

DATA SHEET

SMV1135-004 and SMV1135-004LF Hyperabrupt Junction Tuning Varactors

Applications

- Wideband VCOs

Features

- High tuning ratio
- Low series resistance
- 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 SMV1135-004 and SMV1135-004LF are surface-mount varactor diodes designed for very high capacitance tuning ratios with a low series resistance, which makes these devices especially attractive for wideband Voltage-Controlled Oscillator (VCO) applications.

Table 1 describes the packages and markings of the SMV1135 varactors.

Table 1. Packaging and Marking

Common Cathode
SOT-23
SMV1135-004 Marking: AG3
SMV1135-004LF Green™ Marking: EG3



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. SMV1135-004 and SMV1135-004LF Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
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 SMV1135-004 and SMV1135-004LF varactors are Class 0 Human Body Model (HBM) ESD devices.

Table 3. SMV1135-004 and SMV1135-004LF Electrical Specifications (Note 1)
(T_{OP} = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Conditions	Minimum	Typical	Maximum	Units
Reverse current	I _R	V _R = 21 V			20	nA
Capacitance	C _T	C _T @ 1 V, V _R = 1 V, f = 1 MHz	8.2		10	pF
Capacitance ratio	C _{TR}	C _T (1 V)/C _T (3 V)	1.47		1.76	-
		C _T (1 V)/C _T (9 V)	3.70		4.50	-
Series resistance	R _S	V _R = 1 V, f = 500 MHz			1.2	Ω
Breakdown voltage	V _{BR}	I _R = 10 μA	26			V

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1135-004 and SMV1135-004LF are provided in Table 2. Electrical specifications are provided in Table 3.

Typical performance characteristics are illustrated in Figures 1 through 4. Table 4 summarizes the capacitance for reverse voltages between 0.5 and 20 V.

The SPICE model for the SMV1135-004 and SMV1135-004LF is shown in Figure 5 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figure 6, and tape and reel dimensions are shown 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 SMV1135-004 and SMV1135-004LF 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

