Mini-Circuits®

eVNA-63+

Mini-Circuits®

Vector Network Analyzer

- 2-port, 300 kHz to 6 GHz s-parameter measurements
- -50 dBm to +10 dBm variable port power
- Integrated Bias-Tee
- Standard Time Domain Analysis with Gating

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Vector Network Analyzer

eVNA-63+

300 kHz to 6 GHz

Product Overview

Mini-Circuits' eVNA-63+ is a high performance, externally PC-controlled vector network analyzer (VNA). By moving the complex data processing and calculation required of vector network measurements out of the instrument and into an advanced software environment, Mini-Circuits is able to offer a fully-featured, cost effective VNA for every test bench. In applications where high throughput is needed, the eVNA-63+ used with a separate PC, completely replaces expensive and bulky production test systems saving on space and overall cost of ownership.

The product ships with Mini-Circuits' eVNA User Interface (UI) software, providing a powerful and intuitive control application which will feel familiar to any engineer with experience on modern VNA instruments. The software also includes the eVNA Application Programming Interface (API) and support for a standardized SCPI command-set, allowing easy automation of VNA calibrations, measurements, trace displays and data exports from a wide range of programming environments.

Download the **eVNA Studio** software from www.minicircuits.com/WebStore/Vector-Network_Analyzer.html to explore the full eVNA measurement capabilities prior to purchase.

Key Features

FULL 2-PORT S-PARAMETER MEASUREMENTS
Full characterization of 1 port and 2 port devices with options to analyze S11, S12, S21, and S22 s-parameters. Vector phase and magnitude data can be visualized in rectangular, Smith chart or polar plot formats, or exported as a Touchstone snp data file.

TIME DOMAIN ANALYSIS & GATING
Extend measurement capabilities to include time domain transformation, allowing analysis of the time or distance to impedance changes and discontinuities in a transmission line. This is a highly versatile measurement technique that supports applications such as fault finding in cables (distance to fault & time to fault) and optimizing PCB assemblies (analysis of discontinuities at each stage of the circuit).

Time domain gating adds the ability to mathematically remove undesirable responses from a DUT or test fixture by isolating a section of the circuit that is at a known distance from the measurement port. For example, the effects of a poor connector transition on a test fixture can be easily removed with gating resulting in a more accurate device characterization. These powerful time domain capabilities are included in the eVNA UI software at no extra cost!

SIMULATION MODE
Work with a fully operational VNA with no up-front cost, hardware, or even a DUT (device under test). Connect to an internal simulator in the same way as you would connect to the real hardware and then explore the eVNA-63+'s capability around a built-in band pass filter measurement. The software also accepts imported Touchstone s-parameter files to allow simulated vector network analysis of a wide range of RF components.

- Explore the full eVNA-63+ capability prior to purchase
- Educate yourself on proper eVNA configuration and usage
- Design and practice measurement sequences in advance of DUT availability
- Visualize and interact with standard Touchstone s-parameter data files to properly analyze new RF component choices
- Mini-Circuits has 1000s of s-parameter files available on our website www.minicircuits.com

FLEXIBLE USER CALIBRATION OPTIONS
Support for SOLT (Short, Open, Load, Thru) calibration methods with full calibration kits available for SMA and N-Type DUTs (see accessories). Use any industry standard SOLT calibration kit or define your own calibration standards.

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REMOTE API CONTROL & AUTOMATION

The eVNA system is comprised of the eVNA-63+ hardware connected by USB to a host PC with the eVNA UI software installed. The system can be automated using a series of standardized SCPI commands from most common programming environments, including LabVIEW and Python. Automation programs can be created on the host PC or from a remote PC, connected to the host PC via a TCP / IP network.

INTERNAL BIAS-TEES

Two bias-tee inputs allow provision of up to +24V DC / 200 mA max on either measurement port (or both), ideal for powering amplifiers in-line for gain / P1 dB characterization.

PORT EXTENSION

Correct measurement results to exclude the effect of any test fixture by mathematically moving the reference planes up to the DUT input and output.

BANDWIDTH, LIMIT & RIPPLE TESTS

Automate common measurement activities with powerful marker functions, including filter bandwidth and ripple calculations, and display of pass / fail test results.

