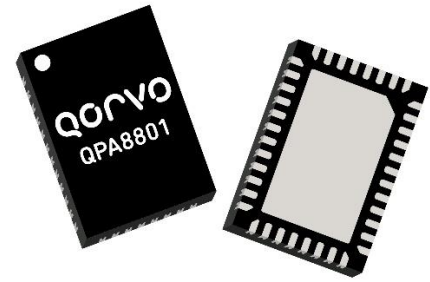


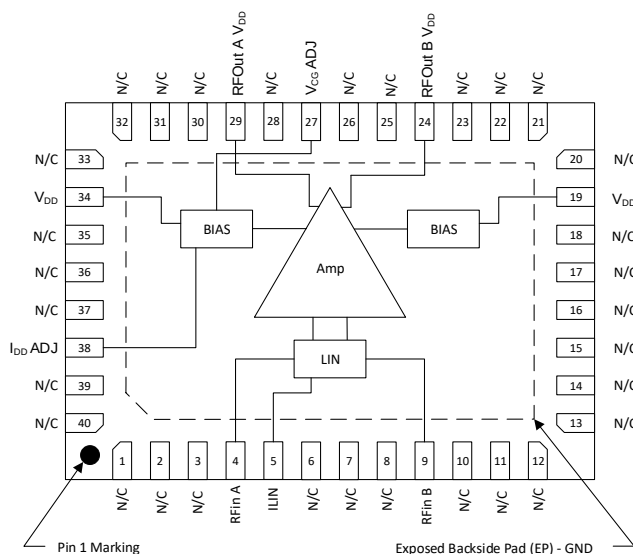
Product Overview

The QPA8801 is an ultra-linear, QFN GaAs amplifier MMIC intended for output stage amplification in CATV infrastructure applications. The device features a push-pull cascode design which provides flat gain along with ultra-low distortion, making it ideal for use in CATV distribution systems requiring high output power capability. The QPA8801 draws approximately 380 mA from a single +12 V supply providing ~11 dB gain with excellent linearity. Users may adjust the bias current with external voltage enabling the QPA8801 to be used in applications such as doublers or for lower power system applications. The QPA8801 is packaged in an industry standard 40 pin 5 x 7 mm QFN package with exposed paddle (EP) beneath the device for thermal and electrical grounding



40P 5x7 QFN Package

Functional Block Diagram



Key Features

- Gain: 11dB @ 1218MHz
- Adjustable Bias
- 45 - 1218 MHz BW
- 49dBmV/ch virtual 1.0GHz, at 3dB tilt
- Low Noise: 5.5dB
- Excellent Composite Distortion
- pHEMT / MESFET device technologies
- Compact Size: 40P 5x7 QFN
- Power Consumption (12V, 380mA – 4.56W)

Applications

- DOCSIS 3.1
- Broadband CATV hybrid modules
- Head End CMTS Equipment
- 75-ohm amplifiers

Ordering Information

Part No.	Description
QPA8801SQ	Sample bag with 25 pieces
QPA8801SR	7" Reel with 100 pieces
QPA8801TR13	13" Reel with 2500 pieces
QPA8801PCK	45 – 1218MHz PCBA with 5-piece sample bag

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage (V_{DD})	+18
Supply Current (I_{DD})	570mA
Maximum Input Level (single tone)	+70dBmV
Operating Temperature Range	-40 to +85°C
Storage Temperature Range	-40 to +100°C
Maximum Junction Temperature	+150°C

