DATA SHEET

SMV1129-079LF and SMV1139-011LF: Hyperabrupt Junction Tuning Varactors

Applications

- Low phase noise VCOs
- High-Q tuning elements in wireless system LOs

Features

- High-Q
- Low series resistance for low phase noise
- Packages 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 SMV1129-079LF and SMV1139-011LF silicon hyperabrupt junction varactors are designed for use in low phase noise Voltage Controlled Oscillators (VCOs) that require low series resistance tuning diodes. The low series resistance of these varactors makes them appropriate for use within tunable high-Q resonant circuits in wireless system Local Oscillators (LOs) to frequencies beyond 2.5 GHz.

Table 1 describes the various packages and markings of the SMV1129 and SMV1139 varactors.

Table 1. Packaging and Marking

	
Single	Single
SOD-323 Green™	SC-79 Green™
SMV1139-011LF Marking: HG	**SMV1129-079LF** Marking: Cathode
L_S = 1.5 nH	L_S = 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. SMV1129 and SMV1139 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
Reverse voltage (I_R = 10 μA)	V_R			12	V
Reverse current (V_R = 10 V)	I_R			20	nA
Power dissipation	P_{DIS}			250	mW
Forward current	I_F			20	mA
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 SMV1129 and SMV1139 varactors are Class 0 Human Body Model (HBM) ESD devices.*

Table 3. SMV1129 and SMV1139 Electrical Specifications (Note 1)
(T_{OP} = 25 °C, Unless Otherwise Noted)

Part Number	C_T @ 1 V (pF)			$\frac{C_T \text{ @ 1 V}}{C_T \text{ @ 3 V}}$ Ratio (pF)		$\frac{C_T \text{ @ 1 V}}{C_T \text{ @ 6 V}}$ Ratio (pF)		R_S @ 1 V, 500 MHz (Ω)
	Minimum	Typical	Maximum	Minimum	Typical	Minimum	Typical	Maximum
SMV1129-079LF	17.5	19.0	20.5	1.40	1.53	2.0	2.5	0.4
SMV1139-011LF	4.95	5.40	5.85	1.40	1.53	2.0	2.5	0.6

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1129 and SMV1139 are provided in Table 2. Electrical specifications are provided in Table 3. Figure 1 shows the typical performance of capacitance versus reverse voltage for the SMV1129 and SMV1139 and Table 4 summarizes the capacitance of both parts for reverse voltages between 0 and 12 V.

The SPICE model for the SMV1129 and SMV1139 is shown in Figure 2 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figures 3 and 5. Tape and reel dimensions are shown in Figures 4 and 6.

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 SMV1129 and SMV1139 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.

Typical Performance Characteristics

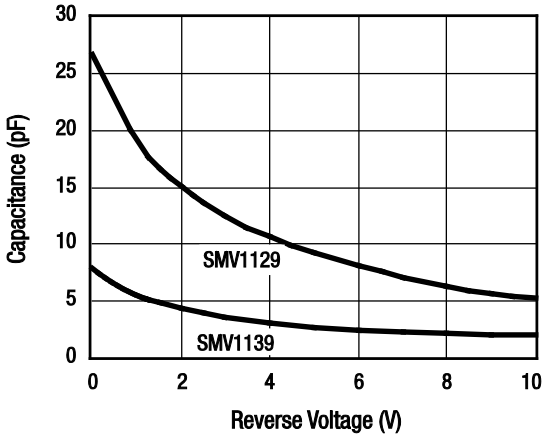

Figure 1. Capacitance vs Reverse Voltage

Table 4. Capacitance vs Reverse Voltage

V_R (V)	SMV1129	SMV1139
	C_T (pF)	C_T (pF)
0	27.5	8.0
1	18.9	5.5
2	15.0	4.4
3	12.5	3.7
4	10.7	3.1
5	9.3	2.7
6	8.1	2.5
7	7.1	2.3
8	6.3	2.2
9	5.7	2.1
10	5.2	2.0
11	4.9	2.0
12	4.7	1.9

