



QM28011

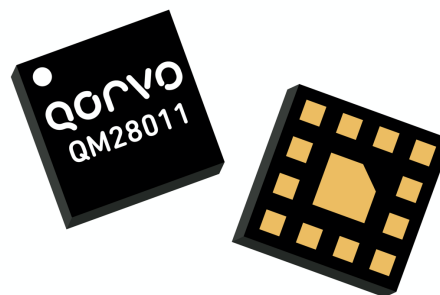
MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer

Product Overview

The QM28011 is a compact, high-performance filter module designed to meet the strict requirements of both WLAN and LTE/nR from 1700-2400 MHz, 2496-2690 MHz, and 3300-7125 MHz

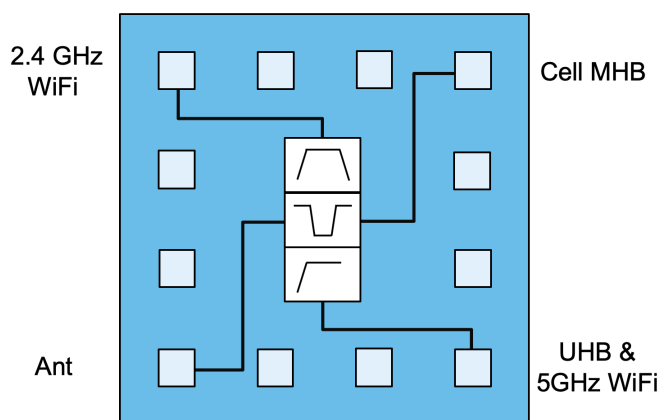
The QM28011 leverages the Qorvo's patented technology to ensure minimal transmit insertion loss in all bands being multiplexed without loading each other. The QM28011 module has also been designed with high cross-isolation which is critical to ensure the best overall performance.

The QM28011 uses common module packing techniques to achieve a compact 2.0 mm x 2.0 mm footprint.



12 Pin 2.0 x 2.0mm leadless SMT package

Functional Block Diagram



Top View

Key Features

- Compact Form-Factor: 2.0mm x 2.0mm
- Highly selective filters achieving low insertion loss and high attenuation over full bandwidth
- Rejection in 2.4GHz WLAN of 10dB minimum
- Single antenna port, triplexing
- RoHS Compliant, Pb-Free Module Package
- Supports Wi-Fi 6E

Applications

- For 2.4GHz and 5GHz WLAN, GSM HB, B1/n1, B2/n2, B3/n3, B4, B7/n7, B11, B21, B25/n25, B30, B32, B66/n66 FDD-LTE and B34/n34, B38/n38, B39/n39, B40/n40, B41/n41, B42, B48 TDD-LTE, n77, n78, and n79 applications
- LTE and 5G handsets

Ordering Information

Part Number	Description
QM28011EVB	Evaluation Board (EVB)
QM28011SB	Sample bag of 5 pieces
QM28011SR	Sample reel of 100 pieces
QM28011TR13	13 inch reel of 10k pieces



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MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer

Absolute Maximum Ratings⁽¹⁾

Parameter		Condition		Rating	UNITS
Storage Temperature				-40 to +85	°C
Operating Case Temperature				-30 to +85	°C
RF Input Power (Pin10, Cell MB/HB)		CW, 55°C, 5k hours		+30	dBm
RF Input Power (Pin7, UHB & 5GHz Wi-Fi 6E)		CW, 55°C, 5k hours		+30	dBm
RF Input Power (Pin1, Wi-Fi)		CW, 55°C, 5k hours		+26	dBm
RF Input Power ⁽²⁾	Pin10, Cell MB/HB	1427.9 MHz – 2200 MHz	FD-LTE/5G-NR 100% DC, 55°C, 5k hours	+28	dBm
		2500 MHz – 2570 MHz			
		2300 MHz – 2390 MHz	TD-LTE/5G-NR 40% DC, 55°C, 5k hours	+28	dBm
		2496 MHz – 2690 MHz			
	Pin1, Wi-Fi	2403 MHz – 2481 MHz	CW, 55°C, 5k hours	+24	dBm
RF Input Power ⁽²⁾	Pin7, UHB	3300 MHz – 5000 MHz	TD-LTE/5G-NR 40% DC, 55°C, 5k hours	+28	dBm
	Pin1, Wi-Fi	2403 MHz – 2481MHz	CW, 55°C, 5k hours	+24	

1. Operation of this device outside the parameter ranges given above may cause permanent damage.
2. RF Applied Simultaneously

MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer
Electrical Specifications⁽¹⁾ 2.4GHz Wi-Fi - Antenna

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	2403 MHz – 2421 MHz ⁽²⁾ (Wi-Fi CH1)	-	1.9	2.2	dB
	2408 MHz – 2426 MHz ⁽²⁾ (Wi-Fi CH2)	-	1.7	1.9	
	2413 MHz – 2431 MHz ⁽²⁾ (Wi-Fi CH3)	-	1.5	1.7	
	2418 MHz – 2436 MHz ⁽²⁾ (Wi-Fi CH4)	-	1.4	1.6	
	2423 MHz – 2446 MHz ⁽²⁾ (Wi-Fi CH5-6)	-	1.3	1.6	
	2433 MHz – 2456 MHz ⁽²⁾ (Wi-Fi CH7-8)	-	1.4	1.7	
	2443 MHz – 2466 MHz ⁽²⁾ (Wi-Fi CH9-10)	-	1.5	1.8	
	2453 MHz – 2471 MHz ⁽²⁾ (Wi-Fi CH11)	-	1.6	1.9	
	2458 MHz – 2476 MHz ⁽²⁾ (Wi-Fi CH12)	-	1.7	2.1	
	2463 MHz – 2481 MHz ⁽²⁾ (Wi-Fi CH13)	-	1.8	2.5	
VSWR (Wi-Fi)	2403 MHz – 2481 MHz	-	1.3:1	2.0:1	-
VSWR (ANT)	2403 MHz – 2481 MHz	-	1.3:1	2.0:1	
Attenuation	617 MHz – 960 MHz	40	41	-	dB
	1427.9 MHz – 1510.9 MHz	42	43	-	
	1559 MHz – 1606 MHz	42	43	-	
	1710 MHz – 2200 MHz	35	43	-	
	2300 MHz – 2370 MHz	33	50	-	
	2496 MHz – 2505 MHz ⁽³⁾	16	31	-	
	2505 MHz – 2690 MHz	40	47	-	
	3200 MHz – 3300 MHz	45	50	-	
	3300 MHz – 3400 MHz	45	52	-	
	3400 MHz – 3800 MHz	46	53	-	
	3800 MHz – 4200 MHz	51	55	-	
	4400 MHz – 5000 MHz	52	59	-	
	4800 MHz – 4970 MHz	56	60	-	
	5150 MHz – 5850 MHz	55	60	-	
	5925 MHz – 7125 MHz	37	45	-	

