S5180B Extended Data Sheet

- **Frequency range:** 100 kHz - 18 GHz
- **Wide output power range:** -45 dBm to +10 dBm
- **Dynamic range:** 130 dB (10 Hz IF bandwidth) typ.
- **Measurement time per point:** 24 µs per point, min typ.
- **16 logical channels with 16 traces** each max.
- **Automation programming** in Python, LabVIEW, MATLAB, .NET, etc.
- **Time domain and gating** conversion included
- **Frequency offset mode**, including vector mixer calibration measurements
- Up to **200,001 measurement points**
- Multiple **precision calibration** methods and automatic calibration

S5180B Specifications[1]

Primary Specifications[3]

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	2
Frequency range	100 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]	
100 kHz to 1 MHz	100 dB (120 dB typ.)
1 MHz to 6.5 GHz	130 dB (133 dB typ.)
6.5 GHz to 8.5 GHz	127 dB (130 dB typ.)
8.5 GHz to 16 GHz	125 dB
16 GHz to 18 GHz	121 dB
Crosstalk[2a]	
10 GHz to 18 GHz	-115 dB

Effective System Data

100 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

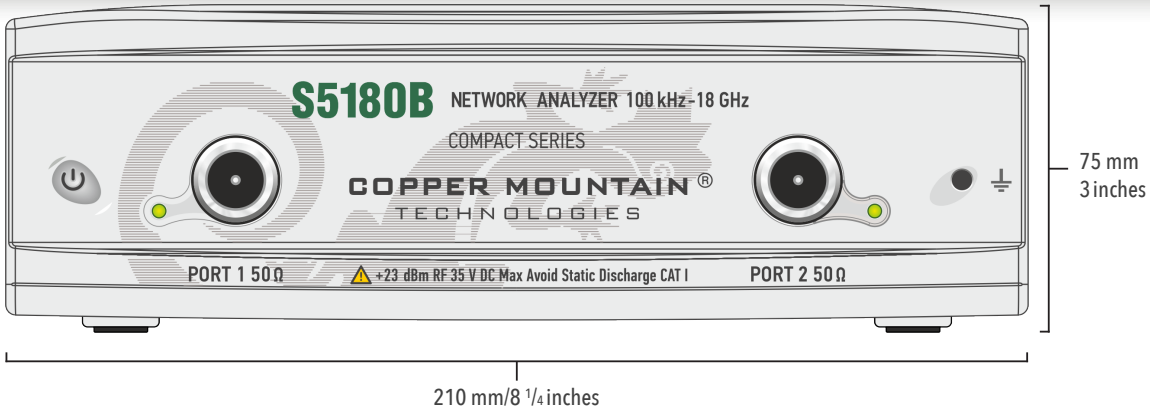
100 kHz to 1 MHz	
Directivity	10 dB
Source match	8 dB
Load match	12 dB
1 MHz to 7 GHz	
Directivity	14 dB
Source match	12 dB
Load match	15 dB
7 GHz to 18 GHz	
Directivity	10 dB
Source match	10 dB
Load match	12 dB

Measurement Accuracy

Accuracy of transmission measurements[4]	Magnitude / Phase
100 kHz to 1 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°
1 MHz to 6.5 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°
-100 dB to -80 dB	±1.0 dB / ±6°
6.5 GHz to 8.5 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°
-97 dB to -75 dB	±1.0 dB / ±6°
8.5 GHz to 16 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°
-95 dB to -75 dB	±1.0 dB / ±6°
16 GHz to 18 GHz	
0 dB to +6 dB	±0.2 dB / ±2°
-55 dB to 0 dB	±0.1 dB / ±1°
-75 dB to -55 dB	±0.2 dB / ±2°
-95 dB to -75 dB	±1.0 dB / ±6°
Accuracy of reflection measurements[5]	Magnitude / Phase
100 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 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)	
100 kHz to 1 MHz	0.010 dB rms
1 MHz to 6.5 GHz	0.002 dB rms
6.5 GHz to 12 GHz	0.003 dB rms
12 GHz to 18 GHz	0.004 dB rms
Temperature dependence	
100 kHz to 6.5 GHz	0.02 dB/°C
6.5 GHz to 18 GHz	0.04 dB/°C

[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. [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 0dBm. 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 1 Hz. [5] Reflection specifications are based on an isolating DUT. [6] Specification applies over frequency range from 300 kHz to upper frequency limit, at output power of 0 dBm.

S5180B Specifications[1]



Test Port Output

Power range	
100 kHz to 16 GHz	-45 dBm to +10 dBm
16 GHz to 18 GHz	-45 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

Test Port Input

Noise floor	
100 kHz to 1 MHz	-100 dBm/Hz
1 MHz to 6.5 GHz	-130 dBm/Hz
6.5 GHz to 8.5 GHz	-127 dBm/Hz
8.5 GHz to 18 GHz	-125 dBm/Hz
Damage level	+23 dBm
Damage DC voltage	35 V

Measurement Speed

Time per point	24 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

Factory Adjustment

Recommended factory adjustment interval	3 years

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

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	1.5 GHz
RAM	1 GB
Interface	USB 2.0
Connector type	USB B
Input power (VNA)	11 V DC to 15 V DC
Input power consumption (VNA)	35 W
Power supply (Main Outlet)	110-240 V, 50/60 Hz
Power consumption (Main Outlet)	40 W

Dimensions

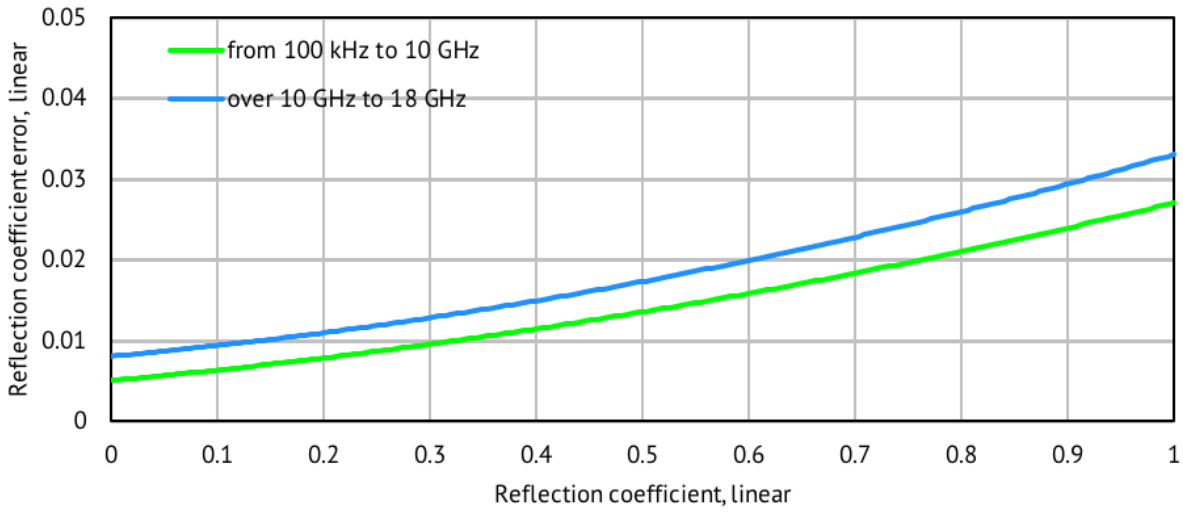
Length	360 mm
Width	200 mm
Height	65 mm
Weight	3.8 kg (134 oz)

