

DATA SHEET

# SMV1145-079LF: Hyperabrupt Junction Tuning Varactor

## Applications

- High volume commercial systems

## Features

- Frequency linear design
- Low series resistance
- Package is rated 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 SMV1145-079LF silicon hyperabrupt junction varactor diode is specifically designed with an increasing gamma versus voltage characteristic. This results in improved voltage-controlled oscillator (VCO) frequency-voltage linearity compared to a conventional hyperabrupt junction varactor.

The SMV1145-079LF varactor is characterized for capacitance and resistance over temperature.

Table 1 describes the package and marking of the SMV1145-079LF varactor.

**Table 1. Packaging and Marking**


Single
SC-79 Green™
<b>SMV1145-079LF</b> 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.

### Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1145-079LF varactor are provided in Table 2. Electrical specifications are provided in Table 3. Typical performance characteristics for the SMV1145-079LF varactor are illustrated in Figures 1 through 4. Table 4 summarizes the capacitance of the SMV1145-079LF for reverse voltages between 0 and 12 V.

The SPICE model for the SMV1145-079LF varactor is shown in Figure 5 and the associated model parameters are provided in Table 5.

Package dimensions are provided in Figure 6. Tape and reel dimensions are provided in Figure 7.

### 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 SMV1145-079LF varactor is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It 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 2. SMV1145-079LF Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Minimum	Typical	Maximum	Units
Reverse voltage	V <sub>R</sub>			12	V
Forward current	I <sub>F</sub>			20	mA
Power dissipation	P <sub>DIS</sub>			250	mW
Operating temperature	T <sub>OP</sub>	-55		+125	°C
Storage temperature	T <sub>STG</sub>	-55		+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 0	ESD			< 250	V

**Note 1:** 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.

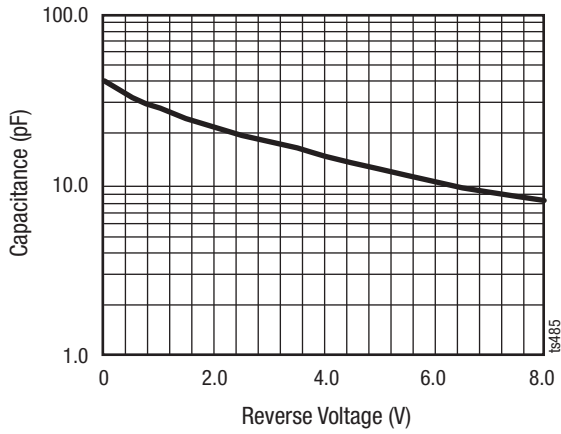
**Table 3. SMV1145-079LF Electrical Specifications (Note 1) (Note 2)**  
(T<sub>OP</sub> = 25 °C, Unless Otherwise Noted)

Part Number	C <sub>T</sub> @ 1 V (pF)		C <sub>T</sub> @ 3 V (pF)	C <sub>T</sub> @ 6 V (pF)	C <sub>T</sub> @ 1 V / C <sub>T</sub> @ 3 V Ratio (pF)		C <sub>T</sub> @ 1 V / C <sub>T</sub> @ 6 V Ratio (pF)		R <sub>S</sub> @ 3 V, 500 MHz (Ω)	Q @ 3 V, 50 MHz
	Min.	Max.	Typ.	Typ.	Min.	Max.	Min.	Max.	Max.	Typ.
SMV1145-079LF	25.50	31.2	18.1	10.6	1.50	1.65	2.50	3.00	0.60	300

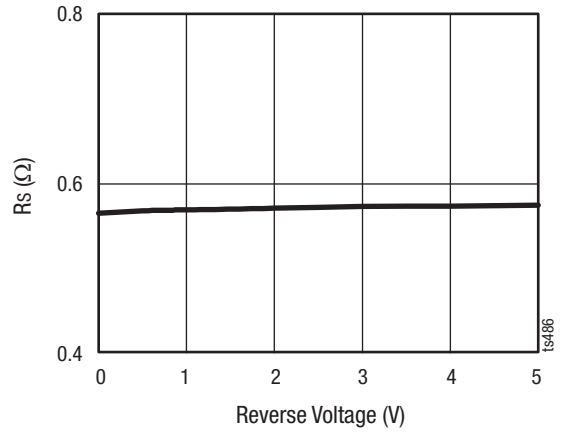
**Note 1:** Performance is guaranteed only under the conditions listed in this table.

**Note 2:** Reverse voltage, V<sub>R</sub> (I<sub>R</sub> = 10 μA): 12 V minimum.  
Reverse current, I<sub>R</sub> (V<sub>R</sub> = 9.6 V): 20 nA maximum.

