Multiport Extended Data Sheet

VNAs available in 6-, 8-, 10-. 12-, 14-, and 16-ports

COPPER MOUNTAIN® TECHNOLOGIES

- **Frequency range:** 300 kHz - 9 GHz
- **Wide output power range:** -45 dBm to +10 dBm
- **Dynamic range:** 140 dB typ (10 Hz IFBW)
- **Measurement time per point:** 24 µs per point, min typ.
- **Time domain and gating** conversion included
- Up to **500,001 measurement points**
- **Precision calibration** methods and automatic calibration

Multiport Specifications

Primary Specifications[3]

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	6, 8, 10, 12, 14, 16
Frequency range	300 kHz to 9 GHz
Full frequency accuracy	$\pm 5 \cdot 10^{-6}$
Frequency resolution	1 Hz
Number of measurement points	2 to 500,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 300 kHz
Dynamic range[2]	
300 kHz to 5 MHz	110 dB (125 dB typ.)
5 MHz to 6 GHz	135 dB (140 dB typ.)
6 GHz to 9 GHz	122 dB (130 dB typ.)

Measurement Accuracy

Accuracy of transmission measurements[4]	Magnitude / Phase
300 kHz to 5 MHz	
0 dB to +10 dB	±0.2 dB / ±2°
-30 dB to 0 dB	±0.1 dB / ±1°
-50 dB to -30 dB	±0.2 dB / ±2°
-70 dB to -50 dB	±1.0 dB / ±6°
5 MHz to 6 GHz	
0 dB to +10 dB	±0.2 dB / ±2°
-60 dB to 0 dB	±0.1 dB / ±1°
-80 dB to -60 dB	±0.2 dB / ±2°
-98 dB to -80 dB	±1.0 dB / ±6°
6 GHz to 9 GHz	
0 dB to +10 dB	±0.2 dB / ±2°
-55 dB to 0 dB	±0.1 dB / ±1°
-75 dB to -55 dB	±0.2 dB / ±2°
-93 dB to -75 dB	±1.0 dB / ±6°
Accuracy of reflection measurements[5]	Magnitude / Phase
-15 dB to 0 dB	±0.4 dB / ±3°
-25 dB to -15 dB	±1.0 dB / ±6°
-35 dB to -25 dB	±3.0 dB / ±20°
Trace noise magnitude (IF bandwidth 3 kHz)	
300 kHz to 6 GHz	0.002 dB rms
6 GHz to 9 GHz	0.004 dB rms
Temperature dependence	
300 kHz to 6 GHz	0.02 dB/°C
6 GHz to 9 GHz	0.04 dB/°C

Effective System Data

300 kHz to 9 GHz	
Directivity	46 dB
Source match	40 dB
Load match	46 dB
Reflection tracking	±0.10 dB
Transmission tracking	±0.08 dB

Uncorrected System Performance

300 kHz to 6 GHz	
Directivity	15 dB
Source match	15 dB
Load match	15 dB
6 GHz to 9 GHz	
Directivity	10 dB
Source match	15 dB
Load match	15 dB

Test Port Output

Power range	
300 kHz to 6 GHz	-45 dBm to +10 dBm
6 GHz to 9 GHz	-45 dBm to +2 dBm
Power accuracy	±1.5 dB
Power resolution	0.05 dB
Harmonic distortion[6]	
300 kHz to 1 GHz	-8 dBc
1 GHz to 9 GHz	-15 dBc
Non-harmonic spurious[6]	-15 dBc (-22 dBc typ.)

[1] All specifications subject to change without notice. [2] The dynamic range is defined as the difference between the specified maximum power level and the specified noise floor. This specification applies at 10 Hz IF bandwidth. [3] Reflection and transmission measurement accuracy applies over the temperature range of (73 ± 9) °F or (23 ± 5) °C after 40 minutes of warming-up, with less than 1 °C deviation from the full 2-port calibration temperature, at output power of 0 dBm. Frequency points have to be identical for measurement and calibration (no interpolation allowed). [4] Transmission specifications are based on a matched DUT, and IF bandwidth of 10 Hz. [5] Reflection specifications are based on an isolating DUT. [6] Specification applies over entire frequency range, at output power of 0 dBm. [7] Display update: OFF.

Multiport Specifications

Test Port Input

Noise floor	
300 kHz to 5 MHz	-110 dBm/Hz
5 MHz to 6 GHz	-135 dBm/Hz
6 GHz to 9 GHz	-130 dBm/Hz
Damage level	+26 dBm
Damage DC voltage	35 V

Measurement Speed

Time per point	24 µs typ.	
Port switchover time	200 µs	
Typical cycle time vs number of measurement points[7]		
Number of points (IF bandwidth 300 kHz)	Uncorrected (1-port)	2-port calibration
51	4	8
201	9	17
401	14	28
1601	40.1	68.9

Frequency Reference Input

Port	Ref IN 10 MHz
External reference frequency	10 MHz
Input level	-3 dBm to 3 dBm
Input impedance	50 Ohm
Connector type	BNC, male

