

Compact VNA - S5048

Extended Specifications



COPPER MOUNTAIN™
TECHNOLOGIES



- **Frequency range:** 20 kHz - 4.8 GHz
- **Wide output power adjustment range:** -50 dBm to +5 dBm
- **Dynamic range:** 123 dB (10 Hz IF bandwidth) typ.
- **Measurement time per point:** 250 μ s per point, min typ.
- Up to **16 logical channels with 16 traces** each max
- **Automation programming** in LabView, Python, 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

EXTEND YOUR REACH™

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Specifications¹

Measurement Range

| | |
|---|-----------------------|
| Impedance | 50 Ohm |
| Test port connector | type N, female |
| Number of test ports | 2 |
| Frequency range | 20 kHz to 4.8 GHz |
| Full frequency accuracy | $\pm 5 \cdot 10^{-6}$ |
| Frequency resolution | 10 Hz |
| Number of measurement points | 2 to 200,001 |
| Measurement bandwidths (with 1/1.5/2/3/5/7 steps) | 1 Hz to 30 kHz |
| Dynamic range ² | |
| 20 kHz to 300 kHz | 75 dB (100 dB typ.) |
| 300 kHz to 4.8 GHz | 120 dB (123 dB typ.) |

Measurement Accuracy³

| | |
|--|---------------------------------|
| Accuracy of transmission measurements ⁴ | Magnitude / Phase |
| 20 kHz to 300 kHz | |
| -15 dB to +10 dB | ± 0.2 dB / $\pm 2^\circ$ |
| -35 dB to -15 dB | ± 1.0 dB / $\pm 6^\circ$ |
| 300 kHz to 4.8 GHz | |
| 0 dB to +10 dB | ± 0.2 dB / $\pm 2^\circ$ |
| -40 dB to 0 dB | ± 0.15 dB / $\pm 1.5^\circ$ |
| -60 dB to -40 dB | ± 0.2 dB / $\pm 2^\circ$ |
| -80 dB to -60 dB | ± 1.0 dB / $\pm 6^\circ$ |
| Accuracy of reflection measurements ⁵ | Magnitude / Phase |
| -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 / $\pm 20^\circ$ |
| Trace noise magnitude (IF bandwidth 3 kHz) | |
| 20 kHz to 300 kHz | 0.050 dB rms |
| 300 kHz to 4.8 GHz | 0.002 dB rms |
| Temperature dependence | 0.02 dB/°C |

Effective System Data

| | |
|--------------------------|---------------|
| 20 kHz to 4.8 GHz | |
| Directivity | 46 dB |
| Source match | 40 dB |
| Load match | 46 dB |
| Reflection tracking | ± 0.10 dB |
| Transmission tracking | ± 0.14 dB |

[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. [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 -5 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. © Copper Mountain Technologies - www.coppermountaintech.com - Rev. 2019Q1

Specifications¹

Uncorrected System Performance

| 20 kHz to 300 kHz | |
|--------------------|--------------------|
| Directivity | 12 dB |
| Source match | 15 dB |
| Load match | 15 dB |
| 300 kHz to 4.8 GHz | |
| Directivity | 15 dB (18 dB typ.) |
| Source match | 15 dB |
| Load match | 22 dB |

Test Port Output

| | |
|------------------------------------|-------------------|
| Power range | -50 dBm to +5 dBm |
| Power accuracy | ±1.0 dB |
| Power resolution | 0.05 dB |
| Harmonic distortion ⁶ | -20 dBc |
| Non-harmonic spurious ⁶ | -30 dBc |

Test Port Input

| Noise floor | |
|--------------------|-------------|
| 20 kHz to 300 kHz | -80 dBm/Hz |
| 300 kHz to 4.8 GHz | -125 dBm/Hz |
| Damage level | +23 dBm |
| Damage DC voltage | 35 V |

Measurement Speed

| | |
|----------------------|-------------|
| Time per point | 250 µs typ. |
| Port switchover time | 10 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 |

Specifications¹

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 | 1.0 GHz |
| RAM | 512 MB |
| Interface | USB 2.0 |
| Connector type | USB B |
| Power supply | 110-240 V, 50/60 Hz |
| Power consumption | 12 W |
| Input power | 9 V DC to 15 V DC |
| Input power consumption DC | 10 W |

