

DATA SHEET

SKY13276-334: 0.1-6.0 GHz GaAs 1 W Low Loss pHEMT SPDT Switch

Applications

- WLAN 802.11 a/b/g/n networks

Features

- Positive low voltage control: 0 and 3 V
- Low insertion loss: 0.7 dB typical over 0.1 to 6.0 GHz
- High linearity: IIP3 = +53 dBm @ 3 V
- High isolation, 20 dB typical @ 2.4 GHz
- Small footprint, LGA (6-pin, 1.5 x 1.2 x 0.8 mm) package (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.

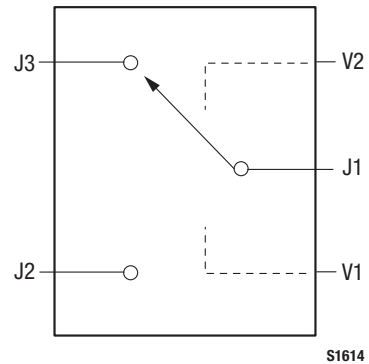


Figure 1. SKY13276-334 Block Diagram

Description

The SKY13276-334 is a GaAs pHEMT Single-Pole, Double-Throw (SPDT) antenna switch. Designed for WLAN applications, this switch is capable of switching 1 W microwave signals with a 3 V control voltage while maintaining high-linearity performance.

The SKY13276-334 covers the entire 802.11a/b/g/n frequency ranges, the public service band at 4.9 GHz, and several Industrial, Scientific, Medical (ISM) and WiMAX bands. The low loss, high isolation, high linearity, and low cost features make this switch ideal for transmit/receive or antenna diversity switching.

The switch is manufactured in a compact, 1.5 x 1.2 x 0.8 mm, 6-pin Land Grid Array (LGA) package. A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.

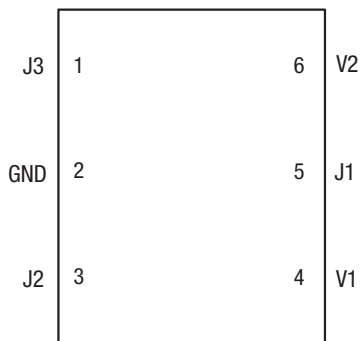


Figure 2. SKY13276-334 Pinout – 6-Pin LGA (Top View)

Table 1. SKY13276-334 Signal Descriptions

Pin #	Name	Description	Pin #	Name	Description
1	J3	RF output	4	V1	Positive control voltage
2	GND	Ground	5	J1	RF common/antenna port
3	J2	RF output	6	V2	Positive control voltage

Table 2. SKY13276-334 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input power @ 0 to 3 V	P _{IN}			+32	dBm
Input power @ 0 to 5 V	P _{IN}			+35	dBm
Operating voltage	V _{CTL}		8		V
Storage temperature	T _{STG}	-65		+150	°C
Operating temperature	T _{OP}	-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.

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13276-334 are provided in Table 2. Electrical specifications are provided in Table 3.

Typical performance characteristics of the SKY13276-334 are illustrated in Figures 3 through 5.

The state of the SKY13276-334 is determined by the logic provided in Table 4.

Table 3. SKY13276-334 Electrical Specifications (Note 1)
($V_{CTL} = 0$ to 3 V, $T_{OP} = +25$ °C, Characteristic Impedance [Z_0] = 50 Ω , Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Insertion loss (J1 to J2 and J1 to J3)	IL	1.00 to 6.00 GHz		0.70	0.85	dB
		2.40 to 2.50 GHz		0.60	0.70	dB
		5.15 to 5.85 GHz		0.70	0.80	dB
Isolation (J1 to J2 and J1 to J3)	ISO	1.00 to 6.00 GHz	16	20		dB
		2.40 to 2.50 GHz	18	20		dB
		5.15 to 5.85 GHz	16	21		dB
Return loss (J1 to J2 and J1 to J3)	IS11I	1.00 to 6.00 GHz	15	20		dB
		2.40 to 2.50 GHz	23	25		dB
		5.15 to 5.85 GHz	18	23		dB
1 dB input compression point @ 5.2 GHz	IP1dB	@ 3 V		+30		dBm
		@ 5 V		+34		dBm
2 nd harmonic @ 2.45 GHz	2fo	$P_{IN} = +22$ dBm, $V_{CTL} = 3$ V		-70		dBc
		$V_{CTL} = 5$ V		-75		dBc
3 rd harmonic @ 2.45 GHz	3fo	$P_{IN} = +22$ dBm, $V_{CTL} = 3$ V		-68		dBc
		$V_{CTL} = 5$ V		-70		dBc
3 rd Order Input Intercept Point @ 5.2 GHz	IIP3	Two-tone +15 dBm, 5 MHz spacing				
		$V_{CTL} = 0$ and 3 V $V_{CTL} = 0$ and 5 V		+53 +55		dBm dBm
Control voltage: Low High	V_{CTL_L}			-0.25	+0.25	V
	V_{CTL_H}		2.5	3.0	5.0	V
Gate leakage		$V_{CTL} = 3$ V		10	100	μ A
		$V_{CTL} = 5$ V		15	200	μ A

