MADL-011015

250 W Peak Power Limiter
2 - 4 GHz

Features
- 54 dBm Peak Power Handling @ +85°C
- 50 dBm CW Power Handling @ +85°C
- 0.6 dB Insertion Loss (2.7 - 3.5 GHz)
- 15 dB Return Loss (2.7 - 3.5 GHz)
- 15 dBm Flat Leakage Power
- Lead-Free 10.1 x 6.2 x 3.2 mm³ Package
- RoHS® Compliant
- Hermetic Seal¹

Description
The MADL-011015 is a lead-free surface mount, high power limiter which integrates the equivalent of
17 PIN, Schottky, limiter diodes, capacitors, inductors, and resistors in a compact ceramic
package. This device provides superior low and high signal performance from 2 - 4 GHz without DC bias.

The MADL-011015 is ideally suitable for higher peak and CW power receiver-protector microwave circuits
applications where higher performance surface mount limiter assemblies are required.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MADL-011015-001</td>
<td>Bulk</td>
</tr>
<tr>
<td>MADL-011015-001SMB</td>
<td>Sample test board</td>
</tr>
</tbody>
</table>

¹ Hermetic Seal provides fine leak rate < 5x10⁻⁸ atm·cc/s.

**Electrical Specifications: \( T_A = +25^\circ C, Z_0 = 50 \, \Omega \) (unless otherwise defined)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
</table>
| Insertion Loss | -10 dBm, 2.0 GHz  
-10 dBm, 3.5 GHz  
-10 dBm, 4.0 GHz | dB | — | 0.4 | — |
| Return Loss | -10 dBm, 2.0 GHz  
-10 dBm, 3.5 GHz  
-10 dBm, 4.0 GHz | dB | — | 25 | — |
| P1dB Input Compression Power | 3.5 GHz | dBm | — | 14 | — |
| CW Incident Power | 3.5 GHz | dBm | — | 51 | — |
| Peak Incident Power | 1 ms pulse, 10% duty cycle, 3.5 GHz | dBm | — | 56 | — |
| Flat Leakage Power | +56 dBm, 1 ms pulse, 10% duty cycle, 3.5 GHz | dBm | — | 15 | — |
| Spike Leakage Power | +56 dBm, 1 ms pulse, 10% duty cycle, 3.5 GHz | dBm | — | 30 | — |
| Spike Leakage Energy | +56 dBm, 1 ms pulse, 10% duty cycle, 3.5 GHz | ergs | — | 0.3 | — |
| Spike Leakage Time (3 dB below Peak Spike Power) | +56 dBm, 1 ms pulse, 10% duty cycle, 3.5 GHz | ns | — | 30 | — |
| Recovery Time (1 dB of Insertion Loss) | +56 dBm, 1 ms pulse, 10% duty cycle, 3.5 GHz | µs | — | 3 | — |
| Input 3rd Order Intermodulation Products (IIP3) | -10 dBm, F1 = 3.500 GHz, F2 = 3.510 GHz | dBm | — | 25 | — |

3. Incident power ratings defined with 1.2:1 maximum source VSWR and 1.2:1 maximum load VSWR.

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
</table>
| Peak Incident Power @ +85°C  
1 ms pulse, 10% duty | 54 dBm |
| Peak Incident Power @ +85°C  
100 µs pulse, 10% duty | 56 dBm |
| CW Incident Power @ +85°C | 50 dBm |
| Junction Temperature \( T_J \) | 175°C |
| Operating Temperature | -65°C to +125°C |
| Storage Temperature | -65°C to +150°C |

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. MACOM does not recommend sustained operation near these survivability limits.
6. Operating at nominal conditions with \( T_J \leq +175^\circ C \) will ensure \( \text{MTTF} > 1 \times 10^6 \) hours.
Typical Performance Curves

**Insertion Loss vs. Frequency**

**Input Return Loss vs. Frequency**

**Pulsed Flat Leakage Power vs. $P_{IN}$**
(1 ms Pulse, 10% Duty Cycle, 3.5 GHz)

**CW Flat Leakage Power vs. $P_{IN}$ @ 3.5 GHz**

**Pulsed Spike Leakage Power vs. $P_{IN}$**
(1 ms Pulse, 10% Duty Cycle, 3.5 GHz)

**Pulsed 1 dB Recovery Time vs. $P_{IN}$**
(1 ms Pulse, 10% Duty Cycle, 3.5 GHz)
MADL-011015

250 W Peak Power Limiter
2 - 4 GHz

SMB Layout

SMB Parts List

<table>
<thead>
<tr>
<th>Part</th>
<th>Quantity</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Connector</td>
<td>2</td>
<td>Johnson 142-0761-861</td>
</tr>
<tr>
<td>Limiter</td>
<td>1</td>
<td>MADL-011015</td>
</tr>
</tbody>
</table>

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1A devices.

Lead-Free 10.1 x 6.2 x 3.2 mm³ 2-Lead package†

NOTES:
REFERENCE JEDEC MO-153-AB FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
ALL DIMENSIONS SHOWN AS INCHES/MM.

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Plating is Au over Ni over Cu.
Application Section

Transmit-Receive Block Diagram using the S Band MADL-011015 Limiter

Ant

Circulator

PA

Circulator

50 Ω High Power Load

MADL-011015 Limiter

LNA
M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

For further information and support please visit: https://www.macom.com/support