Microwave Site Master™

Cable & Antenna Analyzer with Optional VNA and VVM Modes

S820E

1 MHz to 8 GHz, 14 GHz, 20 GHz, 30 GHz, 40 GHz

Introduction

Anritsu is proud to introduce the world's most advanced Site Master. With microwave frequency coverage up to 40 GHz, the new S820E completely redefines the standards for portable handheld analyzers, setting another new industry benchmark for performance and accuracy. The new S820E is the culmination of over 50 years of microwave development, utilizing the very latest technologies to deliver accuracy and performance previously reserved only for benchtop instruments. Based on a true 4 channel receiver design, the S820E offers true VNA performance in a portable package. Optional VNA Mode provides fully reversing S-parameter measurements anywhere, anytime. Optional Vector Voltmeter Mode (VVM) with standard A/B and B/A ratio may be used as drop-in replacement for legacy VVM products.

Cable and Antenna Analyzer Highlights

- 1-Port Measurements: RL, VSWR, Cable Loss, DTF, Phase, Smith Chart
- 2-Port Measurements: Transmission, Cable Loss
- Display: Single or Dual Measurement Touchscreen
- Calibration: Coaxial (OSL, TOSL), Waveguide (SSL, SSLT)
- Dynamic Range: 110 dB (20 MHz to 40 GHz)
- Frequency Resolution: 1 Hz (1 MHz to 40 GHz)
- Sweep Speed: 650 µs/data point
- Calibration Temperature Window: ±10 °C
- Full Temperature Calibration Kits: −10 °C to +55 °C

Vector Network Analyzer Highlights

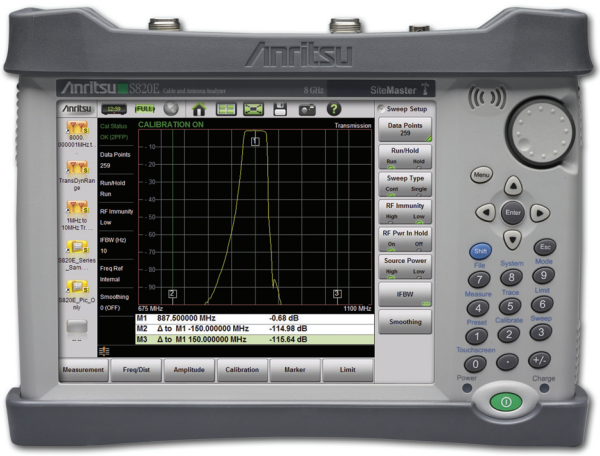
- Fully Reversing Error Corrected Measurements
- Measure All Four S-Parameters Simultaneously
- Flexible Trace Display Layout: 1, 2, 3, or 4, and Overlay
- Calibration Interpolation and Through Update
- Independent Markers and Limits Per Trace
- Fast Sweeps (<700 µs/pt) Even in 5 kHz IFBW
- Arbitrary Data Point Setting
- Port Reference Plane Extension (Distance And/or Loss)

Vector Voltmeter Highlights

- A/B & B/A Ratio Measurement Standard
- Reference Auto-tune reduces or eliminates need for common 10 MHz reference (for A/B & B/A Ratio measurement only)
- Reflection/Transmission Measurement Standard
- Vector Error Correction for Absolute Measurement (Reflection/Transmission only)
- 4 Flexible Data Display Formats
- Table Display allows 12 Measurements and 1 Reference, Simultaneously

Capabilities and Functional Highlights

- Benchtop VNA Performance
- Intuitive GUI + Classic Mode
- 2-Port Measurements Standard
- 2-Port Cable Loss
- Std High Accuracy Power Meter
- USB Transmission Sensors up to 40 GHz
- Ethernet/USB Connectivity
- USB Peripheral Support
- Touchscreen Popup Keyboard
- easyTest™ Automated Scripts
- Embeddded Help (FAQ and User Guide)



Microwave Site Master™ S820E Cable and Antenna Analyzer Featuring 8.4 in Daylight Viewable Touchscreen
Compact Size: 273 mm x 199 mm x 91 mm (10.7 in x 7.8 in x 3.6 in), Lightweight: 3.0 kg (6.6 lb)

Description Page

Definitions

All specifications and characteristics apply under the following conditions, unless otherwise stated:

Warm-Up Time	After 10 minutes of warm-up time, where the instrument is left in the ON state.
Temperature Range	Over the 23 °C ± 5 °C temperature range.
Reference Signal	When using internal reference signal.
Typical Performance	Typical specifications that are not in parenthesis are not tested and not warranted. They are generally representative of characteristic performance.
	Typical specifications in parenthesis ( ) represent the mean value of measured units and do not include any guard-bands or uncertainties. They are not warranted.
Uncertainty	A coverage factor of x1 is applied to the measurement uncertainties to facilitate comparison with other industry handheld analyzers.
Calibration Cycle	Calibration is within the recommended 12 month period (residual specifications also require calibration kit calibration cycle adherence.)
	All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site: www.anritsu.com

Cable and Antenna Analyzer

Measurements

1-Port Measurements	Return Loss
	Distance-to-Fault (DTF) Return Loss
	Cable Loss
	VSWR
	Distance-to-Fault (DTF) VSWR
	Smith Chart 50 Ω/75 Ω (Advanced Mode Only)
	Phase (Advanced Mode Only)
2-Port Measurements	Transmission (Advanced Mode Only)
	Transmission with External Sensor (Advanced Mode Only)
	Cable Loss (2-Port) with External Sensor (Classic Mode Only)

Setup Parameters Classic Mode

Measurement Display	Single Display with independent markers
Frequency	F1/F2
DTF	D1/D2, Units m/ft, DTF Aid, Cable List, Cable Loss, Propagation Velocity
Windowing	Rectangular, Nominal Side Lobe, Low Side Lobe, Minimum Side Lobe
Amplitude	Top, Bottom Auto Scale, Full Scale, Scale Preset
Sweep	Data Points (130, 259, 517, 1033, 2065), Run/Hold, Sweep Type (Single/Continuous), RF Immunity (High/Low), RF Power in Hold (On/Off), Smoothing, Sweep Averaging (1 to 1000), Trace
Marker	Markers 1 to 6 (On/Off), Delta Makers 2 to 4 (Ref Mk1), Marker to Peak/Valley, Marker Table, Marker 5 (Peak/Valley between M1 and M2), Marker 6 (Peak/Valley between M3 and M4)
Trace	Copy Trace To Memory, Trace Display, Trace Math
Limit	On/Off, Edit Value, Limit Alarm (On/ Off), Pass/Fail (On/Off), Limit Preset
Calibration	Start Calibration, Calibration Info, Calibration Correction (On/ Off)
Calibration Setup	Coax, Waveguide
Save/Recall/File Management[1]	Measurement (.dat), Setups (.stp), Screen Shots (.png), Text (.txt), CSV (.csv)

Setup Parameters Advanced Mode

Measurement Display	Single/Dual Display with independent markers
Frequency	Start Frequency (F1), Stop Frequency (F2)
Distance	Start Distance (D1), Stop Distance (D2), Units (meters/feet), DTF Aid
DTF Setup	DTF Line Type (Coax/Waveguide), Cable List, Cable Loss, Propagation Velocity, Windowing (Rectangular, Nominal Side Lobe, Low Side Lobe, Minimum Side Lobe)
Amplitude	Top, Bottom, Auto Scale, Full Scale, Scale Preset
Sweep	Data Points (130, 259, 517, 1033, 2065), Run/Hold, Sweep Type (Single/Continuous), RF Immunity (High/Low), RF Power in Hold (On/Off), Source Power (High/Low), IFBW (10 Hz, 100 Hz, 1 kHz, 100 kHz), Smoothing, Sweep Averaging (1 to 1000)
Markers	Markers 1 to 8 (On/Off), Delta Makers 2 to 8 (Ref Mk1), Marker to Peak/Valley, Marker Tracking (On/Off), Marker Table, Marker 5 and 7 (Peak/Valley between M1 and M2), Marker 6 and 8 (Peak/Valley between M3 and M4)
Trace	Copy Trace to Memory, Trace Display, Trace Math
Limit	Active Limit (Upper/Lower), Limit State (On/Off), Move Active Limit, Edit Segments (42 upper and 42 lower segments maximum), Limit Alarm (On/Off), Pass/Fail (On/Off), Limit Preset
Calibration	Start Calibration, Calibration Info, Calibration Correction (On/Off)
Save/Recall/File Management[1]	Measurement (.dat), Setups (.stp), Screen Shots (.png), Text (.txt), CSV (.csv)

Frequency

Frequency Range	1 MHz to 8 GHz, 14 GHz, 20 GHz, 30 GHz, 40 GHz (frequency option dependent)
Frequency Accuracy	± 1.0 ppm at 23 °C
Stability	± 1.0 ppm from –10 °C to +55 °C, typical
Aging	± 1.0 ppm/yr, typical
Frequency Resolution	1 Hz

IFBW

Advanced Mode Only	10 Hz, 100 Hz, 1 kHz, 100 kHz

Output Power

High	–3 dBm, typical
Low	–20 dBm, typical

RF Immunity[2]

+17 dBm, typical

1. Text (.txt) and CSV (.csv) files cannot be recalled to the instrument.
2. +13 dBm for interfering signals landing in-band.

Cable and Antenna Analyzer (continued)

Measurement Speed[1]

Reflection/Transmission Measurements	≤ 650 µs/data point, RF immunity low, typical
Transmission Ext. Sensor (2-port Cable Loss)	Determined by USB sensor and may vary with model used, not specified.