POWER SWEEP

Configure an automated power sweep sequence at a fixed frequency, ideal for measurement of linearity or compression of amplifiers and other 2 port devices. Calibrate the power accuracy with support for external USB power meters
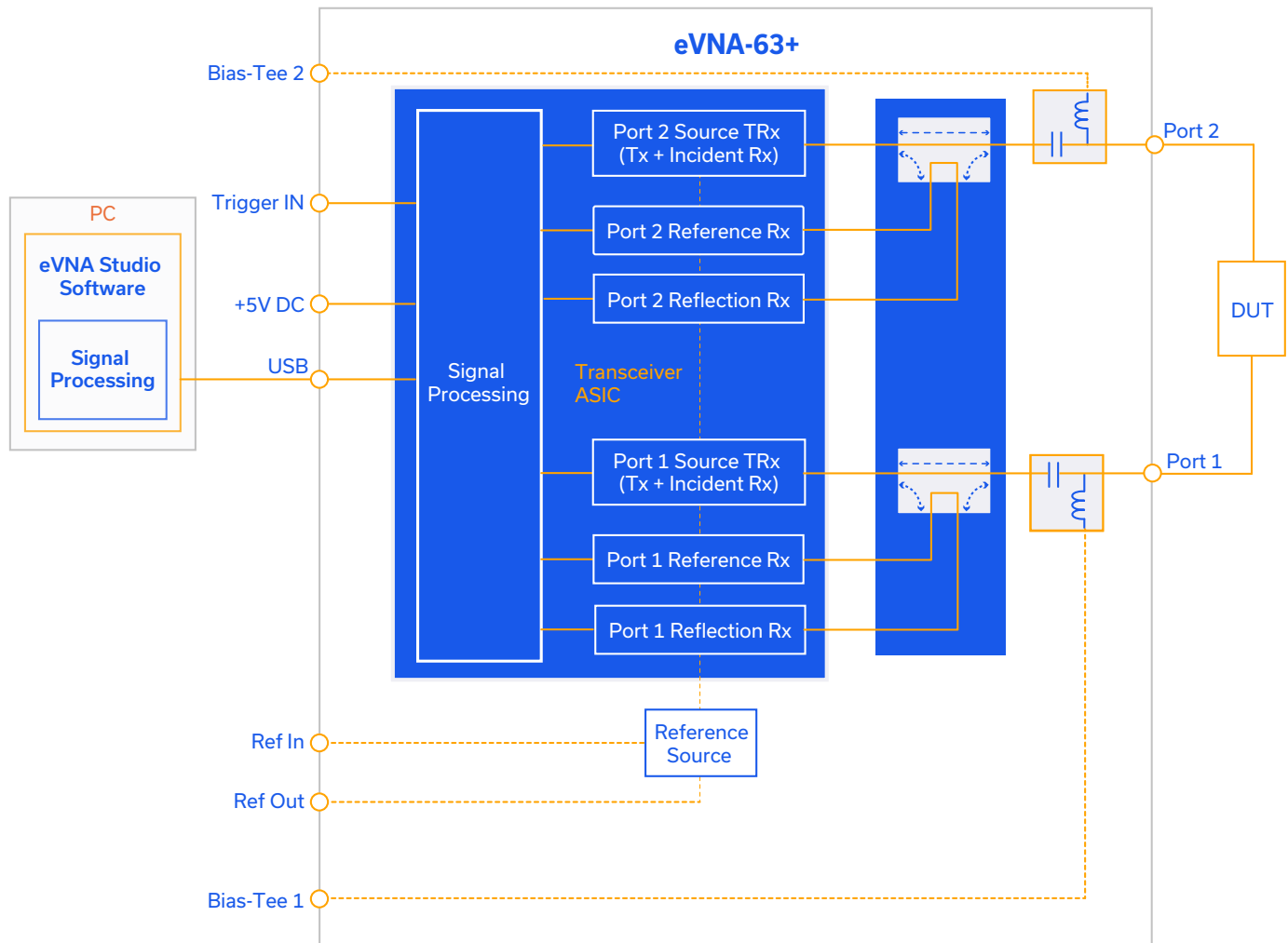
Applications

- Production test systems
- RF & microwave product design
- University lab test benches
- Active/passive component characterization
- Antenna tuning / VSWR measurement
- Amplifier P1dB measurement
- Distance to fault testing

