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EMC TEST REPORT

Dates of Tests: February 26 – March 4, 2024

Project No : 240214-0203

Test Site : LTA Co., Ltd.

Model No.

WRN-2110SB1

APPLICANT

Hanwha Vision Co., Ltd

Equipment name : NETWORK VIDEO RECORDER
Manufacturer : Hanwha Vision Co., Ltd
Model name : WRN-2110SB1
Additional Model name : -
Test Device Serial No.: : Identical prototype
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
Date of issue : March 06, 2024

This test report is issued under the authority of:

The test was supervised by:

Young Kyu Shin, Technical Manager

Jong Chae Kim, 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	06.03.2024	LR500122403E	Initial



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1. General information's

1-1 Test Performed

Company name : **LTA Co., Ltd.**
 Address : 4, Songju-ro 236beon-gil, Yangji-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17159, Korea
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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		-	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	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 : +82-10-2221-6513 / +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
 Equipment Name : NETWORK VIDEO RECORDER
 Model name : WRN-2110SB1
 Additional Model name : -
 Serial number : Identification
 Date of receipt : February 14, 2024
 EUT condition : Pre-production
 Interface Ports : AC IN, HDMI, Display, AUDIO OUT, USB #1~#4,
 NETWORK #1~#18, Console (Unused)
 Power rating : AC 230 V, 50 Hz

2-3 Modification

- NONE

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 : (17 – 21) °C / (25 - 40) % R.H. / (101.5) kPa
 Tested Model : WRN-2110SB1
 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	WRN-2110SB1	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	003NTWG489	LG	-
Adapter#1	PA-1900-08	1Z01445509	LG	-
PoE Switch	SW1600-mini	N/A	ipTIME	-
Notebook Computer	ThinkBook 15 G2 ITL	MP20831Z	Lenovo	-
Adapter#2	ADLX65YCC3D	N/A	Lenovo	-
Camera #1	LND-6022R	ZNDE6V4M900007T	HANWHA TECHWIN CO.,LTD	-
Camera #2	LNV-6032R	ZNHX70GM70000MY	HANWHA TECHWIN CO.,LTD	-
Headphone	SHS-150V/W	N/A	SAMSUNG	-
USB Memory #1	N/A	N/A	SanDisk	-
USB Memory #2	N/A	N/A	SanDisk	-
USB-C Hub	C106	N/A	Linxee (Beijing) Technology 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	AC OUT	1.1	NO
	USB #1	Mouse / EUT	-	1.0	NO
	USB #2	Keyboard	-	1.0	NO
	USB #3	USB MEMORY #1	-	-	NO
	USB #4	USB MEMORY #2	-	-	NO
	HDMI	Monitor #1	HDMI	1.4	YES
	Display	Monitor #2	Display	1.5	YES
	NETWORK #1	Notebook Computer	LAN	3.0	NO
	NETWORK #2	USB-C Hub	LAN	3.0	NO
	AUDIO OUT	Headphone	AUDIO IN	1.5	NO
	NETWORK #5 ~ #18	PoE Switch	LAN #1 ~ #16	1.8	NO
	NETWORK #3	Camera #1	LAN	3.0	NO
	NETWORK #4	Camera #2	LAN	3.0	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 WRN-2110SB1 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/Telecommunication ports.

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

Test method	: 150 kHz – 30 MHz
Measurement Frequency range	: 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 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 A	(40 – 30) dB μ A
(0.5 – 30) MHz	87 dB μ V	74 dB μ V	43 dB μ A	30 dB μ A

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 A	(30 – 20) dB μ A
(0.5 – 30) MHz	74 dB μ V	64 dB μ V	30 dB μ A	20 dB μ A

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

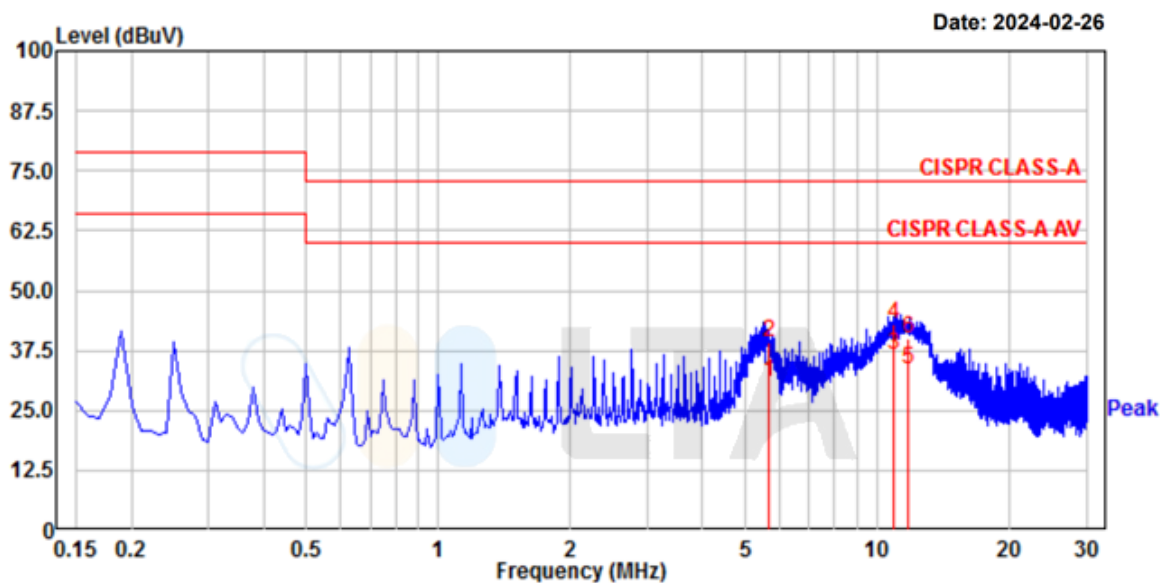
Note 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150/I = 44$ dB)

Conducted Emissions (LINE)



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Project No.	: 240214-0203	Phase	: LIVE
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: KIM J C



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.	5.641	19.39	11.31	19.68	39.07	30.99	73.00	60.00	33.93	29.01	Line
4.	10.911	23.15	16.75	19.82	42.97	36.57	73.00	60.00	30.03	23.43	Line
6.	11.722	19.97	13.73	19.86	39.83	33.59	73.00	60.00	33.17	26.41	Line

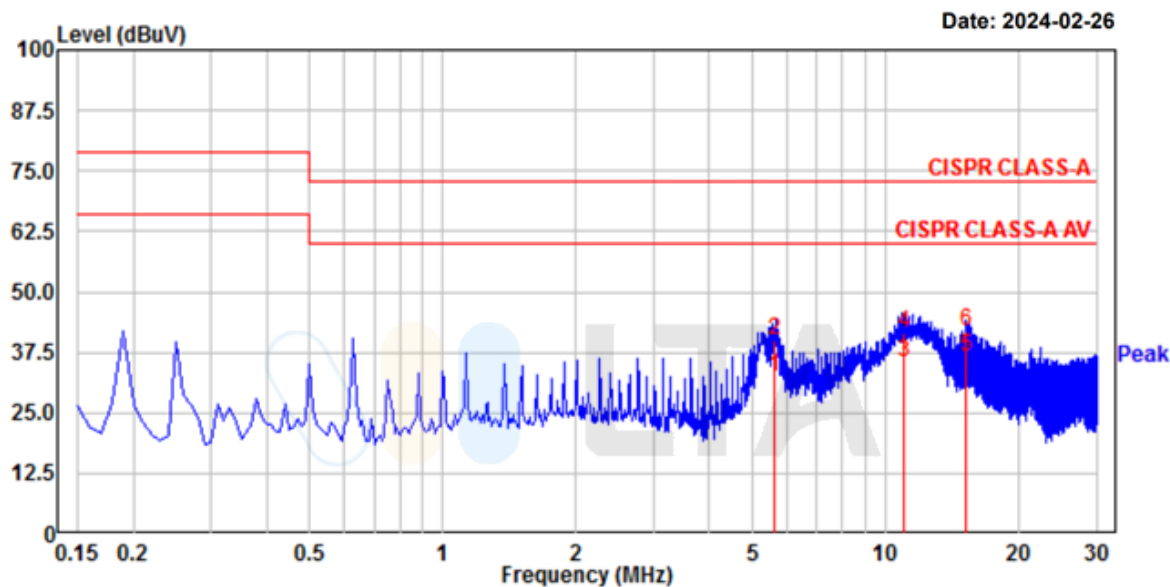
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (NEUTRAL)



