

FCC/IC TEST REPORT

Job No. : GPEM2008000891EH

Applicant Name : G.I.T Co.,Ltd.

Equipment Under Test (EUT) :

Product Name : MaaS Unit

Model Name : MaaS Unit US01

FCC Authorization Type : Certification

Applied Standards : FCC Part 15 Subpart B, Class B

ANSI C63.4a:2017

ICES-003 Issue 6: 2016

Date of Receipt : July 31, 2020

Date of Test : August 27, 2020 ~ September 1, 2020

Date of Issue : September 25, 2020

Test Results : Complied

Tested by

:



Lucas Ku

Reviewed by

:



Julia Choi

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.

Remarks :

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The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full

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Revision History

Revision	Report number	Description
0	F690501-RF-EMH000650	Initial
1	F690501-RF-EMH000650_1	Change Applicant's address

1. General Information

1.1 Client Information

Applicant : G.I.T Co.,Ltd.
Address : 05655, GIT Bldg., 87, Macheon-ro, Songpa-gu, Seoul, Republic of Korea

1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd.
- Giheung 1 Lab : 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea, 17086
- Giheung 2 Lab : 23, Giheungdanji-ro 24beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea, 17086
FCC Registration No. : KR0150
IC Registration No. : 7837B
Phone : + 82 31 548 0710
Fax : + 82 31 548 0719
e-mail : Julia.choi@sgs.com

1.3 General Information of E.U.T.

Classification		Specification
Product Name		MaaS Unit
Model Name		MaaS Unit US01
Internal Max Clock Frequency		2.4 GHz
Test Power		DC 12 V, DC 24 V
Rated Power		DC 7 V ~ DC 35 V
Instrument	size	107 mm x 102 mm x 29.8 mm
	weight (g)	198
System	O/S	Linux 3.10.49
	RAM	1 GB DDR3
	ROM	16 GB eMMC
Port		AUX, OBD-II, EXT.I/F, VEH.COMM, PC(Administrator port) IVI (Not Used).
Function		The MAAS UNIT terminal is a terminal for collecting vehicle information and consists of a MAIN Control unit and an RF modem unit

1.4 Operating Modes and Conditions

Operating mode	Operating Condition
1) Operating	The EUT is transmitting EUT's BLE, CAN, UART, GPS status to notebook computer using ETU's AUX port.

1.5 Peripheral Equipments

Description	Model	Serial No.	Manufacturer
Notebook	NT740U5L	0MMN91GH900176P	Samsung Electronics Co., Ltd.
Test jig	-	-	-

