



S3602D Vector Network Analyzer

Datasheet



Saluki Technology Inc.

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

- S3602D vector network analyzer (10MHz - 50GHz).

Options of the S3602D vector network analyzer in addition to standard accessories:

Part No.	Name	Description
S3602D-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 60 dB and the receiver attenuators are 35 dB.
S3602D-400	4-ports, dual source, base configuration	The 4-port configurable test set comes with two internal sources.
S3602D-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 60 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))
S3602D-008	Pulsed RF Measurements	Applicable for S Parameter Measurement under pulse conditions
S3602D-S10	Time Domain Measurement	Able to recognize and analyze the discontinuous location of the network, cable or fixture .
S3602D-S80	Frequency offset measurements	Applicable for frequency offset measurement, necessary for millimeter extenders.
S3602D-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
S3602D-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
S3602D-S84	Embedded LO measurements (Need Option 400)	Enable S3602 for the embedded LO frequency converter measurement (Option 400 required)
S3602D-S86	Gain compression application	Enable S3602 for the gain compression measurement of amplifier
SAV31123A	2.4mm Calibration kit	Mechanical calibration kit, applicable for Whole-Machine Calibration
FE0BN0BM025.0	2.4mm Test Cable (Male DUT end)	Applicable for Whole-Machine Measurement
FE0BN0BL025.0	2.4mm Test Cable (Female DUT end)	Applicable for Whole-Machine Measurement

Part No.	Name	Description
SAV20404	Electronic Calibration kit	E-cal kit, applicable for Whole-Machine Calibration (10MHz-50GHz, 2 port)
SCAVNA50FM-(2.4/2.4)	2.4mm Test Cable (Male DUT end)	63cm VNA test cable, applicable for Whole-Machine Measurement
SCAVNA50FF-(2.4/2.4)	2.4mm Test Cable (Female DUT end)	63cm VNA test cable, applicable for Whole-Machine Measurement

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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Document Authorization

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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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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 reach 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, microwave pulse characteristic measurement and photoelectric property measurement; It is a necessary instrument in the scientific research, production process of systems like radar, communication and navigation.

This document will introduce technical specifications of S3602D (10MHz - 50GHz).

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°C ($\pm 5^\circ\text{C}$) with less than 1°C 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°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.

Calibration Kit and Ecal Modules

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

- SAV31123A 2.4mm Mechanical Calibration Kit
- SAV20404 Ecal kit (10MHz - 50GHz, 2 port)

2. Specifications

2.1. Frequency

Frequency Range	S3602D: 10MHz - 50GHz
Frequency Resolution	1Hz
Frequency Accuracy	$\pm 1 \times 10^{-7}$ (23°C \pm 3°C)

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	≥ -1 dBm	$\geq +13$ dBm	$\geq +13$ dBm
0.05GHz - 4GHz	≥ 0 dBm	$\geq +7$ dBm	$\geq +14$ dBm
4GHz - 13.5GHz	$\geq +8$ dBm		$\geq +11$ dBm
13.5GHz - 40GHz	$\geq +9.5$ dBm		$\geq +11$ dBm
40GHz - 43.5GHz	$\geq +9.5$ dBm		$\geq +9$ dBm
43.5GHz - 47GHz	$\geq +7.5$ dBm		$\geq +9$ dBm
47GHz - 50GHz	≥ -6 Bm		≥ -3 dBm

- Typical

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	$\geq +14$ dBm	$\geq +16$ dBm
0.05GHz - 4GHz	-	$\geq +9$ dBm	$\geq +15$ dBm
4GHz - 13.5GHz	$\geq +10$ dBm		$\geq +13$ dBm
13.5GHz - 40GHz	$\geq +13$ dBm		$\geq +12$ dBm
40GHz - 43.5GHz	$\geq +10$ dBm		$\geq +11$ dBm
43.5GHz - 47GHz	$\geq +10$ dBm		$\geq +11$ dBm
47GHz - 50GHz	≥ 0 dBm		≥ -1 dBm

