



# Low-Voltage / High Q Si Hyperabrupt Varactors



## Features

- Surface Mount Packages (SOT-23, SOT-323, 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

## Description

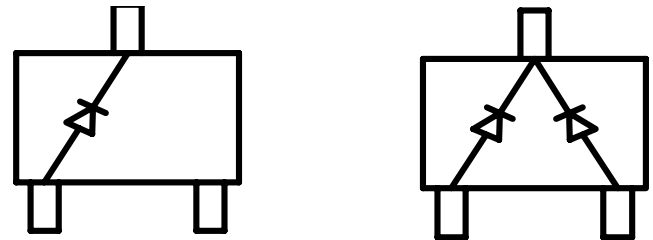
M/A-COM's MA4ST200 series is a ion-implanted, hyperabrupt junction, silicon tuning varactors in SOT-23, SOT-323, and SOD-323 surface mount packages. This series of varactors is designed for high Q and low voltage operation. Each varactor type has a Q greater than 400 at -2 V.

## 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.

## Configurations

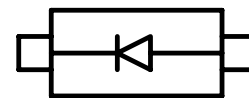
TOP VIEW (SOT-23, SOT-323)



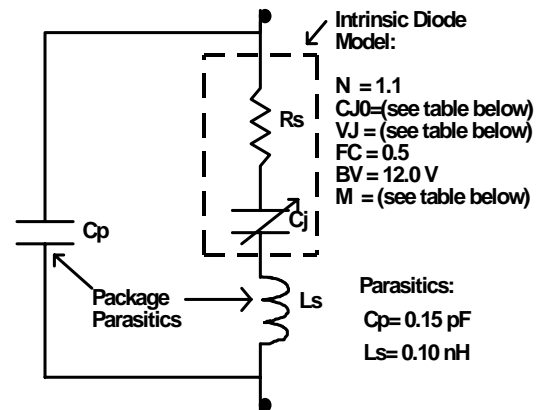
Single

Double

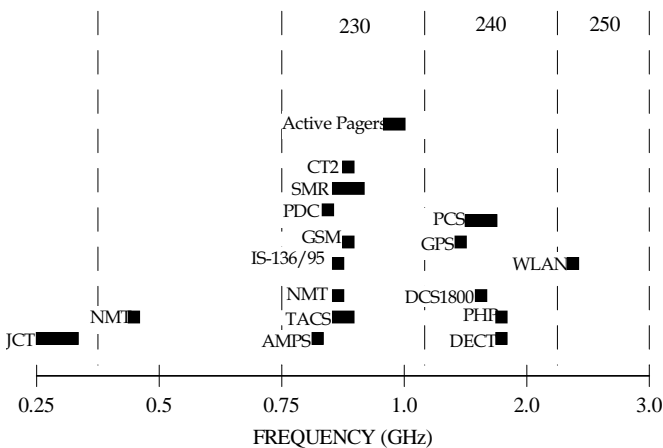
TOP VIEW (SOD-323)



## Spice Model



TYPICAL DEVICE SELECTION by FREQUENCY



Part No.	CJO (pF)	VJ (V)	M
MA4ST230	12.0	4.085	2.228
MA4ST250	8.16	4.930	2.520
MA4ST250	6.19	4.774	2.458



**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

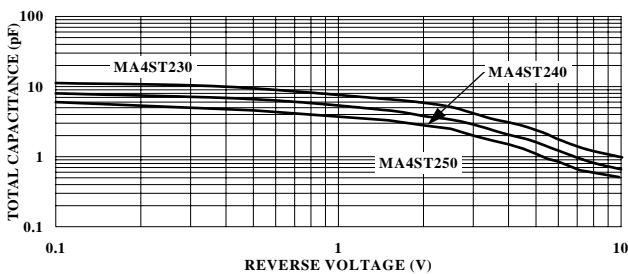
Part Number	$C_T$ (pF) $f = 1 \text{ MHz}, V_R = 2.0\text{V}$			$C_T$ (pF) $f = 1 \text{ MHz}, V_R = 4.0\text{V}$ Max.	Capacitance Ratio $C_{T-0.5}/C_{T-4.0}$ Typ.	Q Factor $f = 50 \text{ MHz}, V_R = 2.0\text{V}$ Min.
	Min.	Nom.	Max.			
MA4ST230	4.5	5.0	6.0	3.1	3.5	400
MA4ST240	3.0	3.5	4.2	2.3	3.5	450
MA4ST250	2.3	2.7	3.5	1.8	3.5	450

