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

AT90-0263
V9

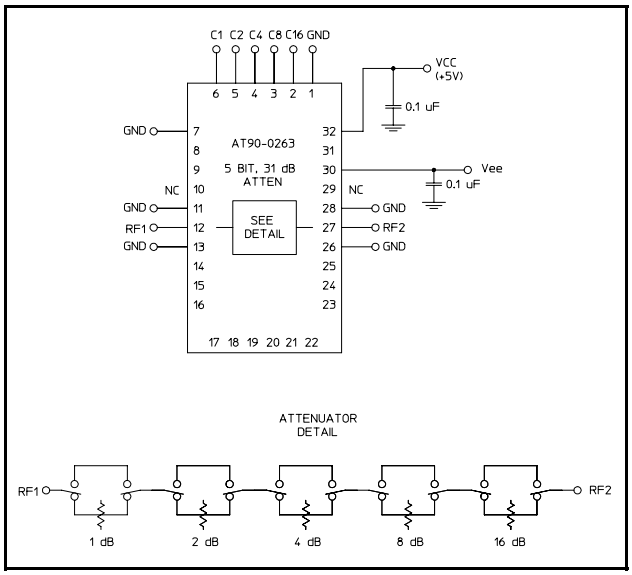
Features

- 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.

Block Diagram



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.

Absolute Maximum Ratings [1]

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz 0.5 - 3.0 GHz	 +27 dBm +34 dBm
+Vcc	-0.5 V ≤ Vcc ≤ 5.5 V
Vee	-8.5V ≤ Vee ≤ 0.5 V
Logic Voltages [2]	-0.5 to +Vcc + 0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

Pin Configuration

Pin #	Function	Pin #	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[3]	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC[3]
14	NC	30	Vee
15	NC	31	NC
16	NC	32	+Vcc

3. Pins 10 & 29 must be isolated

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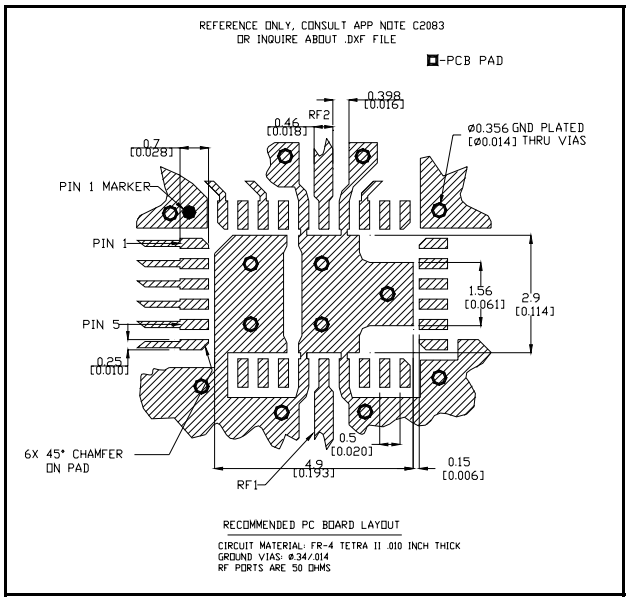
Electrical Specifications T_A = +25°C

Parameter	Test Conditions	Frequency	Units	Min	Typical	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	150 50
1 dB Compression	— —	50 MHz 0.5 - 3.0 GHz	dBm dBm	— —	+21 +24	— —
Input IP_3	Two-tone inputs up to +5 dBm	50 MHz 0.5 - 3.0 GHz	dB dB	— —	+35 +48	— —
+Vcc Vee	— —	— —	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
Icc	Vcc min to max, Logic “0” or “1”	—	mA	—	0.2	6
-Iee	-Vee min to max, Logic “0” or “1”	—	mA	—	-0.2	-1
Thermal Resistance θjc	—	—	°C/W	—	35	—

Recommended PCB Layout [4]