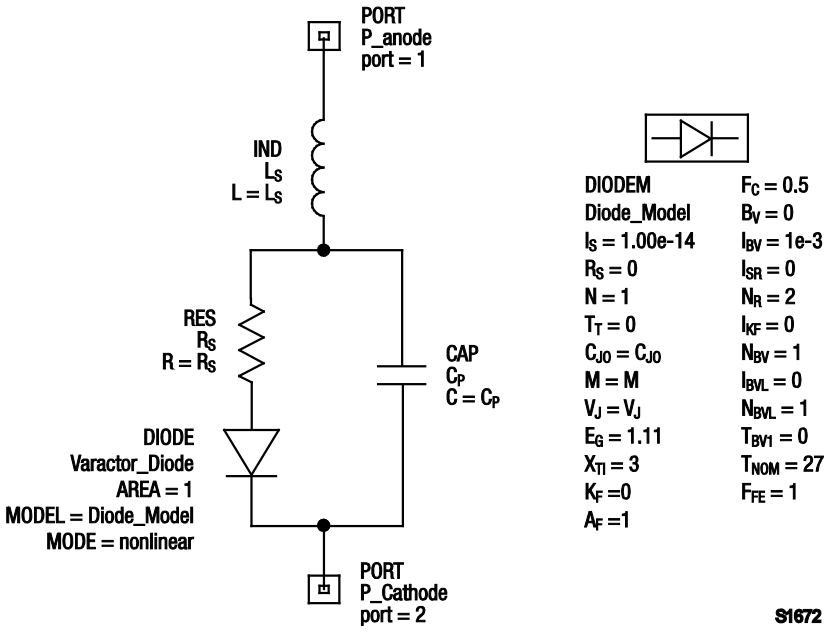

Figure 2. SPICE Model

Table 5. SPICE Model Parameters

Part Number	C_{J0} (pF)	V_J (V)	M	C_P (pF)	R_S (Ω)
SMV1129	27.30	2.38	0.98	0	0.4
SMV1139	6.57	3.34	1.72	1.4	0.6

Note: Values extracted from measured performance.

