CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Copper Mountain Technologies
631 East New York Street
Indianapolis, IN 46202
(and the satellite location listed on the scope)

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.

Jason Stine, Vice President

Expiry Date: 01 July 2026

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
Joshua Arvin 317-222-5400
joshua.a@coppermountaintech.com

CALIBRATION

ISO/IEC 17025 Accreditation Granted: 01 **July 2024**

Certificate Number: **AC-2060** Certificate Expiry Date: **01 July 2026**

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
RF Absolute Power – Measure [2, 3]	0 dBm DC to 33 GHz (33 to 54) GHz (-20 to +20) dBm DC to 33 GHz (33 to 54) GHz	 0.1 dB + M 0.25 dB + M 0.15 dB + M 0.3 dB + M	Thermal Power Sensors: R&S NRP-Z51 R&S NRP-Z52 R&S NRP110T

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 to ≤ 0.4	> 0.4 to ≤ 0.6	> 0.6 to ≤ 0.8	> 0.8 to ≤ 1
(DC to 10) GHz [3]	0.004	0.005	0.006	0.008

1899 L Street NW, Suite 1100-A, Washington, DC 20036
414-501-5494
www.anab.org

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 to ≤ 0.4	> 0.4 to ≤ 0.6	> 0.6 to ≤ 0.8	> 0.8 to ≤ 1
(10 to 33) GHz [3]	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 0.1)	(0.1 to 0.2)	(0.2 to 1)
(DC to 10) GHz [3]	10 °	4 °	2 °	1 °	0.5 °
(10 to 33) GHz [3]	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

1899 L Street NW, Suite 1100-A, Washington, DC 20036
414-501-5494
www.anab.org

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 0.1)	(0.1 to 0.2)	(0.2 to 1)	
(DC to 20) GHz [3]	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 [3]	0.1 dB	0.1 dB	0.1 dB	0.1 dB	0.1 dB	0.1 dB	0.1 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 [3]	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °
(20 to 44) GHz [3]	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	Frequency Counter: Agilent 53181A, opt. 010
Frequency – Measure [3]	1 Hz to 60 GHz	100 nHz/Hz	Frequency Counter: Keysight 53181A, opt. 010;

1899 L Street NW, Suite 1100-A, Washington, DC 20036
414-501-5494
www.anab.org

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
			Spectrum Analyzer: Keysight E4407B; Harmonic Mixers: Keysight 11970A, Keysight 11970U

Services performed at satellite location

Copper Mountain Technologies EMEA

Eleftheriou Venizelou 48
Paphos 8021 Cyprus

Electrical - RF/Microwave

Parameter/ Equipment	Reflection Magnitude [1]			
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220 Calibration Kits: 03CK010-150, 05CK010-150			
Range	**Expanded Uncertainty of Measurement (+/-)**			
Frequency	Measured VRC Magnitude (Linear)			
	0 to ≤ 0.4	> 0.4 to ≤ 0.6	> 0.6 to ≤ 0.8	> 0.8 to ≤ 1
(DC to 10) GHz	0.004	0.005	0.006	0.008
(10 to 20) GHz	0.006	0.007	0.009	0.012

Electrical - RF/Microwave

Parameter/ Equipment	Reflection Phase
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220 Calibration Kits: 03CK010-150, 05CK010-150

Range	Expanded Uncertainty of Measurement (+/-)				
Frequency	Measured VRC Magnitude (Degrees)				
	(0.01 to 0.02)	(0.02 to 0.05)	(0.05 to 0.1)	(0.1 to 0.2)	(0.2 to 1)
(DC to 10) GHz	10 °	4 °	2 °	1 °	0.5 °
(10 to 20) GHz	15 °	6 °	3 °	2 °	1 °

Electrical - RF/Microwave

Parameter/ Equipment	Transmission Magnitude						
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220 Calibration Kits: 03CK010-150, 05CK010-150						
Range	Expanded Uncertainty of Measurement (+/-)						
Frequency	Measured VRC Magnitude (dB)						
	0	10	20	30	40	50	60
(DC to 10) GHz	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB
(10 to 20) GHz	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB	0.05 dB

Electrical - RF/Microwave

Parameter/ Equipment	Transmission Phase						
Reference Standard, Method, and/or Equipment	Vector Network Analyzers: C1220 Calibration Kits: 03CK010-150, 05CK010-150						
Range	Expanded Uncertainty of Measurement (+/-)						
Frequency	Measured VRC Magnitude (dB)						
	0	10	20	30	40	50	60
(DC to 10) GHz	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °
(10 to 20) GHz	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °	0.5 °

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
RF Absolute Power – Measure [2]	0 dBm DC to 33 GHz	0.1 dB + M	Thermal Power Sensors: R&S NRP33T
	(-20 to +20) dBm DC to 33 GHz	0.15 dB + M	

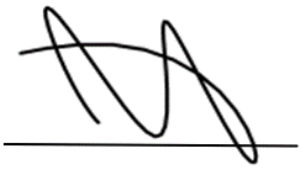
Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency – Source	10 MHz	100 nHz/Hz	Frequency Counter: Keysight 53181A, opt. 010
Frequency – Measure	1 Hz to 26.5 GHz	100 nHz/Hz	Frequency Counter: Keysight 53181A, opt. 010; Spectrum Analyzer: Keysight E4407B

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. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.



Jason Stine, Vice President

1899 L Street NW, Suite 1100-A, Washington, DC 20036
414-501-5494
www.anab.org