

EMC TEST REPORT

Dates of Tests: August 17 - 17, 2017
Test Report S/N: LR500121708X
Test Site : LTA Co., Ltd.

Model No.

XNB-6001P

APPLICANT

Hanwha Techwin Co., Ltd.

Manufacturing Description : NETWORK CAMERA
Manufacturer : Hanwha Techwin Co., Ltd.
Brand : -
Model name : XNB-6001P
Additional Model : -
Test Device Serial No.: : Identification
Rule Part(s) : AS/NZS CISPR 32:2013
CISPR 32 Ed1.0

Date of issue : August 24, 2017

This test report is issued under the authority of:

The test was supervised by:



Young Kyu Shin, Technical Manager



Hyo Joon Kang , 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	24.08.2017	LR5001121708X	Initial

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1. General information's

1-1 Test Performed

Company name : **LTA Co., Ltd.**
 Address : 243 Jubug-ri, Yangji-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do 449-822, Korea
 Web site : <http://www.ltalab.com>
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 Telephone : +82-31-323-6008
 Facsimile : +82-31-323-6010

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	2017-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	2019-04-13	FCC CAB
VCCI	JAPAN	R-2133(10 m), C-2307	Updating	VCCI registration
VCCI	JAPAN	T-2009	2017-12-23	VCCI registration
VCCI	JAPAN	G-847	2018-12-13	VCCI registration
IC	CANADA	5799A-1	2019-11-07	IC filing
KOLAS	KOREA	NO.551	Updating	KOLAS accredited Lab.

2. Information's about test item

2-1 Client / Manufacturer

Company name : Hanwha Techwin Co., Ltd.
 Address : 1204, Changwon-daero, Seongsan-gu, Chang-won-si, Gyeongsangnam-do, korea
 Telephone /Facsimile : +82-70-7147-8361

Factory 1

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

2-2 Equipment Under Test (EUT)

Class : A
 Category : NETWORK CAMERA
 Brand : -
 Model name : XNB-6001P
 Additional model name : -
 Additional model differences : -
 Serial number : Identification
 Date of receipt : August 07, 2017
 EUT condition : Pre-production, not damaged
 Interface Ports : DC IN, LAN (Network), Micro USB, Audio IN/OUT, POE (CAM), VIDEO, ALARM, Micro SD
 Power rating : DC 12 V
 Test memory size : -
 Modulator : -
 Crystal/Oscillator(s) : -
 Firmware version : xxxx

2-3 Modification

-NONE

2-4 Test conditions

Temp. / Humid. / Pressure : +(25) °C / (55 - 57) %RH
 Tested Model : XNB-6001P
 Operating mode : Operating mode
 Tested Voltage : 240 Vac , 50 Hz

2-5 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
LENS MODULE	SLA-T4680V	N/A	Hanwha Techwin (Tianjin) Co., Ltd.
Notebook	PP37L	N/A	DELL
ALARM	N/A	N/A	N/A
Headset	SHS-100VB	N/A	SAMSUNG
DC Power Supply	E3632	N/A	N/A
MICRO SD Card	N/A	N/A	N/A
Multi-Channel LCD Monitor	RPM-501A	501GW10070	POSTIUM

3. Test Report

3.1 Summary of tests

Parameter	Applied Standard	Status
I. Emission		
Radiated Emission	AS/NZS CISPR32:2013	C
Conducted Emission	AS/NZS CISPR32:2013	NA

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	: - mode
Result	: Not Applicable

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)

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 / 3 m for above 1 GHz
Measurement Frequency range	: 30 MHz – 1 000 MHz
Measurement RBW	: 120 kHz @ 10 m / 1 MHz @ 3 m
Test mode	: Operating mode
Result	: Complies

Measurement Data:

- Refer to the Next page (Maximum emission configuration)

- The highest internal source of an EUT is Above 108 MHz, the measurement shall only be made up to 1 GHz.
(The highest internal source of an EUT : Above 108 MHz)

A sample calculation:

COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + COR.F

TEST EQUIPMENT USED: 13, 14, 15, 19, 27

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.	

