S3602A/B Vector Network Analyzer

Datasheet

Saluki Technology Inc.

The document applies to the vector network analyzers of the following models:

- S3602A vector network analyzer (10MHz-13.5GHz).
- S3602B vector network analyzer (10MHz-26.5GHz).

Options of the S3602 series vector network analyzer in addition to standard accessories:

- S3602A:

Part No.	Name	Description
S3602A-201	2-ports, single source, with extended power range	The 2-ports test set with extended power range comes with a configurable test set, source and receiver attenuators at each port.. The source attenuators are 70 dB and the receiver attenuators are 35 dB.
S3602A-400	4-ports, dual source, base configuration	The 4-port configurable test set comes with two internal sources.
S3602A-401	4-ports, dual source, with extended power range (Need option 400)	The 4-ports test set with extended power range comes with a configurable test set, source and receiver attenuators at each port. The source attenuators are 70 dB and the receiver attenuators are 35 dB. (Option 400 required)
S3602B-402	Inter-modulation distortion application	Enable S3602 to set up and calibrate swept-IMD measurements of both amplifiers and frequency converters. (Option 400 required, for converter measurement Option S82 or S83 is required))
S3602A-008	Pulsed RF Measurements	Applicable for S Parameter Measurement under pulse conditions
S3602A-S10	Time Domain Measurement	Able to recognize and analyze the discontinuous location of the network, cable or fixture.
S3602A-S80	Frequency offset measurements	Applicable for frequency offset measurement, necessary for millimeter extenders.
S3602A-S82	Scalar calibrated converter measurements (Need Option 400)	Enable S3602 for the converter scalar measurement (Option 400 required). Converter scalar measurement needs power sensor/power meter. Power sensor/power meter is not covered in this option
S3602A-S83	Vector calibrated converter measurements (Need Option 400)	Enable S3602 for the converter vector/scalar measurement (Option 400 required). Converter vector measurement needs calibration and reference mixers. They are not covered in this option.Converter scalar measurement needs power sensor/power meter. Power sensor/power meter is not covered in this option
S3602A-S84	Embedded LO measurements (Need Option 400)	Enable S3602 for the embedded LO frequency converter measurement (Option 400 required)
S3602A-S86	Gain compression application	Enable S3602 for the gain compression measurement of amplifier
SAV31121	3.5mm Calibration kit	Applicable for Whole-Machine Calibration

Part No.	Name	Description
FB0HA0HB025.0	3.5mm Test Cable (Male DUT end)	Applicable for Whole-Machine Measurement
FB0HA0HC025.0	3.5mm Test Cable (Female DUT end)	Applicable for Whole-Machine Measurement
SAV20403	Electronic Calibration kit	Applicable for Whole-Machine Calibration (10MHz-26.5GHz 2-port)
SAV20405	Electronic Calibration kit	Applicable for Whole Machine Calibration (10MHz-20GHz 4-port)

- S3602B

Part No.	Name	Description
S3602B-201	2-ports, single source, with extended power range	The 2-ports test set with extended power range comes with a configurable test set, source and receiver attenuators at each port. The source attenuators are 70 dB and the receiver attenuators are 35 dB.
S3602B-400	4-ports, dual source, base configuration	The 4-port configurable test set comes with two internal sources, twelve front-panel access loops.
S3602B-401	4-ports, dual source, with extended power range	The 4-ports test set with extended power range comes with a configurable test set, source and receiver attenuators at each port. The source attenuators are 70 dB and the receiver attenuators are 35 dB. (Option 400 required)
S3602B-402	Inter-modulation distortion application (Need Option 400)	Enable S3602 to set up and calibrate swept-IMD measurements of both amplifiers and frequency converters. (Option 400 required)
S3602B-008	Pulsed RF Measurements	Applicable for S Parameter Measurement under pulse circumstance
S3602B-S10	Time Domain Measurement	Able to recognize and analyze the discontinuous location of instrument, cable or fixture.
S3602B-S80	Frequency offset measurements	Applicable for frequency offset measurement, necessary for millimeter extenders.
S3602B-S82	Scalar calibrated converter measurements (Need Option 400)	Enable S3602 for the converter scalar measurement (Option 400 required). Converter scalar measurement needs power sensor/power meter. Power sensor/power meter is not covered in this option
S3602B-S83	Vector calibrated converter measurements (Need Option 400)	Enable S3602 for the converter vector/scalar measurement (Option 400 required). Converter vector measurement needs calibration and reference mixers. They are not covered in this option. Converter scalar measurement needs power sensor/power meter. Power sensor/power meter is not covered in this option
S3602B-S84	Embedded LO measurements (Need Option 400)	Enable S3602 for the embedded LO frequency converter measurement (Option 400 required)
S3602B-S86	Gain compression application	Enable S3602 for the gain compression measurement of amplifier

