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

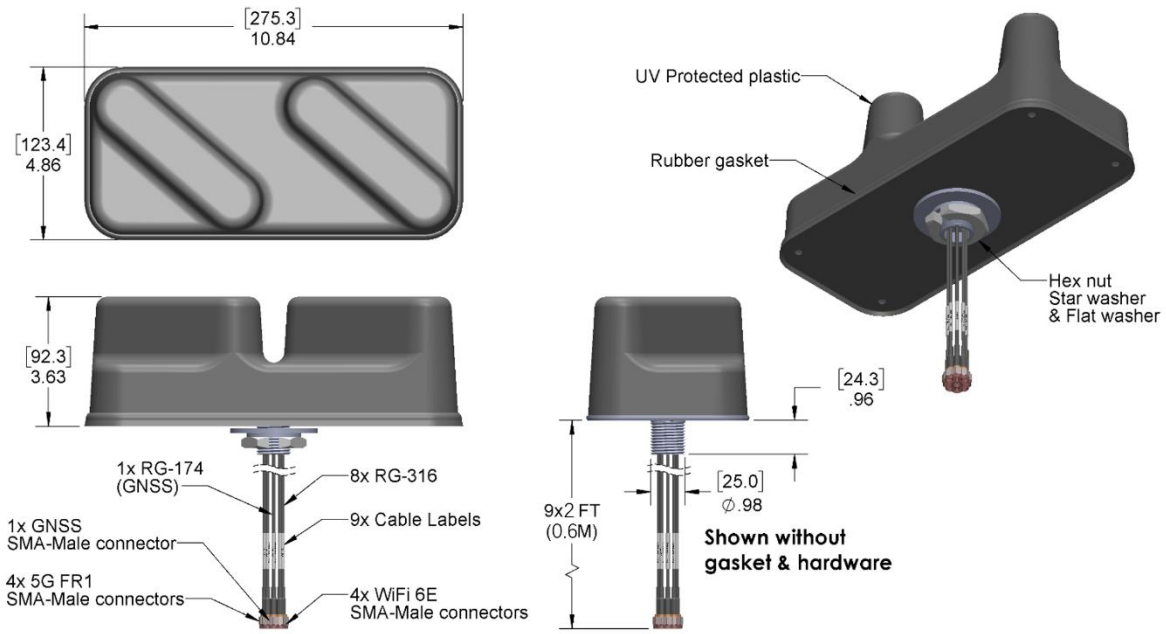
MECHANICAL SPECIFICATIONS					
TWC94411DM (TWC94412DM)					
Dimension (Length x Width x Height)	**Housing Material**	**Color[3]**	**Weight**	**Fixing System**	**Mounting Hole Diameter**
275.3 x 123.4 x 92.3 mm (10.84 x 4.86 x 3.63 inch)	**PC, UV Protected**	**Black or White**	**894g (1.85lbs)**	**Direct 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:
1. (8) Multi-Band Monopoles with built in ground plane, Independent from external ground plane
2. Minimum Isolation (dB)
3. Black antenna P/N TWC94411DM, White antenna P/N TWC94412DM
4. ECE R10.06 supplement 02 certified, Approval No: E24*10R06/02*5124*00
5. ECE R118 compliant cables

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MECHANICAL DRAWING
TWC94411DM (TWC94412DM)





Installation tool
1-5/8" (41mm) Wrench
Installation torque 15-18 Ft/lbs
(20.3-24.4 Nm)

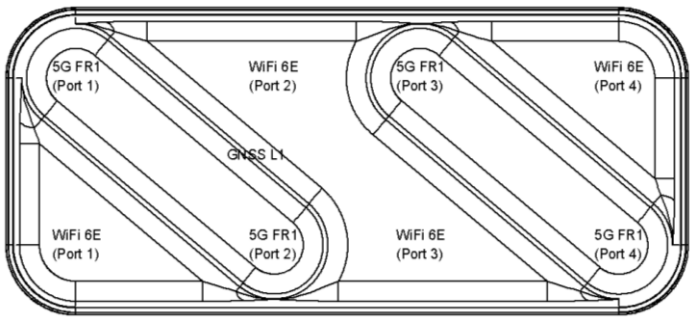
Dimensions: inches (mm) Unless otherwise specified, all tolerances are ±.010 (0.25mm)

Vehicular – Twin Castle (TWC) Series
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TWC94411DM and TWC94412DM - 617 to 7125 MHz

TESTING SETUP

General / Chamber test setup

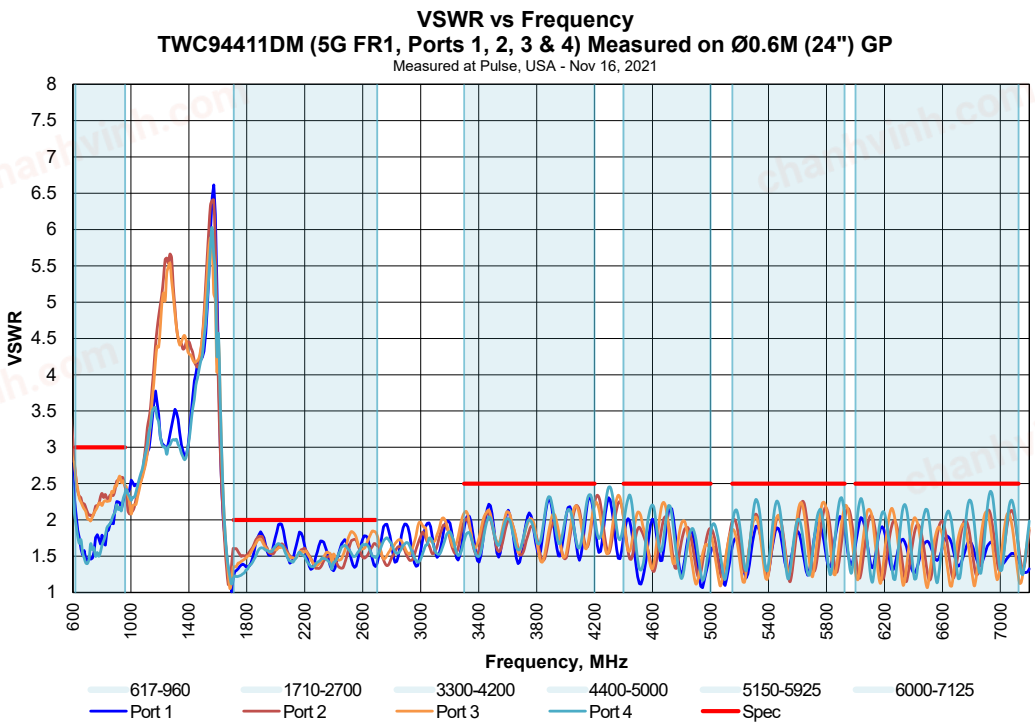
- All measurements done on Ø 600mm (24”) round ground plane.
- S-parameters with 0.3m (1ft) RG316 cable
- Gain and Efficiency with 0.3m (1ft) RG316 cable
- Measured at Pulse, USA (in ETS chamber)





