**MM6002**

**GaAs pHEMT MMIC**

3-Bit Digital Control Phase Shifter
1-3GHz

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**Features**
- Phase Shift Range: 35°
- Minimum Phase Shift: 5°
- Phase Shift Accuracy RMS: 3.5°
- Insertion Loss: 1.8dB
- Phase-shifting Amplitude Modulation: ±0.5dB
- Impedance: 50Ω
- Die Size: 1.5 x 1 x 0.1 mm

**Typical Applications**
- Test Instrumentation
- Microwave Radio & VSAT
- Military & Space
- Telecom Infrastructure
- Fiber Optics

**Electrical Specifications**

TA = +25°C, Vctl = 0/-5V

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>1-3</td>
<td></td>
<td></td>
<td>GHz</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td></td>
<td>1.8</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Phase Shift Accuracy RMS</td>
<td></td>
<td>3.5</td>
<td></td>
<td>°</td>
</tr>
<tr>
<td>Phase-shifting Amplitude Modulation</td>
<td></td>
<td>±0.5</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td></td>
<td>15</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Input 1dB Compression (P1dB)</td>
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<td>24</td>
<td></td>
<td>dBm</td>
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<tr>
<td>Switching Speed</td>
<td></td>
<td>30</td>
<td></td>
<td>ns</td>
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</table>

**Functional Block Diagram**

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MM6002

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3-Bit Digital Control Phase Shifter
1-3GHz

Phase Shift Accuracy (Full-state)

Amplitude Modulation (Full-state)

Insertion Loss (Full-state)

Return Loss (Full-state)
**Pad Description**

<table>
<thead>
<tr>
<th>PAD</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RF1</td>
<td>This pad is RF port and matches to 50Ω Impedance</td>
</tr>
<tr>
<td>8</td>
<td>RF2</td>
<td>This pad is RF port and matches to 50Ω Impedance</td>
</tr>
</tbody>
</table>
| 2,3 | P1,P2    | P1=0V, P2=-5V, 5° cell "OFF"  
P1=-5V, P2=0V, 5° cell "ON" |
| 4,5 | P3,P4    | P3=0V, P4=-5V, 20° cell "OFF"  
P3=-5V, P4=0V, 20° cell "ON" |
| 6,7 | P5,P6    | P5=0V, P6=-5V, 10° cell "OFF"  
P5=-5V, P6=0V, 10° cell "ON" |
| Die Bottom | GND  | Die bottom must be connected to RF/DC ground |

Outline Drawing:

All Dimensions in mm
**Notes:**
1. Die thickness: 100um
2. Typical bond pad is 100*100 μm²
3. Bond pad metalization: Gold
4. Backside metalization: Gold
5. Backside of the die (GND)
6. No connection required for unlabeled bond pads

**Maximum Ratings:**
1. RF input power: +24dBm
2. Storage temperature: -65°C to +175°C
3. Operating temperature: -55°C to +85°C

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**Assembly Drawing**

- 50 ohm microstrip
- 3mil assembling clearance
- 1 mil gold wire