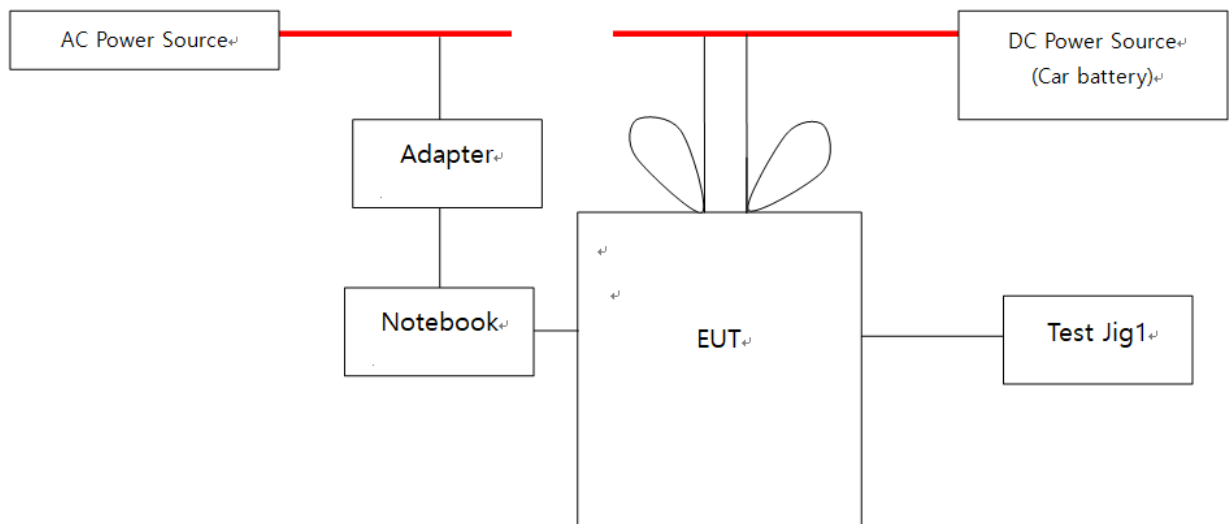
1.6 Cable List

Start		END		Cable Spec.		Used core
Name	I/O Port	Name	I/O Port	Length (m)	Shield	
EUT	AUX	Notebook Computer	USB	2.5	Unshield	No
	EXT.I/F	Test Jig	16PIN	2.5	Unshield	No
	OBD-II	EUT	OBD-II	1.2	Unshield	No
		Car Battery1	DC OUT	2.5	Unshield	No
	VEH.COMM	EUT	VEH.COM M	1.2	Unshield	No
Notebook Computer	DC IN	Notebook Adapter	DC OUT	1.6	Shield	No
Notebook Adapter	AC IN	AC Power Source	-	1.2	Unshield	No

1.7 System Configurations

Description	Model	Serial No.	Manufacturer
Main board	MAAS MAIN ZC GIT	200304-038	-
MODEM BOARD	MAAS MODEM (SI_WP) ZC_B GIT	-	-

1.8 Test System Layout



1.9 Modifications

- There is no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 : Subpart B ICES-003 Issue 6: 2016	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Standards	Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107 ICES-003 Issue 6: 2016	N/A
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ICES-003 Issue 6: 2016	Complied

Note : Test methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Standards	Test Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107 ICES-003 Issue 6: 2016	N/A
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ICES-003 Issue 6: 2016	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m & 3 m
	Above 1 GHz	1 MHz	3 m

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

2.2.2 Test Limits

-Conducted Emission Limits

Frequency Range	Limits(dB μ V)		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

Frequency Range	Limits(dB μ V/m)	Class
	Quasi-peak	
30 MHz ~ 88 MHz	39.0	Class A (10 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.4	
960 MHz ~ 1 GHz	49.5	
30 MHz ~ 88 MHz	40.0	Class B (3 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.0	
960 MHz ~ 1 GHz	54.0	

-Radiated Emission Limits above 1 GHz (3 m method)

Frequency Range	Limits(dB μ V/m)		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
Above 1 GHz	54.0	74.0	Class B

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3 m distance not 10 m distance.

2.3 Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range (30 MHz to 40 GHz) using a max hold mode incorporating a Peak detector and using the software of EMC32 (Version V9.26.01 from R&S) and (Version V10.40.10 from R&S). The final test data was measured using a Quasi-Peak detector below 1 GHz and Peak and CISPR-Average detector above 1 GHz.

Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

2.3.1 Test Equipments

Equipment	Model	Manufacturer	Serial No	Cal Due. Date
EMI TEST RECEIVER	ESU40	R&S	100075	2021.08.18
EMI TEST RECEIVER	ESU26	R&S	100570	2021.02.20
BILOG ANTENNA	VULB 9163	SCHWARZBECK	9163-437	2021.04.23
Double Ridged Horn Antenna	HF907	R&S	102578	2021.01.24
PREAMPLIFIER	AM-1431	MITEQ	1336160	2021.05.25
Microwave Preamplifier	PAM-118A	Com-Power	551074	2020.10.07
RF Cable (EMH-2Lab-RE-03)	-	-	-	2021.01.30
RF Cable (EMH-2Lab-RE-04)	SUCOFLEX1 02	803076/2	HUBER+SHUN ER	2021.01.30
RF Cable (EMH-1Lab-RE-02)	-	-	HUBER+SHUN ER	2021.01.30
RF Cable (EMH-2Lab-RE-04)	-	-	-	2021.01.30
10m SEMI-ANECHOIC CHAMBER	-	SY CORPORATION	-	-
3m SEMI-ANECHOIC CHAMBER	-	Will Tech	-	-

Note : The TRILOG Antenna calibration period is 2 years, but the other equipment calibration period are 1 year.

