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EMC TEST REPORT

Dates of Tests: December 20 – 30, 2019
Test Report S/N: LR500122001N
Test Site : LTA Co., Ltd.

Model No.

QRN-820S

APPLICANT

Hanwha Techwin Co., Ltd.

Equipment Name : NVR
Manufacturer : Hanwha Techwin(Tianjin) Co., Ltd.
Model name : QRN-820S
Test Device Serial No.: Identification
Directive : Electromagnetic Compatibility Directive 2014/30/EU
Rule Part(s) : EN 55032:2012/AC2013
EN 50130-4:2011/A1:2014
EN 61000-3-2:2014
EN 61000-3-3:2013
Data of reissue : January 13, 2020

This test report is issued under the authority of:

The test was supervised by:

Young Kyu Shin, Technical Manager

Jun Hwan Park, Test Engineer

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Revision	Date of issue	Test report No.	Description
0	13.01.2020	LR500122001N	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
NVLAP	U.S.A	200723-0	2020-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	2021-04-11	FCC CAB
VCCI	JAPAN	C-4948,	2020-09-10	VCCI registration
		T-2416,	2020-09-10	
		R-4483(10 m),	2020-10-15	
		G-10847	2022-06-13	
IC	CANADA	5799A	2021-06-16	IC filing
KOLAS	KOREA	NO.KT551	2021-08-20	KOLAS accredited Lab.

2. Information's about test item

2-1 Client/ Manufacturer

Company name : Hanwha Techwin Co., Ltd.
 Address : 6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do
 Telephone / Facsimile : +82-70-7147-8361 / -

Factory #1

Company name : Hanwha Techwin(Tianjin) Co., Ltd.
 Address : No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin, 300385, People's Republic of China

Factory #2

Company name : HANWHA TECHWIN SECURITY VIETNAM CO.,LTD..
 Address : Lot O-2, Que Vo Industrial Zone extended area ,Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam

Factory #3

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 : NVR
 Model name : QRN-820S
 Serial number : Identification
 Date of receipt : December 19, 2019
 EUT condition : Pre-production, not damaged
 Interface Ports : DC IN, GND, VIEWER, HDMI, USB, PoE CAMERA
 Power rating : DC 54 V

2-3 Modification

-NONE

2-4 Model Specification

-NONE

2-5 Test conditions

Temp. / Humid. / Pressure : (19 - 24) °C / (38 - 41) % R.H. / (100.9 - 101.3) kPa
 Tested Model : QRN-820S
 Test mode : REC mode
 Tested Voltage : AC 230 V, 50 Hz

2-5 EUT

Equipment	Model No.	Serial No.	Manufacturer
NVR	QRN-820S	N/A	Hanwha Techwin(Tianjin) Co., Ltd. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD. D-TECH CO.,LTD.
Mouse	MOKJUO	N/A	Primax Electronics Ltd.
Adapter	FSP090-AWAN2	N/A	Zhonghan Electronics (Shenzhen) Co., Ltd.
Remote Controller	N/A	N/A	N/A

2-6 Accessary

Equipment	Model No.	Serial No.	Manufacturer
Notebook	RV711	N/A	SAMSUNG
Notebook Adapter	CPA09-004A	N/A	Chicony
Network Camera	QNV-6032R	N/A	Hanwha Techwin(Tianjin) Co., Ltd.
Smart Phone	SM-G930L	N/A	SAMSUNG
Monitor	24MA53D	N/A	LG
Monitor Adapter	A11-120P1A	N/A	Chicony
IP Router	X5007	N/A	IPTIME
IP Router Adapter	RS-AB02J00-K	N/A	Dongguan Jinhua Sheng Power Technology Co., Ltd
USB Memory Stick (16 GB)	Ultra Flair CZ73	N/A	SanDisk
HDD (6000 GB)	ST6000VX0001	N/A	Seagate

2-7 Cable List

From		To		Length (m)	Shielding	
Type	I/O Port	Type	I/O Port		Cable	backshell
EUT	DC IN	Adapter	DC OUT	1.5	NO	Plastic
	GND	GND	-	1.0	NO	-
	VIEWER	Notebook	LAN	3.0	YES	Plastic
	HDMI	Notebook	HDMI	1.2	YES	Plastic
	USB #1	USB Memory Stick	-	-	-	Metal
	USB #2	Mouse	-	1.0	NO	Plastic
	HDD	HDD	-	-	-	-
	PoE CAMERA #1	Network Camera	PoE	3.0	YES	Plastic
	PoE CAMERA #2 ~ #8	IP Router	LAN	1.0	YES	Plastic
Network Camera	AUDIO IN	Smart Phone	AUX	1.0	NO	Plastic
Remote Controller	DC IN	Battery	DC OUT	-	-	-
Smart Phone	DC IN	Battery	DC OUT	-	-	-
Monitor	DC IN	Monitor Adapter	DC OUT	1.4	NO	Plastic
Notebook	DC IN	Notebook Adapter	DC OUT	1.3	NO	Plastic
IP Router	DC IN	IP Router Adapter	DC OUT	1.5	NO	Plastic
Monitor Adapter	AC IN	AC Power Source	3 Pin AC Line	1.5	NO	Plastic
Notebook Adapter	AC IN	AC Power Source	3 Pin AC Line	1.0	NO	Plastic
IP Router Adapter	AC IN	AC Power Source	2 Pin AC Line	2.0	NO	Plastic

3. Test Report

3.1 Summary of tests

Parameter	Applied Standard	Status
I. Emission		
Conducted Emission	EN 55032:2012/AC2013	C
Radiated Emission	EN 55032:2012/AC2013	C
Harmonic Current Emission	EN 61000-3-2:2014	NA ^{Note 3}
Voltage Fluctuations and Flicker	EN 61000-3-3:2013	C
II. Immunity		
Electrostatic Discharge	EN 61000-4-2:2009	C
RF Electromagnetic field	EN 61000-4-3:2006/A1:2008/A2:2010	C
Fast Transients Common mode	EN 61000-4-4:2012	C
Surges, line to line and line to ground	EN 61000-4-5:2014/A1:2017	C
RF common mode	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 EN61000-3-2 (Harmonic current emissions) for the QRN-820S because equipment whose rated power is less or equal 75W 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 55032:2012/AC2013
Measurement RBW	: 9 kHz
Test mode	: REC 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 dBuV	66 dBuV
(0.5 – 30) MHz	73 dBuV	60 dBuV

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

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

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

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) dBuV	(84 – 74) dBuV	(53 – 43) dBuV	(40 – 30) dBuV
(0.5 – 30) MHz	87 dBuV	74 dBuV	43 dBuV	30 dBuV

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 150Ω 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) dBuV	(74 – 64) dBuV	(40 – 30) dBuV	(30 – 20) dBuV
(0.5 – 30) MHz	74 dBuV	64 dBuV	30 dBuV	20 dBuV

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 150Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150/I = 44$ dB)

Conducted emissions (LINE)



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EUT /Model No. : QRN-820S

Phase : Line

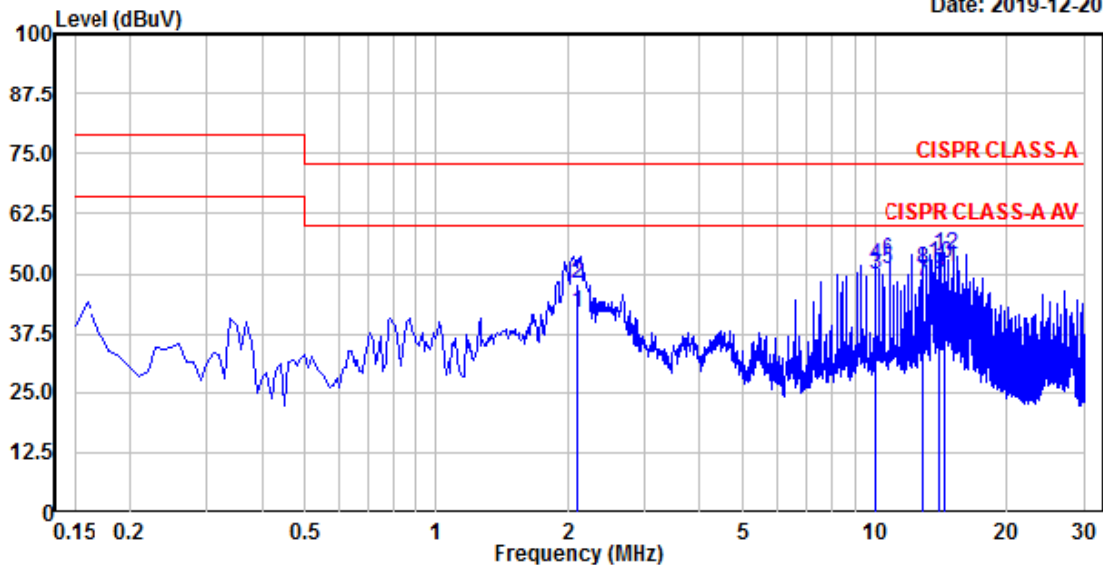
Test Mode : REC mode

Test Power : 230 V / 50 Hz

Temp./ Humi. : 24 'C / 41 % R.H.

