COPPER MOUNTAIN® TECHNOLOGIES
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Multiport VNA Vector Network Analyzer Specifications

Frequency range	300 kHz to 9 GHz
Software	SNVNA

Revision 26.00 14.01.2026

U.S.: +1.317.222.5400
Latin America: +1.954.495.3459
Singapore: +65.63.23.6546
EMEA: +44 75 03 69 21 13

General Overview

Main Parameters

SN0906, SN0908, SN0910, SN0912, SN0914, and SN0916

Frequency range	300 kHz to 9 GHz
Measured parameters	S11, S21, S12, S22
Sweep types	linear frequency, log frequency, segment, power sweep
Dynamic range	>150 dB typ. (1 Hz IF BW)
Measurement speed	24 µs typ.
Output power adjustment range	-45 dBm to +10 dBm
Measurement points per sweep	2 to 500,001
Software	SNVNA

Software Capabilities

Software Capabilities Overview

Included Software Capabilities

Capability	Overview
Port extension	This function is useful when a fixture is used to connect to the DUT but calibration cannot be performed at the DUT terminals.
Power sweep	Allows the VNA to sweep the stimulus power from one level to another at a single frequency.
Mixer/converter measurements	Our analyzers allow users to perform measurements on mixers and other frequency converting devices using both scalar and vector methods.
Time domain measurements	Time domain transformations allow the user to apply an inverse Fourier Transform to frequency domain data to obtain time domain data.
Time domain gating	This function performs a time domain transformation, selects the region in the time domain, deletes the response (outside or inside) the selected region, and transforms the data back to the frequency domain.
Limit testing	A function for automatic pass/fail based on measurement results.
Embedding	This function allows the user to mathematically simulate the DUT parameters after adding fixture circuits.
De-embedding	This function allows the user to mathematically exclude the effect of the fixture circuit existing between the calibration plane and the DUT from the measurement results.

Available Software Options

Capability	Overview
AFR	Automatic Fixture Removal (AFR) is an intuitive software plug-in that is used to accurately measure hard to access devices, such as SMD sized components mounted on a fixture by de-embedding the fixture effects. The AFR VNA software plug-in enables the measurement of a wide range of components through comprehensive methods tailored to specific fixture properties.
Manufacturing Plug-In	The Manufacturing Test Plug-in supports incorporating VNA software into automated manufacturing and QA process.

Software Capabilities Extended

The SNVNA software includes many features that other vendors offer as paid options, including Time Domain capability, S-parameter Embedding and De-Embedding, Frequency Offset, and Vector Mixer Calibration functionality. No integrated PC means faster data processing turnaround and regular updates that are easy to install. Less complexity in the VNA leads to fewer points of failure that impact your design or production time.

All of the features listed below are included in the SNVNA software.

Sweep Features

Sweep type	Linear frequency sweep and logarithmic frequency sweep at fixed output power. Linear power sweep at a fixed frequency.
Measured points per sweep	Set by the user up to 500,001.
Segment sweep features	In applications where a contiguous sweep may be undesirable, this function allows the user to sweep frequency segments rather than the entire frequency span. This can lead to faster measurement results. A frequency sweep can be made within several independent user-defined segments. Frequency range, number of sweep points, source power, and IF bandwidth can be set for each segment.
Output power	Source power from-45 dBm to +10 dBm for all Multiport models . In frequency sweep mode power slope can be set up to 2 dB/GHz to compensate for high frequency attenuation in fixture cables.
Sweep trigger	Trigger modes: continuous, single, or hold. Trigger sources: internal, manual, external, bus (programmatically controlled).

Trace Functions

The SNVNA software incorporates many trace functions, such as:

Trace display	Data trace, memory trace, or simultaneous indication of data and memory traces.
Trace math	Data trace modification by math operations: addition, subtraction, multiplication or division of measured complex values and memory data. S-parameters and raw receiver values may be manipulated. Amplifier stability factors can be displayed. Unbalanced to differential measurements may be calculated.
Autoscaling	Automatic selection of scale division and reference level value to have the trace most effectively displayed.
Electrical delay	Calibration plane movement to compensate for a delay between the calibrated reference plane and the Device Under Test (DUT) input.
Phase offset	Defined in degrees. Applies a chosen constant phase offset to S-parameter measurements at all frequencies.
Sweep trigger	Trigger modes: continuous, single, or hold. Trigger sources: internal, manual, external, bus (program controlled).

Amplifier Compression Measurement

The power sweep feature allows for fast evaluation of the P1dB compression of an amplifier.

Mixer/Converter Measurements

Scalar mixer/converter measurements	The scalar method allows the user to measure the magnitude of the conversion loss of a mixer or other frequency-translating device. No additional mixers or other devices are required. The scalar method employs port frequency offset when there is a difference between the source port frequency and the receiver port frequency.
Scalar mixer/converter calibration	This is the most accurate method of calibration applied for measurements of mixers in frequency offset mode. Open, Short, and Load calibration standards are used for 1-port calibration on each port. An external USB power meter is then used to accurately measure stimulus source power such that a calculated cross-band Thru is achieved for correction of the transmission tracking error.
Vector mixer/converter measurements	The vector method allows measurement of both the magnitude and phase of the mixer conversion loss. This method requires a reference mixer and an LO common to both the reference mixer and the mixer under test. The reference mixer is required to put Ports 1 and 2 at the same frequency such that phase measurements are possible. The reference mixer is de-embedded during vector mixer calibration.
Vector mixer/converter calibration	This method of calibration is applied for vector mixer measurements. Open, Short, and Load calibration standards are used. The reference mixer is de-embedded by this calibration.
Automatic frequency offset adjustment	This function performs automatic frequency offset adjustment when the scalar mixer/converter measurements are performed to compensate for LO frequency inaccuracy.
Sweep trigger	Trigger modes: continuous, single, or hold. Trigger sources: internal, manual, external, bus (program controlled).

Time Domain Measurements

This function performs conversion of the response of the DUT from frequency domain to time domain. Modeled time domain stimulus types are bandpass, lowpass impulse, and lowpass step. The time domain span is determined by the frequency span and the number of measurement points. Windowing functions of various shapes are used for tradeoff between resolution and levels of spurious sidelobes.

Time Domain Gating

This function mathematically removes unwanted responses in the time domain, allowing the user to obtain a frequency response without the effects of fixture elements. Reflections occurring within a chosen time span may be bandpass gated such that all other reflections are suppressed or notch gated such that reflections in the chosen time span are suppressed.

After time domain gating, the result with chosen reflections removed may be viewed in the frequency domain. Gating filter types are bandpass or notch. For a better tradeoff between gate resolution and level of spurious sidelobes the following filter shapes are available: maximum, wide, normal and minimum.

