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EMC TEST REPORT

Dates of Tests: April 11 - 16, 2019
Test Report S/N: LR500121904AC
Test Site : LTA Co., Ltd.

Model No.

QND-8021

APPLICANT

Hanwha Techwin Co., Ltd.

Equipment Name : NETWORK CAMERA
Manufacturer : Hanwha Techwin (Tianjin) Co., Ltd.
Model name : QND-8021
Additional Model name : QND-8011
Test Device Serial No.: : Identification
Rule Part(s) : AS/NZS CISPR 32:2015
CISPR 32 Ed2.0

Date of issue : April 16, 2019

This test report is issued under the authority of:

The test was supervised by:

Young Kyu Shin, Technical Manager

Joo Hyung Cho, 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.



NVLAP LAB CODE 200723-0

Revision	Date of issue	Test report No.	Description
0	16.04.2019	LR5001121904AC	Initial

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1. General information's

1-1 Test Performed

Company name : **LTA Co., Ltd (KR0049)**
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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	Updating	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-2	2019-06-15	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 Techwin 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 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
 Category : NETWORK CAMERA
 Model name : QND-8021
 Additional Model name : QND-8011
 Additional Model is different only lens specification.
 Serial number : Identification
 Date of receipt : April 04, 2019
 EUT condition : Pre-production, not damaged
 Interface Ports : LAN
 Power rating : DC 48 V
 Firmware version : xxxx

2-3 Modification

-NONE

2-4 Test conditions

Temp. / Humid. / Pressure : (22 - 23) °C / (35 - 36) % R.H.
 Tested Model : QND-8021
 Play mode : Play mode
 Tested Voltage : DC 48 V

2-5 EUT

Equipment	Model No.	Serial No.	Manufacturer
NETWORK CAMERA	QND-8021	ZMME70GM400003T	Hanwha Techwin (Tianjin) Co., Ltd.

2-6 Accessary

Equipment	Model No.	Serial No.	Manufacturer
Notebook	Lenovo G500	CD24530393	Lenovo
Notebook Adapter	ADLX65NCC3A	N/A	Lenovo
POE Injector	MPSE-4803E	N/A	MOA TELECOM

2-8 Cable List

From		To		Length (m)	Shielding	
Type	I/O Port	Type	I/O Port		Cable	backshell
EUT	LAN	POE Injection	LAN	3.0	NO	Plastic
POE Injection	LAN	Notebook	LAN	3.0	NO	Plastic
	AC IN	AC Power Source	3 Pin AC Line	1.4	NO	Plastic
Notebook	DC IN	Notebook Adapter	DC OUT	1.4	NO	Plastic
Notebook Adapter	AC IN	AC Power source	3 Pin AC Line	1.0	NO	Plastic

3. Test Report

3.1 Summary of tests

Parameter	Applied Standard	Status
I. Emission		
Conducted Emission	AS/NZS CISPR32:2015	C
Radiated Emission	AS/NZS CISPR32:2015	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.

3.2 EMISSION

3.2.1 Conducted emissions

Definition:

The test assesses the ability of the EUT to limit its internal noise from being present on the AC mains Power In/Output/Telecommunication ports.

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

Test method	: AS/NZS CISPR32:2013
Measurement Frequency range	: 150 kHz - 30 MHz
Measurement RBW	: 9 kHz
Test mode	: Play mode
Result	: Complies

Measurement Data:

- Refer to the Next page (Maximum emission configuration)

A sample calculation:

COR. F (correction factor)= LISN Insertion loss + Cable loss + Pulse Limiter Factor

Emission Level= meter reading + COR.F

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

Frequency Range	Quasi-peak	Average
(0.15 - 0.5) MHz	79 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 100 M)



