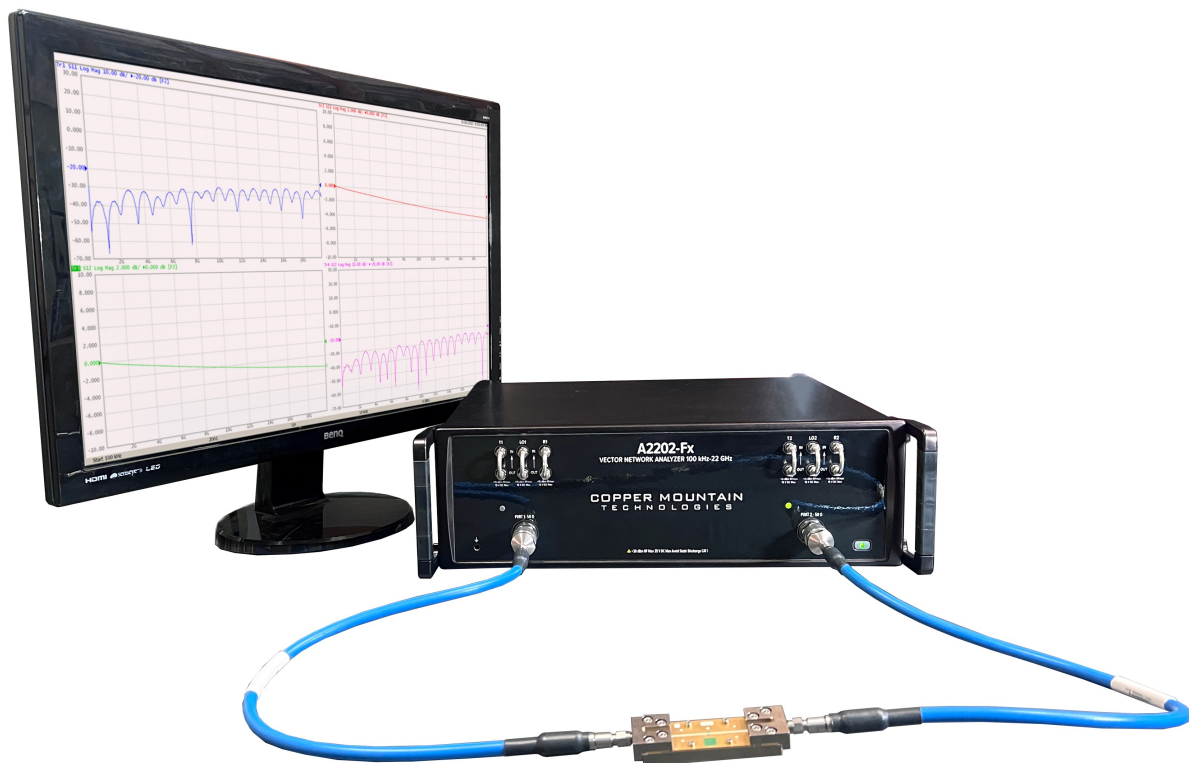




Advanced Series Vector Network Analyzer Specifications



Preliminary Specifications - Subject to Change

General Overview

Main Parameters

A2202, A2202-D, A2202-Fx, and A2202-DFx

Frequency range	100 kHz to 22 GHz
Measured parameters	S11, S21, S12, S22
Dynamic range	
1 MHz to 22 GHz	133 dB (10 Hz IF BW)
Output power adjustment range	-60 dBm to +15 dBm
Measurement time per point	<12 μ s
Full CW frequency accuracy	$\pm 2 \cdot 10^{-6}$
Frequency setting resolution	1 Hz
Number of measurement points	up to 500,001
Effective directivity	
100 kHz to 10 GHz	46 dB
10 GHz to 22 GHz	42 dB
Trace noise magnitude	
1 MHz to 22 GHz	1 mdB rms (3 kHz IF BW)

Hardware Specifications

Advanced Series

A2202, A2202-D, A2202-Fx, and A2202-DFx

[1] All specifications subject to change without notice.

Measurement Range

Impedance	50 Ohm
Test port connector	NMD 3.5 mm, male
Number of test ports	2
Frequency extender compatible	A2202-Fx and A2202-DFx only
Frequency range	100 kHz to 22 GHz
Full frequency accuracy	$\pm 2 \cdot 10^{-6}$
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 3 MHz
Dynamic range ²	
100 kHz to 1 MHz	110 dB
1 MHz to 22 GHz	130 dB (135 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 transmission measurements ⁴	Magnitude/Phase
100 kHz to 1 MHz	
-40 dB to 0 dB	± 0.2 dB / $\pm 2^\circ$
-60 dB to -40 dB	± 0.3 dB / $\pm 3^\circ$
-80 dB to -60 dB	± 1.1 dB / $\pm 7^\circ$
1 MHz to 22 GHz	
0 dB to +10 dB	± 0.2 dB / $\pm 2^\circ$
-60 dB to 0 dB	± 0.1 dB / $\pm 1^\circ$
-80 dB to -60 dB	± 0.2 dB / $\pm 2^\circ$
-100 dB to -80 dB	± 1.0 dB / $\pm 6^\circ$
Accuracy of reflection measurements ^[5]	Magnitude/Phase
100 kHz to 10 GHz	
-15 dB to 0 dB	± 0.4 dB / $\pm 3^\circ$
-25 dB to -15 dB	± 1.0 dB / $\pm 6^\circ$
-35 dB to -25 dB	± 3.0 dB / $\pm 20^\circ$
10 GHz to 22 GHz	
-15 dB to 0 dB	± 0.5 dB / $\pm 4^\circ$
-25 dB to -15 dB	± 1.5 dB / $\pm 10^\circ$
-35 dB to -25 dB	± 5.5 dB / $\pm 30^\circ$
Trace noise magnitude (IF bandwidth 3 kHz)	
100 kHz to 1 MHz	0.020 dB rms
1 MHz to 22 GHz	0.001 dB rms
Temperature dependence	0.02 dB/°C (0.01 dB/°C typ.)

