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EMC TEST REPORT

Dates of Tests: October 23 - 26, 2017

Test Report S/N: LR500122302AC

Test Site : LTA Co., Ltd.

Model No.

SLA-T1080F

APPLICANT

Hanwha Techwin Co., Ltd.

Manufacturing Description : **LENS MODULE**
Manufacturer : **Hanwha Vision Co., Ltd**
Model name : **SLA-T1080F**
Additional model name : **-**
Test Device Serial No.: : **Identification**
Directive : **Electromagnetic Compatibility Directive 2014/30/EU,**
Regulations 2016/1091
Rule Part(s) : **EN 55032:2015/A11:2020**
EN 50130-4:2011/A1:2014

Data of reissue : **February 21, 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

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. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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



Revision	Date of issue	Test report No.	Description
0	27.10.2017	LR500121710O	Initial
1	25.05.2022	LR500122205U	Delete the country of manufacture (China) change. Rule & Directive Update
2	21.02.2023	LR500122302AC	Change company name and manufacturer name



TABLE OF CONTENTS

1. GENERAL INFORMATION'S	4
2. INFORMATION'S ABOUT TEST ITEM	5
3. TEST REPORT	6
3.1 SUMMARY OF TESTS	6
3.2 EMISSION	7
3.2.1 Disturbance Voltage at the mains terminals	7
3.2.2 Radiated disturbances	10
3.2.3 Harmonic Current Emissions	14
3.2.4 Voltage Fluctuations and Flicker	15
3.3 IMMUNITY	16
3.3.1 Electrostatic discharge.....	16
3.3.2 RF Electromagnetic Field	17
3.3.3 Electrical fast transients	18
3.3.4 Surge.....	19
3.3.5 Conducted Disturbances, Induced by Radio-Frequency Fields	20
3.3.6 Main supply voltage dips, short interruptions	21
3.3.7 Main supply voltage variations	22
 APPENDIX	
APPENDIX A TEST EQUIPMENT USED FOR TESTS	23
APPENDIX B PERFORMANCE CRITERIA	26
APPENDIX C MEASUREMENT UNCERTAINTY	29
APPENDIX D PHOTOGRAPH	32

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	2022-09-30	ECT accredited Lab.
RRA	KOREA	KR0049		RRA accredited Lab.
	U.S.A		2023-04-08	
	CANADA		2022-10-18	
VCCI	JAPAN	C-14948	2023-09-10	VCCI registration
		T-12416	2023-09-10	
		R-14483	2023-10-15	
		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 : +82-70-7147-8753(http://hanhwa-security.com)

Factory #1

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

Factory #2

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

2-2 Equipment Under Test (EUT)

Class : A
 Category : LENS MODULE
 Model name : SLA-T1080F
 Serial number : Identification
 Date of receipt : May 12, 2022
 EUT condition : Pre-production, not damaged
 Interface ports : POE
 Power rating : DC 5 V
 Firmware version : XXXX

2-3 Modification

-NONE

2-4 Model Specification

-NONE

2-5 Test conditions

Temp. / Humid. / Pressure : +(17 - 24) °C / (38 - 52) %RH / (99.0 - 99.4) kPa
 Tested Model : SLA-T1080F
 Test mode : Capture mode
 Power supply : AC 230 V / 50 Hz

2-6 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Network Camera	XNB-6001	N/A	HANWHA VISION VIETNAM COMPANY LIMITED D-TECH CO.,LTD.
Notebook	PP37L	N/A	DELL

3. Test Report

3.1 Summary of tests

Parameter	Applied Standard	Status
I. Emission		
Radiated Emission	EN 55032:2015/A11:2020	C
Conducted Emission	EN 55032:2015/A11:2020	C
Harmonic Current Emission	EN 61000-3-2:2014	NA ^{Note 4}
Voltage Fluctuations and Flicker	EN 61000-3-3:2013	NA ^{Note 5}
II. Immunity		
Electrostatic Discharge	EN 61000-4-2:2009	C
RF Electromagnetic field	EN 61000-4-3:2006/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	NA
RF common mode	EN 61000-4-6:2014	C
Voltage dips and Interruptions	EN 61000-4-11:2004	NA
Main supply voltage variations	EN 50130-4:2011	NA

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The device is operated by DC Power.

Note 3: The data in this test report are traceable to the national or international standards.

Note 4: We did not test EN61000-3-2 (Harmonic current emissions) for the **SLA-T1080F** because equipment whose rated power is less or equal 75W don't need to be tested.

