



Maximum Permissible Exposure Evaluation

FCC ID: 2A2GJ-HT62374832L

1. Client Information

Applicant	:	Heltec Automation Technology Co., Ltd
Address	:	1st floor, No. 54, 56, 58 zirui North Street, High-tech Zone, Chengdu city, China
Manufacturer	:	Heltec Automation Technology Co., Ltd
Address	:	1st floor, No. 54, 56, 58 zirui North Street, High-tech Zone, Chengdu city, China

2. General Description of EUT

EUT Name	:	Sufficient IoT Hub
Models No.	:	Sufficient IoT Hub, Sufficient IoT Hub Mini, Sufficient IoT Hub Pro, Sufficient IoT Hub Plus, Sufficient IoT Hub Modul
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is appearance and color.
Sample ID	:	RW-C-202209-0299-4-1#& RW-C-202209-0299-4-2#
Product Description	:	Operation Frequency: LORA: 902.3MHz~914.9MHz(125KHz) 903MHz~914.2MHz(500KHz) 802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz-2452MHz
Power Rating	:	USB Input: DC 5V
Software Version	:	----
Hardware Version	:	----
Connecting I/O Port(S)	:	Please refer to the User's Manual
Remark	:	the MPE report used the EUT-2(RW-C-202209-0299-4-2#).

MPE Calculations

1. Antenna Gain:

Antenna	Brand	Model Name	Type	Antenna Gain(dBi)
LORA	N/A	N/A	Dipole	1.97

Antenna	Brand	Model Name	Type	Antenna Gain(dBi)
2.4G WIFI	N/A	N/A	FPC	3.97

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(DSS) Worst Maximum 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]	Limit of Power Density (mW/cm ²) (S)
LORA	1	902.3	11.041	11 ± 1	12	1.97	20	0.0049	0.6015
		908.9	11.071	11 ± 1	12	1.97	20	0.0049	0.6015
		914.9	11.098	11 ± 1	12	1.97	20	0.0049	0.6015

Note:

 N_{TX}= Number of Transmit Antennas

RF Output power specifies that Maximum Conducted Peak Output Power.

LORA(DTS) Worst Maximum 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]	Limit of Power Density (mW/cm ²) (S)
LORA	1	903	18.153	18 ± 1	19	1.97	20	0.0249	0.6015
		907.8	18.054	18 ± 1	19	1.97	20	0.0249	0.6015
		914.2	17.925	17 ± 1	18	1.97	20	0.0198	0.6015

Note:

 N_{TX}= Number of Transmit Antennas

RF Output power specifies that Maximum Conducted Peak Output Power.



2.4G WIFI Worst Maximum 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	15.018	15±1	16	3.97	20	0.0198
		2437	17.910	17±1	18	3.97	20	0.0313
		2462	15.786	15±1	16	3.97	20	0.0198
802.11g	1	2412	12.118	12±1	13	3.97	20	0.0099
		2437	12.110	12±1	13	3.97	20	0.0099
		2462	12.125	12±1	13	3.97	20	0.0099
802.11n (HT20)	1	2412	12.903	12±1	13	3.97	20	0.0099
		2437	13.358	13±1	14	3.97	20	0.0125
		2462	13.231	13±1	14	3.97	20	0.0125
802.11n (HT40)	1	2422	12.845	12±1	13	3.97	20	0.0099
		2437	13.351	13±1	14	3.97	20	0.0125
		2452	13.213	13±1	14	3.97	20	0.0125

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 two antennas for LORA and WLAN. The LORA and WLAN can transmit simultaneous. The Bluetooth and WLAN with two different Antenna.
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;
 Σ of MPE ratios ≤ 1.0

8. Summary simultaneous transmission results

LORA + 2.4G WIFI Maximum Simultaneous transmission MPE Ratios is
 $0.0414+0.0313=0.0727 \leq 1.0$.

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-----