Notes:

1. All specifications include expected temperature and process guardbands
2. Integrated over each 18MHz channel
3. Specified from +5°C to +85°C

MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer
Electrical Specifications⁽¹⁾ Cell MB/HB - Antenna

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	1427.9 MHz – 1510.9 MHz	-	0.74 ⁽²⁾	1.1	dB
	1574 MHz – 2200 MHz	-	0.78 ⁽²⁾	1.4	
	2300 MHz – 2370 MHz	-	1.5 ⁽²⁾	2.8	
	2370 MHz – 2385 MHz	-	2.8 ⁽²⁾	9.0	
	2385 MHz – 2390 MHz	-	5.7 ⁽²⁾	14.0	
	2496 MHz – 2510 MHz	-	2.1 ⁽²⁾	6.0	
	2510 MHz – 2570 MHz	-	1.3 ⁽²⁾	2.0	
	2515 MHz – 2675 MHz	-	1.3 ⁽²⁾	1.8	
	2570 MHz – 2690 MHz	-	1.3 ⁽²⁾	1.8	
VSWR (Cell MB/HB)	1427.9 MHz – 1510.9 MHz	-	1.7:1	2.0:1	-
	1574 MHz – 2200 MHz	-	1.4:1	2.0:1	
	2300 MHz – 2370 MHz	-	1.3:1	2.0:1	
	2496 MHz – 2510 MHz	-	2.7:1	4.0:1	
	2510 MHz – 2570 MHz	-	1.9:1	2.3:1	
	2570 MHz – 2690 MHz	-	1.5:1	2.0:1	
VSWR (ANT)	1427.9 MHz – 1510.9 MHz	-	1.6:1	2.0:1	-
	1574 MHz – 2200 MHz	-	1.4:1	2.0:1	
	2300 MHz – 2370 MHz	-	1.2:1	2.0:1	
	2496 MHz – 2510 MHz	-	1.6:1	2.0:1	
	2510 MHz – 2570 MHz	-	1.5:1	2.0:1	
	2570 MHz – 2690 MHz	-	1.4:1	2.0:1	
Attenuation	2418 MHz – 2471 MHz ⁽³⁾ (Wi-Fi CH4-11)	15	16	-	dB
	3300 MHz – 3400 MHz	10	19	-	
	3400 MHz – 3800 MHz	15	21	-	
	3800 MHz – 4200 MHz	20	23	-	
	4400 MHz – 5000 MHz	29	32	-	
	5000 MHz – 5150 MHz	37	39	-	
	5150 MHz – 5925 MHz	38	40	-	
	5925 MHz – 7125 MHz	38	45	-	

Notes:

1. All specifications include expected temperature and process guardbands
2. Typical specified as average at room temperature
3. Integrated over each 18 MHz channel



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MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer**Electrical Specifications⁽¹⁾ UHB & 5GHz Wi-Fi 6E - Antenna**

Parameter	Conditions	Min.	Typ.	Max.	Units
Insertion Loss	3300 MHz – 3400 MHz	-	1.4	1.8	dB
	3400 MHz – 3600 MHz	-	0.9	1.3	
	3600 MHz – 4200 MHz	-	0.7	1.1	
	4400 MHz – 5000 MHz	-	0.5	0.7	
	5150 MHz – 5925 MHz	-	0.4	0.7	
	5925 MHz – 7125 MHz	-	0.3	0.7	
VSWR (UHB & 5GHz Wi-Fi 6E)	3300 MHz – 3400 MHz	-	1.2:1	2.0:1	-
	3400 MHz – 5925 MHz	-	1.3:1	2.0:1	
	5925 MHz – 7125 MHz	-	1.1:1	2.0:1	
VSWR (ANT)	3300 MHz – 3400 MHz	-	1.2:1	2.0:1	-
	3400 MHz – 5925 MHz	-	1.4:1	2.0:1	
	5925 MHz – 7125 MHz	-	1.1:1	2.0:1	
Attenuation	100 MHz – 2300 MHz	18	20	-	dB
	2300 MHz – 2400 MHz	20	24	-	
	2400 MHz – 2690 MHz	15	21	-	

Notes:

1. All specifications include expected temperature and process guardbands

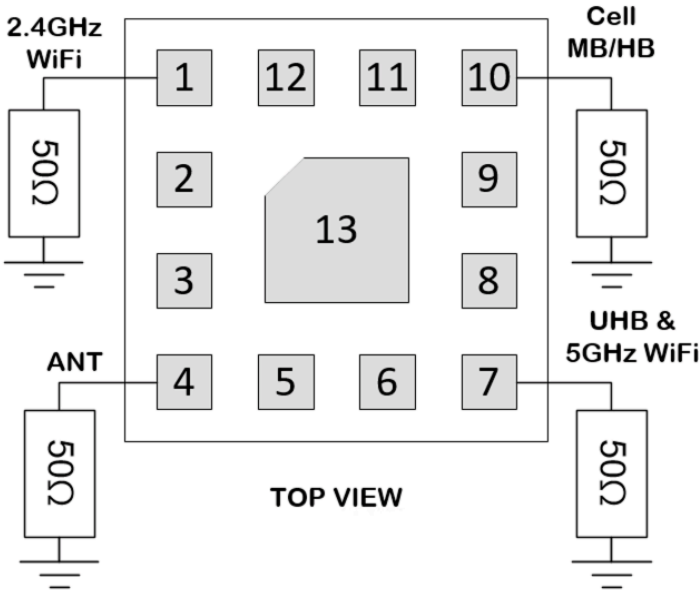
Electrical Specifications⁽¹⁾ Isolations

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Cell MB/HB – 2.4GHz Wi-Fi	1427.9 MHz – 2200 MHz	37	42	-	dB
	2300 MHz – 2370 MHz	37	47	-	
	2403 MHz – 2481 MHz ⁽²⁾	15	16	-	
	2496 MHz – 2505 MHz ⁽³⁾	17	30	-	
	2505 MHz – 2690 MHz	40	47	-	
Isolation Cell MB/HB – UHB & 5GHz Wi-Fi 6E	1427.9 MHz – 2400 MHz	19	20	-	dB
	2400 MHz – 2480 MHz	30	40	-	
	2496 MHz – 2690 MHz	15	24	-	
	3300 MHz – 5925 MHz	15	22	-	
	5925 MHz – 7125 MHz	40	46	-	
Isolation UHB & 5GHz Wi-Fi 6E – 2.4GHz Wi-Fi	5925 MHz – 7125 MHz	43	46	-	dB
	3300 MHz – 5925 MHz	48	51	-	
	2403 MHz – 2481 MHz	20	33	-	