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

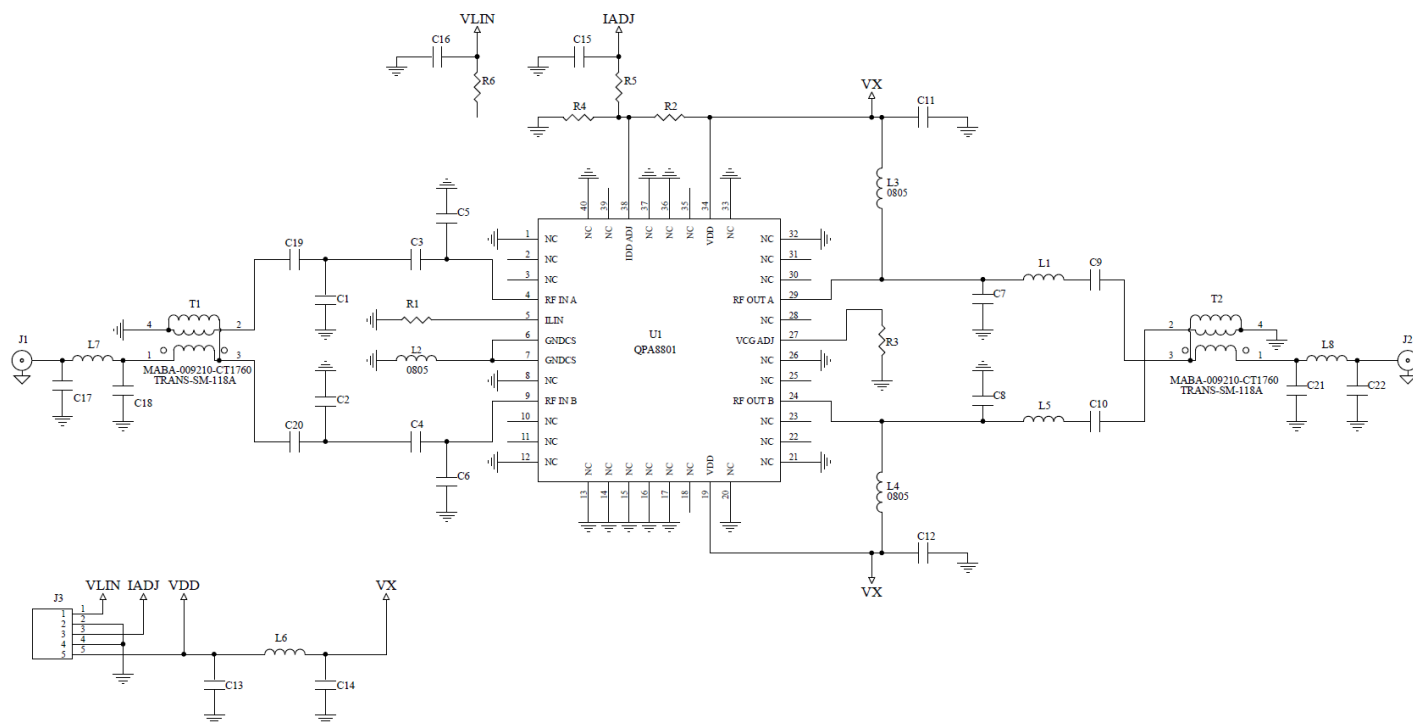
Electrical Specifications – 24V

Parameter	Condition ⁽¹⁾	Min	Typ	Max	Unit
Supply Voltage (V_{DD})			12		V
Supply Current (I_{DD})	V_{DD} total current		380		mA
Frequency Range		50		1218	MHz
Gain	1218MHz		11		dB
Gain Flatness	Max. deviation from line using least squares fit from 47 to 1218 MHz		±0.5		dB
Gain Slope	Gain(1218MHz) - Gain(50MHz)		0.6		dB
Reverse Isolation			-18.5		dB
Input Return Loss			18		dB
Output Return Loss			18		dB
Noise Figure			5.5		dB
CSO	80 NTSC + 72 QAM (-6dB offset), 49dBmV/ch virtual output at 1003MHz @3dB tilt		-70		dBc
CTB			-78		dBc
CIN			68		dB
OIP2	Low band: 225MHz, 275.5MHz, 15dBm/tone		80		dBm
	High band: 1100MHz, 1150.5MHz, 15dBm/tone		78		dBm
OIP3	Low band: 225MHz, 275.5MHz, 15dBm/tone		50		dBm
	High band: 1100MHz, 1150.5MHz, 15dBm/tone		47		dBm
Output P1dB	1218 MHz		27.5		dBm
Thermal Resistance	Θ_{JB} (Junction to backside of QFN)		6		°C/W

Notes:

1. Typical performance at these conditions: Temp = +25°C, V_{DD} = +12V, 75Ω system, Full band unless otherwise noted

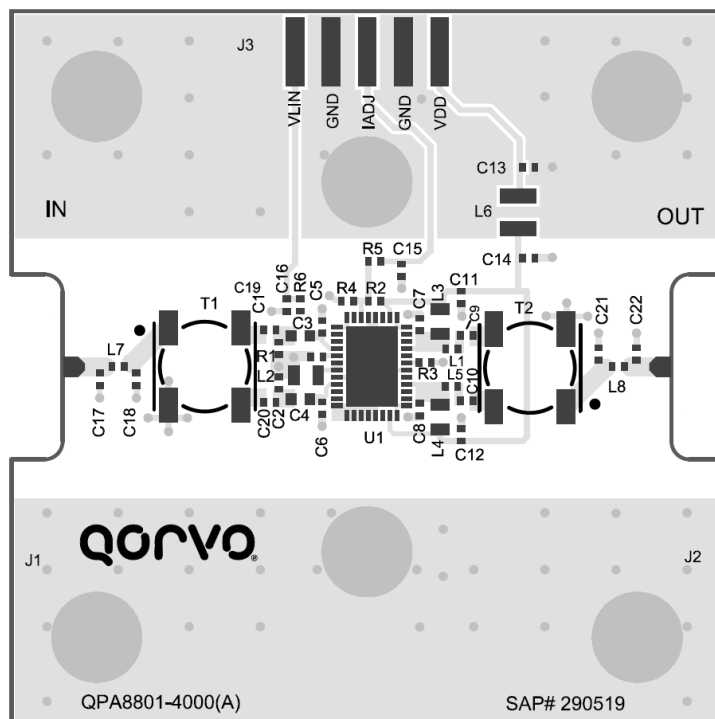
Evaluation Board Schematic 47 – 1218MHz

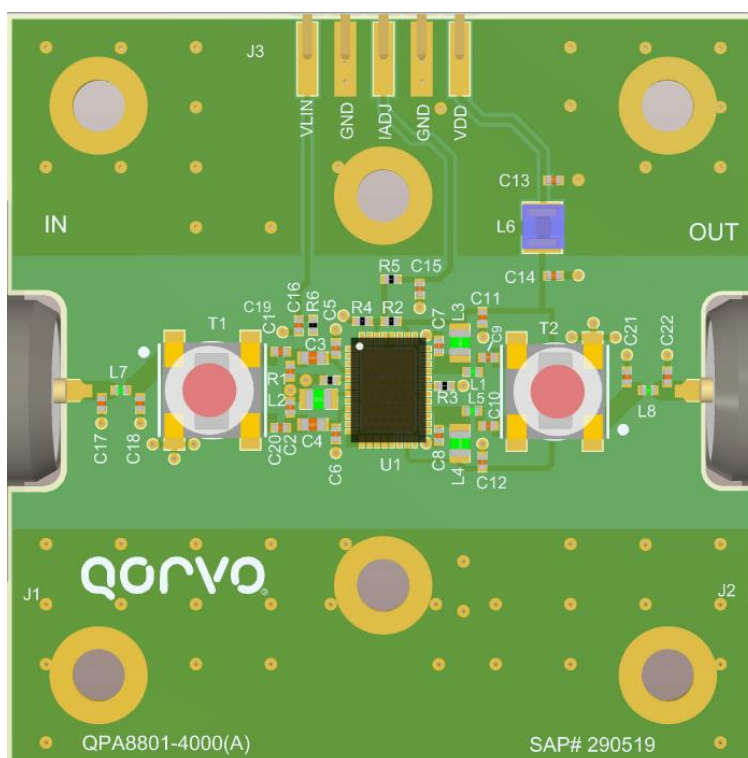


Evaluation Board Bill of Materials

Reference Designator	Description	Manufacturer	PART #
C11,C12,C13, C14,C15,C16	CAP, 0.01uF, 10%, 50V, X7R, 0402	Kemet	C0402C103K5RACTU
C9,C10	CAP, 390pF, 10%, 50V, X7R, 0402	MURATA ELECTRONICS SINGAPORE PTE LT	GRM155R71H391KA01D
C1,C2	CAP, 2.2pF, 0.1pF, 50V, C0G, 0402, LF	MURATA ELECTRONICS SINGAPORE PTE LT	GRM1555C1H2R2BA01D
C3,C4	CAP, 1000pF, 5%, 50V, C0G, 0603	MURATA ELECTRONICS SINGAPORE PTE LT	GRM1885C1H102JA01D
R2	RES0402, 2.7K Ohms, +/-5%, 1/10W	PANASONIC CORP OF NORTH AMERICA	ERJ-2GEJ272X