TEST EQUIPMENT USED: 13, 14, 15, 19, 27, 20, 23

Radiated Emission (Below 1 GHz) / V



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EUT/Model No.: XNB-6001P

Temp/Humi: 25 / 57

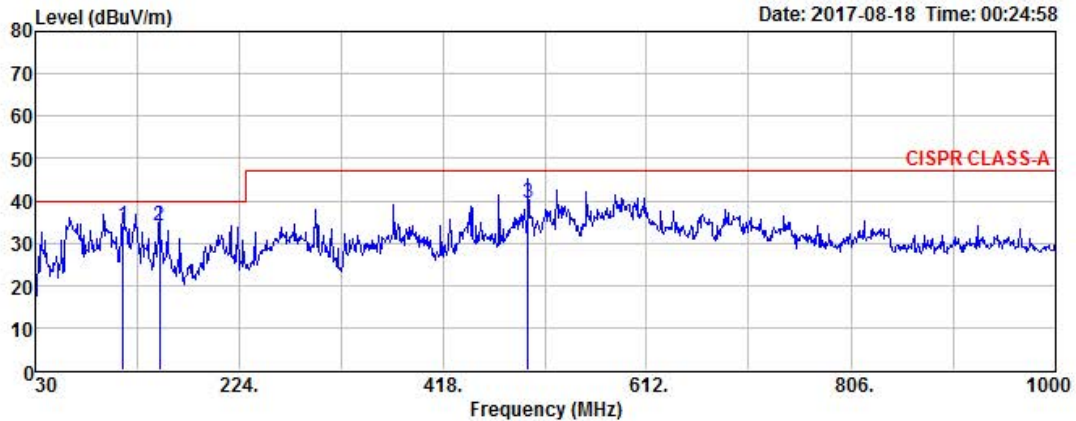
Test Mode : Operating mode

Tested by: KANG H J

Data: 1264

File: C:\Program Files (x86)\e3\1708-1.EM6 (1610)

Date: 2017-08-18 Time: 00:24:58



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
113.42	48.27	-14.16	34.11	40.00	5.89	104	194	VERTICAL
148.34	46.19	-11.94	34.25	40.00	5.75	100	216	VERTICAL
499.48	45.94	-6.65	39.29	47.00	7.71	112	200	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.: XNB-6001P

Temp/Humi: 25 / 57

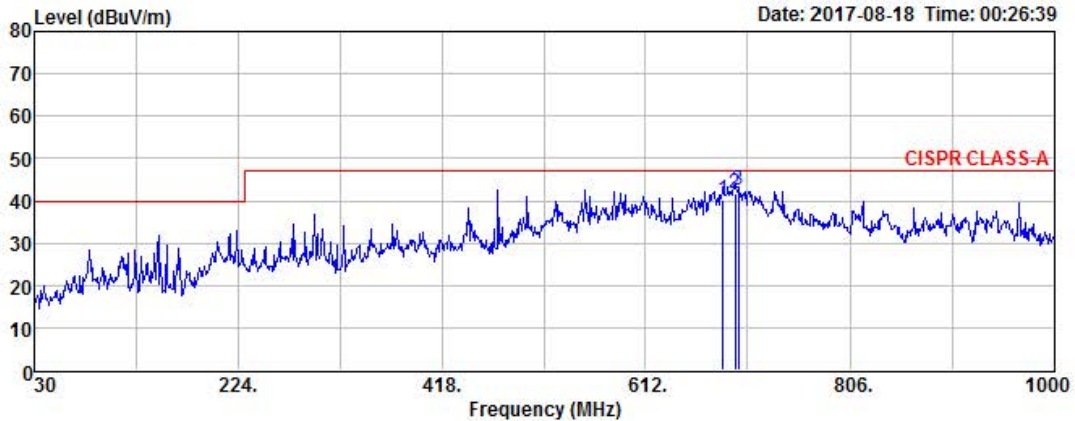
Test Mode : Operating mode

Tested by: KANG H J

Data: 1265

File: C:\Program Files (x86)\e3\1708-1.EM6 (1610)

Date: 2017-08-18 Time: 00:26:39



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
685.72	43.14	-2.96	40.18	47.00	6.82	151	291	HORIZONTAL
697.36	44.63	-2.76	41.87	47.00	5.13	327	221	HORIZONTAL
700.27	45.05	-2.72	42.33	47.00	4.67	384	276	HORIZONTAL

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

Radiated Emission (Above 1 GHz)

