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EMC TEST REPORT

Dates of Tests: August 18 - 23, 2017
 Test Report S/N: LR500121708AC
 Test Site : LTA Co., Ltd.

Model No.

XNB-6001P

APPLICANT

Hanwha Techwin Co., Ltd.

Manufacturing Description : NETWORK CAMERA
Manufacturer : Hanwha Techwin Co., Ltd.
Model name : XNB-6001P
Additional model name : -
Test Device Serial No.: : Identification
Directive : Electromagnetic Compatibility Directive 2014/30/EU
Rule Part(s) : EN 55032:2015
 EN 50130-4:2011/A1:2014

Data of reissue : 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

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NVLAP LAB CODE 200723-0

Revision	Date of issue	Test report No.	Description
0	24.08.2017	LR500121708AC	Initial

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1. General information's

1-1 Test Performed

Company name : **LTA Co., Ltd.**
 Address : 243, Jubug-ri, Yangji-Myeon, Yongin-Si, Kyunggi-Do, Korea. 449-822
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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	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

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
 Model name : XNB-6001P
 Additional Model Name : -
 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
 Modulator : -
 Crystal/Oscillator(s) : -
 Firmware version : XXXX

2-3 Modification

-NONE

2-4 Model Specification

-NONE

2-5 Test conditions

Temp. / Humid. / Pressure : +(25 - 26) °C / (51 - 56) %RH / (99.0 – 100.0) kPa
 Tested Model : XNB-6001P
 Test mode : Operating mode
 Power supply : AC 230 V / 50 Hz

2-6 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	EN 55032:2015	C
Conducted Emission	EN 55032:2015	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 **XNB-6001P** 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 **XNB-6001P** 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
Measurement RBW	: 9 kHz
Test mode	: Operating 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

TEST EQUIPMENT USED: 01, 02, 03, 07, 08, 09, 10, 11, 60

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)

TEST EQUIPMENT USED: 01, 02, 03, 07, 08, 09, 10, 11, 60

Conducted emissions / TEL (POE)



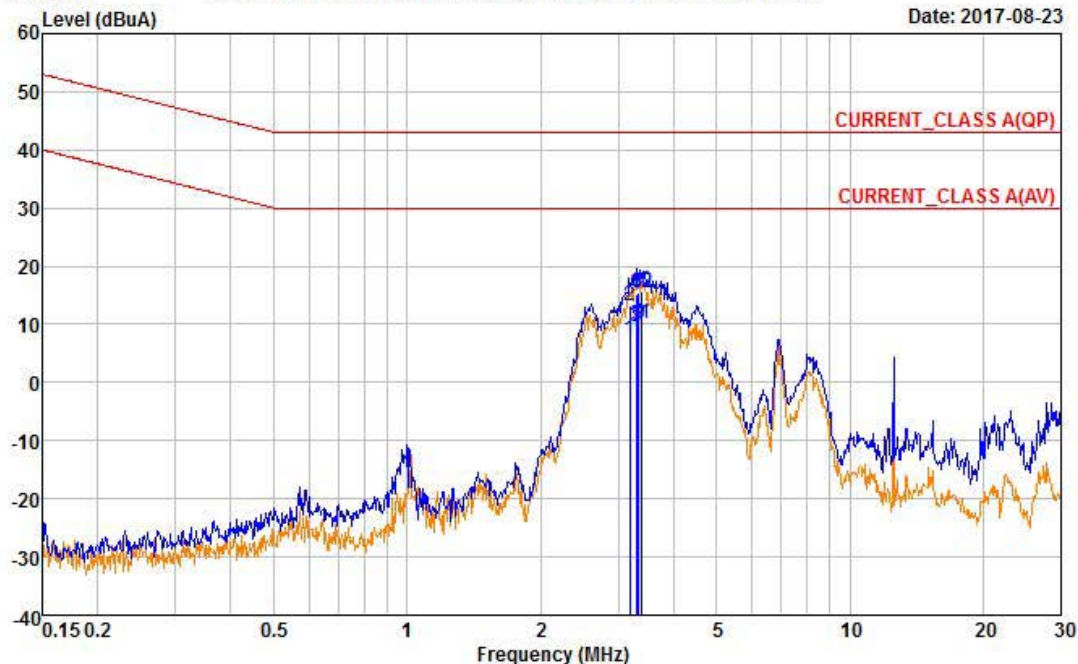
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EUT / Model No. : SLA-6001P	Phase : POE
Test Mode : Operating mode	Test Power : 230 / 50
Temp. / Humi. : 25 / 55	Test Engineer : KANG H J

Data: 1680

File: D:\Conducted Data\2017\LTA_Conduction_2017_08.EM6 (1826)