Test Engineer : PARK J H

Date: 2019-12-20



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.	2.099	28.45	22.31	19.53	47.98	41.84	73.00	60.00	25.02	18.16	Line
4.	9.984	31.83	29.99	19.72	51.55	49.71	73.00	60.00	21.45	10.29	Line
6.	10.664	33.06	31.27	19.74	52.80	51.01	73.00	60.00	20.20	8.99	Line
8.	12.927	31.16	28.55	19.80	50.96	48.35	73.00	60.00	22.04	11.65	Line
10.	14.064	32.17	30.12	19.82	51.99	49.94	73.00	60.00	21.01	10.06	Line
12.	14.518	34.02	31.34	19.84	53.86	51.18	73.00	60.00	19.14	8.82	Line

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

Conducted emissions (NEUTRAL)



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EUT /Model No. : QRN-820S

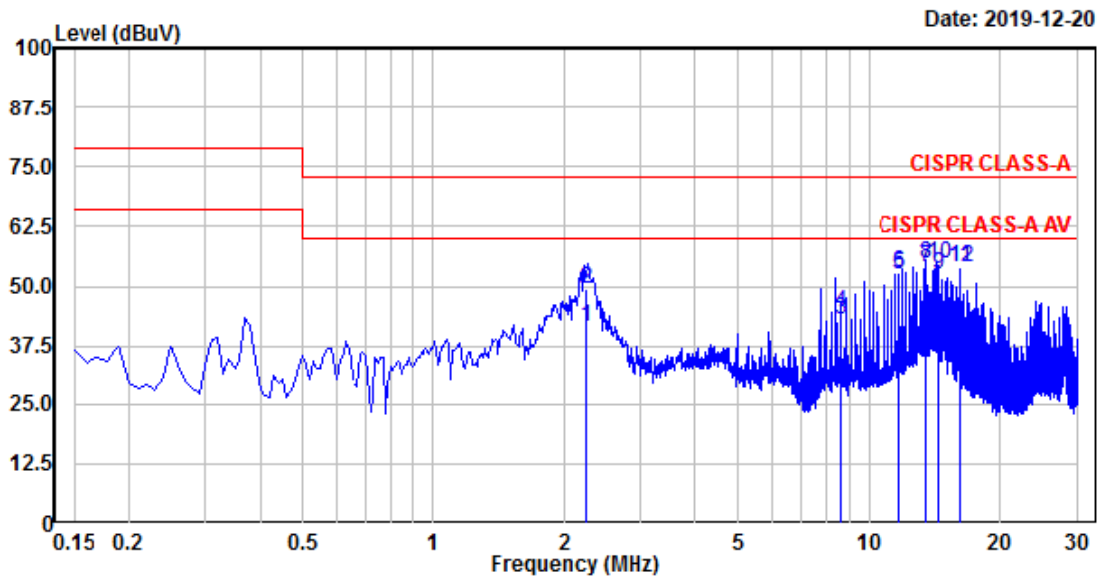
Phase : Neutral

Test Mode : REC mode

Test Power : 230 V / 50 Hz

Temp./ Humi. : 24 'C / 41 % R.H.

Test Engineer : PARK J H



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.	2.240	30.03	21.76	19.58	49.61	41.34	73.00	60.00	23.39	18.66	neutral
4.	8.621	24.87	23.45	19.74	44.61	43.19	73.00	60.00	28.39	16.81	neutral
6.	11.796	32.93	32.68	19.82	52.75	52.50	73.00	60.00	20.25	7.50	neutral
8.	13.609	34.94	34.22	19.87	54.81	54.09	73.00	60.00	18.19	5.91	neutral
10.	14.518	34.87	32.67	19.89	54.76	52.56	73.00	60.00	18.24	7.44	neutral
12.	16.228	34.20	34.02	19.92	54.12	53.94	73.00	60.00	18.88	6.06	neutral

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

Conducted emissions (TEL _ 100 M) / PoE



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EUT /Model No. : QRN-820S

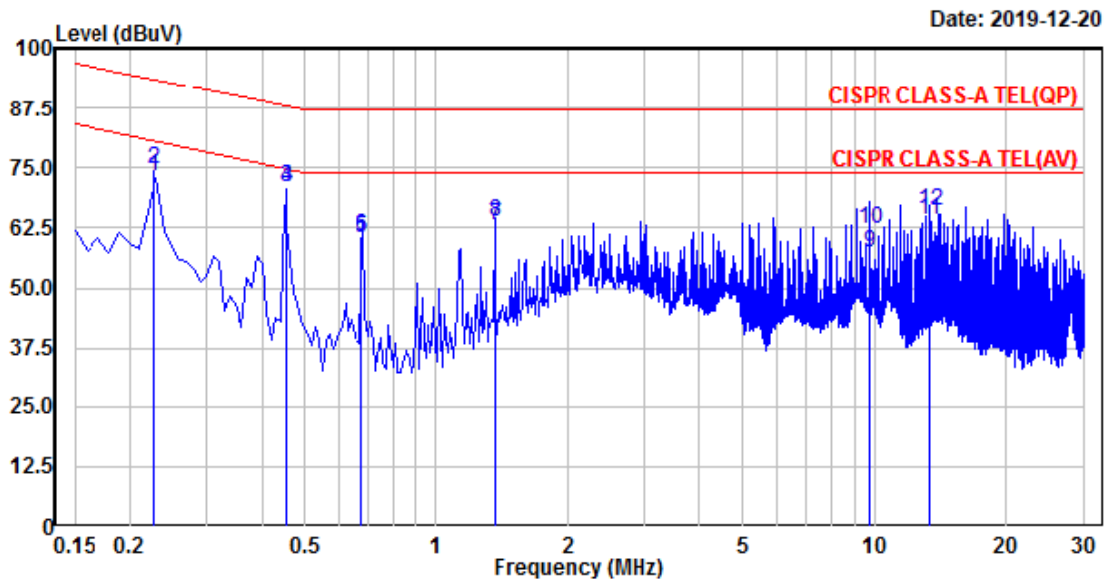
Phase : TEL 100M(PoE)

Test Mode : REC mode

Test Power : 230 V / 50 Hz

Temp./ Humi. : 24 'C / 41 % R.H.

Test Engineer : PARK J H



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.	0.227	54.82	53.51	19.71	74.53	73.22	93.56	80.56	19.03	7.34	Line
4.	0.454	51.56	51.58	19.54	71.10	71.12	87.81	74.81	16.71	3.69	Line
6.	0.677	41.35	40.97	19.47	60.82	60.44	87.00	74.00	26.18	13.56	Line
8.	1.360	44.45	43.48	19.41	63.86	62.89	87.00	74.00	23.14	11.11	Line
10.	9.751	42.74	38.07	19.44	62.18	57.51	87.00	74.00	24.82	16.49	Line
12.	13.419	46.55	44.46	19.51	66.06	63.97	87.00	74.00	20.94	10.03	Line

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

Conducted emissions (TEL_ 1000 M) / Viewer



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EUT /Model No. : QRN-820S

Phase : TEL 1000M(Viewer)

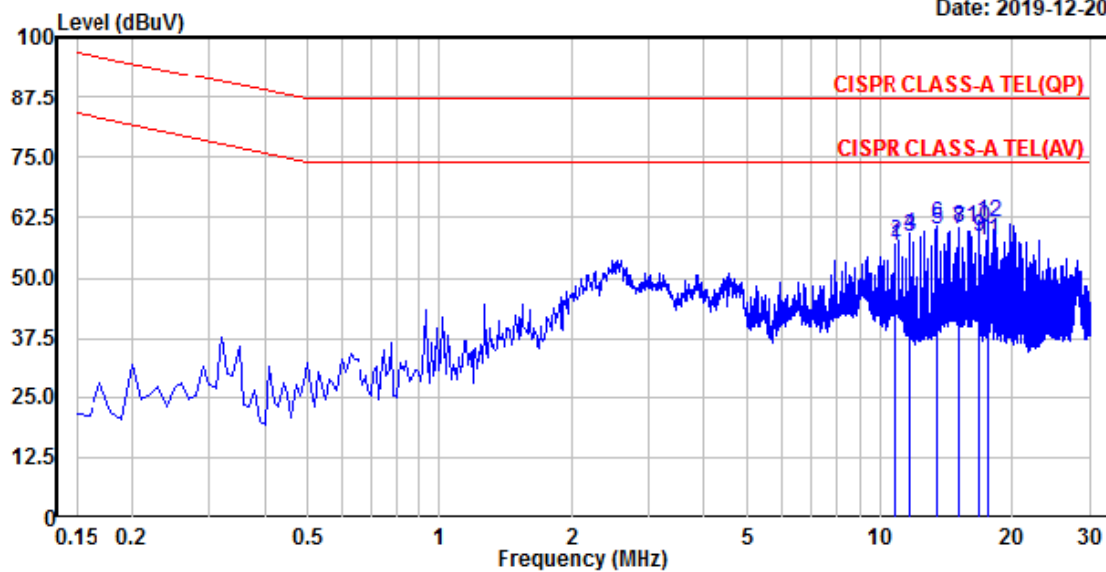
Test Mode : REC mode

Test Power : 230 V / 50 Hz

Temp./ Humi. : 24 'C / 41 % R.H.