2.3.2 Test Site

①Below 1 GHz

10m SEMI-ANECHOIC CHAMBER in Giheung 1 Laboratory

②Above 1 GHz

3m SEMI-ANECHOIC CHAMBER in Giheung 2 Laboratory

2.3.3 Environment Conditions

①Below 1 GHz

Temperature : (minimum 20.4, maximum 21.2) °C

Humidity : (minimum 48.0, maximum 50.0) % R.H.

Atmospheric Pressure : (minimum 99.5, maximum 99.5) kPa

Test Date: August 27, 2020

②Above 1 GHz

Temperature : (minimum 20.0, maximum 21.0) °C

Humidity : (minimum 44.0, maximum 51.0) % R.H.

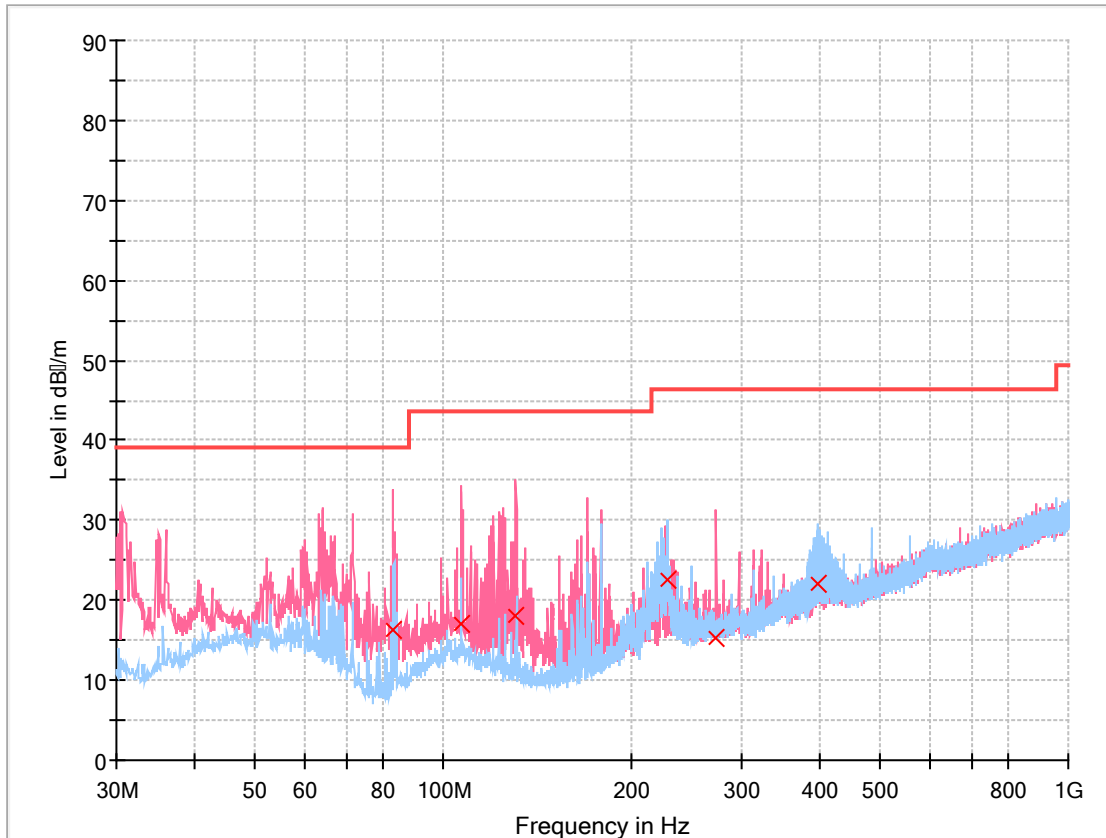
Atmospheric Pressure : (minimum 100.6, maximum 100.6) kPa

