



EMC TEST REPORT

Dates of Tests: April 15 - 23, 2019
Test Report S/N: LR500122302L
Test Site : LTA Co., Ltd.

Model No.

QND-6021

APPLICANT

Hanwha Vision Co., Ltd

Equipment Name : NETWORK CAMERA
Manufacturer : Hanwha Vision Co., Ltd
Model name : QND-6021
Additional Model name : QND-6011
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

Data of reissue : February 17, 2023

This test report is issued under the authority of:

The test was supervised by:


Young Kyu Shin, Technical Manager
Jong Chae Kim, Test Engineer

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Revision	Date of issue	Test report No.	Description
0	23.04.2019	LR500121904AG	Initial
1	17.02.2023	LR500122302L	Change company name and manufacturer name



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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	2019-09-30	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	2019-01-22	
IC	CANADA	5799A-2	2019-03-15	IC filing
KOLAS	KOREA	NO.551	2021-08-20	KOLAS accredited Lab.

2. Information's about test item

2-1 Client/ Manufacturer

Company name : Hanwha Vision Co., Ltd
 Address : 8-10, TECHNO 3-RO, YUSEONG-GU, DAEJEON, KOREA
 Telephone / Facsimile : +82-31-723-5205 / +82-31-723-5108

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 CAMERA
 Model name : QND-6021
 Additional Model name : QND-6011
 Additional Models are different only lens specification.
 Serial number : Identification
 Date of receipt : April 09, 2019
 EUT condition : Pre-production, not damaged
 Interface ports : LAN, Micro SD Card Slot
 Power rating : DC 12 V (Adapter), DC 48 V (PoE)

2-3 Modification

-NONE

2-4 Model Specification

-NONE

2-5 Test conditions

Temp. / Humid. / Pressure : +(20 - 23) °C / (31 - 38) % R.H. / (100.0 – 100.1) kPa
 Tested Model : QND-6021
 Test mode : REC mode (DC), REC mode (POE)
 Tested Voltage : AC 230 V, 50 Hz (Adapter), DC 48 V (PoE)

2-5 EUT

Equipment	Model No.	Serial No.	Manufacturer
NETWORK CAMERA	QND-6021	N/A	HANWHA VISION VIETNAM COMPANY LIMITED D-TECH CO.,LTD.
NETWORK CAMERA Adapter	KSASB0241200200M2	N/A	Kuantech (Belhai) CO., Ltd

2-6 Accessary / REC mode (DC)

Equipment	Model No.	Serial No.	Manufacturer
Alarm	N/A	N/A	N/A
Sensor	SPL-0030	N/A	SECOM
Notebook PC	TFG13	N/A	HANSUNG
Notebook PC Adapter	A13-040N3A	F186921708004182	Chicony
SD Card	KTJD8K9	N/A	N/A

/ REC mode (POE)

Equipment	Model No.	Serial No.	Manufacturer
PoE Injector	PSE305	N/A	Gigabit
Alarm	N/A	N/A	N/A
Sensor	SPL-0030	N/A	SECOM
Notebook PC	TFG13	N/A	HANSUNG
Notebook PC Adapter	A13-040N3A	F186921708004182	Chicony
SD Card	KTJD8K9	N/A	N/A

2-7 Cable List / REC mode (DC)

From		To		Length (m)	Shielding	
Type	I/O Port	Type	I/O Port		Cable	backshell
EUT	DC IN	NETWORK CAMERA Adapter	DC OUT	1.2	NO	Plastic
	LAN	Notebook PC	LAN	3.0	NO	Plastic
	Alarm IN	Alarm	Alarm OUT	1.0	NO	Plastic
	Alarm OUT	Sensor	Sensor OUT	1.0	NO	Plastic
	Alarm Ground	Alarm	Alarm Ground	1.0	NO	Plastic
	Alarm Ground	Sensor	Sensor Ground	1.0	NO	Plastic
	SD Card	SD Card	-	-	-	-
Notebook PC	DC IN	Notebook PC Adapter	DC OUT	1.8	NO	Plastic

/ REC mode (POE)

From		To		Length (m)	Shielding	
Type	I/O Port	Type	I/O Port		Cable	backshell
EUT	DC IN	PoE Injector	DC OUT	1.2	NO	Plastic
	LAN	PoE Injector	P+D / OUT	3.0	NO	Plastic
	Alarm IN	Alarm	Alarm OUT	1.0	NO	Plastic
	Alarm OUT	Sensor	Sensor OUT	1.0	NO	Plastic
	Alarm Ground	Alarm	Alarm Ground	1.0	NO	Plastic
	Alarm Ground	Sensor	Sensor Ground	10.	NO	Plastic
	SD Card	SD Card	-	-	-	-
Notebook PC	LAN	PoE Injector	Data/IN	1.5	NO	Plastic
	DC IN	Notebook PC Adapter	DC OUT	1.8	NO	Plastic

3. Test Report

3.1 Summary of tests

Parameter	Applied Standard	Status
I. Emission		
Radiated Emission	EN 55032:2012/AC2013	C
Conducted Emission	EN 55032:2012/AC2013	C
Harmonic Current Emission	EN 61000-3-2:2014	C
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 QND-6021 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 (DC), REC mode (POE)
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) / REC mode (DC)



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EUT /Model No. : QND-6032R

Phase : LINE

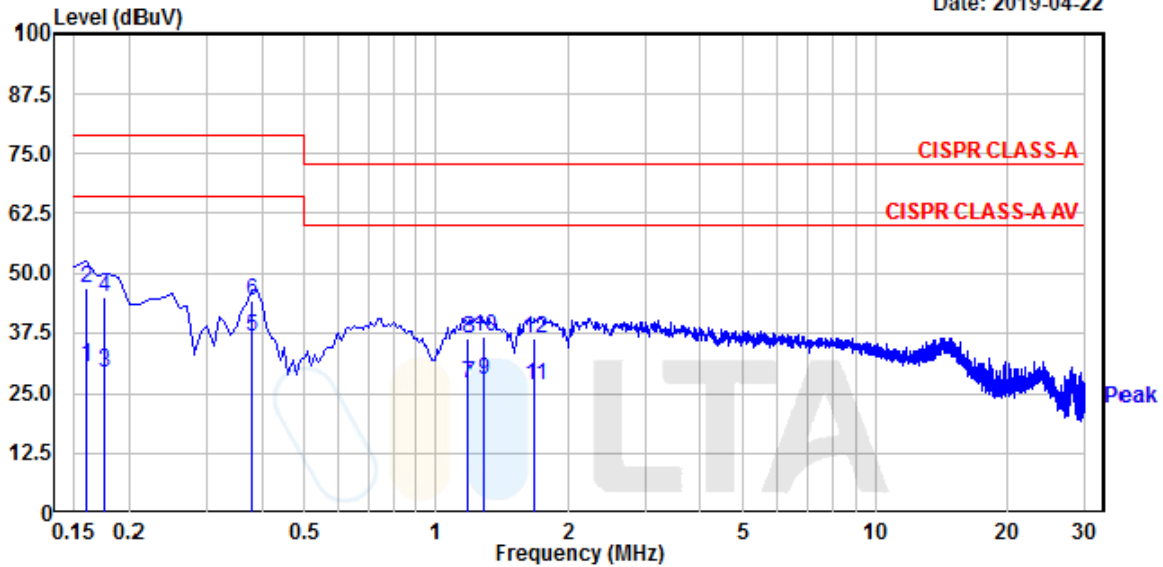
Test Mode : REC mode (DC)

Test Power : 230 / 50

Temp./ Humi. : 21°C / 35% R.H.

Test Engineer : PARK J H

Date: 2019-04-22



Trace: 1

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
0.160	27.32	11.28	19.43	46.75	30.71	79.00	66.00	32.25	35.29
0.175	25.65	10.11	19.43	45.08	29.54	79.00	66.00	33.92	36.46
0.381	24.62	17.07	19.46	44.08	36.53	79.00	66.00	34.92	29.47
1.181	16.90	7.75	19.51	36.41	27.26	73.00	60.00	36.59	32.74
1.274	17.03	8.37	19.51	36.54	27.88	73.00	60.00	36.46	32.12
1.670	16.75	7.24	19.52	36.27	26.76	73.00	60.00	36.73	33.24

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

Conducted emissions (NEUTRAL) / REC mode (POE)



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EUT /Model No. : QND-6032R

Phase : NEUTRAL

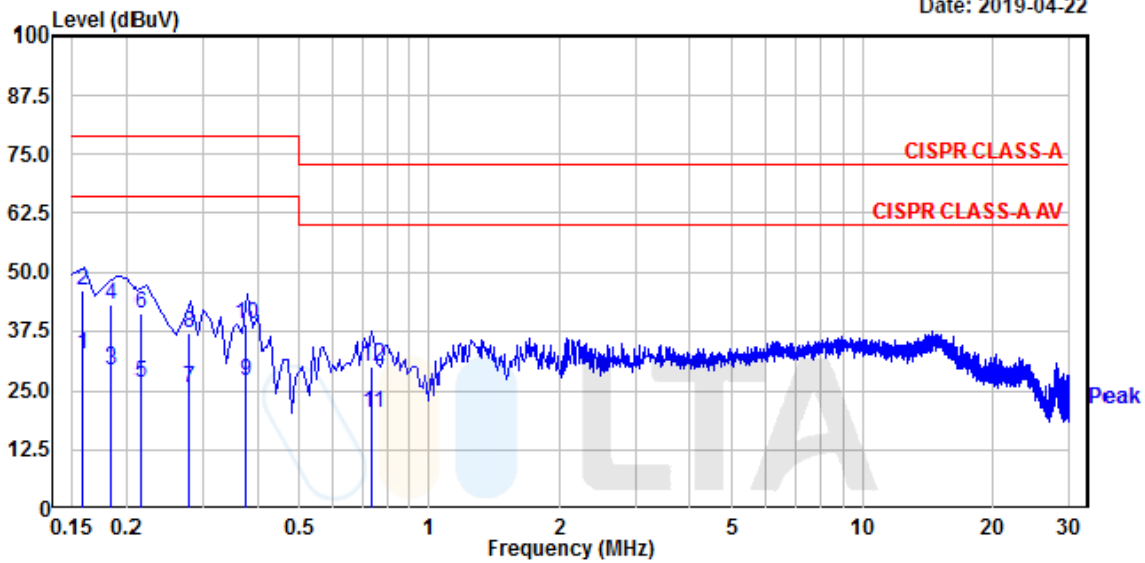
Test Mode : REC mode (DC)

Test Power : 230 / 50

Temp./ Humi. : 21°C / 35% R.H.

