

**Digital Attenuator**  
**15 dB, 4-Bit, TTL Driver, DC-4.0 GHz**

**MAAD-007077-000100**  
**V3**

**Features**

- Attenuation: 1 dB Steps to 15 dB
- Single Positive Supply
- Contains Internal DC to DC Converter
- Integral TTL Driver
- 50 Ohm Impedance
- Test Boards Available
- Tape and Reel Packaging Available
- Lead-Free CSP-1 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of AT90-1413

**Description**

M/A-COM's MAAD-007077-000100 is a GaAs FET 4-Bit digital attenuator with integral driver. Step size is 1 dB providing a 15 dB attenuation range. This device is in an PQFN plastic surface mount package. The MAAD-007077-000100 is suited for single supply applications where accuracy, fast speed, low power consumption and low costs are required. For dual supply designs without switching noise, use MAADCC0006.

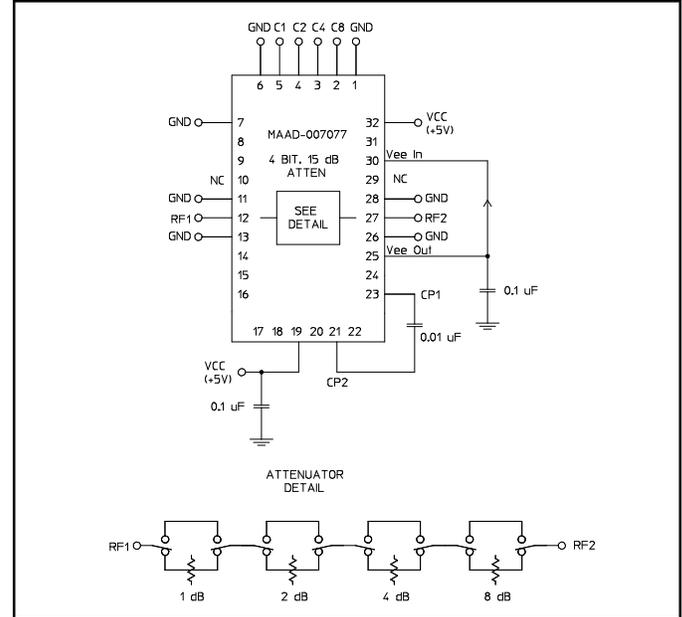
**Ordering Information**

Part Number	Package
MAAD-007077-000100	Bulk Packaging
MAAD-007077-0001TR	1000 piece reel
MAAD-007077-0001TB	Sample Test Board

Note: Reference Application Note M513 for reel size information.  
Note: Die quantity varies.

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

**Functional Schematic**



**Pin Configuration**

Pin No.	Function	Pin No.	Function
1	GND	17	NC
2	C8	18	NC
3	C4	19	Vcc
4	C2	20	N/C
5	C1	21	Cp
6	GND	22	NC
7	GND	23	Cp
8	NC	24	NC
9	NC	25	Vee <sup>2</sup>
10	NC <sup>1</sup>	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC <sup>1</sup>
14	NC	30	Vee <sup>2</sup>
15	NC	31	NC
16	NC	32	Vcc

1. Pins 10 & 29 must be isolated.
2. Vee is produced internally and requires a .1 μF cap to GND. Generated noise is typical of switching DC-DC Converters.
3. The exposed pad centered on the package bottom must be connected to RF and DC ground. (For PQFN Packages)

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

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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.