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EUT /Model No. : QND-8021

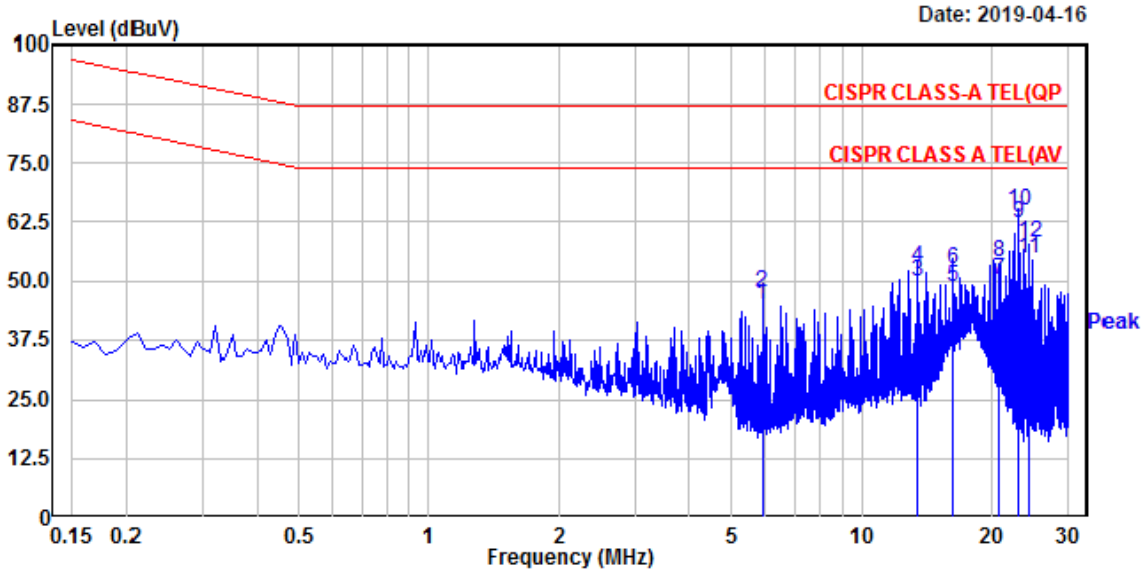
Phase : TEL_100M

Test Mode : Play mode

Test Power : 240 / 50

Temp./ Humi. : 22°C / 35% R.H.

Test Engineer : CHO J H



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
5.909	28.03	25.48	19.49	47.52	44.97	87.00	74.00	39.48	29.03
13.420	33.33	29.99	19.68	53.01	49.67	87.00	74.00	33.99	24.33
16.230	32.68	28.84	19.76	52.44	48.60	87.00	74.00	34.56	25.40
20.809	34.02	30.29	19.90	53.92	50.19	87.00	74.00	33.08	23.81
23.130	44.78	42.18	19.97	64.75	62.15	87.00	74.00	22.25	11.85
24.350	37.97	34.79	20.02	57.99	54.81	87.00	74.00	29.01	19.19

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	: AS/NZS CISPR32:2013
Measuring Distance	: 10 m for below 1 GHz
Measurement Frequency range	: 30 MHz – 1 000 MHz
Measurement RBW	: 120 kHz @ 10 m
Test mode	: Play 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 only 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 (dB μ V/m)	Peak limit @ 3m (dB μ V/m)
(1 000 – 3 000) MHz	56	76
(3 000 – 6 000) MHz	60	80
NOTE:	The lower limit applies at the transition frequency.	

CLASS B

Frequency Range	Average Limit @ 3m (dB μ V/m)	Peak limit @ 3m (dB μ V/m)
(1 000 – 3 000) MHz	50	70
(3 000 – 6 000) MHz	54	74
NOTE:	The lower limit applies at the transition frequency.	

Radiated Emission (Below 1 GHz) / V



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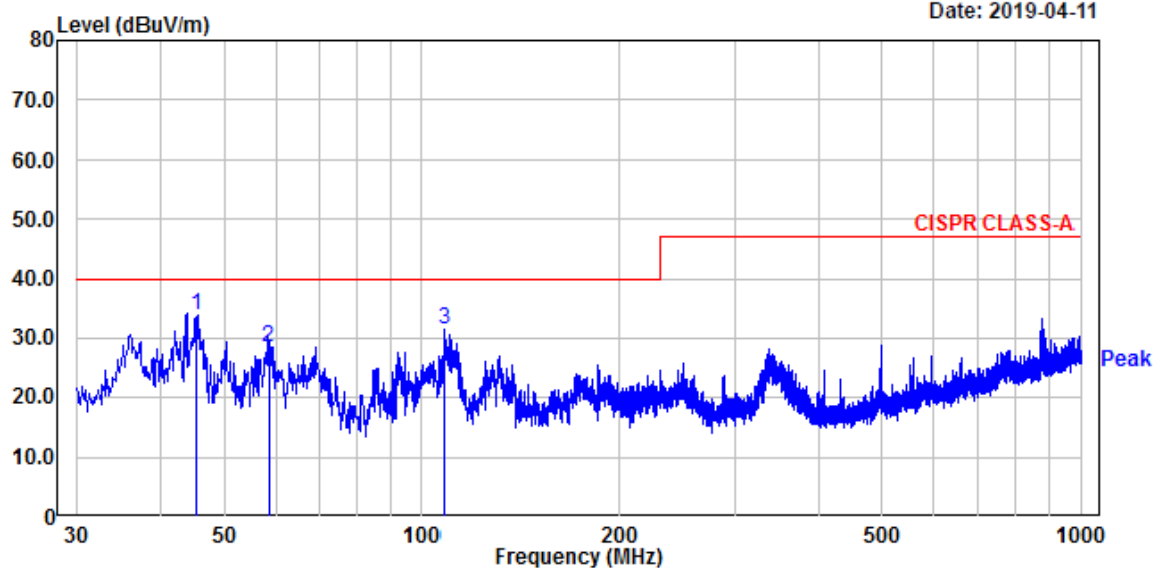
EUT/Model No.: QND-8021

