



QPQ1270

Band 7 BAW Duplexer

Product Overview

The QPQ1270 is a high-performance Bulk Acoustic Wave (BAW) duplexer designed for Band 7 uplink and downlink applications.

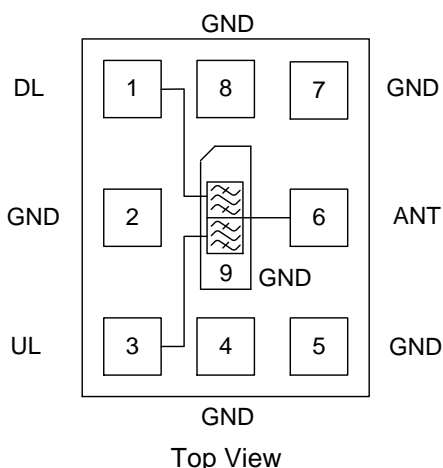
The QPQ1270 provides low insertion loss and high rejection, making it an ideal choice for small cells. This duplexer is housed in a compact RoHS compliant 2.00 mm x 2.50 mm x 1.015 mm surface mount package.

The QPQ1270 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.



9 Pad 2.00 mm x 2.50 mm x 1.015 mm SMP

Functional Block Diagram



Pin Configuration

| Pin No. | Label | Function |
|------------------|-------|----------------|
| 1 | DL | Downlink Input |
| 2, 4, 5, 7, 8, 9 | GND | Ground |
| 3 | UL | Uplink Output |
| 6 | ANT | Antenna Port |

Key Features

- 70 MHz Bandwidth – Band 7 UL & DL
- Low Insertion Loss
- High Out of Band Attenuation
- Small 2.00 mm x 2.50 mm x 1.015 mm Surface Mount Package (SMP)
- Wide Temperature Range with Guaranteed specifications: - 40 °C to + 95 °C
- High Operating Temperature: +105 °C
- High Power Rating: 30 dBm on DL or UL at +85 °C
- No External Matching Required
- RoHS Compliant, Pb-Free

Applications

- Base Stations Infrastructure
- Small Cells
- Repeaters
- LTE Dongles
- General Purpose Wireless

Ordering Information

| Part No. | Description |
|------------|--------------------------------|
| QPQ1270TR7 | 7" Taped Reel with 2500 pieces |
| QPQ1270EVB | Assembled Evaluation Board |

Absolute Maximum Ratings ⁽¹⁾

| Parameter | Rating |
|--------------------------------------|---------------|
| Storage Temperature | -40 to +125°C |
| Operating Temperature ⁽²⁾ | -40 to +105°C |

Notes:

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

Minimum Lifetime Ratings

| Conditions | Rating |
|---|---------------|
| +30dBm at Pin 1 (DL to ANT), 2620-2690 MHz, FD-LTE, 5 MHz, 16 QAM, 25 RB, PAR 8 dB, +85°C | >87,600 hours |
| +30dBm at Pin 3 (UL to ANT), 2500-2570 MHz, FD-LTE, 5 MHz, 16 QAM, 25 RB, PAR 8 dB, +85°C | >87,600 hours |

Electrical Specifications – Uplink ⁽³⁾

Test conditions unless otherwise noted: Temp = -20°C to +85°C

| Parameter | Conditions | Min | Typ ⁽⁷⁾ | Max | Units |
|---------------------------------------|--|-----|--------------------|-----|--------|
| Center Frequency | | – | 2535 | – | MHz |
| Average Insertion Loss ⁽⁴⁾ | 2500 – 2505 MHz (-20°C to +35°C) | – | 2.4 | 3.6 | dB |
| | 2500 – 2505 MHz (+35°C to +85°C) | – | 2.4 | 3.3 | |
| | 2505 – 2565 MHz | – | 1.6 | 2.0 | |
| | 2565 – 2570 MHz | – | 2.1 | 3.2 | |
| Amplitude Variation ⁽⁵⁾ | 2500 – 2570 MHz | – | 1.3 | 3.0 | dB |
| Group Delay Variation ⁽⁶⁾ | 2500 – 2570 MHz (over any 5 MHz) | – | 4.3 | 20 | ns p-p |
| Phase Ripple ⁽⁶⁾ | 2500 – 2570 MHz (over any 5 MHz) | – | 1.1 | 8 | ° p-p |
| Return Loss | Antenna Port (2500 – 2570 MHz) | 8.3 | 11.2 | – | dB |
| | Uplink Port (2500 – 2570 MHz) | 8.3 | 11.6 | – | |
| Attenuation ⁽⁸⁾ | 100 – 700 MHz | 30 | 58 | – | dB |
| | 700 – 960 MHz | 40 | 53 | – | |
| | 960 – 1805 MHz | 30 | 48 | – | |
| | 1805 – 1880 MHz | 43 | 51 | – | |
| | 1880 – 2110 MHz | 25 | 52 | – | |
| | 2110 – 2170 MHz | 45 | 54 | – | |
| | 2170 – 2300 MHz | 25 | 52 | – | |
| | 2300 – 2400 MHz | 45 | 51 | – | |
| | 2402 – 2474 MHz | 40 | 55 | – | |
| | 2474 – 2480 MHz | 7 | 38 | – | |
| | 2590 – 2620 MHz | 10 | 18 | – | |
| | 2620 – 2690 MHz | 54 | 56 | – | |
| | 2690 – 3400 MHz | 25 | 42 | – | |
| | 3400 – 3800 MHz | 30 | 42 | – | |
| | 3800 – 5150 MHz | 15 | 45 | – | |
| | 5150 – 6000 MHz | 25 | 54 | – | |
| WiFi Attenuation ⁽⁹⁾ | 2401 – 2473 MHz (WiFi Channel 1 to 11) | 48 | 58 | – | dB |
| Source/Load Impedance ⁽¹⁰⁾ | Single-ended | – | 50 | – | Ω |

Notes:

3. All specifications are based on the Qorvo schematic for the main reference design.
4. Average Insertion Loss is calculated by averaging |S₂₁| in dB for each measured point within defined frequency range.
5. Amplitude Variation is defined as the difference between the lowest loss and the highest loss within defined frequency range.
6. This is defined as the worst difference between a peak and adjacent valley within defined frequency range.
7. Typical values are based on average measurements of 12 devices at room temperature.
8. Relative to zero dB.
9. Data is an integrated channel measurement from 2412 MHz to 2462 MHz with a 22 MHz channel width and 5 MHz step size (802.11b).
10. This is the optimum impedance in order to achieve the performance shown.

