COPPER MOUNTAIN®
TECHNOLOGIES

COPPER MOUNTAIN
TECHNOLOGIES
US 9,291,657

R140
VECTOR REFLECTOMETER
85MHz-14GHz

PORT 50Ω

READY/
STANDBY

EXT
TRIG

USB

32MHz
REF IN/OUT

⚠ +23 dBm RF 50 VDC Max
Made in Russia
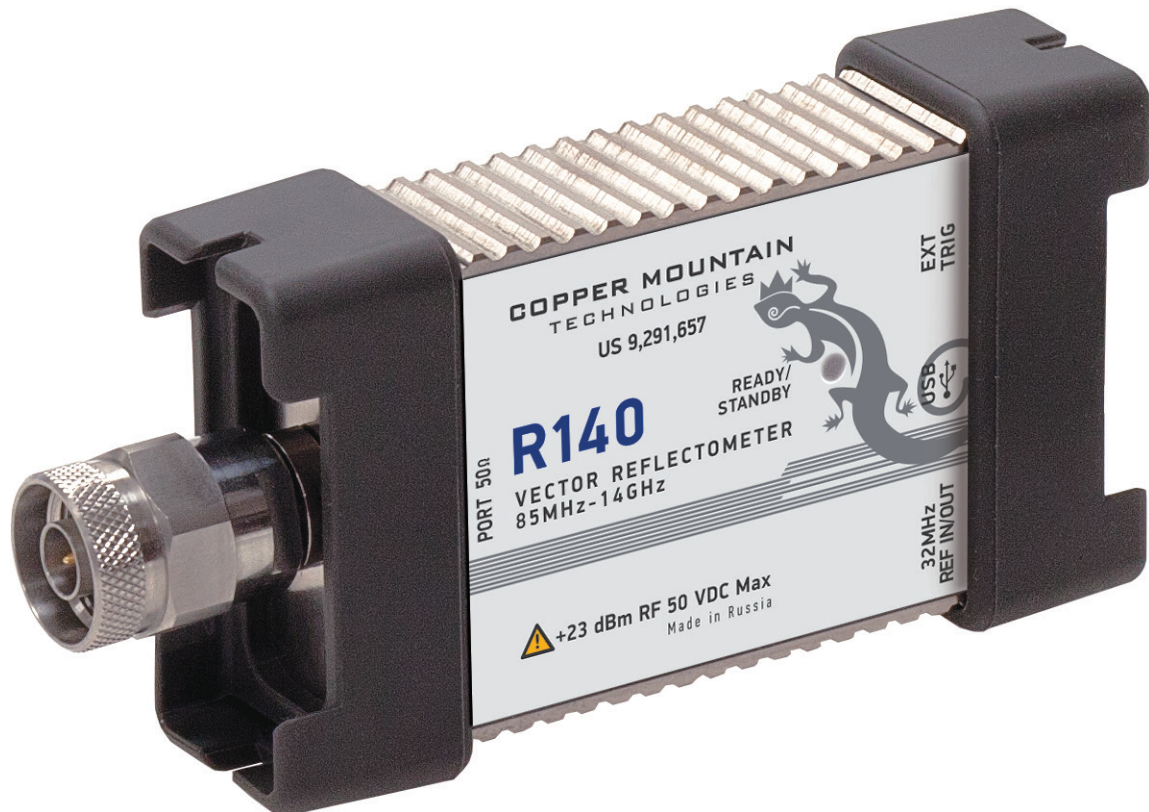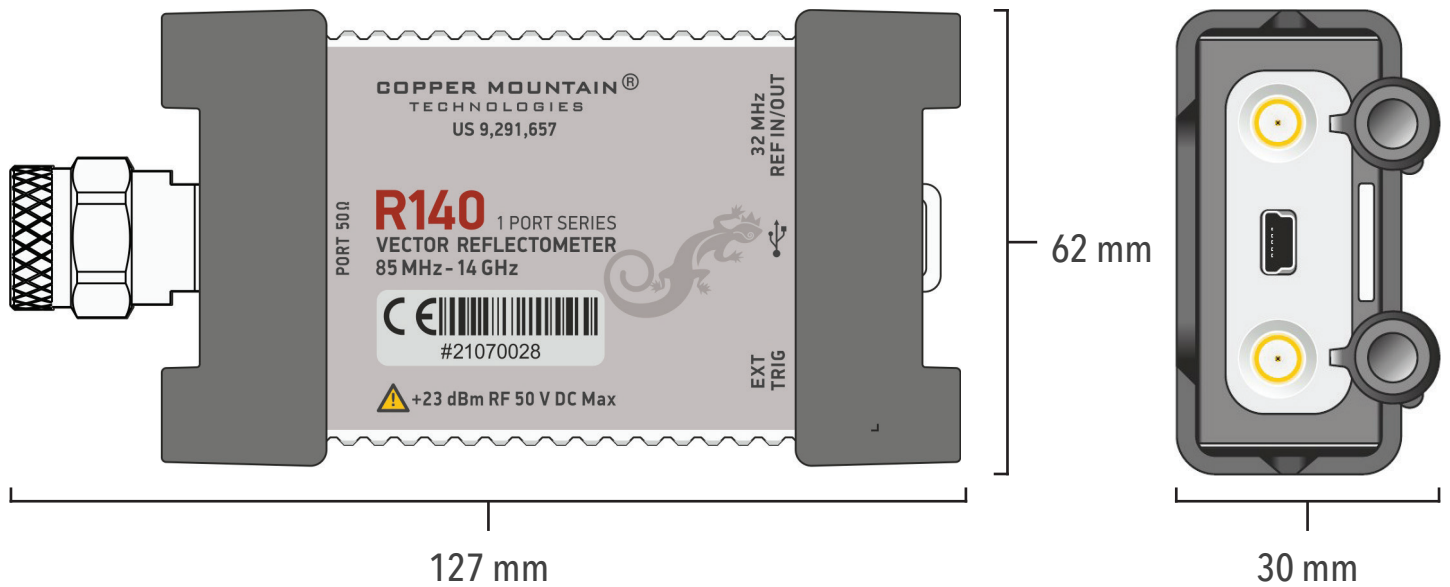
- **Patent US 9,291,657** - No test cable needed

