

SPECIFICATION

Revision
A

Pana-pacific Part No	Taoglas Description
PP407087	4 in1 GNSS LTE1 LTE2 WiFi

Hino Part Number	Hino Description
XXX.XXXX	

Product Features
2* LTE Antennas – LTE Bands 2,4,5,7,12,13,25,26 WCDMA Bands 1,2,4,5,8 GSM Bands 850,1900MHz 1* WIFI Antenna - 2.4GHz 1* GNSS Antenna - 1575.42 MHz/1602 MHz Dims:161*111.5*23.4 mm

1. Introduction

The PP407087 antenna is a 4-in-1, custom low profile, internal antenna for use on vehicles for telematics, transportation and remote monitoring applications. It delivers best in class LTE, GNSS and WIFI antenna performance.

2. Specification

MECHANICAL

Antenna Dimensions	161*111.5*23.4 mm
Enclosure Material	ASA + PC
Weight (including cable)	9.3 oz

ENVIRONMENTAL

Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 90°C
Humidity	Non-condensing 65°C 95% RH

GNSS Antenna

Frequency	1575.42/1602 MHz
Passive Antenna Efficiency	~ 50%
Antenna Bandwidth	~ 40MHz
Ceramic Patch Dim.	25*25*4 mm
Passive Antenna Average gain	~ -2dB
Passive Antenna Peak gain	3dBi
VSWR	1.2
Impedance	50Ω
Axial Ratio	< 3dB
Polarization	RHCP
Cable	914.4 mm Low-loss RG174
Connector	FAKRA C

LNA and Filter

Frequency	1575.42/1602 MHz
Output Impedance	50 Ohm
Voltage	1.8-5.0V
LNA Gain	16 dB nominal
Current Draw	25mA
Noise Figure	2 dB

2G/3G/4G LTE Antennas

LTE	B2	B4	B5	B7	B12	B13	B25	B26
Frequency (MHz)	1850~1990	1710~2155	824~894	2500~2690	699~746	756~777	1850~1915	814~894
Efficiency (%)	55	45	40	30	30	40	55	40
Peak Gain (dBi)	6	6	2	3.5	0	1.5	6	2
Average Gain (dB)	-2	-3	-4	-5	-5	-4	-2	-4
WCDMA	B1		B2	B4		B5		B8
Frequency (MHz)	1920~2170		1850~1990	1710~2155		824~894		880~960
Efficiency (%)	55		55	45		40		30
Peak Gain (dBi)	6		6	6		2		2
Average Gain (dB)	-2		-2	-4		-4		-5
GSM	850				1900			
Frequency (MHz)	824~894				1850~1910			
Efficiency (%)	40				55			
Peak Gain (dBi)	6				6			
Average Gain (dB)	-3				-3			
Impedance				50Ω				
Polarization				Linear				
Isolation				19 dB between LTE antennas (low band)				
Isolation				30 dB between LTE antennas (high band)				
Isolation				> 20 dB between LTE and GNSS antenna				
Isolation				> 20 dB between LTE and WIFI				
Cables				914.4 mm Low loss Rg-174 (QTY 2)				
Connector				FAKRA D, FAKRA N				

WIFI Antenna

Frequency (MHz)	WILAN 1
	2400-2500
Efficiency (%)	50
Peak Gain (dBi)	4
Average Gain (dB)	-2
Impedance	50Ω
Polarization	Linear
VSWR	< 2.5:1
Cable	914.4 mm RG-174 low-loss
Connector	FAKRA I

3. Antenna Characteristics

3.1 GNSS Antenna

3.1.1 GNSS Efficiency (Passive antenna)

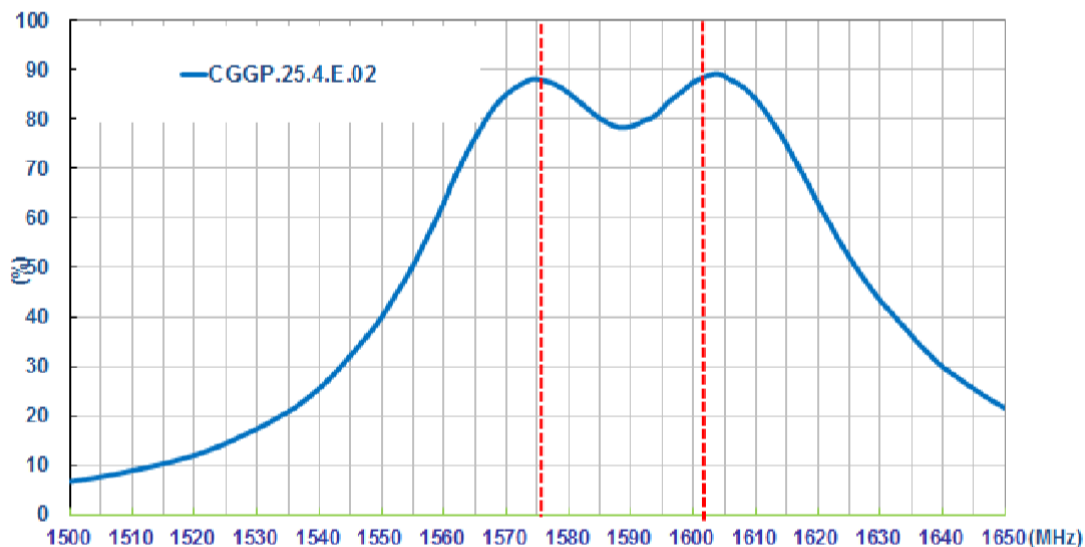


Figure 1. Typical GNSS Antenna Efficiency

3.1.2 GNSS Average gain (Passive antenna)

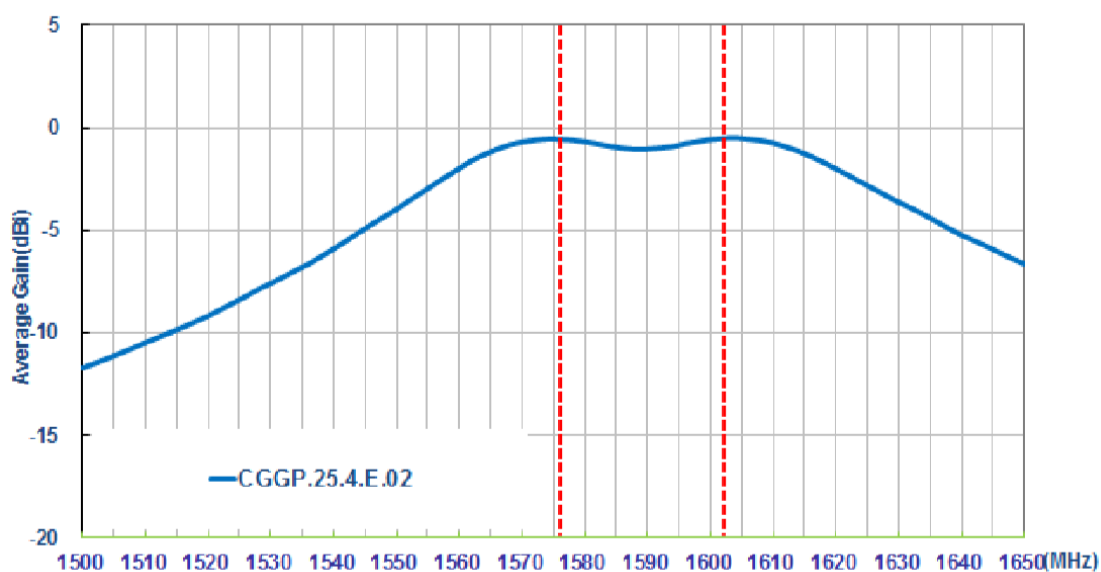
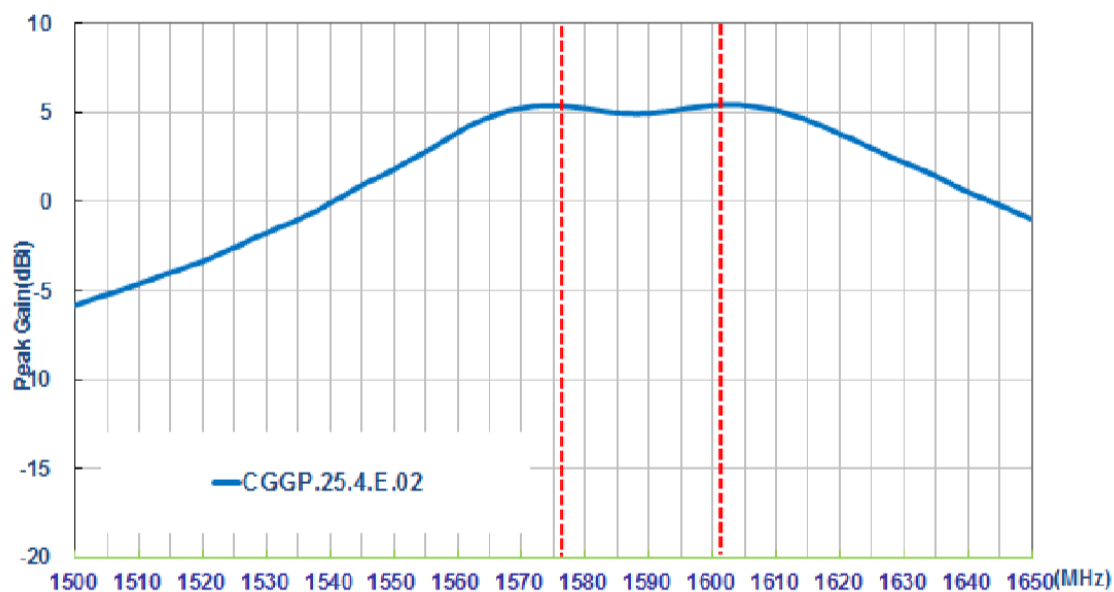


