

Silicon Hyperabrupt Varactor Diode Low Voltage / Low Series Resistance

Rev. V9

Features

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

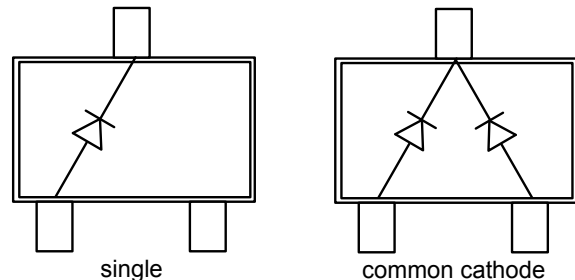
Description and Applications

The MAVR-0013xx series is a highly repeatable, UHCVD / ion-implanted, hyperabrupt silicon tuning varactor. 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.

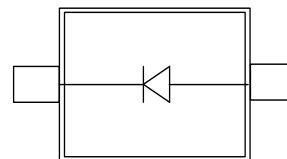
These cost effective surface mount packaged varactors are offered as singles in SC-79 and SOD-323 along with a common cathode version offered in the SC-70, 3 Lead. These diodes are offered with standard 100% matte Sn plating.

Configurations

Top View (SOT-23, SC70 3LD)



Top View (SOD-323, SC-79)



Ordering Information

Part #	Configuration	Package	Package Cp (pF)	Package Ls (nH)
MAVR-001320-12790T	Single	SC-79	0.10	0.6
MAVR-001330-12790T	Single	SC-79	0.10	0.6
MAVR-001340-12790T	Single	SC-79	0.10	0.6
MAVR-001350-12790T	Single	SC-79	0.10	0.6
MAVR-001320-11410T	Single	SOD-323	0.11	1.2
MAVR-001330-11410T	Single	SOD-323	0.11	1.2
MAVR-001340-11410T	Single	SOD-323	0.11	1.2
MAVR-001350-11410T	Single	SOD-323	0.11	1.2
MAVR-001320-1146FT	Common Cathode	SC-70 (3L)	0.12	1.3
MAVR-001330-1146FT	Common Cathode	SC-70 (3L)	0.12	1.3
MAVR-001340-1146FT	Common Cathode	SC-70 (3L)	0.12	1.3
MAVR-001350-1146FT	Common Cathode	SC-70 (3L)	0.12	1.3

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

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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 No. ¹	C_T (pF)				Capacitance Ratio	R_S (Ω)	
	$V_R = 0.5 \text{ V}$			$V_R = 4.0 \text{ V}$	$C_{T0.5} / C_{T3.0}$	$V_R = 2.0 \text{ V}$	
	Min.	Nom.	Max.	Typ.	Typ.	Typ.	Max.
MAVR-001320-xxxxxx	48.0	55.0	63.0	17.0	3.37	0.32	0.50
MAVR-001330-xxxxxx	22.0	25.0	30.0	7.80	3.31	0.45	0.70
MAVR-001340-xxxxxx	15.0	18.0	21.0	5.20	3.40	0.57	0.85
MAVR-001350-xxxxxx	9.5	11.0	13.5	3.60	3.20	0.78	1.00

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

Absolute Maximum Ratings^{4,5}

@ $T_A = +25^\circ\text{C}$ (Unless Otherwise Noted)

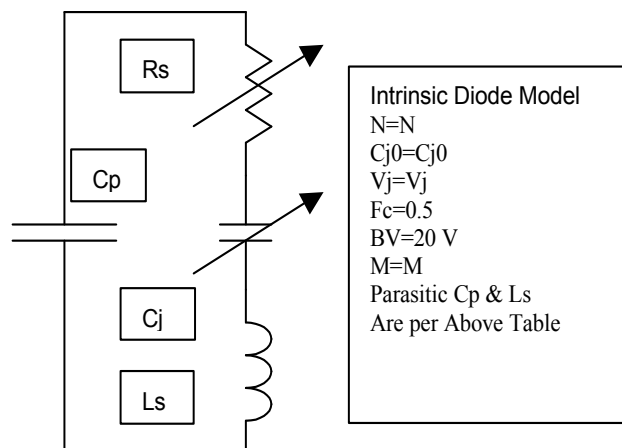
Parameter	Absolute Maximum
Reverse Voltage	12 V
Forward Current	50 mA
Operating Temperature	-55°C to $+125^\circ\text{C}$
Storage Temperature	-55°C to $+125^\circ\text{C}$

