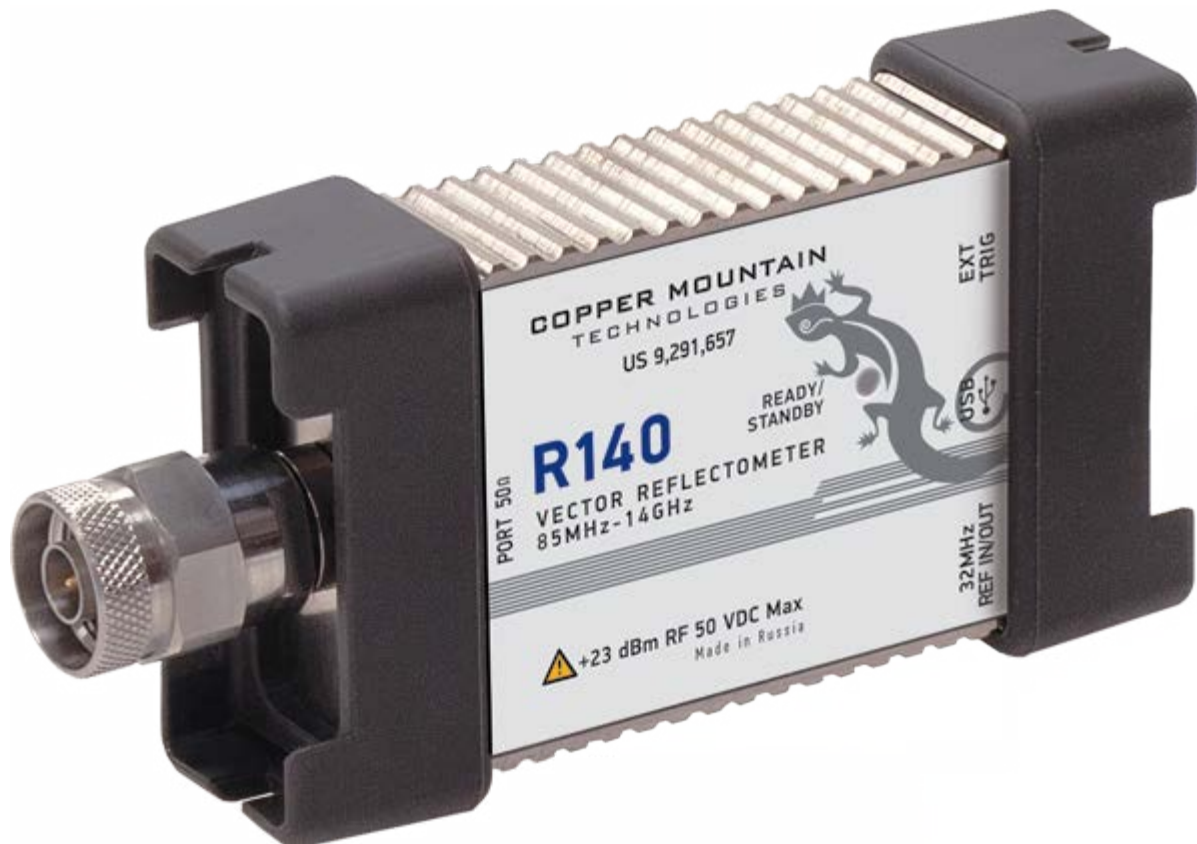


1-Port USB VNA - R140

Extended Specifications



- **Patent US 9,291,657** - No test cable needed
- **Frequency range:** 85 MHz - 14 GHz
- **Measurement time per point:** 200 μ s min typ.
- **Automation programming** in LabView, Python, MATLAB, .NET, etc.
- Up to **100,001 measurement points**
- **Time domain and gating** included standard