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

Typical Performance Characteristics

($V_{CTL} = 0\text{ V}$ to 3 V , $T_{OP} = +25\text{ }^{\circ}\text{C}$, Characteristic Impedance [Z_0] = $50\text{ }\Omega$, Unless Otherwise Noted)

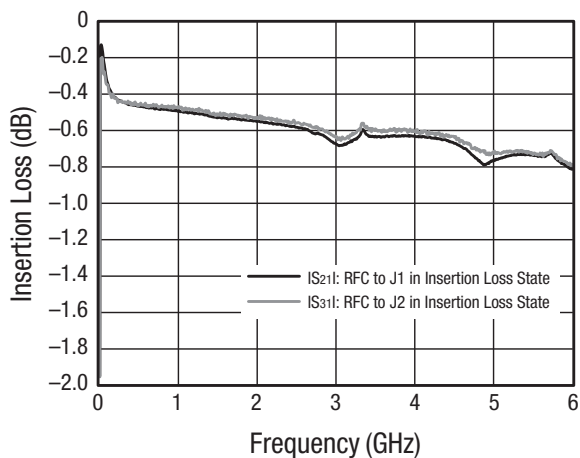


Figure 3. Insertion Loss vs Frequency

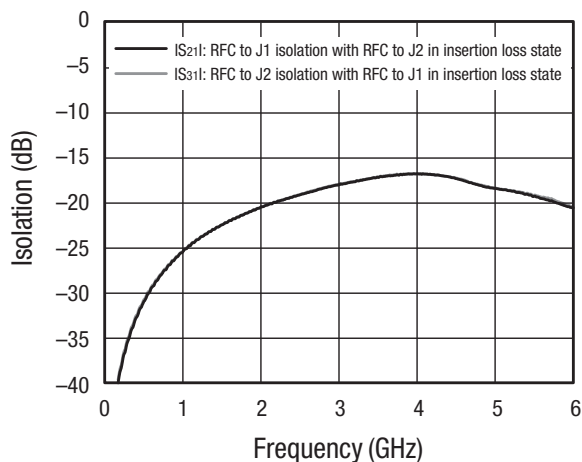


Figure 4. Isolation vs Frequency

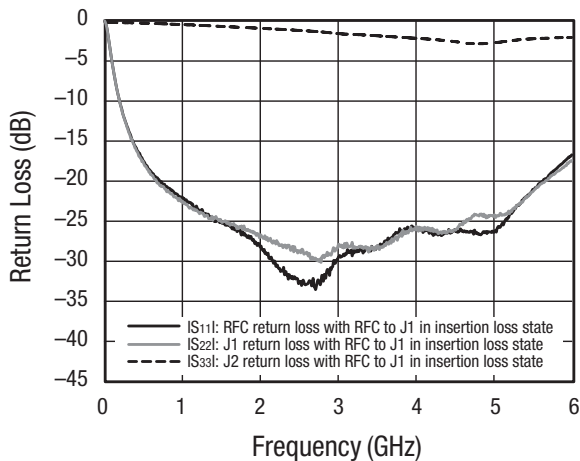


Figure 5. Return Loss vs Frequency (RFC to J1)

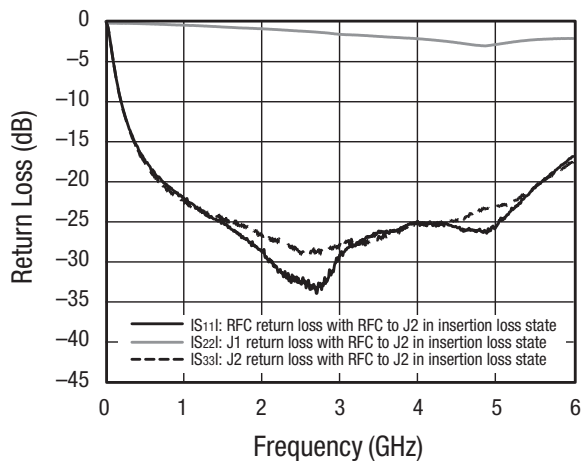


Figure 6. Return Loss vs Frequency (RFC to J2)

