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## Product Datasheet - Technical Specifications

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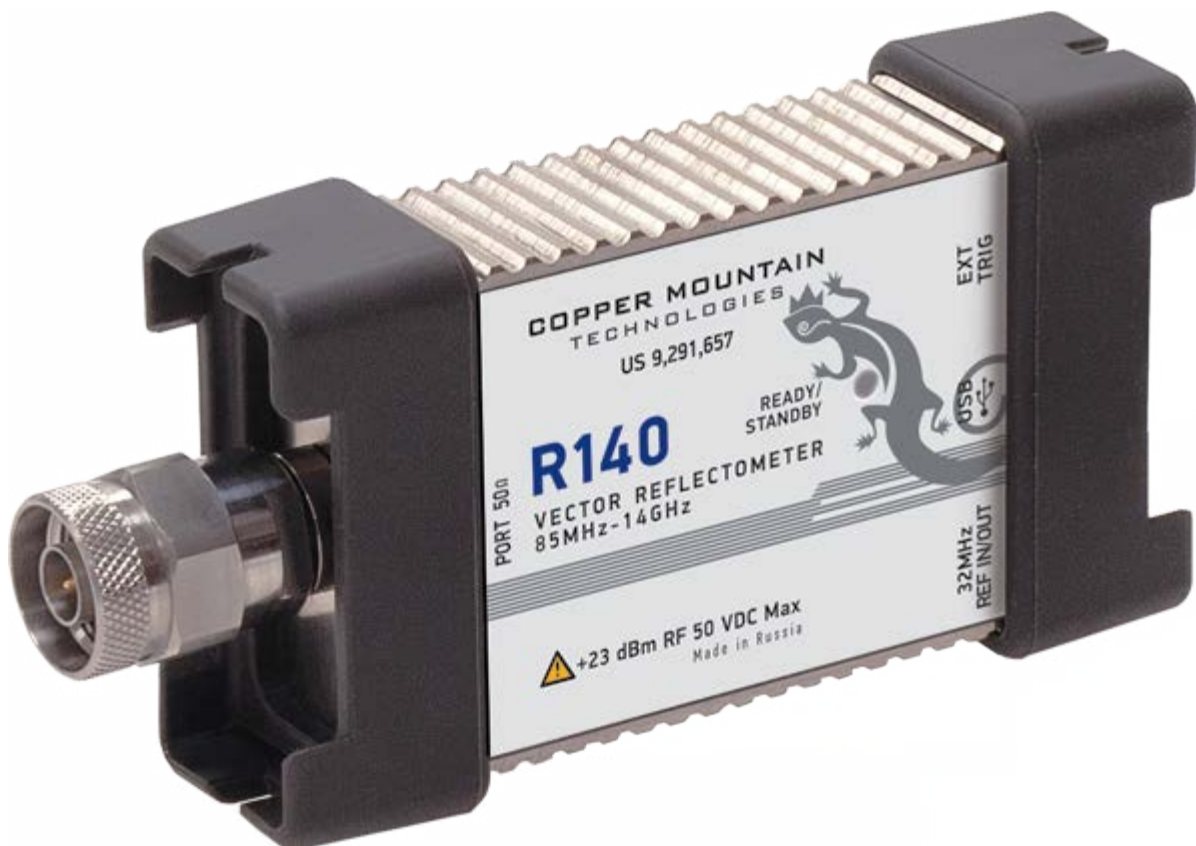
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# 1-Port USB VNA - R140

## Extended Specifications



- **Patent US 9,291,657** - No test cable needed
- **Frequency range:** 85 MHz - 14 GHz
- **Measurement time per point:** 200  $\mu$ 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™**

# Specifications<sup>1</sup>

## 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
<b>Cable loss measurement range</b>	
85 MHz to 4.8 GHz	35 dB
4.8 GHz to 14 GHz	30 dB
<b>Dynamic range<sup>2</sup></b>	
85 MHz to 4.8 GHz	107 dB typ.
4.8 GHz to 14 GHz	70 dB typ.

