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EMC TEST REPORT

Dates of Tests: February 26 – 28, 2024

Project No : 240214-0202

Test Site : LTA Co., Ltd.

Model No.

WRN-2110B1

APPLICANT

Hanwha Vision Co., Ltd

Equipment Name : NETWORK VIDEO RECORDER
Manufacturer : Hanwha Vision Co., Ltd
Model name : WRN-2110B1
Test Device Serial No.: Identification
Rule Part(s) : AS/NZS CISPR 32:2015
CISPR 32 Ed2.0

Date of issue : March 05, 2024

This test report is issued under the authority of:

The test was supervised by:

Young Kyu Shin, Technical Manager

Sang Jun Lee, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory.

This test report is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

Revision history

Revision	Date of issue	Test report No.	Description
0	05.03.2024	LR500122403D	Initial



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1. General information's

1-1 Test Performed

Company name : **LTA Co., Ltd**
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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
RRA	KOREA		-	RRA accredited Lab.
	U.S.A	KR0049	2025-03-29	
	CANADA		2024-08-15	
VCCI	JAPAN	C-14948	2026-09-10	VCCI registration
		T-12416	2026-09-10	
		R-14483	2026-10-15	
		G-10847	2026-12-13	
KOLAS	KOREA	KT551	2025-10-12	KOLAS accredited Lab.

2. Information's about test item

2-1 Client / Manufacturer

Company name : Hanwha Vision Co., Ltd
Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do,
13488, KOREA
Telephone /Facsimile : +82-10-2221-6513 / +82-70-7147-8367

Factory #1

Company name : HANWHA VISION VIETNAM COMPANY LIMITED
Address : Lot O-2, Que Vo Industrial Zone extended area ,Nam Son commune,
Bac Ninh city,Bac Ninh province, Vietnam

Factory #2

Company name : D-TECH CO.,LTD.
Address : 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea
(Suwon Industrial Complex)

2-2 Equipment Under Test (EUT)

Class : A
Category : NETWORK VIDEO RECORDER
Model name : WRN-2110B1
Serial number : Identification
Date of receipt : February 14, 2024
EUT condition : Pre-production, not damaged
Interface Ports : AC IN, HDMI, Display, AUDIO OUT, USB #1~#4,
NETWORK #1~#2, Console (Unused)
Power rating : AC 240 V, 50 Hz

2-3 Modification

-NONE

2-4 Test conditions

Temp. / Humid. / Pressure : (17 - 19) °C / (35) % R.H.
Tested Model : WRN-2110B1
Test mode : Operating mode
Test Voltage : AC 240 V, 50 Hz

2-5 List of EUT and ACCESSORY

EUT				
Equipment Name	Model Name	Serial No.	Manufacturer	Remarks
NETWORK VIDEO RECORDER	WRN-2110B1	N/A	HANWHA VISION VIETNAM COMPANY LIMITED D-TECH CO.,LTD.	-
Mouse	MOKJUO	39400117	Primax Electronics Ltd.	-
ACCESSORY				
Equipment Name	Model Name	Serial No.	Manufacturer	Remarks
KeyBoard	DK-201U	N/A	Adata KOREA	-
Monitor #1	24MT58DF	910KKURMG518	LG	-
Monitor #2	24BK550YW	003NTWGBL489	LG	-
Adapter#1	PA-1900-08	1Z01445509	LG	-
PoE Adapter	NX-1G30W	N/A	River Network	
Note Book	ThinkBook 15 G2 ITL	MP20831Z	Lenovo	-
Adapter#2	ADLX65YCC3 D	N/A	Lenovo	-
Camera	LND-6022R	ZNDE6V4M9000 07T	HANWHA TECHWIN CO.,LTD	-
Headset	SHS-150V/W	N/A	SAMSUNG	-
USB Memory	N/A	N/A	Sand	2 EA

2-6 Cable List

Cable List					
From		To		Length (m)	Shied
Type	I/O Port	Type	I/O Port		
EUT	AC IN#1	AC POWER SOURCE	AC OUT	1.1	NO
	USB #1	Mouse	-	1.0	NO
	USB #2	Ketboard	-	1.0	NO
	USB #3	USB MEMORY STICK #1	-	-	NO
	USB #4	USB MEMORY STICK #2	-	-	NO
	HDMI	Monitor #1	HDMI	1.4	YES
	Display	Mpnitor #2	Display	1.5	YES
	NETWORK #2	Note Book	LAN	3.0	NO
	NETWORK #1	PoE Adapter	LAN	3.0	NO
	AUDIO OUT	Headset	AUDIO IN	1.5	NO



3. Test Report

3.1 Summary of tests

Parameter	Applied Standard	Status
I. Emission		
Conducted Emissions	AS/NZS CISPR 32:2015 CISPR 32 Ed2.0	C
Radiated Emissions	AS/NZS CISPR 32:2015 CISPR 32 Ed2.0	C

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.



4. Test Items

4-1 Conducted Emissions

Definition:

The test assesses the ability of the EUT to limit its internal noise from being present on the AC mains Power In/Output/Telecommunication ports.

We were performed the test according to LTA procedure LTA-QI-04.

Test method	: AS/NZS CISPR 32:2015 CISPR 32 Ed2.0
Measurement Frequency range	: 150 kHz - 30 MHz
Measurement RBW	: 9 kHz
Test Location	: Shielded Room
Test mode	: Operating mode
Result	: Complies

Measurement Data:

- Refer to the Next page (Maximum emission configuration)

A sample calculation:

COR. F (correction factor)= LISN Insertion loss + Cable loss + Pulse Limiter Factor

Emission Level= meter reading + COR.F

Limits for conducted disturbance at the mains ports of class A ITE

Frequency Range	Quasi-peak	Average
(0.15 - 0.5) MHz	79 dB μ V	66 dB μ V
(0.5 – 30) MHz	73 dB μ V	60 dB μ V

Note: The limits will decrease with the frequency logarithmically within 0.15 MHz to 0.5 MHz

Limits for conducted disturbance at the mains ports of class B ITE

Frequency Range	Quasi-peak	Average
(0.15 – 0.5) MHz	(66 – 56) dB μ V	(56 - 46) dB μ V
(0.5 – 5) MHz	56 dB μ V	46 dB μ V
(5 – 30) MHz	60 dB μ V	50 dB μ V

Note: The limits will decrease with the frequency logarithmically within 0.15 MHz to 0.5 MHz

Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15 MHz to 30 MHz for class A equipment

Frequency Range	Voltage limits		Current limits	
	Quasi-peak	Average	Quasi-peak	Average
(0.15 - 0.5) MHz	(97 – 87) dB μ V	(84 – 74) dB μ V	(53 – 43) dB μ V	(40 – 30) dB μ V
(0.5 – 30) MHz	87 dB μ V	74 dB μ V	43 dB μ V	30 dB μ V

Note 1: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150/I = 44$ dB)

Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15 MHz to 30 MHz for class B equipment

Frequency Range	Voltage limits		Current limits	
	Quasi-peak	Average	Quasi-peak	Average
(0.15 - 0.5) MHz	(84 – 74) dB μ V	(74 – 64) dB μ V	(40 – 30) dB μ V	(30 – 20) dB μ V
(0.5 – 30) MHz	74 dB μ V	64 dB μ V	30 dB μ V	20 dB μ V

