



Calibration Certificate

ISO/IEC 17025:2005 and ANSI/NCSL Z540.1-1994

Certificate Number: CMT-12095196-1579-0012



AT-XXXX

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Description: Vector Network Analyzer
Model: PLANAR-804/1
Serial Number: 12095176
Manufacturer: Copper Mountain Technologies

Customer:
 Customer Name
 Address
 State-Zip
 Country

Date of Receipt: 10 May 2016
Date of Calibration: 10 May 2016
Procedure: QMS.CAL.01
Temperature: 24.59 °C
Humidity: 37 %

Location of Calibration:
 Copper Mountain Technologies
 630 East New York Street
 Indianapolis, IN 46202
 USA

This calibration certificate documents that the instrument has been calibrated using applicable procedures and in compliance with ISO/IEC 17025:2005 and ANSI/NCSL Z540.1-1994 (R2002).

As Received Condition:

The measured values of the instrument were observed IN SPECIFICATION at the points tested.

Action Taken:

No corrective actions were necessary to ensure the performance to published operating specifications.

As Shipped Condition:

At the completion of the calibration, measured values were IN SPECIFICATION at the points tested.

No sampling plan or other process was used for this calibration, the results reported herein apply only to the calibration of the instrument describe above. All calibrations are performed to manufacturer's specifications, unless otherwise noted. This certificate may contain data that is not covered by the ANAB scope of accreditation. The unaccredited material, where applicable, is indicated by an asterisk (*) or confined to clearly marked sections. This certificate shall not be reproduced except in full, without the approval of Copper Mountain Technologies.

Based on the customer's request, the next calibration is due on 10 May 2017.

Authorized by:

Technician
Senior Technician



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Compliance with Specification:

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. The uncertainty is accounted for in the determination of the test limits for compliance to specification. If the manufacturer has a specified tolerance for this instrument, then the calibration results, within our uncertainty value added, are compared to this tolerance, and the combined value is compared to the tolerance.

Traceability Information:

Measurements are traceable to the International System of Units (SI) via national metrology institutes (i.e. NIST, NPL, PTB, SNIIM, etc.) that are signatories to the CIPM Mutual Recognition Arrangement.

Calibration Equipment Used:

Type	Model	Description	Serial Number	Certificate Number	Cal Due	Trace Value
W	53181A	Frequency Counter	MY4000952	TME-29781	22 Feb 2017	Frequency
W	E4407B	Spectrum Analyzer	44210601	151201-080518-b10ec4_r1	14 Dec 2016	Frequency
W	NRP-Z51	RF Power Sensor	103288	TME-29775	22 Feb 2017	RF Power
W	05CK10-150	Calibration Kit	CL005	4-246	13 April 2017	Reflection Transmission
W, R	05S122-100	Attenuator 20 dB	15746	4-247	13 April 2017	Reflection Transmission
W, R	NKZ-18-11	Port	2215060001	4-247	13 April 2017	Reflection

W – Working Standard: measurement standard that is used routinely to calibrate or verify measuring instruments or measuring systems (JCGM 200:2012 VIM3).

R – Reference Standard: measurement standard designated for the calibration of other measurement standards for quantities of a given kind in a given organization or at a given location (JCGM 200:2012 VIM3).



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Test Summary

Environmental Conditions			
Temperature:	24.59 °C	Humidity:	37 %

Description	Lower limit	Measured value	Upper limit	MU	Result
Visual inspection	-		-	-	PASS
Gaging connectors *					
Port 1	5.18 mm	5.26 mm	5.26 mm	-	PASS
Port 2	5.18 mm	5.26 mm	5.26 mm	-	PASS
CW frequency accuracy:					
0.3 MHz	299998.5 Hz	300001.5 Hz	300001.5 Hz	±0.03 Hz	PASS
8000 MHz	7999960000 Hz	8000040000 Hz	8000040000 Hz	±800 Hz	PASS
Output power level accuracy	-1.5 dB	0.25 dB	1.5 dB	±0.15 dB	PASS
Harmonic distortion *	-	-28.9 dBc	-25 dBc	-	PASS
Non-harmonic spurious	-	-40.0 dBc	-30 dBc	-	PASS
Receiver Noise Floor (10 Hz bandwidth):					
100 kHz to 300 kHz	-	-127.5 dBm	-105.0 dBm	-	PASS
300 kHz to 8 GHz	-	-126.3 dBm	-125.0 dBm	-	PASS
Trace Noise *:					
100 kHz to 300 kHz	-	0.00451 dB	0.010 dB	-	PASS
300 kHz to 8 GHz	-	0.00057 dB	0.001 dB	-	PASS
Uncorrected parameters:					
Directivity					
100 kHz to 300 kHz	15.0 dB	16.8 dB	-	±0.22 dB	PASS
300 kHz to 8 GHz	18.0 dB	21.7 dB	-	±0.38 dB	PASS
Source match	18.0 dB	19.1 dB	-	±0.28 dB	PASS
Load match	18.0 dB	19.0 dB	-	±0.28 dB	PASS



