



## EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0495-R1  
Date of Issue : Oct. 24, 2017  
Product name : CCTV CAMERA  
Model/Type No. : HCB-6000P  
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 : Jul. 20, 2017  
Test date : Jul. 27, 2017 – Jul. 31, 2017  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Young Suk, Song  
EMC Test Engineer

Reviewed by

Dong-Hun, Jang  
EMC Technical Manager

This test report is not related to KOLAS.

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**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
Aug. 03, 2017	KES-E1-17T0495	Issued
Oct. 24, 2017	KES-E1-17T0495-R1	Standard Revision

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## 1.0 General Product Description

### Main Specifications of E.U.T are:

Video	
Imaging Device	1/2.8" 2M CMOS
Total Pixels	1,945(H) x 1,109(V) 2.16M pixels
Effective Pixels	1,945(H) x 1,097(V) 2.13M pixels
Scanning System	Progressive Scan
Min. Illumination	Color : 0.15Lux (F1.2, 50IRE); 0.09Lux (F1.2, 30IRE) B/W : 0.015Lux (F1.2, 50IRE); 0.009Lux (F1.2, 30IRE)
S / N Ratio	52dB (AGC off, Weight on)
Video Output	BNC(AHD / TVI / CVI / CVBS Selectable)
Resolution	1920 x 1080
Max. Framerate	30fps @1080p 25fps @1080p
Lens Type	
Focal Length (Zoom Ratio)	-
Max. Aperture Ratio	-
Angular Field of View	-
Min. Object Distance	-
Focus Control	-
Lens Type	-
Mount Type	C/CS
Operational	
IR LED	-
Viewable length	-
On Screen Display	Multi-language Support(16) English, Japanese, Spanish, French, Portuguese, Korean, German, Italian, Russian, Polish, Czech, Romanian, Serbian, Swedish, Danish, Turkish
Camera Title	Off / On (Displayed 15 characters)

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Day & Night	Auto (ICR) / External / Color / B/W
Backlight Compensation	Off / User BLC / HLC
Wide Dynamic Range	120dB
Contrast Enhancement	-
Digital Noise Reduction	SSNR4 ( Off / On )
Defog	AUTO / MANUAL / OFF
Digital Image Stabilization	Not support
Motion Detection	Off / On(4 zones)
Privacy Masking	Off / On (4zones rectangle)
Gain Control	Off / Low / Middle / High / Very High
White Balance	ATW / Outdoor / Indoor / Manual / AWC (1,800K° ~ 10,500K°)
LDC (Lens Distortion Correction)	Not support
Electronic Shutter Speed	1sec~ 1/12,000sec
Digital Zoom	Not support
Reverse	Off / H-Rev / V-Rev / HV-Rev
Profile	Basic, Day & Night, Backlight, ITS, Indoor, User
Intelligent Video Analytics	Not support
Alarm	(MD) output 1, External D/N 1
Remote control interface	Coaxial, RS-485
Protocol	Coax : Pelco-C(coaxitron), ACP(AHD Coax Protocol) RS-485 : Samsung T/E, Pelco D/P, Panasonic Bosch, Honeywell, Vicon, GE, AD
Video Transmission Distance	500m(5C2V Coaxial Cable)
<b>Environmental</b>	
Operating Temperature / Humidity	-10°C ~ +55°C (+14°F ~ +131°F) / Less than 90% RH
Ingress Protection	-
Vandal Resistance	-
<b>Electrical</b>	
Input Voltage/Current	Dual ( 24VAC±10% & 12VDC±10% )
Power Consumption	Max. 3.5W
<b>Mechanical</b>	
Color / Material	Ivory / Plastic
Dimension (WxHxD)	92.7*59.6*68.4
Weight	231g

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## 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 ☐ 230Vac ☐ 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
CCTV CAMERA	HCB-6000P	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T

## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
MONITOR	M1962DL	010NDTC5Z497	LG Electronics Nanjing Display Co., Ltd.	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adaptor	RS-AB1000	-	Dongguan Jinhua Sheng Power Technology Co.,Ltd.	-
LENS	AG3Z3112FCS-MPIR	-	computar	-



## 1.6 External I/O Cabling

- AC 24 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
CCTV CAMERA (E.U.T)	BNC	MONITOR	Component	3.0	S
	IRIS	LENS	IRIS	0.1	U
	2 Pin	Controller	2 Pin	3.0	U

- DC 12 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
CCTV CAMERA (E.U.T)	BNC	MONITOR	Component	3.0	S
	IRIS	LENS	IRIS	0.1	U
	2 Pin	Controller	2 Pin	3.0	U

\* Unshielded=U, Shielded=S

## 1.7 E.U.T Operating Mode(s)

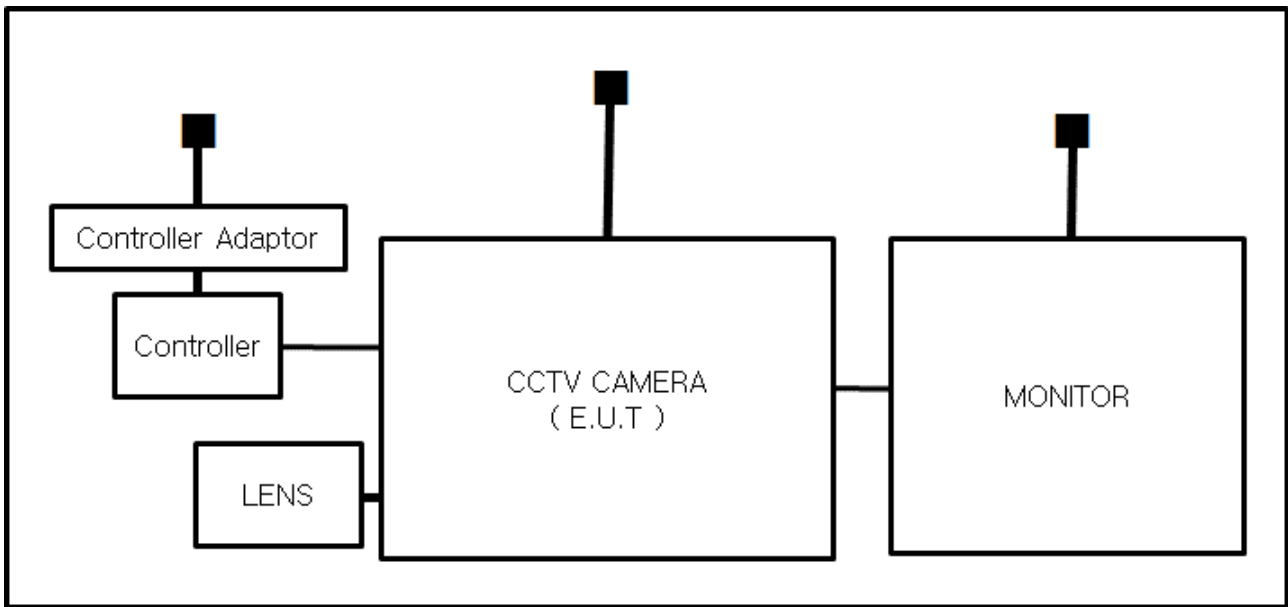
Test mode	operating
AC 24 V	E.U.T Monitoring
DC 12 V	E.U.T Monitoring

