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EMC TEST REPORT

Dates of Tests: September 15 – 23, 2023

Project No: 230831-0146

Test Site : LTA Co., Ltd.

Model No.

XRN-3220B4

APPLICANT

Hanwha Vision Co., Ltd

Equipment Name : Network Video Recorder
Manufacturer : Hanwha Vision Co., Ltd
Model name : XRN-3220B4
Additional Model name : -
Test Device Serial No.: Identification
Directive : Electromagnetic Compatibility Directive 2014/30/EU
Regulations 2016/1091
Rule Part(s) : EN 55032:2015/A11:2020
EN 50130-4:2011/A1:2014
EN 61000-3-2:2014
EN 61000-3-3:2013
Data of issue : September 25, 2023

This test report is issued under the authority of:

The test was supervised by:

Young Kyu Shin, Technical Manager

Hyun Young Ahn, 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	20.07.2023	LR500122307AO	Initial
1	25.09.2023	LR500122309Q	Change hardware parts (PCBs and fan)



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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 “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	KR0049	-	RRA accredited Lab.
	U.S.A		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	2024-12-13	
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 : +82-10-2667-4196 / +82-70-7147-8361

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
 Equipment Name : Network Video Recorder
 Model name : XRN-3220B4
 Additional Model name : -
 Serial number : Identification
 Date of receipt : August 31, 2023
 EUT condition : Pre-production
 Interface Ports : AC IN, HDMI #1, #2, ALARM IN, ALARM OUT, AUDIO OUT, USB #1 ~ #4, NETWORK #1 ~ #3, Console(Unused)
 Power rating : AC 230 V, 50 Hz

2-3 Modification

- Supplementary area: gasket tape inside the device / Material: gasket tape (model name: N/A, manufacturer: N/A number: 1 EA)

2-4 Model Specification

- The console port of the device to be tested is a port for administrators and is excluded from the test item.

2-5 Test conditions

Temp. / Humid. / Pressure : (21 – 24) °C / (47 - 59) % R.H. / (100.2) kPa
 Tested Model : XRN-3220B4
 Test mode : Operating mode
 Tested Voltage : AC 230 V, 50 Hz

2-6 List of EUT and ACCESSORY

EUT				
Equipment Name	Model Name	Serial No.	Manufacturer	Remarks
Network Video Recorder	XRN-3220B4	N/A	HANWHA VISION VIETNAM COMPANY LIMITED D-TECH CO.,LTD.	EUT
Mouse	MOKJUO	34004812	Primax Electronics Ltd.	EUT
ACCESSORY				
Equipment Name	Model Name	Serial No.	Manufacturer	Remarks
NOTEBOOK	ELITE BOOK	N/A	HP	-
MONITOR #1	6230VP	73010478A220371	Lien Fong(Wujiang) Electronics Co.,Ltd.	-
MONITOR #2	AM24MB	N/A	ATEC	-
Keyboard	K120	1547SC5034U8	Logitech	-
POE Injector	ipTIMEPoE408	POE408 4BC00624	ipTIME	-
POE Injector adapter	ANY480A5C-NI	N/A	Wendeng Any Electronics Co.,Ltd	-
ALARM JIG #1	N/A	N/A	N/A	-
ALARM JIG #2	N/A	N/A	N/A	-
Earphone	N/A	N/A	N/A	-
USB Memory Stick	Cruzer Blade 8GB	N/A	SanDisk	2 EA
IP Camera #1	LND-6032R	ZNDJ6V4M90000C M	HANWHA TECHWIN CO.,LTD.	-
IP Camera #2	LND-6022R	ZNDE6V4M90000E V	HANWHA TECHWIN CO.,LTD.	-

2-7 Cable List

Cable List					
From		To		Length (m)	Shield
Type	I/O Port	Type	I/O Port		
EUT	AC IN	AC POWER SOURCE	3 PIN AC LINE	1.0	NO
EUT	USB #1	MOUSE	-	1.0	NO
EUT	USB #2	KEY BOARD	-	1.0	NO
EUT	USB #3	USB MEMORY STICK #1	-	-	NO
EUT	USB #3	USB MEMORY STICK #2	-	-	NO
EUT	HDMI #1	MONITOR #1	HDMI	1.0	YES
EUT	HDMI #2	MONITOR #2	HDMI	1.0	YES
EUT	NETWORK #1	POE INJECTOR	LAN #1	3.0	NO
EUT	NETWORK #2	NOTEBOOK	LAN	3.0	NO
EUT	NETWORK #3	POE INJECTOR	LAN #2	3.0	NO
EUT	AUDIO OUT	EAR PHONE	-	1.0	NO
EUT	ALARM IN	ALARM ZIG #1	-	1.0	NO
EUT	ALARM OUT	ALARM ZIG #2	-	1.0	NO
POE INJECTOR	DC IN	POE INJECTOR ADAPTER	DC OUT	1.0	NO
POE INJECTOR ADAPTER	AC IN	AC POWER SOURCE	2 PIN AC LINE	1.0	NO
MONITOR #1	AC IN	AC POWER SOURCE	3 PIN AC LINE	1.0	NO
MONITOR #2	AC IN	AC POWER SOURCE	3 PIN AC LINE	1.0	NO
POE INJECTOR	POE #1	IP CAMERA #1	LAN	1.0	NO
POE INJECTOR	POE #2	IP CAMERA #2	LAN	1.0	NO

3. Test Report

3.1 Summary of tests

Reference	Parameter	Status (note)
I. Emission		
Conducted Emissions	EN 55032:2015/A11:2020	C
Radiated Emissions	EN 55032:2015/A11:2020	C
Harmonic Current Emission	EN 61000-3-2:2014	NA ^{Note 3}
Voltage Fluctuations and Flicker	EN 61000-3-3:2013	C
II. Immunity (EN 50130-4:2011/A1:2014)		
Electrostatic Discharge	EN 61000-4-2:2009	C
RF Electromagnetic Field	EN 61000-4-3:2006/A1:2008/A2:2010	C
Electrical Fast Transients	EN 61000-4-4:2012	C
Surges	EN 61000-4-5:2014/A1:2017	C
Conducted Disturbances, Induced by Radio-Frequency Fields	EN 61000-4-6:2014/AC:2015	C
Voltage dips and Interruptions	EN 61000-4-11:2004/A1:2017	C
Main supply voltage variations	EN 50130-4:2011/A1:2014	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.

Note 3: We did not test EN 61000-3-2 (Harmonic current emissions) for the XRN-3220B4 because equipment whose rated power is less or equal 75 W don't need to be tested.

3.2 EMISSION

3.2.1 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 ports.

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

Measurement Frequency range	: 150 kHz – 30 MHz
Test method	: EN 55032:2015/A11:2020
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 Factors

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.

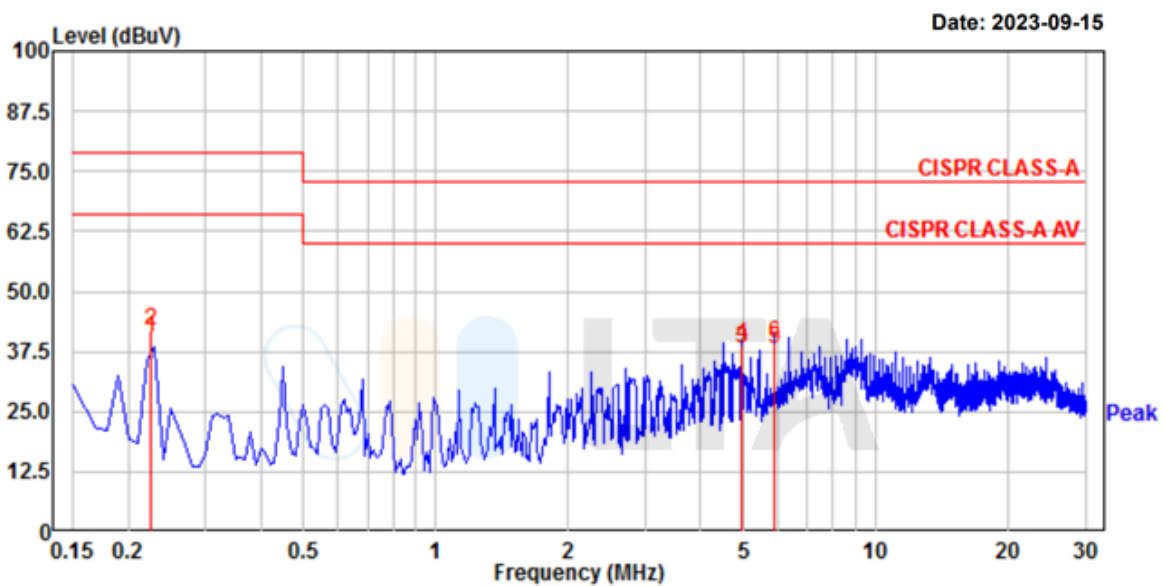
Note 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150/I = 44$ dB)

Conducted Emissions (LINE)



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Project No.	: 230831-0146	Phase	: LINE
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 23 'C / 59 % R.H.	Test Engineer	: AHN H Y



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.	0.226	22.41	21.09	19.42	41.83	40.51	79.00	66.00	37.17	25.49	Line
4.	4.975	19.37	18.57	19.61	38.98	38.18	73.00	60.00	34.02	21.82	Line
6.	5.880	19.73	18.61	19.65	39.38	38.26	73.00	60.00	33.62	21.74	Line