Note 1: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

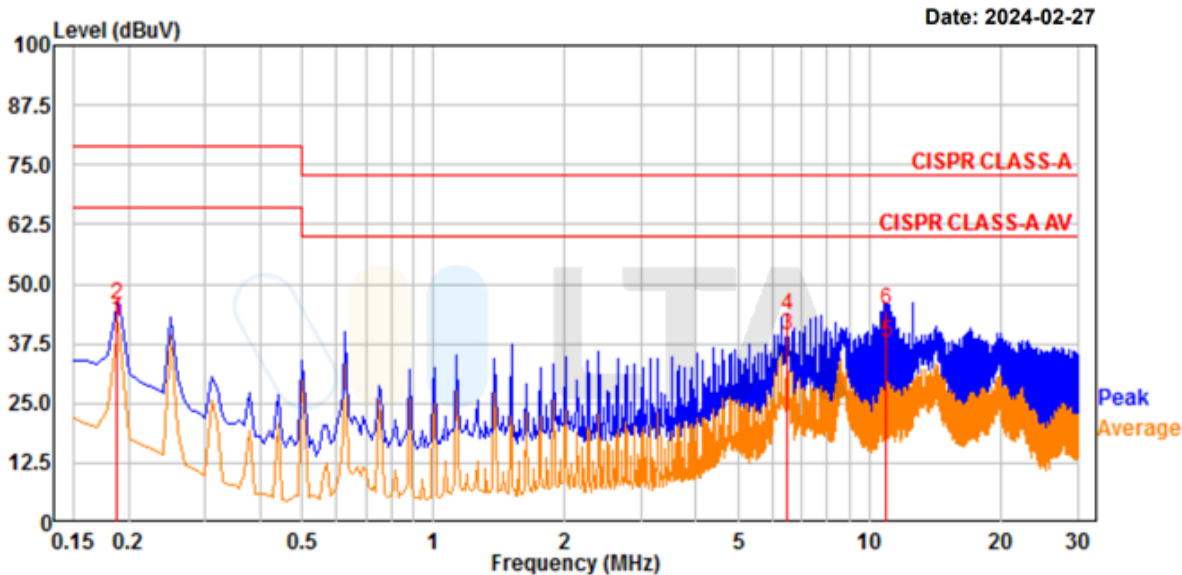
Note 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150/I = 44$ dB)

Conducted Emissions (LINE)



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Project No.	: 240214-0202	Phase	: LIVE
Test Mode	: Operating	Test Power	: AC 240 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: LEE S J



No.	Freq MHz	RD QP dBuV	RD AV dBuV	C.F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB	Phase
2.	0.189	26.07	22.82	19.47	45.54	42.29	79.00	66.00	33.46	23.71	Line
4.	6.477	23.77	19.50	19.72	43.49	39.22	73.00	60.00	29.51	20.78	Line
6.	10.934	24.75	18.03	19.82	44.57	37.85	73.00	60.00	28.43	22.15	Line

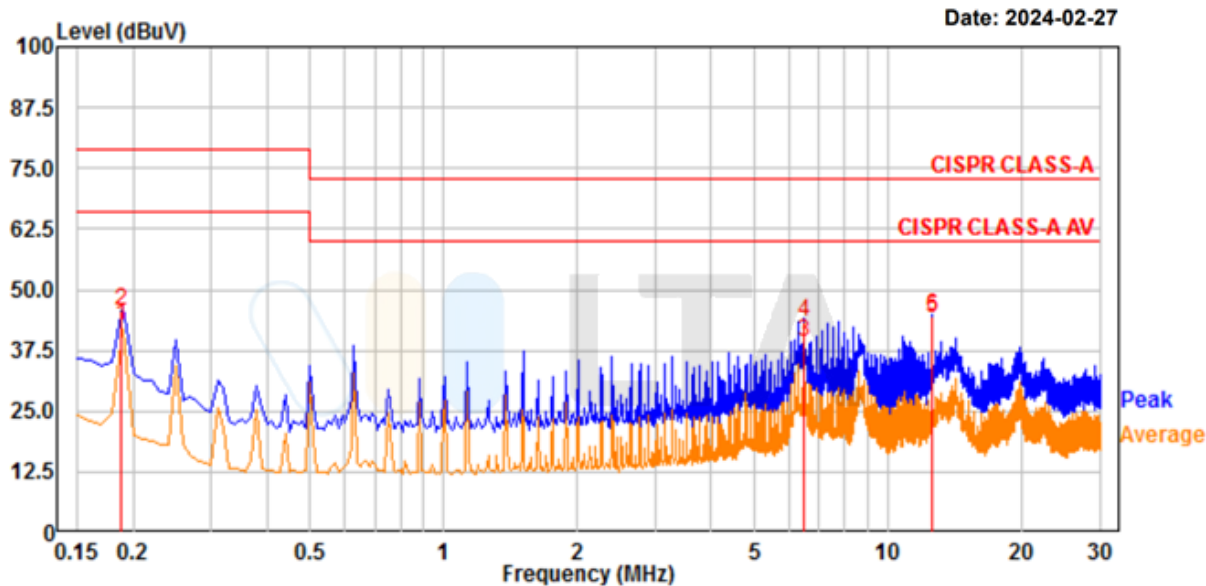
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (NEUTRAL)



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Project No.	: 240214-0202	Phase	: NEUTRAL
Test Mode	: Operating	Test Power	: AC 240 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: LEE S J



No.	Freq MHz	RD QP dBμV	RD AV dBμV	C.F dB	Result QP dBμV	Result AV dBμV	Limit QP dBμV	Limit AV dBμV	Margin QP dB	Margin AV dB	Phase
2.	0.189	26.12	23.10	19.46	45.58	42.56	79.00	66.00	33.42	23.44	neutral
4.	6.477	23.63	19.41	19.72	43.35	39.13	73.00	60.00	29.65	20.87	neutral
6.	12.559	24.53	24.15	19.89	44.42	44.04	73.00	60.00	28.58	15.96	neutral

