



# 4051 A/B/C/D/E-S Signal & Spectrum Analyzer

(3Hz~4GHz/9GHz/13.2GHz/18GHz/26.5GHz)



China Electronics Technology Instruments Co., Ltd

## Product Overview

4051-S Series Signal/Spectrum Analyzers support spectrum measurement services of high price-performance ratio. The analyzers have excellent dynamic range, phase noise, amplitude precision and measurement speed, can supply ten measurement functions in total including high-performance spectrum analysis, standard power measurement modules conforming to relevant criteria etc. Capabilities of the analyzers can be greatly augmented. Multiple practical options are available like preamplifier, phase noise measurement, random IF output and so on. 4051 Series can be widely applied in signal and instrument tests relating to fields of aerospace, communication, EMC, radar detection, navigation, etc..

## Main Characteristics

- **Incomparable Price-Performance Ratio**
- **5 Frequency Range, Up to 26.5GHz**
- **Excellent Measurement and Receiving Performance**
- **Overall spectrum analysis capability**
- **Practical Function Options**
- **Convenient Operation Characteristics**

### **Incomparable Price-Performance Ratio**

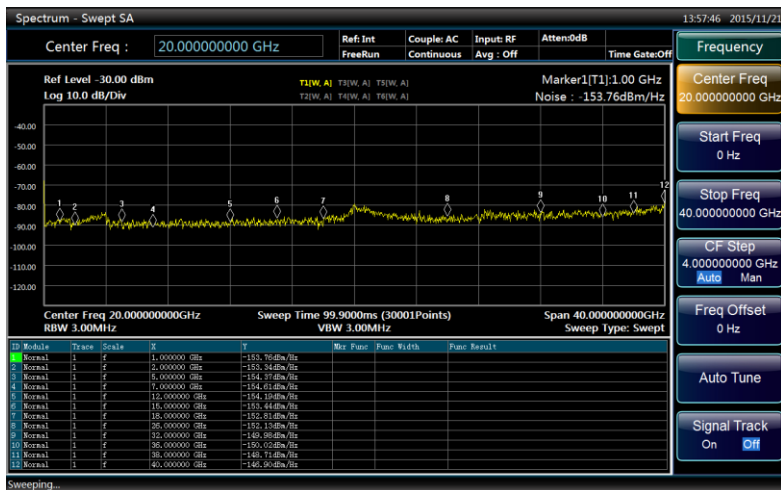
- Economy price effectively reduce testing cost
- Offer outstanding performance and specifications which can only be provided by high end analyzers

### **5 Frequency Range, Up to 26.5GHz**

- The max. coaxial frequency range of 26.5GHz
- 5 frequency ranges available, you can choose based on budgets
- Can supply broadband preamplifiers to match different frequency range

### **Excellent Measurement and Receiving Performances**

- 1GHz testing DANL is -153dBm/Hz. If configured with preamplifier, the typical value is -166dBm/Hz.
- 26.5GHz testing DANL is -141dBm/Hz, configured with preamplifier, the typical value is -160dBm/Hz.
- All digital IF design, fine scale fidelity and IF error rate