Embedding

This feature allows the user to mathematically add a virtual circuit defined by a Touchstone file to any VNA port. This function might be used to test impedance matching on a DUT.

De-embedding

This feature allows the user to mathematically remove a circuit defined by a Touchstone file from the measurements on any VNA port. This might be used to remove the effects of fixture connections or pigtail cable connections to a DUT.

Limit Testing

Limit testing is a function for automatic pass/fail based on measurement results. Pass/fail is based on a comparison of the trace to the limit line set by the user and can consist of one or several segments.

Each segment checks the measurement value for failing either the upper or lower limit, or both. The limit line segment is defined by specifying the coordinates of the beginning (X0, Y0) and the end (X1, Y1) of the segment, and the type of limit. The MAX or MIN limit types check if the trace falls below or above the limit line, respectively.

Port Impedance Conversion

This function converts the S-parameters measured at a 50 Ω port into values which would be seen if measured at a test port with an arbitrary impedance.

S-Parameter Conversion

This function allows for conversion of measured S-parameters to the following parameters: reflection impedance and admittance looking at a grounded DUT, transmission impedance and admittance looking through a DUT, transmission impedance and admittance looking across the top of a grounded DUT using a 2-Port measurement, and inverse S-parameters.

State saving	Analyzer State All state, calibration and measurement data can be saved to an Analyzer state file on the hard disk and later recalled into the software program. The following four types of states are available: State, State & Cal, State & Trace, or All. Channel State A channel state can be saved into the Analyzer state. The procedure is similar to saving of the Analyzer state, and the same types are applied to channel saving. Unlike Analyzer state, channel state is saved into the Analyzer volatile memory (not to the hard disk) and is cleared when power to the Analyzer is switched off. For channel state, there are four memory registers A, B, C, D. Channel state saving allows the user to easily copy the settings of one channel to another one.

Data Output

Trace data CSV file	The Analyzer allows the user to save an individual trace's data as a CSV file (comma separated values). The active trace stimulus and response values in its current format are saved to a *.CSV file.
Trace data Touchstone file	Allows the user to save S-parameters to a Touchstone file. The Touchstone file contains frequency values and S-parameters. Files of this format are industry-standard for most circuit simulator programs. The .s2p files are used for saving all S-parameters of a 2-port device. The .s1p files are used for saving S11 or S22 parameters of a 1-port device. The Touchstone file saving function is applied to individual channels. In addition, the software can be used as a Touchstone file viewer, which allows the user to graphically display and work with previously saved Touchstone files. Normally, trace transforms such as time-domain gating are not saved to a Touchstone file, but enabling "Including Trace Transform" will allow this.
Screenshot capture	A print function is provided with a preview feature, which allows for viewing an image of the screen, and/or save it to a file. Screenshots can be printed using three different applications: MS Word, Image Viewer for Windows, or the Print Wizard of the Analyzer. Each screenshot can be printed in color, grayscale, black and white, or inverted for visibility or to save ink. The current date and time can be added to each capture before it is transferred to the printing application, resulting in quick and easy test reporting. A Word template file in the C drive VNA folder image directory may be customized to change the appearance of the MS Word file output.

User Calibration

Calibration	Calibration of a test setup (which includes the VNA, cables, and adapters) significantly increases the accuracy of measurements. Calibration allows for correction of errors caused by imperfections in the measurement system: system directivity, source and load match, tracking, and isolation.
Calibration methods	The following calibration methods of various sophistication and accuracy are available: • Reflection and transmission normalization • Full one-port calibration • One-path two-port calibration • Full two-port calibration
Reflection and transmission normalization	This is the simplest calibration method; however, it provides reduced accuracy compared to other methods.
Full 1-port calibration	Method of calibration performed for 1-port reflection measurements. It ensures high accuracy.
1-path 2-port calibration	Method of calibration performed for reflection and one-way transmission measurements; for example, for measuring s11 and s21 only. It ensures high accuracy for reflection measurements, and moderate accuracy for transmission measurements. Commonly used when an attenuator must be attached to the receiving port as in the measurement of a high-power amplifier.
Full two-port calibration	This method of calibration is performed for full S-parameter matrix measurement of a two-port DUT, ensuring high accuracy.
Mechanical calibration kits	The user can select one of the predefined calibration kits of various manufacturers or define a new calibration kit.
Automatic calibration modules	Electronic, or automatic, calibration modules offered by CMT make calibration faster and easier than traditional mechanical calibration. Automatic calibration is superior to mechanical calibration.

Sliding load calibration standard	The use of a sliding load calibration standard allows for a significant increase in calibration accuracy at high frequencies compared to the fixed load calibration standard.
Unknown thru calibration standard	The use of a generic 2-port reciprocal circuit instead of a characterized Thru in full 2-port calibration allows the user to calibrate the VNA for measurement of “non-insertable” devices. Unknown thru should be used by default for SOLT (SOLR) calibrations.
Defining of calibration standards	Different methods of calibration standard definition are available: standard definition by polynomial model and standard definition by Touchstone data file (S-parameters).
Error correction interpolation	When the user changes any settings such as the start/stop frequencies or the number of sweep points, compared to the settings at the moment of calibration, interpolation or extrapolation of the calibration coefficients will be applied. Extrapolation is not recommended for accurate measurements.
Power calibration	Power calibration allows a more stable power level setting at the DUT input. An external power meter should be connected to the USB port directly or via a USB/GPIB adapter. VNA output power accuracy is only of concern when measuring a non-linear DUT.
Receiver calibration	This method calibrates the receiver gain at the absolute signal power measurement.

Automation Languages

We maintain code examples and guides in the following languages:

- Python*
- C++*
- LabVIEW
- VBA
- MATLAB

*Available for use with Linux operating system

Measurement Automation

SCPI via TCP Socket	A TCP socket is provided for automation from either localhost--the same machine running the VNA software application--or from a second PC connected by an IP network. SCPI commands are largely compatible with legacy instruments, maximizing code reuse for existing test automation platforms. SCPI via TCP Socket is compatible with either Windows or Linux operating systems.
SCPI via HiSlip	Based on VXI-11, the HiSlip interface uses the same SCPI command set but further allows for instrument discovery and provides ease of automation through Visa library of your choice. SCPI via HiSlip are compatible with either Windows or Linux operating systems.
LabVIEW compatible	The device and its software are fully compatible with LabVIEW applications for ultimate flexibility in user-generated programming and automation. LabVIEW are only compatible with Windows operating systems.

