

**DATA SHEET**

# SMV1281 Series: Hyperabrupt Junction Tuning Varactors

**Applications**

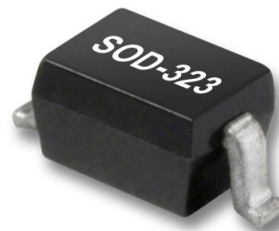
- Wideband VCOs
- High-volume, low-cost systems

**Features**

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





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 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<br>Green™  | SOD-323<br>Green™   |
| <b>SMV1281-079LF</b><br>Marking: Cathode and YC                                      | <b>SMV1281-011LF</b><br>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.

## 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.

## 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 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.

**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    |
| Electrostatic discharge:             | ESD       |         |         |       |
| Charged Device Model (CDM), Class 4  |           |         | 2000    | V     |
| ESD Human Body Model (HBM), Class 3A |           |         | 4000    | V     |
| Man-Machine (MM) Model, Class C      |           |         | 400     | V     |

**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.

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

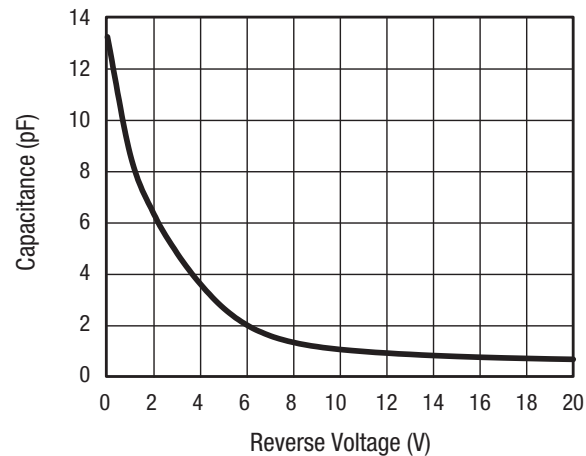
| Parameter         | Symbol   | Test Condition                            | Min        | Typical    | Max        | Units    |
|-------------------|----------|---|------------|------------|------------|----------|
| Reverse current   | $I_R$    | $V_R = 20\text{ V}$                       |            |            | 20         | nA       |
| Capacitance       | $C_T$    | $V_R = 1\text{ V}$<br>$V_R = 20\text{ V}$ | 7.8<br>0.6 | 8.6<br>0.7 | 9.5<br>0.8 | pF<br>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        |            | $\Omega$ |
| 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.

**Table 4. Capacitance vs Reverse Voltage**

| $V_R$<br>(V) | $C_T$<br>(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**

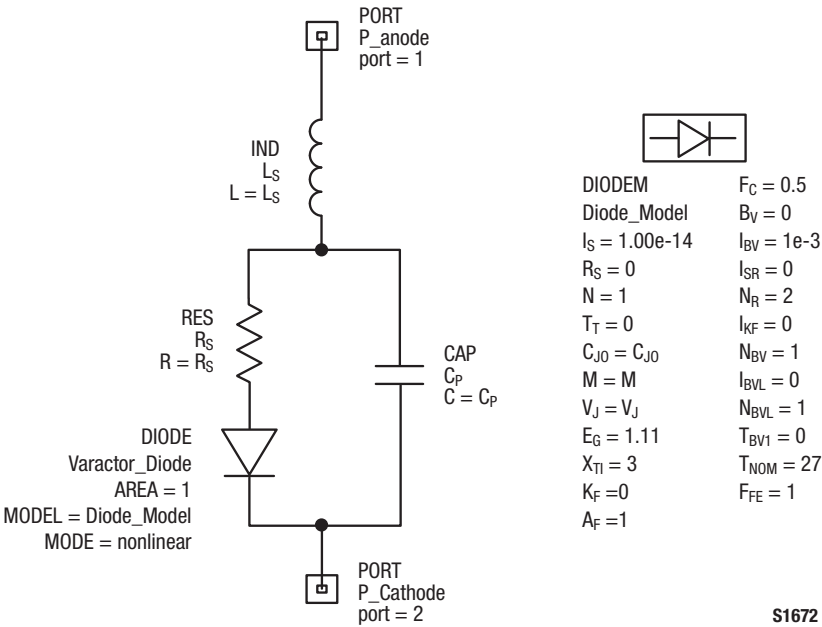


Figure 2. SPICE Model

Table 5. SPICE Model Parameters

| Part Number                    | CJ0 (pF) | VJ (V) | M | Cp (pF) | Rs (Ω) | Ls (nH) |
|--------------------------------|----------|--------|---|---------|--------|---------|
| SMV1281-011LF<br>SMV1281-079LF | 13       | 14     | 6 | 0.62    | 1.7    | 1.2     |

