

Low-Voltage / Wide Band Si Hyperabrupt Varactors

MA4ST300 Series
V4

Features

- Surface Mount Packages (SOT-23, SOT-323, SOD-323)
- High Capacitance Ratio at Low Voltages
- High Q 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

Description

The MA4ST300 series are ion-implanted, hyperabrupt junction, silicon tuning varactors in SOT-23, SOT-323, and SOD-323 surface mount packages. This series of varactors is designed for high capacitance ratio and low voltage operation. Each varactor type has a better than 3:1 capacitance ratio between 0.5V and 3.0V.

Applications

The MA4ST300 series tuning varactors are useful 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 to cover wireless application bands up to the 2.4 GHz WLAN band. Applications include VCOs and voltage tuned filters.

RoHs Compliant parts

| Part Number | RoHs Compliant Part Number |
|-------------|----------------------------|
| MA4ST320 | MAVR-000320 |
| MA4ST330 | MAVR-000330 |
| MA4ST340 | MAVR-000340 |
| MA4ST350 | MAVR-000350 |

Absolute Maximum Ratings @ T_A=+25 °C (Unless Otherwise Noted)¹

| 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 |

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

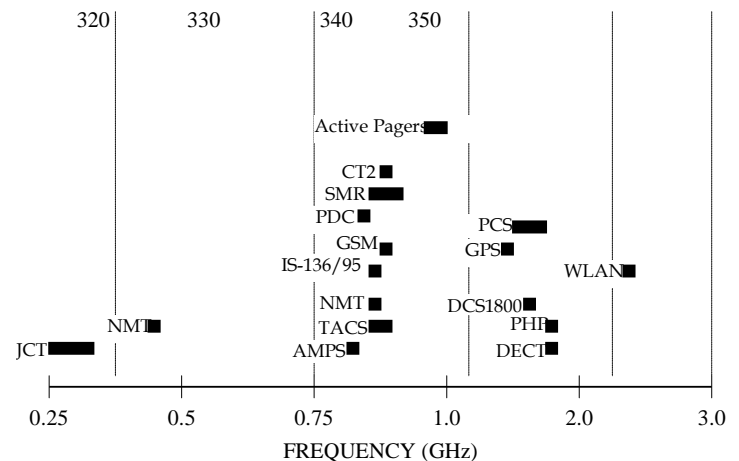


Fig. 1 Typical Device Selection by Frequency

Low-Voltage / Wide Band Si Hyperabrupt Varactors

MA4ST300 Series
V4

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

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

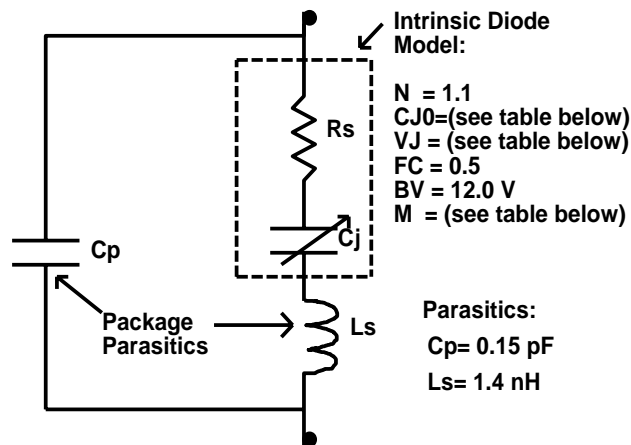
Reverse Leakage Current @ $V_R = 10\text{V}$, $I_R = 100\text{ nA}$ Maximum

| Part Number Base | RoHs Compliant Part Number Base ¹ | C_T^2 | | | | Capaci- tance Ratio | Q Factor |
|---------------------|---|----------------------------|------|------|------------------------------|---------------------------|---------------------------------|
| | | (pF) | | | (pF) | | |
| | | f=1 MHz, $V_R=0.5\text{V}$ | | | f=1MHz, $V_R=3.0\text{V}$ | $C_{T0.5}/C_{T3.0}$ | f=50 MHz, $V_R= 2.0\text{V}$ |
| | | Min. | Nom. | Max. | Max. | Typ. | Min. |
| MA4ST320 | MAVR-000320-XXXXXX | 48.0 | 58.0 | 63.0 | 19.0 | 3.2 | 300 |
| MA4ST330 | MAVR-000330-XXXXXX | 22.0 | 26.0 | 30.0 | 9.0 | 3.2 | 350 |
| MA4ST340 | MAVR-000340-XXXXXX | 15.0 | 18.5 | 21.0 | 6.5 | 3.2 | 350 |
| MA4ST350 | MAVR-000350-XXXXXX | 9.5 | 11.8 | 13.5 | 4.5 | 3.2 | 400 |

¹ The prefix defines package style, configuration and packaging information. Contact representative for complete part identification.

