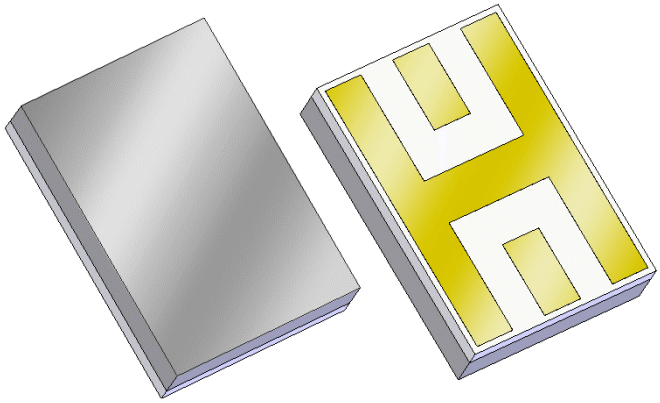
TriQuint SEMICONDUCTOR

Data Sheet

Part Number 880148
2324 MHz BAW Filter

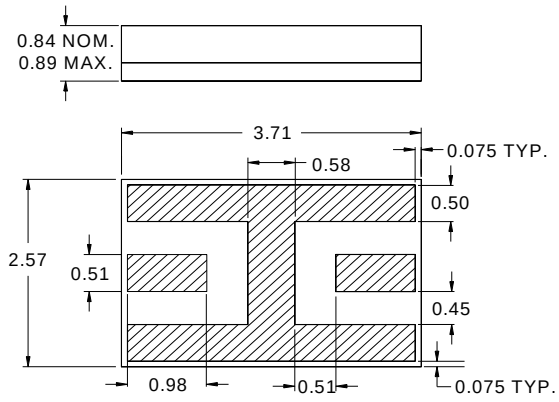
Features

- Usable bandwidth of 38 MHz
- Single-ended operation
- Ceramic Surface Mount Package
- This part number is a replacement for part number SMR-2324-45
- Hermetic



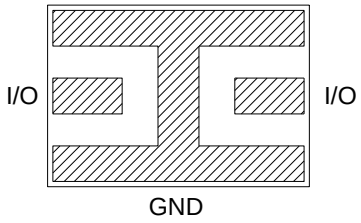
Package

Surface Mount 3.71 x 2.57 x 0.84 mm



Pin Configuration

Bottom View



Pin No.	Description
I/O	Input/Output
GND	Ground

Overall width, length, and thickness are the only critical dimensions. All other dimensions are for reference only.

Dimensions shown are nominal in millimeters
All tolerances are ±0.13mm except overall length and width ±0.25mm

Body: *Sapphire*
Package: *Alumina*
Terminations: *Au* plating 0.5 - 2.5µm, over a 2.0 – 6.0 µm *Ni* plating

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Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

Part Number 880148
2324 MHz BAW Filter

Electrical Specifications [1]

Operating Temperature Range: [2] -40 to +85 °C

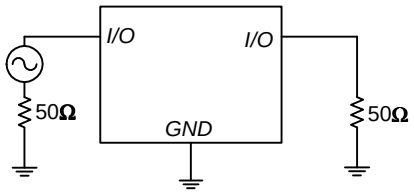
Parameter [3]	Minimum	Typical	Maximum	Unit
Center Frequency	-	2324	-	MHz
Insertion Loss at Fo	-	3	4.5	dB
3 dB Bandwidth [4]	38	47	-	MHz
Lower 40 dB Bandedge	2249	-	-	MHz
Upper 40 dB Bandedge	-	-	2399	MHz
Input/Output VSWR @ Fo	-	-	2:1	-
Source Impedance	-	50	-	Ω
Load Impedance	-	50	-	Ω

Notes:

1. All specifications are based on the test circuit shown below
2. In production, devices will be tested at room temperature to a guardbanded 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 manufacturing tolerances
4. Referenced to the insertion loss at center frequency

Test Circuit:

50 Ω
Single-ended
Input



50 Ω
Single-ended
Output

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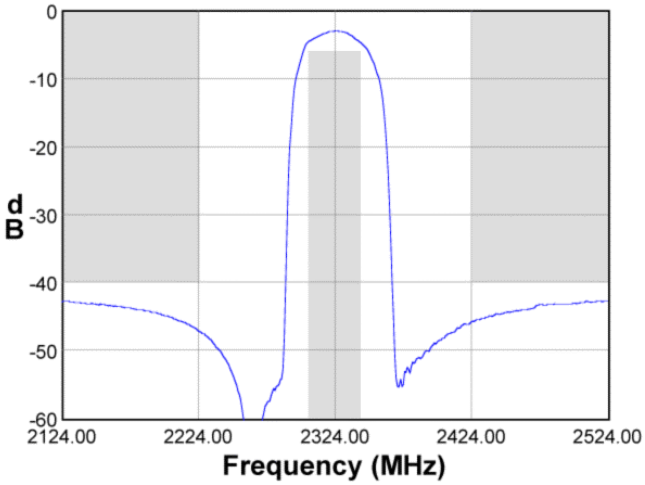
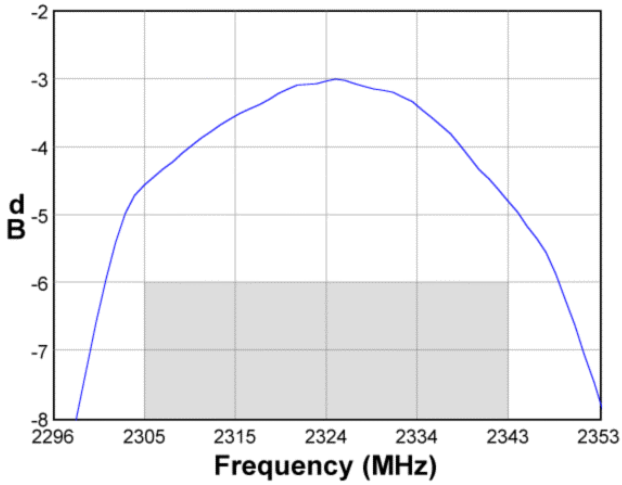
Typical Performance (at +25°C)

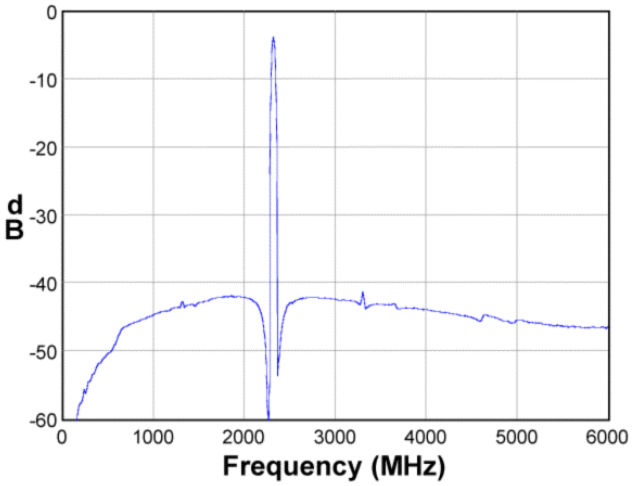
Frequency Response



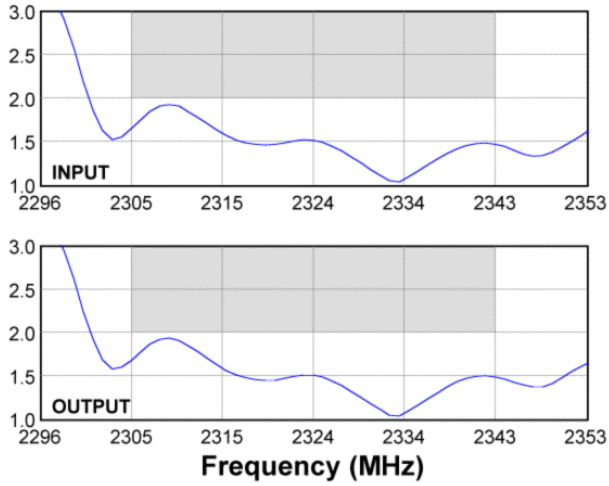
Passband Response



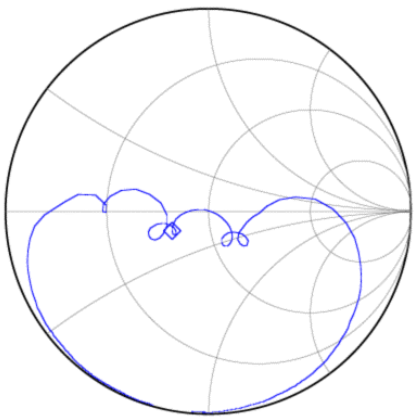
Wideband Response



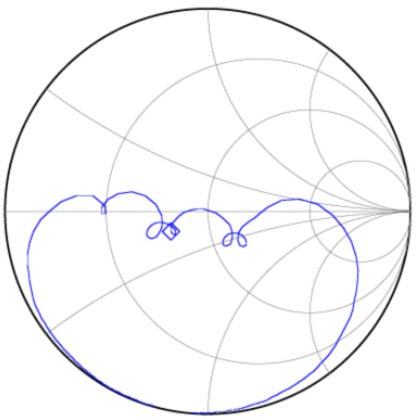
Input/Output VSWR



Input Smith Chart



Output Smith Chart



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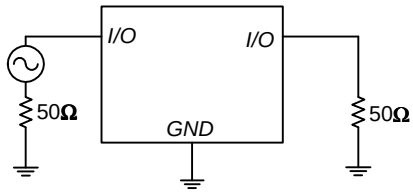
TriQuint SEMICONDUCTOR

Data Sheet

Part Number 880148
2324 MHz BAW Filter

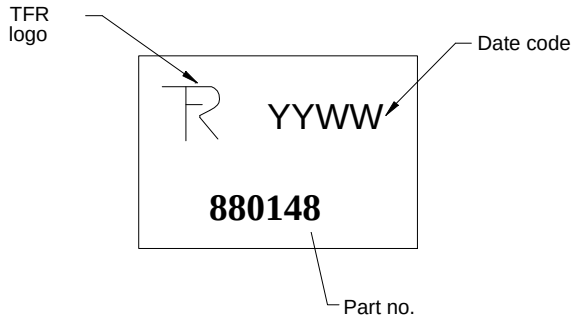
Matching Schematics

50 Ω
Single-ended
Input



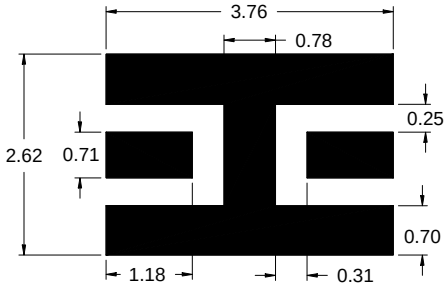
50 Ω
Single-ended
Output

Marking



The date code consists of: YY = last digit of year,
WW = 2 digit week

PCB Footprint



This footprint represents a recommendation only
Dimensions shown are nominal in millimeters

Tape and Reel

Tape and Reel available upon request
EIA-481

Tinning available per J-STD-001

ROHS compliant (no tinning)
DFARS compliant

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TriQuint SEMICONDUCTOR

Data Sheet

Part Number 880148
2324 MHz BAW Filter

Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit
Operating Temperature Range	T	-40	+85	^{o}C
Storage Temperature Range	T_{stg}	-55	+100	^{o}C

Warnings

- Electrostatic Sensitive Device (ESD) 
- Avoid ultrasonic exposure

Links to Additional Technical Information

PCB Layout Tips | Qualification Flowchart | Soldering Profile

S-Parameters | Other Technical Information

Contact Information

TriQuint SEMICONDUCTOR
63140 Britta St. Bldg. C
Bend, OR 97701

Phone: +1 (972) 994-8465
Fax: +1 (972) 994-8504
Email: custservbend@tqs.com
Web: www.triquint.com

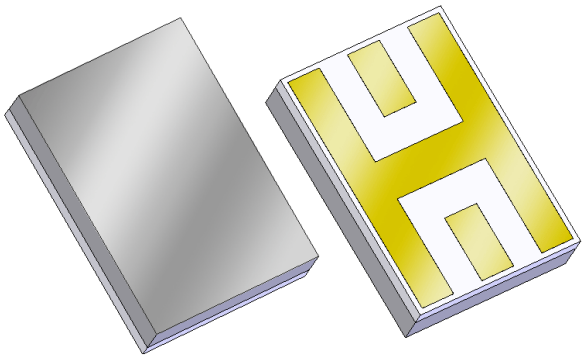
Or contact one of our worldwide Network of sales offices, Representatives or distributors

880157

2560 ***MHz BAW Filter***

Applications

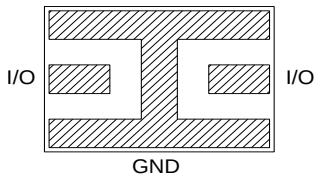
- S-Band
- For high-selectivity applications



Product Features

- Usable bandwidth 30 MHz
- Low loss
- High selectivity
- Single-ended operation
- Ceramic chip-scale Package (CSP)
- Small Size
- Hermetic **RoHS** compliant, **Pb**-free

Functional Block Diagram



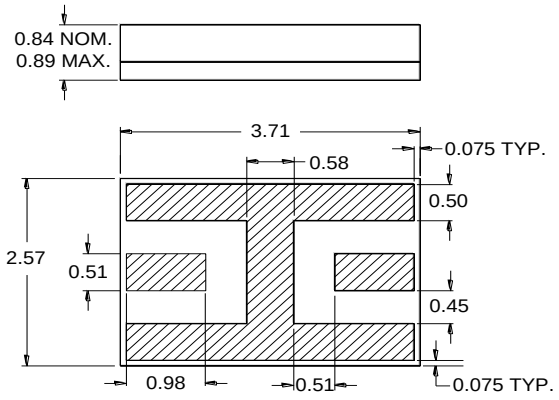
Overall width, length, and thickness are the only critical dimensions.
All other dimensions are for reference only.

Dimensions shown are nominal in millimeters
All tolerances are ±0.13mm except overall
length and width ±0.25mm

Body: *Sapphire*
Package: *Alumina*
Terminations: *Au* plating 0.5 - 2.5µm, over a 2.0 – 6.0 µm *Ni* plating

Pin Configuration

Pin # SE-Balanced	Description
I/O	Input/Output
GND	Ground



Ordering Information

Part No.	Description
880157	packaged part
880157 Eval Board	evaluation board

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Specifications

Electrical Specifications [1]

Specified Temperature Range: [2] -40 to +85 ºC

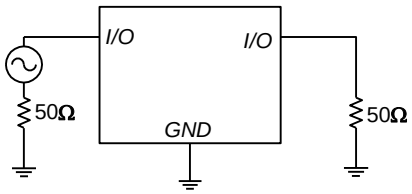
Parameter [3]	Conditions	Min	Typical [4]	Max	Units
Center Frequency		-	2560	-	MHz
Maximum Insertion Loss	@ 2560 MHz	-	3.8	4.5	dB
3dB Bandwidth	Reference loss at 2560 MHz	30	38	-	MHz
40dB Lower Frequency Edge		2505	2525	-	MHz
40dB Upper Frequency Edge		-	2595	2610	MHz
VSWR	@ 2560 MHz	-	1.5	2.0	-
Source Impedance (single-ended) [5]		-	50	-	Ω
Load Impedance (single-ended) [5]		-	50	-	Ω

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design shown on page 3
2. In production, devices will be tested at room temperature to a guardbanded 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 manufacturing tolerances
4. Typical values are based on average measurements at room temperature
5. This is the optimum impedance in order to achieve the performance shown

Reference Design

Schematic

50 Ω
Single-ended
Input

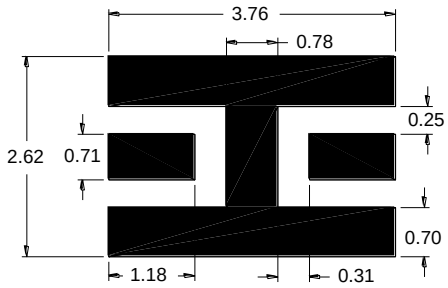


50 Ω
Single-ended
Input

PC Board

Refer to **PCB Layout** for more information.

Mounting Configuration



Notes:
1. All dimensions are in millimeters.
2. This footprint represents a recommendation only.

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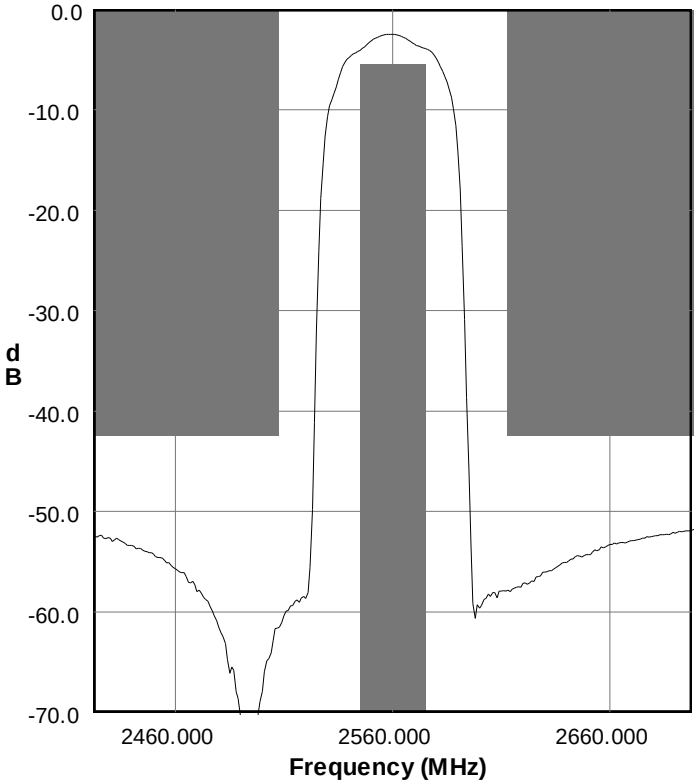
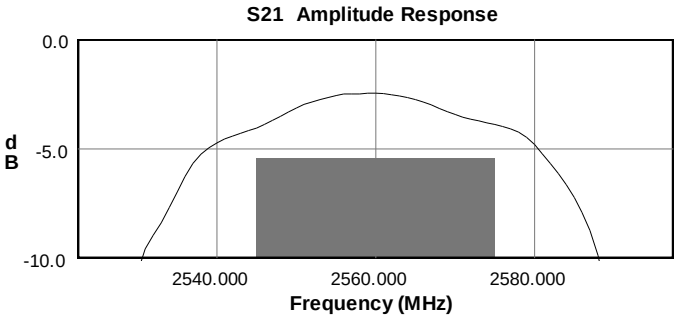
Typical Performance (at room temperature)

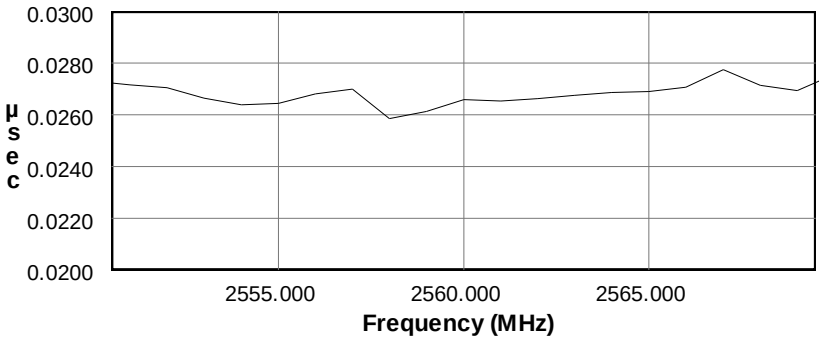
S21 Amplitude Response



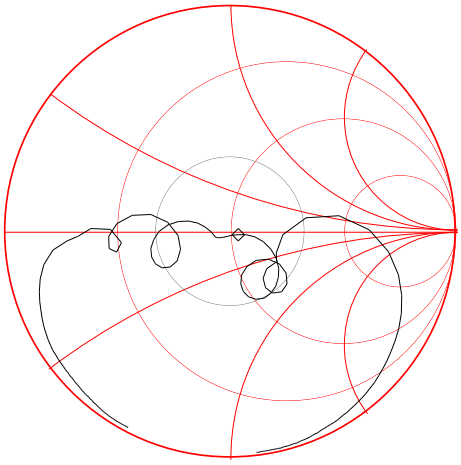
S21 Amplitude Response



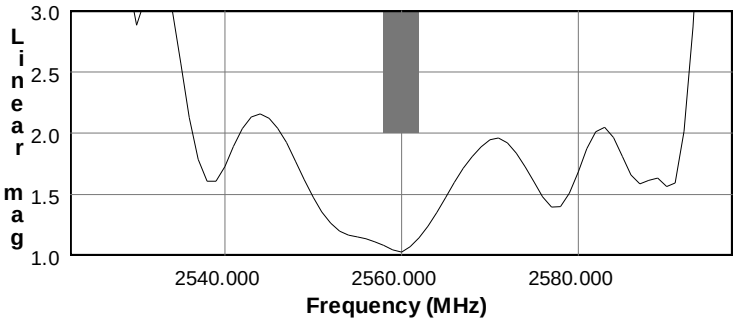
S21 Group Delay Response



S11 Smith Chart



S11 VSWR



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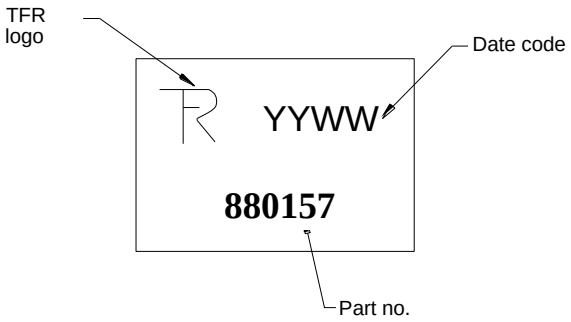
Mechanical Information

Marking



The date code consists of: YY = last digit of year,
WW = 2 digit week

Tape and Reel Information

Tape and Reel available upon request
EIA-481

Tinning available per J-STD-001

Absolute Maximum Ratings

Parameter	Rating
Operating Temperature	-40 to +85 °C
Storage Temperature	-55 to +100 °C
Maximum Input Power	+23 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

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Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

Value:	Passes ≥ 4000 V min.
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114

Value:	Passes ≥ 200 V min.
Test:	Machine Model (MM)
Standard:	JEDEC Standard JESD22-A115

Refer to **ESD Sensitivity** for data

Solderability

Compatible with the latest version of J-STD-020, lead free solder, 260°C

Refer to **Soldering Profile** for recommended guidelines.

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:

- 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, and information about TriQuint:

Web: www.triquint.com **Tel:** +1.407.886.8860
Email: info-sales@tqs.com **Fax:** +1.407.886.7061

For technical questions and application information:

Email: info-defense@tqs.com

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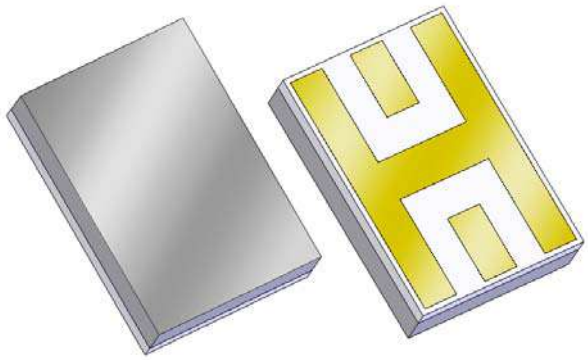
880367

1030 MHz IFF BAW Filter

Applications

- For SSR/IFF Applications
- For high-selectivity applications



Product Features

- Usable bandwidth 14.5 MHz
- Low loss
- High selectivity
- Single-ended operation
- Ceramic chip-scale Package (CSP)
- Small Size
- Hermetic **RoHS** compliant, **Pb**-free

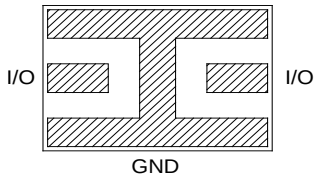
Pin Configuration

Pin # SE-Balanced	Description
I/O	Input/Output
GND	Ground

Ordering Information

Part No.	Description
880367	packaged part
880367 Eval Board	evaluation board

Functional Block Diagram



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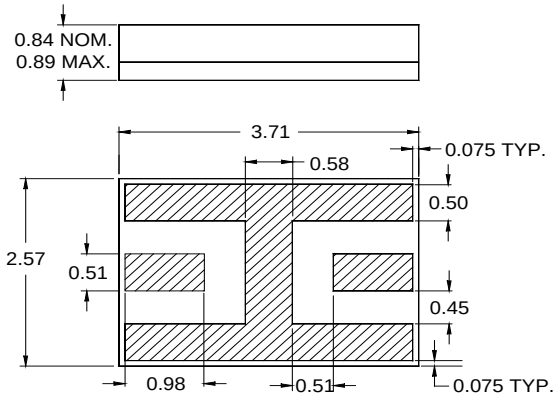
length and width ±0.25mm

Body: *Sapphire*
Package: *Alumina*
Terminations: *Au* plating 0.5 - 2.5μm, over a 2.0 – 6.0 μm *Ni* plating



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Specifications

Electrical Specifications [1]

Specified Temperature Range: [2] -40 to +85 ºC

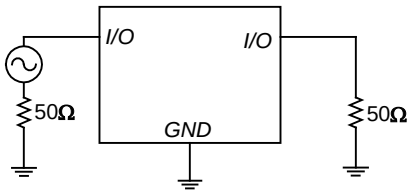
Parameter [3]	Conditions	Min	Typical [4]	Max	Units
Center Frequency		-	1030	-	MHz
Maximum Insertion Loss	@ 1030 MHz	-	3.0	4.0	dB
3dB Bandwidth	Reference loss at 1030 MHz	14	20	-	MHz
40dB Lower Frequency Edge		1009	1013	-	MHz
40dB Upper Frequency Edge		-	1051	1046	MHz
VSWR	@ 1030 MHz	-	1.7	2.0	-
Source Impedance (single-ended) [5]		-	50	-	Ω
Load Impedance (single-ended) [5]		-	50	-	Ω

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design shown on page 3
2. In production, devices will be tested at room temperature to a guardbanded 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 manufacturing tolerances
4. Typical values are based on average measurements at room temperature
5. This is the optimum impedance in order to achieve the performance shown

Reference Design

Schematic

50 Ω
Single-ended
Input

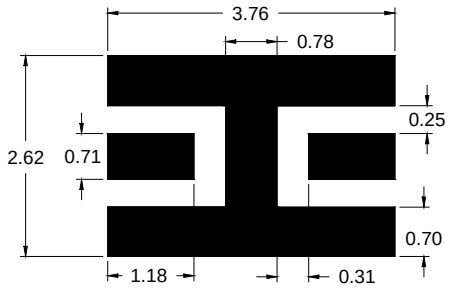


50 Ω
Single-ended
Input

PC Board

Refer to **PCB Layout** for more information.

Mounting Configuration



Notes:
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2. This footprint represents a recommendation only.

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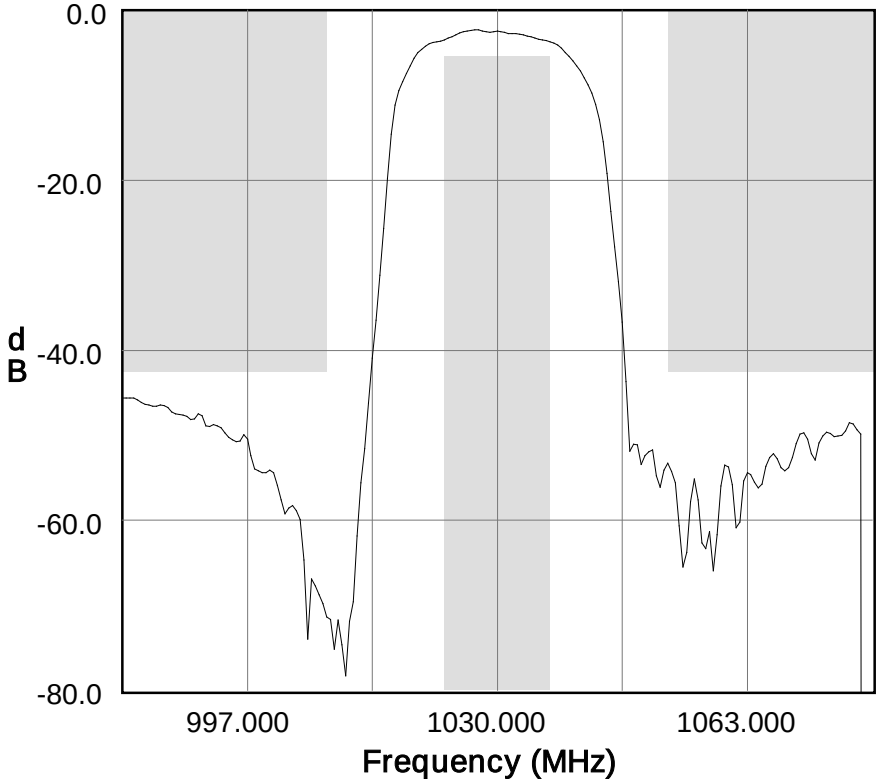
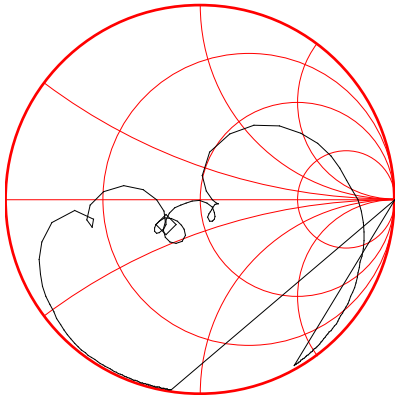
Typical Performance (at room temperature)

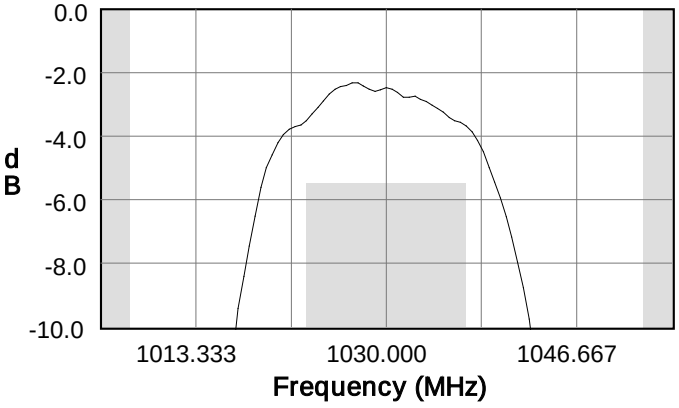
S21 Amplitude Response



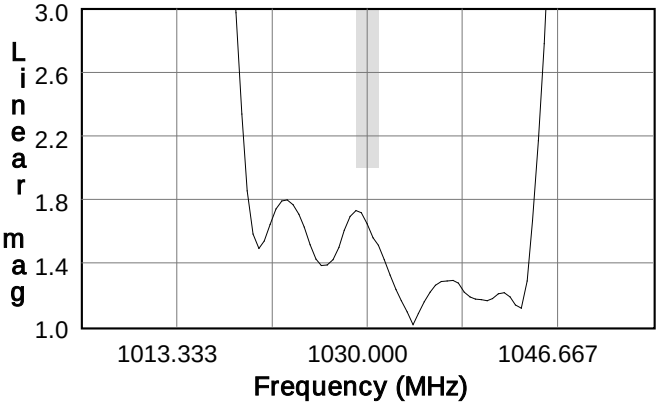
S11 Smith Chart



S21 Amplitude Response



S11 VSWR



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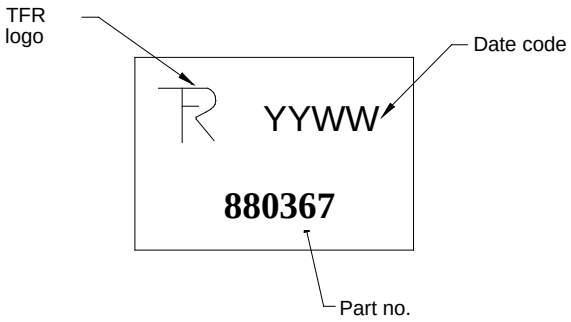
Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

Mechanical Information

Marking



The date code consists of: YY = last digit of year,
WW = 2 digit week

Tape and Reel Information

Tape and Reel available upon request
EIA-481

Tinning available per J-STD-001

Absolute Maximum Ratings

Parameter	Rating
Operating Temperature	-40 to +85 °C
Storage Temperature	-55 to +100 °C
Maximum Input Power	+23 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

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Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

Value:	Passes ≥ 8000 V min.
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114

Value:	Passes ≥ 800 V min.
Test:	Machine Model (MM)
Standard:	JEDEC Standard JESD22-A115

Refer to **ESD Sensitivity** for data

Solderability

Compatible with the latest version of J-STD-020, lead free solder, 260°C

Refer to **Soldering Profile** for recommended guidelines.

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:

- 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, and information about TriQuint:

Web: www.triquint.com **Tel:** +1.407.886.8860
Email: info-sales@tqs.com **Fax:** +1.407.886.7061

For technical questions and application information:

Email: info-defense@tqs.com

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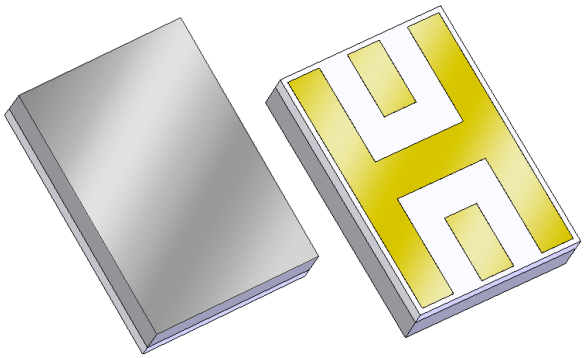
880368

1280 MHz BAW Filter

Applications

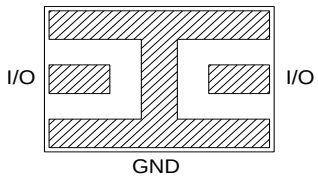
- L-Band
- For high-selectivity applications



Product Features

- Usable bandwidth 19 MHz
- Low loss
- High selectivity
- Single-ended operation
- Ceramic chip-scale Package (CSP)
- Small Size
- Hermetic **RoHS** compliant, **Pb**-free

Functional Block Diagram



Overall width, length, and thickness are the only critical dimensions.
All other dimensions are for reference only.

Dimensions shown are nominal in millimeters
All tolerances are ±0.13mm except overall
length and width ±0.25mm

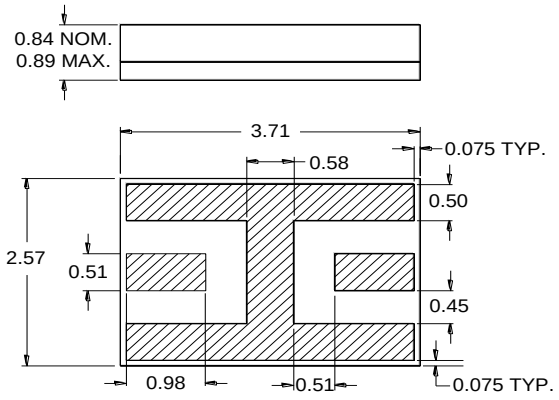
Body: *Sapphire*
Package: *Alumina*
Terminations: *Au* plating 0.5 - 2.5μm, over a 2.0 – 6.0 μm *Ni* plating

Pin Configuration

Pin # SE-Balanced	Description
I/O	Input/Output
GND	Ground

Ordering Information

Part No.	Description
880368	packaged part
880368 Eval Board	evaluation board



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Specifications

Electrical Specifications [1]

Specified Temperature Range: [2] -40 to +85 ºC

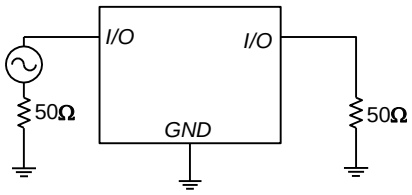
Parameter [3]	Conditions	Min	Typical [4]	Max	Units
Center Frequency		-	1280	-	MHz
Maximum Insertion Loss	@ 1280 MHz	-	4.0	4.5	dB
3dB Bandwidth	Reference loss at 1280 MHz	19	23	-	MHz
40dB Lower Frequency Edge		1249	1260	-	MHz
40dB Upper Frequency Edge		-	1300	1311	MHz
VSWR	@ 1280 MHz	-	1.5	2.0	-
Source Impedance (single-ended) [5]		-	50	-	Ω
Load Impedance (single-ended) [5]		-	50	-	Ω

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design shown on page 3
2. In production, devices will be tested at room temperature to a guardbanded 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 manufacturing tolerances
4. Typical values are based on average measurements at room temperature
5. This is the optimum impedance in order to achieve the performance shown

Reference Design

Schematic

50 Ω
Single-ended
Input

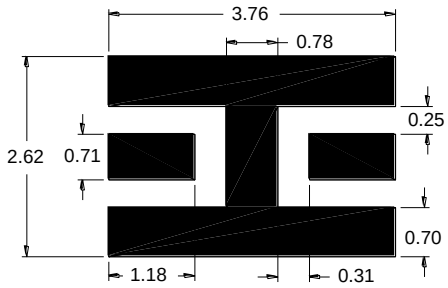


50 Ω
Single-ended
Input

PC Board

Refer to **PCB Layout** for more information.

Mounting Configuration



Notes:
1. All dimensions are in millimeters.
2. This footprint represents a recommendation only.

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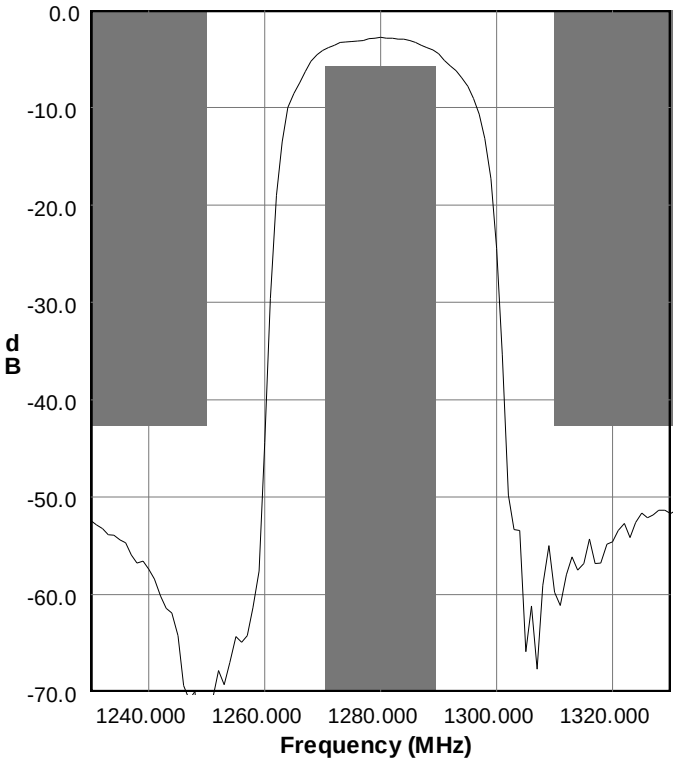
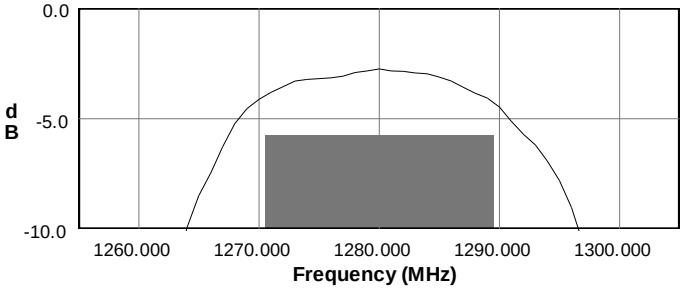
Typical Performance (at room temperature)

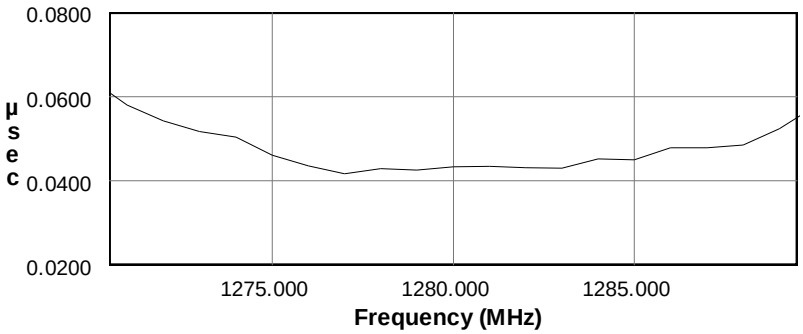
S21 Amplitude Response



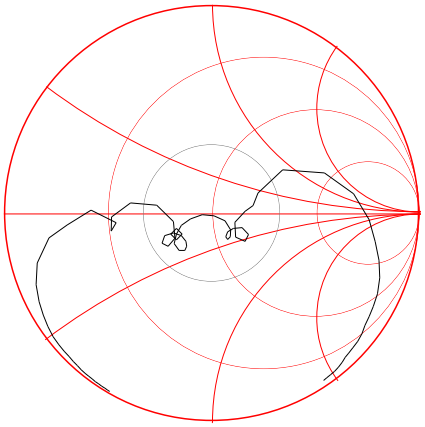
S21 Amplitude Response



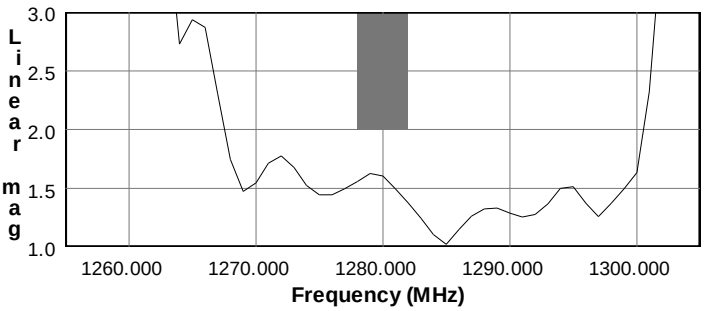
S21 Group Delay Response



S11 Smith Chart

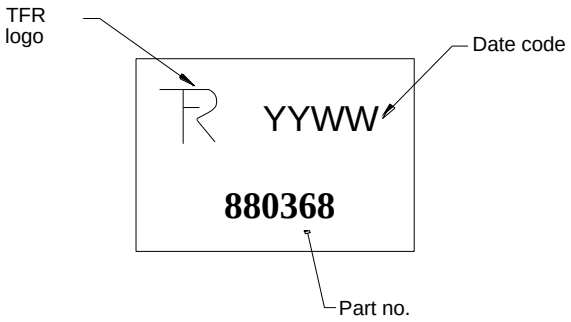


S11 VSWR



Mechanical Information

Marking



The date code consists of: YY = last digit of year,
WW = 2 digit week

Tape and Reel Information

Tape and Reel available upon request
EIA-481

Tinning available per J-STD-001

Absolute Maximum Ratings

Parameter	Rating
Operating Temperature	-40 to +85 °C
Storage Temperature	-55 to +100 °C
Maximum Input Power	+23 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

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Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

Value:	Passes ≥ 8000 V min.
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114

Value:	Passes ≥ 1600 V min.
Test:	Machine Model (MM)
Standard:	JEDEC Standard JESD22-A115

Refer to **ESD Sensitivity** for data

Solderability

Compatible with the latest version of J-STD-020, lead free solder, 260°C

Refer to **Soldering Profile** for recommended guidelines.

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:

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

Contact Information

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885026

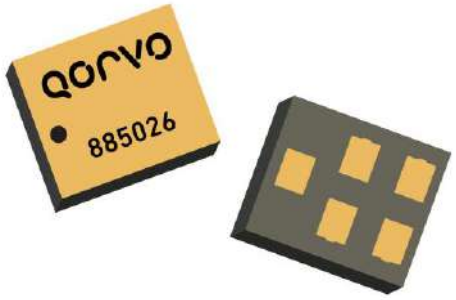
2595 MHz BAW Filter

General Description

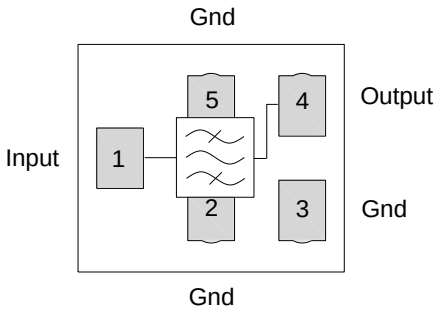
The 885026 is a high-performance Bulk Acoustic Wave (BAW) filter designed to meet the strict LTE rejection requirements for use in B38.

885026 is specifically designed to meet the high-performance expectations of insertion loss and rejection for LTE transmit systems under all operating conditions.

The 885026 uses common module packaging techniques to achieve the industry standard 1.4 x 1.2 x 0.46 mm footprint.



Functional Block Diagram



Top View

Pin Configuration – Single Ended

Pin No.	Label
1	Input
4	Output
2,3,5	Ground

Product Features

- Highly selective BAW filter achieving low insertion loss over full bandwidth and operating conditions
- Rejection in WLAN band of 40dB minimum
- Rejection in Band 7 Rx band of 10dB minimum
- Performance −20 to +90 ºC
- Ceramic chip-scale Package (CSP)
- Small Size: 1.4 x 1.2 x 0.46 mm
- Hermetically Sealed
- RoHS compliant, Pb-free

Applications

- For Band 38 TD-LTE applications
- B7/B38/B40 LTE handset, data cards, mobile routers

Ordering Information

Part No.	Description
885026	Packaged part
885026-EVB	Evaluation board

Standard T/R size = 10,000 units/reel

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to +125 °C
Operable Temperature	-40 to +90 °C
RF Input Power, CW, 50Ω, T=25 °C	+29dBm

Note: Operation of this device outside the parameter ranges given may cause permanent damage.

MTTF

Parameter	Min
RF Input Power +29dBm, CW, in band at 55 °C	10,000 hrs.

Electrical Specifications (1)(2)

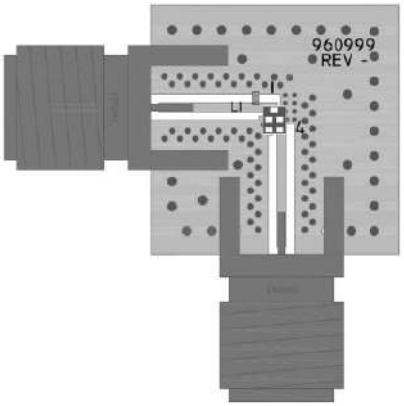
Conditions unless otherwise noted: (3) Device Temperature = 0°C to +70°C.

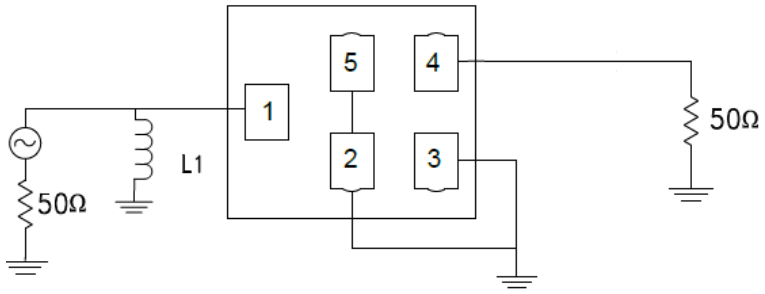
Parameter (2)	Conditions	Min	Typ	Max	Units
Center Frequency		-	2595		dB
Insertion Loss	2570 – 2620 MHz	-	1.5	2.5	dB
	2570 – 2620 MHz		1.5	2.1 (4)	dB
Attenuation (5)	10 – 1574 MHz	30	33	-	dB
	1559 – 1606 MHz	33	34	-	
	1607 – 2300 MHz	32	34	-	
	2400 – 2500 MHz	39	41	-	
	2505 – 2535 MHz(6)	20	37	-	
	2645 – 2670 MHz	10	16	-	
	5150 – 5230 MHz	30	39	-	
	7725 – 7845 MHz	25	32	-	
Input VSWR	2570 – 2620 MHz	-	1.6 :1	2.0:1	-
Output VSWR	2570 – 2620 MHz	-	1.6 :1	2.0:1	-
Source/Load Impedance (7)	Single-ended	-	50	-	Ω

Notes:

1. All specifications are based on the test circuit shown on page 3
2. Electrical margin has been built into the design to account for the variations due to manufacturing tolerances.
3. In production, devices will be tested at room temperature to a guard-banded specification to ensure electrical compliance over temperature
4. At 25 °C only
5. Measurement made relative to zero dB
6. Specified from 0°C to +55°C only.
7. This is the optimum impedance in order to achieve the performance shown.

Evaluation Board





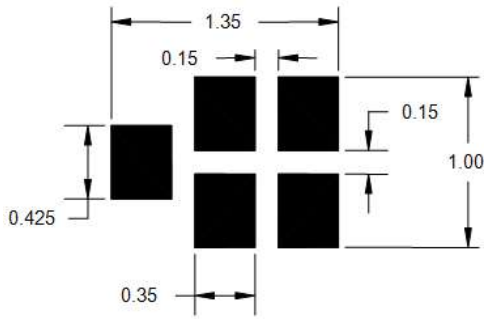
Notes:

1. Matching component values shown are for the specified TriQuint evaluation board. Value adjustment may be required in end user product circuits depending on component manufacturer and PCB material.
2. PCB: .500 x.500 x .062; Construction: ½ oz. *Cu* Top Layer; *TLY-5A* (.0075) ½ oz. *Cu* Middle Layer, *FR4*; ½ oz. *Cu* Bottom Layer. (dimensions are in inches)

Bill of Material

Reference Des.	Value	Description	Manuf.	Part Number
L1	20 nH	0201 chip inductors ±3%	MuRata	LQP03TN20NH02
SMA	N/A	SMA connector	Radiall USA	9602-1111-018
PCB	N/A	3-layer	Multiple	960999

PCB Mounting Pattern

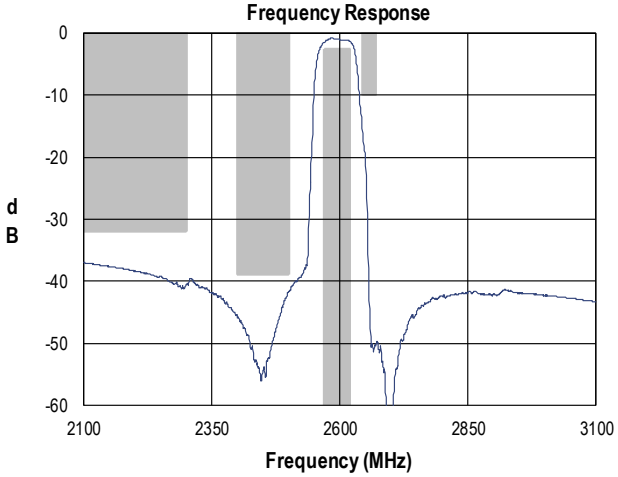


Notes:

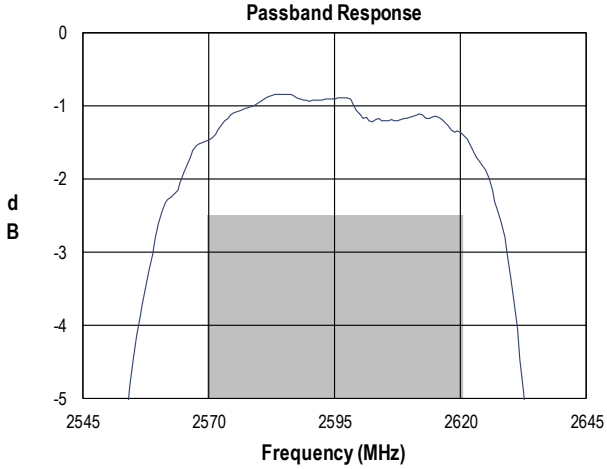
1. All dimensions are in millimeters. Angles are in degrees.
2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

Performance Plots

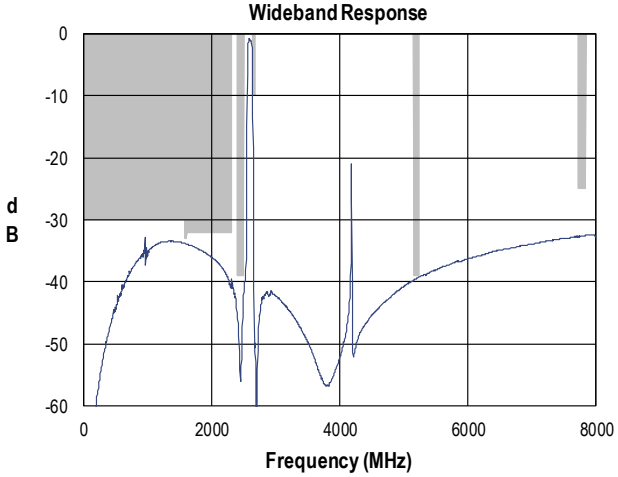
Frequency Response



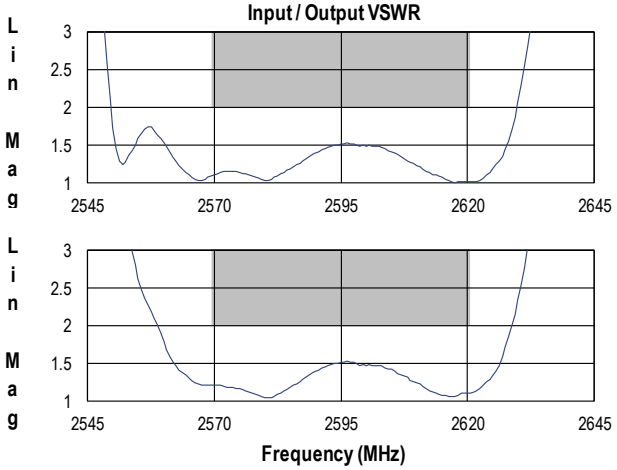
Passband Response



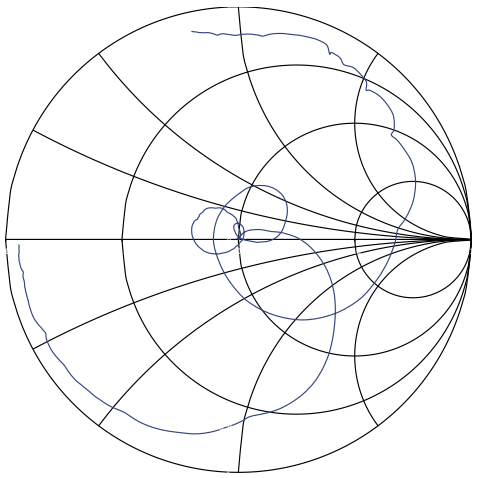
Wideband Response



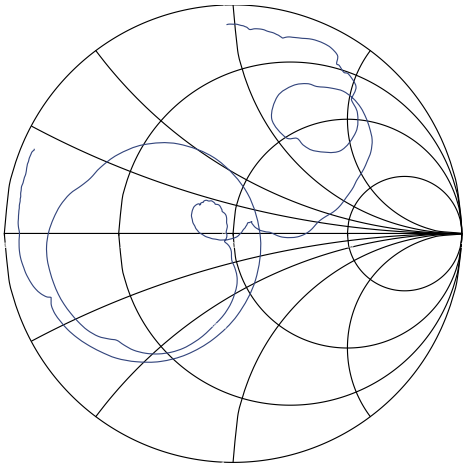
Input / Output VSWR



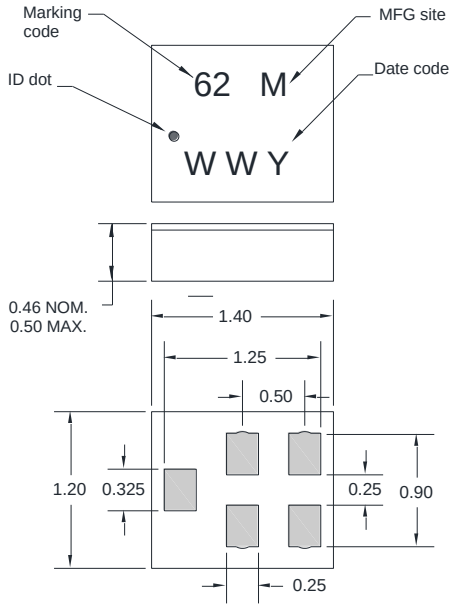
Input Smith Chart



Output Smith Chart



Package Information, Marking and Dimensions



Package Style: CSP-5CT
Dimensions: 1.4 x 1.2 x 0.46 mm

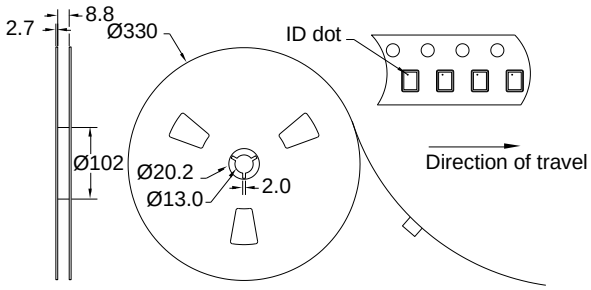
Body: Al_2O_3 ceramic
Lid: *Kovar* or *Alloy 42*, *Au* over *Ni* plated
Terminations: *Au* plating 0.5 - 1.0 µm, over a 2-6 µm *Ni* plating

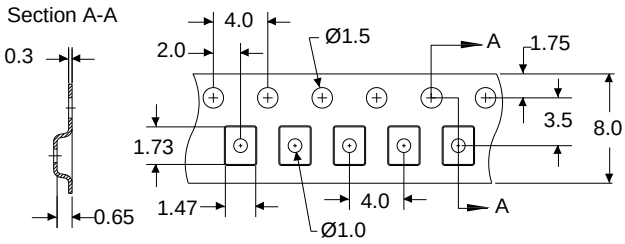
The date code consists of: WW = 2 digit week,
Y = last digit of year, M = manufacturing site code

Notes:

1. All dimensions shown are typical in millimeters.
2. Unless otherwise specified all tolerances are ±0.05mm except length and width that are specified as ± 0.1mm.
3. An asterisk (*) in front of the marking code indicates prototype.

Tape and Reel information





Standard T/R size=10,000 units/reel.
All dimensions are in millimeters.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	ESDA / JEDEC JS-001
ESD – Charge Device Model (CDM)	Class C1	ESDA/JEDEC JS-002
MSL – Moisture Sensitivity Level	N/A *	Hermetic package

*Hermetically sealed ceramic package

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.

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
Email: customer.support@qorvo.com

Important Notice

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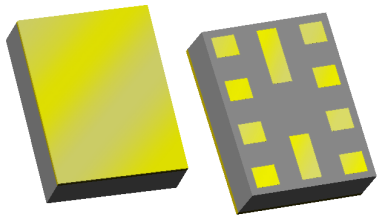
885216

2332.5 MHz Baw Filter

Applications

- Satellite Radio antenna modules
- Satellite Radio devices
- Suitable for Automotive applications - Compliant to the AEC-Q200 Grade 2 reliability standard

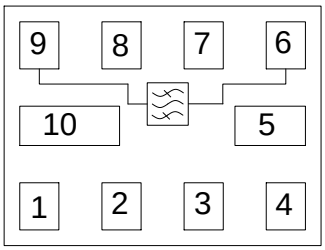


1.7 x 1.3 x 0.46 mm

Product Features

- Temperature-compensated bandpass filter
- Enables Coexistence of SDARS and WCS radios
- Low Loss in full SDARS Radio Channel 2320-2345 MHz band
- High Rejection in the 2305-2315 MHz band: WCS Lower
- High Rejection in 2350-2355 MHz band: WCS Upper
- Industry-leading small size: 1.7 x 1.3 x .46 mm
- + 24 dBm (CW) power handling (min)
- Performance across − 40 to + 105 ºC
- Operable to + 125 ºC
- Single-ended operation
- Ceramic chip-scale package (CSP)
- Hermetically sealed package
- RoHS compliant, Pb-free

Functional Block Diagram



Top View

General Description

885216 is a high-performance, high-power Bulk Acoustic Wave (BAW) filter with extremely steep skirts and a 25 MHz pass band.

885216 is specifically designed to enable coexistence of SDARS and WCS signals within the same device or in close proximity to one another. The part passes the entire SDARS band, covering 2320-2345 MHz.

The 885216 uses advanced and inexpensive packaging techniques to achieve an industry-leading 1.7 x 1.3 x .46 mm package. The filter exhibits excellent power handling capabilities.

Pin Configuration*

Pin No.	Label
9	Input
6	Output
7,8	Ground
1,2,3,4,5,10	Ground (1)

*Note: See page 3 for ground considerations

Ordering Information

Part No.	Description
885216	Packaged Part
885216-EVB-2	Evaluation board description pg3

Standard T/R size = 10,000 units/reel

Electrical Specifications [1,3]

Test conditions unless otherwise noted: Temp= −40 °C to +105 °C [2,3]

Parameter	Conditions	Min	Typ [2]	Max	Units
Center Frequency	Fc of RF Filter	-	2332.5	-	MHz
Maximum Insertion Loss	2320.000 – 2345.000 MHz	-	5.0	7.0	dB
Passband 3.0 dB Bandwidth	Fc = 2332.5 MHz	-	31	-	MHz
Amplitude Ripple					
PB1	2320.000 – 2324.500 MHz (TDM1)		1.1	1.7	
PB2	2324.200 – 2328.000 MHz (COFDM)		0.4	1.2	
PB3	2328.000 – 2332.500 MHz (TDM2)		0.4	1.2	
PB4	2332.500 – 2334.385 MHz (SAT1A)	-	0.4	1.2	dB p-p
PB5	2334.385 – 2336.250 MHz (SAT2A)		0.4	1.2	
PB6	2336.250 – 2337.750 MHz (TERRA)		0.2	1.2	
PB7	2337.750 – 2341.250 MHz (TERRB)		0.3	1.2	
PB8	2341.250 – 2343.125 MHz (SAT2B)		0.5	1.2	
PB9	2343.125 – 2345.000 MHz (SAT1B)		1.1	1.4	
Group Delay Ripple					
PB1	2320.000 – 2324.500 MHz (TDM1)		15	70	
PB2	2324.200 – 2328.000 MHz (COFDM)		10	70	
PB3	2328.000 – 2332.500 MHz (TDM2)		10	70	
PB4	2332.500 – 2334.385 MHz (SAT1A)	-	5	60	ns p-p
PB5	2334.385 – 2336.250 MHz (SAT2A)		5	60	
PB6	2336.250 – 2337.750 MHz (TERRA)		8	70	
PB7	2337.750 – 2341.250 MHz (TERRB)		10	70	
PB8	2341.250 – 2343.125 MHz (SAT2B)		5	60	
PB9	2343.125 – 2345.000 MHz (SAT1B)		5	60	
Input Return Loss	2320 – 2345 MHz	6	13.3	-	dB
Output Return Loss		6	10.8	-	
Relative Attenuation [4]					
(FM)	88 – 108 MHz	36	58		
-	880 – 960 MHz	20	39		
-	1710 – 1910 MHz	20	36		
-	2000 – 2100 MHz	20	36		
(WCS A-Lower)	2305 – 2310 MHz	16	21	-	dBc
(WCS B-Lower)	2310 – 2315 MHz (-40 to +85 °C)	4	6		
(WCS B-Lower) [6]	*2310 – 2315 MHz* (+85 to +105 °C)	3.5	4		
(WCS A-Upper)	2350 – 2355 MHz	4	11		
(WCS B-Upper)	2355 – 2360 MHz	16	28		
-	2400 – 2500 MHz	20	38		
Input and Output Impedance [5]		-	50	-	Ω

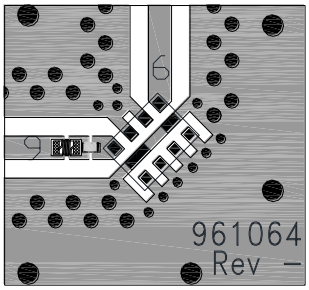
Notes:
1. All specifications are based on the TriQuint schematic for reference design shown on page 3.
2. Typical values are based on average measurements at +25 °C.
3. In production, devices will be tested at room temperature to a guard-banded specification; this limit is based on average performance over temperature.
4. Attenuation is defined from the insertion loss level measured at the center frequency Fc.
5. This is the optimum impedance in order to achieve the performance shown.
6. Extended temperature de-rated specification as noted.

