# QPQ1288

## 2345.0 MHz BAW Filter

## General Description

The QPQ1288 is a high performance Bulk Acoustic Wave (BAW) filter designed to meet the strict LTE rejection requirements for use in B40, Sub-Band 2300-2390 MHz

QPQ1288 is specifically designed to meet the high performance expectations of insertion loss and rejection for LTE TDD systems under all operating conditions.

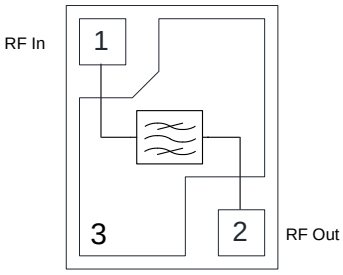
The QPQ1288 uses common module packaging techniques to achieve the industry standard 2.0 x 1.6 x 0.73 mm footprint.


3 Pin 2 x 1.6 mm leadless SMT Package

## Product Features

- Highly selective BAW filter achieving low insertion loss over full bandwidth and operating conditions
- Performance -20 to +90 °C
- Excellent Wi-Fi rejection
- Single-ended operation
- No Matching required for operation at 50 Ω
- High Power Handling Compatible for Small Cells
- Small Size
- **RoHS** compliant (2002/95/EC), **Pb**-free

## Functional Block Diagram




Top View

## Applications

- For Band 40 TD-LTE applications
- 2300 – 2390 MHz Sub-Band
- For Small Cells Base Stations

## Pin Configuration

| Pin No. | Label |
|---|---|
| 1 | RF in |
| 2 | RF out |
| 3 | Ground |

## Ordering Information

| Part No. | Description |
|---|---|
| QPQ1288SR | 100 pieces on a 7” reel |
| QPQ1288TR7 | 2,500 pieces on a 7” reel (standard) |
| QPQ1288EVB | Evaluation Board |

## Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Storage Temperature [1] | −40 to +125 °C |
| Operating Temperature [2] | −40 to +105°C |

[1] Operation of this device outside the parameter ranges given may cause permanent damage.
[2] Device will function but it is not guaranteed to meet electrical specifications.

## Life Test

| Conditions | Rating |
|---|---|
| +29 dBm, LTE SIGNAL PAR = 8dB, 5MHz, 16 QAM + 90 °C | >10 yrs. |

Power rating is valid when Power is injected into Pin 1 or Pin 2

## Electrical Specifications [1]

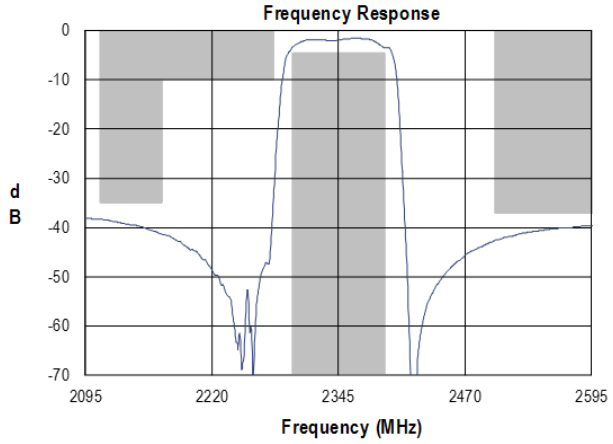
Test conditions unless otherwise specified. Temperature Range: -20 to +90 °C

