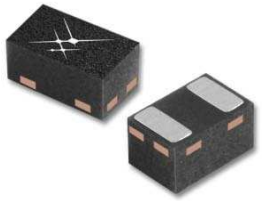
DATA SHEET

SMV1247-040LF and SMV1249-040LF: Surface Mount, 0402 Hyperabrupt Tuning Varactor Diodes

Applications

- Wide bandwidth VCOs
- Wide voltage range, tuned phase shifters and filters



Features

- High capacitance ratio: 0.3/4.7 = 10 typical (SMV1247-040LF) and 12 typical (SMV1249-040LF)
- High-Q at 50 MHz and reverse voltage = 3 V: 1500 typical (SMV1247-040LF) and 600 typical (SMV1249-040LF)
- Low series inductance: 0.45 nH typical
- Industry-standard 0402 footprint
- 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 SMV1247-040LF and SMV1249-040LF are silicon, surface mount hyperabrupt tuning varactor diodes designed for use as tuning elements in RF Voltage-Controlled Oscillators (VCOs), and voltage-tuned phase shifters and filters.

The typical capacitance ratio from 0.3 V to 4.7 V is 10 for the SMV1247-040LF and 12 for the SMV1249-040LF, which makes these two varactors suitable for octive bandwidth VCOs, wide voltage range phase shifters, and wideband voltage-controlled filters.

The SMV1247-040LF and SMV1249-040LF varactor diodes are provided in a surface mount package compatible with the industry-standard 0402 printed circuit board footprint.

Table 1. SMV1247-040LF and SMV1249-040LF Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Forward current	I_F		20	mA
Reverse voltage	V_R		15	V
Dissipated power @ 25 °C	P_D		250	mW
Storage temperature	T_{STG}	–55	+150	°C
Operating temperature	T_A	–40	+85	°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.*

Table 2. SMV1247-040LF and SMV1249-040LF Electrical Specifications (Note 1)
(T_A = +25 °C, Unless Otherwise Noted)

Part Number	Total Capacitance, V_R = 0.3 V (pF)		Total Capacitance, V_R = 1.0 V (pF)	Total Capacitance, V_R = 3.0 V (pF)	Total Capacitance, V_R = 4.7 V (pF)		Capacitance Ratio, $\frac{C_T @ 0.3\ V}{C_T @ 4.7\ V}$		Capacitance Ratio, $\frac{C_T @ 1.0\ V}{C_T @ 3.0\ V}$	Series Resistance, V_R @ 3 V, f = 500 MHz (Ω)	Q @ 3 V, f = 50 MHz
	Min.	Typical	Typical	Typical	Typical	Max.	Min.	Typical	Typical	Typical	Typical
SMV1247	6.5	7.0	4.4	0.95	0.70	0.78	9.5	10.0	4.6	2.6	1500
SMV1249	28	31	18.2	3.40	2.6	2.8	11.0	12.1	5.3	1.2	600

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1247-040LF and SMV1249-040LF varactor diodes are provided in Table 1. Electrical specifications are provided in Table 2. Typical capacitance values are listed in Table 3.

Typical performance characteristics of the SMV1247-040LF and SMV1249-040LF varactor diodes are illustrated in Figures 1 and 2.

Package Dimensions

The PCB layout footprint for the SMV1247-040LF and SMV1249-040LF varactor diodes is provided in Figure 3. Typical case markings are shown in Figure 4. Package dimensions are provided in Figure 5. Tape and reel dimensions are provided in Figure 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 SMV1247-040LF and SMV1249-040LF varactor diodes 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 these products, whether it is done manually or in a production solder reflow environment. Production quantities of these products are shipped in a standard tape and reel format.

Table 3. Capacitance vs Reverse Voltage

V_R (V)	C_T (pF)	
	SMV1247-040LF	SMV1249-040LF
0	8.86	37.35
0.5	6.17	25.88
1.0	4.37	18.18
1.5	2.96	12.08
2.0	1.88	7.27
2.5	1.22	4.44
3.0	0.95	3.40
3.5	0.83	2.96
4.0	0.77	2.72
4.5	0.73	2.51
5.0	0.70	2.38
5.5	0.68	2.30
6.0	0.67	2.24
6.5	0.66	2.19
7.0	0.65	2.14
7.5	0.64	2.09
8.0	0.64	2.03

Typical Performance Characteristics

(T_A = 25 °C, Unless Otherwise Noted)

