QPA4363A

DC to 4000MHz, CASCADABLE SiGe HBT MMIC AMPLIFIER

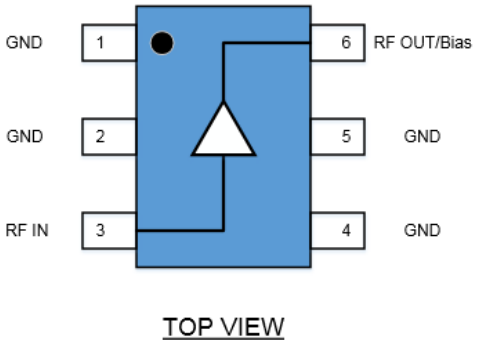
The QPA4363A is a high performance SiGe HBT MMIC amplifier. A Darlington configuration provides high F_T and excellent thermal performance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Only two DC-blocking capacitors, a bias resistor, and an optional RF choke are required for operation.

SOT-363 Package

Features

- High Gain: 14.8 dB at 1950MHz
- DC to 4000MHz Operation
- Cascadable 50Ω
- Operates From Single Voltage Supply
- Low Thermal Resistance Package

Functional Block Diagram



TOP VIEW

Applications

- Power Amplifier Driver Amplifier
- Cellular, PCS, GSM, UMTS
- IF/RF Buffer Amplifier
- Wireless Data, Satellite

Ordering Information

QPA4363ASQ	Sample Bag with 25 pieces
QPA4363ASR	7" Reel with 100 pieces
QPA4363ATR7	7" Reel with 3000 pieces
QPA4363APCK401	850MHz, +8V Operation PCBA with 5-piece Sample Bag

Absolute Maximum Ratings

Parameter	Rating	Units
Device Voltage(V_D)	+5.0	V
Device Current (I_D)	90	mA
RF Input Power Note 1	+18	dBm
Storage Temperature	-55 to +150	°C
ESD Rating (HBM)	TBD	-
Moisture Sensitivity Level	MSL1	-

Notes:

1. Load Condition 1: Z_L = 50 Ω
2. Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in this table.
3. Bias Conditions should also satisfy the following expression: $I_D V_D < (T_J - T_L)/R_{TH}$, and $T_L = T_{LEAD}$.

Caution! ESD sensitive device.

RFMD Green: RoHS status based on EU Directive 2011/65/EU (at time of this document revision), halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

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. Specified typical performance or functional - operation of the device under Absolute Maximum Rating conditions is not implied.

Recommended Operating Conditions

Parameter	Rating			Units
	Min	Typ	Max	
Operating Temperature Range	-40		+105	°C
Junction Temperature (T_J)			+125	°C
Device Operating Voltage	+2.9	+3.2	+3.5	V

Electrical Specifications – General

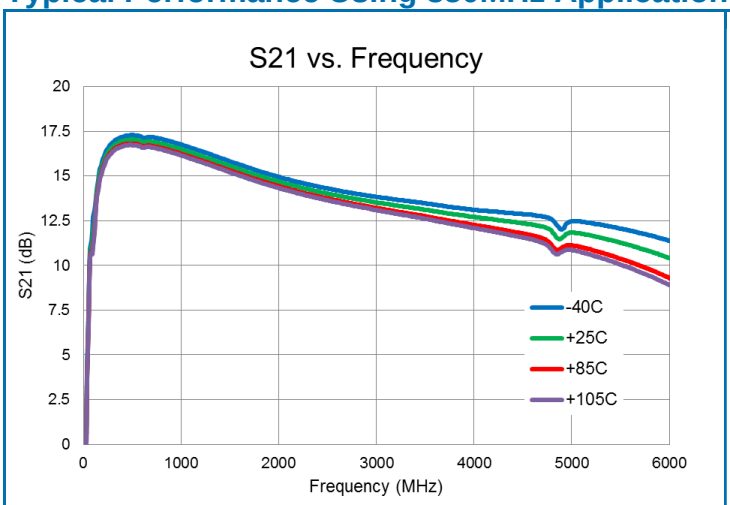
Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Small Signal Gain, S21		16.7		dB	850MHz
		14.8		dB	1950MHz
		14.1		dB	2400MHz
Output Power at 1 dB Compression		14.8		dBm	850MHz
		14.5		dBm	1950MHz
		14.2		dBm	2400MHz
Output Third Order Intercept Point		31.5		dBm	850MHz
		29.2		dBm	1950MHz
		27.9		dBm	2400MHz
Input Return Loss, S11		17.0		dB	850MHz
		20.0		dB	1950MHz
		21.2		dB	2400MHz
Output Return Loss, S22		21.7		dB	850MHz
		12.4		dB	1950MHz
		11.7		dB	2400MHz
Test Conditions unless otherwise specified: $+V_D$ = +3.2 V, V_S = +8 V, I_D = 45 mA Typ., OIP3 Tone Spacing=1 MHz, P_{OUT} per tone = -5 dBm, R_{BIAS} = 110Ω, T_L = +25°C, Z_S = Z_L =50 Ω					