Table 4. SKY13276-334 Truth Table

V1 (Pin 4)	V2 (Pin 6)	J1 to J2 Path	J1 to J3 Path
0	V _{HIGH}	Isolation	Insertion loss
V _{HIGH}	0	Insertion loss	Isolation

Note: V_{high} = +2.5 V to +5 V. "0" = 0 V to +0.25 V. Any state other than described in this Table places the switch into an undefined state. An undefined state will not damage the device.

Evaluation Board Description

The SKY13276-334 Evaluation Board is used to test the performance of the SKY13276-334 SPDT Switch. An assembly drawing for the Evaluation Board is shown in Figure 7. The Evaluation Board schematic diagram is provided in Figure 8.

Package Dimensions

The PCB layout footprint for the SKY13276-334 is provided in Figure 9. Typical case markings are shown in Figure 10. Package dimensions for the 6-pin LGA are shown in Figure 11, and tape and reel dimensions are provided in Figure 12.

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 SKY13276-334 is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering.

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. For packaging details, refer to the Skyworks Application Note, *Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation*, document number 200083.

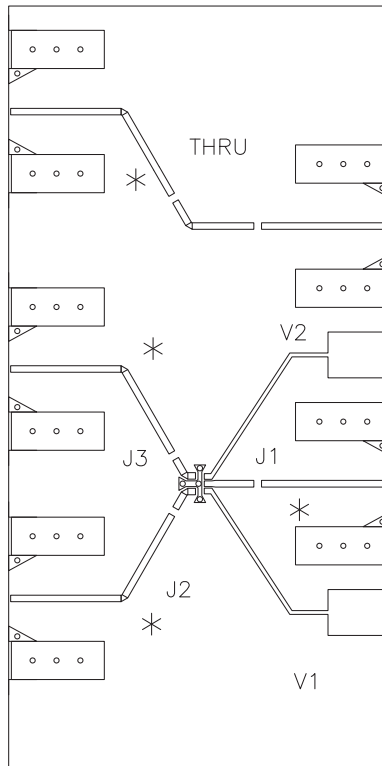
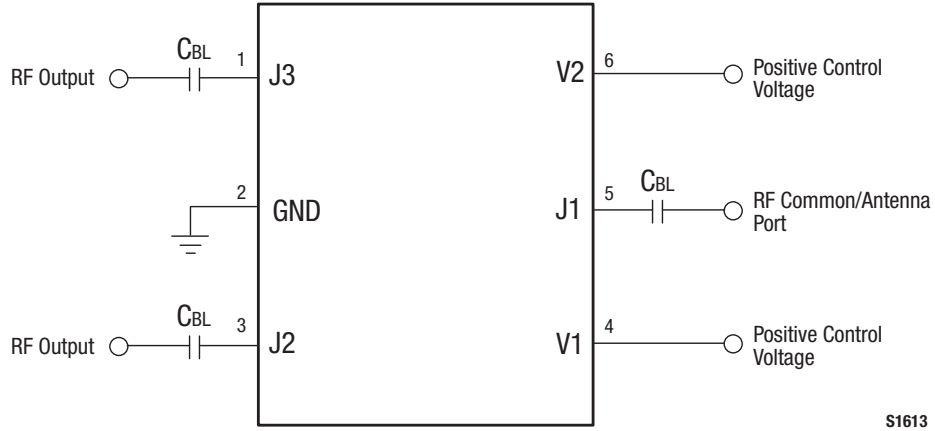
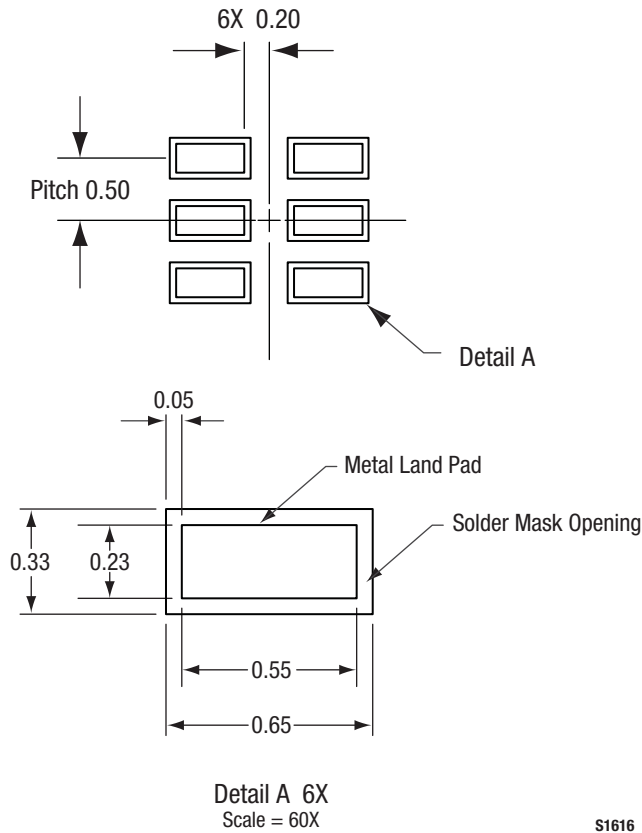


