

### Features

- Surface Mount Packages (SOT-23, SC70 3LD, SOD-323, SC-79)
- High Q at Low Voltages
- High Capacitance Ratio at Low Voltages
- SPC Process for Superior C-V Repeatability
- Available as Single and Common Cathode Pairs
- Tape and Reel Packaging
- Designed for Commercial Wireless Applications
- RoHS\* Compliant and 260°C Reflow Compatible

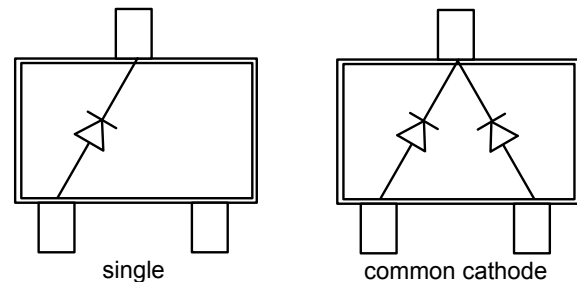
### Description

The MAVR-000200 series are ion-implanted, hyperabrupt junction, silicon tuning varactors in SOT-23, SC70 3LD, SOD-323 and SC-79 surface mount packages. This series of varactors is designed for high Q and low voltage operation. Each varactor type has a typical Q greater than 400 at -2 V. These diodes are offered with 100% matte Sn plating.

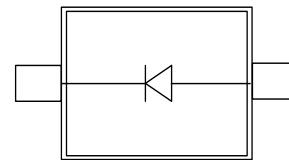
The MAVR-000200 series tuning varactors are ideally suited for wide band tuning and low phase noise applications where the supply voltage is limited to 5 volts or less. These varactors have been specifically designed for use in wireless communications up to the 2.4 GHz band. Applications include VCOs and voltage tuned filters.

### Configurations

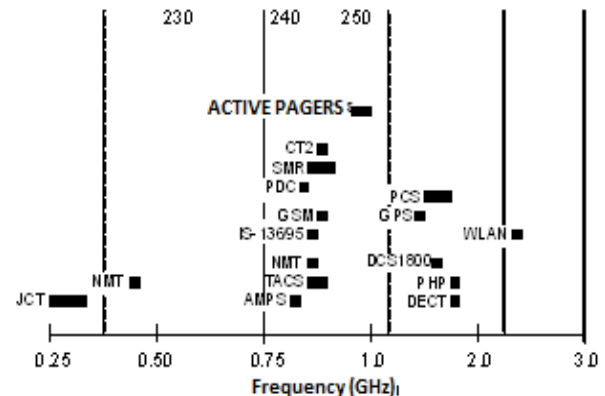
#### Top View (SOT-23, SC70 3LD)



#### Top View (SOD-323, SC-79)



### Typical Device Selection by Frequency



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

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

Breakdown Voltage @  $I_R = 10\text{ }\mu\text{A}$ ,  $V_b = 12\text{ V}$  Minimum

Reverse Leakage Current @  $V_R = 10\text{ V}$ ,  $I_R = 100\text{ nA}$  Maximum

| Base Part Number   | Capacitance ( $C_T$ ) <sup>1</sup> (pF) |      |      |                                   | Capacitance Ratio     | Q Factor                           |
|--------------------|---|------|------|-----------------------------------|-----------------------|------------------------------------|
|                    | f = 1 MHz, $V_R = 2.0\text{ V}$         |      |      | f = 1 MHz<br>$V_R = 4.0\text{ V}$ | $C_{T0.5} / C_{T4.0}$ | f = 50 MHz<br>$V_R = 2.0\text{ V}$ |
|                    | Min.                                    | Nom. | Max. | Max.                              | Typ.                  | Typ.                               |
| MAVR-000230-XXXXXX | 4.5                                     | 5.0  | 6.0  | 3.1                               | 3.5                   | 400                                |
| MAVR-000240-XXXXXX | 3.0                                     | 3.5  | 4.2  | 2.3                               | 3.5                   | 450                                |
| MAVR-000250-XXXXXX | 2.3                                     | 2.7  | 3.5  | 1.8                               | 3.5                   | 450                                |

1. Capacitance @ 1 MHz

### Absolute Maximum Ratings<sup>2,3</sup>

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

| Parameter               | Absolute Maximum |
|-------------------------|------------------|
| Reverse Voltage         | 12 V             |
| Forward Current         | 50 mA            |
| Total Power Dissipation | 250 mW           |
| Operating Temperature   | -55°C to +125°C  |
| Storage Temperature     | -55°C to +125°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.

