# 1466 Series Signal Generator


**Ceyear Technologies Co.,Ltd**

# Product Overview

Ceyear 1466 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 and electronic warfare.

# Main Features

## Excellent RF Performance

- Coaxial frequency coverage: 6kHz to 13GHz/20GHz/33GHz/45GHz/53GHz/67GHz/90GHz/110GHz;
- 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 range from -150dBm to +25dBm;
- Maximum 2GHz modulation bandwidth, optional 500MHz/1GHz bandwidth ;
- Outstanding vector modulation accuracy: EVM<0.8%(5GNR,FR2 28GHz);

## Various Built-in Functions

- Single-machine dual-channel + multi-machine cascade, multi-channel independent or phase-coherent output can be flexibly configured

- Rich modulation functions, covering analog modulation, pulse modulation and 33 digital modulation formats
- Multi-type noise addition and real-time fading simulation function

## Multi-scenario signal simulation

- TestModel/FRC;More than 600 mobile communication TestModel/FRC covering 5G NR, LTE and other protocols
- Internal integrated WLAN standard wireless connection signal simulation function
- Signal Simulation of Multi-objects Dynamic Radar Scenario

## Newly updated interactive interface

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

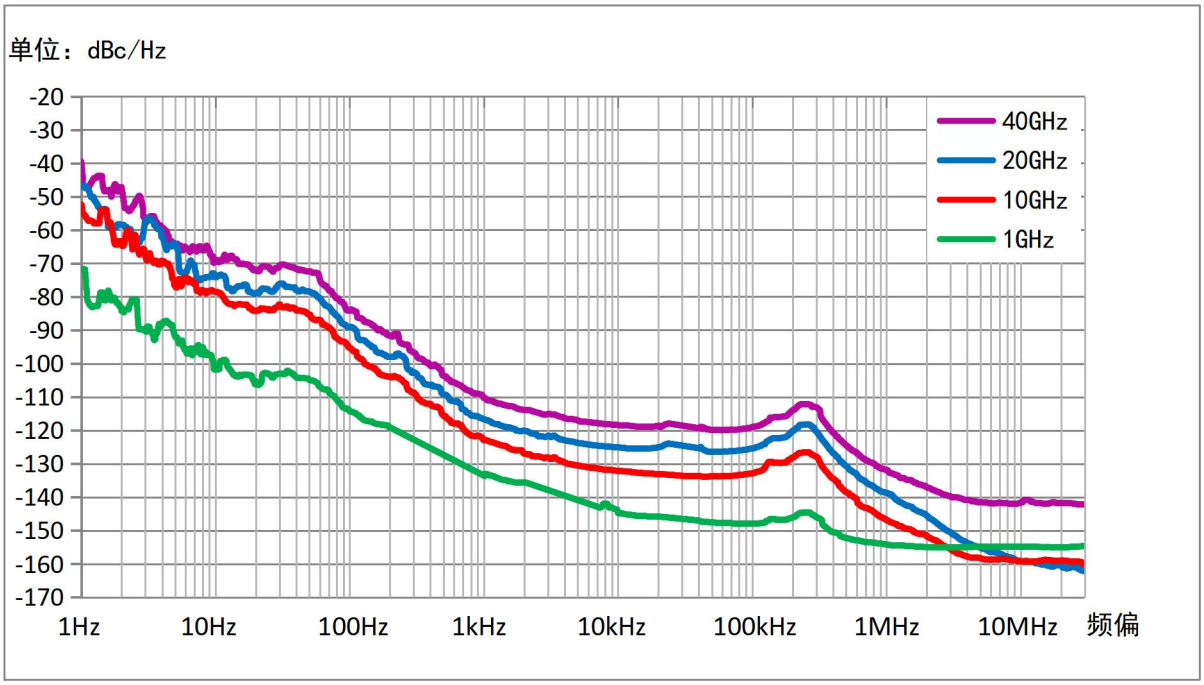
# Excellent RF Performance

### 110GHz coaxial frequency coverage, easier and more accurate testing

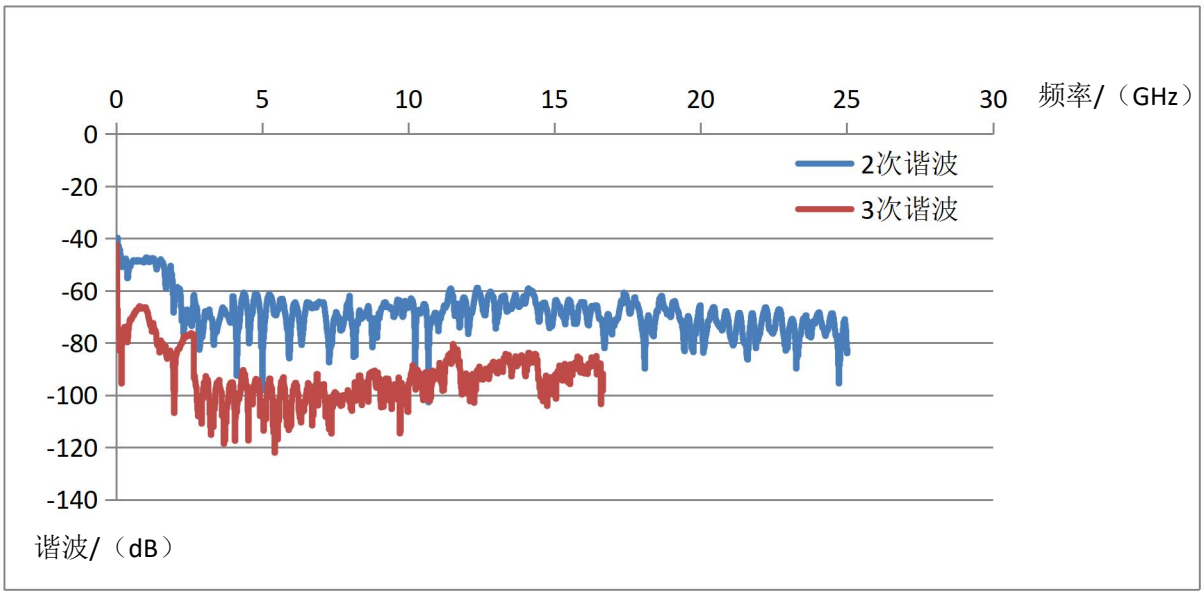
Ceyear 1466 series signal generator coaxial output frequency covers 6kHz to 110GHz, at the same time, it has high-precision large dynamic range amplitude control which can provide excellent power accuracy and stability. Ceyear 1466 series siganl generator supports external Ceyear 8240X series signal source extender which can further expand the frequency to 750GHz. It is a powerful tool for efficient millimeter-wave 5G communication RF conformance testing and millimeter-wave radar testing.

