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

AT90-1263
V12

Features

- Attenuation: 1.0dB Steps to 31dB
- Single Positive Supply
- Contains internal DC to DC converter
- Low DC Power Consumption
- Small Footprint, JEDEC Package
- Integral TTL Driver
- 50 ohm Impedance

Description

M/A-COM's AT90-1263 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 an FQFP-N plastic surface mount package. The AT90-1263 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required. For dual supply designs without DC-DC converter noise, use AT90-0263.

Ordering Information

Part Number	Package
AT90-1263	Bulk Packaging
AT90-1263TR	1000 piece reel
AT90-1263-TB	Units Mounted on Test Board

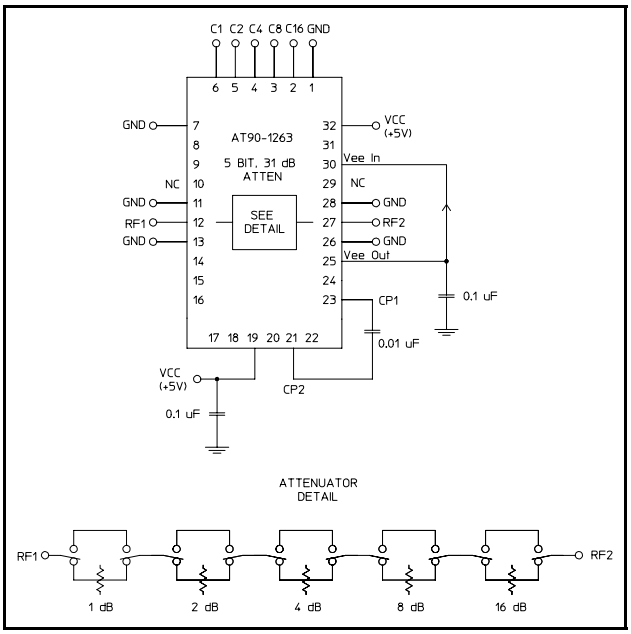
Note: Reference Application Note M513 for reel size information.

Absolute Maximum Ratings [1,2]

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
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.

Block Diagram



Pin Configuration

Pin #	Function	Pin #	Function
1	GND	17	NC
2	C16	18	NC
3	C8	19	+Vcc[4]
4	C4	20	NC
5	C2	21	CP2[6]
6	C1	22	NC
7	GND	23	CP1[6]
8	NC	24	NC
9	NC	25	Vee[5]
10	NC[3]	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC[3]
14	NC	30	Vee[5,7]
15	NC	31	NC
16	NC	32	+Vcc[4,8]

3. Pins 10 & 29 must be isolated
4. Pin 19 must be connected to Pin 32
5. Pin 25 must be connected to Pin 30
6. .01µF cap must be connected between Pins 21 and 23
7. The negative voltage Vee is produced internally and requires a 0.1µF cap to GND. Generated noise is typical of switching DC-DC Converters.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
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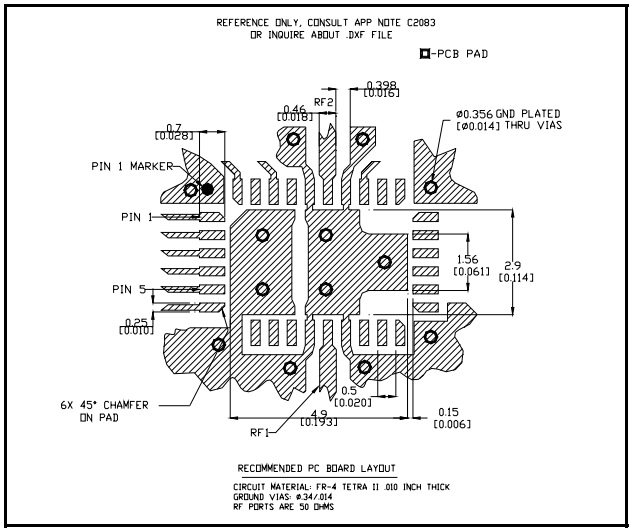
Electrical Specifications T_A = +25°C

Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
Insertion Loss	—	DC - 3.0 GHz	dB	—	3.5	3.8
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	—	—	V	4.75	5.0	5.25
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 [9]	Vcc min to max, Logic “0” or “1”	—	mA	—	6	10
Turn-on Current [10]	For guaranteed start-up	—	mA	—	—	125
Switching Noise	Generated from DC-DC Converter with recommended capacitors	3.5 MHz	dBm	—	-93	—
Thermal Resistance θjc	—	—	°C/W	—	35	—

9. During turn-on, the device requires an initial start up current (Icc) specified as “Turn-on Current”. Once operational, Icc will drop to the specified levels.
10. The DC-DC converter is guaranteed to start in 100 µs as long as the power supplies have the maximum turn-on current available for start up.