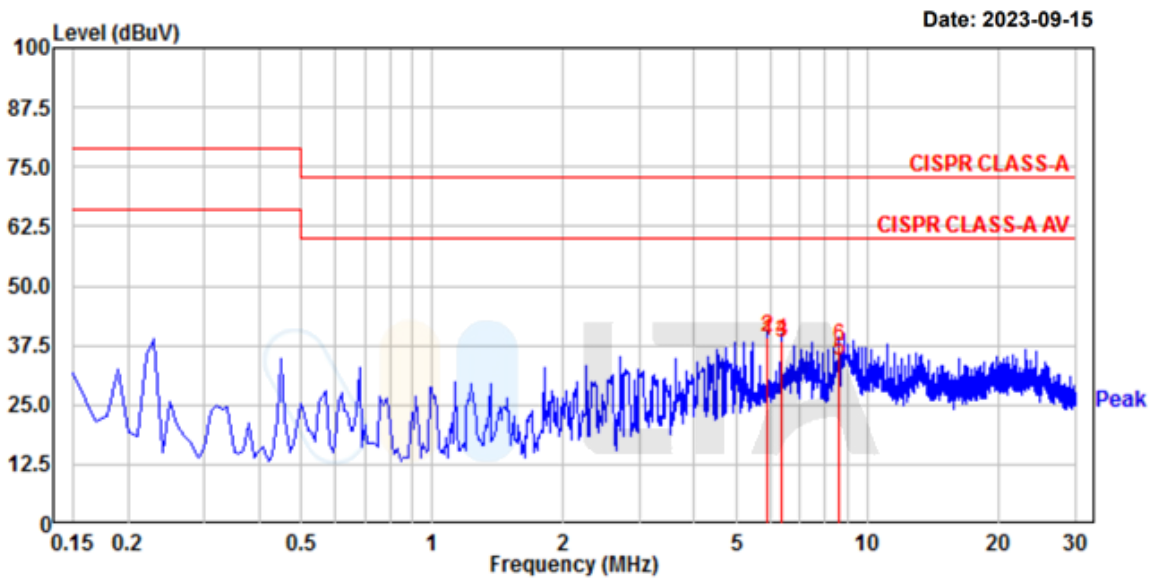
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (NEUTRAL)



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Project No.	: 230831-0146	Phase	: NEUTRAL
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 23 'C / 59 % R.H.	Test Engineer	: AHN H Y



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.	5.879	19.78	18.73	19.65	39.43	38.38	73.00	60.00	33.57	21.62	neutral
4.	6.330	19.00	18.27	19.66	38.66	37.93	73.00	60.00	34.34	22.07	neutral
6.	8.593	17.62	14.78	19.73	37.35	34.51	73.00	60.00	35.65	25.49	neutral

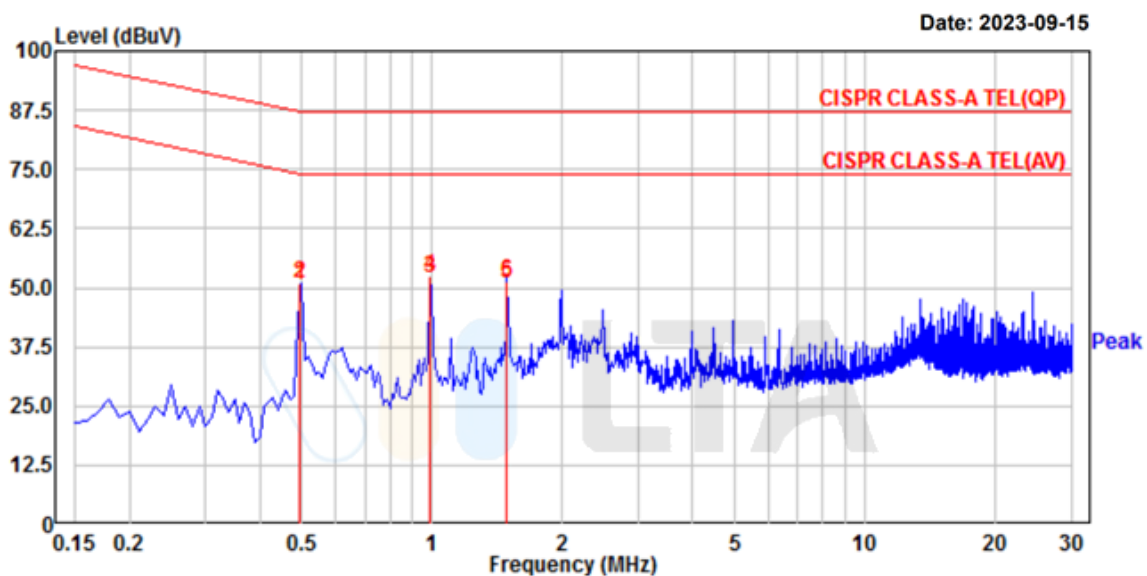
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_1000 M #1)



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Project No.	: 230831-0146	Phase	: TEL_1000M (LAN #1)
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 23 'C / 59 % R.H.	Test Engineer	: AHN H Y



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.	0.496	31.73	31.42	19.32	51.05	50.74	87.06	74.06	36.01	23.32	Line
4.	0.993	33.02	32.69	19.26	52.28	51.95	87.00	74.00	34.72	22.05	Line
6.	1.490	32.17	31.62	19.23	51.40	50.85	87.00	74.00	35.60	23.15	Line

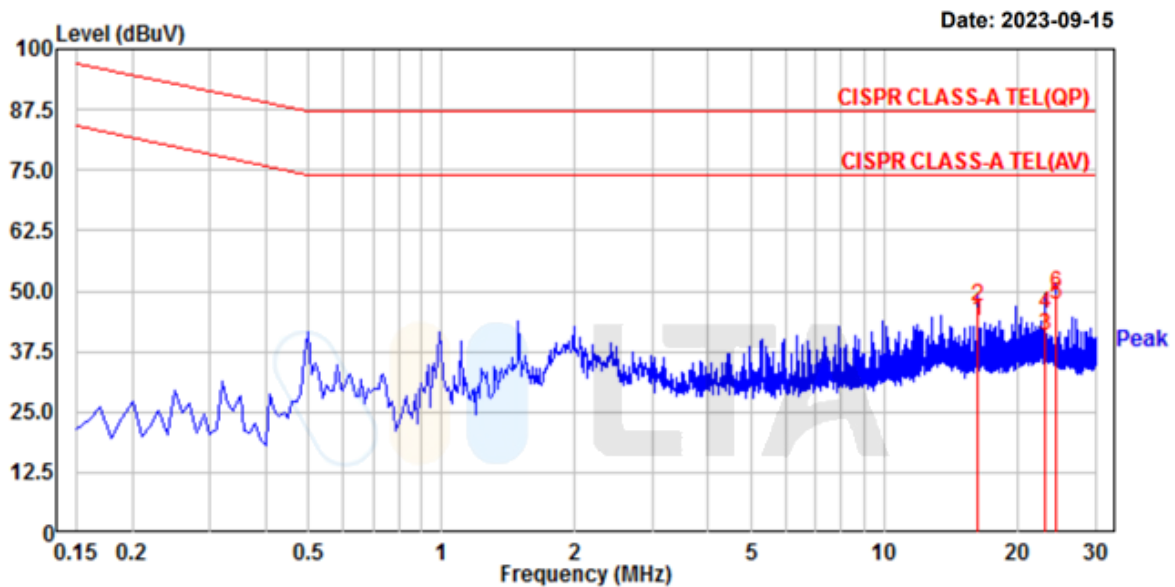
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_1000 M #2)



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Project No.	: 230831-0146	Phase	: TEL_1000M (LAN #2)
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 23 'C / 59 % R.H.	Test Engineer	: AHN H Y



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.	16.228	27.23	24.35	19.54	46.77	43.89	87.00	74.00	40.23	30.11	Line
4.	23.127	25.45	21.02	19.66	45.11	40.68	87.00	74.00	41.89	33.32	Line
6.	24.349	29.58	27.45	19.69	49.27	47.14	87.00	74.00	37.73	26.86	Line

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

3.2.2 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	: EN 55032:2015/A11:2020
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 higher than 108 MHz, the measurement shall be made up to 6 GHz.

A sample calculation:

COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + 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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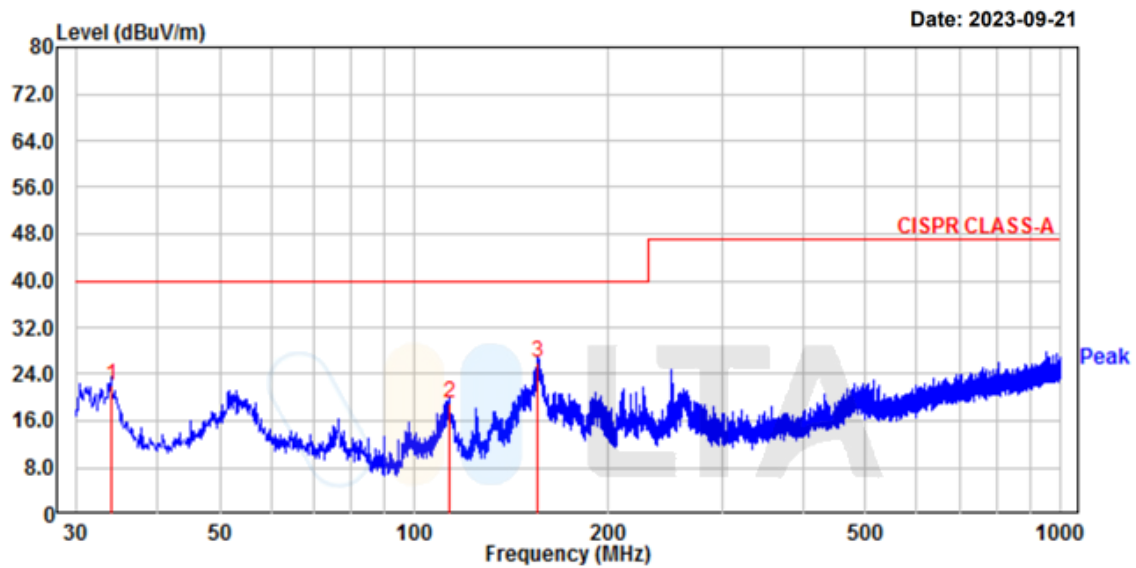
Project No. : 230831-0146

Temp/Humi: 21 'C / 52 % R.H.