Dynamic Range[2,3] (High Power, 10 Hz IFBW, 10 averages Port 1 to Port 2)

1 MHz to 20 MHz	≥ 85 dB (105 dB, typical)
>20 MHz to 8 GHz	≥ 100 dB (115 dB, typical)
>8 GHz to 40 GHz	≥ 100 dB (110 dB, typical)

Receiver Compression Port 1 or Port 2

1 MHz to 40 GHz	+5 dBm (0.1 dB compression), typical

High Level Noise[4] (High Power, 100 Hz IFBW, 20 MHz to 40 GHz)

Magnitude	± 0.006 dB (± 0.001 dB, typical) rms
Phase	± 0.090° (± 0.060°, typical)

Smoothing

Range	0 % to 20 %

System Impedance

Port 1 or Port 2	50 Ω standard, 75 Ω with 50 Ω to 75 Ω adapter

Return Loss

Measurement Display Range	0 dB to 1000 dB
Resolution	0.01 dB

VSWR

Measurement Display Range	1 to 1000
Resolution	0.01

Cable Loss

Measurement Display Range	0 dB to 500 dB
Resolution	0.01 dB

Distance-to-Fault

Vertical Range Return Loss	0 dB to 1000 dB
Vertical Range VSWR	1 to 1000
Fault Resolution (meters)	$(1.5 \times 10^8 \times vp)/\Delta F$ (vp = propagation velocity constant, ΔF is F2–F1 in Hz)
Horizontal Range (meters)	0 to (Data Points – 1) x Fault Resolution, to a maximum of 1500 m (4921 ft)

1-Port Phase

Measurement Display Range	–450 ° to +450 °
Resolution	0.01 °

Smith Chart

Impedance	50 Ω, 75 Ω
Resolution	0.01

Cable Loss 2-Port (Classic Mode Only)

Measurement Display Range	–1000 dB to +1000 dB
Resolution	0.01 dB

Transmission (Advanced Mode Only)

Measurement Display Range	–1000 dB to +1000 dB
Resolution	0.01 dB

Transmission Ext Sensor (Advanced Mode Only)

Measurement Display Range	–1000 dB to +1000 dB
Resolution	0.01 dB

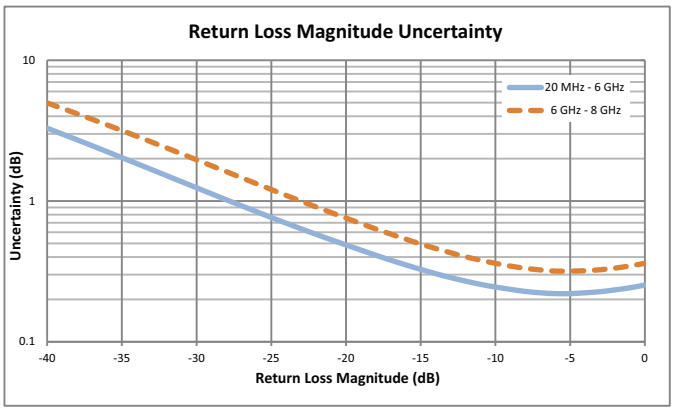
1. 10 ms/point, 1 MHz to 10 MHz, 100 kHz IFBW, typical.
2. Dynamic range is defined as the difference between output power and receiver noise floor.
3. Decrease specification by 20 dB below 10 MHz. Decrease specification by 5 dB between 8 GHz and 14 GHz.
4. High Level Noise below 20 MHz is increased by a factor of 5.0. High Level Noise (Phase only) above 20 GHz is increased by a factor of 1.5.

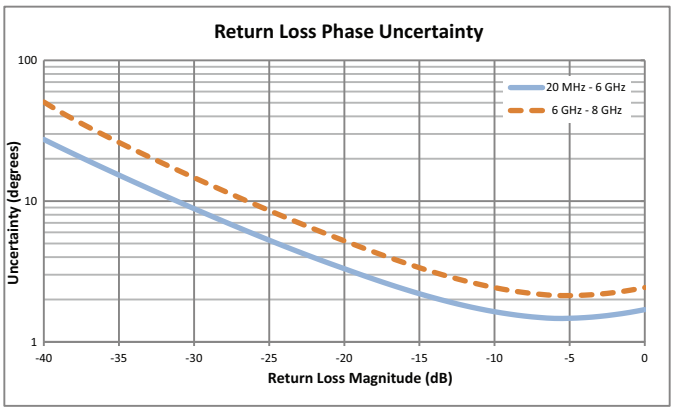
Cable and Antenna Analyzer (continued)

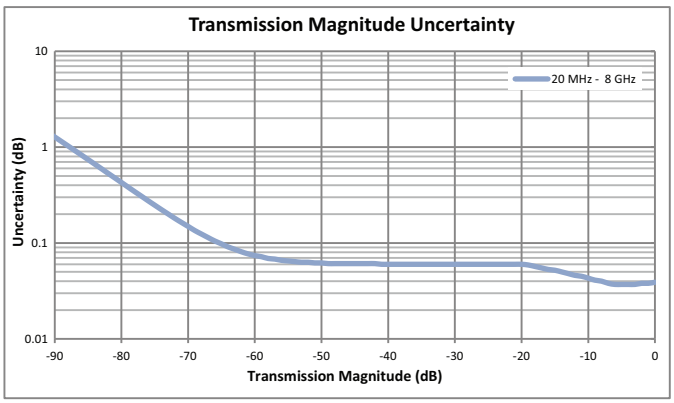
Measurement Accuracy[1] (OSLN50A-8 or OSLNF50A-8, TOSLN50A-8 or TOSLNF50A-8)

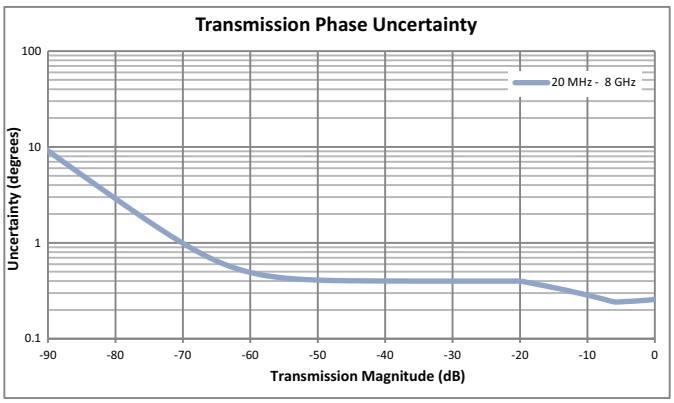
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 6 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 6 GHz to 8 GHz	≥ 37	≥ 33	≥ 37	± 0.08	± 0.06

Corrected Measurement Uncertainty (Transmission from Port 1 to Port 2)









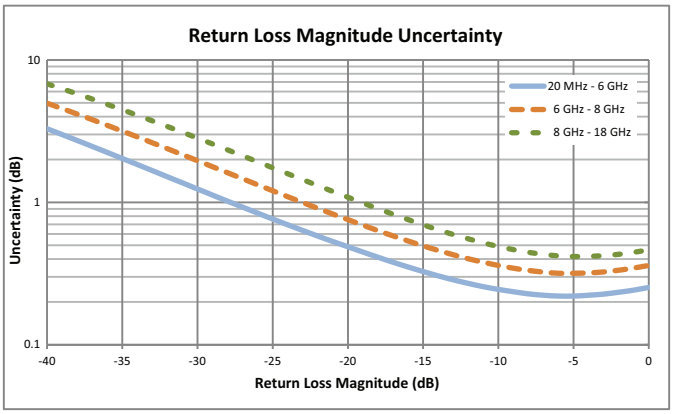
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. OSLN50A-8, OSLNF50A-8, TOSLN50A-8, or TOSLNF50A-8 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

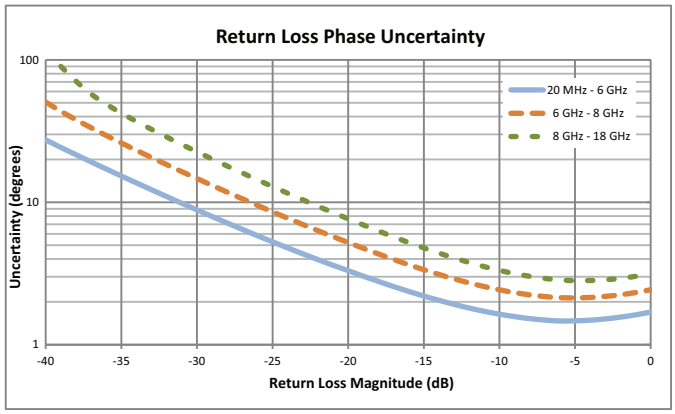
Cable and Antenna Analyzer (continued)

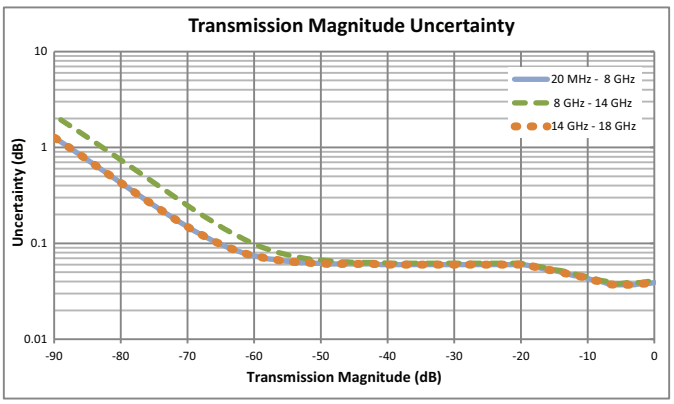
Measurement Accuracy[1] (OSLN50A-18 or OSLNF50A-18, TOSLN50A-18 or TOSLNF50A-18)

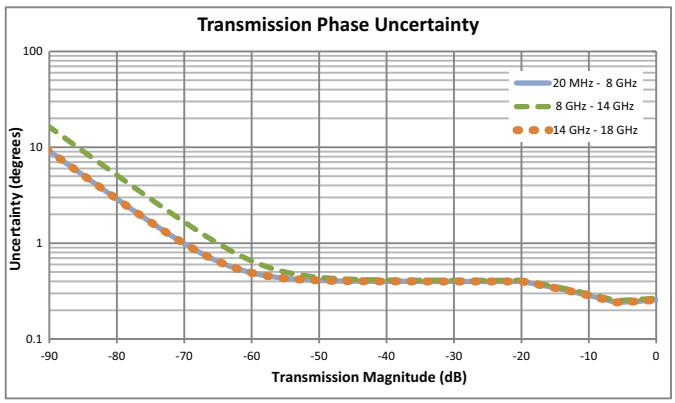
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 6 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 6 GHz to 9 GHz	≥ 37	≥ 33	≥ 37	± 0.08	± 0.06
> 9 GHz to 18 GHz	≥ 33	≥ 26	≥ 33	± 0.04	± 0.03

Corrected Measurement Uncertainty (Transmission from Port 1 to Port 2)









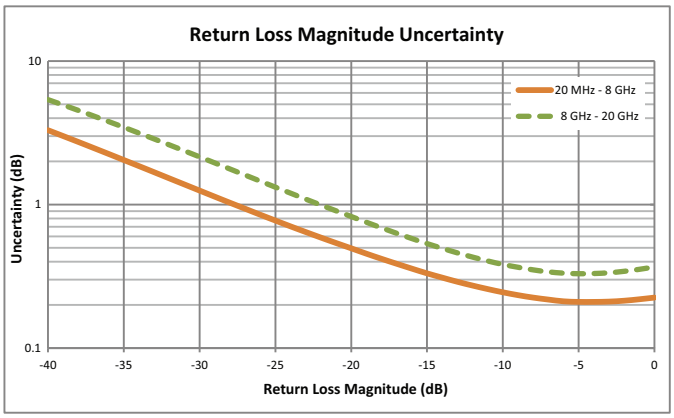
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. OSLN50A-18, OSLNF50A-18, TOSLN50A-18, or TOSLNF50A-18 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

