FCC/IC TEST REPORT

Job No.	**: GPEM2309000631EC**
Applicant	**: Altimobility Corporation**
Equipment Under Test (EUT):	
Product Name	**: OD310**
Model Name	**: DCS-U3-6K**
FCC Authorization Type	**: Certification**
Applied Standards	**: FCC Part 15 Subpart B, Class A** **ICES-003 Issue 7:2020**
FCC ID	**: 2BDBU-DCSU36K**
IC Certification	**: 31548-DCSU36K**
Date of Receipt	**: September 21, 2023**
Date of Test	**: September 22, 2023 ~ October 26, 2023**
Date of Issue	**: November 01, 2023**
Test Results	**: Complied**

Tested by	:	---------- **Dohyeon Lee**
Reviewed by	:	---------- **Paul Kang**

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.

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Revision History

Revision	Report number	Description
0	F690501-RF-EMC001831	Initial
1		

1. General Information

1.1 Client Information

Applicant	Altimobility Corporation
Applicant Address	5th Fl Park. Bldg., 16, Banpo-daero 27-gil, Seocho-gu, Seoul, Republic of Korea
Manufacturer	Altimobility Corporation
Manufacturer Address	5th Fl Park. Bldg., 16, Banpo-daero 27-gil, Seocho-gu, Seoul, Republic of Korea

1.2 Test Laboratory

Name and Address	SGS Korea Co., Ltd.
- Giheung Laboratory	35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
- Gunpo Laboratory	4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 15807, Republic of Korea
- Dongtan Laboratory	12, Dongtansandan 10-gil, Hwaseong-si, Gyeonggi-do, 18487, Republic of Korea
FCC Registration No.	KR0150
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e-mail	Paul.Kang@sgs.com

1.3 General Information of E.U.T.

Classification	Specification
Product Name	OD310
Model Name	DCS-U3-6K
Serial No.	-
EMI Classification	Class A
Internal Clock Frequency	2 690 ㎒
Rated Power	12.0 Vd.c.
Test Voltage	12.0 Vd.c.
H/W Version	OD310 V101
S/W Version	CSFP-5.0.2807.762-22481bf8.bin
Port	3Pin(USB), 4Pin, 6Pin, 7Pin, 20Pin
Components	-
Function	The OD310 device is a communication-type modem device for vehicles.

1.4 Operating Modes and Conditions

Operating mode	Operating Condition
Operating Mode	The status that the EUT was receiving vehicle data from the jig.

1.5 Peripheral Equipments

Description	Model	Serial No.	Manufacturer	Note.
Notebook Computer	LG15U56	602NZC066083	LG Electronics Nanjing New Technology Co., Ltd.	-
AC/DC Adapter	HU10182-17147	-	APD Shenzhen DK Inc.	China
Jig	CS3.0_MAIN_JIG_V101	-	-	-
AC/DC Adapter	SKY1230F	-	Skyplus Co., Ltd	Korea

1.6 Cable List

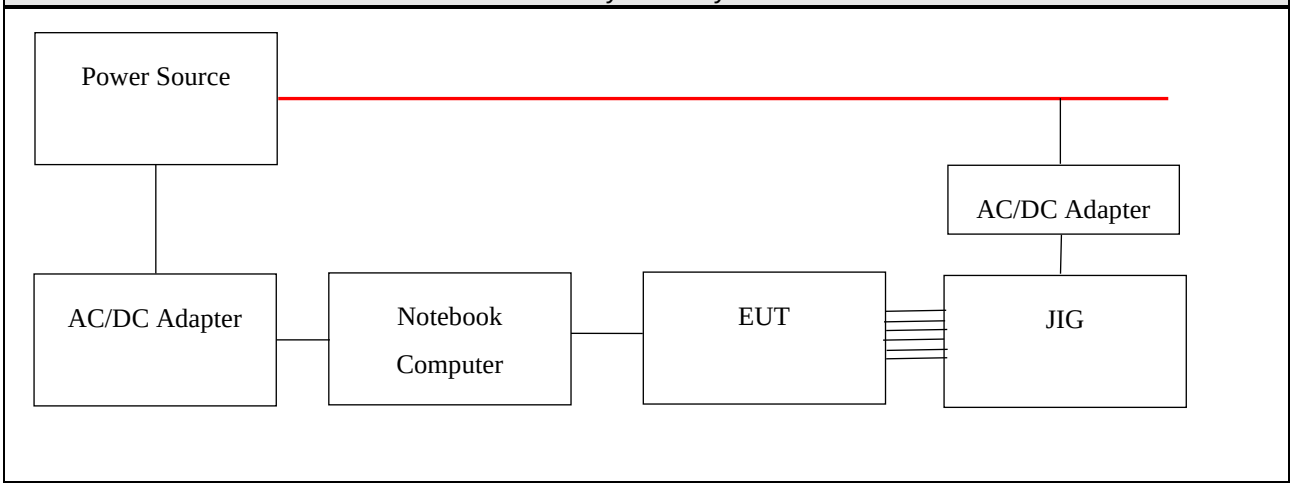
Start		END		Cable Spec.		Used core
Name	I/O Port	Name	I/O Port	Length (m)	Shield	
EUT	3Pin	Notebook Computer	USB	1.4	Unshield	-
	7PIN	JIG	-	1.6	Unshield	-
	4PIN		-	1.6	Unshield	-
	6PIN		-	1.6	Unshield	-
	20PIN		-	1.6	Unshield	-