EUT/Model No.: XNB-6001P

Temp/Humi: 25 / 55

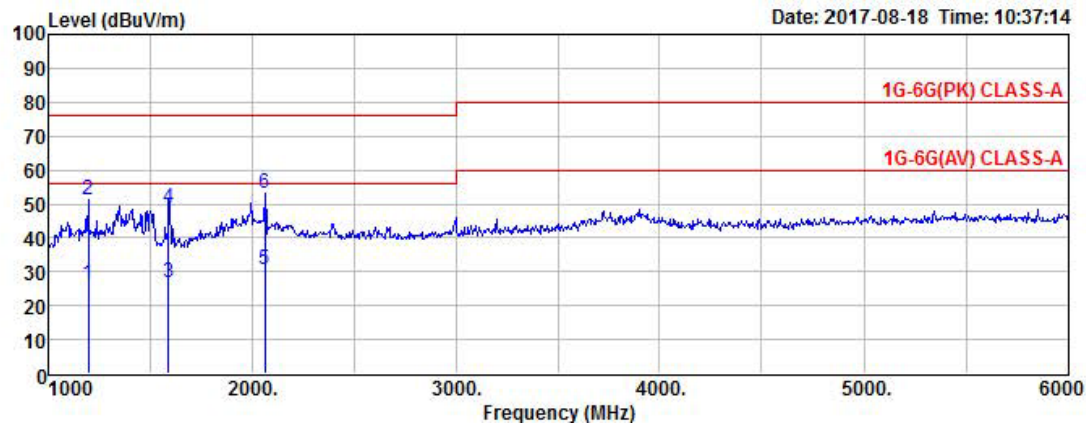
Test Mode : Operating mode

Tested by: KANG H J

Data: 1294

File: C:\Program Files (x86)\e3\1708-1.EM6 (1610)

Date: 2017-08-18 Time: 10:37:14



EUT/Model No.: XNB-6001P

Temp/Humi: 25 / 55

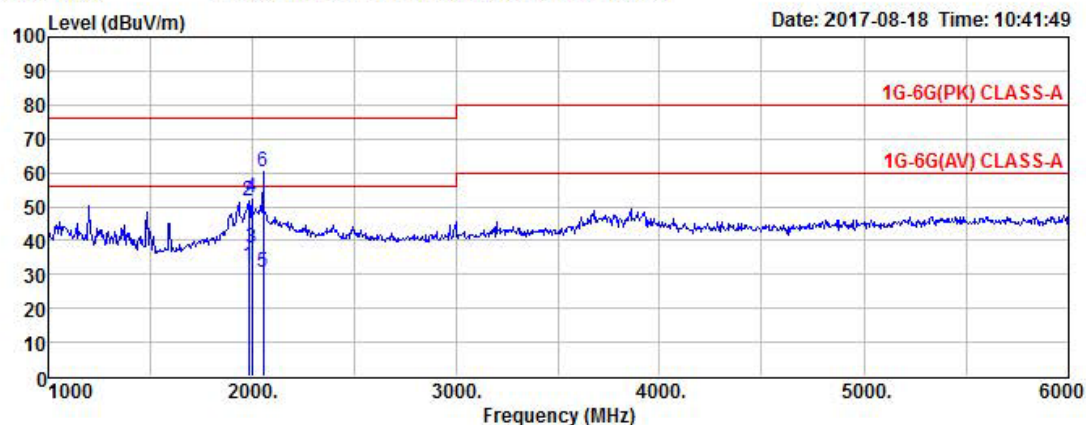
Test Mode : Operating mode

Tested by: KANG H J

Data: 1295

File: C:\Program Files (x86)\e3\1708-1.EM6 (1610)

Date: 2017-08-18 Time: 10:41:49



Manufacture : Hanwha Techwin Co., Ltd.

Test Date

Temp.: Humidity Distance

[°C]

: [%]

(m)

Model : XNB-6001P

2017-08-18

25

55

4.5

TEST mode : Operating mode

Ver Data: 1294

Hor Data: 1295

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
1985.0	55.7	36.7	-0.69	54.99	36.03	76.0	56.0	21.01	19.97	100	36	H
2000.0	56.9	41.7	-0.64	56.24	41.08	76.0	56.0	19.76	14.92	100	38	H
2055.0	64.0	34.2	-0.23	63.81	33.99	76.0	56.0	12.19	22.01	100	11	H
1195.0	60.7	36.0	-6.05	54.68	29.97	76.0	56.0	21.32	26.03	100	44	V
1590.0	56.2	34.3	-4.05	52.14	30.27	76.0	56.0	23.86	25.73	100	67	V
2065.0	56.9	34.3	-0.18	56.67	34.15	76.0	56.0	19.33	21.85	100	82	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.

