Digital Attenuator, 31.5 dB, 6-Bit, TTL Driver
DC - 2 GHz

MAATCC0005
Rev. V5

Features

- Attenuation: 0.5 dB Steps to 31.5 dB
- Low DC Power Consumption
- Integral TTL Driver
- 50 Ω Impedance
- Lead-Free SMT Plastic SOIC, Wide Body, SOW-24
- Test Boards are Available
- Tape & Reel Packaging Available
- RoHS* Compliant Version of AT65-0107

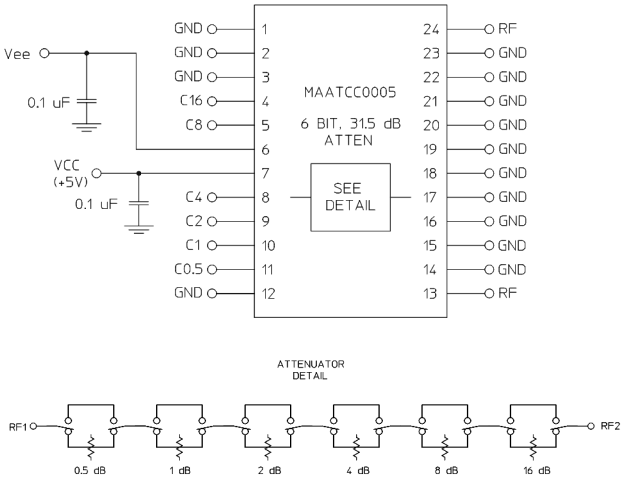
Applications

- Aerospace & Defense
- ISM

Description

The MAATCC0005 is a GaAs FET 6-bit digital attenuator with a 0.5 dB minimum step size and a 31.5 dB total attenuation range. This device is in a SOIC-24 wide body, plastic surface mount package. This attenuator is ideally suited for use where accuracy, fast speed, and very low power consumption are required.

Schematic with Off-Chip Components



Pin Configuration

Pin #	Function
1,2,3,12,14-23	GND
4	C16
5	C8
6	V_{EE}
7	V_{CC}
8	C4
9	C2
10	C1
11	C0.5
13	RF
24	RF

Ordering Information[1]

Part Number	Package
MAATCC0005	Bulk Packaging
MAATCC0005TR	1000 piece reel
MAATCC0005-TB	Sample Test Board

1. Reference Application Note M513 for reel size information.

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

Electrical Specifications: T_A = 25°C

Parameter	Test Conditions	Units	Min	Typ	Max
Insertion Loss	DC - 1 GHz DC - 2 GHz	dB	—	3.1 3.6	3.6 4.2
Attenuation Accuracy	Any Bit or Combination of Bits DC - 2 GHz	dB	±(0.3 +4% of atten. max)		
VSWR	Full Range, DC - 2 GHz	Ratio	—	1.8:1	2:1
Switching Speed	50% Cntl 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 +29	—
Input IP_3	Two-tone inputs up to +5 dBm 50 MHz 0.5 - 2.0 GHz	dB	—	+35 +48	—
Vcc^2 Vee^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	Vin = V_{CC} or GND	µA	-1.0	—	1.0
Quiescent Supply Current	Vcntrl = V_{CC} or GND	µA	—	250	400
ΔIcc (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	—

2. Decoupling capacitors (0.1 µF) are required on Power Supply lines.

Absolute Maximum Ratings[3,4]

Parameter	Absolute Maximum
Input Power 0.05 GHz 0.5 - 2.0 GHz	 +27 dBm +34 dBm
V_{CC}	-0.5V ≤ V_{CC} ≤ +7.0V
V_{EE}	-8.5V ≤ V_{EE} ≤ +0.5V
V_{CC} - V_{EE}	-0.5V ≤ V_{CC} - V_{EE} ≤ 14.5V
Vin[5]	-0.5V ≤ Vin ≤ V_{CC} + 0.5V
Operating Temperature	-40ºC to +85ºC
Storage Temperature	-65ºC to +125ºC

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.
5. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

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.

