

DATA SHEET

SMV1281 Series: Hyperabrupt Junction Tuning Varactors

Applications

- Wideband VCOs
- High-volume, low-cost systems

Features

- High tuning ratio
- Packages rated MSL1, 260 °C per JEDEC J-STD-020

NEW




Skyworks Green™ products are RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, are halogen free according to IEC-61249-2-21, and contain <1,000 ppm antimony trioxide in polymeric materials.


Description

The SMV1281 series of surface mount hyperabrupt junction varactor diodes are 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 SMV1281 varactors.

Table 1. Packaging and Marking

	
Single	Single
SC-79 Green™	SOD-323 Green™
SMV1281-079LF Marking: Cathode	SMV1281-011LF Marking: HP
Ls = 0.7 nH	Ls = 1.5 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.

Table 2. SMV1281 Series Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V_R		24	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 SMV1281 varactors are Class 0 Human Body Model (HBM) ESD devices.

Table 3. SMV1281 Series Electrical Specifications (Note 1)
($T_{OP} = 25\text{ °C}$, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse current	I_R	$V_R = 20\text{ V}$			20	nA
Capacitance	C_T	$V_R = 1\text{ V}$	7.8	8.6	9.5	pF
		$V_R = 20\text{ V}$	0.6	0.7	0.8	pF
Capacitance ratio	C_{TR}	$V_R = 1\text{ V}/20\text{ V}$		12		—
Resistance	R_S	$f = 500\text{ MHz}$, $V_R = 1\text{ V}$		1.7		Ω
Breakdown voltage	V_{BR}	$I_R = 10\text{ }\mu\text{A}$	24			V

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1281 varactors are provided in Table 2. Electrical specifications are provided in Table 3. Typical capacitance values are listed in Table 4. Typical capacitance vs reverse voltage performance for the SMV1281 varactors is illustrated in Figure 1.

The SPICE model for the SMV1281 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 drawings are provided in Figures 4 and 6.

Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SMV1281 varactors 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.

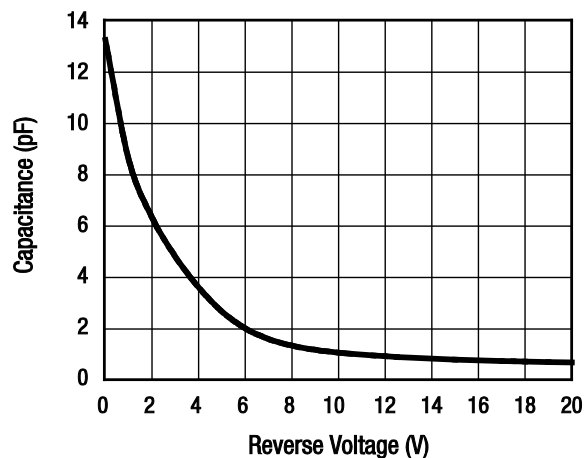
Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed.

Table 4. Capacitance vs Reverse Voltage

V_R (V)	C_T (pF)
0	13.30
1	8.60
2	6.30
3	4.80
4	3.60
5	2.70
6	2.00
7	1.60
8	1.40
9	1.20
10	1.10
11	1.00
12	0.94
13	0.89
14	0.85
15	0.81
16	0.78
17	0.75
18	0.73
19	0.71
20	0.69

