

DATA SHEET

# SMV1130 Series: Hyperabrupt Junction Tuning Varactors

## Applications

- High-volume, low-cost systems
- 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 SMV1130 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 SMV1130 varactors.

**Table 1. Packaging and Marking**

		
Single	Single	Single
SC-79 Green™	SOD-882 Green™	SOD-323 Green™
<b>SMV1130-079LF</b> Marking: Cathode and XH	<b>SMV1130-040LF</b> Marking: HZ1	<b>SMV1130-011LF</b> Marking: HW
Ls = 0.70 nH	Ls = 0.45 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.

### Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1130 varactors are provided in Table 2. Electrical specifications are provided in Table 3. Typical capacitance values are listed in Table 4. Typical capacitance versus voltage performance for the SMV1130 varactors is illustrated in Figure 1.

The SPICE model for the SMV1130 varactor series is shown in Figure 2 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figures 3, 5 and 7, and tape and reel drawings are provided in Figures 4, 6, and 8.

### 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 SMV1130 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.

**Table 2. SMV1130 Series Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V <sub>R</sub>		26	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

**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. SMV1130 Series Electrical Specifications (Note 1)**  
(T<sub>OP</sub> = 25 °C, Unless Otherwise Noted)

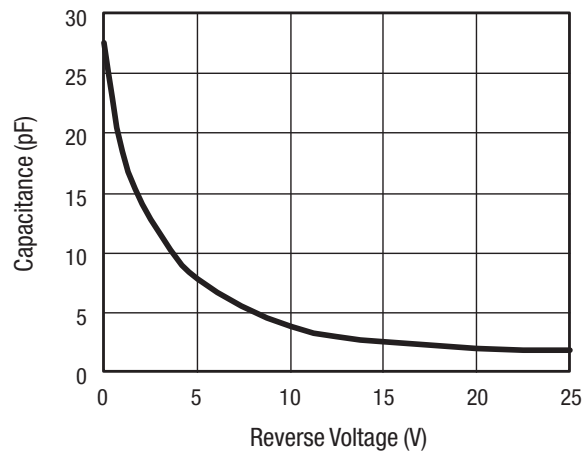
Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse current	I <sub>R</sub>	V <sub>R</sub> = 21 V			20	nA
Capacitance	C <sub>T</sub>	V <sub>R</sub> = 1 V, f = 1 MHz	17.4		21.2	pF
Capacitance ratio	C <sub>TR</sub>	V <sub>R</sub> = 1 V/3 V V <sub>R</sub> = 1 V/9 V	1.47 3.70		1.76 4.50	- -
Series resistance	R <sub>S</sub>	f = 500 MHz, V <sub>R</sub> = 1 V		0.5	0.8	Ω
Breakdown voltage	V <sub>BR</sub>	I <sub>R</sub> = 10 μA	26			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	27.6
1	18.5
2.5	12.8
5	7.9
10	3.8
15	2.6
20	2.0
25	1.8

**Typical Performance Characteristics**



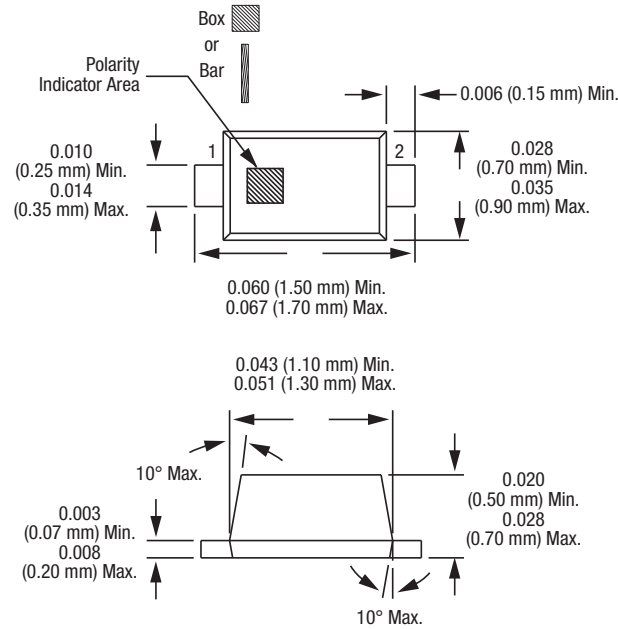
**Figure 1. Capacitance vs Reverse Voltage**



