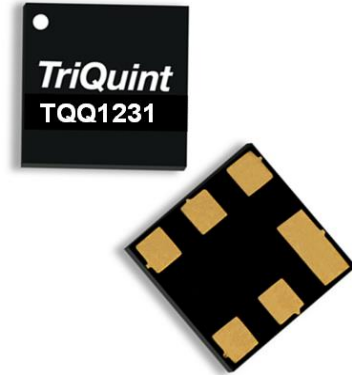


General Description

The TQQ1231 is an exceptionally high-performance BAW Diplexer for LTE Band 1 / Band 3 uplink. This filter is housed in a compact 3x3 mm package for base station applications.

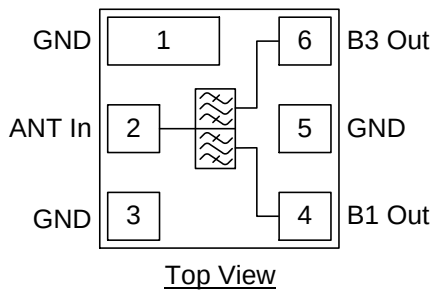
Low insertion loss, coupled with high attenuation makes this filter an ideal choice for uplink RF filtering needs.

The TQQ1231 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.



6 Pin 3 x 3 mm leadless SMT Package

Functional Block Diagram



Pin Configuration

Pin No.	Label
2	ANT In
4	B1 Out
6	B3 Out
1, 3, 5	GND

Product Features

- 60 MHz Bandwidth – Band 1
- 75 MHz Bandwidth – Band 3
- High Attenuation
- Low Loss
- No External Matching Required
- Single Input, Dual Output Operation
- Surface Mount Device
- Small Size: 3.0 x 3.0 x 1.02mm
- RoHS Compliant, Pb-Free

Performance is typical across frequency. Please reference electrical specification table and data plots for more details.

Applications

- LTE Band 1 / Band 3 Uplink Diplexer Infrastructure
- Base Station
- General Purpose Wireless

Ordering Information

Part No.	Description
TQQ1231	Band 1 / Band 3 BAW Diplexer
TQQ1231-EVB	Evaluation board
Standard T/R size = 2500 pieces on a 13" reel	

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to 105°C
RF Input Power:	
(CW, +55 °C for 10,000 hours)	+30 dBm
(CW, +95 °C for 2 hours)	+33 dBm
(CW, +95 °C for 1,000 hours)	+30 dBm
(CW, +95 °C for 10 years, MTTF)	+27 dBm

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.

Recommended Operating Conditions

Parameter	Min	Typ.	Max	Units
T _{CASE}	-40		+105 ⁽¹⁾	°C

Electrical specifications are measured at specified test conditions.

⁽¹⁾ Operation at +105 °C is possible but with lower MTTF

Electrical Specifications ^(1,2,3)

Test conditions unless otherwise noted: Temperature Range = -45 °C to +95 °C, 50 Ω system

ANT to Band 3					
Parameter	Conditions	Min	Typical ⁽⁴⁾	Max	Units
Passband		1710	-	1785	MHz
Insertion Loss	1710 – 1785 MHz	-	3.1	3.8	dB
Amplitude Ripple ⁽⁵⁾	1710 – 1785 MHz (+25 °C)	-	1.2	1.6	dB
	1710 – 1785 MHz	-	1.2	2.2	dB
Group Delay Variation ⁽⁵⁾	1710 – 1785 MHz	-	25	40	ns
	Any 5 MHz window in passband	-	9	20	ns
VSWR	Input	-	2.4:1	2.8:1	-
	Output	-	2.4:1	2.8:1	
Absolute Attenuation (Relative to 0 dB)	0.9 - 720 MHz	30	44	-	dB
	720 - 1670 MHz	27	37	-	
	1670 - 1690 MHz (-40 to +25 °C)	12	39	-	
	1670 - 1690 MHz (+25 to +95 °C)	10	39	-	
	1805 - 1825 MHz (-10 to +95 °C)	40	55	-	
	1805 - 1825 MHz (-40 to -10 °C)	35	55	-	
	1825 - 1880 MHz	45	55	-	
	1880 - 1920 MHz	38	45	-	
	1920 - 1980 MHz	38	42	-	
	1980 - 2110 MHz	33	36	-	
	2110 - 2170 MHz	32	39	-	
	2170 - 2660 MHz	20	22	-	
	2660 - 2690 MHz	24	28	-	
	2690 - 3600 MHz	10	24	-	
	3600 - 5000 MHz	10	25	-	
Input / Output Impedance ⁽⁶⁾		-	50	-	Ω

Notes:

1. All specifications are based on the Qorvo schematics for the reference design.
2. In production, devices will be tested at room temperature to a guard banded specification to ensure electrical compliance over temperature.
3. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacture tolerances.
4. Typical values are based on average measurements at room temperature on pcb. (25 °C ±5 °C)
5. This is defined as the difference between the maximum peak to adjacent valley amplitude change within the specified band
6. Optimum impedance to achieve the performance shown.

