

Features

- Low Series Resistance
- Low Capacitance
- Fast Switching Speed
- Silicon Nitride Passivation
- Polymer Scratch Protection
- Lead-Free size and type of package
- RoHS* Compliant

Applications

The small outline and low RC product, make the device useful in multi-throw switches and switched phase shifter circuits requiring <20 ns switching speeds.

Description

The MADP-011140 is a silicon flip chip PIN diode fabricated using MACOM's HMIC process which provides for repeatable electrical characteristics. This diode is fabricated on epitaxial wafers using a process designed for extremely low parasitic. The diode is fully passivated with silicon nitride to minimize leakage current. The chip also has an additional polymer layer for impact and scratch protection to prevent damage to the active area during handling. The flip chip configuration is suitable for pick and place insertion. This device can be attached with solder or conductive epoxy.

Functional Schematic



Pin Configuration

Pin #	Function
1	Anode
2	Cathode

Ordering Information

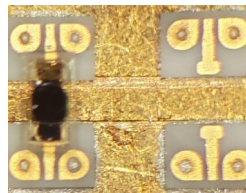
Part Number	Package
MADP-011140-14520P	Tape & Reel (3K per reel)

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

Electrical Specifications: $T_A = +25^\circ\text{C}$, $Z_0 = 50 \Omega$

Parameter	Test Conditions	Symbol	Units	Min.	Typ.	Max.
Total Capacitance	-40 V, 1 MHz ^{1,2} -40 V, >100 MHz ^{1,4}	C_T	pF	—	0.037 0.034	0.050 —
Series Resistance ^{3,4}	50 mA, 100 MHz 100 mA, 100 MHz	R_S	Ω	—	2.5 2.1	—
Forward Voltage	100 mA 20 mA	V_F	V	—	1.10 0.96	— 1.00
Reverse Current	-70 V	I_R	nA	—	—	50
Lifetime	$I_F = +10 \text{ mA} / I_{REV} = -6 \text{ mA}$	T_L	ns	—	100	—

1. The C_T total capacitance represents C_J junction capacitance and C_p parasitic capacitance.
2. C_T at 1MHz measured on a wafer .
3. The series resistance, R_S , is equal to the total diode resistance including the resistance of the junction, R_J .
4. C_T and R_S above 100 MHz retrieved from S parameters measured on PNA N5227B with a die mounted on GSG 50 Ω Probe Point PO-1298011 (see picture below).



GSG 50 Ω Probe Point PO-1298011

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
DC Forward Current	150 mA
DC Reverse Voltage	-70 V
Junction Temperature	+175°C
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +150°C
Dissipated Power ⁷ RF plus DC	900 mW @ +85°C
Mounting Temperature	+300°C for 10 seconds

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. MACOM does not recommend sustained operation near these survivability limits.
7. The dissipated power highly depends on ambient conditions of the diode.

Handling Procedures

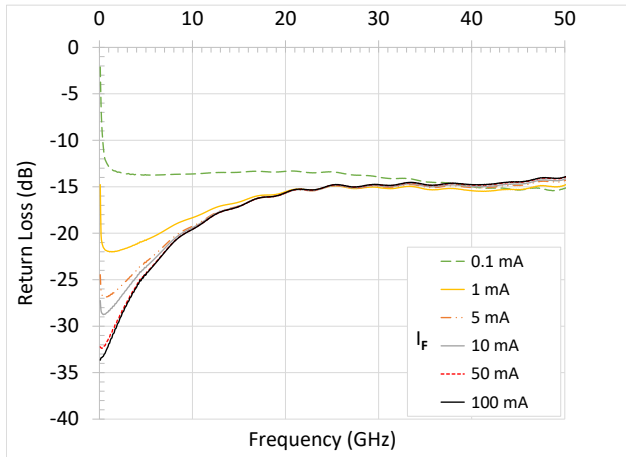
Please observe the following precautions to avoid damage:

Static Sensitivity

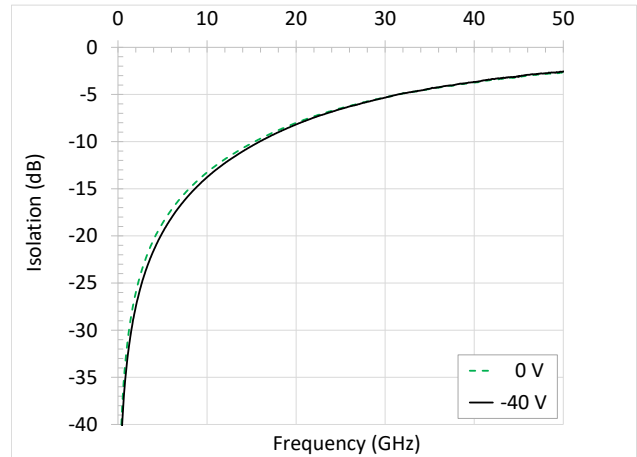
These devices very susceptible to ESD and are rated Class 0 (0 - 199 V) per HBM MIL-STD-883, method 3015.7 [C = 100 pF \pm 10%, R = 1.5 kW \pm 1%]. Even though die survived ESD testing to 100 V, they should be handled in a static free environment.

