DATA SHEET

SMV1763-079LF Hyperabrupt Junction Tuning Varactor

Applications

- Low-noise and wideband UHF and VHF VCOs
- High-volume, low-cost batteries

Features

- Low series resistance
- High capacitance ratio at low reverse voltage
- Ultra-small SC-79 package (MSL1, 260 °C per JEDEC J-STD-020)

NEW

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

Description

The SMV1763-079LF is a silicon hyperabrupt junction varactor diode specifically designed for 3 V platforms. The specified high capacitance ratio and low reverse voltage make this varactor appropriate for low phase noise Voltage-Controlled Oscillators (VCOs) used at frequencies in wireless systems up to and above 2.5 GHz.

Table 1 describes the package and marking of the SMV1763-079LF varactor.

Table 1. Packaging and Marking


Single
SC-79
♦**SMV1763-079LF** Marking: Cathode
L_S = 0.7 nH

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

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Table 2. SMV1763-079LF 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 SMV1763-079LF varactor is a Class 0 Human Body Model (HBM) ESD device.*

Table 3. SMV1763-079LF Electrical Specifications (Note 1)
(T_{OP} = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse current	I_R	V_R = 20 V			20	nA
Capacitance	C_T	F = 1 MHz				
		V_R = 0.5 V	22.1	23.6	25.1	pF
		V_R = 2.5 V	7.7	8.6	9.8	pF
Capacitance ratio	C_{TR}	C_T @ 0.5 V/C_T @ 2.5 V	2.3	2.7		–
Series resistance	R_S	F = 470 MHz, V_R = 1 V		0.7		Ω
Breakdown voltage	V_{BR}	I_R = 10 μA	20			V

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 SMV1763-079LF varactor are provided in Table 2. Electrical specifications are provided in Table 3. Typical capacitance values are listed in Table 4. Typical performance characteristics for the SMV1763-079LF varactor are illustrated in Figures 1 and 2.

The SPICE model for the SMV1763-079LF varactor is shown in Figure 3 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figure 4, and tape and reel dimensions are provided in Figure 5.

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 SMV1763-079LF 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. For packaging details, refer to the Skyworks Application Note *Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation*, document number 200083.

