

CEYEAR TECHNOLOGIES CO., LTD



1452D/G AGILE SIGNAL GENERATOR



1452D/G Agile Signal Generator

(10MHz ~ 20GHz/44GHz)

Product Overview

The 1452D/G Agile Signal Generator adopts a design that combines Direct Digital Synthesis (DDS) technology with Direct Analog Synthesis (ADS) technology, enabling full-band frequency, power, and modulation agility. Its frequency coverage ranges from 10 MHz to 20 GHz/44 GHz, with a maximum power agility range of 90 dB, switching speed ≤ 150 ns, and a maximum modulation bandwidth of 2 GHz. This instrument offers high frequency resolution, low phase noise, and excellent spectral purity, and supports frequency modulation (FM), phase modulation (PM), amplitude modulation (AM), pulse modulation, vector modulation, multi-unit phase coherence, multi-parameter sequence playback, as well as PDW playback functions. The product is equipped with standard interfaces such as GPIB, LAN, USB, and DP, and can be operated with external keyboard and mouse. It features an 11.6-inch large LCD screen, providing intuitive and rich information display, with flexible and convenient operation. It meets the testing requirements for agile frequency signal stimulation and signal simulation, providing support for the development, production, and maintenance of systems and products in related fields.

Main Features

- Full frequency band agility from 10MHz~20GHz/44GHz for frequency, power, and multiple parameters modulation,
- High-speed frequency and power agility of 150ns,
- Large dynamic power agility of 90dB,
- Low phase noise of -127dBc/Hz (typical value, 10GHz carrier, 10kHz offset),
- FM, ϕM , AM, Pulse, digital modulation, multi-tone modulation, intra-pulse modulation, and arbitrary waveform modulation types,
- Maximum RF modulation bandwidth of 2GHz, with flexible options for 250MHz/500MHz/1GHz/2GHz bandwidth,
- Three selectable operation modes: continuous wave, sequence, and PDW stream,
- Supports multiple coherent outputs,
- Flexible large-screen touch operation,
- Graphical menu, easy to use.

Ultra wideband Frequency agile

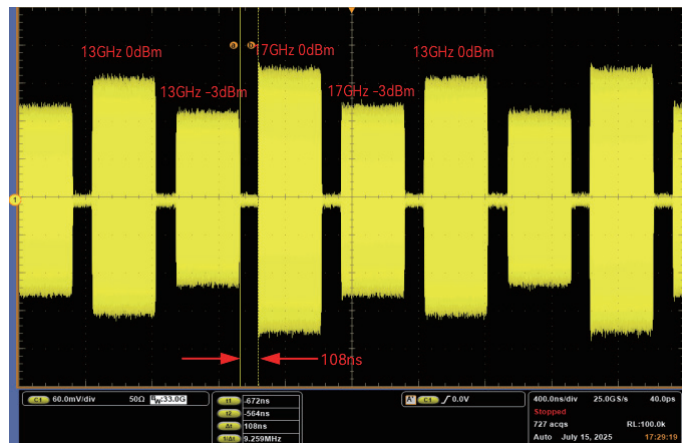
The 1452D/G agile signal generator can provide arbitrary frequency agility across the full frequency range of 10 MHz to 20 GHz/44 GHz, meeting the excitation requirements for ultra-wideband frequency-agile signals in frequency-agile guided systems, and can also provide corresponding analog signals.



frequency-agile step changes of 0.5 GHz from 1 GHz to 20 GHz

Ultra high-speed frequency and power agile output

The 1452D/G frequency-agile signal generator can provide frequency and power agility with a switching speed ≤ 150 ns, meeting the speed testing needs of various agile frequency system equipment.