## Measurement Accuracy<sup>3</sup>

<b>Accuracy of reflection measurements<sup>4</sup></b>	Magnitude / Phase
85 MHz to 4.8 GHz	
-15 dB to 0 dB	$\pm 0.4$ dB / $\pm 4^\circ$
-25 dB to -15 dB	$\pm 1.2$ dB / $\pm 8^\circ$
-35 dB to -25 dB	$\pm 4.0$ dB / $\pm 22^\circ$
4.8 GHz to 14 GHz	
-15 dB to 0 dB	$\pm 0.5$ dB / $\pm 5^\circ$
-25 dB to -15 dB	$\pm 1.5$ dB / $\pm 10^\circ$
-35 dB to -25 dB	$\pm 5.5$ dB / $\pm 30^\circ$
<b>Accuracy of transmission magnitude measurements<sup>5</sup></b>	Magnitude
85 MHz to 4.8 GHz	
-50 dB to 0 dB	$\pm 1$ dB
4.8 GHz to 14 GHz	
-40 dB to 0 dB	$\pm 1$ dB
<b>Trace noise magnitude<sup>6</sup></b>	
85 MHz to 4.8 GHz	0.005 dB rms
4.8 GHz to 14 GHz	0.050 dB rms
<b>Temperature dependence</b>	
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. © Copper Mountain Technologies Rev. 2019Q1

# Specifications<sup>1</sup>

## 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.
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## 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<sup>1</sup>

## 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
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## Dimensions

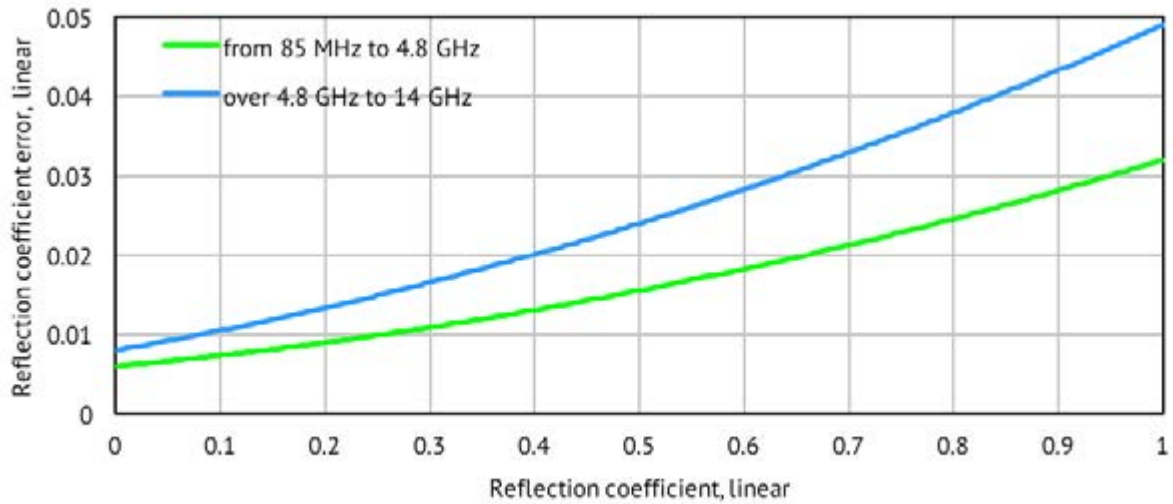
Weight	0.3 kg (10.6 oz)
Length	127 mm
Width	62 mm
Height	30 mm

## Environmental Specifications

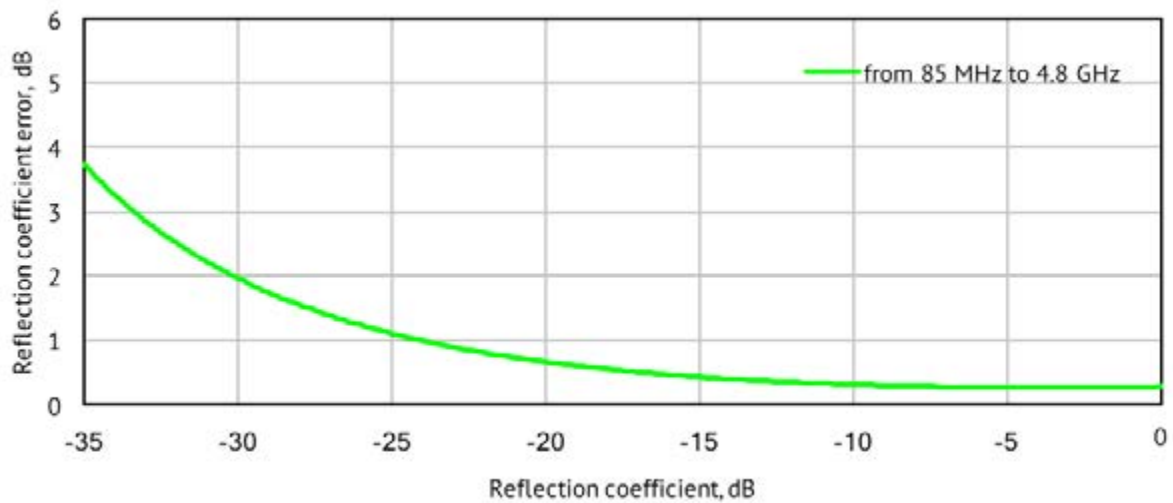
Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Storage temperature	-50 °C to +70 °C (-58 °F to 158 °F)
Humidity	90 % at 25 °C (77 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

