

TEST REPORT

Report Number 220300186SEL-EMC1

Applicant Name/Address KD Navien, Inc.
95, Suworam-gil, Seotan-myeon, Pyeongtaek-si, Gyeonggi-do,
Republic of Korea

Test Sample Description

- Product: Bed warmer

- Model and/or Brand name: EQM582-KSUS

- Variant model name.....: EQM582-QSUS, EQM582-SSUS

- Manufacturer Name / Address ..: KD Navien Co., Ltd.
95, Suworam-gil, Seotan-myeon, Pyeongtaek-si, Gyeonggi-do,
Republic of Korea

- Rating(s): AC 120 V, 60 Hz, 340 W

Receipt of sample(s) 29 Mar. 2022

Date of Test 02 May. 2022

Test Method(s) 47 CFR FCC Part 15 Subpart B with ANSI C63.4

Class Class B

Test Results & Uncertainty See EMC Results Conclusion

Issue date 25 May. 2022

Note 1. The results shown in this test report refer only to the sample(s) tested.

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Note 3: This laboratory is not accredited for the test results marked as *.

Tested by;



Name: Harry Jeon
Engineer

Approved by;



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SECTION 1 CONTENTS

SECTION 2 EMC Results Conclusion (with Justification).....3

SECTION 3 Test environment and conditions4

SECTION 4 EUT Information5

SECTION 5 TEST CONFIGURATION, Operation mode and SET-UP.....6

SECTION 6 EMISSION7

SECTION 7 Appendix I17

 Photographs of Test Configurations17

SECTION 8 Appendix II21

 Photographs of EUT.....21



SECTION 2 EMC RESULTS CONCLUSION (WITH JUSTIFICATION)

We tested the Bed warmer, Model: EQM582-KSUS, to determine if it was in compliance with the relevant US standards as marked on the test report.

We found that the unit met the requirement of FCC Part 15 Subpart B standards when tested as received.

Test Items	Applied Standards	Results			
		Comply	Not Comply	N/A	See Note
Disturbance Voltage	FCC Part 15 Subpart B	☒	☐	☐	☐
Radiated disturbance (Below 1 GHz)	FCC Part 15 Subpart B	☒	☐	☐	☐
Radiated disturbance (Above 1 GHz)	FCC Part 15 Subpart B	☒	☐	☐	☐
Note) When determining the test conclusion, the Measurement Uncertainty of test has been considered.					

Measurement Uncertainty

Conducted Emission	150 kHz – 30 MHz	$U = 3.4$ [dB]
	(Confidence level approximately 95 %, $k = 2$)	
Radiated Emissions	9 kHz – 30 MHz	$U = 5.1$ [dB]
	30 MHz – 1 000 MHz	Horizontal: $U = 4.6$ [dB] Vertical: $U = 4.9$ [dB]
	1 GHz – 6 GHz	Horizontal: $U = 5.6$ [dB] Vertical: $U = 5.5$ [dB]
	6 GHz – 18 GHz	Horizontal: $U = 5.5$ [dB] Vertical: $U = 5.7$ [dB]
	(Confidence level approximately 95 %, $k = 2$)	



SECTION 3 TEST ENVIRONMENT AND CONDITIONS

Test Environment

Test Item	Test Site	Test date (MM-DD)	Temp (°C)	Humidity (% R.H.)	Pressure (kPa)
Disturbance Voltage	Shielded Room #2	05-02	23.4 ± 1.0	40.8 ± 1.0	
Radiated disturbance (Below 1 GHz)	10 m chamber	05-02	23.3 ± 1.0	41.2 ± 1.0	-
Radiated disturbance (Above 1 GHz)	10 m chamber	05-02	23.3 ± 1.0	41.2 ± 1.0	



SECTION 4 EUT INFORMATION

Equipment Under Test (EUT):	Bed warmer
Model:	EQM582-KSUS
Variant Model:	EQM582-QSUS , EQM582-SSUS
Variant model information:	The model EQM582-QSUS is dualization model depending on reduced mat size(Queen size). The model EQM582-SSUS is dualization model depending on reduced mat size(Small size).
Serial No.:	-
Rated Voltage:	AC 120 V, 60 Hz, 340 W
Tested Voltage:	AC 120 V, 60 Hz
Maximum clock frequency:	16 MHz
Wireless Module FCC ID:	2AC7Z-ESP32WROOM32E



SECTION 5 TEST CONFIGURATION, OPERATION MODE AND SET-UP

Test Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer	ETC.
Bed warmer	EQM582-KSUS	-	KD Navien Co., Ltd.	EUT
Remote Controller	-	-	KD Navien Co., Ltd.	EUT