Our command set is modeled after industry-standard legacy equipment; porting code is straightforward, and we can help. Complete installation of CMT software comes with multiple programming examples and guides installed in the C drive VNA folder under Programming Examples and Guides directory on Windows or ~/Documents/VNA directory on Linux.

Automation Features

- Segmented frequency sweeps
- Linear/logarithmic sweeps
- Power sweeps
- Multiple trace formats
- 16 channels max with up to 16 traces each
- Marker math
- Trace math
- Limit tests

Hardware Specifications

SN0906, SN0908, SN0910, SN0912, SN0914, and SN0916

Measurement Range

Impedance	50 Ohm
Test port connector	type N, male
Number of test ports	6
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.)

[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.

Measurement Accuracy[3]

Accuracy of reflection 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°
-95 dB to -80 dB	±1.0 dB / ±6°
6 GHz to 9 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°
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	0.005 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

[3] Reflection and transmission measurement accuracy applies over the temperature range of (73 ± 9) °F or (23 ± 5) °C after 30 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 specification are based on a matched DUT, and IF bandwidth of 10 Hz.

[5] Reflection specifications are based on an isolating DUT.

Effective System Data

300 kHz to 6 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.)

[6] Specification applies over entire frequency range, at output power of 0 dBm.

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

[7] Display update: OFF.

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, female

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, female

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, female

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, 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
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

NOTE: All SN09XX VNAs use SNVNA. Please speak to our Applications Engineers about obtaining the software.

Calibration

Recommended factory adjustment interval	3 Years

Dimensions

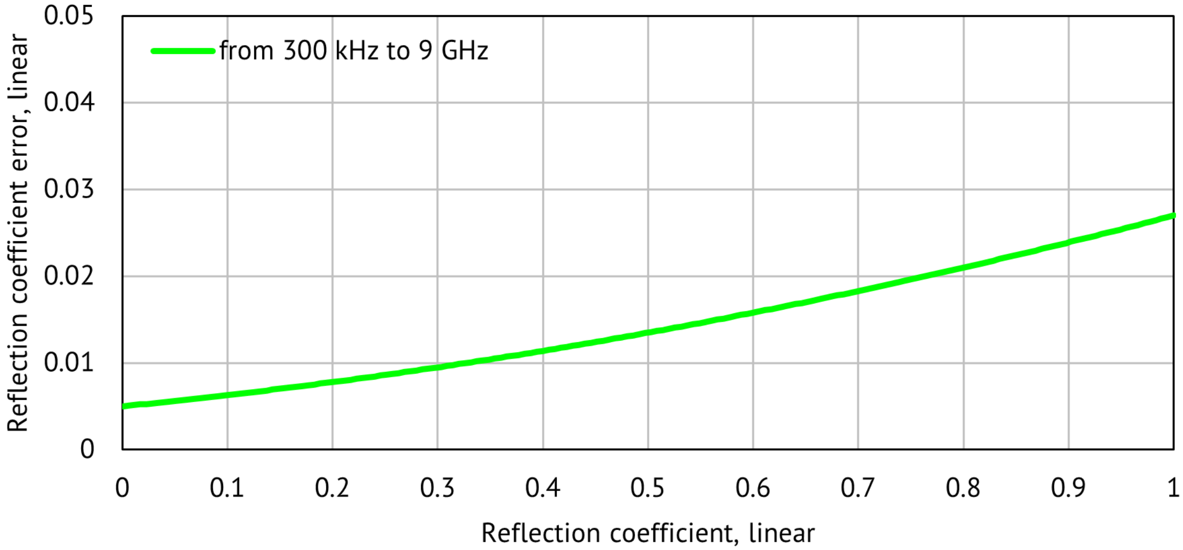
Length	436 mm
Width	425 mm
Height	96 mm
Weight	
SN0906	12.8 kg
SN0908	12.9 kg
SN0910	13.8 kg
SN0912	13.9 kg
SN0914	14.9 kg
SN0916	15.0 kg

