

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.

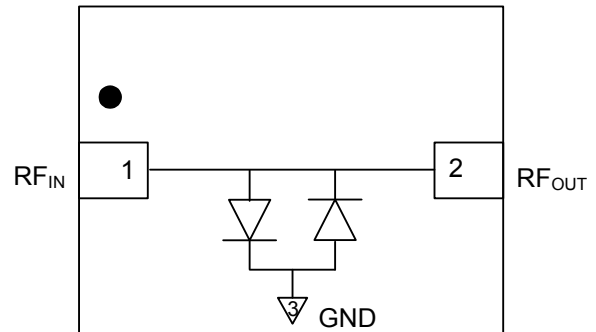
The MADL-011015 is ideally suitable for higher peak and CW power receiver-protector microwave circuits applications where higher performance surface mount limiter assemblies are required.

Ordering Information

Part Number	Package
MADL-011015-001	Bulk
MADL-011015-001SMB	Sample test board

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

Functional Schematic



Top view

Pin Configuration

Pin No.	Pin Name	Description
1 (dot)	RF _{IN}	RF Input
2	RF _{OUT}	RF Output
3	Paddle ²	Ground

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

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

250 W Peak Power Limiter
2 - 4 GHz

Rev. V2

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, 2.0 GHz -10 dBm, 3.5 GHz -10 dBm, 4.0 GHz	dB	—	0.4 0.6 0.8	— 0.9 —
Return Loss	-10 dBm, 2.0 GHz -10 dBm, 3.5 GHz -10 dBm, 4.0 GHz	dB	—	25 15 13	—
P1dB Input Compression Power	3.5 GHz	dBm	—	14	—
CW Incident Power ³	3.5 GHz	dBm	—	51	—
Peak Incident Power ³	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^{4,5}

Parameter	Absolute Maximum
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 ⁶ (T_J)	175°C
Operating Temperature	-65°C to +125°C
Storage Temperature	-65°C to +150°C

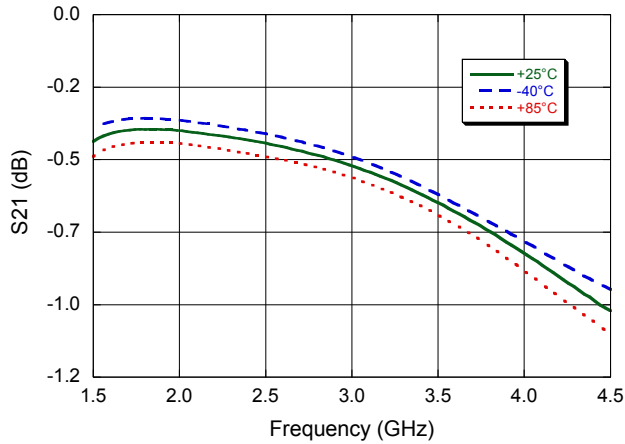
4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. MACOM does not recommend sustained operation near these survivability limits.
6. Operating at nominal conditions with $T_J \leq +175^\circ\text{C}$ will ensure $\text{MTTF} > 1 \times 10^6$ hours.

2

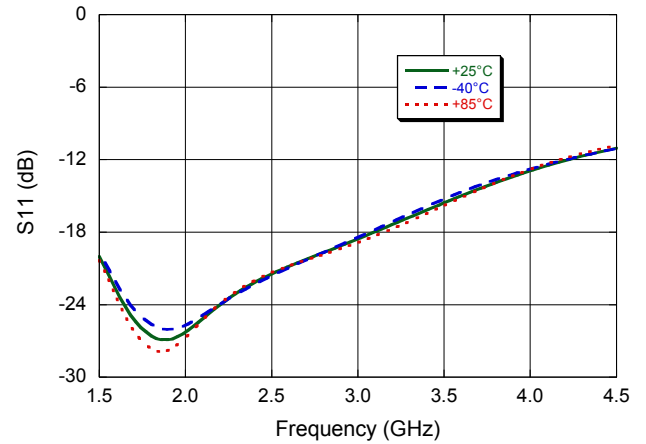
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Typical Performance Curves