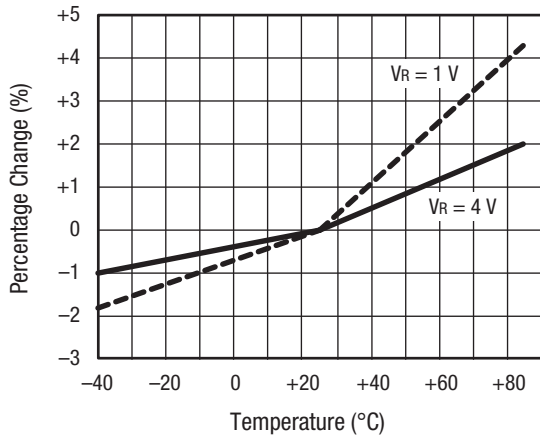
### Typical Performance Characteristics



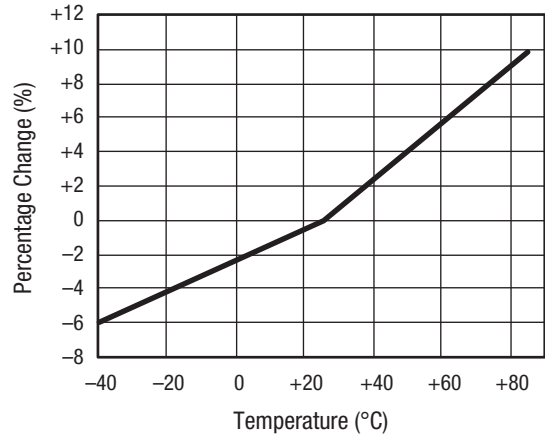
**Figure 1. Capacitance vs Reverse Voltage**



**Figure 2. Series Resistance vs Reverse Voltage @ 500 MHz**



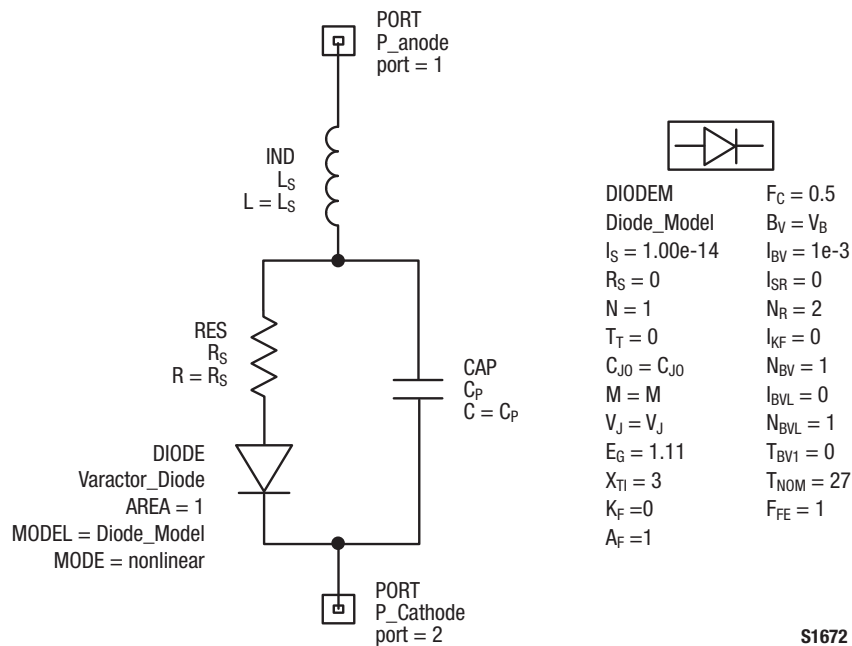
**Figure 3. Relative Capacitance Change vs Temperature**