Figure 2. Typical GNSS Antenna Average Gain

3.1.3 GNSS Peak gain (Passive antenna)



3.1.4 GNSS LNA Gain and Noise Figure (Active antenna) @3V

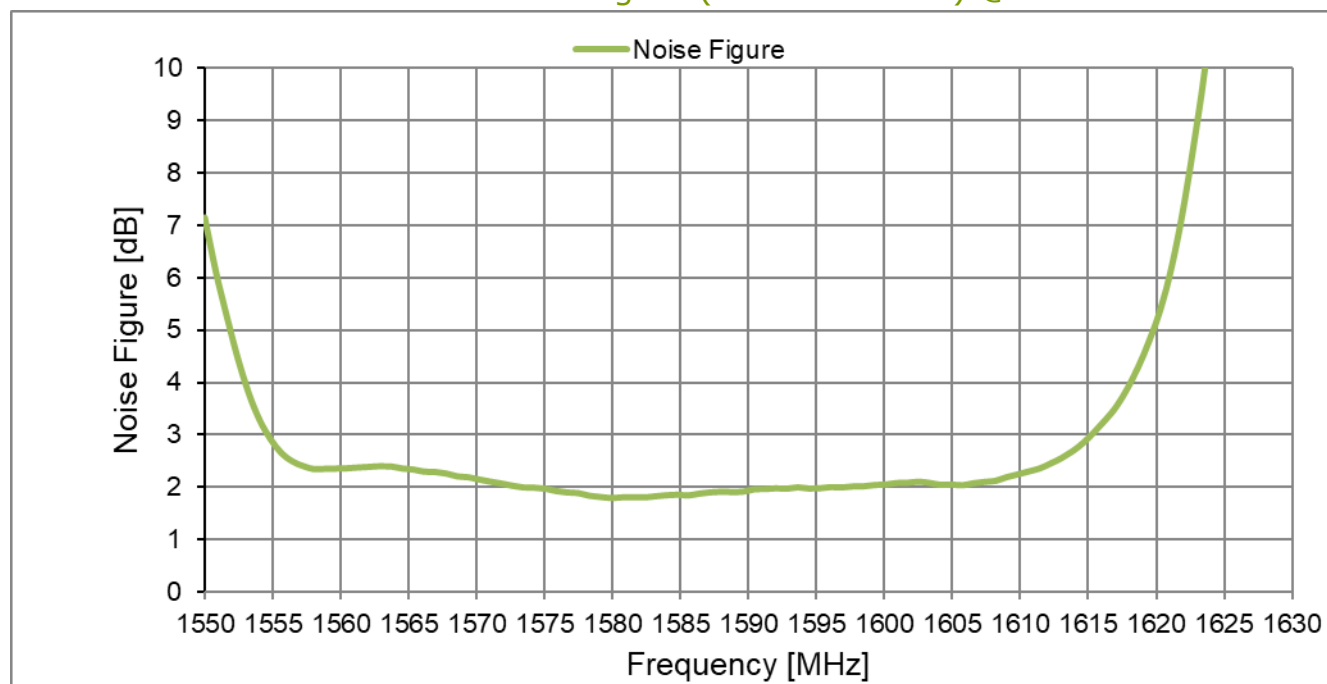


Figure 3. Typical Noise Figure