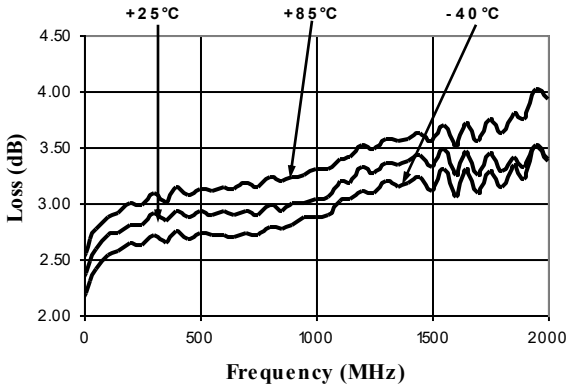
Truth Table (Digital Attenuator)

C16	C8	C4	C2	C1	C0.5	Attenuation
0	0	0	0	0	0	Loss. Reference
0	0	0	0	0	1	0.5 dB
0	0	0	0	1	0	1.0 dB
0	0	0	1	0	0	2.0 dB
0	0	1	0	0	0	4.0 dB
0	1	0	0	0	0	8.0 dB
1	0	0	0	0	0	16.0 dB
1	1	1	1	1	1	31.5 dB

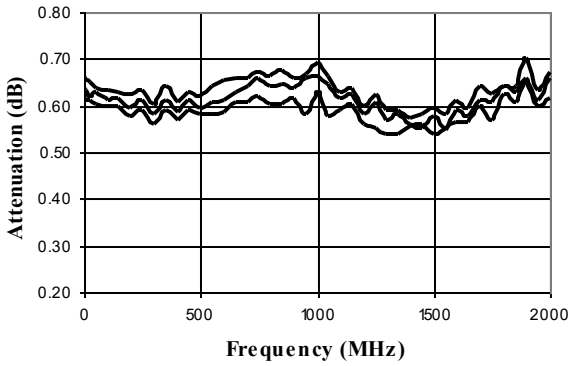
0 = TTL Low; 1 = TTL High

Typical Performance Curves

