

PIN Diode Limiter

50 MHz - 4 GHz

Rev. V2

Features

- Low Insertion Loss and Noise Figure
- +40 dBm Peak and +30 dBm CW Power
- +10 dBm P1dB Compression Point
- +16 dBm Flat Leakage
- Lead-Free 1.2 x 1.5 mm 6-Lead PQFN Package
- RoHS Compliant* and 260°C Reflow Compatible

Description

The MADL-011008 is a silicon PIN limiter with small I-region length specifically designed for medium signal applications. The limiter is available in a lead-free 1.2 x 1.5 mm 6-lead PQFN package. The limiter is ideally designed to provide low insertion loss, at zero bias, as well as low flat leakage power with fast signal response/recovery times.

The MADL-011008 PIN limiter is designed for use in passive limiter control circuits to protect sensitive receiver components such as low noise amplifiers (LNA), detectors, and mixers.

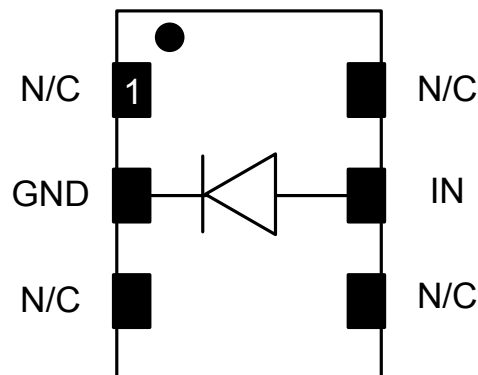
Ordering Information^{1,2}

| Part Number | Package |
|--------------------|-------------------|
| MADL-011008-141200 | Bulk Packaging |
| MADL-011008-14120T | Tape and Reel |
| MADL-011008-001SMB | Sample Test Board |

1. Reference Application Note M513 for reel size information.

2. All sample boards include 5 loose pieces.

Functional Schematic



Pin Configuration

| Pin No. | Pin Name | Description |
|----------------|----------|---------------|
| 1 | N/C | No Connection |
| 2 | GND | RF Ground |
| 3 | N/C | No Connection |
| 4 | N/C | No Connection |
| 5 | IN | RF Input |
| 6 | N/C | No Connection |
| 7 ³ | Pad | GND |

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

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Silicon Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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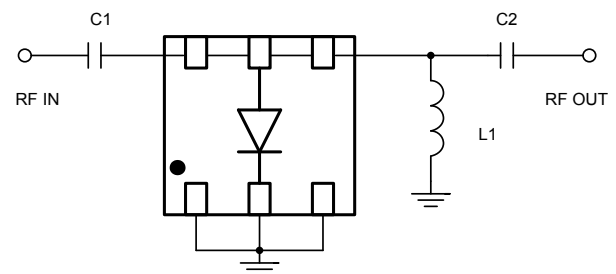
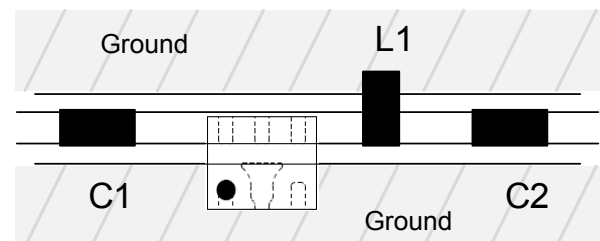
Electrical Specifications: Freq 2.7 to 3.0 GHz, $T_A = 25^\circ\text{C}$, $Z_0 = 50\ \Omega$