Temp/Humi: 23 / 36

Test Mode : Play mode

Tested by: CHO J H

Date: 2019-04-11



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
45.25	46.35	-12.63	33.72	40.00	6.28	100	30	vertical
58.49	41.18	-12.89	28.29	40.00	11.71	110	15	vertical
108.81	46.63	-15.21	31.42	40.00	8.58	140	126	vertical

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

Radiated Emission (Below 1 GHz) / H



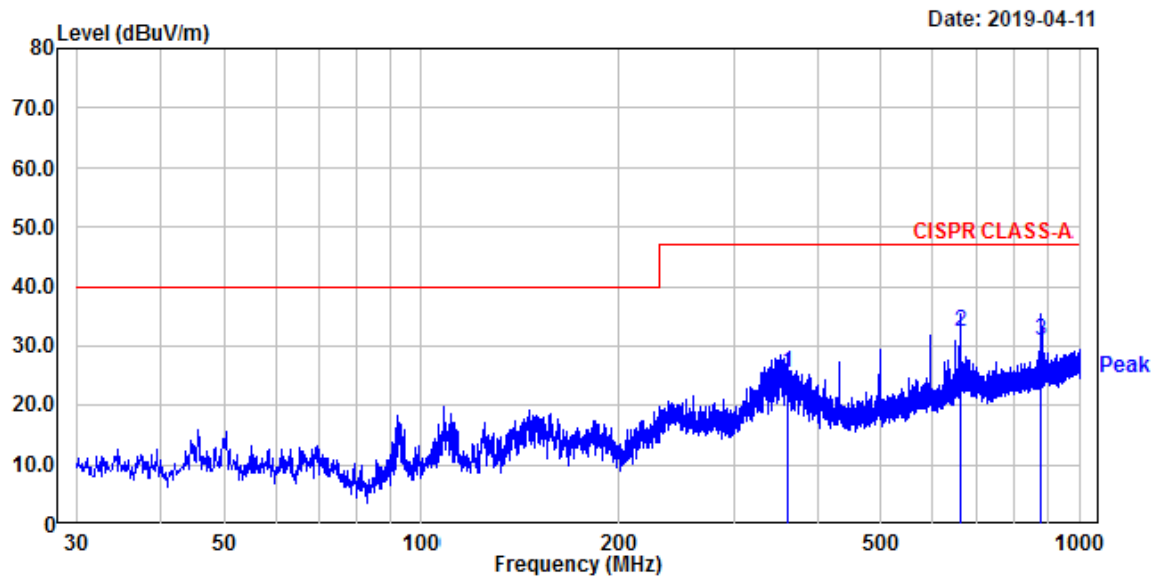
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EUT/Model No.: QND-8021

Temp/Humi: 23 / 36

Test Mode : Play mode

Tested by: CHO J H



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
360.57	34.28	-8.99	25.29	47.00	21.71	400	40	horizontal
660.04	35.43	-3.02	32.41	47.00	14.59	397	243	horizontal
879.23	30.40	0.50	30.90	47.00	16.10	400	229	horizontal

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

Radiated Emission (Above 1 GHz)



