

RF Exposure Evaluation Declaration

FCC ID: YLFSE2200

Applicant: 7Signal Solutions, Inc

Application Type: Certification

Product: 7Signal Sapphire Eye

Model No.: 2200

Brand Name: 7Signal

FCC Classification: Digital Transmission System (DTS)

Unlicensed National Information Infrastructure (NII)

Reviewed By:

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The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date	Note
1811RSU031-U5	Rev. 01	Initial report	01-04-2019	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	7Signal Sapphire Eye
Model No.	2200
Brand Name:	7Signal
Wi-Fi Module 1# Specification:	802.11a/n/ac (Only NII band)
Wi-Fi Module 2# Specification:	802.11b/g/n (Only DTS band)
Power Type:	POE input or AC adapter input
Components	
Adapter	MODEL: YHY-12002500 INPUT: 100 - 240V ~ 50/60Hz 1.0A Max. OUTPUT: DC 12.0V 2.5A

1.2. Antenna Description

Antenna Type	Frequency Band (GHz)	TX Paths	Max Antenna Gain (dBi)	Directional Gain (dBi)
PCB Antenna	2.4	4	6.0	6.0
	5	4	7.0	7.0

Note: The device doesn't support beam-forming technology and Cyclic Delay Diversity (CDD) technology, and the transmit signals are uncorrelated, so directional gain = G_{ANT} .

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
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f = Frequency in MHz

Calculation Formula: $Pd = (Pout * G) / (4 * \pi * r^2)$

Where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

Pd is the limit of MPE, 1mW/cm². 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	7Signal Sapphire Eye
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 1.2.

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)
802.11b/g/n	2412 ~ 2462	25.69	6.0	31.69
802.11a/n/ac	5180 ~ 5240	18.60	7.0	32.29
	5745 ~ 5825	25.29		

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
802.11b/g/n	2412 ~ 2462	31.69	0.2936	1
802.11a/n/ac	5180 ~ 5240 5745 ~ 5825	32.29	0.3371	1

Conclusion:

WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously.

So the max Power Density at R (20 cm) = $0.2936\text{mW/cm}^2 + 0.3371\text{mW/cm}^2 = 0.631\text{mW/cm}^2 < 1\text{mW/cm}^2$.

Therefore, the Min Safety Distance is 20cm.

The End

Appendix A - Test Setup Photograph

Refer to "1811RSU031-UT" file.

Appendix B - EUT Photograph

Refer to "1811RSU031-UE" file.