



EMC TEST REPORT For RCM

Test Report No. : KES-E1-17T0752
Date of Issue : Jan. 04, 2018
Product name : Network Camera
Model/Type No. : QNP-6230H
Variant Model : -
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 1204, Changwon-daero, Seongsan-gu Changwon-si,
Gyeongsangnam-do, Korea
Manufacturer : Hanwha Techwin (Tianjin) Co.,Ltd.
Manufacturer Address : No.11 Weiliu Rd, Micro-Electronic Industrial
Park, TEDA, Tianjin, 300385, People's Republic of China
Date of Receipt : Dec. 19, 2017
Test date : Jan. 02, 2018
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Kang Hyeon, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.

**KES Co., Ltd.**

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-E1-18T0008
Page (2) of (38)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jan. 04, 2018	KES-E1-18T0008	Issued

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document Jun be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



TABLE OF CONTENTS

1.0	General Product Description.....	4
1.1	Test Voltage & Frequency	5
1.2	Variant Model Differences	5
1.3	Device Modifications	5
1.4	Equipment Under Test.....	5
1.5	Support Equipments	5
1.6	External I/O Cabling	6
1.7	EUT Operating Mode(s)	7
1.8	Configuration	8
1.9	Remarks when standards applied	9
1.10	Calibration Details of Equipment Used for Measurement	9
1.11	Test Facility	9
1.12	Laboratory Accreditations and Listings	9
2.0	Test Regulations.....	10
2.1	Conducted Emissions at Mains Power Ports	12
2.2	Conducted Emissions at Telecommunication Ports.....	13
2.3	Radiated Electric Field Emissions(Below 1 GHz)	14
2.4	Radiated Electric Field Emissions(Above 1 GHz)	15
APPENDIX A – TEST DATA.....		16
Conducted Emissions at Mains Power Ports.....		16
Conducted Emissions at Telecommunication Ports		18
Radiated Electric Field Emissions(Below 1 GHz)		22
Radiated Electric Field Emissions(Above 1 GHz)		24
Test Setup Photos and Configuration		26
Conducted Voltage Emissions		26
Conducted Telecommunication Emissions		27
Radiated Electric Field Emissions(Below 1 GHz)		28
Radiated Electric Field Emissions(Above 1 GHz)		29
EUT External Photographs		30
EUT Internal Photographs		31



1.0 General Product Description

Main Specifications of EUT are:

Imaging Device	1/2.8" 2.4M CMOS
Total Pixels	1981(H) x 1288(V), 2.55M
Effective Pixels	1944(H) x 1212(V), 2.35M
Scanning System	Progressive
Min. Illumination	Color : 0.2 Lux (1/30sec, F1.6) B/W : 0.01 Lux (1/30sec, F1.6)
S / N Ratio	50dB
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation
Lens	
Focal Length (Zoom Ratio)	4.44 ~ 102.2mm(Optical 23X)
Max. Aperture Ratio	F1.6 (Wide) / F3.6 (Tele)
Angular Field of View	H : 61.8°(Wide) ~ 3.08°(Tele) / V : 36.2°(Wide) ~ 1.73°(Tele)
Min. Object Distance	Wide 1.5m ,Tele 2m
Focus Control	Auto / Manual / One shot AF
Lens Type	DC Auto Iris
Mount Type	Board-in type



1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage ☐ 240 Vac ☐ 100 Vac ☒ 24 Vac ☐ 12 Vdc ☒ PoE
Frequency ☐ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Network Camera	QNP-6230HP	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adaptor	POE36U-1AT-R	-	PHIHONG	-
Notebook	LG15N54	410NZXE015458	LG	-
Notebook Adaptor	ADP-90WH B	84ZW19F1747	DELTA ELECTRONICS(JIANGSU) LTD.	-
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
MIC	CMK-303	-	CAMAC	-
Alarm	-	-	-	-
Controller	SPC-1010	-	SamSung Techwin Co.,Ltd.	-



1.6 External I/O Cabling

■ AC 24 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	RJ-45	Notebook	RJ-45	3.0	U
	3.5 mm	Speaker	3.5 mm	1.6	U
	3.5 mm	MIC	3.5 mm	1.7	U
	2 Pin	Alarm	2 Pin	4.0	U
	RS-485 (3 Pin)	Controller	RS-485 (3 Pin)	3.5	U

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	RJ-45 (PoE)	PoE Adaptor	RJ-45 (PoE)	3.0	U
	3.5 mm	Speaker	3.5 mm	1.6	U
	3.5 mm	MIC	3.5 mm	1.7	U
	2 Pin	Alarm	2 Pin	4.0	U
	RS-485 (3 Pin)	Controller	RS-485 (3 Pin)	3.5	U
PoE Adaptor	RJ-45 (Data)	Notebook	RJ-45 (Data)	3.0	U

* Unshielded=U, Shielded=S

**KES Co., Ltd.**

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-E1-18T0008
Page (7) of (38)

1.7 EUT Operating Mode(s)

Test mode	operating
AC 24 V	E.U.T Monitoring, Ping Test
PoE	E.U.T Monitoring, Ping Test

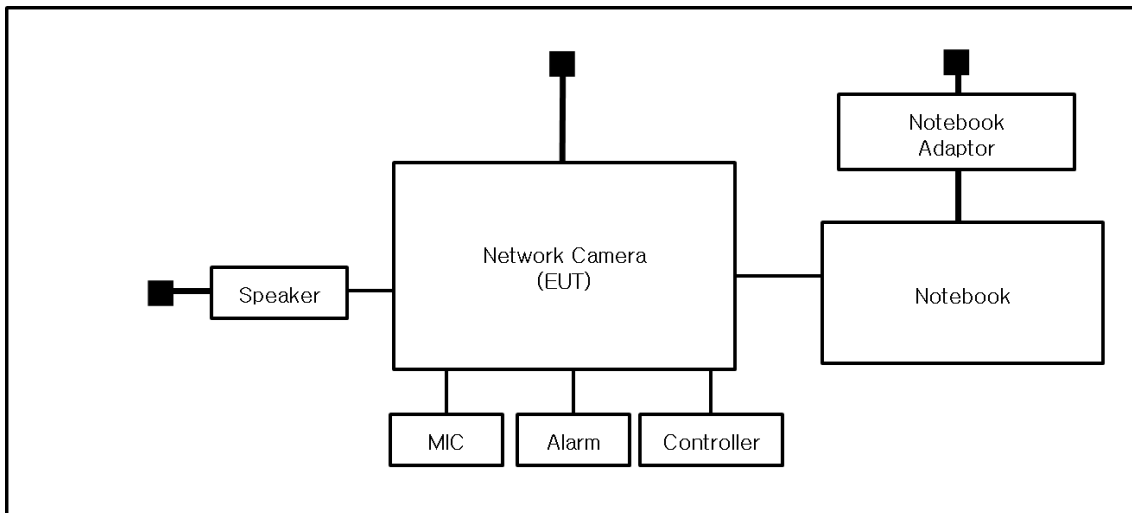
E.U.T Test operating S/W		
Name	Version	Manufacture Company
Webviewer	-	Hanwha Techwin Co., Ltd.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

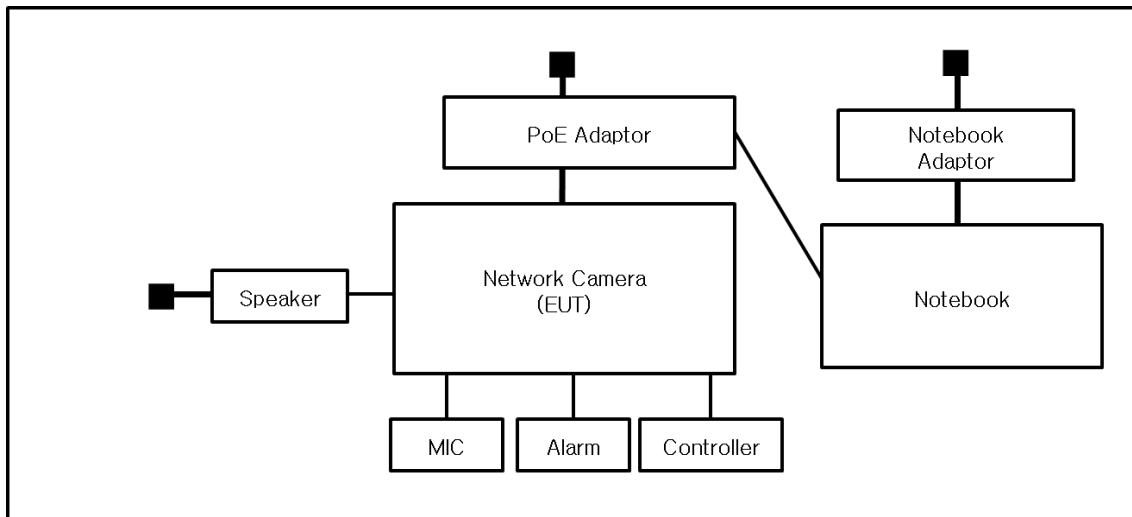
1.8 Configuration

■ AC Main
□ DC Main

■ AC 24 V Mode



■ PoE Mode



1.9 Remarks when standards applied

N/A

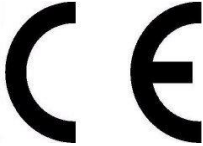
1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 32.