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Description	Lower limit	Measured value	Upper limit	Uncertainty	Result
Transmission coefficient magnitude error: -40 dB 100 kHz to 300 kHz	-0.2 dB	-0.02 dB	0.2 dB	±0.05 dB	PASS
300 kHz to 8 GHz	-0.1 dB	-0.01 dB	0.1 dB	±0.05 dB	PASS
-60 dB 100 kHz to 300 kHz	-1.0 dB	-0.08 dB	1.0 dB	±0.05 dB	PASS
300 kHz to 8 GHz	-0.2 dB	-0.09 dB	0.2 dB	±0.05 dB	PASS
Transmission coefficient phase error: -40 dB 100 kHz to 300 kHz	-2.00°	-0.22°	2.00°	±0.53°	PASS
300 kHz to 8 GHz	-1.00°	0.38°	1.00°	±0.53°	PASS
-60 dB 100 kHz to 300 kHz	-6.00°	-0.52°	6.00°	±0.53°	PASS
300 kHz to 8 GHz	-2.00°	-0.46°	2.00°	±0.53°	PASS
Reflection coefficient magnitude error: High reflection	0.400 dB	0.017 dB	0.400 dB	±0.086 dB	PASS
Low reflection	3.000 dB	-0.109 dB	3.000 dB	±1.266 dB	PASS
Reflection coefficient phase error: High reflection	-3.00°	0.16°	3.00°	±0.56°	PASS
Low reflection	-20.00°	0.66°	20.00°	±6.22°	PASS



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PLANAR 804/1

Serial Number: 12095176

Date: 10 May 2016

PASS

Visual Inspection

Test standards and required equipment				
Model	Description	Serial Number	Certificate Number	Condue
No traceable test standards or equipment are required for this test				

Description	Statement of compliance	Result
The connectors do not have any mechanical damage	YES	PASS
There are no deep scratches or dents in the analyzer housing	YES	
There is no sound in the housing due to loose components	YES	
The label markings are legible	YES	

SAMPLE



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PLANAR 804/1

Serial Number: 12095176

Date: 10 May 2016

PASS

Gaging Connectors

Test standards and required equipment				
Model	Description	Serial Number	Certificate Number	Expiry Date
No traceable test standards or equipment are required for this test				

Port	Lower limit [mm]	Measured value [mm]	Upper limit [mm]	Result
PORT 1 50Ω type N, female	5.18	5.26	5.26	PASS
PORT 2 50Ω type N, female	5.18	5.26	5.26	PASS

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PLANAR 804/1

Serial Number: 12095176

Date: 10 May 2016

PASS

Frequency Accuracy

Test standards and required equipment				
Model	Description	Serial Number	Certificate Number	Cal Due
53181A	Frequency Counter	MY40001952	TME-29781	22 Feb 2017
E4407B	Spectrum Analyzer	SC4210601	151001-0805- b11021	14 Dec 2016

Port	Frequency [MHz]	Lower limit [Hz]	Measurement value [Hz]	Upper limit [Hz]	Measurement Uncertainty [Hz]	Result
1	0.3	299998.5	300000	300001.5	±0.03	PASS
1	8000	79995000	800005792.0	800040000	±800	PASS

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PLANAR 804/1

Serial Number: 12095176

Date: 10 May 2016

PASS

RF Output Level Accuracy

Test standards and required equipment				
Model	Description	Serial Number	Certificate Number	Cal Due
NRP-Z51	Thermal Power Sensor	107188	TME-29715	22 Feb 2017

Port	RF Output Level [dBm]	Max Power Error [dB]	Specification [dB]	Measurement Uncertainty [dB]	Result
1	0	-0.04	±1.5	±0.15	PASS
1	10	0.11	±1.5	±0.15	PASS
1	5	-0.04	±1.5	±0.15	PASS
1	-10	-0.05	±1.5	±0.15	PASS
1	-55	0.23	±3.0	-	PASS *
1	-60	0.06	±1.5	-	PASS *
2	0	0.11	±1.5	±0.15	PASS
2	10	0.25	±1.5	±0.15	PASS
2	5	0.11	±1.5	±0.15	PASS
2	-10	0.11	±1.5	±0.15	PASS
2	-55	-0.14	±3.0	-	PASS *
2	-60	0.15	±1.5	-	PASS *