

Features

- RoHs and ELV compliant
- 1.4 dB Insertion Loss, Typical
- 1.4:1 VSWR, Typical
- 21 dB Attenuation, Typical
- 45 dBm IIP3, Typical
(1 MHz Offset, @ + 0 dBm Pinc)
- 0 – 1.66 Volts Control Voltage @ 1.50 mA Typical

Extra Features

- Covers the following Bands:
 - DCS
 - PCS
 - UMTS/WCDMA/CDMA
 - TD-S_CDMA
 - SCDMA
- Usable Bandwidth: 1.50 GHz to 2.50 GHz
- 1.8 dB Insertion Loss, Typical
- 2:1 VSWR, Typical
- 18.5 dB Attenuation, Typical

Description and Applications

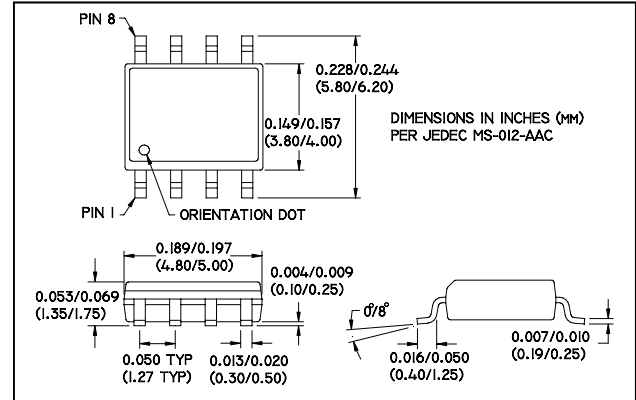
M/A-COM's MA4VAT2004-1061T is a HMIC PIN Diode Variable Attenuator which utilizes an integrated 90 degree 3dB hybrid with a pair of Silicon PIN Diodes to perform the required attenuation function as D.C. Voltage (Current) is applied.

This device operates from 0 to 1.66 Volts at 1.50mA 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 MA4VAT2004-1061T PIN Diode Variable Attenuator is designed for AGC Circuit Applications requiring:

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

PIN Configuration (Topview)



PIN Configuration (Topview)

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

Absolute Maximum Ratings^{1,2} @ T = +25 °C

| 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 | 50mA per Diode |

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

Electrical Specifications @ +25 °C

| Parameter | Frequency Band | Unit | Min | Typ | Max |
|--------------------------------------|---------------------|------|-----|----------------|-----|
| No DC Bias Low Loss State | | | | | |
| Insertion Loss | 1.70 GHz – 2.00 GHz | dB | - | 1.4 | 1.8 |
| Input Return Loss | | dB | 13 | 15 | - |
| Output Return Loss | | dB | 13 | 15 | - |
| P1dB | | dBm | 30 | - | - |
| IIP3 | | dBm | 47 | 49 | - |
| Control Voltage | | V | - | 0V @ 0uA | - |
| DC Bias RF Attenuation State | | | | | |
| Maximum Attenuation | 1.70 GHz – 2.00 GHz | dB | 20 | 24 | - |
| Input Return Loss @ Max Attenuation | | dB | 18 | 21 | - |
| Output Return Loss @ Max Attenuation | | dB | 18 | 21 | - |
| IP3 | | dBm | 36 | 39 | - |
| Control Voltage @ Max Attenuation | | V | - | 1.66V @ 1.50mA | - |
| Current@Max Attenuation | Bias =1.66V | mA | 1.2 | | 2.4 |

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 | 1.6 | 22 | 13 | 50 | +15° |
| | TX | 1805-1880 | 1.6 | 22 | 13 | 50 | |
| PCS | RX | 1850-1910 | 1.6 | 21 | 13 | 50 | +10° |
| | TX | 1930-1990 | 1.6 | 21 | 13 | 50 | |
| UMTS | RX | 1920-1980 | 1.6 | 20 | 13 | 50 | -5° |
| WCDMA/CDMA | TX | 2110-2170 | 1.8 | 20 | 13 | 50 | |
| TD-S-CDMA | - | 2010-2025 | 1.7 | 20 | 13 | 50 | -2° |
| SCDMA | - | 1800-2200 | 1.8 | 20 | 13 | 50 | -10° |

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)

MA4VAT2004-1061T

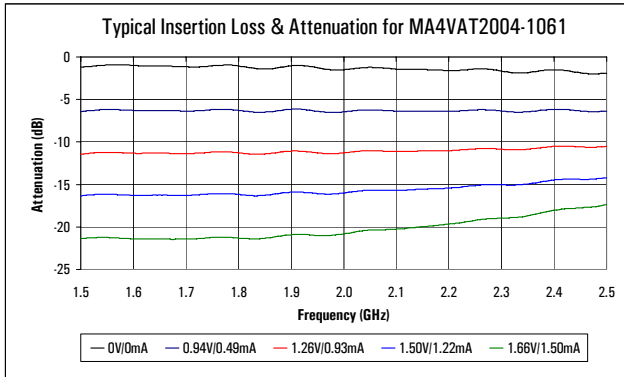


High IIP3 PIN Diode Variable Attenuator
1.7 - 2.0 GHz

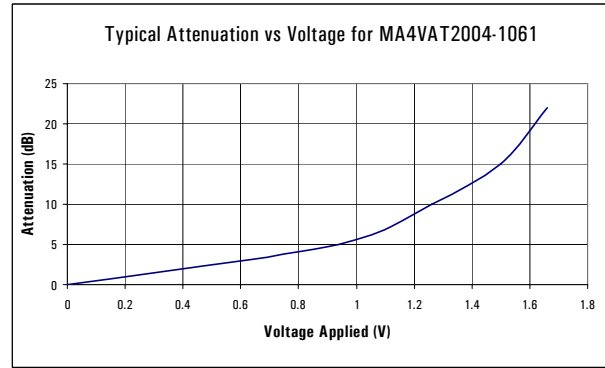
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Plots of Typical RF Characteristics @ + 25 °C