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
KOREA	MSIP	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1
Europe	CE	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	KOLAS	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



-
- | | | |
|---|---|----------------------------------|
| ☐ VCCI V-3 / 2015.04 | ☐ Class A | ☐ Class B |
| ☒ AS/NZS CISPR 32:2013 | ☒ Class A | ☐ Class B |
|
 | | |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2009 | | |
| ☐ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
|
 | | |
| ☐ RE- Directive 2014/53/EU | | |
|
 | | |
| ☐ EN 301 489-1 V1.9.2 | | |
| ☐ Equipment for fixed use | | |
| ☐ Equipment for vehicular use | | |
| ☐ Equipment for portable use | | |
|
 | | |
| ☐ EN 301 489-3 V1.6.1 | | |
|
 | | |
| ☐ EN 301 489-17 V2.2.1 | | |
|
 | | |
| ☐ EN 60945:2002 | | |



2.1 Conducted Emissions at Mains Power Ports

Test Date

Jan. 02, 2018

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 11, 2018
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018

Test Conditions

Temperature: 22,4 °C
Relative Humidity: 42,0 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Jan. 02, 2018

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 11, 2018
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 11, 2018

Test Conditions

Temperature: 22,4 °C

Relative Humidity: 42,0 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jan. 02, 2018

Test Location

☐ OPEN AREA TEST SITE #2 ☒ SAC #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	04, 18, 2018
☒	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

Test Conditions

Temperature: 23,9 °C

Relative Humidity: 41,5 %

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jan. 02, 2017

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	08, 07, 2018
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2018
☐	ATTENUATOR	8491A	HP	32173	03, 24, 2018
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 22,3 °C
Relative Humidity: 41.9 %

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



APPENDIX A – TEST DATA

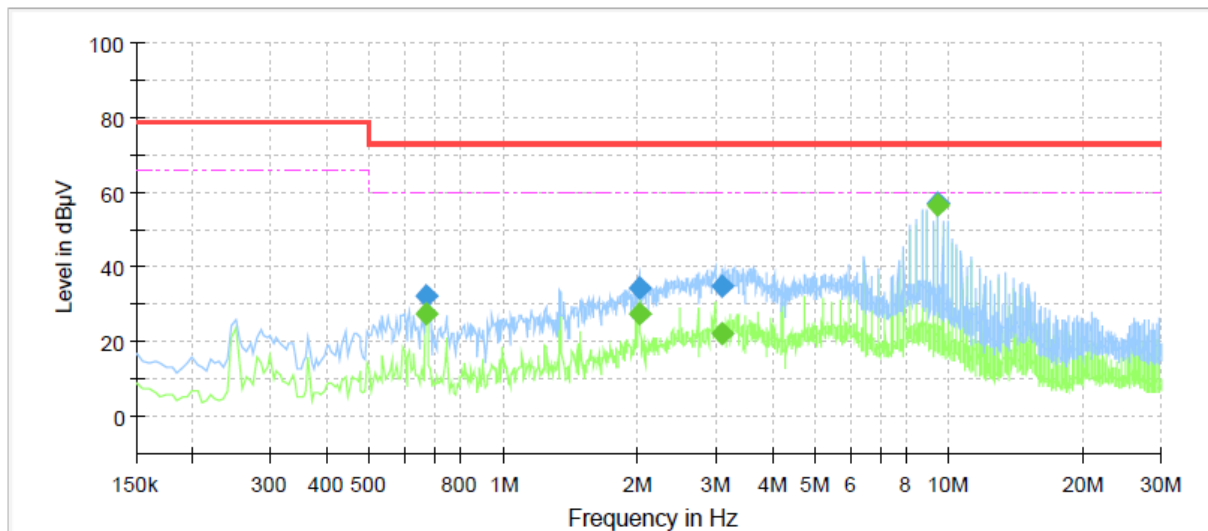
Conducted Emissions at Mains Power Ports

■ AC 24 V Mode

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: QNP-6230HP
Mode: AC
Operator Name: KES



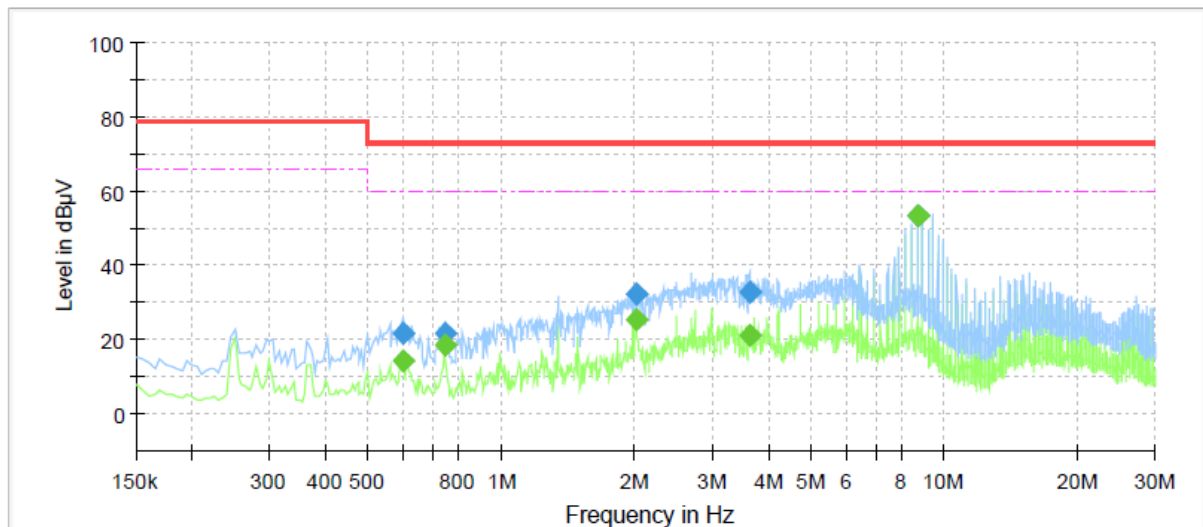
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.670000	---	27.48	60.00	32.52	1000.0	9.000	L1	19.9
0.670000	32.43	---	73.00	40.57	1000.0	9.000	L1	19.9
2.015000	---	27.48	60.00	32.52	1000.0	9.000	L1	20.3
2.015000	34.57	---	73.00	38.43	1000.0	9.000	L1	20.3
3.100000	---	22.22	60.00	37.78	1000.0	9.000	L1	20.1
3.100000	34.81	---	73.00	38.19	1000.0	9.000	L1	20.1
9.440000	---	56.86	60.00	3.14	1000.0	9.000	L1	20.0
9.440000	57.10	---	73.00	15.90	1000.0	9.000	L1	20.0

[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: QNP-6230HP
Mode: AC
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.600000	---	14.48	60.00	45.52	1000.0	9.000	N	19.8
0.600000	21.60	---	73.00	51.40	1000.0	9.000	N	19.8
0.745000	---	18.56	60.00	41.44	1000.0	9.000	N	19.9
0.745000	21.81	---	73.00	51.19	1000.0	9.000	N	19.9
2.015000	---	25.67	60.00	34.33	1000.0	9.000	N	20.2
2.015000	32.11	---	73.00	40.89	1000.0	9.000	N	20.2
3.625000	---	21.14	60.00	38.86	1000.0	9.000	N	20.0
3.625000	32.93	---	73.00	40.07	1000.0	9.000	N	20.0
8.695000	---	53.50	60.00	6.50	1000.0	9.000	N	19.9
8.695000	53.70	---	73.00	19.30	1000.0	9.000	N	19.9

◆ Calculation

QuasiPeak [dBμV] / CAverage [dBμV] = Reading Value [dBμV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



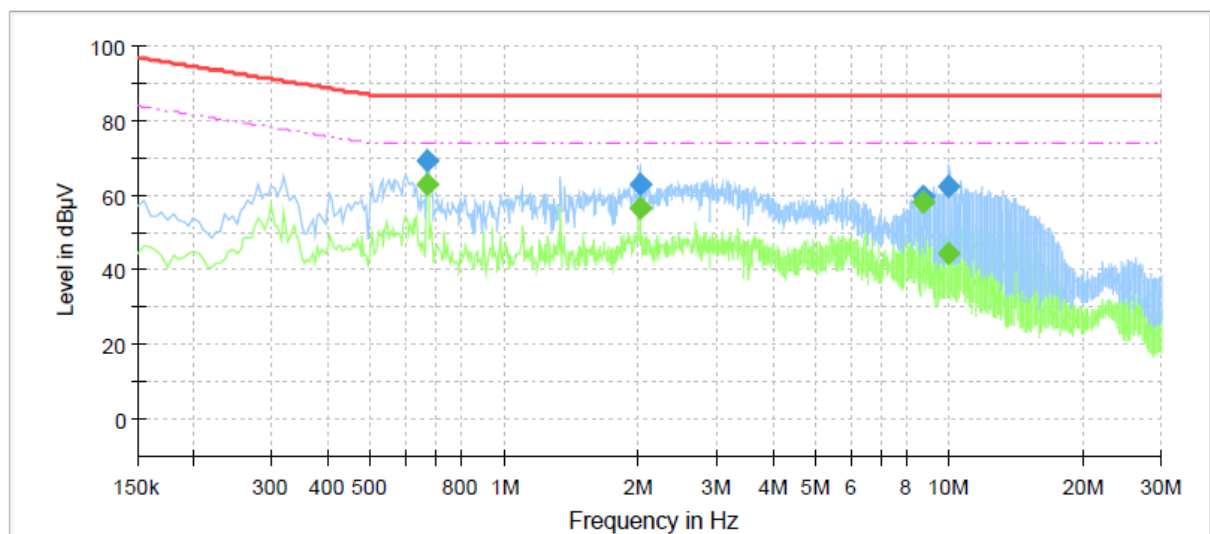
Conducted Emissions at Telecommunication Ports

■ AC 24 V Mode

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QNP-6230HP
Mode: AC 10
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.670000	---	62.95	74.00	11.05	1000.0	9.000	Single Line	19.8
0.670000	69.58	---	87.00	17.42	1000.0	9.000	Single Line	19.8
2.010000	---	56.38	74.00	17.62	1000.0	9.000	Single Line	20.0
2.010000	63.16	---	87.00	23.84	1000.0	9.000	Single Line	20.0
8.700000	---	58.29	74.00	15.71	1000.0	9.000	Single Line	19.6
8.700000	59.93	---	87.00	27.07	1000.0	9.000	Single Line	19.6
10.005000	---	44.57	74.00	29.43	1000.0	9.000	Single Line	19.8
10.005000	62.20	---	87.00	24.80	1000.0	9.000	Single Line	19.8



KES Co., Ltd.

