

DATA SHEET

SKY13575-639LF: Dual-Band Matched SP4T WiFi Switch

Applications

- Dual-band WLAN
- 3G/4G LTE systems
- WLAN 802.11a/b/g/n/ac

Features

- Off ports matched to 50 Ω
- Low insertion loss: 0.6 dB at 2.5 GHz, 1.1 dB at 6 GHz (typical)
- High isolation: 40 dB at 2.5 GHz, 30 dB at 6 GHz (typical)
- Integrated GPIO interface
- Small QFN (14-pin, 1.6 × 1.6 × 0.45 mm) 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.

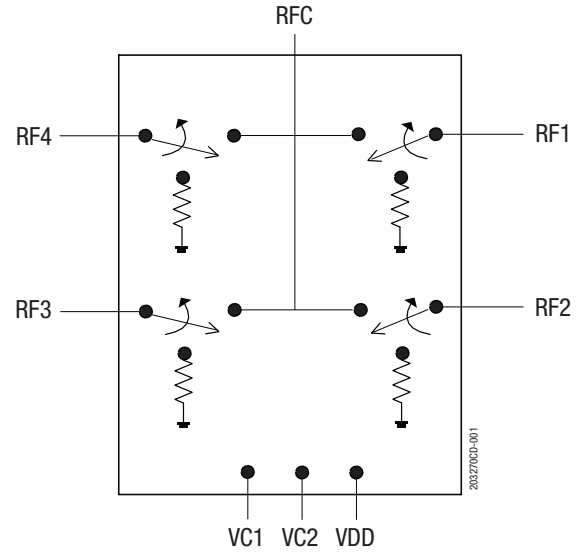


Figure 1. SKY13575-639LF Block Diagram

Description

The SKY13575-639LF is a dual-band single-pole, four-throw switch with an integrated 50 Ω match on all RF output ports. External DC blocking capacitors are required on the RF paths. The switch can operate over the temperature range of -40°C to 90 °C.

Switching is controlled by two CMOS/TTL compatible control voltage inputs: VC1 and VC2. Depending upon the logic voltage level applied to the control pins, the RFC pin is connected to one of four switched RF outputs (RF1 to RF4) by a low insertion loss path, while the path between the RFC pin and the other RF pins is in isolation. The isolated ports are terminated to a 50 Ω load.

The SKY13575-639LF is packaged in a small, 14-pin, 1.6 × 1.6 × 0.45 mm QFN 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 descriptions are provided in Table 1.

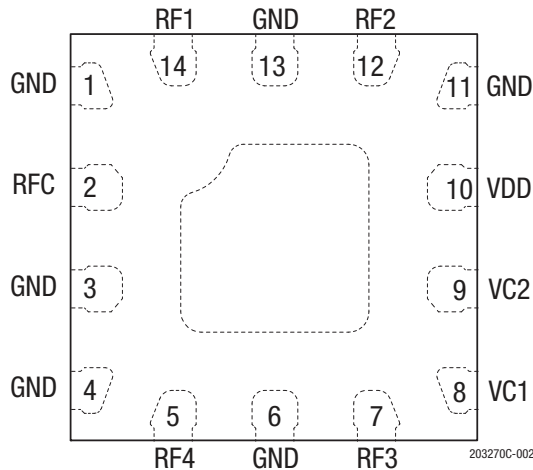


Figure 2. SKY13575-639LF Pinout (Top View)

Table 1. SKY13575-639LF Pin Descriptions¹

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	8	VC1	Control voltage 1
2	RFC	RF common port	9	VC2	Control voltage 2
3	GND	Ground	10	VDD	Battery voltage
4	GND	Ground	11	GND	Ground
5	RF4	RF output port 4	12	RF2	RF output port 2
6	GND	Ground	13	GND	Ground
7	RF3	RF output port 3	14	RF1	RF output port 1

¹ Exposed pads must be grounded

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13575-639LF are provided in Table 2. Electrical specifications are provided in Table 3. The SKY13575-639LF logic truth is shown in Table 4.

