Maximum Permissible Exposure Evaluation
FCC ID: 2A4G5-HLM9521

1. Client Information

Applicant	:	Hangzhou Hylin IoT Technology Co., Ltd.
Address	:	No.80 Pingshui WestRoad xihu District Hangzhou China
Manufacturer	:	Hangzhou Hylin IoT Technology Co., Ltd.
Address	:	No.80 Pingshui WestRoad xihu District Hangzhou China

2. General Description of EUT

EUT Name	:	HLM9521-HW4	
Models No.	:	HLM9521, HLM9521-xxx	
Model Different	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name.	
Product Description	:	Operation Frequency:	LORA(125KHz): 902.3MHz~914.9MHz LORA(125KHz): 915.2MHz~927.6MHz LORA(500KHz): 903MHz~914.2MHz LORA(500KHz): 902.5MHz~926.5MHz LORA(500KHz): 923.3MHz~927.5MHz
		Antenna Gain:	1.03dBi Sucker Antenna
Power Rating	:	USB Input: DC 5V	
Software Version	:	----	
Hardware Version	:	V01	
Connecting I/O Port(S)	:	Please refer to the User's Manual	
Remark	:	the evaluation report used the EUT(HC-C-202308-0242-01-01-2#).	

TB-RF-074-1.0

MPE Calculations for LORA

1. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

2. 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

3. 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

4. Test Result:

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	9.640	10±1	11	1.03	20	0.00317	0.6015
		908.9	9.648	10±1	11	1.03	20	0.00317	0.6015
		914.9	9.611	10±1	11	1.03	20	0.00317	0.6015

Note:
   N_{TX}= Number of Transmit Antennas
   RF Output power specifies that Maximum Conducted Peak Output Power.

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	915.2	9.848	10±1	11	1.03	20	0.0032	0.6015
		920.6	9.792	10±1	11	1.03	20	0.0032	0.6015
		927.6	9.778	10±1	11	1.03	20	0.0032	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	19.491	19±1	20	1.03	20	0.0252	0.6015
		907.8	20.601	20±1	21	1.03	20	0.0317	0.6015
		914.2	20.591	20±1	21	1.03	20	0.0317	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	902.5	18.998	18±1	19	1.03	20	0.0200	0.6015
		914.5	20.180	20±1	21	1.03	20	0.0317	0.6015
		926.5	20.624	20±1	21	1.03	20	0.0317	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	923.3	20.534	20±1	21	1.03	20	0.0317	0.6015
		925.1	20.725	20±1	21	1.03	20	0.0317	0.6015
		927.5	20.633	20±1	21	1.03	20	0.0317	0.6015

Note:
 N_{TX}= Number of Transmit Antennas
 RF Output power specifies that Maximum Conducted Peak Output Power.

5. 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/ cm²)
300-1,500	F/1500
1,500-100,000	1.0

For LORA :902~928MHz

The worst MPE is calculated as ***0.0317mW/ cm2 < limit 1mW / cm²***. So, RF exposure limit warning or SAR test are not required. The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR2.1091 (b).

The RF Exposure Information page from the manual is included here for reference.
Note
For a more detailed features description, please refer to the RF Test Report.

6. 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-----