Test Engineer : PARK J H

Date: 2019-04-22



Trace: 1									
Freq	RD	RD	C.F	Result	Result	Limit	Limit	Margin	Margin
MHz	QP	AV		QP	AV	QP	AV	QP	AV
	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV	dB	dB
0.158	26.61	13.19	19.44	46.05	32.63	79.00	66.00	32.95	33.37
0.185	23.55	9.99	19.44	42.99	29.43	79.00	66.00	36.01	36.57
0.216	21.56	7.19	19.44	41.00	26.63	79.00	66.00	38.00	39.37
0.277	17.40	6.17	19.46	36.86	25.63	79.00	66.00	42.14	40.37
0.375	19.52	7.72	19.46	38.98	27.18	79.00	66.00	40.02	38.82
0.740	10.57	0.94	19.47	30.04	20.41	73.00	60.00	42.96	39.59

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

Conducted emissions (TEL_100 M) / REC mode (DC)



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EUT /Model No. : QND-6032R

Phase : TEL_100M

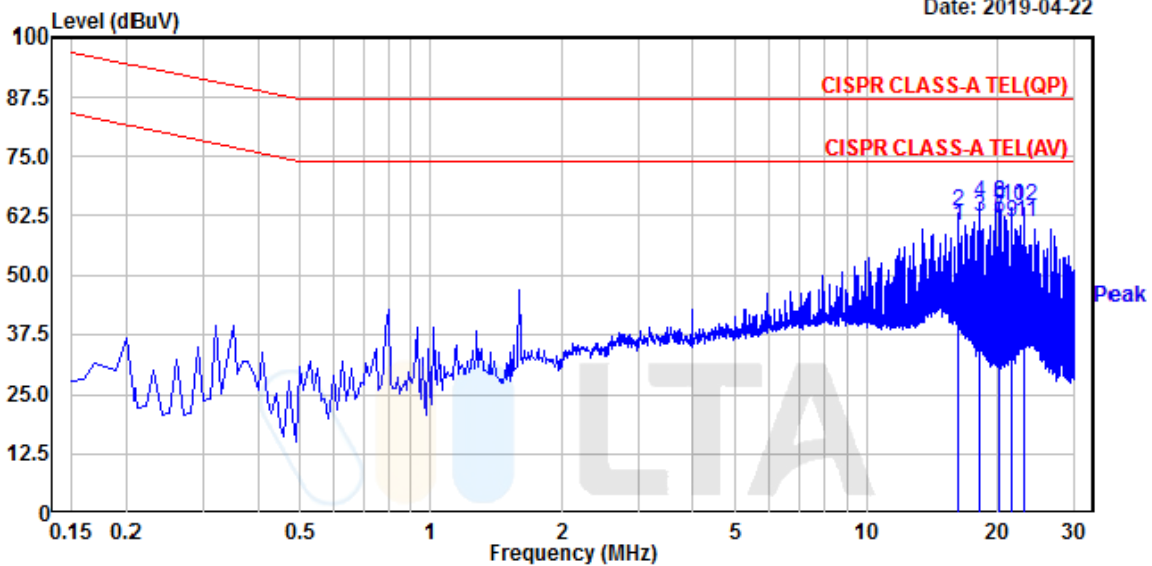
Test Mode : REC mode (DC)

Test Power : 230 / 50

Temp./ Humi. : 22°C / 36% R.H.

Test Engineer : PARK J H

Date: 2019-04-22



Trace: 1

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
16.229	43.54	40.61	19.76	63.30	60.37	87.00	74.00	23.70	13.63
18.243	45.31	42.27	19.81	65.12	62.08	87.00	74.00	21.88	11.92
20.257	45.34	42.19	19.88	65.22	62.07	87.00	74.00	21.78	11.93
20.258	45.40	42.28	19.88	65.28	62.16	87.00	74.00	21.72	11.84
21.662	44.77	41.38	19.93	64.70	61.31	87.00	74.00	22.30	12.69
23.128	44.51	41.02	19.97	64.48	60.99	87.00	74.00	22.52	13.01

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

Conducted emissions (TEL_100 M) / REC mode (POE)



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EUT /Model No. : QND-6032R

Phase : TEL_100M

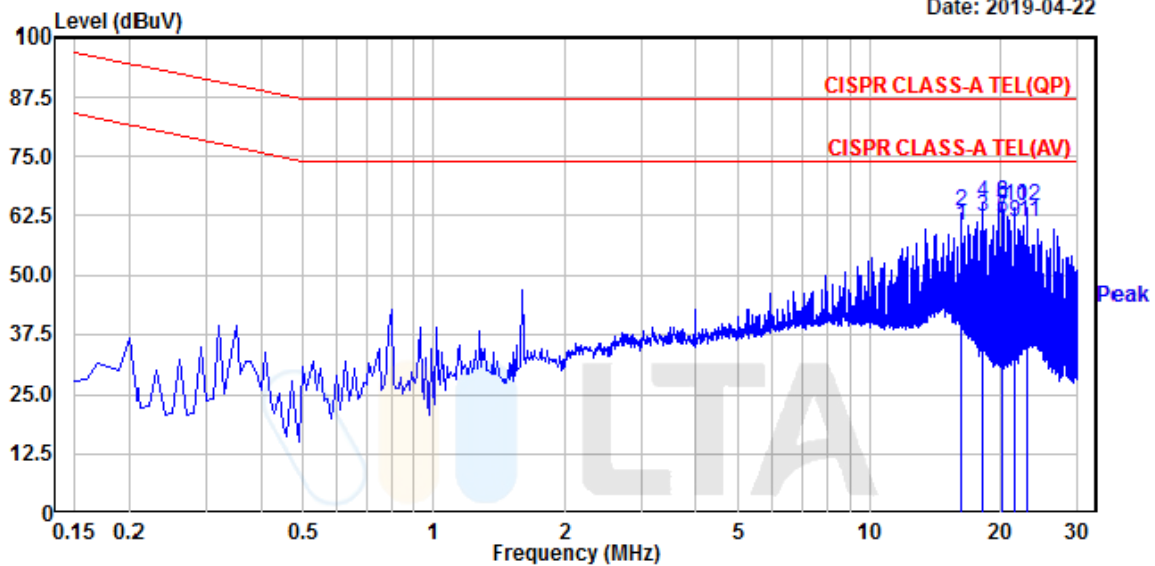
Test Mode : REC mode (DC)

Test Power : 230 / 50

Temp./ Humi. : 22°C / 36% R.H.

Test Engineer : PARK J H

Date: 2019-04-22



Trace: 1

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
16.229	43.54	40.61	19.76	63.30	60.37	87.00	74.00	23.70	13.63
18.243	45.31	42.27	19.81	65.12	62.08	87.00	74.00	21.88	11.92
20.257	45.34	42.19	19.88	65.22	62.07	87.00	74.00	21.78	11.93
20.258	45.40	42.28	19.88	65.28	62.16	87.00	74.00	21.72	11.84
21.662	44.77	41.38	19.93	64.70	61.31	87.00	74.00	22.30	12.69
23.128	44.51	41.02	19.97	64.48	60.99	87.00	74.00	22.52	13.01

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 (DC), REC mode (POE)
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 : 1 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 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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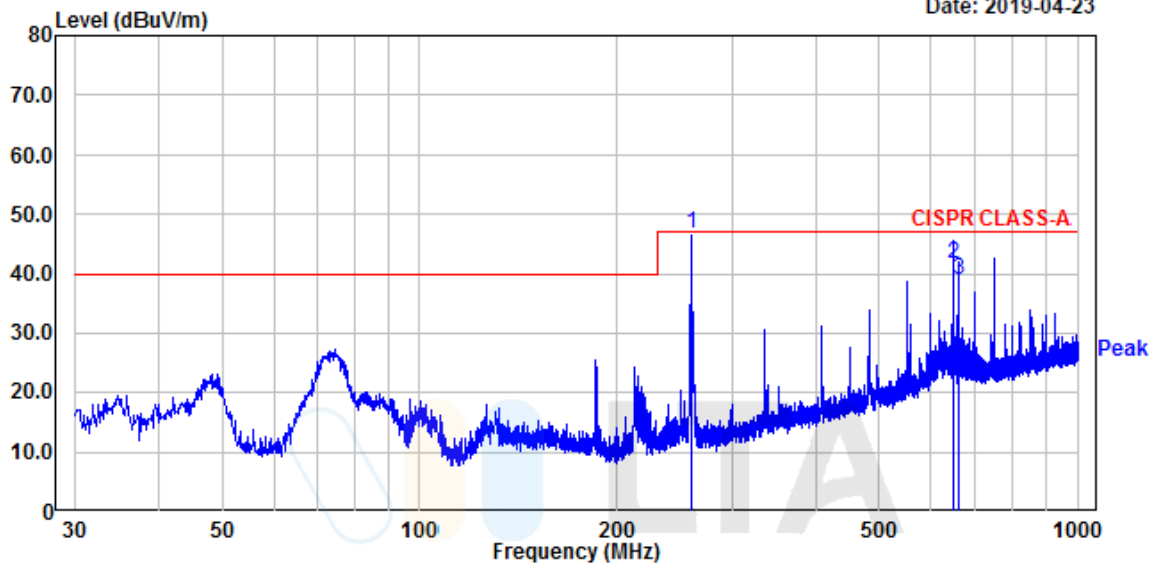
EUT/Model No.: QND-6032R

Temp/Humi: 23 / 31

Test Mode : REC mode(DC)

Tested by: PARK J H

Date: 2019-04-23



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBUV/m	dBUV/m	dB	cm	deg	
259.89	59.20	-12.51	46.69	47.00	0.31	100	150	vertical
650.07	45.19	-3.46	41.73	47.00	5.27	282	351	vertical
660.02	42.15	-3.32	38.83	47.00	8.17	385	265	vertical

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

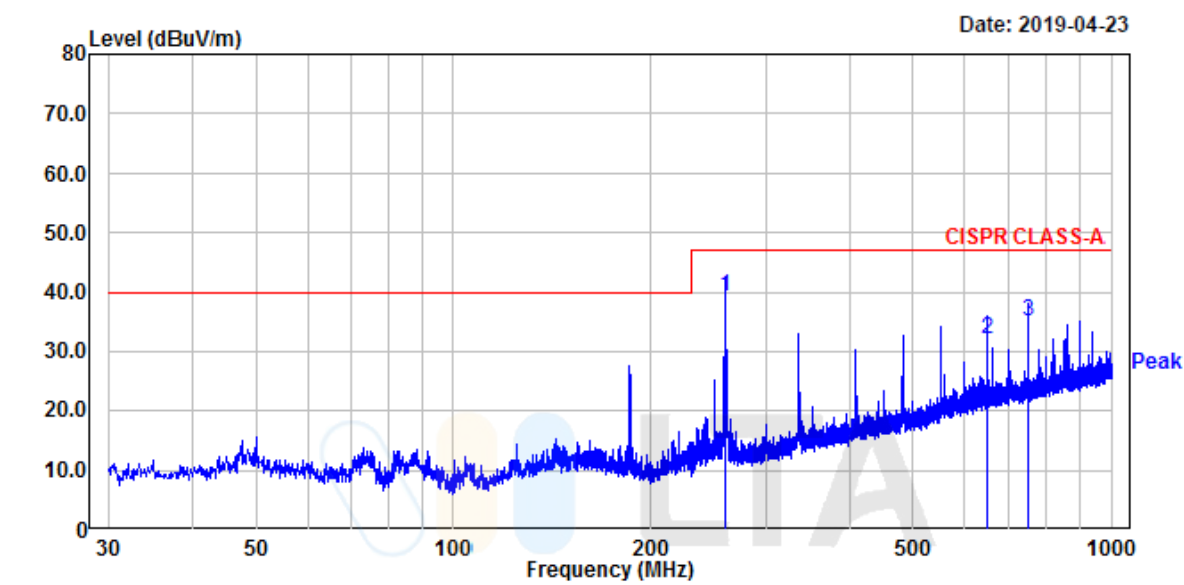
Radiated Emission (Below 1 GHz) / H



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www.ltalab.com

EUT/Model No.: QND-6032RTemp/Humi: 23 / 31

Test Mode : REC mode(DC)Tested by: PARK J H



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
259.89	51.86	-12.51	39.35	47.00	7.65	395	51	horizontal
650.07	35.47	-3.46	32.01	47.00	14.99	374	125	horizontal
749.98	36.85	-1.81	35.04	47.00	11.96	386	114	horizontal

