

FEATURES

- 21.5 dB Gain
- 75 Ω input and output match
- Characterized at +58 dBmV output power
- Superior gain flatness (± 0.2 dB)
- Very Low Distortion
- Stable with High VSWR Load Conditions
- Monolithic GaAs Design for Consistent Performance Part-to-Part
- Surface Mount Package Compatible with Automatic Assembly
- RoHS Compliant Package

APPLICATIONS

- CATV Line Amplifiers, Deep Fiber Nodes



PRODUCT DESCRIPTION

The ACA2420 is a highly linear, monolithic GaAs RF amplifier that has been developed to replace, in new designs, standard CATV hybrid amplifiers. Offered in a convenient surface mount package, the MMIC consists of two pairs of parallel amplifiers that are optimized for exceptionally low

distortion. A hybrid equivalent that provides flat gain response and excellent input and output return loss over the 40 to 1000 MHz CATV downstream band is formed when one ACA2420 is cascaded between two appropriate transmission line baluns.

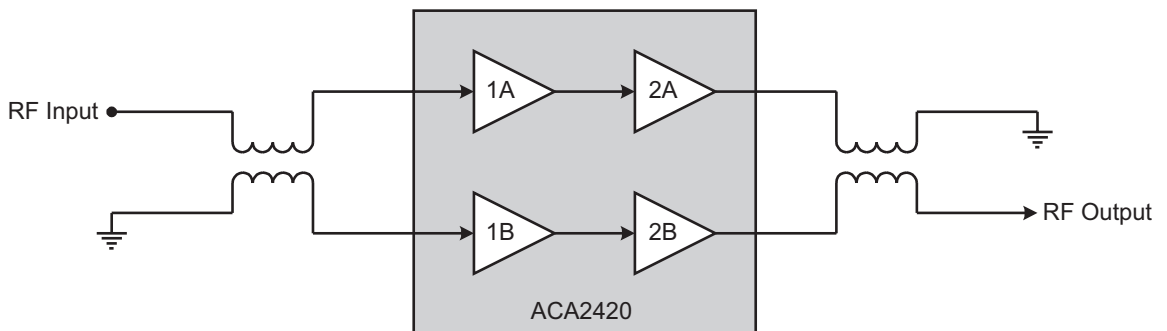


Figure 1: Hybrid Application Diagram

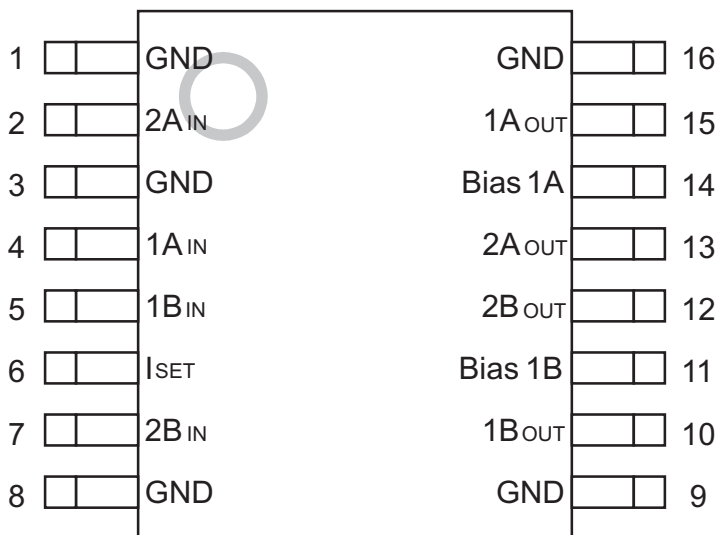


Figure 2: Pinout Diagram

Table 1: Pin Description

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	GND	Ground	9	GND	Ground
2	2A _{IN}	Amplifier 2A Input	10	1B _{OUT}	Amplifier 1B Output
3	GND	Ground	11	Bias 1B	Bias for 1B Amplifier
4	1A _{IN}	Amplifier 1A Input	12	2B _{OUT}	Amplifier 2B Output and Supply
5	1B _{IN}	Amplifier 1B Input	13	2A _{OUT}	Amplifier 2A Output and Supply
6	I _{SET}	Current Adjust	14	Bias 1A	Bias for 1A Amplifier
7	2B _{IN}	Amplifier 2B Input	15	1A _{OUT}	Amplifier 1A Output
8	GND	Ground	16	GND	Ground