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Project No.	: 240214-0203	Phase	: NEUTRAL
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: KIM J C



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.	5.600	20.18	12.75	19.68	39.86	32.43	73.00	60.00	33.14	27.57	neutral
4.	11.042	21.70	15.63	19.85	41.55	35.48	73.00	60.00	31.45	24.52	neutral
6.	15.184	21.78	16.73	19.94	41.72	36.67	73.00	60.00	31.28	23.33	neutral

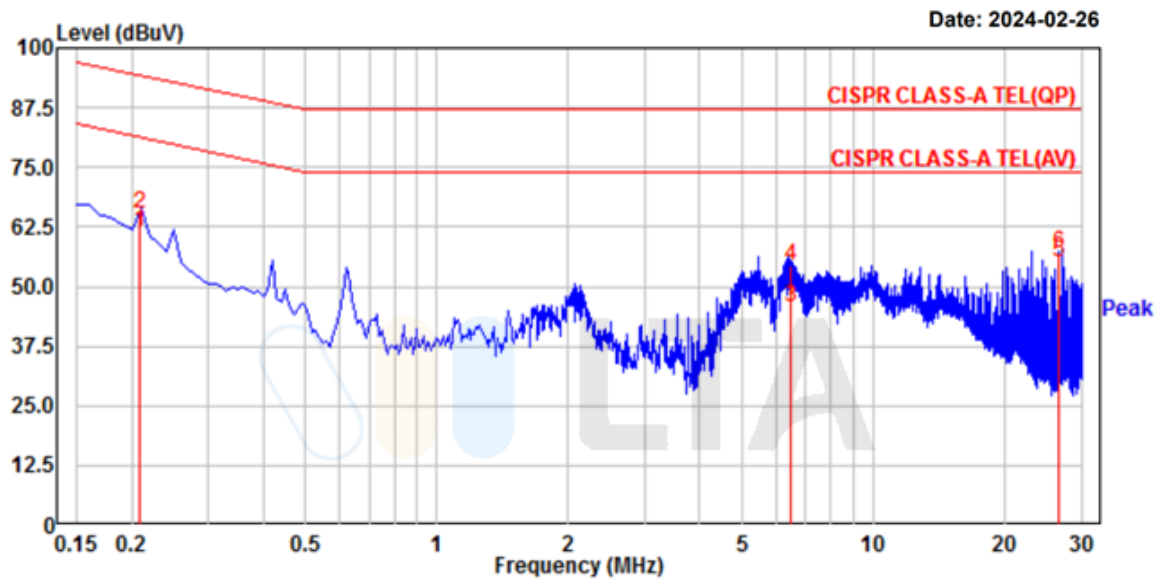
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_CAT5 (100 M) #1)



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Project No.	: 240214-0203	Phase	: CAT5(100 Mbps) #1
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: KIM J C



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.	0.209	45.52	41.80	19.71	65.23	61.51	94.25	81.25	29.02	19.74	Line
4.	6.444	34.72	26.29	19.43	54.15	45.72	87.00	74.00	32.85	28.28	Line
6.	26.610	36.93	34.92	20.01	56.94	54.93	87.00	74.00	30.06	19.07	Line

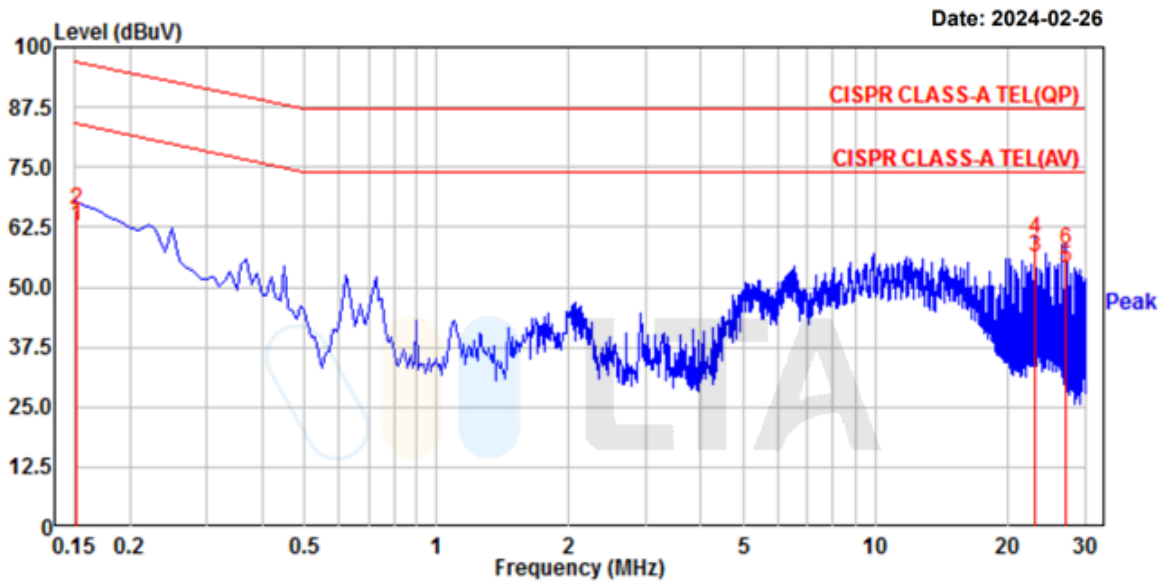
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_CAT5 (100 M) #1)



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Project No.	: 240214-0203	Phase	: CAT5(100 Mbps) #2
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: KIM J C



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.	0.151	46.20	42.83	19.90	66.10	62.73	96.94	83.94	30.84	21.21	Line
4.	23.129	40.26	36.40	19.88	60.14	56.28	87.00	74.00	26.86	17.72	Line
6.	27.158	37.81	33.86	20.03	57.84	53.89	87.00	74.00	29.16	20.11	Line

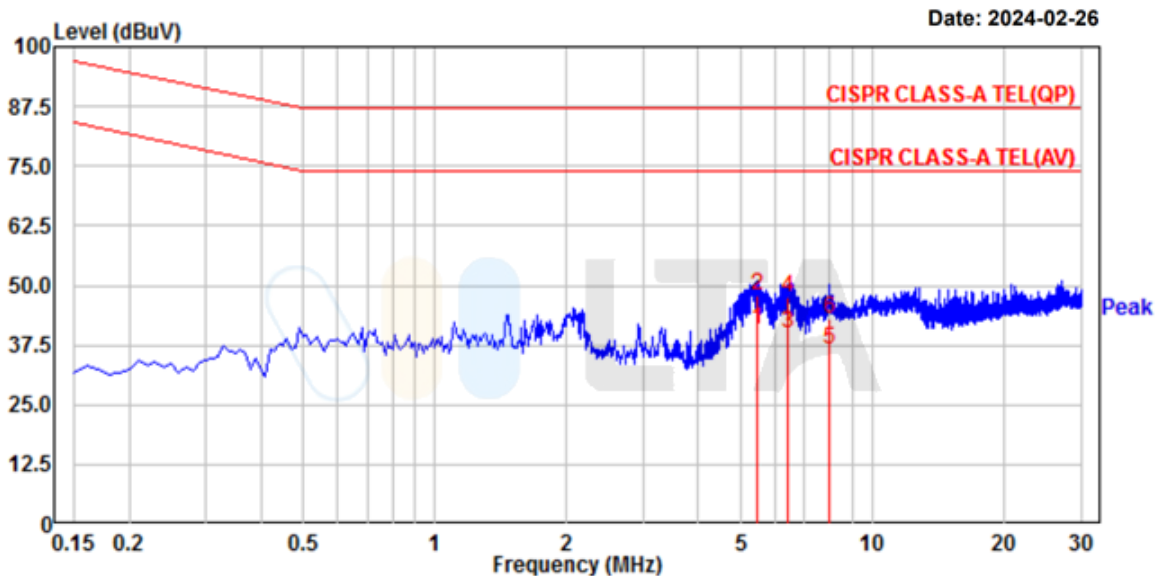
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_CAT6 (1000 M) #1)



