

FCC ID : 2AMEH-ECC

1. 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).

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 = Numeric gain of the antenna relative to isotropic antenna.

π = 3.1416.

R = distance between observation point and center of the radiator in 20cm.

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

2. EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product	Energy Control Center
Model Number	ECC
IEEE 802.11 WLAN Mode Supported	802.11b 802.11g 802.11n(20MHz channel bandwidth) 802.11n(40MHz channel bandwidth)
Modulation	DSSS with DBPSK/DQPSK/CCK for 802.11b OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n
Operating Frequency Range	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
Number of Channels	11 channels for 802.11b/g/n(HT20) 7 Channels for 802.11n(HT40)
Antenna Type	External Antenna
Antenna Gain	2.23dBi
Operation Band:	LTE Cat M1: B2/B4/B5/B12/B13/B25/B26/B66/B85
Modulation:	QPSK, 16QAM
Operating Frequency Range(s):	LTE Cat M1 B2: Tx: 1850~1910MHz/ Rx: 1930~1990MHz LTE Cat M1 B4: Tx: 1710~1755MHz/ Rx: 2110~2155MHz LTE Cat M1 B5: Tx: 824~849MHz/ Rx: 869~894MHz LTE Cat M1 B12: Tx: 699~716MHz/ Rx: 729~746MHz LTE Cat M1 B13: Tx: 777~787MHz/ Rx: 746~756MHz LTE Cat M1 B25: Tx: 1850~1915MHz/ Rx: 1930~1995MHz LTE Cat M1 B26: Tx: 814~824MHz/ Rx: 859~869MHz LTE Cat M1 B26: Tx: 824~849MHz/ Rx: 869~894MHz LTE Cat M1 B66: Tx: 1710~1780MHz/ Rx: 2110~2200MHz LTE Cat M1 B85: Tx: 698~716MHz/ Rx: 728~746MHz
Antenna Type:	External Antenna
Antenna Gain:	LTE Cat M1 B2: 2dBi LTE Cat M1 B4: -0.74dBi LTE Cat M1 B5: 1.1dBi LTE Cat M1 B12: -0.43dBi LTE Cat M1 B13: 0.8dBi LTE Cat M1 B25: 2dBi LTE Cat M1 B26: 1.1dBi LTE Cat M1 B66: -0.33dBi LTE Cat M1 B85: -0.43dBi

Power Supply:	AC 120V/60Hz by Adapter Adapter: Model: DCT30W120200ZZ-A0 Input: 100-240V~50/60Hz, 0.8A Max Output: 12V, 2A, 24W
Temperature Extreme Range:	0°C ~ 40°C

3. Measurement Result

Mode	Frequency (MHz)	Max Power (dBm)	Antenna gain (dBi)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
2.4G WIFI	2412	15.00	2.23	1.67	20	0.011	1.0000
LTE Cat M1 B2	1860	22.37	2.00	1.58	20	0.054	1.0000
LTE Cat M1 B4	1720	19.77	-0.74	0.84	20	0.016	1.0000
LTE Cat M1 B5	829	21.72	1.10	1.29	20	0.038	0.5527
LTE Cat M1 B12	699.7	20.02	-0.43	0.91	20	0.018	0.4665
LTE Cat M1 B13	779.5	21.31	0.80	1.20	20	0.032	0.5197
LTE Cat M1 B25	1850.7	22.46	2.00	1.58	20	0.056	1.0000
LTE Cat M1 B26	814.7	21.61	1.10	1.29	20	0.037	0.5431
LTE Cat M1 B66	1720	19.85	-0.33	0.93	20	0.018	1.0000
LTE Cat M1 B85	703	20.88	-0.43	0.91	20	0.022	0.4687

Note: All the modes are tested, only the worst data are described in the table.

Conclusion of simultaneous transmitter:

Both of the module 1 and module 2 can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1/LPD1+CPD2/LPD2+.....etc. < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore the worst-case situation is $0.056 / 1 + 0.011 / 1 = 0.067$, which is less than 1, this confirmed that the device comply with FCC 1.1310 MPE limit.

----- The End -----