



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Copper Mountain Technologies
631 East New York Street
Indianapolis IN 46202

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 01 July 2022

Certificate Number: AC-2060



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
AND ANSI/NCSL Z540-1-1994 (R2002)**

Copper Mountain Technologies

631 East New York Street
Indianapolis, IN 46202
Kevin Crowe 317-222-5400
Kevin.c@coppermountaintech.com

CALIBRATION

Valid to: **July 1, 2022**

Certificate Number: **AC-2060**

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
RF Absolute Power – Measure ²	0 dBm		Thermal Power Sensors R&S NRP-Z51 R&S NRP-Z52 R&S NRP110T
	DC to 33 GHz	0.10 dB + M	
	(33 to 54) GHz	0.25 dB + M	
	(-20 to +20) dBm		
	DC to 33 GHz	0.15 dB + M	
	(33 to 54) GHz	0.30 dB + M	

Electrical – RF/Microwave

Parameter/ Equipment	Reflection Magnitude ¹			
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220ET, S5243ET, FET1854ET Calibration Kits: 03CK010-150, 05CK010-150, 08CK010-150, 09CK010-150			
Range	Expanded Uncertainty of Measurement (+/-)			
Frequency	Measured VRC Magnitude (Linear)			
	0.0 to ≤0.4	> 0.4 to ≤0.6	> 0.6 to ≤0.8	> 0.8 to ≤1.0
(DC to 10) GHz	0.004	0.005	0.006	0.008
(10 to 33) GHz	0.006	0.007	0.009	0.012
(33 to 50) GHz	0.009	0.011	0.014	0.019
(50 to 54) GHz	0.016	0.018	0.022	0.027

Electrical – RF/Microwave

Parameter/ Equipment	Reflection Phase				
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220ET, S5243ET, FET1854ET Calibration Kits: 03CK010-150, 05CK010-150, 08CK010-150, 09CK010-150				
Range	Expanded Uncertainty of Measurement (+/-)				
Frequency	Measured VRC Magnitude (Degrees)				
	(0.01 to 0.02)	(0.02 to 0.05)	(0.05 to 0.10)	(0.10 to 0.20)	(0.20 to 1.00)
(DC to 10) GHz	10 °	4 °	2 °	1 °	0.5 °
(10 to 33) GHz	15 °	6 °	3 °	2 °	1 °
(33 to 50) GHz	26 °	10 °	5 °	2.5 °	1.5 °
(50 to 54) GHz	–	19 °	10 °	5 °	2 °

Electrical – RF/Microwave

Parameter/ Equipment	Transmission Magnitude						
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220ET, S5243ET, FET1854ET Calibration Kits: 03CK010-150, 05CK010-150, 08CK010-150, 09CK010-150						
Range	Expanded Uncertainty of Measurement (+/-)						
Frequency	Measured VRC Magnitude (dB)						
	0	10	20	30	40	50	60
(DC to 20) GHz	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB
(20 to 44) GHz	0.10 dB	0.10 dB	0.10 dB	0.10 dB	0.10 dB	0.10 dB	0.10 dB
(44 to 50) GHz	0.11 dB	0.11 dB	0.11 dB	0.11 dB	0.11 dB	0.11 dB	0.15 dB
(50 to 54) GHz	0.15 dB	0.15 dB	0.15 dB	0.15 dB	0.15 dB	0.15 dB	0.17 dB

Electrical – RF/Microwave

Parameter/ Equipment	Transmission Phase						
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220ET, S5243ET, FET1854ET Calibration Kits: 03CK010-150, 05CK010-150, 08CK010-150, 09CK010-150						
Range	Expanded Uncertainty of Measurement (+/-)						
Frequency	Measured VRC Magnitude (Degrees)						
	0	10	20	30	40	50	60
(DC to 20) GHz	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °
(20 to 44) GHz	1 °	1 °	1 °	1 °	1 °	1 °	1 °
(44 to 50) GHz	1.1 °	1.1 °	1.1 °	1.1 °	1.1 °	1.1 °	1.5 °
(50 to 54) GHz	1.5 °	1.5 °	1.5 °	1.5 °	1.5 °	1.5 °	1.7 °


Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency - Source	10 MHz	130 nHz/Hz	Agilent 53181A, opt. 010 Counter
Frequency - Measure	1 Hz to 60 GHz	100 nHz/Hz	Frequency counter: 53181A, opt. 010, Spectrum Analyzer: E4407B, Harmonic Mixers: 11970A, 11970U

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. Unitless linear measure.
2. M – Match between Standard and UUT.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2060.



R. Douglas Leonard Jr., VP, PILR SBU