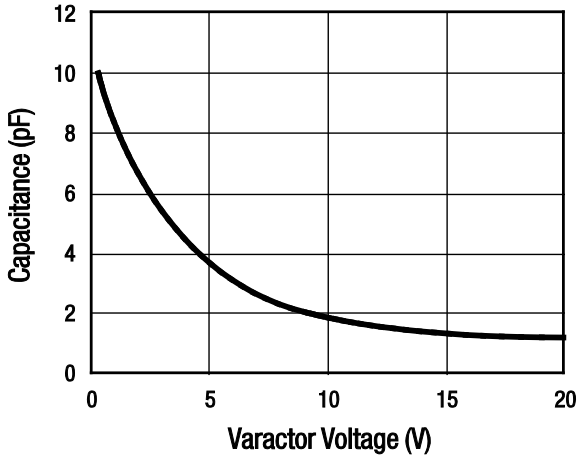


Figure 1. Capacitance vs Voltage

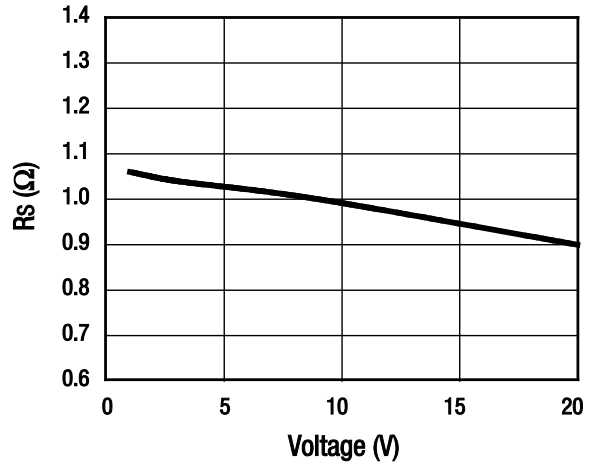


Figure 2. Series Resistance vs Voltage

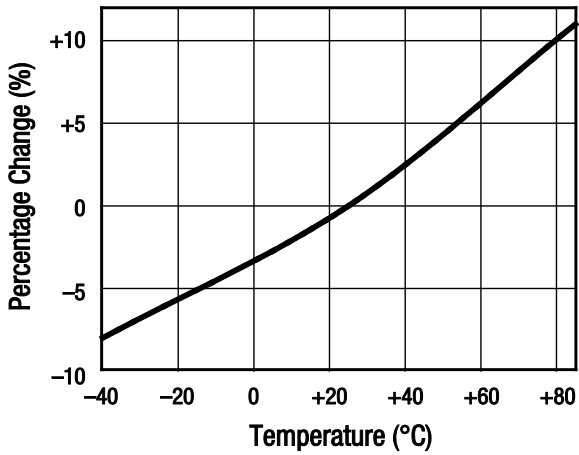


Figure 3. Relative Capacitance Change vs Temperature

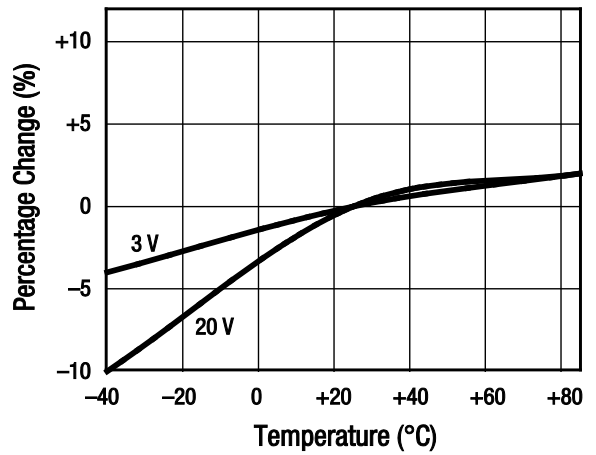


Figure 4. Relative Series Resistance Change vs Temperature

Table 4. Capacitance vs Reverse Voltage

V _R (V)	C _T (pF)
0.5	10.34
1.0	8.69
2.5	5.98
3.0	5.38
6	3.11
10	1.92
20	1.17

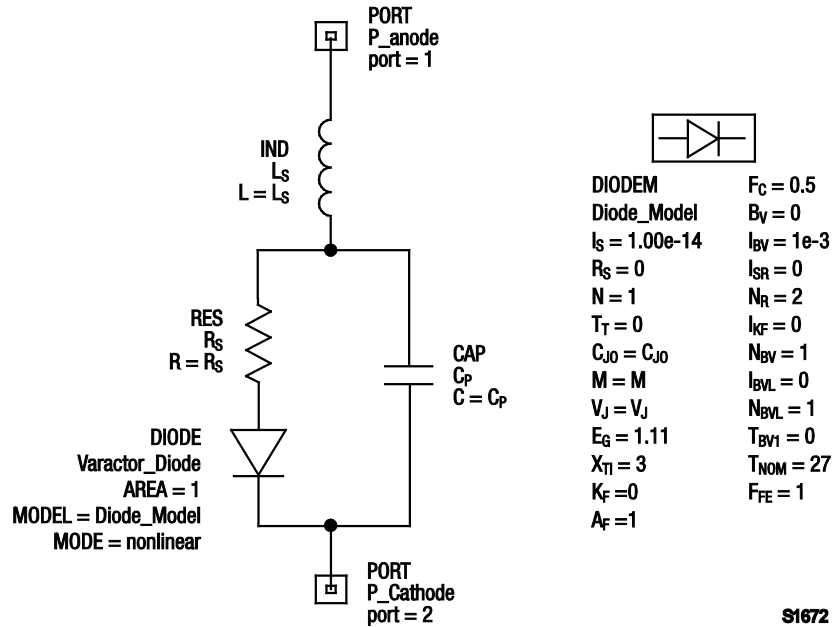
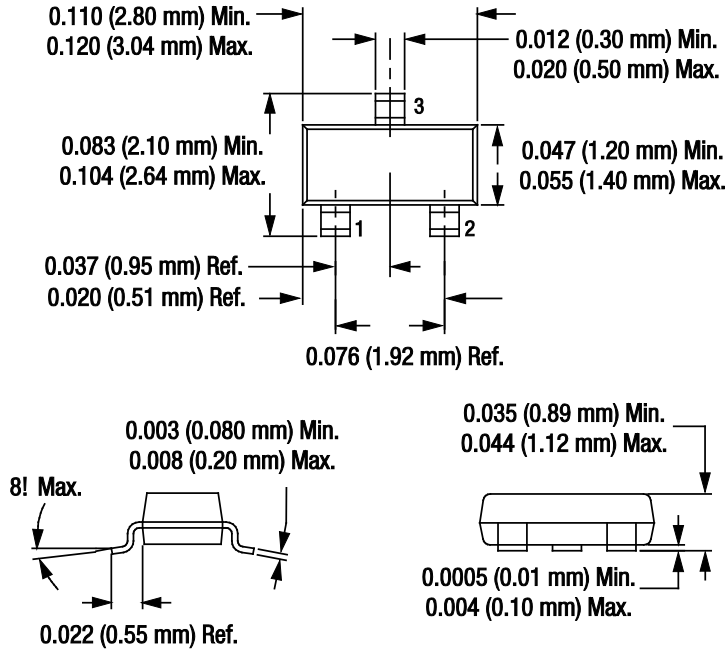


