QM26003

Band 1/3/n41 Pentaplexer

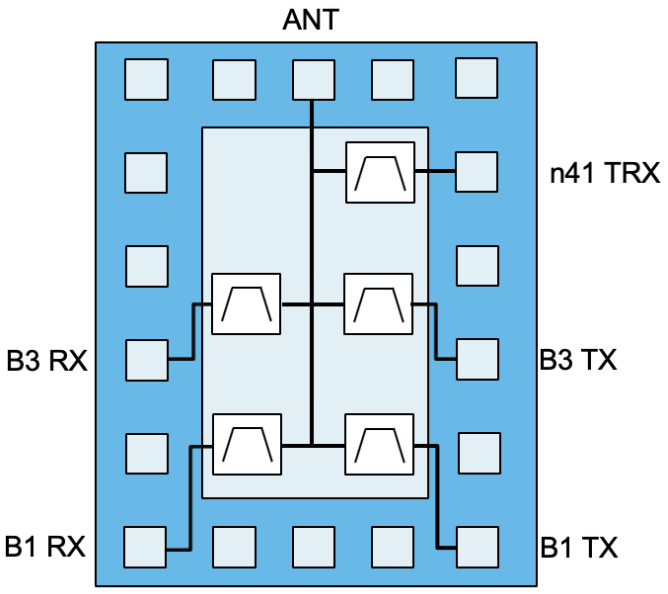
Product Overview

The QM26003 is a compact, high-performance filter module designed to meet the strict performance requirements of B1+B3+n41 carrier aggregation.

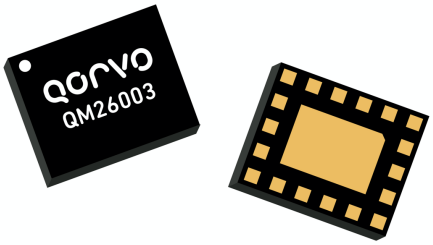
The QM26003 leverages Qorvo's patented technology to ensure minimal insertion loss in all bands being multiplexed while maintaining the high cross-isolation which is critical to ensure good receive sensitivity performance ensuring the best overall performance. In addition, the QM26003 is capable of supporting higher power levels to overcome additional front-end losses seen in today's handsets.

The QM26003 uses common module packing techniques to achieve a compact 3.2mm x 2.6mm footprint.

Functional Block Diagram



Bottom View



19 Pin 3.2mm x 2.6mm leadless SMT package

Key Features

- Compact Form-Factor: 3.2mm x 2.6mm
- Minimizes PA current drain with excellent TX IL
- Improved RX sensitivity with low RX IL
- Supports high power handling on FDD/TDD TX Filters
- Single-Ended
- RoHS Compliant, Pb-Free Module Package

Applications

- LTE/NR Mobile Products
  - Handsets
  - Datacards
- n41 PC2 (2496 MHz to 2690 MHz)
- Carrier Aggregation

Ordering Information

Part Number	Description
QM26003EVB	Evaluation Board (EVB)
QM26003SB	Sample bag of 5 pieces
QM26003SR	Sample reel of 100 pieces
QM26003TR13	13 inch reel of 10k pieces

Absolute Maximum Ratings

Parameter	Pin	Conditions	Rating	Units
Storage Temperature			-40 to +90	°C
RF Input Power	Pins 8 and 10	CW, 100% Duty Cycle, +55°C for 5k hours	+31	dBm
	Pin 6	CW, 40% Duty Cycle, +55°C for 5k hours	+32.5	dBm
Peak RF Input Power	Pins 8, and 10	Max duration 200ms	+35	dBm
	Pin 6	Max duration 200ms	+36	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}	-30		+85	°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 – 1925 MHz	-	1.6[2]	2.5	dB
	1925 MHz – 1980 MHz	-	1.9[2]	2.9	
VSWR (TX Port)	1920 MHz – 1980 MHz	-	1.4:1	2.0:1	-
VSWR (ANT Port)			1.34:1	2.0:1	
Attenuation	600 MHz – 1000 MHz	50	62	-	dB
	1452 MHz – 1496 MHz	45	56	-	
	1559 MHz – 1606 MHz	45	56	-	
	1805 MHz – 1880 MHz	50	62	-	
	2110 MHz – 2170 MHz	45	59	-	
	2400 MHz – 2500 MHz	50	69	-	
	2496 MHz – 2515 MHz	60	70	-	
	2515 MHz – 2675 MHz	52	60	-	
	2675 MHz – 2690 MHz	52	60	-	
	2620 MHz – 2690 MHz	52	60	-	
	3840 MHz – 3960 MHz	50	65	-	
	3400 MHz – 4200 MHz	40	50	-	
	4500 MHz – 4600 MHz	37	45	-	
	4900 MHz – 5940 MHz	15	19	-	

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 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	-	1.8[2]	2.9[3]	dB
VSWR (RX Port)	2110 MHz – 2170 MHz	-	1.75:1	2.0:1	-
VSWR (ANT Port)			1.34:1	2.0:1	
Attenuation	600 MHz – 1000 MHz	50	56	-	dB
	1710 MHz – 1785 MHz	45	56	-	
	1920 MHz – 1980 MHz	45	55	-	
	2400 MHz – 2500 MHz	50	62	-	
	2500 MHz – 2570 MHz	55	66	-	
	2496 MHz – 2515 MHz	50	65	-	
	2515 MHz – 2675 MHz	45	61	-	
	2675 MHz – 2690 MHz	45	60	-	
	4900 MHz – 5150 MHz	25	33	-	
	5150 MHz – 5950 MHz	13	21	-	

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 +55°C

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 – 1780 MHz	-	1.34[2]	3	dB
	1780 MHz – 1785 MHz	-	2.2[2]	3.6[3]	
VSWR (TX Port)	1710 MHz – 1715 MHz	-	1.76:1	2.0:1[4]	-
	1715 MHz – 1785 MHz	-	1.5:1	2.0:1[3]	
VSWR (ANT Port)	1710 MHz – 1715 MHz	-	1.7:1	2.0:1[4]	
	1715 MHz – 1785 MHz	-	1.7:1	2.0:1	
Attenuation	600 MHz – 1000 MHz	47	54	-	dB
	1452 MHz – 1496 MHz	40	45	-	
	1559 MHz – 1606 MHz	45	53	-	
	1805 MHz – 1880 MHz	47	59	-	
	2110 MHz – 2170 MHz	45	51	-	
	2400 MHz – 2500 MHz	45	55	-	
	2496 MHz – 2515 MHz	40	55	-	
	2515 MHz – 2675 MHz	40	53	-	
	2675 MHz – 2690 MHz	40	54	-	
	2620 MHz – 2690 MHz	45	53	-	
	3400 MHz – 3800 MHz	40	50	-	
	3420 MHz – 3570 MHz	45	60	-	
	3800 MHz – 4200 MHz	15	30	-	
	4500 MHz – 4600 MHz	15	21	-	
	4800 MHz – 4900 MHz	21	29	-	
	4900 MHz – 5900 MHz	12	24	-	

