



Maximum Permissible Exposure Evaluation

FCC ID: 2A2GJ-M2802

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 | : | Heltec Indoor Hotspot |
| Models No. | : | HT-M2802 |
| Model Difference | : | ---- |
| Product Description | : | Operation Frequency: DTS: LoRa(500KHz): 923.3MHz-927.5MHz DSS: LoRa(125KHz): 902.3MHz-914.9MHz Bluetooth 4.0(BT): 2402MHz~2480MHz 802.11b/g/n(HT20): 2412MHz~2462MHz |
| Power Rating | : | Adapter(DSS12D-0502000-E) Input: 100-240V~50/60Hz 0.5A Output: 5V2A |
| Software Version | : | N/A |
| Hardware Version | : | N/A |
| Connecting I/O Port(S) | : | Please refer to the User's Manual |
| Remark | : | the MPE report used the EUT-2(RW-C-202204-0107-1-2#). |

MPE Calculations

1. Antenna Gain:

| Antenna | Brand | Model Name | Type | LoRa Antenna Gain(dBi) |
|---------|-------|------------|--------|------------------------|
| Lora | N/A | N/A | Dipole | 3.0 |

| Antenna | Brand | Model Name | Type | BT Antenna Gain(dBi) |
|-----------|-------|------------|----------|----------------------|
| Bluetooth | N/A | N/A | Internal | 3.0 |

| Antenna | Brand | Model Name | Type | 2.4G WIFI Antenna Gain(dBi) |
|-----------|-------|------------|----------|-----------------------------|
| 2.4G WIFI | N/A | N/A | Internal | 3.0 |

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 | RMS 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 | 16.22 | 16±1 | 17 | 3.0 | 20 | 0.0198 | 0.6015 |
| Channel 32 | 15.24 | 15±1 | 16 | 3.0 | 20 | 0.0158 | 0.6015 |
| Channel 64 | 15.61 | 15±1 | 16 | 3.0 | 20 | 0.0158 | 0.6015 |

LoRa DTS

| Channel | RMS 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 | 16.13 | 16±1 | 17 | 3.0 | 20 | 0.0198 | 0.615 |
| Channel 04 | 15.53 | 15±1 | 16 | 3.0 | 20 | 0.0158 | 0.615 |
| Channel 08 | 16.33 | 16±1 | 17 | 3.0 | 20 | 0.0198 | 0.615 |

| Modulation Type | Output power (Turn-up Procedure) | | Antenna Gain (dBi) | Antenna Gain (Numeric) | Distance (cm) [R] | MPE (mW/cm2) | MPE Limits (mW/cm2) |
|-----------------|----------------------------------|-------|--------------------|------------------------|-------------------|--------------|---------------------|
| | dBm | mW | | | | | |
| BT(BDR/EDR) | 7.03 | 5.047 | 3.0 | 1.9952 | 20 | 0.002 | 1.0000 |

| Modulation Type | Output power (Turn-up Procedure) | | Antenna Gain (dBi) | Antenna Gain (Numeric) | Distance (cm) [R] | MPE (mW/cm2) | MPE Limits (mW/cm2) |
|-----------------|----------------------------------|--------|--------------------|------------------------|-------------------|--------------|---------------------|
| | dBm | mW | | | | | |
| IEEE 802.11g | 18.93 | 78.163 | 3.0 | 1.9952 | 20 | 0.031 | 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. 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 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;

\sum of MPE ratios ≤ 1.0

8. Summary simultaneous transmission results

LoRa + BT/2.4G Wifi Maximum Simultaneous transmission MPE Ratios is

$0.0329+0.031=0.0639 \leq 1.0$.

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 REPORT-----