Test Engineer : PARK J H

Date: 2019-12-20



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.	10.885	37.95	37.20	19.40	57.35	56.60	87.00	74.00	29.65	17.40	Line
4.	11.792	39.52	39.02	19.42	58.94	58.44	87.00	74.00	28.06	15.56	Line
6.	13.606	41.53	40.37	19.45	60.98	59.82	87.00	74.00	26.02	14.18	Line
8.	15.193	40.83	40.49	19.47	60.30	59.96	87.00	74.00	26.70	14.04	Line
10.	16.780	41.02	38.98	19.50	60.52	58.48	87.00	74.00	26.48	15.52	Line
12.	17.693	41.89	38.25	19.51	61.40	57.76	87.00	74.00	25.60	16.24	Line

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

3.2.2 Radiated Emission

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 55032:2012/AC2013
Measuring Distance	: 10 m for below 1 GHz / 3 m for above 1 GHz
Measurement Frequency range	: 30 MHz – 6 000 MHz
Measurement RBW	: 120 kHz @ 10 m / 1 MHz @ 3 m
Test mode	: REC 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.

(The highest internal source of an EUT : higher than 108 MHz)

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 for below 1 GHz

CLASS A

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

CLASS B

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

Limit of 3m for above 1 GHz

CLASS A

Frequency Range	Average Limit @ 3m (dBμV/m)	Peak limit @ 3m (dBμV/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 (dBμV/m)	Peak limit @ 3m (dBμV/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 Emission (Below 1 GHz) / V



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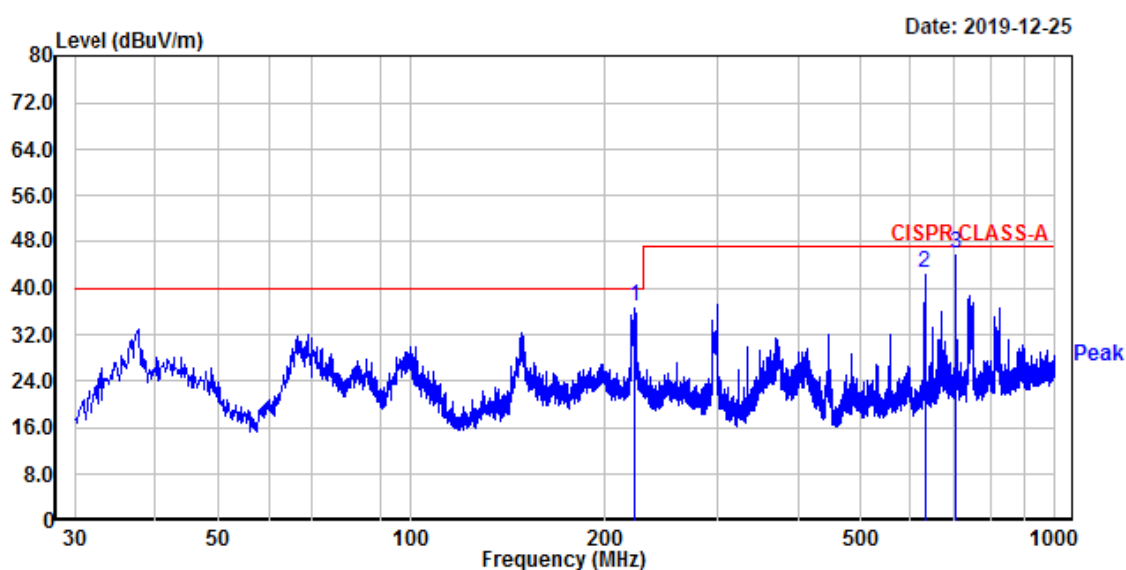
EUT/Model No.: QRN-820S

Temp/Humi: 22 'C / 41 % R.H.

Test Mode : REC mode

Tested by: PARK J H

Power : 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.	223.15	52.09	-15.20	36.89	40.00	3.11	100	0	vertical
2.	631.16	46.75	-4.31	42.44	47.00	4.56	245	0	vertical
3.	705.48	48.88	-3.02	45.86	47.00	1.14	400	185	vertical

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

Radiated Emission (Below 1 GHz) / H



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EUT/Model No.: QRN-820S

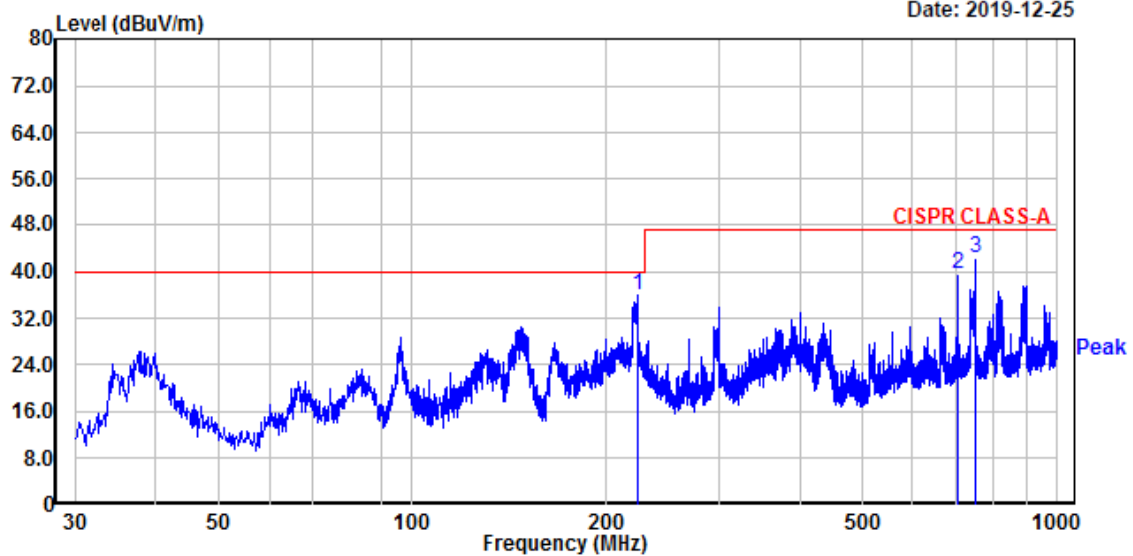
Temp/Humi: 22 'C / 41 % R.H.

Test Mode : REC mode

Tested by: PARK J H

Power : 230 V / 50 Hz

Date: 2019-12-25



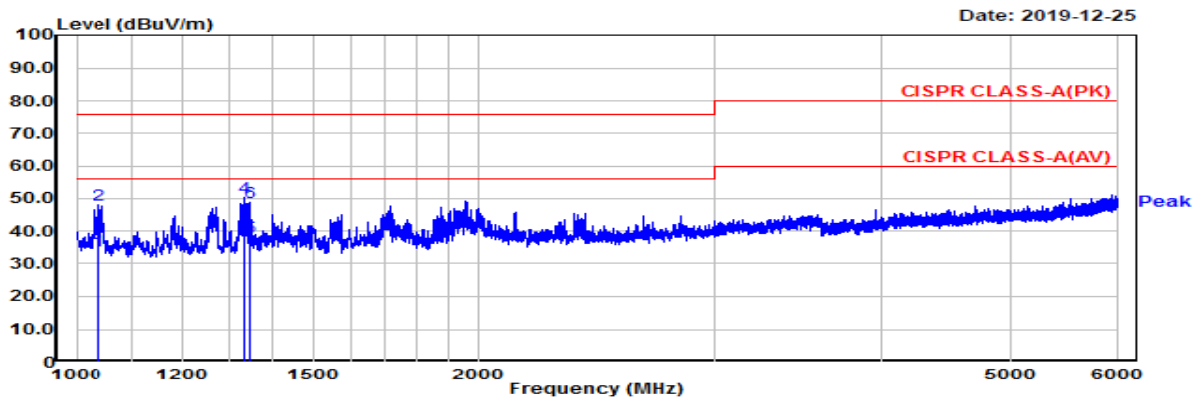
No.	Freq MHz	Reading dBμV	C.F dB	Result QP dBμV/m	Limit dBμV/m	Margin dB	Height cm	Angle deg	Polarity
1.	224.61	51.09	-15.24	35.85	40.00	4.15	400	0	horizontal
2.	705.48	42.60	-3.02	39.58	47.00	7.42	400	330	horizontal
3.	749.98	44.29	-1.89	42.40	47.00	4.60	100	303	horizontal