frequency and power switching at 1 GHz and 17 GHz, switching speed is 108 ns

Excellent power agile dynamic range

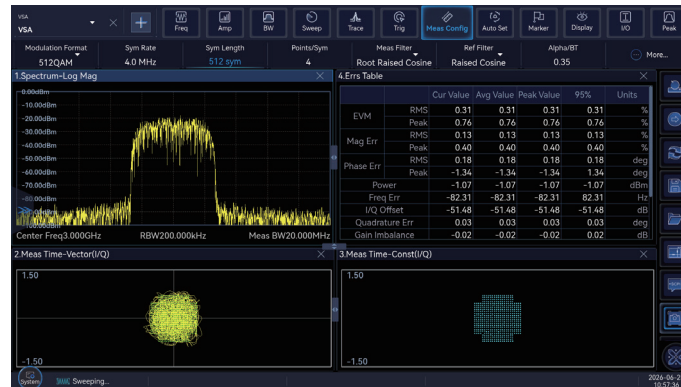
The 1452D/G agile signal generator can achieve a maximum dynamic range of 90 dB in power-agile signal output, with a power agility time of ≤ 150 ns. It can simulate the differences in echo power caused by factors such as range, target characteristics, and RCS fluctuations in real battlefield environments, and can also simulate signal amplitude variations caused by changes in communication channels, thereby providing you with signal excitation and electromagnetic environment simulation that are closer to reality.



power agile dynamic range test

High-Performance Modulated Output

The 1452D/G agile signal generator features high-performance modulation capabilities, supporting FM, ϕ M, AM, Pulse, digital modulation, multi-tone modulation, intra-pulse modulation, arbitrary waveform, and other modulation functions, providing a comprehensive solution for high-quality signal simulation and excitation.



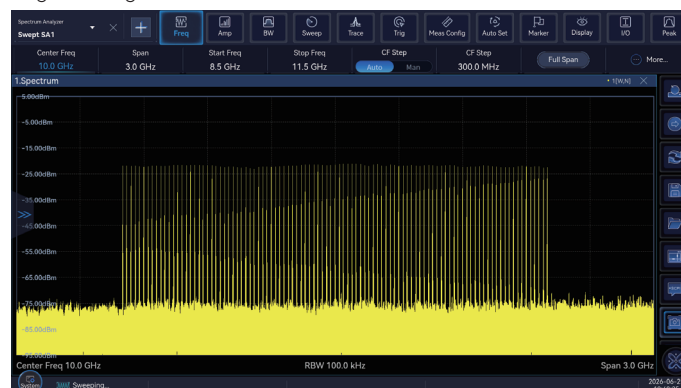
Digital modulation (carrier 3 GHz, 512-QAM)



Multiple modulations in the pulse (linear frequency modulation, Barker code, etc.)

2GHz RF modulation bandwidth, easily handling wideband testing challenges

The 1452D/G agile signal generator can provide a maximum RF modulation bandwidth of 2 GHz. Depending on different application scenarios, it supports flexible selection of 250 MHz, 500 MHz, 1 GHz, and 2 GHz bandwidths. Its outstanding modulation bandwidth performance can easily meet testing challenges.

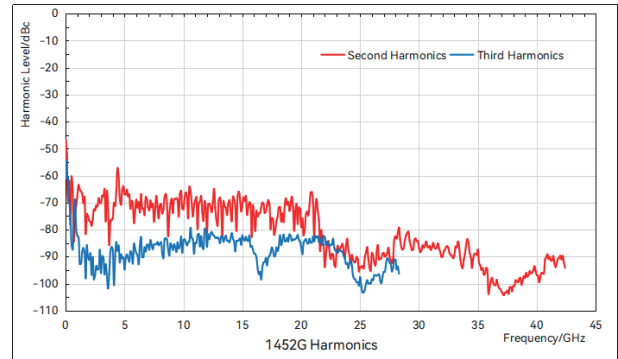
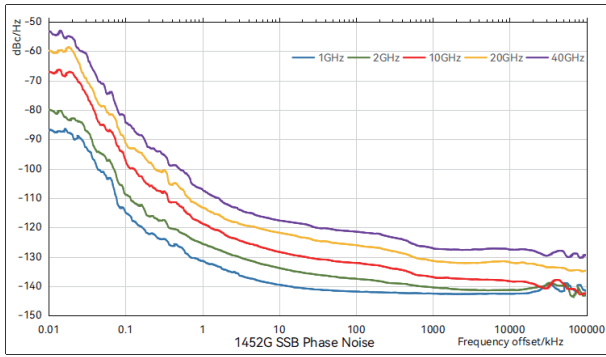


Spectrum of multi-tone signal with 10GHz carrier and 2GHz modulation bandwidth

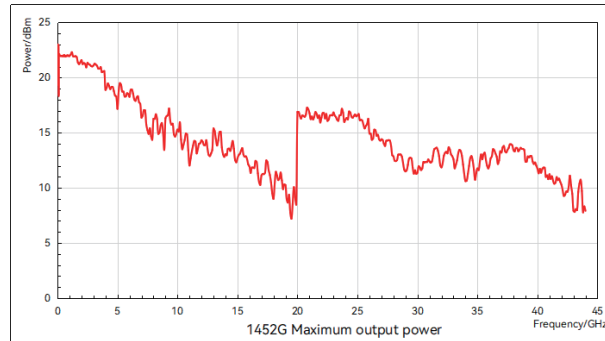
Outstanding performance makes testing simpler and more precise

A cleaner signal ensures that you are no longer troubled by interference signals when testing microwave and millimeter-wave components and systems.