Test Mode : Operating

Tested by: AHN H Y

Power : AC 230 V / 50 Hz



No.	Freq MHz	Reading dBμV	C.F dB	Result QP dBμV/m	Limit dBμV/m	Margin dB	Height cm	Angle deg	Polarity
1.	33.88	35.10	-13.21	21.89	40.00	18.11	310	177	horizontal
2.	113.42	33.60	-14.62	18.98	40.00	21.02	400	88	horizontal
3.	155.49	36.75	-10.91	25.84	40.00	14.16	120	50	horizontal

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

Radiated Emissions (Below 1 GHz) / V



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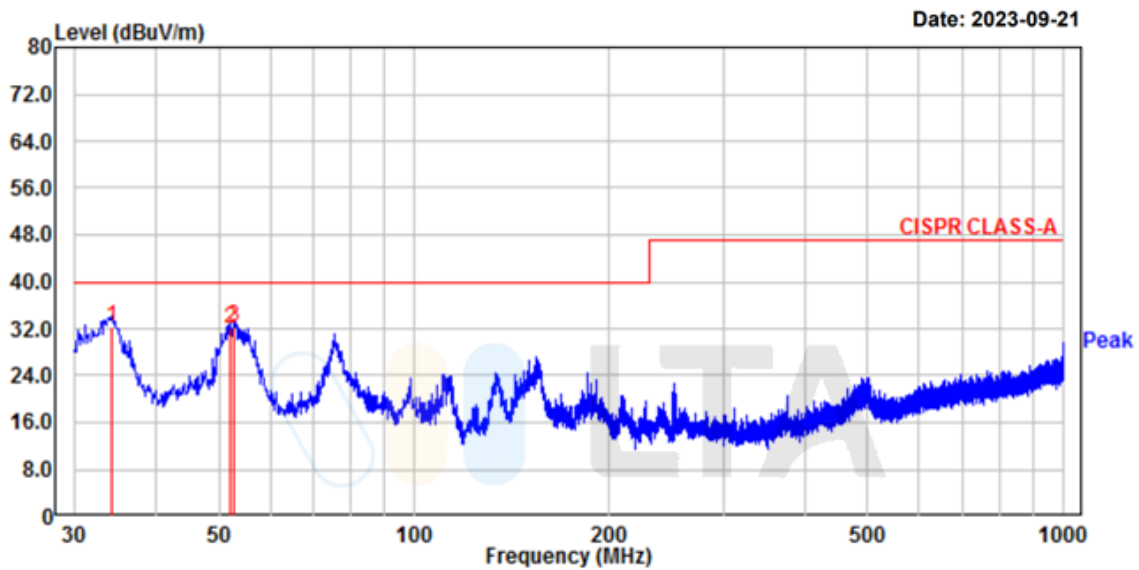
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Temp/Humi: 21 'C / 52 % R.H.

Test Mode : Operating

Tested by: AHN H Y

Power : AC 230 V / 50 Hz



No.	Freq MHz	Reading dBuV	C.F dB	Result QP dBuV/m	Limit dBuV/m	Margin dB	Height cm	Angle deg	Polarity
1.	34.12	45.50	-13.20	32.30	40.00	7.70	130	15	vertical
2.	52.07	43.60	-11.74	31.86	40.00	8.14	100	67	vertical
3.	52.67	44.20	-11.79	32.41	40.00	7.59	180	67	vertical

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

Radiated Emissions (Above 1 GHz) / H



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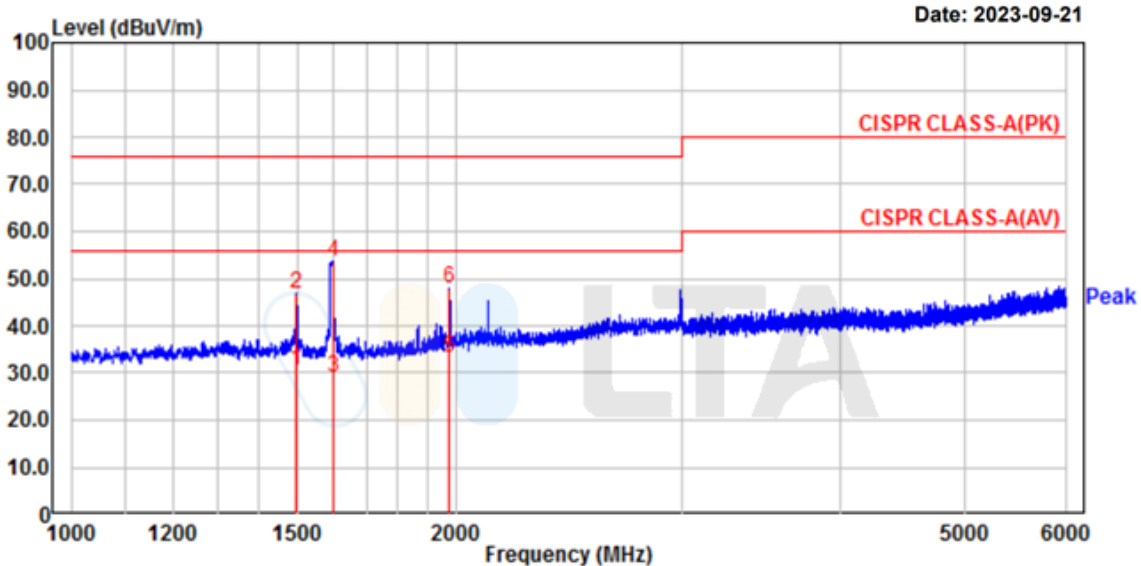
Temp/Humi: 21 'C / 52 % R.H.

Test Mode : Operating

Tested by: AHN H Y

Power : AC 230 V / 50 Hz

Measure distance : 3.8 m



No.	Freq	RD	RD	C.F	Result	Result	Limit	Limit	Margin	Margin	Height	Angle	Polarity
	MHz	PK	AV	dB	PK	AV	PK	AV	PK	AV	cm	deg	
		dBuV	dBuV		dBuV	dBuV	dBuV	dBuV	dB	dB			
2.	1498.13	49.61	33.49	-2.97	46.64	30.52	76.00	56.00	29.36	25.48	100	281	horizontal
4.	1599.38	56.64	31.90	-2.92	53.72	28.98	76.00	56.00	22.28	27.02	100	241	horizontal
6.	1975.63	47.25	32.49	0.58	47.83	33.07	76.00	56.00	28.17	22.93	100	261	horizontal

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

Radiated Emissions (Above 1 GHz) / V



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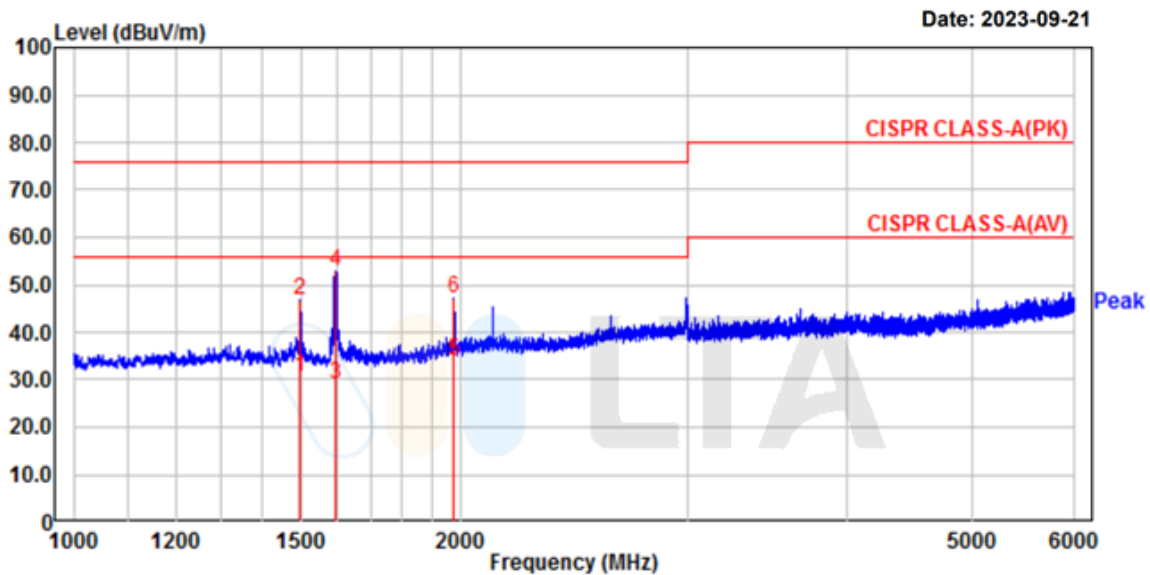
Temp/Humi: 21 'C / 52 % R.H.

Test Mode : Operating

Tested by: AHN H Y

Power : AC 230 V / 50 Hz

Measure distance : 3.8 m



No.	Freq	RD	RD	C.F	Result	Result	Limit	Limit	Margin	Margin	Height	Angle	Polarity
	MHz	PK	AV	dB	PK	AV	PK	AV	PK	AV	cm	deg	
		dBuV	dBuV		dBuV	dBuV	dBuV	dBuV	dB	dB			
2.	1498.13	49.91	33.49	-2.97	46.94	30.52	76.00	56.00	29.06	25.48	100	293	vertical
4.	1598.13	55.84	31.90	-2.92	52.92	28.98	76.00	56.00	23.08	27.02	100	255	vertical
6.	1975.00	46.58	33.50	0.56	47.14	34.06	76.00	56.00	28.86	21.94	100	293	vertical

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

3.2.3 Harmonic Current Emission

Definition:

This part deals with the Limitation of harmonic currents injected into the public supply system.

