M5180
Extended Specifications

COPPER MOUNTAIN™ TECHNOLOGIES

- **Frequency range:** 300 kHz - 18 GHz
- **Wide output power adjustment range:** -40 dBm to +10 dBm
- **Dynamic range:** 130 dB (10 Hz IF bandwidth) typ.
- **Measurement time per point:** 30 µs per point, min typ.
- Up to **16 logical channels with 16 traces** each max
- **Automation programming** in LabView, Python, MATLAB, .NET, etc.
- Models available in **50 Ohm**
- Up to **200,001 measurement points**
- Multiple **precision calibration** methods and automatic calibration

EXTEND YOUR REACH™

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Specifications[1]

Measurement Range

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	2
Frequency range	300 kHz to 18 GHz
Full frequency accuracy	$\pm 5 \cdot 10^{-6}$
Frequency resolution	1 Hz
Number of measurement points	2 to 200,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 300 kHz
Dynamic range[2]	
300 kHz to 10 MHz	115 dB
10 MHz to 7 GHz	130 dB (135 dB typ.)
7 GHz to 12 GHz	125 dB (130 dB typ.)
12 GHz to 16 GHz	122 dB (125 dB typ.)
16 GHz to 18 GHz	116 dB (120 dB typ.)
Crosstalk[2a]	
300 kHz to 5 GHz	-
5 GHz to 7.5 GHz	-120 dB typ.
7.5 GHz to 8.5 GHz	-110 dB typ.
8.5 GHz to 15 GHz	-120 dB typ.
15 GHz to 18 GHz	-100 dB 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. The specification applies at 10 Hz IF bandwidth. [2a] Uncorrected crosstalk is defined at maximum specified output power level. Dynamic range of the analyzer may be limited on the lower end by either crosstalk or noise floor.

Specifications[1]

Measurement Accuracy[3]

Accuracy of transmission measurements[4]	Magnitude / Phase
300 kHz to 10 MHz	
0 dB to +10 dB	±0.2 dB / ±2°
-35 dB to 0 dB	±0.1 dB / ±1°
-55 dB to -35 dB	±0.2 dB / ±2°
-75 dB to -55 dB	±1.0 dB / ±6°
10 MHz to 7 GHz	
0 dB to +10 dB	±0.2 dB / ±2°
-50 dB to 0 dB	±0.1 dB / ±1°
-70 dB to -50 dB	±0.2 dB / ±2°
-90 dB to -70 dB	±1.0 dB / ±6°
7 GHz to 16 GHz	
0 dB to +10 dB	±0.2 dB / ±2°
-45 dB to 0 dB	±0.1 dB / ±1°
-65 dB to -45 dB	±0.2 dB / ±2°
-85 dB to -65 dB	±1.0 dB / ±6°
16 GHz to 18 GHz	
0 dB to +5 dB	±0.2 dB / ±2°
-40 dB to 0 dB	±0.1 dB / ±1°
-60 dB to -40 dB	±0.2 dB / ±2°
-80 dB to -60 dB	±1.0 dB / ±6°
Accuracy of reflection measurements[5]	Magnitude / Phase
300 kHz to 10 GHz	
-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°
10 GHz to 18.0 GHz	
-15 dB to 0 dB	±0.5 dB / ±4°
-25 dB to -15 dB	±1.5 dB / ±10°
-35 dB to -25 dB	±5.5 dB / ±30°
Trace noise magnitude (IF bandwidth 3 kHz)	
300 kHz to 9 GHz	0.002 dB rms
9 GHz to 18 GHz	0.004 dB rms
Temperature dependence	
300 kHz to 7 GHz	0.02 dB/°C
7 GHz to 18 GHz	0.04 dB/°C

[1] All specifications subject to change without notice. [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 two-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.

Specifications[1]

Effective System Data

300 kHz to 10 GHz	
Directivity	46 dB
Source match	40 dB
Load match	46 dB
Reflection tracking	±0.10 dB
Transmission tracking	±0.08 dB
10 GHz to 18 GHz	
Directivity	42 dB
Source match	38 dB
Load match	42 dB
Reflection tracking	±0.10 dB
Transmission tracking	±0.08 dB

Uncorrected System Performance

300 kHz to 7 GHz	
Directivity	15 dB
Source match	12 dB
Load match	15 dB
7 GHz to 14 GHz	
Directivity	10 dB
Source match	10 dB
Load match	12 dB
14 GHz to 16 GHz	
Directivity	8 dB
Source match	10 dB
Load match	12 dB
16 GHz to 18 GHz	
Directivity	6 dB
Source match	10 dB
Load match	12 dB

Test Port Output

Power range	
300 kHz to 16 GHz	-40 dBm to +10 dBm
16 GHz to 18 GHz	-40 dBm to +6 dBm
Power accuracy	±1.5 dB
Power resolution	0.05 dB
Harmonic distortion[6]	-15 dBc
Non-harmonic spurious[6]	
300 kHz to 16 GHz	-20 dBc
16 GHz to 18 GHz	-15 dBc

[1] All specifications subject to change without notice. [6] Specification applies over entire frequency range, at output power of 0 dBm.

Specifications[1]

Test Port Input

Noise floor	
300 kHz to 10 MHz	-115 dBm/Hz
10 MHz to 7 GHz	-130 dBm/Hz (135 dBm/Hz typ.)
7 GHz to 12 GHz	-125 dBm/Hz (130 dBm/Hz typ.)
12 GHz to 16 GHz	-122 dBm/Hz (127 dBm/Hz typ.)
16 GHz to 18 GHz	-120 dBm/Hz (125 dBm/Hz typ.)
Damage level	+23 dBm
Damage DC voltage	35 V

Measurement Speed

Time per point	30 µs typ.
Port switchover time	0.2 ms

Frequency Reference Input

Port	10 MHz Ref In/Out
External reference frequency	10 MHz
Input level	-1 dBm to 5 dBm
Input impedance	50 Ohm
Connector type	BNC, female

Frequency Reference Output

Port	10 MHz Ref In/Out
Internal reference frequency	10 MHz
Output reference signal level at 50 Ohm impedance	1 dBm to 5 dBm
Connector type	BNC, female

Trigger Input

Port	Ext Trig In
Input level	
Low threshold voltage	0.5 V
High threshold voltage	2.7 V
Input level range	0 V to + 5 V
Pulse width	≥2 µs
Polarity	positive or negative
Input impedance	≥10 kOhm
Connector type	BNC, female

Specifications[1]

Trigger Output

Port	Ext Trig Out
Maximum output current	20 mA
Output level	
Low level voltage	0.0 V
High level voltage	3.5 V
Polarity	positive or negative
Connector type	BNC, female

System & Power

Operating system	Windows 7 and above
CPU frequency	1.0 GHz
RAM	512 MB
Interface	USB 2.0
Connector type	USB B
Power supply	110-240 V, 50/60 Hz
Power consumption	32 W
Input power	9 V DC to 15 V DC
Input power consumption DC	25 W