# Reflection Accuracy Plots

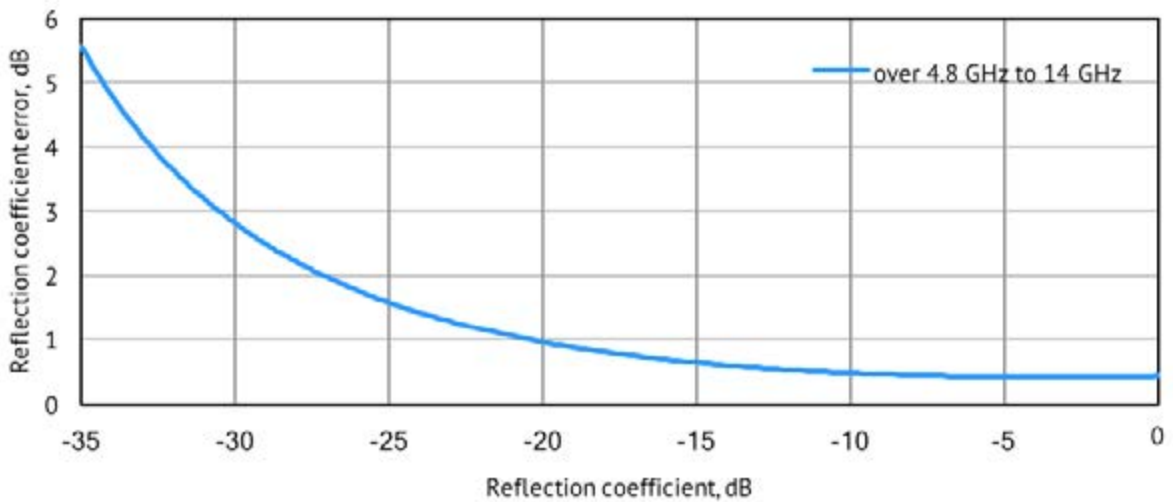
## Reflection Magnitude Errors



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



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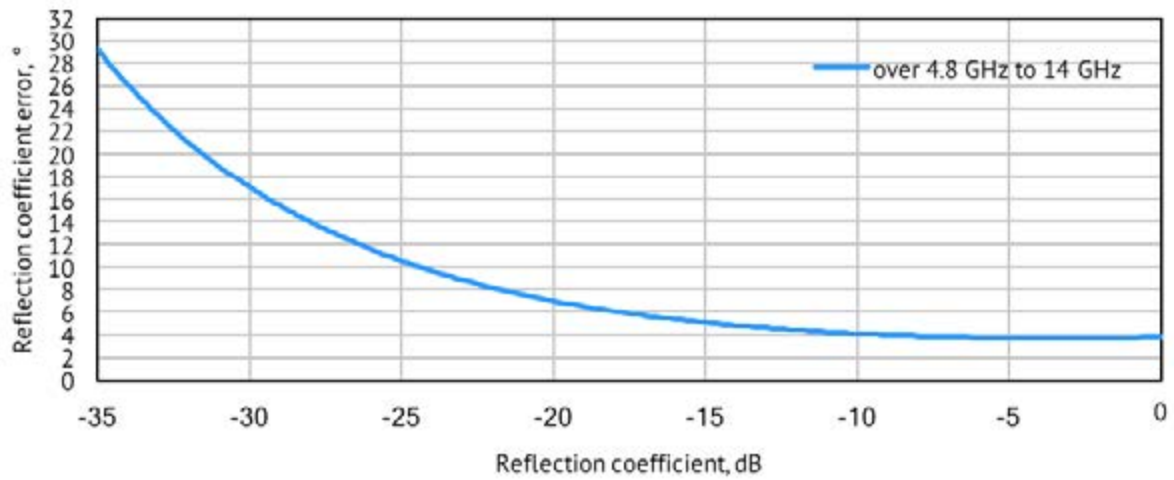


# Reflection Accuracy Plots

## Reflection Phase Errors



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



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

