MHV507-19-1

Silicon Hyperabrupt Varactor Diode

Rev. V1

Features

- High Capacitance Ratio: 3 Minimum
- High Quality Factor: 1500 Typical
- Compact Surface Mount Package
- Ultra-thin Termination Plating to Combat Embrittlement
- RoHS* Compliant

Description

The MHV507-19-1 silicon hyperabrupt tuning varactor offers a large change in junction capacitance over a small tuning voltage range. It is a mesa device with an epitaxial-deposited cathode layer for low series resistance and high quality factor. The die is passivated with a high-reliability glass passivation for very fast settling time. This varactor diode is packaged in an epoxy-encapsulated surface mount package.

The MHV507-19-1 is ideally suited for voltage controlled filters, analog voltage controlled phase shifters and voltage controlled oscillators.

Electrical Specifications: T_A = +25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Breakdown Voltage (V_B)	I_R = 10 µA	V	22	—	—
Reverse Leakage Current (I_R)	V_R = 20 V	nA	—	—	50
Total Capacitance (C_T)	V_R = 0 V, 1 MHz V_R = 4 V, 1 MHz V_R = 20 V, 1 MHz	pF	9.20 3.20 0.75	10.2 3.5 1.0	11.2 3.8 1.4
Capacitance Ratio	V_R = 4 V to V_R = 20 V, 1 MHz	Ratio	3.0	—	5.5
Quality Factor (Q_4)	V_R = 4 V, 50 MHz	—	—	1500	—

Ordering Information

Part Number	Package
MHV507-19-1-W	100 piece waffle pack
MHV507-19-R	3000 piece reel

Absolute Maximum Ratings

Parameter	Absolute Maximum
Reverse DC Voltage	22 V
Forward DC Current	50 mA
Assembly Temperature	+260°C, 10 seconds
Operating Temperature	-55°C to +85°C
Storage Temperature	-55°C to +100°C

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

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Environmental Capabilities

The MHV507-19-1 silicon hyperabrupt junction varactor diode is durable and capable of reliably operating in military, commercial, and industrial environments. The device is compatible with pick-and-place assembly and is available in tape and reel. The MHV507-19-1 silicon hyperabrupt junction varactor diode is capable of meeting the environmental requirements of MIL-STD-750.

ESD & Moisture Sensitivity Level Rating

As are all semiconductors, silicon hyperabrupt tuning varactor diode are susceptible to damage from ESD events. Proper ESD prevention procedures should be followed. The ESD rating for this device is Class 0 (HBM). The moisture sensitivity level (MSL) rating for this part is MSL 1.

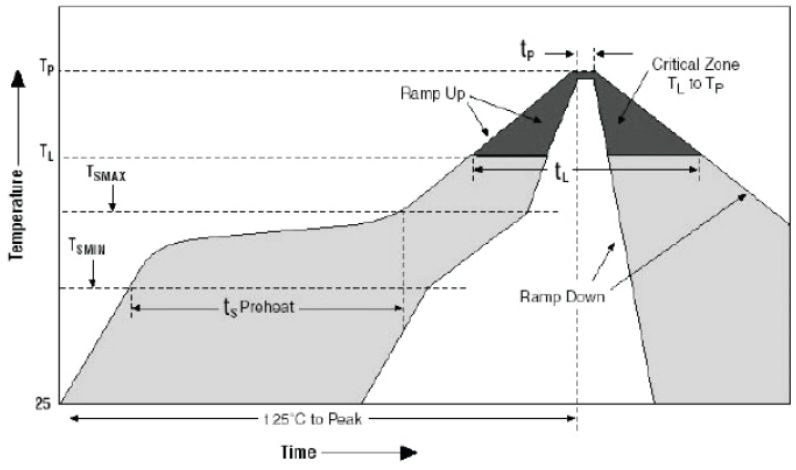
Assembly Instructions

Diodes may be placed onto circuit boards with pick and place manufacturing equipment from tape-reel. The devices are attached to the circuit using conventional solder re-flow or wave soldering procedures with RoHS type or Sn 60 / Pb 40 type solders.

