

# MHV500-19-6 Si Hyperabrupt Varactor Diode

## Datasheet

### Features

- High capacitance ratio : 2.5 Minimum
- High quality factor : 2600 Typical
- Compact surface mount package
- Ultra-thin termination plating to combat embrittlement
- RoHS compliant



### Applications

- Voltage controlled filters
- Analog voltage controlled phase shifters
- Voltage controlled oscillators

### Description

The Aeroflex/Metelics MHV500-19-6 silicon hyperabrupt tuning varactor offers a large change in junction capacitance over a small tuning voltage range. It is a mesa device with an epitaxially-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. The MHV500-19-6 is packaged in an epoxy-encapsulated surface mount package.

The MHV500-19-6 silicon hyperabrupt junction varactor diode complies with the RoHS requirements.

### Environmental Capabilities

The MHV500-19-6 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 MHV500-19-6 silicon hyperabrupt junction varactor diode is capable of meeting the environmental requirements of MIL-STD-750

### ESD and 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.



## Electrical Specifications

$T_A = 25^\circ\text{C}$  (Unless Otherwise Noted)

Parameter	Symbol	Test Conditions	Minimum Value	Typical Value	Maximum Value	Units
Breakdown Voltage	$V_B$	$I_R = 10 \mu\text{A}$	22			V
Reverse Leakage Current	$I_R$	$V_R = 20 \text{V}$			50	nA
Total Capacitance	$C_T$	$f = 1 \text{MHz}$				
		$V_R = 0 \text{V}$ ,	2.45	2.75	2.95	pF
		$V_R = 4 \text{V}$ ,	0.90	1.00	1.10	pF
		$V_R = 20 \text{V}$ ,	0.33	0.40	0.50	pF
Capacitance Ratio		$V_R = 4 \text{V}$ to $V_R = 20 \text{V}$ , $f = 1 \text{MHz}$	2.5		5.5	
Quality Factor	$Q_4$	$V_R = 4.0 \text{V}$ , $f = 50 \text{MHz}$		2600		

## Absolute Maximum Ratings

$T_{CASE} = +25^\circ\text{C}$  (Unless Otherwise Noted)

Parameter	Conditions	Absolute Maximum Value
Operating Temperature		- 55 °C to 85 °C
Storage Temperature		- 55 °C to 100 °C
Assembly Temperature	$t = 10 \text{s}$	260 °C
Forward DC Current		50 mA
Reverse DC Voltage		22 V

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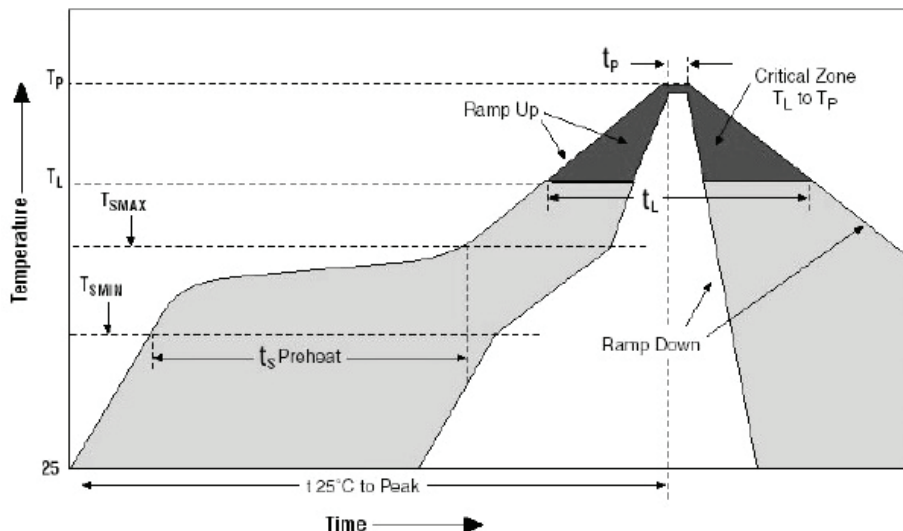
## Assembly Instructions

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.