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

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




**Option H05: Single sideband phase noise measured values**

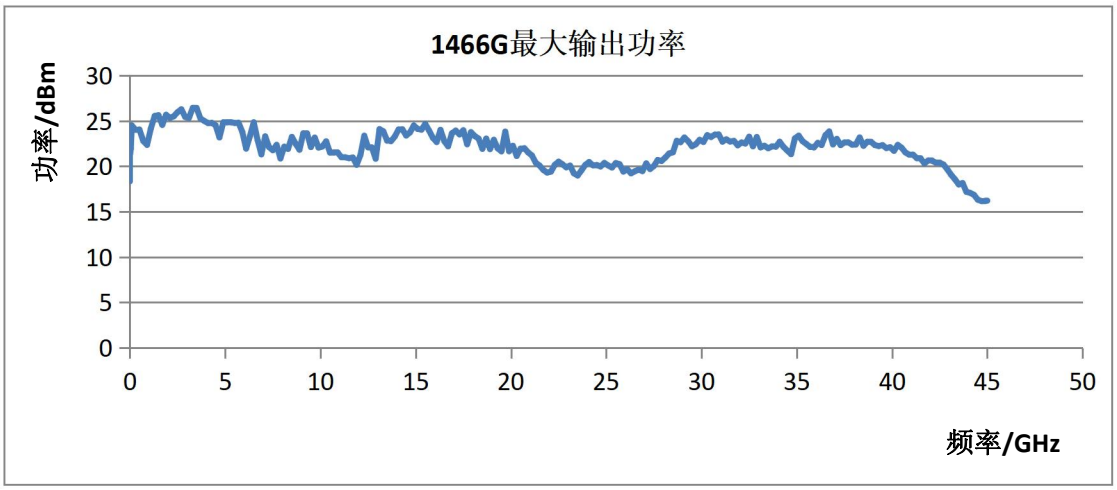



**Option H05: harmonics in the 45GHz range**


**10 GHz carrier spurious test results**

## Large dynamic range, high accuracy power output

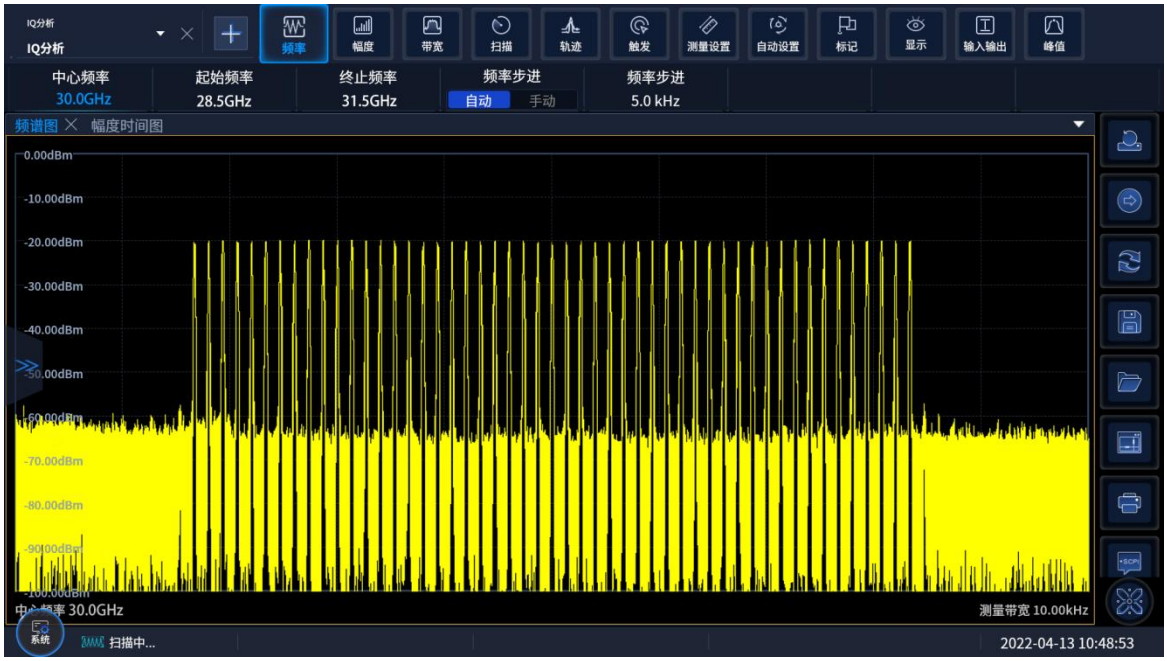
Ceyear 1466 series signal generator maximum output power: +25dBm @3GHz, +22dBm@ 20GHz, +22dBm @40GHz, +10dBm@ 67GHz, +3dBm @110GHz. Minimum settable output power can up to -150dBm,dynamic range of output power can reach 170dB. Industry-leading power accuracy specifications:<0.5dB below 20GHz(typ).




**1466G maximum output power measured**

## 2GHz RF modulation bandwidth

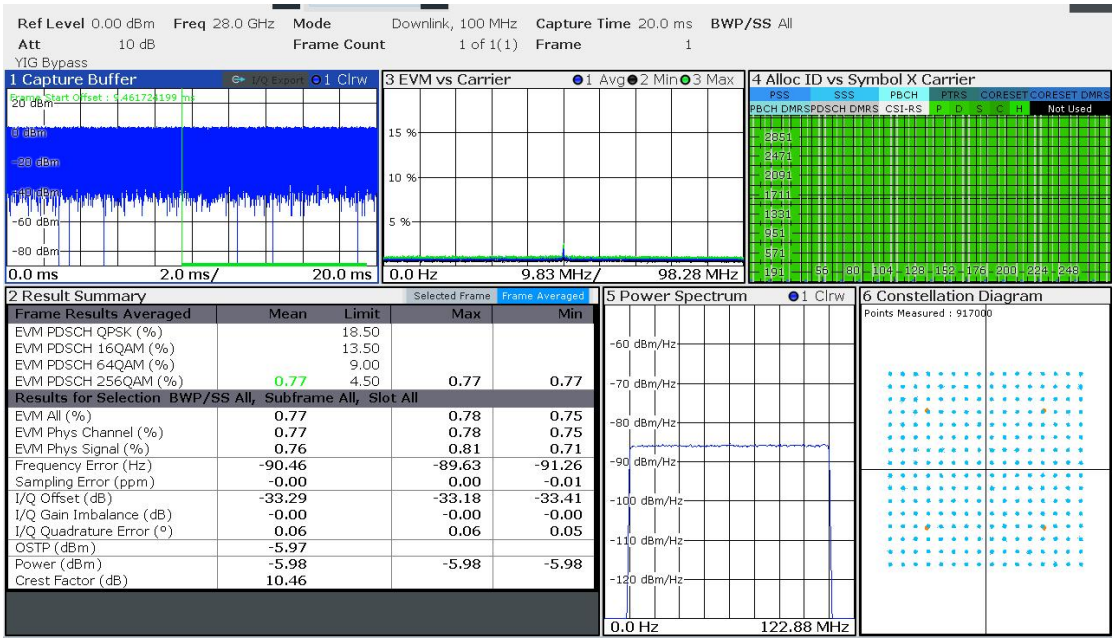
Ceyear 1466 series signal generator can provide a maximum 2GHz RF modulation bandwidth, and the typical in-band frequency response is less than 1.0dB. According to different application scenarios, it supports flexible selection of 500MHz, 1GHz, and 2GHz bandwidth. When using an external broadband baseband 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