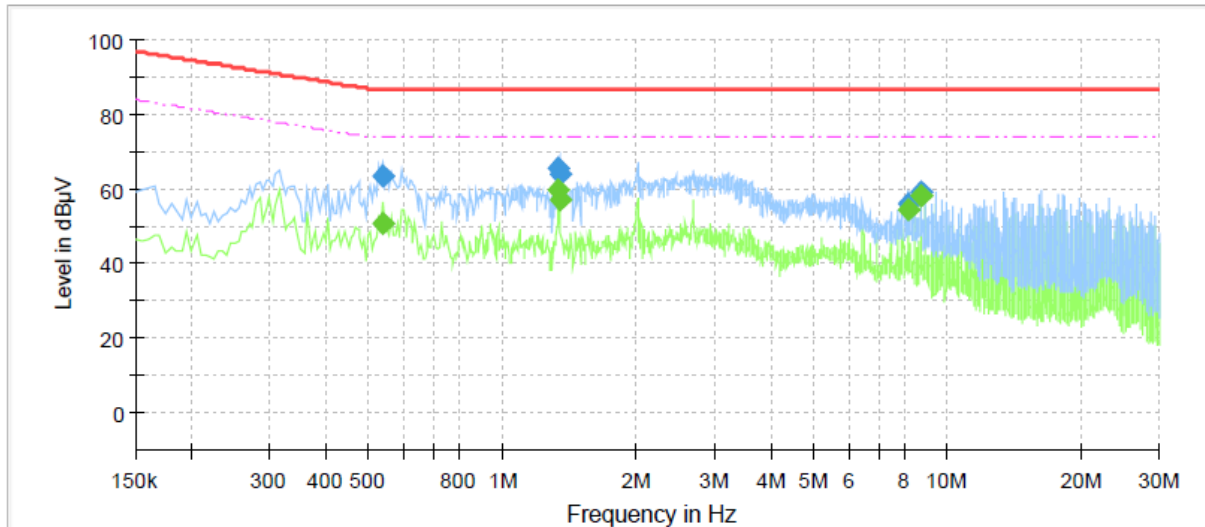
C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-E1-18T0008
Page (19) of (38)

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QNP-6230HP
Mode: AC 100
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.540000	---	51.08	74.00	22.92	1000.0	9.000	Single Line	20.0
0.540000	63.33	---	87.00	23.67	1000.0	9.000	Single Line	20.0
1.340000	---	59.57	74.00	14.43	1000.0	9.000	Single Line	20.2
1.340000	65.54	---	87.00	21.46	1000.0	9.000	Single Line	20.2
1.345000	---	56.97	74.00	17.03	1000.0	9.000	Single Line	20.2
1.345000	64.22	---	87.00	22.78	1000.0	9.000	Single Line	20.2
8.200000	---	54.57	74.00	19.43	1000.0	9.000	Single Line	19.8
8.200000	56.35	---	87.00	30.65	1000.0	9.000	Single Line	19.8
8.700000	---	58.13	74.00	15.87	1000.0	9.000	Single Line	19.9
8.700000	59.12	---	87.00	27.88	1000.0	9.000	Single Line	19.9

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

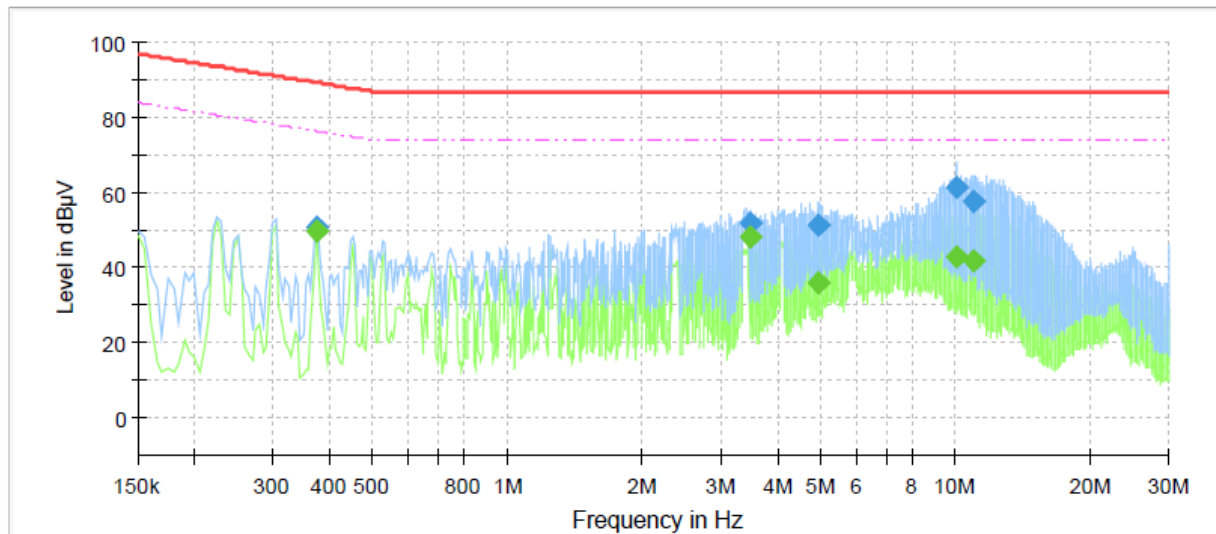


■ PoE Mode

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QNP-6230HP
Mode: POE 10
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.375000	---	49.54	76.39	26.85	1000.0	9.000	Single Line	19.6
0.375000	50.99	---	89.39	38.40	1000.0	9.000	Single Line	19.6
3.480000	---	48.09	74.00	25.91	1000.0	9.000	Single Line	19.8
3.480000	51.95	---	87.00	35.05	1000.0	9.000	Single Line	19.8
4.950000	---	35.86	74.00	38.14	1000.0	9.000	Single Line	19.5
4.950000	51.15	---	87.00	35.85	1000.0	9.000	Single Line	19.5
10.010000	---	43.01	74.00	30.99	1000.0	9.000	Single Line	19.8
10.010000	61.37	---	87.00	25.63	1000.0	9.000	Single Line	19.8
10.925000	---	41.72	74.00	32.28	1000.0	9.000	Single Line	19.9
10.925000	57.92	---	87.00	29.08	1000.0	9.000	Single Line	19.9



KES Co., Ltd.

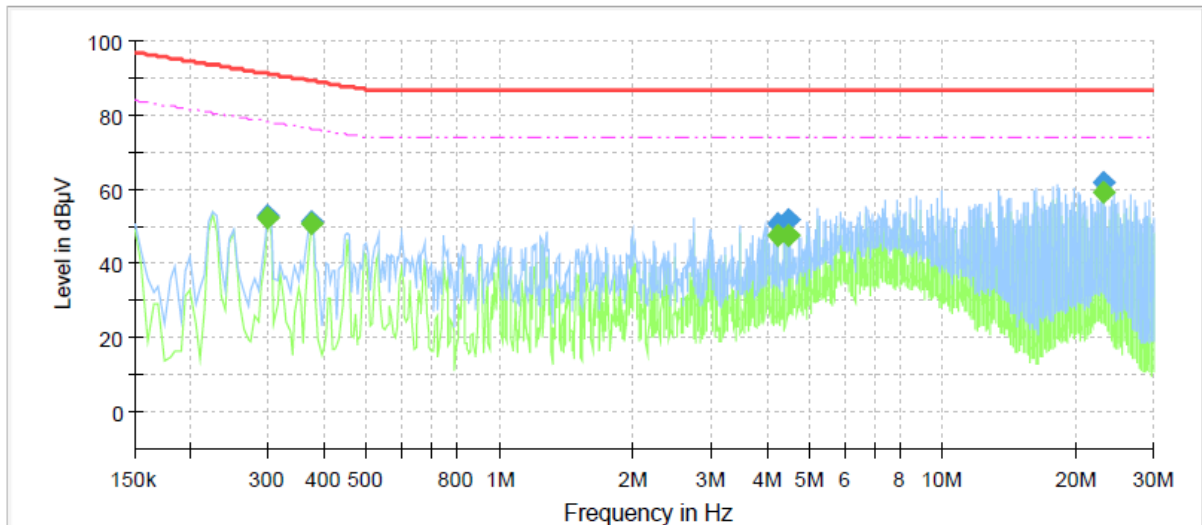
C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-E1-18T0008
Page (21) of (38)

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: QNP-6230HP
Mode: POE 100
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.300000	---	52.62	78.24	25.62	1000.0	9.000	Single Line	19.9
0.300000	53.18	---	91.24	38.06	1000.0	9.000	Single Line	19.9
0.375000	---	50.66	76.39	25.73	1000.0	9.000	Single Line	19.9
0.375000	51.49	---	89.39	37.90	1000.0	9.000	Single Line	19.9
4.225000	---	47.70	74.00	26.30	1000.0	9.000	Single Line	19.9
4.225000	50.64	---	87.00	36.36	1000.0	9.000	Single Line	19.9
4.475000	---	47.69	74.00	26.31	1000.0	9.000	Single Line	19.9
4.475000	51.86	---	87.00	35.14	1000.0	9.000	Single Line	19.9
23.130000	---	59.21	74.00	14.79	1000.0	9.000	Single Line	20.6
23.130000	62.01	---	87.00	24.99	1000.0	9.000	Single Line	20.6

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



KES Co., Ltd.