Electrical Specifications ^(1,2,3)

Test conditions unless otherwise noted: Temperature Range = -45 °C to +95 °C, 50 Ω system

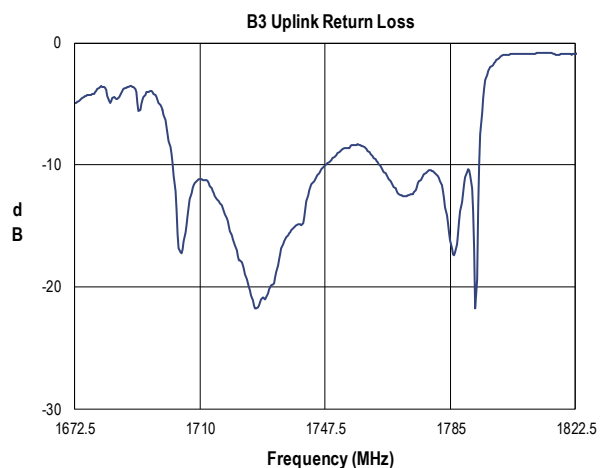
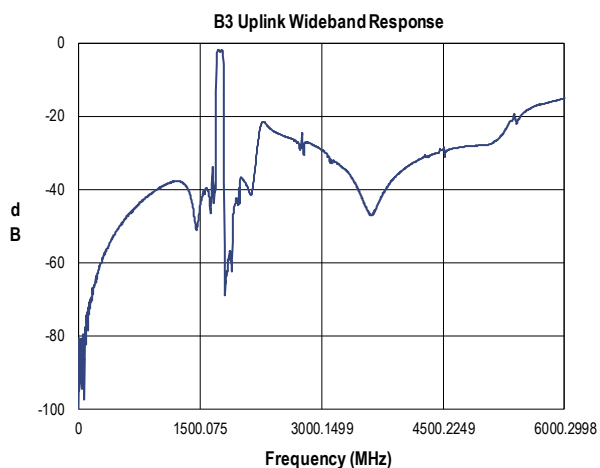
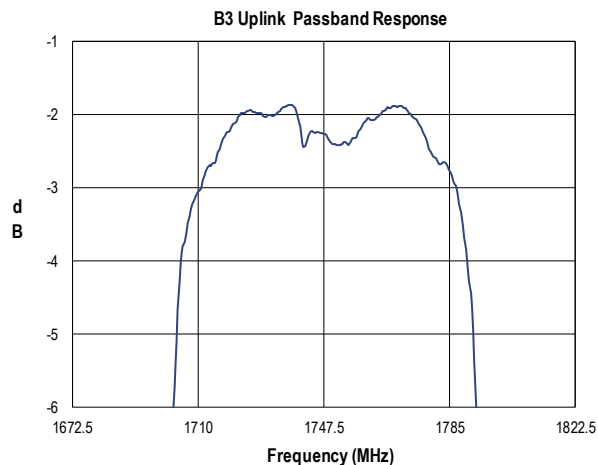
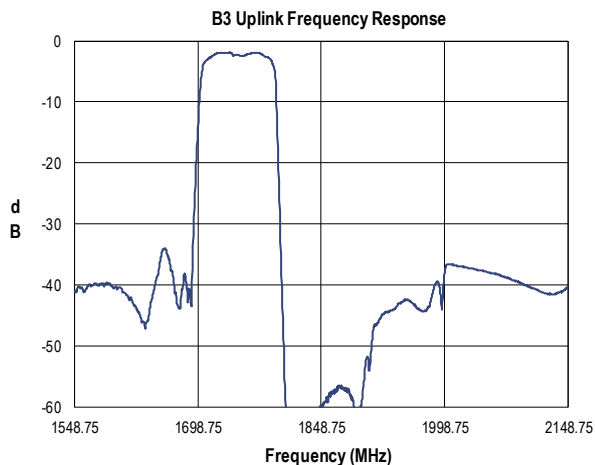
ANT to Band 1					
Parameter	Conditions	Min	Typical ⁽⁴⁾	Max	Units
Passband		1920	-	1980	MHz
Insertion Loss	1920 - 1980 MHz	-	3.0	3.8	dB
Amplitude Ripple ⁽⁵⁾	1920 - 1980 MHz (+25 °C)	-	0.7	1.7	dB
	1920 - 1980 MHz	-	0.7	2.2	dB
Group Delay Variation ⁽⁵⁾	1920 - 1980 MHz	-	15	40	ns
	Any 5 MHz window in passband	-	7	13	ns
VSWR	Input	-	2.1:1	2.6:1	-
	Output	-	2.1:1	2.6:1	
Absolute Attenuation (Relative to 0 dB)	0.9 - 1400 MHz	30	34	-	dB
	1400 - 1495 MHz	30	34	-	
	1495 - 1700 MHz	30	36	-	
	1700 - 1785 MHz	36	40	-	
	1785 - 1870 MHz	30	38	-	
	1870 - 1888 MHz	15	41	-	
	1888 MHz	11	47	-	
	1900 MHz	5	48	-	
	2000 MHz	4	25	-	
	2000 - 2015 MHz	3.5	20	-	
	2012 - 2015 MHz	7.5	36	-	
	2015 - 2030 MHz	8	38	-	
	2030 - 2050 MHz	35	41	-	
	2050 - 2080 MHz	33	39	-	
	2080 - 2170 MHz	30	42	-	
	2170 - 4170 MHz	25	32	-	
	4170 - 5000 MHz	30	41	-	
	5000 - 5720 MHz	10	36	-	
	5720 - 6000 MHz	8	40	-	
Input / Output Impedance ⁽⁶⁾		-	50	-	Ω

