



4025 Handheld Spectrum Analyzer (9kHz to 20GHz)



Ceyear Technologies Co., Ltd.

Product Overview

The Ceyear 4025D spectrum analyzer is a new generation of high-performance handheld spectrum analyzer, with a frequency measurement range of 9kHz to 20GHz, mainly used for installation and commissioning of wireless communication equipment in the field, maintenance and interference detection, etc. It is small, lightweight, highly adaptable to the environment, flexible in power supply and easy to operate.

4025D spectrum analyzer with 40MHz real-time spectrum analysis bandwidth is configured with Interference Analysis, Channel Scan, Field Strength Measurement, USB CW and Peak Power Measurement, Analog Demodulation Analysis, Directional Analysis and other measurement function modes, as well as channel power, occupied bandwidth, adjacent channel power, spectrum emission Mask, carrier-to-noise ratio, harmonic distortion, spurious emission Mask, indoor/outdoor map coverage and other intelligent measurement functions. The spectrum analyzer supports LAN, USB, MicroSD card, Wi-Fi wireless communication and other interfaces. The whole machine adopts a 10.1-inch capacitive touch screen, which supports marker dragging, frequency and amplitude dragging and scaling, etc. The product can be applied to mobile communication, satellite communication, radar detection, microwave communication, on-site debugging and installation and maintenance of electronic reconnaissance and countermeasure equipment, interference source direction finding and map positioning, transient time-varying signal testing, etc.

Main Features

- **Frequency range coverage: 9 kHz to 20 GHz, low frequency can be extended to 5 kHz, full-band pre-amplifier are configured**

- **RF performance specifications:**

DANL: $\leq -165\text{dBm/Hz}$ (2MHz~2GHz, Pre-amplifier on,Typ.)

SSB Phase Noise: $\leq -113\text{dBc/Hz}$ @100kHz offset @1GHz carrier(Typ.)

$\leq -108\text{dBc/Hz}$ @100kHz offset @10GHz carrier(Typ.)

TOI: +16dBm @ 900 MHz(Typ.)

Total Amplitude Uncertainty: $\pm 1.0\text{dB}$ (Typ.)

- **Fast Sweep Speed**

Sweep time < 33ms (20 GHz sweep span, 3 MHz resolution bandwidth)

Sweep time < 4s (1 GHz sweep span, 1 kHz resolution bandwidth, Fast FFT sweep mode)

- **Multiple measurement function modes**

spectrum analysis, interference analysis (waterfall, RSSI), channel scan, field strength measurement, USB CW power measurement, USB Peak power measurement, analog demodulation analysis (AM, FM, PM), directional analysis, 40MHz real-time spectrum analysis bandwidth (supporting digital persistence spectrum and waterfall display), etc.

- **Various intelligent measurement functions**

channel power, occupied bandwidth, adjacent channel power, spectrum emission Mask, carrier-to-noise ratio, harmonic distortion, spurious emission mask, indoor/outdoor map coverage, time gate measurement, etc. Support GPS/Bei Dou positioning and frequency disciplined calibration function for the crystal in the machine, the typical value of frequency reference accuracy after GPS locking calibration can reach ± 10 ppb.

- **A wide range of auxiliary test interfaces and digital interfaces**

10MHz reference input and output, GPS/Bei Dou antenna, zero sweeps wide IF output, Wi-Fi wireless communication interface, LAN, USB, MicroSD, etc.

- **User-friendly operation experience:**

10.1" LCD and capacitive touch screen with 6 independent markers, support for marker dragging, frequency/amplitude parameter dragging and scaling functions, support for signal tracking and peak tracking, 3 display traces, 6 detection methods (standard, positive peak, negative peak, sampling, mean, root mean square).

- **Excellent field usability:**

strong environmental adaptability, working temperature $-20^{\circ}\text{C} \sim 55^{\circ}\text{C}$, storage temperature $-50^{\circ}\text{C} \sim 70^{\circ}\text{C}$; lightweight, the whole machine including battery weighs about 3.5kg; supports three display modes: standard, outdoor and night vision; built-in large-capacity lithium-ion battery, typical operating time up to 4.5 hours.

- **A wide range of optional field test accessories can be configured**

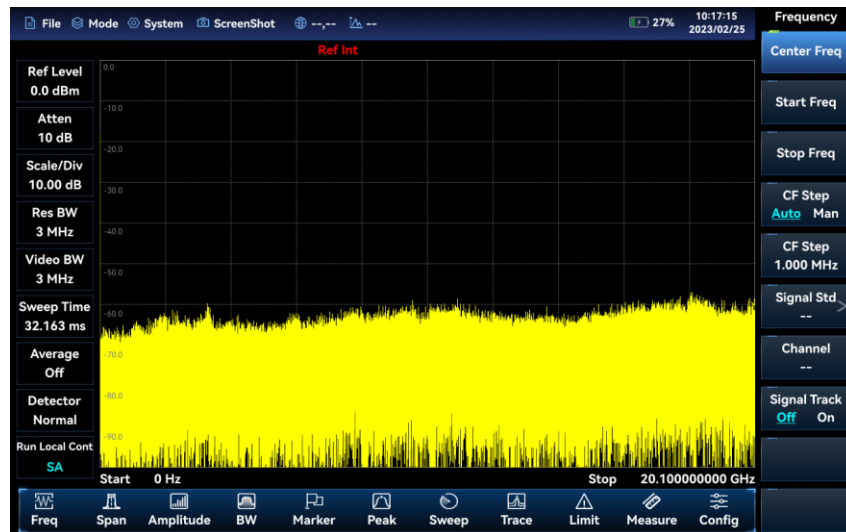
such as USB CW power sensors, USB Peak power sensors, omnidirectional antennas, directional antennas, electronic compasses, EMI near-field probes, car chargers, battery holders, etc.