Calibration

Recommended factory adjustment interval	3 years

Dimensions

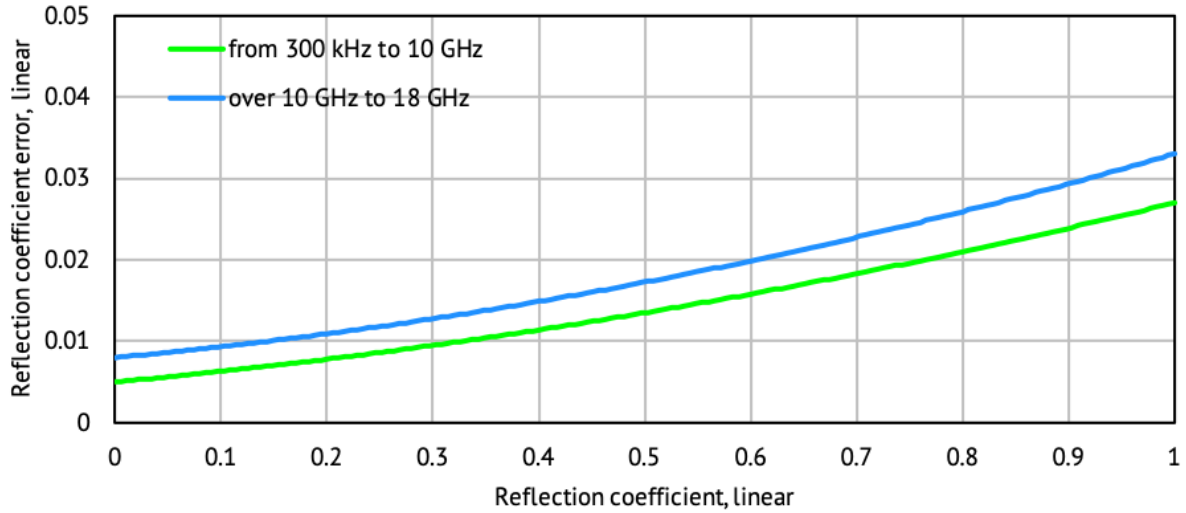
Length	360 mm
Width	200 mm
Height	65 mm
Weight	3.8 kg (134 oz)

Environmental Specifications

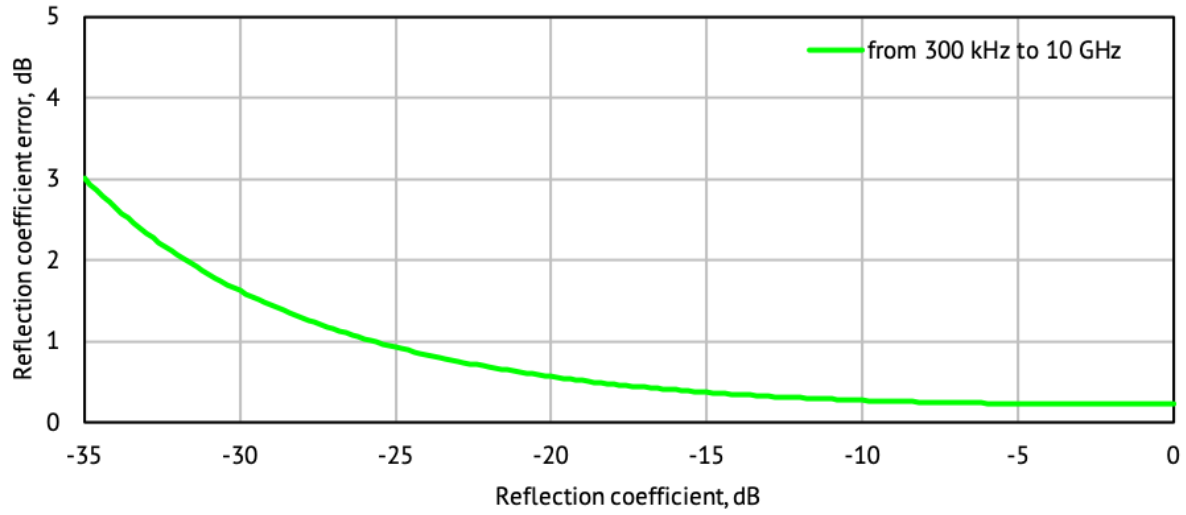
Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Storage temperature	-50 °C to +70 °C (-58 °F to 158 °F)
Humidity	90 % at 25 °C (77 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

Reflection Accuracy Plots

Reflection Magnitude Errors



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



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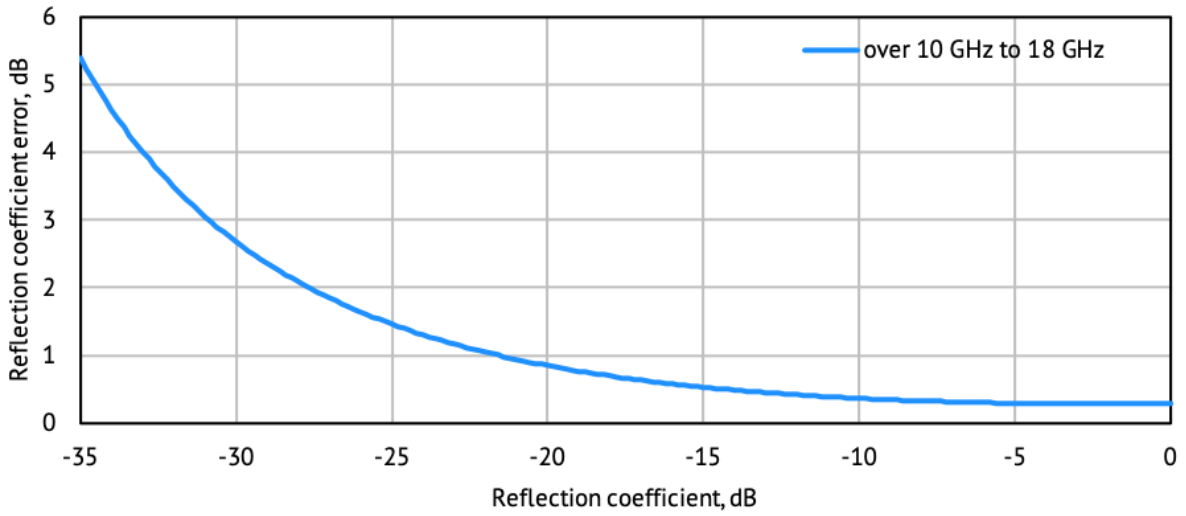