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Mimimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply (pins 12, 13)	0	+28	V _{DC}
Current Adjust (pin 6)	0	+4	V _{DC}
RF Power at Inputs (pins 4, 5)	-	+75	dBmV
Storage Temperature	-65	+150	°C
Soldering Temperature	-	+260	°C
Soldering Time	-	5.0	Sec

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Notes:

- (1) Pins 2, 4, 5 and 7 should be AC-coupled. No external DC bias should be applied.
- (2) Pin 6 should be AC-grounded and/or pulled to ground through a resistor for current control.
- (3) Pins 11 and 14 are bias feeds for input amplifiers 1A and 1B. No external DC bias should be applied.
- (4) Pins 10 and 15 receive DC bias directly from pins 11 and 14.

Table 3: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT
Supply: V _{DD} (pins 12, 13)	-	+24	-	V _{DC}
Current Adjust (pin 6)	-	+1.5	-	V _{DC}
RF Frequency	40	-	1000	MHz
Case Temperature	-40	-	+100	°C

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

Table 4: AC and DC Electrical Specifications
(T_A = +25 °C, V_{DD} = +24 VDC)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain @ 1000 MHz ⁽¹⁾	20.8	21.5	22.3	dB	
Cable Equivalent Slope ⁽¹⁾	-0.1	0	0.7	dB	
Gain Flatness 50 to 1000 MHz ⁽¹⁾	-	±0.2	-	dB	
Noise Figure ⁽¹⁾	-	5.75	6.5	dB	
CTB ⁽¹⁾ 77 Channels ⁽²⁾ 77 Channels ⁽³⁾	- - -	-78 -76	- -74	dBc	
CSO ⁽¹⁾ 77 Channels ⁽²⁾ 77 Channels ⁽³⁾	- - -	-71 -69	- -67	dBc	
XMOD ⁽¹⁾ 77 Channels ⁽²⁾ 77 Channels ⁽³⁾	- - -	-64 -63	- -59	dBc	
CIN ⁽¹⁾ 77 Channels ⁽³⁾	-	-	-58	dBc	
Return Loss (Input) ⁽¹⁾ 40-1000 MHz	-	-22	-18	dB	75 Ω system
Return Loss (Output) ⁽¹⁾ 40-900 MHz 901-1000 MHz	- - -	-22 -22	-20 -18	dB	75 Ω system
Supply Current	495	520	545	mA	
Thermal Resistance	-	2.7	3.3	°C/W	

Notes:

(1) Measured with baluns on the input and output of the device.

(2) Parts measured with 77 channels, +58 dBmV power, 15.5 dB tilt at 1000 MHz.

(3) Parts measured with 77 channels, +58 dBmV power, 15.5 dB tilt at 1000 MHz, plus Q_{AM} to 1GHz.

(4) All specifications as measured on Evaluation Board (see Figures 13 & 14).