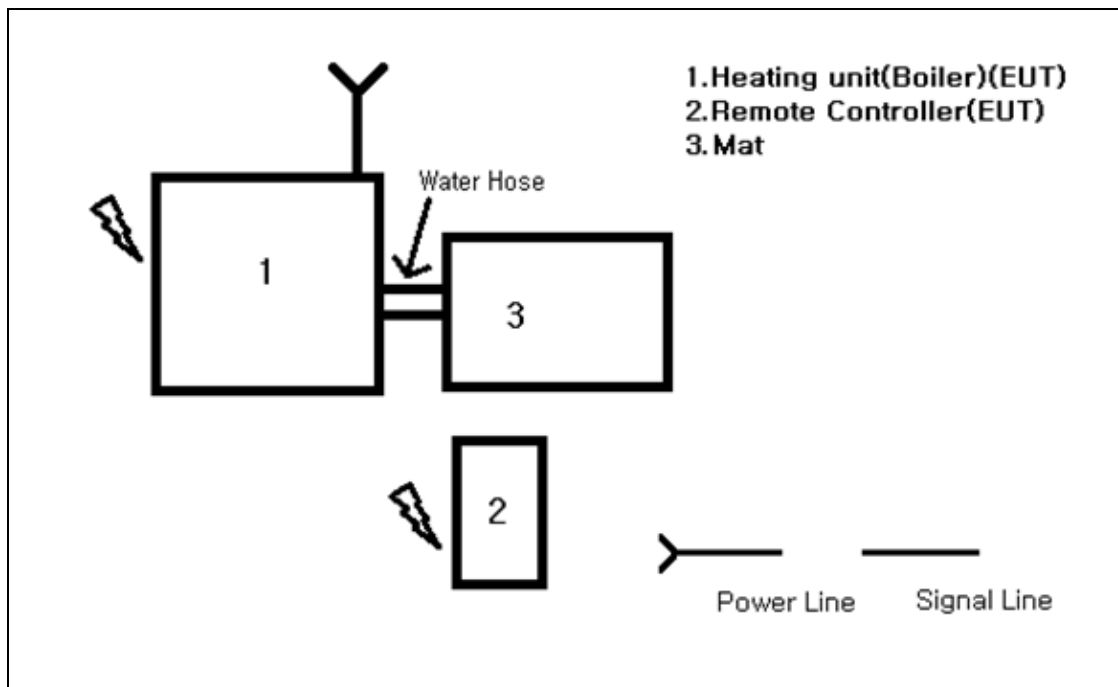
Used cable description

Start		END		CABLE		
Name	I/O Port	Name	I/O Port	Length (m)	Shield	With Ferrite
EUT	AC IN	AC Power	AC OUT	1.4	Unshielded	-

Test Operation Mode

- Normal Operating Mode: After configuring the EUT as shown in the layout diagram, it was tested after setting the maximum temperature.

Test Setup





SECTION 6 EMISSION

Radiated disturbance test

Test Method and Summary

Test standard: FCC Part 15 Subpart B

Used Test Equipment

Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC001	EMI Test Receiver	R & S	ESU40	100478	2023.01.03	1Y
EMC002	EMI Test Receiver	R & S	ESU26	100590	2023.01.03	1Y
EMC025	Biconilog (Type7)	ETS-Lindgren	3142E	00203547	2023.12.09	2Y
EMC029	DRG Horn (Medium)	ETS-Lindgren	3117	00203763	2022.07.16	1Y
EMC031	Standard Gain Horn	ETS-Lindgren	3160-09	LM9860	2022.05.18	1Y
EMC074	AMP	R & S	SCU-01D	1904843	2022.06.29	1Y
EMC078	AMP	R & S	SCU-18D	1952129	2022.06.29	1Y
EMC079	AMP	R & S	SCU-26D	1879069	2022.06.29	1Y

Used Test Software

Software	Manufacturer	Software Version	Used
EMC32	R & S	10.30.00	☒

Operating Environment

Test Voltage: AC 120 V, 60 Hz

Test Setup and Procedure

The EUT along with its peripherals were placed on a non-conducted table with a height of 0.8 m in height table above the reference ground plane.

Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 m to 4 m above the reference ground plane continuously to determine associated with higher emission levels and record them.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

For measurements above 1 GHz, place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal.

The final measurement antenna elevation shall be that which maximizes the emissions.

**Limits**

- The test frequency range of Radiated Disturbance measurements are listed below.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 – 500	2 000
500 – 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

(1) Limit for Radiated Emission below 1 000 MHz

Frequency range (MHz)	Class A Equipment (10 m distance) Quasi-peak (dBμV/m)	Class B Equipment (3 m distance) Quasi-peak (dBμV/m)
30 to 88	39.0	40.0
88 to 216	43.5	43.5
216 to 960	46.4	46.0
960 to 1 000	49.5	54.0

Note 1) The lower limit shall apply at the transition frequency.

Note 2) Additional provisions may be required for cases where interference occurs.

Note 3) According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards (CISPR), Pub. 22 shown as below.

Note 4) Result (dBμV/m) = Reading (dBμV) + Corr. (Ant. Factor (dB/m) + Cable Loss (dB) – Amp. Gain (dB))

Result: QuasiPeak, Reading: Receiver reading value, Corr.: Correction Factor

Margin = Limit – Result

Frequency range (MHz)	Class A Equipment (10 m distance) Quasi-peak (dBμV/m)	Class B Equipment (10 m distance) Quasi-peak (dBμV/m)
30 to 230	40	30
230 to 1 000	47	37

(2) Limits for Radiated Emission above 1 000 MHz at a measuring distance of 3 m

Frequency (GHz)	Class A Equipment		Class B Equipment	
	Peak (dBμV/m)	Average (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
1 to 40	80	60	74	54

Note 1) Result (dBμV/m) = Reading (dBμV) + Corr. (Ant. Factor (dB/m) + Cable Loss (dB) – Amp. Gain (dB))

Result: Final value, Reading: Receiver reading value, Corr.: Correction Factor

Margin = Limit – Result

Note 2) If measured at a distance other than 3 m, apply the following formula to compensate the measured value.