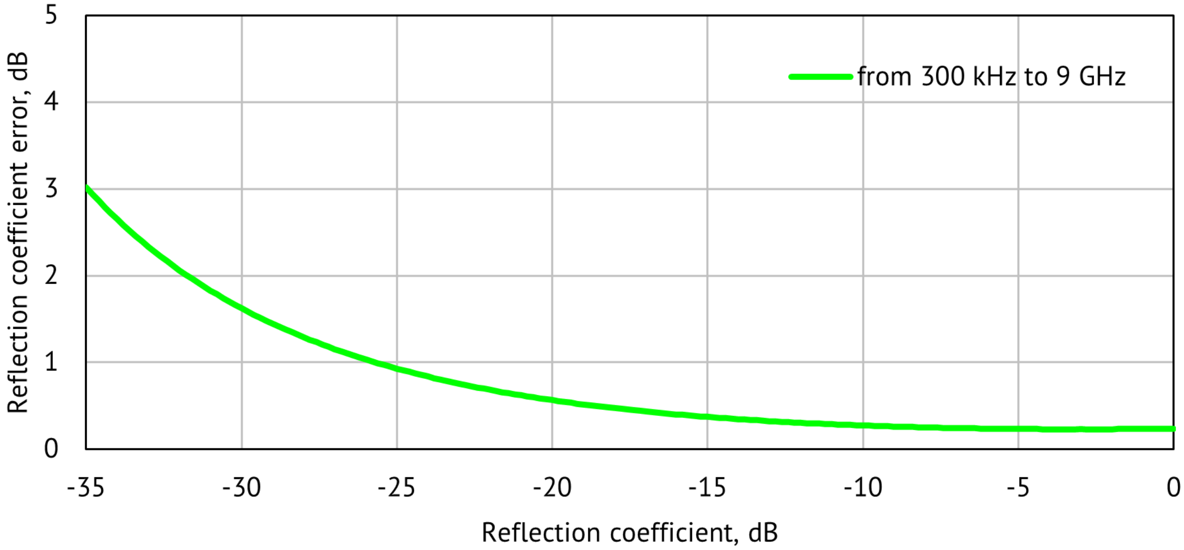
Environmental Specifications

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

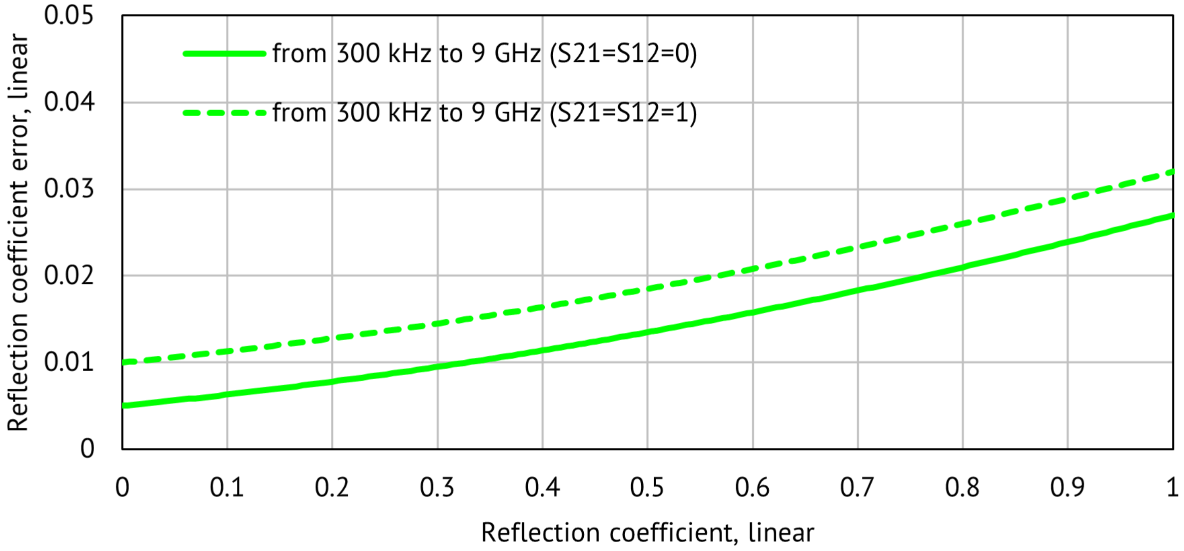
Reflection Accuracy Plots

Reflection Magnitude Errors

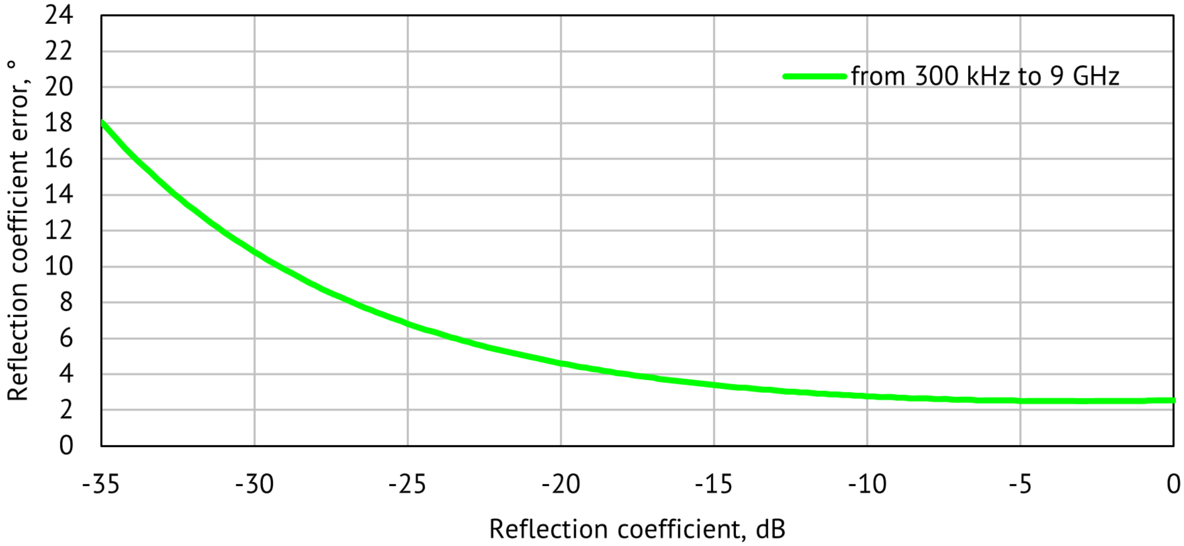




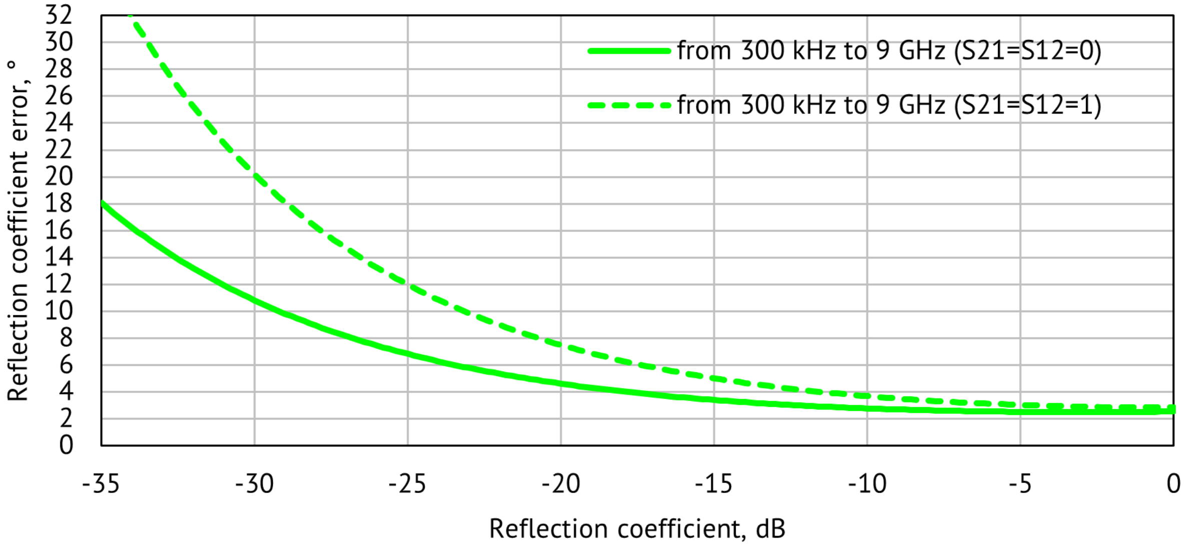
Specifications are based on an isolating DUT (S21 = S12 = 0)


0.05
0.04
0.03
0.02
0.01
0
Reflection coefficient error, linear
from 300 kHz to 9 GHz (S21=S12=0)
from 300 kHz to 9 GHz (S21=S12=1)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Reflection coefficient, linear

