

GaAs Flip-Chip Multiplier Varactor Diode

V 2.00

MA46H146

Features

- Very Low Total Capacitance < 0.06 pF
- Extremely High Q > 15 K
- Silicon Nitride Passivation
- Polymer Scratch Protection
- Surface Mount Configuration

Description

M/A-COM's MA46H146 is a gallium arsenide flip chip multiplier varactor. These devices are fabricated on MOVPE epitaxial wafers using a process designed for high device uniformity and extremely low parasitics. The MA46H146 diodes are fully passivated with silicon nitride and have an additional polyimide layer for scratch protection. The protective coatings prevent damage to the junction during automated or manual handling. The flip chip configuration is suitable for pick and place insertion.

Absolute Maximum Ratings

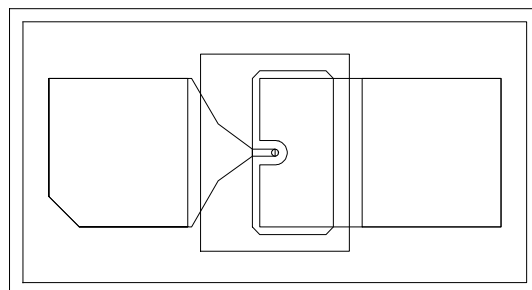
@T_A = +25 °C

(unless otherwise specified)

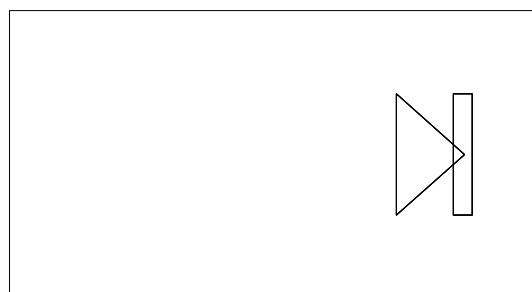
Parameter	Absolute Maximum
Forward Current	50 mA
Reverse Voltage	-26 V
Operating Temperature	-65 °C to +150 °C
Storage Temperature	-65 °C to +150 °C
Mounting Temperature	<200 °C

Chip Layout

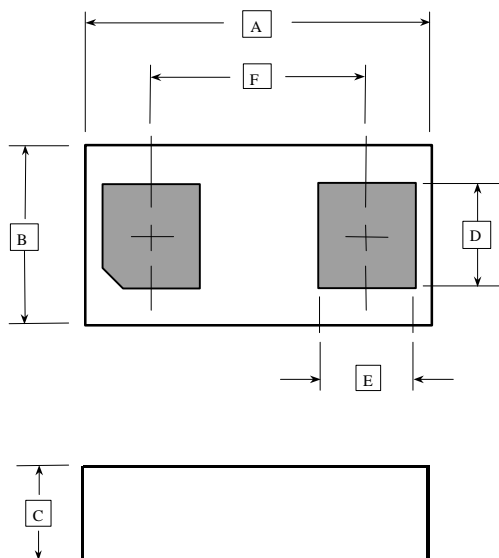
Front View (Circuit Side)



Back View (Operator Side)



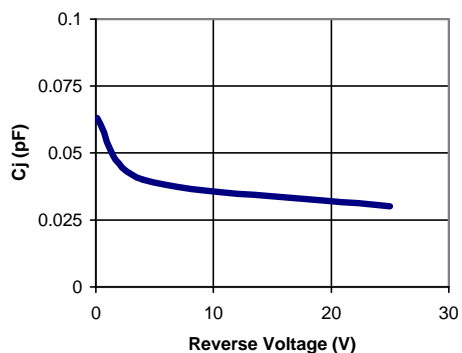
Case Styles



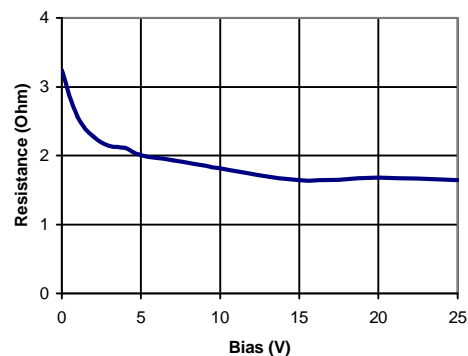
DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.025	0.027	0.64	0.69
B	0.012	0.015	0.30	0.38
C	0.006	0.008	0.15	0.20
D	0.007	0.009	0.18	0.23
E	0.006	0.008	0.15	0.20
F	0.015	0.017	0.38	0.43

1. Hatched areas indicate bond pads.

Total Capacitance vs. Reverse Voltage



Resistance vs. Bias*



*Resistance is measured at 4 GHz.