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)	MAVR-001320	MAVR-001330	MAVR-001340	MAVR-001350
	C_T (pF)	C_T (pF)	C_T (pF)	C_T (pF)
0.5	55.45	25.4	17.7	11.4
1.0	45.0	20.7	14.4	9.3
1.5	36.3	16.8	11.7	7.6
2.0	28.3	13.2	9.2	5.9
2.5	21.2	10.1	7.0	4.5
3.0	16.4	7.9	5.4	3.4
3.5	13.3	6.4	4.4	2.9
4.0	11.4	5.5	3.8	2.5
4.5	10.0	4.8	3.3	2.2
5.0	9.1	4.4	3.0	2.0

Spice Model



Part Number	N	C_{J_0} (pF)	V_J (V)	M
MAVR-001320	1.1	71.5	20.35	13.21
MAVR-001330	1.1	32.8	20.91	13.72
MAVR-001340	1.1	22.7	22.32	14.72
MAVR-001350	1.1	14.3	25.52	15.87

MAVR-0013xx Series

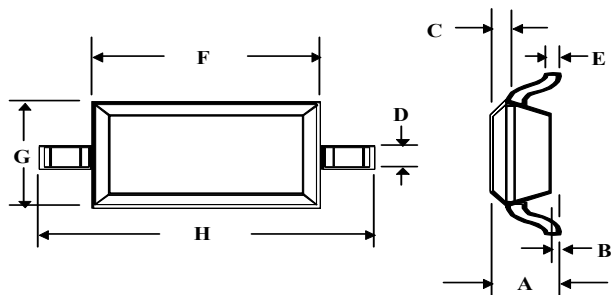


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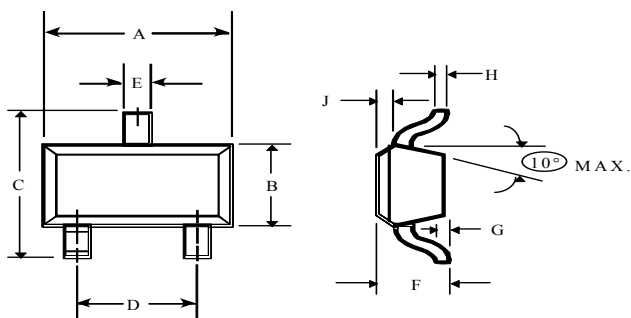
Case Styles

SOD-323 (Case Style 1141)



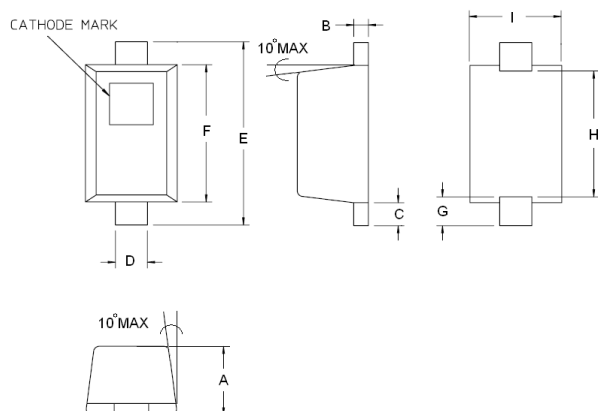
Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	—	0.043	—	1.10
B	—	0.004	—	0.10
C	—	0.008	—	0.20
D	0.010	0.016	0.25	0.41
E	0.003	0.006	0.07	0.15
F	0.063	0.075	1.60	1.90
G	0.045	0.057	1.14	1.45
H	0.091	0.106	2.30	2.70

SC-70, 3 lead (Case Style 1146)



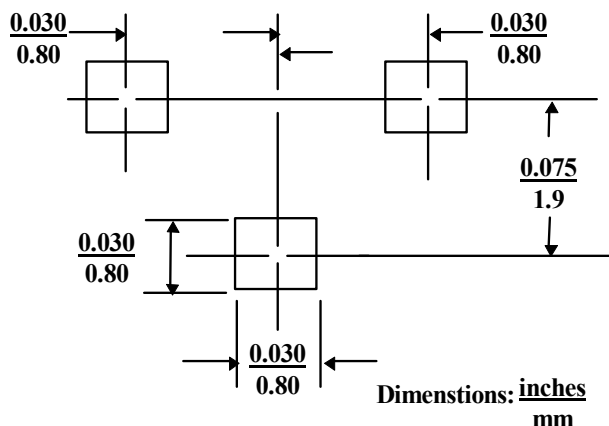
Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.071	0.087	1.80	2.21
B	0.045	0.053	1.14	1.35
C	0.071	0.094	1.80	2.39
D	0.047	0.057	1.19	1.45
E	0.010	0.016	0.25	0.41
F	0.031	0.039	0.79	1.00
G	0.000	0.004	0.00	0.10
H	0.004	0.007	0.10	0.18
J	0.004	0.010	0.10	0.25

