

## Features

- Attenuation: 1.0 dB Steps to 31 dB
- Low DC Power Consumption
- Plastic SOW, Wide Body, SMT Package
- Integral TTL Driver
- 50  $\Omega$  Impedance
- Test Boards are Available
- Tape and Reel Packaging Available
- Lead-Free SOW-16 Package
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of AT65-0263

## Description

The MAATCC0007 is a GaAs FET 5-bit digital attenuator with integral TTL driver. Step size is 1.0 dB providing 31 dB total attenuation range. This device is in a SOW-16 plastic surface mount package.

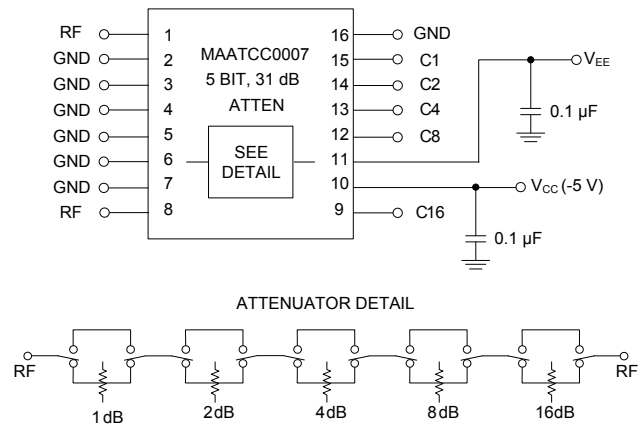
The MAATCC0007 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required.

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

Part Number	Package
MAATCC0007	Bulk Packaging
MAATCC0007TR	1000 piece reel
MAATCC0007-TB	Sample Test Board

1. Reference Application Note M513 for reel size information.

## Schematic with Off-Chip Components



## Pin Configuration

Pin No.	Function	Pin No.	Function
1	RF	9	C16
2	GND	10	Vcc
3	GND	11	Vee
4	GND	12	C8
5	GND	13	C4
6	GND	14	C2
7	GND	15	C1
8	RF	16	GND

\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

**Electrical Specifications: Freq. = DC - 2 GHz, T<sub>A</sub> = 25°C**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	—	dB	—	2.8	3.2
Attenuation Accuracy	Individual Bits 1, 2, 4, 8, 16 Any Combination of bits 3 - 29 dB Any Combination of bits 30 - 31 dB	dB	±(0.5 +5% of atten setting) ±(0.5 +5% of atten setting) ±(0.7 +7% of atten setting)		
VSWR	Full Range	Ratio	—	1.5:1	1.8:1
Switching Speed	50% Control to 90%/10% RF 10% to 90% or 90% to 10%	ns	—	75 20	150 50
1 dB Compression	50 MHz 0.5-2.0 GHz	dBm	—	+21 +24	—
Input IP3	Two-tone inputs up to +5 dBm 50 MHz 0.5-2.0 GHz	dB	—	+35 +48	—
$V_{CC}^2$ $V_{EE}^2$	—	V	4.75 -8.0	5.0 -5.0	5.25 -4.75
$V_{IL}$ $V_{IH}$	LOW-level input voltage HIGH-level input voltage	V	0.0 2.0	—	0.8 5.0
Input Leakage Current	$V_{IN} = V_{CC}$ or GND	μA	-1.0	—	1.0
$I_{CC}$ (Quiescent Supply Current)	$V_{CTRL} = V_{CC}$ or GND	μA	—	250	400
$\Delta I_{CC}^3$ (Additional Supply Current Per TTL Input Pin)	$V_{CC} = \text{max}$ , $V_{CTRL} = V_{CC} - 2.1$ V	mA	—	—	1.0
$I_{EE}$	$V_{EE}$ min to max, $V_{IN} = V_{IL}$ or $V_{IH}$	mA	-1.0	-0.2	—
Thermal Resistance $\theta_{JA}$	PCB mount on FR4 material, copper trace, still air at +25°C	°C/W	—	90 - 130	—

- Decoupling capacitors (0.1 μF) are required on power supply lines.
- For calculating  $\Delta I_{CC}$ , the number of TTL input pins is 6.

## Absolute Maximum Ratings<sup>4,5</sup>

Parameter	Absolute Maximum
Input Power 0.05 GHz 0.5 - 2.0 GHz	+27 dBm +34 dBm
V <sub>CC</sub>	-0.5 V ≤ V <sub>CC</sub> ≤ +7.0 V
V <sub>EE</sub>	-8.5 V ≤ V <sub>EE</sub> ≤ +0.5 V
V <sub>CC</sub> - V <sub>EE</sub>	-0.5 V ≤ V <sub>CC</sub> - V <sub>EE</sub> ≤ 14.5 V
V <sub>IN</sub>	-0.5 V ≤ V <sub>IN</sub> ≤ V <sub>CC</sub> + 0.5 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. MACOM does not recommend sustained operation near these survivability limits.

