RF Exposure Evaluation Declaration

FCC ID:	2AUBBFL60P-E
Applicant:	China Starwin Science & Technology Co.,Ltd
Application Type:	Certification
Product:	Flat Panel Integrated Satellite Communication Terminal
Model No.:	FL60P-E
Serial Model No.:	FL60P-M, FL60F-M
Brand Name:	StarWin
FCC Classification:	Digital Transmission System (DTS) Licensed Non-Broadcast Station Transmitter (TNB)

Reviewed By: (Jame Yuan)

Approved By: (Robin Wu)

Revision History

Report No.	Version	Description	Issue Date	Note
1907RSU030-U5	Rev. 01	Initial Report	09-10-2019	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	Flat Panel Integrated Satellite Communication Terminal
Model No.	FL60P-E
Serial Model No.	FL60P-M, FL60F-M
Brand Name	StarWin
Wi-Fi Specification	802.11b/g/n
Bluetooth Version	V5.0 (single mode, BLE only)
Satellite Specification	Transmit: 13.75~14.50GHz Receive: 10.95~12.75GHz
GNSS Specification	GPS, GLONASS, BDS
Accessories	
Adapter	Model No.: GST160A24 Input Power: 100 - 240V ~ 50/60Hz, Max. 2.0A Output Power: 24VDC 6.67A, 160W MAX

1.2. Antenna Description

Antenna Type	Frequency Range (MHz)	TX Paths	Max Peak Gain (dBi)
BLE Internal Antenna			
PCB Antenna	2400 ~ 2483.5	1	1.50
2.4G Wi-Fi Internal Antenna			
Dipole Antenna	2400 ~ 2483.5	1	6.00
Satellite Internal Antenna			
Slotted Waveguide Array Antenna	13750 ~ 14500	1	36.22

1.3. Satellite Antenna Gain

Frequency Range (MHz)	Off-axis (degree)	Max Peak Gain (dBi)
13750 ~ 14500	Antenna main beam	36.22
	Out range of +10	3.32
	Out range of -10	3.32

Note: The details of the satellite antenna gain refer to the antenna specification.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational / Control Exposures				
300-1500	--	--	f/300	6
1500-100000	--	--	5	6
(B) Limits for General Population / Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $P_d = (P_{out}*G)/(4*pi*r^2)$

Where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

r = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

Product	Flat Panel Integrated Satellite Communication Terminal
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 1.2 & 1.3.

For antenna main beam:

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at R = 1100 cm (mW/cm^2)	Limit (mW/cm^2)
BLE	2400 ~ 2483.5	0.25	1.75	1.50	0.0000	1
2.4G Wi-Fi	2400 ~ 2483.5	18.37	24.37	273.53	0.0000	1
Satellite	13750 ~ 14500	35.53	71.75	14962356.56	0.9840	1

Conclusion:

BLE, 2.4G Wi-Fi and Satellite can transmit simultaneously.

So the Power Density at R (1100 cm) = 0.0000mW/cm^2 + 0.0000mW/cm^2 + 0.9840mW/cm^2= 0.9840mW/cm^2 < 1mW/cm^2.

Therefore, the Safety Distance is **1100** cm (for antenna main beam).

For out range of ±10 degrees off-axis:

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at R = 26 cm (mW/cm^2)	Limit (mW/cm^2)
BLE	2400 ~ 2483.5	0.25	1.75	1.50	0.0002	1
2.4G Wi-Fi	2400 ~ 2483.5	18.37	24.37	273.53	0.0322	1
Satellite	13750 ~ 14500	35.53	38.85	7673.61	0.9033	1

Conclusion:

BLE, 2.4G Wi-Fi and Satellite can transmit simultaneously.

So the Power Density at R (20 cm) = 0.0002mW/cm^2 + 0.0322mW/cm^2 + 0.9033mW/cm^2= 0.9357mW/cm^2 < 1mW/cm^2.

Therefore, the Safety Distance is **26** cm (for out range of ±10 degrees off-axis).

The End

Appendix A - Test Setup Photograph

Refer to “1907RSU030-UT” file.

Appendix B - EUT Photograph

Refer to “1907RSU030-UE” file.