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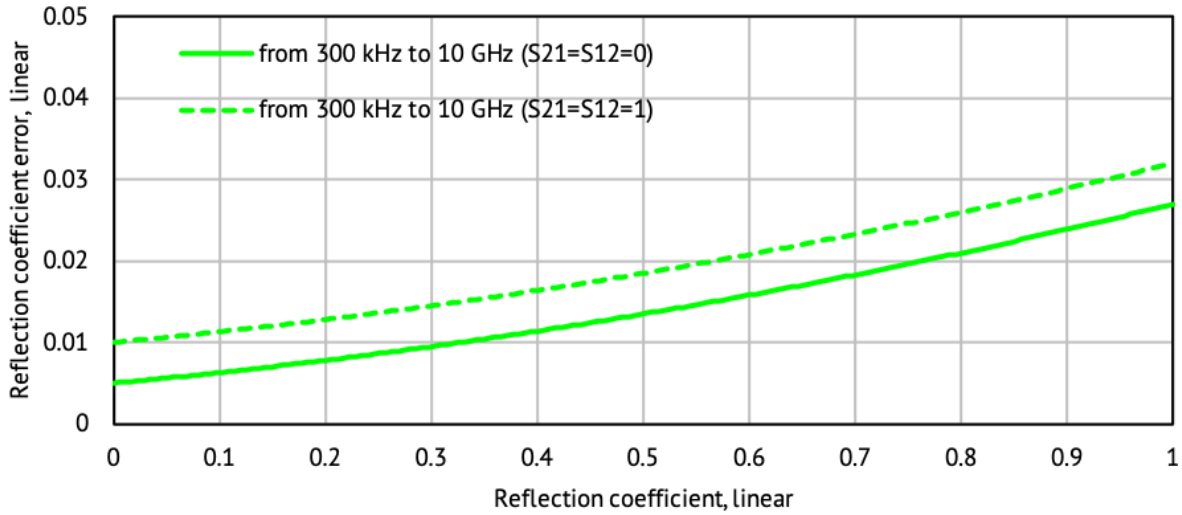
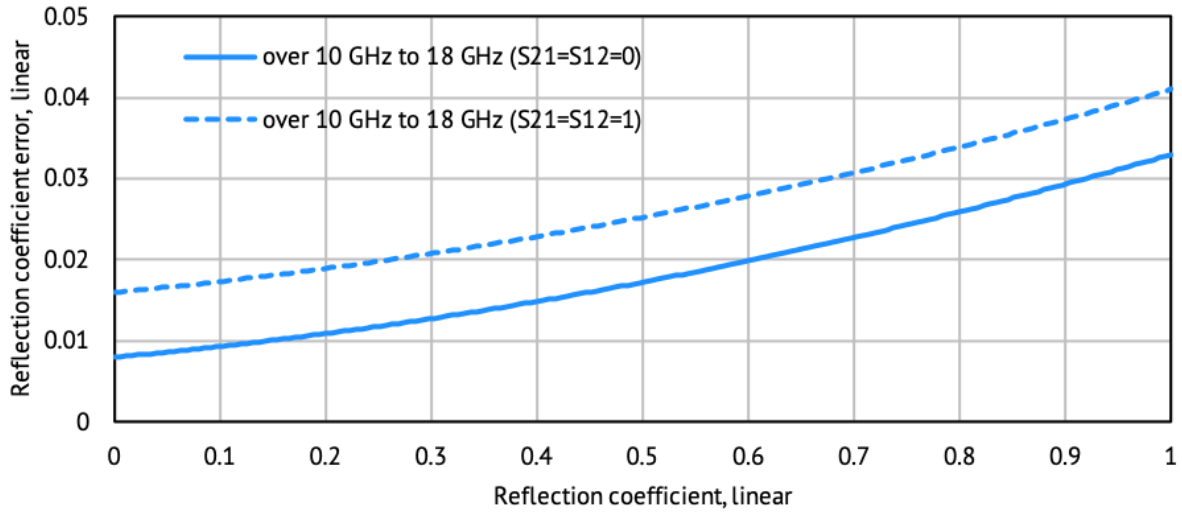
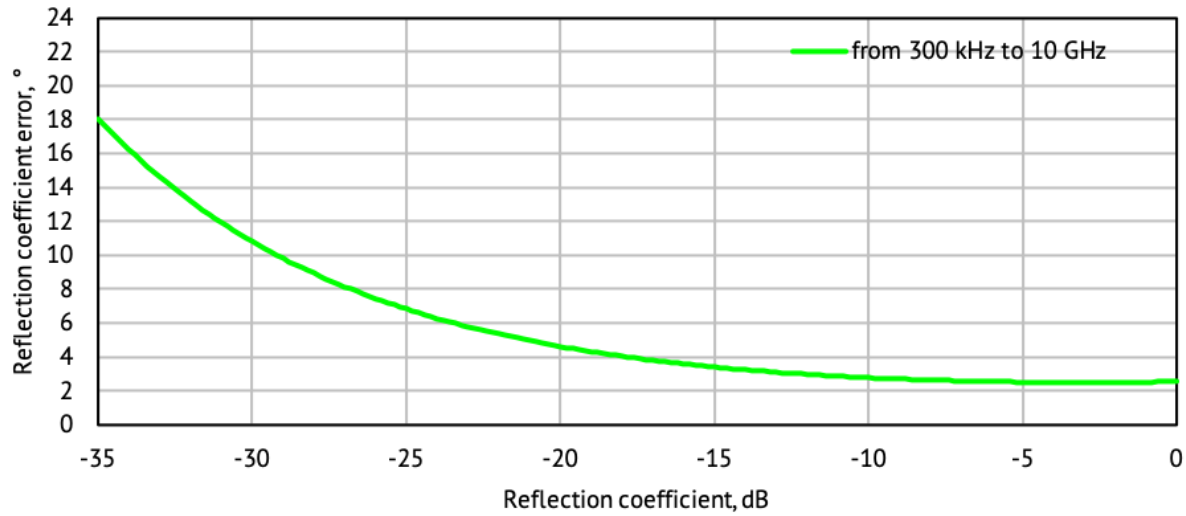




Reflection Phase Errors



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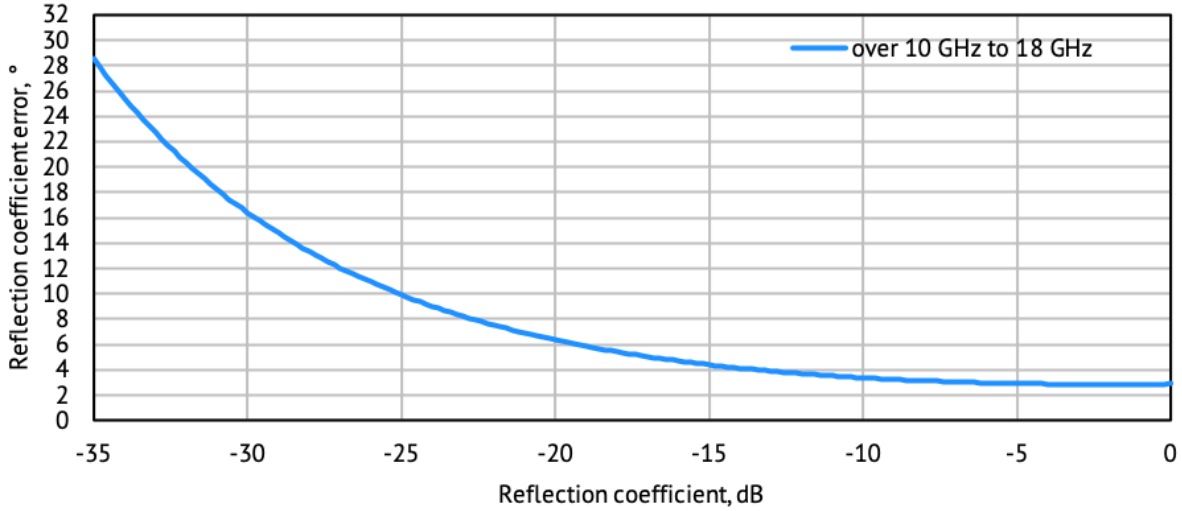
Reflection Accuracy Plots