## Truth Table (Digital Attenuator)

C16	C8	C4	C2	C1	Attenuation
0	0	0	0	0	Loss, Reference
0	0	0	0	1	1 dB
0	0	0	1	0	2 dB
0	0	1	0	0	4 dB
0	1	0	0	0	8 dB
1	0	0	0	0	16 dB
1	1	1	1	1	31 dB

0 = TTL Low; 1 = TTL High

## Handling Procedures

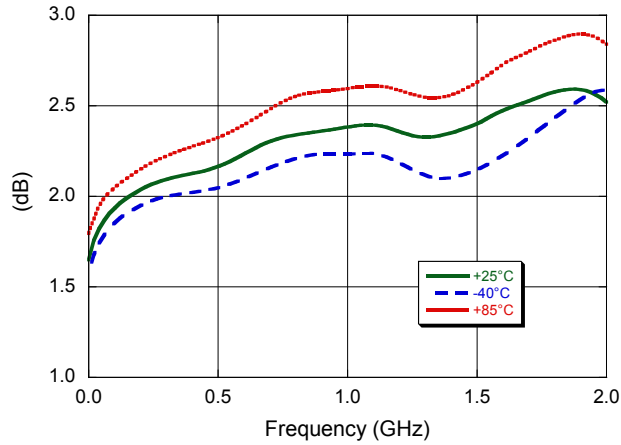
Please observe the following precautions to avoid damage:

## Static Sensitivity

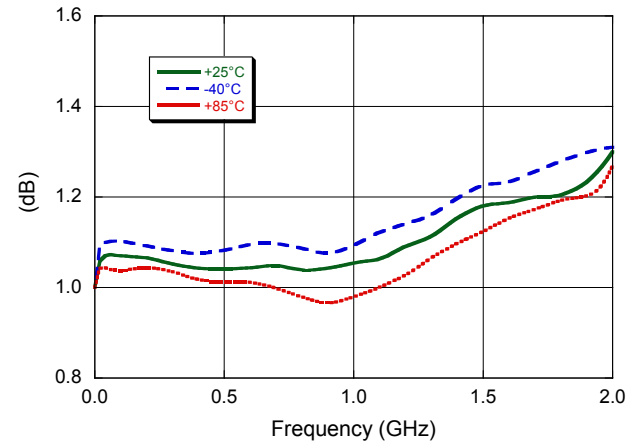
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Performance Curves