Table 2. SKY13575-639LF Absolute Maximum Ratings¹

Parameter	Symbol	Condition	Minimum	Maximum	Units
Supply voltage	VDD	T = 25 °C		3.7	V
Control voltage	VC1, VC2	T = 25 °C	-0.5	3.3	V
RF input power	RFIN	Peak power at RFC port, T = 25 °C; 50 Ω		+32	dBm
Output port 50 Ω power handling	50 Ω P _{MAX}	Maximum power applied to the output port in isolation mode		+5	dBm
Operating case temperature	T _{CASEMAX}		-40	+90	°C
Storage temperature	T _{STORE}		-55	+150	°C

¹ 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 3. SKY13575-639LF Electrical Specifications¹

(V_{DD} = 3.3 V, V_{c1} = V_{c2} = High = 3.0 V, P_{IN} = 0 dBm, T_{OP} = +25 °C, Characteristic Impedance [Z₀] = 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Small Signal						
Insertion loss (RFC to RF1,2,3,4)	IL	0.1 to 2.4 GHz		0.6	0.8	dB
		2.4 to 2.5 GHz		0.6	0.9	dB
		4.8 to 6.0 GHz		1.1	1.4	dB
Isolation (RFC to RF1,2,3,4)	Iso	0.1 to 2.4 GHz	35	40		dB
		2.4 to 2.5 GHz	35	40		dB
		4.8 to 6.0 GHz	26	30		dB
Output return loss in isolation state (RF1,2,3,4)	RL_Off Port	2.4 to 2.5 GHz 4.8 to 6.0 GHz	14	17 10.5		dB dB
Large Signal						
LB 2nd harmonics (RFC to RF1,2,3,4)	2fo	fo = 2.4 to 2.5 GHz P _{IN} = + 20 dBm	65	80		dBc
LB 3rd harmonics (RFC to RF1,2,3,4)	3fo	fo = 2.4 to 2.5 GHz P _{IN} = + 20 dBm	70	80		dBc
HB 2nd harmonics (RFC to RF1,2,3,4)	2fo	fo = 4.8 to 6.0 GHz P _{IN} = + 20 dBm	52	70		dBc
HB 3rd harmonics (RFC to RF1,2,3,4)	3fo	fo = 4.8 to 6.0 GHz P _{IN} = + 20 dBm	60	70		dBc
LB EVM power (RFC to RF1,2,3,4)	P_EVM_LB	fo = 2.45 GHz, input power for 2.5% error, 802.11g, 54 Mbps	25	27		dBm
HB EVM power (RFC to RF1,2,3,4)	P_EVM_HB	fo = 5.8 GHz, input power for 2.5% error, 802.11g, 54 Mbps	25	27		dBm
LB input IP3 (RFC to RF1,2,3,4), +20 dBm input power	LB_IIP3	Two tones, 1 MHz spacing, fo = 2.4 to 2.5 GHz	+52	+55		dBm
HB Input IP3 (RFC to RF1,2,3,4), +20 dBm input power	HB_IIP3	Two tones, 1 MHz spacing fo = 4.8 to 6.0 GHz	+52	+55		dBm
DC Operating						
Supply voltage	V _{DD}	T = 25 °C	2.5	3.3	3.5	V
Control voltage high	V _{c1_H} , V _{c2_H}	T = 25 °C	2.5	3.0	3.3	V
Control voltage low	V _{c1_L} , V _{c2_L}	T = 25 °C		0	0.45	V
Supply current	I _{DD}	T = 25 °C		8	10	μA
Switching speed	SS	50 % CTL to 90 % RF 50 % CTL to 10 % RF		400	500	ns
Rise/fall time	t _{ON} /t _{OFF}	10% RF to 90 % RF 90 % RF to 10 % RF			500	ns
Startup time	t _{START}	From V _{DD} off to V _{DD} on		500	1000	ns

¹ Performance is guaranteed only under the conditions listed in this table.

Table 4. Logic Truth Table¹

Low-Loss Path	VC1	VC2
RFC to RF1	L	L
RFC to RF2	L	H
RFC to RF3	H	L
RFC to RF4	H	H

¹ H = 2.5 to 3.3 V
L = 0 to 0.45 V

Evaluation Board Description

The SKY13575-639LF Evaluation Board is used to test the performance of the SKY13575-639LF. An Evaluation Board schematic diagram is provided in Figure 3. Figure 4 shows the Evaluation Board assembly diagram.

Package Dimensions

The PCB layout footprint for the SKY13575-639LF is provided in Figure 5. Typical part markings are shown in Figure 6. Package dimensions are shown in Figure 7, and tape and reel dimensions are provided in Figure 8.

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 SKY13575-639LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It 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.