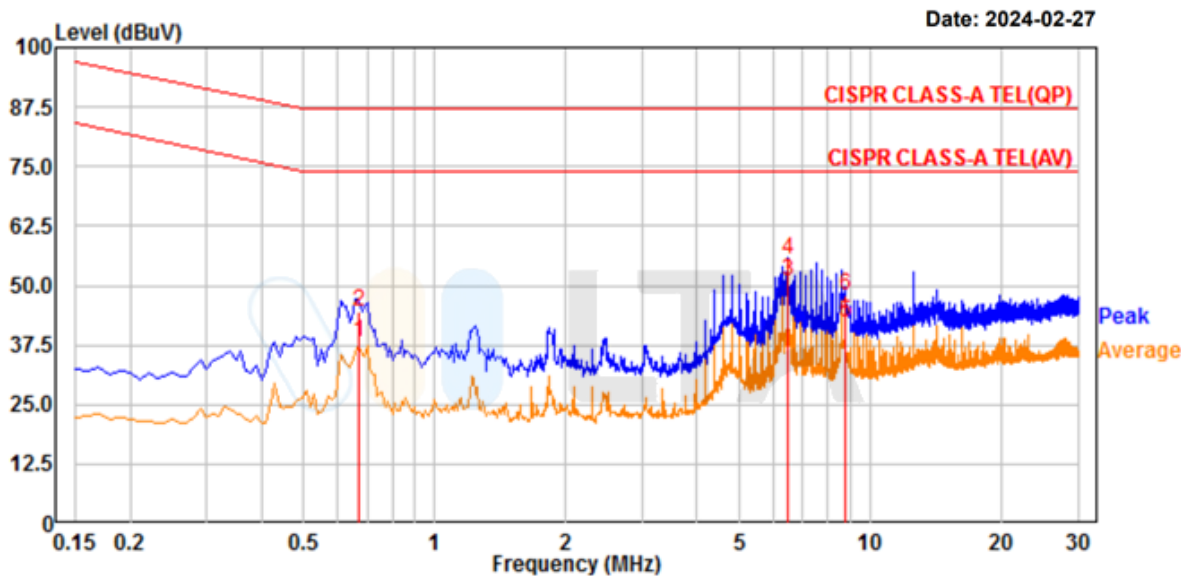
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_Ethernet 1 / 1000 M)



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Project No.	: 240214-0202	Phase	: TEL(Ethernet 1 / 1 000 Mbps)
Test Mode	: Operating	Test Power	: AC 240 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: LEE S J



No.	Freq MHz	RD QP dBuV	RD AV dBuV	C.F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB	Phase
2.	0.671	25.19	18.90	19.36	44.55	38.26	87.00	74.00	42.45	35.74	Line
4.	6.477	35.98	31.75	19.35	55.33	51.10	87.00	74.00	31.67	22.90	Line
6.	8.775	28.49	22.99	19.41	47.90	42.40	87.00	74.00	39.10	31.60	Line

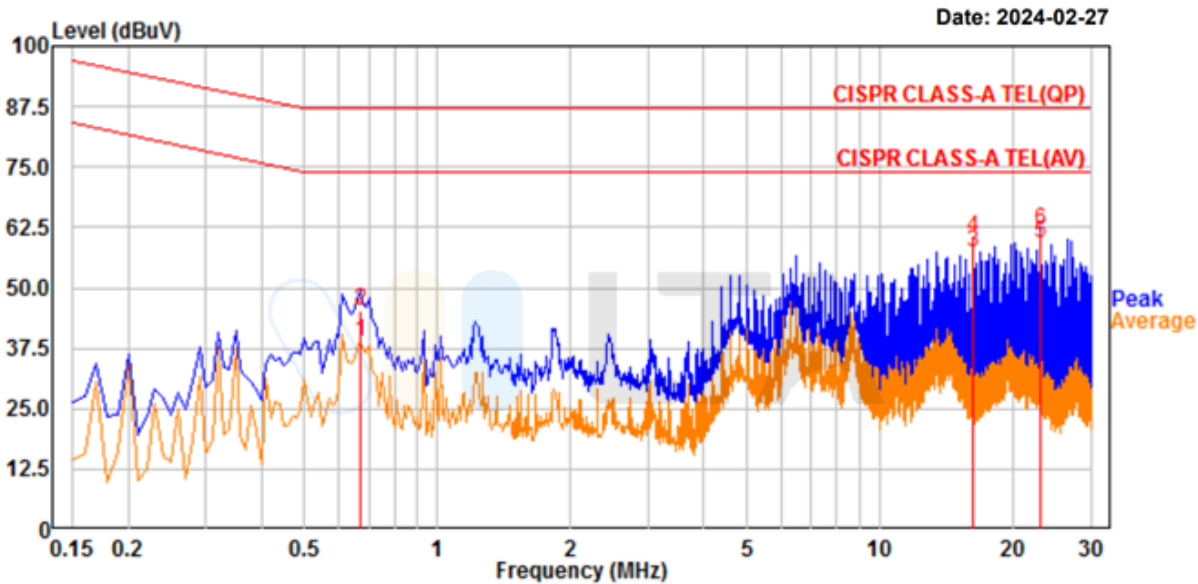
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_Ethernet 1 / 100 M)



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Project No.	: 240214-0202	Phase	: TEL(Ethernet 1 / 100 Mbps)
Test Mode	: Operating	Test Power	: AC 240 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: LEE S J



No.	Freq MHz	RD QP dBUV	RD AV dBUV	C.F dB	Result QP dBUV	Result AV dBUV	Limit QP dBUV	Limit AV dBUV	Margin QP dB	Margin AV dB	Phase
2.	0.673	25.86	19.43	19.45	45.31	38.88	87.00	74.00	41.69	35.12	Line
4.	16.227	40.74	37.55	19.66	60.40	57.21	87.00	74.00	26.60	16.79	Line
6.	23.129	42.15	39.19	19.88	62.03	59.07	87.00	74.00	24.97	14.93	Line

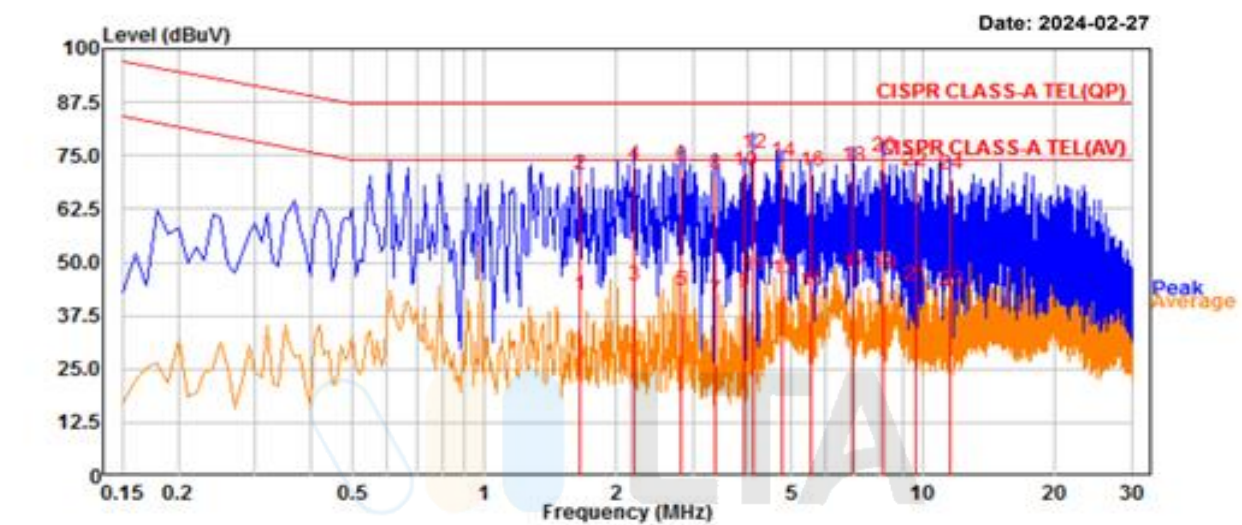
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_Ethernet 2 / 100 M)



