



Maximum Permissible Exposure Evaluation

FCC ID: 2BEWX-UX18

1. Client Information

Applicant	:	Zhejiang Lingzhu Technology Co., Ltd.
Address	:	Room 302, No 1 Building Huace Center, Xihu District, Hangzhou, China 310000
Manufacturer	:	Zhejiang Lingzhu Technology Co., Ltd.
Address	:	Room 302, No 1 Building Huace Center, Xihu District, Hangzhou, China 310000

2. General Description of EUT

EUT Name	:	Multimode Engineering Gateway
Models No.	:	UX18
Model Difference	:	----
Sample ID	:	HC-C-202411-0044-02-02-1#&HC-C-202411-0044-02-02-2#
Product Description	:	Operation Frequency: ZigBee: 2405MHz~2480MHz Bluetooth LE 5.0: 2402MHz~2480MHz 802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz
Power Rating	:	Adapter(GFDQ3L-0502000U) INPUT: 100-240V~50/60Hz 0.3A Max OUTPUT: 5V/2A
Software Version	:	3.0.29
Hardware Version	:	V03
Connecting I/O Port(S)	:	Please refer to the User's Manual
Remark	:	the MPE report used the EUT-2(HC-C-202411-0044-02-02-2#).

MPE Calculations

1. Antenna Gain:

Antenna	Brand	Model Name	Type	Antenna Gain(dBi)
ZigBee	N/A	N/A	Dipole	3.14
Bluetooth	N/A	N/A	Dipole	3.14
2.4G WIFI	N/A	N/A	Dipole	3.14

Antenna	Brand	Model Name	Type	Antenna Gain(dBi)
2.4G WIFI	N/A	N/A	Suction Cup	3.4

2. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3. Exposure Evaluation:

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=(PG)/4\pi R^2$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna

4. Simultaneous transmission MPE Considerations

According to KDB447498: All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

This means that:

\sum of MPE ratios ≤ 1.0



5. Standalone MPE Evaluation:

ZigBee Worst Maximum MPE Result							
Mode	N _{TX}	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/cm ²) [S]
O-QPSK	1	6.84	6±1	7	3.14	20	0.00205
Note: N _{TX} = Number of Transmit Antennas RF Output power specifies that Maximum Conducted Peak Output Power.							

Bluetooth Worst Maximum MPE Result							
Mode	N _{TX}	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/cm ²) [S]
GFSK	1	6.22	6±1	7	3.14	20	0.00205
Note: N _{TX} = Number of Transmit Antennas RF Output power specifies that Maximum Conducted Peak Output Power.							

2.4G WIFI Worst Maximum MPE Result Ant.1							
Mode	N _{TX}	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/cm ²) [S]
802.11b	1	18.18	18±1	19	3.14	20	0.03256
802.11g	1	16.31	16±1	17	3.14	20	0.02055
802.11n20	1	14.13	14±1	15	3.14	20	0.01296
802.11n40	1	14.27	14±1	15	3.14	20	0.01296
Note: N _{TX} = Number of Transmit Antennas RF Output power specifies that Maximum Conducted Output Power.							



2.4G WIFI Worst Maximum MPE Result Ant.2							
Mode	N _{TX}	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/cm ²) [S]
802.11b	1	16.84	16±1	17	3.4	20	0.02181
802.11g	1	15.78	15±1	16	3.4	20	0.01732
802.11n20	1	14.08	14±1	15	3.4	20	0.01376
802.11n40	1	13.43	13±1	14	3.4	20	0.01093

Note:
N_{TX}= Number of Transmit Antennas
RF Output power specifies that Maximum Conducted Output Power.

Remark:

1. Output power including turn-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.
4. Only the worst power was evaluated for each wireless function

6. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Power density (mW/ cm ²)
300-1,500	F/1500
1,500-100,000	1.0

7. Summary simultaneous transmission information

The sample supports four antennas for ZigBee Antenna, Bluetooth Antenna, 2.4G WIFI Antenna1 and 2.4G WIFI Antenna2. The ZigBee Antenna, Bluetooth Antenna, 2.4G WIFI Antenna1 and 2.4G WIFI Antenna2 can transmit simultaneous. The ZigBee Antenna, Bluetooth Antenna, 2.4G WIFI Antenna1 and 2.4G WIFI Antenna2 with four different Antenna.

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations; \sum of MPE ratios ≤ 1.0

8. Summary simultaneous transmission results

ZigBee Antenna + Bluetooth Antenna + 2.4G WIFI Antenna1 + 2.4G WIFI Antenna2 Maximum Simultaneous transmission MPE Ratios is

$$0.00205+0.00205+0.03256+0.02181=0.05847 \leq 1.0$$

9. Conclusion:

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----END OF THE REPORT-----