Recommended PCB Layout [11]



11. 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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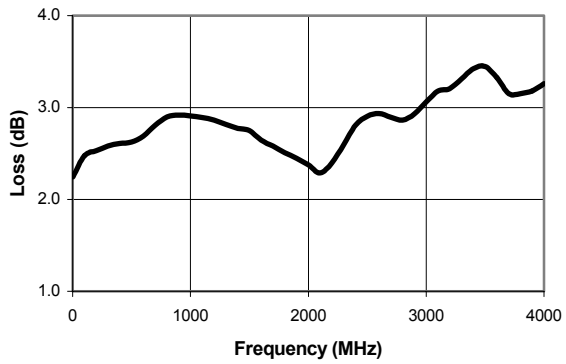
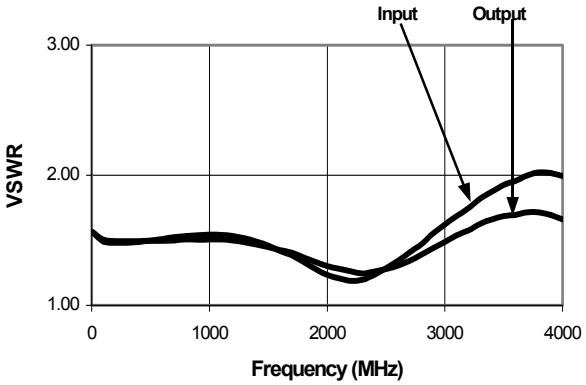
Typical Performance Curves

