

Vehicular – Twin Castle (TWC) Series

5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna

TWC94411DM and TWC94412DM - 617 to 7125 MHz



Features & Applications:

- Vehicle roof mount, directly on metal plane
- 4 port 5G/4G
- 4 port WiFi 6E, DSRC, V2X
- 1 port Active GNSS L1 with low noise 30dB amplifier
- Cable length and connector type per request
- Available in Black (P/N TWC94411DM) or White (P/N TWC94412DM)
- Heavy and light vehicles Tracking
- ECE-R10 / R118 compliant
- Robust mechanical design rated with IP67 and IK10 impact protection

ELECTRICAL SPECIFICATIONS @ 25°C

General Specifications– 5G FR1 + WiFi 6E

Antenna type	Nominal Impedance	Polarization	Radiation pattern	Power withstanding	DC Ground
Monopole ¹	50Ω	Vertical / Linear	Omni	45W	No

ELECTRICAL SPECIFICATIONS @ 25°C

5G-FR1 Antennas: 617 – 7125MHz

Ports	Frequency (MHz)	617-960	1710-2700	3300-4200	4400-5000	5150-5925	6000-7125
Port 1 & 4 (Main)	VSWR	3:1	2:1	2.5:1	2.5:1	2.5:1	2.5:1
	Avg. Peak Gain (dBi)	2.5	5.0	5.9	7.2	6.4	4.5
	Avg. Efficiency (%)	60	64	58	56	58	51
	Avg. HPBW (°)	82	40	27	21	23	40
Port 2 & 3 (Secondary)	VSWR	3:1	2:1	2.5:1	2.5:1	2.5:1	2.5:1
	Avg. Peak Gain (dBi)	2.4	5.5	7.4	7.2	6.8	5.5
	Avg. Efficiency (%)	47	61	60	57	58	51
	Avg. HPBW (°)	77	31	27	24	26	21
Port – Port Isolation ²	Port 1-2 / Port 3-4 (dB)	8	20	19	18	20	29
	Port 1-3 / Port 2-4 (dB)	13	25	24	30	28	36
	Port 1-4 (dB)	21	24	26	29	36	39

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WiFi 6E Antennas: 2400-2500/ 4900-7125MHz			
Ports	Frequency (MHz)	2400-2500	4900-7125
Port 1 & 4 (WiFi)	VSWR	2:1	2:5
	Avg. Peak Gain (dBi)	6.3	5.8
	Avg. Efficiency (%)	69	60
	Avg. HPBW (°)	34	23
Port 2 & 3 (WiFi)	VSWR	2:1	2:5
	Peak Gain (dBi)	6.0	6.5
	Avg. Efficiency (%)	60	60
	Avg. HPBW (°)	35	30
Port – Port Isolation ³	Port 1-2 / Port 3-4 (dB)	17	17
	Port 1-3 / Port 2-4 (dB)	23	28
	Port 1-4 (dB)	26	37

GNSS Antenna: 1561.098 +/- 2.046MHz, 1575.42 +/- 1.023MHz, 1602.5625 +/- 4MHz				
Frequency (MHz)	1561.098 +/- 2.046	1575.42 +/- 1.023	1602.5625 +/- 4	
VSWR	2:1	2:1	2:1	
Gain – Radiating Element (dBic)	-5 +/- 1	-0.8 +/- 1	4.4 +/- 1	
Polarization	LNA Gain (dB)	Noise Figure (dB)	Operating Voltage (V _{dc})	Current Consumption (mA)
RHCP	30 +/- 2	< 2.4	3.3 – 5.0	< 11
Frequency (MHz)	960	1710	2170	2400
Out of Band Rejection (dB)	> 65	> 60	> 65	> 65

MECHANICAL SPECIFICATIONS					
TWC94411DM (TWC94412DM)					
Dimension (Length x Width x Height)	Housing Material	Color ³	Weight	Fixing System	Mounting Hole Diameter
275.3 x 123.4 x 92.3 mm (10.84 x 4.86 x 3.63 inch)	PC, UV Protected	Black or White	894g (1.85lbs)	Direct Mount	1.063" (27mm)
Wireless Technology	No. of Port	Cable Length	Cable Type	Connector Type	
5G FR1	4	1ft (0.3m)	RG-316	SMA (Male)	
WiFi 6E	4	1ft (0.3m)	RG-316	SMA (Male)	
GNSS L1	1	1ft (0.3m)	RG-174	SMA (Male)	

ENVIRONMENTAL SPECIFICATIONS					
TWC94411DM (TWC94412DM)					
Operating Temperature	Storage Temperature	Ingress Protection	Standard / Regulation	Impact Protection	RoHS Compliant
-40/+85° C	-40/+85° C	IP67	UN/ECE R118	IK10	Yes

Notes:

- (8) Multi-Band Monopoles with built in ground plane, Independent from external ground plane
- Minimum Isolation (dB)
- Black antenna P/N TWC94411DM, White antenna P/N TWC94412DM
- ECE R10.06 supplement 02 certified, Approval No: E24*10R06/02*5124*00
- ECE R118 compliant cables

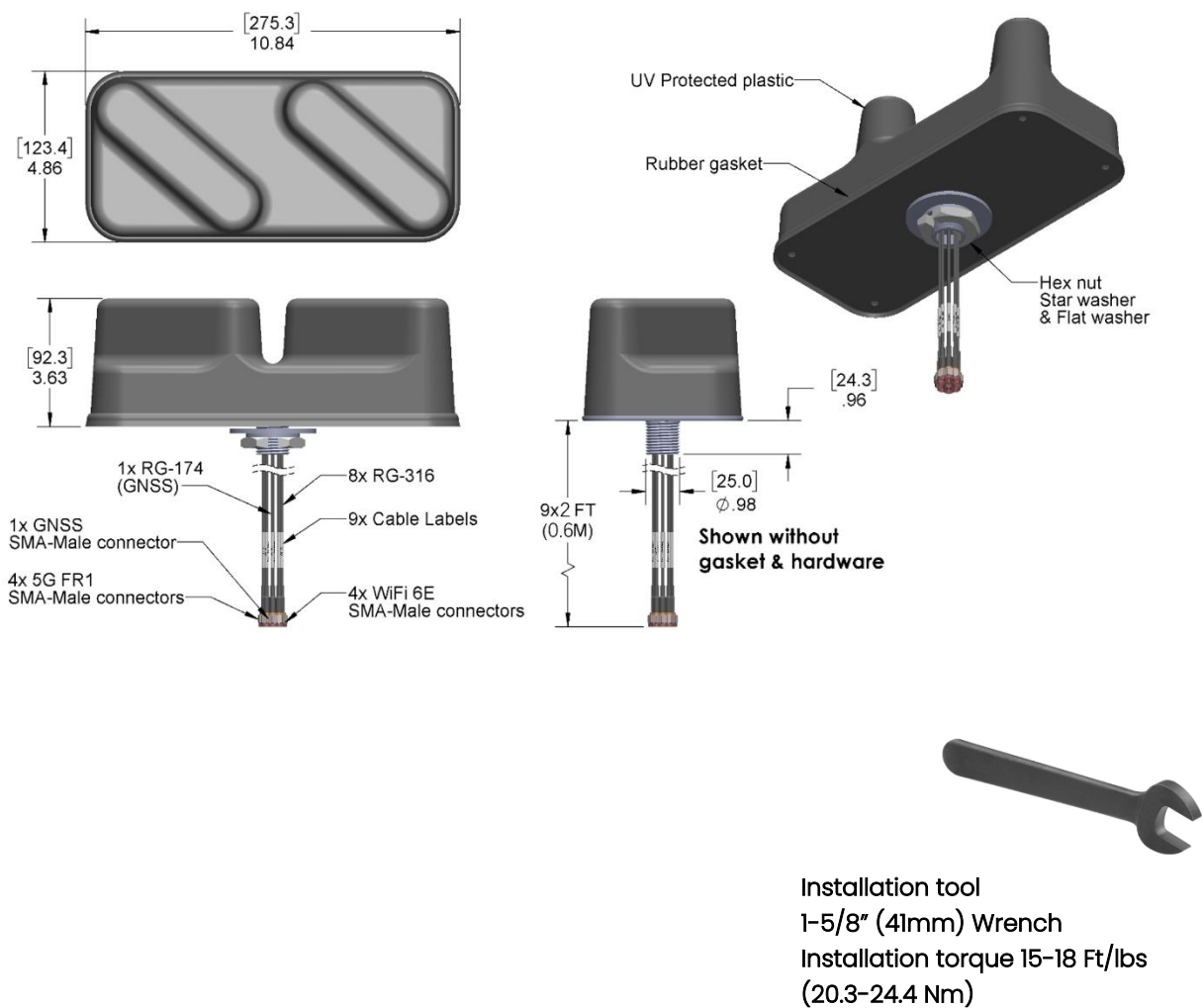
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MECHANICAL DRAWING

