## Digital Attenuator 30 dB, 4-Bit, TTL Driver, DC - 3 GHz

### Features

- Attenuation: 2 dB Steps to 30 dB
- Low DC Power Consumption
- Integral TTL Driver
- 50 Ω Impedance
- Temperature Stability: ±0.18 dB from -55°C to +85°C
- Lead-Free SO-16 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of AT65-0233

### Description

The MAATCC0006 is a GaAs FET 4-bit digital attenuator with a 2 dB minimum step size and a 30 dB total attenuation range. This device is in a SOIC-16 plastic surface mount package.

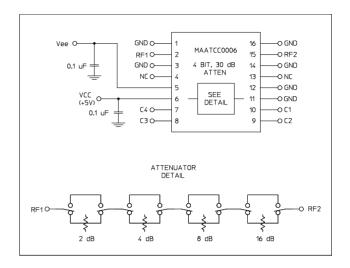
The MAATCC0006 is ideally suited for use where accuracy, fast speed, very low power consumption is required. Typical applications include dynamic range setting in precision receiver circuits and other gain/ leveling control circuits.

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

Part Number	Package	
MAATCC0006	Bulk Packaging	
MAATCC0006TR	1000 piece reel	
MAATCC0006-TB	Sample Test Board	

1. Reference Application Note M513 for reel size information.

## Schematic with Off-Chip Components or Functional Block Diagram



## **Pin Configuration**

Pin #	Function	Pin #	Function	
1	GND	9	C2	
2	RF1	10	C1	
3	GND	11	GND	
4	NC <sup>2</sup>	12	GND	
5	Vee	13	NC <sup>2</sup>	
6	Vcc	14	GND	
7	C4	15	RF2	
8	C3	16	GND	

2. NC = No Connection

\* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

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## Electrical Specifications: T<sub>A</sub> = 25°C

Parameter	Test Conditions	Units	Min.	Тур.	Max.	
T drameter		Onits				
Insertion Loss	DC - 0.5 GHz			1.7	2.0	
	DC - 2.0 GHz DC - 3.0 GHz	dB	_	2.3 2.6	2.7 3.1	
Attenuation Accuracy	Any Bit or Combination of Bits	dB				
Allenuation Accuracy	DC - 3.0 GHz	iHz dB		± (.4 + 8% of attenuation)		
VSWR	Full Range DC - 3.0 GHz	Ratio	—	—	1.7:1	
Trise, Tfall	10% to 90%	ns		10	50	
Ton, Toff	50% Cntl to 90%/10% RF	ns		30	150	
Transients	In-Band	mV		35		
	Input Power		_	+20		
1 dB Compression	0.05 GHz	dBm		+28		
	0.5 - 3.0 GHz					
In must ID	Two-tone inputs up to +5 dBm	-ID		+40		
Input IP <sub>3</sub>	0.05 GHz 0.5 - 3.0 GHz	dBm		+50		
	Two-tone inputs up to +5 dBm					
Input IP <sub>2</sub>	0.05 GHz	dBm		+45		
input in 2	0.5 - 3.0 GHz	ubiii		+68		
VCC			4.5	5.0	5.5	
VEE		V	-8.0	-5.0	-4.75	
V <sub>IL</sub>	LOW-level input voltage		, 0.0		0.8	
V <sub>IH</sub>	HIGH-level input voltage	V	2.0	_	5.0	
lin (Input Leakage Current)	Vin = V <sub>CC</sub> or GND	μA	-1.0	—	1.0	
lcc	Vcntrl = V <sub>CC</sub> or GND	μA		250	400	
(Quiescent Supply Current)		μΑ		250	400	
Δlcc						
(Additional Supply Current Per TTL Input Pin)	$V_{CC}$ = Max, Vcntrl = $V_{CC}$ - 2.1 V	mA		—	1.0	
IEE	VEE min to max, Vin = $V_{IL}$ or $V_{IH}$	mA	-1.0	-0.2	_	

## Absolute Maximum Ratings<sup>3,4</sup>

Parameter	Absolute Maximum	
Input Power 0.05 GHz 0.5 - 3.0 GHz	+27 dBm +34 dBm	
V <sub>CC</sub>	$-0.5 V \le V_{CC} \le +7.0 V$	
V <sub>EE</sub>	$-8.5 \text{ V} \le \text{V}_{\text{EE}} \le +0.5 \text{ V}$	
V <sub>CC</sub> - V <sub>EE</sub>	-0.5 V $\leq$ V <sub>CC</sub> - V <sub>EE</sub> $\leq$ 14.5 V	
Vin <sup>5</sup>	$-0.5~\textrm{V} \leq \textrm{V}_{\textrm{IN}} \leq \textrm{V}_{\textrm{CC}} + 0.5~\textrm{V}$	
Operating Temperature	-40°C to +85°C	
Storage Temperature	-65°C to +125°C	

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

 MACOM does not recommend sustained operation near these survivability limits.

