



FCC TEST REPORT

Job No. : GPWE2311000188EC
Applicant : Cresyn Co.,Ltd
Equipment Under Test (EUT) :
Product Name : True Wireless Earbuds
Model Name : TW-E5C
FCC Authorization Type : Certification
Applied Standards : FCC Part 15 Subpart B, Class B
FCC ID : V2R-TWE5C
Date of Receipt : November 7, 2023
Date of Test : November 22, 2023
Date of Issue : November 28, 2023
Test Results : Complied

Tested by :	 ----- Jaehyeok Lee
Technical Manager :	 ----- 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.

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Contents

1. General Information.....	4
1.1 Client Information.....	4
1.2 Test Laboratory.....	4
1.3 General Information of E.U.T.	4
1.4 Operating Modes and Conditions.....	4
1.5 Peripheral Equipments.....	4
1.6 Cable List.....	4
1.7 System Configurations.....	5
1.8 Test System Layout	5
1.9 Modifications/Notes.....	5
1.10 Applicable Standards for Testing	5
1.11 Summary of Test Results.....	5
2. Emission Test.....	6
2.1 Test Results.....	6
2.2 Test Method and Limits.....	6
2.2.1 Test Method.....	6
2.2.2 Test Limits.....	6
2.3 Conducted Disturbance	7
2.3.1 Test Equipments.....	7
2.3.2 Test Site.....	7
2.3.3 Environment Conditions.....	7
2.3.4 Test Results.....	8
2.4 Radiated Emission	10
2.4.1 Test Equipments.....	10
2.4.2 Test Site.....	10
2.4.3 Environment Conditions.....	10
2.4.4 Test Results.....	11
Appendix A : Measurement Uncertainty	13

Revision History

Revision	Report number	Description
0	F690501-RF-EMC001885	Initial
1		

1. General Information

1.1 Client Information

Applicant	Cresyn Co.,Ltd
Applicant Address	5, Gangnam-daero 107-gil, Seocho-gu, Seoul, Republic of Korea
Manufacturer	Cresyn Co.,Ltd
Manufacturer Address	5, Gangnam-daero 107-gil, Seocho-gu, Seoul, Republic of Korea
Factory	CRESYN HANOI CO., LTD.
Factory Address	Dong Tho Industrial Complex, Yen Phong District, Bac Ninh Province, Vietnam

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
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	True Wireless Earbuds
Model Name	TW-E5C
Serial No.	-
EMI Classification	Class B
Internal Clock Frequency	2 480 Mhz (Wireless Tx Freq. : 2 480 Mhz)
Operating Power	Min 3.0V, Normal 3.7V, Max 4.2V
Test Voltage	120 V~, 60 Hz
H/W Version	1.0
S/W Version	1.0
Port	USB(C-type), POGO Pin
Components	Bluetooth Headset, cradle, C to A USB Cable
Function	Wireless Bluetooth headset & charging cradle

1.4 Operating Modes and Conditions

Operating mode	Operating Condition
Charging Mode	Status that the EUT is charging through cradle

1.5 Peripheral Equipments

Description	Model	Serial No.	Manufacturer	Note.
Travel adapter	ETA0U83EWE	-	Samsung Electronics	