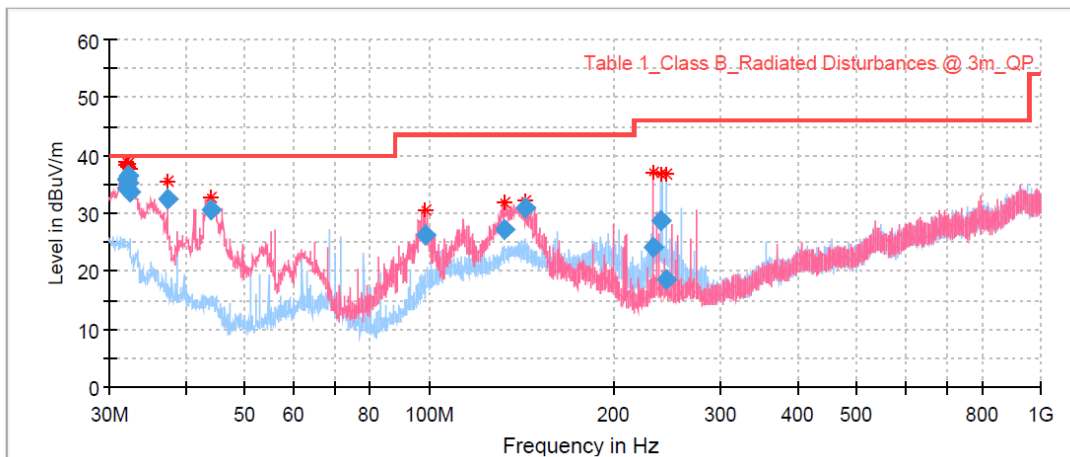
$E_m = E_{dm} + 20 \cdot \log(d/3)$ (d: Measured distance)

E_m : Result of measured distance correction, E_{dm} : Measured value



Test Data

[30 MHz ~ 1 GHz]

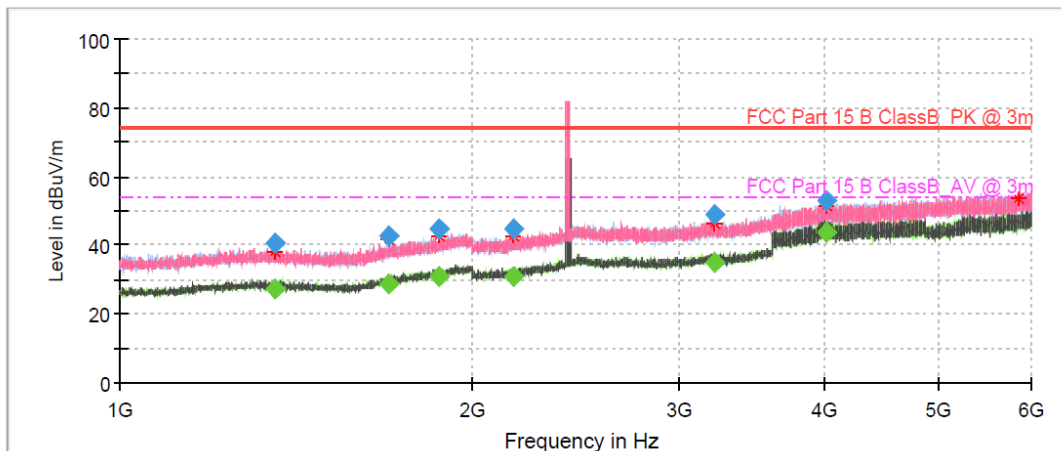


Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.89	35.98	40.00	4.02	107.0	V	273.00	-6.60
31.99	34.40	40.00	5.60	100.0	V	291.00	-6.66
32.10	35.35	40.00	4.65	100.0	V	332.00	-6.74
32.26	36.47	40.00	3.53	100.0	V	292.00	-6.87
32.53	33.75	40.00	6.25	100.0	V	235.00	-7.08
37.44	32.57	40.00	7.43	100.0	V	279.00	-9.85
43.90	30.55	40.00	9.45	100.0	V	297.00	-13.20
98.49	26.34	43.50	17.16	100.0	V	6.00	-13.62
132.71	27.30	43.50	16.20	100.0	V	273.00	-12.86
143.87	30.89	43.50	12.61	100.0	V	237.00	-12.35
232.57	24.03	46.00	21.97	107.0	V	83.00	-8.55
239.90	28.64	46.00	17.36	190.0	H	176.00	-8.13
244.37	18.52	46.00	27.48	190.0	H	179.00	-7.99



[1 GHz ~ 6 GHz]