1452D/G Agile Signal Generator

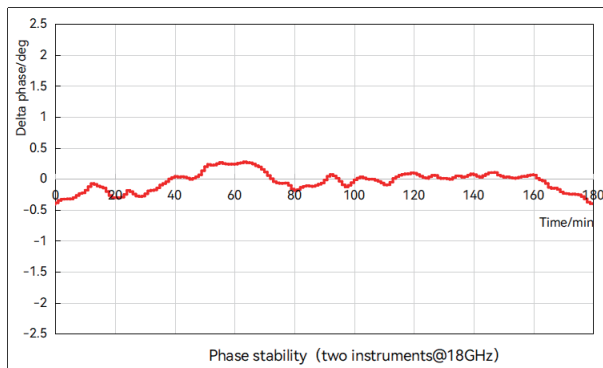


Maximum power measurement values: +22 dBm at 1 GHz, +17 dBm at 5 GHz, +16 dBm at 20 GHz, +11 dBm at 30 GHz, and +11 dBm at 40 GHz. Minimum power: -135 dBm (configurable), with a dynamic range exceeding 145 dB.

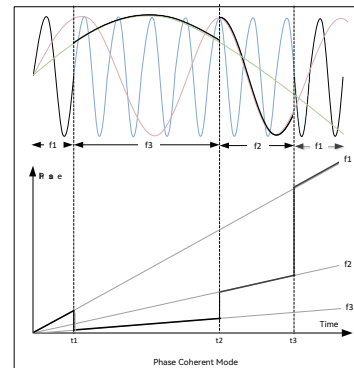


High-precision phase control, supporting multi-device coherence

The 1452D/G agile signal generator supports high-precision phase control with 0.1° steps, continuous phase and phase coherence control, as well as multi-unit coherent network control. Through modular assembly and reconfiguration, it can flexibly achieve coherent networking with up to 128 channels, facilitating scenario-level testing for large-scale array receivers. The amplitude, phase, and time differences between channels can be adjusted with high precision, and the inter-channel consistency and stability are excellent. It can accurately simulate the direction of incoming waves and supports Angle of Arrival (AoA) testing.



Multi-Instrument Phase Coherence



Completely Upgraded Human-Computer Interaction

It features an 11.6-inch high-resolution touchscreen that clearly displays key parameters and instrument status, paired with a signal flow diagram guide interface to make the display more intuitive and the interaction more user-friendly.

It supports user-customizable menus, allowing you to tailor a personalized control interface based on testing habits, enabling multi-functional operations in a single window and avoiding the hassle of deep menus and repeated searching.

You can also access and control it via a web browser, with the instrument's status refreshing in real-time. It supports one-click export of recorded SCPI commands and automatically generates VS (C, C#), Qt, Matlab, and LabWindows/CVI programmable demo projects, making programming easier.

The instrument offers additional expansion interfaces like GPIB, LAN, and USB for data transfer, remote control, and firmware upgrades.

Typical Applications

Radar Signal Simulation

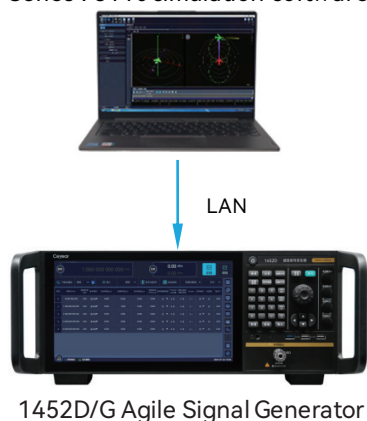
The 1452D/G agile signal generator, combined with the 78110A radar signal simulation software, can simulate various radar signals. It can generate pulse train radar signals with intra-pulse modulation, simulate pulse repetition frequency radar signals, and set the envelope shape of pulses. The intra-pulse modulation methods include linear frequency modulation, nonlinear frequency modulation, triangular frequency modulation, BPSK, QPSK, Barker code, and others. PRF (Pulse repetition frequency) types include PRF staggering, PRF jitter, and PRF sliding. Pulse envelopes mainly include rectangular, trapezoidal, raised cosine, root raised cosine, and exponential shapes.

