# MAATSS0020



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

Rev. V1

#### **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. 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.

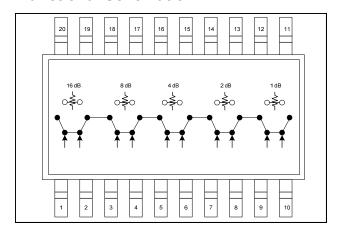
# Ordering Information<sup>1</sup>

Commitment to produce in volume is not guaranteed.

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	VC1	12	Ground	
3	VC2	13	Ground	
4	VC2	14	Ground	
5	VC3	15	Ground	
6	VC3	16	Ground	
7	VC4	17	Ground	
8	VC4	18	Ground	
9	9 No Connection 19		Ground	
10	VC5	20	RF2	

# Absolute Maximum Ratings <sup>2,3</sup>

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.

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<sup>\*</sup> Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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## Electrical Specifications: $T_A = 25$ °C, $Z_0 = 50 \Omega$

Parameter	Test Conditions	Units	Min.	Тур.	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 <sub>2</sub>	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 <sub>3</sub>	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	_

<sup>4.</sup> Attenuation accuracy specifications apply with negative bias control and low inductance grounding.

## Truth Table 5

Control Inputs									
VC 5	VC 4	VC 4	VC 3	VC 3	VC 2	VC 2	VC 1	VC 1	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

<sup>5.</sup>  $0 = Vin Low = 0 V = 0 to -0.2V @ 20 \mu A maximum.$ 

## **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.

and/or prototype measurements. Commitment to develop is not guaranteed. **PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

<sup>1 =</sup> Vin High = -5V @ 20  $\mu$ A typical to -8 V @ 200  $\mu$ A maximum.

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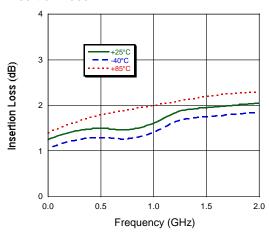


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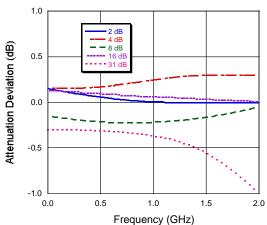
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## **Typical Performance Curves**

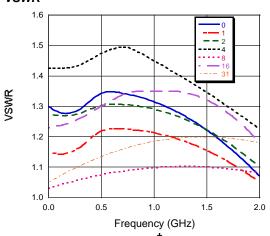
#### **Insertion Loss**



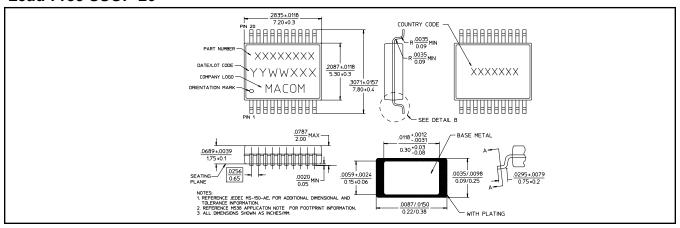
#### **Attenuation Accuracy**



#### **VSWR**



### Lead-Free SSOP-20 †



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

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