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Project No.	: 240214-0202	Phase	: TEL(Ethernet 2 / 100 Mbps)
Test Mode	: Operating	Test Power	: AC 240 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: LEE S J



No.	Freq MHz	RD QP dBuV	RD AV dBuV	C.F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB	Phase
2.	1.649	51.01	22.83	19.37	70.38	42.20	87.00	74.00	16.62	31.80	Line
4.	2.198	53.37	25.36	19.36	72.73	44.72	87.00	74.00	14.27	29.28	Line
6.	2.809	53.19	23.86	19.37	72.56	43.23	87.00	74.00	14.44	30.77	Line
8.	3.359	51.15	21.73	19.38	70.53	41.11	87.00	74.00	16.47	32.89	Line
10.	3.908	51.81	23.82	19.38	71.19	43.20	87.00	74.00	15.81	30.80	Line
12.	4.091	56.18	27.43	19.38	75.56	46.81	87.00	74.00	11.44	27.19	Line
14.	4.763	54.15	26.77	19.39	73.54	46.16	87.00	74.00	13.46	27.84	Line
16.	5.557	51.84	24.11	19.40	71.24	43.51	87.00	74.00	15.76	30.49	Line
18.	6.900	52.95	27.77	19.44	72.39	47.21	87.00	74.00	14.61	26.79	Line
20.	8.121	55.40	27.84	19.46	74.86	47.30	87.00	74.00	12.14	26.70	Line
22.	9.587	51.95	25.06	19.50	71.45	44.56	87.00	74.00	15.55	29.44	Line
24.	11.541	50.88	23.67	19.55	70.43	43.22	87.00	74.00	16.57	30.78	Line

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

4-2 Radiated Emissions

Definition:

The test assesses the ability of ancillary equipment to limit their internal noise from being radiated from the enclosure.

We were performed the test according to LTA procedure LTA-QI-04.

Test method	: AS/NZS CISPR 32:2015 CISPR 32 Ed2.0
Measuring Distance	: 10 m below 1 GHz / 3 m above 1 GHz
Measurement Frequency range	: 30 MHz – 6 000 MHz
Measurement RBW	: 120 kHz @ 10 m / 1 MHz @ 3 m
Test Location	: 10 m Chamber
Test mode	: Operating mode
Result	: Complies

Measurement Data:

- Refer to the Next page (Maximum emission configuration)
- The highest internal source of an EUT is 3.4 GHz, the measurement shall only be made up to 6 GHz.

A sample calculation:

$\text{COR. F (correction factor)} = \text{Antenna factor} + \text{Cable loss} - \text{Amp. gain} - \text{Distance correction}$

$\text{Emission Level} = \text{meter reading} + \text{COR.F}$

Limit of 10 m below 1 GHz

CLASS A

Frequency Range	Quasi-peak
(30 – 230) MHz	40 dB μ V/m
(230 – 1 000) MHz	47 dB μ V/m

CLASS B

Frequency Range	Quasi-peak
(30 – 230) MHz	30 dB μ V/m
(230 – 1 000) MHz	37 dB μ V/m

Limit of 3m above 1 GHz

CLASS A

Frequency Range	Average Limit @ 3m (dB μ V/m)	Peak limit @ 3m (dB μ V/m)
(1 000 – 3 000) MHz	56	76
(3 000 – 6 000) MHz	60	80

NOTE: The lower limit applies at the transition frequency.

CLASS B

Frequency Range	Average Limit @ 3m (dB μ V/m)	Peak limit @ 3m (dB μ V/m)
(1 000 – 3 000) MHz	50	70
(3 000 – 6 000) MHz	54	74

NOTE: The lower limit applies at the transition frequency.

Radiated Emissions (Below 1 GHz) / H



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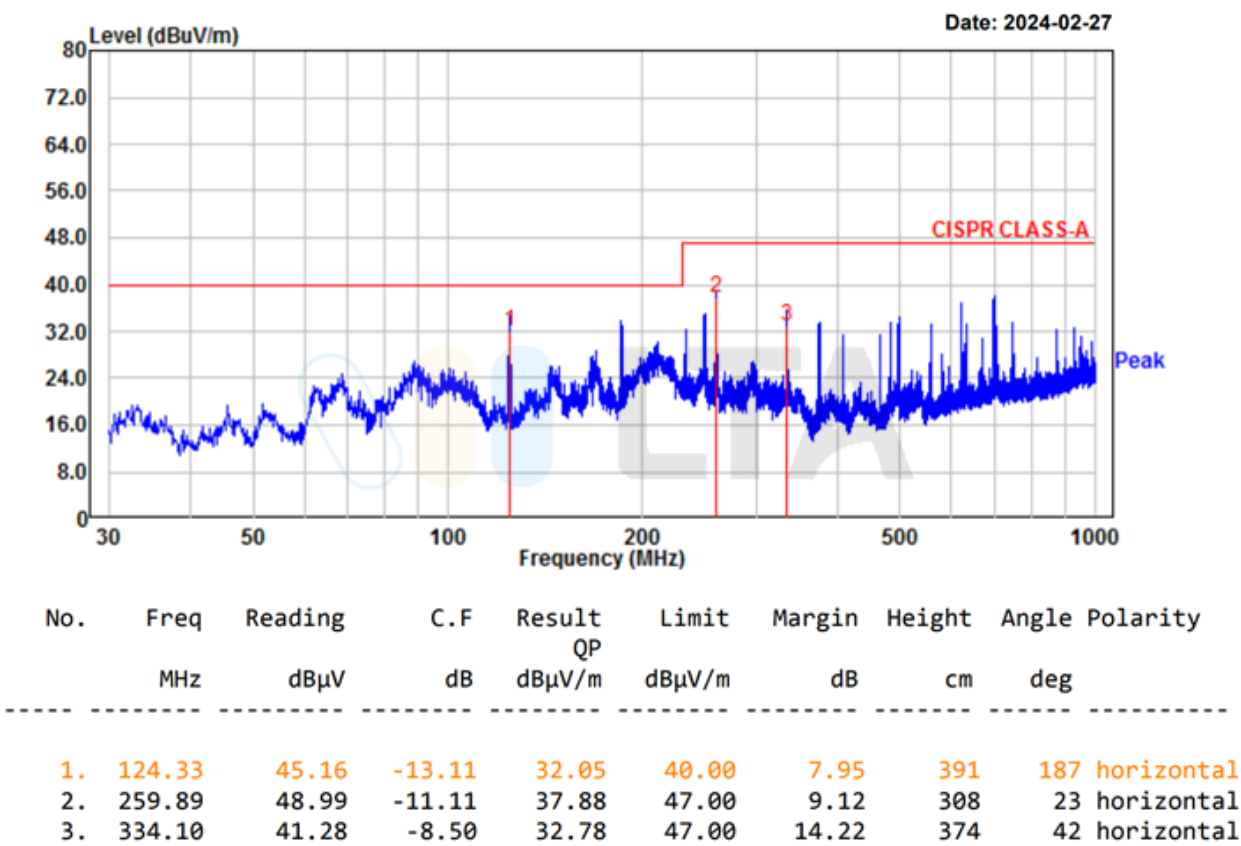
Project No. : 240214-0202

Temp/Humi: 19 'C / 35 % R.H.

