S3602E Vector Network Analyzer

Datasheet

Saluki Technology Inc.

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

- S3602E vector network analyzer (10MHz-67GHz).

Options of the S3602E vector network analyzer in addition to standard accessories:

Part No.	Name	Description
S3602E-201	2-Port Programmable Step Attenuator	Set two 50dB programmable step attenuators for the source path, and two 50dB programmable step attenuators for the receiver path
S3602E-400	4-Port Measurement	Two-source stimulus configuration, four-port VNA configuration
S3602E-401	4-Port Programmable Step Attenuator	Set four 50dB programmable step attenuators for the source path, and four 50dB programmable step attenuators for the receiver path (Option 400 is needed)
S3602E-402	Active Inter-modulation Measurement	For inter-modulation signal measurement of amplifier (Option 400, S80 is needed)
S3602E-008	Pulse Measurement	For pulse S-parameter measurement
S3602E-480	Four-port Spread Spectrum System Cable	Required connection cable for four-port vector network analyzer when directly building a spread spectrum system.
S3602E-S05	S-parameter Signal Integrity Analysis	Used to display the frequency domain characteristics and time domain TDR characteristics of the system. Built-in crosstalk evaluation modules such as NEXT, FEXT, PSXT, ILD, ICR and ICN. Built-in standards such as IEEE 802.3, PCIe, SAS and SATA help to quickly evaluate whether S parameters Meet the design requirements. Can automatically convert the software graphic curve into Word or PPT report. Support a variety of Dk/Df extraction methods. Support NRZ, PAM-4 eye diagram drawing function.
S3602E-S06	MiliMeter Extension Port Power Control	Special for Saluki VNA. Suitable for extension modules with power adjustable function such as 3643P S-parameter extension module.
S3602E-S07	AFR Automatic Fixture Removal Option	Used for automatic testing and removal of single-ended and balanced device measurement fixtures.
S3602E-S10	Time Domain Measurement	For time-domain test, can locate and analyze the discontinuous positions in devices, fixtures or cables.
S3602E-S11	Advanced Time Domain Analysis	Used for TDR time domain impedance test, eye diagram analysis, etc.. S10 option is included in S11.

Part No.	Name	Description
S3602E-S80	Frequency Offset Measurement	For frequency offset measurement. millimeter-wave frequency extension main unit needs this option
S3602E-S82	Mixer Scalar Measurement	For the scalar parameter measurement of mixers (Option 400, S80 is needed)
S3602E-S83	Mixer Vector Measurement	For the vector parameter measurement of mixers (Option 400, S80 is needed)
S3602E-S84	Embedded LO Frequency Converter Measurement	For the measurement of embedded LO frequency converters (Option 400, S82 or S83, S80 are needed)
S3602E-S86	Gain Compression Two-Dimension Sweep Measurement	For the gain compression two-dimension sweep test of amplifier
S3602E-S88	Phase Scan Option	Used for phase scan measurement (need option S3602E-400)
31128	1.85mm Calibration Kit	For calibration of the VNA
SCAVNA67FM-(1.85/1.85)	1.85mm Test Cable	For measurement of the analyzer, 1.85mm (female) to 1.85mm (male)
SCAVNA67FF-(1.85/1.85)	1.85mm Test Cable	For measurement of the analyzer, 1.85mm (female) to 1.85mm (female)
Top Rack	/	Easy to build the system and use on the cabinet
S3602E-061	Extension Workbench	/
S3602E-EWT1	Extend 1 year warranty	For S3602E main machine
S3602E-3648-EWT1	Extend 1 year warranty	For S3602E-3648 link expansion device

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

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 reach up to 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 show technical specifications of S3602E(10MHz - 67GHz).