1.7 System Configurations

Description	Model	Serial No.	Manufacturer	Note
Battery	SH564074	-	-	-
Main Board	PJSA-0142	-	-	-

1.8 Test System Layout

Test System Layout



1.9 Modifications/Notes

- There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 : Subpart B ICES-003 Issue 7:2020	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 7:2020 ANSI C63.4a:2017	N/A Note2
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ICES-003 Issue 7:2020 ANSI C63.4a:2017	Complied

Note 1. Test methods of all test items are performed according to the basic standards in this table.
2. It didn't test for conductive emission test item because this device operated by receiving the vehicle's DC power..

EMISSION

2.1 Test Results

Test Items	Standards	Test Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107 ICES-003 Issue 7:2020 ANSI C63.4a:2017	N/A Note1
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ICES-003 Issue 7:2020 ANSI C63.4a:2017	Complied

Note1 : This device operated by receiving the vehicle's dc 12V is excluded from the Conductive Emission test.

2.2 Test Method and Limits

2.2.1 Test Method

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

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

2.2.2 Test Limits

-Conducted Emission Limits

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

-Radiated Emission Limits below 1 ㎓

[FCC Part 15 Subpart B]

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

[ICES-003 Issue 7 : 2020]

Frequency Range	Limits(dB μV/m)	Class
	Quasi-peak	
30 MHz ~ 88 MHz	40.0	Class A (10 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 230 MHz	46.4	
230 MHz ~ 960 MHz	47.0	
960 MHz ~ 1 GHz	49.5	
30 MHz ~ 88 MHz	50.0	Class A (3 m method)
88 MHz ~ 216 MHz	54.0	
216 MHz ~ 230 MHz	56.9	
230 MHz ~ 960 MHz	57.0	
960 MHz ~ 1 GHz	60.0	
30 MHz ~ 88 MHz	30.0	Class B (10 m method)
88 MHz ~ 216 MHz	33.1	
216 MHz ~ 230 MHz	35.6	
230 MHz ~ 960 MHz	37.0	
960 MHz ~ 1 GHz	43.5	
30 MHz ~ 88 MHz	40.0	Class B (3 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 230 MHz	46.0	
230 MHz ~ 960 MHz	47.0	
960 MHz ~ 1 GHz	54.0	

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

[FCC Part 15 Subpart B]

Frequency Range	Limits(dB μV/m)		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
	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.

[ICES-003 Issue 7 : 2020]

Frequency Range	Limits(dB μV/m)		Class
	Average	Peak	
Above 1 GHz	60.0	80.0	Class A
	54.0	74.0	Class B

2.3 Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range (30 ㎒ to 18 ㎓) using a max hold mode incorporating a Peak detector by using the EMI measuring software. The final test data was measured using a Quasi-Peak detector below 1 ㎓, Peak and CISPR Average detector above 1 ㎓.
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.