Notes:

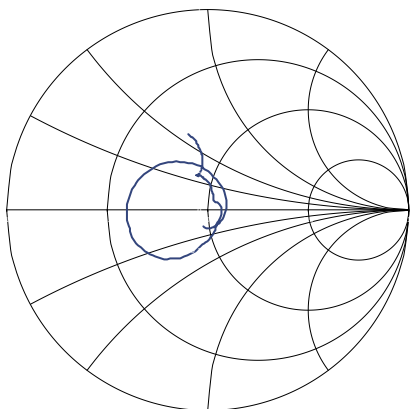
1. All specifications are based on the Qorvo schematics for the reference design.
2. In production, devices will be tested at room temperature to a guard banded specification to ensure electrical compliance over temperature.
3. Electrical margin has been built into the design to account for the variations due to temperature drift and manufacture tolerances.
4. Typical values are based on average measurements at room temperature on pcb. (25 °C ±5 °C)
5. This is defined as the difference between the maximum peak to adjacent valley amplitude change within the specified band
6. Optimum impedance to achieve the performance shown.

B3 Typical Performances

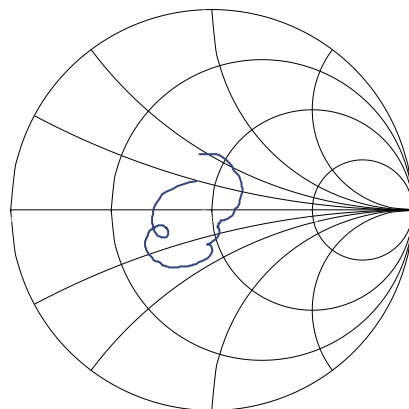
Test conditions unless otherwise noted: Temp = +25 °C, 50 Ω system



