

# MA4VAT907-1061T



## High IIP3 PIN Diode Variable Attenuator 0.8 - 1.0 GHz

Rev. V4

### Features

- Bandwidth: 0.80 GHz to 1.0 GHz
- 1.0 dB Insertion Loss, Typical
- 12 dB Return Loss, Typical
- 25 dB Attenuation, Typical
- 50 dBm Input IP3, Typical (1MHz Offset, @+0dBm Pinc)
- 0 – 3.0 Volts Control Voltage @3.3mA Typical
- RoHs Compliant

### Extra Features

- Covers the following Bands:
  - GSM
  - AMPS
- Usable Bandwidth: 0.60 GHz to 1.20 GHz
- 1.5 dB Insertion Loss, Typical
- 1.8:1 VSWR, Typical
- 18.5 dB Attenuation, Typical

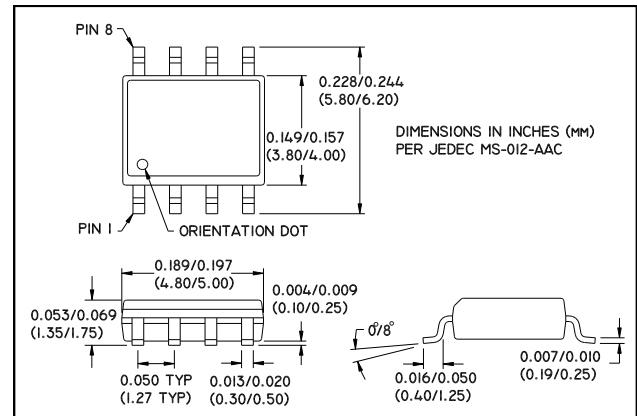
### Description and Applications

M/A-COM's MA4VAT907-1061T 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 D.C. Voltage (Current) is applied.

This device operates from 0 to 2.77Volts at 3.0mA 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 MA4VAT907-1061T 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



### SOIC-8 PIN Configuration (Topview)

| PIN | Function | Comments                      |
|-----|----------|-------------------------------|
| 1   | DC1      |                               |
| 2   | GND      |                               |
| 3   | GND      |                               |
| 4   | RFin/out | Symmetrical as RF Input/Ouput |
| 5   | RFout/in | Symmetrical as RF Input/Ouput |
| 6   | GND      |                               |
| 7   | GND      |                               |
| 8   | DC2      |                               |

### Absolute Maximum Ratings @ +25 °C <sup>1,2</sup>

| 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 | 50nA              |
| Control Current          | 50 mA per Diode   |

1. All the above values are at +25 °C, unless otherwise noted.
2. Exceeding these limits may cause permanent damage.

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### Electrical Specifications @ +25 °C

| Parameter   | Frequency Band    | Unit | Min  | Typ             | Max |
|---|-------------------|------|------|-----------------|-----|
| <b>Low Loss RF Parameter (Pin = +10 dBm, except for P1dB, &amp; IP3)</b>            |                   |      |      |                 |     |
| Insertion Loss  | 0.80 GHz—1.00 GHz | dB   | -    | 1.0             | 1.2 |
| Input Return Loss   |                   | dB   | 11   | 12              | -   |
| Output Return Loss  |                   | dB   | 11   | 12              | -   |
| P1dB  |                   | dBm  | 30   | -               | -   |
| Input IP3   |                   | dBm  | 45   | 49              | -   |
| Control Voltage   |                   | V    | -    | 0 V @ 0uA       | -   |
| <b>Maximum Attenuation RF Parameter (Pin = +10 dBm, except for P1dB, &amp; IP3)</b> |                   |      |      |                 |     |
| Maximum Attenuation   | 0.80 GHz—1.00 GHz | dB   | 18.5 | 24              | -   |
| Input Return Loss @ Max Attenuation   |                   | dB   | 15   | 21              | -   |
| Output Return Loss @ Max Attenuation  |                   | dB   | 15   | 21              | -   |
| Input IP3   |                   | dBm  | 36   | 39              | -   |
| Control Voltage @ Max Attenuation   |                   | V    | -    | 3.0 V @ 3.35 mA | -   |