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

- Specification

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥-2dBm	≥+12dBm	≥+13dBm
0.05GHz - 4GHz	≥-1dBm	≥+7dBm	≥+13dBm
4GHz - 13.5GHz	≥+7dBm		≥+10dBm
13.5GHz - 40GHz	≥+7dBm		≥+10.5dBm
40GHz -43.5GHz	≥+7dBm		≥+8dBm
43.5GHz - 47GHz	≥+7dBm		≥+7dBm
47GHz - 50GHz	≥-6Bm		≥-5dBm

- Typical

Frequency	Port 1		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+13dBm	≥+15dBm
0.05GHz - 4GHz	-	≥+8dBm	≥+14dBm
4GHz - 13.5GHz	≥+9dBm		≥+12dBm
13.5GHz - 40GHz	≥+12dBm		≥+12dBm
40GHz -43.5GHz	≥+9dBm		≥+10dBm
43.5GHz - 47GHz	≥+9dBm		≥+8.5dBm
47GHz - 50GHz	≥-1dBm		≥-2dBm

● **4-port configuration(Option 400), 2 sources**

■ **Specification**

Frequency	Port 1,3		Port 2, 4
	Filtering mode (dBm)	High-power mode (dBm)	(dBm)
10MHz - 50MHz	≥-1dBm	≥+13dBm	≥+13dBm
0.05GHz - 4GHz	≥0dBm	≥+7dBm	≥+14dBm
4GHz - 13.5GHz	≥+8dBm		≥+11dBm
13.5GHz - 40GHz	≥+9.5dBm		≥+11dBm
40GHz - 43.5GHz	≥+9.5dBm		≥+9dBm
43.5GHz - 47GHz	≥+7.5dBm		≥+9dBm
47GHz - 50GHz	≥-6Bm		≥-3dBm

■ **Typical**

Frequency	Port 1,3		Port 2, 4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+14dBm	≥+16dBm
0.05GHz - 4GHz	-	≥+9dBm	≥+15dBm
4GHz - 13.5GHz	≥+10dBm		≥+13dBm
13.5GHz - 40GHz	≥+13dBm		≥+12dBm
40GHz - 43.5GHz	≥+10dBm		≥+11dBm
43.5GHz - 47GHz	≥+10dBm		≥+11dBm
47GHz - 50GHz	≥0dBm		≥-1dBm

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

■ **Specification**

Frequency	Port 1,3		Port 2 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥-2dBm	≥+12dBm	≥+13dBm
0.05GHz - 4GHz	≥-1dBm	≥+7dBm	≥+13dBm
4GHz - 13.5GHz	≥+7dBm		≥+10dBm
13.5GHz - 40GHz	≥+7dBm		≥+10.5dBm
40GHz - 43.5GHz	≥+7dBm		≥+8dBm
43.5GHz - 47GHz	≥+7dBm		≥+7dBm
47GHz - 50GHz	≥-6Bm		≥-5dBm

■ **Typical**

Frequency	Port 1,3		Port 2, 4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	-	≥+13dBm	≥+15dBm
0.05GHz - 4GHz	-	≥+8dBm	≥+14dBm
4GHz - 13.5GHz	≥+9dBm		≥+12dBm
13.5GHz - 40GHz	≥+12dBm		≥+12dBm
40GHz - 43.5GHz	≥+9dBm		≥+10dBm
43.5GHz - 47GHz	≥+9dBm		≥+8.5dBm
47GHz - 50GHz	≥-1dBm		≥-2dBm

2. 2. 2. Output Power Setting Range

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

2. 2. 3. Minimum Stable Output Power

Standard/Option 400	-25dBm (Typ.)
With Attenuator (Option 201,401)	-85dBm (Typ.)