Charts – VSWR

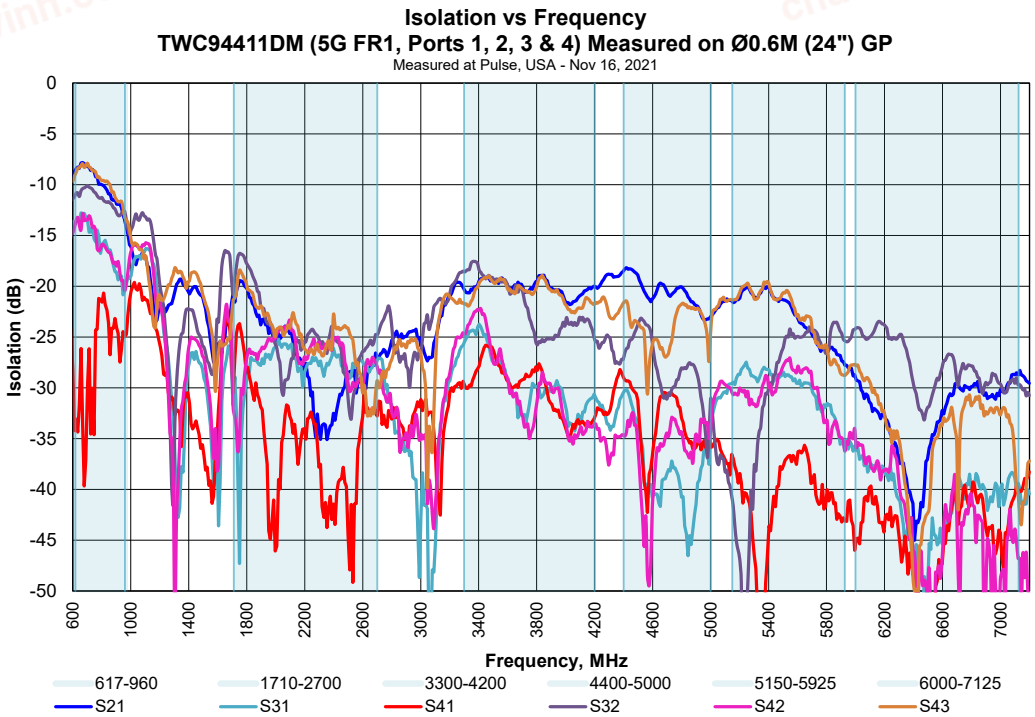
5G-FR1

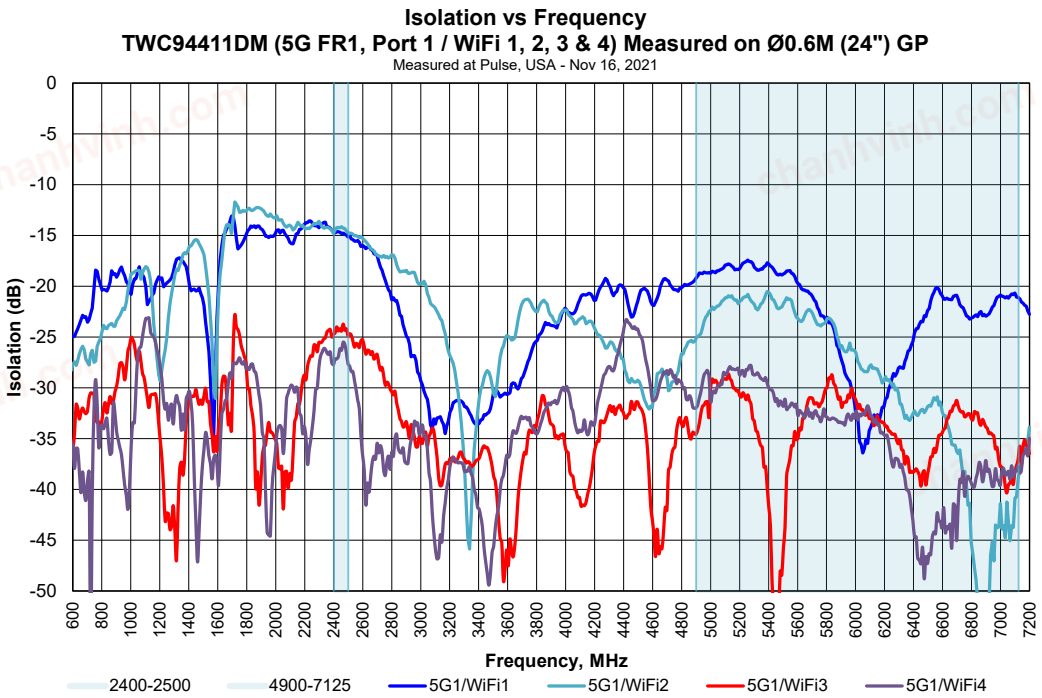


Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

Charts-Isolation

5G-FR1

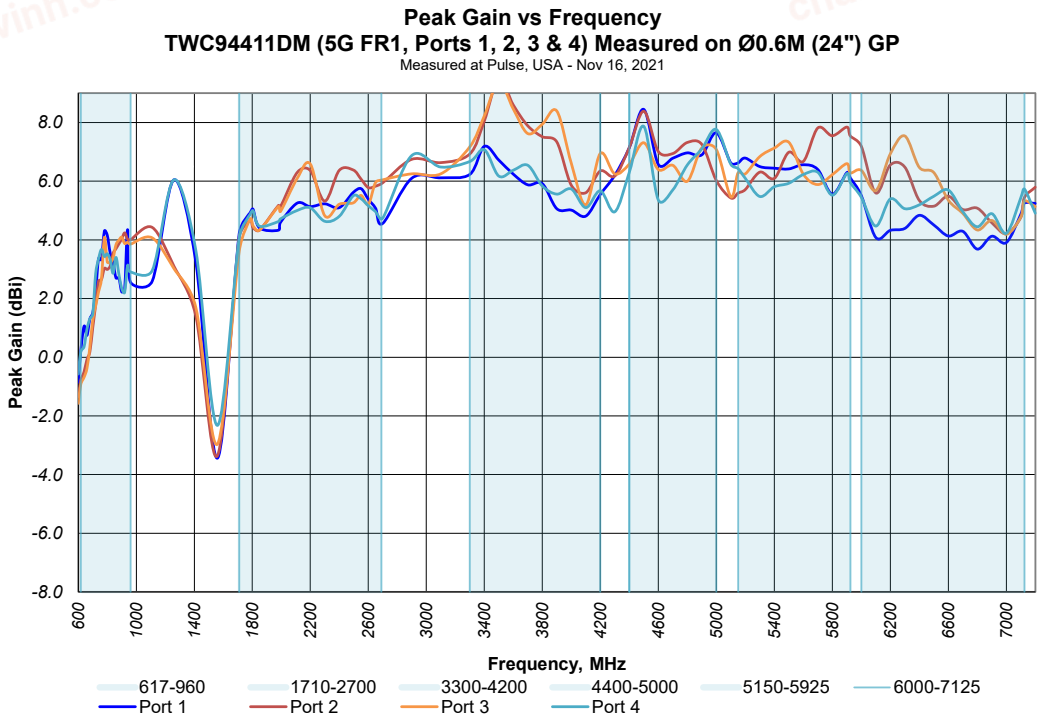




Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

