

Wide Band Surface Mount Limiter

100 MHz - 18 GHz



MADL-011092

Rev. V2

Features

- +56 dBm Peak Power Handling @ 2.5 - 4.0 GHz
- Low insertion Loss
- +24 dBm Flat Leakage Power
- 8.8 x 5 x 1.8 mm package
- RoHS* Compliant
- Passive Device

Applications

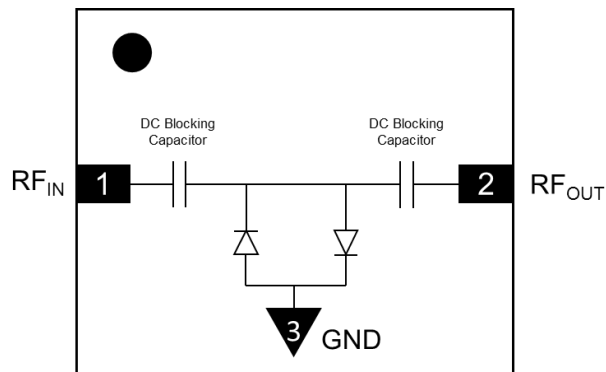
- Receiver Protection
- Ship and Airborne Radar

Description

The MADL-011092 is a lead-free wide band surface mount limiter that integrates multiple limiter stages and blocking capacitors into a compact laminate package. This device provides superior low and high signal performance from 100 MHz to 18 GHz without DC bias.

The MADL-011092 is ideally suitable for high peak power receiver-protector microwave circuit applications where higher performance surface mount limiter assemblies are required.

Functional Schematic



Pin Configuration

Pin #	Function
1	RF Input
2	RF Output
3 (Paddle) ¹	Ground

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

Ordering Information

Part Number	Package
MADL-011092	Parts in Waffle Pack
MADL-011092-SMB	Sample Board

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

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Electrical Specifications: $T_A = +25^\circ\text{C}$, $Z_0 = 50 \Omega$, $P_{IN} = -10 \text{ dBm}$ (unless otherwise specified)

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	0.1 - 5 GHz 5 - 8 GHz 8 - 13 GHz 13 - 18 GHz	dB	—	0.6 1.0 1.7 2.3	0.8 1.3 2.0 3.0
Return Loss	0.1 - 5 GHz 5 - 8 GHz 8 - 13 GHz 13 - 18 GHz	dB	—	22 15 10 13	—
P1dB	0.4 - 14 GHz 14 - 18 GHz	dBm	—	15 10	—
IIP3	-10 dBm per Tone, 10 MHz Spacing, 0.1 - 4 GHz 4 - 14 GHz 14 - 18 GHz	dBm	—	28 25 19	—
IIP2	-10 dBm per Tone, 10 MHz Spacing, 0.1 - 4 GHz 4 - 14 GHz 14 - 18 GHz	dBm	—	41 35 27	—
Peak Power Handling	10 μs PW, 2% Duty Cycle, 2.5 - 4 GHz 4 - 12 GHz 12 - 18 GHz	dBm	—	56 43 41	—
CW Power Handling	2.5 - 18 GHz	dBm	—	35	—
Flat Leakage Power	0.4 - 18 GHz	dBm	—	24	27
Spike Leakage Power	56 dBm input, 2.5 - 4 GHz	dBm	—	29	—
Spike Leakage Time	56 dBm input, 2.5 - 4 GHz	ns	—	150	—
Spike Leakage Energy	56 dBm input, 2.5 - 4 GHz	ergs	—	0.8	—
1 dB Recovery Time	56 dBm input, 2.5 - 4 GHz	μs	—	11	—

Absolute Maximum Ratings^{3,4}

Parameter	Absolute Maximum
Peak Incident Power @ +85°C, 10 μs pulse, 2% duty 2.5 - 4 GHz 4 - 12 GHz 12 - 18 GHz	54 dBm 43 dBm 41 dBm
CW Incident Power @ +85°C	35 dBm
DC Voltage ⁵	45 V
Junction Temperature ⁶	175°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.