Vector Network Analyzer
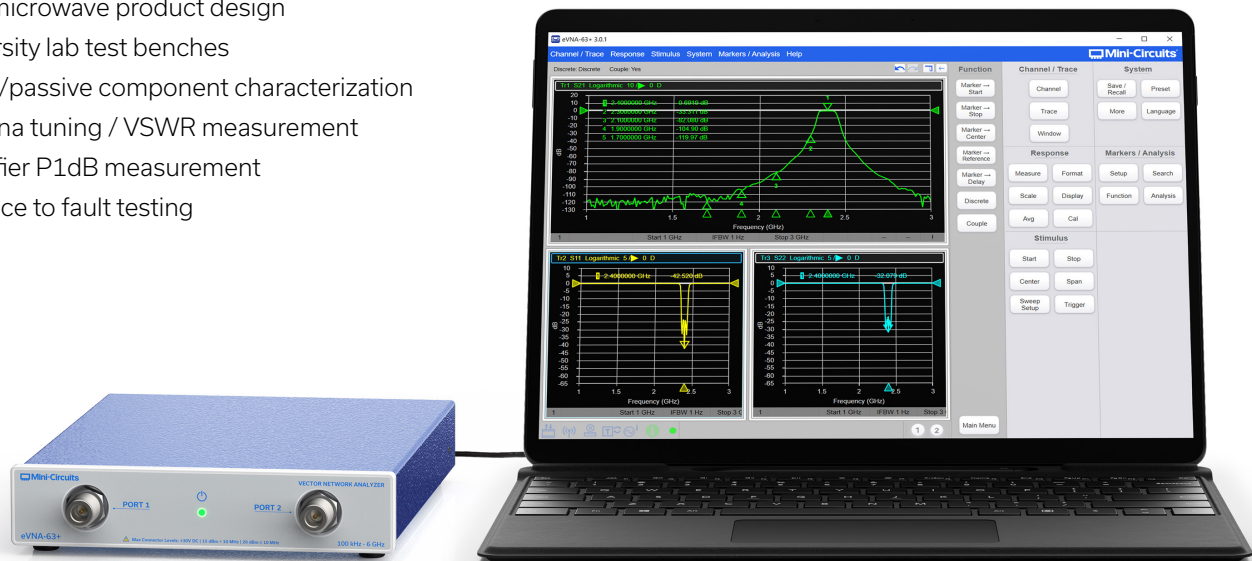
Block Diagram

Functional representation of the eVNA-63+ design, including the source, receiver, coupler and bias-tee routing.

Definitions

Minimum (Min) and Maximum (Max) electrical specifications are warranted performance over a temperature range of +25 °C ±5 °C after a 60 minute warm up time with VNA application running.

Typical (Typ) specifications are expected performance of an average unit and are not covered by product warranty.

All specifications are under Normal sweep mode operation unless otherwise noted.

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Electrical Specifications

DYNAMIC RANGE, CROSSTALK & NOISE FLOOR

Parameter	Conditions	Frequency (MHz)	Min	Typ	Max	Units
Dynamic Range[1] (Max Output Power - Noise Floor)	IF BW = 10 Hz Pout = +10dBm averaging enabled (10 averages)	0.3-1	108	116		dB
		1-10	122	132		
		10-200	125	132		
		200-2000	125	141		
		2000-4500	125	137		
		4500-6000	121	134		
Noise Floor	IF BW = 10 Hz; Pout = +10 dBm; averaging enabled (10 averages)	0.3-1		-121	-110	dBm/Hz
		1-10		-129	-117	
		10-200		-126	-117	
		200-2000		-135	-117	
		2000-4500		-132	-117	
		4500-6000		-129	-115	
Crosstalk[2]	IF BW = 10 Hz; Pout = +10dBm averaging enabled (10 averages)	0.3-1		-101	-85	dB
		1-10		-131	-105	
		10-200		-120	-105	
		200-2000		-124	-110	
		2000-4500		-128	-112	
		4500-6000		-131	-115	

1. Dynamic range does not include the effect of crosstalk
2. Ports terminated with Loads. (System Correction ON, User Correction OFF)

DYNAMIC ACCURACY

Parameter	Conditions	Frequency (MHz)	Min	Typ	Max	Units
Dynamic Accuracy Magnitude (Referenced to -10 dBm Rx Level)	Rx level = +5 to +10 dBm	10-200		0.35		dB
		200-6000		0.15		
	Rx level = 0 to +5 dBm	10-200		0.25	0.5	
		200-6000		0.1	0.4	
	Rx level = -20 to 0 dBm	10-200		0.1	0.4	
		200-6000		0.05	0.3	
	Rx level = -34 to -20 dBm	10-200		0.15	0.45	
		200-6000		0.1	0.35	
	Rx level = -50 to -34 dBm	10-200		0.2		
		200-6000		0.15		
	Rx level = -60 to -50 dBm	10-200		0.25		
		200-6000		0.2		

TRACE NOISE

Parameter	Conditions	Frequency (MHz)	Min	Typ	Max	Units
Trace Noise Magnitude	Pout: +10 dBm, IF BW : 10 Hz	0.3-200		0.004	0.009	dB rms
		200-6000		0.005	0.009	
Trace Noise Phase		0.3-200		0.02	0.05	° rms
		200-6000		0.03	0.05	

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TEST PORT OUTPUT

Parameter	Conditions	Frequency (MHz)	Min	Typ	Max	Units
Output Power	Settable range		-50		10	dBm
Max Output Power[3]	Output level set to +10 dBm	0.3 - 10		5		dBm
		10 - 200	7	10		
		200 - 4500	7	10		
		4500 - 6000	6.5	9		
Power Accuracy	Output = 0 to +5 dBm	5 - 6000	-2.5	±1	2.5	dB
	Output = -25 to 0 dBm	0.3 - 6000	-2.5	±1	2.5	
Harmonic & Spurious	Output ≤ 0 dBm	0.3 - 200		-20		dBc
		200 - 6000		-30		

3. Use the "Normal Sweep" Mode for maximum power at 0.3-10MHz

FREQUENCY

Parameter	Min	Typ	Max	Units
Frequency Range	0.3		6000	MHz
Frequency Resolution		1		Hz
Frequency Accuracy			±7	ppm
IF Bandwidth	0.001		500	kHz
External Ref Frequency (Ref In)	10 MHz (±50 Hz)			
Internal Ref Frequency (Ref Out)	10 MHz (±10 Hz typ)			