² Capacitance @ 1 MHz

Spice Model



| Part No. | C_{J0} (pF) | V_J (V) | M |
|----------|---------------|-----------|------|
| MA4ST320 | 77.4 | 11.71 | 6.51 |
| MA4ST330 | 33.9 | 8.91 | 5.15 |
| MA4ST340 | 25.3 | 14.25 | 7.41 |
| MA4ST350 | 15.7 | 14.55 | 7.26 |

2

M/A-COM Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. M/A-COM makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does M/A-COM assume any liability whatsoever arising out of the use or application of any product(s) or information.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

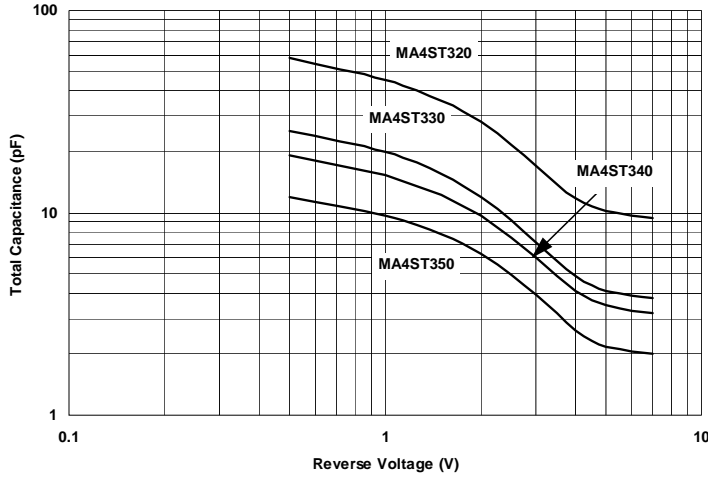
Visit www.macom.com for additional data sheets and product information.

**Low-Voltage / Wide Band
Si Hyperabrupt Varactors**

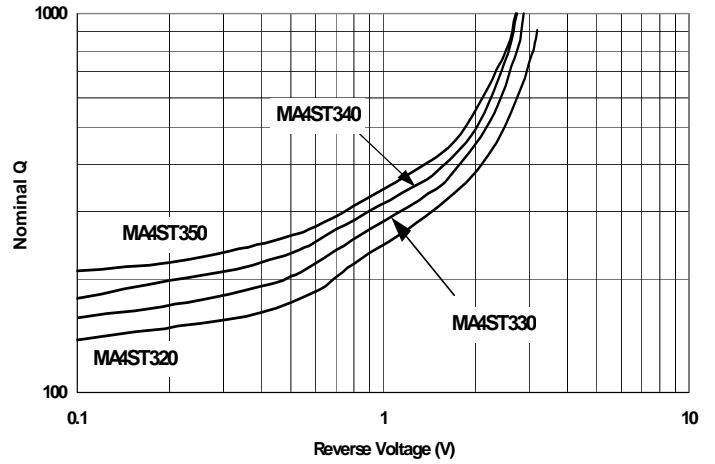
MA4ST300 Series
V4

Typical Performance Curves

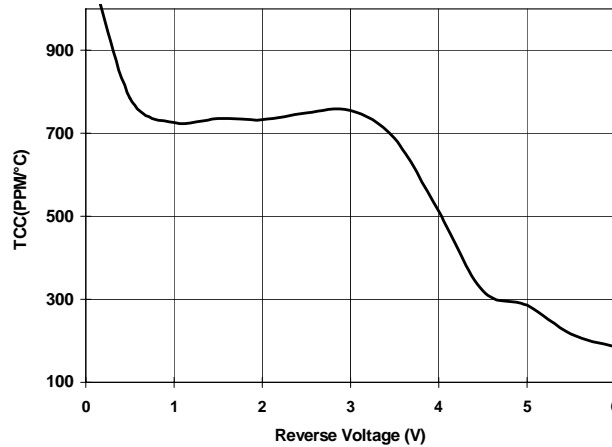
Total Capacitance vs. Reverse Voltage at 1 MHz