Notes:

1. All specifications include expected temperature and process guardbands
2. Integrated over each 18 MHz channel
3. Specified from +5°C to +85°C

Application Circuit Schematic



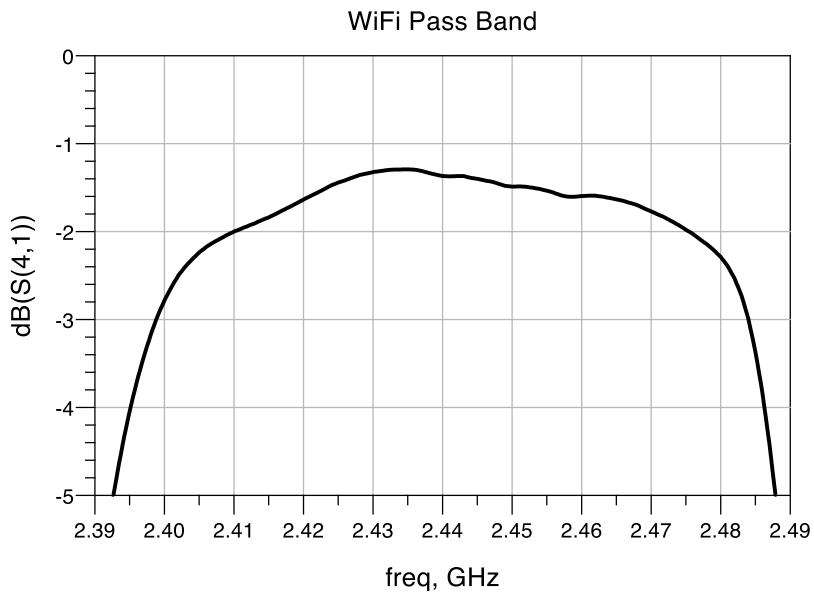
Note:
All ports are matched to 50 ohm impedance

Bill of Materials

Ref. Des.	Value	Description	Manuf.	Part number
U1	N/A	MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer	Qorvo	QM28011
PCB	N/A	10-layer Printed Circuit Board		QM28011-4000