Date: 2017-08-23



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
3.191	-6.47	-12.37	19.67	13.20	7.30	43.02	30.02	29.82	22.72
3.298	-4.41	-10.12	19.68	15.27	9.56	43.02	30.02	27.75	20.46
3.324	-4.16	-9.81	19.69	15.53	9.88	43.02	30.02	27.49	20.14
3.328	-4.12	-9.88	19.69	15.57	9.81	43.02	30.02	27.45	20.21
3.379	-4.08	-9.57	19.69	15.61	10.12	43.02	30.02	27.41	19.90
3.383	-4.14	-9.68	19.69	15.55	10.01	43.02	30.02	27.47	20.01

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

Conducted emissions / TEL_10 M



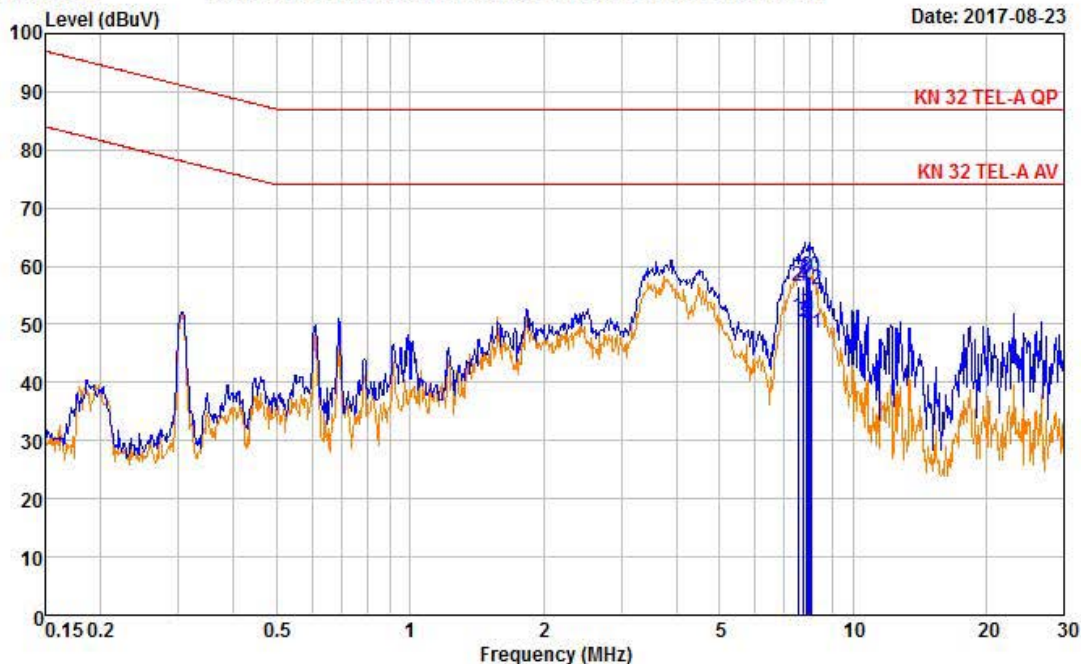
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EUT / Model No. : SLA-6001P	Phase : TEL_10M
Test Mode : Operating mode	Test Power : 230 / 50
Temp. / Humi. : 25 / 55	Test Engineer : KANG H J

Data: 1698

File: D:\Conducted Data\2017\LTA_Conduction_2017_08.EM6 (1826)

Date: 2017-08-23



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
7.515	37.07	31.66	19.60	56.67	51.26	87.00	74.00	30.33	22.74
7.700	37.02	30.73	19.61	56.63	50.34	87.00	74.00	30.37	23.66
7.831	38.12	30.80	19.61	57.73	50.41	87.00	74.00	29.27	23.59
7.922	38.50	32.24	19.61	58.11	51.85	87.00	74.00	28.89	22.15
7.987	38.67	31.26	19.62	58.29	50.88	87.00	74.00	28.71	23.12
8.090	36.51	28.98	19.62	56.13	48.60	87.00	74.00	30.87	25.40

