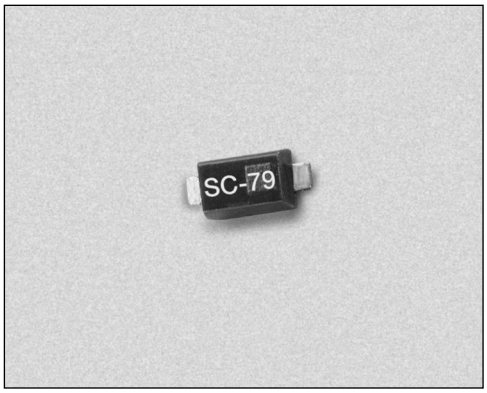
Hyperabrupt Junction Tuning Varactor

SKYWORKS

SMV1705 Series

Features

- Designed for High Volume, Low Cost Battery Applications
- Low Series Resistance
- High Capacitance Ratio
- Available Lead (Pb)-Free MSL-1 @ 250°C per JEDEC J-STD-020
- Ultra Small Size SC-79 Package
- Available in Tape and Reel Packaging



Description

The SMV1705 series are silicon hyperabrupt junction varactor diodes specifically designed for battery operation. The specified high capacitance ratio and low R_S of these varactors make them appropriate for low noise VCOs used at frequencies in wireless systems to beyond 2.5 GHz. Applications include low noise and wideband UHF and VHF VCO for GSM, PCS, CDMA and analog phones.

NEW Lead (Pb)-Free "environmentally friendly" packaging available: Skyworks offers the SMV1705-079LF Lead (Pb)-Free package as a green alternative.

Absolute Maximum Ratings

Characteristic	Value
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

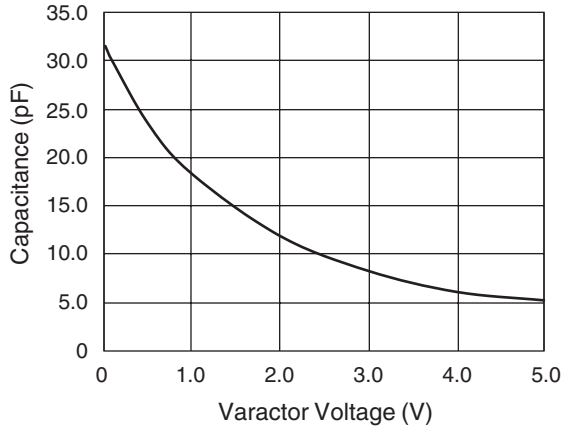
Single
SC-79
SMV1705-079
SMV1705-079LF
L_S = 0.7 nH

LF denotes Lead (Pb)-Free packaging.

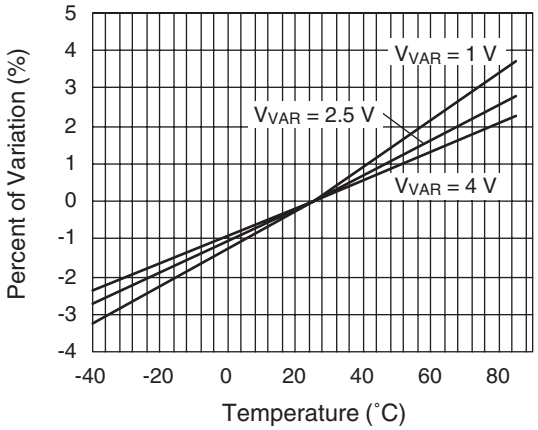
Electrical Specifications at 25°C

Parameter	Condition	Min.	Typ.	Max.	Unit
Reverse Current (I_R)	V_R = 8 V		< 0.01	20.0	nA
Capacitance (C_T)	V_R = 1 V, F = 1 MHz	17.3	18.30	19.3	pF
Capacitance (C_T)	V_R = 4 V, F = 1 MHz	5.3	6.10	6.6	pF
Capacitance Ratio (C_{TR})	C_T (1 V)/C_T (4 V)	2.8	3.00		
Series Resistance (R_S)	V_R = 1 V, F = 470 MHz		0.32		Ω
Breakdown Voltage (V_{BR})	I_R = 10 µA	12.0			V

