

DATA SHEET

SKY13268-344LF: 300 kHz–3 GHz Medium Power GaAs SPDT Switch

Applications

- Transceiver transmit-receive switching in GSM, CDMA, WCDMA, WLAN, Bluetooth®, Zigbee®, land mobile radio base stations or terminal equipment
- General-purpose medium power switch in telecommunications applications

Features

- Broadband: 300 kHz–3 GHz
- Low insertion loss: 0.3 dB @ 900 MHz
- $P_{1\text{ dB}}$: 30 dBm typical @ 3 V
- Low distortion: IP3 43 dBm @ 3 V
- Low current consumption: < 100 μA @ 3 V
- Ultraminiature SOT-666 6-lead package
- Available lead (Pb)-free, RoHS-compliant, and Green MSL-1 @ 260 °C per JEDEC J-STD-020

Description

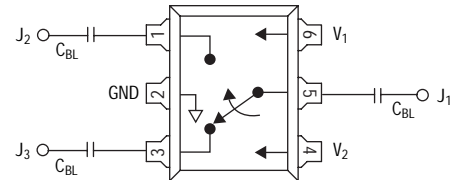
The SKY13268-344LF is a monolithic SPDT switch, fabricated using Skyworks proprietary GaAs pHEMTs as the switching elements. This wideband switch operates with RF signals from 300 kHz to 3 GHz. The RF signal paths within the SKY13268-344LF are fully bilateral. Ports J_2 and J_3 , RF input/output terminals are reflective.

Switching is controlled via two control voltage inputs, which are compatible with CMOS logic levels. Depending upon the logic voltage level applied to the control voltage pin, the common RF pin, J_1 , is connected to one of two switched RF pins (J_2 or J_3) via a low insertion loss path, while the path between the RF common and the other RF pin is in its high-isolation state.

DC power consumption is very low, 100 μA maximum with control voltage of 3 V. The switch can operate over the temperature range of -40 °C to +95 °C.

An evaluation board is available upon request.

Pin Out



DC blocking capacitors (C_{BL}) must be supplied externally for positive voltage operation. $C_{BL} = 100\text{ pF}$ for operation >500 MHz.



Skyworks Green products are lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, and are free from antimony trioxide and brominated flame retardants.

Electrical Specifications

V_{CTL} = 0 V/3 V, T = 25 °C, P_{INPUT} = 0 dBm, Z₀ = 50 Ω, unless otherwise noted

| Parameter | Frequency | Min. | Typ. | Max. | Unit |
|----------------|---------------|------|-------|-------|------|
| Insertion loss | 300 kHz–1 GHz | | 0.3 | 0.4 | dB |
| | 1–2 GHz | | 0.4 | 0.5 | dB |
| | 2–3 GHz | | 0.4 | 0.6 | dB |
| Isolation | 300 kHz–1 GHz | 20 | 25 | | dB |
| | 1–2 GHz | 20 | 25 | | dB |
| | 2–3 GHz | 20 | 23 | | dB |
| VSWR | 300 kHz–1 GHz | | 1.3:1 | 1.4:1 | |
| | 1–2 GHz | | 1.3:1 | 1.4:1 | |
| | 2–3 GHz | | 1.3:1 | 1.4:1 | |

Operating Characteristics

V_{CTL} = 0 V/3 V, T = 25 °C, P_{INPUT} = 0 dBm, Z₀ = 50 Ω, unless otherwise noted

| Parameter | Condition | Frequency | Min. | Typ. | Max. | Unit |
|---------------------------------------|--|------------------------|------|----------|------|------------|
| Switching characteristics | | | | | | |
| Rise, fall | 10/90% or 90/10% RF | | | 36 | | ns |
| On, off | 50% CTL to 90/10% RF | | | 58 | | ns |
| Video feedthru | T _{RISE} = 1 ns, BW = 500 MHz | | | 25 | | mV |
| Input power for 1 dB compression | V _{LOW} = 0 V, V _{HIGH} = 3 V | 0.5–3 GHz | | 30 | | dBm |
| | V _{LOW} = 0 V, V _{HIGH} = 5 V | 0.5–3 GHz | | 34 | | dBm |
| Intermodulation intercept point (IP3) | For two-tone input power 5 dBm | | | | | |
| | V _{LOW} = 0 V, V _{HIGH} = 3 V V _{LOW} = 0 V, V _{HIGH} = 5 V | 0.5–3 GHz 0.5–3 GHz | | 43 50 | | dBm dBm |
| Thermal resistance | | | | 25 | | °C/W |
| Control voltages | V _{LOW} = 0 V @ 20 μA max. V _{HIGH} = 3 V @ 100 μA max. to 5 V @ 200 μA max. | | | | | |