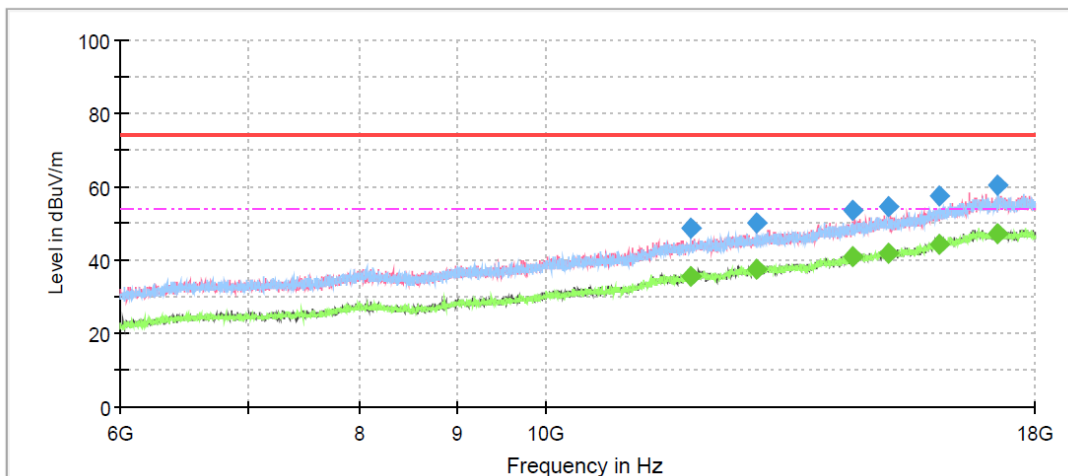


Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	CAverage (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1356.83	---	27.56	54.00	26.44	124.0	H	246.00	5.44
1356.83	40.75	---	74.00	33.25	124.0	H	246.00	5.44
1692.00	---	28.76	54.00	25.24	137.0	V	105.00	6.26
1692.00	42.66	---	74.00	31.34	137.0	V	105.00	6.26
1871.83	---	30.82	54.00	23.18	100.0	V	283.00	8.18
1871.83	44.74	---	74.00	29.26	100.0	V	283.00	8.18
2165.83	---	31.17	54.00	22.83	100.0	V	13.00	9.07
2165.83	45.07	---	74.00	28.93	100.0	V	13.00	9.07
3220.00	48.93	---	74.00	25.07	168.0	V	50.00	12.05
3220.00	---	35.13	54.00	18.87	168.0	V	50.00	12.05
4006.50	53.09	---	74.00	20.91	100.0	H	342.00	17.14
4006.50	---	43.67	54.00	10.33	100.0	H	342.00	17.14



[6 GHz ~ 18 GHz]

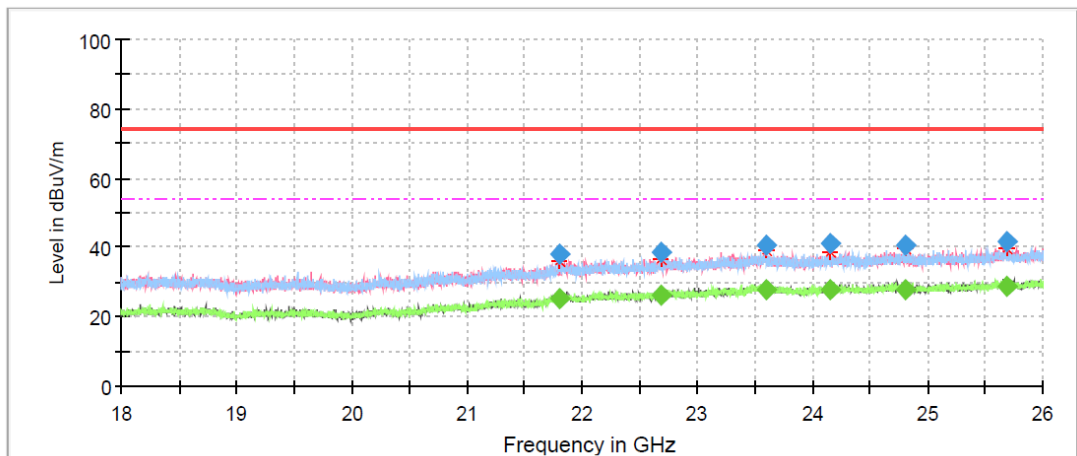


Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11895.06	---	35.67	54.00	18.33	122.0	H	57.00	19.21
11895.06	48.71	---	74.00	25.29	122.0	H	57.00	19.21
12876.05	---	37.45	54.00	16.55	100.0	V	327.00	20.97
12876.05	50.16	---	74.00	23.84	100.0	V	327.00	20.97
14447.85	---	40.79	54.00	13.21	127.0	H	38.00	24.34
14447.85	53.57	---	74.00	20.43	127.0	H	38.00	24.34
15079.46	54.83	---	74.00	19.17	100.0	H	307.00	25.49
15079.46	---	42.00	54.00	12.00	100.0	H	307.00	25.49
16025.61	57.67	---	74.00	16.33	138.0	H	9.00	27.92
16025.61	---	44.58	54.00	9.42	138.0	H	9.00	27.92
17218.89	---	47.09	54.00	6.91	100.0	H	212.00	29.89
17218.89	60.64	---	74.00	13.36	100.0	H	212.00	29.89



[18 GHz ~ 26 GHz]



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
21802.98	37.94	---	74.00	36.06	100.0	V	166.00	7.84
21802.98	---	25.38	54.00	28.62	100.0	V	166.00	7.84
22688.94	38.61	---	74.00	35.39	182.0	H	85.00	8.31
22688.94	---	26.06	54.00	27.94	182.0	H	85.00	8.31
23593.65	---	27.92	54.00	26.08	162.0	V	154.00	9.96
23593.65	40.82	---	74.00	33.18	162.0	V	154.00	9.96
24151.77	---	27.76	54.00	26.24	100.0	H	40.00	9.97
24151.77	41.02	---	74.00	32.98	100.0	H	40.00	9.97
24806.31	---	28.07	54.00	25.93	138.0	H	233.00	9.63
24806.31	40.93	---	74.00	33.07	138.0	H	233.00	9.63
25697.06	---	28.82	54.00	25.18	100.0	H	222.00	9.94
25697.06	41.99	---	74.00	32.01	100.0	H	222.00	9.94