Test Mode : Operating

Tested by: LEE S J

Power : AC 240 V / 50 Hz



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Below 1 GHz) / V



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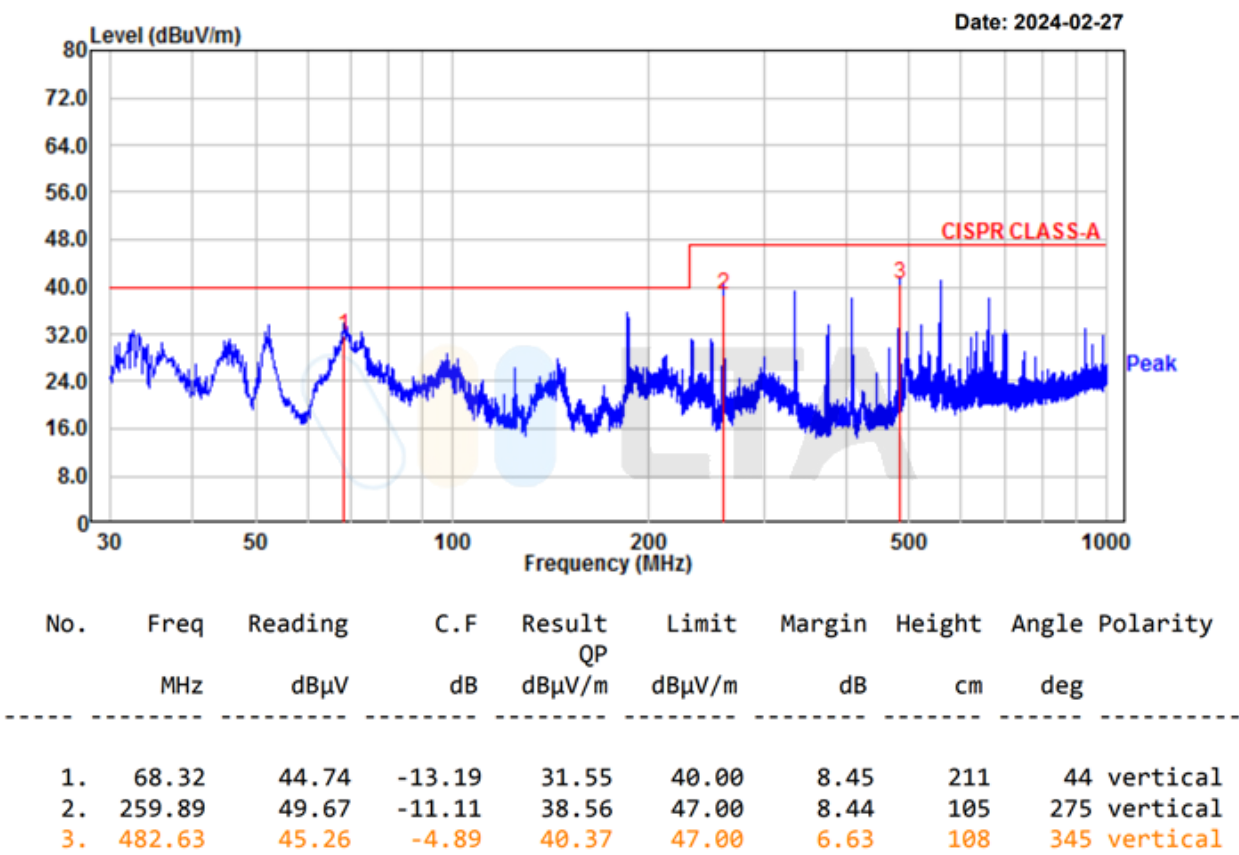
Project No. : 240214-0202

Temp/Humi: 19 'C / 35 % R.H.

Test Mode : Operating

Tested by: LEE S J

Power : AC 240 V / 50 Hz



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions (Above 1 GHz) / H



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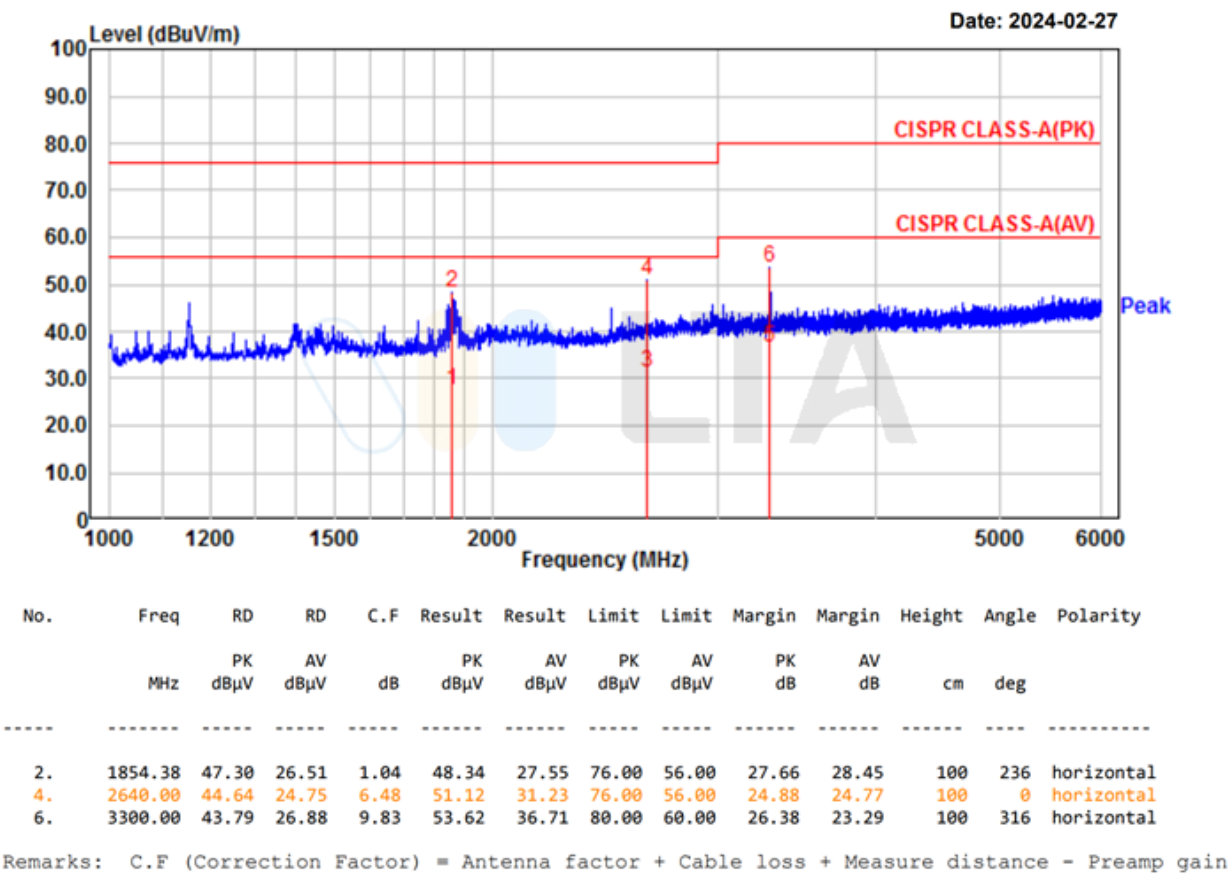
Temp/Humi: 19 'C / 35 % R.H.