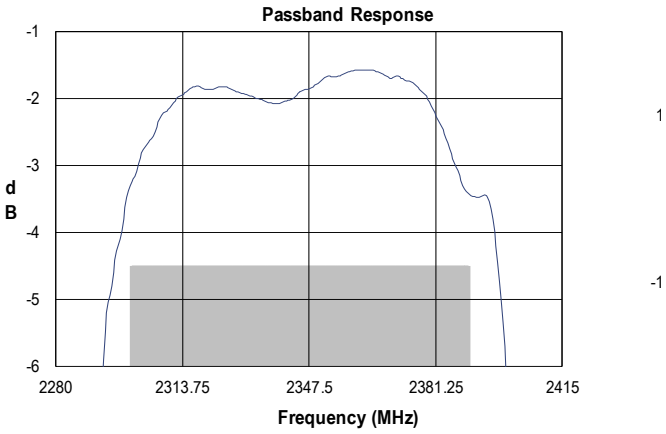
| Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Average Insertion Loss[2] | 2300 – 2310 | - | 2.8 | 3.5 | dB |
| | 2310 – 2370 (Over any 10 MHz) | - | 2.1 | 2.8 | dB |
| | 2370 – 2380 | - | 2.1 | 2.8 | dB |
| | 2380 – 2390 | - | 2.8 | 3.5 | dB |
| Input / Output VSWR | 2300.0–2390.0 MHz | - | 2:1 | 2.4:1 | - |
| Input / Output Return Loss | 2300.0–2390.0 MHz | 7.7 | 9.0 | - | dB |
| Amplitude Variation[3] (over any 10 MHz window) | 2300.0–2390.0 MHz | - | 1.2 | 2.0 | dB |
| | 2305.0–2385.0 MHz | - | 0.7 | 1.6 | dB |
| Group Delay Ripple[4] (over any 10 MHz window) | 2300.0–2390.0 MHz | - | 15 | 30 | ns p-p |
| Phase Ripple[4] (over any 10 MHz window) | 2300.0–2390.0 MHz | - | 7 | 25 | ° p-p |
| Attenuation in WIFI Band[5] (Average per Channel using 802.11b Spectrum mask) | 2401 – 2423 MHz (Channel 1) | 11 | 37 | - | dB |
| | 2406 – 2428 MHz (Channel 2) | 22 | 46 | - | |
| | 2411 – 2433 MHz (Channel 3) | 52 | 62 | - | |
| | 2416 – 2463 MHz (Channel 4 - 9) | 50 | 56 | - | |
| | 2446 – 2468 MHz (Channel 10) | 46 | 48 | - | |
| | 2451 – 2473 MHz (Channel 11) | 45 | 47 | - | |
| | 2456 – 2478 MHz (Channel 12) | 44 | 46 | - | |
| | 2461 – 2483 MHz (Channel 13) | 42 | 44 | - | |
| | 2473 – 2495 MHz (Channel 14) | 41 | 43 | - | |
| Attenuation[7] | 10 – 766 MHz | 50 | 55 | - | dB |
| | 791 – 960 MHz | 47 | 49 | - | |
| | 1150 – 1195 MHz | 35 | 44 | - | |
| | 1574.4 – 1576.4 MHz | 37 | 40 | - | |
| | 1710 – 2170 MHz | 35 | 38 | - | |
| | 2170 – 2275 MHz | 10 | 37 | - | |
| | 2500 – 2690 MHz | 36 | 39 | - | |
| | 3400 – 3500 MHz | 35 | 39 | - | |
| | 4600 – 4800 MHz | 32 | 36 | - | |
| | 5150 – 5850 MHz | 20 | 23 | - | |
| | 6000 – 8000 MHz | 13 | 17 | - | |
| 2nd Harmonic[8] | Pin = +29 dBm (2300-2390 MHz) | 55 | 80 | | dBc |
| Source/Load Impedance [9] | Single-ended | - | 50 | - | Ω |

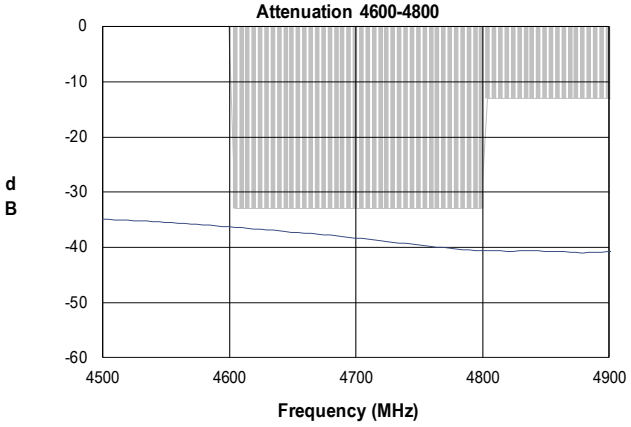
Notes:
1. All specifications are based on the QORVO schematic for the main reference design shown on page 5.
2. Average Insertion Loss is calculated by averaging |S21| in dB for each measured point within defined frequency range
3. Amplitude Variation is defined as the difference between the lowest loss and the highest loss within 10 MHz channels.
4. This is defined as the worst difference between a peak and adjacent valley within defined frequency points
5. WIFI attenuation is calculated by averaging |S21| in dB referenced to ZERO dB for each measured point within defined frequency range
6. Typical values are an average of 20 pieces measured at a temperature of 25 C.
7. Attenuation is referenced to ZERO dB
8. Non-Linear Response is the same for Pin 2 Input
9. This is the optimum impedance in order to achieve the performance shown