Note. Measuring software
- Giheung Lab.: EMC32(V10.40.10) from R&S
- Gunpo Lab.: EP5RE(V5.3.70) from TOYO
- Dongtan Lab.: EMC32(V10.40.10) from R&S

2.3.1 Test Equipments

Equipment	Model	Manufacturer	Serial No	Cal Due. Date
EMI TEST RECEIVER	ESU40	R&S	100075	2024.01.19
Hybrid ANTENNA	VULB 9163	SCHWARZBECK	9163-396	2024.03.22
Double Ridged Horn Antenna	HF907	R&S	10208	2024.03.09
PREAMPLIFIER	AM-1431	MITEQ	1336160	2024.05.23
AMPLIFIER	SCU 18	R&S	10070	2024.08.24
RF Cable	EMH-1Lab-RE-01	-	-	-
RF Cable	EMH-1Lab-RE-02	-	-	-
RF Cable	EMH-1Lab-RE-03	-	-	-
RF Cable	EMH-1Lab-RE-04	-	-	-

Note: The calibration period of every equipment is 1 year.

2.3.2 Test Site

10 m SEMI-ANECHOIC CHAMBER in Giheung Laboratory

2.3.3 Environment Conditions

Below 1 ㎓

Temperature	(Minimum 20.4, Maximum 21.0) ℃
Humidity	(Minimum 43.0, Maximum 44.0) % R.H.
Atmospheric Pressure	(Minimum 100.6, Maximum 100.6) ㎪
Test Date	September 22, 2023

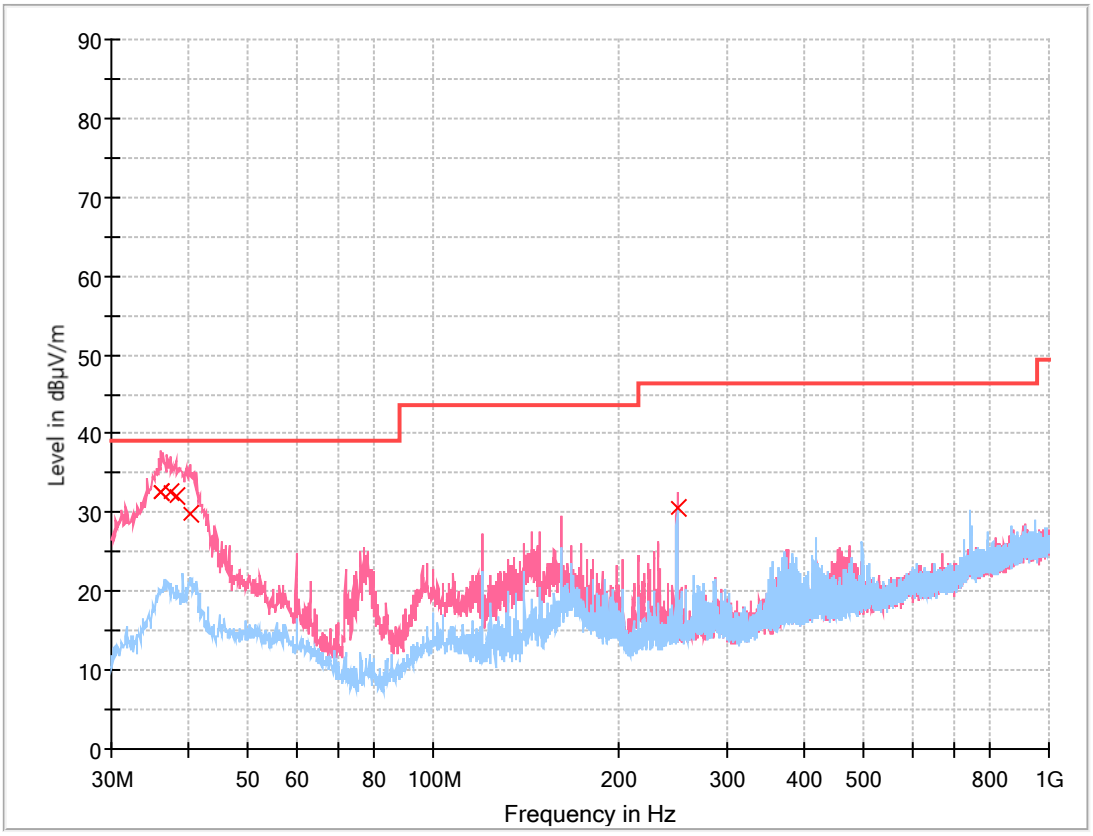
Above 1 ㎓

Temperature	(Minimum 19.1, Maximum 23.5) ℃
Humidity	(Minimum 43.0, Maximum 45.0) % R.H.
Atmospheric Pressure	(Minimum 101.0, Maximum 101.0) ㎪
Test Date	October 26, 2023