Figure 7. SKY13276-334 Evaluation Board Assembly Diagram



S1613

Figure 8. SKY13276-334 Evaluation Board Schematic



S1616

Figure 9. SKY13276-334 PCB Layout Footprint (Top View)

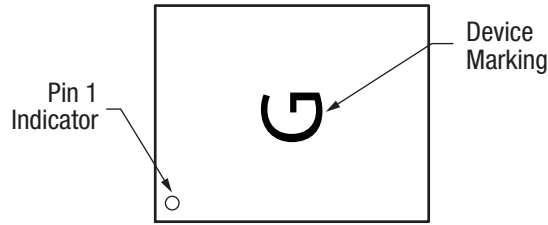
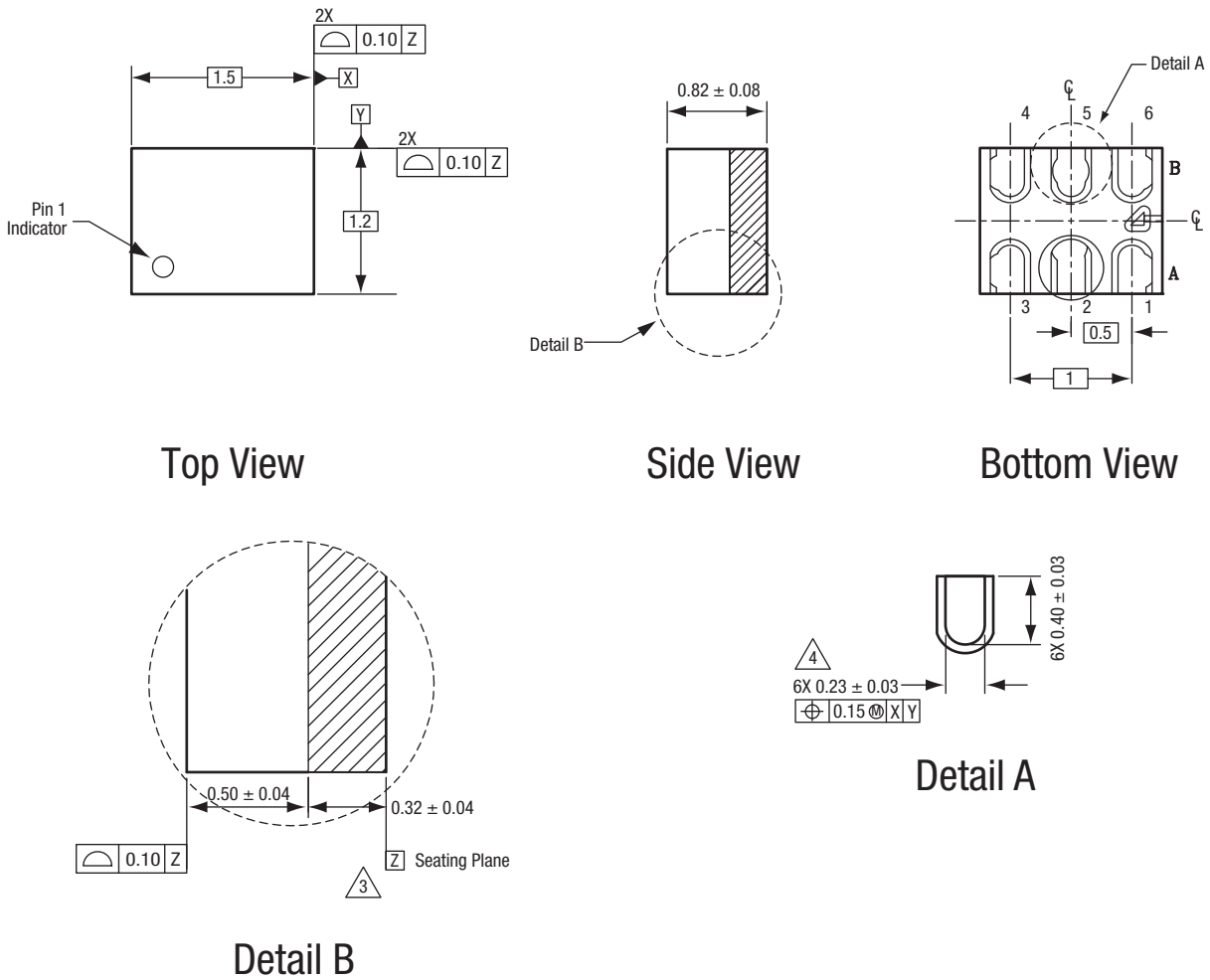