EXTEND YOUR REACH™

Specifications¹

Measurement Range

| | |
|---|-------------------------|
| Impedance | 50 Ohm |
| Test port connector | type N, male |
| Number of test ports | 1 |
| Frequency range | 85 MHz to 14 GHz |
| Full frequency accuracy | $\pm 2.5 \cdot 10^{-6}$ |
| Frequency resolution | 25 Hz |
| Number of measurement points | 2 to 100,001 |
| Measurement bandwidths (with 1/3 steps) | 10 Hz to 30 kHz |
| Cable loss measurement range | |
| 85 MHz to 4.8 GHz | 35 dB |
| 4.8 GHz to 14 GHz | 30 dB |
| Dynamic range² | |
| 85 MHz to 4.8 GHz | 107 dB typ. |
| 4.8 GHz to 14 GHz | 70 dB typ. |

Measurement Accuracy³

| | |
|--|-------------------------------|
| Accuracy of reflection measurements⁴ | Magnitude / Phase |
| 85 MHz to 4.8 GHz | |
| -15 dB to 0 dB | ± 0.4 dB / $\pm 4^\circ$ |
| -25 dB to -15 dB | ± 1.2 dB / $\pm 8^\circ$ |
| -35 dB to -25 dB | ± 4.0 dB / $\pm 22^\circ$ |
| 4.8 GHz to 14 GHz | |
| -15 dB to 0 dB | ± 0.5 dB / $\pm 5^\circ$ |
| -25 dB to -15 dB | ± 1.5 dB / $\pm 10^\circ$ |
| -35 dB to -25 dB | ± 5.5 dB / $\pm 30^\circ$ |
| Accuracy of transmission magnitude measurements⁵ | Magnitude |
| 85 MHz to 4.8 GHz | |
| -50 dB to 0 dB | ± 1 dB |
| 4.8 GHz to 14 GHz | |
| -40 dB to 0 dB | ± 1 dB |
| Trace noise magnitude⁶ | |
| 85 MHz to 4.8 GHz | 0.005 dB rms |
| 4.8 GHz to 14 GHz | 0.050 dB rms |
| Temperature dependence | |
| 85 MHz to 4.8 GHz | 0.015 dB/°C |
| 4.8 GHz to 14 GHz | 0.035 dB/°C |

[1] All specifications subject to change without notice. [2] Measurement of $|S_{21}|$ and $|S_{12}|$ using two reflectometers, both being connected to the same USB hub, applies over the temperature range of $(23 \pm 5)^\circ\text{C}$ after 30 minutes of warming-up, with less than 1°C deviation from the calibration temperature at high output power and IF bandwidth 100 Hz. [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 30 minutes of warming-up, with less than 1°C deviation from calibration temperature, at high output power and IF BW 100 Hz. Frequency points have to be identical for measurement and calibration (no interpolation allowed). [4] Reflection specifications are based on an isolating DUT. [5] Transmission specifications are based on a matched DUT. Measurement of $|S_{21}|$ and $|S_{12}|$ using two devices, both being connected to the same USB hub. [6] IF bandwidth 1 kHz. © Copper Mountain Technologies - www.coppermountaintech.com - Rev. 2019Q1

Specifications¹

Effective System Data

| 85 MHz to 4.8 GHz | |
|---------------------|----------|
| Directivity | 45 dB |
| Source match | 37 dB |
| Reflection tracking | ±0.10 dB |
| 4.8 GHz to 14 GHz | |
| Directivity | 42 dB |
| Source match | 35 dB |
| Reflection tracking | ±0.20 dB |

Uncorrected System Performance

| 85 MHz to 14 GHz | |
|------------------|--------------------|
| Directivity | 10 dB (15 dB typ.) |
| Source match | 10 dB (15 dB typ.) |

Test Port

| Output power | |
|-----------------------|---------|
| 85 MHz to 4.8 GHz | |
| High level | 0 dBm |
| Low level | -35 dBm |
| 4.8 GHz to 14 GHz | |
| | -10 dBm |
| Interference immunity | +17 dBm |
| Damage level | +23 dBm |
| Damage DC voltage | 50 V |

Measurement Speed

| | |
|----------------|-------------|
| Time per point | 200 µs typ. |
|----------------|-------------|

Frequency Reference Input

| | |
|------------------------------|----------------|
| Port | Ref In / Out |
| External reference frequency | 32 MHz |
| Input level | 0 dBm to 4 dBm |
| Input impedance | 50 Ohm |
| Connector type | SMA, female |

