

TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: 2AZ8A-OPM-1300

Equipment Under Test : S-IoT Hub
Model Name : OPM-1300
Variant Model Name(s) : -
Applicant : PLUTO Solution CO., LTD
Manufacturer : PLUTO Solution CO., LTD
Date of Receipt : 2021.02.17
Date of Test(s) : 2021.04.20 ~ 2021.06.09
Date of Issue : 2021.08.23

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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Report Number: F690501-RF-RTL002286-1

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
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- Designation number: KR0150

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1.2. Details of Applicant

Applicant : PLUTO Solution CO., LTD
Address : B-1122, Kumkang Penterium IT Tower, 282, Hagui-ro, Dongan-gu,
Anyang-si, Gyeonggi-do, South Korea
Contact Person : Son, In-suk
Phone No. : +82 31 387 6780

1.3. Details of Manufacturer

Company : Same as applicant
Address : Same as applicant

1.4. Description of EUT

Kind of Product	S-IoT Hub
Model Name	OPM-1300
Serial Number	Conducted Sample: M13008ML040350A Radiated Open Type Sample : M13008ML040348A Radiated Close Type Sample : M13008ML040349A
Power Supply	DC 24 V
Frequency Range	2 412 MHz ~ 2 462 MHz (11b/g/n_HT20) 2 422 MHz ~ 2 452 MHz (11n_HT40) 5 180 MHz ~ 5 240 MHz (Band 1: 11a/n_HT20, 11ac_VHT20) 5 190 MHz ~ 5 230 MHz (Band 1: 11n_HT40, 11ac_VHT40) 5 210 MHz (Band 1: 11ac_VHT80) 5 260 MHz ~ 5 320 MHz (Band 2A: 11a/n_HT20, 11ac_VHT20) 5 270 MHz ~ 5 310 MHz (Band 2A: 11n_HT40, 11ac_VHT40) 5 290 MHz (Band 2A: 11ac_VHT80) 5 500 MHz ~ 5 720 MHz (Band 2C: 11a/n_HT20, 11ac_VHT20) 5 510 MHz ~ 5 710 MHz (Band 2C: 11n_HT40, 11ac_VHT40) 5 530 MHz ~ 5 690 MHz (Band 2C: 11ac_VHT80) 5 745 MHz ~ 5 825 MHz (Band 3: 11a/n_HT20, 11ac_VHT20) 5 755 MHz ~ 5 795 MHz (Band 3: 11n_HT40, 11ac_VHT40) 5 775 MHz (Band 3: 11ac_VHT80)
Modulation Technique	DSSS, OFDM
Number of Channels	11 channels (11b/g/n_HT20) 9 channels (11n_HT40) 4 channels (Band 1: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 1: 11n_HT40, 11ac_VHT40) 1 channel (Band 1: 11ac_VHT80) 4 channels (Band 2A: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 2A: 11n_HT40, 11ac_VHT40) 1 channel (Band 2A: 11ac_VHT80) 12 channels (Band 2C: 11a/n_HT20, 11ac_VHT20) 6 channels (Band 2C: 11n_HT40, 11ac_VHT40) 3 channels (Band 2C: 11ac_VHT80) 5 channels (Band 3: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 3: 11n_HT40, 11ac_VHT40) 1 channel (Band 3: 11ac_VHT80)
Antenna Type	PCB Antenna
Antenna Gain	2 400 MHz ~ 2 483.5 MHz: 2.27 dB i 5 150 MHz ~ 5 250 MHz: 4.90 dB i 5 250 MHz ~ 5 350 MHz: 4.90 dB i 5 470 MHz ~ 5 725 MHz: 4.90 dB i 5 725 MHz ~ 5 850 MHz: 4.90 dB i
H/W Version	OHT HUB_MX8MM_STF745_EXTEND V1.2.1
S/W Version	ss_3.5.6.21031515

1.5. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL002286	2021.06.16	Initial
1	F690501-RF-RTL002286-1	2021.08.23	- Add the Simultaneous transmission Scenario

2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1 500	-	-	f/300	6
1 500-100 000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1 500	-	-	f/1500	30
1 500-100 000	-	-	1.0	30

2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

WLAN

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 400 ~ 2 483.5	11.0	2.27	0.004 224	1
5 150 ~ 5 250	8.0	4.90	0.003 879	
5 250 ~ 5 350	10.0	4.90	0.006 148	
5 470 ~ 5 725	10.0	4.90	0.006 148	
5 725 ~ 5 850	10.0	4.90	0.006 148	

Note;

- WLAN2.4GHz and WLAN5GHz can not transmitter simultaneously.
- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm².
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dBi and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.
- According to KDB 447498 D01 RF Exposure Guidance 4.1.

- End of the Test Report -