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

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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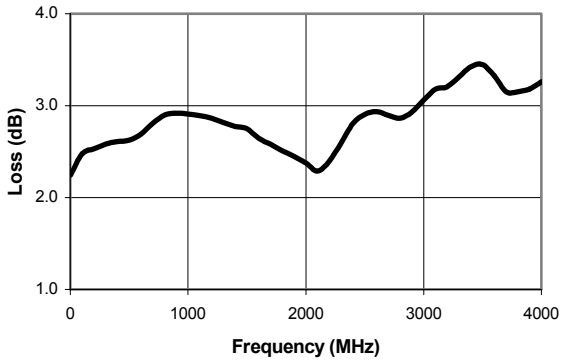
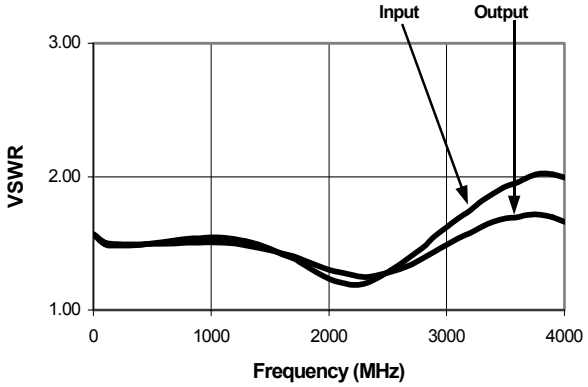
Typical Performance Curves

