



SMV1130-040LF and SMV1130-079LF: 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
- For RoHS and other product compliance information, see the [Skyworks Certificate of Conformance](#).

Description

The SMV1130 surface mount varactor diodes are designed for very high capacitance tuning ratios with a low series resistance, making them attractive for wideband Voltage-Controlled Oscillator (VCO) applications.



Figure 1. SMV1130 Packages

Table 1. Packaging and Marking

| |
|---|
| |
| Single |
| SOD-882 |
| SMV1130-040LF Marking: HZ1 |
| LS = 0.45 nH |
| |
| Single |
| SC-79 |
| SMV1130-079LF Marking: Cathode and XH |
| LS = 0.70 nH |

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 2.

The SPICE model for the SMV1130 varactor series is shown in Figure 3 and the associated model parameters are provided in Table 5.

Package and tape and reel dimensions are shown in Figures 4 through 7.

Electrical Specifications

Table 2. Absolute Maximum Ratings¹

| Parameter | Symbol | Minimum | Maximum | Units |
|-----------------------|------------------|---------|---------|-------|
| Reverse voltage | V _R | | 26 | 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 |

1. Exposure to maximum rating conditions for extended periods may reduce device reliability. Exceeding any of the limits listed here may result in permanent damage to the device.

ESD Handling: Industry-standard ESD handling precautions must be adhered to at all times to avoid damage to this device.

Table 3. SMV1130 Series Specifications¹
(T_{OP} = 25 °C, Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Min | Typical | Max | Units |
|-------------------|-----------------|--|--------------|---------|--------------|--------|
| Reverse current | I _R | V _R = 21 V | | | 20 | nA |
| Capacitance | C _T | V _R = 1 V, f = 1 MHz | 17.4 | | 21.2 | pF |
| Capacitance ratio | C _{TR} | V _R = 1 V/3 V V _R = 1 V/9 V | 1.47 3.70 | | 1.76 4.50 | - - |
| Series resistance | R _S | f = 500 MHz, V _R = 1 V | | 0.5 | 0.8 | Ω |
| Breakdown voltage | V _{BR} | I _R = 10 μA | 26 | | | V |

