

Flip Chip PIN Diode

Rev. V5

Features

- ◆ Low Series Resistance
- ◆ Low Capacitance
- ◆ Fast Switching Speed
- ◆ Silicon Nitride Passivation
- ◆ Polymer Scratch Protection
- ◆ RoHS Compliant

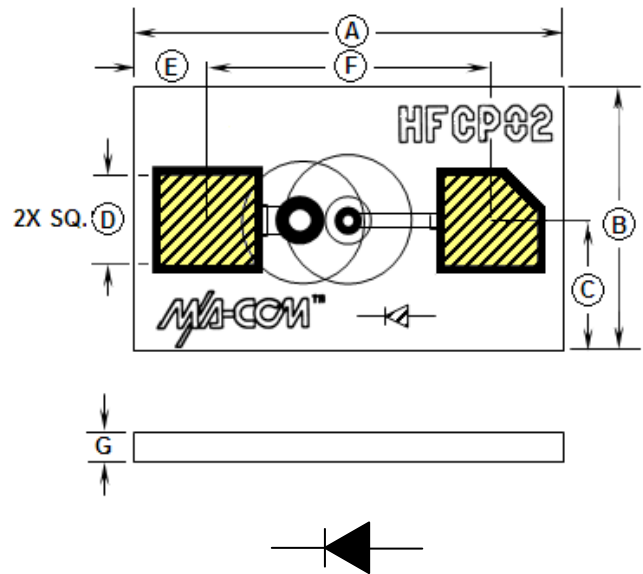
Description

The MA4FCP200 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 parasitics. 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.

Applications

The small outline and low 0.05pS RC product, make the device useful in multi-throw switches and switched phase shifter circuits requiring <20nS switching speeds at operating frequencies up to 18GHz.

1264 Outline



- Backside metal contacts: 0.1µm thick gold.
- Yellow hatched areas indicate backside, mounting, ohmic, gold contacts.

Absolute Maximum Ratings¹

T_{AMB} = +25°C (unless otherwise specified)

Parameter	Absolute Maximum
Forward Current	100mA
Reverse Voltage	- 70V
Operating Temperature	- 55°C to + 125°C
Storage Temperature	- 55°C to + 150°C
Dissipated Power RF plus DC	100mW
Mounting Temperature	+300°C for 10 seconds

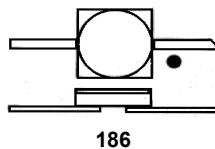
Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.014	0.015	0.356	0.381
B	0.008	0.009	0.203	0.229
C	0.004	0.005	0.102	0.127
D	0.003	0.004	0.076	0.102
E	0.002	0.003	0.175	0.225
F	0.008	0.010	0.203	0.254
G	0.004	0.006	0.102	0.152

1. Exceeding any of these limits may cause permanent damage to the chip.

Electrical Specifications @ $T_{AMB} +25^{\circ}C$

Parameters @ Conditions	Symbol	Units	Min.	Typ.	Max.
Total Capacitance @ -40V, 1MHz ¹	C_T	pF	—	0.025	0.030
Total Capacitance @ -40V, 1GHz ^{1,3}	C_T	pF	—	0.020	—
Series Resistance @ +50mA ^{2,3} , 100MHz	R_S	Ω	—	2.4	3.0
Series Resistance @ +50mA ^{2,3} , 1GHz	R_S	Ω	—	2.8	—
Forward Voltage @ +100mA	V_F	V	—	1.25	1.5
Reverse Voltage @ -10 μ A	V_R	V	-70	—	—
Reverse Current @ -70V	I_R	μ A	—	—	-10
Lifetime @ $I_F = +10mA$ / $I_{REV} = -6mA$	T_L	nS	—	100	—
Steady State Thermal Resistance ⁴	θ	$^{\circ}C/W$	—	900	—