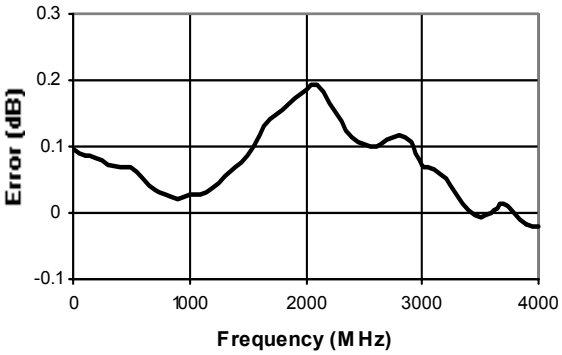
Insertion Loss



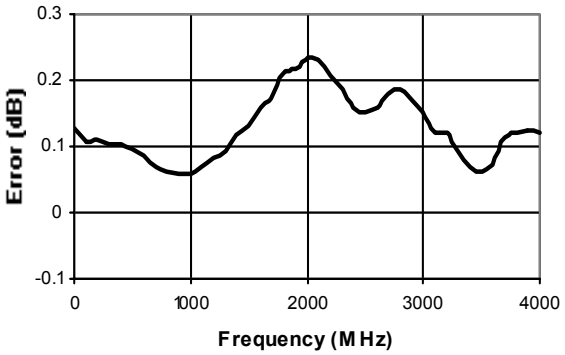
VSWR @ Insertion Loss



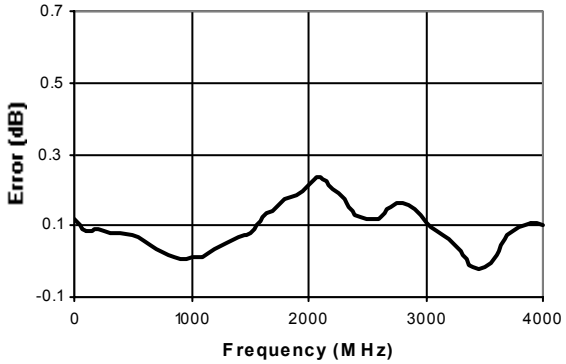
Attenuation Error, 1 dB Bit



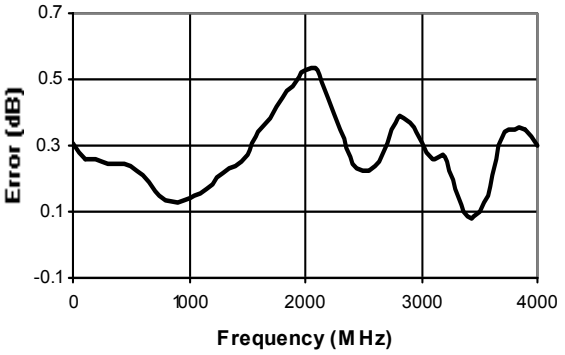
Attenuation Error, 2 dB Bit



Attenuation Error, 4 dB Bit



Attenuation Error, 8 dB Bit



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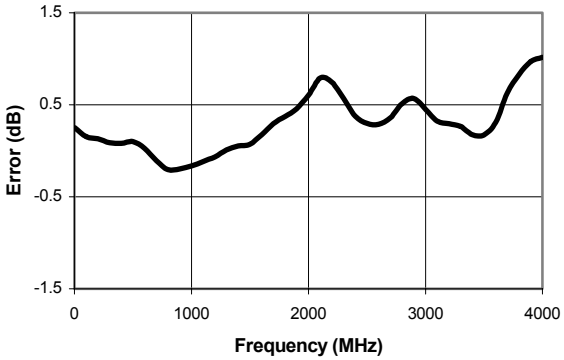
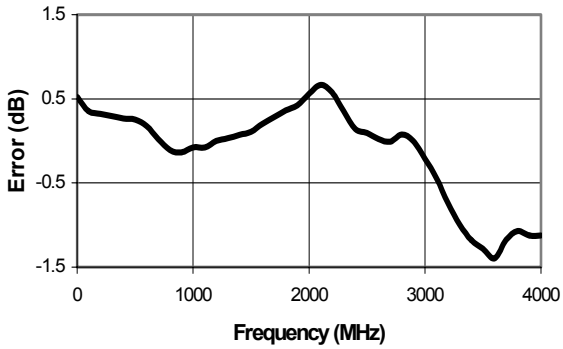
Typical Performance Curves