TWC94411DM (TWC94412DM)



Dimensions: inches (mm) Unless otherwise specified, all tolerances are ± 0.010 (0.25mm)

Vehicular – Twin Castle (TWC) Series

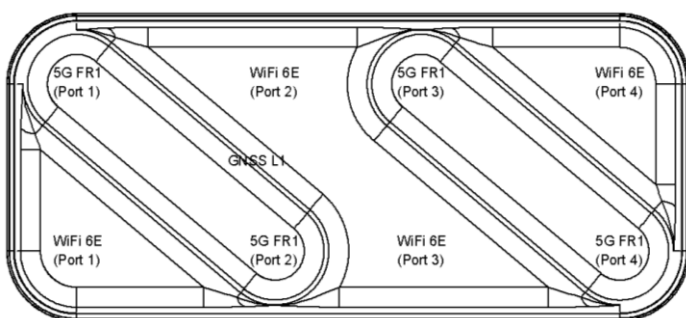
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TESTING SETUP

General / Chamber test setup

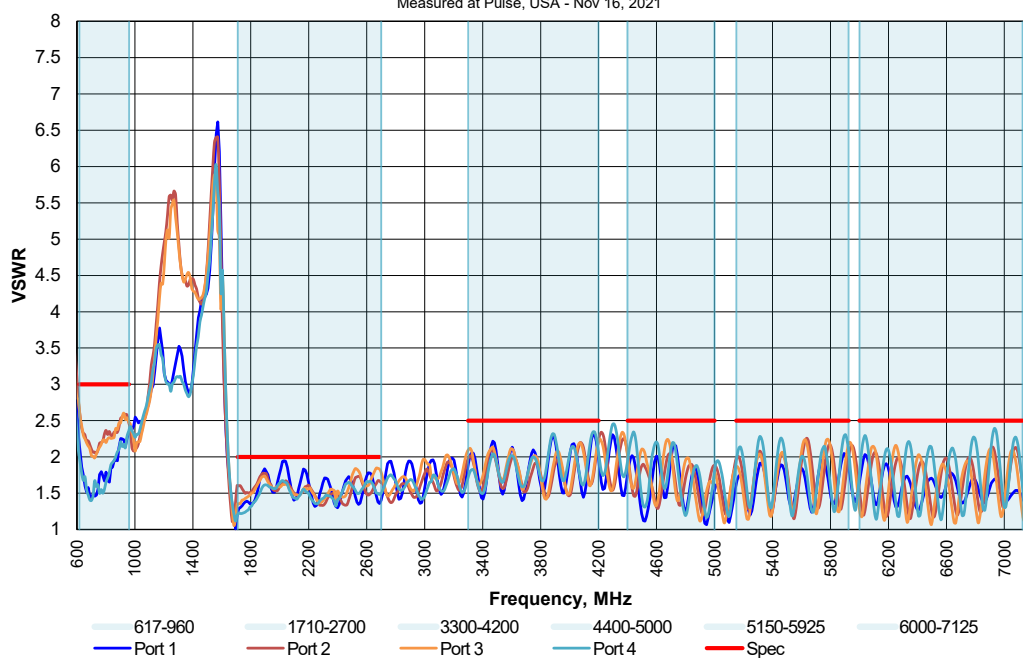
- All measurements done on Ø 600mm (24") round ground plane.
- S-parameters with 0.3m (1ft) RG316 cable
- Gain and Efficiency with 0.3m (1ft) RG316 cable
- Measured at Pulse, USA (in ETS chamber)



Charts – VSWR

5G-FR1

VSWR vs Frequency
TWC94411DM (5G FR1, Ports 1, 2, 3 & 4) Measured on Ø0.6M (24") GP
Measured at Pulse, USA - Nov 16, 2021



