

DATA SHEET

SMV1283 Series: Hyperabrupt Junction Tuning Varactors

Applications

- Wideband VCOs

Features

- High tuning ratio
- Small footprint 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 SMV1283 series of hyperabrupt junction tuning varactors are designed for very high capacitance tuning ratios with low series resistance. The varactor is well suited for wideband Voltage Controlled Oscillator (VCO) applications.

The packaging options are defined in Table 1. The absolute maximum ratings of the SMV1283 varactor series are provided in Table 2. Electrical specifications are specified in Table 3. Figure 1 shows the typical performance of capacitance versus voltage. The SPICE model for the SMV1283 series is shown in Figure 2 and the associated model parameters are provided in Table 4. The relationship between voltage and capacitance for the SMV1283 series is shown in Table 5.

Table 1. Packaging and Marking

	
Single	Single
SOD-323 Green™	SOD-882 Green™
SMV1283-011LF Marking: HQ	SMV1283-040LF Marking: HC1
Ls = 1.7 nH	Ls = 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.

Table 2. SMV1283 Series Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V_R		28	V
Power dissipation	P_{DIS}		250	mW
Forward current	I_F		20	mA
Operating temperature	T_{OP}	-55	+125	°C
Storage temperature	T_{STG}	-55	+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 0	ESD		<250	V

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.

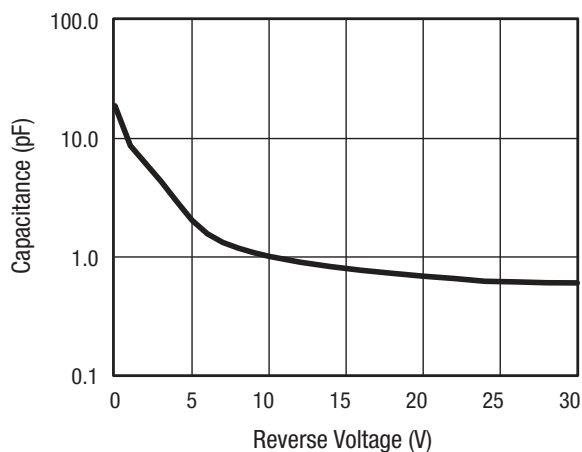
CAUTION: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

Table 3. SMV1283 Series Electrical Specifications (Note 1)
($T_{OP} = 25\text{ }^{\circ}\text{C}$, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse leakage current	I_R	$V_R = 26\text{ V}$			20	nA
Reverse breakdown voltage	V_{BR}	$I_R = 10\text{ }\mu\text{A}$	28			V
Capacitance	C_T	$f = 1\text{ MHz}$				
		$V_R = 1\text{ V}$	8.50	9.10	9.70	pF
		$V_R = 26\text{ V}$	0.48	0.62	0.75	pF
Capacitance ratio	C_{TR}	$C_T @ 1\text{ V}/C_T @ 26\text{ V}$	14.0	14.7		—
Series resistance	R_S	$V_R = 1\text{ V}, f = 500\text{ MHz}$		2.4		Ω

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

Typical Performance Characteristics

**Figure 1. Capacitance vs Reverse Voltage**

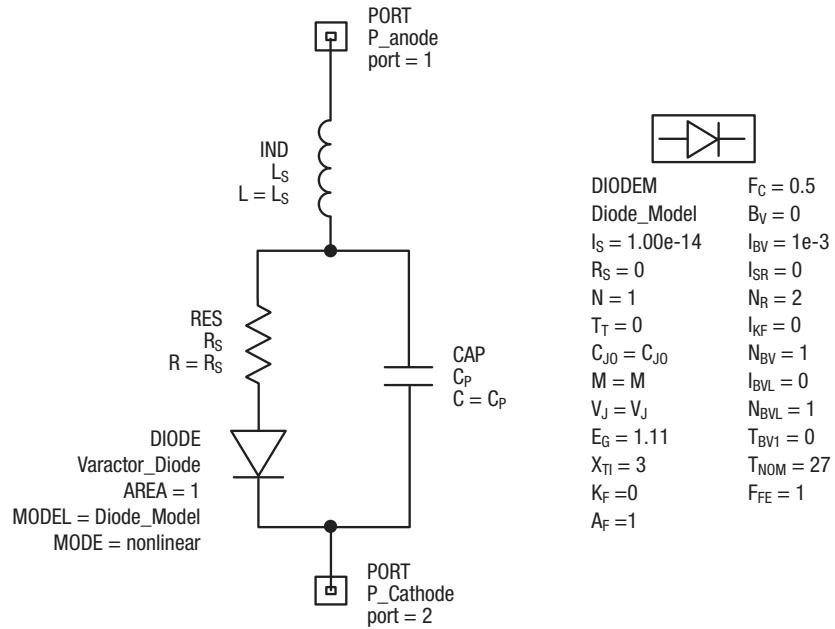


Figure 2. SPICE Model

Table 4. SPICE Model Parameters

Part Number	C _{J0} (pF)	V _J (V)	M	C _p (pF)	R _s (Ω)	L _s (nH)
SMV1283-011LF	19	3	2.6	0.58	2.4	1.7
SMV1283-040LF	19	3	2.6	0.58	2.4	0.45