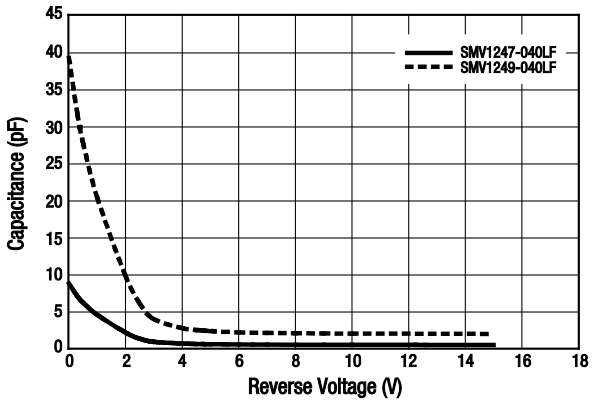


Figure 1. Capacitance vs Reverse Voltage

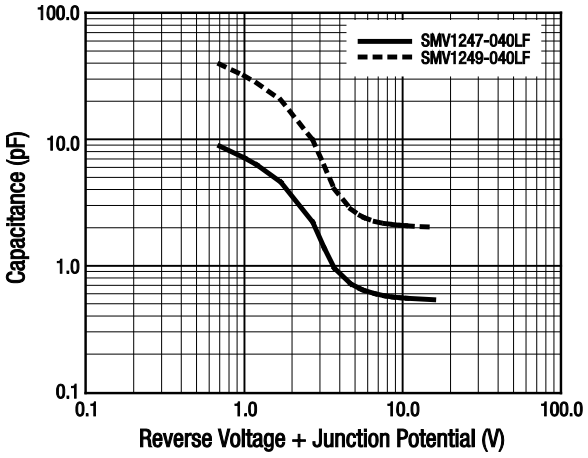


Figure 2. Capacitance vs Reverse Voltage Plus Junction Potential

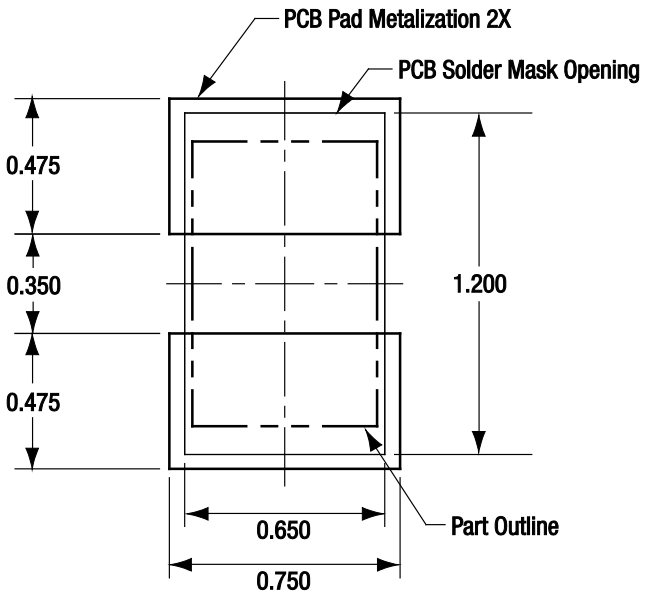


Figure 3. SMV1247-040LF and SMV1249-040LF PCB Layout Footprint

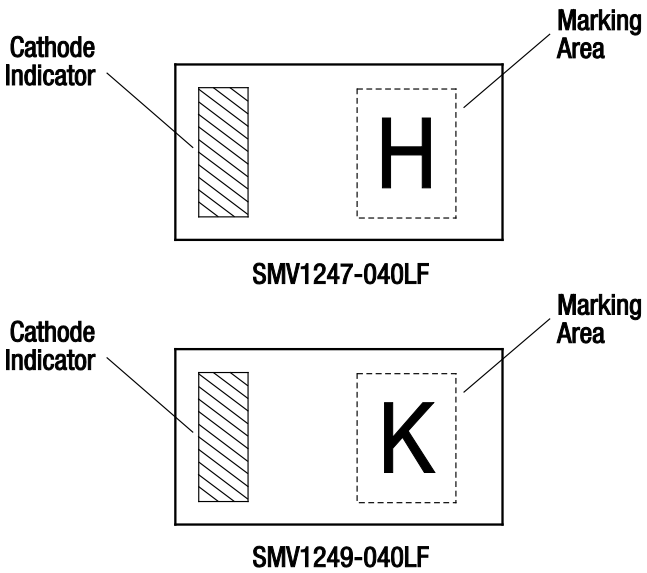


Figure 4. SMV1247-040LF and SMV1249-040LF Typical Case Markings (Top View)