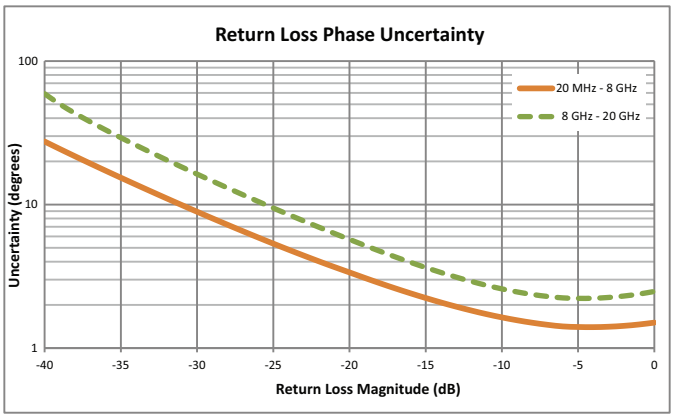
Cable and Antenna Analyzer (continued)

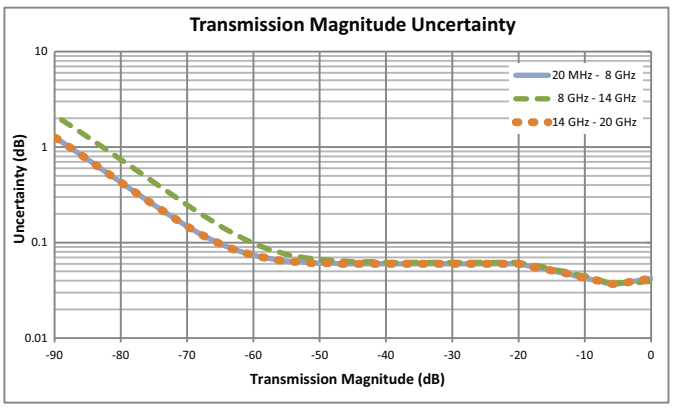
Measurement Accuracy[1] (TOSLK50A-20 or TOSLKF50A-20)

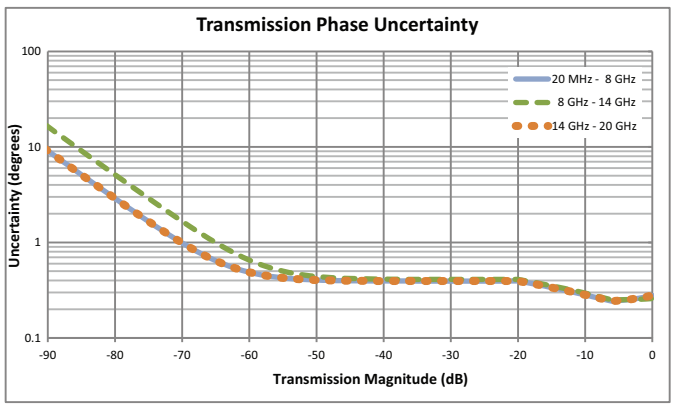
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 10 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 10 GHz to 20 GHz	≥ 36	≥ 26	≥ 36	± 0.04	± 0.03

Corrected Measurement Uncertainty (Transmission from Port 1 to Port 2)









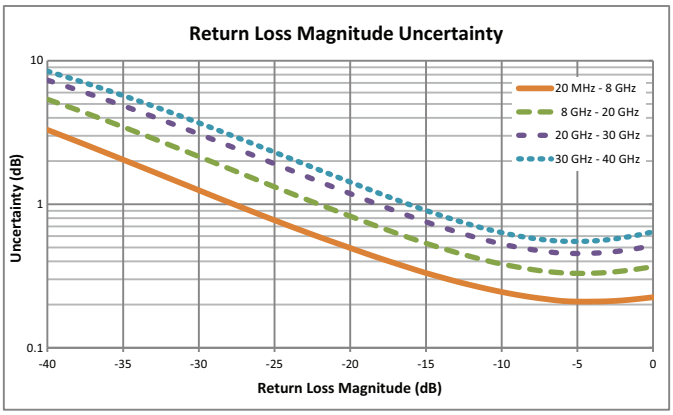
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. TOSLK50A-20 or TOSLKF50A-20 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

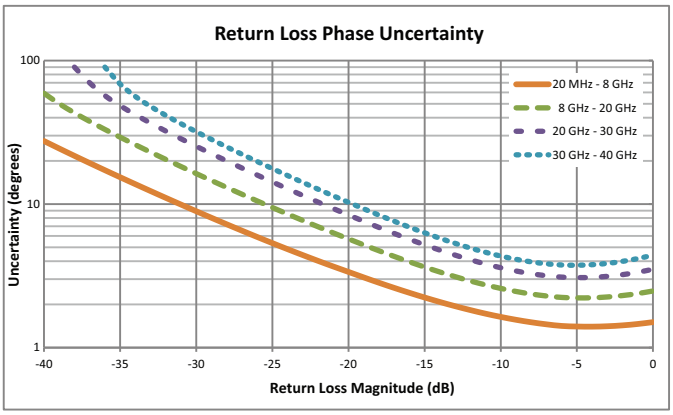
Cable and Antenna Analyzer (continued)

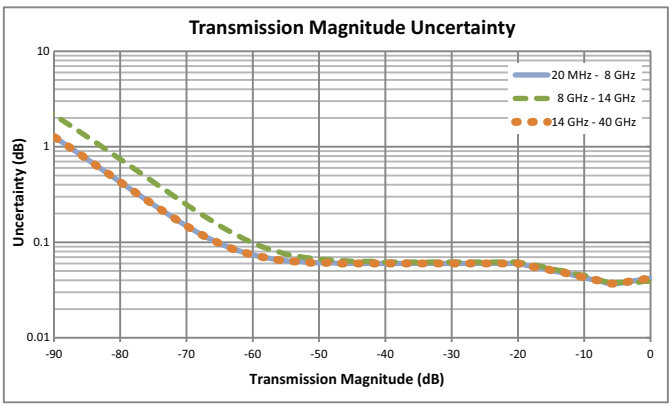
Measurement Accuracy[1] (TOSLK50A-40 or TOSLKF50A-40)

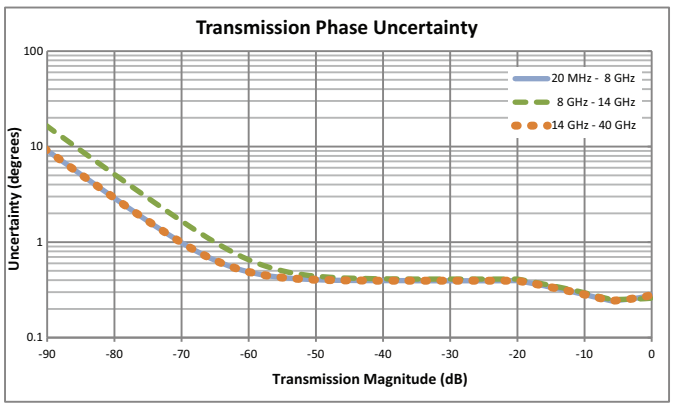
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 10 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 10 GHz to 20 GHz	≥ 36	≥ 26	≥ 36	± 0.04	± 0.03
> 20 GHz to 30 GHz	≥ 32	≥ 22	≥ 32	± 0.04	± 0.03
> 30 GHz to 40 GHz	≥ 30	≥ 20	≥ 30	± 0.04	± 0.03

Corrected Measurement Uncertainty (Transmission from Port 1 to Port 2)





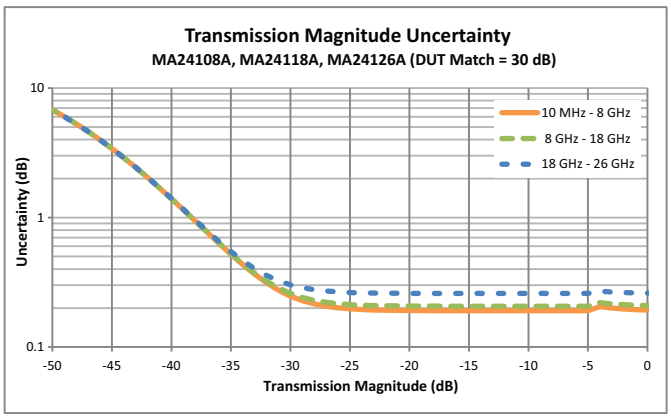


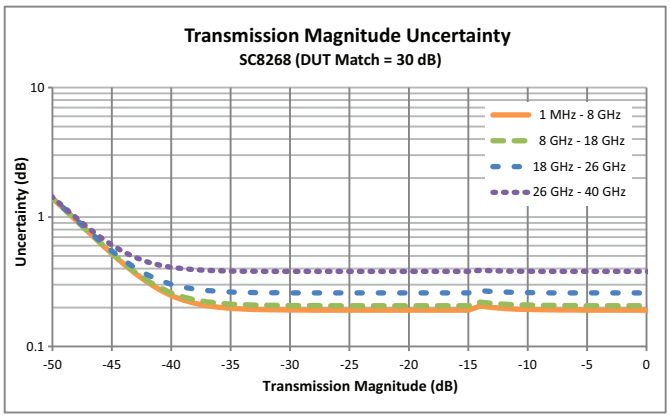


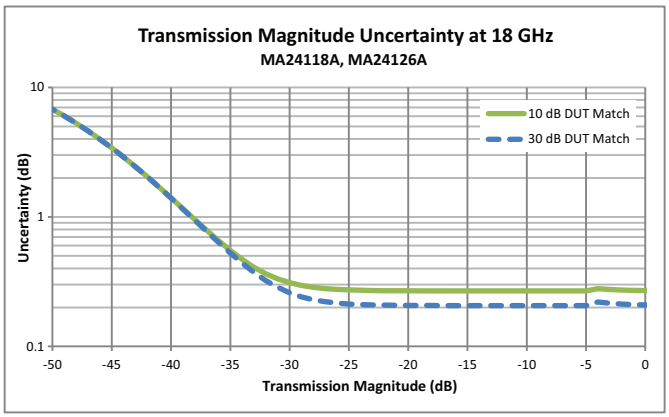
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. TOSLK50A-40 or TOSLKF50A-40 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

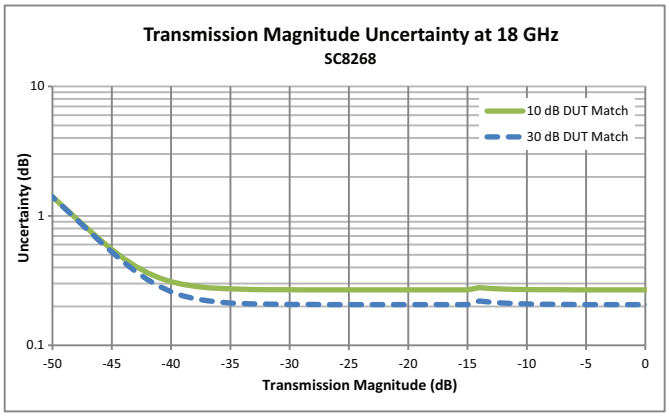
Cable and Antenna Analyzer (continued)

External Sensor Transmission Measurement Accuracy[1] (Corrected Transmission Uncertainty, Magnitude Only)