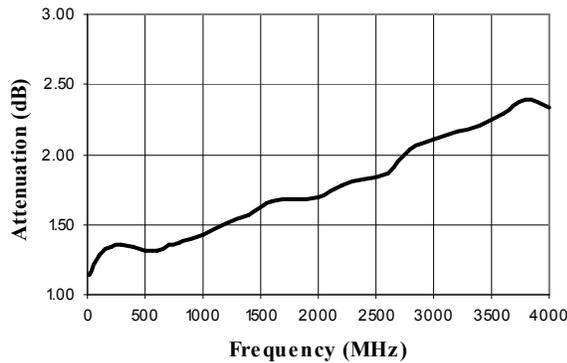
**Truth Table (Digital Attenuator)**

C8	C4	C2	C1	Attenuation
0	0	0	0	Loss, Reference
0	0	0	1	1.0 dB
0	0	1	0	2.0 dB
0	1	0	0	4.0 dB
1	0	0	0	8.0 dB
1	1	1	1	15.0 dB

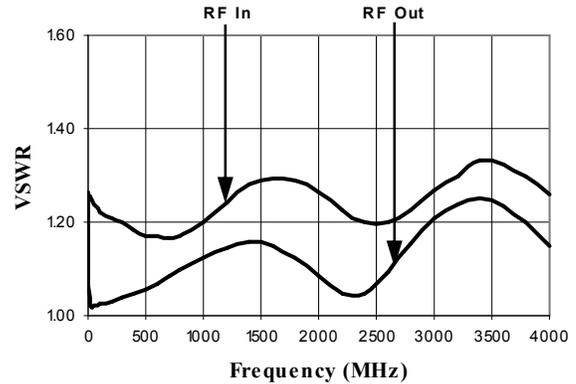
0 = TTL Low; 1 = TTL High

**Typical Performance Curves**

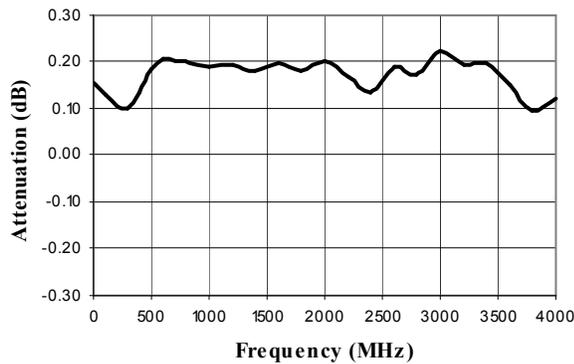
**Insertion Loss**



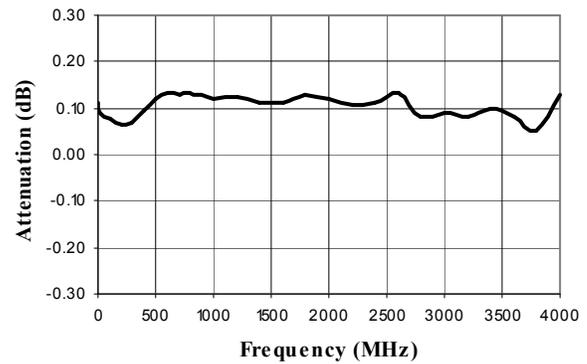