Part No.	Name	Description
SAV31121	3.5mm Calibration kit	Applicable for Whole-Machine Calibration
FB0HA0HB025.0	3.5mm Test Cable (Male DUT end)	Applicable for Whole-Machine Measurement
FB0HA0HC025.0	3.5mm Test Cable (Female DUT end)	Applicable for Whole-Machine Measurement
SAV20403	Electronic Calibration kit	Applicable for Whole-Machine Calibration (10MHz-26.5GHz 2-port)
SAV20405	Electronic Calibration kit	Applicable for Whole Machine Calibration (10MHz-20GHz 4-port)

Preface

Thanks for choosing S3602 vector network 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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Saluki Technology

Document Authorization

The information contained in this document is subject to change without notice. The power to interpret the contents of and terms used in this document rests with Saluki.

Product Quality Assurance

The warranty period of the product is 36 months 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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Content

1. Overview

S3602 Series VNA is a top level VNA with excellent specifications. Its frequency ranges from 10MHz to 67GHz. With Saluki frequency extension modules, S3602 can reaches 325GHz. S3602 has a wide dynamic range, low trace noise, flexible interfaces and friendly UI.

S3602 series VNA can be universally implemented in fields including transmission/reception module measurement, dielectric material property measurement and microwave pulse characteristic measurement; It is a necessary instrument in the scientific research, production process of systems like radar, communication and navigation.

This document will show technical specifications of S3602A (10MHz - 13.5GHz) and S3602B (10MHz - 26.5GHz).

Definitions

Instrument specifications listed in this datasheet applies to all different configurations S3602 VNA unless options are clearly noted.

Specification (Spec.)

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

- 90 min warming up
- Environmental temperature of 25℃ (± 5℃) with less than 1℃ deviation from the calibration temperature
- Specifications include 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℃. 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.

Calibration Kit and Ecal Modules

Corrected system in this document is calibrated with following calibration kit:

- SAV31121 3.5mm Mechanical Calibration Kit
- SAV20403 Ecal kit (10MHz - 26.5GHz, 2 port)

2. Specifications

2. 1. Frequency

Frequency Range	S3602A: 10MHz - 13.5GHz
	S3602B: 10MHz - 26.5GHz
Frequency Resolution	1Hz
Frequency Accuracy	$\pm 1\times10^{-7}$（23℃±3℃）

2. 2. Test Port Specification

2. 2. 1. Maximum Output Power

- 2-port configuration (Standard), signal source
  - Specification

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥+1dBm	≥+9dBm	≥+13dBm
0.05GHz - 4GHz	≥0dBm	≥+6dBm	≥+13dBm
4GHz - 10GHz	≥+13dBm		≥+10dBm
10GHz - 13.5GHz	≥+8dBm		≥+9dBm
13.5GHz - 20GHz	≥+6dBm		≥+6dBm
20GHz - 26.5GHz	≥+4dBm		≥+2dBm

  - Typical

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+16dBm	≥+16dBm
0.05GHz - 4GHz	-	≥+11dBm	≥+16dBm
4GHz - 10GHz	≥+16dBm		≥+16dBm
10GHz - 13.5GHz	≥+14dBm		≥+15dBm
13.5GHz - 20GHz	≥+11dBm		≥+13dBm
20GHz - 26.5GHz	≥+9dBm		≥+8dBm