E.U.T Test operating S/W		
Name	Version	Manufacture Company
-	-	-

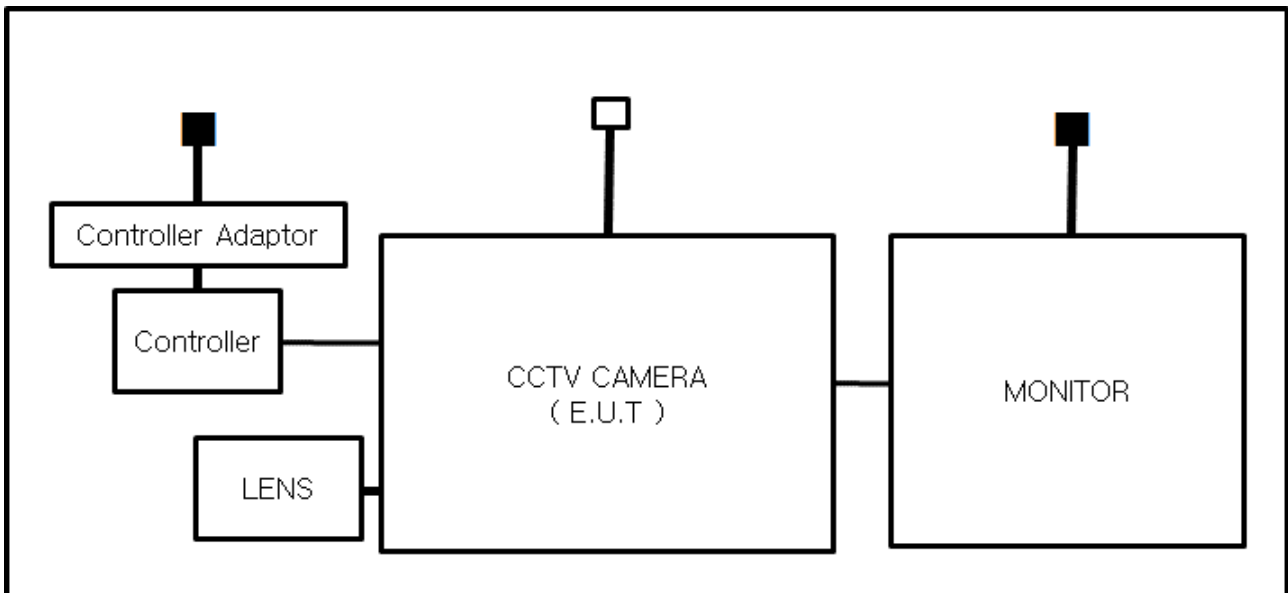
## 1.8 Configuration

■ AC Main  
□ DC Main

- AC 24 V Mode



- DC 12 V Mode



## 1.9 Remarks when standards applied

- N/A

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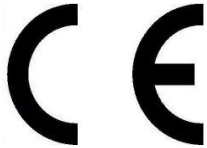

## 1.10 Calibration Details of Equipment Used for Measurement

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, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

## 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)	



## 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 61547:2009

☒ EN 55032:2012

☒ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☒ EN 50130-4:2011

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



- 
- |   |                                  |                                  |
|---|----------------------------------|----------------------------------|
| <input type="checkbox"/> <b>VCCI V-3 / 2015.04</b>            | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>AS/NZS CISPR22:2009 +A1:2010</b>  | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>47 CFR Part 15, Subpart B</b>     |                                  |                                  |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010               | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2009                      |                                  |                                  |
| <input type="checkbox"/> <b>IC Regulation ICES-003 : 2016</b> |                                  |                                  |
| <input type="checkbox"/> CAN/CSA CISPR 22-10                  | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014                      |                                  |                                  |
| <br><input type="checkbox"/> <b>RE- Directive 2014/53/EU</b>  |                                  |                                  |
| <br><input type="checkbox"/> EN 301 489-1 V1.9.2              |                                  |                                  |
| <input type="checkbox"/> Equipment for fixed use              |                                  |                                  |
| <input type="checkbox"/> Equipment for vehicular use          |                                  |                                  |
| <input type="checkbox"/> Equipment for portable use           |                                  |                                  |
| <br><input type="checkbox"/> EN 301 489-3 V1.6.1              |                                  |                                  |
| <br><input type="checkbox"/> EN 301 489-17 V2.2.1             |                                  |                                  |
| <br><input type="checkbox"/> EN 60945:2002                    |                                  |                                  |



## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

Jul. 27, 2017

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	04, 27, 2018
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	02, 03, 2018
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	04, 27, 2018
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017

### Test Conditions

Temperature: 24,0 °C

Relative Humidity: 53,4 %

### 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

N/A

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	04, 27, 2018
<input type="checkbox"/>	LISN	ENV216	R & S	101137	02, 03, 2018
<input type="checkbox"/>	LISN	ENV216	R & S	101786	04, 27, 2018
<input type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
<input type="checkbox"/>	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 29, 2018
<input type="checkbox"/>	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 29, 2018
<input type="checkbox"/>	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 11, 2017

### Test Conditions

Temperature: °C

Relative Humidity: %

### 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

N/A



## 2.3 Radiated Electric Field Emissions(Below 1 GHz)

### Test Date

Jul. 27, 2017

### Test Location

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

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 18, 2018
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	12, 13, 2017
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

### Test Conditions

Temperature: 25,1 °C

Relative Humidity: 52,1 %

### 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

Jul. 28, 2017

### Test Location

SEMI ANECHOIC CHAMBER #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR7	R & S	101190	08, 08, 2017
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2018
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

### Test Conditions

Temperature: 24,9 °C  
Relative Humidity: 48,4 %

### 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.







### 3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 +A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

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 is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

#### Radiated electromagnetic fields

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 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 picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to 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.

---

**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 discharge is permissible, providing

That there is no residual 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.

**Conducted RF immunity**

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 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 oeuvres at  $U = 130 \text{ dB}\mu\text{V}$ .

For component of CCTV systems, where the status is monitored by observing the TV picture,  
then deterioration of the picture is allowed at  $U = 140 \text{ dB}\mu\text{V}$ , 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  $U = 130 \text{ dB}\mu\text{V}$ , any deterioration of the picture is so minor that the system could still be used; and
- (c) there in no observable deterioration of the picture at  $U = 120 \text{ dB}\mu\text{V}$ .

**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, after the conditioning.



### 3.1 Electrostatic Discharge

#### Reference Standard

EN 61000-4-2:2009

#### Test Date

Jul. 28, 2017

#### Test Location

EMS-ESD: Electro wave Shieldroom

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	-	-	-	-
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2018
<input checked="" type="checkbox"/>	HCP	-	Noise Ken	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

#### Test Conditions

Temperature: 22,1 °C  
Relative Humidity: 51,5 %  
Atmospheric Pressure: 99,4 kPa



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### Test Specifications

Discharge Factor:  $\geq 1$  s

Discharge Impedance: 330 ohm / 150 pF

Kind of Discharge: Air, Contact (direct and indirect)

Polarity: Positive and Negative

Number of Discharge: 10 at all locations for Air discharge  
10 at all locations for Contact discharge

Discharge Voltage:	Contact	Air	HCP	VCP
	<input type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 2 kV	<input type="checkbox"/> 2 kV	<input type="checkbox"/> 2 kV
	<input type="checkbox"/> 4 kV	<input checked="" type="checkbox"/> 4 kV	<input type="checkbox"/> 4 kV	<input type="checkbox"/> 4 kV
	<input checked="" type="checkbox"/> 6 kV	<input type="checkbox"/> 6 kV	<input checked="" type="checkbox"/> 6 kV	<input checked="" type="checkbox"/> 6 kV
	<input type="checkbox"/> 8 kV	<input checked="" type="checkbox"/> 8 kV	<input type="checkbox"/> 8 kV	<input type="checkbox"/> 8 kV
	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV

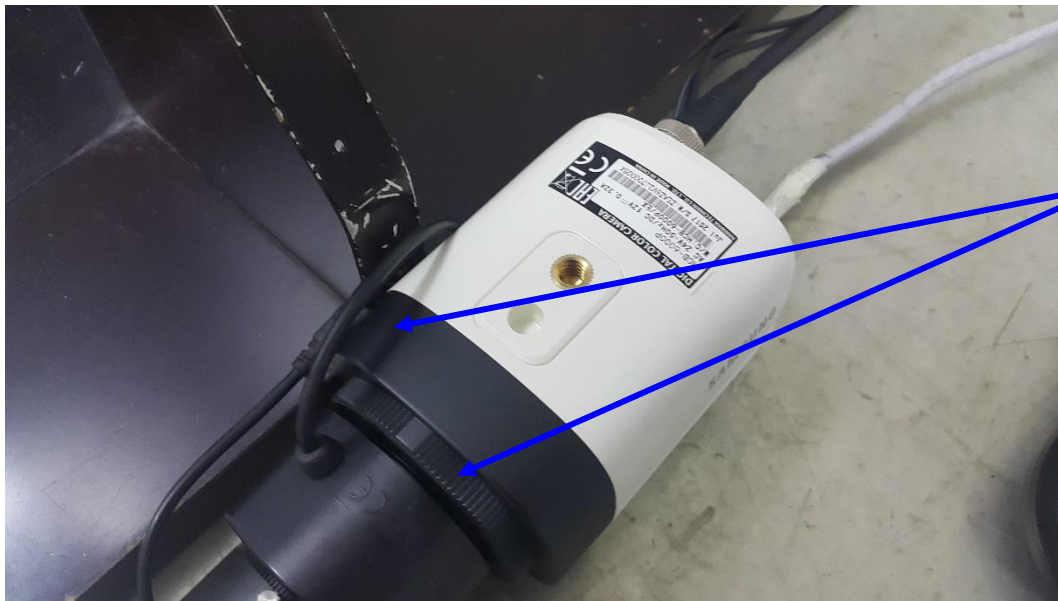
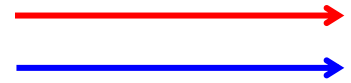
Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

**Location of Discharge:**

Air
Contact



1



## Test Data

### - AC 24 V Mode

#### Indirect Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

#### Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact Discharge	Complied	-

### - DC 12 V Mode

#### Indirect Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

#### Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

## Test Results

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

## Remarks

PASS Required Performance Criteria.



