

RF EXPOSURE EVALUATION

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)

FCC ID: 2AWFF-J2004

EUT Specification

EUT	iSurpass Smart Gateway
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.24GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☒ Others: 2.402GHz~2.480GHz (BLE) & 908.4MHz, 908.42MHz, 916MHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others ____
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm ²) ☒ General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	WiFi 2.4GHz : 14.14dBm (0.0259W) BLE: 2.975dBm (0.0020W)
Antenna gain (Max)	WiFi & BLE: 1 dBi 908.4MHz, 908.42MHz, 916MHz: 5.14 dBi
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation

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
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission 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 the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Measurement Result

2.4GHz WiFi & BT:

Operating Mode	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits (mW/cm ²)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
802.11b	2412	13.87	13.87±1	14.87	1	0.0077	1
	2437	13.93	13.93±1	14.93	1	0.0078	1
	2462	13.21	13.21±1	14.21	1	0.0066	1
802.11g	2412	13.83	13.83±1	14.83	1	0.0076	1
	2437	14.14	13.83±1	15.14	1	0.0082	1
	2462	13.00	13.00±1	14	1	0.0063	1
802.11n (HT20)	2412	13.81	13.81±1	14.81	1	0.0076	1
	2437	13.89	13.89±1	14.89	1	0.0077	1
	2462	13.01	13.01±1	14.01	1	0.0063	1
BLE	2402	0.917	0.917±1	1.917	1	0.0004	1
	2440	2.212	2.212±1	3.212	1	0.0005	1
	2480	2.975	2.975±1	3.975	1	0.0006	1

Note:

2.4G WiFi+BLE simultaneous (worst case):

0.0082+0.0006=0.0088 < 1