

# MA4ST200 Series



## Low-Voltage / High Q Si Hyperabrupt Varactors

Rev. V5

### Features

- Surface Mount Packages (SOT-23, SC70 3LD, SOD-323)
- 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
- Lead-Free (RoHS Compliant) equivalents available with 260°C reflow compatibility

### Description

M/A-COM's MA4ST200 series is a ion-implanted, hyperabrupt junction, silicon tuning varactors in SOT-23, SC70 3LD, and SOD-323 surface mount packages. This series of varactors is designed for high Q and low voltage operation. Each varactor type has a Q greater than 400 at -2 V. These diodes are offered with standard Sn/Pb plating, as well as 100% matte Sn plating on our RoHS compliant equivalent devices.

### Applications

The MA4ST200 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 for use in the wireless communications up to the 2.4 GHz band. Applications include VCOs and voltage tuned filters.

### RoHS Compliant Parts

Part Number	RoHS Compliant Base Part Number
MA4ST230	MAVR-000230
MA4ST240	MAVR-000240
MA4ST250	MAVR-000250

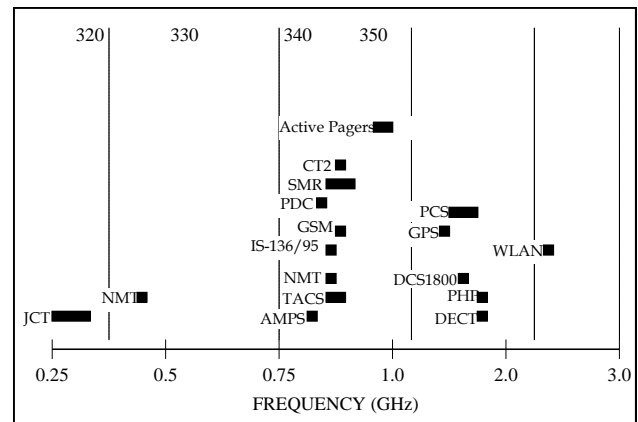
### Absolute Maximum Ratings<sup>1,2</sup>

@ T<sub>A</sub>=+25 °C (Unless Otherwise Noted)

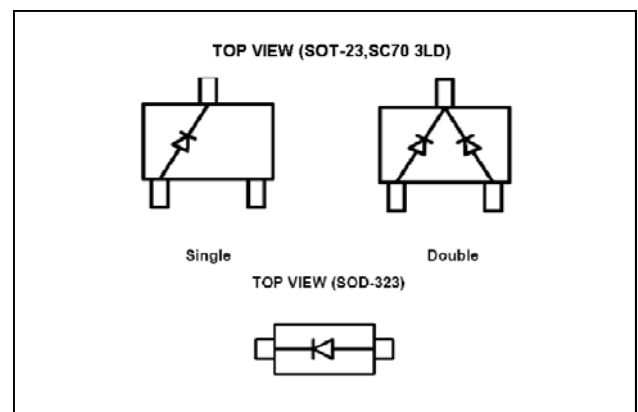
Parameter	Absolute Maximum
Reverse Voltage	12 V
Forward Current	50 mA
Total Power Dissipation	250 mW
Operating Temperature	-55 °C to +125 °C
Storage Temperature	-55 °C to +125 °C

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

### Typical Device Selection by Frequency



### Configurations



<sup>1</sup> Specifications are subject to change without prior notification

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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**

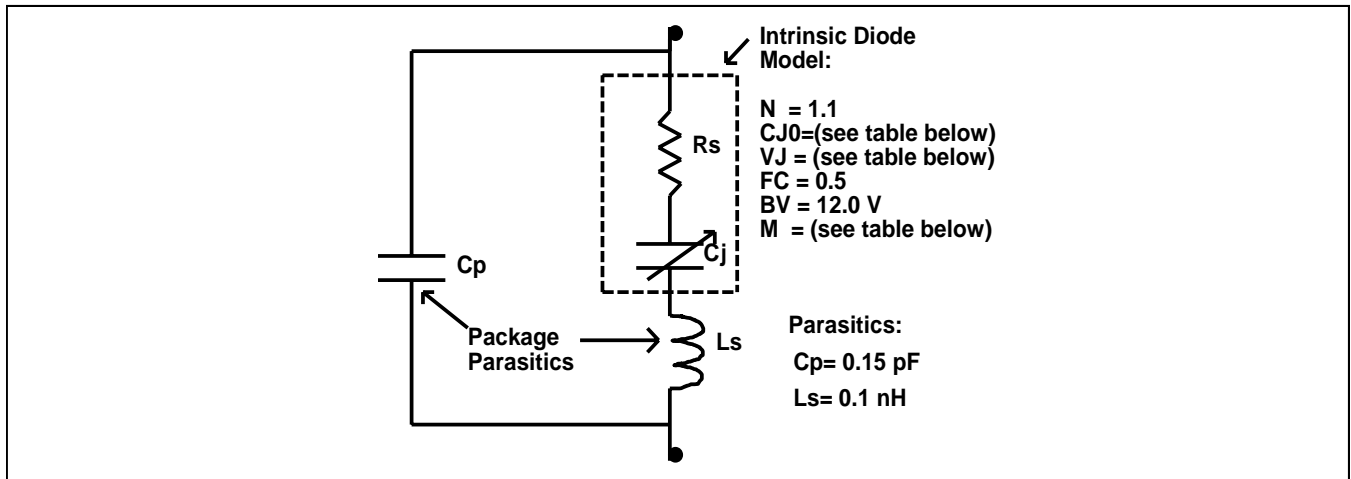
Part Number Base	RoHS Compliant Part Number Base <sup>3</sup>	$C_T$ <sup>4</sup>				Capacitance Ratio	Q Factor
		(pF)			(pF)		
		f = 1 MHz, $V_R = 2.0\text{ V}$			f = 1 MHz $V_R = 4.0\text{ V}$	$C_{T0.5}/C_{T4.0}$	f = 50 MHz $V_R = 2.0\text{ V}$
		Min.	Nom.	Max.	Max.	Typ.	Min.
MA4ST230	MAVR-000230-XXXXXX	4.5	5.0	6.0	3.1	3.5	400
MA4ST240	MAVR-000240-XXXXXX	3.0	3.5	4.2	2.3	3.5	450
MA4ST250	MAVR-000250-XXXXXX	2.3	2.7	3.5	1.8	3.5	450