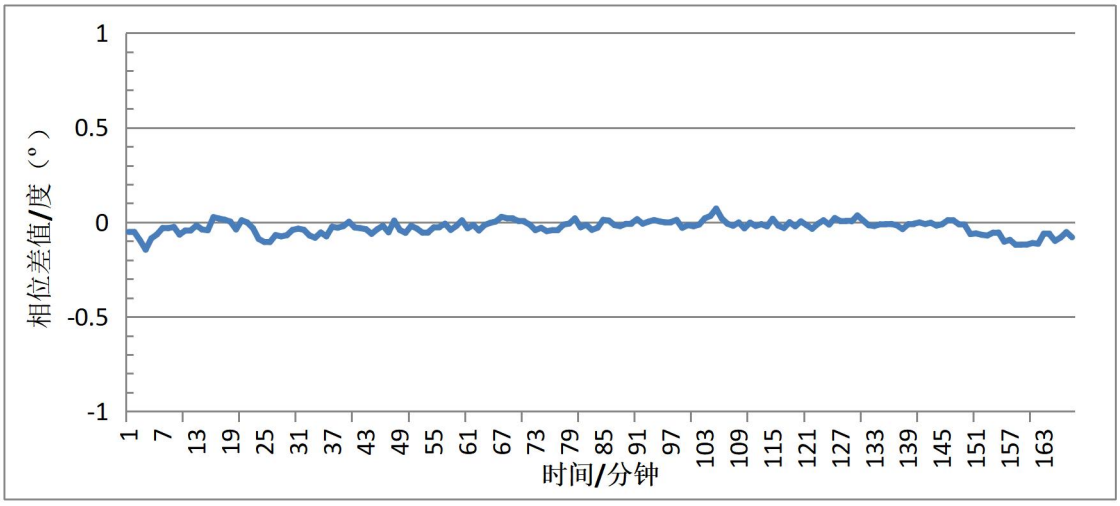
Ceyear 1466 series signal generator has excellent vector modulation accuracy, 5GNR EVM<0.8% (28GHz carrier, typical value). It has excellent adjacent channel power ratio, 5GNR ACPR (typical value, <-55dBc@3.5GHz carrier, <-45dBc@42.5GHz carrier). The signal generator is capable of performing performance evaluation in communication equipment research and development and communication equipment performance testing in production lines.




**28GHz carrier 5G NR EVM test results**

## Dual RF channel output for more flexible applications

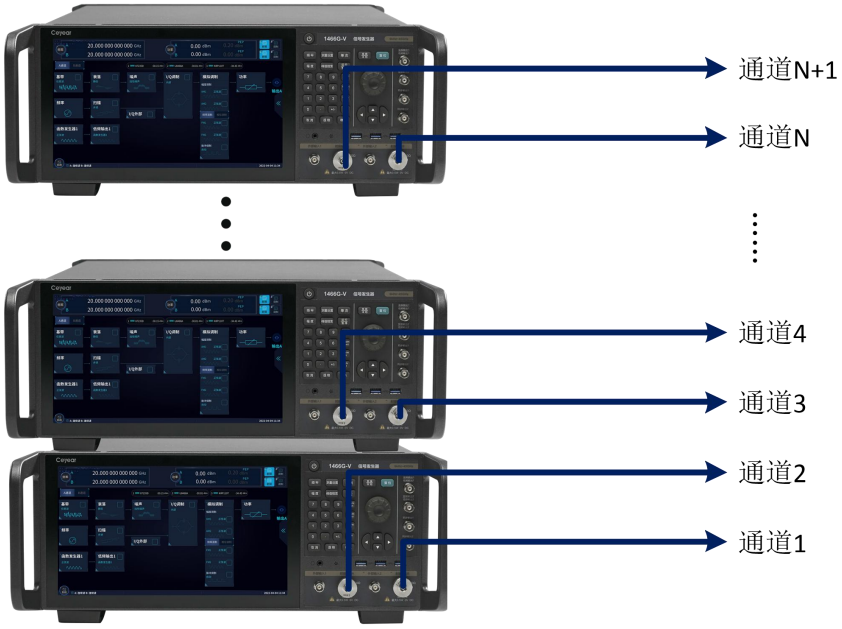
Cyear 1466 series signal generator supports single-machine dual-channel output. The output performance of dual-channel is consistent with that of single-channel. The resolution of phase coherence is flexible and adjustable at 0.001°, and it has good phase-coherence stability.




**Dual-channel phase coherence variation measured data**

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

Ceyear 1466 series signal generator supports multi-machine cascading, providing solutions for MIMO, beamforming, and signal diversity testing.




**1466 Series signal generator multiple 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.


**Analogue modulation interface**

## Multi-style sweep mode

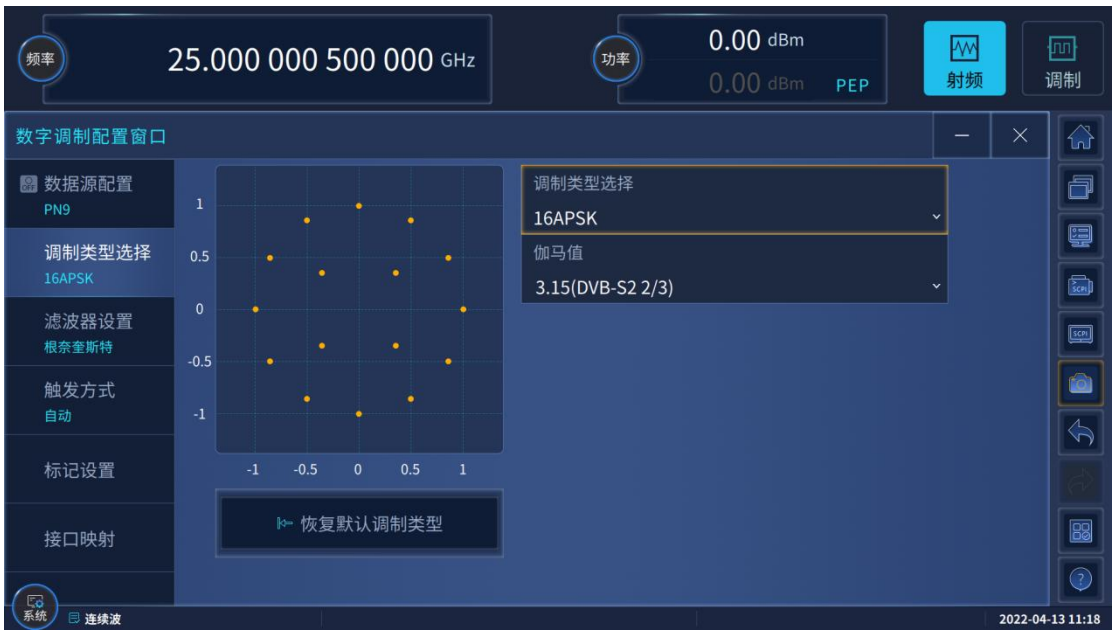
Support Step sweep, List sweep, ramp sweep and power sweep functions.