4. MACOM does not recommend sustained operation near these survivability limits.

5. Maximum DC voltage applied externally to RF input and RF output DC blocking capacitors.

6. Operating at nominal conditions with $T_J \leq +175^\circ\text{C}$ will ensure $\text{MTTF} > 1 \times 10^6$ hours.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These HBM class 1B (CDM class C3) electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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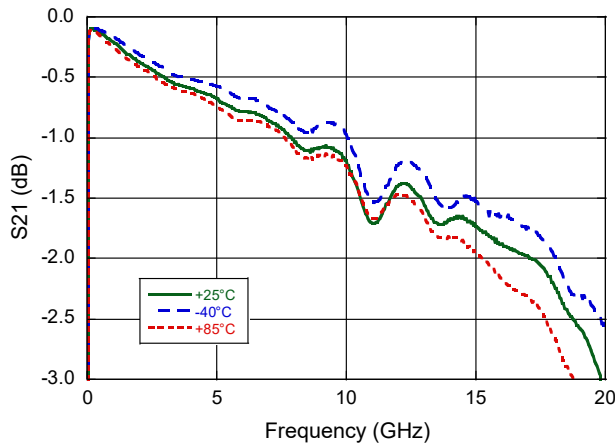


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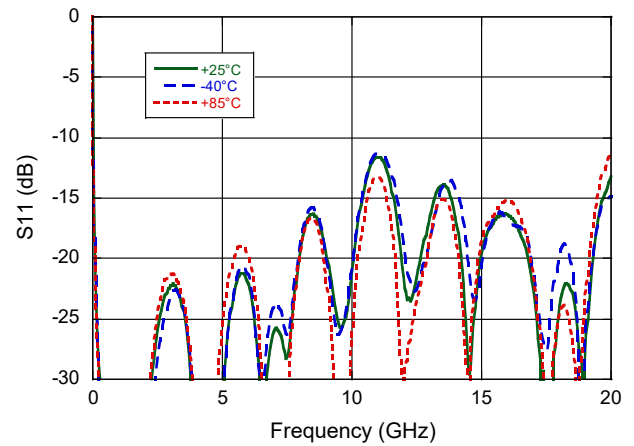
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Typical Performance Curves: Freq. = 0.1 - 20 GHz, $Z_0 = 50 \Omega$