2. 2. 4. Power Resolution

Power Resolution	0.01dB
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2. 2. 5. Temperature Stability

Temperature Stability	0.06dB/°C
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2. 2. 6. Power Accuracy

10MHz≤f≤13.5GHz	±1.5dB
13.5GHz<f≤40GHz	±2.0dB
40GHz<f≤50GHz	±3.0dB

2. 2. 7. Port Damage Level

Damage Level	+27dBm, 30VDC
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2. 2. 8. Power Sweep Range

Frequency	Specification(dB)	Typical
10MHz - 500MHz	≥35dB	≥+38dB
0.5GHz - 4GHz	≥30dB	≥+33dB
4GHz - 13.5GHz	≥31dB	≥+34dB
13.5GHz - 40GHz	≥33dB	≥+37dB
40GHz - 47GHz	≥30dB	≥+34dB
47GHz - 50GHz	≥17dB	≥+23dB

2. 2. 9. 1dB Compression Point

Frequency range	Figure(dBm)
10MHz - 50GHz	≥+10dBm (typ.)

2. 2. 10. Power Linearity

Power Linearity (23°C±3°C)	±2.0dB
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2. 2. 11. Port Harmonics Suppression

- 2-port configuration (Standard, Option 201)

	Frequency	Figure(dBc)
Port 1 Harmonic Suppression	0.01GHz - 4GHz	≤-50dBc
	4GHz - 13.5GHz	≤-60dBc
	13.5GHz - 50GHz	≤-60dBc
Port 2 Harmonic Suppression	0.01GHz - 4GHz	≤-13dBc (≤ -15dBc typ.)
	4GHz - 13.5GHz	≤-21dBc
	13.5GHz - 50GHz	≤-60dBc

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

	Frequency	Figure(dBc)
Port 1,3 Harmonic Suppression	0.01GHz - 4GHz	≤-50dBc
	4GHz - 13.5GHz	≤-60dBc
	13.5GHz - 50GHz	≤-60dBc
Port 2,4 Harmonic Suppression	0.01GHz - 4GHz	≤-13dBc (≤ -15dBc typ.)
	4GHz - 13.5GHz	≤-21dBc
	13.5GHz - 50GHz	≤-60dBc

2. 3. Network Specifications

2. 3. 1. System Dynamic Range

- IF bandwidth = 1Hz
- Averaging factor = 8

	Specification(dB)	Typical(dB)
10MHz≤f≤1GHz	≥90dB	≥105dB
1GHz<f≤13.5GHz	≥122dB	≥133dB
13.5GHz<f≤26.5GHz	≥120dB	≥126dB
26.5GHz<f≤35GHz	≥115dB	≥120dB
35GHz<f≤43.5GHz	≥112dB	≥116dB
43.5GHz<f≤47GHz	≥108dB	≥116dB
47GHz<f≤50GHz	≥97dB	≥103dB

2. 3. 2. Phase Noise

- Frequency offset 1kHz

Frequency	Phase Noise	Frequency	Phase Noise
10MHz	-124dBc/Hz	4GHz	-99dBc/Hz
20MHz	-123dBc/Hz	8GHz	-93dBc/Hz
30MHz	-126dBc/Hz	10GHz	-89dBc/Hz
40MHz	-122dBc/Hz	16GHz	-87dBc/Hz
50MHz	-118dBc/Hz	20GHz	-83dBc/Hz
100MHz	-112dBc/Hz	26.5GHz	-81dBc/Hz
500MHz	-117dBc/Hz	32GHz	-81dBc/Hz
1GHz	-111dBc/Hz	40GHz	-77dBc/Hz
2GHz	-105dBc/Hz	50GHz	-74dBc/Hz

2. 3. 3. Noise Floor

Frequency	Noise Floor
10MHz - 50MHz	≤-78dBm
50MHz - 1GHz	≤-83dBm
1GHz - 4GHz	≤-115dBm
4GHz - 13.5GHz	≤-115dBm
13.5GHz - 26.5GHz	≤-113dBm
26.5GHz - 35GHz	≤-108dBm
35GHz - 40GHz	≤-105dBm
40GHz - 47GHz	≤-103dBm
47GHz - 50GHz	≤-101dBm

2. 3. 4. Corrected System Performance

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

Following test cables are used in this test:

FE0BN0BM025.0	2.4mm Test Cable (Male DUT end)	Applicable for Whole-Machine Measurement
FE0BN0BL025.0	2.4mm Test Cable (Female DUT end)	Applicable for Whole-Machine Measurement