Reflection Phase Errors



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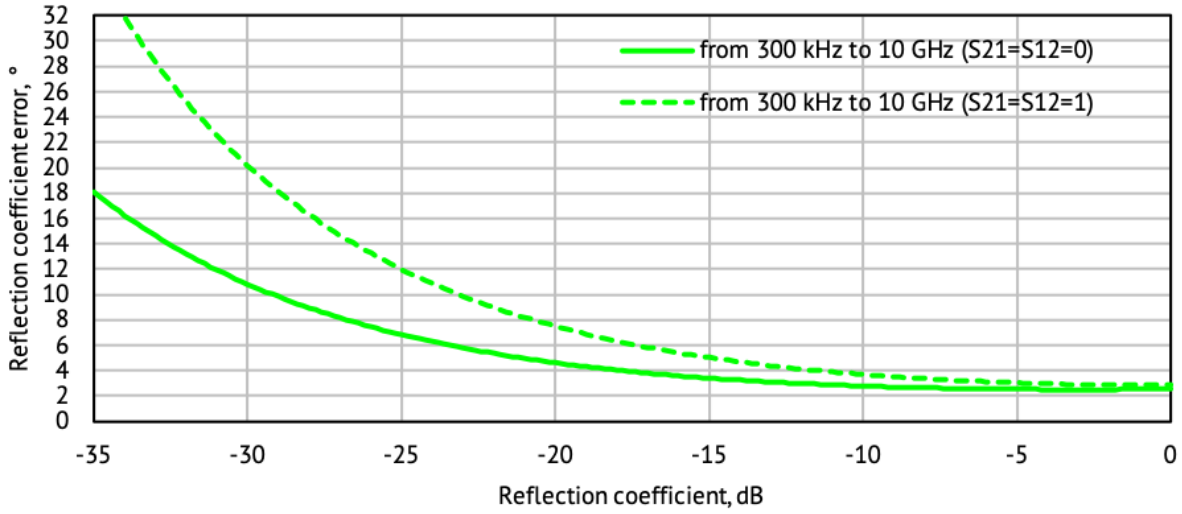
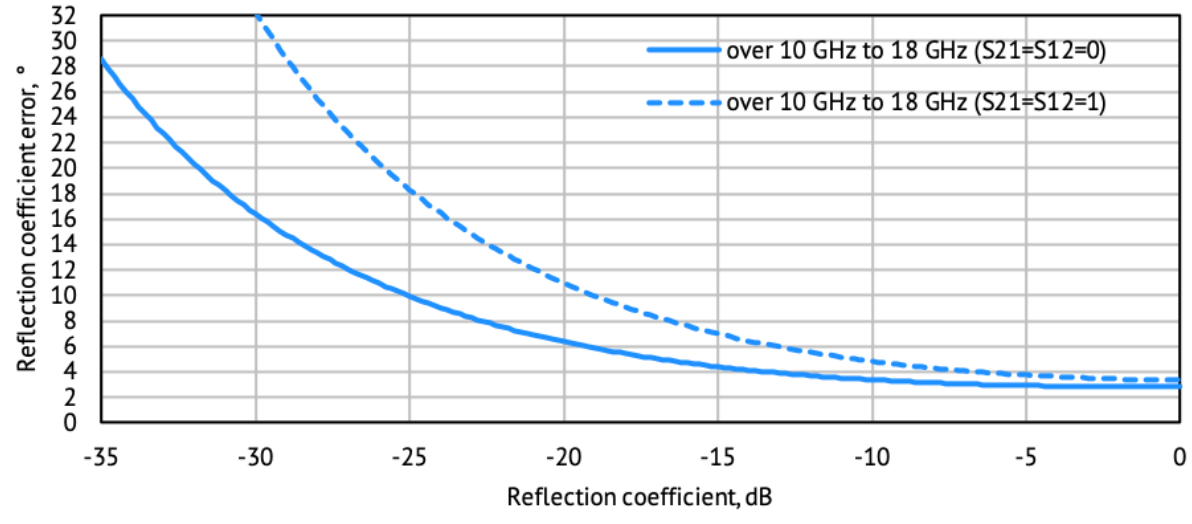
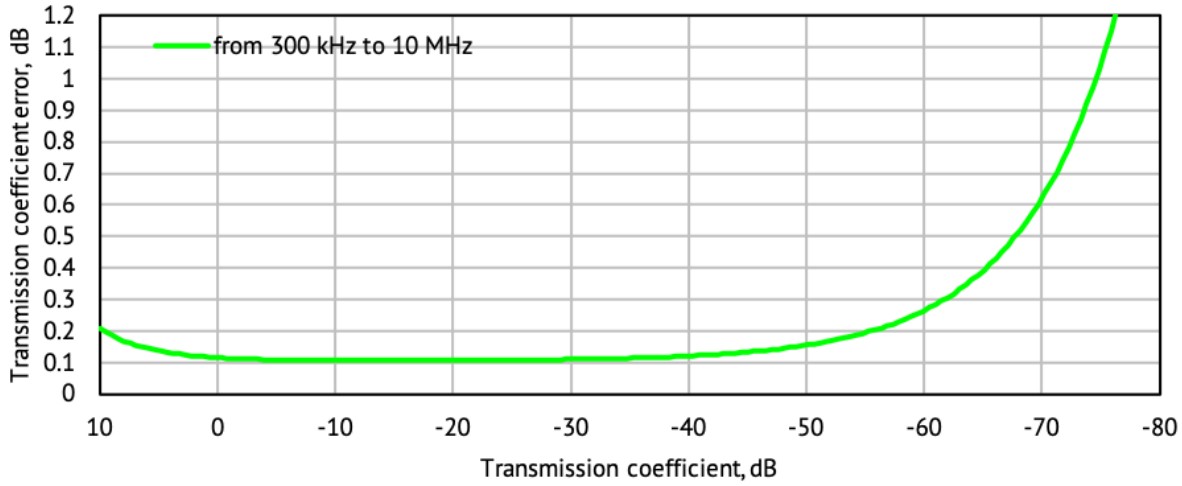


