

DATA SHEET

SMV1493-079LF and SMV1494-079LF Plastic Packaged Abrupt Junction Tuning Varactors

Applications

- High-Q resonators in wireless system VCOs
- High volume commercial systems



Features

- High Q
- Low series resistance for low phase noise
- Ultra-small SC-79 package (MSL1, 260 °C per JEDEC J-STD-020)




Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

Description

The SMV1493-079LF and SMV1494-079LF silicon abrupt junction varactor diodes are designed for use in Voltage Controlled Oscillators (VCOs) requiring tight capacitance tolerances. The low resistance of these varactors makes them appropriate for high-Q resonators in wireless system VCOs to frequencies above 2.5 GHz. Table 1 describes the SC-79 package and markings of the SMV1493/SMV1494-079LF varactors.

Table 1. Packaging and Marking


Single
SC-79 Green™
SMV1493-079LF Marking: Cathode
SMV1494-079LF Marking: Cathode
Ls = 0.7 nH



The Pb-free symbol or "LF" in the part number denotes a lead-free, RoHS-compliant package unless otherwise noted as Green™. Tin/lead (Sn/Pb) packaging is not recommended for new designs.

Table 2. SMV1405-SMV1413 Series Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
Reverse voltage	V _R			15	V
Forward current	I _F			20	mA
Power dissipation	P _{DIS}			250	mW
Operating temperature	T _{OP}	-55		+125	°C
Storage temperature	T _{STG}	-55		+150	°C

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

CAUTION: Although this device is designed to be as robust as possible, Electrostatic Discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times. The SMV1493-079LF and SMV1494-079LF varactors are Class 0 Human Body Model (HBM) ESD devices.

Table 3. SMV1493-079LF and SMV1494-079LF Electrical Specifications (Note 1)
(T_{OP} = 25 °C, Unless Otherwise Noted)

Part Number	C _T @ 1 V (pF)		C _T @ 4 V (pF)		Rs @ 1 V, 500 MHz (Ω)
	Min.	Max.	Min.	Max.	Max.
SMV1493	17.4	20.0	10.0	12.1	0.50
SMV1494	36.3	41.7	20.7	25.3	0.45

Note 1: Performance is guaranteed only under the conditions listed in this Table.

Reverse voltage V_R (I_R = 10 μA) = 12 V minimum
Reverse current I_R (V_R = 10 V) = 20 nA maximum

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1493-079LF and SMV1494-079LF varactors are provided in Table 2. Electrical specifications are provided in Table 3. Typical capacitance values are listed in Table 4. Typical capacitance vs reverse voltage performance for the SMV1494-079LF and SMV1494-079LF varactors is illustrated in Figure 1.

The SPICE model for the SMV1493-079LF and SMV1494-079LF varactors is shown in Figure 2 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figure 3, and tape and reel dimensions are provided in Figure 4.

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SMV1493-079LF and SMV1494-079LF varactors are rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. They can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.

Table 4. Capacitance vs Reverse Voltage

V _R (V)	C _T (pF)	
	SMV1493-079LF	SMV1494-079LF
0	28.7	57.8
0.2	25.6	51.5
0.4	23.3	46.9
0.6	21.5	43.4
0.8	20.1	40.5
1.0	19.0	38.4
1.2	17.9	36.3
1.4	17.0	34.6
1.6	16.2	33.0
1.8	15.5	31.6
2.0	15.0	30.6
2.2	14.4	29.5
2.4	13.9	28.5
2.6	13.5	27.6
2.8	13.1	26.7
3.0	12.7	26.1
3.2	12.4	25.3
3.4	12.0	24.7
3.6	11.7	24.1
3.8	11.4	23.5
4.0	11.2	23.1
4.2	10.9	22.6
4.4	10.7	22.1
4.6	10.5	21.7
4.8	10.3	21.3
5.0	10.1	20.9
6.0	9.2	19.2
7.0	8.5	17.9
8.0	8.0	16.7
9.0	7.6	15.7
10.0	7.1	14.7

Typical Performance Characteristics

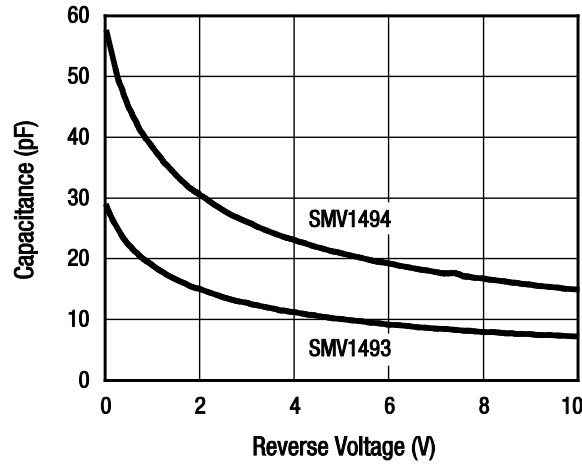


Figure 1. Capacitance vs Reverse Voltage

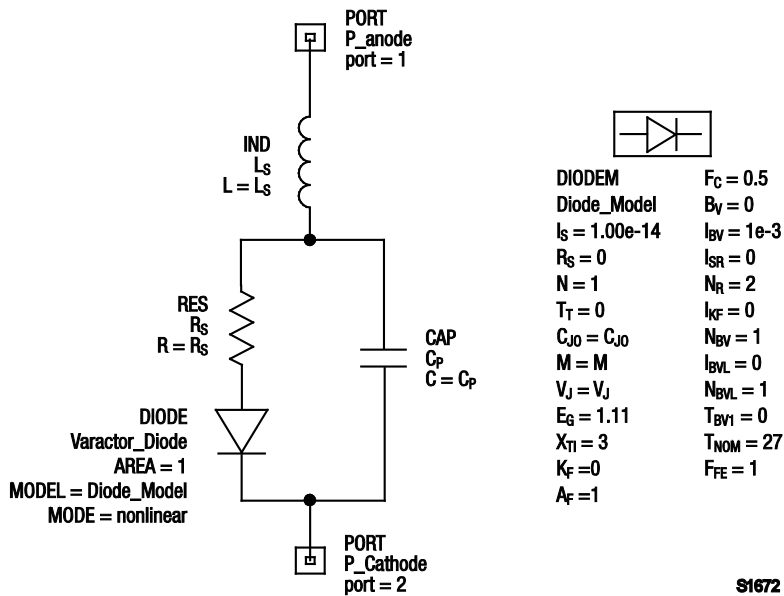


Figure 2. SPICE Model

Table 5. SPICE Model Parameters

Part Number	Cj0 (pF)	Vj (V)	M	Cp (pF)	Rs (Ω)
SMV1493	28.66	0.88	0.55	0	0.50
SMV1494	57.70	0.83	0.52	0	0.45

Values extracted from measured performance.

For package inductance, Ls, refer to Table 1.

For more details, refer to the Skyworks Application Note, *Varactor SPICE Model for Approved RF VCO Applications*, document number 200315.

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