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

Example : The MA4ST250-1141T RoHS compliant version is MAVR-000250-11410T .

4. Capacitance @ 1 MHz

### Spice Model



Part No.	RoHS Compliant Base Part No.	CJ0 (pF)	VJ (V)	M
MA4ST230	MAVR-000230	12.0	4.085	2.228
MA4ST240	MAVR-000240	8.16	4.930	2.520
MA4ST250	MAVR-000250	6.19	4.774	2.458

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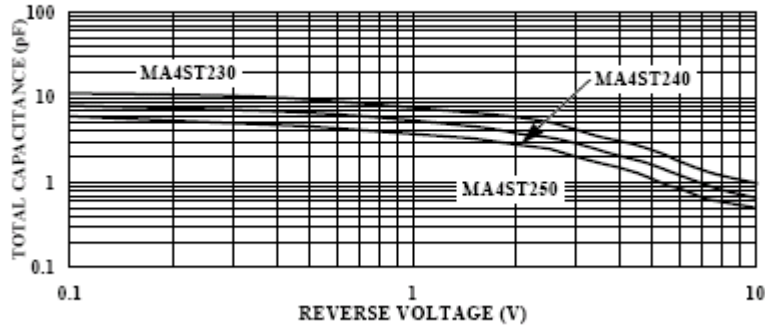
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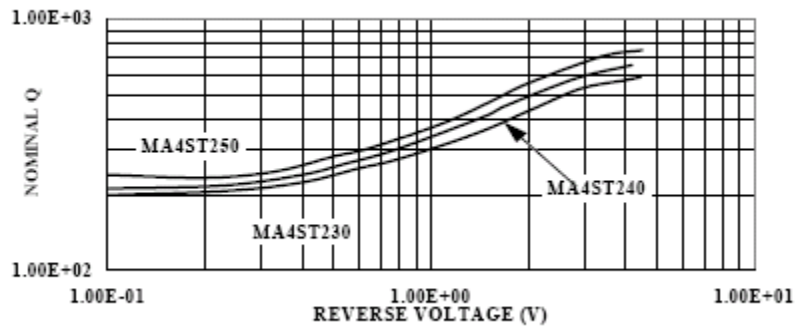
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## Typical Performance Curves

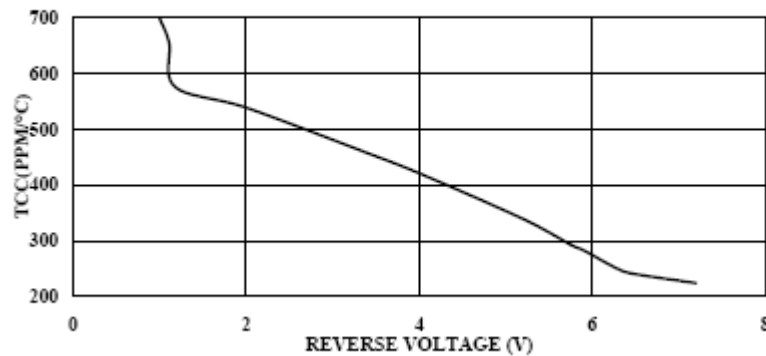
**TOTAL CAPACITANCE vs REVERSE VOLTAGE at 1 MHz**



**NOMINAL Q at 50 MHz vs REVERSE VOLTAGE**



**NOMINAL CHANGE in CAPACITANCE with TEMPERATURE**



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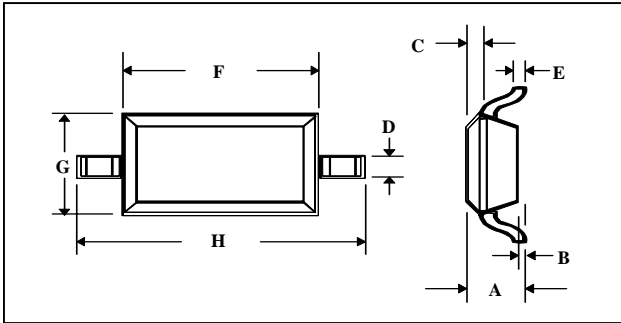