High Accuracy Power Meter (Requires external USB power sensor, sold separately)

Amplitude	Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale
Average	# of Running Averages, Max Hold
Zero/Cal	Zero On/Off, Cal Factor (Center Frequency, Signal Standard)
Limits	Limit On/Off, Limit Upper/Lower

Power Sensor Model	MA24105A	MA24106A	MA24108A/18A/26A
Description	Inline High Power Sensor	High Accuracy RF Power Sensor	Microwave USB Power Sensor
Frequency Range	350 MHz to 4 GHz	50 MHz to 6 GHz	10 MHz to 8/18/26 GHz
Connector	Type N(f), 50 Ω	Type N(m), 50 Ω	Type N(m), 50 Ω (8/18 GHz) Type K(m), 50 Ω (26 GHz)
Dynamic Range	+3 dBm to +51.76 dBm (2 mW to 150 W)	–40 dBm to +23 dBm (0.1 µW to 200 mW)	–40 dBm to +20 dBm (0.1 µW to 100 mW)
VBW	100 Hz	100 Hz	50 kHz
Measurand	True-RMS	True-RMS	True-RMS, Slot Power, Burst Average Power
Measurement Uncertainty	± 0.17 dB[a]	± 0.16 dB[b]	± 0.18 dB[c]
Data sheet (for complete specifications)	11410-00621	11410-00424	11410-00504

Notes:

a. Expanded uncertainty with K=2 for power measurements of a CW signal greater than +20 dBm with a matched load. Measurement results referenced to the input side of the sensor.
b. Total RSS measurement uncertainty (0 ºC to 50 ºC) for power measurements of a CW signal greater than –20 dBm with zero mismatch errors.
c. Expanded uncertainty with K=2 for power measurements of a CW signal greater than –20 dBm with zero mismatch errors.

1. Sensor Transmission Calibration from Port 1 to Sensor, default power, 10 Hz bandwidth. SC8268 specifications below 10 MHz are typical.

Vector Network Analyzer (Option 0440)

Setup Parameters

Active Trace	Tr1, Tr2, Tr3, Tr4
Measurement (S Parameter)	S_{11}, S_{21}, S_{12}, S_{22}
Graph Types	Log Magnitude, SWR, Phase, Real, Imaginary, Group Delay, Smith Chart (Impedance), Inverted Smith Chart (Admittance), Log Mag/2 (1-Port Cable Loss), Real Impedance, Imaginary Impedance
Domain	Frequency Domain, Distance Domain
Number of Traces	1, 2, 3, 4
Trace Format	Single, Dual, Tri, Quad. When used with Number of Traces, overlays are possible including a Single Format with Four trace overlays.
Smoothing	Smoothing 0 % to 20 % Independent Trace based.
Group Delay Aperture	Aperture 0.25 % to 20 % Aperture Defined as the frequency span over which the phase change is computed at a given frequency point. The aperture can be changed without recalibration.
Group Delay Range	< 180º of phase change within the aperture
Frequency	Start Frequency (F1), Stop Frequency (F2)
Distance	Start Distance (D1), Stop Distance (D2)
Distance Units	Meters (m), Feet (ft)
DTF Aid	Provides detailed DTF resolution information based on current instrument settings. Also provides helpful tips to optimize results.
DTF Setup	DUT Line Type (Coax/WG), Cable List, Cable Loss, Propagation Velocity, Windowing
Windowing	Rectangular, Nominal Side Lobe, Low Side Lobe, Minimum Side Lobe
Amplitude	Resolution Per Division, Reference Value, Reference Line, Autoscale, Scale Preset
Calibration	Start Calibration, Through Update, Cal Info, Interpolation (On/Off), Cal Correction (On/Off)
Cal Type	Full 2-Port, Full S_{11}, Full S_{22}, Full S_{11} & S_{22}, One- Path Two-Port (S_{11},S_{21}), One-Path Two-Port (S_{22},S_{12}), Response S_{11}, Response S_{22}, Response S_{11} & S_{22}, Response S_{21}, Response S_{12}, Response S_{21} & S_{12}
Cal Line	Coax, Waveguide
Cal Method	Short-Open-Load-Through (SOLT), Offset-Short (SSLT)
Calibration Standards' Coefficients	Coax: K-Connector, N-Connector, 7/16, TNC, SMA, TNC, and four User defined Waveguide: WG11A, WG12, WG13, WG14, WG15, WG16, WG17, WG18, WG20, WG22, and four User Defined
Marker	Markers 1 to 8 (On/Off), Delta Makers 2 to 8 (Ref Mk1), Marker to Peak/Valley, Marker Tracking (On/Off),4 Marker Table, Marker 5 and 7 (Peak/Valley between M1 and M2), Marker 6 and 8 (Peak/Valley between M3 and M4)
Limit	Active Limit (Upper/Lower), Limit State (On/Off), Move Active Limit, Edit Segments (42 upper and 42 lower segments maximum), Limit Alarm (On/Off), Pass/Fail (On/Off), Limit Preset
Test Limits	Pass/Fail for Upper, Pass/Fail for Lower, Limit Audible Alarm
Save[1]	Measurement (.svna), Setup (.stp), Screen Shot (.png), S2P-Real/Imaginary (.s2p), S2P-Linear Mag/Phase (.s2p), S2P-Log Mag/Phase (.s2p), Text (.txt), CSV (.csv)
Recall[2]	Measurement (.svna), Setup (.stp), Screen Shot (.png)
File Management	Rename, Create Folder, Copy, Paste, Delete
Navigation (File management)	Top, Bottom, Page Up, Page Down
Frequency Sweep Type	Linear Continuous, Linear Single Sweep
Data Points	Data Points 2 to 4001 (arbitrary setting)
Data Averaging	Sweep-by-Sweep, 1 to 1000
IF Bandwidth (Hz)	10, 20, 50, 100, 200, 500, 1k, 2k, 5k, 10k, 20k, 50k, 100k
Reference Plane	Reference Plane The reference planes of a calibration (or other normalization) can be changed by entering a line length and loss. Assumes flat magnitude, linear phase, and constant impedance.
Trace Memory	A separate memory for each trace can be used to store measurement data for later display. The trace data can be saved and recalled.
Trace Math	Complex trace math operations of subtraction, addition, multiplication, or division are provided.
Dispersion Compensation	Waveguide correction that improves accuracy of distance-to-fault data by automatically compensating for different wavelengths propagating at different speeds.
Impedance Conversion	Support for 50 Ω and 75 Ω Smith Charts are provided.
Timebase Reference	Internal (default), External 10 MHz (Auto-sense, BNC female, Max +10 dBm)
Ethernet Configuration	DHCP or Manual (Static) IP configuration, 10/100 Base-T, RJ45 jack
Languages	English, French, German, Italian, Spanish, Russian, Portuguese, Japanese, Korean, Chinese

1. SVNA (.svna) and S2P (.s2p) file formats are available in VNA Mode only.
2. SVNA (.svna) file format recall is available in VNA Mode only.

Vector Network Analyzer (Option 0440) (continued)

Frequency

Frequency Range	1 MHz to 8/14/20/30/40 GHz (Frequency option dependent)
Frequency Accuracy	± 1.0 ppm at 23 °C
Stability	± 1.0 ppm from –10 °C to +55 °C, typical
Aging	± 1.0 ppm/yr, typical
Frequency Resolution	1 Hz

Output Power

–3 dBm, typical (High), –20 dBm, typical (Low)

RF Immunity [1]

RF Immunity High	+17 dBm nominal

Measurement Speed [2, 3]

≤650 µs/pt (S_{11} and S_{21}, 1001 points, 100 kHz IFBW, RF immunity low, typical)

Dynamic Range[4] (High Power, 10 Hz IFBW, 10 averages Port 1 to Port 2)

1 MHz to 20 MHz	≥ 85 dB (105 dB, typical)
>20 MHz to 8 GHz	≥ 100 dB (115 dB, typical)
>8 GHz to 40 GHz	≥ 100 dB (110 dB, typical)

Receiver Compression Port 1 or Port 2

1 MHz to 40 GHz	+5 dBm (0.1 dB compression), typical

High Level Noise[5] (High Power, 100 Hz IFBW, 20 MHz to 40 GHz)

Magnitude	± 0.006 dB (± 0.001 dB, typical) rms
Phase	± 0.090° (± 0.060°, typical)

Log Mag

Resolution Per Division	0.01 to 100 dB
Reference Value	± 1000 dB
Reference Line	0 to 10

SWR

Resolution Per Division	0.01 to 100
Reference Value	1 to 1000
Reference Line	0 to 10

Phase

Resolution Per Division	0.01° to 90°
Reference Value	± 1000°
Reference Line	0 to 10

Real/Imaginary

Resolution Per Division	0.01 to 260
Reference Value	± 10000
Reference Line	0 to 10

Group Delay

Resolution Per Division	1 fs to 100 s
Reference Value	± 100 s
Reference Line	0 to 10

Smith Chart/Inv Smith Chart

Reference Impedance 50 Ω, 75 Ω

Log Mag/2

Resolution Per Division	0.01 to 100 dB
Reference Value	± 1000 dB
Reference Line	0 to 10

Real/Imaginary Impedance

Resolution Per Division	0.01 Ω to 100,000 Ω
Reference Value	± 100,000 Ω
Reference Line	0 to 10

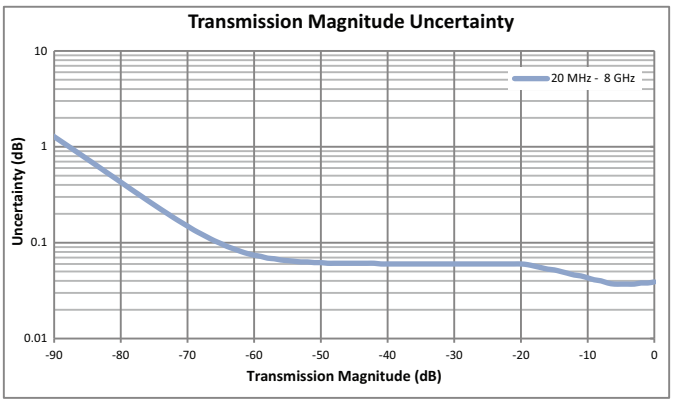
1. +13 dBm for interfering signals landing in-band.
2. Single trace display, frequency domain. Excludes Group Delay, Smith, or Admittance graph types. Excludes Active Smoothing, Markers, and/or Limits.
3. 10 ms/pt from 1 MHz to 10 MHz.
4. Dynamic range is defined as the difference between output power and receiver noise floor. Decrease specification by 20 dB below 10 MHz. Decrease specification by 5 dB between 8 GHz and 14 GHz.
5. High Level Noise below 20 MHz is increased by a factor of 5.0. High Level Noise (Phase only) above 20 GHz is increased by a factor of 1.5.