Various Measurement Modes and Options

- **Spectrum Analysis Mode**

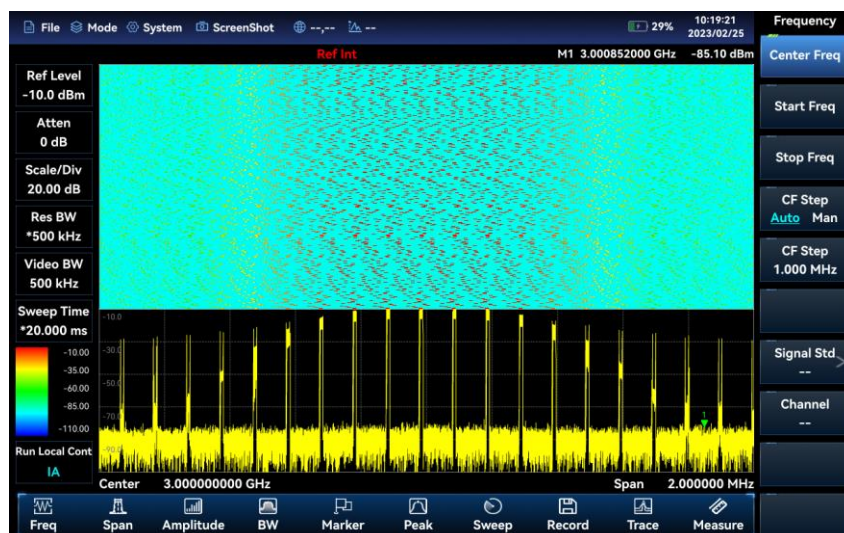
The spectrum analysis function of the 4025D spectrum analyzer is equipped with channel power, occupied bandwidth, adjacent channel power, spectrum emission mask, carrier-to-noise ratio, audio demodulation, harmonic distortion, spectrum emission mask, multi-carrier adjacent channel power and other test functions as standard, featuring high test sensitivity, fast scanning speed, large dynamic range and good phase noise indicators. 4025D

spectrum analyzer has a variety of built-in predefined signal standards that can be The 4025D has a wide range of predefined signal standards that can be called up directly, supports noise marker and frequency counter functions, can display 3 traces simultaneously, and has different detection methods such as standard, positive peak, negative peak, sampling, mean and root mean square, and supports signal tracking and peak tracking functions.



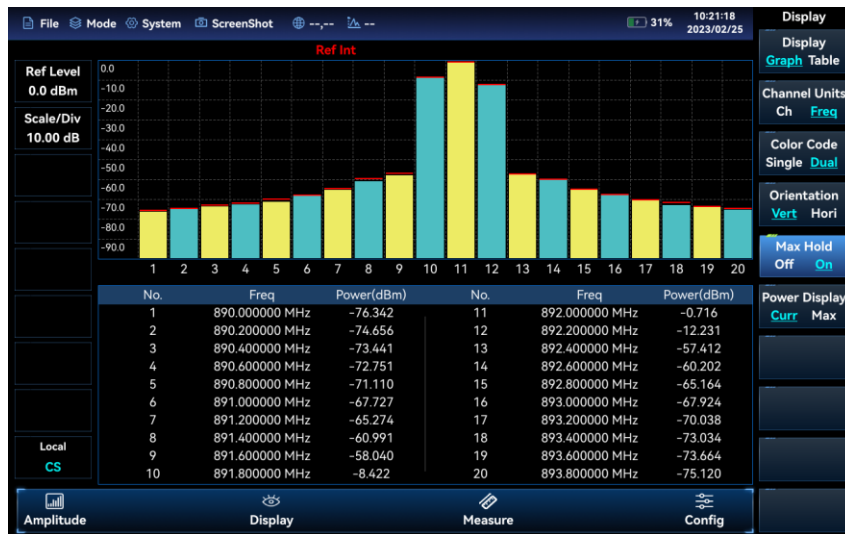
- **Interference Analysis Mode (Option)**

The 4025D spectrum analyzer's interference analysis option features spectrum measurement, waterfall diagram and RSSI measurement. The waterfall diagram uses a three-dimensional display of frequency-amplitude-time, making it easy to observe periodic or intermittent signals. The different colours in the waterfall diagram reflect the strength of the signal amplitude.



- **Channel Scanner Mode (Option)**

The channel scanner measurement mode provides the measurement of the signal power of multiple channels. The signal power is displayed as a bar graph or as a list, and the signal power of up to 20 channels can be measured. There are three measurement modes depending on how the channels are set up: channel scan, frequency scan and list scan, all of which allow the bandwidth and number of channels to be set.