2.3.4 Test Results

Below 1 ㎓ (10 m method)

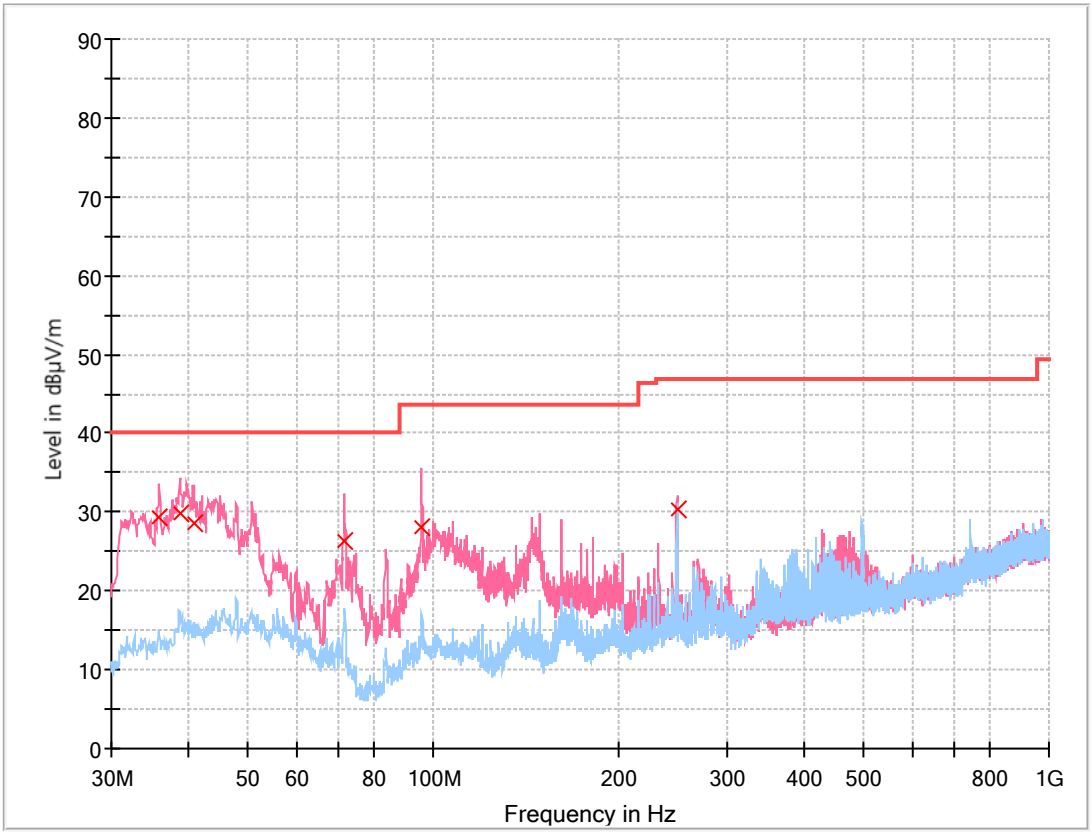
[FCC Part 15 Subpart B]



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
36.031	32.68	39.10	6.42	1 5000.0	120.000	250.0	V	336.0	-20.0
36.042	32.57	39.10	6.53	1 5000.0	120.000	250.0	V	259.0	-20.0
37.509	32.55	39.10	6.55	1 5000.0	120.000	209.0	V	3.0	-19.4
38.228	32.09	39.10	7.01	1 5000.0	120.000	202.0	V	15.0	-19.2
40.402	29.88	39.10	9.22	1 5000.0	120.000	143.0	V	48.0	-18.6
248.809	30.49	46.50	16.01	1 5000.0	120.000	103.0	V	15.0	-18.1

[ICES-003 Issue 7: 2020]

