

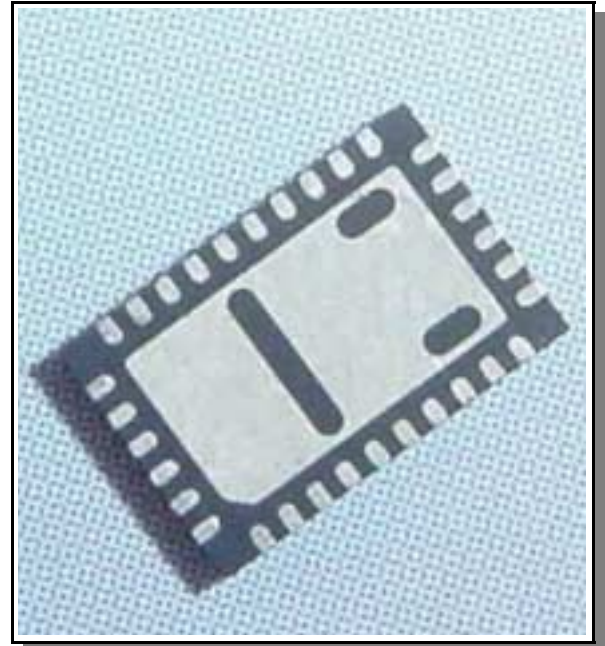
## Features

- Attenuation: 0.5 dB Steps to 15.5 dB
- 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 AT90-1283 is a GaAs FET 5-bit digital attenuator with integral TTL driver. Step size is 0.5 dB providing a 15.5 dB total attenuation range. This device is in an FQFP-N plastic surface mount package. The AT90-1283 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required. For dual supply designs without switching noise, use AT90-0283.

## CSP-1



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

Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
Insertion Loss	—	DC - 3.5 GHz	dB	—	2.8	3.2
Attenuation Accuracy	Individual Bits 0.5-1-4-8 dB	DC - 3.5 GHz	dB	—	—	$\pm(.3 +5\% \text{ of atten setting})$
	Individual Bit 2 dB	DC - 3.5 GHz	dB	—	—	$\pm(.4 +10\% \text{ of atten setting})$
	Any Combination of Bits 1 to 15.5 dB	DC - 3.5 GHz	dB	—	—	$\pm(.5 +7\% \text{ of atten setting})$
VSWR	Full Range	DC - 3.5 GHz	Ratio	—	1.6:1	1.8:1
Switching Speed	50% Cntl to 90%/10% RF	—	nS	—	75	150
	10% to 90% or 90% to 10%	—	nS	—	20	50
1 dB Compression	—	50 MHz	dBm	—	+21	—
	—	0.5 - 3.5 GHz	dBm	—	+29	—
Input $IP_3$	Two-tone inputs up to +5 dBm	50 MHz	dB	—	+35	—
		0.5-3.5 GHz	dB	—	+48	—
+Vcc	—	—	V	4.75	5.0	5.25
Logic "0"	Sink Current is 20 $\mu\text{A}$ max.	—	V	0.0	—	0.8
Logic "1"	Source Current is 20 $\mu\text{A}$ max.	—	V	2.0	—	5.0
$I_{cc}^1$	Vcc min to max, Logic "0" or "1"	—	mA	—	6	10
Turn-on Current <sup>2</sup>	For guaranteed start-up	—	mA	—	—	125
Switching Noise	Generated from DC-DC Converter with recommended capacitors	3.5 MHz	dBm	—	-93	—
Thermal Resistance $\theta_{jc}$	—	—	$^\circ\text{C/W}$	—	15	—

1. During turn-on, the device requires an initial start up current ( $I_{cc}$ ) specified as "Turn-on Current". Once operational,  $I_{cc}$  will drop to the specified levels.
2. The DC-DC converter is guaranteed to start in 100  $\mu\text{s}$  as long as the power supplies have the maximum turn-on current available for start-up.