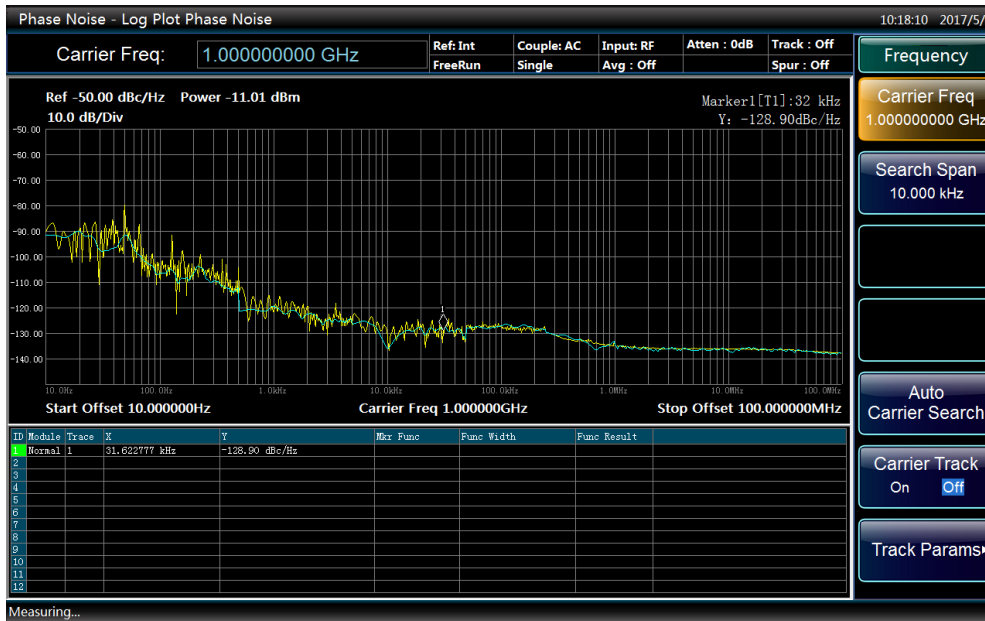
## Overall Spectrum Analysis Capabilities

- Support frequency sweep and FFT sweep
- Zero frequency band fast sweep, the fastest sweep time is 1μs
- Accurate frequency counting, counting resolution can be 0.001Hz
- Sweep points numbers can be arbitrarily selected among 101~30001
- 6 traces can be configured, with abundant marker operation functions
- 6 detector modes, 3 average types.
- Support time gate measurement
- Occupied bandwidth, channel power, adjacent channel power measurement functions
- Measurement functions of power statistics, burst power, harmonic distortion, TOI, spurious emission etc.



## Practical Function Options

- Phase noise testing capability
- RF or full band preamplifiers
- 10MHz~160MHz random IF output, 1Hz steps, 4 auto gain control levels



### Convenient Operation Characteristics

- Humanized automatic tuning and automatic scale
- One-button measurement
- 10.1 inch LCD, 1280\*800 screen resolution, display more clear measurement results
- Support USB, LAN, GPIB, monitor etc., for your convenience.

### Typical Applications

- RF performance assessment of electronic systems: as universal spectrum analyzers of multiple functions, 4051-S Series Signal/Spectrum analyzers can be widely used in RF performance evaluative of electronic systems in fields like radar, communication and so on. They can provide high sensitivity, wide dynamic range, and high precision and efficiency resolutions.
- Measurement and diagnosis of transmitter and receiver: 4051-S Series can furnish comprehensive common diagnosis services for transmitter and receiver by the multiple functions of spectrum analysis, spectral power testing, and phase noise Measurement and so on.
- Can be directly used for the integration of complex test and diagnosis systems, to get test results of spectrum characteristics and signal output.

### Technical Specifications

|                 |         |             |               |
|-----------------|---------|-------------|---------------|
| Frequency Range | 4051A-S | DC coupled  | AC coupled    |
|                 | 4051B-S | 3Hz~4GHz    | 10MHz~4GHz    |
|                 | 4051C-S | 3Hz~9GHz    | 10MHz~9GHz    |
|                 | 4051D-S | 3Hz~13.2GHz | 10MHz~13.2GHz |
|                 | 4051E-S | 3Hz~18GHz   | 10MHz~18GHz   |
|                 | 4051E-S | 3Hz~26.5GHz | 10MHz~26.5GHz |