Frequency Reference Output

Port	Ref OUT 10 MHz
Internal reference frequency	10 MHz
Output reference signal level at 50 Ohm impedance	-1 dBm to 3 dBm
Connector type	BNC, male

Trigger Input

Port	Ext Trig In
Input level	
Low threshold voltage	1.1 V
High threshold voltage	2.6 V
Input level range	0 V to + 5 V
Pulse width	≥2 µs
Polarity	positive or negative
Input impedance	≥2 kOhm
Connector type	BNC, male

Trigger Output

Port	Ext Trig Out
Maximum output current	20 mA
Output level	
Low level voltage	0.0 to 0.6 V
High level voltage	3.0 to 3.8 V
Polarity	positive or negative
Connector type	BNC, male

System & Power

Operating system	Windows 7 and above
CPU frequency	1.5 GHz
RAM	1 GB
Interface	USB 2.0
Connector type	USB B
Power supply	100-253 V, 50/60 Hz
Power consumption	
SN0906	50 W
SN0908	60 W
SN0910	65 W
SN0912	75 W
SN0914	80 W
SN0916	85 W

Factory Adjustment

Recommended factory adjustment interval	3 years

Dimensions

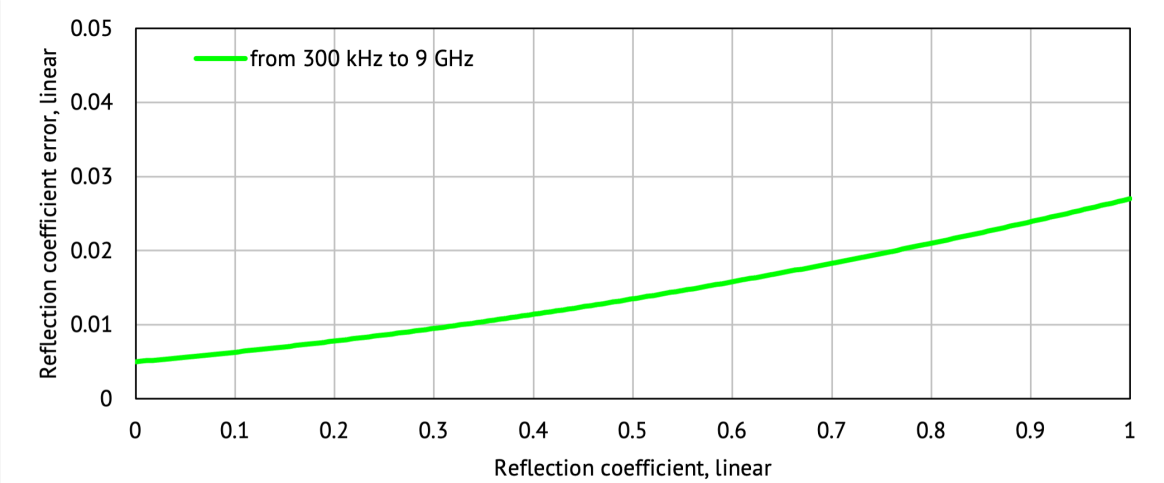
Length	436 mm
Width	425 mm
Height	96 mm
Weight	
SN0906	12.8 kg
SN0908	12.9 kg
SN0910	13.8 kg
SN0912	13.9 kg
SN0914	14.9 kg
SN0916	15.0 kg

Environmental Specifications

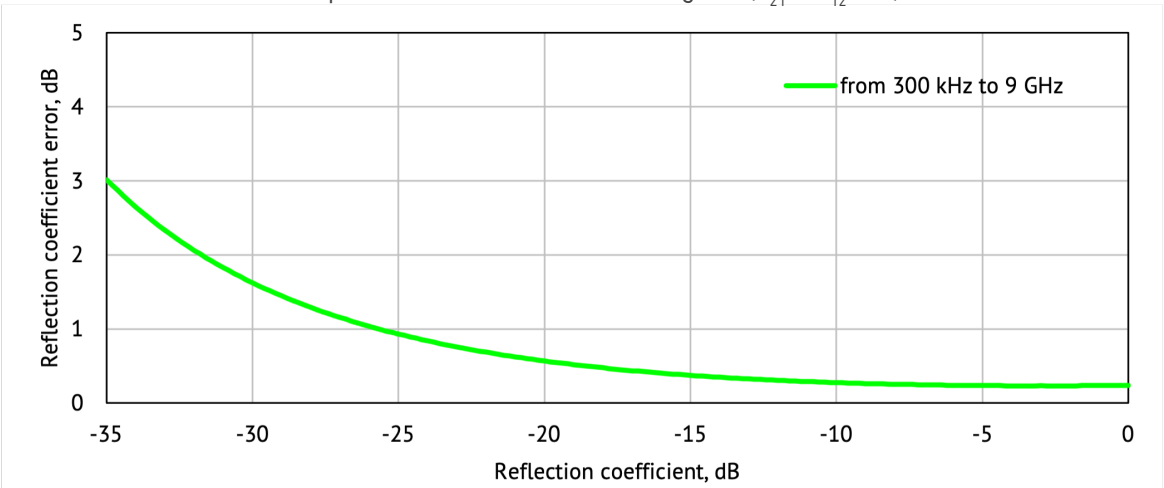
Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Storage temperature	-50 °C to +70 °C (-58 °F to 158 °F)
Humidity	90 % at 25 °C (77 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

