

DATA SHEET

# SMV1245 Series Hyperabrupt Junction Tuning Varactors

## Applications

- Wideband RF and microwave VCOs

## Features

- High tuning ratio
- Low series resistance
- Designed for high volume, low-cost applications
- SC-79 and SOD-323 packages (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 SMV1245 series of surface mount varactor diodes is designed for very low series resistance applications such as RF and microwave VCOs.

The SMV1245 series packaging options are defined in Table 1. The absolute maximum ratings of the SMV1245 series of varactors are provided in Table 2. Electrical specifications are specified in Table 3. Figure 1 shows the typical performance of capacitance versus reverse voltage. The SPICE model for the SMV1245 series is shown in Figure 2 and the associated model parameters are provided in Table 4. The relationship between voltage and capacitance for the SMV1245 series is shown in Table 5.

**Table 1. Packaging and Marking**

	
Single	Single
SOD-323 Green™	SC-79 Green™
<b>SMV1245-011LF</b> Marking: HL	<b>SMV1245-079LF</b> Marking: Cathode
Ls = 1.5 nH	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. SMV1245 Series Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Units
Power dissipation	P <sub>DIS</sub>		250	mW
Forward current	I <sub>F</sub>		20	mA
Operating temperature	T <sub>OP</sub>	-55	+125	°C
Storage temperature	T <sub>STG</sub>	-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.

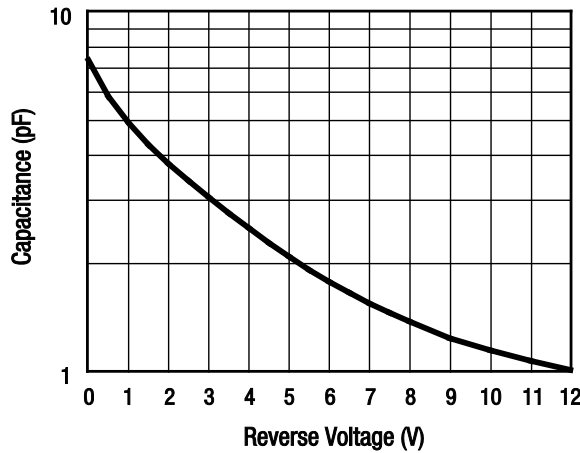
**CAUTION:** Although these devices are designed to be as robust as possible, Electrostatic Discharge (ESD) can damage them. These devices must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times. The SMV1245 series of varactors are Class 0 Human Body Model (HBM) ESD devices.

**Table 3. SMV1245 Series Electrical Specifications (Note 1)**  
(T<sub>OP</sub> = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse leakage current	I <sub>R</sub>	V <sub>R</sub> = 20.8 V			50	nA
Reverse breakdown voltage	V <sub>BR</sub>	I <sub>R</sub> = 10 μA	26			V
Capacitance	C <sub>T</sub>	V <sub>R</sub> = 1 V, f = 1 MHz	4.4	4.9	5.4	pF
Capacitance ratio	C <sub>TR</sub>	C <sub>T</sub> (1 V)/C <sub>T</sub> (3 V) C <sub>T</sub> (1 V)/C <sub>T</sub> (9 V)	1.47 3.50		1.76 4.20	- -
Series resistance	R <sub>S</sub>	V <sub>R</sub> = 1 V, f = 500 MHz		1.6	2.0	Ω