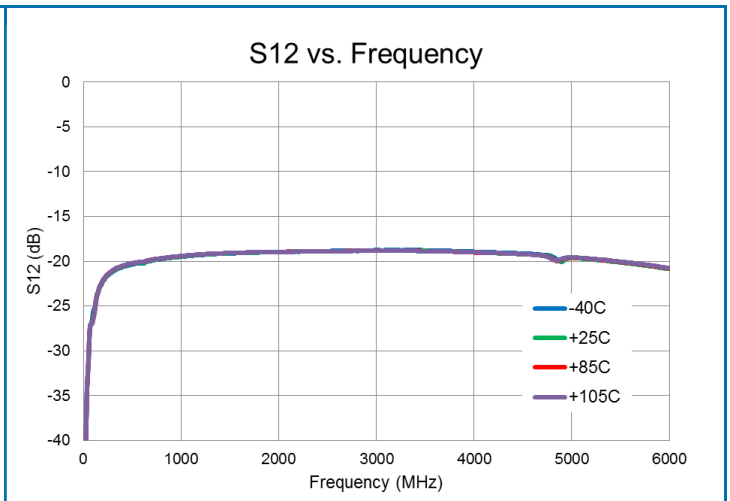
Electrical Specifications – General (Continued)

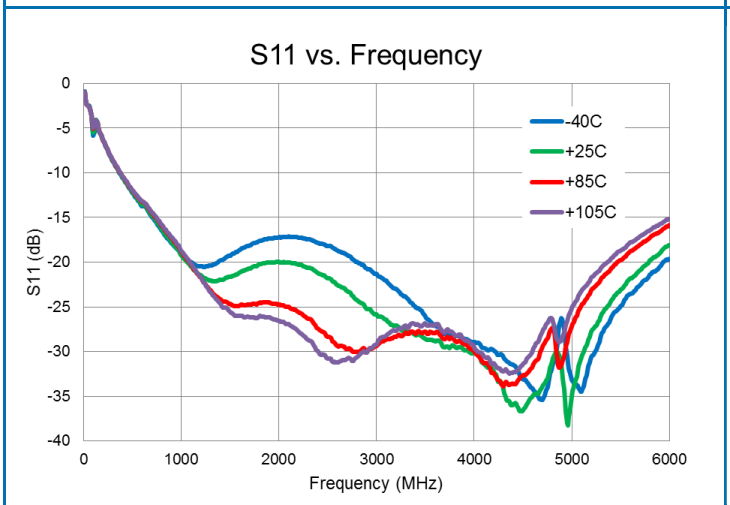
Parameter	Specification			Units	Conditions
	Min	Typ	Max		
Reverse Isolation, S12		19.6		dB	850MHz
		19.0		dB	1950MHz
		18.9		dB	2400MHz
Noise Figure		2.7		dB	850MHz
		3.0		dB	1950MHz
		3.2		dB	2400MHz
Thermal Resistance		104		°C/W	
Device Operating Current		45.0		mA	