Note 5: We did not test EN 61000-3-3 (Flicker) for the **SLA-T1080F** because of clause 6.1, this standard Predicate as follows: "Devices which produce no significant voltage dips or flicker with a certain probability have not 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 - 30MHz
Test method	: EN 55032:2015/A11:2020
Measurement RBW	: 9 kHz
Test mode	: Capture 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

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 / TEL



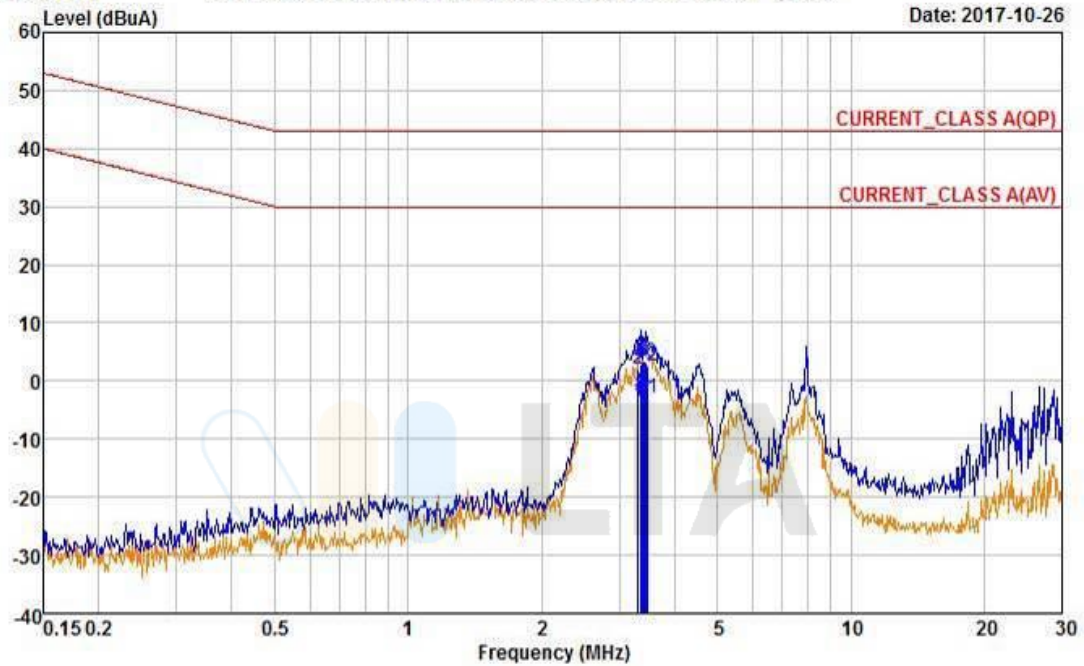
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EUT / Model No. : SLA-T1080F	Phase : POE
Test Mode : Capture mode	Test Power : 230 / 50
Temp. / Humi. : 24 / 38	Test Engineer : KANG H J

Data: 1875

File: D:\Conducted Data\2017\LTA_Conduction_2017_10.EM6 (1875)

Date: 2017-10-26



Freq	RD	RD	C.F	Result	Result	Limit	Limit	Margin	Margin
MHz	QP	AV		QP	AV	QP	AV	QP	AV
	dBuA	dBuA	dB	dBuA	dBuA	dBuA	dBuA	dB	dB
3.308	-17.58	-23.19	19.68	2.10	-3.51	43.02	30.02	40.92	33.53
3.347	-16.77	-22.29	19.69	2.92	-2.60	43.02	30.02	40.10	32.62
3.374	-16.55	-22.01	19.69	3.14	-2.32	43.02	30.02	39.88	32.34
3.402	-16.27	-21.73	19.69	3.42	-2.04	43.02	30.02	39.60	32.06
3.431	-16.45	-21.99	19.70	3.25	-2.29	43.02	30.02	39.77	32.31
3.481	-17.13	-22.56	19.70	2.57	-2.86	43.02	30.02	40.45	32.88

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 55032:2015/A11:2020
Measuring Distance	: 10m
Measurement Frequency range	: 30 MHz – 1 000 MHz
Measurement RBW	: 120 kHz
Test mode	: Capture mode
Result	: Complies

Measurement Data:

- Refer to the Next page (Maximum emission configuration)