Typical Performance Characteristics**Figure 1. Capacitance vs Reverse Voltage**

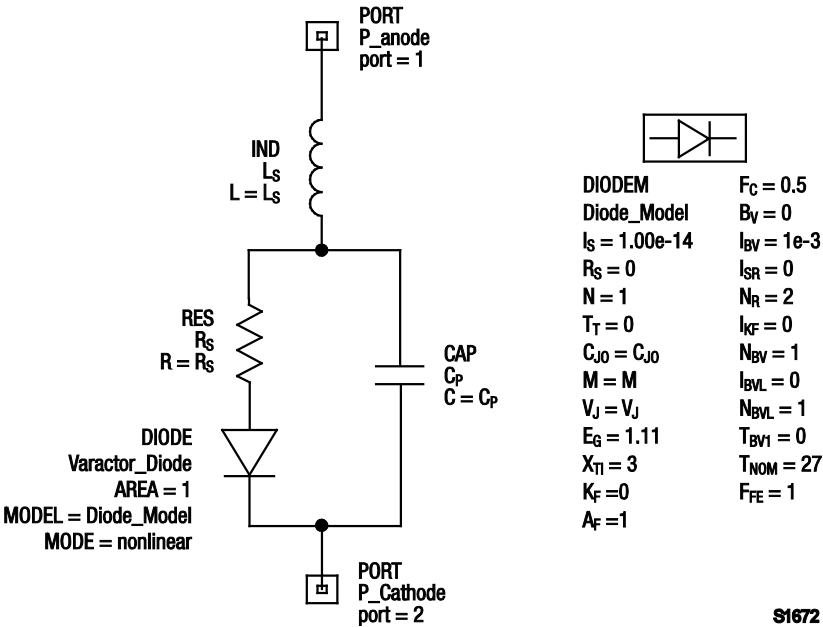
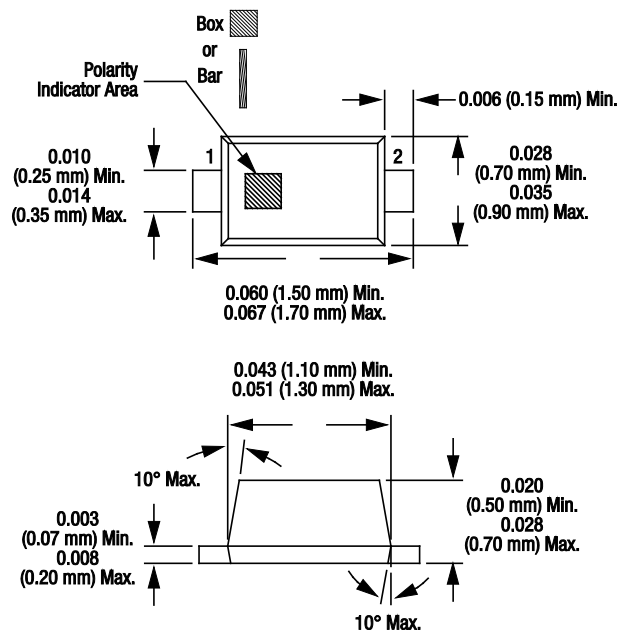


Figure 2. SPICE Model

Table 5. SPICE Model Parameters

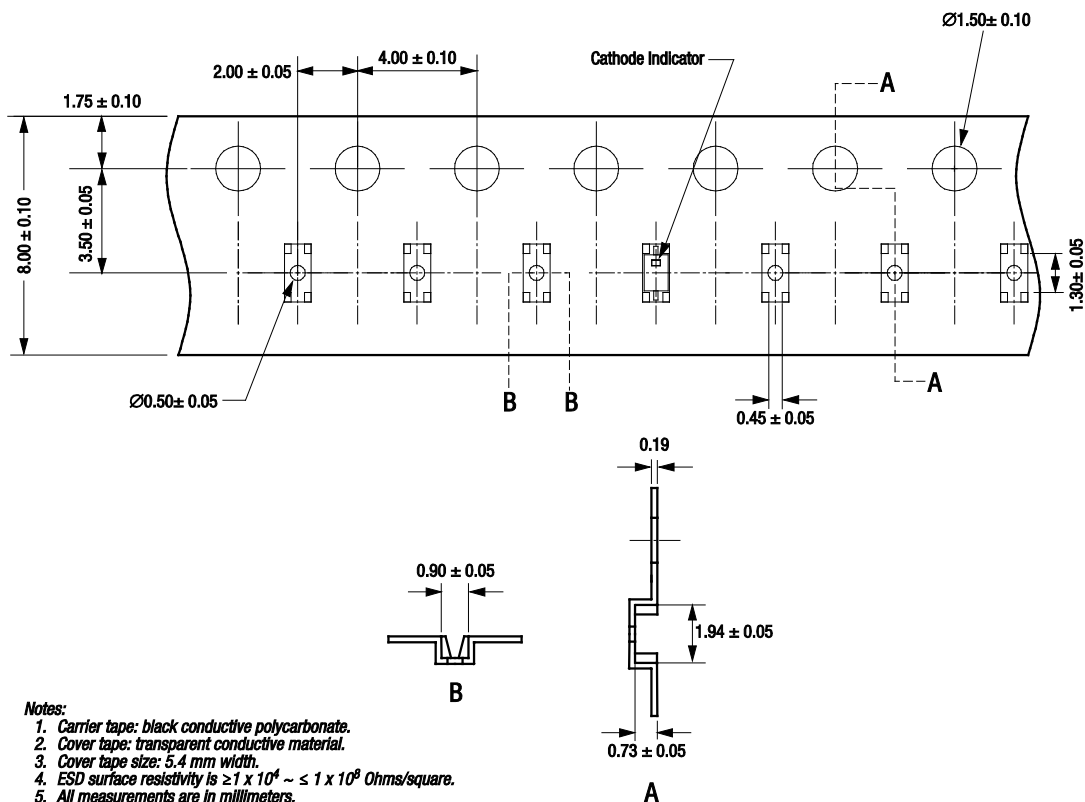
Part Number	Cj0 (pF)	Vj (V)	M	Cp (pF)	Rs (Ω)	Ls (nH)
SMV1281-011LF SMV1281-079LF	13	14	6	0.62	1.7	1.2