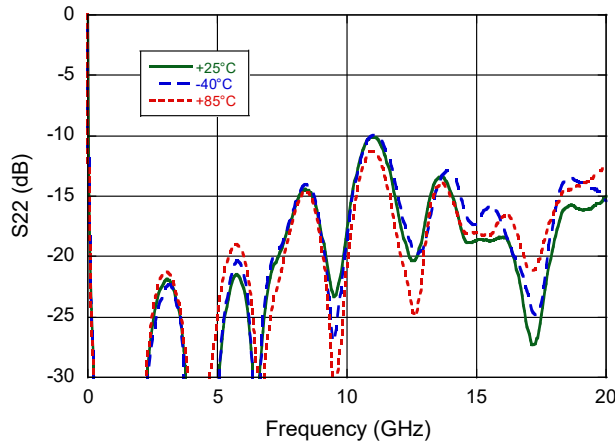
Insertion Loss versus Frequency



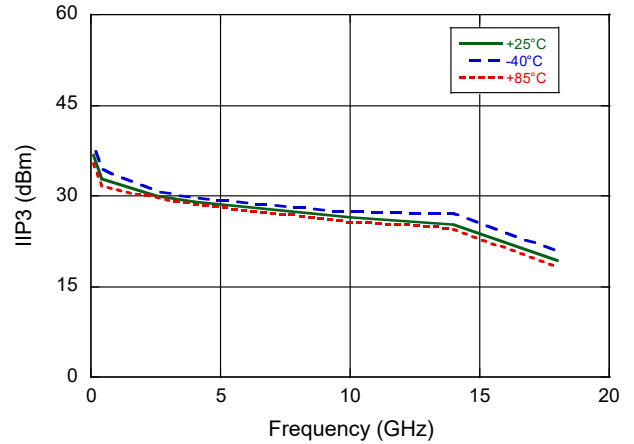
Input Return Loss versus Frequency



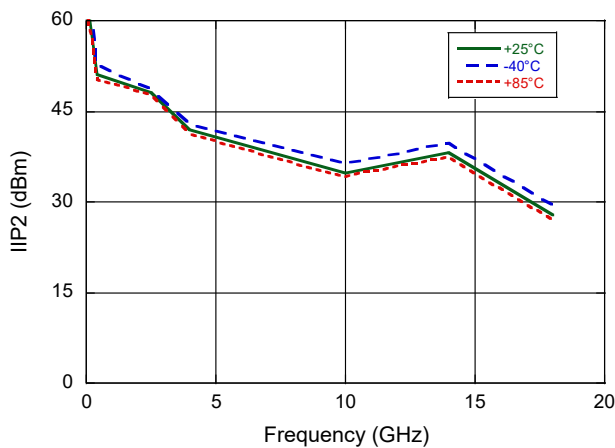
Output Return Loss versus Frequency



IIP3 at -10 dBm Input Power versus Frequency

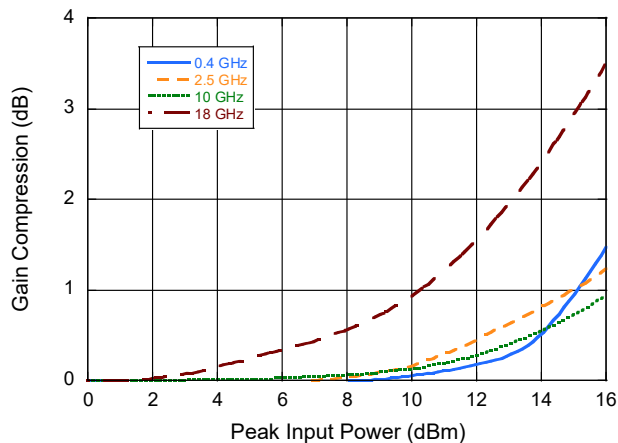


IIP2 at -10 dBm Input Power versus Frequency

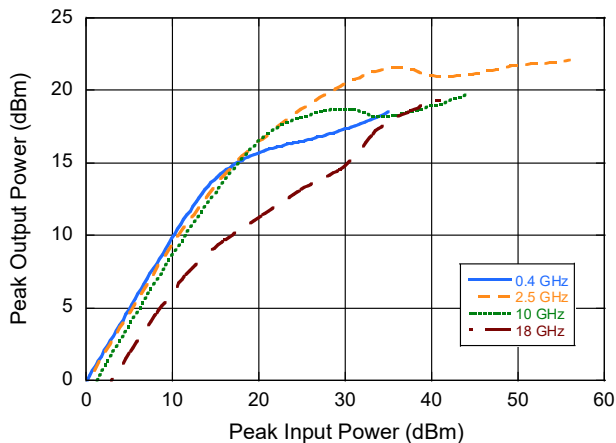


Typical Performance Curves: $T_A = +25^\circ\text{C}$ unless otherwise specified, $Z_0 = 50 \Omega$