## 3.2 Radiated Electric Field Immunity

### Reference Standard

EN 61000-4-3:2006 +A2:2010

### Test Date

Jul. 28, 2017

### Test Location

EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 08, 2017
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 08, 2017
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 08, 2017
<input checked="" type="checkbox"/>	POWER METER	NRP2	R & S	103475	08, 08, 2017
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 08, 2017
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 08, 2017
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-

### Test Conditions

Temperature: 24,9 °C  
Relative Humidity: 48,4 %  
Atmospheric Pressure: 99,4 kPa





## Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☐ 3 V/m  
☒ 10 V/m

Frequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz  
☒ 80 MHz to 2,7 GHz

Modulation: ☒ AM, 80 %, 1 kHz sine wave  
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☒ 1 s ☐ 3 s

# of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied

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**Test Data**

- AC 24 V Mode

Side Exposed	Observations	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

- DC 12 V Mode

Side Exposed	Observations	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

**Remarks**

PASS Required Performance Criteria.

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### 3.3 Electrical Fast Transients/Bursts

**Reference Standard**

EN 61000-4-4:2012

**Test Date**

Jul. 31, 2017

**Test Location**

EMS-EFT: Electro wave Shieldroom

**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.3.9	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2018

**Test Conditions**Temperature: 21,7 °C  
Relative Humidity: 49,5 %  
Atmospheric Pressure: 99,3 kPa**Test Specifications**

Pulse Amplitude & Polarity: (AC Power Lines)	<input type="checkbox"/> ± 1.0 kV <input type="checkbox"/> ± 4.0 kV	<input checked="" type="checkbox"/> ± 2.0 kV
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	<input type="checkbox"/> ± 0.5 kV <input type="checkbox"/> ± 2.0 kV	<input checked="" type="checkbox"/> ± 1.0 kV
Burst Period:	<input checked="" type="checkbox"/> 300 ms	<input type="checkbox"/> 2 s
Repetition Rate:	<input type="checkbox"/> 5 kHz	<input checked="" type="checkbox"/> 100 kHz
Duration of Test Voltage:	<input checked="" type="checkbox"/> ≥ 1 min	
Required Performance Criteria:	<input checked="" type="checkbox"/> Complied	



## Test Data

- AC 24 V Mode

☒ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L – N	Complied	Complied

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
BNC	Complied	Complied
Controller (2Pin)	Complied	Complied

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**- DC 12 V Mode**

☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L1 – L2	Complied	Complied

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
BNC	Complied	Complied
Controller (2Pin)	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

**Remarks**

PASS Required Performance Criteria.



### 3.4 Surge Transients

#### Reference Standard

EN 61000-4-5:2014

#### Test Date

Jul. 31, 2017

#### Test Location

EMS-Surge: Electro wave Shieldroom

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.3.9	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018
<input checked="" type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1551168979	04, 26, 2018
<input type="checkbox"/>	CDN	CNV 508T5	EM TEST	P1549168422	04, 26, 2018

#### Test Conditions

Temperature: 21,7 °C  
Relative Humidity: 49,5 %  
Atmospheric Pressure: 99,3 kPa



## Test Specifications

### AC Power Lines

Source Impedance: 12 ohm for common mode and 2 ohm for differential mode

Surge Amplitude :

Common Mode

☐ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

☒ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min    ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

### Other supply / Signal Lines

Source Impedance: 42 ohm for common mode

Surge Amplitude:

Common Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min    ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied



## Test Data

- AC 24 V Mode

☒ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L - N	Complied	Complied

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

## Signal Lines

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
BNC	Complied	Complied



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**- DC 12 V Mode**

☐ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
-	-	-

**Signal Lines**

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
BNC	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

**Remarks**

PASS Required Performance Criteria.

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## 3.5 Conducted Disturbance

### Reference Standard

EN 61000-4-6:2014

### Test Date

Jul. 31, 2017

### Test Location

EMS-CS: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.7	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1	EM TEST	V0936105119	08, 08, 2017
<input checked="" type="checkbox"/>	ATTENUATOR	ATT6	EM TEST	1208-34	08, 08, 2017
<input checked="" type="checkbox"/>	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 08, 2017
<input type="checkbox"/>	CDN	CDN T8RJ45	EM TEST	0909-09	08, 08, 2017
<input checked="" type="checkbox"/>	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 03, 2018

### Test Conditions

Temperature: 21,7 °C  
Relative Humidity: 49,5 %  
Atmospheric Pressure: 99,3 kPa



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### Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 150 kHz to 80 MHz

Voltage Level: ☐ 1 Vrms ☐ 3 Vrms  
☒ 10 Vrms

Modulation: ☒ AM, 80 %, 1 kHz sine wave  
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☒ 1 s ☐ 3 s

Required Performance Criteria: ☒ Complied

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## Test Data

- AC 24 V Mode

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N	CDN ( <input checked="" type="checkbox"/> M2, <input type="checkbox"/> M3)	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN ( <input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
BNC	EM Injection Clamp	Complied
Controller (2Pin)	EM Injection Clamp	Complied

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**- DC 12 V Mode**

☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	CDN ( <input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☒ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L1 - L2	CDN ( <input checked="" type="checkbox"/> M2, <input type="checkbox"/> M3)	Complied

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
BNC	EM Injection Clamp	Complied
Controller (2Pin)	EM Injection Clamp	Complied

Notes: CDN = Coupling Decoupling Network  
"blank" = Not performed

Observations:

Complied – No degradation of function

**Test Results**

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria

**Remarks**

PASS Required Performance Criteria.



### 3.6 Voltage Dips and Short Interruptions

#### Reference Standard

EN 61000-4-11:2004

#### Test Date

Jul. 31, 2017

#### Test Location

EMS-Voltage dip: Electro wave Shieldroom

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.3.9	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018

#### Test Conditions

Temperature: 21,7 °C  
Relative Humidity: 49,5 %  
Atmospheric Pressure: 99,3 kPa



## Test Specifications & Observations/Remarks

- AC 24 V Mode

(Test Voltage : 50 Hz)

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input checked="" type="checkbox"/> 20 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>
<input checked="" type="checkbox"/> 30 % dip	<input checked="" type="checkbox"/> 25 / 500	<u>Complied</u>
<input checked="" type="checkbox"/> 60 % dip	<input checked="" type="checkbox"/> 10 / 200	<u>Complied</u>
<input checked="" type="checkbox"/> 100 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>

- Voltage variations

<input checked="" type="checkbox"/> Unom + 10 %	<input checked="" type="checkbox"/> 253.0 V (ac)	<u>Complied</u>
<input checked="" type="checkbox"/> Unom - 15 %	<input checked="" type="checkbox"/> 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

### Test Results

- ☒ PASS Required Performance Criteria  
☐ NOT PASS Required Performance Criteria  
☐ NOT APPLICABLE

### Remarks

PASS Required Performance Criteria.