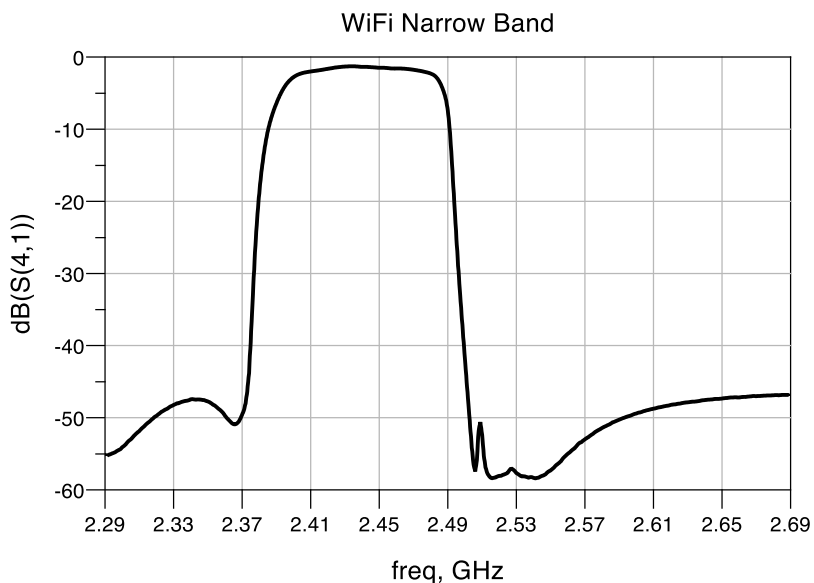
WiFi Insertion Loss

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



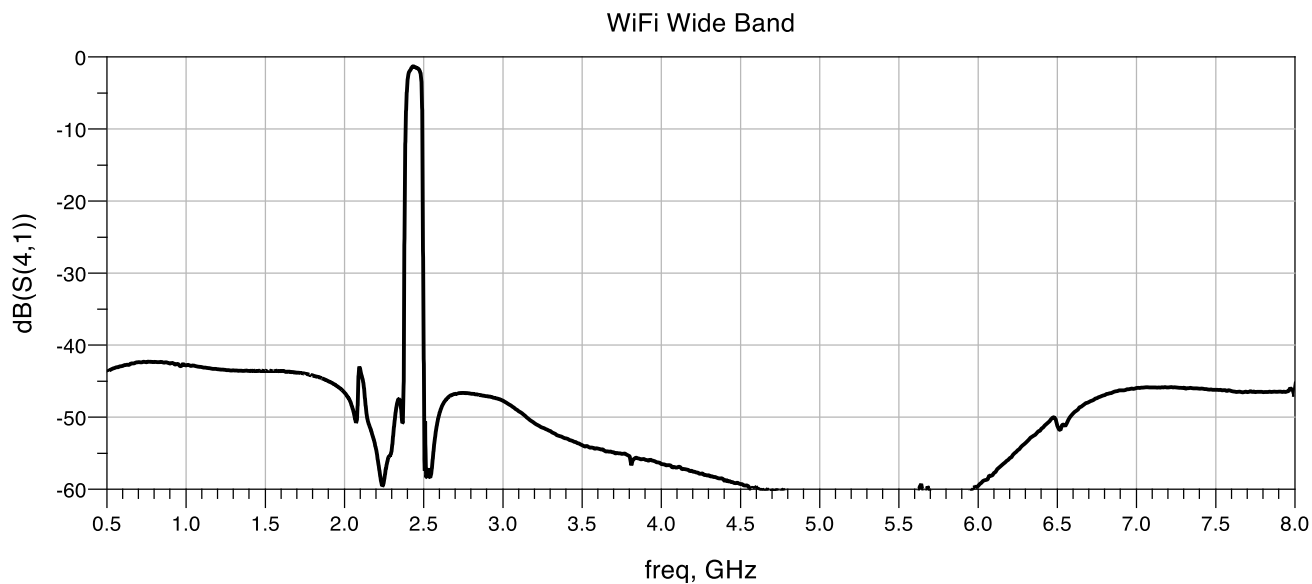
WiFi Attenuation

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



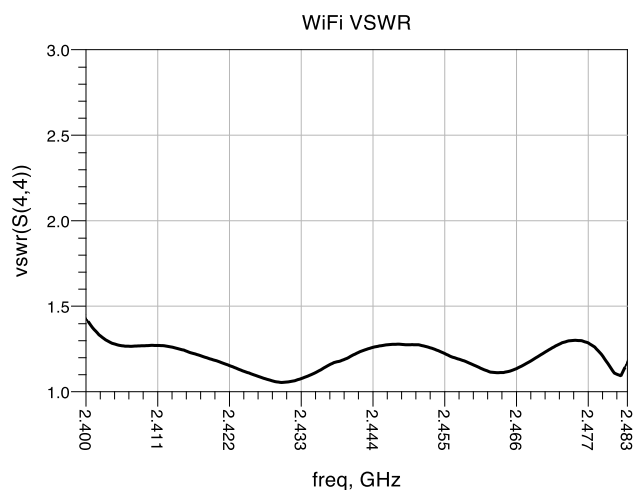
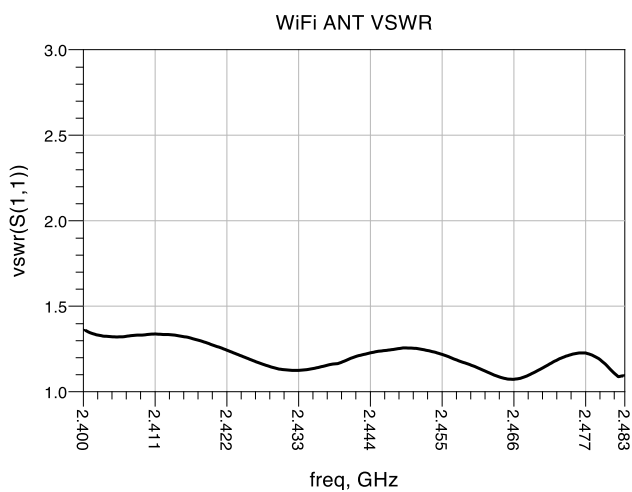
WiFi Attenuation Wideband

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



WiFi VSWR

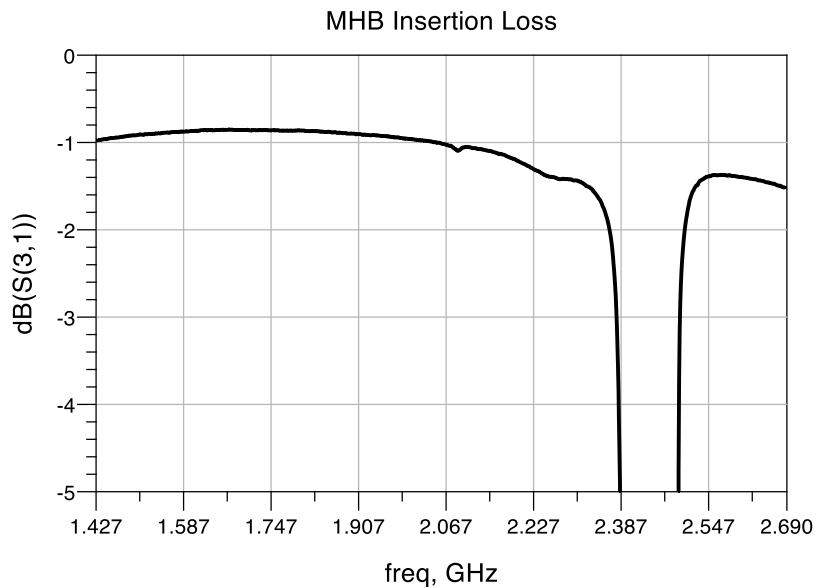
Test conditions unless otherwise noted: Temp. = +25°C



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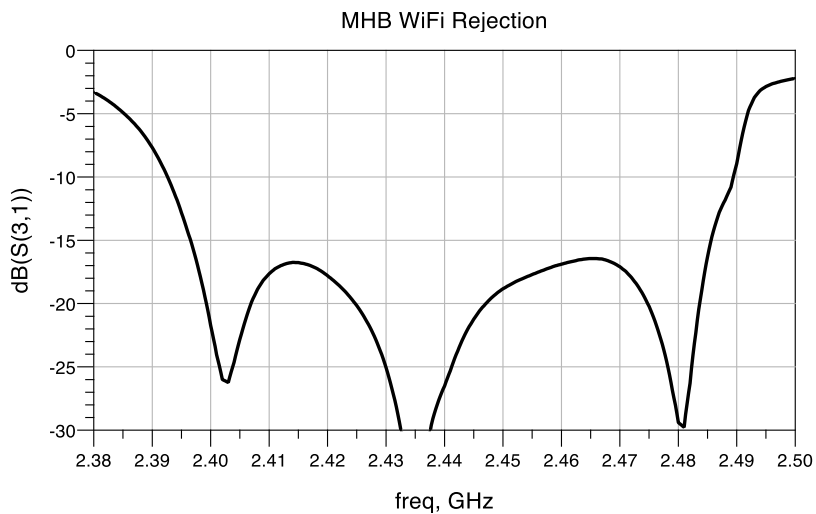
MHB Insertion Loss