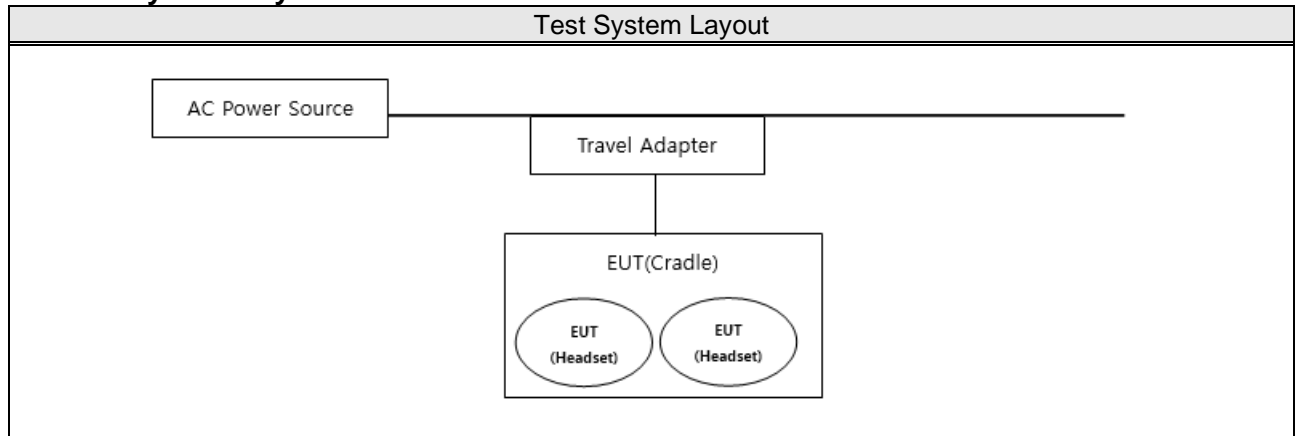
1.6 Cable List

Name	Start		END		Cable Spec.		Used core
	I/O Port		Name	I/O Port	Length (m)	Shield	
EUT(cradle)	USB C-type		Travel Adapter	USB A-type	0.2	Shielded	No
	POGO Pin		EUT(Headset)	POGO	-	-	-

1.7 System Configurations

Description	Model	Serial No.	Manufacturer	Note
Cradle board	002005_V1.0	-	-	-
Cradle sub board	002005_V1.0	-	-	-
Rechargeable Li-ion battery	751235	-	Chogqing VDL Electronics Co.,Ltd.	-
Left headset main board	TWS102 L REV3.0	-	-	-
Left headset sub board	UNIT L V1.0	-	-	-
Left battery	1ICR13/6	-	-	-
Right headset main board	TWS102 R REV3.0	-	-	-
Right headset sub board	UNIT L V1.0	-	-	-
Right battery	1ICR13/6	-	-	-

1.8 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	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Standards	Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107 ANSI C63.4a:2017	Complied
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ANSI C63.4a:2017	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 ANSI C63.4a:2017	Complied
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ANSI C63.4a:2017	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 Conducted Disturbance

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and CISPR-Average detector and using the EMI measuring software. The final test data was measured using a Quasi-Peak detector and CISPR-Average detector.

Note. Measuring software

- Giheung Lab.: EMC32(V10.40.10) from R&S
- Gunpo Lab.: EMC32(V10.60.20) from R&S
- Dongtan Lab.: EMC32(V10.40.00) from R&S

2.3.1 Test Equipments

Equipment	Model	Manufacturer	Serial No	Cal Due. Date
EMI TEST RECEIVER	ESU8	R&S	100128	2024.05.25
2-LINE V-NETWORK	ENV216	R&S	101180	2024.08.04
PULSE LIMITER	ESH3-Z2	R&S	100283	2024.08.28
RF Cable	EMH-1Lab-CE-01	-	-	-

