

Features

- Low Series Resistance @ Low Tuning Voltages
- High Capacitance Ratio @ Low Tuning Voltages
- Surface Mount Plastic Packages:
SC-79, SOD-323, SC-70 (3L)
- SPC Process for Superior C vs. V Repeatability
- RoHS* Compliant

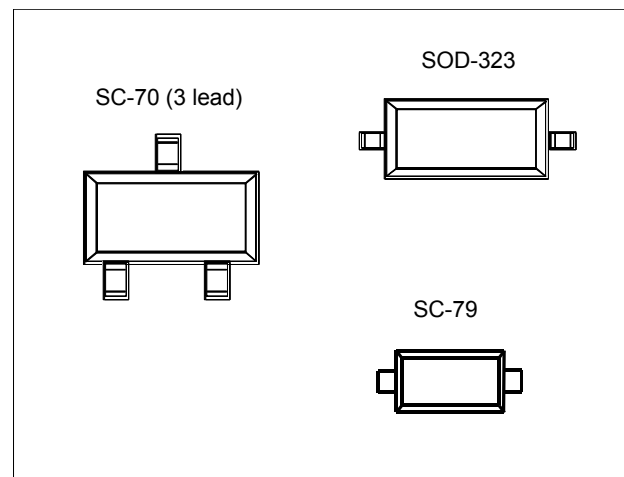
Description

The MA4ST1200 series is a highly repeatable, UHCVD/ion-implanted, hyperabrupt silicon tuning varactor in a cost effective surface mount package.

This series of varactors is designed for high capacitance ratio, and high Q for low battery voltage operation. It is efficient for wide band tuning and low phase noise application where the supply voltage is limited to 5 volts or less.

The varactors are offered as singles in SC-79, and SOD-323 along with a common cathode version offered in the SC-70 (3L). These diodes are offered with 100% matte Sn plating.

Package Styles



Ordering Information

| Part No. | Configuration | Package | Package Cp (pF) | Package Ls (nH) |
|--------------------|----------------|------------|-----------------|-----------------|
| MAVR-001230-12790T | Single | SC-79 | 0.10 | 0.6 |
| MAVR-001240-12790T | Single | SC-79 | 0.10 | 0.6 |
| MA4ST1231-1141T | Single | SOD-323 | 0.11 | 1.2 |
| MA4ST1241-1141T | Single | SOD-323 | 0.11 | 1.2 |
| MA4ST1241CK-1146T | Common Cathode | SC-70 (3L) | 0.12 | 1.3 |

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

Low Tuning Voltage / Low Rs Silicon Hyperabrupt Varactor Diode

Rev. V10

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

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

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

| RoHS Compliant Part No. | C_T (pF) | | | | Capacitance Ratio | | R_S (Ohm) | |
|--------------------------|-----------------------|-----------------------|------|-----------------------|-----------------------|-----------------------|-------------|------|
| | $V_R = 0.5 \text{ V}$ | $V_R = 2.0 \text{ V}$ | | $V_R = 4.0 \text{ V}$ | $C_{T0.5} / C_{T4.0}$ | $V_R = 2.0 \text{ V}$ | | |
| | Typ. | Min. | Nom. | Max. | Typ. | Typ. | Typ. | Max. |
| MA4ST1231 MAVR-001230 | 10.1 | 4.2 | 4.7 | 5.6 | 2.75 | 3.67 | 0.40 | 0.70 |
| MA4ST1241 MAVR-001240 | 7.1 | 3.0 | 3.4 | 3.8 | 2.05 | 3.46 | 0.40 | 0.70 |

1. The prefix defines package style, configuration and packaging information. Contact representative for complete part identification.
2. Capacitance @ 1 MHz.
3. Series Resistance @ 100 MHz. guaranteed by design.

