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# Compact VNA - TR1300/1

COPPER MOUNTAIN® TECHNOLOGIES

## Extended Specifications




- **Frequency range:** 300 kHz - 1.3 GHz
- **Wide output power adjustment range:** -55 dBm to +3 dBm
- **Dynamic range:** 135 dB (10 Hz IF bandwidth) typ.
- **Measurement time per point:** 150 µs 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 **16,001 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 1.3 GHz |
| **Full frequency accuracy** | $\pm 5 \cdot 10^{-6}$ |
| **Frequency resolution** | 1 Hz |
| **Number of measurement points** | 2 to 16,001 |
| **Measurement bandwidths (with 1/3 steps)** | 10 Hz to 30 kHz |
| **Dynamic range[2]** | 130 dB (135 dB typ.) |

## Measurement Accuracy[3]

| **Accuracy of transmission measurements[4]** | Magnitude / Phase ($S_{11} = S_{22} = 0$) | Magnitude / Phase ($S_{11} = S_{22} = 0.1$) |
|---|---|---|
| +10 dB to +13 dB | ±0.2 dB / ±2° | ±0.2 dB / ±2° |
| -50 dB to +10 dB | ±0.1 dB / ±1° | ±0.15 dB / ±1.5° |
| -70 dB to -50 dB | ±0.2 dB / ±2° | ±0.2 dB / ±2° |
| -85 dB to -70 dB | ±1.0 dB / ±6° | ±1.0 dB / ±6° |
| **Accuracy of reflection measurements[5]** | Magnitude / Phase | |
| -15 dB to 0 dB | ±0.4 dB / ±4° | |
| -25 dB to -15 dB | ±1.5 dB / ±7° | |
| -35 dB to -25 dB | ±4.0 dB / ±22° | |
| **Trace noise magnitude (IF bandwidth 3 kHz)** | 0.002 dB rms | |
| **Temperature dependence** | 0.02 dB/°C | |

## Effective System Data

| **300 kHz to 1.3 GHz** | |
|---|---|
| Directivity | 45 dB |
| Source match | 40 dB |
| Load match | 28 dB |
| Reflection tracking | ±0.10 dB |
| Transmission tracking | ±0.08 dB |

## Uncorrected System Performance

| **300 kHz to 1.3 GHz** | |
|---|---|
| Directivity | 18 dB |
| Source match | 15 dB |
| Load match | 28 dB |

## Test Port Output

| | |
|---|---|
| **Power range** | -55 dBm to +3 dBm |
| **Power accuracy** | ±1.5 dB |
| **Power resolution** | 0.05 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 one-path two-port calibration temperature, at output power of -10 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*

# Specifications[1]

## Test Port Input

| | |
|---|---|
| **Noise floor** | -137 dBm/Hz |
| **Damage level** | +26 dBm |
| **Damage DC voltage** | 35 V |

## Measurement Speed

| | |
|---|---|
| **Time per point** | 150 µs typ. |

## Frequency Reference Output

| | |
|---|---|
| **Port** | 10 MHz Ref Out |
| **Internal reference frequency** | 10 MHz |
| **Output reference signal level at 50 Ohm impedance** | 1 dBm to 5 dBm |
| **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** | 10 W |
| **Input power** | 9 V DC to 15 V DC |
| **Input power consumption DC** | 8 W |