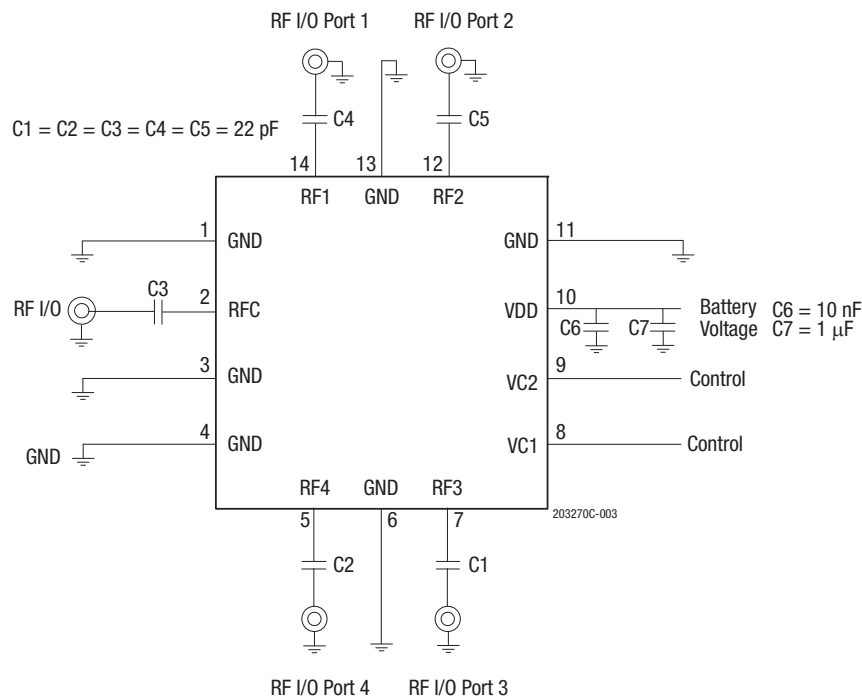


Figure 3. SKY13575-639LF Evaluation Board Schematic