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

Conducted emissions / TEL_1000 M



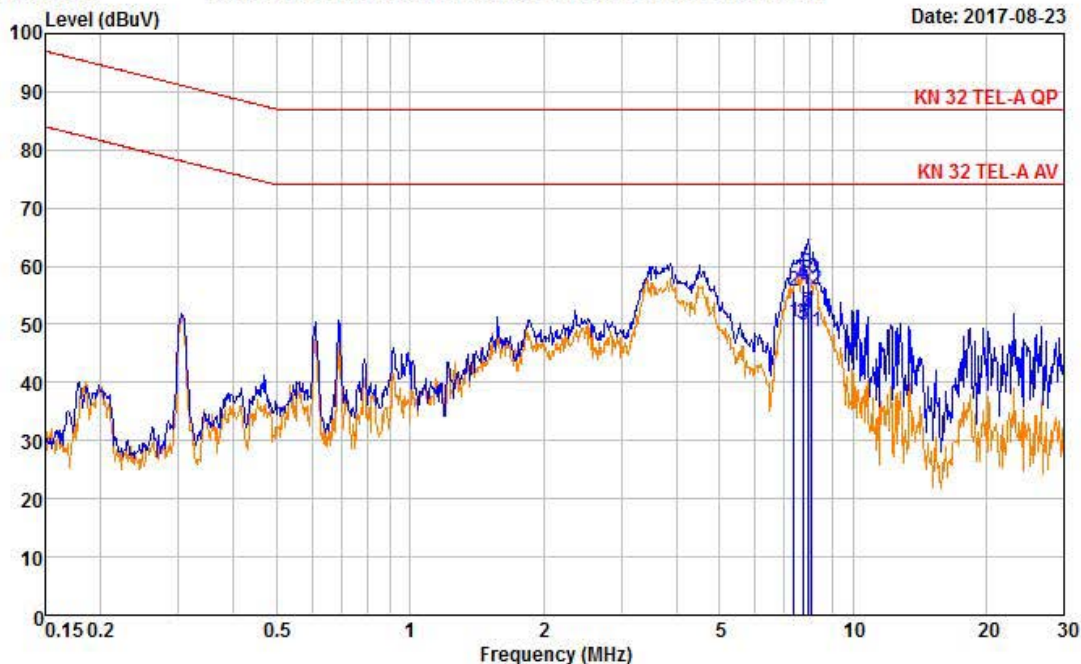
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Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT / Model No. : SLA-6001P	Phase : TEL_1000M
Test Mode : Operating mode	Test Power : 230 / 50
Temp. / Humi. : 25 / 55	Test Engineer : KANG H J

Data: 1694

File: D:\Conducted Data\2017\LTA_Conduction_2017_08.EM6 (1826)

Date: 2017-08-23



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
7.372	36.51	31.32	19.19	55.70	50.51	87.00	74.00	31.30	23.49
7.719	37.49	30.82	19.20	56.69	50.02	87.00	74.00	30.31	23.98
7.756	37.63	30.70	19.20	56.83	49.90	87.00	74.00	30.17	24.10
7.923	39.62	32.76	19.20	58.82	51.96	87.00	74.00	28.18	22.04
7.925	38.82	32.36	19.20	58.02	51.56	87.00	74.00	28.98	22.44
8.071	36.64	29.51	19.21	55.85	48.72	87.00	74.00	31.15	25.28

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
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	: Operating 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 (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.	

TEST EQUIPMENT USED: 13, 14, 15, 19, 21, 23, 60

Radiated Emission (Below 1 GHz) / V



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EUT/Model No.: XNB-6001P

Temp/Humi: 26 / 56

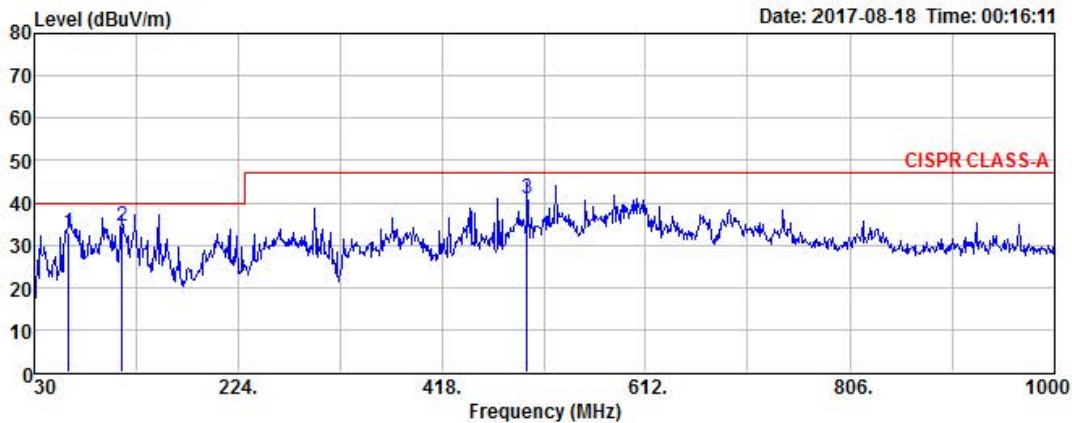
Test Mode : Operating mode

Tested by: KANG H J

Data: 1261

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

Date: 2017-08-18 Time: 00:16:11



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBUV/m	dBUV/m	dB	cm	deg	
62.98	47.90	-14.85	33.05	40.00	6.95	105	262	VERTICAL
113.42	48.45	-14.16	34.29	40.00	5.71	102	207	VERTICAL
499.48	47.47	-6.65	40.82	47.00	6.18	107	220	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: 26 / 56