Absolute Maximum Ratings^{4,5}

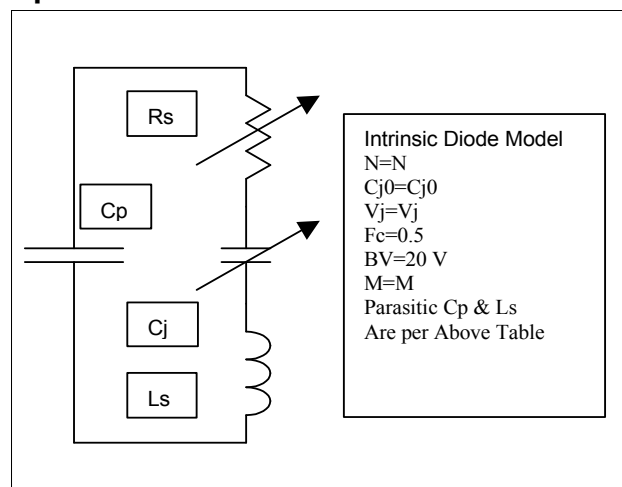
| Parameter | Absolute Maximum |
|-----------------------|------------------|
| Reverse Voltage | 12 V |
| Forward Current | 50 mA |
| Operating Temperature | -55°C to +125°C |
| Storage Temperature | -55 C to +125°C |

4. Operation of this device above any one of these parameters may cause permanent damage.
5. Please refer to application note M538 for surface mounting instructions.

Typical Capacitance Values

| V_R (V) | C_T (pF) | |
|-----------|------------|-----------|
| | MA4ST1231 | MA4ST1241 |
| 0.5 | 10.170 | 7.016 |
| 1.0 | 7.839 | 5.424 |
| 1.5 | 6.062 | 4.213 |
| 2.0 | 4.840 | 3.370 |
| 2.5 | 4.053 | 2.829 |
| 3.0 | 3.527 | 2.466 |
| 3.5 | 3.155 | 2.208 |
| 4.0 | 2.877 | 2.016 |
| 4.5 | 2.661 | 1.865 |
| 5.0 | 2.488 | 1.746 |

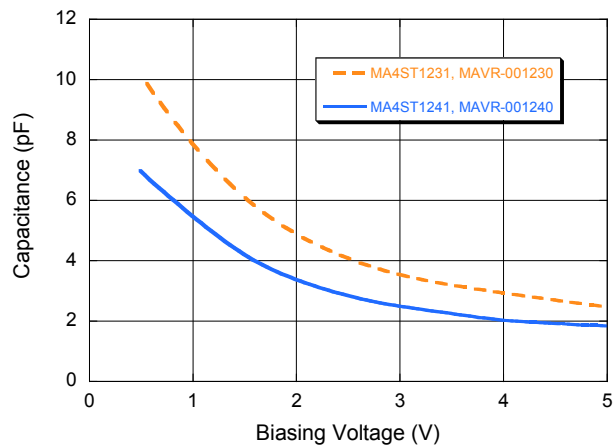
Spice Model



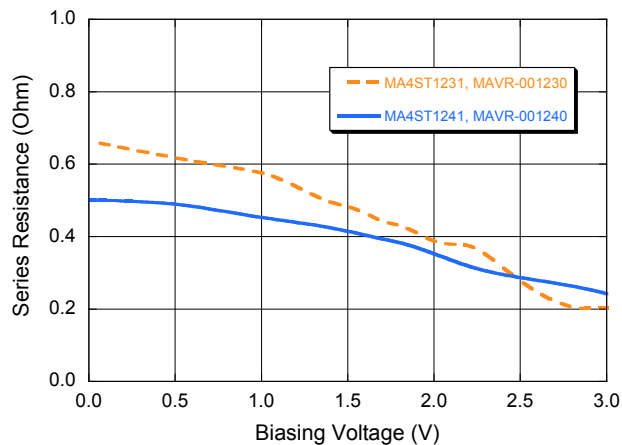
| Part Number | N | Cj0 (pF) | Vj (V) | M |
|--------------------------|-----|----------|--------|-----|
| MA4ST1231 MAVR-001230 | 1.1 | 12.7 | 3.136 | 2.6 |
| MA4ST1241 MAVR-001240 | 1.1 | 8.65 | 3.170 | 2.6 |