Test Mode : Operating

Tested by: LEE S J

Power : AC 240 V / 50 Hz

Measure distance : 3.9 m



Radiated Emissions (Above 1 GHz) / V



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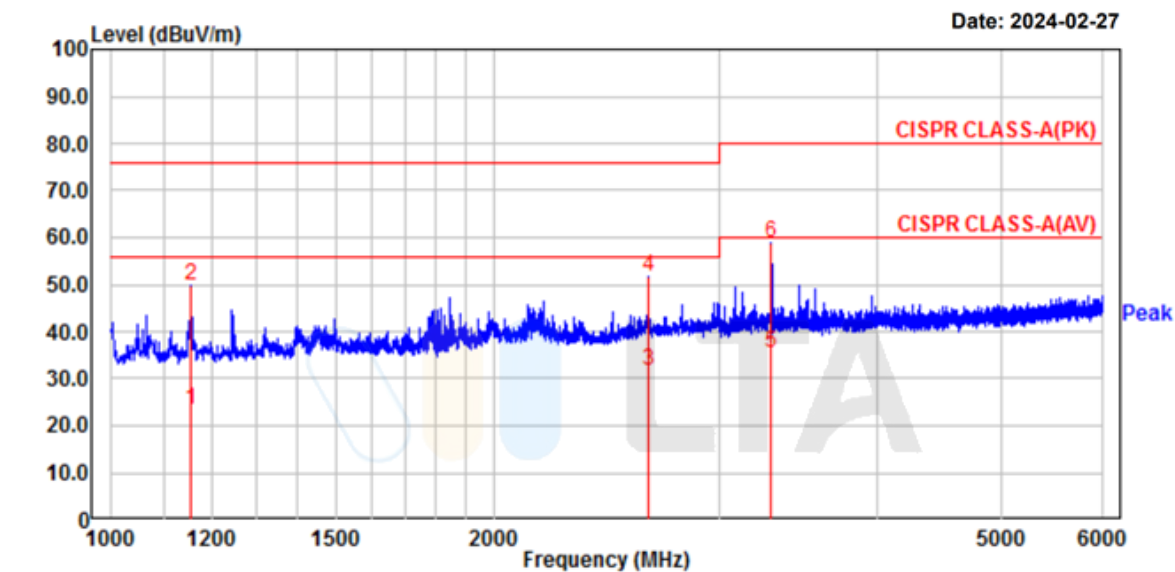
Temp/Humi: 19 'C / 35 % R.H.

Test Mode : Operating

Tested by: LEE S J

Power : AC 240 V / 50 Hz

Measure distance : 3.9 m



No.	Freq MHz	RD		C.F	Result		Limit		Margin		Height	Angle	Polarity
		PK dBμV	AV dBμV		PK dBμV	AV dBμV	PK dBμV	AV dBμV	PK dB	AV dB			
2.	1155.00	53.42	27.18	-3.63	49.79	23.55	76.00	56.00	26.21	32.45	100	313	vertical
4.	2640.00	45.23	25.39	6.48	51.71	31.87	76.00	56.00	24.29	24.13	100	355	vertical
6.	3300.00	49.06	25.80	9.83	58.89	35.63	80.00	60.00	21.11	24.37	100	338	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss + Measure distance - Preamp gain

APPENDIX A

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS



To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment are identified by the Test Laboratory.

Conducted Emissions

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESR	Rohde & Schwarz	101499	2024.03.13	1 year
☒	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100710	2024.03.13	1 year
☒	ISN	ISN T800	TESEQ	27109	2024.08.17	1 year
☒	ISN	ENY81-CA6	Rohde & Schwarz	101565	2024.08.17	1 year
☐	ISN	ISN S8	Schwarzbeck	79	2024.08.17	1 year
☐	CURRENT PROBE	EZ-17	Rohde & Schwarz	100508	2024.08.23	1 year
☐	CDN	TSCDN-C1-BNC-75	F.C.C	07004	2024.03.13	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	100378	2024.08.22	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	101468	2024.08.22	1 year
☒	LISN(main)	ENV216	Rohde & Schwarz	102872	2024.09.07	1 year
☒	LISN(sub)	LT32C/10	AFJ	32031518210	2024.08.22	1 year
☒	TEST PROGRAM	e3_ce 20181212a (V9)	AUDIX	-	-	-

Radiated Emissions – Below 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESCI7	Rohde & Schwarz	100772	2024.08.22	1 year
☒	Amplifier	8447D	HP	1937A03453	2024.08.22	1 year
☒	BILOG Antenna	VULB 9168	SCHWARZBECK	749	2025.03.29	2 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

Radiated Emissions – Above 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESCI7	Rohde & Schwarz	100772	2024.08.22	1 year
☐	EMI TEST Receiver	ESU	Rohde & Schwarz	100092	2024.08.22	1 year
☒	Amplifier	8449B	Agilent	3008A02126	2024.03.14	1 year
☐	Amplifier	PAM-840A	COM-POWER	461314	2024.03.15	1 year
☐	HORN ANTENNA	3116B	ETS	133350	2024.03.22	1 year
☐	HORN ANTENNA	3116B	ETS	81109	2024.04.25	1 year
☒	HORN ANTENNA	3115	ETS	114105	2024.04.20	1 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