Table 5. Capacitance vs Reverse Voltage

Voltage (V_R) (V)	Typical Capacitance (C_T) (pF)
0	14.228
1	9.130
2	6.651
3	4.967
4	3.643
5	2.582
6	1.825
7	1.391
8	1.167
9	1.032
10	0.939
12	0.815
14	0.734
16	0.674
18	0.627
20	0.589
26	0.517

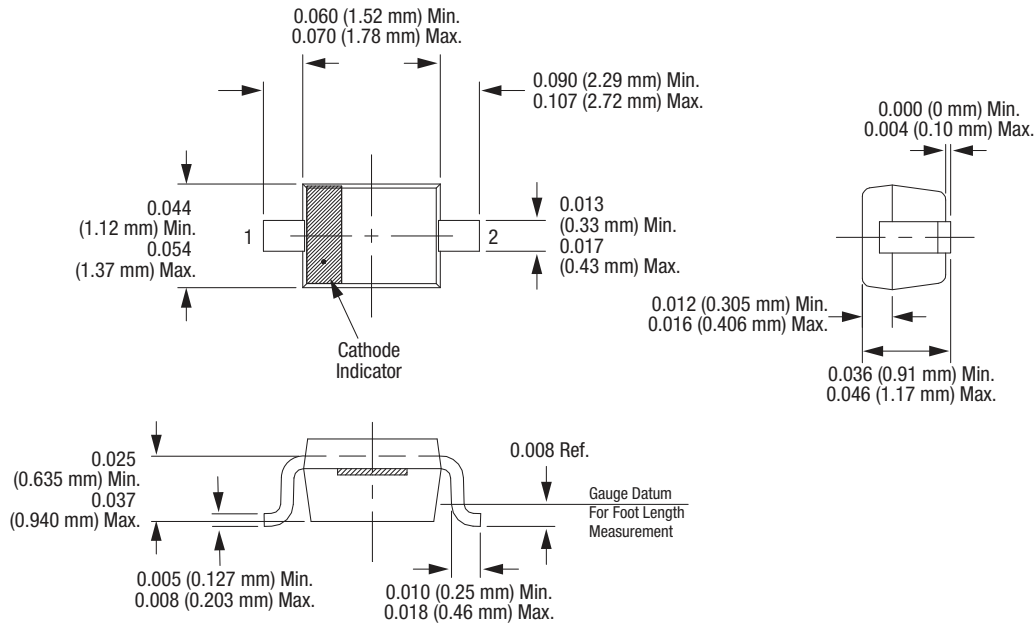
Package and Handling Information

Package dimensions and tape and reel dimensions for the SOD-323 are shown in Figures 3 and 4, respectively. Package dimensions and tape and reel dimensions for the SOD-882 are provided in Figures 5 and 6, respectively.

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 SMV1283 series are 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.

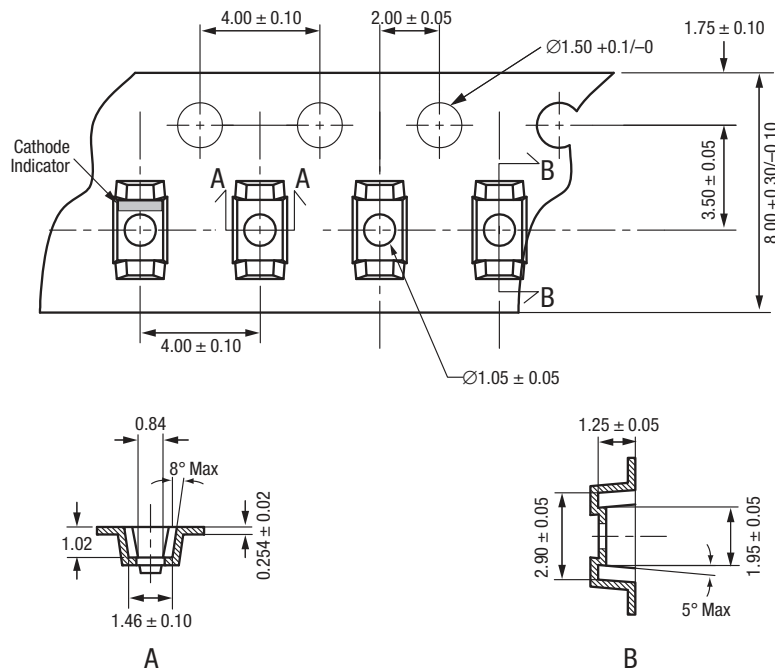
Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



Dimensions are in inches (millimeters shown in parentheses)