- **Frequency range:** 85 MHz - 14 GHz

- **Measurement time per point:** 200 µs per point, min typ.

- Up to **100,001 measurement points**

- **Automation programming** in LabVIEW, Python, MATLAB, .NET, etc.

- **Time domain and gating** conversion included

R140 Specifications[1]

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PORT 50Ω

R140 1 PORT SERIES
VECTOR REFLECTOMETER
85 MHz – 14 GHz

32 MHz REF IN/OUT

EXT TRIG

CE #21070028

⚠ +23 dBm RF 50 V DC Max

62 mm

127 mm

30 mm

Primary Specifications

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.

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

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

Uncorrected System Performance

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

[1] All specifications subject to change without notice. [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 0 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 1 Hz. [5] Reflection specifications are based on an isolating DUT. [6] Specification applies over frequency range from 1 MHz to 9 GHz, at output power of 0 dBm.

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R140 Specifications[1]

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

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

Factory Adjustment

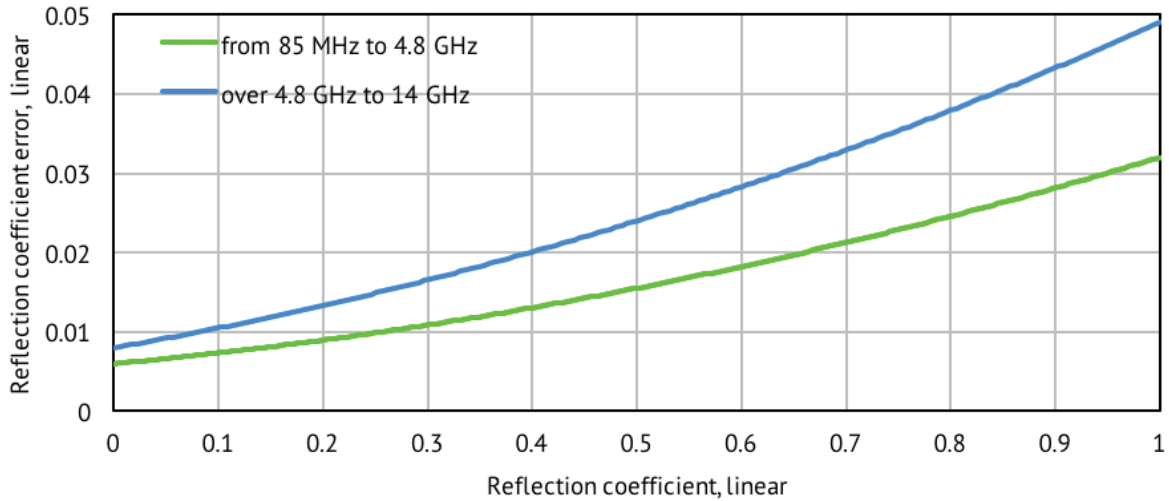| Recommended factory adjustment interval	3 Years

