



Maximum Permissible Exposure Evaluation

FCC ID: 2A376-HL100A

1. Client Information

Applicant	:	Smart Harvest Instruments Inc.
Address	:	180 Northfield Drive West, Unit 4 Waterloo Canada N2L 0C7
Manufacturer	:	Smart Harvest Instruments Inc.
Address	:	180 Northfield Drive West, Unit 4 Waterloo Canada N2L 0C7

2. General Description of EUT

EUT Name	:	Light Hotspot Miner
HVIN/Models No.	:	HL100
Model Difference	:	----
Product Description	:	Operation Frequency: 802.11b/g/n(HT20): 2412MHz~2462MHz n(HT40): 2422MHz~2452MHz DSS: LoRa(125KHz): 902.3MHz-914.9MHz DTS: LoRa(500KHz): 923.3MHz-927.5MHz DTS: LoRa(500KHz): 903MHz-914.2MHz
Power Rating	:	Adapter: LX10AA-050210-ZU Input:100-240V~50/60Hz 0.35A Output:5V2.1A
Software Version	:	v1.0.0-211201
Hardware Version	:	N/A
Connecting I/O Port(S)	:	Please refer to the User's Manual
Remark	:	the MPE report used the EUT-2(202203-0298-3-2#).

TB-RF-073-3.0

MPE Calculations

1. Antenna Gain:

Antenna	Brand	Model Name	Type	LoRa Antenna Gain(dBi)
Lora	N/A	N/A	External	3.0
2.4G WIFI	N/A	N/A	Ceramic	2.0

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(902.3~914.9MHz)

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	21.17	21±1	22	3.0	20	0.0629	0.6015
Channel 32	22.57	22±1	23	3.0	20	0.0792	0.6015
Channel 64	21.90	21±1	22	3.0	20	0.0629	0.6015

LoRa DTS(923.3~927.5MHz)

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	26.44	26±1	27	3.0	20	0.1990	0.615
Channel 04	26.40	26±1	27	3.0	20	0.1990	0.615
Channel 08	26.30	26±1	27	3.0	20	0.1990	0.615

LoRa DTS(903~914.2MHz)

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	27.14	27±1	28	3.0	20	0.2505	0.602
Channel 04	27.12	27±1	28	3.0	20	0.2505	0.602
Channel 08	27.00	26±1	27	3.0	20	0.1990	0.602

2.4GWiFi(2412~2462MHz)

Mode	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)
802.11B	16.37	16±1	17	2	20	0.01580	1
802.11G	17.74	17±1	18	2	20	0.01989	1
802.11N(HT20)	17.52	17±1	18	2	20	0.01989	1
802.11N(HT40)	17.47	17±1	18	2	20	0.01989	1

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 + 2.4G Wifi Maximum Simultaneous transmission MPE Ratios is
 $0.4161+0.01874=0.4348 \leq 1.0$.

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-----