Figure 2. SPICE Model

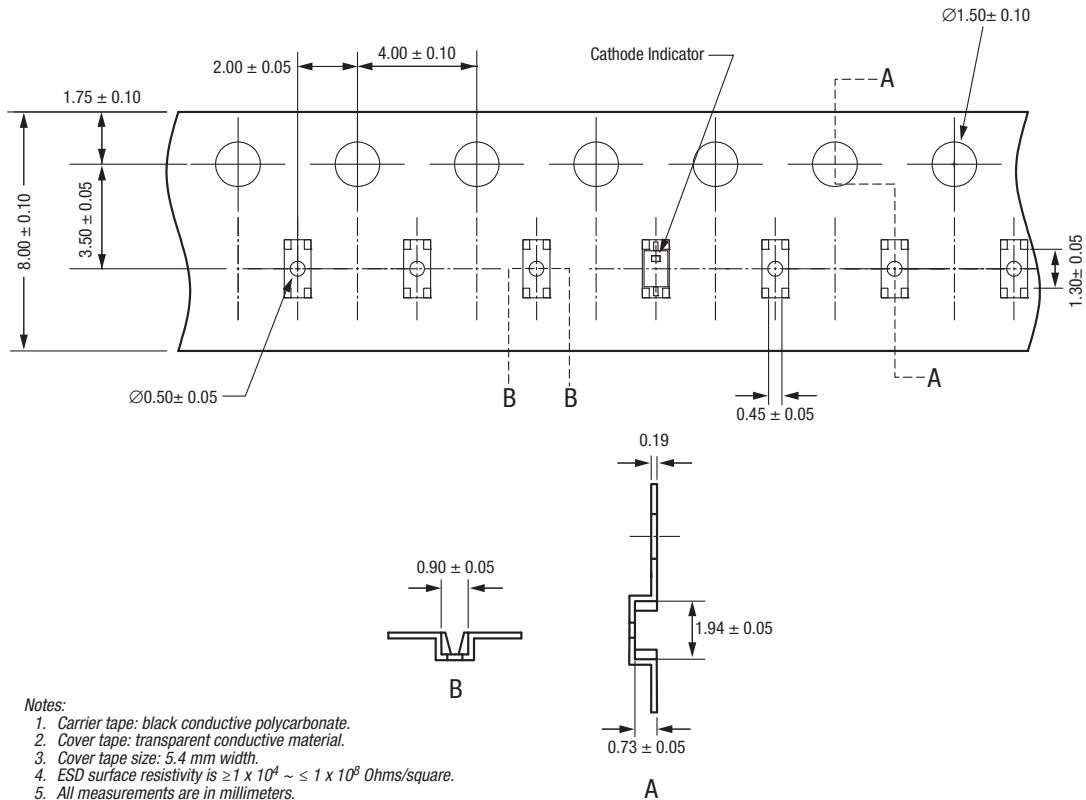
Table 5. SPICE Model Parameters

Part Number	C <sub>J0</sub> (pF)	V <sub>J</sub> (V)	M	C <sub>P</sub> (pF)	R <sub>S</sub> (Ω)	L <sub>S</sub> (nH)
SMV1130-079LF	25.8	10	3.7	1.8	0.8	0.70
SMV1130-040LF	25.8	10	3.7	1.8	0.8	0.45
SMV1130-011LF	25.8	10	3.7	1.8	0.8	1.50