[3] Reflection and transmission measurement accuracy applies over the temperature range of $(73 \pm 9)^\circ\text{F}$ or $(23 \pm 5)^\circ\text{C}$ 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 1 Hz.

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

Effective System Data

100 kHz to 1 MHz	
Directivity	46 dB
Source match	40 dB
Load match	46 dB
Reflection tracking	±0.05 dB
Transmission tracking	±0.20 dB
1 MHz to 10 GHz	
Directivity	46 dB
Source match	40 dB
Load match	46 dB
Reflection tracking	±0.05 dB
Transmission tracking	±0.05 dB
10 GHz to 22 GHz	
Directivity	42 dB
Source match	38 dB
Load match	42 dB
Reflection tracking	±0.10 dB
Transmission tracking	±0.05 dB

Uncorrected System Performance

100 kHz to 1 MHz	
Directivity	5 dB
Source match	10 dB
Load match	10 dB
1 MHz to 10 GHz	
Directivity	15 dB
Source match	10 dB
Load match	10 dB
10 GHz to 22 GHz	
Directivity	15 dB
Source match	10 dB
Load match	10 dB

Test Port Output

Power range	
100 kHz to 18 GHz	-60 dBm to +15 dBm
18 GHz to 22 GHz	-60 dBm to +10 dBm
Power accuracy	±1.5 dB
Power resolution	0.05 dB
Harmonic distortion^[6]	-30 dBc
Non-harmonic spurious^[6]	-30 dBc

[6] Specification applies over frequency range from 1 MHz to 20 GHz, at output power of -5 dBm.

Test Port Input

Noise floor	
100 kHz to 1 MHz	-110 dBm/Hz
1 MHz to 22 GHz	-133 dBm/Hz
Damage level	+30 dBm
Damage DC voltage	35 V

Measurement Speed

Time per point	12 µs typ.	
Port switchover time	0.2 ms typ.	
Typical cycle time vs number of measurement points^[7]		
Number of points (IF bandwidth 1 MHz)		
Number of points	Uncorrected (1-port)	2-port calibration
51	2.3 ms	4.4 ms
201	4.2 ms	8.2 ms
401	6.5 ms	12.8 ms
1601	20.5 ms	40.8 ms

[7] Display update: OFF

Frequency Reference Input

Port	10 MHz Ref In
External reference frequency	10 MHz
Input level	-2 dBm to 4 dBm
Input impedance	50 Ohm
Connector type	BNC, female

Frequency Reference Output

Port	10 MHz Ref Out
Internal reference frequency	10 MHz
Output reference signal level at 50 Ohm impedance	0 dBm to 2 dBm
Connector type	BNC, female

Trigger Input

Port	Ext Trig In
Input level	
Low threshold voltage	0.8 V
High threshold voltage	2.7 V
Input level range	0 V to +5 V
Pulse width	$\geq 2 \mu\text{s}$
Polarity	positive or negative
Input impedance	$\geq 10 \text{ kOhm}$
Connector type	BNC, female

Trigger Output

Port	Ext Trig Out
Maximum output current	20 mA
Output level	
Low level voltage	0.4 V
High level voltage	3.0 V
Polarity	positive or negative
Connector type	BNC, female

System and 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	145 W

Calibration

Recommended factory adjustment interval	3 years
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Dimensions