**Absolute Maximum Rating**

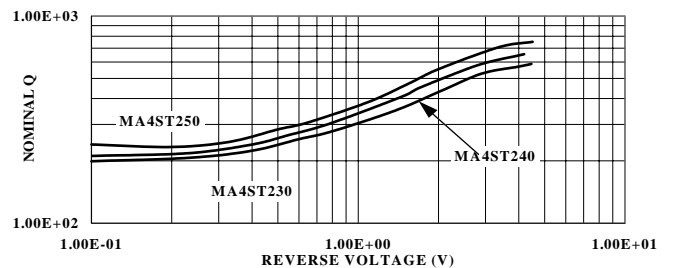
Parameter	Absolute Maximum
Reverse Voltage	12 Volts
Forward Current	50 mA
Total Power Dissipation	250 mW
Junction Operating Temp.	-55°C to +125°C
Storage Temperature	-55°C to +125°C

**Typical Performance Curves**

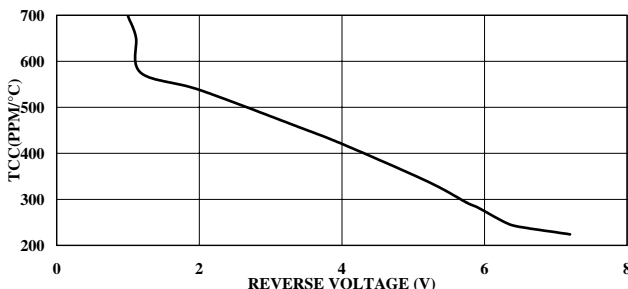
**TOTAL CAPACITANCE vs REVERSE VOLTAGE at 1 MHz**



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



**NOMINAL CHANGE in CAPACITANCE with TEMPERATURE**

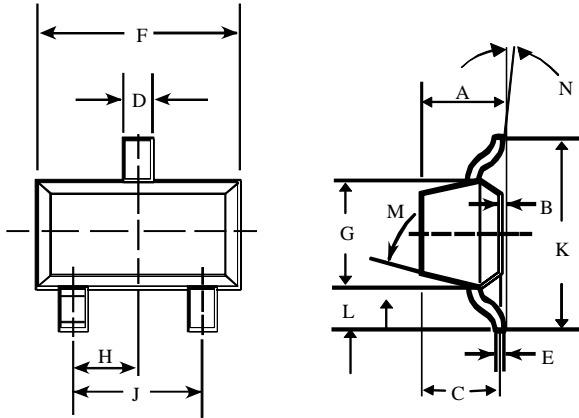


**Ordering Information**

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 SOT-323, 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.

Case Styles

SOT-23  
Case Style 287



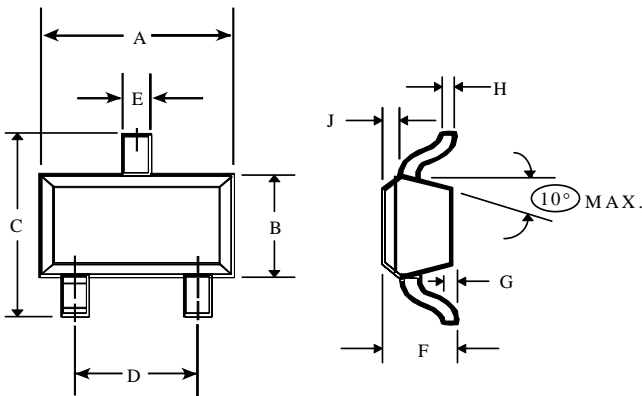
SOT-23 (Case Style 287)

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

DIM.	GRADIENT
M	10° max. <sup>†</sup>
N	2° ... 30°

Note:  
1. Applicable on all sides.

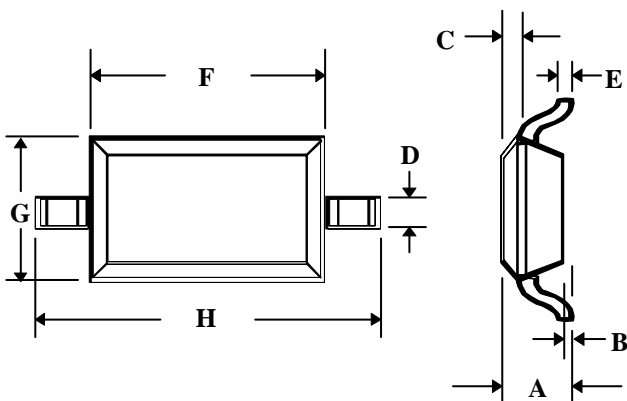
SOT-323  
Case Style 1146



SOT-323 (Case Style 1146)

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.063	0.087	1.6	2.2
B	0.045	0.053	1.15	1.35
C	0.079	0.087	2.0	2.2
D	0.047	0.055	1.2	1.4
E	0.008	0.016	0.2	0.4
F	0.031	0.039	0.8	1.0
G	—	0.004	—	0.1
H	0.003	0.006	0.08	0.15
J	0.004	0.010	0.1	0.25

SOD-323  
Case Style 1141



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