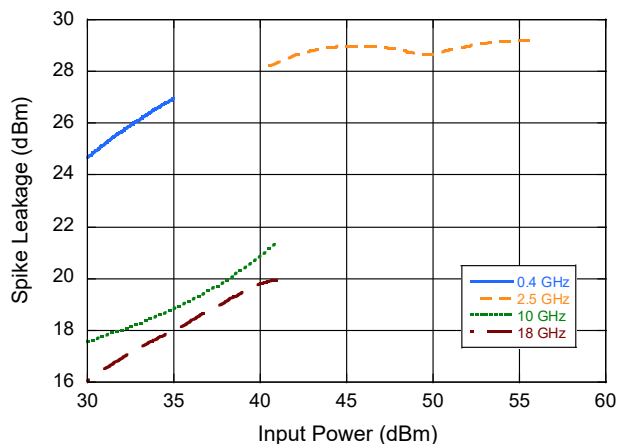
Pulsed Gain Compression at 0.4, 2.5, 10, 18 GHz
(10 μs Pulse Width, 2 % Duty Cycle)



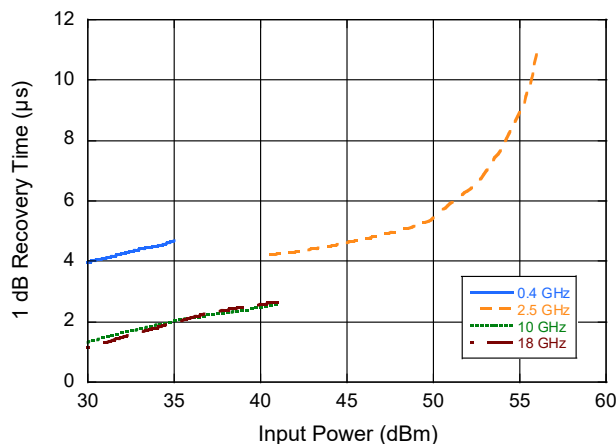
Pulsed Flat Leakage Power at 0.4, 2.5, 10, 18 GHz
(10 μs Pulse Width, 2 % Duty Cycle)



Pulsed Spike Leakage Power at 0.4, 2.5, 10, 18 GHz
(10 μs Pulse Width, 2 % Duty Cycle)



Recovery Time at 0.4, 2.5, 10, 18 GHz
(10 μs Pulse Width, 2 % Duty Cycle)



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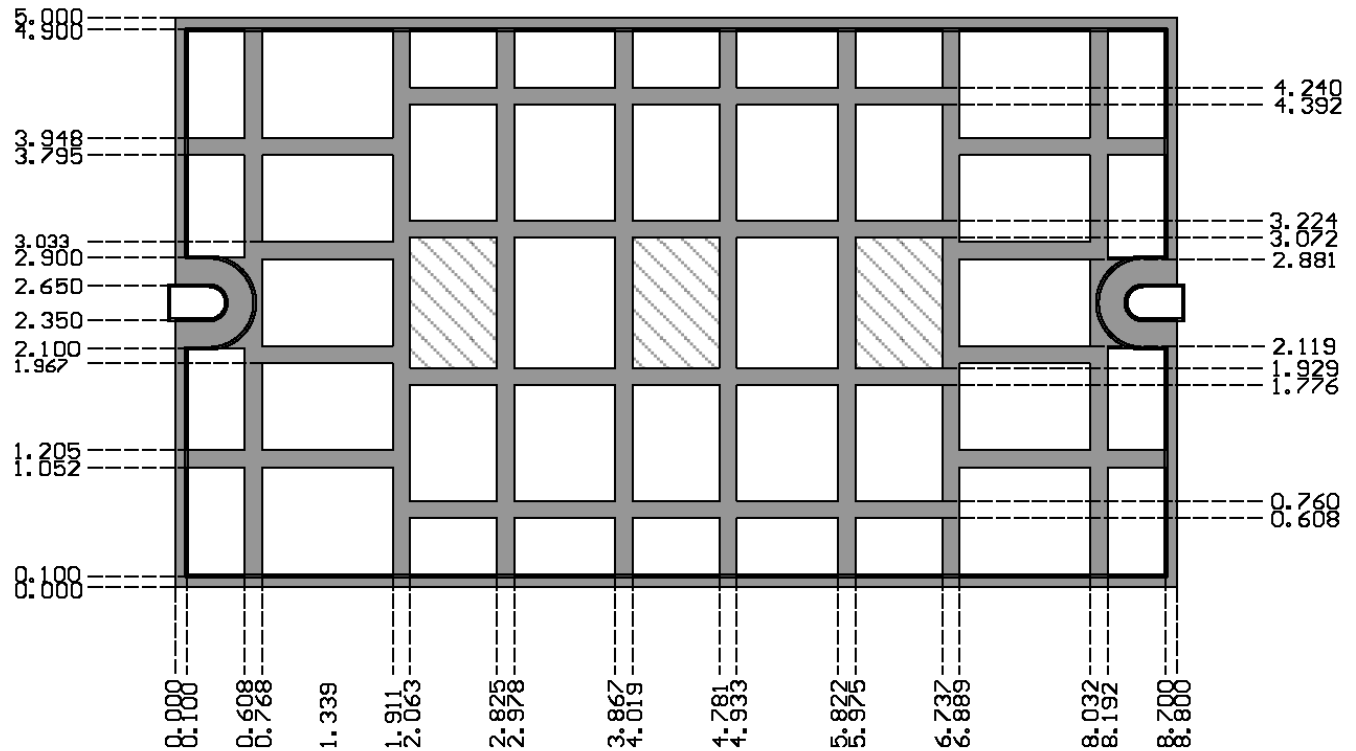