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

Test method	: EN 61000-3-2:2014
Test Location	: Shielded Room
Test mode	: Operating mode
Rated power	: 42.070 W
Result	: Not Applicable

Measurement Data:

- We did not test EN IEC 61000-3-2 (Harmonic Current Emission) for the XRN-3220B4 because equipment whose rated power is less or equal 75 W don't need to be tested.



Harmonic Current Emission

23st September 2023 - 11:32:08		Ph:1 Page 1/10		IECSOft v2_7	
		BS EN 61000-3-2:2014			
Fluctuating Harmonics					
Instrument Details					
Instrument Model	PPA5511				
Serial Number	162-04957				
Firmware Version	2.185				
N4L Calibration Date	18th September 2017				
Instrument Version	Standard				
Test Settings					
Class	Class A				
Mode	Operating				
Equipment Under Test					
Brand	Hanwha Vision Co., Ltd.				
Model	XRN-3220B4				
Serial	N/A				
Impedance Network ID	N/A				
Test Conditions					
	User Entered		Measured		
Rated Voltage	N/A		230.921V		
Rated Current	N/A		319.109mA		
Rated Frequency	N/A		50.000Hz		
Rated Power	N/A		42.070W		
Additional Test Information					
Measured Power Factor	0.5709				
Max Current THD	18.26%				
Average THC	54.949mA				
Max Power	45.367W				
Max F.Current	314.868mA				
Average F.Current	305.863mA				
Minimum Current	100A				
Test Duration	2.5 minutes				
Additional Test Details					
Operator	AHN H Y				
Lab Name	N/A				
Location	N/A				
Notes	22 °C, 49 % R.H				
Signature					
Results	Test - N/A. Rated Power < 75W				

Test not applicable

With the exception of lighting equipment section 7 of the BS EN 61000-3-2:2014 standard declares that no Harmonic current limits are specified for equipment with a rated power of 75W or less.

3.2.4 Voltage Fluctuations and Flicker

Definition:

This section is concerned with the limitation of voltage fluctuations and flicker impressed on the public low-voltage system.

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

Test method	: EN 61000-3-3:2013
Test Location	: Shielded Room
Test mode	: Operating mode
Result	: Complies

Measurement Data:

- Refer to the Next page



Voltage Fluctuations and Flicker

23st September 2023 - 12:41:25		Ph:1 Page 1/3		IECSOft v2_7	
		BS EN 61000-3-3:2013			
Flickermeter					
Instrument Details					
Instrument Model	PPA5511				
Serial Number	162-04957				
Firmware Version	2.185				
N4L Calibration Date	18th September 2017				
Instrument Version	Standard				
Test Settings					
Class	Voltage				
Mode	Operating (4.0%)				
Minimum Current	10A				
PST	10 minutes				
PLT	12 PSTs				
Equipment Under Test					
Brand	Hanwha Vision Co., Ltd.				
Model	XRN-3220B4				
Serial	N/A				
Impedance Network ID	N/A				
Test Conditions					
	User Entered		Measured		
Rated Voltage	N/A		230.952V		
Rated Current	N/A		N/A		
Rated Frequency	N/A		50.000Hz		
Rated Power	N/A		N/A		
D max	0.0710% (Limit: 4.0%)				
T max	0.0000 s (Limit: 0.5 s)				
DC max	0.0114% (Limit: 3.3%)				
Additional Test Details					
Operator	AHN H Y				
Lab Name	N/A				
Location	N/A				
Notes	22 °C, 49 % R.H				
Signature					
Results	Phase1: PASS				

23st September 2023 - 12:41:25				Ph:1 Page 2/3				IECSoft v2_7			
BS EN 61000-3-3:2013 Flickermeter											
Instrument Details											
Instrument Model		PPA5511									
Instrument Serial		162-04957									
Instrument Firmware		2.185									
Equipment Under Test											
Brand		Hanwha Vision Co., Ltd.									
Model		XRN-3220B4									
Serial		N/A									
Flicker Test Results											
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim			
1	Phase1: NO RESULTS	0.01144	0.06537	0.00000	0.08226	1.00000	0.08226	N/A			
2	Phase1: PASS	0.01144	0.06537	0.00000	0.08226	1.00000	0.08226	N/A			
3	Phase1: PASS	0.01144	0.06537	0.00000	0.08226	1.00000	0.08226	N/A			
4	Phase1: PASS	0.01144	0.06647	0.00000	0.08226	1.00000	0.08226	N/A			
5	Phase1: PASS	0.01144	0.06647	0.00000	0.08226	1.00000	0.08226	N/A			
6	Phase1: PASS	0.01144	0.06647	0.00000	0.08226	1.00000	0.08226	N/A			
7	Phase1: PASS	0.01144	0.06647	0.00000	0.08226	1.00000	0.08226	N/A			
8	Phase1: PASS	0.01144	0.06656	0.00000	0.08226	1.00000	0.08226	N/A			
9	Phase1: PASS	0.01144	0.07105	0.00000	0.08226	1.00000	0.08226	N/A			
10	Phase1: PASS	0.01144	0.07105	0.00000	0.08226	1.00000	0.08226	N/A			
11	Phase1: PASS	0.01144	0.07105	0.00000	0.08226	1.00000	0.08226	N/A			
12	Phase1: PASS	0.01144	0.07105	0.00000	0.08226	1.00000	0.08226	0.65000			



3.3 IMMUNITY

3.3.1 Electrostatic Discharge

Definition:

The test assesses the ability of the EUT to operate as intended in the event of an electrostatic discharge.

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

Test date : 2023. 09. 22.
 Test method : EN 61000-4-2 :2009
 Temperature / Humidity / Pressure : 21.4 °C / 49 % R.H. / 100.2 kPa
 Discharge Impedance : $(330 \pm 10 \%) \Omega / (150 \pm 10 \%) \text{ pF}$
 Type of Discharge (air discharge) : $\pm 2 \text{ kV}, \pm 4 \text{ kV}, \pm 8 \text{ kV}$
 Type of Discharge (contact discharge) : $\pm 4 \text{ kV}$
 Number of discharges at each point : 10 of each polarity
 Discharge Repetition on Rate : 1 / sec
 Test Location : Shielded Room
 Test mode : Operating mode
 Result : **Complies**

Measurement Data:
ESD Test Point and Result
1. Indirect Discharge

No.	Position	Kind of Discharge	Results	Remarks
1	HCP	Contact	Complies	No reaction recognized
2	VCP	Contact	Complies	No reaction recognized

2. Direct Discharge

Position No.	Position	Kind of Discharge	Result	Remarks
1	Enclosure	Contact	Complies	No reaction recognized
2	Enclosure	Air	Complies	No reaction recognized
3	Mouse	Air	Complies	No reaction recognized
4	SCREW	Contact	Complies	No reaction recognized
5	Port	Contact	Complies	No reaction recognized

ESD TEST POINT

[Air discharge]
[Contact discharge]



3.3.2 RF Electromagnetic Field

Definition:

The test assesses the ability of the EUT to operate as intended in the presence of a radio frequency electromagnetic field disturbance.

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

Test date	: 2023. 09. 21
Test method	: EN 61000-4-3:2006/A1:2008/A2:2010
Temperature / Humidity	: 21.6 °C / 52 % R.H.
Frequency range	: 80 MHz to 2,700 MHz
Test level	: 10 V/m (measured unmodulated)
Amplitude Modulation	: AM, 80 %, 1 kHz Sinusoidal PM, 1 Hz (0.5s ON : 0.5s OFF)
Step size	: 1 % of fundamental
Dwell Time	: 3 s
Test Location	: 3 m Chamber
Test mode	: Operating mode
Result	: Complies

Measurement Data:

Port	Side	Result	Remarks
Horizontal	Front	Complies	No reaction recognized
	Left	Complies	No reaction recognized
	Rear	Complies	No reaction recognized
	Right	Complies	No reaction recognized
Vertical	Front	Complies	No reaction recognized
	Left	Complies	No reaction recognized
	Rear	Complies	No reaction recognized
	Right	Complies	No reaction recognized

3.3.4 Surges

Definition:

The test assesses the ability of the EUT to operate as intended in the event of surge presence on the AC main power input ports.

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

Test date	: 2023. 09. 22
Test method	: EN 61000-4-5:2014/A1:2017
Temperature / Humidity	: 21.4 °C / 49 % R.H.
Test level	: ± 0.5 kV, ± 1 kV (line to line), ± 0.5 kV, ± 1 kV, ± 2 kV (line to ground)
Polarity	: Negative/ positive
Wave shape	: 1.2/ 50 μ s pulse
Number of surges	: 5 (at each phase)
Test Location	: Shielded Room
Test mode	: Operating mode
Result	: Complies

Measurement Data:

Phase	Line	level	Result	Remark
0°	Line(L) to Line(N)	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized
	Line(L) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
	Line(N) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
90°	Line(L) to Line(N)	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized
	Line(L) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
	Line(N) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
180°	Line(L) to Line(N)	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized
	Line(L) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
	Line(N) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
270°	Line(L) to Line(N)	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized
	Line(L) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized
	Line(N) to ground(PE)	$\pm(0.5, 1.0, 2.0)$ kV	Complies	No reaction recognized

Signal Line	Test level	Result	Remarks
NETWORK #1	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized
NETWORK #2	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized
NETWORK #3	$\pm(0.5, 1.0)$ kV	Complies	No reaction recognized



3.3.5 Conducted Disturbances, Induced by Radio-Frequency Fields

Definition:

The test assesses the ability of the EUT to operate as intended in the presence of a radio frequency electromagnetic disturbance on the input/output ports.