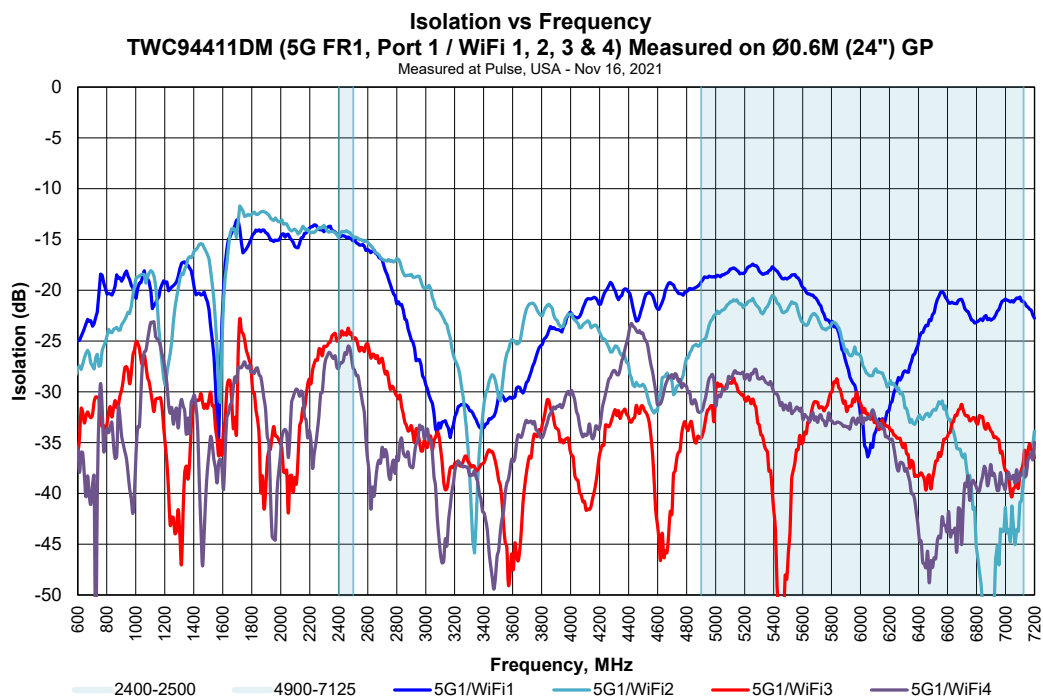
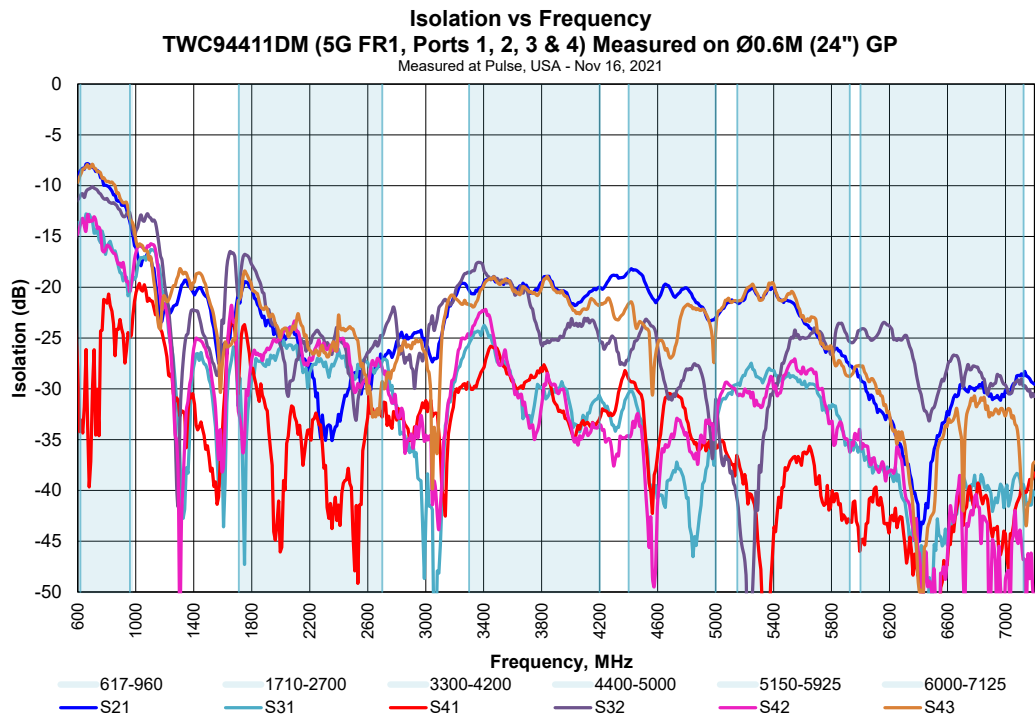
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Charts-Isolation

5G-FR1



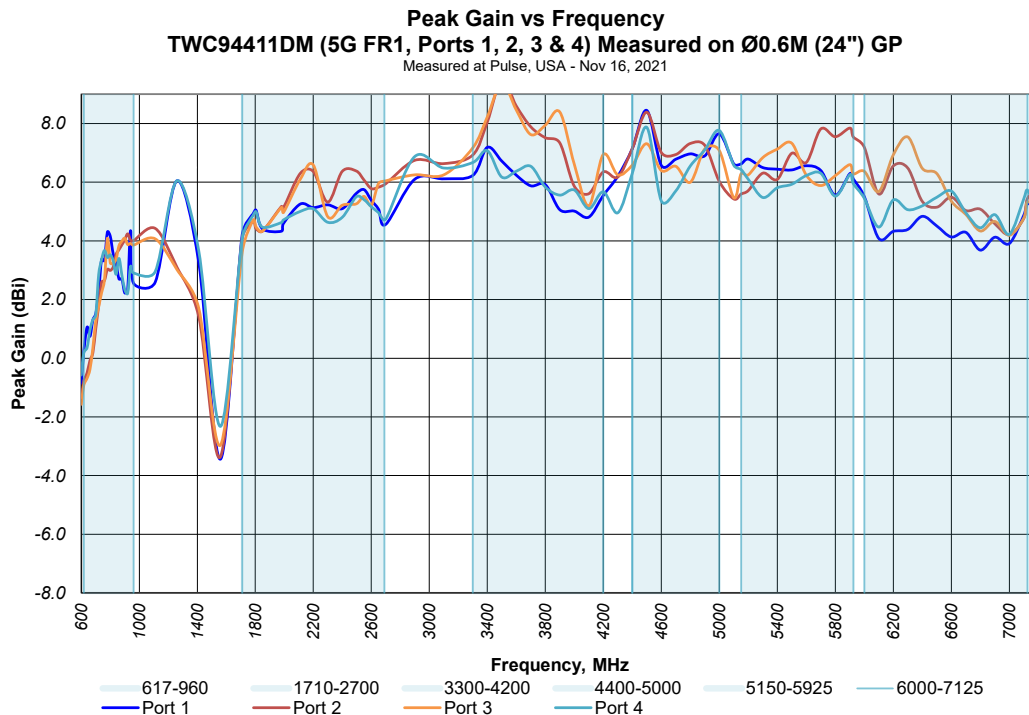
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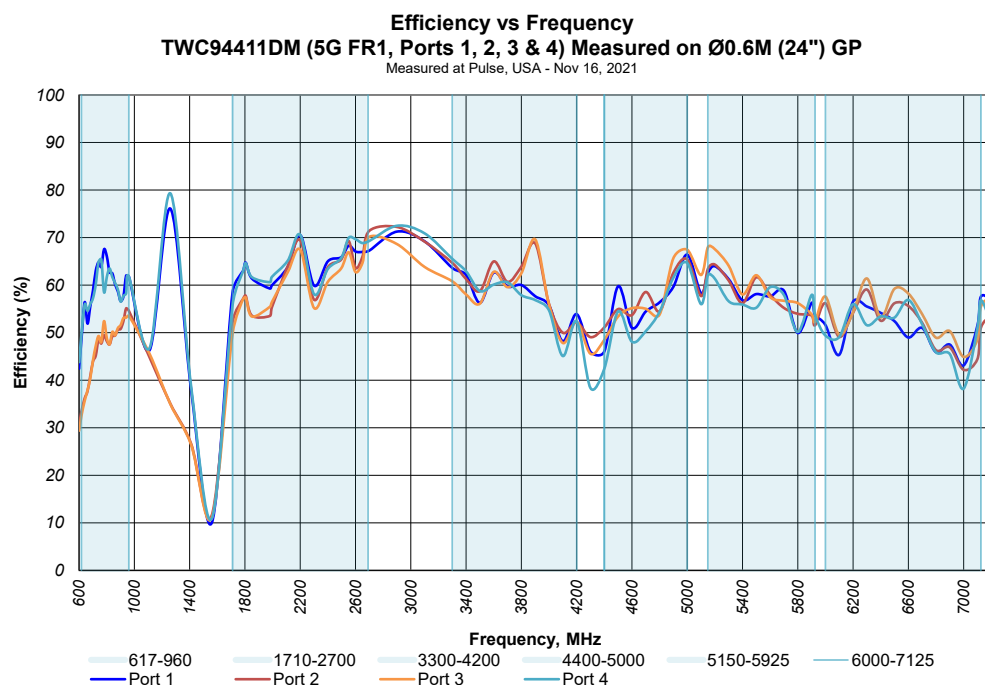
Charts-Peak Gain