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

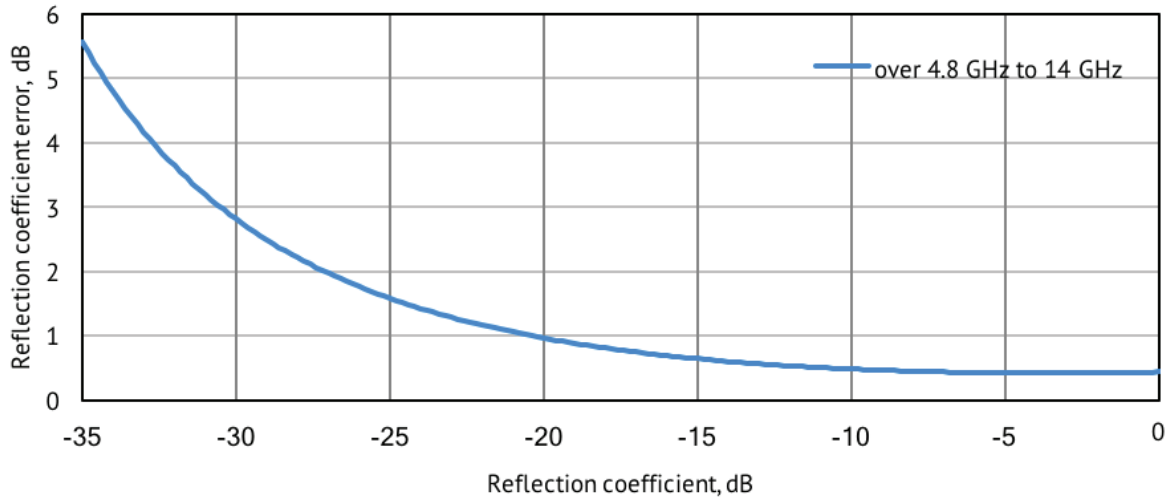# Reflection Accuracy Plots

Reflection Magnitude Errors

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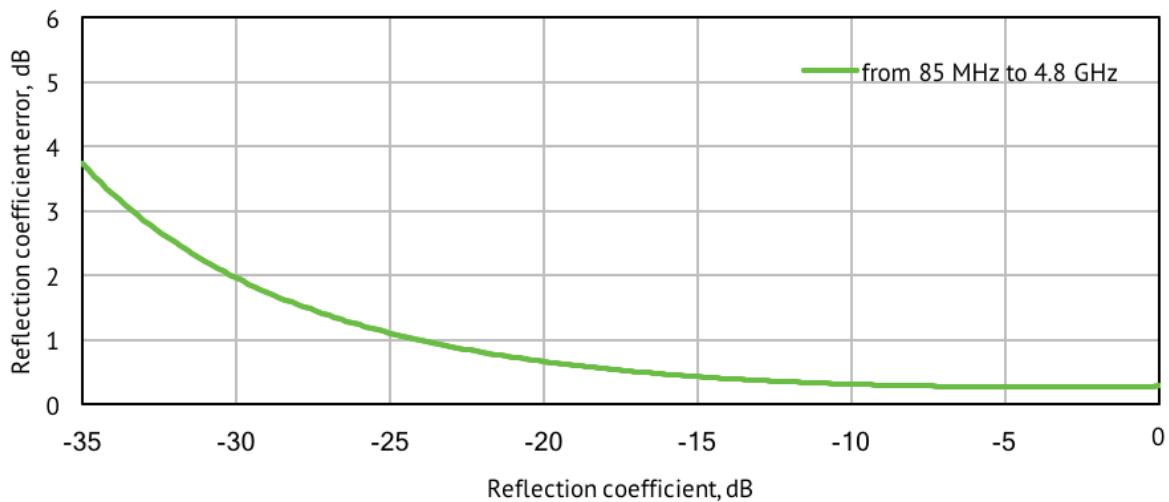
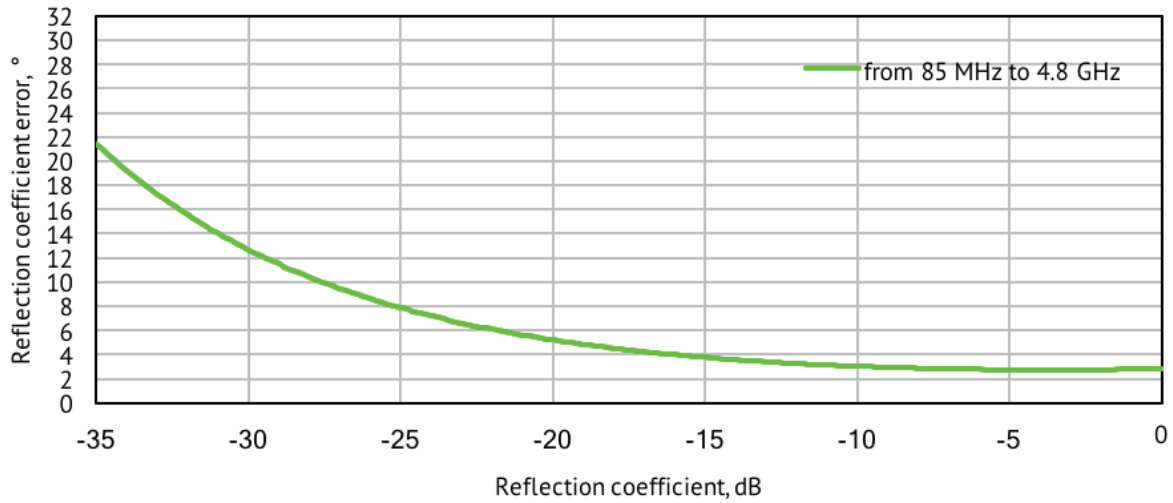Specifications are based on isolating DUT ($S_{21} = S_{12} = 0$)