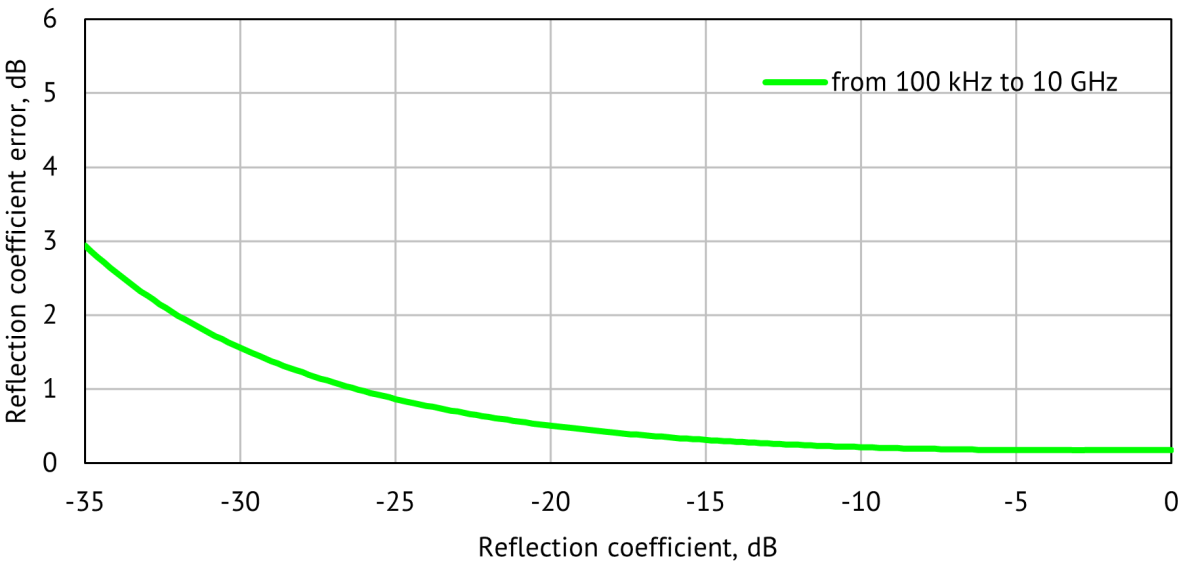
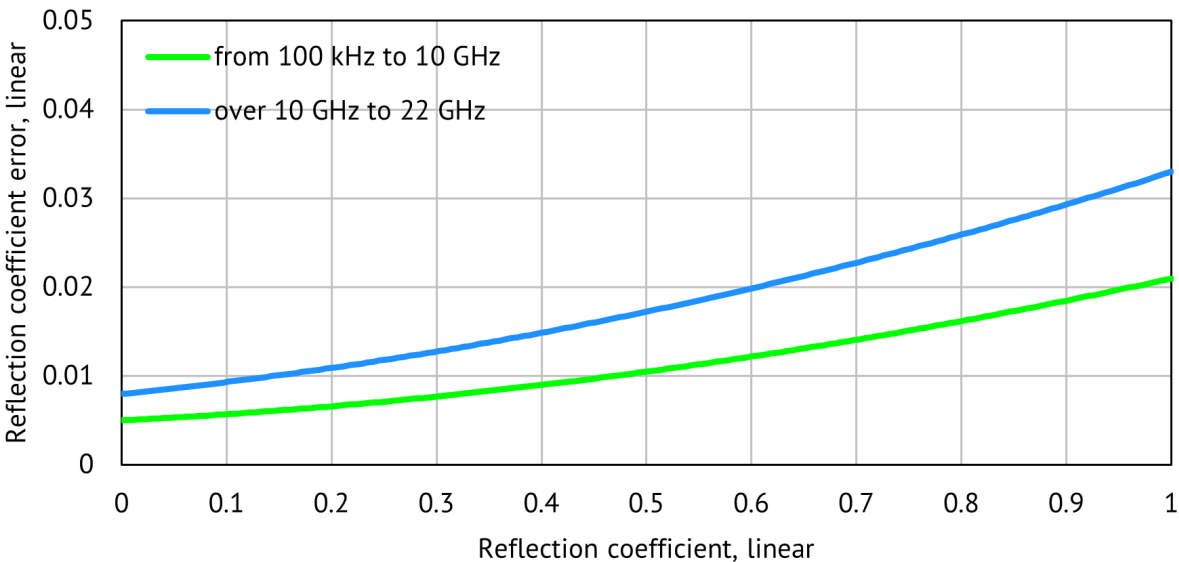
Length	470 mm
Width	440 mm
Height	140 mm
Weight	14 kg (494 oz)

