



Digital Attenuator, 30 dB, 4-Bit, TTL Driver, DC - 2.5 GHz

V 1.00

AT90-1233

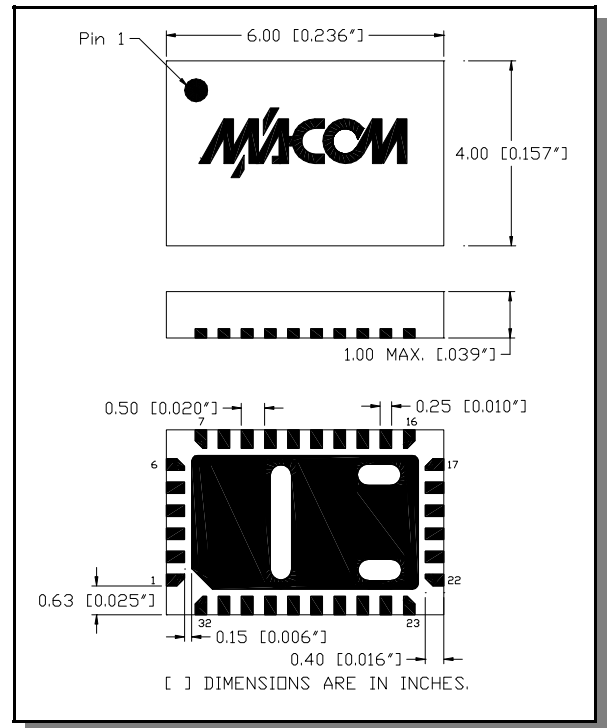
Features

- Attenuation: 2 dB Steps to 30 dB
- Single Positive Supply
- Contains Internal DC to DC Converter
- Small Footprint, JEDEC Package
- Integral TTL Driver
- 50 Ohm Impedance
- Test Boards Available
- Tape and Reel Packaging Available

Description

M/A-COM's AT90-1233 is a GaAs FET 4-Bit digital attenuator with integral driver. Step size is 2 dB providing a 30 dB attenuation range. This device is in an FQFP-N plastic surface mount package. The AT90-1233 is suited for single supply applications where accuracy, fast speed, low power consumption and low costs are required.

CSP-1



Electrical Specifications $T_A = +25^\circ\text{C}$

Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
Insertion Loss	—	DC - 2.5 GHz	dB	—	2.7	3.0
Attenuation Accuracy	Individual Bits or Combination of Bits	DC - 2.5 GHz	dB	—	—	$\pm(.3 + 5\%$ of atten setting)
VSWR	Full Range	DC - 2.5 GHz	Ratio	—	1.5:1	1.8:1
Switching Speed	50% Cntl to 90%/10% RF 10% to 90% or 90% to 10%	—	nS	—	75	150
		—	nS	—	20	50
1 dB Compression	—	50 MHz	dBm	—	+21	—
		0.5 - 2.5 GHz	dBm	—	+29	—
Input IP_3	Two-tone inputs up to +5 dBm	50 MHz	dB	—	+35	—
		0.5 - 2.5 GHz	dB	—	+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	Vcc min to max, Logic "0" or "1"	—	mA	—	6	10

Pin Configuration

Pin No.	Function	Pin No.	Function
1	GND	17	N/C
2	C16	18	N/C
3	C8	19	+Vcc ²
4	C4	20	N/C
5	C2	21	Cp ⁴
6	GND	22	N/C
7	GND	23	Cp ⁴
8	N/C	24	N/C
9	N/C	25	-VEE ³
10	N/C ¹	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	N/C ¹
14	N/C	30	-VEE ^{3,5}
15	N/C	31	N/C
16	N/C	32	+Vcc ^{2,6}

1. Pins 10 and 29 must be isolated.
2. Pin 19 must be connected to Pin 32.
3. Pin 25 must connect to Pin 30.
4. A .01 µF cap must be connected between Pins 21 and 23.
5. -VEE is produced internally and requires a .1 µF cap to GND.
6. +Vcc requires a .1 µF cap to GND.