Radar Scenario Simulation

The 1452D/G agile signal generator supports high-density PDW data stream playback at 6 million pulses per second. When combined with the 78110B radar scenario simulation software, it can transform a standard instrument into a flexible and versatile complex electromagnetic environment signal simulator, enabling laboratory-based testing of electromagnetic environments that would normally be conducted in the field.

The 78110B radar scenario simulation software can simulate large-scale, multi-radar dynamic electromagnetic environment signals by setting relevant characteristic parameters such as frequency, amplitude, pulse width, repetition frequency, arrival time, arrival angle, and intra-pulse modulation. It can also drive a single or multiple agile signal generators via network interfaces to simulate radar radiation signals, meeting user requirements for constructing radar signal environments and conducting hardware-in-the-loop simulation testing of array receiving equipment in a laboratory setting.

Series 78110 simulation software



Typical Application Diagram

Data Sheet¹

Model	1452D	1452G
Frequency range	10MHz~20GHz	10MHz~44GHz
Frequency resolution	0.001Hz	
Frequency accuracy	±3×10 ⁻⁸ (Factory calibration accuracy, calibration temperature 23°C±5°C)	
Internal timebase reference oscillator Aging rate	±5×10 ⁻⁹ /Year or ±5×10 ⁻¹⁰ /day (typical value) ² after continuous power supply for 30 days)	
Phase-adjusted step	0.1°	
Agile frequency switching speed	≤150ns	
Maximum power(23°C±5°C)	10MHz≤f < 4GHz +10dBm	10MHz≤f < 4GHz +10dBm
	4GHz≤f≤20GHz +7dBm	4GHz≤f < 20GHz +5dBm
	/	20GHz≤f < 40GHz +7dBm
	/	40GHz≤f≤44GHz +5dBm
Minimum power	-120dBm(Settable -135dBm)	
Power resolution	0.01dB	

1452D/G Agile Signal Generator

Power Accuracy(23°C±5°C)	-10dBm≤p≤Maximum	±1.0dB	-10dBm≤p≤Maximum	±1.0dB
	-90dBm≤p < -10dBm	±1.5dB	-90dBm≤p < -10dBm	±1.5dB
	-120dBm≤p < -90dBm	±2.0dB	/	
Agile power range	10MHz≤f≤20GHz	≥90dB	10MHz≤f < 20GHz	≥90dB
	/		20GHz≤f≤44GHz	≥80dB
Agile power resolution	0.5dB(typical value ²)			
Agile power switching speed	≤150ns			
Harmonics	10MHz≤f < 3GHz	≤-40dBc	10MHz≤f < 3GHz	≤-40dBc
	3GHz≤f<5GHz	≤-50dBc	3GHz≤f<5GHz	≤-50dBc
	5GHz≤f≤20GHz	≤-55dBc	5GHz≤f≤44GHz	≤-55dBc
Non-harmonics	10MHz≤f < 2GHz	≤-62dBc	10MHz≤f < 2GHz	≤-62dBc
	2GHz≤f≤20GHz	≤-60dBc	2GHz≤f≤44GHz	≤-60dBc
Absolute SSB phase noise	1GHz	≤-132dBc/Hz	1GHz	≤-132dBc/Hz
	2GHz	≤-125dBc/Hz	2GHz	≤-125dBc/Hz
	10GHz	≤-117dBc/Hz	10GHz	≤-117dBc/Hz
	20GHz	≤-111dBc/Hz	20GHz	≤-111dBc/Hz
	/		44GHz	≤-104dBc/Hz
Pulse modulation	On/off ratio		≥80dB	
	Rise/fall times		≤20ns	
	Minimum pulse width		100ns(standard)	
			20ns(option S13)	
	pulse period		100ns(standard)	
			20ns(option S13)	
Amplitude modulation	Maximum rate		10MHz	
	Maximum depth		95%	
	Depth accuracy		±(6%×depth+1%)(1kHz rate, 30%depth)	
Frequency modulation	Maximum rate		10MHz	
	Maximum peak deviation		10MHz≤f < 4GHz	5% center frequency
			4GHz≤f≤44GHz	600MHz
	Deviation accuracy		±1%×FM deviation(1kHz rate, 100kHz deviation)	
Phase modulation	Maximum rate		10MHz	
	Maximum peak deviation		5% carrier frequency/modulation frequency or 12π(whichever is less)	
	Deviation accuracy		±1%×FM deviation(1kHz rate, 3π rad deviation)	
External modulation inputs	Modulation types		AM, FM, φM	
	Input		SMA, impedance 50Ω(typical value)	
Low frequency outputs	Waveforms		Sine, square, triangular, sawtooth, noise, double sine, Swept sine	
	Frequency rang		Sine, double sine, Swept sine	1Hz~10MHz
			square, triangular, sawtooth	1Hz~1MHz
	Amplitude		0Vpp~5Vpp	
modulation types	intra-pulse modulation			
	Digital、multitone、arb(option S01)			
RF modulation bandwidth	10MHz≤f < 3GHz		10%carrier frequency or 250MHz(whichever is less)	