Reflection Phase Errors

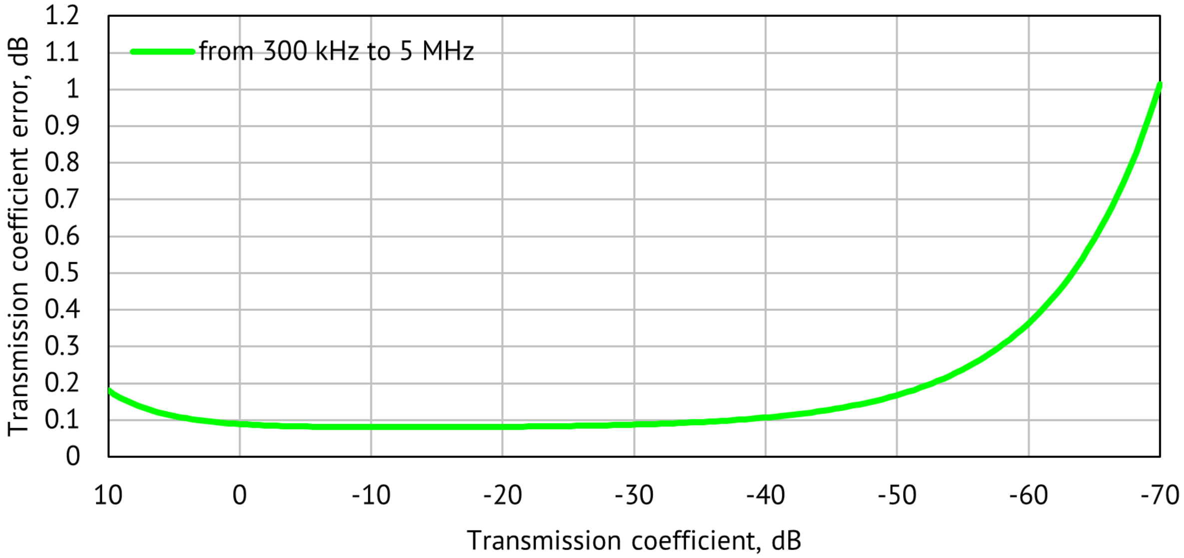


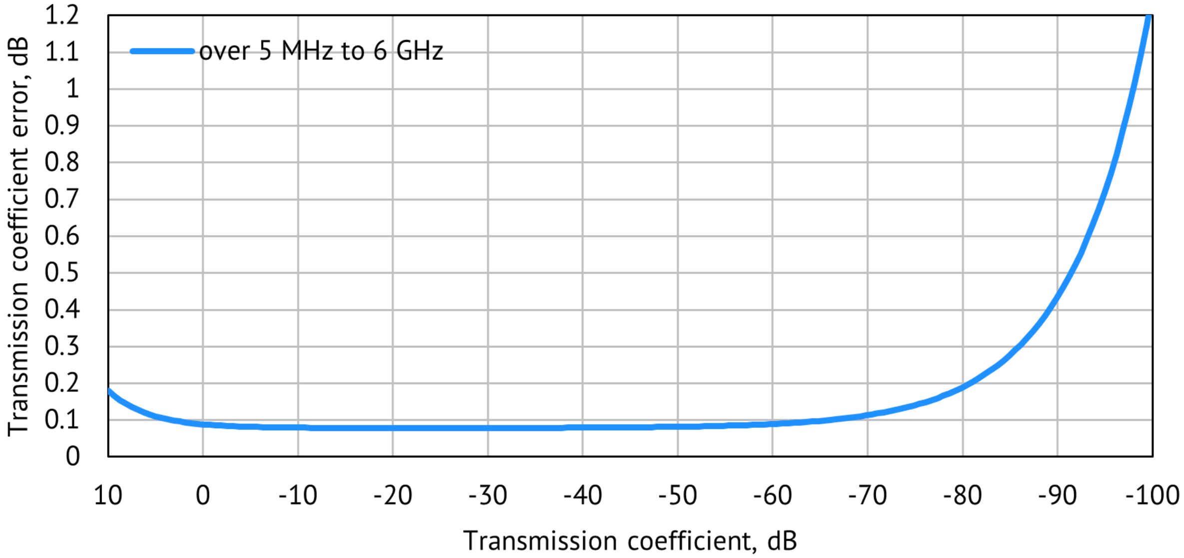
Specifications are based on an isolating DUT (S21 = S12 = 0)