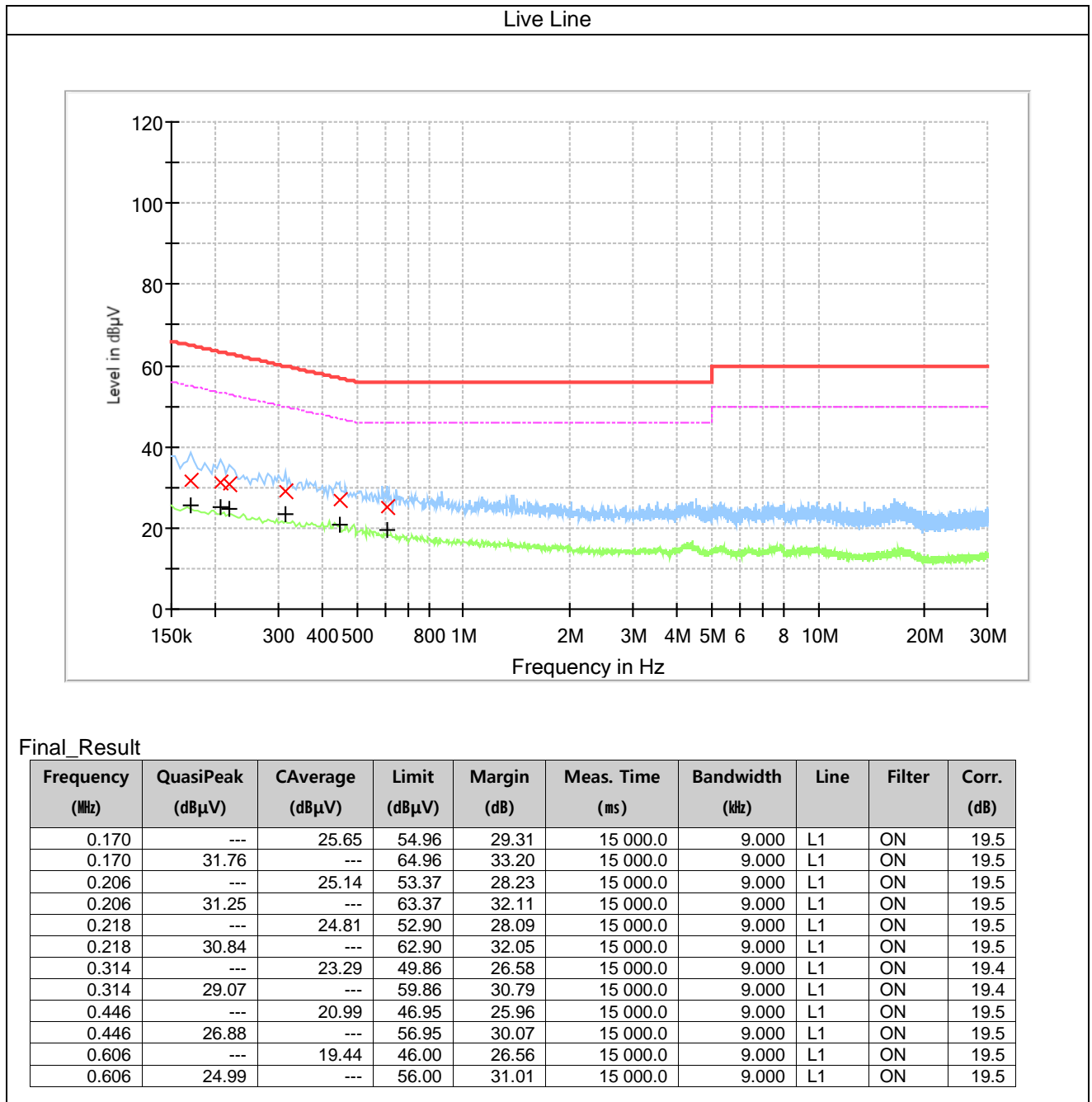
2.3.2 Test Site

Shield Room in Giheung Laboratory

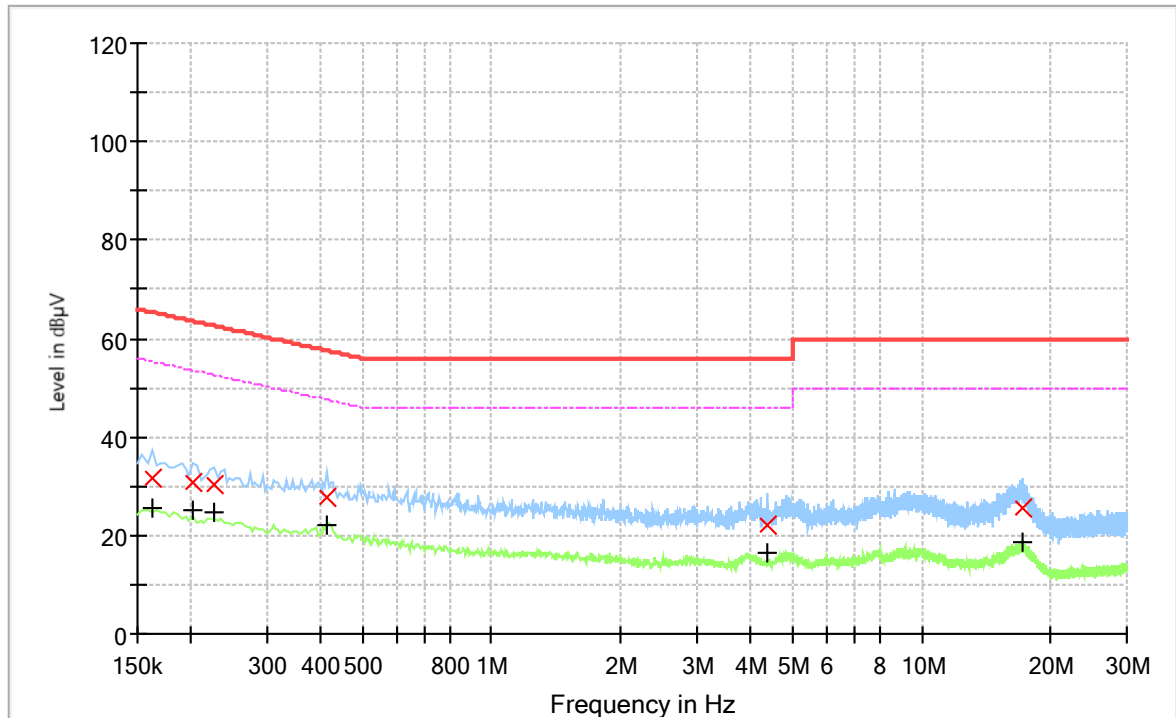
2.3.3 Environment Conditions

Temperature	(Minimum 21.2, Maximum 22.4) °C
Humidity	(Minimum 31.0, Maximum 32.0) % R.H.
Atmospheric Pressure	(Minimum 101.2, Maximum 101.2) kPa
Test Date	November 22, 2023

2.3.4 Test Results



Neutral Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.162	---	25.76	55.36	29.60	15 000.0	9.000	N	ON	19.5
0.162	31.62	---	65.36	33.74	15 000.0	9.000	N	ON	19.5
0.202	---	25.00	53.53	28.53	15 000.0	9.000	N	ON	19.5
0.202	30.67	---	63.53	32.85	15 000.0	9.000	N	ON	19.5
0.226	---	24.57	52.60	28.02	15 000.0	9.000	N	ON	19.5
0.226	30.39	---	62.60	32.20	15 000.0	9.000	N	ON	19.5
0.414	---	22.13	47.57	25.44	15 000.0	9.000	N	ON	19.5
0.414	27.85	---	57.57	29.71	15 000.0	9.000	N	ON	19.5
4.386	---	16.59	46.00	29.41	15 000.0	9.000	N	ON	19.7
4.386	22.28	---	56.00	33.72	15 000.0	9.000	N	ON	19.7
17.190	---	18.56	50.00	31.44	15 000.0	9.000	N	ON	19.9
17.190	25.62	---	60.00	34.38	15 000.0	9.000	N	ON	19.9

Measurement Uncertainty : See Appendix A

Note : • (L1) : Live

• Margin = Limit – Quasi Peak or CAverage

• (N) : Neutral

• Corr. = LISN Factor + Cable loss + Pulse Limiter factor

Ex) In case

Freq ; 0.5 MHz, level ; 30 dB(µV), CL ; 0.2 dB, LISN ; 9.5 dB, P/L: 9.8 dB

Result = Level + CL + LISN + P/L

$$= 30 + 0.2 + 9.5 + 9.8$$

$$= 49.5$$

Margin = Limit – Result

$$= 79 - 49.5$$

$$= 29.5$$

2.4 Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range (30 MHz to 13 GHz) 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 GHz, 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.

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

2.4.1 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	100208	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-04	-	-	-
RF Cable	EMH-1Lab-RE-05	-	-	-
RF Cable	EMH-1Lab-RE-06	-	-	-

