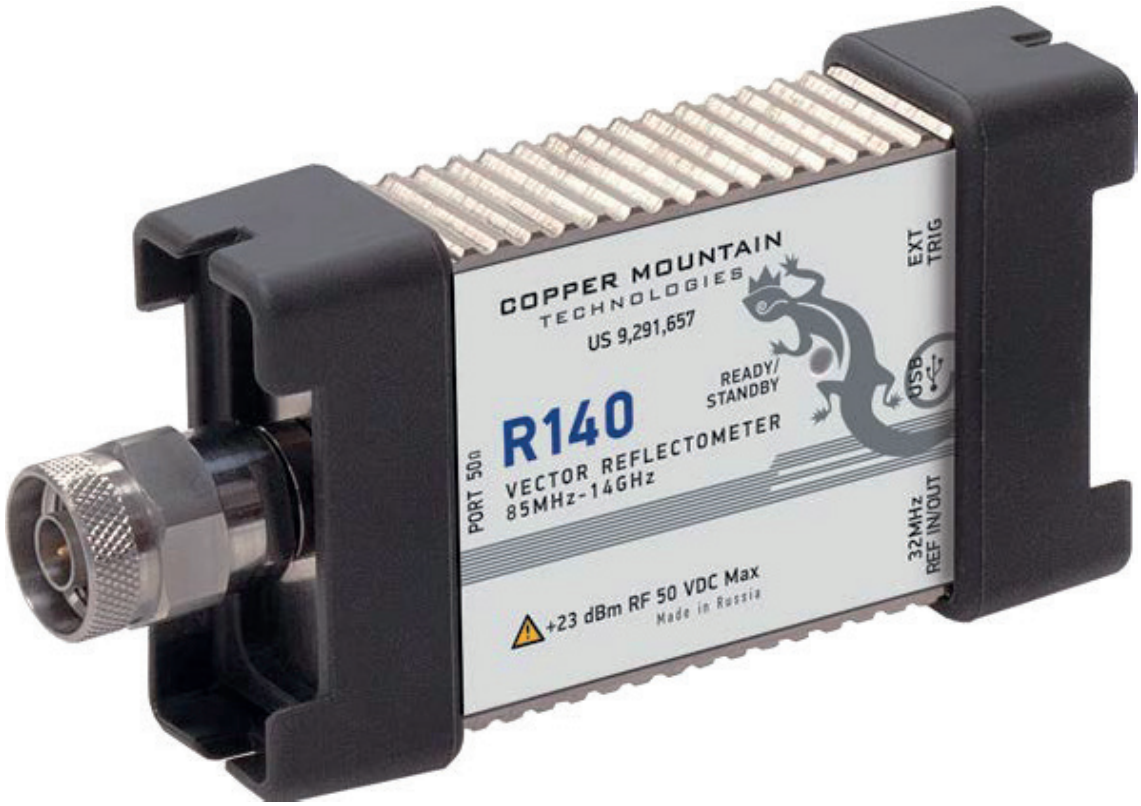
# 1-Port USB VNA - R140

## Extended Specifications

Telemeter Electronic




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

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# Specifications[1]

## 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 range[2]** | |
| 85 MHz to 4.8 GHz | 107 dB typ. |
| 4.8 GHz to 14 GHz | 70 dB typ. |

## Measurement Accuracy[3]

| | |
|---|---|
| **Accuracy of reflection measurements[4]** | Magnitude / Phase |
| 85 MHz to 4.8 GHz | |
| -15 dB to 0 dB | ±0.4 dB / ±4° |
| -25 dB to -15 dB | ±1.2 dB / ±8° |
| -35 dB to -25 dB | ±4.0 dB / ±22° |
| 4.8 GHz to 14 GHz | |
| -15 dB to 0 dB | ±0.5 dB / ±5° |
| -25 dB to -15 dB | ±1.5 dB / ±10° |
| -35 dB to -25 dB | ±5.5 dB / ±30° |
| **Accuracy of transmission magnitude measurements[5]** | 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 magnitude[6]** | |
| 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 |S21| and |S12| using two reflectometers, both being connected to the same USB hub, applies over the temperature range of (23 ± 5) °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 ± 9) °F or (23 ± 5) °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 |S21 | and |S12 | using two devices, both being connected to the same USB hub. [6] IF bandwidth 1 kHz.* 

