TEST REPORT

CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.: CTK-2024-00283

1. Applicant

◦ Name : ENPLUG CO.,LTD

◦ Address : A-704. 705, 46, Dallaenae-ro, Sujeong-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

◦ Date of Receipt : 2024-01-24

2. Manufacturer

◦ Name : ENPLUG CO.,LTD

◦ Address : A-704. 705, 46, Dallaenae-ro, Sujeong-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model : Health Hub / EUM-100

5. Date of Test : 2024-01-24

6. Test Standard(method) used : FCC 47 CFR part 24 subpart E

7. Testing Environment: Temp.: (19 ~ 23) ℃, Humidity: (32 ± 3) % R.H.

8. Test Results : Compliance

9. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
(Address : 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea)

Approval	Tested by Bong-seok Kim: (Signature)	Technical Manager Young-taek Lee: (Signature)

Remark. This report is not related to KOLAS accreditation and relevant regulation.

2024-01-29

CTK Co., Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2024-01-29	Issued (CTK-2024-00283)	all

CONTENTS

1. General Product Description

1.1 Client Information

Company	ENPLUG CO.,LTD
Contact Point	A-704. 705, 46, Dallaenae-ro, Sujeong-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Contact Person	Name : Jongsung Lee E-mail : js.lee@enplug.co.kr Tel : -

1.2 Product Information

FCC ID	2BEJA-EUM-100
Product Description	Health Hub
Model name	EUM-100
Variant Model name	-
LTE Category	M1
LTE Band	2
Operating Frequency range	TX : 1 850 MHz ~ 1 910 MHz RX : 1 930 MHz ~ 1 990 MHz
RF Conducted Power (Module test report reference)	20.89 dBm (0.123 W)
Antenna Type	Integral antenna
Power Source	DC 5 V
Hardware version	1.0
Software version	1.0

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2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	CN : 8737A CAB ID : KR0025
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

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3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Status (Note 1)	Report Clause
24.238(a)	Radiated spurious emission	C	4.1
Other test requirements		NT(Note 3)	
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
Note 2: The data in this test report are traceable to the national or international standards.			
Note 3: The equipment contains an approved single module(FCC ID : XMR2020BG95M1). The test result is the same as the single module.			
Note 4: The sample was tested according to the following specification: ANSI C63.26-2015.			

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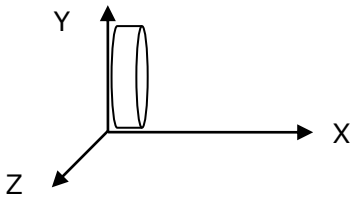
3.2 Mode of operation during the test

The test was performed only in the worst case, referring to the test report of the equipped single module.

Worst mode

Bandwidth	Channel / Frequency	Index	RB#RBstart	Modulation
10 MHz	18650 / 1855 MHz	0	4#0	QPSK

Worst measurement Configuration

Condition	Radiated measurement
EUT faces identified relative to view from receiving antenna	

3.3 Peripheral Devices

No.	Device	Manufacturer	Model No.	Serial No.
1	Radio Communication Analyzer	Anritsu	MT8821C	6261915476
2	DC Power Supply	Topward Electric Instruments Co.,Ltd.	6303D	711196

3.4 Test Software

Radiated Test	EP5RE Ver. 6.0.1.0, ES10 Ver. 10.001

3.5 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor k = 2, Confidence levels of 95 %

Test Item	Uncertainty
Radiated emissions (below 1 GHz)	3.88 dB (C.L. : Approx. 95%, k = 2)
Radiated emissions (above 1 GHz)	2.25 dB (C.L. : Approx. 95%, k = 2)

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4. Technical Characteristic Test

4.1 Radiated emissions

Requirement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

※ P [dBW] – (43 + 10 log(P)) = P [dBm] + 30 [dB] – (43 + P[dBm]) = -13 dBm

Test Location

☒ 10 m SAC (measurement distance : ☐ 10 m, ☒ 3 m)