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

Radiated Emission

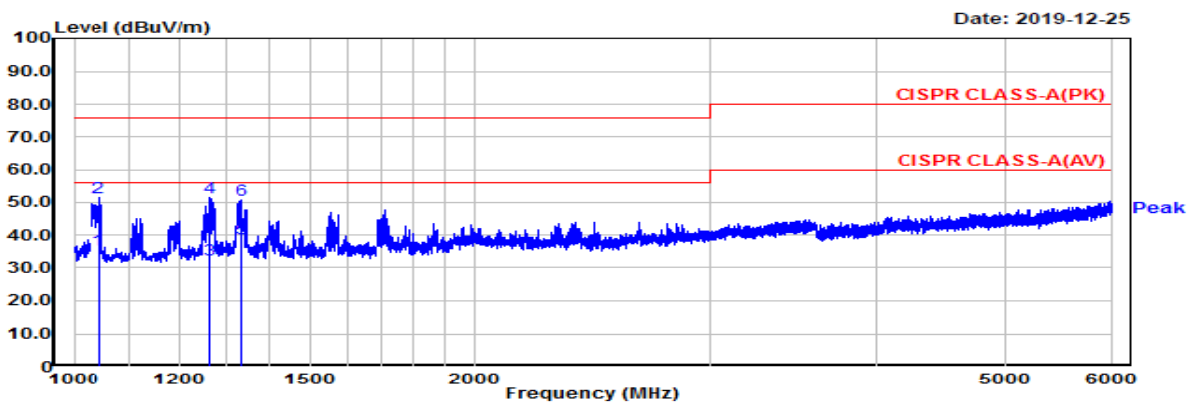
(Above 1 GHz) / V

EUT/Model No.: QRN-820S Temp/Humi: 22 °C / 41 % R.H.
 Test Mode : REC mode Tested by: PARK J H
 Power : 230 V / 50 Hz



(Above 1 GHz) / H

EUT/Model No.: QRN-820S Temp/Humi: 22 °C / 41 % R.H.
 Test Mode : REC mode Tested by: PARK J H
 Power : 230 V / 50 Hz



Manufacture : Hanwha Techwin(Tianjin) Co., Ltd.

Test Date

Temp.:
[°C]Humidity:
[%]Distance
(m)

Model : QRN-820S

2019-12-25

22.00

41.00

3.8

TEST mode : REC mode

Frequency MHz	Reading(PK) dBuV	Reading(AV) dBuV	C.F dB	Result(PK) dBuV/m	Result(AV) dBuV/m	Limit(PK) dBuV/m	Limit(AV) dBuV/m	Margin(PK) dB	Margin(AV) dB	Height cm	Angle deg	Polarity H/V
1043.75	44.97	44.97	-7.63	37.34	37.34	76.00	56.00	38.66	18.66	100	167	H
1265.00	40.24	40.24	-5.55	34.69	34.69	76.00	56.00	41.31	21.31	100	178	H
1334.38	45.97	45.97	-4.88	41.09	41.09	76.00	56.00	34.91	14.91	100	143	H
1039.38	57.45	43.63	-7.66	49.79	35.97	76.00	56.00	26.21	20.03	100	106	V
1333.75	57.23	44.98	-4.89	52.34	40.09	76.00	56.00	23.66	15.91	100	88	V
1347.50	55.39	45.00	-4.72	50.67	40.28	76.00	56.00	25.33	15.72	100	80	V

3.2.3 Harmonic Current (AC power input port)

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 mode	: REC mode
Rated power	: 20.242 W
Result	: Not Applicable

Measurement Data:

- We did not test EN61000-3-2 (Harmonic current emissions) for the QRN-820S because equipment whose rated power is less or equal 75W don't need to be tested.

Harmonic Current (AC power input port)

30th December 2019 - 13:26:33		Page 1/5	IECSoft v2_6
		IEC61000-3-2:2014 Fluctuating Harmonics	
			
Instrument Details			
Instrument Model	PPA5511		
Serial Number	162-04957		
Firmware Version	2.179		
N4L Calibration Date	18th September 2017		
Instrument Version	Standard		
Test Settings			
Class	Class A		
Mode	Measured		
Equipment Under Test			
Brand	Hanwha Techwin(Tianjin) Co., Ltd.		
Model	QRN-820S		
Serial	N/A		
Impedance Network ID	N/A		
Test Conditions			
	User Entered	Measured	
Rated Voltage	N/A	230.664V	
Rated Current	N/A	122.785mA	
Rated Frequency	N/A	50.000Hz	
Rated Power	N/A	20.242W	
Additional Test Information			
Measured Power Factor	0.7142		
Max Current THD	0.00%		
Average THC	56.314mA		
Max Power	26.409W		
Max F.Current	129.193mA		
Average F.Current	102.380mA		
Minimum Current	100A		
Test Duration	2.5 minutes		
Additional Test Details			
Operator	N/A		
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 IEC61000-3-2:2014 standard declares that no Harmonic current limits are specified for equipment with a rated power of 75W or less.

3.2.4 Voltage Variation and Flicking (AC power input port)

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 mode	:	REC mode
Result	:	Complies

Measurement Data:

- Refer to the Next page

Voltage Variation and Flicking (AC power input port)

30th December 2019 - 15:34:40		Page 1/2	IECSoft v2_6
		IEC61000-3-3:2013 Ed.3.0 Flickermeter	
Instrument Details			
Instrument Model	PPA5511		
Serial Number	162-04957		
Firmware Version	2.179		
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 Techwin(Tianjin) Co., Ltd.		
Model	QRN-820S		
Serial	N/A		
Impedance Network ID	N/A		
Test Conditions			
	User Entered	Measured	
Rated Voltage	N/A	230.664V	
Rated Current	N/A	N/A	
Rated Frequency	N/A	50.000Hz	
Rated Power	N/A	N/A	
D max	0.0781% (Limit: 4.0%)		
T max	0.0000 s (Limit: 0.5 s)		
DC max	0.0078% (Limit: 3.3%)		
Additional Test Details			
Operator	N/A		
Lab Name	N/A		
Location	N/A		
Notes			
Signature			
Results	Phase1: PASS		

30th December 2019 - 15:34:40		Ph:1 Page 2/2		IECSoft v2_6				
IEC61000-3-3:2013 Ed.3.0 Flickermeter								
Instrument Details								
Instrument Model	PPA5511							
Instrument Serial	162-04957							
Instrument Firmware	2.179							
Equipment Under Test								
Brand	Hanwha Techwin(Tianjin) Co., Ltd.							
Model	QRN-820S							
Serial	N/A							
Flicker Test Results								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase 1: PASS	0.00780	0.07693	0.00000	0.08226	1.00000	0.08226	N/A
2	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
3	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
4	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
5	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
6	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
7	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
8	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
9	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
10	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
11	Phase 1: PASS	0.00780	0.07809	0.00000	0.08226	1.00000	0.08226	N/A
12	Phase 1: PASS	0.00780	0.07809	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	: 2019.12.28.
Test method	: EN 61000-4-2 :2009
Temperature / Humidity / Pressure	: 20 °C / 40 % R.H. / 101.1 kPa
Discharge Impedance	: (330 ±10%)Ω / (150 ±10%) pF
Type of Discharge (air discharge)	: ± 2kV, ± 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 mode	: REC mode
Result	: Complies

