

DATA SHEET

SMV1702-011LF Hyperabrupt Junction Tuning Varactor

Applications

- Low-noise and wideband UHF and VHF VCOs
- High-volume, low-voltage VCOs

Features

- Low series resistance
- High capacitance ratio
- Small footprint SOD-323 package (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 SMV1702-011LF silicon hyperabrupt junction varactor diode is specifically designed for battery operation. The high capacitance ratio and low series resistance make this varactor appropriate for low-noise Voltage Controlled Oscillators (VCOs) used at frequencies in wireless systems.

Table 1 describes the SOD-323 package and marking of the SMV1702-011LF varactor.

Table 1. Packaging and Marking


Single
SOD-323 Green™
SMV1702-011LF Marking: HJ
$L_s = 1.5 \text{ nH}$



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.

Table 2. SMV1702-011LF Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
Reverse voltage	V_R			10	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

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. The SMV1702-011LF varactor is a Class 0 Human Body Model (HBM) ESD device.

Table 3. SMV1702-011LF Electrical Specifications (Note 1)
($T_{OP} = 25\text{ °C}$, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse current	I_R	$V_R = 8\text{ V}$		<0.01	20	nA
Reverse breakdown voltage	V_{BR}	$I_R = 10\text{ }\mu\text{A}$	10			V
Capacitance	C_T	$F = 1\text{ MHz}$				
		$V_R = 0.1\text{ V}$	90	100	110	pF
		$V_R = 2\text{ V}$	41	46	50	pF
		$V_R = 4\text{ V}$	22	25	29	pF
Capacitance ratio	C_{TR}	$C_T (0.1\text{ V}/4\text{ V})$	3.6	4.0		—
Series resistance	R_S	$V_R = 5\text{ V}, F = 470\text{ MHz}$		0.45	1.25	Ω

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

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMV1702-011LF varactor is provided in Table 2. Electrical specifications are provided in Table 3. Typical capacitance values are listed in Table 4. Typical capacitance vs voltage performance for the SMV1702-011LF varactor is illustrated in Figure 1.

The SPICE model for the SMV1702-011LF varactor is shown in Figure 2 and the associated model parameters are provided in Table 5.

Package dimensions are shown in Figure 3, and tape and reel dimensions are provided in Figure 4.

Package and Handling Information

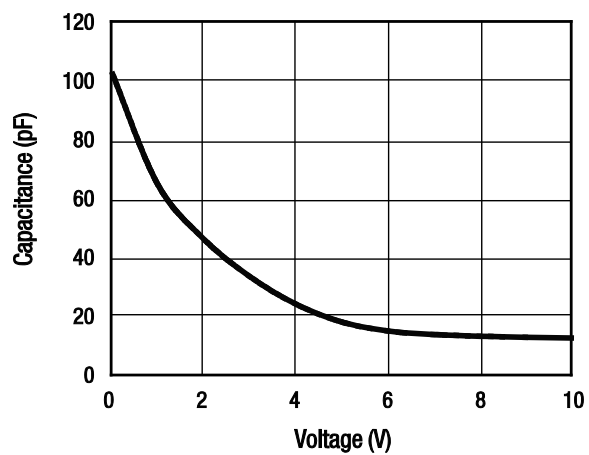
Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SMV1702-011LF varactor is 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 4. Capacitance vs Reverse Voltage

Voltage (V_R) (V)	Typical Capacitance (C_T) (pF)
0	103.3
1	65.1
2	46.38
3	33.57
4	24.20
5	18.08
6	15.01
7	13.80
8	13.21
9	12.84
10	12.58

