Digital Attenuator, 31.0 dB, 1 dB LSB, 5-Bit, 800 - 2500 MHz

V 2.00

MAATSS0002

Features

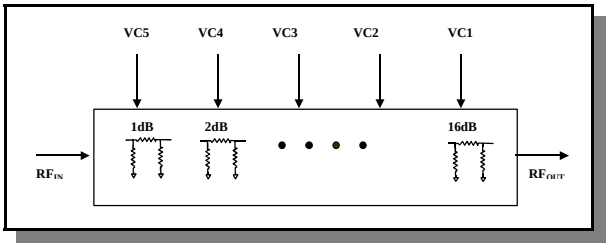
- 5 Bits, 1 dB Steps
- Excellent Accuracy
- Positive Control (+3 to +5V)
- Small Low Cost QSOP-16 (SSOP-16) Package

Description

The M/A-COM MAATSS0002 is a 1 dB step GaAs MMIC digital attenuator with 31.0 dB dynamic range in a low cost QSOP-16 (SSOP-16) package. It requires external DC blocking capacitors on the RF ports, positive supply voltage and five individual bit control voltages. It is particularly suited where high attenuation accuracy, low insertion loss and low intermodulation products are required. Typical applications include base stations, wireless data, and wireless local loop gain level control circuits.

The MAATSS0002 is fabricated using M/A-COM's GaAs 1.0 micron process. The process features full chip passivation for increased performance and reliability.

Functional Schematic



Absolute Maximum Ratings [1]

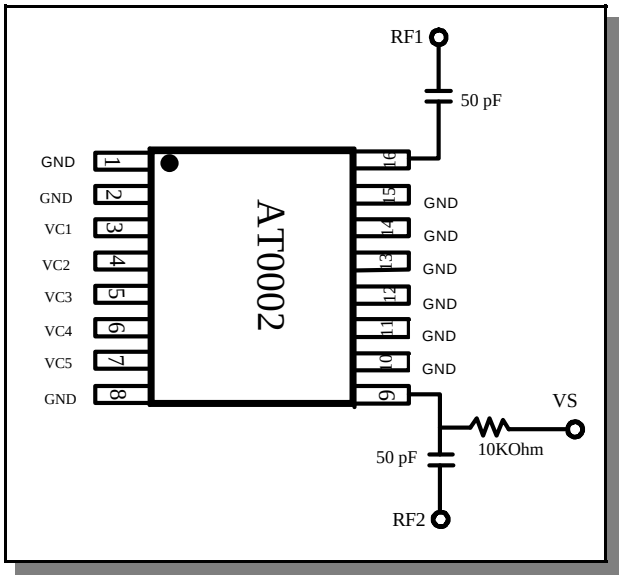
Parameter	Absolute Maximum
Max Input Power 0.8 - 2.5 GHz	+34 dBm
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

1. Operation of this device above any one of these parameters may cause permanent damage.

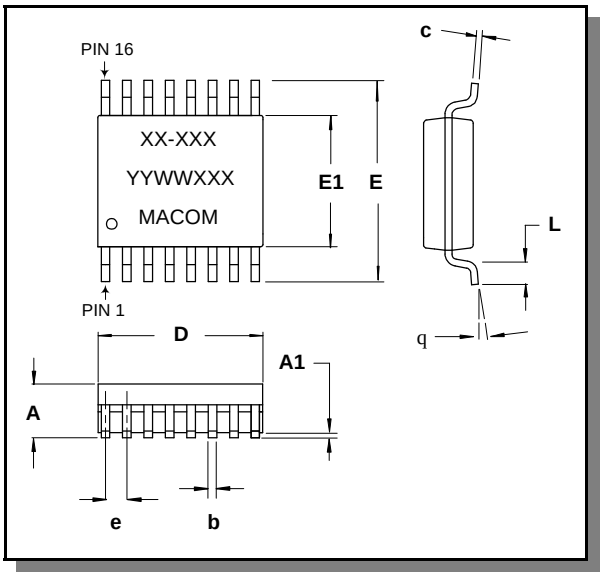
Electrical Specifications: T_A = 25 °C, Z_0 = 50 Ω

