MAATSS0020

Digital Attenuator, 31 dB, 5-Bit
DC - 2.0 GHz

Rev. V2

Features

- 1-dB Attenuation Steps to 31 dB
- Ultra Low DC Power Consumption
- Low Intermodulation Products: IP3 = 50 dBm
- Tape and Reel Packaging Available
- Temperature Stability: ± 0.15 dB from –40°C to +85°C
- Lead-Free SSOP-20 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of AT-260

Description

M/A-COM's MAATSS0020 is a 5-bit, 1-dB step GaAs MMIC digital attenuator in a lead-free SSOP-20 surface mount plastic package. The MAATSS0020 is ideally suited for use where high power accuracy, fast switching, very low power consumption and low intermodulation products are required at a low cost.

Typical Applications include radio and cellular equipment, wireless LANS, GPS equipment and other gain/level control circuits.

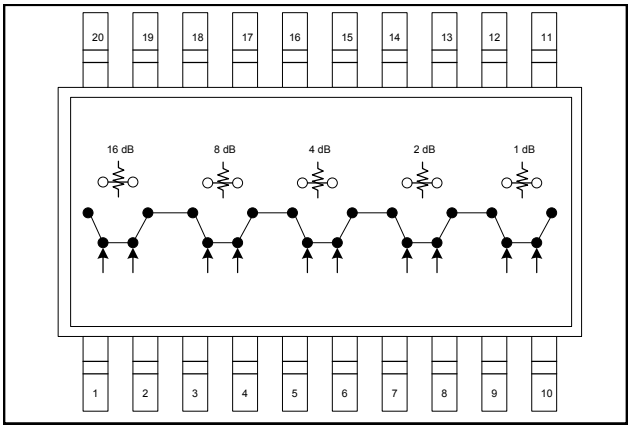
The MAATSS0020 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information[1]

Part Number	Package
MAATSS0020	SSOP 20-Lead
MAATSS0020TR-3000	3000 piece reel

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

Pin No.	Function	Pin No.	Function
1	VC1	11	RF1
2	$\overline{VC1}$	12	Ground
3	VC2	13	Ground
4	$\overline{VC2}$	14	Ground
5	VC3	15	Ground
6	$\overline{VC3}$	16	Ground
7	VC4	17	Ground
8	$\overline{VC4}$	18	Ground
9	No Connection	19	Ground
10	$\overline{VC5}$	20	RF2

Absolute Maximum Ratings [2,3]

Parameter	Absolute Maximum
Input Power: 0.05 GHz 0.5 - 2.0 GHz	 +27 dBm +34 dBm
Control Voltage	+5 V, -8.5 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

2. Exceeding any one or combination of these limits may cause permanent damage to this device.
3. M/A-COM does not recommend sustained operation near these survivability limits.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Reference Insertion Loss	DC - 0.1 GHz 0.1 - 0.5 GHz 0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB dB dB dB	— — — —	1.6 1.7 1.9 2.2	— — 2.2 —
Attenuation Accuracy [4]	DC - 1.0 GHz DC - 2.0 GHz	± (0.20 dB + 3% of Atten Setting in dB) dB ± (0.30 dB + 3% of Atten Setting in dB) dB			
VSWR	(Any State)	Ratio	—	1.5:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	nS	—	8	—
Ton, Toff	50%Control to 90% RF, 50% Control to 10% RF	nS	—	15	—
Transients	In Band	mV	—	2	—
1 dB Compression	Input Power 0.05 GHz 0.5 - 2.0 GHz	 dBm dBm	 — —	 20 27	 — —
IP_2	0.05 GHz 0.5 - 2.0 GHz Measured Relative to Input Power (for two-tone input power up to +5 dBm)	dBm dBm	— —	45 60	— —
IP_3	0.05 GHz 0.5 - 2.0 GHz Measured Relative to Input Power (for two-tone input power up to +5 dBm)	dBm dBm	— —	34 50	— —

4. Attenuation accuracy specifications apply with negative bias control and low inductance grounding.

Truth Table [5]

