



4041 Series Spectrum Analyzer

(9kHz~20GHz/26.5GHz/32GHz/44GHz)



China Electronics Technology Instruments Co., Ltd.

Product Overview

The 4041 spectrum analyzer is adopted with the compact portable box structure, which has advantages of small size, light weight, low power consumption and convenient carrying. The broadband millimeter-wave receiver miniaturization integrated design technology, whole phase locking technology based on the broadband VCO, full digital intermediate frequency design technology, and microwave composite multilayer circuit board design technology are adopted for this product, thus realizing high performance indicators and ensuring the economical efficiency of the product.

The 4041 spectrum analyzer series currently consists of four types of products. The frequency measurement range covers 9kHz~20GHz, 9kHz~26.5GHz, 9kHz~32GHz and 9kHz~44GHz respectively. The full spectrum of the product is equipped with a preamplifier, so that it has very high receiving sensitivity at any frequency point. In addition, with the 12.1-inch high brightness LCD and integrated design of capacitive touch screen, large button and virtual button combination design, its operation convenience is improved.

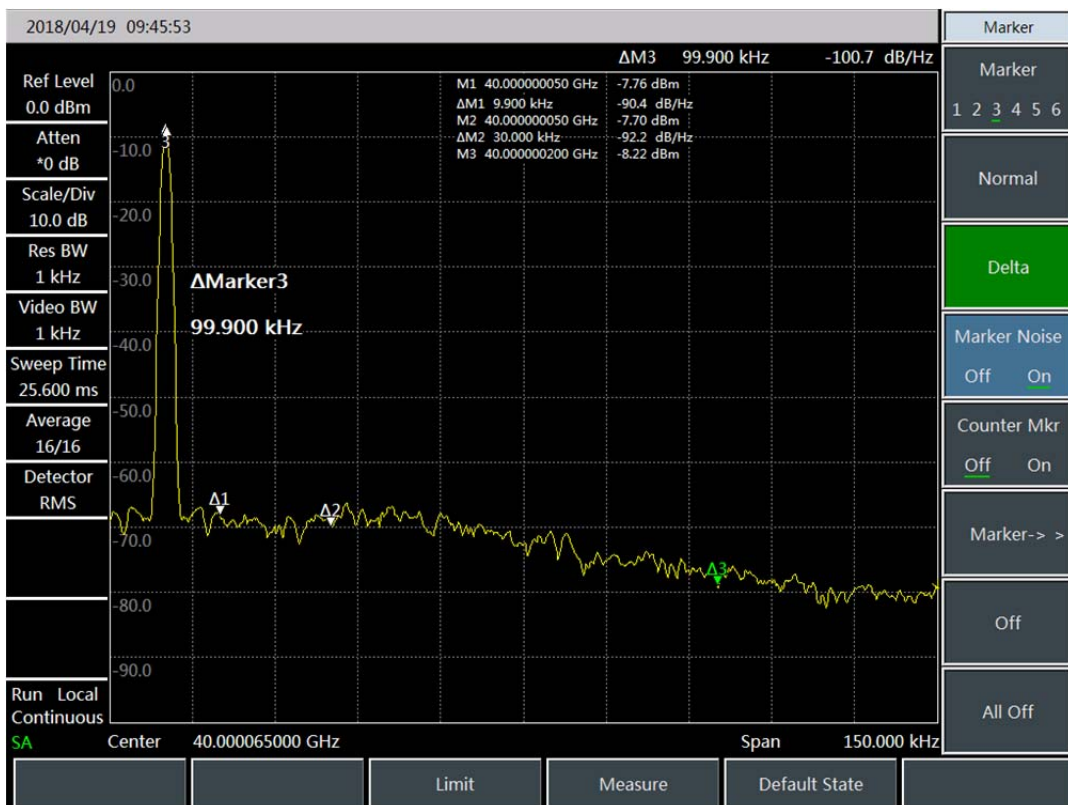
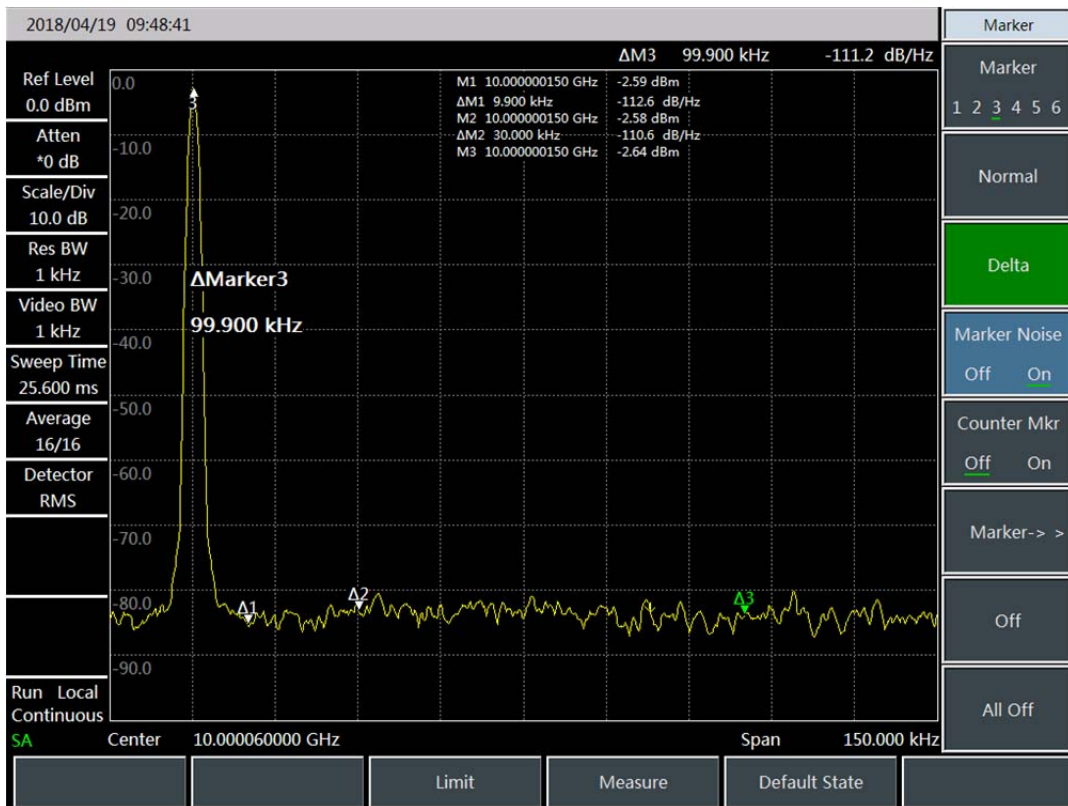
For its performance indicators, it has excellent average noise level and phase noise indicator as well as the high scanning speed. For its measurement function, it has the option modes including the interference analyzer channel scanner, AM/FM/PM analyzer, and power meter, as well as a variety of measurement functions