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

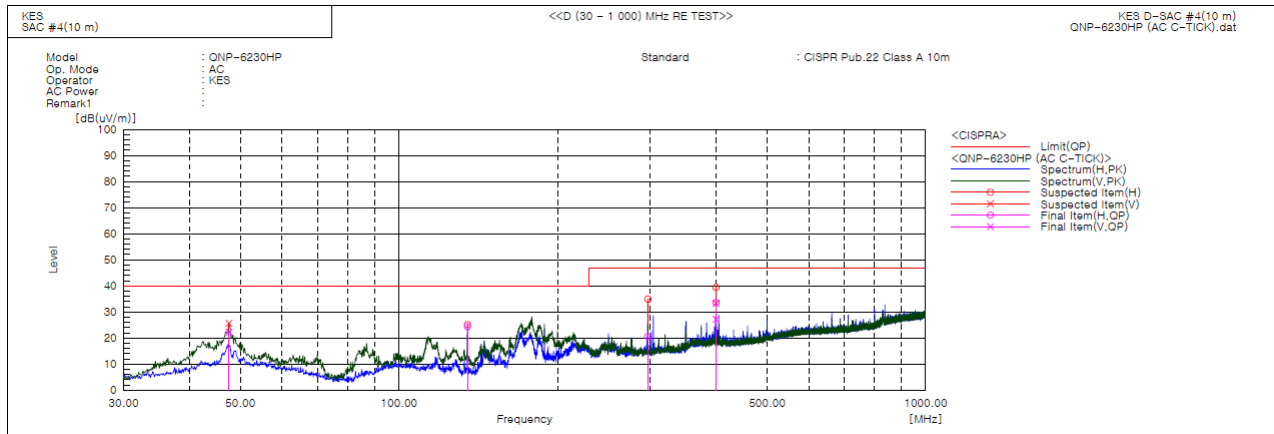
Test report No.:

KES-E1-18T0008

Page (22) of (38)

Radiated Electric Field Emissions(Below 1 GHz)

■ AC 24 V Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	135.003	H	56.3	-31.9	24.4	40.0	15.6	400.0	101.0	
2	296.993	H	44.6	-24.0	20.6	47.0	26.4	200.0	211.0	
3	400.055	H	54.0	-20.4	33.6	47.0	13.4	200.0	140.0	
4	47.581	V	50.2	-27.9	22.3	40.0	17.7	150.0	89.0	
5	400.055	V	47.6	-20.4	27.2	47.0	19.8	400.0	195.0	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



KES Co., Ltd.

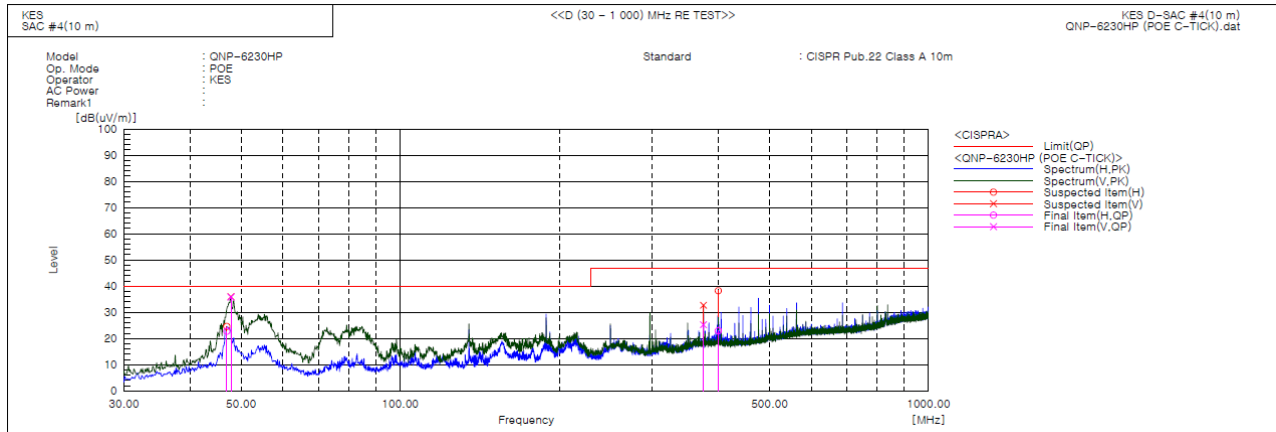
C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-18T0008

Page (23) of (38)

PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	46.975	H	50.8	-28.0	22.8	40.0	17.2	400.0	203.0	
2	400.055	H	43.4	-20.4	23.0	47.0	24.0	200.0	265.0	
3	47.824	V	63.7	-27.9	35.8	40.0	4.2	150.0	304.0	
4	374.956	V	46.6	-21.3	25.3	47.0	21.7	100.0	340.0	

Calculation - SAC #4(10 m)

Result(QP) [dB(μ V/m)] = (Reading(QP)[dB(μ V)] + c.f[dB(1/m)])

Margin(QP)[dB] = Limit[dB(μ V/m)] - Result(QP) [dB(μ V/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



KES Co., Ltd.

C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

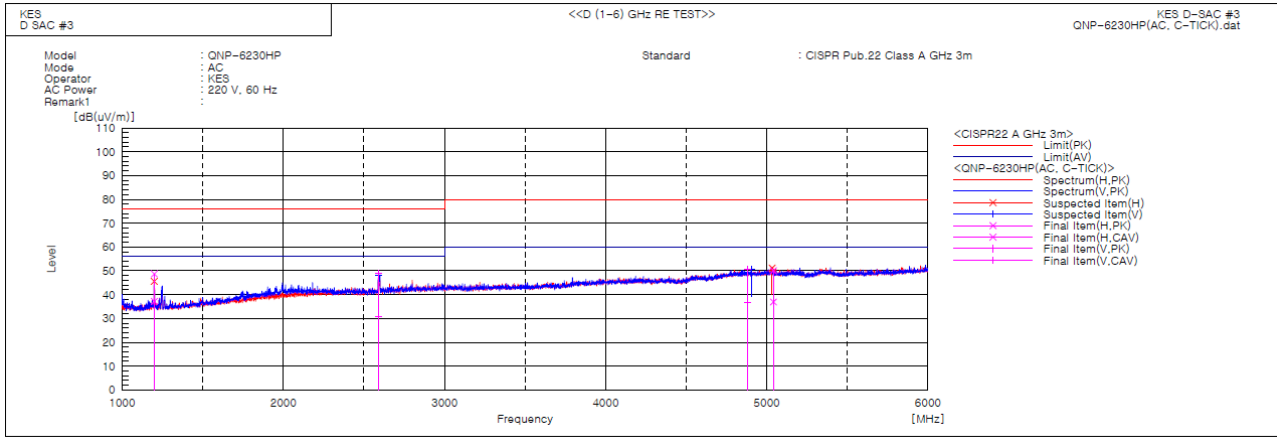
Test report No.:

KES-E1-18T0008

Page (24) of (38)

Radiated Electric Field Emissions(Above 1 GHz)

■ AC 24 V Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result CAV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1200.170	H	57.2	45.7	-8.5	48.7	37.2	76.0	56.0	27.3	18.8	100.0	195.0	
2	2590.210	V	47.9	29.9	0.9	48.8	30.8	76.0	56.0	27.2	25.2	100.0	323.9	
3	4880.125	V	40.3	26.6	10.1	50.4	36.7	80.0	60.0	29.6	23.3	100.0	268.0	
4	5041.528	H	39.6	26.5	10.5	50.1	37.0	80.0	60.0	29.9	23.0	100.0	235.2	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.



KES Co., Ltd.

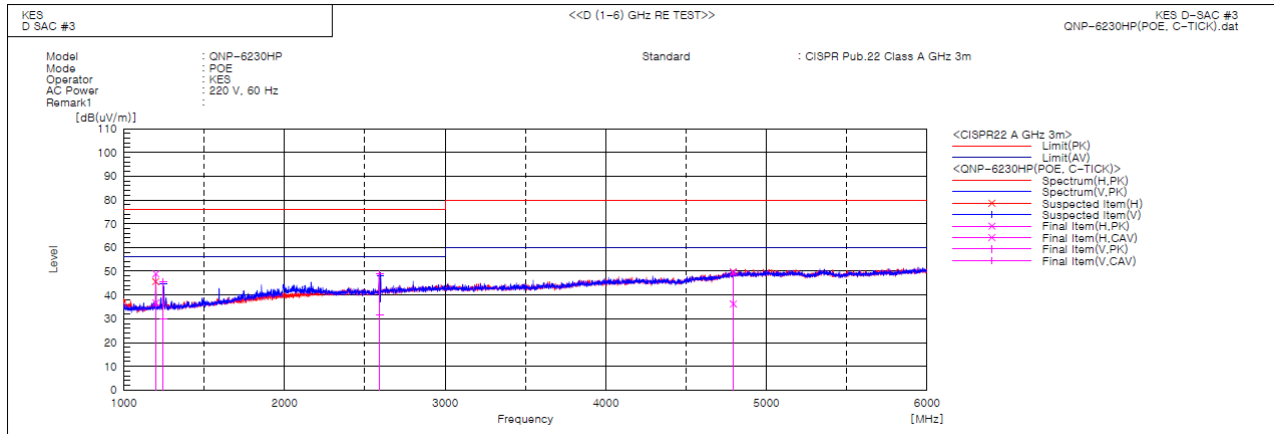
C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-18T0008

Page (25) of (38)

PoE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1200.190	H	57.4	45.2	-8.5	48.9	36.7	76.0	56.0	27.1	19.3	100.0	234.0	
2	1246.310	V	53.8	38.3	-8.2	45.6	30.1	76.0	56.0	30.4	25.9	100.0	185.3	
3	2593.841	V	47.9	30.5	1.0	48.9	31.5	76.0	56.0	27.1	24.5	100.0	65.0	
4	4794.190	H	40.0	26.7	9.5	49.5	36.2	80.0	60.0	30.5	23.8	100.0	201.5	