### Typical RF Performance Over Industry Designated RF Frequency Bands

| Band |    | Freq    | I. Loss | Att. | R. Loss | IIP3  | Phase -Relative- |
|------|----|---------|---------|------|---------|-------|------------------|
|      |    | (MHz)   | (dB)    | (dB) | (dB)    | (dBm) | (Degree)         |
| AMPS | RX | 824-849 | 0.9     | 22   | 12      | 50    | -15°             |
|      | TX | 869-894 | 0.9     | 22   | 12      | 50    |                  |
| GSM  | RX | 880-915 | 1.2     | 20   | 11      | 50    | -20°             |
|      | TX | 925-960 | 1.2     | 20   | 11      | 50    |                  |

- All are typical values only.
- Relative phase is the measured Insertion Phase difference between Insertion Loss and 15 dB Attenuation. (Please refer to the plots below)

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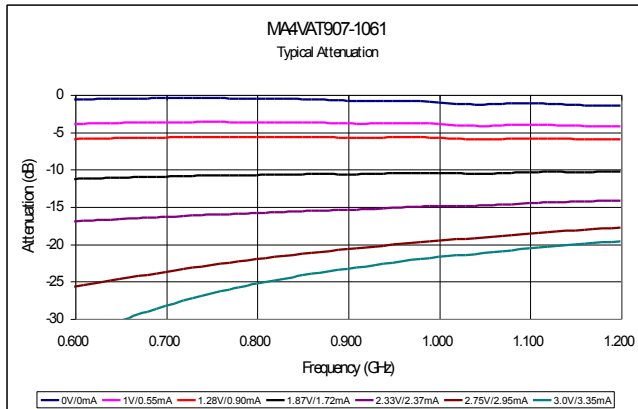


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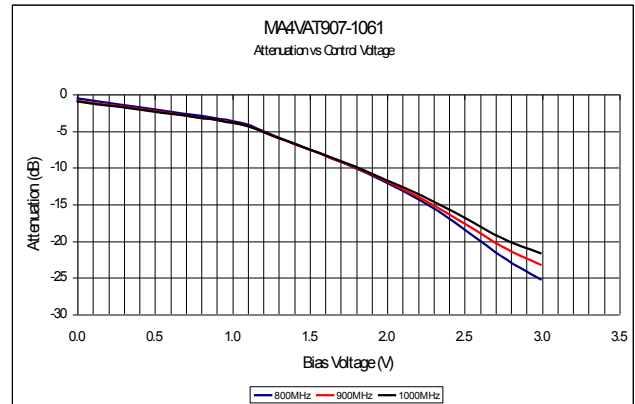
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### Plots of Typical RF Characteristics @ +25 °C

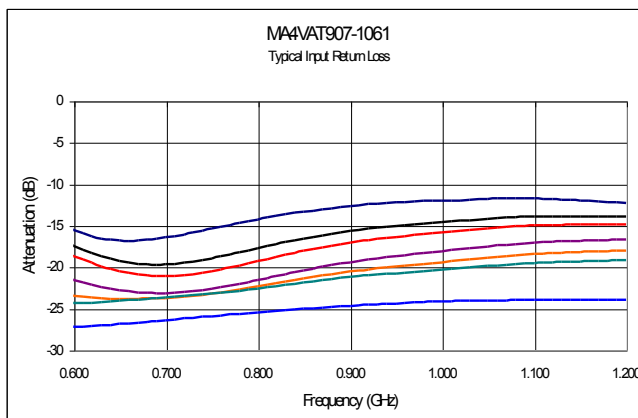
**Typical Insertion Loss & Attenuation Plot**