R1	Res Thick Film 0402 560 Ohm 5% 1/16W	KOA Speer Electronics, Inc.	RK73B1ETTP561J
C19,C20	RES, 0 OHM, 50M OHM, 0402	KOA Speer Electronics, Inc.	RK73Z1ETTP
R5,R6	1.21K OHM,1%,1/16W,LF,040 2 LEAD FREE	KOA Speer Electronics, Inc.	RK73H1ETTP1211F
L6	IND, 0.9uH, 10%, 1.3A, WW, 1008	Coilcraft, Inc.	1008AF-901XKL
L8	IND, 3.9nH, 5%, W/W, 0402	Coilcraft, Inc.	0402CS-3N9XJLU
L3,L4	IND, 680nH, 5%, 660mA, WW, 0805	Coilcraft, Inc.	0805AF-681XJR
L1,L5,L7	IND, 1.0nH, ± 5%, 1.36A, 0402	Coilcraft, Inc.	0402CS-1N0XJL
T1,T2	XFMR, SMT, 75 Ohm, 1:1 BALUN	Macom	MABA_009210_CT1760
J3	CONN, HDR, ST, PLRZD, 36-PIN	ITW Pancon	MPSS100-36-C
C5,C6,C7,C8, C17,C18,C21, C22,L2,R3,R4	NO LOAD		

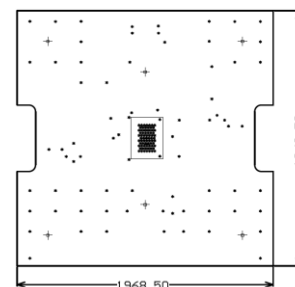
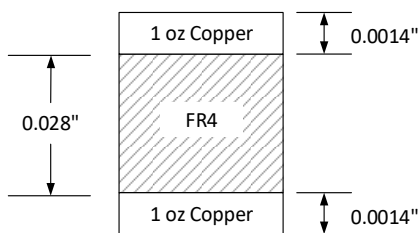
Evaluation Board Assembly Drawing