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Project No.	: 240214-0203	Phase	: CAT6(1 000 Mbps) #1
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: KIM J C



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.	5.433	28.74	21.54	19.32	48.06	40.86	87.00	74.00	38.94	33.14	Line
4.	6.380	28.03	20.74	19.35	47.38	40.09	87.00	74.00	39.62	33.91	Line
6.	7.999	23.76	17.03	19.39	43.15	36.42	87.00	74.00	43.85	37.58	Line

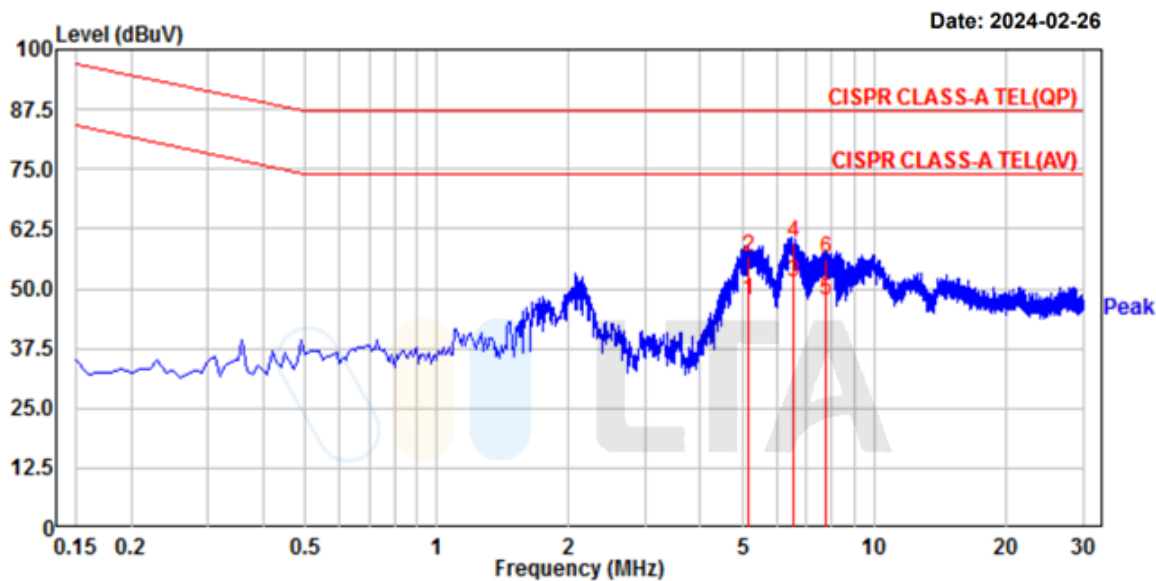
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

Conducted Emissions (TEL_CAT6 (1000 M) #2)



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Project No.	: 240214-0203	Phase	: CAT6(1 000 Mbps) #2
Test Mode	: Operating	Test Power	: AC 230 V / 50 Hz
Temp./ Humi.	: 17 'C / 35 % R.H.	Test Engineer	: KIM J C



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.	5.146	37.27	28.25	19.31	56.58	47.56	87.00	74.00	30.42	26.44	Line
4.	6.504	40.38	32.06	19.35	59.73	51.41	87.00	74.00	27.27	22.59	Line
6.	7.763	37.02	28.07	19.38	56.40	47.45	87.00	74.00	30.60	26.55	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 3.4 GHz, the measurement shall 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

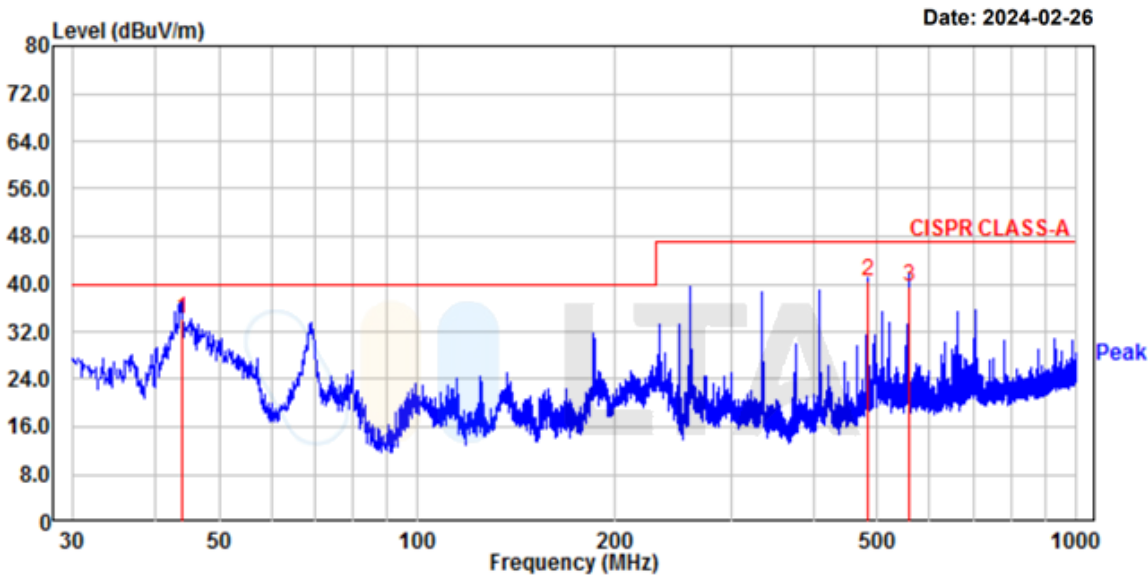
NOTE: The lower limit applies at the transition frequency.

Radiated Emissions (Below 1 GHz) / V



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Project No. : 240214-0203
Temp/Humi: 18 'C / 33 % R.H.
Test Mode : Operating
Tested by: KIM J C
Power : AC 230 V / 50 Hz



No.	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	QP	dBµV/m	dB	cm	deg	
1.	43.82	45.89	-11.81	34.08	40.00	5.92	153	87	vertical
2.	482.63	45.27	-4.89	40.38	47.00	6.62	391	68	vertical
3.	556.95	42.57	-2.95	39.62	47.00	7.38	255	169	vertical