Calibration

| | |
|---|---------|
| Recommended factory adjustment interval | 3 years |
|---|---------|

Dimensions

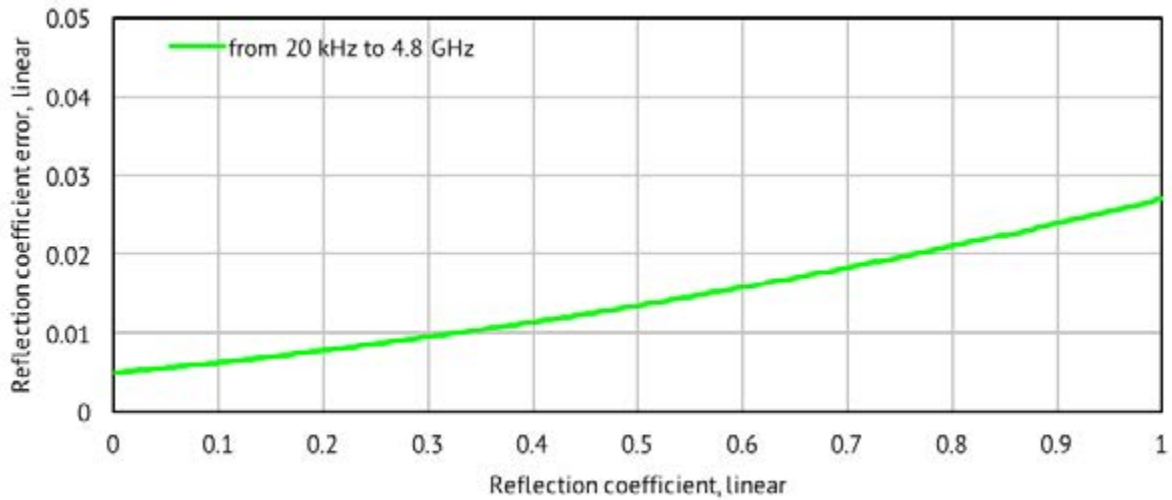
| | |
|--------|----------------|
| Length | 267 mm |
| Width | 160 mm |
| Height | 44 mm |
| Weight | 1.3 kg (46 oz) |

Environmental Specifications

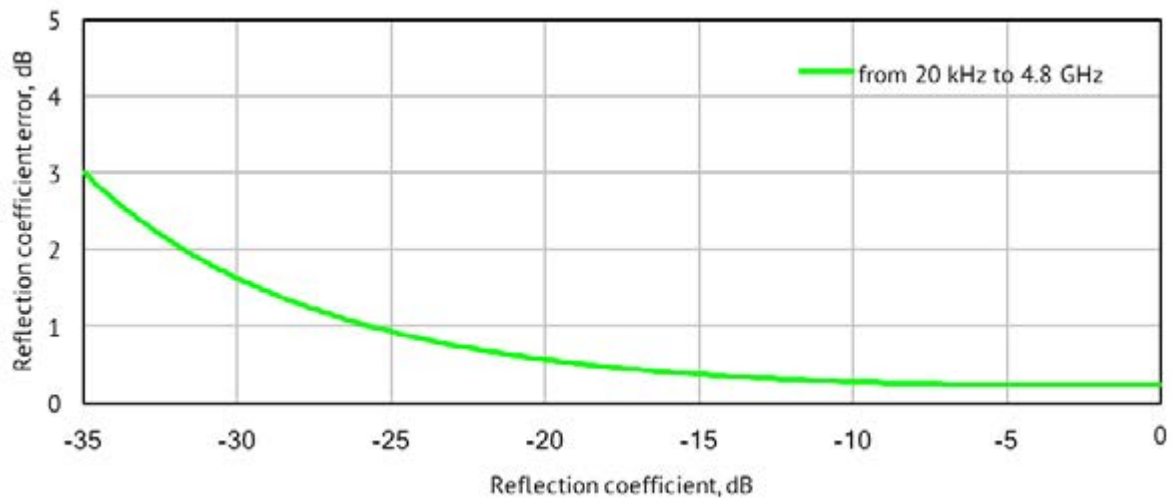
| | |
|-----------------------|-------------------------------------|
| Operating temperature | +5 °C to +40 °C (41 °F to 104 °F) |
| Storage temperature | -50 °C to +70 °C (-58 °F to 158 °F) |
| Humidity | 90 % at 25 °C (77 °F) |
| Atmospheric pressure | 70.0 kPa to 106.7 kPa |