B3 Uplink Path - Ant Port Impedance

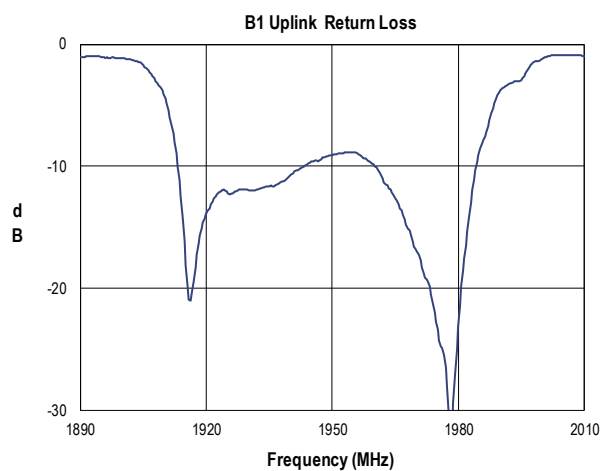
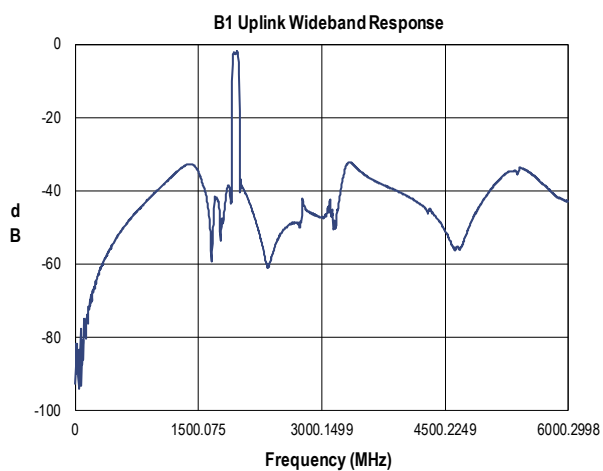
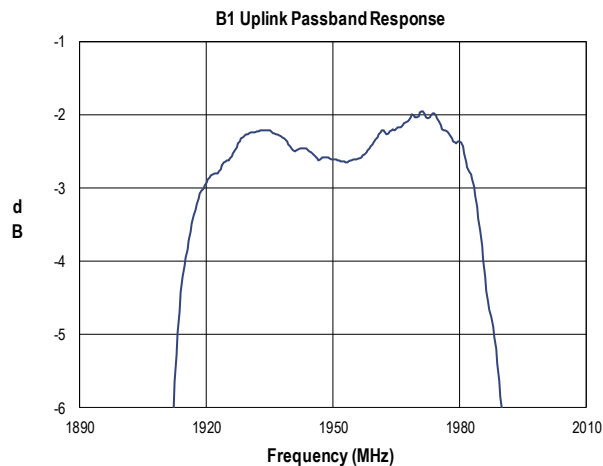
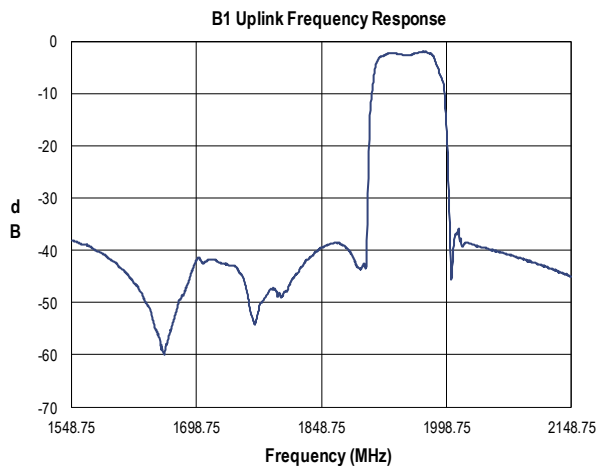


B3 Uplink Port Impedance

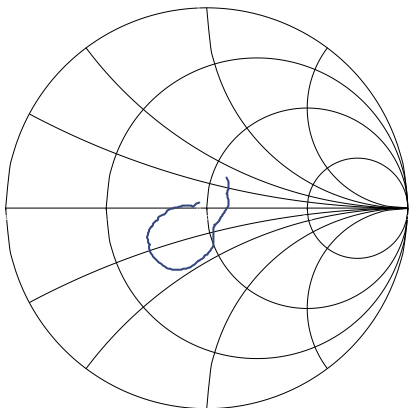


B1 Typical Performances

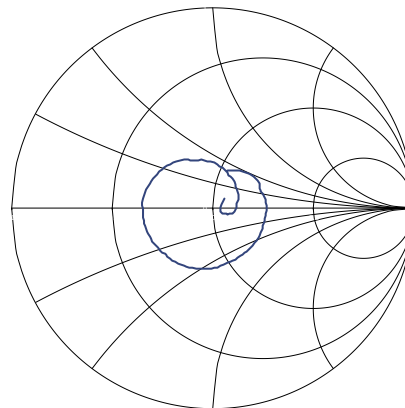
Test conditions unless otherwise noted: Temp = +25 °C, 50 Ω system