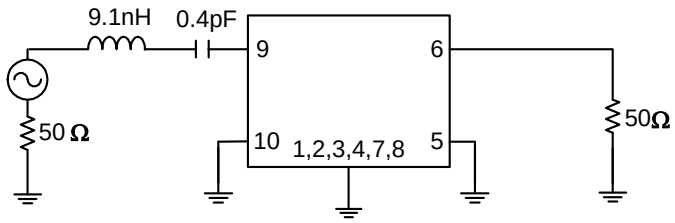
Absolute Maximum Ratings

Parameter	Rating
Storage Temperature (1)	−40 to +125 °C
Operable Temperature (2)	−40 to +125 °C
RF Input Power (3)	+ 24 dBm

1. Operation of this device outside the parameter ranges given may cause permanent damage.
2. Specifications are not guaranteed over all operable conditions.
3. Input Power with applied CW signal equivalent to + 55°C for 10k hours.

Evaluation Board



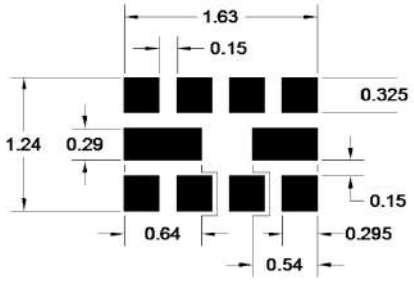


Notes:
1. Impedance matching required (series tank)
2. Trace width nominal 50 Ohms
3. PCB: .580 x.580 x .062; Construction (5 layer stack-up): ½ oz Cu Top Layer; Dielectric: Taconic TLY-5A (.0075); ½ oz Cu Middle Layer, FR4; ½ oz Cu Bottom Layer; total thickness (0.062) (dimensions are in inches). Contact TriQuint for Gerber files.

Bill of Material

Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	CSP 1713, 2332.5 MHz Baw Filter	Qorvo	885216
L1	9.1 nH	0201 chip Inductor, +/- 0.1 nH	Murata	LQP03TN9N1J02
C1	0.4 pF	0105 chip cap, +/- 0.04 pF	Murata	GRM0225C1CR40BD05D
SMA	N/A	SMA connector	Radiall	9602-1111-018
PCB	n/a	Printed Circuit Board	Multiple	961064

PCB Mounting Pattern



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

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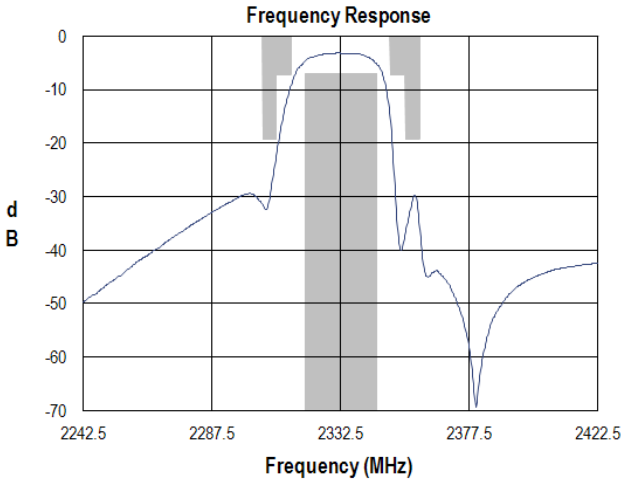
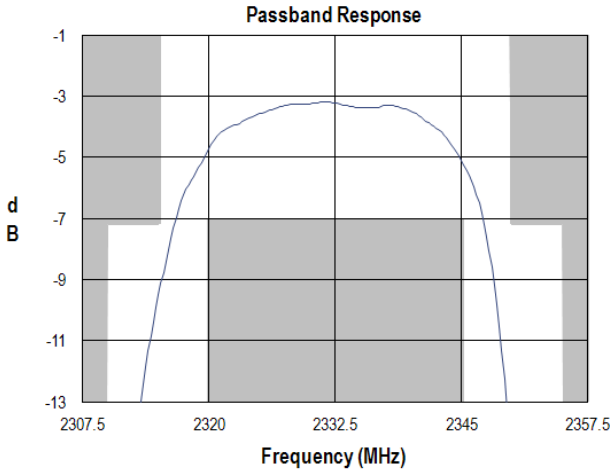
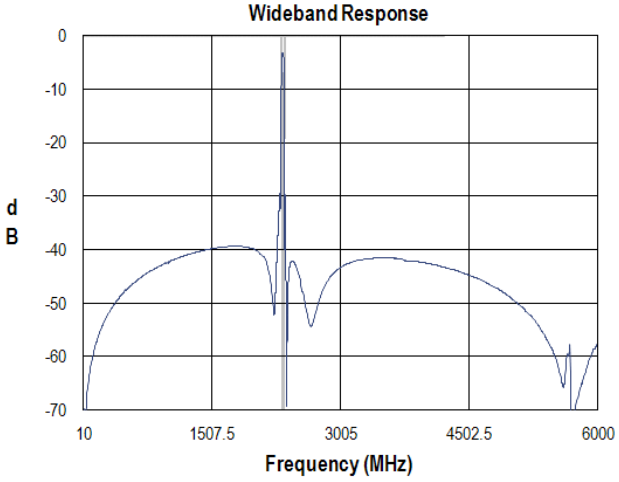
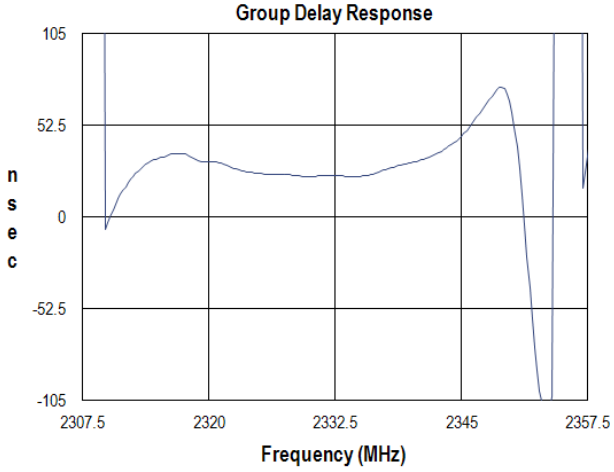
Performance Plots - Reference Design

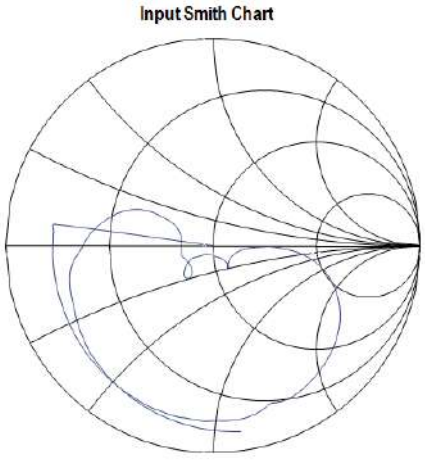
Test conditions unless otherwise noted: Temp= + 25 °C

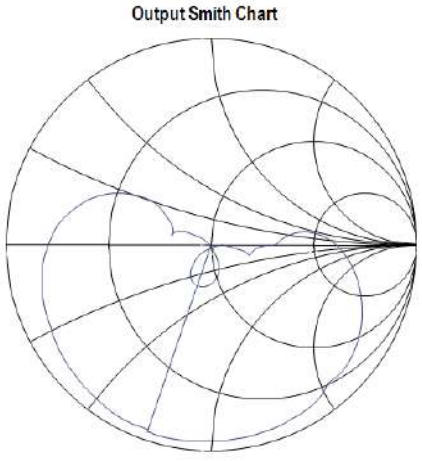




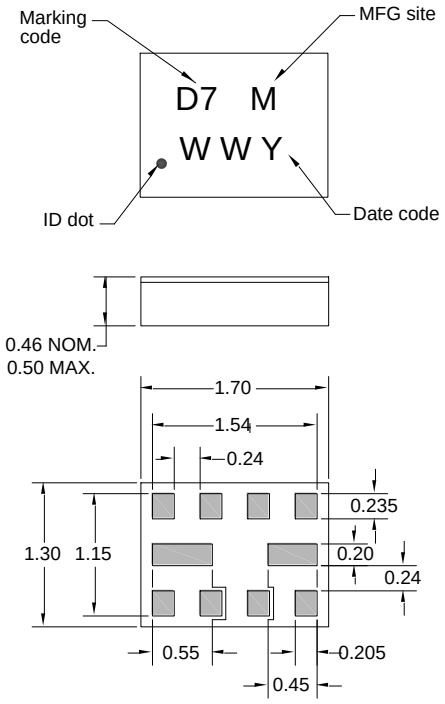








Package Information, Marking and Dimensions



Package Style: CSP-1713
Dimensions: 1.70 x 1.30 x 0.46 mm

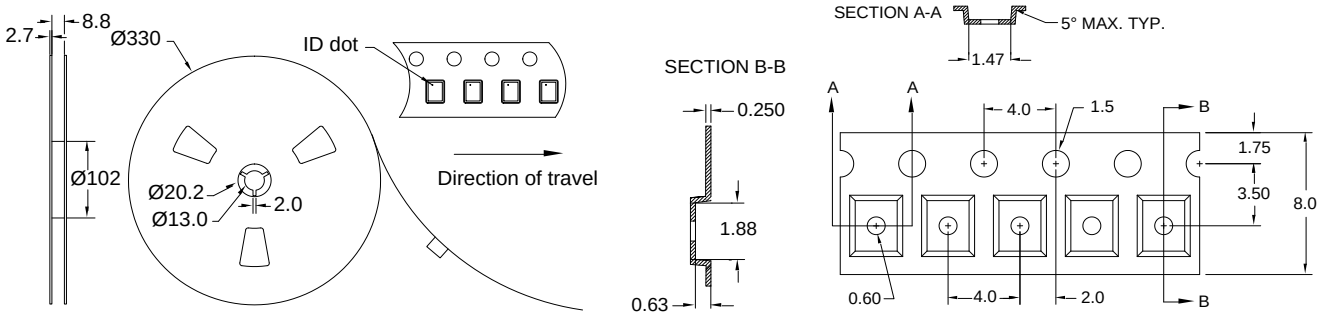
Body: Al_2O_3 ceramic
Lid: *Kovar* or *Alloy 42, Au* over *Ni* plated
Terminations: *Au* plating 0.5 - 1.0 µm, over a 2-6 µm *Ni* plating

All dimensions shown are nominal in millimeters
All tolerances are ± 0.15 mm except overall length and width ± 0.10 mm

Notes:
1. All dimensions shown are typical in millimeters
2. An asterisk (*) in front of the marking code indicates prototype.

Tape and Reel information

Standard T/R size = 10,000 units/reel



ES France - Département RF & Hyperfréquences - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating: Class 1C
Test Human Body Model (HBM)
Standard ESDA/JEDEC JS-001

ESD Rating: Class C3
Test: Charge Device Model (CDM)
Standard: ESDA/JEDEC JES-002

MSL Rating

Not applicable. Hermetic package.

Solderability

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

Refer to **Soldering Profile** for recommended guidelines.

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

Contact Information

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

Web: www.triquint.com **Tel:** +1.407.886.8860
Email: info-sales@tqs.com **Fax:** +1.407.886.7061

For technical questions and application information: **Email:** flapplication.engineering@tqs.com

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QPQ1029

Band 1 and Band 3 Dual Filter

Product Overview

QPQ1029 is a high performance, Bulk Acoustic Wave (BAW) dual band filter module designed for Band 1 Uplink & Band 3 Uplink

The QPQ1029 provides low insertion loss and very high rejection, making it an ideal choice for small cell. This diplexer is housed in a compact ROHs compliant 3x3 mm surface mount package.

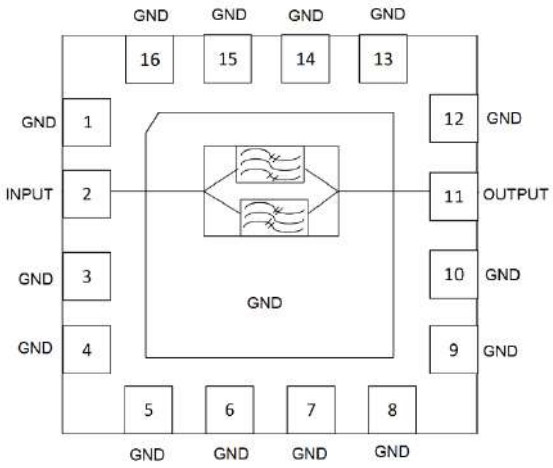
The QPQ1029 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.

16 Pad 3 x 3 mm SMT Package

Key Features

- 60 MHz Bandwidth for Band 1 Uplink
- 75 MHz Bandwidth for Band 3 Uplink
- Low Loss and High Attenuation
- +29dBm Power Handling for Small Cell Application
- Single Ended Operation to 50 Ω
- No External Matching Required
- RoHS Compliant, Pb-Free

Functional Block Diagram



Top View

Applications

- B3 Uplink and B1 Uplink
- Base Station Infrastructure
- Small Cells
- Repeaters
- LTE Dongles
- General Purpose Wireless

Pin Configuration

Pin No.	Label
2	INPUT
11	OUTPUT
1,3,4,5,6,7,8,9,10,12,13,14, 15,16, Back Side Center Pad	GND

Ordering Information

Part No.	Description
QPQ1029TR7	2,500 pieces on a 7" reel (standard)
QPQ1029EVB	Evaluation Board

Absolute Maximum Ratings (1)

Parameter	Rating
Storage Temperature	−40 to +125 °C
Operating Temperature (2)	−40 to +95 °C

Notes:
1. Operation of this device outside of the parameter ranges may cause permanent damage.
2. Device will be functional, but is not guaranteed to meet electrical specifications

Minimum Lifetime Rating

Conditions	Rating
+29dBm Apply to Pin 2 Input, +95°C, LTE 5 MHz, 16 QAM, PAR 8dB, Frequency 1785MHz or 1980 MHz	>87,600 hours

Electrical Specifications (1) (2) (3)

Test Conditions unless otherwise noted= -20°C to +85°C

Parameter	Conditions	Min	Typ (4)	Max	Units
Passband Frequency, B3UL		1710	-	1785	MHz
Passband Frequency, B1UL		1920	-	1980	MHz
Integrated Insertion Loss (5) B3UL	1710 MHz – 1785 MHz	-	2.5	3.5	dB
Integrated Insertion Loss (5) B1UL	1920 MHz – 1980 MHz	-	2.1	2.7	dB
Amplitude Ripple (6) B3UL	1710 MHz – 1785 MHz	-	0.8	2.4	dB
Amplitude Ripple (6) B1UL	1920 MHz – 1980 MHz	-	0.6	1.6	dB
Input VSWR B3UL	1710 MHz – 1785 MHz	-	1.6:1	2.0:1	ratio
Input VSWR B1UL	1920 MHz – 1980 MHz	-	1.4:1	2.0:1	ratio
Output VSWR B3UL	1710 MHz – 1785 MHz	-	1.6:1	2.0:1	ratio
Output VSWR B1UL	1920 MHz – 1980 MHz	-	1.5:1	2.0:1	ratio
Input Return Loss B3UL (8)	1710 MHz – 1785 MHz	9.5	13	-	dB
Input Return Loss B1UL (8)	1920 MHz – 1980 MHz	9.5	16	-	dB
Output Return Loss B3UL (8)	1710 MHz – 1785 MHz	9.5	12	-	dB
Output Return Loss B1UL (8)	1920 MHz – 1980 MHz	9.5	14	-	dB
Group Delay Variation B3UL (7)	1710 MHz – 1785 MHz	-	8	24	ns
Group Delay Variation B1UL (7)	1920 MHz – 1980 MHz	-	5	20	ns

Notes:
1. All specifications are based on the Qorvo test circuit shown on page 11
2. In production, devices are tested at room temperature with guard-banded specifications to ensure electrical compliance over temperature
3. Electrical margin has been designed into account for the variations due to temperature drift and manufacturing tolerances
4. Typical values are based on average measurements at room temperature of 25°C
5. Insertion Loss is Integrated over any 5MHz bandwidth within the defined frequency band
6. This is defined as the worst difference between a peak and adjacent valley over any 5 MHz window within the frequency band
7. Measured over any 5 MHz window within the frequency band
8. This Parameter is guaranteed by design, and will not be tested in production

Electrical Specifications (1) (2) (3)

Test Conditions unless otherwise noted= -20°C to +85°C

Parameter	Conditions	Min	Typ (4)	Max	Units
Attenuation (6)	0-729 MHz	31	50	-	dB
	729-960 MHz	42	45	-	
	960-1475 MHz	31	40	-	
	1475-1559 MHz	33	35	-	
	1559-1690 MHz (5)	10	30	-	
	1805-1880 MHz (5)	45	49	-	
	2025-2110 MHz	26	26	-	
	2110-2170 MHz (5)	45	53	-	
	2170-2288 MHz	26	52	-	
	2300-2400 MHz	45	49	-	
	2400-2690 MHz	35	45	-	
	2690-3400 MHz	21	44	-	
	3400-3800 MHz	47	56	-	
	3800-4600 MHz	26	36	-	
	4600-5000 MHz	30	39	-	
	5000-8000 MHz	11	27	-	
	8000-12750 MHz (11)	11	26	-	
Load/Source Impedance (7)		-	50	-	Ω
PIM5 (8)	IMD5-H(9) at Output P2 (B1UL)	-	-117	-	dBm
	IMD5-L(10) at Output P2 (B3UL)	-	-112	-	dBm

Notes:

1. All specifications are based on the Qorvo test circuit shown on page 11
2. In production, devices are tested at room temperature with guard-banded specifications to ensure electrical compliance over temperature.
3. Electrical margin has been designed into account for the variations due to temperature drift and manufacturing tolerances
4. Typical values are based on average measurements at room temperature of 25°C
5. Integrated attenuation over any 5 MHz bandwidth within the specified frequency range
6. Relative to zero dB
7. This is the optimum impedance in order to achieve the performance shown.
8. With 2 tones, F1 and F2, +23dBm/tone applied to INPUT P1. The F1 and F2 are selected from 1805 to1880 MHz to have the IMD5 in B1 UL or B3 UL frequency range. The noise floor of the measurement system is -140 dBm. The PIM is guaranteed by design and not tested in production.
9. IMD5-H (3*F2-2*F1) at Band 1 UL frequency range
10. IMD5-L (3*F1-2*F2) at Band 3 UL frequency range
11. This attenuation is guaranteed by design, and will not be tested in production

Electrical Specifications (1) (2) (3)

Test Conditions unless otherwise noted= -40°C to +95°C

Parameter	Conditions	Min	Typ (4)	Max	Units
Passband Frequency, B3UL		1710	-	1785	MHz
Passband Frequency, B1UL		1920	-	1980	MHz
Integrated Insertion Loss (5) B3UL	1710 MHz – 1785 MHz	-	2.5	3.8	dB
Integrated Insertion Loss (5) B1UL	1920 MHz – 1980 MHz	-	2.1	2.9	dB
Amplitude Ripple (6) B3UL	1710 MHz – 1785 MHz	-	0.8	2.5	dB
Amplitude Ripple (6) B1UL	1920 MHz – 1980 MHz	-	0.6	1.8	dB
Input VSWR B3UL	1710 MHz – 1785 MHz	-	1.6:1	2.1:1	ratio
Input VSWR B1UL	1920 MHz – 1980 MHz	-	1.4:1	2.1:1	ratio
Output VSWR B3UL	1710 MHz – 1785 MHz	-	1.6:1	2.1:1	ratio
Output VSWR B1UL	1920 MHz – 1980 MHz	-	1.5:1	2.1:1	ratio
Input Return Loss B3UL (8)	1710 MHz – 1785 MHz	9.0	13	-	dB
Input Return Loss B1UL (8)	1920 MHz – 1980 MHz	9.0	16	-	dB
Output Return Loss B3UL (8)	1710 MHz – 1785 MHz	9.0	12	-	dB
Output Return Loss B1UL (8)	1920 MHz – 1980 MHz	9.0	14	-	dB
Group Delay Variation B3UL (7)	1710 MHz – 1785 MHz		8	26	ns
Group Delay Variation B1UL (7)	1920 MHz – 1980 MHz		5	22	ns

Notes:
1. All specifications are based on the Qorvo test circuit shown on page 11.
2. In production, devices will be tested at room temperature with guard-banded specifications to ensure electrical compliance over temperature.
3. Electrical margin has been designed into account for the variations due to temperature drift and manufacturing tolerances
4. Typical values are based on average measurements at room temperature of 25°C
5. Insertion Loss is Integrated over any 5MHz bandwidth within defined frequency band
6. This is defined as the worst difference between a peak and adjacent valley within any 5 MHz window within the frequency band
7. Measured over any 5 MHz window within the frequency band
8. This Parameter is guaranteed by design, and will not be tested in production

De-Embedded Electrical Specifications (1) (2) (3)

Test Conditions unless otherwise noted= -40°C to +95°C

Parameter	Conditions	Min	Typ. (4)	Max	Units
Attenuation (6)	0-729 MHz	31	50	-	dB
	729-960 MHz	42	45	-	
	960-1475 MHz	31	40	-	
	1475-1559 MHz	33	35	-	
	1559-1690 MHz (5)	7	30	-	
	1805-1880 MHz (5)	43	49	-	
	2025-2110 MHz	26	26	-	
	2110-2170 MHz (5)(11)	45	53	-	
	2170-2288 MHz	26	52	-	
	2300-2400 MHz	45	49	-	
	2400-2690 MHz	35	45	-	
	2690-3400 MHz	21	44	-	
	3400-3800 MHz	47	56	-	
	3800-4600 MHz	26	36	-	
	4600-5000 MHz	30	39	-	
	5000-8000 MHz	11	27	-	
	8000-12750 MHz (11)	11	26	-	
Load/Source Impedance (6)		-	50	-	Ω
PIM5 (8)	IMD5-H (9) at Output P2 (B1UL)	-	-117	-	dBm
	IMD5-L (10) at Output P2 (B3UL)	-	-112	-	dBm

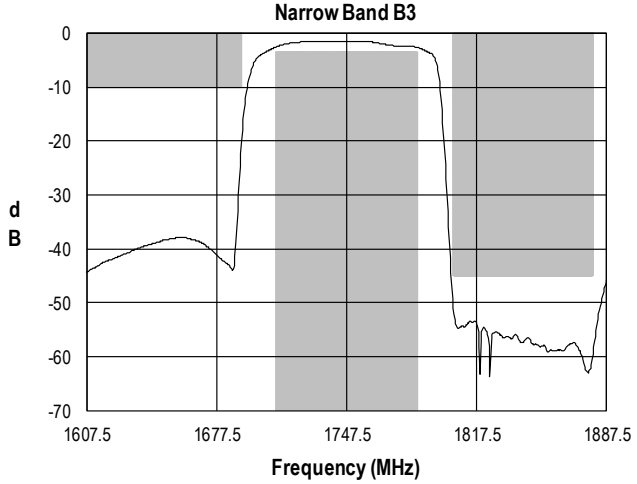
Notes:

1. All specifications are based on the Qorvo test circuit shown on page 11.
2. In production, devices will be tested at room temperature with guard-banded specifications 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 manufacturing tolerances
4. Typical values are based on average measurements at room temperature of 25°C
5. Integrated Rejection over 5 MHz bandwidth.
6. Relative to zero dB.
7. This is the optimum impedance in order to achieve the performance shown.
8. With 2 Tones, F1 and F2, +23dBm/tone applied to INPUT P1. F1 and F2 are selected from 1805 to1880 MHz to have IMD5 in B1 UL or B3 UL frequency range. The noise floor of the measurement system is -140 dBm. PIM is guaranteed by design, and not tested in production.
9. IMD5-H (3*F2-2*F1) in Band 1 UL frequency range
10. IMD5-L (3*F1-2*F2) in Band 3 UL frequency range
11. This attenuation is guaranteed by design, and will not be tested in production

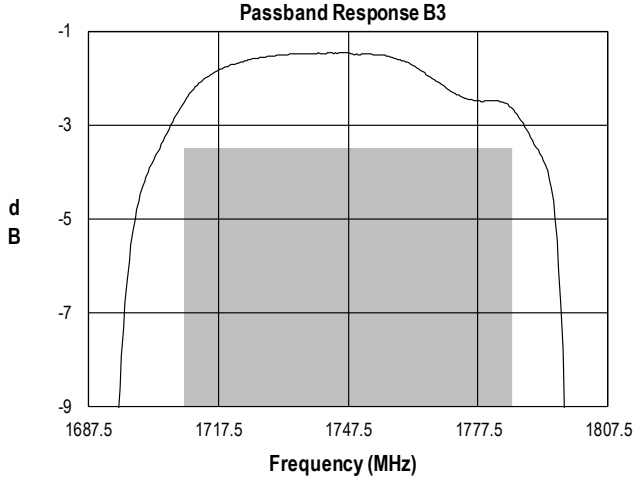
De-embedded Performance Plots – Band 3

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

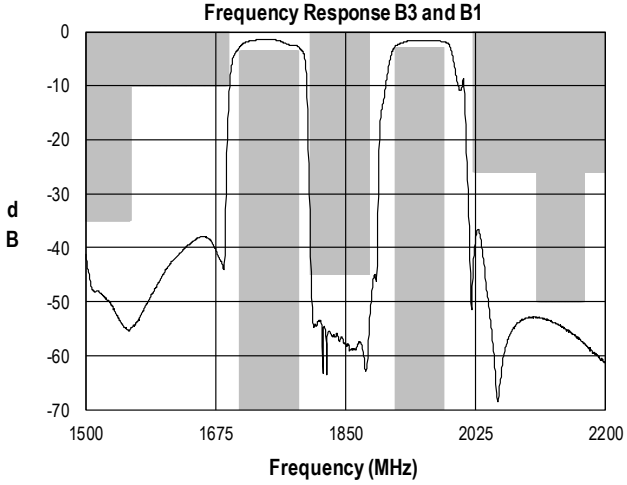
Narrow Band B3



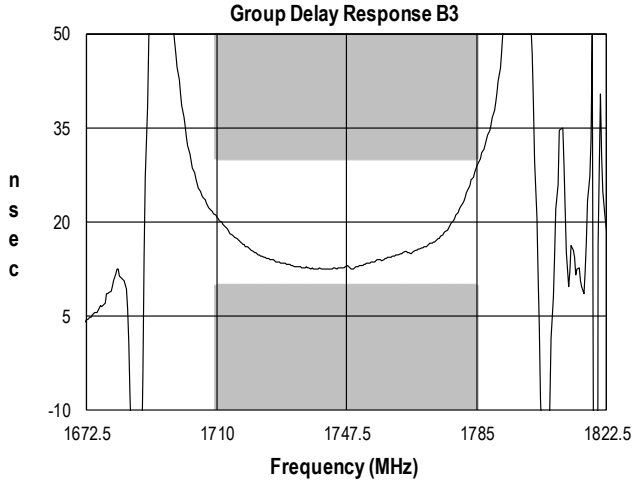
Passband Response B3



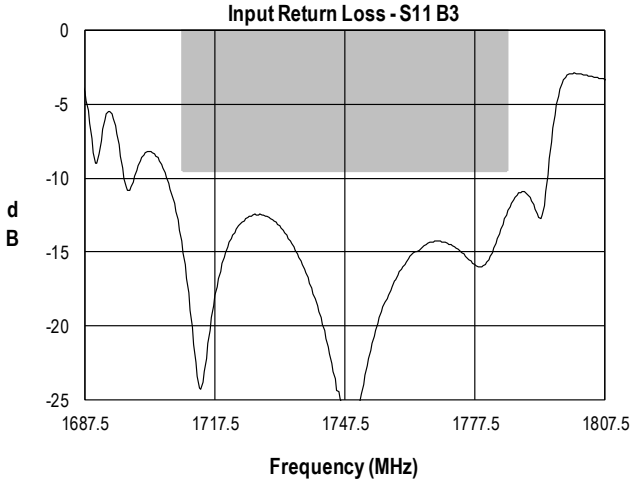
Frequency Response B3 and B1



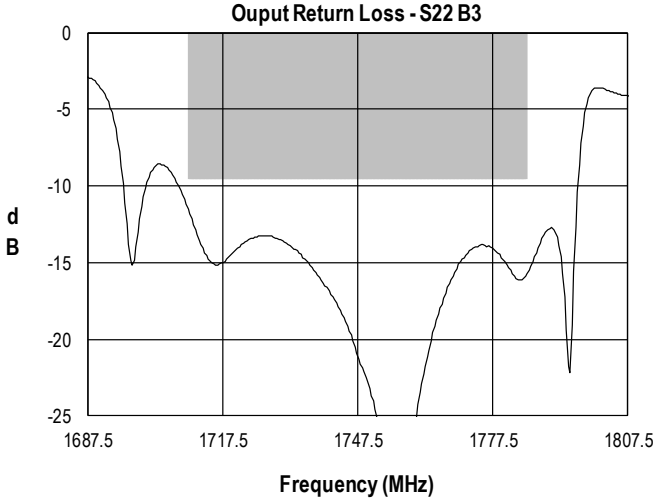
Group Delay Response B3



Input Return Loss - S11 B3



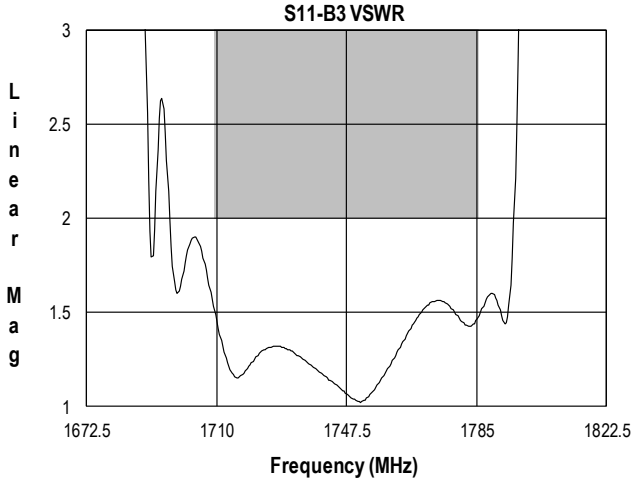
Ouput Return Loss - S22 B3



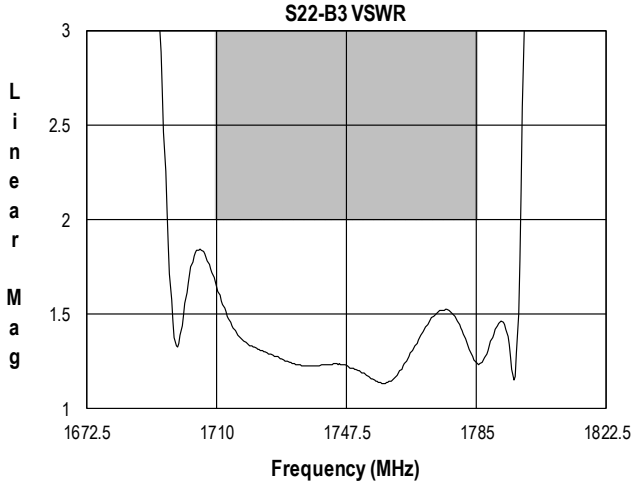
De-embedded Performance Plots – Band 3

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

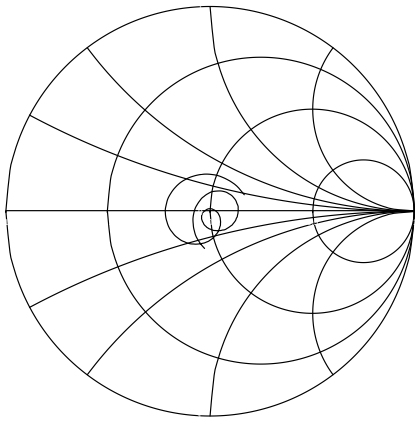
S11-B3 VSWR



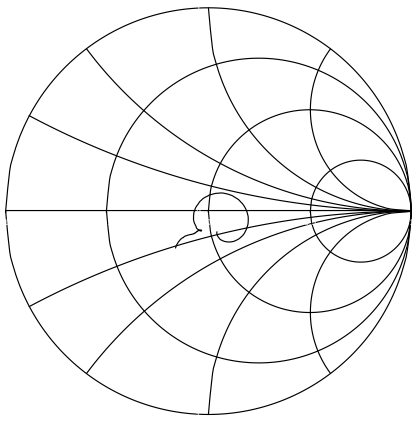
S22-B3 VSWR



S11-B3 UL



S22-B3 UL



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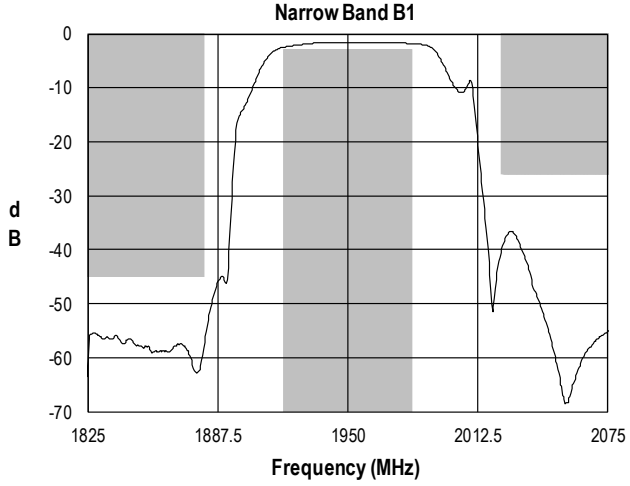
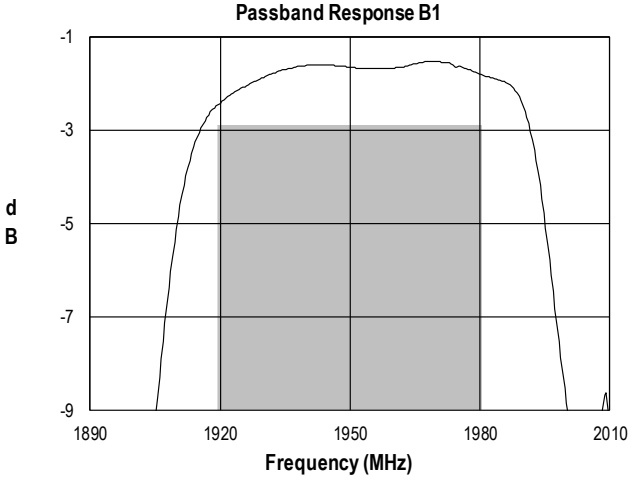
De-embedded Performance Plots – Band 1

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

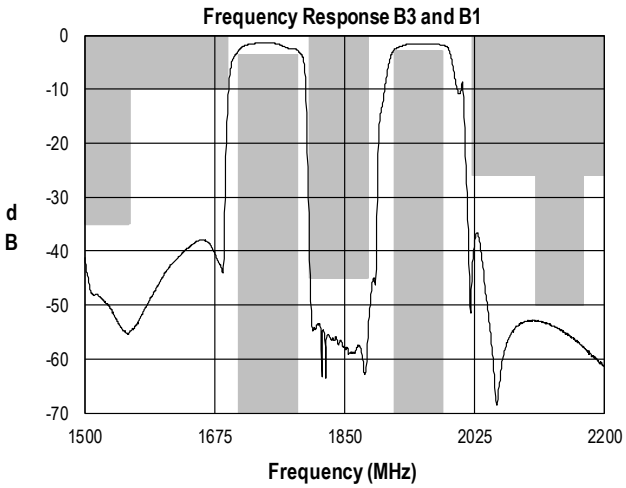
Narrow Band B1



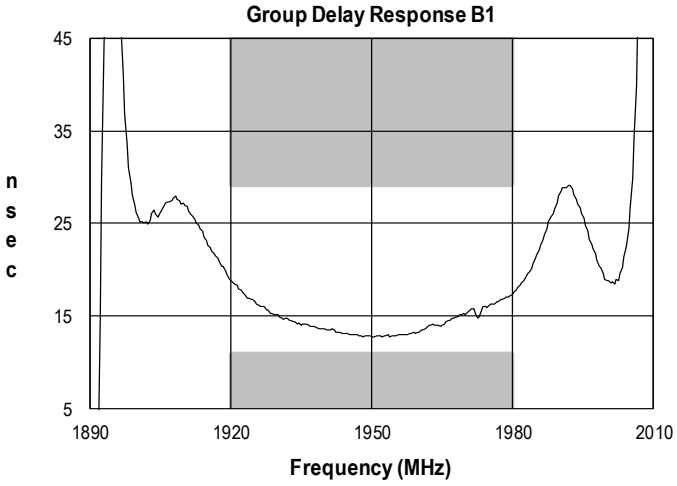
Passband Response B1



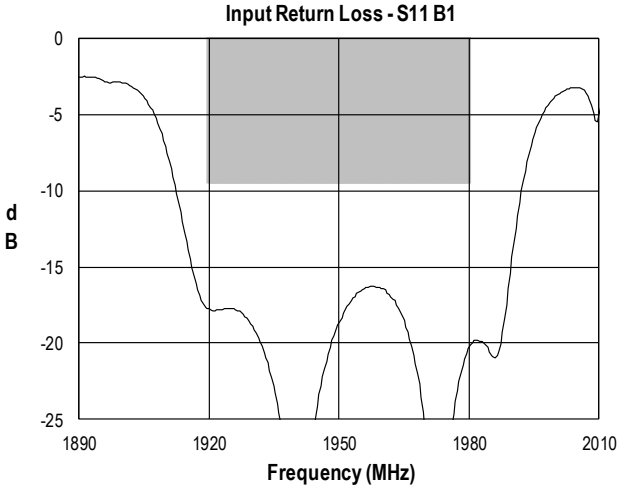
Frequency Response B3 and B1



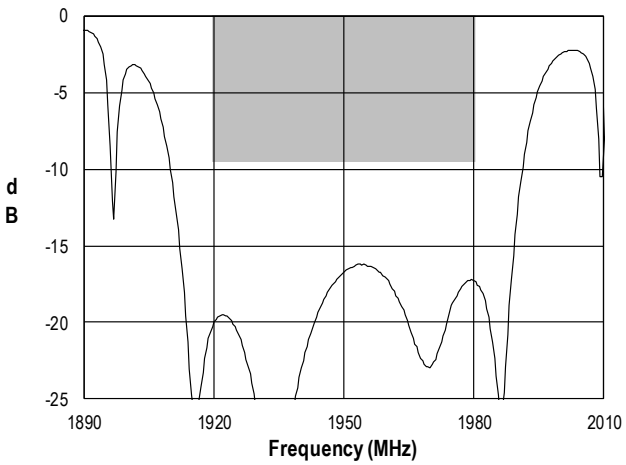
Group Delay Response B1



Input Return Loss - S11 B1



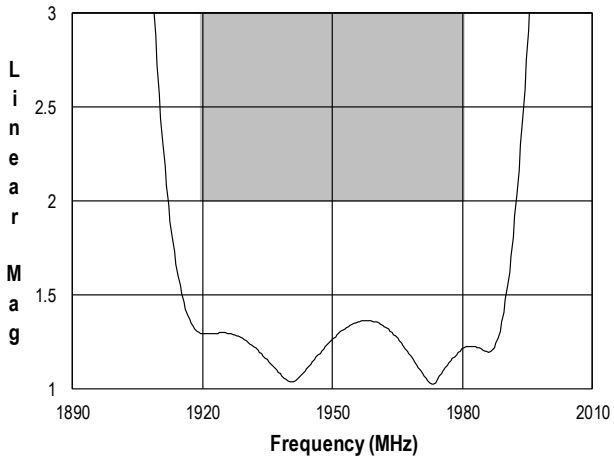
Ouput Return Loss -S22 B1



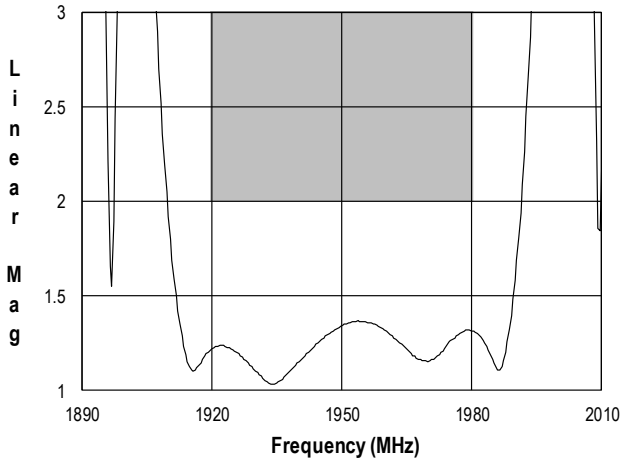
De-embedded Performance Plots – Band 1

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

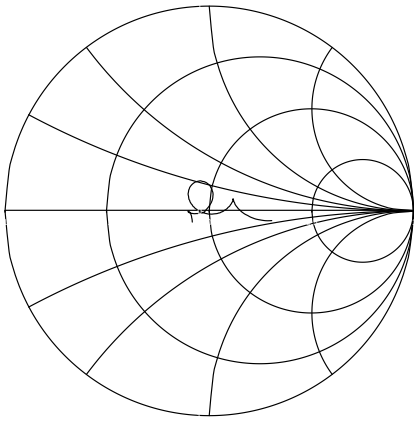
S11-B1 VSWR



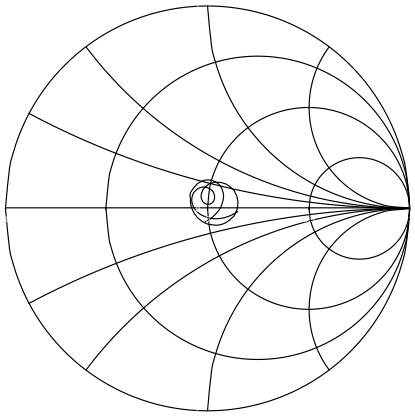
S22-B1 VSWR



S11-B1 UL



S22-B1 UL



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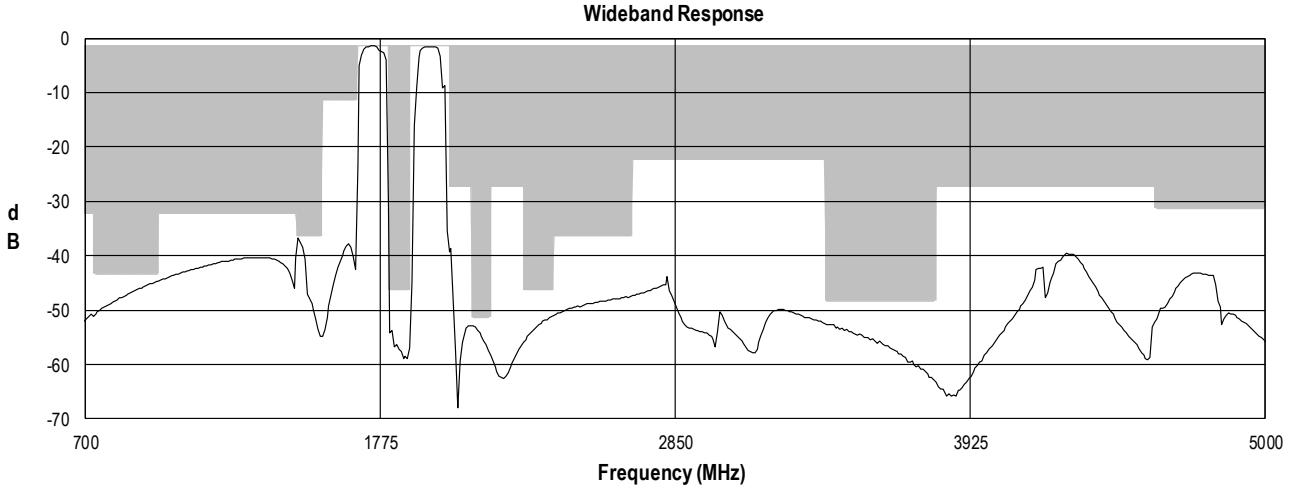
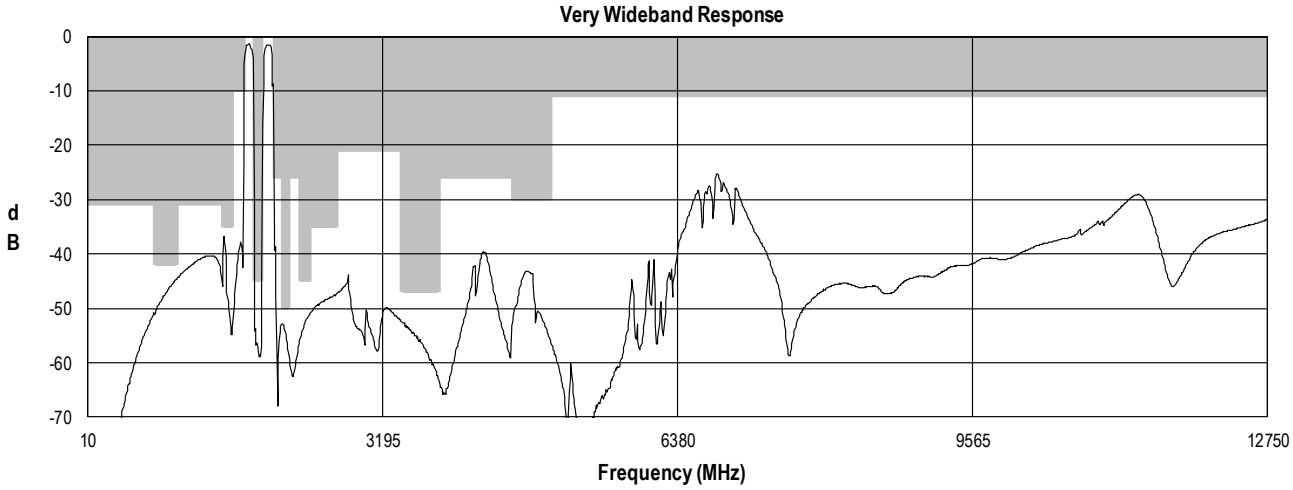
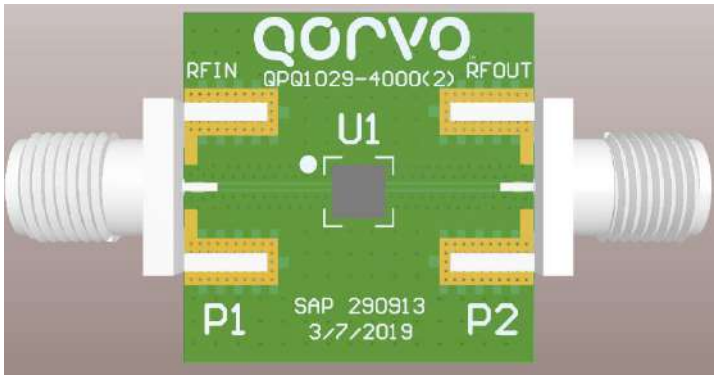
De-embedded Performance Plots – Band 1 and Band 3, Wideband

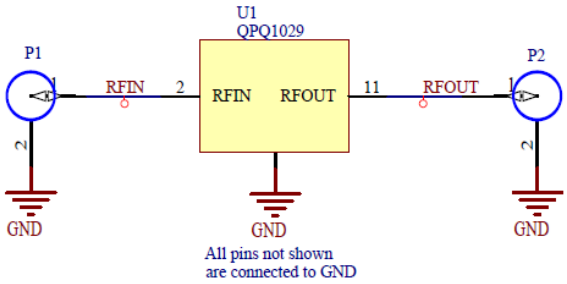
Test conditions unless otherwise noted: Temp.=+25 °C





Evaluation Board and Circuit





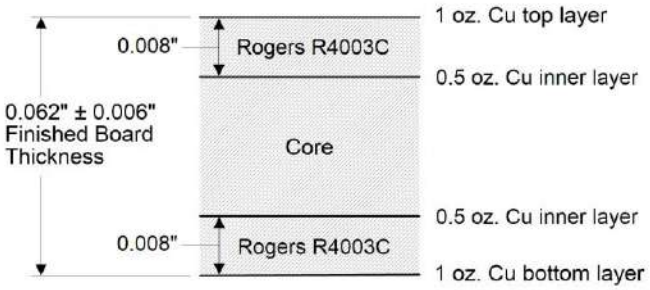
Bill of Material – QPQ1029EVB

Ref. Des.	Value	Description	Manuf.	Part Number
U1	-	Filter, Band 1 and Band 3 Dual Band	Qorvo	QPQ1029
-	-	PCB, Printed Circuit Board	Qorvo	290913
-	-	Connector, SMA Edge Mount	Cinch	142-0701-851

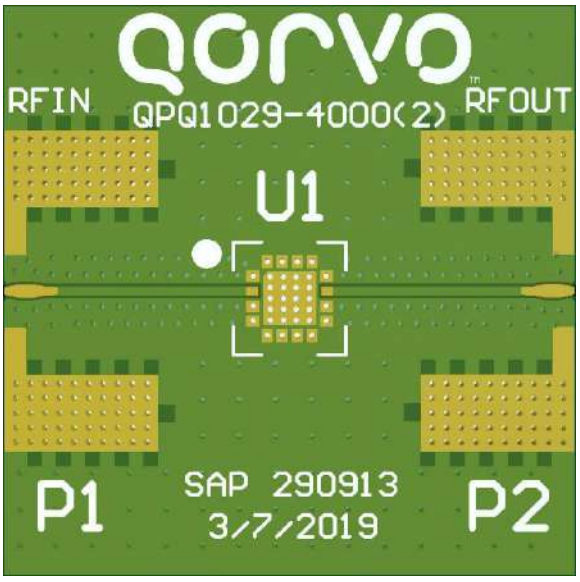
Evaluation Board PCB Information

PC Board Layout

PCB 290913 Material (stack up)

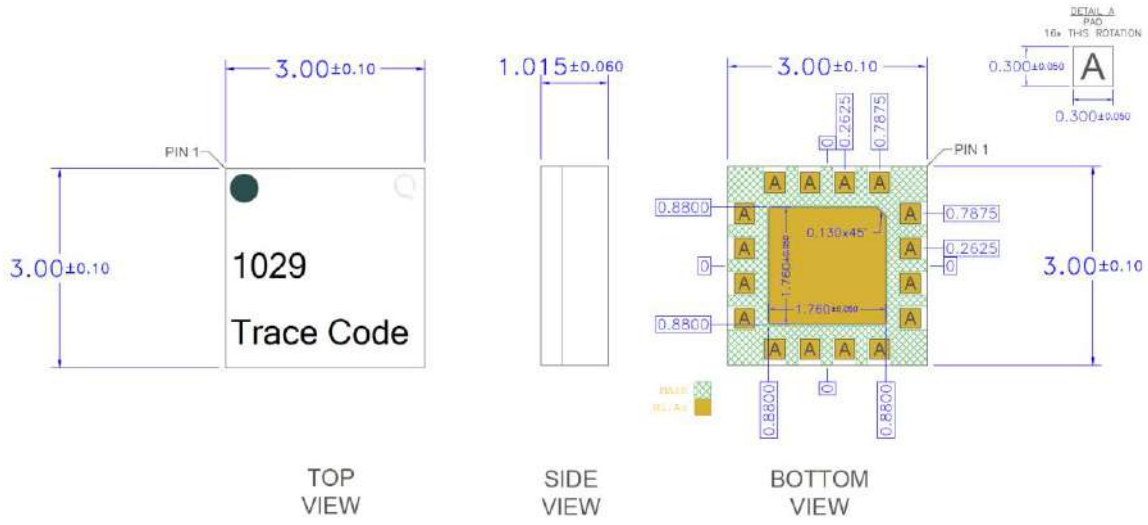


50 Ω line dimensions: width = 0.012”, spacing = 0.004”



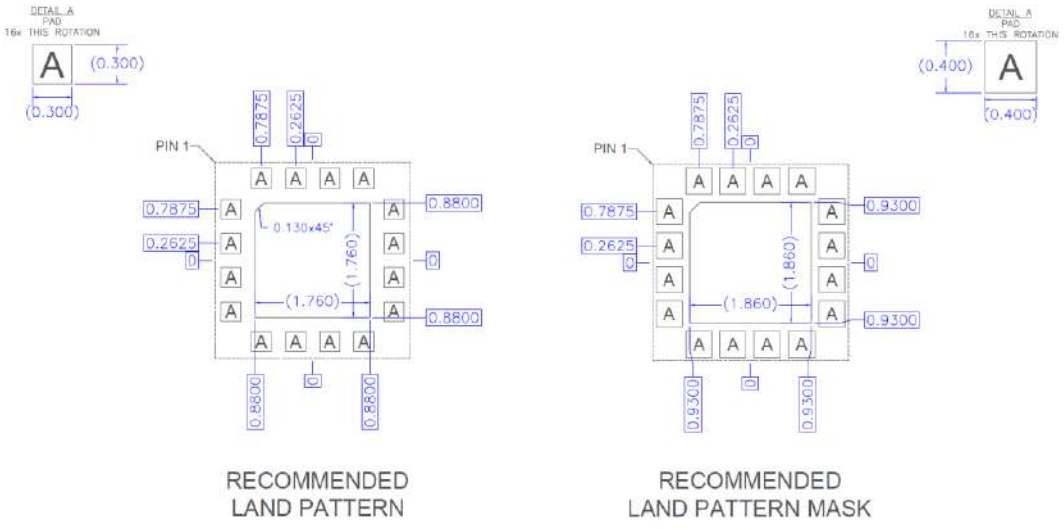
Package Marking and Dimensions

Marking: Qorvo Logo
Part Number – 1029
Trace Code – Assigned by subcontractor



Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Contact plating: Electroless NiPdAu

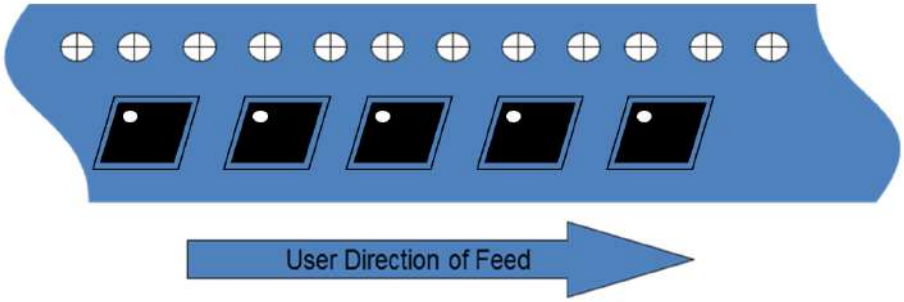
PCB Mounting Pattern

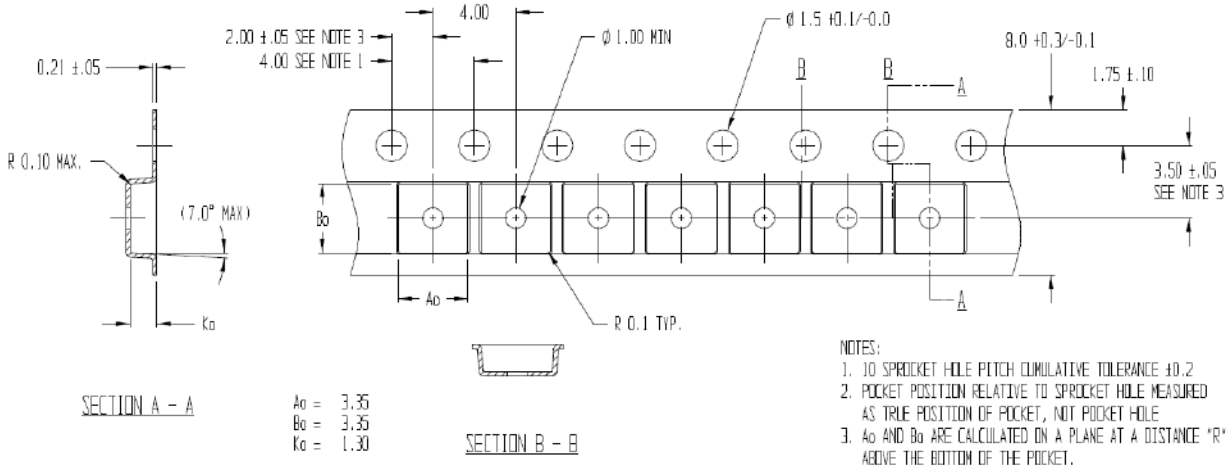


Notes:
1. All dimensions are in millimeters. Angles are in degrees.

.

Tape and Reel Information – Carrier and Cover Tape Dimensions





Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.132	3.35
	Width	B0	0.132	3.35
	Depth	K0	0.051	1.30
	Pitch	P1	0.315	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	0.362	5.40
Carrier Tape	Width	W	0.315	8.00

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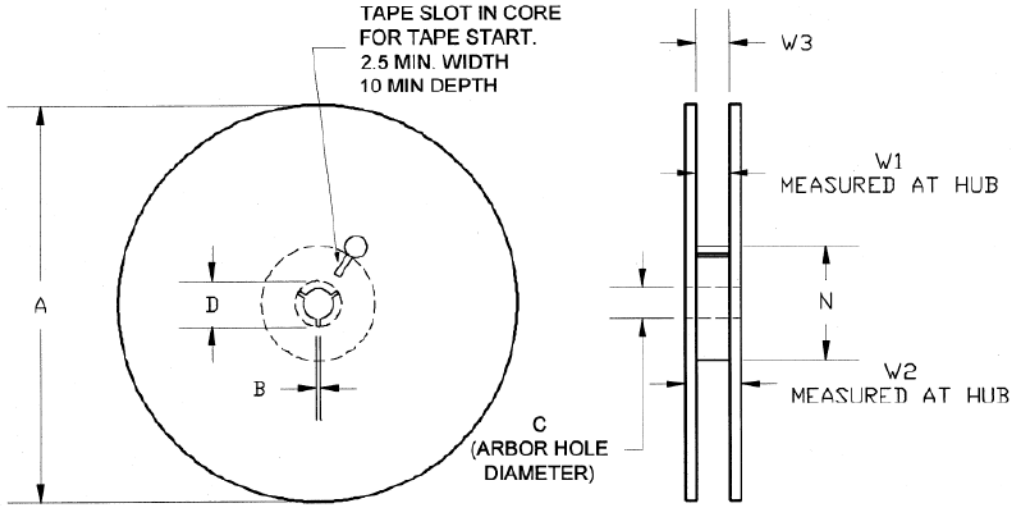
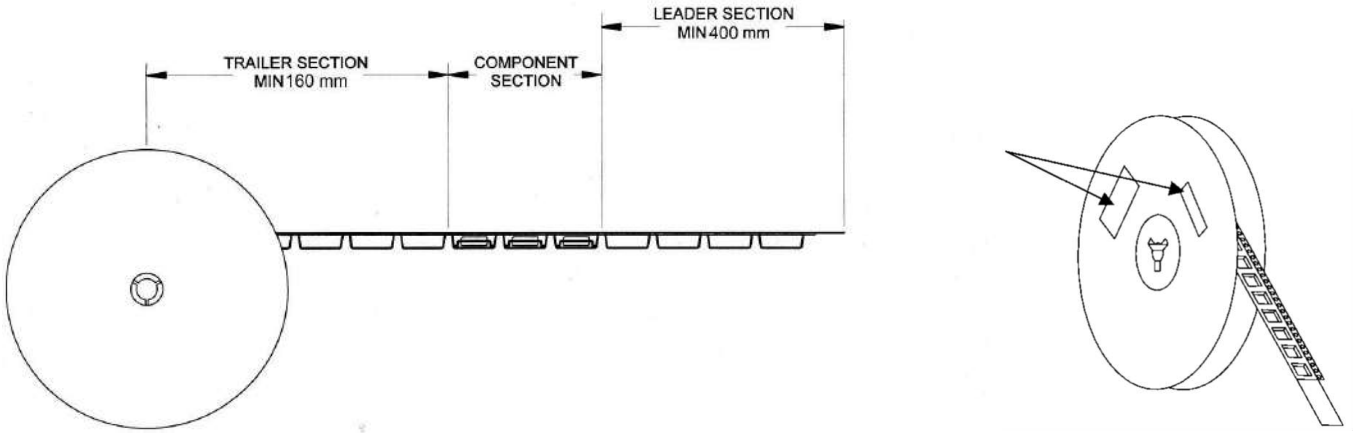
Tape and Reel Information – Reel Dimensions

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



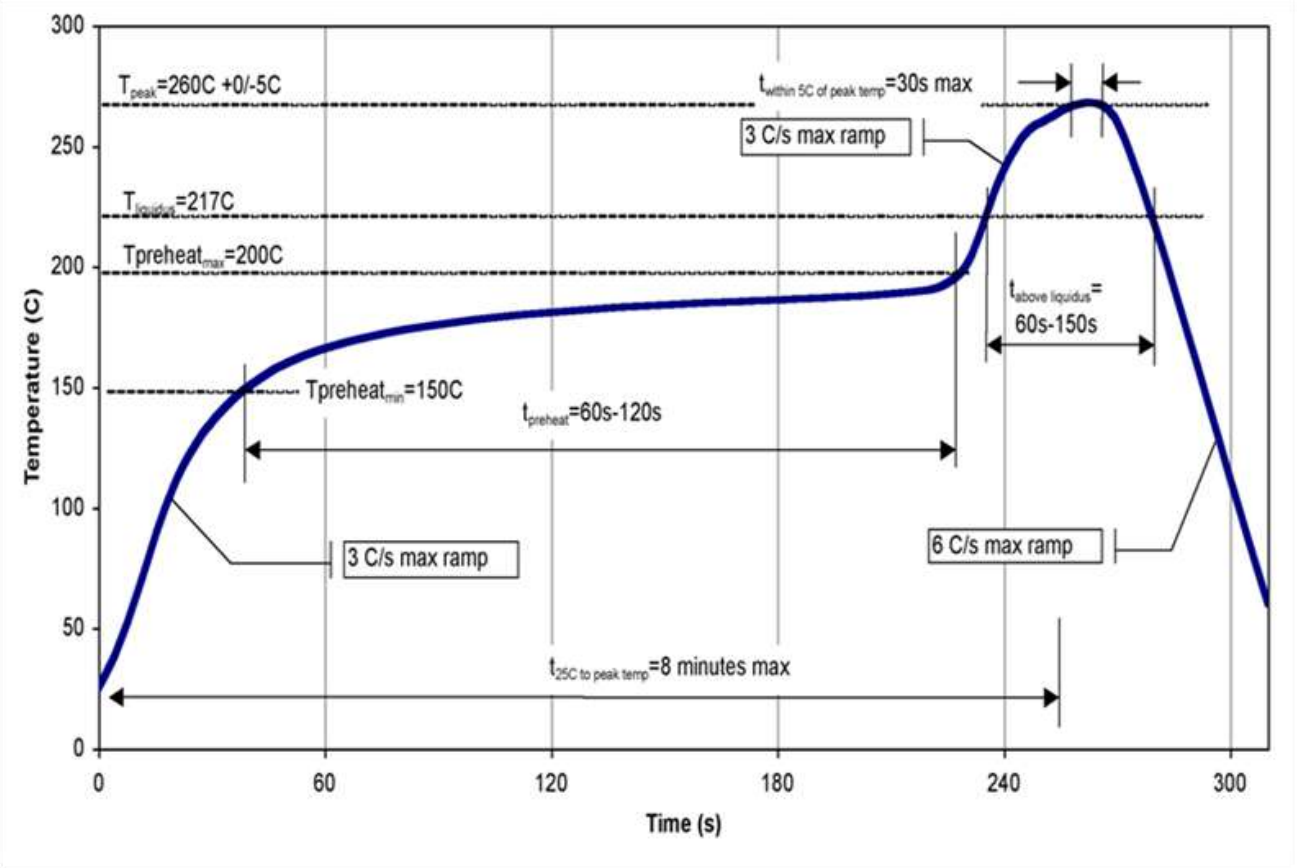
Notes:
1. Empty part cavities at the trailing and leading ends are sealed with cover tape. See EIA 481-1-A.
2. Labels are placed on the flange opposite the sprockets in the carrier tape.

