

Automatic Calibration Modules



Frequency Range:

50Ω:
ACM6000T • 300 kHz - 6.0 GHz • 2-port
ACM8000T • 300 kHz - 8.0 GHz • 2-port
ACM8400T • 100 kHz - 8.0 GHz • 4-port

75Ω:
ACM4000T • 300 kHz - 4.0 GHz • 2-port

Automatic compatibility with CMT software
Supports the USBTMC-USB488 standard
USB 2.0 connection to PC
Multiple hardware configurations available



COPPER MOUNTAIN
TECHNOLOGIES

ACM6000T



ACM8400T



Automatic Calibration Modules

All Copper Mountain Technologies' Automatic Calibration Modules (ACMs) are designed for full one-port through four-port calibrations of vector network analyzers (VNA) produced by Copper Mountain Technologies.

Copper Mountain Technologies' VNAs have a built-in function of one-touch automatic calibration performed with these ACMs. The ACM calibrates the VNA in fully automatic mode through the built-in functions of the analyzer software. The ACM switches to the impedance states one by one in the process of calibration. The VNA calibration coefficients are calculated using the measured S-parameters of the ACM impedance states and the data stored in the ACM memory.

Control Protocol

The ACMs are produced with an open control protocol compatible with the USBTMC-USB488 standard, which means they can be used to calibrate VNAs of various brands, which requires an external control program. The set of commands is detailed in the ACM Programming Manual.

Advantages of Automatic Calibration

The ACM calibration offers the following advantages over traditional mechanical SOLT calibration:

- Reduced number of connections (for example, full two-port calibration requires only one connection of the ACM to a VNA instead of 7 connections of mechanical standards)
- Faster calibration procedure
- Reduced risk of human error
- Higher accuracy
- Reduced wear on test port connectors

The ACM contains two RF connectors for connection to

VNA test ports, Mini-USB control port, several different transmission and reflection impedance states and electronic changeover switches. ACM4000T and ACM6000T each have six reflection states (three for each port) and a Thru. ACM8000T has ten reflection states (five for each port) and a Thru. ACM8400T has 12 reflection states (three for each port) and six Thru. The precise S-parameters of the calibration impedance states are stored in the ACM memory (factory characterization data)

User-Defined Characterization

Besides factory characterization, the ACM memory can store up to three user characterizations. The user characterization allows use of the ACM with adapters and other fixtures connected.

Attenuator State

The ACM features an additional attenuator state, which is not used in calibration. The attenuator is applied in confidence check of the performed calibration using a specific VNA function, which compares the measured S-parameters of the attenuator and the ACM memory data.

Thermal Compensation

Thermal compensation is used to enhance ACM calibration accuracy in the entire range of the operating temperatures of 64F to 82F (18C to 28C). It is a software function of correcting the ACM characterization data for ambient temperature variations. Temperature dependence of S-parameters of each ACM is determined at the factory and saved into the device memory.

Specifications ³

Model	50 Ω			75 Ω	
	ACM6000T	ACM8000T	ACM8400T	ACM4000T	
Frequency Range	300 kHz - 6 GHz	300 kHz - 8 GHz	100 kHz - 8 GHz	300 kHz - 1 MHz	1 MHz - 4 GHz
Directivity	46 dB	46 dB	46 dB	39 dB	42 dB
Source match	-40 dB	-40 dB	-40 dB	-36 dB	-39 dB
Load match	-46 dB	-46 dB	-46 dB	-39 dB	-42 dB
Reflection tracking	0.04 dB	0.04 dB	0.04 dB	0.15 dB	.10 dB
Transmission tracking	0.06 dB	0.06 dB	0.06 dB	0.15 dB	.10 dB
Max number of characterization points	1601	1601	1601	1601	1601
Max input power	0dBm	-5dBm	0 dBm	0 dBm	0 dBm
Max input DC voltage ¹	10 V	10 V	10 V	10 V	10 V
Input power limit ²	+18 dBm	+18 dBm	+18 dBm	+18 dBm	+18 dBm
Input DC voltage limit ²	35 V	35 V	35 V	35 V	35 V
Connection to PC	USB Mini-B connector type with USB 2.0 interface				
Dimensions	4.5 x 1.6 x 1 in. (115 x 40 x 25 mm)	4.5 x 1.6 x 1 in. (115 x 40 x 25 mm)	4.5 x 2.9 x 1 in. (115 x 74 x 25 mm)	4.5 x 1.6 x 1 in. (115 x 40 x 25 mm)	
Weight	12 oz. (350 g)	12 oz. (350 g)	20 oz. (550 g)	12 oz. (350 g)	12 oz. (350 g)

Operating Conditions

Ambient temperature	41°F to 104°F (5°C to 40°C)
Relative air humidity at 25°C	90%
Atmospheric pressure	84 to 106.7 kPa

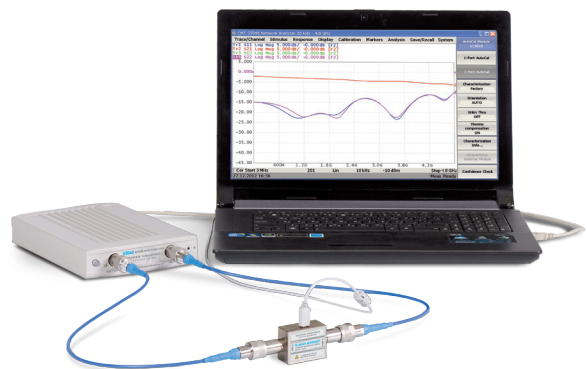
¹ Exceeding max values reduces VNA measurement accuracy.

² Exceeding limit values results in ACM failure.

³ VNA effective parameters (after calibration).

Hardware Configurations

Model	Connector Type		
	Port A	Port B	
ACM6000T - 011	N-type female	N-type female	
ACM6000T - 012	N-type male	N-type female	
ACM6000T - 111	3.5 mm female	3.5 mm female	
ACM6000T - 112	3.5 mm male	3.5 mm female	
50 Ω	Port A	Port B	
	ACM8000T - 011	N-type female	N-type female
	ACM8000T - 012	N-type male	N-type female
	ACM8000T - 111	3.5 mm female	3.5 mm female
ACM8000T - 112	3.5 mm male	3.5 mm female	
50 Ω	Port A/C	Port B/D	
	ACM8400T - 01111	N-type female	N-type female
	ACM8400T - 01212	N-type male	N-type female
	ACM8400T - 11111	3.5 mm female	3.5 mm female
ACM8400T - 11212	3.5 mm male	3.5 mm female	
75 Ω	Port A	Port B	
	ACM4000T - 511	N-type 75 female	N-type 75 male
	ACM4000T - 512	N-type 75 male	N-type 75 female
	ACM4000T - 411	F-type female	F-type female
ACM4000T - 412	F-type male	F-type female	



Copper Mountain Technologies

Copper Mountain Technologies is changing the way VNAs are used in the industry. Our unique VNAs deliver highly accurate measurements at a fraction of the price of traditional instrumentation. Leveraging breakthrough advances in RF technology, CMT manages to compress an advanced feature set and high performance into a compact form factor. We specialize in making affordable high performance analyzers for many environments and applications, with a wide variety of solutions from 20 kHz to 14 GHz



COPPER MOUNTAIN
TECHNOLOGIES

3905 Vincennes Road, Suite 105
Indianapolis, IN 46268
USA: +1.317.222.5400 • Singapore: +65.63.23.6546

www.coppermountaintech.com