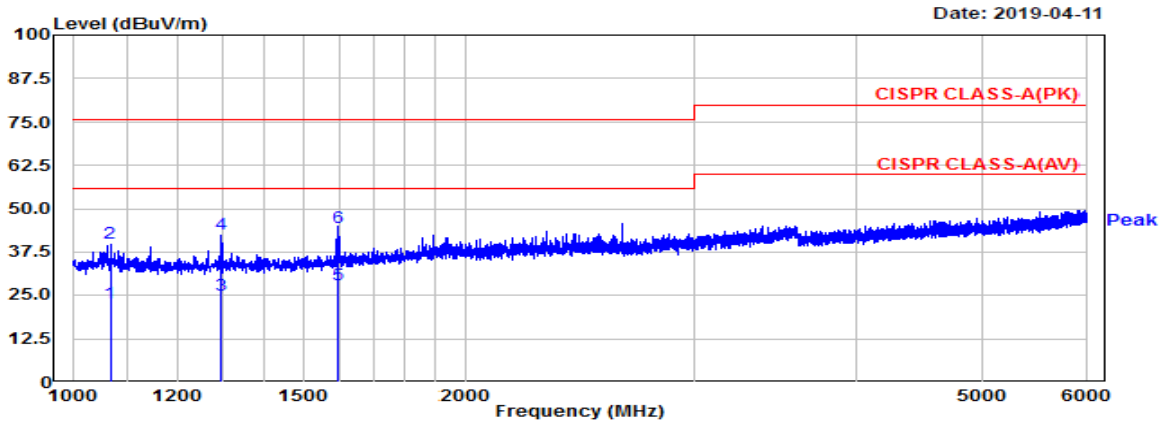
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EUT/Model No.: QND-8021

Temp/Humi: 23 / 36

Test Mode : Play mode

Tested by: CHO J H

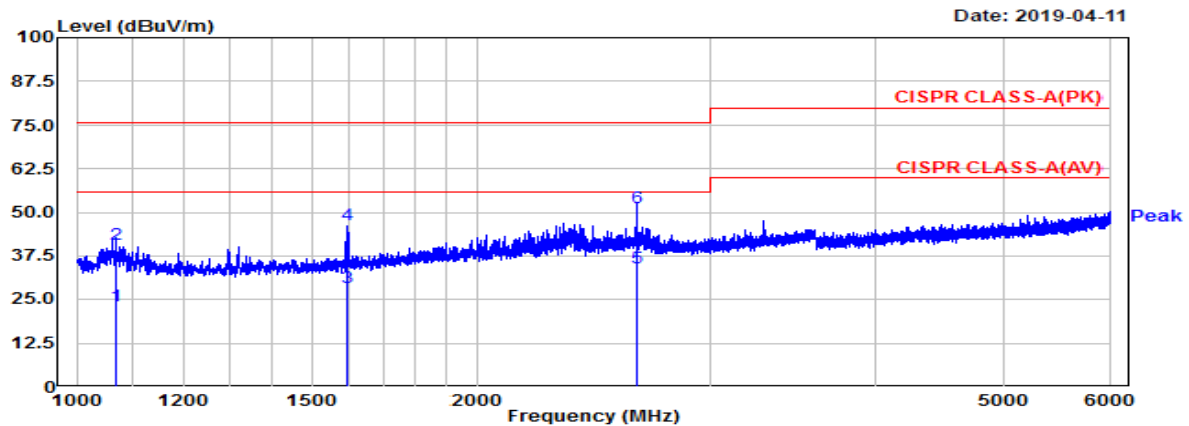


EUT/Model No.: QND-8021

Temp/Humi: 23 / 36

Test Mode : Play mode

Tested by: CHO J H



Manufacture : Hanwha Techwin (Tianjin) Co., Ltd

Test Date

Temp.: [°C]

Humidity: [%]

Distance (m)

Model : QND-8021

2019-04-11

23

36

3.8

TEST mode : Play mode

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 Hor/Ver
1067.4	49.2	31.7	-6.99	42.22	24.72	76.0	56.0	33.78	31.28	100	97	H
1296.3	50.1	32.4	-5.49	44.59	26.89	76.0	56.0	31.41	29.11	100	289	H
1598.8	50.2	33.5	-3.62	46.57	29.87	76.0	56.0	29.43	26.13	100	358	H
1068.8	49.7	32.1	-6.93	42.72	25.12	76.0	56.0	33.28	30.88	100	217	V
1597.5	51.6	33.3	-3.08	48.56	30.26	76.0	56.0	27.44	25.74	100	232	V
2639.4	50.6	33.1	2.87	53.51	36.01	76.0	56.0	22.49	19.99	100	335	V

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 Disturbance Measurements

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESCI7	Rohde & Schwarz	100772	2019.09.06	1 year
☒	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100710	2020.03.16	1 year
☒	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
☐	LISN	ESH3-Z6	Rohde & Schwarz	100378	2019.09.07	1 year
☒	LISN	ENV216	Rohde & Schwarz	100408	2019.10.10	-
☒	LISN	LT32C/10	AFJ	32031518210	2019.09.06	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	101468	2019.09.07	1 year
☒	TEST PROGRAM	e3_ce 20181212a (V9)	AUDIX	-	-	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	-	-	-

APPENDIX B

PERFORMANCE CRITERIA

Performance criterion A:

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B:

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as untended.

