MA4VAT2007-1061T
High IIP3 PIN Diode Variable Attenuator
1.7 - 2.0 GHz

Features
• RoHs and ELV compliant
• Bandwidth: 1.70 GHz to 2.00 GHz
• 1.4 dB Insertion Loss, Typical
• 1.4:1 VSWR, Typical
• 23 dB Attenuation, Typical
• 50 dBm Input IP3, Typical
  (1 MHz Offset, @ + 0 dBm Pinc)
• 0 - 2.77 Volts Control Voltage @ 3 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
• 2.0 dB Insertion Loss, Typical
• 2:1 VSWR, Typical
• 18.5 dB Attenuation, Typical

Description and Applications
M/A-COM's MA4VAT2007-1061T 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 2.77 Volts 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 MA4VAT2007-1061T 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

Absolute Maximum Ratings

<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>1 -50nA I</td>
</tr>
<tr>
<td>Control Current</td>
<td>50mA per Diode</td>
</tr>
</tbody>
</table>

1. All the above are at room temperature except as noted
2. Exceeding the above limits may cause permanent damage
## High IIP3 PIN Diode Variable Attenuator

**1.7 - 2.0 GHz**

**MA4VAT2007-1061T**

**Rev. V4**

### Electrical Specifications @ +25 °C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency Band</th>
<th>Unit</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>No DC Bias Low Loss State (Pin = +10dBm, except for P1dB, &amp; IP3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>1.70 GHz – 2.00 GHz</td>
<td>dB</td>
<td>-</td>
<td>1.4</td>
<td>1.6</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>dB</td>
<td>13</td>
<td>15</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>dB</td>
<td>13</td>
<td>15</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>P1dB</td>
<td>dBm</td>
<td>33</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>IIP3</td>
<td>dBm</td>
<td>50</td>
<td>52</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Control Voltage</td>
<td>V</td>
<td>-</td>
<td>0V @ 0uA</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DC Bias RF Attenuation State</th>
<th>Frequency Band</th>
<th>Unit</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Attenuation</td>
<td>1.70 GHz – 2.00 GHz</td>
<td>dB</td>
<td>21</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Input Return Loss @ Max Attenuation</td>
<td>dB</td>
<td>19</td>
<td>21</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Output Return Loss @ Max Attenuation</td>
<td>dB</td>
<td>19</td>
<td>21</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Input IP3</td>
<td>dBm</td>
<td>40</td>
<td>42</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Control Voltage @ Max Attenuation</td>
<td>V</td>
<td>-</td>
<td>2.77V @ 3.00mA</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Current @ Max Attenuation</td>
<td>Bias =2.77V mA</td>
<td>2.5</td>
<td>-</td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

### 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></td>
<td>(MHz)</td>
<td>(dB)</td>
<td>(dB)</td>
<td>(dB)</td>
<td>(dBm)</td>
<td>(Degree)</td>
</tr>
</tbody>
</table>

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)
MA4VAT2007-1061T

High IIP3 PIN Diode Variable Attenuator
1.7 - 2.0 GHz

Plots of Typical RF Characteristics @ + 25 °C

**Typical Insertion Loss & Attenuation Plot**

![Typical Insertion Loss & Attenuation Plot](image)

**Typical Attenuation Vs Voltage Plot**

![Typical Attenuation Vs Voltage Plot](image)

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

![Typical Return Loss @ All Attenuation Levels Plot](image)

**Typical IIP3 Vs Attenuation Plot**

![Typical IIP3 Vs Attenuation Plot](image)

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

![Typical Relative Phase Shift Per Attenuation (Voltage) Plot](image)

For Reference ONLY:
- Low Loss = 0.00V, @0.00mA
- 5 dB Attenuation = 1.30V, @0.95mA
- 10 dB Attenuation = 1.94V, @1.78mA
- 15 dB Attenuation = 2.36V, @2.42mA
- 20 dB Attenuation = 2.67V, @2.90mA
- Max Attenuation = 2.77V, @3.00mA

ADVANCED: Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

PRELIMINARY: Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.

Visit www.macomtech.com for additional data sheets and product information.
High IIP3 PIN Diode Variable Attenuator
1.7 - 2.0 GHz

Package Pin Designation, External Components, and Equivalent Circuit

![Circuit Diagram]

External Bias Components
R_{bias} = 680 Ohms (2.77 V, 3.0 mA)
L_{bias} = 150 nH
C_{bias} = 100 pF
C_{block} = 100 pF

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA4VAT2007-1061T</td>
<td>Tape and Reel</td>
</tr>
</tbody>
</table>