Disturbance Voltage test

Test Method and Summary

Test standard : FCC Part 15 Subpart B

Used Test Equipment

Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC004	EMI Test Receiver	R & S	ESR7	101560	2023.01.03	1Y
EMC007	Two-Line V-Network	R & S	ENV216	101982	2022.10.15	1Y

Used Test Software

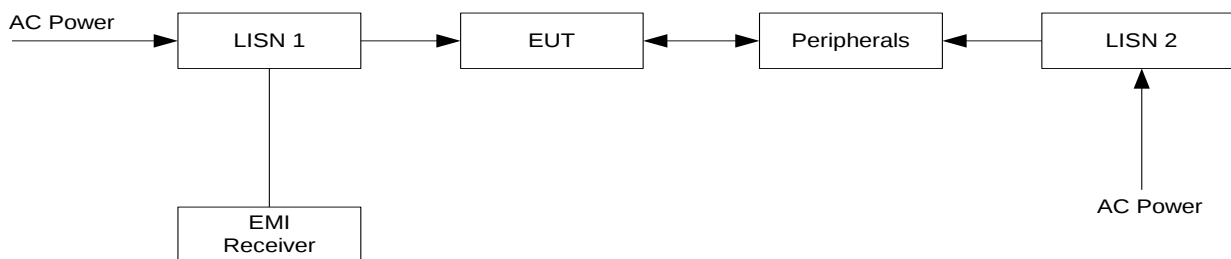
Software	Manufacturer	Software Version	Used
EMC32	R & S	10.28.00	☒

Operating Environment

Test Voltage: AC 120 V, 60 Hz

Test Setup and Procedure

Disturbance Voltage Test at Mains Terminal:



The EUT along with its peripherals were placed on a 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 m space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 characteristic coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

**Limits**

Frequency range (MHz)	Limits dB(μV)			
	Quasi-peak		Average	
	Class A	Class B	Class A	Class B
0.15 to 0.50	79	66 to 56	66	56 to 46
0.50 to 5	73	56	60	46
5 to 30		60		50

Note 1) The lower limit shall apply at the transition frequencies.

Note 2) The limit decreases linearly with the logarithm of the frequency in the range (0.15 ~ 0.5) MHz.

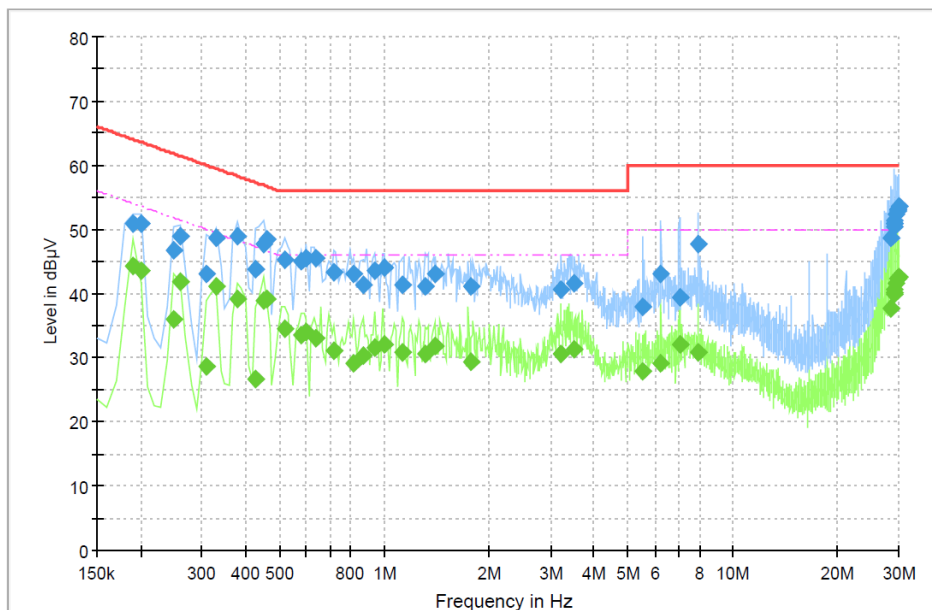
Note 3) Result (dBμV) = Reading (dBμV) + Corr. (Insertion Loss (dB) + Cable Loss (dB))

Result: QuasiPeak/CAverage, Reading: Receiver reading value, Corr.: Correction Factor

