DATA SHEET

SMV1771 Series: Hyperabrupt Junction Tuning Varactors

Applications

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

Features

- Low series resistance
- High capacitance ratio
- SC-79 and ultra-small SOD-882 packages (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 SMV1771 series are silicon hyperabrupt junction varactor diodes specifically designed for battery operation. The specified high capacitance ratio and low series resistance make these varactors 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 SMV1771 varactor series.

Table 1. Packaging and Marking

	
Single	Single
SC-79 Green™	SOD-882 Green™
SMV1771-079LF Marking: Cathode and YH	**SMV1771-040LF** Marking: EL1
L_S = 0.7 nH	L_S = 0.45 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 SMV1771 varactor series are provided in Table 2. Electrical specifications are provided in Table 3. Typical capacitance values are listed in Table 4. The relationship between capacitance and reverse voltage is illustrated in Figure 1.

The SPICE model for the SMV1771 varactor series is shown in Figure 2 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figures 3 and 5, and tape and reel dimensions are provided 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 SMV1771 varactor series 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.

Table 2. SMV1771 Series Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Reverse voltage	V_R			12	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 1: 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.*

Table 3. SMV1771 Series 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 = 8 V			20	nA
Capacitance	C_T	F = 1 MHz				
		V_R = 1.0 V	22.0		24.0	pF
		V_R = 2.5 V	9.5		12.5	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		0.4	0.5	Ω
Breakdown voltage	V_{BR}	I_R = 10 μA	12			V

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

Table 4. Capacitance vs Reverse Voltage

V_R (V)	C_T (pF)
0.5	29.80
1.0	22.90
2.0	14.07
2.5	11.23
3.0	9.23
3.5	7.86
4.0	6.90
4.5	6.25
5.0	5.80

Typical Performance Characteristics

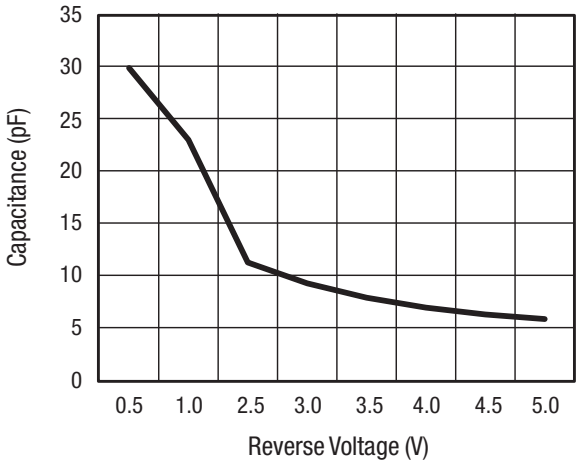


Figure 1. Capacitance vs Reverse Voltage, Mean Test Data

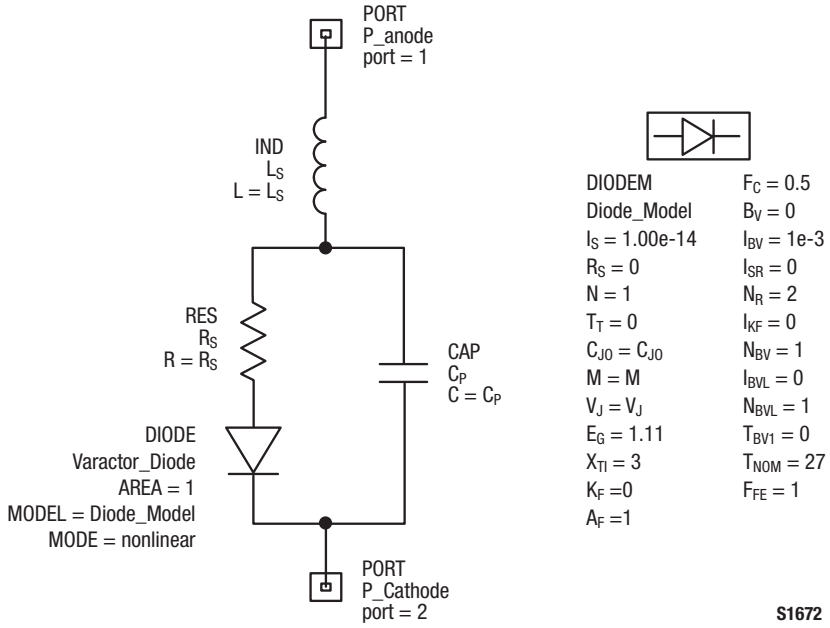
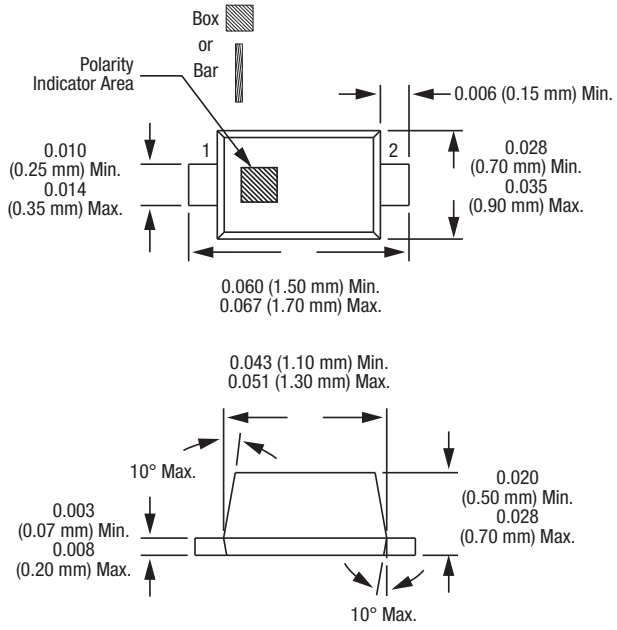


