MADL-011021-14150T

PIN-Schottky Anti-Parallel Diode Limiter
10 MHz - 6 GHz

Rev. V2

Features

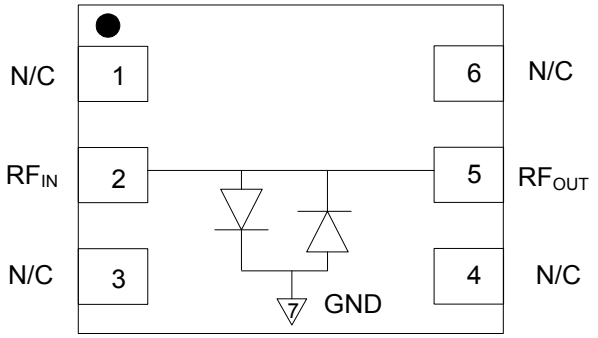
- 3 Terminal LPF Broadband Shunt Structure
- 10 MHz - 6 GHz Broadband Frequency
- > 2.5 W Peak and CW Power Handling
- < 0.5 dB Shunt Insertion Loss
- < +15 dBm Flat Leakage Power
- Lead-Free 1.5 x 1.2 mm 6-lead TDFN Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MADL-011021 is a lead-free 1.5 x 1.2 mm TDFN surface mount plastic packaged that provides both low and high signal frequency operation from 10 MHz to 6 GHz. The anti-parallel arrangement of the PIN limiter and schottky diode provides for broadband performance, eliminating the need for a shunt coil as a DC return.

This device is ideally suitable for usage in higher frequency and lower flat leakage limiter microwave circuits applications where higher performance surface mount diode assemblies are required.

Functional Schematic



Top view

Ordering Information[1,2]

Part Number	Package
MADL-011021-14150T	3000 piece reel
MADL-011021-000SMB	Sample board

1. Reference Application Note M513 for reel size information.
2. All RF Sample boards include 5 loose parts.

Pin Configuration[3]

Pin No.	Pin Name	Description
1	N/C	No Connection
2	RF$_{IN}$	RF Input
3	N/C	No Connection
4	N/C	No Connection
5	RF$_{OUT}$	RF Output
6	N/C	No Connection
7	Paddle[4]	Ground

3. MACOM recommends connecting unused package pins to ground.
4. The exposed pad centered on the package bottom must be connected to RF, DC, and thermal ground.

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

Electrical Specifications: T_A = +25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	P incident = -10 dBm, F = 750 MHz	dB	—	0.15	0.20
Return Loss	P incident = -10 dBm, F = 750 MHz	dB	—	20	—
P1dB Input Compression Power	F = 1 GHz	dBm	—	+5	—
C.W. Incident Power[5]	F = 4 GHz	dBm	—	34	—
Peak Incident Power[5]	1 µs, 1 % duty @ 4 GHz	dBm	—	34	—
Flat Leakage Power[6]	+34 dBm, 1 µs, 1 % duty @ 4 GHz	dBm	—	18	—
Spike Leakage Power[6,7]	+34 dBm, 1 µs, 1 % duty @ 4 GHz	dBm	—	20	—
Spike Leakage Energy[6,7]	+34 dBm, 1 µs, 1 % duty @ 4 GHz	ergs	—	0.01	—
Recovery Time[5,6,7] (1 db of Insertion Loss)	+34 dBm, 1 µs, 1 % duty @ 4 GHz	ns	—	100	—
Input 3rd Order Intermodulation Products (IIP3)	P incident = -10 dBm, F1 = 1.000 GHz, F2 = 1.010 GHz	dBm	—	15	—

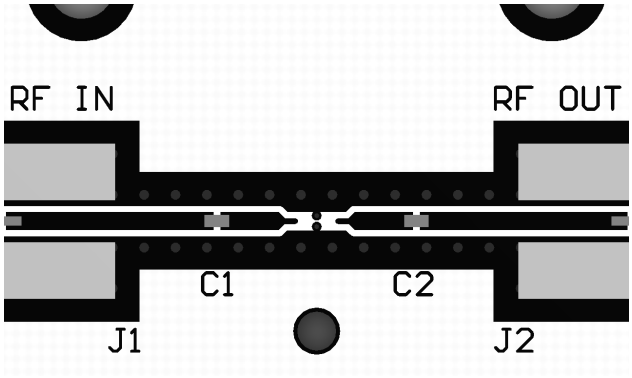
5. Incident power ratings defined with 1.2;1 source VSWR and 1.2:1 max load VSWR.
6. Peak incident power defined at 1 µs RF pulse width, 1% duty cycle
7. Spike leakage power and recovery time values are defined at peak power conditions.