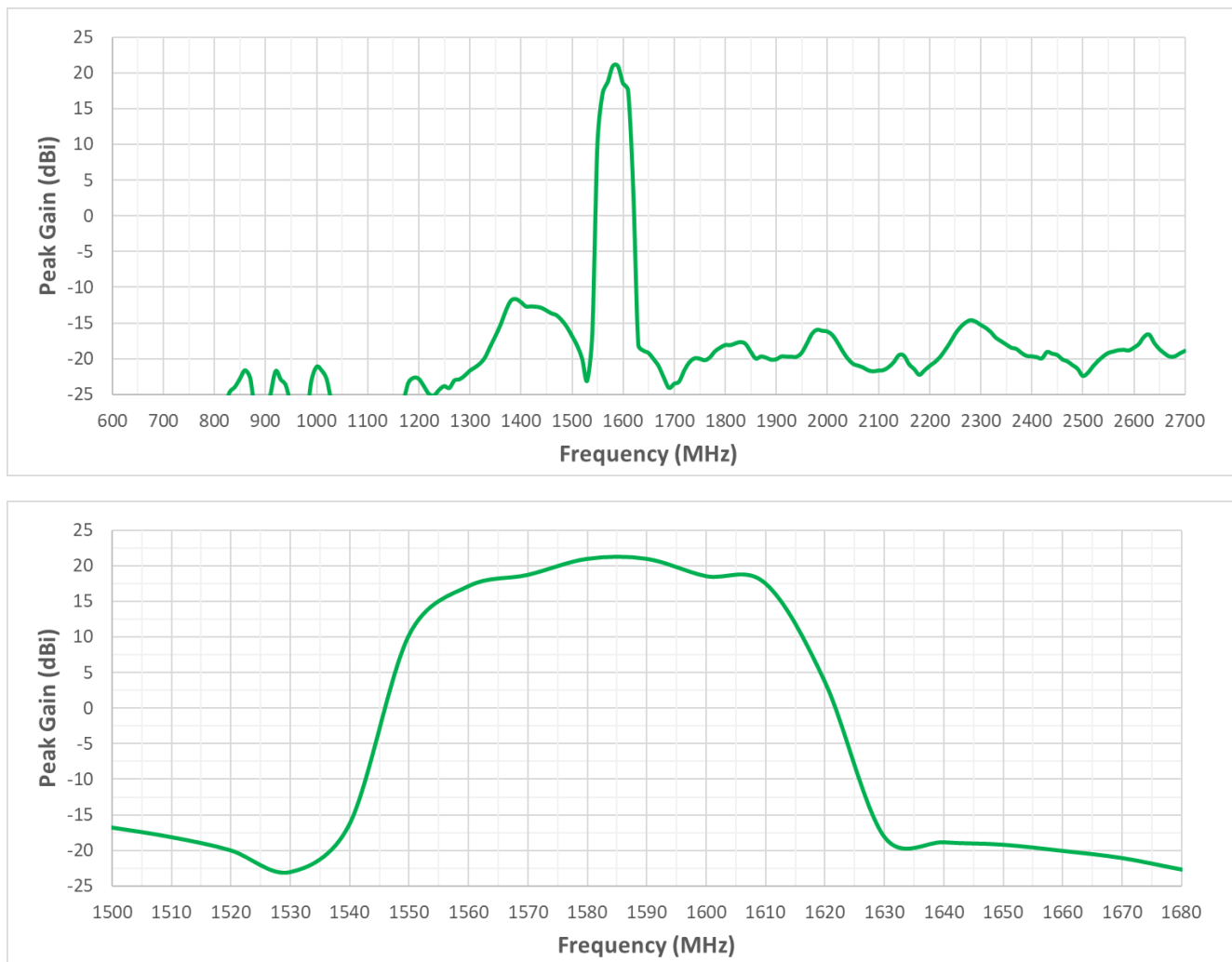


Figure 4. Typical Active GNSS Gain

3.1.5 Out Band Rejection (Active antenna)

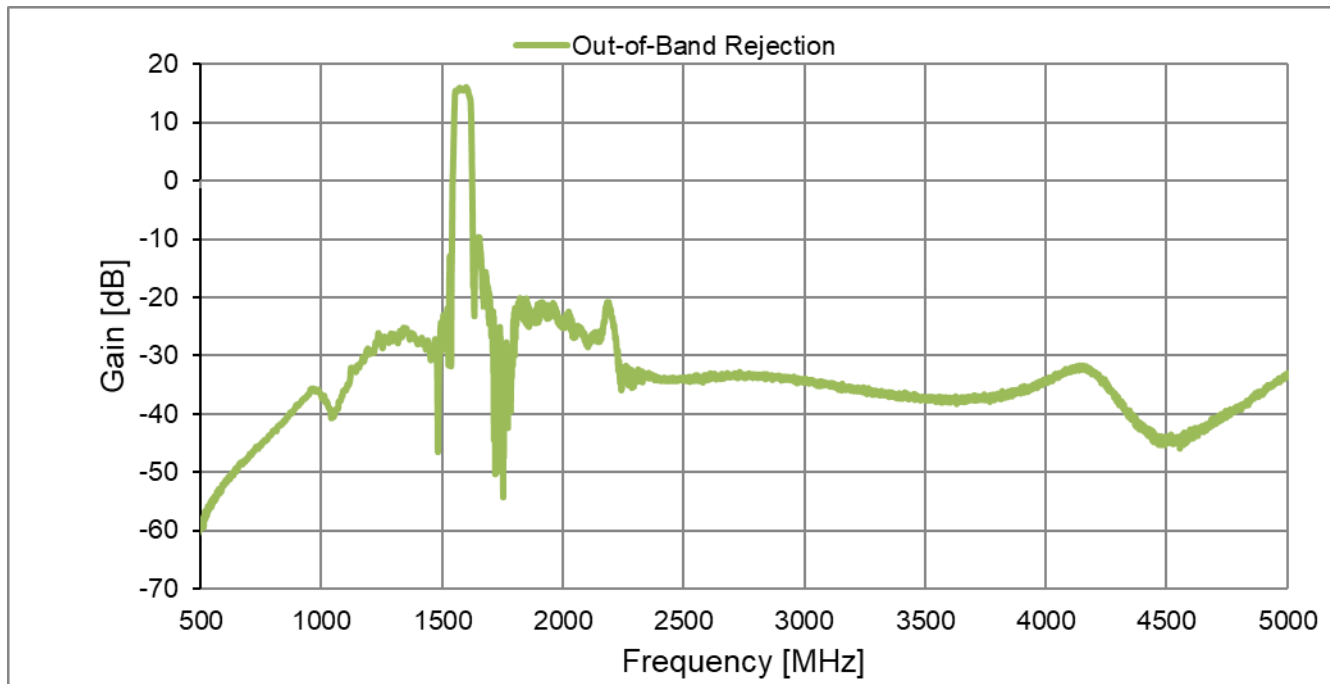
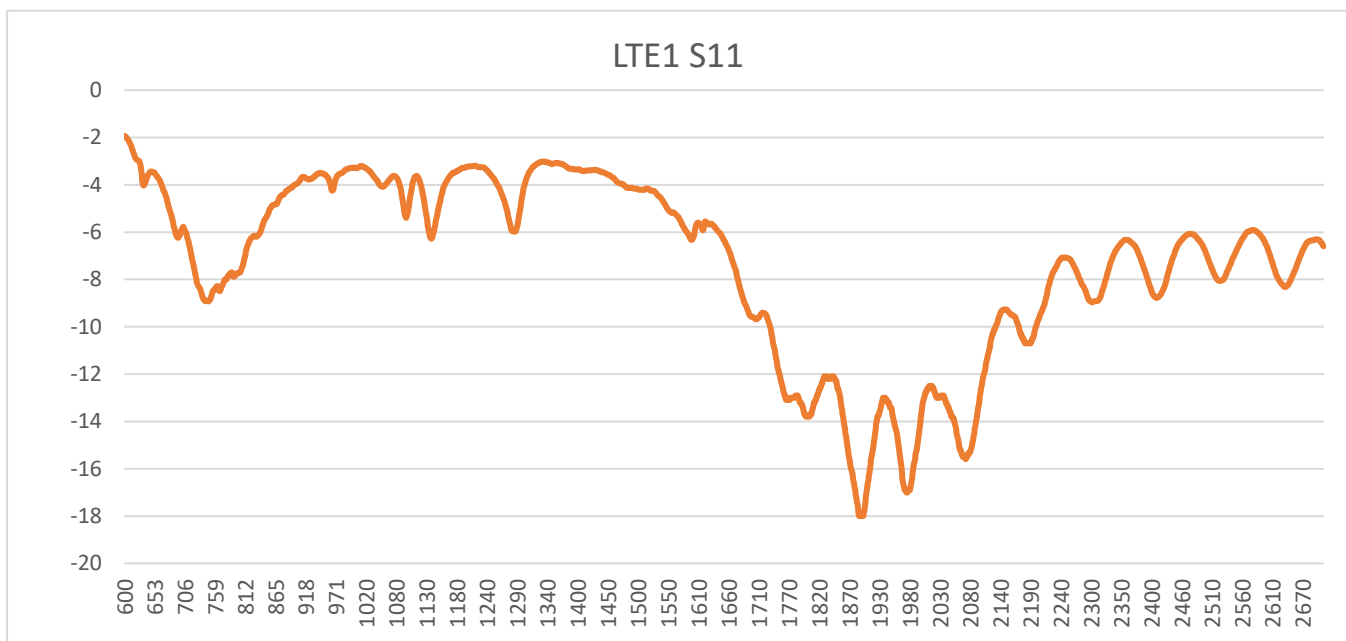