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



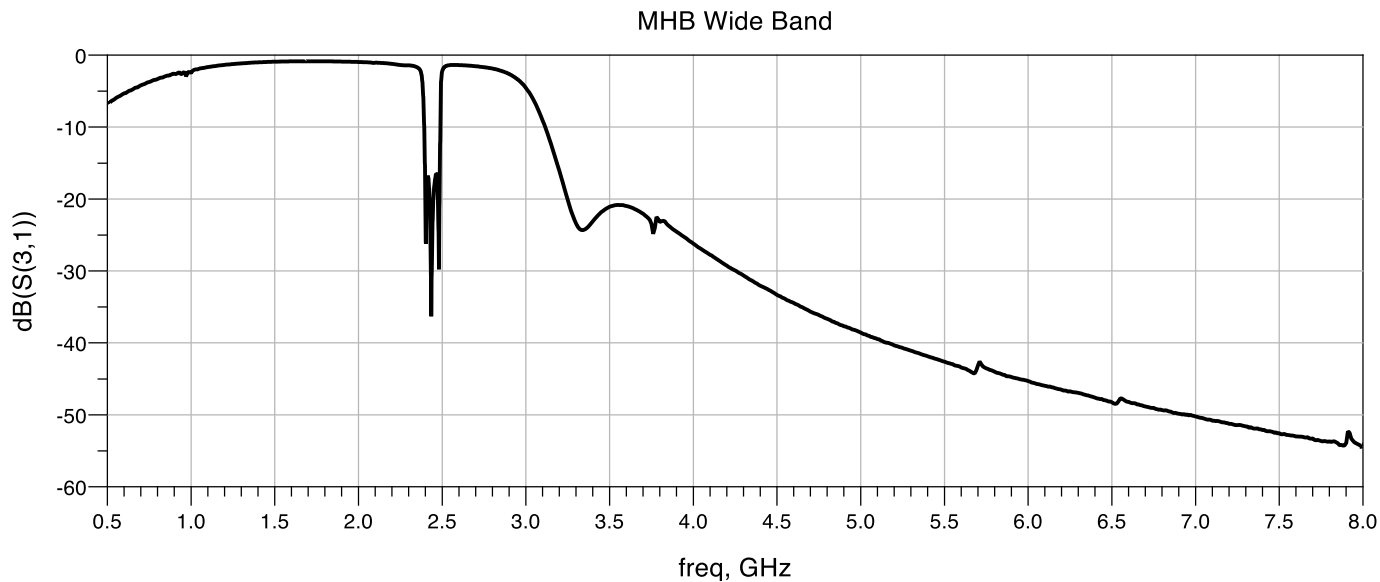
MHB Attenuation at WiFi Band

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



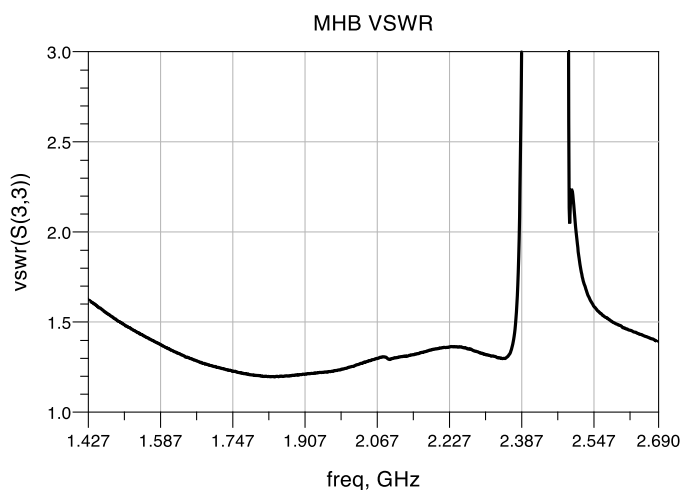
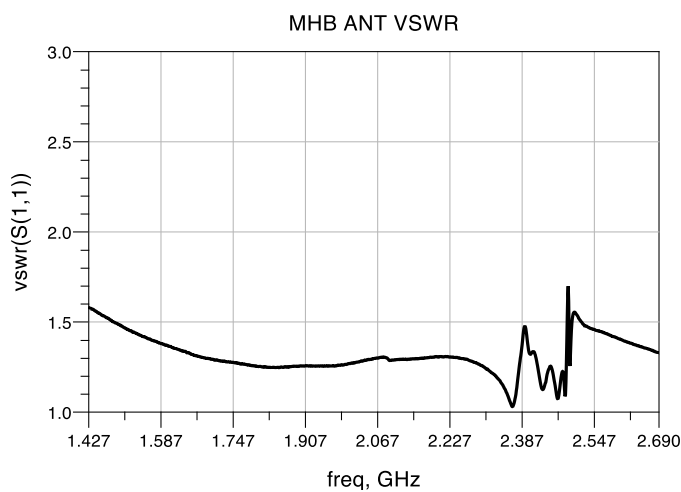
MHB Wideband