● Analog Demodulation Mode (Option)

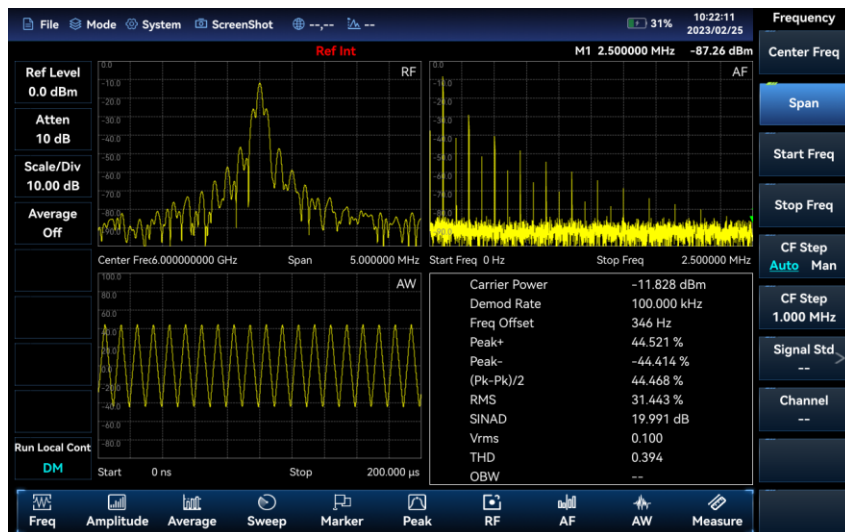
The demodulation analysis measurement mode provides the display of AM, FM and PM modulation signal profiles and the analysis of the associated parameters. The main plots and related parameters are measured as shown below.

RF spectrum: similar to the spectrum analysis mode, the spectrum plot of the modulated signal is displayed and the occupied bandwidth can be measured.

Audio spectrum: displays the spectrum of the demodulated audio signal.

Audio waveform: displays the waveform of the demodulated audio signal in the time domain.

Parameter analysis function: Carrier power, modulation rate, carrier frequency deviation, modulation depth (AM), modulation frequency deviation (FM), modulation phase deviation (PM), signal-to-noise ratio, modulation distortion, total harmonic distortion and other parameters of the modulated signal can be measured and analyzed.



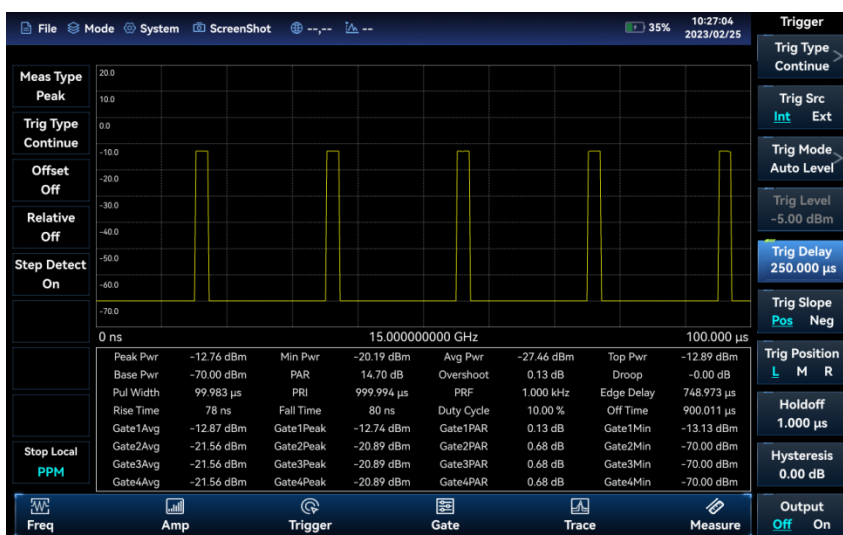
USB CW Power Measurement Mode (Option)

The USB power measurement function can measure the CW signal power up to 40GHz with the external USB power sensor of 87230/87231/84232/87233 series.



- **USB Peak Power Measurement Mode (Option)**

4025D spectrum analyzer connects 87234D/E/F/L USB peak power sensor through a USB interface, which can test RF/microwave signals up to 67GHz, and realize pulse power measurement in a large dynamic range.



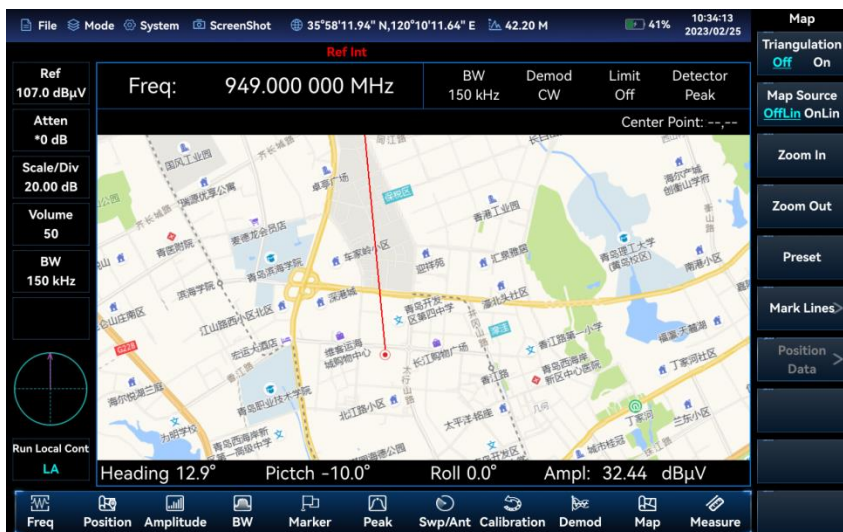
- **Field Strength Measurement (Option)**

The 4025D spectrum analyzer can be used with portable antennas for field strength measurements and is widely used in space electromagnetic environment monitoring and radio management. The antenna file can be called up directly by the user or the antenna factor can be defined. Field strength measurements can be made in three modes: point frequency measurements, frequency scan measurements and list scan measurements. Point frequency measurement is performed by setting the point frequency rate to observe the frequency deviation, amplitude and field strength of the current point; frequency scan measurement is performed by setting the start frequency, step frequency and number of scanning points to observe the amplitude and field strength of a frequency range; list scan measurement is performed by calling a pre-edited or saved list to observe the amplitude and field strength of the listed frequency points.