UNCORRECTED PERFORMANCE
System Correction: ON   User Correction: OFF

Frequency (MHz)	Directivity (dB) Typ	Source Match (dB) Typ	Load Match (dB) Typ	Reflection Tracking (dB) Typ	Transmission Tracking (dB) Typ
0.3-1	-42	-47	-6	±0.1	±0.1
1-10	-43	-45	-10	±0.1	±0.1
10-200	-45	-44	-20	±0.1	±0.1
200-2000	-40	-38	-14	±0.2	±0.2
2000-4500	-35	-34	-12	±0.2	±0.2
4500-6000	-32	-32	-10	±0.2	±0.3

CORRECTED PERFORMANCE
Conditions: IF BW = 1 kHz; using KSOLT-63-S+ cal kit with 1 x CBL-2FT-SMNM+ and 1 x CBL-2FT-SFNM+ 2FT Cables. Load match and transmission tracking values apply for insertable device calibrations

Frequency (MHz)	Directivity (dB)		Source Match (dB)		Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
	Typ	Max	Typ	Max	Typ	Typ	Typ
0.3-1	-50	-40	-45	-38	-35	±0.06	±0.04
1-10	-51	-42	-46	-38	-35	±0.07	±0.03
10-200	-50	-40	-44	-36	-37	±0.07	±0.03
200-2000	-48	-37	-41	-33	-36	±0.09	±0.02
2000-4500	-39	-36	-40	-30	-33	±0.10	±0.04
4500-6000	-39	-36	-38	-29	-32	±0.13	±0.06

Vector Network Analyzer

CORRECTED PERFORMANCE

Conditions: IF BW = 1 kHz; using KSOLT-63-N+ cal kit with 1 x CBL-2FT-SMNM+ and 1 x CBL-2FT-SFNM+ 2FT Cables. Load match and transmission tracking values apply for insertable device calibrations

Frequency (MHz)	Directivity (dB)		Source Match (dB)		Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
	Typ	Max	Typ	Max	Max	Typ	Typ
0.3-1	-50	-40	-45	-39	-36	±0.06	±0.04
1-10	-51	-42	-45	-38	-36	±0.07	±0.03
10-200	-50	-40	-43	-37	-37	±0.08	±0.03
200-2000	-48	-37	-42	-32	-36	±0.11	±0.03
2000-4500	-39	-36	-41	-29	-33	±0.13	±0.05
4500-6000	-38	-35	-38	-28	-32	±0.18	±0.08

MEASUREMENT SPEED (ms)[1]

Typical time per point. 1000 MHz-1200 MHz; One Path; Fast Sweep Mode; Display ON

IF BW (kHz)	Points		
	201	2001	20001
100	0.44	0.40	0.39
10	0.58	0.53	0.52
1	2.04	2.00	1.92

Typical time per point. 300 kHz-6 GHz (Full Span); One Path; Fast Sweep Mode; Display ON

IF BW (kHz)	Points		
	201	2001	20001
100	0.61	0.42	0.41
10	0.82	0.61	0.57
1	3.05	2.56	2.42

1. System Correction ON, User Correction OFF, S11, S21 traces displayed. Measurement time is typically doubled when measuring both directions and all four S-Parameters.

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Port Connections

FRONT PANEL

FRONT PANEL CONNECTIONS

Port Name	Description	Operating range	Connector Type
Port 1, 2	VNA Measurement Ports	-50 dBm to +10 dBm	N-Type Female, Brass

REAR PANEL

REAR PANEL CONNECTIONS

Port Name	Description	Operating range	Connector Type
Bias 1, 2	Bias Tee DC Ports	± 24 VDC, ± 200 mA	BNC
Ref In	External Reference Input	10 MHz ± 50 Hz, -5 dBm to + 10 dBm	BNC
Ref Out	External Reference Output	10 MHz ± 50 Hz, > +5 dBm	BNC
Trigger In	External Trigger Input	5V TTL	BNC
Aux Sync	Auxiliary Trigger	5V TTL	BNC
USB 2.0	USB Connection to PC		USB type B
DC Input	Power Supply DC Input	5 ± 0.25 VDC, 2 A nominal	2.5 x 5.5 x 9.5 mm barrel

Regulatory Compliance

+RoHS
Compliant   The +Suffix identifies RoHS Compliance. See our website for RoHS Compliance methodologies and qualifications

Meets the requirements of the following applicable European directives and carries the CE marking accordingly:
• Low Voltage Directive 2014/35
• Electromagnetic Compatibility – Directive 2014/30/EU
• Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)
 – Directive 2011/65/EU

Meets the requirements of the following applicable UK directives and carries the UKCA marking accordingly:
• Electrical Equipment (Safety) Regulations 2016
• Electromagnetic Compatibility Regulations 2016
• The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Environmental Specifications