-The test has been tested using the AC / AC Adaptor

## APPENDIX A – TEST DATA

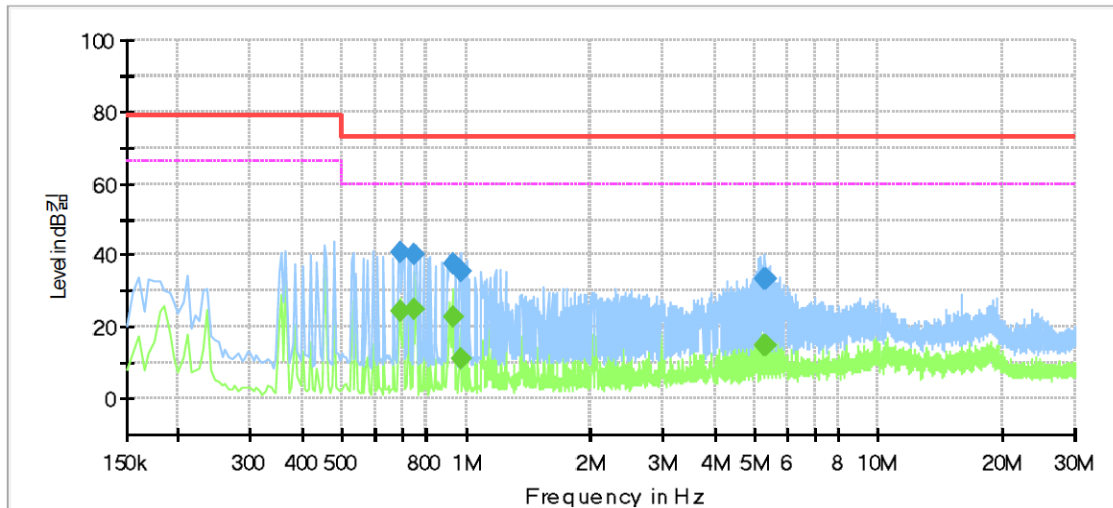
### Conducted Emissions at Mains Power Ports

[HOT]

- AC 24 V Mode

#### Common Information

Test Description:	Conducted Emission
Model No.:	HCB-6000P
Mode	AC 24 V_H
Operator Name:	KES



#### Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.690000	---	24.16	60.00	35.84	1000.0	9.000	L1	19.7
0.690000	40.57	---	73.00	32.43	1000.0	9.000	L1	19.7
0.745000	---	24.87	60.00	35.13	1000.0	9.000	L1	19.7
0.745000	40.09	---	73.00	32.91	1000.0	9.000	L1	19.7
0.925000	---	22.98	60.00	37.02	1000.0	9.000	L1	19.8
0.925000	37.38	---	73.00	35.62	1000.0	9.000	L1	19.8
0.970000	---	11.18	60.00	48.82	1000.0	9.000	L1	19.8
0.970000	35.62	---	73.00	37.38	1000.0	9.000	L1	19.8
5.295000	---	14.81	60.00	45.19	1000.0	9.000	L1	19.9
5.295000	33.53	---	73.00	39.47	1000.0	9.000	L1	19.9
5.350000	---	14.88	60.00	45.12	1000.0	9.000	L1	19.9
5.350000	33.55	---	73.00	39.45	1000.0	9.000	L1	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))

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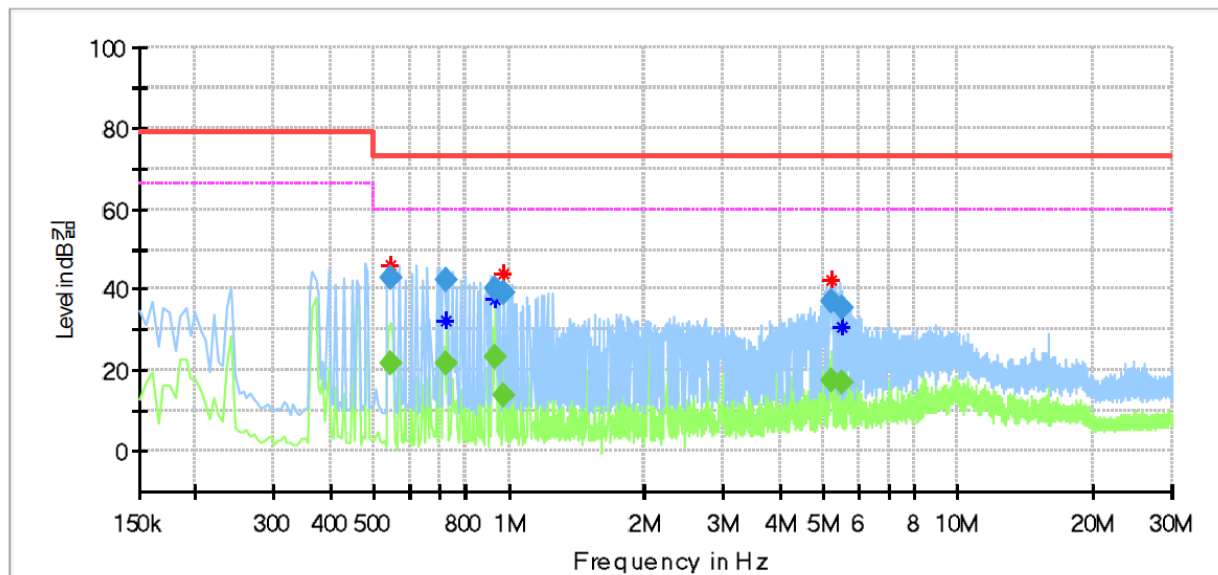




[ NEUTRAL ]

## Common Information

Test Description: Conducted Emission  
Model No.: HCB-6000P  
Mode: AC 24 V\_N  
Operator Name: KES



## Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.545000	---	21.77	60.00	38.23	1000.0	9.000	N	19.6
0.545000	42.66	---	73.00	30.34	1000.0	9.000	N	19.6
0.725000	---	21.78	60.00	38.22	1000.0	9.000	N	19.7
0.725000	42.43	---	73.00	30.57	1000.0	9.000	N	19.7
0.930000	---	23.18	60.00	36.82	1000.0	9.000	N	19.8
0.930000	40.25	---	73.00	32.75	1000.0	9.000	N	19.8
0.975000	---	13.83	60.00	46.17	1000.0	9.000	N	19.8
0.975000	39.12	---	73.00	33.88	1000.0	9.000	N	19.8
5.200000	---	17.57	60.00	42.43	1000.0	9.000	N	19.9
5.200000	36.83	---	73.00	36.17	1000.0	9.000	N	19.9
5.530000	---	17.15	60.00	42.85	1000.0	9.000	N	19.8
5.530000	35.40	---	73.00	37.60	1000.0	9.000	N	19.8

### ◆ 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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))



---

## Conducted Emissions at Telecommunication Ports

**[10 Mbps]**

N/A

### ◆ 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))



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**[100 Mbps]**

N/A

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

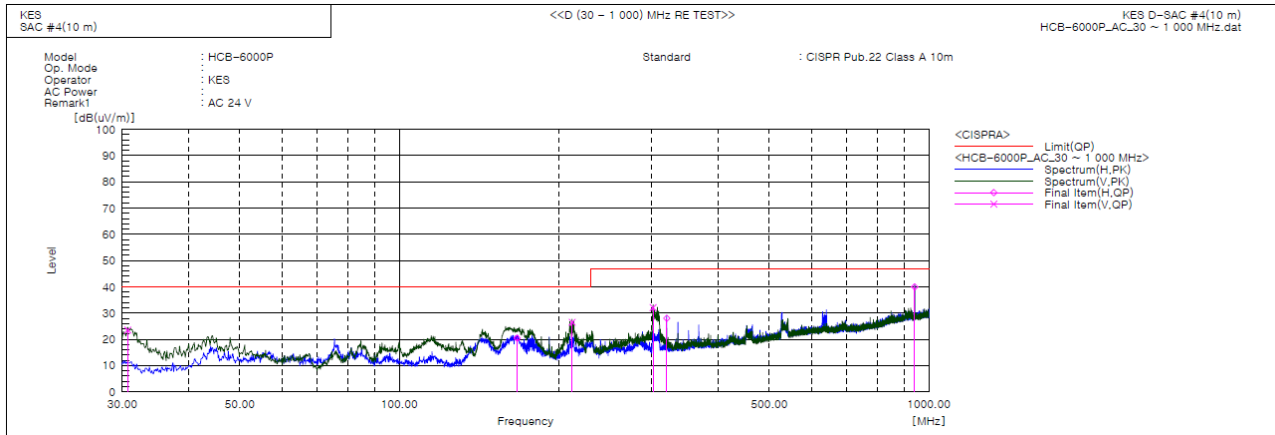
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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## 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	30.728	V	55.7	-32.2	23.5	40.0	16.5	154.0	102.0	
2	167.013	H	50.9	-30.5	20.4	40.0	19.6	393.0	59.0	
3	212.118	V	53.0	-26.5	26.5	40.0	13.5	110.0	175.0	
4	301.721	V	55.8	-23.7	32.1	47.0	14.9	103.0	9.0	
5	320.030	H	51.1	-23.1	28.0	47.0	19.0	216.0	163.0	
6	940.624	H	49.0	-9.1	39.9	47.0	7.1	101.0	4.0	

### ◆ Calculation

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

Margin(QP)[dB] = Limit[dB( $\mu$ V/m)] - Result(QP) [dB( $\mu$ 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