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

Radiated Emissions (Above 1 GHz) / H



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Project No. : 240214-0203

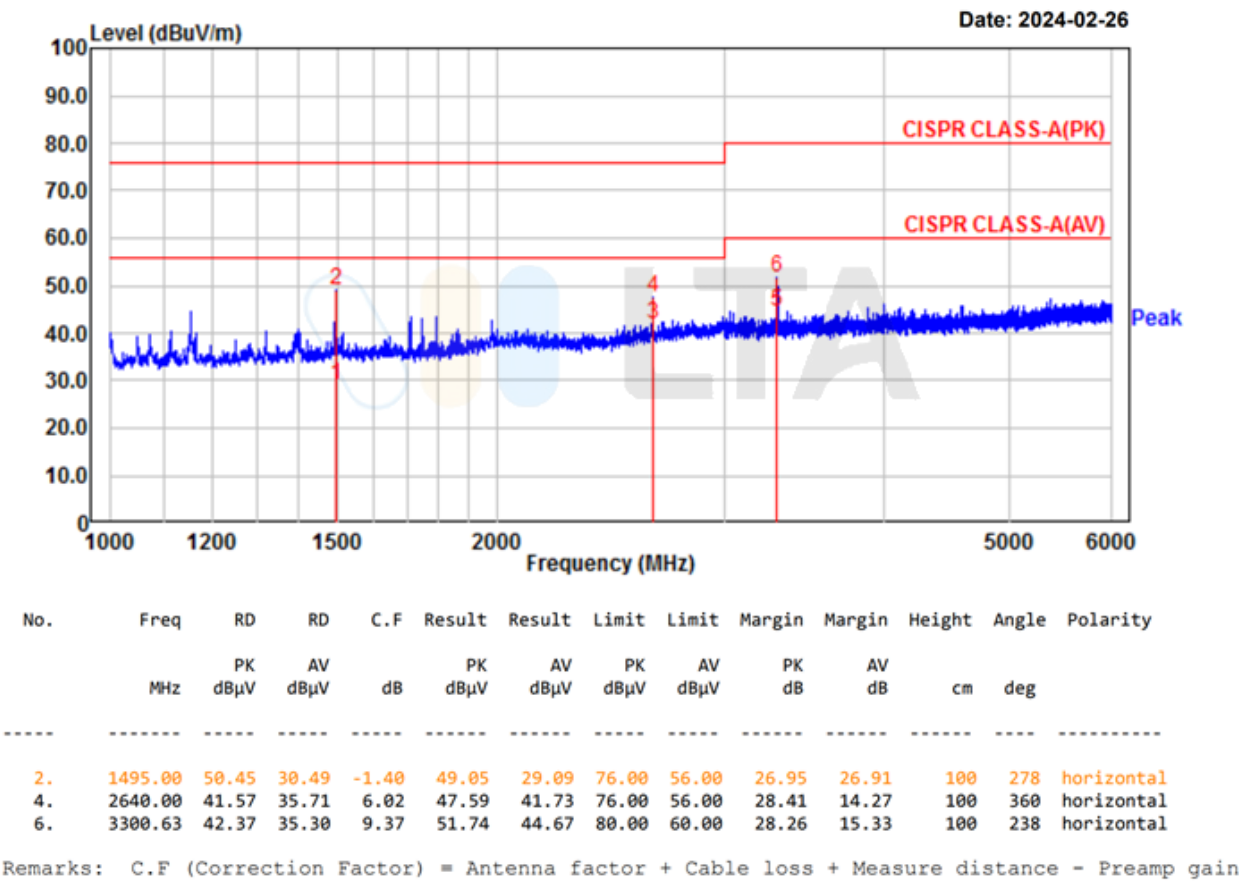
Temp/Humi: 18 'C / 33 % R.H.

Test Mode : Operating

Tested by: KIM J C

Power : AC 230 V / 50 Hz

Measure distance : 3.7 m

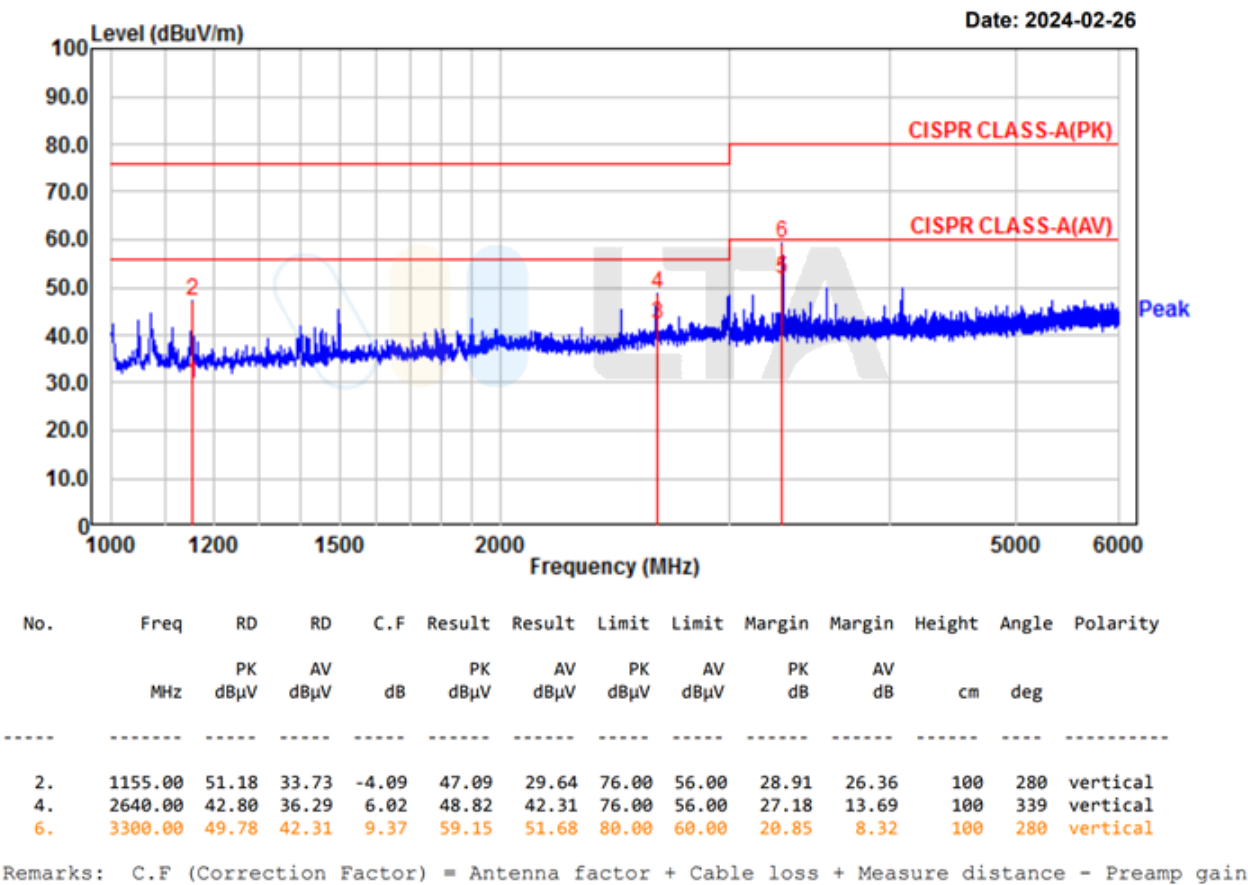


Radiated Emissions (Above 1 GHz) / V



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Project No.	: 240214-0203	Temp/Humi:	18 'C / 33 % R.H.
Test Mode	: Operating	Tested by:	KIM J C
Power	: AC 230 V / 50 Hz	Measure distance :	3.7 m



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	: 35.043 W
Result	: Not Applicable

Measurement Data:

- We did not test EN IEC 61000-3-2 (Harmonic Current Emission) for the WRN-2110SB1 because equipment whose rated power is less or equal 75 W don't need to be tested.



Harmonic Current Emission

4th March 2024 - 16:52:18		Ph:1 Page 1/5		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	Measured				
Equipment Under Test					
Brand	Hanwha Vision Co., Ltd				
Model	WRN-2110SB1				
Serial	N/A				
Impedance Network ID	N/A				
Test Conditions					
	User Entered		Measured		
Rated Voltage	N/A		230.703V		
Rated Current	N/A		204.217mA		
Rated Frequency	N/A		50.000Hz		
Rated Power	N/A		35.043W		
Additional Test Information					
Measured Power Factor	0.7438				
Max Current THD	33.83%				
Average THC	63.370mA				
Max Power	35.338W				
Max F.Current	191.390mA				
Average F.Current	189.482mA				
Minimum Current	100A				
Test Duration	2.5 minutes				
Additional Test Details					
Operator	KIM J C				
Lab Name	N/A				
Location	N/A				
Notes					
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

4th March 2024 - 17:18:49		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	Normal (4.0%)				
Minimum Current	10A				
PST	10 minutes				
PLT	12 PSTs				
Equipment Under Test					
Brand	Hanwha Vision Co., Ltd				
Model	WRN-2110SB1				
Serial	N/A				
Impedance Network ID	N/A				
Test Conditions					
	User Entered		Measured		
Rated Voltage	N/A		230.752V		
Rated Current	N/A		N/A		
Rated Frequency	N/A		50.000Hz		
Rated Power	N/A		N/A		
D max	0.0655% (Limit: 4.0%)				
T max	0.0000 s (Limit: 0.5 s)				
DC max	0.0006% (Limit: 3.3%)				
Additional Test Details					
Operator	KIM J C				
Lab Name	N/A				
Location	N/A				
Notes					
Signature					
Results	Phase1: PASS				