SC-79 (Case Style 1279)

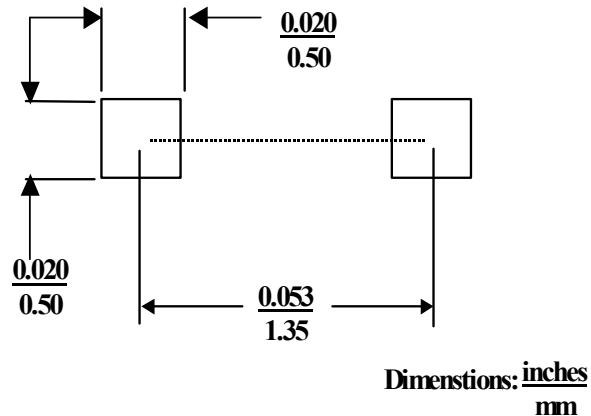


Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.0197	0.0276	0.50	0.70
B	0.003	0.008	0.07	0.20
C	0.006	0.010	0.15	0.25
D	0.010	0.014	0.25	0.35
E	0.059	0.067	1.50	1.70
F	0.043	0.051	1.09	1.30
G	0.0098 nominal		0.250 nominal	
H	0.0433 nominal		1.10 nominal	
I	0.027	0.035	0.68	0.89

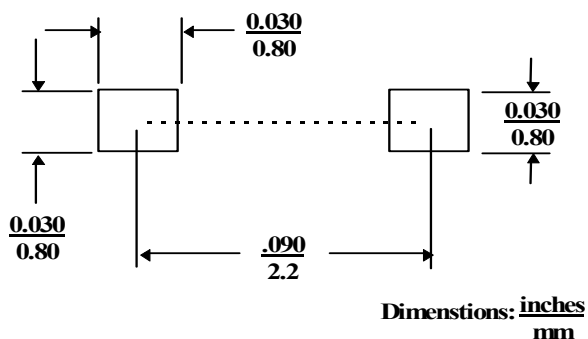
SC-70, 3 Lead (Case Style 1146)



SC-79 (Case Style 1279)



SOD-323 (Case Style 1141)



Mounting Information

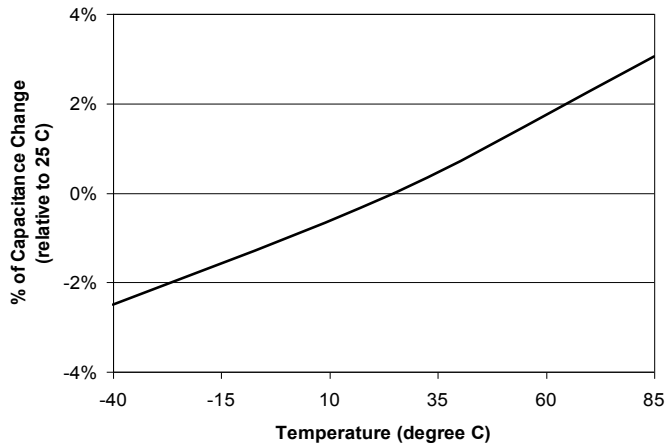
The illustration indicates the recommended mounting pad configuration for the SC-79, SC-70 and SOD-323 packages. Solder paste containing flux should be screened onto the pads to a thickness of 0.005- 0.007 inches. The plastic package is placed in position, firmly adhering to the solder paste.

Permanent attachment is performed by a reflow soldering procedure during which the body temperature does not exceed +260°C.

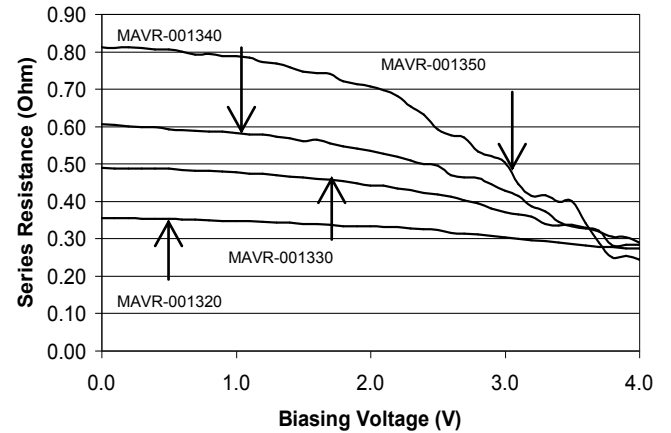
Please refer to Application Note M538 for surface mounting instructions.

Typical Performance Curves

Typical Capacitance Change vs. Temperature



Series Resistance vs Biasing Voltage*



Typical Capacitance vs. Biasing Voltage