B1 Uplink Path - Ant Port Impedance

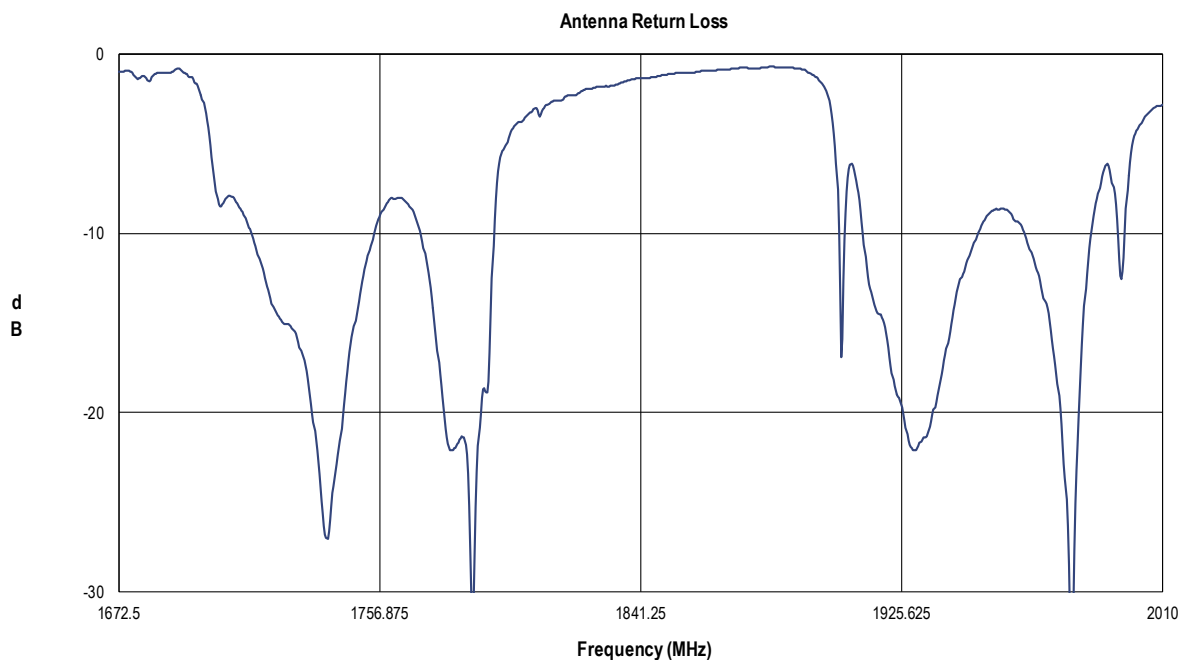
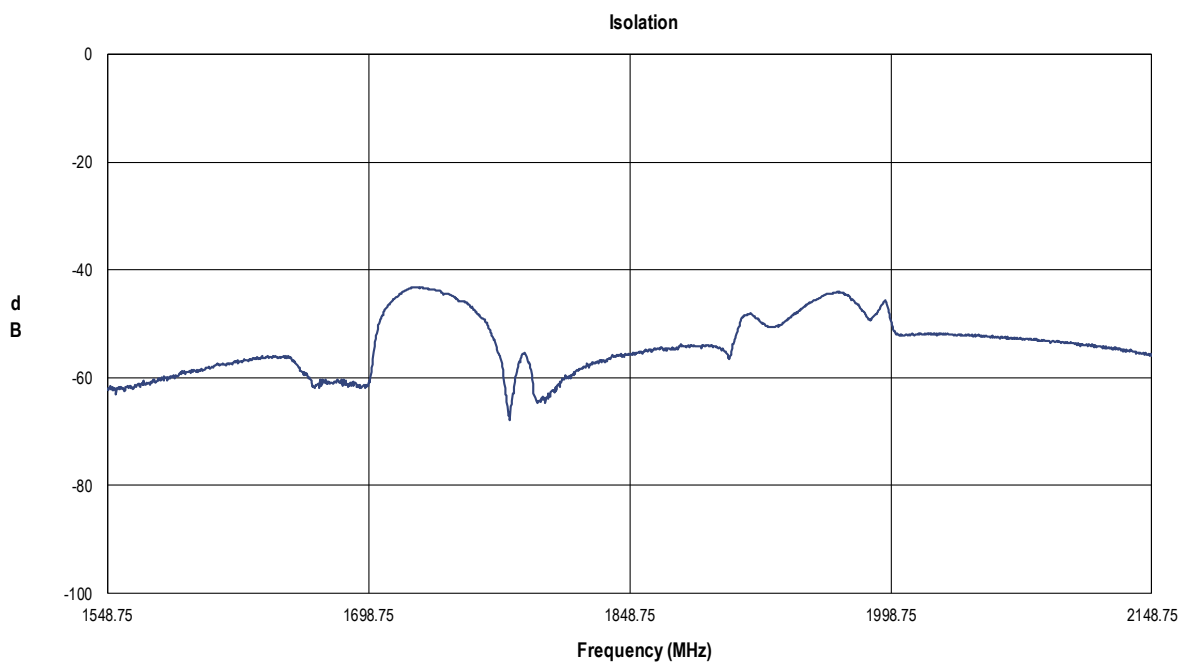