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.: SLA-T1080F

Temp/Humi: 17 / 49

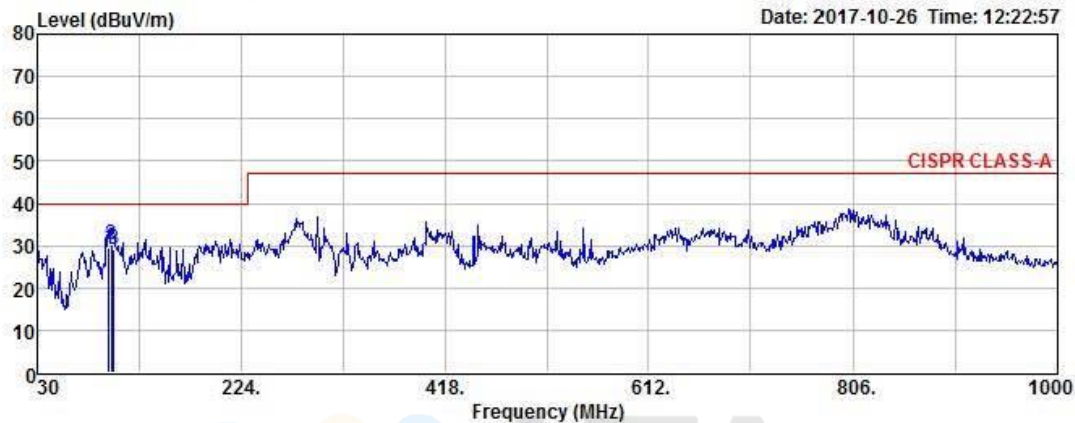
Test Mode : Capture mode

Tested by: KANG H J

Data: 1328

File: C:\Program Files (x86)\e3\1710-1.EM6 (1328)

Date: 2017-10-26 Time: 12:22:57



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
97.90	46.10	-16.81	29.29	40.00	10.71	100	147	VERTICAL
100.81	46.40	-16.24	30.16	40.00	9.84	106	84	VERTICAL
102.75	44.80	-15.83	28.97	40.00	11.03	102	221	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.: SLA-T1080F

Temp/Humi: 17 / 49

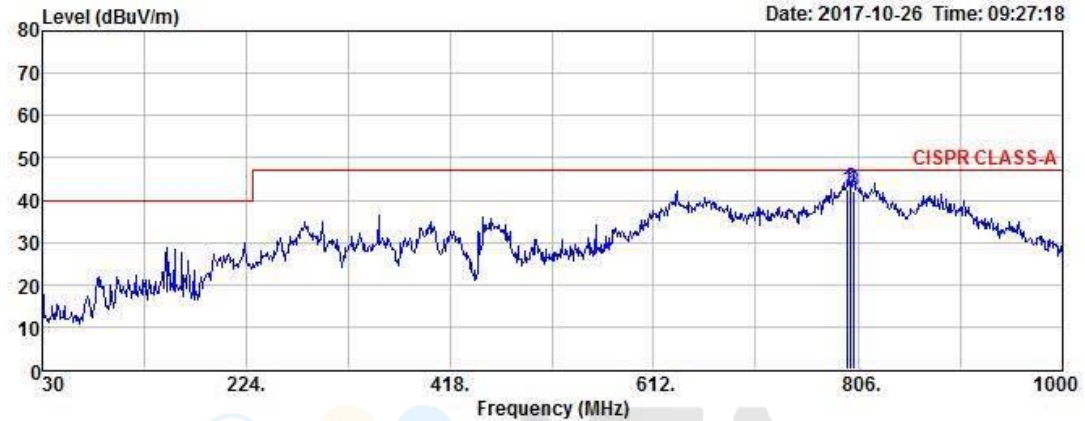
Test Mode : Capture mode

Tested by: KANG H J

Data: 1301

File: C:\Program Files (x86)\e3\1710-1.EM6 (1301)

Date: 2017-10-26 Time: 09:27:18



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
795.33	43.70	-1.10	42.60	47.00	4.40	125	59	HORIZONTAL
798.24	43.90	-1.06	42.84	47.00	4.16	100	65	HORIZONTAL
801.15	43.31	-1.03	42.28	47.00	4.72	124	60	HORIZONTAL

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

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.

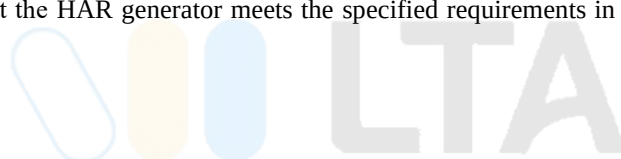
Test method	: EN 61000-3-2:2014
Test mode	: Capture mode
Rated power	: - W
Result	: Not Applicable

Measurement Data:

- We did not test EN61000-3-2 (Harmonic current emissions) for the **SLA-T1080F** because equipment whose rated power is less or equal 75W don't need to be tested.