Reflection Accuracy Plots

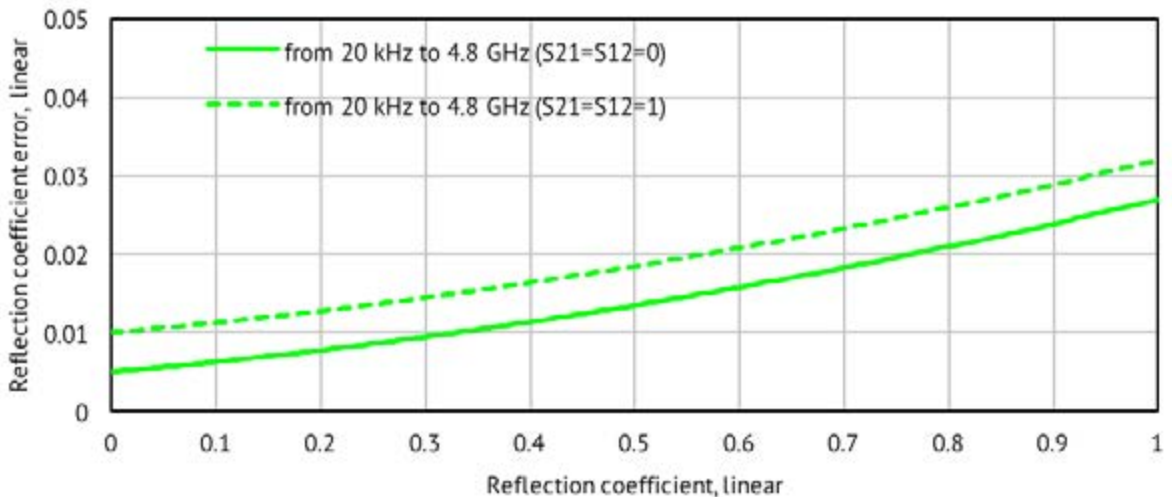
Reflection Magnitude Errors



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

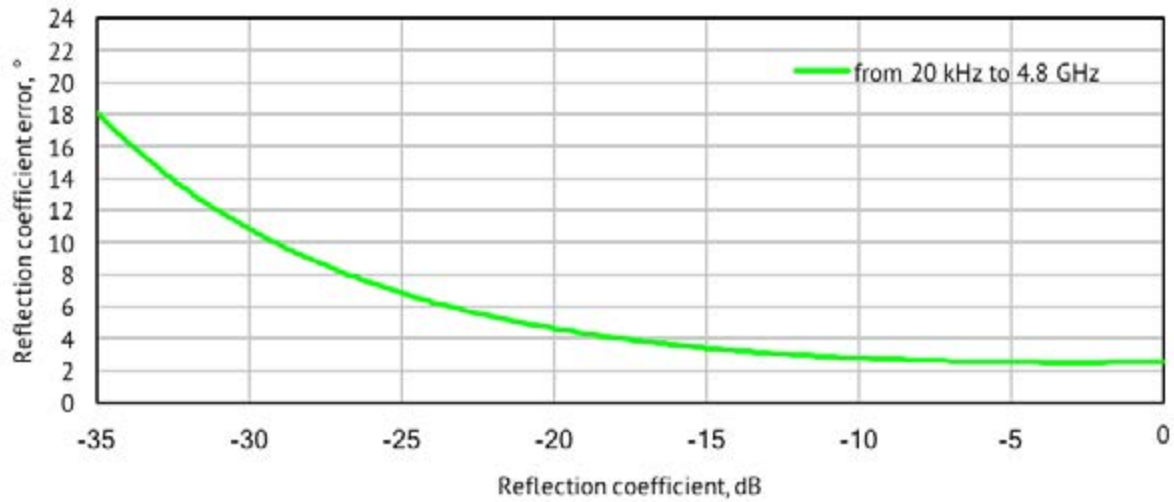


Specifications are based on isolating DUT ($S_{21} = S_{12} = 0$)