Typical Performance Curves

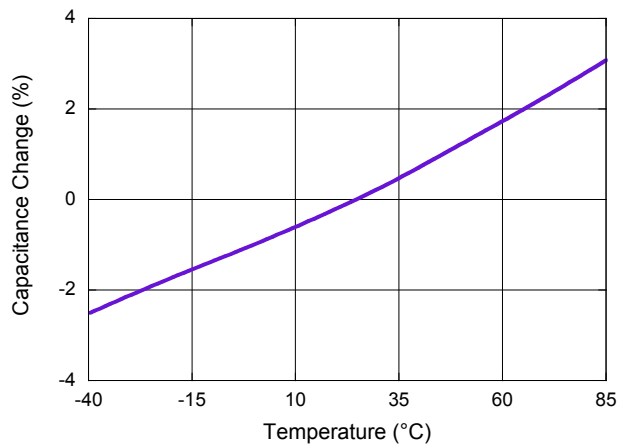
Capacitance vs. Biasing Voltage



Series Resistance vs. Biasing Voltage



Capacitance Change (relative to +25°C) vs. Temperature



MA4ST1200 Series

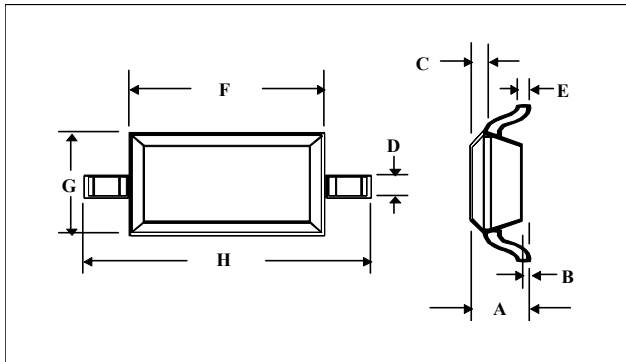


Low Tuning Voltage / Low Rs Silicon Hyperabrupt Varactor Diode

Rev. V10

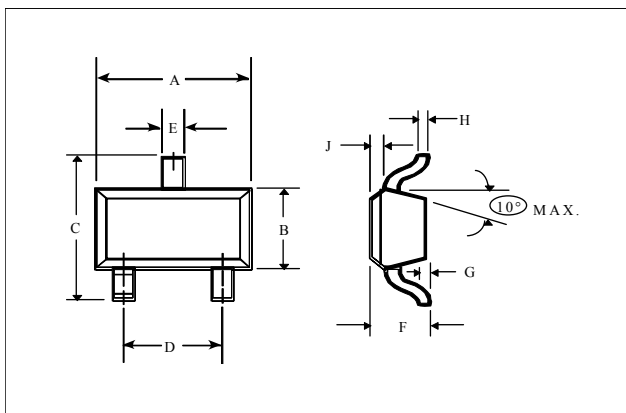
Case Styles

SOD-323 (Case Style 1141)



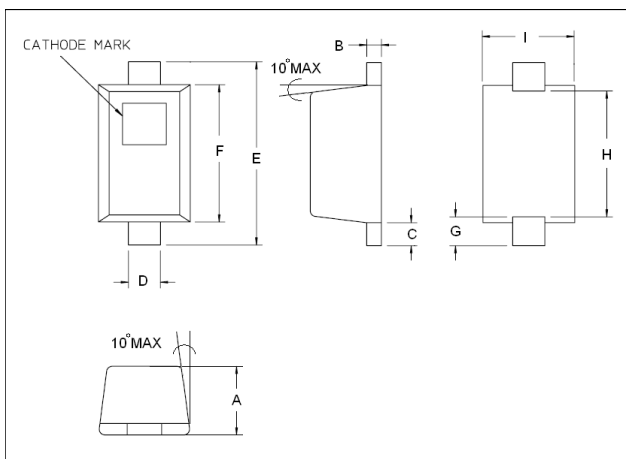
| DIM. | INCHES | | MILLIMETERS | |
|------|--------|-------|-------------|------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 3/4 | 0.043 | 3/4 | 1.1 |
| B | 3/4 | 0.004 | 3/4 | 0.1 |
| C | 3/4 | 0.008 | 3/4 | 0.2 |
| D | 0.010 | 0.016 | 0.25 | 0.41 |
| E | 0.003 | 0.006 | 0.07 | 0.15 |
| F | 0.063 | 0.075 | 1.6 | 1.9 |
| G | 0.045 | 0.057 | 1.14 | 1.45 |
| H | 0.091 | 0.106 | 2.3 | 2.7 |