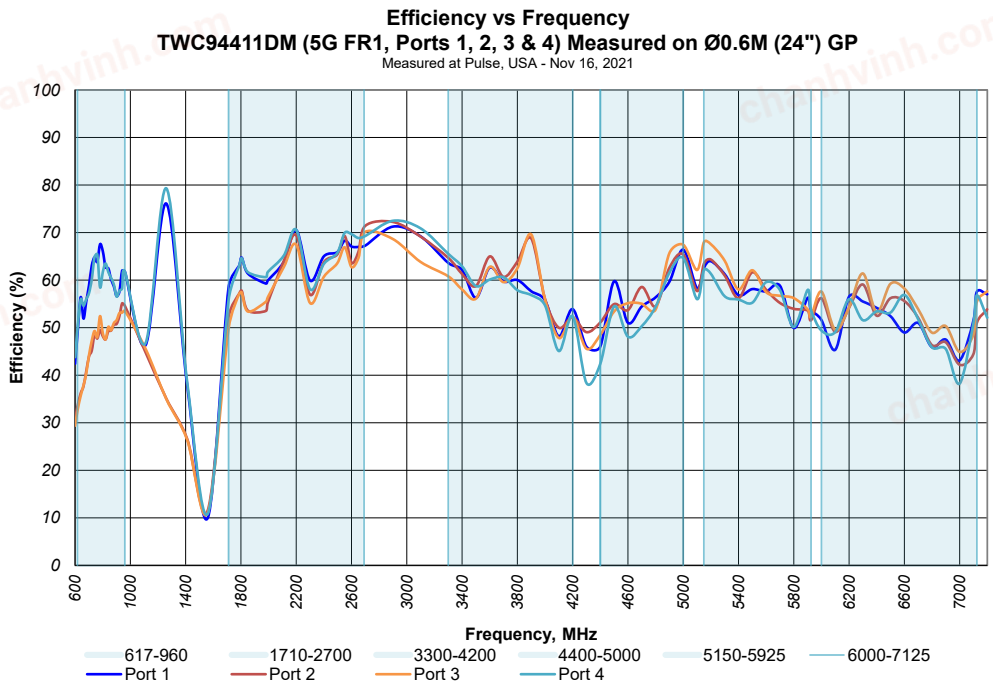
Charts-Peak Gain

5G-FR1



Charts-Peak Efficiency

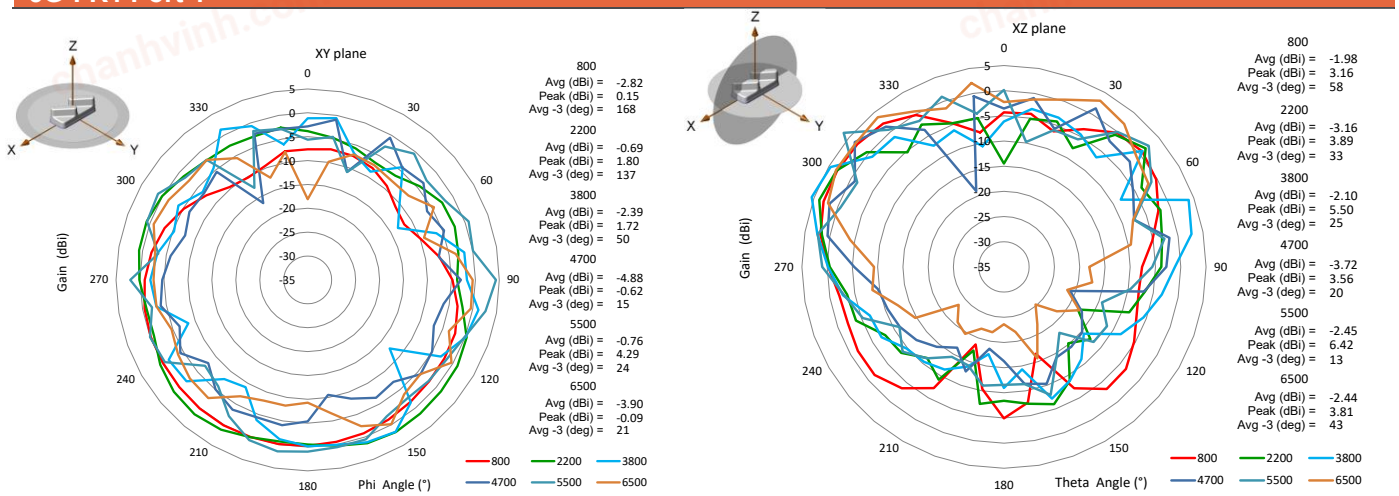
5G-FR1



Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

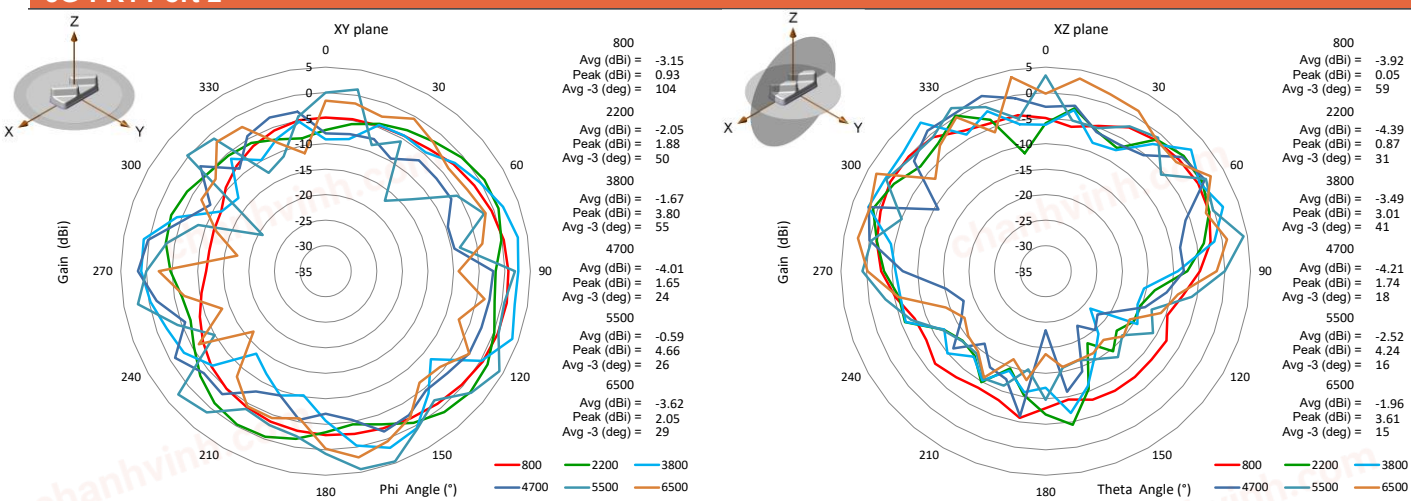
Radiation Pattern – 5G FR1 – Port 1 – XY & XZ Gain Plot