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

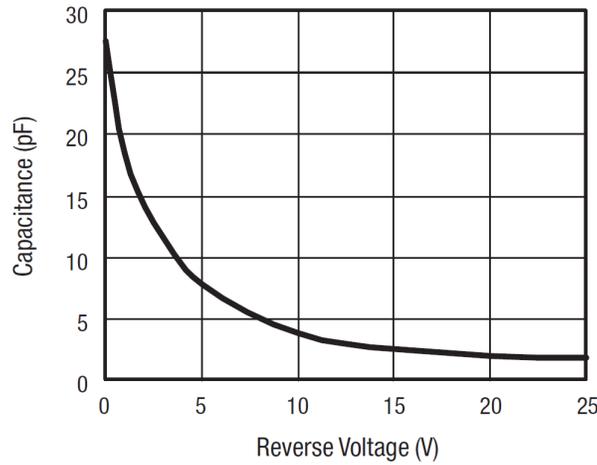


Figure 2. Capacitance vs Reverse Voltage

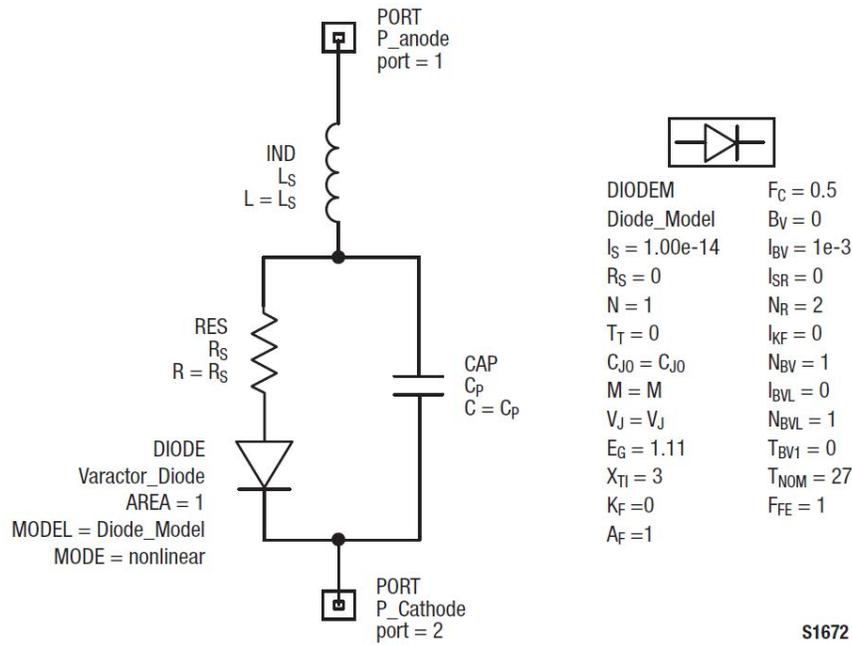


Figure 3. SPICE Model

Table 5. SPICE Model Parameters

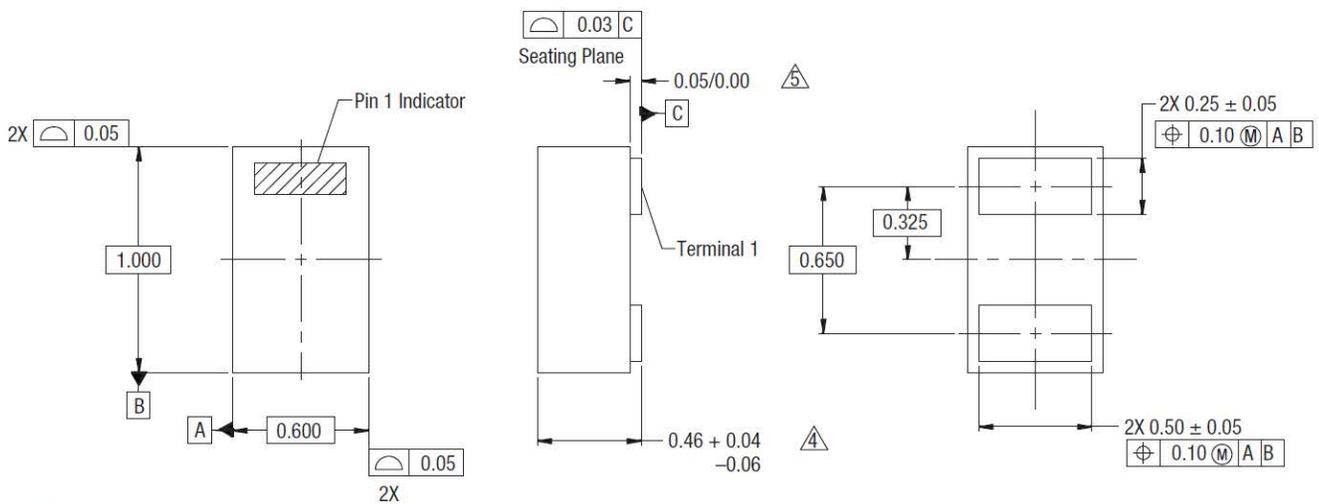
| Part Number | C _{J0} (pF) | V _J (V) | M | C _P (pF) | R _S (Ω) | L _S (nH) |
|---------------|----------------------|--------------------|-----|---------------------|--------------------|---------------------|
| SMV1130-040LF | 25.8 | 10 | 3.7 | 1.8 | 0.8 | 0.45 |
| SMV1130-079LF | 25.8 | 10 | 3.7 | 1.8 | 0.8 | 0.70 |

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.