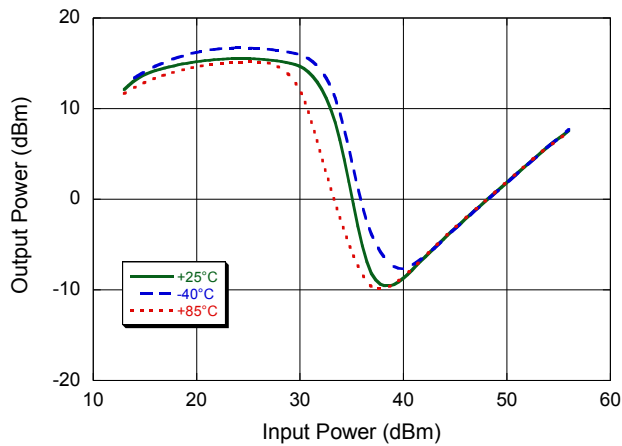
Insertion Loss vs. Frequency



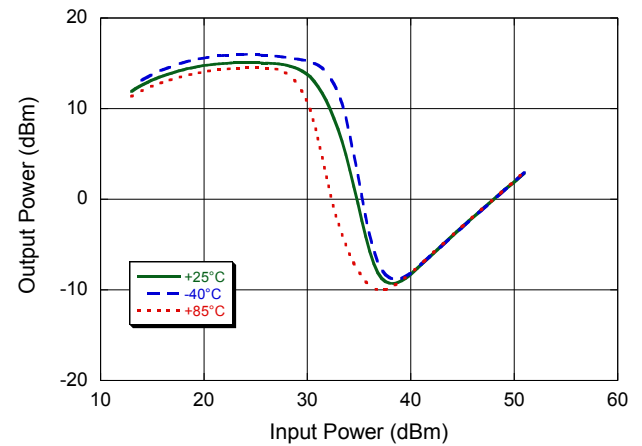
Input Return Loss vs. Frequency



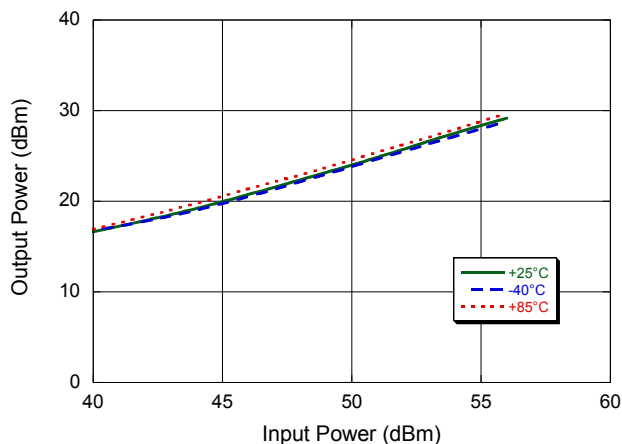
Pulsed Flat Leakage Power vs. P_{IN}
(1 ms Pulse, 10% Duty Cycle, 3.5 GHz)



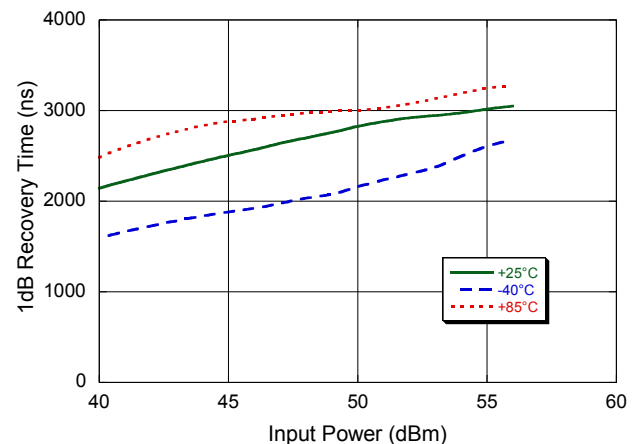
CW Flat Leakage Power vs. P_{IN} @ 3.5 GHz