5G-FR1



Charts-Peak Efficiency

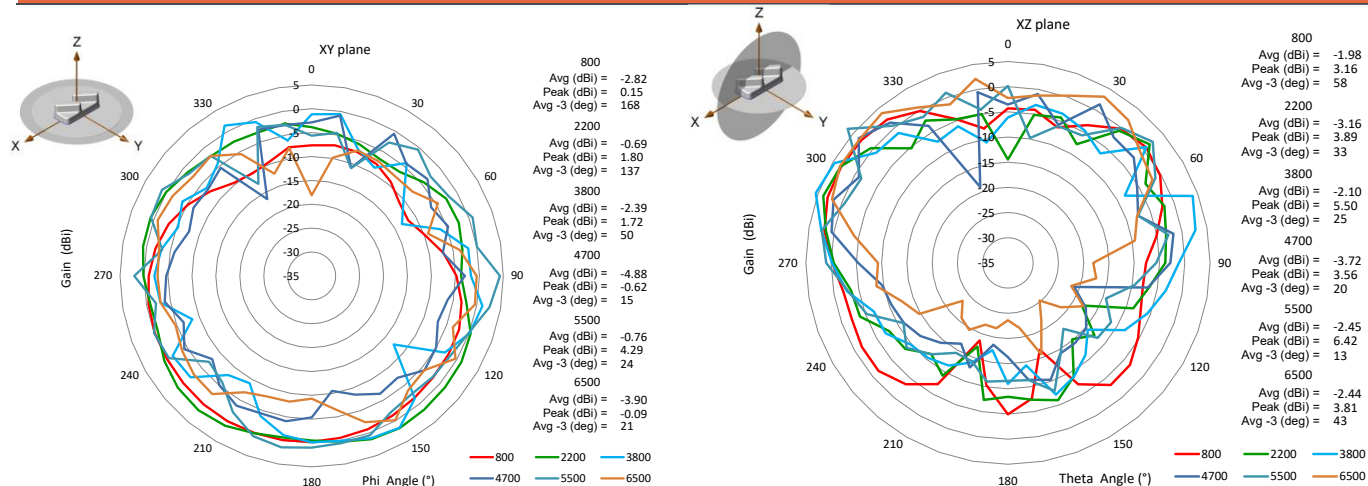
5G-FR1



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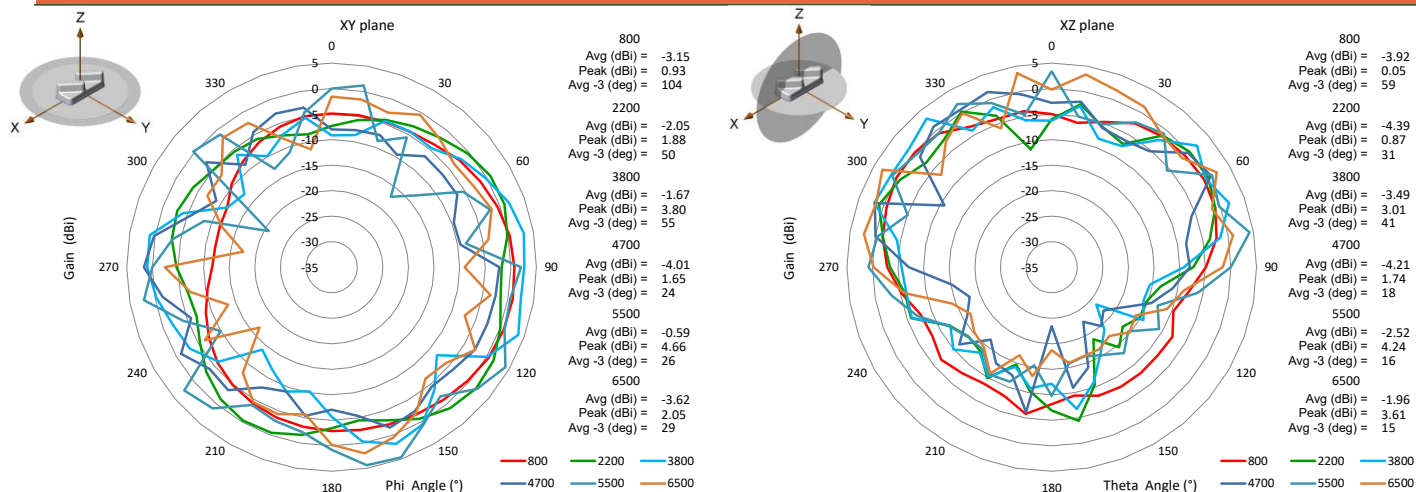
Radiation Pattern – 5G FR1 – Port 1 – XY & XZ Gain Plot

5G-FR1 Port 1



Radiation Pattern – 5G FR1 – Port 2 – XY & XZ Gain Plots

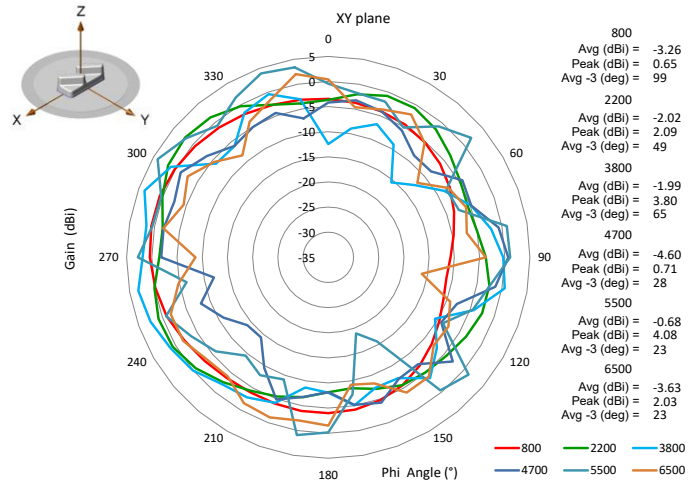
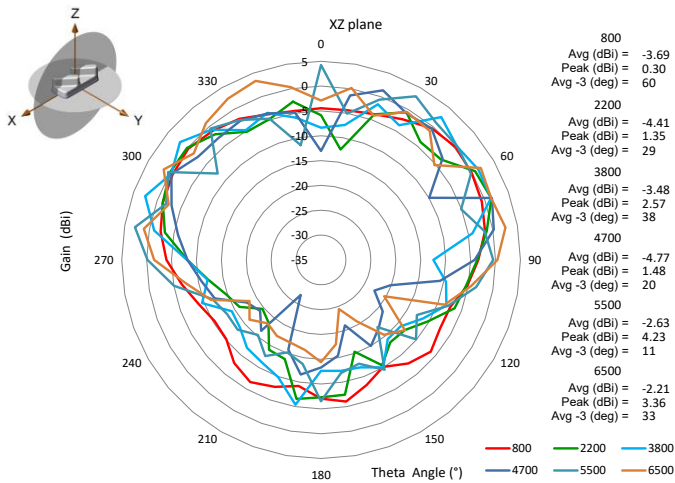
5G-FR1 Port 2



