

RF EXPOSURE EVALUATION

EUT Specification

EUT	LED Ceiling Light
Model Number	348-2129
FCC ID	2APP3-348-2129
Antenna Gain	2.2dBi
Operation Frequency	BLE: 2402 MHz to 2480 MHz WIFI: 2412 MHz to 2462 MHz
Modulation	BLE: GFSK 802.11b: DSSS(DBPSK/DQPSK/CCK) 802.11g/n: OFDM(BPSK/QPSK/16QAM/64QAM)
Power Supply	AC120V/60Hz
Max. output power	BLE: 3.47dBm IEEE 802.11b: 16.23 dBm IEEE 802.11g: 14.54 dBm IEEE 802.11n-HT20: 14.29 dBm IEEE 802.11n-HT40: 12.91 dBm

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

Friis transmission formula: $P_d = \frac{P_{out} \cdot G}{4 \cdot \pi \cdot R^2}$

Where

P_d = Power density in mW/cm^2

P_{out} = 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 = 20cm

P_d the limit of MPE, $1\text{mW}/\text{cm}^2$. 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

Antenna gain: 2.2dBi

BLE:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain (Numeric)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
GFSK	2402	2.48	2±1	3	1.66	0.000659	1
GFSK	2440	3.35	3±1	4	1.66	0.000830	1
GFSK	2480	3.47	3±1	4	1.66	0.000830	1

WIFI:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain (Numeric)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	2412	15.61	16±1	17	1.66	0.016551	1
	2437	16.23	16±1	17	1.66	0.016551	1
	2462	16.14	16±1	17	1.66	0.016551	1
802.11g	2412	13.63	14±1	15	1.66	0.010443	1
	2437	14.48	14±1	15	1.66	0.010443	1
	2462	14.54	15±1	16	1.66	0.013147	1
802.11n HT20	2412	13.51	13±1	14	1.66	0.008295	1
	2437	14.27	14±1	15	1.66	0.010443	1
	2462	14.29	14±1	15	1.66	0.010443	1
802.11n HT40	2422	12.8	13±1	14	1.66	0.008295	1
	2437	12.91	13±1	14	1.66	0.008295	1
	2452	12.87	13±1	14	1.66	0.008295	1

Signature:


 Shawn Wen
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