Figure 5. Typical Out-of-band Rejection

3.2 LTE Antenna 30cm*30cm Ground Center

3.2.1 Return Loss (LTE)



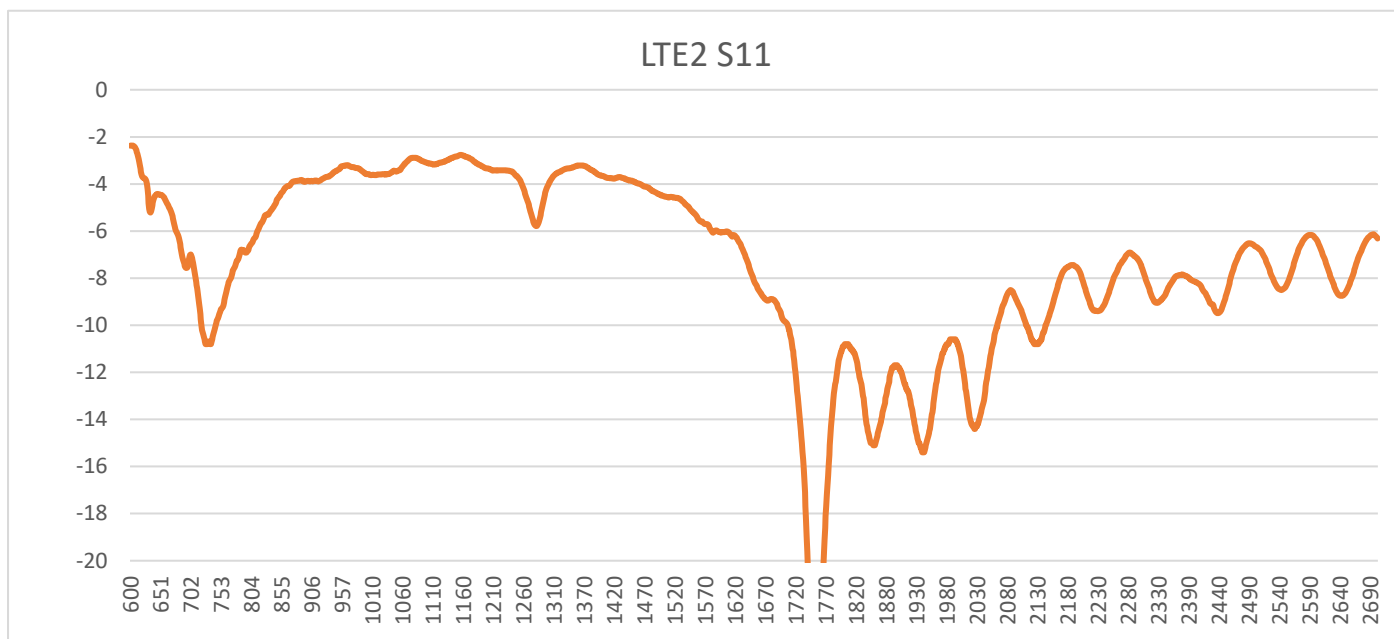
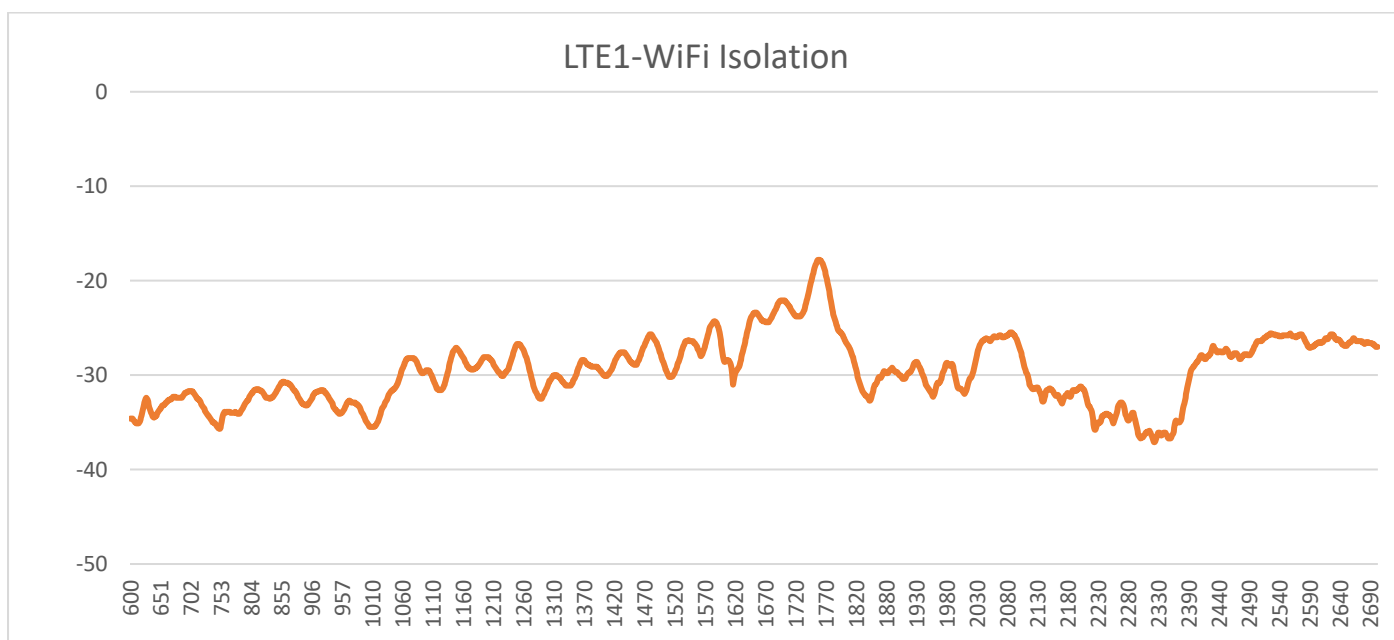