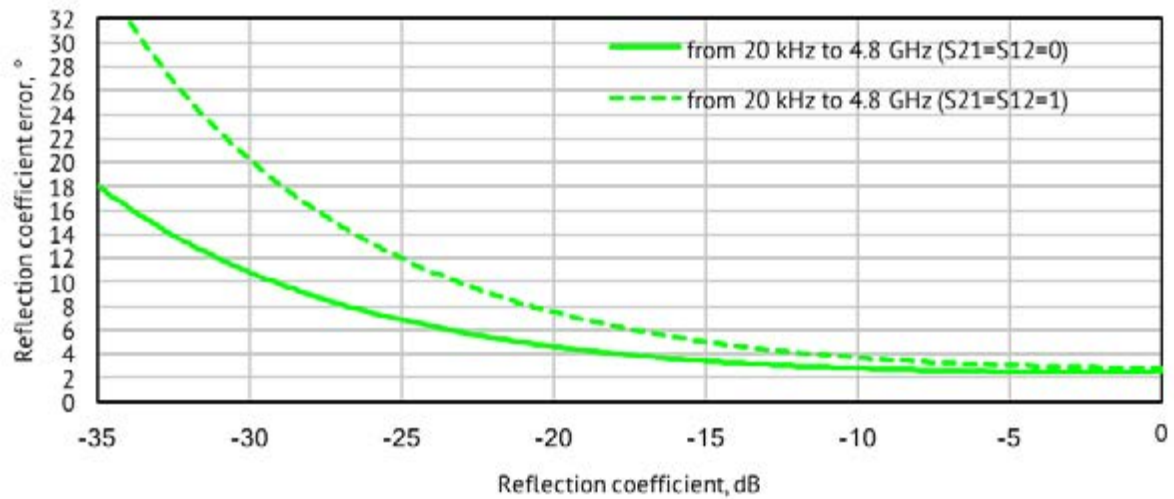


Reflection/Transmission Accuracy Plots

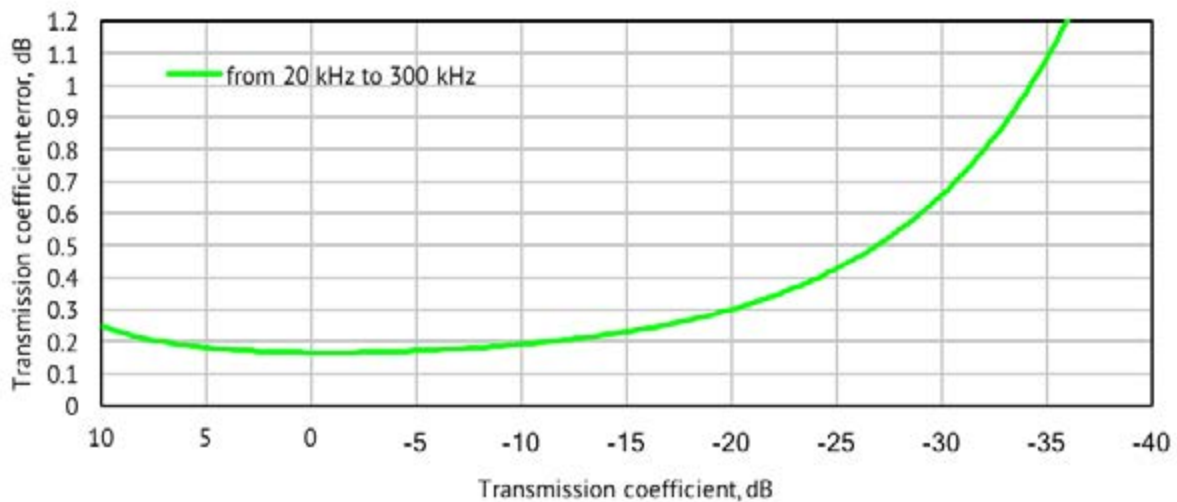
Reflection Phase Errors



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



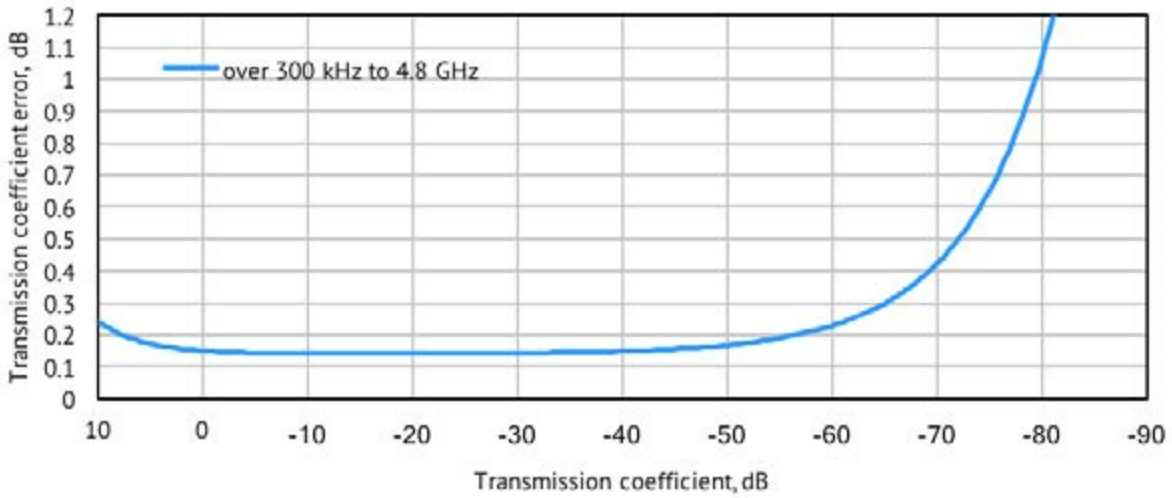