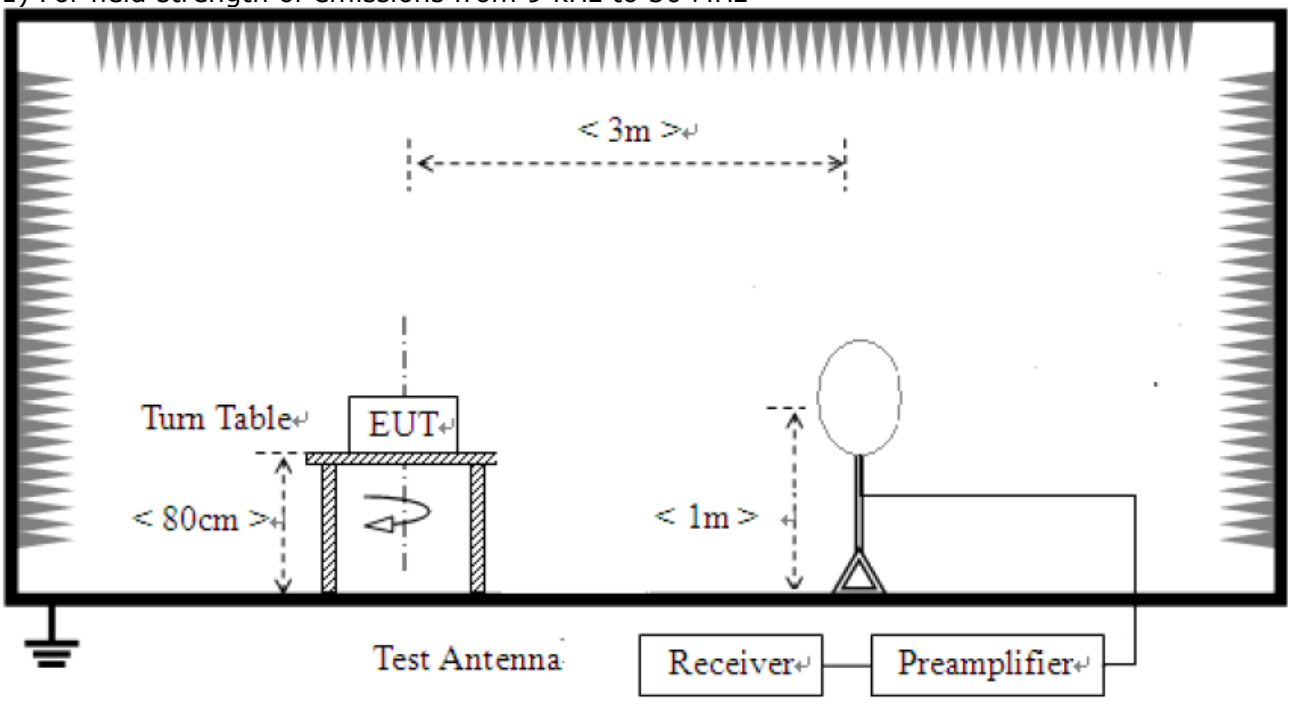
Test Procedures

Test Method	
☒	Refer as ANSI C63.26-2015, clause 5.5.4(Radiated measurement using the field strength method).
☒	Radiated emission tests shall be performed in the frequency range of 9 kHz to 30 MHz, using a calibrated loop antenna. When perpendicular to the ground plane, the lowest height of the magnetic antenna shall be 1 m above the ground and shall be positioned at the specified distance from the EUT. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
	☒ The results shall be by using the square of an inverse linear distance extrapolation factor(40 dB/decade).
☒	In the frequency rage above 30 MHz, Bi-Log antenna(30 MHz to 1 GHz) is used. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.
☒	In the frequency rage above 1 GHz, Horn antenna is used. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.
☒	The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
☒	E [dBuV/m] = EIRP [dBm] – 20log(D) + 104.8 ; where D is measurement distance(in the far field region) in m. If the measurement distance is 3m, the formula is as follows : E [dBuV/m] = EIRP [dBm] – 95.2
☒	Relationship between ERP and EIRP : ERP = EIRP – 2.15 dB

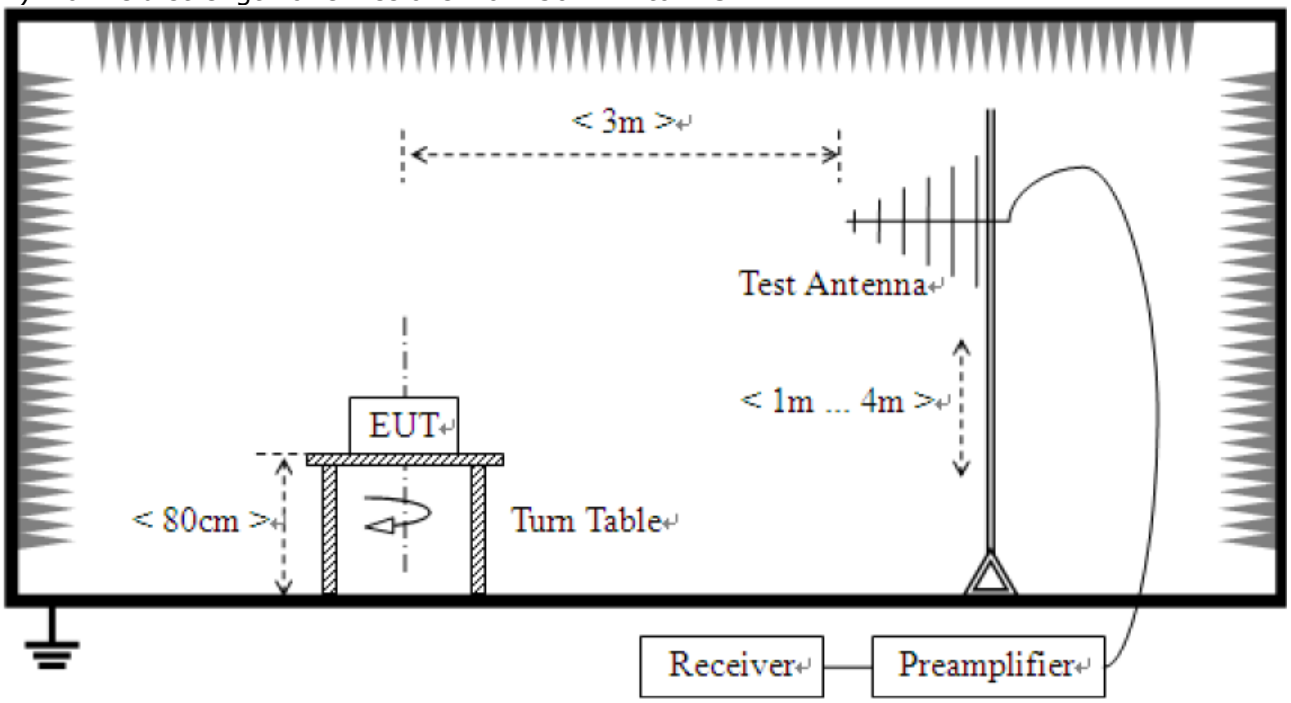
Measuring instrument Settings	
Frequency Range	9 kHz ~ 20 GHz (tenth harmonic)
RBW	200 Hz (9 kHz – 150 kHz), 9 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1 000 MHz), 1 MHz (above 1 GHz)
VBW	≥ RBW
Sweep time	auto