Figure 6. Typical LTE Antenna Return Loss

3.2.2 Isolation



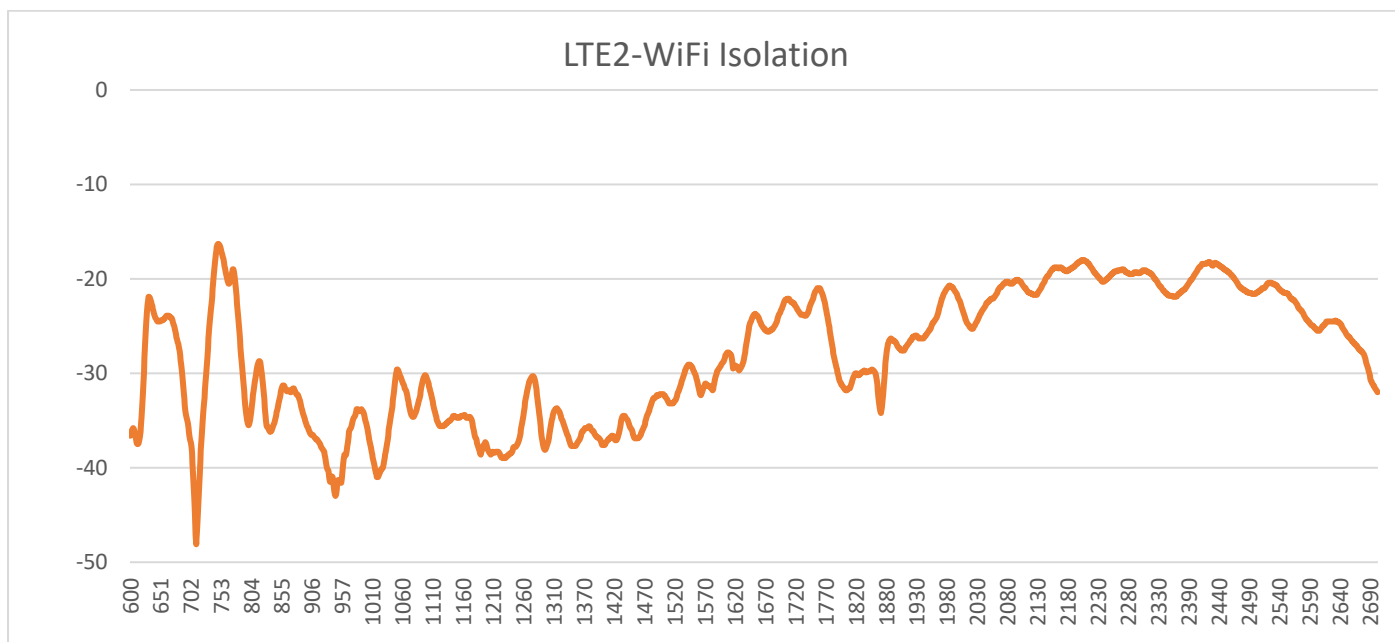


Figure 7. Isolation Between LTE and WIFI Antenna

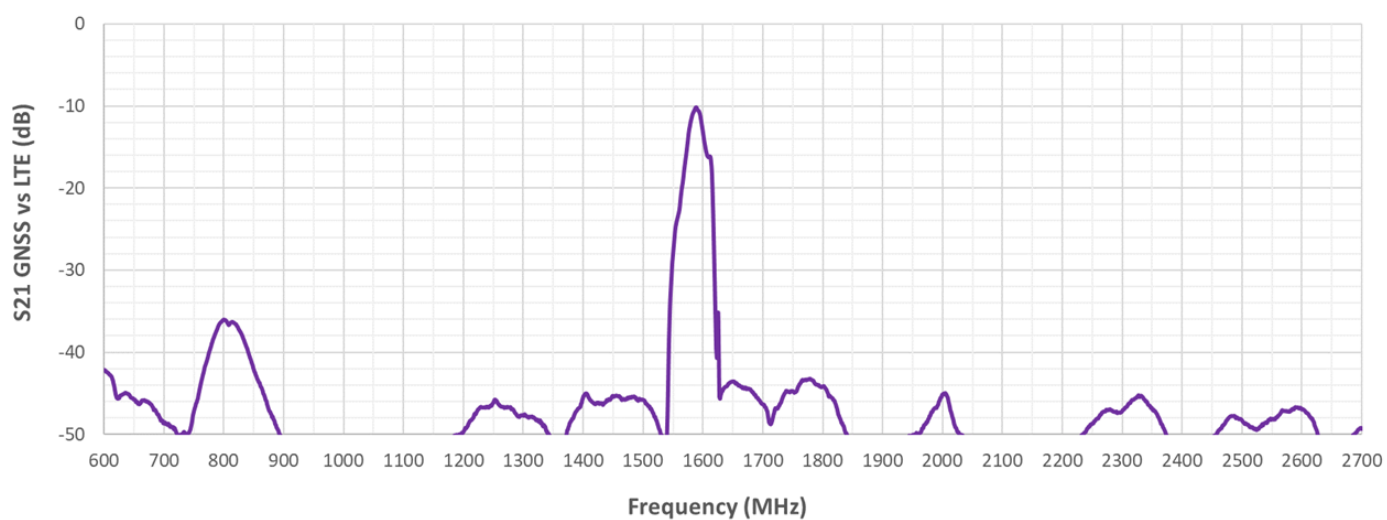


Figure 8. Isolation Between LTE and Passive GNSS Antenna

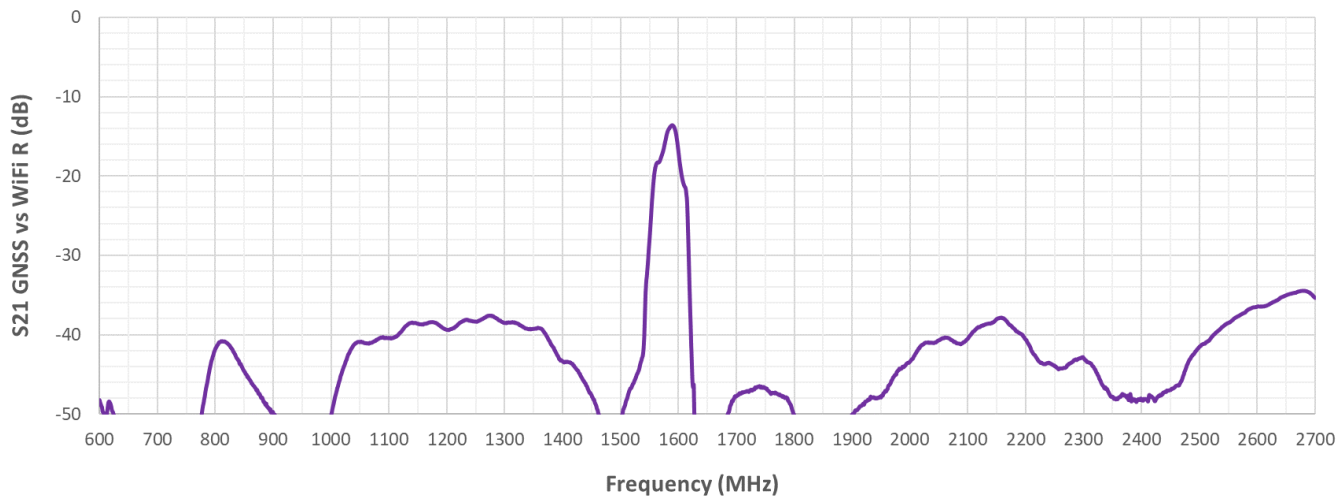
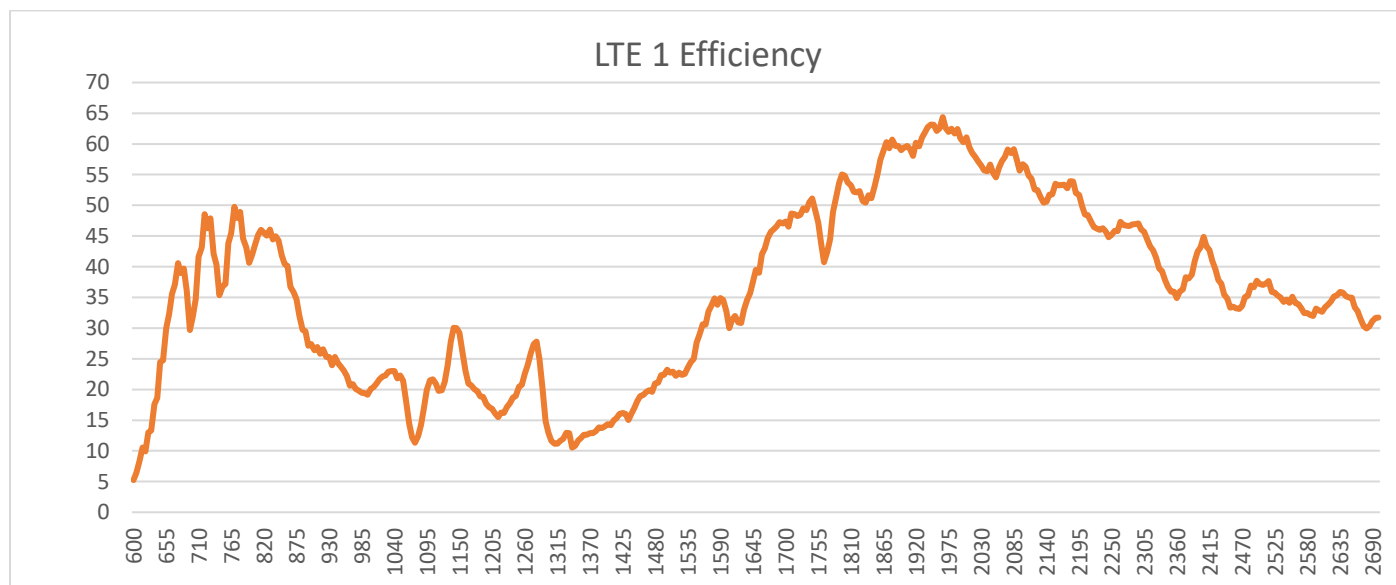