Electrical Specifications – Downlink ⁽¹⁾

Test conditions unless otherwise noted: Temp = –20°C to +85°C

| Parameter | Conditions | Min | Typ ⁽⁵⁾ | Max | Units |
|---------------------------------------|---|-----|--------------------|-----|--------|
| Center Frequency | | – | 2655 | – | MHz |
| Average Insertion Loss ⁽²⁾ | 2620 – 2625 MHz | – | 2.3 | 3.0 | dB |
| | 2625 – 2685 MHz | – | 1.8 | 2.2 | |
| | 2685 – 2690 MHz | – | 2.1 | 3.0 | |
| Amplitude Variation ⁽³⁾ | 2620 – 2690 MHz | – | 1.0 | 1.8 | dB |
| Group Delay Variation ⁽⁴⁾ | 2620 – 2690 MHz (over any 5 MHz) | – | 4.1 | 20 | ns p-p |
| Phase Ripple ⁽⁴⁾ | 2620 – 2690 MHz (over any 5 MHz) | – | 1.1 | 8 | ° p-p |
| Return Loss | Antenna Port (2620 – 2690 MHz) | 9.1 | 12.2 | – | dB |
| | Downlink Port (2620 – 2690 MHz) | 8.3 | 10.8 | – | |
| Attenuation ⁽⁶⁾ | 100 – 960 MHz | 35 | 63 | – | dB |
| | 960 – 1710 MHz | 30 | 53 | – | |
| | 1710 – 1920 MHz | 45 | 53 | – | |
| | 1920 – 1980 MHz | 46 | 52 | – | |
| | 1980 – 2300 MHz | 30 | 53 | – | |
| | 2300 – 2400 MHz | 57 | 60 | – | |
| | 2400 – 2484 MHz | 57 | 60 | – | |
| | 2485 – 2570 MHz (5MHz averaging) ⁽⁸⁾ | 55 | 60 | – | |
| | 2570 – 2585 MHz | 25 | 51 | – | |
| | 2585 – 2595 MHz | 5 | 30 | – | |
| | 2715 – 2725 MHz | 5 | 25 | – | |
| | 2725 – 2800 MHz | 25 | 58 | – | |
| | 2800 – 3400 MHz | 30 | 58 | – | |
| | 3400 – 3800 MHz | 30 | 52 | – | |
| | 3800 – 5150 MHz | 20 | 45 | – | |
| | 5150 – 5400 MHz | 40 | 62 | – | |
| | 5400 – 6000 MHz | 30 | 62 | – | |
| 2 nd Harmonic at ANT | P _{in} = +27 dBm into DL (2620-2690) | – | 67 | – | dBc |
| IMD3L at Uplink | 2 Tone of Pin = +24 dBm into DL port | – | 101 | – | dBc |
| IMD5L at Uplink | 2 Tone of Pin = +24 dBm into DL port | – | 157 | – | dBc |
| Source/Load Impedance ⁽⁷⁾ | Single-ended | – | 50 | – | Ω |

Electrical Specifications – Isolation ⁽¹⁾

Test conditions unless otherwise specified: Temp = –20 °C to +85 °C

| Parameter | Conditions ^(1, 2) | Min | Typ ⁽⁵⁾ | Max | Unit |
|--------------------------|------------------------------|-----|--------------------|-----|------|
| Isolation ⁽⁸⁾ | 2500 – 2560 MHz | 57 | 61 | – | dB |
| | 2560 – 2570 MHz | 54 | 59 | – | |
| | 2620 – 2690 MHz | 57 | 59 | – | |

Notes:

1. All specifications are based on the Qorvo schematic for the main reference design.
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 defined frequency range.
4. This is defined as the worst difference between a peak and adjacent valley within defined frequency range.
5. Typical values are based on average measurements of 12 devices at room temperature.
6. Relative to zero dB.
7. This is the optimum impedance in order to achieve the performance shown.
8. Data is the integrated loss value with respect to zero dB of the linear s-parameter over 5MHz range.



QPQ1270

Band 7 BAW Duplexer

Electrical Specifications – Uplink ⁽¹⁾

Test conditions unless otherwise noted: Temp = -40°C to +95°C

| Parameter | Conditions | Min | Typ ⁽⁵⁾ | Max | Units |
|---------------------------------------|--|-----|--------------------|-----|--------|
| Center Frequency | | – | 2535 | – | MHz |
| Average Insertion Loss ⁽²⁾ | 2500 – 2505 MHz (-40 °C to +35°C) | – | 2.4 | 3.8 | dB |
| | 2500 – 2505 MHz (+35 °C to +95°C) | – | 2.4 | 3.3 | |
| | 2505 – 2565 MHz | – | 1.6 | 2.2 | |
| | 2565 – 2570 MHz | – | 2.1 | 3.4 | |
| Amplitude Variation ⁽³⁾ | 2500 – 2570 MHz | – | 1.3 | 3.2 | dB |
| Group Delay Variation ⁽⁴⁾ | 2500 – 2570 MHz (over any 5 MHz) | – | 4.3 | 22 | ns p-p |
| Phase Ripple ⁽⁴⁾ | 2500 – 2570 MHz (over any 5 MHz) | – | 1.1 | 9 | ° p-p |
| Return Loss | Antenna Port (2500 – 2570 MHz) | 8.3 | 11.2 | – | dB |
| | Uplink Port (2500 – 2570 MHz) | 8.3 | 11.6 | – | |
| Attenuation ⁽⁶⁾ | 100 – 700 MHz | 30 | 58 | – | dB |
| | 700 – 960 MHz | 40 | 53 | – | |
| | 960 – 1805 MHz | 30 | 48 | – | |
| | 1805 – 1880 MHz | 43 | 51 | – | |
| | 1880 – 2110 MHz | 25 | 52 | – | |
| | 2110 – 2170 MHz | 45 | 54 | – | |
| | 2170 – 2300 MHz | 25 | 51 | – | |
| | 2300 – 2400 MHz | 45 | 51 | – | |
| | 2402 – 2474 MHz | 38 | 55 | – | |
| | 2474 – 2480 MHz | 5 | 38 | – | |
| | 2590 – 2620 MHz | 9 | 18 | – | |
| | 2620 – 2690 MHz | 53 | 56 | – | |
| | 2690 – 3400 MHz | 25 | 42 | – | |
| | 3400 – 3800 MHz | 30 | 42 | – | |
| | 3800 – 5150 MHz | 15 | 45 | – | |
| | 5150 – 6000 MHz | 25 | 54 | – | |
| WiFi Attenuation ⁽⁷⁾ | 2401 – 2473 MHz (WiFi Channel 1 to 11) | 47 | 58 | – | dB |
| Source/Load Impedance ⁽⁸⁾ | Single-ended | – | 50 | – | Ω |

Notes:

1. All specifications are based on the Qorvo schematic for the main reference design.
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 defined frequency range.
4. This is defined as the worst difference between a peak and adjacent valley within defined frequency range.
5. Typical values are based on average measurements of 12 devices at room temperature.
6. Relative to zero dB.
7. Data is an integrated channel measurement from 2412 MHz to 2462 MHz with a 22 MHz channel width and 5 MHz step size (802.11b).
8. This is the optimum impedance in order to achieve the performance shown.