- **Directional Analysis Mode (Option)**

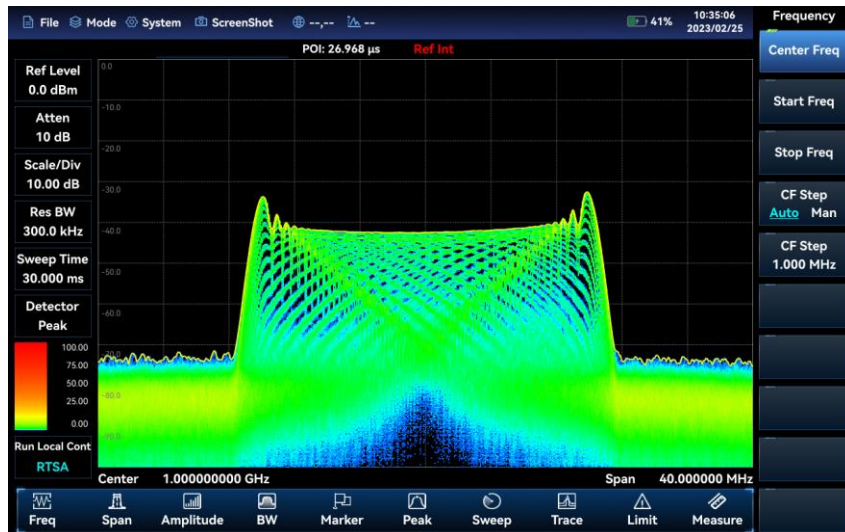
The 4025D spectrum analyzer's directional analysis option requires a directional antenna, electronic compass and GPS/Bei Dou options to achieve direct interference signal finding, horizontal scan direction finding and map cross-location. When equipped with the ZE9080 series antenna and handheld handle, a separate configuration is not necessary due to its built-in electronic compass.



- **40 MHz Real-time Spectrum Analysis Mode (Option)**

The 4025D spectrum analyzer has a real-time spectrum analysis function, which is mainly used

for the capture and analysis of transient time-varying signals and burst signals. The real-time analysis bandwidth is up to 40MHz, and the transient signal digital afterglow and waterfall graph measurement functions can be realized.



- **Out-door Map Mode (Option)**

The outdoor map option is a measurement function in spectrum analysis mode that allows RSSI and adjacent channel power ratio tests to be performed and the test results to be marked on a map in real-time based on time or distance. The test results marked on the map can be saved to the instrument for subsequent recall.



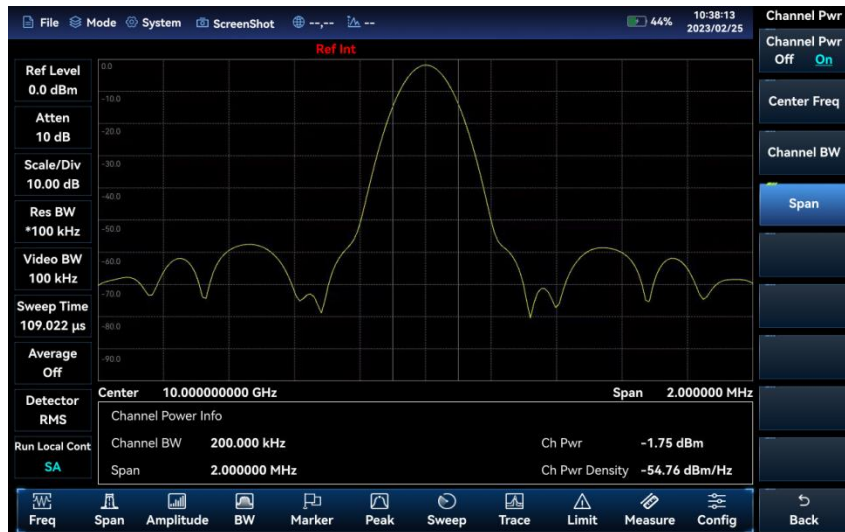
- **Indoor Map Mode (Option)**

The indoor map option allows RSSI and adjacent channel power ratio tests to be carried out. As the GPS signal cannot be received indoors, the user has to manually move the position and mark the test results on the map. The test results marked on the map can be saved to the instrument for later recall and viewing. A special software (included with the option) allows the user to convert the floor plan in image format into a tile map for storage on the instrument.