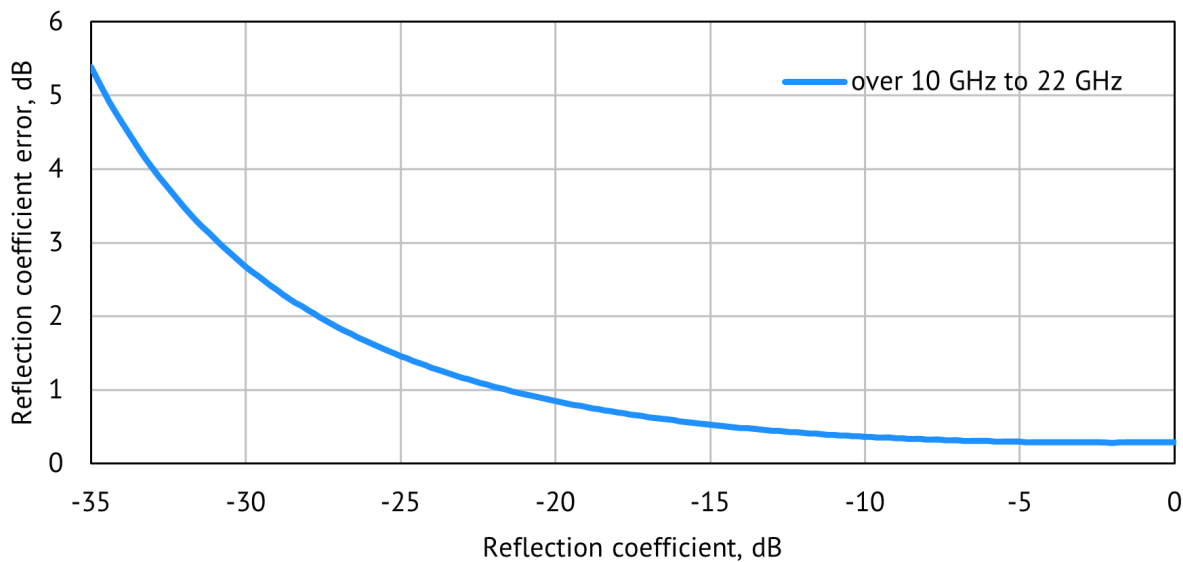
Environment

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

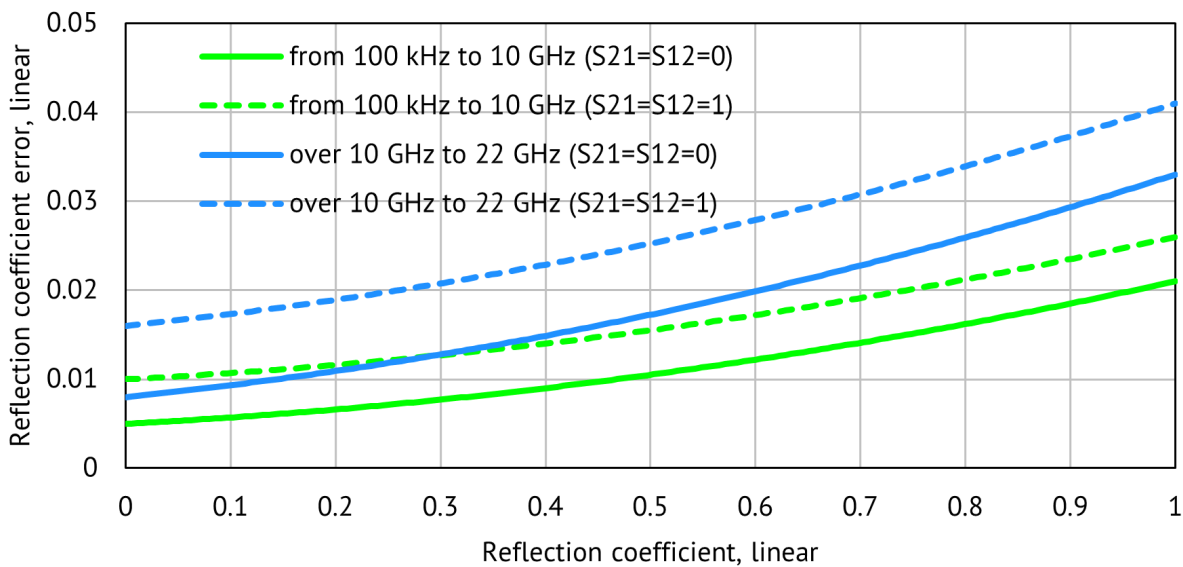
Reflection Accuracy Plots

Reflection Magnitude Errors

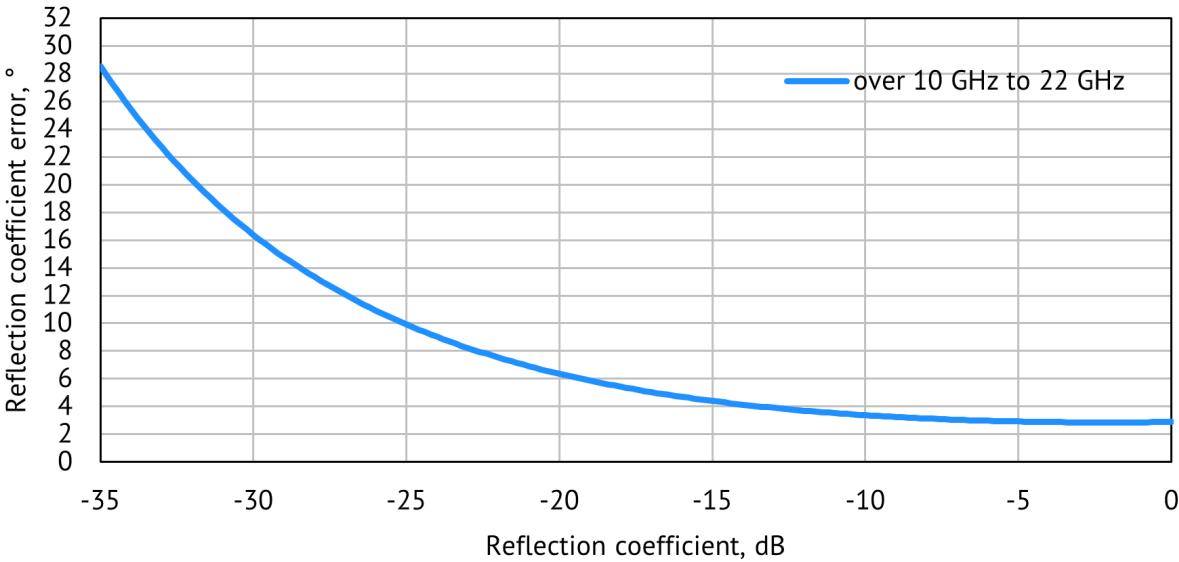
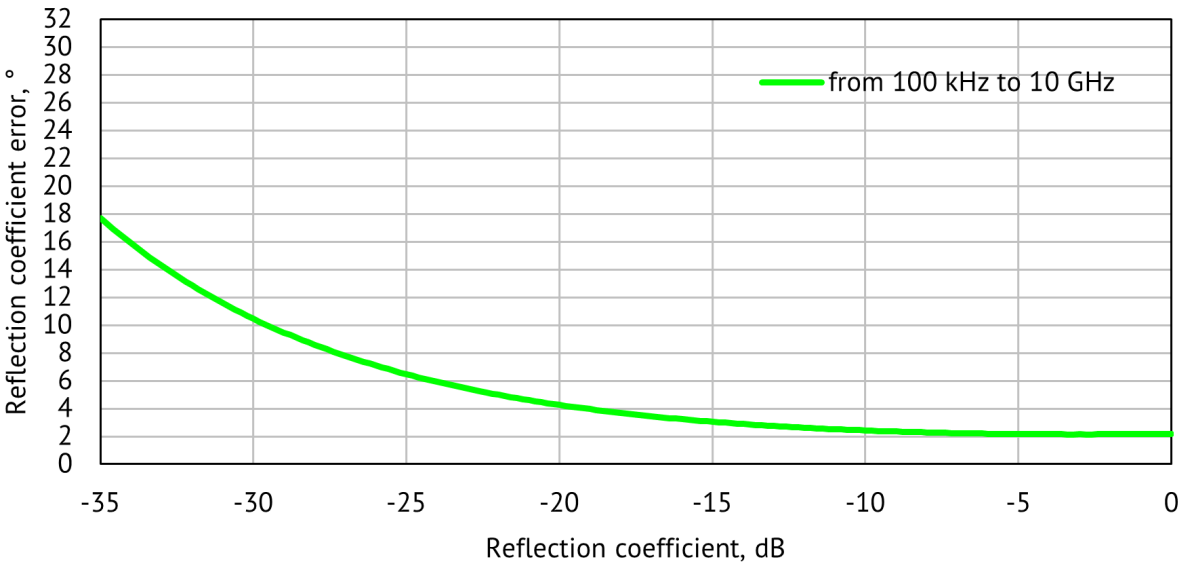