### Handling Procedures

Please observe the following precautions to avoid damage:

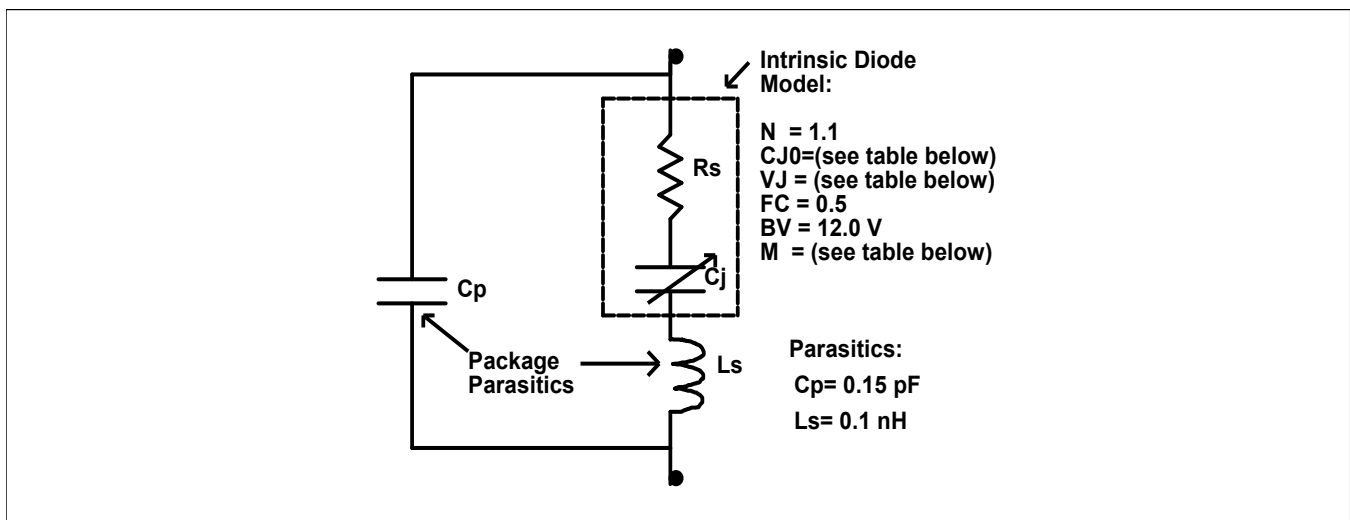
### Static Sensitivity

Silicon Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

### Part Number Designations

| Ordering Part Number | Package Style | Diode Configuration | Diode Marking |
|----------------------|---------------|---------------------|---------------|
| MAVR-000230-0287AT   | SOT-23        | Single              | V5J           |
| MAVR-000230-0287FT   | SOT-23        | Common Cathode      | V5K           |
| MAVR-000230-11410T   | SOD-323       | Single              | 5J            |
| MAVR-000240-0287AT   | SOT-23        | Single              | V5L           |
| MAVR-000240-11410T   | SOD-323       | Single              | 5L            |
| MAVR-000240-1146FT   | SC-70         | Common Cathode      | 5M            |
| MAVR-000250-0287AT   | SOT-23        | Single              | V5N           |
| MAVR-000250-0287FT   | SOT-23        | Common Cathode      | V5P           |
| MAVR-000250-11410T   | SOD-323       | Single              | 5N            |
| MAVR-000250-1146FT   | SC-70         | Common Cathode      | 5P            |
| MAVR-000250-12790T   | SC-79         | Single              | No Marking    |

