>\pm</math>5.0dB);  H33/H33-B:5GHz(<math>f&gt;20</math>GHz, ALC off, input 500mVPP sine to channel I, frequency response: <math>\pm</math>8.0dB).</p>
<p><b>Internal baseband signal generator</b></p>	<p>Channel: 2 (I and Q)  Max. symbol rate:  Standard: 150Msps  Option H31-1000: 300Msps  Option H31-2000: 600Msps  Baseband waveform memory:  Standard: 1G sampling point  Option H32: 4G sampling point  Real-time baseband mode:  Modulation format:  PSK: BPSK, QPSK, AQPSK, OQPSK, <math>\pi/4</math>DQPSK, 8PSK  QAM: 16, 32, 64, 128, 256, 512, 1024, 2048, 4096  FSK: 2, 4, 8, 16, 32, 64</p>



	ASK, MSK, APSK arbitrary wave modulation Maximum frequency interval in multitone mode (H31-2000): 2GHz EVM: <0.5% (typ) (RMS%, symble rate 4Msps, Gennyquist filter, $\alpha =0.3$ , QPSK format) Arbitrary wave mode: Data format: waveform segment, sequence Maximum clock frequency (H31-2000): 2.5GHz Trigger mode: continuous, single, gated Trigger source: key trigger, external Trigger type: Automatic, trigger, real-time, single ignore repeat trigger, single buffer repeat trigger, single real-time repeat trigger, high gating valid, low gating valid.
<b>General characteristics</b>	
<b>RF output interface</b>	1466C/D(-V): 3.5mm(Male), Impedance 50 $\Omega$ 1466E/G(-V): 2.4mm(Male), Impedance 50 $\Omega$ 1466H/L(-V): 1.85mm(Male), Impedance 50 $\Omega$
<b>Dimension (W×H×D)</b>	475mm×193mm×620mm (Includes handle and protective bottom corner) 426mm×177mm×500mm(Excludes handle and protective bottom corner)
<b>Weight</b>	<35kg (weight depend on product model and option)
<b>Power requirements</b>	100 to 120VAC,50 to 60Hz or 200 to 240VAC,50 to 60Hz (adaptive power supply)
<b>Power consumption</b>	<700W
<b>Temperature range</b>	Operating temperature range: 0 $^{\circ}$ C to +50 $^{\circ}$ C; Storage temperature range: -40 $^{\circ}$ C to +70 $^{\circ}$ C

## Ording Information

### ● Mainframe:

- 1466C-V Signal Generator: 6kHz to 13GHz
- 1466D-V Signal Generator: 6kHz to 20GHz
- 1466E-V Signal Generator: 6kHz to 33GHz
- 1466G-V Signal Generator: 6kHz to 45GHz
- 1466H-V Signal Generator: 6kHz to 53GHz
- 1466L-V Signal Generator: 6kHz to 67GHz

### ● Standard:

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

### ● Option:

Option No.	Description	Function and performance
<b>Programmable step attenuator option</b>		

Option No.	Description	Function and performance
1466-H01-130	130dB programmable step attenuator	To expand output power dynamic range for 1466C/D/E/G-V
1466-H01-120	120dB programmable step attenuator	To expand output power dynamic range for 1466H/L-V
1466-H01-90	90dB programmable step attenuator	To expand output power dynamic range for 1466H/L-V
1466-H01-B130	Channel B 130dB programmable step attenuator	To expand Channel B output power dynamic range for 1466C/D-V, Requires option 1466-H11-B13/B20/BV13/BV20
<b>Low phase noise option</b>		
1466-H04-1	Low phase noise	Improved phase noise performance, 10GHz@10kHz: -120dBc/Hz. For option 1466-H04-1 and 1466-H04-2, one of them must be selected.
1466-H04-2	Ultra low phase noise	Improved phase noise performance, 10GHz@10kHz: -128dBc/Hz. For option 1466-H04-1 and 1466-H04-2, one of them must be selected.
1466-H04-B1	Channel B low phase noise	Improved Channel B phase noise performance, 10GHz@10kHz: -120dBc/Hz, Regarding options 1466-H11-B13/B20/BV13/BV20. 1466-H04-B1, 1466-H04-B2 either one of them must be selected
1466-H04-B2	Channel B ultra low phase noise	Improved Channel B phase noise performance, 10GHz@10kHz: -128dBc/Hz, Regarding options 1466-H11-B13/ B20/ BV13/ BV20, 1466-H04-2. 1466-H04-B1, 1466-H04-B2, either one of them must be selected.
<b>High output power option</b>		
1466-H05-13	13GHz High output power	Improve maximum output power for 1466C-V
1466-H05-20	20GHz High output power	Improve maximum output power for 1466D-V
1466-H05-33	33GHz High output power	Improve maximum output power for 1466E-V
1466-H05-45	45GHz High output power	Improve maximum output power for 1466G-V
1466-H05-53	53GHz High output power	Improve maximum output power for 1466H-V
1466-H05-67	67GHz High output power	Improve maximum output power for 1466L-V
1466-H05-B13	13GHz Channel B High output power	Improve Channel B maximum output power for 1466C-V, Option 1466-H11-B13/BV13 need to be configured
1466-H05-B20	20GHz Channel B High output power	Improve Channel B maximum output power for 1466D-V, Option 1466-H11-B20/BV20 need to be configured
<b>Dual channel option</b>		
1466-H11-BV13	13GHz Vector Channel B	Add Channel B, output 100kHz to 13GHz vector signal for 1466D-V
1466-H11-BV20	20GHz Vector Channel B	Add Channel B, Output 100kHz to 20GHz Vector signal for 1466D-V

