

320 W Peak Power Limiter 1 - 2 GHz

Rev. V1

Features

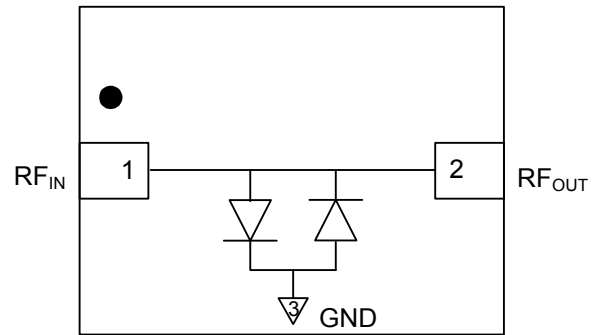
- +55 dBm Peak Power Handling @ +85°C
- +53 dBm CW Power Handling @ +85°C
- 0.35 dB Insertion Loss (1.2 - 1.4 GHz)
- 19 dB Return Loss (1.2 - 1.4 GHz)
- +19 dBm Flat Leakage Power
- Lead-Free 10.1 x 6.2 x 3.2 mm³ Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MADL-011014 is a lead-free surface mount, high power limiter which integrates the equivalent of 19 PIN, Schottky, limiter diodes, capacitors, inductors, and resistors in a compact ceramic package. This device provides superior low and high signal performance from 1 - 2 GHz without DC bias.

The MADL-011014 is ideally suitable for higher peak and CW power receiver-protector microwave circuits applications where higher performance surface mount limiter assemblies are required.

Functional Schematic



Top view

Pin Configuration

| Pin No. | Pin Name | Description |
|---------|---------------------|-------------|
| 1 | RF _{IN} | RF Input |
| 2 | RF _{OUT} | RF Output |
| 3 | Paddle ³ | Ground |

3. The exposed paddle centered on the package bottom must be connected to RF, DC, and thermal ground.

Ordering Information

| Part Number | Package |
|--------------------|---|
| MADL-011014-001000 | Hermetic Seal ¹ |
| MADL-011014-002000 | Moisture Seal ² |
| MADL-011014-001SMB | Sample board (Hermetic Seal Limiter) |
| MADL-011014-002SMB | Sample board (Moisture Seal Limiter) |

1. Hermetic Seal provides fine leak rate <math>< 5 \times 10^{-8}</math> atm·cc/s.
2. Moisture Seal provides fine leak rate <math>< 1 \times 10^{-5}</math> atm·cc/s.

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

320 W Peak Power Limiter 1 - 2 GHz

Rev. V1

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

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|--|--|---------------|------|-------------|----------|
| Insertion Loss | -10 dBm, 1.2 - 1.4 GHz -10 dBm, 1.0 - 2.0 GHz | dB | — | 0.35 0.8 | 0.6 — |
| Return Loss | -10 dBm, 1.2 - 1.4 GHz -10 dBm, 1.0 - 2.0 GHz | dB | — | 19 10 | — |
| P1dB Input Compression Power | 1.3 GHz | dBm | — | +12 | — |
| C.W. Incident Power ⁴ | 1.3 GHz | dBm | — | 55 | — |
| Peak Incident Power ⁴ | 3 ms pulse, 10% duty cycle, 1.3 GHz | dBm | — | 55 | — |
| Flat Leakage Power | 3 ms pulse, 10% duty cycle, 1.3 GHz | dBm | — | 19 | — |
| Spike Leakage Power | +55 dBm, 3 ms pulse, 10% duty cycle, 1.3 GHz | dBm | — | 28 | — |
| Spike Leakage Energy | +55 dBm, 3 ms pulse, 10% duty cycle, 1.3 GHz | ergs | — | 0.5 | — |
| Recovery Time (3 dB of Insertion Loss) | +55 dBm, 3 ms pulse, 10% duty cycle, 1.3 GHz | μs | — | 3.5 | — |
| Input 3rd Order Intermodulation Products (IIP3) | -10 dBm, F1 = 1.500 GHz, F2 = 1.510 GHz | dBm | — | 20 | — |

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

Absolute Maximum Ratings^{5,6}

| Parameter | Absolute Maximum |
|---|------------------|
| Peak Incident Power 3 ms pulse, 10% duty @ +85°C | +55 dBm |
| CW Incident Power @ +85°C | +53 dBm |
| Junction Temperature ⁷ | 175°C |
| Operating Temperature | -65°C to +125°C |
| Storage Temperature | -65°C to +150°C |