B1 Uplink Port Impedance

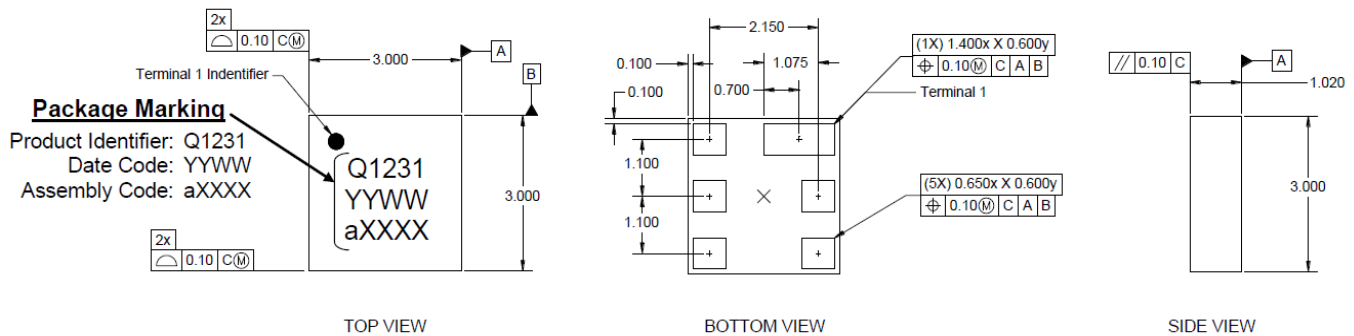


B1_B3 Typical Performances

Test conditions unless otherwise noted: Temp = +25 °C, 50 Ω system



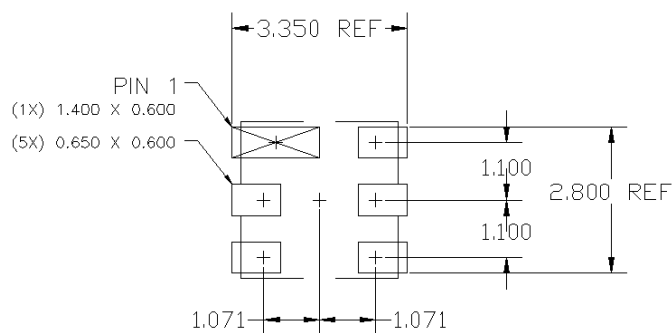
Package Marking and Dimensions



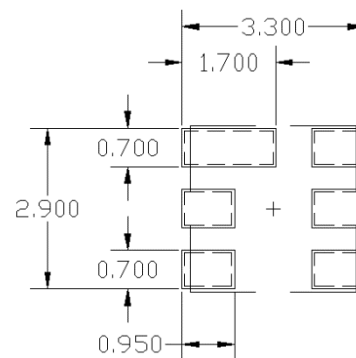
Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Except where noted, this part outline conforms to JEDEC standard MO-229.
3. Dimension and tolerance formats conform to ASME Y14.4M-1994.
4. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

PCB Mounting Pattern



Top view recommended land pattern metallization.



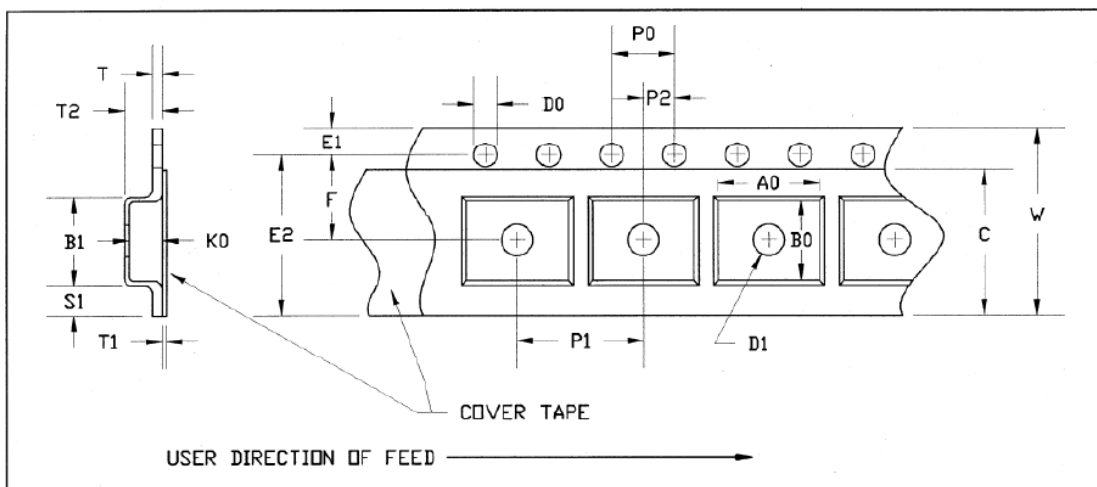
Top view recommended land pattern stencil aperture.