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 -30°C to +55°C
4. 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 – 1820 MHz	-	1.9[2]	3.2	dB
	1820 MHz – 1880 MHz	-	1.5[2]	2.9	
VSWR (RX Port)	1805 MHz – 1880 MHz	-	1.7:1	2.0:1	-
VSWR (ANT Port)			1.56:1	2.0:1	
Attenuation	600 MHz – 1000 MHz	45	54	-	dB
	1710 MHz – 1785 MHz	45	60	-	
	1920 MHz – 1980 MHz	45	55	-	
	2400 MHz – 2500 MHz	40	60	-	
	2500 MHz – 2570 MHz	40	61	-	
	2496 MHz – 2515 MHz	40	61	-	
	2515 MHz – 2675 MHz	50	62	-	
	2675 MHz – 2690 MHz	55	63	-	
	4900 MHz – 5950 MHz	25	37	-	

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 n41 - Antenna

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

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	2496 MHz – 2515 MHz	-	2.7[2]	3.6	dB
	2515 MHz – 2520 MHz	-	2.4[2]	3.3	
	2575 MHz – 2675 MHz	-	1.9[2]	3.1	
	2675 MHz – 2690 MHz	-	2.4[2]	3.6	
VSWR (TX/RX Port)	2496 MHz – 2515 MHz	-	1.47:1	2.0:1	-
	2515 MHz – 2675 MHz	-	1.53:1	2.0:1	
	2675 MHz – 2690 MHz	-	1.51:1	2.0:1	
VSWR (ANT Port)	2496 MHz – 2515 MHz	-	1.76:1	2.0:1	-
	2515 MHz – 2675 MHz	-	1.92:1	2.2:1	
	2675 MHz – 2690 MHz	-	1.92:1	2.2:1	
Attenuation	617 MHz – 960 MHz	35	40	-	dB
	1166.22 MHz – 1254 MHz	35	40	-	
	1559.052 MHz – 1605.89 MHz	45	51	-	
	1710 MHz – 1785 MHz	55	60	-	
	1805 MHz – 1880 MHz	55	61	-	
	1880 MHz – 1920 MHz	55	62	-	
	1920 MHz – 1990 MHz	55	62	-	
	2110 MHz – 2170 MHz	49	58	-	
	2403 MHz – 2421 MHz[3] WiFi CH1	25	37	-	
	2408 MHz – 2426 MHz[3] WiFi CH2	30	38	-	dB
	2413 MHz – 2436 MHz[3] WiFi CH3-4	30	41	-	dB
	2423 MHz – 2441 MHz[3] WiFi CH5	30	38	-	dB
	2428 MHz – 2466 MHz[3] WiFi CH6-10	30	36	-	dB
	2453 MHz – 2471 MHz[3] WiFi CH11	9.5	32	-	dB
	3300 MHz – 3800 MHz	21	27	-	dB
	3800 MHz – 4200 MHz	29	35	-	dB
	4400 MHz – 5000 MHz	30	37	-	dB
	5030 MHz – 5350 MHz	30	35	-	dB
	5150 MHz – 5850MHz	30	35	-	dB

1. All specifications are based on the Qorvo schematic for the main reference design
2. Typical specified as average at room temperature
3. Each channel integrated over 18MHz

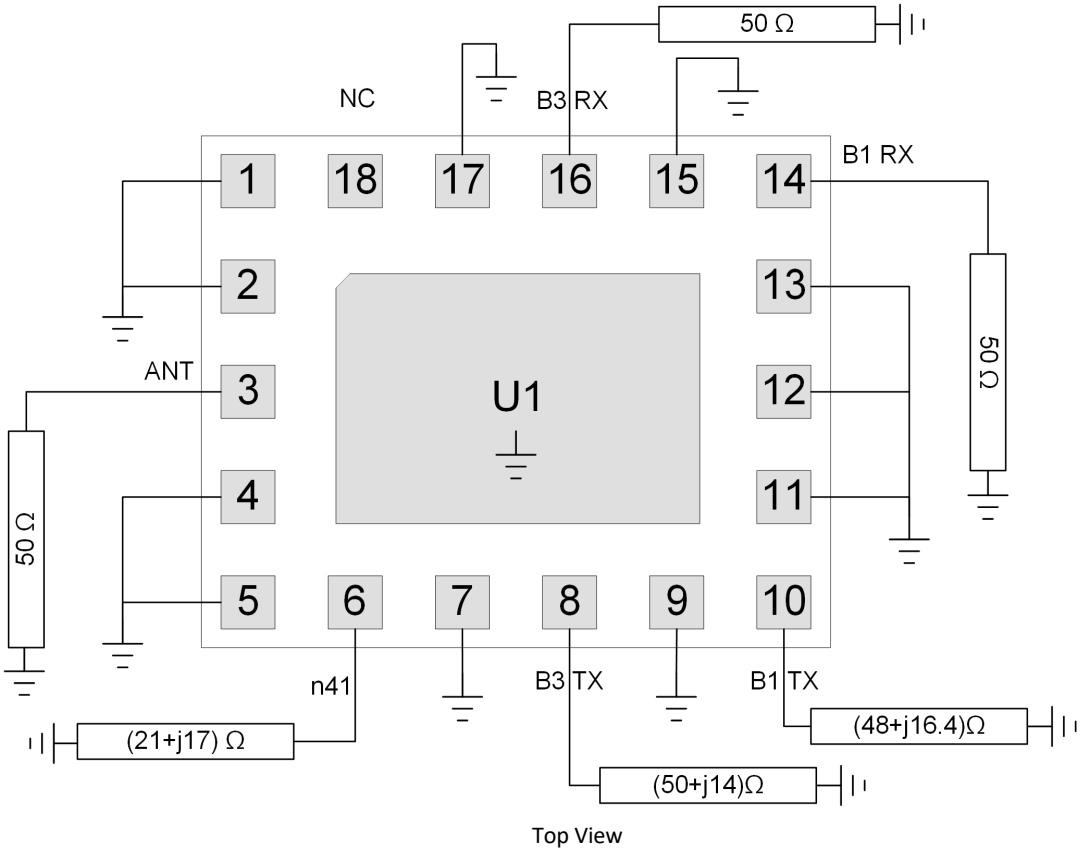
Electrical Specifications[1] Isolation

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	52	59	-	
TX-RX Isolation in B3 RX	1805 MHz – 1880 MHz	55	61	-	
TX-RX Isolation in B3 TX	1710 MHz – 1785 MHz	55[2]	61	-	
B1 TX to B3 RX Isolation in B3 RX	1805 MHz – 1880 MHz	55	64	-	
B1 TX to B3 RX Isolation in B1 TX	1920 MHz – 1980 MHz	54	58	-	
B3 TX to B1 RX Isolation in B3 TX	1710 MHz – 1785 MHz	50	57	-	
B3 TX to B1 RX Isolation in B1 RX	2110 MHz – 2170 MHz	50	53	-	
B1 TX to B41 Isolation in B1 TX	1920 MHz – 1980 MHz	55	63	-	
B1 TX to B41 Isolation in B41	2496 MHz – 2690 MHz	55	61	-	
B3 TX to B41 Isolation in B3 TX	1710 MHz – 1785 MHz	53	57	-	
B3 TX to B41 Isolation in B41	2496 MHz – 2690 MHz	49	52	-	

Notes:
1. All specifications are based on the Qorvo schematic for the main reference design
2. Specified from -30°C to +55°C