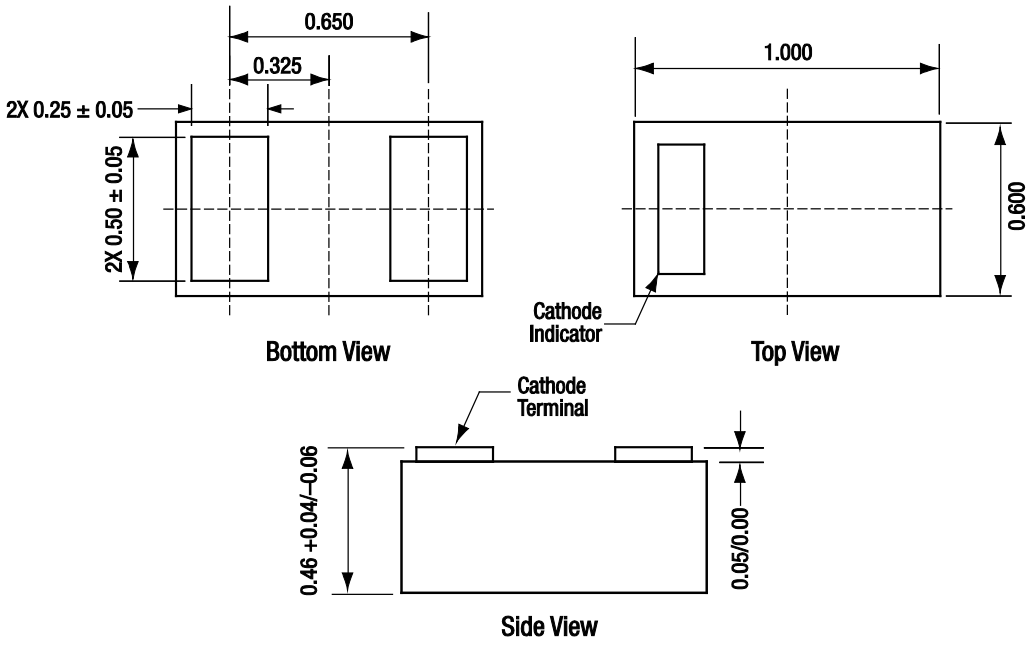
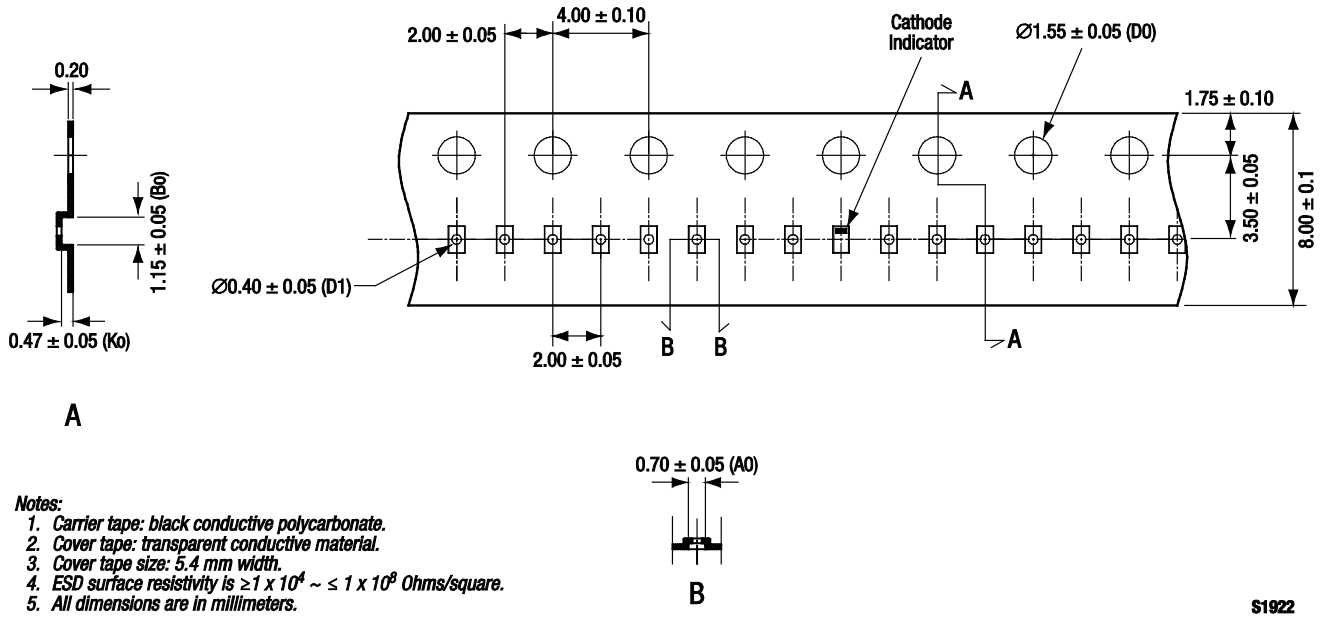


Figure 5. SMV1247-040LF and SMV1249-040LF Package Dimensions



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 ≥1 x 10^4 ~ ≤ 1 x 10^8 Ohms/square.*
5. *All dimensions are in millimeters.*

Figure 6. SMV1247-040LF and SMV1249-040LF Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number
SMV1247-040LF and SMV1249-040LF Varactor Diodes	SMV1247-040LF SMV1249-040LF