Reflection Accuracy Plots

Reflection Magnitude Errors



Specifications are based on isolating DUT ($S_{21} = S_{12} = 0$)



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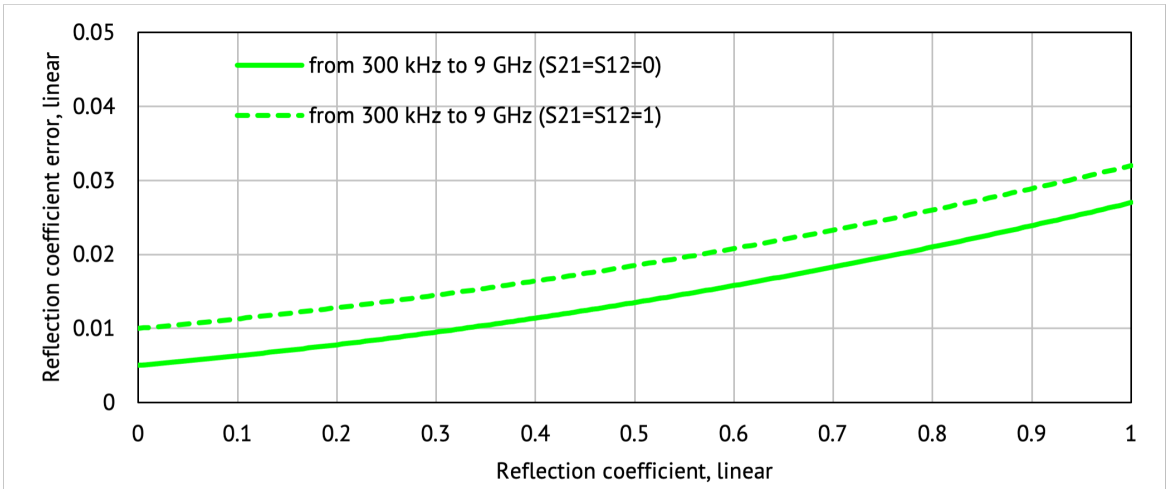