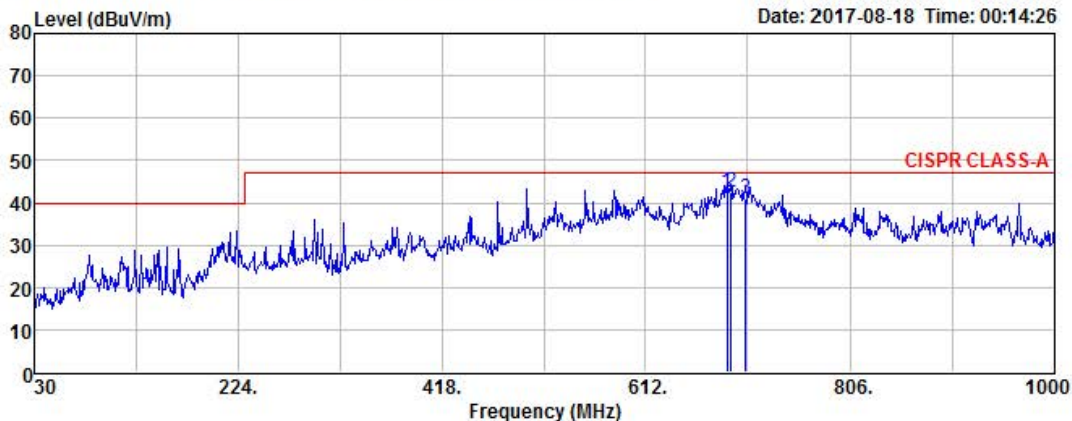
Test Mode : Operating mode

Tested by: KANG H J

Data: 1260

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

Date: 2017-08-18 Time: 00:14:26



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP dBuV/m	dBuV/m	dB	cm	deg	
689.60	45.46	-2.86	42.60	47.00	4.40	142	57	HORIZONTAL
693.48	45.16	-2.81	42.35	47.00	4.65	327	117	HORIZONTAL
707.06	43.68	-2.62	41.06	47.00	5.94	320	338	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