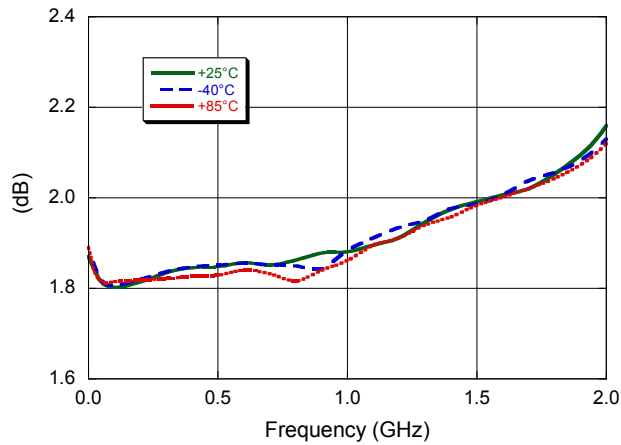
Insertion Loss



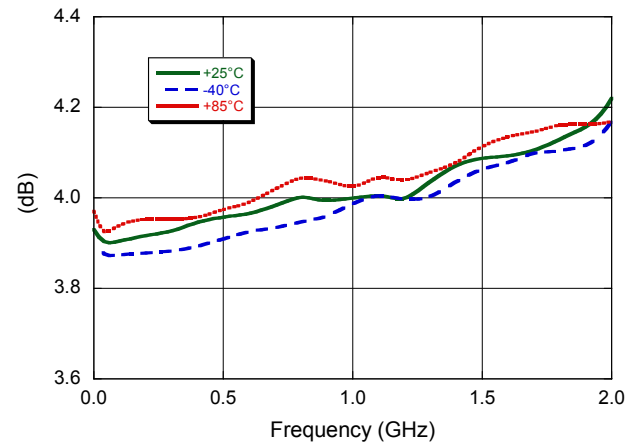
Attenuation @ 1 dB



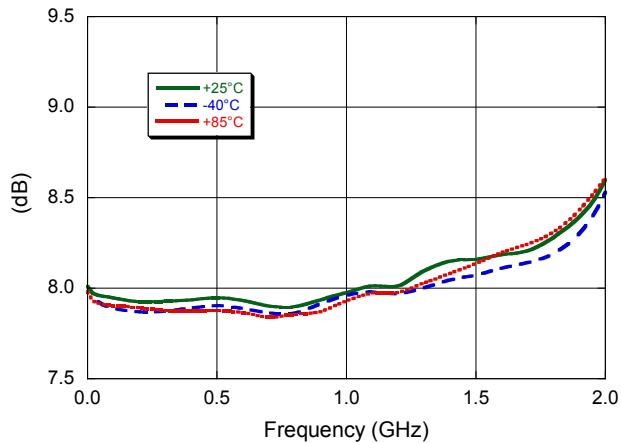
Attenuation @ 2 dB



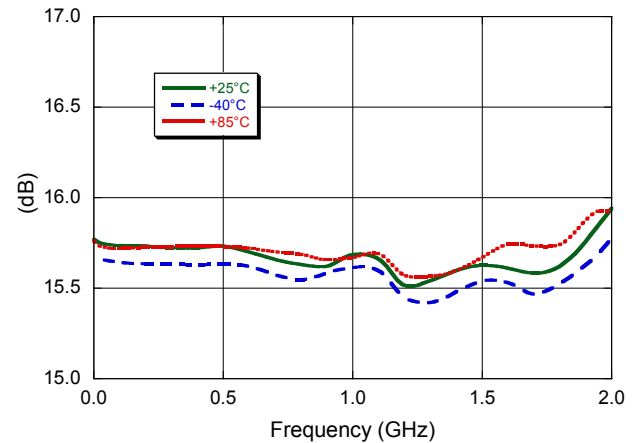
Attenuation @ 4 dB



Attenuation @ 8 dB

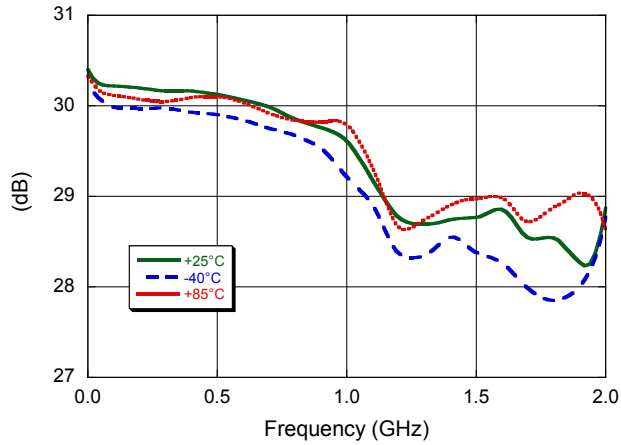


Attenuation @ 16 dB

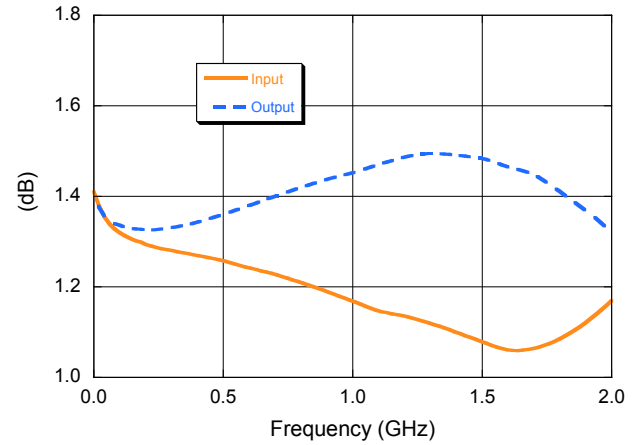