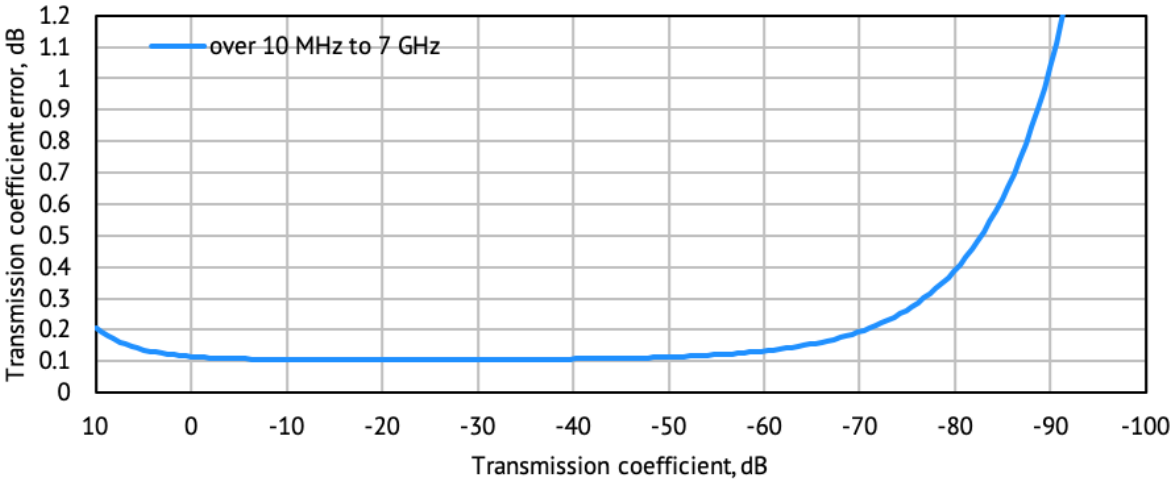


Transmission Accuracy Plots

Transmission Magnitude Errors



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



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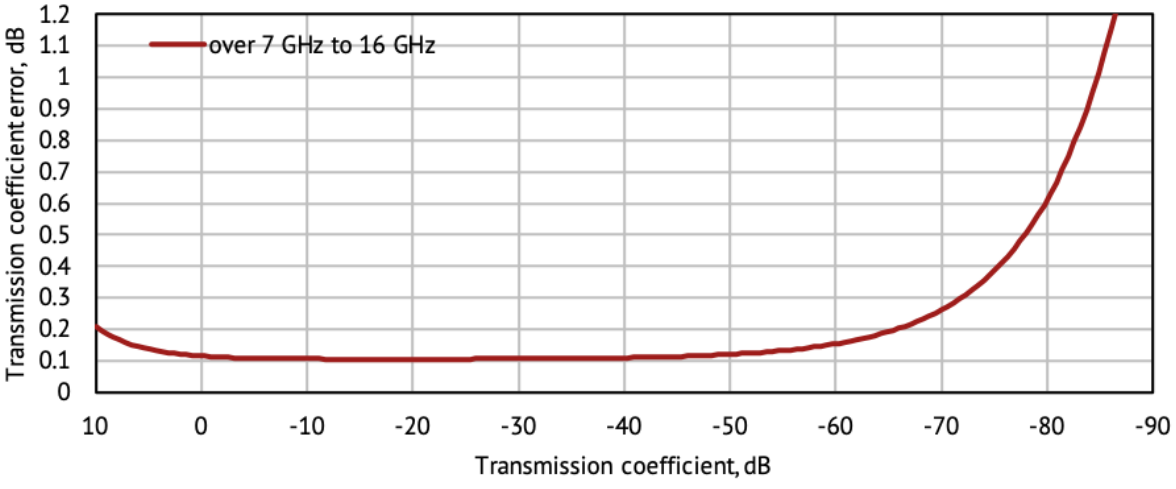

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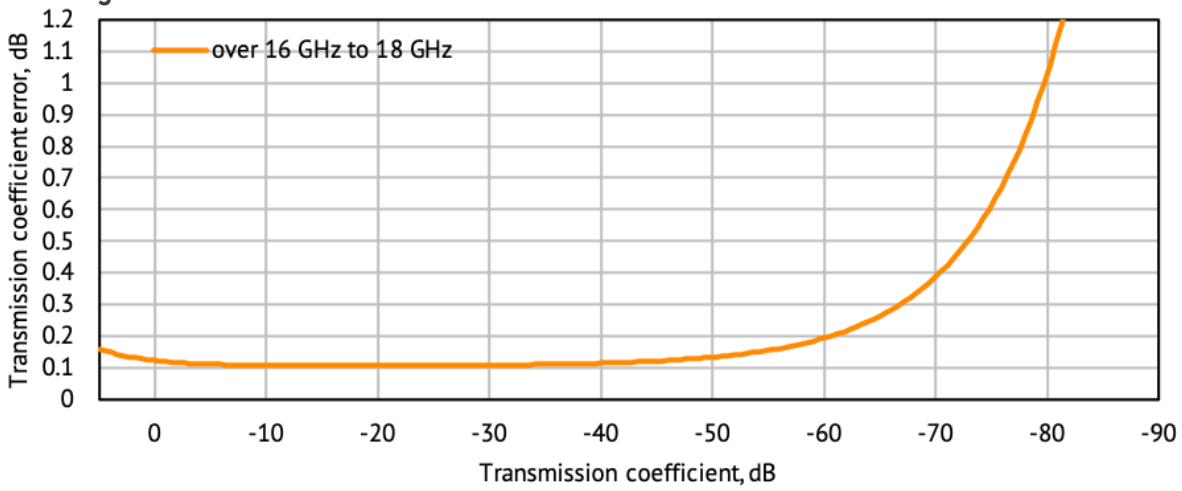

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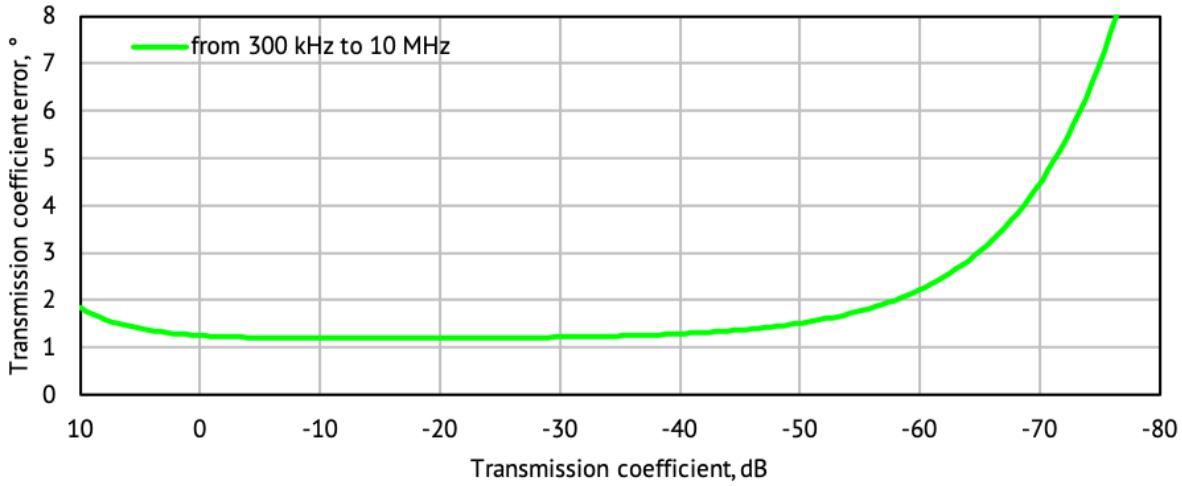
Transmission Phase Errors



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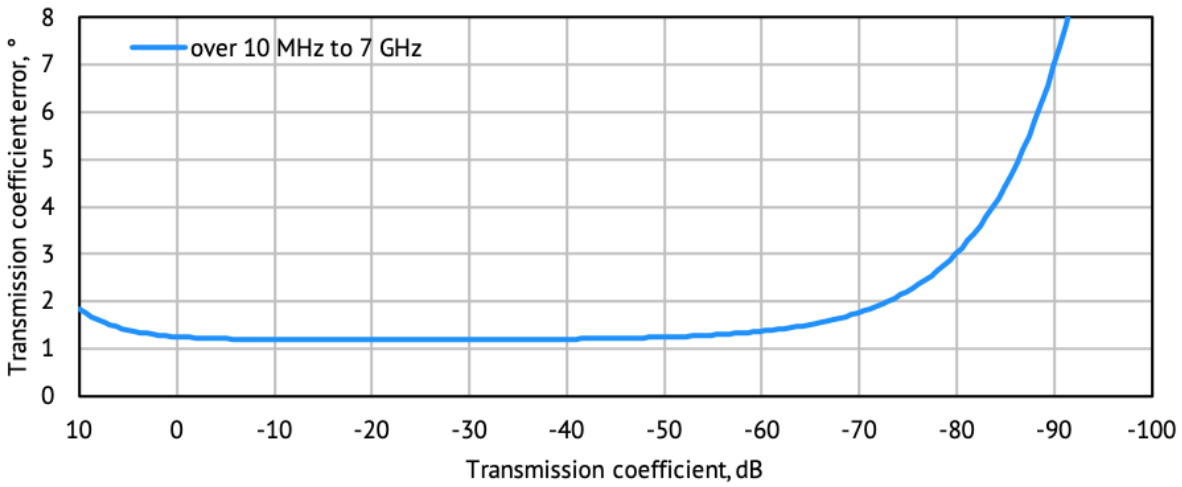