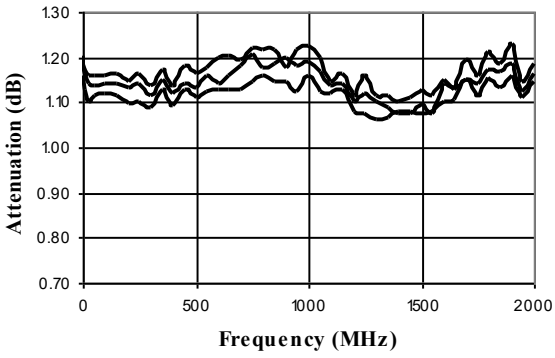
Loss vs. Temperature



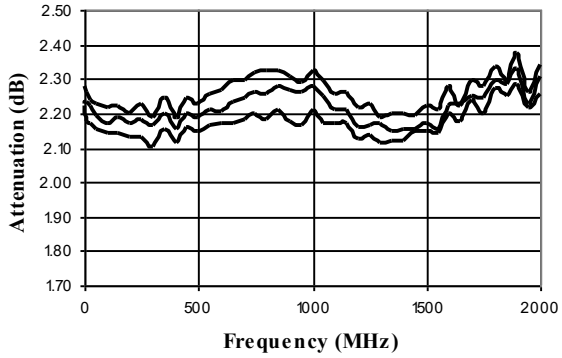
0.5 dB Bit vs. Temperature



1 dB Bit vs. Temperature

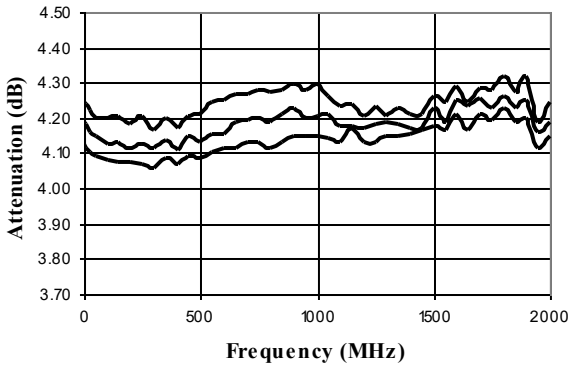


2 dB Bit vs. Temperature

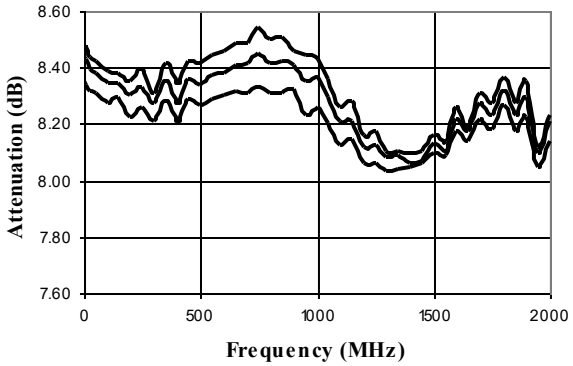


Typical Performance Curves

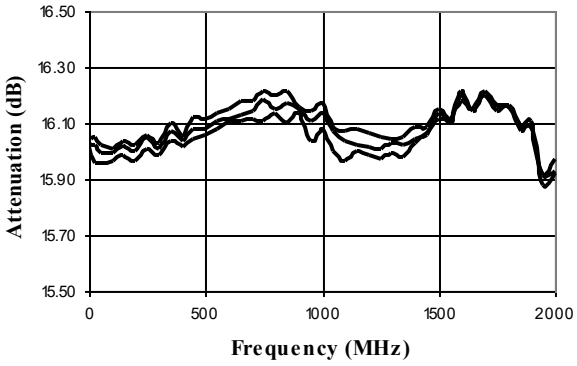
4 dB Bit vs. Temperature