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

Radiated Emission (Above 1 GHz)



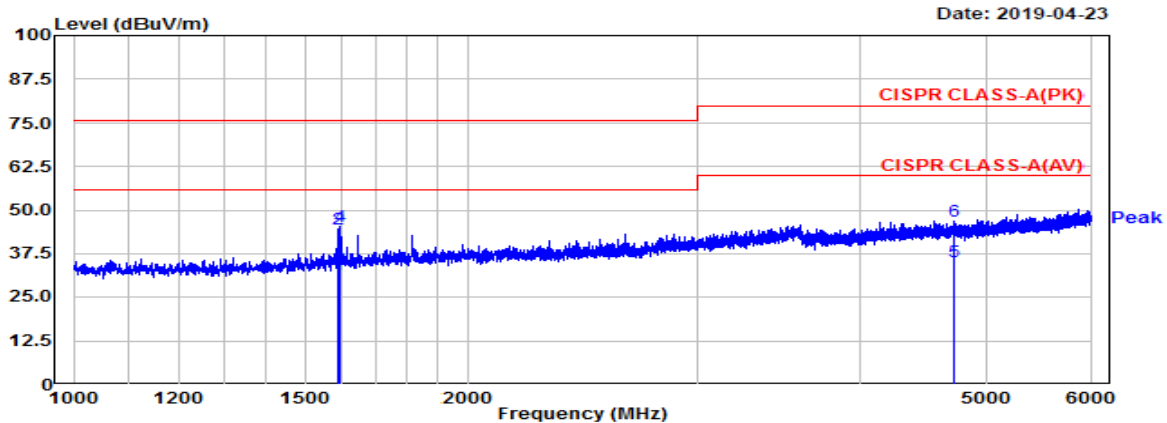
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EUT/Model No.: QND-6032R

Temp/Humi: 23 / 31

Test Mode : REC mode(DC)

Tested by: PARK J H

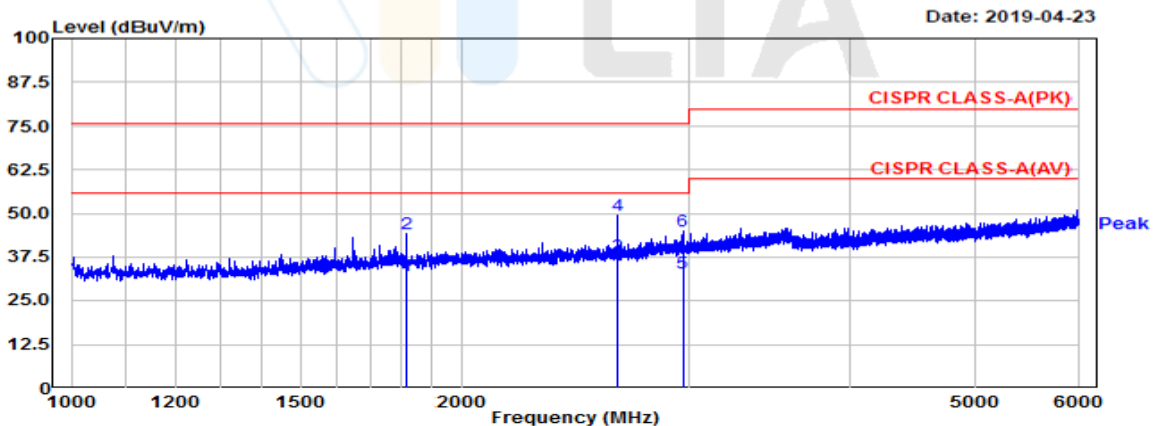


EUT/Model No.: QND-6032R

Temp/Humi: 23 / 31

Test Mode : REC mode(DC)

Tested by: PARK J H



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

Test Date

Temp.:
[°C]Humidity:
[%]Distance
(m)

Model : QND-6032R

2019-04-23

23

31

3.8

TEST mode : REC mode(DC)

Freq.(MHz)	Reading(PK)	Reading(AV)	C.F	Result(PK)	Result(AV)	Limit(PK)	Limit(AV)	Margin(PK)	Margin(AV)	Height	Angle	Polarity
MHz	dBuV	dBuV	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	cm	deg	Hor/Ver
1592.50	49.7	36.7	-3.14	46.53	33.53	76.0	56.0	29.47	22.47	100	87	H
1598.75	50.4	38.4	-3.08	47.27	35.27	76.0	56.0	28.73	20.73	100	15	H
4726.25	36.7	24.7	12.31	48.98	36.98	80.0	60.0	31.02	23.02	100	340	H
1814.38	47.4	35.4	-1.19	46.16	34.16	76.0	56.0	29.84	21.84	100	117	V
2640.00	48.8	36.8	2.87	51.62	39.62	76.0	56.0	24.38	16.38	100	278	V
2969.38	42.4	30.4	4.55	46.93	34.93	76.0	56.0	29.07	21.07	100	291	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 (DC)
Rated power	: 2.920 W
Result	: Not Applicable

Measurement Data:

- We did not test EN61000-3-2 (Harmonic current emissions) for the QND-6021 because equipment whose rated power is less or equal 75W don't need to be tested.



Harmonic Current (AC power input port) / REC mode (DC)

25th April 2019 - 10:38:23		Page 1/1		IECSOFT v2_5a	
		IEC61000-3-2:2014			
		Fluctuating Harmonics			
Instrument Details					
Instrument Model	PPA5511				
Serial Number	162-04957				
Firmware Version	2.168				
N4L Calibration Date	18th September 2017				
Instrument Version	Standard				
Test Settings					
Class	Class A				
Mode	Measured				
Equipment Under Test					
Brand	Hanwha Techwin Co., Ltd.				
Model	QND-6032R				
Serial	N/A				
Impedance Network ID	N/A				
Test Conditions					
	User Entered		Measured		
Rated Voltage	N/A		230.727V		
Rated Current	N/A		38.475 mA		
Rated Frequency	N/A		50.000 Hz		
Rated Power	N/A		2.920W		
Additional Test Information					
Measured Power Factor	0.329				
Max Current THD	385.03%				
Max THC	46.960mA				
Max Power	2.959W				
Max F.Current	13.562mA				
Average F.Current	12.707mA				
Minimum Current	100A				
Test Duration	2.5 minutes				
Additional Test Details					
Operator	PARK J H				
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

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 (DC)
Result	:	Complies

Measurement Data:

- Refer to the Next page



Voltage Variation and Flicking (AC power input port) / REC mode (DC)

25th April 2019 - 13:12:48		Page 1/2	IECSoft v2_5a
		IEC61000-3-3:2013 Ed.3.0 Flickermeter	
			
Instrument Details			
Instrument Model	PPA5511		
Serial Number	162-04957		
Firmware Version	2.168		
N4L Calibration Date	18th September 2017		
Instrument Version	Standard		
Test Settings			
Class	Voltage		
Mode	Normal (4%)		
Minimum Current	10A		
PST	10.00 minutes		
PLT	12 PSTs		
Equipment Under Test			
Brand	Hanwha Techwin Co., Ltd.		
Model	QND-6032R		
Serial	N/A		
Impedance Network ID	N/A		
Test Conditions			
	User Entered	Measured	
Rated Voltage	N/A	230.723V	
Rated Current	N/A	N/A	
Rated Frequency	N/A	50.000Hz	
Rated Power	N/A	N/A	
D max	0.0671% (Limit: 4.0%)		
T max	0.0000 s (Limit: 0.5 s)		
DC max	0.0012% (Limit: 3.3%)		
Additional Test Details			
Operator	PARK J H		
Lab Name	N/A		
Location	N/A		
Notes			
Signature			
Results	Phase1: PASS		

25th April 2019 - 13:12:48		Ph:1 Page 2/2		IECSoft v2_5a				
IEC61000-3-3:2013 Ed.3.0 Flickermeter								
Instrument Details								
Instrument Model	PPA5511							
Instrument Serial	162-04957							
Instrument Firmware	2.168							
Equipment Under Test								
Brand	Hanwha Techwin Co., Ltd.							
Model	QND-6032R							
Serial	N/A							
Flicker Test Results								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
2	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
3	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
4	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
5	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
6	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
7	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
8	Phase1: PASS	0.001	0.06441	0	0.082	1.00	N/A	N/A
9	Phase1: PASS	0.001	0.06707	0	0.082	1.00	N/A	N/A
10	Phase1: PASS	0.001	0.06707	0	0.082	1.00	N/A	N/A
11	Phase1: PASS	0.001	0.06707	0	0.082	1.00	N/A	N/A
12	Phase1: PASS	0.001	0.06707	0	0.082	1.00	N/A	N/A



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	: 2019.04.22.
Test method	: EN 61000-4-2 :2009
Temperature / Humidity / Pressure	: 20 °C / 37 % R.H. / 100.0 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)	: $\pm 6 \text{ kV}$
Number of discharges at each point	: 10 of each polarity
Discharge Repetition on Rate	: 1 / sec
Test mode	: REC mode (DC), REC mode (POE)
Result	: Complies

Measurement Data:

- Refer to the Next page


1-1. Indirect Discharge

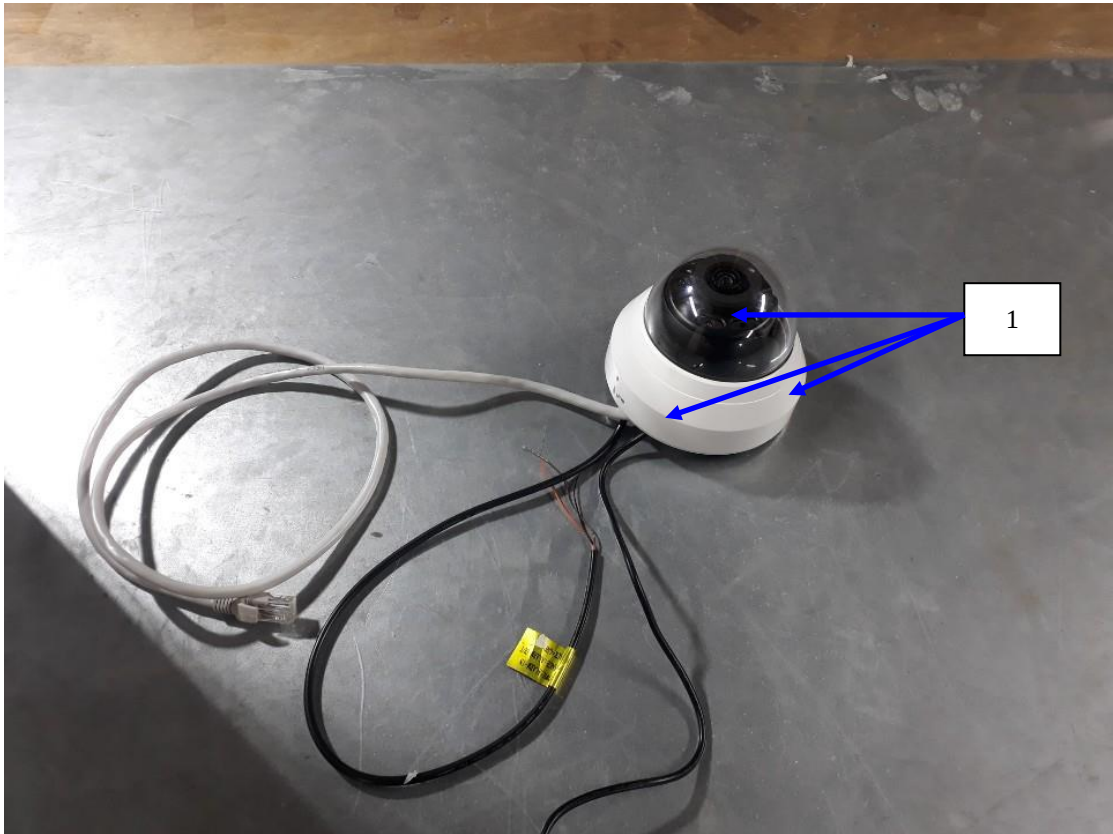
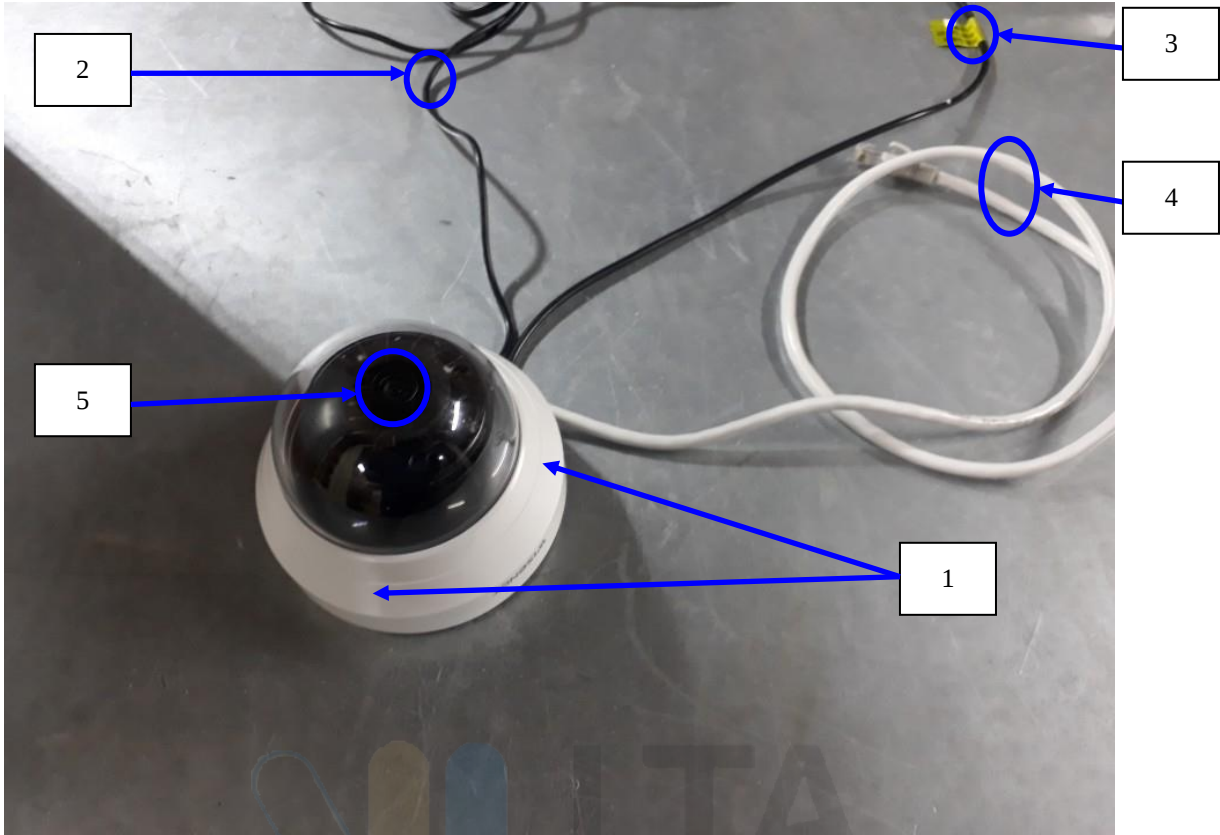
No.	Position	Kind of Discharge	Results	Remarks
1	HCP	Contact	Complies	No reaction recognized
2	VCP	Contact	Complies	No reaction recognized

1-2. Direct Discharge

No.	Position	Kind of Discharge	Result	Remarks
1	Enclosure	Air	Complies	No reaction recognized
2	LAN	Air	Complies	No reaction recognized
3	Alarm	Air	Complies	No reaction recognized
4	Lens	Air	Complies	No reaction recognized

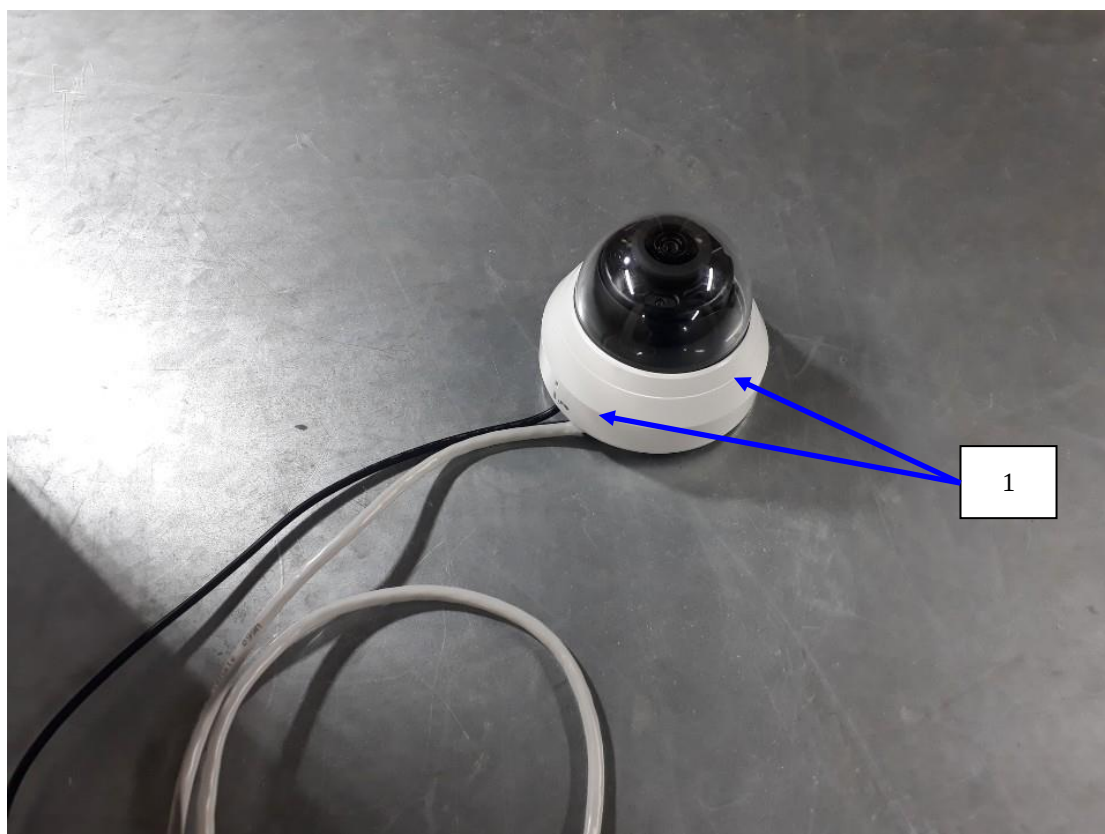
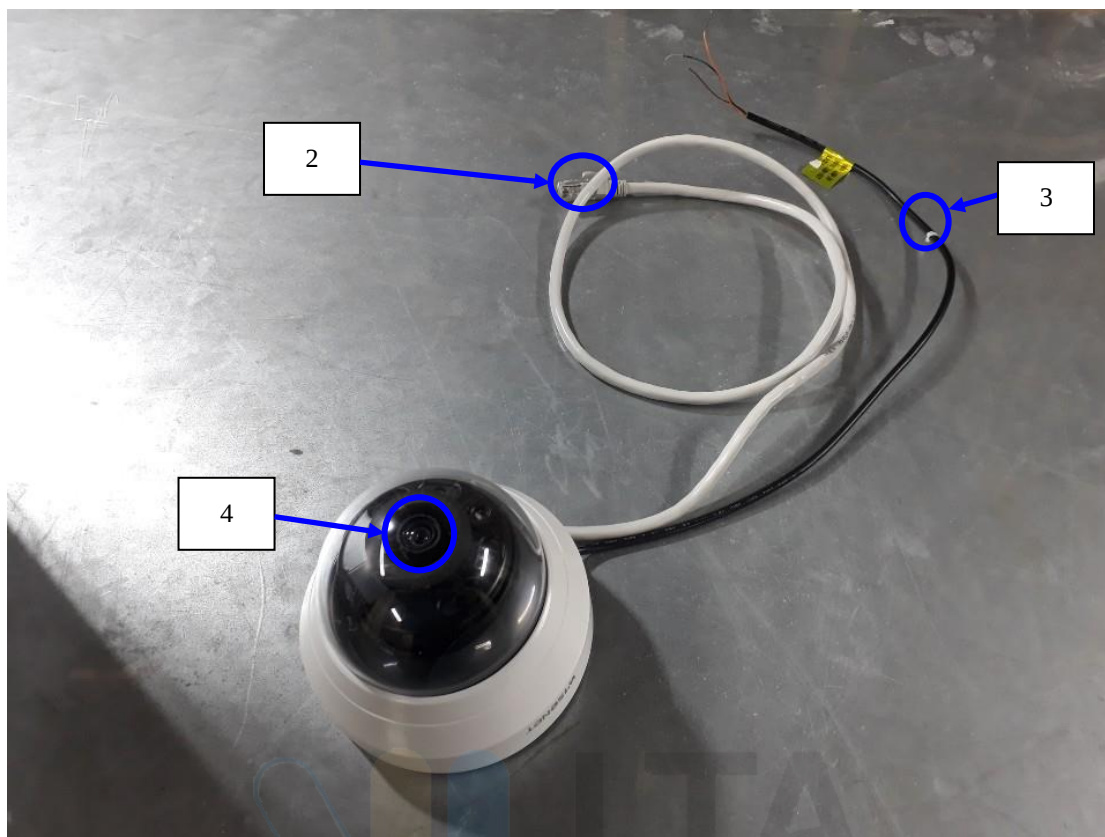
- ← Air discharge
- ← Contact discharge

ESD TEST POINT / REC mode (DC)



- ← Air discharge
← Contact discharge

ESD TEST POINT / REC mode (POE)



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	:	2019.04.26.
Test method	:	EN 61000-4-3:2006/A1:2008/A2:2010
Temperature / Humidity / Pressure	:	21 °C / 38 % R.H. / 100.1 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 (DC), REC mode (POE)
Result	:	Complies

Measurement Data:

MODE : REC mode (DC)

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

MODE : REC mode (POE)

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

※ Results are complies in each test mode.