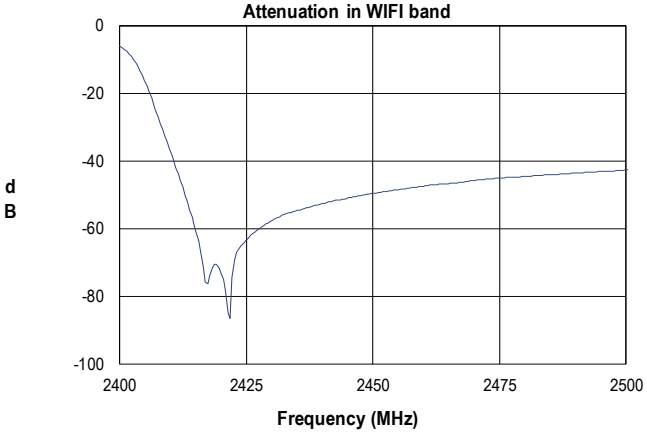
## Performance Plots

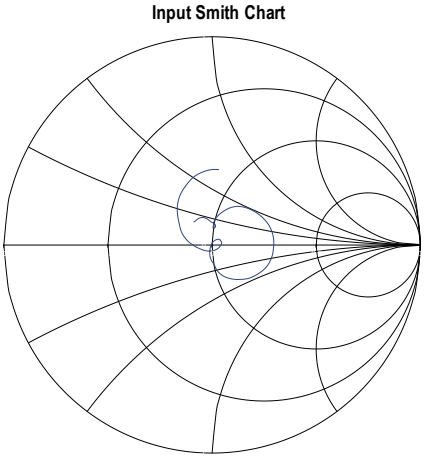
Test conditions unless otherwise noted: Temp.= +25 °C