Typical Performance Data



Capacitance vs. Voltage

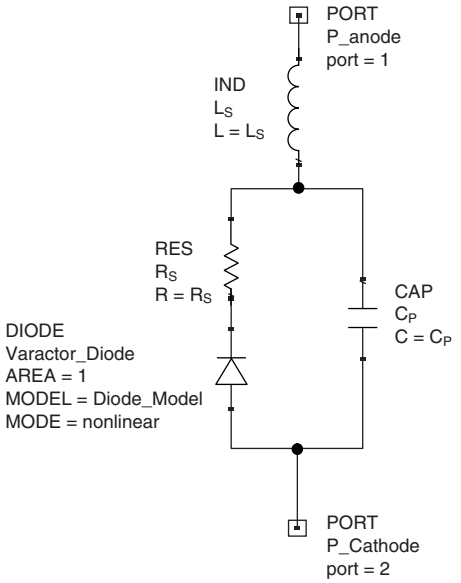


Relative Capacitance Change vs. Temperature

Capacitance vs. Voltage

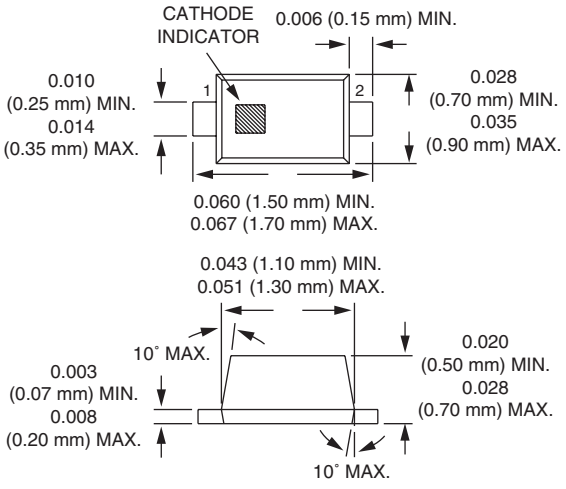
V_R (V)	C_T (pF)
0.0	31.5
0.5	23.5
1.0	18.3
1.5	14.3
2.0	11.9
2.5	9.7
3.0	8.3
3.5	7.1
4.0	6.1
4.5	5.5
5.0	5.2

SPICE Model



Part Number	C_{JO} (pF)	V_J (V)	M	C_P (pF)	R_S (Ω)	L_S (nH)
SMV1705	31	3	2	0.5	0.32	0.8

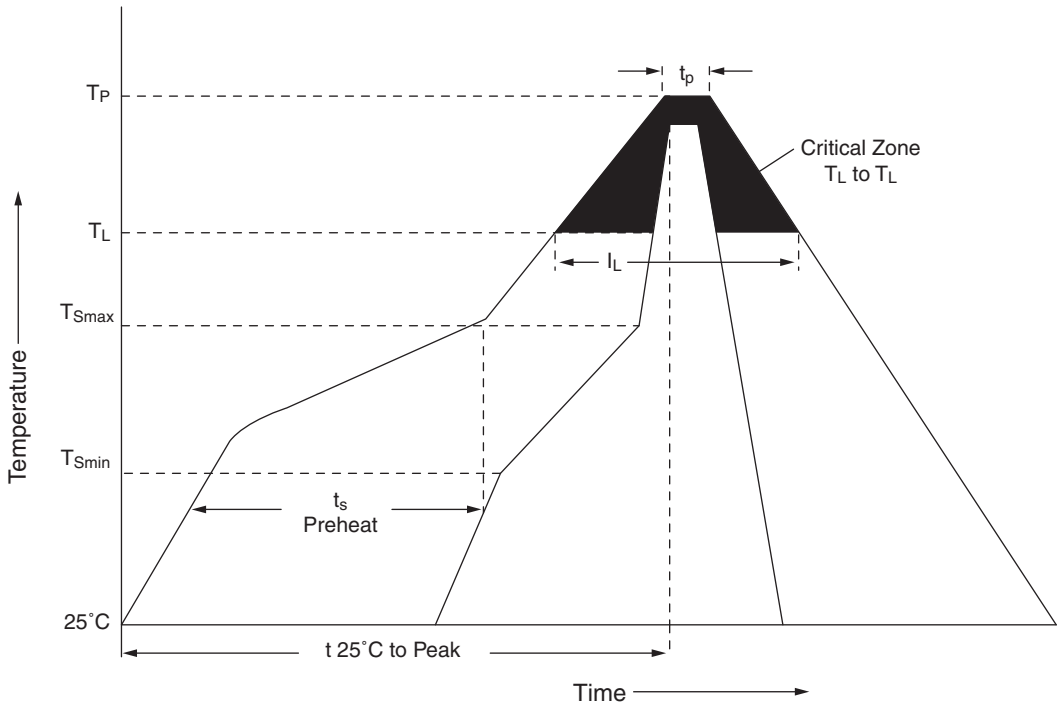
SC-79



Recommended Solder Reflow Profiles

Profile Feature	SnPb Eutectic Assembly	Lead (Pb)-Free Assembly 100% Sn
Average Ramp-Up Rate (T_L to T_P)	3°C/Second Max.	3°C/Second Max.
Preheat Temperature Min. (T_{Smin}) Temperature Max. (T_{Smax}) Time (Min. to Max.) (ts)	 100°C 150°C 60–120 Seconds	 150°C 200°C 60–80 Seconds
T_{Smax} to T_L Ramp-up Rate	 —	 3°C/Second Max.
Time Maintained Above: Temperature (T_L) Time (t_L)	 183°C 60–150 Seconds	 217°C 60–150 Seconds
Peak Temperature (T_P)	240 +0/-5°C	250 +0/-5°C
Time Within 5°C of Actual Peak Temperature (tp)	10–30 Seconds	20–40 Seconds
Ramp-Down Rate	6°C/Second Max.	6°C/Second Max.
Time 25°C to Peak Temperature	6 Minutes Max.	8 Minutes Max.

All temperatures refer to the topside of the package, measured on the package body surface.
Reference JEDEC J-STD-020B.



Reference JEDEC J-STD-020