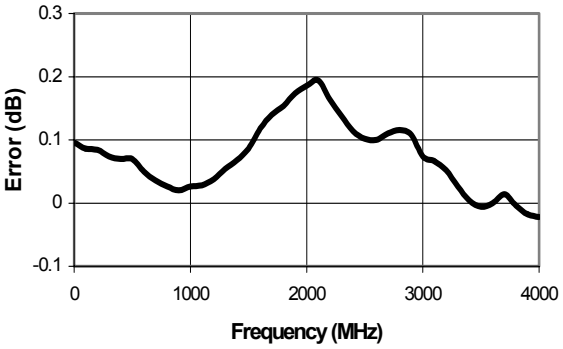
Insertion Loss



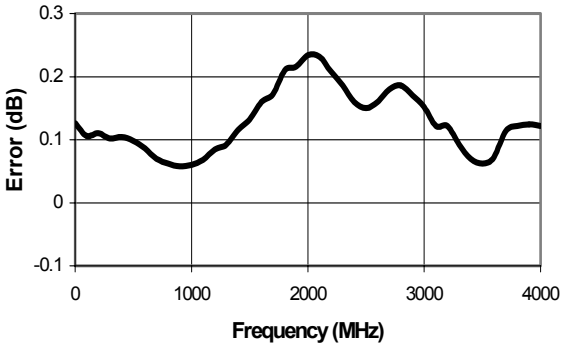
VSWR @ Insertion Loss



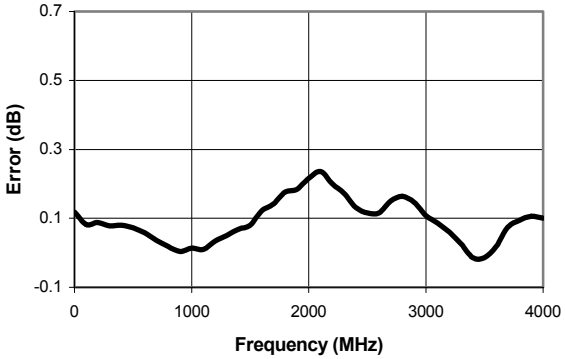
Attenuation Error, 1 dB Bit



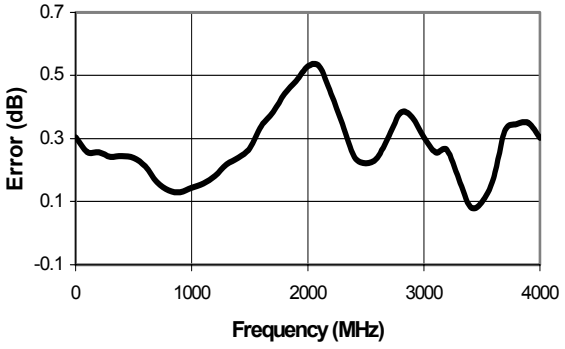
Attenuation Error, 2 dB Bit



Attenuation Error, 4 dB Bit



Attenuation Error, 8 dB Bit



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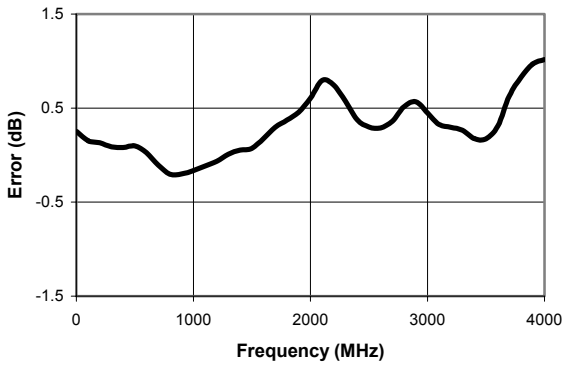
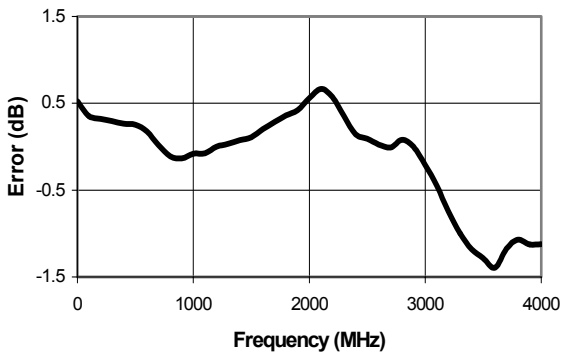
Typical Performance Curves