Nominal Q at 50 MHz vs. Reverse Voltage



Nominal Change in Capacitance with temperature



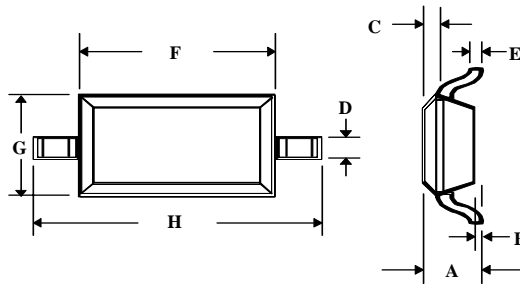
Low-Voltage / Wide Band Si Hyperabrupt Varactors

MA4ST300 Series
V4

Case Styles

SOD-323

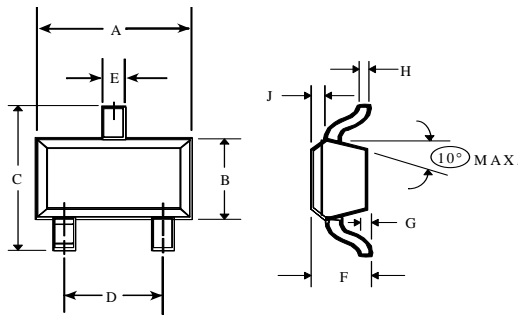
Case Style 1141



| 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 | 0.4 |
| E | 0.003 | 0.006 | 0.08 | 0.15 |
| F | 0.063 | 0.075 | 1.6 | 1.9 |
| G | 0.045 | 0.057 | 1.15 | 1.45 |
| H | 0.091 | 0.106 | 2.3 | 2.7 |

SC-70, 3 Lead

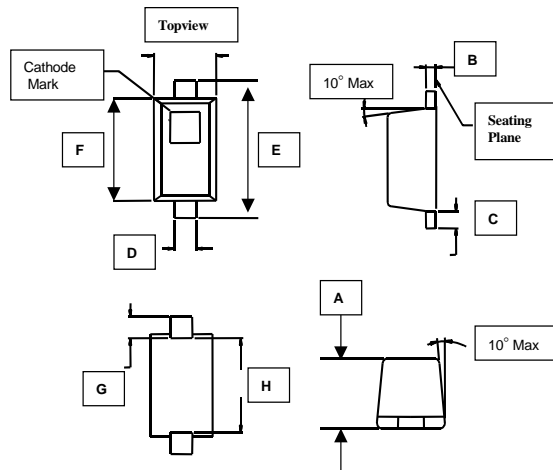
Case Style 1146



| DIM. | INCHES | | MILLIMETERS | |
|------|--------|-------|-------------|------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.071 | 0.094 | 1.80 | 2.40 |
| D | 0.047 | 0.057 | 1.19 | 1.45 |
| E | 0.010 | 0.016 | 0.25 | 0.41 |
| F | 0.031 | 0.039 | 0.80 | 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 | 0.020 | 0.028 | 0.50 | 0.71 |
| B | 0.003 | 0.008 | 0.08 | 0.20 |
| C | 0.006 | 0.010 | 0.15 | 0.25 |
| D | 0.010 | 0.014 | 0.25 | 0.36 |
| E | 0.059 | 0.067 | 0.08 | 0.15 |
| F | 0.043 | 0.051 | 1.50 | 1.30 |
| G | 0.011 | 0.012 | 0.28 | 0.30 |
| H | 0.037 typical | 0.043 | 0.94 | 1.09 |

Low-Voltage / Wide Band Si Hyperabrupt Varactors

MA4ST300 Series
V4

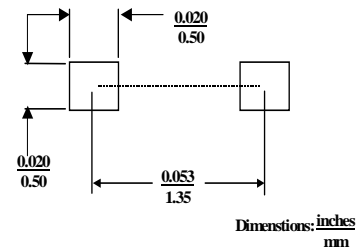
Mounting Information

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.

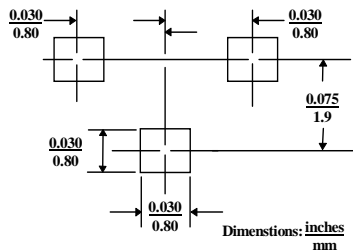
Permanent attachment is performed by a reflow soldering procedure during which the tab temperature does not exceed +275 °C and the body temperature does not exceed +250 °C, for standard models and +260 °C for the RoHS compliant devices.

Please refer to Application Note M538 for surface mounting instructions.

SC-79



SOT-323



SOD-323