Application Circuit Schematic



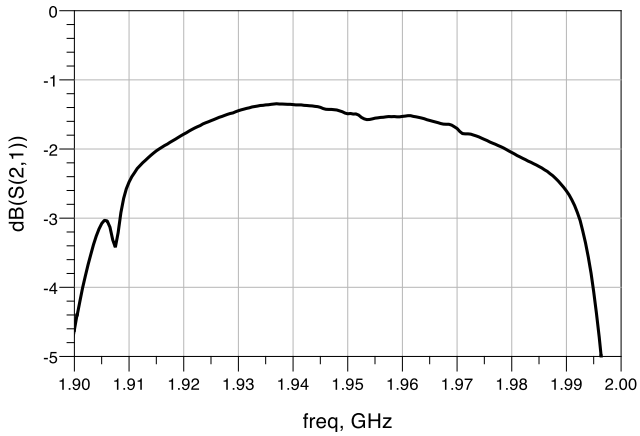
Bill of Materials

Ref. Des.	Value	Description	Manuf.	Part number
U1	N/A	Band 1/3/n41 Pentaplexer	Qorvo	QM26003
PCB	N/A	4-layer Printed Circuit Board		

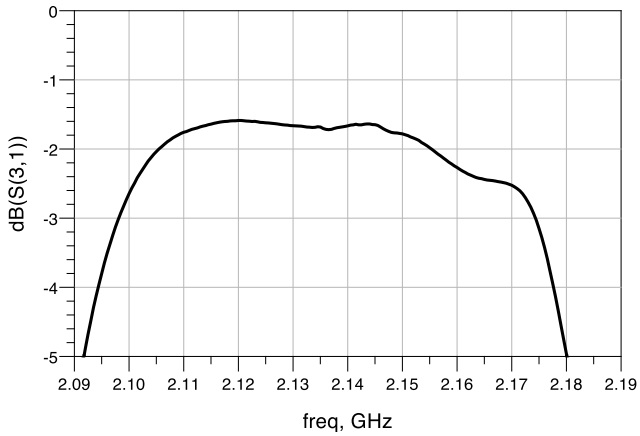
Simulated Performance Plots – Pass Band

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

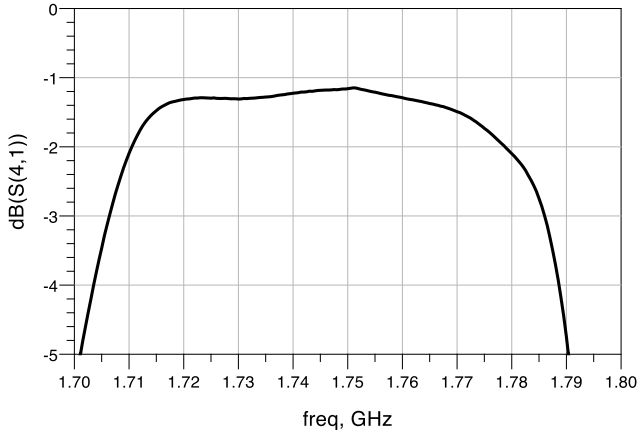
B1 TX Pass Band



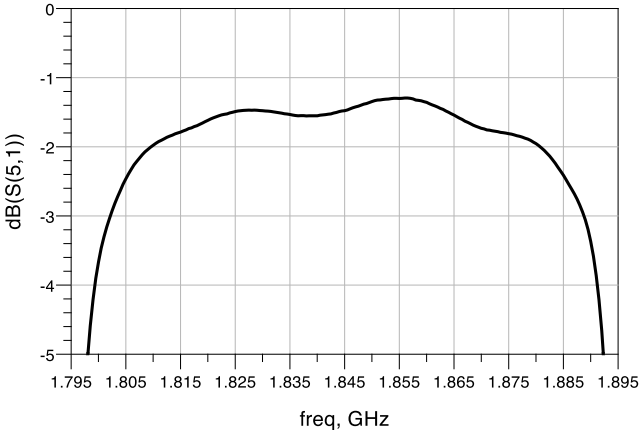
B1 RX Pass Band



B3 TX Pass Band



B3 RX Pass Band

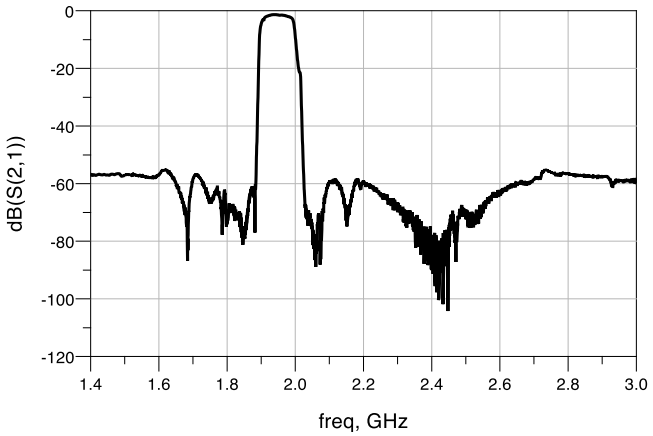


B41 Pass Band

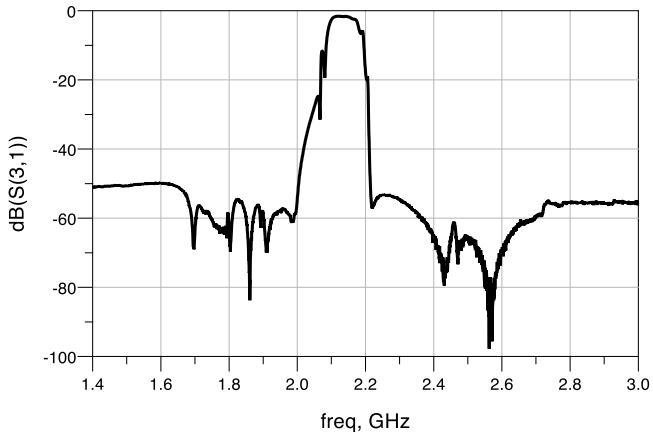
Simulated Performance Plots – Narrow Band