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

2.4.2 Test Site

10 m SEMI-ANECHOIC CHAMBER in Giheung Laboratory

2.4.3 Environment Conditions

Below 1 GHz

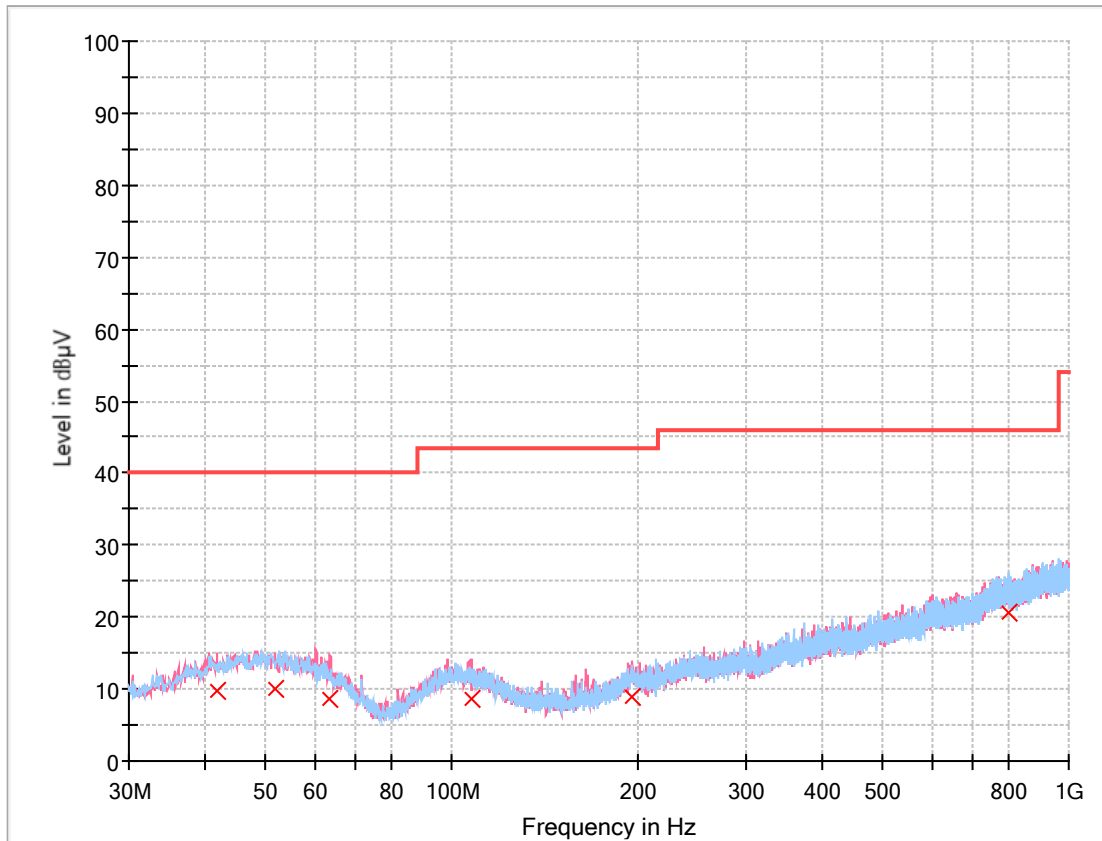
Temperature	(Minimum 19.5, Maximum 20.2) °C
Humidity	(Minimum 31.0, Maximum 35.0) % R.H.
Atmospheric Pressure	(Minimum 101.2, Maximum 101.2) kPa
Test Date	November 22, 2023

Above 1 GHz

Temperature	(Minimum 19.5, Maximum 20.2) °C
Humidity	(Minimum 31.0, Maximum 35.0) % R.H.
Atmospheric Pressure	(Minimum 101.2, Maximum 101.2) kPa
Test Date	November 22, 2023

2.4.4 Test Results

Below 1 GHz (3 m method)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.737	9.88	40.00	30.12	15 000.0	120.000	221.0	V	344.0	-18.2
51.631	10.06	40.00	29.94	15 000.0	120.000	215.0	V	225.0	-17.5
63.562	8.51	40.00	31.49	15 000.0	120.000	212.0	V	92.0	-19.8
107.503	8.62	43.50	34.88	15 000.0	120.000	135.0	V	225.0	-19.7
196.646	8.80	43.50	34.70	15 000.0	120.000	111.0	V	218.0	-19.3
796.494	20.58	46.00	25.42	15 000.0	120.000	160.0	H	104.0	-8.0

