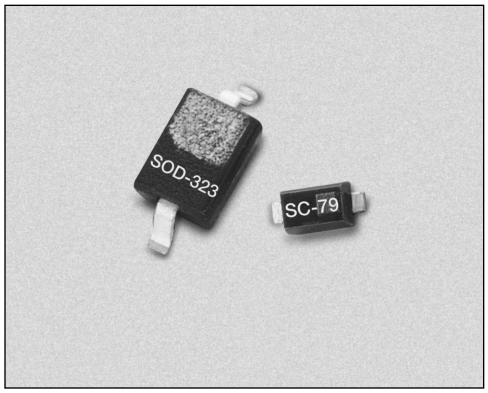
Hyperabrupt Junction Tuning Varactors

Alpha

SMV1142–SMV1148

Features

- Frequency Linear Design
- Low Series Resistance
- Available in the SOD-323 and SC-79 Packages
- Designed for High Volume Commercial Applications
- SPICE Models are Available



Description

The SMV1142–SMV1148 series of silicon hyperabrupt junction varactor diodes are specifically designed with an increasing gamma vs. voltage characteristic. This characteristic will result in improved VCO frequency-voltage linearity, in comparison to a conventional hyperabrupt junction varactor. This family of varactors is characterized for capacitance and resistance over temperature. SPICE models are provided.

Absolute Maximum Ratings

Characteristic	Value
Reverse Voltage (V_R)	12 V
Forward Current (I_F)	20 mA
Power Dissipation (P_D)	250 mW
Storage Temperature (T_{ST})	-55°C to +150°C
Operating Temperature (T_{OP})	-55°C to +125°C

	
Single	Single
SC-79	SOD-323
	♦ **SMV1142-011**
	♦ **SMV1143-011**
	♦ **SMV1144-011**
♦ **SMV1145-079**	♦ **SMV1145-011**
	♦ **SMV1146-011**
	♦ **SMV1147-011**
	♦ **SMV1148-011**
L_S = 0.7 nH	L_S = 1.5 nH

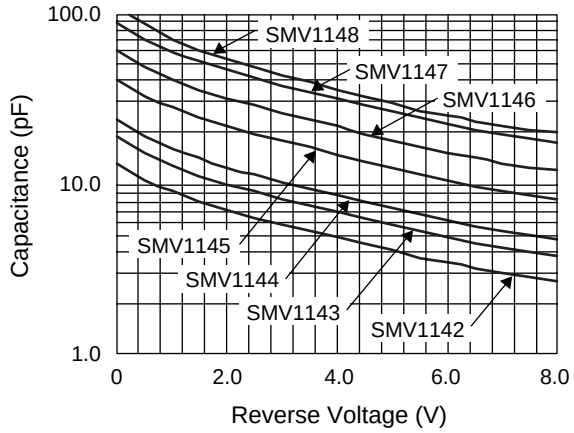
♦ Available through distribution.
For other packages or configurations, please contact the factory.

Electrical Specifications at 25°C

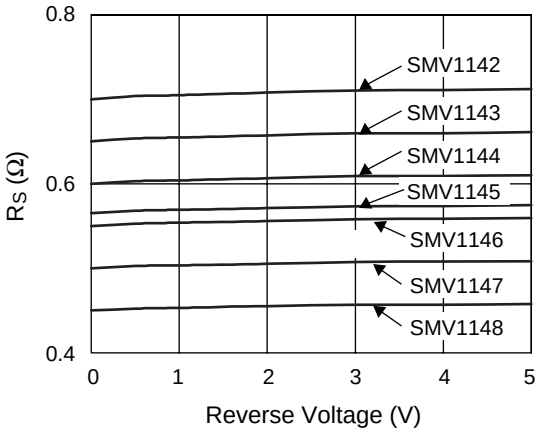
Part Number	C_T @ 1 V (pF)		C_T @ 3 V (pF)	C_T @ 6 V (pF)	$\frac{C_T \text{ @ 1 V}}{C_T \text{ @ 3 V}}$ (Ratio)		$\frac{C_T \text{ @ 1 V}}{C_T \text{ @ 6 V}}$ (Ratio)		R_S @ 3 V 500 MHz (Ω)	Q @ 3 V 50 MHz
	Min.	Max.	Typ.	Typ.	Min.	Max.	Min.	Max.	Max.	Typ.
SMV1142	8.20	10.00	5.8	3.5	1.50	1.65	2.43	2.93	0.70	800
SMV1143	11.60	14.20	8.2	4.9	1.50	1.65	2.45	2.95	0.65	600
SMV1144	14.65	17.95	10.4	6.1	1.50	1.65	2.46	2.96	0.65	500
SMV1145	25.50	31.20	18.1	10.6	1.50	1.65	2.50	3.00	0.60	300
SMV1146	37.80	46.20	26.4	15.5	1.50	1.65	2.50	3.00	0.60	200
SMV1147	54.60	66.70	38.6	22.6	1.50	1.65	2.50	3.00	0.55	150
SMV1148	62.00	76.00	44.1	25.2	1.50	1.65	2.50	3.00	0.50	150