Table 4. Capacitance vs Reverse Voltage

V_R (V)	C_T (pF)
0	9.0
0.5	6.7
1.0	5.2
1.5	4.0
2.0	3.2
2.5	2.6
3.0	2.2
3.5	2.0
4.0	1.9
4.5	1.8
5.0	1.8

Typical Performance Characteristics

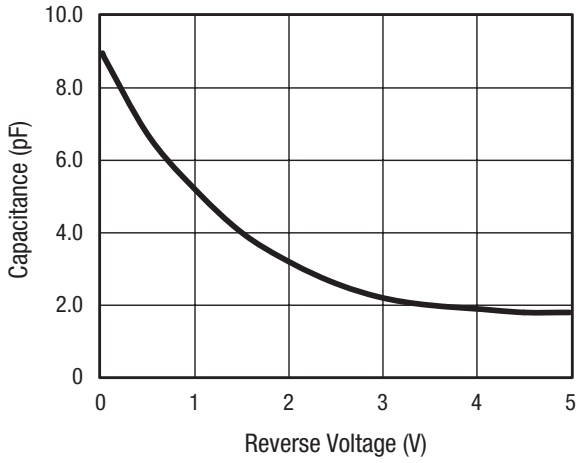


Figure 1. Capacitance vs Voltage

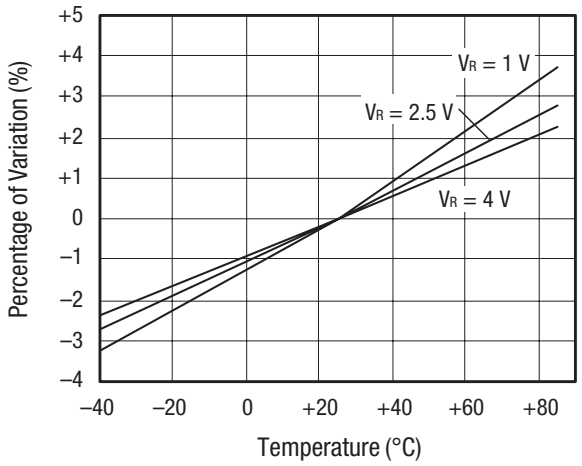


Figure 2. Relative Capacitance Change vs Temperature

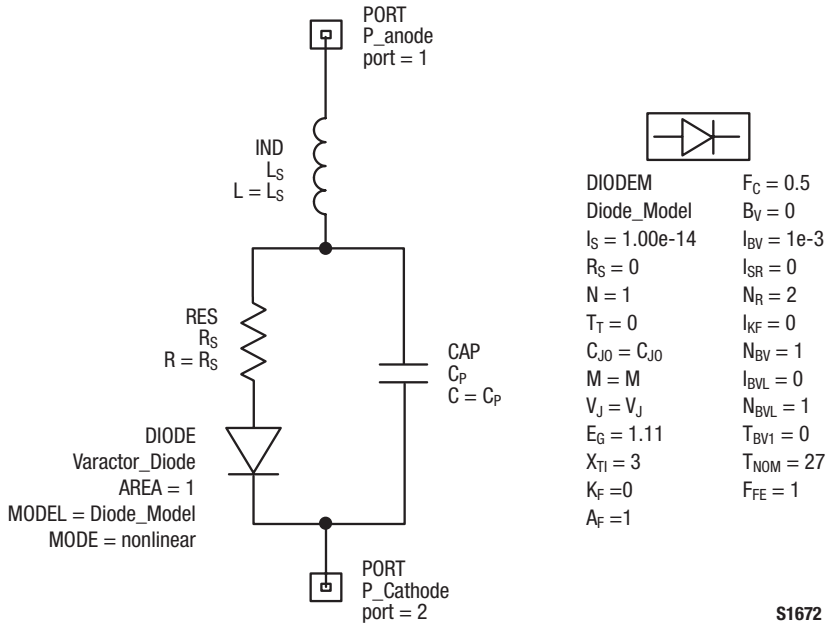
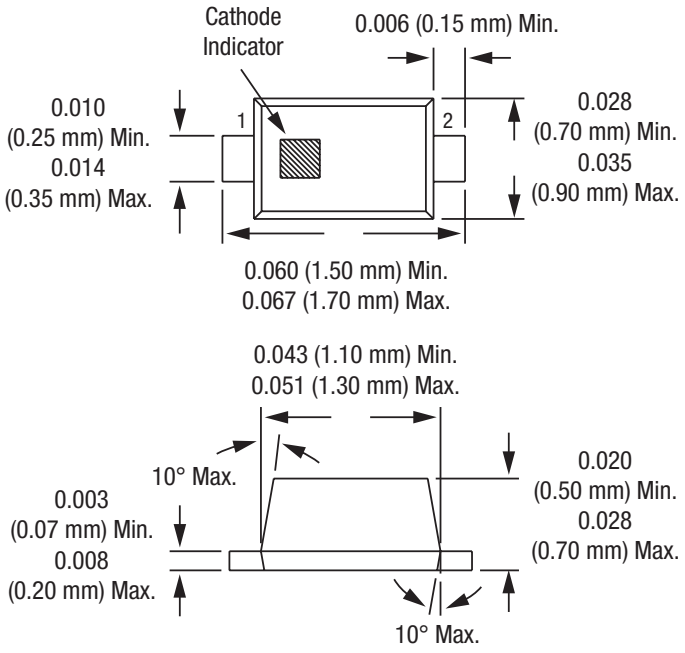


Figure 3. SPICE Model

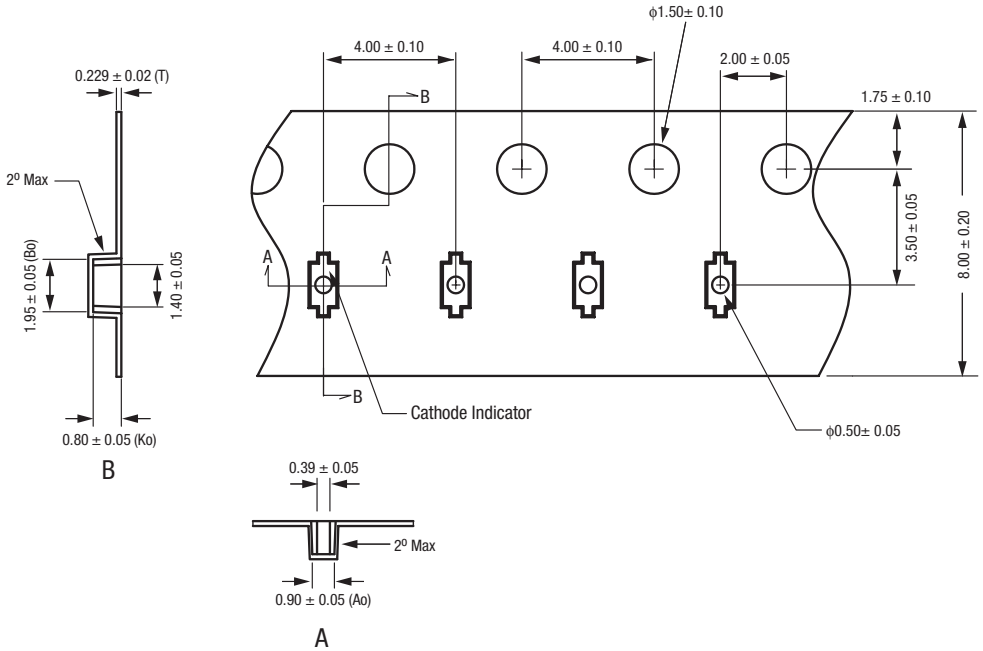
Table 5. SPICE Model Parameters

Part Number	C_{J0} (pF)	V_J (V)	M	C_P (pF)	R_S (Ω)	L_S (nH)
SMV1763-079LF	8.2	15	9.5	0.67	0.5	0.8



Dimensions are in inches (millimeters shown in parentheses) **S1652**

Figure 4. SC-79 Package Dimensions



Notes:
1. *Carrier tape: black conductive polycarbonate or polystyrene.*
2. *Cover tape material: transparent conductive PSA.*
3. *Cover tape size: 5.4 mm width.*
4. *All measurements are in millimeters.*

S1673

Figure 5. SC-79 Tape and Reel Dimensions