# MA4VAT2000-1277T

## 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 ℃ to +85 ℃ |
| Storage Temperature | -65 ℃ to +150 ℃ |
| Junction Temperature | +175 ℃ |
| 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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- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

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## 1.70 - 2.20 GHz



### Electrical Specifications @ +25 ℃

| 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 | -20º |
| | TX | 1805-1880 | | 1.2 | 23 | 13 | 40 | |
| | | | | | | | | |
| PCS | RX | 1850-1910 | | 1.2 | 23 | 13 | 40 | -20º |
| | TX | 1930-1990 | | 1.4 | 23 | 13 | 40 | |
| | | | | | | | | |
| UMTS | RX | 1920-1980 | | 1.4 | 23 | 11 | 40 | -25º |
| WCDMA/CDMA | TX | 2110-2170 | | 1.5 | 23 | 11 | 40 | |
| | | | | | | | | |
| TD-S-CDMA | - | 2010-2025 | | 1.4 | 23 | 11 | 40 | -25º |
| | | | | | | | | |
| SCDMA | - | 1800-2200 | | 1.8 | 23 | 11 | 40 | -25º |

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)





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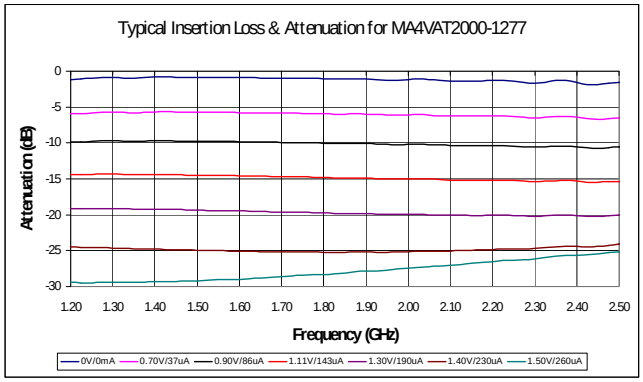
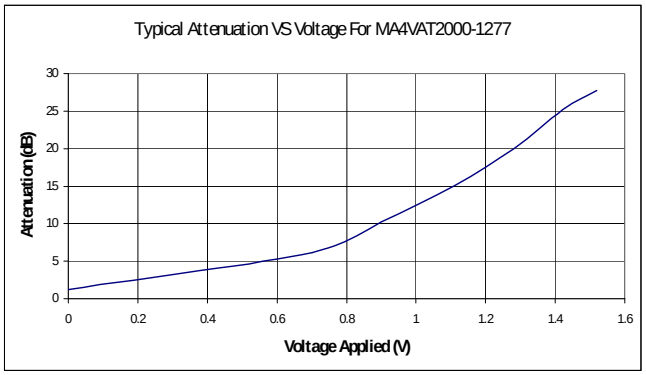
## Plots of Typical RF Characteristics @ + 25 ℃

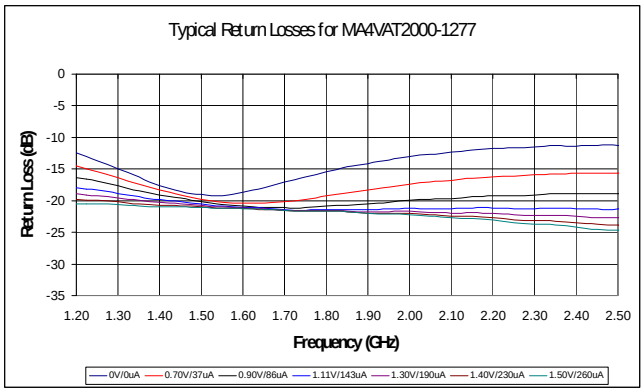
### *Typical Insertion Loss & Attenuation Plot*