Dimensions are in inches (millimeters shown in parentheses) S1652

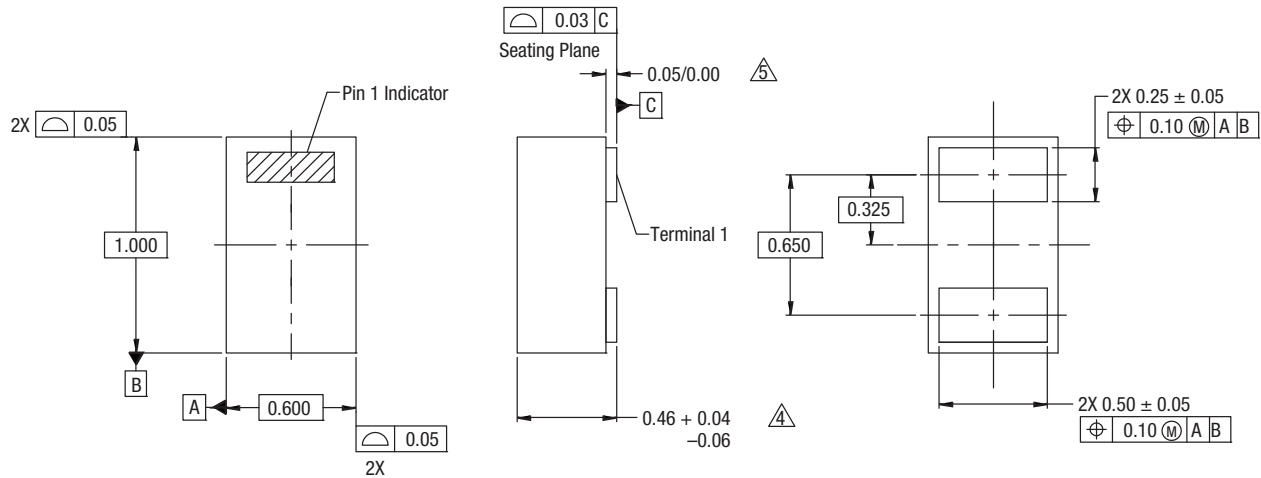
Figure 3. SC-79 Package Dimensions



- 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  $\geq 1 \times 10^4 \sim \leq 1 \times 10^9$  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

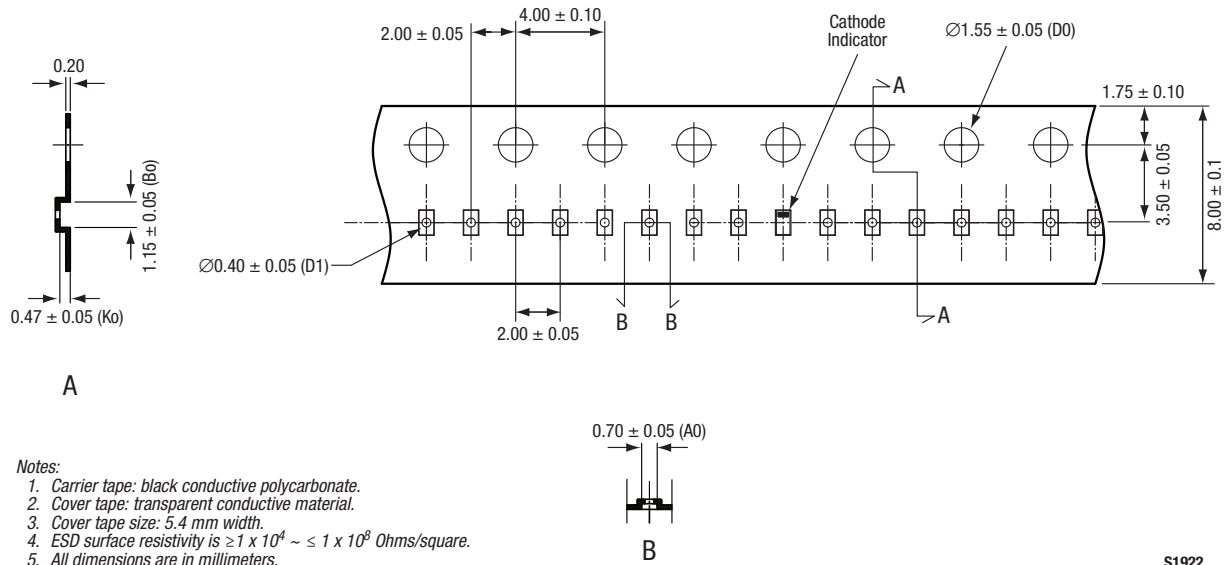


NOTES:

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

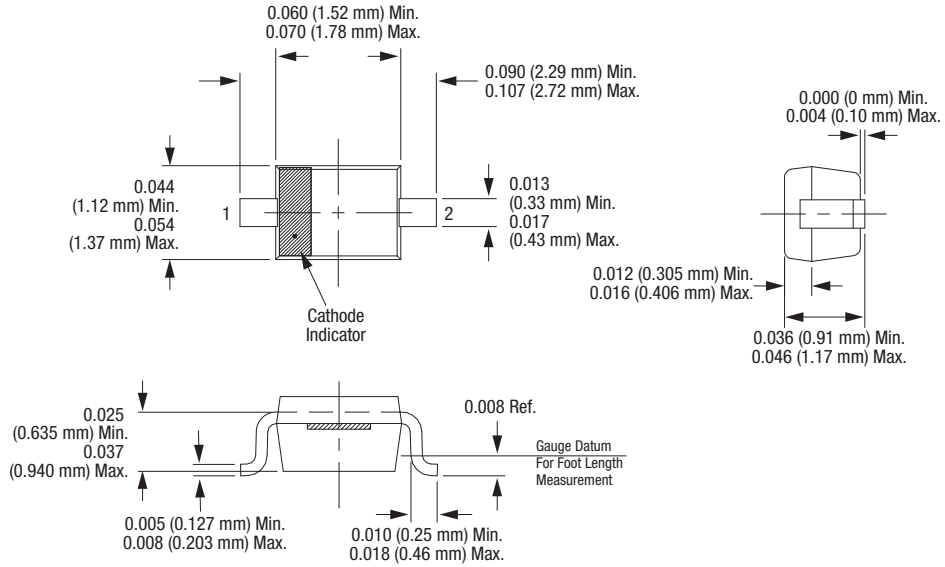


Notes:

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

S1922

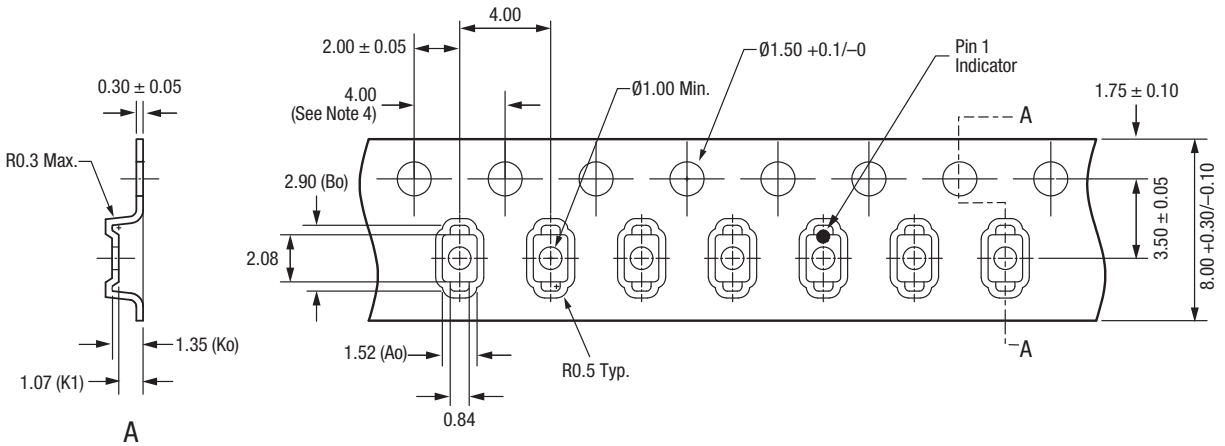
Figure 6. SOD-882 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses)

S1619

Figure 7. SOD-323 Package Dimensions



Notes:

1. Carrier tape: black conductive polystyrene.
2. Cover tape: transparent conductive PSA.
3. Cover tape size: 5.4 mm width.
4. 10 sprocket hole pitch cumulative tolerance:  $\pm 0.20$  mm.
5. All measurements are in millimeters.

S2910

Figure 8. SOD-323 Tape and Reel Dimensions

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