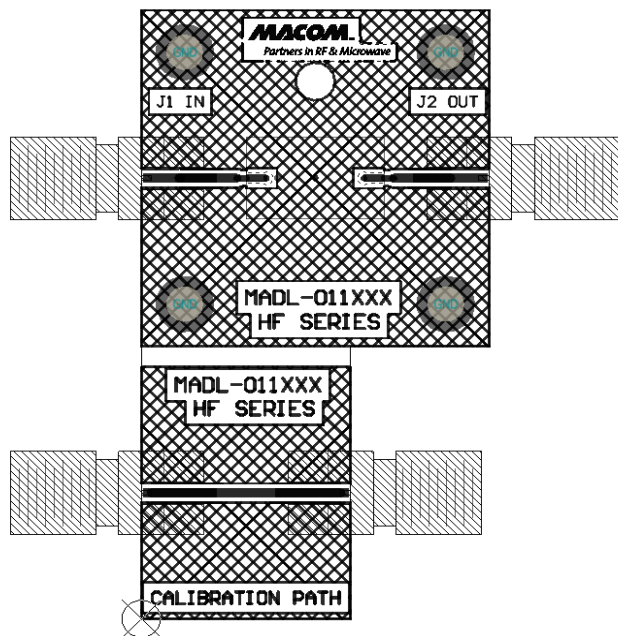
Pulsed Spike Leakage Power vs. P_{IN}
(1 ms Pulse, 10% Duty Cycle, 3.5 GHz)



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



SMB Layout



SMB Parts List

Part	Quantity	Part Number
RF Connector	2	Johnson 142-0761-861
Limiter	1	MADL-011015