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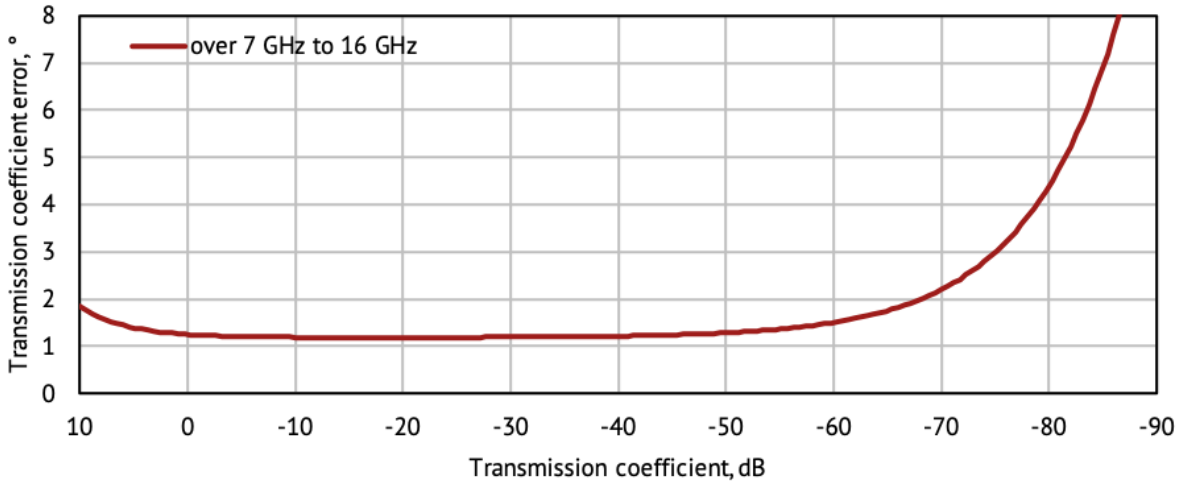
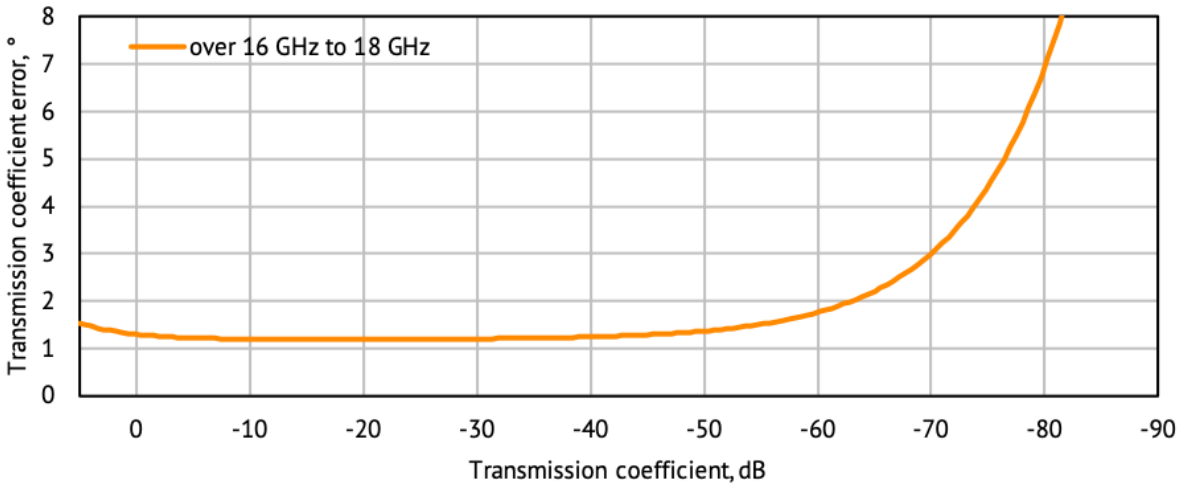
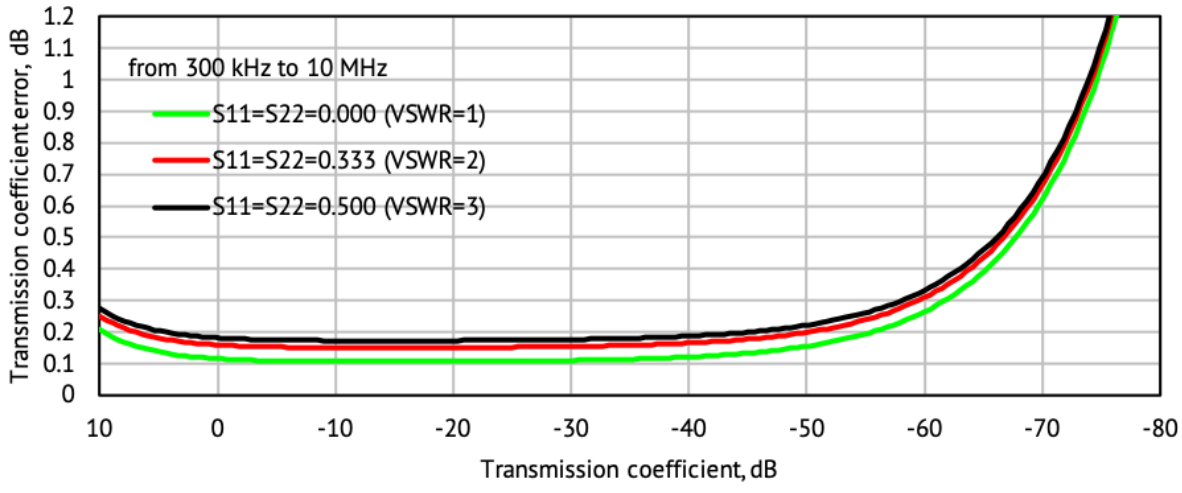


Specifications are based on matched DUT, and IF bandwidth of 10 Hz



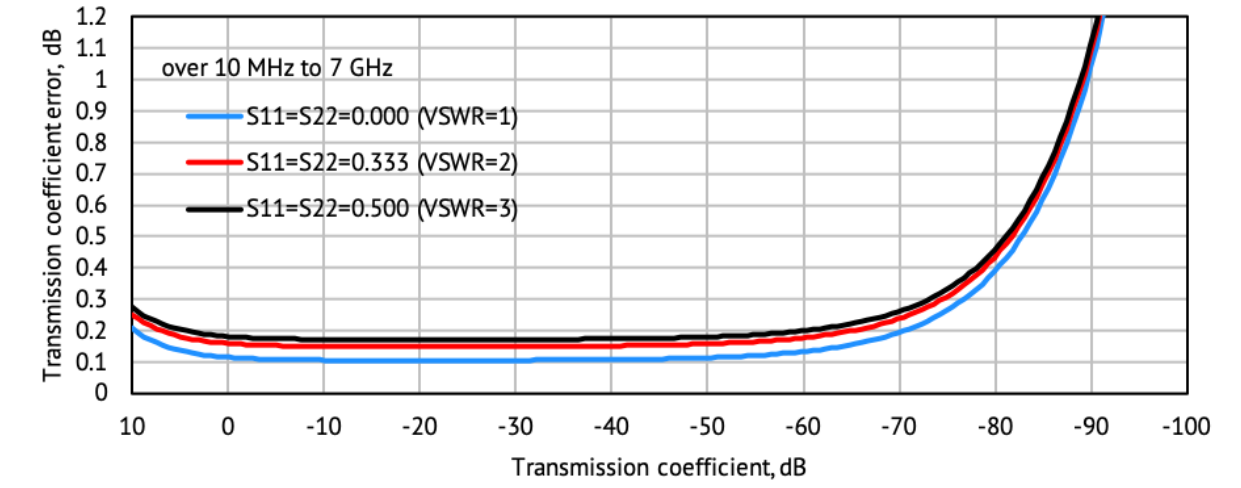
Specifications are based on matched DUT, and IF bandwidth of 10 Hz