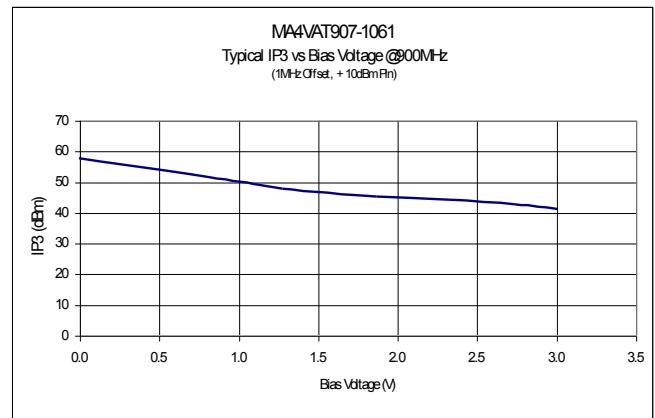
**Typical Attenuation vs Voltage**



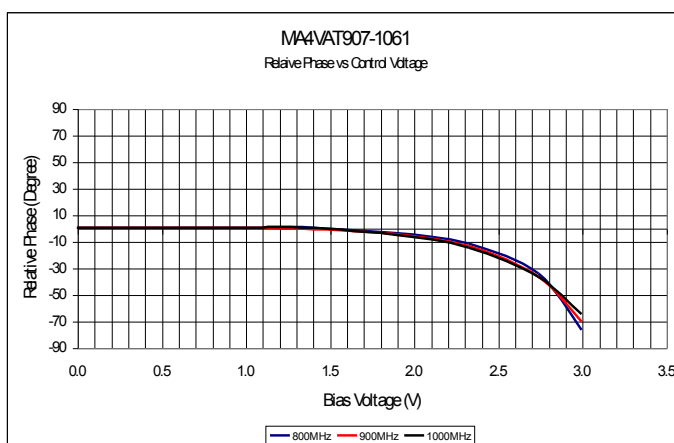
**Typical Return Loss @ All Attenuation Levels Plot**



**Typical IIP3 vs Attenuation Plot**



**Typical Relative Phase Shift Per Attenuation (Voltage)**



**For Reference ONLY:**

- Insertion Loss = 0.00 V @ 0.00 mA
- 5dB Attenuation = 1.30 V @ 0.95 mA
- 10dB Attenuation = 1.94 V @ 1.78 mA
- 15dB Attenuation = 2.36 V @ 2.42 mA
- 20dB Attenuation = 2.67 V @ 2.90 mA
- Max Attenuation = 2.77 V @ 3.00 mA