Figure 2. SPICE Model

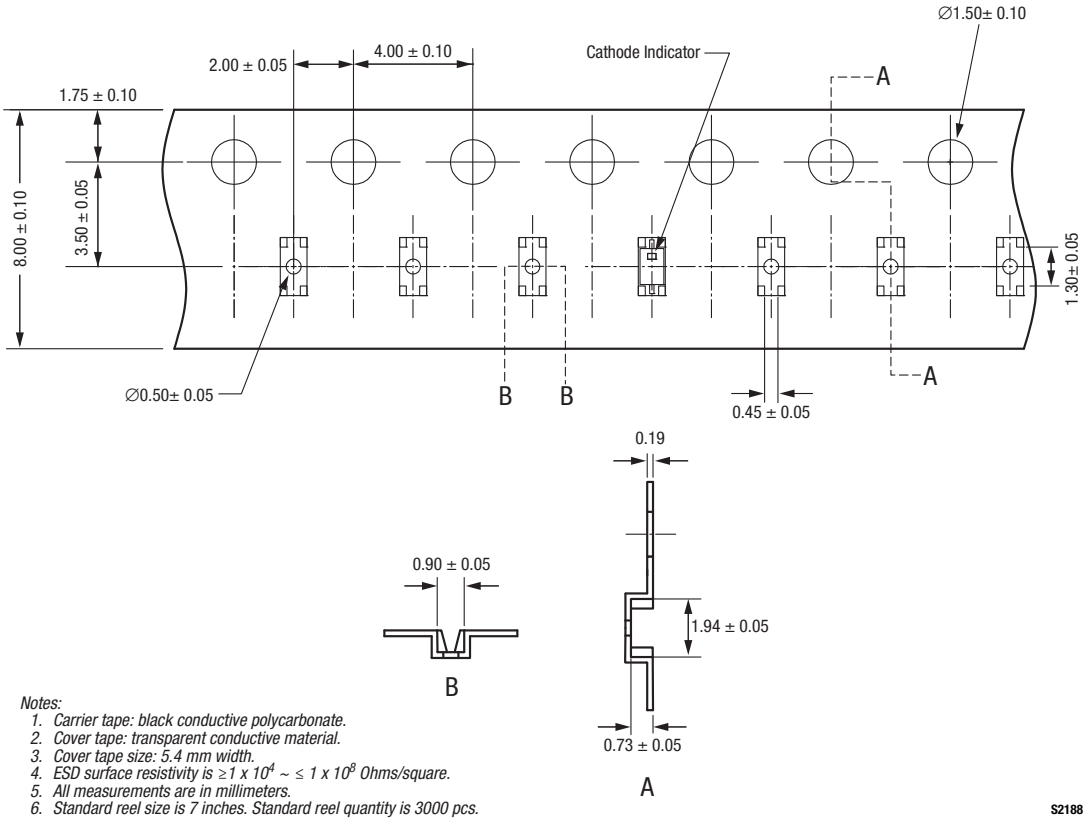
Table 5. SPICE Model Parameters

Part Number	C_{J0} (pF)	V_J (V)	M	C_P (pF)	R_S (Ω)	L_S (nH)
SMV1771-079LF	31.0	12	8	2	0.40	0.80
SMV1771-040LF	41.6	12	8	2	0.45	0.45