Test Setup

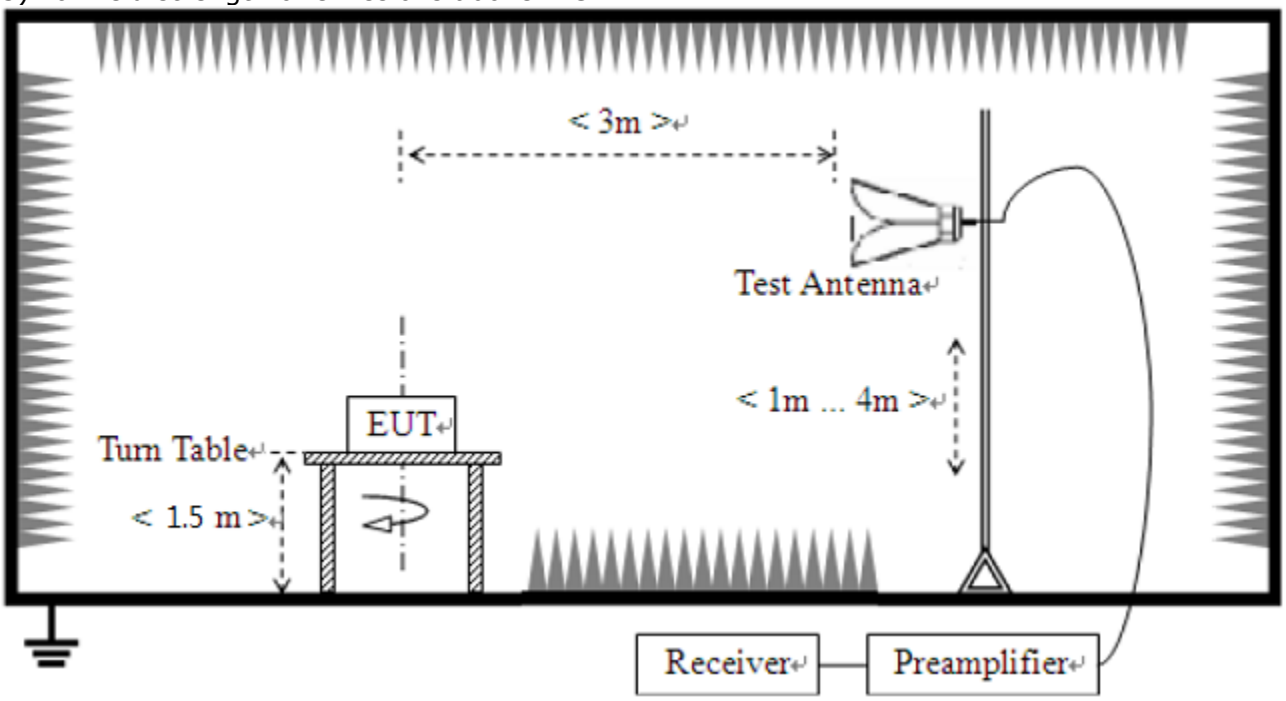
1) For field strength of emissions from 9 kHz to 30 MHz



2) For field strength of emissions from 30 MHz to 1 GHz



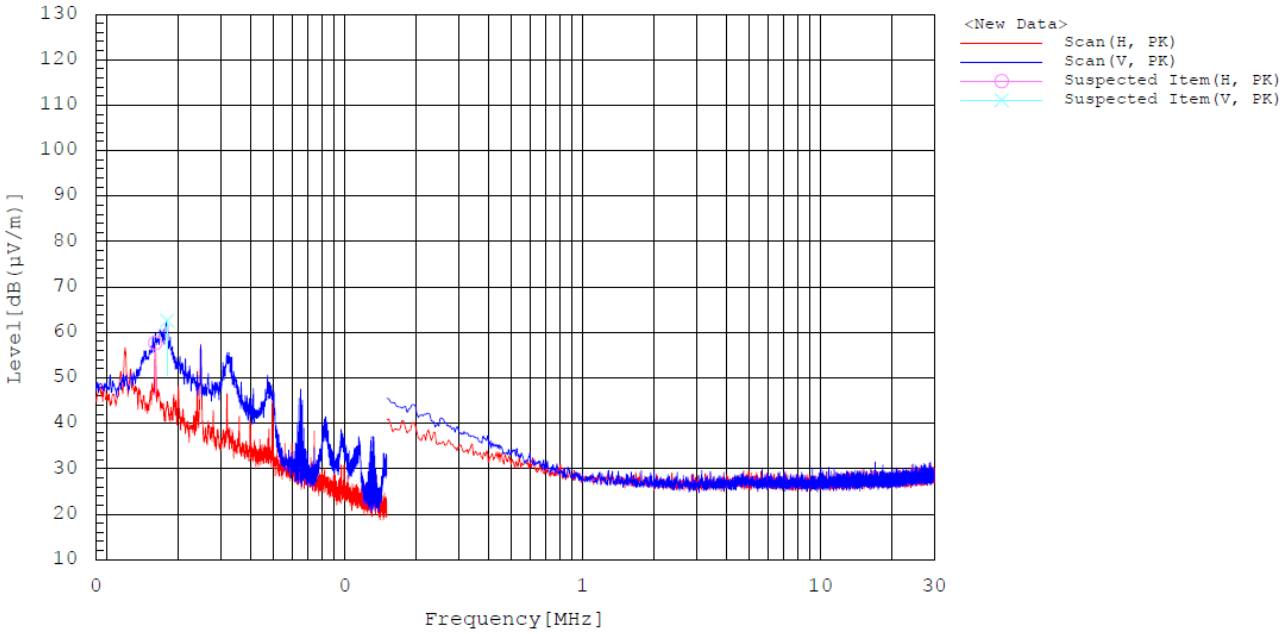
3) For field strength of emissions above 1 GHz