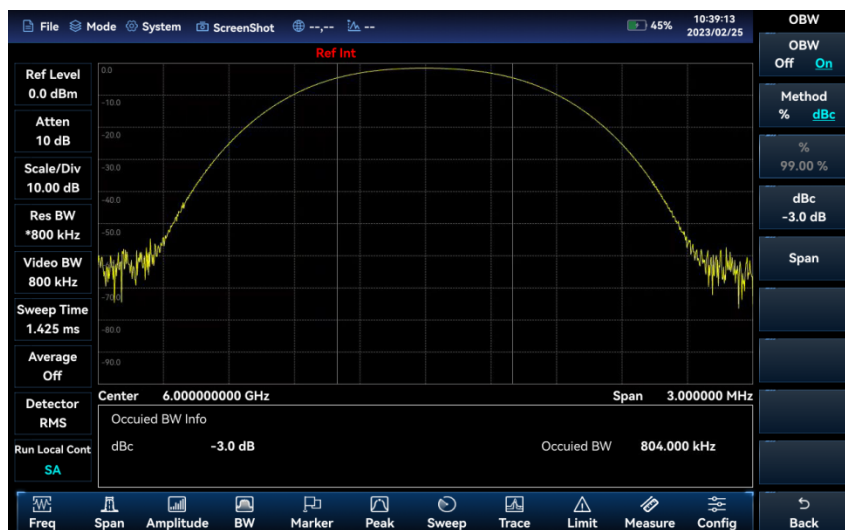


Comprehensive Intelligent Measurement Function

- Channel Power



- Occupied Bandwidth



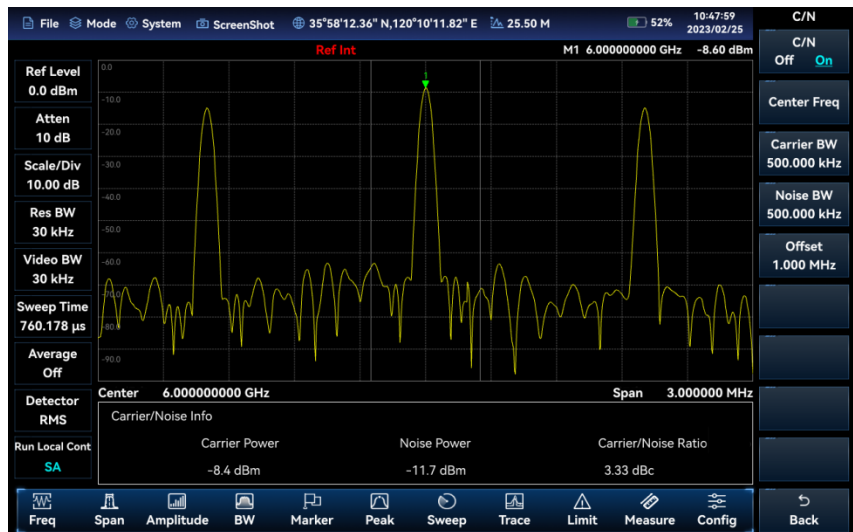
- Adjacent Channel Power



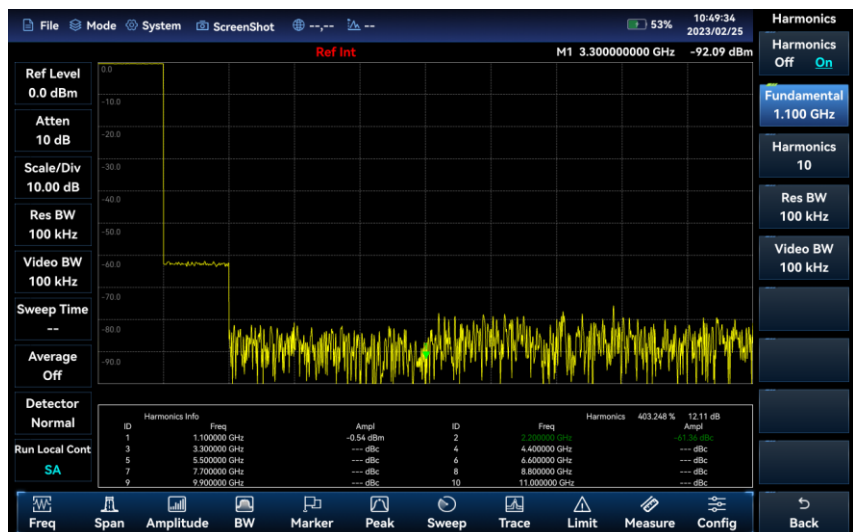
- Spectrum Emission Mask



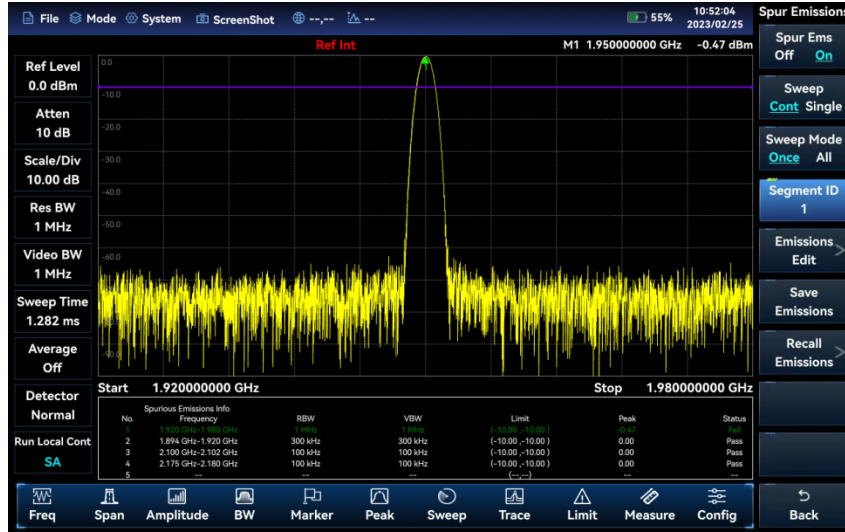
- Carrier To Noise Ratio



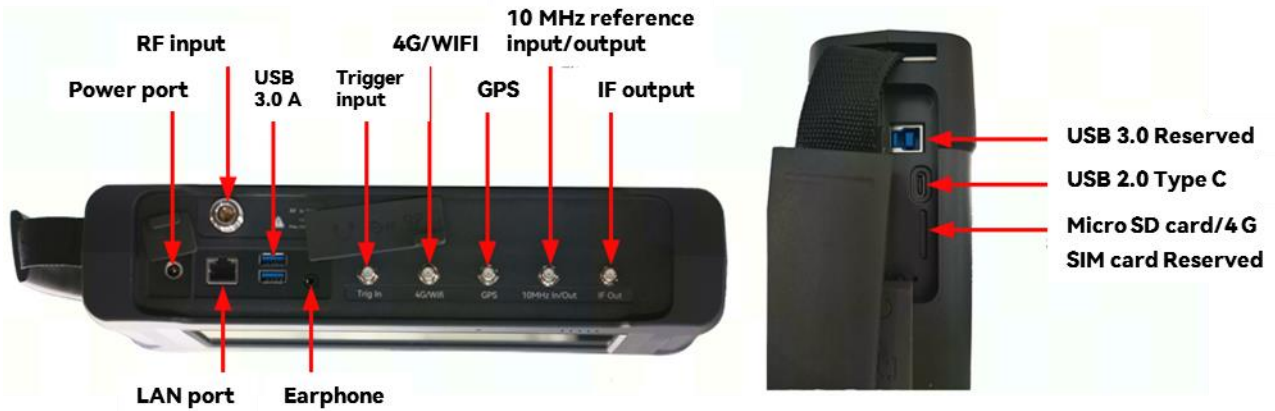
- Harmonic Distortion



- Spurious Emission Mask



Multiple RF and Auxiliary Test Interfaces



Typical Applications

- **Field comprehensive performance evaluation of electronic equipment**

The 4025D spectrum analyzer has multiple advantages such as high-performance indicators, fast scanning speed, multiple test functions, easy operation, etc. With a handheld structure, small size, lightweight, strong adaptability to the environment, and battery-powered, it can be applied to the field installation and commissioning of various electronic equipment such as radar, communications, electronic countermeasures and electronic reconnaissance, precision guidance and maintenance.

- **Field testing and diagnosis of transmitters and receivers**

The 4025D spectrum analyzer product has a variety of measurement function modes such as spectrum analysis, real-time spectrum analysis, interference analysis, analogue demodulation analysis, power measurement, channel scan, field strength measurement, etc., and has a variety of intelligent measurement functions such as channel power, occupied bandwidth, adjacent channel power, carrier-to-noise ratio, spurious Mask, harmonic distortion, etc., which can provide comprehensive spectrum analysis and diagnosis for field testing of transmitters and receivers. The new product is designed to provide comprehensive spectrum analysis and diagnostic services for transmitter and receiver field testing.

- **Broadband spectrum monitoring, interference identification**

The 4025D spectrum analyzer can be used for electromagnetic environment detection, radio interference analysis, electromagnetic environment background assessment, spectrum monitoring and identification of illegal channel interference signals by means of external omnidirectional or directional antennas; it can be used for spectrum testing of complex signals such as time division multiple access signals and transient time-varying signals by means of time gates and real-time spectrum analysis.

Technical Specifications

Model	4025D
Frequency Range	9kHz~20GHz