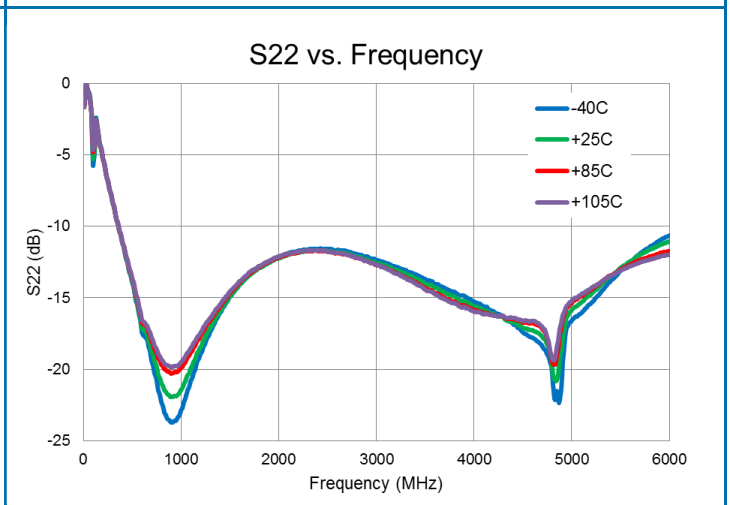
Test Conditions unless otherwise specified: $+V_D$ = +3.2 V, V_S = +8 V, I_D = 45 mA Typ., OIP3 Tone Spacing=1 MHz, P_{OUT} per tone = -5 dBm, R_{BIAS} = 110Ω, T_L = +25°C, Z_S = Z_L =50 Ω