**Scan mode interface**

## Comprehensive standard digital modulation styles

Generation of up to 33 digital standard modulation signals (PSK, FSK, QAM, APSK), covering all important frequency bands and modulation styles for digital communications.

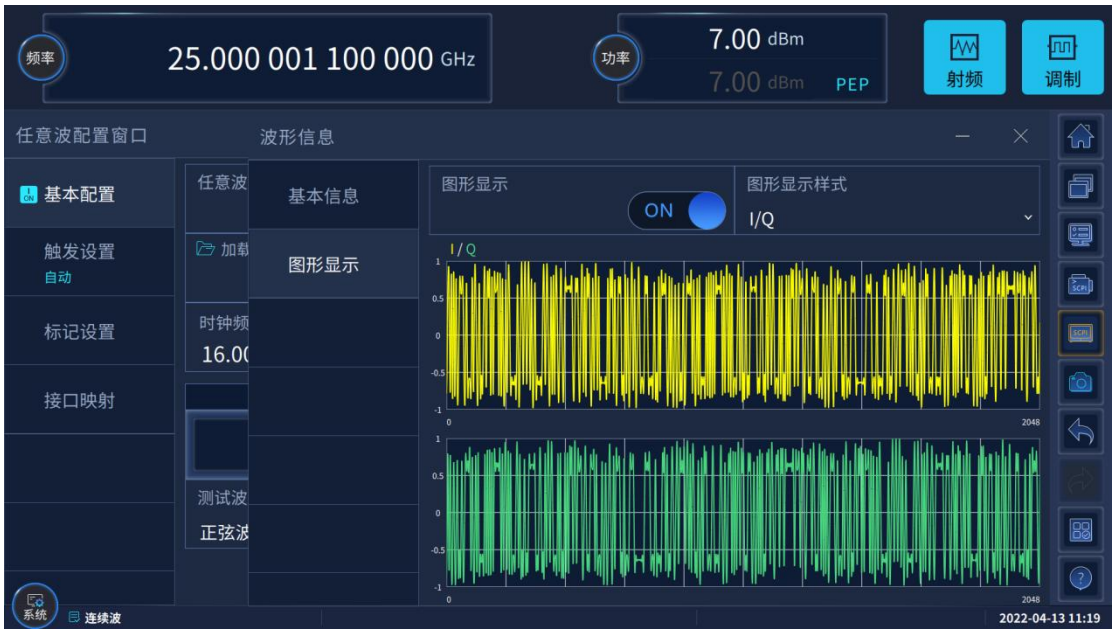

**4096QAM modulation interface**



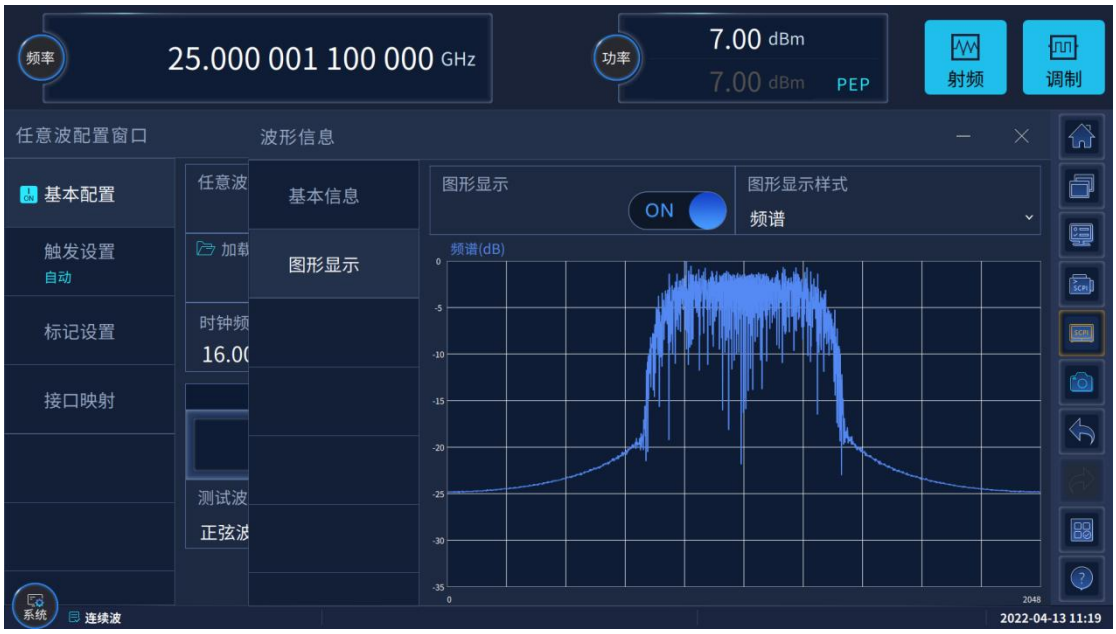

**16APSK modulation interface**

## 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 interface**




**Arbitrary wave IQ data spectrum interface**

**Multicarrier signal generation**

Support continuous wave multi-tone and complex multi-carrier modulation functions. Supports up to 65535 CW multi-tone signal modulation.


**Polyphonic modulation configuration screen**

## Multiple types of noise addition methods

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


**Additive Gaussian white 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 decay simulation interface**

# Multi-scenario signal simulation

The 1466 signal generator combines simulation software to support multi-type signal simulation and RF output such as communication, radar, and electronic warfare.