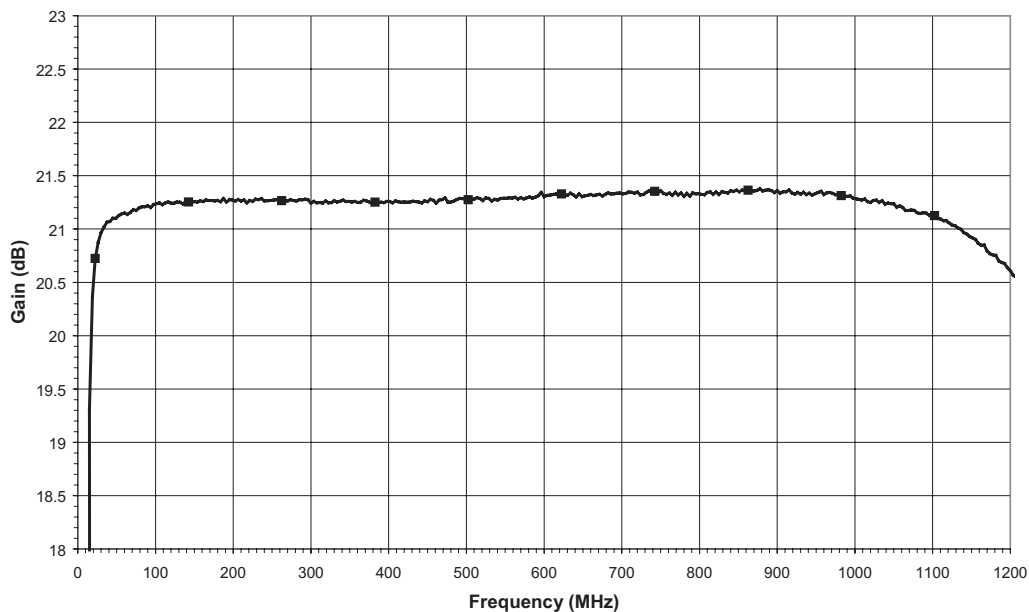


Figure 3: Gain (S21) vs Frequency
 (TA = +25 °C, VDD = +24 V, 75 Ω system)

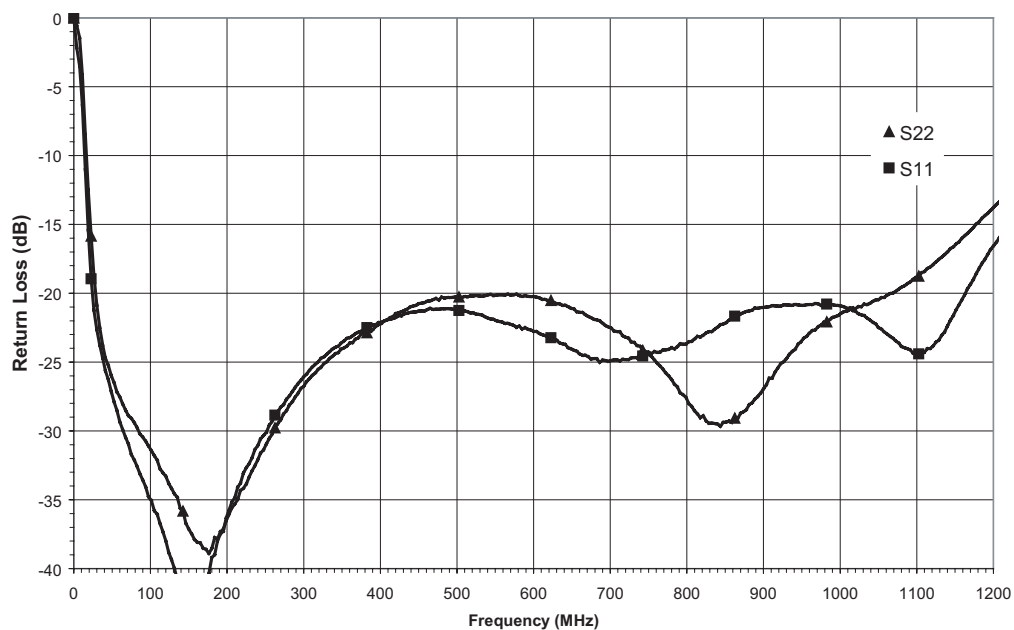


Figure 4: Input and Output Return Loss (S11 and S12) vs. Frequency
 (TA = +25 °C, VDD = +24 V, 75 Ω system)