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

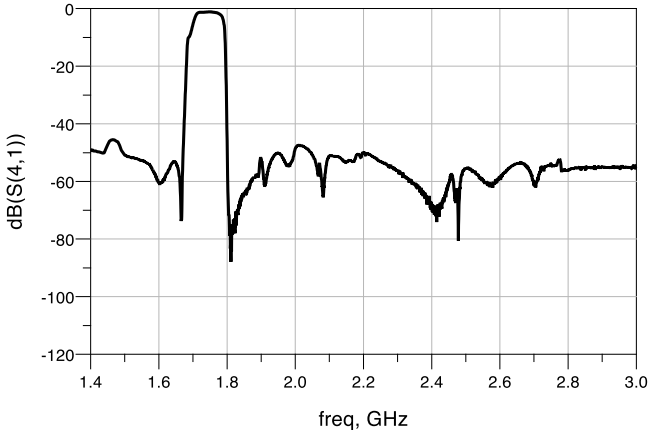
B1 TX Narrow Band



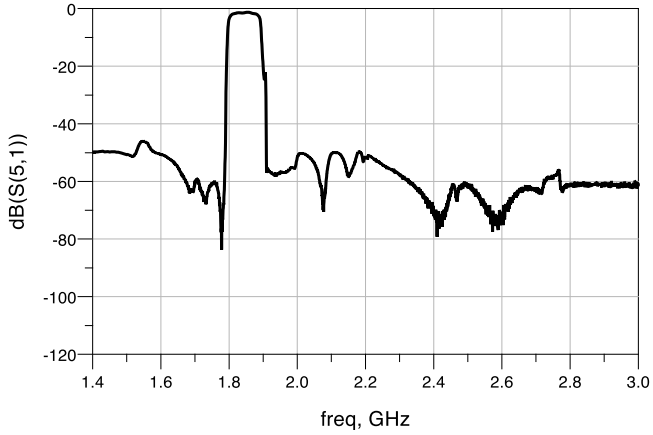
B1 RX Narrow Band



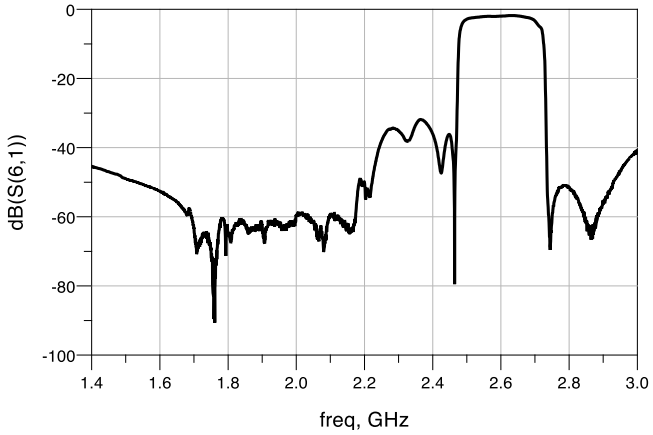
B3 TX Narrow Band



B3 RX Narrow Band



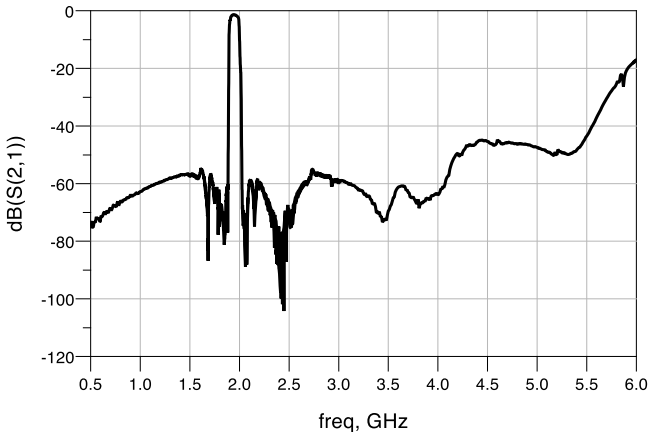
B41 Narrow Band



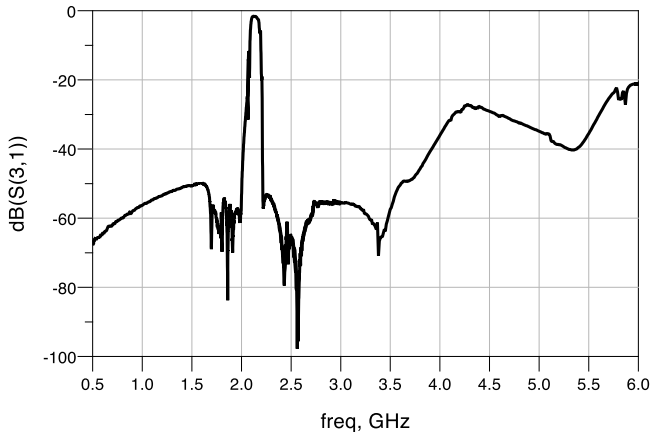
Simulated Performance Plots – Wide Band

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

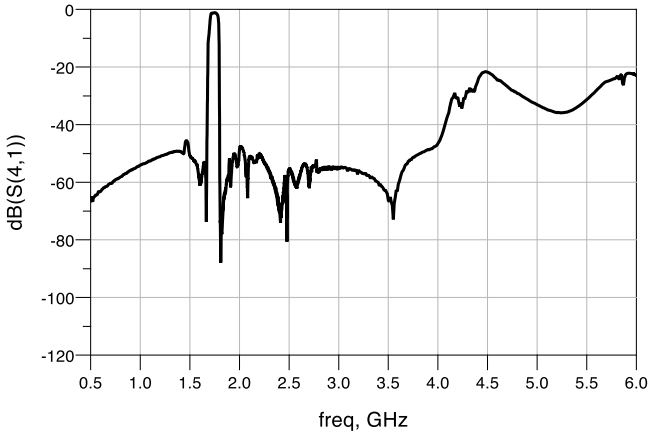
B1 TX Wide Band



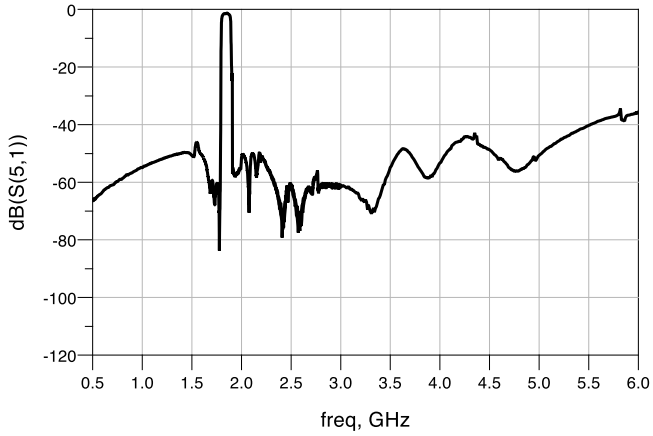
B1 RX Wide Band



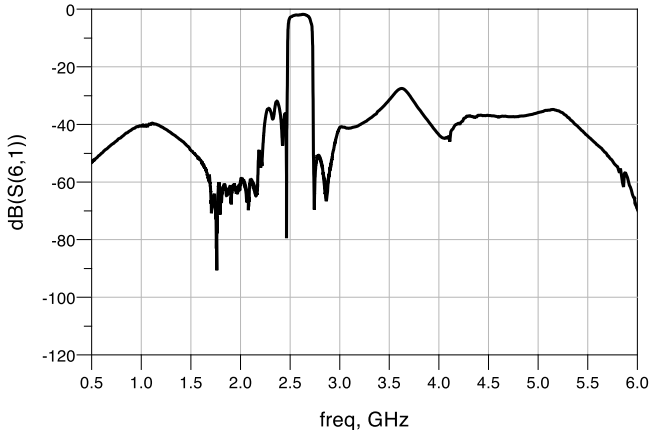
B3 TX Wide Band



B3 RX Wide Band

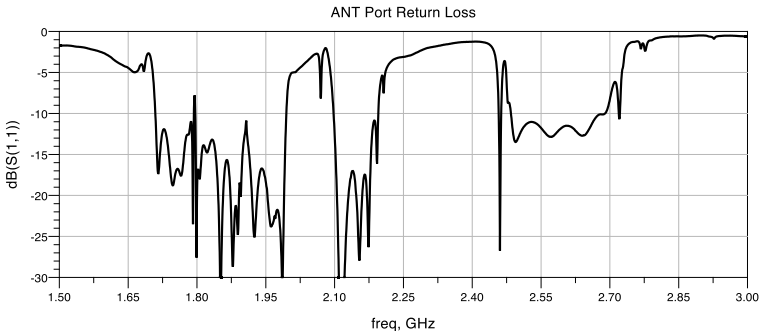


