RF EXPOSURE EVALUATION

EUT Specification

EUT	Noke Gateway
Model Number	Noke Gateway 100
FCC ID	2AFRJ-100
Antenna gain (Max)	WIFI/BT:5dBi, BLE:1.1dBi
Operation Frequency	WLAN: 2.412GHz ~ 2.462GHz BR+EDR: 2402-2480MHz BLE: 2402-2480MHz
Input Rating	POE 36-57VDC, 2A
Max. output power	WIFI: 802.11b: 15.94dBm 802.11g: 14.74dBm 802.11n(HT20): 15.15dBm 802.11n(HT40): 12.51dBm BR+EDR: 3.09dBm(0.002037W) BLE: 4.42dBm(0.0028W)

Test Requirement:

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
(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**

11.1 Friis transmission formula: Pd= (Pout*G)\ (4*pi*R^2)

Where

Pd= Power density in mW/cm^2

Pout=output power to antenna in mW

G= Numeric gain of the antenna relative to isotropic antenna

Pi=3.1416

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

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

11.2 Measurement Result

WIFI:

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm2)	Power density Limits (mW/ cm2)
802.11b	1	15±1	16	39.811	5	3.162	0.025045	1
	6	16±1	17	50.119	5	3.162	0.031530	1
	11	16±1	17	50.119	5	3.162	0.031530	1
802.11g	1	14±1	15	31.623	5	3.162	0.019894	1
	6	15±1	16	39.811	5	3.162	0.025045	1
	11	15±1	16	39.811	5	3.162	0.025045	1
802.11n(HT20)	1	15±1	16	39.811	5	3.162	0.025045	1
	6	15±1	16	39.811	5	3.162	0.025045	1
	11	15±1	16	39.811	5	3.162	0.025045	1
802.11n(HT40)	3	12±1	13	19.953	5	3.162	0.012552	1
	6	12±1	13	19.953	5	3.162	0.012552	1
	9	12±1	13	19.953	5	3.162	0.012552	1

BR+EDR:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
GFSK	2402	1.17	1±1	2	3.162	0.000997	1
GFSK	2441	2.72	3±1	4	3.162	0.001580	1
GFSK	2480	3.09	3±1	4	3.162	0.001580	1
π /4-DQPSK	2402	-2.1	-2±1	-1	3.162	0.000500	1
π /4-DQPSK	2441	1.16	1±1	2	3.162	0.000997	1
π /4-DQPSK	2480	1.26	1±1	2	3.162	0.000997	1
8DPSK	2402	-1.33	-1±1	0	3.162	0.000629	1
8DPSK	2441	0.78	1±1	2	3.162	0.000997	1
8DPSK	2480	1.28	1±1	2	3.162	0.000997	1

BLE :

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
GFSK	2402	-1.91	-2±1	-1	1.288	0.000204	1
GFSK	2440	4.42	4±1	5	1.288	0.000810	1
GFSK	2480	4.24	4±1	5	1.288	0.000810	1

Signature:

Alan He
Date: 2021-04-30