Test Date: September 1, 2020

2.3.4 Test Results

①Below 1 GHz (10m Method)

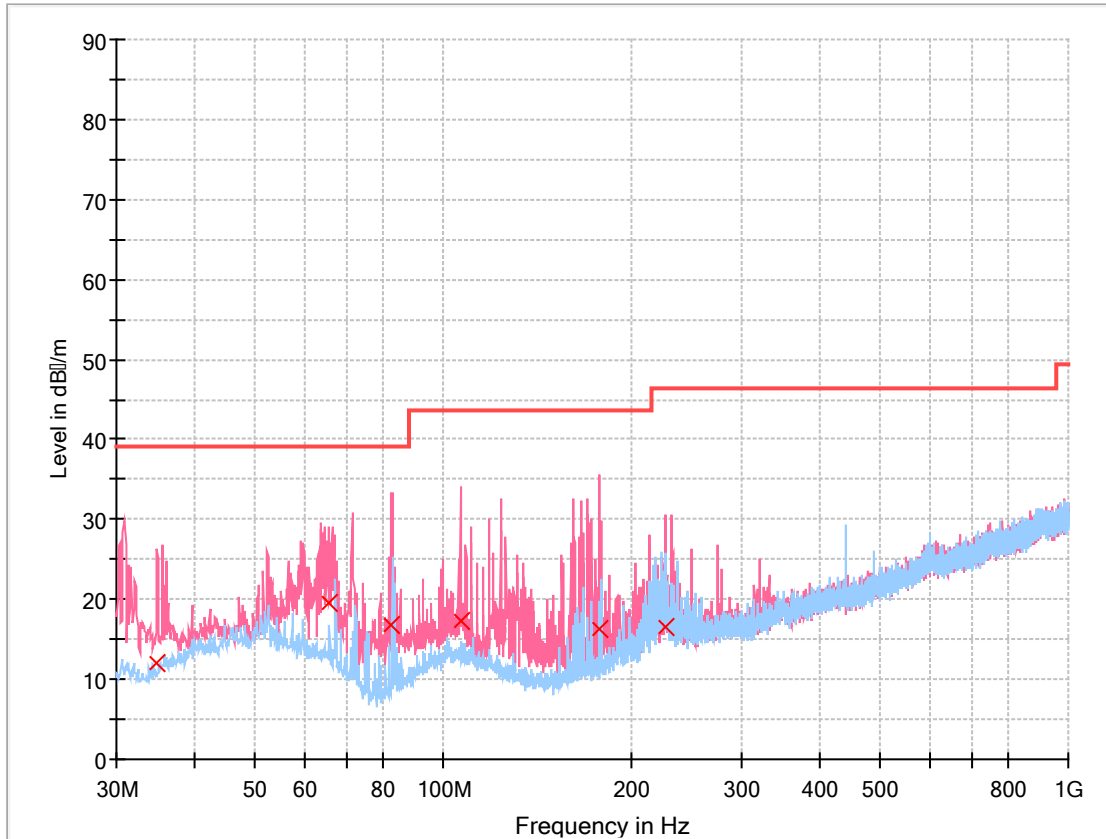
- DC 12 V



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
83.059 000	16.27	39.10	22.83	15 000.0	120.000	312.0	V	79.0	-22.9
106.824 000	16.95	43.52	26.57	15 000.0	120.000	110.0	V	85.0	-18.5
130.783 000	18.17	43.52	25.35	15 000.0	120.000	120.0	V	200.0	-21.4
228.656 000	22.57	46.50	23.93	15 000.0	120.000	400.0	H	336.0	-17.3
273.664 000	15.24	46.50	31.26	15 000.0	120.000	110.0	V	357.0	-15.9
398.309 000	22.02	46.50	24.48	15 000.0	120.000	250.0	H	72.0	-11.7