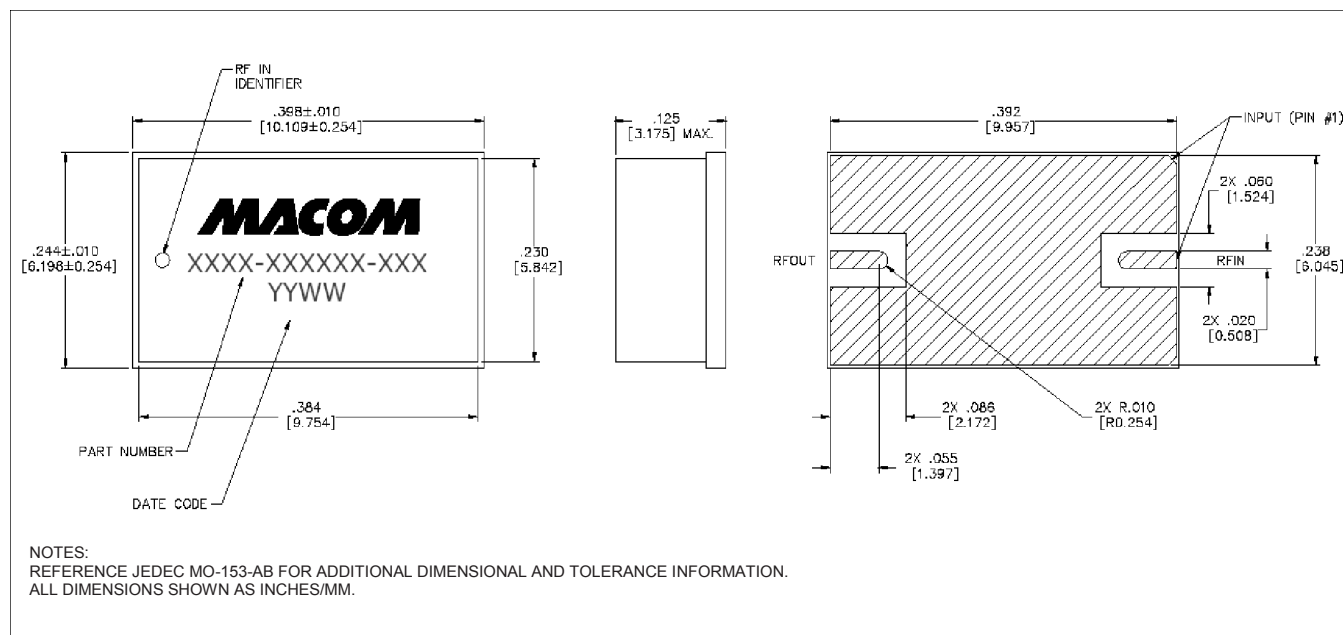
Handling Procedures

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.

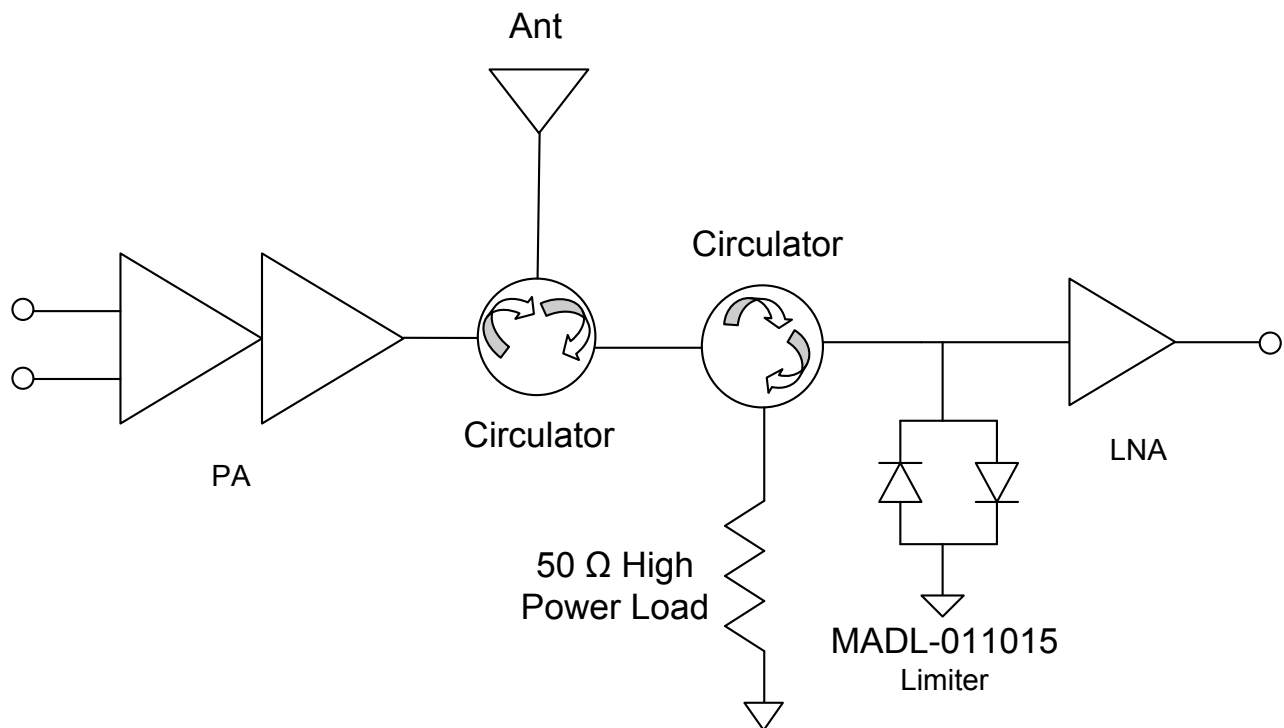
Lead-Free 10.1 x 6.2 x 3.2 mm³ 2-Lead package[†]



[†] 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



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