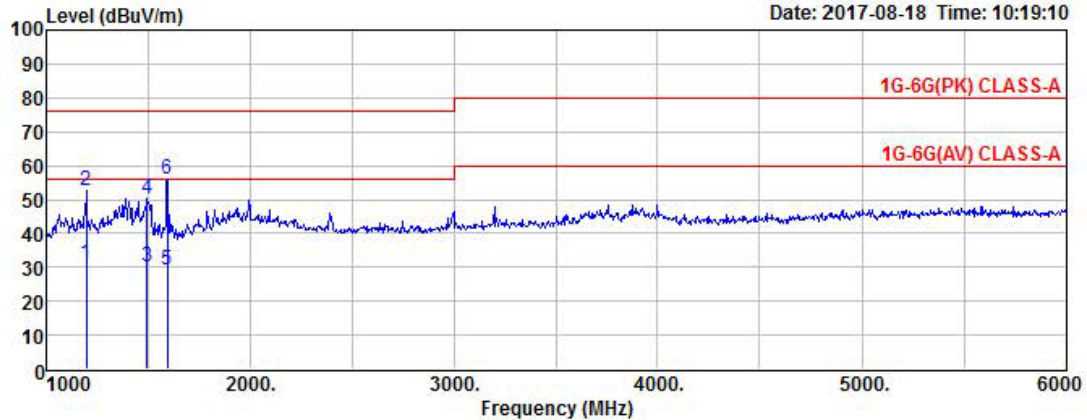
Test Mode : Operating mode

Tested by: KANG H J

Data: 1288

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

Date: 2017-08-18 Time: 10:19:10



EUT/Model No.: XNB-6001P

Temp/Humi: 25 / 55

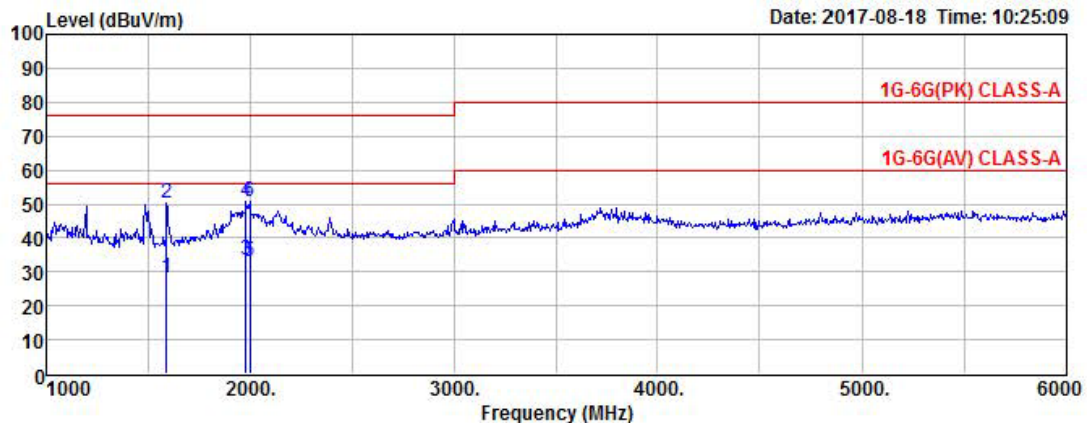
Test Mode : Operating mode

Tested by: KANG H J

Data: 1289

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

Date: 2017-08-18 Time: 10:25:09



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: 1288

Hor Data: 1289

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
1590.0	57.7	35.8	-4.05	53.60	31.77	76.0	56.0	22.40	24.23	100	167	H
1980.0	55.1	37.8	-0.71	54.34	37.11	76.0	56.0	21.66	18.89	100	94	H
2000.0	54.7	37.1	-0.64	54.06	36.48	76.0	56.0	21.94	19.52	100	240	H
1195.0	62.0	40.7	-6.05	55.96	34.67	76.0	56.0	20.04	21.33	100	238	V
1495.0	58.5	38.4	-4.63	53.91	33.72	76.0	56.0	22.09	22.28	100	163	V
1595.0	63.6	36.9	-4.02	59.62	32.89	76.0	56.0	16.38	23.11	100	308	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	: Operating mode
Rated power	: - W
Result	: Not Applicable

Measurement Data:

- We did not test EN61000-3-2 (Harmonic current emissions) for the **XNB-6001P** 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 **XNB-6001P** 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	:	26 °C / 51 %RH / 100 kPa
Discharge Impedance	:	$(330 \pm 10\%) \Omega$ / $(150 \pm 10\%)$ pF
Type of Discharge (air discharge)	:	± 2 kV, ± 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	:	Operating 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.

TEST EQUIPMENT USED: 27, 28, 15

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	Air	Complies	No reaction recognized
2	Micro SD	Air	Complies	No reaction recognized
3	Audio IN/OUT	Air	Complies	No reaction recognized
4	POE (CAM)	Contact	Complies	No reaction recognized
5	DC IN	Air	Complies	No reaction recognized
6	ALRAM	Air	Complies	No reaction recognized
7	LAN (Network)	Air	Complies	No reaction recognized
8	Micro USB	Air	Complies	No reaction recognized
9	VIDEO	Air	Complies	No reaction recognized

TEST EQUIPMENT USED: 27, 28, 15

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 1 000 MHz, 1 400 MHz to 2 000 MHz, 2 000 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	:	Operating 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

TEST EQUIPMENT USED: 29, 30, 31, 32, 33, 34, 35, 03, 28

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 (DC power input port) 1.0 kV (Signal port)
Polarity	:	Negative/ positive
Repetition frequency	:	5 kHz
Test mode		Operating 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.

power Line	Test level	Result	Remarks
Positive - Negative	+ 1 kV	Complies	No reaction recognized
	- 1 kV	Complies	No reaction recognized

Signal Line	Test level	Result	Remarks
LAN	+ 1 kV	Complies	No reaction recognized
	- 1 kV	Complies	No reaction recognized
POE	+ 1 kV	Complies	No reaction recognized
	- 1 kV	Complies	No reaction recognized

TEST EQUIPMENT USED: 57, 28, 15, 58, 59

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	: Operating mode
Result	: Complies

Measurement Data:

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

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

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

TEST EQUIPMENT USED: 46, 47, 48, 03, 28, 49, 51, 59

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.

	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	ESC17	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	ESD Slimulator	ESS-2000	ESS0625187	NOISEKEN	1 year	Apr-17
28	Hygro-Thermograph	THB-36	0041557-01	ISUZU	1 year	Dec-16
29	Signal Generator	E4432B	MY41310632	Agilent	1 year	May-17
30	Power Meter	E4419B	GB38410133	Agilent	1 year	Jun-17
31	RF POWER AMPLIFIER	ITA0300KL-300	0300KL 1507 001	INFINITECH	-	-
32	RF POWER AMPLIFIER	ITA2000KL-120	200KL 1507 001	INFINITECH	-	-
33	RF POWER AMPLIFIER	ITA4500KL-70	4500KL 1507 001	INFINITECH	-	-
34	RF POWER AMPLIFIER	ITA0750KL-300	0750KL 1507 001	INFINITECH	-	-
35	Log.-Per.Antenna (80 MHz ~ 3 GHz)	K9128	NONE	RAPA	-	-
36	Microphone	MP201	530147	BSWA	1 year	Nov-16
37	Sound Acoustic Tester	TST-1000	15065-A	TESTEK	1 year	Nov-16