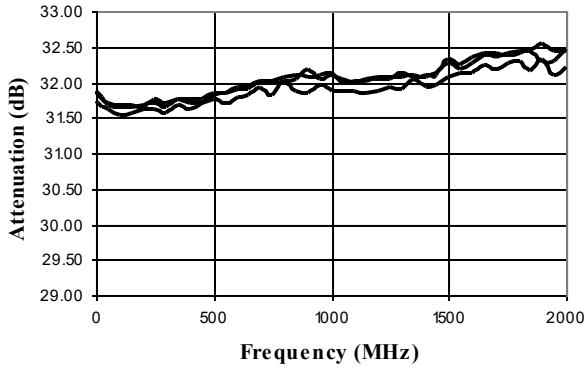
8 dB Bit vs. Temperature



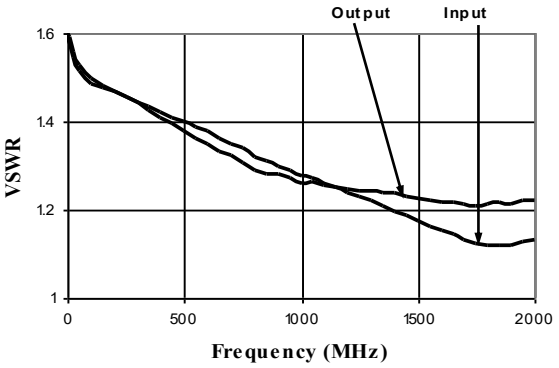
16 dB Bit vs. Temperature



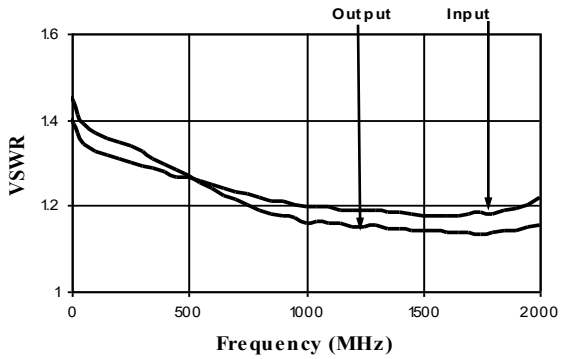
Max Attenuation vs. Temperature



VSWR @ Insertion Loss

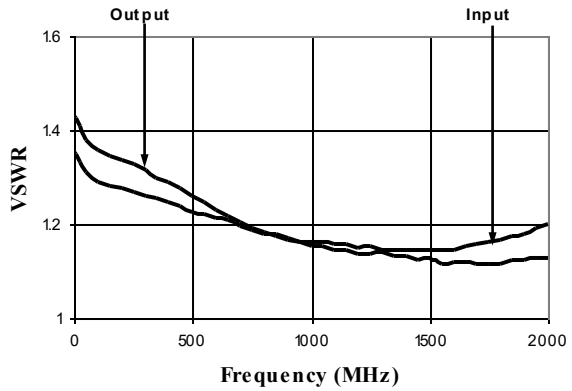


VSWR, 0.5 dB Bit

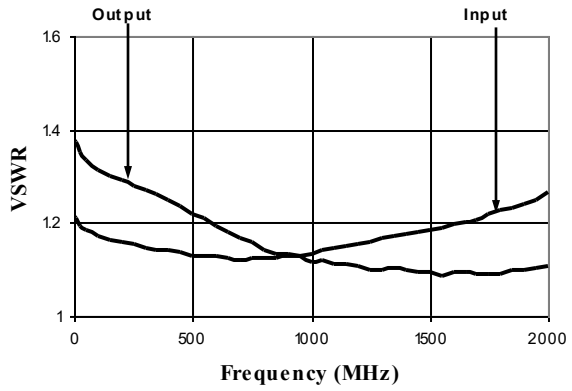


Typical Performance Curves

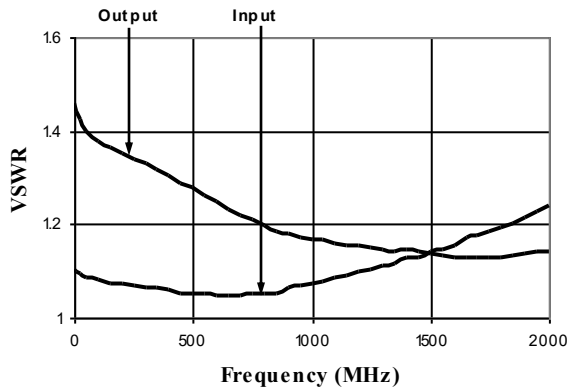