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 : 2019.04.25.
 Test method : EN 61000-4-4:2012
 Temperature / Humidity / Pressure : 22 °C / 36 % R.H. / 100.0 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 (DC), REC mode (POE)
 Result : **Complies**

Measurement Data:

MODE : REC mode (POE)

AC Power Line	Test level	Result	Remarks
Power	± 2 kV	Complies	No reaction recognized

Signal Line	Test level	Result	Remarks
LAN	± 1 kV	Complies	No reaction recognized

MODE : REC mode (POE)

Signal Line	Test level	Result	Remarks
POE	± 1 kV	Complies	No reaction recognized

※ Results are complies in each test mode.

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	:	2019.04.25.
Test method	:	EN 61000-4-5:2014/A1:2017
Temperature / Humidity / Pressure	:	23 °C / 36 % R.H. / 100.1 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 (DC), REC mode (POE)
Result	:	Complies

Measurement Data:

MODE : REC mode (DC)

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

Signal Line	level	Result	Remark
LAN	± 0.5, 1.0 kV	Complies	No reaction recognized

MODE : REC mode (POE)

Signal Line	level	Result	Remark
PoE	± 0.5, 1.0 kV	Complies	No reaction recognized

※ Results are complies in each test mode.

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	:	2019.04.25.
Test method	:	EN 61000-4-6:2014/AC:2015
Temperature / Humidity / Pressure	:	21 °C / 36 % R.H. / 100.0 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 (DC), REC mode (POE)
Result	:	Complies

Measurement Data:

MODE : REC mode (DC)

Port	Test level (Vrms)	Result	Remarks
Power Line	10	Complies	No reaction recognized

Port	Test level (Vrms)	Result	Remarks
LAN	10	Complies	No reaction recognized

MODE : REC mode (POE)

Port	Test level (Vrms)	Result	Remarks
PoE	10	Complies	No reaction recognized

※ Results are complies in each test mode.

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 : 2019.04.25.
 Test method : EN 61000-4-11:2004/A1:2017
 Temperature / Humidity / Pressure : 22 °C / 37 % R.H. / 100.0 kPa
 Ut : 230 Vac
 Test mode : REC mode (DC)
 Result : **Complies**

Measurement Data:

MODE : REC mode (DC)

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	Screen disconnected during the test. Automatic replay without user's control. After the test, EUT was operated normally.

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	:	2019.04.25.
Test method	:	EN 50130-4:2011/A1:2014
Temperature / Humidity / Pressure	:	22 °C / 37 % R.H. / 100.0 kPa
Supply Voltage maximum	:	$U_{nom} + 10 \%$
Supply Voltage minimum	:	$U_{nom} - 15 \%$
Ut	:	230 Vac
Test mode	:	REC mode (DC)
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

MODE : REC mode (DC) / 230 V, 50 Hz

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	2019.07.11	1 year
☒	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100710	2020.03.16	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	100378	2019.09.07	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	101468	2019.09.07	1 year
☒	LISN(main)	ENV216	Rohde & Schwarz	100408	2019.10.10	1 year
☒	LISN(sub)	LT32C/10	AFJ	32031518210	2019.09.06	1 year
☒	TEST PROGRAM	e3_ce 20181212a (V9)	AUDIX	-	-	-
☒	ISN	ISN T800	TESEQ	27109	2019.09.12	1 year
☐	ISN	ENY81-CA6	Rohde & Schwarz	101565	2019.09.12	1 year
☐	CURRENT PROBE	EZ-17	Rohde & Schwarz	100508	2019.09.06	1 year

Radiated Emission – Below 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESU	Rohde & Schwarz	100092	2019.09.06	1 year
☒	Amplifier (25 dB)	8447D	HP	2944A07684	2019.09.06	1 year
☒	BILOG Antenna	VULB9168	SCHWARZBECK	775	2020.03.16 (KOLAS)	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	2019.09.06	1 year
☒	Amplifier	8449B	HP	3008A00671	2019.09.06	1 year
☒	HORN ANTENNA	3115	ETS	114105	2019.11.03 (KOLAS)	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	2019.09.10	1 year
☒	Reference Impedance Network	ES4152	NF Corp.	9074424	2019.09.07	1 year

Electrostatic Discharge

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	ESD Simulator	ESS-2000	NOISEKEN	8000C03241	2019.09.11	1 year
☒	ESD GUN	TC-815R	NOISEKEN	ESS0564361	2019.09.11	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	-	-

Electrical fast transients

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2019.09.06	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2019.09.06	1 year
☒	Capacitive Coupling Clamp	CCI	EMTEST	P1744207071	2019.09.06	1 year

Surge

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2019.09.06	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2019.09.06	1 year
☒	CDN	CNV 508T5	EMTEST	P1742204978	2019.09.07	1 year
☐	CDN	CNV 508N1	EMTEST	P1742204940	2019.09.07	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	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	2020.03.16	1 year
☒	CDN (M2)	TSCDN-M2-16A	F.C.C	07008	2019.09.06	1 year
☐	CDN (M2)	TSCDN-M2-16A	F.C.C	07009	2020.03.16	1 year
☐	CDN (M3)	TSCDN-M3-16A	F.C.C	07016	2020.03.16	1 year
☒	CDN (M3)	TSCDN-M3-16A	F.C.C	07017	2019.09.06	1 year

Mains supply voltage dips, short interruptions

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2019.09.06	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2019.09.06	1 year

Mains supply voltage variations

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Compact Generator	Compact NX	EMTEST	P1725200196	2019.09.06	1 year
☒	AC Power Source	Variac NX	EMTEST	P1745207276	2019.09.06	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



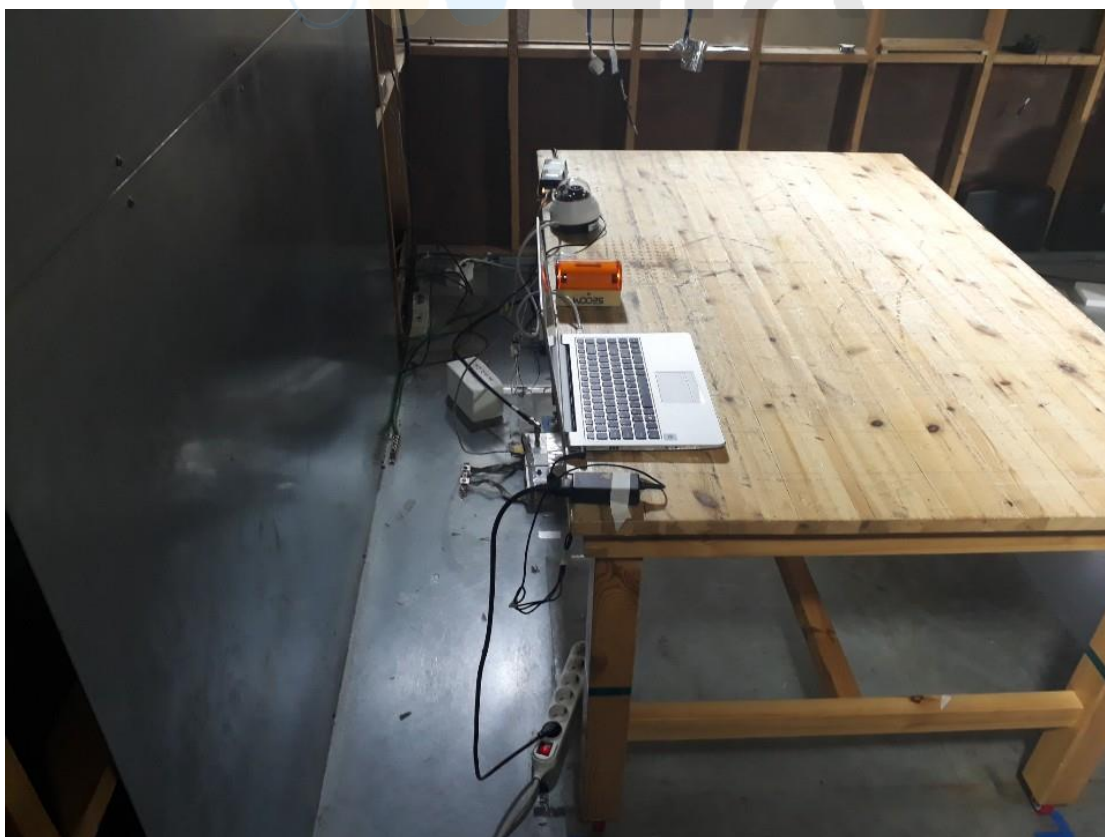
Conducted emission (Maximum emission configuration) / REC mode (DC)