Transmission Magnitude Errors



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

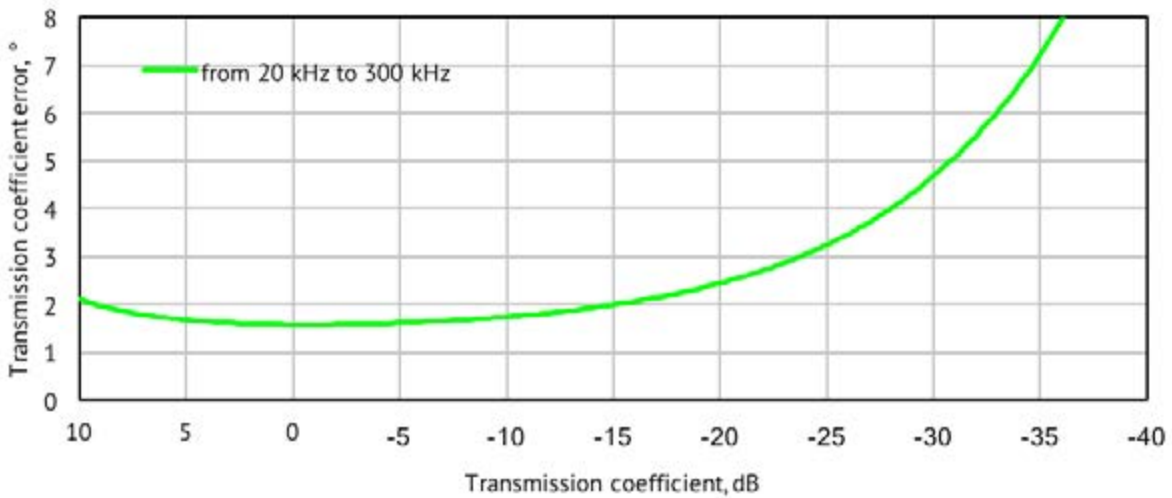
Transmission Accuracy Plots

Transmission Magnitude Errors

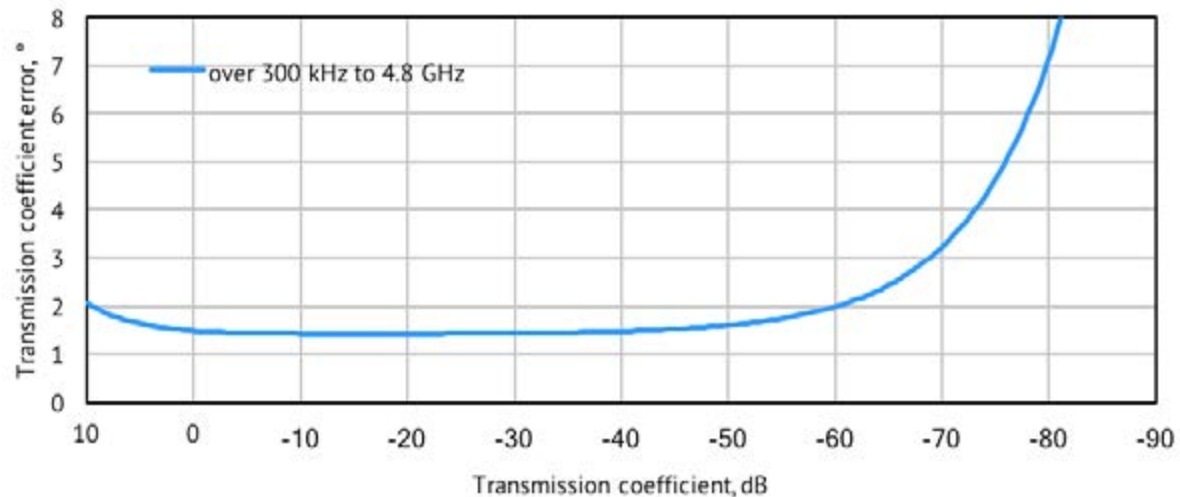