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

**Typical Performance Characteristics**



**Figure 1. Capacitance vs Reverse Voltage @ 25 °C**

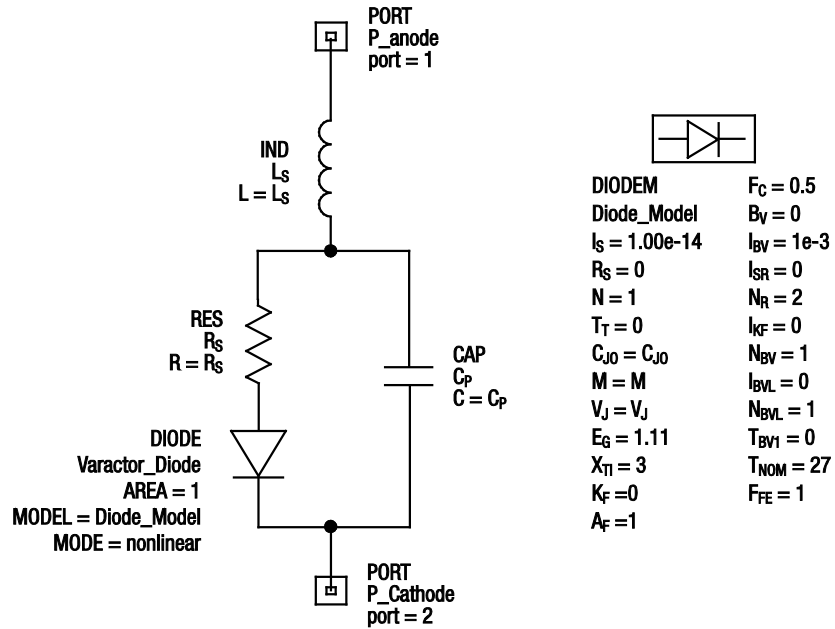


Figure 2. SPICE Model

Table 4. SPICE Model Parameters

Part Number	C <sub>J0</sub> (pF)	V <sub>J</sub> (V)	M	C <sub>P</sub> (pF)	R <sub>S</sub> (Ω)	L <sub>S</sub> (nH)
SMV1245-011LF	6.9	3.5	1.7	0.47	2	1.5
SMV1245-079LF	6.9	3.5	1.7	0.47	2	0.7

**Table 5. Capacitance vs Reverse Voltage**

Voltage (V <sub>R</sub> ) (V)	Typical Capacitance (C <sub>T</sub> ) (pF)
0	7.37
0.5	5.84
1.0	4.93
1.5	4.28
2.0	3.79
2.5	3.40
3.0	3.06
3.5	2.76
4.0	2.51
4.5	2.28
5.0	2.09
5.5	1.92
6.0	1.78
6.5	1.66
7.0	1.55
7.5	1.46
8.0	1.38
8.5	1.32
9.0	1.26
9.5	1.20
10.0	1.16
10.5	1.12
11.0	1.08
11.5	1.05
12.0	1.02

**Package and Handling Information**

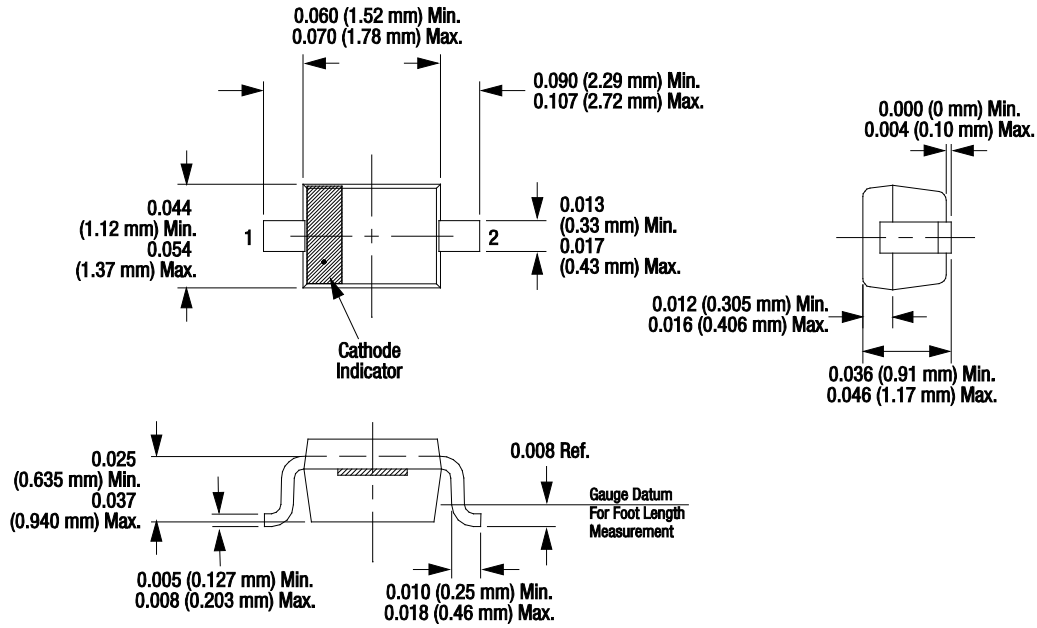
Package dimensions for the SMV1245 series of varactors are shown in Figures 3 and 5, and tape and reel dimensions are provided in Figures 4 and 6.