Frequency Reference Output

| | |
|---|-----------------|
| Port | Ref In / Out |
| Internal reference frequency | 32 MHz |
| Output reference signal level at 50 Ohm impedance | -1 dBm to 5 dBm |
| Connector type | SMA, female |

Specifications¹

Trigger Input

| | |
|-------------------------|----------------------------|
| Port | Ext Trig |
| External trigger source | 3.3 V CMOS, TTL compatible |
| Pulse width | ≥1 μs |
| Polarity | positive or negative |
| Input impedance | ≥10 kOhm |
| Connector type | SMA, female |

System & Power

| | |
|-------------------|---------------------|
| Operating system | Windows 7 and above |
| CPU frequency | 1.0 GHz |
| RAM | 2 GB |
| Interface | USB 2.0 |
| Connector type | Mini USB B |
| Power consumption | 3 W |

Calibration

| | |
|---|---------|
| Recommended factory adjustment interval | 3 Years |
|---|---------|

Dimensions

| | |
|--------|------------------|
| Weight | 0.3 kg (10.6 oz) |
| Length | 127 mm |
| Width | 62 mm |
| Height | 30 mm |

Environmental Specifications

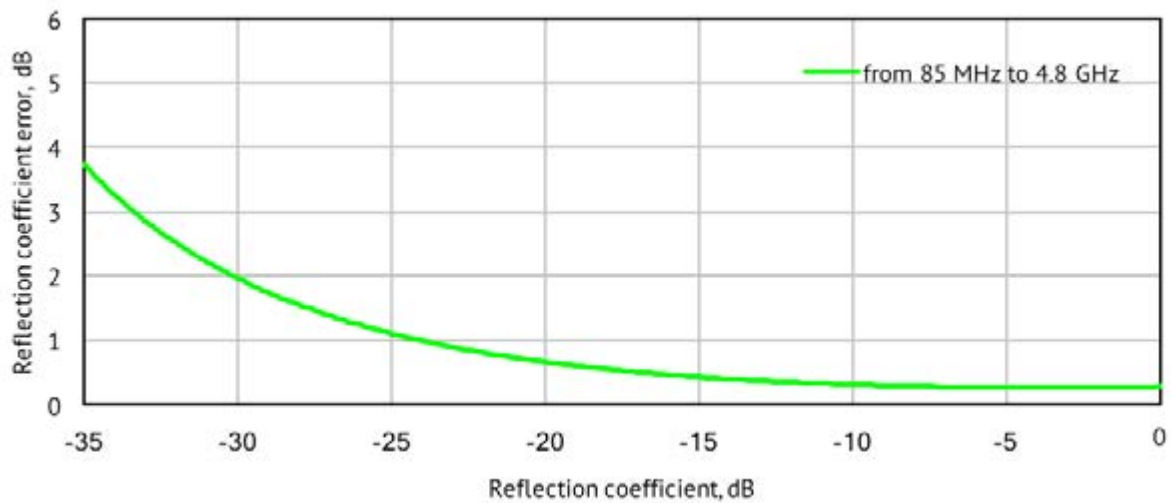
| | |
|-----------------------|-------------------------------------|
| Operating temperature | +5 °C to +40 °C (41 °F to 104 °F) |
| Storage temperature | -50 °C to +70 °C (-58 °F to 158 °F) |
| Humidity | 90 % at 25 °C (77 °F) |
| Atmospheric pressure | 70.0 kPa to 106.7 kPa |