Specifications are based on matched DUT, and IF bandwidth of 10 Hz

Transmission Phase Errors



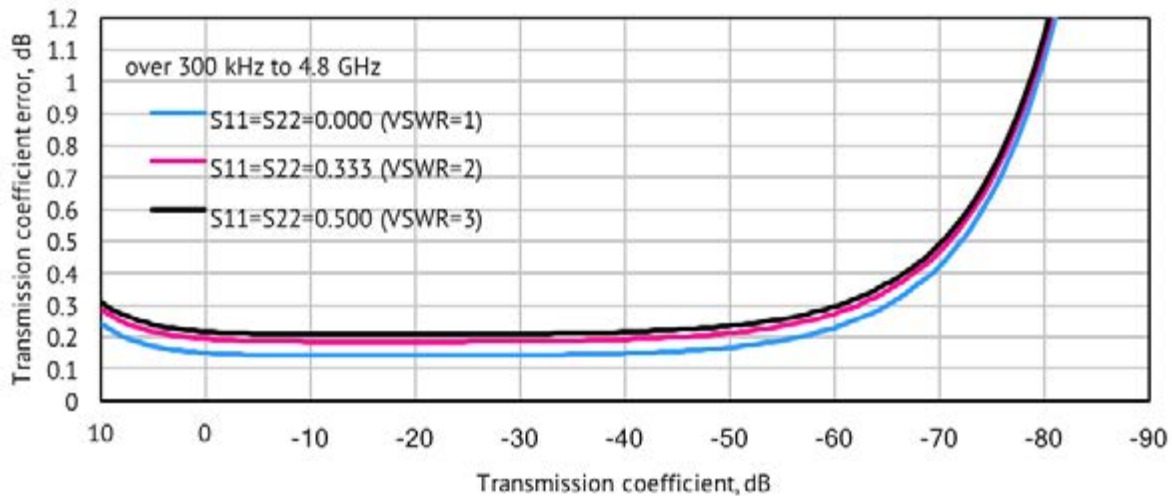
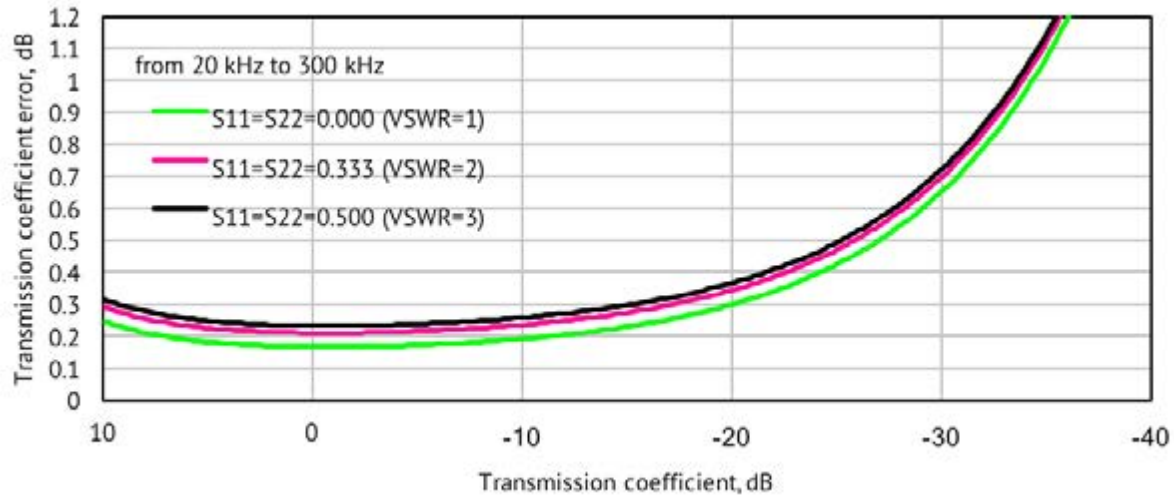
Specifications are based on matched DUT, and IF bandwidth of 10 Hz



