

HMIC PIN Diode Variable Attenuator 1.70 - 2.20 GHz

Rev. V3

Features

- RoHs and ELV compliant
- Bandwidth: 1.70 GHz to 2.20 GHz
- 1.2 dB Insertion Loss, Typical
- 1.4:1 VSWR, Typical
- 24 dB Attenuation, Typical
- 40 dBm IIP3, Typical (1MHz Offset, @ +0dBm Pinc)
- 0-1.5 Volt Control Voltage.
- User can add an External Resistor for higher D.C. Voltage requirements.

Extra Features

- Usable Bandwidth: 1.20 GHz to 2.50 GHz
- 1.5 dB Insertion Loss, Max
- 2:1 VSWR, Max
- 23 dB Attenuation, Max

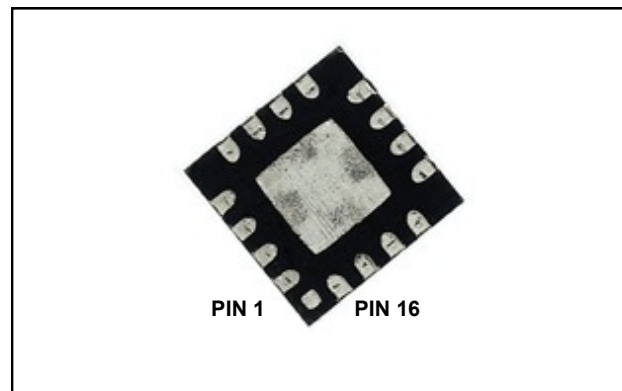
Description and Applications

M/A-COM's MA4VAT2000-1277T is a HMIC PIN Diode Variable Attenuator which utilizes an integrated 90 degree 3dB hybrid with a pair of Silicon PIN Diodes to perform the required attenuation function as Voltage (Current) is applied. This device operates from 0 to 1.5 Volts at 260 uA typical control current for maximum attenuation. The user can add external biasing resistors to the bias ports for higher voltage requirements as required.

M/A-COM's MA4VAT2000-1277T PIN Diode Variable Attenuator is designed for AGC Circuit Applications requiring:

- Lower Insertion Loss
- Lower distortion through attenuation
- Larger dynamic range for wide spread spectrum applications

MLP 3mm Package (Circuit Side View)



PIN Configuration

PIN	Function	PIN	Function
1	GND	9	DC2
2	GND	10	GND
3	GND	11	GND
4	GND	12	DC1
5	GND	13	GND
6	RF2	14	GND
7	GND	15	RF1
8	GND	16	GND

**Center Paddle is RF and D.C. Ground
RF Input/Output Ports are Functionally Symmetrical**

Absolute Maximum Ratings^{1,2}

Parameter	Maximum Ratings
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-65 °C to +150 °C
Junction Temperature	+175 °C
RF C.W. Incident Power	+33 dBm C.W.
Reversed Current @ -30 V	I -50nA I
Control Current	50mA per Diode

1. All the above are at Room Temperature except as noted
2. Exceeding the above Limits may cause permanent damage

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Electrical Specifications @ +25 °C

Parameter	Frequency Band	Unit	Min	Typ	Max
No DC Bias Low Loss State					
Insertion Loss	1.70 GHz – 2.20 GHz	dB	-	1.2	1.4
Input Return Loss		dB	11	16	-
Output Return Loss		dB	11	16	-
P1dB		dBm	30	33	-
IIP3		dBm	37	40	-
Control Voltage		V	-	0V @ 0uA	-
DC Bias RF Attenuation State					
Maximum Attenuation	1.70 GHz – 2.20 GHz	dB	23	25	-
Input Return Loss @ Max Attenuation		dB	17	20	-
Output Return Loss @ Max Attenuation		dB	17	20	-
IIP3		dBm	15	21	-
Control Voltage @ Max Attenuation		V	-	1.50V @ 260uA	-

Typical RF Performance Over Industry Designated RF Frequency Bands ^{3,4}

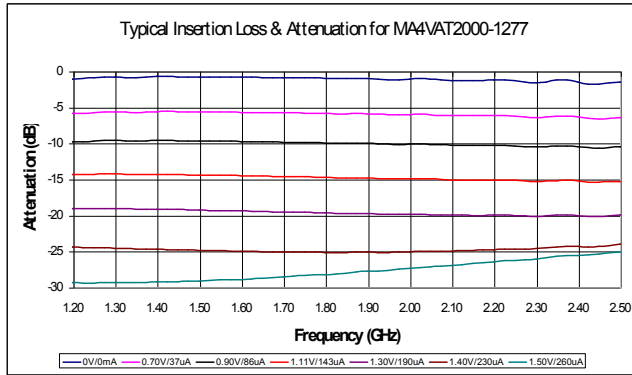
Band		Freq	I. Loss	Att.	R. Loss	IIP3	Phase -Relative-
		(MHz)	(dB)	(dB)	(dB)	(dBm)	(Degree)
DCS	RX	1710-1785	1.2	23	13	40	-20°
	TX	1805-1880	1.2	23	13	40	
PCS	RX	1850-1910	1.2	23	13	40	-20°
	TX	1930-1990	1.4	23	13	40	
UMTS	RX	1920-1980	1.4	23	11	40	-25°
WCDMA/CDMA	TX	2110-2170	1.5	23	11	40	
TD-S-CDMA	-	2010-2025	1.4	23	11	40	-25°
SCDMA	-	1800-2200	1.8	23	11	40	-25°