Absolute Maximum Ratings

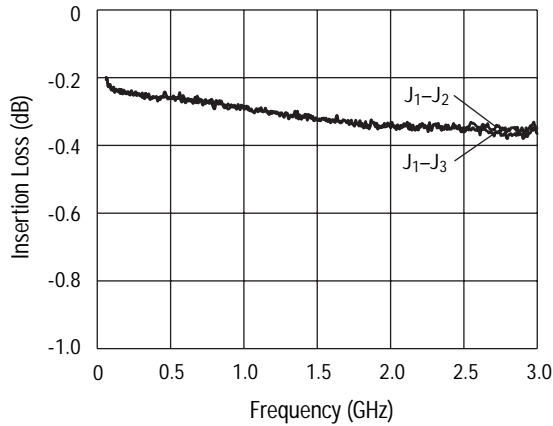
| Characteristic | Value |
|-----------------------------|--|
| Control voltage range | -0.2 V _C to 8 V |
| RF input power | 1 W for f < 500 MHz, 6 W for f > 500 MHz, V _{CTL} = 0/7 V |
| Storage temperature range | -65 °C to +150 °C |
| Operating temperature range | -40 °C to +95 °C |

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.

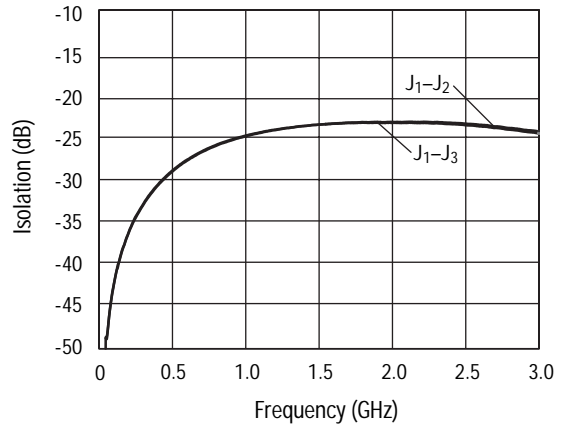
CAUTION: Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

Typical Performance Data

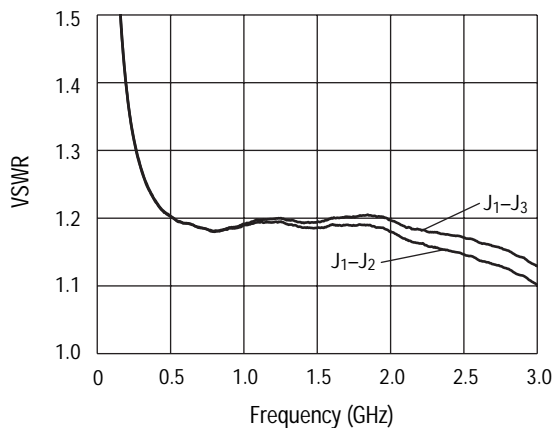
$V_{CTL} = 0$ V/3 V, $T = 25$ °C, $Z_0 = 50$ Ω , unless otherwise noted