# Specifications[1]

## 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 |

# Specifications[1]

## 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 |

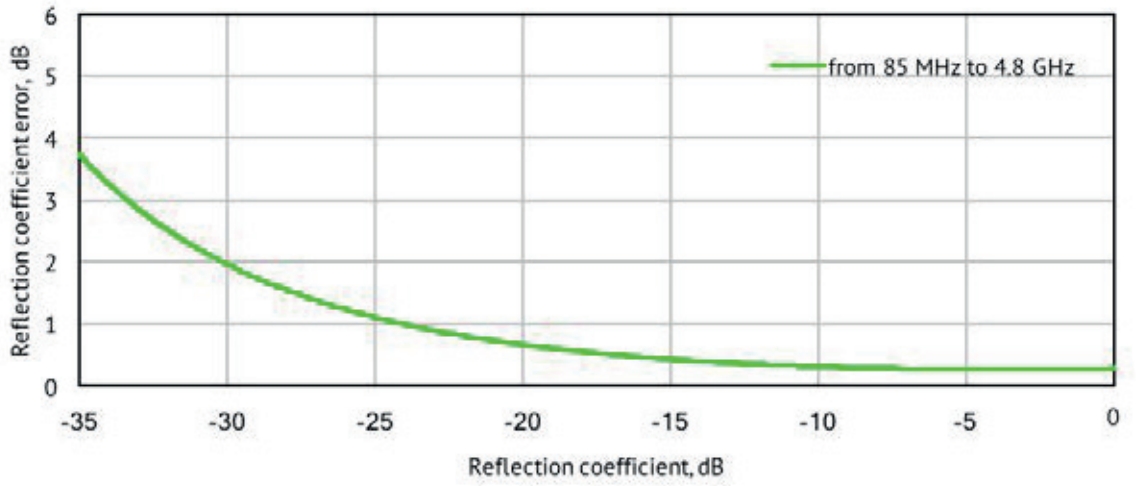
## Environmental Specifications

| | |
|---|---|
| **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 ($S_{21} = S_{12} = 0$)