Frequency Reference	Frequency:10MHz Aging: $\pm 5 \times 10^{-7}$ /year Initial Frequency Accuracy: $\pm 3 \times 10^{-7}$ Temperature Stability: $\pm 1 \times 10^{-7}$ ($-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$, Comparative to $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$) Frequency reference error: \pm (last calibration date x aging rate + temperature stability + calibration accuracy) Note: default to the last calibration time is 1 year, the indicator is guaranteed by the crystal manufacturer
Sweep Time	Range: $1\mu\text{s} \sim 6000\text{s}$ (Zero Span) Accuracy: $\pm 1.0\%$ (Zero Span)
Frequency Readout Accuracy	\pm (Frequency Readout \times frequency Reference +1 % \times Span +10% \times Resolution Bandwidth)
Frequency Span	Range: 0Hz(Zero Span),10Hz~20GHz Accuracy: $\pm 1.0\%$
Resolution Bandwidth	1Hz~20MHz(1-2-3-5-8 steps)
Video Bandwidth	1Hz~20MHz(1-2-3-5-8 steps)
SSB Phase Noise (1GHz Carrier, $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$)	$\leq -108\text{dBc/Hz}$ @10kHz, $\leq -110\text{dBc/Hz}$ @100kHz $\leq -118\text{dBc/Hz}$ @1MHz, $\leq -129\text{dBc/Hz}$ @10MHz
Displayed Average Noise Level (input port is connected with a 50 Ω load, 0dB input attenuation, average detection, the logarithm of video type, RBW normalized to 1Hz, $+15^{\circ}\text{C}$ to $+35^{\circ}\text{C}$)	Pre-amplifier ON: $\leq -161\text{dBm}$ (2MHz~2.4GHz), $\leq -160\text{dBm}$ (2.4GHz~6GHz), $\leq -159\text{dBm}$ (6GHz~9GHz), $\leq -158\text{dBm}$ (9GHz~14GHz), $\leq -156\text{dBm}$ (14GHz~20GHz) Pre-amplifier OFF: $\leq -142\text{dBm}$ (2MHz~2.4GHz), $\leq -141\text{dBm}$ (2.4GHz~6GHz), $\leq -140\text{dBm}$ (6GHz~9GHz), $\leq -138\text{dBm}$ (9GHz~14GHz), $\leq -138\text{dBm}$ (14GHz~20GHz)
Second Harmonic Distortion (0dB attenuation, -30dBm input signal, Pre-amplifier OFF)	$\leq -70\text{dBc}$ (50MHz~10GHz)
TOI (-15dBm 2-tone signal, 100kHz span, 0dB attenuator, Pre-amplifier OFF)	$\geq +13\text{dBm}$ (50MHz~20GHz)
Image, multiple and out-of-band response (Mixer Level: -10dBm)	$< -65\text{dBc}$ (10MHz~7.5GHz), $< -60\text{dBc}$ (7.5GHz~10.5GHz), $< -65\text{dBc}$ (10.5GHz~20GHz)
Residual Response (RF input; 50 Ω load, input attenuation: 0dB)	Pre-amplifier ON: $\leq -110\text{dBm}$ (10MHz~3GHz), $\leq -105\text{dBm}$ (3GHz~9GHz) $\leq -103\text{dBm}$ (9GHz~12GHz), $\leq -100\text{dBm}$ (12GHz~20GHz) Pre-amplifier OFF: $\leq -90\text{dBm}$ (10MHz~20GHz)
Absolute Amplitude Accuracy (Frequency : 10MHz~20GHz, Attenuation: 10dB, 0dBm~-50dBm, Pre-amplifier: OFF, Resolution bandwidth :1kHz)	$\pm 1.30\text{ dB}$ (operating temperature: $+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$)