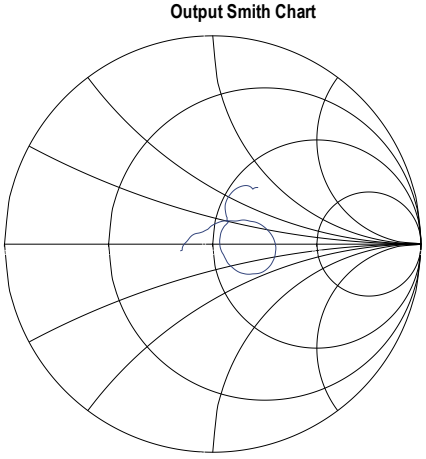


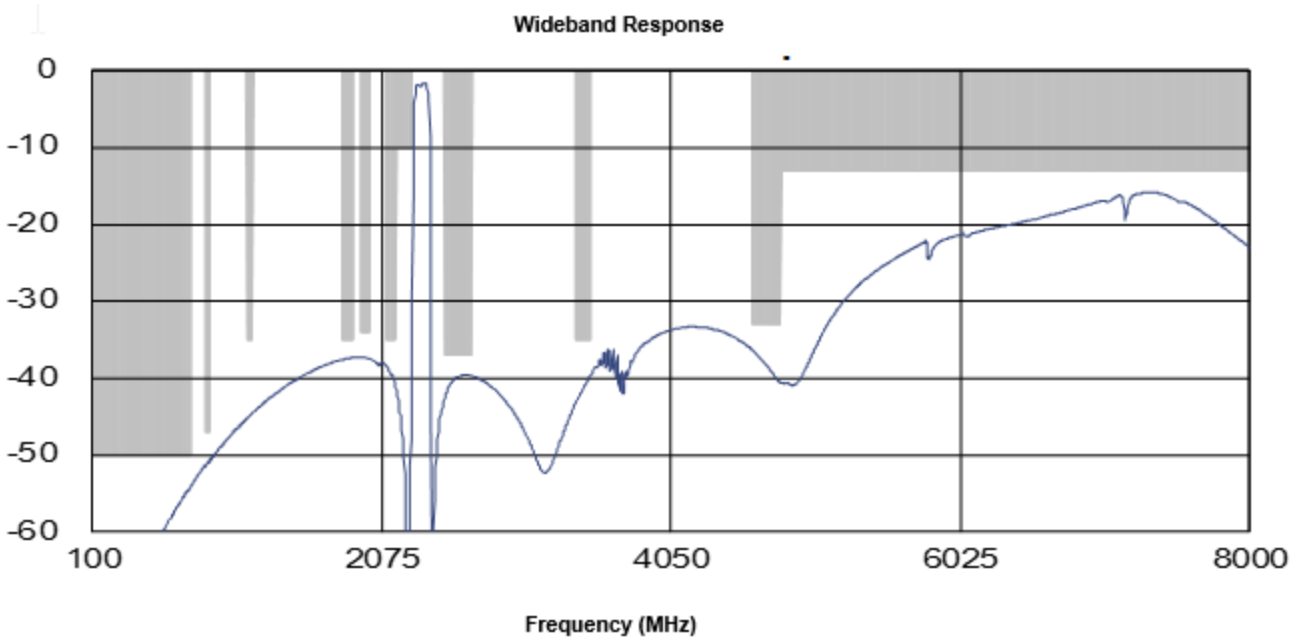



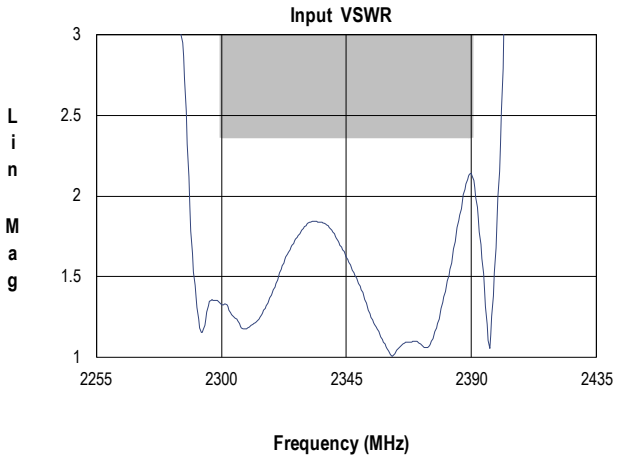



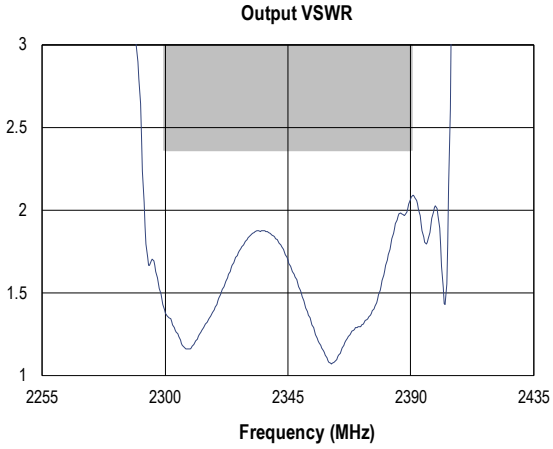



## Performance Plots – (continued)

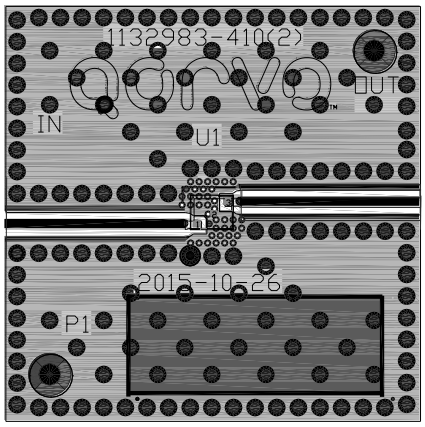
Test conditions unless otherwise noted: Temp.= +25 °C

