Silicon Flip Chip PIN Diode

MA4FCP305
Rev. V7

Features

- Low Series Resistance: 1.7 Ω
- Low Capacitance: 50 fF
- Fast Switching Speed: 20 ns
- Silicon Nitride Passivation
- Polyimide Scratch Protection
- Designed for Automated Pick and Place Insertion
- Rugged Design
- RoHS* Compliant

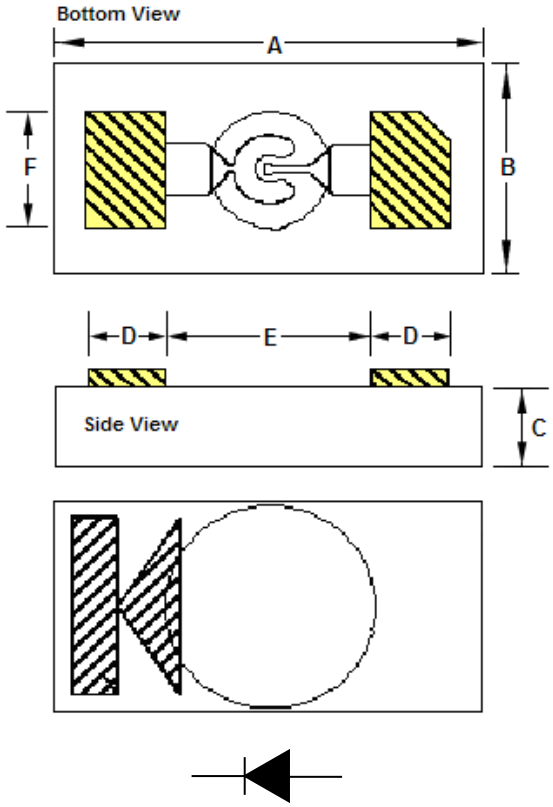
Applications

- Aerospace & Defense
- ISM

Description

The MA4FCP305 is a silicon flip chip PIN diode fabricated using MACOM's HMIC process. The epitaxial wafers used to fabricated this flip chip are designed for repeatable electrical characteristics and extremely low parasitics. The diode is fully passivated with silicon nitride and also has an additional layer of polyimide for scratch protection. These protective coatings prevent damage to the junction area during manual or automated handling making it suitable for pick and place insertion.

The small 0315 outline and low 0.085 ps RC product, make the device useful for multi-throw switch and switched phase shifter circuits requiring <20 ns switching speeds up to 18 GHz operating frequency.



Ordering Information[1]

Part Number	Package
MA4FCP305	Die in Waffle Pack

1. Reference Application Note M513 for reel size information.

Package Outline Dimensions[2,3]

Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.0269	0.0289	0.683	0.733
B	0.0135	0.0155	0.343	0.393
C	0.0040	0.0080	0.102	0.203
D	0.0041	0.0061	0.105	0.155
E	0.0124	0.0144	0.315	0.365
F	0.0069	0.0089	0.175	0.225

2. Yellow hatched areas indicate backside ohmic gold contacts.
3. Total backside metal thickness 0.1 µm.

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

Electrical Specifications @ + 25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Total Capacitance (C_T)	-10 V, 1 MHz[4] -10 V, 1 GHz[4,6]	pF	—	0.06 0.05	—
Series Resistance (R_S)	50 mA[5,6], 100 MHz 50 mA[5,6], 100 GHz	Ω	—	1.7 2.1	—
Forward Voltage (V_F)	100 mA	V	—	1.05	1.25
Reverse Voltage (V_R)	-10 µA	V	-40	-50	—
Reverse Current (I_R)	-40 V	µA	—	—	-10
Lifetime (T_L)	50 - 90% @ +10 mA / -6 mA	ns	—	25	—
Thermal Resistance (ɵ)	Steady State[7]	°C/W	—	640	—

4. Total capacitance is equivalent to the sum of junction capacitance (C_J) and parasitic capacitance (C_P).
5. Series resistance (R_S) is equivalent to the total diode series resistance including the junction resistance (R_J).
6. R_S and C_P measured on an HP4291A with die mounted in an ODS-186 package.
7. Steady-state Thermal Resistance measured with die mounted in an ODS-186 package.

Absolute Maximum Ratings @ +25°C[8,9]

Parameter	Absolute Maximum
Forward Current	100 mA
Reverse Voltage	-40 V
Dissipated Power	230 mW
Operating & Storage Temperature	-55°C to +150°C
Mounting Temperature	+300°C for 10 seconds

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.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These 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 HBM Class 0 devices. The die must be handled in a dust free, anti-static environment

Handling Procedures

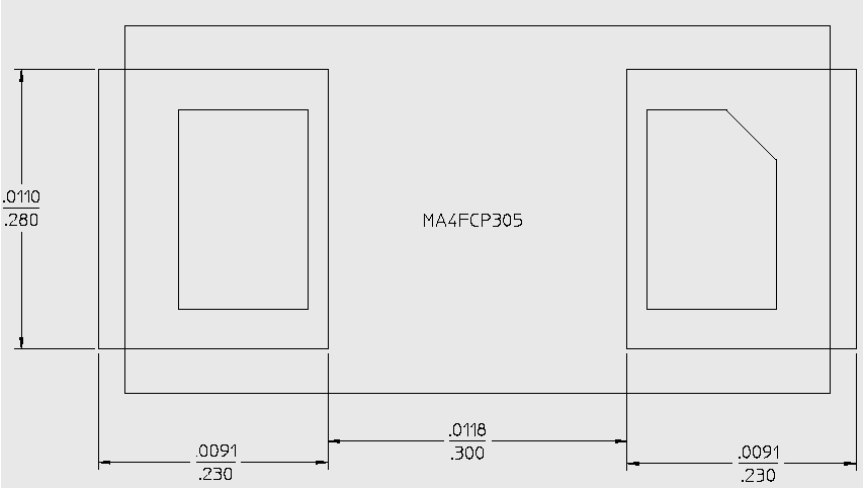
All semiconductor chips should be handled with care to avoid damage or contamination from perspiration and skin oils. The die must be handled in a dust free, anti-static environment.

The use of plastic tipped tweezers or vacuum pickups is strongly recommended for individual components. Bulk handling should ensure that abrasion and mechanical shock are minimized.

Bonding Techniques

The MA4FCP305 is designed for insertion onto hard or soft substrates with the junction (gold pad) side down. They can be mounted with electrically conductive epoxy or with a low temperature solder preform. However, tin rich solders will scavenge the gold on the surface of the pad or cause gold embrittlement and are not recommended. Indalloy or 80Au/20Sn, solders should be used instead. Maximum soldering temperature must be <300°C for <10 seconds. It is recommended that the chips be mounted onto silkscreened circuits using electrically conductive Ag epoxy, approximately 1-2 mils in thickness and cured at approximately 90°C to 150°C per manufacturer's schedule. For extended cure times, >30 minutes, temperatures must be below 200°C. The die can also be assembled with the junction or contact side up, and wire or ribbon bonds made to the pads.

PCB Footprint



ALL DIMENSIONS ARE IN in/mm