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

Test date : 2023. 09. 22.
 Test method : EN 61000-4-6:2014/AC:2015
 Temperature / Humidity : 24 °C / 47 % R.H.
 Frequency range : 0.15 MHz – 100 MHz
 Test level : 10 Vrms unmodulated
 Amplitude Modulation : AM, 80 %, 1 kHz Sinusoidal
 PM, 1 Hz (0.5s ON : 0.5s OFF)
 Step size : 1 % of fundamental.
 Test Location : Shielded Room
 Test mode : Operating mode
 Result : **Complies**

Measurement Data:

Power Port	Result	Remarks
Power	Complies	No reaction recognized

Signal Port	Result	Remarks
NETWORK #1	Complies	No reaction recognized
NETWORK #2	Complies	No reaction recognized
NETWORK #3	Complies	No reaction recognized

3.3.6 Voltage dips and Interruptions

Definition:

The test assesses the ability of the EUT to operate as intended in the event of voltage dips and interruptions present on the AC mains power input ports.

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

Test date	: 2023. 09. 22
Test method	: EN 61000-4-11:2004/A1:2017
Temperature / Humidity	: 21.4 °C / 49 % R.H.
Ut	: 230 Vac
Test Location	: Shielded Room
Test mode	: Operating mode
Result	: Complies

Measurement Data:

Test Level %Ut	Voltage droop and interruptions %Ut	Duration of Reduction (period)	Result	Remarks
80	20	250	Complies	No reaction recognized
70	30	25	Complies	No reaction recognized
40	60	10	Complies	No reaction recognized
0	100	250	Complies	EUT was turned off during the test. Re-operation by user's control. After the test, EUT was normally operated.

3.3.7 Mains supply voltage variations

Definition:

The test assesses the ability of the EUT to operate as intended in the event of voltage variations present on the AC mains power input ports.

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

Test date	: 2023. 09. 22.
Test method	: EN 61000-4-11:2004/A1:2017
Temperature / Humidity	: 21.4 °C / 49 % R.H.
Supply Voltage maximum	: $U_{nom} + 10 \%$
Supply Voltage minimum	: $U_{nom} - 15 \%$
Ut	: 230 Vac
Test Location	: Shielded Room
Test mode	: Operating mode
Result	: Complies

Measurement Data:

U_{nom} = Nominal mains voltage. Where provision is made to adapt the equipment to suit a number of nominal supply voltages (e.g. by transformer tap changing), the above conditioning severity shall be applied for each nominal voltage, with the equipment suitably adapted. For equipment which is claimed to be suitable for a range of nominal mains voltages (e.g. 220/240 V) without adaptation, $U_{max} = (\text{Maximum } U_{nom}) + 10 \%$, and $U_{min} = (\text{Minimum } U_{nom}) - 15 \%$. In any case the range of U_{nom} must include the European nominal mains voltage of 230 V.

Mains supply voltage variations

Test LevelCondition		Test Level (V)	Result	Remarks
U_{nom}	+10%	253	Complies	No reaction recognized
U_{nom}	-15%	195.5	Complies	No reaction recognized

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	2 year
☐	HORN ANTENNA	3116B	ETS	81109	2024.04.25	2 year
☒	HORN ANTENNA	3115	ETS	114105	2024.04.20	1 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

Harmonic Current Emission / Voltage Fluctuations and Flicker

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Precision Power Analyzer	PPA5511	Newtons4th Ltd	162-04957	2024.08.18	1 year
☒	Reference Impedance Network	ES4152	NF Corp.	9074424	2024.08.18	1 year

Electrostatic Discharge

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	ESD Simulator	ESS-2000	NOISEKEN	8000C03241	2024.08.22	1 year
☒	ESD GUN	TC-815R	NOISEKEN	ESS0382069	2024.08.22	1 year

RF Electromagnetic Field

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Signal Generator	E4432B	Agilent	MY41310673	2024.08.22	1 year
☒	Power Meter	E4419B	Agilent	GB38410133	2024.03.14	1 year
☒	Power Sensor	E9300A	Agilent	MY41497992	2024.03.14	1 year
☒	Power Sensor	E9300A	Agilent	MY41497618	2024.03.14	1 year
☒	WIDE BAND HIGH POWER AMPLIFIER	ITA0300KL-500	INFINITECH	0300KL 20 09 001	-	-
☒	RF POWER AMPLIFIER	ITA2000KL-120	INFINITECH	200KL 1507 001	-	-
☒	RF POWER AMPLIFIER	ITA4500KL-70	INFINITECH	4500KL 1507 001	-	-
☒	RF POWER AMPLIFIER	ITA0750KL-300	INFINITECH	0750KL 1507 001	-	-
☒	Log.-Per.Antenna (80 MHz ~ 3 GHz)	K9128	RAPA	NONE	-	-
☒	Signal Generator	E4438C	Agilent	MY42080843	2024.08.22	-
☒	HORN ANTENNA	BBHA 9120 A	SCHWARZBECK	BBHA 9120 A 481	-	-

Electrical Fast Transients

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2024.08.23	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2024.08.23	1 year
☒	Capacitive Coupling Clamp	CCI	EMTEST	P1744207071	2024.08.23	1 year

Surges

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2024.08.23	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2024.08.23	1 year
☒	CDN	CNV 508T5	EMTEST	P1742204940	2024.08.23	1 year
☐	CDN	CNV 508N1	EMTEST	P1742204940	2024.08.23	1 year

Conducted Disturbances, Induced by Radio-Frequency Fields

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Signal generator	SML03	R&S	103026/0013	2024.03.14	1 year
☒	POWER METER	NRVD	R&S	101689	2024.03.14	1 year
☒	POWER Sensor	URV5-Z2	R&S	100755	2024.03.14	1 year
☒	POWER Sensor	URV5-Z2	R&S	100756	2024.03.14	1 year
☒	RF Power Amplifier	FLL75A	FRANKONIA	1033	-	-
☒	EM INJECTION CLAMP	TSIC-23	F.C.C	529	2024.03.16	1 year
☐	CDN (M1)	TSCDN-M1-16A	F.C.C	07004	2024.08.22	1 year
☐	CDN (M2)	TSCDN-M2-16A	F.C.C	07008	2024.08.22	1 year
☐	CDN (M2)	TSCDN-M2-16A	F.C.C	07009	2024.03.13	1 year
☒	CDN (M3)	TSCDN-M3-16A	F.C.C	07016	2024.03.13	1 year
☒	CDN (M3)	TSCDN-M3-16A	F.C.C	07017	2024.08.22	1 year

Voltage dips and Interruptions

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2024.08.23	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2024.08.23	1 year

Mains supply voltage variations

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Multifunctional AC/DC Power source	NetWave 3.1-230	EMTEST	P2119252057	2024.08.22	1 year

APPENDIX B

PERFORMANCE CRITERIA



Performance criteria

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to the EUT

(e.g. no corruption of memory or changes to programmable setting etc.)

(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and

(c) there is no observable deterioration of the picture at 1 V/m.

The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Fast transient burst

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of the bursts is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of the surges is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at $U_0 = 130 \text{ dB}\mu\text{V}$.

For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at $U_0 = 140 \text{ dB}\mu\text{V}$, providing

(a) there is no permanent damage or change to the EUT

(e.g. no corruption of memory or changes to programmable settings, etc.)

(b) at $U_0 = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could still be used, and

(c) there is no observable deterioration of the picture at $U_0 = 120 \text{ dB}\mu\text{V}$.

The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Voltage dip/interruption

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

It is permitted to use ancillary equipment (e.g. A UPS) to meet the requirements of this clause. This shall be detailed in the test report and the manufacturer's installation manual.

Signaling a mains fault during the 100 % voltage reduction test is permitted.

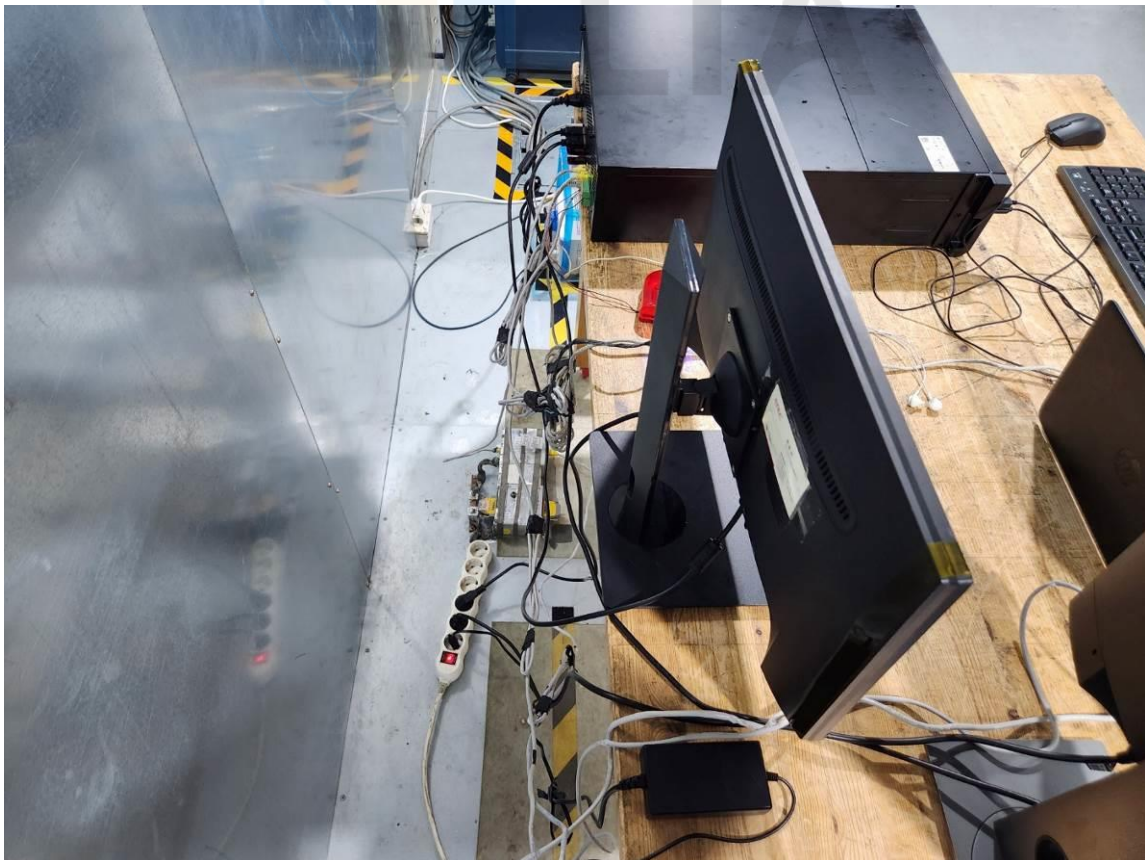
Mains supply voltage variations

There shall be no damage, malfunction or change of status due to the different supply voltage conditions. The EUT shall meet the acceptance criteria for the functional test(see Clause 6), during the conditioning.