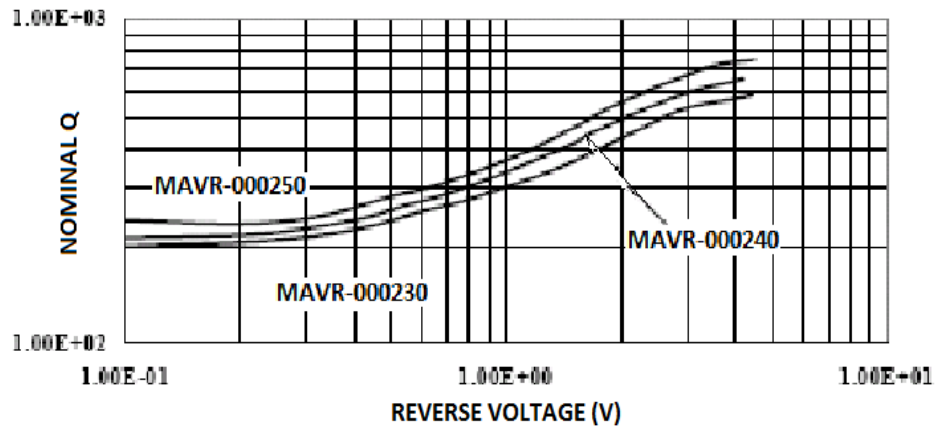
### Spice Model



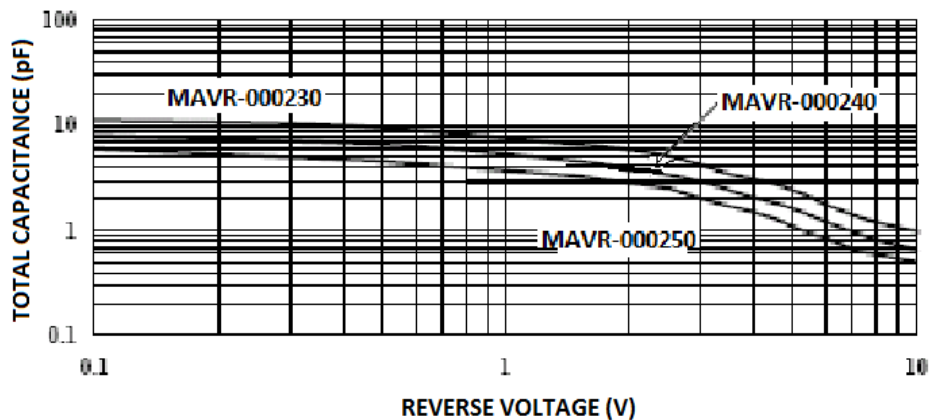
| Base Part No. | CJ0 (pF) | VJ (V) | M     |
|---------------|----------|--------|-------|
| MAVR-000230   | 12.0     | 4.085  | 2.228 |
| MAVR-000240   | 8.16     | 4.930  | 2.520 |
| MAVR-000250   | 6.19     | 4.774  | 2.458 |