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



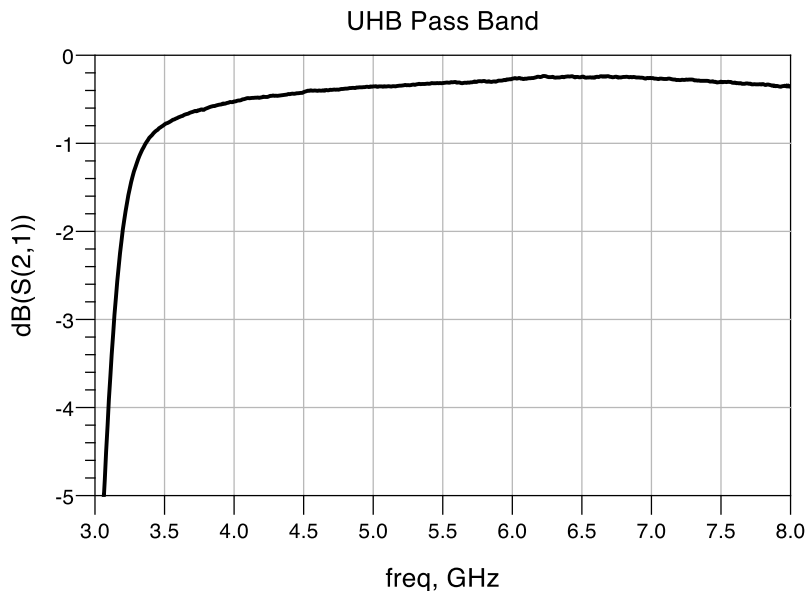
MHB VSWR

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



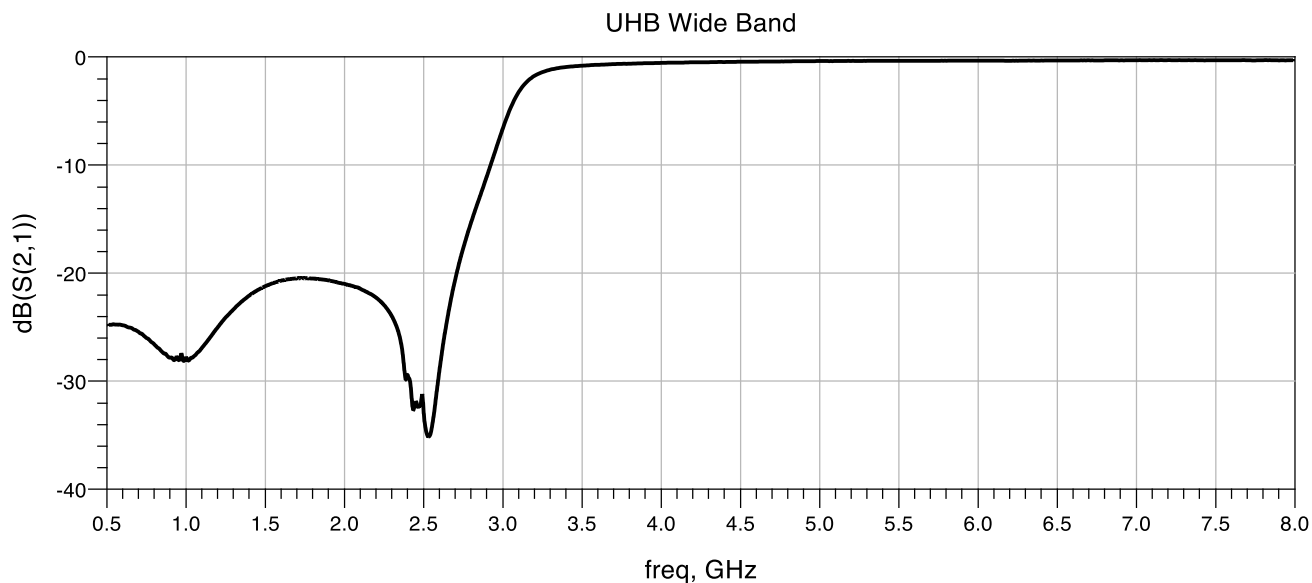
UHB Insertion Loss

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



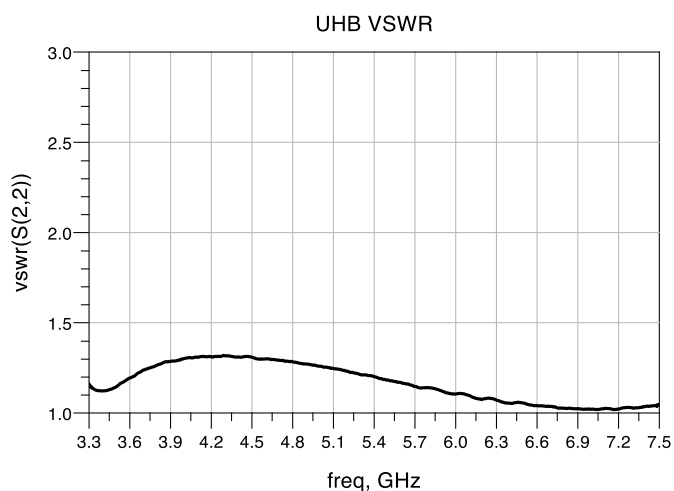
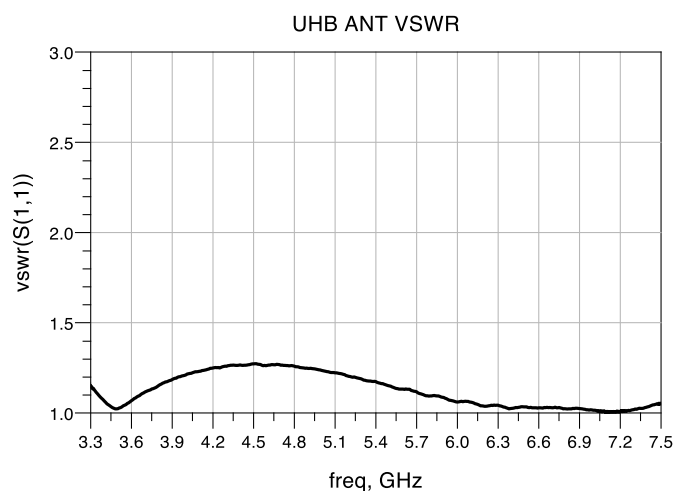
UHB Wideband