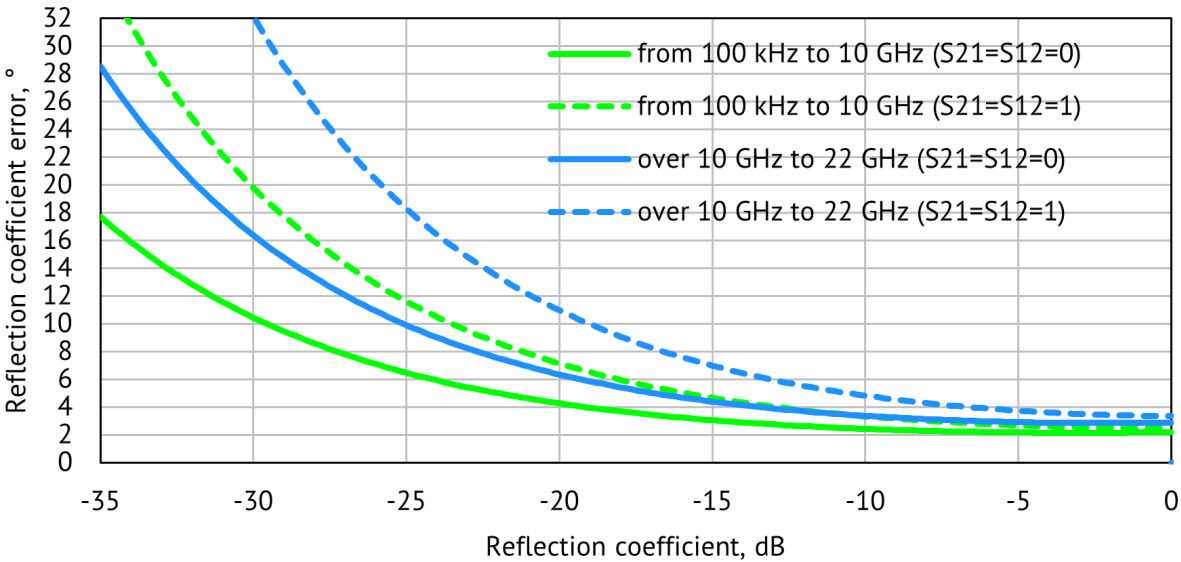
Specifications are based on isolating DUT ($S_{21} = S_{12} = 0$)



Reflection Phase Errors

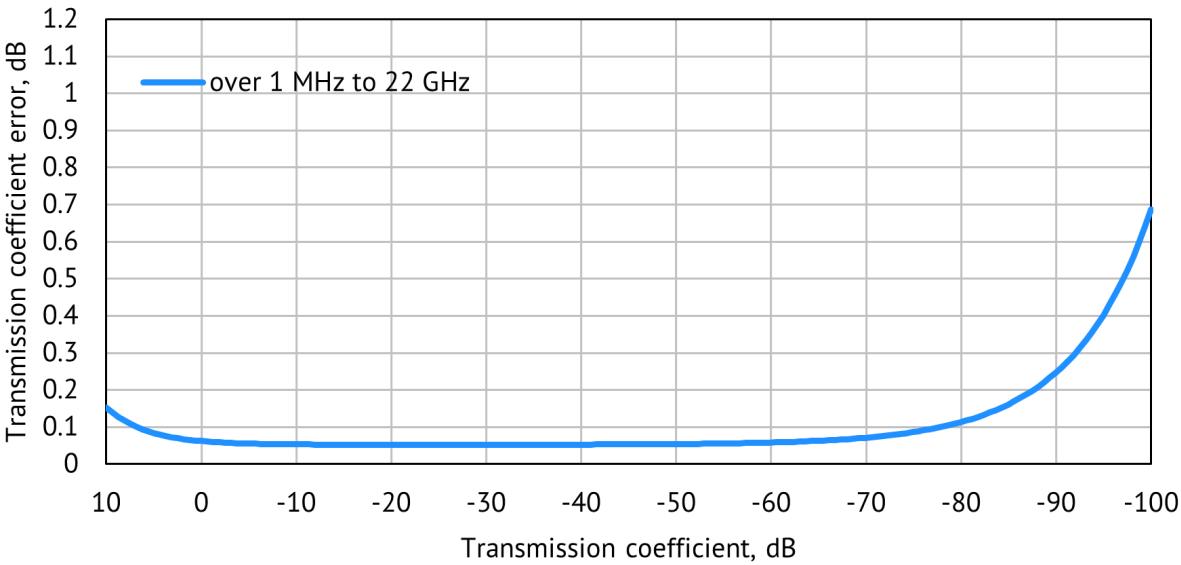
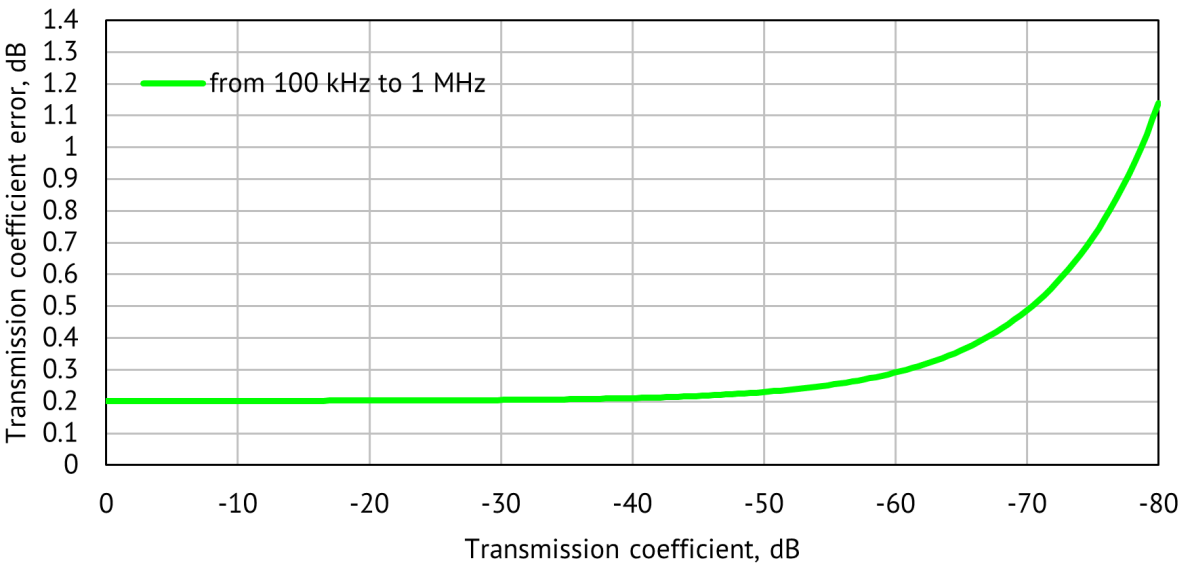