Option No.	Description	Function and performance
<b>Internal modulation bandwidth option</b>		
1466-H31-500	500MHz modulation bandwidth	Internal modulation bandwidth:500MHz, Regarding options 1466-H31-500, 1466-H31-1000, 1466-H31-2000, either one of them must be selected.
1466-H31-1000	1GHz modulation bandwidth	Internal modulation bandwidth:1GHz for 1466-V series Regarding options 1466-H31-500, 1466-H31-1000, 1466-H31-2000, either one of them must be selected.
1466-H31-2000	2GHz modulation bandwidth	Internal modulation bandwidth:2GHz for 1466-V series Regarding options 1466-H31-500, 1466-H31-1000, 1466-H31-2000, either one of them must be selected.
1466-H31-B500	Channel B 500MHz modulation bandwidth	Channel B Internal modulation bandwidth:500MHz Regarding options 1466-H31-B500, 1466-H31-B1000, 1466-H31-B2000, either one of them must be selected. Option 1466-H11-BV13 or 1466-H11-BV20 need to be configured.
1466-H31-B1000	Channel B 1GHz modulation bandwidth	Channel B Internal modulation bandwidth:1GHz Regarding options 1466-H31-B500, 1466-H31-B1000, 1466-H31-B2000, either one of them must be selected. Option 1466-H11-BV13 or 1466-H11-BV20 need to be configured.
1466-H31-B2000	Channel B 2GHz modulation bandwidth	Channel B Internal modulation bandwidth:2GHz Regarding options 1466-H31-B500, 1466-H31-B1000, 1466-H31-B2000, either one of them must be selected. Option 1466-H11-BV13 or 1466-H11-BV20 need to be configured.
<b>Large memory option</b>		
1466-H32	Internal baseband large capacity memory	Expand internal baseband memory to 16GB
1466-H32-B	Channel B Internal baseband large capacity memory	Expand Channel B internal baseband memory to 16GB, Option 1466-H11-BV13 or option 1466-H11-BV20 need to be configured
<b>Wideband external IQ input option</b>		
1466-H33	Wideband external IQ input	Add wideband external IQ input function
1466-H33-B	Channel B Wideband external IQ input	Channel B Wideband external IQ input, Option 1466-H11-BV13 or option 1466-H11-BV20 need to be configured
1466-H36	Phase coherence extension	Realize phase coherent input-output interface connection
<b>Matching option</b>		
1466-H94	Rack mount kit	Mount kit for rack
1466-H99	Aluminum alloy transport case	High-intensity portable aluminum alloy transport case, with carrying handle and omni-directional wheel, convenient for transportation
1466-H100	User Manual paper version	A detailed user manual in hard copy is provided.
1466-S01	Arbitrary waveform modulation function	Support arbitrary wave data download and playback, baseband signal generation or signal playback for 1466-V series
1466-S02	Multitone modulation	Realize multitone modulation signal generation function