Parameter	Conditions	Frequency	Units	Min.	Typ.	Max.
Insertion Loss	—	0.8 - 1.5 GHz 1.5 - 2.0 GHz 2.0 - 2.5 GHz	dB dB dB	— — —	1.8 2.2 2.7	1.9 2.3 2.9
Accuracy	—	0.8 - 1.5 GHz 1.5 - 2.0 GHz 2.0 - 2.5 GHz	± (0.3 dB + 4% of Attenuation) ± (0.3 dB + 3% of Attenuation) ± (0.4 dB + 3% of Attenuation)			
Step Change	—	0.8 - 1.5 GHz 1.5 - 2.0 GHz 2.0 - 2.5 GHz	dB dB dB	0.4 0.4 0.4	1.0 1.0 1.0	1.4 1.6 1.8
Attenuation Range	—	0.8 - 2.5 GHz	dB	30.0	31.0	32.2
VSWR	—	0.8 - 2.5 GHz	dB	—	—	2.0:1
Trise, Tfall	10% to 90% RF, 90% to 10% RF	—	µS	—	2	—
Ton, Toff	50% Control to 10% / 90% RF	—	µS	—	2	—
Transients	In Band	—	mV	—	120	—
P1dB	+3V +5V	0.8 - 2.5 GHz 0.8 - 2.5 GHz	dBm dBm	15 18	— —	— —
IP3	+3V Input Power up to + 5 dBm +5V Input Power up to +5 dBm	0.8 - 2.5 GHz 0.8 - 2.5 GHz	dBm dBm	34 43	— —	— —
Control Voltages	Vlow = 0.0 ± 0.2V @ 20 µA, 40 µA Max. Vhigh = +3 ± 0.2V or +5V ± 0.2V @ 20 µA, 40 µA Max. Vs = Vhigh @ 200 µA Max					

Pin Out



QSOP-16 (SSOP-16)



Truth Table

Control Inputs					
VC5	VC4	VC3	VC2	VC1	Attenuation (dB)
1	1	1	1	1	Reference
0	1	1	1	1	1 dB
1	0	1	1	1	2 dB
1	1	0	1	1	4 dB
1	1	1	0	1	8 dB
1	1	1	1	0	16 dB

1 = Vhigh = (Vs ± 0.1) V, 0 = (0.0 ± 0.1) V

Dimensions	Measurement (Inches)		
	Minimum	Nominal	Maximum
A	0.053	0.064	0.069
A1	0.004	0.006	0.010
b	0.008	—	0.012
c	0.007	—	0.010
D	0.189	0.193	0.197
e	0.025 basic	0.025 basic	0.025 basic
E	0.228	0.236	0.244
E1	0.150	0.154	0.157
L	0.016	0.025	0.050
0	—	0.025 basic	—

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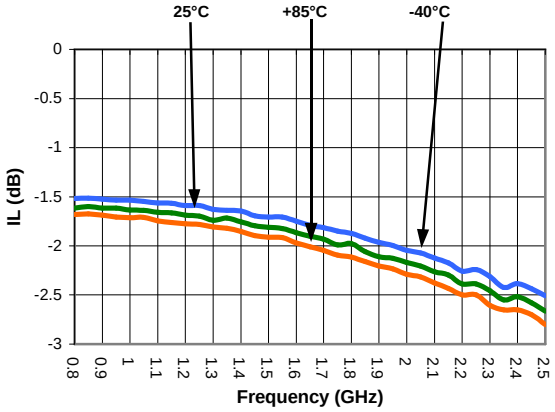
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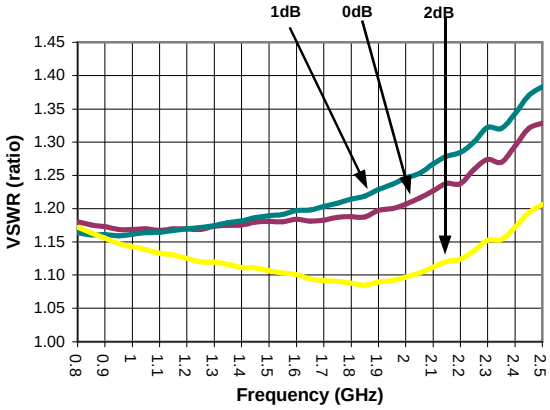
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Typical Performance Curves