Pin Configuration

Pin #	Function	Pin #	Function
1	GND	17	NC
2	C8	18	NC
3	C4	19	+Vcc <sup>4</sup>
4	C2	20	NC
5	C1	21	Cp <sup>6</sup>
6	C0.5	22	NC
7	GND	23	Cp <sup>6</sup>
8	NC	24	NC
9	NC	25	-Vee <sup>5,7</sup>
10	NC <sup>3</sup>	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC <sup>2</sup>
14	NC	30	-Vee <sup>5,7</sup>
15	NC	31	NC
16	NC	32	+Vcc <sup>4,8</sup>

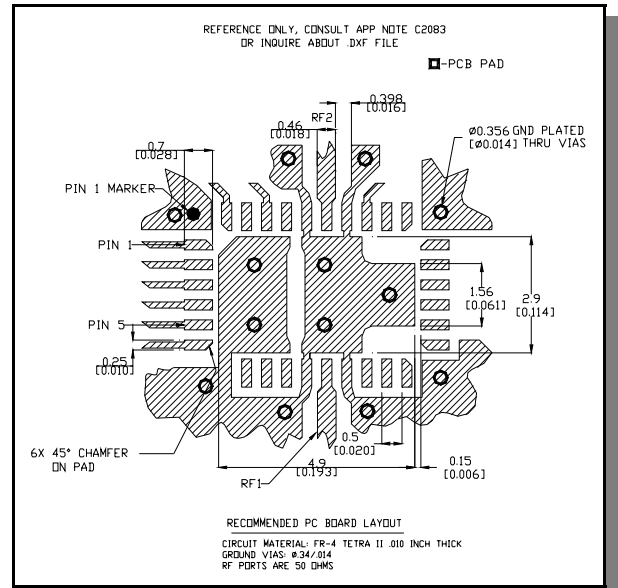
- Pins 10 & 29 must be isolated
- Pin 19 must be connected to Pin 32.
- Pin 25 must be connected to Pin 30.
- .01 μF cap must be between pins 21 & 23.
- Vee produced internally and requires a .1 μF cap to GND. Generated noise is typical of switching DC-DC Converters.
- +Vcc requires a .1 μF cap to GND.

Truth Table

C8	C4	C2	C1	C0.5	Attenuation
0	0	0	0	0	Loss, Reference
0	0	0	0	1	0.5 dB
0	0	0	1	0	1.0 dB
0	0	1	0	0	2.0 dB
0	1	0	0	0	4.0 dB
1	0	0	0	0	8.0 dB
1	1	1	1	1	15.5 dB

0 = TTL Low; 1 = TTL High

Recommended PCB Layout <sup>9</sup>



9. Application Note C2083 is available on line at [www.macom.com](http://www.macom.com)

Absolute Maximum Ratings <sup>10</sup>

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz 0.5 - 3.5 GHz	+27 dBm +34 dBm
+Vcc	+5.5V
Logic Voltages <sup>11</sup>	-0.5 to +Vcc + 0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

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

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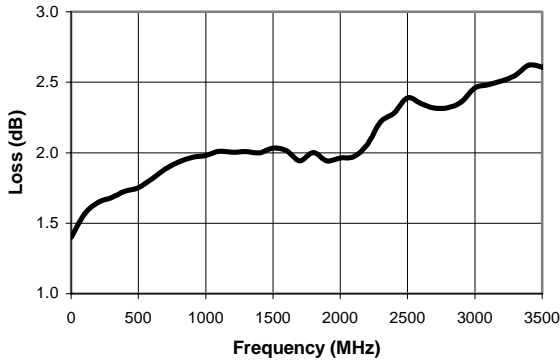
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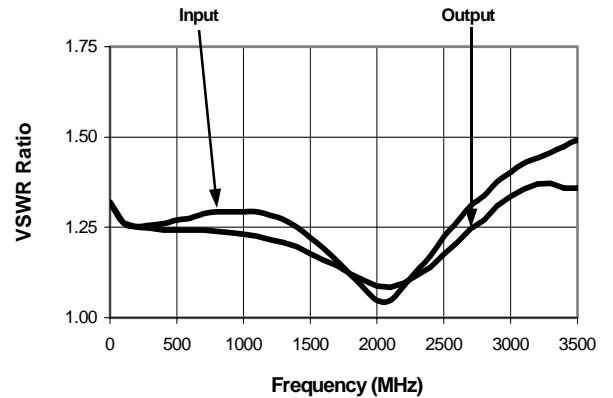
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- Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298
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Typical Performance Curves