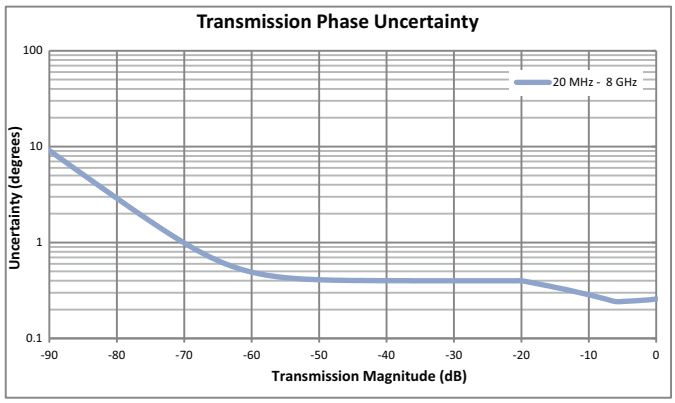
Vector Network Analyzer (Option 0440) (continued)

Measurement Accuracy[1] (OSLN50A-8 or OSLNF50A-8, TOSLN50A-8 or TOSLNF50A-8)

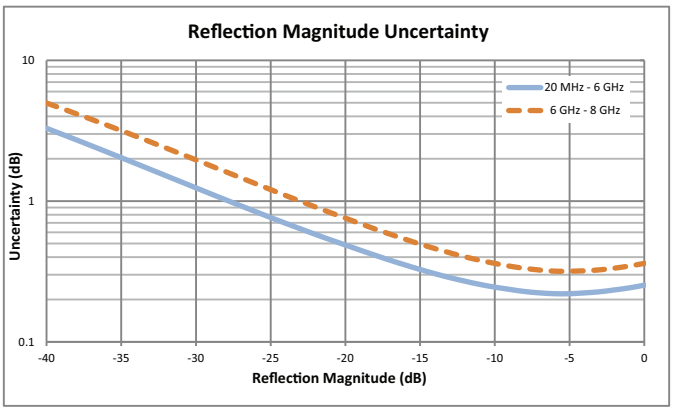
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 6 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 6 GHz to 8 GHz	≥ 37	≥ 33	≥ 37	± 0.08	± 0.06

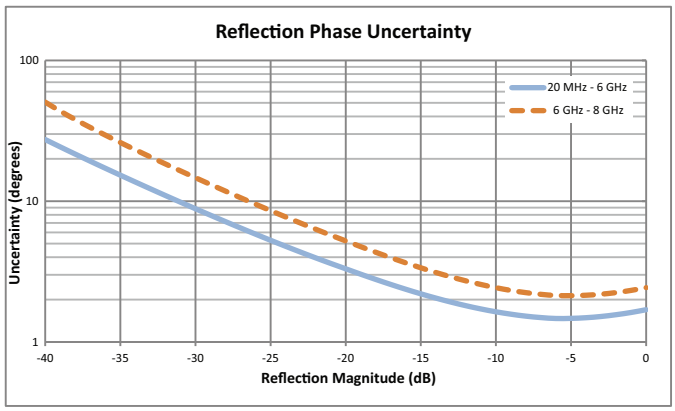
Transmission Uncertainty (S_{21}, S_{12})





Reflection Uncertainty (S_{11}, S_{22})





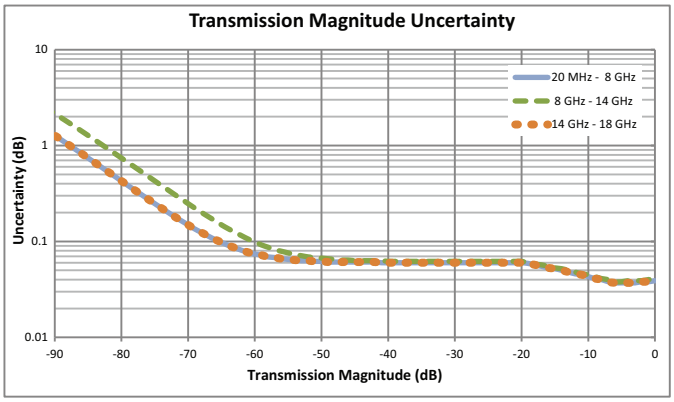
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. OSLN50A-8, OSLNF50A-8, TOSLN50A-8, or TOSLNF50A-8 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

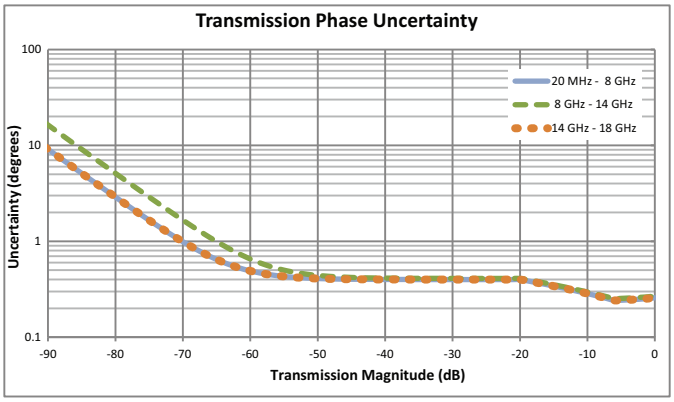
Vector Network Analyzer (Option 0440) (continued)

Measurement Accuracy[1] (OSLN50A-18 or OSLNF50A-18, TOSLN50A-18 or TOSLNF50A-18)

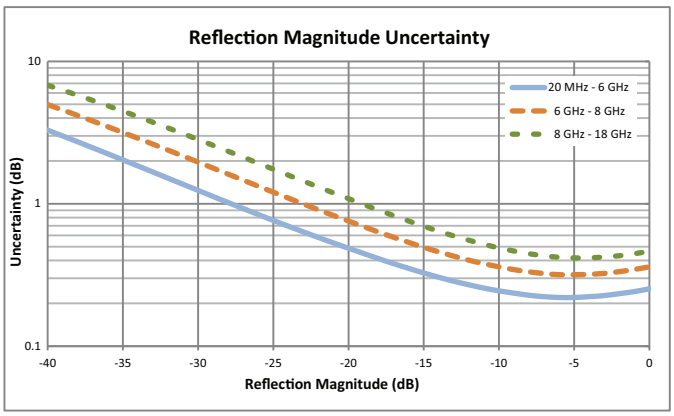
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 6 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 6 GHz to 9 GHz	≥ 37	≥ 33	≥ 37	± 0.08	± 0.06
> 9 GHz to 18 GHz	≥ 33	≥ 26	≥ 33	± 0.04	± 0.03

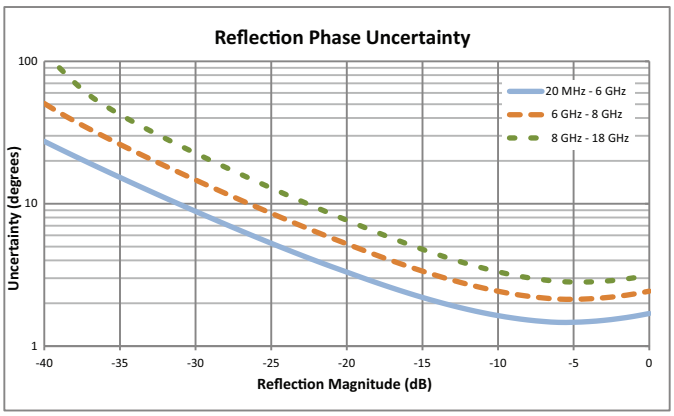
Transmission Uncertainty (S_{21}, S_{12})





Reflection Uncertainty (S_{11}, S_{22})





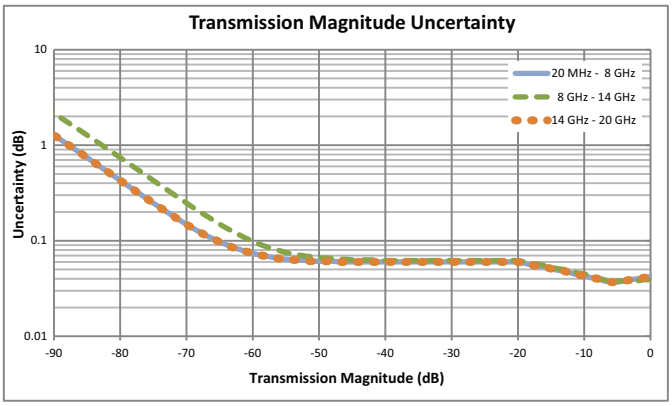
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. OSLN50A-18, OSLNF50A-18, TOSLN50A-18, or TOSLNF50A-18 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

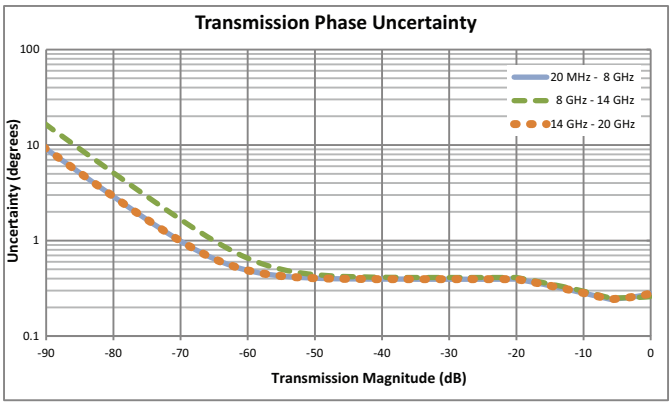
Vector Network Analyzer (Option 0440) (continued)

Measurement Accuracy[1] (TOSLK50A-20 or TOSLKF50A-20)

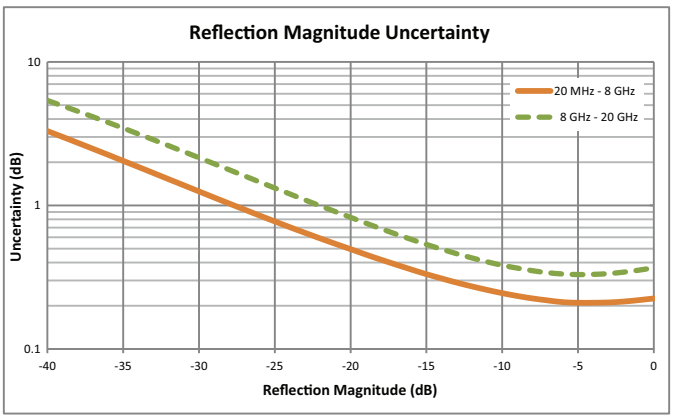
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 10 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 10 GHz to 20 GHz	≥ 36	≥ 26	≥ 36	± 0.04	± 0.03