4th March 2024 - 17:18:49				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		WRN-2110SB1						
Serial		N/A						
Flicker Test Results								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase1: NO RESULTS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
2	Phase1: PASS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
3	Phase1: PASS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
4	Phase1: PASS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
5	Phase1: PASS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
6	Phase1: PASS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
7	Phase1: PASS	0.00058	0.06365	0.00000	0.08226	1.00000	0.08226	N/A
8	Phase1: PASS	0.00058	0.06552	0.00000	0.08226	1.00000	0.08226	N/A
9	Phase1: PASS	0.00058	0.06552	0.00000	0.08226	1.00000	0.08226	N/A
10	Phase1: PASS	0.00058	0.06552	0.00000	0.08226	1.00000	0.08226	N/A
11	Phase1: PASS	0.00058	0.06552	0.00000	0.08226	1.00000	0.08226	N/A
12	Phase1: PASS	0.00058	0.06552	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	: 2024. 02. 28.
Test method	: EN 61000-4-2:2009
Temperature / Humidity / Pressure	: 20 °C / 40 % R.H. / 101.5 kPa
Discharge Impedance	: (330 ± 10 %) Ω / (150 ± 10 %) pF
Type of Discharge (air discharge)	: ±2 kV, ±4 kV, ±8 kV
Type of Discharge (contact discharge)	: ±6 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**

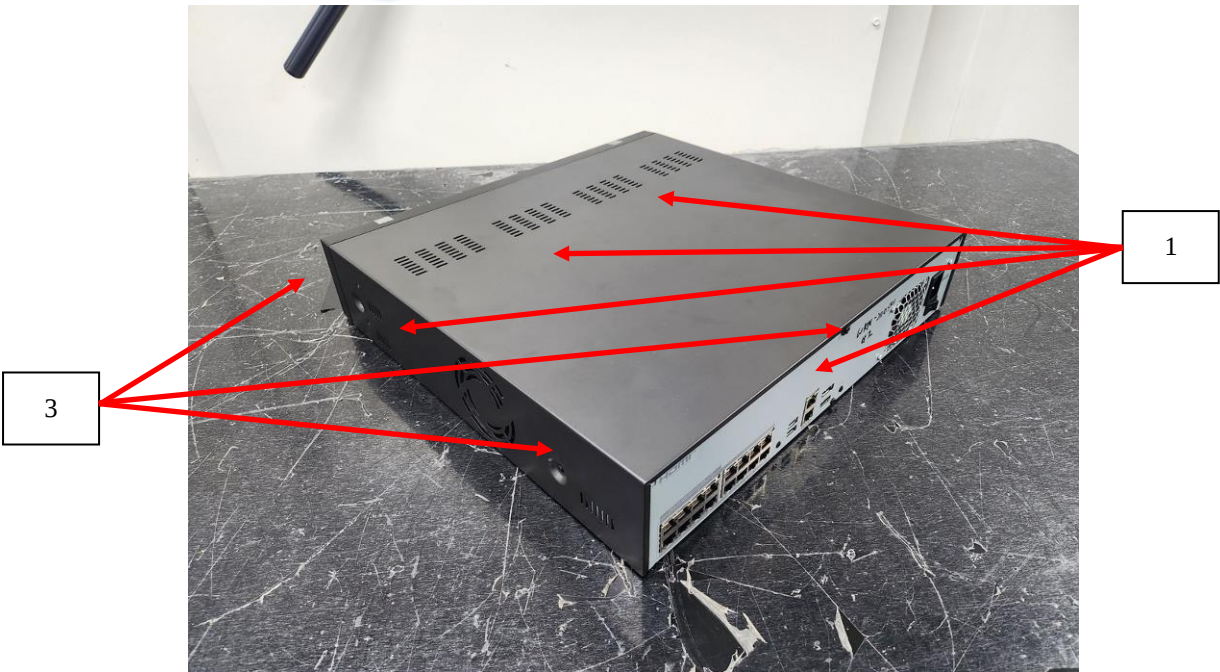
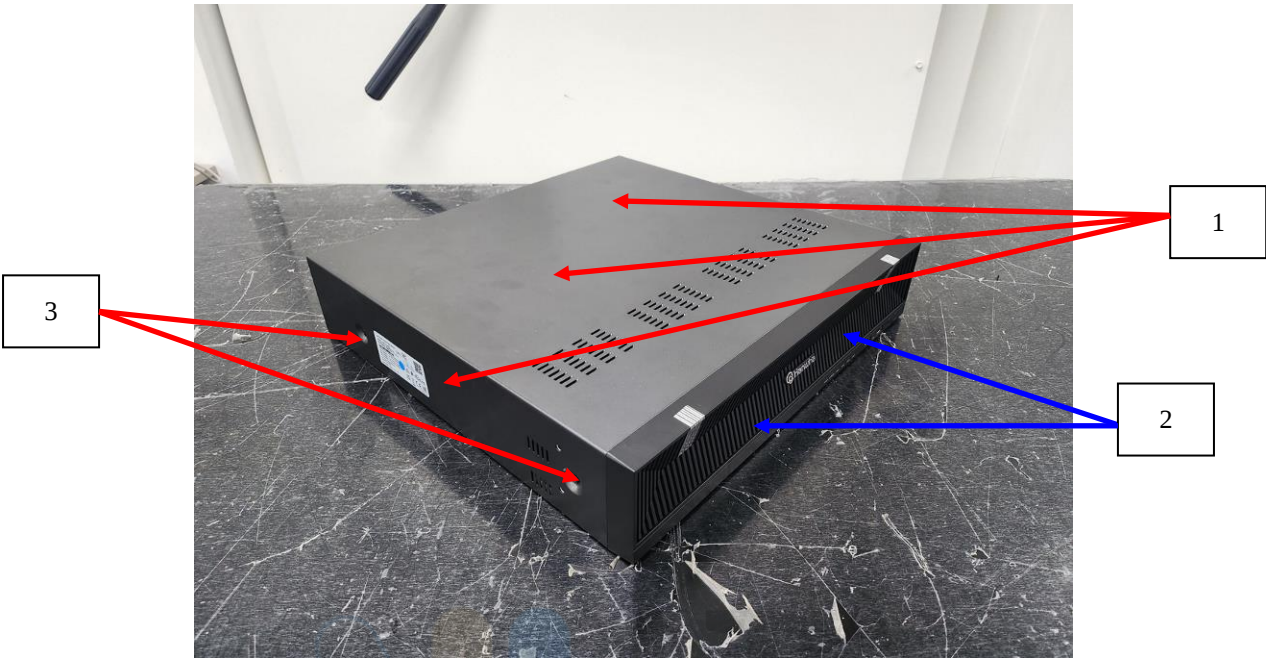
No.	Position	Kind of Discharge	Results	Remarks
1	HCP	Contact	Complies (A)	No reaction recognized
2	VCP	Contact	Complies (A)	No reaction recognized