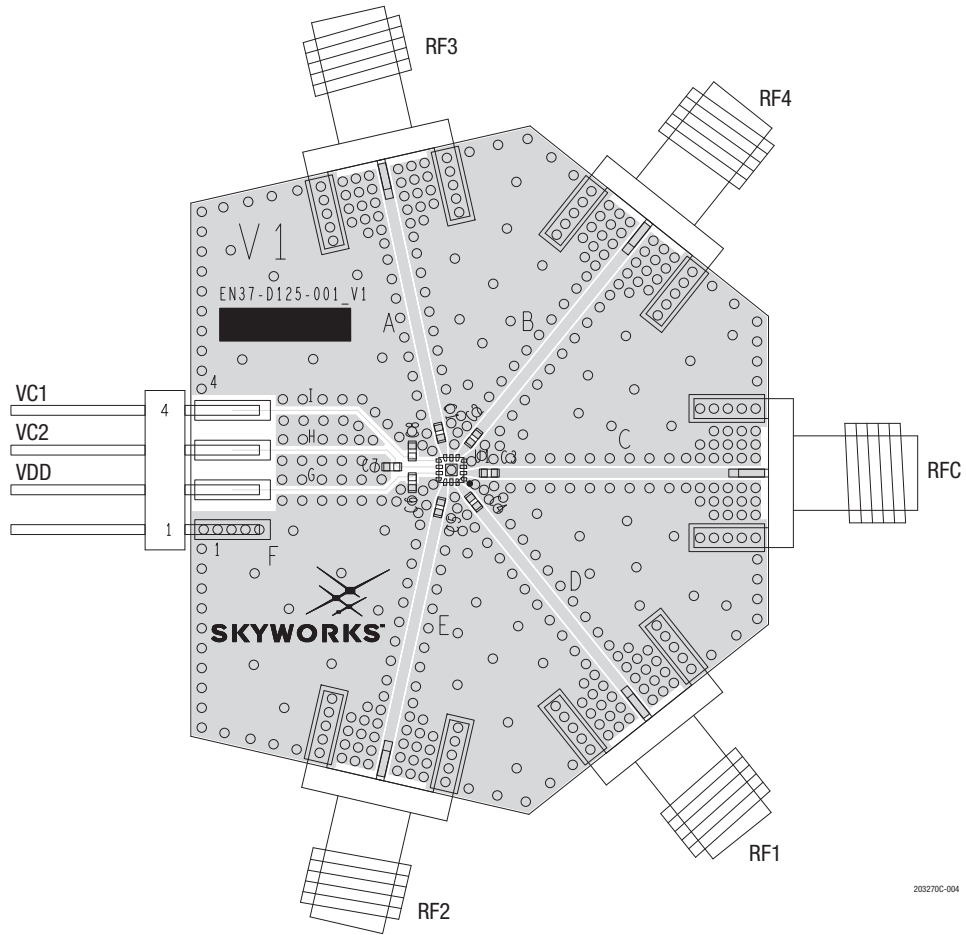
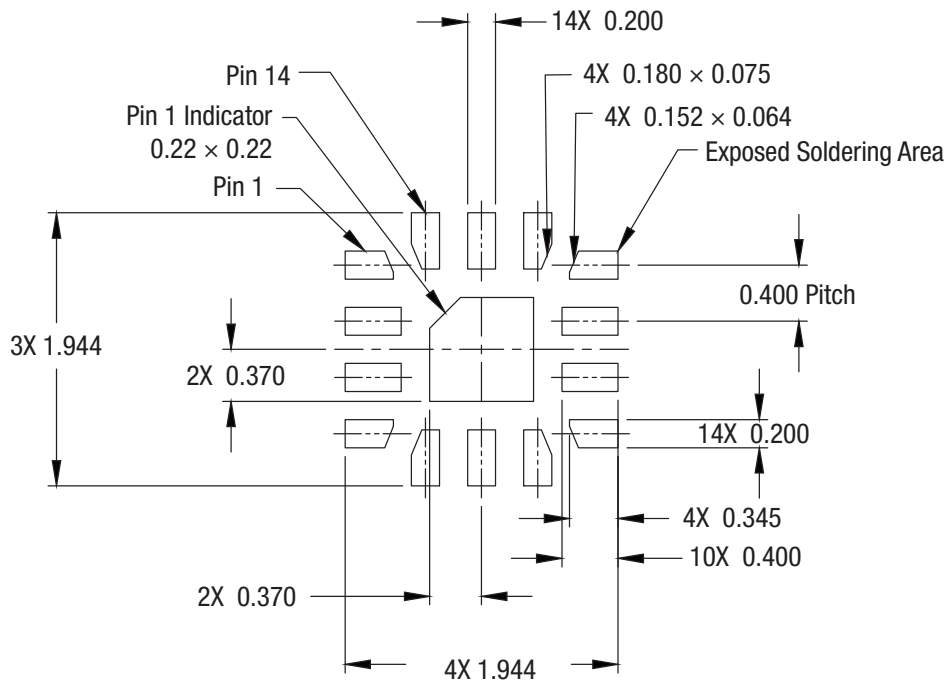