Specifications are based on isolating DUT ($S_{21} = S_{12} = 0$)

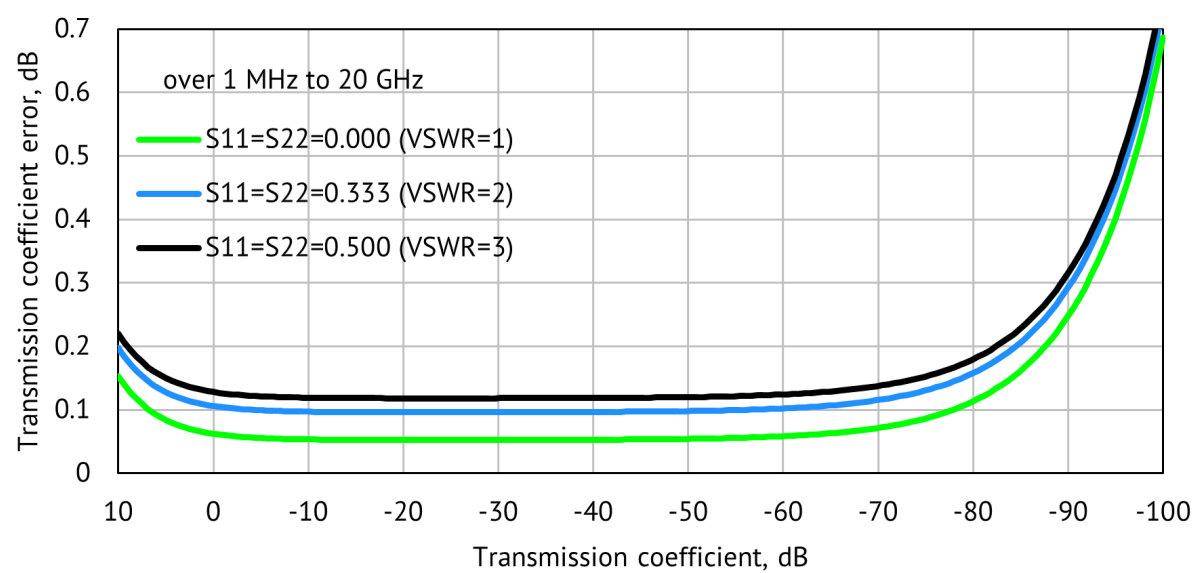


Transmission Accuracy Plots

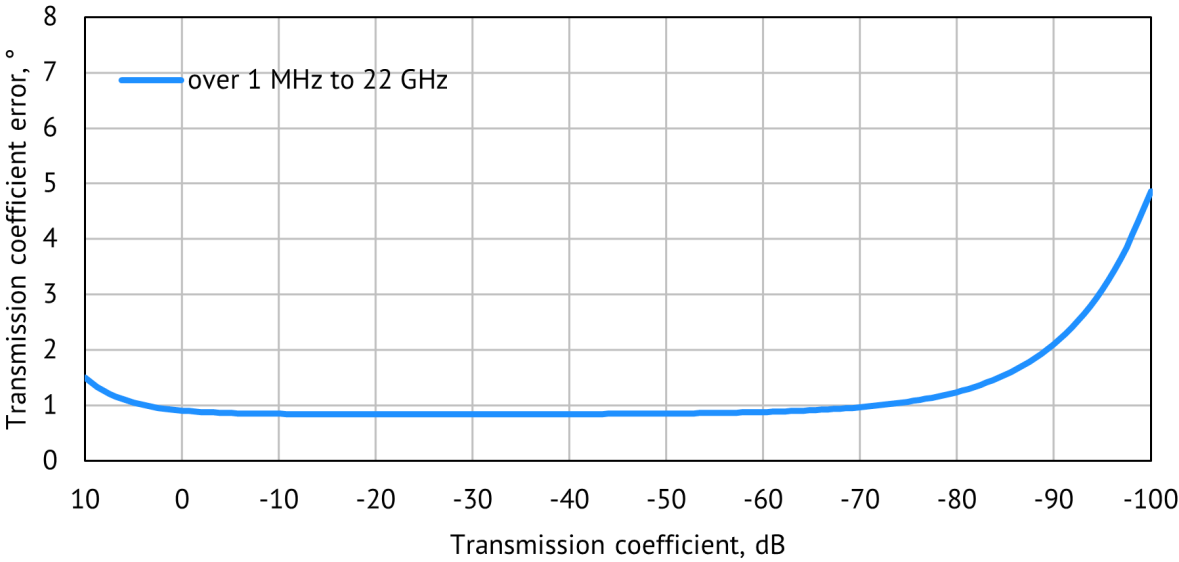