including the channel power, occupied bandwidth, adjacent channel power, audio demodulation, emission mask and carrier-to-noise ratio. This product can be used for the test and maintenance of the aviation, spaceflight, wireless communications and radar signals and devices, and it can also be used for the research, development and production of electronic products and the teaching experiment of scientific research institutes.

Main Characteristics

- A portable case characterized by thin thickness and light weight, which can be conveniently placed and carried
- Wide frequency range covering 9kHz~20GHz/26.5GHz/32GHz/44GHz; with the full-band pre-amplifier as standard
- Low displayed average noise level: -163dBm@1Hz RBW(typical)
- Excellent phase noise performance: -106dBc/Hz@100kHz frequency offset@1GHz carrier
- RBW: 1Hz~10MHz
- Extremely high sweep speed: for 1GHz span, shortest sweep time <20ms
- Various measurement functions, such as the channel power, occupied bandwidth, adjacent channel power, audio demodulation, carrier-to-noise ratio, and emission mask
- Abundant test function mode options: interference analysis (spectrogram plot, RSSI), analog AM/FM/PM analyzer, channel scanner, and high-precision power meter, etc.
- Easy to operate, equipped with 12.1-inch high brightness LCD screen featuring large font display and loose button layout, and supporting the capacitive touch screen operation and touch screen cursor dragging

Good Single-Sideband Phase Noise Indicators

As the multi-loop phase-locked frequency synthesis technology is adopted, the whole frequency band has good phase noise indicators.