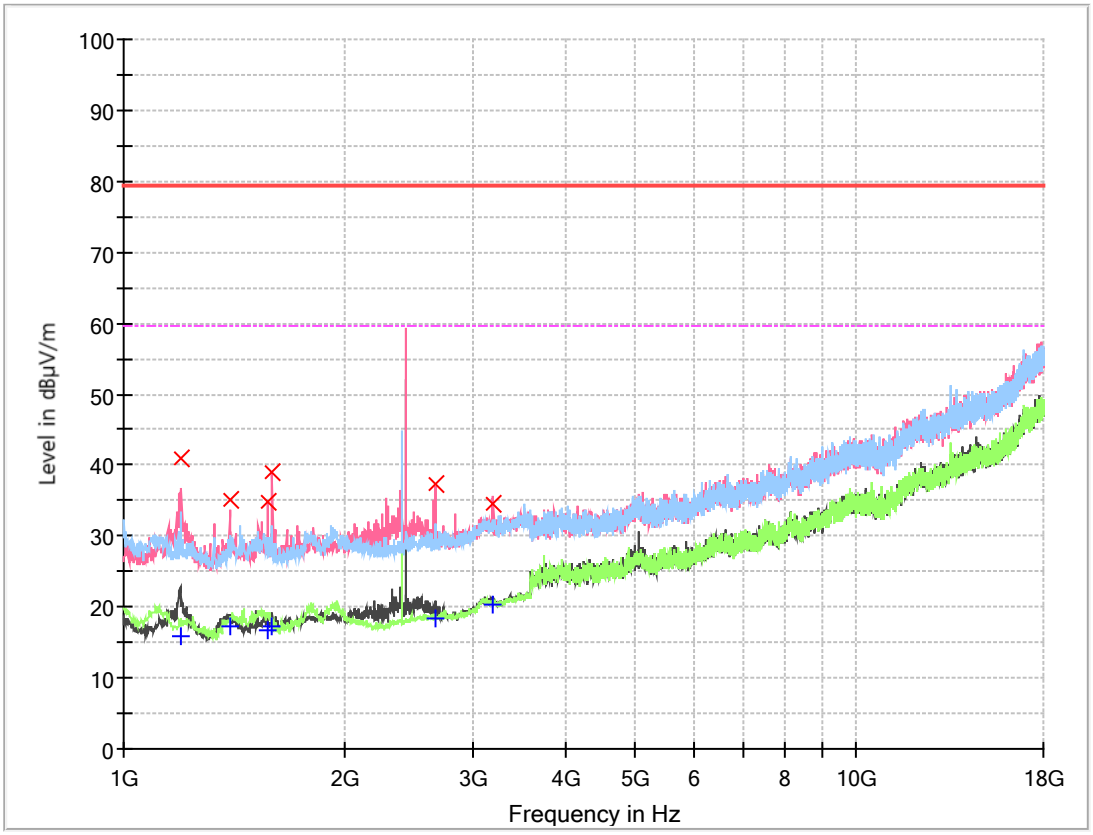


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.837	29.31	40.00	10.69	15000.0	120.000	130.0	V	52.0	-20.1
38.810	29.79	40.00	10.21	15000.0	120.000	150.0	V	333.0	-19.0
40.807	28.57	40.00	11.43	15000.0	120.000	156.0	V	328.0	-18.4
71.807	26.39	40.00	13.61	15000.0	120.000	128.0	V	234.0	-22.8
95.726	28.02	43.50	15.48	15000.0	120.000	173.0	V	344.0	-19.9
248.975	30.32	47.00	16.68	15000.0	120.000	150.0	V	15.0	-18.1

Above 1 ㎓ (3 m method)