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:

- SAV31123A 1.85mm Mechanical Calibration Kit

2. Specifications

2. 1. Frequency

Frequency Range	S3602E: 10MHz - 67GHz
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**

Frequency	Filtering mode (dBm)	High-power mode (dBm)
10MHz - 50MHz	≥-1	≥+8
0.05GHz - 4GHz	≥0	≥+5
4GHz - 26.5GHz	≥+5	
26.5GHz - 35GHz	≥+7	
35GHz - 40GHz	≥+4	
40GHz - 67GHz	≥+5	

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

Frequency	Filtering mode (dBm)	High-power mode (dBm)
10MHz - 50MHz	≥-2	≥+7
0.05GHz - 4GHz	≥-1	≥+4
4GHz - 26.5GHz	≥+3	
26.5GHz - 35GHz	≥+4	
35GHz - 40GHz	≥+1	
40GHz - 67GHz	≥0	

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

Frequency	Port 1,3	Port 1,3	Port 2, 4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥-1	≥+8	≥+8
0.05GHz - 4GHz	≥0	≥+5	≥+5
4GHz - 26.5GHz	≥+5		≥+5

Frequency	Port 1,3	Port 1,3	Port 2, 4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
26.5GHz - 35GHz	≥+7		≥+7
35GHz - 40GHz	≥+4		≥+4
40GHz - 67GHz	≥+5		≥+5

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

Frequency	Port 1,3	Port 1,3	Port 2, 4 (dBm)
	Filtering mode (dBm)	High-power mode (dBm)	
10MHz - 50MHz	≥-2	≥+7	≥+7
0.05GHz - 4GHz	≥-1	≥+4	≥+4
4GHz - 26.5GHz	≥+3		≥+3
26.5GHz - 35GHz	≥+4		≥+4
35GHz - 40GHz	≥+1		≥+1
40GHz - 67GHz	≥0		≥0

2. 2. 2. Stable Minimum Output Power

Without Anttenuator	-25dBm
With Attenuator (Option 201,401)	-75dBm

2. 2. 3. Power Resolution

Power Resolution	0.01dB

2. 2. 4. Temperature Stability

Temperature Stability	0.06dB/℃

2. 2. 5. Power Accuracy

10MHz≤f≤13.5GHz	±2.0dB
13.5GHz<f≤40GHz	±3.0dB
40GHz - 67GHz	±4.0dB

2. 2. 6. Port Damage Level

Damage Level	+26dBm, 30Vdc

2. 2. 7. Power Sweep Range

Frequency	Figure(dB)
10MHz-500MHz	32
0.5GHz-4GHz	29
4GHz-26.5GHz	28
26.5GHz-35GHz	29
35GHz-40GHz	26
40GHz-67GHz	25

2. 2. 8. Power Linearity

Power Linearity (23℃±3℃)	±2.0dB

2. 2. 9. Port Harmonics Suppression

- **2-port configuration (Standard, Option 201)**

	Frequency	Figure(dBc)
Port 1 Harmonic Suppression	0.01GHz-4GHz	≤-48 (≤ -51 typ.)
	4GHz-67GHz	≤-57 (≤ -60 typ.)
Port 2 Harmonic Suppression	0.01GHz-4GHz	≤-13 (≤ -15 typ.)
	4GHz-13.5GHz	≤-18 (≤-21 typ.)
	13.5GHz-67GHz	≤-57 (≤-60 typ.)

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

	Frequency	Figure(dBc)
Port 1,3 Harmonic Suppression	0.01GHz-4GHz	≤-48 (≤ -51 typ.)
	4GHz-67GHz	≤-57 (≤ -60 typ.)
Port 2,4 Harmonic Suppression	0.01GHz-4GHz	≤-13 (≤ -15 typ.)
	4GHz-13.5GHz	≤-18 (≤-21 typ.)
	13.5GHz-67GHz	≤-57 (≤-60 typ.)

2. 2. 10. Phase Noise (typ.)

Frequency	1kHz Offset (dBc/Hz)	10kHz Offset (dBc/Hz)	100kHz Offset (dBc/Hz)	1MHz Offset (dBc/Hz)
10MHz - 500MHz	-95	-85	-85	-120
500MHz - 1GHz	-106	-112	-112	-127
1GHz - 2GHz	-101	-106	-106	-120
2GHz - 4GHz	-95	-100	-100	-113
4GHz - 8GHz	-89	-94	-94	-107
8GHz - 16GHz	-83	-88	-88	-103
16GHz - 32GHz	-76	-83	-82	-95
32GHz - 64GHz	-72	-82	-76	-91
64GHz - 67GHz	-65	-75	-70	-85