- Uncertainty(HAR) = +/- 2.24 % (with a 95 % confidence level, k=2)

“It has been demonstrated that the HAR generator meets the specified requirements in the standard with at least 95 % confidence.”



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.

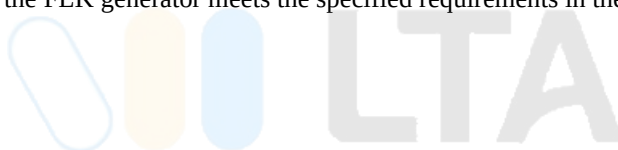
Test method	: EN 61000-3-3:2013
Test mode	: - W
Result	: Not Applicable

Measurement Data:

- We did not test EN 61000-3-3 (Flicker) for the **SLA-T1080F** because of clause 6.1, this standard Predicate as follows:
“Devices which produce no significant voltage dips or flicker with a certain probability have not to be tested.”

- Uncertainty(FLK) = +/- 9.94 % (with a 95 % confidence level, k=2)

“It has been demonstrated that the FLK generator meets the specified requirements in the standard with at least 95 % confidence.”



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 method	:	EN 61000-4-2 :2009
Temperature / Humidity / Pressure	:	20 °C / 52 %RH / 99.2 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	:	Capture mode
Result	:	Complies

Measurement Data:

- Uncertainty(ESD) = +/- 5 % (with a 95 % confidence level, k=2)

“It has been demonstrated that the ESD generator meets the specified requirements in the standard with at least 95 % confidence.”

Criteria for compliance:

- There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the application of the discharges 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.

1-2. 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	LENS	Air	Complies	No reaction recognized
3	POE	Air	Complies	No reaction recognized

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 method	: EN 61000-4-3:2006/A2:2010
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	: Capture mode
Result	: Complies

Measurement Data:

- Uncertainty = +/- 1.6dB (with a 95 % confidence level, k=2.28)

“It has been demonstrated that the RS generator meets the specified requirements in the standard with at least 95 % confidence.”

Port	Test level (V/m)	Result		Remark
		Horizontal	Vertical	
Enclosure	10	Complies	Complies	No reaction recognized

Criteria for compliance:

- 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 indications 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.
 - a) There is no permanent damage or change to the EUT.
 - b) At 3 V/m, any deterioration of the picture is so minor that the system could still be used.
 - c) There is no observable deterioration of the picture at 1 V/m

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 method	: EN 61000-4-4:2012
Cable length	: > 3 m
Test level	: 1.0 kV (Signal port)
Polarity	: Negative/ positive
Repetition frequency	: 100 kHz
Test mode	Capture mode
Result	: Complies

Measurement Data:

- Uncertainty = +/- 10 % (with a 95 % confidence level, k=2)

“It has been demonstrated that the EFT/Burst generator meets the specified requirements in the standard with at least 95 % confidence.”

Criteria for compliance:

- There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the application of the discharges 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.

Signal Line	Test level	Result	Remarks
POE	+ 1 kV	Complies	No reaction recognized
	- 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 method	: EN 61000-4-5:2014
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 μ s pulse
Number of surges	: 5 (at each phase)
Test mode	- mode
Result	: Not Applicable

Measurement Data:

- Uncertainty = +/- 10 % (with a 95 % confidence level, k=2)

“It has been demonstrated that the Surge generator meets the specified requirements in the standard with at least 95 % confidence.”

Criteria for compliance:

- There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the application of the discharges 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.

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 method	: EN 61000-4-6:2014
Frequency range	: 0.15MHz – 100 MHz
Test level	: 10 Vrms unmodulated
Amplitude Modulation	: AM, 80 %, 1 kHz Sinusoidal
Step size	: 1 % of fundamental.
Test mode	: Capture mode
Result	: Complies

Measurement Data:

- Uncertainty = +/-1.25 dB (with a 95 % confidence level, k=2)

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

Criteria for compliance:

- 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 $U_0 = 130$ dBuV.
- For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at $U_0 = 140$ dBuV.
 - a) There is no permanent damage or change to the EUT.
 - b) At $U_0 = 130$ dBuV, any deterioration of the picture is so minor that the system could still be used.
 - c) There is no observable deterioration of the picture at $U_0 = 120$ dBuV

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 method	: EN 61000-4-11:2004
Ut	: 230 Vac
Test mode	: - mode
Result	: Not Applicable

Measurement Data:

- Uncertainty = +/- 5 % (with a 95 % confidence level, k=2)

“It has been demonstrated that the Voltage dips generator meets the specified requirements in the standard with at least 95 % confidence.”