## Typical Performance Curves

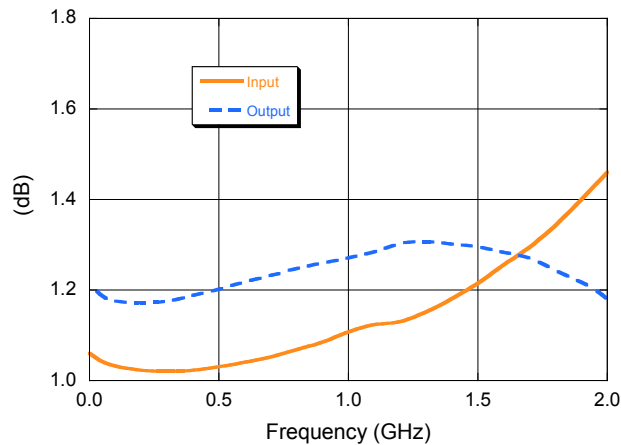
**Attenuation @ 31 dB**



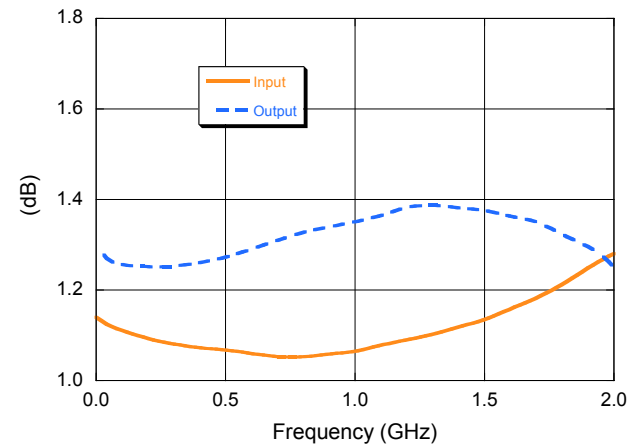
**Maximum VSWR, Loss**



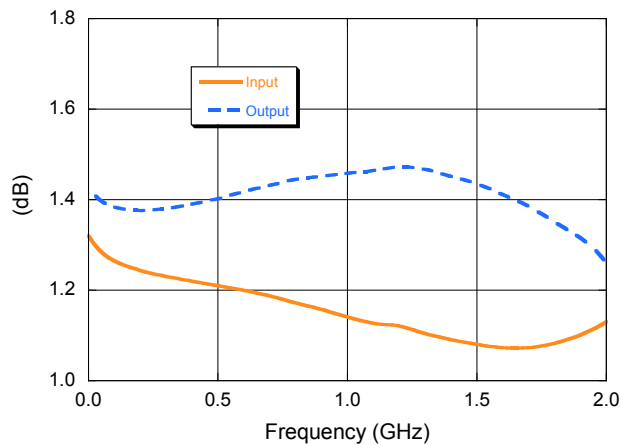
**Maximum VSWR, 1 dB Bit**



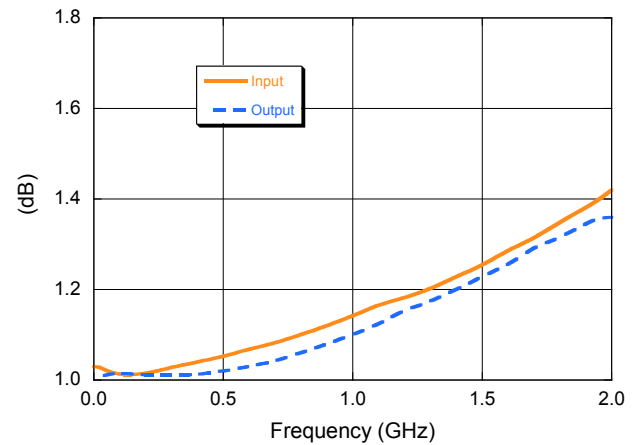
**Maximum VSWR, 2 dB Bit**



**Maximum VSWR, 4 dB Bit**

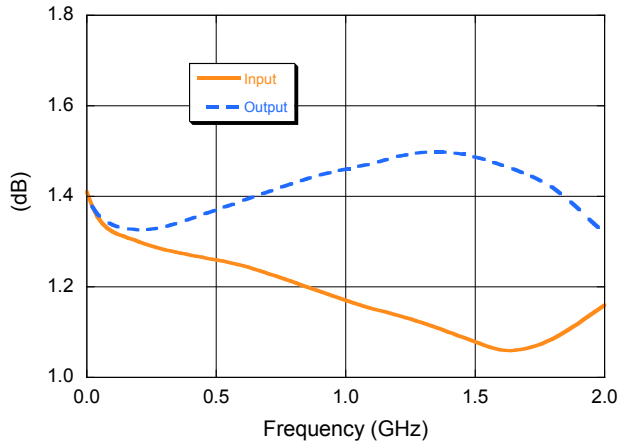


