

Maximum Permissible Exposure Evaluation

FCC ID: 2A2GJ-HTIT

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 WiFi Kit LoRa Node
Models No.	:	HTIT-WS
Series Model No.	:	Please see page 2
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is appearance and color.
Brand Name	:	----
Product Description	:	Operation Frequency: DTS: LoRa(500KHz): 903MHz-914.2MHz DSS: LoRa(125KHz): 902.3MHz-914.9MHz Bluetooth 4.2(BT): 2402MHz~2480MHz Bluetooth 4.2(BLE): 2402MHz~2480MHz 802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz-2452MHz
Power Rating	:	USB Input: DC 5V
Software Version	:	V1.0
Hardware Version	:	V2
Connecting I/O Port(S)	:	Please refer to the User's Manual
Remark	:	the MPE report used the EUT-2(RW-C-202202-0173-1-2#).

Series Model No.	:	HTIT-WB32LAF, HTIT-WB32, HTIT-WS, HTIT-WSL, HTIT-WSH, HTIT-TB, HTIT-LN151, HTIT-LK151, HITI-WB32LABR, HTIT-W8266, HTIT-WB32G, HT-M00, HT-M01S, HTCC-AB01, HTCC-AB01-S, HTCC-AB02, HTCC-AB02-S, HTCC-AB03, HTCC-AB03-S, HTCC-AC01, HTCC-AC01-S, HTCC-AC02, HTCC-AC02-S, HTCC-AC03, HTCC-AC03-S, HTCC-AM01, HTCC-AM01-S, HTCC-AM02, HTCC-AM02-S, HTCC-AM03, HTCC-AM03-S, HTIT-DIY0051N, HTIT-DIY0031
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MPE Calculations

1. Antenna Gain:

Antenna	Brand	Model Name	Type	LoRa Antenna Gain(dBi)
Lora	N/A	N/A	Internal	3.0

Antenna	Brand	Model Name	Type	BT&BLE Antenna Gain(dBi)
/	N/A	N/A	Internal	3.0

Antenna	Brand	Model Name	Type	2.4G WIFI Antenna Gain(dBi)
/	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	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	13.45	13±1	14	3.0	20	0.0099	0.6015
Channel 32	13.34	13±1	14	3.0	20	0.0099	0.6015
Channel 64	13.22	13±1	14	3.0	20	0.0099	0.6015

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	13.83	13±1	14	3.0	20	0.0099	0.602
Channel 04	13.85	13±1	14	3.0	20	0.0099	0.602
Channel 08	13.66	13±1	14	3.0	20	0.0099	0.602

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)&BLE	6.52	4.487	3.0	1.9952	20	0.0017	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	16.51	44.771	3.0	1.9952	20	0.0178	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;
 Σ of MPE ratios ≤ 1.0

8. Summary simultaneous transmission results

LoRa + BT/2.4G Wifi Maximum Simultaneous transmission MPE Ratios is
 $0.0165+0.0178=0.0343 \leq 1.0$.

9. Conclusion:

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

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