Chip Scale Package MMIC 26 GHz Equalizer

1 Device Overview

1.1 General Description
The MEQ6-26CSP1 is a passive surface mount GaAs MMIC equalizer in a chip scale package (CSP). This equalizer is ideal for compensating for low pass filtering effects in RF/microwave and high-speed digital systems. The MEQ6-26CSP1 provides positive slope from DC to 26GHz with a DC attenuation of 6dB. The CSP allows for extreme miniaturization of the SMT footprint while providing die-like performance. GaAs MMIC technology provides consistent unit-to-unit performance in a small, low-cost form factor.

1.2 Features
- Small 1.5 x 1.5 mm package size
- 2W Power Handling
- DC attenuation of 6dB
- Typical Insertion Loss 0.3 dB at 26GHz
- VSWR < 1.5 Over Operating Band
- Low SWaP
- S2P data: MEQ6-26CSP1.s2p

1.3 Applications
- RF Transceivers
- High-Speed Data
- Telecom
- Cable Loss Compensation
- Amplifier Compensation

1.4 Functional Block Diagram

1.5 Part Ordering Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Loss at DC (dB)</th>
<th>Description</th>
<th>Package</th>
<th>Green Status</th>
<th>Product Lifecycle</th>
<th>Export Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEQ6-26CSP1</td>
<td>6</td>
<td>1.5 x 1.5 mm CSP</td>
<td>CSP1</td>
<td>RoHS</td>
<td>Active</td>
<td>EAR99</td>
</tr>
<tr>
<td>EVB-MEQ6-26</td>
<td>6</td>
<td>Connectorized Eval Module</td>
<td>Module</td>
<td></td>
<td></td>
<td></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>April 2022</td>
<td>Datasheet Initial Release</td>
</tr>
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</table>
2 Port Configurations and Functions

2.1 Port Diagram
An x-ray view of the MEQ6-26CSP1 package outline drawing is shown below. The MEQ equalizers are symmetrical allowing Port 1 or Port 2 to be used as the input.

![Port Diagram](image)

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>Input/Output</td>
<td>Pin 1 is DC connected to ground through a resistor. DC block is required if voltage present.</td>
<td><img src="image" alt="P1 Circuit" /></td>
</tr>
<tr>
<td>Pin 2</td>
<td>Output/Input</td>
<td>Pin 2 is DC connected to ground through a resistor. DC block is required if voltage present.</td>
<td><img src="image" alt="P2 Circuit" /></td>
</tr>
<tr>
<td>GND</td>
<td>Ground</td>
<td>SM package ground path is provided through the ground paddle.</td>
<td><img src="image" alt="Pad Circuit" /></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>Power Handling at any port</td>
<td>2</td>
<td>W</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55 to +100</td>
<td>ºC</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 to +125</td>
<td>ºC</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>TBD</td>
</tr>
</tbody>
</table>

3.3 Electrical Specifications2

The electrical specifications apply at $T_A=+25^\circ$C in a 50Ω system. Typical data shown is for the equalizer in a SM package with a sine wave input applied to port 1.

Min and Max limits are guaranteed at $T_A=+25^\circ$C. All bare die are 100% DC tested and visually inspected.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency Range (GHz)</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss (dB)</td>
<td>DC</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return Loss (dB)</td>
<td>DC to 26</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impedance (Ω)</td>
<td>DC to 26</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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2 Equalizer is symmetrical. Reverse measurement is equivalent to forward measurement. All measurements taken in eval and de-embedded to the CSP1 pad interface.
3.4 Typical Performance Plots

3.4.1 Electrical Performance

Electrical Performance Plots are de-embedded to the CSP package ports.

3.4.2 Electrical Performance Over Temperature

EVAL board performance is shown as a proxy for device performance due to fixturing variability over temperature.

---

3 Electrical Performance Plots are de-embedded to the CSP package ports.
4 EVAL board performance is shown as a proxy for device performance due to fixturing variability over temperature.
4 Mechanical Data

4.1 CSP1 Package Outline Drawing

Unless otherwise specified, dimensions are in inches. Tolerances are:

- X \pm .1
- XXX \pm .004

1. Front to back registration to be 50.8\,\mu m max.
2. Circuits to be shipped individually.
3. Shaded areas are metalized.
4. Finish: Ni: 0.5 - 2.5 \,\mu m
   Pd: 0.02 - 0.15 \,\mu m
   Au: 0.003 - 0.015 \,\mu m

4.2 CSP1 Package Footprint

Recommended to have the ground plane flooded. Ground plane are left to PCB designer's discretion.

Ø.010 Plated thru via epoxy filled. Recommended conductive or non-conductive fill, 6 PL. Vias can be added or reduced at PCB designer's discretion.

The landing pattern is to be used on Rogers4003, 0.008" thick, 1/2 Oz Cu.

SM-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 EVB Package Outline Drawing

Unless otherwise specified, dimensions are in inches. Tolerances are:

- .XX ± .02
- .XXX ± .005

Port 1: Connector Type

<table>
<thead>
<tr>
<th>Port</th>
<th>Connector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>In</td>
<td>2.92mm Female</td>
</tr>
<tr>
<td>Out</td>
<td>2.92mm Female</td>
</tr>
</tbody>
</table>

Note: Connectors are not removable.

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