Assembly Notes

Compatible with both lead-free (260°C peak. reflow temp.) and tin/lead (245°C peak. reflow temp.) soldering processes.
The use of no-clean solder to avoid washing after soldering is recommended.

Contact plating: Electroless NiPdAu *(Plating thickness: Ni 0.4±0.10µm, Pd 0.145±0.035µm, Au 0.095±0.025µm)*

Recommended Soldering Temperature Profile



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Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	Class C3	JEDEC JESD22-C101F
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 ($C_{15}H_{12}Br_40_2$) 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**

Email: customer.support@qorvo.com

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QPQ1061

L2 Low Loss GPS SAW Filter

General Description

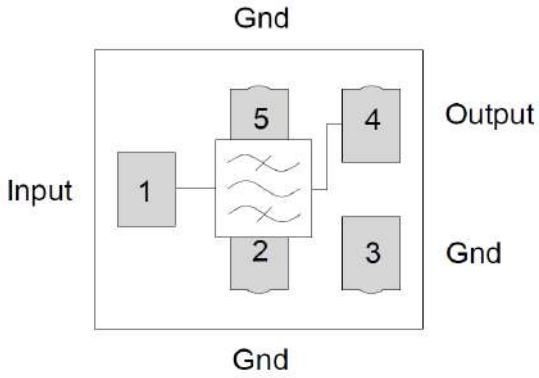
QPQ1061 is a L2 GPS Band Pass Filter in a compact size for use in any GPS application. Designed for rejection of unwanted GPS signals, this SAW filter also has excellent power handling capability for low power transmitters.

Housed in a 1.4 x 1.2 mm laminate with over mold package, this device allows for a compact and cost effective diplexer solution for GPS applications.

No matching components are required, making the PCB design and implementation easy.

1.4 X 1.2 X 0.84 mm

Functional Block Diagram



Top View

Pin Configuration - Single Ended

Pin No.	Label
1	Antenna Input (1)
2, 3, 5	Ground
4	L2 Output (1)

(1) Blocking capacitors are required on any ports where a DC voltage may be present.

Product Features

- Usable bandwidth 31 MHz
- No matching required for operation at 50Ω
- Excellent rejection for GPS operation
- High Isolation
- High Rejection
- Laminate with Over Mold Surface Mount Package (SMP)
- Small Size: 1.4 x 1.2 x 0.84mm

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

Applications

- General purpose GPS
- Communication Systems

Ordering Information

Part No.	Description
QPQ1061TR7	7” Taped Reel with 2500 pieces
QPQ1061EVB01	Evaluation board

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to 125°C
Operation Temperature	-55 to 105°C
RF Input Power (1) - Test conditions: PW = 200ms; DC = 50% @ +25 °C	34 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.

(1) Input Power for both Input & Output ports

Minimum Lifetime Ratings

Conditions	Rating
RF Input Power (1), @ Pin 1 (Antenna Port), @ Pin 4 (L2 Port)	>10 years @ +95C
	>5 years @ +105C

(1) Input Power: CW, 25 dBm

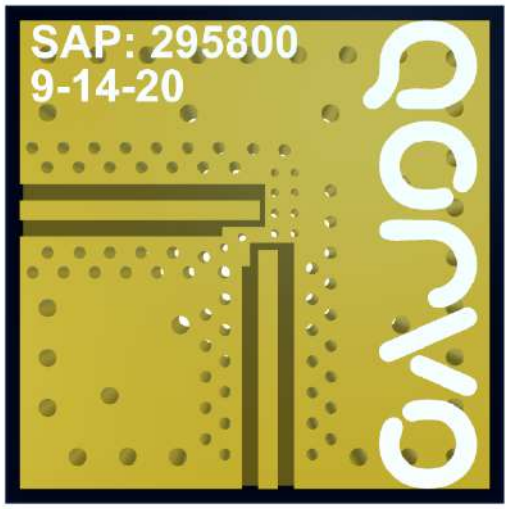
Electrical Specifications (1,2)

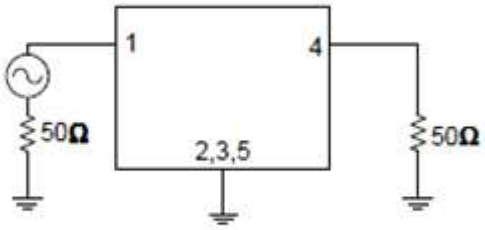
L2 Band GPS					
Parameter (3)	**Conditions**	**Min**	**Typical (4)**	**Max**	**Units**
Center Frequency	1212.1 - 1243.1 MHz	-	1227.6	-	MHz
Maximum Insertion Loss	1212.1 - 1243.1 MHz	-	1.2	2.0	dB
	1215.6 - 1239.6 MHz	-	-	2.0	
	1217.6 - 1237.6 MHz	-	-	2.0	
Amplitude Variation	1212.1 - 1243.1 MHz	-	0.39	0.6	dB
	1215.6 - 1239.6 MHz	-	-	0.6	
	1217.6 - 1237.6 MHz	-	-	0.6	
Group Delay Variation	1212.1 - 1243.1 MHz	-	18	26	ns
	1215.6 - 1239.6 MHz	-	-	26	
	1217.6 - 1237.6 MHz	-	-	26	
Absolute Attenuation (Relative to 0 dB)	10 - 1172.6 MHz	38	39	-	dB
	1282.6 - 2500 MHz	35	37	-	
Input Return Loss	1212.1 - 1243.1 MHz	10	12	-	dB
	1215.6 - 1239.6 MHz	10	-	-	
	1217.6 - 1237.6 MHz	10	-	-	
Output Return Loss	1212.1 - 1243.1 MHz	10	12	-	dB
	1215.6 - 1239.6 MHz	10	-	-	
	1217.6 - 1237.6 MHz	10	-	-	
Nominal Impedance (5)	Single Ended	-	50	-	Ohm

Notes:

1. All specifications are based on the Qorvo schematics for the reference designs shown on page 3.
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. Optimum impedance to achieve the performance shown.

Evaluation Board – QPQ1061-EVB





Notes: Blocking capacitors are required on any RF ports where a DC voltage may be present.

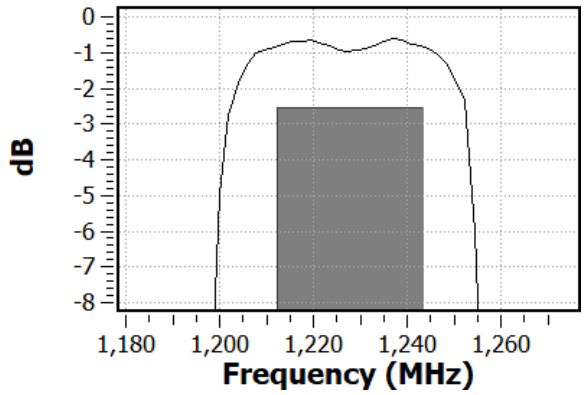
Bill of Material – QPQ1061-EVB

Reference Des.	Value	Description	Manuf.	Part Number
DUT	-	L2 Low Loss GPS SAW Filter	Qorvo	QPQ1061
SMA	-	SMA connector	Various	
PCB	-	Printed Circuit Board	Various	

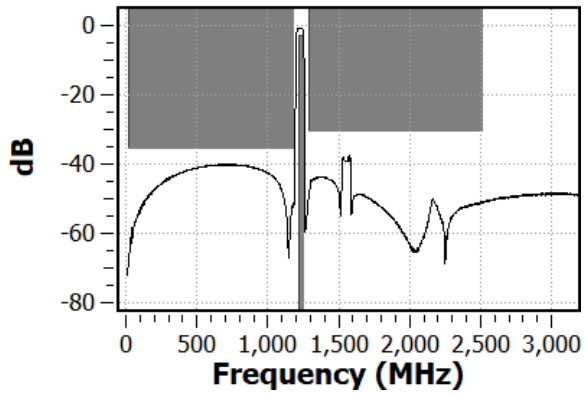
Typical Performances

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

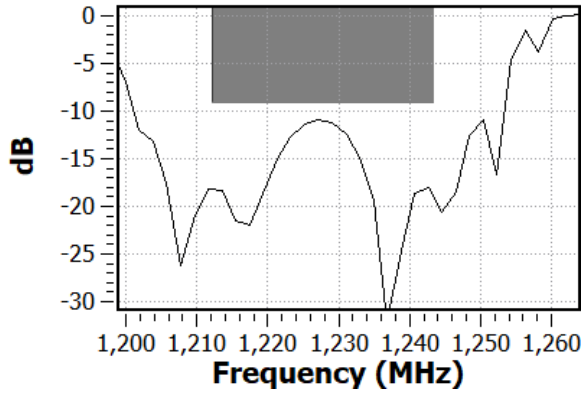
Passband



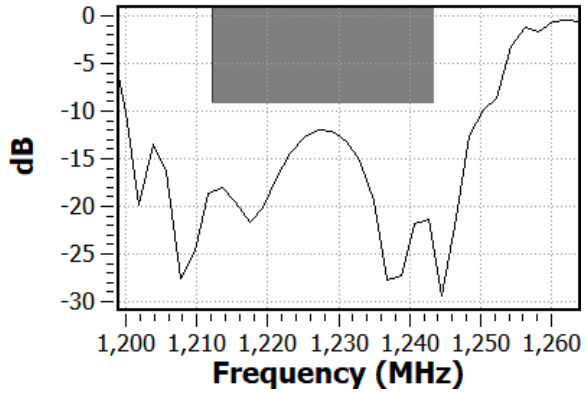
Wide Band



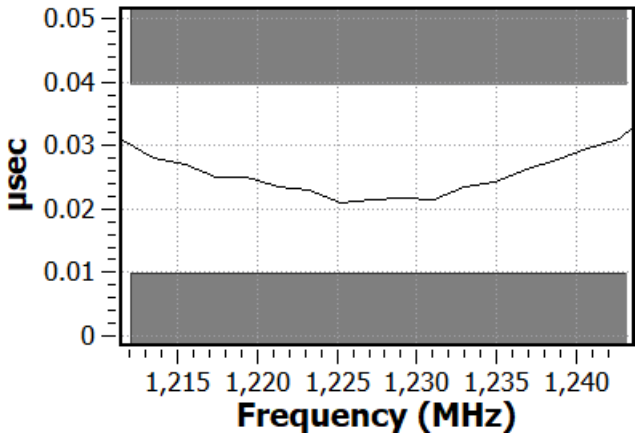
Input Return Loss



Output Return Loss



Group Delay



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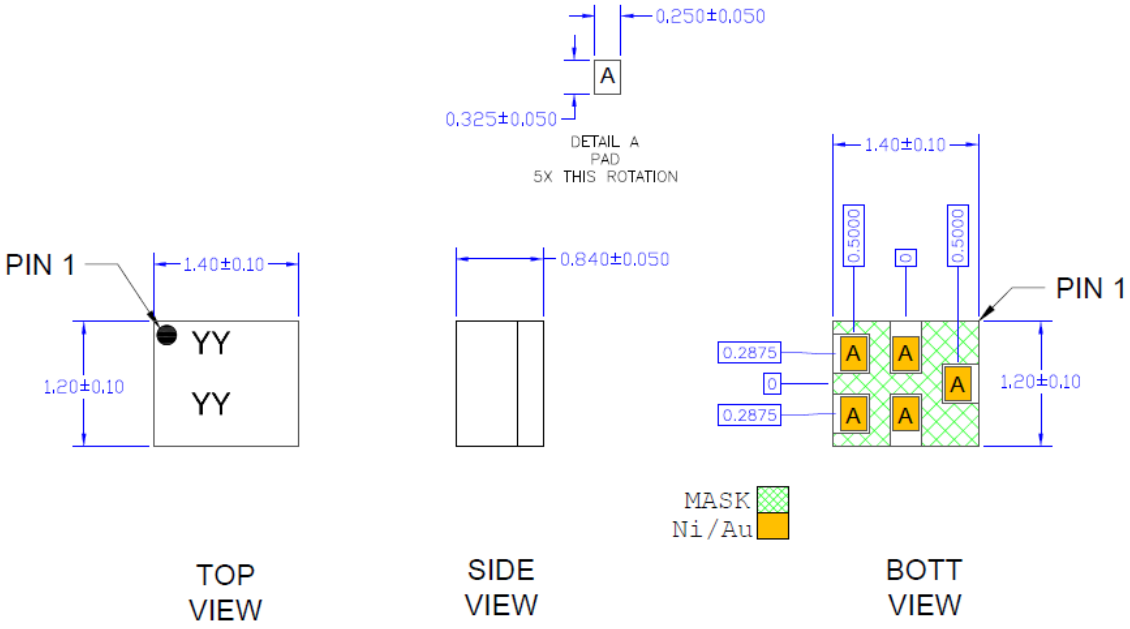
Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

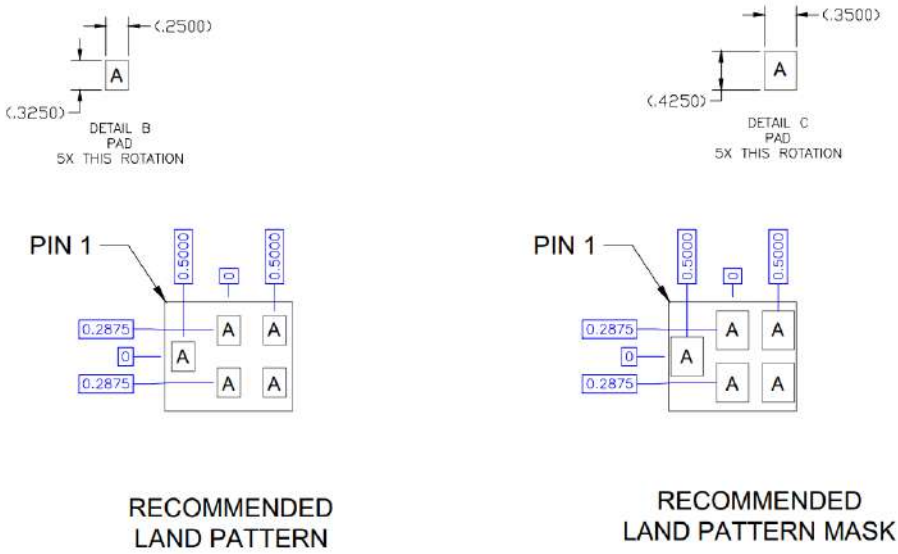
Package Marking and Dimensions

Marking: Qorvo Logo
Part Number – 1061
Trace Code – Assigned by subcontractor



Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012

PCB Mounting Pattern

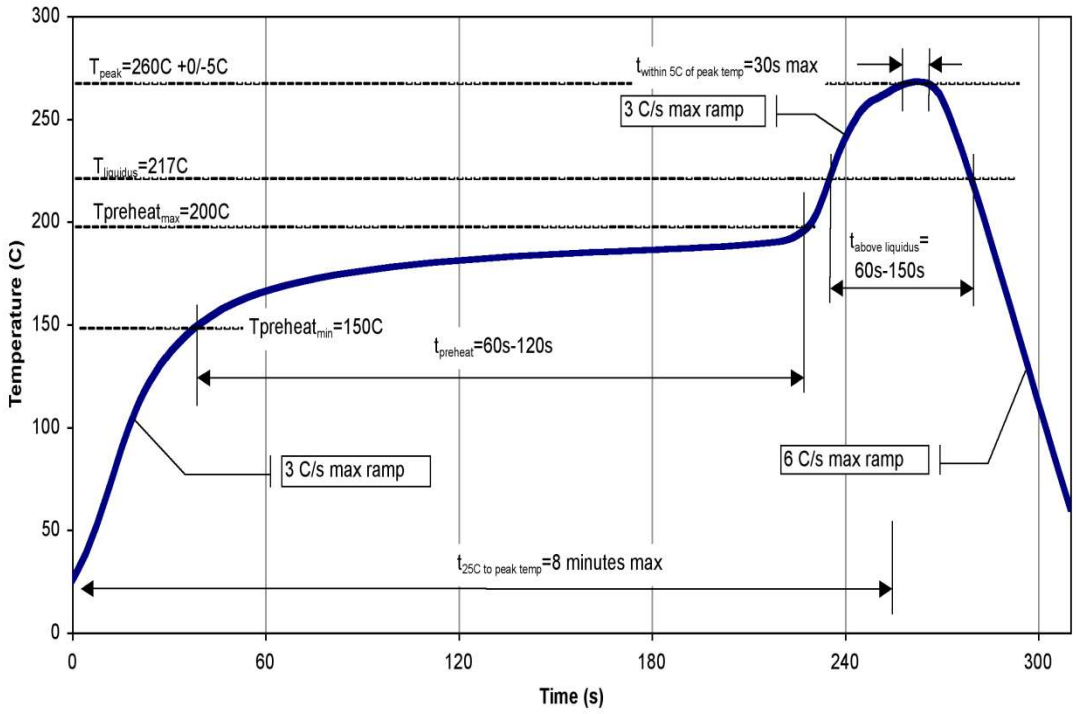


Notes:
1. All dimensions are in millimeters. Angles are in degrees. .

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: ENEPIG.

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 3A	ESDA / JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ESDA / JEDEC JS-002
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
- SVHC Free
- PFOS

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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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.

QPQ1062

L5 Low Loss GPS SAW Filter

General Description

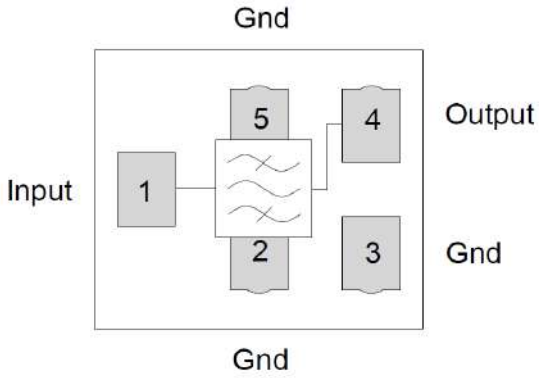
QPQ1062 is a L5 GPS Band Pass Filter in a compact size for use in any GPS application. Designed for rejection of unwanted GPS signals, this SAW filter also has excellent power handling capability for low power transmitters.

Housed in a 1.4 x 1.2 mm laminate with over mold package, this device allows for a compact and cost effective diplexer solution for GPS applications.

No matching components are required, making the PCB design and implementation easy.

1.4 X 1.2 X 0.84 mm

Functional Block Diagram



Top View

Pin Configuration - Single Ended

Pin No.	Label
1	Antenna Input (1)
2, 3, 5	Ground
4	L5 Output (1)

(1) Blocking capacitors are required on any ports where a DC voltage may be present.

Product Features

- Usable bandwidth 31 MHz
- No matching required for operation at 50Ω
- Excellent rejection for GPS operation
- High Isolation
- High Rejection
- Laminate with Over Mold Surface Mount Package (SMP)
- Small Size: 1.4 x 1.2 x 0.84mm

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

Applications

- General purpose GPS
- Communication Systems

Ordering Information

Part No.	Description
QPQ1062TR7	7” Taped Reel with 2500 pieces
QPQ1062EVB01	Evaluation board

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Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to 125°C
Operation Temperature	-55 to 105°C
RF Input Power (1) - Test conditions: PW = 200ms; DC = 50% @ +25 °C	33 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.

(1) Input Power for both Input/Output ports

Minimum Lifetime Ratings

Conditions	Rating
RF Input Power (1), @ Pin 1 (Antenna Port), @ Pin 4 (L5 Port)	>10 years @ +95C
	>5 years @ +105C

(1) Input Power: CW, 25 dBm

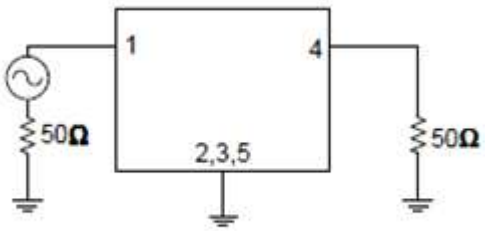
Electrical Specifications (1,2)

L5 Band GPS					
Parameter (3)	**Conditions**	**Min**	**Typical (4)**	**Max**	**Units**
Center Frequency	1160.95 - 1191.95 MHz	-	1176.45	-	MHz
Maximum Insertion Loss	1160.95 - 1191.95 MHz	-	1.2	2.0	dB
	1164.45 - 1188.45 MHz	-	-	2.0	
	1166.45 - 1186.45 MHz	-	-	2.0	
Amplitude Variation	1160.95 - 1191.95 MHz	-	0.43	0.6	dB
	1164.45 - 1188.45 MHz	-	-	0.6	
	1166.45 - 1186.45 MHz	-	-	0.6	
Group Delay Variation	1160.95 - 1191.95 MHz	-	22	30	ns
	1164.45 - 1188.45 MHz	-	-	30	
	1166.45 - 1186.45 MHz	-	-	30	
Absolute Attenuation (Relative to 0 dB)	10 – 1123.95 MHz	39	40	-	dB
	1228.95 - 2500 MHz	38	40	-	
Input Return Loss	1160.95 - 1191.95 MHz	11	15	-	dB
	1164.45 - 1188.45 MHz	11	-	-	
	1166.45 - 1186.45 MHz	11	-	-	
Output Return Loss	1160.95 - 1191.95 MHz	11	14	-	dB
	1164.45 - 1188.45 MHz	11	-	-	
	1166.45 - 1186.45 MHz	11	-	-	
Nominal Impedance (5)	Single Ended	-	50	-	Ohm

Notes:

1. All specifications are based on the Qorvo schematics for the reference designs shown on page 3.
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. Optimum impedance to achieve the performance shown.

Evaluation Board – QPQ1062-EVB



Notes: Blocking capacitors are required on any RF ports where a DC voltage may be present.

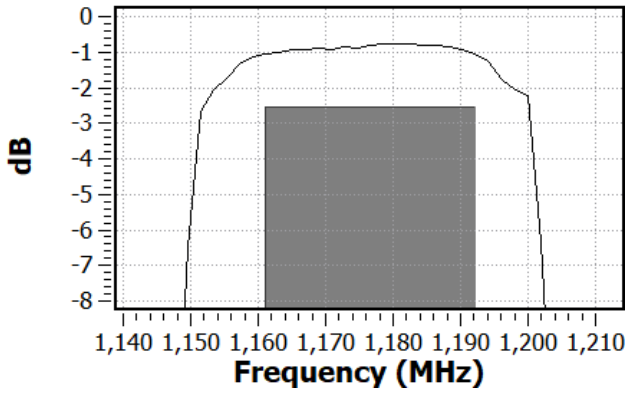
Bill of Material – QPQ1062-EVB

Reference Des.	Value	Description	Manuf.	Part Number
DUT	-	L5 Low Loss GPS SAW Filter	Qorvo	QPQ1062
SMA	-	SMA connector	Various	
PCB	-	Printed Circuit Board	Various	

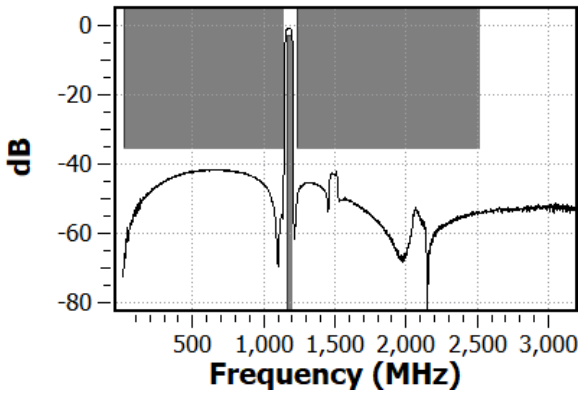
Typical Performances

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

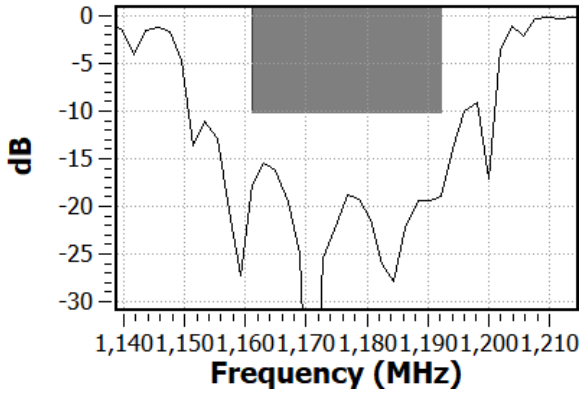
Passband



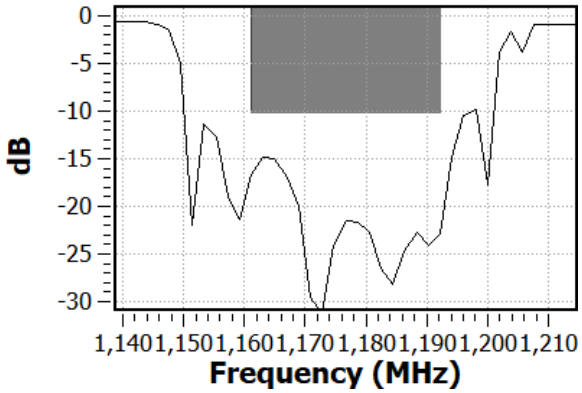
Wide Band



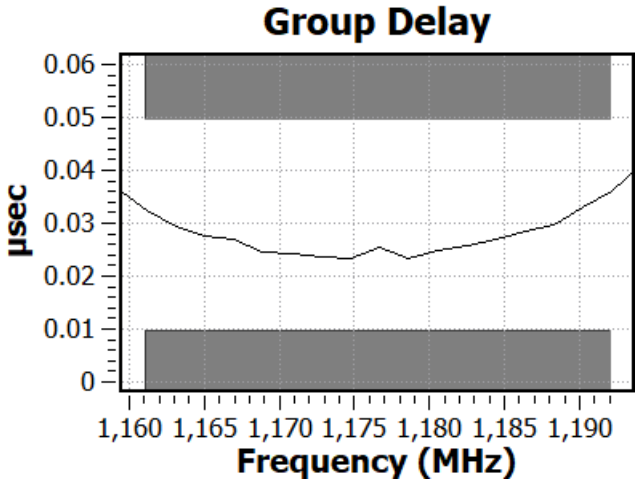
Input Return Loss



Output Return Loss



Group Delay



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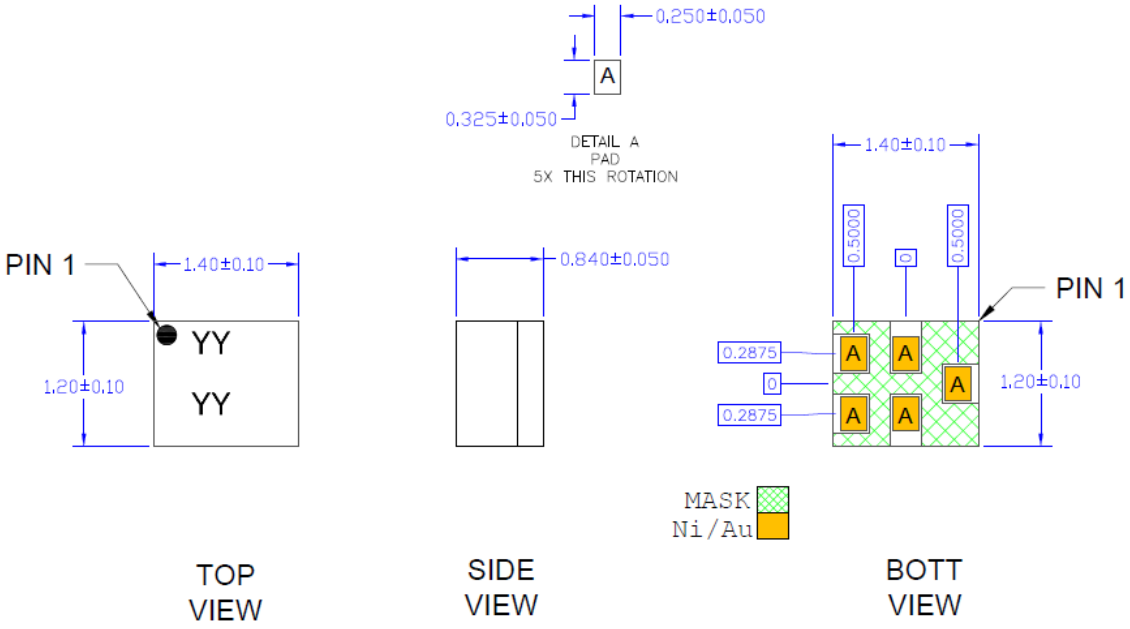
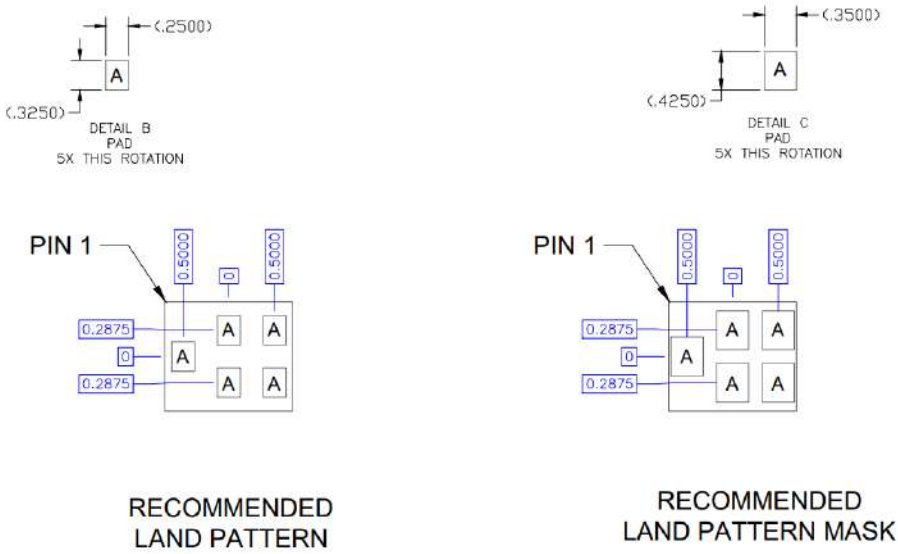
Package Marking and Dimensions

Marking: Qorvo Logo
Part Number – 1062
Trace Code – Assigned by subcontractor



Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012

PCB Mounting Pattern

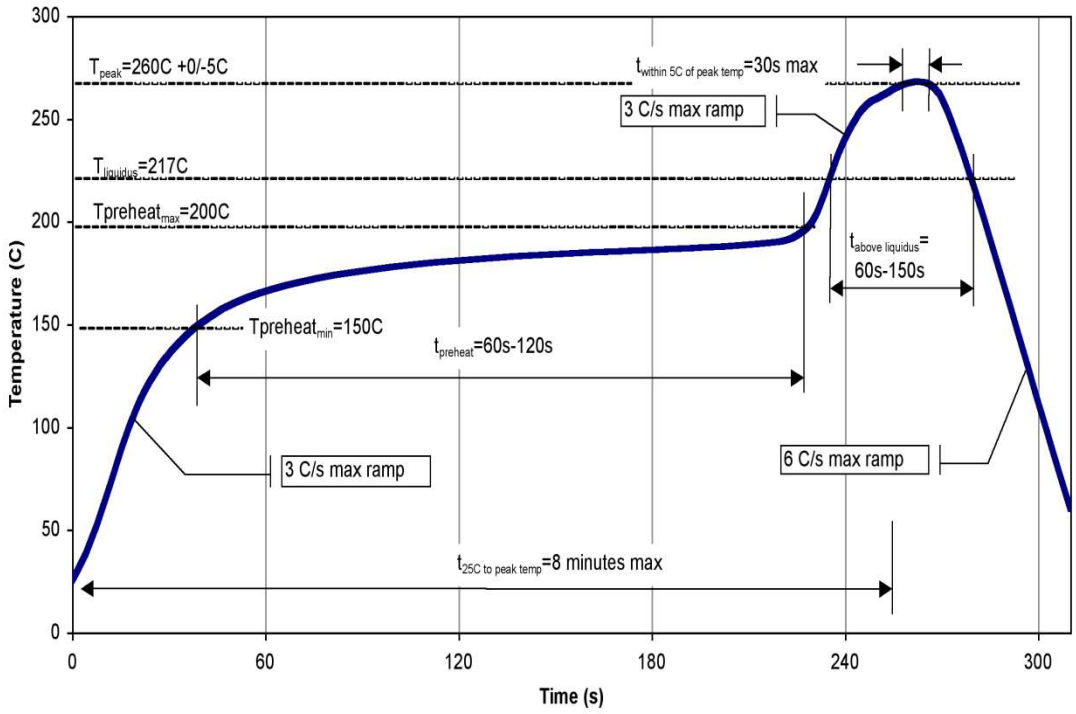


Notes:
1. All dimensions are in millimeters. Angles are in degrees. .

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: ENEPIG

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	ESDA / JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ESDA / JEDEC JS-002
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
- SVHC Free
- PFOS

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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QPQ1281

TDD B40 Band Pass Filter – 70MHz

3 Pin 2.0 x 1.6 x 0.73 mm leadless SMT Package

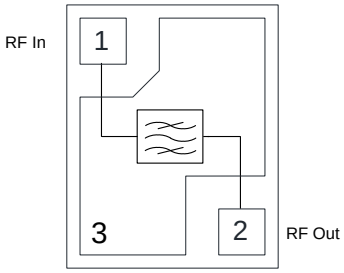
Product Overview

The QPQ1281 is a high performance Bulk Acoustic Wave (BAW) filter designed to meet the strict LTE rejection requirements for use in B40, Sub-Band 2300-2370 MHz

QPQ1281 is specifically designed to meet the high performance expectations of insertion loss and rejection for LTE TDD systems under all operating conditions.

The QPQ1281 uses common module packaging techniques to achieve the industry standard 2.0 x 1.6 x 0.73 mm footprint.

Functional Block Diagram



Top View

Pin Configuration

Pin No.	Label	Function
1	RF In	RF Input
2	RF Out	RF Output
3		Ground

Key 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
- High Power Handling Compatible for Small Cells
- Small Size
- RoHS compliant, Pb-free

Applications

- For Band 40 TD-LTE applications
- 2300 – 2370 MHz Sub-Band
- For Small Cell Base Stations

Ordering Information

Part No.	Description
QPQ1281SR	100 pieces on a 7” reel
QPQ1281TR7	2,500 pieces on a 7” reel (standard)
QPQ1281EVB	Evaluation Board

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature (1)	−40 to +125°C
Operation Temperature (2)	−40 to +95 °C

Notes:
1. Operation of this device outside the parameter ranges given above may cause permanent damage.
2. Device will function over the recommended range without degradation in reliability but is not guaranteed to meet electrical specifications.

Life Test

Conditions	Rating
+29 dBm DL, +85°C LTE, 5MHz 16QAM, PAR =8dB	> 87,600 hours

Electrical specifications are measured at specified test conditions.

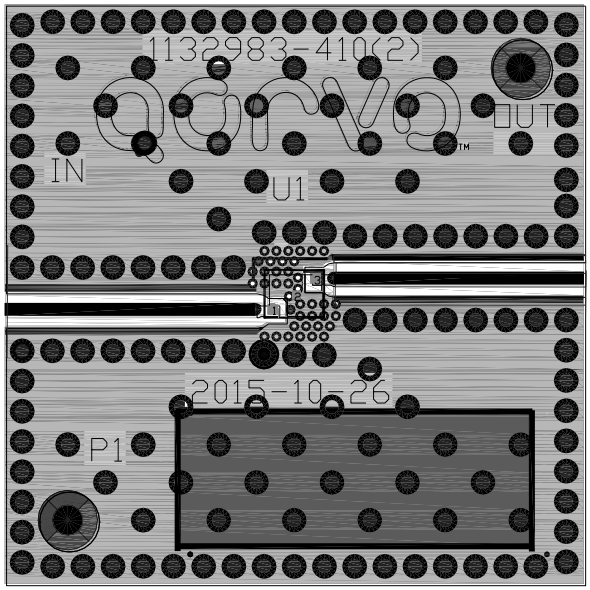
Electrical Specifications (1)

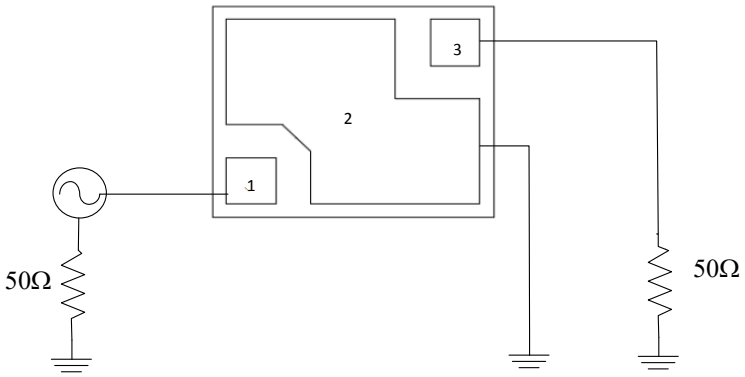
Parameter	Conditions	Min	Typ (4)	Max	Units
Passband		2300	–	2370	MHz
Insertion Loss		–	1.9	3.2	dB
Amplitude Variation (2)		–	1.0	1.7	dB
Group Delay Variation (3)		–	12	25	ns
Phase Ripple (3)		–	28	55	°p-p
VSWR	Input / Output	–	1.5:1	2:1	–
Return Loss		9.5	14	–	dB
Attenuation (5)	10–960 MHz 961–1709 MHz 1710–1880 MHz 1920–2170 MHz 2110–2170 MHz 2171–2280 MHz 2393–2400 MHz 2400–2440 MHz 2440–2480 MHz 2480–2500 MHz 2500–3660 MHz 3750–4900 MHz 4901–6000 MHz 6001–8000 MHz	35 30 29 29 29 10 10 42 37 35 31 35 27 31	45 33 32 32 32 23 17 47 40 38 34 38 30 35	– – – – – – – – – – – – – –	dB
2nd Harmonic	Pin = +29 dBm	65	86		dBc
Impedance (6)	Input / Output	–	50	–	Ω

Notes:

Test conditions unless otherwise noted: Temp= -20 to +90°C
1. All specifications are based on the Qorvo schematic for the main reference design.
2. Amplitude Variation is defined as the difference between the lowest loss and the highest loss within define frequency points.
3. This is defined as the worst difference between a peak and adjacent valley within defined frequency points.
4. Typical values are based on average measurements of 20 devices at a temperature of +25°C
5. Attenuation is referenced to zero dB
6. This is the optimum impedance in order to achieve the performance shown.

QPQ1281EVB Evaluation Board





Notes:

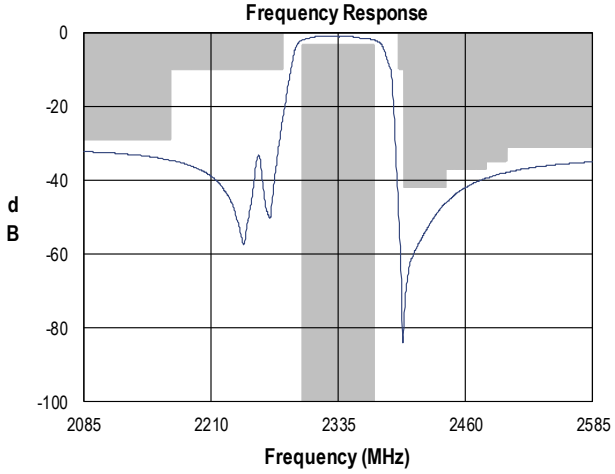
1. Top, middle & bottom layers: 1/2 oz copper, Substrates: FR4 dielectric, 0.062” thick, Finish plating: Nickel: 3-8 µm thick, Gold: 0.03-0.2 µm thick, Hole plating: Copper min 0.0008 µm thick

Bill of Material – QPQ1281EVB

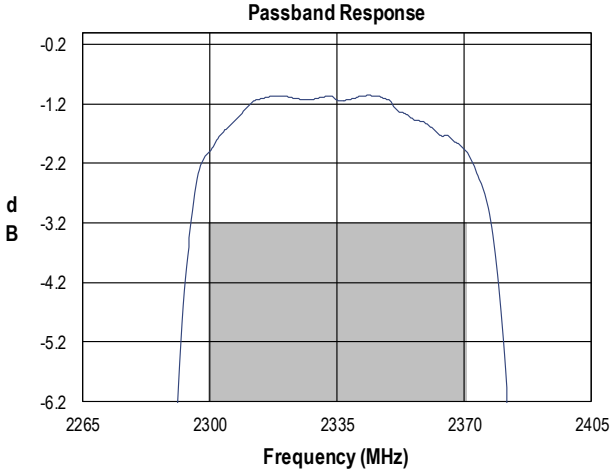
Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	Band 40 BAW Filter	Qorvo	QPQ1281
SMA	n/a	SMA Edge Connector	Radiall USA Inc.	9602-1111-018
PCB	n/a	3-Layer	Qorvo	960568

Performance Plots

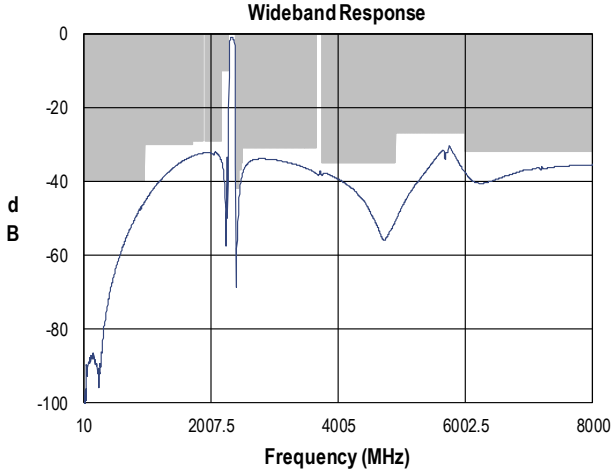
Frequency Response



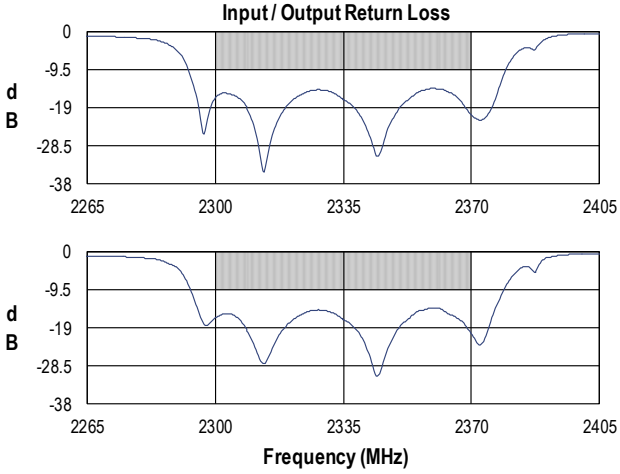
Passband Response



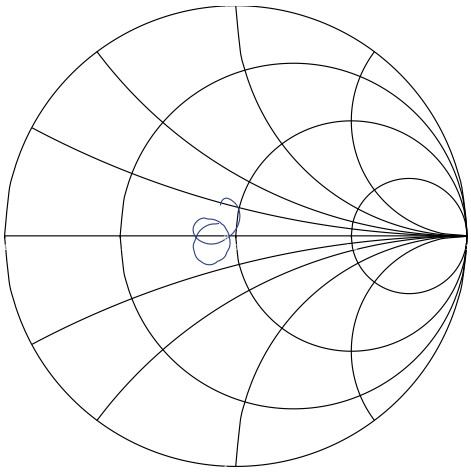
Wideband Response



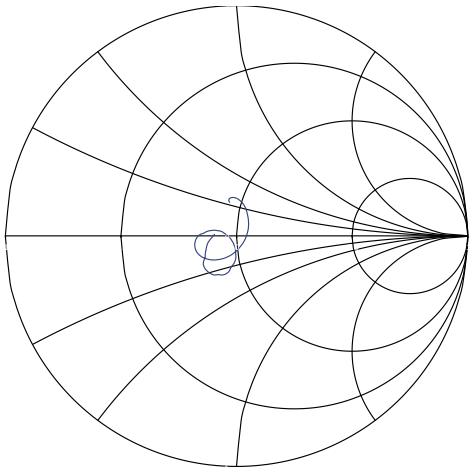
Input / Output Return Loss



Input Smith Chart

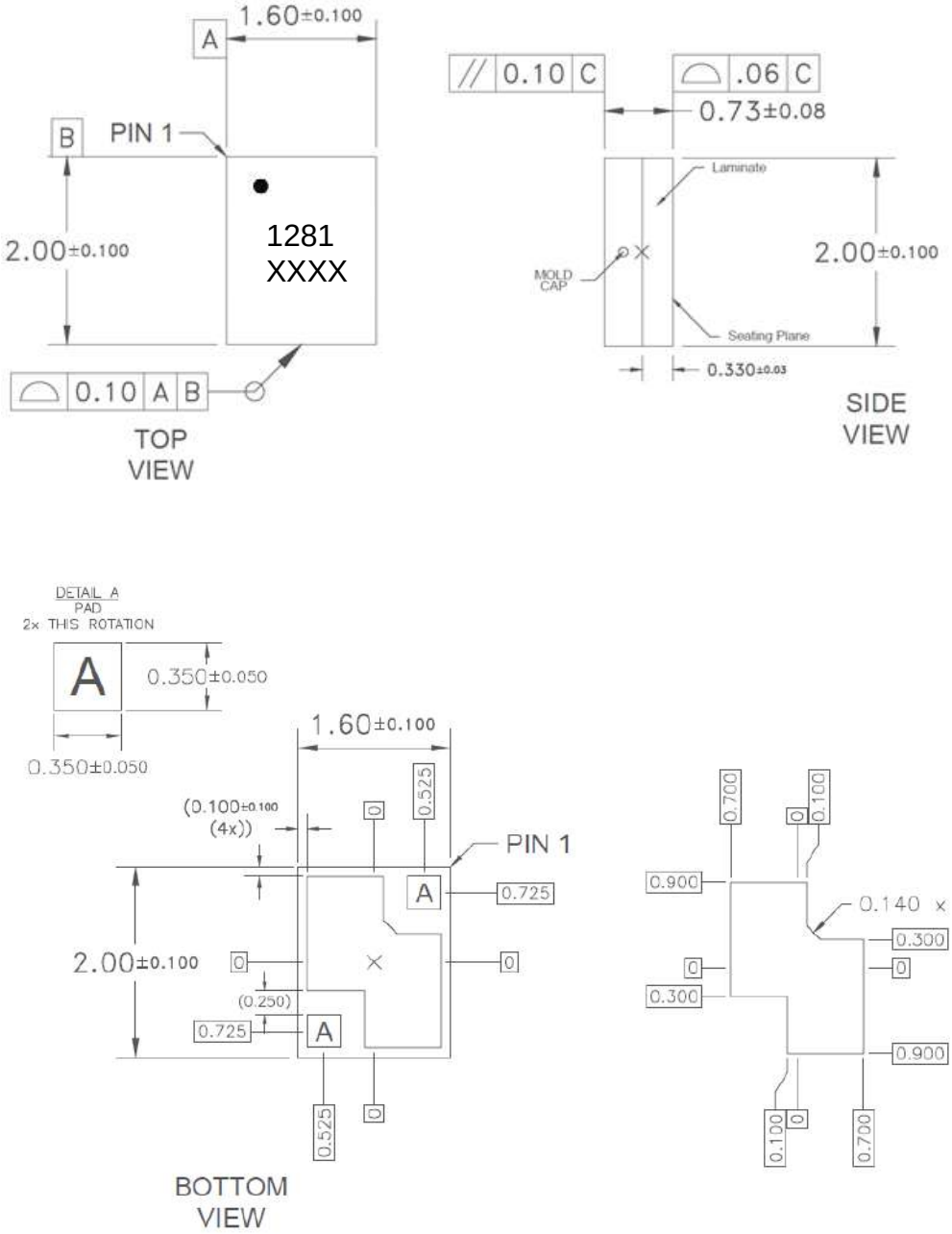


Output Smith Chart



Package Marking and Dimensions

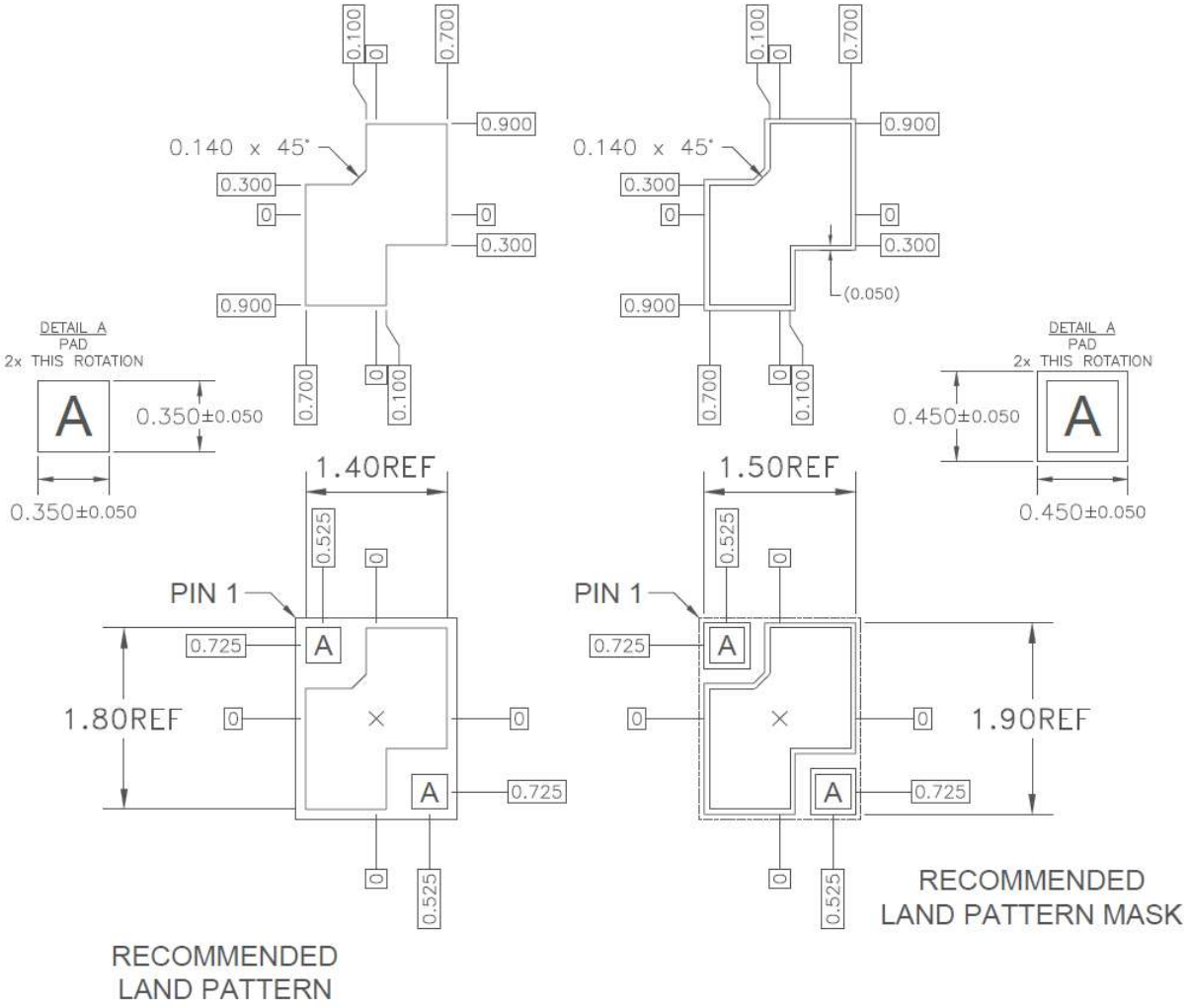
Marking
4-digit Part Number: 1281
4-digit Trace Code: XXXX



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.

PCB Mounting Pattern

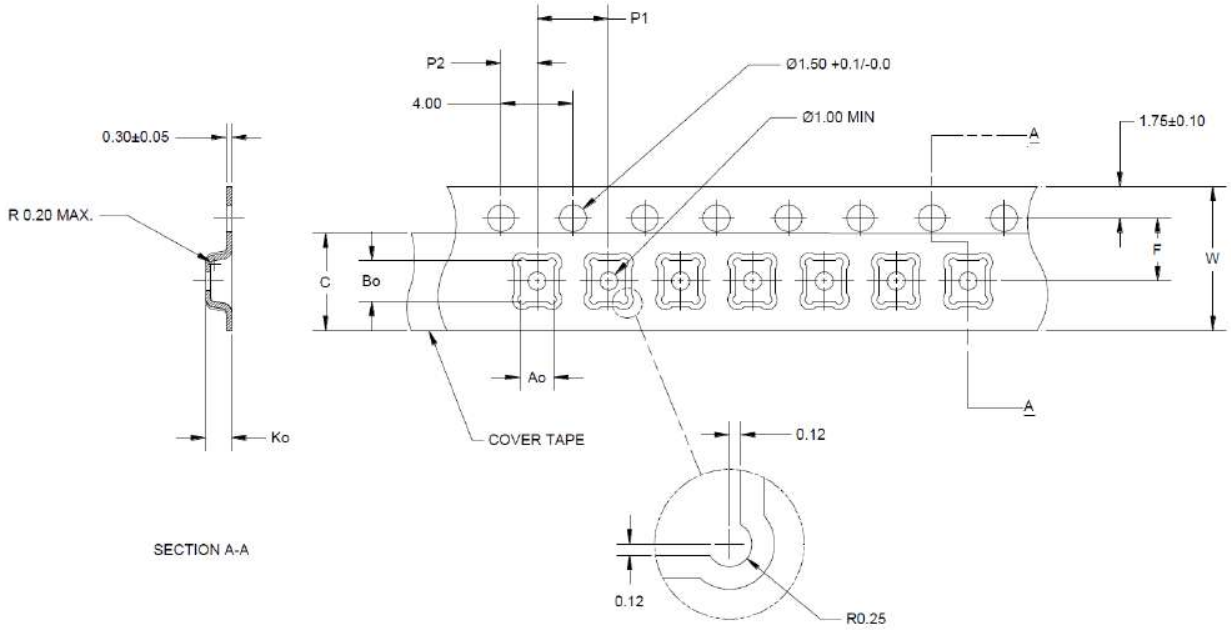


Notes:

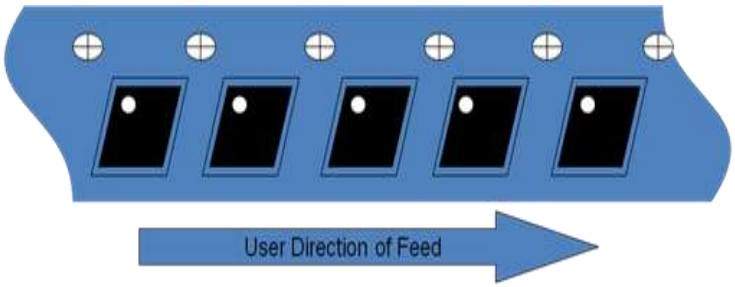
1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. coper minimum for top and bottom layer metal.
3. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

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	0.077	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



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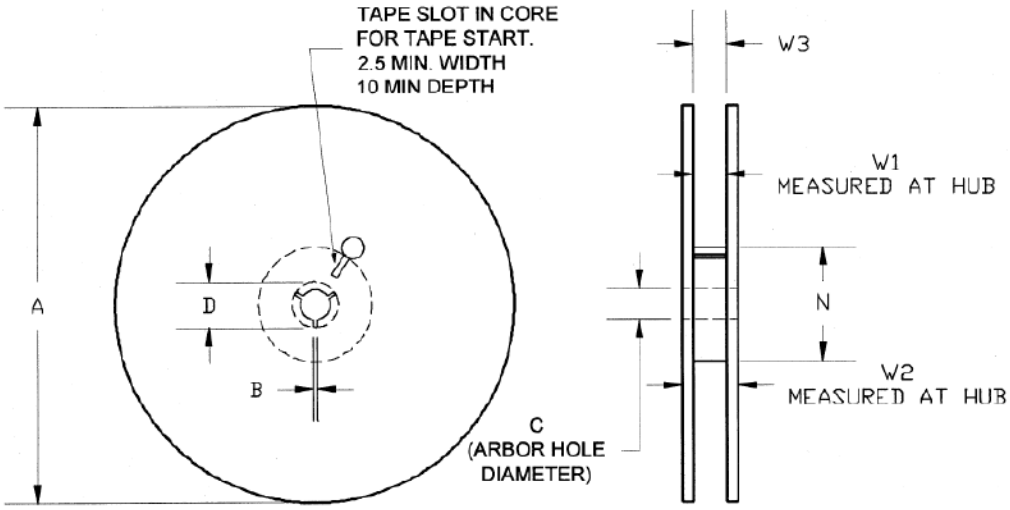
Tape and Reel Information – Reel Dimensions

Tape and reel specifications for this part are also available on the Qorvo website.
Standard T/R size = 2,500 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

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: ENIG (Electroless Nickel Immersion Gold)

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**

Email: customer.support@qorvo.com

For technical questions and application information:

Email: appsupport@qorvo.com

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QPQ1285

TDD B41 Band Pass Filter – 194 MHz

General Description

The QPQ1285 is an exceptionally high performance BAW Filter for sub-Band 41 uplink / downlink. This filter is housed in a compact 2 x 1.6 mm package for base station applications.

Low insertion loss, coupled with high attenuation makes this filter an ideal choice for TDD Macro Cells and Small Cells.

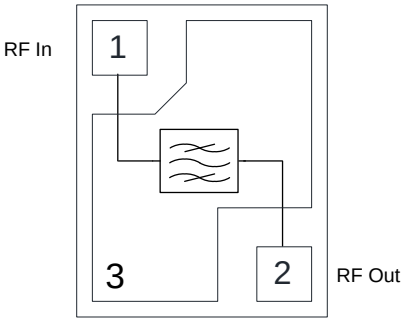
The QPQ1285 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.

3 Pin 2 x 1.6 mm leadless SMT Package

Product Features

- 194 MHz Bandwidth – Band 41
- High Attenuation
- Low Loss
- No External Matching Required
- Excellent Wi-Fi Rejection
- Single Input, Single Output Operation
- Small Size: 2.00 x 1.60 x 0.73 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Functional Block Diagram



Top View

Applications

- Band 41
- Base Station Infrastructure
- Small Cells
- Repeaters
- Routers
- LTE Dongles
- General Purpose Wireless

Pin Configuration

Pin No.	Label
1	RF In
2	RF Out
3	GND Back Side Paddle

Ordering Information

Part No.	Description
QPQ1285SR	100 pieces on a 7" reel
QPQ1285TR7	2,500 pieces on a 7" reel (standard)
QPQ1285EVB	Evaluation Board

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−40 to +125 °C
Operation Temperature	−40 to +95 °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.

Life Test

Conditions	Rating
+29 dBm, +95 °C, FD-LTE, 5MHz 16QAM, 5MHz, PAR=8.5dB	>102,000 Hrs.
+29 dBm, +85 °C, FD-LTE, 5MHz 16QAM, 5MHz, PAR=8.5dB	>294,000 Hrs.
+24 dBm, +95 °C, FD-LTE, 5MHz 16QAM, 5MHz, PAR=8.5dB	>15M Hrs.

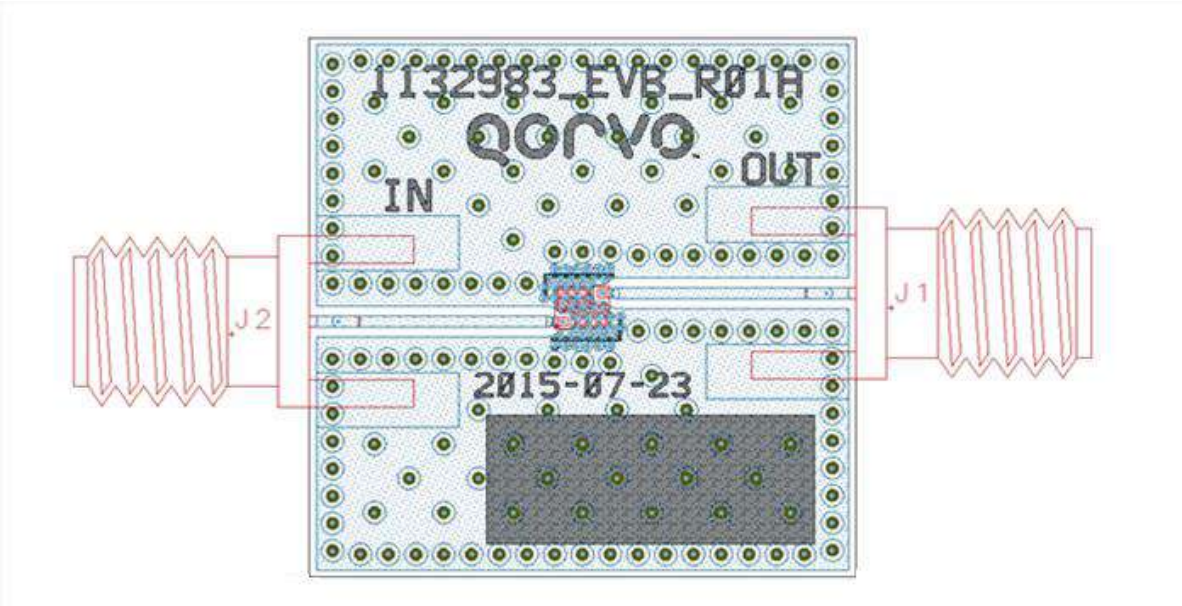
Power is applied to Pin 1.