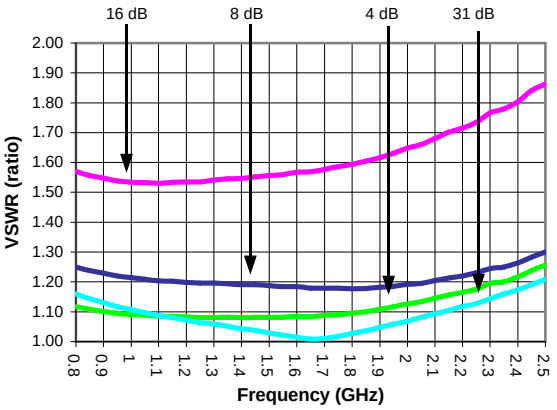
Insertion Loss vs. Frequency



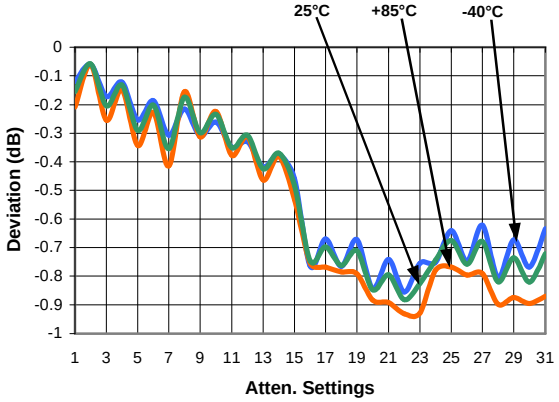
VSWR vs. Frequency @ +25°C



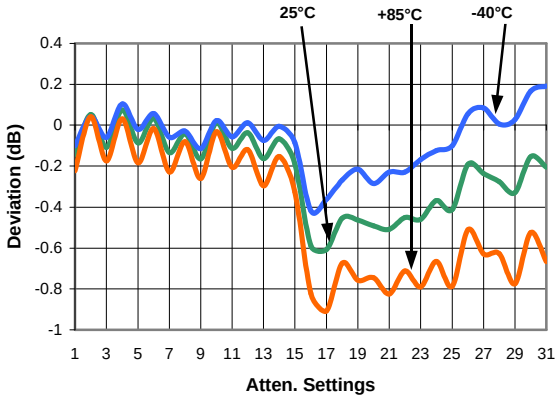
VSWR vs. Frequency @ +25°C



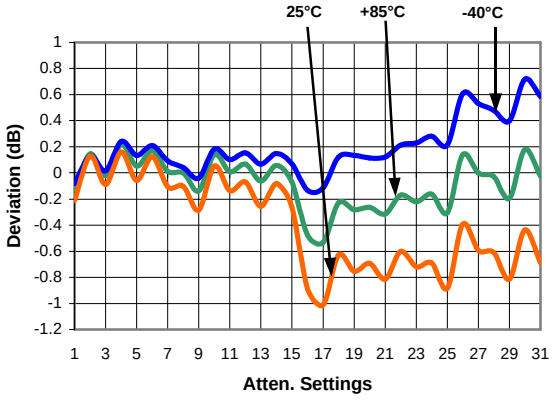
Deviation from Attenuation Setting @ 0.8 GHz



Deviation from Attenuation Setting @ 1.5 GHz



Deviation from Attenuation Setting @ 2.0 GHz

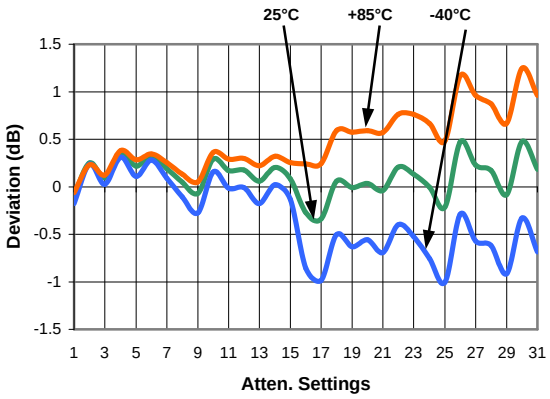


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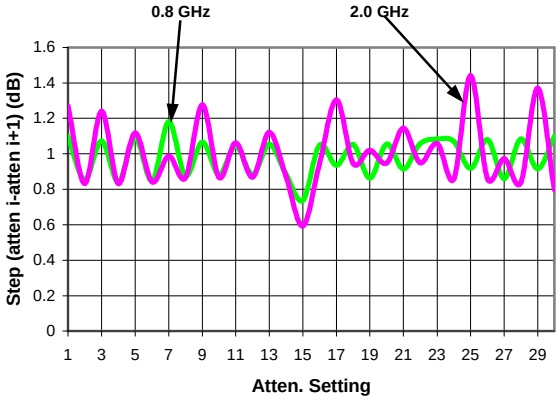
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Typical Performance Curves