Environmental Specifications

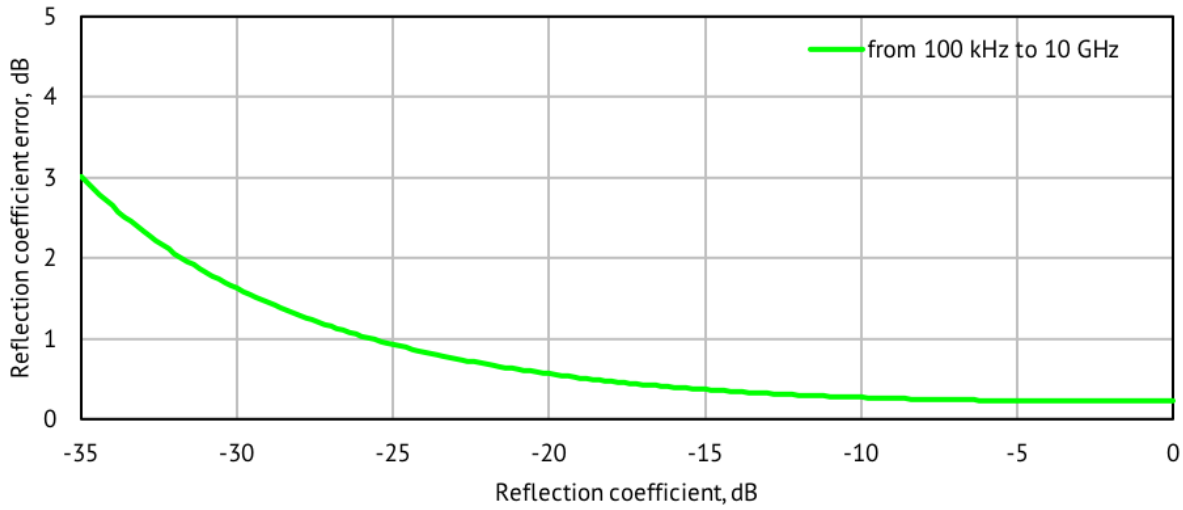
Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Storage temperature	-50 °C to +70 °C (-58 °F to 158 °F)
Humidity	90 % at 25 °C (77 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

Reflection Accuracy Plots

Reflection Magnitude Errors



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



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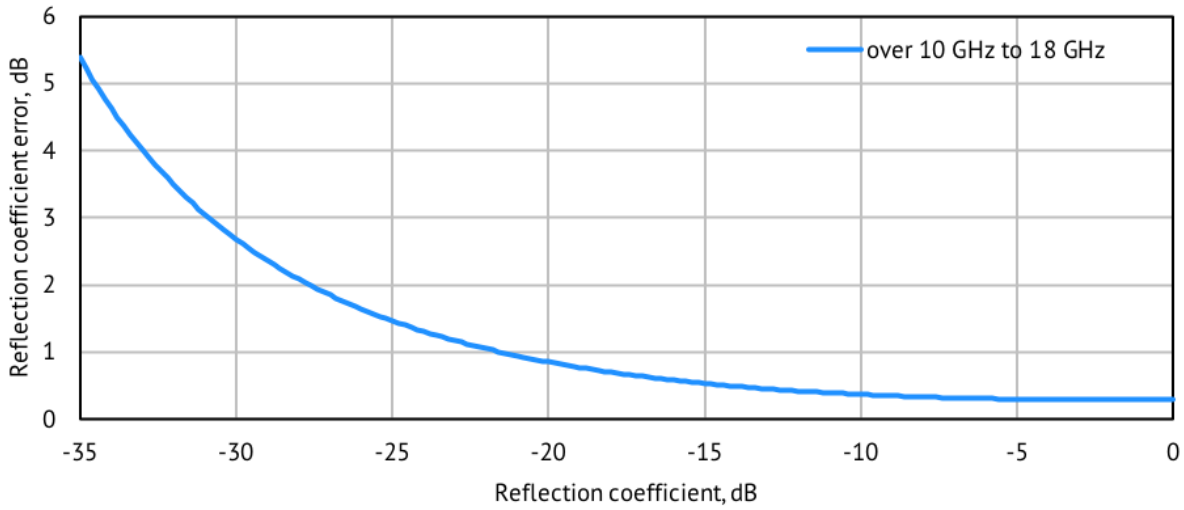

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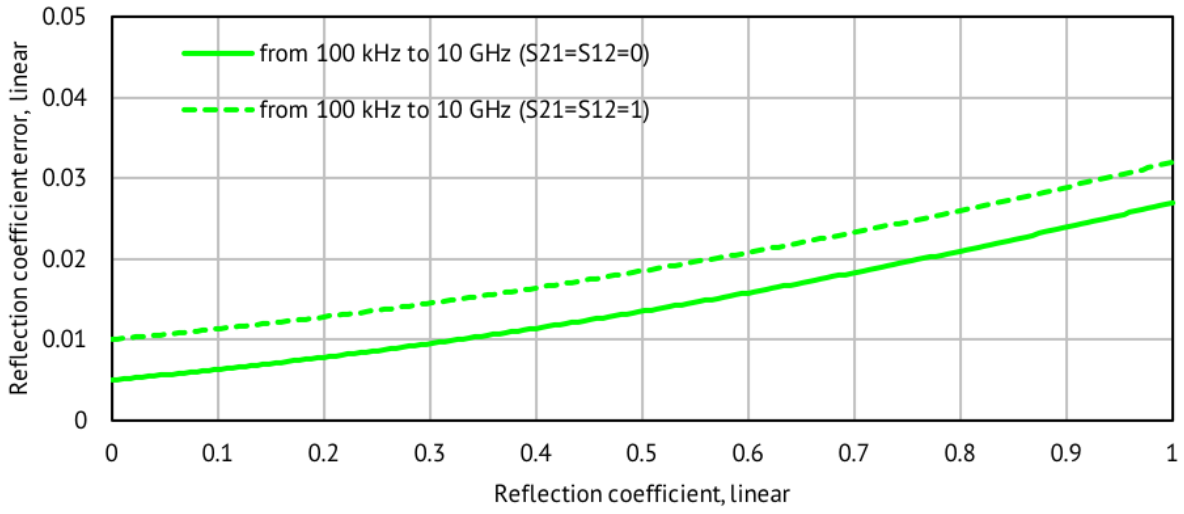
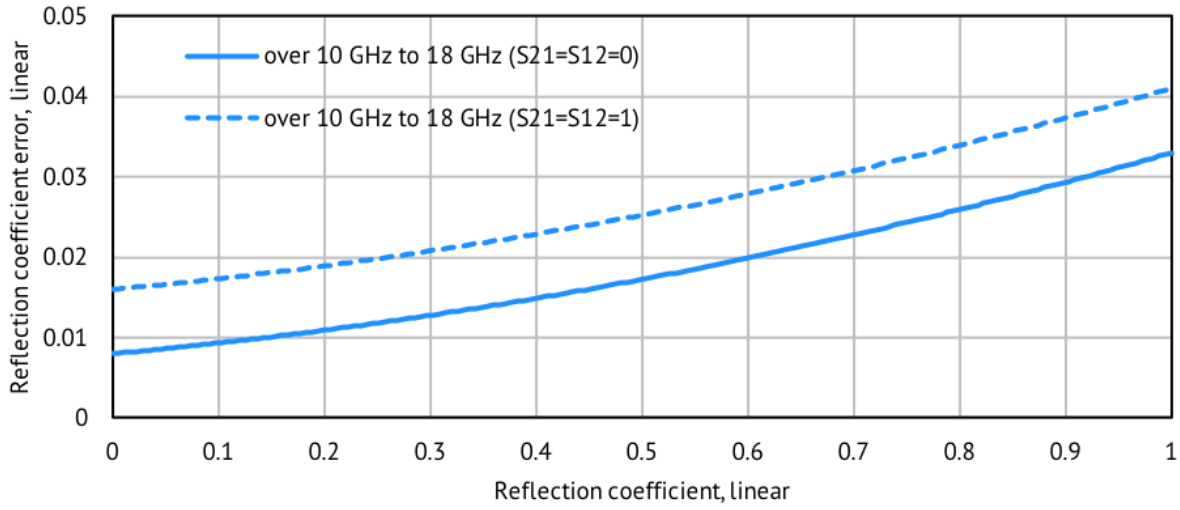
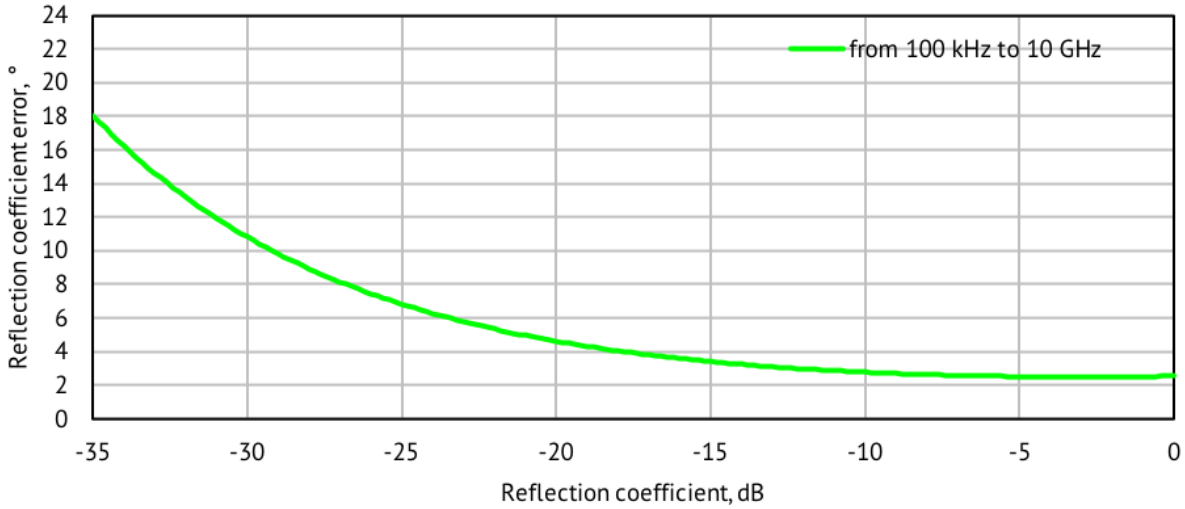