|   |   |
|---|---|
| 10MHz Precision Frequency Reference         | <p>Frequency accuracy: <math>\pm</math> (last calibration time <math>\times</math> aging rate + temp stability + calibration accuracy)</p> <p>Aging rate: <math>\pm 1 \times 10^{-7}/Y</math></p> <p>Temperature stability: <math>\pm 1 \times 10^{-8}</math> (20°C ~ 30°C) <math>\pm 5 \times 10^{-8}</math> (0°C ~ 50°C)</p> <p>Calibration accuracy: <math>\pm 4 \times 10^{-8}</math></p> |
| Frequency Readout Accuracy                  | <p><math>\pm</math> (Frequency readout <math>\times</math> frequency reference accuracy + 0.1% span + 5% resolution bandwidth + 2Hz + 0.5 horizontal resolution *)</p> <p>*: Horizontal resolution = span / (sweep points - 1)</p>  |
| Frequency Counting Accuracy                 | $\pm$ (Frequency readout $\times$ frequency reference accuracy + 0.1Hz)   |
| Span  | <p>Range: 0Hz (zero span), 10Hz ~ the max. frequency range of this model</p> <p>Accuracy: <math>\pm</math> (0.1% <math>\times</math> span + span / (sweep points - 1))</p>  |
| Sweep Time Range                            | <p>span <math>\geq</math> 10Hz: 1ms ~ 6000s</p> <p>span = 0Hz: 1us ~ 6000s</p>  |
| Resolution Bandwidth                        | <p>Range: 1Hz ~ 3MHz (1, 2, 3, 5 steps) 4, 5, 6, 8, 10, 20MHz</p> <p>Conversion uncertainty: 0.3dB 1Hz ~ 10MHz</p> <p>1.0dB 20MHz</p>   |
| Video Bandwidth                             | 1Hz ~ 3MHz (1, 2, 3, 5 steps) 4, 5, 6, 8, 10, 20MHz (nominal)   |
| Trigger Source                              | Free, Line, Video, External Level (front panel), External Level (rear panel), Burst RF, Timer   |
| Trace Detector                              | Normal, Positive Peak, Negative Peak, Sample, Video Average, Power Average, Voltage Average   |
| Average Mode                                | Video Average, Power Average, Level Average   |
| SSB Phase Noise (1GHz Carrier, 20°C ~ 30°C) | <p>-92dBc/Hz 100Hz</p> <p>-105dBc/Hz 1kHz</p> <p>-118dBc/Hz 10kHz</p> <p>-123dBc/Hz 100kHz</p>  |
| Residual FM (Central Frequency 1GHz,        | <p><math>\leq</math>(0.25 Hz <math>\times</math> N) p-p, nominal value within 20 ms</p> <p>N is frequency multiplication times of LO</p>  |