High Receiving Sensitivity

The miniaturization integrated design technology of microwave & millimeter-wave frequency conversion modules and the use of the low noise preamplifier in the whole frequency band reduce the noise level and improve the receiving sensitivity.

10 MHz~20 GHz typical receiving sensitive value-160 dBm/Hz (preamplifier on)



Comprehensive Spectrum Measurement Functions

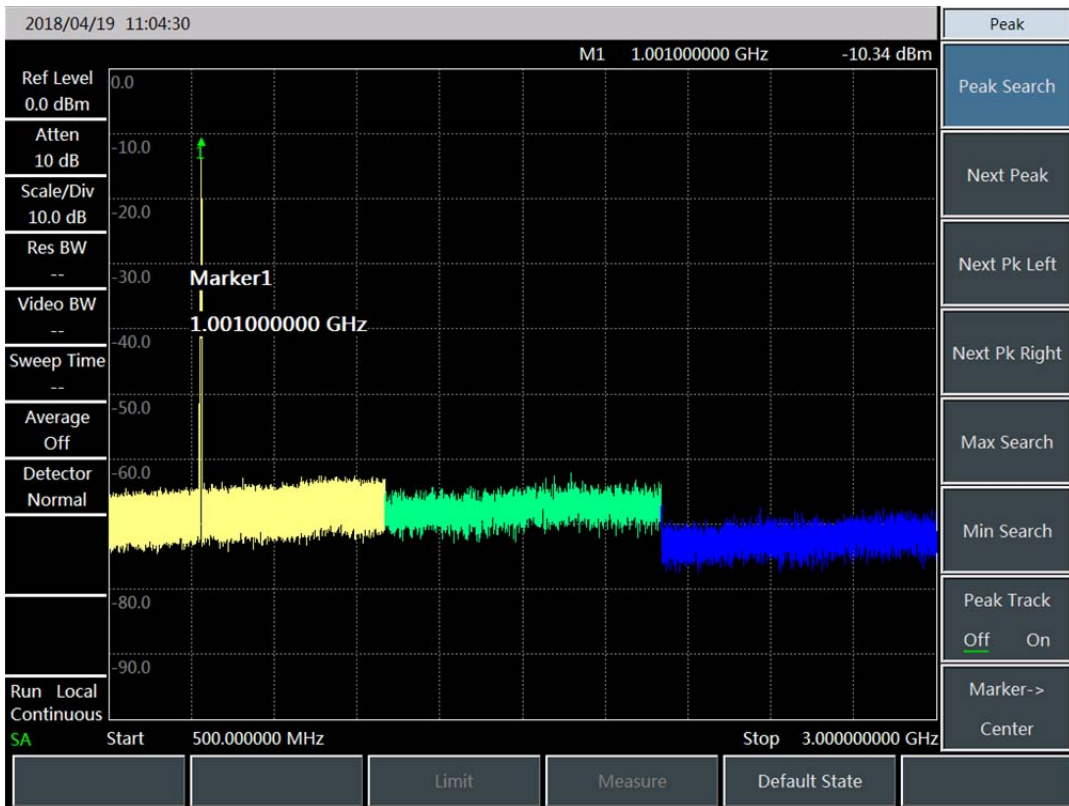
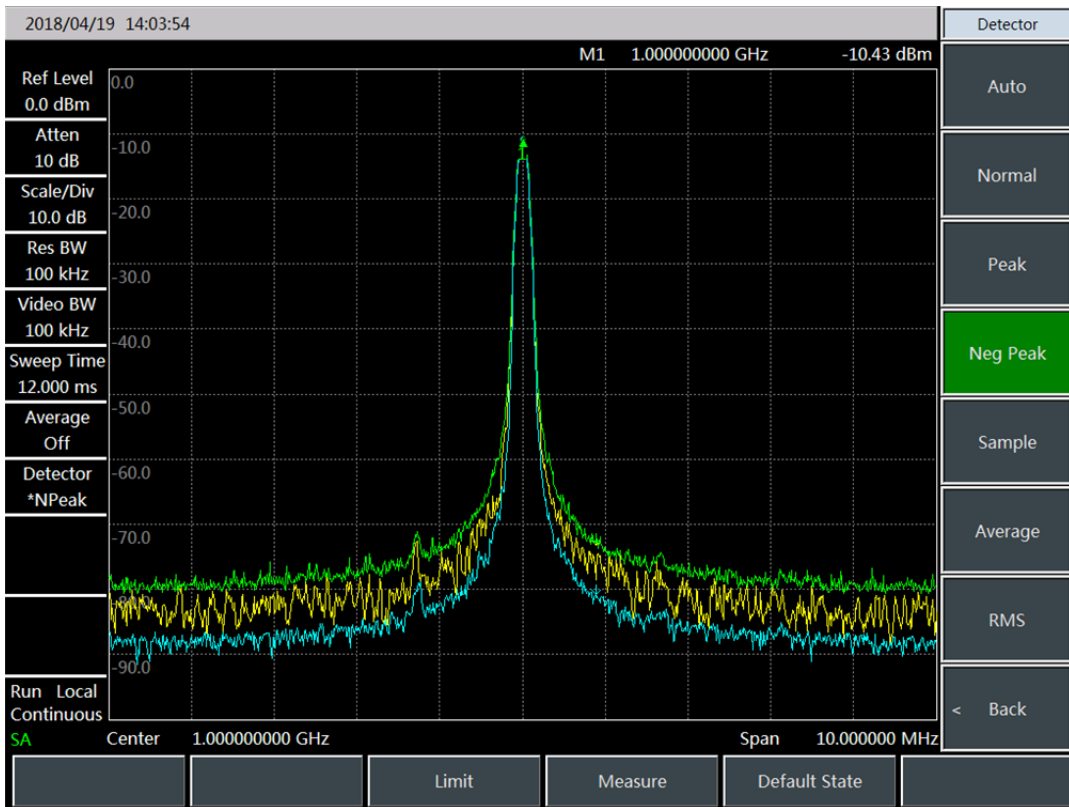
It has functions including the signal tracking, peak tracking and signal search.