## 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 1466 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.


**5GNR up and down link test case interface**

## WLAN signal simulation

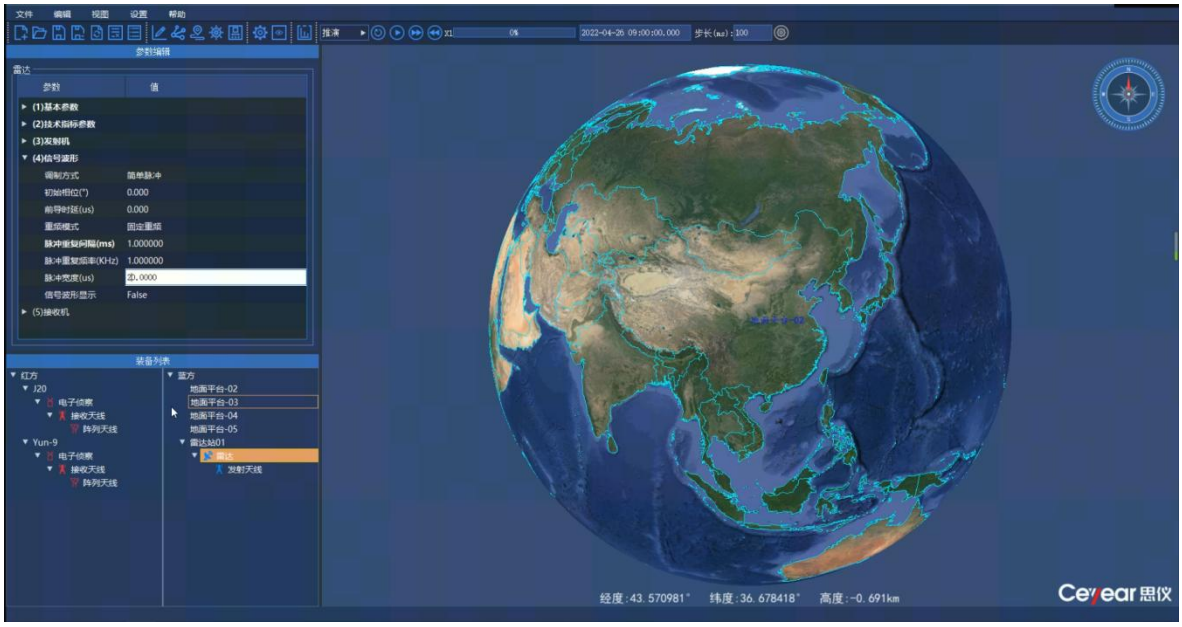
For the development, production and testing of wireless communication terminals, it has 802.11a/b/g/n/ac/ax wireless connection PPDU, MPDU, A-MPDU and other signal simulations, and supports physical frames composed of multiple PPDUs with different modulation and coding methods block signal simulation.


**WLAN物理帧块配置界面**


**MAC header configuration interface**

## Radar scenario signal simulation

Combined with the 1466-S55-01/02/03 radar scenario simulation option, it can simulate wide-band and multi-standard radar scene signals. Arrange multi-radar signal simulation scenarios in the background of 3D map, through the drag-and-drop carrier platform setting, visualized multi-platform space multi-parameter editing and trajectory planning, comprehensive and continuous simulation of radar scene signal characteristics, and stereoscopic and dynamic image display through 3D models.




**Radar scene simulation option**

# 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.


**Signal flow diagram guide interface**

## Flexible user control interface

Support user-defined menus, tailor-made personalized user control interface according to test habits, realize multi-function operations in one

window, and avoid the trouble of too deep menus and repeated searches.


**User-defined menus**

## 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 recording**

# Technical Specifications

<table>
<tr><th colspan="5">Frequency characteristics</th></tr>
<tr><td rowspan="14">Frequency</td><td rowspan="14">1466C:6kHz to 13GHz<br>1466D:6kHz to 20GHz<br>1466E:6kHz to 33GHz<br>1466G:6kHz to 45GHz<br>1466H:6kHz to 53GHz<br>1466L:6kHz to 67GHz<br>1466N:6kHz to 90GHz<br>1466L:6kHz to 110GHz<br>1466C-V:100kHz to 13GHz<br>1466D-V:100kHz to 20GHz<br>1466E-V:100kHz to 33GHz<br>1466G-V:100kHz to 45GHz<br>1466H-V:100kHz to 53GHz<br>1466L-V:100kHz to 67GHz</td><td colspan="2">Frequency range</td><td>N[1]</td></tr>
<tr><td colspan="2">6kHz≤f≤10MHz</td><td>-</td></tr>
<tr><td colspan="2">10MHz<f≤50MHz</td><td>-</td></tr>
<tr><td colspan="2">50MHz<f≤62.5MHz</td><td>1/256</td></tr>
<tr><td colspan="2">62.5MHz<f≤125MHz</td><td>1/128</td></tr>
<tr><td colspan="2">125MHz<f≤250MHz</td><td>1/64</td></tr>
<tr><td colspan="2">250MHz<f≤500MHz</td><td>1/32</td></tr>
<tr><td colspan="2">500MHz<f≤1GHz</td><td>1/16</td></tr>
<tr><td colspan="2">1GHz<f≤2GHz</td><td>1/8</td></tr>
<tr><td colspan="2">2GHz<f≤4GHz</td><td>1/4</td></tr>
<tr><td colspan="2">4GHz<f≤8GHz</td><td>1/2</td></tr>
<tr><td colspan="2">8GHz<f≤20GHz</td><td>1</td></tr>
<tr><td colspan="2">20GHz<f≤40GHz</td><td>2</td></tr>
<tr><td colspan="2">40GHz<f≤67GHz</td><td>4</td></tr>
<tr><td colspan="2">100GHz<f≤110GHz</td><td>6</td></tr>
<tr><td>Resolution</td><td colspan="4">0.001Hz</td></tr>
<tr><td>Switching speed</td><td colspan="4"><15ms</td></tr>
<tr><td>Aging rate(typ)</td><td colspan="4">±5×10 $^{-10}$ /day after 30 days</td></tr>
<tr><td rowspan="2">Reference output</td><td colspan="2">Frequency</td><td colspan="2">10MHz</td></tr>
<tr><td colspan="2">Amplitude</td><td colspan="2">>+4dBm into 50Ω load</td></tr>
<tr><td rowspan="2">External reference input</td><td colspan="2">Frequency</td><td colspan="2">1 to 100MHz,step:1Hz</td></tr>
<tr><td colspan="2">Amplitude</td><td colspan="2">-5dBm to +10dBm,impedance: 50Ω</td></tr>
<tr><th colspan="5">Sweep characteristics</th></tr>
<tr><td>Sweep mode</td><td colspan="4">Step sweep List sweep Ramp(analog) sweep Power sweep</td></tr>
<tr><td rowspan="2">Ramp(analog) sweep<br>(Option S15)</td><td>Maximum sweep rate</td><td colspan="2">f>4GHz</td><td>400MHz/ms</td></tr>
<tr><td>Frequency accuracy</td><td colspan="3">±0.05% of span ±timebase(at 100ms sweep time, for sweep spans less than maximum values given above)</td></tr>
<tr><th colspan="5">Output characteristics</th></tr>
<tr><td rowspan="2">Minimum output power</td><td colspan="2">Model</td><td>standard</td><td>Option H01-130/120/50</td></tr>
<tr><td colspan="2">1466C/D/E/G(-V)</td><td>-20dBm</td><td>6kHz≤f≤100kHz<br>-90.0dBm(minimum settable output power:-150dBm)<br>f > 100kHz<br>-120.0dBm(minimum settable outpue poer:-150dBm)</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | 1466H/L(-V) | -20dBm | -90.0dBm(minimum settable outpue poer:-140dBm) | | |
| | 1466N/P | -10dBm | -50.0dBm(minimum settable outpue poer:-70dBm) | | |
| Maximum output power (25±10°C) | **Configuration / Frequency range** | **Standard** | **Programmable step attenuator Option H01-130/120/50/B130** | **High output power (option H05-13/20/33/45/53/67/90/110/B13/B20)** | **High output power and programmable step attenuator (option H01-130+H05-13/20/33/45; H01-120+H05-53/67; H01-50+H05-90/110; H01-B130+H05-B13/B20)** |
| | 1466C/D(-V) | | | | |
| | 6kHz≤f≤50MHz | ≥+15.0 | ≥+15.0 | ≥+15.0 | ≥+15.0 |
| | 50MHz<f≤20GHz | ≥+15.0 | ≥+15.0 | ≥+20.0 | ≥+20.0 |
| | 1466E/G(-V) | | | | |
| | 6kHz≤f≤50MHz | ≥+8.0 | ≥+8.0 | ≥+8.0 | ≥+8.0 |
| | 50MHz<f≤6GHz | ≥+12.0 | ≥+12.0 | ≥+20.0 | ≥+20.0 |
| | 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 |
| | 1466H/L(-V) | | | | |
| | 6kHz≤f≤50MHz | ≥+5.0 | ≥+5.0 | ≥+8.0 | ≥+8.0 |
| | 50MHz<f≤20GHz | ≥+5.0 | ≥+5.0 | ≥+17.0 | ≥+17.0 |
| | 20GHz<f≤40GHz | ≥+5.0 | ≥+5.0 | ≥+15.0 | ≥+15.0 |
| | 40GHz<f≤53GHz | ≥+5.0 | ≥+5.0 | ≥+14.0 | ≥+14.0 |
| | 53GHz<f≤65GHz | ≥+5.0 | ≥+5.0 | ≥+12.0 | ≥+10.0 |
| | 65GHz<f≤67GHz | ≥+5.0 | ≥+3.0 | ≥+10.0 | ≥+8.0 |
| | 1466N/P | | | | |
| | 6kHz≤f≤50MHz | ≥+5.0 | ≥+5.0 | ≥+8.0 | ≥+8.0 |
| | 50MHz<f≤20GHz | ≥+5.0 | ≥+5.0 | ≥+13.0 | ≥+13.0 |
| | 20GHz<f≤40GHz | ≥+5.0 | ≥+5.0 | ≥+12.0 | ≥+12.0 |
| | 40GHz<f≤67GHz | ≥+3.0 | ≥+3.0 | ≥+8.0 | ≥+6.0 |

