

Maximum Permissible Exposure Evaluation

FCC ID: 2A4AL-H500

1. Client Information

Applicant	:	Shanghai NanChao Information Technology Co.,Ltd
Address	:	Floor 3, Building 1, No.400 fangchun Road, Pilot Free Trade Zone, Shanghai, China
Manufacturer	:	Shanghai NanChao Information Technology Co.,Ltd
Address	:	Floor 3, Building 1, No.400 fangchun Road, China (Shanghai) Pilot Free Trade Zone

2. General Description of EUT

EUT Name	:	Lorawan gateway	
Models No.	:	H500	
Brand Name	:	----	
Product Description	:	Operation Frequency:	DTS: LoRa(500KHz): 923.3MHz-927.5MHz DSS:LoRa(125KHz): 902.3MHz-914.9MHz
	:	Number of Channel:	DTS: 8 channels DSS: 64 channels
Power Rating	:	Adapter:WEEQU-1220 Input: AC 100-240V 50/60Hz Onput: DC 12V2A	
Software Version	:	V1.0	
Hardware Version	:	V1.0	
Connecting I/O Port(S)	:	Please refer to the User's Manual	
Remark	:	the MPE report used the EUT-2(20211227-24-2#).	

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MPE Calculations

1. Antenna Gain:

2.5dBi External Antenna

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:

$$\sum \text{ of MPE ratios} \leq 1.0$$

5. Standalone MPE Evaluation:

LoRa FHSS

Channel	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]	Limit of Power Density (mW/ cm ²) (S)
Channel 01	15.15	15±1	16	2.5	20	0.01408	0.6013
Channel 32	15.78	15±1	16	2.5	20	0.01408	0.6013
Channel 64	14.79	14±1	15	2.5	20	0.01119	0.6013

LoRa DTS

Channel	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]	Limit of Power Density (mW/ cm ²) (S)
Channel 01	10.471	10±1	11	2.5	20	0.00445	0.6153
Channel 04	10.49	10±1	11	2.5	20	0.00445	0.6153
Channel 08	10.037	10±1	11	2.5	20	0.00445	0.6153

contains FCC ID: 2ABCB-RPIRM0

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
BT(BDR/EDR)	6.5	1.466	3.5	2.2387	20	0.00199	1.0000

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11b	15.4	34.673	3.5	2.2387	20	0.01544	1.0000

Modulation Type	Output power (Turn-up Procedure)		Antenna Gain (dBi)	Antenna Gain (Numeric)	Distance (cm) [R]	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11a	18.20	66.069	2.3	1.6982	20	0.02232	1.0000

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. Summary simultaneous transmission information

The sample supports two antennas for LoRa and BT/WLAN. The SRD and BT/WLAN can transmit simultaneous. The BT/WLAN are share the same antenna

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Σ of MPE ratios ≤ 1.0

7. Summary simultaneous transmission results

LoRa BT 2.4G Wifi and 5G Wifi Maximum Simultaneous transmission MPE Ratios is

$0.01408+0.02232=0.0364 \leq 1.0$.

8. Conclusion:

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

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