It can provide 12 cursors, and it has both normal mode and differential mode for option, and supports the noise marker and frequency count functions.

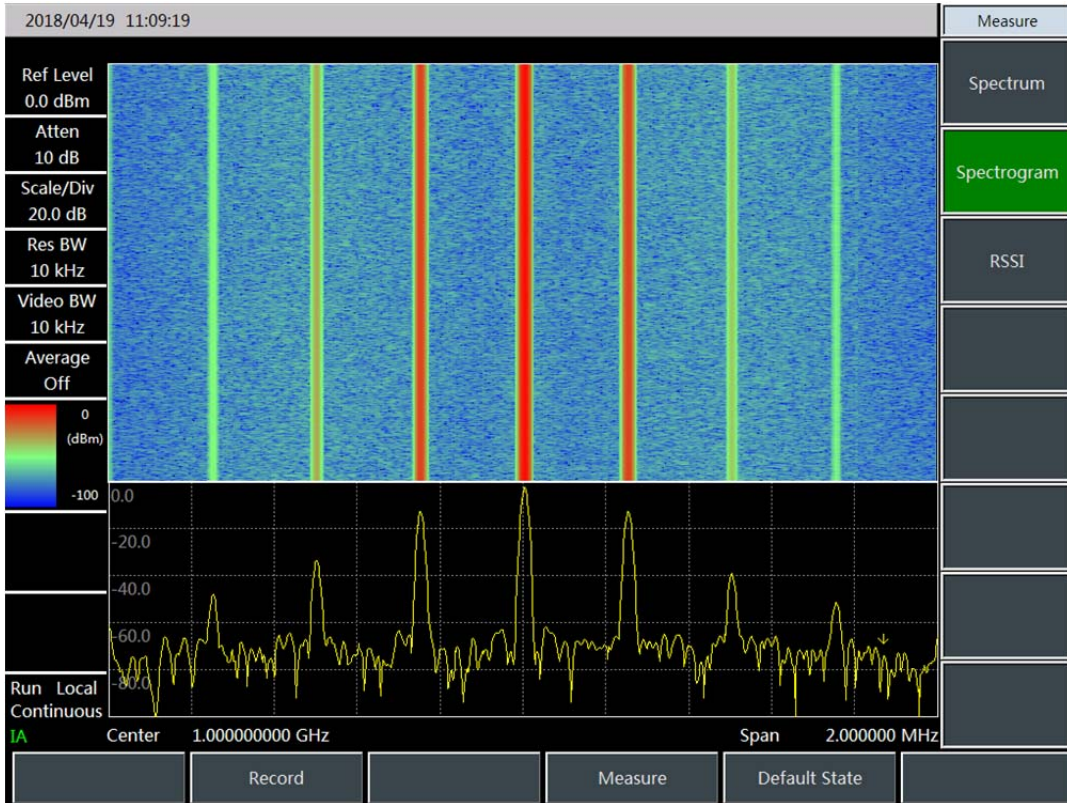
The transmitter power kit has the one-button measurement functions, including the channel power, occupied bandwidth, adjacent channel power, carrier-to-noise ratio, emission mask, and audio demodulation.