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---------------------|----------------------------------------------------------------------------------------------------------------------------|---------------|------|------|------|
| Insertion Loss | 0 dBm | dB | — | 0.15 | — |
| Input Return Loss | 0 dBm | dB | — | 20 | — |
| Output Return Loss | 0 dBm | dB | — | 20 | — |
| P1dB | — | dBm | — | 10 | — |
| Peak Incident Power | Pulse Width 1 μSec , Duty Cycle 0.1% | dBm | — | 40 | — |
| CW Incident Power | — | dBm | — | 30 | — |
| CW Flat Leakage | Incident Power = +24 dBm | dBm | — | 16 | — |
| Recovery Time | To within 1 dB of final insertion loss Peak Incident Power = +30 dBm Pulse Width 1 μSec , Duty Cycle 0.1% | ns | — | 50 | — |
| Spike Leakage | +30 dBm Pin, Pulse Width 1 μSec , Duty Cycle 0.1% | erg | — | 0.5 | — |
| IP3 | Pin -5 dBm/tone, 10 MHz Spacing | dBm | — | 30 | — |
| IP2 | Pin -5 dBm/tone | dBm | — | 43 | — |
| Forward Voltage | Forward current = 10 mA | V | — | 0.9 | 1.1 |
| Reverse Current | Reverse voltage = 20 volts | μA | — | 0.1 | 100 |

Absolute Maximum Ratings^{4,5}

| Parameter | Absolute Maximum |
|------------------------------------------------------------------------|---------------------------------------------|
| Peak Incident Power Pulse Width 1 μSec , Duty Cycle 0.1% | 43 dBm |
| CW Incident Power | 33 dBm |
| Operating Temperature | -40°C to $+85^\circ\text{C}$ |
| Storage Temperature | -65°C to $+150^\circ\text{C}$ |

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
 5. M/A-COM Technology Solutions does not recommend sustained operation near these survivability limits.

Application Schematic

Recommended Board Layout

Parts List

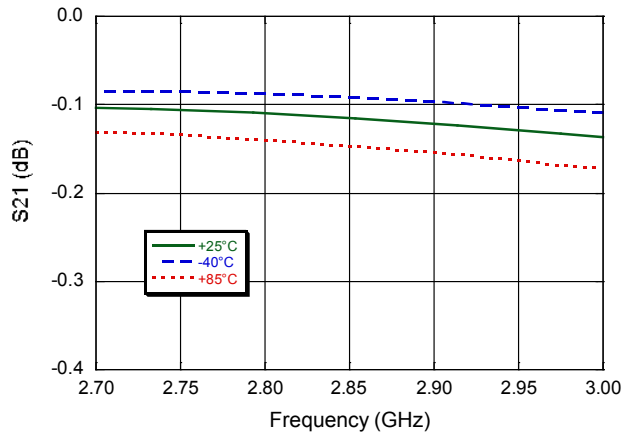
| Component | Value | Package |
|-----------|--------|---------|
| C1 - C2 | 68 pF | 0402 |
| L1 | 5.1 nH | 0402 |

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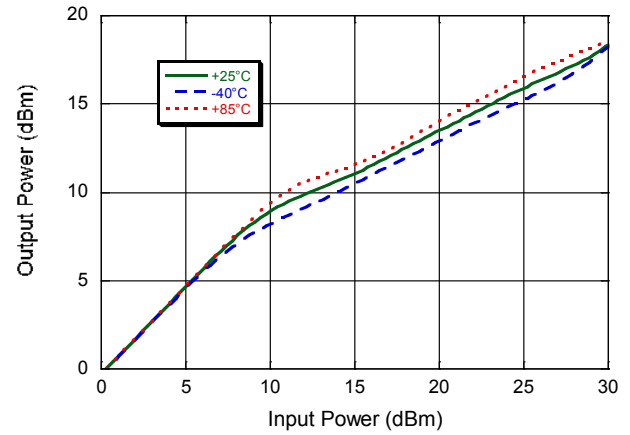
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Typical Performance Curves