Truth Table

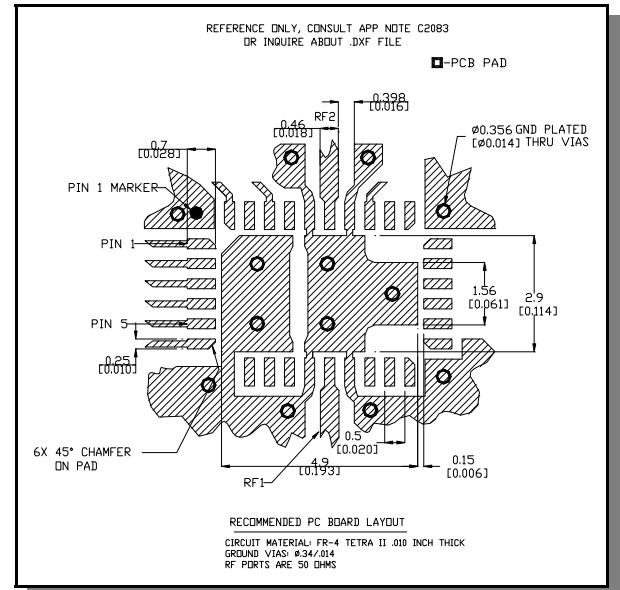
C16	C6	C4	C2	Attenuation
0	0	0	0	Loss, Reference
0	0	0	1	2.0 dB
0	0	1	0	4.0 dB
0	1	0	0	8.0 dB
1	0	0	0	16.0 dB
1	1	1	1	30.0 dB

0 = TTL Low; 1 = TTL High

Ordering Information

Part Number	Package
AT90-1233	Bulk Packaging
AT90-1233TR	Tape and Reel (1K Reel)
AT90-1233-TB	Units Mounted on Test Board

Recommended PCB Layout ⁷



7. Application Note C2083 is available on line at www.macom.com

Absolute Maximum Ratings ⁸

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz	+27 dBm
0.5 - 2.5 GHz	+34 dBm
+Vcc	+5.5V
-Vee	-8.5V
Logic Voltages ⁹	-0.5 to +Vcc + 0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

8. Operation of this device above any one of these parameters may cause permanent damage.
9. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

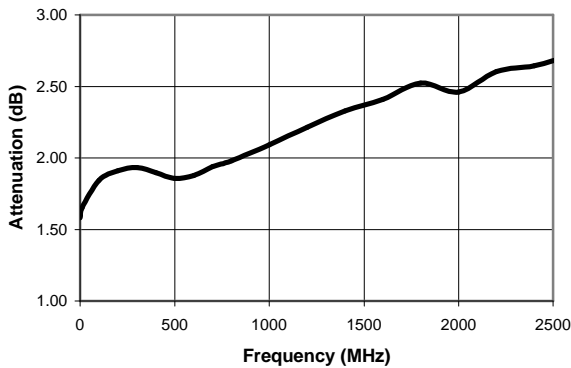
Specifications subject to change without notice.

- North America: Tel. (800) 366-2266
- Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298
- Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

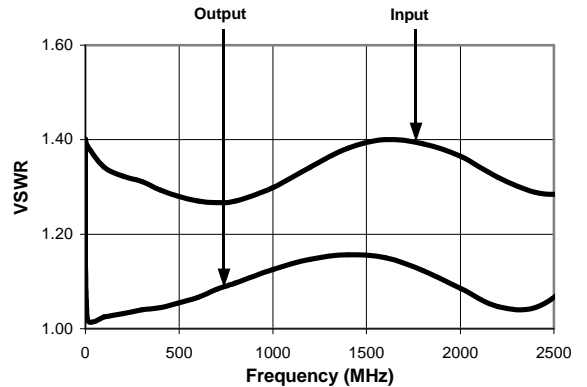
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Typical Performance Curves

