

SMV1129 and SMV1139 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 offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances) compliant packaging.





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	SC-79
SMV1139-011LF Marking: HG	SMV1129-079LF Marking: Cathode
Ls = 1.5 nH	Ls = 0.7 nH



LF denotes lead (Pb)-free, RoHS-compliant packaging option as an alternative to the standard Skyworks tin/lead (Sn/Pb) packaging.

Table 2. SMV1129 and SMV1139 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
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)			C _T @ 1 V C _T @ 3 V Ratio (pF)		C _T @ 1 V C _T @ 6 V Ratio (pF)		Rs @ 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 and is not guaranteed over the full operating or storage temperature ranges. Operation at elevated temperatures may reduce reliability of the device.

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 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 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. For packaging details, refer to the Skyworks Application Note *Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation*, document number 200083.

Typical Performance Characteristics

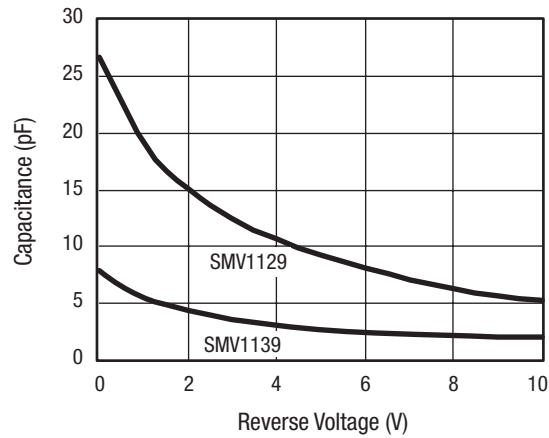


Figure 1. Capacitance vs Reverse Voltage

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

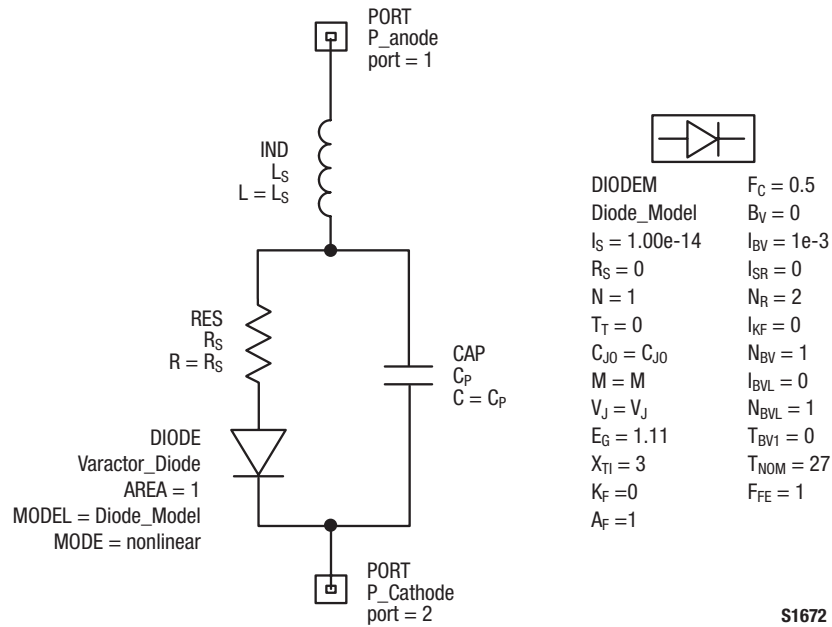
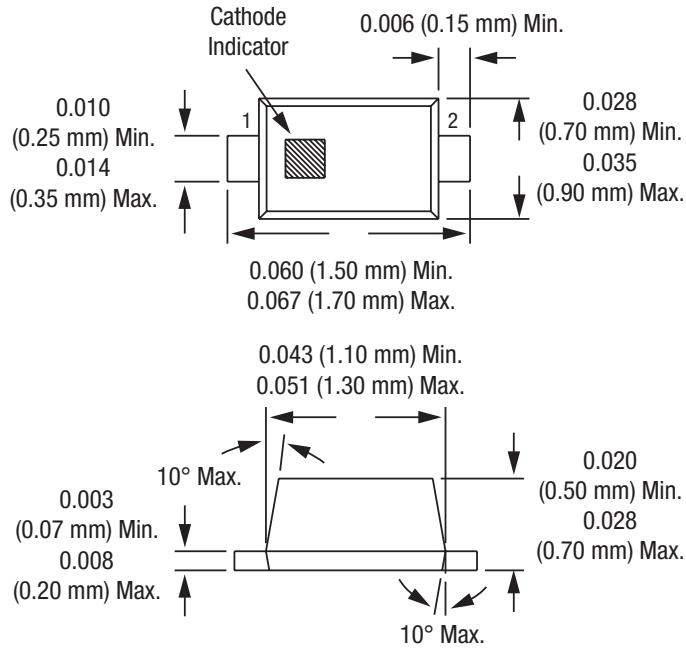


Figure 2. SPICE Model

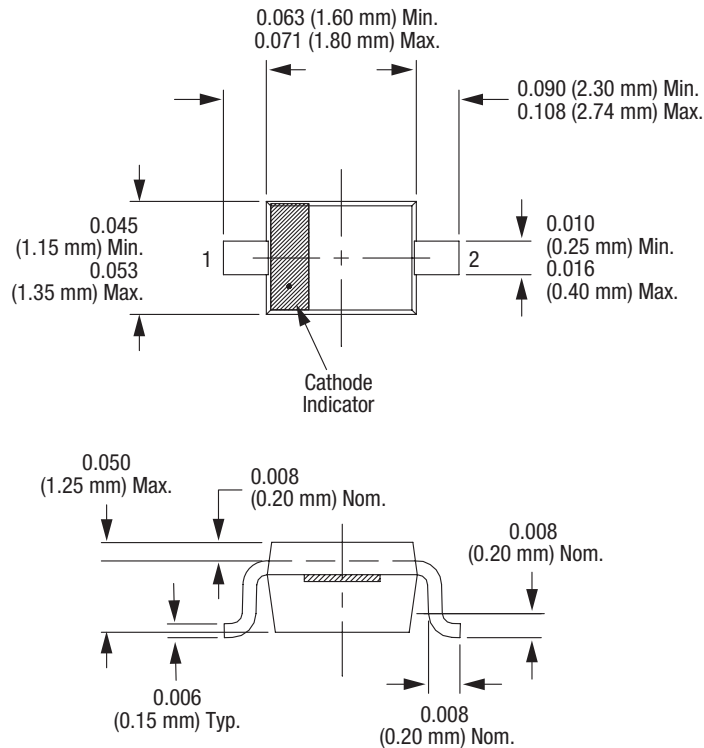
Table 5. SPICE Model Parameters

Part Number	C _{J0} (pF)	V _J (V)	M	C _P (pF)	R _S (Ω)
SMV1129	27.5	2.8	1.1	0	0.4
SMV1139	8.0	1.2	0.65	0	0.6



Dimensions are in inches (millimeters shown in parentheses) S1652

Figure 3. SC-79 Package Dimensions



Dimensions are in inches (millimeters shown in parentheses) S1619

Figure 4. SOD-323 Package Dimensions

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