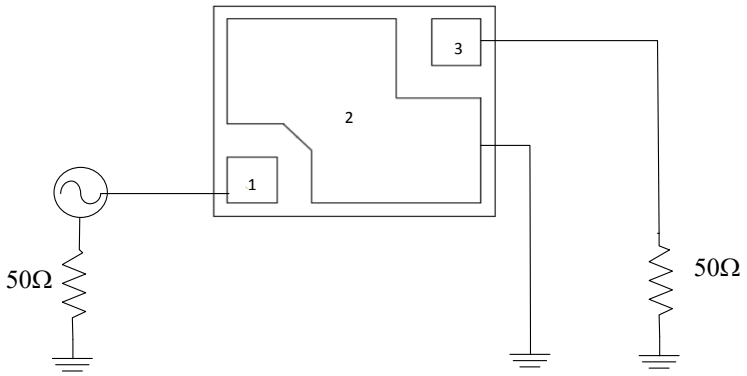


## Evaluation Board



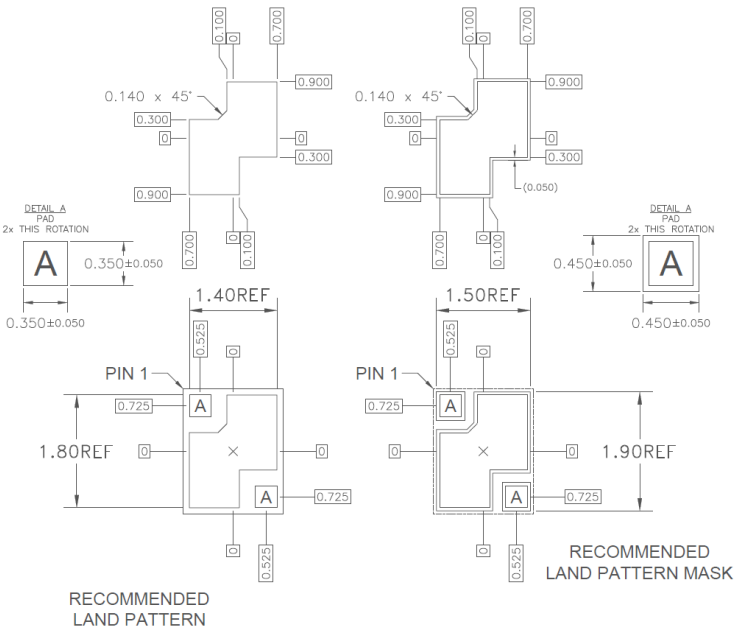




## Bill of Material

| Reference Des. | Value | Description | Manuf. | Part Number |
|---|---|---|---|---|
| SMA | N/A | SMA connector | Radiall | 9602-1111-018 |
| PCB | N/A | 3-layer | Multiple | 1132983 |