Reflection Accuracy Plots

Reflection Magnitude Errors



Reflection Phase Errors



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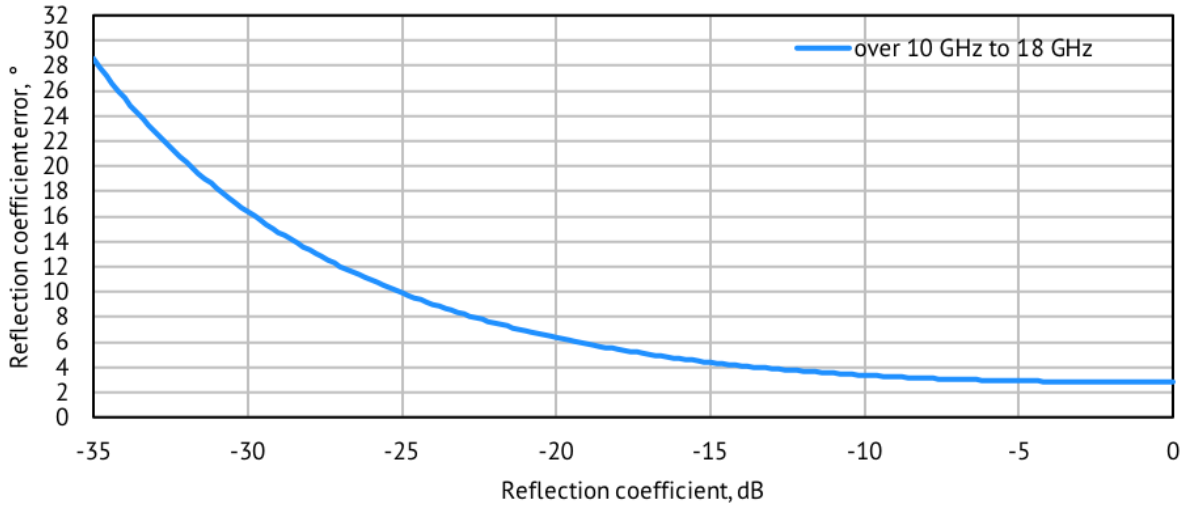
Reflection Phase Errors



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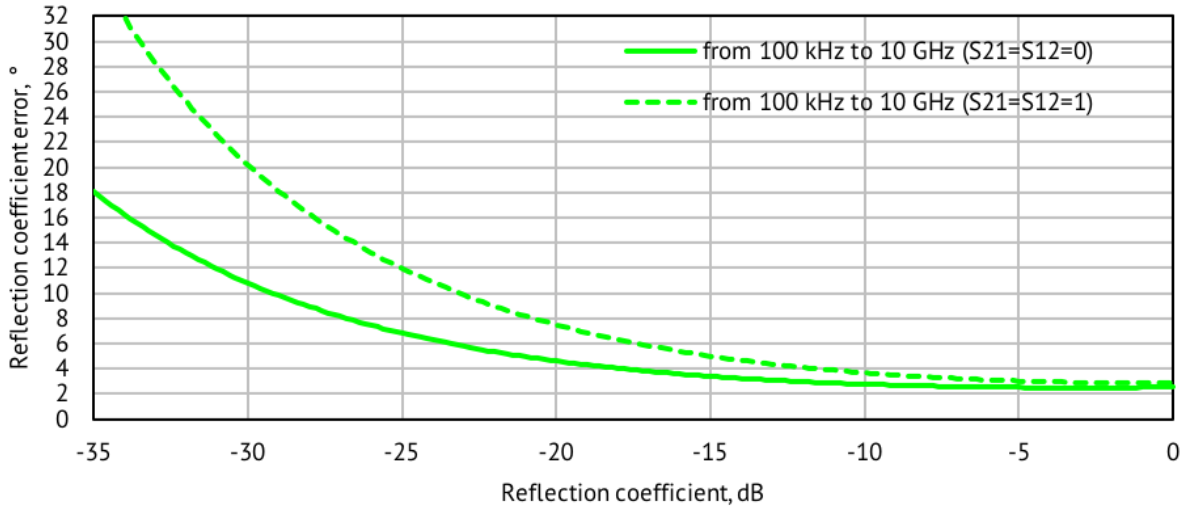
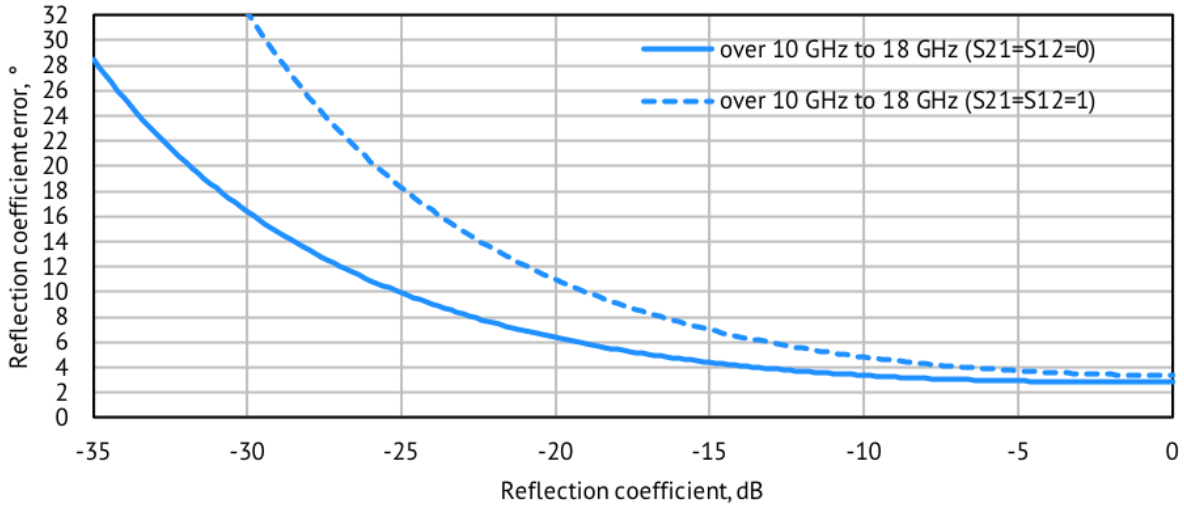