Reverse Voltage V_R (I_R = 10 μA): 12 V
Reverse Current I_R (V_R = 9.6 V): 20 nA

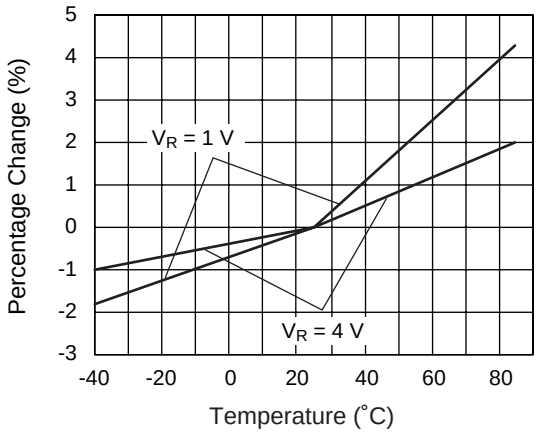
Typical Performance Data



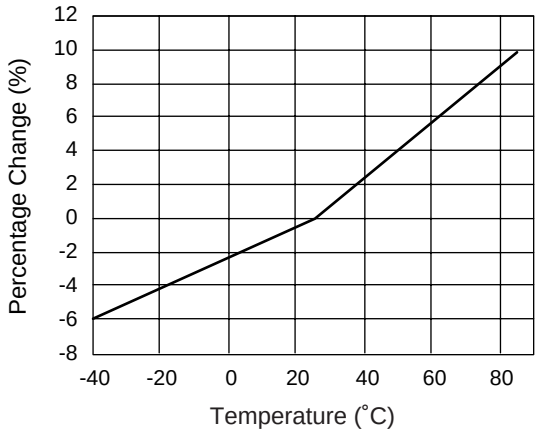
Capacitance vs. Reverse Voltage



Series Resistance vs. Reverse Voltage @ 500 MHz



Relative Capacitance Change vs. Temperature

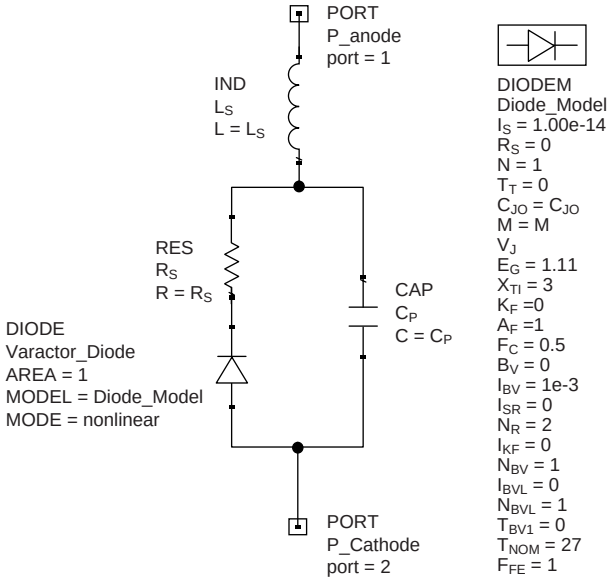


Relative Series Resistance Change vs. Temperature

Typical Capacitance Values

	SMV1142	SMV1143	SMV1144	SMV1145	SMV1146	SMV1147	SMV1148
V_R (V)	C_T (pF)	C_T (pF)	C_T (pF)	C_T (pF)	C_T (pF)	C_T (pF)	C_T (pF)
0.0	13.38	18.99	24.01	41.81	61.13	89.52	104.71
0.5	10.70	15.18	19.18	33.38	48.97	71.44	83.27
1.0	9.10	12.90	16.30	28.35	41.43	60.65	70.48
1.5	7.98	11.30	14.28	24.82	36.26	53.07	61.48
2.0	7.12	10.08	12.73	22.11	32.30	47.27	54.56
2.5	6.42	9.08	11.46	19.91	29.08	42.55	48.92
3.0	5.83	8.24	10.40	18.06	26.37	38.58	44.13
3.5	5.32	7.51	9.48	16.45	24.01	35.12	39.97
4.0	4.86	6.87	8.66	15.02	21.92	32.06	36.29
4.5	4.45	6.29	7.93	13.73	20.04	29.31	32.99
5.0	4.09	5.76	7.26	12.57	18.34	26.81	30.03
5.5	3.75	5.29	6.66	11.53	16.81	24.57	27.43
6.0	3.46	4.87	6.13	10.60	15.45	22.58	25.22
6.5	3.21	4.51	5.68	9.81	14.30	20.89	23.43
7.0	3.00	4.22	5.31	9.17	13.36	19.52	22.06
7.5	2.84	3.99	5.02	8.66	12.62	18.43	21.01
8.0	2.72	3.82	4.80	8.29	12.07	17.63	20.22
8.5	2.63	3.69	4.63	7.99	11.63	16.98	19.61
9.0	2.56	3.58	4.50	7.76	11.30	16.50	19.12
9.5	2.50	3.50	4.40	7.58	11.03	16.10	18.72
10.0	2.45	3.43	4.31	7.43	10.81	15.78	18.38
10.5	2.41	3.37	4.24	7.30	10.62	15.50	18.11
11.0	2.36	3.31	4.15	7.15	10.40	15.18	17.87
11.5	2.35	3.28	4.15	7.10	10.33	15.08	17.65
12.0	2.32	3.25	4.08	7.02	10.21	14.90	17.43