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

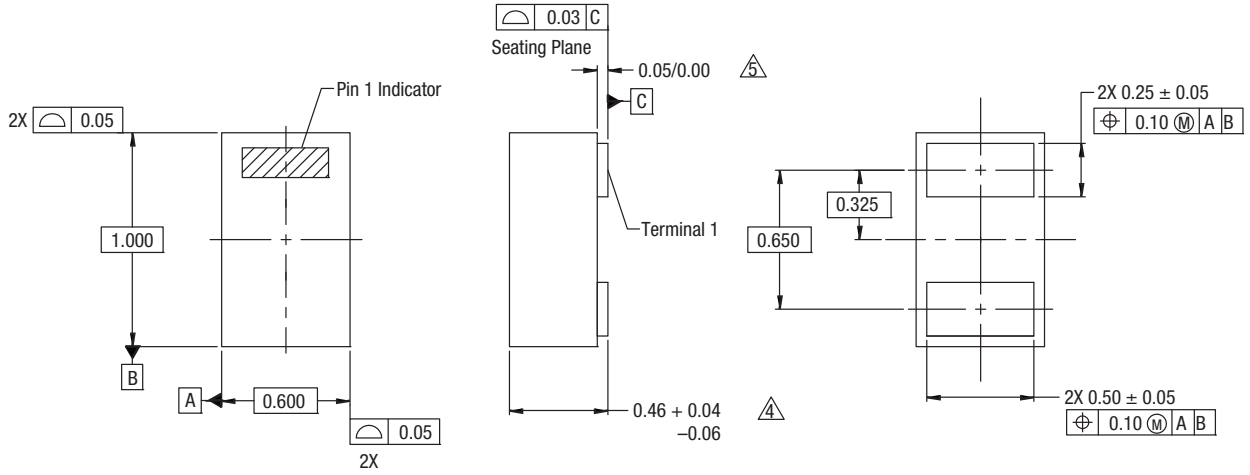
Figure 3. SC-79 Package Dimensions



Notes:
1. *Carrier tape: black conductive polycarbonate.*
2. *Cover tape: transparent conductive material.*
3. *Cover tape size: 5.4 mm width.*
4. *ESD surface resistivity is ≥1 x 10^4 ~ ≤ 1 x 10^8 Ohms/square.*
5. *All measurements are in millimeters.*
6. *Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.*

S2188

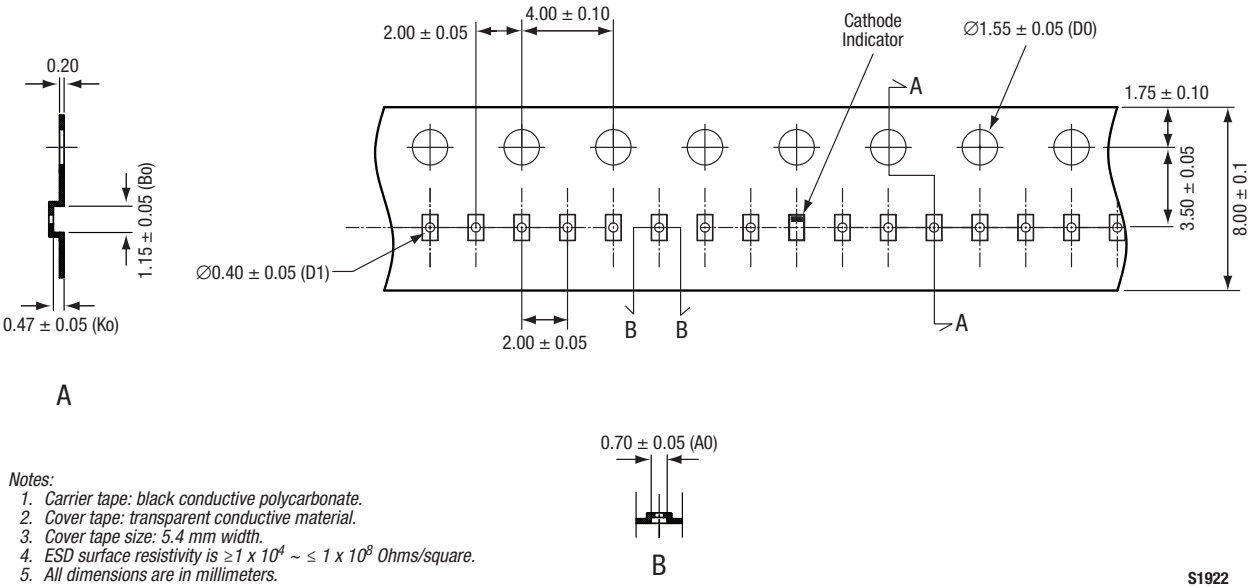
Figure 4. SC-79 Tape and Reel Dimensions



NOTES:
1. *All measurements are in millimeters.*
2. *Dimensions and tolerances according to ASME Y14.5M-1994.*
3. *These packages are used principally for discrete devices.*
4. *This dimension includes stand-off height and package body thickness, but does not include attached features, e.g., external heatsink or chip capacitors. An integral heatslug is not considered an attached feature.*
5. *This dimension is primarily terminal plating, but does not include small metal protrusion.*

Y1410

Figure 5. SOD-882 Package Dimensions



Notes:
1. *Carrier tape: black conductive polycarbonate.*
2. *Cover tape: transparent conductive material.*
3. *Cover tape size: 5.4 mm width.*
4. *ESD surface resistivity is ≥1 x 10^4 ~ ≤ 1 x 10^8 Ohms/square.*
5. *All dimensions are in millimeters.*

S1922

Figure 6. SOD-882 Tape and Reel Dimensions

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