



S3502 Series Spectrum Analyzer

Datasheet



Saluki Technology Inc.

The document applies to the spectrum analyzer of the following models:

- S3502D Spectrum Analyzer (9kHz - 20GHz).
- S3502E Spectrum Analyzer (9kHz - 26.5GHz).
- S3502F Spectrum Analyzer (9kHz - 32GHz).
- S3502G Spectrum Analyzer (9kHz - 44GHz).

Standard pack and accessories:

| No. | Item |
|-----|--------------------------------|
| 1 | Main machine |
| 2 | Standard three-core power line |
| 3 | USB programmable cable |

Options of the S3502 series spectrum analyzer in addition to standard accessories:

| Model No. | Name | Description |
|-----------|---------------------------------------|---|
| S3502-H01 | Tracking generator option | Provide the independent, tracking source scanning method |
| S3502-003 | User manual | \ |
| S3502-005 | Programming manual | \ |
| S3502-006 | Purple Cat5e cable | Point to point, 2 meters |
| S3502-007 | GPS antenna | GPS external antenna |
| S3502-008 | USB power meter option | Provide USB power meter function (Need USB power probe:009/010/011/012) |
| S3502-009 | 87230 USB continuous wave power probe | 9kHz - 6GHz power probe |
| S3502-010 | 87231 USB continuous wave power probe | 10MHz - 18GHz power probe |
| S3502-011 | 87232 USB continuous wave power probe | 50MHz - 26.5GHz power probe |
| S3502-012 | 87233 USB continuous wave power probe | 50MHz - 40GHz power probe |
| S3502-013 | Interference analyzer option | Provide spectrogram, RSSI measurement etc. functions |
| S3502-014 | AM/FM/PM analyzer option | To realize modulation characteristics analysis of AM/FM/PM signals |
| S3502-015 | Channel scanner option | To realize signal power measurement of multiple channels and frequency |

| Model No. | Name | Description |
|-----------|-------------------------|---|
| S3502-016 | List sweep option | To realize continuous sweep measurement of various frequency bands |
| S3502-017 | Field strength option | Realize the field strength of the dot frequency, frequency scan and list scan |
| S3502-018 | Zero span IF output | Output the third or fourth IF signal (Choose one of two) |
| S3502-019 | 89101A antenna | Frequency range: 10kHz - 20MHz (Needs option 023) |
| S3502-020 | 89101B antenna | Frequency range: 20MHz - 200MHz (Needs option 023) |
| S3502-021 | 89101C antenna | Frequency range: 200MHz - 500MHz (Needs option 023) |
| S3502-022 | 89101D antenna | Frequency range: 500MHz - 4GHz (Needs option 023) |
| S3502-023 | 89401 antenna amplifier | Frequency range: 10kHz - 4GHz, Type-N (f) (Needs option 019/020/021/022) |
| S3502-024 | 89901 antenna | Frequency range: 1GHz - 18GHz, Type-N (f) |
| S3502-025 | 89902 antenna | Frequency range: 18GHz - 40GHz, 2.92mm (f) |

Preface

Thank you for choosing S3502 spectrum analyzer produced by Saluki Technology Inc.

We devote ourselves to meeting your demands, providing you high-quality measuring instrument and the best after-sales service. We persist with “superior quality and considerate service”, and are committed to offering satisfactory products and service for our clients.

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Document Authorization

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Product Quality Assurance

The warranty period of the product is 3 years from the date of delivery. The instrument manufacturer will repair or replace damaged parts according to the actual situation within the warranty period.

Product Quality Certificate

The product meets the indicator requirements of the document at the time of delivery. Calibration and measurement are completed by the measuring organization with qualifications specified by the state, and relevant data are provided for reference.

Quality/Settings Management

Research, development, manufacturing and testing of the product comply with the requirements of the quality and environmental management system.

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1. Overview

Saluki S3502 series 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 S3502 series spectrum analyzer series currently consists of four types of products. The full spectrum of the product is equipped with a preamplifier, so that it has very high receiving sensitivity at any frequency point. 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.