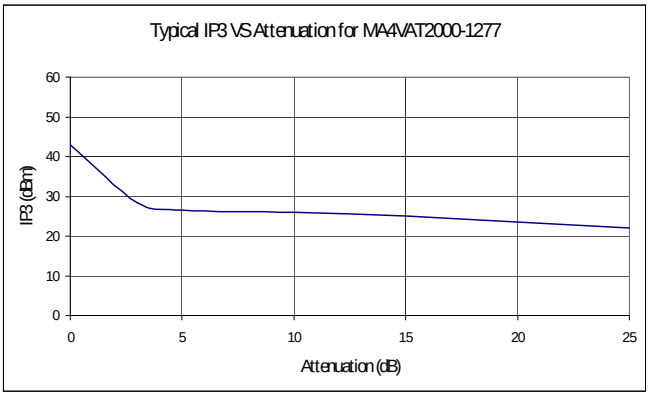

### *Typical Attenuation Vs Voltage Plot (@ 1950 MHz)*



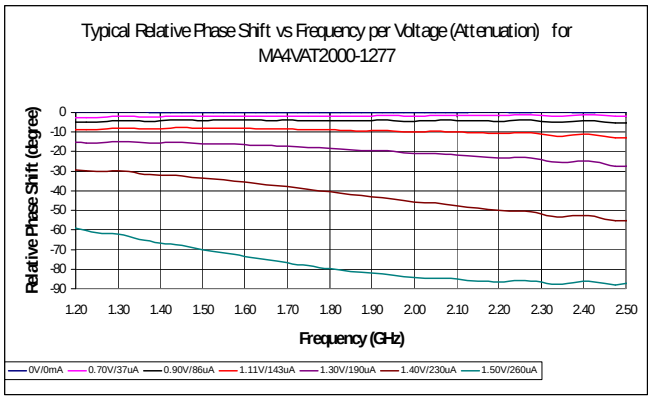

### *Typical Return Loss @ All Attenuation Levels Plot*




### *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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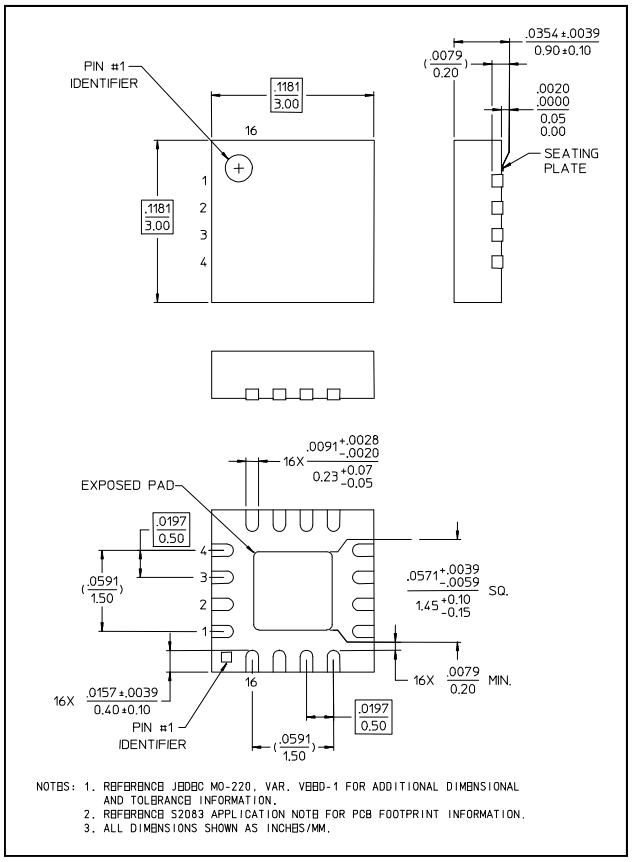
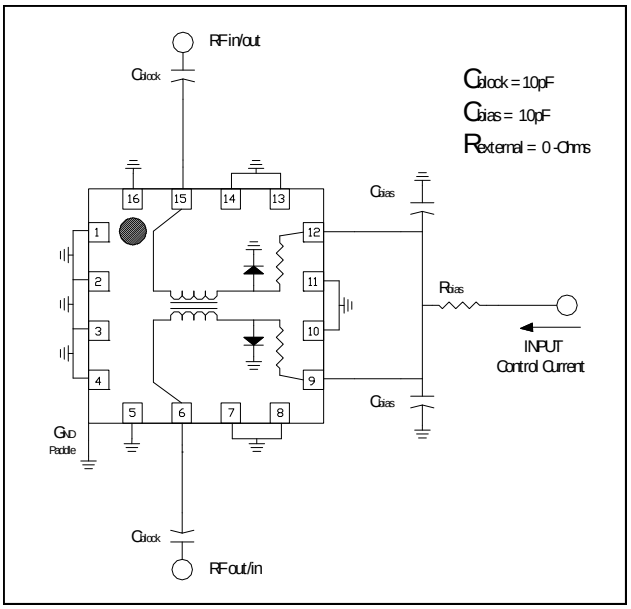
## Package PIN Designation, External Components, and Equivalent Circuit




## Ordering Information

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



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