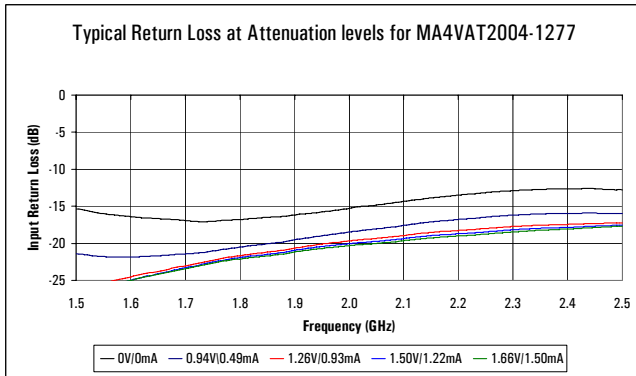
Typical Insertion Loss & Attenuation Plot



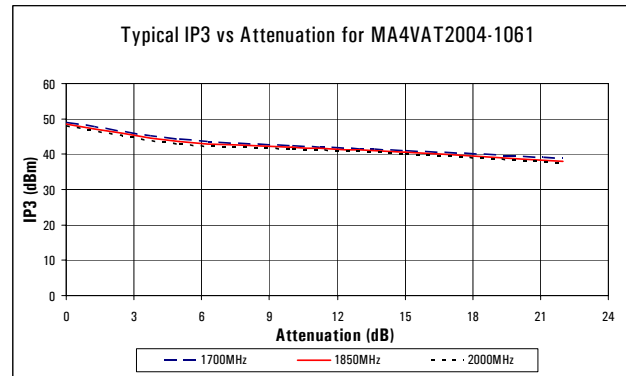
Typical Attenuation Vs Voltage Plot



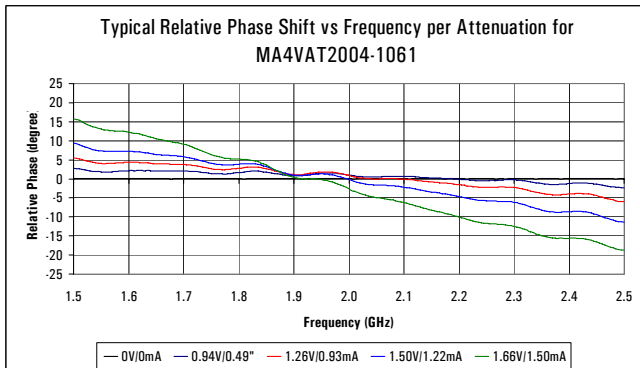
Typical Return Loss @ All Attenuation Levels Plot



Typical IIP3 Vs Attenuation Plot



Typical Relative Phase Shift Per Attenuation (Voltage) Plot



For Reference ONLY:

- Low Loss = 0.00V, @0.00mA
- 5 dB Attenuation = 0.94V, @0.49mA
- 10 dB Attenuation = 1.26V, @0.93mA
- 15 dB Attenuation = 1.50V, @1.22mA
- 20 dB Attenuation = 1.66V, @1.50mA

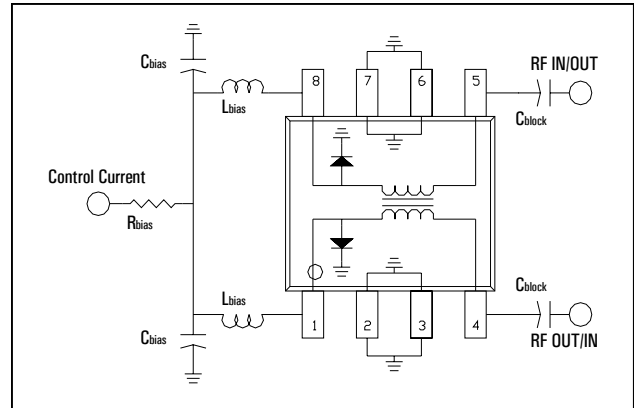
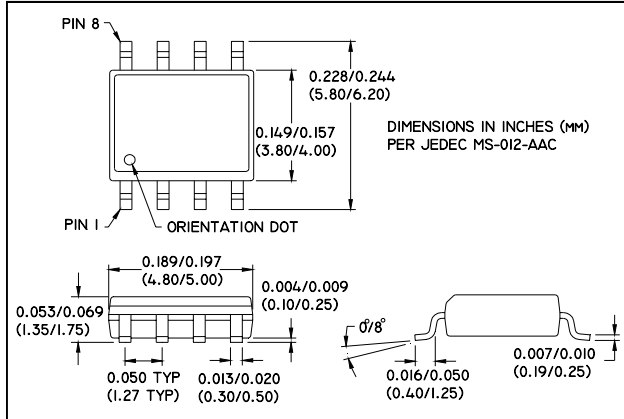
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High IIP3 PIN Diode Variable Attenuator
1.7 - 2.0 GHz

Rev. V4

Package Pin Designation, External Components, and Equivalent Circuit



Ordering Information

| Part Number | Package |
|------------------|---------------|
| MA4VAT2004-1061T | Tape and Reel |

External Bias Components

Rbias= 680 Ohms (1.66 V, 1.50 mA)
Lbias= 150 nH
Cbias =100 pF
Cblock =100 pF