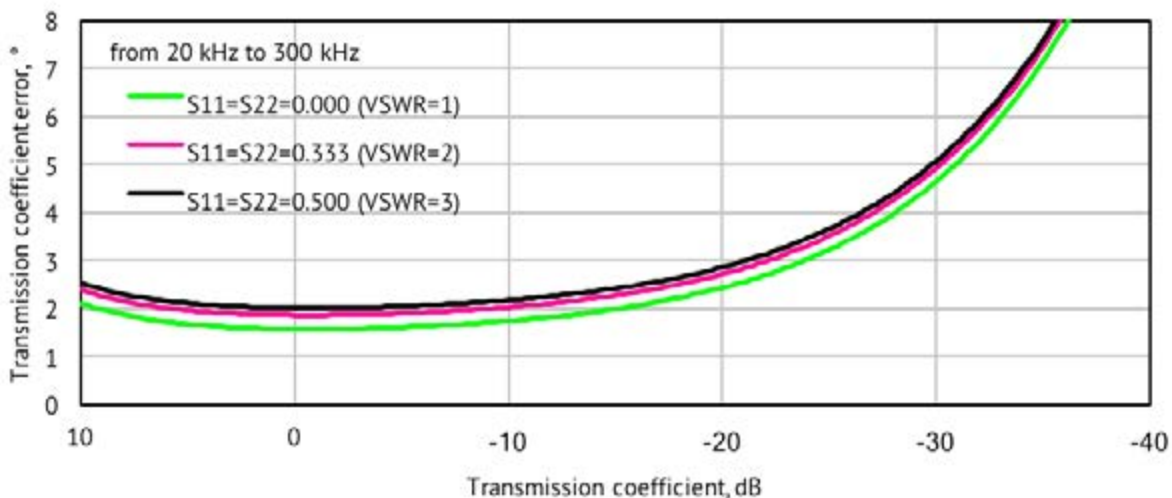
Specifications are based on matched DUT, and IF bandwidth of 10 Hz