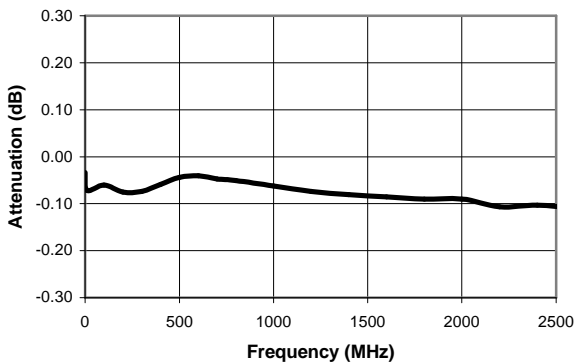
Insertion Loss



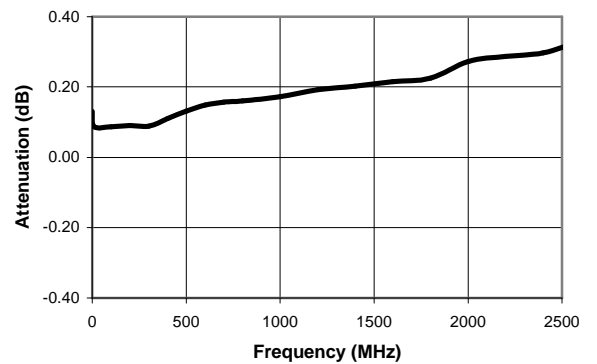
VSWR @ Insertion Loss



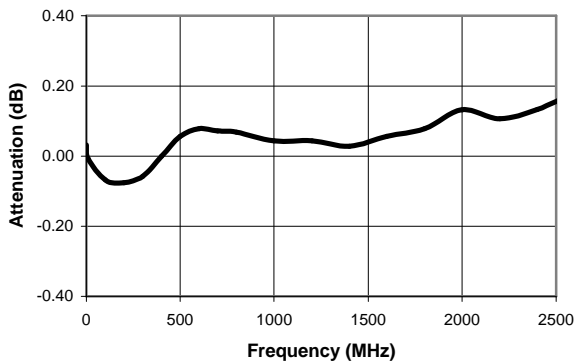
Attenuation Error, 2 dB Bit



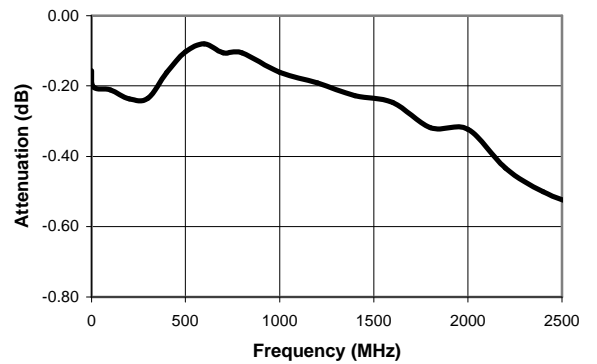
Attenuation Error, 4 dB Bit



Attenuation Error, 8 dB Bit



Attenuation Error, 16 dB Bit



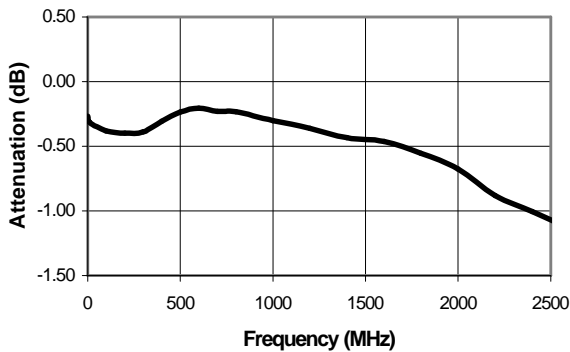
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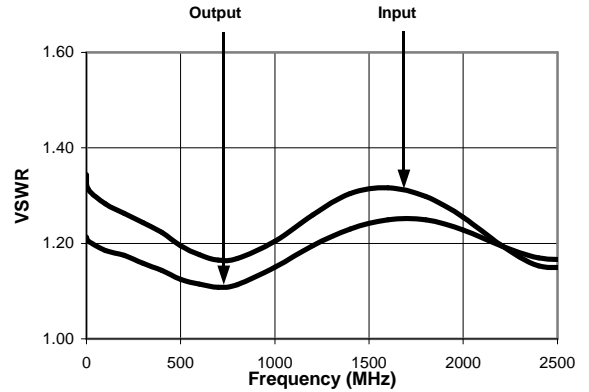