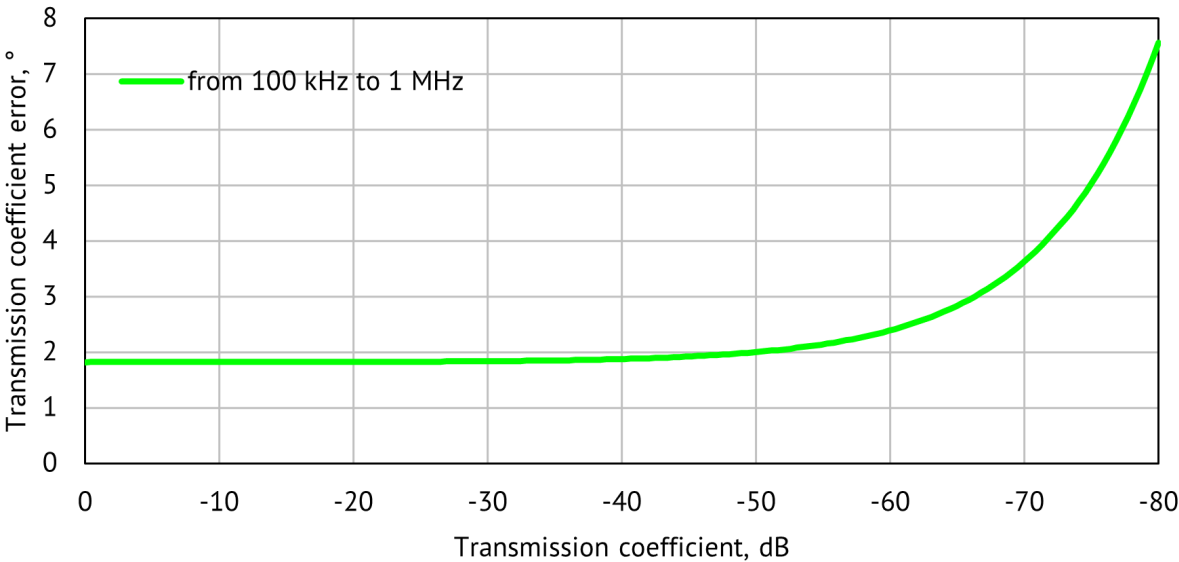
Transmission Magnitude Errors



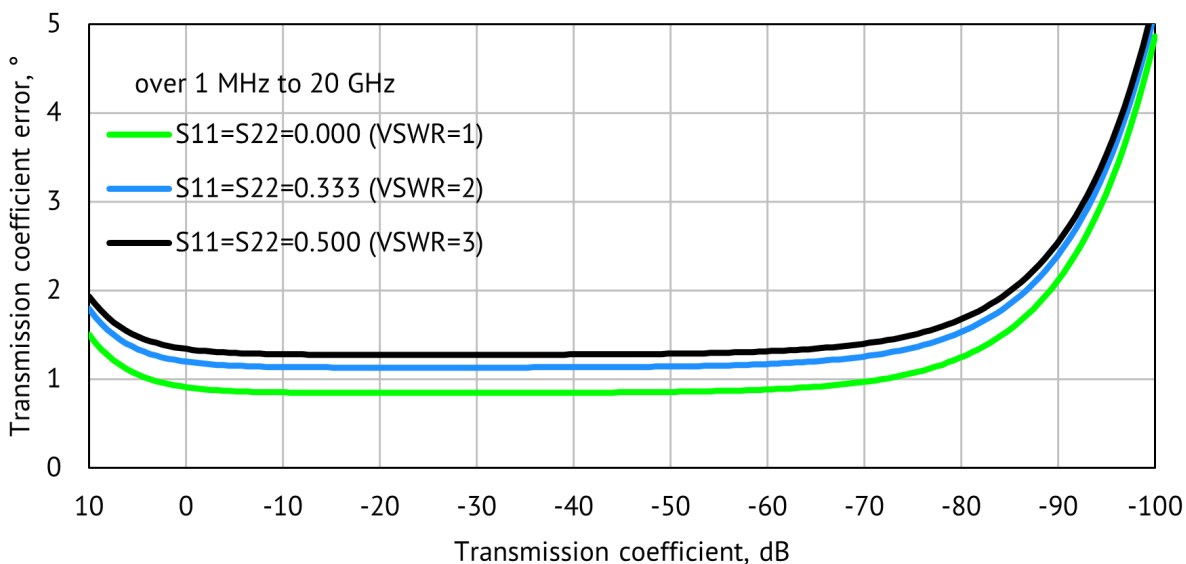
Specifications are based on matched DUT, and IF bandwidth of 1 Hz