Test Level %Ut	Voltage droop and interruptions %Ut	Duration of Reduction (period)	Result	Remarks
80	20	250	-	-
70	30	25	-	-
40	60	10	-	-
0	100	250	-	-

Criteria for compliance:
- Mains supply voltage variations

There shall be no damage, malfunction or change of status due to the different supply voltage conditions.

- Mains supply voltage dips and short interruptions

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.

During the 250 period power loss, in accordance with the standard, a UPS was used to maintain full operation of the unit.

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 method	: EN 50130-4 Clause 7
Supply Voltage maximum	: $U_{nom} + 10\%$
Supply Voltage minimum	: $U_{nom} - 15\%$
Ut	: 230 Vac
Test mode	: - mode
Result	: Not Applicable

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
Unom	+10%	253	-	-
Unom	-15%	195.5	-	-

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	2018.07.11	1 year
☒	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100710	2018.03.20	1 year
☐	ISN	ISN T800	TESEQ	27109	2018.01.25	1 year
☐	ISN	ENY81-CA6	Rohde & Schwarz	101565	2018.01.25	1 year
☒	CURRENT PROBE	EZ-17	Rohde & Schwarz	100508	2018.01.25	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	100378	2018.09.07	1 year
☐	LISN(main)	ENV216	Rohde & Schwarz	100408	2018.09.07	1 year
☒	LISN(sub)	KNW-407	Kyoritsu	8-1430-1	2018.09.07	1 year
☒	TEST PROGRAM	e3_Ver: 5.5.201a	AUDIX	-	-	-

Radiated Emission – Below 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESCI7	Rohde & Schwarz	100772	2018.09.07	1 year
☒	Amplifier (25 dB)	8447D	HP	2944A07974	2018.09.07	1 year
☒	TRILOG Antenna	VULB9160	SCHWARZBECK	9160-3237	2019.05.16	2 year
☒	TEST PROGRAM	e3_Ver: 6.2009-10-12a	AUDIX	-	-	-

Electrostatic Discharge

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	ESD Slimulator	ESS-2000	NOISEKEN	ESS0625187	2018.04.04	1 year

RF Electromagnetic Field

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	Signal Generator	E4432B	Agilent	MY41310632	2018.05.22	1 year
☒	Power Meter	E4419B	Agilent	GB38410133	2018.06.09	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	NX5	EMTEST	P1640185038	2018.03.21	1 year
☒	AC Power Source	Variac NX1-260-16	EMTEST	P1648188071	2018.03.21	1 year
☒	Capacitive Coupling Clamp	CCI	EMTEST	P1703190739	2018.03.21	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	2018.03.20	1 year
☒	POWER METER	NRVD	R&S	101689	2018.03.20	1 year
☒	RF Power Amplifier	FLL75A	FRANKONIA	1033	-	-
☒	EM INJECTION CLAMP	TSIC-23	F.C.C	529	2018.06.12	1 year
☐	CDN (M1)	TSCDN-M1-16A	F.C.C	07004	2018.09.07	1 year
☒	CDN (M2)	TSCDN-M2-16A	F.C.C	07008	2018.09.07	1 year
☒	CDN (M3)	TSCDN-M3-16A	F.C.C	07017	2018.09.07	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 / Voltage variation

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.

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

Measurement Uncertainty

1. Conducted Emission

2. Radiated Emission



1. Conducted Emission

Input Quantity	Probability Distribution	Probability Distribution (dB)	Standard
		9 kHz – 30 MHz	
Cable loss(RG400)	Standard Deviation(SD)	± 0.061	10 th measurement
Receiver corrections; -Sine wave voltage -Pulse amplitude response -Pulse repetition rate response	Rectangular ($\sqrt{3}$) Rectangular ($\sqrt{3}$) Rectangular ($\sqrt{3}$)	± 0.17 ± 0.02 ± 0.58	Cal. Report Cal. Report Cal. Report
LISN corrections (ENV216) ; -Voltage division factor	Normal (k = 2)	± 0.09	Cal. Report
Mismatch ; - Receiver VRC* : $\Gamma_i = 0.09$ -LISN VRC : $\Gamma_g = 0.14(150\text{kHz})$ = $0.05(30\text{MHz})$ - Uncertainty: $20\log(1 \pm \Gamma_i \Gamma_g)$	U-type($\sqrt{2}$)	± 0.89	Cal. Report
System Repeatability	Standard Deviation(SD)	± 0.28	10 th measurement
Combined measurement uncertainty Uc(y)	Normal	+ 0.73 - 0.73	
Expended measurement uncertainty (95%,Confidence level,k = 2)dB	Normal(k = 2)	+ 1.46 - 1.46	