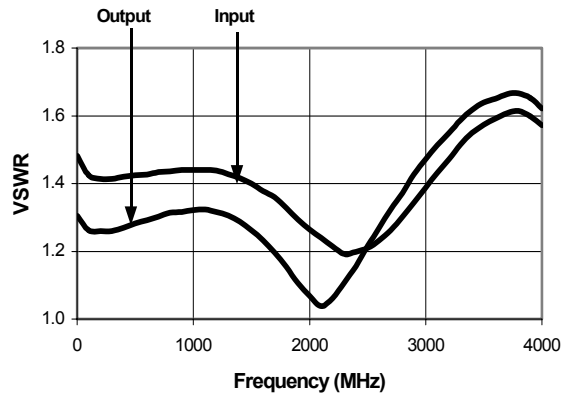
Attenuation Error, 16 dB Bit



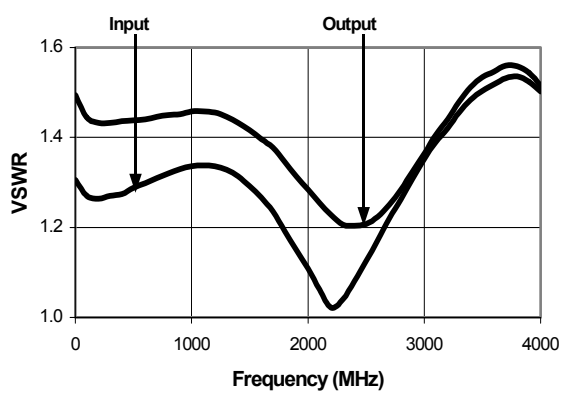
Attenuation Error, Max. Attenuation



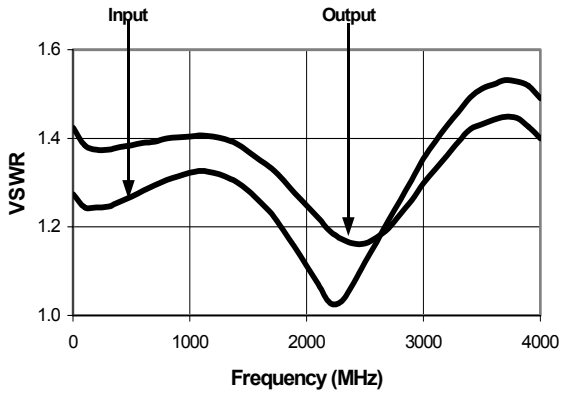
VSWR, 1 dB Bit



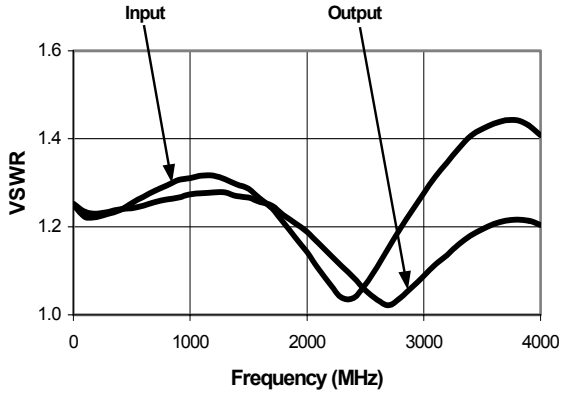
VSWR, 2 dB Bit



VSWR, 4 dB Bit



VSWR, 8 dB Bit



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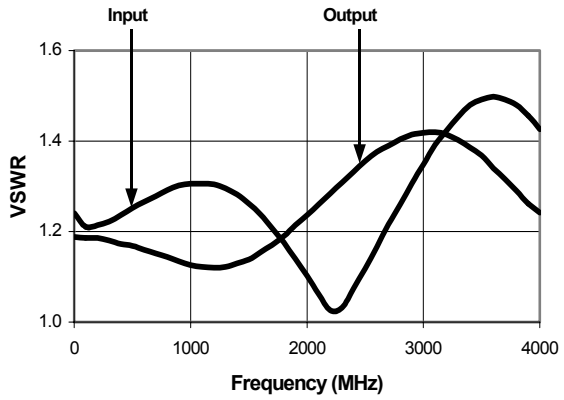
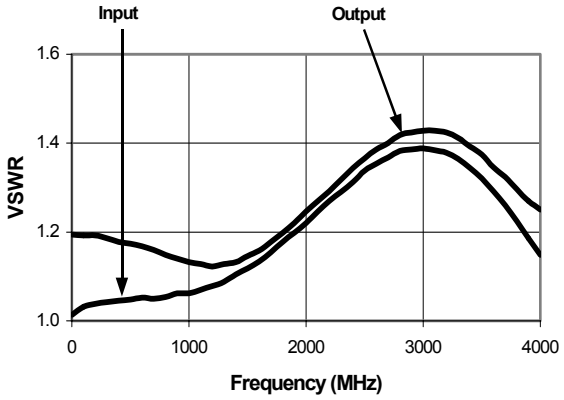
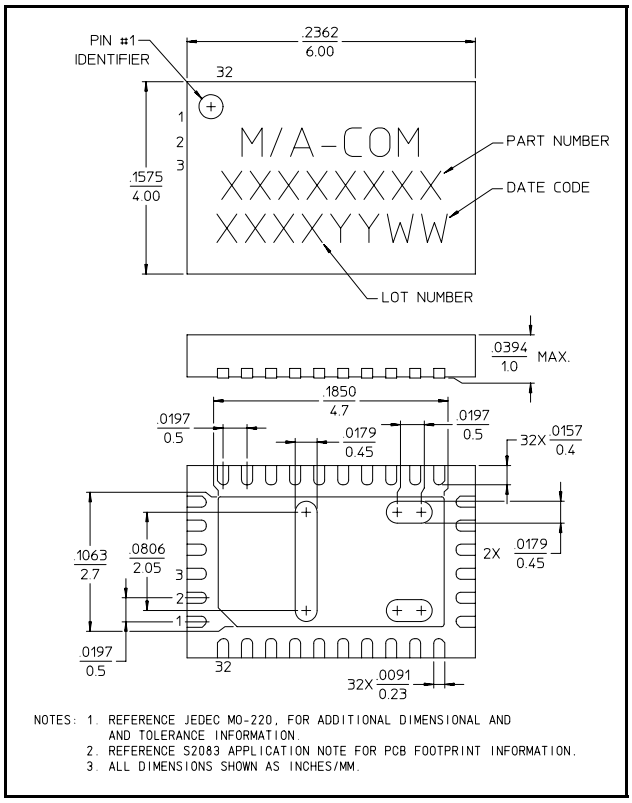
VSWR, 16 dB Bit



VSWR, Maximum Attenuation



CSP-1



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.

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