

RF Exposure Evaluation Declaration

FCC ID: 2AAC2-WL01

Applicant: Icomera AB

Application Type: Certification

Product: Icomera TraXside solution

Model No.: WL01

Brand Name: Icomera

FCC Classification: Unlicensed National Information Infrastructure (UNII)

Reviewed By:

Jame Yuan

(Jame Yuan)

Approved By:

Robin Wu

(Robin Wu)



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
1906RSU020-U2	Rev. 01	Initial Report	08-15-2019	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	Icomera TraXside solution
Model No.	WL01
Brand Name	Icomera
Operating Temperature	-20 ~ 70 °C
Power Type	POE input (Power range: 37 ~ 57 Vdc)

Note1: Configuration for FCC Certification (Type 02): Host board (BBD 0009) and 2 * 5GHz Wi-Fi Modules, M/N: TR-1X. Wi-Fi Module 1 operating in UNII Band 1, Wi-Fi Module 2 operating in UNII Band 3.

1.2. Antenna Description

Antenna No.	Antenna Type	Frequency Band (GHz)	T _x Paths	Max Antenna Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
Antenna Configuration 1# (1 * Ant 1 + 1 * Ant 2)						
1	Patch Array	5	2	23	23	26.01
2	Patch Array	5	1	23		
Antenna Configuration 2# (3 * Ant 3)						
3	Monopole	5	1	12	12	15.01

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 2$, $N_{SS} = 1$.

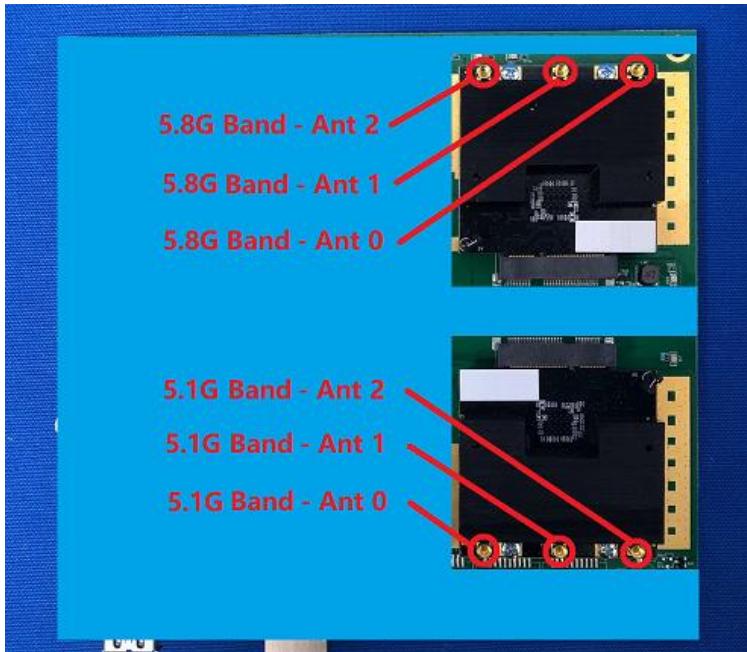
If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
 $\text{Array Gain} = 10 \log (N_{ANT}/ N_{SS}) \text{ dB} = 3.01$;
- For power measurements on IEEE 802.11 devices,
 $\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4$;

2. The EUT doesn't support Beam-forming technology.
3. Ant 1 has Cross-Polarized design, see the antenna specification for further details.
4. Both antenna configurations had been accessed in this report.

1.3. Description of Antenna RF Port

Antenna RF Port						
Software Control Port	NII-1 RF Port			NII-3 RF Port		
	Ant 0	Ant 1	Ant 2	Ant 0	Ant 1	Ant 2



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/cm²

P_{out} = 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

P_d 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	Icomera TraXside solution					
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)	Power Density at R = 130 cm (mW/cm ²)	Limit (mW/cm ²)
802.11a/n/ac	5180 ~ 5240	26.68	23	49.68	0.4374	1
802.11a/n/ac	5745 ~ 5825	27.50	23	50.50	0.5283	1

Conclusion:

WLAN 5GHz NII-1 and NII-3 can transmit simultaneously.

So the max Power Density at R (130 cm) = $0.4374\text{mW/cm}^2 + 0.5283\text{mW/cm}^2 = 0.9657\text{mW/cm}^2 < 1\text{mW/cm}^2$.

Therefore, the Min Safety Distance is 130cm.

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Power Density at R = 37 cm (mW/cm ²)	Limit (mW/cm ²)
802.11a/n/ac	5180 ~ 5240	26.68	12	38.68	0.4289	1
802.11a/n/ac	5745 ~ 5825	27.50	12	39.50	0.5181	1

Conclusion:

WLAN 5GHz NII-1 and NII-3 can transmit simultaneously.

So the max Power Density at R (37 cm) = $0.4289\text{mW/cm}^2 + 0.5181\text{mW/cm}^2 = 0.9470\text{mW/cm}^2 < 1\text{mW/cm}^2$.

Therefore, the Min Safety Distance is 37cm.

The End

Appendix A - EUT Photograph

Refer to "1906RSU020-UE" file.