

DATA SHEET

SMV2022–SMV2023: Hyperabrupt Junction Tuning Varactors

Features

- Low series resistance
- High capacitance ratio at low reverse voltage
- Multiple packages: SOT-23 and SOD-323
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020
- Designed for high-volume, low-cost battery applications
- Available in tape and reel packaging



Description

The SMV2022 and SMV2023 devices are silicon hyperabrupt junction varactor diodes. The specified high capacitance ratio and low R_S of these varactors make them attractive for low phase noise VCOs in wireless systems.

NEW Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.



Absolute Maximum Ratings

Characteristic	Value
Reverse voltage (V_R)	22 V
Forward current (I_F)	20 mA
Power dissipation (P_D)	250 mW
Storage temperature (T_{ST})	-55 °C to +150 °C
Operating temperature (T_{OP})	-55 °C to +125 °C
ESD human body model	Class 0




Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.


CAUTION: Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) 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 must be employed at all times.

Electrical Specifications at 25 °C

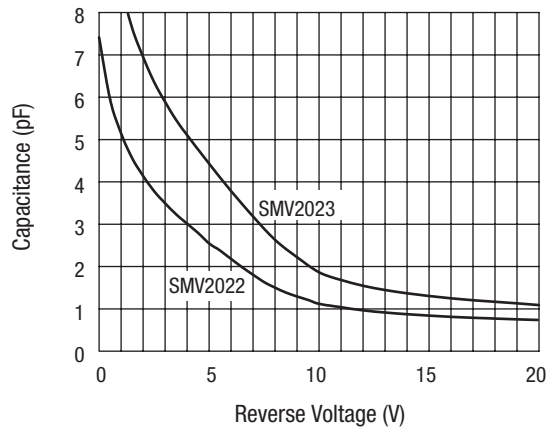
Part Number	$C_T @ 4 V$ (pF)		$C_T @ 20 V$ (pF)		$\frac{C_T @ 4 V}{C_T @ 20 V}$ (Ratio)	$Q @ 4 V$
	Min.	Max.	Min.	Max.	Min.	50 MHz
SMV2022	2.5	3.3	0.6	0.85	3	500
SMV2023	4.4	5.4	0.9	1.2	4.2	500

Reverse current I_R ($V_R = 16$ nA): 50 nA maximum.
 Performance is guaranteed only under the conditions listed in the Electrical Specifications table.

		
Single	Common Cathode	Single
SOT-23	SOT-23	SOD-323
	SMV2022-004 Marking: VJ3	
	SMV2022-004LF Marking: DJ3	
SMV2023-001 Marking: VK1	SMV2023-004 Marking: VK3	SMV2023-011 Marking: VK1
SMV2023-001LF Marking: DK1	SMV2023-004LF Marking: DK3	SMV2023-011LF Marking: DK1
$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 1.5$ nH

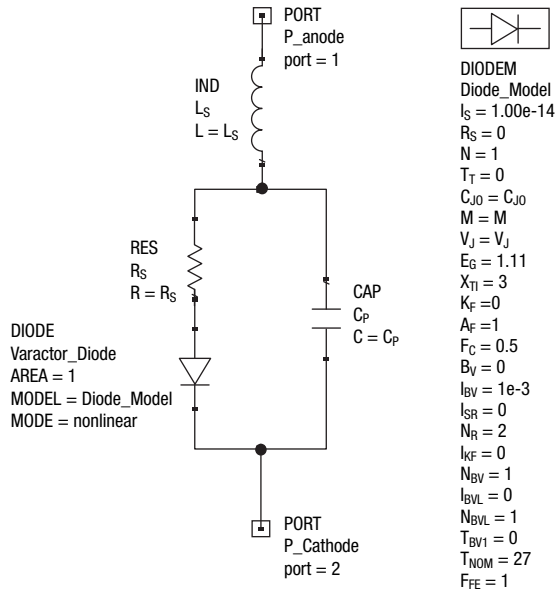
 LF denotes lead (Pb)-free, RoHS-compliant packaging option as an alternative to our standard tin/lead (Sn/Pb) packaging.

Typical Performance Data



Capacitance vs. Voltage

SPICE Model



Part Number	C _{J0} (pF)	V _J (V)	M	C _P (pF)	R _S (Ω)	L _S (nH)
SMV2022	7.3	4	1.4	0	2.2	1.5
SMV2023	12.23	4	1.4	0	1.6	1.5

Capacitance vs. Voltage

V _R (V)	SMV2022 C _T (pF)	SMV2023 C _T (pF)
0	7.41	12.33
0.5	5.94	9.9
1	5.14	8.6
1.5	4.56	7.62
2	4.14	6.94
2.5	3.78	6.34
3	3.49	5.88
3.5	3.23	5.45
4	3.01	5.09
5	2.54	4.42
6	2.18	3.77
7	1.8	3.18
8	1.5	2.63
9	1.29	2.21
10	1.11	1.86
11	1.03	1.68
12	0.96	1.54
13	0.91	1.44
14	0.87	1.37
15	0.83	1.3
16	0.81	1.25
17	0.78	1.2
18	0.76	1.16
19	0.75	1.13
20	0.73	1.09

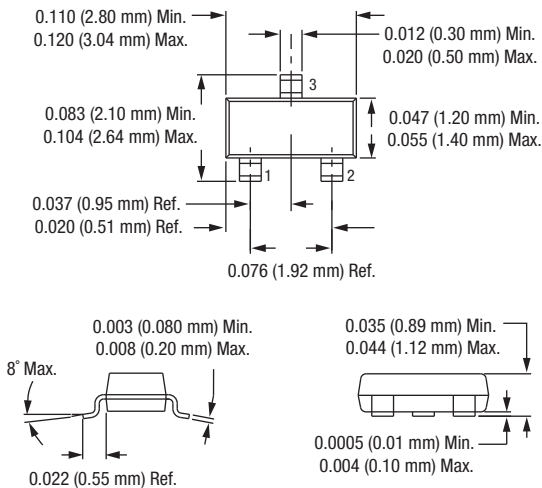
Recommended Solder Reflow Profiles

Refer to the [“Recommended Solder Reflow Profile”](#) Application Note.

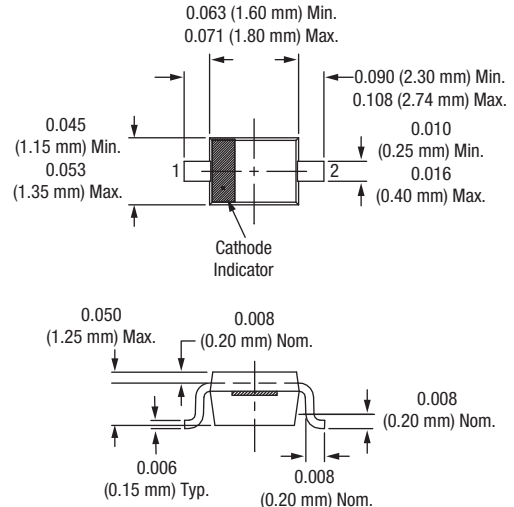
Tape and Reel Information

Refer to the [“Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation”](#) Application Note.

SOT-23



SOD-323



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