

## Solderable GaAs Constant Gamma Flip-Chip Varactor Diode

Rev. V2

### Features

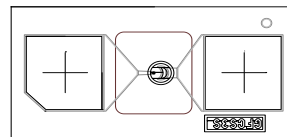
- Constant Gamma for Linear Tuning
- Low Parasitic Capacitance
- High Q
- Silicon Nitride Passivation
- Polyimide Scratch Protection
- Surface Mount Configuration
- Lead Free (RoHS Compliant\*)
- Available in Pocket Tape and Reel
- Can withstand 500 Temperature Cycles (-65°C to +150°C), mounted with Sn96.5/Pb3.5 solder without Mechanical Degradation
- Can be Mounted with Solder or Conductive Epoxy

### Description

The MAVR-011020-1411 is a gallium arsenide flip chip hyperabrupt varactor diode. This device is fabricated on OMCVD epitaxial wafers using a process designed for high device uniformity and extremely low parasitics. This diode is fully passivated with silicon nitride and has an additional layer of polyimide 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.

### Flip-Chip Design



Front View (Circuit Side)



Back View (Operator Side)

### Ordering Information<sup>1,2</sup>

| Part Number        | Package     |
|--------------------|-------------|
| MAVR-011020-14110P | Pocket Tape |
| MAVR-011020-14110G | Gel Pack    |

1. Reference Application Note M513 for reel size information.
2. All sample boards include x loose parts.

### Electrical Specifications: $T_A = +25^\circ\text{C}$

Breakdown Voltage @  $I_R = 10 \mu\text{A}$ ,  $V_B = 22 \text{ V}$  Minimum

Reverse Leakage Current @  $V_R = 18 \text{ V}$ ,  $I_R = 100 \text{ nA}$  Maximum

Forward Voltage @  $1 \text{ mA} = 1.15 - 1.25 \text{ V}$

| Parameter         | Test Conditions                         | Units | Min.                   | Typ. | Max.                    |
|-------------------|-----------------------------------------|-------|------------------------|------|-------------------------|
| Total Capacitance | 1 MHz, 0 V<br>1 MHz, 4 V<br>1 MHz, 15 V | pF    | 0.19<br>0.065<br>0.025 | —    | 0.275<br>0.097<br>0.048 |
| Q Factor          | 50 MHz, 4 V                             | —     | —                      | 3000 | —                       |
| Gamma             | 2 - 12 V                                | —     | —                      | 0.9  | 1.1                     |

\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

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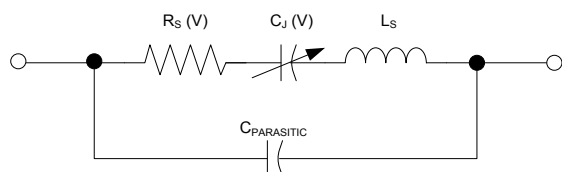
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### Absolute Maximum Ratings<sup>3,4</sup>

| Parameter             | Absolute Maximum |
|-----------------------|------------------|
| Power Dissipation     | 100 mW           |
| Mounting Temperature  | +260°C           |
| Operating Temperature | -40°C to +125°C  |
| Storage Temperature   | -65°C to +150°C  |

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.

### Schematic (equivalent circuit)



### Mounting Techniques

Die attach for these devices is made simple through the use of surface mount die attach technology. This chip was designed to be inserted onto hard or soft substrates with the junction side down. This chip can be mounted with conductive epoxy or with solder.

#### Solder Die Attach:

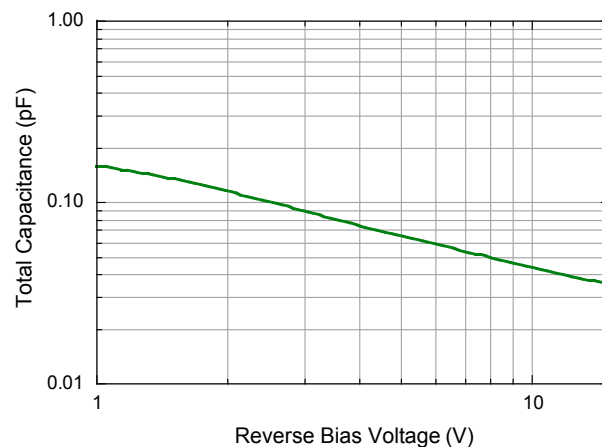
This device can be mounted with Sn63/Pb37 or RoHS compliant solder.