 Standard CMOS TTL interface, latch=up will occur if logic signal applied prior to power supply.

# Truth Table (Digital Attenuator)<sup>6</sup>

C1	C2	C3	C4	Attenuation
0	0	0	0	Loss, Reference
1	0	0	0	2.0 dB
0	1	0	0	4.0 dB
0	0	1	0	8.0 dB
0	0	0	1	16.0 dB
1	1	1	1	30.0 dB

6. 0 = TTL Low; 1 = TTL High

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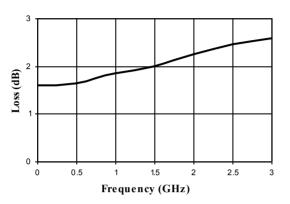


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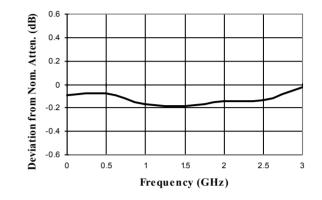
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## **Typical Performance Curves**

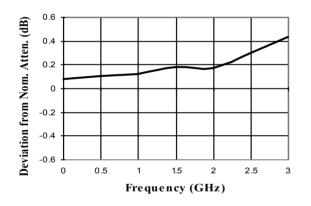
### Typical Insertion Loss (dB)



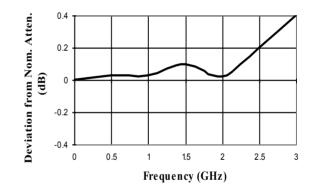
Attenuation Accuracy, 2 dB



#### Attenuation Accuracy, 4 dB



Attenuation Accuracy, 8 dB



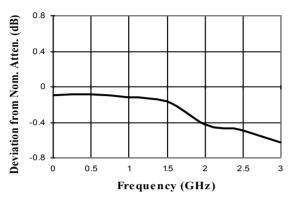


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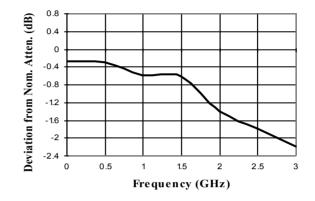
Rev. V5

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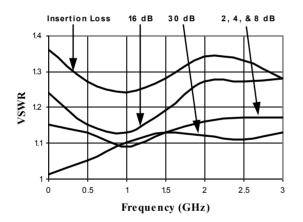
### Attenuation Accuracy, 16 dB



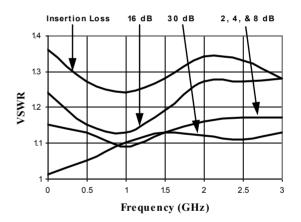
#### Attenuation Accuracy, 30 dB



#### Typical RF1 VSWR



#### Typical RF2 VSWR



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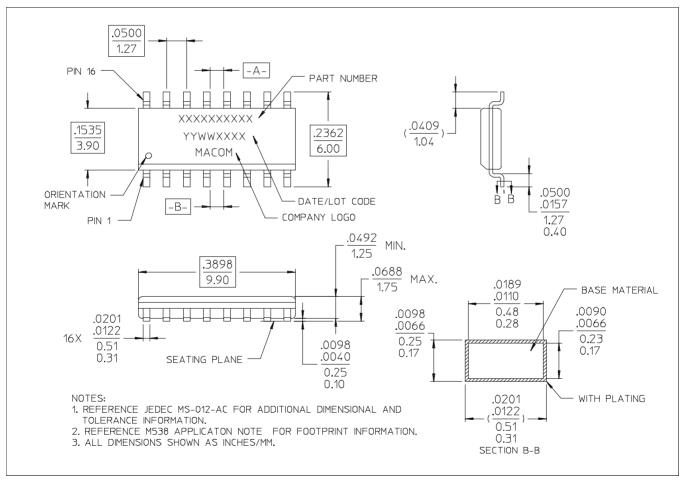
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### **Handling Procedures**

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.



## Lead-Free, SOIC-16<sup>†</sup>

<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.

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