2. 3. Network Specifications

2. 3. 1. System Dynamic Range

Frequency range	Figure(dB)
10MHz - 1GHz	≥74
1GHz - 4GHz	≥90
4GHz - 10GHz	≥107
10GHz -26.5GHz	≥110
26.5GHz -35GHz	≥100
35GHz -50GHz	≥90
50GHz -67GHz	≥75

2. 3. 2. Noise Floor

- IF = 1Hz
- Averaging factor = 8

Frequency Range	Noise Floor (dBm)
10MHz - 1GHz	≤ -66
1GHz - 4GHz	≤ -85
4GHz - 10GHz	≤ -106
10GHz -13.5GHz	≤ -106
13.5GHz -26.5GHz	≤ -105
26.5GHz -35GHz	≤ -97
35GHz -40GHz	≤ -87
40GHz - 50GHz	≤ -85
50GHz -67GHz	≤ -70

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:

FF0CN0CM025.0	1.85mm/1.85mm Test Cable (Male DUT end)	Applicable for Whole-Machine Measurement
FF0CN0CL025.0	1.85mm/1.85mm Test Cable (Female DUT end)	Applicable for Whole-Machine Measurement

Mechanical Calibration Kit SAV 31123A

- **Effective Directivity**

Frequency	Effective Directivity (dB)
0.01GHz-2GHz	≥+35
2GHz-13.5GHz	≥+41
13.5GHz-40GHz	≥+34
40GHz-67GHz	≥+32

- **Effective Source Match**

Frequency	Effective Source Match (dB)
0.01GHz-2GHz	≥+35
2GHz-13.5GHz	≥+31
13.5GHz-40GHz	≥+28
40GHz-67GHz	≥+25

- **Effective Load Match**

Frequency	Effective Load Match (dB)
0.01GHz-2GHz	≥+35
2GHz-13.5GHz	≥+41
13.5GHz-40GHz	≥+33
40GHz-67GHz	≥+30

- **Reflection Tracking**

Frequency	Reflection Tracking (dB)
0.01GHz-2GHz	±0.05
2GHz-13.5GHz	±0.06
13.5GHz-26.5GHz	±0.08
26.5GHz-67GHz	±0.10

- **Transmission Tracking**

Frequency	Transmission Tracking (dB)
0.01GHz-2GHz	±0.10
2GHz-13.5GHz	±0.11
13.5GHz-26.5GHz	±0.16
26.5GHz-67GHz	±0.20

2. 3. 4. Trace Noise

	Frequency range	Figure(dB rms)
Trace Noise Magnitude 1KHz IF bandwidth	10-50MHz	≤ 0.05
	50-500MHz	≤ 0.02
	0.5-13.5GHz	≤ 0.005
	13.5-26.5GHz	≤ 0.004
	26.5-67GHz	≤ 0.02

	Frequency range	Figure(deg rms)
Trace Noise Phase 1KHz IF bandwidth	10-50MHz	≤ 0.9
	50-500MHz	≤ 0.7
	0.5-13.5GHz	≤ 0.04
	13.5-26.5GHz	≤ 0.05
	26.5-67GHz	≤ 0.1

2. 4. Pulse Specifications

Pulse Width Setting Range	33ns - 60s	
Pulse transition time （10% - 90%）	30ns	
Pulse ON/OFF ratio	Frequency range	Figure(dB)
	0.01GHz-4GHz	64
	4GHz-67GHz	80

2. 5. General

IF Bandwidth	1MHz - 5MHz
Max. Sweep Point per Trace	32001
Max Window Qty	16
Max Channel Qty	64
Max Marker Qty	9

Saved Data format	Status (*.sta) Calibration settings (*.cal) Data (*.dat, *.cti, *.s1p, *.s2p, *.s3p, *.s4p) List (*.prn) Picture (*.bmp, *.jpg)
Magnitude Display Resolution	0.001dB/div
Phase display Resolution	0.01°/div
Reference Level Magnitude	-500 to +500dB
Input Reference Phase Range	-500 to +500°
Port Connector Type	1.85mm (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(1280*800) touch screen
Dimension (LxHxW)	463 × 281 × 690 (W x H x D)
Power	110V/220V±10%, 50Hz - 60Hz
Operating Temperature	0℃ to 50℃
Storage Temperature	-30℃ to 70℃
The Maximum Power Consumption	500W
Maximum Weight	50kg

2. 6. Compliant

2. 6. 1. CE

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 -