Reflection Accuracy Plots

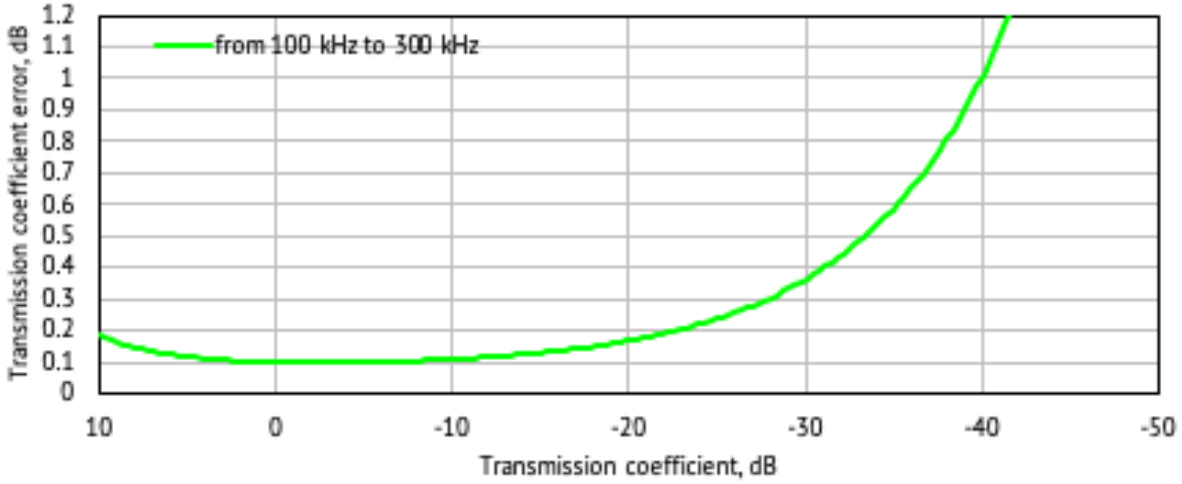
Reflection Phase Errors



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

Transmission Accuracy Plots

Transmission Magnitude Errors



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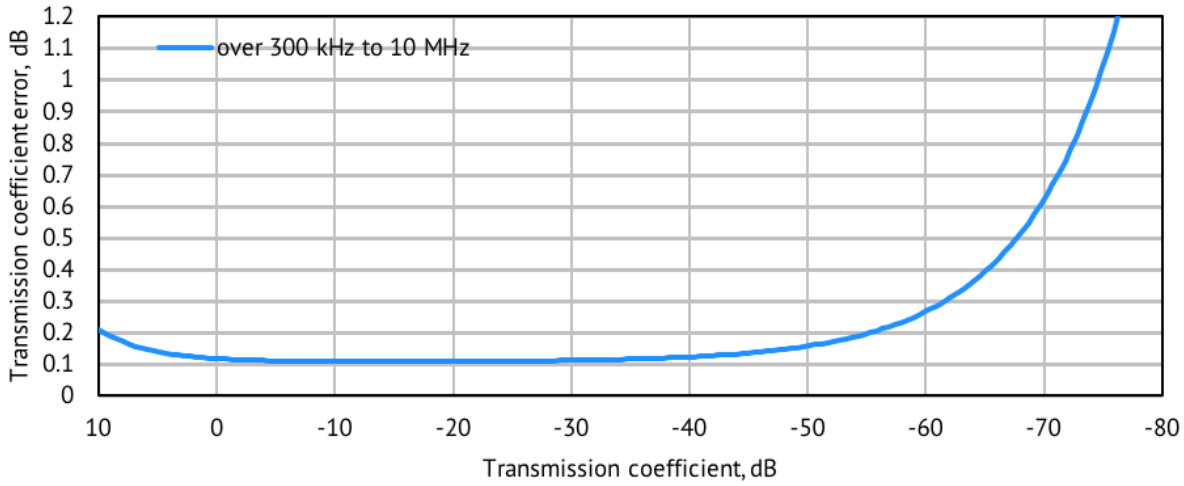

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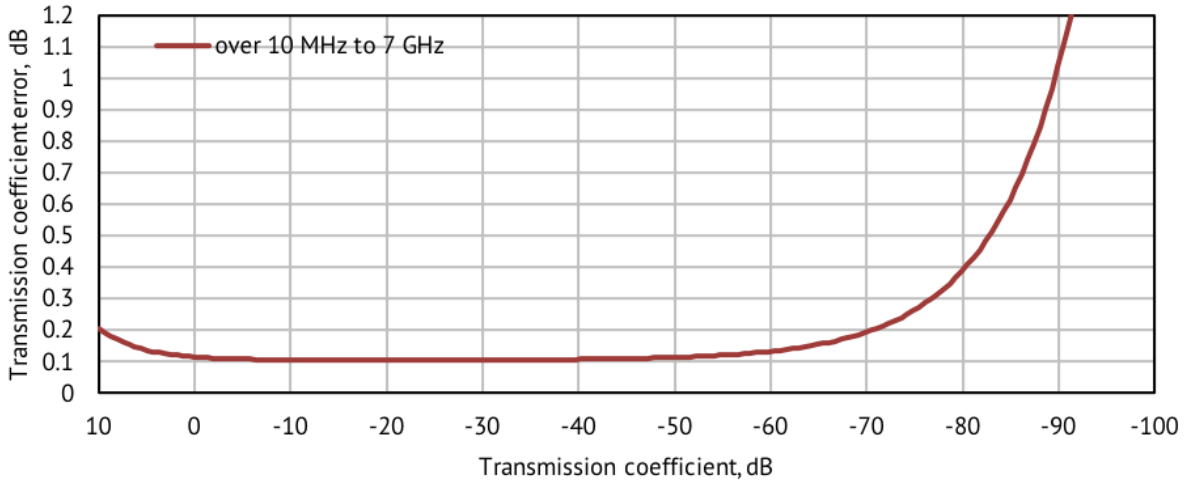
Transmission Magnitude Errors



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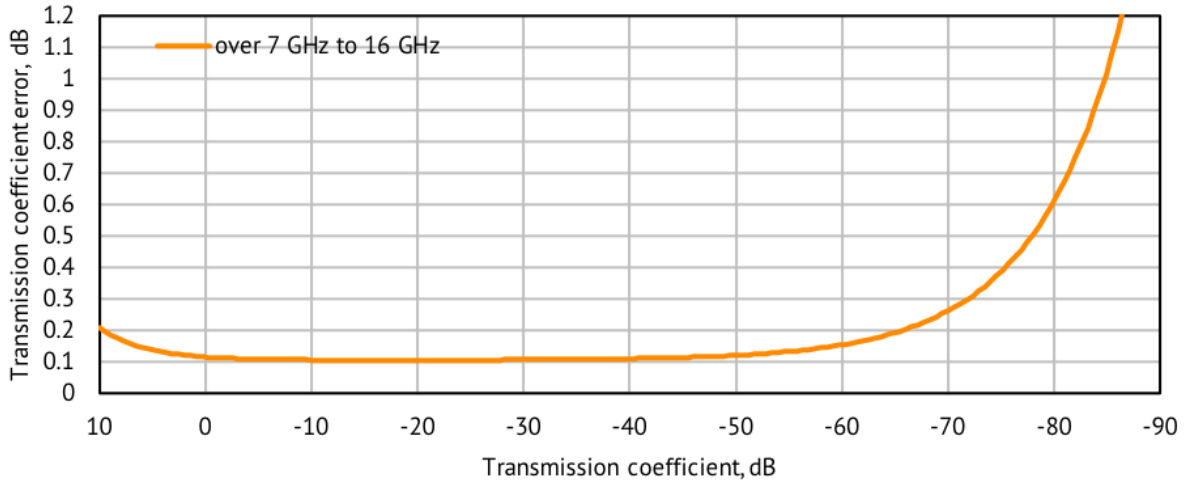

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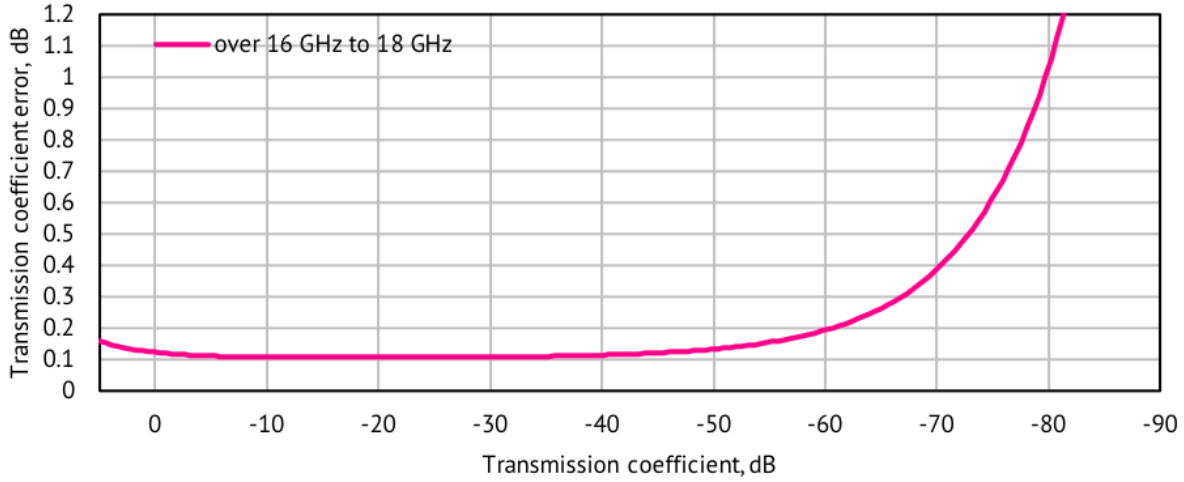