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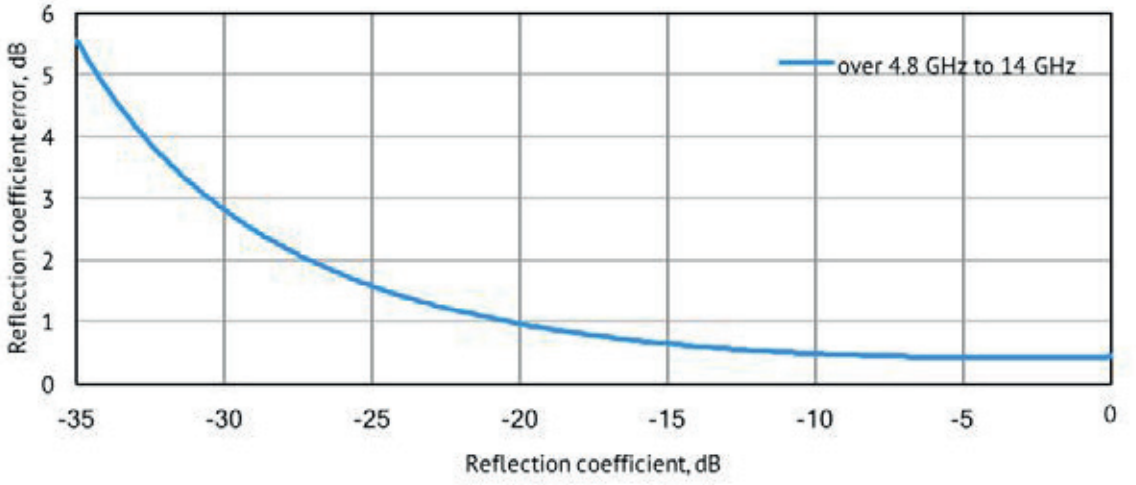
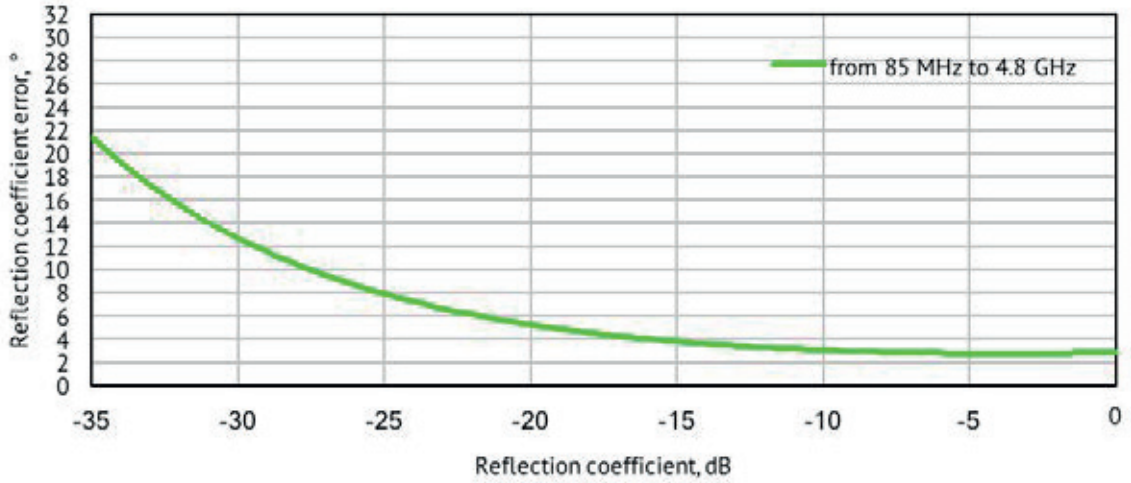
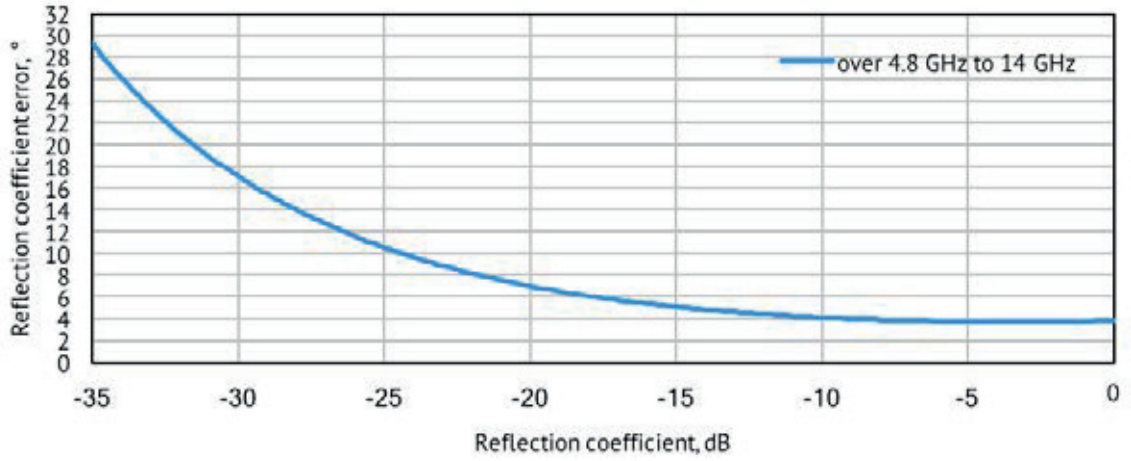


# Reflection Accuracy Plots

### Reflection Phase Errors




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




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