MAXIMUM RATINGS

Parameter	Conditions	Frequency (MHz)	Min	Typ	Max	Units
Operating Temperature			5	-	50	°C
Storage Temperature			-35	-	75	°C
Test Ports 1 & 2	Input Power	0.3-10		-	15	dBm
		10-6000		-	20	
	DC Voltage			-	30	V
Bias-Tee Input	Voltage		-30	-	30	V
	Current		-200	-	200	mA
Trigger Input	Voltage			-	5	V
DC Supply	Voltage			5	5.25	V

Vector Network Analyzer

Mechanical Specifications

OUTLINE DRAWING (VF3213)
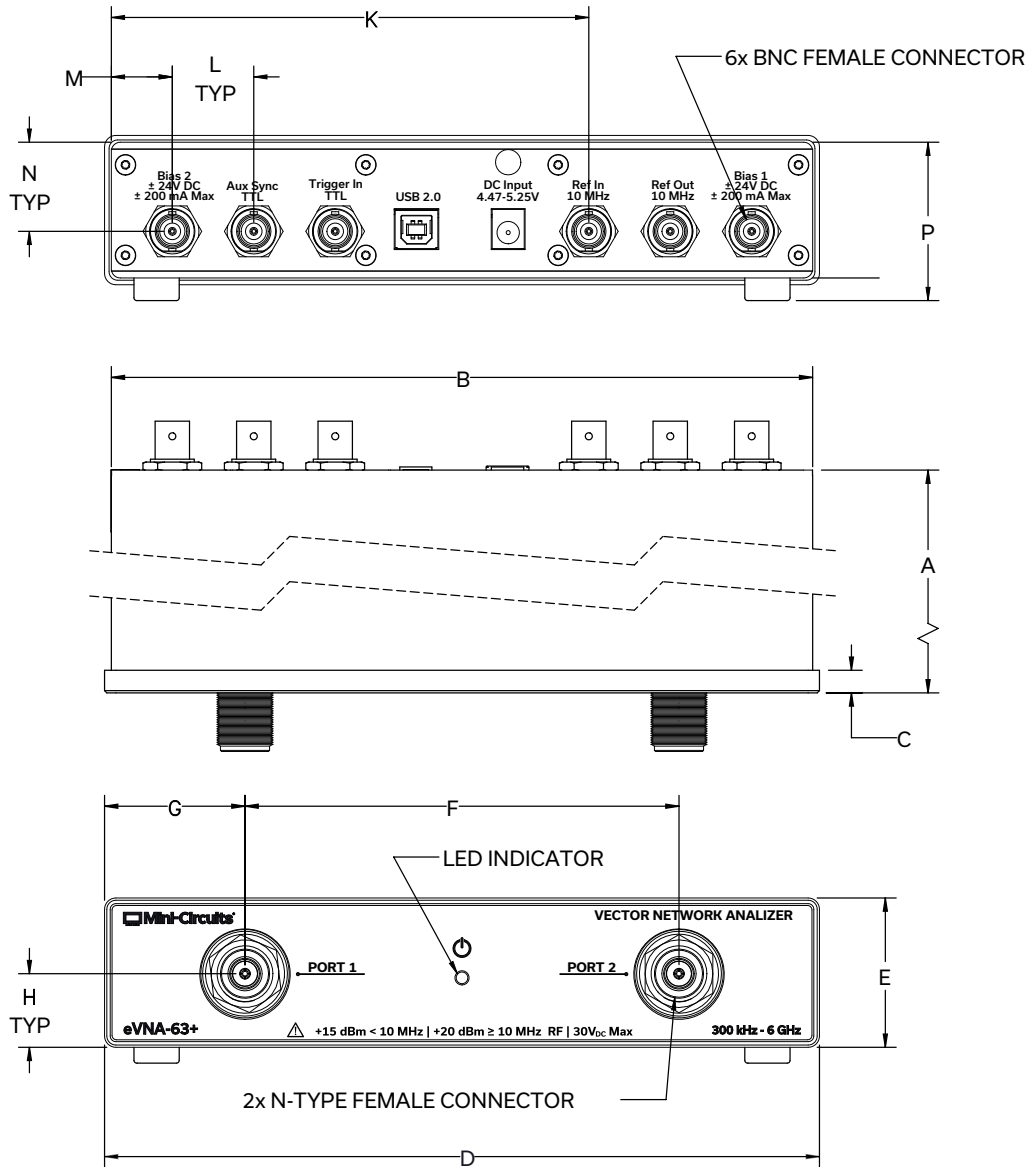
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015

A	B	C	D	E	F	G	H	K	L	M	N	P	wt
10.02	7.75	0.25	7.90	1.65	4.80	1.55	0.81	5.28	0.90	0.67	0.98	1.75	grams
254.5	196.9	6.4	200.7	41.9	121.9	39.4	20.6	134	22.9	17.02	25	44.5	2360