5G-FR1 Port 1



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

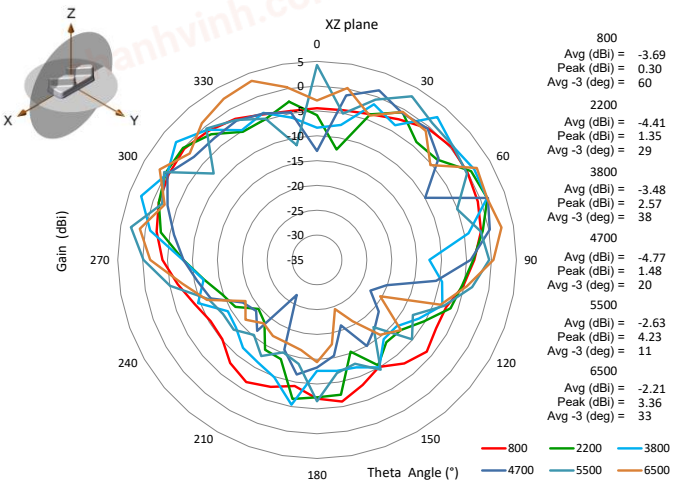
5G-FR1 Port 2

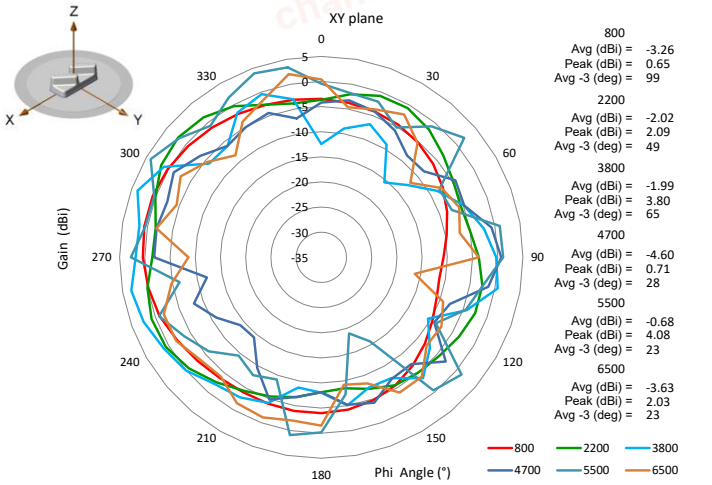


Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

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

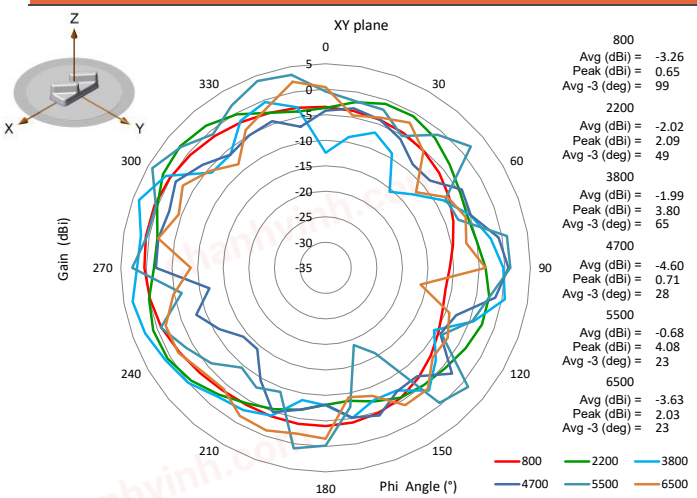
5G-FR1 Port 3

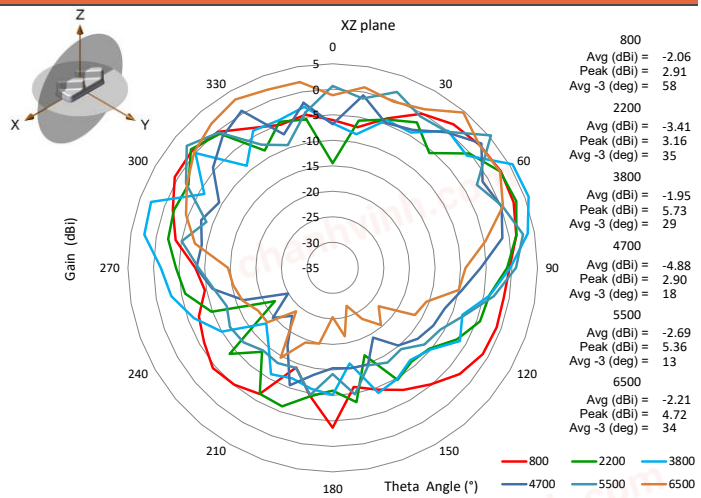




Radiation Pattern – 5G FR1 – Port 4 - XY & XZ Gain Plots

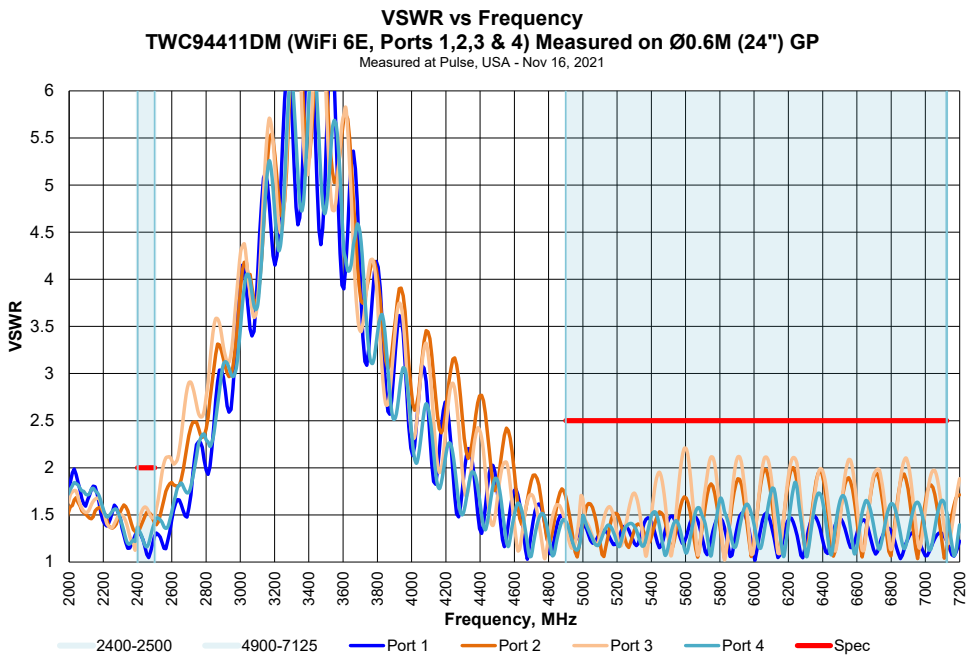