	Description	Model No.	Serial No.	Manufacturer	Interval	LAST Cal.
1	EMI TEST Receiver	ESR	101499	Rohde & Schwarz	1 year	Jul-17
2	Pulse Limiter	ESH3-Z2	100710	Rohde & Schwarz	1 year	Mar-17
3	DIGITAL THERMO HYGROMETER	TH-611	NONE	BODYCOM	1 year	Sep-16
4	DTV Signal Generator	MFG-100	15M2002	MFLO	1 year	Mar-17
5	Color TV Pattern Generator	PM-5518-TX	LO5333	Philips	-	-
6	LISN	ESH3-Z6	100378	Rohde & Schwarz	1 year	Sep-16
7	LISN(main)	ESH3-Z5	893045/017	Rohde & Schwarz	1 year	Mar-17
8	LISN(sub)	ENV216	100408	Rohde & Schwarz	1 year	Sep-16
9	ISN	ISN T800	27109	TESEQ	1 year	Jan-17
10	ISN	ENY81-CA6	101565	Rohde & Schwarz	1 year	Jan-17
11	CURRENT PROBE	EZ-17	100508	Rohde & Schwarz	1 year	Jan-17
12	LISN	ESH3-Z6	100378	Rohde & Schwarz	1 year	Sep-16
13	EMI TEST Receiver	ESCI7	100772	Rohde & Schwarz	1 year	Sep-16
14	Amplifier (25 dB)	8447D	2944A07974	HP	1 year	Sep-16
15	DIGITAL THERMO HYGROMETER	TESTEK-303A	TAEGUANG	-	1 year	Mar-17
16	STEP TRANSFORMER	INA6502	34270	SCHAFFNER	1 year	Sep-16
17	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	2 year	Apr-17
18	Biconical Antenna	VHA 9103	VHA 9103-2315	SCHWARZBECK	2 year	Apr-17
19	TRILOG Antenna	VULB9160	9160-3237	SCHWARZBECK	2 year	May-17
20	TRILOG Antenna	VULB9160	9160-3237	SCHWARZBECK	2 year	Apr-17
21	Amplifier (25 dB)	8449B	3008A00337	HP	1 year	Mar-17
22	Spectrum Analyzer (~ 26.5 GHz)	E4407B	MY45108946	Agilent	1 year	Mar-17
23	HORN ANTENNA	3115	55005	ETS	2 year	May-17
24	HORN ANTENNA	3115	55005	ETS	2 year	Apr-17
25	Universal Power Analyzer	PM6000	1.00007E+11	Voltech Instruments	1 year	Mar-17
26	Reference Impedance Network	ES4152	9074424	NF Corp.	1 year	Sep-16
27	TEST PROGRAM	e3_Ver:6.2009- 10-12a	-	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

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(30MHz) - 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 -Pulse amplitude response -Pulse repetition rate response	Normal (k = 2)	± 0.17	± 0.17	Cal. Report Cal. Report CISPR16-4-2
	Normal (k = 2)	± 0.58	± 0.58	
	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