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eVNA Studio Software
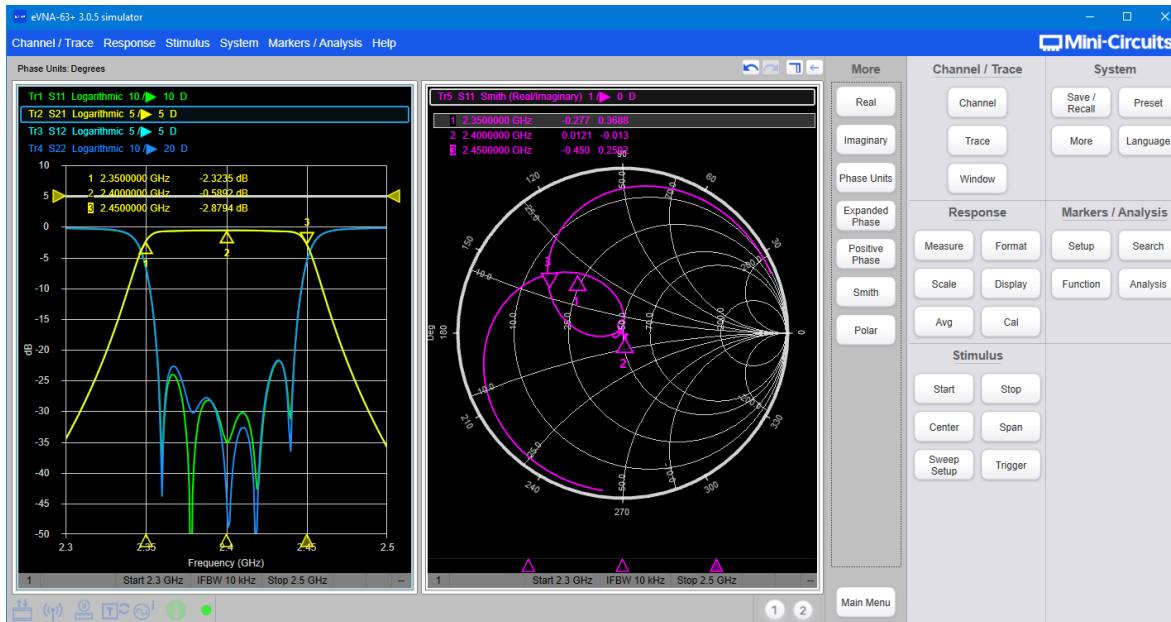
MEASUREMENT AND DISPLAY CAPABILITIES
- Full two Port S-Parameters (S_{11}, S_{21}, S_{12}, S_{22})
- Absolute receiver quantities from reference and reflection receivers
- Up to 16 independent measurement channels
- Up to 16 display traces per channel
- Up to 9 markers per trace
- Store traces for recall or trace math operations: Data + Mem, Data - Mem, Data * Mem, Data / Mem
- Flexible trace format options: Log Mag, Phase (Deg), Phase (Rad), Group Delay, Lin Mag, SWR, Real, Imaginary, Unwrapped Phase, Positive Phase, Smith, Polar

SWEEP STIMULUS
- Sweep Type: Lin Freq, Log Freq, Power, Segmented
- Sweep Mode: Normal or Fast
- Number of points: Up to 20,001
- IF Bandwidth: 1 Hz to 500 kHz
- Port Power Setting: -50 dBm to +10 dBm
- Power Slope Setting: -2 to +2 dB/GHz

ANALYSIS AND MARKER FUNCTIONS
- Marker Search: Max, Min, Peak, Target
- Marker Function: Set sweep and scaling settings using markers as reference

- Limit and Bandwidth Tests: Integrated Pass/Fail testing for Min/Max, ripple, and bandwidth limits
- Time Domain Transform: Lowpass and Bandpass Time Domain transform
- Time Domain Gating: Fixture De-Embedding using time-domain techniques

DATA EXPORT OPTIONS
- S-parameter File
- CSV trace data
- Trace screenshot
- Instrument / calibration / data states

CALIBRATION AND CORRECTION CAPABILITIES
- Response
- Enhanced Response
- 1-port SOL
- 2-Port SOLT
- Electronic Calibration
- Port Extension
- Power Calibration

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Software Specifications

SOFTWARE & DOCUMENTATION DOWNLOAD:
- Mini-Circuits' eVNA software package, user guide, programming manual and examples can be downloaded from www.minicircuits.com/softwaredownload/evna.html
- Ready To Learn More

MINIMUM SYSTEM REQUIREMENTS:

Parameter	Required
Interface	USB 2.0 or later
System Requirements (Host PC)	Windows 7, 10
Hardware	Intel i3 6th Gen CPU or Equivalent. 8GB RAM

APPLICATION PROGRAMMING INTERFACE (API)
The eVNA software suite incorporates an API which allows custom automation programs to be created for the eVNA. Most common programming environments are supported, including Python, LabVIEW, C# and MatLab.

SCPI CONTROL
eVNA-63+ Studio supports a comprehensive set of SCPI control commands which should be familiar to anyone that has previously programmed with a VNA. These commands expose the full range of eVNA capabilities, from calibration to display configuration, to measurement, to data processing.

API CONTROL FROM THE HOST PC
The host PC has the eVNA software package installed and is connected by USB to the eVNA-63+. The API can be used to create custom automation programs running on the host PC, using SCPI commands to control the eVNA.