Figure 4. SKY13575-639LF Evaluation Board Assembly Diagram



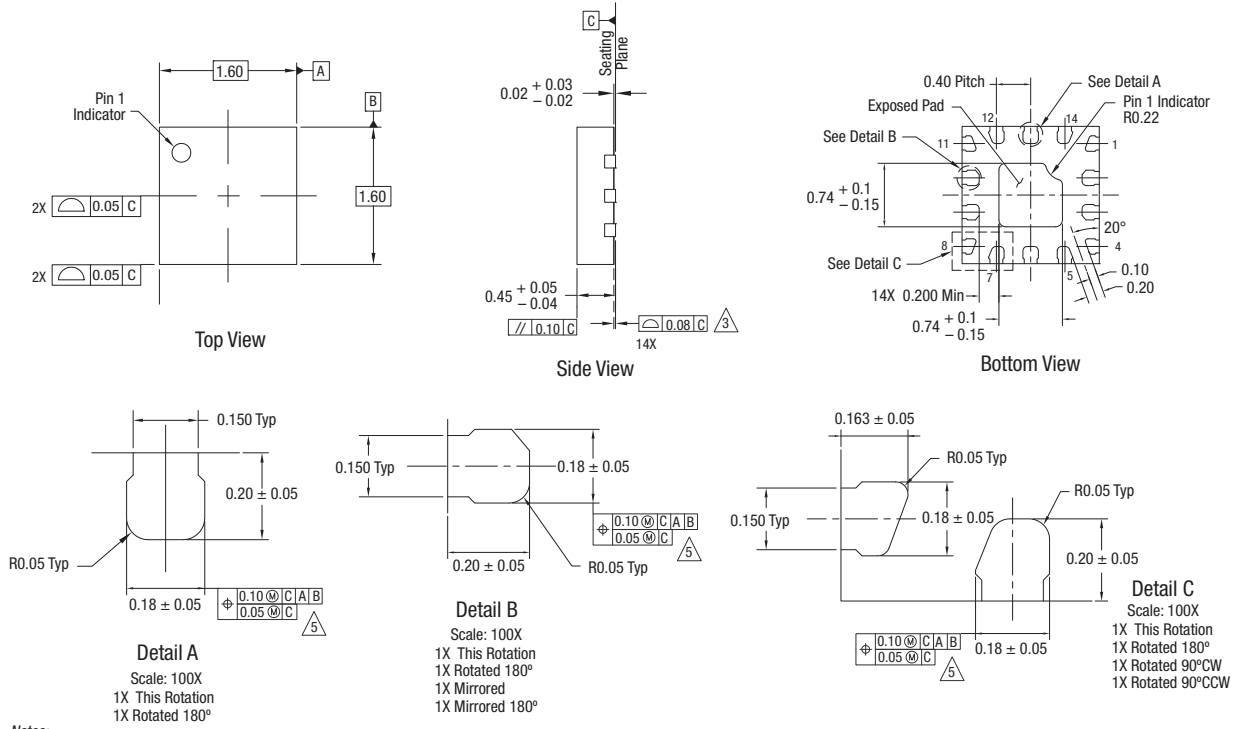
All dimensions are in millimeters.

203270C-005

Figure 5. SKY13575-639LF PCB Layout Footprint (Bump Side Down)



Figure 6. Typical Part Markings (Top View)

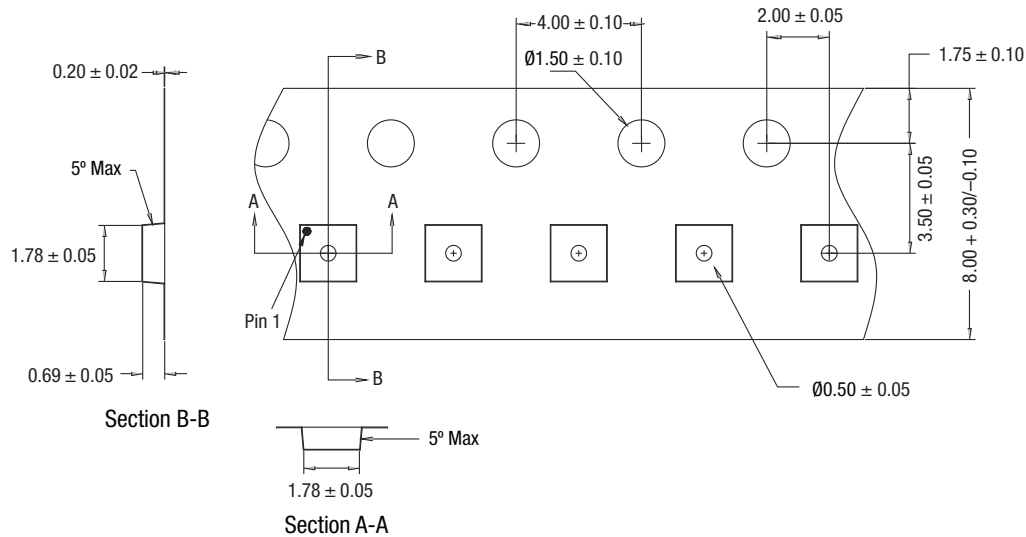


Notes:

1. All dimensions are in millimeters.
2. Dimensions and tolerances per ASME Y14.5M-1994.
3. Coplanarity applies to the terminal and all other bottom surface metallization.
4. Plating requirements per source control drawing (SCD) 25D4.
5. Dimension applies to metallized terminal. If the terminal has a radius on its end, the width dimension should not be measured in the radius area.

203270C-007

Figure 7. SKY13575-639LF Package Dimensions



All measurements are in millimeters unless otherwise stated.

203270C-008

Figure 8. SKY13575-639LF Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number	Evaluation Board Part Number
SKY13575-639LF: SP4T WiFi Switch	SKY13575-639LF	SKY13575-639LF-EVB

Copyright © 2014-2016 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 and the Skyworks symbol 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.