Digital Attenuator 31.5 dB, 6-Bit, TTL Driver, DC-2.0 GHz



Rev. V4

Features

- Attenuation: 0.5 dB Steps to 31.5 dB
- Low DC Power Consumption
- Plastic SOIC, Wide Body, SMT Package .
- Integral TTL Driver •
- 50 ohm Impedance •
- Test Boards are Available
- Tape and Reel Packaging Available .
- Lead-Free SOW-24 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of AT65-0107

Description

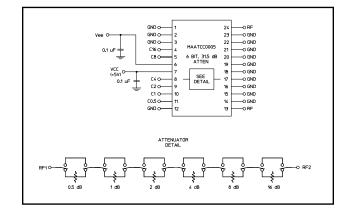
M/A-COM's MAATCC0005 is a GaAs FET 6-bit digital attenuator with a 0.5 dB minimum step size and a 31.5 dB total attenuation range. This device is in a SOIC-24 wide body, plastic surface mount package. The MAATCC0005 is ideally suited for use where accuracy, fast speed, very low power consumption and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

Ordering Information

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

Note: Reference Application Note M513 for reel size information.

Schematic with Off-Chip Components



Pin Configuration

Pin No.	Function	Pin No.	Function	
1	GND	13	RF	
2	GND	14	GND	
3	GND	15	GND	
4	C16	16	GND	
5	C8	17	GND	
6	Vee	18	GND	
7	Vcc	19	GND	
8	C4	20	GND	
9	C2	21	GND	
10	C1	22	GND	
11	C0.5	23	GND	
12	GND	24	RF	

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

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Electrical Specifications: T_A = 25°C

Parameter	Test Conditions	Frequency	Units	Units Min		Max	
Insertion Loss		DC - 1.0 GHz DC - 2.0 GHz	dB dB	— 3.1 — 3.6		3.6 4.2	
Attenuation Accuracy	Any Bit or Combination of Bits	DC - 2.0 GHz	dB	_	_	±(.3 +4% of atten.)	
VSWR	Full Range	DC - 2.0 GHz	Ratio	io —		2:1	
Switching Speed	50% Cntl to 90%/10% RF 10% to 90% or 90% to 10%	_	nS nS	_	75 20	150 50	
1 dB Compression	_	50 MHz 0.5 - 2.0 GHz	dBm dBm			_	
Input IP ₃	Two-tone inputs up to +5 dBm	50 MHz 0.5-2.0 GHz	dB dB	_	+35 +48	_	
Vcc ¹ Vee ¹		—	V V			5.25 -4.75	
V _{IL} V _{IH}	LOW-level input voltage HIGH-level input voltage	_	V 0.0 V 2.0		_	0.8 5.0	
lin (Input Leakage Current)	Vin = V _{CC} or GND	—	uA -1.		_	1.0	
Icc (Quiescent Supply Current)	Vcntrl = V _{CC} or GND	—	— uA		250	400	
∆lcc (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	—	

1. Decoupling capacitors (.1 μ F) are required on Power Supply lines.

Absolute Maximum Ratings^{2,3}

Parameter	Absolute Maximum		
Max. Input Power 0.05 GHz 0.5 - 2.0 GHz	+27 dBm +34 dBm		
V _{cc}	$-0.5 V \le V_{CC} \le +7.0 V$		
V _{EE}	$-8.5 \text{V} \le \text{V}_{\text{EE}} \le +0.5 \text{V}$		
V _{CC} - V _{EE}	$-0.5 \text{V} \leq \text{V}_{\text{CC}} - \text{V}_{\text{EE}} \leq 14.5 \text{V}$		
Vin ⁴	$-0.5V \le Vin \le V_{CC} + 0.5V$		
Operating Temperature	-40°C to +85°C		
Storage Temperature	-65°C to +125°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.

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

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components distributor

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Handling Procedures

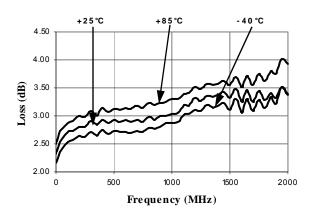
Please observe the following precautions to avoid damage:

Static Sensitivity

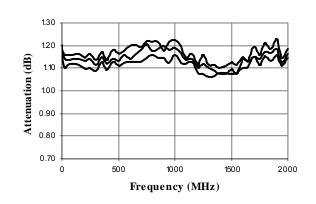
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves

Loss vs. Temperature



1 dB Bit vs. Temperature



3

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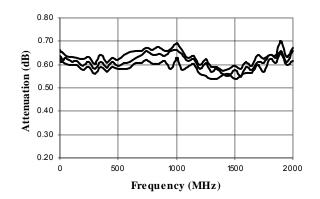
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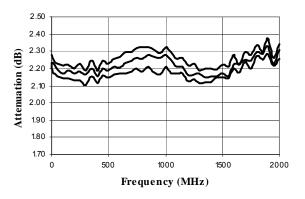
C16	C8	C4	C2	C1	C0.5	Attenuation
0	0	0	0	0	0	Loss. Reference
0	0	0	0	0	1	0.5 dB
0	0	0	0	1	0	1.0 dB
0	0	0	1	0	0	2.0 dB
0	0	1	0	0	0	4.0 dB
0	1	0	0	0	0	8.0 dB
1	0	0	0	0	0	16.0 dB
1	1	1	1	1	1	31.5 dB