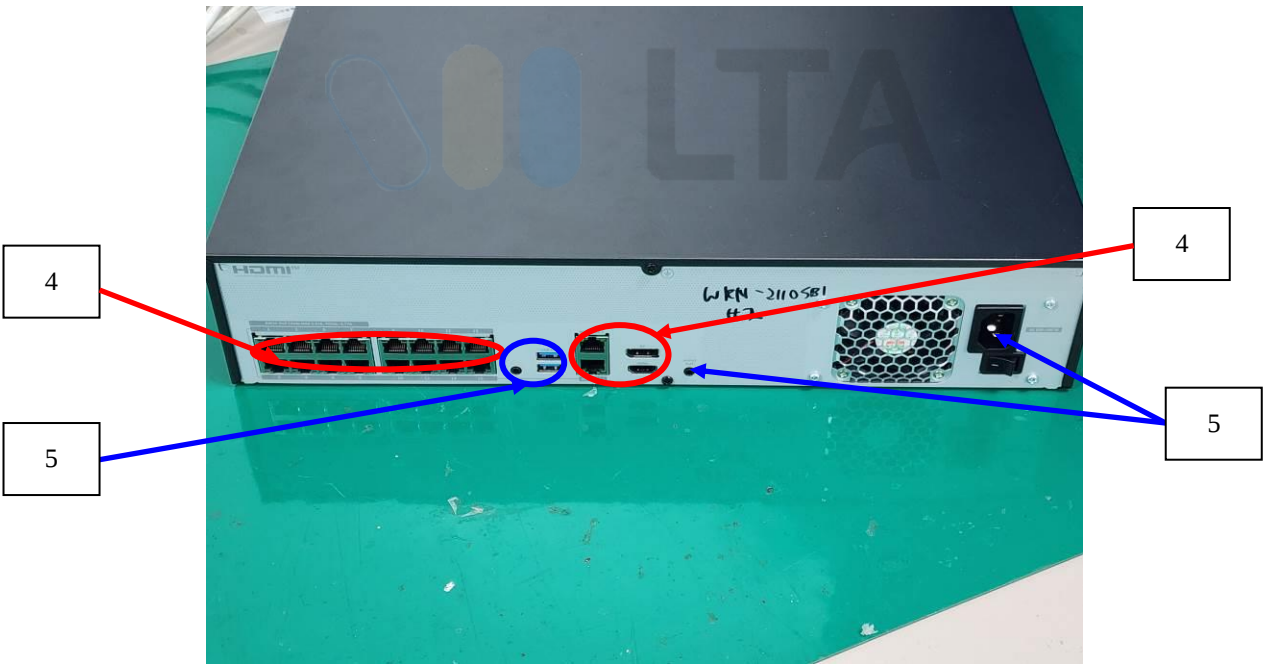
2. Direct Discharge

Position No.	Position	Kind of Discharge	Result	Remarks
1	EUT Enclosure (Metal)	Contact	Complies (A)	No reaction recognized
2	EUT Enclosure (Non Metal)	Air	Complies (A)	No reaction recognized
3	EUT Screw	Contact	Complies (A)	No reaction recognized
4	EUT Port (NETWORK, HDMI, Display)	Contact	Complies (A)	No reaction recognized
5	EUT Port (AC IN, USB#1~#4, AUDIO OUT, console)	Air	Complies (A)	No reaction recognized
6	EUT Mouse	Air	Complies (A)	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	: 2024. 02. 29.
Test method	: EN 61000-4-3:2006/A1:2008/A2:2010
Temperature / Humidity	: 20 - 21 °C / 25 - 27 % 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

3.3.3 Electrical Fast Transients

Definition:

The test assesses the ability of the EUT to operate as intended in the event of fast transients presence on one of the input/output ports.

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

Test date : 2024. 02. 28.
Test method : EN 61000-4-4:2012
Temperature / Humidity : 19 °C / 38 % R.H.
Cable length : > 3 m
Test level : 2.0 kV (AC power input port)
1.0 kV (Signal port)
Polarity : Negative/ positive
Repetition frequency : 100 kHz
Test Location : Shielded Room
Test mode : Operating mode

Measurement Data:

Power Line	Test level	Result	Remarks
L – N – PE	±2 kV	Complies	No reaction recognized

Signal Line	Test level	Result	Remarks
NATWORK #1	±1 kV	Complies	No reaction recognized
NATWORK #2	±1 kV	Complies	No reaction recognized
NATWORK #3	±1 kV	Complies	No reaction recognized
NATWORK #4	±1 kV	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	: 2024. 02. 28.
Test method	: EN 61000-4-5:2014/A1:2017
Temperature / Humidity	: 19 °C / 37 % 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

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	: 2024. 02. 29.
Test method	: EN 61000-4-6:2014/AC:2015
Temperature / Humidity	: 21 °C / 29 - 30 % 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:

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
NETWORK #4	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 : 2024. 02. 28.
Test method : EN 61000-4-11:2004/A1:2017
Temperature / Humidity : 19 °C / 37 % 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	: 2024. 02. 28.
Test method	: EN 61000-4-11:2004/A1:2017
Temperature / Humidity	: 19 °C / 37 % 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 $U_{min} = (\text{Minimum } U_{nom}) \pm 15 \%$. 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	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	-	-	-

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	MY42080845	2024.08.22	1 year
☒	HORN ANTENNA	BBHA 9120 A	SCHWARZBECK	BBHA 9120 A 481	-	-
☐	Sound Acoustic Tester	TST-1000	TESTEK	150065-A	2024.08.18	1 year

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	P1742204978	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
☐	Sound Acoustic Tester	TST-1000	TESTEK	150065-A	2024.08.18	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



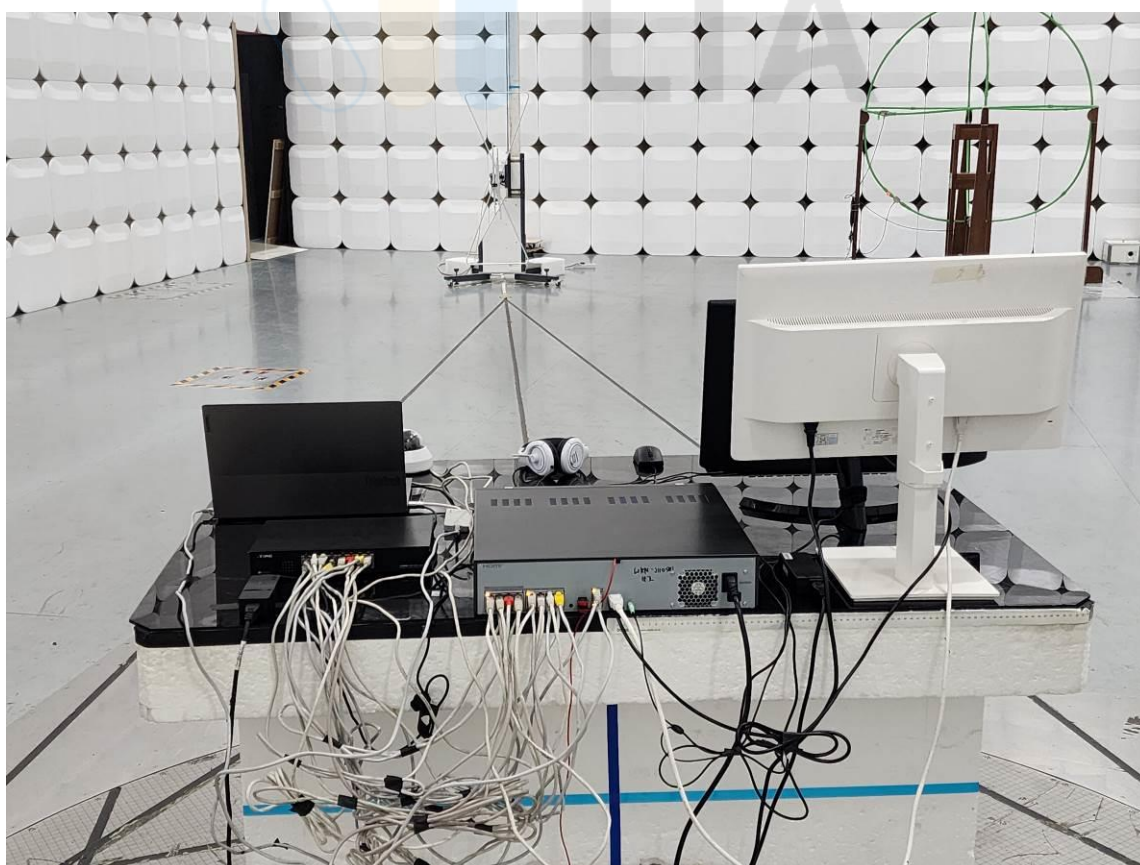
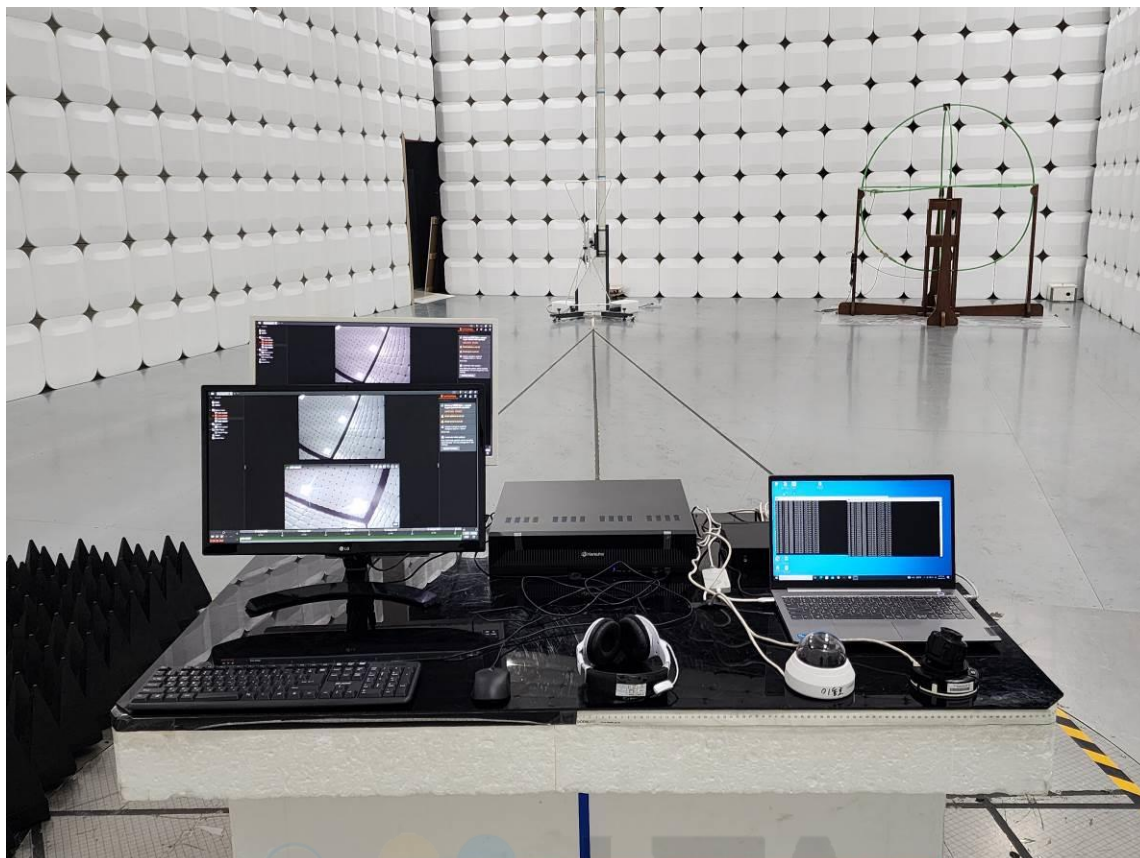
Conducted Emissions