Margin = Limit – Result



Test Data



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.189800	---	44.32	54.05	9.73	N	ON	9.9
0.189800	50.94	---	64.05	13.10	N	ON	9.9
0.199750	---	43.66	53.62	9.96	N	ON	9.8
0.199750	50.91	---	63.62	12.71	N	ON	9.8
0.249500	---	35.87	51.77	15.90	N	ON	9.6
0.249500	46.80	---	61.77	14.98	N	ON	9.6
0.259450	---	41.94	51.45	9.51	N	ON	9.6
0.259450	48.85	---	61.45	12.60	N	ON	9.6
0.309200	---	28.51	49.99	21.48	N	ON	9.7
0.309200	43.07	---	59.99	16.92	N	ON	9.7
0.329100	48.78	---	59.47	10.70	N	ON	9.8
0.329100	---	41.05	49.47	8.43	N	ON	9.8
0.378850	---	39.22	48.31	9.09	N	ON	9.9
0.378850	48.83	---	58.31	9.47	N	ON	9.9
0.428600	---	26.66	47.28	20.62	N	ON	9.9
0.428600	43.82	---	57.28	13.46	N	ON	9.9
0.448500	---	38.85	46.90	8.05	N	ON	9.9
0.448500	47.77	---	56.90	9.14	N	ON	9.9
0.458450	---	39.03	46.72	7.69	N	ON	9.9
0.458450	48.46	---	56.72	8.26	N	ON	9.9
0.518150	---	34.45	46.00	11.55	N	ON	9.9
0.518150	45.15	---	56.00	10.85	N	ON	9.9
0.577850	---	33.57	46.00	12.43	N	ON	9.9
0.577850	44.92	---	56.00	11.08	N	ON	9.9
0.597750	---	34.03	46.00	11.97	N	ON	9.9
0.597750	45.40	---	56.00	10.60	N	ON	9.9
0.637550	---	33.07	46.00	12.93	N	ON	9.9
0.637550	45.41	---	56.00	10.59	N	ON	9.9
0.717150	---	30.99	46.00	15.01	L1	ON	9.8
0.717150	43.32	---	56.00	12.68	L1	ON	9.8
0.816650	43.05	---	56.00	12.95	L1	ON	9.8
0.816650	---	29.23	46.00	16.77	L1	ON	9.8
0.866400	41.44	---	56.00	14.56	L1	ON	9.8
0.866400	---	30.35	46.00	15.65	L1	ON	9.8
0.936050	---	31.48	46.00	14.52	L1	ON	9.7
0.936050	43.45	---	56.00	12.55	L1	ON	9.7
1.005700	---	32.00	46.00	14.00	N	ON	9.7
1.005700	44.04	---	56.00	11.96	N	ON	9.7
1.125100	41.37	---	56.00	14.63	L1	ON	9.8
1.125100	---	30.87	46.00	15.13	L1	ON	9.8
1.314150	---	30.57	46.00	15.43	L1	ON	9.8
1.314150	41.06	---	56.00	14.94	L1	ON	9.8



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
1.403700	---	31.78	46.00	14.22	N	ON	9.7
1.403700	42.97	---	56.00	13.03	N	ON	9.7
1.781800	---	29.25	46.00	16.75	N	ON	9.7
1.781800	40.98	---	56.00	15.02	N	ON	9.7
3.224550	---	30.55	46.00	15.45	L1	ON	9.7
3.224550	40.68	---	56.00	15.32	L1	ON	9.7
3.513100	---	31.42	46.00	14.58	L1	ON	9.7
3.513100	41.67	---	56.00	14.33	L1	ON	9.7
5.513050	---	27.91	50.00	22.09	L1	ON	9.7
5.513050	38.03	---	60.00	21.97	L1	ON	9.7
6.239400	---	29.21	50.00	20.79	L1	ON	9.8
6.239400	43.12	---	60.00	16.88	L1	ON	9.8
7.035400	---	32.07	50.00	17.93	L1	ON	9.8
7.035400	39.32	---	60.00	20.68	L1	ON	9.8
7.930900	---	30.82	50.00	19.18	L1	ON	9.9
7.930900	47.60	---	60.00	12.40	L1	ON	9.9
28.408000	---	37.71	50.00	12.29	L1	ON	10.0
28.408000	48.60	---	60.00	11.40	L1	ON	10.0
28.925400	---	39.77	50.00	10.23	L1	ON	10.0
28.925400	50.47	---	60.00	9.53	L1	ON	10.0
28.985100	---	40.01	50.00	9.99	L1	ON	10.0
28.985100	50.84	---	60.00	9.16	L1	ON	10.0
29.005000	---	40.08	50.00	9.92	L1	ON	10.0
29.005000	50.87	---	60.00	9.13	L1	ON	10.0
29.164200	51.38	---	60.00	8.62	L1	ON	10.1
29.164200	---	40.73	50.00	9.27	L1	ON	10.1
29.422900	---	41.64	50.00	8.36	L1	ON	10.1
29.422900	52.30	---	60.00	7.70	L1	ON	10.1
29.651750	---	42.22	50.00	7.78	L1	ON	10.1
29.651750	52.92	---	60.00	7.08	L1	ON	10.1
29.751250	---	42.32	50.00	7.68	L1	ON	10.1
29.751250	53.10	---	60.00	6.90	L1	ON	10.1
29.820900	53.08	---	60.00	6.92	L1	ON	10.1
29.820900	---	42.41	50.00	7.59	L1	ON	10.1
29.860700	---	42.55	50.00	7.45	L1	ON	10.1
29.860700	53.48	---	60.00	6.52	L1	ON	10.1