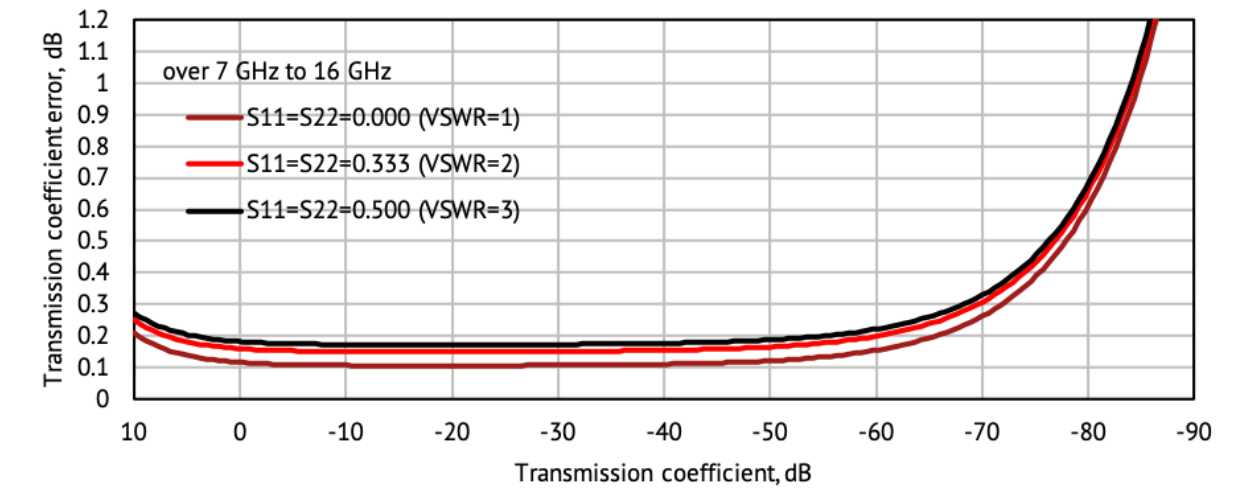
Transmission magnitude errors for unmatched devices