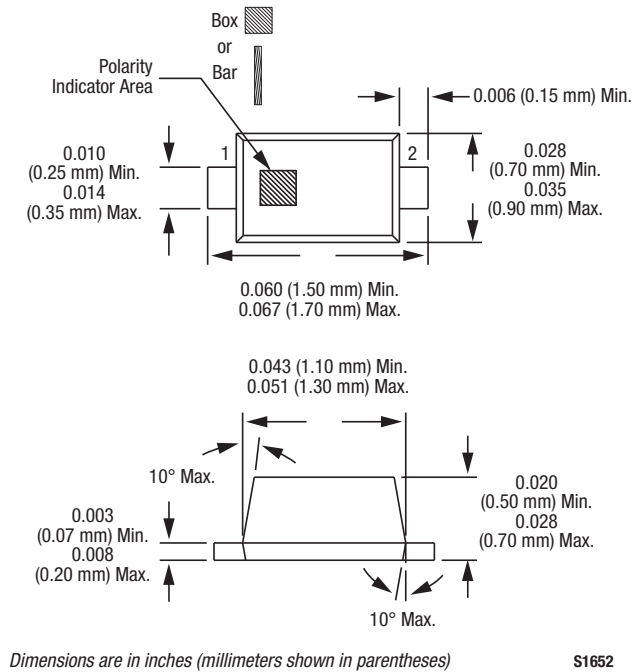


Figure 3. SC-79 Package Dimensions

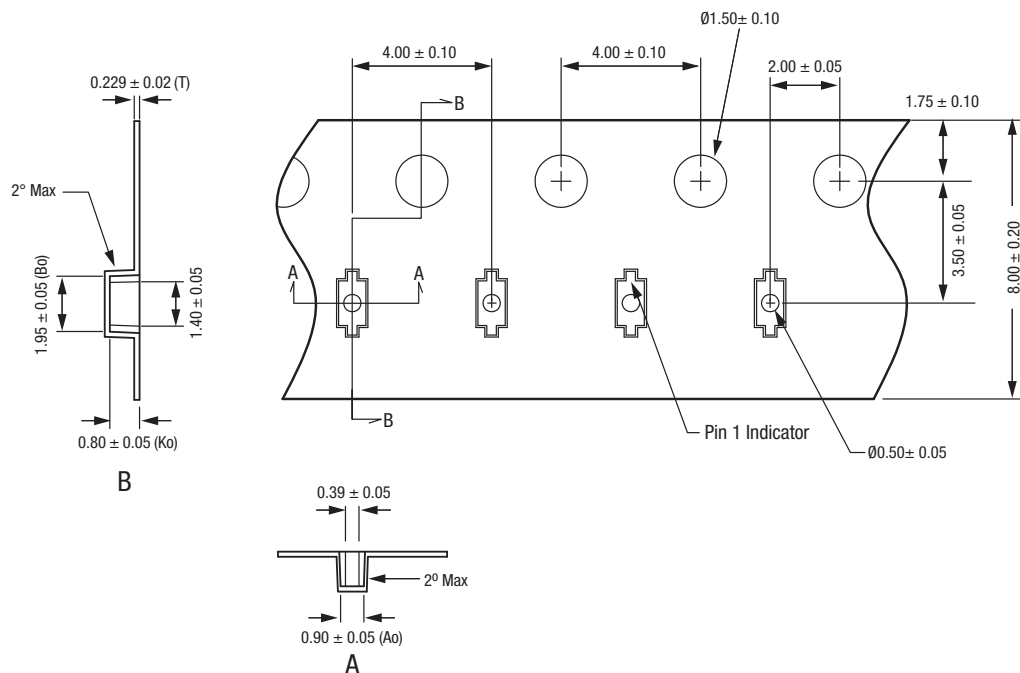
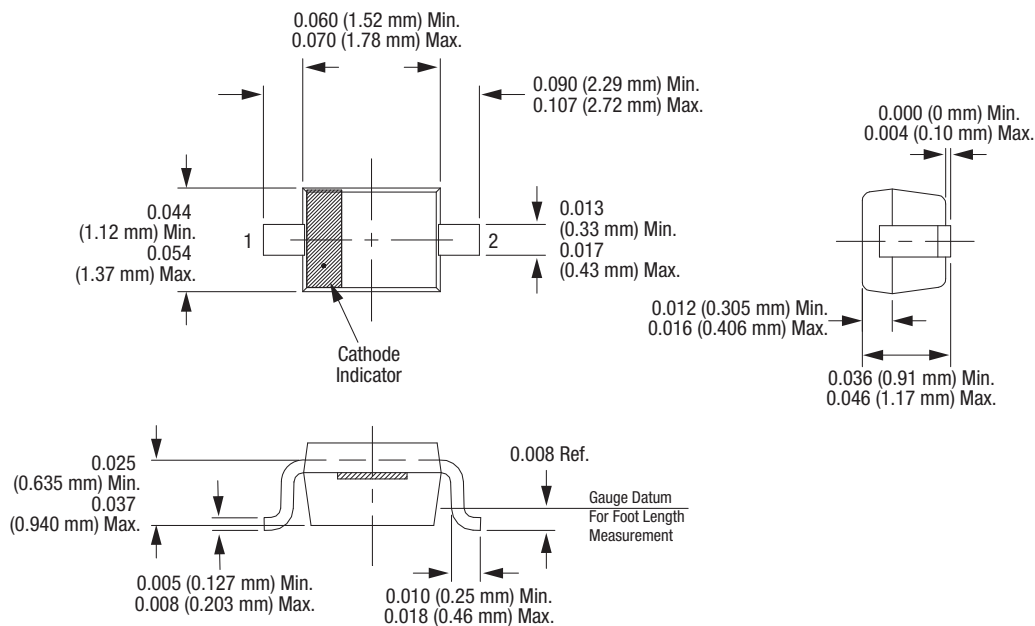