SC-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 |

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 |

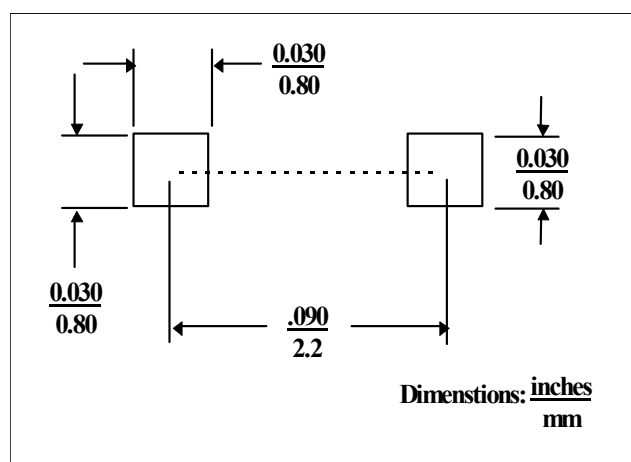
Mounting Information

The illustration indicates the recommended mounting pad configuration for the SC-79, SOT-323 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.

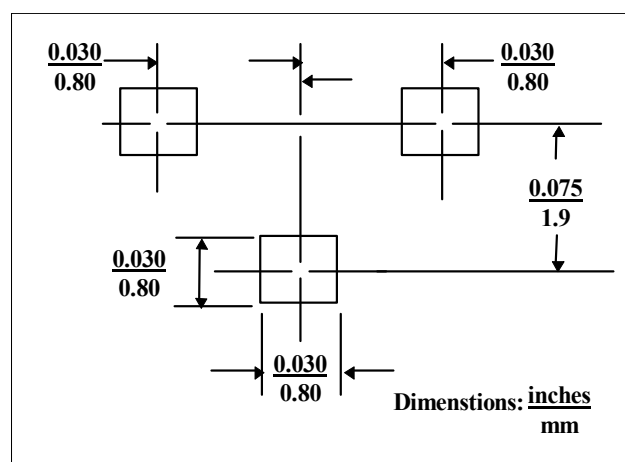
Permanent attachment is performed by a reflow soldering procedure during which the tab temperature does not exceed +275°C and the body temperature does not exceed +250°C, for standard models and +260°C for the RoHS compliant devices.

Please refer to Application Note M538 for surface mounting instructions.

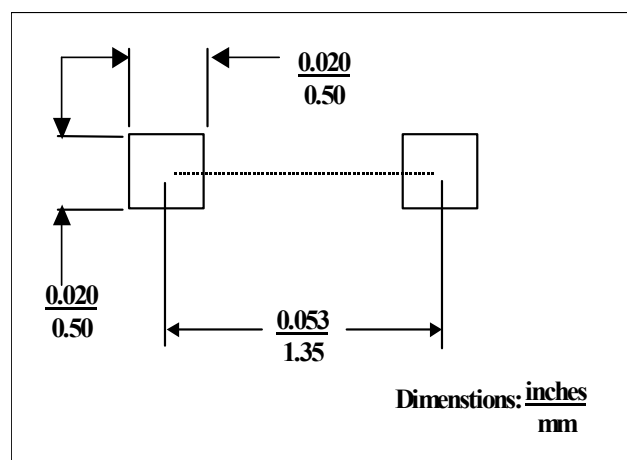
SOD-323 (Case Style 1141)



SC-70, 3 Lead (Case Style 1146)



SC-79 (Case Style 1279)



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