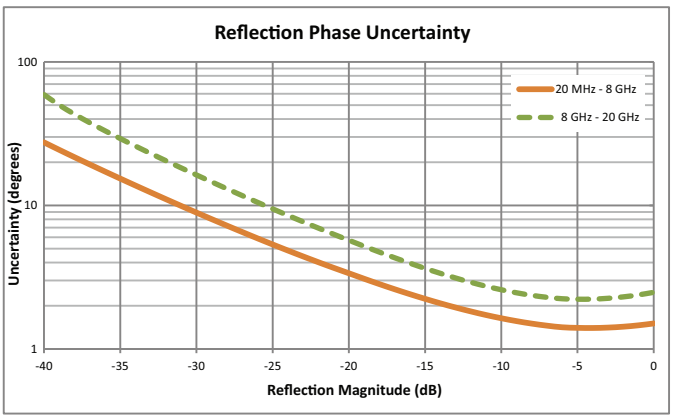
Transmission Uncertainty (S_{21}, S_{12})





Reflection Uncertainty (S_{11}, S_{22})





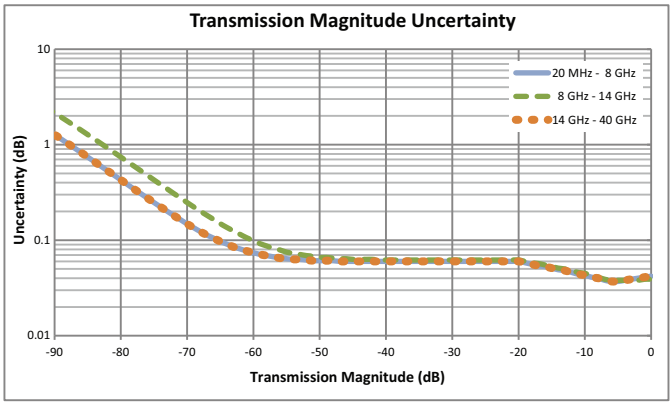
1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. TOSLK50A-20 or TOSLKF50A-20 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

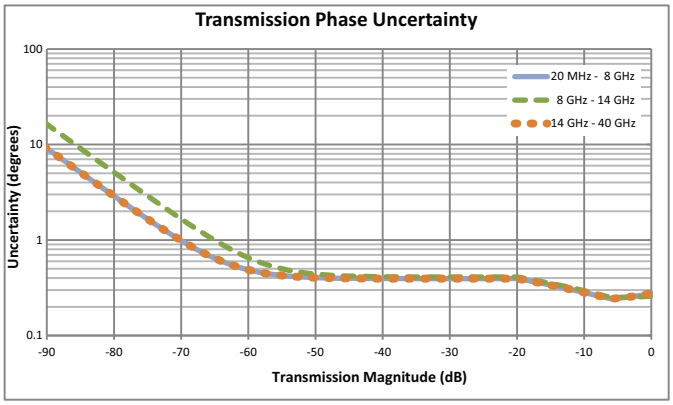
Vector Network Analyzer (Option 0440) (continued)

Measurement Accuracy[1] (TOSLK50A-40 or TOSLKF50A-40)

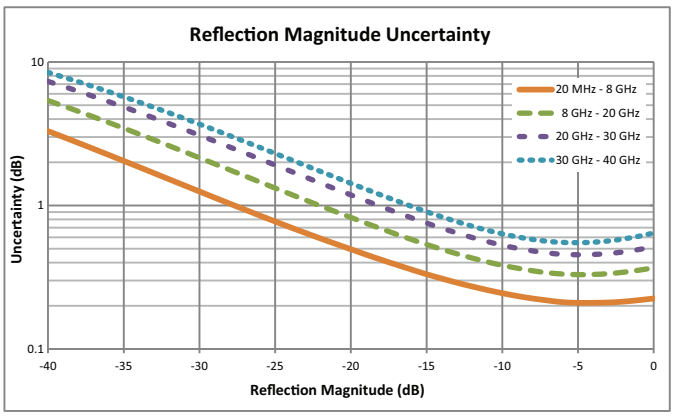
Frequency Range	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
1 MHz to 10 GHz	≥ 42	≥ 33	≥ 42	± 0.08	± 0.06
> 10 GHz to 20 GHz	≥ 36	≥ 26	≥ 36	± 0.04	± 0.03
> 20 GHz to 30 GHz	≥ 32	≥ 22	≥ 32	± 0.04	± 0.03
> 30 GHz to 40 GHz	≥ 30	≥ 20	≥ 30	± 0.04	± 0.03

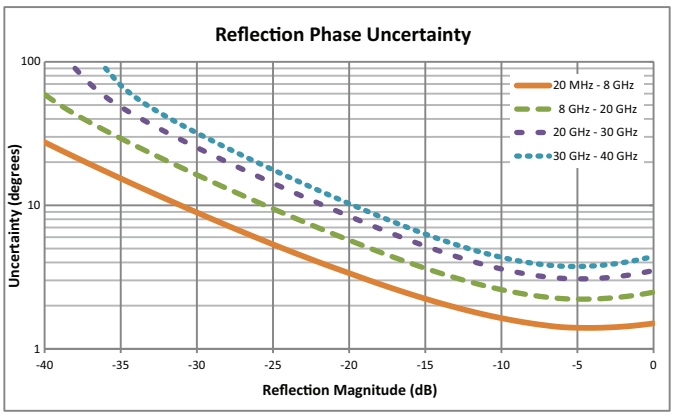
Transmission Uncertainty (S_{21}, S_{12})





Reflection Uncertainty (S_{11}, S_{22})





1. Full 2-Port calibration with isolation, Default Power, 10 Hz IFBW, No averaging, 10 minute warm-up. TOSLK50A-40 or TOSLKF50A-40 calibration kit. Load match specification applicable directly at corrected port only. De-rate by approximately 8 dB if using a 3670 series test port cable. Reflection and Transmission Tracking are typical.

Vector Voltmeter (Option 0441)

Setup Parameters (Measurement)

Reflection	1-port Reflection (best for cable trimming, stub tuning, magnitude and phase matching of low loss DUTs)
Transmission	2-port Transmission (best magnitude and phase matching of splitters, high loss DUTs, glide slope, etc.)
Ratio A/B	Magnitude & Phase Ratio of A & B receivers. Port 1 = A, Port 2 = B. Requires external CW source
Ratio B/A	Magnitude & Phase Ratio of A & B receivers. Port 1 = A, Port 2 = B. Requires external CW source
Measurement Format	LogMag/Phase, LinMag/Phase, SWR, Impedance
Display Format	Single, Table (table holds up to 12 measurements plus reference)
Save Reference	Normalize response (Measurements become relative to saved reference)
Clear Reference	Clears normalized response (Measurements are no longer relative to saved reference)
Clear Table	Clears all values in table

Setup Parameters (Frequency)[1]

Measurement Frequency	Set CW Frequency, 1 MHz (minimum)

Setup Parameters (Amplitude)

Resolution	1 or 2 Decimal Display Resolution
Reference Impedance	50 Ω or 75 Ω (Impedance Measurement Format only)

Setup Parameters (Calibration)

Start Calibration	Measure, Cal Setup
Cal Info	Display current calibration status, including temperature
Cal Correction	On/Off

Setup Parameters (Sweep)

Run/Hold	Hold stops measurement and freezes display data
RF Pwr In Hold	On/Off
Source Power	High/Low
IFBW	10 Hz, 100 Hz (default), 1 kHz, 100 kHz
Sweep Averaging	Range 1 to 1000 rolling average

Setup Parameters (File)

Save	Measurement (.vvm), Setup (.stp), Screen Shot (.png), Text (.txt), CSV (.csv)
Recall	Measurement (.vvm), Setup (.stp), Screen Shot (.png)
File Management	Rename, Create Folder, Copy, Paste, Delete
Navigation (File management)	Top, Bottom, Page Up, Page Down

Setup Parameters (System)

Timebase Reference	Internal (default), External 10 MHz (Auto-sense, BNC female, Max +10 dBm)
Ethernet Configuration	DHCP or Manual (Static) IP configuration, 10/100 Base-T, RJ45 connector
Languages	English, French, German, Italian, Spanish, Russian, Portuguese, Japanese, Korean, Chinese

1. Reference receiver (A or B) will Auto-tune approximately ±100 kHz to lock onto external CW signal during A/B & B/A Ratio measurement.

Vector Voltmeter (Option 0441) (continued)

Frequency

Frequency Range	1 MHz to 8/14/20/30/40 GHz (Frequency option dependent)
Frequency Accuracy	± 1.0 ppm at 23 °C
Stability	± 1.0 ppm from –10 °C to +55 °C, typical
Aging	± 1.0 ppm/yr, typical
Frequency Resolution	1 Hz

Output Power[1]

-3 dBm, typical (High), -20 dBm, typical (Low)

Reflection/Transmission Uncertainty

1 MHz to 40 GHz	See the uncertainty curves in the Cable and Antenna Analyzer section. Applicable only when a vector error correction (calibration) is performed and active. Uncalibrated reflection/transmission uncertainty is not specified.

Receiver Compression[2] Port 1 or Port 2

1 MHz to 40 GHz	+5 dBm (0.1 dB compression) typical

Reference Level Input Range[2] (A/B and B/A)

1 MHz to 40 GHz	+5 dBm to –60 dBm (auto ranging), typical

Ratio Accuracy[3] (A/B and B/A)

1 MHz to 1 GHz	≤± 0.2 dB typical (Relative to stored reference, DUT loss <10 dB)
>1 GHz to 20 GHz	≤± 0.5 dB typical (Relative to stored reference, DUT loss <10 dB)
>20 GHz to 40 GHz	≤± 1.0 dB typical (Relative to stored reference, DUT loss <10 dB)

Measurement Format

LogMag/Phase

Resolution	1 or 2 decimal places
Magnitude Display	dB
Phase Display Range	± 180°

LinMag/Phase

Resolution	1 or 2 decimal places
Magnitude Display	Linear
Phase Display Range	± 180°

SWR

Resolution	1 or 2 decimal places
Display	Linear SWR

Impedance

Resolution	1 or 2 decimal places
Display	Real and Imaginary (complex impedance) Ω

1. Not applicable in A/B or B/A Ratio Measurement.
2. Recommend ≤+3 dBm for A/B or B/A Ratio Measurement.
3. Reference signal level 0 to -20 dBm at input port.