Absolute Maximum Ratings[8,9]

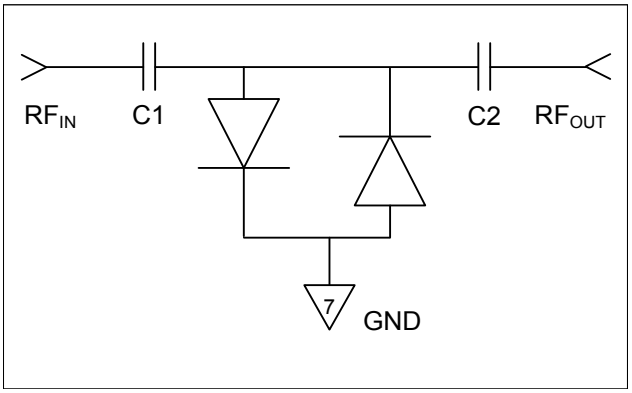
Parameter	Absolute Maximum
Peak Incident Power 1 µs pulse, 1% duty (+85°C)	+33 dBm
CW Incident Power (+85°C)	+33 dBm
Junction Temperature	+175°C
Operating Temperature	-65°C to +125°C
Storage Temperature	-65°C to +150°C

8. Exceeding any one or combination of these limits may cause permanent damage to this device.
9. MACOM does not recommend sustained operation near these survivability limits.

PCB Layout



PCB Schematic



Parts List

Part	Value	Case Style
C1, C2 (DC Blocks)	100 pF	0402

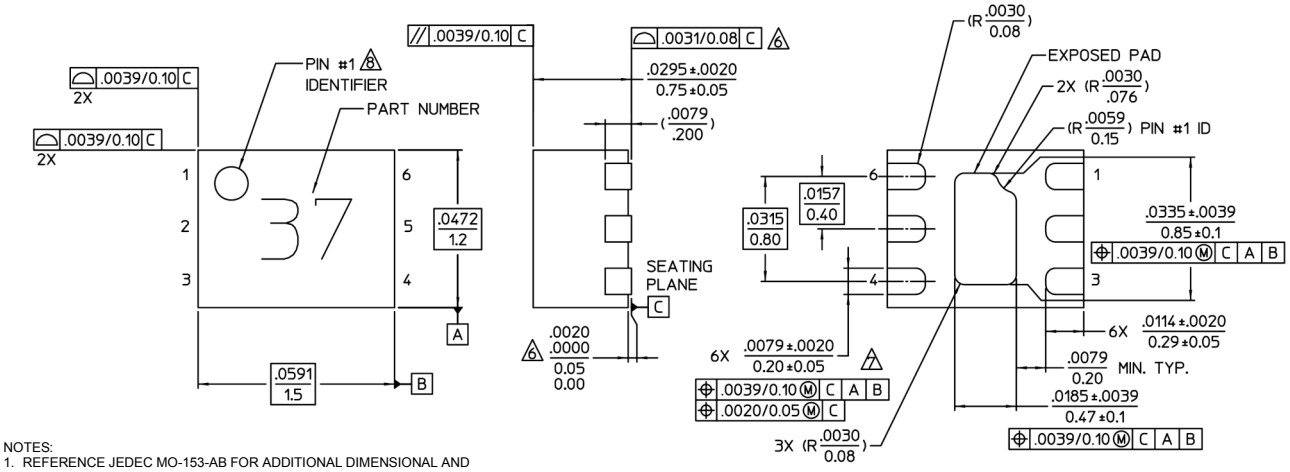
Handling Procedures

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 devices.

Lead-Free 1.5 x 1.2 mm 6-Lead TDFN†

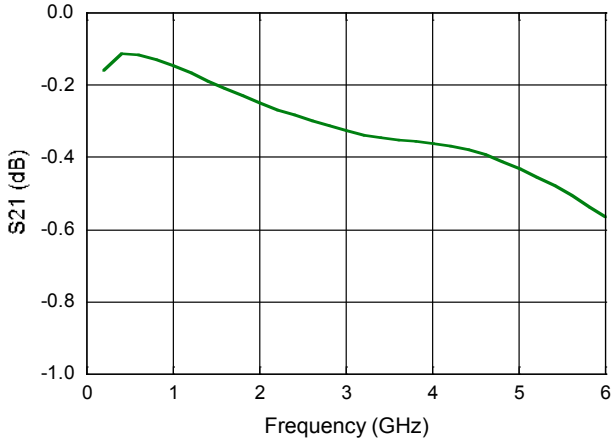


NOTES:
1. REFERENCE JEDEC MO-153-AB FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. ALL DIMENSIONS SHOWN AS INCHES/MM.