Input Attenuator	Attenuation range: 0~30dB,2dB steps
Maximum Input Power	+27dBm CW Power(input frequency $\geq 50\text{MHz}$, $\geq 10\text{dB}$ attenuation,pre-amplifier OFF)
Reference Level	Range: -150dBm~+30dBm,minimum 1dB steps Conversion Uncertainty: $\pm 0.50\text{dB}$ (Reference level: 0dBm~-60dBm)
Detector Type	Standard, Positive peak, Negative peak, Sample, Average, RMS
Dimensions	316.5mm(W) \times 236.5mm(H) \times 75mm(D) (Without side strap and interface plug, the back bracket is closed) 316.5mm(W) \times 236.5mm(H) \times 68mm(D) (Without side strap and interface plug, the back bracket is closed)
Weight	Typical: 3.0kg (without internal battery),3.5kg (with internal battery)
Working Temperature	-20°C~+55°C(Battery discharge: -20°C~+55°C, Battery charge: +10°C~+45°C)
Storage Temperature	-50°C~+70°C(Storage temperature of the battery:-20°C~+50°C,Storage time: <1 month)
Electromagnetic Compatibility	Conforms to the relevant requirements of item 3.9.1 of GJB 3947A-2009
Power Input Requirement	AC power adapter: input voltage: 100 to 240VAC,50/60Hz Output voltage: 19VDC,4.7A Built-in lithium electronic battery: Nominal voltage: 10.8V
Power Consumption	Typical: 22W~28W (Depend on the operation mode)
Battery Operating Time	Typical: 3.5h~4.5h (Depend on the operation mode)
Test Interface	RF input: N(Female) connector
Other Interfaces	10MHz reference input/output port: SMA(F) External trigger input port: SMA(F) GPS antenna port: SMA(F)(option) IF output port: SMA(F)(option) Wi-Fi/4G antenna port: SMA(F)(option, The input interface of 4G antenna is reserved and not supported for now.)
Communication and Auxiliary Interfaces	USB interface: 2 USB3.0 A-type interface 1 USB2.0 Type C-type interface 1 USB3.0 B-type interface(reserved) LAN interface: standard RJ-45 type Audio phone interface: standard 3.5mm SD/SIM card: Micro SD card and SIM card slot(The 4G option is reserved)

Ordering Information

- **Main Unit:** 4025D Spectrum Analyzer(9kHz~20GHz)

- **Standard Package**

No.	Description	Remarks
1	Power line assembly	Standard 3-Phase Power Cord Power adapter:100~240V 50/60Hz input, 19V,4.7A output Lithium-ion rechargeable battery
2	Product quick user guide	Quick start using the instrument
3	Product certificate	Factory Certificate of Conformity

- **Option**

No.	Option	Description	Function
1	4025-01	Optional Accessories of English Version	English Signs, Keys, Menu
2	4025-02	User Manual (Chinese)	User Manual Chinese Version
3	4025-03	User Manual (English)	User Manual English Version
4	4025-04	Programming Manual (Chinese)	Programming Manual Chinese Version
5	4025-05	Programming Manual (English)	Programming Manual English Version
6	4025-S01	USB CW Power Meter Option	CW Power measurement function available with external USB continuous wave power sensor 87230/87231 /87232/87233.
7	4025-S02	USB Peak Power Meter Option	Peak power measurement is available and requires the 87234D/E/F/L USB peak/average power sensor to be used.
8	4025-S03	Interference Analyzer Option	Provides waterfall diagram, RSSI measurements and more
9	4025-S04	Channel Scanner Option	To Realize Signal Power Measurement of Multiple Channels and Frequency
10	4025-S05	Field Strength Option	For measuring the radiation intensity of the electric field of the device under test.
11	4025-S06	Outdoor Map	RSSI test and adjacent channel power ratio test can be done under the outdoor interference map, and the test results can be marked on the map in real time according to time or distance, to be used with the 4025-H01 option.
12	4025-S07	Indoor Map	RSSI and adjacent channel power ratio tests can be carried out under the indoor map, with the results marked on the map by dotting the correlation between signal strength and color.
13	4025-S08	Analog Demodulation	Realize AM, FM and PM modulation signal analysis and measurement function.
14	4025-S09	Zero Span IF Output	Output IF signal at zero span
15	4025-S10	Time Gated	Used for time division interference signal testing
16	4025-S11	Directional Analysis Option	For locating external sources of interference or unknown signals, to be used in conjunction with the 4025-H01 option, the USB electronic