S1619

Figure 3. SOD-323 Package Dimensions

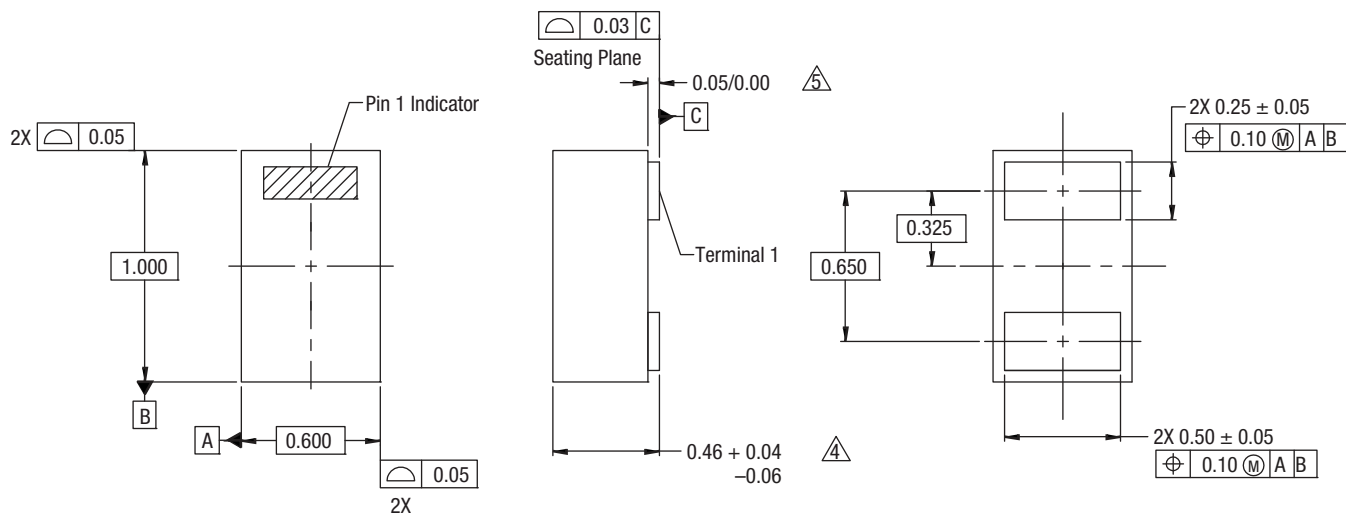


Notes:

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. A₀ and B₀ 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 4. SOD-323 Tape and Reel Dimensions

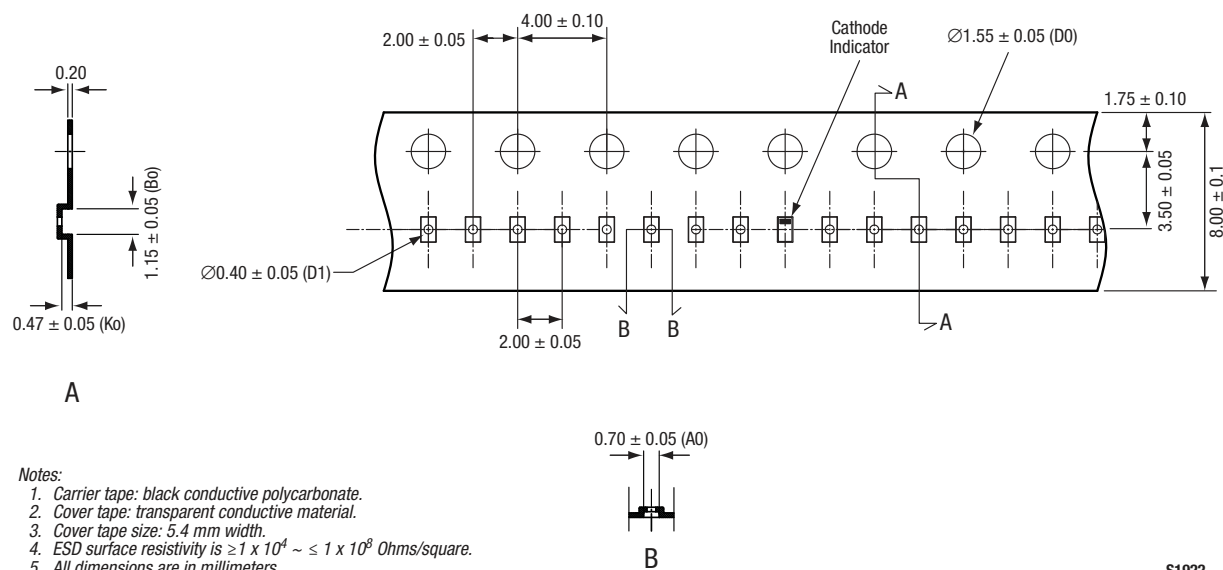


NOTES:

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 $\geq 1 \times 10^4 \sim \leq 1 \times 10^8$ Ohms/square.
5. All dimensions are in millimeters.

S1922

Figure 6. SOD-882 Tape and Reel Dimensions

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