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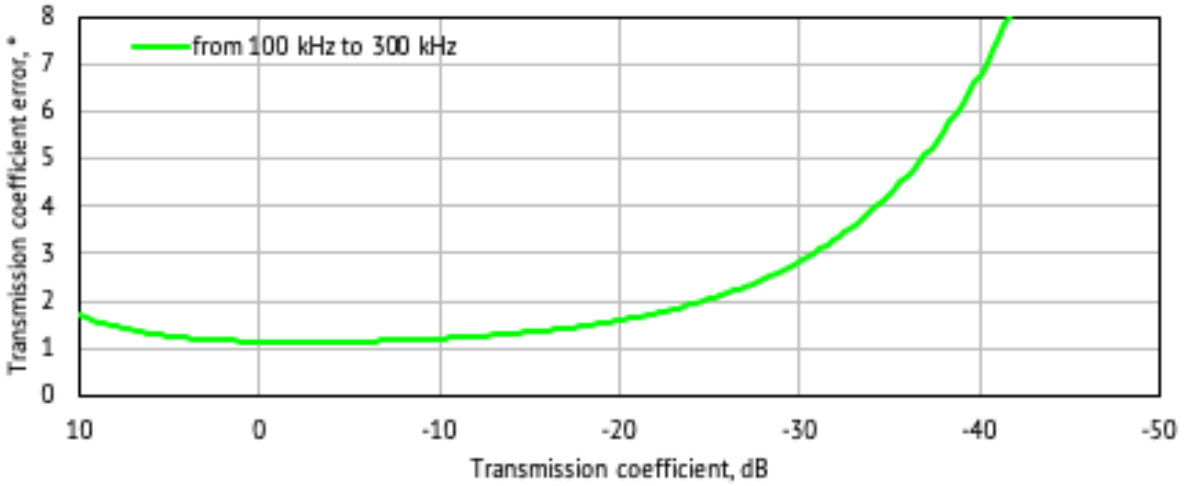
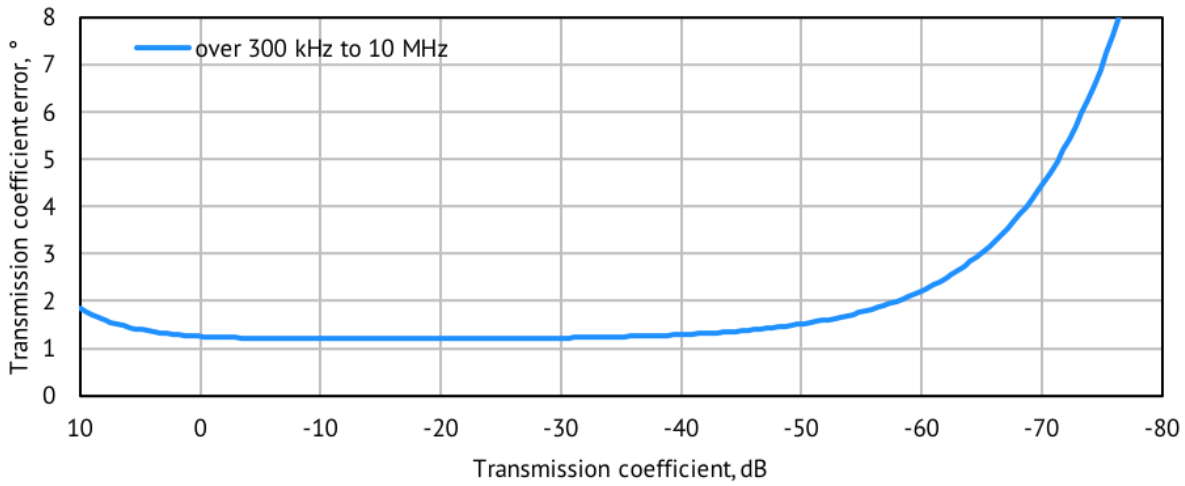


Specifications are based on matched DUT, and IF bandwidth of 10 Hz

Transmission Accuracy Plots

Transmission Phase Errors



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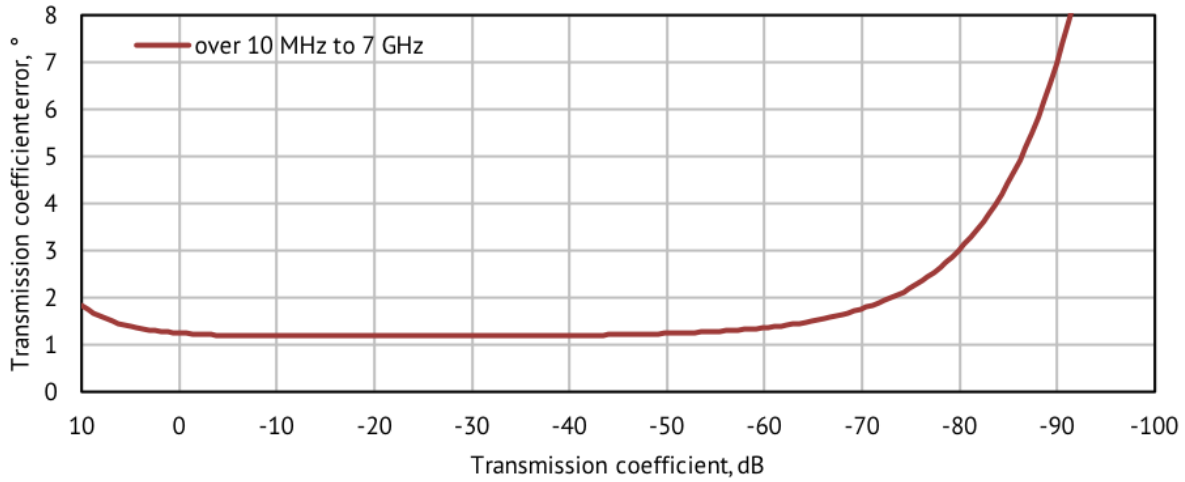

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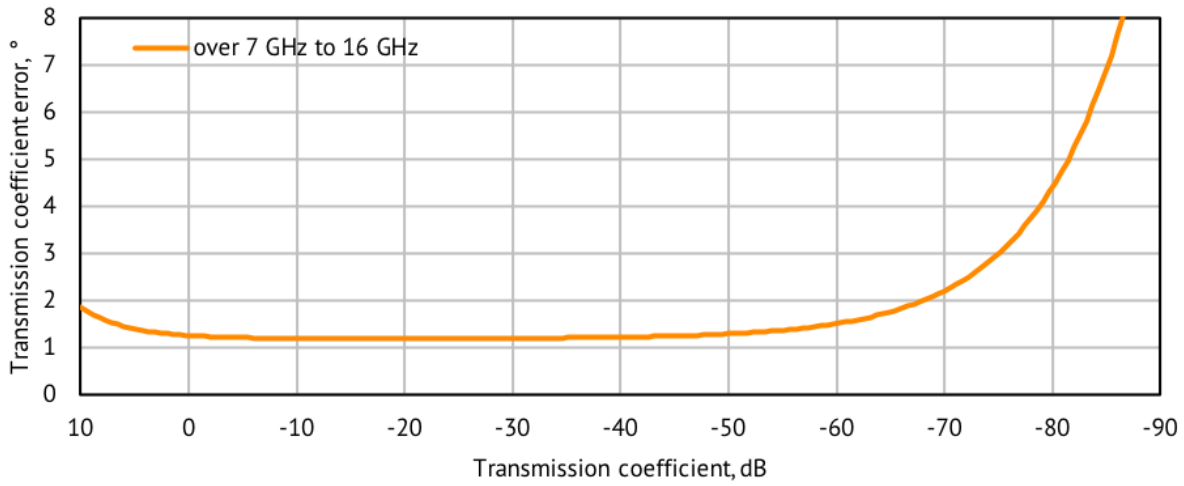