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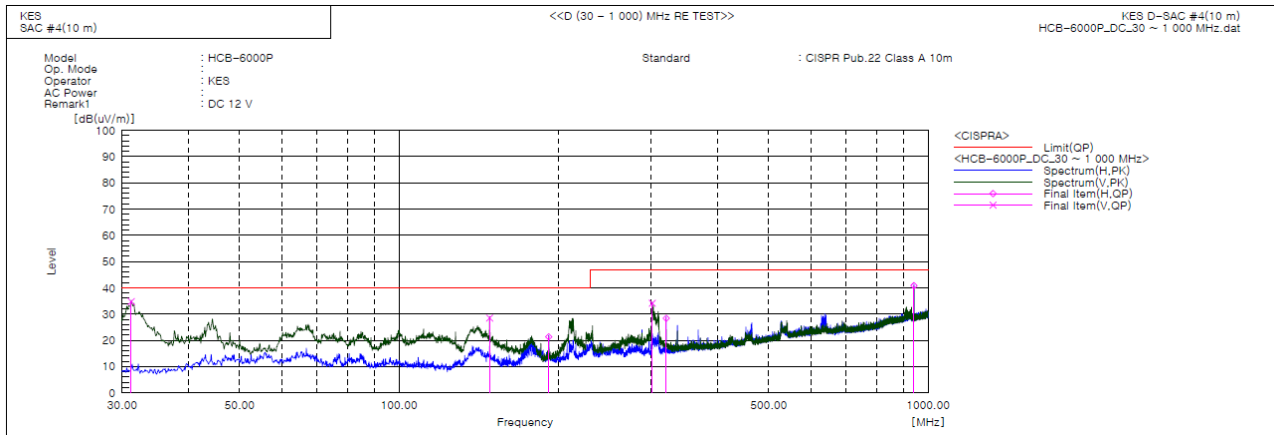
C-3701, Simin-daero 365-40,  
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### - DC 12 V Mode



### 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	31.213	V	66.8	-32.1	34.7	40.0	5.3	100.0	147.0	
2	148.461	V	59.9	-31.4	28.5	40.0	11.5	105.0	167.0	
3	191.990	H	48.8	-27.5	21.3	40.0	18.7	398.0	172.0	
4	301.236	V	57.9	-23.8	34.1	47.0	12.9	113.0	1.0	
5	320.030	H	51.5	-23.1	28.4	47.0	18.6	232.0	167.0	
6	940.579	H	49.9	-9.1	40.8	47.0	6.2	101.0	4.0	

### ◆ Calculation

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

Margin(QP)[dB] = Limit[dB( $\mu$ V/m)] - Result(QP) [dB( $\mu$ V/m)]

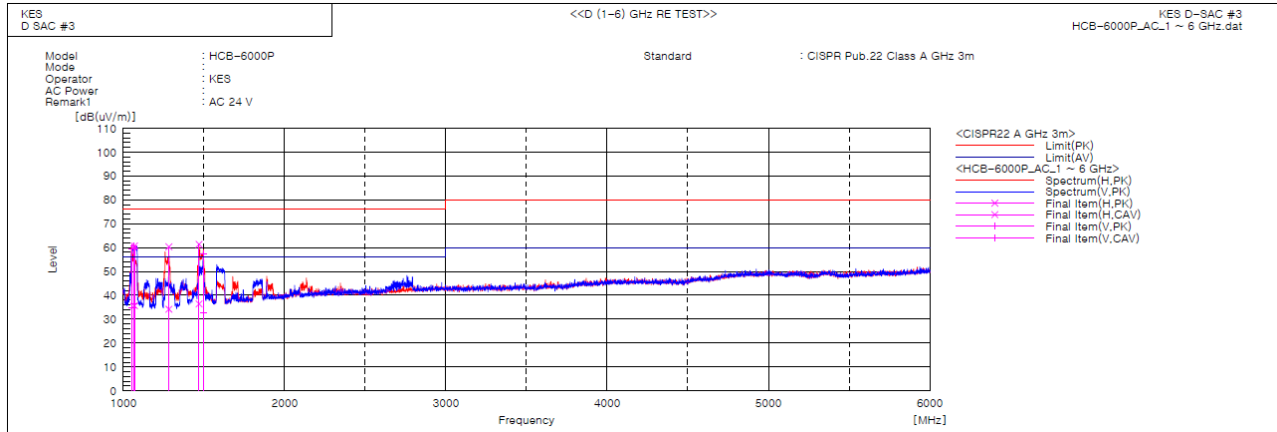
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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



## 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	1056.444	V	69.2	44.3	-9.6	59.6	34.7	76.0	56.0	16.4	21.3	100.0	3.8	
2	1063.568	V	70.0	45.8	-9.5	60.5	36.3	76.0	56.0	15.5	19.7	100.0	344.9	
3	1069.086	H	70.2	45.2	-9.5	60.7	35.7	76.0	56.0	15.3	20.3	100.0	347.3	
4	1282.805	H	68.2	42.1	-7.9	60.3	34.2	76.0	56.0	15.7	21.8	100.0	14.9	
5	1469.810	H	67.8	42.8	-6.4	61.4	36.4	76.0	56.0	14.6	19.6	100.0	40.2	
6	1495.990	V	63.6	38.7	-6.1	57.5	32.6	76.0	56.0	18.5	23.4	100.0	28.0	

### ◆ Calculation

Result(PK/CAV) [dB(μV/m)] = (Reading(PK/CAV)[dB(μV)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/m)]

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

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

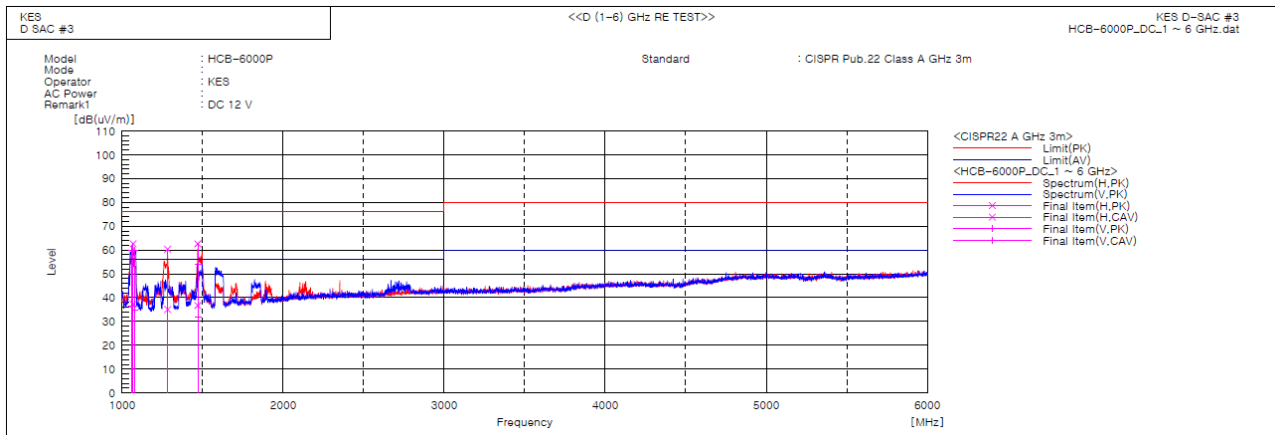


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### - DC 12 V Mode



#### 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	1062.333	V	69.5	45.9	-9.5	60.0	36.4	76.0	56.0	16.0	19.6	100.0	344.1	
2	1068.666	H	72.1	46.7	-9.5	62.6	37.2	76.0	56.0	13.4	18.8	100.0	353.2	
3	1076.765	V	69.3	44.3	-9.4	59.9	34.9	76.0	56.0	16.1	21.1	100.0	355.7	
4	1282.580	H	68.2	42.9	-7.9	60.3	35.0	76.0	56.0	15.7	21.0	100.0	54.7	
5	1470.100	H	69.0	43.1	-6.4	62.6	36.7	76.0	56.0	13.4	19.3	100.0	338.5	
6	1472.885	V	60.4	38.1	-6.4	54.0	31.7	76.0	56.0	22.0	24.3	100.0	331.1	

#### ◆ Calculation

$$\text{Result(PK/CAV)} [\text{dB}(\mu\text{V/m})] = (\text{Reading(PK/CAV)} [\text{dB}(\mu\text{V})] + \text{c.f} [\text{dB}(1/\text{m})])$$

$$\text{Margin(PK/CAV)} [\text{dB}] = \text{Limit} [\text{dB}(\mu\text{V/m})] - \text{Result(PK/CAV)} [\text{dB}(\mu\text{V/m})]$$