5G-FR1 Port 4



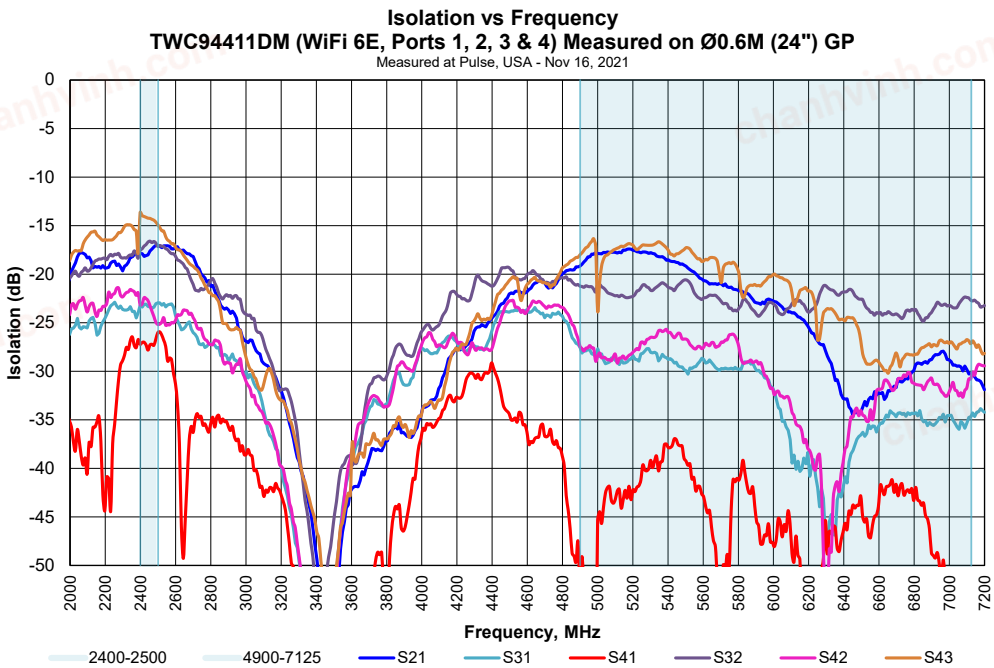


Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

Charts-VSWR
WiFi 6E



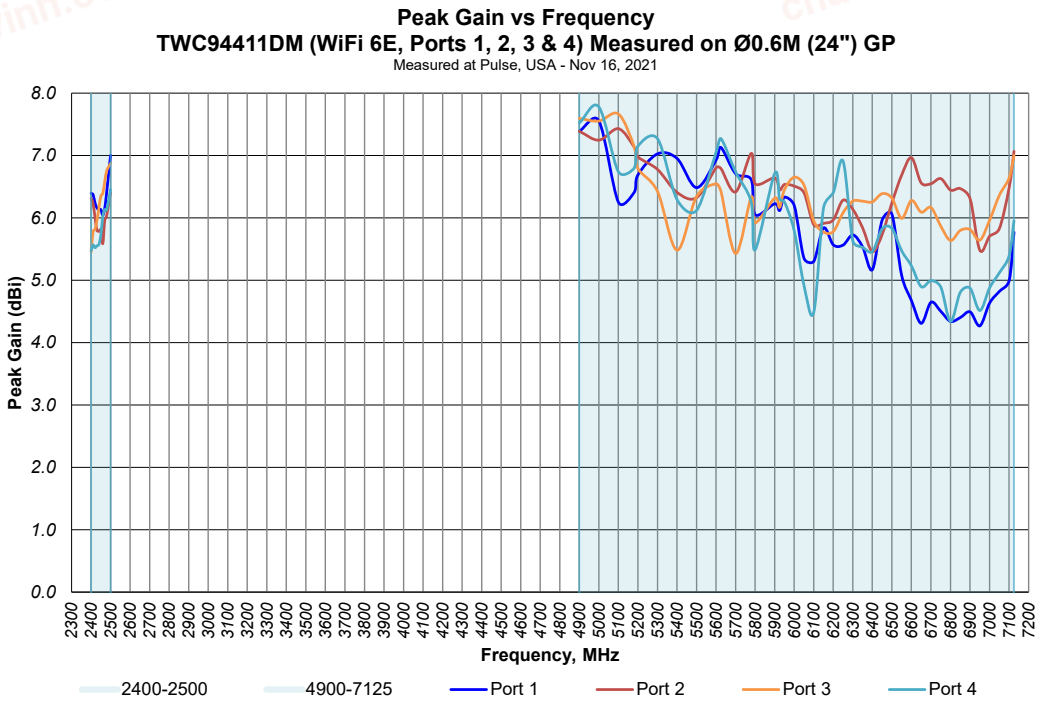
Charts--Isolation
WiFi 6E



Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

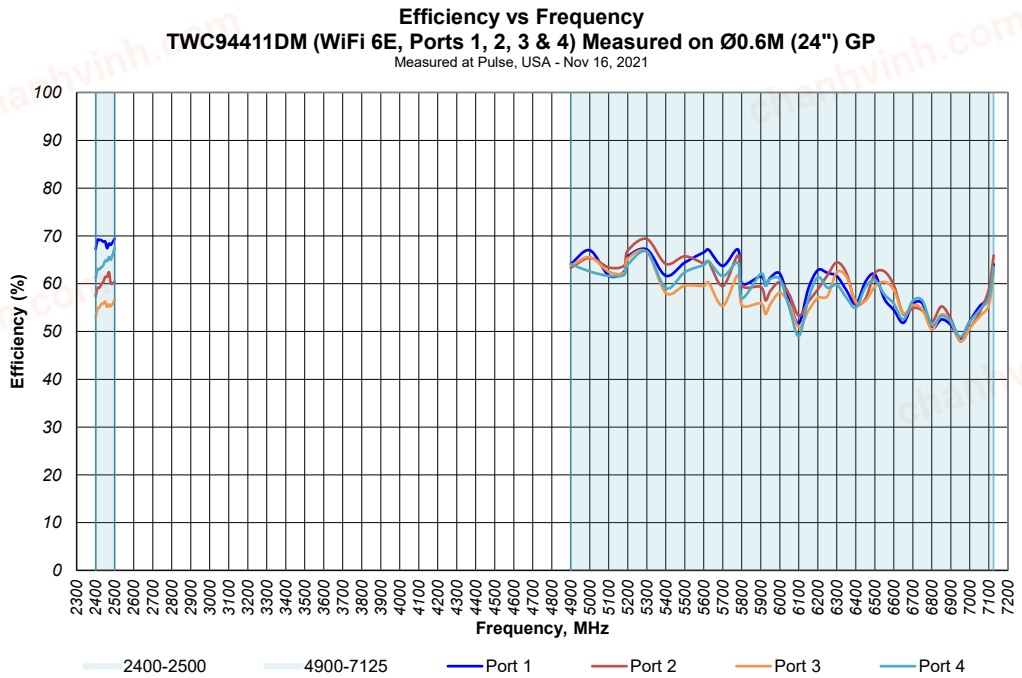
Charts-Peak Gain

WiFi 6E



Charts-Peak Efficiency

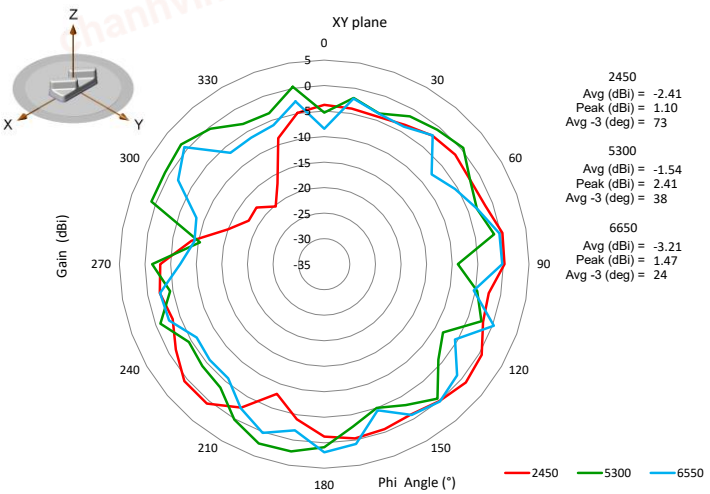
WiFi 6E

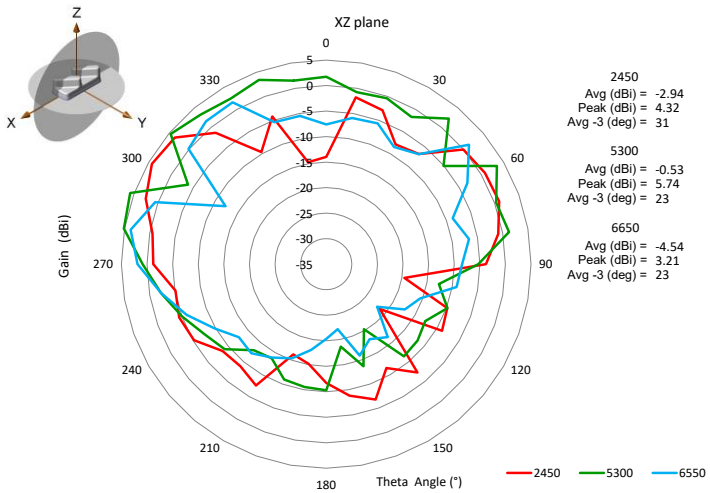


Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