Typical Performance Using 850MHz Application Circuit

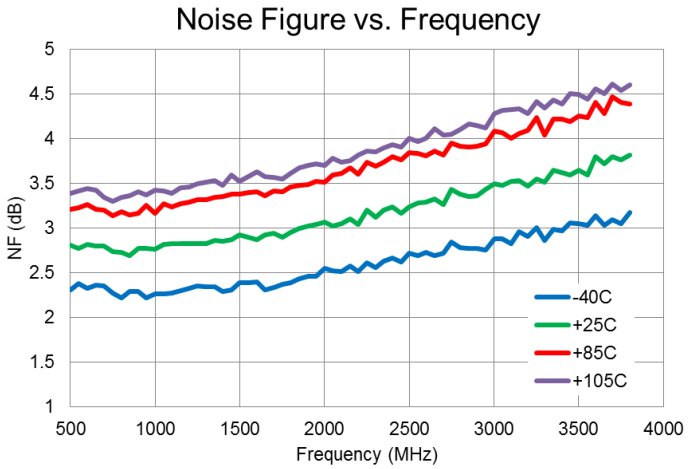


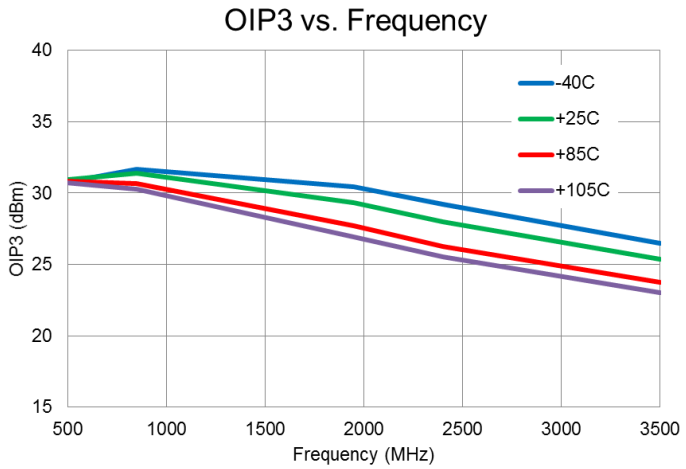


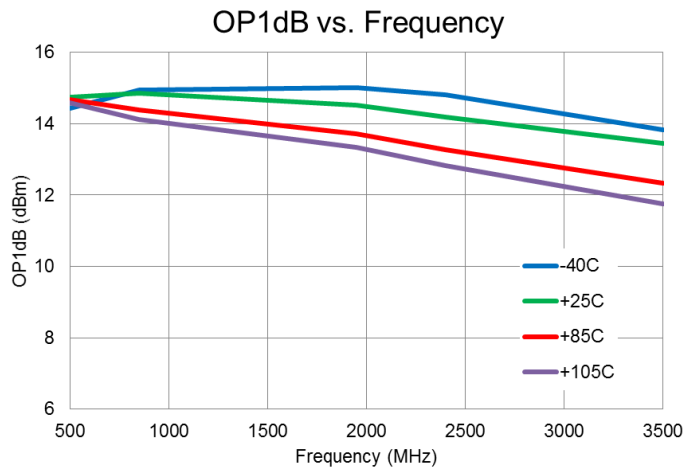


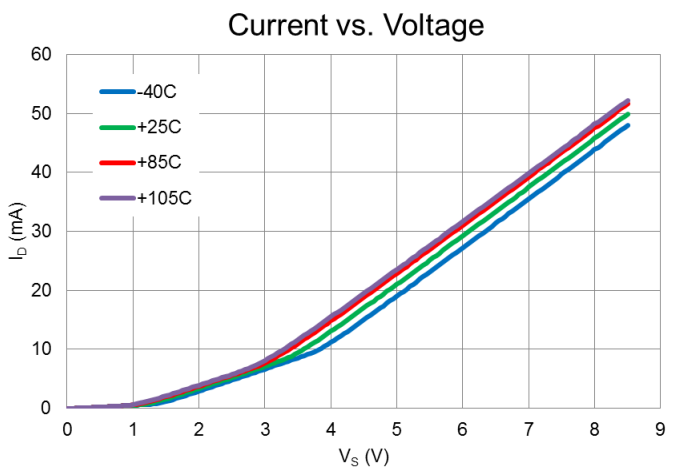


Typical Performance Using 850MHz Application Circuit

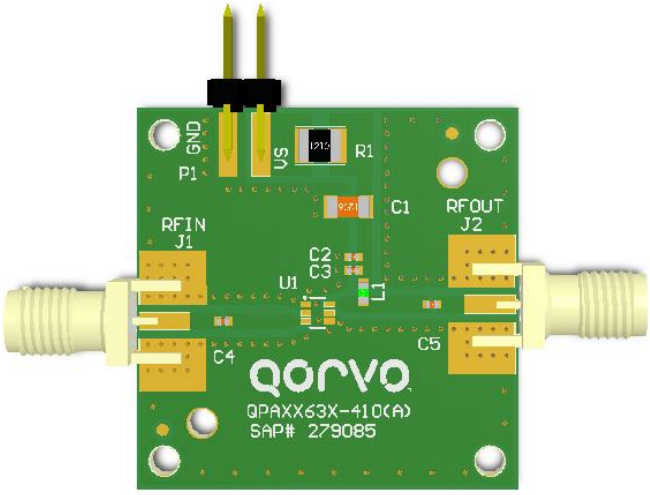


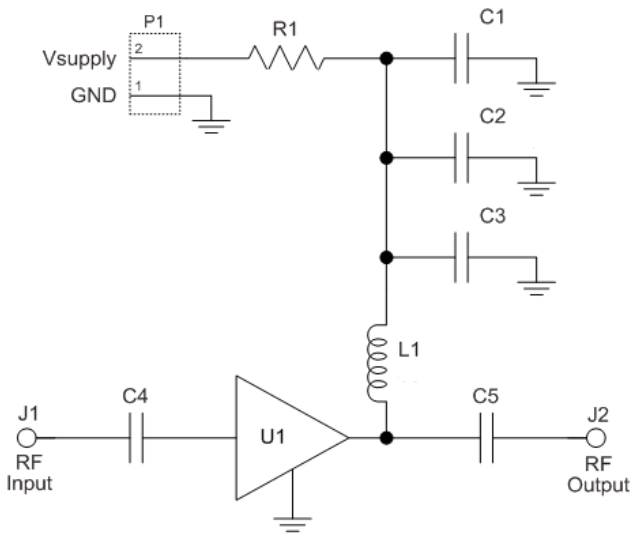






Evaluation Board and Schematic





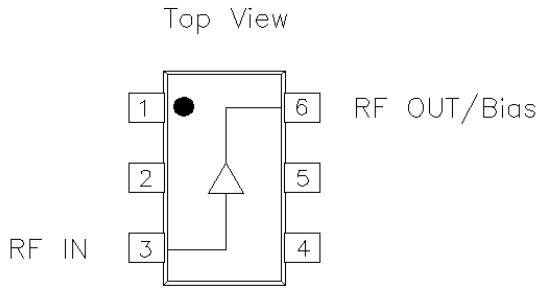
Evaluation Board Bill of Materials For 850MHz Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
Gain Block	U1	QORVO	QPA4363A
PCB	NA	Viasystems Technologies Corp	QPAXX63X-410(A)
CAP, 1uF, 10%, 25V, X7R, 1206	C1	Murata Electronics	GRM31MR71E105KA01L
CAP, 1000pF, 10%, 50V, X7R, 0402	C2	Murata Electronics	GRM155R71H102KA01D
CAP, 68pF, 5%, 50V, C0G, 0402	C3	Murata Electronics	GRM1555C1H680JA01D