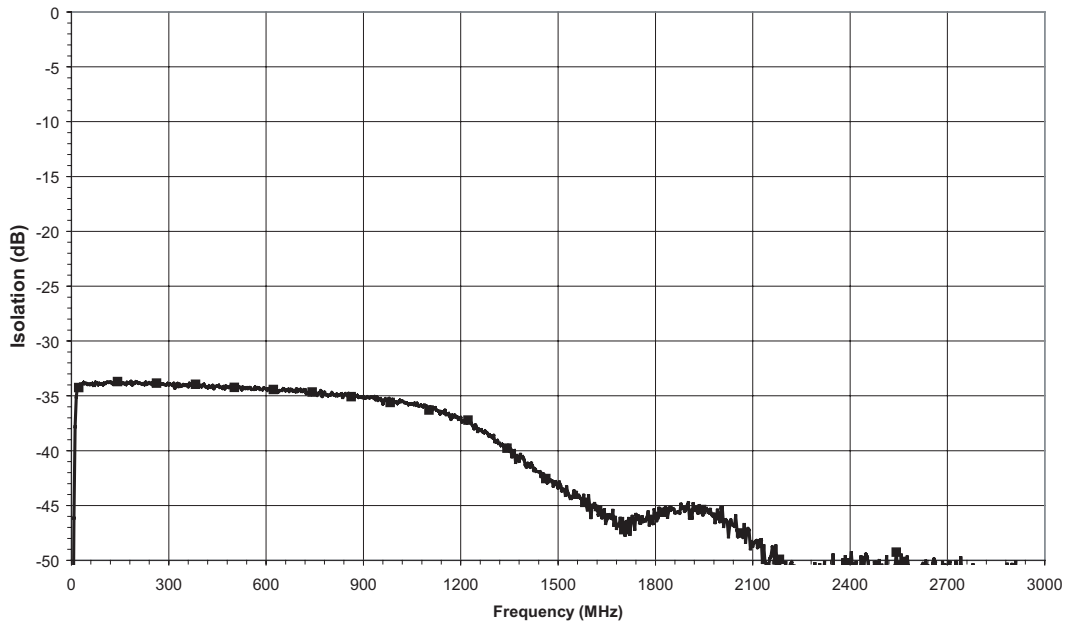


Figure 5: Isolation (S12) vs. Frequency
 (T_A = +25 °C, V_{DD} = +24 V, 75 Ω system)

