

MA4ST079 thru MA4ST083 Series



Surface Mount Hyperabrupt Wide-Band Tuning Varactors

Rev. V6

Features

- Low Cost
- Very High Capacitance Ratio from 1 to 8 Volts
- Surface Mount Package
- High Quality Factor
- Useful for Battery Applications
- SPC Monitored Ion Implantation for Excellent C-V Repeatability
- Singles and Common Cathode Pairs
- Available in Tape and Reel
- Lead-Free (RoHs Compliant) equivalents available with 260°C reflow compatibility

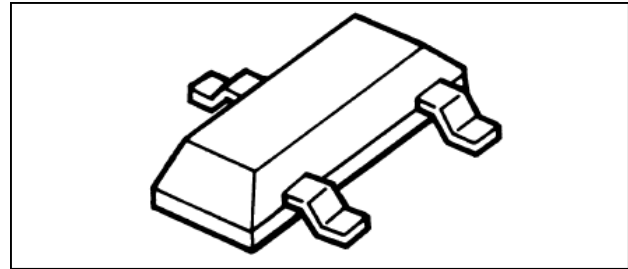
Description

The MA4ST079 through MA4ST083 series of silicon hyperabrupt junction tuning varactors is produced with ion implantation and advanced epitaxial growth techniques. These diodes have thermal oxide passivation, and feature very high capacitance ratio and quality factor. They are well suited for use from the sub-HF through UHF frequency range. The standard capacitance tolerance is $\pm 10\%$, with tighter tolerances available. Capacitance matching at one or more bias voltages is also available. These diodes are offered with standard Sn/Pb plating, as well as 100% matte Sn plating on our RoHs compliant equivalent devices.

Applications

The MA4ST079 through MA4ST083 series of hyperabrupt junction tuning varactors is suggested for usage where a large frequency change is required with only a small change in tuning voltage. This series is appropriate for usage in wide band voltage-controlled oscillators and voltage controlled filters which require the largest rate of change of capacitance with voltage. The large change in capacitance from 1 to 8 volts makes them very attractive for battery operated or other systems with limited available control voltage. The MA4ST079 through MA4ST083 family can be used in VCOs and VTFs from approximately 100 KHz through the UHF frequency band.

SOT-23



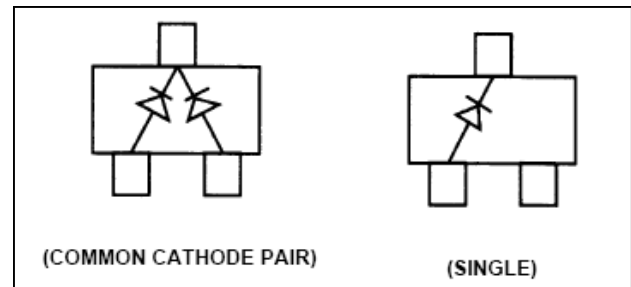
Absolute Maximum Ratings ^{1,2}

@ T_A=+25 °C (Unless Otherwise Noted)

| Parameter | Absolute Maximum |
|-----------------------|-------------------|
| Reverse Voltage | 12 V |
| Forward Current | 50 mA |
| Power Dissipation | 50mW @25°C |
| Operating Temperature | -65 °C to +125 °C |
| Storage Temperature | -65 °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

Configurations



Ordering Information

| Part Number | RoHs Compliant Part Number ³ |
|-------------|---|
| MA4ST079 | MAVR-000079-XXXXXX |
| MA4ST080 | MAVR-000080-XXXXXX |
| MA4ST081 | MAVR-000081-XXXXXX |
| MA4ST082 | MAVR-000082-XXXXXX |
| MA4ST083 | MAVR-000083-XXXXXX |

3. Suffix refers to package style, configuration and packaging requirements. See electrical specification for complete part number offerings

Specifications are subject to change without prior notification

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 - **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
 - **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298
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Electrical Specifications @ $T_A = +25\text{ }^\circ\text{C}$

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

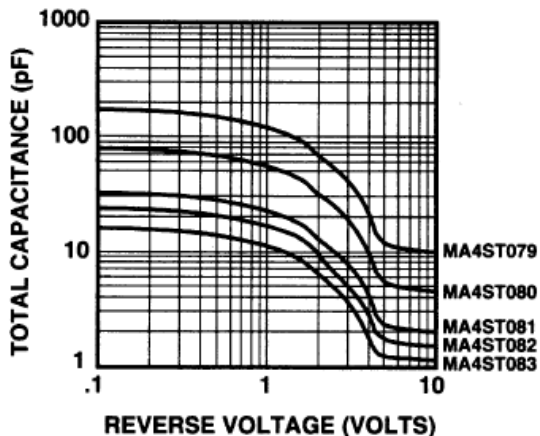
Reverse Leakage Current @ $V_R = 10\text{V}$, $I_R = 100\text{ nA}$ Maximum