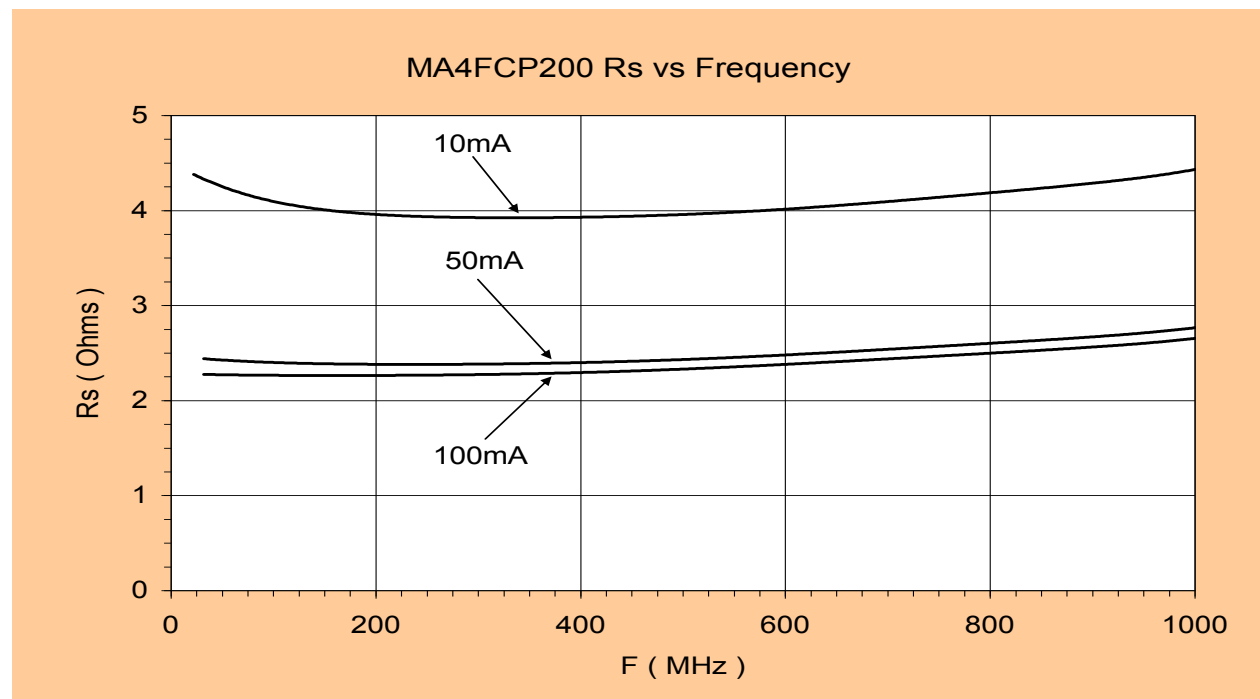
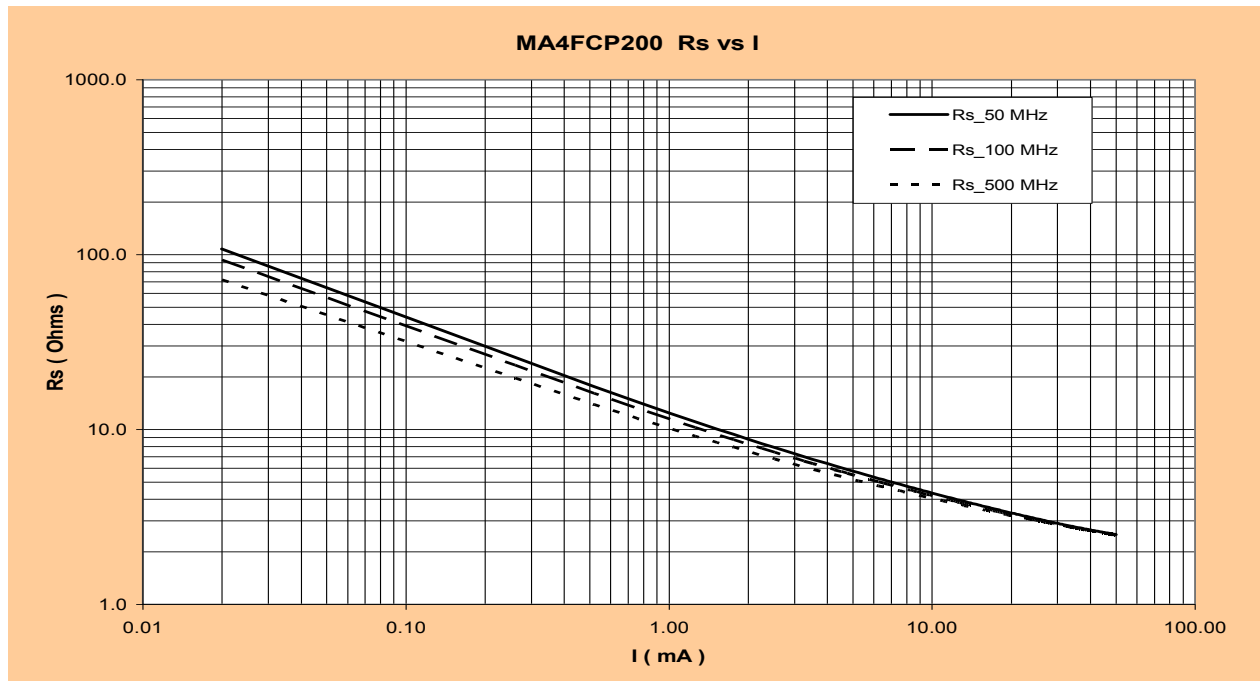
1. Total capacitance is equivalent to the sum of junction capacitance, C_j , plus the die parasitic capacitance, C_p .
2. The series resistance, R_s , is equal to the total diode resistance which also includes the resistance of the junction, R_j .
3. R_s and C_p measured on an HP4291A with die mounted in an ODS-186 package.
4. Steady-state Thermal Resistance measured with die mounted in an ODS-186 package.