## Typical Performance Curves

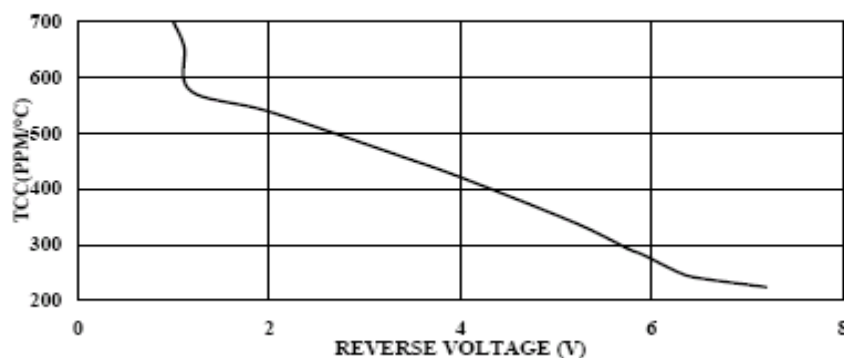
NOMINAL Q at 50 MHz vs REVERSE VOLTAGE



TOTAL CAPACITANCE VS REVERSE VOLTAGE at 1MHz

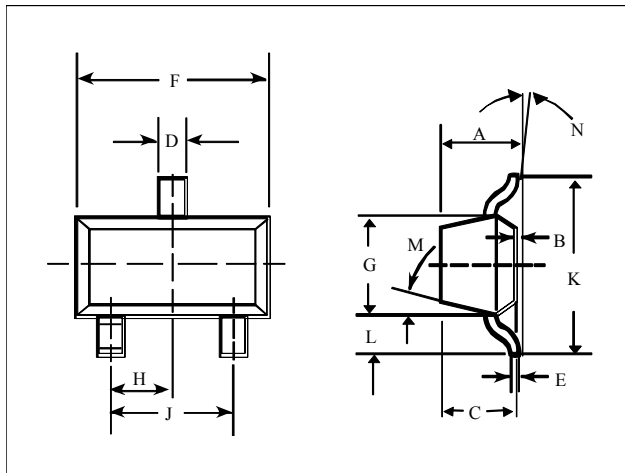


NOMINAL CHANGE in CAPACITANCE with TEMPERATURE



### Case Styles

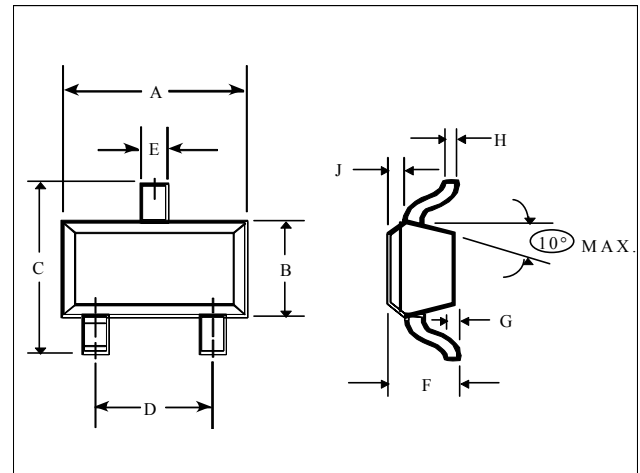
#### SOT-23 (Case Style 287)



| Dim.        | INCHES                |       | MILLIMETERS  |      |
|-------------|-----------------------|-------|--------------|------|
|             | Min.                  | Max.  | Min.         | Max. |
| A           | —                     | 0.048 | —            | 1.22 |
| B           | —                     | 0.008 | —            | 0.20 |
| C           | —                     | 0.040 | —            | 1.00 |
| D           | 0.013                 | 0.020 | 0.35         | 0.50 |
| E           | 0.003                 | 0.006 | 0.08         | 0.15 |
| F           | 0.110                 | 0.119 | 2.80         | 3.00 |
| G           | 0.047                 | 0.056 | 1.20         | 1.40 |
| H           | 0.037 typical         |       | 0.95 typical |      |
| J           | 0.075 typical         |       | 1.90 typical |      |
| K           | —                     | 0.103 | —            | 2.60 |
| L           | —                     | 0.024 | —            | 0.60 |
| <b>Dim.</b> | <b>GRADIENT</b>       |       |              |      |
| M           | 10° max. <sup>4</sup> |       |              |      |
| N           | 2° .. .30°            |       |              |      |