Transmission Accuracy Plots

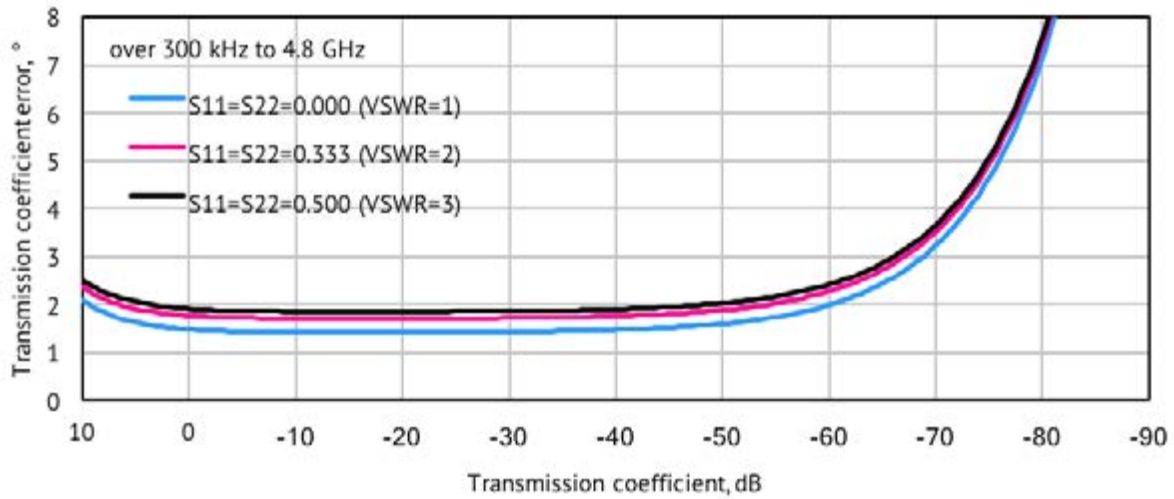
Transmission magnitude errors for unmatched devices



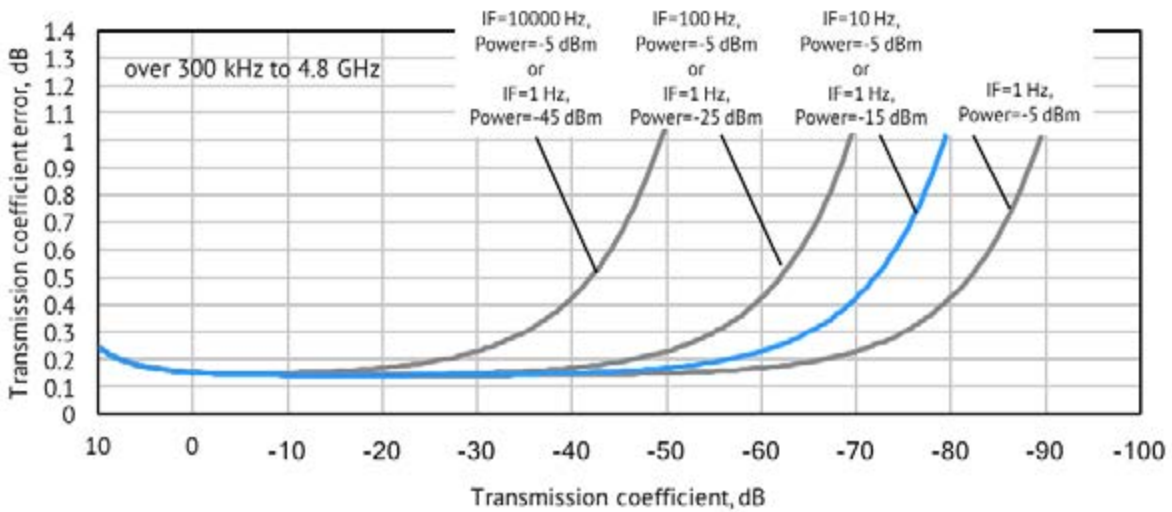
Transmission phase errors for unmatched devices



Transmission Accuracy Plots



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 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.



| | S5048 | S7530 | S5065 | S5085 | S5180 |
|------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Frequency Range | 20 kHz to 4.8 GHz | 20 kHz to 3 GHz | 9 kHz to 6.5 GHz | 9 kHz to 8.5 GHz | 20 kHz to 18 GHz |
| S-parameters | $S_{11}, S_{21}, S_{12}, S_{22}$ | $S_{11}, S_{21}, S_{12}, S_{22}$ | $S_{11}, S_{21}, S_{12}, S_{22}$ | $S_{11}, S_{21}, S_{12}, S_{22}$ | $S_{11}, S_{21}, S_{12}, S_{22}$ |
| Port Impedance | 50 Ohm | 75 Ohm | 50 Ohm | 50 Ohm | 50 Ohm |

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