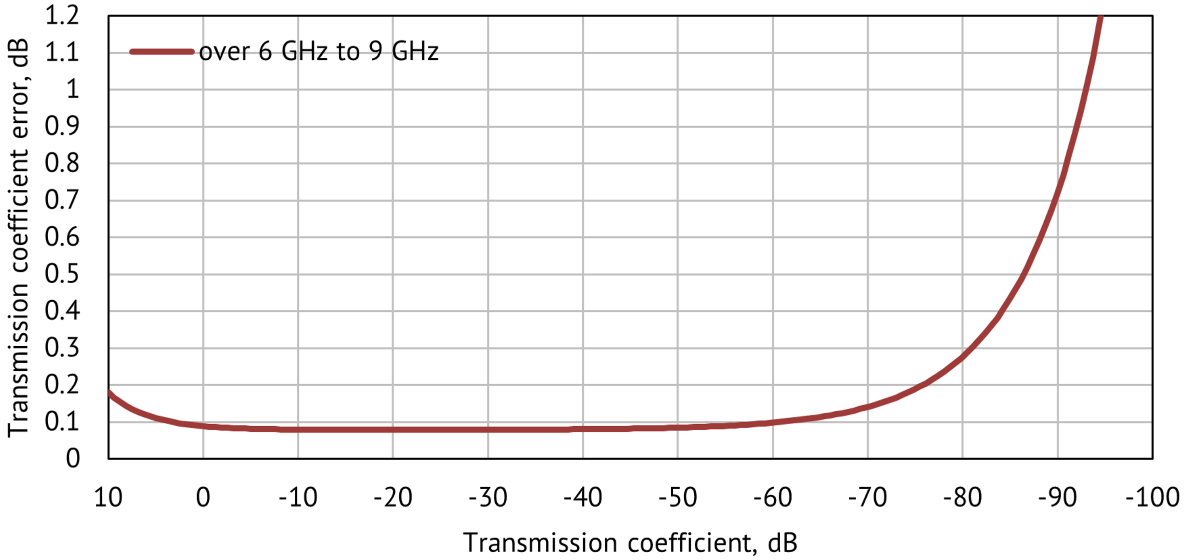


Transmission Accuracy Plots

Transmission Magnitude Errors

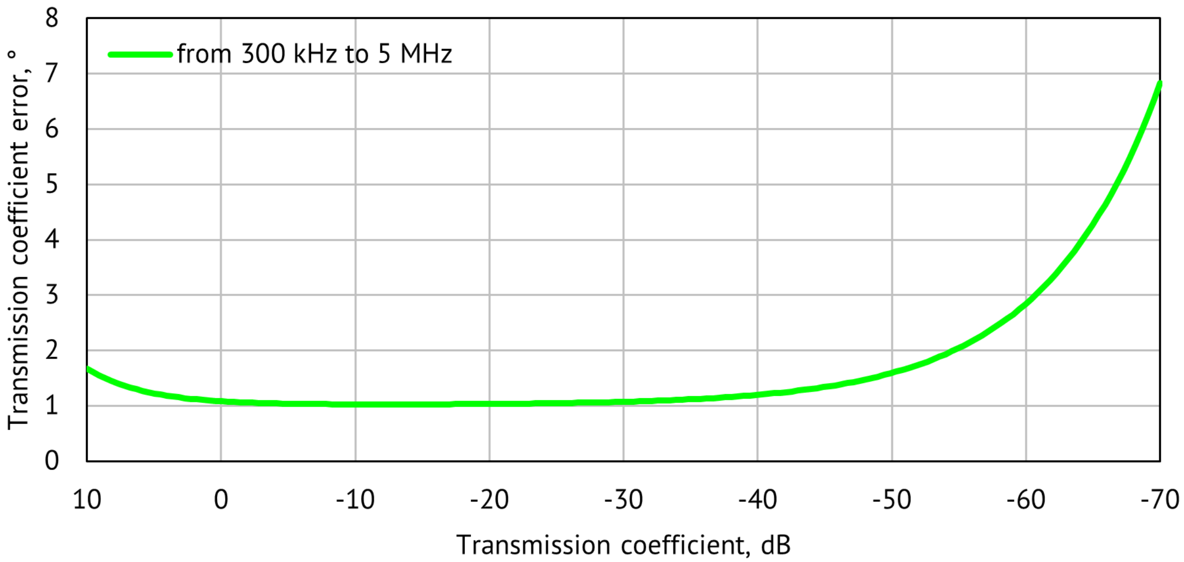


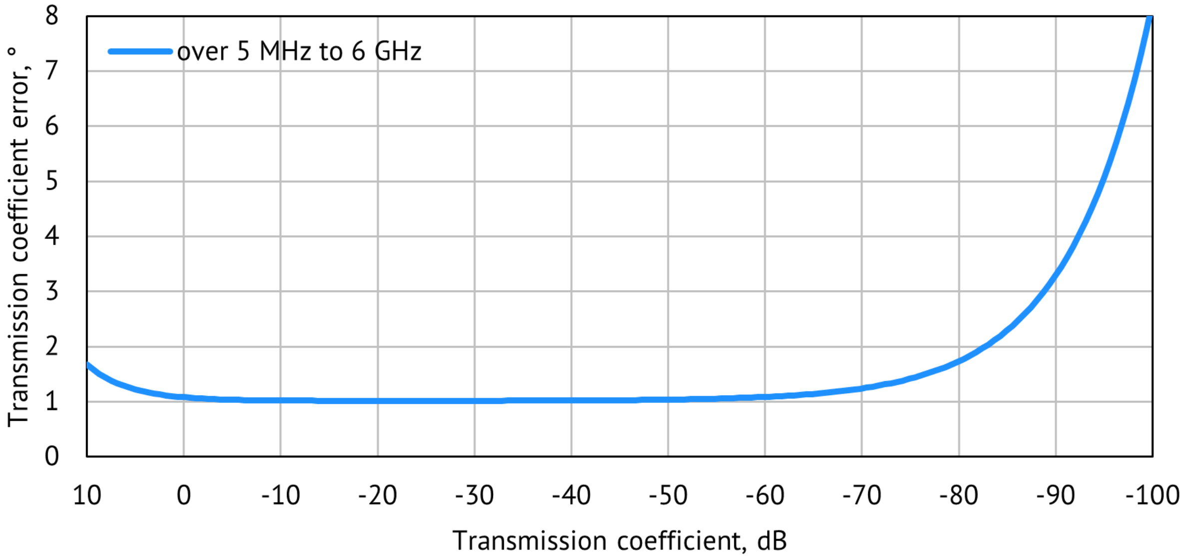


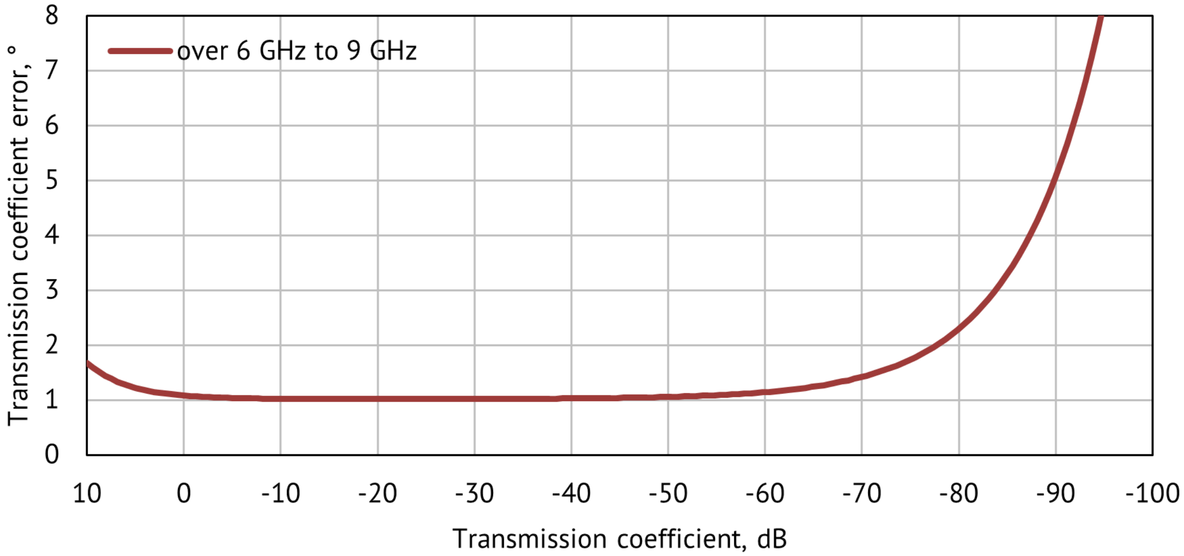


Specifications are based on a matched DUT, and IF bandwidth of 10 Hz.