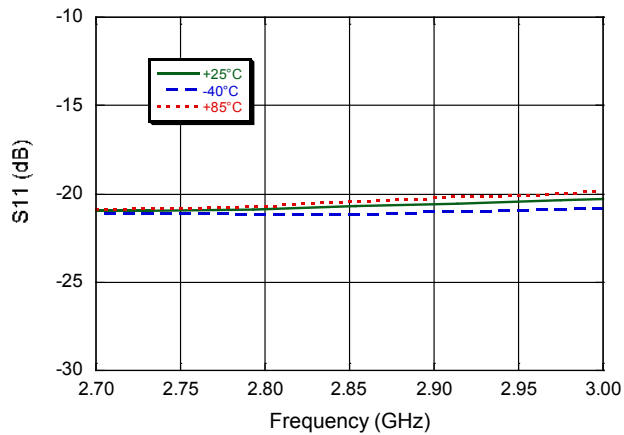
Insertion Loss



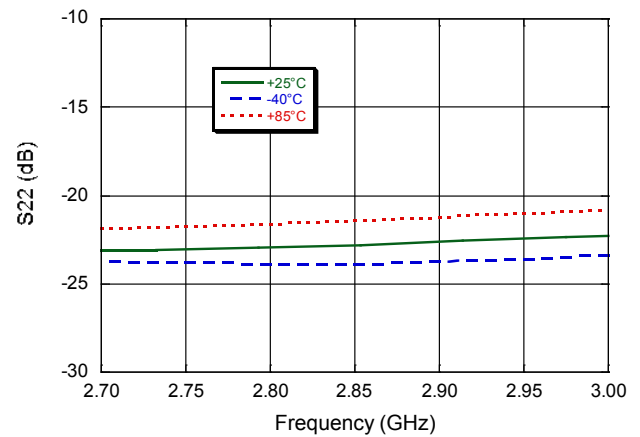
Pin vs. Pout @ 2.85 GHz



Input Return loss

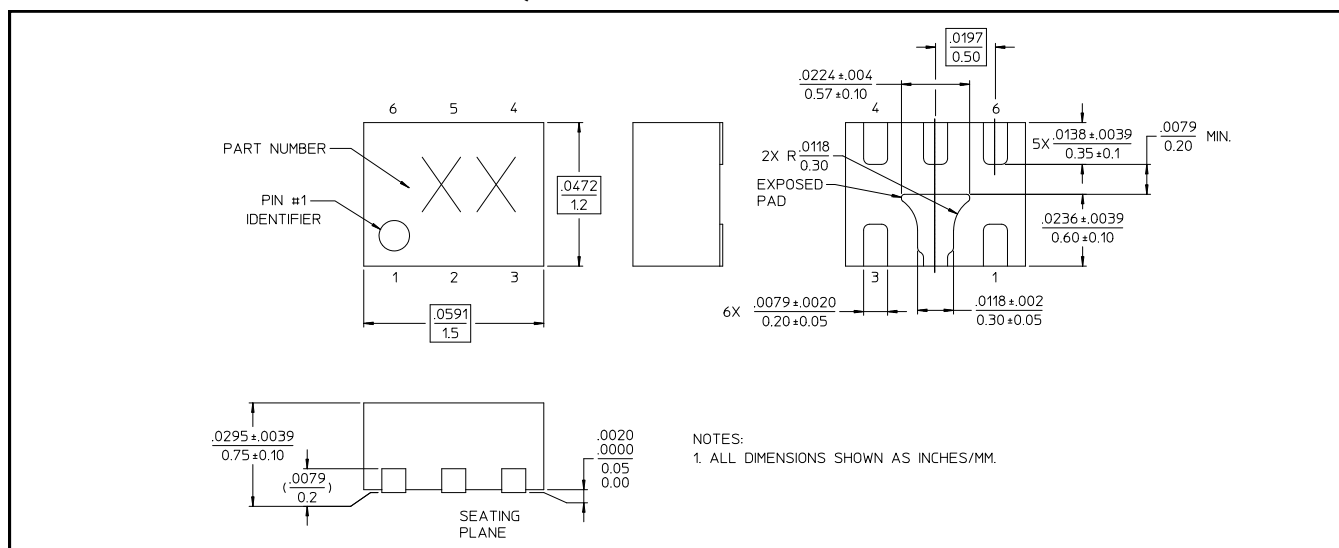


Output Return Loss



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Lead-Free 1.2 x 1.5 mm 6-Lead PQFN†

† Reference Application Note M538 for lead-free solder reflow recommendations.
 Meets JEDEC moisture sensitivity level 1 requirements.
 Plating is 100% matte tin over copper.

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