1. 1. Definitions

Specification (Spec.)

Specifications describe the performance of parameters within the warranty of the instrument. Product specifications applies under the following conditions:

- 1) Two hours storage at ambient temperature(0-40°C) followed by 30 minutes warm-up operation
- 2) Specified environmental conditions met
- 3) Instrument is within its calibration cycle.
- 4) The specification listed in the datasheet includes measurement uncertainties.

Data in this document are Spec. unless otherwise noted.

Typical (typ.)

Typical data is not guaranteed by instrument warranty. It describes additional product performance information that 80 percent of the units exhibit. Typical data only valid at 25°C. Typical performance does not include measurement uncertainty.

Nominal(nom.)

Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but are not covered by the product warranty.

2. Specifications

2. 1. Frequency & Sweep

2. 1. 1. Frequency Range

| Model | Frequency Range |
|--------|-----------------|
| S3502D | 9kHz - 20GHz |
| S3502E | 9kHz - 26.5GHz |
| S3502F | 9kHz - 32GHz |
| S3502G | 9kHz - 44GHz |

2. 1. 2. Frequency Reference

| | |
|------------------------------|---|
| Tuning Resolution | 1Hz |
| Nominal frequency | 10MHz |
| Frequency reference error | (Last calibration date × 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 $25 \pm 5^\circ\text{C}$) |
| Initial calibration accuracy | $\pm 3 \times 10^{-7}$ |

2. 1. 3. Frequency Readout Accuracy

| | |
|----------|---|
| Accuracy | \pm (frequency reading × frequency reference error + 2% × sweep width + 10% × resolution bandwidth) |
|----------|---|

2. 1. 4. Frequency Span

| | |
|----------|-------------------------------|
| Range | 10 μ s - 600s (zero span) |
| Accuracy | $\pm 2.00\%$ (zero span) |

2. 1. 5. RBW & VBW

| | |
|--|--|
| RBW | 1Hz - 10MHz (step by 1-3) |
| RBW Accuracy | 1kHz - 3MHz: $\pm 10\%$, 10MHz: $\pm 20\%$ |
| VBW | 1Hz - 10MHz (1-3 times step) |
| Resolution Bandwidth Change to Uncertainty | $\pm 1.20\text{dB}$ 1Hz - 10MHz (take 100kHz RBW as a reference) |

2. 2. Amplitude

2. 2. 1. Absolute Amplitude Accuracy

Specifications in this section apply to following settings

- RBW: 10MHz - 40GHz
- Input level: -10 to -50dBm
- Auto couple
- Any reference level
- Any scale
- 20° C - 30° C

| | |
|---------------|--------|
| 10MHz - 13GHz | ±1.8dB |
| 13GHz - 40GHz | ±2.3dB |

2. 2. 2. Maximum Safe Input Level

| | |
|-------------------|---------------|
| ≥10dB attenuation | +30dBm (typ.) |
| <10dB attenuation | +23dBm (typ.) |
| Preamplifier On | +13dBm (typ.) |

2. 2. 3. Display 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 |

2. 2. 4. Input Attenuator

| | |
|------------------|--|
| Input Attenuator | Scope of attenuation 0dB~50dB, 10dB step Conversion uncertainty: ± 1.20dB |
|------------------|--|

2. 2. 5. Reference Level

| | |
|------------------|---|
| Range | Logarithmic scale -120dBm to +30dBm, 1dB step |
| Linear scale | 22.36μV - 7.07V, 0.1% step |
| Conversion error | ±1.20dB (reference level 0dBm to -60dBm) |

2. 2. 6. Display 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 | ± 1.00 dB |

2. 2. 7. Trace Detector

| | |
|-----------------------|--|
| Detection Mode | Normal, Peak, Neg Peak, Sample, Average, RMS |
|-----------------------|--|