**Maximum VSWR, 8 dB Bit**

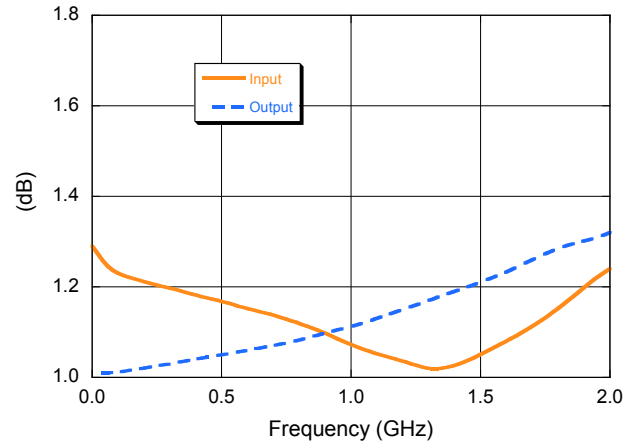


## Typical Performance Curves

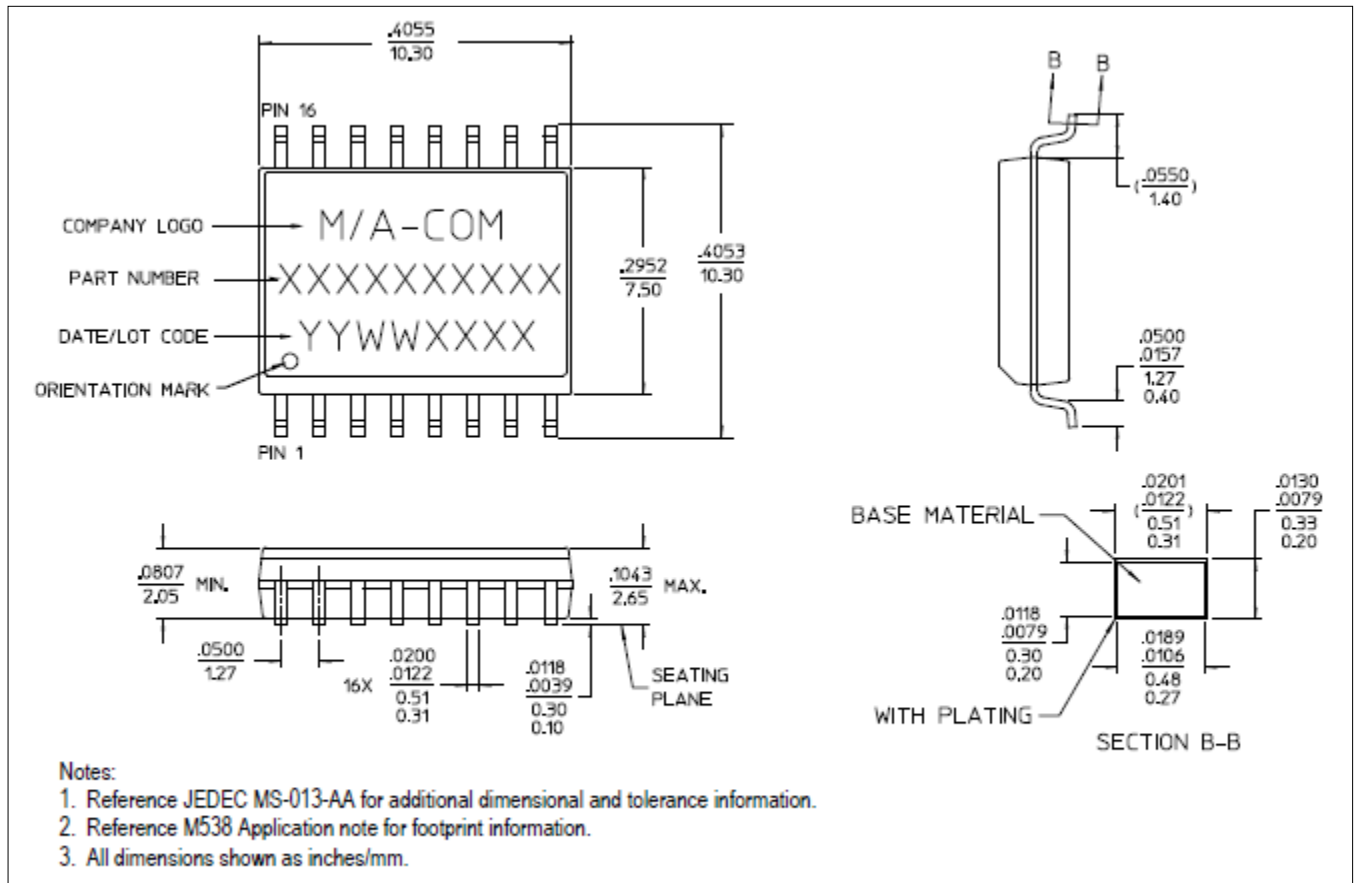
Maximum VSWR, 16 dB Bit



Maximum VSWR, 31 dB Bit



## Lead-Free, SOW-16<sup>†</sup>



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

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