No.	Option	Description	Function
			compass option and the directional antenna option.
17	4025-S12	40MHz Real-time Spectrum Analysis	Provide 40 MHz real-time spectrum analysis function
18	4025-S13	List Sweep	Realize continuous sweep of multiple frequency bands
19	4025-H01	GPS/Bei Dou Location	GPS or Bei Dou positioning function can be realized through the external antenna.
20	4025-H02	Wi-Fi Communication Option	Wireless communication with external devices.
21	4025-H03	Tie rod aluminium alloy box	Tie rod aluminium alloy box
22	4025-H04	Pull-rod transport box	Pull-rod transport box
23	4025-H05	Backpack	Portable Backpack
24	AAL090K-N029	Power Adapter	Power Adapter
25	GSA3SA1	9900mAh Lithium rechargeable battery	Standby battery pack, nominal voltage 10.8V, battery capacity 9900mAh, not suitable for air transport carry-on.
26	GS2040IM	9000mAh lithium-ion rechargeable battery	Standby battery pack, nominal voltage 10.8V, battery capacity 9000mAh, suitable for air transport carry-on.
27	GSCAR19V5525100W	Vehicle Power Adaptor	Car charger with input voltage 12~24V and output voltage 19V for powering handheld measuring instruments.
28	GSCH4000B	Smart Battery Charging Base	Lithium-ion battery charging stand
29	Kingston MicroSD Class10(128G)	Micro SD Card	Micro SD card, capacity: 128G.
30	87230	87230 USB CW Power Sensor	Frequency range: 9kHz~6GHz, Interface: N(m).
31	87231	87231 USB CW Power Sensor	Frequency range: 10MHz~18GHz, Interface: N(m).
32	87232	87232 USB CW Power Sensor	Frequency range: 50MHz~26.5GHz, Interface: 3.5mm(m).
33	87233	87233 USB CW Power Sensor	Frequency range: 50MHz~40GHz, Interface: 2.4mm(m).
34	87234D	87234D USB Peak/CW Power Sensor	Frequency range: 50MHz~18GHz, Interface: N(m).
35	87234E	87234E USB Peak/CW Power Sensor	Frequency range: 50MHz~26.5GHz, Interface: 3.5mm(m).
36	87234F	87234F USB Peak/CW Power Sensor	Frequency range: 50MHz~40GHz, Interface: 2.4mm(m).
37	87234L	87234L USB Peak/CW Power Sensor	Frequency range: 500MHz~67GHz, Interface: 1.85mm(m).
38	ZE9080 Antenna Module A	ZE9080 Directional Antenna A	Frequency range: 9kHz~20MHz, Interface: N(f). Recommended for use with the optional ZE9080 Handle Module
39	ZE9080 Antenna Module B	ZE9080 Directional Antenna B	Frequency range: 20MHz~200MHz, Interface: N(f). Recommended for use with the optional ZE9080 Handle Module
40	ZE9080 Antenna Module C	ZE9080 Directional Antenna C	Frequency range: 200MHz~500MHz, Interface: N(f).

No.	Option	Description	Function
			Recommended for use with the optional ZE9080 Handle Module
41	ZE9080 Antenna Module D	ZE9080 Directional Antenna D	Frequency range: 500MHz~8GHz, Interface: N(f). Recommended for use with the optional ZE9080 Handle Module.
42	ZE9080 Handle Module	ZE9080 Antenna Amplifier	Frequency range: : 9kHz~8GHz,N(f), can be used with the ZE9080 Antenna Module A/B/C/D option, Internal with amplifier and electronic compass.
43	ZE9080 Antenna Pull Rod Box	ZE9080 Antenna Transport Box	Transport case for ZE9080 antenna, to hold ZE9080 Antenna Module A/B/C/D and ZE9080 handheld module.
44	HyperLOG 7060X	700MHz~6GHz Directional Antenna	Active Log-periodic Antenna, Frequency: 700MHz~6GHz, Interface: SMA(f).
45	HyperLOG 60100X	680MHz~10GHz Directional Antenna	Active Log-periodic Antenna , Frequency: 680MHz~10GHz, Interface: SMA(f).
46	HyperLOG 60200X	680MHz~20GHz Directional Antenna	Active Log-periodic Antenna , Frequency: 680MHz~20GHz, Interface: SMA(f).
47	OmniLOG 70600	6GHz Omni-directional Antenna	Portable Omni-directional Antenna, Frequency: 680MHz~6GHz, Interface: SMA(m).
48	OmniLOG 30800	8GHz Omni-directional Antenna	Portable Omni-directional antenna, Frequency: 300MHz~8GHz, Interface: SMA(m).
49	HyperLOG 7060	700MHz~6GHz Passive Directional Antenna	Passive Log-periodic Antenna, Frequency: 700MHz~6GHz, Interface: SMA(f).
50	HyperLOG 60100	680MHz~10GHz Passive Directional Antenna	Passive Log-periodic Antenna , Frequency: 680MHz~10GHz, Interface: SMA(f)
51	HyperLOG 60180	680MHz~18GHz Passive Directional Antenna	Passive Log-periodic Antenna, Frequency: 680MHz~18GHz, Interface: SMA(f).
52	USB Electronic Compass	USB Electronic Compass	External USB Electronic Compass can be used with HyperLOG 7060X,HyperLOG 60100X,HyperLOG 60200X,4025-S11 options.
53	UF2-SMAMNM-2.0M	N/SMA-JJ RF Cable(2m)	N/SMA (M-M) RF coaxial cable, DC~18GHz,length: 2m
54	PBS1	PBS1 Near-field Probe	Maximum frequency: 9 GHz, with 1 electric field probe and 1 each of 6mm, 12mm, 25mm and 50mm magnetic field probes, Interface: SMB(m).