APPLICATION INFORMATION

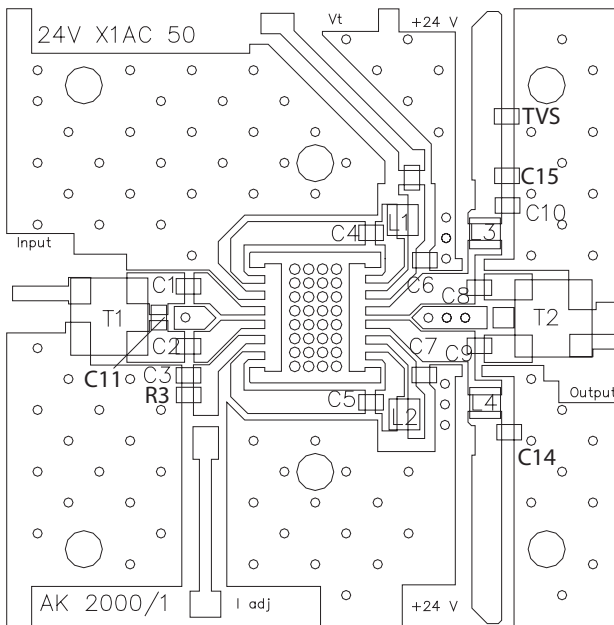


Figure 6: Evaluation Board Layout

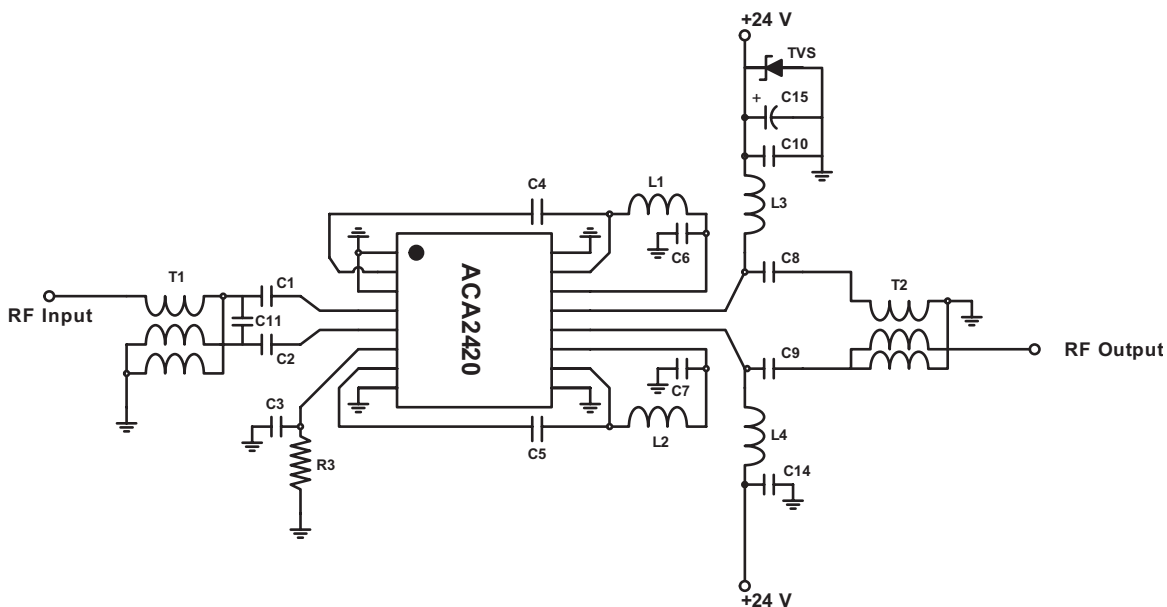


Figure 7: Evaluation Board Schematic

Table 5: Evaluation Board Parts List

REFERENCE	DESCRIPTION	QTY	VENDOR	VENDOR P/N
C1, C2, C3, C6, C7, C10, C14	0.01 uF CHIP CAP	7	MURATA	GRM39X7R103K50V
C4, C5, C8, C9	270 pF CHIP CAP	4	MURATA	GRM39X7R271K50V
C11	1.0 pF CHIP CAP	1	MURATA	GRM36COG0R5C50
C15	47 uF ELECT CAP	1	DIGI-KEY CORP	P5275-ND
C12, C13, R2, R3	NOT USED			
TVS	TVS 24 VOLT 600 WATT	1	DIGI-KEY CORP	SMBJ24ACCCT-ND
L1, L2, L3, L4	470 nH INDUCTOR	4	MURATA	LQH1WA47KONO003-4052
R3	15 K Ohm	1	-	-
CONNECTOR ⁽¹⁾	75 Ohm N MALE PANEL MOUNT	2	PASTERNAK ENTERPRISES	PE4504
T1, T2	Balun	2	M/A-COM	MABA-009210-CT1760
	Printed Circuit Board ⁽²⁾	1	STANDARD PRINTED CIRC. INC.	24VX1AC50

Notes:

(1) N connector center pin should be approximately 80 mils in length.

(2) Due to the power dissipation of this device, the printed circuit board should be mounted / attached to a heat sink.