Calculation

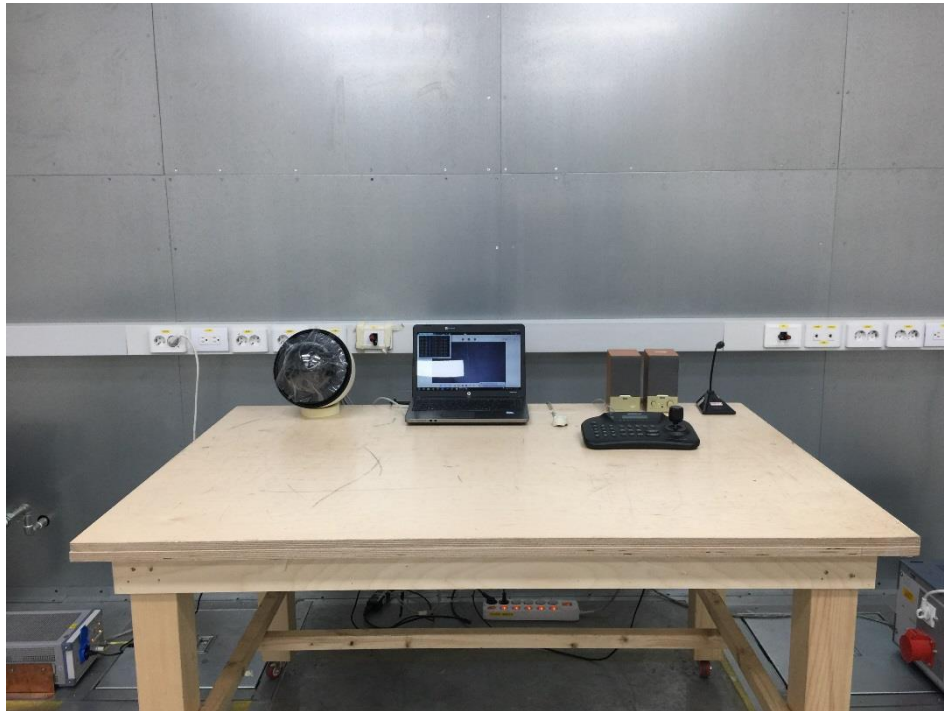
Over Limit [dB] = (Read Level[dB μ V] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dB μ V]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor, Cable Loss : Cable loss, Preamp Factor : Preamp Factor

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

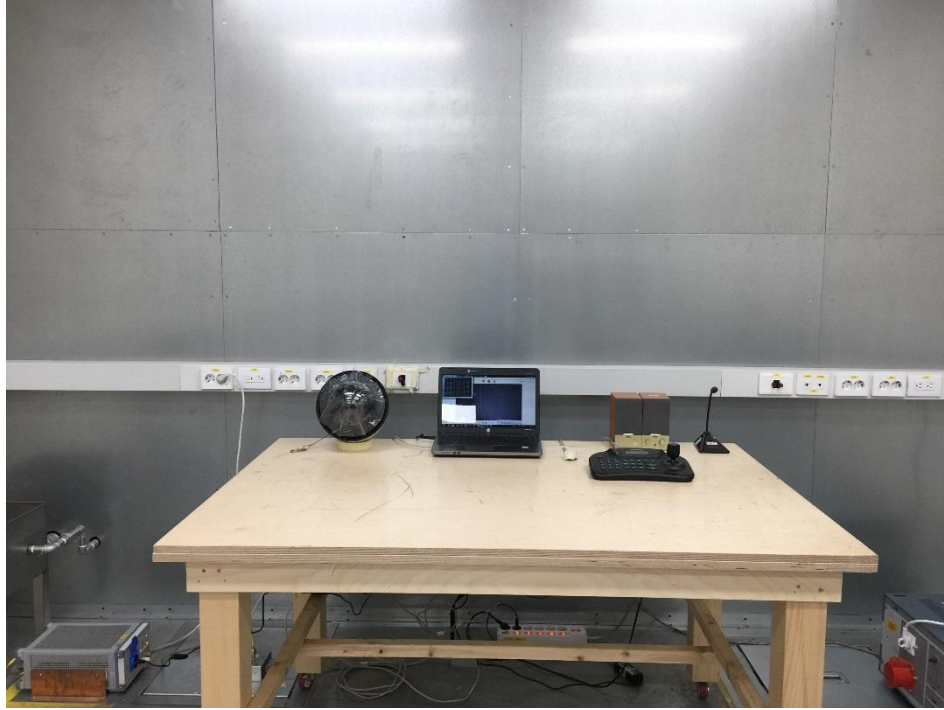
Test Setup Photos and Configuration

Conducted Voltage Emissions



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Conducted Telecommunication Emissions



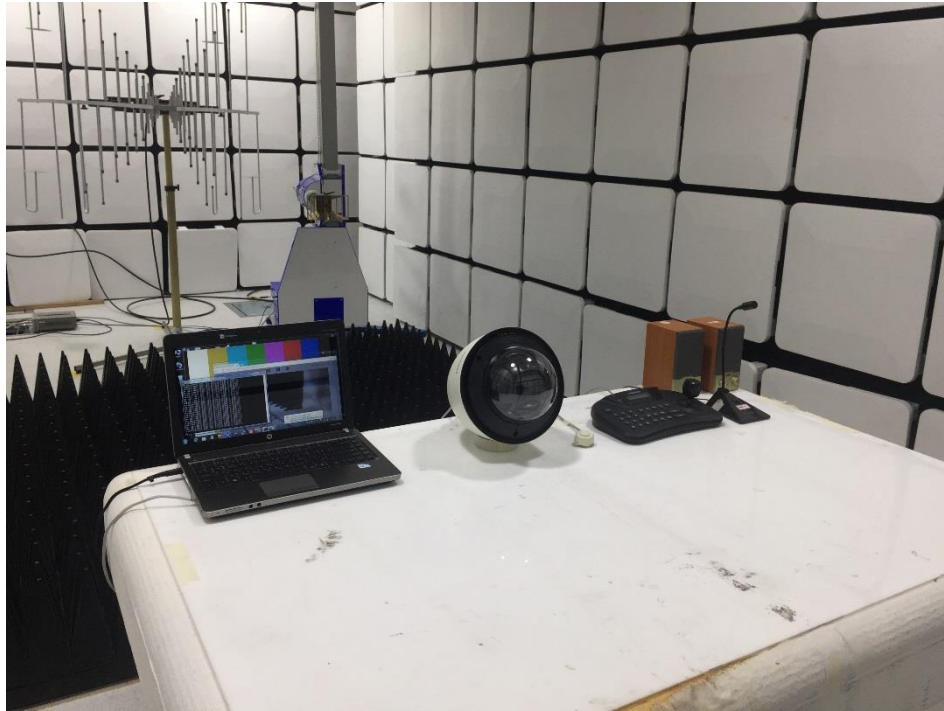
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Radiated Electric Field Emissions(Below 1 GHz)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

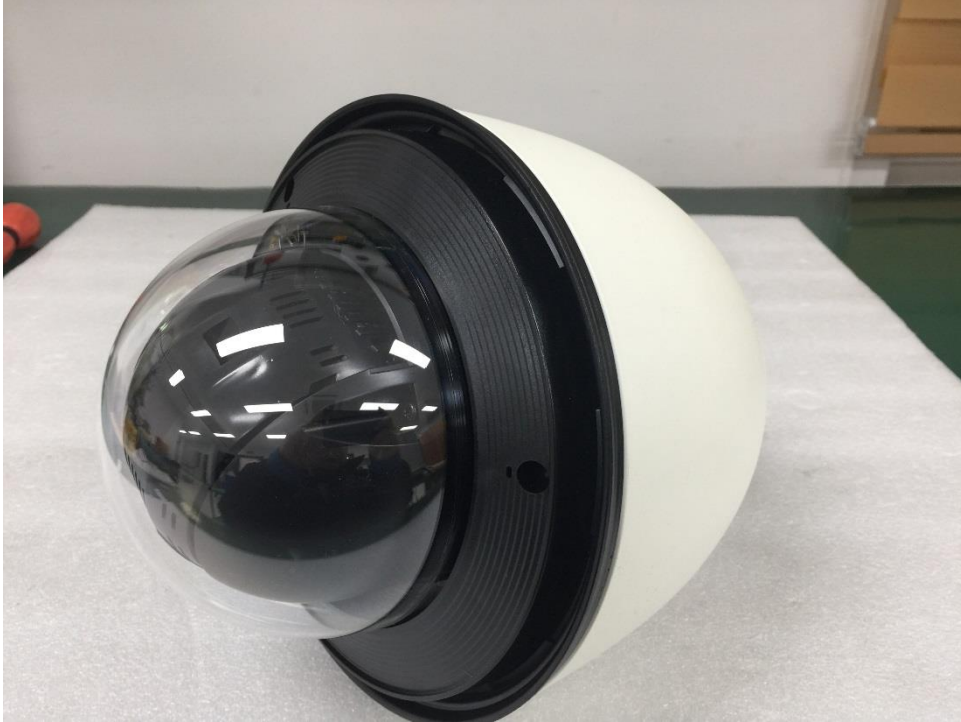
Radiated Electric Field Emissions(Above 1 GHz)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT External Photographs