Measurement Data:
1-1. Indirect Discharge

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

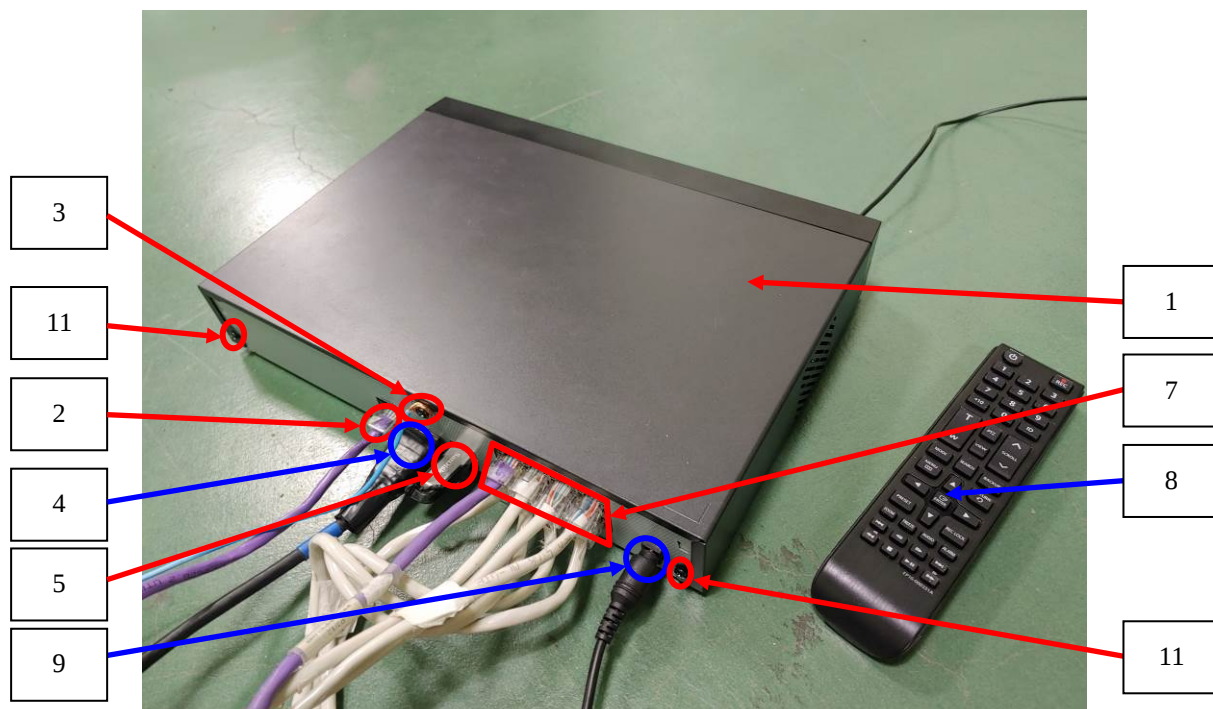
1-2. Direct Discharge

No.	Position	Kind of Discharge	Result	Remarks
1	Enclosure	Contact	Complies	No reaction recognized
2	VIEWER	Contact	Complies	No reaction recognized
3	GND	Contact	Complies	No reaction recognized
4	HDMI	Air	Complies	No reaction recognized
5	USB #1	Contact	Complies	No reaction recognized
6	USB #2	Air	Complies	No reaction recognized
7	PoE CAMERA	Contact	Complies	No reaction recognized
8	Remote Controller	Air	Complies	No reaction recognized
9	DC IN	Air	Complies	No reaction recognized
10	LED	Air	Complies	No reaction recognized
11	Screw	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	:	2019.12.29.
Test method	:	EN 61000-4-3:2006/A1:2008/A2:2010
Temperature / Humidity / Pressure	:	19 °C / 39 % R.H. / 101.3 kPa
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 mode	:	REC 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	:	2019.12.27.
Test method	:	EN 61000-4-4:2012
Temperature / Humidity / Pressure	:	19 °C / 38 % R.H. / 100.9 kPa
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 mode	:	REC mode
Result	:	Complies

Measurement Data:

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

Signal Line	Test level	Result	Remarks
PoE CAMERA	± 1 kV	Complies	No reaction recognized
VIEWER	± 1 kV	Complies	No reaction recognized

3.3.4 Surge

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	:	2019.12.27.
Test method	:	EN 61000-4-5:2014/A1:2017
Temperature / Humidity / Pressure	:	20 °C / 38 % R.H. / 100.9 kPa
Test level	:	± 0.5 kV, ±1 kV (line to line) ± 0.5 kV, ± 1 kV, ± 2 kV (line to ground), ± 0.5 kV, ± 1 kV (signal line)
Polarity	:	Negative/ positive
Wave shape	:	1.2/ 50 µs pulse
Number of surges	:	5 (at each phase)
Test mode	:	REC mode
Result	:	Complies

Measurement Data:

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

Signal Line	level	Result	Remark
PoE CAMERA	± 0.5 kV	Complies	No reaction recognized
VIEWER	± 0.5 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	:	2019.12.28.
Test method	:	EN 61000-4-6:2014/AC:2015
Temperature / Humidity / Pressure	:	21 °C / 41 % R.H. / 101.1 kPa
Frequency range	:	0.15MHz – 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 mode	:	REC mode
Result	:	Complies

Measurement Data:

Power Port	Result	Remarks
Power	Complies	No reaction recognized

Signal Port	Result	Remarks
PoE CAMERA	Complies	No reaction recognized
VIEWER	Complies	No reaction recognized

3.3.6 Mains supply voltage dips, short 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	:	2019.12.27.
Test method	:	EN 61000-4-11:2004/A1:2017
Temperature / Humidity / Pressure	:	21 °C / 39 % R.H. / 100.9 kPa
Ut	:	230 Vac
Test mode	:	REC 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 OFF during the test. Re-operation without 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	:	2019.12.27.
Test method	:	EN 61000-4-11:2004/A1:2017
Temperature / Humidity / Pressure	:	21 °C / 39 % R.H. / 100.9 kPa
Supply Voltage maximum	:	$U_{nom} + 10 \%$
Supply Voltage minimum	:	$U_{nom} - 15 \%$
Ut	:	230 Vac
Test mode	:	REC 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.

2 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	2020.07.04	1 year
☒	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100710	2020.03.16	1 year
☒	ISN	ISN T800	TESEQ	27109	2020.09.09	1 year
☒	ISN	ENY81-CA6	Rohde & Schwarz	101565	2020.09.09	1 year
☐	ISN	ISN S8	Schwarzbeck	79	2020.09.06	1 year
☐	CURRENT PROBE	EZ-17	Rohde & Schwarz	100508	2020.09.09	1 year
☐	CDN	TSCDN-C1-BNC-75	F.C.C	07004	2020.05.23	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	100378	2020.09.05	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	101468	2020.09.05	1 year
☒	LISN(main)	ENV216	Rohde & Schwarz	101222	2020.09.06	1 year
☒	LISN(sub)	LT32C/10	AFJ	32031518210	2020.09.05	1 year
☒	TEST PROGRAM	e3_ce 20181212a (V9)	AUDIX	-	-	-

Radiated Emission – Below 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESU	Rohde & Schwarz	100092	2020.09.05	1 year
☒	Amplifier (25 dB)	8447D	HP	2944A07684	2020.03.16	1 year
☒	BILOG Antenna	VULB 9168	SCHWARZBECK	775	2021.03.26 (KOLAS)	2 year
☐	BILOG Antenna	VULB 9168	SCHWARZBECK	775	2021.11.12 (RRA)	2 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

Radiated Emission – Above 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESU	Rohde & Schwarz	100092	2020.09.05	1 year
☒	Amplifier	8449B	HP	3008A00671	2020.09.05	1 year
☐	Amplifier	PAM-840A	COM-POWER	461314	2020.03.18	1 year
☐	HORN ANTENNA	3116B	ETS	133350	2020.05.10	2 year
☐	HORN ANTENNA	3116B	ETS	81109	2020.05.10	2 year
☒	HORN ANTENNA	3115	ETS	114105	2021.09.17 (KOLAS)	2 year
☐	HORN ANTENNA	3115	ETS	114105	2021.11.11 (RRA)	2 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

Harmonic Current / Voltage Variation and Flicking

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Precision Power Analyzer	PPA5511	Newtons4th Ltd	162-04957	2020.09.16	1 year
☒	Reference Impedance Network	ES4152	NF Corp.	9074424	2020.09.09	1 year

Electrostatic Discharge

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	ESD Simulator	ESS-2000	NOISEKEN	8000C03241	2020.09.09	1 year
☒	ESD GUN	TC-815R	NOISEKEN	ESS0564361	2020.09.09	1 year

RF Electromagnetic Field

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Signal Generator	E4432B	Agilent	MY41310632	2020.03.16	1 year
☒	Power Meter	E4419B	Agilent	GB38410133	2020.03.16	1 year
☒	Power Sensor	E9300A	Agilent	MY41497992	2020.03.16	1 year
☒	Power Sensor	E9300A	Agilent	MY41497618	2020.03.16	1 year
☒	RF POWER AMPLIFIER	ITA0300KL-300	INFINITECH	0300KL 1507 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	2020.09.06	1 year
☐	HORN ANTENNA	BBHA 9120 A	SCHWARZBECK	BBHA 9120 A 481	-	-
☐	Sound Acoustic Tester	TST-1000	TESTEK	150065-A	2020.09.09	1 year
☐	Microphone	MP201	BSWA	530147	2020.10.20	1 year