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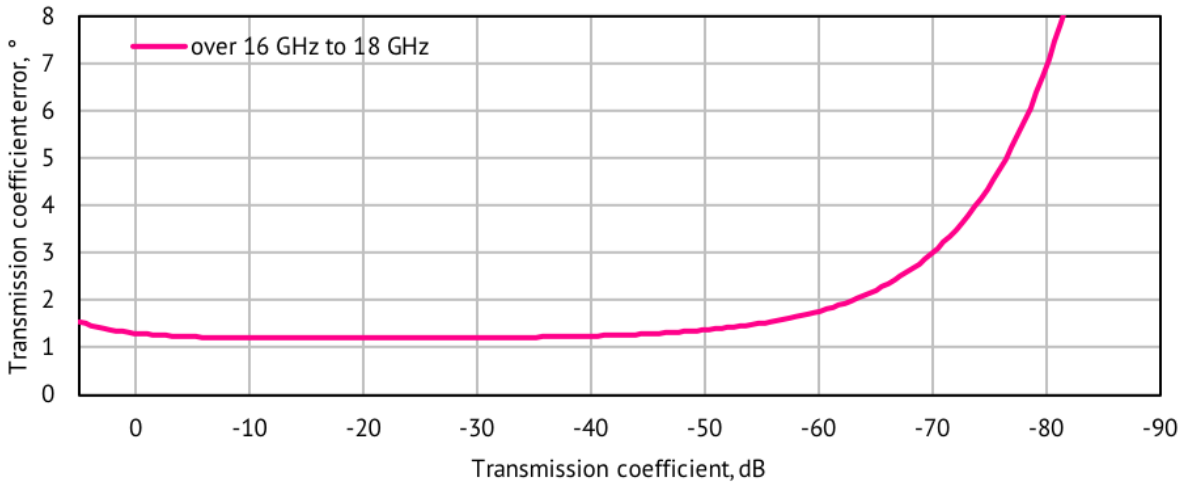
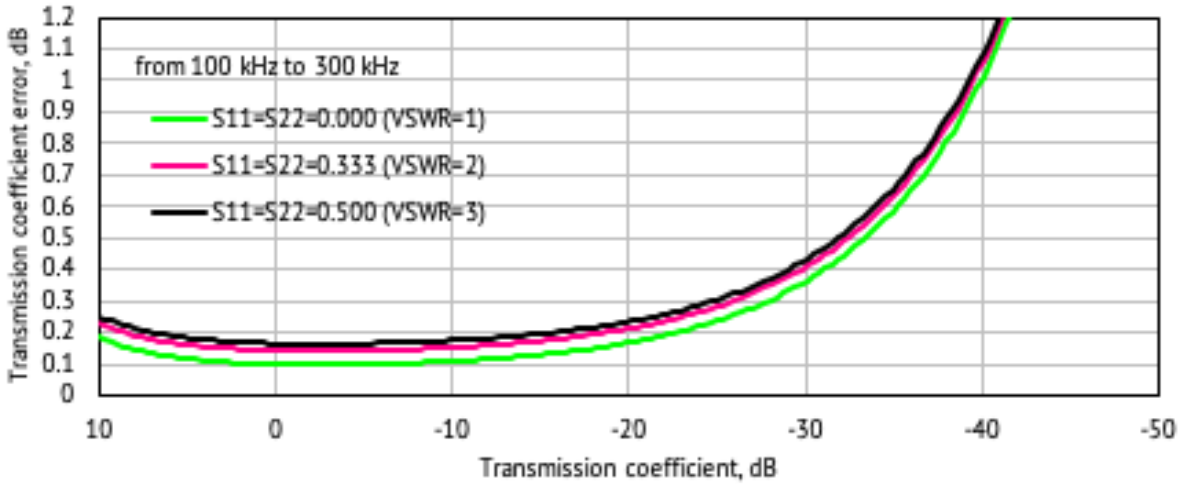
Transmission Phase Errors

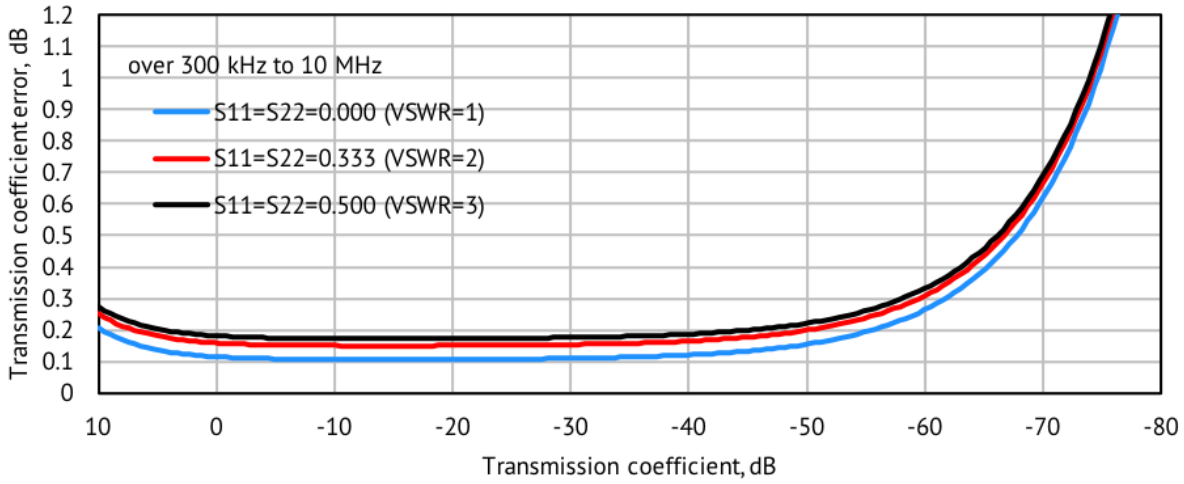


Specifications are based on matched DUT, and IF bandwidth of 10 Hz

Transmission Accuracy Plots

Transmission magnitude errors for unmatched devices





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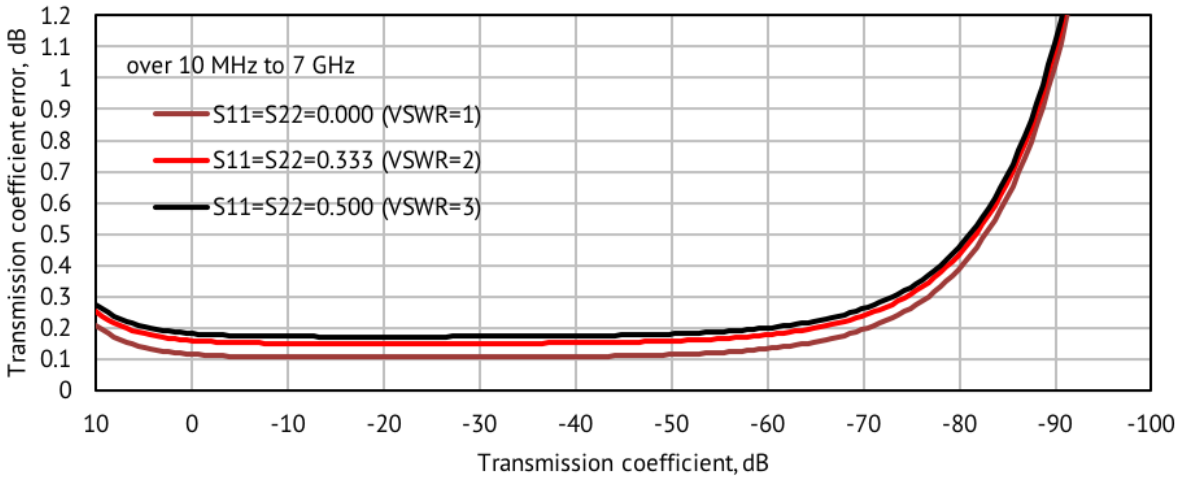