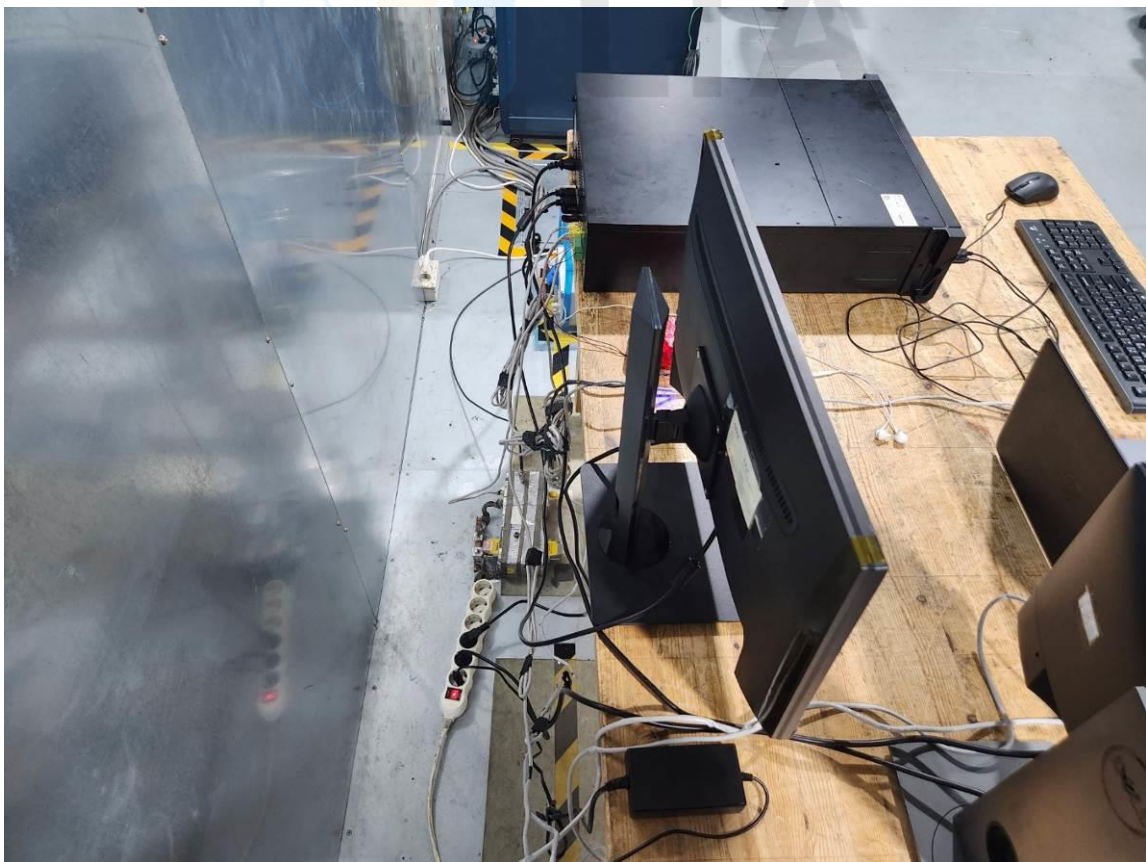
APPENDIX C
PHOTOGRAPHS



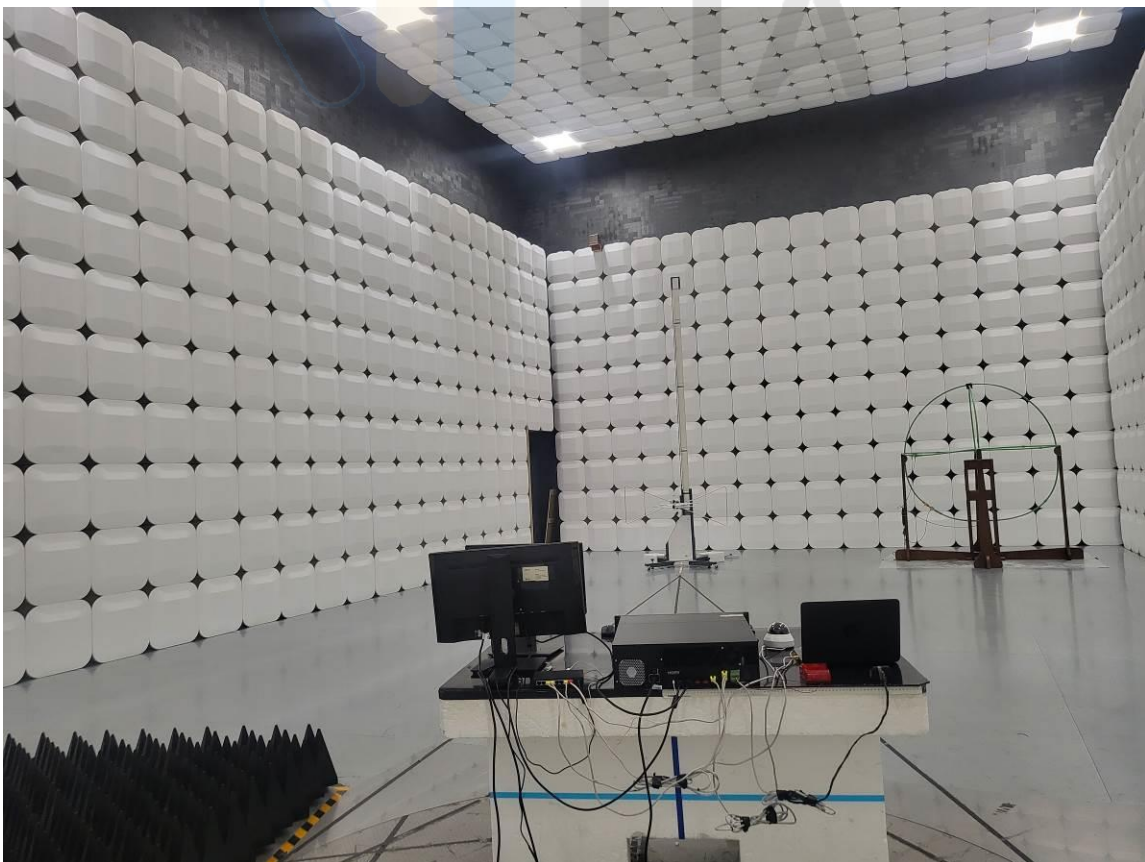
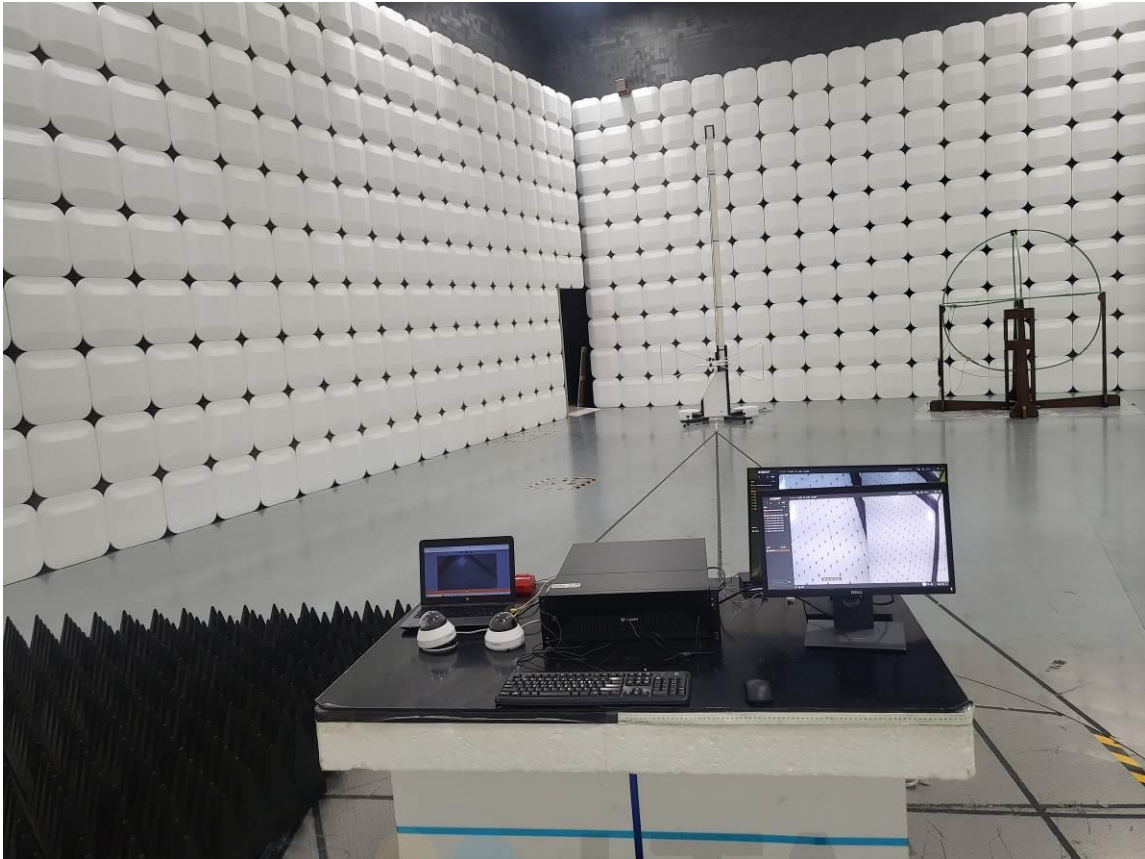
Conducted Emissions