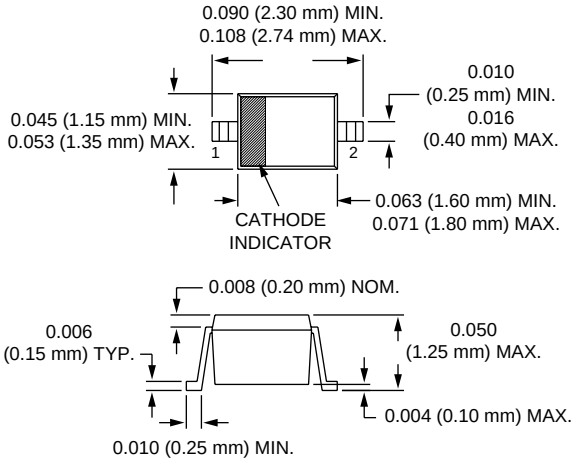
SPICE Model



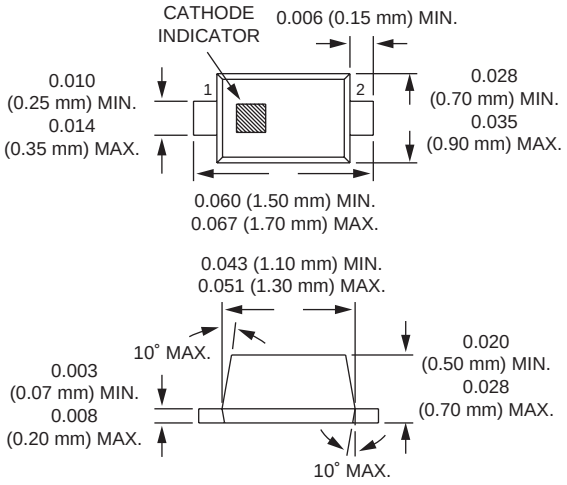
Part Number	C_{JO} (pF)	V_J (V)	M	C_P (pF)	R_S (Ω)
SMV1142	13.38	2.20	1.0	0	0.70
SMV1143	18.99	2.20	1.0	0	0.65
SMV1144	24.01	2.20	1.0	0	0.65
SMV1145	41.80	2.50	1.1	0	0.60
SMV1146	61.13	2.50	1.1	0	0.60
SMV1147	89.52	2.50	1.1	0	0.55
SMV1148	104.70	2.25	1.1	0	0.50

1. Values extracted from measured performance.
2. For package inductance (L_S) refer to package type.
3. For more details refer to the "Varactor SPICE Models for RF VCO Applications" Application Note.

SOD-323


0.090 (2.30 mm) MIN.
0.108 (2.74 mm) MAX.
0.010
(0.25 mm) MIN.
0.045 (1.15 mm) MIN.
0.053 (1.35 mm) MAX.
0.016
(0.40 mm) MAX.
1
2
CATHODE
INDICATOR
0.063 (1.60 mm) MIN.
0.071 (1.80 mm) MAX.
0.008 (0.20 mm) NOM.
0.006
(0.15 mm) TYP.
0.050
(1.25 mm) MAX.
0.004 (0.10 mm) MAX.
0.010 (0.25 mm) MIN.

SC-79


CATHODE
INDICATOR
0.006 (0.15 mm) MIN.
0.010
(0.25 mm) MIN.
0.014
(0.35 mm) MAX.
1
2
0.028
(0.70 mm) MIN.
0.035
(0.90 mm) MAX.
0.060 (1.50 mm) MIN.
0.067 (1.70 mm) MAX.
0.043 (1.10 mm) MIN.
0.051 (1.30 mm) MAX.
10˚ MAX.
0.020
(0.50 mm) MIN.
0.003
(0.07 mm) MIN.
0.008
(0.20 mm) MAX.
0.028
(0.70 mm) MAX.
10˚ MAX.