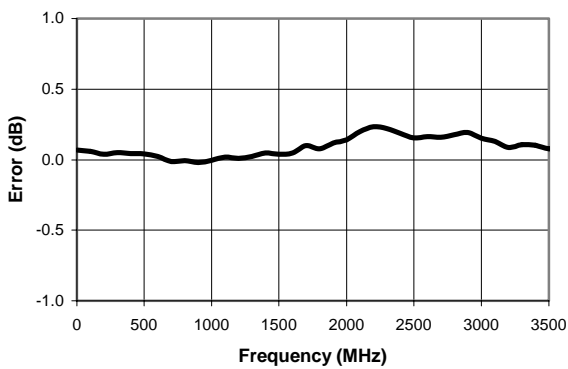
Insertion Loss



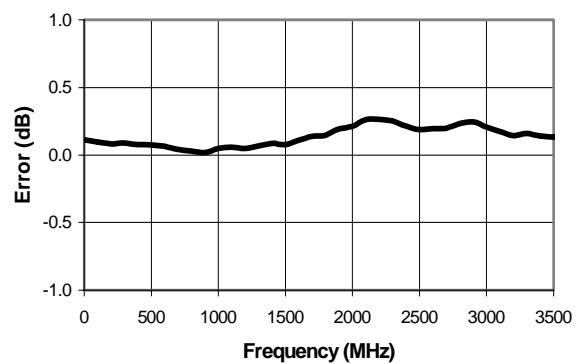
VSWR @ Insertion Loss



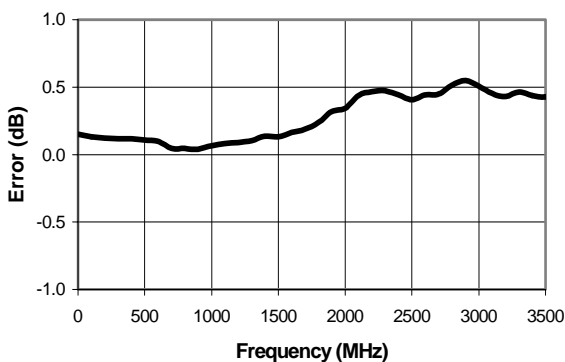
Attenuation Error, 0.5 dB Bit



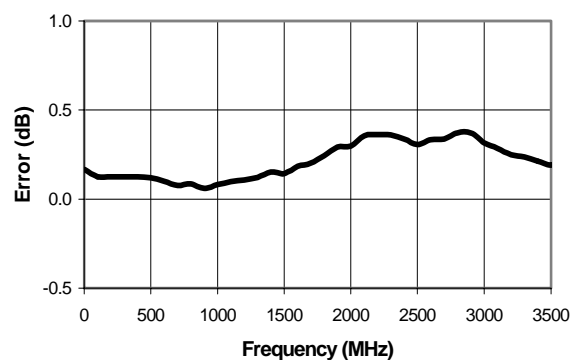
Attenuation Error, 1 dB Bit



Attenuation Error, 2 dB Bit



Attenuation Error, 4 dB Bit



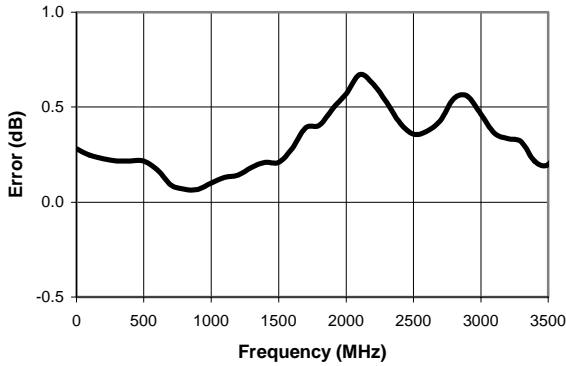
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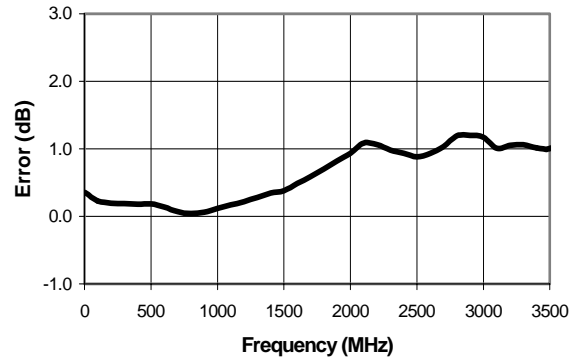
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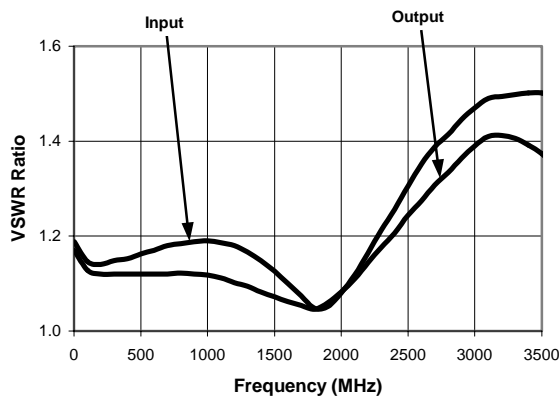
Attenuation Error, 8 dB Bit