VSWR, 1 dB Bit



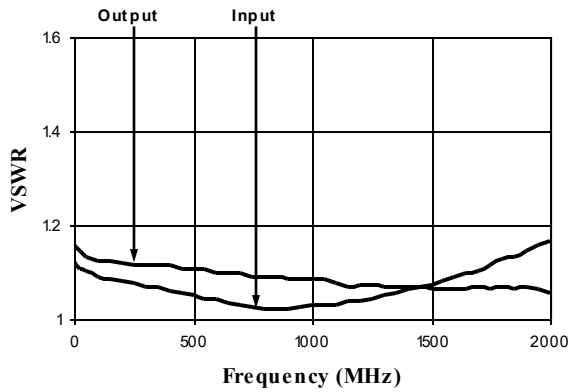
VSWR, 2 dB Bit



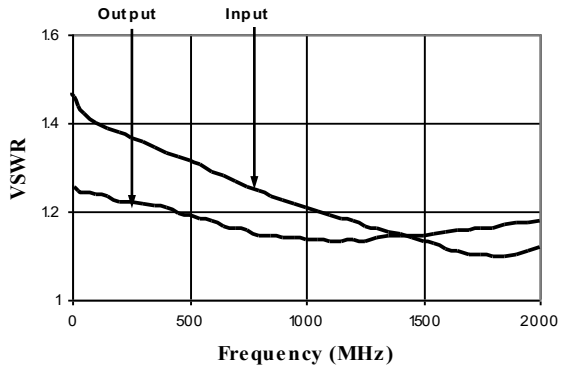
VSWR, 4 dB Bit



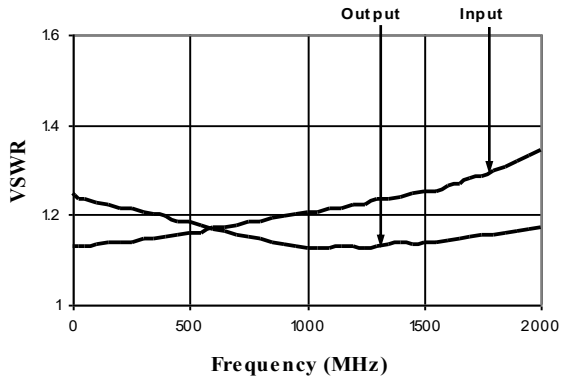
VSWR, 8 dB Bit



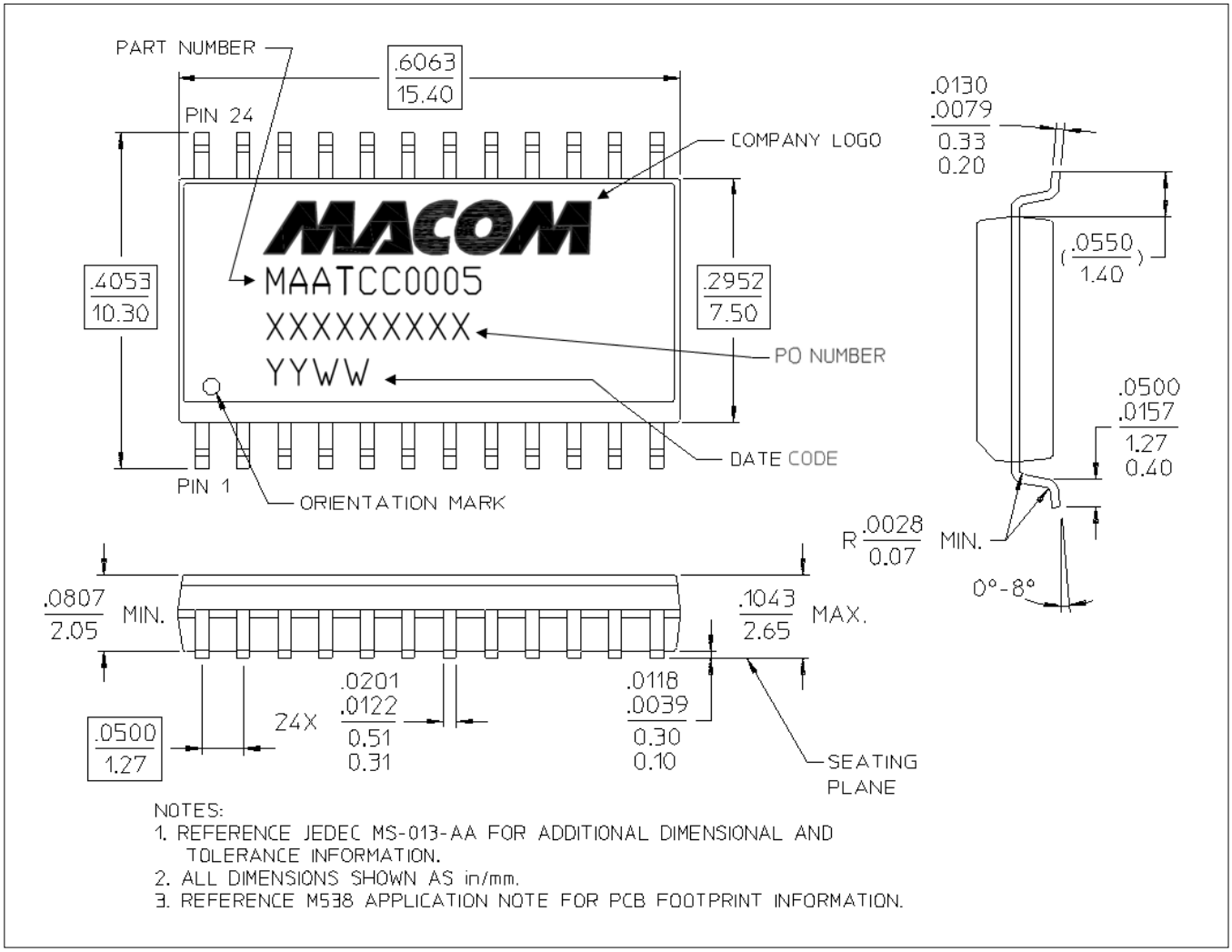
VSWR, 16 dB Bit



VSWR, Maximum Attenuation



Lead-Free, SOW-24†



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