3 display traces and 6 detection modes are available.

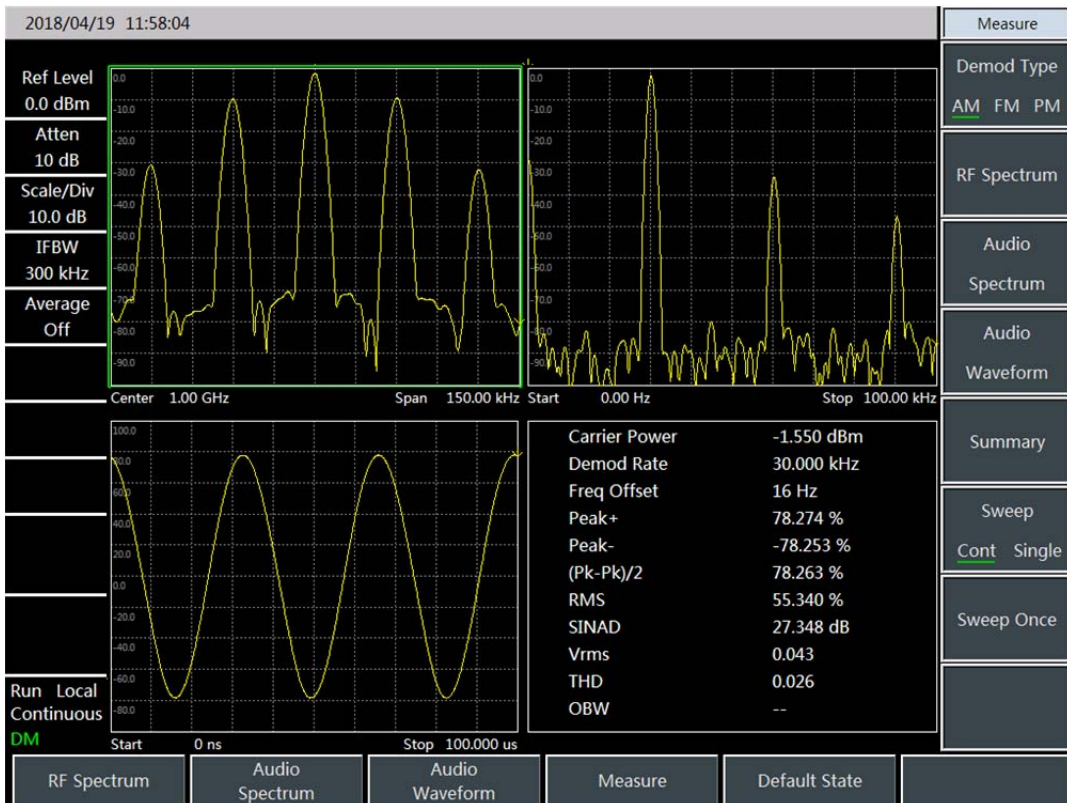
It supports to sweep, edit, store and call the list.