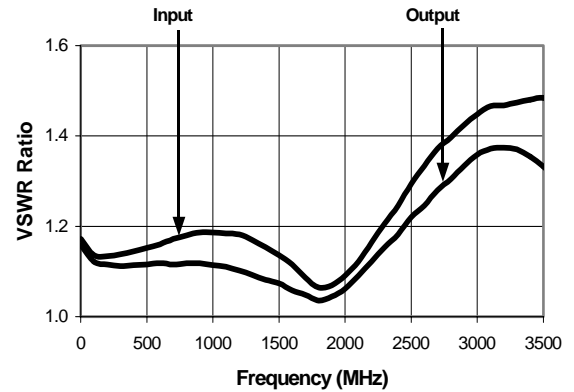
Attenuation Error, Max. Attenuation



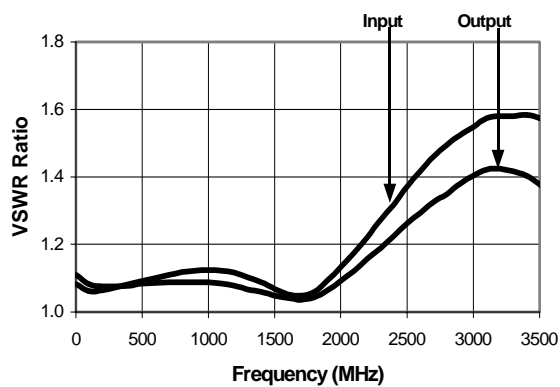
VSWR, 0.5 dB Bit



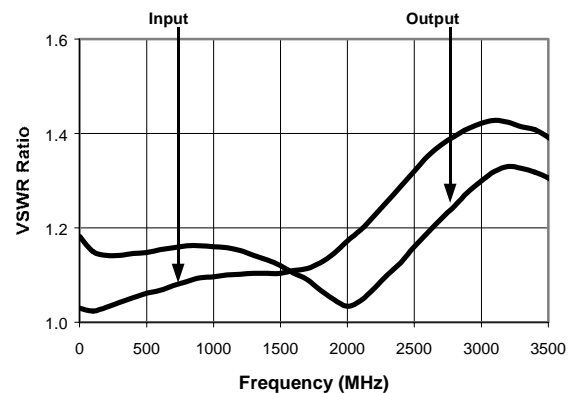
VSWR, 1 dB Bit



VSWR, 2 dB Bit



VSWR, 4 dB Bit

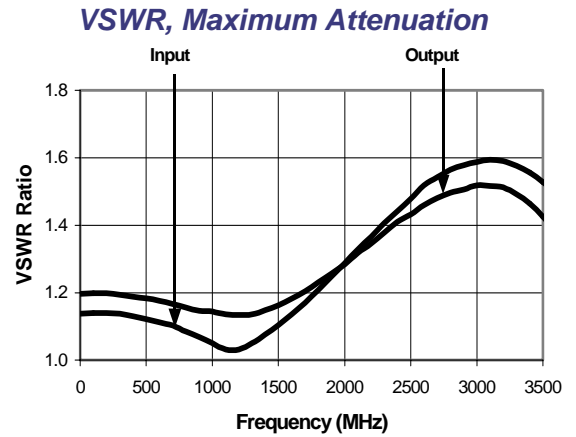
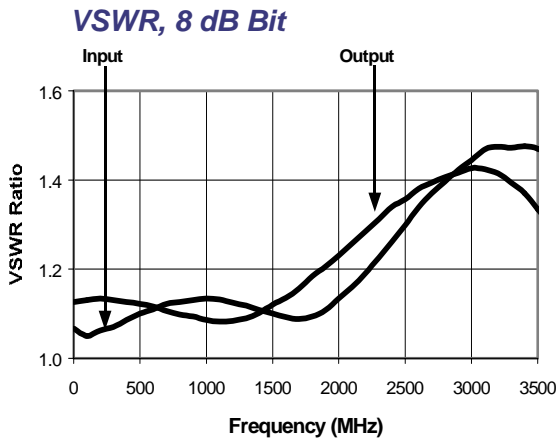


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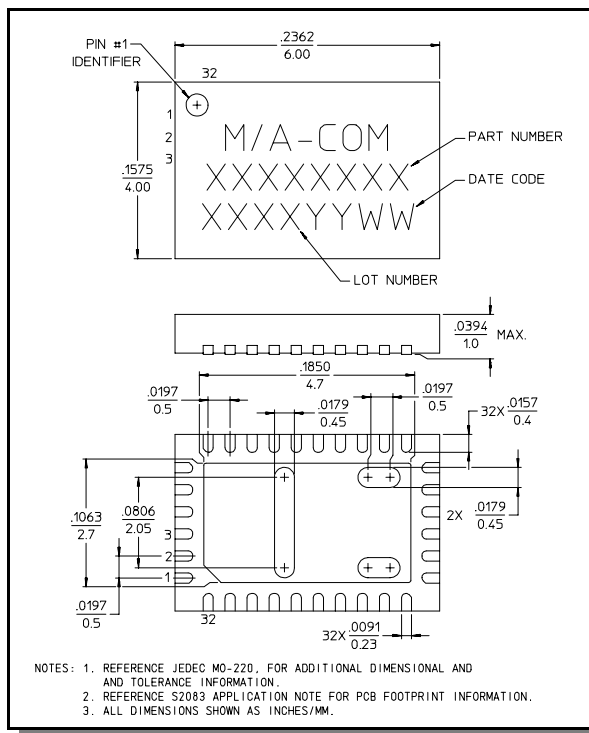
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Typical Performance Curves



CSP-1



Ordering Information

Part Number	Package
AT90-1283	Bulk Packaging
AT90-1283TR	Tape and Reel (1K Reel)
AT90-1283-TB	Units Mounted on Test Board

Note: Reference Application Note M513 for reel size information.

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