Figure 9. *Isolation Between GNSS and WiFi Antenna*

3.2.3 Efficiency (LTE)



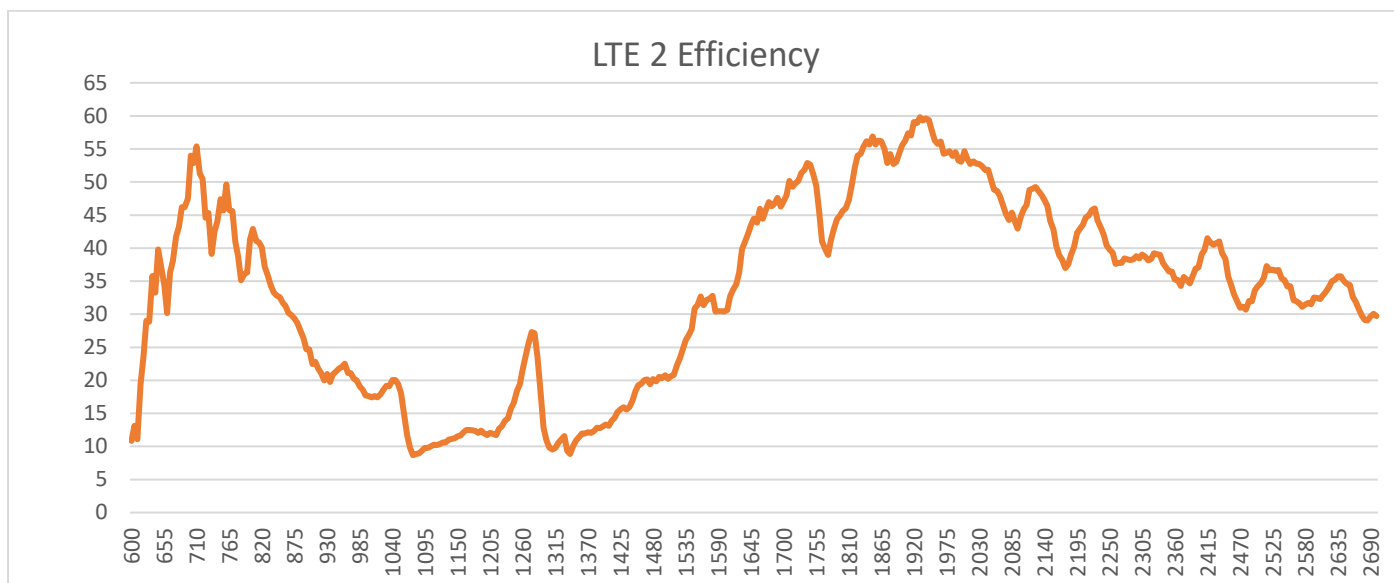
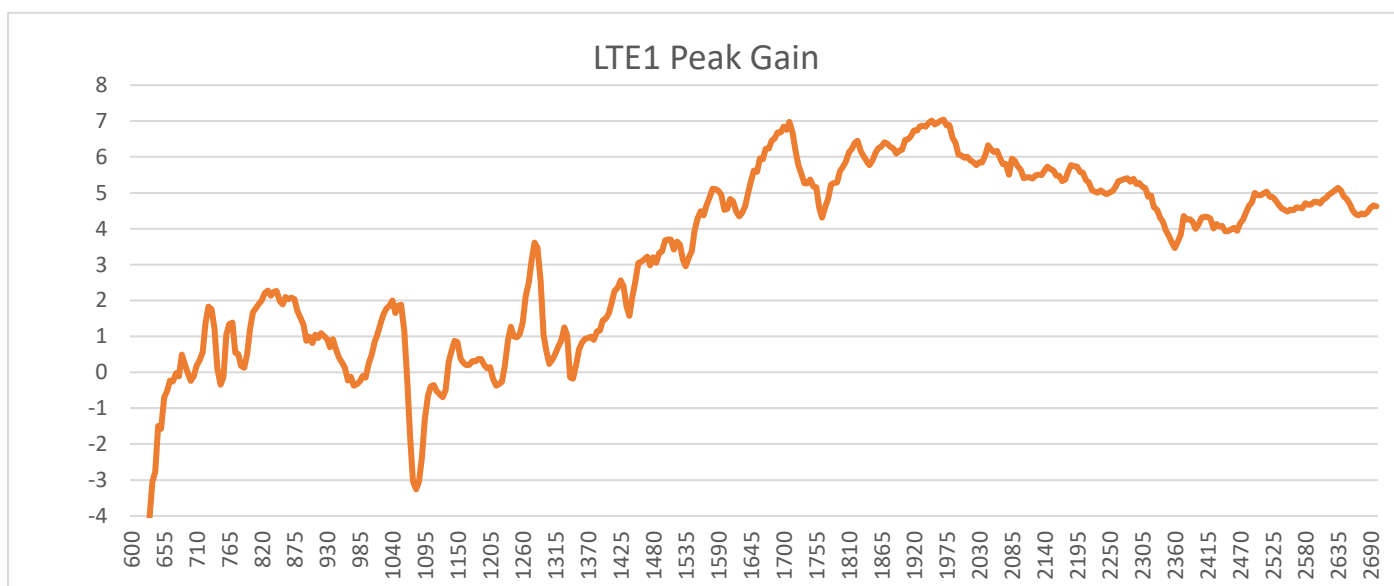