CAP, 100pF, 5%, 50V, C0G, 0402	C4, C5	Murata Electronics	GRM1555C1H101JA01D
RES, 110 OHM, 5%, 1/2W, 1210	R1	Panasonic Industrial Devices	ERJ-14YJ111U
IND, 33nH, 5%, M/L, 0603	L1	Murata Electronics	LL1608-FSL33NJ
CONN, SMA, EL, FLT, 0.068" SPE-000318	J1. J2	Amphenol RF Asia Corp	901-10426
CONN, HDR, ST, 1x2, 0.100", HI-TEMP, T/H	P1	Samtec Inc.	HTSW-102-07-G-S

Component Values For Specific Frequency and Voltage in Application Circuit

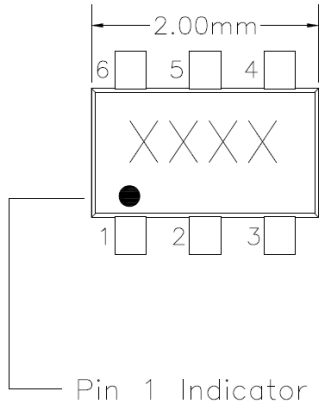
Reference Designator	Frequency (MHz)				
	500	850	1950	2400	3500
C_4, C_5	220pF	100pF	68pF	56pF	39pF
C_3	100pF	68pF	22pF	22pF	15pF
L_1	68nH	33nH	22nH	18nH	15nH
Required Bias Resistance for I_D = 45mA Bias Resistance = R_{BIAS} + R_{LDC} = (V_S -V_D) / I_D					
Supply Voltage (V_S)		+6 V	+8 V	+10 V	+12 V
Bias Resistance (R_1 = R_{Bias})		62 Ω	110 Ω	150 Ω	200 Ω
*Note: Bias resistor improves current stability over temperature					