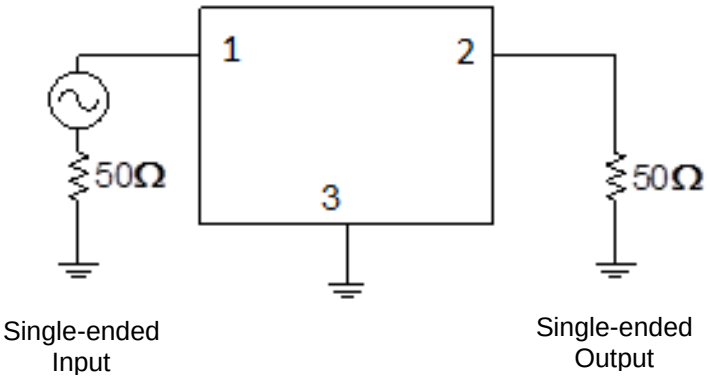
Electrical Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Frequency Range		2496		2690	MHz
Insertion Loss		-	3.5	4.3	dB
Amplitude Variation (3)		-	1.1	2.1	dB
	Any 5 MHz Window	-	0.4	1.2	dB
Input / Output Return Loss		10	13	-	dB
Integrated Rejection (over 20 MHz Bandwidth)	2402 - 2422 MHz	40	53	-	dB
	2407 - 2427 MHz	45	57	-	dB
	2412 - 2432 MHz	50	60	-	dB
	2417 - 2437 MHz	50	61	-	dB
	2422 - 2442 MHz	50	60	-	dB
	2427 - 2447 MHz	50	60	-	dB
	2432 - 2452 MHz	50	60	-	dB
	2437 - 2457 MHz	50	60	-	dB
	2442 - 2462 MHz	50	59	-	dB
	2447 - 2467 MHz	50	57	-	dB
	2452 - 2472 MHz	50	55	-	dB
	2412 - 2467 MHz	50	57	-	dB
Attenuation (4)	10 - 700 MHz	41	48	-	dB
	701 - 900 MHz	28	34	-	dB
	901 - 1564 MHz	22	28	-	dB
	1565 - 1615 MHz (GPS)	33	41	-	dB
	1616 - 1709 MHz	31	40	-	dB
	1710 - 1880 MHz (B3)	26	32	-	dB
	1920 - 2170 MHz (B1)	15	18	-	dB
	2300 - 2330 MHz	17	21	-	dB
	2472 - 2477 MHz (WiFi Ch12)		36	-	dB
	3000 - 3900 MHz	27	30	-	dB
	3900 - 4100 MHz	15	18	-	dB
	4100 - 6000 MHz	34	27	-	dB
	6000 - 7500 MHz	29	36	-	dB
	7500 - 8000 MHz	25	33	-	dB
Harmonics	H2: 2496-2690 MHz, 5 MHz Step, 28 dBm	60	70	-	dBc
	H3: 2496-2690 MHz, 5 MHz Step, 28 dBm	100	110	-	dBc

Notes:
1. Test conditions unless otherwise noted: Temp = -40 °C to +95 °C
2. All specifications are based on the QORVO schematic for the main reference design shown on page 3.
3. This is defined as the worst difference between a peak and adjacent valley within defined frequency points
4. Attenuation is referenced to ZERO dB

Evaluation Board and Schematic





Single-ended Input

Single-ended Output

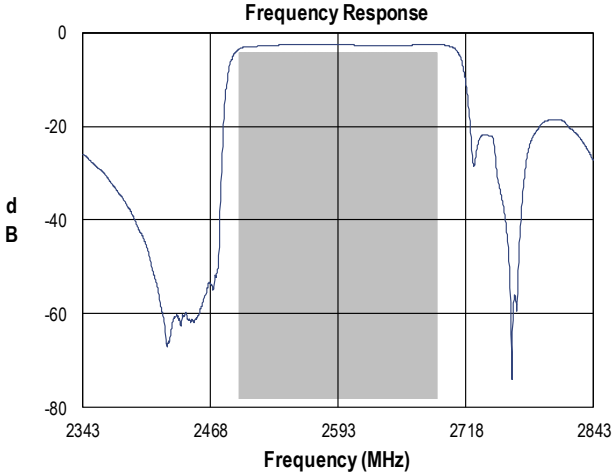
Bill of Material

Reference	Value	Description	Manufacturer	Part Number
U1	N/A	Band 41 BAW Filter	Qorvo	QPQ1285
N/A	N/A	Printed Circuit Board	Qorvo	1132983
N/A	N/A	SMA Edge Connector	Radial	9602-1111-018

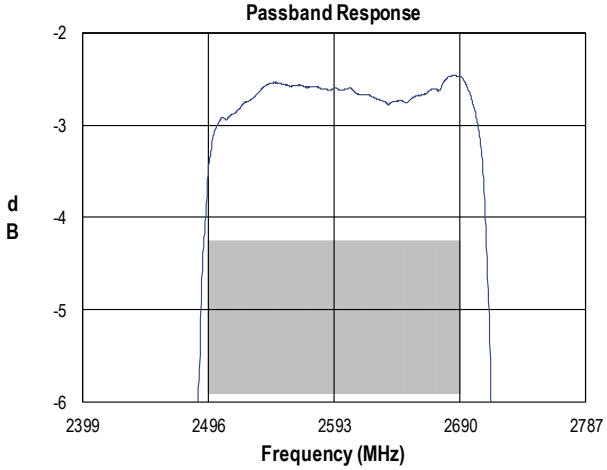
Performance Plots – Application Circuit

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

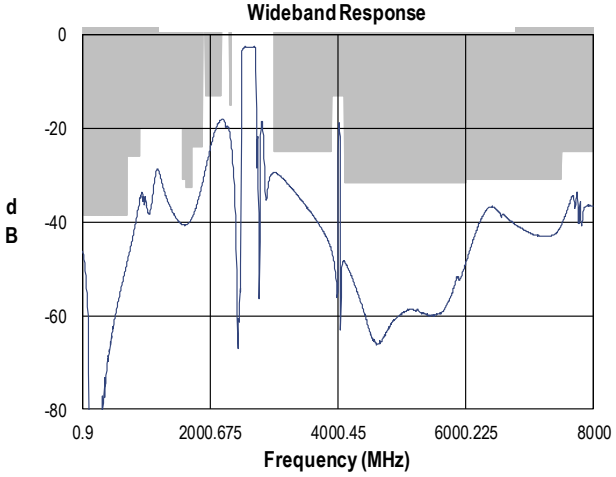
Frequency Response



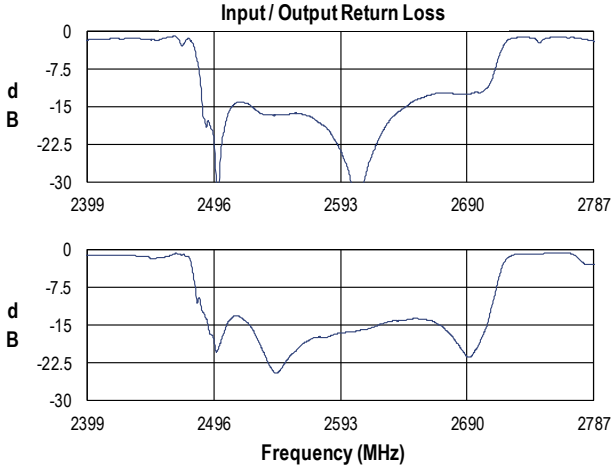
Passband Response



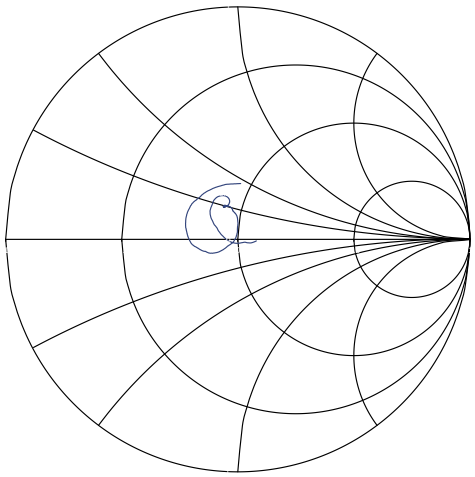
Wideband Response



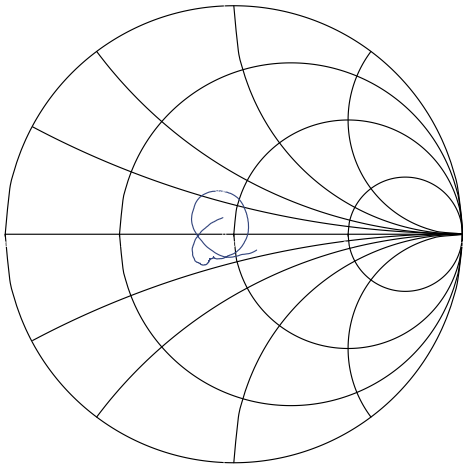
Input / Output Return Loss



Input Smith Chart



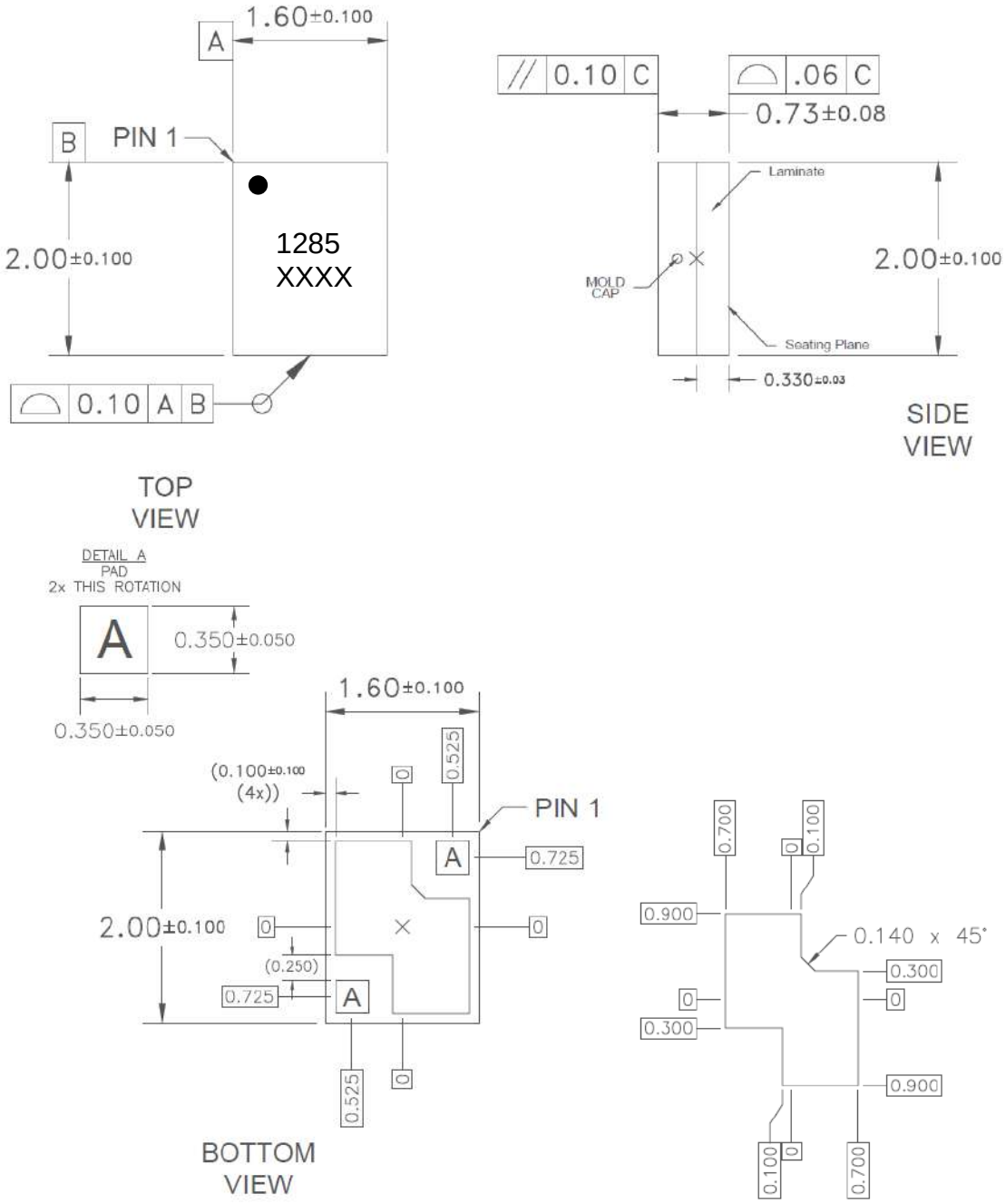
Output Smith Chart



Package Marking and Dimensions

Marking
4-digit Part number: 1285
4-digit Trace code: XXXX

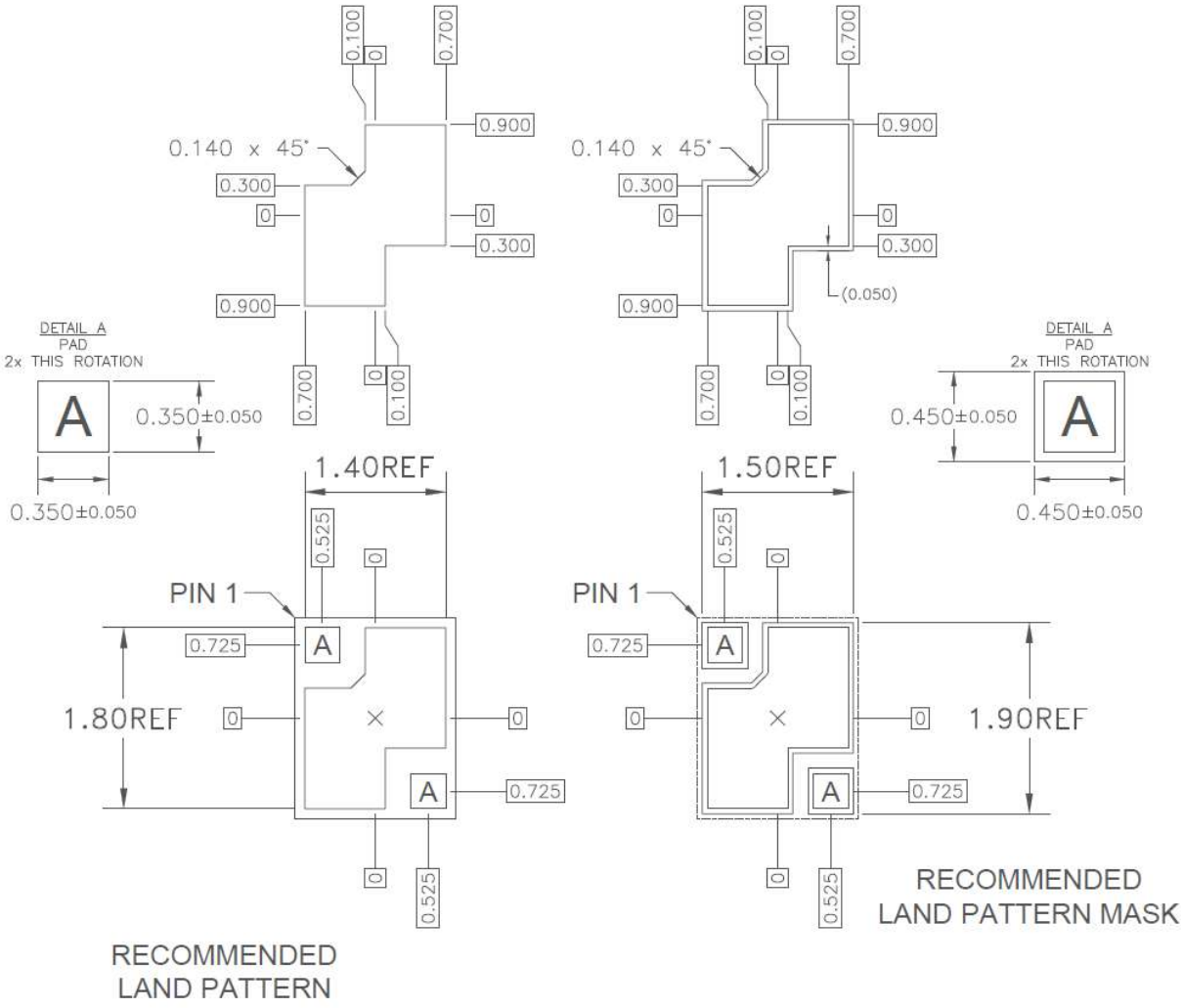
Body: Al2O3 ceramic
Lid: Kovar, Au over Ni plating
Terminations: Au plating 0.5 - 1.0µm, over a 2-6µm Ni plating



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.

PCB Mounting Pattern

All dimensions are in millimeters



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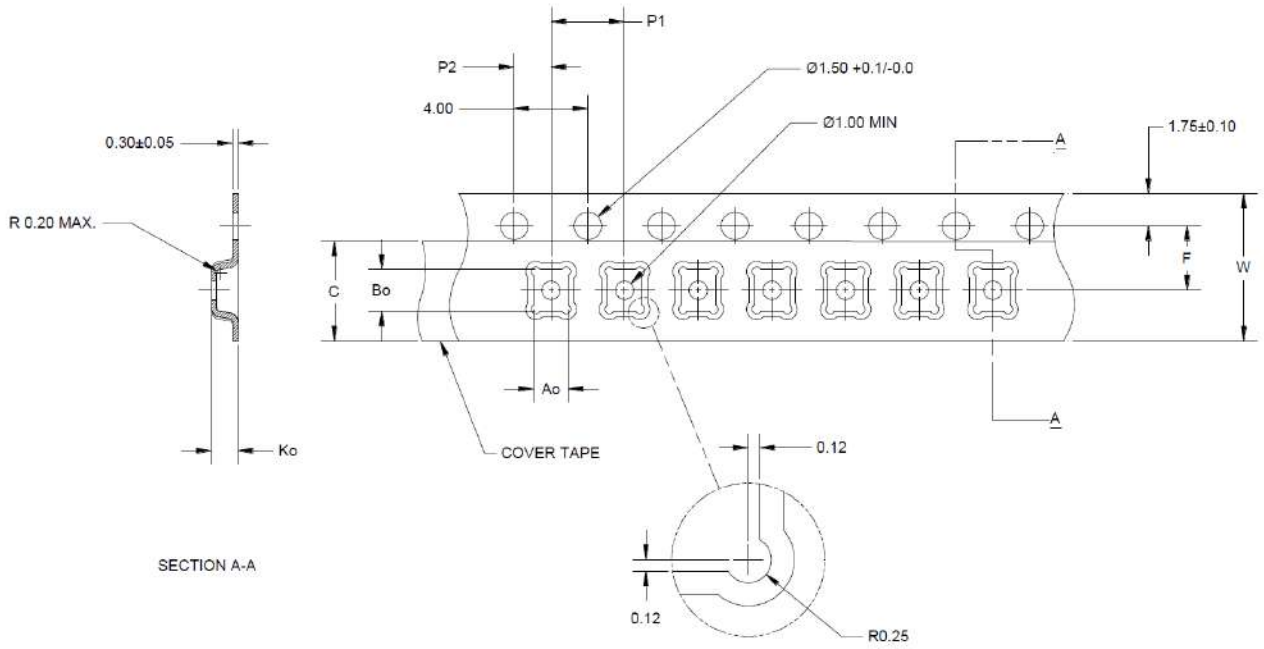
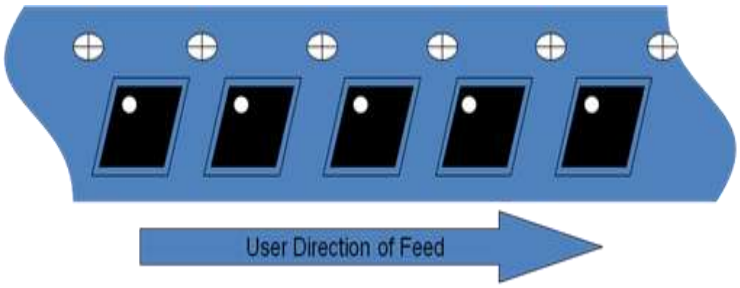
Tape and Reel Information – Carrier and Cover Tape Dimensions

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

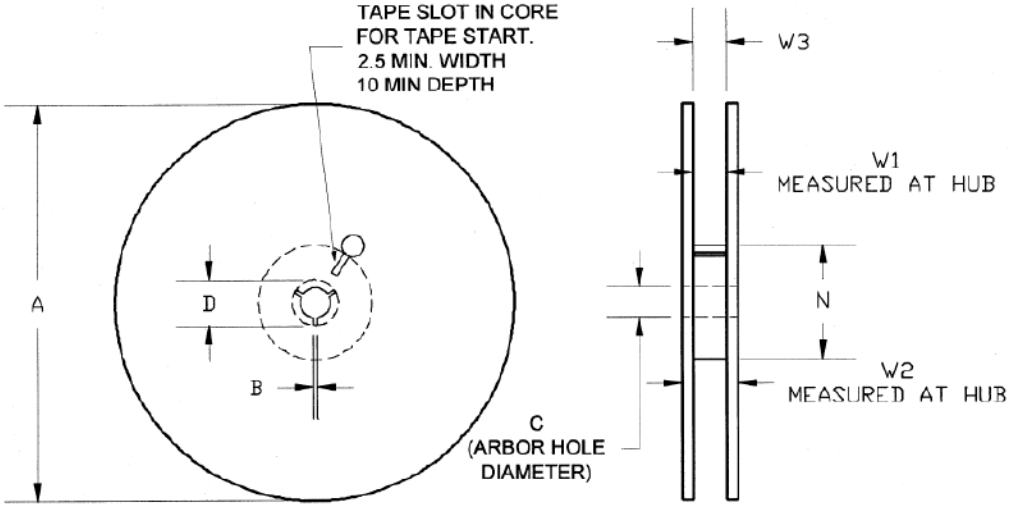


Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.077	1.95
	Width	B0	0.093	2.35
	Depth	K0	0.045	1.15
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.138	3.50
Cover Tape	Width	C	0.213	5.40
Carrier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



Tape and Reel Information – Reel Dimensions

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

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	ANSI / ESD / JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ANSI / ESD / JEDEC JS-002
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

Solderability

Compatible with lead-free (260°C max. reflow temp.) soldering process.
Solder profiles available upon request.

Contact plating: Ni Au

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**

Email: customer.support@qorvo.com

For technical questions and application information:

Email: appsupport@qorvo.com

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QPQ1287

TDD B40 BAW Band Pass Filter (100MHz)

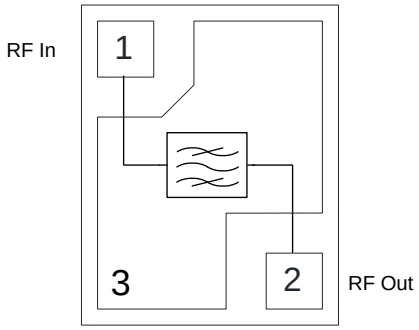
Product Overview

The QPQ1287 is a high performance Bulk Acoustic Wave (BAW) filter designed to meet the strict LTE rejection requirements for use in B40, Full Band 2300-2400 MHz.
The QPQ1287 is specifically designed to meet the high performance expectations of insertion loss and rejection for LTE TDD systems under all operating conditions.

The QPQ1287 is manufactured using Qorvo's world class BAW technology and is housed in a compact, industry standard 2.0 mm x 1.6 mm x 0.73 package that is lead free and RoHS complaint.

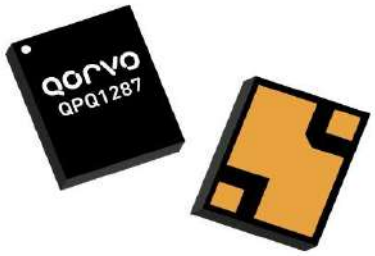
The QPQ1287 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.

Functional Block Diagram



Pin Configuration - Single Ended

Pin No.	Label
1	RF Input
2	RF Output
3	Ground



3 Pad 2.0 mm x 1.6 mm x 0.73 mm SMT Package

Key Features

- Highly Selective BAW Filter
- Low Insertion Loss Over Full Bandwidth and Operating Conditions
- Performance over −20 to +90 °C
- Excellent Wi-Fi Rejection
- Single-Ended Operation
- Internally Matched to 50 Ohms
- High Power Handling for Small Cells
- Small Size: 2.00 x 1.60 x 0.73 mm
- **RoHS** compliant (2002/95/EC), **Pb**-free

Applications

- Band 40 TD-LTE
- 2300 – 2400 MHz Band
- Small Cells Base Stations

Ordering Information

Part No.	Description
QPQ1287SB	Sample Bag with 5 pieces
QPQ1287SR	Sample Reel with 100 pieces
QPQ1287TR7	7" Taped Reel with 2500 pieces
QPQ1287EVB	Assembled Evaluation Board

Absolute Maximum Ratings (1)

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

Life Test

Conditions	Rating
P_{IN}=+29 dBm, Temp.=+90 °C, FD-LTE, 5 MHz, 16QAM, PAR=8 dB	>87600 hrs.

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

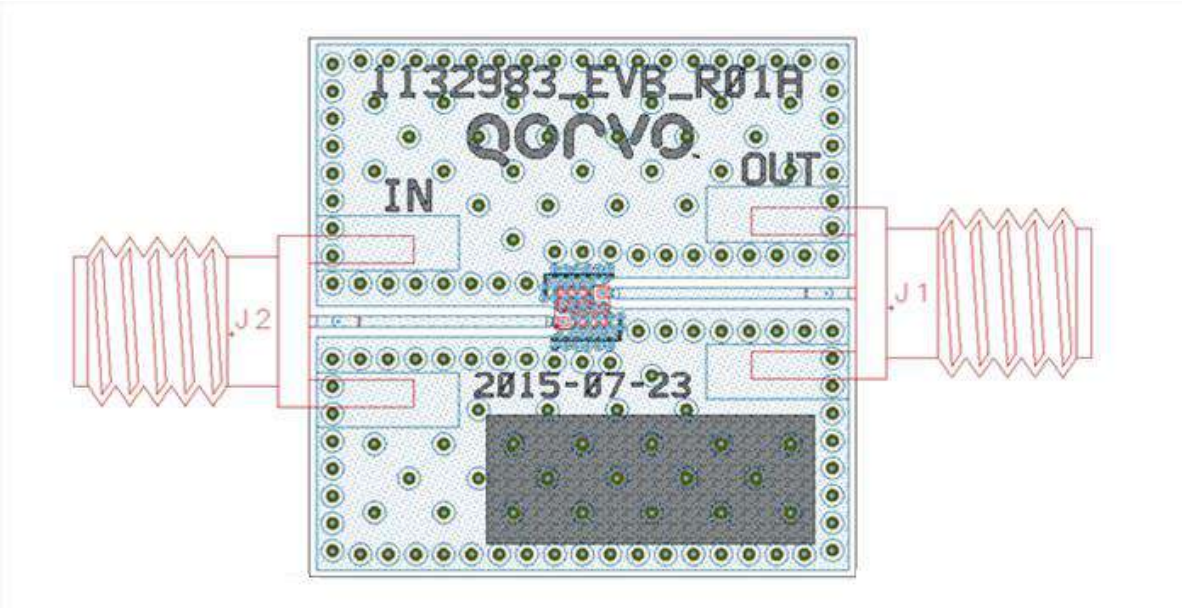
Electrical Specifications (1)

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

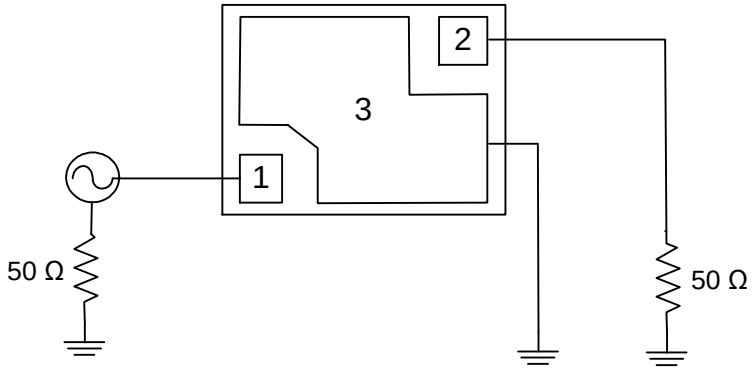
Parameter	Conditions (1, 2)	Min	Typ (6)	Max	Unit
Average Insertion Loss(2)	2300 – 2310 MHz 2310 – 2380 MHz 2380 – 2390 MHz 2390 – 2400 MHz	- - - -	3.1 2.2 2.2 2.7	3.9 3.0 3.2 3.9	dB
Input / Output VSWR	2300.0 – 2400.0 MHz	-	2.0:1	2.25:1	-
Input / Output Return Loss	2300.0 – 2400.0 MHz	8.3	9.3	-	dB
Amplitude Variation(3) (over any 10 MHz window)	2300.0 – 2400.0 MHz 2305.0 – 2395.0 MHz	- -	1.2 0.8	2.5 1.5	dB
Group Delay Variation(4) (over any 10 MHz window)	2300.0 – 2400.0 MHz	-	9.1	25	ns p-p
Phase Ripple(4) (over any 10 MHz window)	2300.0 – 2400.0 MHz	-	4.2	20	Deg. p-p
Attenuation in WIFI Band(5) (Average per Channel using 802.11b Spectrum mask)	2401 – 2423 MHz (Channel 1) 2406 – 2428 MHz (Channel 2) 2411 – 2433 MHz (Channel 3) 2416 – 2463 MHz (Channel 4 – 9) 2446 – 2468 MHz (Channel 10) 2451 – 2473 MHz (Channel 11) 2456 – 2478 MHz (Channel 12) 2461 – 2483 MHz (Channel 13) 2473 – 2495 MHz (Channel 14)	5 10 20 45 45 45 43 43 40	16 28 40 54 51 49 48 47 45	- - - - - - - - -	dB
Attenuation(7)	10 – 766 MHz	50	54	-	dB
	869 – 894 MHz	47	50	-	
	1150 – 1195 MHz	40	44	-	
	1574.4 – 1576.4 MHz	35	38	-	
	1710 – 2170 MHz	34	36	-	
	2500 – 2690 MHz	35	38	-	
	3400 – 3500 MHz	30	36	-	
	4600 – 4800 MHz	27	33	-	
	5150 – 5850 MHz	23	27	-	
	6000 – 8000 MHz	25	30	-	
2nd Harmonic(8)	Pin = +29 dBm (2300 – 2400 MHz)	55	65	-	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 not the same for Pin 2 input.
9. This is the optimum impedance in order to achieve the performance shown.

Evaluation Board and Schematic – QPQ1287EVB



Notes:
1. Top, middle & bottom layers: 1/2 oz copper, Substrates: FR4 dielectric, .062" thick, Finish plating: Nickel: 3-8 µm thick, Gold: .03-.2 µm thick, Hole plating: Copper min .0008 µm thick.



Single-ended Input Single-ended Output

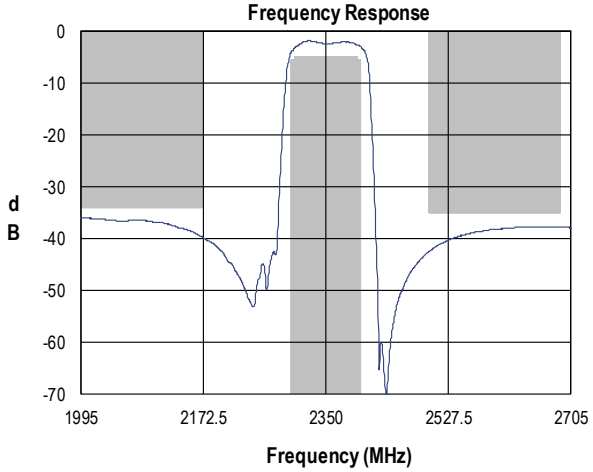
Bill of Material – QPQ1287EVB

Ref. Des.	Value	Description	Manufacturer	Part Number
U1	N/A	2350.0 MHz BAW Filter	Qorvo	QPQ1287
N/A	N/A	Printed Circuit Board	Qorvo	1132983
N/A	N/A	SMA Edge Connector	Radial	9602-1111-018

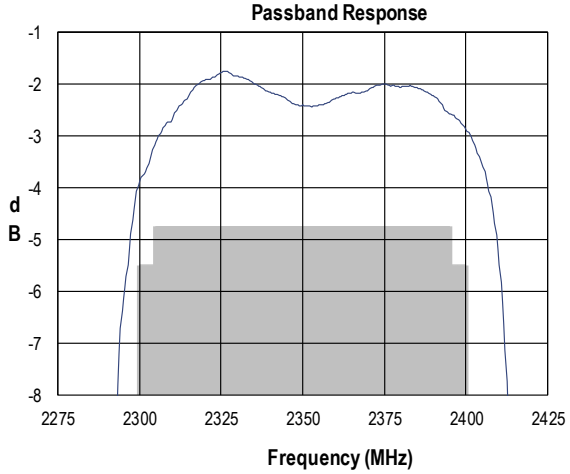
Performance Plots – QPQ1287EVB

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

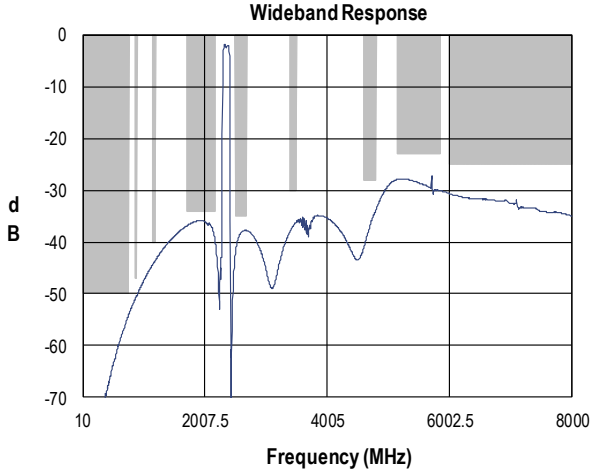
Frequency Response



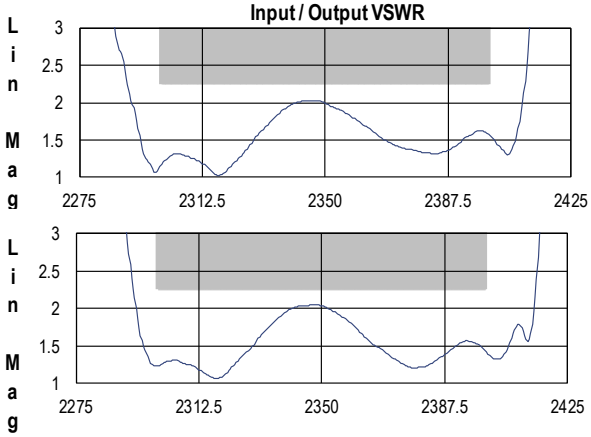
Passband Response



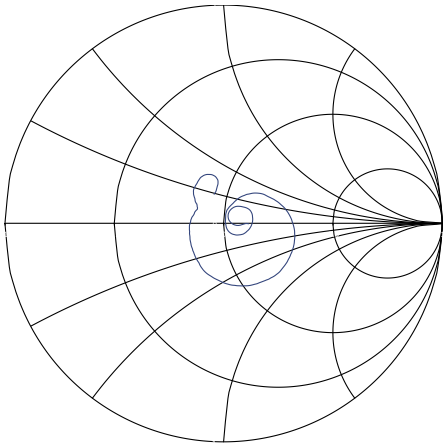
Wideband Response



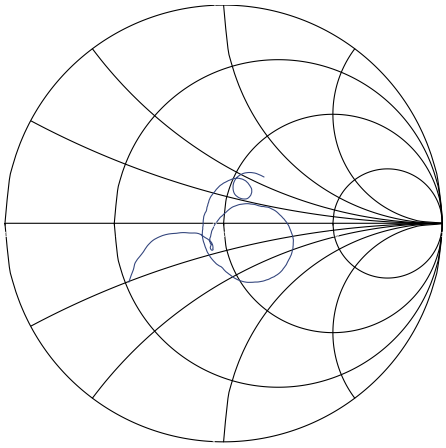
Input / Output VSWR



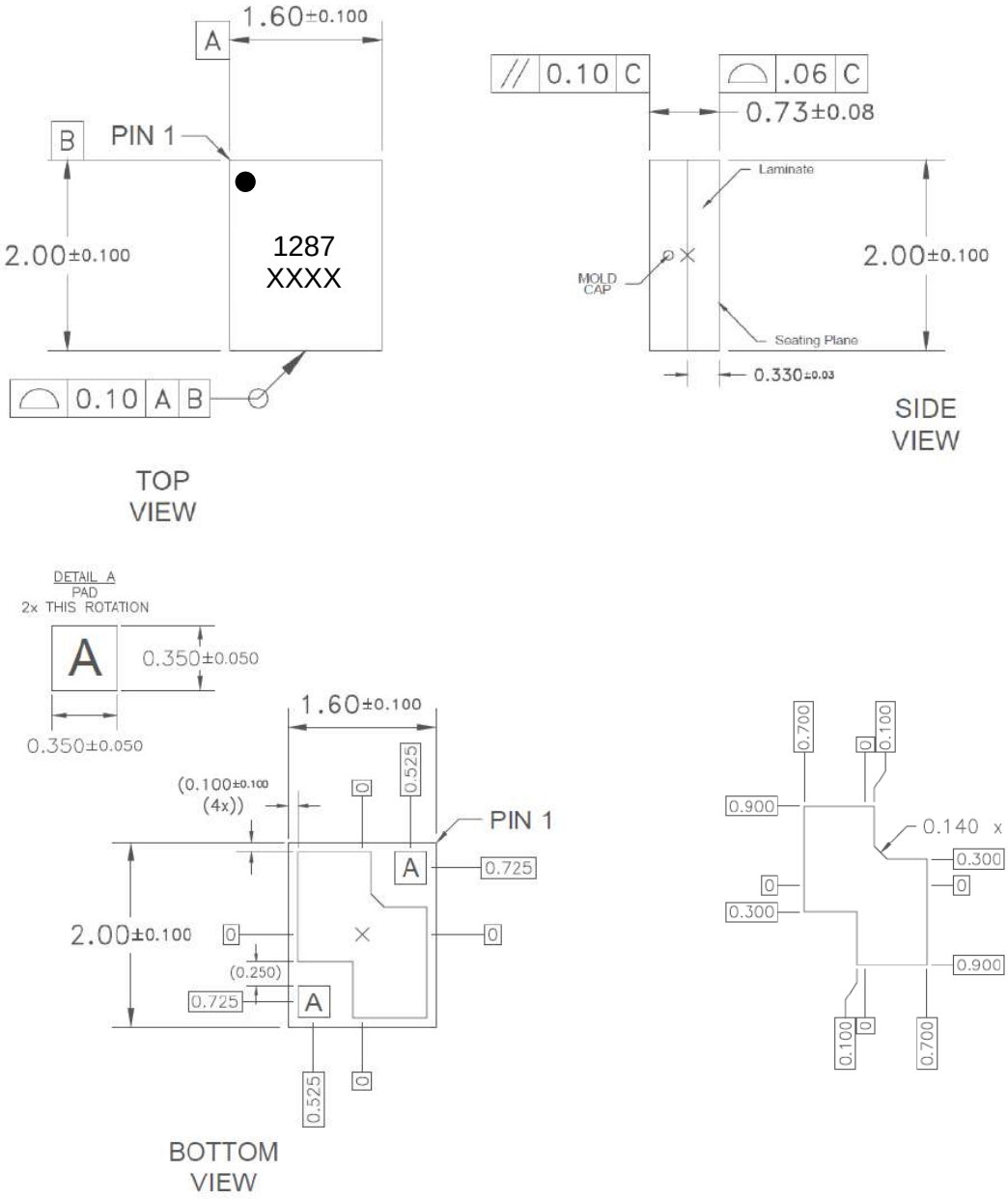
Input Smith Chart



Output Smith Chart



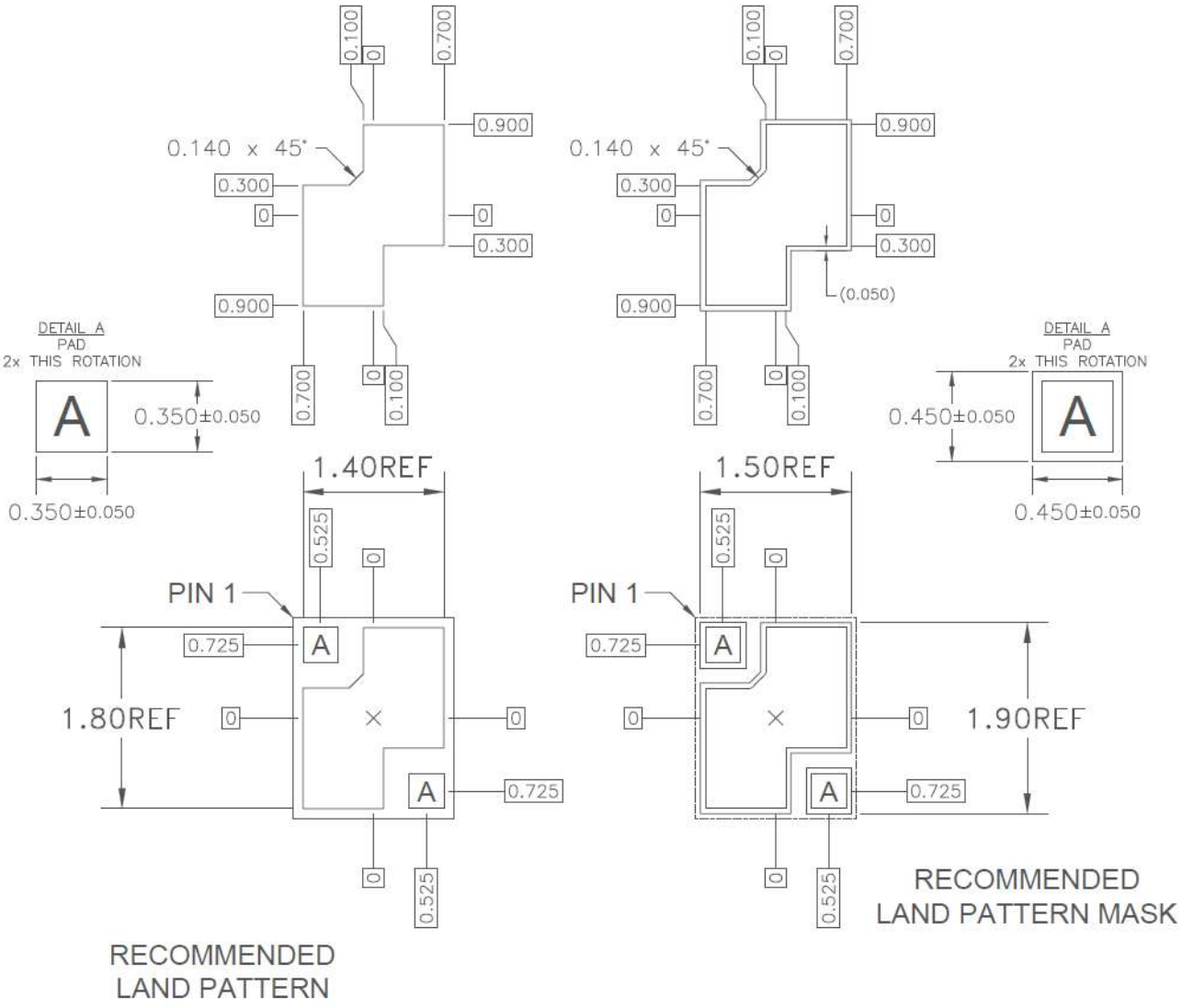
Package Marking and Dimensions



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.
4. Body: Al_2O_3 ceramic
5. Lid: *Kovar*, *Au* over *Ni* plating
6. Terminations: *Au* plating 0.5 - 1.0µm, over a 2-6µm *Ni* plating
7. An asterisk (*) in front of the marking code indicates prototype.

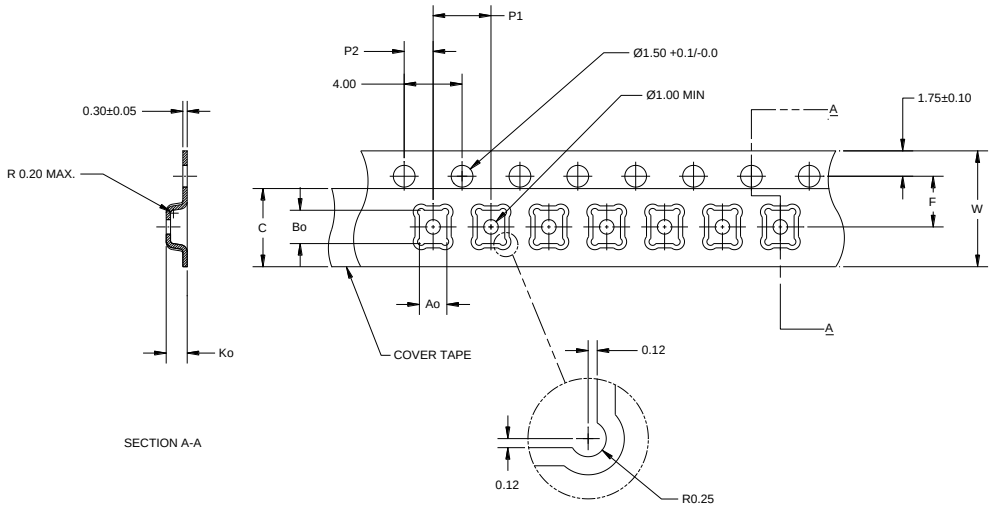
PCB Mounting Pattern



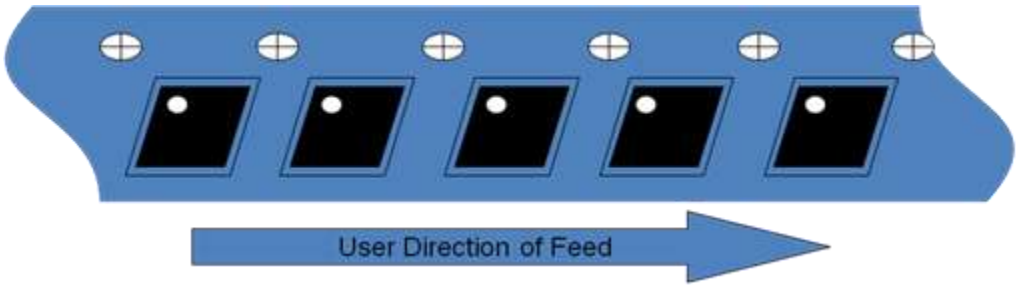
Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.

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 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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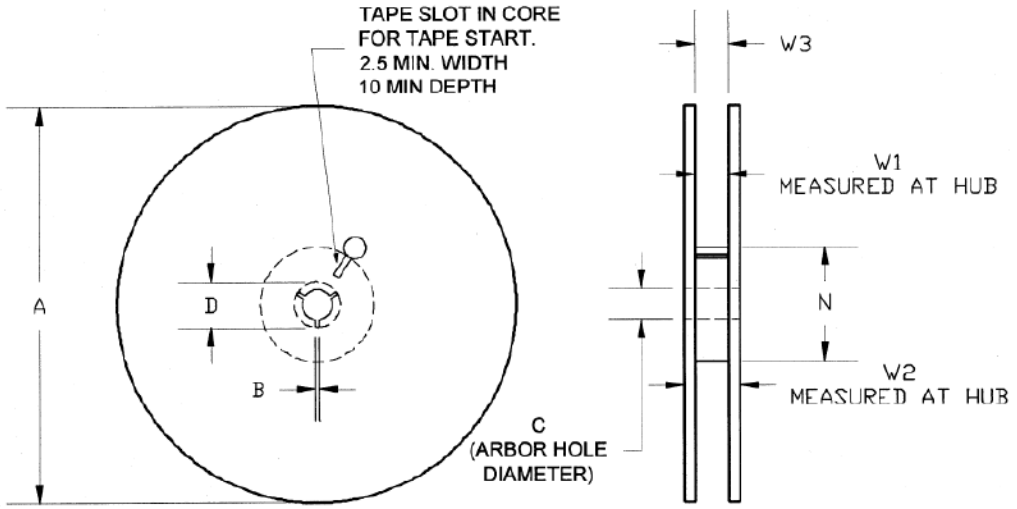

Feature	Measure	Symbol	Size (in)	Size (mm)
Flange	Diameter	A	6.969	177.0
	Thickness	W2	0.559	14.2
	Space Between Flange	W1	0.346	8.8
Hub	Outer Diameter	N	2.283	58.0
	Arbor Hole Diameter	C	0.512	13.0
	Key Slit Width	B	0.079	2.0
	Key Slit Diameter	D	0.787	20.0

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* plating 0.5 - 1.0µm, over a 2-6µm *Ni* plating

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 ($C_{15}H_{12}Br_40_2$) 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

Email: customer.support@qorvo.com

For technical questions and application information: **Email:** appsupport@qorvo.com

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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.

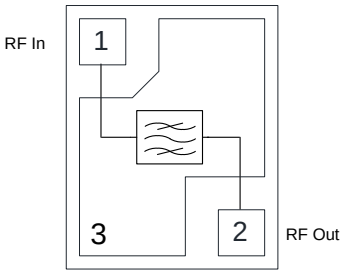
The QPQ1288 uses common module packaging techniques to achieve the industry standard 2.0 x 1.6 x 0.73 mm footprint.

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)

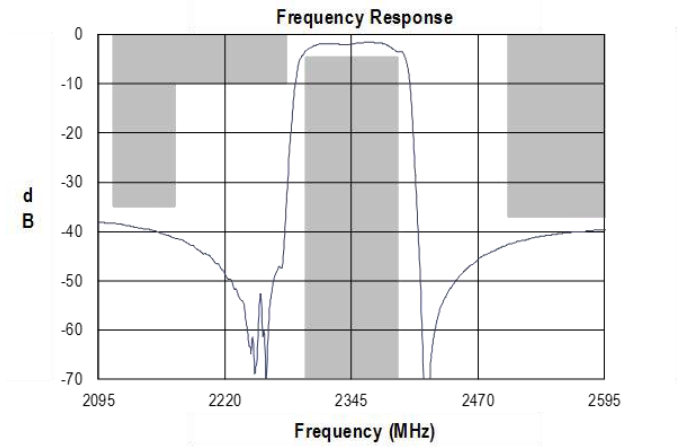
Test conditions unless otherwise specified. Temperature Range: -20 to +90 °C

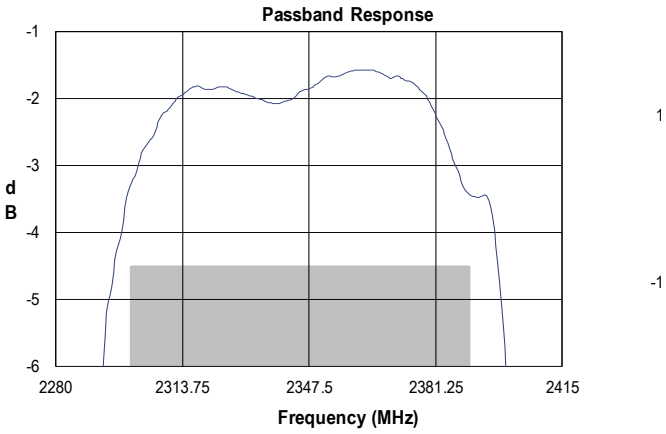
Parameter	Conditions	Min	Typ	Max	Units
Average Insertion Loss(2)	2300 – 2310	-	2.8	3.5	dB
	2310 – 2370 (Over any 10 MHz)	-	2.1	2.8	dB
	2370 – 2380	-	2.1	2.8	dB
	2380 – 2390	-	2.8	3.5	dB
Input / Output VSWR	2300.0–2390.0 MHz	-	2:1	2.4:1	-
Input / Output Return Loss	2300.0–2390.0 MHz	7.7	9.0	-	dB
Amplitude 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

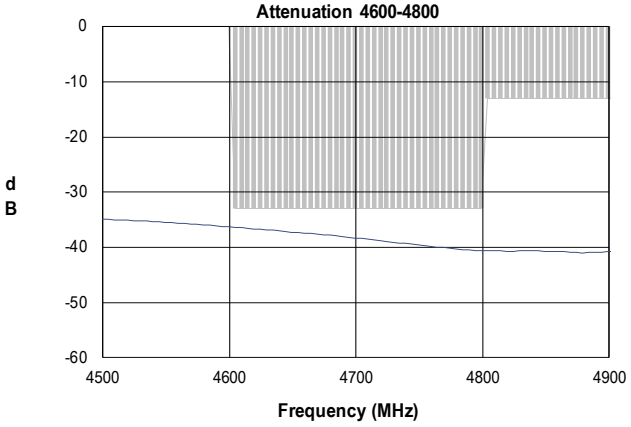
Notes:
1. All specifications are based on the QORVO schematic for the main reference design shown on page 5.
2. Average Insertion Loss is calculated by averaging |S21| in dB for each measured point within defined frequency range
3. Amplitude Variation is defined as the difference between the lowest loss 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

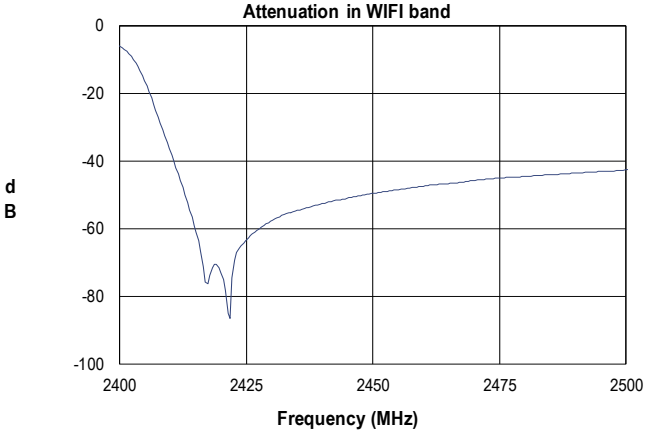
Performance Plots

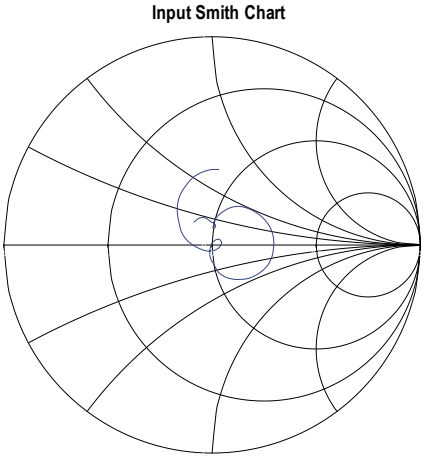
Test conditions unless otherwise noted: Temp.= +25 °C

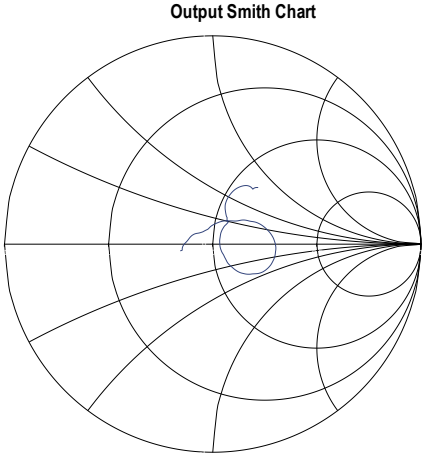












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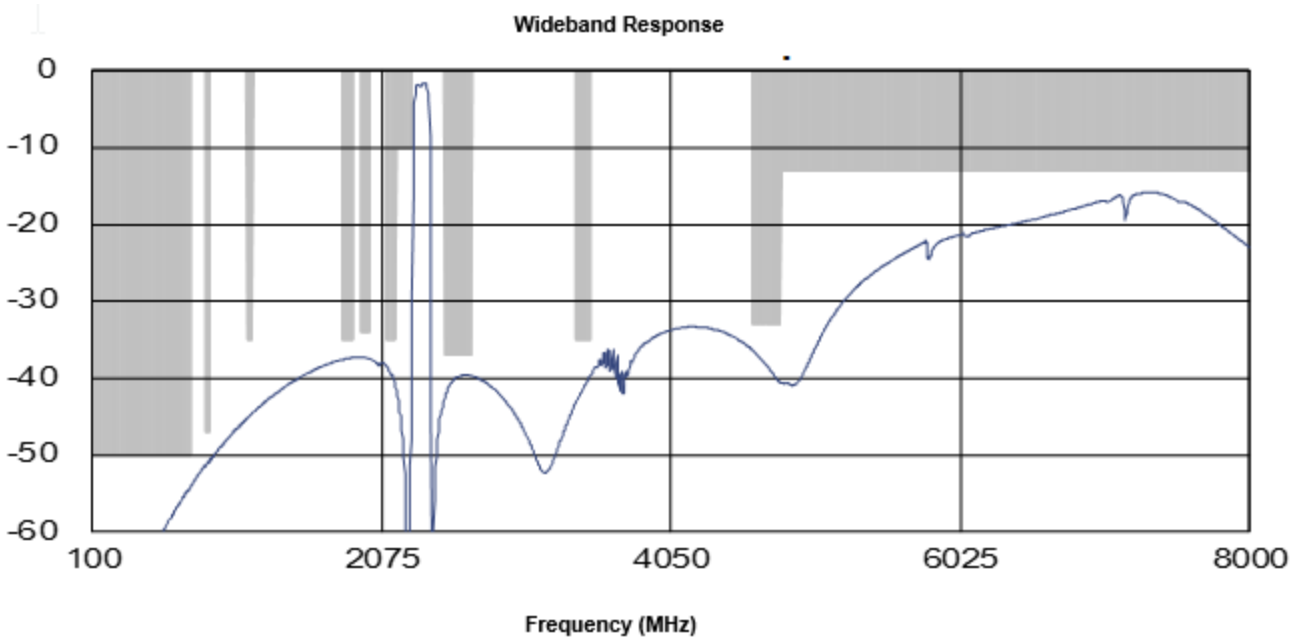
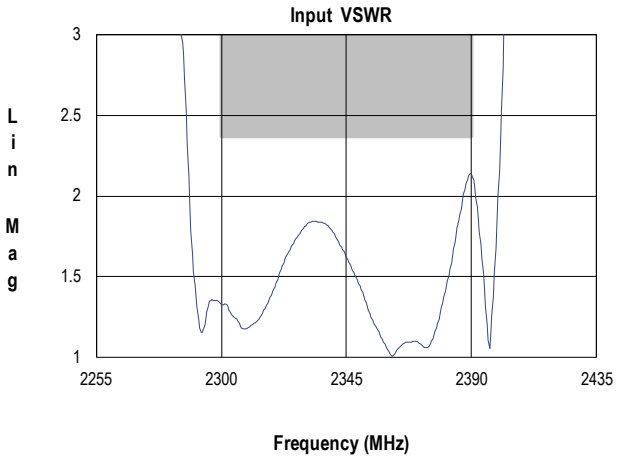
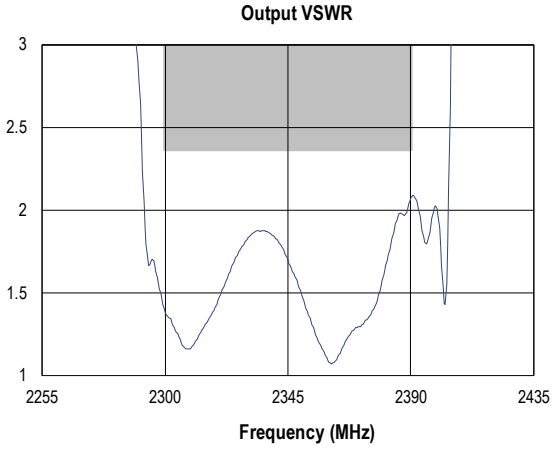
Performance Plots – (continued)

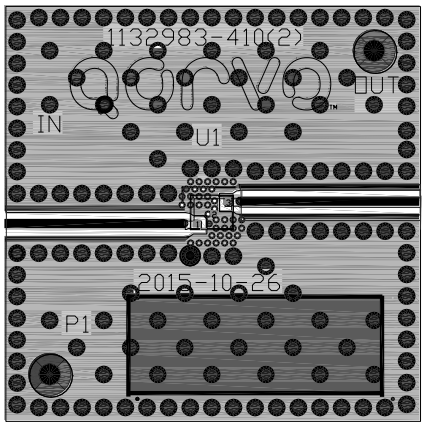
Test conditions unless otherwise noted: Temp.= +25 °C

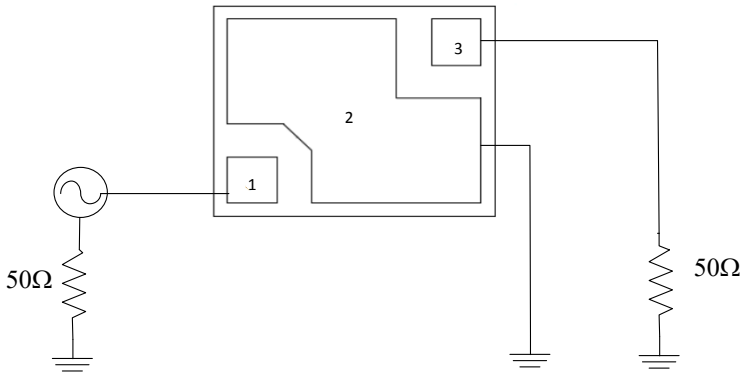






Evaluation Board



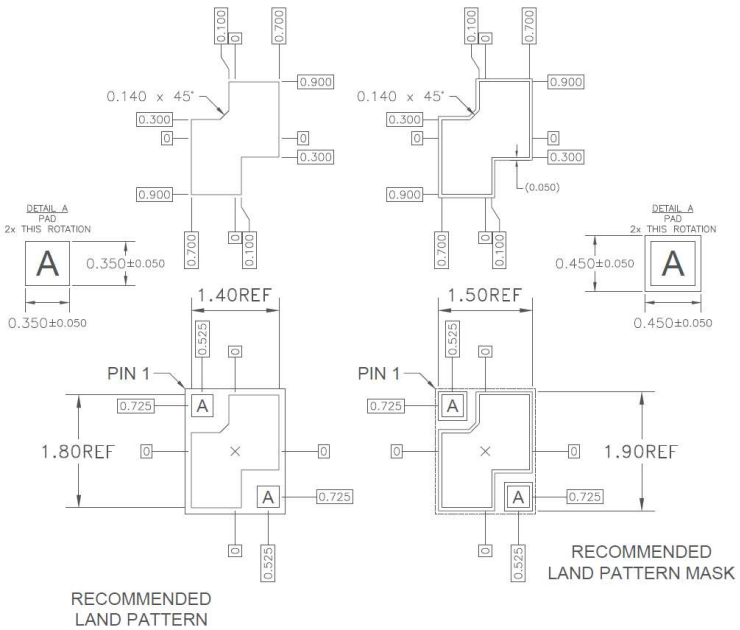


Bill of Material

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

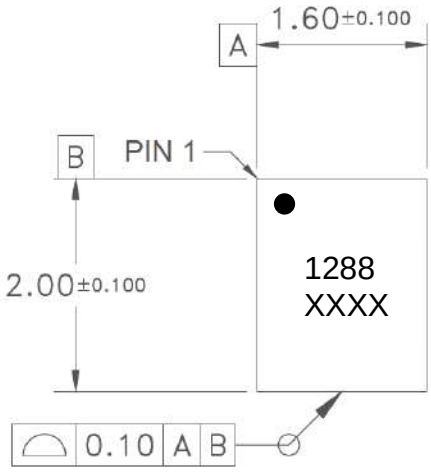
All dimensions are in millimeters



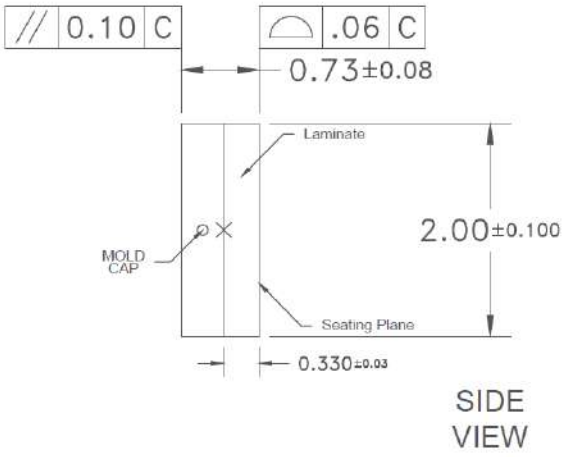
Package Marking and Dimensions

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

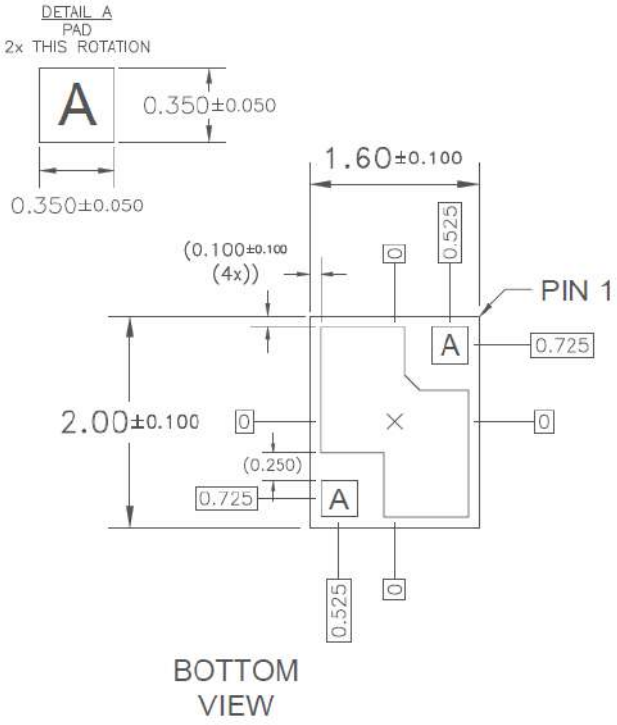
Body: Al2O3 ceramic
Lid: Kovar, Au over Ni plating
Terminations: Au plating 0.5 - 1.0µm, over a 2-6µm Ni plating



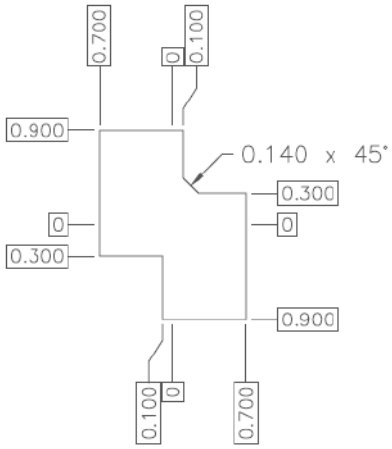
TOP VIEW



SIDE VIEW



BOTTOM VIEW



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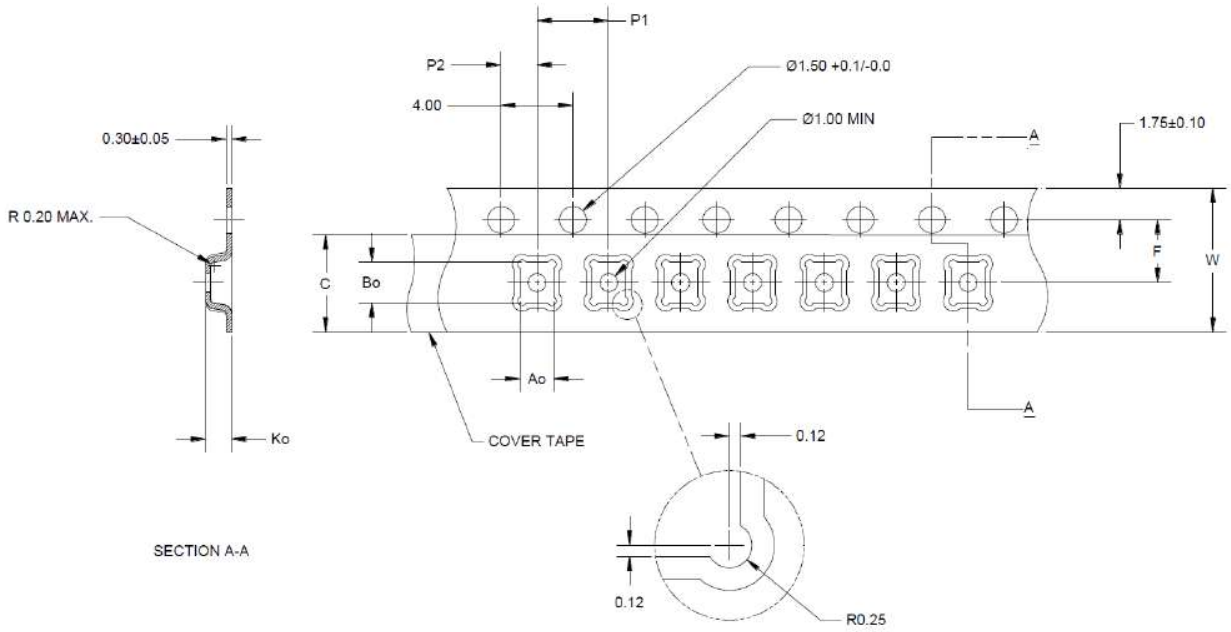

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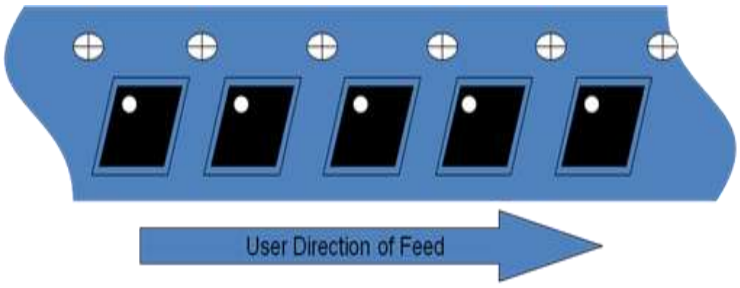

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Tape and Reel Information – Reel Dimensions

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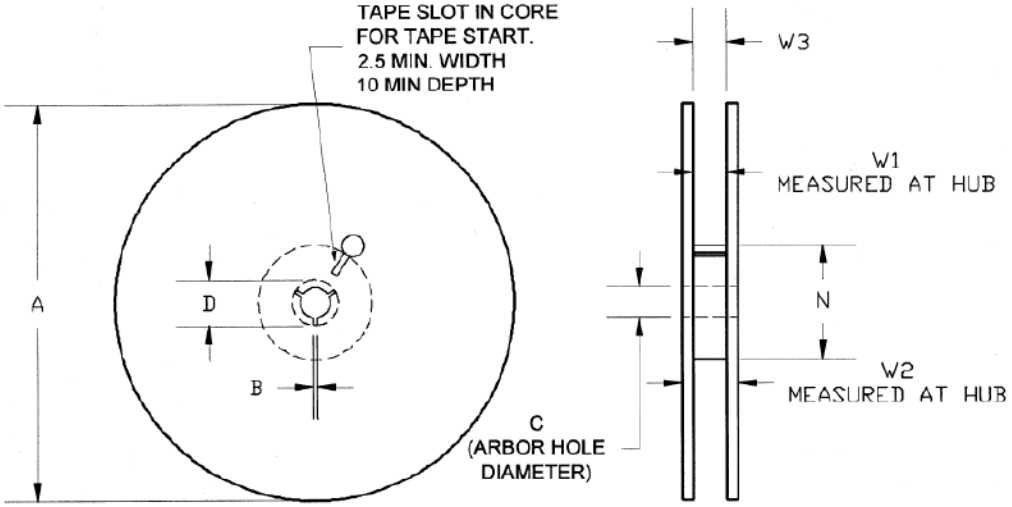

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Caution!
ESD-Sensitive Device

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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QPQ1295

Band 25 Downlink BAW Filter

Product Overview

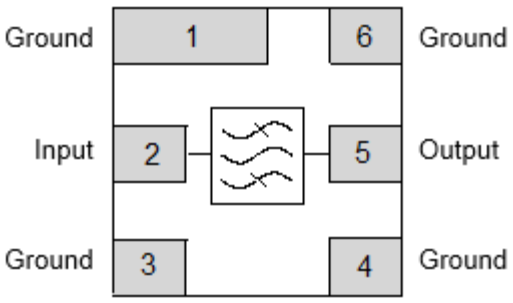
The QPQ1295 is an exceptionally high performance BAW filter for Band 25 Downlink. This filter is housed in a compact 3.00 x 3.00 x 0.91 mm package for base station applications.

