

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

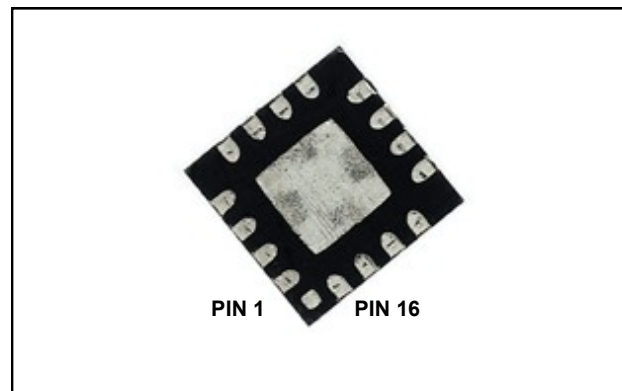
Description and Applications

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}

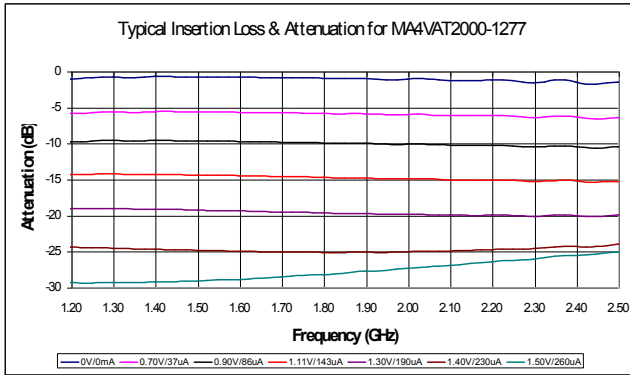
| Band | | Freq | I. Loss | Att. | R. Loss | IIP3 | Phase -Relative- |
|------------|----|-----------|---------|------|---------|-------|---------------------|
| | | (MHz) | (dB) | (dB) | (dB) | (dBm) | (Degree) |
| DCS | RX | 1710-1785 | 1.2 | 23 | 13 | 40 | -20° |
| | TX | 1805-1880 | 1.2 | 23 | 13 | 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.

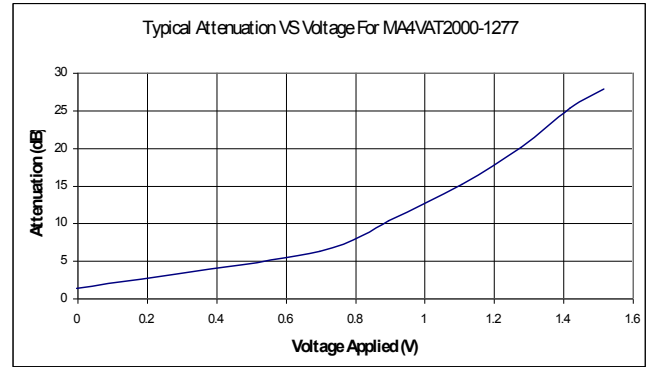
4. Relative phase is the measured Insertion Phase Difference between Insertion Loss and the 20dB Attenuation State.
(Please refer to the plots below)

Plots of Typical RF Characteristics @ + 25 °C

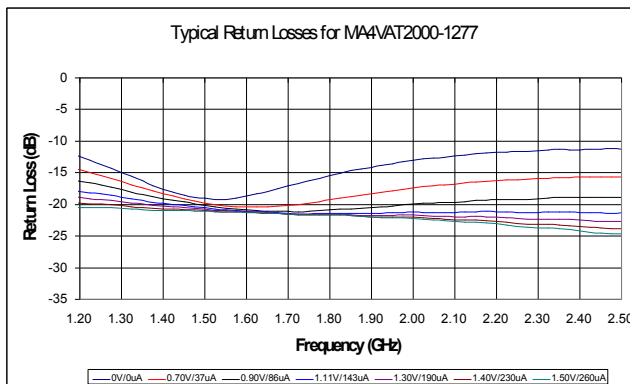
Typical Insertion Loss & Attenuation Plot



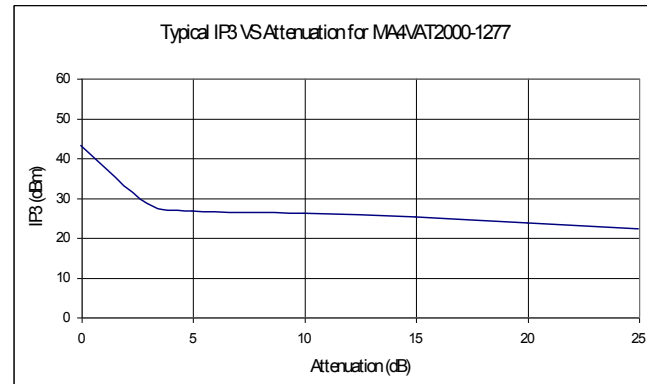
Typical Attenuation Vs Voltage Plot (@ 1950 MHz)



