Maximum Permissible Exposure Evaluation

FCC ID: 2A4AL-H300

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.	:	H300	
Model Difference	:	----	
Product Description	:	Operation Frequency:	DTS: LoRa(500KHz): 923.3MHz-927.5MHz DTS: LoRa(500KHz): 903MHz-914.2MHz DSS: LoRa(125KHz): 902.3MHz-914.9MHz 802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz
Power Rating	:	Adapter(KSAS0361200300D5) Input: 100-240V~50/60Hz 1.0A Output: 12V3.0A	
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(RW-C-202208-0135-4-2#).	

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MPE Calculations

1. Antenna Gain:

Antenna	Brand	Model Name	Type	LoRa Antenna Gain(dBi)
Lora	N/A	N/A	External	2.18

Antenna	Brand	Model Name	Type	2.4G WIFI Antenna Gain(dBi)
2.4G WIFI	N/A	N/A	PCB	1.88

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: ∑ of MPE ratios ≤ 1.0

5. Standalone MPE Evaluation:

LoRa FHSS(902.3MHz-914.9MHz)

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	21.09	21±1	22	2.18	20	0.0521	0.6015
Channel 32	21.34	21±1	22	2.18	20	0.0521	0.6015
Channel 64	21.09	21±1	22	2.18	20	0.0521	0.6015

LoRa DTS(903MHz-914.2MHz)

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	27.78	27±1	28	2.18	20	0.2074	0.602
Channel 05	27.57	27±1	28	2.18	20	0.2074	0.602
Channel 08	27.45	27±1	28	2.18	20	0.2074	0.602

LoRa DTS(923.3MHz-927.5MHz)

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	27.12	27±1	28	2.18	20	0.2074	0.615
Channel 04	27.06	27±1	28	2.18	20	0.2074	0.615
Channel 08	27.01	27±1	28	2.18	20	0.2074	0.615

2.4G WiFi MPE Result								
Mode	N_{TX}	Freq. (MHz)	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	2412	17.71	17±1	18	1.88	20	0.0194
		2437	17.38	17±1	18	1.88	20	0.0194
		2462	17.48	17±1	18	1.88	20	0.0194
802.11g	1	2412	17.35	17±1	18	1.88	20	0.0194
		2437	17.25	17±1	18	1.88	20	0.0194
		2462	17.32	17±1	18	1.88	20	0.0194
802.11n20	1	2412	17.50	17±1	18	1.88	20	0.0194
		2437	17.70	17±1	18	1.88	20	0.0194
		2462	17.42	17±1	18	1.88	20	0.0194
802.11n40	1	2422	17.57	17±1	18	1.88	20	0.0194
	1	2437	17.57	17±1	18	1.88	20	0.0194
	1	2452	17.40	17±1	18	1.88	20	0.0194
Note: N_{TX}= Number of Transmit Antennas RF Output power specifies that Maximum Conducted Peak 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 three antennas for LoRa and WLAN. The LoRa and WLAN can transmit simultaneous. The WLAN with two different Antenna.
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;
∑ of MPE ratios ≤ 1.0

8. Summary simultaneous transmission results

LoRa + 2.4G Wifi Maximum Simultaneous transmission MPE Ratios is

0.3445+0.0194=0.3639⩽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.

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