

**Digital Attenuator, 31 dB, 5-Bit, TTL Driver
DC - 3.0 GHz**

**AT90-0263
V9**

Features

- Attenuation: 1.0dB Steps to 31dB
- Low DC Power Consumption
- Small Footprint, JEDEC Package
- Integral TTL Driver
- 50 ohm Impedance
- Test Boards are Available
- Tape and Reel Packaging Available

Description

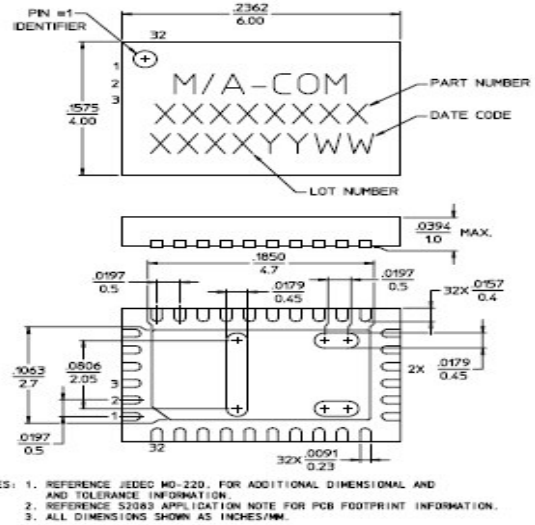
M/A-COM's AT90-0263 is a GaAs FET 5-bit digital attenuator with integral TTL driver. Step size is 1.0 dB providing 31 dB total attenuation range. This device is in a FQFP-N plastic surface mount package. The AT90-0263 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required.

Pin Configuration

Pin No.	Function	Pin No.	Function
1	GND	17	NC
2	C16	18	NC
3	C8	19	NC
4	C4	20	NC
5	C2	21	NC
6	C1	22	NC
7	GND	23	NC
8	NC	24	NC
9	NC	25	NC
10	NC ¹	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC ¹
14	NC	30	Vee
15	NC	31	NC
16	NC	32	+Vcc

1. Pins 10 and 29 must be isolated.

CSP-1



Ordering Information

Part Number	Package
AT90-0263	Bulk Packaging
AT90-0263TR	1000 piece reel
AT90-0263-TB	Units Mounted on Test Board

Note: Reference Application Note M513 for reel size information.

Truth Table

C16	C8	C4	C2	C1	Attenuation
0	0	0	0	0	Loss, Reference
0	0	0	0	1	1.0 dB
0	0	0	1	0	2.0 dB
0	0	1	0	0	4.0 dB
0	1	0	0	0	8.0 dB
1	0	0	0	0	16.0 dB
1	1	1	1	1	31.0 dB

0 = TTL Low; 1 = TTL High

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Electrical Specifications: T_A = 25°C

Parameter	Test Conditions	Frequency	Units	Min.	Typ.	Max.
Insertion Loss	—	DC - 3.0 GHz	dB	—	3.6	4.0
Attenuation Accuracy	Individual Bits 1-2-4-8-16 dB Any Combination of Bits 1 to 31 dB	DC - 3.0 GHz DC - 3.0 GHz	dB dB	— —	— —	±(.3 +5% of atten setting) ±(.5+7% of atten setting)
VSWR	Full Range	DC - 3.0 GHz	Ratio	—	2.0:1	2.2:1
Switching Speed	50% Cntl to 90%/10% RF 10% to 90% or 90% to 10%	— —	nS nS	— —	75 20	— —
1 dB Compression	— —	50 MHz 0.5 - 3.0 GHz	dBm dBm	— —	+21 +24	— —
Input IP3	Two-tone inputs up to +5 dBm	50 MHz 0.5 - 3.0 GHz	dB dB	— —	+35 +48	— —
V _{cc} -V _{ee}	— —	— —	V V	4.75 -8.0	5.0 -5.0	5.25 -4.75
Logic "0"	Sink Current is 20 µA max.	—	V	0.0	—	0.8
Logic "1"	Source Current is 20 µA max.	—	V	2.0	—	5.0
I _{cc}	V _{cc} min to max, Logic "0" or "1"	—	mA	—	0.2	6
-I _{ee}	-V _{ee} min to max, Logic "0" or "1"	—	mA	—	-0.2	-1
Thermal Resistance θ _{JA}	—	—	°C/W	—	35	—

Absolute Maximum Ratings³

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz 0.5 - 3.0 GHz	+27 dBm +34 dBm
Supply Voltages V _{cc} V _{ee}	-0.5V ≤ V _{cc} ≤ 5.5V -8.5V ≤ V _{cc} ≤ 0.5V
Logic Voltage ⁴	-0.5V to V _{cc} +0.5V
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.