Measurement Uncertainty: See Appendix A

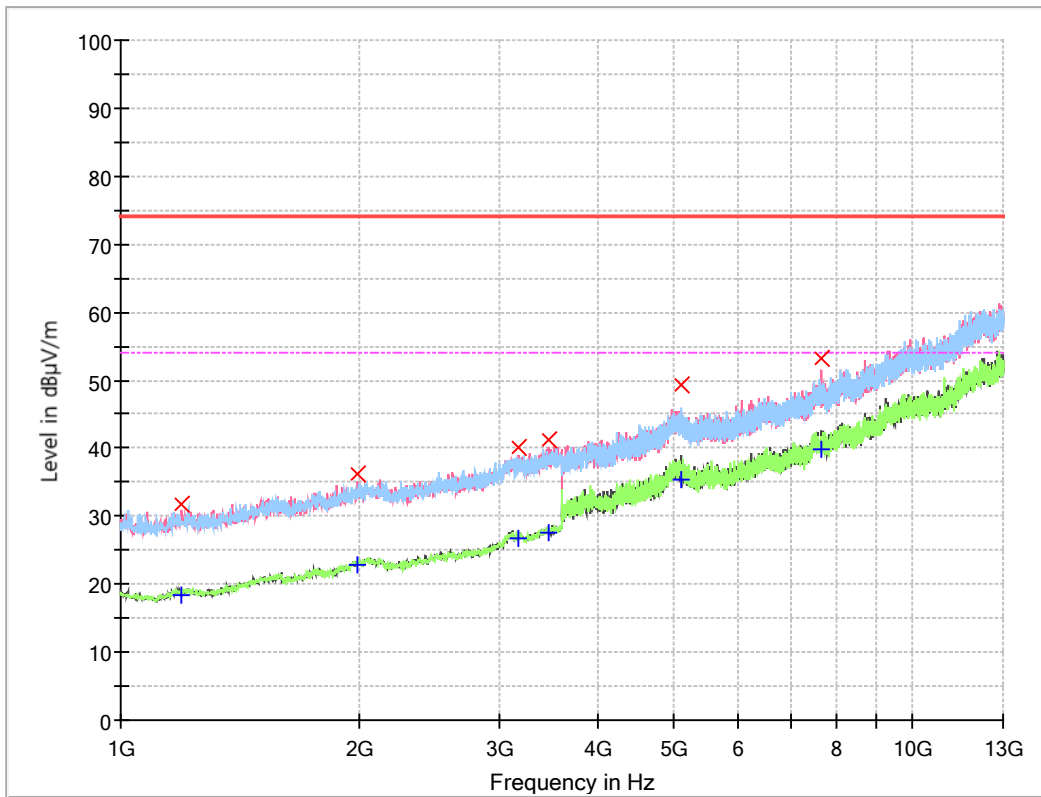
Note : • POL H = Horizontal

• POL V = Vertical

• Margin = Limit – Quasi Peak

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

Above 1 GHz (3 m method)



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)
1 195.600	31.77	---	74.00	42.23	15 000.0	1 000.000	100.0	V	208.0	-14.1
1 195.600	---	18.33	54.00	35.67	15 000.0	1 000.000	100.0	V	208.0	-14.1
1 993.600	36.31	---	74.00	37.69	15 000.0	1 000.000	100.0	V	358.0	-7.4
1 993.600	---	22.76	54.00	31.24	15 000.0	1 000.000	100.0	V	358.0	-7.4
3 176.800	---	26.71	54.00	27.29	15 000.0	1 000.000	100.0	V	234.0	-1.7
3 176.800	40.16	---	74.00	33.84	15 000.0	1 000.000	100.0	V	234.0	-1.7
3 461.200	---	27.53	54.00	26.47	15 000.0	1 000.000	100.0	V	261.0	-0.9
3 461.200	41.36	---	74.00	32.64	15 000.0	1 000.000	100.0	V	261.0	-0.9
5 093.200	---	35.51	54.00	18.49	15 000.0	1 000.000	100.0	H	123.0	6.4
5 093.200	49.27	---	74.00	24.73	15 000.0	1 000.000	100.0	H	123.0	6.4
7 670.800	53.33	---	74.00	20.67	15 000.0	1 000.000	100.0	V	0.0	11.0
7 670.800	---	39.77	54.00	14.23	15 000.0	1 000.000	100.0	V	0.0	11.0

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

$$\begin{aligned} \text{Result} &= \text{Level} + \text{AF} + \text{CL} - \text{Amp} \\ &= 30 + 10 + 4 - 25 \\ &= 19 \end{aligned}$$

$$\begin{aligned} \text{Margin} &= \text{Limit} - \text{Result} \\ &= 43.5 - 19 \\ &= 24.5 \end{aligned}$$

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 %, $k=2$)	
Discontinuous		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 -