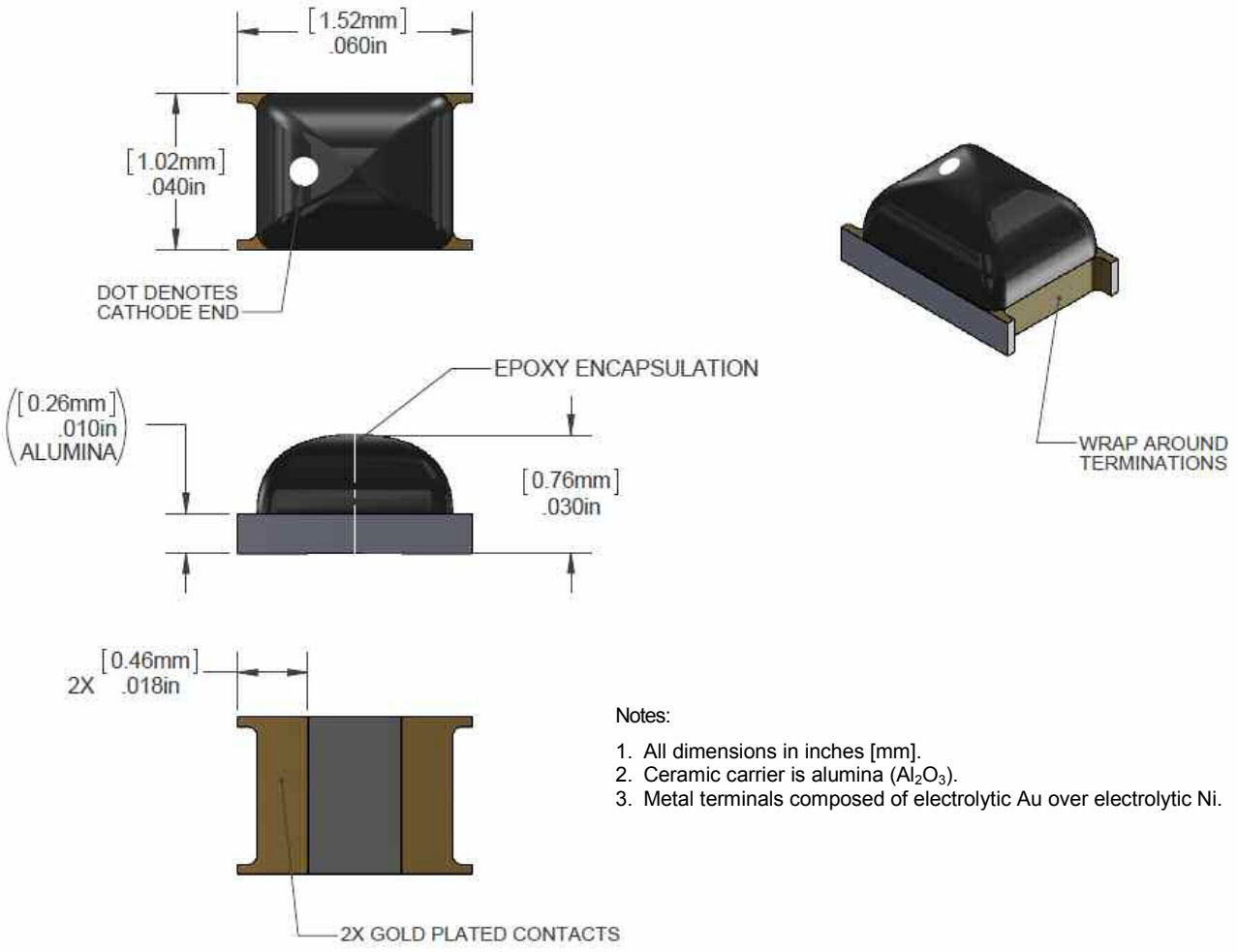
Table 1. Time-Temperature Profile for Sn60/Pb40 or RoHS Type Solders

Profile Feature	SnPb Solder Assembly	Pb-Free Solder Assembly
Average Ramp-Up Rate (T_L to T_P)	3°C /second maximum	3°C /second maximum
Preheat: -Temperature Min (T_{SMIN}) -Temperature Max (T_{SMAX}) -Time (min to max)(t_S)	 100°C 150°C 60 - 120 s	 150°C 200°C 60 - 180 s
T_{SMAX} to T_L - Ramp-Up Rate		 3°C /s maximum
Time Maintained Above: -Temperature (T_L) - Time (t_L)	 183°C 60 - 150 s	 217°C 60 - 150 s
Peak temperature (T_P)	225 +0/-5°C	260 +0/-5°C
Time Within 5°C of Actual Peak Temperature (t_P)	10 – 30 s	20 – 40 s
Ramp-Down Rate	6°C /s maximum	6°C /s maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Figure 1. Solder Re-Flow Time-Temperature Profile



Outline (CS19-1)



Notes:

1. All dimensions in inches [mm].
2. Ceramic carrier is alumina (Al_2O_3).
3. Metal terminals composed of electrolytic Au over electrolytic Ni.