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

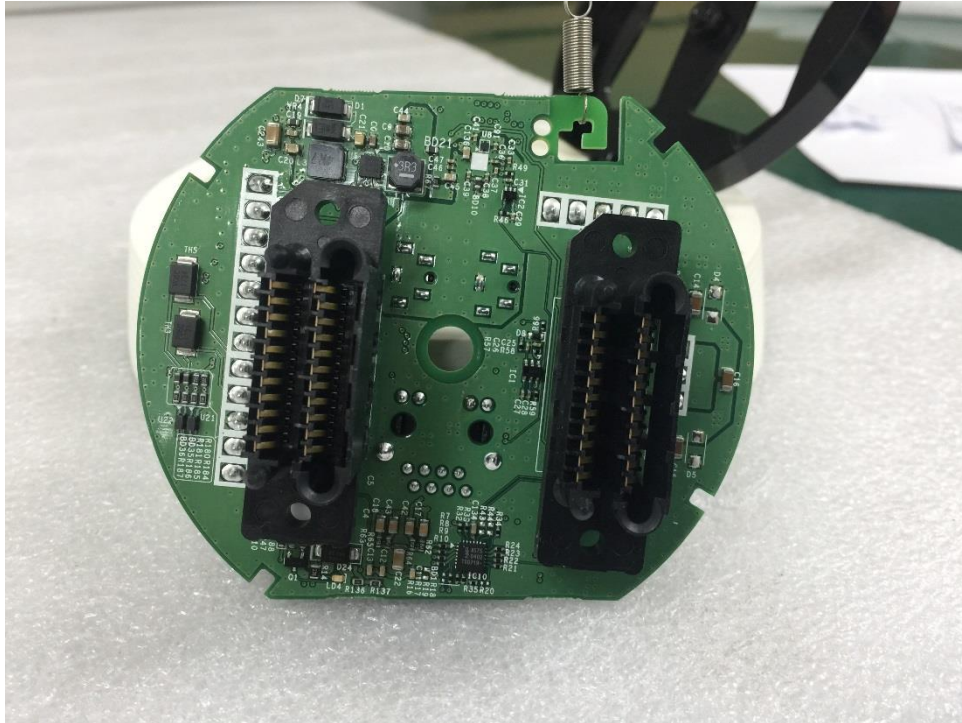
EUT Internal Photographs

(Internal View)

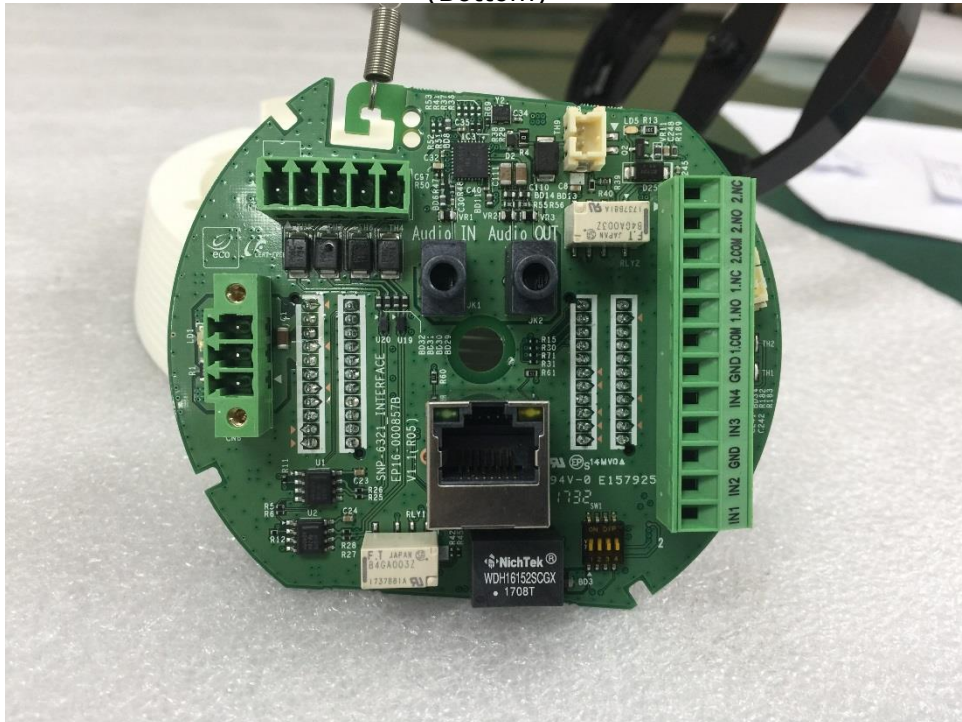


EUT Internal View – Board 1

(Top)



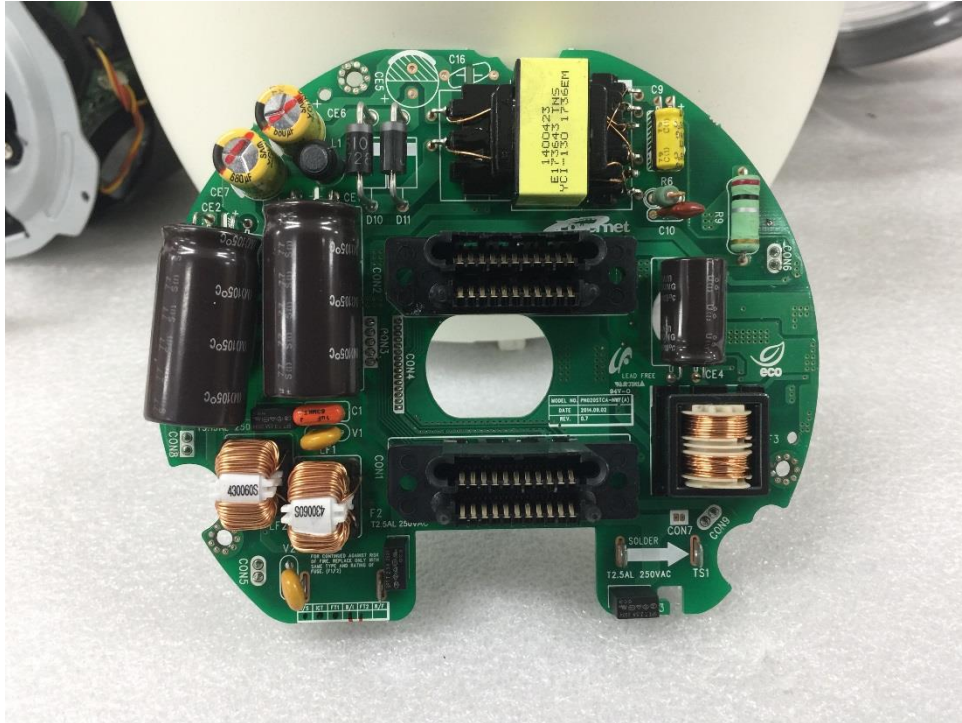
(Bottom)



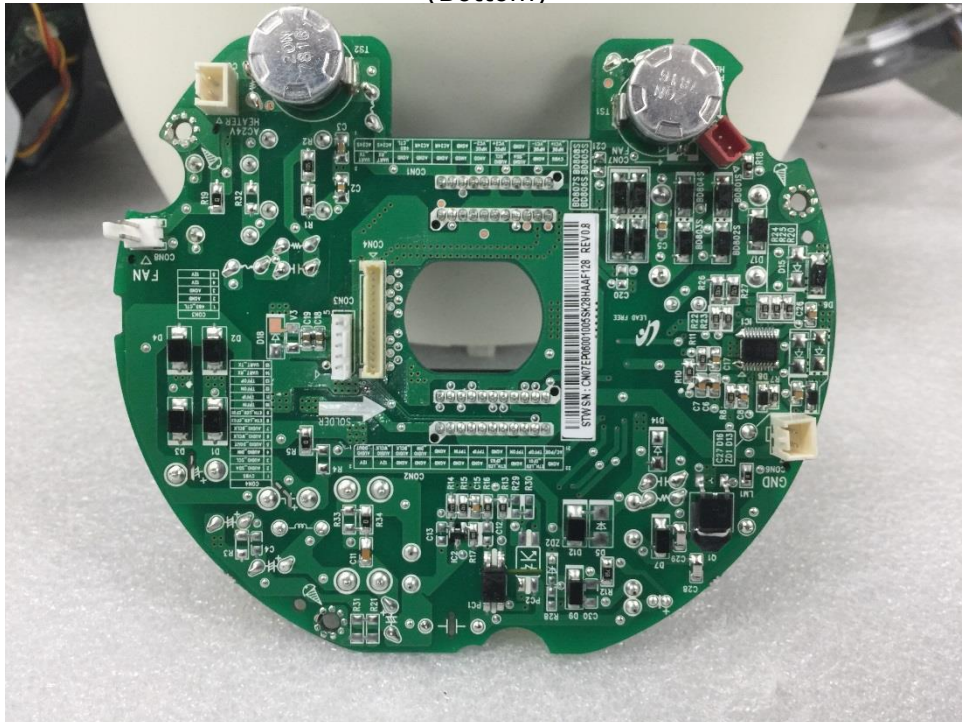
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 2

(Top)