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

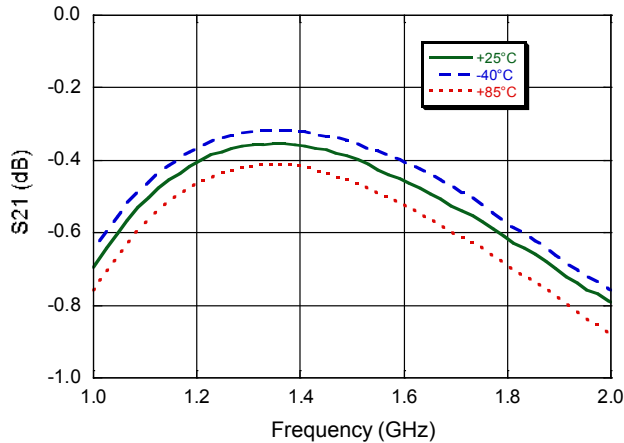
Typical Performance Curve

**Pulse Width vs. Peak Input Power @ +85°C
(10% Duty Cycle, 1.3 GHz)**

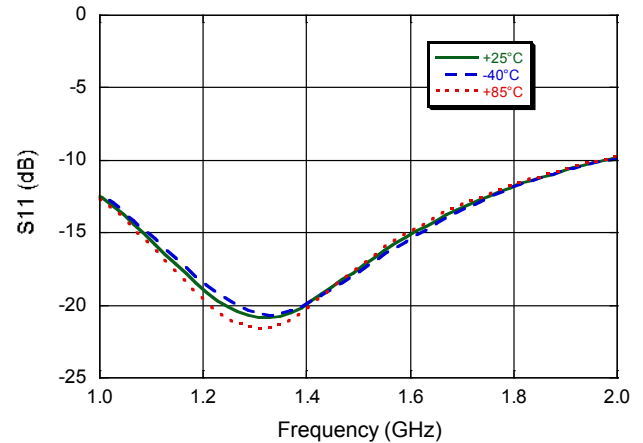


Typical Performance Curves

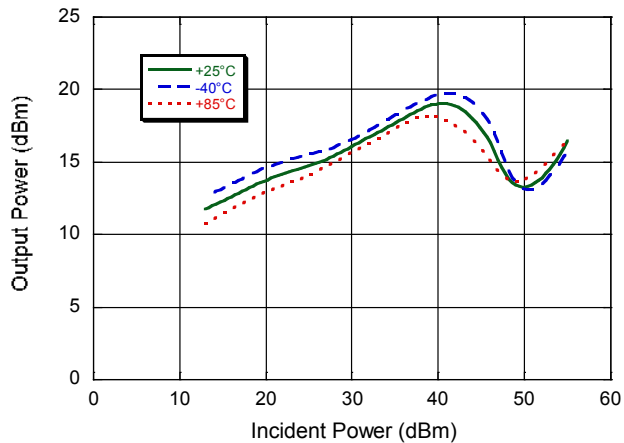
Insertion Loss vs. Frequency



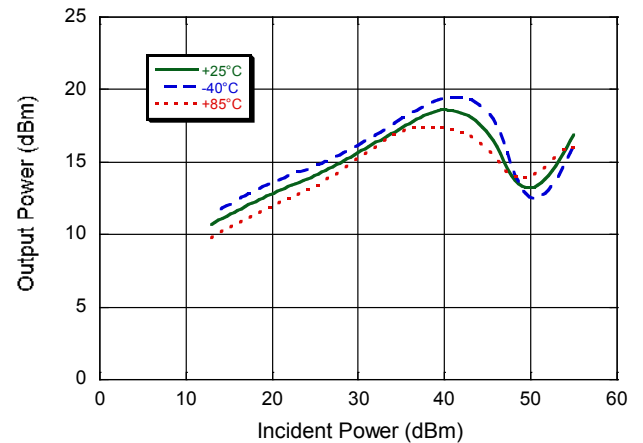
Input Return Loss vs. Frequency



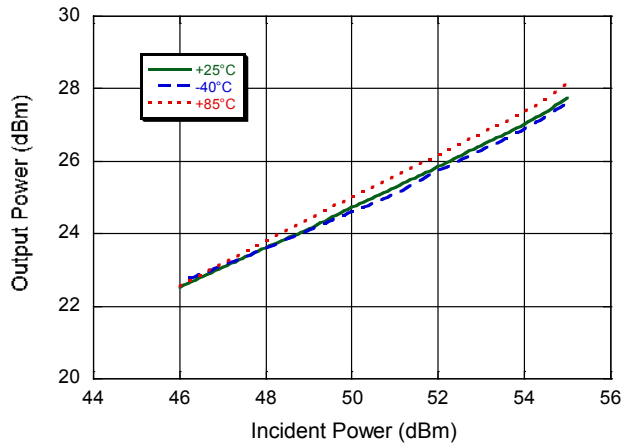
Pulsed Flat Leakage Power vs. P_{IN}
(3 ms Pulse, 10% Duty Cycle, 1.3 GHz)



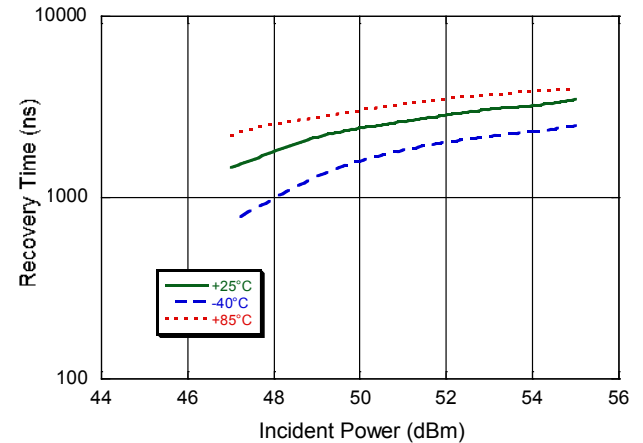
CW Flat Leakage Power vs. P_{IN} @ 1.3 GHz