Reflection Accuracy Plots

Reflection Phase Errors

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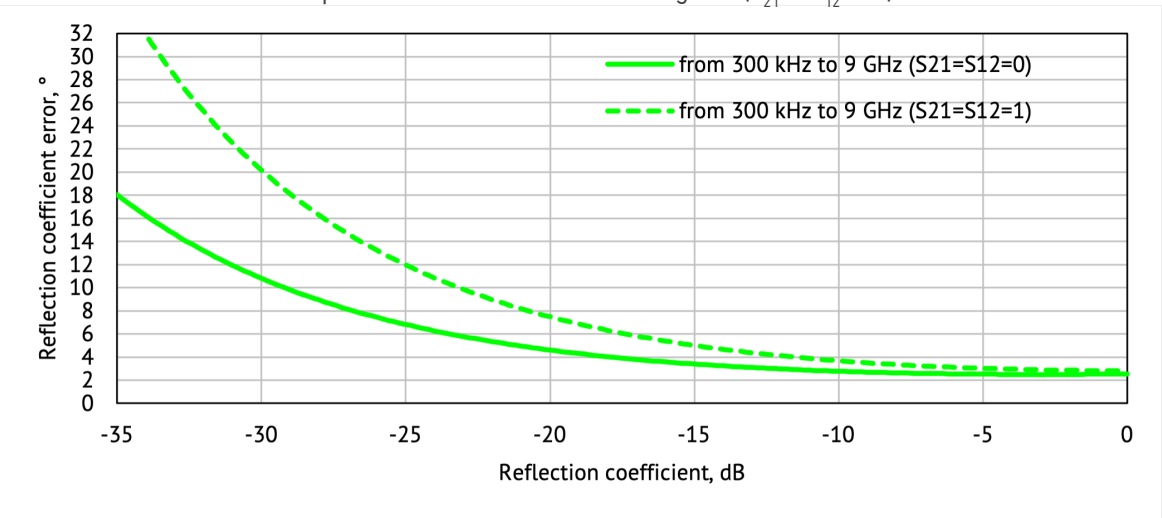
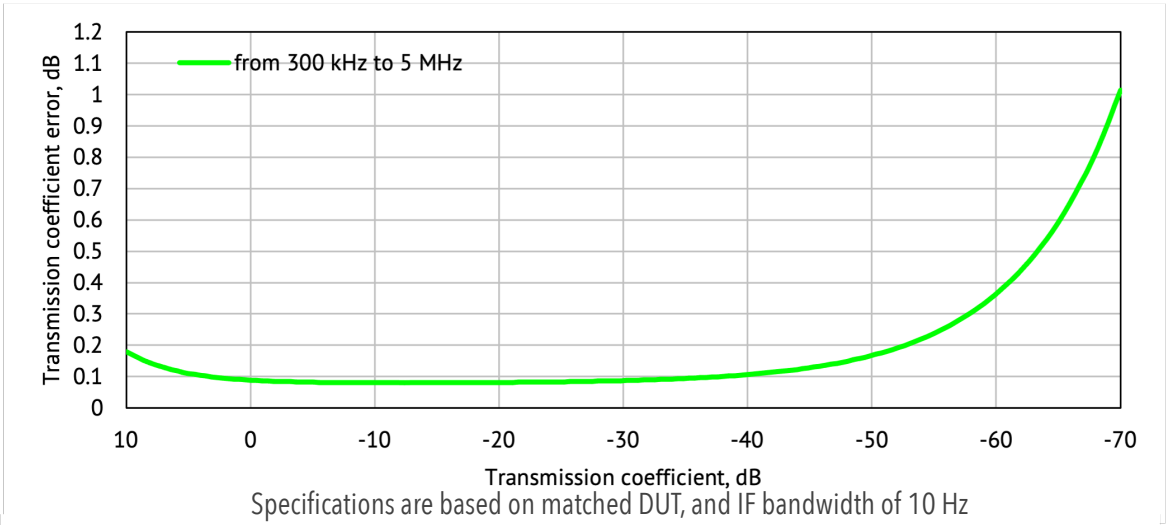
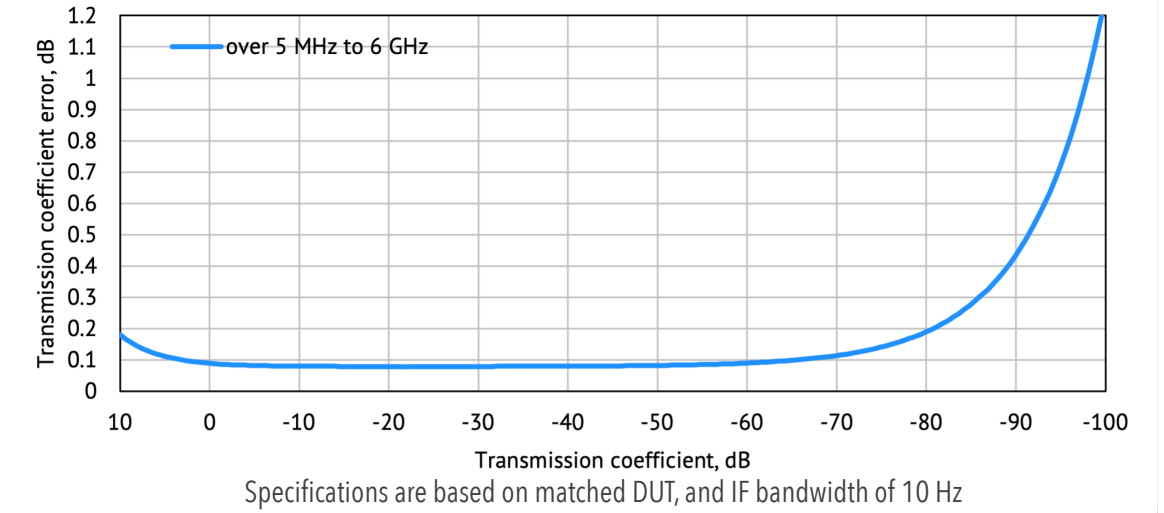