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Recommended solder mask pattern on SMB to prevent voiding

Units in mm



Diode Locations: Minimize solder voiding

Recommended Attachment

A High density solid Cu via farm or Solid Cu heat Slug is recommended under the attach pad for optimum thermal heat dissipation. Solder voiding under the package should be minimized and no voiding should be present under the diode locations.

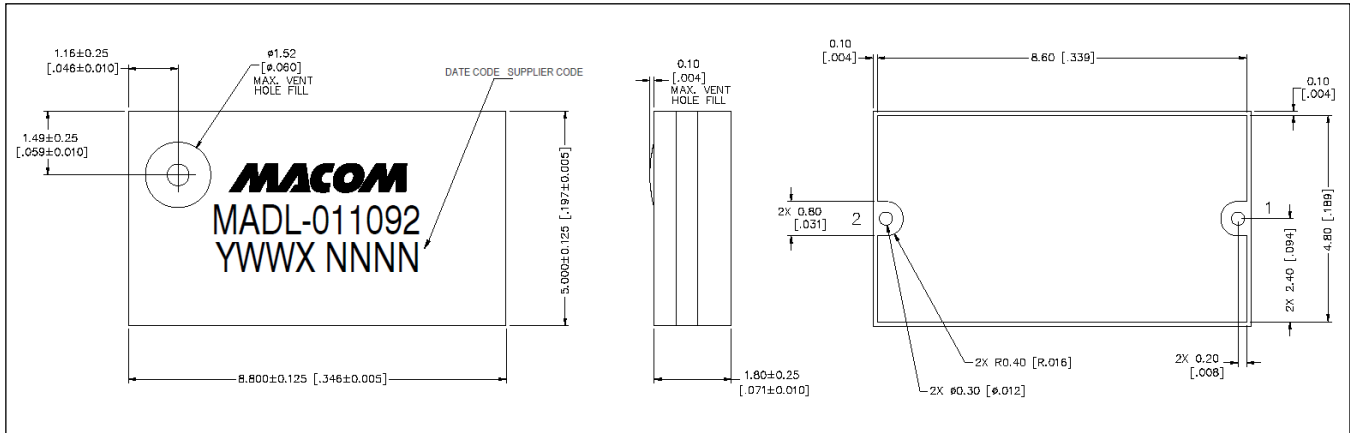
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Lead-Free 8.8 mm x 5 mm x 1.8 mm 2-Lead Package[†]



[†] Reference Application Note S2083 for lead-free solder reflow recommendations.
Plating is Au over Pd over Ni over Cu
Limiter is NOT Bi-Directional, pin 1 is RF Input.

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