## PCB Mounting Pattern

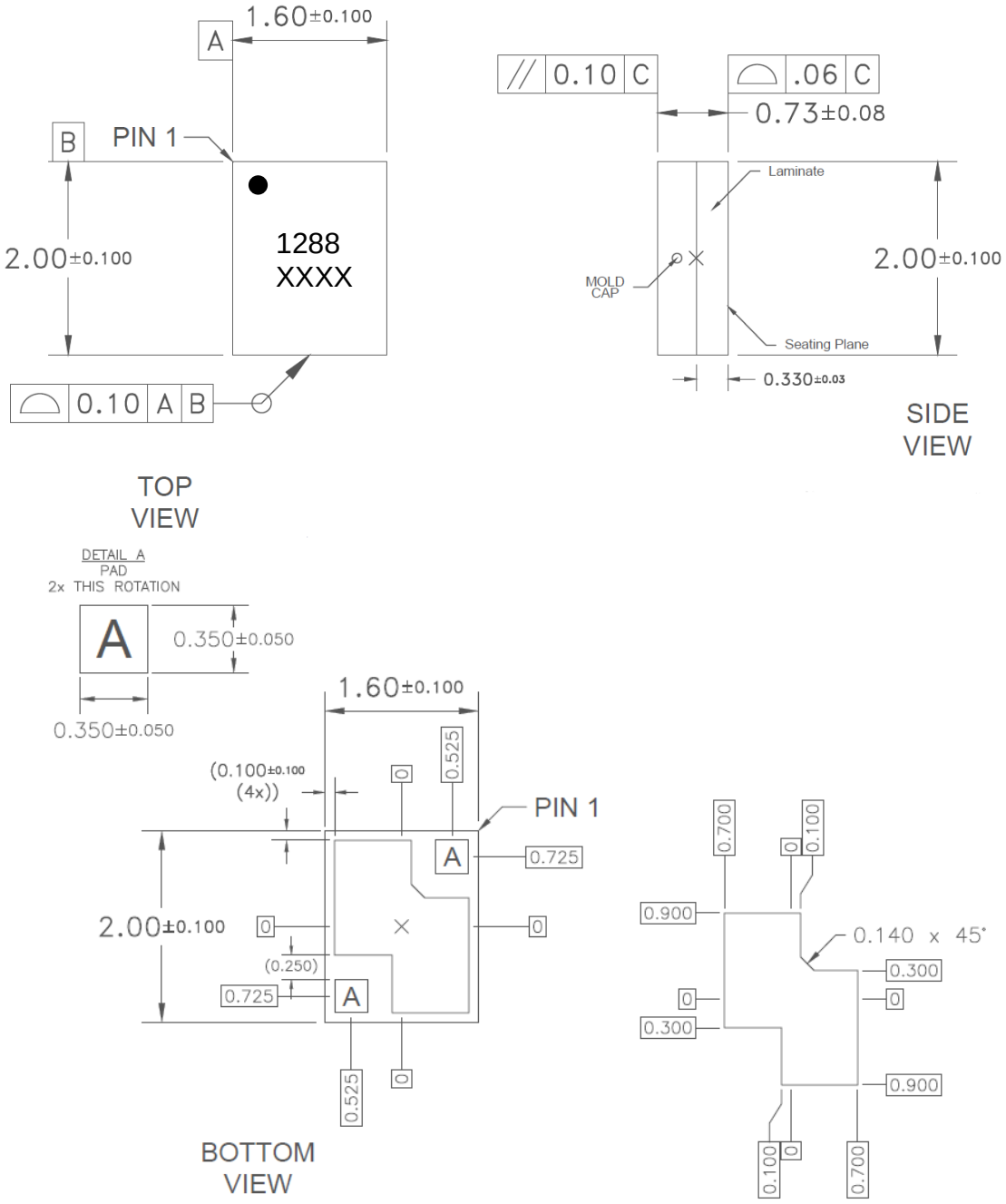
All dimensions are in millimeters



## Package Marking and Dimensions

Marking
4-digit Part Number: 1288
4-digit Trace Code: XXXX

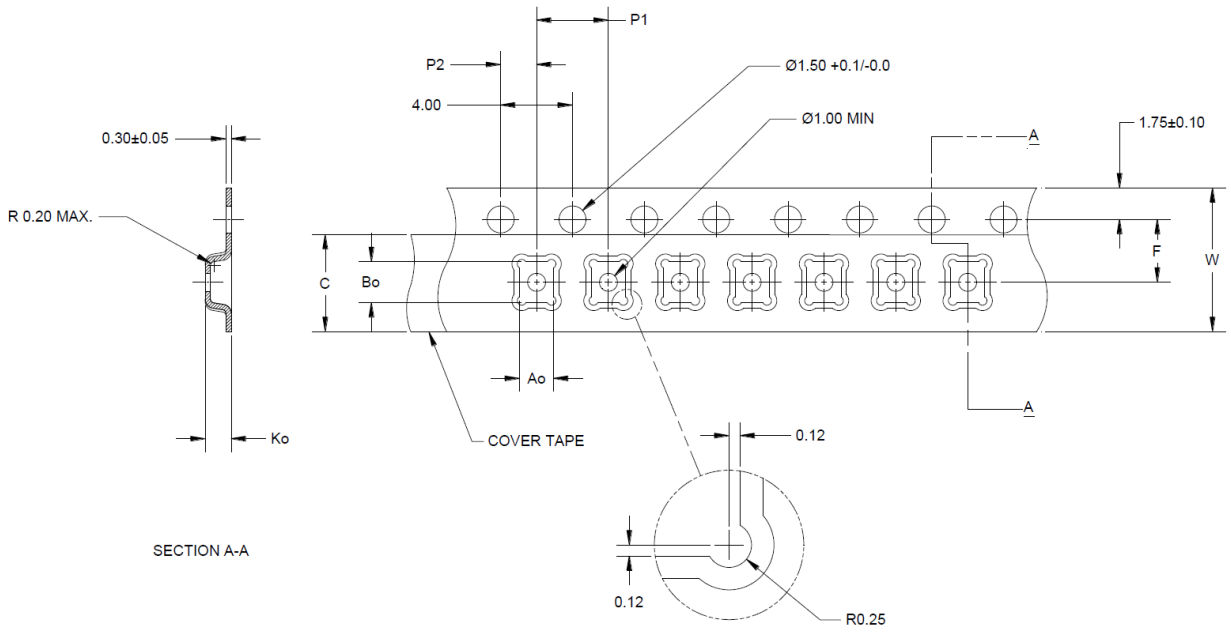
Body: Al2O3 ceramic
Lid: Kovar, Au over Ni plating
Terminations: Au plating 0.5 - 1.0µm, over a 2-6µm Ni plating