Insertion Loss vs. Frequency



Isolation vs. Frequency



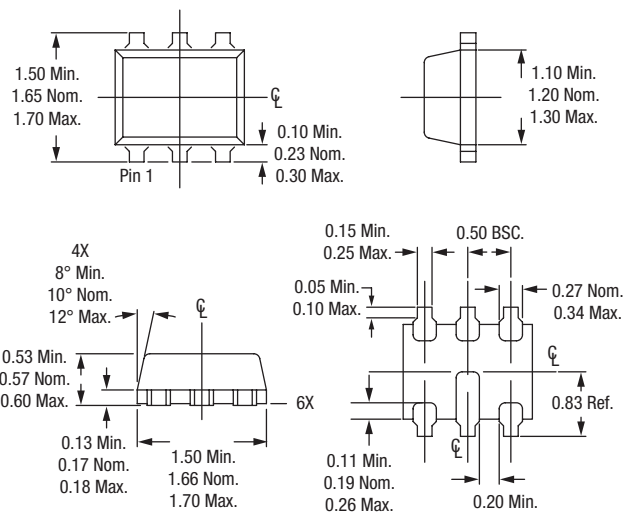
VSWR vs. Frequency

Truth Table

| V_1 | V_2 | J ₁ -J ₂ | J ₁ -J ₃ |
|------------|------------|--------------------------------|--------------------------------|
| V_{HIGH} | 0 | Isolation | Insertion loss |
| 0 | V_{HIGH} | Insertion loss | Isolation |
| 0 | 0 | Not recommended | Not recommended |
| V_{HIGH} | V_{HIGH} | Not recommended | Not recommended |

3 V \square V_{HIGH} \square 5 V.

SOT-666 Package Outline



All dimensions are in mm.
 Package outline exclusive of mold flash and metal burr.
 Package outline inclusive of plating.
 Maximum webbing flash remain 0.075 mm.
 Plating requirement per Source Control Drawing (SCD) 2504.

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.

Pin Descriptions

| Pin Number | Pin Name | Description |
|------------|----------------|---|
| 1 | J ₂ | RF input/output – RF input or output port which is either connected via a low insertion loss path to RF common (J ₁) or isolated from RF common, according to the logic levels applied to V ₁ and V ₂ |
| 2 | GND | Equipotential point – Equipotential point for control voltage and RF circuits. Must be connected to PCB ground via lowest possible impedance |
| 3 | J ₃ | RF input/output – RF input or output port which is either connected via a low insertion loss path to RF common (J ₁) or isolated from RF common, according to the logic levels applied to V ₁ and V ₂ |
| 4 | V ₂ | Control voltage – Control voltage input #2 |
| 5 | J ₁ | RF common input/output – RF input/output port that is connected via low insertion loss path to either RF1 or RF2, depending upon the voltage applied to control voltage pin |
| 6 | V ₁ | Control voltage – Control voltage input #1 |

Evaluation Board

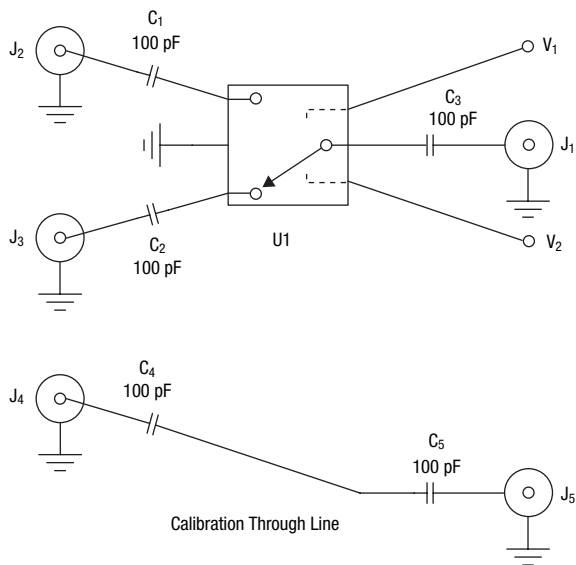
The evaluation board for SKY13268-344LF allows the part to be fully exercised. The insertion loss of the transmission lines between J₁- U1 and U1 - J₂/J₃ can be determined by measuring the performance of the calibration through-line, which contains two DC block capacitors in identical positions to the DC blocks present in the main circuit.

The state of the SKY13268-344LF is controlled by applying the appropriate logic level voltages to ports V₁ and V₂, per the Truth Table.

Evaluation Board Components

| Component | Description | Default |
|--|------------------------|-------------------|
| C ₁ -C ₅ | DC blocking capacitor | 100 pF, size 0402 |
| U1 | SKY13268-344 GaAs SPDT | |
| J ₁ , J ₂ , J ₃ , J ₄ , J ₅ | SMA connectors | |

SKY13268-344LF Evaluation Circuit



Copyright © 2002, 2003, 2004, 2005, 2006, 2007, 2009 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.