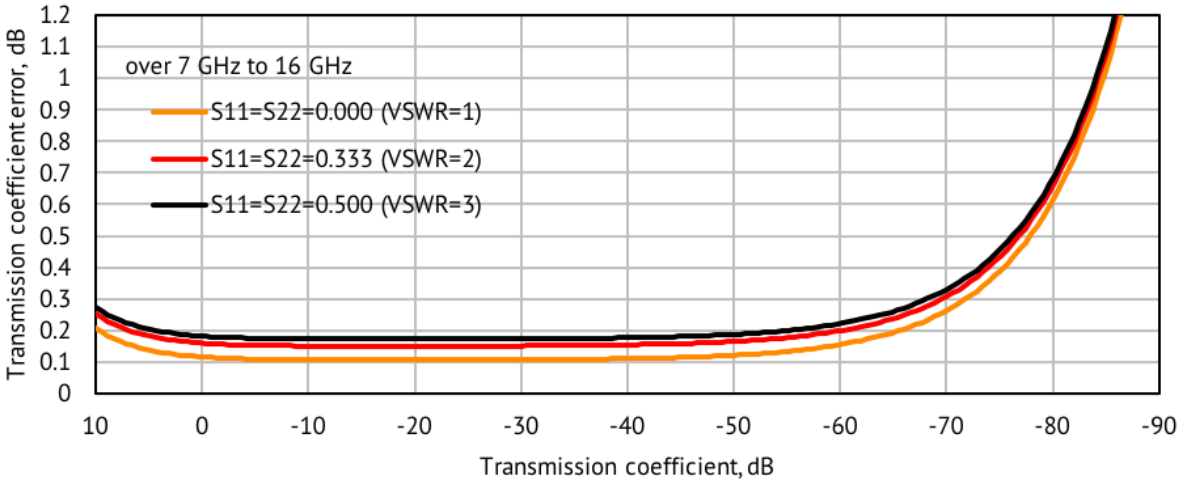

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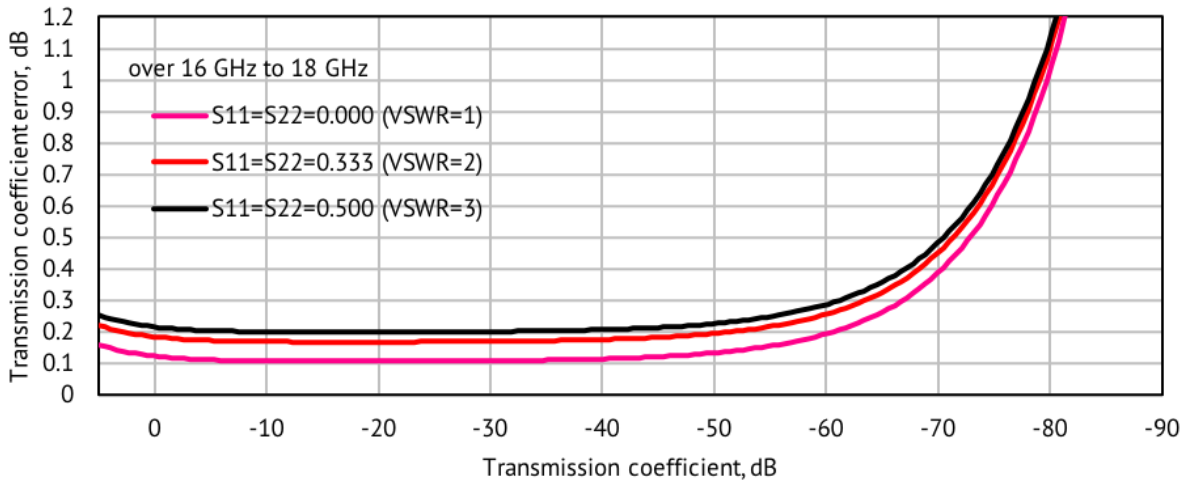
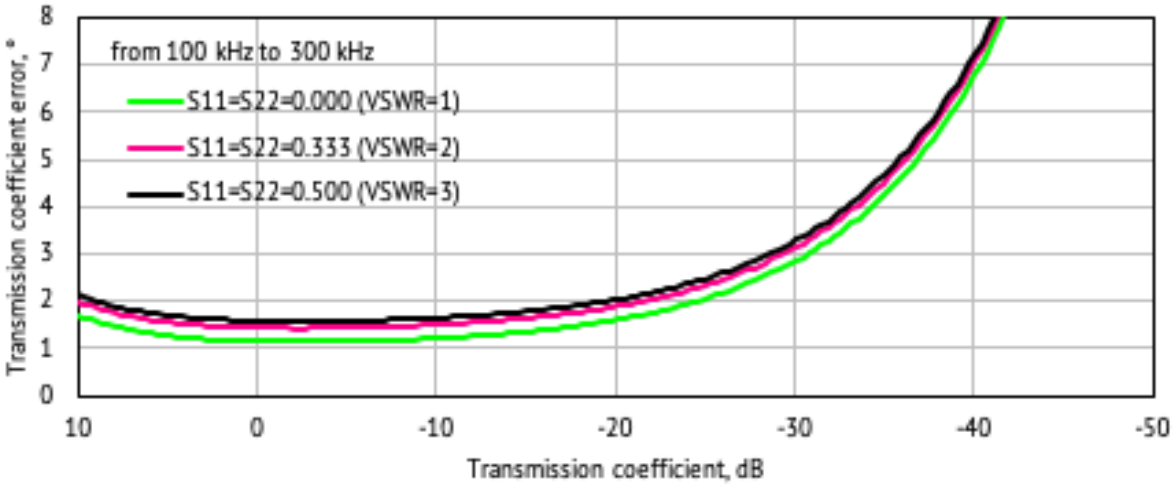


Transmission phase errors for unmatched devices



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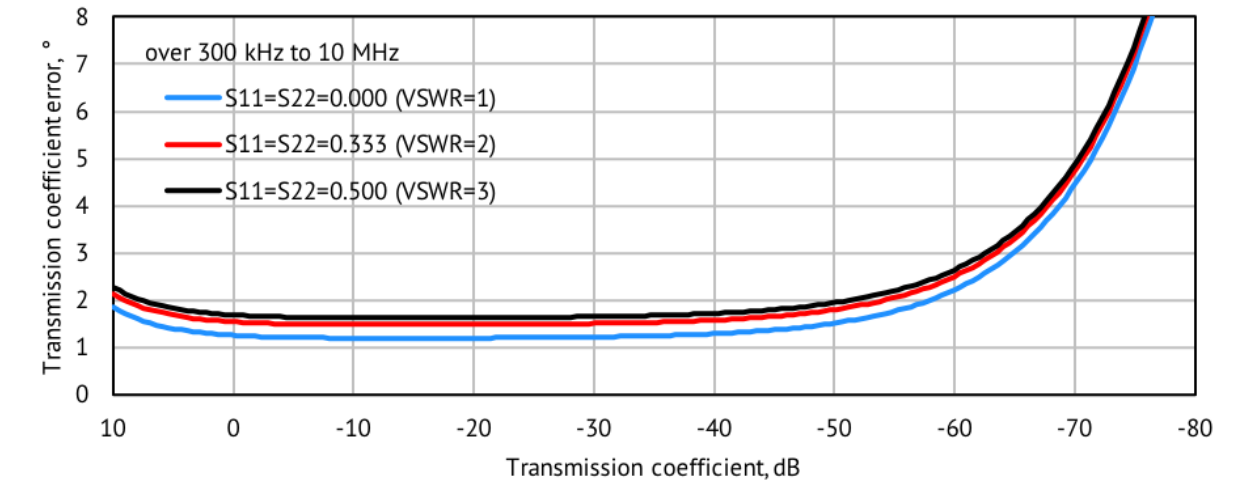