Option No.	Description	Function and performance
1466-S03	Intrapulse modulation	Intrapulse Chirp, Barker Code, etc for 1466-V series
1466-S04	AWGN generation	Support pure noise generation, additive white Gaussian noise (AWGN) and continuous wave interference functions f
1466-S06	Segment waveform file generation	Realize the digital modulation signal generated waveform segment file
1466-S07	Sequencing file generation	To achieve multiple waveform segment files generated sequence files. Option S01 need to be configured
1466-S08	Multicarrier waveform generation	Realize multicarrier waveform signal generation. Option S01 arbitrary waveform need to be configured.
1466-S09	Frequency hopping signal generation	Realize frequency hopping signal generation
<b>Analog modulation option</b>		
1466-S11	Analog modulation	Add analog modulation function including AM, FM, $\Phi$ M
1466-S12	Pulse modulation	Add pulse modulation function, minimum pulse width 100ns
1466-S13	Narrow pulse modulation	Add pulse modulation function, minimum pulse width 20ns
1466-S14	LF output/function waveform generator	Add low frequency output and function waveform signal generation
<b>Sweep function option</b>		
1466-S15	Ramp(analog)sweep	Add analog sweep function(Ramp sweep)
1466-S16	Power sweep	Add power sweep function
<b>Internal signal simulation option</b>		
1466-S21	Wireless connection signal simulation function	802.11a/b/g/n/ac/ax (Wi-Fi1~Wi-Fi6) Wireless connection PPDU, MPDU, A-MPDU and other signal simulation, with leading, data domain, MAC frame, PE, space mapping and other module parameter Settings. It supports physical frame block signal simulation consisting of multiple PPDUs with different modulation and coding modes. Applicable to all models of the 1466-V series.
1466-S31	Communication signal simulation GSM/EDGE	Support normal symbol rate full speed/half speed conventional, synchronous, frequency correction, access and null burst types, as well as high symbol rate burst types; Support normal symbol rate MSK/FSK, AQPSK, 8PSK, 16QAM, 32QAM and high symbol rate QPSK, 16QAM, 32QAM modulation; Support single frame, double frame and no frame 3 different types of frame structure configuration; Support independent power configuration for each time slot; Support channel coding for each time slot; Support wide pulse and narrow pulse filtering with high symbol rate; Supports up to 64 multi-carrier configurations.
1466-S33	Communication signal simulation LTE/LTE-ADVANCED	Uplink: Support FDD/TDD duplex mode, PRACH, PUCCH, PUSCH and other uplink channels and DMRS uplink signal simulation of different bandwidth and modulation coding modes, with A1 to A8 a total of 44 categories of FRC signal simulation functions.

Option No.	Description	Function and performance
		Downlink: Support FDD/TDD duplex mode, PBCH, PCFICH, PHICH, PDCCH, PDSCH and other downlink channels and CRS, PSS, SSS and other downlink signal simulation under Auto DCI/Manual scheduling PDSCH mode. It has the aggregation function of up to 5 carriers, the multi-antenna setting function of up to 4 antennas, and a total of 8 TestModel signal simulation functions of E-TM1~E-TM3.
1466-S34	Communication signal simulation 5G NR	Support 5G NR protocol R16 signal generation, including a variety of bandwidth and subcarrier interval Settings; It can generate more than 600 Testmodels and FRCS, support one-click simulation of standard protocol signals, and quickly establish test scenarios. Support uplink PUSCH, PUCCH, PRACH, downlink PDSCH, CORESET multi-channel time-frequency resource detailed configuration, PDSCH/PUSCH channel coding, multi-antenna, multi-layer transmission simulation; Support CSI-RS, SRS, SS/PBCH, PRS, LTE-CRS and other signal configurations; Support a variety of upstream and downstream DCI formats in CORESET, DCI automatically calls PDSCH configuration; Support carrier aggregation and cross-carrier scheduling; Supports a variety of filters and user-defined filter configurations.
1466-S35	Communication signal simulation NB-Iot	Uplink: It supports Standalone, In_band, Guard_band and other deployment modes, and has uplink channel functions such as NPUSCH and NPRACH with different bandwidths and modulation and coding modes. The NPUSCH format includes F1 and F2. The signal styles include Single-tone(15kHz/3.75kHz) and SC-FDMA(15kHz). Downlink: Support Standalone, In_band, Guard_band and other three deployment modes, with different bandwidth and modulation coding mode of NPBCH, NPDCCH, NPDSCH and other downlink signal simulation functions such as NPSS, NSSS, NRS, DCI format includes N0, N1, N2 three. NPDCCH search space includes UE specific, type1 common and type2 common.
1466-S61	Digital broadcast signal simulation DVB-H/T/T2/S2/S2X	Support DVB-H, DVB-T, DVB-T2, DVB-S2X protocol; Support for data channel coding according to protocol standards, including scrambling, interleaving, external code (BCH), and internal code (LDPC) with rate from 1/4 to 31/45; Configurable baseband (BB) head, VL-SNR head, TS head, GSE head; Support DVB-S2 modulation scheme: QPSK, 8APSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK, 256APSK; Support QPSK, $\pi/2$ BPSK in VL-SNR mode; Support pilot insertion and configuration; Supports superframe configuration, hop beam configuration, and configurable dwell time.