Notes:

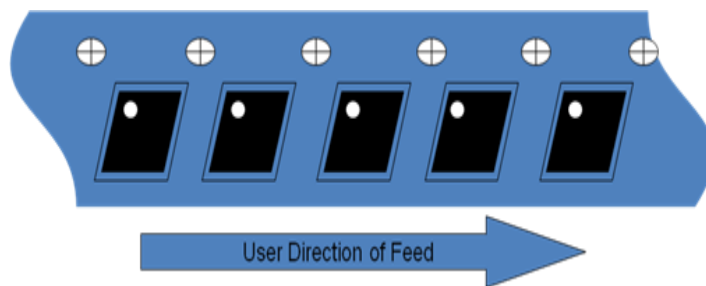
1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.

Tape and Reel Information – Carrier and Cover Tape Dimensions

Tape and reel specifications for this part are also available on the Qorvo website.
Standard T/R size = 2500 pieces on a 13" reel.

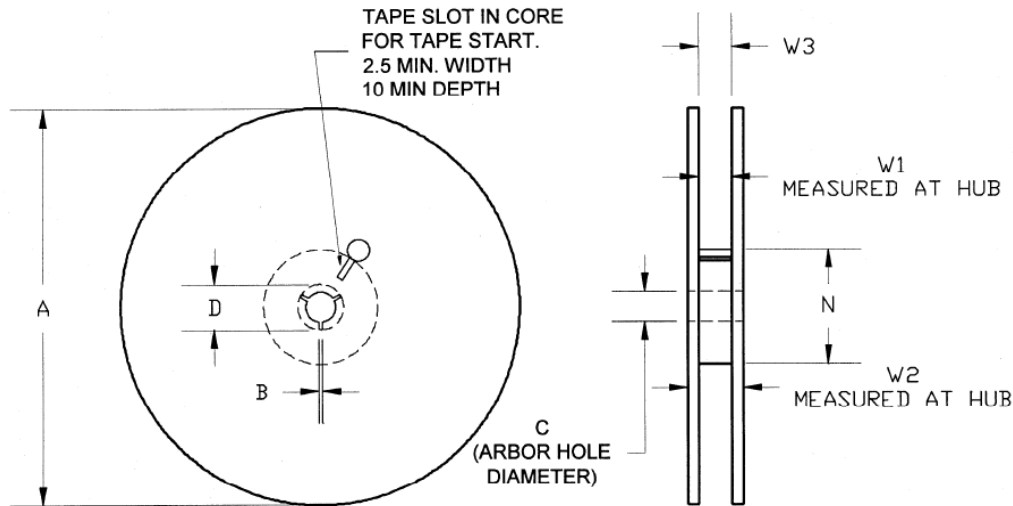


Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.126	3.20
	Width	B0	0.126	3.20
	Depth	K0	0.047	1.20
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.217	5.50
Cover Tape	Width	C	0.362	9.20
Carrier Tape	Width	W	0.472	12.0



Tape and Reel Information – Reel Dimensions

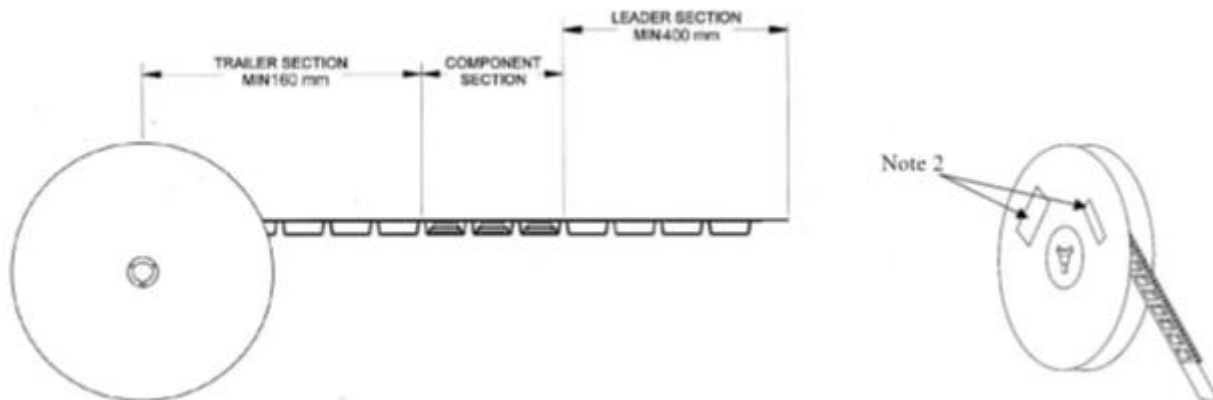
Tape and reel specifications for this part are also available on the Qorvo website.
Standard T/R size = 2500 pieces on a 13" reel.