General Specifications

Setup Parameters[1]

System Info	Status, Battery
System Setups	Date/Time, Language, Display/Audio
Date/Time	Day, Month, Year, Time
Language	English, French, German, Italian, Spanish, Russian, Portuguese, Japanese, Korean, Chinese
Display/Audio	Brightness, Color Schemes, Screen Shot Settings, Volume
Connectivity	GPS (Clear Data, Sync System Time), Ethernet Configuration (DHCP/Static)
Diagnostics	Self Test
Preset	Preset, Reset
Reset	Factory Reset, Delete All User or Custom Files, Master Reset, Update Firmware
File	Save, Recall, File Management
File Management	Rename, Create Folder, Copy, Paste, Delete, Navigation
Save	Measurement (*.dat), Setup (*.stp), Screen Shot (*.png), Text (*.txt), CSV (*.csv)
Recall	Measurement (*.dat), Setup (*.stp), Screen Shot (*.png)
Navigation	Top, Bottom, Page Up, Page Down
Internal Trace/Setup Memory	>2000 files, files may be traces, setups, screenshots, or any combination
External Trace/Setup Memory	Limited only by size of USB Flash drive

Connectors

Port 1 (models up to 14 GHz)	Type N, female, 50 Ω, Maximum Input +23 dBm, ±50 VDC
Port 2 (models up to 14 GHz)	Type N, female, 50 Ω, Maximum Input +23 dBm, ±50 VDC
Port 1 (models > 14 GHz)	Type Ruggedized K, male, 50 Ω, Maximum Input +23 dBm, ±50 VDC
Port 2 (models > 14 GHz)	Type Ruggedized K, male, 50 Ω, Maximum Input +23 dBm, ±50 VDC
External Reference In	Type BNC female, 50 Ω, 10 MHz, Maximum +10 dBm
External Trigger In	Type BNC female, 50 Ω, 3.3 V or 5 V TTL triggers on positive edge. Maximum +5 VDC
Headset Jack	3.5 mm mini-jack
External Power	5.5 mm barrel connector, +11 VDC to +14 VDC, ≤ 4.0 A
USB Interface (2)	Type A, Connect USB Flash Drive, GPS Module, Power Sensor, other
USB Interface	5-pin Mini-B, Connect to PC for data transfer and/or control
Ethernet	RJ-45, Category 5, 10/100 MB/s. Connect to PC for data transfer and/or control

Display

Type	High Resolution Resistive Touchscreen
Size	8.4 in daylight viewable color LCD
Resolution	800 x 600

Battery

Type	Li-Ion
Battery Operation	6.0 hr, typical

Electromagnetic Compatibility

European Union	CE Mark EMC Directive: 2004/108/EC Standards: • Emissions: EN 55011:2009 +A1:2010 Group 1 Class A • Immunity: EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-11
Australia and New Zealand	C-tick N274

Safety

European Union	CE Mark Low Voltage Directive: 2006/95/EC Standard: EN 61010-1:2010 (when used with Anritsu Company supplied Power Supply meeting IEC 60950-1)

Environmental

Operating Temperature	–10 ºC to +55 ºC
Storage Temperature	–51 ºC to +71 ºC
Maximum Relative Humidity	95 %, non-condensing
Mechanical Shock	MIL-PRF-28800F Class 2
Explosive Atmosphere	MIL-PRF-28800F Section 4.5.6.3
Altitude	4600 m (15092 ft), operating and non-operating

Size and Weight

Size	273 mm x 199 mm x 91 mm (10.7 in x 7.8 in x 3.6 in)
Weight	3.0 kg (6.6 lb), including battery

1. Applies to standard instruments only. Refer to specific option pages for detailed setup parameters for installed options.

Line Sweep Tools™ (for your PC)

Trace Capture

Browse to Instrument	View and copy traces from the test equipment to your PC using Windows Explorer
Open Legacy Files	Open DAT files captured with Handheld Software Tools v6.61
Open Current Files	Open VNA or DAT files
Capture Plots To	The Line Sweep Tools screen, DAT files, Database, or JPEG

Traces

Trace Types	Return Loss, VSWR, DTF-RL, DTF-VSWR, Cable Loss, Smith Chart, and PIM
Trace Formats	DAT, VNA, CSV, PNG, BMP, JPG, HTML, Data Base, and PDF

Report Generation

Report Generator	Includes GPS location along with measurements
Report Format	Create reports in HTML or PDF format
Report Setup	Report Title, Company, Prepared for, Location, Date and Time, Filename, Company logo
Trace Setup	1 Trace Portrait Mode, 2 Trace Portrait Mode, 1 Trace Landscape Mode

Trace Validation

Presets	7 presets allow "one click" setting of up to 6 markers and one limit line
Marker Controls	6 regular Markers, Marker Peak, Marker Valley, Marker between, and frequency entry
Delta Markers	6 Delta markers
Limit Line	Enable and drag or value entry. Also works with presets
Next Trace Button	Next Trace and Previous Trace arrow keys allow quick switching between traces

Tools

Cable Editor	Allows creation of custom cable parameters
Distance to Fault	Converts a Return Loss trace to a Distance to Fault trace
Measurement Calculator	Converts Real, Imaginary, Magnitude, Phase, RL, VSWR, Rho, and Transmit power
Signal Standard Editor	Creates new band and channel tables
Renaming Grid	36 user-definable phrases for creation of file names, trace titles, and trace subtitles

Connectivity

Connections	Connect to PC using Serial, USB, or Ethernet
Download	Download measurements and live traces to PC for storage and analysis
Upload	Upload measurements from PC to instrument

easyTest Tools™ (for your PC)

Instrument Mode	Cable & Antenna Analyzer Mode

Commands

Display Image	Allows putting a custom image on the instrument screen
Recall Setup	Places the instrument into a known state
Prompt	Displays instructional messages on the instrument screen
Save	Allows automatic or manual saving of traces

Ordering Information (standard configuration)

Part Number	Description
S820E	Microwave Site Master (Requires one Frequency Option 0708, 0714, 0720, 0730, or 0740)
	Three Year Warranty (One year on battery)

Frequency Options (select one frequency option only)

Option Number	Description
S820E-0708	1 MHz to 8 GHz, type N(f) ports
S820E-0714	1 MHz to 14 GHz, type N(f) ports
S820E-0720	1 MHz to 20 GHz, type Ruggedized K(m) ports (compatible with 3.5 mm and SMA connectors)
S820E-0730	1 MHz to 30 GHz, type Ruggedized K(m) ports (compatible with 3.5 mm and SMA connectors)
S820E-0740	1 MHz to 40 GHz, type Ruggedized K(m) ports (compatible with 3.5 mm and SMA connectors)

Instrument Options

Option Number	Description
S820E-0440	Vector Network Analyzer (VNA)
S820E-0441	Vector Voltmeter (VVM)
S820E-0098	Standard Calibration to ISO/IEC 17025:2005
S820E-0099	Premium Calibration to ISO/IEC 17025:2005 plus Test Data

USB Power Sensors (for complete ordering information, see the respective data sheets of each sensor)

Model Number	Description
MA24105A	Inline Dual Directional High Power Sensor, 350 MHz to 4 GHz, +3 dBm to +51.76 dBm
MA24106A	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +23 dBm to –40 dBm
MA24108A	Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm to –40 dBm
MA24118A	Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm to –40 dBm
MA24126A	Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm to –40 dBm

USB Transmission Sensors and USB Extender Kit (for 2-port cable loss/transmission (external sensor) measurements)

Model Number	Description
MA24108A	Microwave USB Power Sensor, N(m), 10 MHz to 8 GHz, +20 dBm to –40 dBm
MA24118A	Microwave USB Power Sensor, N(m), 10 MHz to 18 GHz, +20 dBm to –40 dBm
MA24126A	Microwave USB Power Sensor, K(m), 10 MHz to 26 GHz, +20 dBm to –40 dBm
SC8268	USB Transmission Sensor, K(m), 1 MHz to 40 GHz, +10 dBm to –50 dBm
2000-1717-R	USB Extender, Requires Cat 5e extension cable (sold separately)
2100-28-R	Cat 5e extension cable for use with USB Extender (22.5 m)

Documentation (soft copy included on disc and at www.anritsu.com)

Part Number	Description
11410-00749	Technical Data Sheet
10580-00343	User Guide
10580-00344	Programming Manual
10580-00345	Maintenance Manual

Standard Accessories (included with instrument)

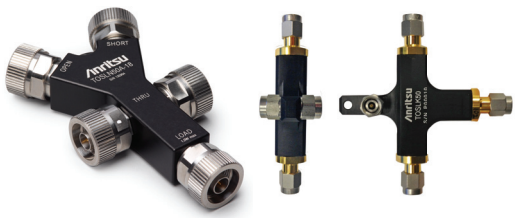
Part Number	Description
2000-1654-R	Soft Carrying Case
10920-00060	Anritsu Handheld Instruments Documentation Disc
2300-577	Anritsu Software Tool Box for Handheld RF Instruments Disc
71693-R	Ruggedized K(f) to N(f), 2 pcs (included only with S820E-0720)
633-75	Rechargeable Li-Ion Battery
40-187-R	AC-DC Adapter
806-141-R	Automotive Power Adapter, 12 VDC, 60 W
2000-1691-R	Stylus with Coiled Tether
2000-1797-R	Screen Protector Film (one factory installed, one spare)
3-2000-1498	USB A/5-pin Mini-B Cable, 3.05 m (10 ft)
2000-1371-R	Ethernet Cable, 2.13 m (7 ft)
	Certificate of Calibration and Conformance

Optional Accessories

Miscellaneous Accessories

Part Number	Description
2000-1723-R	High Performance USB Mag-Mount GPS Antenna/Receiver
2000-1374	External Charger for Li-Ion Batteries
67135	Anritsu Backpack (For Handheld Instrument and PC)
760-243-R	Large Transit Case with Wheels and Handle

Full Temperature Coaxial Calibration Kits (–10 °C to +55 °C , K Type is compatible with 3.5 mm and SMA connectors see individual data sheets on www.anritsu.com)



Part Number	Description
OSLN50A-8	High Performance Type N(m), DC to 8 GHz, 50 Ω
OSLNF50A-8	High Performance Type N(f), DC to 8 GHz, 50 Ω
TOSLN50A-8	High Performance with Through Type N(m), DC to 8 GHz, 50 Ω
TOSLNF50A-8	High Performance with Through Type N(f), DC to 8 GHz, 50 Ω
OSLN50A-18	High Performance Type N(m), DC to 18 GHz, 50 Ω
OSLNF50A-18	High Performance Type N(f), DC to 18 GHz, 50 Ω
TOSLN50A-18	High Performance with Through Type N(m), DC to 18 GHz, 50 Ω
TOSLNF50A-18	High Performance with Through Type N(f), DC to 18 GHz, 50 Ω
TOSLK50A-20	High Performance with Through Type K(m), DC to 20 GHz, 50 Ω
TOSLKF50A-20	High Performance with Through Type K(f), DC to 20 GHz, 50 Ω
TOSLK50A-40	High Performance with Through Type K(m), DC to 40 GHz, 50 Ω
TOSLKF50A-40	High Performance with Through Type K(f), DC to 40 GHz, 50 Ω

Coaxial Calibration Components, N Type 50 Ω, K Type 50 Ω (K Type is compatible with 3.5 mm and SMA connectors)

Part Number	Description
22N50	Precision Open/Short, N(m), DC to 18 GHz, 50 Ω
22NF50	Precision Open/Short, N(f), DC to 18 GHz, 50 Ω
28N50-2	Precision Load, N(m), DC to 18 GHz, 50 Ω
28NF50-2	Precision Load, N(f), DC to 18 GHz, 50 Ω
22K50	Precision Open/Short, K(m), DC to 40 GHz, 50 Ω
22KF50	Precision Open/Short, K(f), DC to 40 GHz, 50 Ω
28K50	Precision Load, K(m), DC to 40 GHz, 50 Ω
28KF50	Precision Load, K(f), DC to 40 GHz, 50 Ω

