High IIP3 PIN Diode Variable Attenuator
0.8 - 1.0 GHz

Features
- 1.0 dB Insertion Loss, Typical
- 12 dB Return Loss, Typical
- 25 dB Attenuation, Typical
- 45 dBm IIP3, Typical (1MHz Offset, @ +0dBm Pinc)
- SOIC-8 Surface Mount Package
- 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 MA4VAT904-1061T 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 1.9 Volts at 1.89 mA 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 MA4VAT904-1061T 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)

<table>
<thead>
<tr>
<th>PIN</th>
<th>Function</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RFin/out</td>
<td>Symetrical as RF Input/Output</td>
</tr>
<tr>
<td>5</td>
<td>RFout/in</td>
<td>Symetrical as RF Input/Output</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>DC2</td>
<td></td>
</tr>
</tbody>
</table>

Absolute Maximum Ratings @ +25 °C 1,2

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Maximum Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 °C to +150 °C</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>+175 °C</td>
</tr>
<tr>
<td>RF C.W. Incident Power</td>
<td>+33 dBm C.W.</td>
</tr>
<tr>
<td>Reversed Current @ -30 V</td>
<td>50nA</td>
</tr>
<tr>
<td>Control Current</td>
<td>50 mA per Diode</td>
</tr>
</tbody>
</table>

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

For further information and support please visit: https://www.macom.com/support
## Typical RF Performance Over Industry Designated RF Frequency Bands

<table>
<thead>
<tr>
<th>Band</th>
<th>Freq</th>
<th>I. Loss</th>
<th>Att.</th>
<th>R. Loss</th>
<th>IIP3</th>
<th>Phase -Relative-</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMPS</td>
<td>RX 824-849</td>
<td>0.9</td>
<td>22</td>
<td>12</td>
<td>45</td>
<td>-15°</td>
</tr>
<tr>
<td></td>
<td>TX 869-894</td>
<td>0.9</td>
<td>22</td>
<td>12</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>GSM</td>
<td>RX 880-915</td>
<td>1.2</td>
<td>20</td>
<td>11</td>
<td>45</td>
<td>-20°</td>
</tr>
<tr>
<td></td>
<td>TX 925-960</td>
<td>1.2</td>
<td>20</td>
<td>11</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

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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Plots of Typical RF Characteristics @ +25 °C

Typical Insertion Loss & Attenuation

Typical Return Loss @ All Attenuation Levels

Typical Attenuation vs Voltage

Typical IIP3 vs Attenuation

Typical Relative Phase Shift Per Attenuation (Voltage)

For Reference ONLY:
- Insertion Loss = 0.00 V @ 0.00 mA
- 5dB Attenuation = 0.94 V @ 0.49 mA
- 10dB Attenuation = 1.26 V @ 0.93 mA
- 15dB Attenuation = 1.50 V @ 1.22 mA
- 20dB Anttenuation = 1.77V @ 1.60 mA
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Rev. V4

Package PIN Designation, External Components, and Equivalent Circuit

External Bias Components

$\text{R}_{\text{bias}} = 680 \text{ Ohms (1.66 V, @1.50 mA)}$

$L_{\text{bias}} = 150 \text{ nH}$

$C_{\text{bias}} = 100 \text{ pF}$

$C_{\text{block}} = 100 \text{ pF}$
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