Silicon Flip Chip PIN Diode

V 3.00

MA4FCP305

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 by Design

Description

M/A-COM's MA4FCP Series consists of Silicon Flip Chip PIN diodes fabricated with M/A-COM's patented HMIC process. This diode is fabricated on epitaxial wafers using a process designed for repeatable electrical characteristics and extremely low parasitics. This diode is fully passivated with Silicon Nitride and has an additional layer of Polyimide for scratch protection. These protective coatings prevent damage to the junction during automated or manual handling. This flip chip configuration is suitable for pick and place insertion.

Applications

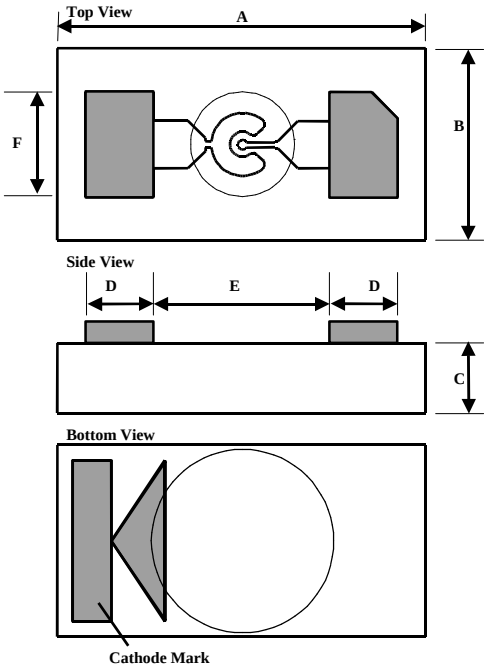
The small 0315 outline and low 0.085 pS RC product, make the device useful for multi-throw switch and switched phase shifter circuits requiring < 20 nS switching speeds up to 18 GHz operating frequency.

Absolute Maximum Ratings @ 25 °C[1]

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

1. Exceeding any of these values may result in permanent damage

1269 Outline Drawing



Nominal Die Dimensions

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

Electrical Specifications @ T_A = + 25 °C

Parameters @ Conditions	Symbol	Units	Min.	Typ.	Max.
Total Capacitance @ -10 V, 1 MHz[1]	C_T	pF		0.060	
Total Capacitance @ -10 V, 1 GHz[1,3]	C_T	pF		0.050	
Series Resistance @ +50 mA[2,3], 100 MHz	R_S	Ω		1.7	
Series Resistance @ +50 mA[2,3], 1 GHz	R_S	Ω		2.1	
Forward Voltage @ +100 mA	V_F	V		1.05	1.25
Reverse Voltage @ -10 µ A	V_R	V	-40	-50	
Reverse Current @ -40 V	I_R	µ A			10
50 - 90% Lifetime @ +10 mA / -6 mA	TL	ns		25	
Steady State Thermal Resistance[4]	θ	° C/W		640	

1. Total capacitance is equivalent to the sum of junction capacitance Cj and parasitic capacitance, Cp.
2. Series resistance R_S is equivalent to the total diode series resistance including the junction resistance Rj.
3. Rs and Cp measured on an HP4291A with die mounted in an ODS-186 package.
4. Steady-state thermal resistance measured with die mounted in an ODS-186 package.

Assembly Considerations

The following precautions should be observed for successful assembly of the die.

Cleanliness

These chips should be handled in a clean environment. Do not attempt to clean die after installation.

ESD

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 ±10%, R = 1.5k Ω ±1%]. Even though tested die pass 100 V ESD, they must be handled in a static-free environment

General Handling

The protective polymer coating on the active areas of these devices provides scratch protection, particularly for the metal airbridge that contacts the anode. Die can be handled with tweezers or vacuum pickups and are suitable for use with automatic pick-and-place equipment.

Mounting Techniques

These devices were designed for insertion onto hard or soft substrates with the junction side down. They can be mounted with electrically conductive epoxy or with a low temperature solder preform. The die can also be assembled with the junction side up, and wire or ribbon bonds made to the pads.

Solder Die Attach Using Electrically Conductive Ag Epoxy and Solder

These chips are designed to be inserted onto hard or soft substrates with the junction side down. They should 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.

Sn Rich Solders are not recommended due to the Tungsten Metallization scheme beneath the gold contacts. Indalloy or 80 Au/20 Sn Solders are acceptable. Maximum soldering temperature must be <300 °C for <10 sec.

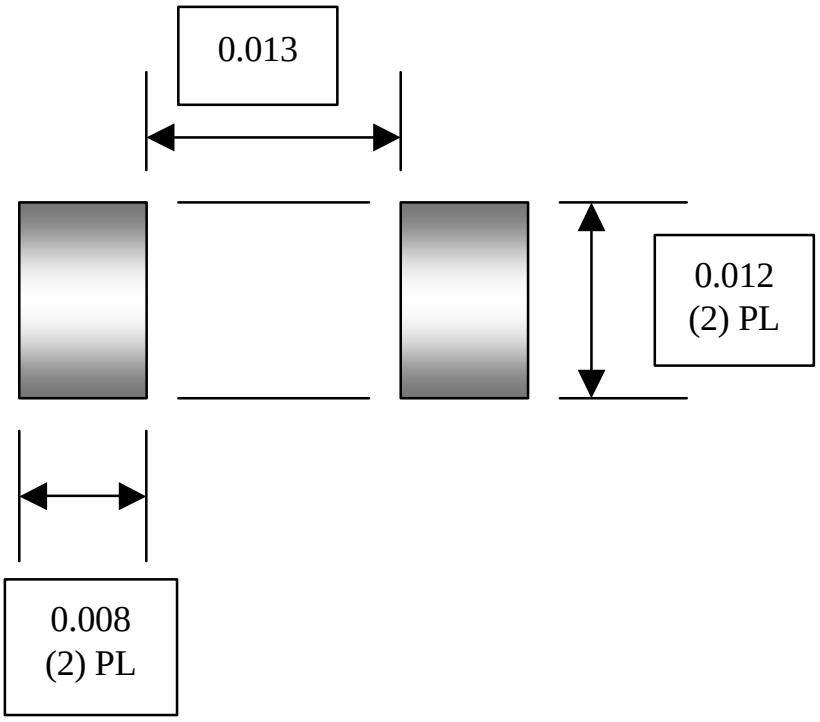
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Circuit Mounting Dimensions (Inches)



Ordering Information

Part Number	Package
MA4FCP305	Die in Carrier
MADP00716101269	Tape/Reel
MA4FCP305-W	Wafer on Frame

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