Electrical Specifications – Downlink ⁽¹⁾

Test conditions unless otherwise noted: Temp = –40°C to +95°C

| Parameter | Conditions | Min | Typ ⁽⁵⁾ | Max | Units |
|---------------------------------------|--|-----|--------------------|-----|--------|
| Center Frequency | | – | 2655 | – | MHz |
| Average Insertion Loss ⁽²⁾ | 2620 – 2625 MHz | – | 2.3 | 3.0 | dB |
| | 2620 – 2665 MHz | – | 1.8 | 2.3 | |
| | 2665 – 2690 MHz | – | 2.1 | 3.2 | |
| Amplitude Variation ⁽³⁾ | 2620 – 2690 MHz | – | 0.8 | 2.0 | dB |
| Group Delay Variation ⁽⁴⁾ | 2620 – 2690 MHz (over any 5 MHz) | – | 4.1 | 21 | ns p-p |
| Phase Ripple ⁽⁴⁾ | 2620 – 2690 MHz (over any 5 MHz) | – | 1.1 | 9 | ° p-p |
| Return Loss | Antenna Port (2620 – 2690 MHz) | 9.0 | 12.2 | – | dB |
| | Uplink Port (2620 – 2690 MHz) | 8.3 | 12.1 | – | |
| Attenuation ⁽⁶⁾ | 100 – 960 MHz | 35 | 63 | – | dB |
| | 960 – 1710 MHz | 30 | 53 | – | |
| | 1710 – 1920 MHz | 45 | 53 | – | |
| | 1920 – 1980 MHz | 46 | 52 | – | |
| | 1980 – 2300 MHz | 30 | 53 | – | |
| | 2300 – 2400 MHz | 56 | 60 | – | |
| | 2400 – 2484 MHz | 56 | 60 | – | |
| | 2485 – 2570 MHz (5MHz averaging) ⁽⁸⁾ | 54 | 60 | – | |
| | 2570 – 2585 MHz | 24 | 51 | – | |
| | 2585 – 2595 MHz | 4 | 30 | – | |
| | 2715 – 2725 MHz | 4 | 25 | – | |
| | 2725 – 2800 MHz | 24 | 58 | – | |
| | 2800 – 3400 MHz | 30 | 58 | – | |
| | 3400 – 3800 MHz | 30 | 52 | – | |
| | 3800 – 5150 MHz | 20 | 45 | – | |
| | 5150 – 5400 MHz | 40 | 62 | – | |
| | 5400 – 6000 MHz | 30 | 62 | – | |
| 2 nd Harmonic at ANT | P _{in} = +27 dBm into DL (2620-2690) | – | 67 | – | dBc |
| IMD3L at Uplink | 2 Tone of P _{in} = +23 dBm into DL port | – | 101 | – | dBc |
| IMD5L at Uplink | 2 Tone of P _{in} = +23 dBm into DL port | – | 157 | – | dBc |
| Source/Load Impedance ⁽⁷⁾ | Single-ended | – | 50 | – | Ω |

Electrical Specifications – Isolation ⁽¹⁾

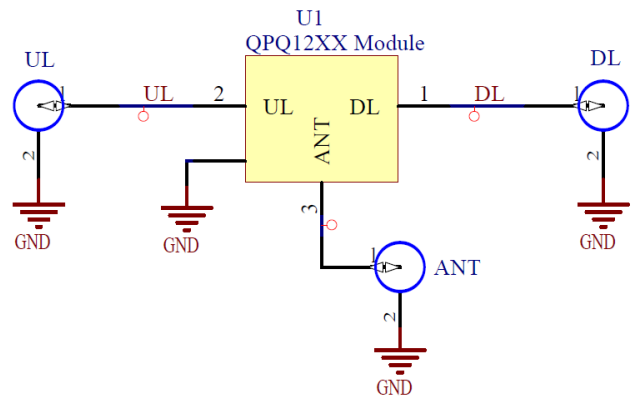
Test conditions unless otherwise specified: Temp = –40°C to +95°C

| Parameter | Conditions ^(1, 2) | Min | Typ ⁽⁵⁾ | Max | Unit |
|--------------------------|------------------------------|-----|--------------------|-----|------|
| Isolation ⁽⁸⁾ | 2500 – 2560 MHz | 56 | 61 | – | dB |
| | 2560 – 2570 MHz | 53 | 59 | – | |
| | 2620 – 2690 MHz | 56 | 59 | – | |

Notes:

1. All specifications are based on the Qorvo schematic for the main reference design.
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 defined frequency range.
4. This is defined as the worst difference between a peak and adjacent valley within defined frequency range.
5. Typical values are based on average measurements of 12 devices at room temperature.
6. Relative to zero dB.
7. This is the optimum impedance in order to achieve the performance shown.
8. Data is the integrated loss value with respect to zero dB of the linear s-parameter over 5MHz range.