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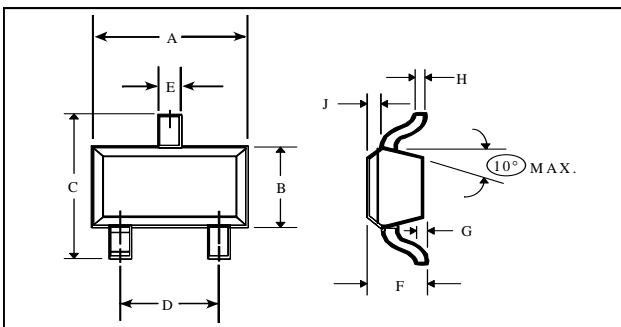
### Case Styles

#### SOD-323 (Case Style 1141)



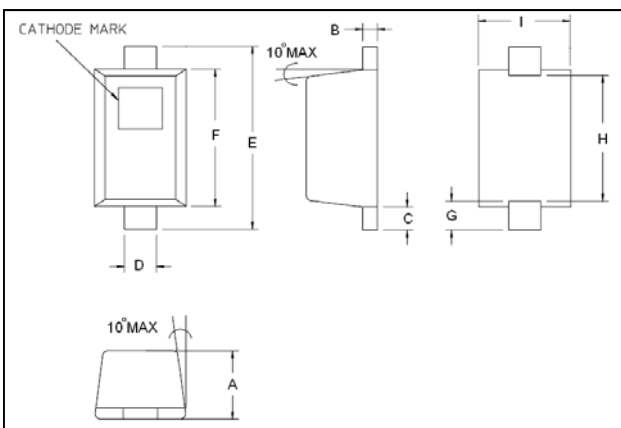
DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	—	0.043	—	1.1
B	—	0.004	—	0.1
C	—	0.008	—	0.2
D	0.010	0.016	0.25	0.41
E	0.003	0.006	0.07	0.15
F	0.063	0.075	1.6	1.9
G	0.045	0.057	1.14	1.45
H	0.091	0.106	2.3	2.7

#### SC-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

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### Mounting Information

The illustration indicates the recommended mounting pad configuration for the SC-79, SC70 3LD 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.

These varactors are available in the three case styles shown. When ordering, specify the desired case style by adding the case designation (287 for SOT-23, 1146 for SC70 3LD, 1141 for SOD-323) as a suffix to the model number. For example, MA4ST230-1141 specifies the MA4ST230 varactor in the SOD-323 package. The model number indicated is for a single varactor. Common cathode pairs are available in SOT-23 package, and are specified by adding "CK" to the end of the model number. For example MA4ST230CK-287 specifies the MA4ST230 varactor in common cathode pairs.

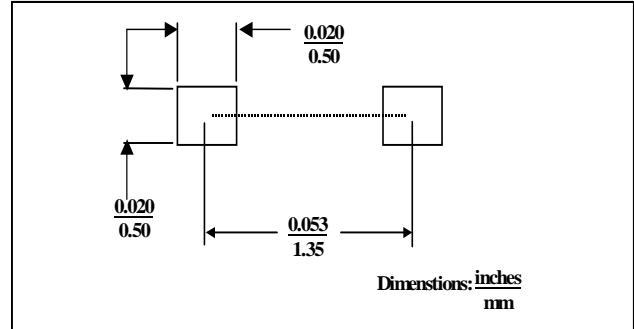
For RoHS Compliant Parts, use the Following Suffices for the Given Package Style ( After the Base P/N ) :

SC-79 : 12790T  
 SOD-323 : 11410T  
 SC70 3LD : 1146FT

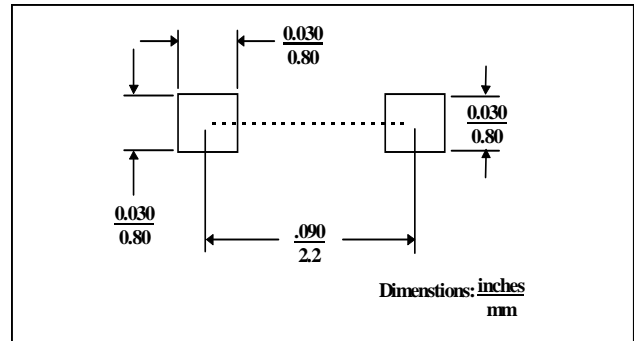
As example, the RoHS P/N for the Base P/N MAVR-000230 in SOD-323 is :  
 MAVR-000230-1146FT.

**Please refer to Application Note M538 for surface mounting instructions.**

### SC-79 (Case Style 1279)



### SOD-323 (Case Style 1141)



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