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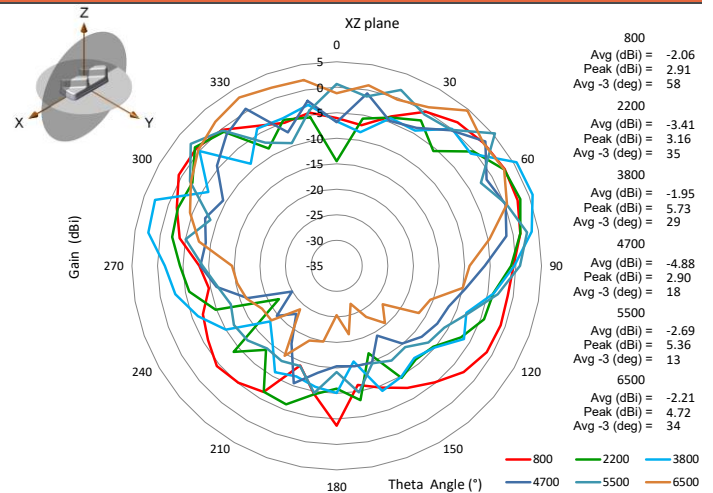
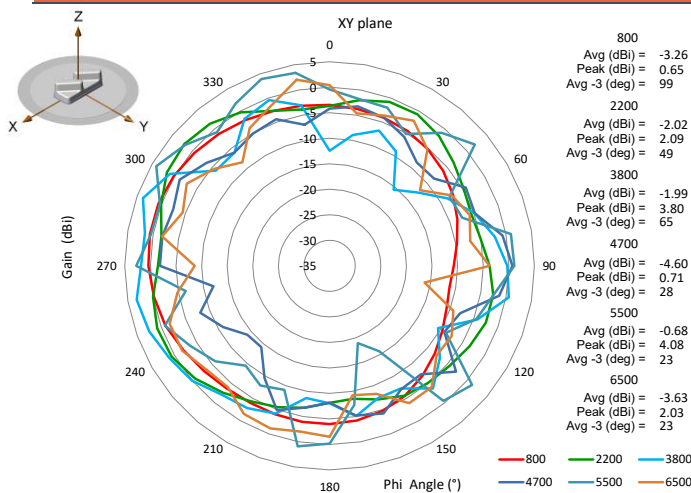
Radiation Pattern – 5G FR1 – Port 3 - XY & XZ Gain Plots

5G-FR1 Port 3



Radiation Pattern – 5G FR1 – Port 4 - XY & XZ Gain Plots

5G-FR1 Port 4



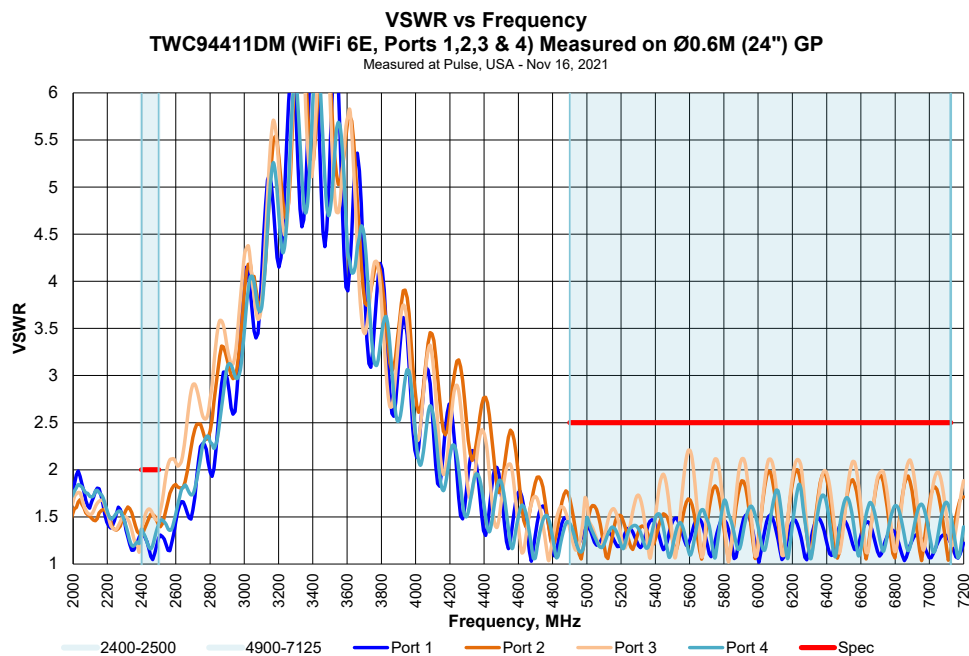
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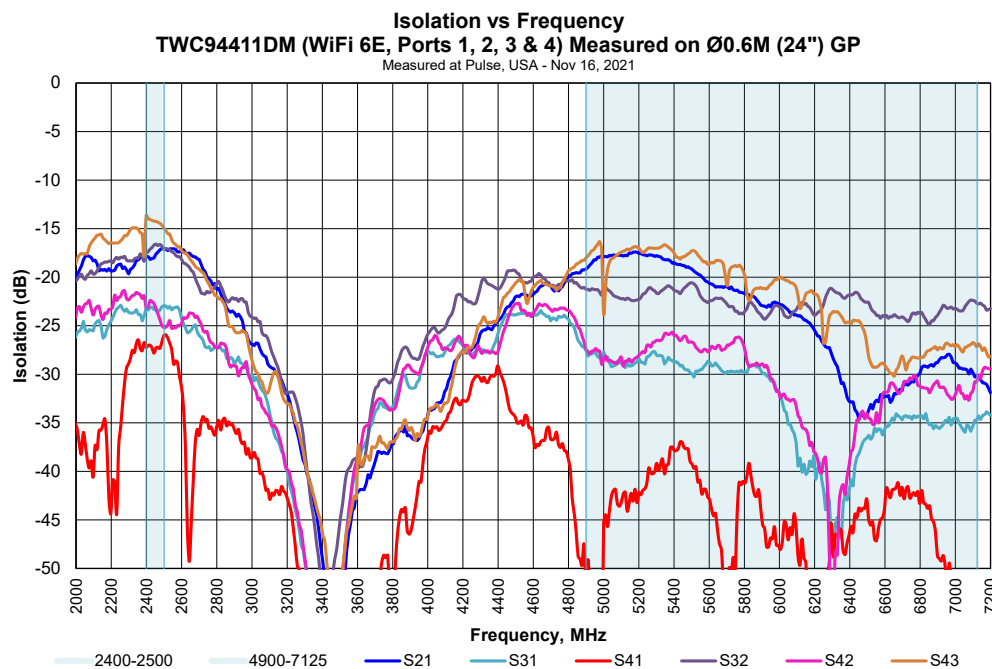
Charts-VSWR