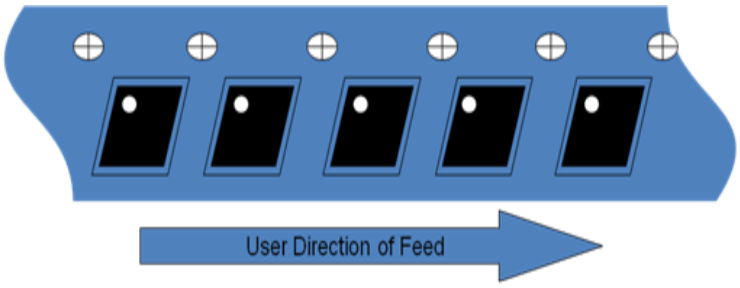

Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

## 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 7” reel.




| Feature | Measure | Symbol | Size (in) | Size (mm) |
|---|---|---|---|---|
| Cavity | Length | A0 | 0.077 | 1.95 |
| | Width | B0 | 0.093 | 2.35 |
| | Depth | K0 | 0.045 | 1.15 |
| | Pitch | P1 | 0.157 | 4.00 |
| Centerline Distance | Cavity to Perforation - Length Direction | P2 | 0.079 | 2.00 |
| | Cavity to Perforation - Width Direction | F | 0.138 | 3.50 |
| Cover Tape | Width | C | 0.213 | 5.40 |
| Carrier Tape | Width | W | 0.315 | 8.00 |



## Tape and Reel Information – Reel Dimensions

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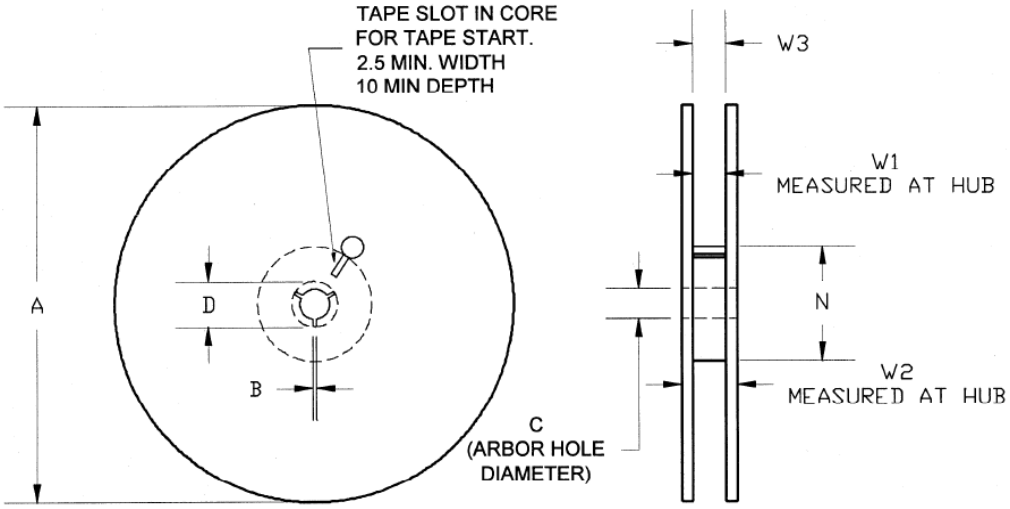


| Feature | Measure | Symbol | Size (in) | Size (mm) |
|---|---|---|---|---|
| Flange | Diameter | A | 6.969 | 177.0 |
| | Thickness | W2 | 0.559 | 14.2 |
| | Space Between Flange | W1 | 0.346 | 8.8 |
| Hub | Outer Diameter | N | 2.283 | 58.0 |
| | Arbor Hole Diameter | C | 0.512 | 13.0 |
| | Key Slit Width | B | 0.079 | 2.0 |
| | Key Slit Diameter | D | 0.787 | 20.0 |

## Handling Precautions

| Parameter | Rating | Standard |
|---|---|---|
| ESD – Human Body Model (HBM) | Class 3B | ESDA / JEDEC JS-001-2012 |
| ESD – Charged Device Model (CDM) | Class C3 | ESDA / JEDEC JS-002-2014 |
| MSL – Moisture Sensitivity Level | Level 3 | 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: Au over Ni

## RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment). This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free
- Qorvo Green

## 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

For technical questions and application information:

**Email:** appsupport@qorvo.com

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