	Description	Model No.	Serial No.	Manufacturer	Interval	LAST Cal.
38	Horn Antenna	3115A	114105	ETS	2 year	Jul-15
39	Signal Generator	SMB 100A	177621	R&S	1 year	Mar-17
40	EFT Simulator	FNS-AX2	4000B01332	NoiseKen	1 year	Sep-16
41	Capacitive Coupling Clamp	CDN 8015	21240	SCHAFFNER	1 year	Sep-16
42	LIGHTNING SURGE SIMULATOR	LSS-6030	LSS02X0153	NOISEKEN	1 year	Sep-16
43	R-BOX (4x1000 HM)	INA 172	SL403-109	SCHAFFNER	1 year	-
44	CDN	CDN 117	20985	SCHAFFNER	1 year	-
45	CDN	CDN 118	20082	SCHAFFNER	1 year	-
46	Signal generator	SML03	103026/0013	R&S	1 year	Mar-17
47	POWER METER	NRVD	101689	R&S	1 year	Mar-17
48	RF Power Amplifier	FLL75A	1033	FRANKONIA	1 year	Dec-16
49	EM INJECTION CLAMP	TSIC-23	529	F.C.C	1 year	Jun-17
50	CDN (M1)	TSCDN-M1-16A	7004	F.C.C	1 year	Sep-16
51	CDN (M2)	TSCDN-M2-16A	7008	F.C.C	1 year	Sep-16
52	CDN (M3)	TSCDN-M3-16A	7017	F.C.C	1 year	Sep-16
53	Coil	INA 702	132	SCHAFFNER	6 month	Apr-17
54	Magnetic Field Generator	MFO6502	34267	SCHAFFNER	6 month	Apr-17
55	Modula System	MODULA6100	34395	SCHAFFNER	1 year	Sep-16
56	TRILOG Antenna	VULB9168	577	SCHWARZBECK	2 year	Mar-17
57	Compact Generator	NX5	P1640185038	EMTEST	1 year	May-17
58	AC Power Source	Variac NX1-260-16	P1648188071	EMTEST	1 year	May-17
59	Capacitive Coupling Clamp	CCI	P1703190739	EMTEST	1 year	Nov-16
60	TEST PROGRAM	e3_Ver:6.2009-10-12a	-	AUDIX	-	-

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	
Expanded 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	
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