|   |   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
|---|---|---------|-------------|---------|--------------|---------|-------------|---------|-------------|---------|-------------|---------|------------|---------|---------------|---------|------------|---------------------------------|-----------------|
| Resolution<br>Bandwidth<br>10Hz, Video<br>Bandwidth<br>10 Hz)   |   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| Displayed<br>Average Noise<br>Level (the Input<br>End is<br>Connected to<br>Match Load,<br>Sampling or<br>Average Wave<br>Detection. The<br>Average Type is<br>Logarithm, 0dB<br>Input<br>Attenuation, RF<br>Gain Takes the<br>DANL as the<br>Priority, 20°C ~<br>30°C) | <table> <tr> <td>-153dBm</td> <td>10MHz~1GHz</td> </tr> <tr> <td>-151dBm</td> <td>1GHz~2GHz</td> </tr> <tr> <td>-150dBm</td> <td>2GHz~3GHz</td> </tr> <tr> <td>-148dBm</td> <td>3GHz~3.6GHz</td> </tr> <tr> <td>-145dBm</td> <td>3.6GHz~4GHz</td> </tr> <tr> <td>-148dBm</td> <td>4GHz~5GHz</td> </tr> <tr> <td>-150dBm</td> <td>5GHz~9GHz</td> </tr> <tr> <td>-146dBm</td> <td>9GHz~18GHz</td> </tr> <tr> <td>-141dBm</td> <td>18GHz~26.5GHz</td> </tr> </table>   | -153dBm | 10MHz~1GHz  | -151dBm | 1GHz~2GHz    | -150dBm | 2GHz~3GHz   | -148dBm | 3GHz~3.6GHz | -145dBm | 3.6GHz~4GHz | -148dBm | 4GHz~5GHz  | -150dBm | 5GHz~9GHz     | -146dBm | 9GHz~18GHz | -141dBm                         | 18GHz~26.5GHz   |
| -153dBm   | 10MHz~1GHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -151dBm   | 1GHz~2GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -150dBm   | 2GHz~3GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -148dBm   | 3GHz~3.6GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -145dBm   | 3.6GHz~4GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -148dBm   | 4GHz~5GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -150dBm   | 5GHz~9GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -146dBm   | 9GHz~18GHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -141dBm   | 18GHz~26.5GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| Frequency<br>Response &<br>Absolute<br>Amplitude<br>Accuracy<br>(10dB<br>Attenuation,<br>20°C ~ 30°C)   | <p>Frequency response:</p> <table> <tr> <td>±1.0dB</td> <td>3Hz~20MHz</td> </tr> <tr> <td>±1.0dB</td> <td>20MHz~2GHz</td> </tr> <tr> <td>±1.0dB</td> <td>2Hz~3.6GHz</td> </tr> <tr> <td>±1.2dB</td> <td>3.6GHz~4GHz</td> </tr> <tr> <td>±1.5dB</td> <td>4GHz~9GHz</td> </tr> <tr> <td>±2.0dB</td> <td>9GHz~18GHz</td> </tr> <tr> <td>±3.0dB</td> <td>18GHz~26.5GHz</td> </tr> </table> <p>Absolute amplitude accuracy 10 dB Attenuation, 20°C ~ 30°C, 1 Hz ≤ Resolution bandwidth ≤ 1 MHz, Input signal-10 ~ -50 dBm) :</p> <table> <tr> <td>±0.24dB</td> <td>500MHz</td> </tr> <tr> <td>± (0.24dB + Frequency response)</td> <td>All frequencies</td> </tr> </table> | ±1.0dB  | 3Hz~20MHz   | ±1.0dB  | 20MHz~2GHz   | ±1.0dB  | 2Hz~3.6GHz  | ±1.2dB  | 3.6GHz~4GHz | ±1.5dB  | 4GHz~9GHz   | ±2.0dB  | 9GHz~18GHz | ±3.0dB  | 18GHz~26.5GHz | ±0.24dB | 500MHz     | ± (0.24dB + Frequency response) | All frequencies |
| ±1.0dB  | 3Hz~20MHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±1.0dB  | 20MHz~2GHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±1.0dB  | 2Hz~3.6GHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±1.2dB  | 3.6GHz~4GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±1.5dB  | 4GHz~9GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±2.0dB  | 9GHz~18GHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±3.0dB  | 18GHz~26.5GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ±0.24dB   | 500MHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| ± (0.24dB + Frequency response)   | All frequencies   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| 1dB gain<br>Compression<br>(Mixer Level,  | <table> <tr> <td>-3dBm</td> <td>20MHz~40MHz</td> </tr> <tr> <td>0dBm</td> <td>40MHz~200MHz</td> </tr> <tr> <td>+1dBm</td> <td>200MHz~4GHz</td> </tr> </table>   | -3dBm   | 20MHz~40MHz | 0dBm    | 40MHz~200MHz | +1dBm   | 200MHz~4GHz |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| -3dBm   | 20MHz~40MHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| 0dBm  | 40MHz~200MHz  |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |
| +1dBm   | 200MHz~4GHz   |         |             |         |              |         |             |         |             |         |             |         |            |         |               |         |            |                                 |                 |