Transmission Phase Errors

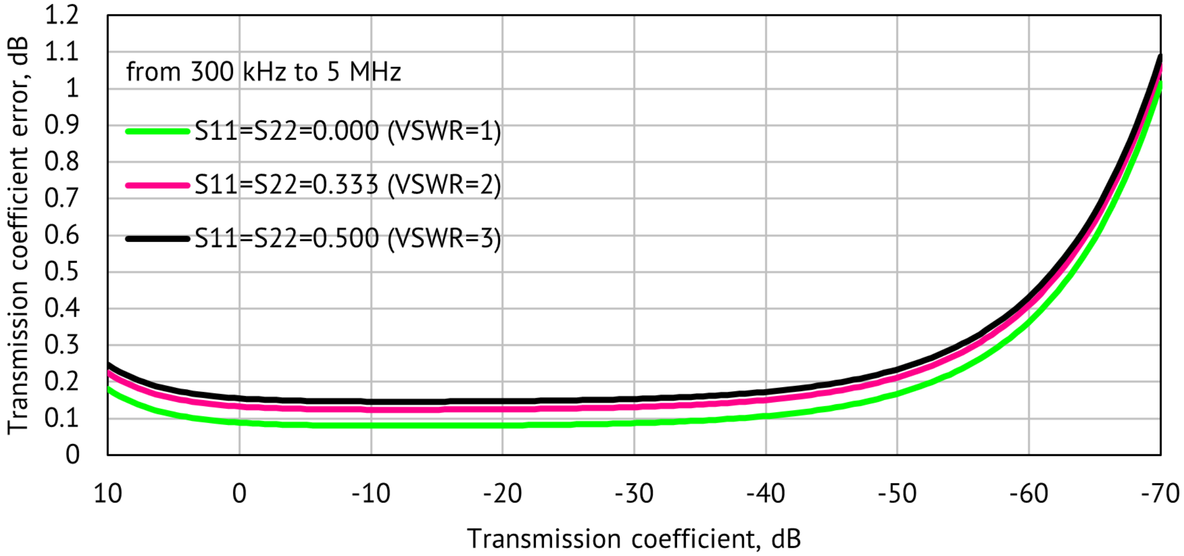


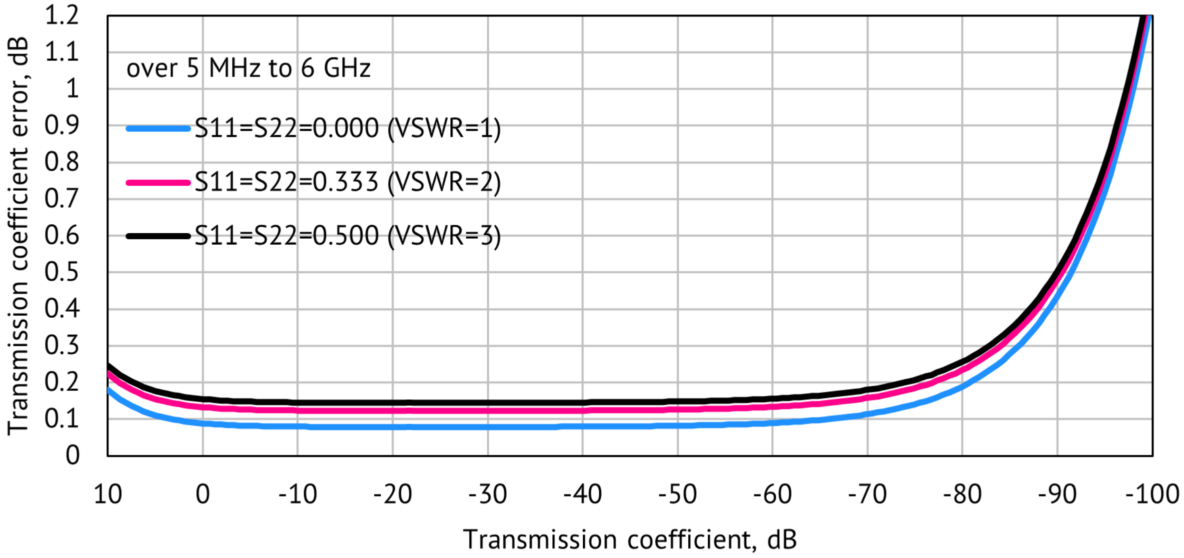


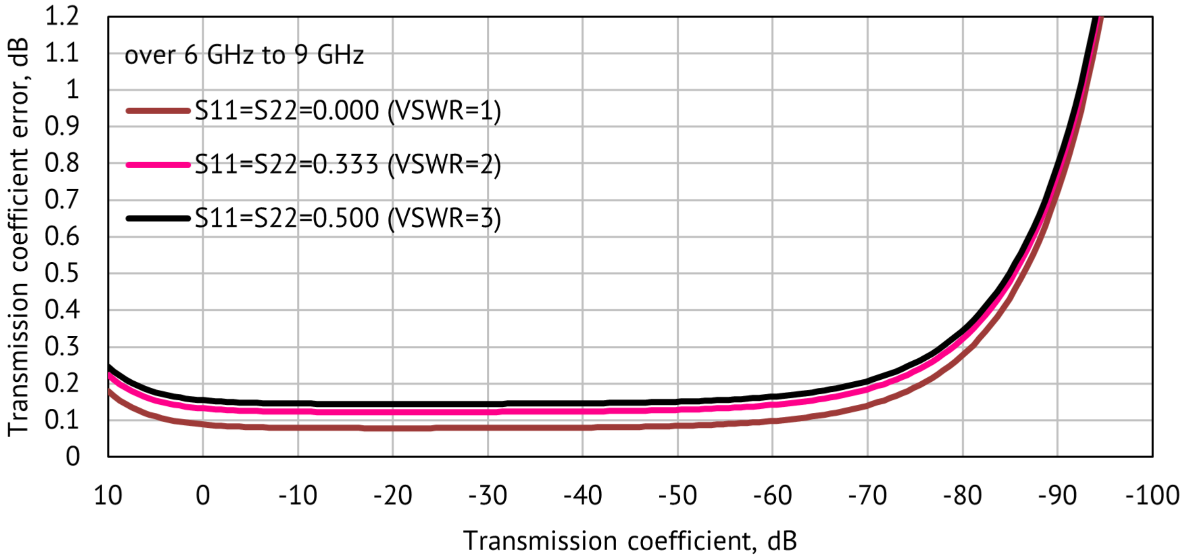


Specifications are based on a matched DUT, and IF bandwidth of 10 Hz.