Feature	Measure	Symbol	Size (in)	Size (mm)
Flange	Diameter	A	12.992	330.0
	Thickness	W2	0.717	18.2
	Space Between Flange	W1	0.504	12.8
Hub	Outer Diameter	N	4.016	102.0
	Arbor Hole Diameter	C	0.512	13.0
	Key Slit Width	B	0.079	2.0
	Key Slit Diameter	D	0.795	20.2

Tape and Reel Information – Tape Length and Label Placement

Standard T/R size = 2500 pieces on a 13" reel.



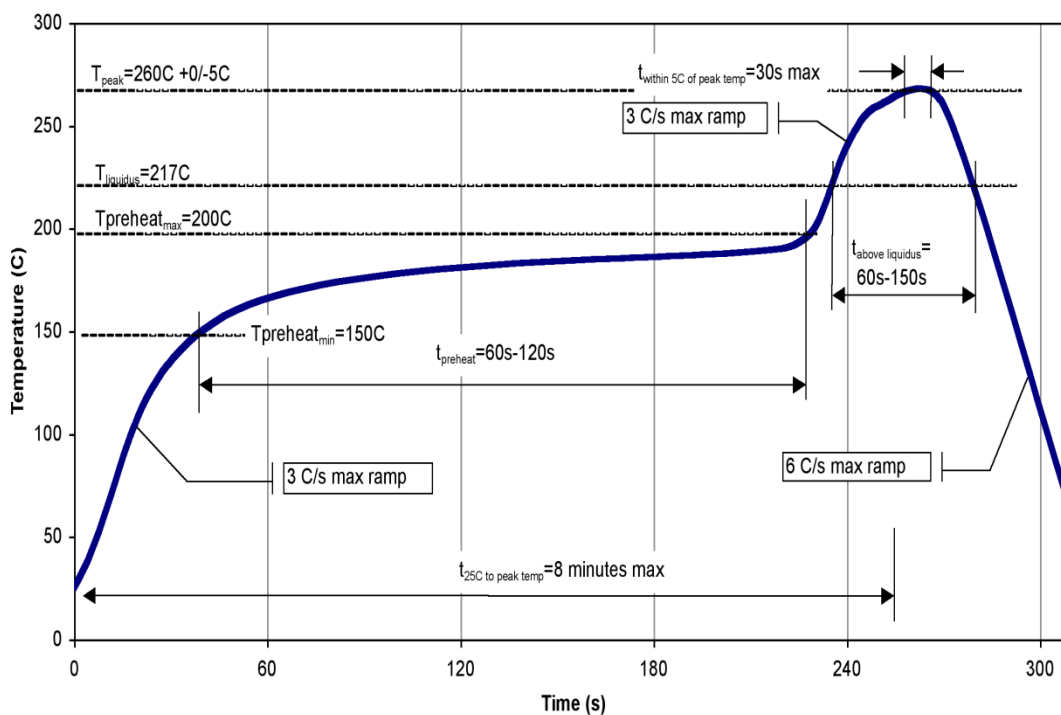
Notes:

1. Empty part cavities at the trailing and leading ends are sealed with cover tape. See EIA 481.
2. Labels are placed on the flange opposite the sprockets in the carrier tape.

Assembly Notes

1. Compatible with both Lead-free solder (260°C peak reflow temperature) and tin/lead (245°C peak reflow temp.) soldering processes.
2. Contact plating: ENIG (Electroless Nickel Immersion Gold)

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 0B	ESDA / JEDEC JS-001
ESD – Machine Model (MM)	Class B	JEDEC J-STD22-A115
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive Device

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
- SVHC Free
- PFOS Free

Contact Information

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

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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