AMP M/A-COM

GaAs Beam Lead Schottky Barrier Diodes

Features

- Low Series Resistance
- Low Capacitance
- High Cut-Off Frequency
- Silicon Nitride Passivation
- Multiple Configurations

Description

M/A-COM's MA4E2037 single, MA4E2039 antiparallel pair and MA4E2040 series tee are gallium arsenide beam lead Schottky barrier diodes. These devices are fabricated on OMCVD epitaxial wafers using a process designed for high device uniformity and extremely low parasitics. The high carrier mobility of gallium arsenide results in lower series resistance than a silicon Schottky with equivalent capacitance, resulting in lower noise figure and conversion loss. The diodes are fully passivated with silicon nitride and have an additional layer of a polymer for scratch protection. The protective coatings prevent damage to the junction and the anode airbridge during handling.

Applications

The high cut-off frequency of these diodes allows use through low millimeter wave frequencies. Typical applications include single and double balanced mixers in PCN transceivers and radios, automotive radar systems and police radar detectors.

The MA4E2039 antiparallel pair is designed for use in subharmonically pumped mixers. Close matching of the diode characteristics results in high LO suppression at the RF input.

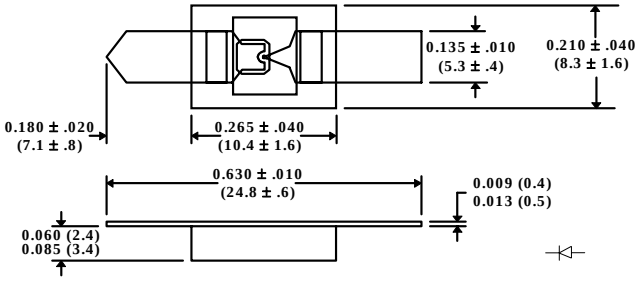
Absolute Maximum Ratings[1]

Parameter	Maximum Ratings
Operating Temperature	-65°C to +125°C
Storage Temperature	-65°C to +125°C
Incident LO Power	+20 dBm
Incident RF Power	+2- dBm
Mounting Temperature	+235°C for 10 seconds

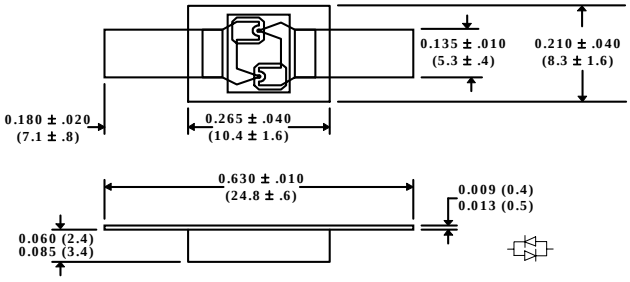
1. Exceeding these limits may cause permanent damage.

Package Outlines[1, 2]

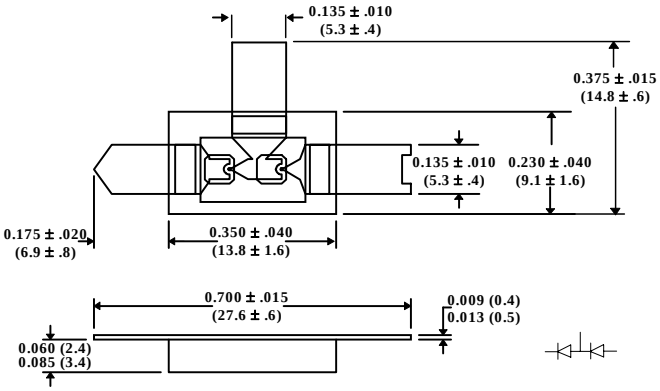
MA4E2037



MA4E2039



MA4E2040



Notes: (unless otherwise specified)
1. Dimensions are in mm (mils)
2. Views are with junction side up.

V3.001

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Electrical Specifications @ T_A = +25°C

Symbol	Parameters and Test Conditions	Units	MA4E2037 Single			MA4E2039 Anti-parallel			MA4E2040 Series Tee		
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
C_j	Junction Capacitance at 0V at 1 MHz	pF	-	.020	-	-	.020[3]	-	-	.020[3]	
C_t	Total Capacitance at 0V at 1 MHz[1]	pF	.040	.050	.060	0.40[3]	.050[3]	.060[3]	.040[3]	.050[3]	.060[3]
ΔC_t	Total Capacitance Difference	pF	-	-	-	-	-	-	-	.005	.010
R_s	Series Resistance at +10mA[2]	Ohms	-	4	7	-	4	7	-	4	7
V_{f1}	Forward Voltage at +1mA	Volts	.60	.70	.80	.60	.70	.80	.60	.70	.80
ΔV_f	Forward Voltage Difference at 1mA	Volts	-	-	-	-	.005	.010	-	.005	.010
V_{br}	Reverse Breakdown Voltage at -10µA	Volts	4.5	7	-	-	-	-	4.5	7	-

1. Total capacitance is equivalent to the sum of junction capacitance Cj and parasitic capacitance Cp.
2. Series resistance is determined by measuring the dynamic resistance and subtracting the junction resistance of 2.6 ohms at +10 mA.
3. Capacitance for the MA4E2039 and MA4E2040 is per Schottky diode.

Handling Procedures

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

Cleanliness:

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

Static Sensitivity:

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

General Handling:

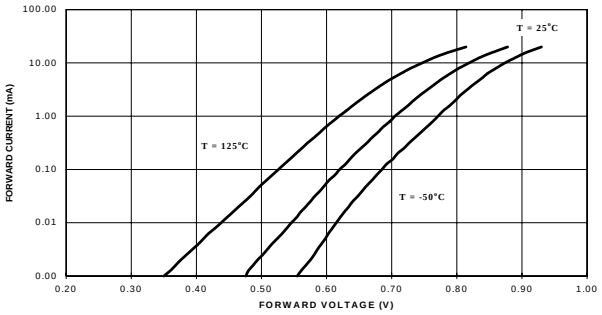
These devices have a polymer layer which provides scratch protection for the junction area and the anode air bridge. Beam lead devices must, however, be handled with care since the leads may easily be distorted or broken by the normal pressures exerted when handled by tweezers. A vacuum pencil with a #27 tip is recommended for picking and placing. A sharpened wooden stick which has been dipped in isopropyl alcohol may also be used as a pick and place tool.

Mounting Techniques

These devices are designed to be inserted onto hard or soft substrates. Recommended methods of attachment include thermocompression bonding, parallel-gap welding, solder reflow and conductive epoxy.

See Application Note M541, *"Bonding and Handling Procedures for Chip Diode Devices"* for Detailed Instructions.

Typical Forward Characteristics



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