RF modulation bandwidth	3GHz≤f≤44GHz	250MHz (standard)
		500MHz (option H31-500)
		1GHz (option H31-1000)
		2GHz (option H31-2000)
PDW streaming rate	≥6 M pulses/s(SSD)	
List mode	Number of points	1~8192
	Dwell timer	200ns~100s
	Operating modes	List of Frequency, power, phase, modulation (pulse modulation, intra-pulse linear frequency modulation, analog modulation, frequency phase coding, arbitrary waveform4)
	List edit mode	User-defined, auto-fill (equal spacing, uniform acceleration, etc.)
General specifications	Voltage	100VAC ~ 120VAC, 50Hz/60Hz; or 200VAC ~ 240VAC, 50Hz/60Hz (Adaptive)
	Power	≤500W
	Temperature	Operating temperature range : 0°C ~ 50°C; Storage temperature range : -40°C ~ 70°C
	Weight	≤35kg(The weight varies depending on the model and optional configurations)
	Dimensions (W×H×D)	(426.0±2.0)mm×(177.0±1.2)mm×(500.0±2.0)mm (The main overall dimensions excluding the handle, base feet, rear frame, rotary wheel, rubber buttons, side carrying strap, plugs, screws, grounding posts, fiber optic cage, jumpers, input and output connectors, and local protruding parts of structural components)
	RF output	3.5mm(male),50Ω 2.4mm(male),50Ω

Note:

1. The 1452 series agile signal generator, after being stored at ambient temperature for 2 hours and preheated for 30 minutes, meets all performance specifications within the given operating range.
2. Typical values refer to other product performance information that is not within the guaranteed specifications; when performance exceeds technical specifications, 80% of the samples within the temperature range of 20°C~30°C can demonstrate 95% confidence; typical performance does not include measurement uncertainty.
3. Tested with output power set to 0 dBm.
4. Arbitrary waveform modulation in sequence and PDW modes requires the optional S01.

Ordering Information

Main Instrument

1452D Agile Signal Generator 10MHz ~ 20GHz
1452G Agile Signal Generator 10MHz ~ 44GHz

Standards

Name	Function
Power Cord Assembly	Standard Three-Core Power Cord
Quick Start Guide	Instrument quick start guide
Product Certificate	Certificate of Product Conformity

