

### Digital Attenuator, 15 dB, 4-Bit DC - 2.0 GHz

#### Features

- 1-dB Attenuation Steps to 15 dB
- High Accuracy
- Low Intermodulation Product: +50 dBm IP3
- Low DC Power Consumption: 50 μW
- Tape and Reel Packaging Available
- Temperature Stability +/-0.15 dB: -40°C to +85°C
- Lead-Free SOIC-16 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Re-flow Compatible
- RoHS\* Compliant Version of AT-210

#### Description

M/A-COM's MAATSS0015 is a 4-bit, 1-dB step GaAs MMIC digital attenuator in a lead-free SOIC 16 -lead surface mount plastic package. The MAATSS0015 is ideally suited for use where high accuracy, fast switching, very low power consumption and low intermodulation products are required. Typical applications include radio, cellular, and wireless LANs, GPS equipment and other gain/ level control circuits.

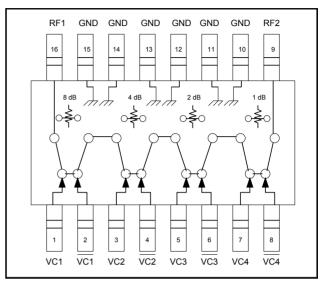
The MAATSS0015 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

### Ordering Information<sup>1</sup>

Part Number	Package
MAATSS0015	SOIC 16-Lead Plastic Package
MAATSS0015TR	Tape & Reel

1. Reference Application Note M513 for reel size information.

#### **Functional Schematic**



### **Pin Configuration**

Pin No.	Function	Pin No.	Function		
1	VC1	9	RF2		
2	VC1	10	GND		
3	VC2	11	GND		
4	VC2	12	GND		
5	VC3	13	GND		
6	VC3	14	GND		
7	VC4	15	GND		
8	VC4	16	RF1		

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

Parameter	Absolute Maximum			
Input Power: 50 MHz 500-2000 MHz	+27 dBm +34 dBm			
Control Voltage	$-8.5~V \le V_C \le 5V$			
Operating Temperature	-40°C to +85°C			
Storage Temperature	-65°C to +150°C			

Exceeding any one or combination of these limits may cause permanent damage to this device.

 M/A-COM does not recommend sustained operation near these survivability limits.

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

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1

Rev. V4



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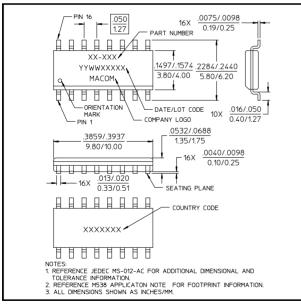
Rev. V4

## Electrical Specifications: T<sub>A</sub> = 25°C, V<sub>C</sub> = 0 V / –5 V, Z<sub>0</sub> = 50 $\Omega$

Parameter	Test Conditions	Frequency	Units	Min.	Тур.	Max.
Insertion Loss (Reference state)		DC - 0.1 GHz DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz	dB dB dB dB		0.9 1.3 1.5 2.0	 1.5 1.8 
Attenuation Accuracy <sup>4</sup>		DC - 1.0 GHz DC - 2.0 GHz	± (0.15 dB + 3% of Atten Setting in dB) dB ± (0.30 dB + 3% of Atten Setting in dB) dB			
VSWR			Ratio		1.4	_
Trise, Tfall	10% to 90% RF, 90% to 10% RF	_	nS		10	
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	_	nS	_	15	
Transients	In-Band	—	mV	—	18	—
1 dB Compression	Input Power Input Power	0.05 GHz 0.5 - 2.0 GHz	dBm dBm		22 28	—
IP <sub>2</sub>	Measured Relative to Input Power (For two-tone input power up to +5 dBm)	0.05 GHz 0.5 - 2.0 GHz	dBm dBm		49 72	—
IP <sub>3</sub>	Measured Relative to Input Power (For two-tone input power up to +5 dBm)	0.05 GHz 0.5 - 2.0 GHz	dBm dBm	_	45 50	—
Control Current	V <sub>c</sub>   = 5 V		μA	_	10	20

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

## Lead-Free SOIC-16<sup>†</sup>



### Truth Table <sup>5</sup>

	Control Inputs							
VC 4	VC 4	VC 3	VC 3	VC 2	VC 2	<u>VC</u> 1	VC 1	Attenua- tion (dB)
1	0	1	0	1	0	1	0	Reference state
0	1	1	0	1	0	1	0	1 dB
1	0	0	1	1	0	1	0	2 dB
1	0	1	0	0	1	1	0	4 dB
1	0	1	0	1	0	0	1	8 dB
0	1	0	1	0	1	0	1	15 dB

5. 0 = -0.2 V to 0 V, 1 = -8 V to -5 V.

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

Meets JEDEC moisture sensitivity level 1 requirements

2

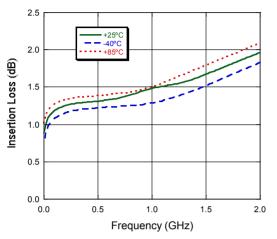
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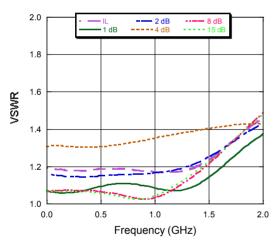
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#### **Typical Performance Curves**

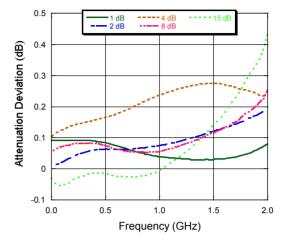
#### Insertion Loss



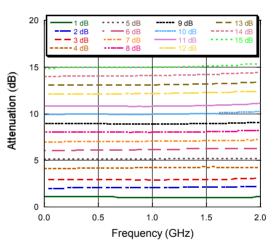




Attenuation Accuracy



Attenuation



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