

## Product Datasheet - Technical Specifications



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# Value Series



- **Frequency range:** 100 kHz - 9 GHz
- **Wide output power range:** -50 dBm to +5 dBm\*
- **Dynamic range:** 130 dB (10 Hz IF bandwidth) typ.\*
- **Measurement time per point:** 25  $\mu$ s per point, min typ.\*
- **16 logical channels with 16 traces per channel.**

- **Automation programming** in Python, LabVIEW, MATLAB, .NET, etc.
- **Up to 500,001 measurement points**
- **Multiple precision calibration methods** and automatic calibration

*\*Depending on model*

# V0402 Preliminary Specifications<sup>1</sup>

## Primary Specifications<sup>3</sup>

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	2
Frequency range	100 kHz to 4.5 GHz
Full frequency accuracy	$\pm 5 \cdot 10^{-6}$
Frequency resolution	1 Hz
Number of measurement points	2 to 500,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 300 kHz
Dynamic range <sup>2</sup>	
100 kHz to 10 MHz	115 dB
10 MHz to 4.5 GHz	130 dB (135 dB typ.)

## Effective System Data

100 kHz to 4.5 GHz	
Directivity	42 dB
Source match	38 dB
Load match	42 dB
Reflection tracking	$\pm 0.10$ dB
Transmission tracking	$\pm 0.14$ dB

## Test Port Output

Power range	
100 kHz to 4.5 GHz	-50 dBm to +5 dBm
Power accuracy	$\pm 1.5$ dB
Power resolution	0.05 dB
Harmonic distortion <sup>6</sup>	-20 dBc
Non-harmonic spurious <sup>6</sup>	-20 dBc

## Measurement Accuracy

Accuracy of transmission measurements	Magnitude / Phase
100 kHz to 10 MHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-35 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-55 dB to -35 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-75 dB to -55 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
10 MHz to 4.5 GHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-50 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-70 dB to -50 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-90 dB to -70 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
Accuracy of reflection measurements	Magnitude / Phase
-15 dB to 0 dB	$\pm 0.5$ dB / $\pm 4^\circ$
-25 dB to -15 dB	$\pm 1.5$ dB / $\pm 10^\circ$
-35 dB to -25 dB	$\pm 5.5$ dB / $\pm 30^\circ$
Trace noise magnitude (IF bandwidth 3 kHz)	
100 kHz to 10 MHz	0.005 dB rms
10 MHz to 4.5 GHz	0.002 dB rms
Temperature dependence	0.02 dB/°C

## Uncorrected System Performance

100 kHz to 4.5 GHz	
Directivity	15 dB
Source match	15 dB
Load match	15 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  $(73 \pm 9)^\circ\text{F}$  or  $(23 \pm 5)^\circ\text{C}$  after 40 minutes of warming-up, with less than  $1^\circ\text{C}$  deviation from the full two-port calibration temperature, at output power of -5 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. [6] Specification applies over entire frequency range, at output power of 0 dBm.

### Test Port Input

Noise floor	
100 kHz to 10 MHz	-120 dBm/Hz
10 MHz to 4.5 GHz	-135 dBm/Hz
Damage level	+23 dBm
Damage DC voltage	25 V

### Measurement Speed

Time per point	25 $\mu$ s typ.
Port Switchover time	1 ms

### Frequency Reference Input

Port	10 MHz Ref In/Out
External reference frequency	10 MHz
Input level	-1 dBm to 5 dBm
Input impedance	50 Ohm
Connector type	BNC, female

### Frequency Reference Output

Port	10 MHz Ref In/Out
Internal reference frequency	10 MHz
Output reference signal level at 50 Ohm impedance	1 dBm to 5 dBm
Connector type	BNC, female

### Trigger Input

Port	Ext Trig In
Input level	
low threshold voltage	0.8 V
high threshold voltage	2.0 V
Input level range	0 V to +3.3 V
Pulse width	$\geq 2$ $\mu$ s
Polarity	positive or negative
Input impedance	$\geq 5$ kOhm
Connector type	BNC, female

### Trigger Output

Port	Ext Trig Out
Maximum output current	12 mA
Output level	
low threshold voltage	0.0 V
high threshold voltage	3.3 V
Polarity	positive or negative
Connector type	BNC, female

### System & Power

Operating system (min requirements)	Windows 7 and above
CPU	1.5 GHz
RAM	1 GB

### Factory Adjustment

Recommended factory adjustment interval	3 Years
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### Dimensions

Length	297 mm
Width	160 mm
Height	44 mm
Weight	2.3 kg (70.5 oz)