Electrical fast transients

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2020.10.31	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2020.10.31	1 year
☒	Capacitive Coupling Clamp	CCI	EMTEST	P1744207071	2020.10.31	1 year

Surge

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2020.10.31	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2020.10.31	1 year
☒	CDN	CNV 508T5	EMTEST	P1742204978	2020.10.31	1 year
☐	CDN	CNV 508N1	EMTEST	P1742204940	2020.10.31	

Conducted disturbances, induced by radio-frequency fields

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Signal generator	SML03	R&S	103026/0013	2020.03.16	1 year
☒	POWER METER	NRVD	R&S	101689	2020.03.16	1 year
☒	POWER Sensor	URV5-Z2	R&S	100755	2020.03.16	1 year
☒	POWER Sensor	URV5-Z2	R&S	100756	2020.03.16	1 year
☒	RF Power Amplifier	FLL75A	FRANKONIA	1033	-	-
☒	EM INJECTION CLAMP	TSIC-23	F.C.C	529	2020.03.25	1 year
☐	CDN (M1)	TSCDN-M1-16A	F.C.C	07004	2020.09.06	1 year
☐	CDN (M2)	TSCDN-M2-16A	F.C.C	07008	2020.09.06	1 year
☐	CDN (M2)	TSCDN-M2-16A	F.C.C	07009	2020.03.16	1 year
☒	CDN (M3) (sub)	TSCDN-M3-16A	F.C.C	07016	2020.03.16	1 year
☒	CDN (M3) (main)	TSCDN-M3-16A	F.C.C	07017	2020.09.06	1 year
☐	Sound Acoustic Tester	TST-1000	TESTEK	150065-A	2020.09.09	1 year
☐	Microphone	MP201	BSWA	530147	2020.10.20	1 year

Mains supply voltage dips, short interruptions

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2020.10.31	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2020.10.31	1 year

Mains supply voltage variations

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2020.10.31	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2020.10.31	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 / 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 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

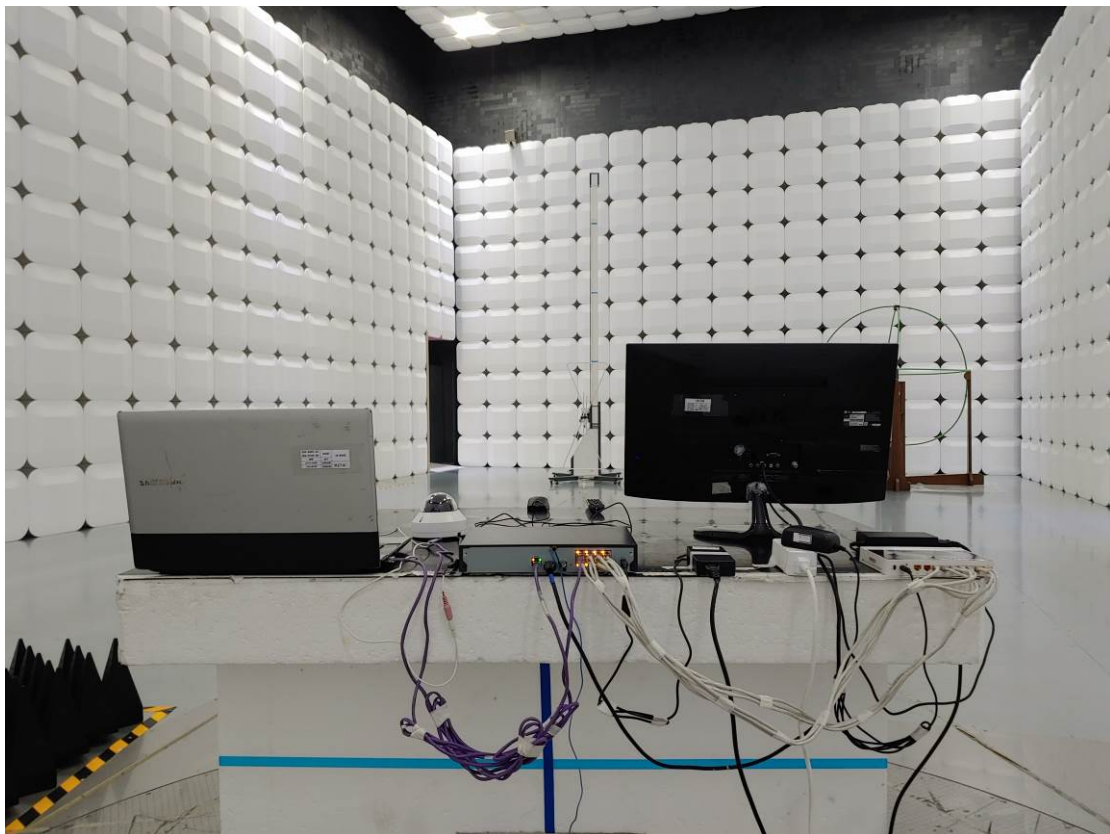
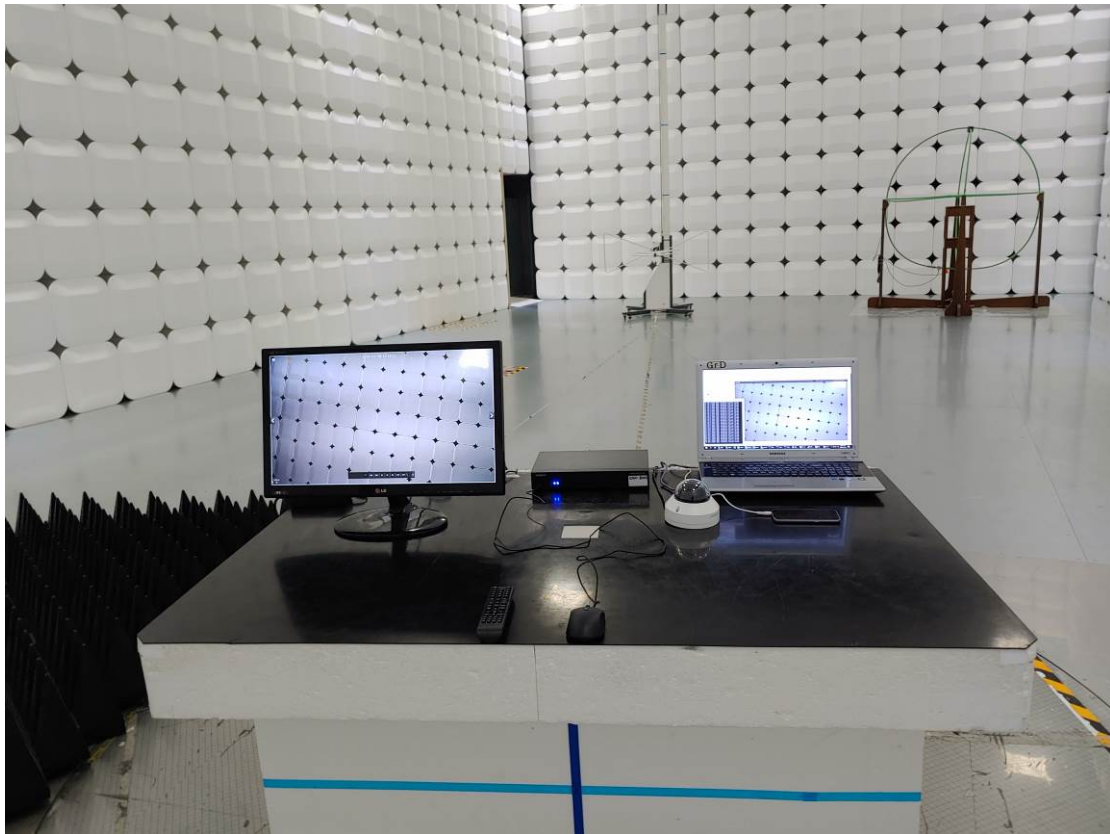
Conducted emission (Maximum emission configuration)