| | | | | | |
|---|---|---|---|---|---|
| | 67GHz<f≤85GHz | ≥0.0 | ≥0.0 | ≥+7.0 | ≥+5.0 |
| | 85GHz<f≤110GHz | ≥-5.0 | ≥-5.0 | ≥+3.0 | ≥+0.0 |

| | | | | | |
|---|---|---|---|---|---|
| Level accuracy (25±10°C) | Standard | | | | |
| | **Power(dBm) / Frequency** | **-20dBm<P≤-10dBm** | **-10dBm<P≤+10dBm** | **+10dBm<P≤+25dBm** | **+25dBm<P** |
| | 6kHz≤f≤50MHz | ±1.0dB | ±1.0dB | ±1.0dB | — |
| | 50MHz<f≤3GHz | ±0.9dB | ±0.5dB | ±0.5dB | ±1.0dB |
| | 3GHz<f≤20GHz | ±1.0dB | ±0.9dB | ±0.9dB | ±1.2dB |
| | 20GHz<f≤40GHz | ±1.3dB | ±1.0dB | ±1.0dB | — |
| | 40GHz<f≤50GHz | ±1.5dB | ±1.3dB | ±1.3dB | — |
| | 50GHz<f≤67GHz | ±2.0dB | ±1.8dB | ±1.8dB | — |
| | 67GHz<f≤85GHz | — | ±2.0dB | ±2.0dB | — |
| | 85GHz<f≤110GHz | — | ±2.2dB | — | — |
| | **H01-130/120/50/B130 programmable step attenuator option** | | | | |
| | **Power(dBm) / Frequency** | **+120dBm<P≤-90dBm** | **-90dBm<P≤+50dBm** | **-50dBm<P≤+10dBm** | **+10dBm<P≤+25dBm** | **+25dBm<P** |
| | 6kHz≤f≤50MHz | — | ±1.0dB | ±1.0dB | ±1.0dB | — |
| | 50MHz<f≤3GHz | ±1.2dB | ±0.7dB | ±0.5dB | ±0.5dB | ±1.0dB |
| | 3GHz<f≤20GHz | ±1.8dB | ±0.9dB | ±0.9dB | ±0.9dB | ±1.2dB |
| | 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 | — |
| | 67GHz<f≤85GHz | — | — | ±2.0dB | ±2.0dB | — |
| | 85GHz<f≤110GHz | — | — | ±2.2dB | — | — |
| Level resolution | 0.01dB | | | | | |
| Temperature stability | 0.02dB/℃(typ) | | | | | |
| Output impedance | 50Ω(nom) | | | | | |
| VSWR(internal leveled)(typ) | 100kHz≤f≤20GHz | <1.6 | | | | |
| | 20GHz<f≤40GHz | <1.8 | | | | |
| | 40GHz<f≤67GHz | <2.0 | | | | |
| | 67GHz<f≤85GHz | <2.5 | | | | |
| | 85GHz<f≤110GHz | <3.0 | | | | |
| Maximum reverse power | 0.5W(0V DC)(nom) | | | | | |

| **Spectral purity characteristics** | | |
|---|---|---|
| Harmonics (dBc at +10dBm or maximum specified output power, whichever is lower) | **Frequency** | **Standard** |
| | 100kHz≤f≤50MHz | <-30dBc |
| | 50MHz<f≤3GHz | <-30dBc |
| | 3GHz<f≤67GHz | <-55dBc |
| | 67GHz<f≤110GHz | <-40dBc |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sub-harmonics(at +10dBm or maximum specified output power, whichever is lower) | 6kHz≤f≤20GHz | | | | <-80dBc | | | |
| | 20GHz<f≤40GHz | | | | <-60dBc | | | |
| | 40GHz<f≤110GHz | | | | <-50dBc | | | |
| Non-harmonics(dBc at 0dBm, for offset >3kHz) | **Frequency** | | **Option H04-1** | | | **Option H04-2** | | |
| | 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 | | <-52dBc | | | <-62dBc | | |
| | 67GHz<f≤110GHz | | <-48dBc | | | <-58dBc | | |
| | 1466H/L -V | | | | | | | |
| | 40GHz<f≤67GHz | | <-45dBc | | | <-45dBc | | |
| SSB phase noise (dBc/Hz, at +10dBm or maximum specified output power, whichever is lower) | **Offset from carrier** | **10Hz** | **100Hz** | **1kHz** | **10kHz** | **100kHz** | **1MHz** | **10MHz** |
| | **H04-1 low phase noise option** | | | | | | | |
| | 100MHz | — | <-120 | <-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 | — | — |
| | **H04-2 ultra low phase noise option** | | | | | | | |
| | 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 |
| | 67GHz<f≤110GHz | <-51 | <-67 | <-88 | <-104 | <-104 | <-116 | <-130 |
| **Modulation characteristics** | | | | | | | | |
| Frequency modulation (50MHz<f≤50GHz,Op | Maximum deviation:N×20MHz(N: YO harmonic number)<br>Accuracy(at 1kHz, N×20kHz≤deviation<N×800kHz): | | | | | | | |