WiFi 6E



Charts--Isolation

WiFi 6E



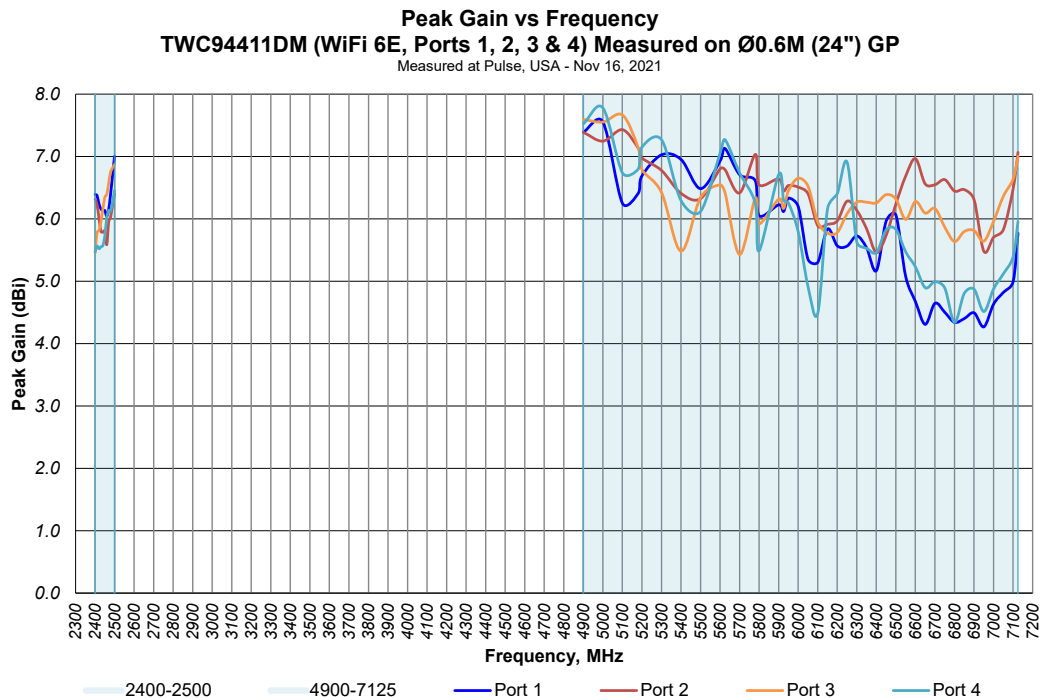
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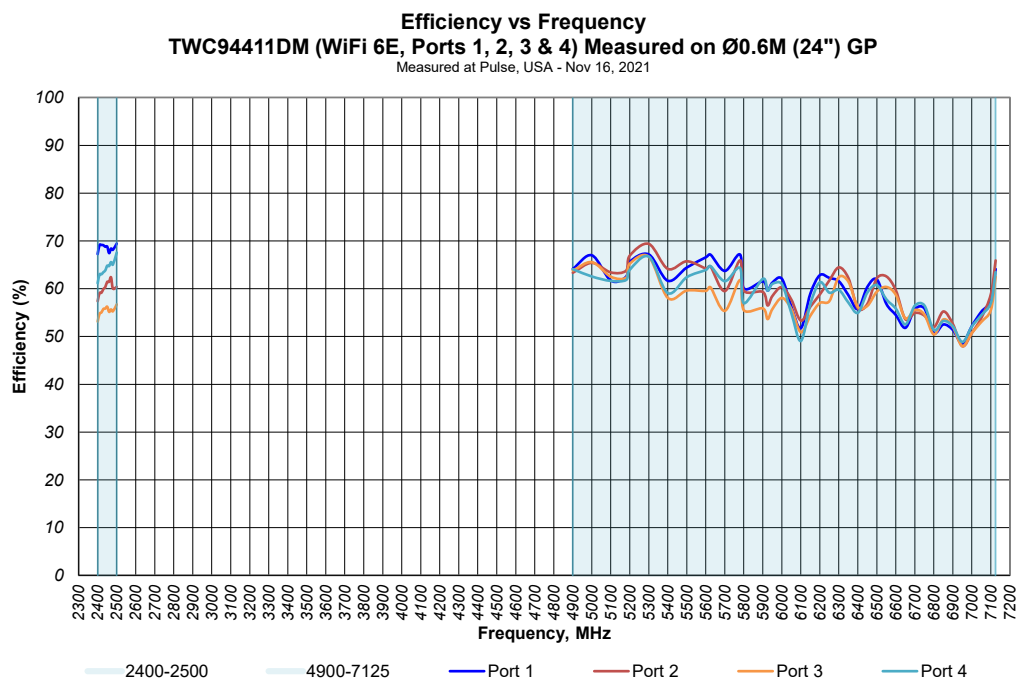
Charts-Peak Gain