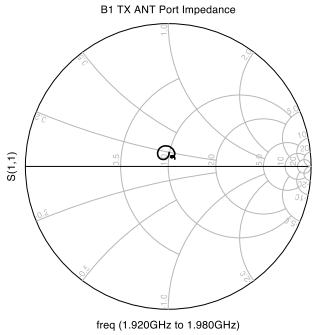
B41 Wide Band

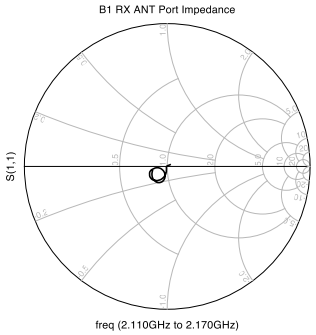


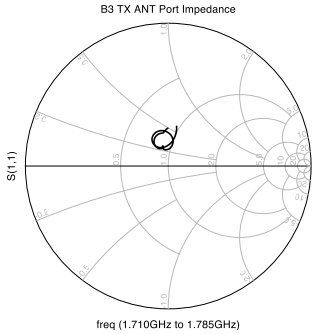
Simulated Performance Plots – ANT Port Return Loss/Impedance

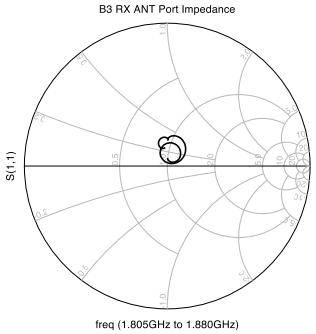
Test conditions unless otherwise noted: Temp. = +25 °C

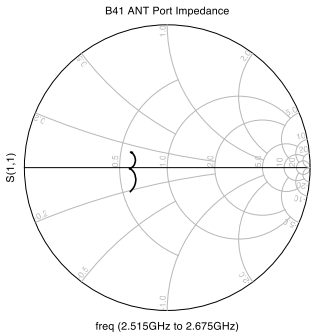






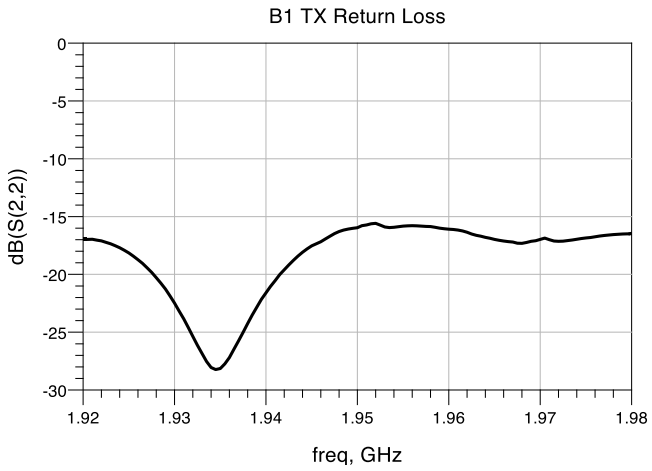


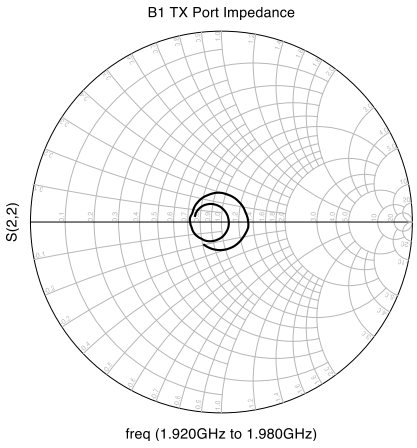


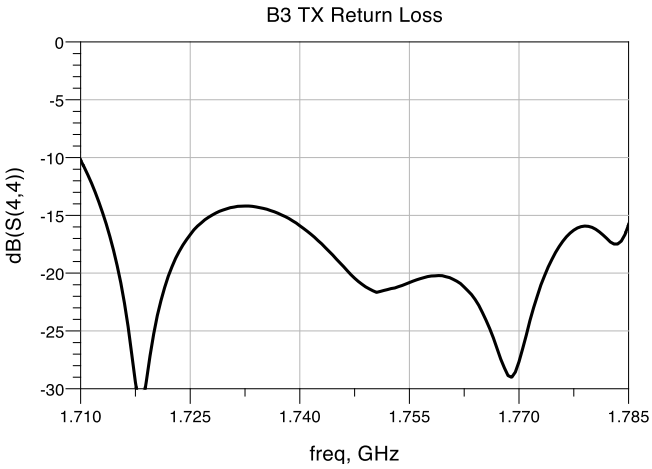


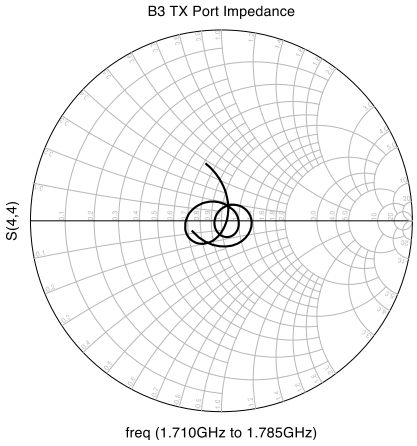
Simulated Performance Plots – TX Port Return Loss/Impedance

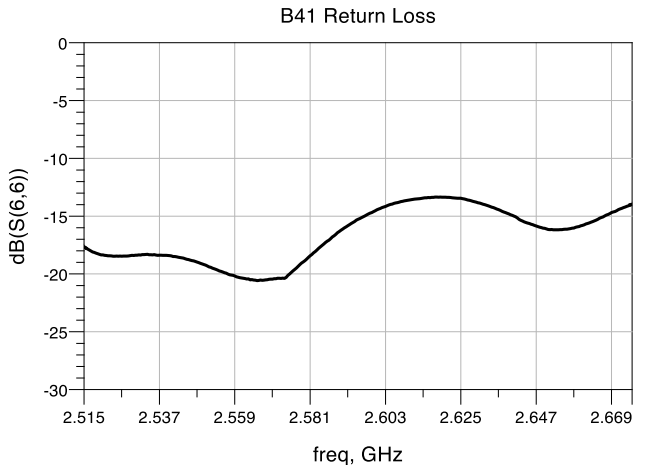
Test conditions unless otherwise noted: Temp. = +25 °C