Evaluation Board and Schematic – QPQ1270EVB

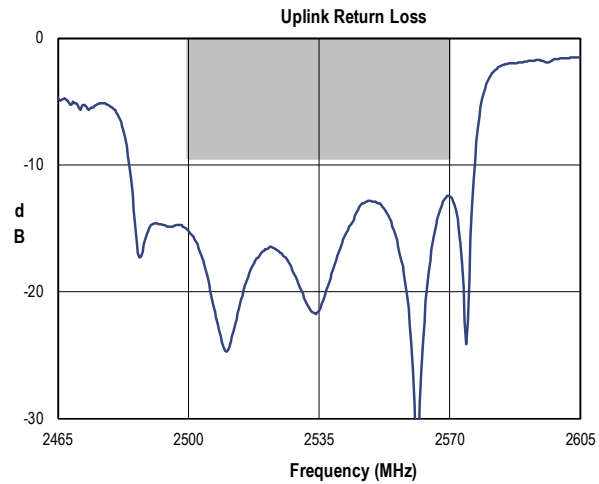
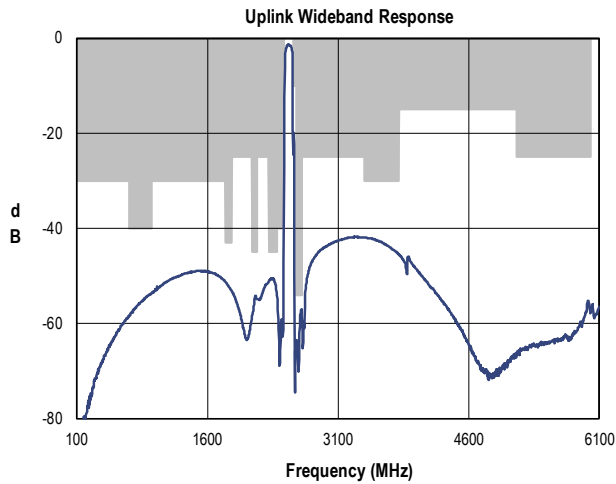
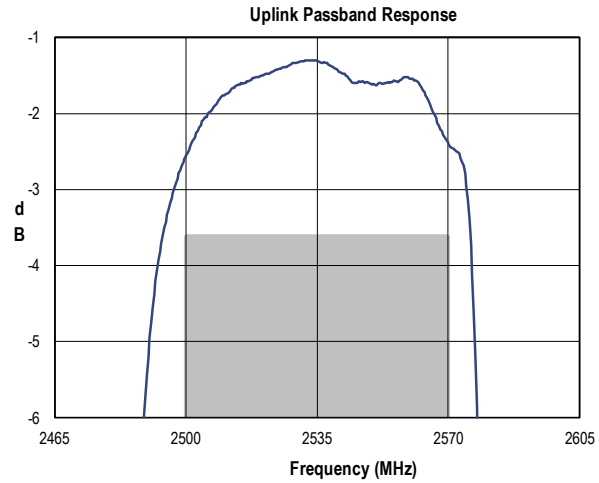
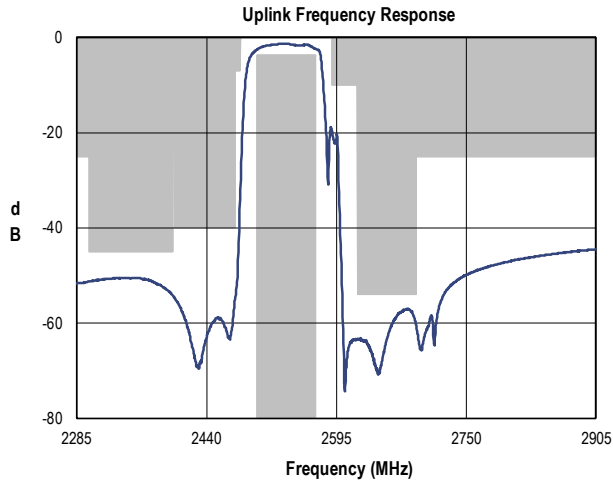


Bill of Material – QPQ1270EVB

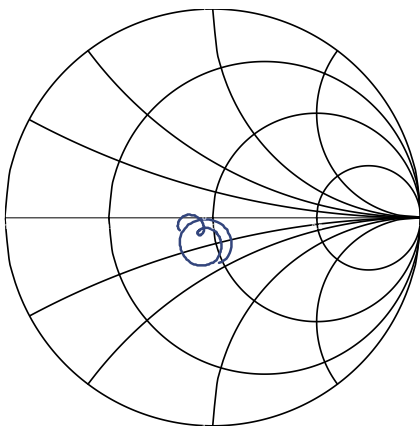
| Ref. Des. | Value | Description | Manufacturer | Part Number |
|-----------|-------|-----------------------------------|--------------|---------------|
| U1 | – | Duplexer, Band7, BAW | Qorvo | QPQ1270 |
| SMA | – | Connector, SMA | Radiall | 9602-1111-018 |
| PCB | – | Printed Circuit Board, Evaluation | Qorvo | 283666 |

De-embedded Performance Plots Uplink

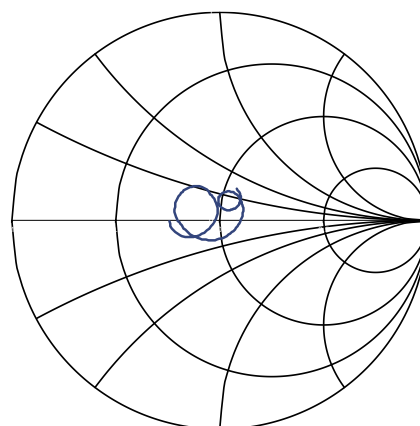
Test conditions unless otherwise noted: Temp= +25°C



Uplink Path - Ant Port Impedance

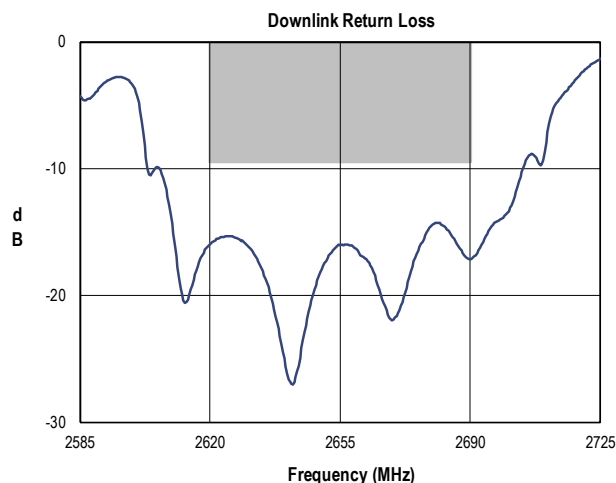
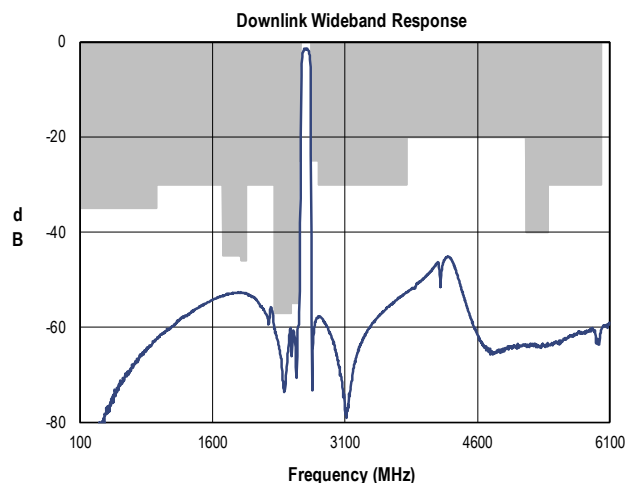
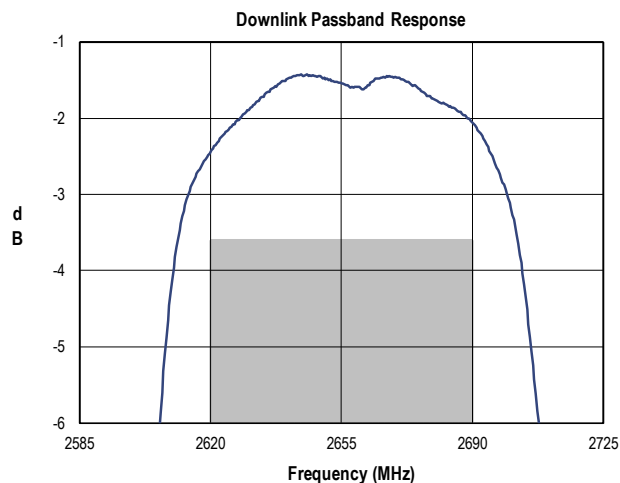
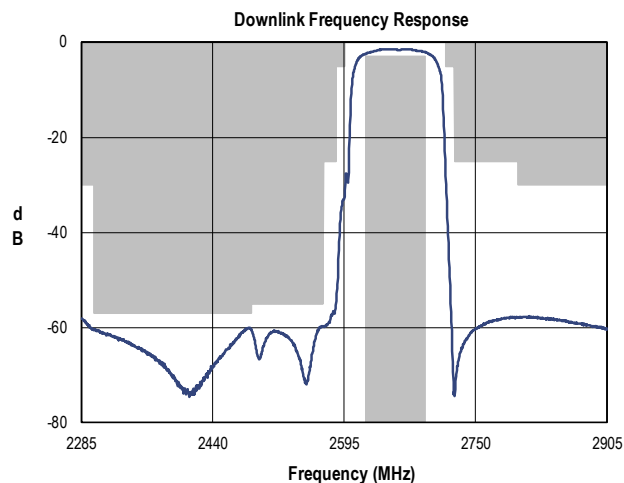