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

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









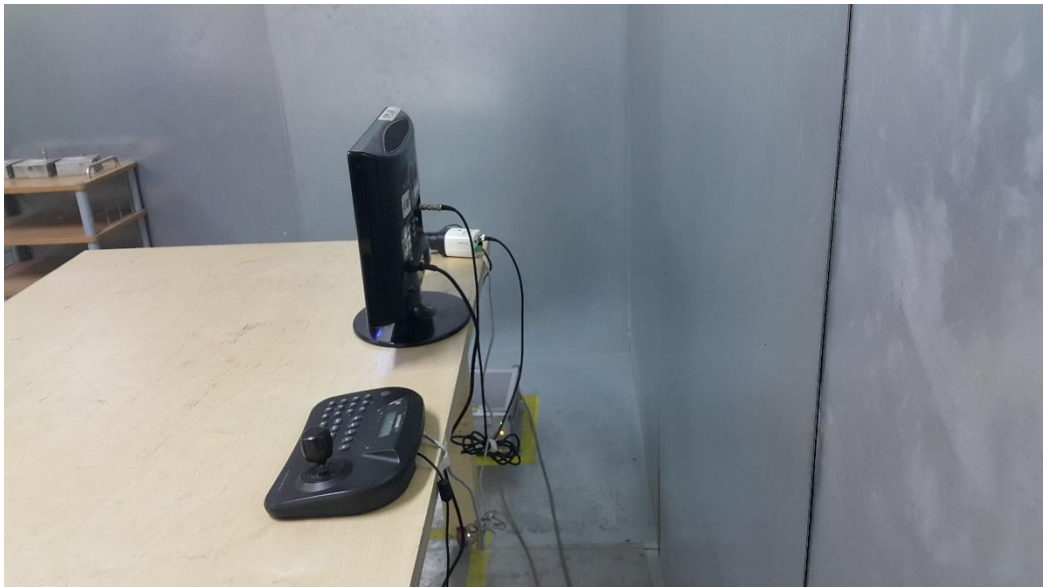
Test Data - Voltage Fluctuations

**Maximum Flicker results**

	EUT values	Limit	Result
Pst	N/A		
Plt			
dc [%]			
dmax [%]			
Tmax [s]			

## Test Setup Photos and Configuration

### Conducted Voltage Emissions



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### Conducted Telecommunication Emissions

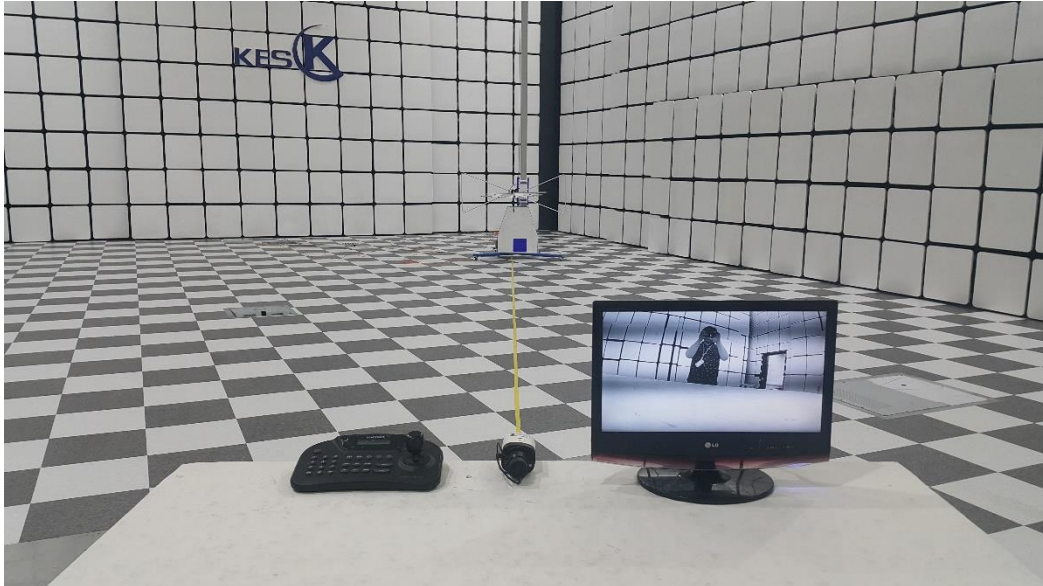
N/A

N/A

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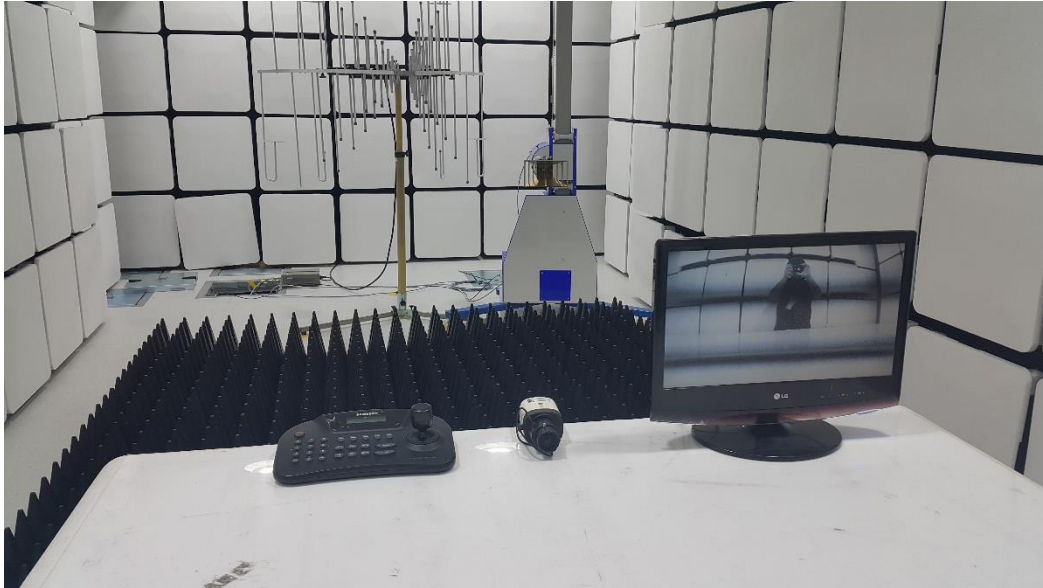
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## Radiated Electric Field Emissions(Below 1 GHz)



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## Radiated Electric Field Emissions(Above 1 GHz)



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## Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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## Electrostatic Discharge



## Radiated Electric Field Immunity



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## Electrical Fast Transients/Bursts



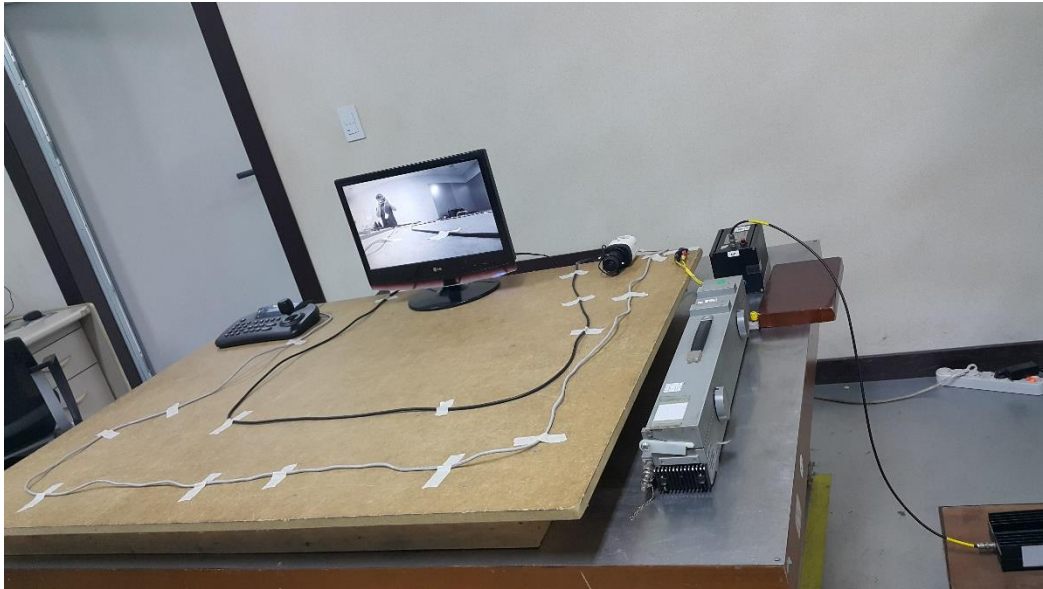
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## Surge Transients



