2-26.5 GHz MMIC 2-way Power Divider/Combiner MPD-0226SM

1 Device Overview

1.1 General Description

MPD-0226SM is a MMIC 2-way Wilkinson power divider. Passive GaAs MMIC technology allows production of smaller constructions that replace larger form factor circuit board constructions. Tight fabrication tolerances result in less unit to unit variation than traditional power divider technologies, allowing for accurate simulations using the provided S3P file taken from measured production units. Power dividers are passive reciprocal devices that can be used either as power combiners or as power dividers. Applications include Radar, Satcom, EW and test equipment. The MPD-0226SM is available as a 4 X 4 mm QFN package. Evaluation boards are also available.

1.2 Features

- 2 GHz to 26.5 GHz In-phase Power splitting
- 20 dB Typical Output to Output Isolation
- Outstanding phase and amplitude balance
- RoHS Compliant
- S3P data MPD-0226SM.zip

1.3 Functional Block Diagram

![Functional Block Diagram](image)

1.4 Part Ordering Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Package</th>
<th>Green Status</th>
<th>Product Lifecycle</th>
<th>Export Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPD-0226SM</td>
<td>4 X 4 mm QFN</td>
<td>SM</td>
<td>RoHS</td>
<td>Active</td>
<td>EAR99</td>
</tr>
<tr>
<td>EVAL-MPD-0226</td>
<td>Connectorized Evaluation Fixture</td>
<td>Eval</td>
<td>RoHS</td>
<td>Active</td>
<td>EAR99</td>
</tr>
</tbody>
</table>

1 Refer to our website for a list of definitions for terminology presented in this table.

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Revision History

<table>
<thead>
<tr>
<th>Revision Code</th>
<th>Revision Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>June 2020</td>
<td>Initial Datasheet Release</td>
</tr>
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</table>
2 Port Configurations and Functions

2.1 Port Diagram
A bottom-up view of the MPD-0226SM’s SM package outline drawing is shown below. The MMIC Power dividers are passive reciprocal devices allowing either power splitting or power combining.

![Port Diagram]

2.2 Port Functions

<table>
<thead>
<tr>
<th>Port</th>
<th>Function</th>
<th>Description</th>
<th>Equivalent Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>Output 1</td>
<td>The output 1 port is DC short to the other two ports and open to ground.</td>
<td>![Pin 1 Diagram]</td>
</tr>
<tr>
<td>Pin 5</td>
<td>Output 2</td>
<td>The output 2 port is DC short to the other two ports and open to ground.</td>
<td>![Pin 5 Diagram]</td>
</tr>
<tr>
<td>Pin 13</td>
<td>Input/common</td>
<td>The common port is DC short to the other two ports and open to ground.</td>
<td>![Pin 13 Diagram]</td>
</tr>
<tr>
<td>Pad</td>
<td>Ground</td>
<td>SM package ground path is provided through the ground paddle.</td>
<td>![Pad Diagram]</td>
</tr>
</tbody>
</table>
3 Specifications

3.1 Absolute Maximum Ratings
The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Maximum Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Current</td>
<td>60</td>
<td>mA</td>
</tr>
<tr>
<td>Power Handling, at any Port</td>
<td>TBD</td>
<td>dBm</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 to +125</td>
<td>°C</td>
</tr>
</tbody>
</table>

3.2 Package Information

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD</td>
<td>Human Body Model (HBM), per MIL-STD-750, Method 1020</td>
<td>N/A</td>
</tr>
</tbody>
</table>

3.3 Electrical Specifications¹
The electrical specifications apply at $T_A=+25°C$ in a $50\Omega$ system.

Min and Max limits are guaranteed at $T_A=+25°C$.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency (GHz)</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Units</th>
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<tbody>
<tr>
<td>Nominal Power Splitting</td>
<td>2-26.5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>dB</td>
</tr>
<tr>
<td>Nominal Phase Shift</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Degrees</td>
</tr>
<tr>
<td>Amplitude Balance</td>
<td></td>
<td>0.2</td>
<td>0.8</td>
<td>0.8</td>
<td>dB</td>
</tr>
<tr>
<td>Phase Balance</td>
<td></td>
<td>2</td>
<td>8.5</td>
<td>8.5</td>
<td>Degrees</td>
</tr>
<tr>
<td>Excess Insertion Loss²</td>
<td></td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>dB</td>
</tr>
<tr>
<td>VSWR</td>
<td>1.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Impedance</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
</tbody>
</table>

¹ All measured data is taken from the eval board without de-embedding of the connectors and traces.
² Excess Insertion Loss = (Common Port to Output Port Insertion Loss) – 3 dB.
3.4 Typical Performance Plots

Fig. 1. Common to output port insertion loss

Fig. 2. Return loss for common port and output ports.

Fig. 3. Amplitude balance between output ports.

Fig. 4. Phase balance between output ports.

Fig. 5. Isolation between differential ports
4 Mechanical Data
4.1 SM Package Outline Drawing

Notes:
1. Substrate material is LCP.
2. I/O Leads and Ground Paddle plating is (from base to finish):
   - Ni: 0.5um MIN
   - Pd: 0.02um MIN
   - Au: 0.05um MAX
3. All unconnected pins should be connected to PCB RF ground.

4.2 SM Package Footprint

The landing pattern is to be used on Rogers4003 0.008" thick, and taper sample is below. Grounded Coplanar wave guide with 5.25mil slot.

QFN-Package Surface-Mount Landing Pattern

Click here for a DXF of the above layout.

Click here for leaded solder reflow.  Click here for lead-free solder reflow.
4.3 Evaluation Board outline

All measurements are typical

Edge Mount Connector
2.92 Female, 3PL

Backside Label

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