Uplink Port Impedance

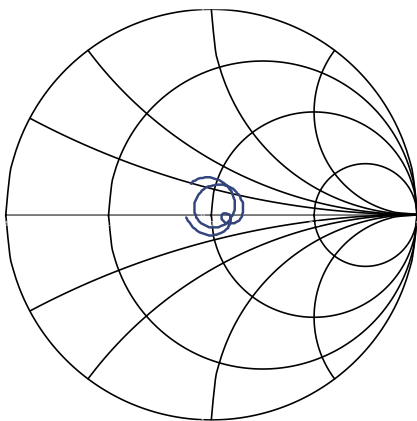


De-embedded Performance Plots Downlink

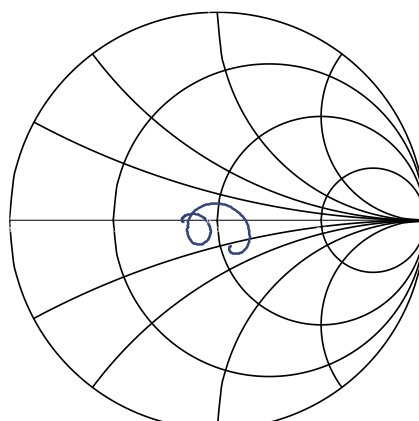
Test conditions unless otherwise noted: Temp= +25°C



Downlink Path - Ant Port Impedance

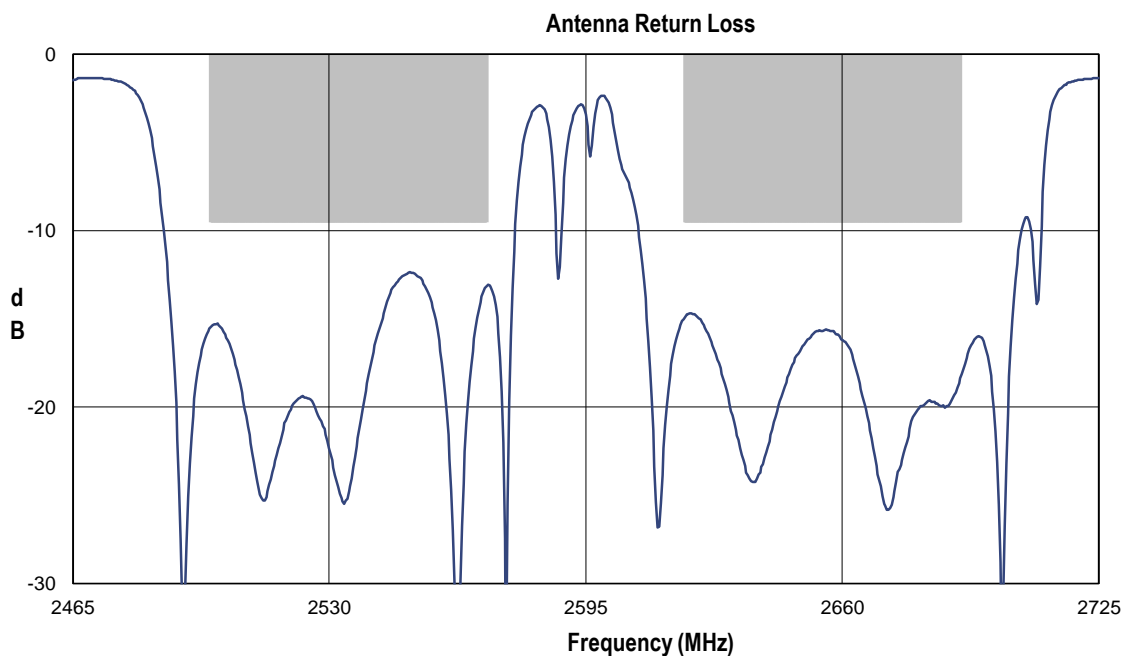
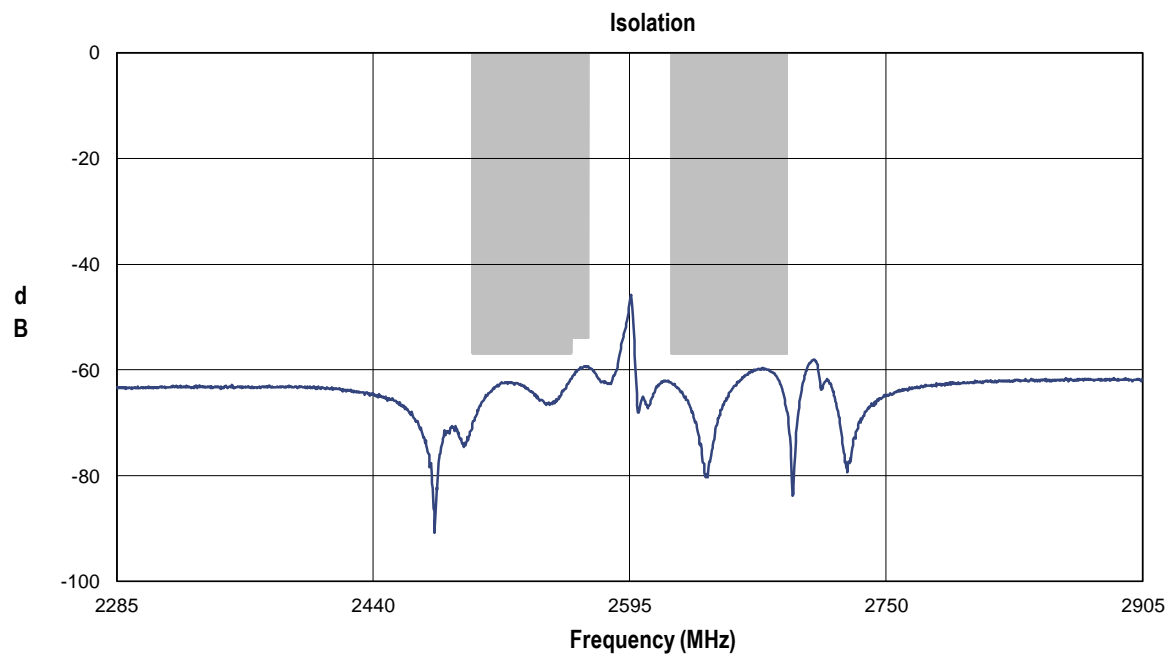