Transmission Accuracy Plots

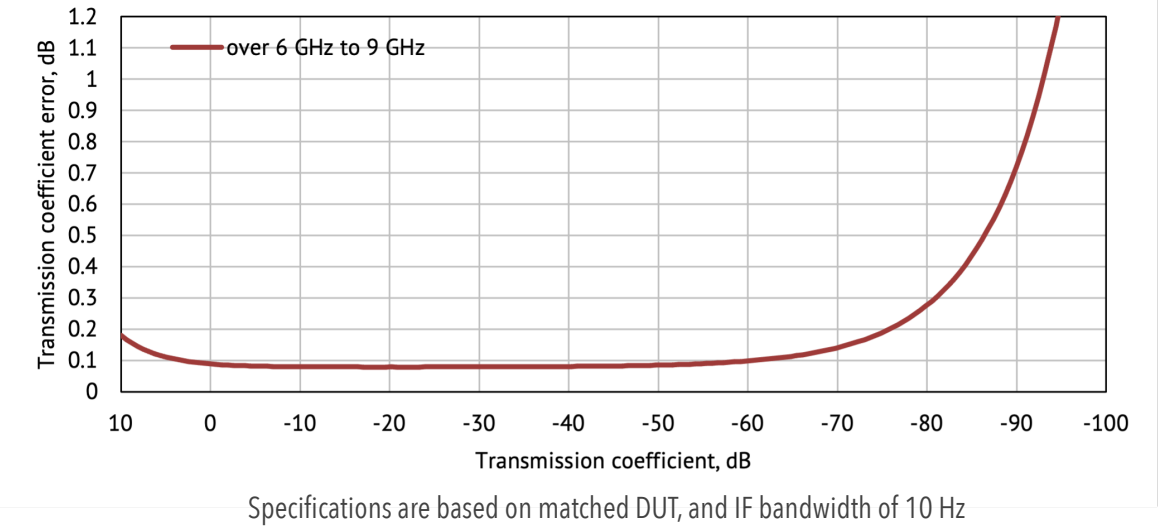
Transmission Magnitude Errors



Specifications are based on matched DUT, and IF bandwidth of 10 Hz



Specifications are based on matched DUT, and IF bandwidth of 10 Hz



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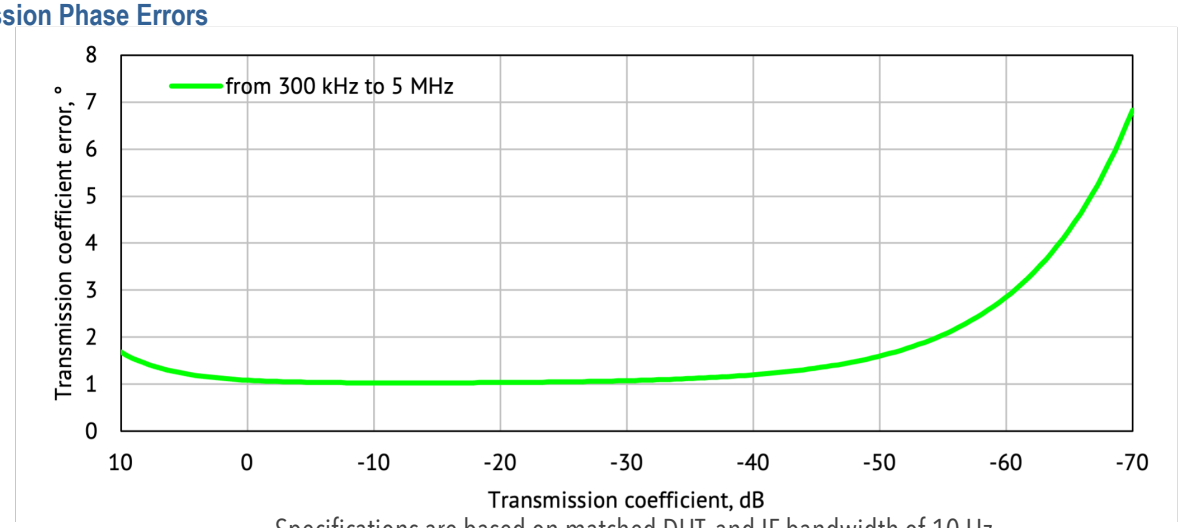
Transmission Accuracy Plots

Transmission Phase Errors



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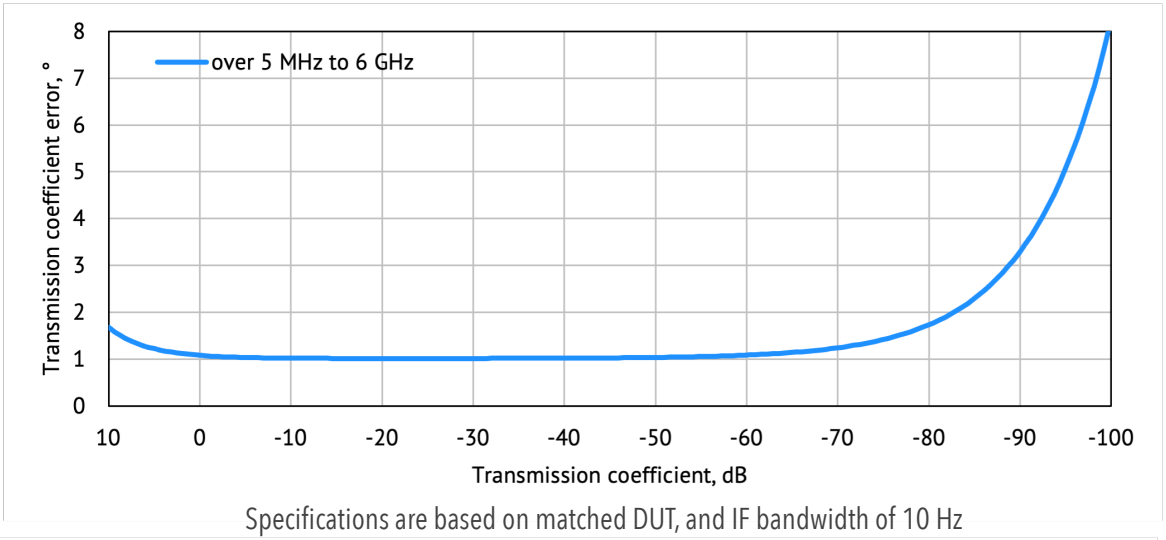