4. Applicable on all sides

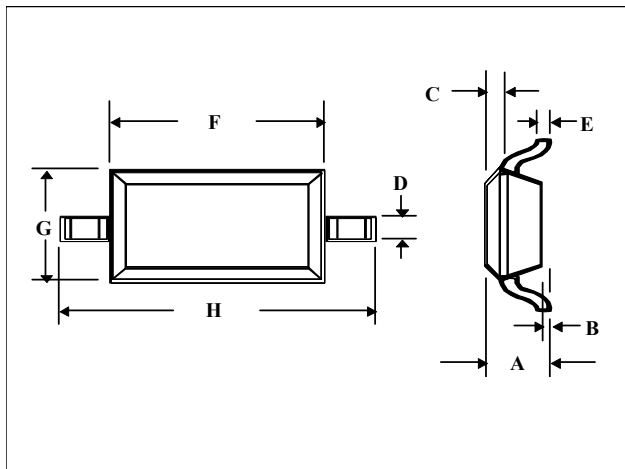
#### SC-70, 3 Lead (Case Style 1146)



| Dim. | INCHES |       | MILLIMETERS |      |
|------|--------|-------|-------------|------|
|      | Min.   | Max.  | Min.        | Max. |
| A    | 0.071  | 0.087 | 1.80        | 2.21 |
| B    | 0.045  | 0.053 | 1.14        | 1.35 |
| C    | 0.071  | 0.094 | 1.80        | 2.39 |
| D    | 0.047  | 0.057 | 1.19        | 1.45 |
| E    | 0.010  | 0.016 | 0.25        | 0.41 |
| F    | 0.031  | 0.039 | 0.79        | 1.00 |
| G    | 0.000  | 0.004 | 0.00        | 0.10 |
| H    | 0.004  | 0.007 | 0.10        | 0.18 |
| J    | 0.004  | 0.010 | 0.10        | 0.25 |

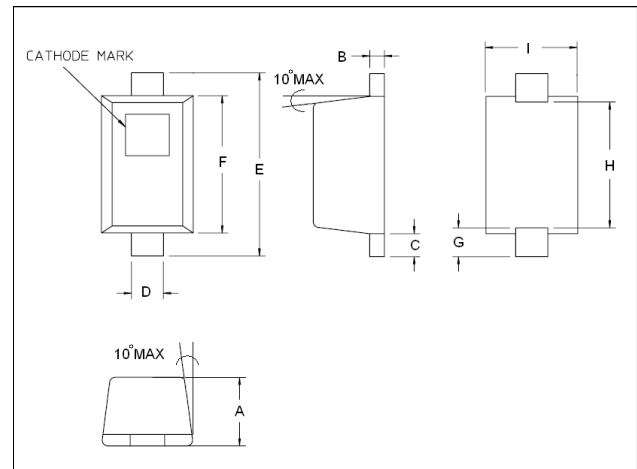
## Case Styles

### SOD-323 (Case Style 1141)



| Dim. | INCHES |       | MILLIMETERS |      |
|------|--------|-------|-------------|------|
|      | Min.   | Max.  | Min.        | Max. |
| A    | —      | 0.043 | —           | 1.1  |
| B    | —      | 0.004 | —           | 0.1  |
| C    | —      | 0.008 | —           | 0.2  |
| D    | 0.010  | 0.016 | 0.25        | 0.41 |
| E    | 0.003  | 0.006 | 0.07        | 0.15 |
| F    | 0.063  | 0.075 | 1.6         | 1.9  |
| G    | 0.045  | 0.057 | 1.14        | 1.45 |
| H    | 0.091  | 0.106 | 2.3         | 2.7  |

### SC-79 (Case Style 1279)



| Dim. | INCHES        |       | MILLIMETERS   |      |
|------|---------------|-------|---------------|------|
|      | Min.          | Max.  | Min.          | Max. |
| A    | .0197         | .0276 | 0.50          | 0.70 |
| B    | 0.003         | 0.008 | 0.07          | 0.20 |
| C    | 0.006         | 0.010 | 0.15          | 0.25 |
| D    | 0.010         | 0.014 | 0.25          | 0.35 |
| E    | 0.059         | 0.067 | 1.50          | 1.70 |
| F    | 0.043         | 0.051 | 1.09          | 1.30 |
| G    | .0098 nominal |       | 0.250 nominal |      |
| H    | .0433 nominal |       | 1.10 nominal  |      |
| I    | .027          | .035  | 0.68          | 0.89 |