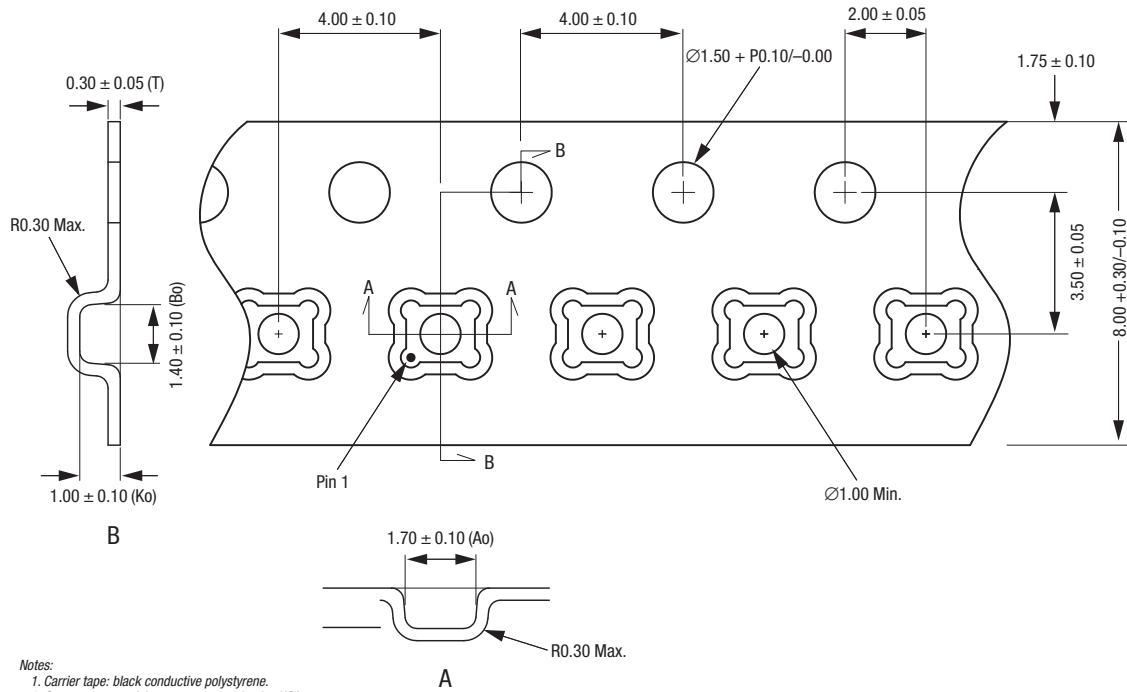
Figure 10. Typical Part Markings (Top View)



All measurements are in millimeters.
 Dimensioning and tolerancing according to ASME Y14.5M-1994.
 Primary datum -Z- is seating plane.
 Lead width is measured at the maximum land diameter, parallel to primary datum -Z-.
 Termination metalization is gold.

S1615

Figure 11. SKY13276-334 6-Pin LGA Package Dimensions



- Notes:
1. Carrier tape: black conductive polystyrene.
 2. Cover tape material: transparent conductive HSA.
 3. Cover tape size: 5.40 mm width.
 4. Ten sprocket hole pitch cumulative tolerance ± 0.20 mm.
 5. All measurements are in millimeters.

S1617

Figure 12. SKY13276-334 Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number	Evaluation Board Part Number
SKY13276-334 SPDT Switch	SKY13276-334	SK39653, rev. 2

Copyright © 2008, 2009, 2010 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.