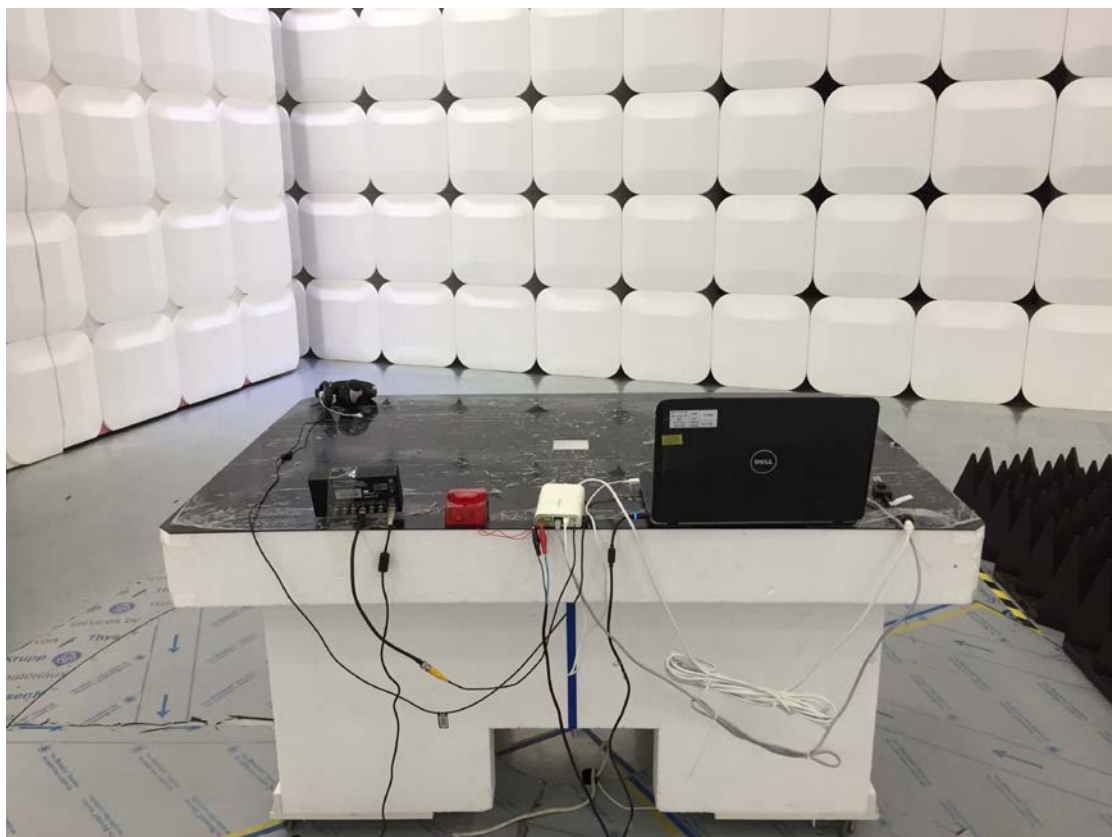
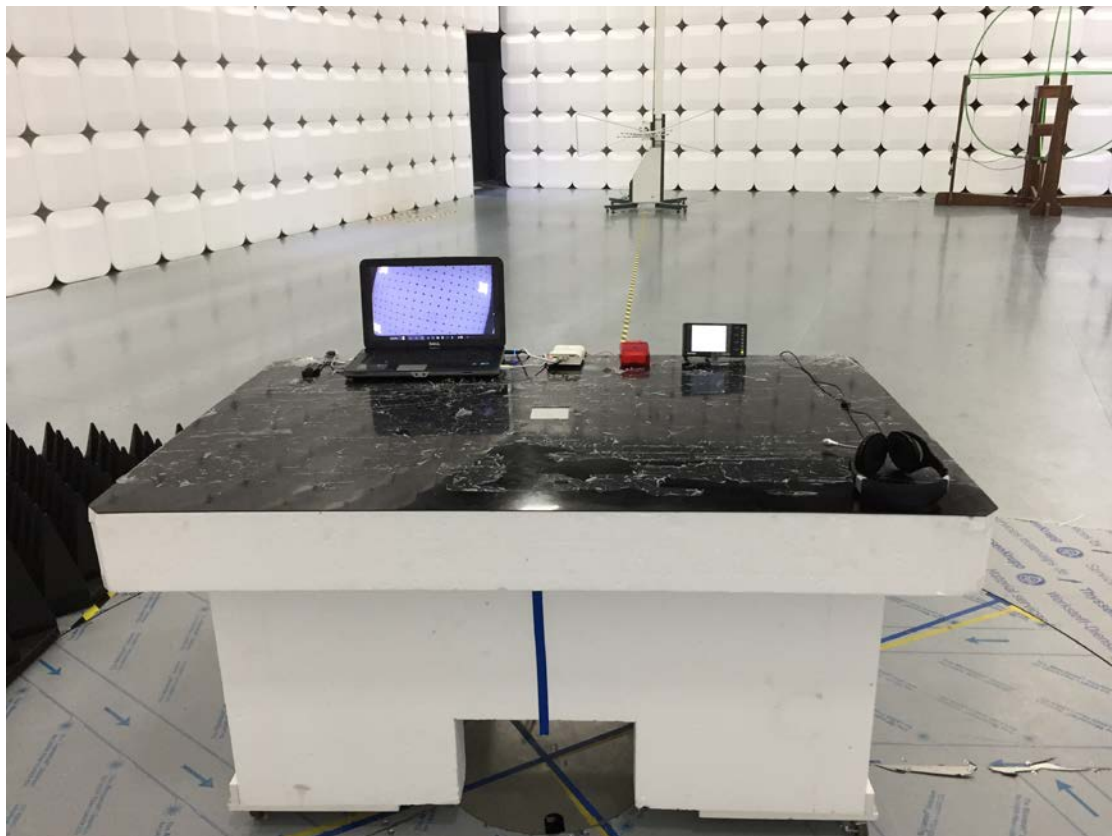
Input Quantity	Probability Distribution	Probability Distribution (dB)	Standard
		HORN	
Antenna Factor (ETS 3115)	Normal (k=2) (normal)	1 GHz - 6 GHz ± 1.00	ANT Cal. uncertainty
Cable loss (SUHNER MULTIFLEX microwave cables)	Standard Deviation(SD)	± 0.32	10 th measurement
Receiver corrections; -Sine Wave Voltage -Pulse amplitude response -Pulse repetition rate response	Normal (k = 2) Normal (k = 2) Rectangular($\sqrt{3}$)	± 0.17 ± 0.58 ± 1.50	Cal. Report Cal. Report CISPR16-4-2
Antenna Directivity	Rectangular($\sqrt{3}$)	± 1.00	CISPR16-4-2
AF Height Dependence	Rectangular($\sqrt{3}$)	± 0.10	CISPR16-4-2
Phase Center Location	Rectangular($\sqrt{3}$)	± 0.20	CISPR16-4-2
Separation Distance	Rectangular($\sqrt{3}$)	± 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 ($\sqrt{2}$)	± 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	
Expanded measurement uncertainty (95%,Confidence level,k=2)dB	Normal(k = 2)	1 GHz - 6 GHz + 3.46 - 3.46	

