MPE Calculation

Applicant:	Zhejiang Lingzhu Technology Co., Ltd.
Address:	Room 302, No 1 Building Huace Center, Xihu District 310000, Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA
Product:	Smart M Gateway
FCC ID:	2BEWXTHP23
Model No.:	THP23-ZB-X
Reference RF report #	4842024420600A, 4842024420600B, 4842024420600C, 4842024420600D

According to subpart 15.247(i) and subpart §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (KDB 447498 D01, §1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:
Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

For 2.4G Wi-Fi:

Maximum peak output power at antenna input terminal (dBm):	23.02
Maximum peak output power at antenna input terminal (mW):	200.45
Prediction distance (cm):	20
Antenna Gain, typical (dBi):	2.78
Maximum Antenna Gain (numeric):	1.90
The worst case is power density at predication frequency at 20 cm (mW/cm^2):	0.0756
MPE limit for general population exposure at prediction frequency (mW/cm^2):	1.00

For Bluetooth LE:

Maximum peak output power at antenna input terminal (dBm):	7.37
Maximum peak output power at antenna input terminal (mW):	5.46
Prediction distance (cm):	20
Antenna Gain, typical (dBi):	3.46
Maximum Antenna Gain (numeric):	2.22
The worst case is power density at predication frequency at 20 cm (mW/cm^2):	0.0024
MPE limit for general population exposure at prediction frequency (mW/cm^2):	1.00

For Zigbee:

Maximum peak output power at antenna input terminal (dBm):	6.19
Maximum peak output power at antenna input terminal (mW):	4.16
Prediction distance (cm):	20
Antenna Gain, typical (dBi):	3.70
Maximum Antenna Gain (numeric):	2.34
The worst case is power density at predication frequency at 20 cm (mW/cm^2):	0.0019
MPE limit for general population exposure at prediction frequency (mW/cm^2):	1.00

For 5G Wi-Fi:

Maximum peak output power at antenna input terminal (dBm):	14.75
Maximum peak output power at antenna input terminal (mW):	29.85
Prediction distance (cm):	20
Antenna Gain, typical (dBi):	2.44
Maximum Antenna Gain (numeric):	1.75
The worst case is power density at predication frequency at 20 cm (mW/cm^2):	0.0104
MPE limit for general population exposure at prediction frequency (mW/cm^2):	1.00

Result: Compliant

- TÜV SÜD Certification and Testing (China) Co., Ltd.

Reviewed by:	Prepared by:	Tested by:
Zhilan Xue	**Xin Feng**	**Xu Zheng**
EMC Review Manager	EMC Project Engineer	EMC Test Engineer
Date: 2025、04、07	Date: 2025、04、07	Date: 2025、04、07
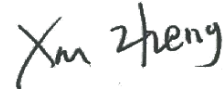
---**End of Test Report**---

Title: FCC RF Exposure Test Report
Revision: 00
Effective date: 2024-08-01

ID-Number: EMC_WUX_F_25.83E
Author: Ming GU

Phone: +86 510 8820 3737
Fax: +86 510 8820 3636

TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China