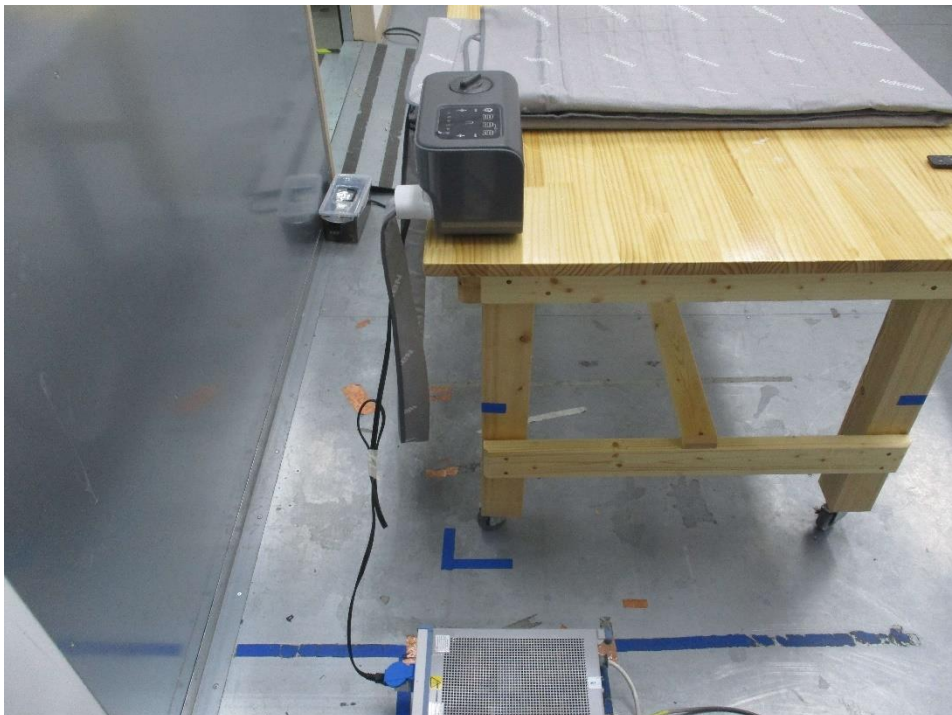


SECTION 7 APPENDIX I

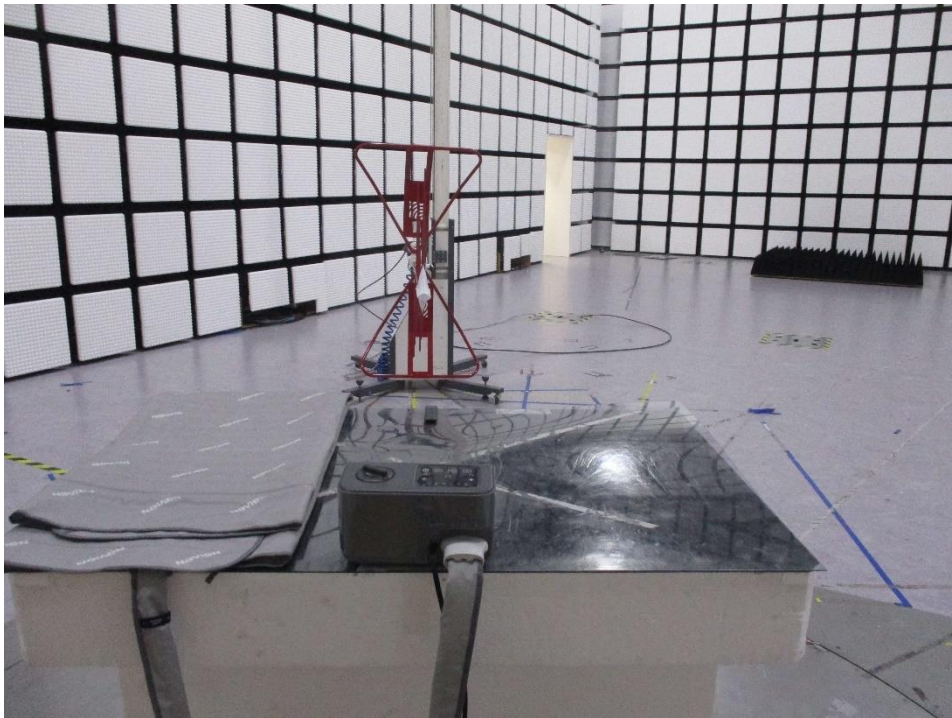
Photographs of Test Configurations



Disturbance Voltage Test



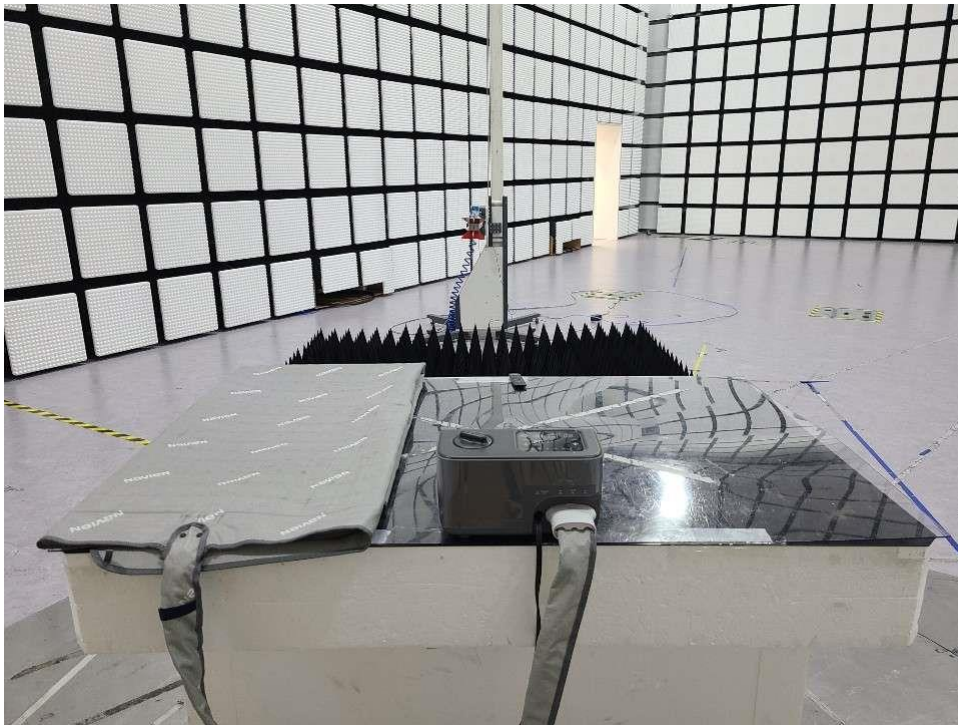
Disturbance Voltage Test



Radiated disturbance (30 MHz ~ 1 GHz)