## Calibration

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

## Dimensions

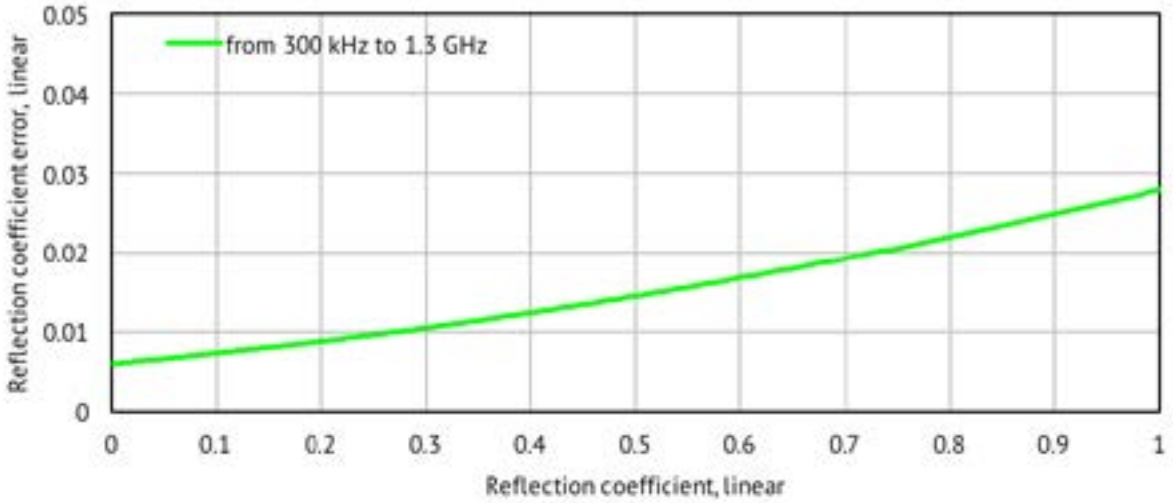
| | |
|---|---|
| **Length** | 285 mm |
| **Width** | 142 mm |
| **Height** | 40 mm |
| **Weight** | 1.5 kg (53 oz) |

## Environmental Specifications

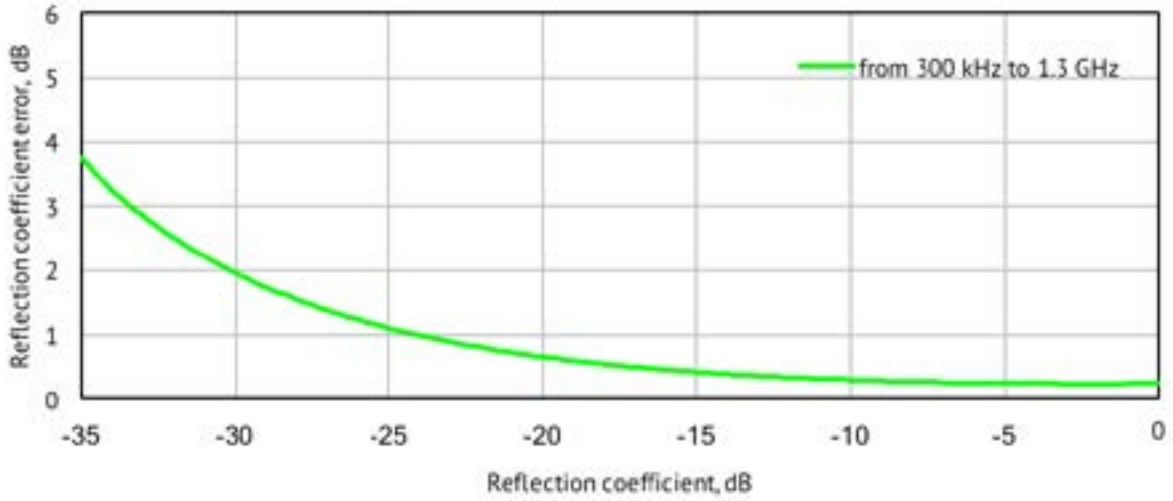
| | |
|---|---|
| **Operating temperature** | +5 °C to +40 °C (41 °F to 104 °F) |
| **Storage temperature** | -50 °C to +70 °C (-58 °F to 158 °F) |
| **Humidity** | 90 % at 25 °C (77 °F) |
| **Atmospheric pressure** | 70.0 kPa to 106.7 kPa |