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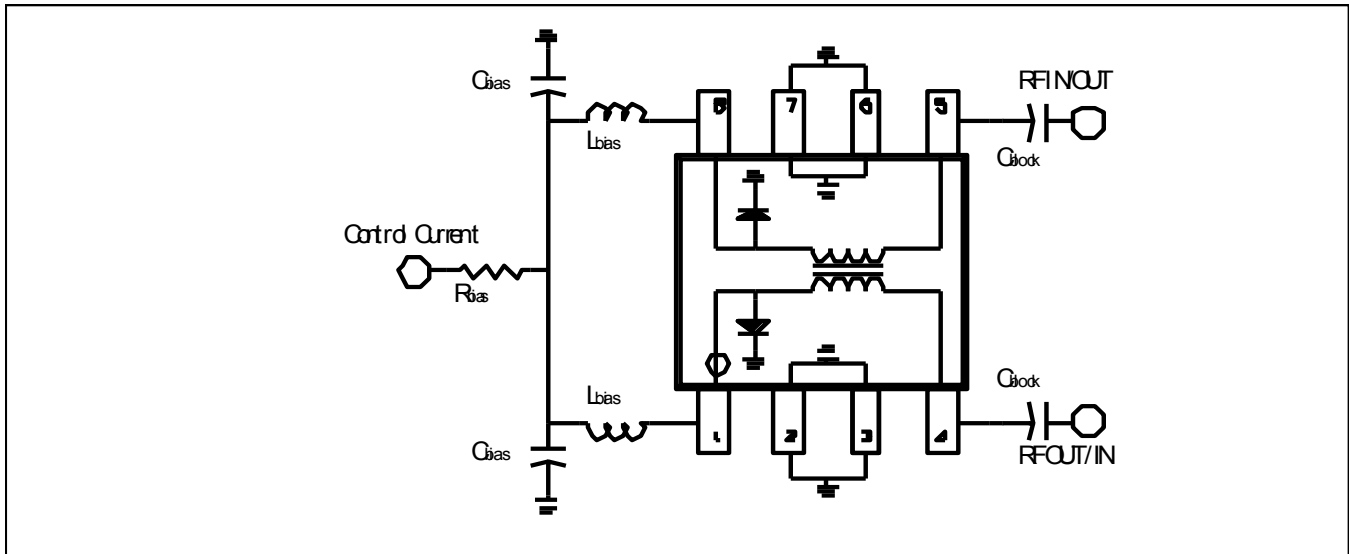
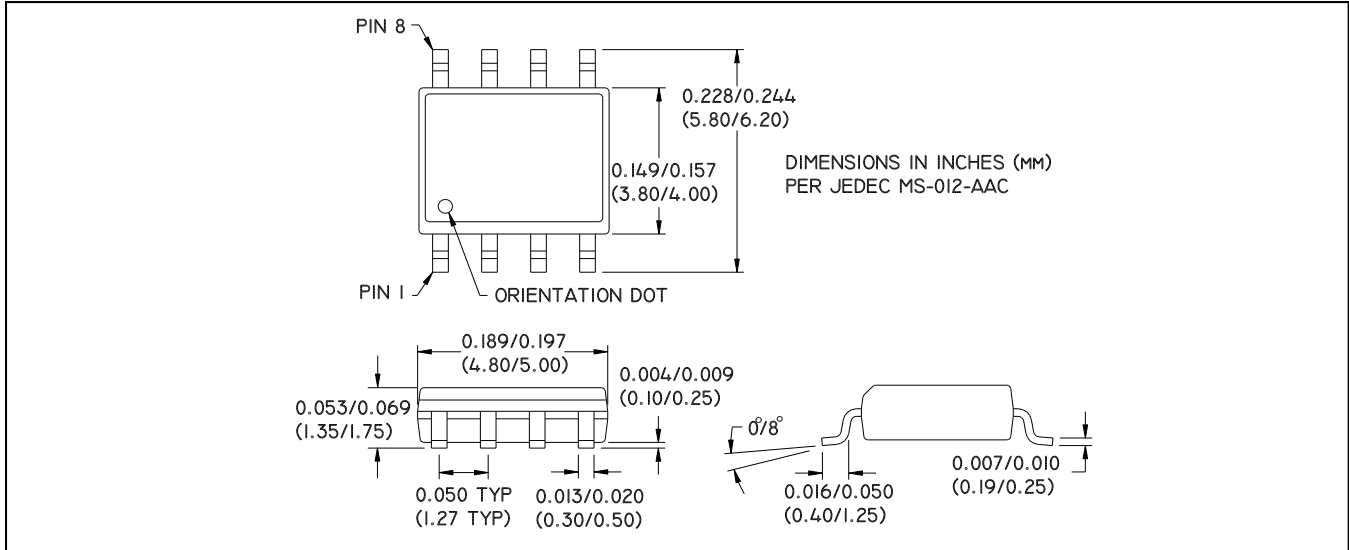
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### Package PIN Designation, External Components, and Equivalent Circuit



### External Bias Components

Rbias= 680 Ohms ( 3.0 V @ 3.5 mA )  
Lbias= 150 nH  
Cbias =100 pF  
Cblock =100 pF