### Environmental Specifications

Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Operating humidity	90 % at 25 °C (77 °F)
Storage temperature	0 °C to +40 °C (32 °F to 104 °F)
Storage humidity	80 % at 35 °C (95 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

# V0602 Preliminary Specifications<sup>1</sup>

## Primary Specifications<sup>3</sup>

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	2
Frequency range	100 kHz to 6.5 GHz
Full frequency accuracy	$\pm 5 \cdot 10^{-6}$
Frequency resolution	1 Hz
Number of measurement points	2 to 500,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 300 kHz
Dynamic range <sup>2</sup>	
100 kHz to 10 MHz	115 dB
10 MHz to 4.5 GHz	130 dB (135 dB typ.)
4.5 GHz to 6.5 GHz	125 dB (130 dB typ.)

## Effective System Data

<b>100 kHz to 6.5 GHz</b>	
Directivity	42 dB
Source match	38 dB
Load match	42 dB
Reflection tracking	$\pm 0.10$ dB
Transmission tracking	$\pm 0.14$ dB

## Test Port Output

<b>Power range</b>	
100 kHz to 6.5 GHz	-50 dBm to +5 dBm
Power accuracy	$\pm 1.5$ dB
Power resolution	0.05 dB
Harmonic distortion <sup>6</sup>	-20 dBc
Non-harmonic spurious <sup>6</sup>	-20 dBc

## Measurement Accuracy

<b>Accuracy of transmission measurements</b>	Magnitude / Phase
100 kHz to 10 MHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-35 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-55 dB to -35 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-75 dB to -55 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
10 MHz to 4.5 GHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-50 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-70 dB to -50 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-90 dB to -70 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
4.5 MHz to 6.5 GHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-45 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-65 dB to -45 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-85 dB to -65 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
<b>Accuracy of reflection measurements</b>	Magnitude / Phase
-15 dB to 0 dB	$\pm 0.5$ dB / $\pm 4^\circ$
-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>Trace noise magnitude (IF bandwidth 3 kHz)</b>	
100 kHz to 10 MHz	0.005 dB rms
10 MHz to 4.5 GHz	0.002 dB rms
4.5 GHz to 6.5 GHz	0.004 dB rms
<b>Temperature dependence</b>	0.02 dB/°C

## Uncorrected System Performance

<b>100 kHz to 6.5 GHz</b>	
Directivity	15 dB
Source match	15 dB
Load match	15 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  $(73 \pm 9)^\circ\text{F}$  or  $(23 \pm 5)^\circ\text{C}$  after 40 minutes of warming-up, with less than  $1^\circ\text{C}$  deviation from the full two-port calibration temperature, at output power of -5 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. [6] Specification applies over entire frequency range, at output power of 0 dBm.

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## Test Port Input

Noise floor	
100 kHz to 10 MHz	-120 dBm/Hz
10 MHz to 4.5 GHz	-135 dBm/Hz
4.5 GHz to 6.5 GHz	-130 dBm/Hz
Damage level	+23 dBm
Damage DC voltage	25 V

## Measurement Speed

Time per point	25 $\mu$ s typ.
Port Switchover time	1 ms

## Frequency Reference Input

Port	10 MHz Ref In/Out
External reference frequency	10 MHz
Input level	-1 dBm to 5 dBm
Input impedance	50 Ohm
Connector type	BNC, female

## Frequency Reference Output

Port	10 MHz Ref In/Out
Internal reference frequency	10 MHz
Output reference signal level at 50 Ohm impedance	1 dBm to 5 dBm
Connector type	BNC, female

## Trigger Input

Port	Ext Trig In
Input level	
low threshold voltage	0.8 V
high threshold voltage	2.0 V
Input level range	0 V to +3.3 V
Pulse width	$\geq 2 \mu$ s
Polarity	positive or negative
Input impedance	$\geq 5$ kOhm
Connector type	BNC, female

## Trigger Output

Port	Ext Trig Out
Maximum output current	12 mA
Output level	
low threshold voltage	0.0 V
high threshold voltage	3.3 V
Polarity	positive or negative
Connector type	BNC, female

## System & Power

Operating system (min requirements)	Windows 7 and above
CPU	1.5 GHz
RAM	1 GB

## Factory Adjustment

Recommended factory adjustment interval	3 Years
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## Dimensions

Length	297 mm
Width	160 mm
Height	44 mm
Weight	2.3 kg (70.5 oz)

## Environmental Specifications

Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Operating humidity	90 % at 25 °C (77 °F)
Storage temperature	0 °C to +40 °C (32 °F to 104 °F)
Storage humidity	80 % at 35 °C (95 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

# V0902 Preliminary Specifications<sup>1</sup>

## Primary Specifications<sup>3</sup>

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	2
Frequency range	100 kHz to 9 GHz
Full frequency accuracy	$\pm 5 \cdot 10^{-6}$
Frequency resolution	1 Hz
Number of measurement points	2 to 500,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 300 kHz
Dynamic range <sup>2</sup>	
100 kHz to 10 MHz	115 dB
10 MHz to 4.5 GHz	130 dB (135 dB typ.)
4.5 GHz to 6.5 GHz	125 dB (130 dB typ.)
6.5 GHz to 9.0 GHz	123 dB (130 dB typ.)

