

DATA SHEET

# SMV1270-079LF: Hyperabrupt Junction Tuning Varactor

## Applications

- Low-noise and wideband UHF and VHF VCOs
- High-volume, low-cost battery-powered tuning circuits

## Features

- High capacitance ratio
- Ultra-small SC-79 package  
(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 SMV1270-079LF is a silicon hyperabrupt junction varactor diode specifically designed for battery operation. The specified high-capacitance ratio and low reverse voltage make this varactor appropriate for low-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 SMV1270-079LF varactor.

**Table 1. Packaging and Marking**

|   |
|---|
|  |
| Single  |
| SC-79<br>Green™   |
| <b>SMV1270-079LF</b><br>Marking: Cathode and Y3                                       |
| $L_s = 0.7 \text{ nH}$  |



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 SMV1270-079LF 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 SMV1270-079LF varactor are illustrated in Figures 1 and 2.

The SPICE model for the SMV1270-079LF 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 SMV1270-079LF 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. SMV1270-079LF Absolute Maximum Ratings<sup>1</sup>**

| Parameter   | Symbol           | Minimum | Maximum | Units |
|---|------------------|---------|---------|-------|
| Reverse voltage   | V <sub>R</sub>   |         | 20      | 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:<br>Human Body Model (HBM), Class 0 | ESD              |         | <250    | V     |

<sup>1</sup> 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.

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**ESD HANDLING:** *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 when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

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**Table 3. SMV1270-079LF Electrical Specifications<sup>1</sup>**  
(T<sub>OP</sub> = 25 °C, Unless Otherwise Noted)

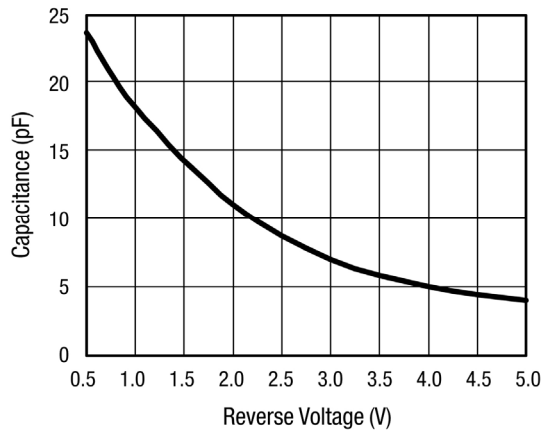
| Parameter         | Symbol          | Test Condition                                   | Min         | Typ         | Max         | Units    |
|-------------------|-----------------|--|-------------|-------------|-------------|----------|
| Reverse current   | I <sub>R</sub>  | V <sub>R</sub> = 16 V                            |             |             | 20          | nA       |
| Capacitance       | C <sub>T</sub>  | F = 1 MHz  |             |             |             |          |
|                   |                 | V <sub>R</sub> = 0.5 V<br>V <sub>R</sub> = 2.5 V | 22.1<br>7.7 | 23.6<br>8.6 | 25.1<br>9.8 | pF<br>pF |
| Capacitance ratio | C <sub>TR</sub> | C <sub>T</sub> @ 0.5 V/C <sub>T</sub> @ 2.5 V    | 2.3         | 2.7         |             | -        |
| Series resistance | R <sub>S</sub>  | F = 470 MHz, V <sub>R</sub> = 1 V                |             | 0.7         |             | Ω        |
| Breakdown voltage | V <sub>BR</sub> | I <sub>R</sub> = 10 μA                           | 20          |             |             | V        |

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

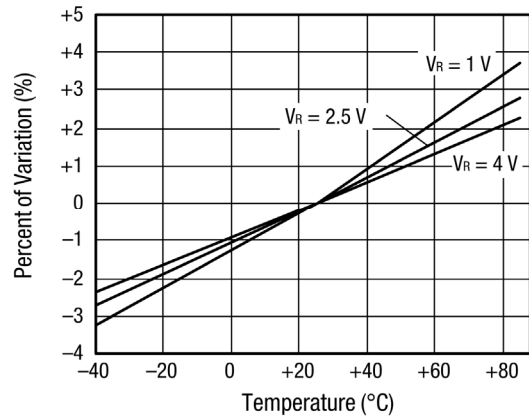
**Table 4. SMV1270-079LF Capacitance vs Reverse Voltage**

| $V_R$<br>(V) | $C_T$<br>(pF) |
|--------------|---------------|
| 0.5          | 23.64         |
| 1.0          | 17.81         |
| 1.5          | 13.69         |
| 2.0          | 10.74         |
| 2.5          | 8.60          |
| 3.0          | 7.03          |
| 3.5          | 5.87          |
| 4.0          | 5.00          |
| 4.5          | 4.35          |
| 5.0          | 3.85          |

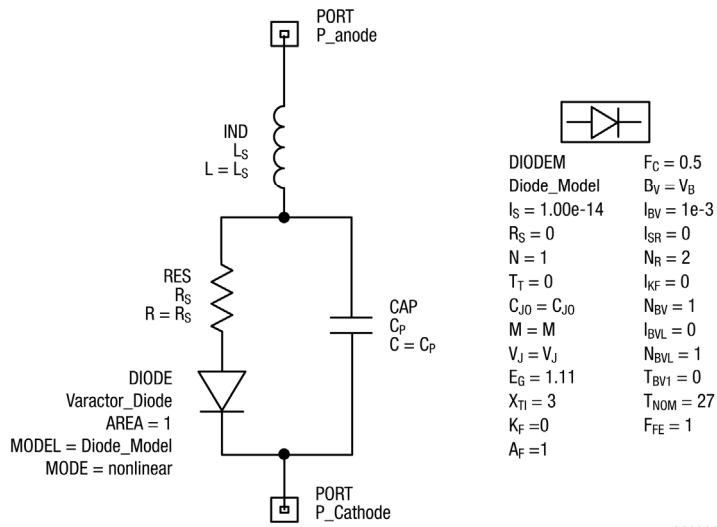
**Typical Performance Characteristics**



**Figure 1. Capacitance vs Voltage**



**Figure 2. Relative Capacitance Change vs Temperature**



200065-003

Figure 3. SMV1270-079LF SPICE Model

Table 5. SMV1270-079LF SPICE Model Parameters

| C <sub>J0</sub><br>(pF) | V <sub>J</sub><br>(V) | M | C <sub>P</sub><br>(pF) | R <sub>s</sub><br>(Ω) | L <sub>s</sub><br>(nH) |
|-------------------------|-----------------------|---|------------------------|-----------------------|------------------------|
| 30                      | 12                    | 8 | 2                      | 0.7                   | 0.7                    |



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