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

The QPQ1295 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.

6 Pad 3.00 mm x 3.00 mm x 0.91 mm SMP

Functional Block Diagram



Top View

Key Features

- 65 MHz Bandwidth
- High Attenuation
- Low Loss
- Single-ended Operation
- Small Size: 3.00 x 3.00 x 0.91 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Applications

- Band 25 DL
- Small Cell
- Base Station Infrastructure
- General Purpose Wireless

Pin Configuration - Single Ended

Pin No.	Label
2	Input
5	Output
1, 3, 4, 6	Ground

Ordering Information

Part No.	Description
QPQ1295SR	Sample Reel with 100 pieces
QPQ1295TR7	7" Taped Reel with 2500 pieces
QPQ1295EVB	Assembled Evaluation Board

Absolute Maximum Ratings (1)

Parameter	Rating
Storage Temperature	−40 to +125°C
Operating Temperature	0 to +70 °C
RF in (2)	+39 dBm

Notes:
1. Operation of this device outside the parameter ranges given may cause permanent damage.
2. CW pulses of 500ms ON time, 10s OFF time.

Minimum Lifetime Ratings

Conditions	Rating
+27 dBm DL, +70°C, CW	>1,000,000 hours
+30 dBm DL, +55°C, CW	>10,000 hours

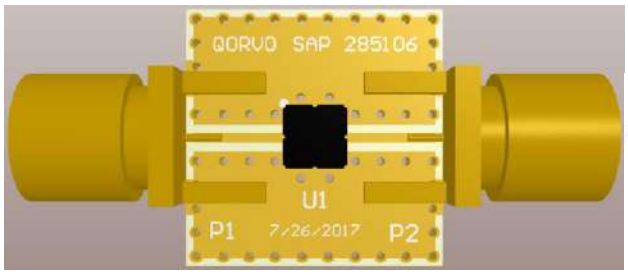
Electrical Specifications (1)

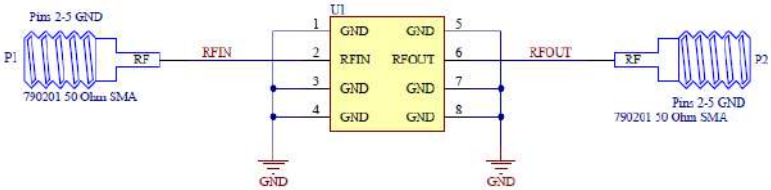
Test conditions unless otherwise specified. Temperature Range: 0 to +70 °C

Parameter	Conditions (1, 2)	Min	Typ	Max	Unit
Insertion Loss (2)	1930 – 1932 MHz	-	3.4	5.0	dB
	1932 – 1935 MHz	-	2.7	4.1	dB
	1935 – 1995 MHz	-	1.9	3.0	dB
Input / Output VSWR	1930 – 1995 MHz	-	1.6:1	2.1:1	
Attenuation (4)	1710 – 1755 MHz	30	35	-	dB
	1850 – 1910 MHz	35	43	-	dB
	1910 – 1915 MHz	32	41	-	dB
	1915 – 1920 MHz	20	36	-	dB
	1915 – 1922.5 MHz at +25°C	15	22	-	dB
	2100 – 3000 MHz	30	37	-	dB
	3000 – 6000 MHz	20	29	-	dB

Notes:
1. All specifications are based on the QORVO schematic for the main reference design.
2. Maximum Insertion Loss within defined frequency range.
3. Attenuation is referenced to zero dB

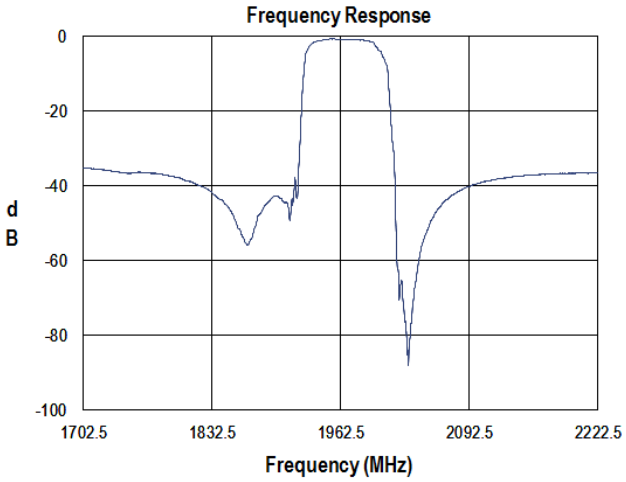
Evaluation Board and Schematic – QPQ1295EVB

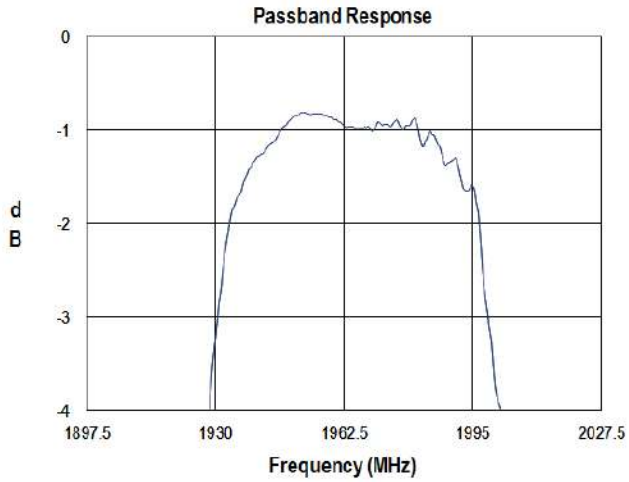


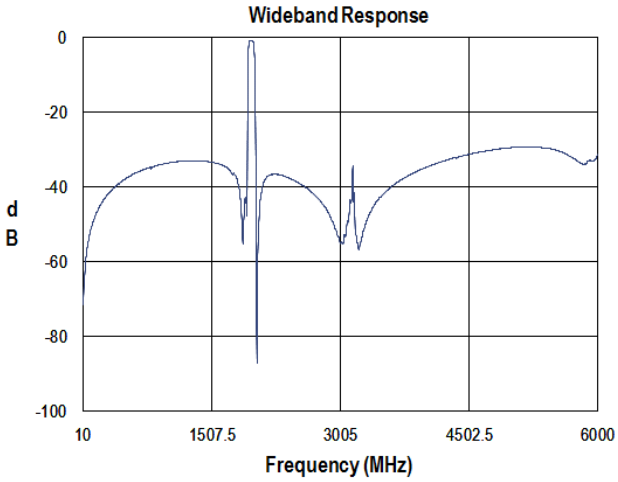


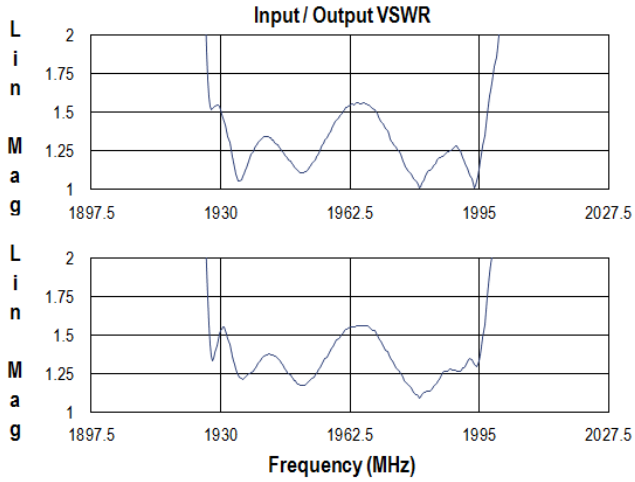
Performance Plots

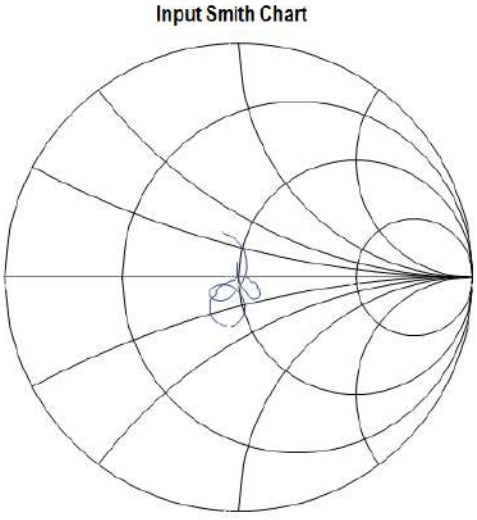
Test conditions unless otherwise noted: Temp= +25°C

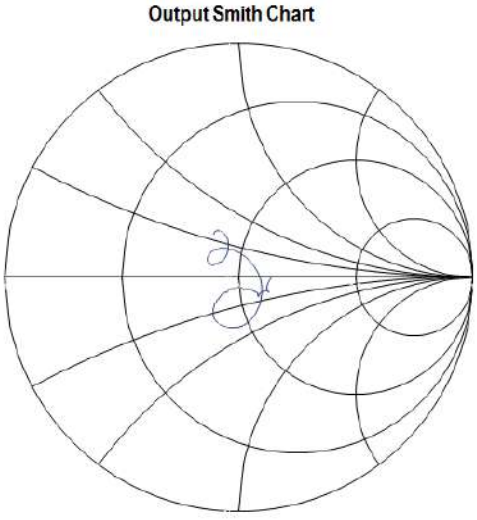




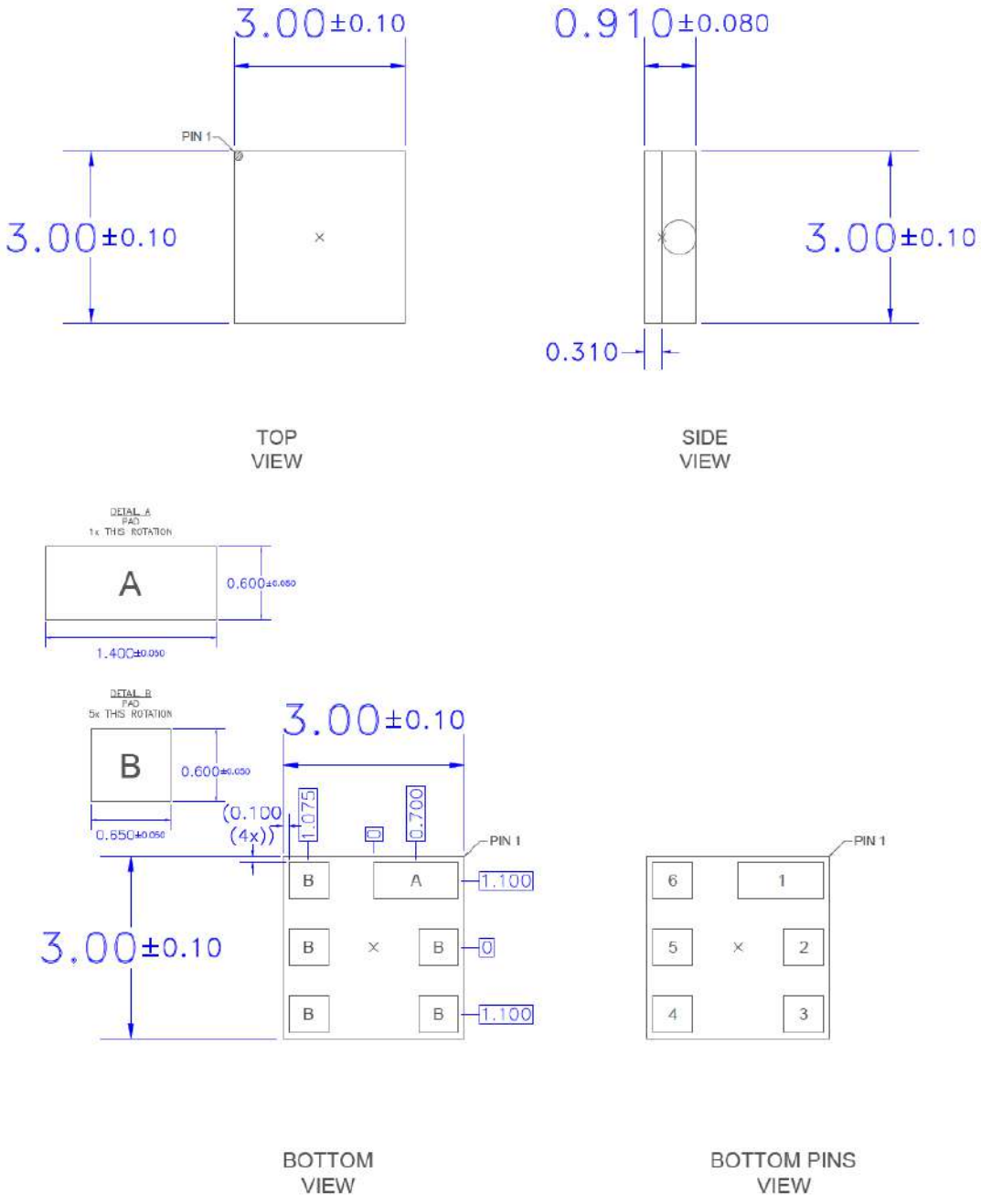






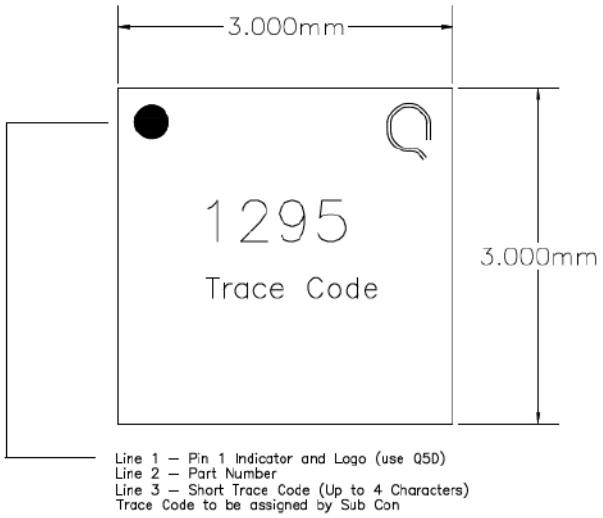


Package Dimensions



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

RECOMMENDED LAND PATTERN

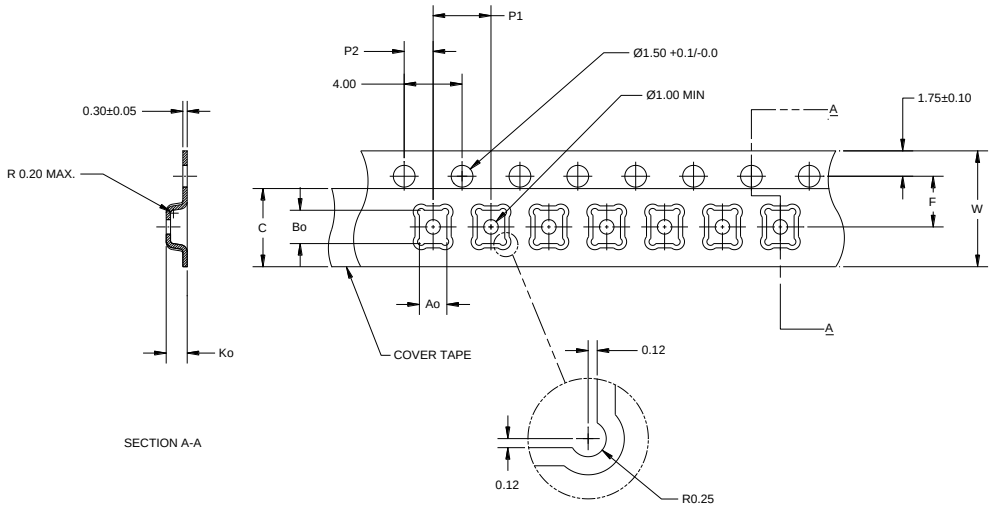
RECOMMENDED LAND PATTERN MASK

Notes:

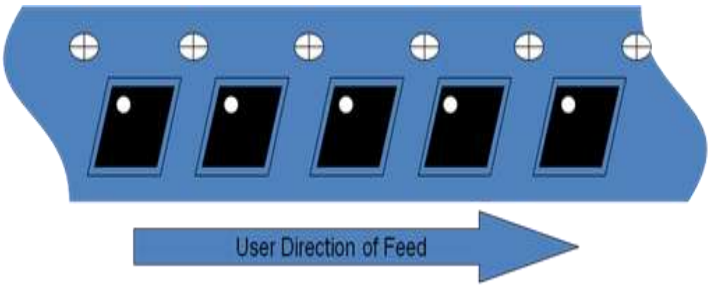
1. All dimensions are in millimeters. Angles are in degrees.
2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

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.

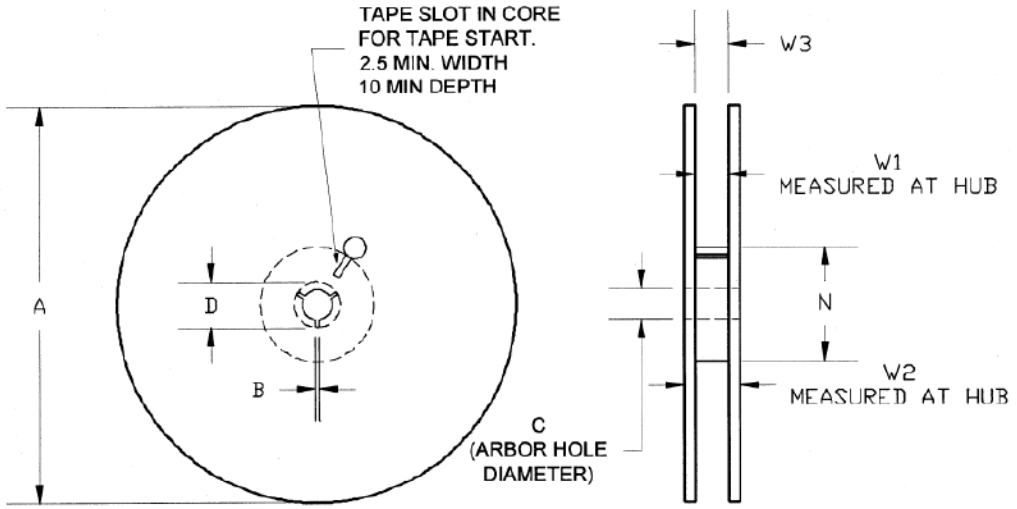


Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.132	3.35
	Width	B0	0.132	3.35
	Depth	K0	0.051	1.30
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.138	3.50
Cover Tape	Width	C	0.213	5.40
Carrier Tape	Width	W	0.315	8.00



Tape and Reel Information – Reel Dimensions

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

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	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: Ni / Au

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

Email: customer.support@qorvo.com

For technical questions and application information: **Email:** appsupport@qorvo.com

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QPQ1296

Band 25 Uplink BAW Filter

Product Overview

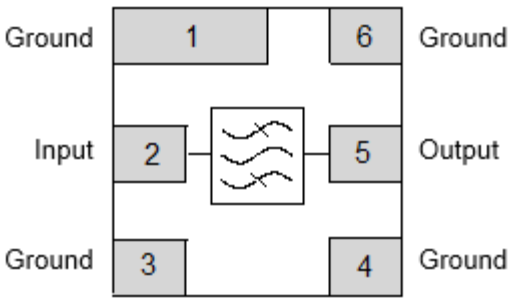
The QPQ1296 is an exceptionally high performance BAW filter for Band 25 Uplink. This filter is housed in a compact 3.00 x 3.00 x 0.91 mm package for base station applications.

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

The QPQ1296 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.

6 Pad 3.00 mm x 3.00 mm x 0.91 mm SMP

Functional Block Diagram



Top View

Key Features

- 65 MHz Bandwidth
- High Attenuation
- Low Loss
- Single-ended Operation
- Small Size: 3.00 x 3.00 x 0.91 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Applications

- Band 25 UL
- Small Cell
- Base Station Infrastructure
- General Purpose Wireless

Pin Configuration - Single Ended

Pin No.	Label
2	Input
5	Output
1, 3, 4, 6	Case Ground

Ordering Information

Part No.	Description
QPQ1296SR	Sample Reel with 100 pieces
QPQ1296TR7	7" Taped Reel with 2500 pieces
QPQ1296EVB	Assembled Evaluation Board

Absolute Maximum Ratings (1)

Parameter	Rating
Storage Temperature	−40 to +125°C
Operating Temperature	0 to +70 °C
RF in (2)	+37 dBm

Notes:
1. Operation of this device outside the parameter ranges given may cause permanent damage.
2. 500ms Pulse Width, 5% Duty Cycle Pulses

Minimum Lifetime Ratings

Conditions	Rating
+27 dBm In-band at Input, +70°C, CW	>1,000,000 hours
+28 dBm In-band at Input, +55°C, CW	>800,000 hours

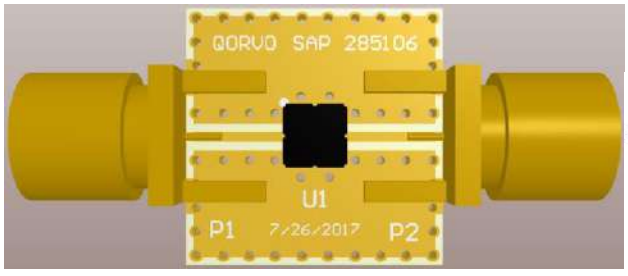
Electrical Specifications (1)

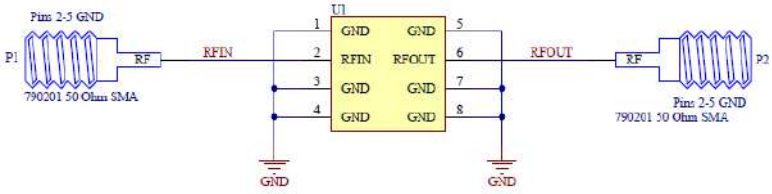
Test conditions unless otherwise specified. Temperature Range: 0 to +70 °C

Parameter	Conditions (1, 2)	Min	Typ	Max	Unit
Insertion Loss (2)	1850 – 1913 MHz	-	2.0	3.5	dB
	1913 – 1915 MHz	-	2.7	7.0	dB
Input VSWR	1850 – 1915 MHz	-	1.7:1	2.0	-
Output VSWR	1850 – 1913 MHz	-	1.7:1	2.3	-
	1913 – 1915 MHz	-	1.8:1	2.75	-
Attenuation (4)	1922.5 – 1930 MHz at +25°C	17	37	-	dB
	1930 – 1995 MHz	35	38	-	dB
	2110 – 2155 MHz	35	40	-	dB
	2155 – 2800 MHz	30	34	-	dB
	2800 – 3000 MHz	27	33	-	dB
	3000 – 6000 MHz	15	21	-	dB

Notes:
1. All specifications are based on the QORVO schematic for the main reference design.
2. Maximum Insertion Loss within defined frequency range.
3. Attenuation is referenced to zero dB

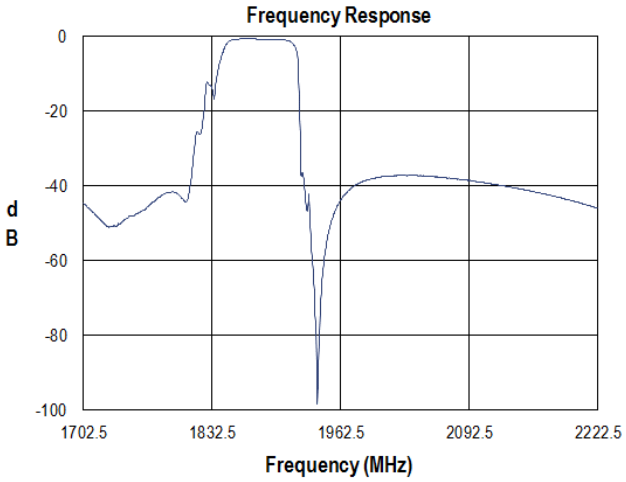
Evaluation Board and Schematic – QPQ1296EVB

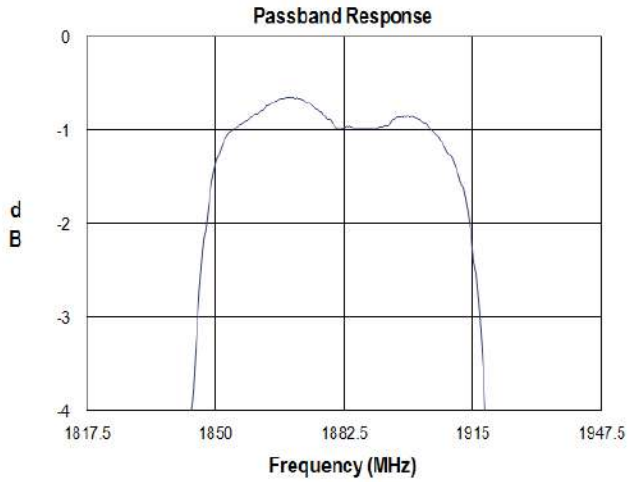


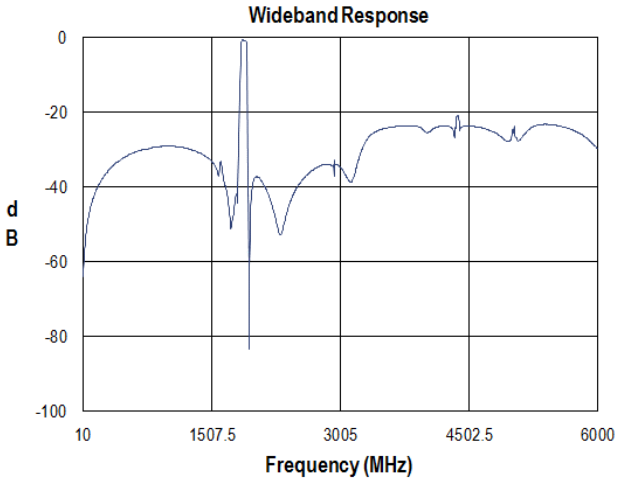


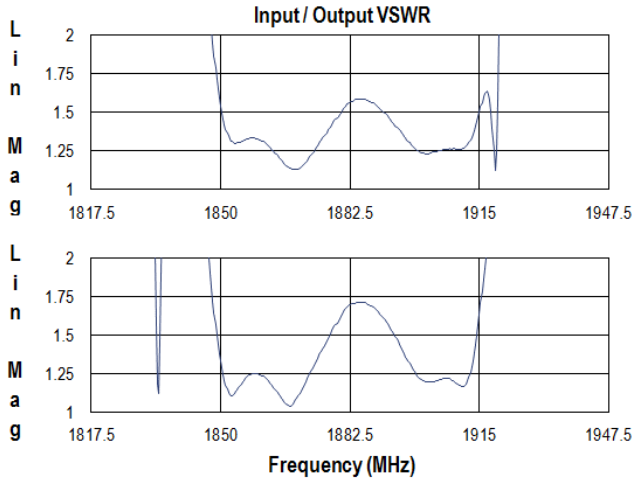
Performance Plots

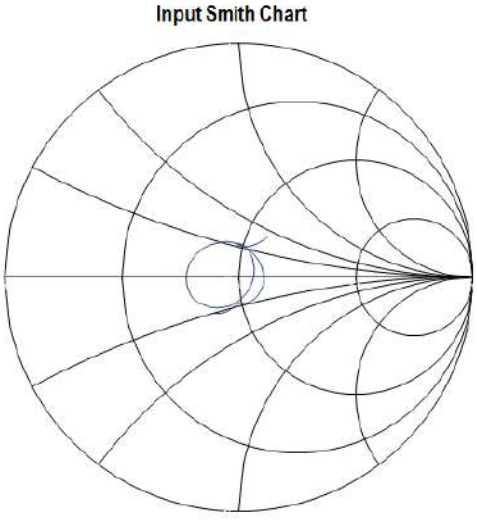
Test conditions unless otherwise noted: Temp= +25°C

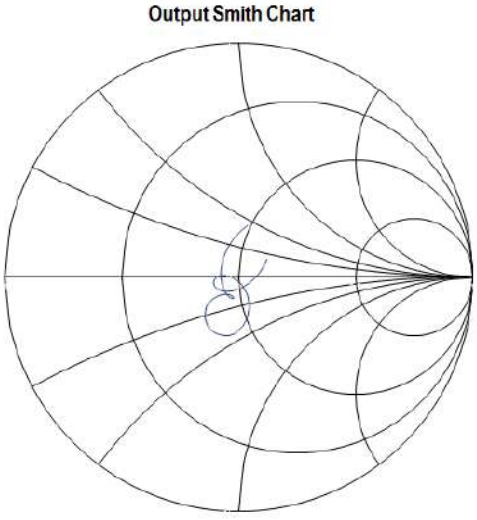




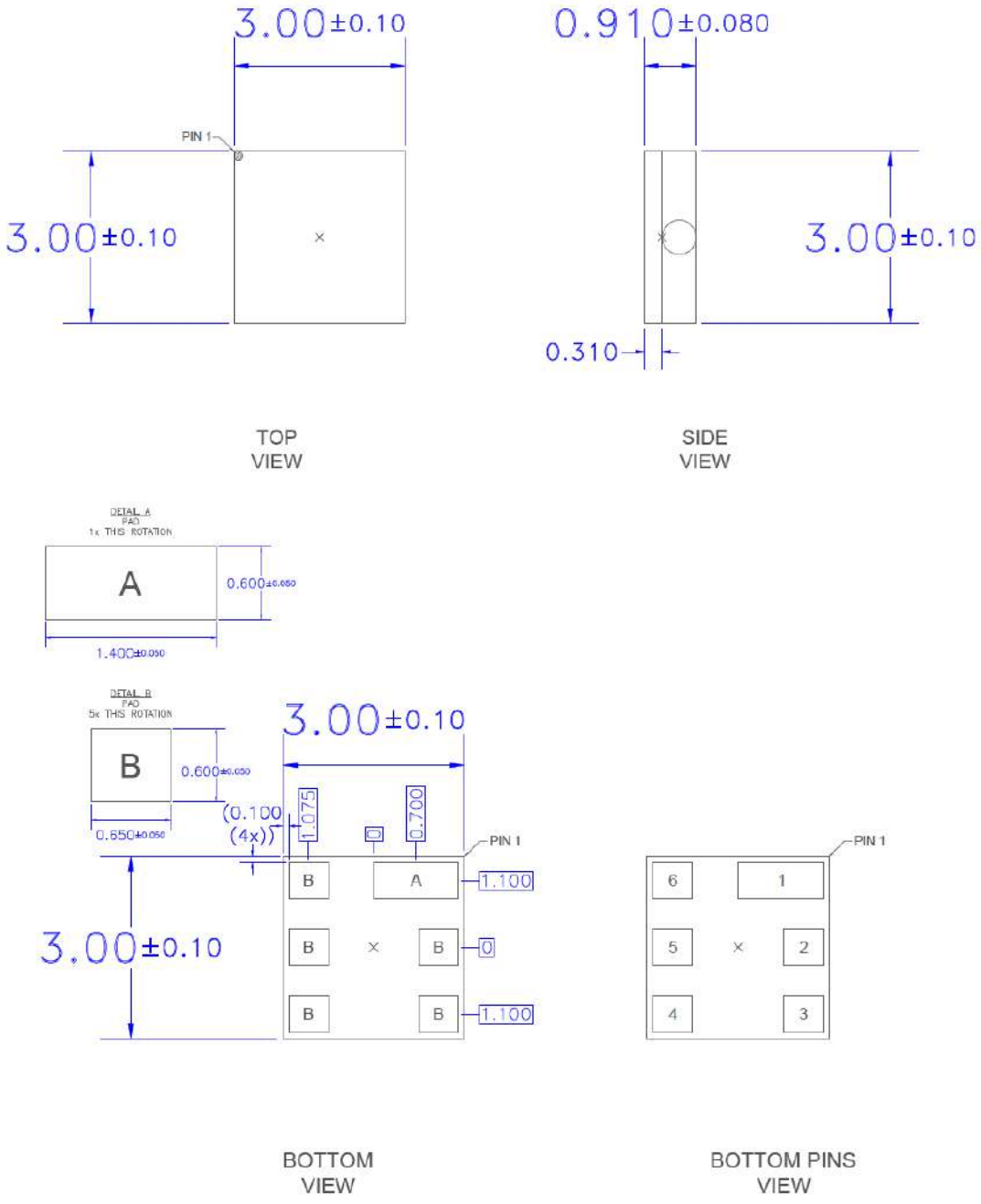






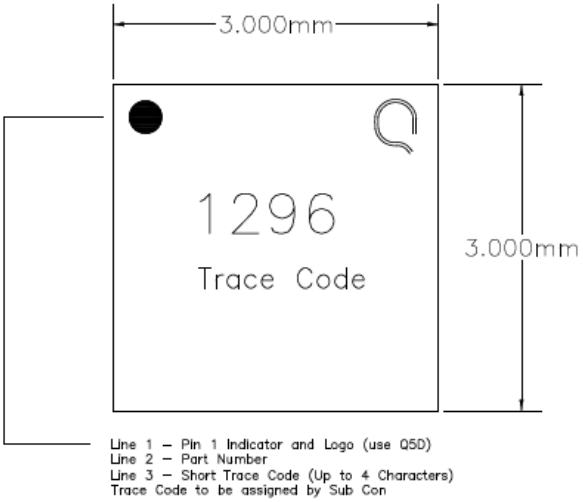


Package Dimensions



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

RECOMMENDED
LAND PATTERN

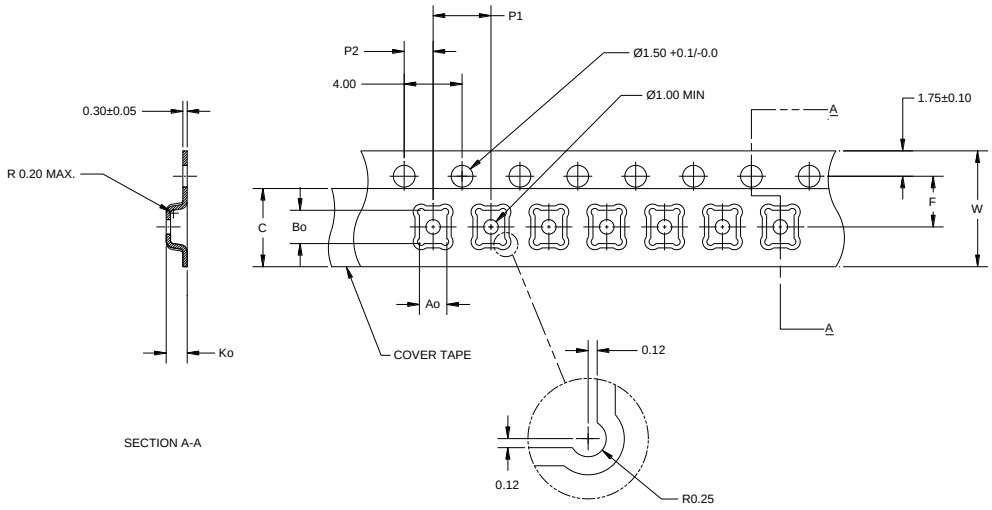
RECOMMENDED
LAND PATTERN MASK

Notes:

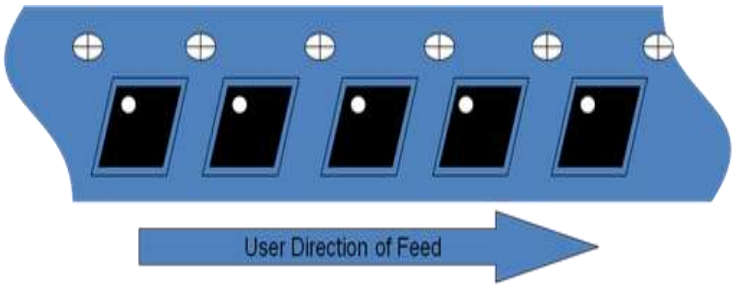
1. All dimensions are in millimeters. Angles are in degrees.
2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

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.

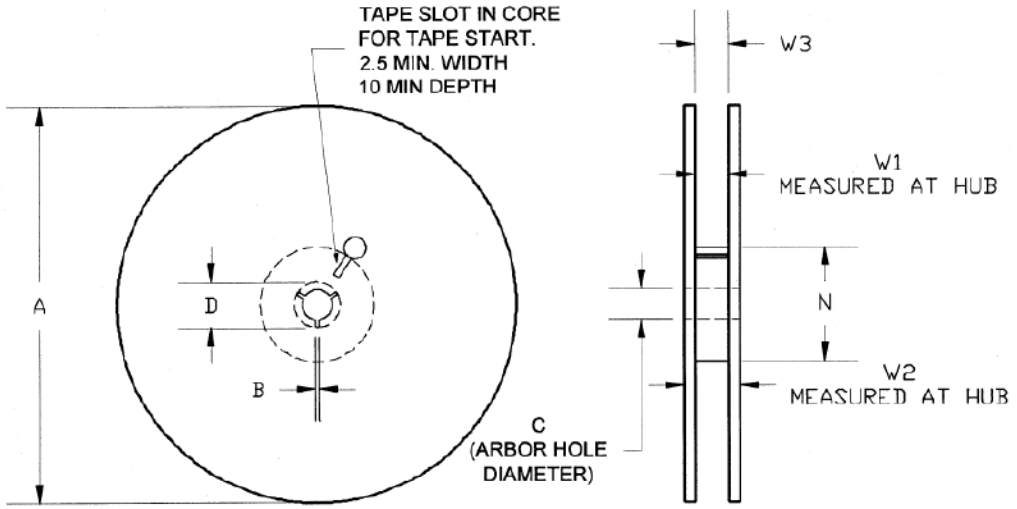


Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.132	3.35
	Width	B0	0.132	3.35
	Depth	K0	0.051	1.30
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.138	3.50
Cover Tape	Width	C	0.213	5.40
Carrier Tape	Width	W	0.315	8.00



Tape and Reel Information – Reel Dimensions

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

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	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: ENIG (Electroless Nickel Immersion Gold)

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**

Email: customer.support@qorvo.com

For technical questions and application information:

Email: appsupport@qorvo.com

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QPQ1298

B41 Sub-Band 160 MHz BAW Filter

General Description

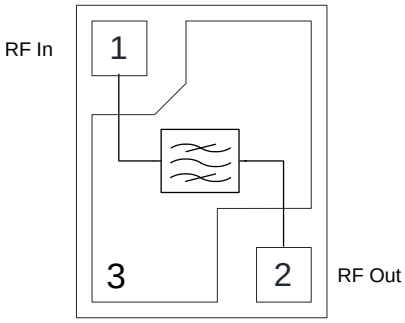
The QPQ1298 is an exceptionally high-performance BAW Filter for sub-Band 41 uplink / downlink. This filter is housed in a compact 2.0 x 1.6 mm package for base station applications.

Low insertion loss coupled with high attenuation makes this filter an ideal choice for TDD Macro Cells and Small Cells.

The QPQ1298 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.

3 Pin 2.0 x 1.6 mm leadless SMT Package

Functional Block Diagram



Top View

Product Features

- 160 MHz Bandwidth – Band 41
- High Attenuation
- Low Loss
- No External Matching Required
- Excellent Wi-Fi Rejection
- Single Input, Single Output Operation
- Small Size: 2.00 x 1.60 x 0.715 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Applications

- Band 41
- Base Station Infrastructure
- Small Cells
- Repeaters
- Routers
- LTE Dongles
- General Purpose Wireless

Pin Configuration

Pin No.	Label
1	RF In
2	RF Out
3	GND Back Side Paddle

Ordering Information

Part	Description
QPQ1298TR7	2500 pieces on a 7" Reel.
QPQ1298EVB	Evaluation Board – QPQ1298

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−40 to 125 °C
Operation Temperature	−40 to +95 °C
RF Input Power, CW, 50 Ω, T=25 °C	37.5 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 device may reduce device reliability.

Minimum Lifetime Ratings

Conditions	Rating
+29 dBm at Pin 1, 2515-2675 MHz, FD-LTE, 5 MHz, 16 QAM, 25 RB, PAR 8 dB, +95°C	>10 years
+31 dBm at Pin 1, 2515-2675 MHz, FD-LTE, 5 MHz, 16 QAM, 25 RB, PAR 8 dB, +95°C	43,000 hours

Electrical Specifications (1) (2) (3)

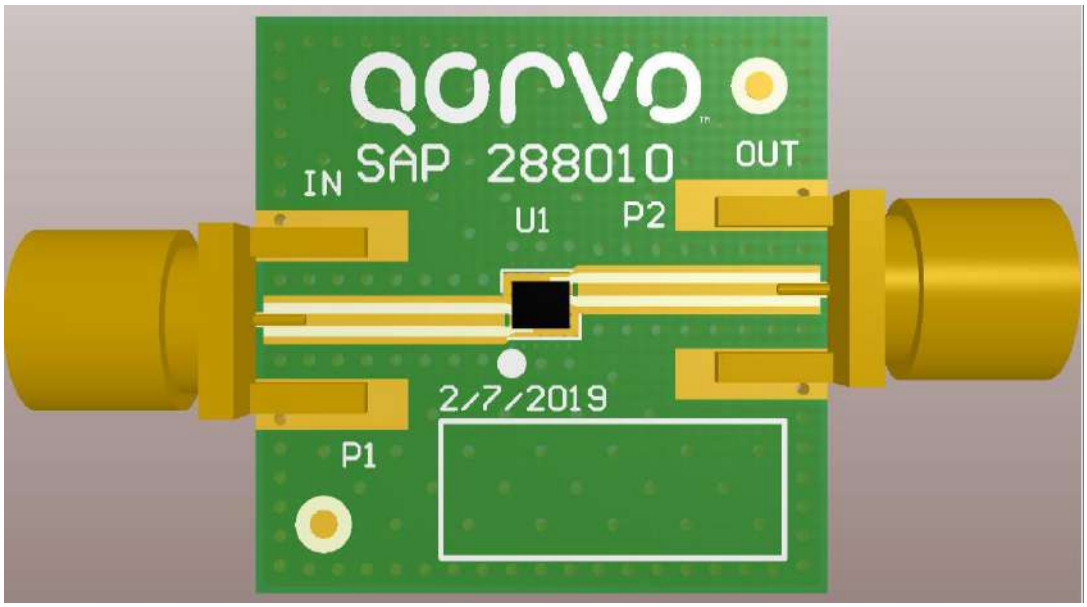
Test Conditions unless otherwise noted= -40°C to +95°C

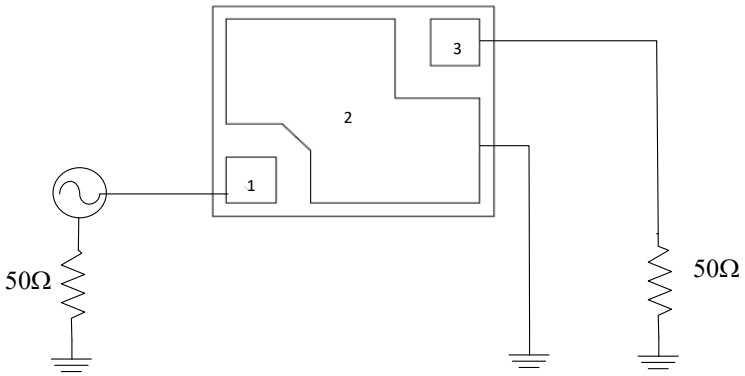
Parameter	Conditions	Min	Typ. (4)	Max	Unit
Frequency Range		2515		2675	MHz
Insertion Loss			2.5	3.3	dB
Amplitude Variation			1.4	2.0	dB
Input VSWR			1.8:1	2.2:1	-
Output VSWR			1.8:1	2.2:1	-
Attenuation (5)	1 - 1785 MHz	30	34		dB
	1785 - 2200 MHz	30	35		dB
	2200 - 2300 MHz	35	41		dB
	2300 - 2400 MHz	46	50		dB
	2400 - 2483.5 MHz	43	46		dB
	2715 - 3000 MHz	38	44		dB
	3300 - 3600 MHz	25	28		dB
	4900 - 5025 MHz	35	38		dB
	5150 - 5350 MHz	35	37		dB
	5490 - 5850 MHz	32	35		dB
Harmonics	H2: 5030-5350 MHz, P_{IN} = 27 dBm @+25 °C	70	79		dBc
	H3: 7545-8025 MHz, P_{IN} = 27 dBm @+25 °C	72	77		dBc

Notes:

1. All specifications are based on the Qorvo schematic shown on page 3.
2. In production, devices will be tested at room temperature to a guard banded specification to ensure compliance over temperature.
3. Electrical margin has been built into the design to account for variations due to temperature drift and manufacturing tolerances.
4. Typical values are based on average measurements at room temperature.
5. Attenuation is referenced to ZERO dB.

QPQ1298EVB Evaluation Board



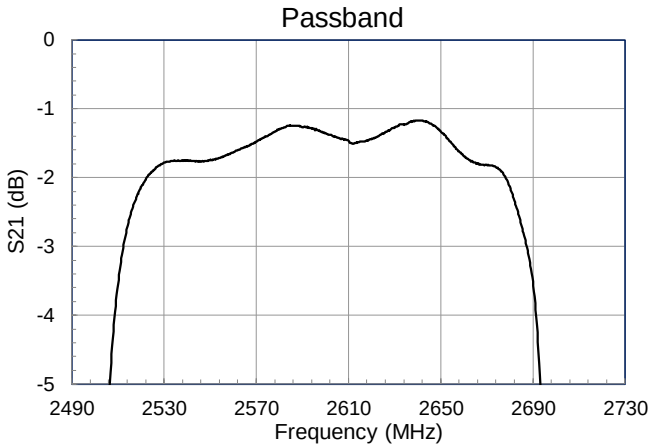


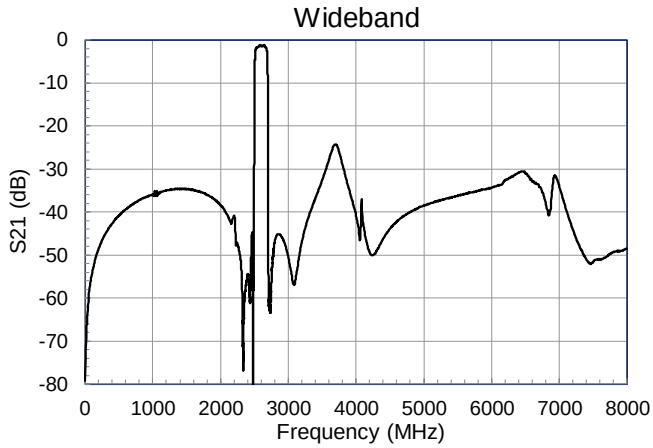
Bill of Material – QPQ1298EVB

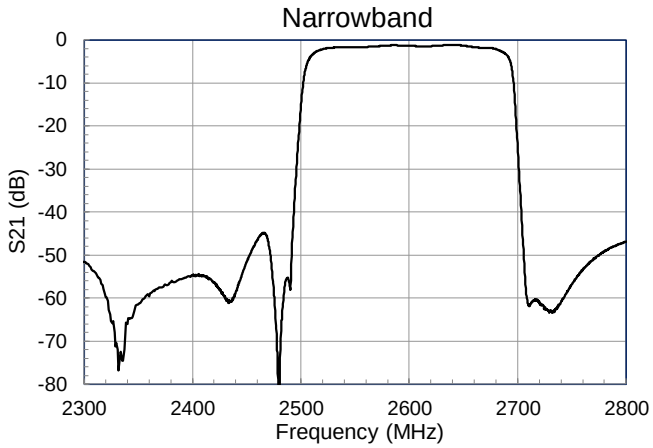
Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	B41 Sub-Band Band 160 MHz BAW Filter	Qorvo	QPQ1298
SMA	n/a	SMA Edge Connector	Various	
PCB	n/a	3-Layer	Various	

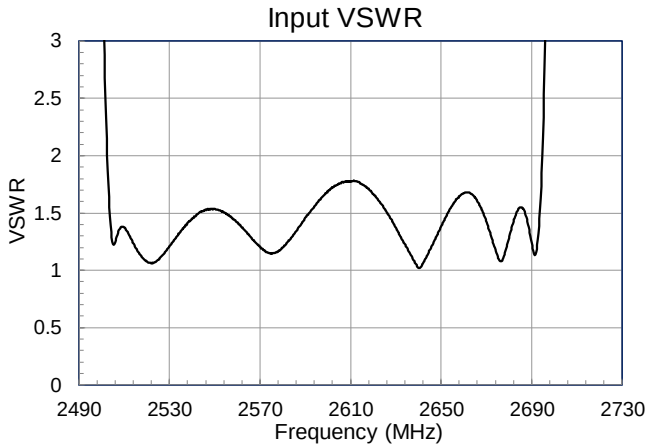
Performance Plots – Small Signal

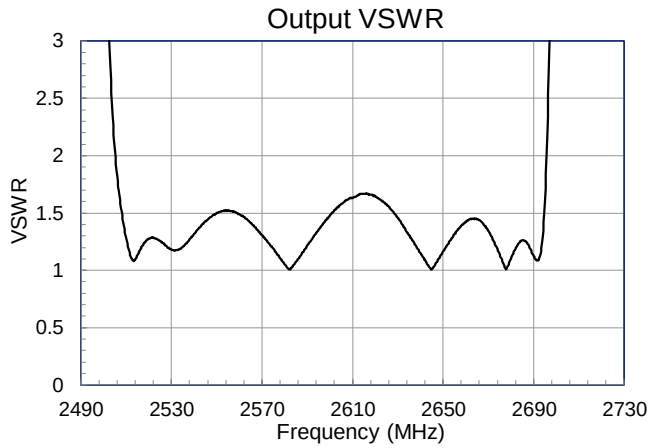
Test conditions unless otherwise noted: Temp = +25 °C, 50 Ω system









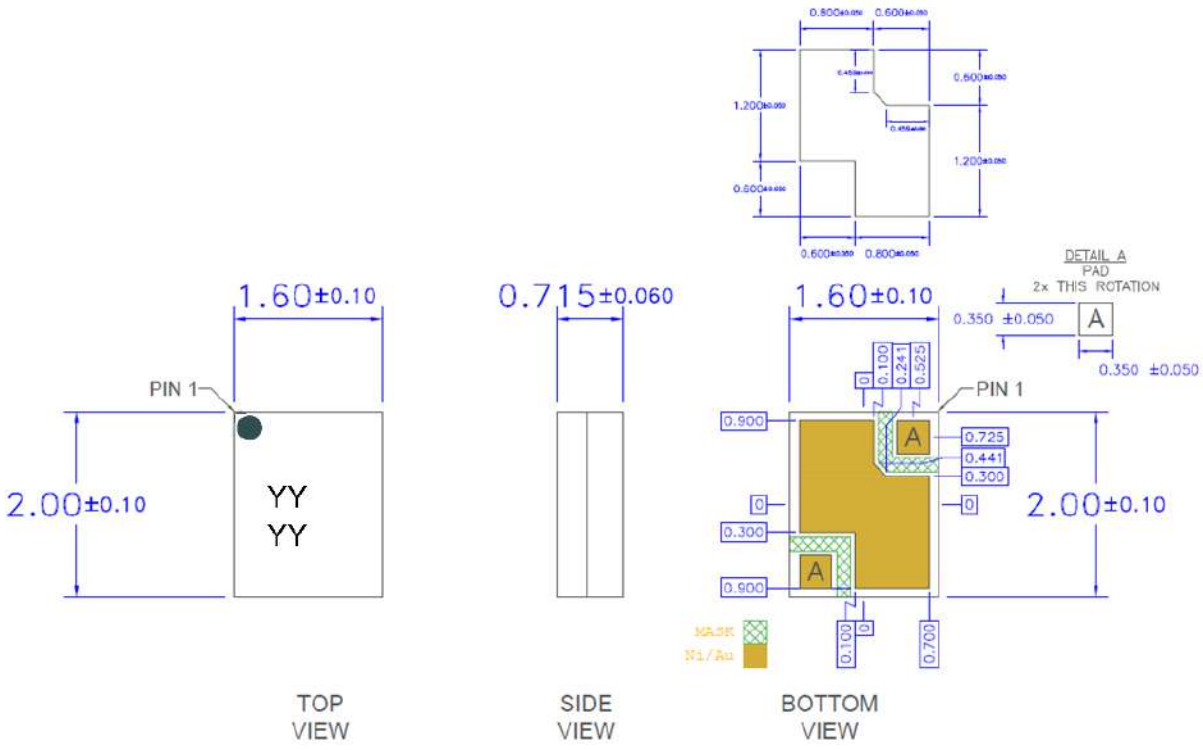


ES France - Département RF & Hyperfréquences - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

Package Marking and Dimensions

Marking:

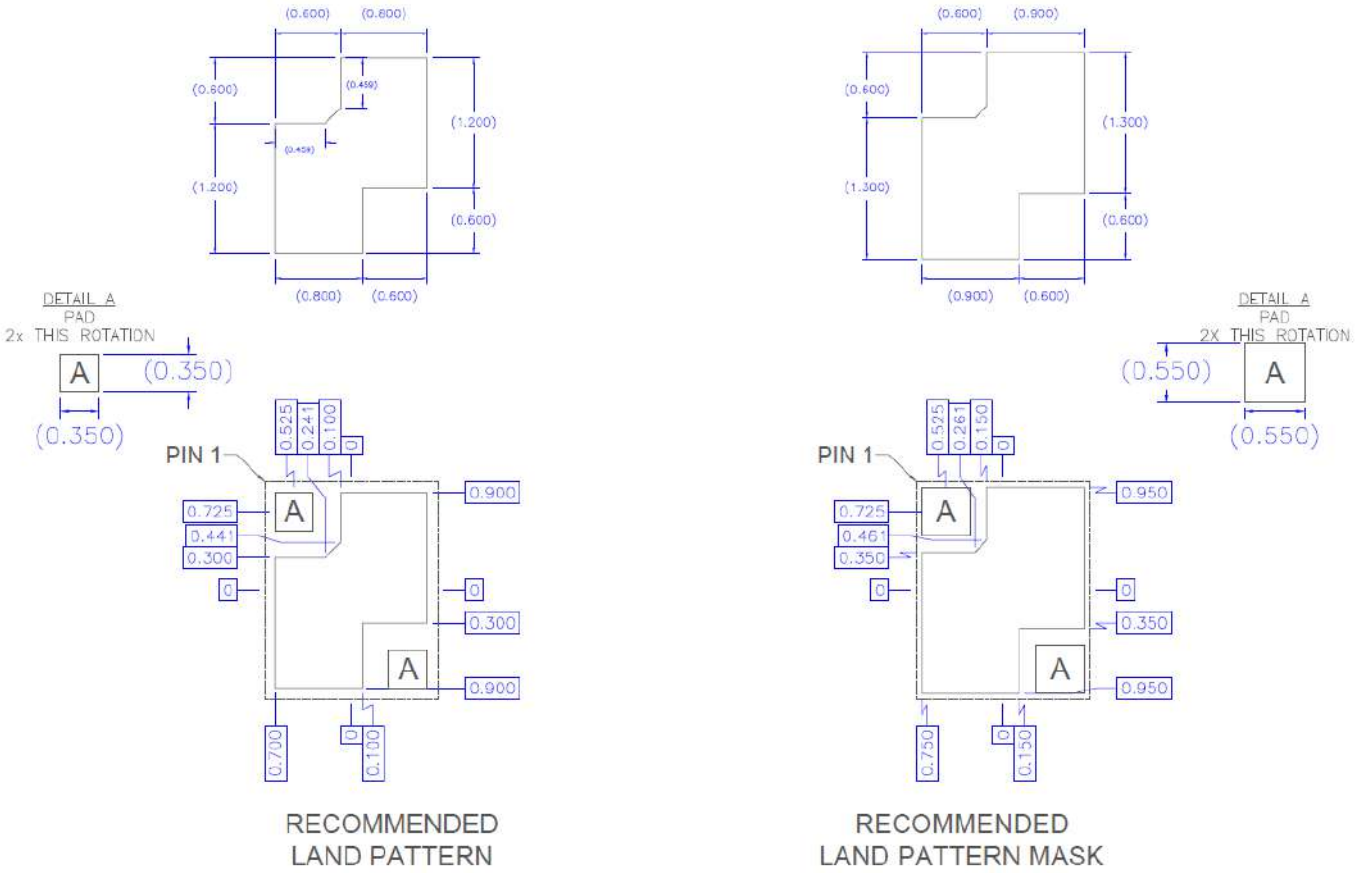
YYYY indicates the Trace Code



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.