Test results

1) Radiated emissions in the frequency range of 9 kHz to 30 MHz

The requirements are:
☒ Complies



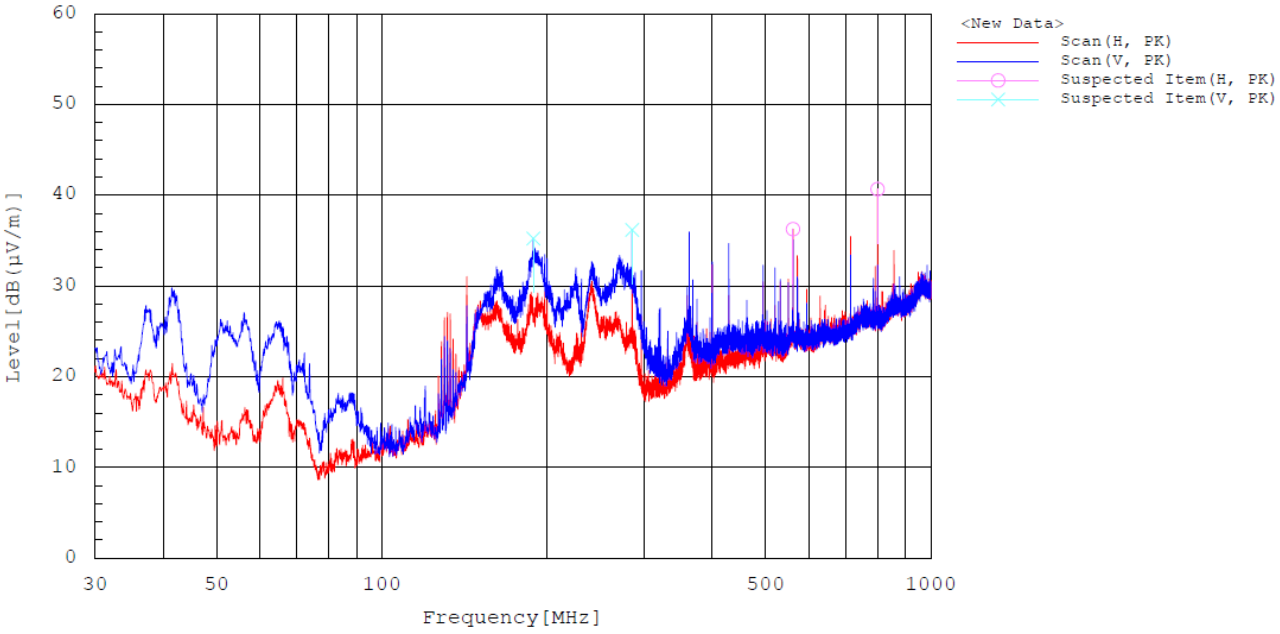
Frequency [MHz]	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
0.016	32.7	25.0	57.7	-39.65	-13.0	26.65	
0.018	37.6	25.0	62.6	-34.75	-13.0	21.75	

Remark :

1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, 6 dB attenuator
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result ERP [dBm] : Result E [dBuV/m] - 95.2 - 2.15

2) Radiated emissions in the frequency range of 30 MHz to 1 000 MHz

The requirements are:
☒ Complies



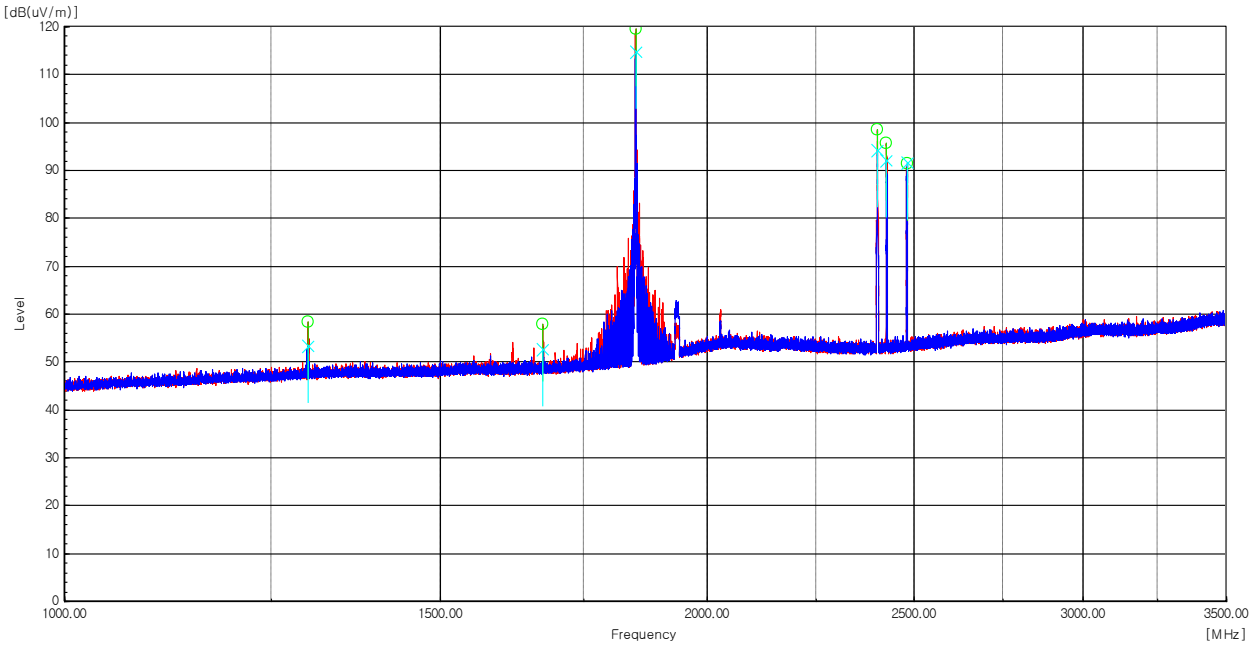
Frequency [MHz]	Pol.	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
188.789	V	50.4	-15.2	35.2	-62.15	-13.0	49.15	
285.692	V	46.7	-10.5	36.2	-61.15	-13.0	48.15	
560.978	H	38.3	-2.0	36.3	-61.05	-13.0	48.05	
800.083	H	39.6	1.1	40.7	-56.65	-13.0	43.65	

Remark :

1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, 6 dB attenuator, Amp Gain
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result ERP [dBm] : Result E [dBuV/m] - 95.2 - 2.15