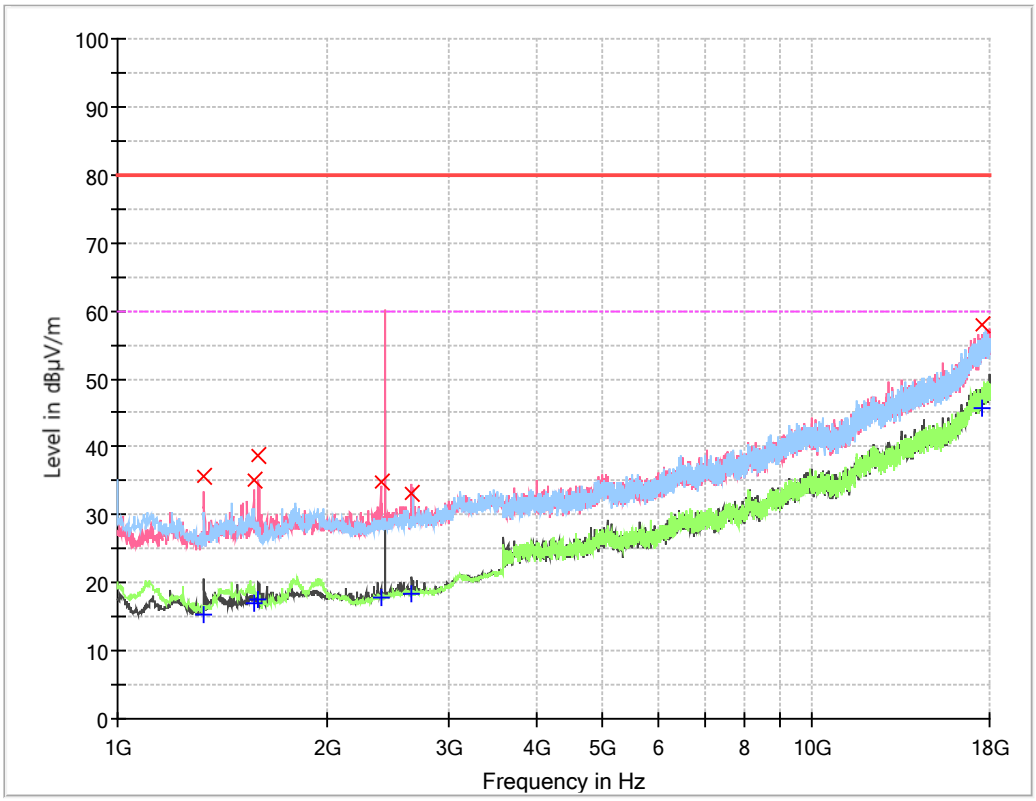
[FCC Part 15 Subpart B]



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time(ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1200.600	---	15.84	59.50	43.66	1 5000.0	1000.000	100.0	V	0.0	-17.9
1200.600	41.04	---	79.50	38.46	1 5000.0	1000.000	100.0	V	0.0	-17.9
1396.100	35.12	---	79.50	44.38	1 5000.0	1000.000	100.0	V	352.0	-16.9
1396.100	---	17.23	59.50	42.27	1 5000.0	1000.000	100.0	V	352.0	-16.9
1574.600	---	16.65	59.50	42.85	1 5000.0	1000.000	100.0	V	34.0	-15.5
1574.600	34.69	---	79.50	44.81	1 5000.0	1000.000	100.0	V	34.0	-15.5
1596.700	---	17.23	59.50	42.27	1 5000.0	1000.000	100.0	V	19.0	-15.4
1596.700	38.90	---	79.50	40.60	1 5000.0	1000.000	100.0	V	19.0	-15.4
2664.300	37.46	---	79.50	42.04	1 5000.0	1000.000	100.0	V	63.0	-10.5
2664.300	---	18.45	59.50	41.05	1 5000.0	1000.000	100.0	V	63.0	-10.5
3193.000	---	20.42	59.50	39.08	1 5000.0	1000.000	100.0	V	352.0	-7.8
3193.000	34.56	---	79.50	44.94	1 5000.0	1000.000	100.0	V	352.0	-7.8

[ICES-003 Issue 7: 2020]



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time(ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1329.800	35.60	---	80.00	44.40	1 5000.0	1000.000	100.0	V	29.0	-17.3
1329.800	---	15.44	60.00	44.56	1 5000.0	1000.000	100.0	V	29.0	-17.3
1574.600	---	16.87	60.00	43.13	1 5000.0	1000.000	100.0	V	29.0	-15.5
1574.600	35.08	---	80.00	44.92	1 5000.0	1000.000	100.0	V	29.0	-15.5
1596.700	38.80	---	80.00	41.20	1 5000.0	1000.000	100.0	V	44.0	-15.4
1596.700	---	17.63	60.00	42.37	1 5000.0	1000.000	100.0	V	44.0	-15.4
2390.600	34.85	---	80.00	45.15	1 5000.0	1000.000	100.0	V	281.0	-12.0
2390.600	---	17.70	60.00	42.30	1 5000.0	1000.000	100.0	V	281.0	-12.0
2654.100	33.28	---	80.00	46.72	1 5000.0	1000.000	100.0	V	0.0	-10.5
2654.100	---	18.32	60.00	41.68	1 5000.0	1000.000	100.0	V	0.0	-10.5
17522.300	---	45.69	60.00	14.31	1 5000.0	1000.000	100.0	V	281.0	16.3
17522.300	58.05	---	80.00	21.95	1 5000.0	1000.000	100.0	V	281.0	16.3

Measurement Uncertainty : See Appendix A

Note : • AF = Antenna Factor • CL = Cable Loss • AMP = Amplifier Gain
• POL H = Horizontal • POL V = Vertical • A = Angle
• H = Height • Margin = Limit – Result
• Corr. = AF + CL – AMP ** The value of 'Level' includes 'Corr.'.

