

TEST REPORT

of

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

FCC ID: TMGMAASUS01

1. Equipment Under Test : MaaS Unit
2. Model Name : MaaS Unit US01
3. Variant Model Name(s) : -
4. Applicant : G.I.T CO.,LTD
5. Manufacturer : G.I.T Co.,Ltd.
6. Date of Receipt : 2020.08.10
7. Date of Test(s) : 2020.08.11 ~ 2020.09.13
8. Date of Issue : 2020.09.25

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

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

Tested by:



Jinhyoung Cho

Technical
Manager:



Jungmin Yang

SGS Korea Co., Ltd. Gunpo Laboratory



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

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

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1.2. Details of Applicant

Applicant : G.I.T CO.,LTD

Grantee Address : 87, Macheon-ro, Songpa-gu, Seoul, South Korea, 05655

Address : 05655, GIT Bldg., 87, Macheon-ro, Songpa-gu, Seoul, Republic of Korea

Contact Person : Ryu, Ji-hyung

Phone No. : +82 2 2189 5405

1.3. Details of Manufacturer

Company : Same as applicant

Address : Same as applicant

1.4. Description of EUT

Kind of Product	MaaS Unit
Model Name	MaaS Unit US01
Power Supply	DC 12 V, DC 24 V
Frequency Range	2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy)
Modulation Technique	GFSK
Number of Channels	40 channels (Bluetooth Low Energy)
Antenna Type	Chip Antenna
Antenna Gain	1.99 dBi

1.5. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL001176	2020.09.16	Initial
1	F690501-RF-RTL001176-1	2020.09.25	Added the Grantee Address of Applicant

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
<u>300-1 500</u>	<u>-</u>	<u>-</u>	<u>f/1500</u>	<u>30</u>
<u>1 500-100 000</u>	<u>-</u>	<u>-</u>	<u>1.0</u>	<u>30</u>

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. Test information of Cable Loss and Antenna Gain

Test Item	Frequency (MHz)	Cable Loss (dB)	Antenna Gain (dB i)	Final Antenna Gain (dB i)
WCDMA - Band II	1 850 ~ 1 910	0.30	0.06	0.36
WCDMA - Band V	824 ~ 849	0.50	-4.24	-3.74
LTE - Band 2	1 850 ~ 1 910	0.50	0.06	0.56
LTE - Band 4	1 710 ~ 1 755	0.50	1.12	1.62
LTE - Band 5	824 ~ 849	0.30	-4.24	-3.94
LTE - Band 13	777 ~ 787	0.30	-4.09	-3.79
LTE - Band 17	704 ~ 716	0.30	-0.98	-0.68

Note;

- Final Antenna Gain (dB i) = Cable Loss (dB) + Antenna Gain (dB i)

2.1.4. Output Power into Antenna & RF Exposure Evaluation Distance

Bluetooth Low Energy

- 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	0	1.99	0.000 315	1

WCDMA - Band II

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	25	0.36	0.068 349	1

WCDMA - Band V

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	25	-3.74	0.026 591	0.55

LTE - Band 2

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	24	0.56	0.056 850	1

LTE - Band 4

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 710 ~ 1 755	24	1.62	0.072 565	1

LTE - Band 5

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	24	-3.94	0.020 171	0.55

LTE - Band 13

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
777 ~ 787	24	-3.79	0.020 880	0.52

LTE - Band 17

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
704 ~ 716	24	-0.68	0.042 730	0.47

Note;

- 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 dB i 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.

Simultaneous transmission of RF Exposure test exclusion for worst case configuration.

Bluetooth Low Energy: the ratio is 0.000 315 / 1

WWLAN: the radio is 0.042 730 / 0.47

Confirm the sum result of individual MPEs ratio is ≤ 1.0 ;

Bluetooth + WWLAN: $(0.000\ 315 / 1) + (0.042\ 730 / 0.47) = 0.091\ 230 \leq 1.0$

- End of the Test Report