2. 3. Dynamic Range Specifications

2. 3. 1. 1dB Gain Compression

- **Settings:** 2 tones, 10MHz signal spacing, 20°C - 30°C

| Frequency Range | Specification |
|-----------------|---------------|
| 50MHz - 4GHz | ≥-2dBm |
| 4GHz - 13GHz | ≥-3dBm |
| 13GHz - 44GHz | ≥-3dBm |

2. 3. 2. DANL

- **Settings:** 50ohm load, 0dB input attenuation, average detector mode, logarithmic Video Type, RBW normalization to 1Hz, 20°C - 30°C

| Frequency Range | Pre-amplifier Off | Pre-amplifier On |
|-----------------|-------------------|------------------|
| 10MHz - 20GHz | ≤-138dBm | ≤-157dBm |
| 20GHz - 32GHz | ≤-135dBm | ≤-154dBm |
| 32GHz - 40GHz | ≤-127dBm | ≤-148dBm |
| 40GHz - 44GHz | ≤-120dBm | ≤-140dBm |

2. 4. Residues, Phase Noise, Harmonics, TOI

2. 4. 1. Residual Response

- **Settings:** RF input match, 0dB attenuation (exceptional frequency: 3.2GHz)
- **Pre-amplifier On**

| Frequency Range | Specification |
|-----------------|---------------|
| 10MHz - 32GHz | ≤-100dBm |
| 32GHz - 44GHz | ≤-95dBm |

- **Pre-amplifier Off**

| Frequency Range | Specification |
|-----------------|---------------|
|-----------------|---------------|

| | |
|---------------|---------|
| 10MHz - 13GHz | ≤-90dBm |
| 13GHz - 20GHz | ≤-85dBm |
| 20GHz - 44GHz | ≤-80dBm |

2. 4. 2. Single-sideband Phase Noise

- **Settings:** Carrier wave 1GHz, 20°C-30°C

| Frequency Offset | Specification |
|------------------|---------------|
| 10kHz offset | ≤-102dBc/Hz |
| 100kHz offset | ≤-106dBc/Hz |
| 1MHz offset | ≤-111dBc/Hz |
| 10MHz offset | ≤-123dBc/Hz |

2. 4. 3. Second Harmonic Distortion

- **Settings:** attenuation 0dB; input level: -30dBm

| | |
|-----------------------------------|---------|
| Second Harmonic Distortion | <-60dBc |
|-----------------------------------|---------|

2. 4. 4. Third Order Intermodulation Distortion

- **Settings:** two tones, -25dBm, 100kHz tone spacing, 20°C - 30°C; pre-amplifier off.

| Frequency Range | Specification |
|-----------------|---------------|
| 50MHz - 4GHz | ≥+7dBm |
| 4GHz - 13GHz | ≥+6dBm |
| 13GHz - 44GHz | ≥+6dBm |

2. 5. Interfaces

| Interface Description | Interface Type | |
|--------------------------|-------------------------------|----------------------|
| Test Port | S3502D/E | N-type (f) |
| | S3502F/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 |

| Interface Description | Interface Type |
|-----------------------|----------------------|
| Other Interfaces | LAN, USB, VGA output |

2. 6. General

| | |
|-------------------------------|--|
| Size (W×H×D) | 430mm×270mm×180mm (excluding the handle and foot) 430mm×360mm×180mm (including the handle and foot) |
| Weight | ≤12kg |
| Power Supply | AC 220/240V; 50/60Hz |
| Power Consumption | <60W (working state) |
| Operating Temperature | 0°C to +50°C |
| Storage Temperature | -40°C to +70°C |
| Electromagnetic Compatibility | Conforms to GJB3947A-2009 3.9.1 Requirements |

2. 7. Compliant

2. 7. 1. CE



- EMC

Complies with the requirements of the **EC EMC** directives.

Test Standards:EN 61326

- Safety

Complies with **EC LVD** Directive.

Test Standard:EN61010-1

2. 7. 2. ISO



- Manufacturing

This instrument is manufactured in an ISO-9001 registered facility