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

Handling Procedures

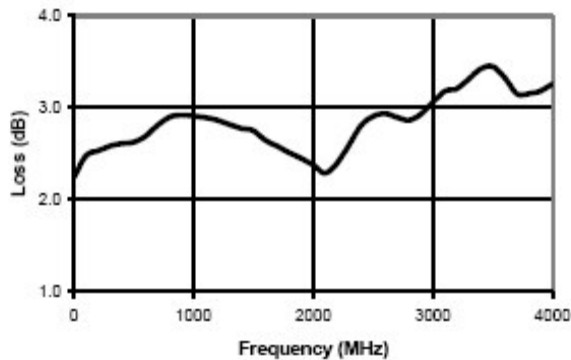
Please observe the following precautions to avoid damage:

Static Sensitivity

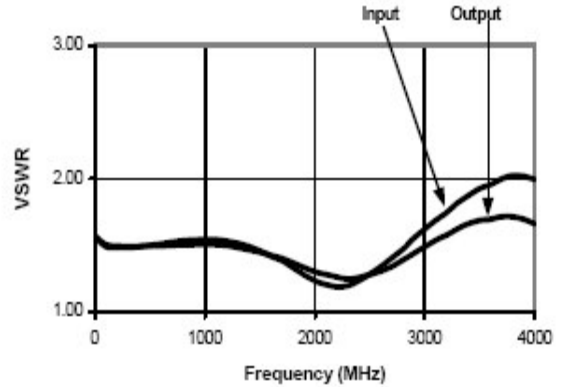
GMIC Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves @ 25°C