Figure 10. *LTE Antenna Efficiency*

3.2.4 Peak Gain (LTE)



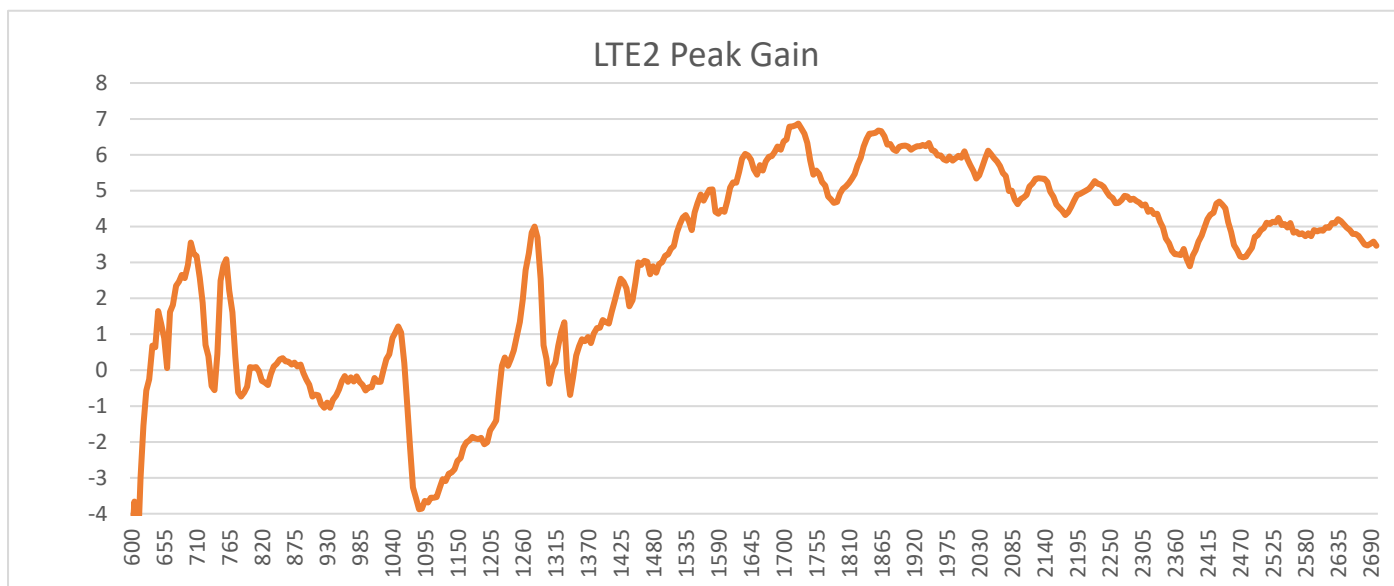


Figure 11. Typical LTE Antenna Peak Gain

3.3 WIFI on 30cm*30cm Ground Center

3.3.1 Return Loss (WiFi)

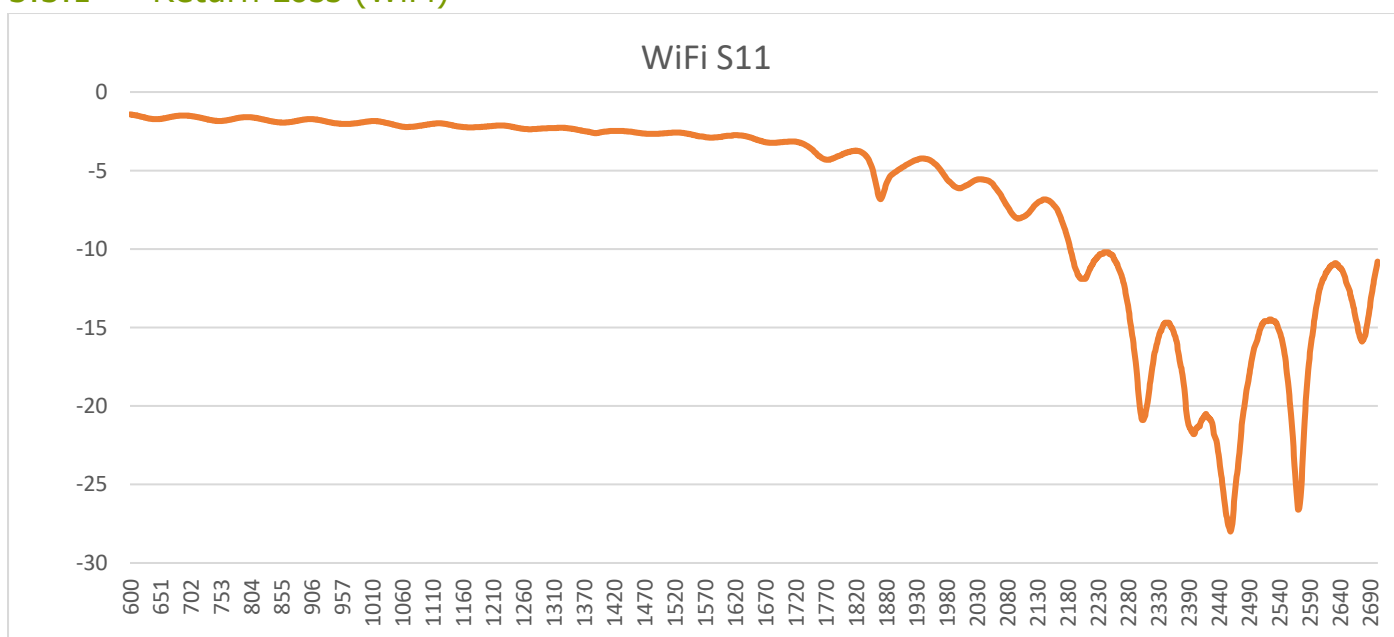


Figure 12. Typical WIFI Antenna Return Loss

3.3.2 Efficiency (WIFI)

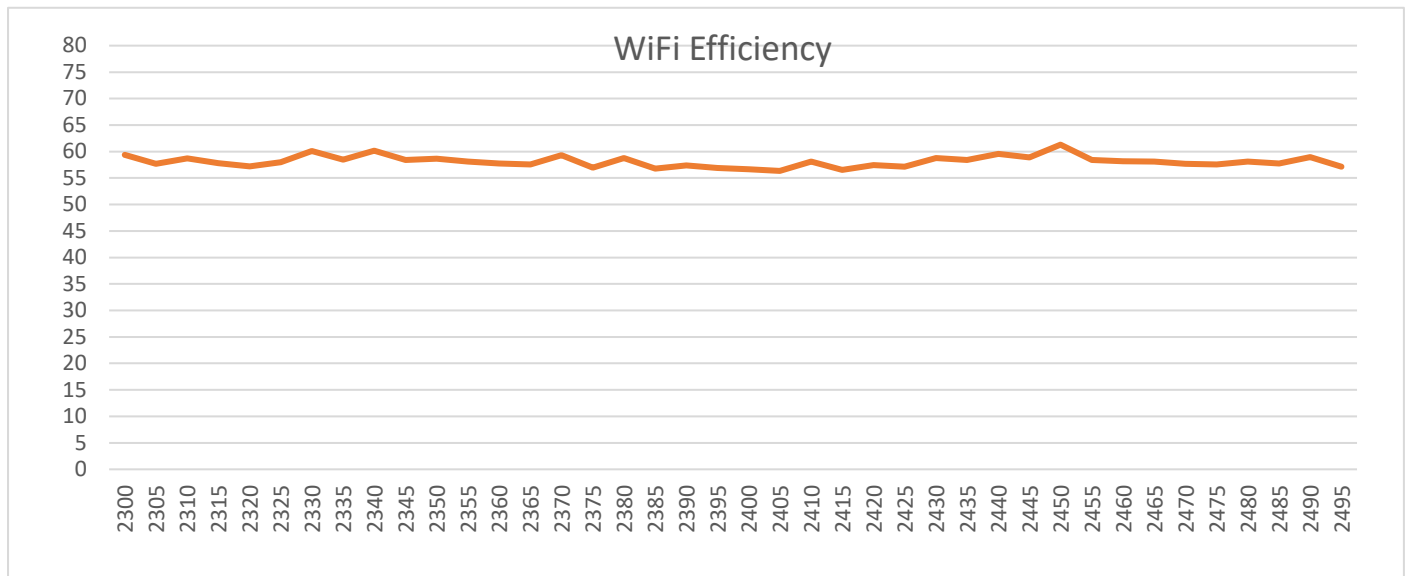


Figure 13. Typical WIFI Antenna Efficiency

4. Reliability Test Summary

4.1 High Temperature Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	0	85	48	1		

4.2 Low Temperature Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	0	-40	48	1		

4.3 Thermal Cycle Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	0	-40 and 85	8	12		

4.4 Humidity and Thermal Cycle Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	95% @ 38C Else 65%	-40 and 85	8	12		

4.5 Thermal Shock Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 1	SGS Taiwan	55 +/- 20%	-40 and 85	2	42		

4.6 Random Vibration

Test Parameters	Test House	Frequency (Hz)	Temperature (°C)	Duration (hours)	Number of Axes	Physical Inspection	Functional Inspection
Sample QTY: 2	Taoglas Taiwan	10 to 2000	23	24 per Axis	3		

4.7 Mechanical Operational Shock Test

Test Parameters	Test House	Wave Type	Peak g Value	Shock Duration	Shock per Axis	Number of Axes	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	Haft Wave	30G	11ms	3	6		

4.8 Combined environmental Test

Test Parameters	Test House	Random Vibration	Humidity (%)	Temperature (°C)	Duration (hours)	Number of Axes	Physical Inspection	Functional Inspection
Sample QTY: 3	SGS Taiwan	10 to 2000 Hz	55 +/- 20%	-40 and 85	24 per Axis	3		