| | | | |
|---|---|---|---|
| tion S11) | <± (2.5%× set frequency offset +20Hz)<br>Modulation rate(3dB bandwidth, N×500kHz frequency offset)):DC-10MHz<br>Distortion(at 1kHz, N×20kHz≤deviations<N×800kHz):<1% | | |
| Phase modulation (50MHz<f≤50GHz,Option S11) | Maximum deviation:<br>Normal mode:N×20.0rad(N: YO harmonic number)<br>Broadband mode:N×2rad<br>Low noise mode:N×0.2rad<br>Accuracy(at 1kHz,N×0.2rad≤phase deviations<N×8rad,normal mode):<br><± (3% of setting deviation+0.01 rad)<br>Modulation rate(3dB bandwidth, broadband mode):DC to 10MHz(typ)<br>Distortion (at 1kHz, N×0.8rad≤deviations<N×8rad, THD)::<0.8% | | |
| Amplitude modulation (10MHz<f≤50GHz,Option S11) | Maximum depth:>90%<br>Modution rate(3 dB bandwidth, 30% modulation depth):DC to 100kHz<br>Accuracy(1kHz modulation rate,30% modulation depth):±(5% of setting+1%)<br>Distortion(1kHz modulation rate,Linear mode,THD,30% modulation depth):<1.0% | | |
| Pulse modulation | **Option S12** | >50MHz to 67GHz | >67GHz |
| | On/off ratio | >80dB | >60dB |
| | Rise/fall times | <20ns | <30ns |
| | Repetition frequency | 0Hz to 25MHz | 0Hz to 25MHz |
| | Minimum pulse width with ALC on | 1μs | 1μs |
| | Minimum pulse width with ALC off | 0.1μs | 0.1μs |
| | **Option S13** | >50MHz to 67GHz | |
| | On/off ratio | >80dB | — |
| | Rise/fall times | <10ns | — |
| | Repetition frequency | 0Hz to 25MHz | — |
| | Minimum pulse width with ALC on | 1μs | — |
| | Minimum pulse width with ALC off | 20ns | — |
| LF out/Function generator(option S14) | Support frequency/phase modulation, amplitude modulation output<br>Waveform: sina, square, triangle, sawtooth, noise, double sine, sweep sine<br>Frequency range: DC to 10MHz for sine, double sine, sweep sine waveform; 0.1Hz to 1MHz for square, triangle, swatooth waveform.<br>Frequency resolution:0.1Hz<br>Low frequency output:amplitude: 0 to 5Vpp(nom), into 50Ω load | | |

| | |
|---|---|
| Vector accuracy(EVM,RMS%, after calibration,0dBm,25℃±10℃,1466-V series) | Basic modulation types(symbol rate 4 Msym/s,root Nyquist filter,α=0.3,QPSK format,f>100MHz):<br>100MHz<f≤4GHz <0.8%<br>4GHz<f≤20GHz <1.0%<br>20GHz<f≤40GHz <1.2%<br>40GHz<f≤67GHz <1.4%<br>CDMA(symbol rate 3.84 Msym/s,root Nyquist filter,α=0.22,QPSK format):<br><0.7% (2GHz)<br>5GNR:(Test Model 3.1a,100MHz,256QAM,30kHz SCS,Option S01):<br><0.85% (100MHz,3.5GHz)<br><1.2% (100MHz,28GHz) |
| Adjacent Channel Power Ratio(ACPR,after calibration,0dBm,25℃±10℃,1466-V series) | CDMA:(symbol rate 3.84 Msym/s,root Nyquist filter,α=0.22,QPSK format)<br>>64dBc (2GHz)<br>5GNR:(Test Model 3.1a,100MHz,256QAM,30kHz SCS,option S01)<br>>53dBc (100MHz,3.5GHz)<br>>51dBc (100MHz,10GHz)<br>>48dBc (100MHz,28GHz) |
| Internal modulation bandwidth(1466-V series) | (Carrier:900MHz, 2.6GHz, 3.5GHz, 10GHz, 28GHz, 42.5GHz, 80GHz)<br>H31-500/H31-B500 option:500MHz(Multitone,number of tones:51,Frequency interval:10MHz,frequency response:<3.0dB);<br>H31-1000/H31-B1000 option:1GHz(Multitone,number of tones:51, carrier:≥2.6GHz,frequency interval: 20MHz,frequency response: <4.0dB);<br>H31-2000/H31-B2000 option:2GHz(Multitone,number of tones:51 carrier: ≥3.5GHz,frequency interval: 40MHz,frequency response: <5.0dB). |
| External modulation bandwidth(1466-V series) | (carrier: 10GHz, 28GHz)<br>standard:2GHz(ALC off,input 500mVPP sine to channel I,frequency response: ±5.0dB);<br>H33/H33-B:5GHz(f>20GHz,ALC off,input 500mVPP sine to channel I,frequency response: ±8.0dB). |
| **General characteristics** | |
| RF output interface | 1466C/D(-V):3.5mm(Male),Impedance50Ω<br>1466E/G(-V):2.4mm(Male),Impedance50Ω<br>1466H/L(-V):1.85mm(Male),Impedance50Ω<br>1466N/P:1.0mm(Male),Impedance50Ω |
| Dimension (W×H×D) | 475mm×193mm×620mm(Includes handle and protective bottom corner)<br>426mm×177mm×500mm(Excludes handle and protective bottom corner) |
| Weight | <35kg(weight depend on product model and option) |
| Power requirements | 100 to 120VAC,50 to 60Hz or 200 to 240VAC,50 to 60Hz(adaptive power supply) |
| Power consumption | <700W |
| Temperature range | Operating temperature range:0℃ to +50℃;Storage temperature range:-40℃ to +70℃ |

**1.N is a factor used to help define the YO harmonic number of times.**

# Ordering Information

## Mainframe:

1466C Signal Generator: 6kHz to 13GHz

1466D Signal Generator: 6kHz to 20GHz

1466E Signal Generator: 6kHz to 33GHz

1466G Signal Generator: 6kHz to 45GHz

1466H Signal Generator: 6kHz to 53GHz

1466L Signal Generator: 6kHz to 67GHz

1466N Signal Generator: 6kHz to 90GHz

1466P Signal Generator: 6kHz to 110GHz

1466C-V Signal Generator: 100kHz to 13GHz

1466D-V Signal Generator: 100kHz to 20GHz

1466E-V Signal Generator: 100kHz to 33GHz

1466G-V Signal Generator: 100kHz to 45GHz

1466H-V Signal Generator: 100kHz to 53GHz

1466L-V Signal Generator: 100kHz to 67GHz

## Standard:

| No. | Description | Remarks |
|---|---|---|
| 1 | Power cable assembly | Standard three-core power cord |
| 2 | User Manual | / |
| 3 | Programming Manual | / |
| 4 | The Product certificate of conformity | / |