**VSWR @ Insertion Loss**



**Attenuation Error, 1 dB Bit**

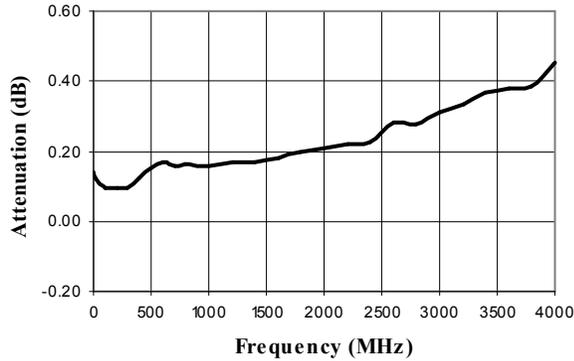


**Attenuation Error, 2 dB Bit**

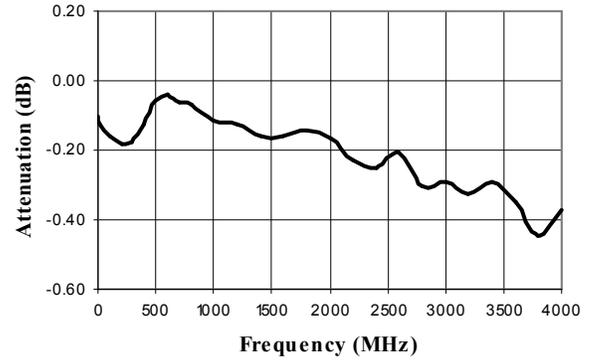


**Typical Performance Curves**

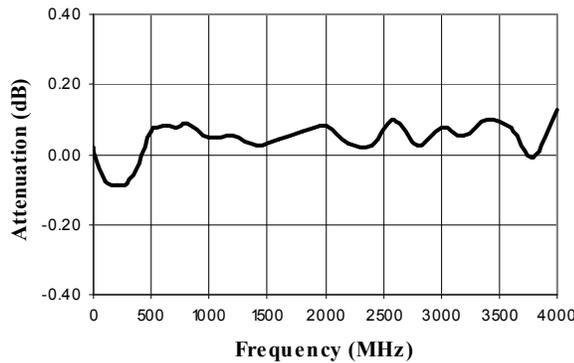
*Attenuation Error, 4 dB Bit*



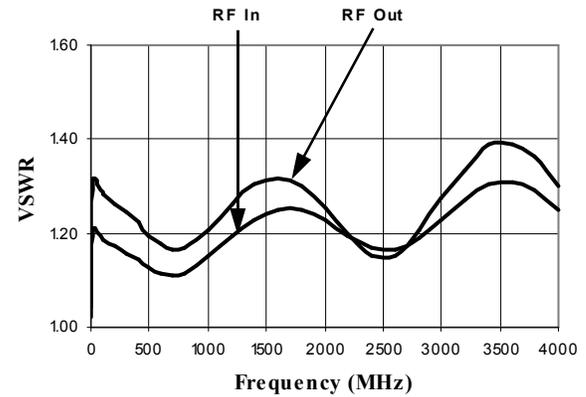
*Attenuation Error, 8 dB Bit*



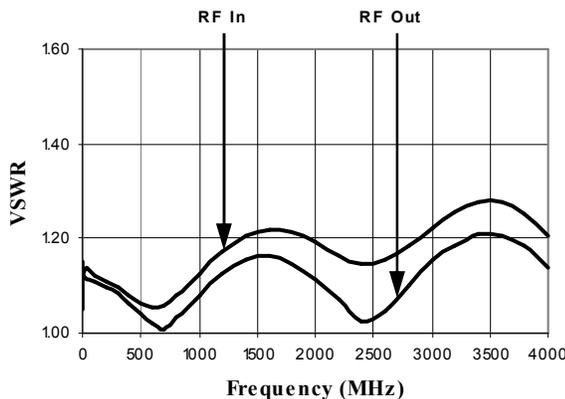
*Attenuation Error, Max. Attenuation*



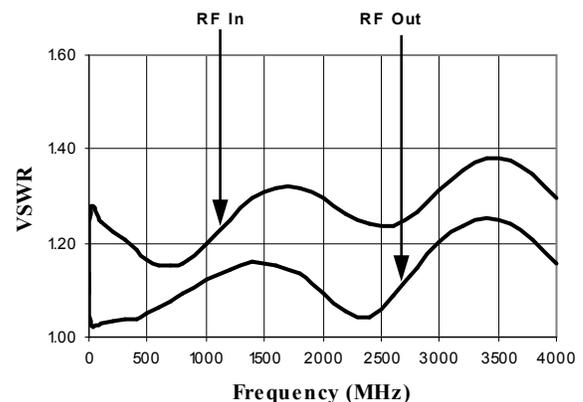