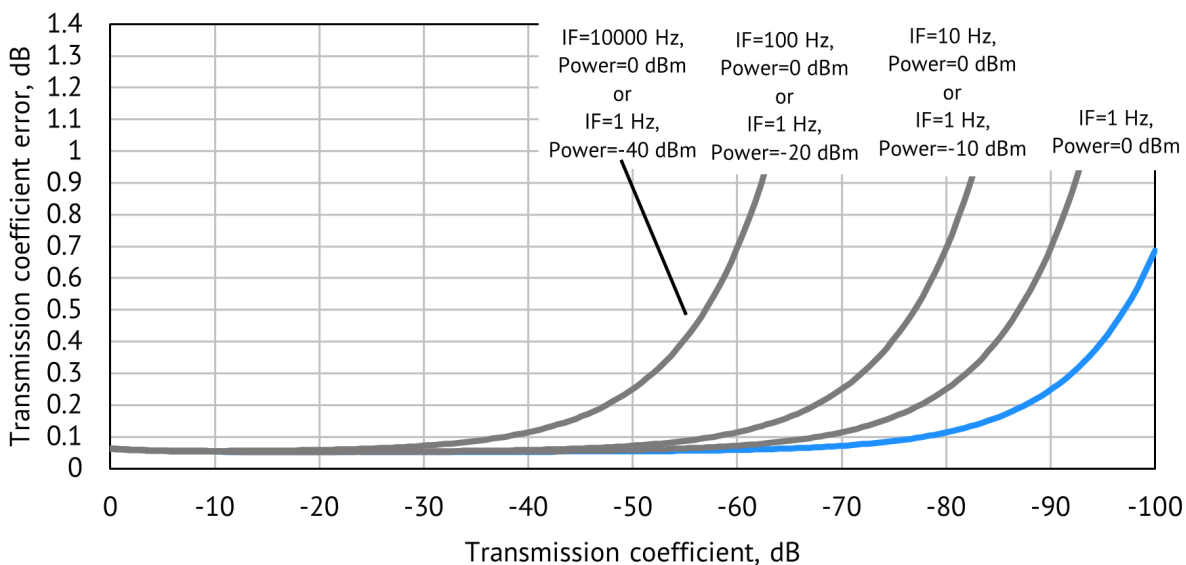
Transmission Phase Errors



Specifications are based on matched DUT, and IF bandwidth of 1 Hz



Transmission Errors for Matched Devices vs Output Power and IF Bandwidth



Service

Accredited Calibration Labs



Periodic verification is used to check the instrument to ensure that it is operating within its specifications. Two years is recommended, but the interval should be determined by your organization's quality policy.

Our Indianapolis and Cyprus calibration laboratories are accredited in accordance with the recognized international standard ISO/IEC 17025 (2017) and meet the requirements of ANSI/NCSL Z540-1994-1.

Warranty, Service, & Repairs

All our products come with a standard three-year warranty from date of shipment. During that time we will repair or replace any product malfunctioning due to defective parts or labor.

While we pride ourselves on quality of our instruments, should your VNA malfunction for any reason, we will gladly offer a loaner unit while we service yours. With our USB VNAs where all data is stored on your PC, a simple swap of the measurement module assures uninterrupted workflow and little or no downtime.

The Crown Customer Service Package

The package includes support that goes beyond the analyzer. Our expert engineers give guidance to customers using CMT analyzers regarding their measurement setup, automation, and much more. This package provides an unparalleled level of service before, during, and after the purchase of the analyzer. And the best part? It's included with every purchase from every company. We are always here to provide reliable and timely customer support.

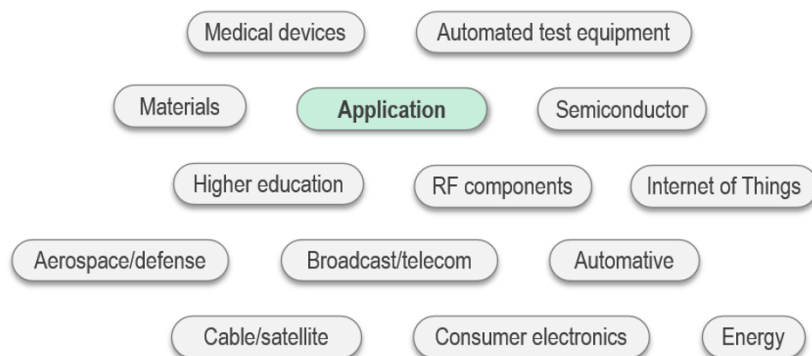
Automation Support

We understand that your time is valuable, which is why our team strives to provide rapid support for engineers using automation in their testing. Because we want to keep you working, our Crown Customer Service package includes help with setting up your testing automation for your analyzer. Our engineers have lots of experience with many coding languages, like C++, Python, MATLAB*, Visual Basic (Excel)*, and LabVIEW*.



Supporting Unique Applications

Technological advancements have engineers using analyzers for more things than ever before.



Customers are using CMT analyzers in industries such as agriculture, automotive R&D and manufacturing tests, medical applications, the expansive network of IoT and IIoT, energy, and more. Determining the ideal analyzer often requires extensive research, so the Crown Customer Support Package includes a consultation with our technical staff to discuss your specific application and recommend the best options. This support package comes at no charge with the purchase of a Copper Mountain Technologies VNA.

Having Issues with Your Analyzer?

We have built and supply high-quality test equipment we are proud of and stand behind. However, we know that issues happen, and when they do, we are here to help. Be it software support, repairs, or just a routine annual verification, the Crown Customer Service Package includes beyond-average rapid support for all of these occurrences. Our service and support teams do all they can to get the analyzer back to making accurate measurements as soon as possible.

For more detailed information, please visit our website:

<https://coppermountaintech.com/crown-customer-service-package/>