Reflection Accuracy Plots
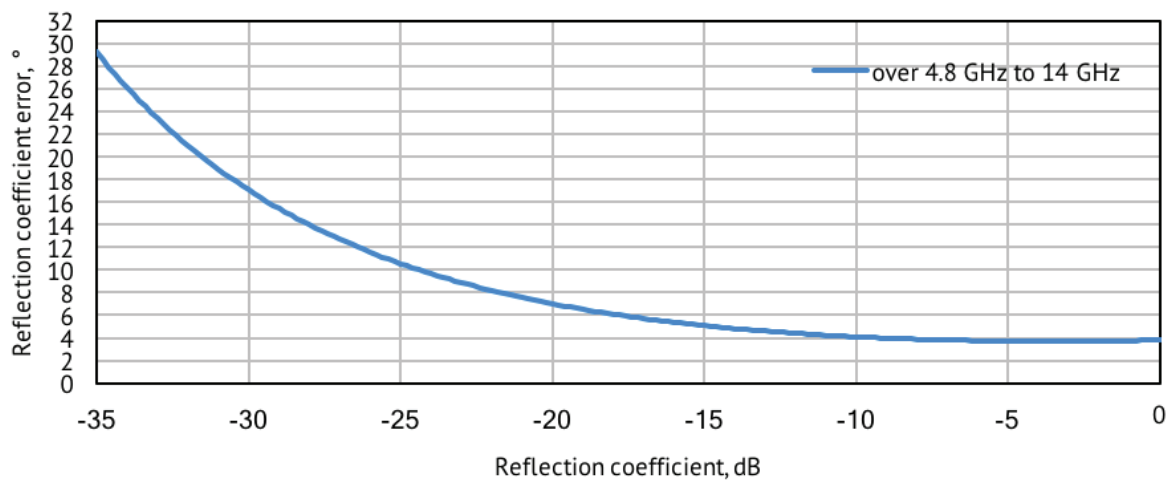
Reflection Magnitude Errors

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 transfered, 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 or Linux 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.

1-Port VNA Series Overview

	R60	R140	R180
Frequency Range	1 MHz to 6 GHz	85 MHz to 14 GHz	1 MHz to 18 GHz
External Frequency Reference	10 MHz	32 MHz	10 MHz
External Trigger	Input/Output	Input	Input/Output
Power Connector	Reinforced (rugged) USB mini-B	USB mini-B	Reinforced (rugged) USB-C or +5V External
Adjustable Output Power	0.25 dB Steps	Hi/Low/Off	0.05 dB Steps

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