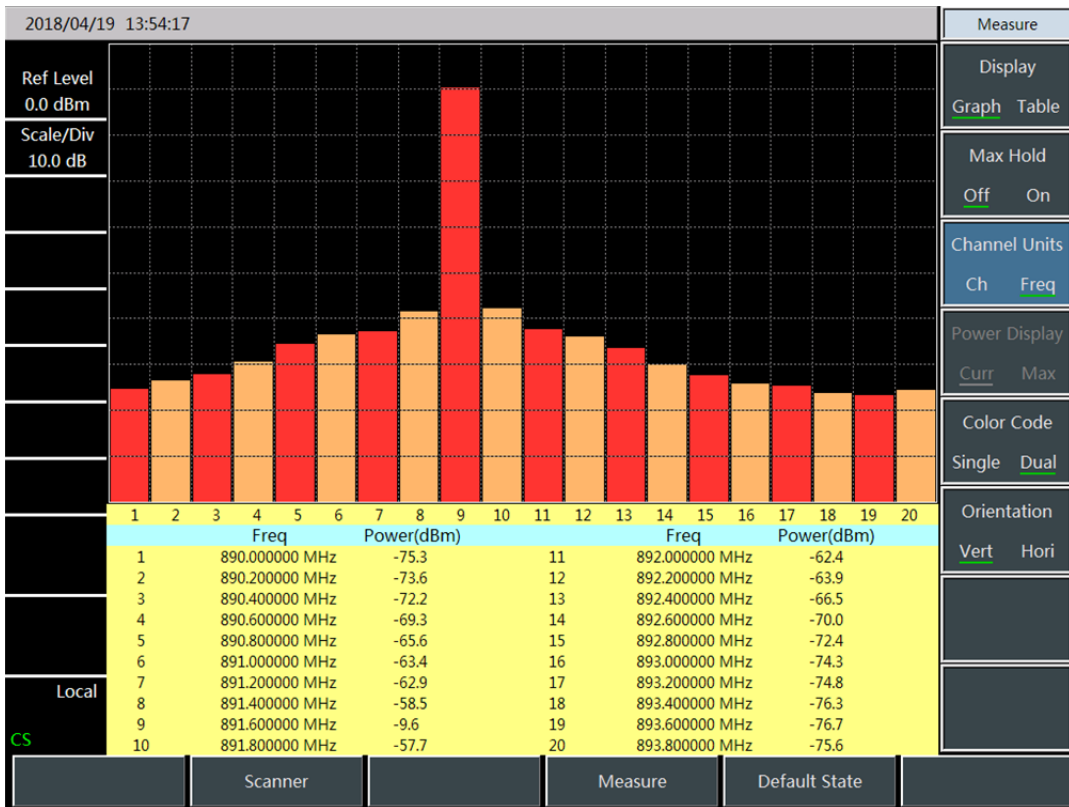
Various Measurement Functions



Interference Analyzer (Spectrogram)



AM/FM/PM Analyzer



Channel Scanner



Power Meter (87230 series USB power Sensor)

Convenient and Fast User Experience

One-button quick measurement

State and data storage and call functions

12.1-inch high brightness LCD display screen, less light transmittance, and clear display

Convenient capacitive touch screen

Supporting a number of auxiliary interfaces including the USB program control and storage, LAN program control, VGA video output, zero span IF output, and trigger input, convenient for the user's operation.

Typical Applications

Test of Components and Parts

It can be used for the test of parameters and indicators including the gain, frequency response, frequency conversion loss and insertion loss of the components and modules including the amplifier, filter, mixer, attenuator, cable and directional coupler.

Test and Diagnosis of the Transmitter and Receiver

The 4041 spectrum analyzer has a number of measurement function modes including the spectrum analyzer, interference analyzer, AM/FM/PM analyzer, power meter, and channel scanner, and it also has a number of measurement functions including the channel power, occupied bandwidth, adjacent channel power, carrier-to-noise ratio, field strength, and emission mask; therefore, it can provide the comprehensive spectrum analysis and diagnosis service for the test of the transmitter and receiver.