Downlink Port Impedance

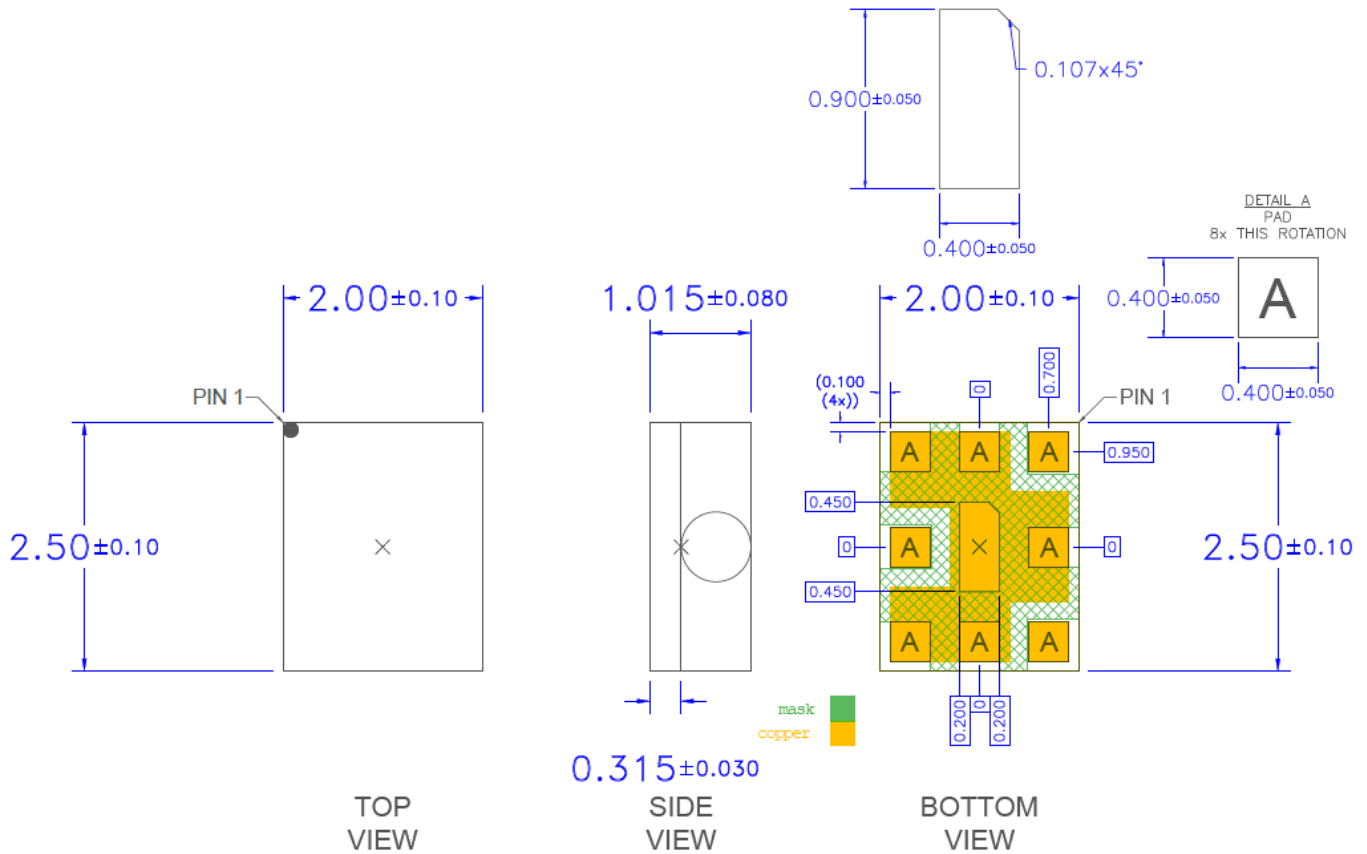


De-embedded Performance Plots Isolation

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



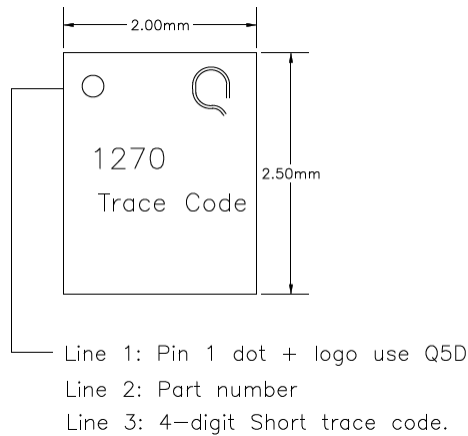
Package Dimensions



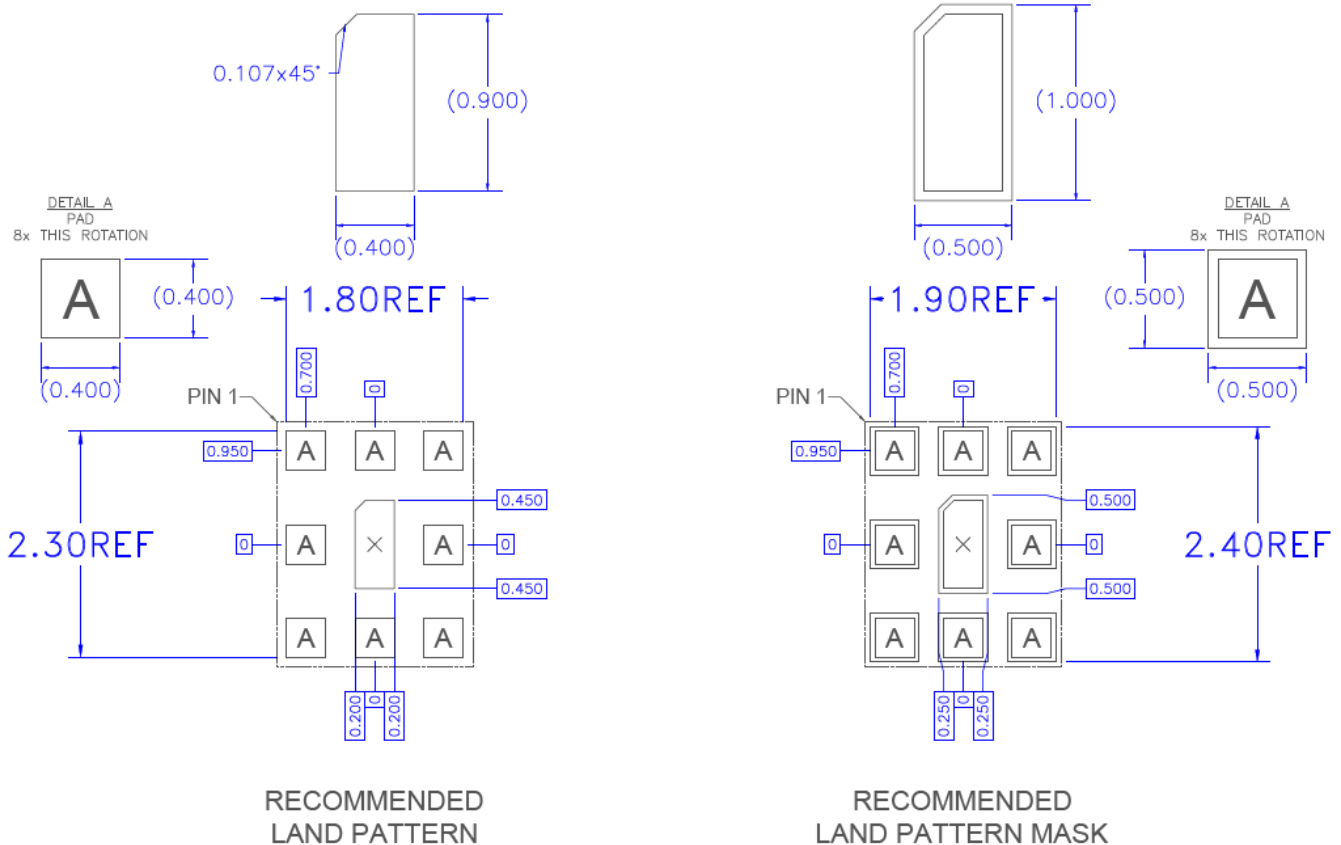
Notes:

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.