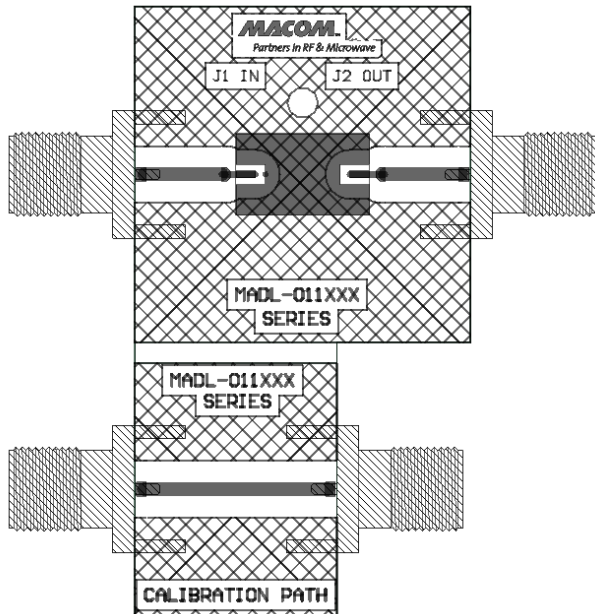
Pulsed Spike Leakage Power vs. P_{IN}
(3 ms Pulse, 10% Duty Cycle, 1.3 GHz)



Pulsed 3 dB Recovery Time vs. P_{IN}
(3 ms Pulse, 10% Duty Cycle, 1.3 GHz)



SMB Layout



SMB Layout

| Part | Quantity | Part Number |
|--------------|----------|----------------------|
| RF Connector | 2 | Johnson 142-0701-851 |
| Limiter | 1 | MADL-011014 |

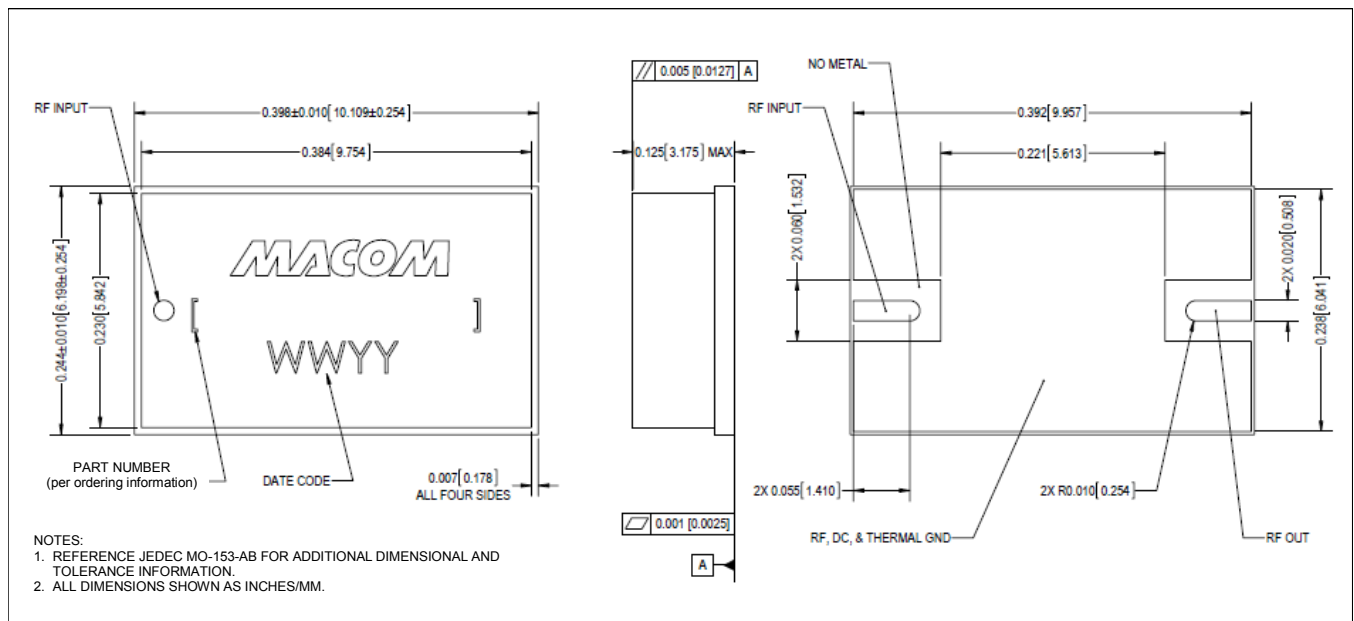
Handling Procedures

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 1C devices.

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



[†] 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 L Band MADL-011014 Limiter

