

FCC ID : 2AMVP-VCB5106L6WB

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/cm²)	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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

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 and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2. EUT TECHNICAL DESCRIPTION

Product	LTE/Wi-Fi Dongle
Model Number	VCB-5106L6-WB
Power Supply:	Input Votage: 5V-12V DC Test Votage: 5V DC
Temperature Range:	-40°C~80°C

Bluetooth Version:	V4.2
Data Rate:	1Mbps for GFSK modulation 2Mbps for pi/4-DQPSK modulation 3Mbps for 8DPSK modulation
Modulation:	GFSK, pi/4-DQPSK, 8DPSK
Operating Frequency Range:	2402-2480MHz
Number of Channels:	79 channels

BLE Version:	V4.2
Device Type:	Bluetooth with BLE mode
Data Rate :	1Mbps
Modulation:	GFSK
Operating Frequency Range:	2402-2480MHz
Number of Channels:	40 Channels

IEEE 802.11 WLAN Mode Supported:	802.11b 802.11g 802.11n(20MHz channel bandwidth) 802.11n(40MHz channel bandwidth)
Modulation:	DSSS, OFDM
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)

Operation Band:	LTE Cat M1 B2/B4/B5/B12/B13/B25/B26/B66/B85
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Modulation:	QPSK, 16QAM
Operating Frequency Range(s):	LTE Band 2: Tx: 1850~1910MHz/ Rx:1930~1990MHz LTE Band 4: Tx: 1710~1755MHz/ Rx:2110~2155MHz LTE Band 5: Tx: 824~849MHz/ Rx:869~894MHz LTE Band 12: Tx: 699~716 MHz/ Rx:729~746 MHz LTE Band 13: Tx: 777~787 MHz/ Rx:746~756MHz LTE Band 25: Tx: 1850~1915MHz/ Rx:1930~1995MHz LTE Band 26: Tx: 814~849MHz/ Rx:859~894MHz LTE Band 66: Tx: 1710~1780MHz/ Rx: 2110~2200MHz LTE Band 85: Tx: 698~716MHz/ Rx: 728~746MHz

3. Measurement Result

Mode	Frequency (MHz)	Conducted Power (dBm)	Tune Up Max Power (dBm)	Antenna Gain (dBi)	Antenna Gain Numeric	R (cm)	Evaluation Result (mW/cm ²)	Power Density Limits (mW/cm ²)
BT	2402	8.02	9	2.35	1.72	20	0.003	1.0000
BLE	2402	8.47	9	2.35	1.72	20	0.003	1.0000
2.4G WIFI	2412	15.73	16	2.35	1.72	20	0.014	1.0000
LTE Cat M1 Band 2	1860	20.89	21	3.83	2.42	20	0.060	1.0000
LTE Cat M1 Band 4	1720	20.79	21	3.71	2.35	20	0.059	1.0000
LTE Cat M1 Band 5	829	20.65	21	2.94	1.97	20	0.049	0.5527
LTE Cat M1 Band 12	699.7	20.42	21	3.81	2.40	20	0.060	0.4665
LTE Cat M1 Band 13	779.5	20.47	21	3.44	2.21	20	0.055	0.5197
LTE Cat M1 Band 25	1850.7	20.39	21	3.83	2.42	20	0.060	1.0000
LTE Cat M1 Band 26	814.7	20.49	21	2.94	1.97	20	0.049	0.5431
LTE Cat M1 Band 66	1720	20.03	21	3.71	2.35	20	0.059	1.0000
LTE Cat M1 Band 85	703	21.26	22	3.81	2.40	20	0.076	0.4687

NOTE:

(1) All the modes are tested, only the worst data are described in the table.

(2) LTE Cat M1 all power refer to original module's test report No.: R1907A0450-R1V2, R1907A0450-R2V2, R1907A0450-R3V3, R1907A0450-R4V2, R1907A0450-R5V2.

Conclusion of simultaneous transmitter:

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

$CPD1/LPD1 + CPD2/LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

Therefore the worst-case situation is $0.014/1 + 0.076/0.4687 = 0.176$, which is less than 1, this confirmed that the device comply with FCC 1.1310 MPE limit.

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