Typical Performance Curves @ +25°C

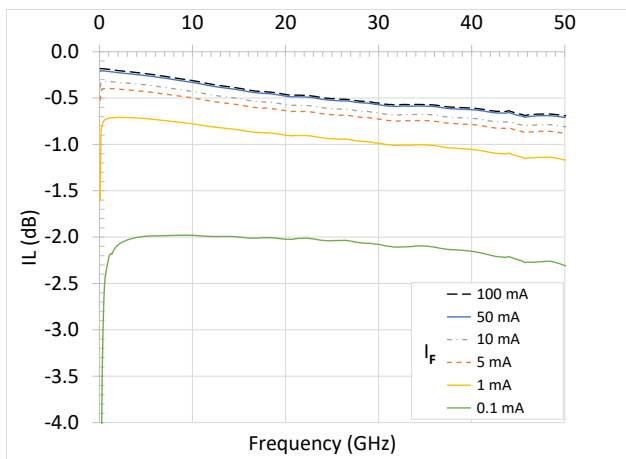
Return Loss vs Frequency over I_F



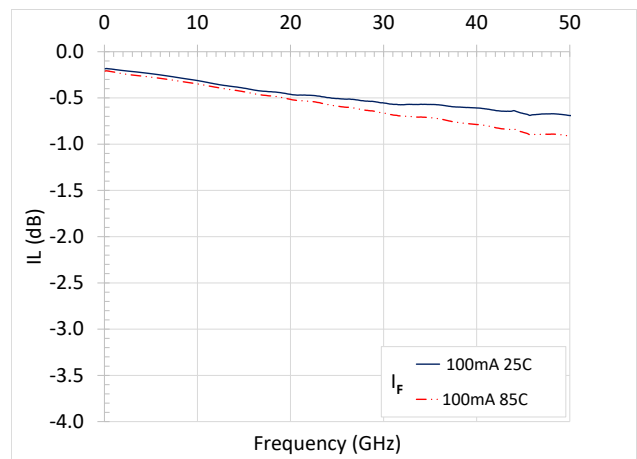
Isolation vs Frequency over V_R



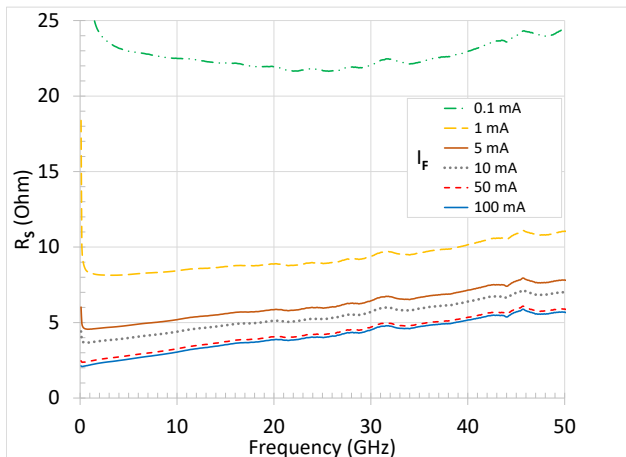
Insertion Loss over Bias Current



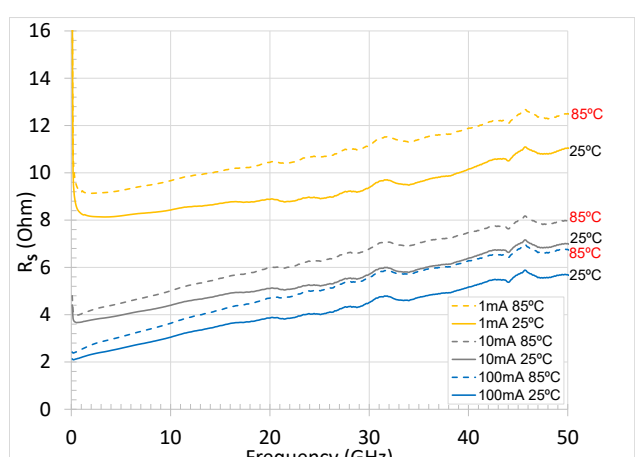
Insertion Loss @ 100mA over Temp



R_S over Bias Current

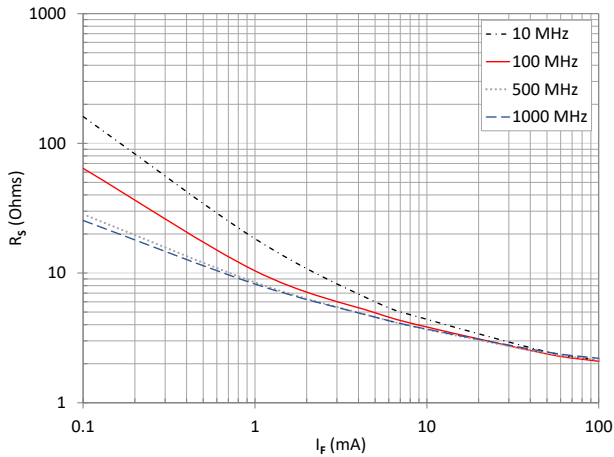