WiFi 6E



Charts-Peak Efficiency

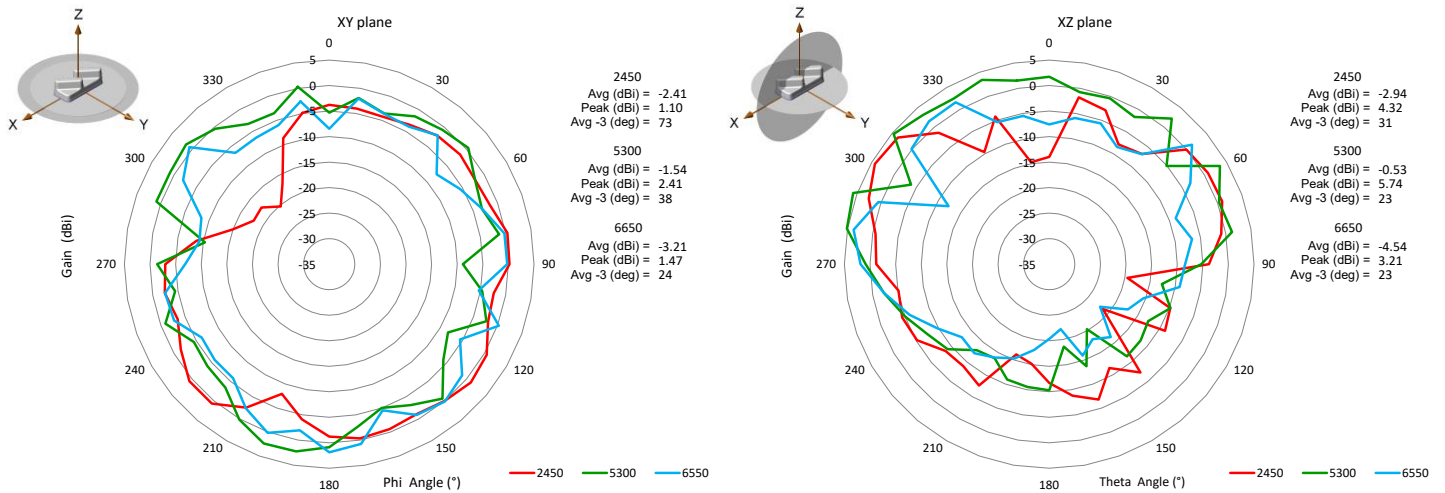
WiFi 6E



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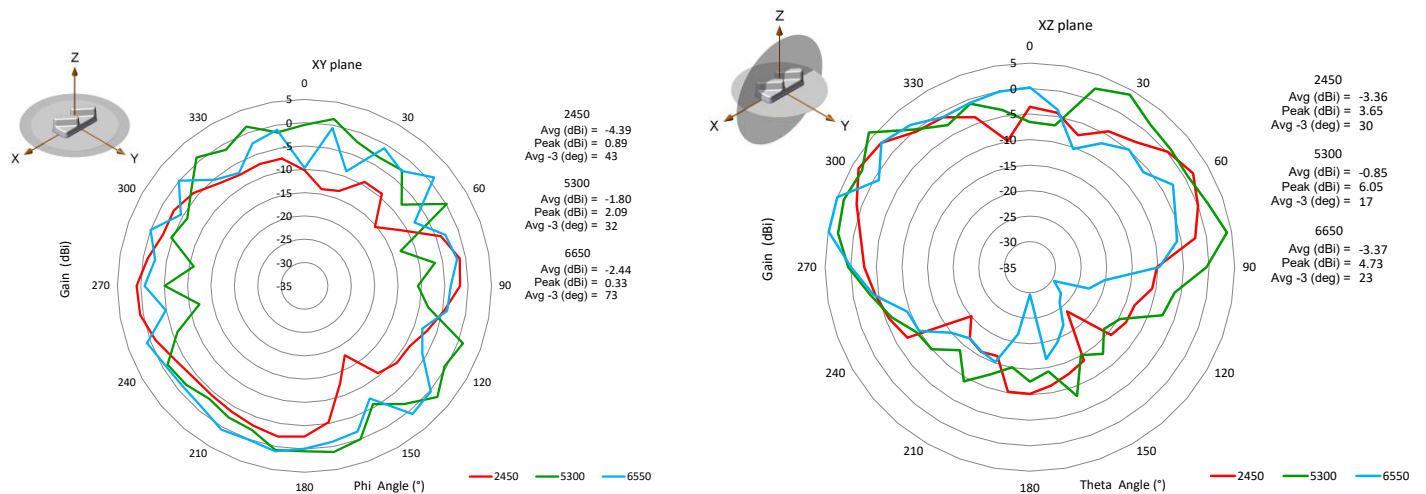
Radiation Pattern – WiFi 6E – Port 1 - XY & XZ Gain Plots

WiFi 6E Port1



Radiation Pattern – WiFi 6E – Port 2 - XY & XZ Gain Plots

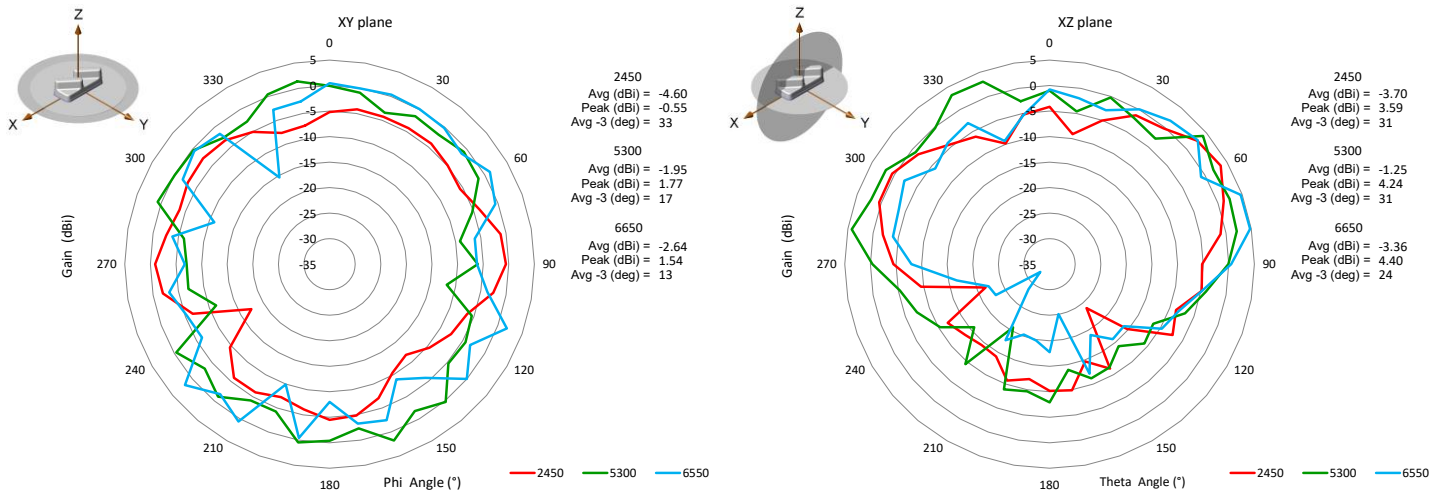
WiFi 6E Port2



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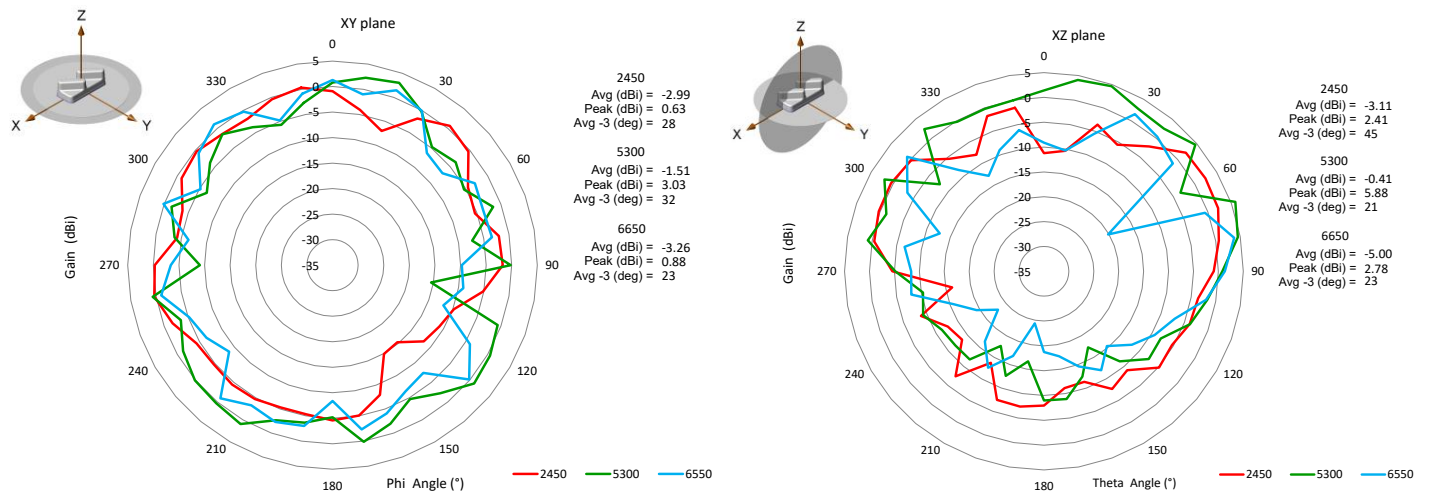
Radiation Pattern – WiFi 6E – Port 3 - XY & XZ Gain Plots