- 2-port configuration (Option 201), signal source
  - Specification

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥+1dBm	≥+9dBm	≥+13dBm
0.05GHz - 4GHz	≥0dBm	≥+6dBm	≥+13dBm
4GHz - 10GHz	≥+13dBm		≥+10dBm
10GHz - 13.5GHz	≥+8dBm		≥+9dBm
13.5GHz - 20GHz	≥+6dBm		≥+6dBm
20GHz - 26.5GHz	≥+2dBm		≥+0dBm

  - Typical

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+15dBm	≥+15dBm
0.05GHz - 4GHz	-	≥+10dBm	≥+15dBm
4GHz - 10GHz	≥+15dBm		≥+15dBm
10GHz - 13.5GHz	≥+13dBm		≥+14dBm
13.5GHz - 20GHz	≥+10dBm		≥+12dBm
20GHz - 26.5GHz	≥+8dBm		≥+7dBm

- 4-port configuration (Option 400), 2 sources
  - Specification

Frequency	Port 1,3		Port 2,4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥+1dBm	≥+9dBm	≥+13dBm
0.05GHz - 4GHz	≥0dBm	≥+6dBm	≥+13dBm
4GHz - 10GHz	≥+13dBm		≥+10dBm
10GHz - 13.5GHz	≥+8dBm		≥+9dBm
13.5GHz - 20GHz	≥+6dBm		≥+6dBm
20GHz - 26.5GHz	≥+4dBm		≥+2dBm

- Typical

Frequency	Port 1,3		Port 2,4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+16dBm	≥+16dBm
0.05GHz - 4GHz	-	≥+11dBm	≥+16dBm
4GHz - 10GHz	≥+16dBm		≥+16dBm
10GHz - 13.5GHz	≥+14dBm		≥+15dBm
13.5GHz - 20GHz	≥+11dBm		≥+13dBm
20GHz - 26.5GHz	≥+9dBm		≥+8dBm

- 4-port configuration (Option 401, 402), 2 sources
  - Specification

Frequency	Port 1,3		Port 2,4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥+1dBm	≥+9dBm	≥+13dBm
0.05GHz - 1GHz	≥0dBm	≥+6dBm	≥+13dBm
4GHz - 10GHz	≥+13dBm		≥+10dBm
10GHz - 13.5GHz	≥+8dBm		≥+8dBm
13.5GHz - 20GHz	≥+6dBm		≥+6dBm
20GHz - 26.5GHz	≥+2dBm		≥+0dBm

  - Typical

Frequency	Port 1,3		Port 2,4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+15dBm	≥+15dBm
0.05GHz - 4GHz	-	≥+10dBm	≥+15dBm
4GHz - 10GHz	≥+15dBm		≥+15dBm
10GHz - 13.5GHz	≥+13dBm		≥+14dBm
13.5GHz - 20GHz	≥+10dBm		≥+12dBm
20GHz - 26.5GHz	≥+8dBm		≥+7dBm

2. 2. 2. Output Power Setting Range

Standard/Option 400	-25dBm - +20dBm
With Attenuator (Option 201,401)	-85dBm - +20dBm

2. 2. 3. Stable Minimum Output Power

Without Attenuator	-25dBm (Typ.)
With Attenuator (Option 201,401)	-85dBm (Typ.)

2. 2. 4. Power Resolution

Power Resolution	0.01dB

2. 2. 5. Temperature Stability

Temperature Stability	0.06dB/℃

2. 2. 6. Power Accuracy

10MHz≤f≤13.5GHz	±1.5dB
13.5GHz<f≤26.5GHz	±2.0dB

2. 2. 7. Port Damage Level

Damage Level	+28dBm, +30V DC

2. 2. 8. Power Sweep Range

Frequency	Spec.	Typ.
10MHz - 500MHz	≥33dB	≥40dB
0.5GHz - 4GHz	≥32dB	≥37dB
4GHz - 10GHz	≥38dB	≥42dB
10GHz - 13.5GHz	≥37dB	≥41dB
13.5GHz - 20GHz	≥35dB	≥38dB
20GHz - 26.5GHz	≥25dB	≥35dB

2. 2. 9. 1dB Compression Point

Frequency range	Spec (dBm)
10MHz - 13.5GHz	≥+10dBm
13.5GHz - 16GHz	≥+10 dBm
16GHz - 26.5GHz	≥+2 dBm