APPENDIX B

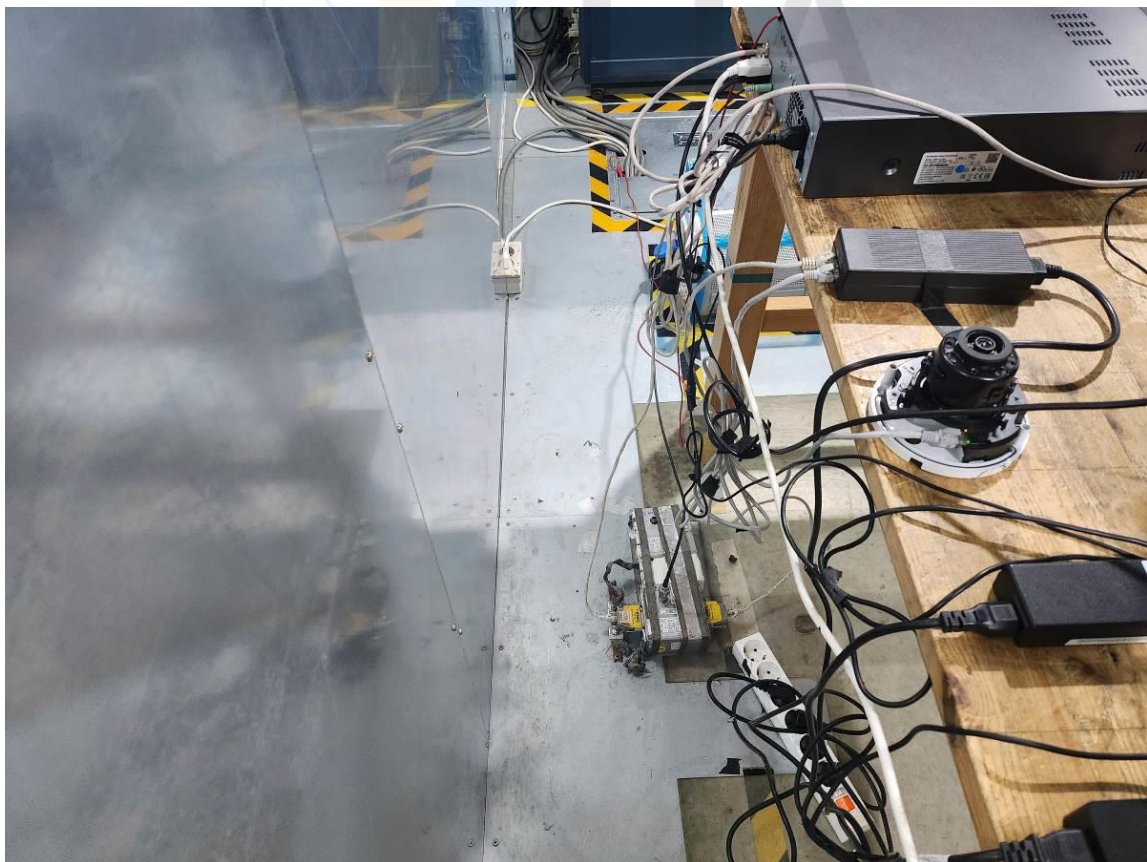
PHOTOGRAPHS



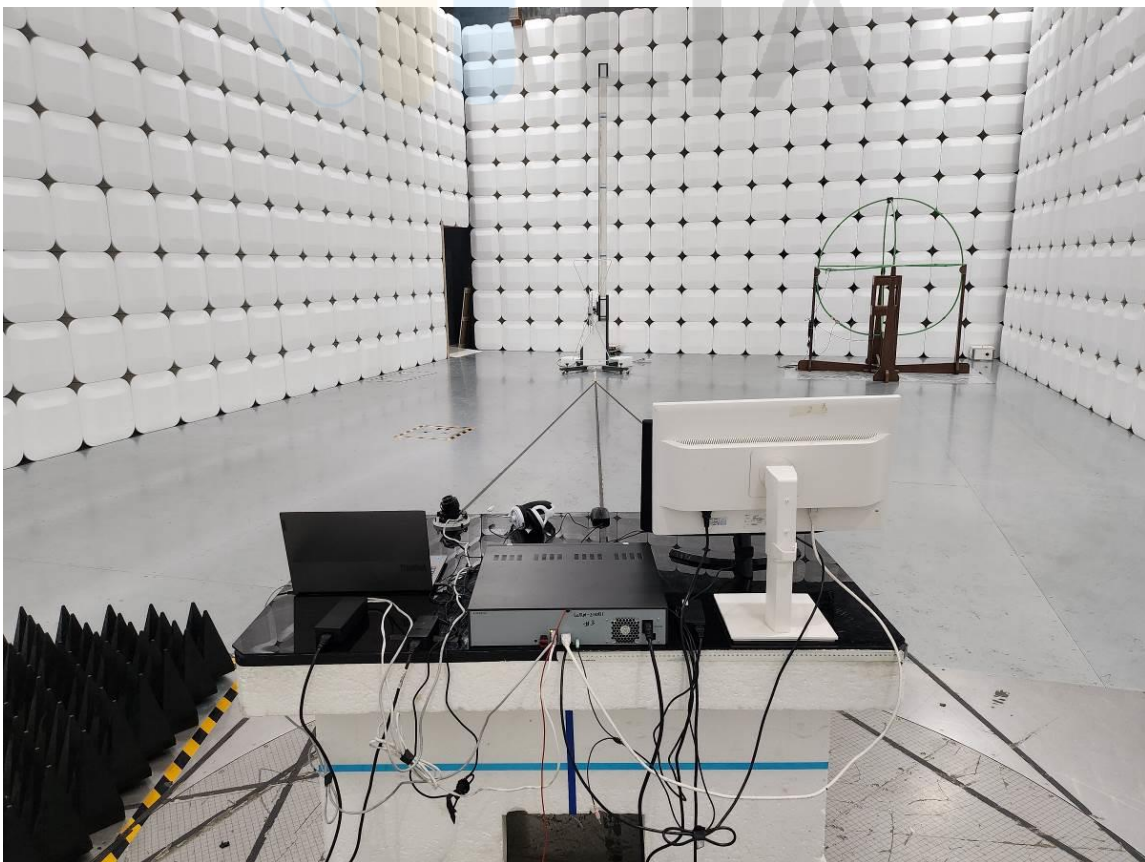
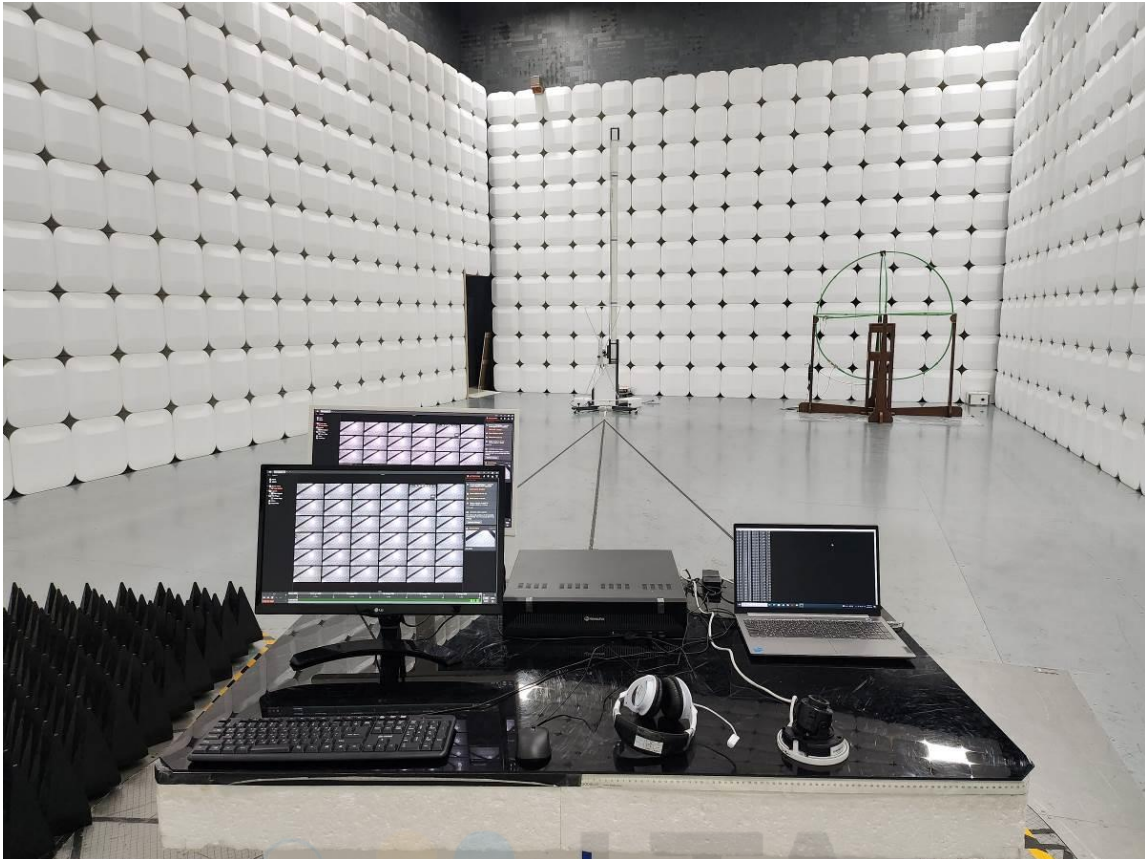
Conducted Emissions