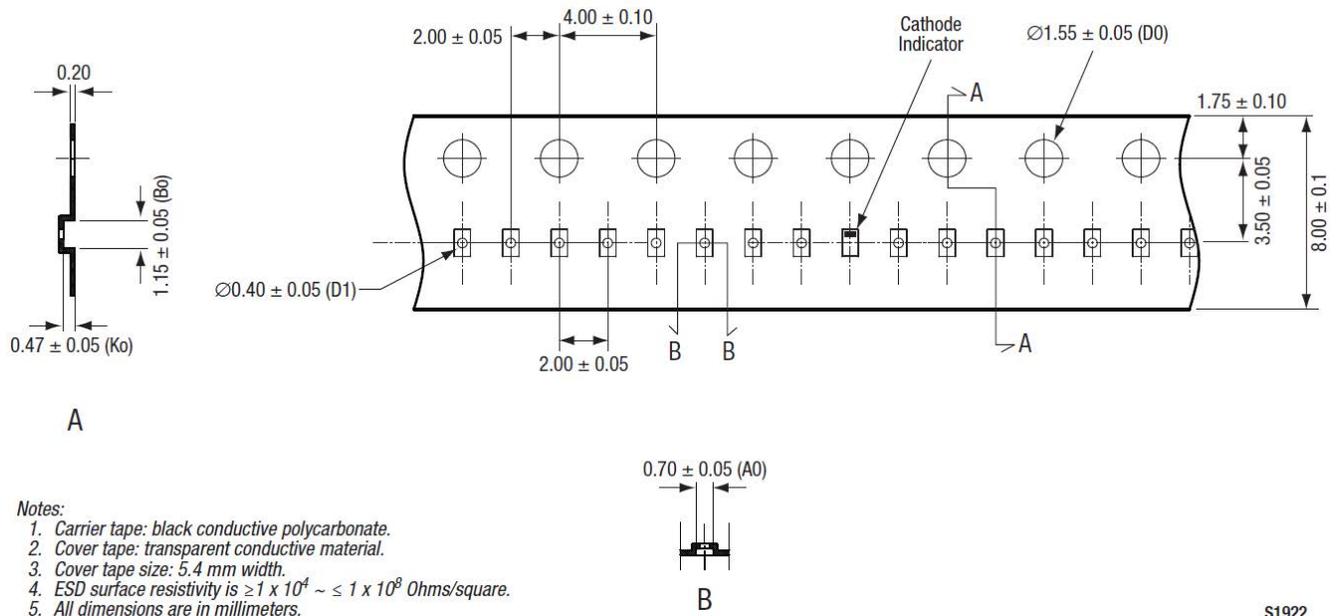
Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



- 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.