Performance criterion C:

Loss of function is allowed, provided the function is self-recoverable or can be restored by the operating of the controls by the user In accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

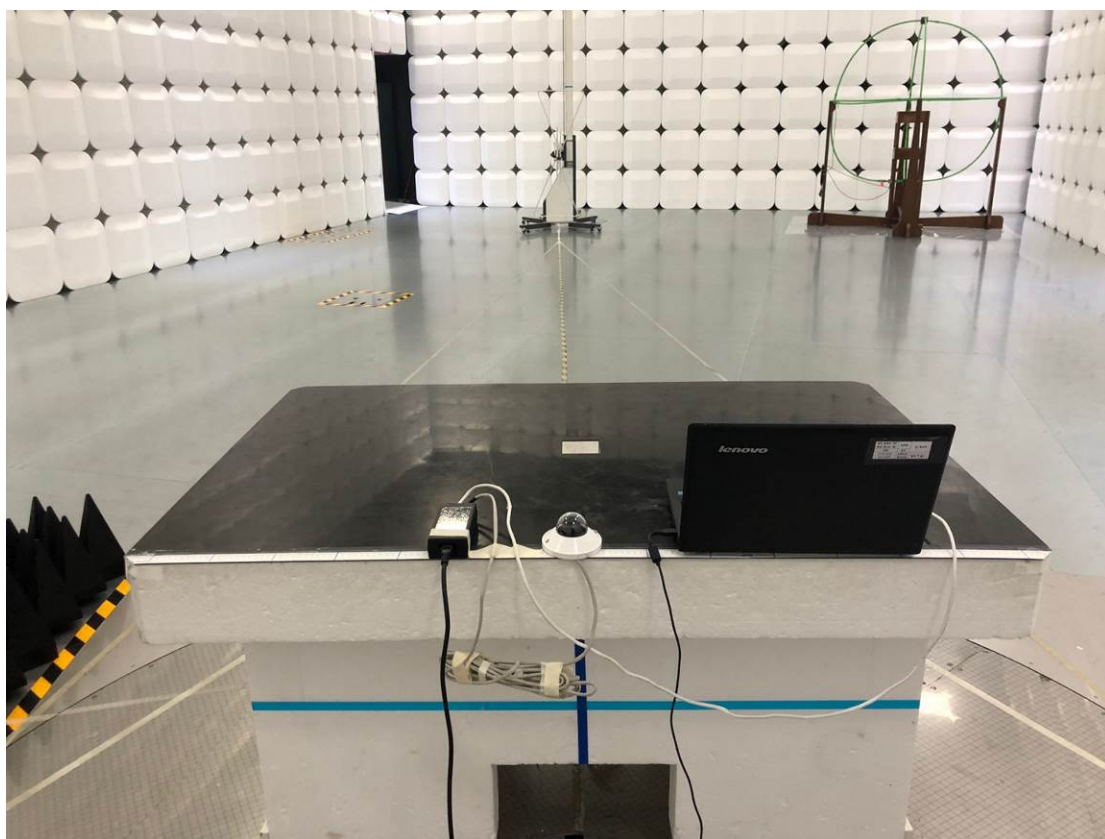
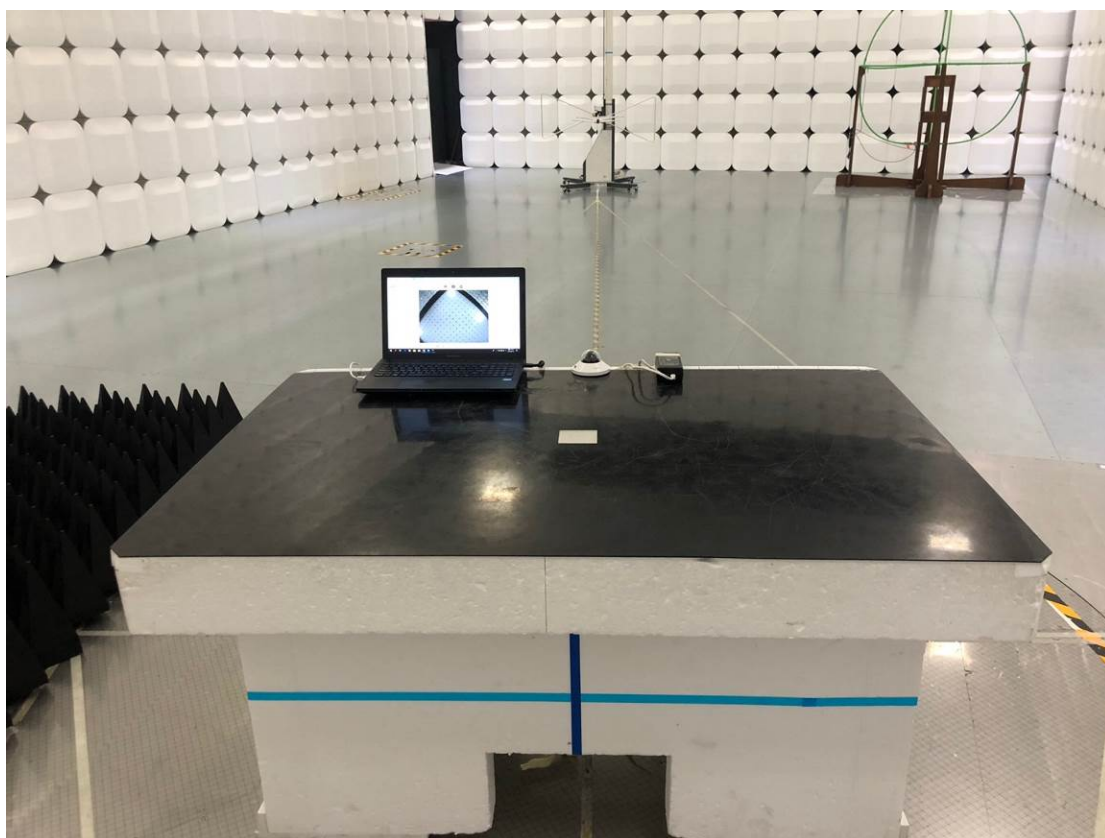
APPENDIX C