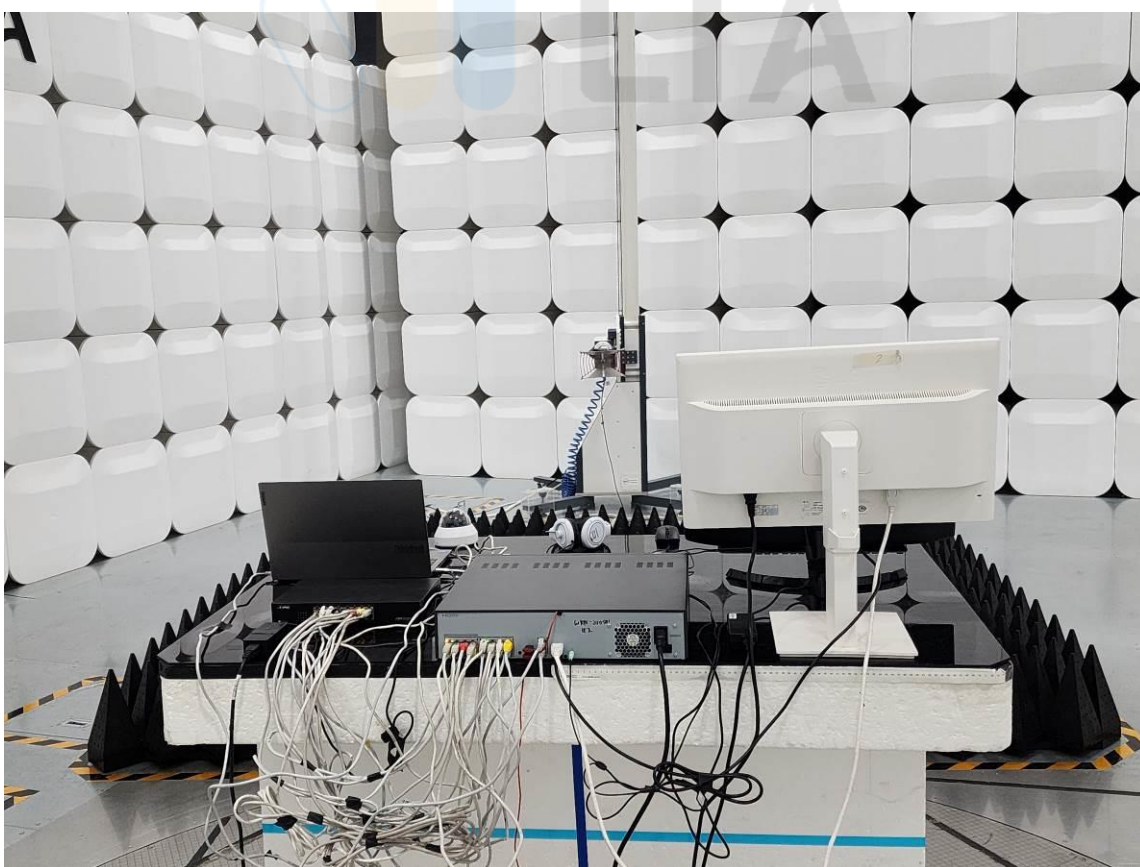
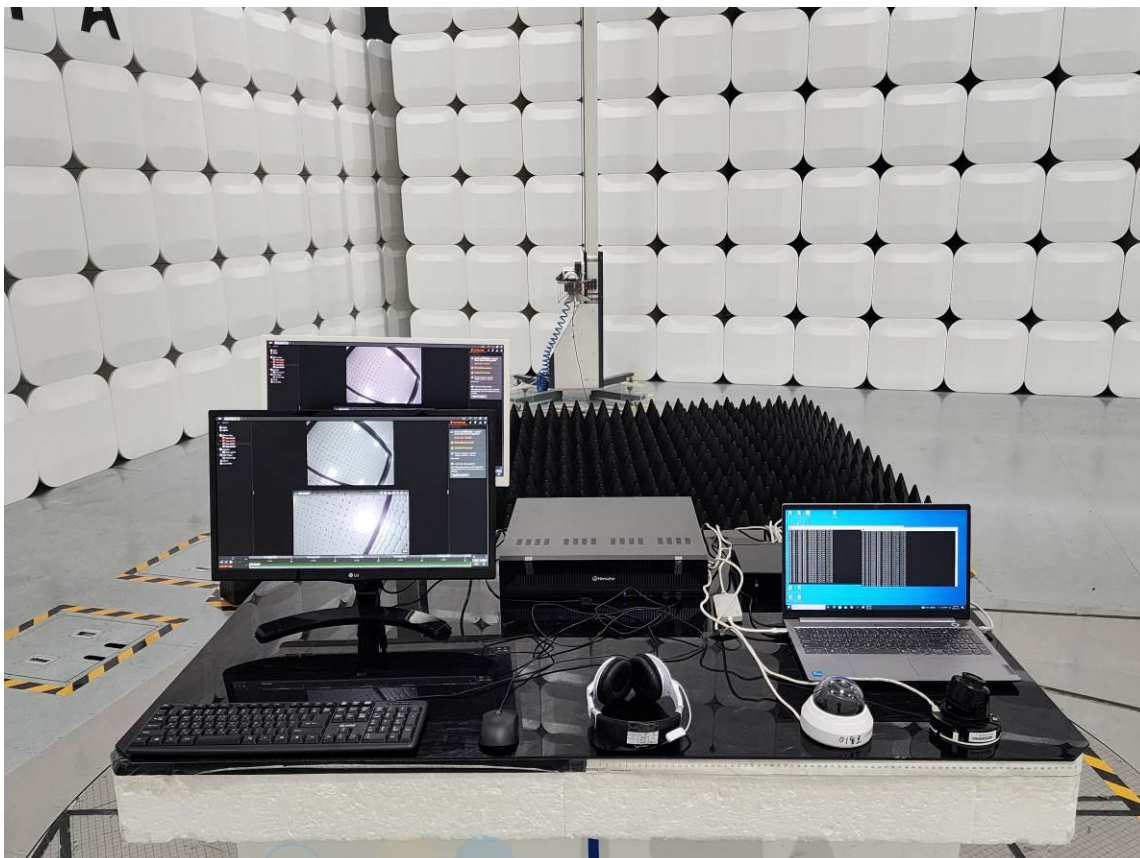
Conducted Emissions / TEL