1452D/G Agile Signal Generator

Options

Number	Name	Function
Built-in Options		
1452-H11	10 Gigabit Ethernet Interface	Fiber Optic-Based 10 Gigabit Network Interface.
1452D-H31-500	500 MHz Modulation Bandwidth	Increase the standard 250MHz modulation bandwidth to 500MHz, applicable to the 1452D.
1452G-H31-500	500 MHz Modulation Bandwidth	Increase the standard 250MHz modulation bandwidth to 500MHz, applicable to the 1452G.
1452D-H31-1000	1GHz Modulation Bandwidth	Increase the standard 250MHz modulation bandwidth to 1GHz, applicable to the 1452D.
1452G-H31-1000	1GHz Modulation Bandwidth	Increase the standard 250MHz modulation bandwidth to 1GHz, applicable to the 1452G.
1452D-H31-2000	2GHz Modulation Bandwidth	Increase the standard 250MHz modulation bandwidth to 2GHz, applicable to the 1452D.
1452G-H31-2000	2GHz Modulation Bandwidth	Increase the standard 250MHz modulation bandwidth to 2GHz, applicable to the 1452G.
1452-H36	Phase Coherent	Implement multi-device phase coherence functionality.
Additional Options		
1452-H94	Rack Mounting Kit	Dedicated kit for installation into a rack.
1452-H99	Aluminum Alloy Transport Case	High-strength lightweight specialized aluminum alloy transport case, equipped with handles and universal wheels for convenient transportation.
1452-H100	User Manual (Printed Version)	Provide a detailed user manual in print.
1452D-S01	Vector Modulation Function	Supports digital modulation, multi-tone modulation, arbitrary waveform functions, as well as arbitrary waveform functions under PDW and sequences. The maximum modulation bandwidth is the same as that of the H31 option and is suitable for the 1452D.
1452G-S01	Vector Modulation Function	Supports digital modulation, multi-tone modulation, arbitrary waveform functions, as well as arbitrary waveform functions under PDW and sequences. The maximum modulation bandwidth is the same as that of the H31 option and is suitable for the 1452G.
1452-S13	Narrow Pulse Modulation Function	Implement narrow pulse modulation functionality, with a minimum pulse width of 20 ns.
1452-S50	Radar Signal Simulation	An external option capable of simulating radar pulse signals with complex pulse envelopes, modulation, and repetition frequency characteristics. The pulse envelopes include rectangular, trapezoidal, raised cosine, root raised cosine, exponential, etc. Intra-pulse modulation includes linear frequency modulation(LFM), nonlinear frequency modulation, triangular frequency modulation, BPSK, QPSK, Barker code, etc. Pulse repetition characteristics include PRF staggering, PRF jitter, and PRF sliding. It supports the editing of intra-pulse composite modulated signals, enabling the simulation of radar pulse signals with multiple modulations.
1452-S55-01	Radar Scenario Simulation - Basic Functions	An external option, featuring functions such as static radar radiation signal simulation. By editing scene parameters, conventional radar radiation signal simulation can be defined. It provides basic radar scene signal simulation capabilities including conventional pulses, pulse repetition frequency, antenna mechanical scanning, and antenna radiation patterns. Selection of the S01 vector modulation option or the S56 PDW stream playback option is required.
1452-S55-02	Radar Scene Simulation - Complex Signal Simulation Function	An external option, featuring functions such as high-density complex modulated radar radiation signal simulation. Through scenario parameter editing, it enables comprehensive and realistic radar radiation signal simulation definition. It provides the capability for complex intra-pulse modulation as well as antenna beam scanning and antenna polarization signal simulation. Selection of 1452-S55-01 is required.
1452-S55-03	Radar Scene Simulation - Dynamic Scene Simulation Function	This is an external option featuring functions such as dynamic scenario simulation. It enables the definition of the motion attributes of radiation sources and receivers by setting the six-degree-of-freedom characteristic parameters of multiple transceiving platforms; by applying radar signal spatial propagation algorithms, it achieves dynamic scenario signal simulation and modeling of multiple radar radiation sources. Selection of either 1452-S55-01 or 1452-S55-02 is required.

Number	Name	Function
1452-S55-04	Radar Scene Simulation - Angle of Arrival Simulation Function	An external option, featuring functions such as angle of arrival simulation. By setting the parameters of the receiving channels of the device under test, it can change the arrival time, power, and phase characteristic data of the simulated signal, generate radar pulse descriptive words (PDW) for the output signal of the control signal generator, and achieve the simulation and generation of multi-channel coherent radar arrival signals. Selection of 1452-S55-01 or 1452-S55-02 is required; for dynamic angle of arrival simulation, 1452-S55-03 must be additionally selected.
1452-S56	PDW Streaming Playback Function	Supports PDW data playback in both file and streaming modes. When used with the S55 option, radar scene simulation can be realized.
1452D-JL	Measurement Service	Provide metrological calibration services and supply measurement reports.
1452G-JL	Measurement Service	Provide metrological calibration services and supply measurement reports.
1452D-EWT1	Extended Warranty Beyond the Standard Warranty Period	Extend the warranty by one year beyond the standard warranty period.
1452G-EWT1	Extended Warranty Beyond the Standard Warranty Period	Extend the warranty by one year beyond the standard warranty period.

Ceyear Technologies Co., Ltd

Address: No.98,Xiang Jiang Road,Huangdao District,Qingdao,China
Zip code: 266555
E-mail: sales@ceyear.com
<https://en.ceyear.com>
Tel: +86 532 86896691