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



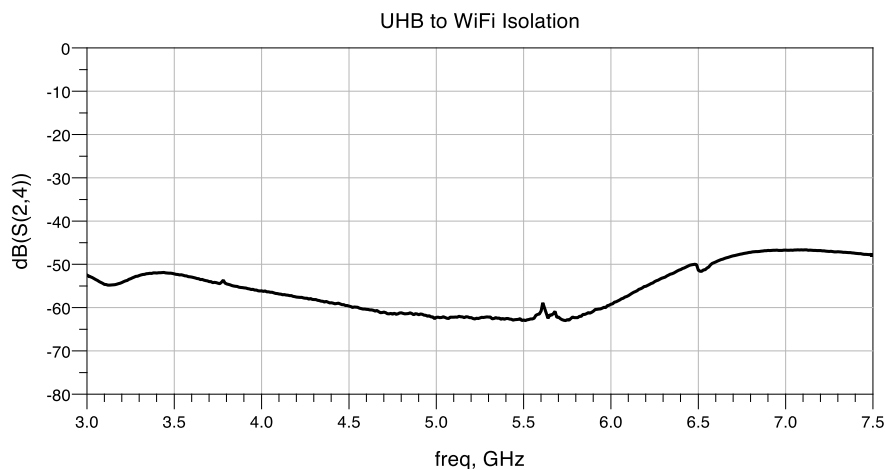
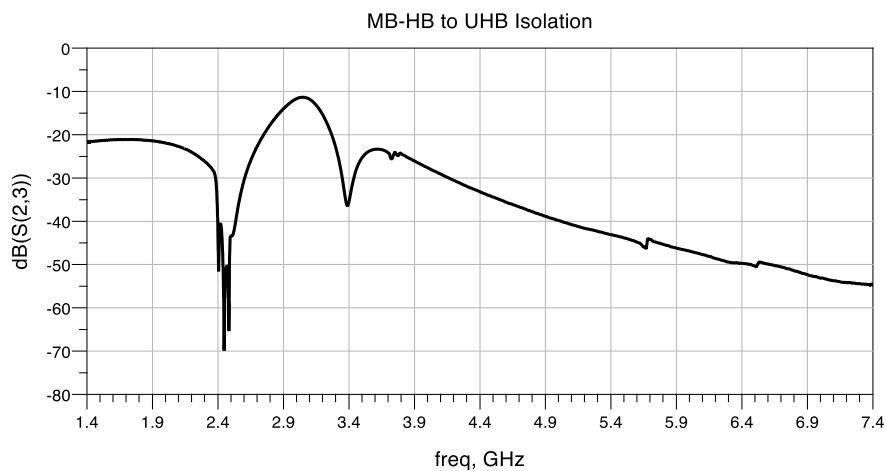
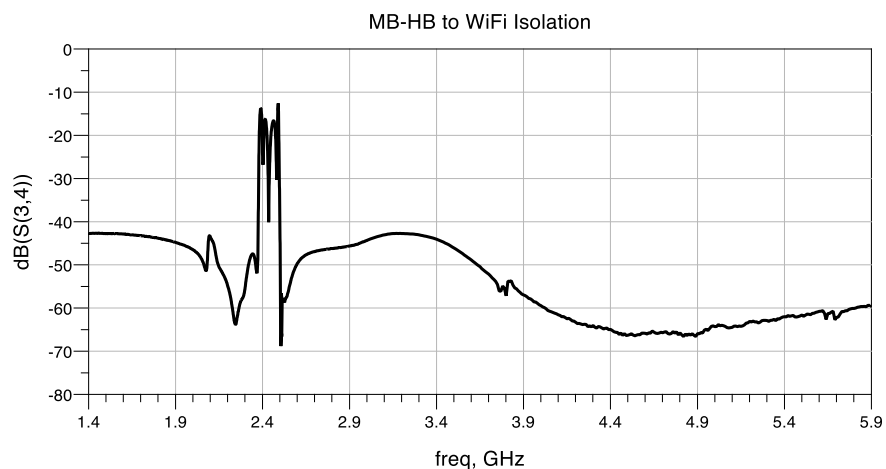
UHB VSWR

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

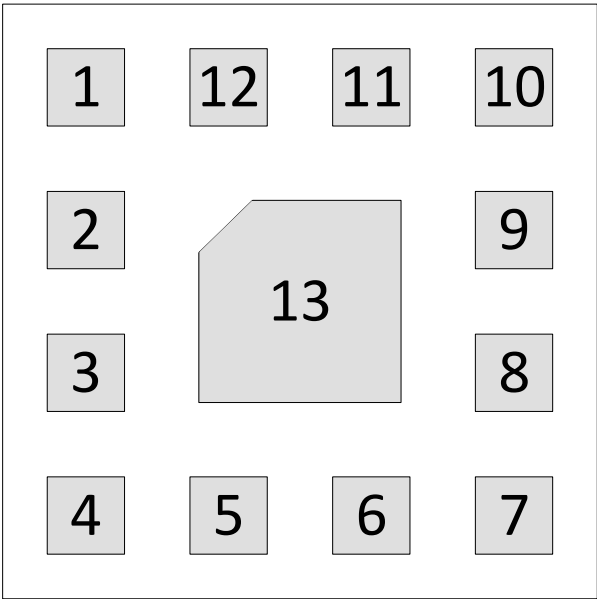


ISOLATION

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



Pin Configuration and Description



Top View

Pin Number	Label	Description
1	2.4 GHz WiFi	2.4 GHz Wi-Fi Port
4	ANT	Antenna Port
7	UHB & 5GHz Wi-Fi 6E	Ultra High Band Cellular Port
10	Cell MB/HB	Mid / High Band Cellular Port
2, 3, 5, 6, 8, 9, 11, and 12	GND	Ground
13	GND	Package Ground