Specifications are based on matched DUT, and IF bandwidth of 10 Hz

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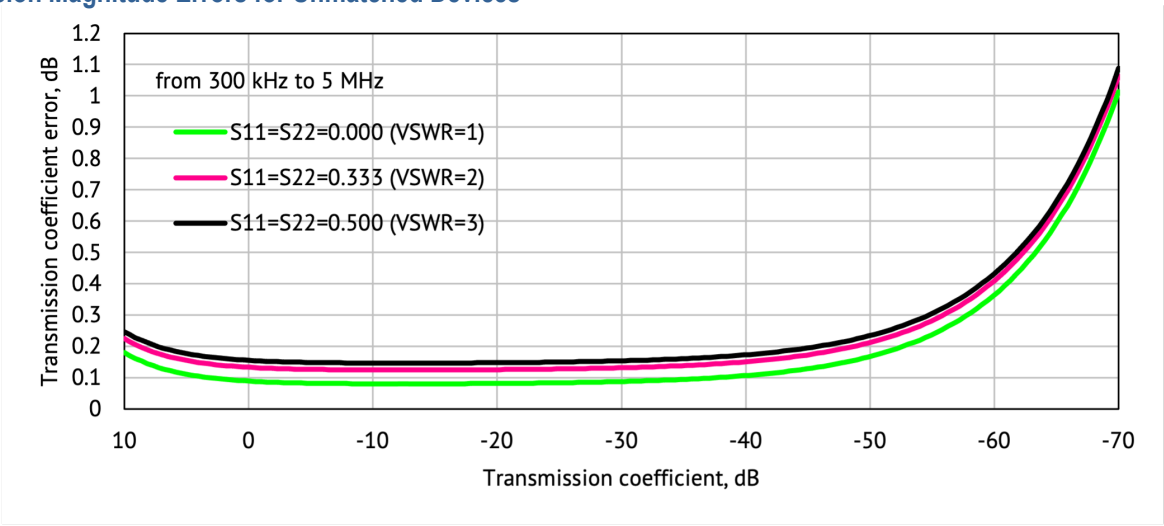
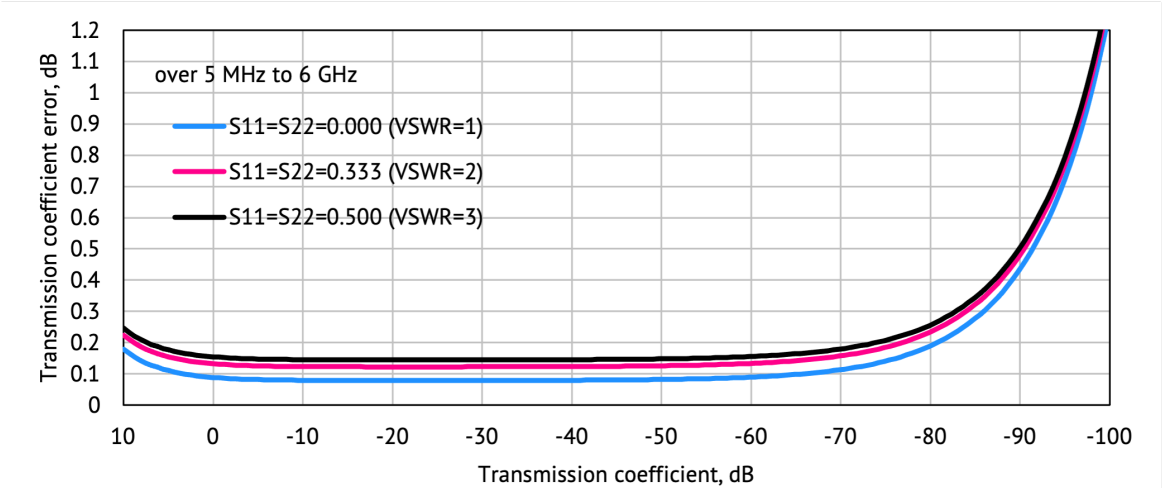
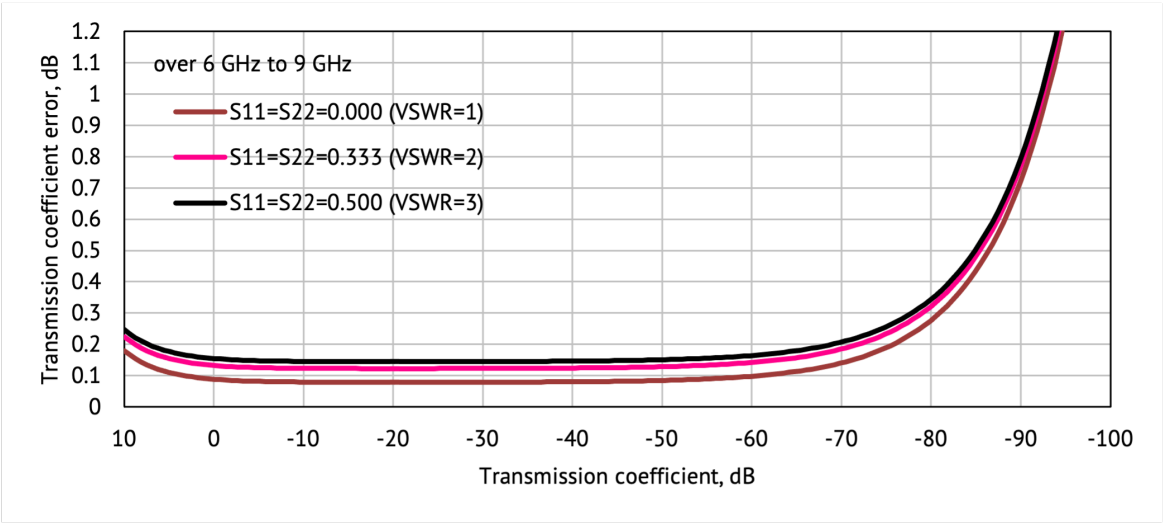
Transmission Accuracy Plots