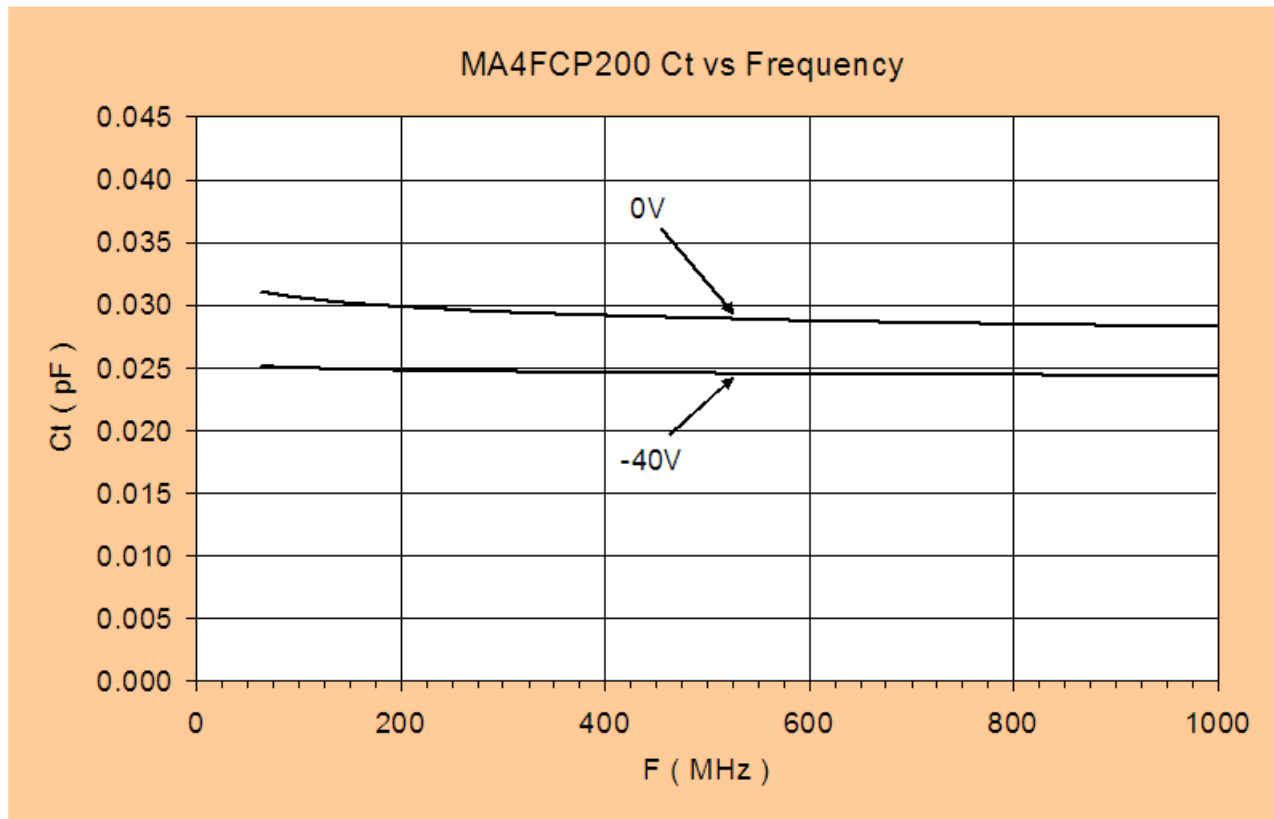
ESD

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

Typical Performance @ $T_{AMB} +25^{\circ}C$



Typical Performance @ $T_{AMB} +25^{\circ}C$



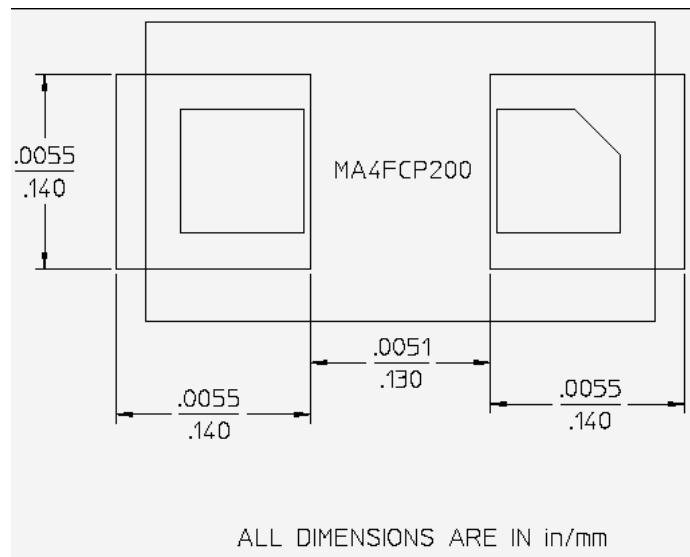
Handling Procedures

All semiconductor chips should be handled with care to avoid damage or contamination from perspiration and skin oils. The use of plastic tipped tweezers or vacuum pickups is strongly recommended for individual components. Bulk handling should insure that abrasion and mechanical shock are minimized.

Bonding Techniques

These devices were designed for insertion onto hard or soft substrates with the junction (pad) side down. They can be mounted with electrically conductive epoxy or with a eutectic solder preform. However, tin rich solders will scavenge gold from the bottom contacts and are not recommended. Indalloy or 80/20, Au/Sn, solders are acceptable. Maximum soldering temperature must be <math><300^{\circ}\text{C}</math> for <math><10</math> sec. These chips are designed to be inserted onto hard or soft substrates with the junction side down. They should be mounted onto silk-screened 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 kept below 200°C. The die can also be assembled using non conductive epoxy with the junction side up, and wire or ribbon bonds made to the pads.

PCB Land Pattern



Ordering Information

Part Number	Packaging
MA4FCP200	Die in Gel Pack
MA4FCP200-W	Wafer Cut on Tape

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.