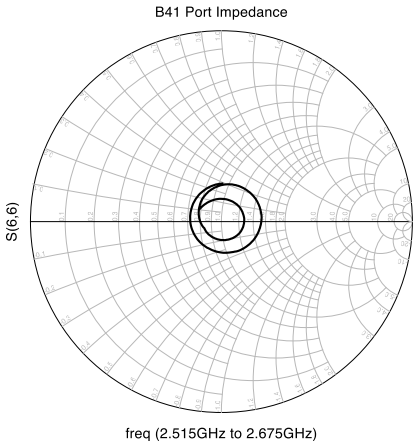






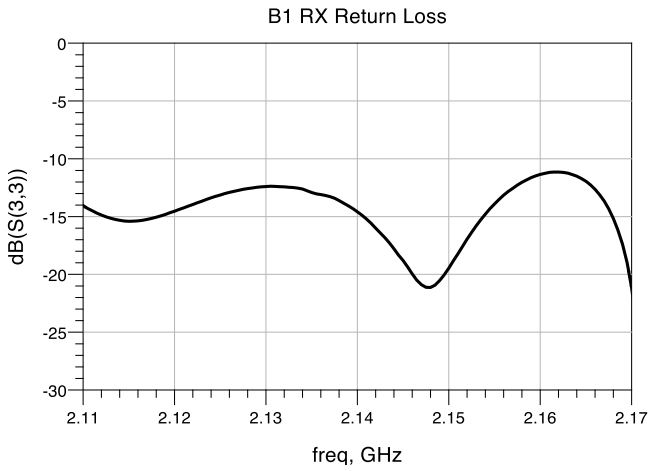


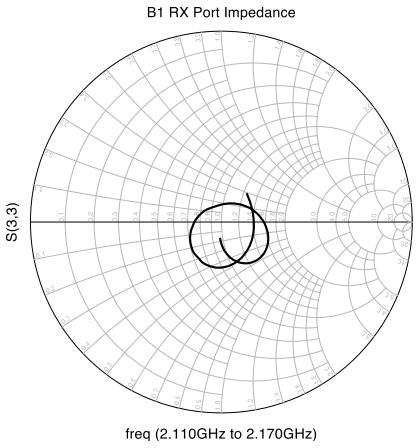


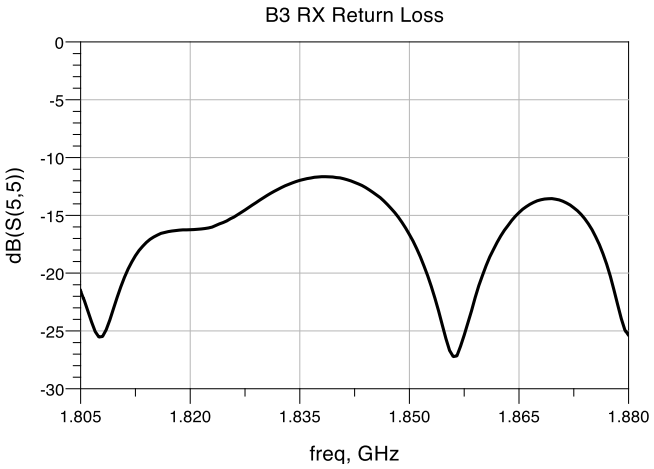


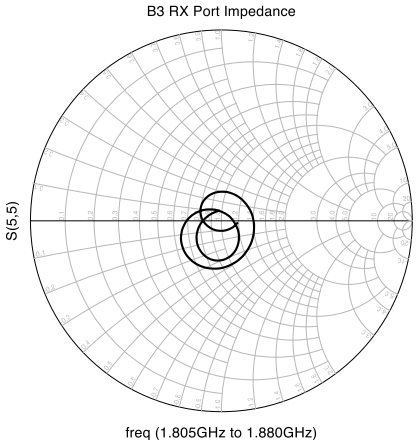
Simulated Performance Plots – RX Port Return Loss/Impedance