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

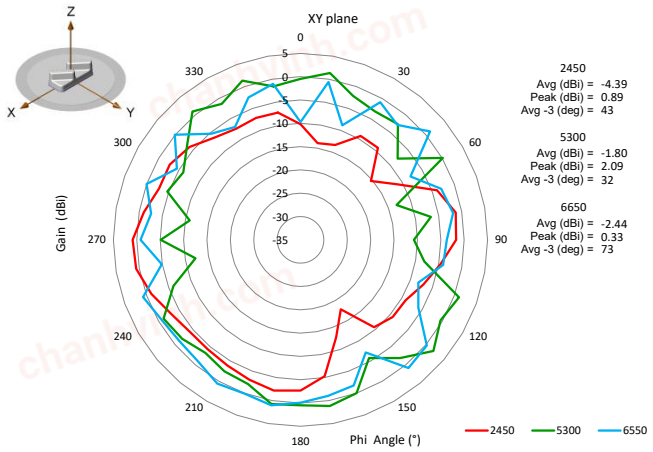
WiFi 6E Port1

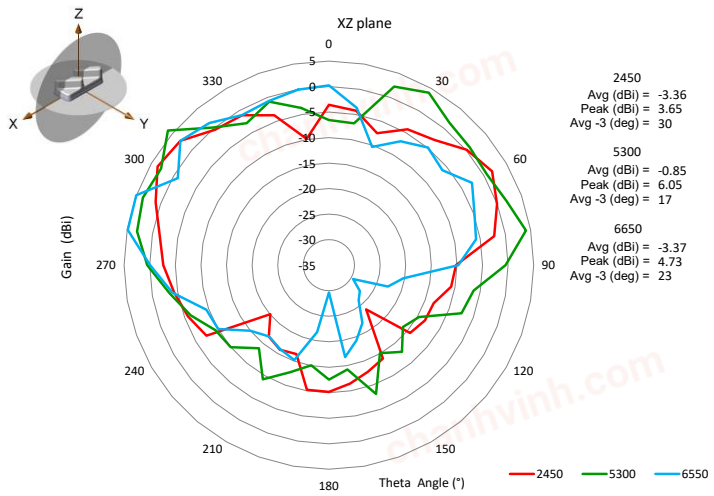




Radiation Pattern – WiFi 6E – Port 2 - XY & XZ Gain Plots

WiFi 6E Port2

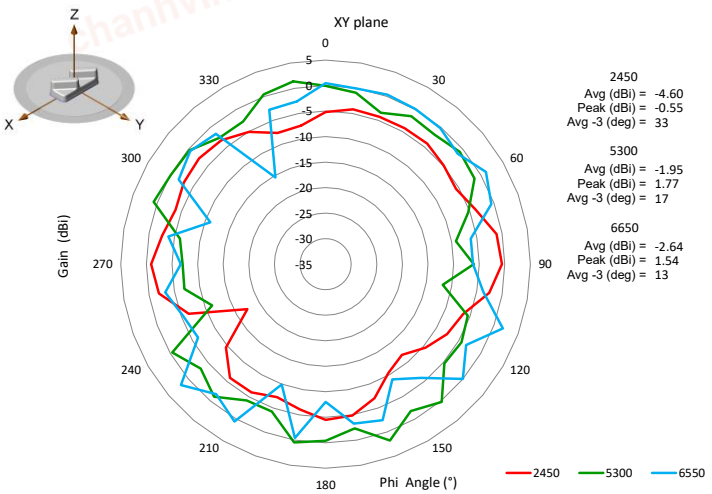


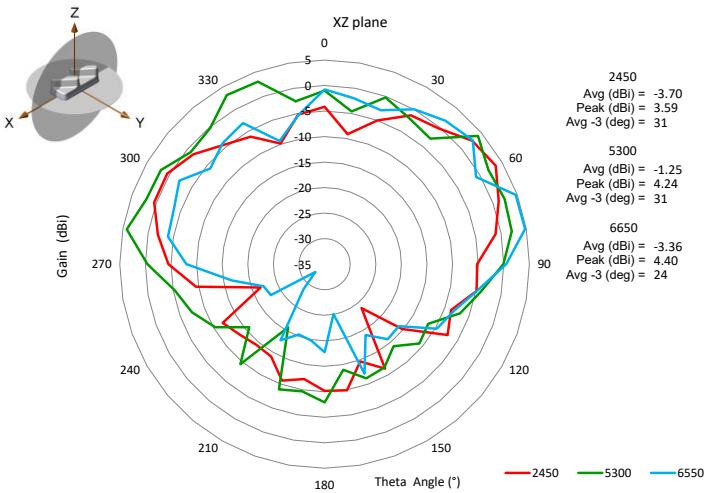


Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

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

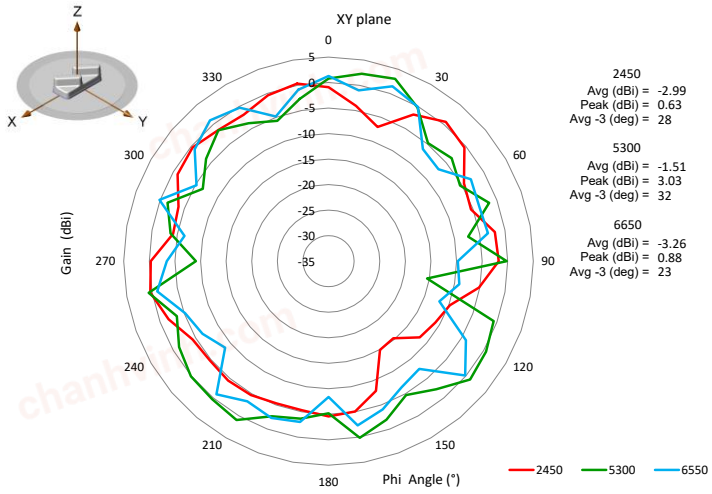