PCB Mounting Pattern

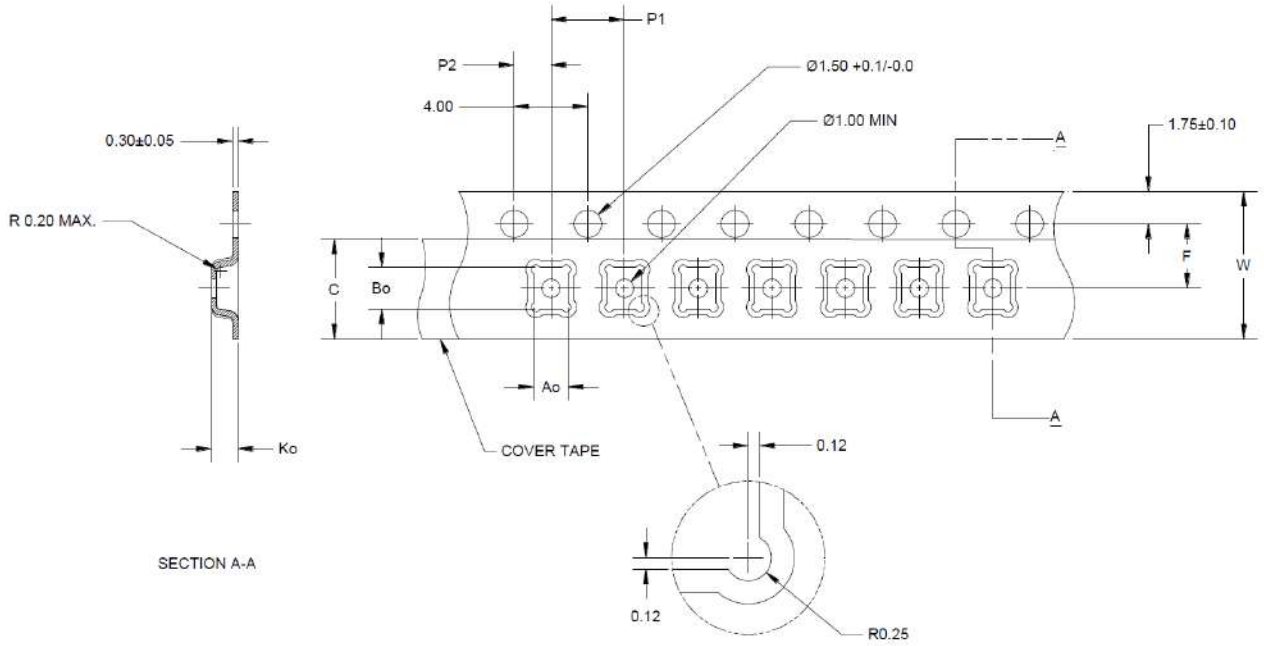


Notes:

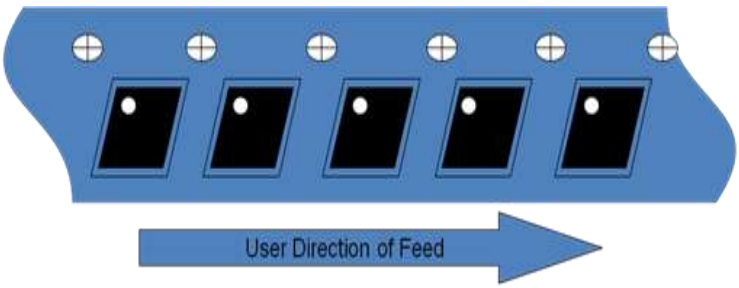
1. All dimensions are in millimeters.
2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes

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	0.077	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



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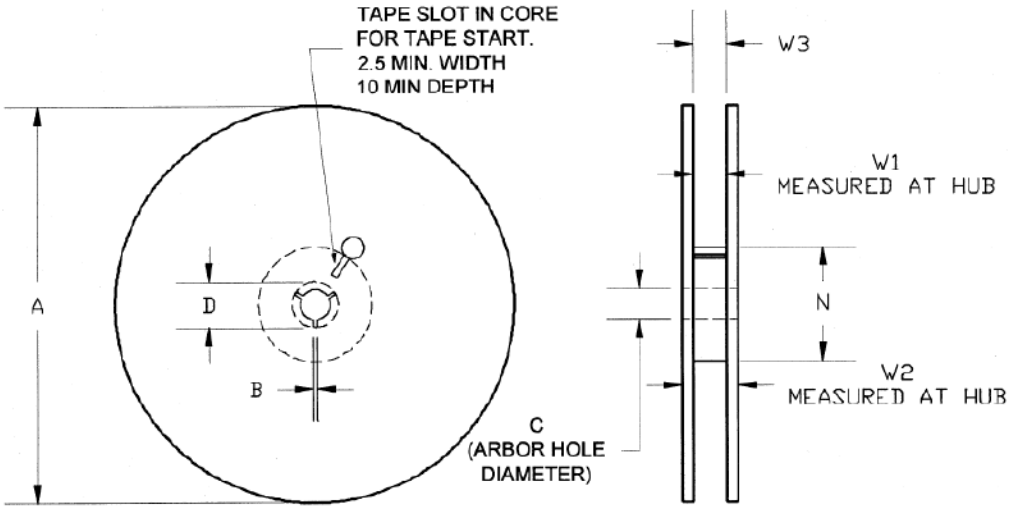
Tape and Reel Information – Reel Dimensions

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



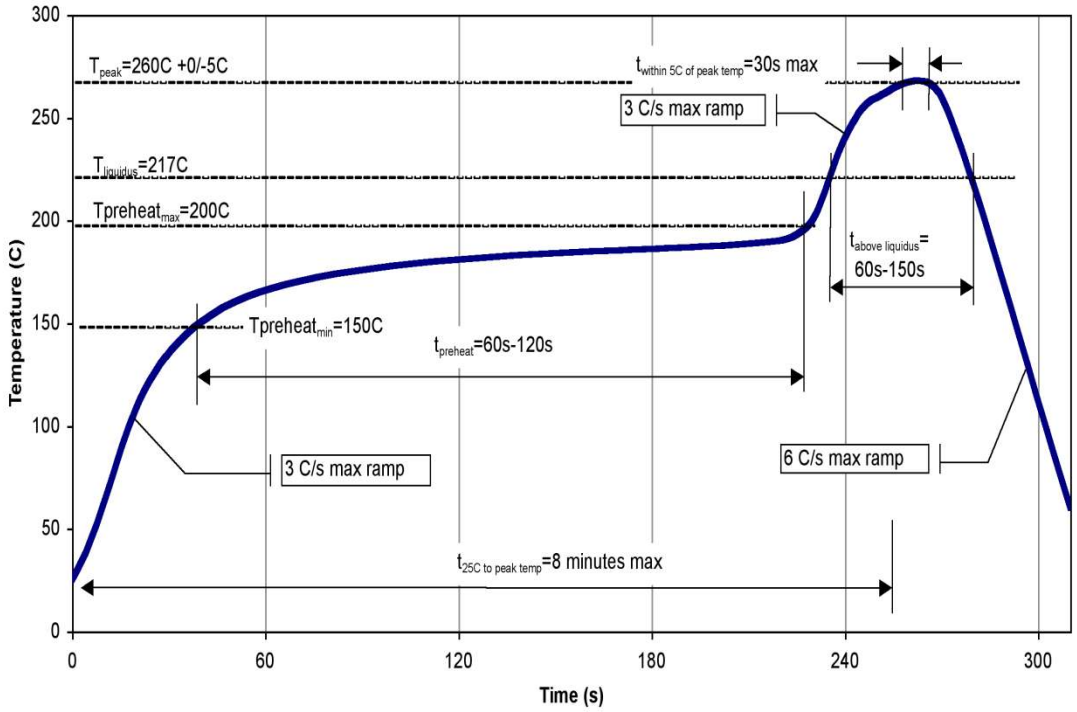
Feature	Measure	Symbol	Size (in)	Size (mm)
Flange	Diameter	A	6.969	177.0
	Thickness	W2	0.559	14.2
	Space Between Flange	W1	0.346	8.8
Hub	Outer Diameter	N	2.283	58.0
	Arbor Hole Diameter	C	0.512	13.0
	Key Slit Width	B	0.079	2.0
	Key Slit Diameter	D	0.787	20.0

Assembly Notes

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

Contact plating: Ni-Au

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	1C	ANSI / ESD / JEDEC JS-001
ESD – Charged Device Model (CDM)	C3	ANSI / ESD / JEDEC JS-002
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

RoHS Compliance

This product is compliant with the 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 ($C_{15}H_{12}Br_40_2$) 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

Email: customer.support@qorvo.com

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QPQ2601

Band 1/3/7 Multiplexer

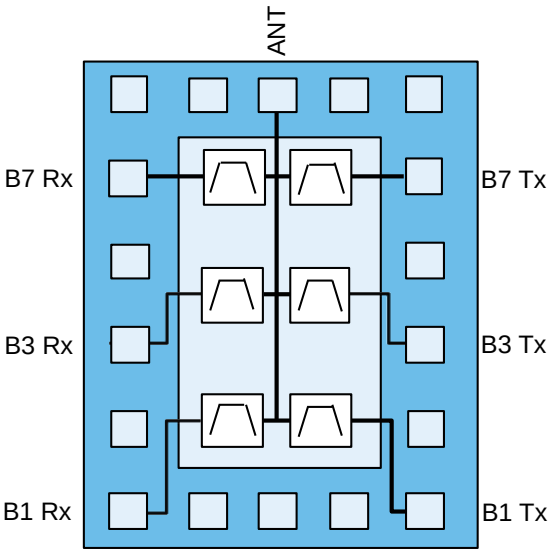
Product Overview

The QPQ2601 is a compact, high-performance multiplexer module fabricated using a patented technology with performance optimized to enable carrier aggregation of bands 1, 3, and 7 for LTE/NR.

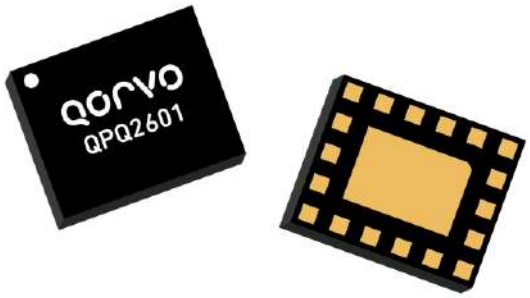
The QPQ2601 leverages the high-Q properties to ensure minimal transmit insertion loss in all bands being multiplexed without loading each other. The QPQ2601 module has also been designed with high cross-isolation which is critical to ensure good receive performance.

The QPQ2601 uses unique Wafer Level Packaging (WLP) techniques to enable a compact 2.6mm x 3.2mm x 0.8mm footprint.

Functional Block Diagram



Bottom View



19 Pin 2.6 x 3.2mm leadless SMT package

Key Features

- Compact Form-Factor: 2.6mm x 3.2mm
- Minimizes PA current drain with excellent TX IL
- Improved RX sensitivity with low RX IL
- Single-Ended
- RoHS Compliant, Pb-Free Module Package

Applications

- Base Station Infrastructure
- Small Cells
- Repeaters
- Routers
- LTE Dongles
- General Purpose Wireless

Ordering Information

Part Number	Description
QPQ2601TR13	5000 pieces on a 13” Reel
QPQ2601EVB	Evaluation Board (EVB)

Absolute Maximum Ratings

Parameter	Pin	Conditions	Rating	Units
Storage Temperature			-40 to +105	°C
RF Input Power	6, 8, or 10	CW, +55°C for 5k hours	+31	dBm
Peak RF Input Power	6, 8, or 10	Max duration 500ms, +25°C	+36.5	dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
T_{CASE}	-40		+105	°C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications[1] Band 1 Transmit - Antenna

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	1920 MHz – 1980 MHz	-	1.88[2]	3.1	dB
VSWR (TX Port)	1920 MHz – 1980 MHz	-	1.4:1	2:1[3]	-
VSWR (ANT Port)			1.4:1	2:1	
Attenuation	600 MHz – 1000 MHz	44	60	-	dB
	1452 MHz – 1496 MHz	44	57	-	
	1559 MHz – 1606 MHz	44	60	-	
	1805 MHz – 1880 MHz	46	61	-	
	2110 MHz – 2170 MHz	50	60	-	
	2400 MHz – 2500 MHz	45	67	-	
	2620 MHz – 2690 MHz	50	70	-	
	3840 MHz – 3960 MHz	35	72	-	
	4900 MHz – 5940 MHz	30	60	-	

Notes:

1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature
3. Specified from -15°C to +85°C

Electrical Specifications[1] Band 1 Antenna - Receive

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	2110 MHz – 2170 MHz	-	1.86[2]	3	dB
VSWR (RX Port)	2110 MHz – 2170 MHz	-	1.4:1	2:1	-
VSWR (ANT Port)			1.4:1	2:1	
Attenuation	600 MHz – 1000 MHz	40	55	-	dB
	1710 MHz – 1785 MHz	48	61	-	
	1920 MHz – 1980 MHz	48	59	-	
	2400 MHz – 2500 MHz	45	69	-	
	2500 MHz – 2570 MHz	48	66	-	
	4900 MHz – 5150 MHz	27	35	-	
	5150 MHz – 5950 MHz	35	41	-	

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature

Electrical Specifications[1] Band 3 Transmit - Antenna

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	1710 MHz – 1785 MHz	-	1.85[2]	3.6	dB
VSWR (TX Port)	1710 MHz – 1785 MHz	-	1.3:1	2:1	-
VSWR (ANT Port)			1.3:1	2:1	
Attenuation	600 MHz – 1000 MHz	40	50	-	dB
	1452 MHz – 1496 MHz	40	44	-	
	1559 MHz – 1606 MHz	45	56	-	
	1805 MHz – 1880 MHz	50[3]	62	-	
	2110 MHz – 2170 MHz	45	56	-	
	2400 MHz – 2500 MHz	40	56	-	
	2620 MHz – 2690 MHz	45	64	-	
	3420 MHz – 3570 MHz	40	65	-	
	4900 MHz – 5900 MHz	30	43	-	

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature
3. Specified from +25°C to +85°C

Electrical Specifications[1] Band 3 Antenna - Receive

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	1805 MHz – 1880 MHz	-	1.87[2]	3.9[3]	dB
VSWR (RX Port)	1805 MHz – 1880 MHz	-	1.6:1	2:1	-
VSWR (ANT Port)			1.5:1	2:1	
Attenuation	600 MHz – 1000 MHz	40	52	-	dB
	1710 MHz – 1785 MHz	44	60	-	
	1920 MHz – 1980 MHz	45	58	-	
	2400 MHz – 2500 MHz	45	53	-	
	2500 MHz – 2570 MHz	45	63	-	
	4900 MHz – 5950 MHz	35	62	-	

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature
3. Integrated over any 5MHz bandwidth

Electrical Specifications[1] Band 7 Transmit - Antenna

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	2500 MHz – 2570 MHz	-	1.67[2]	3.4[3]	dB
VSWR (TX Port)	2500 MHz – 2570 MHz	-	1.5:1	2:1	-
VSWR (ANT Port)	2500 MHz – 2570 MHz	-	1.4:1	2:1	
Attenuation	600 MHz – 1000 MHz	35	47	-	dB
	1452 MHz – 1496 MHz	35	49	-	
	1559 MHz – 1606 MHz	35	55	-	
	1805 MHz – 1880 MHz	45	53	-	
	2110 MHz – 2170 MHz	44	52	-	
	2402.5 MHz – 2471.5 MHz[4] WiFi CH1-11	43	46	-	
	2457.5 MHz – 2476.5 MHz[4] WiFi CH12	36	46	-	
	2620 MHz – 2690 MHz	45	61	-	
	4900 MHz – 5900 MHz	28	31	-	

Notes:

1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature
3. Specified from +25°C to +85°C
4. Each channel integrated over 19MHz

Electrical Specifications[1] Band 7 Antenna - Receive

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	2620 MHz – 2690 MHz	-	1.6[2]	2.7	dB
VSWR (RX Port)	2620 MHz – 2690 MHz	-	1.5:1	2:1	-
VSWR (ANT Port)	2620 MHz – 2690 MHz	-	1.6:1	2:1	
Attenuation	600 MHz – 1000 MHz	40	53	-	dB
	1710 MHz – 1785 MHz	45	55	-	
	1920 MHz – 1980 MHz	45	58	-	
	2400 MHz – 2500 MHz	40	55	-	
	2500 MHz – 2570 MHz	45	59	-	
	4900 MHz – 5950 MHz	30	53	-	

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature

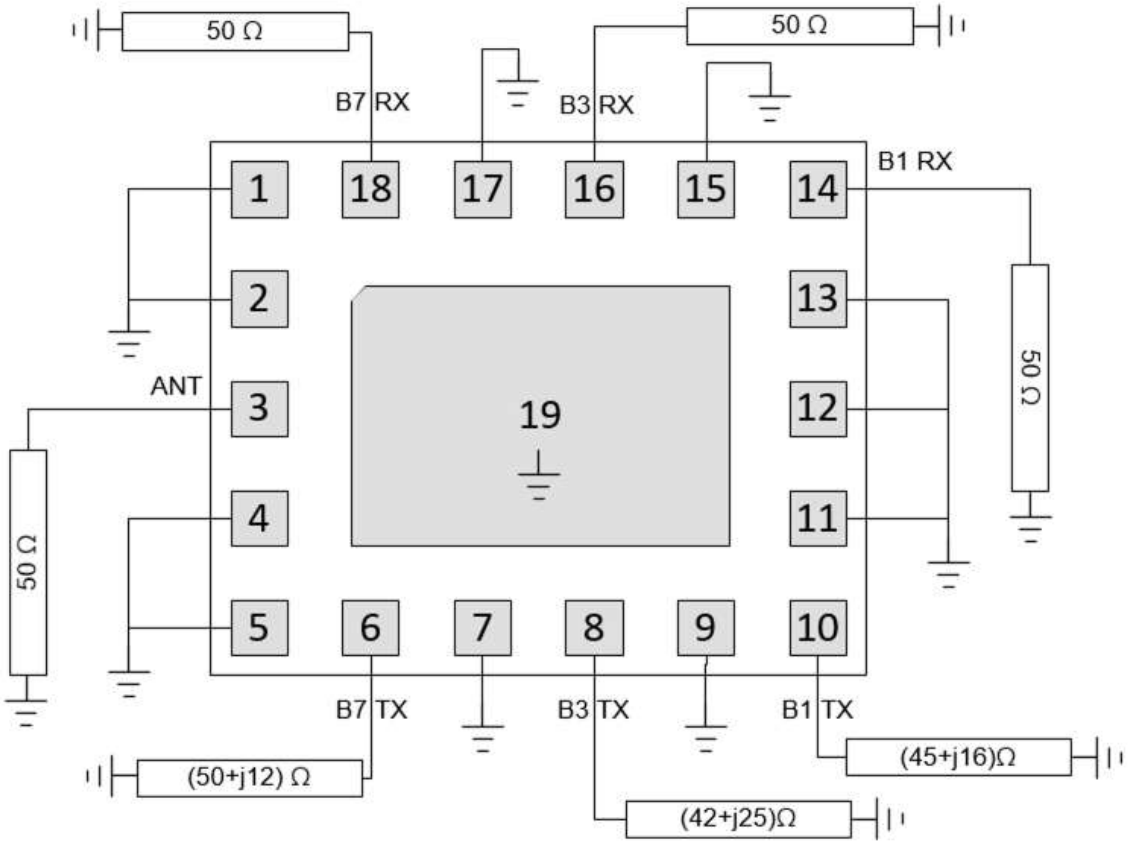
Electrical Specifications[1] Isolation

Unless Otherwise Noted: Operating Temp = −30 °C to +85 °C

Parameter	Conditions	Min.	Typ.	Max.	Units
TX-RX Isolation in B1 RX	2110 MHz – 2170 MHz	55	60	-	dB
TX-RX Isolation in B1 TX	1920 MHz – 1980 MHz	55	59	-	
TX-RX Isolation in B3 RX	1805 MHz – 1880 MHz	55[2][3]	59	-	
TX-RX Isolation in B3 TX	1710 MHz – 1785 MHz	55[3]	62	-	
TX-RX Isolation in B7 TX	2500 MHz – 2570 MHz	55	61	-	
TX-RX Isolation in B7 RX	2620 MHz – 2690 MHz	55	63	-	
B1 TX to B3 RX Isolation in B3 RX	1805 MHz – 1880 MHz	55	58	-	
B1 TX to B3 RX Isolation in B1 TX	1920 MHz – 1980 MHz	55	64	-	
B3 TX to B1 RX Isolation in B3 TX	1710 MHz – 1785 MHz	55	63	-	
B3 TX to B1 RX Isolation in B1 RX	2110 MHz – 2170 MHz	54	57	-	
B1 TX to B7 RX Isolation in B1 TX	1920 MHz – 1980 MHz	55	60	-	
B1 TX to B7 RX Isolation in B7 RX	2620 MHz – 2690 MHz	55	69	-	
B7 TX to B1 RX Isolation in B7 TX	2500 MHz – 2570 MHz	55	66	-	
B7 TX to B1 RX Isolation in B1 RX	2110 MHz – 2170 MHz	50	62	-	
B3 TX to B7 RX Isolation in B3 TX	1710 MHz – 1785 MHz	55	57	-	
B3 TX to B7 RX Isolation in B7 RX	2620 MHz – 2690 MHz	55	66	-	
B7 TX to B3 RX Isolation in B7 TX	2500 MHz – 2570 MHz	55	62	-	
B7 TX to B3 RX Isolation in B3 RX	1805 MHz – 1880 MHz	54[3]	57	-	

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design
2. Specified from +25°C to +85°C
3. Integrated over any 5MHz bandwidth

Application Circuit Schematic



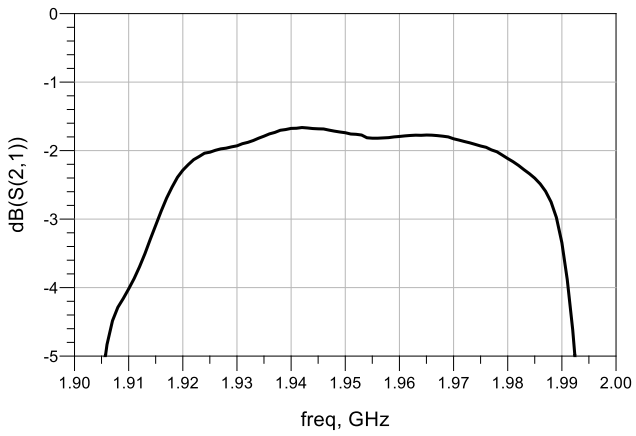
Note:

B1 TX (pin 10), B3 TX (pin 8), and B7 TX (pin 6) are terminated with complex impedance to provide flexible matching options for optimizing TX performance between PA and QPQ2601. All other ports are matched to 50 ohm impedance

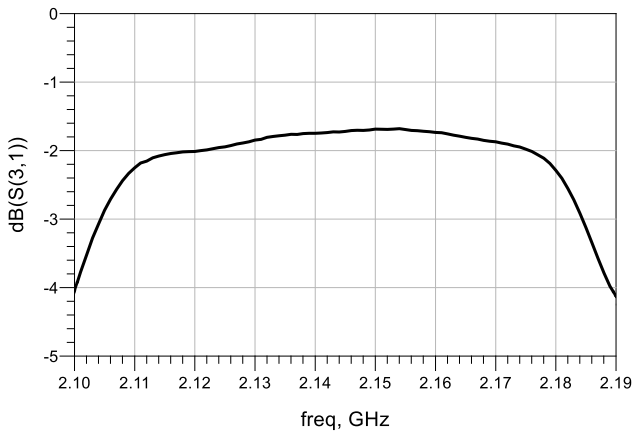
Performance Plots – Pass Band

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

B1 TX

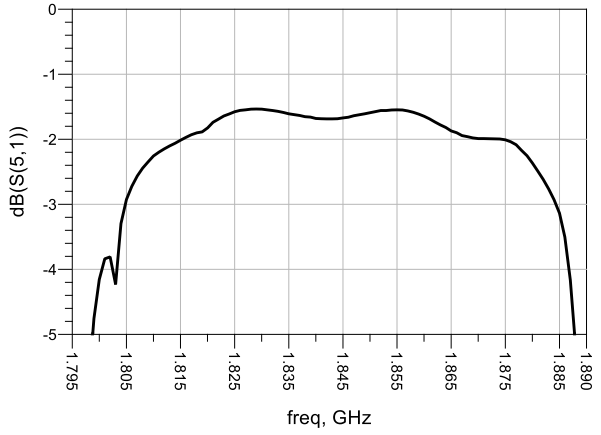


B1 RX

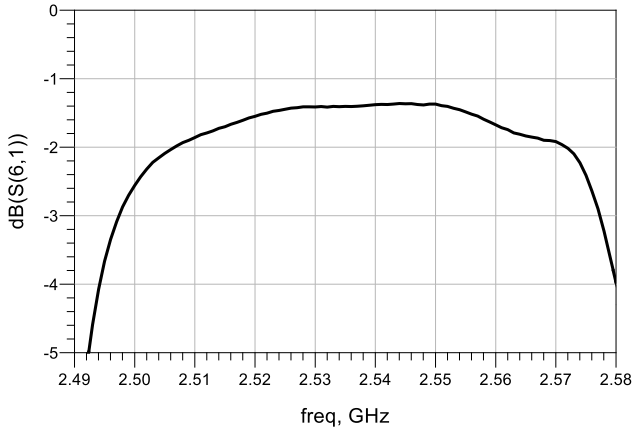


B3 TX

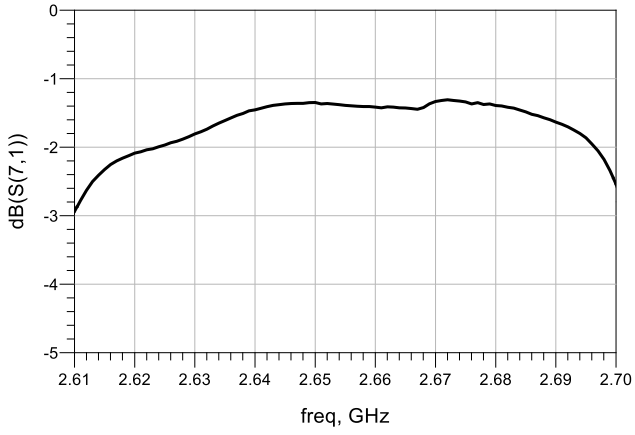
B3 RX



B7 TX



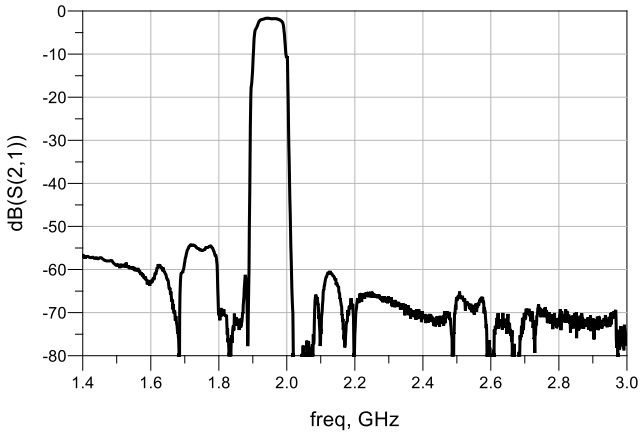
B7 RX



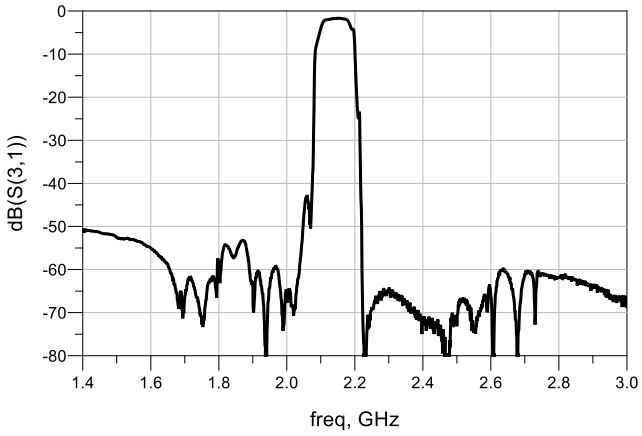
Performance Plots – Narrow Band

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

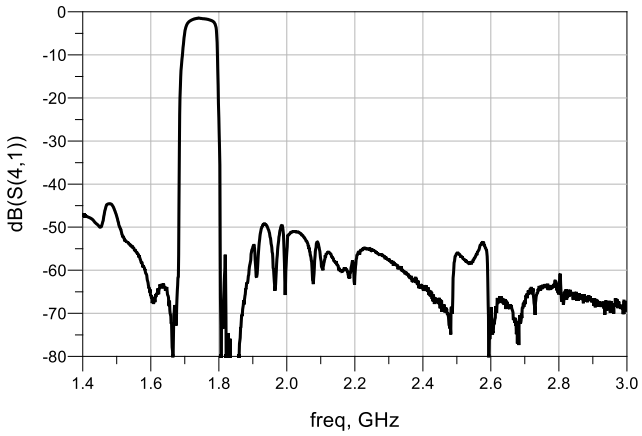
B1 TX NB



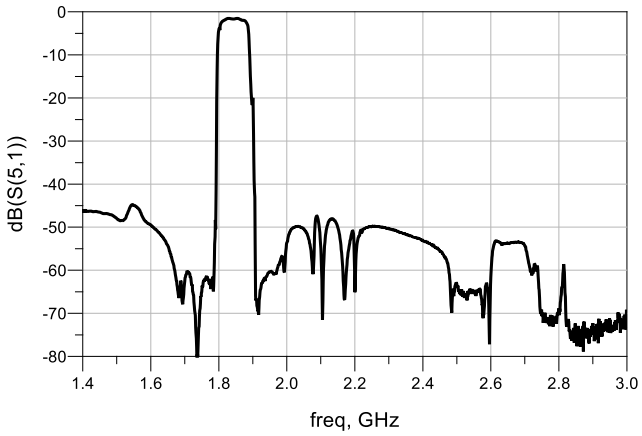
B1 RX NB



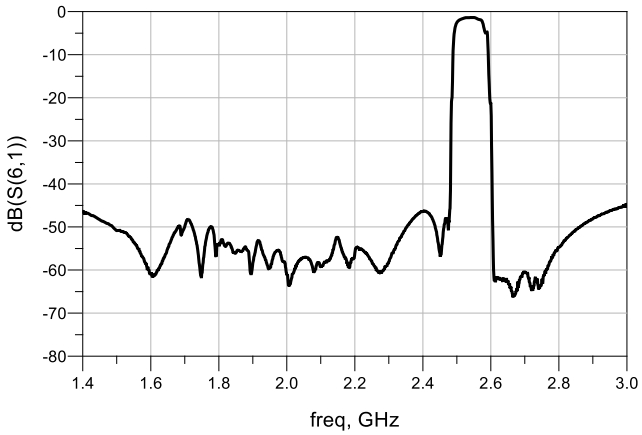
B3 TX NB



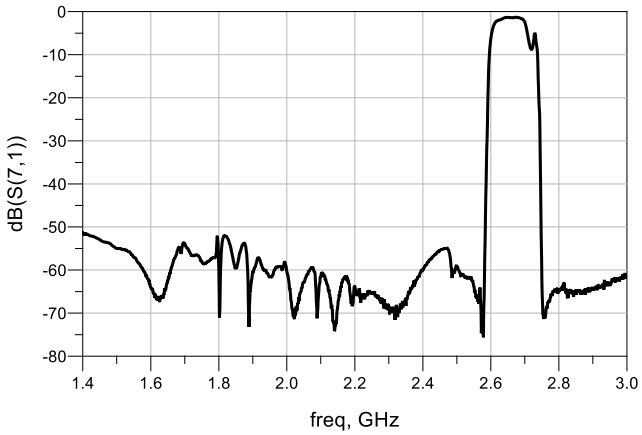
B3 RX NB



B7 TX NB



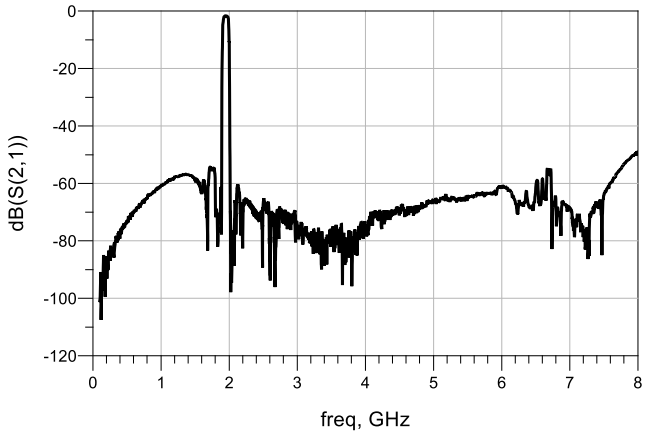
B7 RX NB



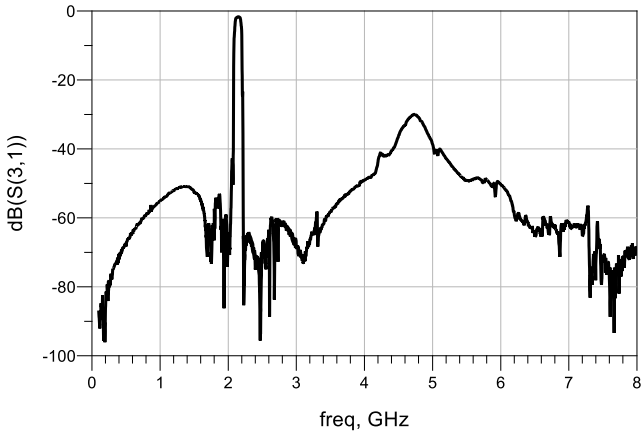
Performance Plots – Wide Band

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

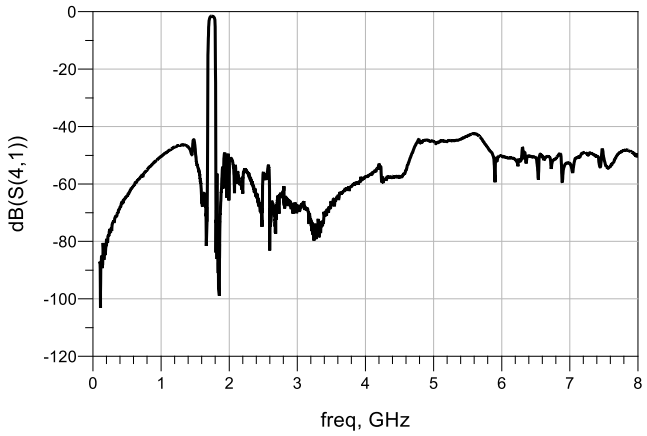
B1 TX WB



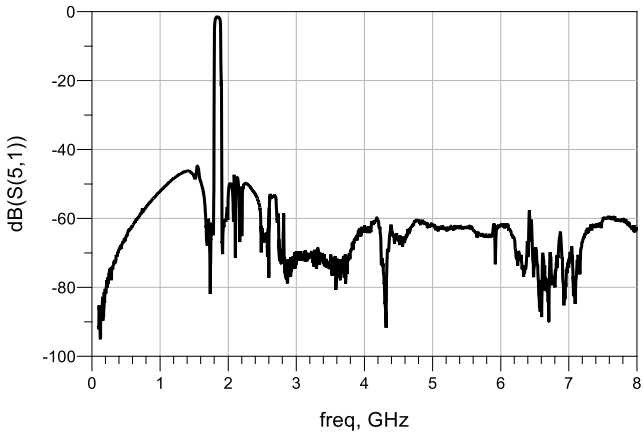
B1 WB



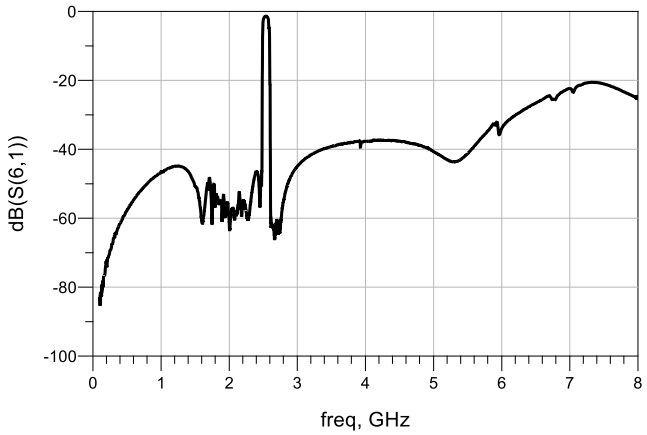
B3 TX WB



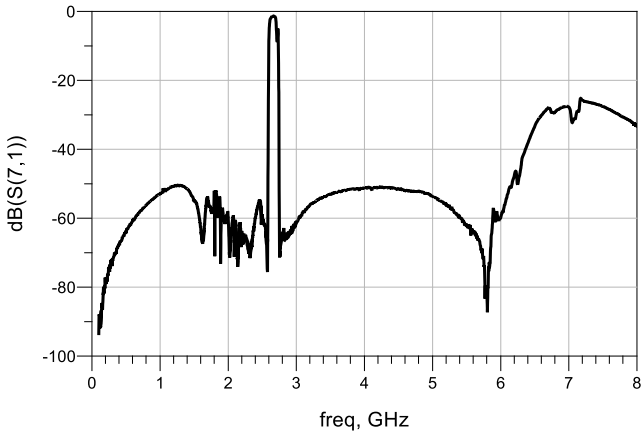
B3 RX WB



B7 TX WB

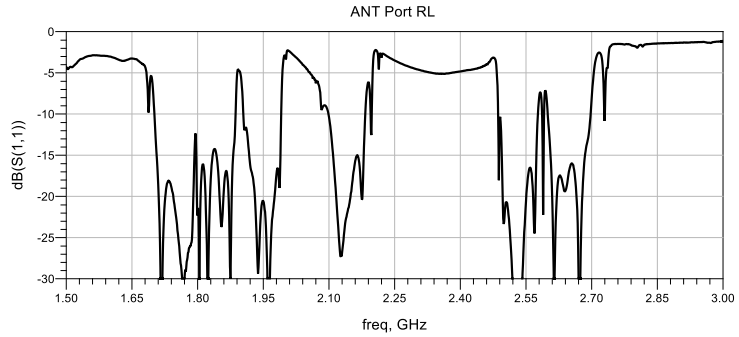


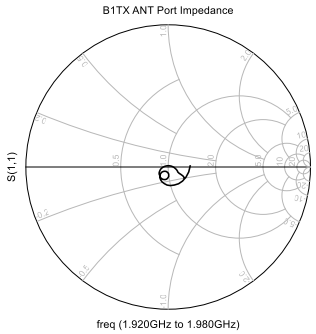
B7 RX WB

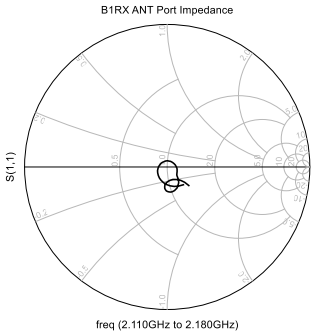


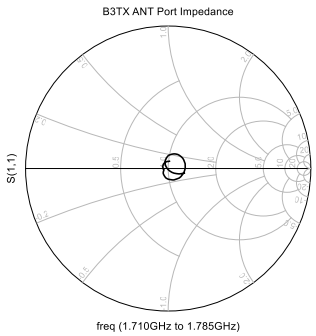
Performance Plots – ANT Port Return Loss/Impedance

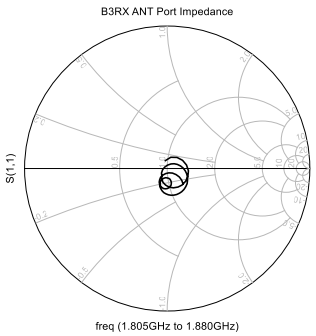
Test conditions unless otherwise noted: Temp. = +25 °C

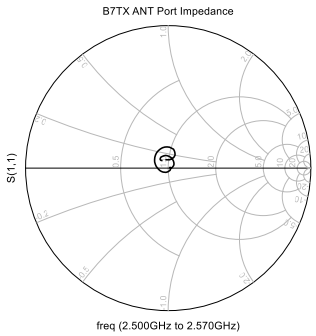


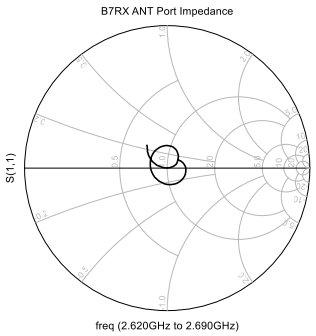






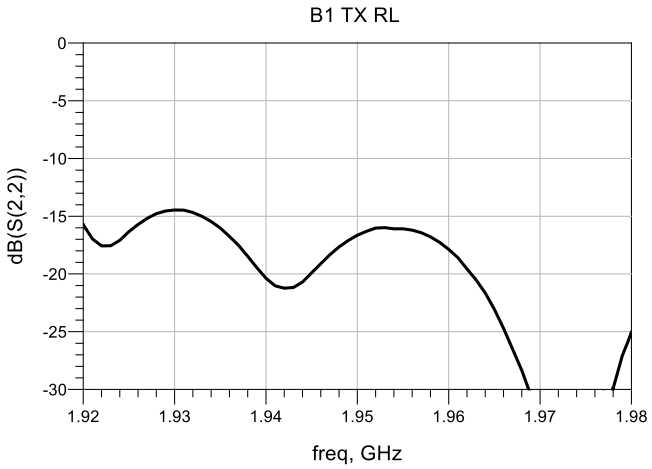


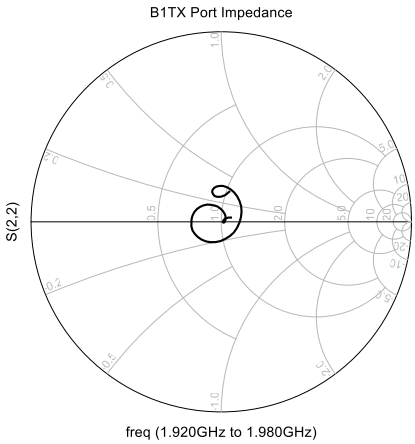


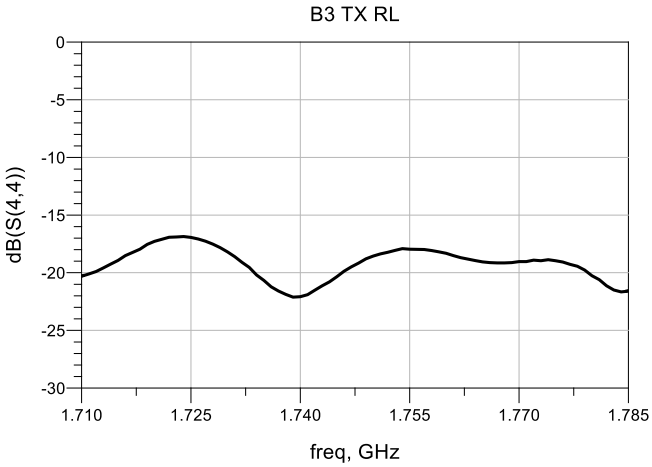


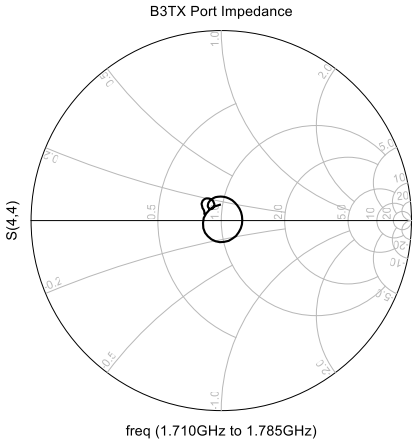
Performance Plots – TX Port Return Loss/Impedance

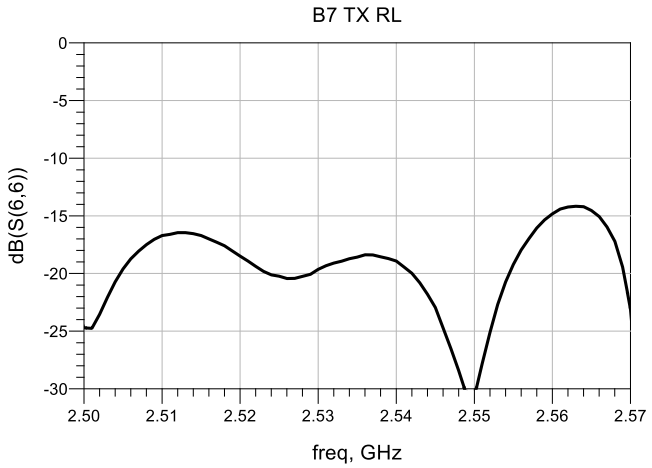
Test conditions unless otherwise noted: Temp. = +25 °C

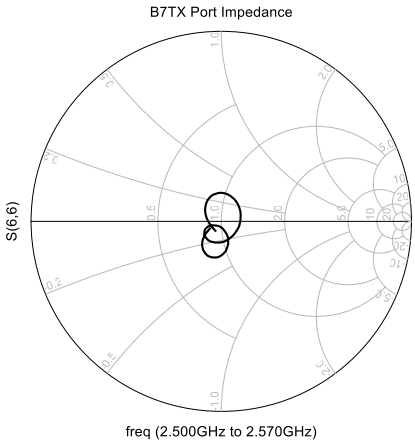






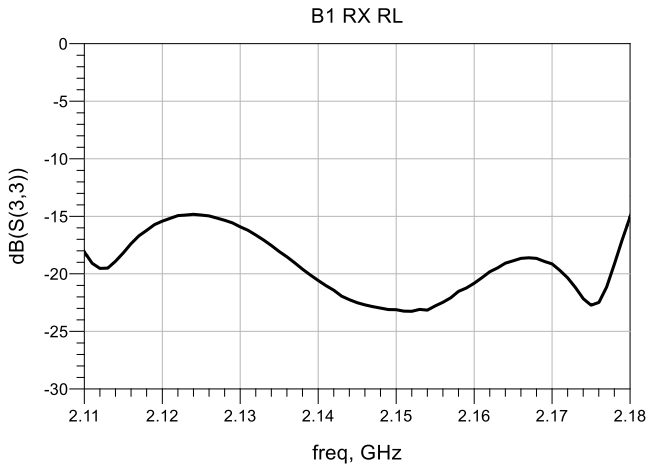


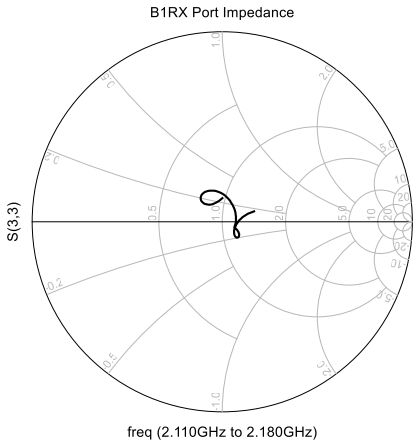


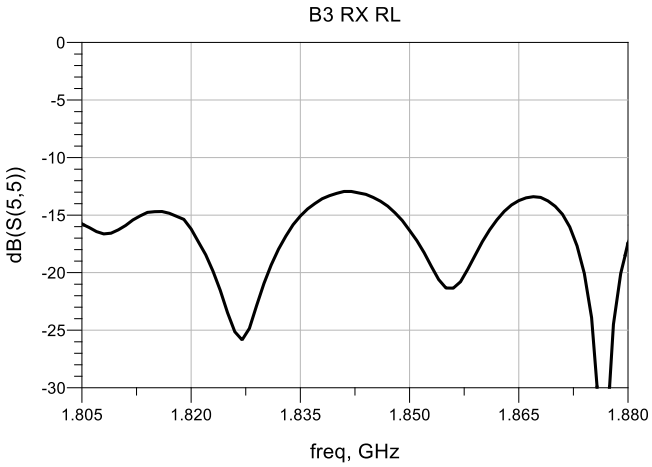


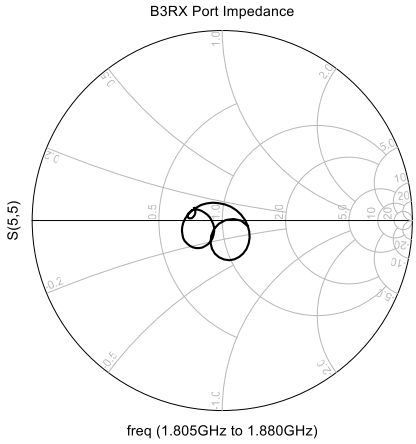
Performance Plots – RX Port Return Loss/Impedance

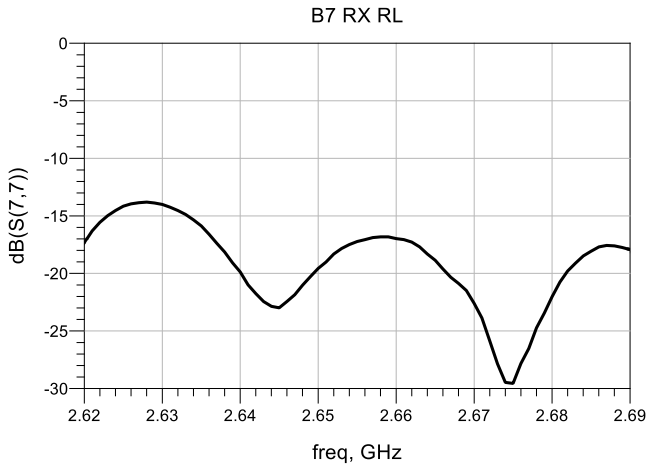
Test conditions unless otherwise noted: Temp. = +25 °C

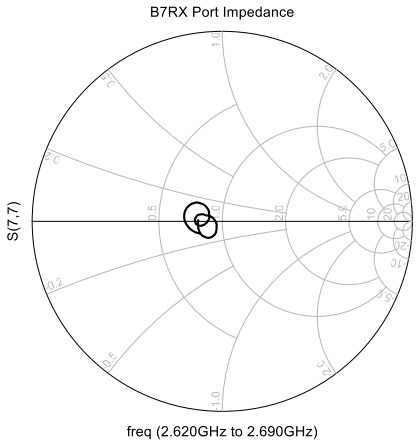






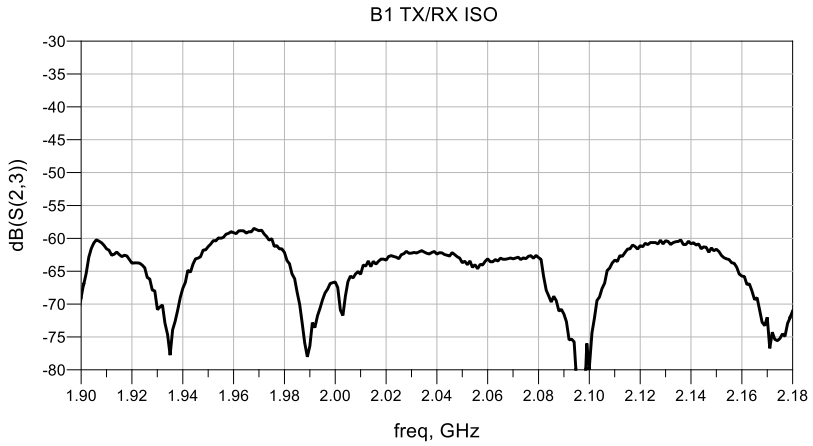


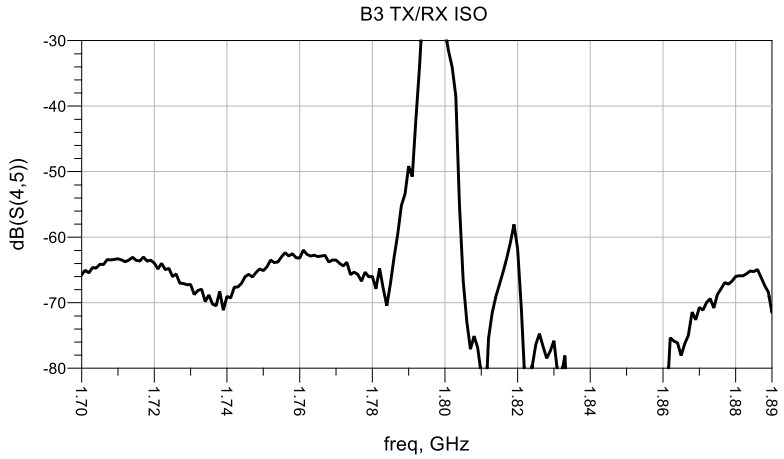


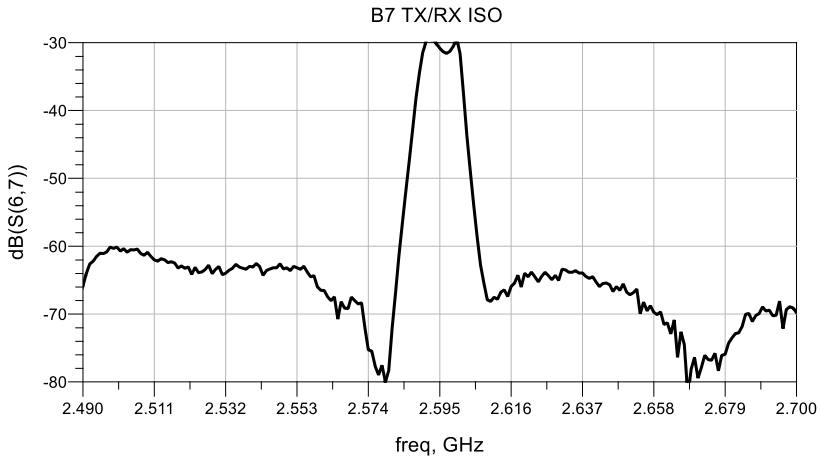


Performance Plots – Isolation

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



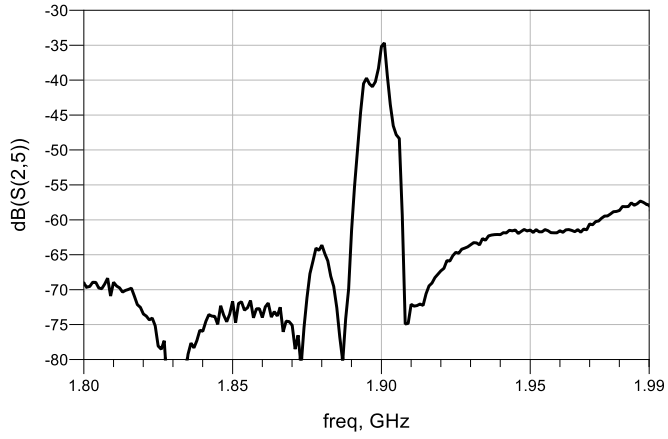




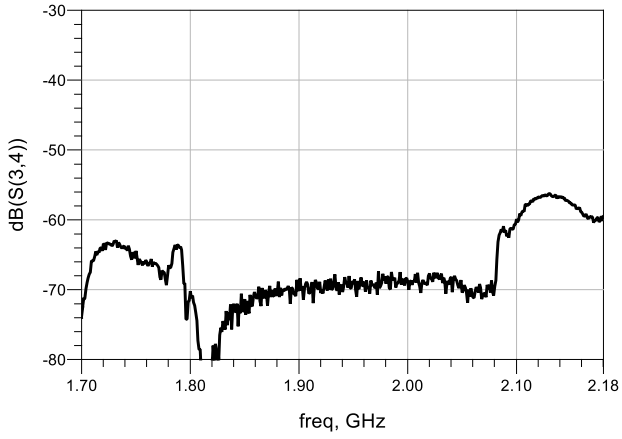
Performance Plots – Cross-Isolation

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

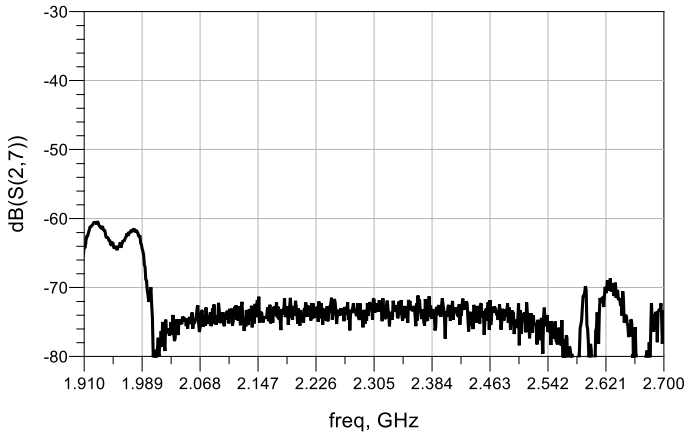
B1 TX - B3RX Cross-ISO



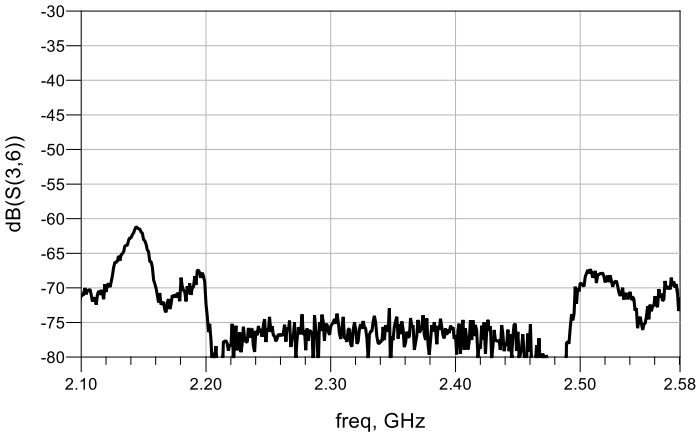
B1RX - B3TX Cross-ISO



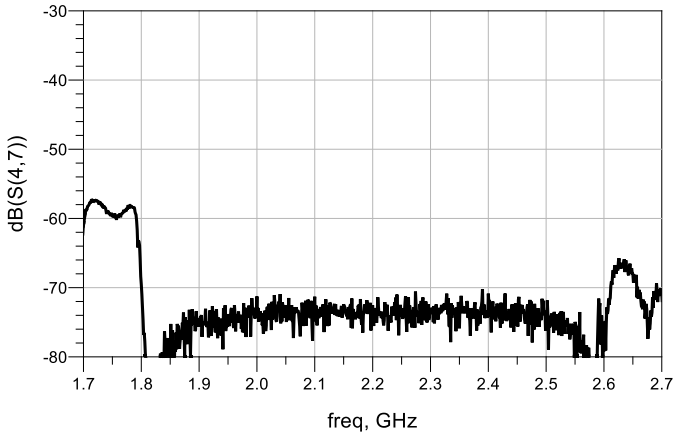
B1TX - B7RX Cross-ISO



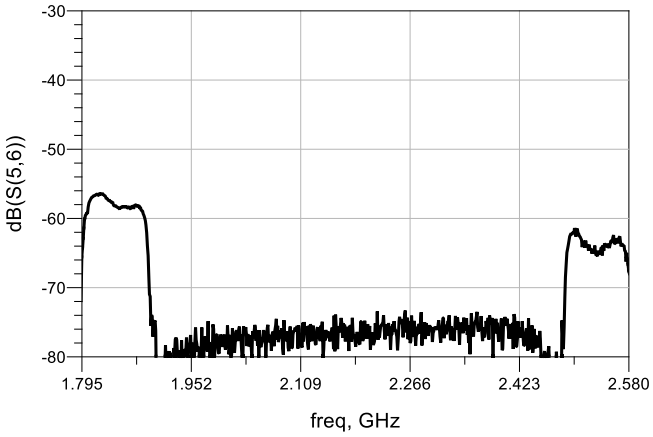
B1RX - B7TX Cross-ISO



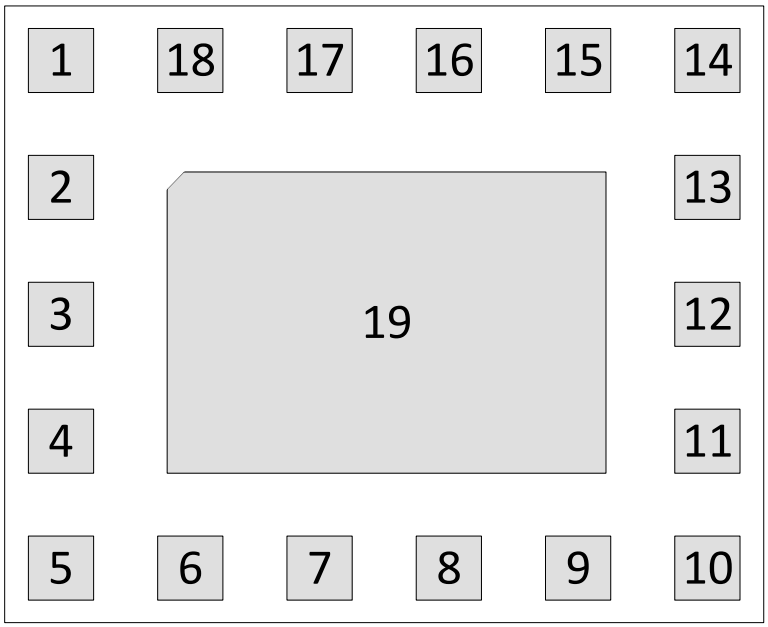
B3TX -B7RX Cross-ISO



B3RX-B7TX Cross-ISO



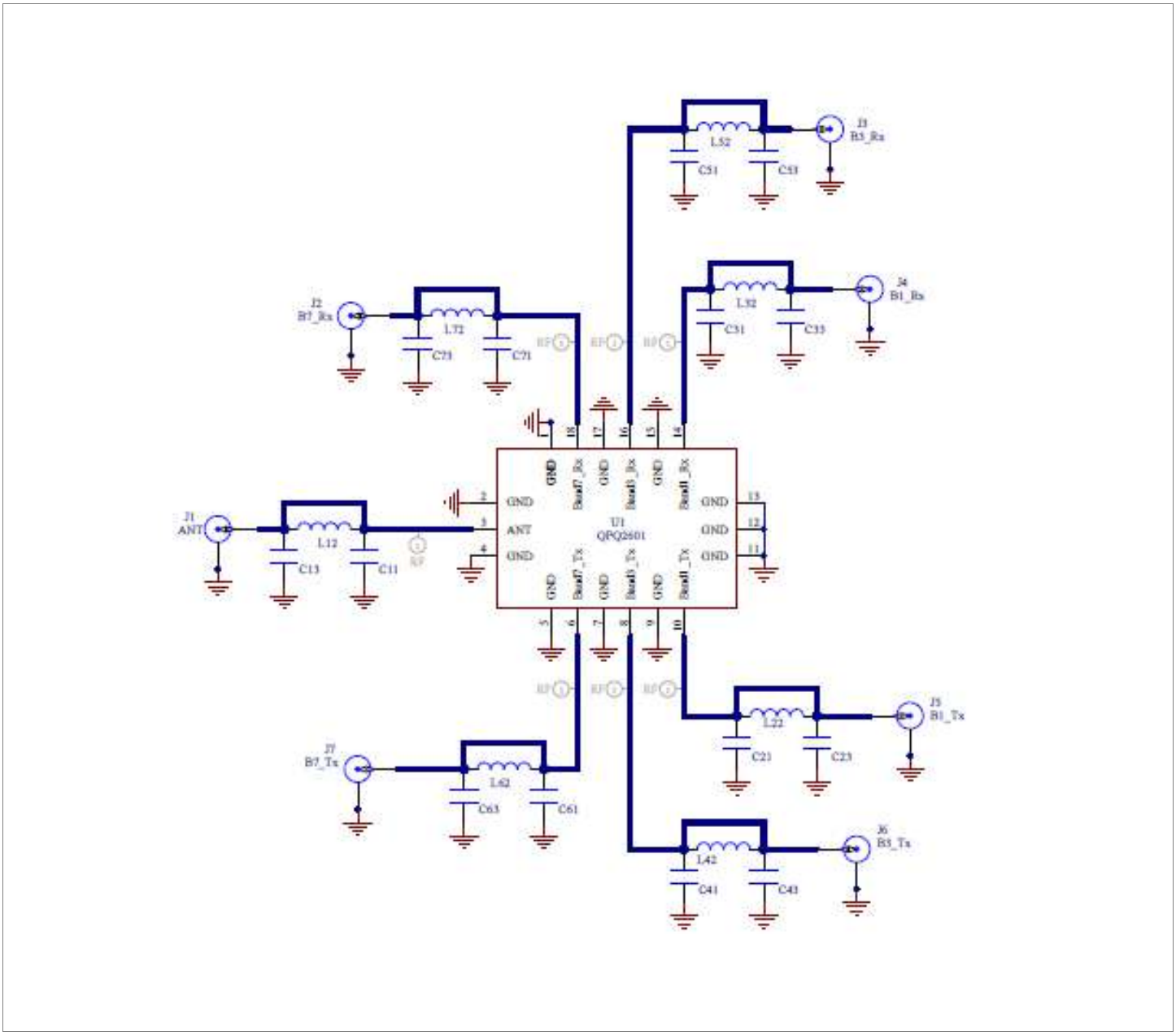
Pin Configuration and Description



Top View

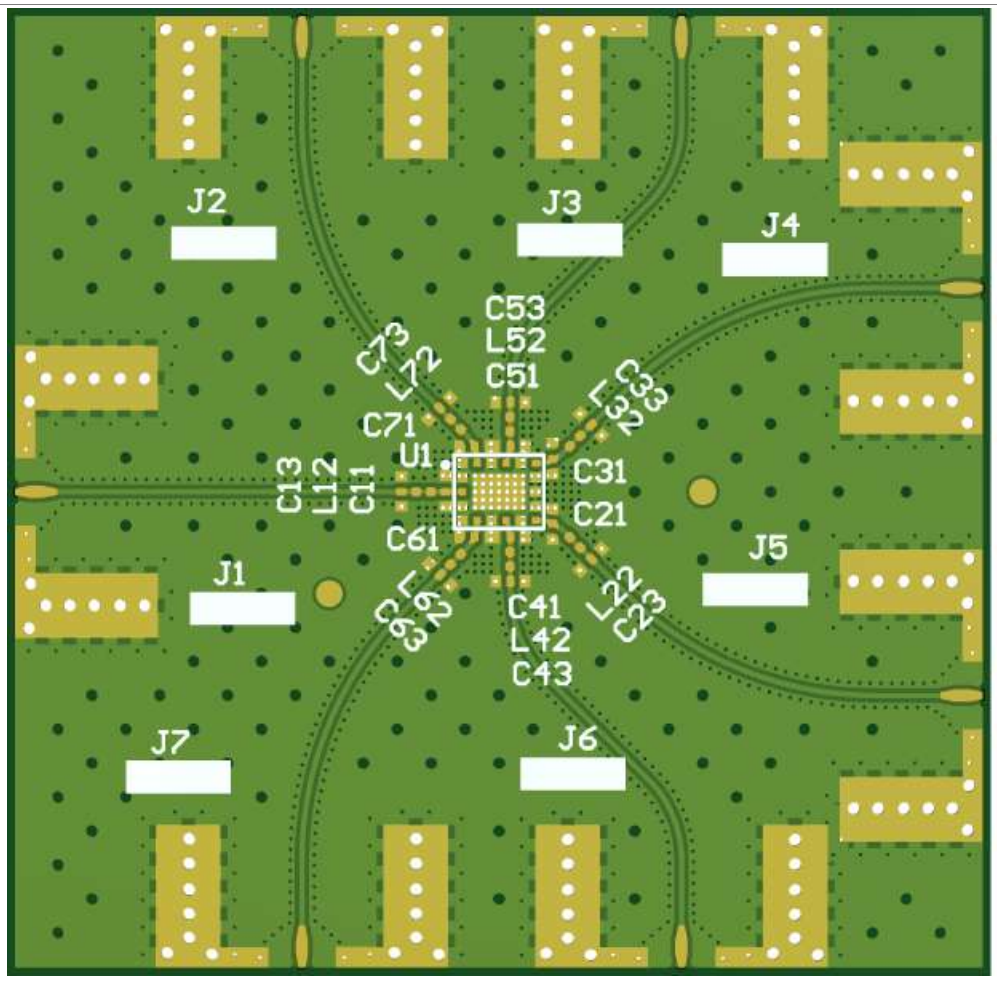
Pin Number	Label	Description
3	ANT	Band 1/3/7 Antenna Port
6	B7 TX	Band 7 Transmit Port
8	B3 TX	Band 3 Transmit Port
10	B1 TX	Band 1 Transmit Port
14	B1 RX	Band 1 Receive Port
16	B3 RX	Band 3 Receive Port
18	B7 RX	Band 7 Receive Port
1,2,4,5,7,9,11, 12,13,15,17,19	GND	Package Ground

Application Circuit



No external components are needed.