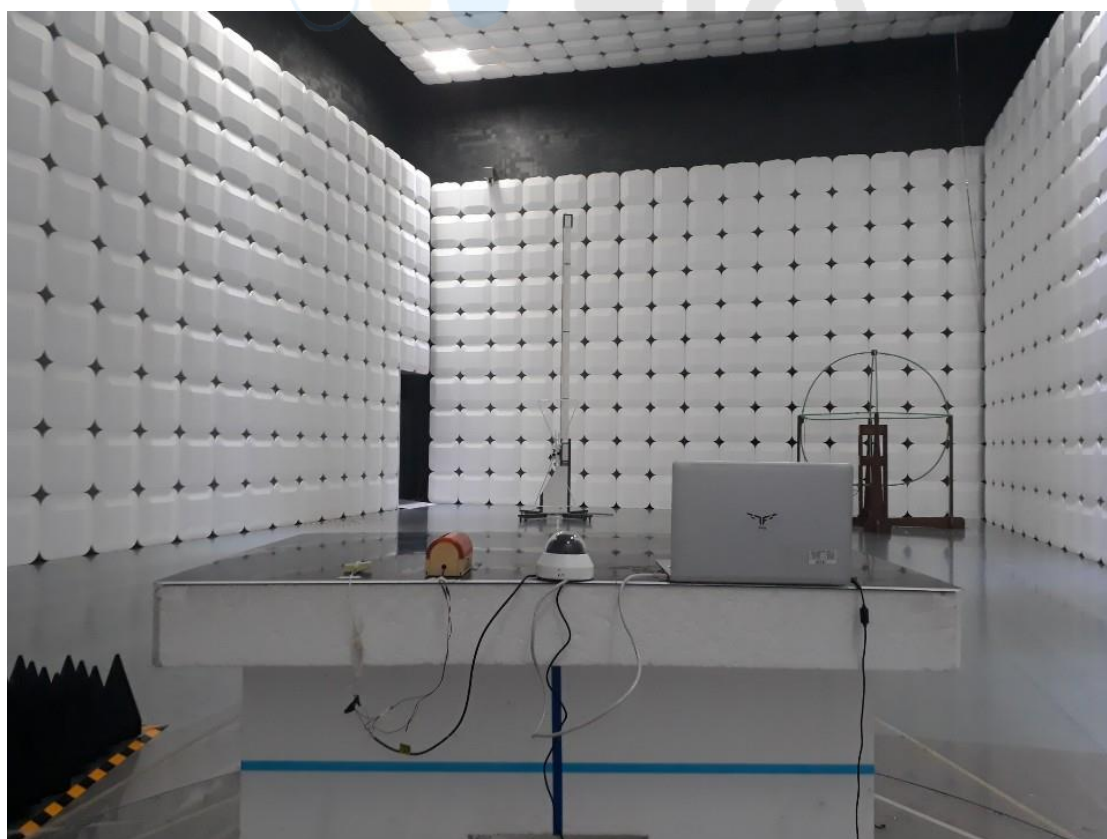
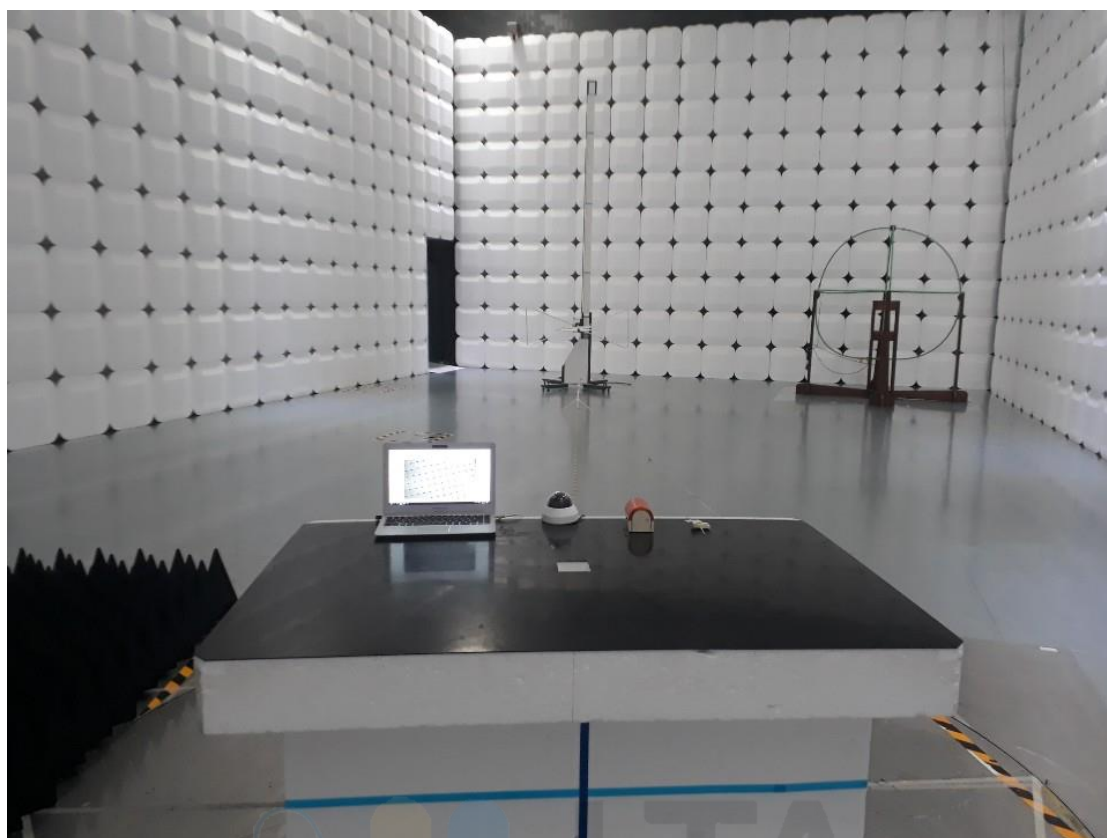
Conducted emission (Maximum emission configuration) / TEL _ REC mode (DC)



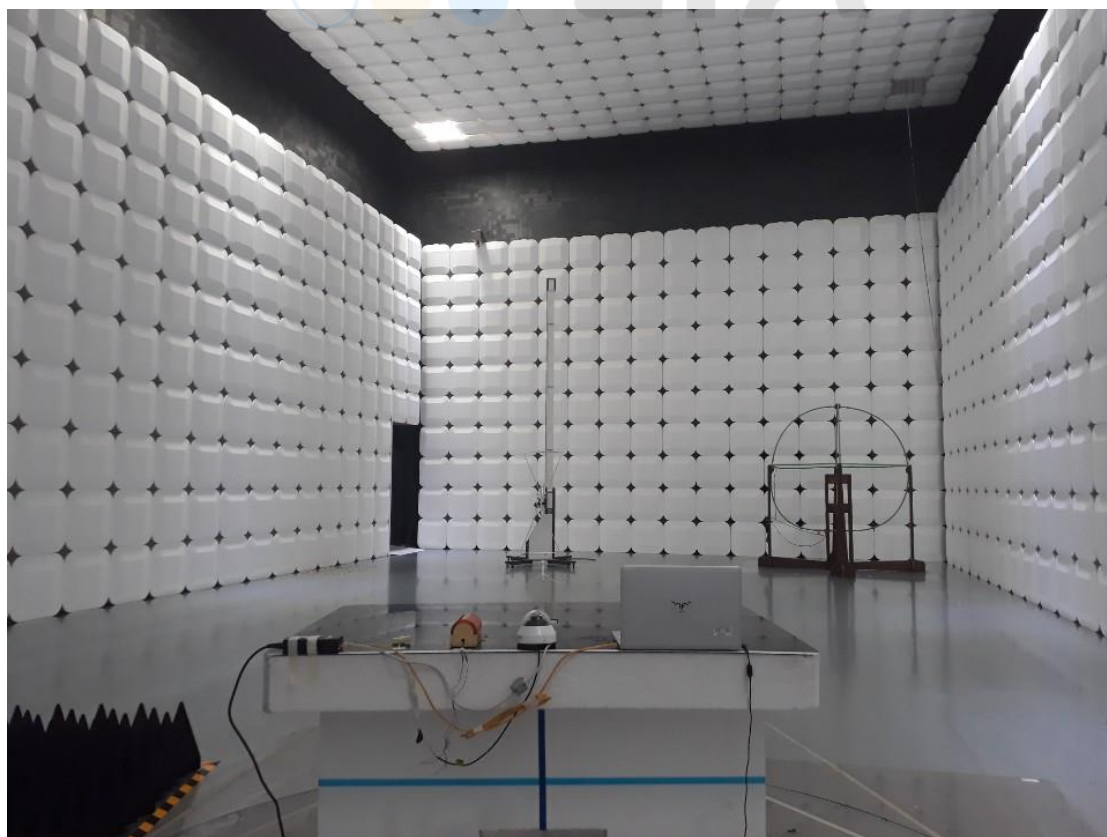
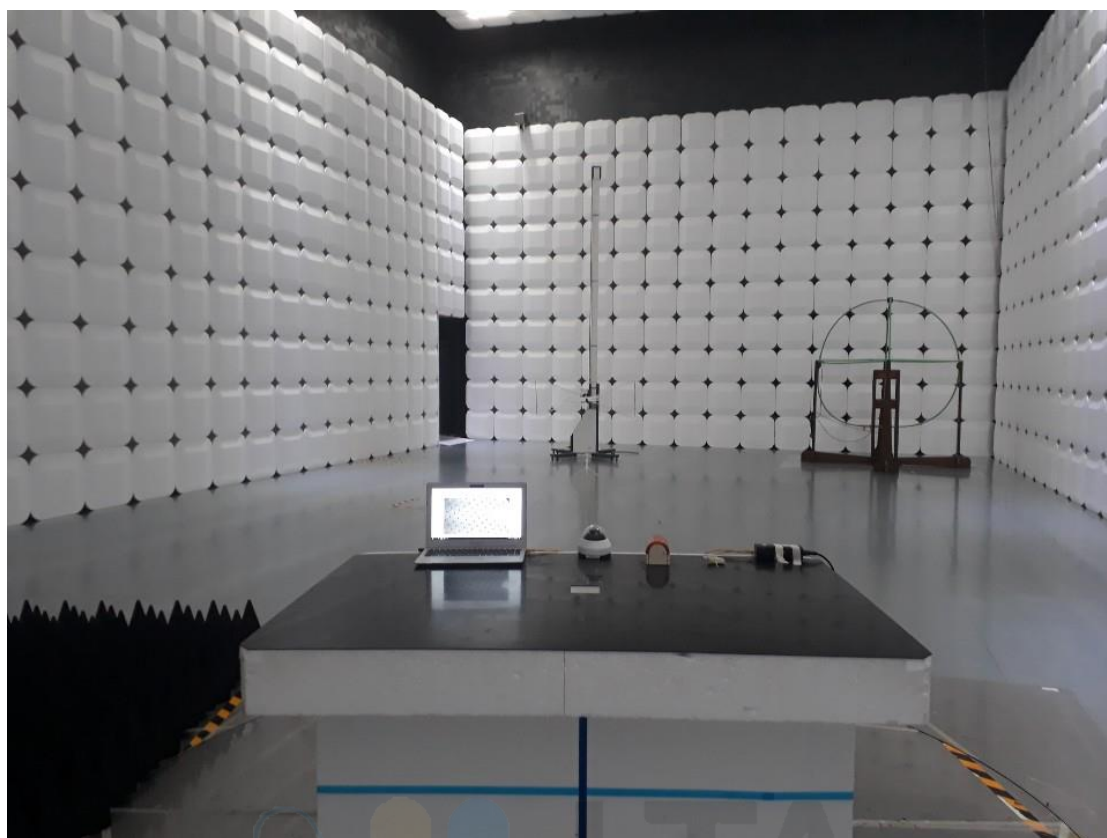
Conducted emission (Maximum emission configuration) / TEL _ REC mode (POE)