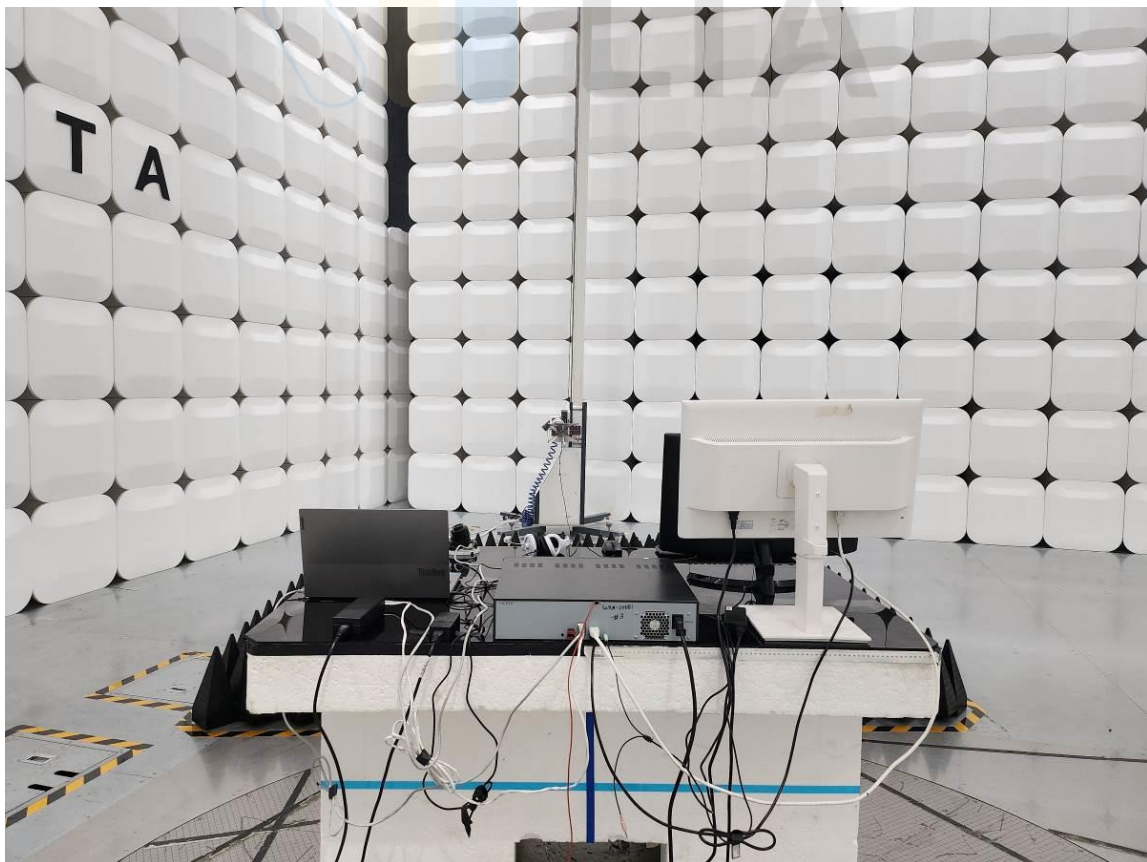
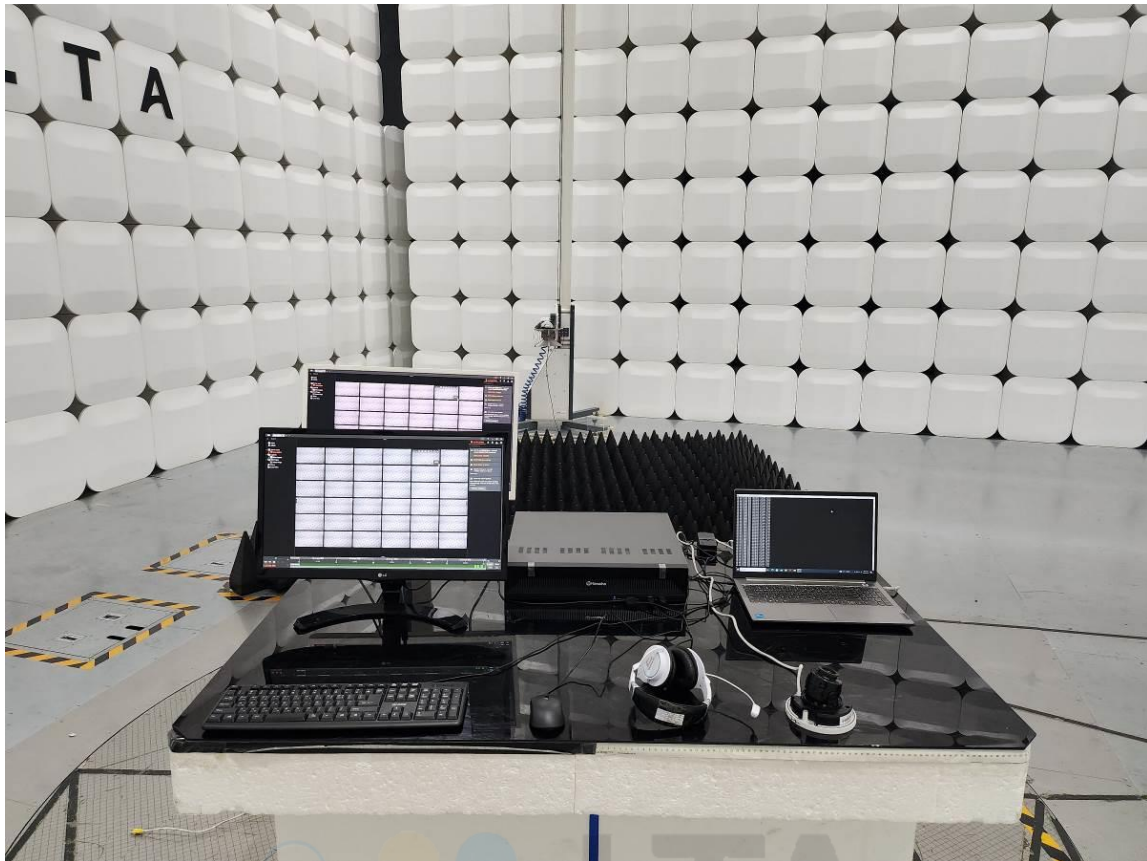
Conducted Emissions / TEL



Radiated Emissions - Below 1 GHz



Radiated Emissions - Above 1 GHz



EUT



EUT