Evaluation Board (EVB) Assembly Layout.



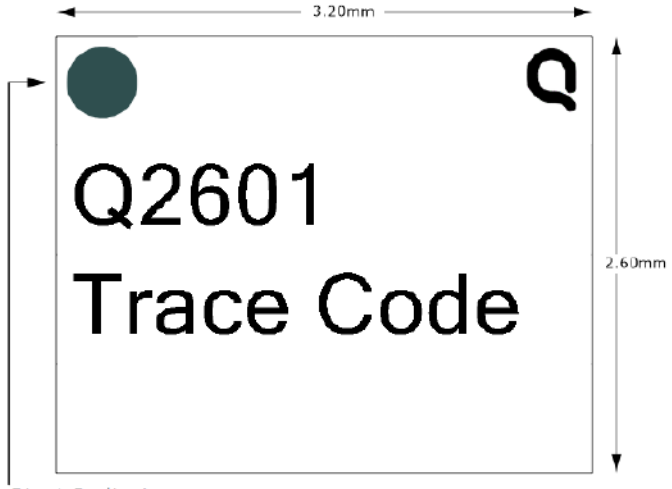
Bill of Materials for EVB

Reference Des.	Value	Description	Manuf.	Part Number
U1	N/A	Band 1/3/7 Multiplexer	Qorvo	QPQ2601
Ji,J2,J3,J4,J5,J6,J7	N/A	RF Connectors	Various	–
PCB	N/A	4-layer Printed Circuit Board	Various	–

No external components are needed.

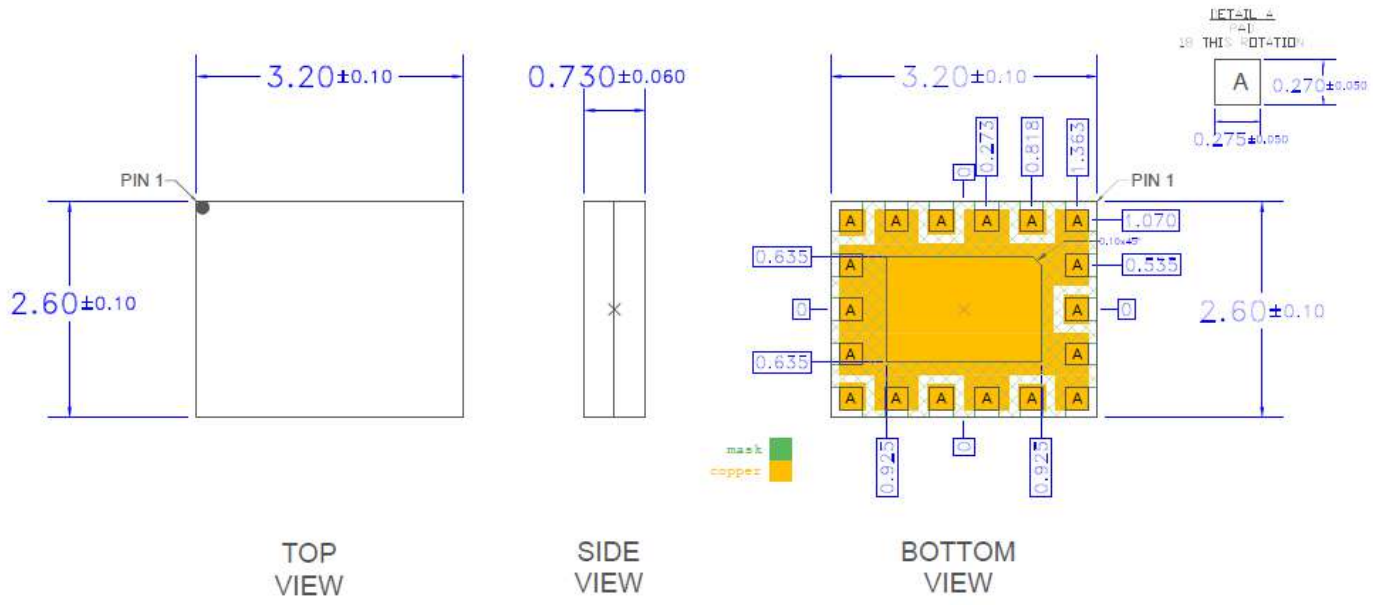
Package Marking and Dimensions

Package Marking Diagram



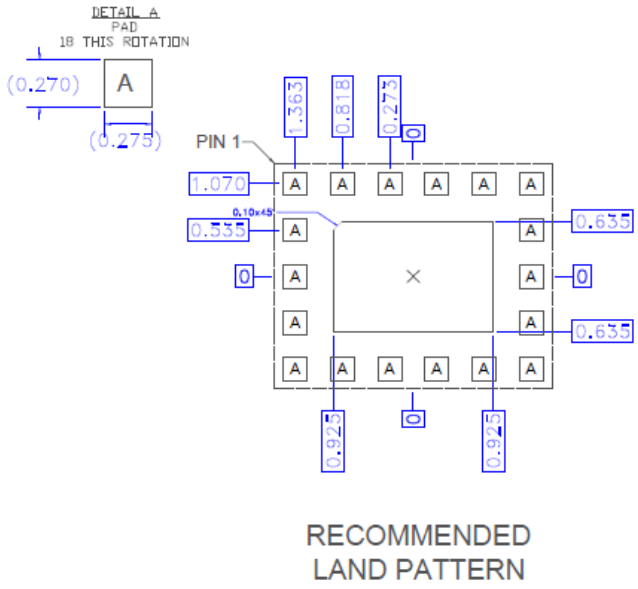
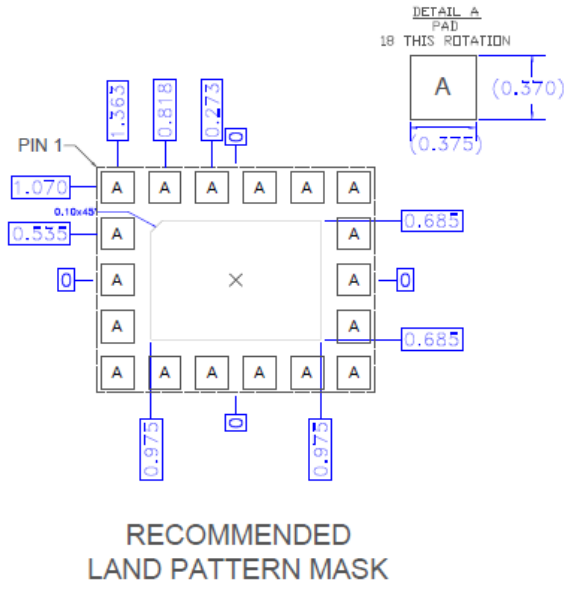
Pin 1 Indicator
Qorvo Logo - Use Q5D
Trace Code to be assigned by subcon

Package Outline Dimension Drawing



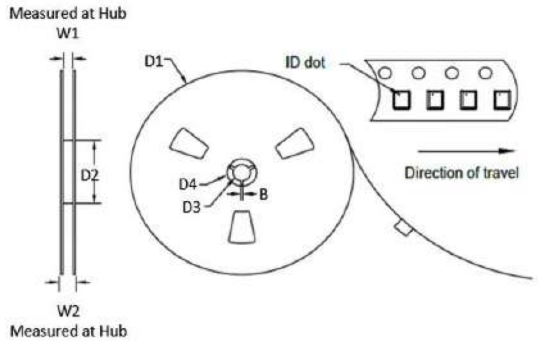
Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012

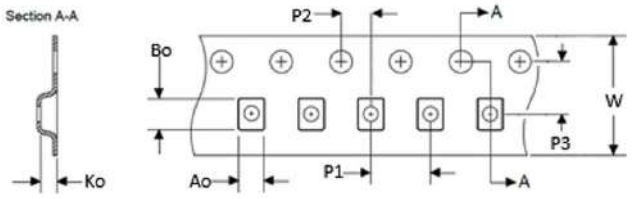
Package Mechanical Information

Recommended Land Pattern – Top View	Recommended Land Pattern Mask – Top View
	

ES France - Département RF & Hyperfréquences - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

Tape and Reel Information – Carrier and Cover tape Dimensions





Feature	Measure	Symbol	Size (mm)
Flange	Diameter	D1	330.0
	Thickness	W2	18.2
	Space Between Flange	W1	12.8
Hub	Outer Diameter	D2	102.0
	Arbor Hole Diameter	D3	13.0
	Key Slit Width	B	2.0
	Key Slit Diameter	D4	20.2

Feature	Measure	Symbol	Size (mm)
Cavity	Length	Ao	2.8
	Width	Bo	3.5
	Depth	Ko	1.16
	Pitch	P1	4.0
Centerline Distance	Cavity to Perforation (Length)	P2	2.0
	Cavity to Perforation (Width)	P3	5.5
Carrier Tape	Width	W	12.0

(Unless otherwise specified, all dimension tolerances per EIA-481)

Handling Precautions

PARAMETER	RATING	STANDARD
ESD – Human Body Model (HBM)	Class 1B	ESDA/JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ESDA/JEDEC JS-002
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 temperature) and tin/lead (245 °C max. reflow temperature) soldering processes.

Package lead plating: Thin Ni ENEPIG

RoHS Compliance

This part is compliant with the 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
- SVHC Free
- PFOS

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

Important Notice

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QPQ3500

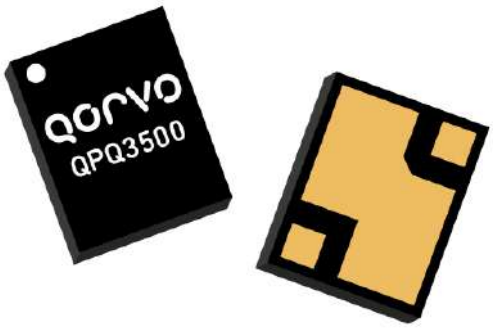
B42 200 MHz BAW Filter Module

General Description

The QPQ3500 is an exceptionally high-performance BAW Filter for sub-Band 42. This filter is housed in a compact 2.0 x 1.6 mm package for base station applications.

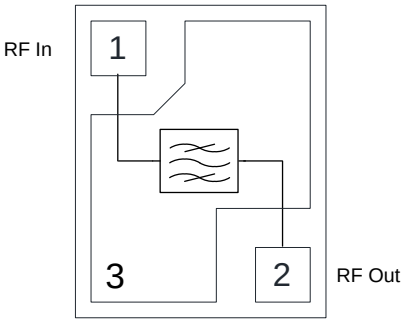
Low insertion loss coupled with high attenuation makes this filter an ideal choice for TDD Macro Cells and Small Cells.

The QPQ3500 is part of Qorvo's extensive portfolio of RF BAW and SAW filters.



3 Pin 2.0 x 1.6 mm leadless SMT Package

Functional Block Diagram



Top View

Product Features

- 200 MHz Bandwidth – Band 42
- High Attenuation
- Low Loss
- No External Matching Required
- Excellent Wi-Fi Rejection
- Single Input, Single Output Operation
- Small Size: 2.00 x 1.60 x 0.89 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Applications

- Band 42
- Base Station Infrastructure
- Small Cells
- Repeaters
- Routers
- LTE Dongles
- General Purpose Wireless

Pin Configuration

Pin No.	Label
1	RF In
2	RF Out
3	GND Back Side Paddle

Ordering Information

Part	Description
QPQ3500TR7	2500 pieces on a 7" Reel.
QPQ3500SB	Sample Bag with 5 pieces
QPQ3500EVB	Evaluation Board – QPQ3500

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−40 to 125 °C
Operation Temperature	−40 to +95 °C
RF Input Power - Test conditions: PW = 500ms; DC = 50% @ +25 °C	37 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.

Minimum Lifetime Ratings

Conditions	Rating
29 dBm at Pin 1, FD-LTE, 5 MHz, 16 QAM, PAR 8 dB, +95°C	>10 years

Electrical Specifications (1) (2) (3)

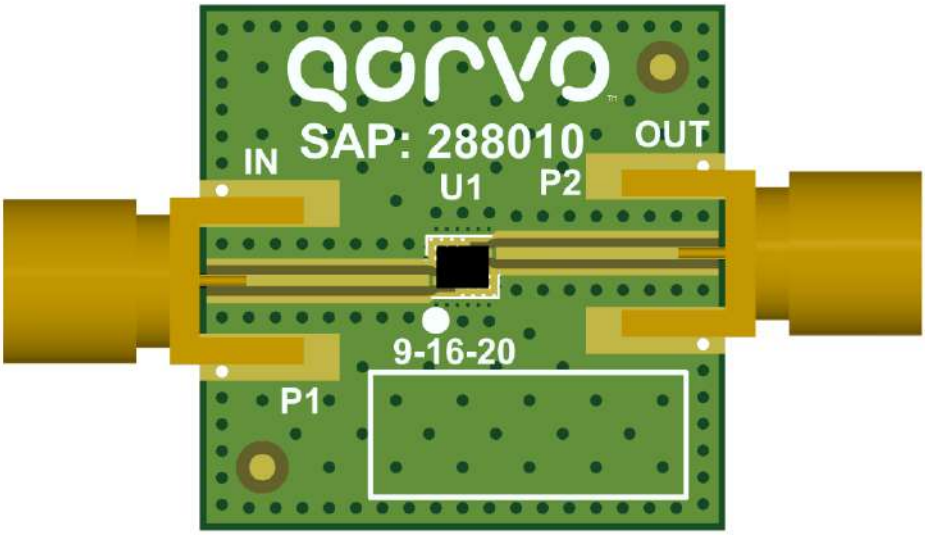
Test Conditions unless otherwise noted= -40°C to +95°C

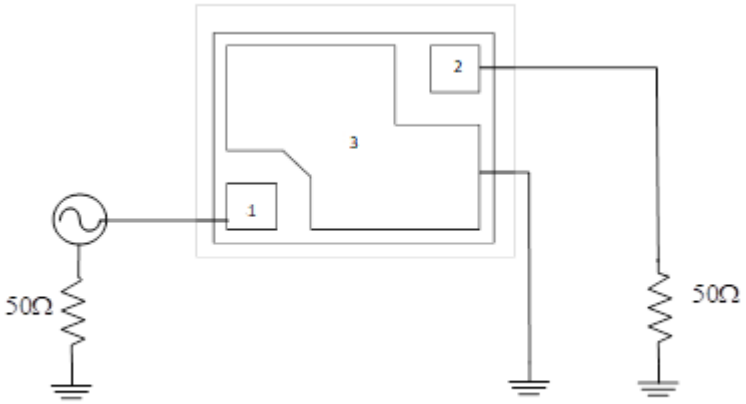
Parameter	Conditions	Min	Typ. (4)	Max	Unit
Frequency Range		3400		3600	MHz
Integrated Insertion Loss (5)	3400 – 3600 MHz			3.2	dB
Amplitude Variation (6)	3400 – 3600 MHz			1.0	dB
Error Vector Magnitude (7)	3400 – 3600 MHz			3	%
Group Delay Variation (7)	3400 – 3600 MHz			10	ns
Input Return Loss	3400 – 3600 MHz	9.5			dB
Input VSWR	3400 – 3600 MHz			2.0	-
Output Return Loss	3400 – 3600 MHz	9.5			dB
Output VSWR	3400 – 3600 MHz			2.0	-
Integrated Rejection (8)	3200 – 3305 MHz	30			dB
Integrated Rejection (8)	3680 – 4180 MHz	30			dB
Attenuation (9)	10 - 960 MHz	30			dB
	960 – 1440 MHz	30			dB
	1440 – 1490 MHz	25			dB
	1490 – 1880 MHz	30			dB
	1880 – 2170 MHz	30			dB
	2170 – 2473 MHz	30			dB
	2473 – 2483 MHz	30			dB
	3200 – 3305 MHz	30			dB
	3680 – 4180 MHz	30			dB
	4180 – 4480 MHz	25			dB
	4480 – 5365 MHz	26			dB
	5365 – 5925 MHz	30			dB
	6800 – 7200 MHz	28			dB

Notes:

1. All specifications are based on the Qorvo schematic shown on page 3.
2. In production, devices will be tested at room temperature to a guard banded specification to ensure compliance over temperature.
3. Electrical margin has been built into the design to account for variations due to temperature drift and manufacturing tolerances.
4. Typical values are based on average measurements at room temperature.
5. Insertion Loss is Integrated over any 5MHz bandwidth within defined frequency band
6. Maximum Insertion Loss Variation between specified frequencies over any 5 MHz bandwidth
7. Across the band between specified frequencies in 5 MHz sliding window
8. Integrated Rejection over 5 MHz BW within specified frequencies
9. Attenuation is referenced to ZERO dB.

QPQ3500EVB Evaluation Board



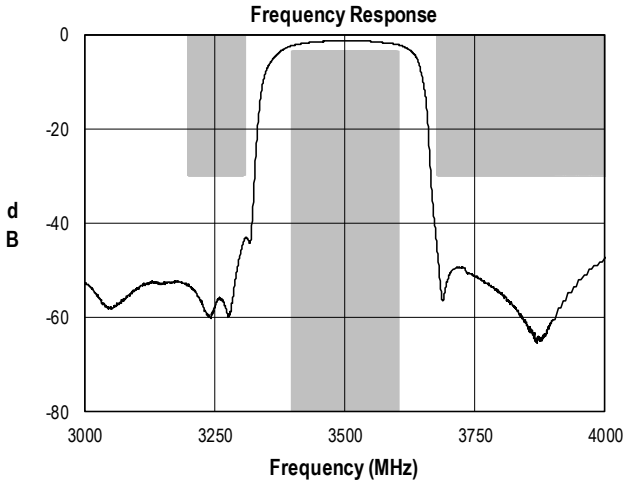


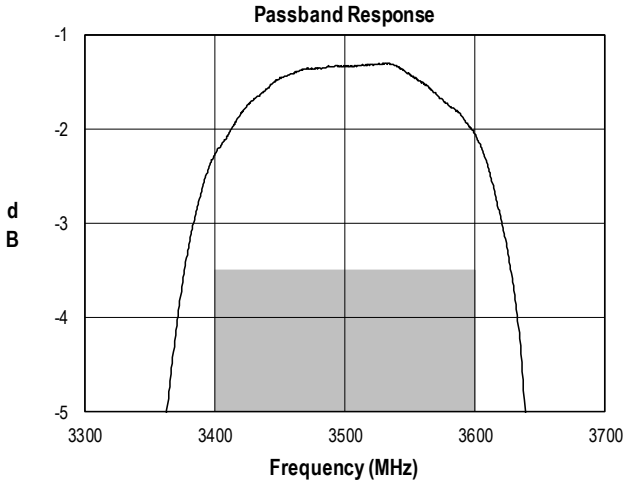
Bill of Material – QPQ3500EVB

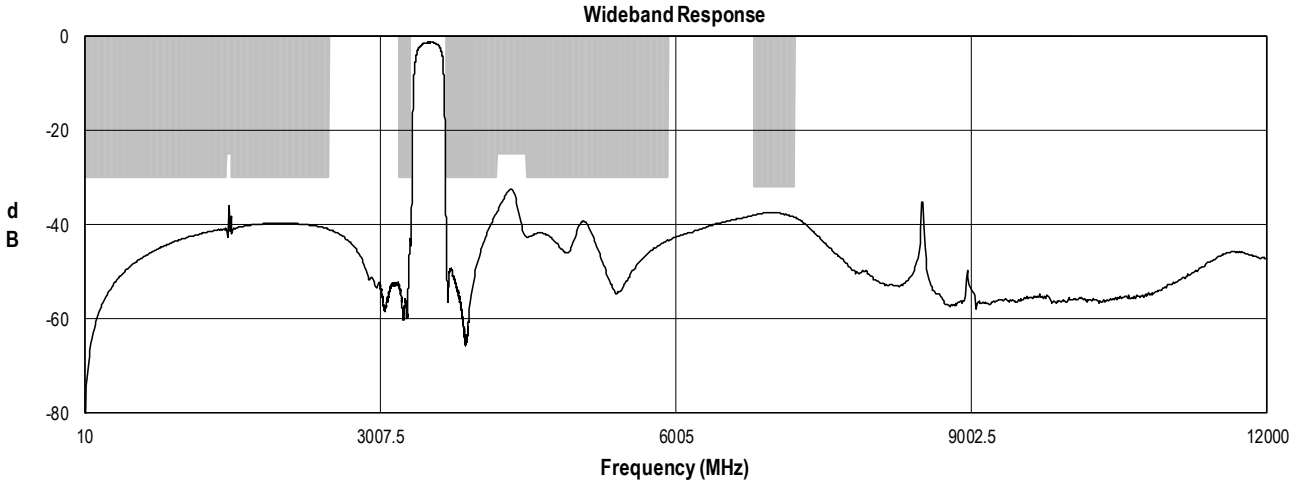
Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	B42 200 MHz BAW Filter	Qorvo	QPQ3500
SMA	n/a	SMA Edge Connector	Various	
PCB	n/a	3-Layer	Various	

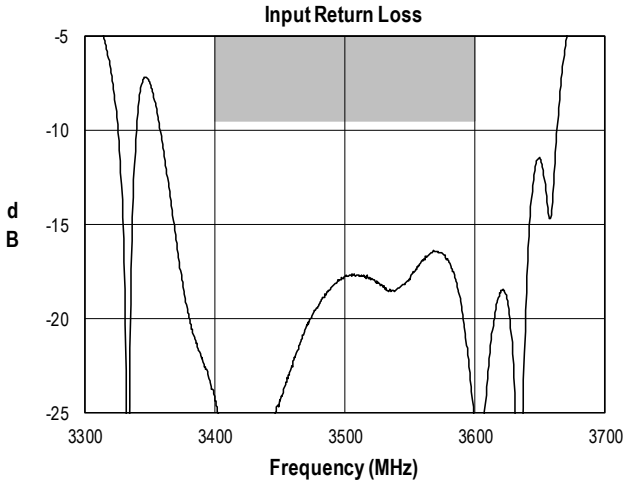
Performance Plots – Small Signal

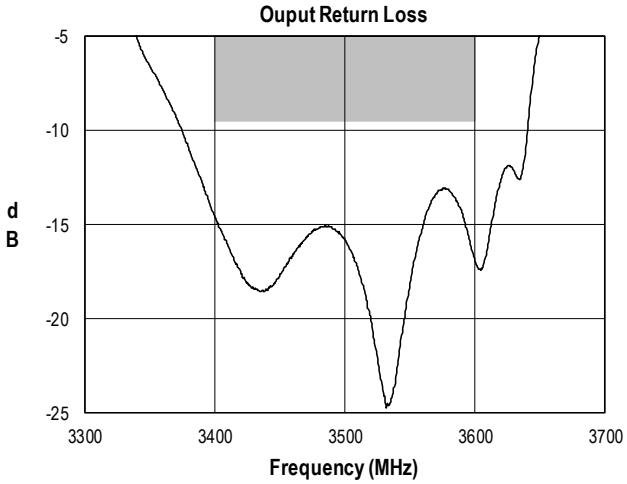
Test conditions unless otherwise noted: Temp = +25 °C, 50 Ω system







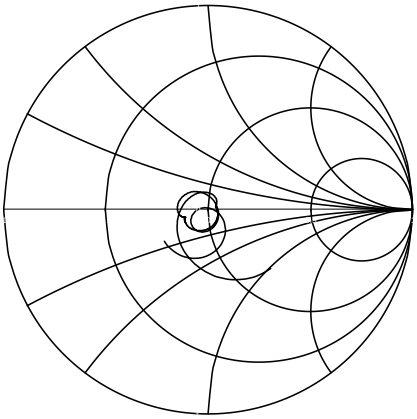




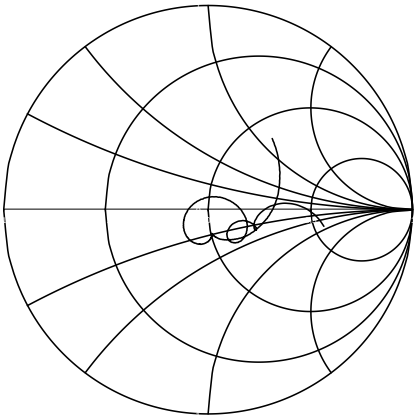
Performance Plots – Small Signal

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

Input Smith Chart



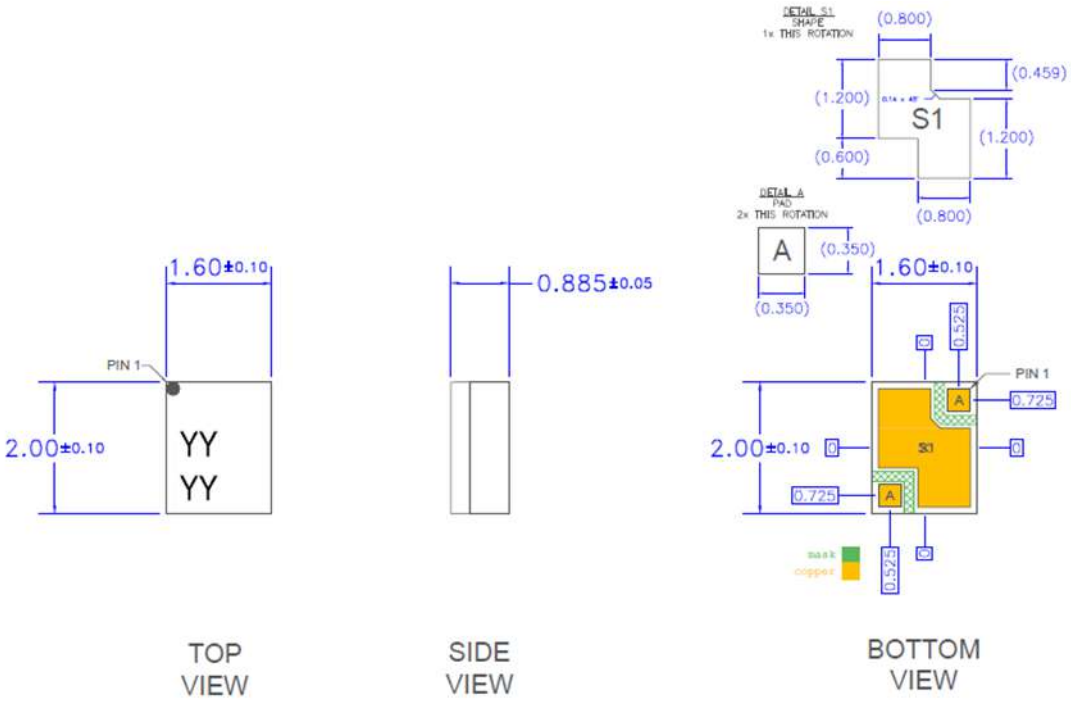
Output Smith Chart



Package Marking and Dimensions

Marking:

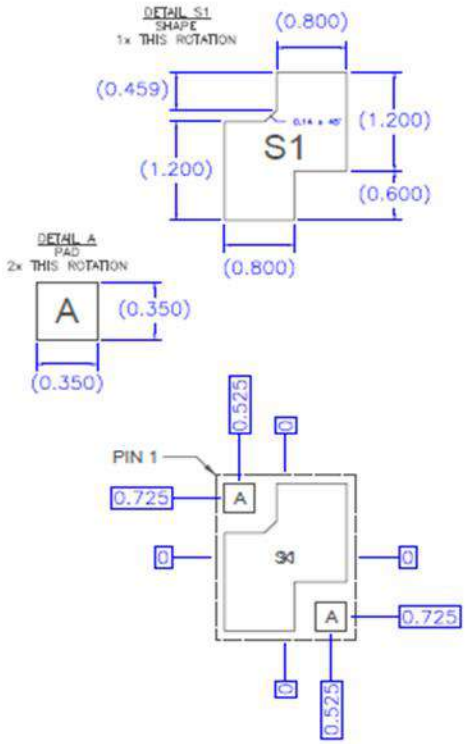
YYYY indicates the Trace Code



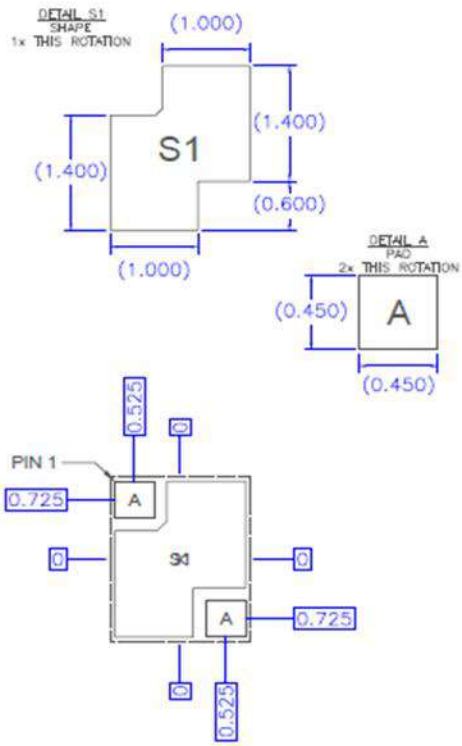
Notes:

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.

PCB Mounting Pattern



RECOMMENDED
LAND PATTERN



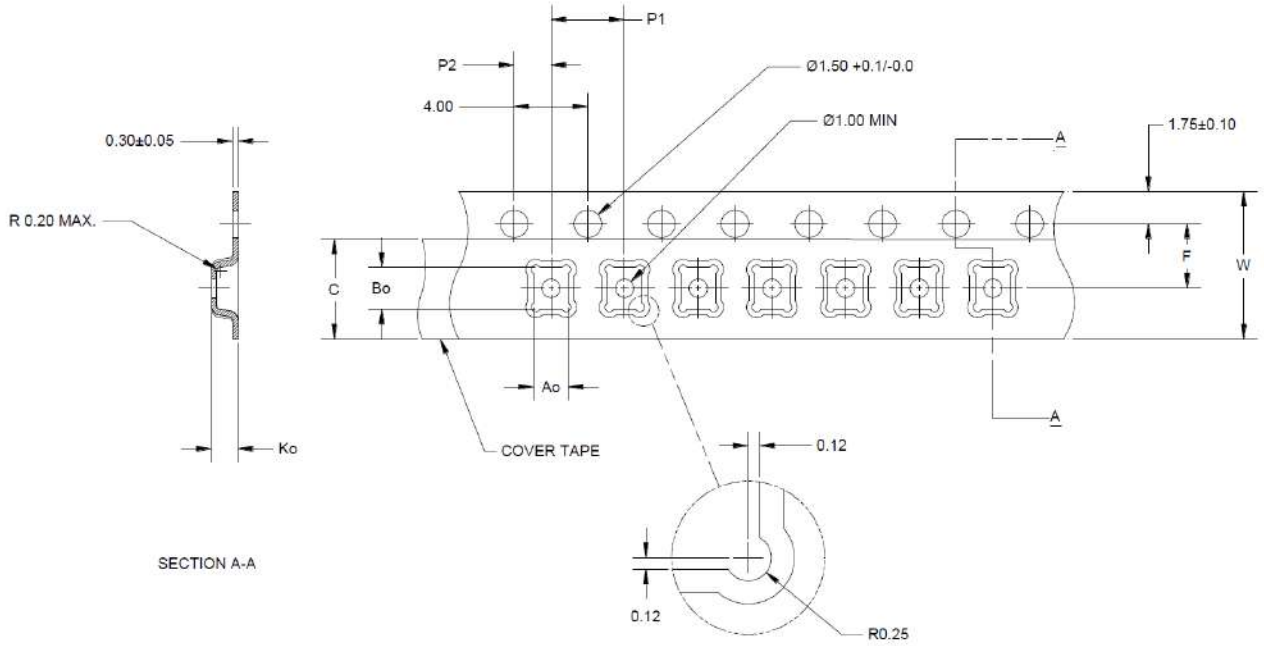
RECOMMENDED
LAND PATTERN MASK

Notes:

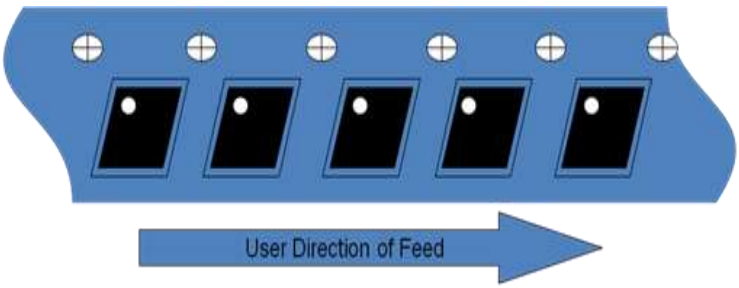
1. All dimensions are in millimeters.
2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

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.



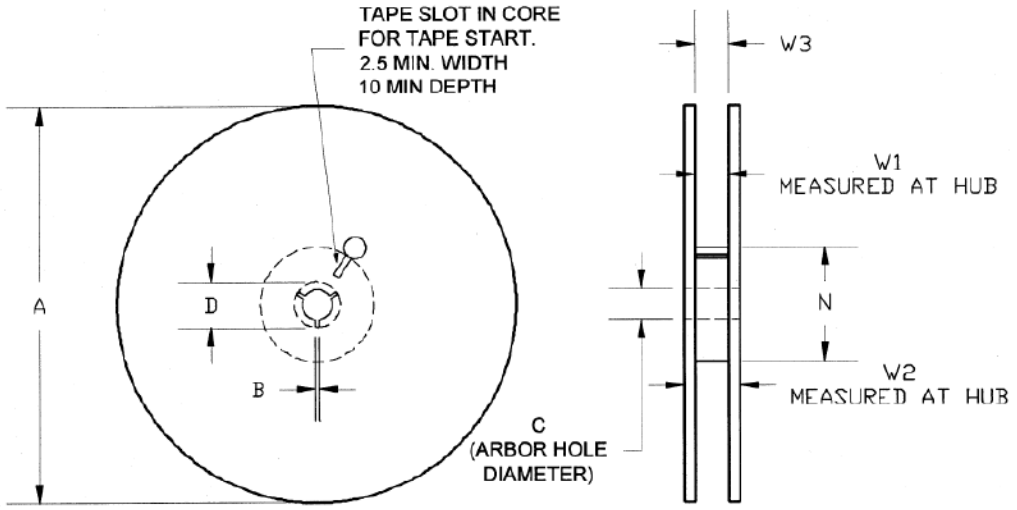
Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.077	1.95
	Width	B0	0.093	2.35
	Depth	K0	0.045	1.15
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.138	3.50
Cover Tape	Width	C	0.213	5.40
Carrier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



ES France - Département RF & Hyperfréquences - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 60 - Fax. 01 47 01 16 22 - e-mail: hyper@es-france.com - Site Web: www.es-france.com

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.



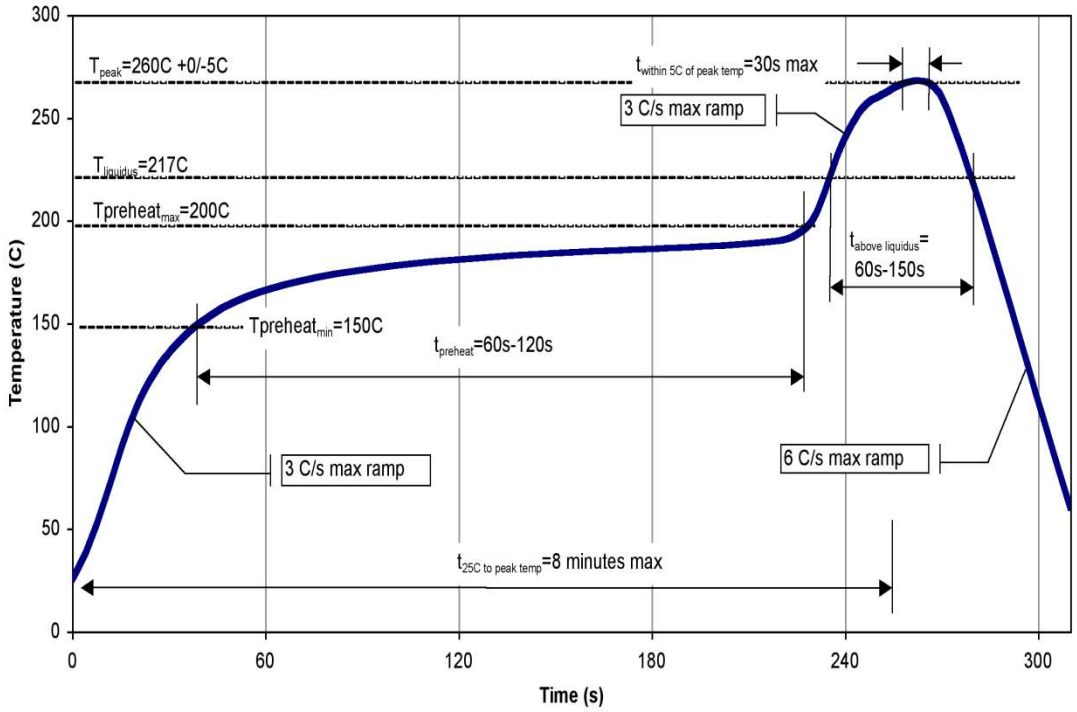
Feature	Measure	Symbol	Size (in)	Size (mm)
Flange	Diameter	A	6.969	177.0
	Thickness	W2	0.559	14.2
	Space Between Flange	W1	0.346	8.8
Hub	Outer Diameter	N	2.283	58.0
	Arbor Hole Diameter	C	0.512	13.0
	Key Slit Width	B	0.079	2.0
	Key Slit Diameter	D	0.787	20.0

Assembly Notes

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

Contact plating: Ni-Au

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1C	ANSI / ESD / JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ANSI / ESD / JEDEC JS-002
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

RoHS Compliance

This product is compliant with the 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

Email: customer.support@qorvo.com

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TQQ0041T

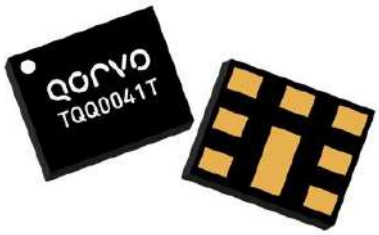
Band 41 Tx/Rx Filter

Product Overview

The TQQ0041T is a high-performance Bulk Acoustic Wave (BAW) Tx / Rx filter designed to meet the strict LTE rejection requirements for use in B41.

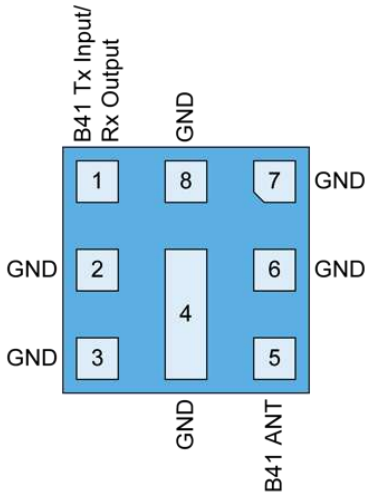
TQQ0041T is specifically designed to meet the high performance expectations of insertion loss and rejection for LTE transmit systems under all operating conditions.

The TQQ0041T uses common module packaging techniques to achieve the industry standard 1.8 mm x 1.4 mm x 0.73 mm footprint.



8-Pin: 1.8 mm x 1.4 mm Package

Functional Block Diagram



Top View

Key Features

- Highly selective BAW filter achieving low insertion loss over full bandwidth and operating conditions
- Excellent Wi-Fi rejection
- Tested and validated for Power Class 2 Applications
- Performance −20 to +85 °C
- RoHS compliant, Pb-free module package

Applications

- For Full Band 41 TD-LTE Tx/Rx
- Power Class 2

Pin Configuration

Pin Number	Label
1	B41 Tx Input / Rx Output
5	B41 Ant
2, 3, 4, 6, 7, 8	Ground

*Note, see application section for details on optimal grounding.

Ordering Information

Part Number	Description
TQQ0041T	Packaged Part
TQQ0041T-EVB	Evaluation Board

Standard T/R size = 2500 pieces per reel.

TQQ0041T

Band 41 Tx/Rx Filter

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−40 to +85 °C
Input Power (2496 MHz to 2690 MHz, CW signal, 5000 hrs, 55°C, pin1)	+31 dBm
Input Power (2496 MHz to 2690 MHz, LTE Signal, 5000 hrs, 55°C, pin 1) 10MHz 12RB, 19RB offset, 40% Duty Cycle	+33 dBm
Peak RF Input Power (pin 1), max duration of 0.5 sec	+37 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Unit
T_{CASE}	-20		+85	°C

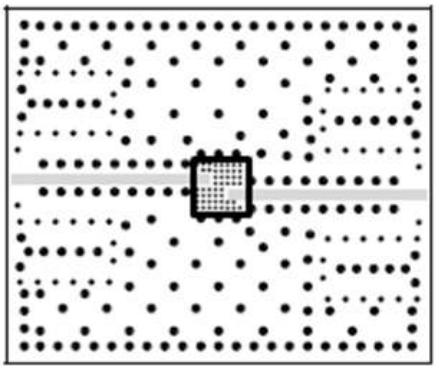
Electrical specifications are measured at specified test conditions.

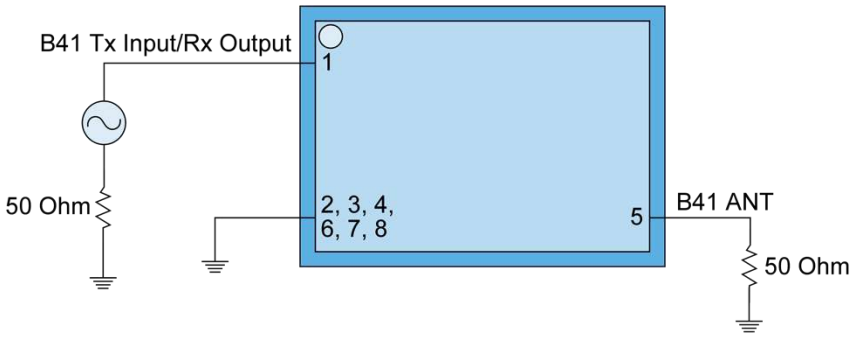
Electrical Specifications − Band 41[1]

Parameter	Condition	−20 °C to +85 °C			
		Min.	Typ[2]	Max.	Unit
Insertion Loss	2496 – 2500 MHz	–	3.2	3.7	dB
	2500 – 2686 MHz	–	2.5	3.2	dB
	2686 – 2690 MHz	–	2.5	3.2	dB
Passband Ripple	2496 – 2690 MHz	–	1.2	2.0	dB
VSWR In	2496 – 2690 MHz	–	1.6:1	2.0:1	–
VSWR Out	2496 – 2690 MHz	–	1.6:1	2.0:1	–
Attenuation	10 – 1564 MHz	30	44	–	dB
	1565 – 1615 MHz	32	36	–	dB
	1616 – 2400 MHz	5	6.5	–	dB
	2401 – 2453 MHz (WiFi CH1-7)[3]	40	45	–	dB
	2436 – 2468 MHz (WiFi CH8-10)[3]	40	49	–	dB
	2451 – 2473 MHz (WiFi CH11)[3]	38	45	–	dB
	2456 – 2478 MHz (WiFi CH12)[3]	23	42	–	dB
	2461 – 2483 MHz (WiFi CH13)[3]	12	25	–	dB
	2775 – 4991 MHz	13	16	–	dB
	4992 – 5380 MHz	25	35	–	dB
	5381 – 7487 MHz	18	21	–	dB
	7488 – 8000 MHz	18	25	–	dB
H2	2496 – 2690 MHz[4]	–	-35	–	dBm

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design shown on page 3.
2. Typical values are values of a nominal part at +25 °C.
3. Averaging |S21| over the center 19 MHz of the channels and converting to dB value.
4. H2 is measured for Pin = +28 dBm (CW) at room temperature.

Reference Design – Tx / Rx 50 Ohms SE/Ant 50 Ohms SE





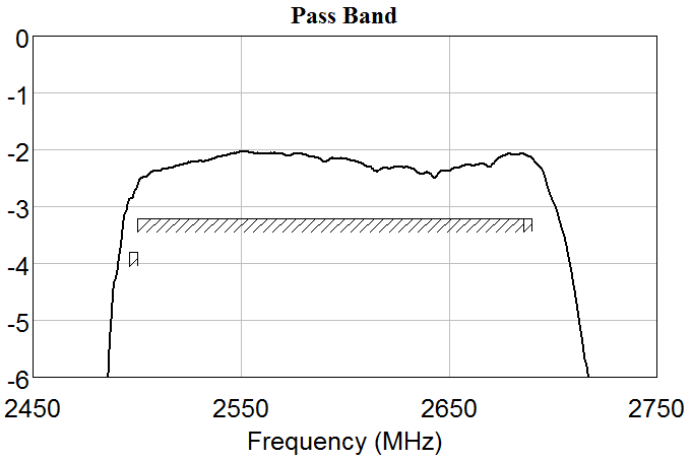
Notes:
1. Top, middle & bottom layers: 35 µm Cu finished thickness plated up to 25 µm Substrates: Isola FR-408HR.
   Finish plating: Silver.
   Hole plating: Via fill.
2. Grey indicates metalized area.
3. This footprint represents a recommendation only.
4. For solder pad recommendation see mechanical information.
5. Pin 1 is in the same corner as the ID dot (see page 4 Marking).

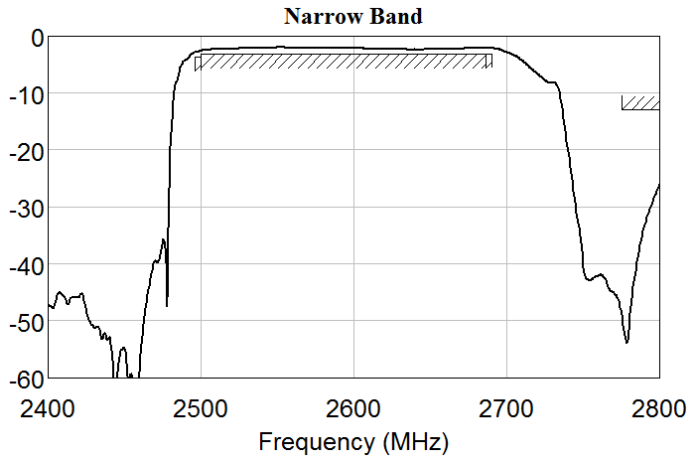
Bill of Material – TQQ0041T-PCB

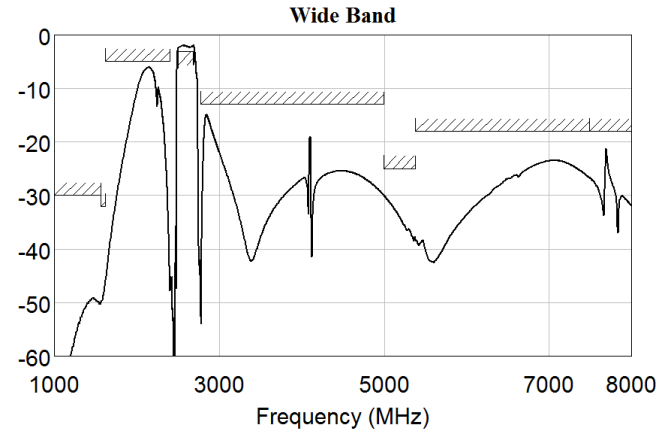
Reference Des.	Value	Description	Manuf.	Part Number
PCB	N/A	3-layer	multiple	TQQ0041T_EVB_R03B

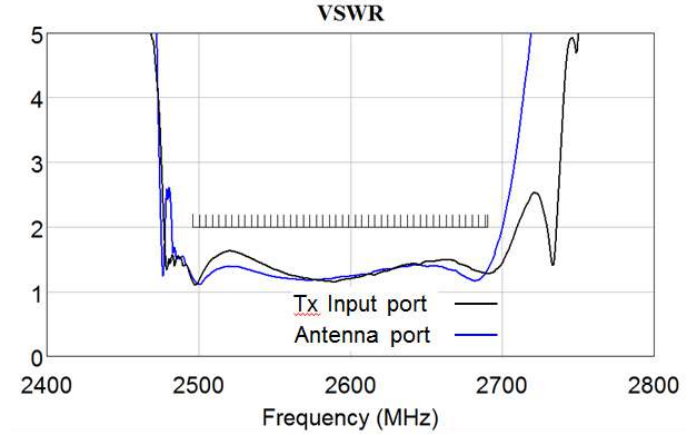
Performance Plots – Band 41

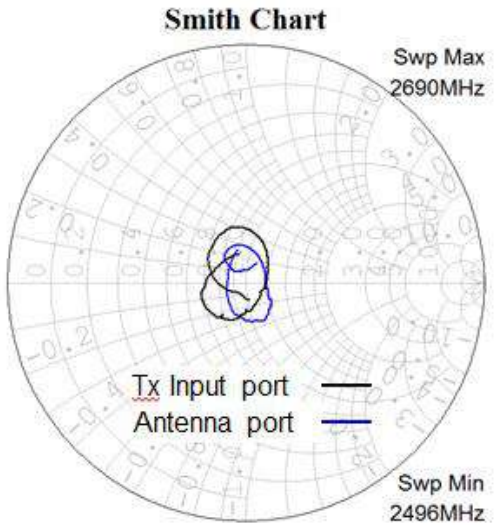
Test conditions unless otherwise noted: Temp. = +25 °C.

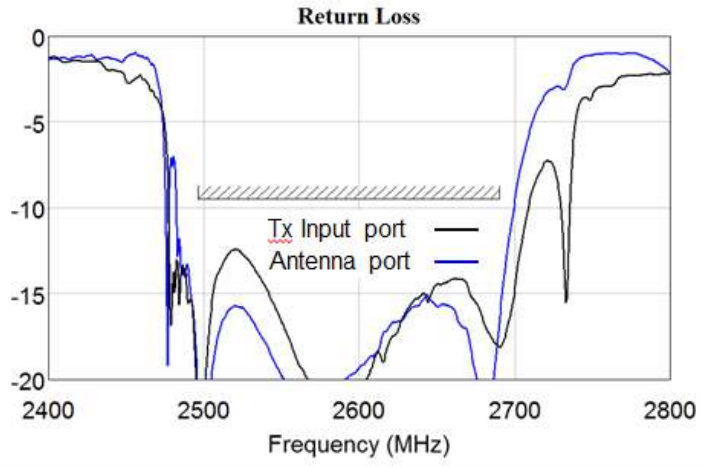






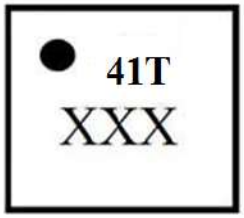






Mechanical Information

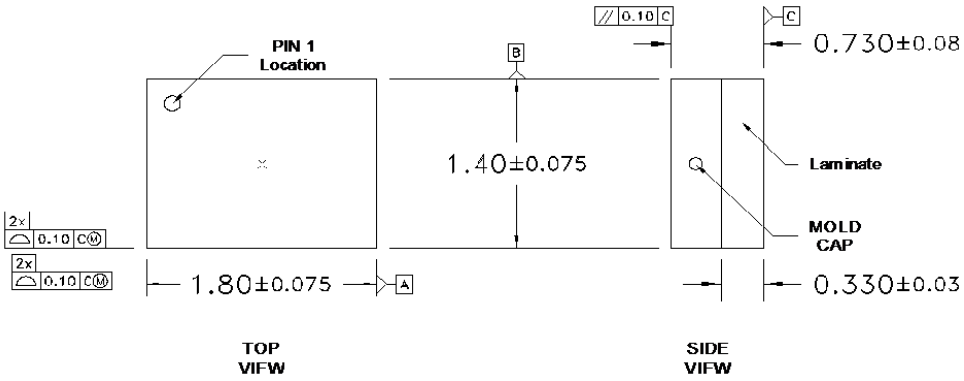
Package Marking and Dimensions

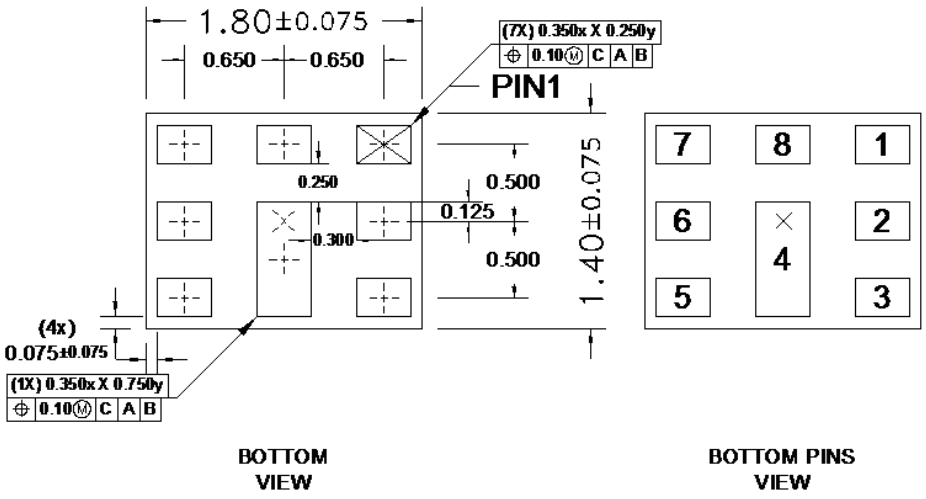


Pin 1 Location: **place in the Upper Left Hand Corner**

Line 1 – Product Name

Line 2 – Assembly Lot Code (3 characters only, starting right side of lot code

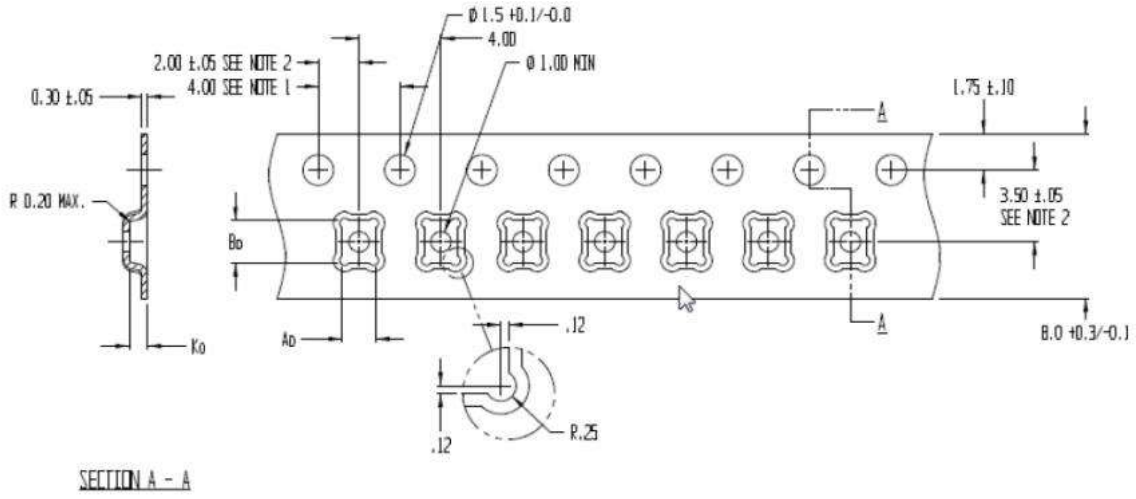




Notes:
1. Package Style: Laminate Overmold Module.
2. Dimensions: 1.8 mm x 1.4 mm x 0.73 mm.
3. All dimensions shown are nominal in millimeters.

Tape and Reel Information

Tape and reel specifications for this part are also available on the Qorvo website.
Standard T/R size = 2,500 pieces per reel. All dimensions are in millimeters.



Feature	Measure	Symbol	Size (mm)
Cavity	Length	A0	1.66
	Width	B0	2.06
	Depth	K0	0.90
	Pitch	P1	4.0
Centerline Distance	Cavity to Perforation – Length Direction	P2	2.00
	Cavity to Perforation – Width Direction	F	3.50
Cover Tape	Width	C	8.0
Carrier Tape	Width	W	5.4

Handling Precautions

PARAMETER	RATING	STANDARD
ESD – Human Body Model (HBM)	Class 2	ESDA/JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ESDA/JEDEC JS-002
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 temperature) and tin/lead (245 °C max. reflow temperature) soldering processes.
Package lead plating: Plated Au over Ni

RoHS Compliance

This part is compliant with the 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
- 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

Email: customer.support@qorvo.com

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TQQ7301

Band 1 Uplink BAW Filter

Applications

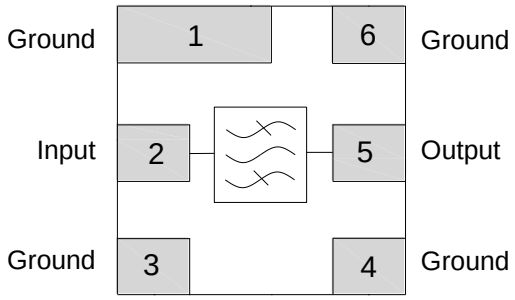
- Band 1 Uplink Infrastructure
- Base Station
- General Purpose Wireless

6 Pin 3 x 3 mm leadless SMT Package

Product Features

- 60 MHz Bandwidth
- High Attenuation
- Low Loss
- Single-ended Operation
- Small Size: 3 x 3 x 1.02 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Functional Block Diagram



Top View

General Description

The TQQ7301 is an exceptionally high performance uplink BAW filter for Band 1. This filter is housed in a compact 3 x 3 x 1.02 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 TQQ7301 is part of TriQuint's extensive portfolio of RF Baw and SAW filters.

Pin Configuration

Pin No.	Label
2	Input
5	Output
1,3,4,6	Case Ground

Ordering Information

Part No.	Description
TQQ7301	Band 1 UL BAW Filter
TQQ7301-EVB	Evaluation board

Standard T/R size = 2500 pieces on a 7" reel

Absolute Maximum Ratings

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

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
T_{CASE}	−40		+95	°C

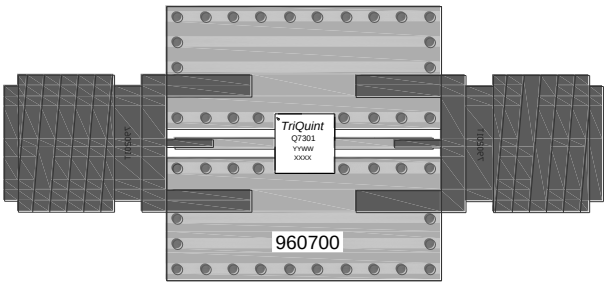
Electrical specifications are measured at specified test conditions.

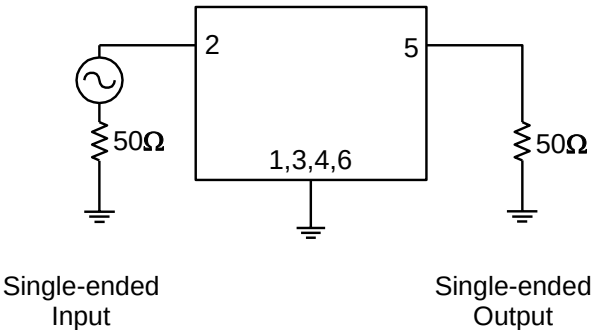
Electrical Specifications

Operating Temperature Range: -40 to +95°C.