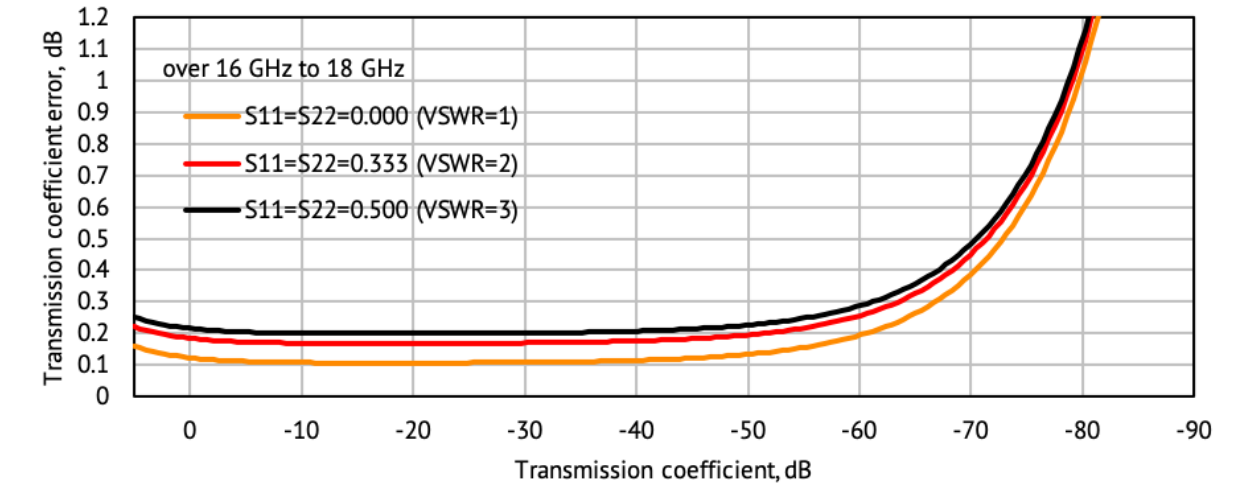


Transmission Accuracy Plots

Transmission magnitude errors for unmatched devices

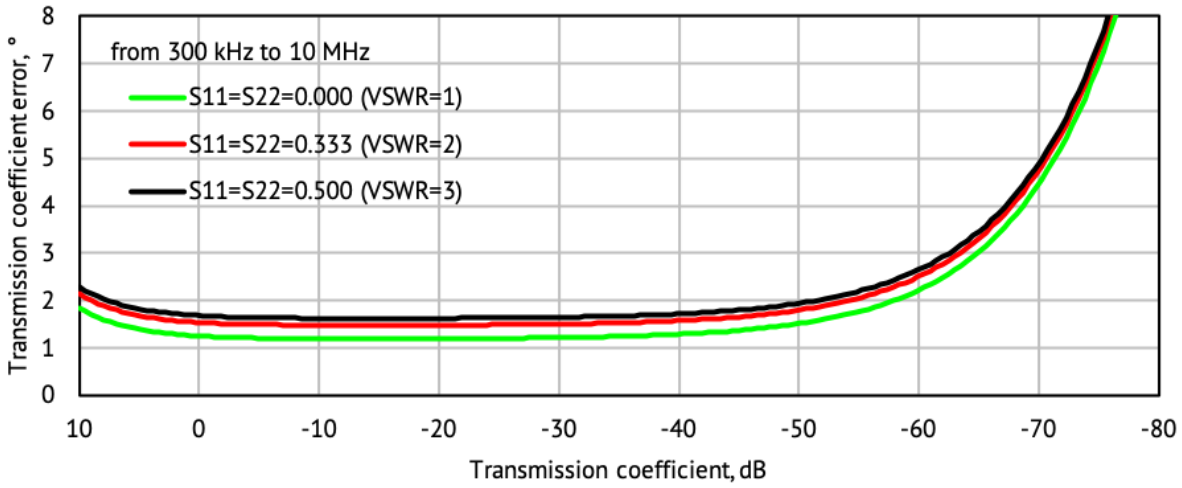


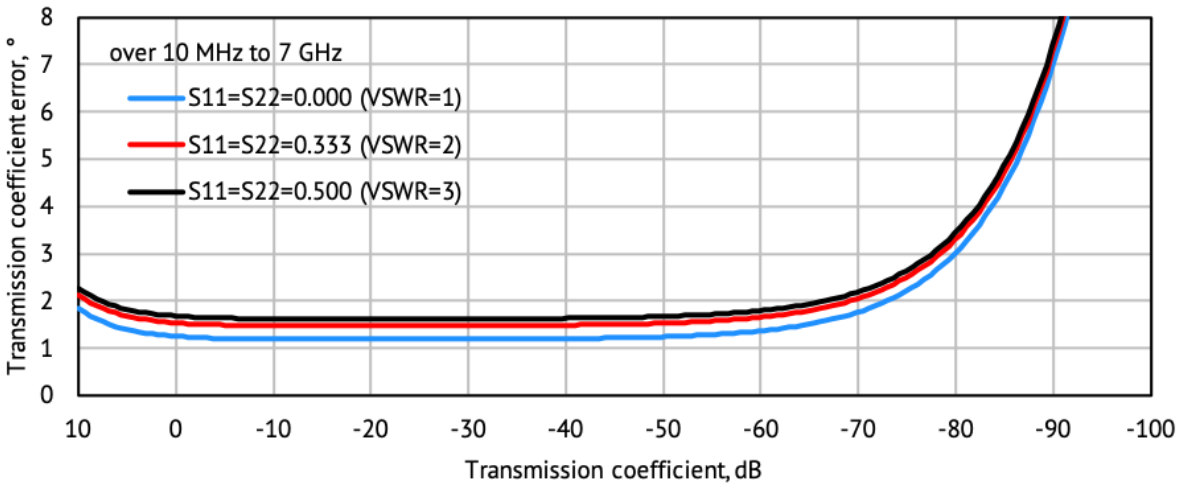


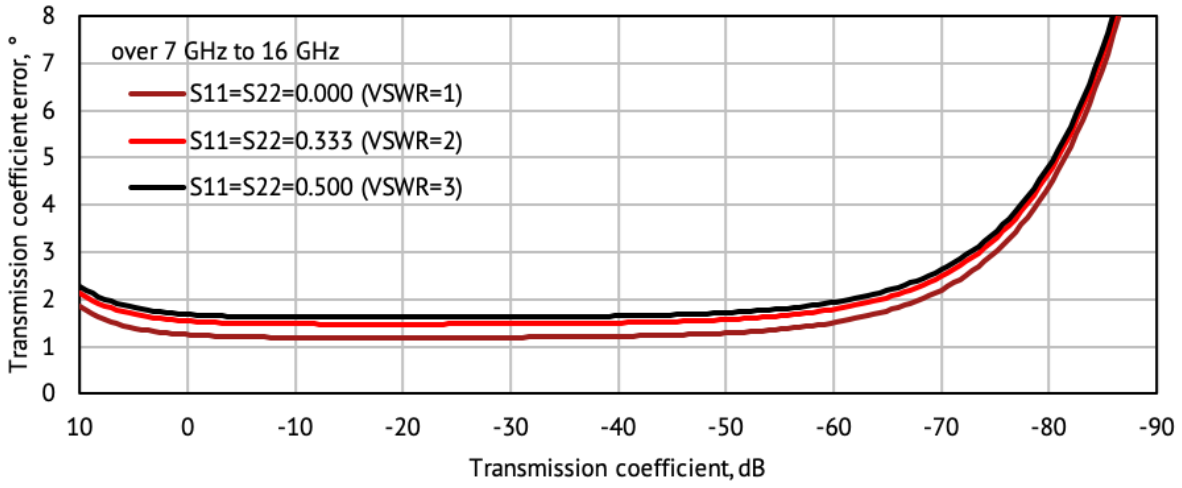


Transmission Accuracy Plots

Transmission phase errors for unmatched devices

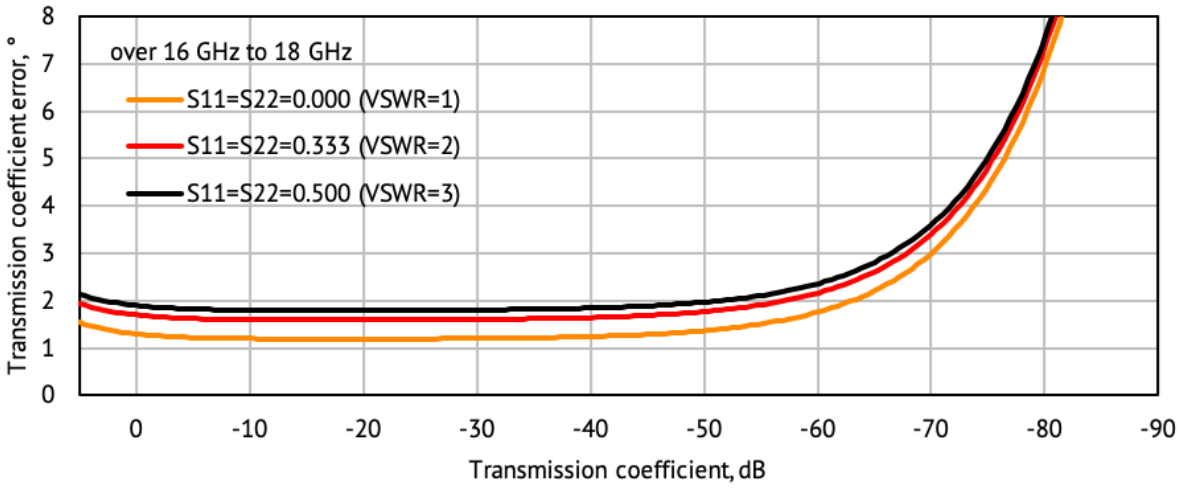




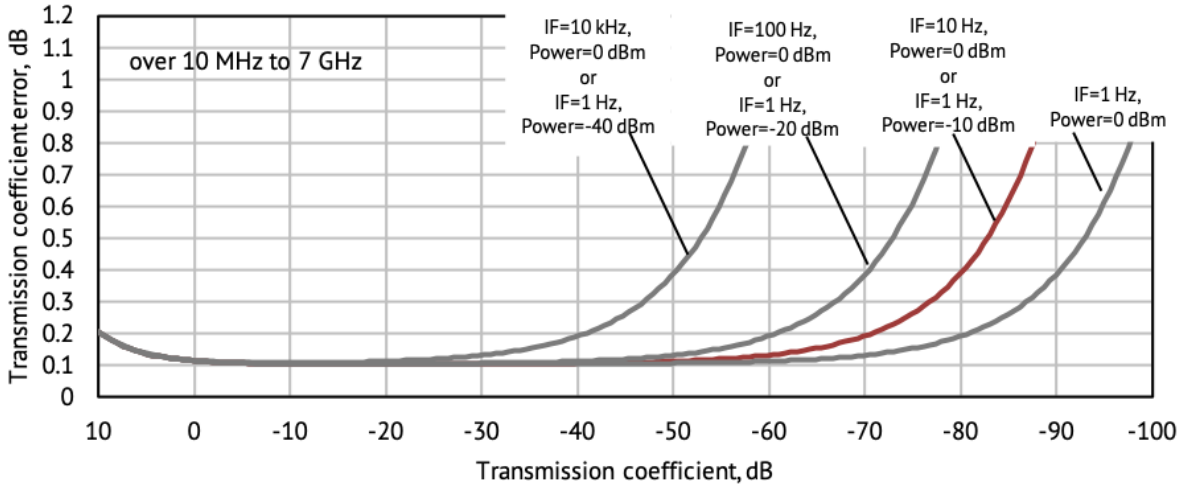


Transmission Accuracy Plots

Transmission phase errors for unmatched devices



Transmission errors for matched devices vs output power and IF bandwidth



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 transferred, 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.

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