Typical Performance Characteristics**Figure 1. Capacitance vs Voltage**

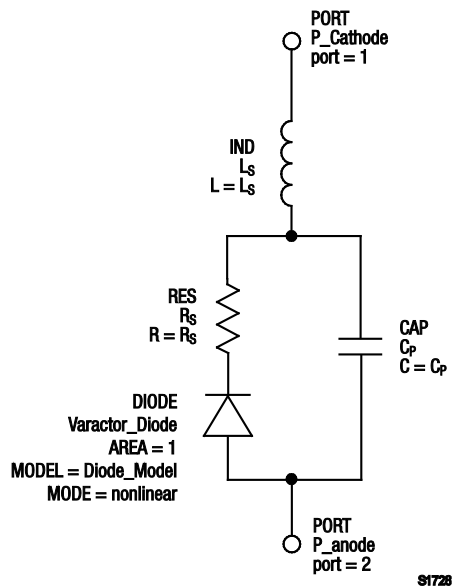


Figure 2. SPICE Model

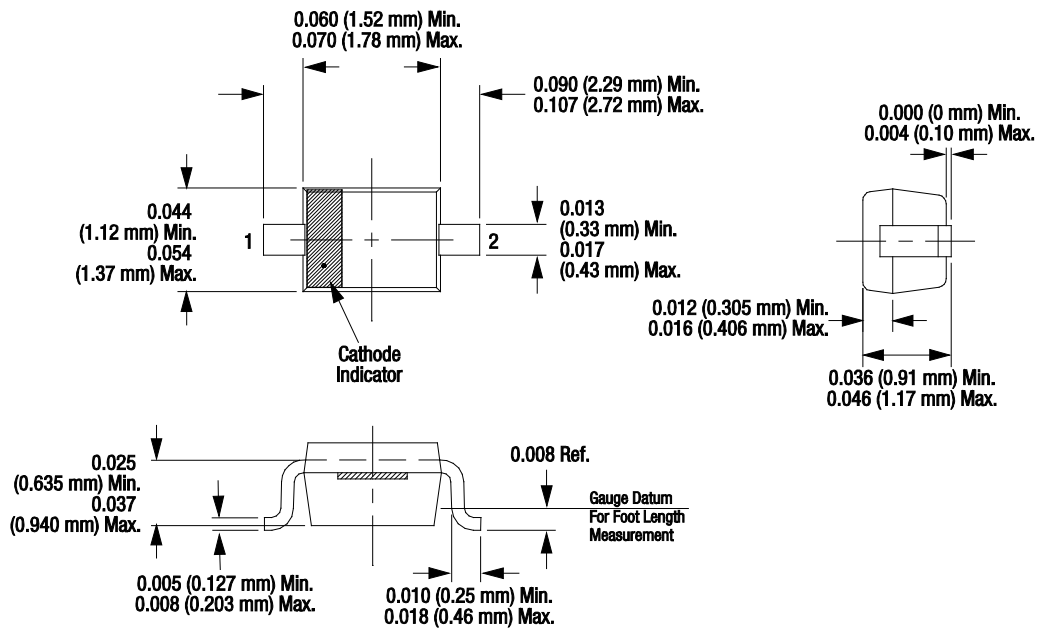
Table 5. SPICE Model Parameters (1 of 2)

Parameter	Description	Unit	Value	Default
IS	Saturation current (with N, determines the DC characteristics of the diode)	A	–	1e–14
Rs	Series resistance	–	0.5	0
N	Emission coefficient (with IS, determines the DC characteristics of the diode)	–	–	1
TT	Transit time	s	–	0
Cj0	Zero-bias junction capacitance (with Vj and M, defines nonlinear junction capacitance of the diode)	F	92.65e–12	0
Vj	Junction potential (with Cj0 and M, defines nonlinear junction capacitance of the diode)	V	25	1
M	Grading coefficient (with Cj0 and Vj, defines nonlinear junction capacitance of the diode)	–	12.76	0.5
Eg	Energy gap (with XTI, helps define the dependence of IS on temperature)	eV	–	1.11
XTI	Saturation current temperature exponent (with Eg, helps define the dependence of IS on temperature)	–	–	3
KF	Flicker noise coefficient	–	–	0
AF	Flicker noise exponent	–	–	1
FC	Forward-bias depletion capacitance coefficient	–	–	0.5
Bv	Reverse breakdown voltage	V	18	–
Ibv	Current at reverse breakdown voltage	A	1e–5	1e–3
ISR	Recombination current parameter	A	–	0
NR	Emission coefficient for ISR	–	–	2
IKF	High-injection knee current	A	–	–
NBV	Reverse breakdown ideality factor	–	–	1

Table 5. SPICE Model Parameters (2 of 2)

Parameter	Description	Unit	Value	Default
IBVL	Low-level reverse breakdown knee current	A	–	0
NBVL	Low-level reverse breakdown ideality factor	–	–	1
TNOM	Nominal ambient temperature at which these model parameters were derived	°C	–	27
FFE	Flicker noise frequency exponent	–	–	1
Cpkg		pF	10.36	–
LS		nH	1.5	–

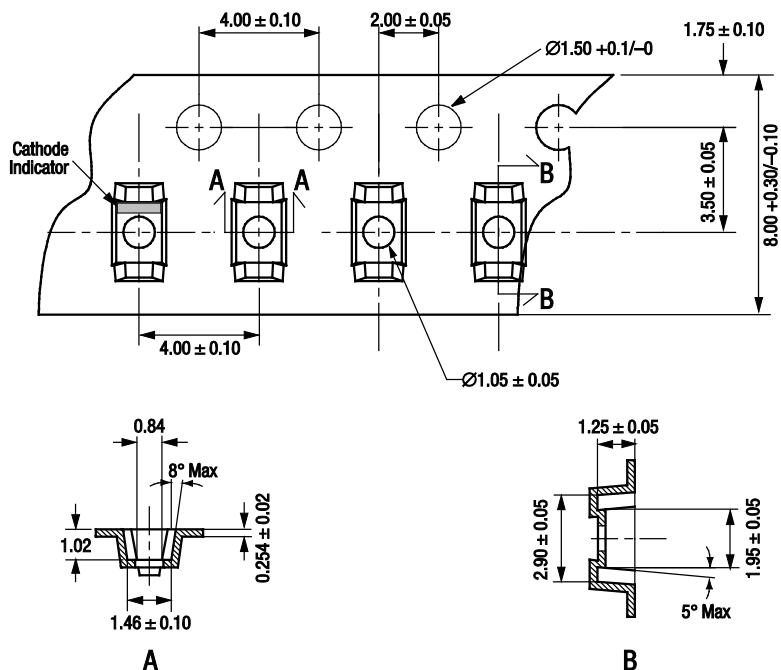
Note: This Table contains typical SPICE parameters for the SMV1702-011LF. The default value should be used for any parameter for which the Value column is blank.



Dimensions are in inches (millimeters shown in parentheses)

S1619

Figure 3. SOD-323 Package Dimensions



Notes:

1. Carrier tape: black conductive polycarbonate or polystyrene.
2. Cover tape: transparent conductive material.
3. Cover tape size: 5.5 mm width.
4. ESD surface resistivity is $\geq 1 \times 10^6 \sim 1 \times 10^{11}$ Ohms/square.
5. 10 sprocket hole pitch cumulative tolerance: ± 0.20 mm.
6. A_o and B_o measured on plane 0.30 mm above bottom of the pocket.
7. All measurements are in millimeters.
8. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.

S2061

Figure 4. SOD-323 Tape and Reel Dimensions

Copyright © 2002-2007, 2009-2011 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks, the Skyworks symbol, and "Breakthrough Simplicity" are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at www.skyworksinc.com, are incorporated by reference.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9