3) Radiated emissions in the frequency range of 1 GHz to 3.5 GHz

The requirements are:
☒ Complies



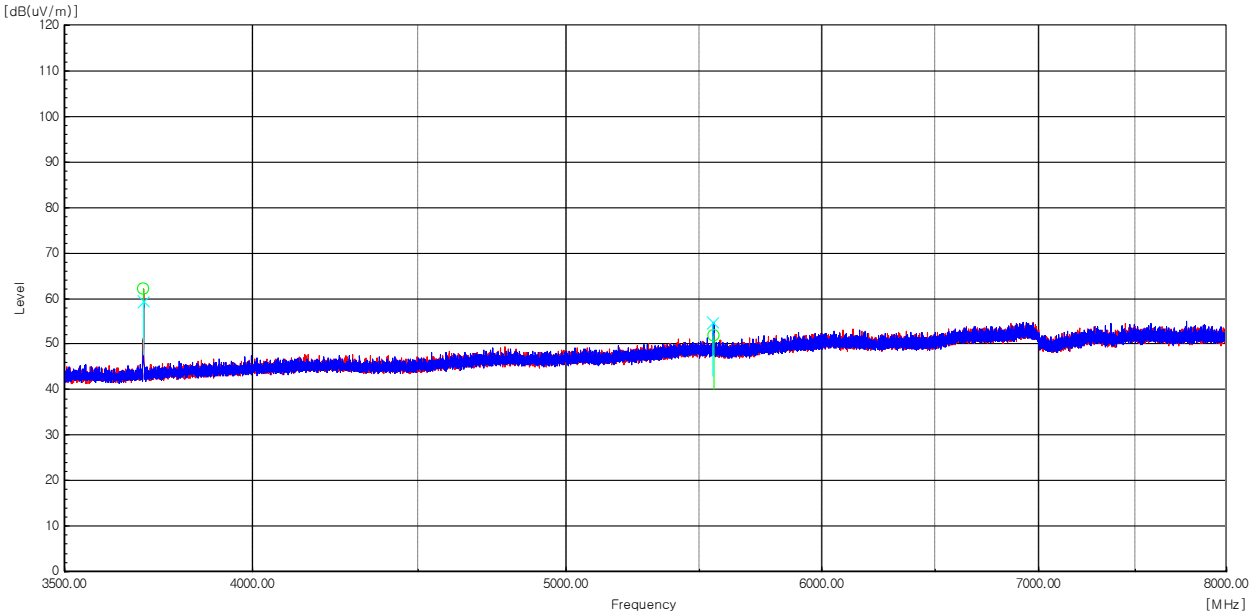
Frequency [MHz]	Pol.	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1 299.612	H	68.8	-10.3	58.5	-36.7	-13.0	23.7	
1 300.612	V	63.7	-10.3	53.4	-41.8	-13.0	28.8	
1 674.727	V	61.9	-9.2	52.7	-42.5	-13.0	29.5	
1 674.827	H	67.1	-9.2	57.9	-37.3	-13.0	24.3	
1 851.034	V	123.4	-8.5	114.9	19.7			LTE Fundamental Frequency
1 851.134	H	127.9	-8.5	119.4	24.2			
2 401.756	H	104.3	-5.8	98.5	3.3			BLE Fundamental Frequency
2 402.056	V	100.1	-5.8	94.3	-0.9			
2 426.157	V	97.9	-5.7	92.2	-3.0			
2 426.357	H	101.4	-5.7	95.7	0.5			
2 479.859	V	97	-5.3	91.7	-3.5			
2 480.059	H	96.7	-5.3	91.4	-3.8			

Remark :

1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, Amp Gain
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result EIRP [dBm] : Result E [dBuV/m] - 95.2

4) Radiated emissions in the frequency range of 3.5 GHz to 8 GHz

The requirements are:
☒ Complies



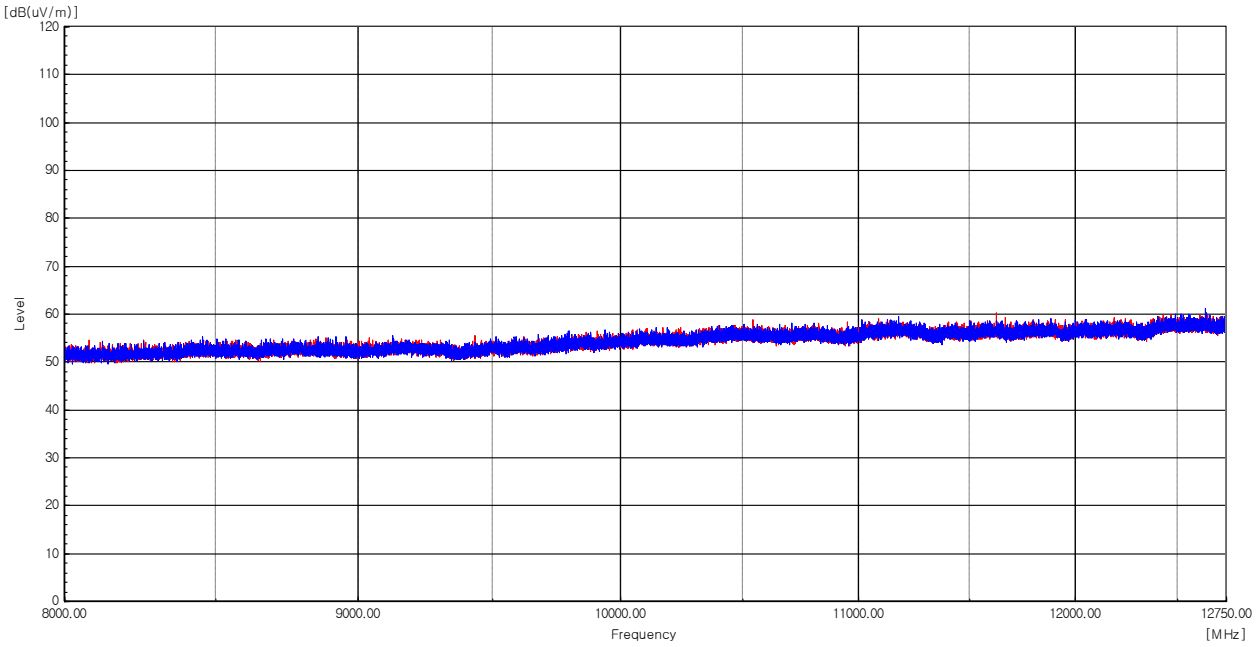
Frequency [MHz]	Pol.	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
3 702.228	H	62.8	-0.6	62.2	-33.0	-13.0	20.0	
3 701.828	V	59.9	-0.6	59.3	-35.9	-13.0	22.9	
5 553.902	H	47.7	4.2	51.9	-43.3	-13.0	30.3	
5 553.102	V	50.6	4.2	54.8	-40.4	-13.0	27.4	

Remark :

1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, Amp Gain
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result EIRP [dBm] : Result E [dBuV/m] - 95.2