3. All are typical values only.

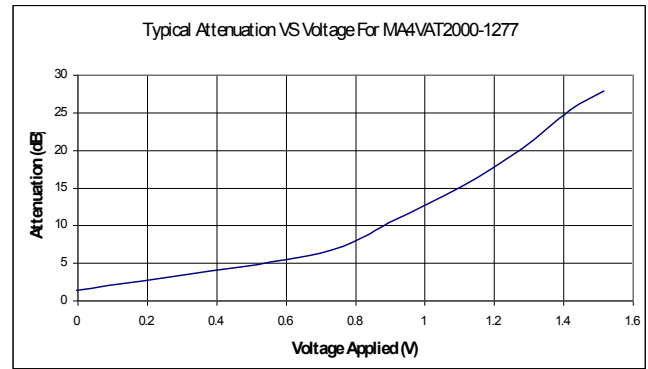
4. Relative phase is the measured Insertion Phase Difference between Insertion Loss and the 20dB Attenuation State.
(Please refer to the plots below)

Plots of Typical RF Characteristics @ + 25 °C

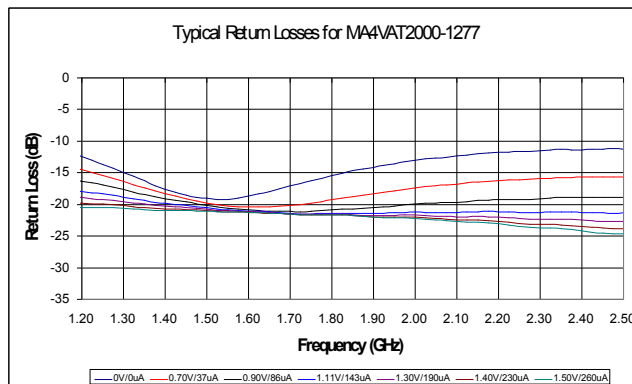
Typical Insertion Loss & Attenuation Plot



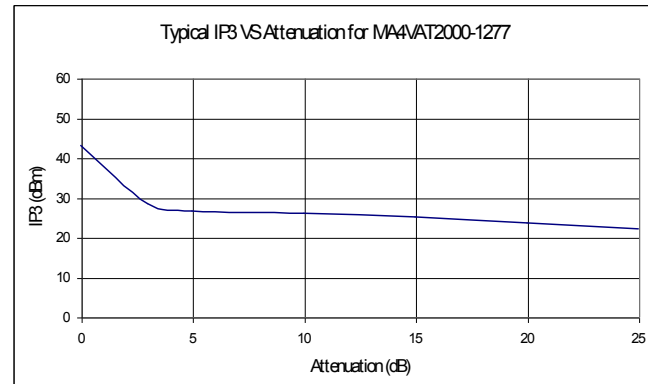
Typical Attenuation Vs Voltage Plot (@ 1950 MHz)



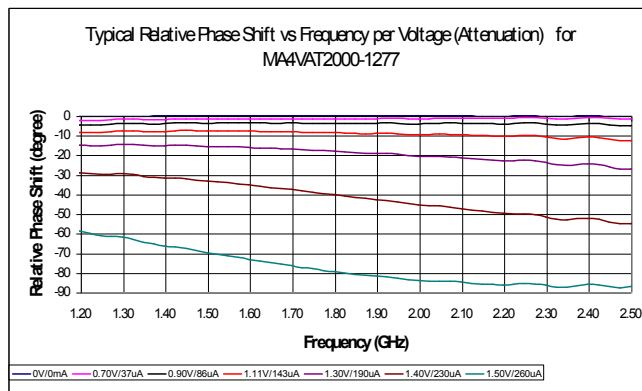
Typical Return Loss @ All Attenuation Levels Plot



Typical IIP3 Vs Attenuation Plot



Typical Relative Phase Shift Per Attenuation (Voltage) Plot



For Reference ONLY:

- Low Loss = 0V, @0uA
- 5 dB Attenuation = 0.90V, @86uA
- 10 dB Attenuation = 1.11V, @143uA
- 15 dB Attenuation = 1.30V, @190uA
- 20 dB Attenuation = 1.40V, @230uA
- 25 dB Attenuation = 1.50V, @260uA

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