Pin Configuration and Description

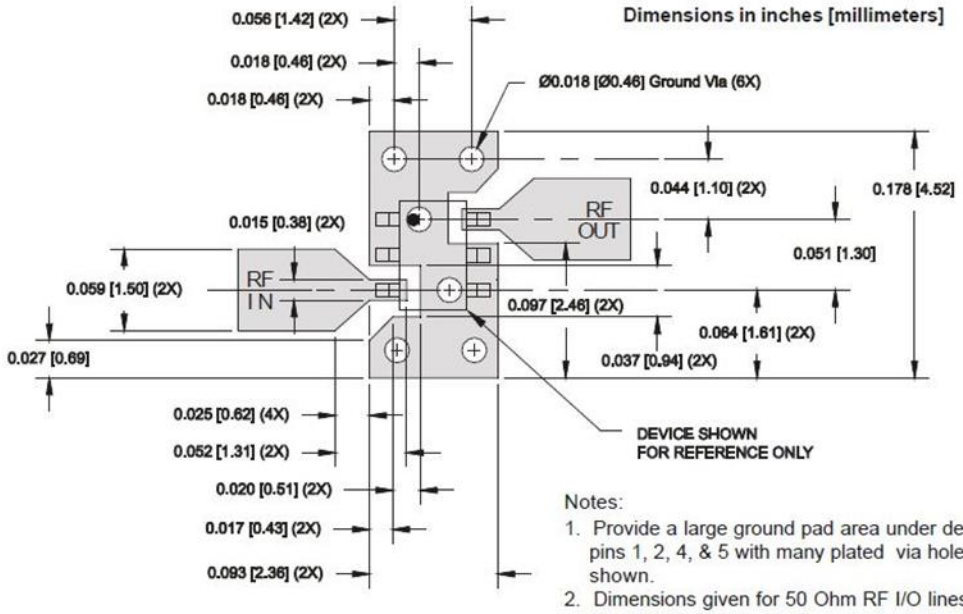


Pin	Label	Description
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor as shown in the application schematic.
1, 2, 4, 5	GND	Connect to ground per application circuit drawing. For best performance, vias should be used as shown in the recommended pad layout.
6	RF OUT/BIAS	RF output and bias pin. Bias will be supplied to this pin through an external RF choke. A DC blocking capacitor is necessary on the RF output as shown in the application circuit.

Package Marking



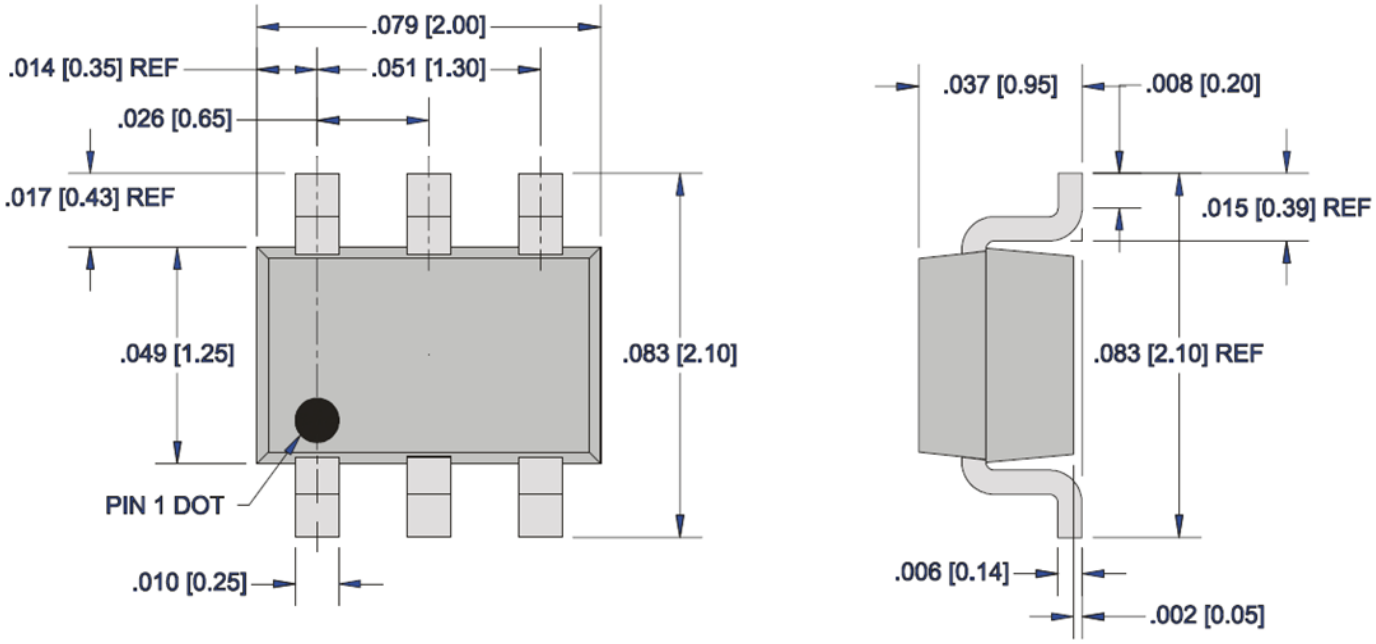
Suggested Pad Layout (Dimensions in inches [millimeters])



Notes:

1. Provide a large ground pad area under device pins 1, 2, 4, & 5 with many plated via holes as shown.
2. Dimensions given for 50 Ohm RF I/O lines are for 31 mil thick Getek. Scale accordingly for different board thicknesses and dielectric contants.
3. We recommend 1 or 2 ounce copper. Measurements for this data sheet were made on a 31 mil thick Getek with 1 ounce copper on both sides.

Package Outline (Dimensions in inches [millimeters])



Contact Information

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For information about the merger of RFMD and TriQuint as Qorvo:

Web: www.qorvo.com

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