Control Inputs									
$\overline{VC5}$	$\overline{VC4}$	VC4	$\overline{VC3}$	VC3	$\overline{VC2}$	VC2	$\overline{VC1}$	VC1	Atten (dB)
1	1	0	1	0	1	0	1	0	Reference
0	1	0	1	0	1	0	1	0	1 dB
1	0	1	1	0	1	0	1	0	2 dB
1	1	0	0	1	1	0	1	0	4 dB
1	1	0	1	0	0	1	1	0	8 dB
1	1	0	1	0	1	0	0	1	16 dB
0	0	1	0	1	0	1	0	1	31 dB

5. 0 = Vin Low = 0 V = 0 to -0.2V @ 20 µA maximum.
   1 = Vin High = -5V @ 20 µA typical to -8 V @ 200 µA maximum.

Handling Procedures

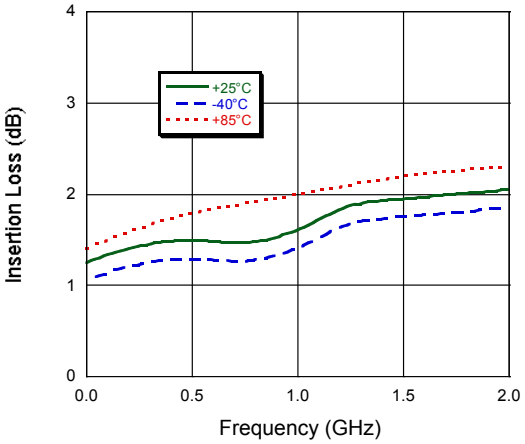
Please observe the following precautions to avoid damage:

Static Sensitivity

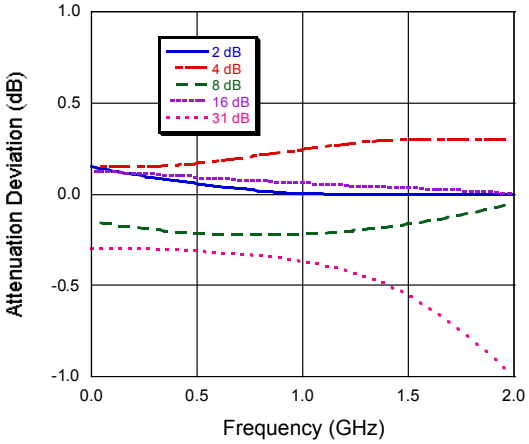
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves

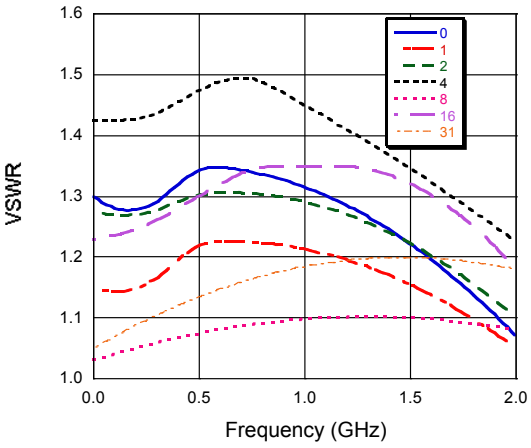
Insertion Loss



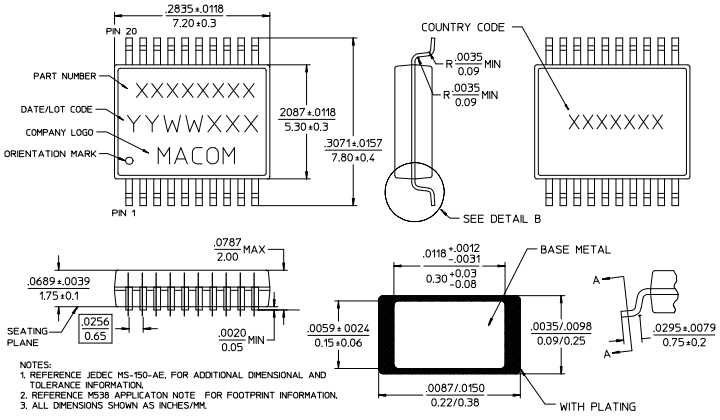
Attenuation Accuracy



VSWR



Lead-Free SSOP-20 †



† Reference Application Note M538 for lead-free solder reflow recommendations.