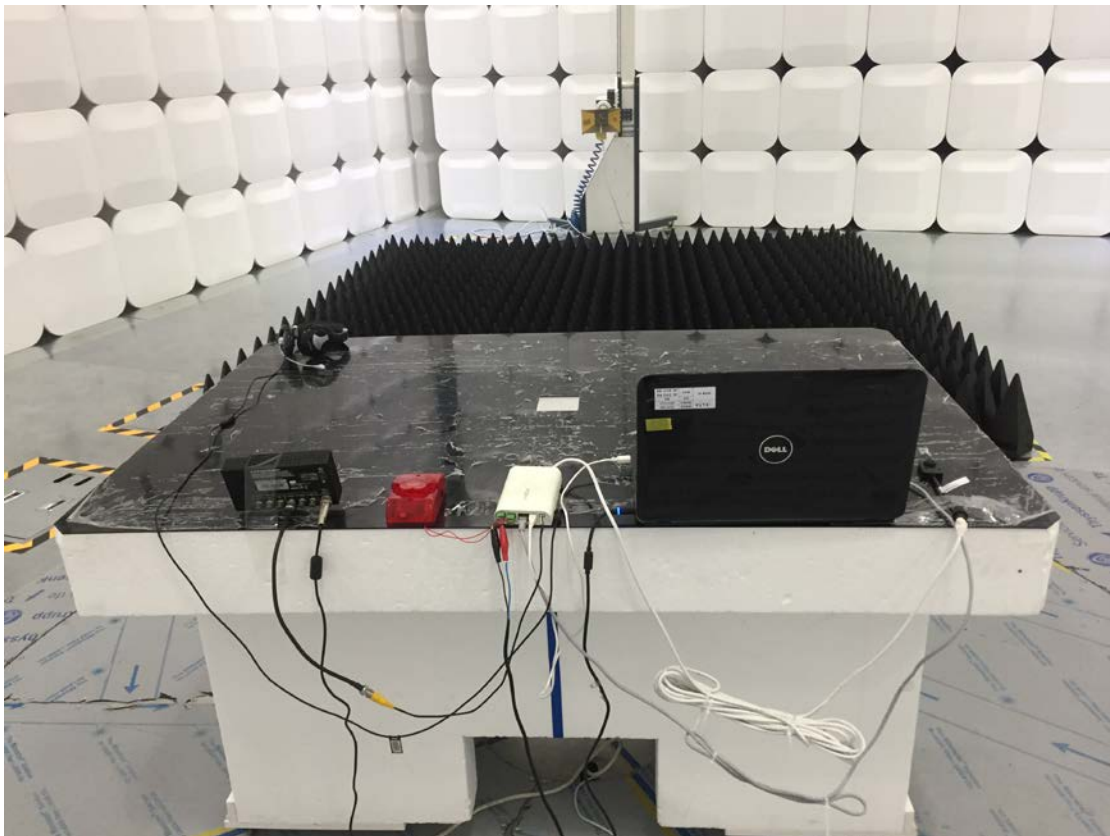
Note:VRC(Voltage Reflection Coefficient)

APPENDIX D

PHOTOGRAPHS

Radiated emission (Maximum emission configuration)-Below 1 GHz





EUT