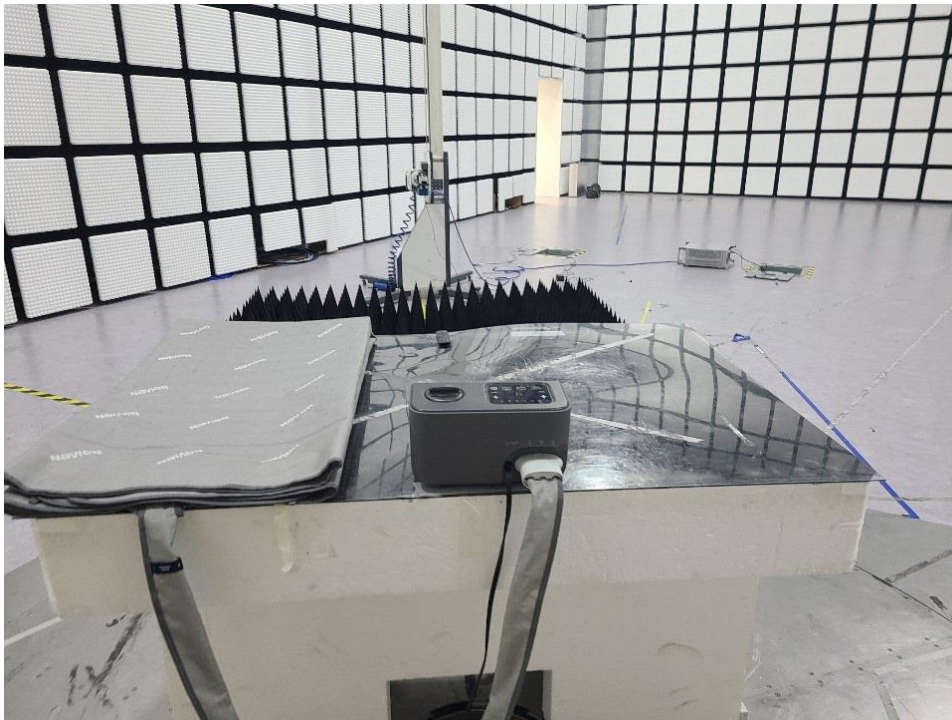
Radiated disturbance (30 MHz ~ 1 GHz)



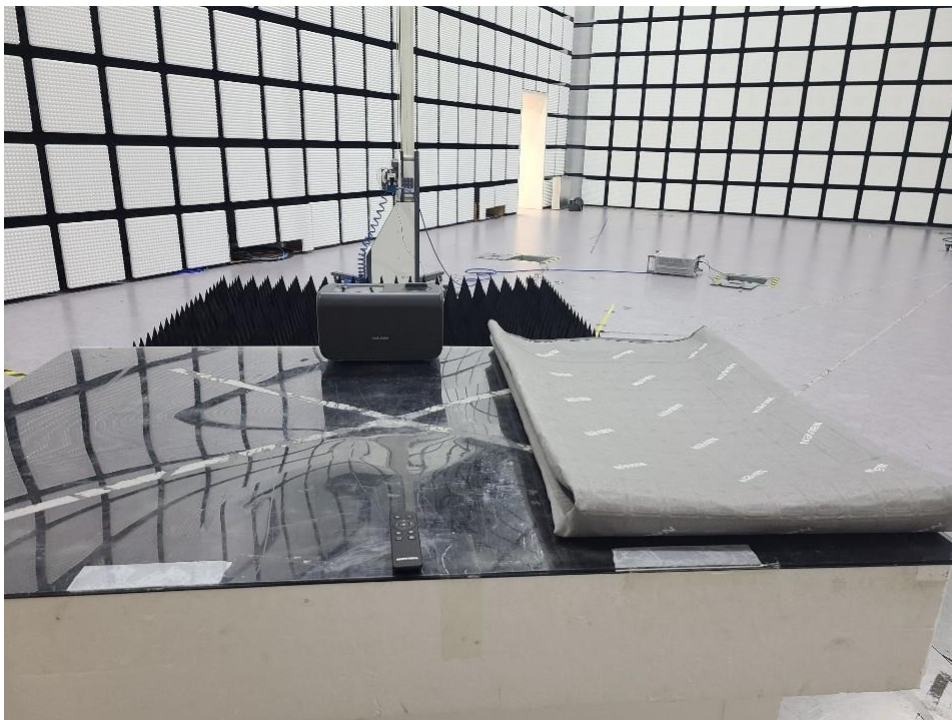
Radiated disturbance (1 GHz ~ 18 GHz)



Radiated disturbance (1 GHz ~ 18 GHz)



Radiated disturbance (18 GHz ~ 26 GHz)



Radiated disturbance (18 GHz ~ 26 GHz)



SECTION 8 APPENDIX II

Photographs of EUT



Front



Rear



Remote Controller Front



Remote Controller Rear

---- E N D ----