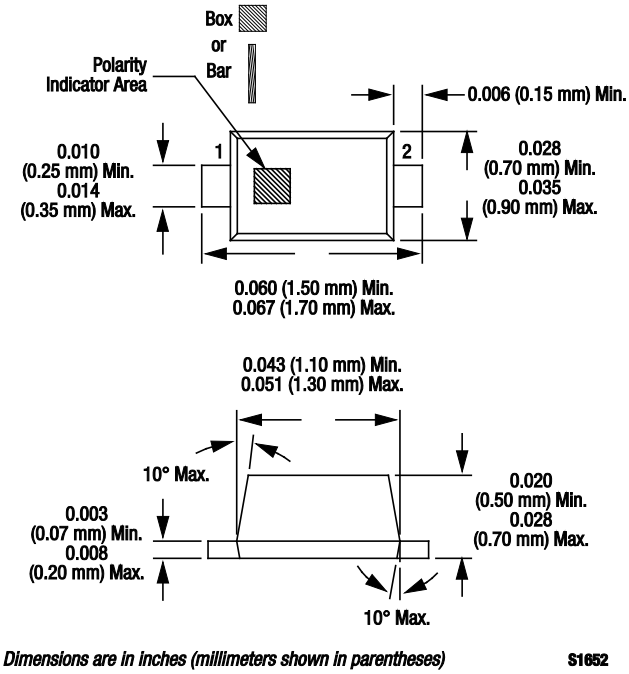

Figure 3. SC-79 Package Dimensions

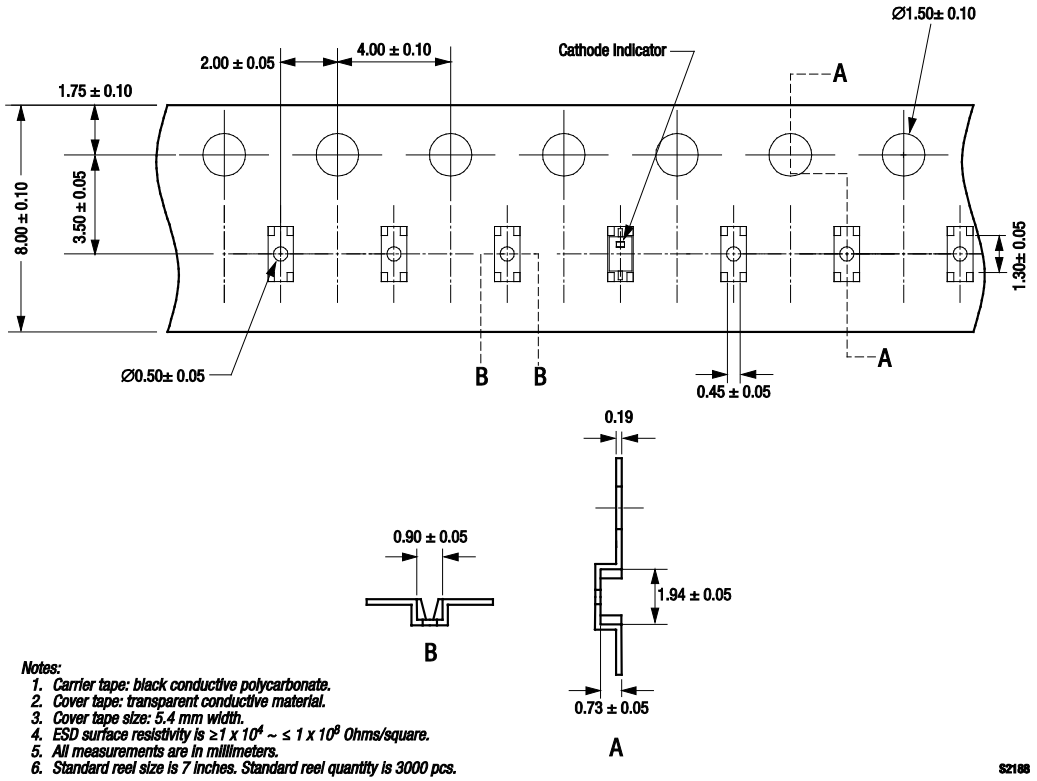

Figure 4. SC-79 Tape and Reel Dimensions

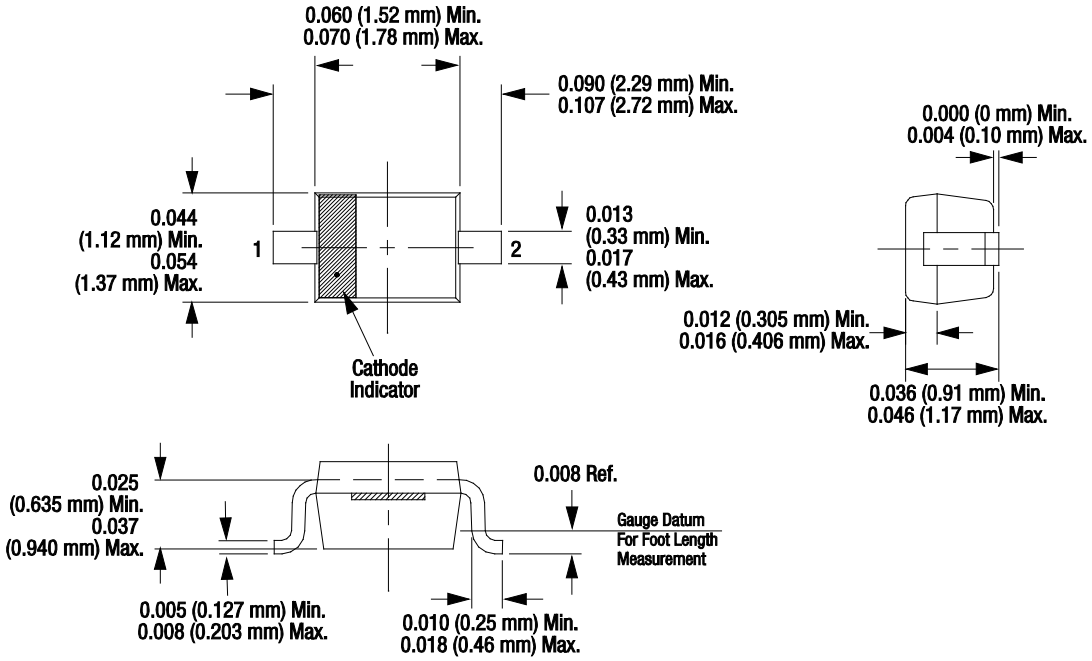

Figure 5. SOD-323 Package Dimensions

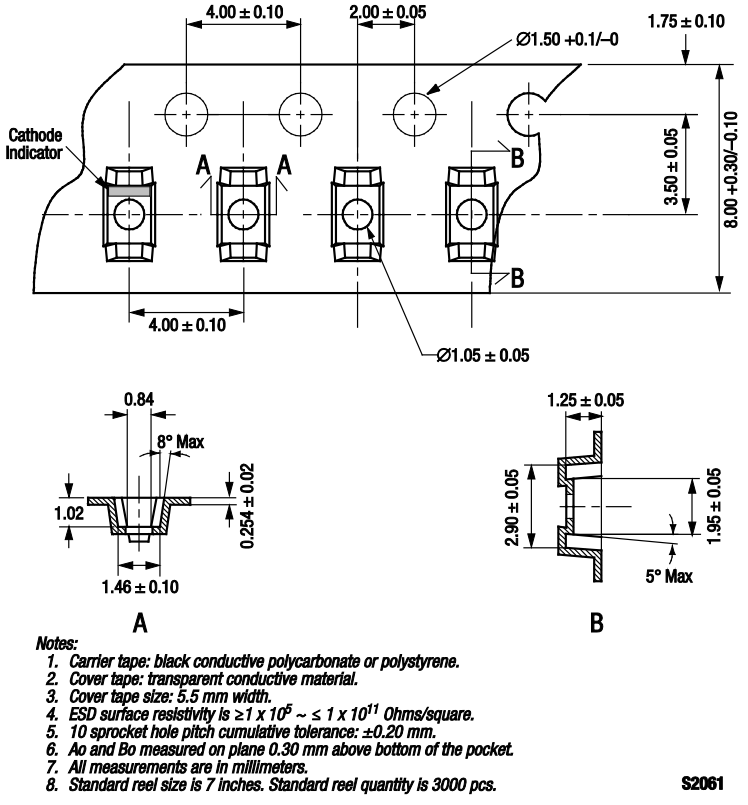

Figure 6. SOD-323 Tape and Reel Dimensions