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 SMV1245 series 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.

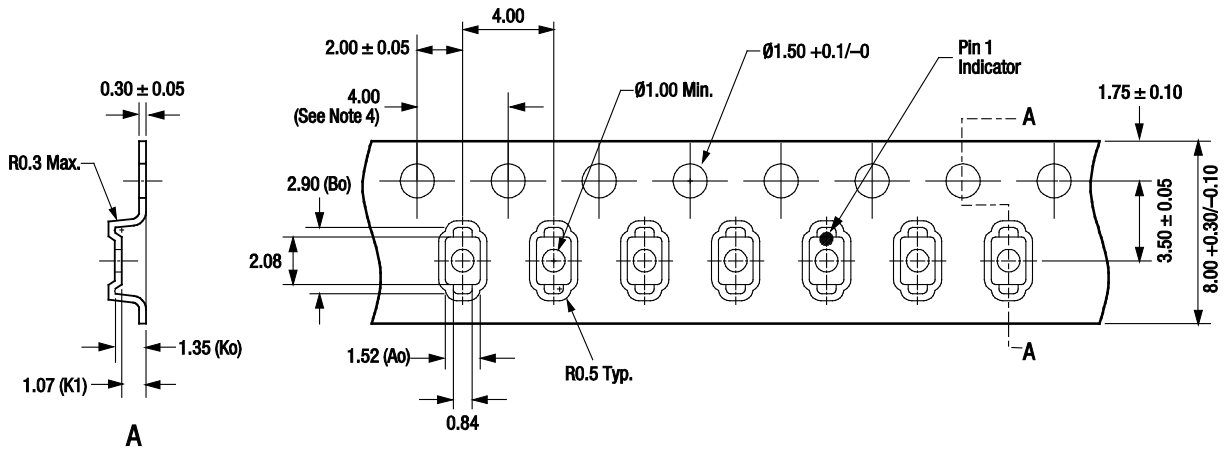
Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



Dimensions are in inches (millimeters shown in parentheses)

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Figure 3. SMV1245-011LF SOD-323 Package Dimensions

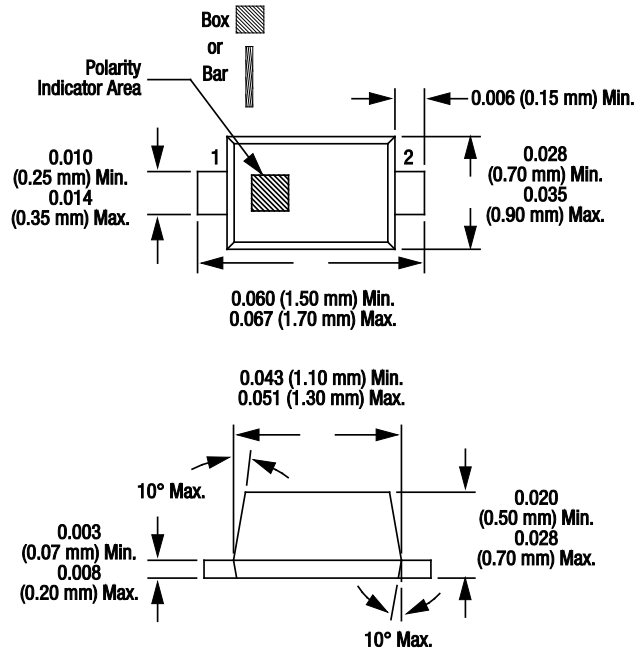


Notes:

1. Carrier tape: black conductive polystyrene.
2. Cover tape: transparent conductive PSA.
3. Cover tape size: 5.4 mm width.
4. 10 sprocket hole pitch cumulative tolerance: ±0.20 mm.
5. All measurements are in millimeters.

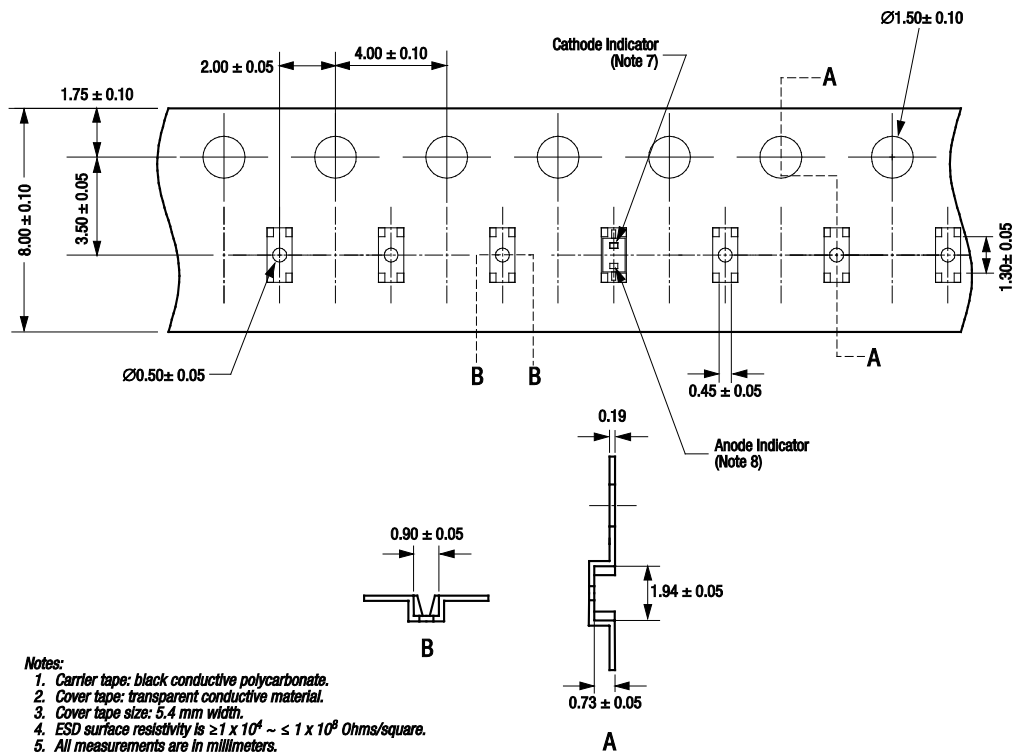
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Figure 4. SOD-323 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) S1652

Figure 5. SMV1245-079LF 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  $\geq 1 \times 10^4 \sim \leq 1 \times 10^8$  Ohms/square.
  5. All measurements are in millimeters.
  6. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.
  7. Cathode indicator for all devices except for the SMS7630-079LF.
  8. Anode indicator for the SMS7630-079LF only.

S2188

Figure 6. SC-79 Tape and Reel Dimensions

**Ordering Information**

Model Name	Manufacturing Part Number
SMV1245 Series Hyperabrupt Junction Tuning Varactors	SMV1245-011LF SMV1245-079LF

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