GaAs Flip-Chip Multiplier Varactor Diode

MA46H146

V3

Features

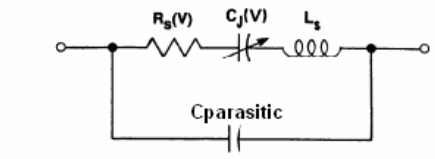
- **Very Low Total Capacitance < 0.06 pF**
- **Extremely High Q > 15 K**
- **Silicon Nitride Passivation**
- **Polymer Scratch Protection**
- **Surface Mount Configuration**

Description

M/A-COM's MA46H146 is a gallium arsenide flip chip multiplier varactor These devices are facilitated 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 polymide 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.

Schematic

FLIPCHIP TUNING VARACTOR EQUIVALENT CIRCUIT



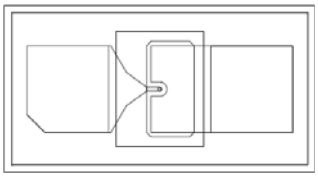
Absolute Maximum Ratings @ T_A=+25 °C

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

1. Operation of this device above any one of these parameters may cause permanent damage

Chip Layout

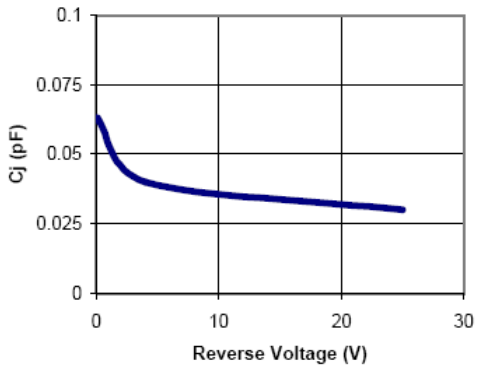
Front View (Circuit Side)



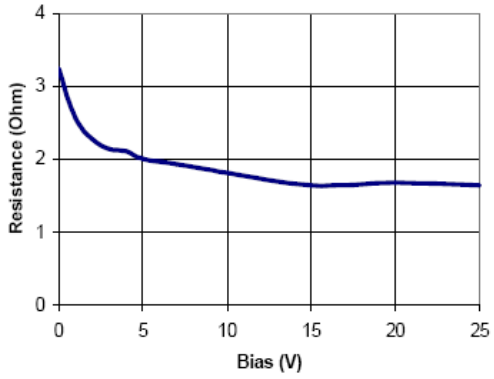
Back View (Operator Side)

Typical Performance Curves

Typical Capacitance vs. Reverse Bias Voltage



Typical Resistance vs. Reverse Bias Voltage



Specifications Subject to Change Without Notice.

• **North America** Tel: 800.366.2266 / Fax: 978.366.2266
• **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
• **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

Visit www.macom.com for additional data sheets and product information.

Electrical Specifications @ T_A = +25 °C

Gamma 0.50 Abrupt Multiplier Varactors
Breakdown Voltage @ 10 µA = 26V minimum
Reverse Current @ 18 V = 50 nA maximum
Gamma = 0.45-0.55, VR = 0 to 20 V

Part Number	Total Capacitance	Total Capacitance	Total Capacitance	Total Capacitance	Total Capacitance Ratio	Q Minimum
	Vr=0V F=1MHz	Vr=4V F=1MHz	Vr=10V F=1MHz	Vr=25V F=1MHz	Vr=0V / Vr=25V	Vr=4V f=50MHz
	(pF)	(pF)	(pF)	(pF)	-	-
	Typical	Typical	Typical	Typical	Typical	Typical
MA46H146	0.063	0.040	0.032	0.030	2.1	15600

Applications

These GaAs Flip Chip devices are suited for millimeter wave frequency tunable filters, where extremely low parastics 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 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.

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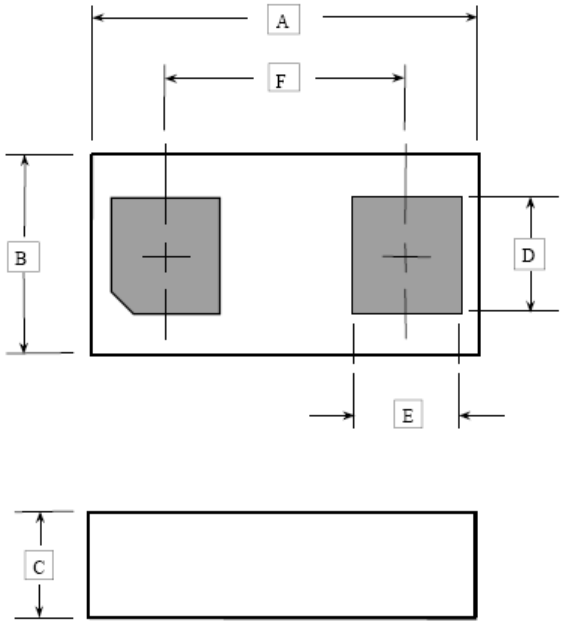
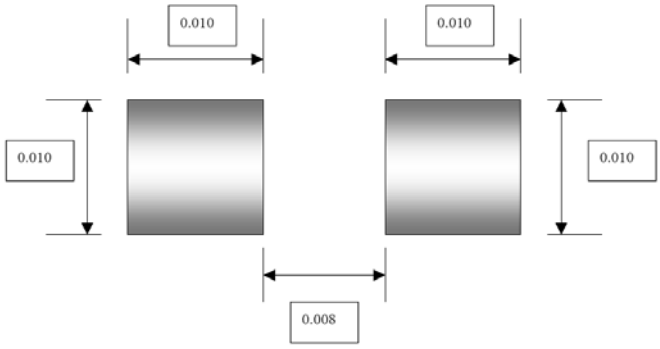
Dimensions



DIMENSION	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

Circuit Mounting Dimensions (inches)



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