Transmission Magnitude Errors for Unmatched Devices

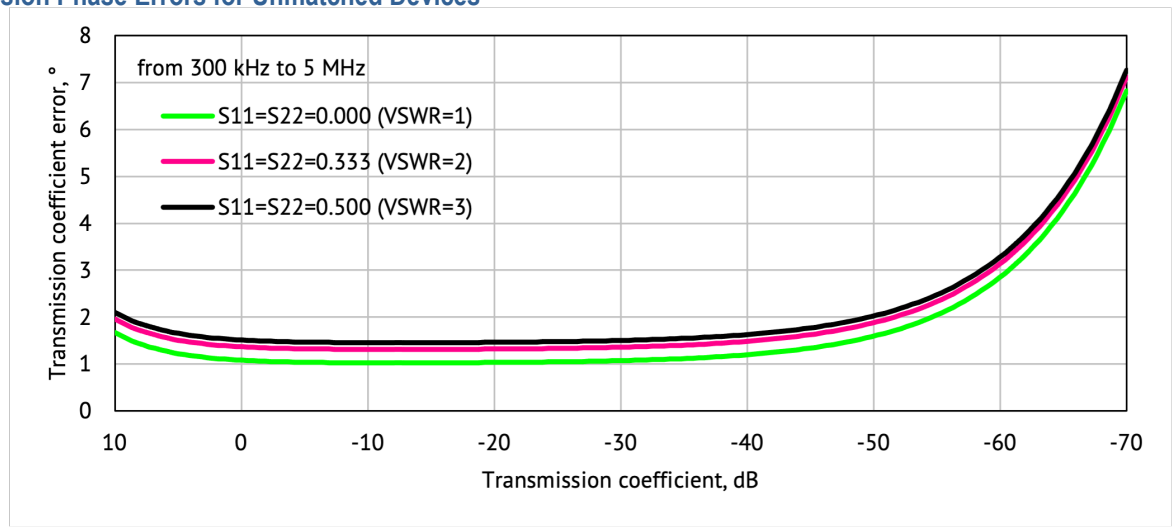


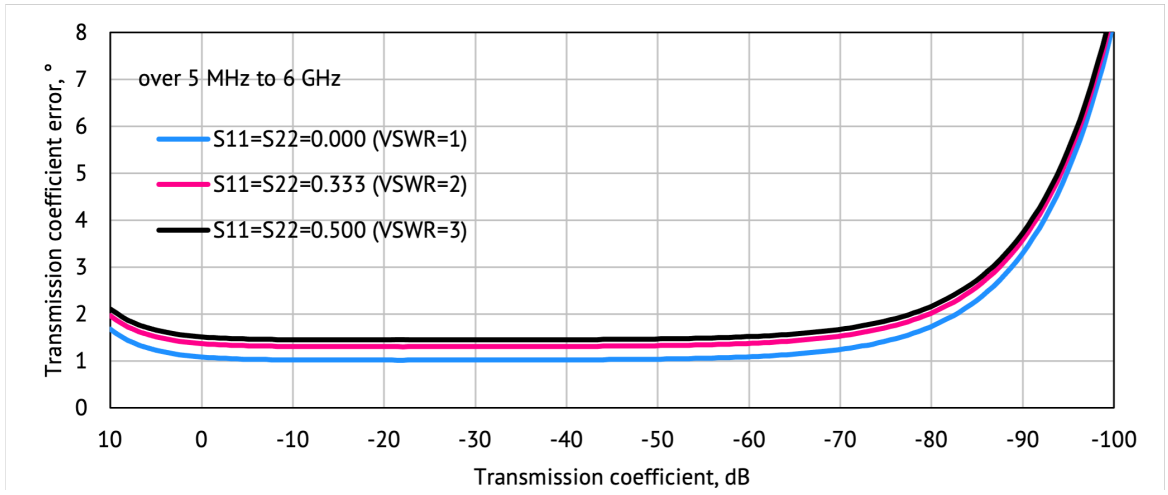


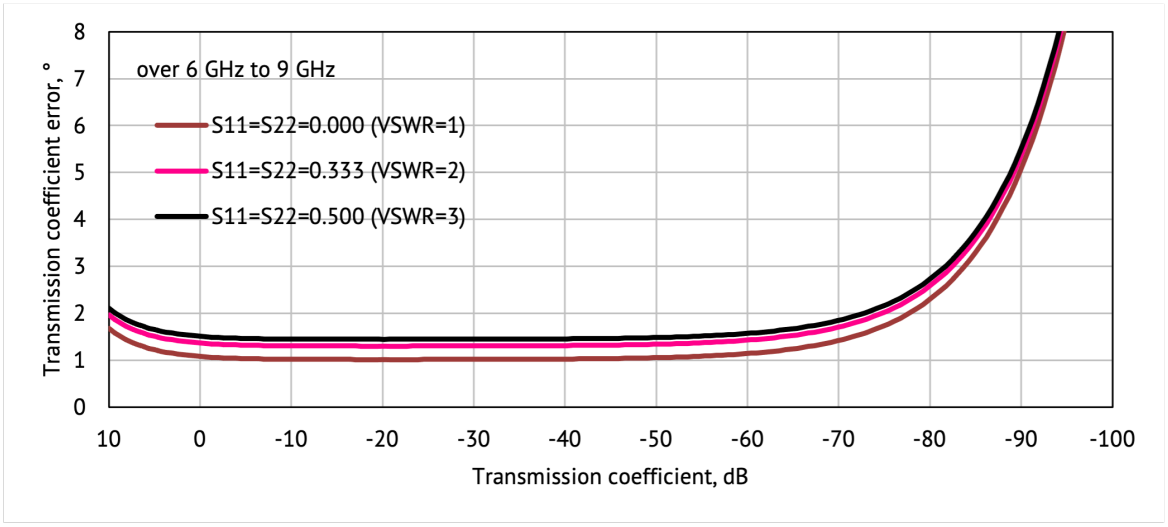


Transmission Accuracy Plots

Transmission Phase Errors for Unmatched Devices

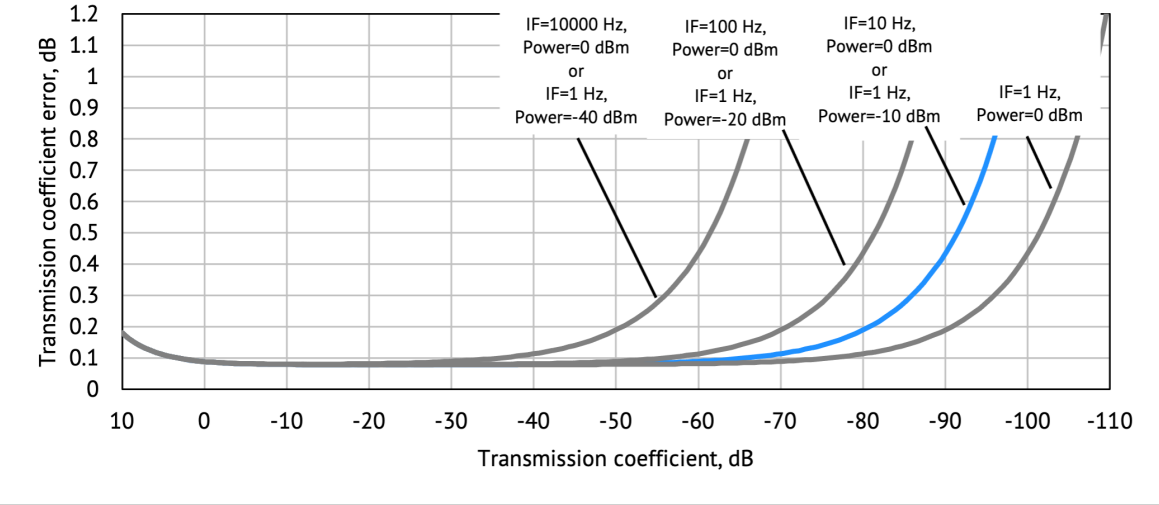






Transmission Accuracy Plots

Transmission Errors for Matched Devices vs Output Power and IF Bandwidth



COPPER MOUNTAIN®
TECHNOLOGIES

Technology is supposed to move. It's supposed to change and update and progress. It's not meant to sit stagnant year after year simply because that's how things have always been done.

The engineers at Copper Mountain Technologies are creative problem solvers. They know the people using VNAs don't just need one giant machine in a lab. They know that VNAs are needed in the field, requiring portability and flexibility. Data needs to be quickly transfered, and a test setup needs to be easily automated and recalled for various applications. The engineers at Copper Mountain Technologies are rethinking the way VNAs are developed and used.

Copper Mountain Technologies' VNAs are designed to work with the Windows or Linux PC you already use via USB interface. After installing the test software, you have a top-quality VNA at a fraction of the cost of a traditional analyzer. The result is a faster, more effective test process that fits into the modern workspace. This is the creativity that makes Copper Mountain Technologies stand out above the crowd.

We're creative. We're problem solvers.

Multiport VNAs Overview

	SN0906	SN0908	SN0910	SN0912	SN0914	SN0916
Frequency Range	300 kHz to 9 GHz	300 kHz to 9 GHz	300 kHz to 9 GHz	300 kHz to 9 GHz	300 kHz to 9 GHz	300 kHz to 9 GHz
Number of Ports	6 ports	8 ports	10 ports	12 ports	14 ports	16 ports

631 E. New York Street
Indianapolis, IN 46202

United States: +1.317.222.5400
Latin America: +1.954.706.5920

APAC: +65.63.23.6546
EMEA: +44 75 03 69 21 13