0 = TTL Low; 1 = TTL High

0.5 dB Bit vs. Temperature



2 dB Bit vs. Temperature



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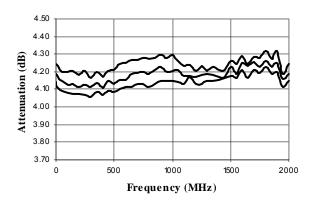
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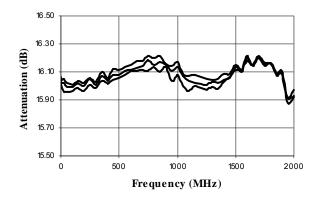
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Typical Performance Curves

4 dB Bit vs. Temperature

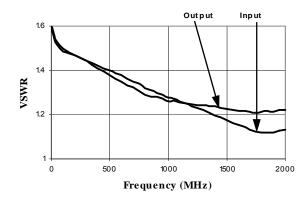


16 dB Bit vs. Temperature



VSWR @ Insertion Loss

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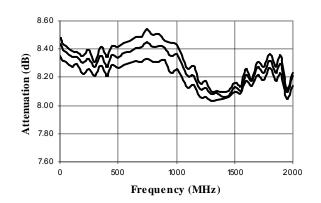


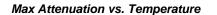
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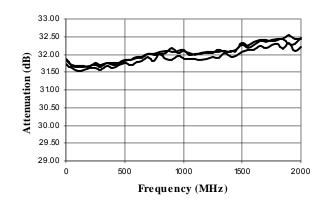
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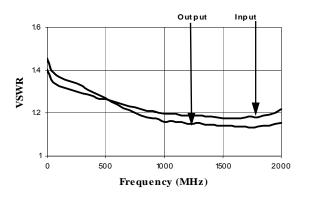








VSWR, 0.5 dB Bit



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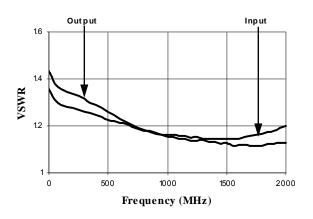
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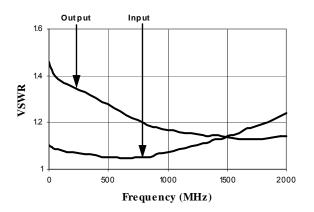
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Typical Performance Curves

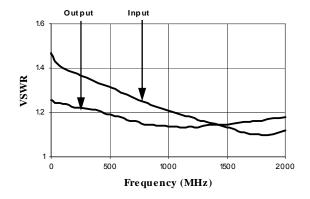
VSWR, 1 dB Bit



VSWR, 4 dB Bit



VSWR, 16 dB Bit



5

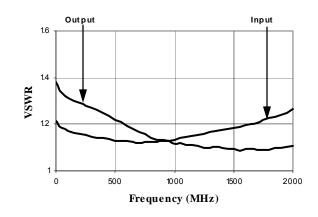
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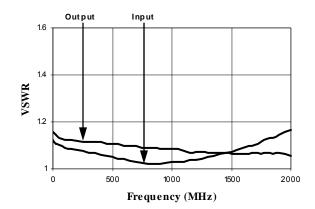


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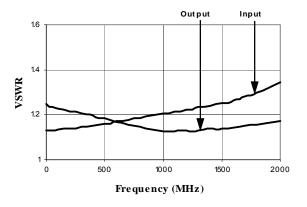
VSWR, 2 dB Bit



VSWR, 8 dB Bit



VSWR, Maximum Attenuation

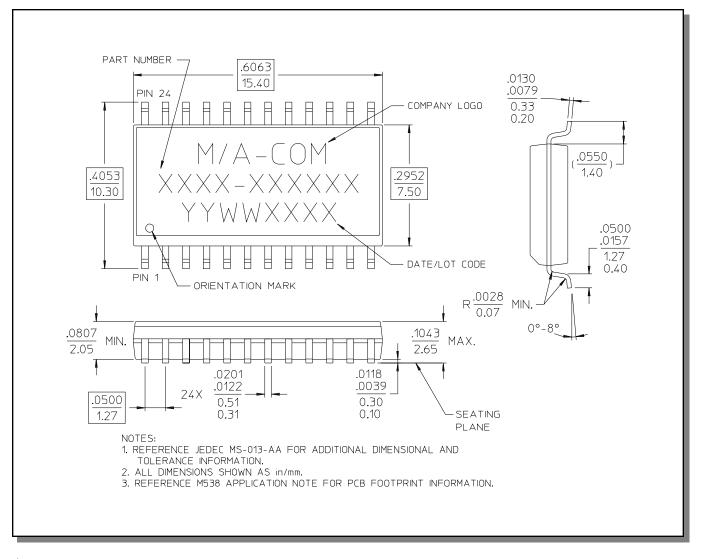


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Lead-Free, SOW-24[†]



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

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