2. Below 1 GHz Radiated Emission

Input Quantity	Probability Distribution	Probability Distribution (dB)		Standard
		Trilog		
		3m	10m	
Antenna Factor (VULB 9160)	Normal (k = 2)	30 MHz – 1 GHz	30 MHz – 1 GHz	ANT Cal. uncertainty
		± 2.00	± 2.00	
Cable loss (HFB-5010/HFC12D)	Standard Deviation(SD)	± 0.14	± 0.14	10 th measurement
Receiver corrections; -Sine Wave Voltage	Normal (k = 2)	± 0.17	± 0.17	Cal. Report Cal. Report CISPR16-4-2
-Pulse amplitude response	Normal (k = 2)	± 0.58	± 0.58	
-Pulse repetition rate response	Rectangular(√ 3)	± 1.50	± 1.50	
Antenna Directivity	Rectangular(√ 3)	± 1.00	± 1.00	CISPR16-4-2
AF Height Dependence	Rectangular(√ 3)	± 0.10	± 0.10	CISPR16-4-2
Phase Center Location	Rectangular(√ 3)	± 0.20	± 0.20	CISPR16-4-2
Separation Distance	Rectangular(√ 3)	± 0.30	± 0.30	CISPR16-4-2
Uncertainty of Site	Triangular(√ 6)	± 2.97	± 2.97	NSA
Mismatch ; - Receiver VRC* : Γi = 0.09 -ANT. VRC : Γg = 0.09 - Uncertainty: 20log(1± Γi Γg)	U-type (√ 2)	± 0.54	± 0.54	CISPR16-4-2
Pre-amp.	Normal (k = 2)	± 0.14	± 0.14	Cal. Report
System Repeatability	Standard Deviation(SD)	± 0.60	± 0.60	10 th measurement
Combined measurement uncertainty Uc(y)	Normal	+ 1.97 - 1.97	+ 1.97 - 1.97	
Expended measurement uncertainty (95%,Confidence level,k=2)dB	Normal(k = 2)	30 MHz – 1 GHz + 3.94 - 3.94	30 MHz – 1 GHz + 3.94 - 3.94	

Note:VRC(Voltage Reflection Coefficient)

3. Above 1 GHz Radiated Emission

Input Quantity	Probability Distribution	Probability Distribution (dB)	Standard
		HORN	
Antenna Factor (ETS 3115)	Normal (k=2) (normal)	1 GHz - 6 GHz ± 1.00	ANT Cal. uncertainty
Cable loss (SUHNER MULTIFLEX microwave cables)	Standard Deviation(SD)	± 0.32	10 th measurement
Receiver corrections; -Sine Wave Voltage -Pulse amplitude response -Pulse repetition rate response	Normal (k = 2) Normal (k = 2) Rectangular(√ 3)	± 0.17 ± 0.58 ± 1.50	Cal. Report Cal. Report CISPR16-4-2
Antenna Directivity	Rectangular(√ 3)	± 1.00	CISPR16-4-2
AF Height Dependence	Rectangular(√ 3)	± 0.10	CISPR16-4-2
Phase Center Location	Rectangular(√ 3)	± 0.20	CISPR16-4-2
Separation Distance	Rectangular(√ 3)	± 0.30	CISPR16-4-2
Uncertainty of Site	Standard Deviation(SD)	± 0.13	SVSWR 10 th measurement
Mismatch ; - Receiver VRC* : $\Gamma_i = 0.09$ -ANT. VRC : $\Gamma_g = 0.09$ - Uncertainty: $20\log(1 \pm \Gamma_i \Gamma_g)$	U-type (√ 2)	± 0.54	CISPR16-4-2
Pre-amp.	Normal (k = 2)	± 0.60	Cal. Report
System Repeatability	Standard Deviation(SD)	± 0.34	10 th measurement
Combined measurement uncertainty $U_c(y)$	Normal	+ 1.73 - 1.73	
Expended measurement uncertainty (95%,Confidence level,k=2)dB	Normal(k = 2)	1 GHz - 6 GHz + 3.46 - 3.46	

Note:VRC(Voltage Reflection Coefficient)