*VSWR, 1 dB Bit*



*VSWR, 2 dB Bit*



*VSWR, 4 dB Bit*

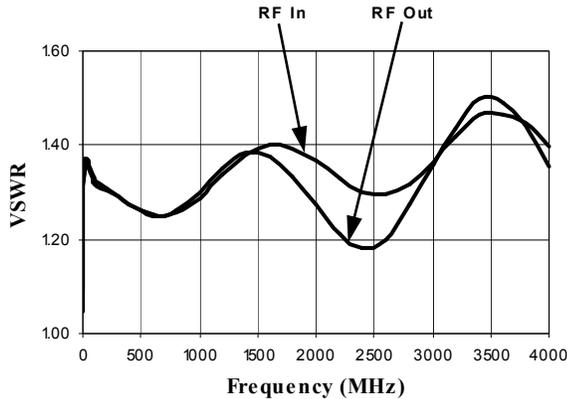


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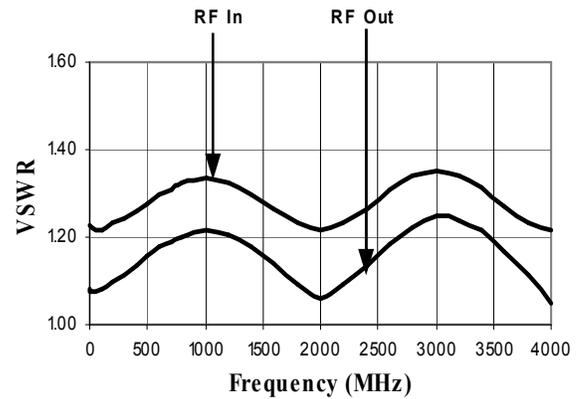
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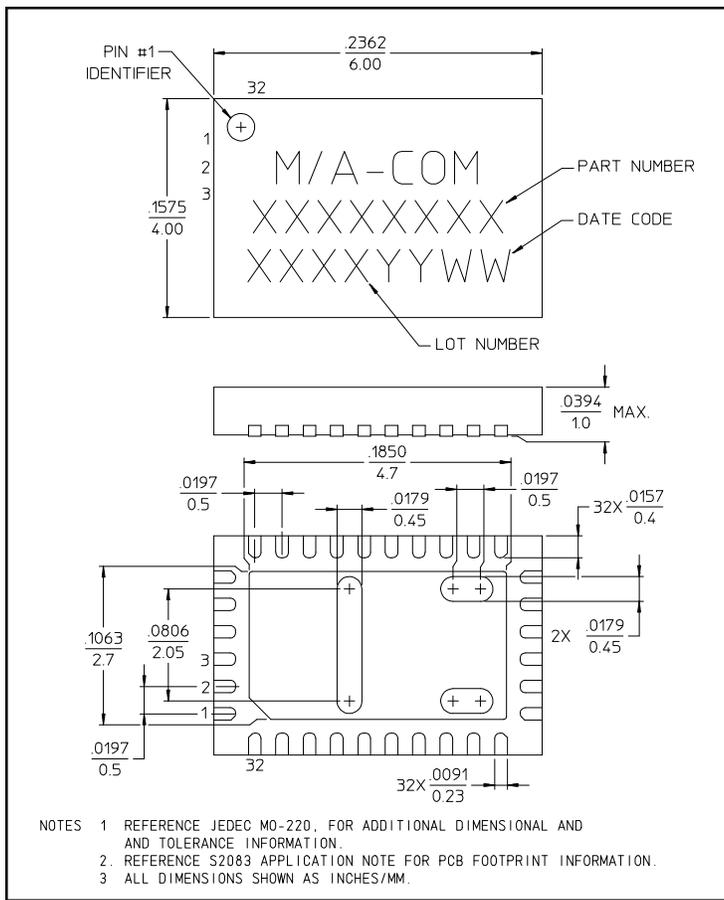
**VSWR, 8 dB Bit**



**VSWR, Maximum Attenuation**



**CSP-1, Lead-Free 4 x 6 mm, 32-lead PQFN†**



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