● DC 24 V



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.850 000	12.06	39.10	27.04	15 000.0	120.000	132.0	V	56.0	-20.4
65.599 000	19.60	39.10	19.50	15 000.0	120.000	352.0	V	112.0	-19.6
82.768 000	16.75	39.10	22.35	15 000.0	120.000	102.0	V	42.0	-22.9
106.436 000	17.40	43.52	26.12	15 000.0	120.000	310.0	V	4.0	-18.5
177.925 000	16.22	43.52	27.30	15 000.0	120.000	350.0	V	264.0	-20.2
226.813 000	16.54	46.50	29.96	15 000.0	120.000	100.0	V	0.0	-17.4

Measurement Uncertainty (Horizontal) : 3.89 dB (The confidential level is about 95 %, k=2)

Measurement Uncertainty (Vertical) : 4.51 dB (The confidential level is about 95 %, k=2)

Note : ● POL H = Horizontal

● POL V = Vertical

● Margin = Limit – Quasi Peak

● Corr. = Antenna Factor + Cable loss – Amplifier Gain

Ex) In case

Freq ; 100 MHz, level ; 30 dB(μV/m), AF ; 10 dB/m, CL ; 4 dB, Amp ; 25 dB

Result = Level + AF + CL – Amp

= 30 + 10 + 4 - 25

= 19

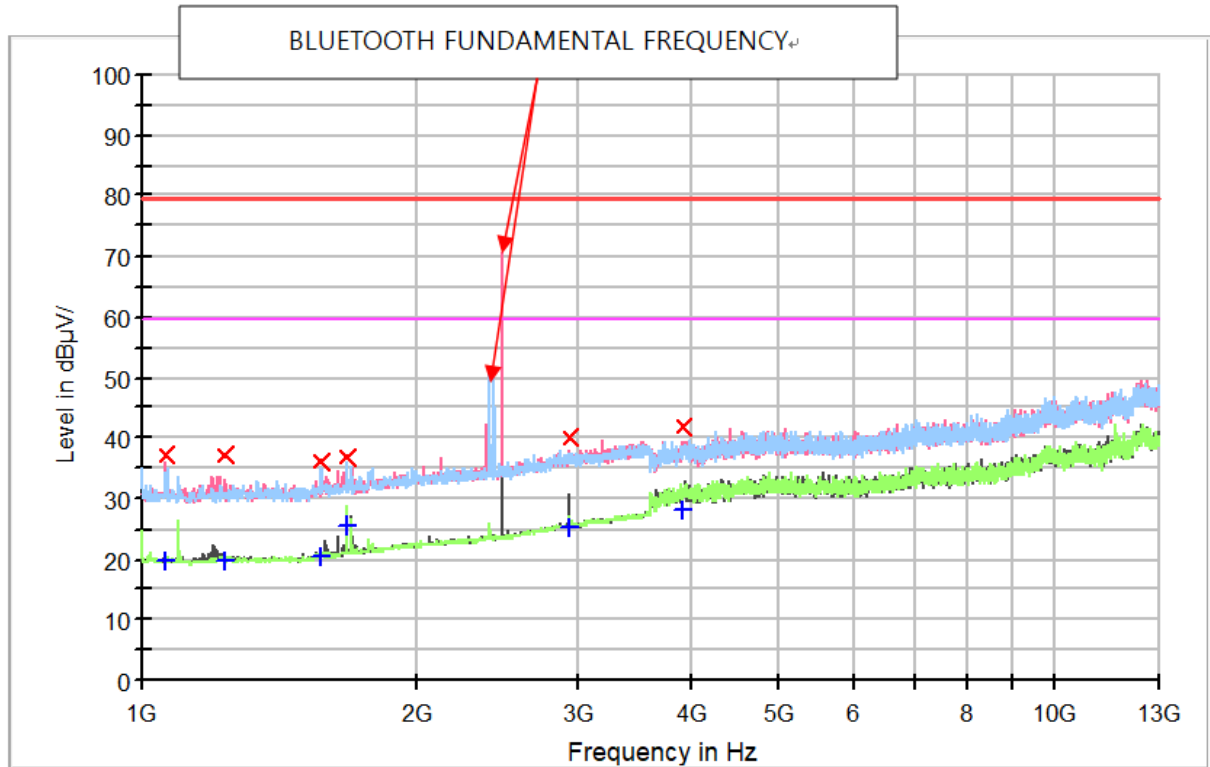
Margin = Limit – Result

= 43.5 – 19

= 24.5

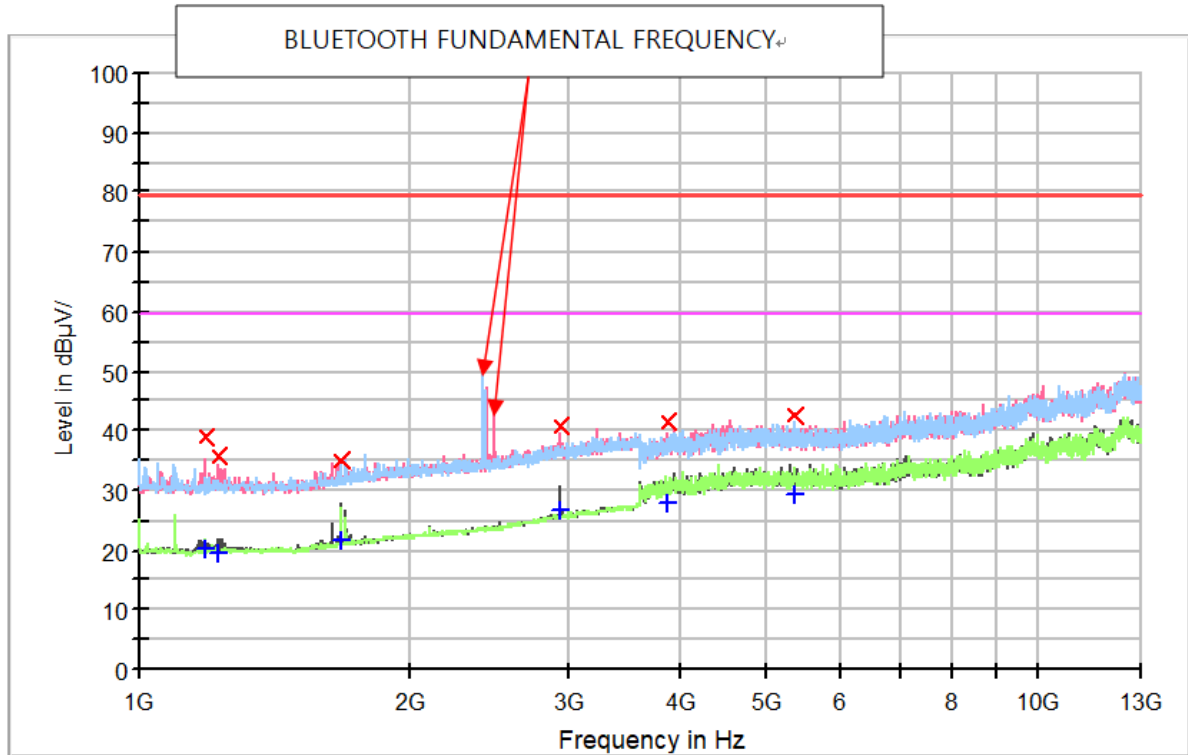
②Above 1 GHz(3m Method)