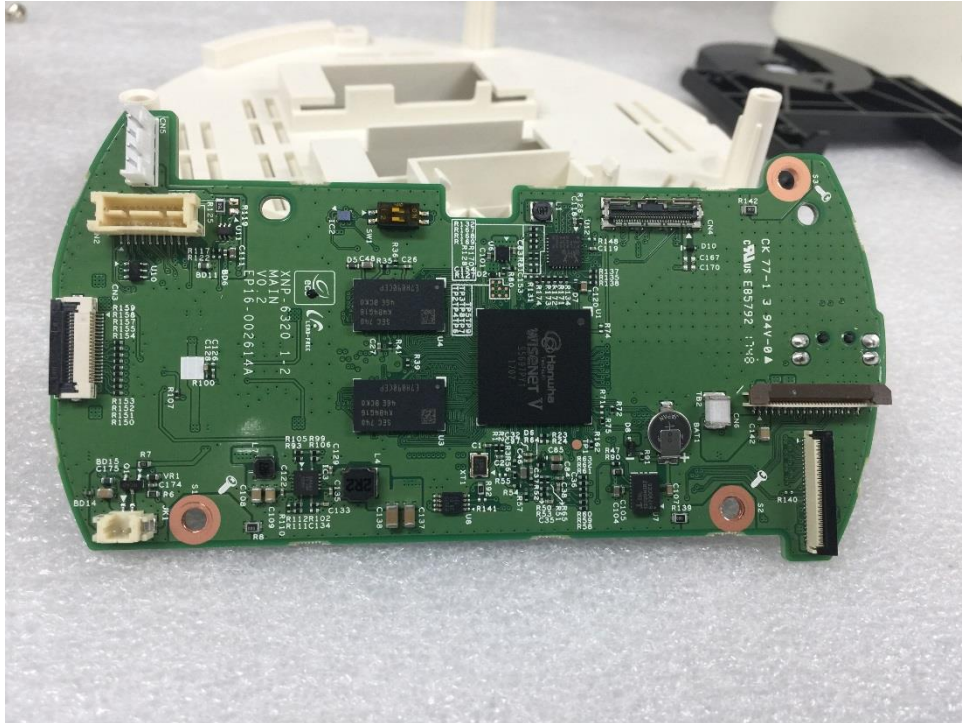
(Bottom)



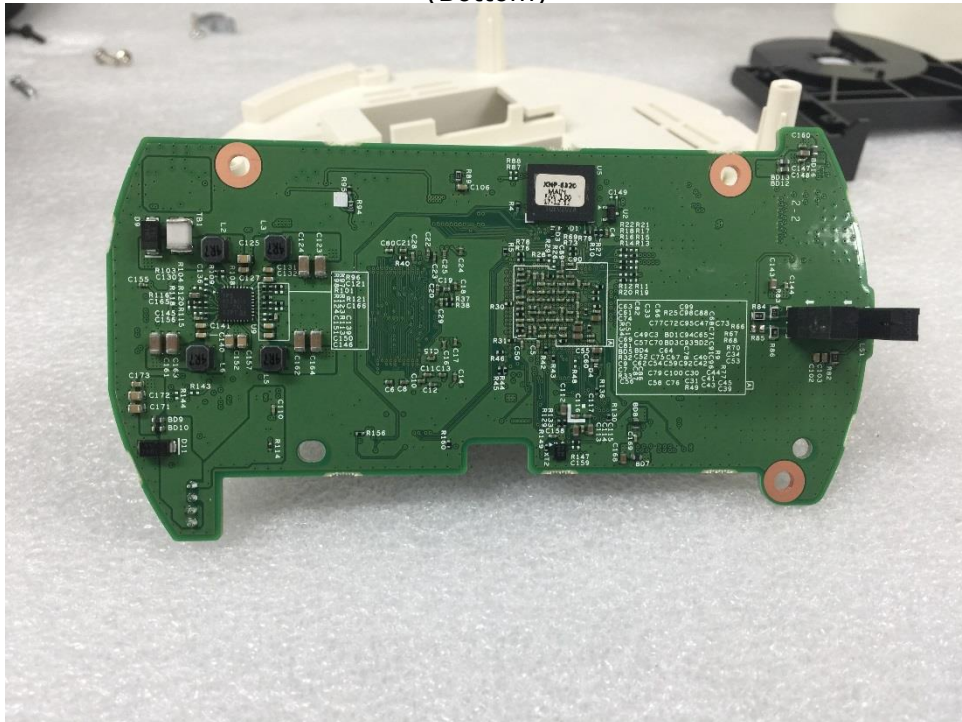
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 3

(Top)



(Bottom)



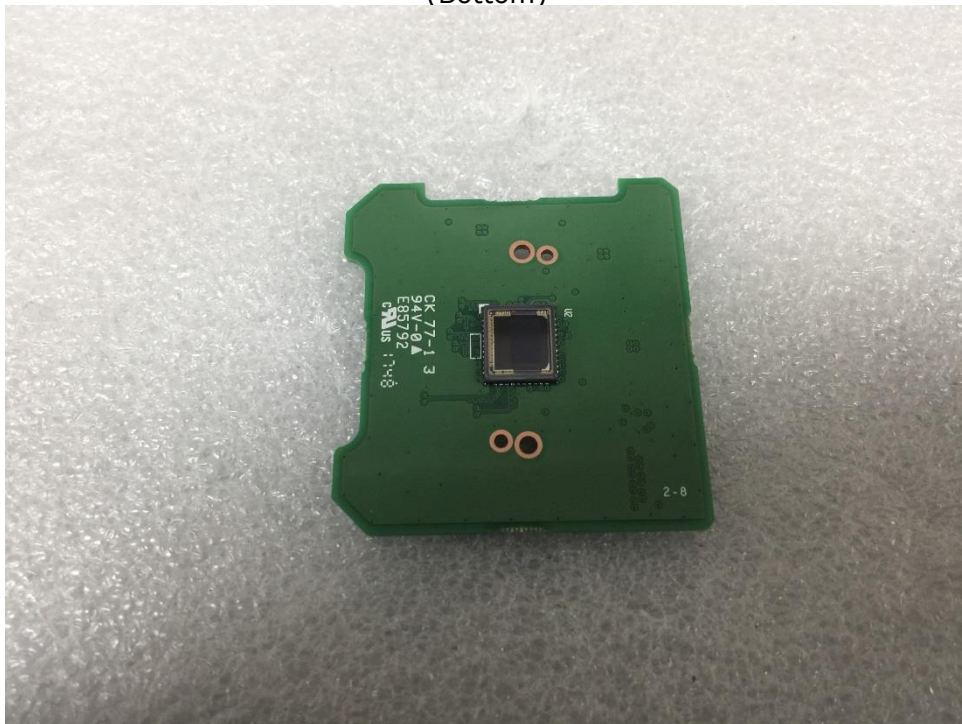
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 4

(Top)



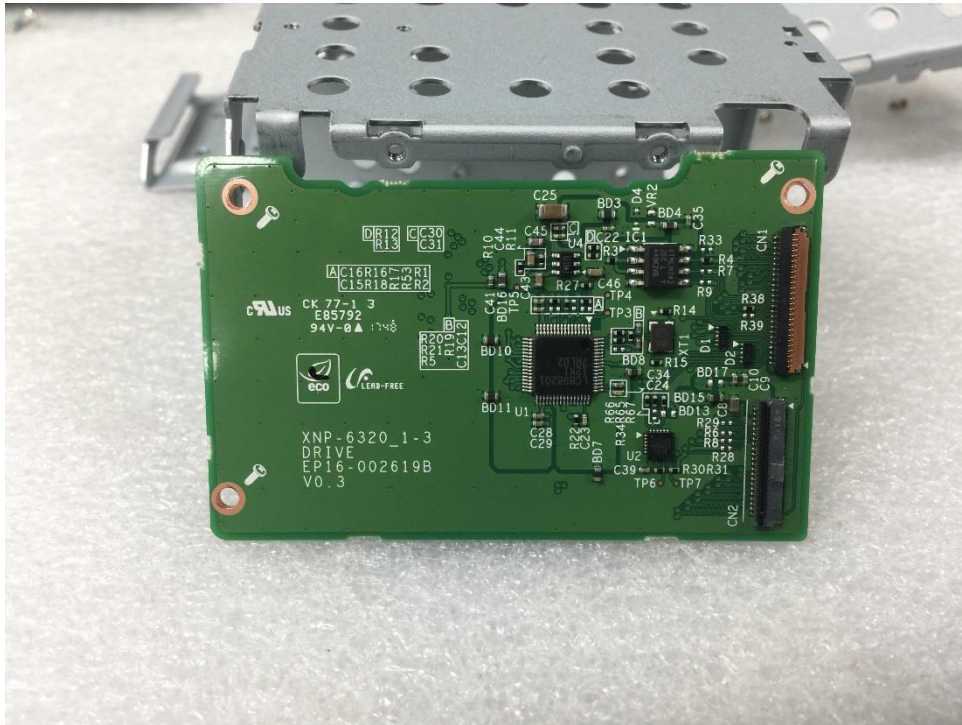
(Bottom)



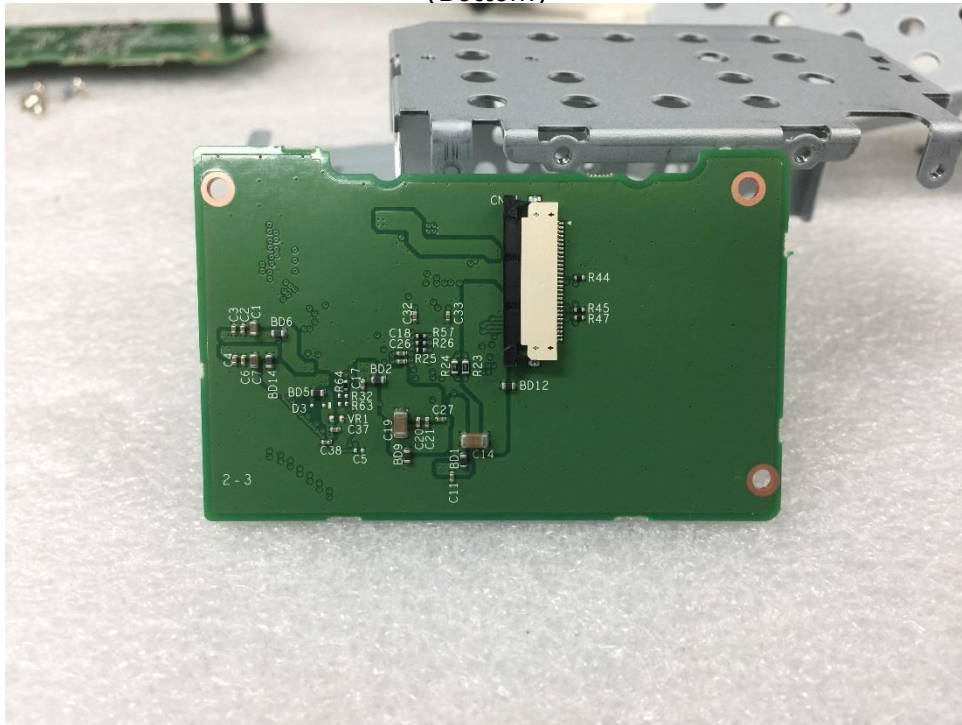
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 5