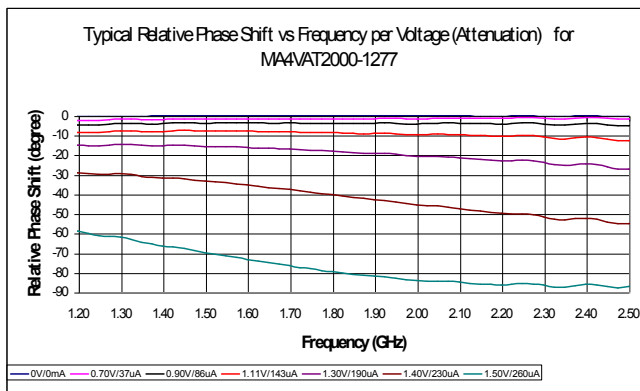
Typical Return Loss @ All Attenuation Levels Plot



Typical IIP3 Vs Attenuation Plot



Typical Relative Phase Shift Per Attenuation (Voltage) Plot



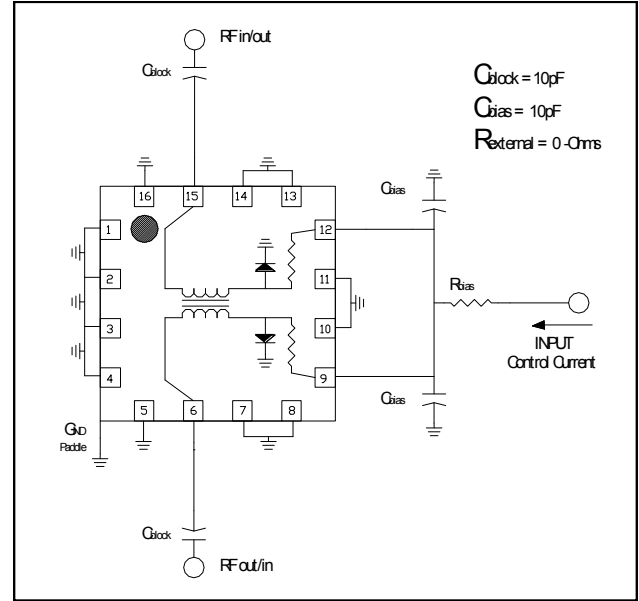
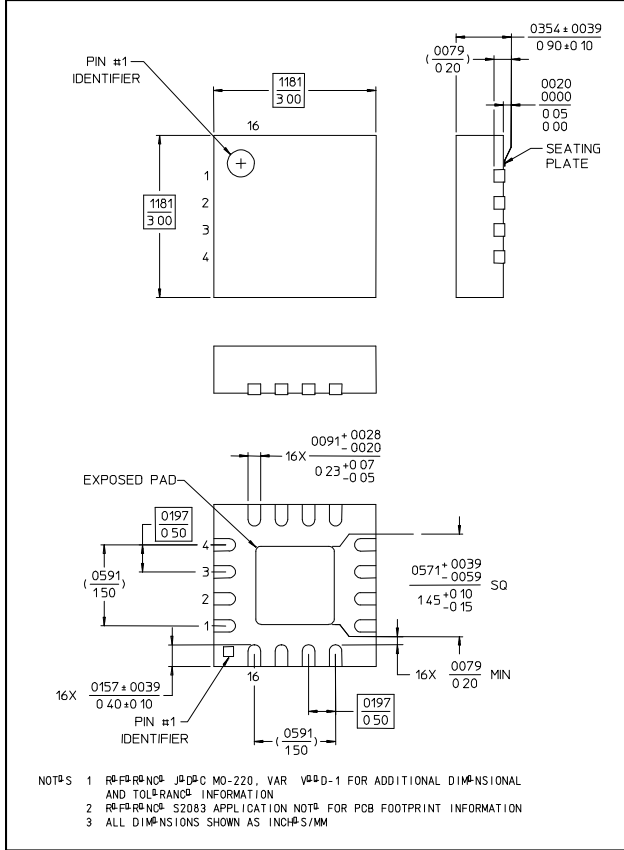
For Reference ONLY:

- 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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Package PIN Designation, External Components, and Equivalent Circuit



Ordering Information

| Part Number | Package |
|------------------|---------------|
| MA4VAT2000-1277T | Tape and Reel |

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