RF Exposure Evaluation

FCC ID: 2ANTYB0008, IC: 26025-B0008

FCC RF exposure requirement:

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f^2	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f^2	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

Friss Formula

Friss 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=gain of antenna in linear scale

Pi=3.1416

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

Pd id the limit of MPE, 1 mW/ 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.

EUT Operation condition

EUT was enable to transmit and receive at lowest, middle and highest channels.

Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual.

Measurement data

802.11b

Test channel	Output power (dBm)	Tune up tolerance(dBm)	Maximum tune-up power(dBm)
2412MHz	14.64	14±1	15
2437MHz	14.32	14±1	15
2462MHz	14.34	14±1	15

802.11g

Test channel	Output power (dBm)	Tune up tolerance(dBm)	Maximum tune-up power(dBm)
2412MHz	14.18	14±1	15
2437MHz	14.22	14±1	15
2462MHz	13.87	14±1	15

802.11n

Test channel	Output power (dBm)	Tune up tolerance(dBm)	Maximum tune-up power(dBm)
2412MHz	13.33	13±1	14
2437MHz	12.79	13±1	14
2462MHz	12.45	12±1	13

Antenna is 1.5dBi, gain of antenna in linear scale is 1.41, the maximum power is 15dBm, 31.62mW,

So $Pd=(31.62*1.41)/(4*3.1416*20^2)=0.009<1$, it compliance the MPE requirement.

IC RF exposure requirement:

According to 2.5.2 of RSS-102:

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where ƒ is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where ƒ is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Measurement data

802.11b

Test channel	e.r.i.p (dBm)	Tune up tolerance(dBm)	Maximum tune-up power(dBm)
2412MHz	16.14	16±1	17
2437MHz	15.82	15.5±1	16.5
2462MHz	15.84	15.5±1	16.5

802.11g

Test channel	e.r.i.p (dBm)	Tune up tolerance(dBm)	Maximum tune-up power(dBm)
2412MHz	15.68	15.5±1	16.5
2437MHz	15.72	15.5±1	16.5
2462MHz	15.37	15.5±1	16.5

802.11n

Test channel	e.r.i.p (dBm)	Tune up tolerance(dBm)	Maximum tune-up power(dBm)
2412MHz	14.83	14.5±1	15.5
2437MHz	14.29	14±1	15
2462MHz	13.95	14±1	15

The maximum e.i.r.p. of the device is 17dBm, 0.05012W,

According to at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10-2 ƒ0.6834 W (adjusted for tune-up tolerance), where ƒ is in MHz; The limit is $1.31 \times 10^{-2} \times 2412^{0.6834}$ W, 2.684W.

0.05012W<2.684W, so it compliance the RF exposure requirement.