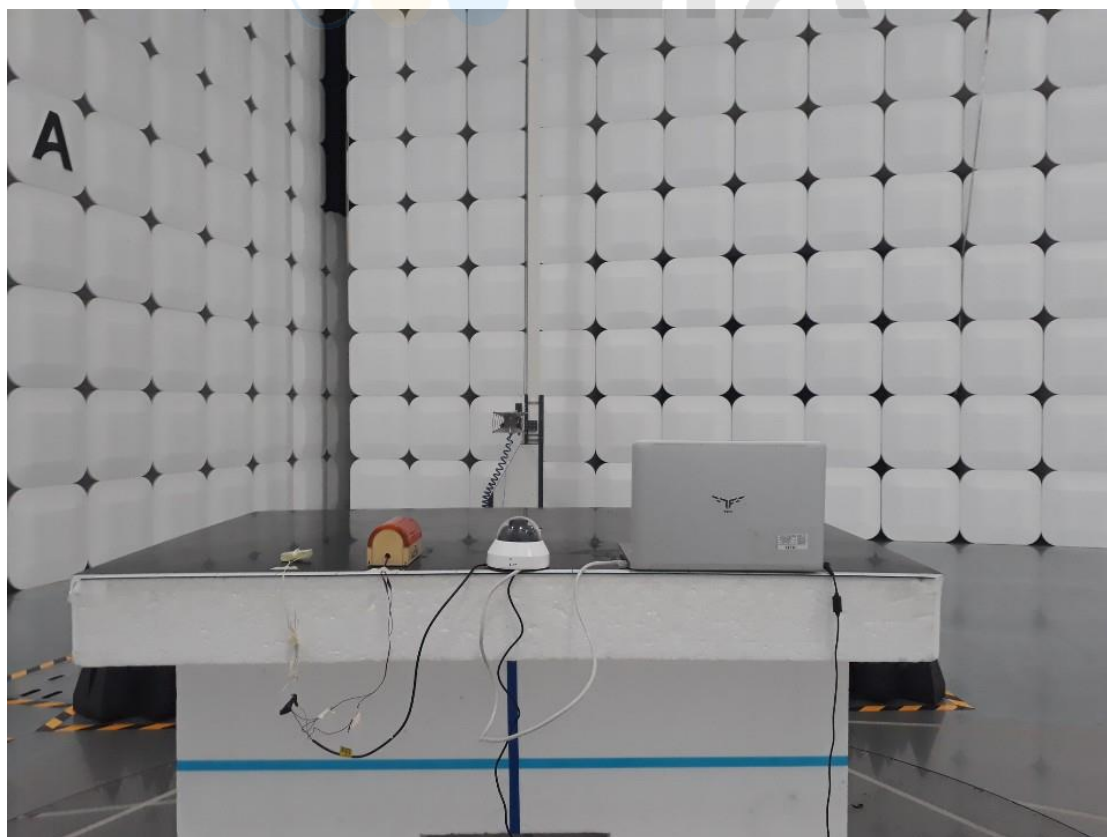
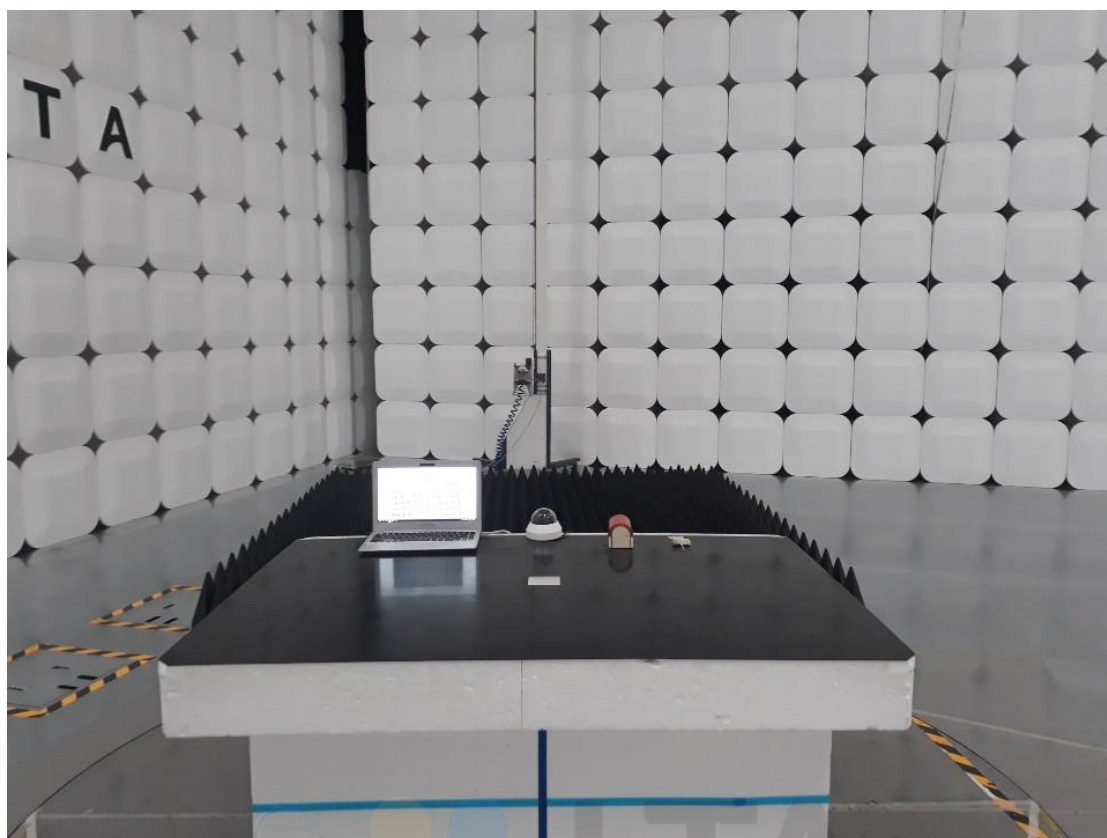
Radiated emission (Maximum emission configuration)-Below 1 GHz / REC mode (DC)



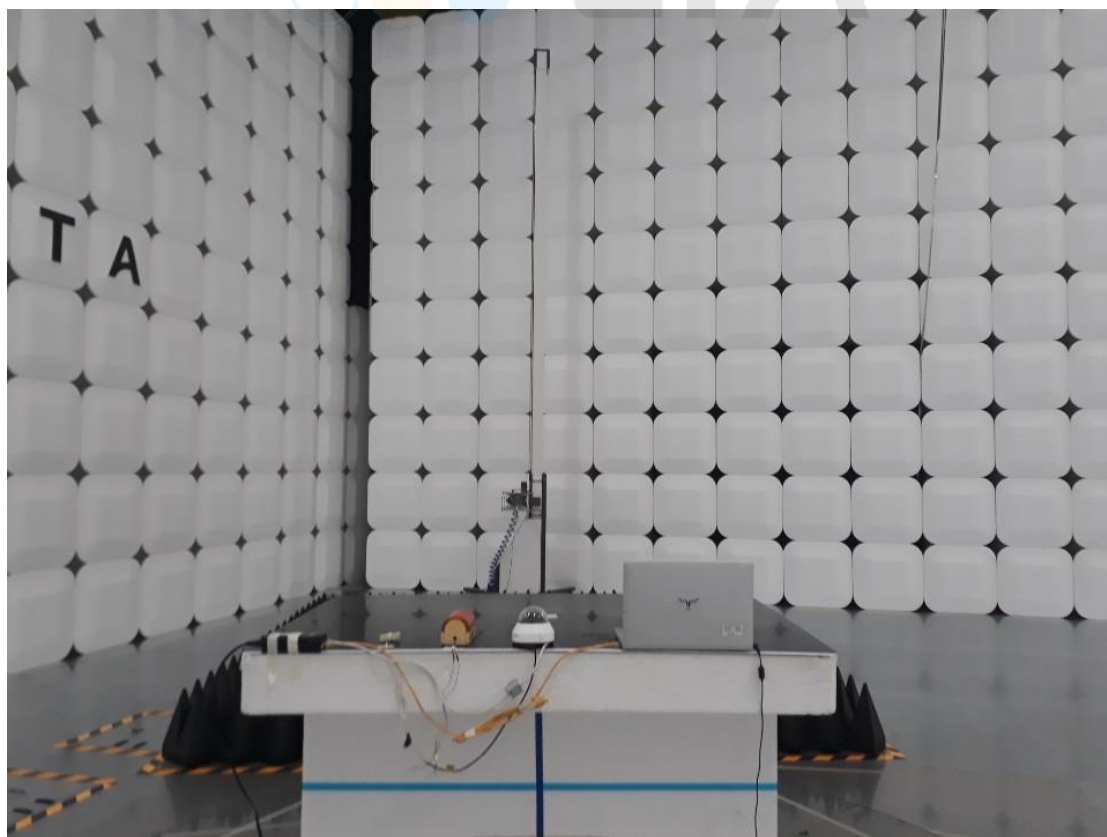
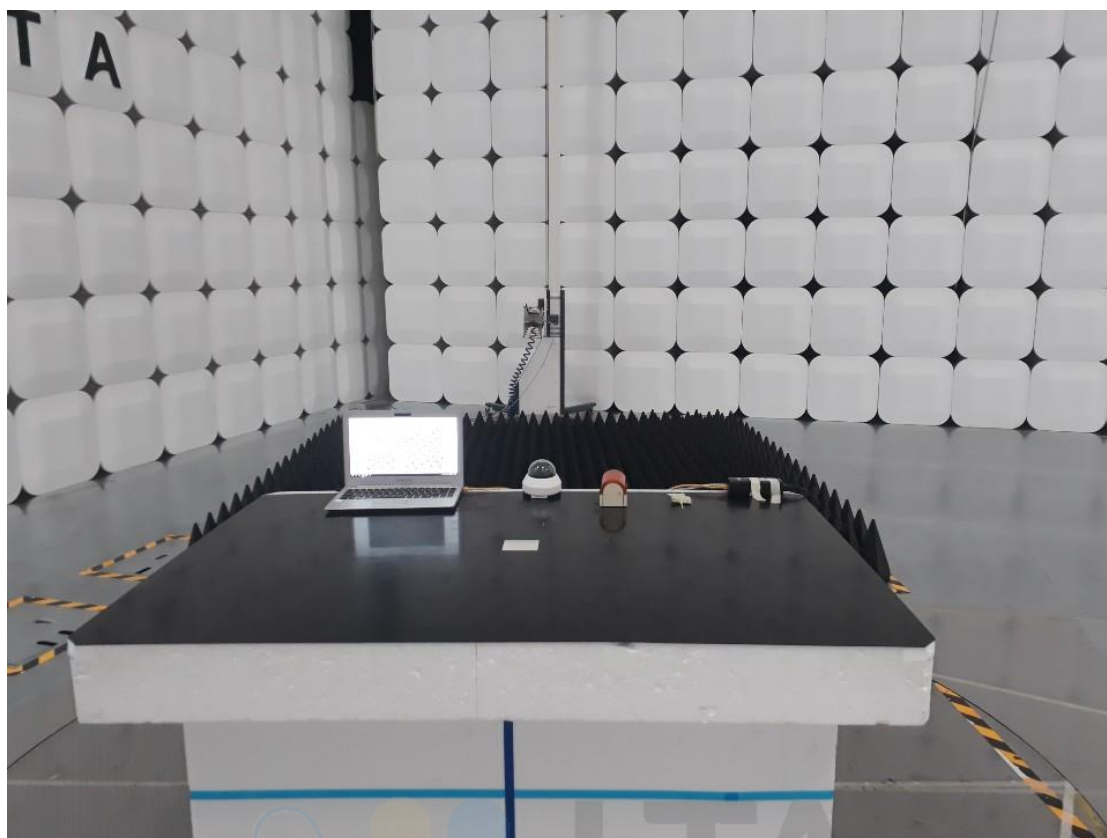
Radiated emission (Maximum emission configuration)-Below 1 GHz / REC mode (POE)