WiFi 6E Port3



Radiation Pattern – WiFi 6E – Port 4 - XY & XZ Gain Plots

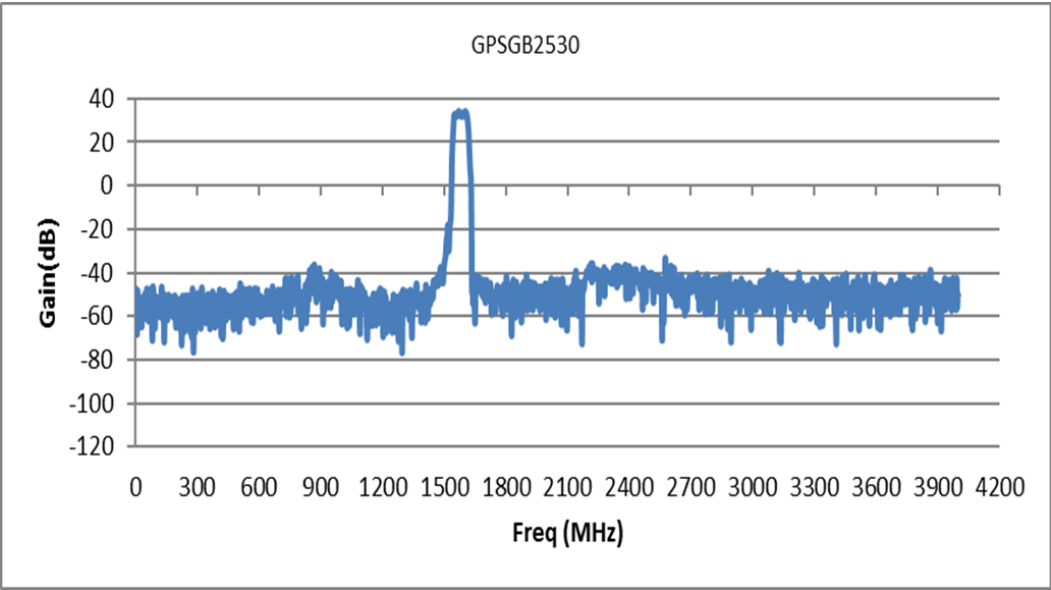
WiFi 6E Port4



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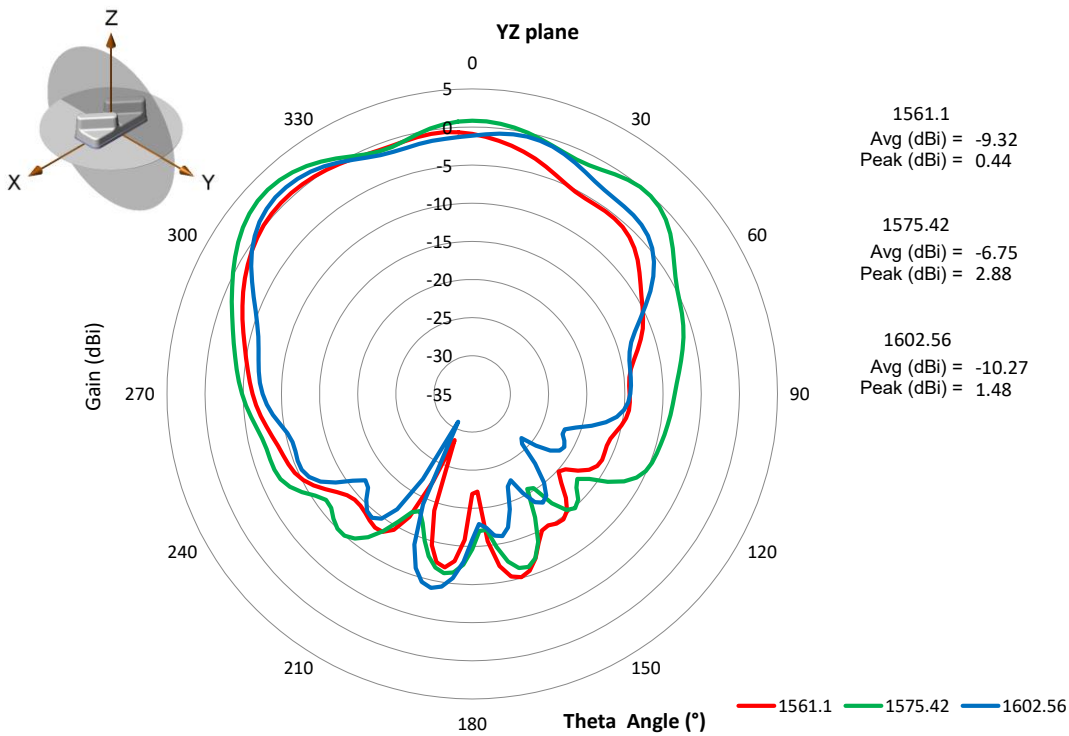
GNSS Antenna - LNA Gain Plots

LNA gain and Out-of-band Rejection



GNSS Antenna - Radiation Pattern (YZ Plane) Plots

YZ Plane: Passive measurement with 6" cable



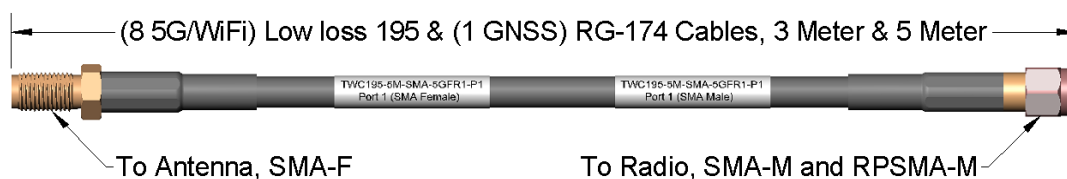
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Additional Product Info

Cable Assemblies for TWC94411DM (2DM) (Not included)



TWC (Twin Castle) Cable Assemblies

TWC Cable Assemblies

Orderable P/N ¹	5G FR1 Port 1	5G FR1 Port 2	5G FR1 Port 3	5G FR1 Port 4	WiFi 6E Port 1	WiFi 6E Port 2	WiFi 6E Port 3	WiFi 6E Port 4	GNSS Port 1
TWC9-3M	SMA-M	SMA-M	SMA-M	SMA-M	RPSMA-M	RPSMA-M	RPSMA-M	RPSMA-M	SMA-M
TWC9-5M	SMA-M	SMA-M	SMA-M	SMA-M	RPSMA-M	RPSMA-M	RPSMA-M	RPSMA-M	SMA-M

Family Products – TWC (Twin Castle)

Multiport TWC Products - 5G FR1/ WiFi/ GNSS

Orderable P/N	No. of Total Ports	No. of 5G FR1 Ports	No. of WiFi 6E Ports	No. of GNSS Ports	Cable Length (Total)	Color
TWC94411DM	9	4	4	1	0.3M	Black
TWC94412DM	9	4	4	1	0.3M	White
TWC94411DM3MKIT	9	4	4	1	3.3M	Black
TWC94412DM3MKIT	9	4	4	1	3.3M	White
TWC94411DM5MKIT	9	4	4	1	5.3M	Black
TWC94412DM5MKIT	9	4	4	1	5.3M	White
TWC74211DM06M	7	4	2	1	0.6M	Black
TWC44001DM	4	4	0	0	0.3M	Black
TWC44002DM	4	4	0	0	0.3M	White

Notes:

1. TWC9-3M Included in TWC94411DM3MKIT (2DM3MKIT). TWC9-5M Included in TWC94411DM5MKIT (2DM5MKIT)
2. Please contact sales for availability, lead time, and/or any special requests. Samples available upon request.

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PACKAGING Specification

TWC94411DM (TWC94412DM)

Antennas packed in PE bag and carton box

1pcs antennas per plastic bag
2pcs antennas per package box
Package box: 17inch x12inch x 9inch



For more information

Americas - antennas.us@pulseelectronics.com | Europe – antennas.eu@pulseelectronics.com | Asia – antennas.as@pulseelectronics.com | Questions? +1-800-ANTENNA
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Issue: (26/04)