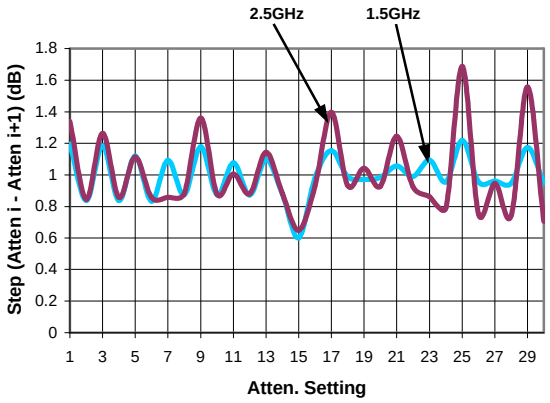
Deviation from Attenuation Setting @ 2.5 GHz



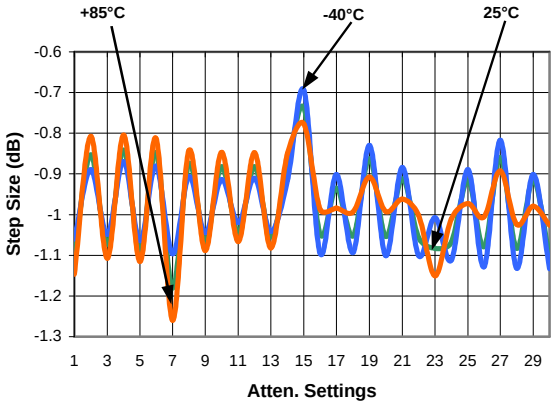
Typical Step Size @ +25°C



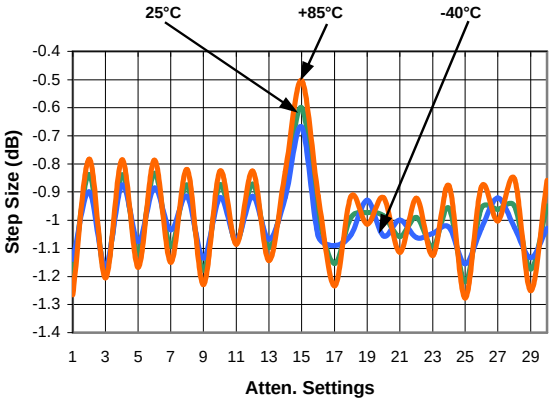
Typical Step Size @ +25°C



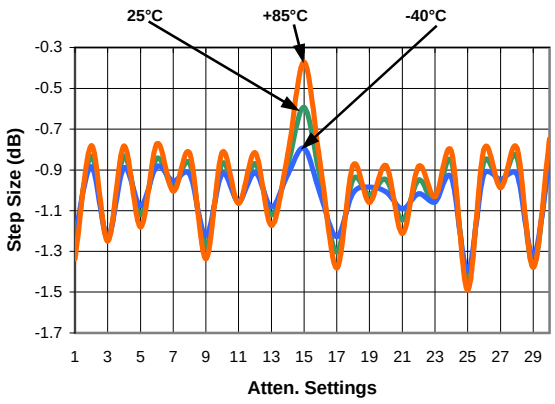
Step Size over Temperature @ 0.8 GHz



Step Size over Temperature @ 1.5 GHz



Step Size over Temperature @ 2.0 GHz

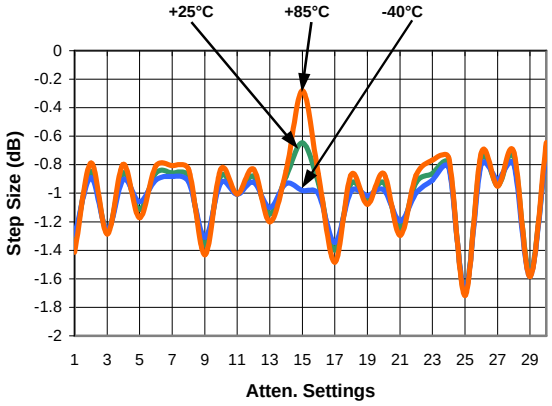


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Typical Performance Curves

Step Size over Temperature @ 2.5 GHz



Ordering Information

Part Number	Package
MAATSS0002	Bulk Packaging
MAATSS0002TR	Tape and Reel (1K Reel)
MAATSS0002-TB	Units Mounted on Test Board

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