Typical reflow profiles are provided on application note M538, "Surface Mounting Instructions" which can be found @ [www.macom.com](http://www.macom.com)

#### Epoxy Die Attach:

This device can also be attached with conductive epoxy. The assembly can be preheated to 125 - 150°C. Use a minimum amount of epoxy. Cure epoxy as per manufacturer's instructions.

### Performance Curve @ +25°C



### Handling Procedures

The following precautions should be observed to avoid damaging these chips:

#### Cleanliness

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

#### Static Sensitivity

Semiconductor devices are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

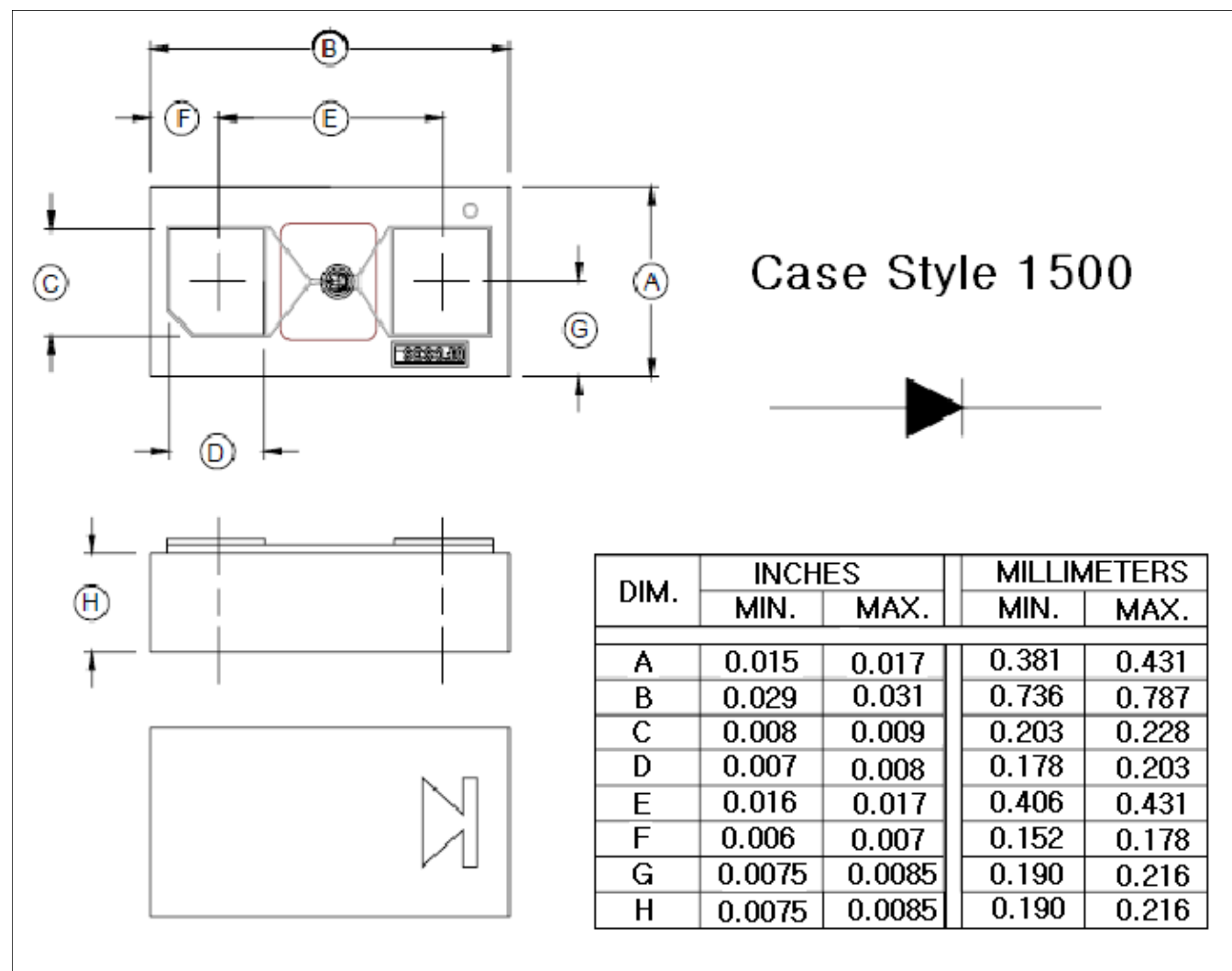
### General Handling

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

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### Flip Chip Outline Drawing (Case Style 1500)



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