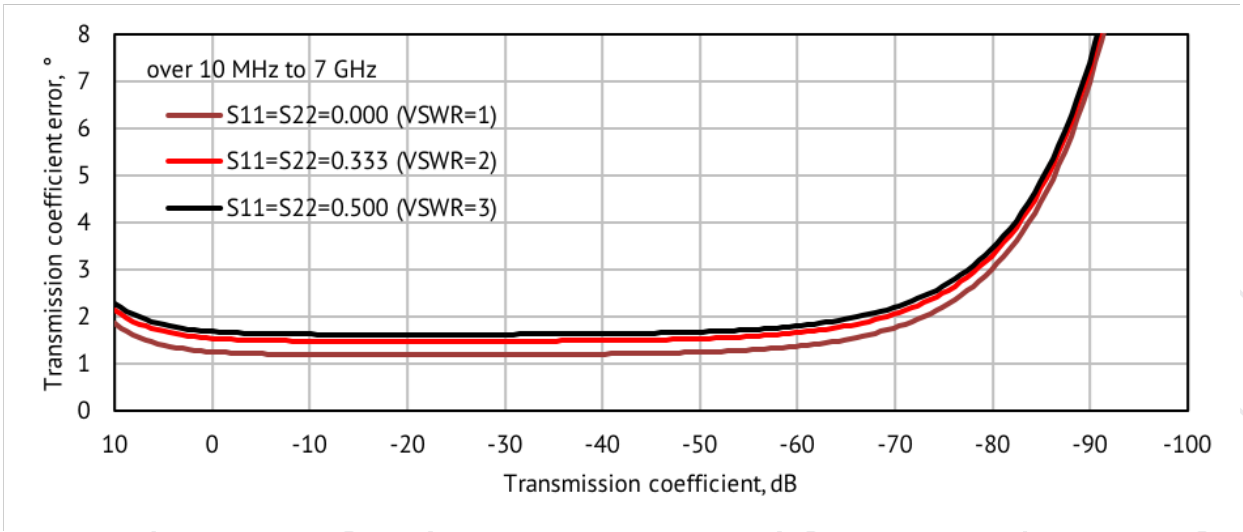

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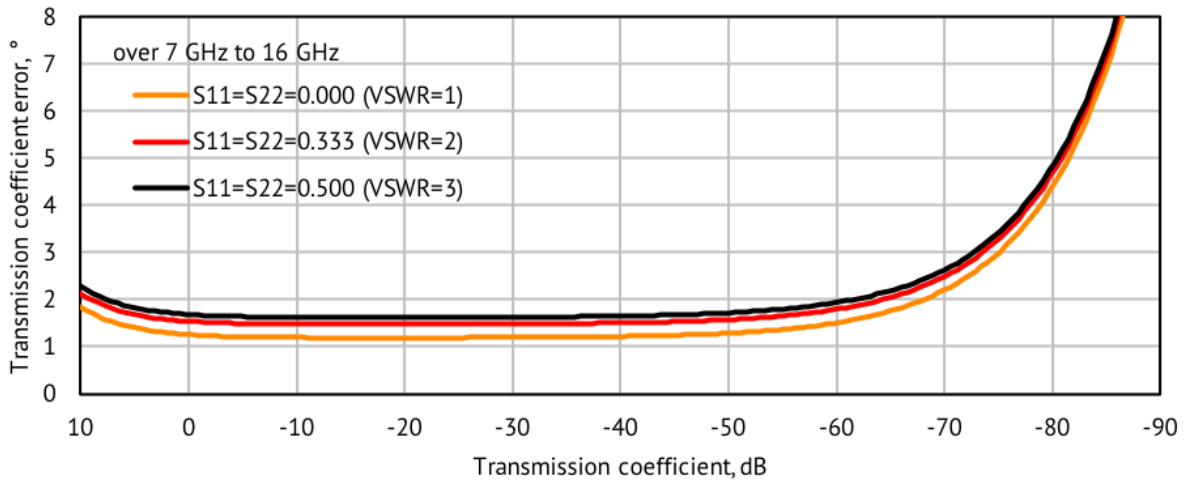
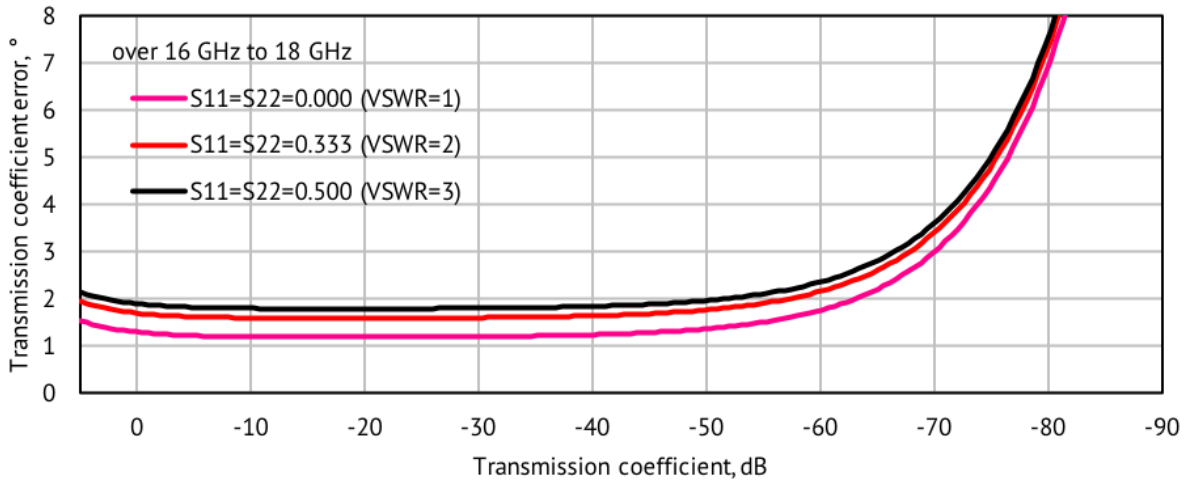
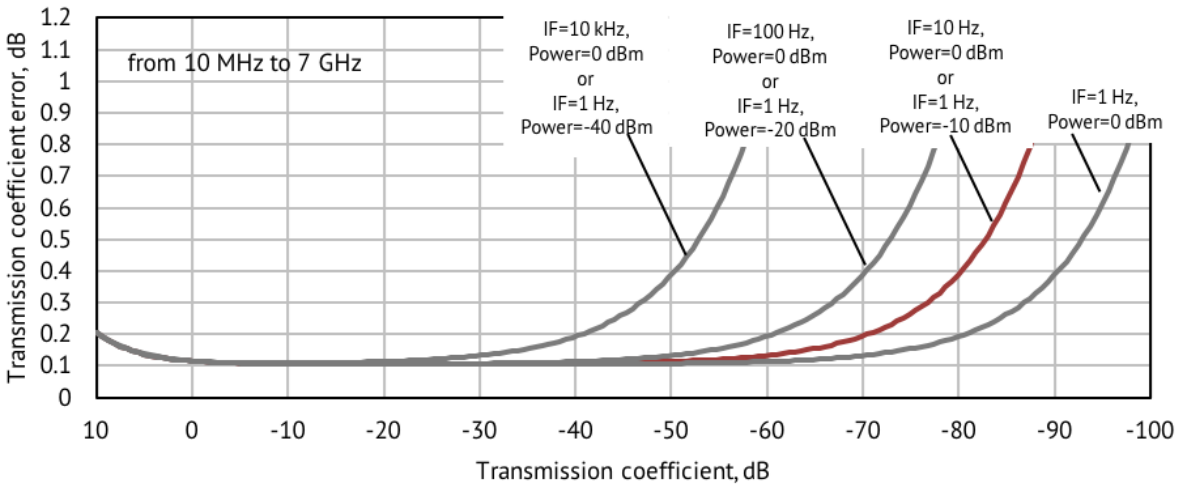




Transmission Accuracy Plots

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.

Compact Series S Models Overview

	S5045	S5065	S5085	S5180B	S5243	S7530
Frequency Range	9 kHz to 4.5 GHz	9 kHz to 6.5 GHz	9 kHz to 8.5 GHz	100 kHz to 18 GHz	10 MHz to 44 GHz	20 kHz to 3 GHz
Dynamic Range	130 dB, typ.	130 dB, typ.	130 dB, typ.	>130 dB, typ.	135 dB, typ.	123 dB, typ.
Port Impedance	50 Ohm	50 Ohm	50 Ohm	50 Ohm	50 Ohm	75 Ohm

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