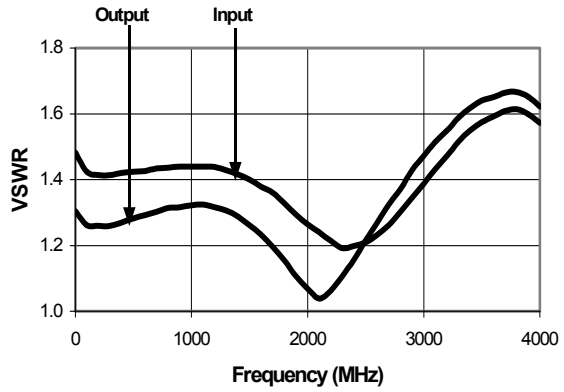
Attenuation Error, 16 dB Bit



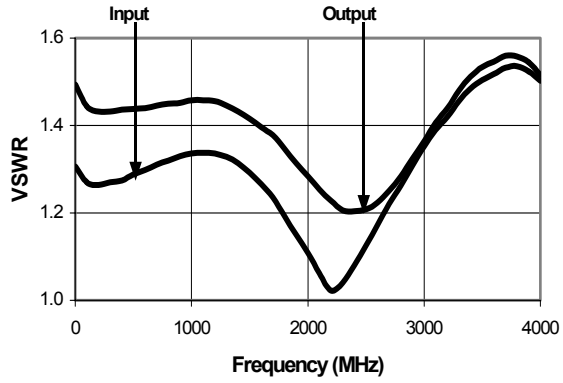
Attenuation Error, Max. Attenuation



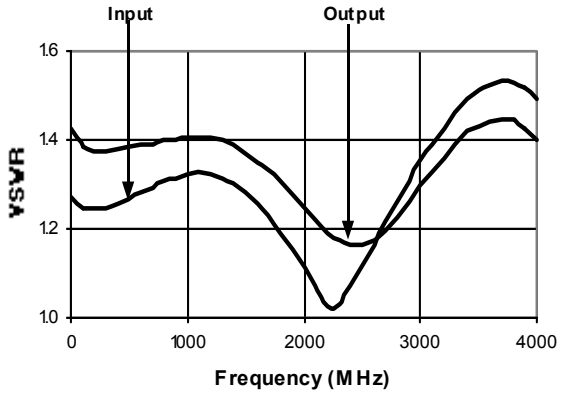
VSWR, 1 dB Bit



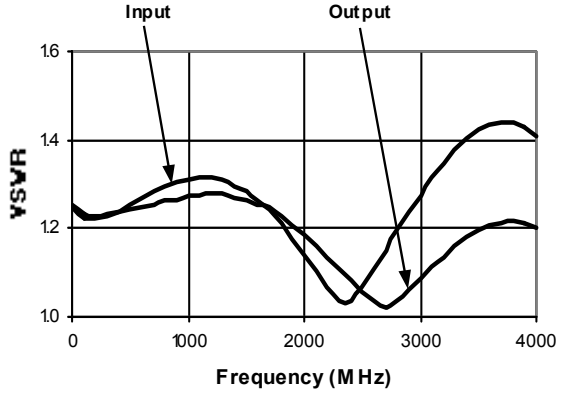
VSWR, 2 dB Bit



VSWR, 4 dB Bit



VSWR, 8 dB Bit



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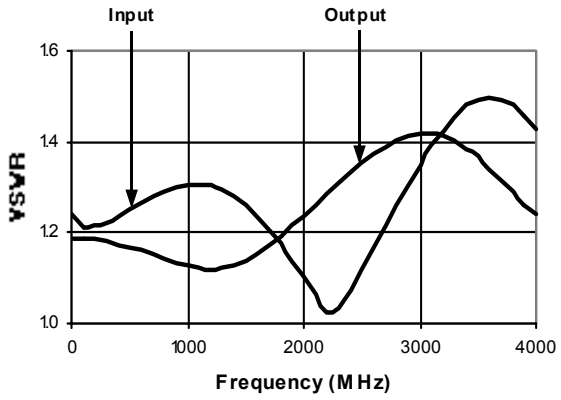
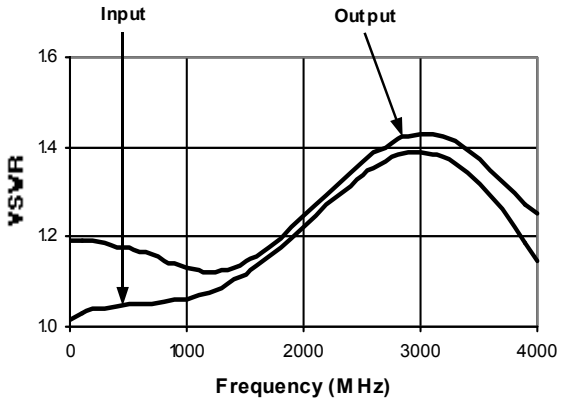
Typical Performance Curves

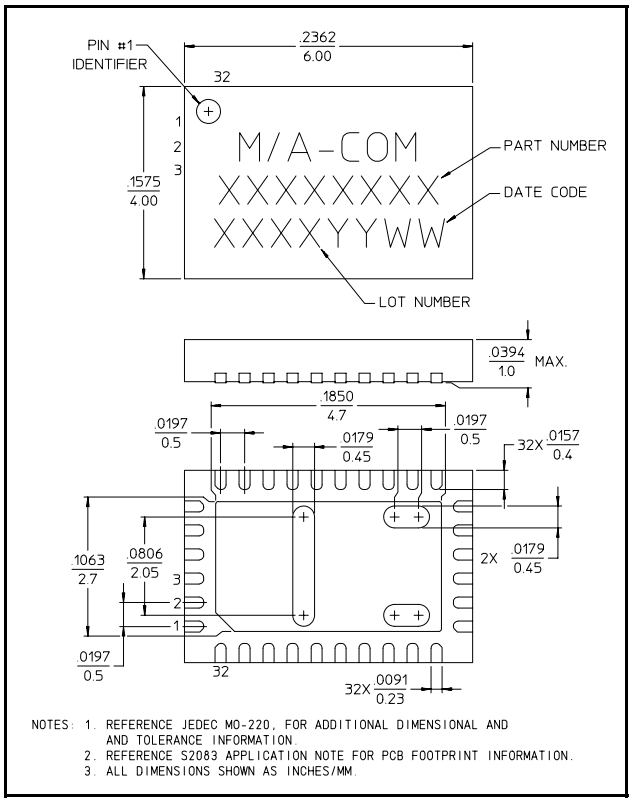
VSWR, 16 dB Bit



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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