API CONTROL FROM A REMOTE PC
The complete eVNA system (host PC + eVNA software + eVNA-63+ instrument) can be configured to allow remote control over a network connection. The remote PC connects to the eVNA host PC using a TCP/IP connection and then has access to the full range of SCPI commands for eVNA control.

Vector Network Analyzer

Recommended Mechanical Calibration Kits

KSOLT-63-N+
N-type mechanical calibration kit, comprising:

Quantity	Model Name	Description
1	SOL-63 NF+	Short / Open / Load (N female)
1	SOL-63-NM+	Short / Open / Load (N male)
1	MTH-63-NFNF+	Phase Matched Thru (N female to female)
1	MTH-63-NFNM+	Phase Matched Thru (N female to male)
1	MTH-63-NMNM+	Phase Matched Thru (N male to male)
1	TRQ-N20-8	N-type break-over torque wrench

KSOLT-63-S+
SMA mechanical calibration kit, comprising:

Quantity	Model Name	Description
1	SOL-63 SF+	Short / Open / Load (SMA female)
1	SOL-63-SM+	Short / Open / Load (SMA male)
1	MTH-63-SFSF+	Phase Matched Thru (SMA female to female)
1	MTH-63-SFSM+	Phase Matched Thru (SMA female to male)
1	MTH-63-SMSM+	Phase Matched Thru (SMA male to male)
1	TRQ-516-08	SMA break-over torque wrench

Recommended Test Accessories

Model	Cables
CBL-2FT-NMNM+	N Male to N Male, Precision Test
CBL-2FT-SMNM+	N Male to SMA Male, Precision Test
CBL-2FT-SFNM+	N Male to SMA Female, Precision Test
Model	**Adapters**
SF-SM50+	Adapter SMA-M to SMA-F
SM-SM50+	Adapter SMA-M to SMA-M
SF-SF50+	Adapter SMA-F to SMA-F
NF-NM50+	Adapter N-M to N-F
NM-NM50+	Adapter N-M to N-M
NF-NF50+	Adapter N-F to N-F
NF-SF50+	Adapter N-F to SMA-F
NF-SM50+	Adapter N-F to SMA-M
NM-SF50+	Adapter N-M to SMA-F
NM-SM50+	Adapter N-M to SMA-M
Model	**Terminations**
ANNE-50+	Termination SMA Male
ANNEF-50+	Termination SMA Female
KARN-50+	Termination N Male
Model	**Wrenches**
TRQ-516-08	SMA Torque Wrench
TRQ-N34-8	N-Type Torque Wrench 3/4" 8 lb-in
TRQ-N20-8	N-Type Torque Wrench 20 mm 8 lb-in
Model	**Calibration Kits**
KSOLT-63-S+	SMA calibration kit
KSOLT-63-N+	N-type calibration kit
Model	**Connector Gauges**
ACUDIAL-SMA	SMA connector gauge kit
ACUDIAL-N	N-type connector gauge kit

Ordering Information

Price and availability: www.minicircuits.com

Model	Description
eVNA-63+	USB Vector Network Analyzer 6 GHz

Included Accessories	Part No.	Description
	AC/DC-5-3W	AC/DC 5 VDC Grounded Power Adaptor. Operating temperature: 0°C to +40°C, IMAX=4A
See Below	CBL-3W-XX	AC Power Cord (Select one power cord from below with each Switch Matrix box)
	USB-CBL-AB-3+	2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)

AC Power Cords[5]	Part No.	Description
	CBL-3W-US	Power Cord for United States
	CBL-3W-EU	Power Cord for Europe
	CBL-3W-UK	Power Cord for United Kingdom
	CBL-3W-AU	Power Cord for Australia and China
	CBL-3W-IL	Power Cord for Israel