|   |  |
|---|--|
| Dual-Tone Testing, Resolution Bandwidth of 5kHz, Frequency Interval of 3MHz, 20°C ~ 30°C)                           | - 1dBm      4GHz~9GHz<br>0dBm      9GHz~26.5GHz  |
| Tri-Order Intermodulation Distortion (TOI) (Input mixer 2 -10dBm signals, Frequency Interval is 50kHz, 20°C ~ 30°C) | +12dBm      10MHz ~ 200MHz<br>+12dBm      200MHz~ 4GHz<br>+10dBm      4GHz ~ 9GHz<br>+12dBm      9GHz ~ 18GHz<br>+13dBm      18GHz ~ 26.5GHz |
| Residual Response (The Input End is Connected to Match Load, 0dB Attenuation)                                       | -100dBm      200kHz~9GHz<br>-100dBm (nominal)      Other frequencies   |
| Size  | W×H×D= 510mm×192mm×534mm (with handles, foot-pads, stand)<br>W×H×D= 426mm×177mm×460mm (without handles, foot-pads, stand)                    |
| Weight  | Approx. 25kg (different options, different weight)   |
| Power   | Standard: AC 220~240V: 50~60Hz<br>4051-H98: AC 100~240V: 50~60Hz   |
| Power Consumption   | Standby: less than 20W; operating: less than 400W  |
| Temperature Range   | Operating temperature: 0°C ~ +50°C ; Storage temperature: -40°C ~ +70°C  |

|                 |   |
|-----------------|---|
| Input Connector | 4051A-S/4051B-S /4051C-S /4051D-S: type N (F), Impedance 50Ω<br>4051E-S: 3.5mm (M), Impedance 50Ω |
|-----------------|---|

Notes:

1. Nominal value refers to the estimated performance, or the performance which is useful for the product beyond the quality guarantee scope.
2. Typical value refers to other performance information when typical values stay beyond the quality guarantee scope. When performance surpasses technical specifications, 80% of samples will present 95% confidence within 20°C ~ 30°C temperature range. Typical performance excludes test uncertainty.

### Ordering Information

|                   |         |                   |             |
|-------------------|---------|-------------------|-------------|
| <b>Main Unit:</b> | 4051A-S | Spectrum Analyzer | 3Hz~4GHz    |
|                   | 4051B-S | Spectrum Analyzer | 3Hz~9GHz    |
|                   | 4051C-S | Spectrum Analyzer | 3Hz~13.2GHz |
|                   | 4051D-S | Spectrum Analyzer | 3Hz~18GHz   |
|                   | 4051E-S | Spectrum Analyzer | 3Hz~26.5GHz |

### Standard Package

| No. | Description        | Remarks                       |
|-----|--------------------|-------------------------------|
| 1   | Power Cord         | Standard tri-prong power cord |
| 2   | USB Mouse          | --                            |
| 3   | User Manual        | --                            |
| 4   | Programming Manual | --                            |

### Options

| No.   | Description            | Functions  |
|---|------------------------|--|
| 4051-H03  | IF Output              | Output third IF signal, output frequency range is 10MHz ~ 160MHz, step resolution is 1Hz.  |
| 4051-H08  | Wide Log Detect Output | To output the logarithm wave-detection signal which can reflect the input signal level characteristics.  |
| 4051-H34-04<br>4051-H34-09<br>4051-H34-13<br>4051-H34-18<br>4051-H34-26 | Low-Noise Preampfier   | Can select low waveband preamplifier or full waveband preamplifier. Under full waveband preamplifier, the analyzer provide above 4GHz frequency band noise optimization path. (Note: the No. of low waveband preamplifier is H34-04. The full waveband preamplifier should be selected according to the frequency upper limit of the main unit. For instance, the max. frequency of 4051E-S is 26.5GHz, then |



|          |                              |  |
|----------|------------------------------|--|
|          |                              | the full waveband preamplifier H34-26 should be selected).   |
| 4051-S04 | Phase Noise Measurement      | SSB phase noise curves and single-point phase noise measurement.   |
| 4051-H97 | Mounting Suit                | Handles and accessories for 4051 mounting on standard racks.   |
| 4051-H98 | English Options              | English panels, user manual, operation interface, and operation system. Power supply: AC 100~240V: 50~60Hz.    |
| 4051-H99 | Aluminum Transportation Case | High-strength lightweight aluminum transportation case, with handle and roller, convenient for transportation. |



**Focus on Measurement  
Explore the Future**

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