4.9 Drop Test

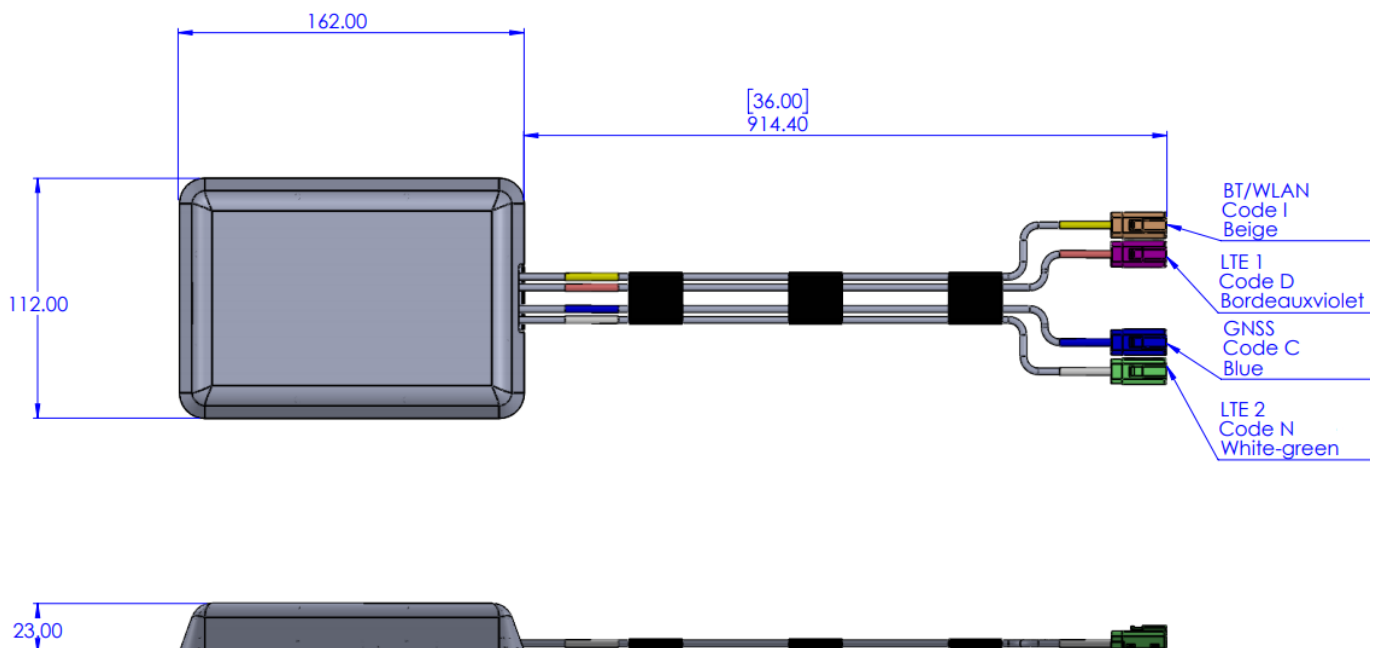
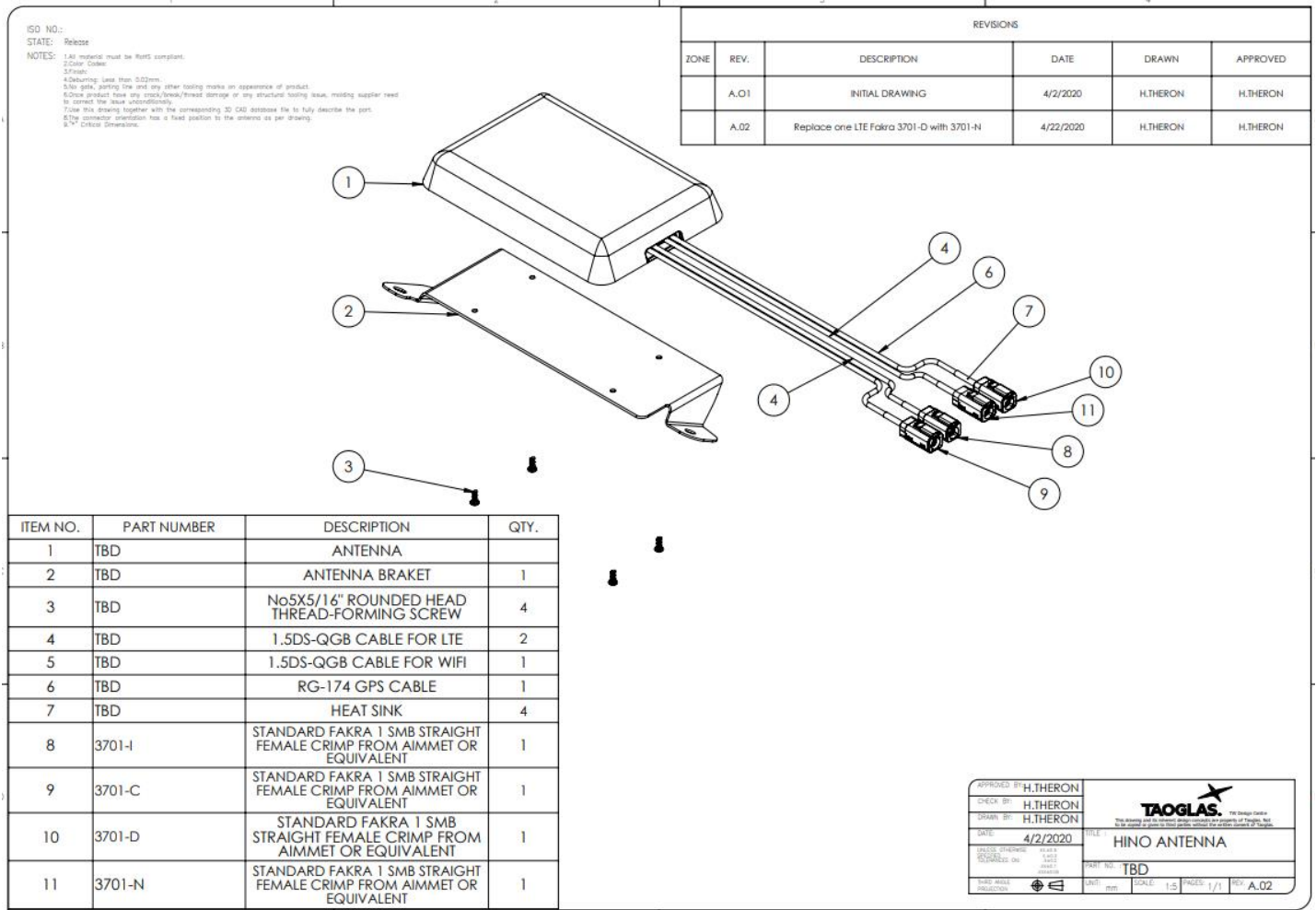
Test Parameters	Test House	Drop Height	Number of Axes	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas	1m	3	N/A	1		

	Taiwan						
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4.10 ESD Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Discharge Type	Discharge Level	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	65 +/- 20%	23	Air and Contact	15KV Air and 8kV contact		

5. Drawings

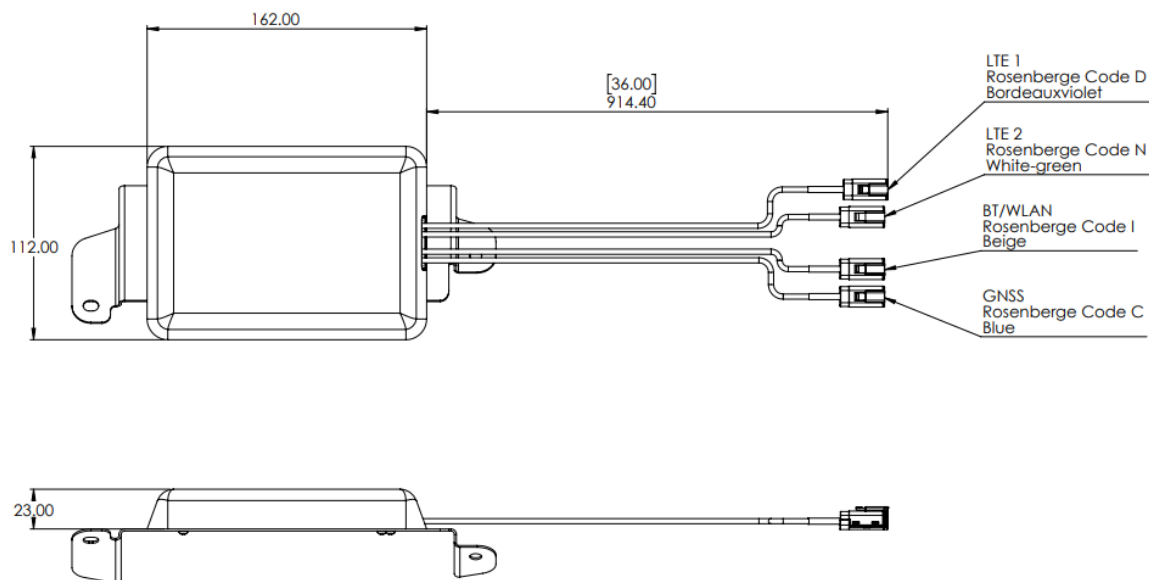


ISO NO.:

STATE: Release

NOTES:

1. All material must be RoHS compliant.
2. Color Codes:
3. Finish:
4. Deburring: Less than 0.02mm.
5. No gate, parting line and any other tooling marks on appearance of product.
6. Once product have any crack/break/thread damage or any structural tooling issue, molding supplier need to correct the issue immediately.
7. Use this drawing together with the corresponding 3D CAD database file to fully describe the part.
8. The connector orientation has a fixed position to the antenna as per drawing.
9. ** Critical Dimensions.



APPROVED BY:		 The Design Center This drawing and its related parts cannot be printed or copied without the written permission of TAOGLAS.	
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