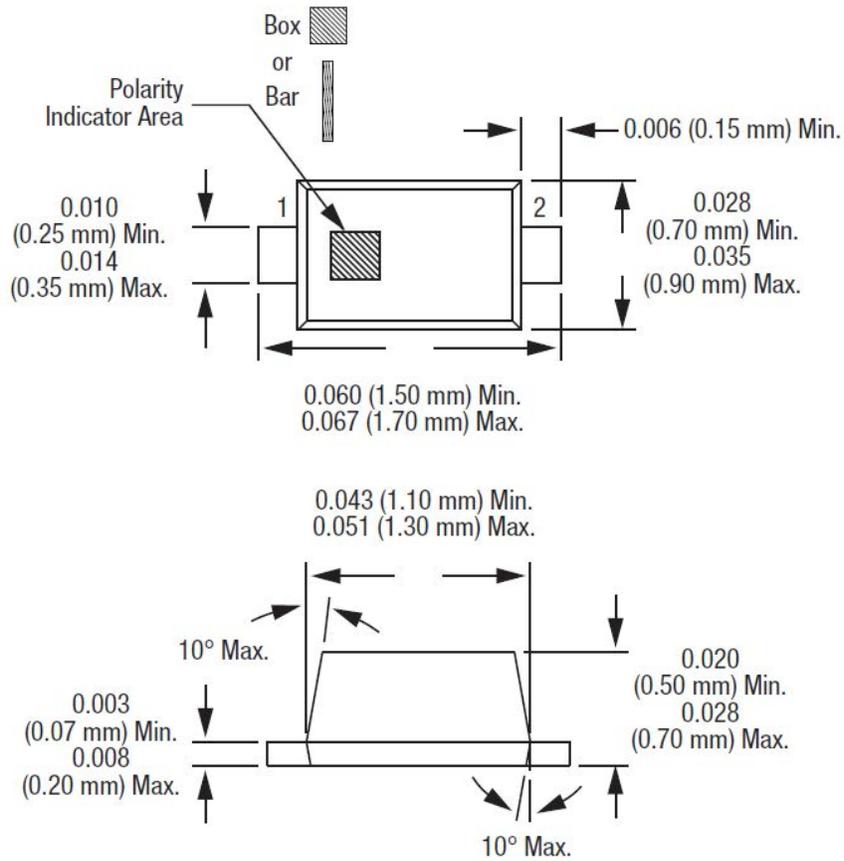
Y1410

Figure 4. SOD-882 Package Dimensions



S1922

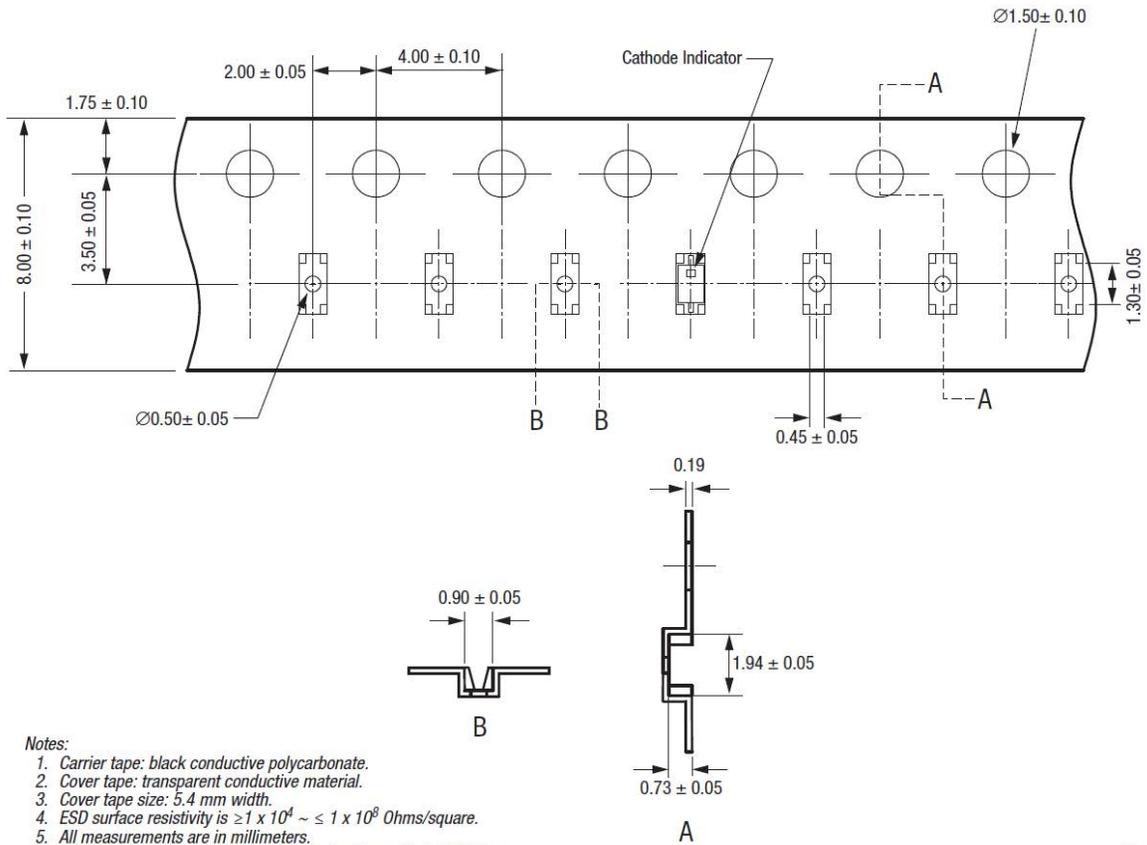
Figure 5. SOD-82 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses)

S1652

Figure 6. 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 $\geq 1 \times 10^4 \sim \leq 1 \times 10^8$ Ohms/square.
 5. All measurements are in millimeters.
 6. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.

S2188

Figure 7. SC-79 Tape and Reel Dimensions

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