**Figure 4. Relative Series Resistance Change vs Temperature**

**Table 4. Capacitance vs Reverse Voltage**

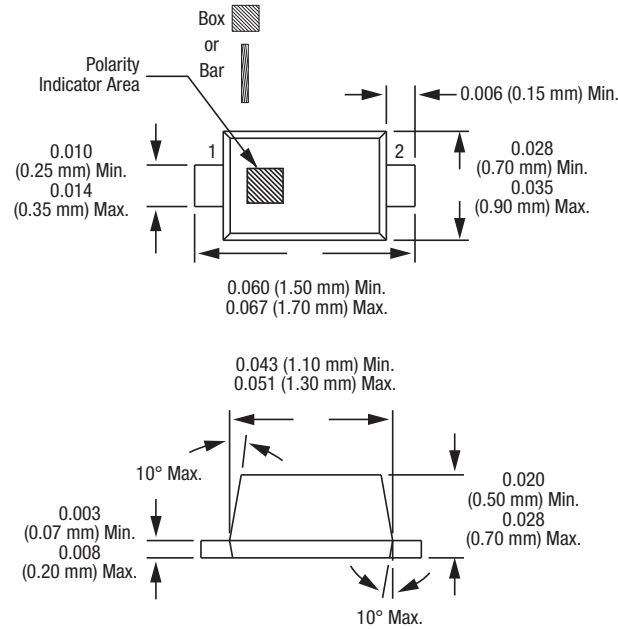
V <sub>R</sub> (V)	C <sub>T</sub> (pF)	V <sub>R</sub> (V)	C <sub>T</sub> (pF)
0	41.81	6.5	9.81
0.5	33.38	7.0	9.17
1.0	28.35	7.5	8.66
1.5	24.82	8.0	8.29
2.0	22.11	8.5	7.99
2.5	19.91	9.0	7.76
3.0	18.06	9.5	7.58
3.5	16.45	10.0	7.43
4.0	15.02	10.5	7.30
4.5	13.73	11.0	7.15
5.0	12.57	11.5	7.10
5.5	11.53	12.0	7.02
6.0	10.60		



**Figure 5. SPICE Model**

**Table 5. SPICE Model Parameters**

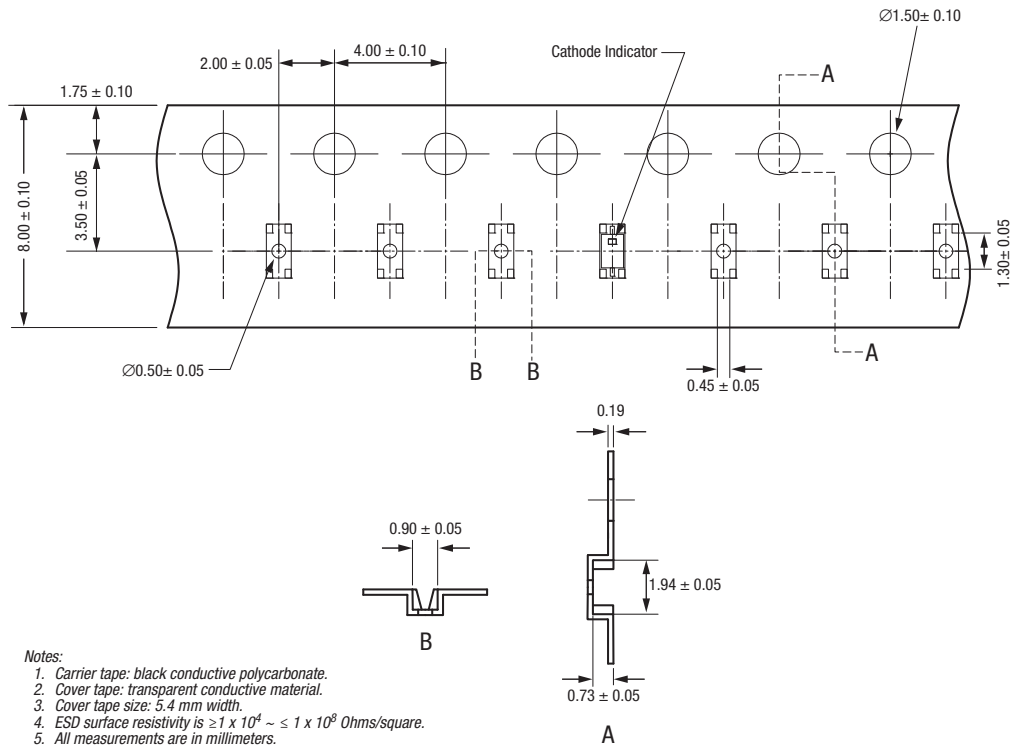
Part Number	C <sub>J0</sub> (pF)	V <sub>J</sub> (V)	V <sub>B</sub> (V)	M	C <sub>P</sub> (pF)	R <sub>s</sub> (Ω)
SMV1145-079LF	41.80	2.50	12	1.10	0	0.60



Dimensions are in inches (millimeters shown in parentheses)

S1652

Figure 6. SC-79 Package Dimensions



Notes:

1. Carrier tape: black conductive polycarbonate.
2. Cover tape: transparent conductive material.
3. Cover tape size: 5.4 mm width.
4. ESD surface resistivity is  $\geq 1 \times 10^4 \sim 1 \times 10^8$  Ohms/square.
5. All measurements are in millimeters.
6. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.

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Figure 7. SC-79 Tape and Reel Dimensions

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