Temperature Coefficient of Capacitance @ $V_R = 8\text{ Volts}$, $TCC = 400\text{ppm}/^\circ\text{C}$ Typical

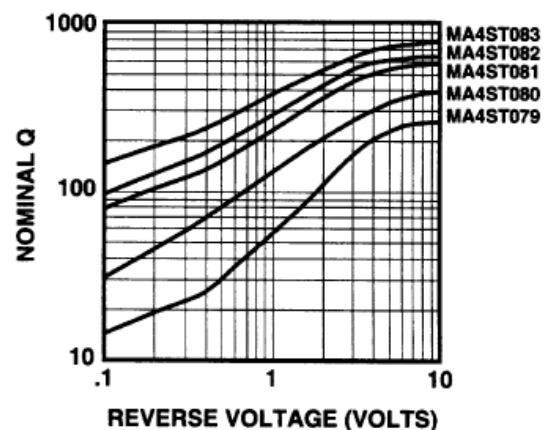
| Part Number Base ¹ | RoHS Compliant Part No. Base ¹ | Ct (pF) ² | | | | | Typ. Capacitance Ratio C_{t1V}/C_{t8V} | Typical Q |
|-------------------------------|---|--|--|------|--|--|--|-----------|
| | | $V_R = 1\text{ V}$ $f = 1\text{ MHz}$ | $V_R = 2.5\text{ V}$ $f = 1\text{ MHz}$ | | $V_R = 4\text{ V}$ $f = 1\text{ MHz}$ | $V_R = 8\text{ V}$ $f = 1\text{ MHz}$ | | |
| | | Min. | Min. | Max. | Max. | Max. | Typ. | Typ. |
| MA4ST079CK-287T | MAVR-000079-0287FT | 87.4 | 48.7 | 59.5 | 27.3 | 11.8 | 9.1 | 80 |
| MA4ST080-287T | MAVR-000080-0287AT | 40.0 | 22.3 | 27.3 | 13.1 | 5.5 | 8.9 | 150 |
| MA4ST080CK-287T | MAVR-000080-0287FT | 40.0 | 22.3 | 27.3 | 13.1 | 5.5 | 8.9 | 150 |
| MA4ST081-287T | MAVR-000081-0287AT | 16.2 | 9.1 | 11.1 | 5.2 | 2.4 | 8.5 | 300 |
| MA4ST081CK-287T | MAVR-000081-0287FT | 16.2 | 9.1 | 11.1 | 5.2 | 2.4 | 8.5 | 300 |
| MA4ST082-287T | MAVR-000082-0287AT | 11.5 | 6.6 | 8.0 | 3.8 | 1.8 | 8.2 | 350 |
| MA4ST082CK-287T | - | 11.5 | 6.6 | 8.0 | 3.8 | 1.8 | 8.2 | 350 |
| MA4ST083-287T | MAVR-000083-0287AT | 7.9 | 4.5 | 5.5 | 2.6 | 1.3 | 7.8 | 450 |
| MA4ST083CK-287T | MAVR-000083-0287FT | 7.9 | 4.5 | 5.5 | 2.6 | 1.3 | 7.8 | 450 |

Typical Performance Curves³

Total Capacitance vs. Reverse Voltage



Nominal vs. Reverse Voltage



1. The prefix defines package style, configuration and packaging information. Contact representative for complete part identification.
2. Capacitance @ 1 MHz
3. Performance curves also reflect that of the RoHS equivalent part

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2

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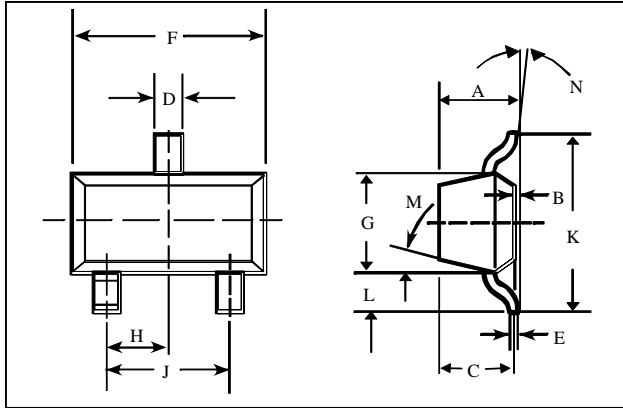
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Case Styles

SOT-23 (Case Style 287)



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| 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 |
| DIM. | GRADIENT | | | |
| M | 10° max. | | | |
| N | 2° .. .30° | | | |

Mounting Information

The illustration indicates the recommended mounting pad configuration for the SOT-23 package. 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.

SOT-23