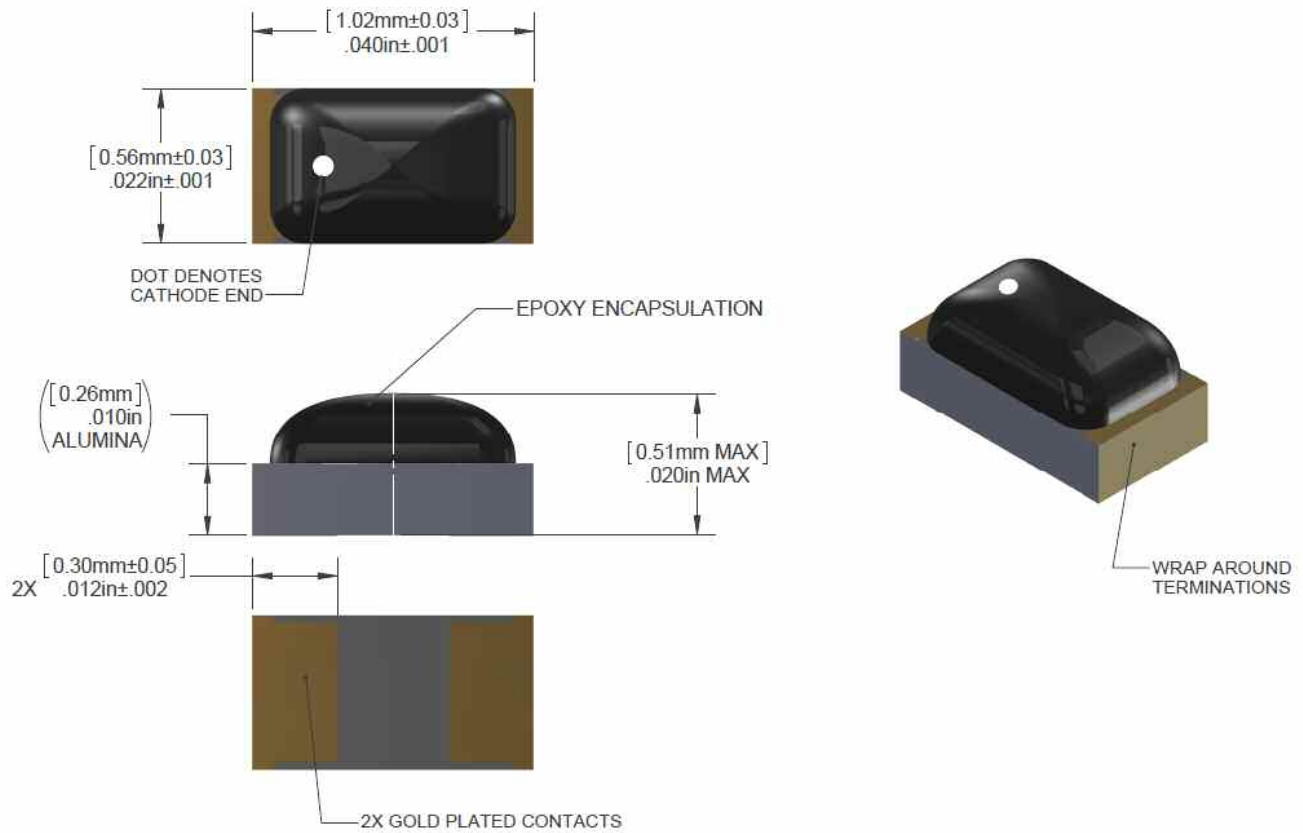
Table 1. Time-Temperature Profile for Sn60/Pb40 or RoHS Type Solders

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 ( $T_{SMIN}$ )	100°C	150°C
- Temperature Max ( $T_{SMAX}$ )	150°C	200°C
- Time (min to max)( $t_s$ )	60-120 s	60-180 s
$T_{SMAX}$ to $T_L$		
- Ramp-Up Rate		3°C/s maximum
Time Maintained Above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60-150 s	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 - Case Style E19-6**



Notes:

1. All dimensions in inches [mm].
2. Ceramic carrier is alumina ( $\text{Al}_2\text{O}_3$ ).
3. Metal terminals composed of electrolytic Au over electrolytic Ni.

**Part Number Ordering Information**

Part Number	Description
MHV500-19-6-R	Tape-Reel Packaging (Quantity = 3000 Maximum)

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