Parameter	Conditions		Min	Typ	Max	Units
Pass Band Frequency			1920		1980	
Center Frequency			-	1950	-	MHz
3.0 dB Bandwidth			-	60	-	MHz
Insertion Loss	1920 – 1980 MHz	+25 °C	-	2.0	3.2	dB
		−40 °C to +95 °C	-	3.0	4.0	
Amplitude Variation	1920 – 1980 MHz	−40 °C to +95 °C	-	1.0	2.0	dB p−p
Input Return Loss			7.5	10.4	-	dB
Output Return Loss			7.5	10.1	-	dB
Stopband Attenuation (relative to zero dB)	0.9MHz to 1400MHz		30	34	-	dB
	1400 MHz to 1495 MHz		30	34	-	
	1495 MHz to 1700 MHz		30	36	-	
	1700 MHz to 1785 MHz		36	40	-	
	1785 MHz to 1870 MHz		30	38	-	
	1870 MHz to 1888 MHz		15	-	-	
	2030 MHz to 2050 MHz		35	41	-	
	2050 MHz to 2080 MHz		33	39	-	
	2080 MHz to 2170 MHz		30	42	-	
	2170 MHz to 4170 MHz		25	32	-	
	4170 MHz to 5000 MHz		30	41	-	
	5000 MHz to 5720 MHz		10	36	-	
	5720 MHz to 6000 MHz		8	40	-	
Group Delay Variation	1920 – 1980 MHz		-	17	40	ns p-p
Group Delay Variation	Any 5 MHz band in passband		-	8	21	ns p-p

TQQ7301-PCB Evaluation Board





Bill of Material – TQQ7301-PCB

Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	Band 1 Uplink BAW Filter	Qorvo	TQQ7301
n/a	n/a	Printed Circuit Board	Qorvo	960700
n/a	n/a	SMA Edge Connector	Radiall	9602-1111-018

Evaluation Board PCB Information

Top, middle & bottom layers: 1 oz copper

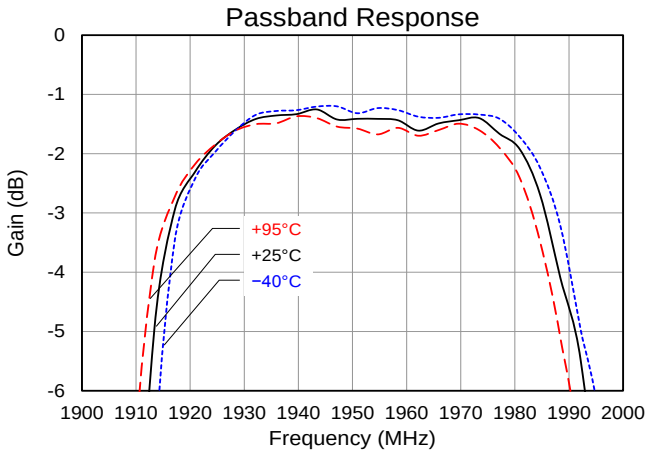
Substrates: FR4 dielectric, .031” thick

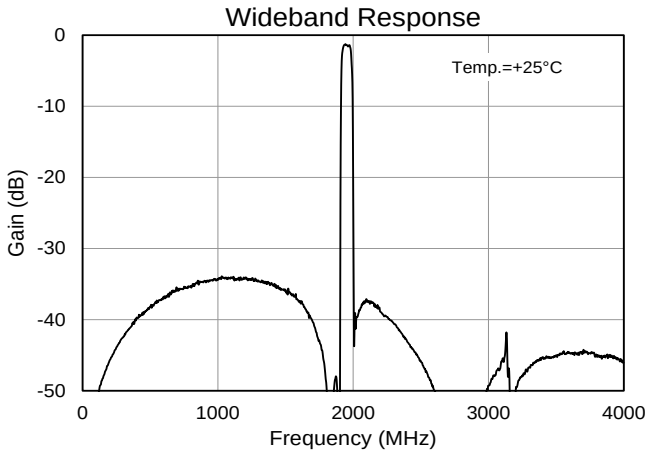
Finish plating: Nickel: 3-8µm thick, Gold: .03-.2µm thick

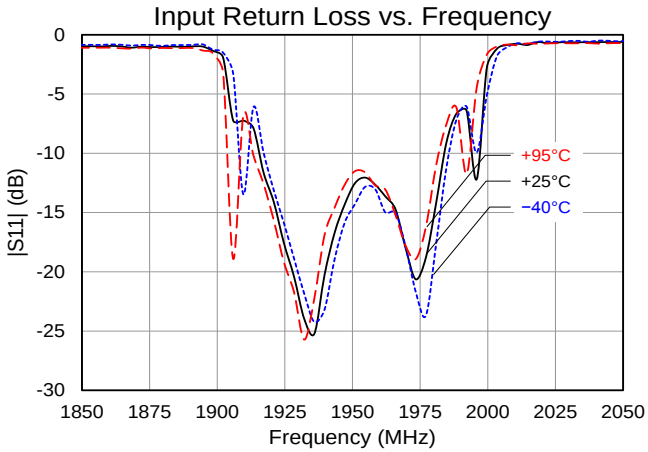
Hole plating: Copper min .0008µm thick

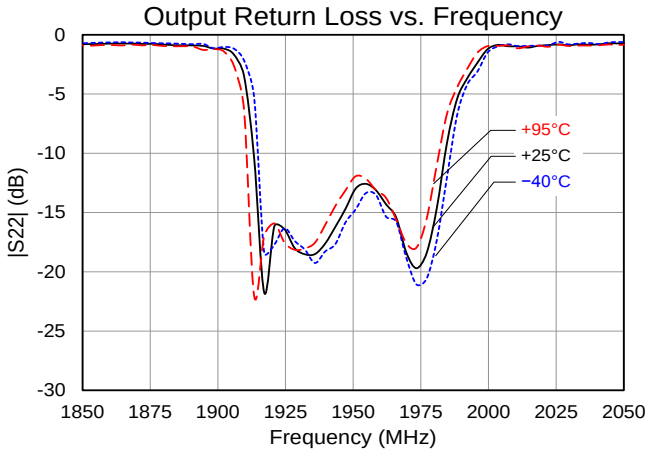
Performance Plots

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

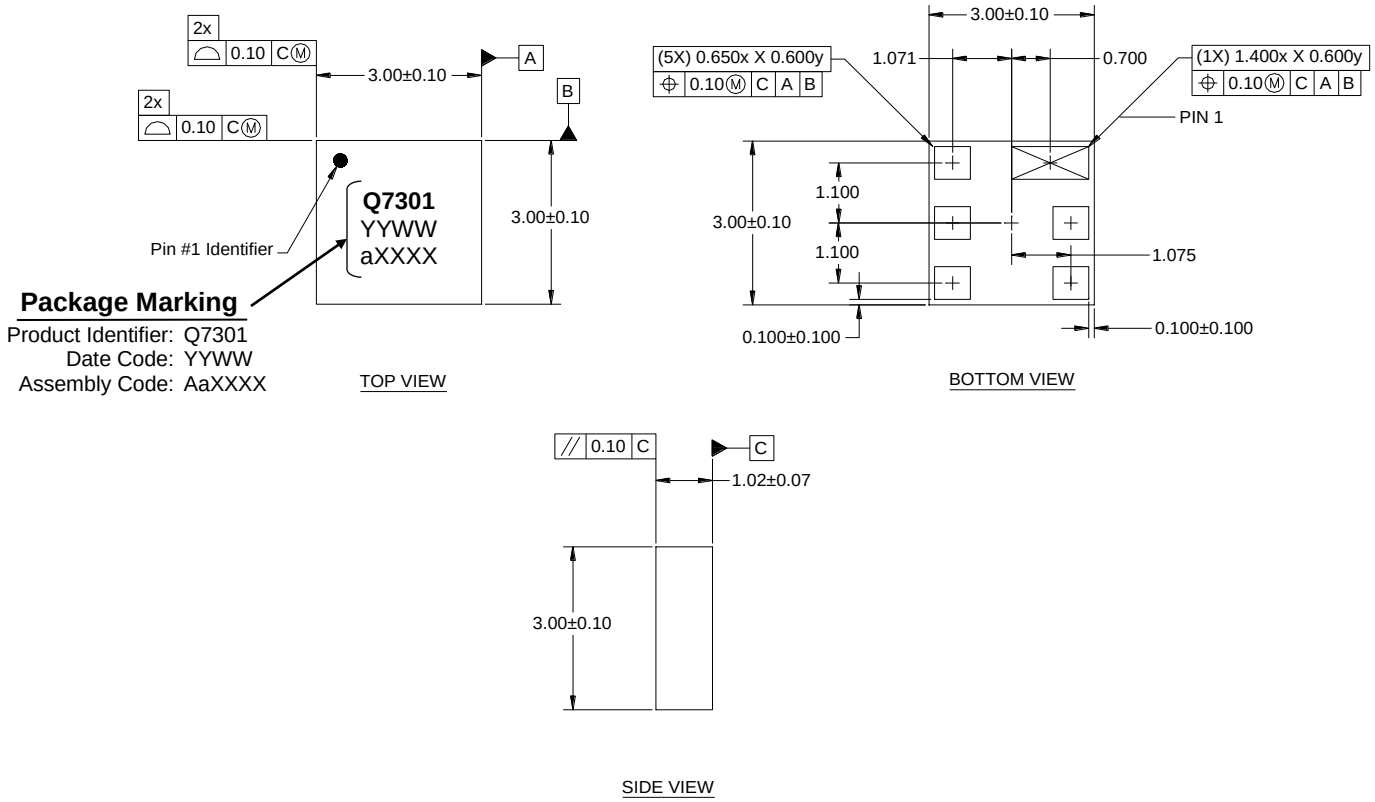






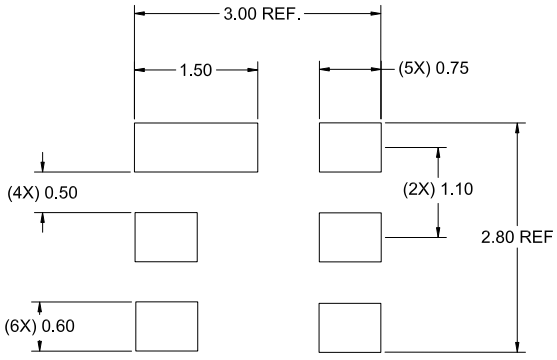


Package Marking and Dimensions



Notes:
1. All dimensions are in millimeters
2. All tolerances are ±0.15 mm except overall length and width ±0.10 mm
3. Contact plating : ENIG (Electroless Nickel Immersion Gold)
4. Terminations: 0.5 – 1.0 µm *Au* plating, over a 2 – 6 µm *Ni* plating

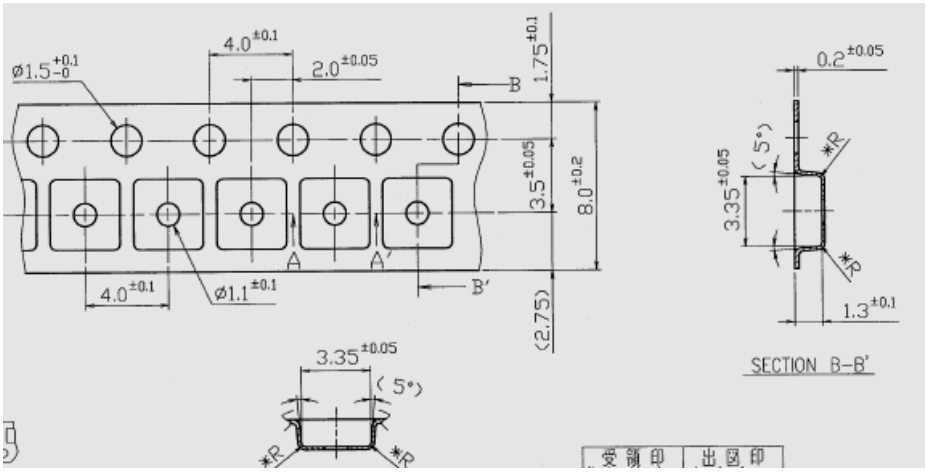
PCB Mounting Pattern



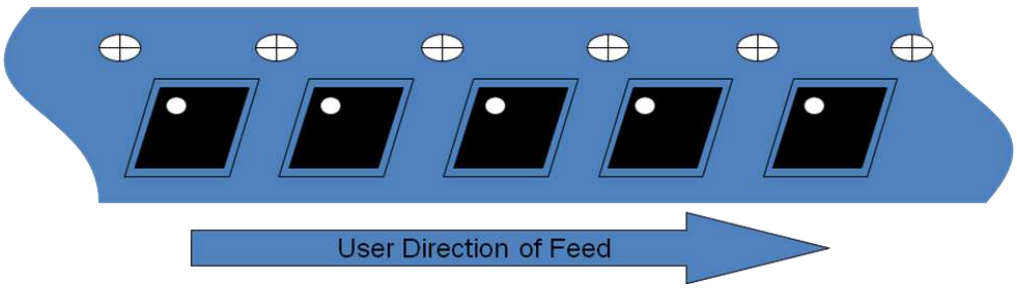
Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.

Tape and Reel Information – Carrier and Cover Tape Dimensions

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

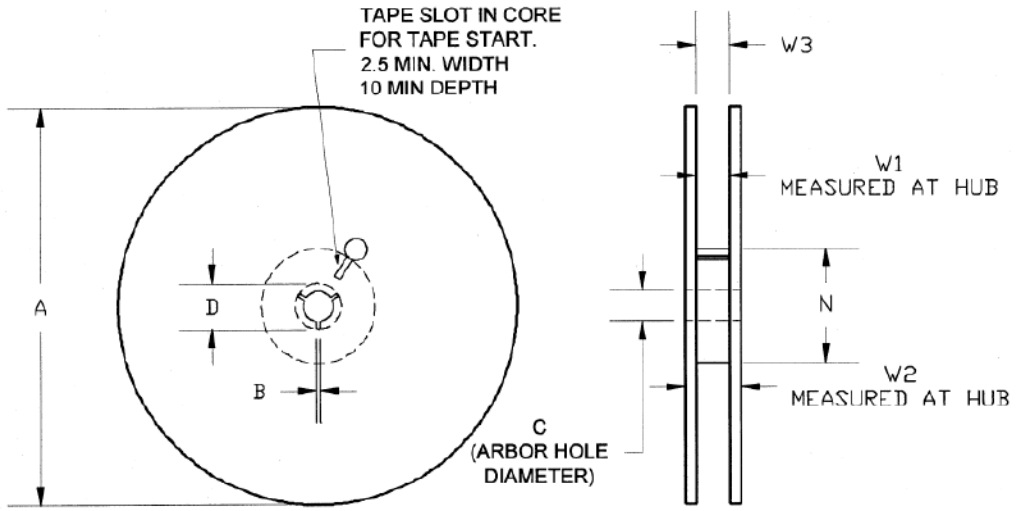


Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.132	3.35
	Width	B0	0.132	3.35
	Depth	K0	0.055	1.40
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.138	3.50
Cover Tape	Width	C	0.213	5.40
Carrier Tape	Width	W	0.315	8.00



Tape and Reel Information – Reel Dimensions

Tape and reel specifications for this part are also available on the TriQuint website.
Standard T/R size = 2,500 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

Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating:	Class 1B
Value:	≥ 500 V to < 1000 V
Test:	Human Body Model (HBM)
Standard:	ESDA / JEDEC Standard JS-001-2012

ESD Rating:	Class C3
Value:	> 1000 V
Test:	Machine Model (CDM)
Standard:	JEDEC Standard JESD22-C101F

MSL Rating

MSL Rating:	Level 3
Test:	260 °C convection reflow
Standard:	JEDEC Standard IPC/JEDEC J-STD-020

Solderability

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

Contact plating: ENIG (Electroless Nickel Immersion Gold)

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

Contact Information

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

Web: www.triquint.com **Tel: 877-800-8584**
Email: customer.support@qorvo.com

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

Web: www.qorvo.com

For technical questions and application information:

Email: sjcapplications.engineering@qorvo.com

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TQQ7303

1747.5 MHz LTE Band 3 Uplink BAW Filter

Applications

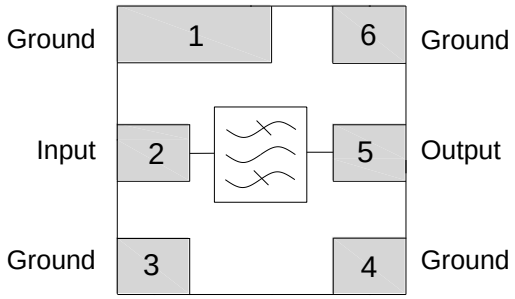
- LTE Band 3 Uplink Infrastructure
- Base Station
- General Purpose Wireless

6 Pin 3 x 3 mm leadless SMT Package

Product Features

- 75 MHz Bandwidth
- High Attenuation
- Low Loss
- Single-ended Operation
- Small Size: 3 x 3 x 1.02 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Functional Block Diagram



Top View

General Description

The TQQ7303 is an exceptionally high performance uplink BAW filter for LTE Band 3. This filter is housed in a compact 3 x 3 x 1.02 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 TQQ7303 is part of TriQuint's extensive portfolio of RF Baw and SAW filters.

Pin Configuration

Pin No.	Label
2	Input
5	Output
1,3,4,6	Case Ground

Ordering Information

Part No.	Description
TQQ7303	1747.5 MHz BAW Filter
TQQ7303-EVB	Evaluation board

Standard T/R size = 2500 pieces on a 7" reel

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−40 to +95 °C
RF Input Power (CW, +55 °C for 10,000 hours) (CW, +105 °C for 100,000 hours)	 +30 dBm +24 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
T_{CASE}	−40		+85	°C

Electrical specifications are measured at specified test conditions.

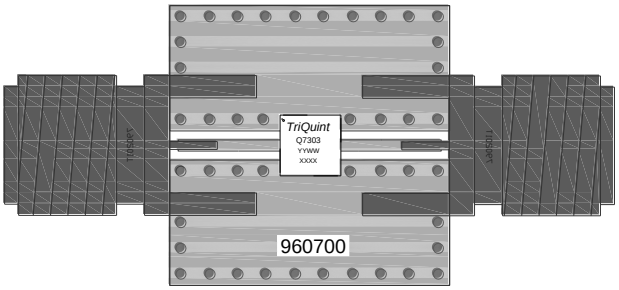
Electrical Specifications (1,2,3)

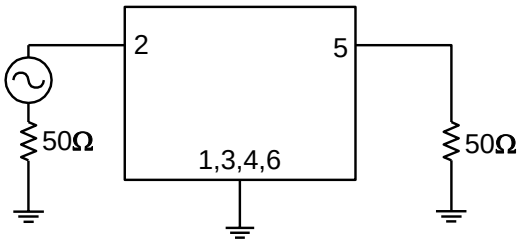
Test conditions unless otherwise specified: Temp. +25 °C, Z_S=Z_L=50 Ohms

Parameter	Conditions		Min	Typ	Max	Units
Pass Band Frequency			1710		1785	
Center Frequency			-	1747.5	-	MHz
3.0 dB Bandwidth			-	81	-	MHz
Insertion Loss	1710 – 1785 MHz	+25 °C	-	2.4	3.0	dB
		−40 °C to +85 °C	-	3.0	3.5	
Passband Ripple(5)(6)	1710 – 1785 MHz	+25 °C	-	1.0	1.8	dB p−p
		−40 °C to +85 °C	-	1.6	2.4	
Group Delay Variation	1710 – 1785 MHz	+25 °C	-	20	40	ns p-p
		+25 °C to +85 °C	-	38	55	
Group Delay Variation	Any 5 MHz band in passband	+25 °C	-	7	18	ns p-p
		−40 °C to +85 °C	-	14	30	
Input/Output VSWR			-	1.9:1	2.4:1	ratio
Stopband Attenuation (relative to zero dB)	0.9 – 720 MHz		30	32	-	dB
	720 – 1670 MHz		28	32	-	
	1670 – 1690 MHz		10	20	-	
	1805 – 1825 MHz (−40 to −10 °C)		38	46	-	
	1825 – 1880 MHz		44	52	-	
	1880 – 1920 MHz		30	44	-	
	1920 – 2110 MHz		40	42	-	
	2110 – 2170 MHz		40	44	-	
	2170 – 2660 MHz		24	28	-	
	2660 – 2690 MHz		22	26	-	
	2690 – 3800 MHz		10	17	-	
	3800 – 5000 MHz		5	11	-	
Source/Load Impedance (7)	Single ended		-	50	-	Ohms

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design.
2. Production test is performed at room temp. to a guard-banded specification to ensure electrical compliance over temperature.
3. Electrical margin has been built into the design to account for variation due to temperature drift and manufacturing tolerances.
4. Typical values are based on average measurements at room temperature of 25°C.
5. This is defined as the difference between the maximum and minimum insertion loss within the specified band.
6. This is defined as the worst difference between a peak and adjacent valley within defined frequency points.
7. This is the optimum impedance in order to achieve the performance shown.

TQQ7303-PCB Evaluation Board





Single-ended Input

Single-ended Output

Evaluation Board PCB Information

Top, middle & bottom layers: 1 oz copper

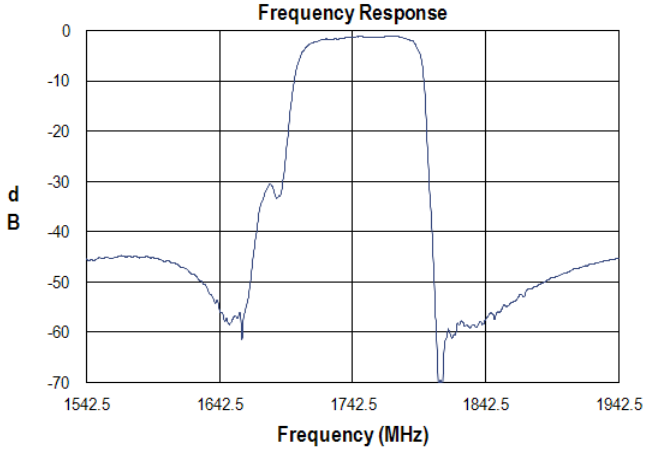
Substrates: FR4 dielectric, .031" thick

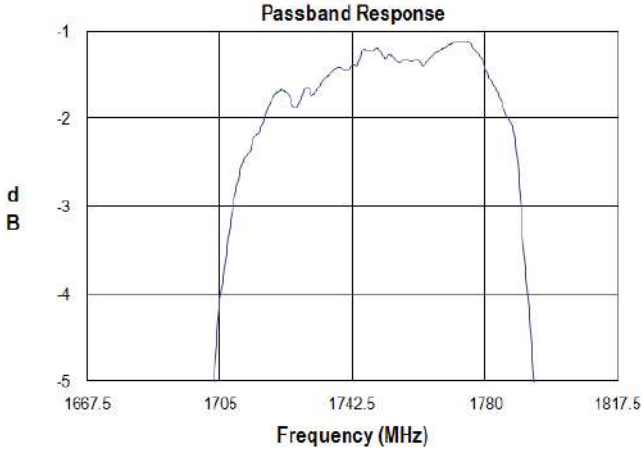
Finish plating: Nickel: 3-8µm thick, Gold: .03-.2µm thick

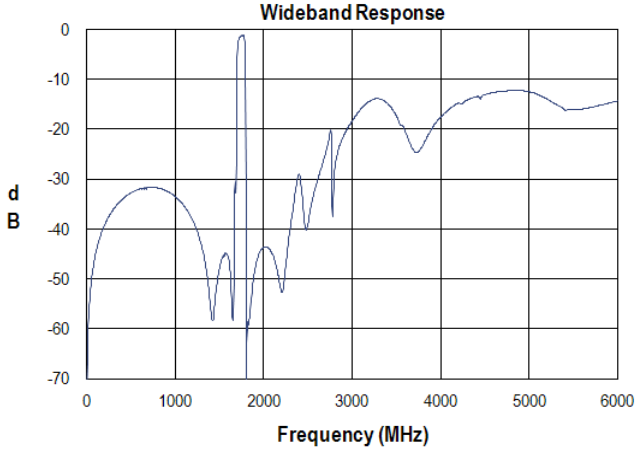
Hole plating: Copper min .0008µm thick

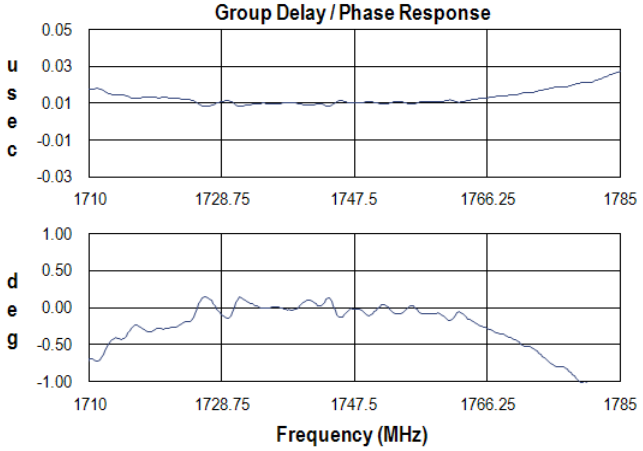
Performance Plots

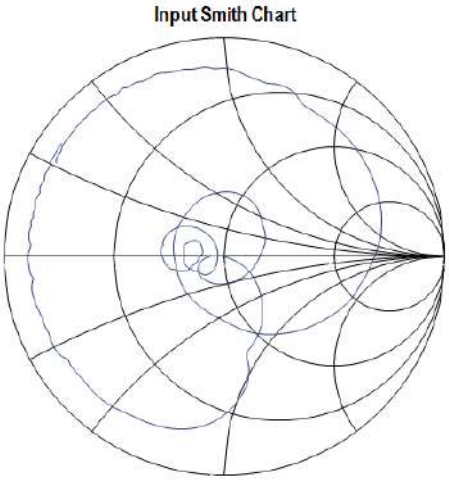
Test conditions unless otherwise noted: Temp.= +25 °C

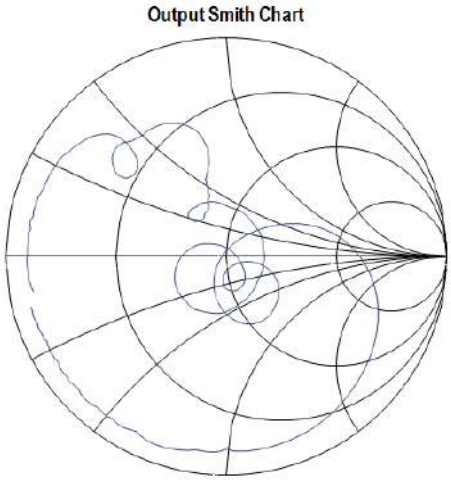




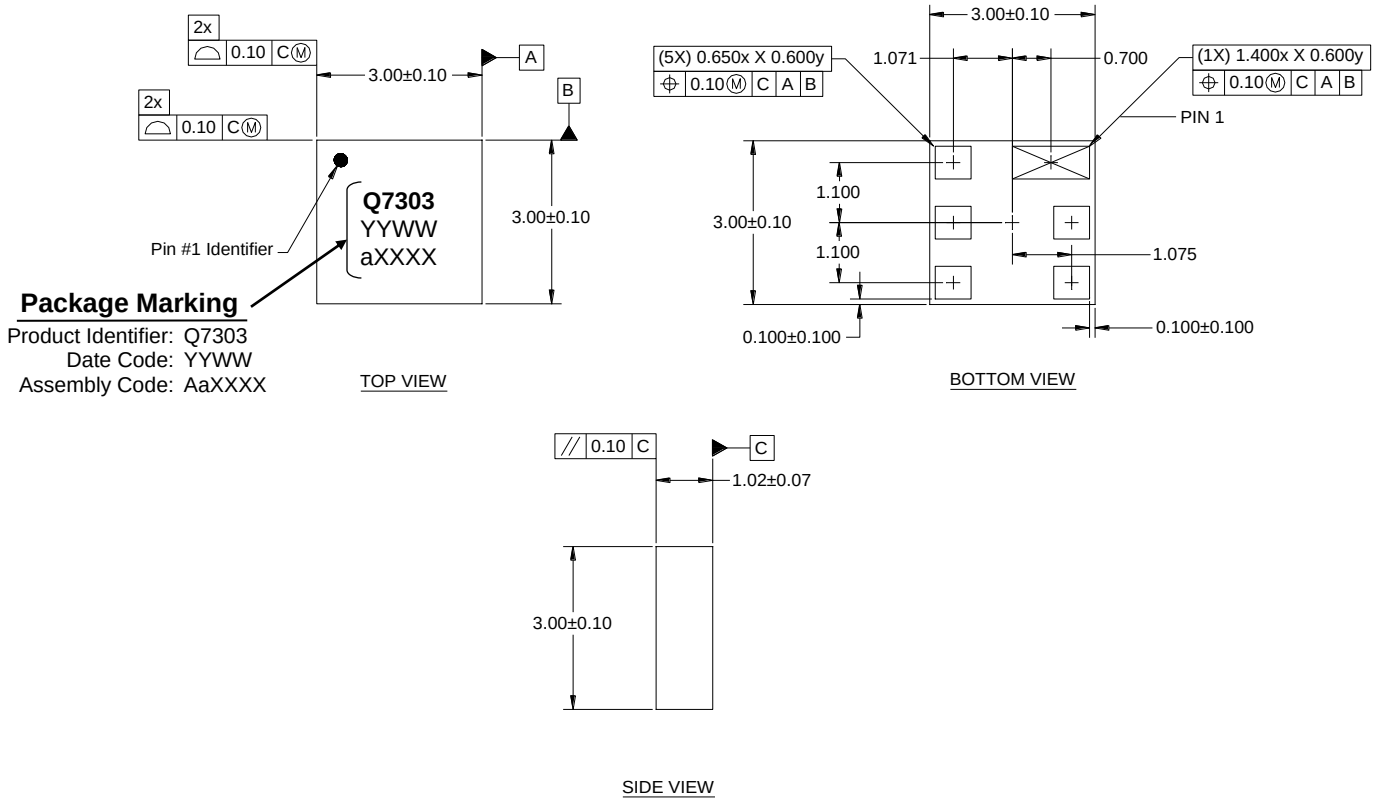






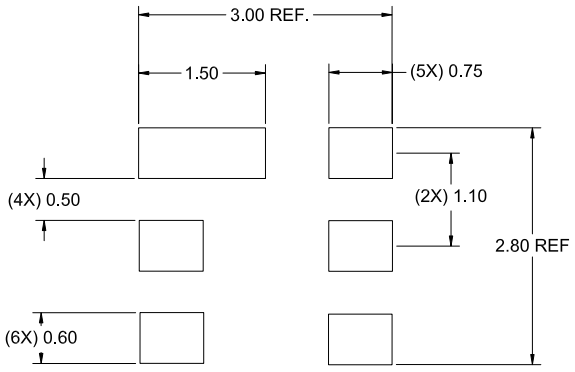


Package Marking and Dimensions



Notes:
1. All dimensions are in millimeters
2. All tolerances are ±0.15 mm except overall length and width ±0.10 mm
3. Contact plating : ENIG (Electroless Nickel Immersion Gold)
4. Terminations: 0.5 – 1.0 µm *Au* plating, over a 2 – 6 µm *Ni* plating

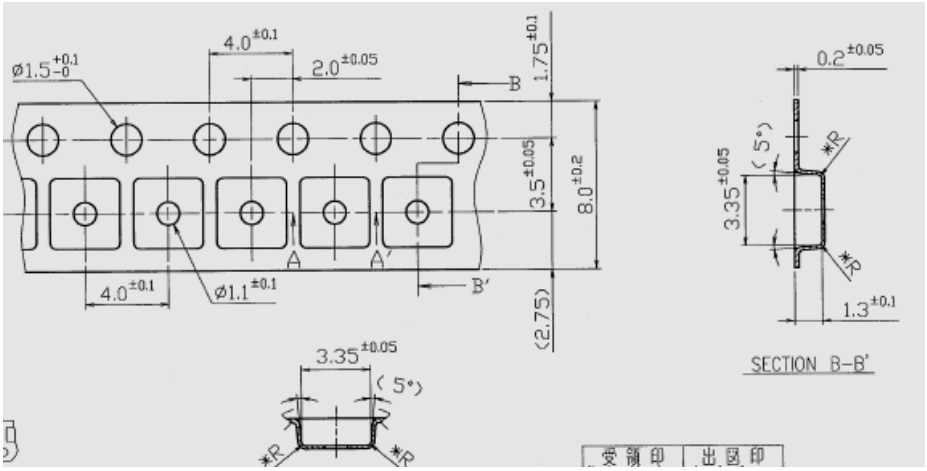
PCB Mounting Pattern



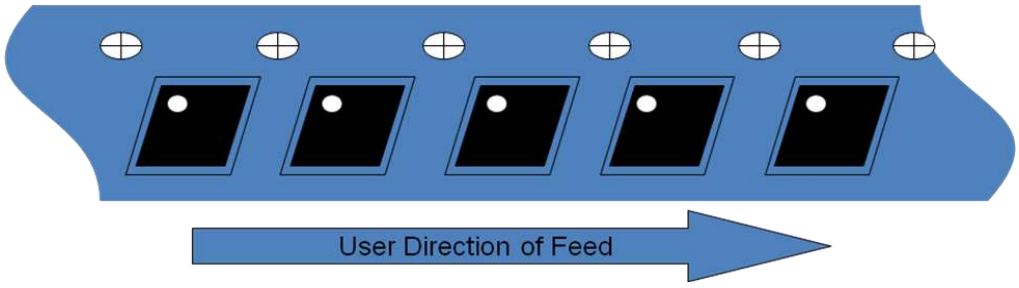
Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.

Tape and Reel Information – Carrier and Cover Tape Dimensions

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

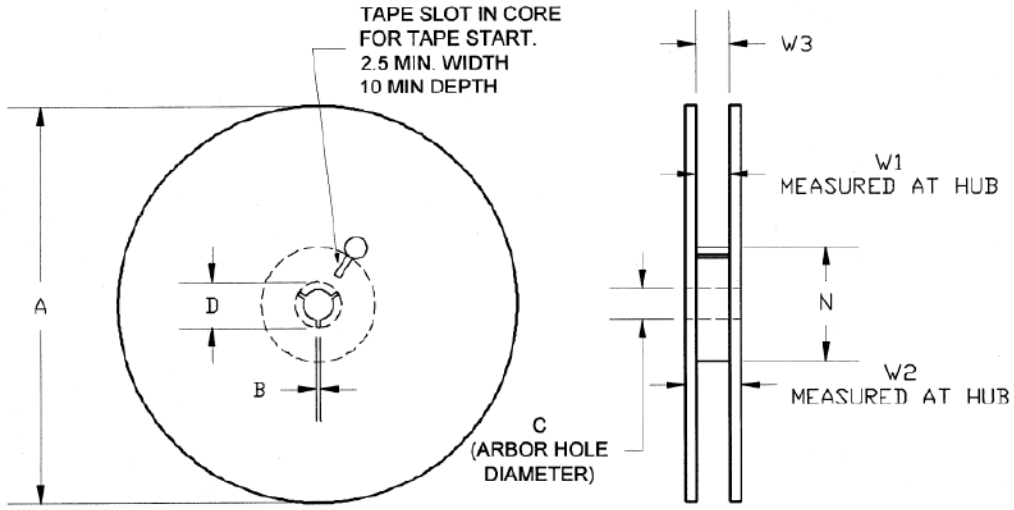


Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.132	3.35
	Width	B0	0.132	3.35
	Depth	K0	0.055	1.40
	Pitch	P1	0.157	4.00
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.00
	Cavity to Perforation - Width Direction	F	0.138	3.50
Cover Tape	Width	C	0.213	5.40
Carrier Tape	Width	W	0.315	8.00



Tape and Reel Information – Reel Dimensions

Tape and reel specifications for this part are also available on the TriQuint website.
Standard T/R size = 2,500 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

Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating: Class 0B
Value: ≥ 125 V to < 250 V
Test: Human Body Model (HBM)
Standard: ESDA / JEDEC Standard JS-001-2012

ESD Rating: Class B
Value: > 200 V to < 400 V
Test: Machine Model (MM)
Standard: JEDEC Standard JESD22-A115F

MSL Rating

MSL Rating: Level 3
Test: 260 °C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

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

Contact plating: ENIG (Electroless Nickel Immersion Gold)

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

Contact Information

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Email: info-sales@triquint.com **Fax:** +1.407.886.7061

For technical questions and application information:

Email: sjcapplications.engineering@triquint.com

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TQQ7307

2535 MHz LTE Band 7 Uplink BAW Filter

Applications

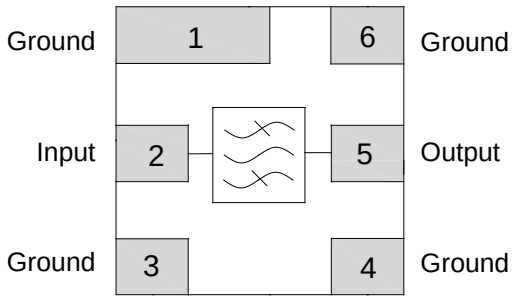
- LTE Band 7 Uplink Infrastructure
- Base Station
- General Purpose Wireless

6 Pin 3 x 3 mm leadless SMT Package

Product Features

- 70 MHz Bandwidth
- High Attenuation
- Low Loss
- 50 Ohm Input/Output Impedance
- Single-ended Operation
- Small Size: 3 x 3 x 1.02 mm
- Surface Mount Device
- RoHS Compliant, Pb-Free

Functional Block Diagram



Top View

General Description

The TQQ7307 is a general purpose uplink BAW filter for LTE Band 7. This filter is housed in a compact 3 x 3 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 TQQ7307 is part of TriQuint's extensive portfolio of RF BAW and SAW filters.

Pin Configuration

Pin No.	Label
2	Input
5	Output
1,3,4,6	Ground

Ordering Information

Part No.	Description
TQQ7307	2535 MHz BAW Filter
TQQ7307-EVB	Evaluation board

Standard T/R size = 2500 pieces on a 7" reel

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Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−40 to +95°C
RF Input Power (CW, +55°C for 10,000 hours)	+30 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
T_{CASE}	−40		+85	°C

Electrical specifications are measured at specified test conditions.

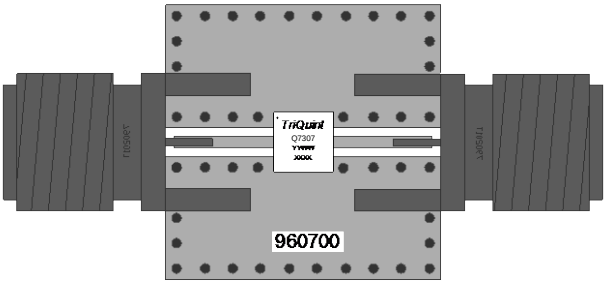
Electrical Specifications (1,2,3)

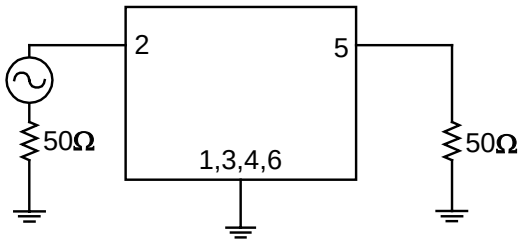
Test conditions unless otherwise specified: Temp. +25 °C, Z_S=Z_L=50 Ohms

Parameter	Conditions	Min	Typ(4)	Max	Units
Pass Band Frequency		2500		2570	
Center Frequency		-	2535	-	MHz
3.5 dB Bandwidth		-	83	-	MHz
Maximum Insertion Loss	2500 – 2570 MHz	-	2.0	3.5	dB
Amplitude Variation(5)	2500 – 2570 MHz	-	0.9	2.4	dB
Group Delay Variation(6)	2500 – 2570 MHz	-	14	30	ns p-p
Group Delay Variation(6)	Any 5 MHz band in passband	-	7	13	ns p-p
Input VSWR	2500 – 2570 MHz	-	1.9:1	2.4:1	-
Output VSWR	2500 – 2570 MHz		1.8:1	2.4:1	-
Stopband Attenuation (relative to zero dB)	0.9 – 1100 MHz 1100 – 2170 MHz 2170 – 2260 MHz 2260 – 2450 MHz 2450 – 2480 MHz 2590 – 2620 MHz 2620 – 2690 MHz 2690 – 2900 MHz 2900 – 3800 MHz 3800 – 5000 MHz 5000 – 6000 MHz	36 30 38 32 12 8 40 40 30 13 -	40 34 45 39 20 12 48 47 37 17 4	- - - - - - - - - - -	dB
Source/Load Impedance (7)	Single ended	-	50	-	Ohms

Notes:
1. All specifications are based on the TriQuint schematic for the main reference design.
2. Production test is performed at room temp. to a guard-banded specification to ensure electrical compliance over temperature.
3. Electrical margin has been built into the design to account for variation due to temperature drift and manufacturing tolerances.
4. Typical values are based on average measurements at room temperature of 25°C.
5. This is defined as the difference between the maximum and minimum insertion loss within the specified band.
6. This is defined as the worst case difference between a peak and adjacent valley within defined frequency points.
7. This is the optimum impedance in order to achieve the performance shown.

TQQ7307-PCB Evaluation Board





Single-ended Input

Single-ended Output

Bill of Material – TQQ7307-PCB

Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	2535 MHz BAW Filter	TriQuint	TQQ7307
n/a	n/a	Printed Circuit Board	TriQuint	960700
n/a	n/a	SMA Edge Connector	Radiall	9602-1111-018

Evaluation Board PCB Information

Top, middle & bottom layers: 1 oz copper

Substrates: FR4 dielectric, .031” thick

Finish plating: Nickel: 3-8µm thick, Gold: .03-.2µm thick

Hole plating: Copper min .0008µm thick

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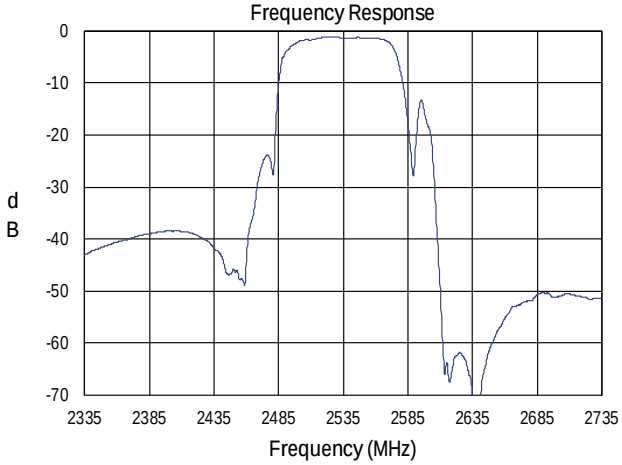
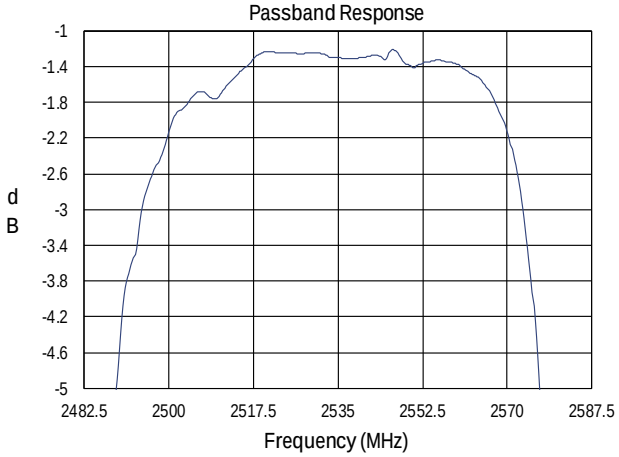
Performance Plots

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

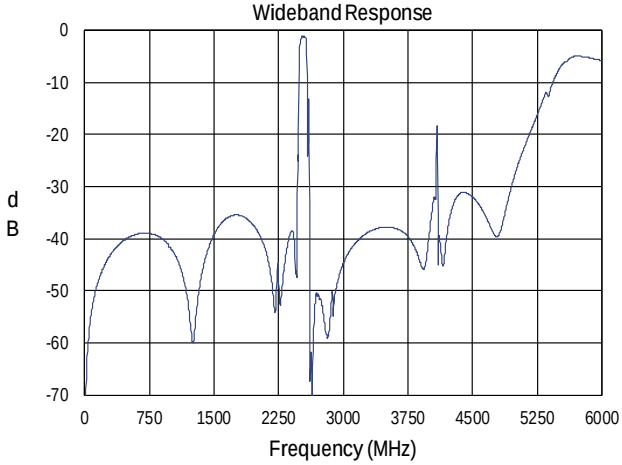
Frequency Response



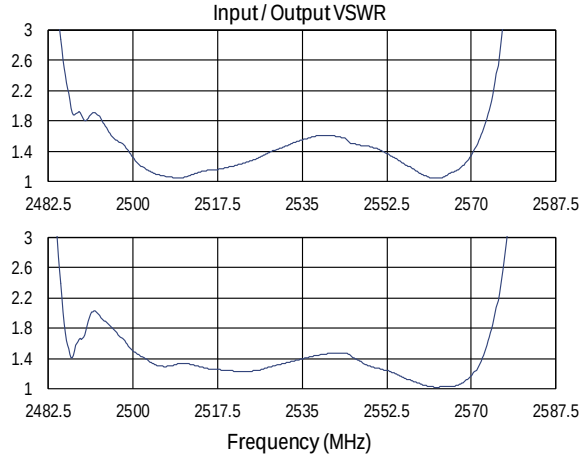
Passband Response



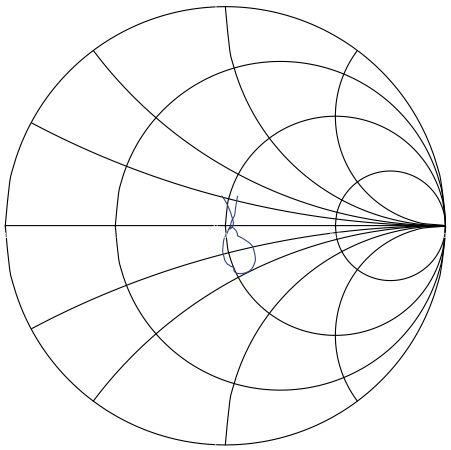
Wideband Response



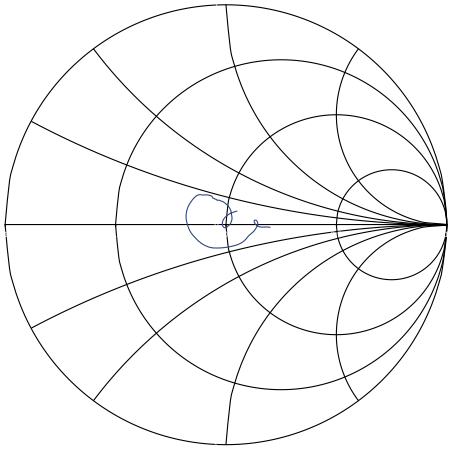
Input / Output VSWR



Input Smith Chart



Output Smith Chart



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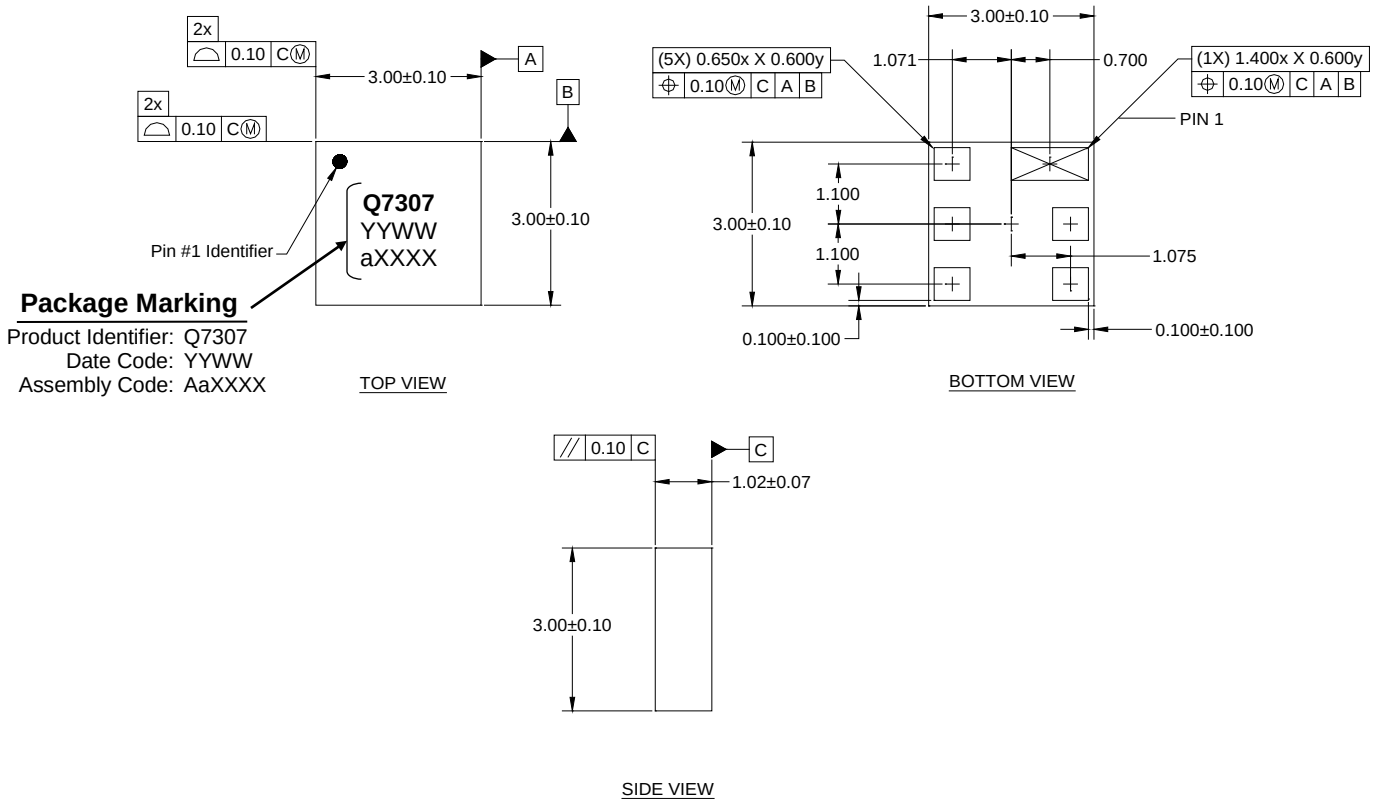
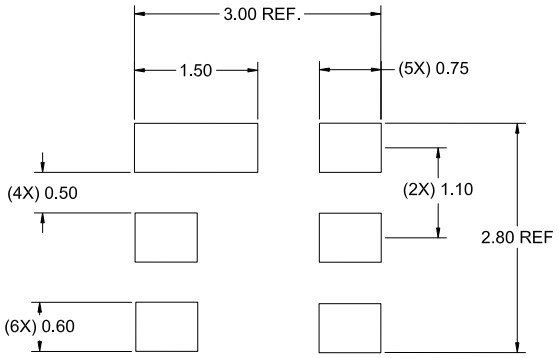
Package Marking and Dimensions



Notes:
1. All dimensions are in millimeters
2. All tolerances are ±0.15 mm except overall length and width ±0.10 mm
3. Contact plating : ENIG (Electroless Nickel Immersion Gold)
4. Terminations: 0.5 – 1.0 µm *Au* plating, over a 2 – 6 µm *Ni* plating

PCB Mounting Pattern



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

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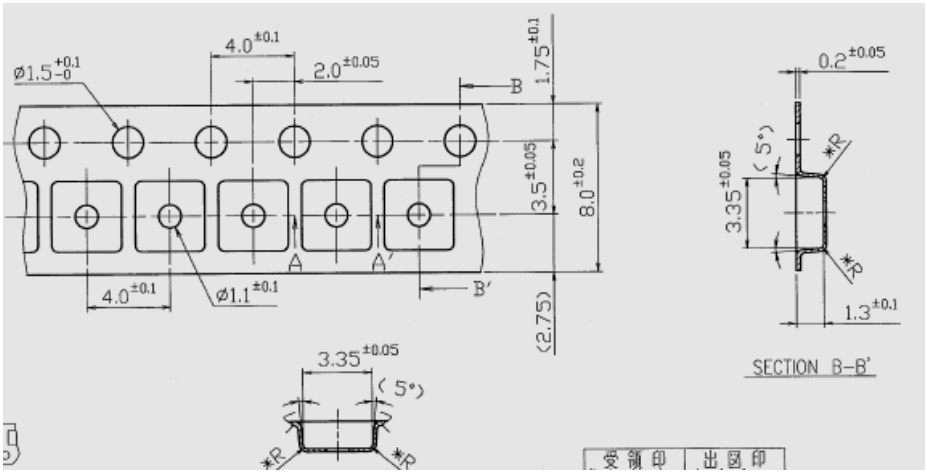
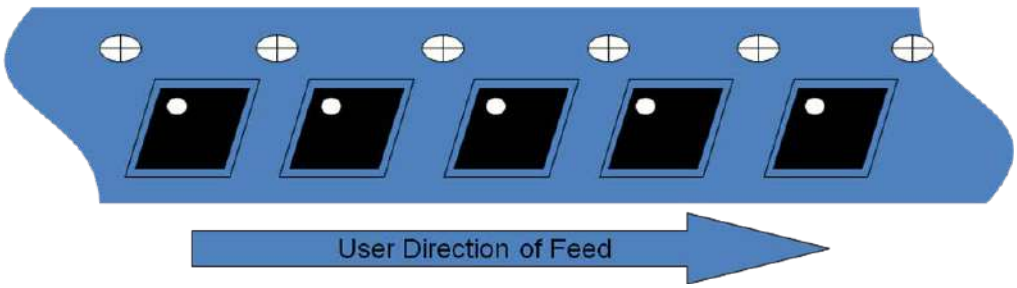
Tape and Reel Information – Carrier and Cover Tape Dimensions

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



Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.132	3.35
	Width	B0	0.132	3.35
	Depth	K0	0.055	1.40
	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



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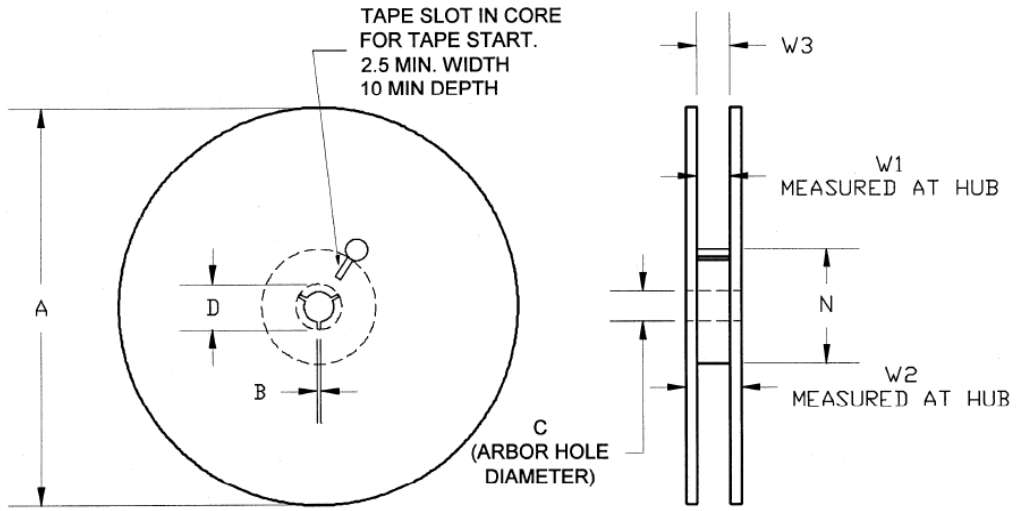
Tape and Reel Information – Reel Dimensions

Tape and reel specifications for this part are also available on the TriQuint website.
Standard T/R size = 2,500 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

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Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating:	Class 1B
Value:	Passes ≥ 500V to < 1000V
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JS-001-2012

ESD Rating:	Class B
Value:	Passes ≥ 200V to < 400V
Test:	Machine Model (MM)
Standard:	JEDEC Standard JESD22-A115

MSL Rating

MSL Rating:	Level 3
Test:	260°C convection reflow
Standard:	JEDEC Standard IPC/JEDEC J-STD-020

Solderability

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

Contact plating: ENIG (Electroless Nickel Immersion Gold)

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

Contact Information

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TQQ7399

DC – 2700 MHz Through Line

Applications

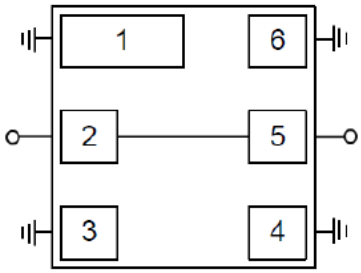
- General Purpose Wireless
- RF Bypass Paths
- Microwave Radio
- Test & Measurement
- Scientific Instruments

6 Pin 3 x 3 mm leadless SMT Package

Product Features

- DC – 2700 MHz
- 50 Ohm Port Impedance
- Typical Insertion Loss, 0.15 dB at 2140 MHz
- Typical Return Loss, 25 dB at 2140 MHz
- Surface Mountable

Functional Block Diagram



Top View

General Description

The TQQ7399 is a passive low-loss through line that operates from 0 to 2700 MHz. At 2140 MHz, input and output return loss is typical 25 dB and typical insertion loss is 0.15 dB. The product is housed in an industry standard Pb-free / RoHS-compliant surface-mount leadless package.

Pin Configuration

Pin #	Label
2, 5	RF I/O
1, 3, 4, 6	NC

Typical Performance

Parameter	Typical Value			Units
Frequency	100	2140	2700	MHz
Insertion Loss	0.15	0.15	0.15	dB
Input / Output Return Loss	25	25	25	dB

Ordering Information

Part No.	Description
TQQ7399TR7*	Through Line

*Standard T/R size = 2500 pieces on a 7” reel.

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	−50 to +150 °C
RF Input Power, CW	+20 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
T_{CASE}	−40		+105	°C

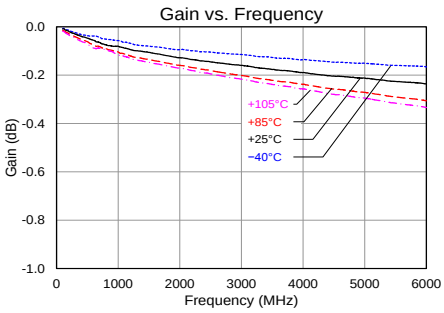
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

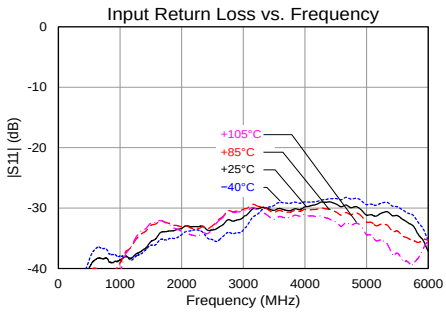
Electrical Specifications Antenna − Transmit

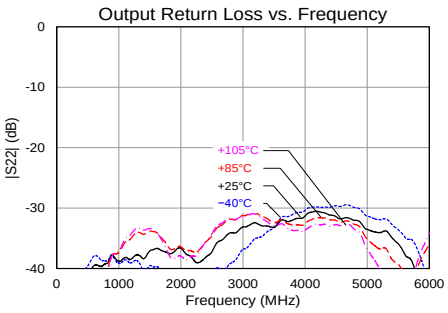
Test conditions unless otherwise specified: Temp. = +25 °C

Parameter	Conditions	Min	Typ	Max	Units
Operational Frequency Range		0		2700	MHz
Test Frequency			2140		MHz
Port Impedance	0 to 2700 MHz		50		Ohms
Insertion Loss			0.15	0.2	dB
Return Loss	0 to 2700 MHz		25		dB

Performance Plots: TQQ7399

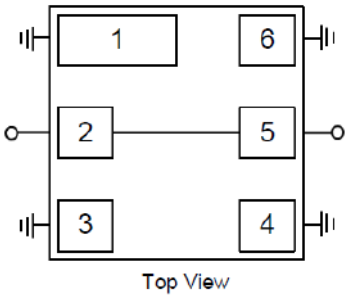




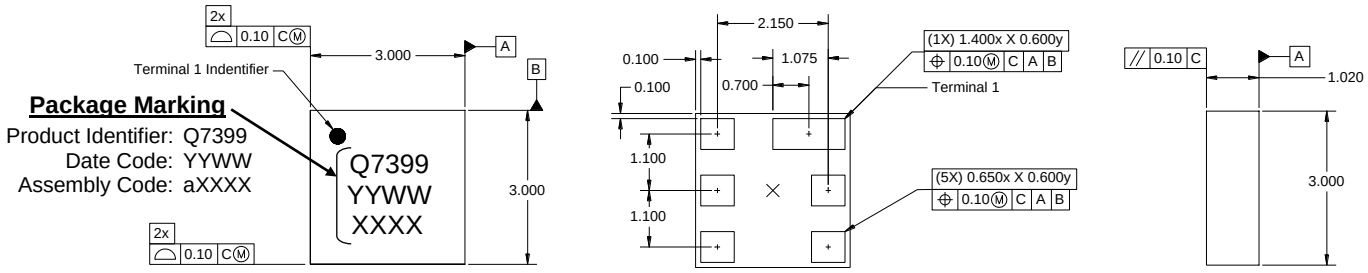


Pin Description & Layout

Pin No.	Symbol	Description
2, 5	RF I/O	RF through path (bi-directional)
1, 3, 4, 6	NC	No electrical connection. Provide grounded land pads for PCB mounting integrity.



Package Marking and Dimensions

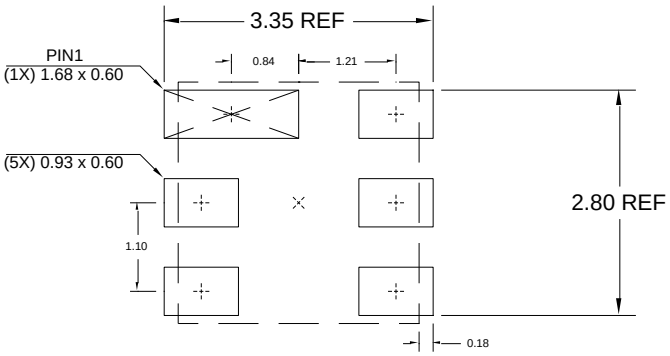


TOP VIEW BOTTOM VIEW SIDE VIEW

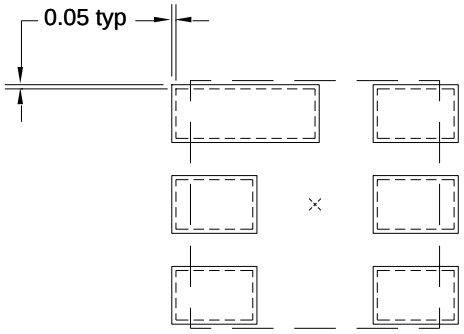
Notes:

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.

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.

Manufacturing Environments

COMPONENT HANDLING

All necessary special handling techniques shall be adopted in order to avoid contamination of metallization / terminations. Examples include use of finger cots, plastic tweezers, etc.

PART PLACEMENT

A placement force of up to 500 grams is applied (using a 2.00 mm or a 0.080 inch diameter rod) to the center of the part while remaining in its tape carrier.

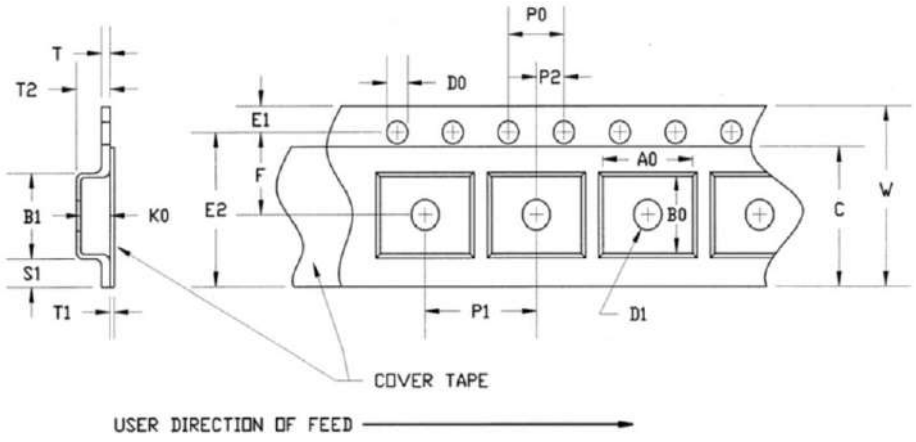
COMPONENT SOLDERABILITY

Convection or Infrared Reflow

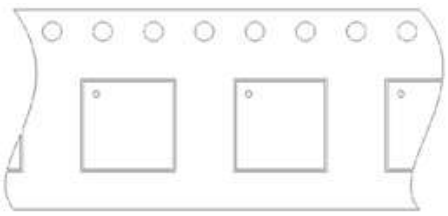
Part will comply with convection or infrared reflow soldering processes consistent with IPC/JEDEC J-STD-020. Qorvo's actual reflow profile for qualification is provided below:

Reflow Parameters	IPC / JEDEC J-STD-020	Qorvo Actual
Average ramp-up rate (217 °C to Peak)	3 °C /second max.	0.57 °C / second
Preheat Time (150 °C to 200 °C)	60 – 180 seconds	150 seconds
Time above 217 °C	60 – 150 seconds	126 seconds
Peak Temperature	260 +0 / −5 °C	259 °C
Time within 5 °C of actual Peak Temperature	20 – 40 seconds	30 seconds
Ramp-down Rate	6 °C / second max.	0.875 °C / second
Time 25 °C to Peak Temperature	8 minutes max.	7 minutes max.

Tape and Reel Information



PART	FEATURE	SYMBOL	SIZE (in)	SIZE (mm)
CAVITY	LENGTH	A0	0.134	3.40
	WIDTH	B0	0.126	3.20
	DEPTH	K0	0.055	1.40
	PITCH	P1	0.157	4.00
DISTANCE BETWEEN CENTERLINE	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



Product Compliance Information

MSL Rating

MSL Rating: Level 3
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

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

Contact plating: Electroless Nickel Immersion Gold

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

Contact Information

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