WiFi 6E Port3

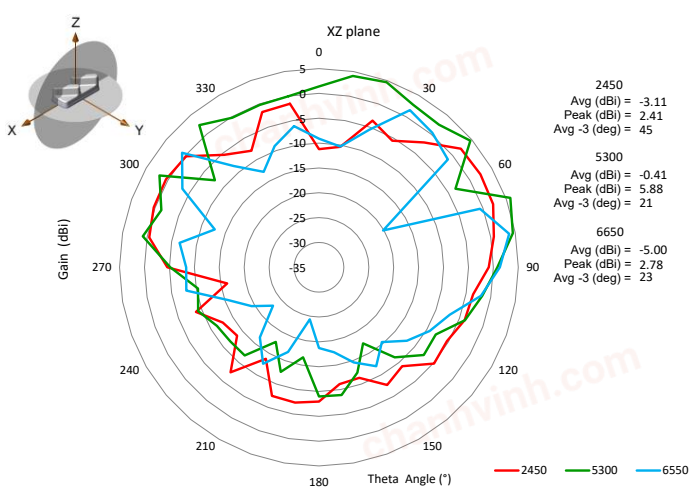




Radiation Pattern – WiFi 6E – Port 4 - XY & XZ Gain Plots

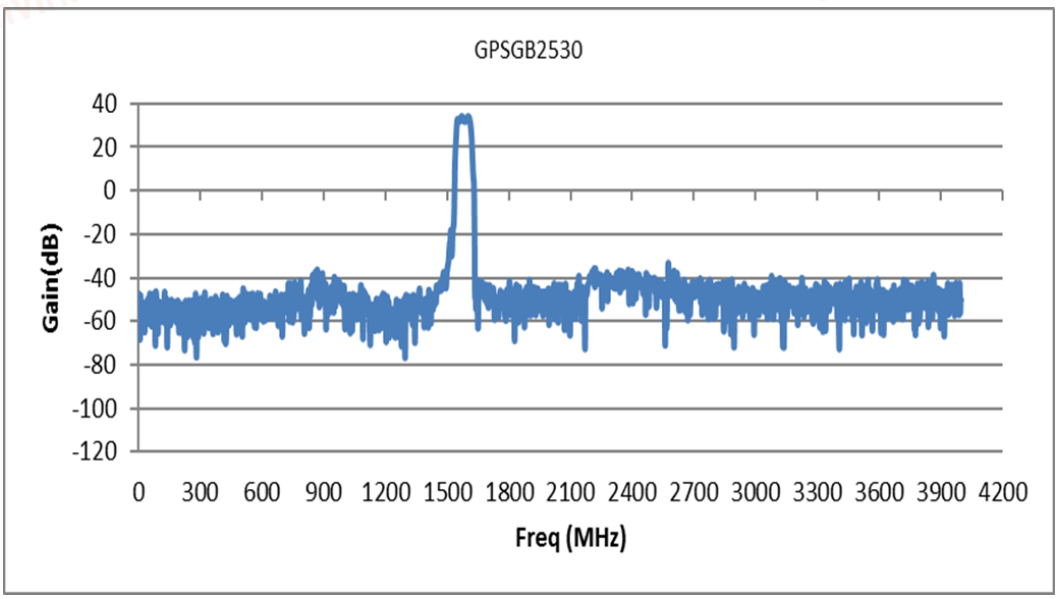
WiFi 6E Port4



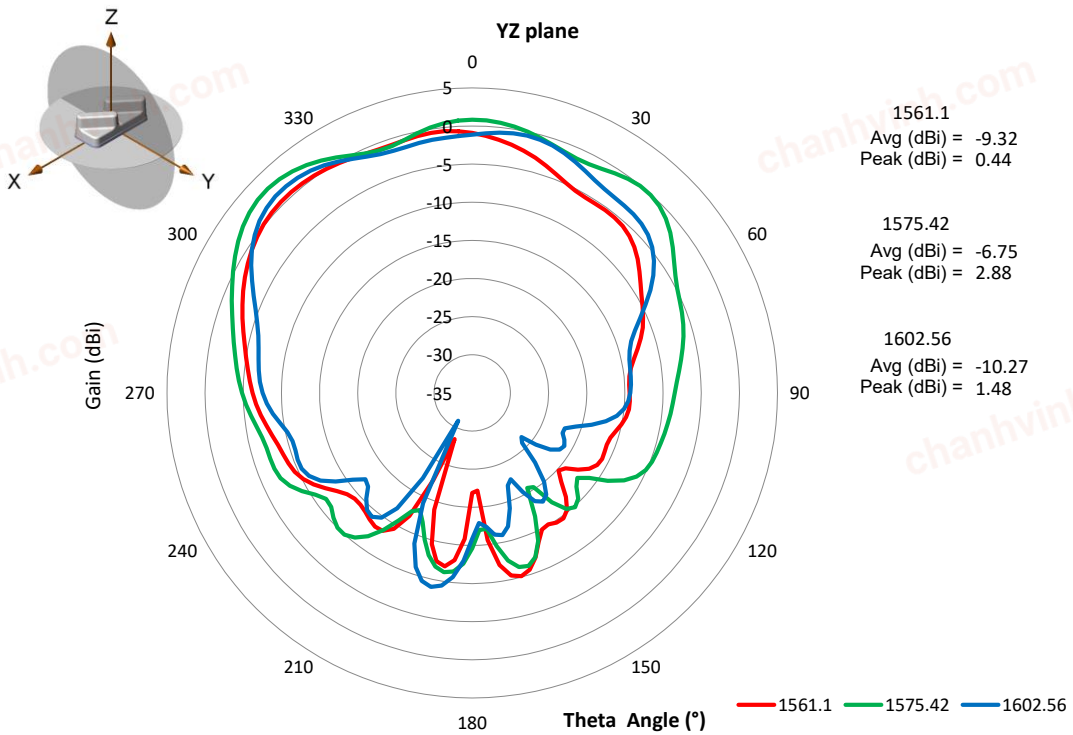


Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

GNSS Antenna - LNA Gain Plots
LNA gain and Out-of-band Rejection

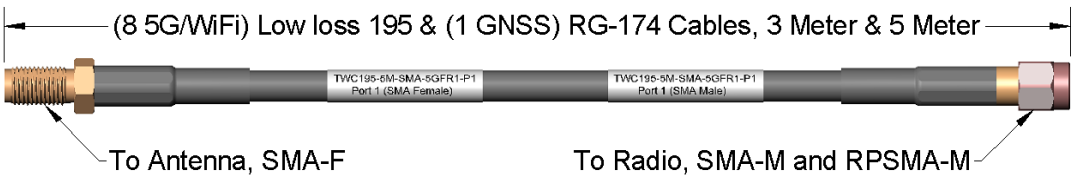


GNSS Antenna - Radiation Pattern (YZ Plane) Plots
YZ Plane: Passive measurement with 6” cable



Vehicular – Twin Castle (TWC) Series
5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

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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5G-FR1+WiFi 6E+GNSS L1 Direct Mount 9-in-1 Antenna
TWC94411DM and TWC94412DM - 617 to 7125 MHz

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





chanhvinh.com

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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