## Option:

| Option No. | Description | Function and performance requirements |
|---|---|---|
| 1466-H01-130 | 130dB programmable step attenuator | To expand output power dynamic range for 1466C/D/E/G and 1466C/D/E/G-V |
| 1466-H01-120 | 120dB programmable step attenuator | To expand output power dynamic range for1466H/L and 1466H/L-V |
| 1466-H01-50 | 50dB programmable | To expand output power dynamic range for 1466N/P |

| Option No. | Description | Function and performance requirements |
|---|---|---|
| | step attenuator | |
| 1466-H01-B130 | Channel B 130dB programmable step attenuator | To expand Channel B output power dynamic range for1466C/D or 1466C/D-V,Requires option 1466-H11-B13/B20/BV13/BV20 |
| 1466-H04-1 | Low phase noise | Improved phase noise performance,10GHz@10kHz:-120dBc/HzFor 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/HzFor 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/BV201466-H04-B1, 1466-H04-B2 either one of them must be selected to configure the 1466 Signal Generator.** |
| 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-H04-21466-H04-B1, 1466-H04-B2, either one of them must be selected to configure the 1466 Signal Generator.** |
| 1466-H05-13 | 13GHz High output power | Improve maximum output power for 1466C/C-V |
| 1466-H05-20 | 20GHz High output power | Improve maximum output power for 1466D/D-V |
| 1466-H05-33 | 33GHz High output power | Improve maximum output power for 1466E/E-V |
| 1466-H05-45 | 45GHz High output power | Improve maximum output power for 1466G/G-V |
| 1466-H05-53 | 53GHz High output power | Improve maximum output power for 1466H/H-V |
| 1466-H05-67 | 67GHz High output power | Improve maximum output power for 1466L/L-V |
| 1466-H05-90 | 90GHz High output power | Improve maximum output power for 1466N |
| 1466-H05-110 | 110GHz High output power | Improve maximum output power for 1466P |
| 1466-H05-B13 | 13GHzChannel B High output power | Improve Channel B maximum output power for 1466C/C-V,Option 1466-H11-B13/BV13 need to be configured |
| 1466-H05-B20 | 20GHzChannel B High output power | Improve Channel B maximum output power for 1466D/D-V,Option 1466-H11-B20/BV20 need to be configured |

| Option No. | Description | Function and performance requirements |
|---|---|---|
| 1466-H11-B13 | 13GHzChannel B | AddChannel B,output 6kHz to 13GHz analog signal for 1466C/D |
| 1466-H11-B20 | 20GHz Channel B | Add Channel B,output 6kHz to 20GHz analog signal for 1466D |
| 1466-H11-BV13 | 13GHz Vector Channel B | AddChannel B,output 100kHz to 13GHz vector signal for 1466C/D-V |
| 1466-H11-BV20 | 20GHz Vector Channel B | Add Channel B, Output 100kHz to 20GHz Vector signal for 1466D-V |
| 1466-H31-500 | 500MHz modulation bandwidth | Internal modulation bandwidth:500MHz,<br>**Regarding options 1466-H31-500, 1466-H31-1000, 1466-H31-2000, either one of them must be selected to configure the 1466 Signal Generator.** |
| 1466-H31-1000 | 1GHz modulation bandwidth | Internal modulation bandwidth:1GHz for 1466-V series<br>**Regarding options 1466-H31-500, 1466-H31-1000, 1466-H31-2000, either one of them must be selected to configure the 1466 Signal Generator.** |
| 1466-H31-2000 | 2GHz modulation bandwidth | Internal modulation bandwidth:2GHz for 1466-V series<br>**Regarding options 1466-H31-500, 1466-H31-1000, 1466-H31-2000, either one of them must be selected to configure the 1466 Signal Generator.** |
| 1466-H31-B500 | Channel B 500MHz modulation bandwidth | Channel B Internal modulation bandwidth:500MHz<br>**Regarding options 1466-H31-B500, 1466-H31-B1000, 1466-H31-B2000, either one of them must be selected to configure the 1466 Signal Generator. Option 1466-H11-BV13 or 1466-H11-BV20 need to be configured.** |
| 1466-H31-B1000 | Channel B 1GHz modulation bandwidth | Channel BInternal modulation bandwidth:1GHz<br>**Regarding options 1466-H31-B500, 1466-H31-B1000, 1466-H31-B2000, either one of them must be selected to configure the 1466 Signal Generator. Option 1466-H11-BV13 or 1466-H11-BV20 need to be configured.** |
| 1466-H31-B2000 | Channel B 2GHz modulation bandwidth | Channel BInternal modulation bandwidth:2GHz<br>**Regarding options 1466-H31-B500, 1466-H31-B1000, 1466-H31-B2000, either one of them must be selected to configure the 1466 Signal Generator. Option 1466-H11-BV13 or 1466-H11-BV20 need to be configured.** |
| 1466-H32 | Internal baseband large capacity memory | Expand internal baseband memory to 16GB, Optional for 1466-V series. |
| 1466-H32-B | Channel B Internal baseband large capacity memory | Expand Channel Binternal baseband memory to 16GB, Option1466-H11-BV13 or option 1466-H11-BV20 need to be configured |
| 1466-H33 | Wideband external IQ input | Add wideband external IQ input function for 1466-V series |

| Option No. | Description | Function and performance requirements |
|---|---|---|
| 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 for 1465-V series |
| 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 | Support arbitrary wave data download and playback, baseband signal generation or signal playback for 1466-V series |
| 1466-S02 | Multitone modulation | Realize multitone modulation siganl generation function for 1466-V series |
| 1466-S03 | Intrapulse modulation | Intrapulse Chirp, Barker Code, etc for 1466-V series |
| 1466-S04 | AWGN | Support pure noise generation, additive white Gaussian noise (AWGN) and continuous wave interference functions for 1466-V series |
| 1466-S06 | Segment waveform file generation | Realize the digital modulation signal generated waveform segment file for 1466-V series |
| 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 siganl generation. Option S01 arbitrary waveform need to be configured. |
| 1466-S09 | Frequency hopping signal generation | Realize frequency hopping siganl generation for 1466-V series |
| 1466-S11 | Analog modulation | Add analog modulation function indluding AM,FM,ΦM |
| 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 |
| 1466-S15 | Ramp(analog)sweep | Add analog sweep function(Ramp sweep) |
| 1466-S16 | Power sweep | Add power sweep function |
| 1466-S21 | Wireless connection signal simulation function | 802.11a/b/g/n/ac/ax wireless connection PPDU, MPDU, A-MPDU and other signal simulation, support physical frame block signal simulation composed of multiple PPDUs with different modulation and coding methods for 1466-V series. |

| Option No. | Description | Function and performance requirements |
|---|---|---|
| 1466-S55-01 | Radar Scenario Simulation - Basic Functions | Radar scene simulation software, with functions such as static scene simulation Option SO1 arbitrary waveform need to be configured |
| 1466-S55-02 | Radar Scenario Simulation-Complex signal simulation | Radar scene simulation software, with functions such as complex signal simulation,Option 1466-S55-01 need to be configured. |
| 1466-S55-03 | Radar Scenario Simulation-Dynamic scenario simulation | Radar scene simulation software, with functions such as dynamic scene simulation, Option 1466-S55-01 need to be configured. |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