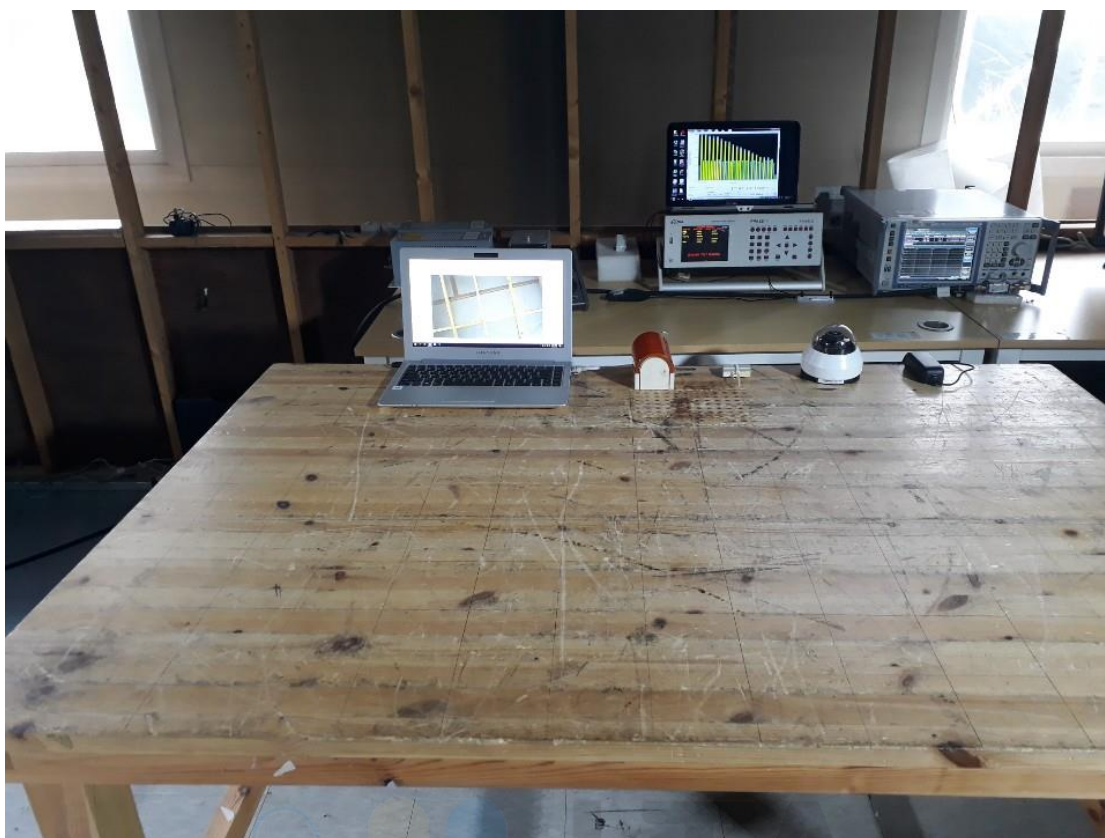
Radiated emission (Maximum emission configuration) – Above 1GHz / REC mode (DC)



Radiated emission (Maximum emission configuration) – Above 1GHz / REC mode (POE)



Harmonic Current / REC mode (DC)



Voltage Variation and Flicking / REC mode (DC)



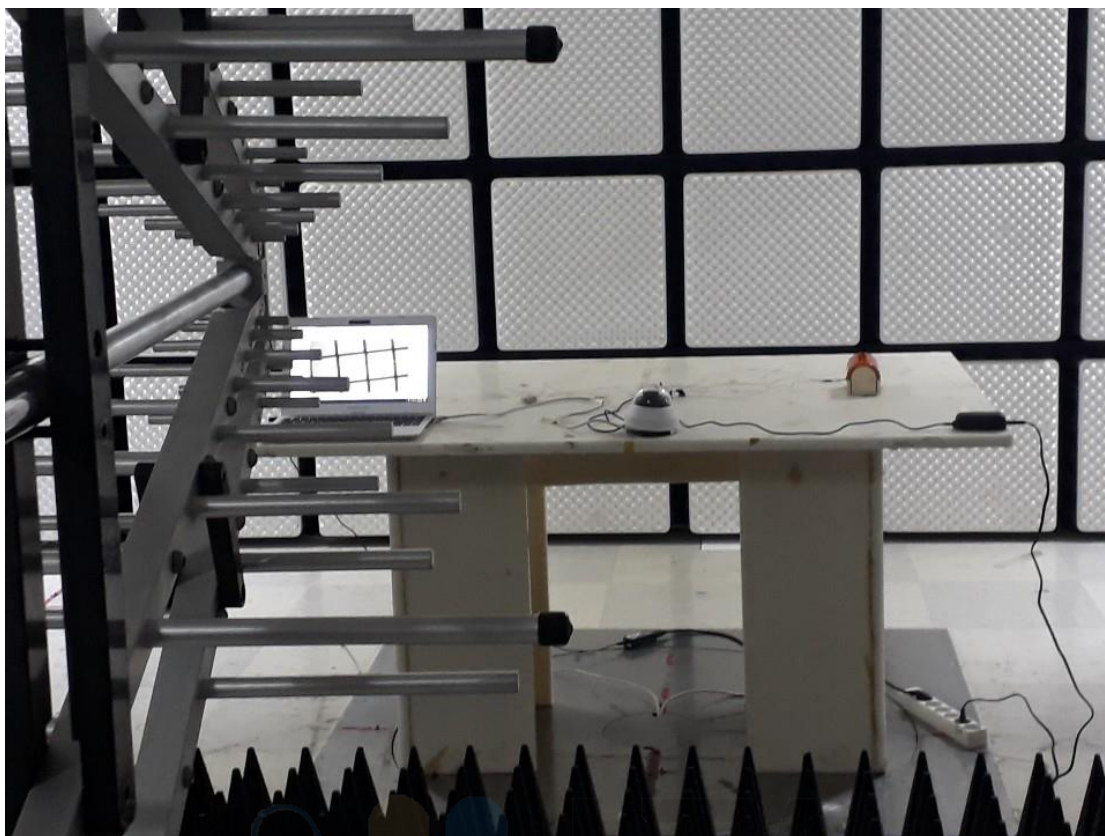
Electrostatic discharge / REC mode (DC)



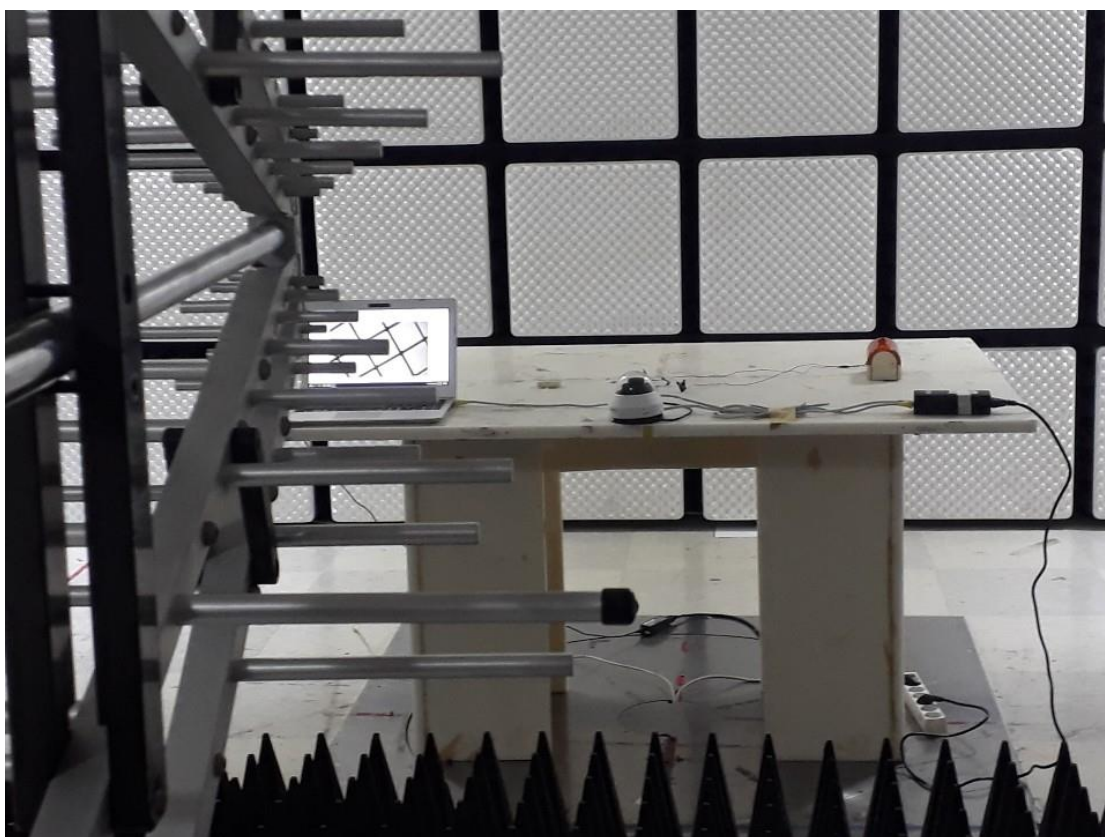
Electrostatic discharge / REC mode (POE)



RF Electromagnetic Field / REC mode (DC)



RF Electromagnetic Field / REC mode (POE)



Electrical fast transients / REC mode (DC)



Electrical fast transients / REC mode (POE)



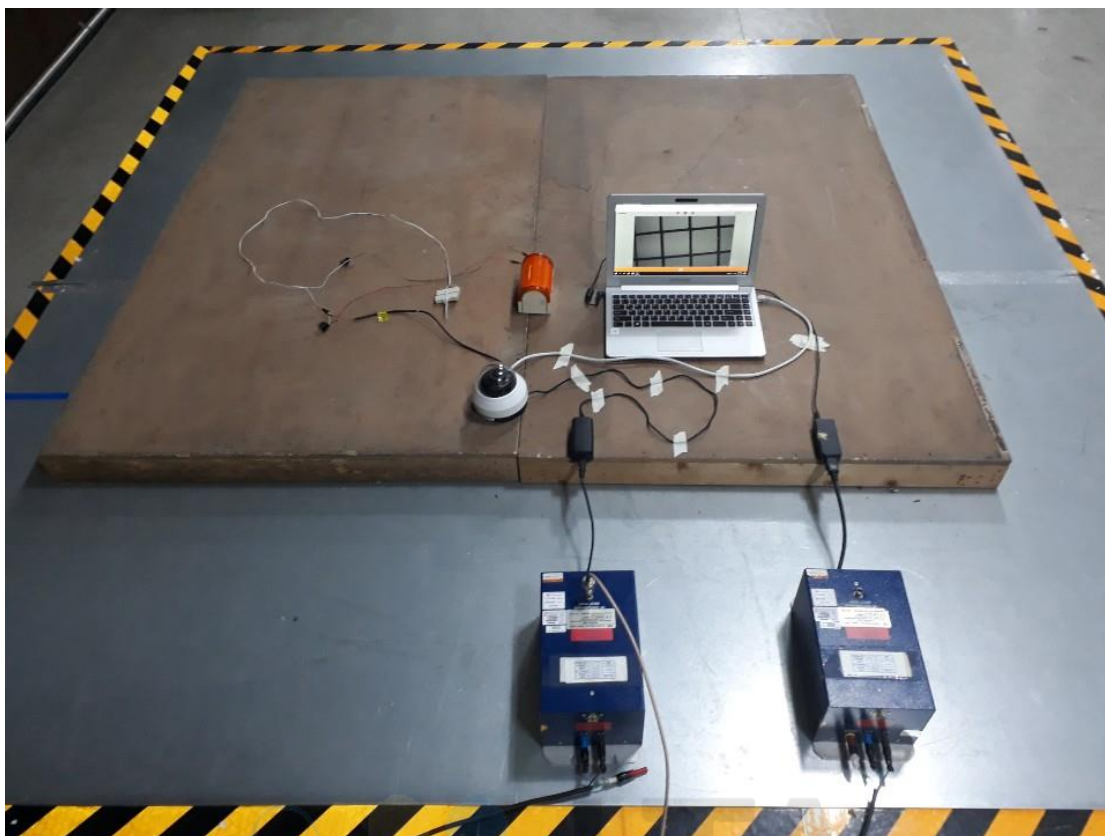
Surge / REC mode (DC)



Surge / REC mode (POE)



Conducted Disturbances, Induced by Radio-Frequency Fields / REC mode (DC)



Conducted Disturbances, Induced by Radio-Frequency Fields / REC mode (POE)



Main supply voltage dips, short interruptions / REC mode (DC)



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