# Reflection Accuracy Plots

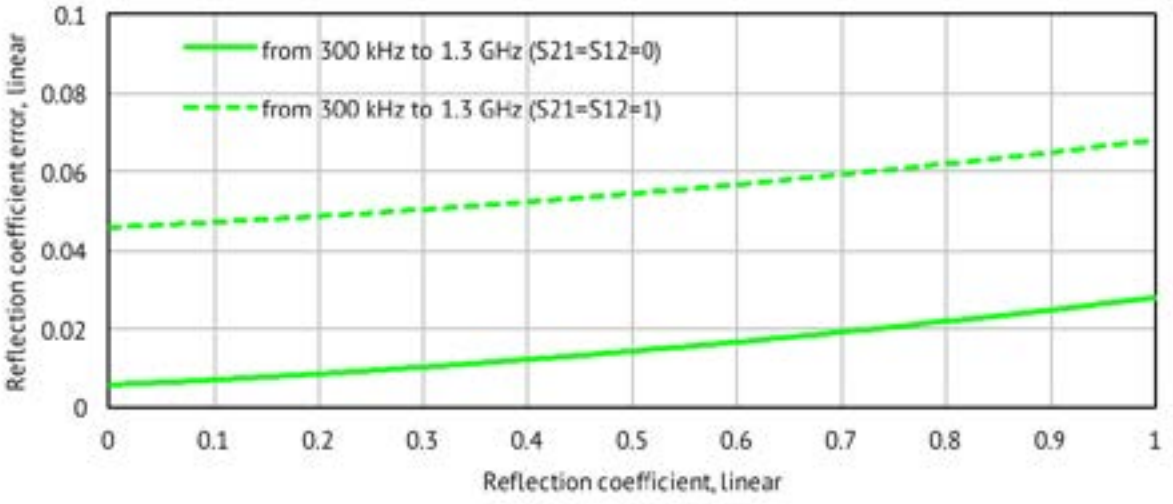
**Reflection Magnitude Errors**




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

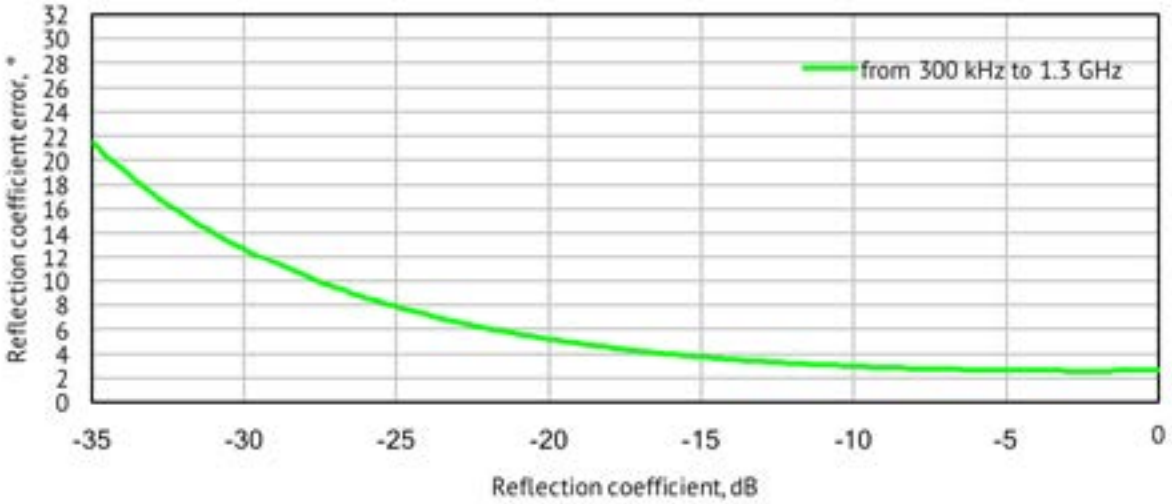



Specifications are based on isolating DUT ($S_{21} = S_{12} = 0$)