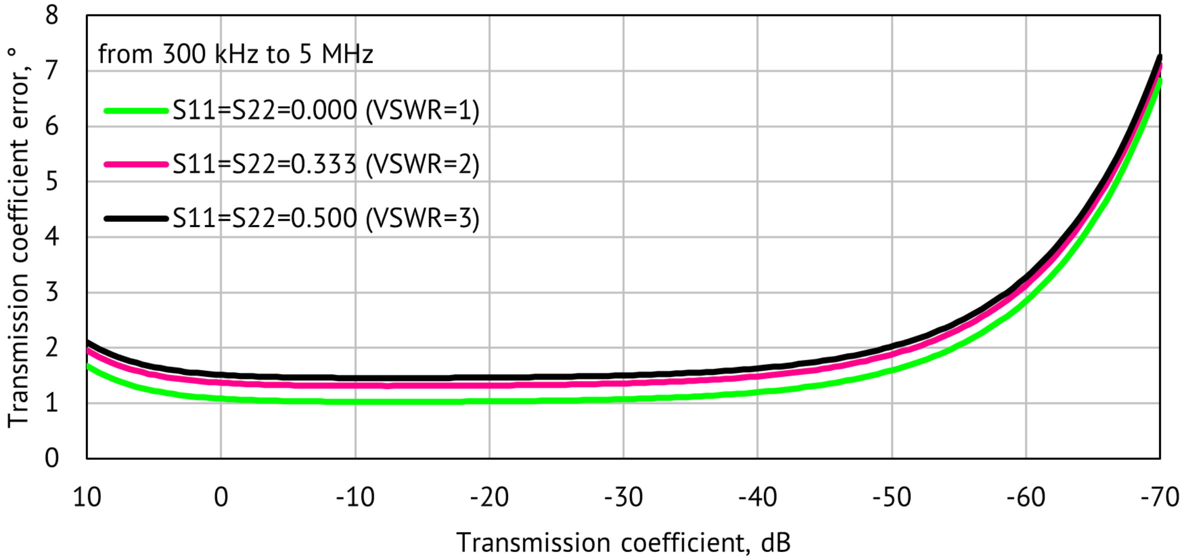
Transmission Magnitude Errors for Unmatched Devices

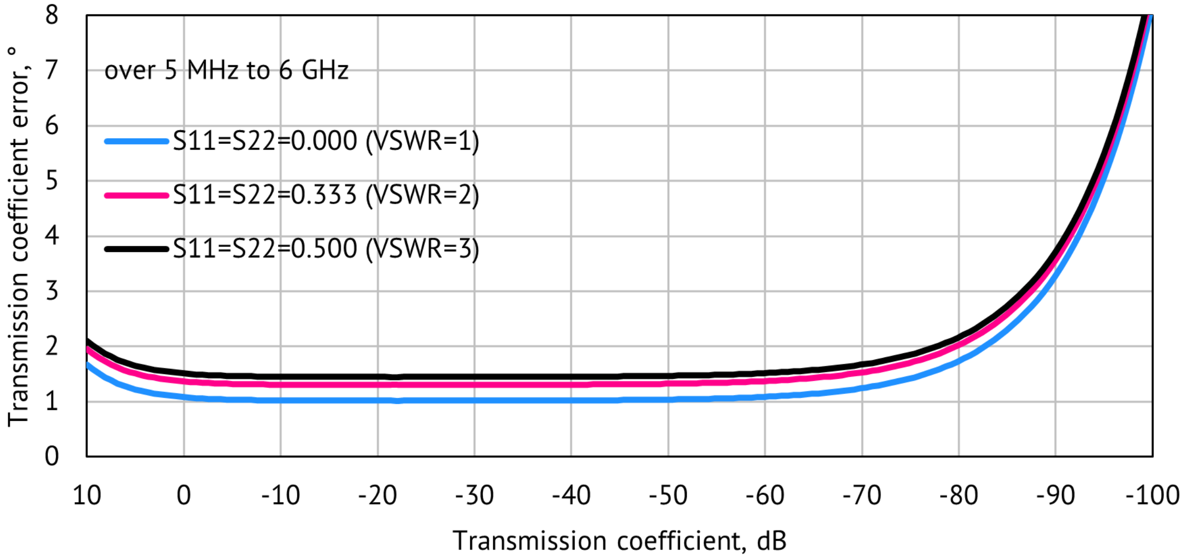


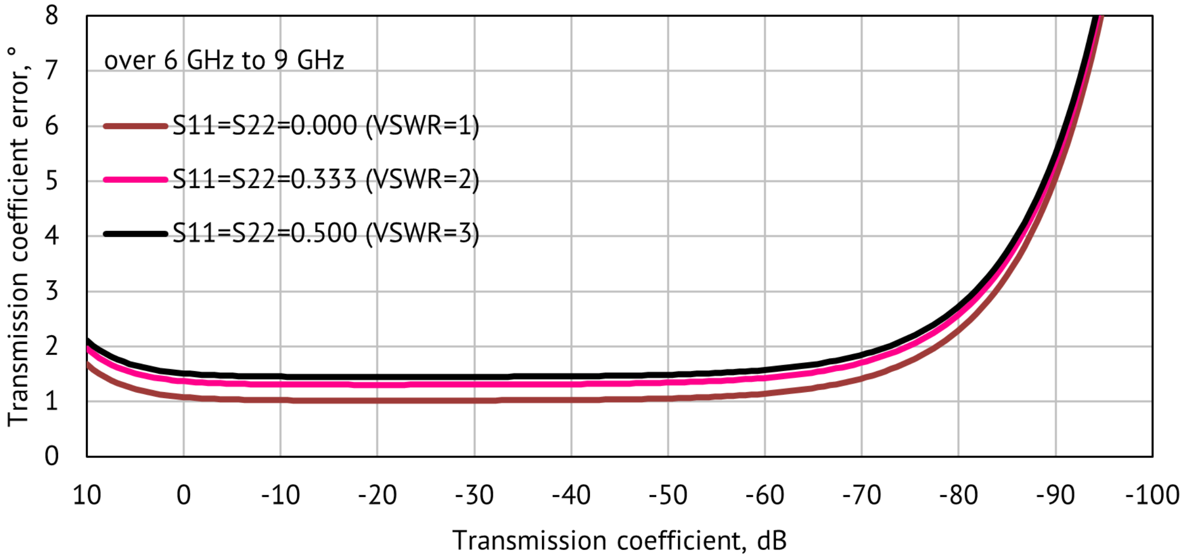



over 6 GHz to 9 GHz
S11=S22=0.000 (VSWR=1)
S11=S22=0.333 (VSWR=2)
S11=S22=0.500 (VSWR=3)
Transmission coefficient error, dB
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Transmission coefficient, dB

Transmission Phase Errors for Unmatched Devices







Transmission Errors for Matched Devices vs Output Power and IF Bandwidth