(Top)



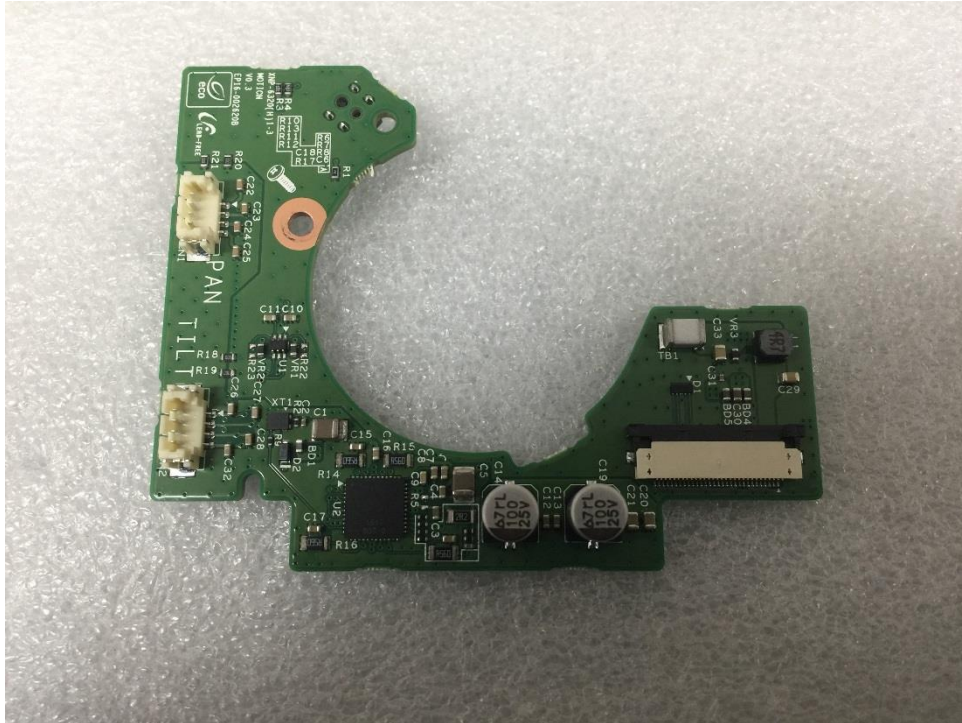
(Bottom)



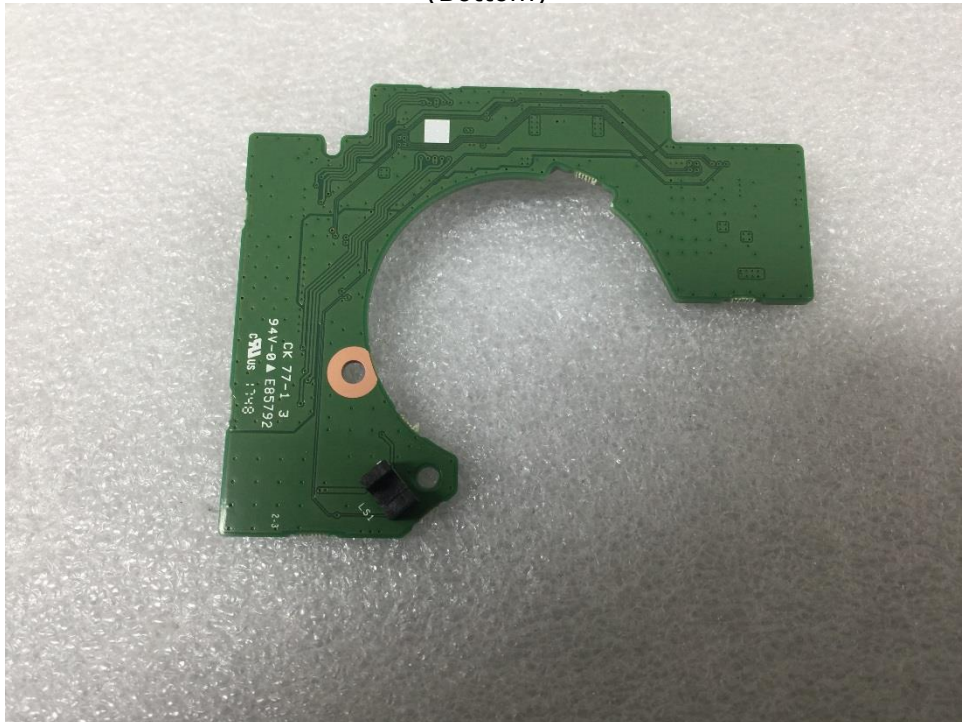
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 6

(Top)



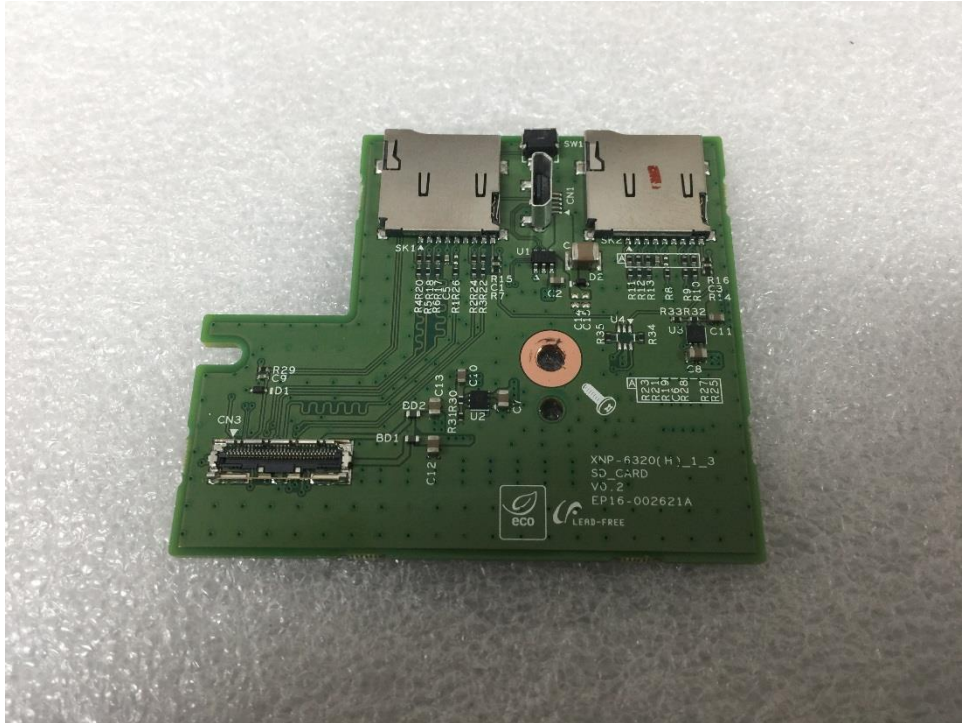
(Bottom)



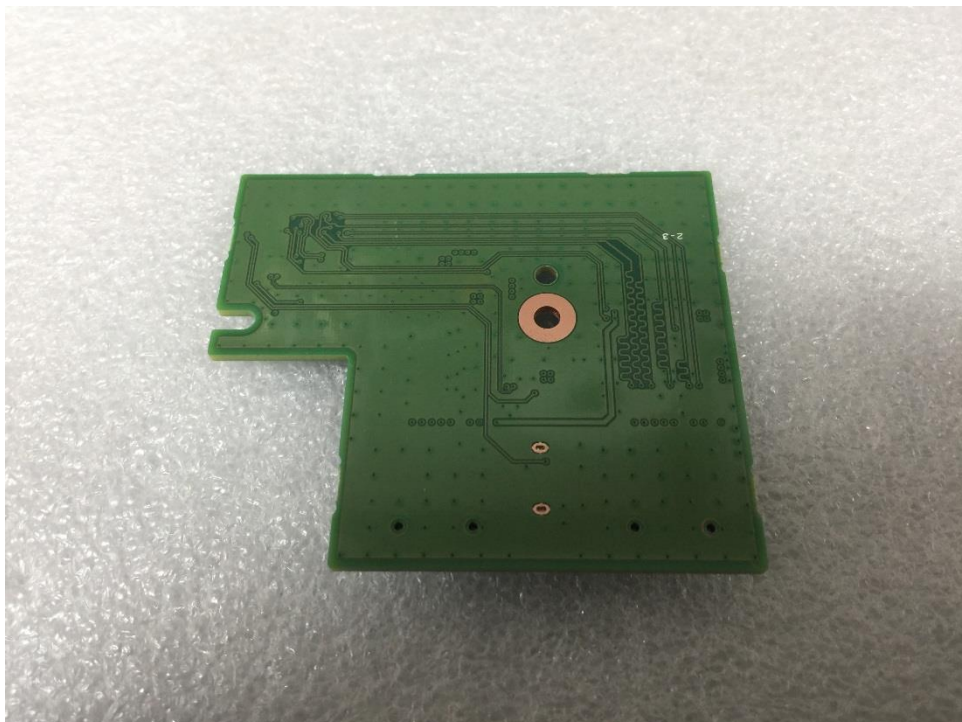
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

EUT Internal View – Board 6

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.