Package Marking



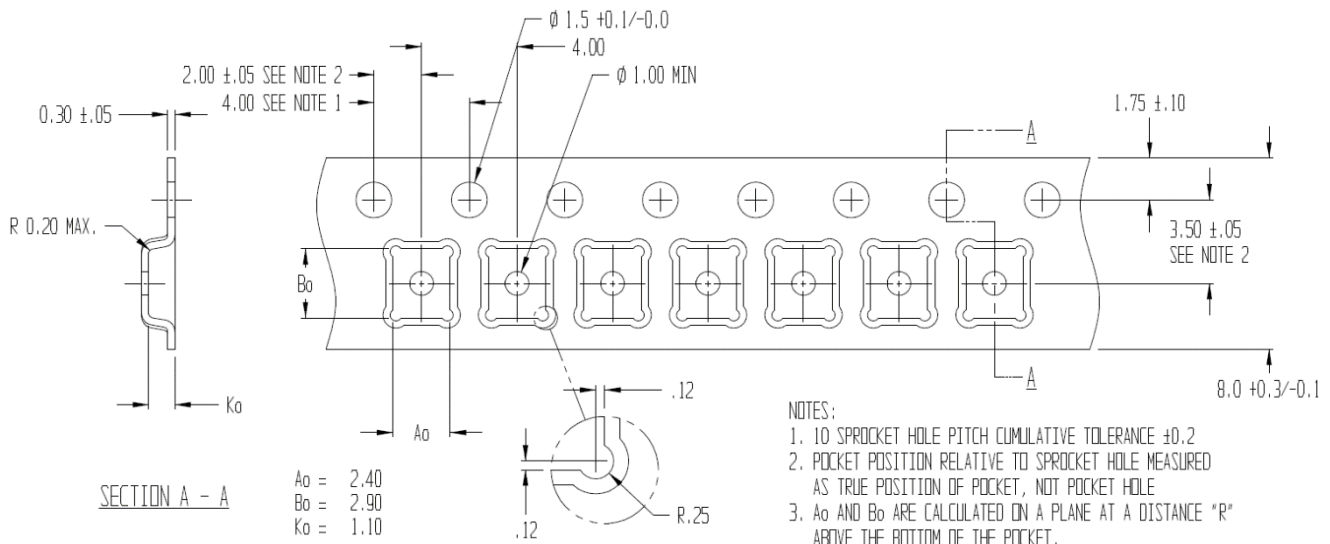
PCB Mounting Pattern



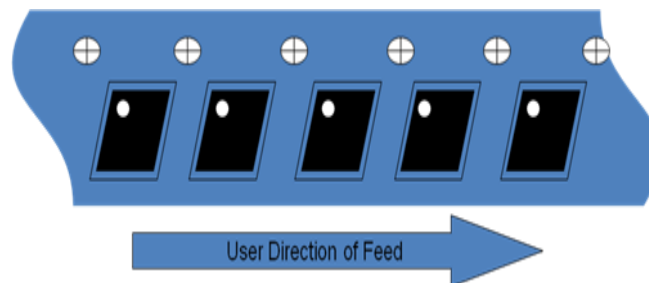
- Notes:
1. All dimensions are in millimeters. Angles are in degrees.
 2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

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.