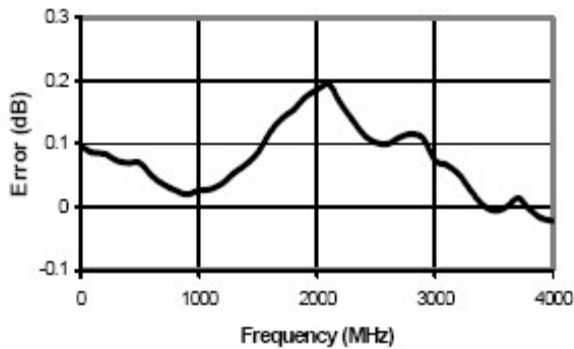
Insertion Loss



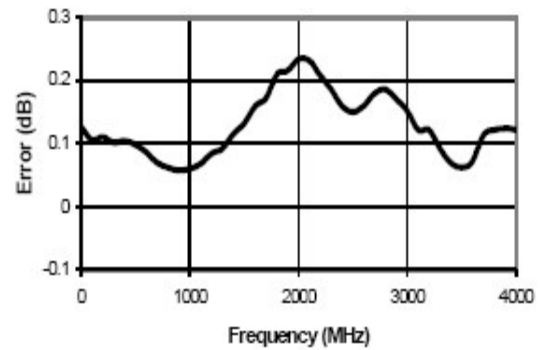
VSWR @ Insertion Loss



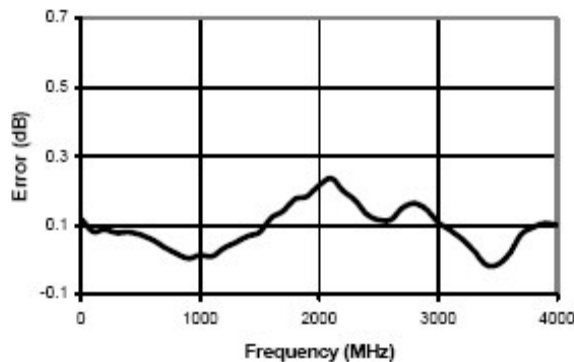
Attenuation Error, 1 dB Bit



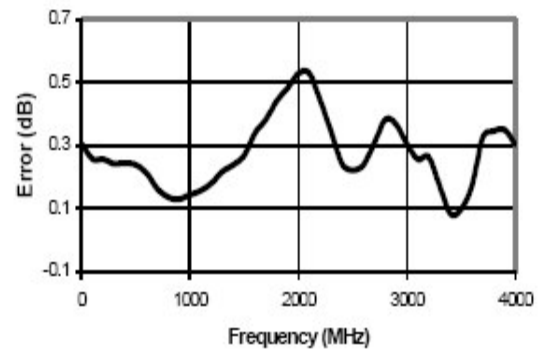
Attenuation Error, 2 dB Bit



Attenuation Error, 4 dB Bit



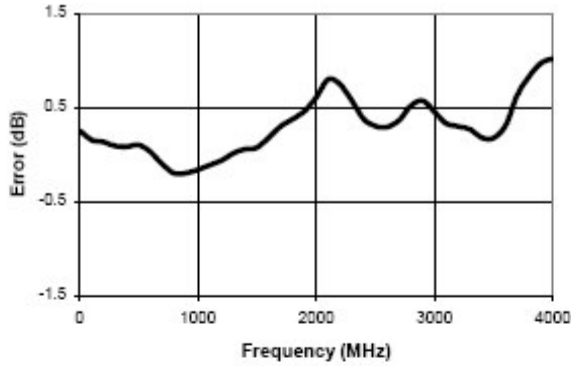
Attenuation Error, 8 dB Bit



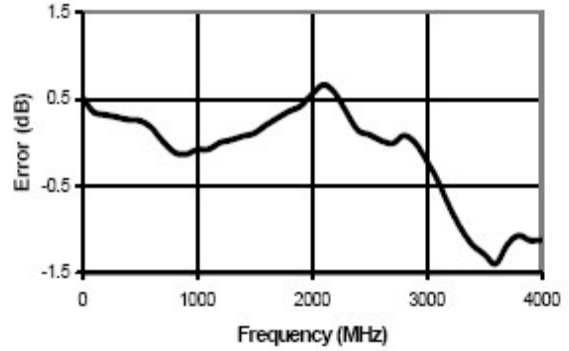
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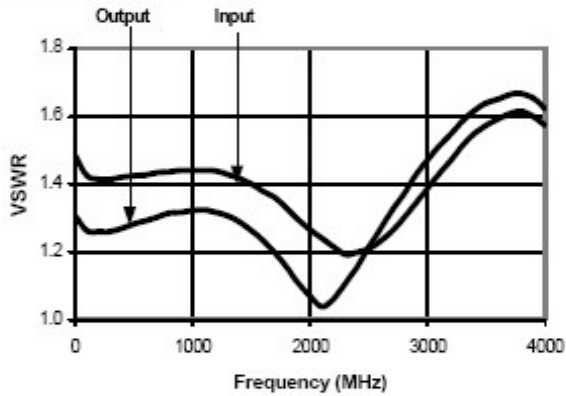
Attenuation Error, 16 dB Bit