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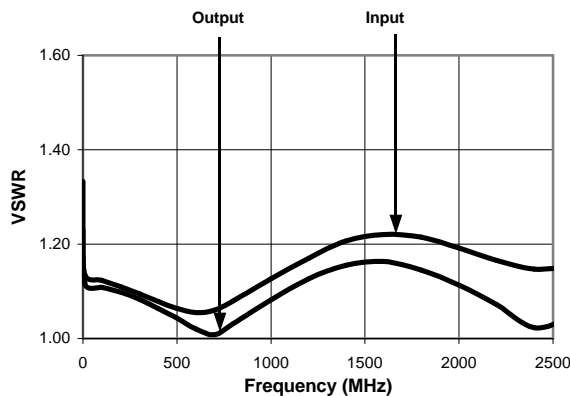
Attenuation Error, Max. Attenuation



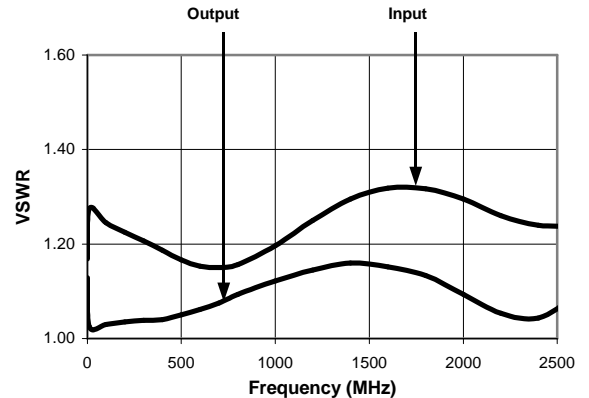
VSWR, 2 dB Bit



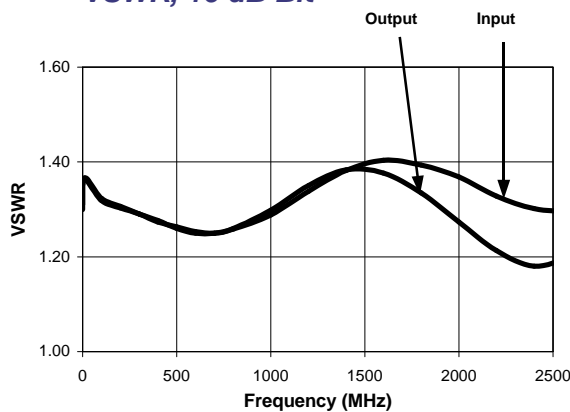
VSWR, 4 dB Bit



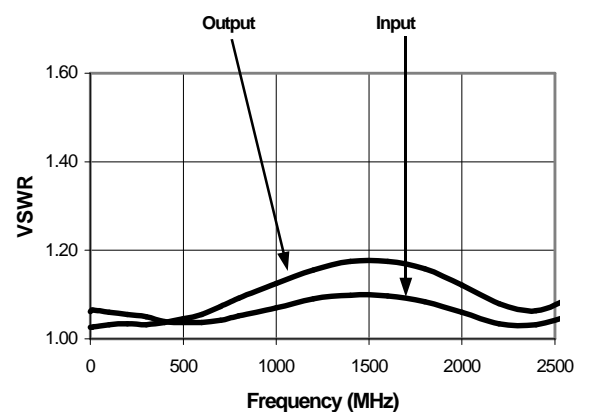
VSWR, 8 dB Bit



VSWR, 16 dB Bit



VSWR, Maximum Attenuation



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