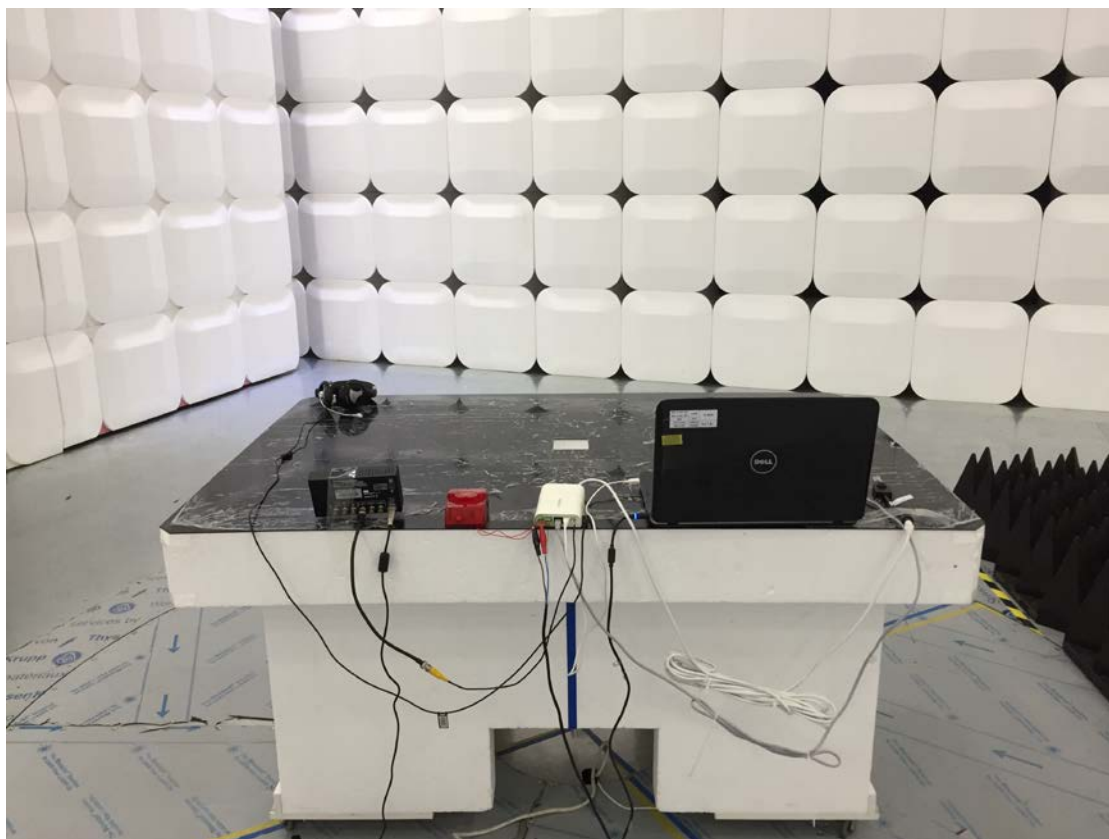
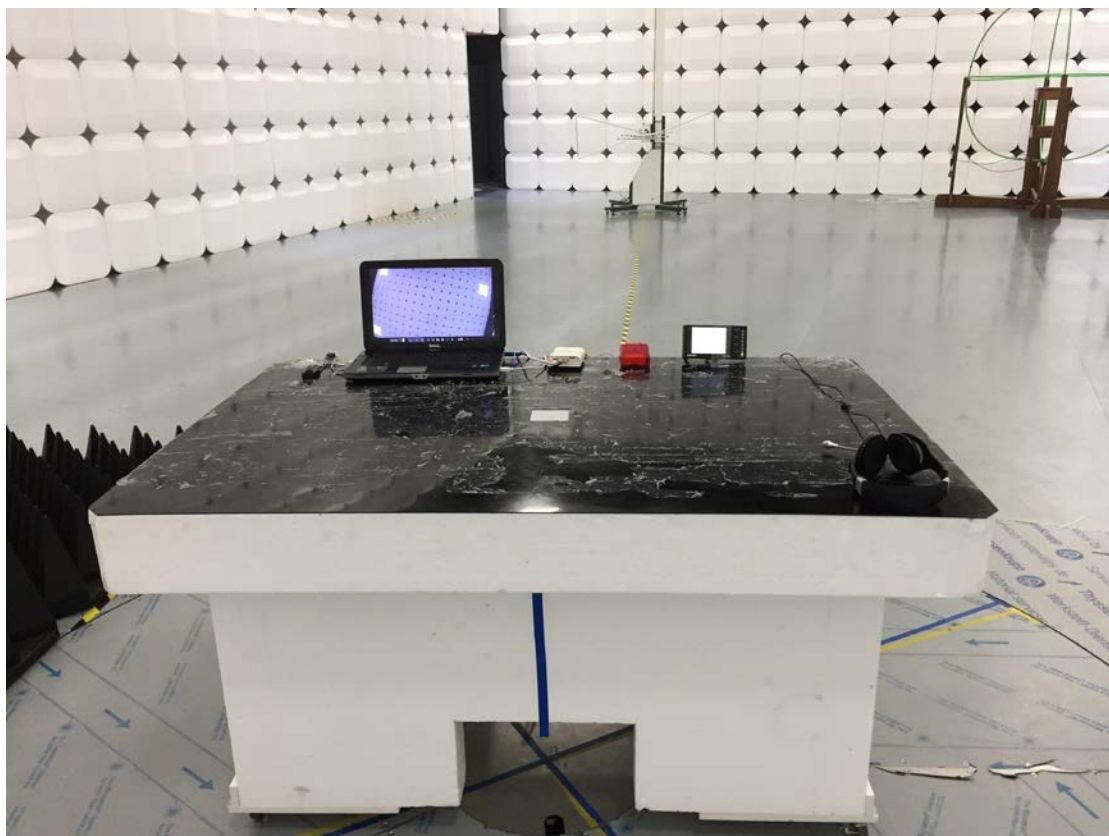
Conducted emission (Maximum emission configuration) _ TEL 1