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

Appendix A : Measurement Uncertainty

- Giheung Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	3.7 dB (The confidential level is 95 %, *k*=2)
		ESH2-Z5	3.2 dB (The confidential level is 95 %, *k*=2)
		ESH3-Z6	3.2 dB (The confidential level is 95 %, *k*=2)
		NNLK8129	3.1 dB (The confidential level is 95 %, *k*=2)
Conducted Emission - Signal		ISN T800	5.4 dB (The confidential level is 95 %, *k*=2)
		ISN ST08	6.6 dB (The confidential level is 95 %, *k*=2)
Discontinuous		2.7 dB (The confidential level is 95 %, *k*=2)	
Radiated Emission	9 kHz ~30 MHz	Horizontal	3.3 dB (The confidential level is 95 %, *k*=2)
		Vertical	3.3 dB (The confidential level is 95 %, *k*=2)
	30 MHz ~ 1 000 MHz	Horizontal	4.3 dB (The confidential level is 95 %, *k*=2)
		Vertical	4.6 dB (The confidential level is 95 %, *k*=2)
	1 GHz ~ 18 GHz	Horizontal	3.9 dB (The confidential level is 95 %, *k*=2)
		Vertical	4.0 dB (The confidential level is 95 %, *k*=2)

- Gunpo Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	4.0 dB (The confidential level is 95 %, *k*=2)
		ESH2-Z5	3.6 dB (The confidential level is 95 %, *k*=2)
		ESH3-Z6	3.8 dB (The confidential level is 95 %, *k*=2)
Conducted Emission - Signal		ISN T800	5.8 dB (The confidential level is 95 %, *k*=2)
		ISNT8-Cat6	5.8 dB (The confidential level is 95 %, *k*=2)
		ISN S751	7.5 dB (The confidential level is 95 %, *k*=2)
Disturbance Voltage at Antenna Terminal		2.9 dB (The confidential level is 95 %, *k*=2)	
Radiated Emission	9 kHz ~30 MHz	Horizontal	3.4 dB (The confidential level is 95 %, *k*=2)
		Vertical	3.4 dB (The confidential level is 95 %, *k*=2)
	30 MHz ~ 1 000 MHz	Horizontal	4.5 dB (The confidential level is 95 %, *k*=2)
		Vertical	5.1 dB (The confidential level is 95 %, *k*=2)
	1 GHz ~ 18 GHz	Horizontal	3.7 dB (The confidential level is 95 %, *k*=2)
		Vertical	3.9 dB (The confidential level is 95 %, *k*=2)

- Dongtan Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	3.5 dB (The confidential level is 95 %, *k*=2)
		ESH2-Z5	3.3 dB (The confidential level is 95 %, *k*=2)
		ESH3-Z6	3.3 dB (The confidential level is 95 %, *k*=2)
		NNLK8129	3.4 dB (The confidential level is 95 %, *k*=2)
Conducted Emission - Signal		ISN T800	5.7 dB (The confidential level is 95 %, *k*=2)
		ISN ST08	5.5 dB (The confidential level is 95 %, *k*=2)
Discontinous		2.9 dB (The confidential level is 95 %, *k*=2)	
disturbance Power		3.9 dB (The confidential level is 95 %, *k*=2)	
Radiated Emission	9 kHz ~30 MHz (Triple Loop Ant.)	3.4 dB (The confidential level is 95 %, *k*=2)	
	9 kHz ~30 MHz (Loop Ant.)	Horizontal	3.8 dB (The confidential level is 95 %, *k*=2)
		Vertical	3.8 dB (The confidential level is 95 %, *k*=2)
	30 MHz ~ 1 000 MHz	Horizontal	4.8 dB (The confidential level is 95 %, *k*=2)
		Vertical	5.4 dB (The confidential level is 95 %, *k*=2)
	1 GHz ~ 18 GHz	Horizontal	4.1 dB (The confidential level is 95 %, *k*=2)
		Vertical	4.2 dB (The confidential level is 95 %, *k*=2)

- End of Test Report -