High IIP3 PIN Diode Variable Attenuator 0.8 - 1.0 GHz

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.

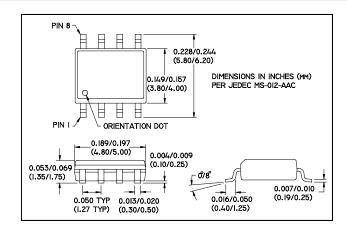
This device operates from 0 to 2.77Volts at 3.0mA typical control current for maximum attenuation. The user can add external biasing resistors to the bias ports for higher voltage requirements as required.

M/A-COM's MA4VAT907-1061T PIN Diode Variable Attenuator is designed for AGC Circuit Applications requiring:

Lower Insertion Loss

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- · 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 | Symetrical as RF Input/Ouput | | |
| 5 | RFout/in | Symetrical as RF Input/Ouput | | |
| 6 | GND | | | |
| 7 | GND | | | |
| 8 | DC2 | | | |

Absolute Maximum Ratings @ +25 °C ^{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 | 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 ℃

| Parameter | Frequency Band | nd Unit Min | | Тур | Max |
|---------------------------------------|-------------------------|--------------|------|-----------------|-----|
| Low Loss RF Parameter (Pin = +10 dBm, | except for P1dB, & IP3) | | | | |
| 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 @ OuA | - |
| Maximum Attenuation RF Parameter (Pir | n = +10 dBm, except for | P1dB, & IP3) | | | |
| 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 | - |
| Current@ Max Attenuation Bias = 3.0V | | mA | 2.5 | | 4.5 |

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° |
| | тх | 869-894 | 0.9 | 22 | 12 | 50 | |
| | | | | | | | |
| GSM | RX | 880-915 | 1.2 | 20 | 11 | 50 | |
| | тх | 925-960 | 1.2 | 20 | 11 | 50 | |

3. All are typical values only.

4. 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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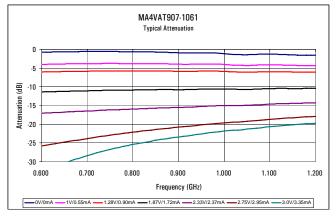


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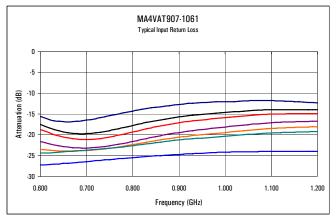
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Plots of Typical RF Characteristics @ +25 °C

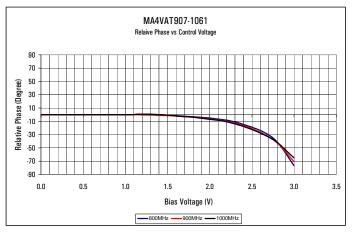
Typical Insertion Loss & Attenuation Plot



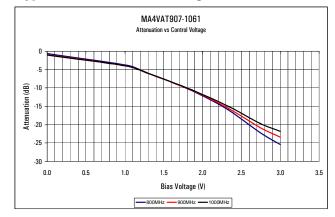
Typical Return Loss @ All Attenuation Levels Plot



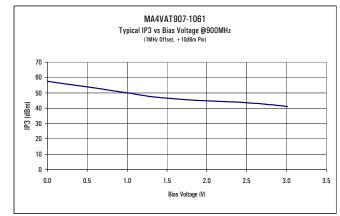
Typical Relative Phase Shift Per Attenuation (Voltage)



Typical Attenuation vs Voltage



Typical IIP3 vs Attenuation Plot



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 Anttenuation = 2.67 V @ 2.90 mA
- Max Attenuation = 2.77 V @ 3.00 mA

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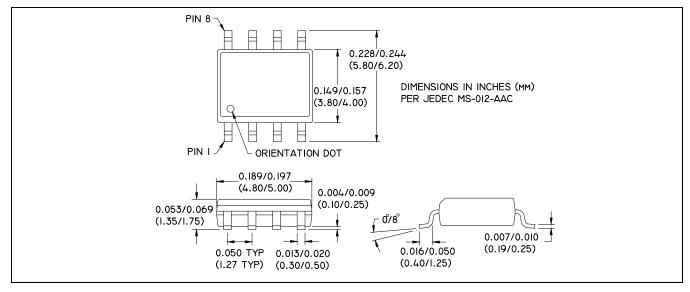
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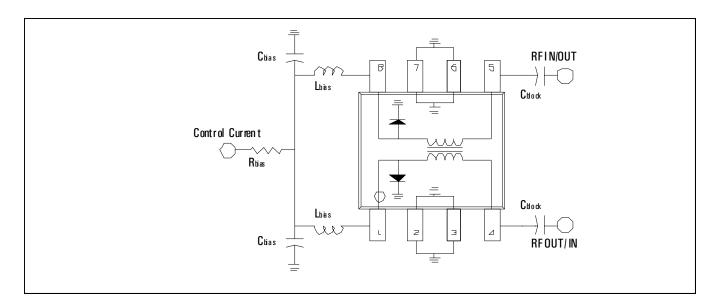


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Package PIN Designation, External Components, and Equivalent Circuit





External Bias Components

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

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