PHOTOGRAPHS

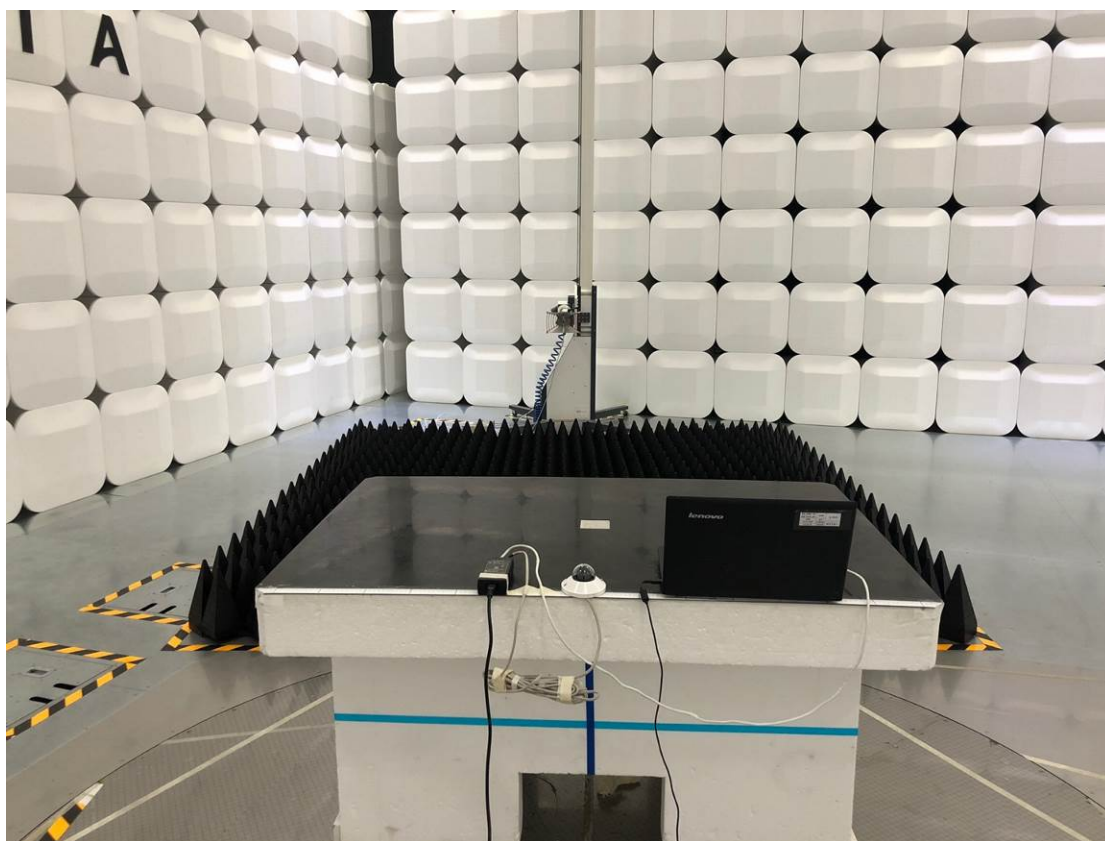
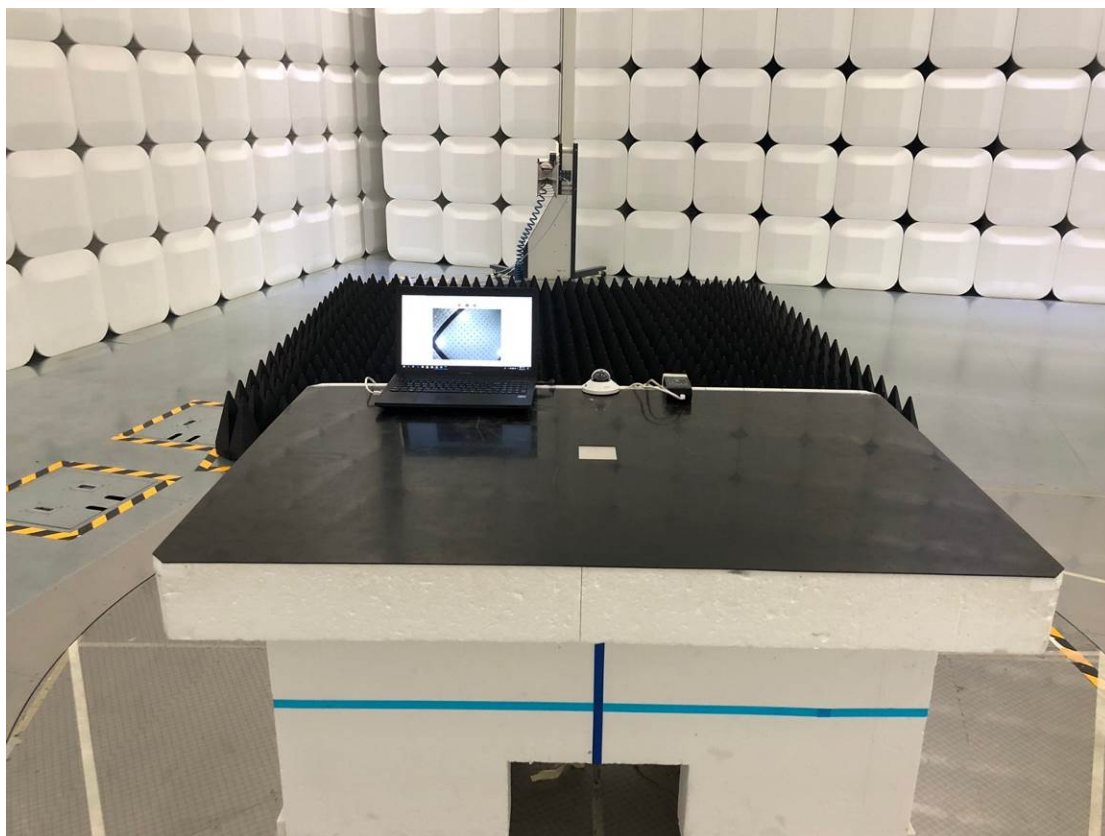
Conducted emissions (TEL)



Radiated emission (Maximum emission configuration)-Below 1 GHz



Radiated emission (Maximum emission configuration)-Above 1 GHz



EUT



EUT