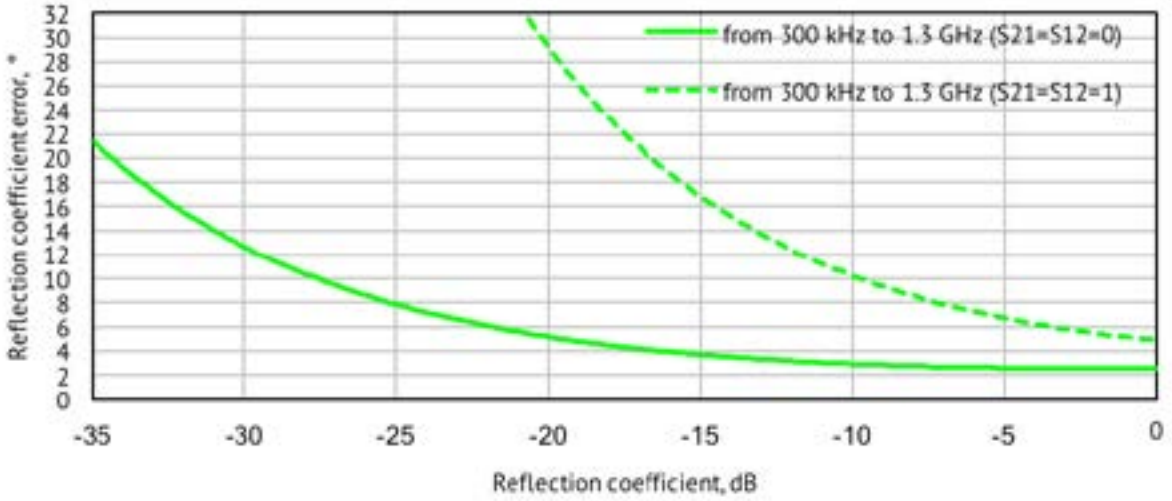


# Reflection/Transmission Accuracy Plots

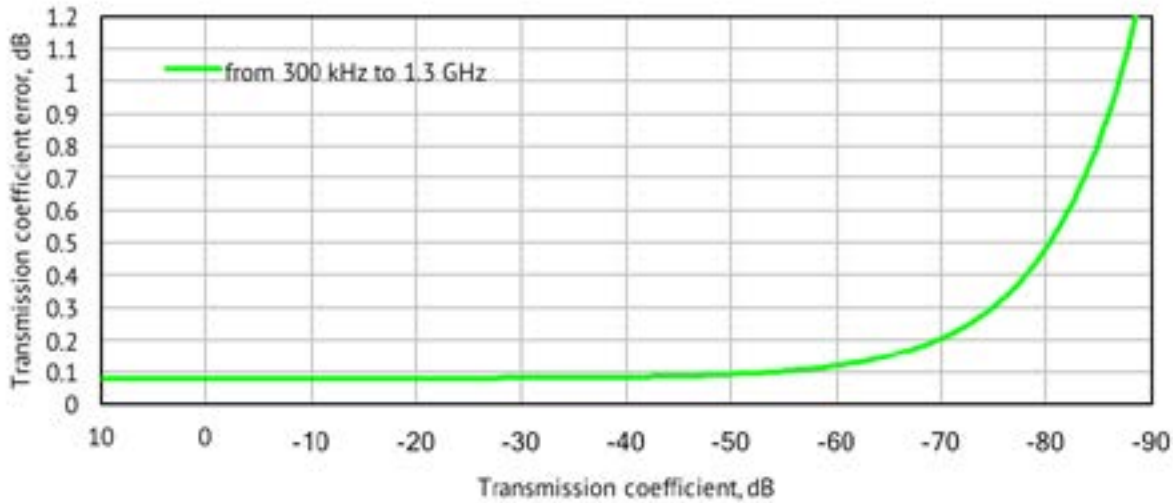
### Reflection Phase Errors




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



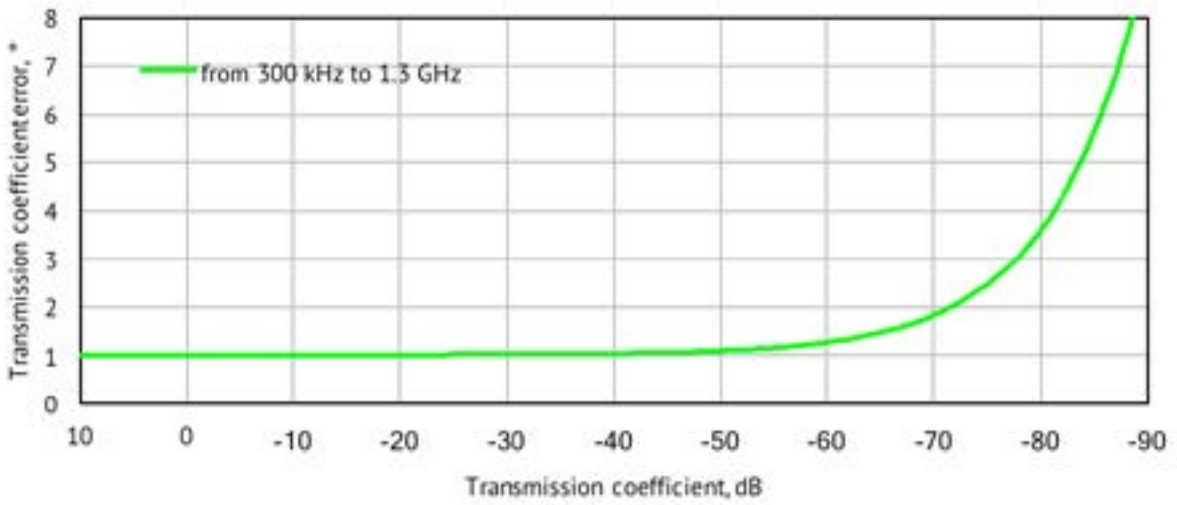

### Transmission Magnitude Errors



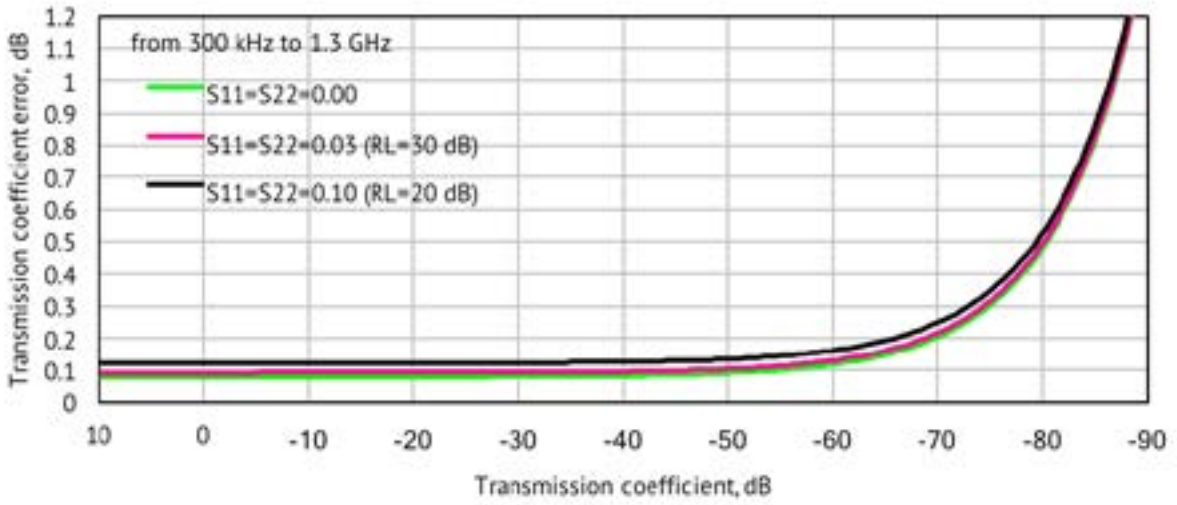