5) Radiated emissions in the frequency range of 8 GHz to 12.75 GHz

The requirements are:
☒ Complies



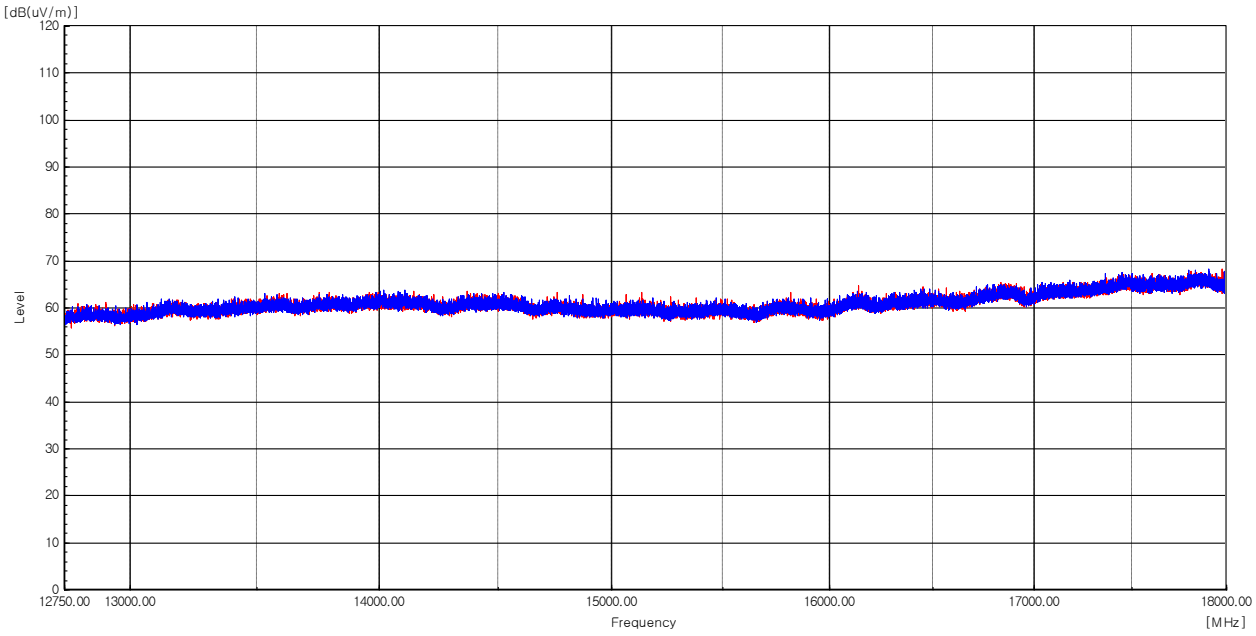
Frequency [MHz]	Pol.	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
The spurious emissions level is no more than noise floor.								

Remark :

1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, Amp Gain
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result EIRP [dBm] : Result E [dBuV/m] - 95.2

6) Radiated emissions in the frequency range of 12.75 GHz to 18 GHz

The requirements are:
☒ Complies



Frequency [MHz]	Pol.	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
The spurious emissions level is no more than noise floor.								

Remark :

1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, Amp Gain
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result EIRP [dBm] : Result E [dBuV/m] - 95.2

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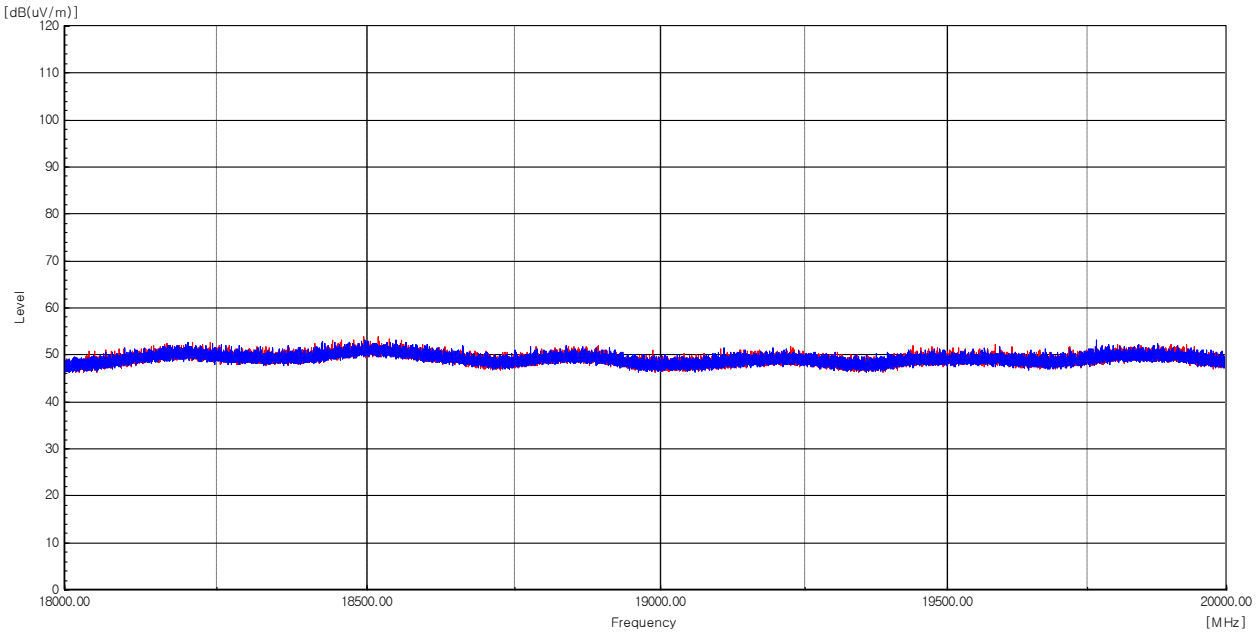
7) Radiated emissions in the frequency range of 18 GHz to 20 GHz

The requirements are:
☒ Complies



Frequency [MHz]	Pol.	Meas. Level [dBuV]	c.f. [dB(1/m)]	Result E [dB(uV/m)]	Result EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
The spurious emissions level is no more than noise floor.								