2. 2. 10. Power Linearity

Power Linearity (23℃±3℃)	±2.0dB

2. 2. 11. Port Harmonics Suppression

- 2-port configuration (Standard, Option 201)

	Frequency	Spec
Port 1 Harmonic Suppression	0.01GHz - 4GHz	≤-51dBc
	4GHz - 13.5GHz	≤-60dBc
	13.5GHz - 26.5GHz	≤-60dBc
Port 2 Harmonic Suppression	0.01GHz - 4GHz	≤-13dBc
	4GHz - 13.5GHz	≤-21dBc
	13.5GHz - 26.5GHz	≤-21dBc
Port non-harmonic Suppression	0.01GHz - 13.5GHz	≤-40dBc
	13.5GHz - 16GHz	≤-40dBc
	16GHz - 26.5GHz	≤-30dBc

- 4-port configuration (Option 400, Option 401)

	Frequency	Spec
Port 1,3 Harmonic Suppression	0.01GHz - 4GHz	≤-51dBc
	4GHz - 13.5GHz	≤-60dBc
	13.5GHz - 26.5GHz	≤-60dBc
Port 2,4 Harmonic Suppression	0.01GHz - 4GHz	≤-13dBc
	4GHz - 13.5GHz	≤-21dBc
	13.5GHz - 26.5GHz	≤-21dBc
Port non-harmonic Suppression	0.01GHz - 13.5GHz	≤-40dBc
	13.5GHz - 16GHz	≤-40dBc
	16GHz - 26.5GHz	≤-30dBc

2. 3. Network Specifications

2. 3. 1. System Dynamic Range

- IF bandwidth = 1Hz
- Averaging factor = 8

Frequency range	Spec.(dB)	Typ. (dB)
10MHz – 500MHz	≥95dB	≥100dB
500MHz – 1GHz	≥110dB	≥120dB
1GHz - 4GHz	≥127dB	≥135dB
4GHz - 10GHz	≥130dB	≥135dB
10GHz - 20GHz	≥126dB	≥132dB
20GHz - 24GHz	≥122dB	≥129dB
24GHz - 26.5GHz	≥117dB	≥125dB

2. 3. 2. Noise Floor

Frequency range	Spec (dBm)
10MHz - 1GHz	≤ -85dBm
1GHz - 4GHz	≤ -117dBm
4GHz - 10GHz	≤ -120dBm
10GHz - 13.5GHz	≤ -118dBm
13.5GHz - 20GHz	≤ -120dBm
20GHz - 24GHz	≤ -118dBm
24GHz - 26.5GHz	≤ -117dBm

2. 3. 3. Corrected System Performance

Measurement environmental temperature 23° ±3 °C, with < 1 °C deviation from calibration temperature.

Following test cables are used in this test:

FB0HA0HB025.0	3.5mm Test Cable (Male DUT end)	Applicable for Whole-Machine Measurement
FB0HA0HC025.0	3.5mm Test Cable (Female DUT end)	Applicable for Whole-Machine Measurement

- Mechanical Calibration Kit SAV 31121.

	Frequency	Spec.	Typ.
Effective Directivity	0.01 GHz - 2GHz	≥48dB	≥60dB
	2 GHz - 13.5GHz	≥44dB	≥53dB
	13.5 GHz - 26.5GHz	≥44dB	≥53dB

	Frequency	Spec.	Typ.
Effective Source Match	0.01 GHz - 2GHz	≥40dB	≥46dB
	2 GHz - 13.5GHz	≥30dB	≥36dB
	13.5 GHz - 26.5GHz	≥30dB	≥36dB
Effective Load Match	0.01 GHz - 2GHz	≥48dB	≥60dB
	2 GHz - 13.5GHz	≥44dB	≥51dB
	13.5 GHz - 26.5GHz	≥44dB	≥51dB
Reflection Tracking	0.01 GHz - 2GHz	±0.04dB	±0.004dB
	2 GHz - 13.5GHz	±0.04dB	±0.01dB
	13.5 GHz - 26.5GHz	±0.05dB	±0.01dB
Transmission Tracking	0.01GHz - 2GHz	±0.10dB	±0.005dB
	2 GHz - 13.5GHz	±0.11dB	±0.015dB
	13.5 GHz - 26.5GHz	±0.12dB	±0.015dB