Reflection Accuracy Plots

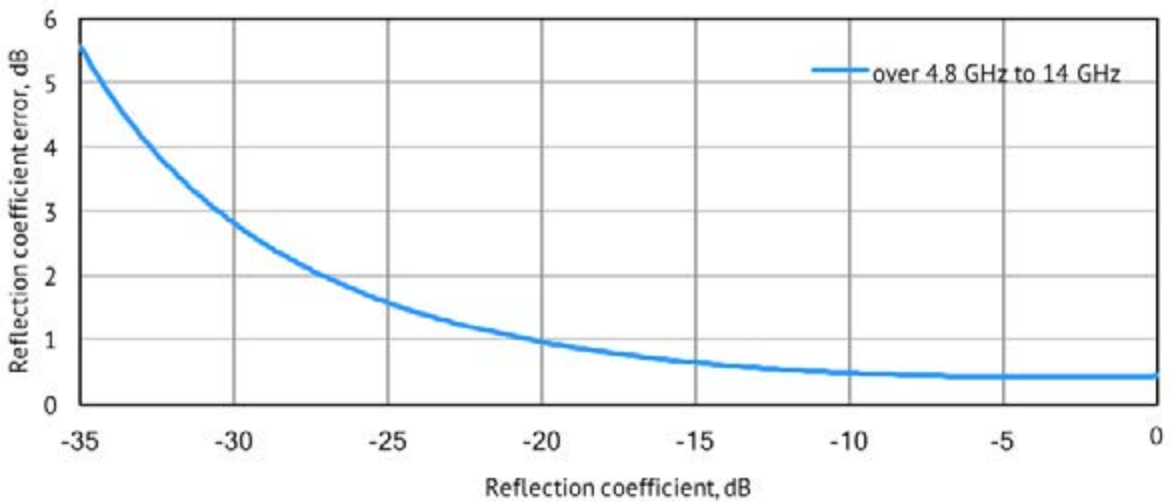
Reflection Magnitude Errors



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



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

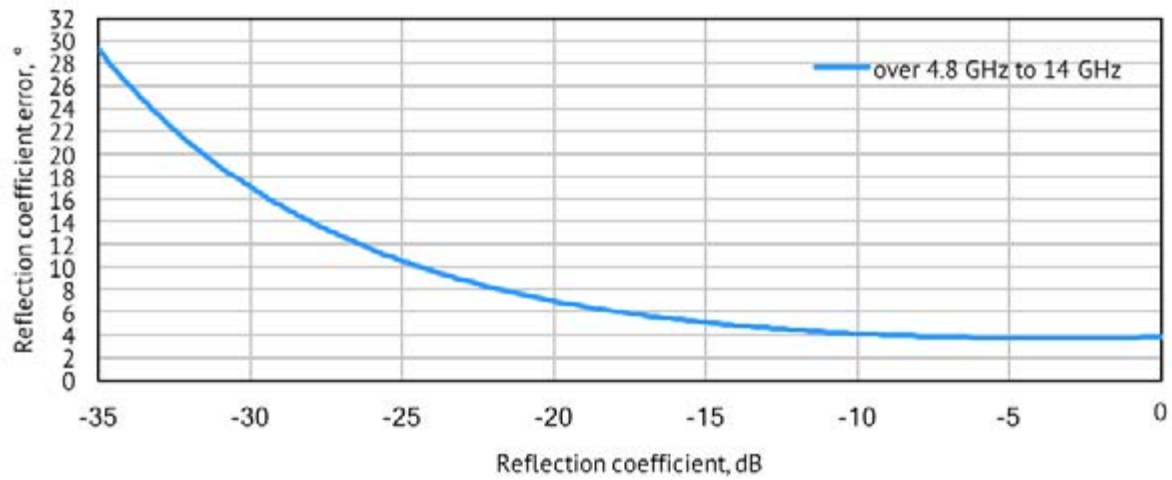


Reflection Accuracy Plots

Reflection Phase Errors



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



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

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.



| | R54 | R60 | R140 | R180 |
|------------------------------|--|--------------------------------|--|---|
| Frequency Range | 85 MHz to 5.4 GHz | 1 MHz to 6 GHz | 85 MHz to 14 GHz | 1 MHz to 18 GHz |
| External frequency reference | No | 10 MHz | 32 MHz | 10 MHz |
| External trigger | No | Input/Output | Input | Input/Output |
| Power connector | USB mini-B | Reinforced (rugged) USB mini-B | USB mini-B | Reinforced (rugged) USB-C or +5V external |
| Adjustable output power | Hi/Low/Off | 0.25 dB steps | Hi/Low/Off | 0.05 dB steps |
| S21, S12 measurements | Scalar, with specialized software (available upon request) | | Scalar, with specialized software (available upon request) | |

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