Technical Specifications

Model	4041D/E/F/G
Frequency range	4041D: 9kHz~20GHz 4041E: 9kHz~26.5GHz 4041F: 9kHz~32GHz 4041G: 9kHz~44GHz Tuning resolution: 1 Hz
Frequency reference	Nominal frequency: 10MHz Frequency reference error: \pm (Last calibration date \times aging rate + temperature stability + calibration accuracy) Aging rate: $\pm 5 \times 10^{-7}$ /year Temperature stability: $\pm 1 \times 10^{-7}$ (0°C ~ 50°C, relative to 25 \pm 5°C) Initial calibration accuracy: $\pm 3 \times 10^{-7}$ Note: The default time elapsed since the last calibration date is one year.
Frequency readout accuracy	Frequency readout accuracy = \pm (frequency reading \times frequency reference error + 2% \times sweep width + 10% \times resolution bandwidth)
Frequency span	Range: 100Hz~upper frequency limit of corresponding model or 0Hz Accuracy: $\pm 2.0\%$
Sweep time	Range: 10 μ s~600s (zero span); Accuracy: $\pm 2.00\%$ (zero span)
Resolution bandwidth	Range: 1Hz~10MHz (step by 1-3) Accuracy (3.0dB): $\pm 10\%$ 1kHz~3MHz $\pm 20\%$ 10MHz
Resolution bandwidth change to uncertainty	± 1.20 dB 1Hz~10MHz (take 100kHz RBW as a reference)
Video bandwidth	1Hz~10MHz (1-3 times step)
Detection mode	Normal, Peak, Neg Peak, Sample, Average, RMS
Single-sideband phase noise (Carrier wave 1GHz, 20°C~30°C)	≤ -102 dBc/Hz@10kHz frequency offset ≤ -106 dBc/Hz@100kHz frequency offset ≤ -111 dBc/Hz@1MHz frequency offset ≤ -123 dBc/Hz@10MHz frequency offset
Average noise level display (50 Ω load at the input end, 0dB input attenuation, average detector mode, logarithmic Video Type, RBW normalization to 1Hz, 20-30°C)	Preamplifier off ≤ -138 dBm (10MHz~20GHz) ≤ -135 dBm (20GHz~32GHz) ≤ -127 dBm (32GHz~40GHz) ≤ -120 dBm (40GHz~44GHz) Preamplifier on ≤ -157 dBm (10MHz~20GHz) ≤ -154 dBm (20GHz~32GHz) ≤ -148 dBm (32GHz~40GHz) ≤ -140 dBm (40GHz~44GHz)
Residual response (RF input match, 0dB attenuation)	(Exceptional frequency: 3200MHz) Preamplifier off ≤ -90 dBm (10MHz~13GHz) ≤ -85 dBm (13GHz~20GHz) ≤ -80 dBm (20GHz~44GHz) Preamplifier on ≤ -100 dBm (10MHz~32GHz) ≤ -95 dBm (32GHz~44GHz)
Second harmonic distortion	< -60 dBc (0dB attenuation, -30dBm input signal)
1dB gain compression (Double-tone test, 10MHz signal spacing)	≥ -2 dBm 50MHz~4GHz ≥ -3 dBm 4GHz~13GHz ≥ -3 dBm 13GHz~44GHz