Remark :

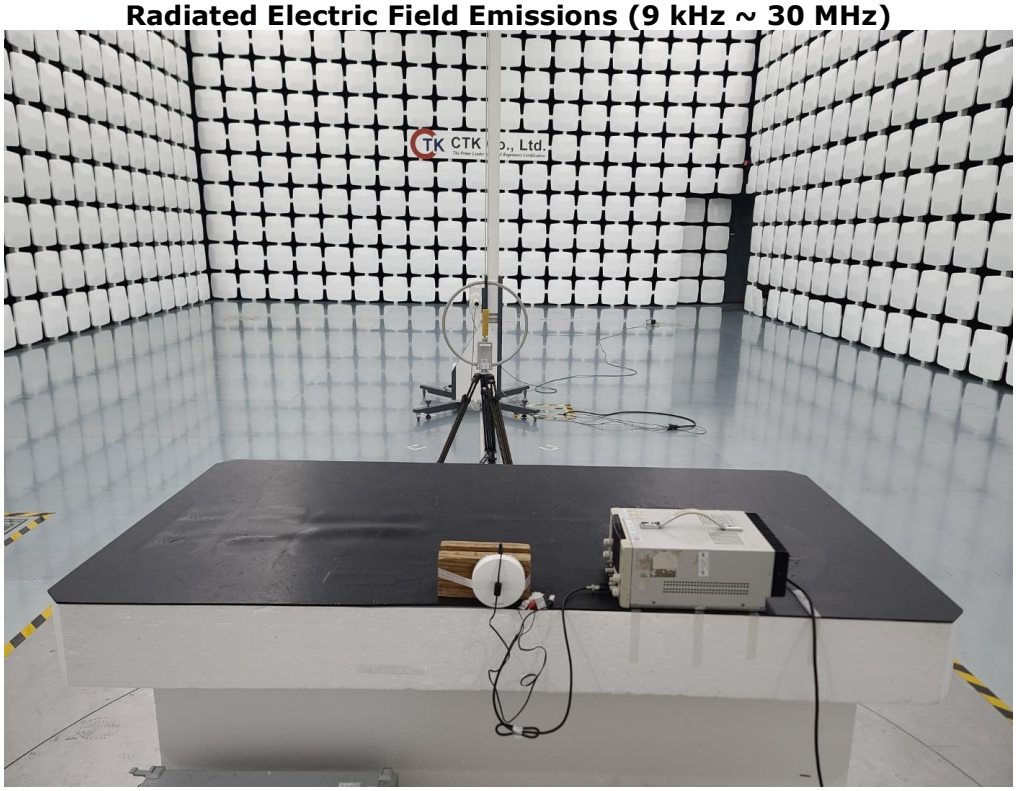
1. Meas. Level : Measured amplitude level
2. Correction factor(c.f.) : Antenna factor, Cable loss, Amp Gain
3. Result E [dBuV/m] : Meas. Level + c.f(Correction factor)
4. Result EIRP [dBm] : Result E [dBuV/m] - 95.2

APPENDIX A – Test Equipment Used For Tests

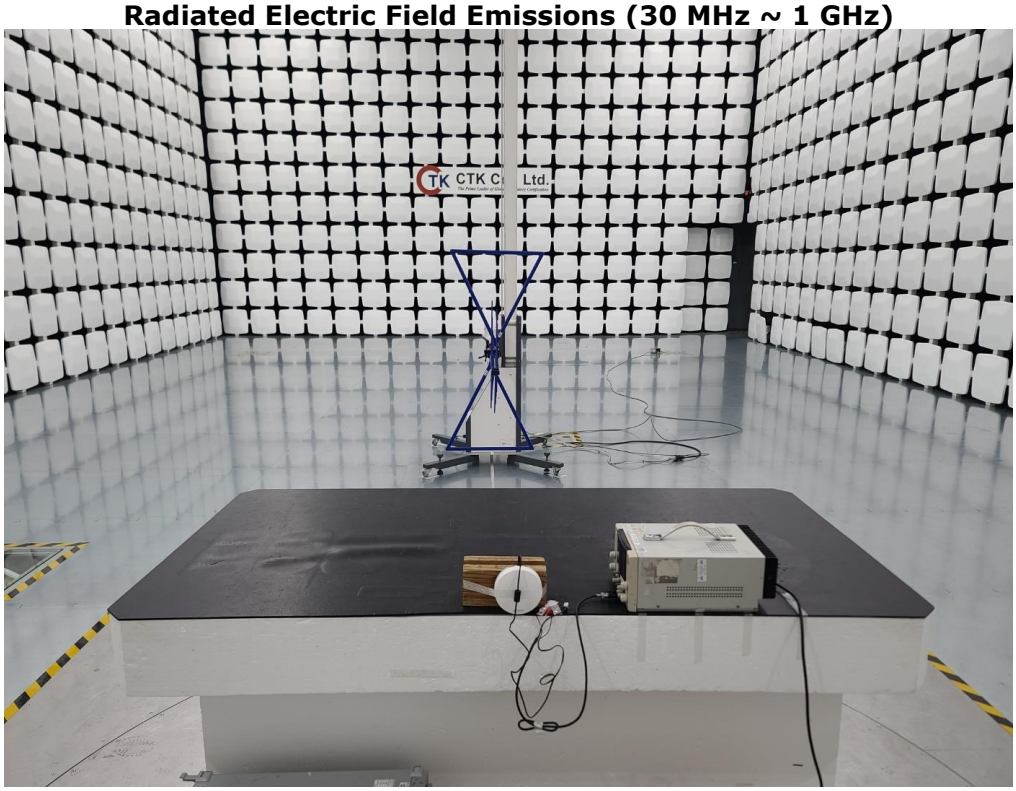
No.	Name of Equipment	Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date
1	Signal Generator	Rohde & Schwarz	SMB100A	175528	2023-03-22	2024-03-22
2	EMI TEST RECEIVER	Rohde & Schwarz	ESW44	102039	2023-05-03	2024-05-03
3	BILOG ANTENNA	TESEQ	CBL6111D	60654	2023-08-21	2025-08-21
4	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2022-04-15	2024-04-15
5	6dB Attenuator	PASTERNACK	PE7AP006-06	L20210504000023	2023-08-04	2024-08-04
6	AMPLIFIER	SONOMA INSTRUMENT	310N	411011	2023-08-04	2024-08-04
7	Spectrum Analyzer	R&S	FSV40	101574	2024-01-15	2025-01-15
8	PRE AMPLIFIER	HP	8449B	3008A00620	2023-04-21	2024-04-21
9	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078895	2023-04-13	2024-04-13
10	HORN ANTENNA	SCHWARZBECK	BBHA9170	1153	2023-10-19	2024-10-19
11	LOW NOISE AMPLIFIER	TESTEK	TK-PA1840H	210124-L	2023-10-23	2024-10-23
12	High Pass Filter	FILTRON	H16030FL	1606001S-2	2023-03-23	2024-03-23
13	High Pass Filter	FILTRON	F-JD2_sub	1606001S-5	2023-03-23	2024-03-23
14	High Pass Filter	ACE RF COMM	HPF12.75-27.0	F-G012.G027.H1	2023-12-04	2024-12-04