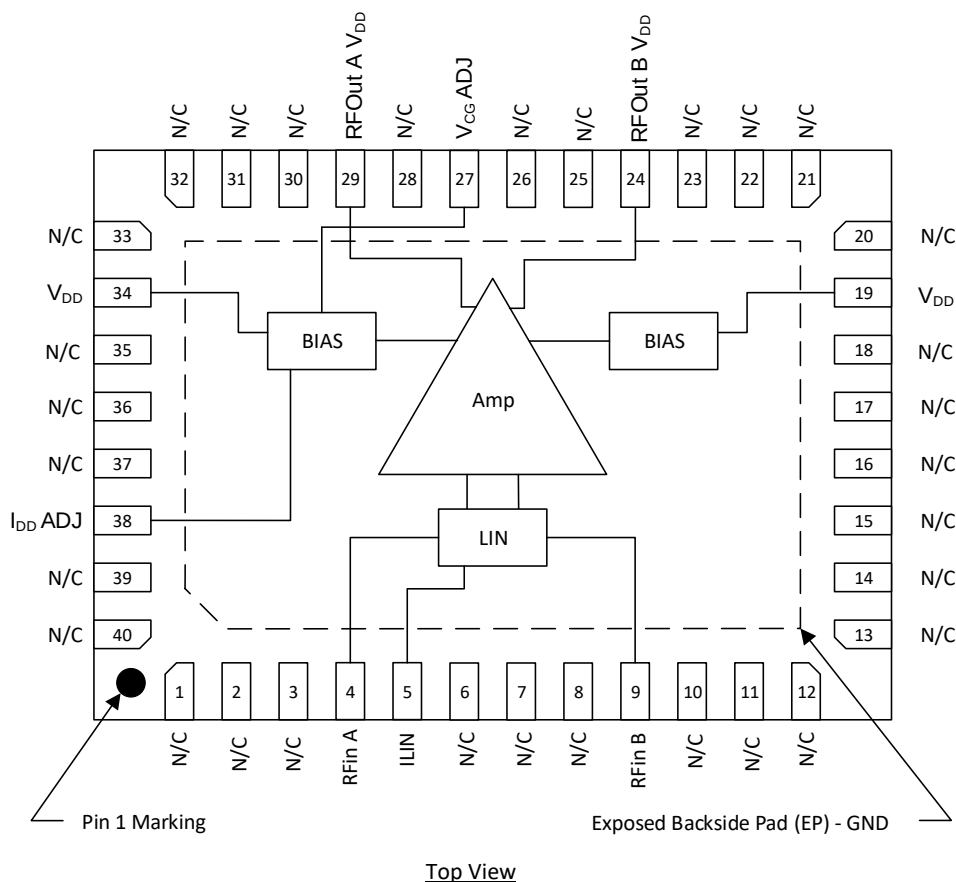


EVB PCB Material and Stack-up

Board Material: 0.028" FR4, $\epsilon_r=4.2$
 Plating: 1oz Copper
 Board Dimension: 1.9685" x 1.9685"

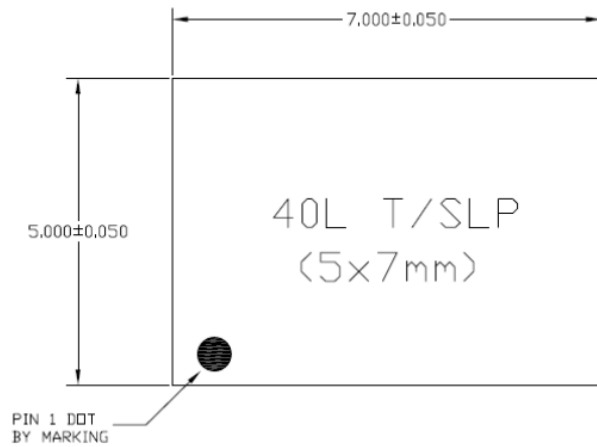


Pin Configuration and Description

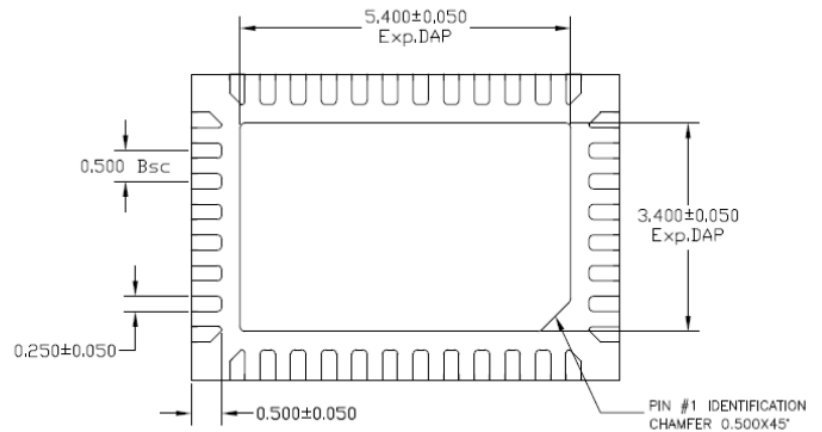


Pin No.	Label	Description
4	RFin A	RF in A, requires external Balun. External DC Block required.
9	RFin B	RF in B, requires external Balun. External DC Block required.
5	ILIN	Current adjust pin to optimize Linearity
29	RFout A/V _{DD}	RF Out A and supply voltage, external DC block & Balun required.
24	RFout B/V _{DD}	RF Out B and supply voltage, external DC block & Balun required.
19, 34	V _{DD}	Bias controller supply voltage
27	V _{CG} ADJ	Common Gate adjustment to optimize common gate amplifier bias voltage (normally open)
38	I _{DD} ADJ	I _{DD} current control (normally open), pulling to gnd lowers I _{DD} current
Backside Paddle	GND	RF/DC ground. Use recommended via pattern to minimize inductance and thermal resistance. See PCB Mounting Pattern for suggested footprint.
1,2,3,6,7,8,10 -18, 20,21,25,26,28,32,33,36,37,40, 22,23,30,31,35	N/C	No connection

Package Outline



TOP VIEW

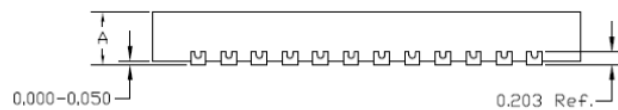


BOTTOM VIEW

NOTE:

1) TSLP AND SLP SHARE THE SAME EXPOSE OUTLINE BUT WITH DIFFERENT THICKNESS!