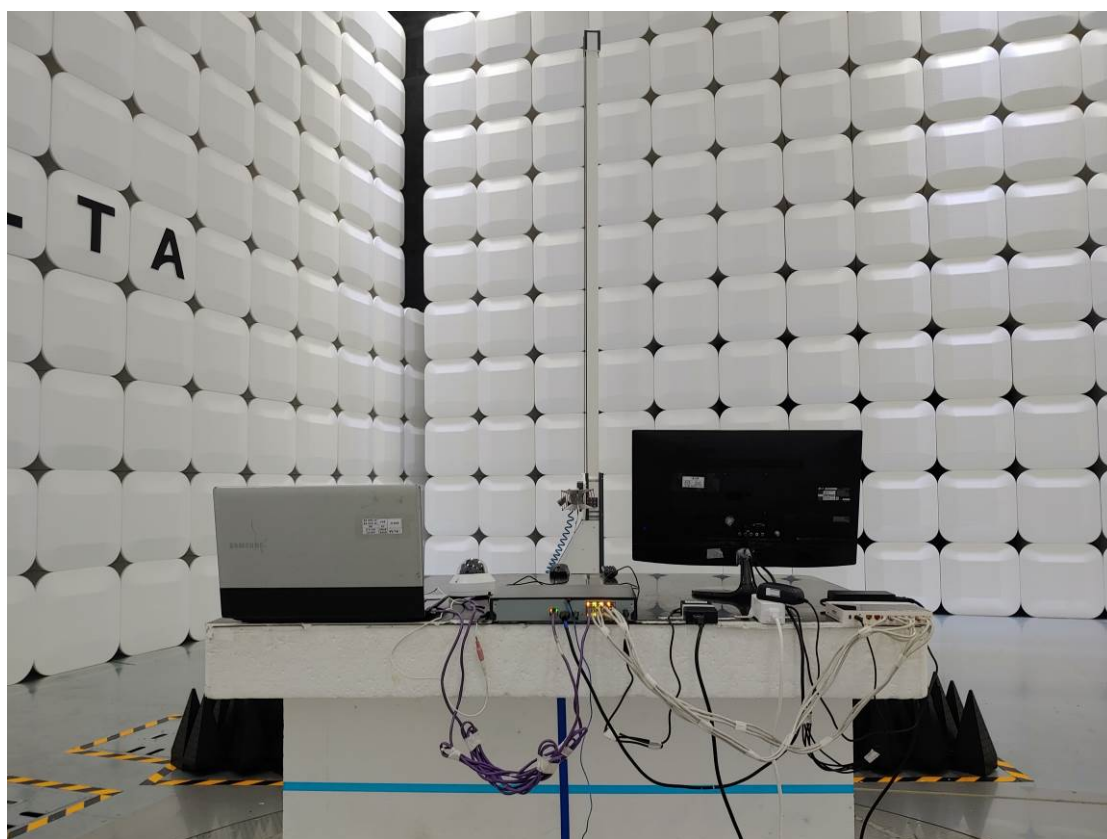
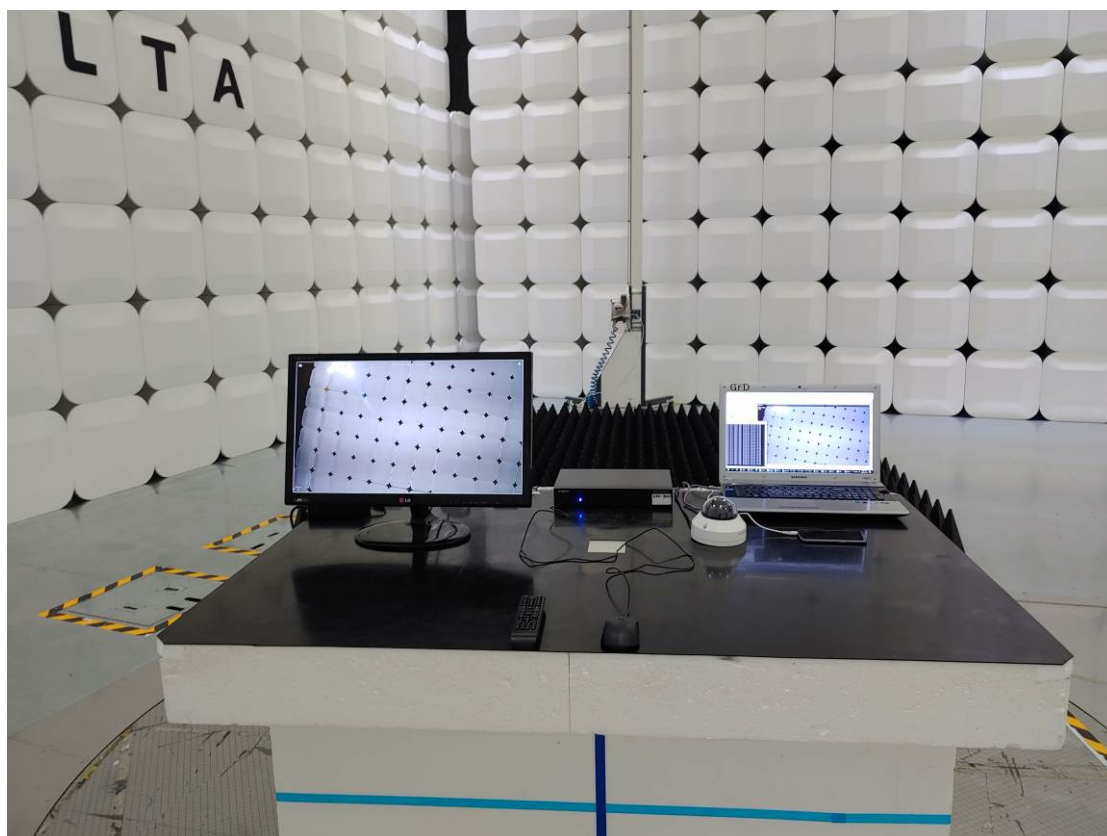
Conducted emission (Maximum emission configuration) / TEL



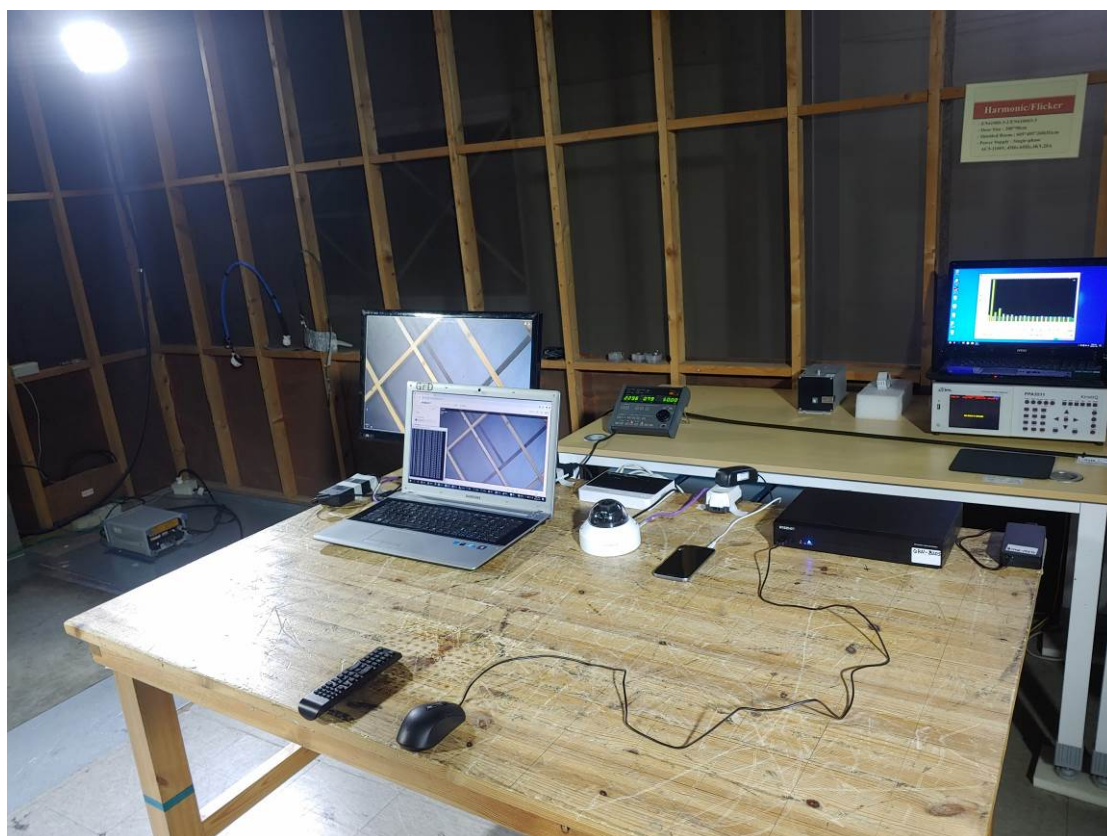
Radiated emission (Maximum emission configuration)-Below 1 GHz