- **Mechanical Calibration Kit SAV 31123A.**

	Frequency	Specification
Effective Directivity	0.01GHz - 13.5GHz	≥+50dB
	13.5GHz - 40GHz	≥+45dB
	40GHz - 43.5GHz	≥+42dB
	43.5GHz - 50GHz	≥+37dB
Effective Source Match	10MHz≤f≤2GHz	≥+41dB
	2GHz<f≤13.5GHz	≥+33dB
	13.5GHz<f≤40GHz	≥+30dB
	40GHz<f≤43.5GHz	≥+32dB
	43.5GHz<f≤50GHz	≥+34dB
Effective Load Match	0.01GHz - 13.5GHz	≥+50dB
	13.5GHz - 40GHz	≥+50dB
	40GHz - 50GHz	≥+45dB
Reflection Tracking	0.01GHz - 13.5GHz	±0.01dB
	13.5GHz - 40GHz	±0.01dB
	40GHz - 43.5GHz	±0.015dB
	43.5GHz - 50GHz	±0.03dB
Transmission Tracking	0.01GHz - 13.5GHz	±0.015dB
	13.5GHz - 40GHz	±0.03dB
	40GHz - 43.5GHz	±0.03dB
	43.5GHz - 50GHz	±0.035dB

- **E-Cal Kit SAV 20404 (2-port)**

Spec.	Frequency Range					
	10MHz - 45MHz	45MHz - 2GHz	2GHz - 10GHz	10GHz -20GHz	20GHz - 40GHz	40GHz - 50GHz
Effective Directivity	≥45dB	≥45dB	≥43dB	≥40dB	≥37dB	≥33dB
Effective Source Match	≥37dB	≥37dB	≥34dB	≥31dB	≥30dB	≥32dB
Effective Load Match	≥39dB	≥39dB	≥36dB	≥35dB	≥33dB	≥32dB
Reflection Tracking	±0.06dB	±0.06dB	±0.08dB	±0.09dB	±0.12dB	±0.15dB
Transmission Tracking	±0.07dB	±0.07dB	±0.09dB	±0.12dB	±0.16dB	±0.20dB

2. 3. 5. Trace Noise

	Frequency range	Figure(dB rms)
Trace Noise Magnitude 1KHz IF bandwidth	10MHz - 50MHz	≤ 0.006
	50MHz - 500MHz	≤ 0.002
	0.5GHz - 13.5GHz	≤ 0.001
	13.5GHz - 26.5GHz	≤ 0.0009
	26.5GHz - 50GHz	≤ 0.004
	Frequency range	Figure(deg rms)
Trace Noise Phase 1KHz IF bandwidth	10MHz - 50MHz	≤ 0.04
	50MHz - 500MHz	≤ 0.01
	0.5GHz - 13.5GHz	≤ 0.005
	13.5GHz - 26.5GHz	≤ 0.02
	26.5GHz - 50GHz	≤ 0.03

2. 4. Pulse Specifications

Pulse Width Setting Range	20ns - 60s	
Pulse transition time (10% - 90%)	20ns	
Pulse off ratio	Frequency range	Figure(dB)
	0.01GHz-4GHz	64dB
	4GHz-13.5GHz	80dB
	13.5GHz-50GHz	80dB

2. 5. General

IF Bandwidth	1Hz - 5MHz
Max. Sweep Point per Trace	32001
Sweep Type	Linear, Log, Power, CW, Segment, Phase
Trace Display Format	Log magnitude, linear magnitude, SWR , phase , group delay, real and imaginary , smith chart, polar
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	2.4mm (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: for USB device, printer etc
	GPIO: programming control interface
	VGA: external display interface
	LAN: network interface, programming control interface
Operating System	Windows 7
Storage Capability	160G SSD
Screen	12.1 inch high resolution touch screen
Dimension (LxHxW)	516mm x 280mm x 690mm (W x H x D)
Power	220V±10%, 50Hz - 60Hz
Operating Temperature	0°C - 50°C
Storage Temperature	-30°C - 70°C
Maximum Power Consumption	500W
Maximum Weight	47kg

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 -