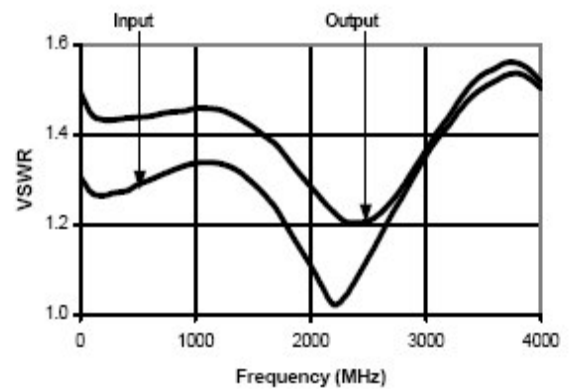
Attenuation Error, Max. Attenuation



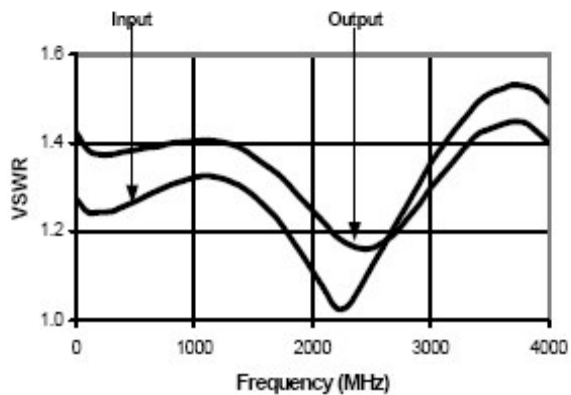
VSWR, 1 dB Bit



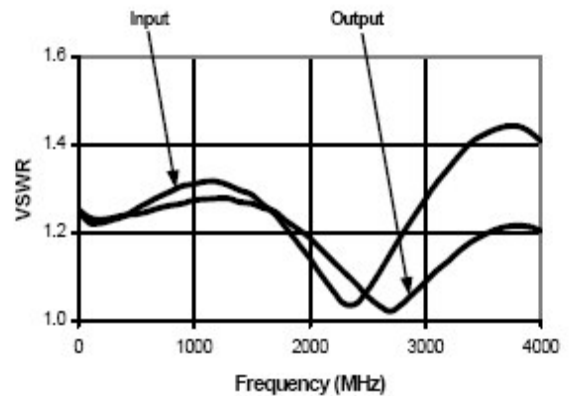
VSWR, 2 dB Bit



VSWR, 4 dB Bit



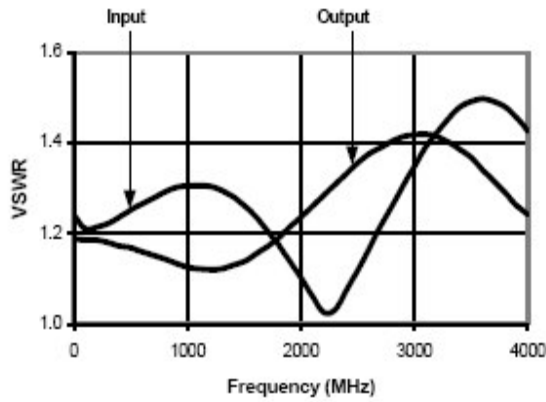
VSWR, 8 dB Bit



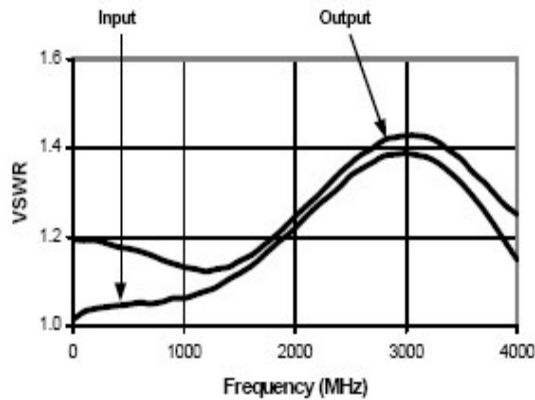
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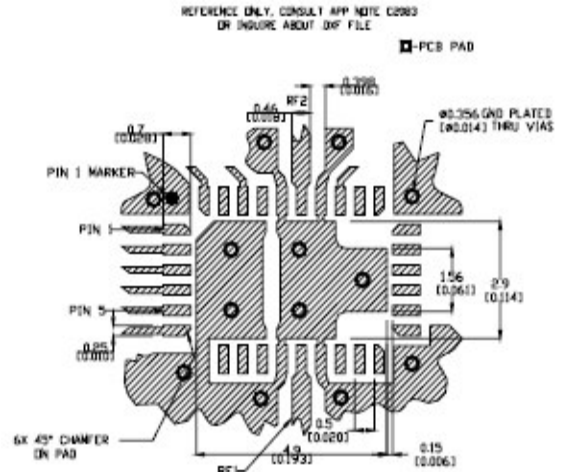
VSWR, 16 dB Bit



VSWR, Maximum Attenuation



Recommended PCB Configuration5



RECOMMENDED PCB BOARD LAYOUT
CIRCUIT MATERIAL: FR-4 TETRA II 800 PPM THICK
DRILLING VIAS: 0.34/0.14
RF PORTS ARE 50 OHMS

5. Application Note S2083 is available on line at www.macom.com

Block Diagram