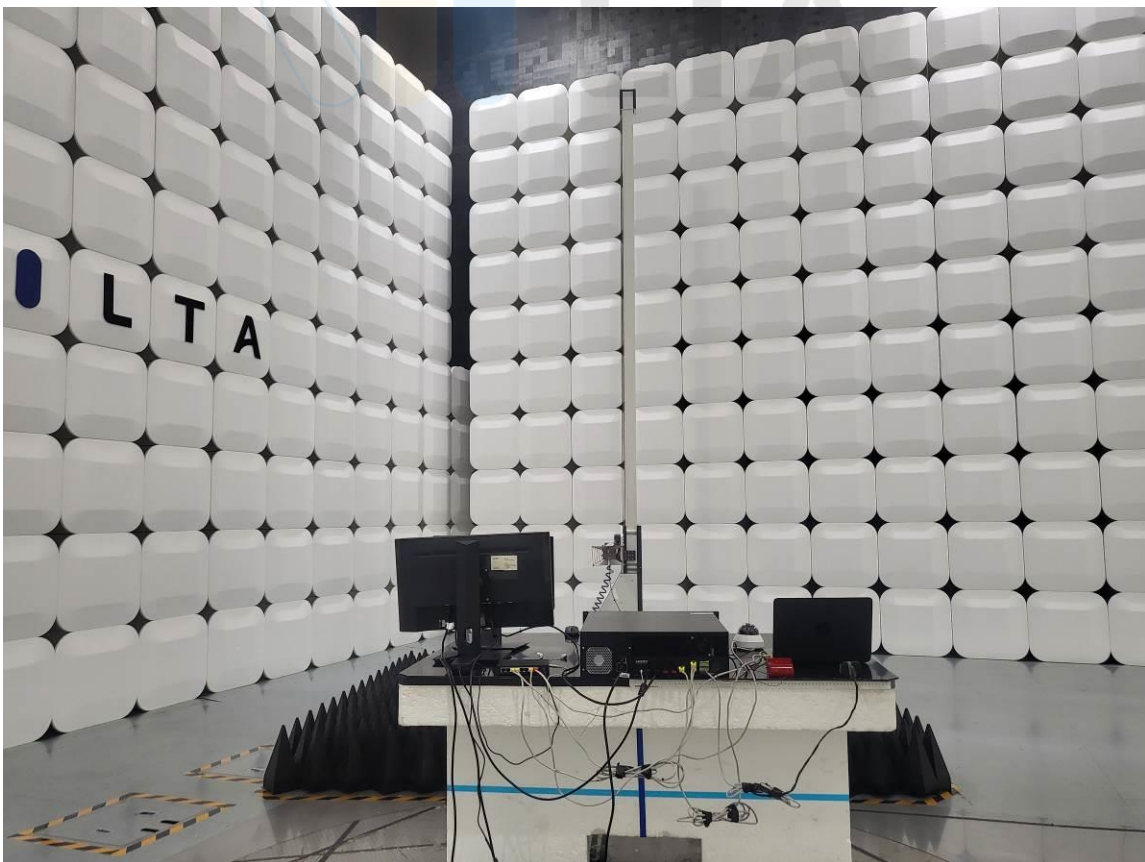
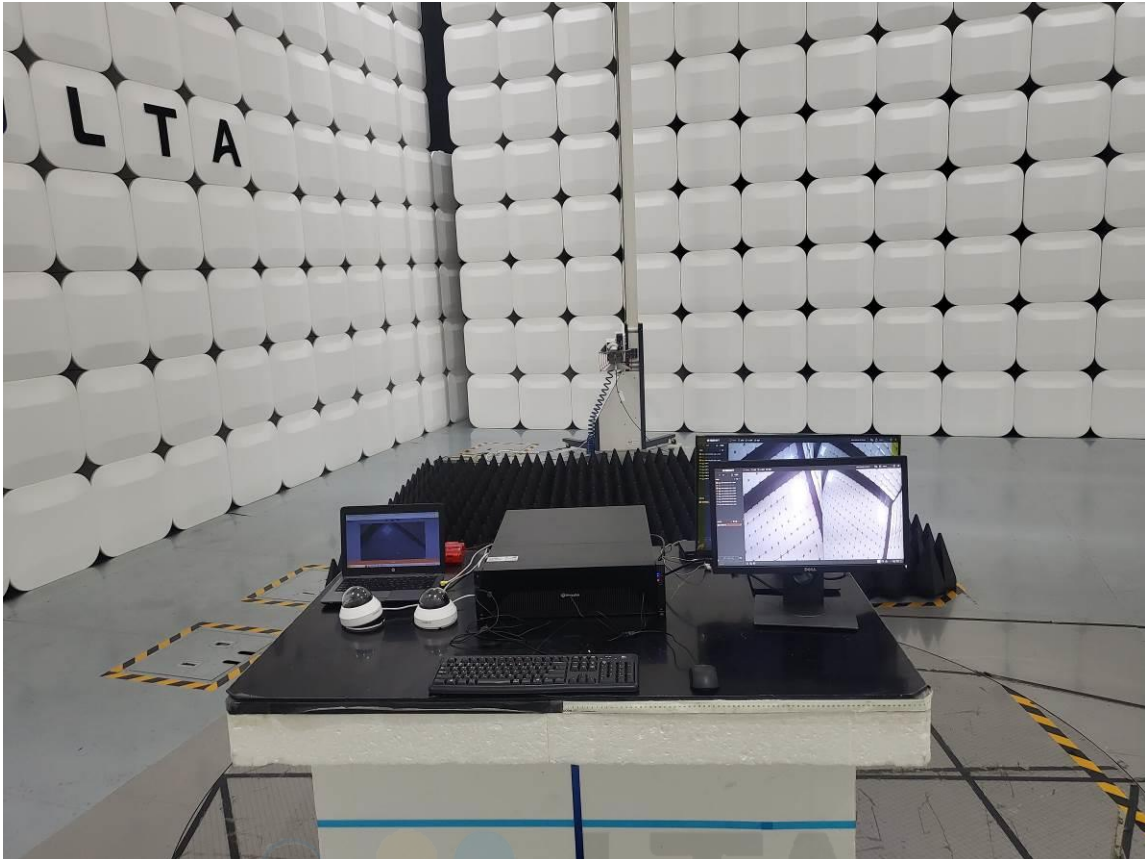
Conducted Emissions (TEL)