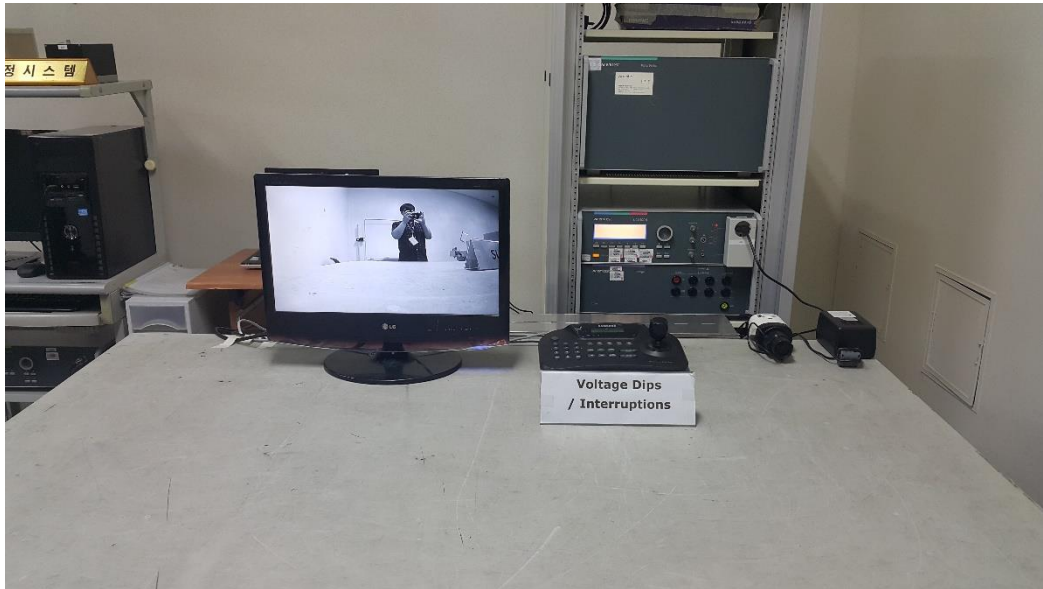
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## Conducted Disturbance



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## Voltage Dips and Short Interruptions



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## EUT External Photographs

(Top)



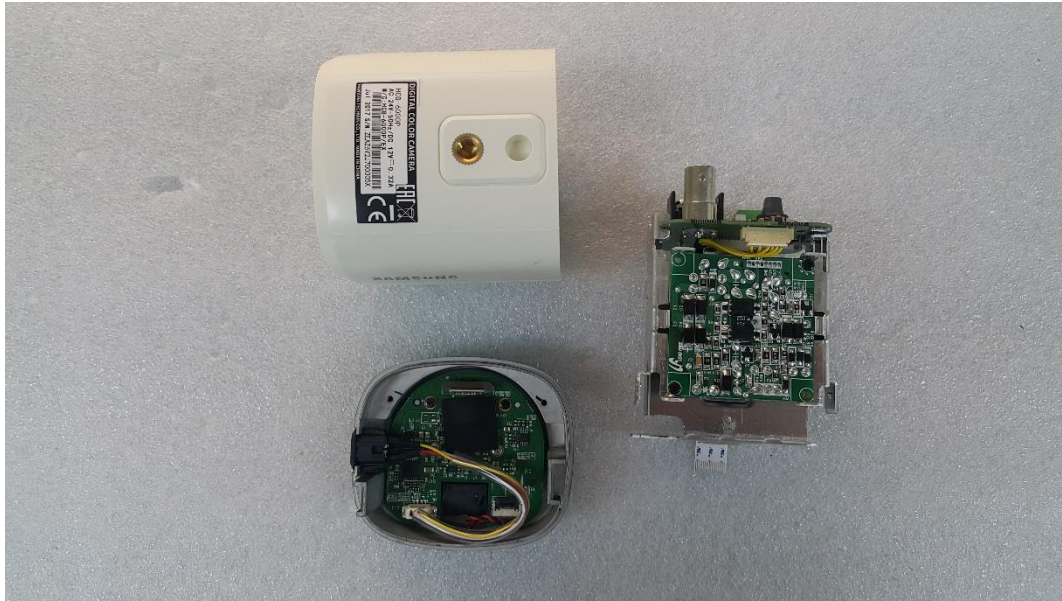
(Bottom)



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## EUT Internal Photographs

(Internal View)

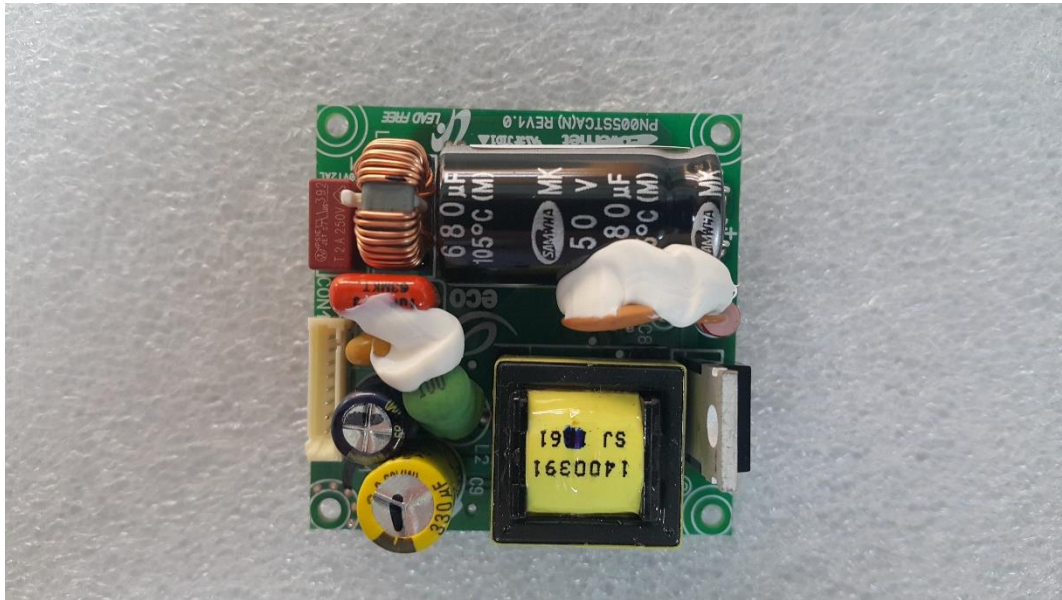


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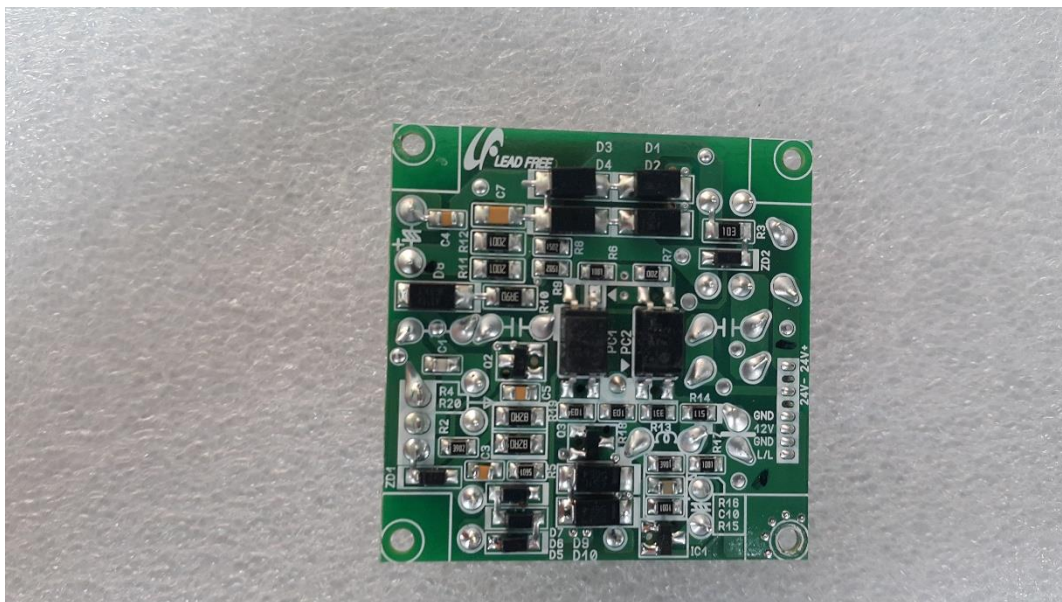


## EUT Internal View – board

(Top)