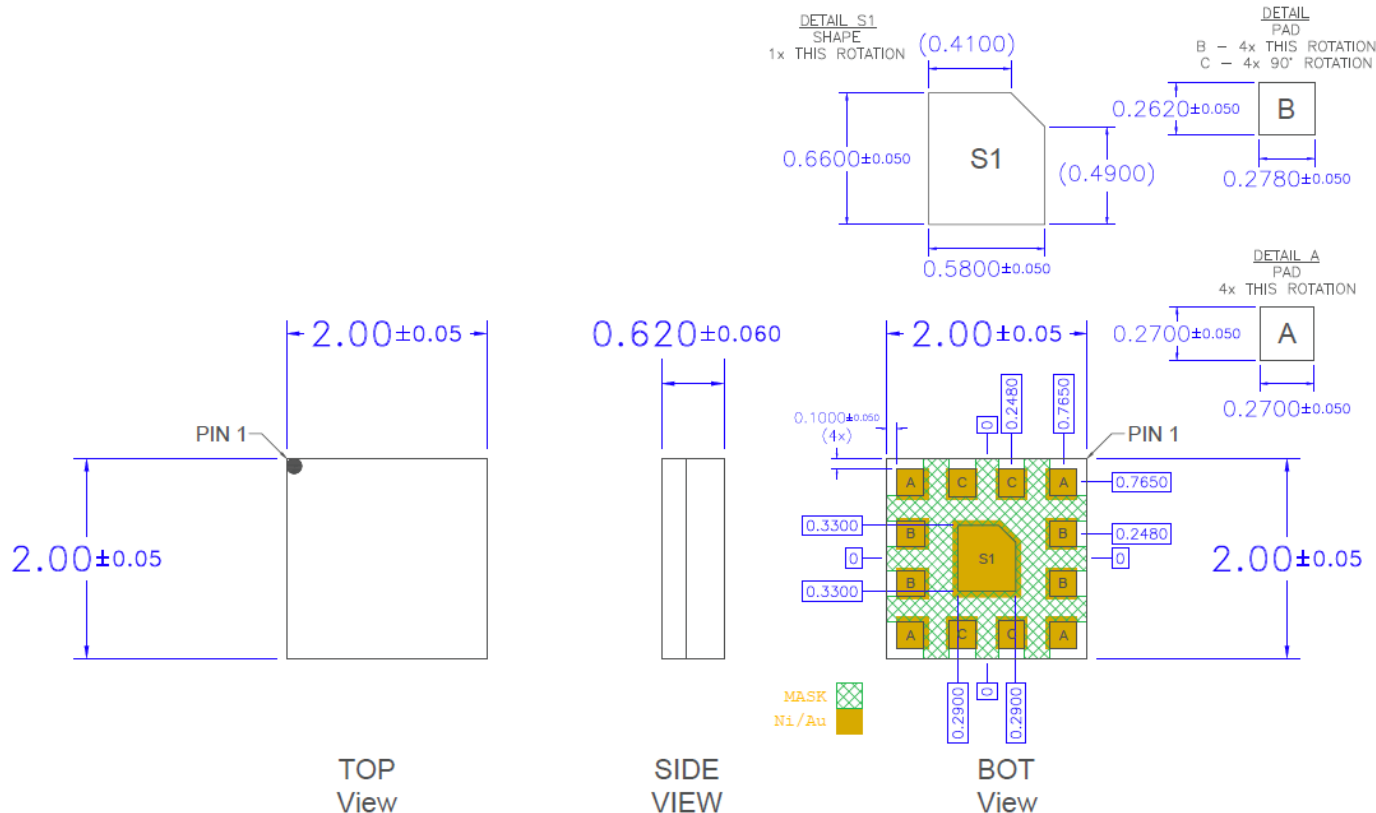
Package Marking and Dimensions

Package Marking Diagram



Pin 1 Indicator
Trace Code to be assigned by SubCon
5B is the Product Code
YYYY is the Trace Code

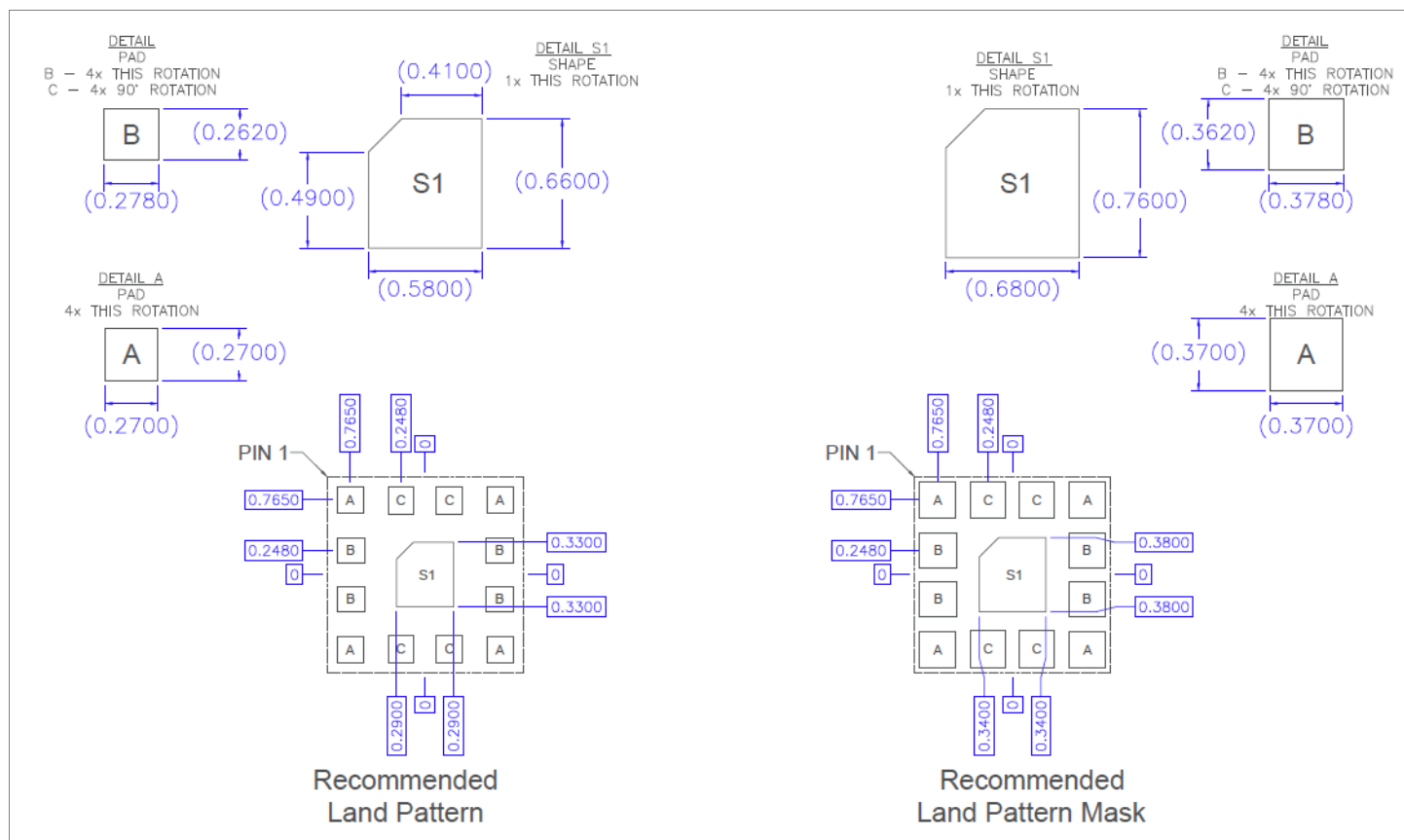
Package Outline Dimension Drawing



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



Tape and Reel Information

Measured at Hub
W1
D1
ID dot
D4
D3
B
W2
Measured at Hub
Direction of travel

Section A-A
Bo
Ao
Ko
P1
P2
P3
W
A

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	20.0

Feature	Measure	Symbol	Size (mm)
Cavity	Length	Ao	2.2
	Width	Bo	2.2
	Depth	Ko	0.95
	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.

This product also has the following attributes:

- Lead free
- Halogen Free (Chlorine, Bromine)
 - Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) 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

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MHB, 2.4G Wi-Fi, and UHB/5G Wi-Fi 6E Antenna Triplexer

REVISION HISTORY

Revision	Date (YYYYMMDD)	Description
E	20200421	Initial Production Release
F	20200824	Added 5G Wi-Fi 6E specifications
G	20200903	Added simultaneous power handling specs