3-order intermodulation distortion (-25dBm double-tone signal, 100kHz spacing, 0dB attenuation, pre-amplifier off)	$\geq +7\text{dBm}$ 50MHz~4GHz $\geq +6\text{dBm}$ 4GHz~13GHz $\geq +6\text{dBm}$ 13GHz~44GHz
Total level uncertainty (frequency range 10MHz~40GHz, input signal -10~-50dBm, all settings are auto couple, 20°C ~30°C)	$\pm 1.80\text{dB}$ (10MHz~13GHz) $\pm 2.30\text{dB}$ (10MHz~40GHz)
Input attenuator	Scope of attenuation 0dB~50dB, 10dB step Conversion uncertainty: $\pm 1.20\text{dB}$
Maximum safe input level	+30dBm, typical value ($\geq 10\text{dB}$ attenuation) +23dBm, typical value ($< 10\text{dB}$ attenuation) +13dBm, typical value (preamplifier ON)
Reference level	Range: Logarithmic scale -120dBm~+30dBm, 1dB step Linear scale: 22.36 μV ~7.07V, 0.1% step Conversion error: $\pm 1.20\text{dB}$ (reference level 0dBm ~-60dBm)
Displayed scale	Logarithmic scale: 0.1dB~10dB per scale, minimum 0.1dB step, 10-scale display Linear scale: 10-scale display Calibration unit: V, A, W, dBm, dBW, dBV, dBmV, dBuV, dBA, dBmA, dBuA
Scale fidelity	$\pm 1.00\text{ dB}$
Size	430mm(width) \times 270mm (height) \times 180mm (depth) (excluding the handle and foot) 430mm(width) \times 360mm (height) \times 180mm (depth) (including the handle and foot)
Weight	$\leq 12\text{ kg}$
Power supply	AC 220/240V; 50/60Hz
Power consumption	$< 60\text{W}$ (working state)
Operating temperature	0°C~+50°C
Storage temperature	-40°C ~+70°C
Electromagnetic compatibility	Conforms to GJB3947A-2009 3.9.1 Requirements
Test port	4041D/E: Type-N (f) 4041F/G: 2.4 mm (m)
Auxiliary test interface	10 MHz reference input/output: BNC female connector External trigger input: BNC female connector Intermediate frequency output: BNC female connector GPS antenna input: BNC female connector
Other interfaces	LAN, USB, VGA output

Ordering Information

Main unit: 4041D spectrum analyzer (9kHz~20GHz)

Main unit:4041E spectrum analyzer (9kHz~26.5GHz)

Main unit:4041F spectrum analyzer (9kHz~32GHz)

Main unit:4041G spectrum analyzer (9kHz~44GHz)

Standard package

No.	Description	Remarks
1	Standard three-core power line	Standard three-core power line
2	Quick start guide	
3	USB cable	USB programmable cable
4	Certificate of conformity	

Options

No.	Description	Function
4041-001	English version of the option	English Signs、 Keys、 Menu
4041-002	User Manual (Chinese version)	
4041-003	User Manual (English version)	
4041-004	Programming Manual (Chinese version)	
4041-005	Programming Manual (English version)	
4041-006	Purple Cat5e Cable	Point to point, 2 Meters
4041-007	GPS antenna	GPS external antenna
4041-008	Function option of the USB power meter	Provide USB Power meter Function (Requires USB Power Sensor:009/010/011/012)
4041-009	87230 USB continuous wave power sensor	9kHz~6GHz Power Sensor
4041-010	87231 USB continuous wave power sensor	10MHz~18GHz Power Sensor
4041-011	87232 USB continuous wave power sensor	50MHz~26.5GHz Power Sensor
4041-012	87233 USB continuous wave power sensor	50MHz~40GHz Power Sensor
4041-013	Interference Analyzer Option	Provide Spectrogram, RSSI Measurement etc. Functions
4041-014	AM/FM/PM Analyzer Option	To Realize Modulation Characteristics Analysis of AM/FM/PM Signals
4041-015	Channel Scanner Option	To Realize Signal Power Measurement of Multiple Channels and Frequency
4041-016	List Sweep Option	To Realize Continuous Sweep Measurement of Various Frequency Bands
4041-017	Field strength Option	Realize the field strength of the dot frequency, frequency scan and list scan
4041-018	Zero Span IF Output	Output the Third or Fourth IF Signal (Choose One of Two)
4041-019	89101A antenna	Frequency range: 10kHz~20MHz (Requires Option 023 option)
4041-020	89101B antenna	Frequency range: 20MHz~200MHz (Requires Option 023 option)
4041-021	89101C antenna	Frequency range: 200MHz~500MHz (Requires Option 023 option)
4041-022	89101D antenna	Frequency range: 500MHz~4GHz

		(Requires Option 023 option)
4041-023	89401 antenna amplifier	Frequency range: 10kHz~4GHz, Type-N (f) (Requires Option 019/020/021/022 options)
4041-024	89901 antenna	Frequency range: 1GHz~18GHz, Type-N (f)
4041-025	89902 antenna	Frequency range: 18GHz~40GHz, 2.4mm (f)

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