Conducted emission (Maximum emission configuration) _ TEL 2



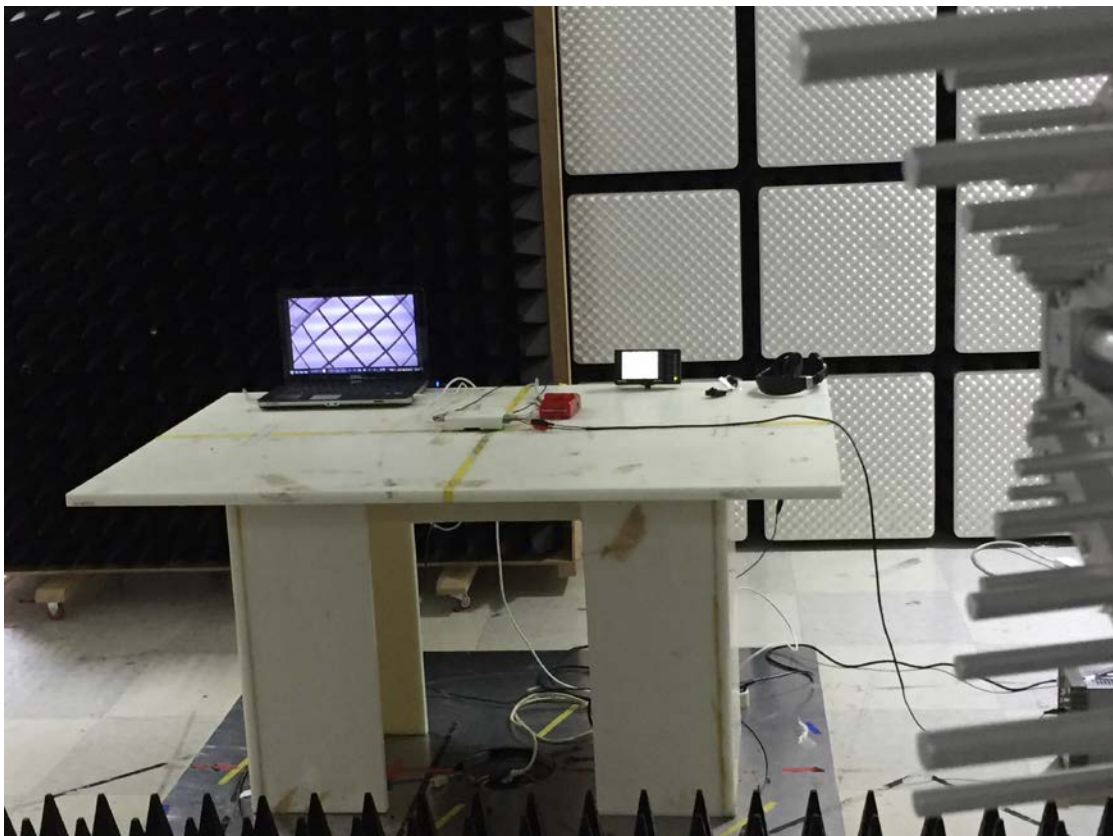
Radiated emission (Maximum emission configuration)-Below 1 GHz



Electrostatic discharge



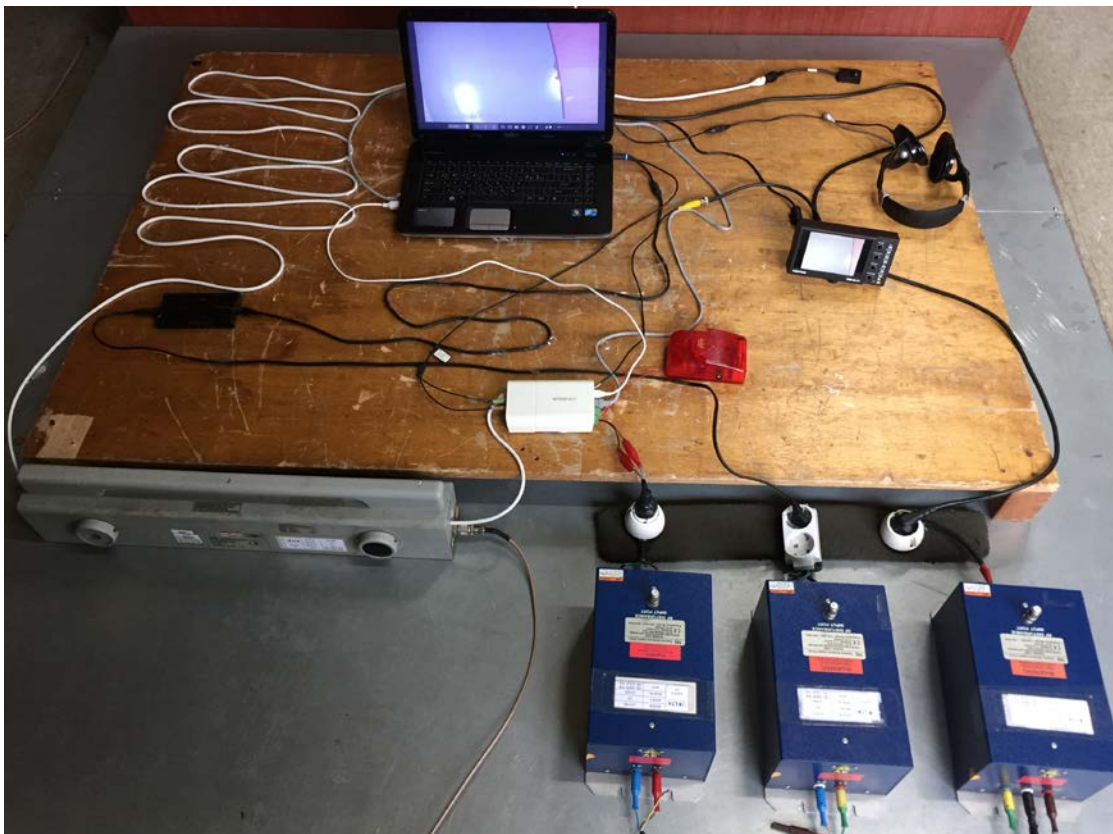
RF Electromagnetic Field



Electrical fast transients



Conducted Disturbances, Induced by Radio-Frequency Fields



EUT