APPENDIX B – Test Setup Photos

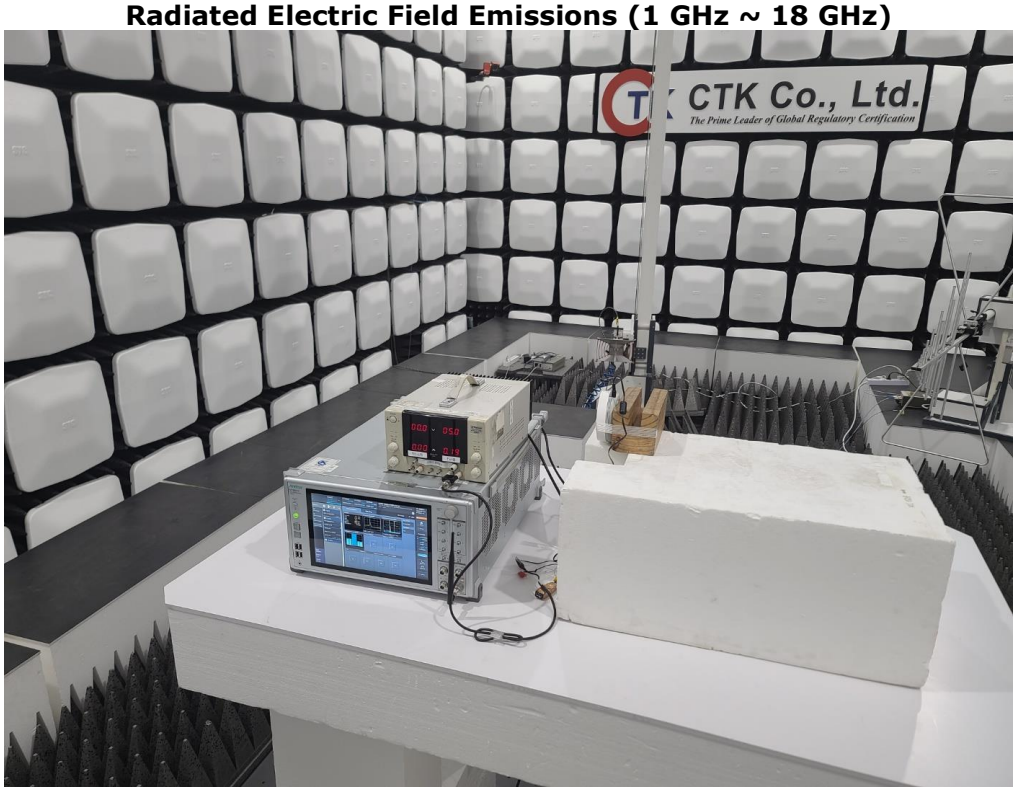
Radiated Electric Field Emissions (9 kHz ~ 30 MHz)



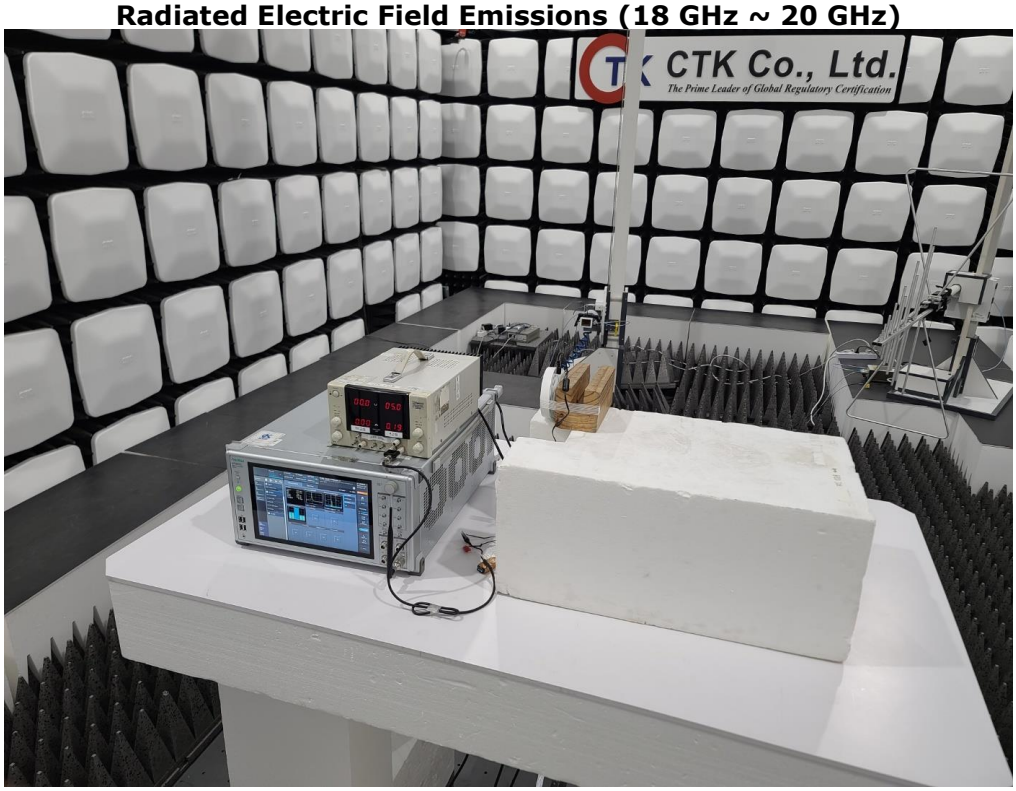
Radiated Electric Field Emissions (30 MHz ~ 1 GHz)



Radiated Electric Field Emissions (1 GHz ~ 18 GHz)



Radiated Electric Field Emissions (18 GHz ~ 20 GHz)



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