Dimensions are in inches (millimeters shown in parentheses)

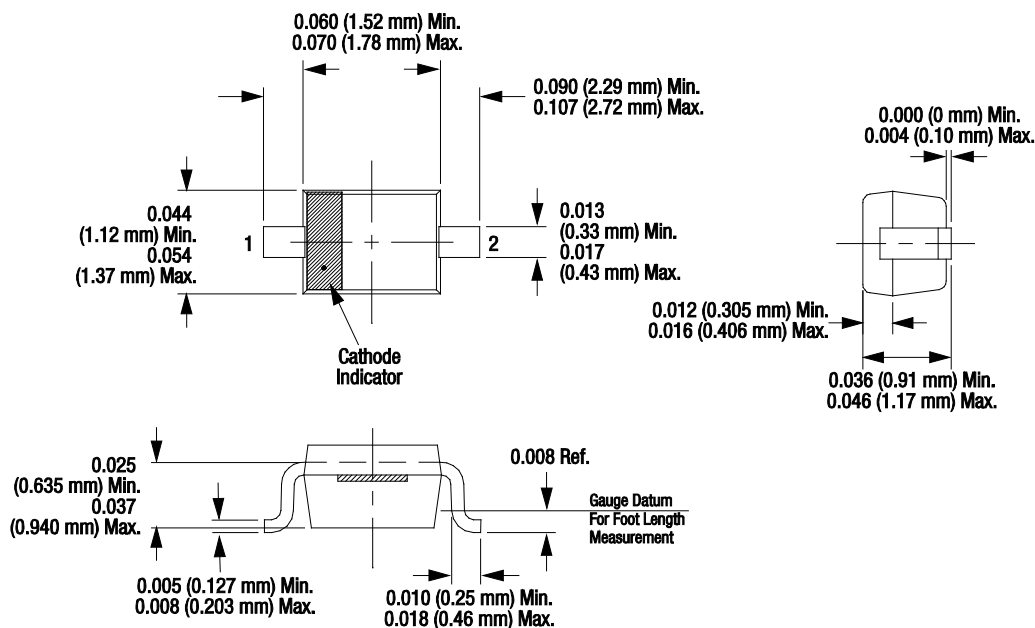
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Figure 3. SC-79 Package Dimensions



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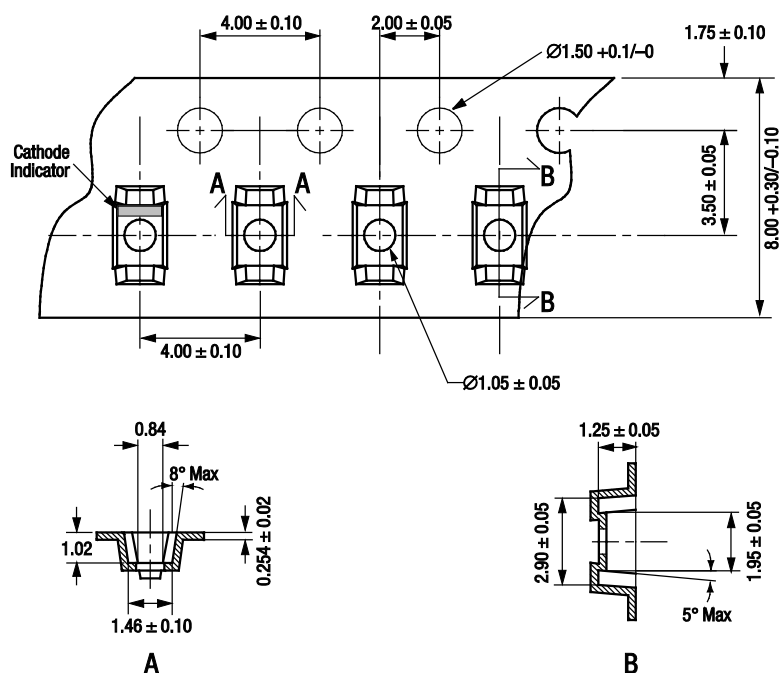
Figure 4. SC-79 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses)

S1619

Figure 5. SOD-323 Package Dimensions



Notes:

1. Carrier tape: black conductive polycarbonate or polystyrene.
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. 10 sprocket hole pitch cumulative tolerance: ± 0.20 mm.
6. A_0 and B_0 measured on plane 0.30 mm above bottom of the pocket.
7. All measurements are in millimeters.
8. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.

S2061

Figure 6. SOD-323 Tape and Reel Dimensions

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