R_S over Temp @ 1, 10 and 100mA

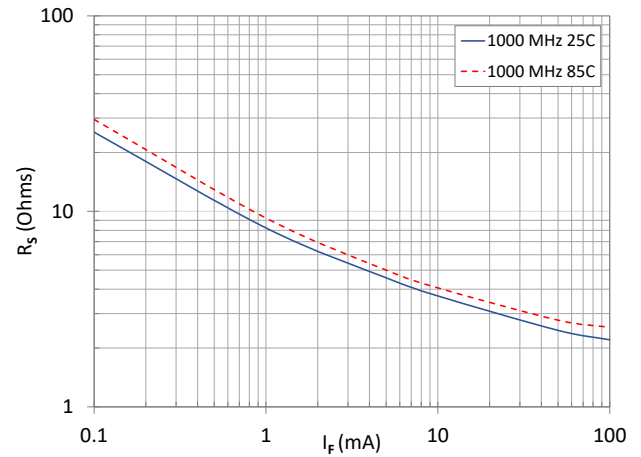


Typical Performance Curves @ +25°C

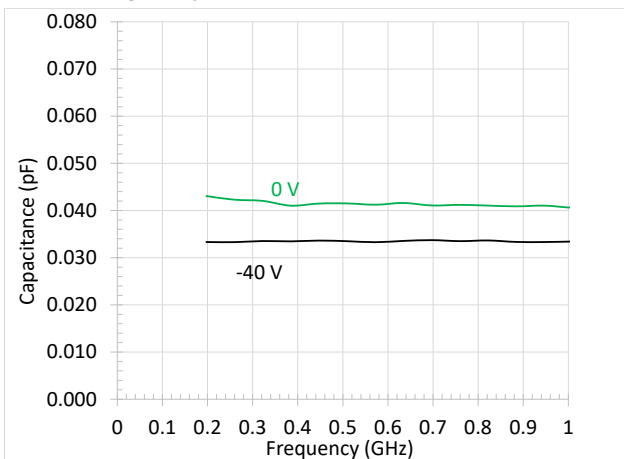
R_S over Bias Current @ 10, 100, 500 and 1000 MHz



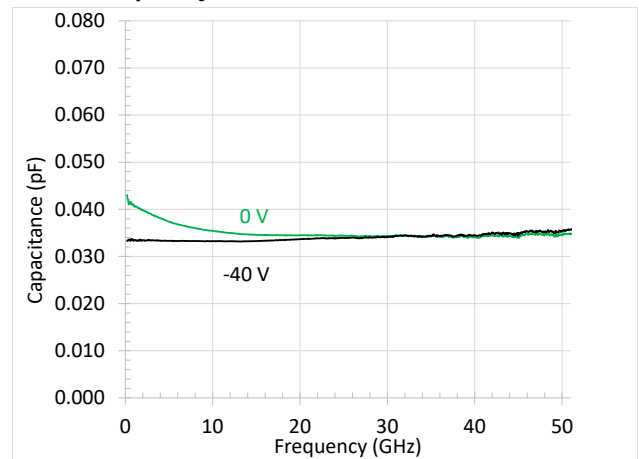
R_S over Bias Current @ 1000 MHz, 25°C and 85°C



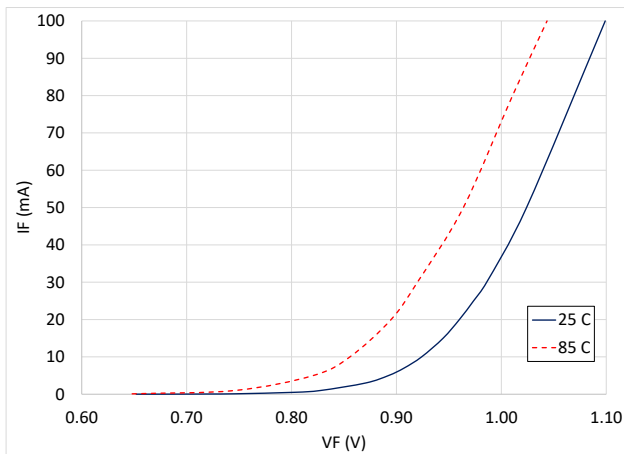
C_T vs Frequency to 1 GHz at 0 V and -40 V