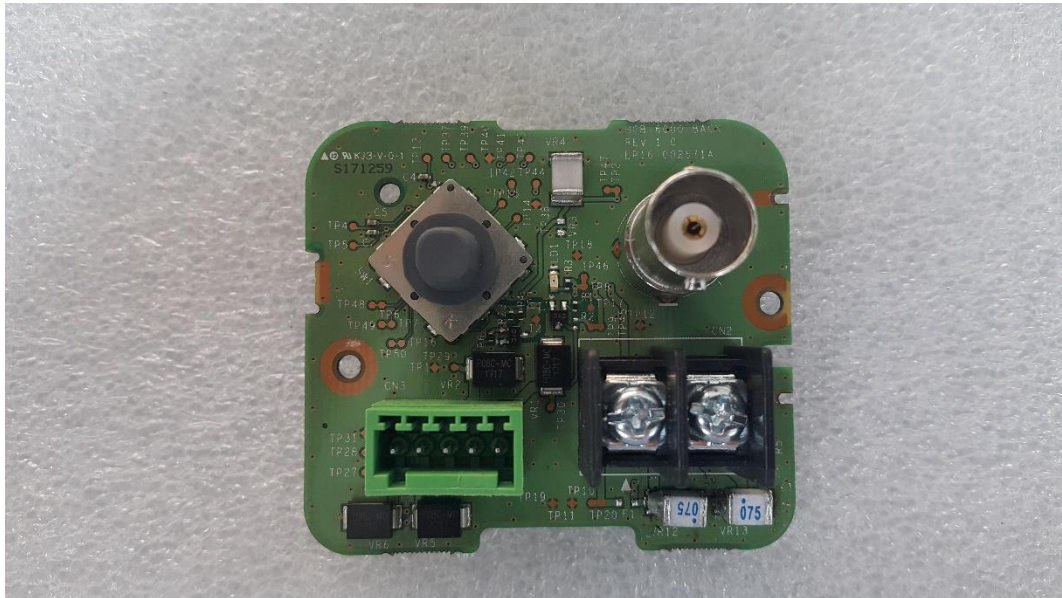
(Bottom)



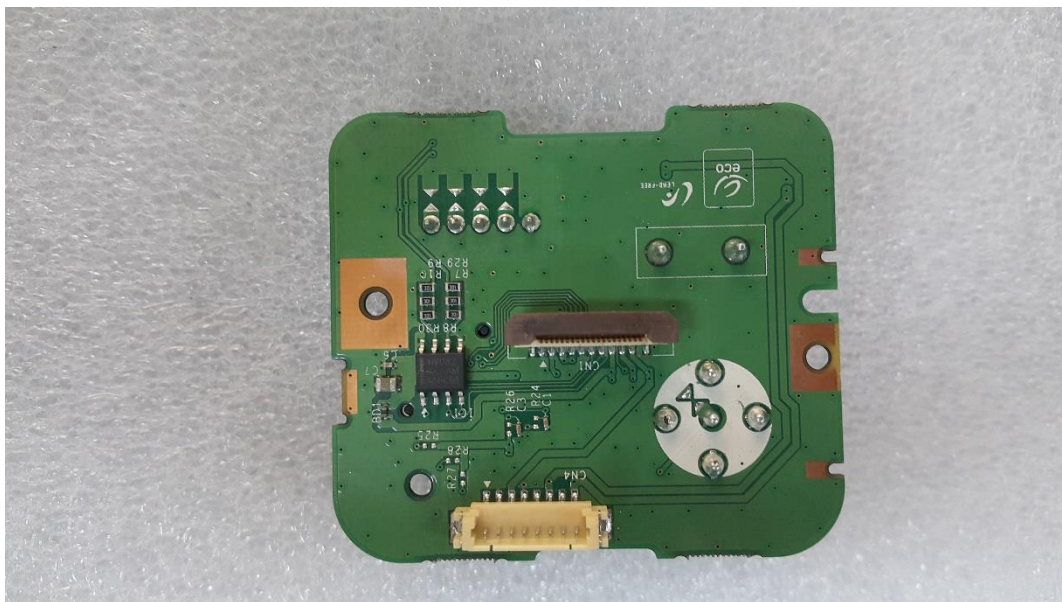
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## EUT Internal View – Port board

(Top)



(Bottom)

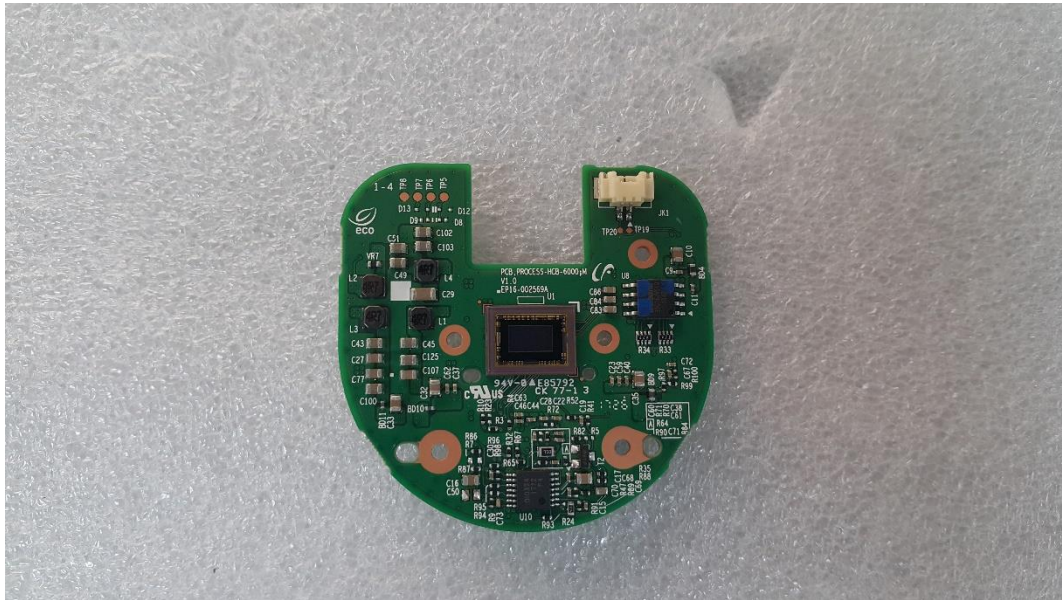


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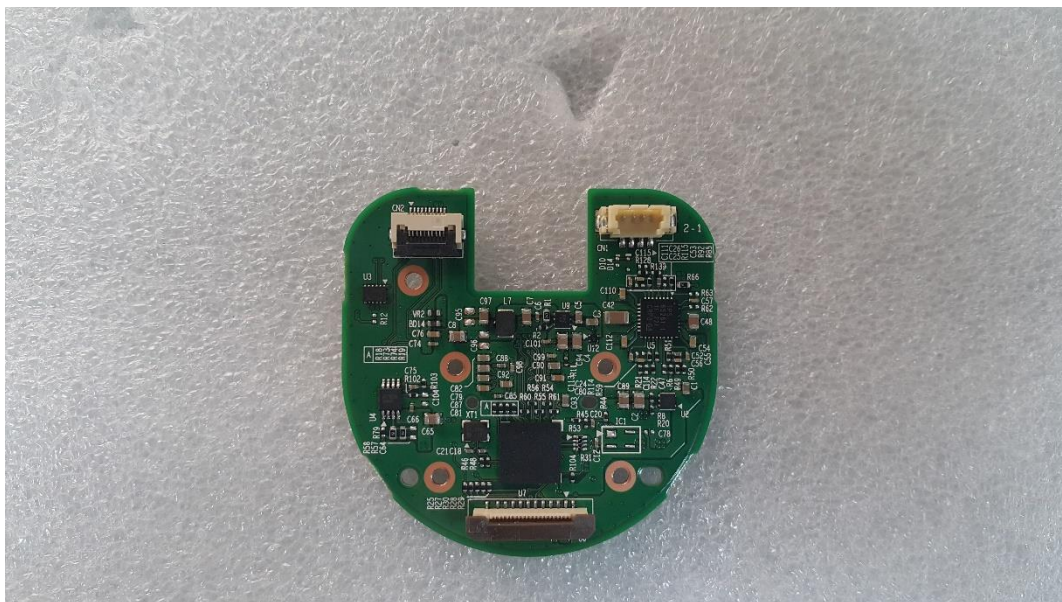


## EUT Internal View – Lens board

(Top)



(Bottom)



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## Label and Location



### **CCTV CAMERA**

Model No : HCB-6000P

Manufacturer : Hanwha Techwin (Tianjin) Co.,Ltd.

Made in of China