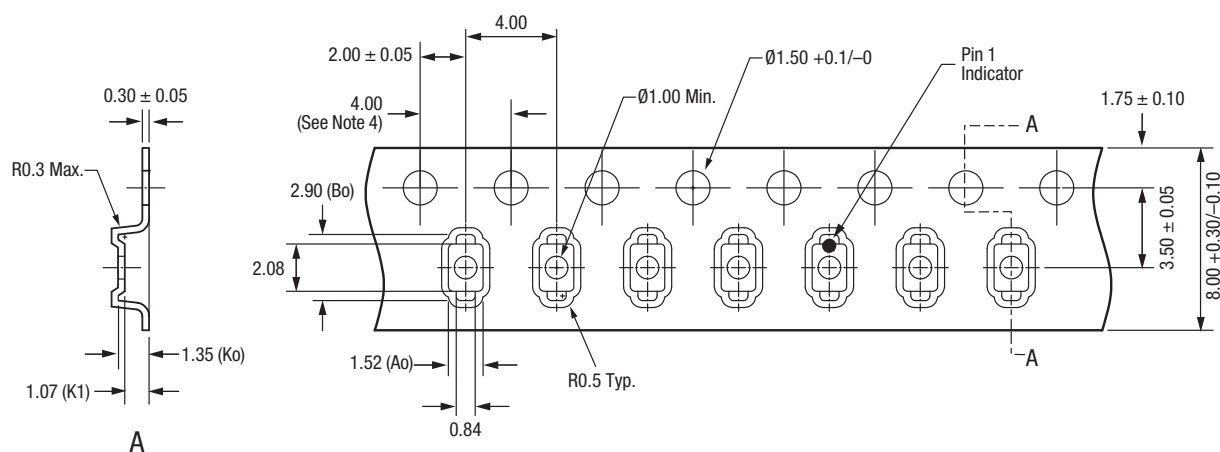
Figure 4. SC-79 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses)

S1619

Figure 5. SOD-323 Package Dimensions



Notes:

1. Carrier tape: black conductive 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 6. SOD-323 Tape and Reel Dimensions

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