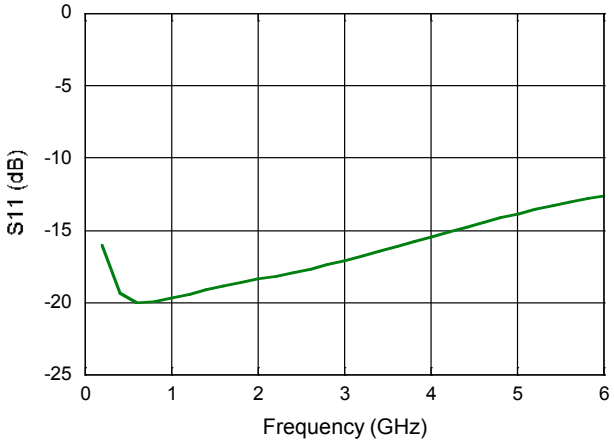
† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

Typical Performance Curves @ +25°C

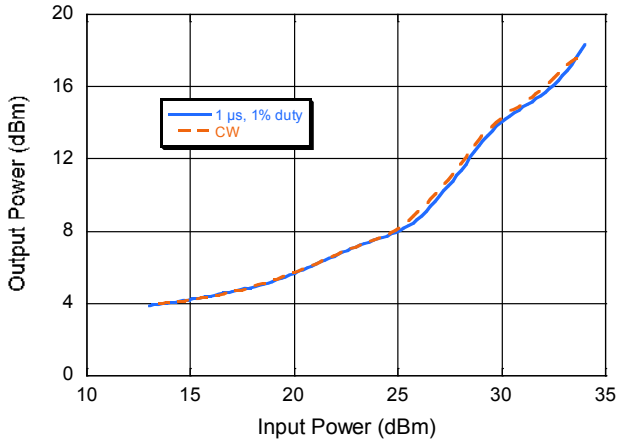
Insertion Loss vs. Frequency



Return Loss vs. Frequency

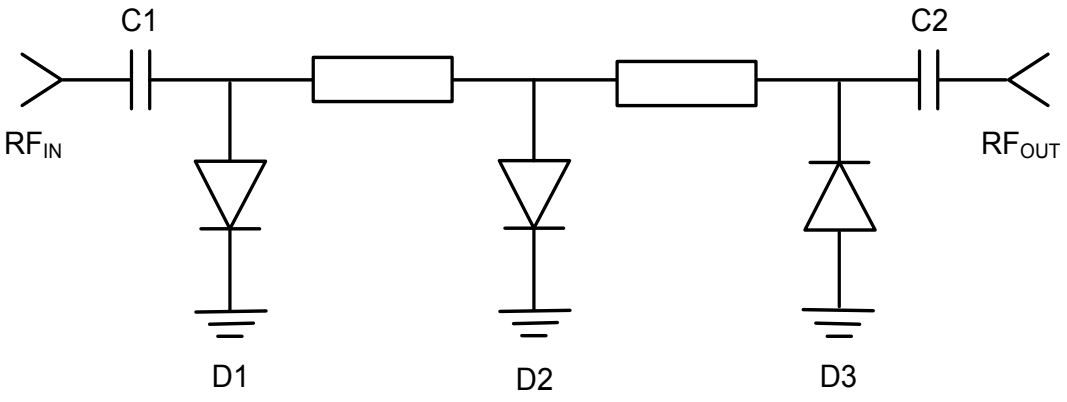


Flat Leakage Power @ CW and Pulsed Power, 4 GHz



Applications Section

Schematic of 3 Stage Limiter using MADL-011021-14150T
F = 1 - 6 GHz, P_{inc} = +40 dBm CW, + 47 dBm, 5 us, 1 % duty



Parts List[10]

Part	PN	Case Style	Description	Quantity
D1	MADP-011029-14150T	ODS-1415	Input PIN Diode	1
D2, D3[11]	MADL-011021-14150T	ODS-1415	2nd & 3rd Stage PIN Diode	1
C1, C2	22 pF	0402	DC Block	2

10. Parts list is shown for 1 - 6 GHz operation. Component values can be scaled for various frequency bands.
11. D2 and D3 are combined as single MADL-011021-14150T.