A	TSLP		SLP
	MAX.	0.800	0.900
	NOM.	0.750	0.850
	MIN.	0.700	0.800

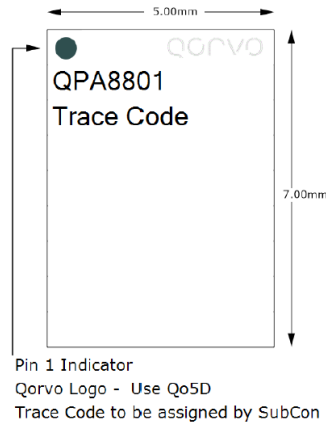


SIDE VIEW

Notes:

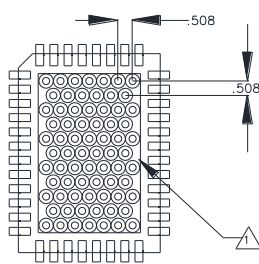
1. Dimensions in millimeters

Package Marking

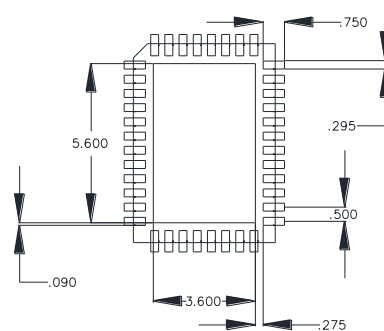


1. Dimension and tolerance formats conform to ASME Y14.4M-1994.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Co-planarity applies to the exposed ground/thermal pad as well as the contact pins.
4. Package body length/width does not include plastic flash protrusion across mold parting line.

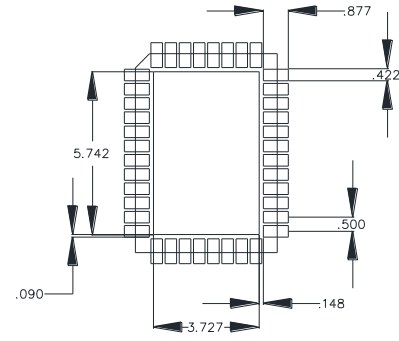
Recommended Mounting Pattern



VIA PATTERN



LAND PATTERN



SOLDER MASK

NOTES:

1. GROUND/THERMAL VIAS AND MOUNTING HOLES ARE ESSENTIAL FOR THE PROPER DEVICE PERFORMANCE. DO NOT OMIT. VIAS SHOULD USE A .35mm (#80/.0135") DIAMETER DRILL AND HAVE A FINAL, PLATED THRU DIAMETER OF .25mm (.010").
2. TO ENSURE RELIABLE OPERATION, DEVICE GROUND PADDLE-TO-GROUND PAD SOLDER JOINT IS CRITICAL. NO SOLDER MASK ON BACKSIDE OF PCB IN HEAT SINK CONTACT AREA.
3. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.

- Ensure good package backside paddle solder attach for reliable operation and best electrical performance.
- Place mounting screws near the part to fasten a back-side heat sink.
- Do not apply solder mask to the back side of the PC board in the heat sink contact region.
- Ensure that the backside via region makes good physical contact with the heat sink.



QPA8801

75Ω 11dB CATV Push Pull Amplifier 45 – 1218MHz

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ANSI / ESDA / JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C2b	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	MSL3	IPC / JEDEC J-STD-020



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes. Solder profiles available upon request.

Contact plating: NiPdAu

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Tel: 1-844-890-8163

Web: www.qorvo.com

Email: customer.support@qorvo.com

Important Notice

The information contained herein is believed to be reliable; however, Qorvo makes no warranties regarding the information contained herein and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for Qorvo products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information. **THIS INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Without limiting the generality of the foregoing, Qorvo products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

Copyright 2018 © Qorvo, Inc. | Qorvo is a registered trademark of Qorvo, Inc.