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Electrical Characteristics @ $T_A = +25\text{ }^{\circ}\text{C}$

Part Number	Vb (V) Ir = 10 mA	Ir (na) Vr = 21 V	Ct (pF) VR = 0 V F = 1 MHz	Ct (pF) VR = 4 V F = 1 MHz	Ct (pF) VR = 10 V F = 1 MHz	Ct (pF) VR = 25 V F = 1 MHz	Tuning Ratio Ct (0 V) / Ct (25 V)	Q VR = 0 V 50 MHz
	Min.	Max.	Typ.	Typ.	Typ.	Typ.	Typ.	Typ.
MA46H146	26.0	20.0	0.063	0.040	0.032	0.030	2.10	15600

Applications

These GaAs Flip Chip devices are suited for millimeter wave frequency tunable filters, where extremely low parasitics are required to maintain reasonable Q. In addition, this product can be used in multiplier circuits, for 2X and 3X output frequencies in the millimeter wave frequency bands.

Assembly Requirements using Electrically Conductive Ag Epoxy

These chips are designed to be inserted onto hard or soft substrates with the junction side down. They must be mounted with Electrically Conductive Ag epoxy. Solders are not recommended due to Tungsten metallization beneath the gold contacts. The die can also be assembled with the junction side up, and wire or ribbon bonds made from the bond pads to the circuit trace.

Circuit can be preheated to 125 – 150 °C. Use a controlled amount of conductive epoxy for each bond pad. Finished, uniform silver epoxy thickness should be between 1 – 2 mils. Cure epoxy per manufacturer's schedule. For extended cure times, temperatures must be below 200 °C.

Handling Procedures

The following precautions should be observed to avoid damaging GaAs Flip-Chips:

Cleanliness

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

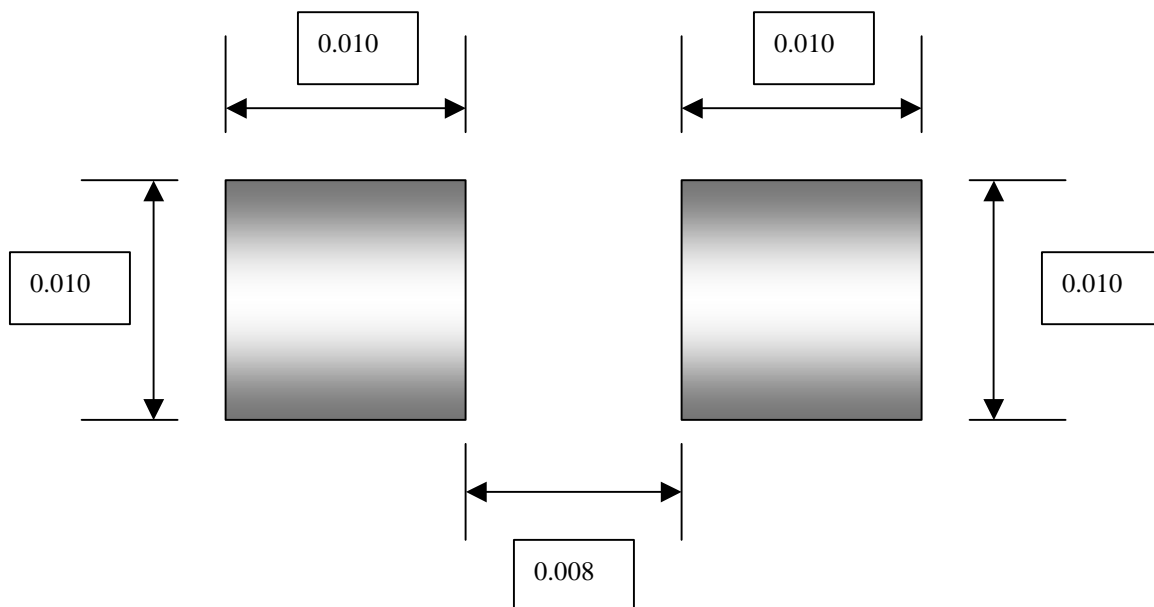
Static Voltage Sensitivity

Varactor diodes are ESD sensitive and can be damaged by static electricity. Proper ESD techniques and precautions should be followed when handling these devices.

General Handling

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

Circuit Mounting Dimensions (Inches)



Ordering Information

Part Number	Packaging
MA46H146-W	Wafer on Frame
MA46H146	Die in Carrier
MA46H146-T	Tape/Reel

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