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



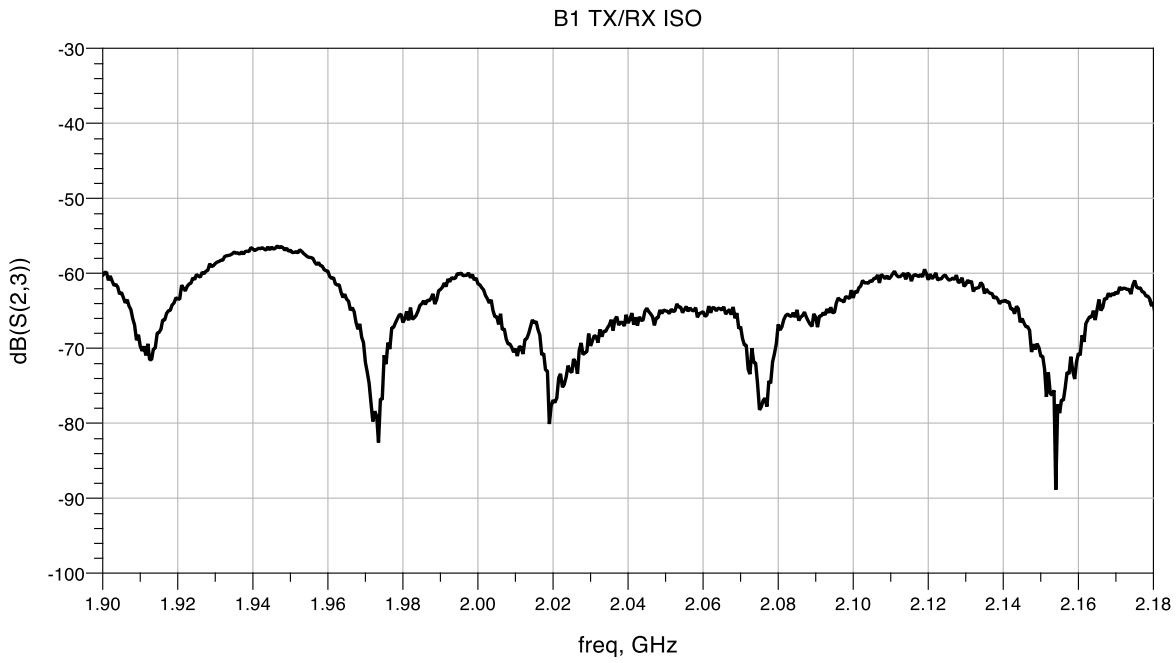


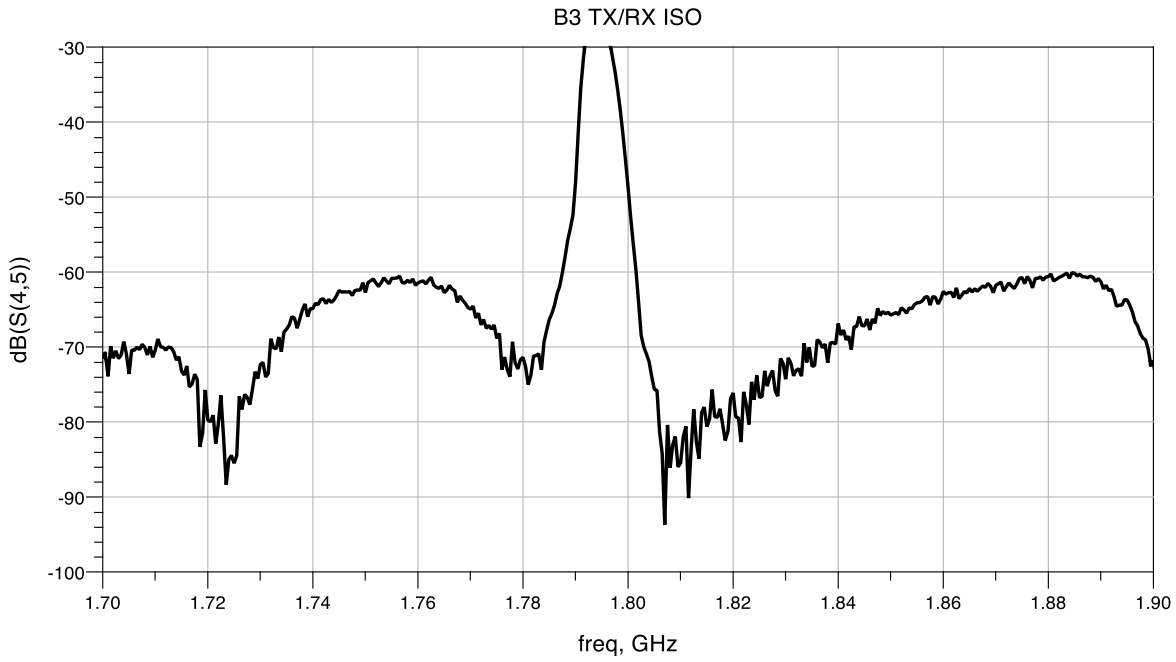




Simulated Performance Plots – Isolation

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

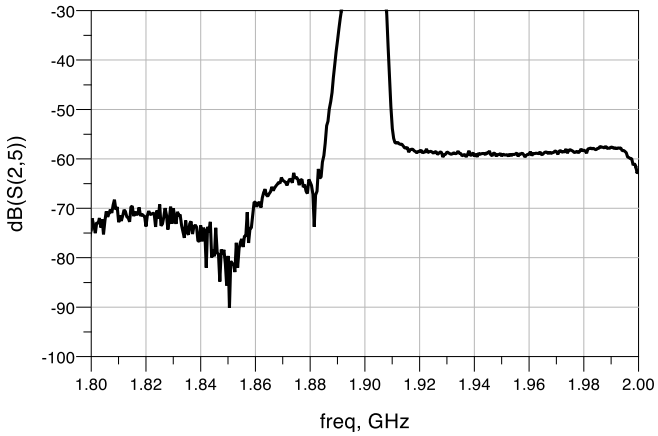




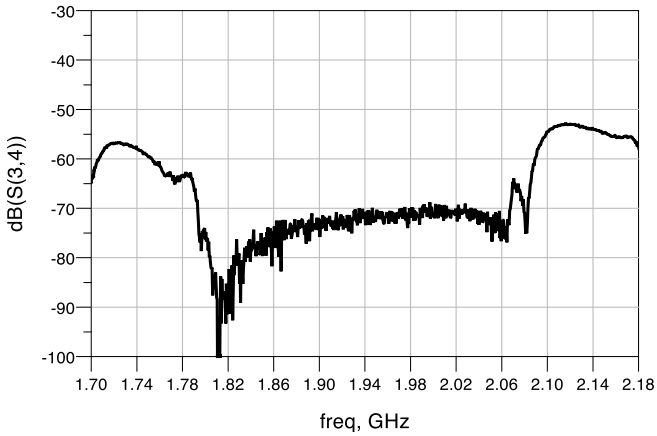
Simulated Performance Plots – Cross-Isolation