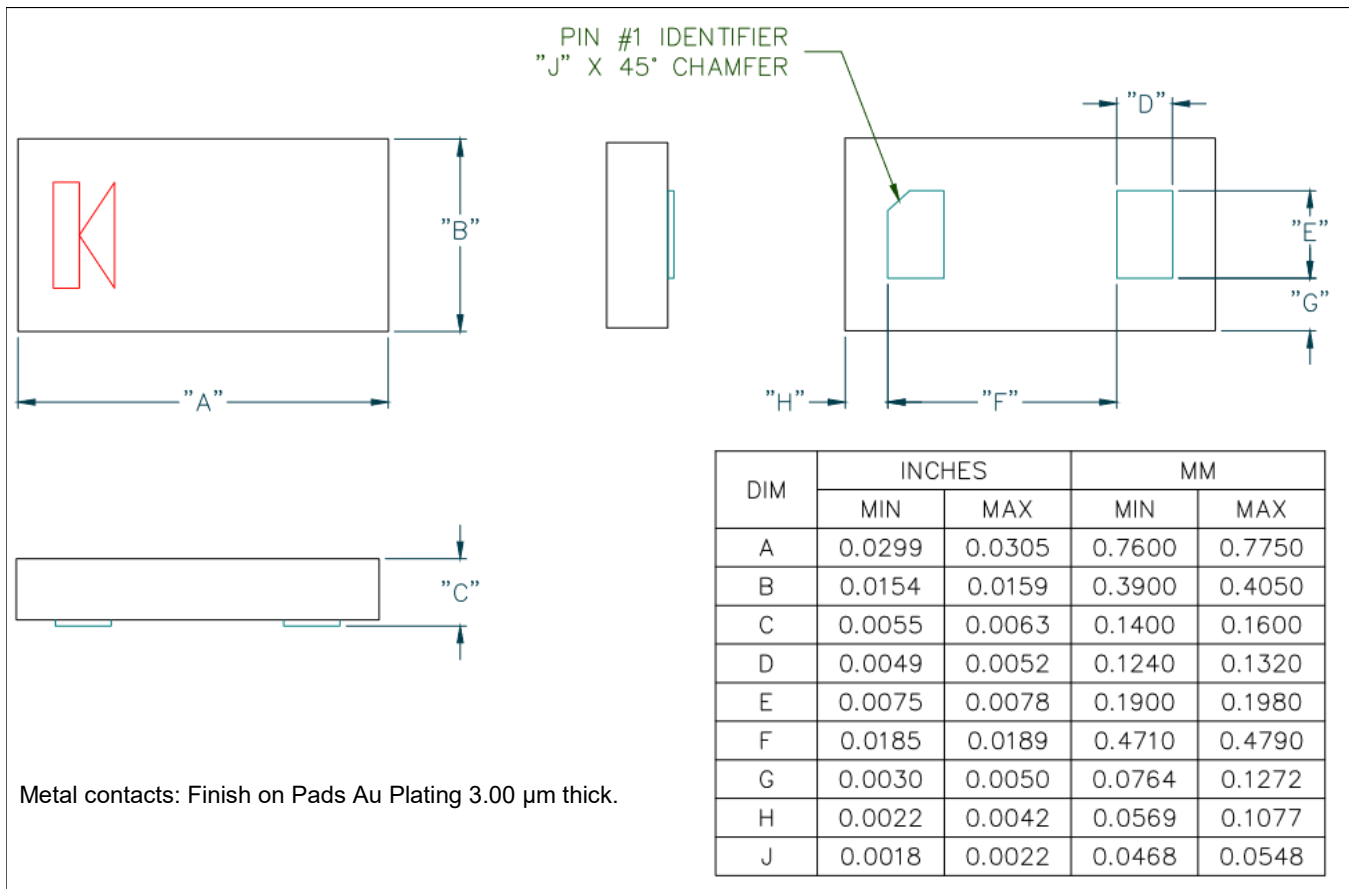
C_T vs Frequency to 50 GHz at 0 V and -40 V



I-V Curve over Temp



Outline



Mounting Techniques

Die attach for these devices is made simple through the use of surface mount die attach technology. This chip was designed to be inserted onto hard or soft substrates with the junction side down. This chip can be mounted with conductive epoxy or with solder.

Solder Die Attach:

This device can be mounted with Sn63/Pb37 or RoHS compliant solder. Typical reflow profiles are provided on MACOM application note M538 - Surface Mounting Instructions which can be found on the MACOM website.

Epoxy Die Attach:

This device can also be attached with conductive epoxy. The assembly can be preheated to 125 - 150°C. Use a minimum amount of epoxy. Cure epoxy as per manufacturer's instructions.

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