Coaxial Calibration Components, Other 50 Ω, 75 Ω

Part Number	Description
2000-1618-R	Open/Short/Load, 7/16 DIN(m), DC to 6.0 GHz 50 Ω
2000-1619-R	Open/Short/Load, 7/16 DIN(f), DC to 6.0 GHz 50 Ω
12N50-75B	Matching Pad, DC to 3 GHz, 50 Ω to 75 Ω
22N75	Open/Short, N(m), DC to 3 GHz, 75 Ω
22NF75	Open/Short, N(f), DC to 3 GHz, 75 Ω
26N75A	Precision Termination, N(m), DC to 3 GHz, 75 Ω
26NF75A	Precision Termination, N(f), DC to 3 GHz, 75 Ω
1091-55-R	Open, TNC(f), DC to 18 GHz
1091-53-R	Open, TNC(m), DC to 18 GHz
1091-56-R	Short, TNC(f), DC to 18 GHz
1091-54-R	Short, TNC(m), DC to 18 GHz
1015-54-R	Termination, TNC(f), DC to 18 GHz
1015-55-R	Termination, TNC(m), DC to 18 GHz

Waveguide Calibration Components, Rectangular Type 50 Ω

Frequency Range (GHz)	1/8 Offset	3/8 Offset	Termination	Coax to Waveguide Adapter	Compatible Flanges
3.30 to 4.90	23UA229	24UA229	26UA229	35UA229N	PDR40
3.95 to 5.85	23UA187	24UA187	26UA187	35UA187N	CPR187F, CPR187G, UG-1352/U, UG-1353/U, UG-1728/U, UG-1729/U, UG-148/U, UG-149A/U
5.85 to 8.20	23UA137	24UA137	26UA137	35UA137N	CPR137F, CPR137G, UG-1356/U, UG-1357/U, UG-1732/U, UG-1733/U, UG-343B/U, UG-344/U, UG-440B/U, UG-441/U
7.05 to 10.00	23UA112	24UA112	26UA112	35UA112N	CPR112F, CPR112G, UG-1358/U, UG-1359/U, UG-1734/U, UG-1735/U, UG-52B/U, UG-51/U, UG-137B/U, UG-138/U
8.20 to 12.40	23UA90	24UA90	26UA90	35UA90N	CPR90F, CPR90G, UG-1360/U, UG-1361/U, UG-1736/U, UG-1737/U, UG-40B/U, UG-39/U, UG-135/U, UG-136B/U
10.00 to 15.00	23UA75	24UA75	26UA75	35UA75N	UBR120
12.40 to 18.00	23UA62	24UA62	26UA62	35UA62N	UG-541A/U, UG-419/U, UG-1665/U, UG1666/U
17.00 to 26.50	23UA42	24UA42	26UA42	35UA42K	UG-596A/U, UG-595/U, UG-597/U, UG-598A/U
26.50 to 40.00	23UA28	24UA28	26UA28	35UA28K	UG-599/U
3.30 to 4.90	23UM40	24UM40	26UM40	35UM40N	PDR40
3.95 to 5.85	23UM48	24UM48	26UM48	35UM48N	CAR48, PAR48, UAR48, PDR48
5.85 to 8.20	23UM70	24UM70	26UM70	35UM70N	CAR70, PAR70, UAR 70, PDR70
7.05 to 10.00	23UM84	24UM84	26UM84	35UM84N	CBR84, UBR84, PBR84, PDR84
8.20 to 12.40	23UM100	24UM100	26UM100	35UM100N	CBR100, UBR100, PBR100, PDR100
10.00 to 15.00	23UM120	24UM120	26UM120	35UM120N	CBR120, UBR120, PBR120, PDR120
12.40 to 18.00	23UM140	24UM140	26UM140	35UM140N	CBR140, UBR140, PBR140, PDR140
17.00 to 26.50	23UM220	24UM220	26UM220	35UM220K	CBR220, UBR220, PBR220, PDR220
26.50 to 40.00	23UM320	24UM320	26UM320	35UM320K	UBR320

Phase-Stable Test Port Extension Cables (Armored and Flexible)

Part Number	Description
14RKFKF50-0.6	0.6 m (24 in), DC to 40 GHz, Ruggedized K(f) to K(f), 50 Ω
14RKFKF50-1.0	1.0 m (39 in), DC to 40 GHz, Ruggedized K(f) to K(f), 50 Ω
14RKFK50-0.6	0.6 m (24 in), DC to 40 GHz, Ruggedized K(f) to K(m), 50 Ω
14RKFK50-1.0	1.0 m (39 in), DC to 40 GHz, Ruggedized K(f) to K(m), 50 Ω
14KFKF50-0.6	0.6 m (24 in), DC to 40 GHz, K(f) to K(f), 50 Ω
14KFKF50-1.0	1.0 m (39 in), DC to 40 GHz, K(f) to K(f), 50 Ω
14KFK50-0.6	0.6 m (24 in), DC to 40 GHz, K(f) to K(m), 50 Ω
14KFK50-1.0	1.0 m (39 in), DC to 40 GHz, K(f) to K(m), 50 Ω
15NN50-1.0B	1.0 m (39 in), DC to 18 GHz, N(m) to N(m), 50 Ω
15NNF50-1.0B	1.0 m (39 in), DC to 18 GHz, N(m) to N(f), 50 Ω
15LL50-1.0A	1.0 m (39 in), DC to 20 GHz, 3.5 mm(m) to 3.5 mm(m), 50 Ω
15LLF50-1.0A	1.0 m (39 in), DC to 20 GHz, 3.5 mm(m) to 3.5 mm(f), 50 Ω
15KK50-1.0A	1.0 m (39 in), DC to 26.5 GHz, K(m) to K(m), 50 Ω
15KKF50-1.0A	1.0 m (39 in), DC to 26.5 GHz, K(m) to K(f), 50 Ω

Phase-Stable 18 GHz and 40 GHz Semi-Rigid Cables (Armored)

3670K50-1	0.3 m (12 in), DC to 40 GHz, K(f) to K(m), 50 Ω
3670K50-2	0.6 m (24 in), DC to 40 GHz, K(f) to K(m), 50 Ω
3670N50-1	0.3 m (12 in), DC to 18 GHz, N(f) to N(m), 50 Ω
3670NN50-1	0.3 m (12 in), DC to 18 GHz, N(m) to N(m), 50 Ω
3670N50-2	0.6 m (24 in), DC to 18 GHz, N(f) to N(m), 50 Ω
3670NN50-2	0.6 m (24 in), DC to 18 GHz, N(m) to N(m), 50 Ω

Adapters

71693-R	Ruggedized K(f) to N(f), DC to 18 GHz, 50 Ω
1091-26-R	SMA(m) to N(m), DC to 18 GHz, 50 Ω
1091-27-R	SMA(f) to N(m), DC to 18 GHz, 50 Ω
1091-80-R	SMA(m) to N(f), DC to 18 GHz, 50 Ω
1091-81-R	SMA(f) to N(f), DC to 18 GHz, 50 Ω
1091-172	BNC(f) to N(m), DC to 1.3 GHz, 50 Ω
510-90-R	7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
510-91-R	7/16 DIN(f) to N(f), DC to 7.5 GHz, 50 Ω
510-92-R	7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 Ω
510-93-R	7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 Ω
510-96-R	7/16 DIN(m) to 7/16 DIN (m), DC to 7.5 GHz, 50 Ω
510-97-R	7/16 DIN(f) to 7/16 DIN (f), DC to 7.5 GHz, 50 Ω
513-62	Adapter, DC to 18 GHz, TNC(f) to N(f), 50 Ω
1091-315	Adapter, DC to 18 GHz, TNC(m) to N(f), 50 Ω
1091-324	Adapter, DC to 18 GHz, TNC(f) to N(m), 50 Ω
1091-325	Adapter, DC to 18 GHz, TNC(m) to N(m), 50 Ω
1091-317	Adapter, DC to 18 GHz, TNC(m) to SMA(f), 50 Ω
1091-318	Adapter, DC to 18 GHz, TNC(m) to SMA(m), 50 Ω
1091-323	Adapter, DC to 18 GHz, TNC(m) to TNC(f), 50 Ω
1091-326	Adapter, DC to 18 GHz, TNC(m) to TNC(m), 50 Ω
510-102-R	N(m) to N(m), DC to 11 GHz, 50 Ω, 90 degrees right angle

Precision Adapters

34NN50A	Precision Adapter, N(m) to N(m), DC to 18 GHz, 50 Ω
34NFNF50	Precision Adapter, N(f) to N(f), DC to 18 GHz, 50 Ω
K220B	Precision Adapter, DC to 40 GHz, K(m) to K(m), 50 Ω
K222B	Precision Adapter, DC to 40 GHz, K(f) to K(f), 50 Ω
K224B	Precision Adapter, DC to 40 GHz, K(m) to K(f), 50 Ω

Attenuators N Type (up to 18 GHz)

3-1010-122	20 dB, 5 W, DC to 12.4 GHz, N(m) to N(f)
42N50-20	20 dB, 5 W, DC to 18 GHz, N(m) to N(f)
42N50A-30	30 dB, 5 W, DC to 18 GHz, N(m) to N(f)
3-1010-123	30 dB, 50 W, DC to 8.5 GHz, N(m) to N(f)
1010-127-R	30 dB, 150 W, DC to 3 GHz, N(m) to N(f)
3-1010-124	40 dB, 100 W, DC to 8.5 GHz, N(f) to N(m), Uni-directional
1010-121	40 dB, 100 W, DC to 18 GHz, N(f) to N(m), Uni-directional
1010-128-R	40 dB, 150 W, DC to 3 GHz, N(m) to N(f)

Attenuators K Type (up to 40 GHz)

41KB-3	Precision Fixed Attenuator, K(m) to K(f), 3 dB, DC to 26.5 GHz, 50 Ω
41KB-6	Precision Fixed Attenuator, K(m) to K(f), 6 dB, DC to 26.5 GHz, 50 Ω
41KB-10	Precision Fixed Attenuator, K(m) to K(f), 10 dB, DC to 26.5 GHz, 50 Ω
41KB-20	Precision Fixed Attenuator, K(m) to K(f), 20 dB, DC to 26.5 GHz, 50 Ω
41KC-3	Precision Fixed Attenuator, K(m) to K(f), 3 dB, DC to 40 GHz, 50 Ω
41KC-6	Precision Fixed Attenuator, K(m) to K(f), 6 dB, DC to 40 GHz, 50 Ω
41KC-10	Precision Fixed Attenuator, K(m) to K(f), 10 dB, DC to 40 GHz, 50 Ω
41KC-20	Precision Fixed Attenuator, K(m) to K(f), 20 dB, DC to 40 GHz, 50 Ω

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