Radiated Emissions - Below 1 GHz



Radiated Emissions - Above 1GHz



Harmonic Current Emission / Voltage Fluctuations and Flicker



Electrostatic Discharge



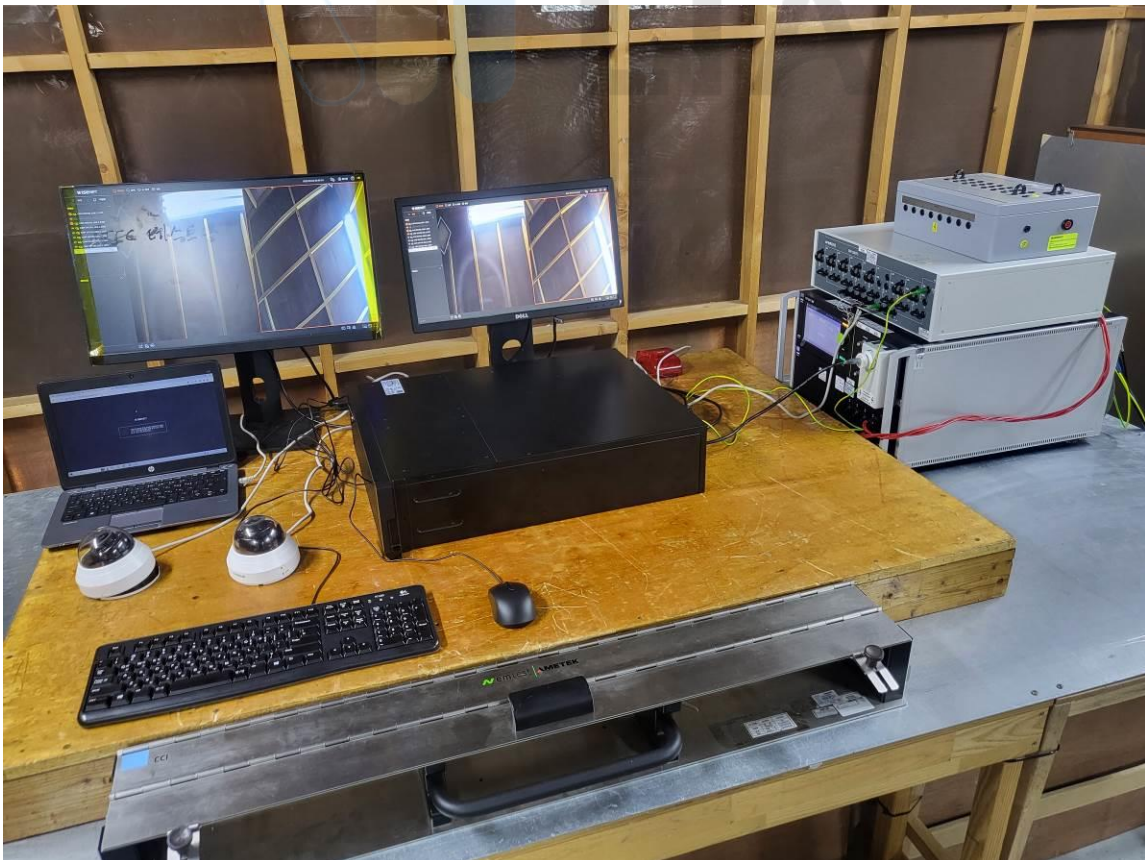
RF Electromagnetic Field



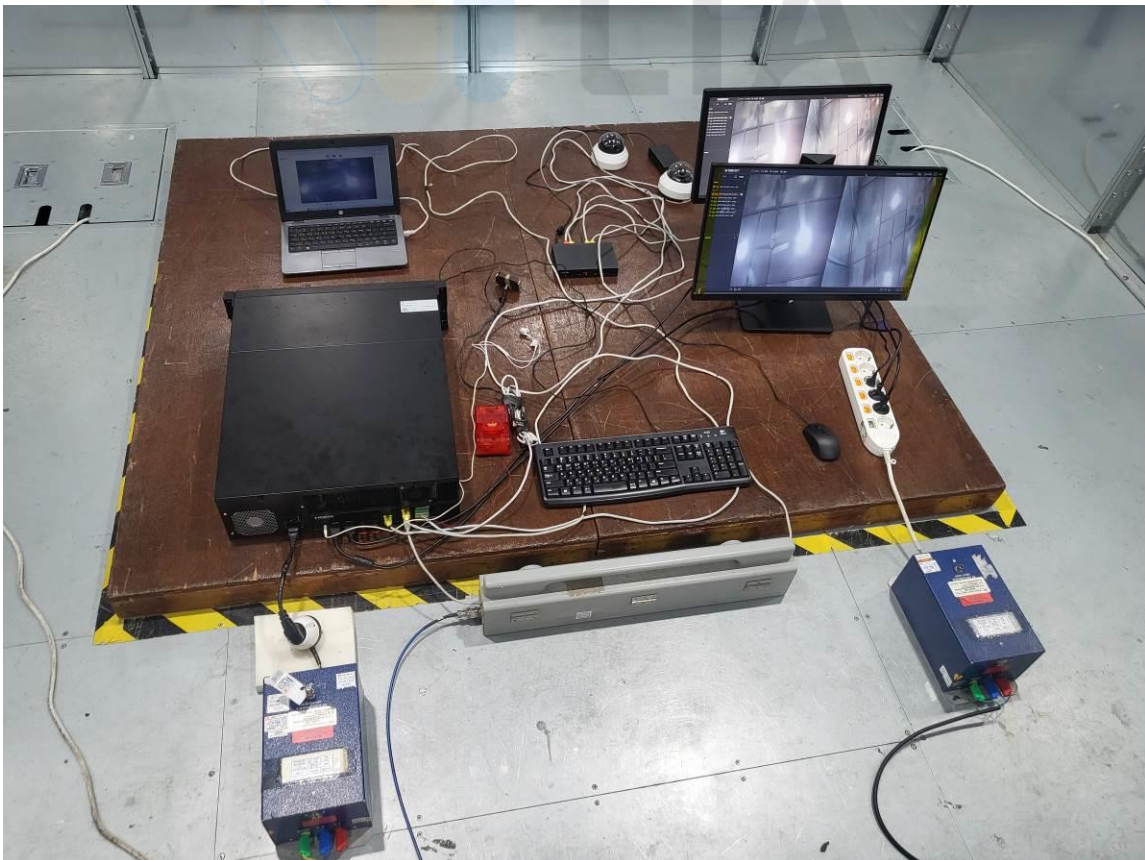
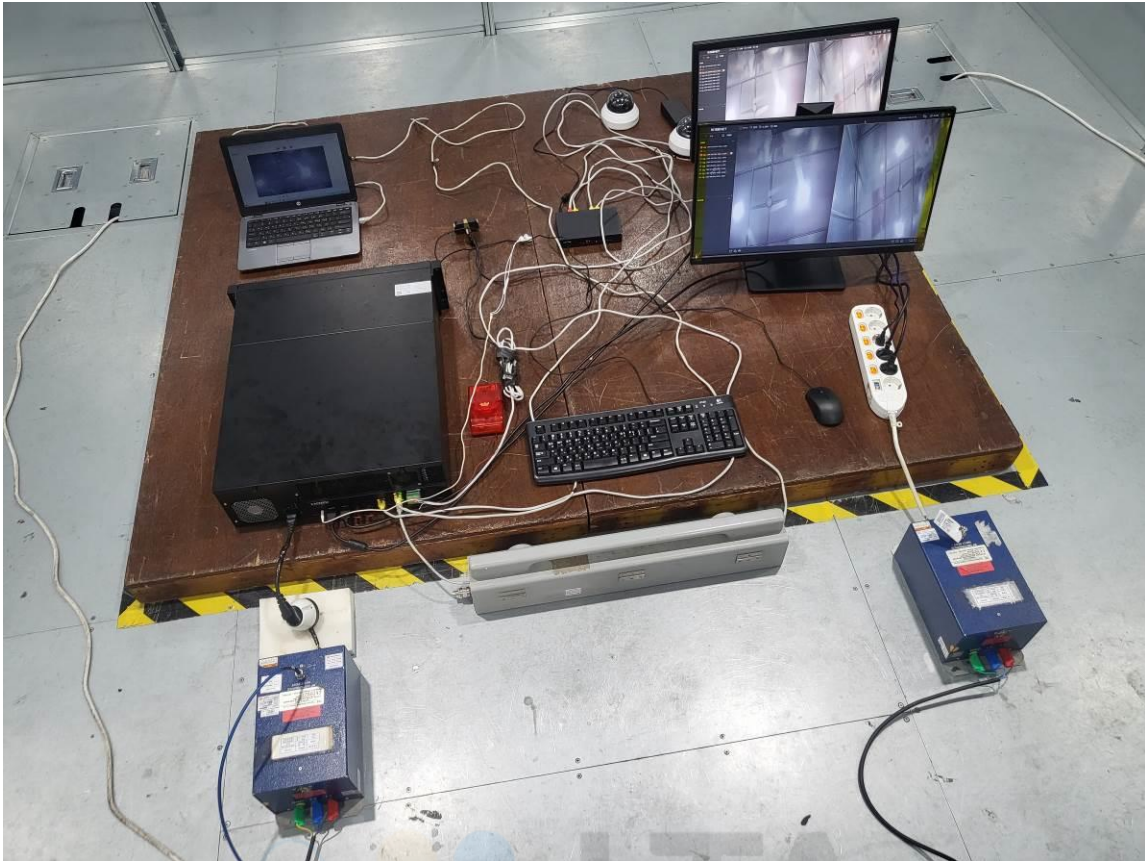
Electrical Fast Transients



Surges



Conducted Disturbances, Induced by Radio-Frequency Fields



Voltage dips and short interruptions



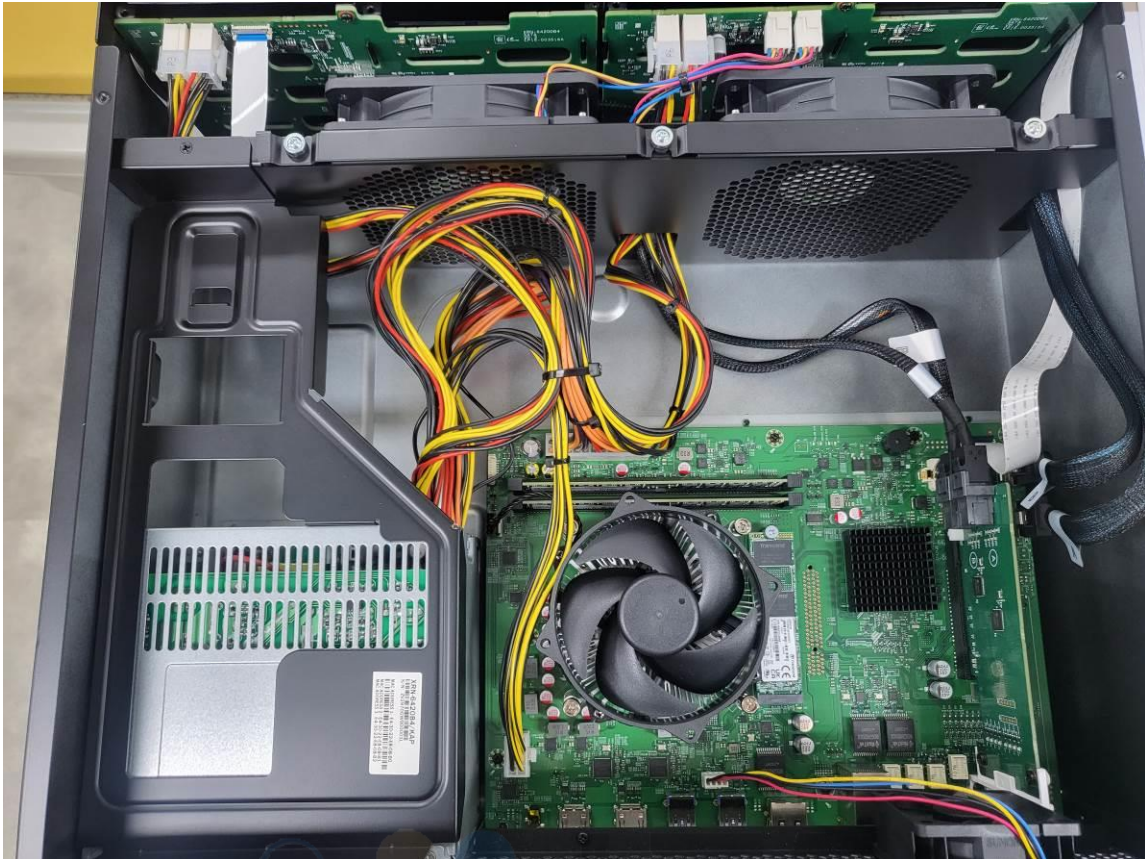
Main supply Voltage Variation



EUT



EUT



Modification