Figure 5. SPICE Model

Table 5. SPICE Model Parameters

Part Number	C _{J0} (pF)	V _J (V)	M	C _P (pF)	R _S (Ω)	L _S (nH)
SMV1135	11.4	6.4	2.38	0.75	1.2	1.5

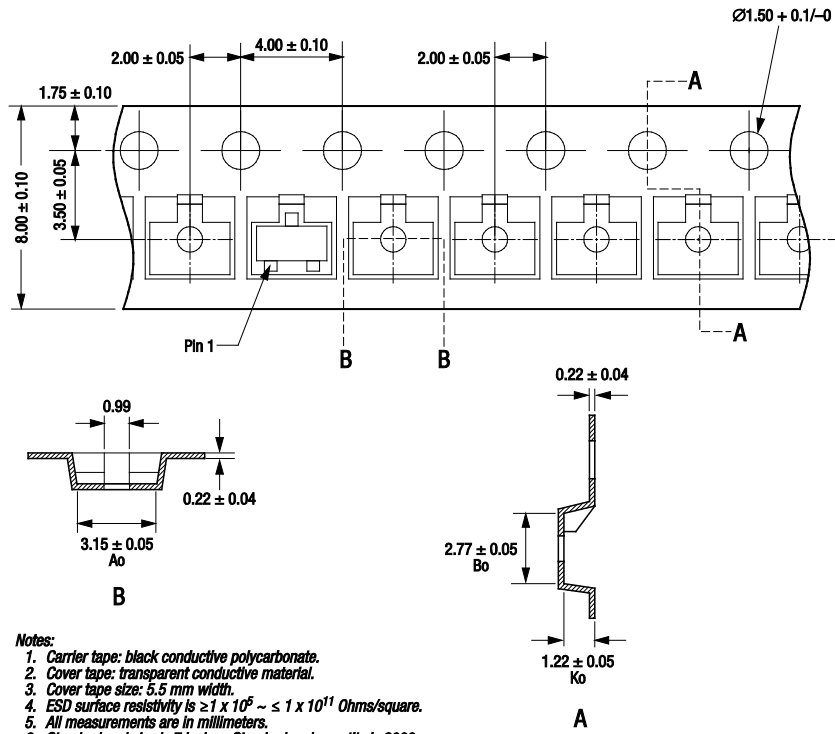
Note: Values extracted from measured performance.



Dimensions are in inches (millimeters shown in parentheses)

S1389

Figure 3. SOT-23 Package Dimensions



- Notes:
1. Carrier tape: black conductive polycarbonate.
 2. Cover tape: transparent conductive material.
 3. Cover tape size: 5.5 mm width.
 4. ESD surface resistivity is $\geq 1 \times 10^5 \sim \leq 1 \times 10^{11}$ Ohms/square.
 5. All measurements are in millimeters.
 6. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.

S2259

Figure 4. SOT-23 Tape and Reel Dimensions

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