APPENDIX D

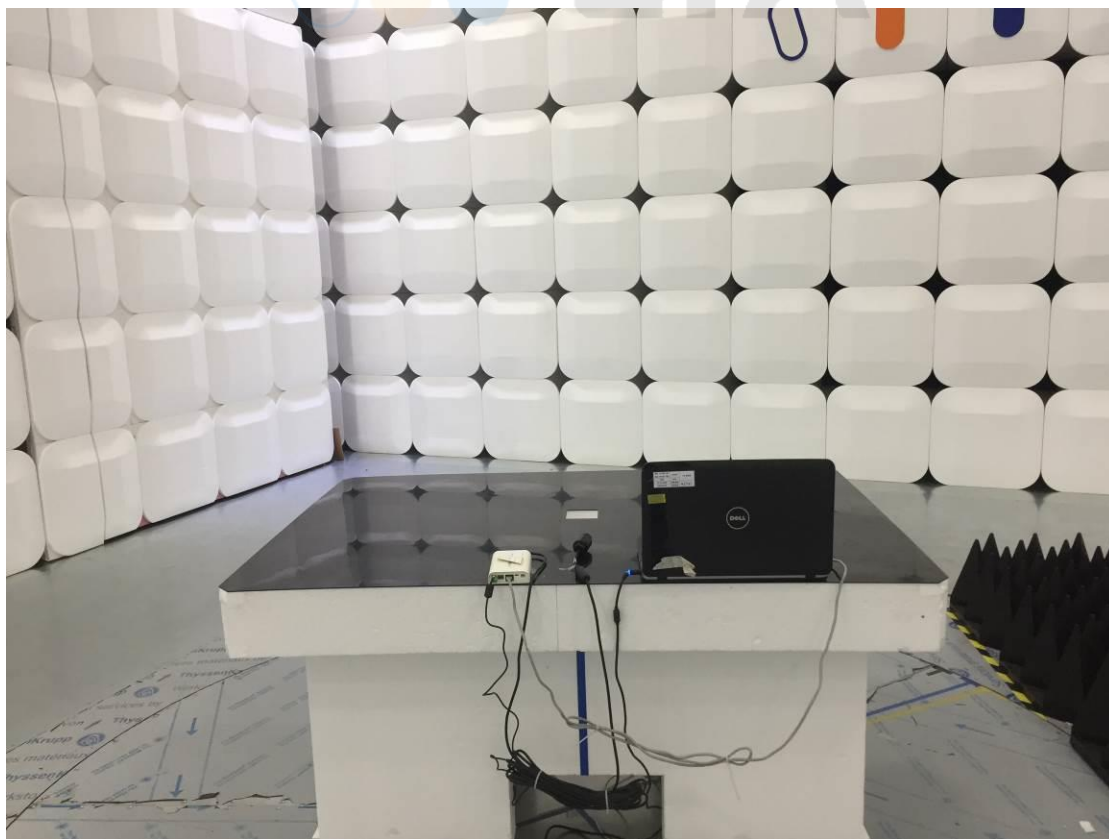
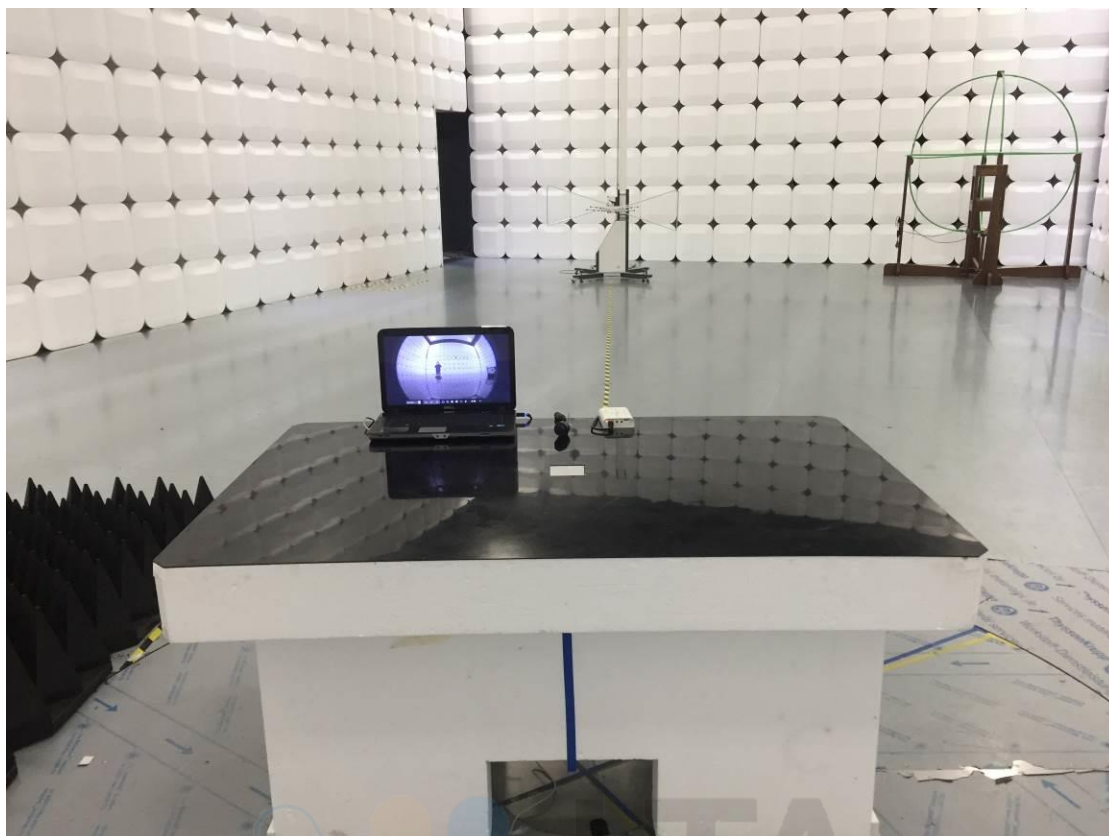
PHOTOGRAPHS