Specifications are based on matched DUT, and IF bandwidth of 10 Hz

# Transmission Accuracy Plots

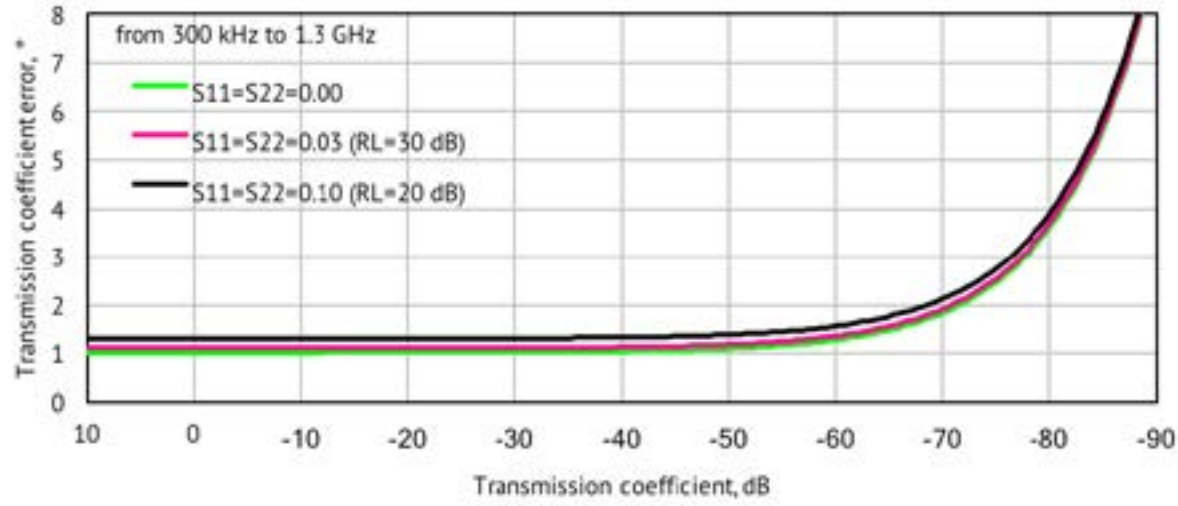
### Transmission Phase Errors




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



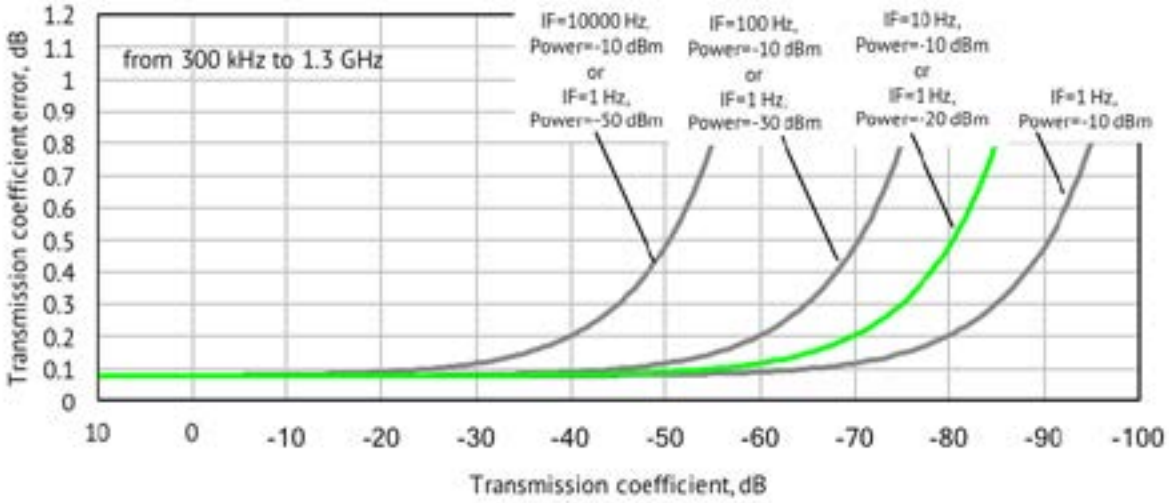

### Transmission Phase Errors for Unmatched Devices




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

# 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.**







| | TR1300/1 | TR5048 | TR7530 |
|---|---|---|---|
| **Frequency Range** | 300 kHz to 1.3 GHz | 20 kHz to 4.8 GHz | 20 kHz to 3 GHz |
| **S-parameters** | $S_{11}$, $S_{21}$ | $S_{11}$, $S_{21}$ | $S_{11}$, $S_{21}$ |
| **Port Impedance** | 50 Ohm | 50 Ohm | 75 Ohm |

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