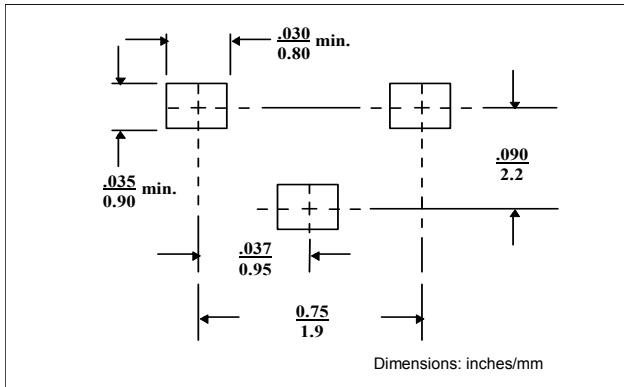
### Mounting Information

The illustration indicates the recommended mounting pad configuration for the SC-79, SC70 3LD, SOT-23 and SOD-323 packages. Solder paste containing flux should be screened onto the pads to a thickness of 0.005 - 0.007 inches. The plastic package is placed in position, firmly adhering to the solder paste.

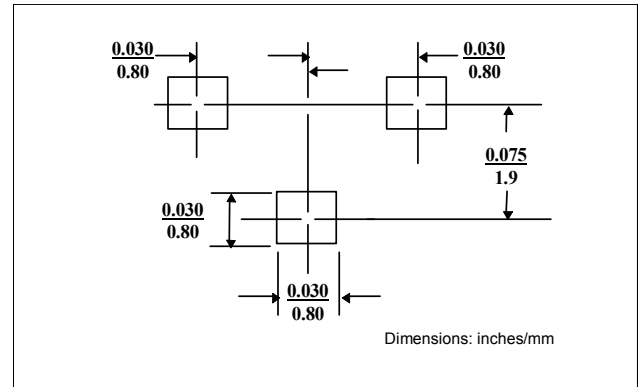
Permanent attachment is performed by a reflow soldering procedure during which the tab temperature does not exceed +275°C and the body temperature does not exceed +260°C.

Please refer to Application Note M538 for surface mounting instructions.

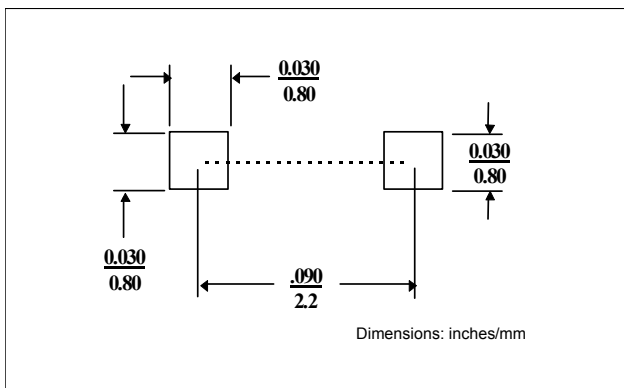
### SOT-23 (Case Style 287)



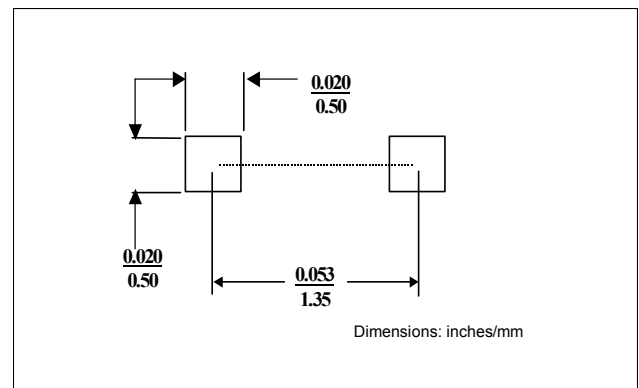
### SC-70, 3 Lead (Case Style 1146)



### SOD-323 (Case Style 1141)



### SC-79 (Case Style 1279)



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