- DC 12 V



Frequency (MHz)	MaxPeak (dBμV/m)	Coverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 064.500 000	37.31	---	79.50	42.19	15 000.0	1 000.000	100.0	V	120.0	-15.2
1 064.500 000	---	19.89	59.50	39.61	15 000.0	1 000.000	100.0	V	120.0	-15.2
1 231.000 000	37.14	---	79.50	42.36	15 000.0	1 000.000	100.0	V	120.0	-15.1
1 231.000 000	---	19.79	59.50	39.71	15 000.0	1 000.000	100.0	V	120.0	-15.1
1 574.500 000	36.20	---	79.50	43.30	15 000.0	1 000.000	100.0	H	168.0	-14.6
1 574.500 000	---	20.58	59.50	38.92	15 000.0	1 000.000	100.0	H	168.0	-14.6
1 679.500 000	---	25.50	59.50	34.00	15 000.0	1 000.000	100.0	H	168.0	-14.1
1 679.500 000	36.68	---	79.50	42.82	15 000.0	1 000.000	100.0	H	168.0	-14.1
2 941.000 000	---	25.33	59.50	34.17	15 000.0	1 000.000	100.0	V	0.0	-10.2
2 941.000 000	39.93	---	79.50	39.57	15 000.0	1 000.000	100.0	V	0.0	-10.2
3 919.000 000	42.04	---	79.50	37.46	15 000.0	1 000.000	200.0	V	346.0	-7.5
3 919.000 000	---	28.20	59.50	31.30	15 000.0	1 000.000	200.0	V	346.0	-7.5

- DC 24 V



Frequency (MHz)	MaxPeak (dBμV/m)	Coverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 214.200 000	19.52	---	79.50	59.98	15 000.0	1 000.000	100.0	V	0.0	-15.1
1 214.200 000	---	6.05	59.50	53.45	15 000.0	1 000.000	100.0	V	0.0	-15.1
1 422.100 000	---	6.34	59.50	53.16	15 000.0	1 000.000	300.0	V	0.0	-15.0
1 422.100 000	19.64	---	79.50	59.86	15 000.0	1 000.000	300.0	V	0.0	-15.0
1 966.700 000	23.12	---	79.50	56.38	15 000.0	1 000.000	200.0	V	225.0	-13.0
1 966.700 000	---	9.57	59.50	49.93	15 000.0	1 000.000	200.0	V	225.0	-13.0
2 425.200 000	25.96	---	79.50	53.54	15 000.0	1 000.000	400.0	H	129.0	-11.9
2 425.200 000	---	10.85	59.50	48.65	15 000.0	1 000.000	400.0	H	129.0	-11.9
3 228.100 000	27.02	---	79.50	52.48	15 000.0	1 000.000	100.0	V	246.0	-9.5
3 228.100 000	---	13.66	59.50	45.84	15 000.0	1 000.000	100.0	V	246.0	-9.5
3 841.300 000	---	18.95	59.50	40.55	15 000.0	1 000.000	400.0	V	358.0	-7.7
3 841.300 000	32.42	---	79.50	47.08	15 000.0	1 000.000	400.0	V	358.0	-7.7

Measurement Uncertainty (Horizontal) : 4.02 dB (The confidential level is about 95 %, k=2)

Measurement Uncertainty (Vertical) : 4.18 dB (The confidential level is about 95 %, k=2)

Note : ● POL H = Horizontal

● POL V = Vertical

● Margin = Limit – Quasi Peak

● Corr. = Antenna Factor + Cable loss – Amplifier Gain

Ex) In case

Freq ; 100 MHz, level ; 30 dB(μV/m), AF ; 10 dB/m, CL ; 4 dB, Amp ; 25 dB

Result = Level + AF + CL – Amp

= 30 + 10 + 4 - 25

= 19

Margin = Limit – Result

= 43.5 – 19

= 24.5

- End of Test Report -