- E-Cal Kit SAV 20403 (2-port)

	10MHz-500MHz	500MHz-2GHz	2GHz - 10GHz	10GHz - 20GHz	20GHz - 26.5GHz
Effective Directivity	≥41dB	≥51dB	≥46dB	≥42dB	≥38dB
Effective Source Match	≥35dB	≥41dB	≥38dB	≥37dB	≥33dB
Effective Load Match	≥38dB	≥38dB	≥45dB	≥40dB	≥36dB
Reflection Tracking	±0.07dB	±0.08dB	±0.08dB	±0.1dB	±0.14dB
Transmission Tracking	±0.05dB	±0.05dB	±0.08dB	±0.12dB	±0.13dB

- E-Cal kit SAV 20405(4-port)

	10MHz-500MHz	500MHz-2GHz	2GHz - 10GHz	10GHz - 20GHz
Effective Directivity	≥47dB	≥47dB	≥42dB	≥38dB
Effective Source Match	≥38dB	≥33dB	≥33dB	≥31dB
Effective Load Match	≥40dB	≥40dB	≥38dB	≥36dB
Reflection Tracking	±0.05dB	±0.06dB	±0.08dB	±0.18dB
Transmission Tracking	±0.08dB	±0.12dB	±0.12dB	±0.2dB

2. 3. 4. Trace Noise

	Frequency range	Spec (dB rms)
Trace Noise Magnitude 1KHz IF bandwidth	10MHz - 100MHz	≤ 0.007
	0.1GHz - 13.5GHz	≤ 0.002
	13.5GHz - 22.5GHz	≤ 0.002
	22.5GHz - 24GHz	≤ 0.003
	24GHz - 26.5GHz	≤ 0.005
	Frequency range	Spec (deg rms)
Trace Noise Phase 1KHz IF bandwidth	10MHz - 100MHz	≤ 0.051
	0.1GHz - 13.5GHz	≤ 0.015
	13.5GHz - 22.5GHz	≤ 0.042
	22.5GHz - 24GHz	≤ 0.054
	24GHz - 26.5GHz	≤ 0.054

2. 4. Pulse Specifications

Pulse Width Setting Range	33ns - 60s	
Pulse transition time （10% - 90%）	30ns	
Pulse off ratio	Frequency range	Spec (dB)
	0.01GHz - 4GHz	64dB
	4GHz - 13.5GHz	80dB
	13.5GHz - 26.5GHz	80dB

2. 5. General

IF Bandwidth	1Hz - 5MHz
Max. Sweep Point per Trace	32001
Magnitude Display Resolution	0.001dB/div
Phase display Resolution	0.01°/div
Reference Level Magnitude	-500 ~ +500dB
Input Reference Phase Range	-500 ~ +500°
Port Connector Type	3.5mm (M），50 Ω impedance
Measurement of Ports	2 port Standard；4-port with option 400
Peripheral Interface	8 x USB type B, 1 x USB type A
	GPIB
	VGA
	LAN
Operating System	Windows 7
Storage Capability	160G SSD
Screen	12.1 inch high resolution touch screen
Dimension (W x H x D)	463 × 281 × 640 （W x H x D)
Power	220V±10%, 50Hz - 60Hz
Operating Temperature	0℃ - 50℃
Storage Temperature	-30℃ - 70℃
The Maximum Power Consumption	400W
Maximum Weight	42kg

2. 6. Compliant

2. 6. 1. CE

- EMC

Complies with the requirements of the EC EMC directive 2014/30/EU with amendments.

Test Standards:

EN 61326-1:2013

EN 61000-3-2:2014

EN 61000-3-3:2013

- Safety

Complies with EC LVD Directive 2014/35/EU with amendment.

Test Standard

EN61010-1:2010

2. 6. 2. ISO

- Manufacturing

This instrument is manufactured in an ISO-9001 registered facility

- End of Document -