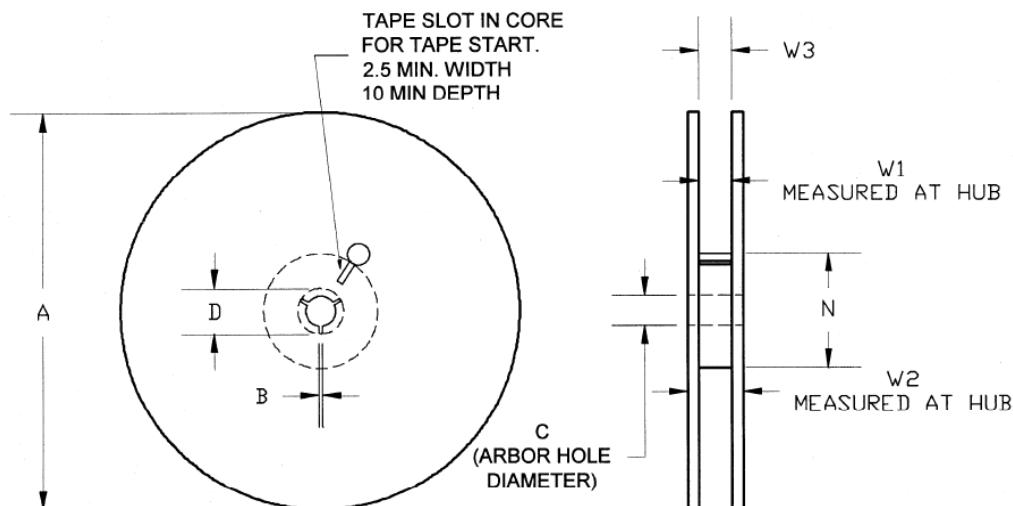


| Feature | Measure | Symbol | Size (in) | Size (mm) |
|---------------------|--|--------|-----------|-----------|
| Cavity | Length | A0 | 0.094 | 2.40 |
| | Width | B0 | 0.114 | 2.90 |
| | Depth | K0 | 0.043 | 1.10 |
| | Pitch | P1 | 0.157 | 4.00 |
| Centerline Distance | Cavity to Perforation - Length Direction | P2 | 0.079 | 2.00 |
| | Cavity to Perforation - Width Direction | F | 0.138 | 3.50 |
| Cover Tape | Width (Reference Only) | C | 0.213 | 5.40 |
| Carrier Tape | Width | W | 0.315 | 8.00 |



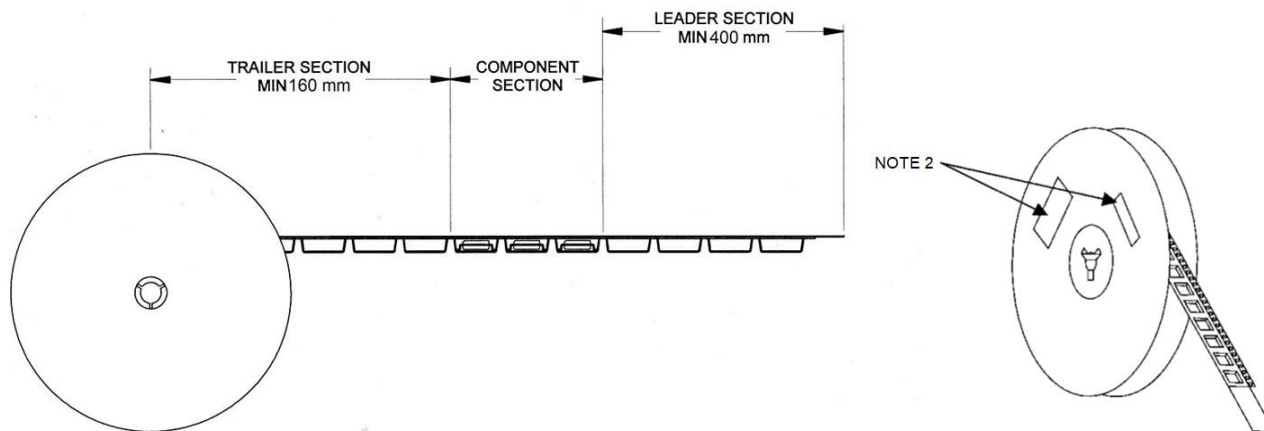
Tape and Reel Information – Reel Dimensions

Tape and reel specifications for this part are also available on the Qorvo website.
Standard T/R size = 2500 pieces on a 7" reel.



| 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 |

Tape and Reel Information – Tape Length and Label Placement



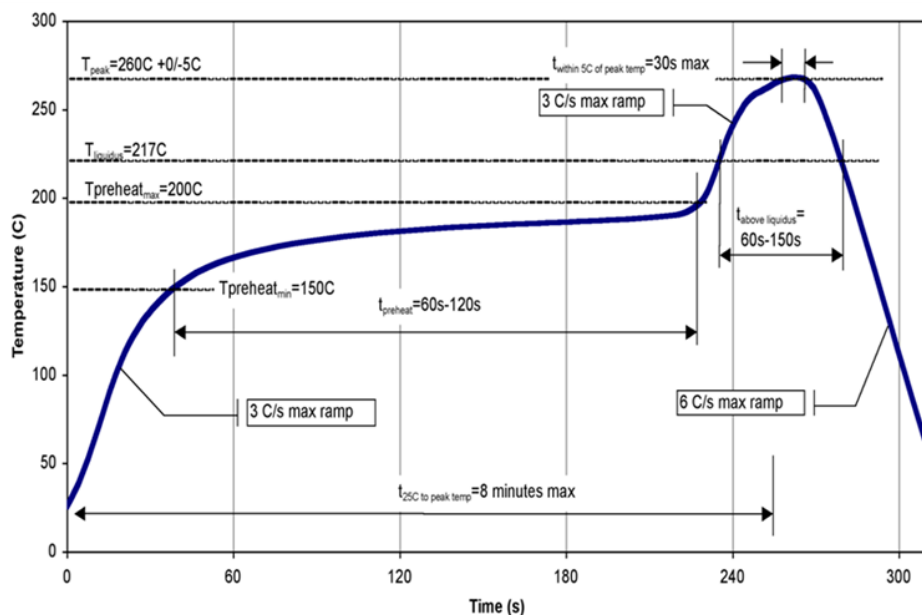
Notes:

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

Assembly Notes

Compatible with both lead-free (260°C peak reflow temperature) and tin/lead (245°C peak reflow temperature) soldering processes.

Contact Plating: NiAu (*Thickness: Ni 5.0±3.0 µm; Au 0.1 µm min.*)



Recommended Soldering Temperature Profile



QPQ1270

Band 7 BAW Duplexer

Handling Precautions

| Parameter | Rating | Standard |
|----------------------------------|-----------|--------------------------|
| ESD – Human Body Model (HBM) | Class 1B | ESDA / JEDEC JS-001-2012 |
| ESD – Charged Device Model (CDM) | Class C2b | ESDA / JEDEC JS-002-2014 |
| 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 ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free



Contact Information

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

Web: www.qorvo.com

Tel: 1-844-890-8163

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