Conducted emission (Maximum emission configuration)



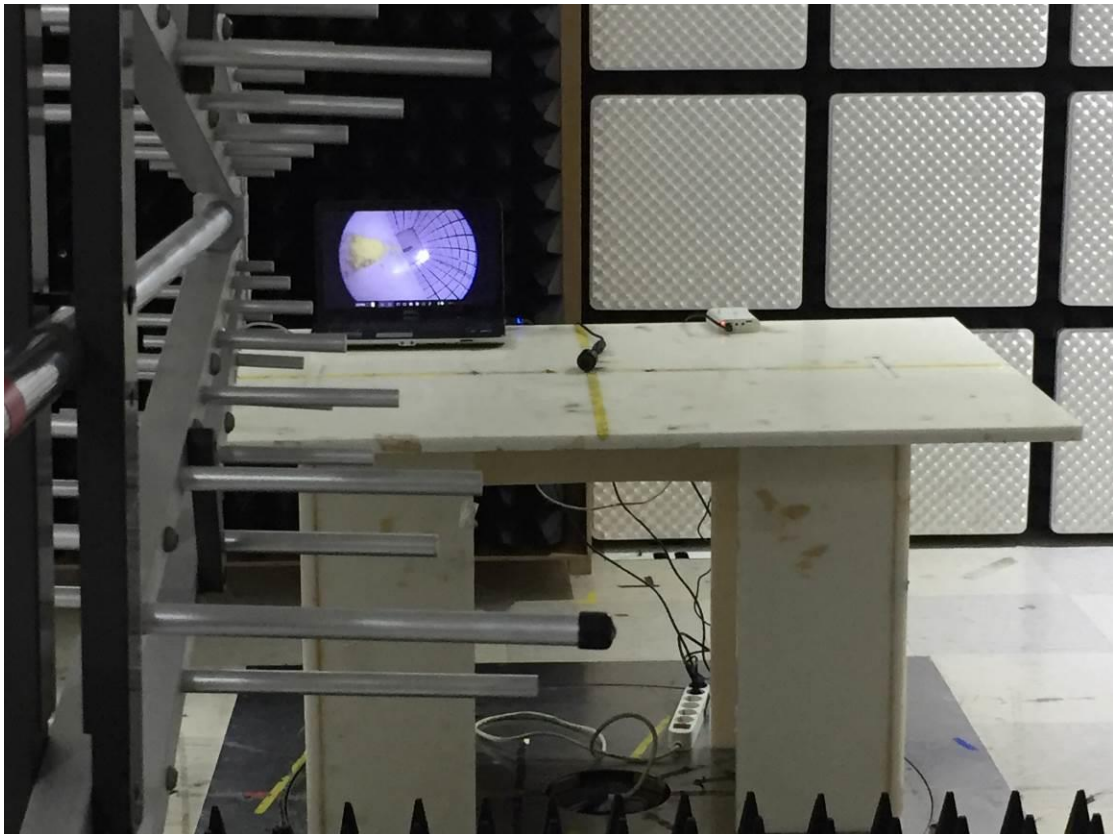
Radiated emission (Maximum emission configuration)-Below 1 GHz



Electrostatic discharge



RF Electromagnetic Field



Electrical fast transients



Conducted Disturbances, Induced by Radio-Frequency Fields



EUT

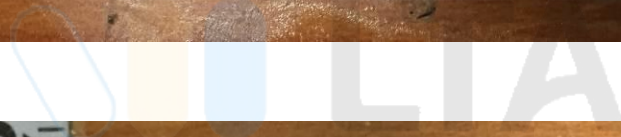


EUT



EUT





EUT