Radiated emission (Maximum emission configuration) – Above 1GHz



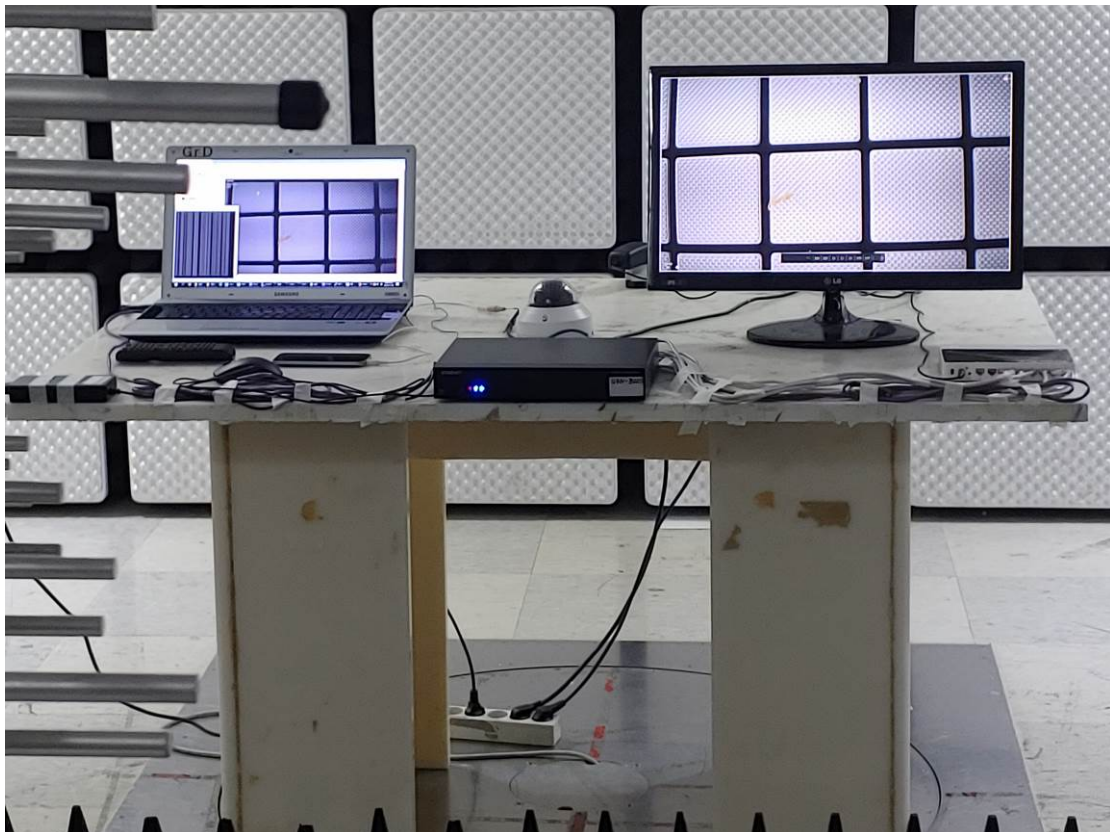
Harmonic Current / Voltage Variation and Flicking



Electrostatic discharge



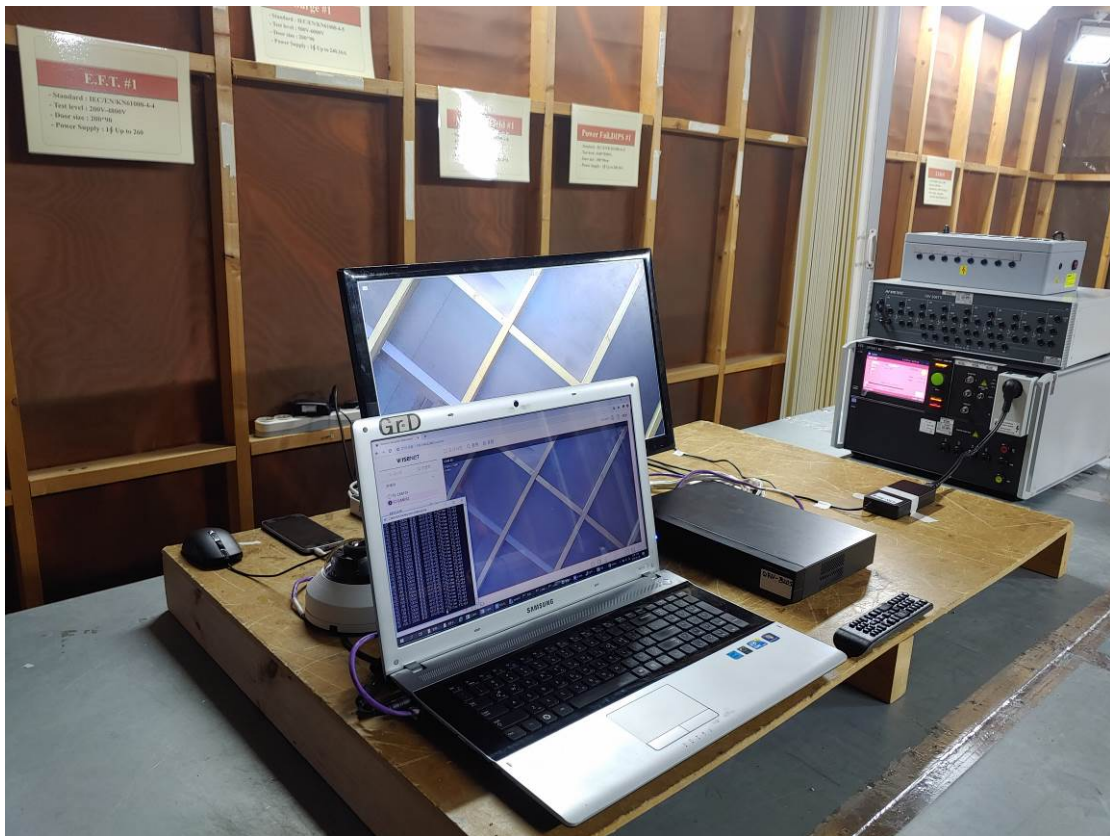
RF Electromagnetic Field / [1 GHz ~ 6 GHz]



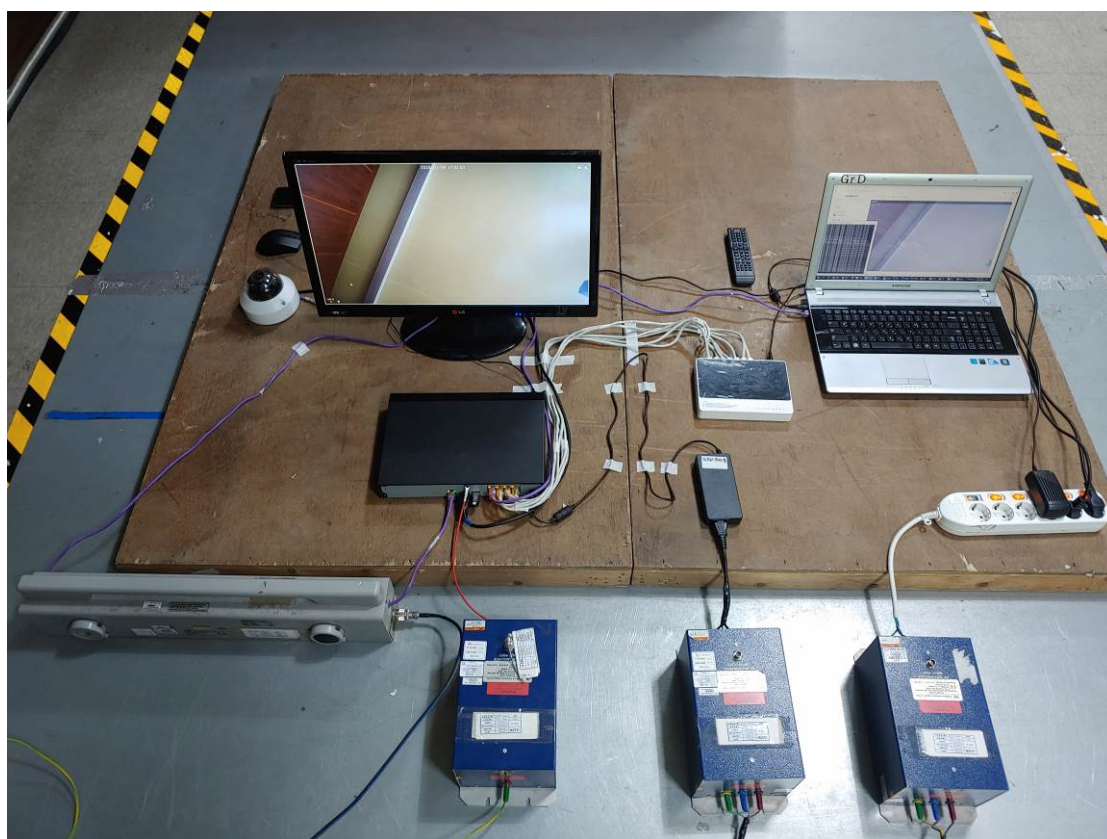
Electrical fast transients



Surge



Conducted Disturbances, Induced by Radio-Frequency Fields



Main supply voltage (dips, variations) short interruptions



EUT



EUT