## Effective System Data

100 kHz to 9 GHz	
Directivity	42 dB
Source match	38 dB
Load match	42 dB
Reflection tracking	$\pm 0.10$ dB
Transmission tracking	$\pm 0.14$ dB

## Test Port Output

Power range	
100 kHz to 6.5 GHz	-50 dBm to +5 dBm
6.5 GHz to 9GHz	-50 dBm to +3 dBm
Power accuracy	$\pm 1.5$ dB
Power resolution	0.05 dB
Harmonic distortion <sup>6</sup>	-20 dBc
Non-harmonic spurious <sup>6</sup>	-20 dBc

## Measurement Accuracy

Accuracy of transmission measurements	Magnitude / Phase
100 kHz to 10 MHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-35 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-55 dB to -35 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-75 dB to -55 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
10 MHz to 4.5 GHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-50 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-70 dB to -50 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-90 dB to -70 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
4.5 MHz to 9 GHz	
0 dB to +10 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-45 dB to 0 dB	$\pm 0.15$ dB / $\pm 1.5^\circ$
-65 dB to -45 dB	$\pm 0.25$ dB / $\pm 2.5^\circ$
-85 dB to -65 dB	$\pm 1.1$ dB / $\pm 7.5^\circ$
Accuracy of reflection measurements	Magnitude / Phase
-15 dB to 0 dB	$\pm 0.5$ dB / $\pm 4^\circ$
-25 dB to -15 dB	$\pm 1.5$ dB / $\pm 10^\circ$
-35 dB to -25 dB	$\pm 5.5$ dB / $\pm 30^\circ$
Trace noise magnitude (IF bandwidth 3 kHz)	
100 kHz to 10 MHz	0.005 dB rms
10 MHz to 4.5 GHz	0.002 dB rms
4.5 GHz to 9 GHz	0.004 dB rms
Temperature dependence	0.02 dB/°C

## Uncorrected System Performance

100 kHz to 6.5 GHz	
Directivity	15 dB
Source match	15 dB
Load match	15 dB
6.5 GHz to 9 GHz	
Directivity	12 dB
Source match	12 dB
Load match	12 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  $\pm$  9) °F or (23  $\pm$  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 -5 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. [6] Specification applies over entire frequency range, at output power of 0 dBm.

## Test Port Input

Noise floor	
100 kHz to 10 MHz	-120 dBm/Hz
10 MHz to 4.5 GHz	-135 dBm/Hz
4.5 GHz to 9 GHz	-130 dBm/Hz
Damage level	+23 dBm
Damage DC voltage	25 V

## Measurement Speed

Time per point	25 $\mu$ s typ.
Port Switchover time	1 ms

## Frequency Reference Input

Port	10 MHz Ref In/Out
External reference frequency	10 MHz
Input level	-1 dBm to 5 dBm
Input impedance	50 Ohm
Connector type	BNC, female

## Frequency Reference Output

Port	10 MHz Ref In/Out
Internal reference frequency	10 MHz
Output reference signal level at 50 Ohm impedance	1 dBm to 5 dBm
Connector type	BNC, female

## Trigger Input

Port	Ext Trig In
Input level	
low threshold voltage	0.8 V
high threshold voltage	2.0 V
Input level range	0 V to +3.3 V
Pulse width	$\geq 2 \mu$ s
Polarity	positive or negative
Input impedance	$\geq 5$ kOhm
Connector type	BNC, female

## Trigger Output

Port	Ext Trig Out
Maximum output current	12 mA
Output level	
low threshold voltage	0.0 V
high threshold voltage	3.3 V
Polarity	positive or negative
Connector type	BNC, female

## System & Power

Operating system (min requirements)	Windows 7 and above
CPU	1.5 GHz
RAM	1 GB

## Factory Adjustment

Recommended factory adjustment interval	3 Years
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## Dimensions

Length	297 mm
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Storage humidity	80 % at 35 °C (95 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa





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 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.