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

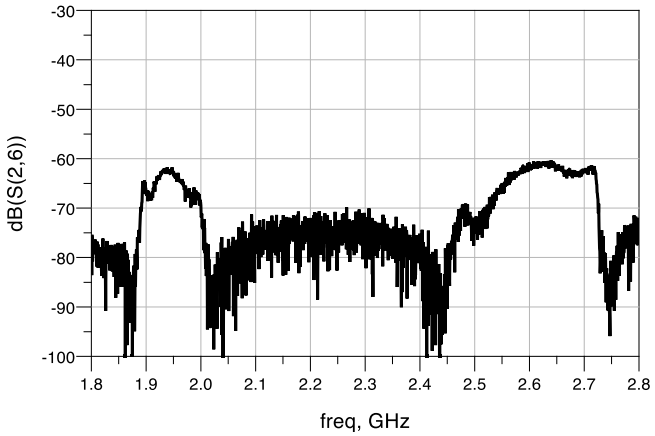
B1 TX - B3 RX Cross-ISO



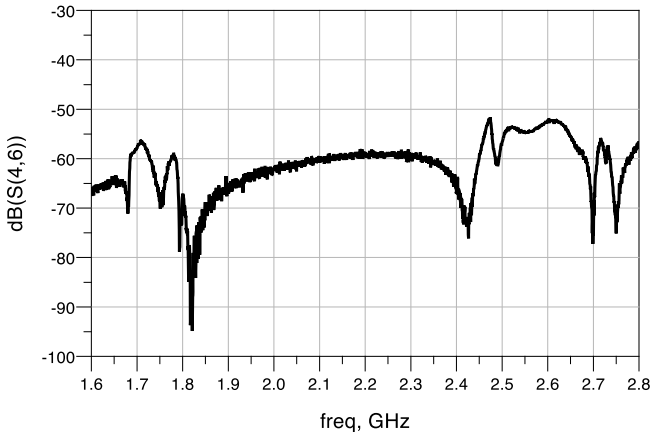
B3 TX - B1 RX Cross-ISO



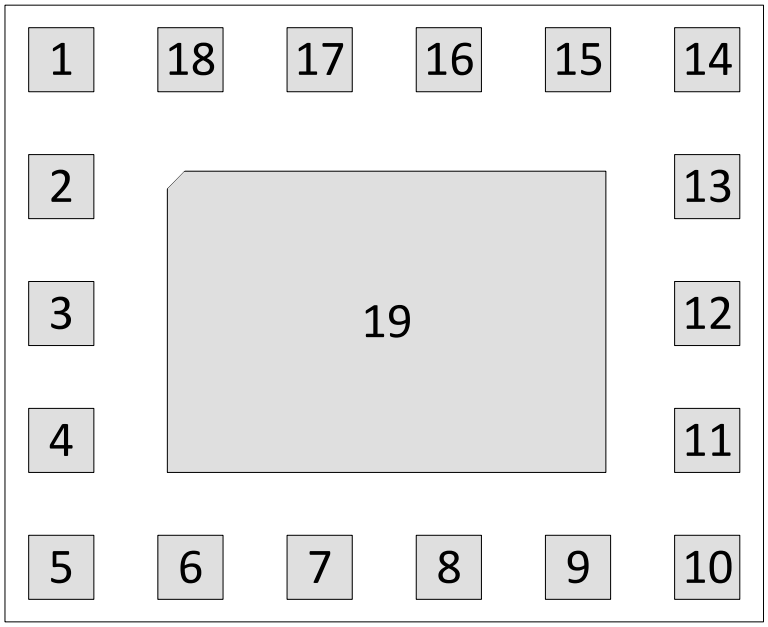
B1 TX - B41 Cross-ISO



B3 TX - B41 Cross-ISO



Pin Configuration and Description



Top View

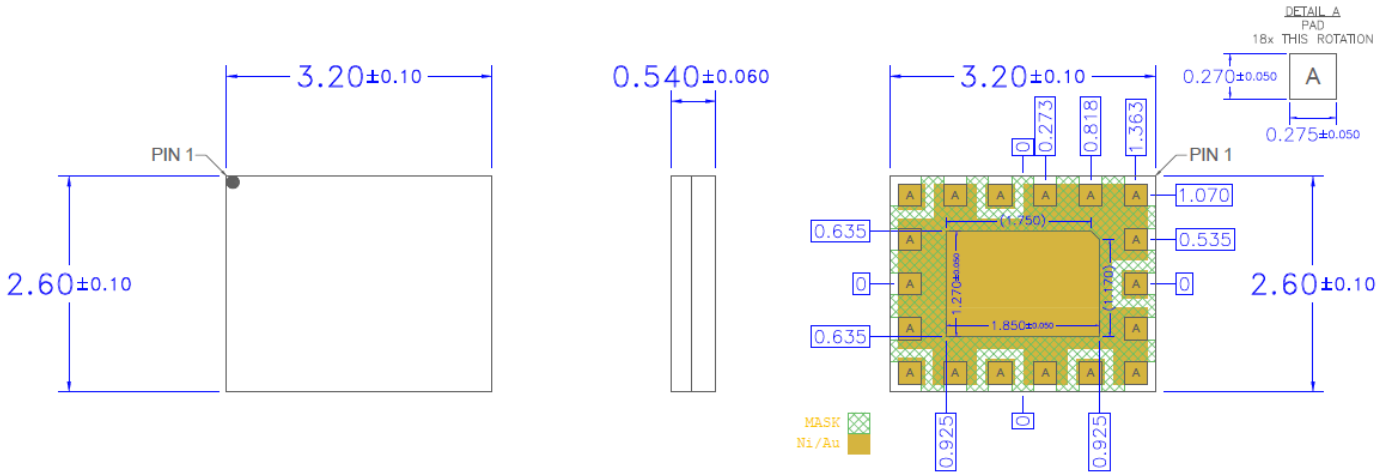
Pin Number	Label	Description
3	ANT	Band 1/3/n41 Antenna Port
6	n41 TX/RX	Band n41 Transmit/Receive Port
8	B3 TX	Band 3 Transmit Port
10	B1 TX	Band 1 Transmit Port
14	B1 RX	Band 1 Receive Port
16	B3 RX	Band 3 Receive Port
18	NC	No Connect
1,2,4,5,7,9,11, 12,13,15,17	GND	Ground
19	GND	Package Ground

Package Marking and Dimensions

Package Marking Diagram

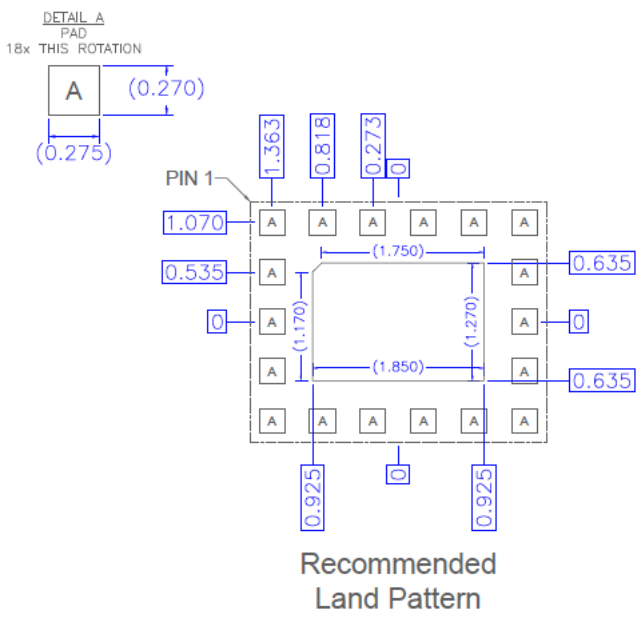
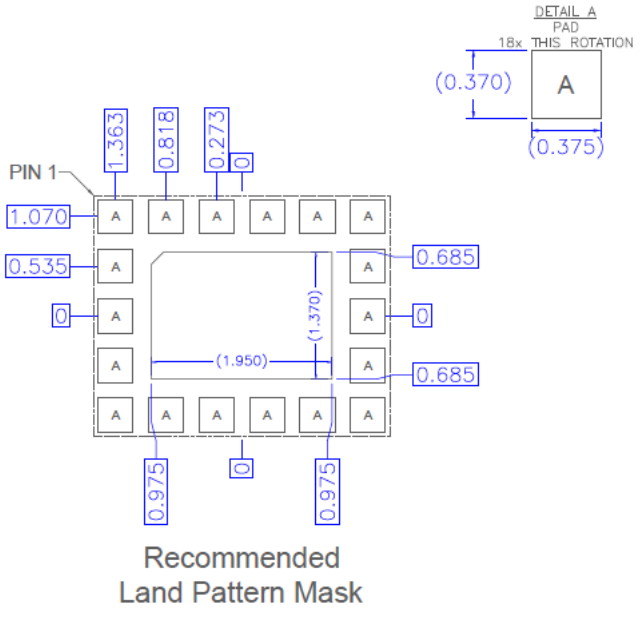
Pin 1 Indicator
Qorvo Logo - Use Q5D
Trace Code to be assigned by SubCon

Package Outline Dimension Drawing

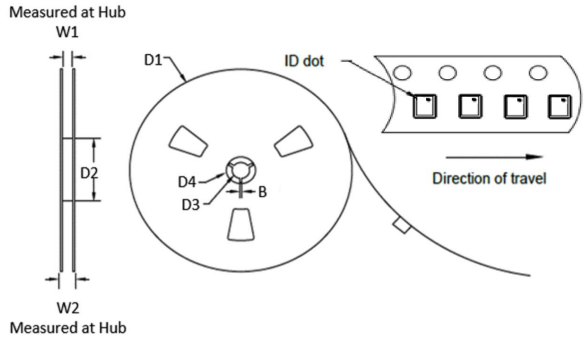


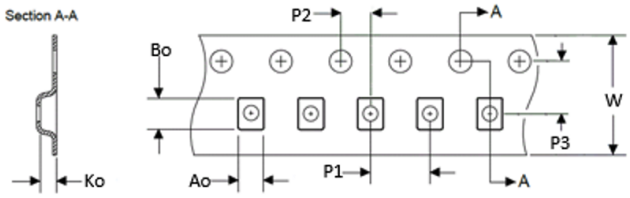
Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012

Mechanical Information

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

Tape and Reel Information – Carrier and Cover tape Dimensions





Feature	Measure	Symbol	Size (mm)
Flange	Diameter	D1	330.0
	Thickness	W2	18.4(max)
	Space Between Flange	W1	12.4(min)
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	1.0
	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: Electrolytic 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.

- Lead-free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_40_2$) Free
- PFOS Free
- SVHC Free
- Qorvo Green

REVISION HISTORY

Revision	Date (MMDDYYYY)	Description
C	02122021	Initial Production Release

Contact Information

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

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Email: customer.support@qorvo.com

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