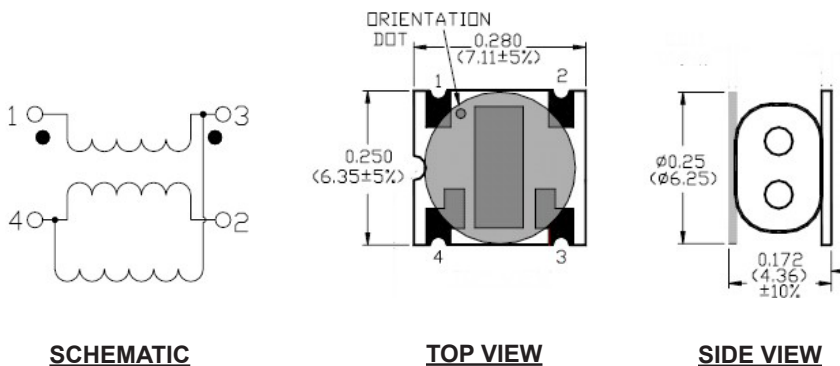
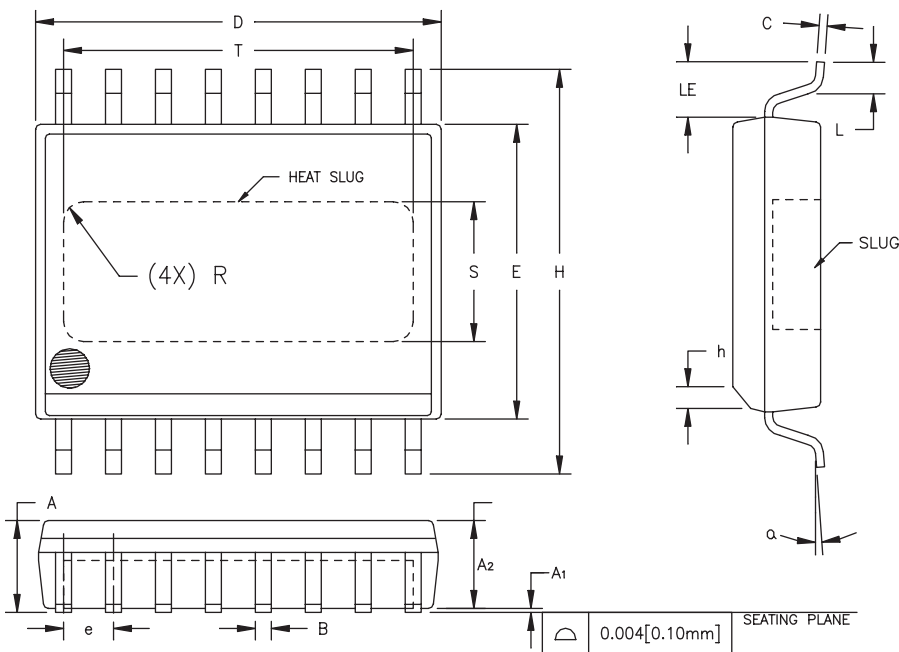


Figure 4: Balun Drawing

Note:

See M/A-COM's data sheet for more details.

PACKAGE OUTLINE



S _v M _{Bo}	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	0.087	0.098	2.21	2.49	
A ₁	0.000	0.004	0.00	0.10	6
A ₂	0.087	0.094	2.21	2.39	
B	0.013	0.019	0.33	0.48	
C	0.007	0.009	0.18	0.23	
D	0.398	0.412	10.11	10.46	2
E	0.290	0.300	7.37	7.62	3
e	0.050	BSC	1.27	BSC	4
H	0.394	0.418	10.01	10.62	
h	0.010	0.028	0.25	0.71	
L	0.024	0.040	0.61	1.02	
LE	0.052	—	1.32	—	
a	0°	8°	0°	8°	
S	0.120	0.140	3.05	3.56	5
T	0.330	0.350	8.38	8.89	5
R	REF.	0.015	REF.	0.38	5

NOTES:

1. CONTROLLING DIMENSION: INCHES
2. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.006 [0.15mm] PER SIDE.
3. DIMENSION "E" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.010 [0.25mm] PER SIDE.
4. MAXIMUM LEAD TWIST/SKEW TO BE ±0.005 [0.13mm].
5. DIMENSIONS "S", "T" AND "R" INDICATE EXPOSED SLUG AREA.
6. STANDOFF HEIGHT (A₁) MEASURED FROM BOTTOM OF SLUG.

Figure 5: S7 Package Outline - 16 Pin Wide Body SOIC with Heat Slug

ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
ACA2420RS7P2	-40 °C to +110 °C	16 Pin Wide Body SOIC with Heat Slug	Tape and Reel, 1500 pieces per Reel
EVB2420			Evaluation Board Part Number

NOTES

Copyright © 2016-2017 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.

Skyworks Solutions, Inc.

Phone [781] 376-3000 • Fax [781] 376-3100 • sales@skyworksinc.com • www.skyworksinc.com

Skyworks Proprietary and Confidential information • Products and Product Information are Subject to Change Without Notice