5. If you need a Power cord for a country not listed. Ready To Learn More

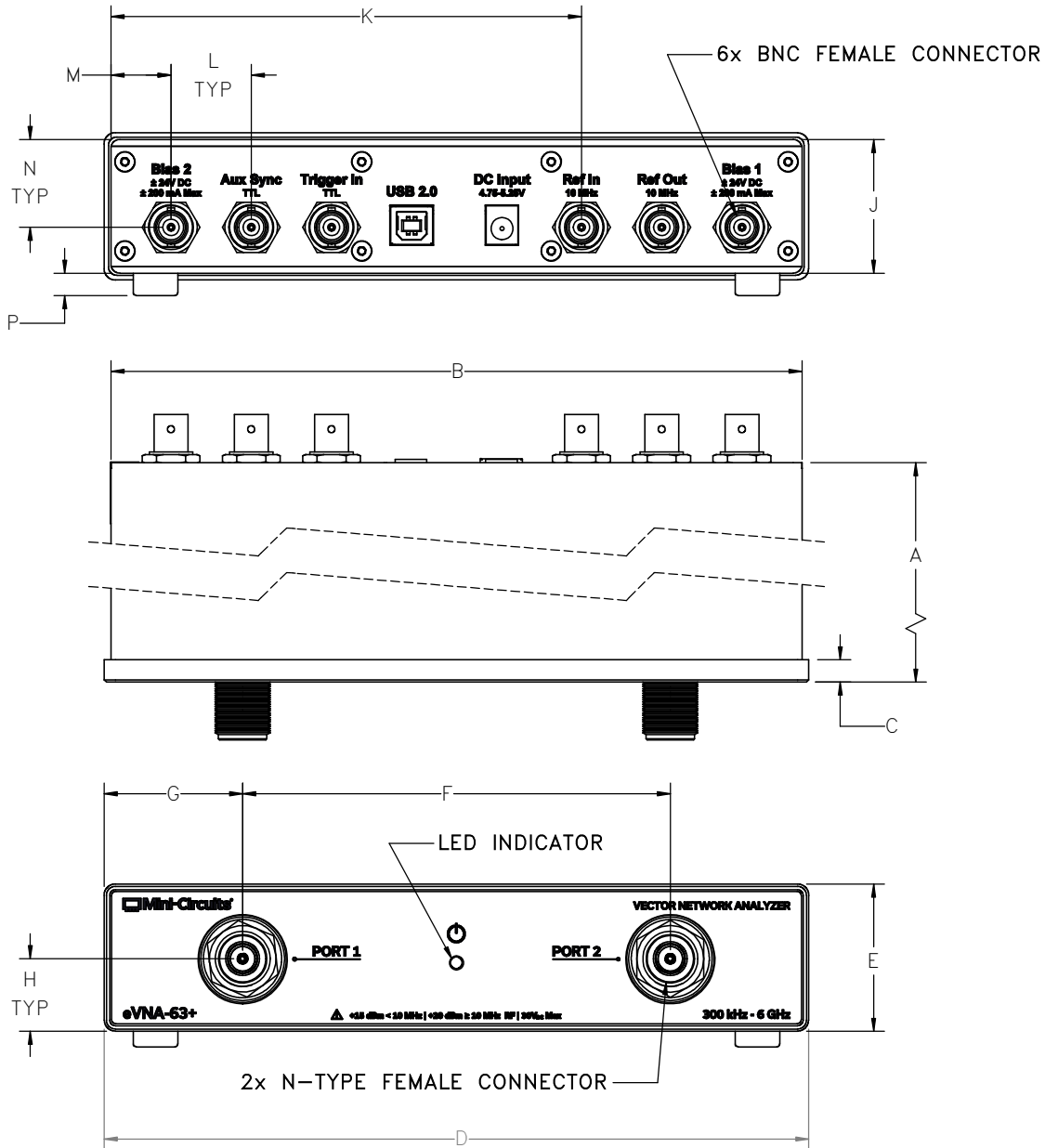## OPTIONAL ACCESSORIES

USB-CBL-AB-3+	2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)
USB-CBL-AB-7+	6.8 ft (2.1 m) USB Cable: USB type A(Male) to USB type B(Male)
USB-CBL-AB-11+	11 ft (3.4 m) USB Cable: USB type A(Male) to USB type B(Male)

NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

6x BNC FEMALE CONNECTOR

Bias 2 ±24V DC ± 200 mA Max | Aux Sync TTL | Trigger In TTL | USB 2.0 | DC Input 4.75-5.25V | Ref In 10 MHz | Ref Out 10 MHz | Bias 1 ±24V DC ± 200 mA Max

LED INDICATOR

Mini-Circuits® PORT 1   VECTOR NETWORK ANALYZER PORT 2

eVNA-63+ ⚠ +15 dBm < 10 MHz | +20 dBm ≥ 10 MHz RF | 20Vdc Max 300 kHz - 6 GHz

2x N—TYPE FEMALE CONNECTOR

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAMS
VF3213	10.02 (254.5)	7.75 (196.9)	.25 (6.4)	7.90 (200.7)	1.65 (41.9)	4.80 (121.8)	1.55 (39.4)	.81 (20.7)	1.50 (38.1)	5.28 (134)	.90 (22.9)	.67 (17.1)	.98 (25)	.25 (6.4)	2360

Dimensions are in inches (mm). Tolerances: 2 Pl. ±.03; 3 Pl. ±.015

Notes:
1. Case and Bezel material: Aluminum alloy.
2. Finish: For Case- Powder coating. Color: Blue. For Bezel - Clear anodize.

Mini-Circuits®
ISO 9001 ISO 14001 CERTIFIED

ALL NEW
minicircuits.com

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

VF3213 Rev: OR (01/12/22) NPO-002337 File: VF3213
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Sheet 1 OF 1

Mini-Circuits

Environmental Specifications **ENV50**

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-0° to 50° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-30° to 70° C Ambient Environment	Individual Model Data Sheet
Operating and Storage Humidity	5% to 85% RH (non-condensing)	Ambient
Bench Handling Test	Bench Top Tip 45° & Drop	MIL-PRF-28800F
Transit Drop Test	Free Fall Drop, 20 cm (7.9 inches)	MIL-PRF-28800F Class 3