Radiated Emissions - Below 1 GHz



Radiated Emissions - Above 1 GHz



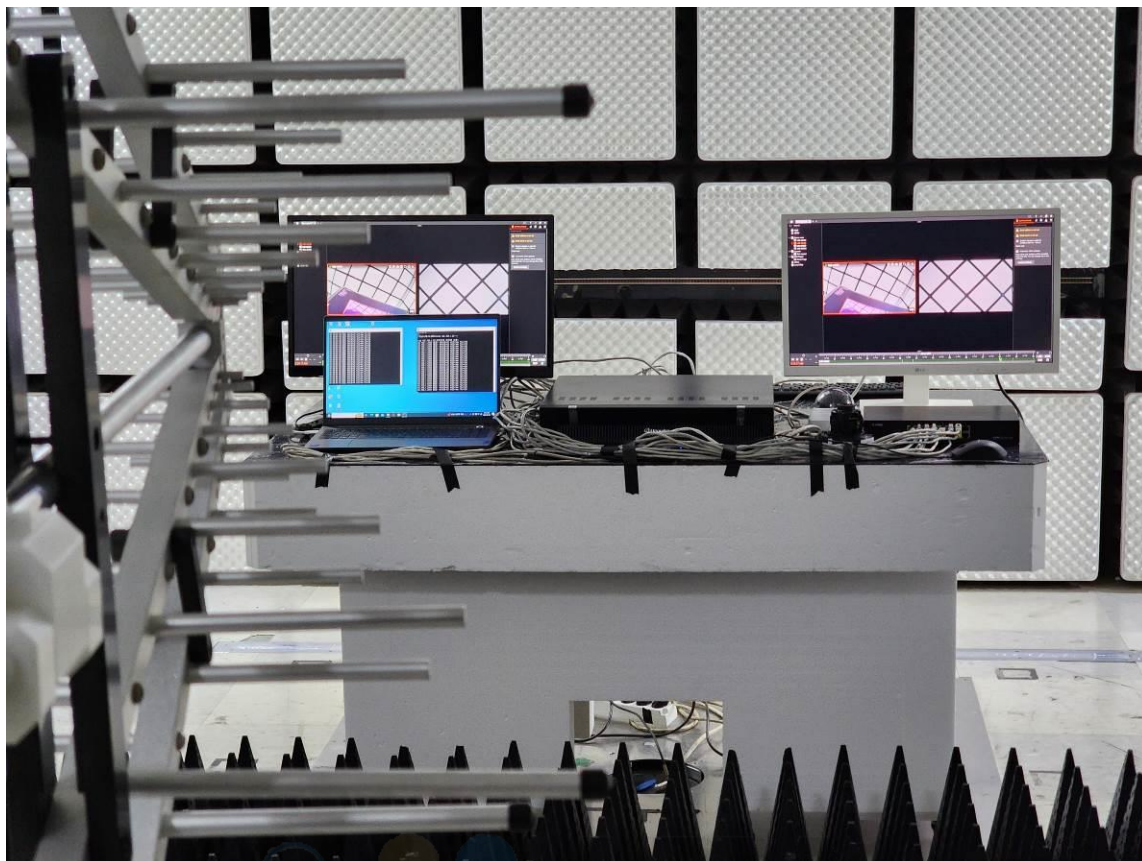
Harmonic Current Emission / Voltage Fluctuations and Flicker



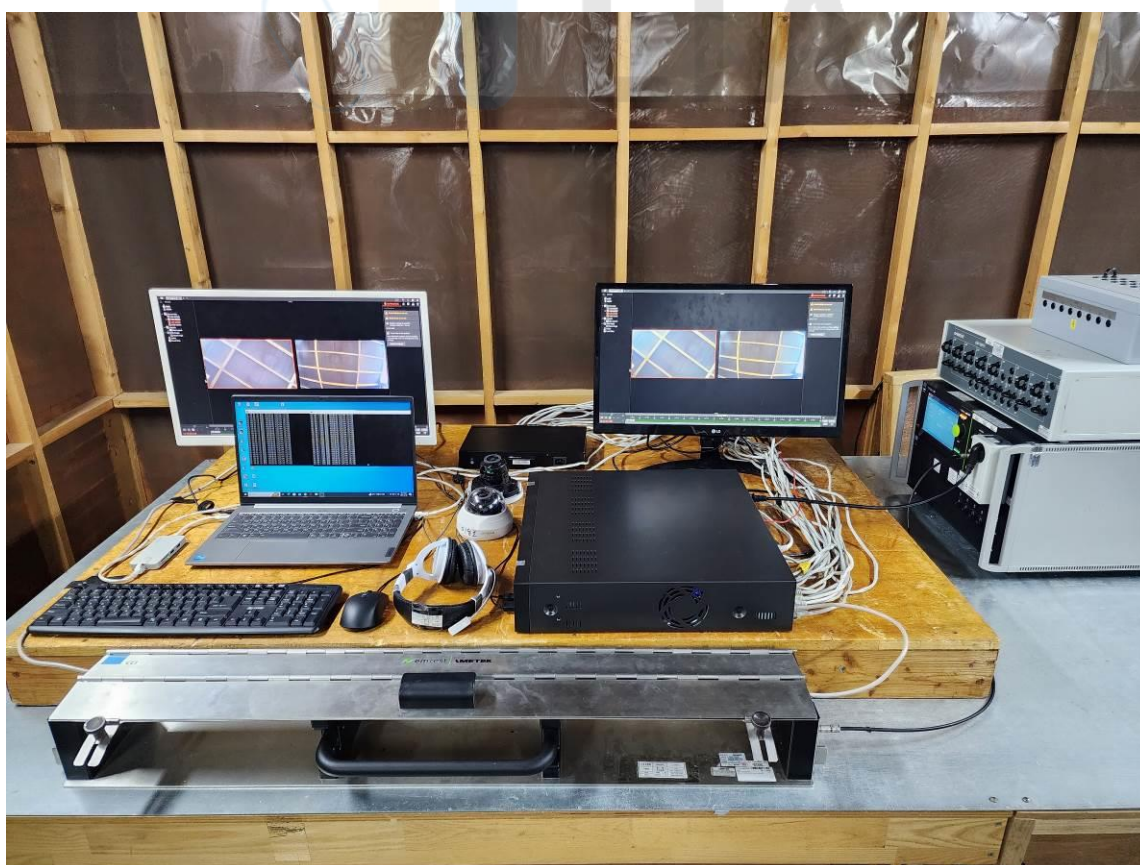
Electrostatic Discharge



RF Electromagnetic Field



Electrical Fast Transients



Surges



Conducted Disturbances, Induced by Radio-Frequency Fields



Voltage dips and Interruptions



Main supply Voltage Variation



EUT



EUT

