



# EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0069-R1  
Date of Issue : Oct, 23, 2017  
Product name : CCTV CAMERA  
Model/Type No. : HCM-9020VQP  
Variant Model : -  
Applicant : Hanwha Techwin Co., Ltd.  
Applicant Address : 1204, Changwon-daero, Seongsan-gu, Changwon-si,  
Gyeongsangnam-do, Korea  
Manufacturer : CPRO ELECTRONICE Co., Ltd.  
Manufacturer Address : #501, 58, Pangyo-ro 255beon-gil, Bundang-gu, Seongnam-si,  
Gyeonggi-do, 463-400 Korea.  
Date of Receipt : Dec, 26, 2016  
Test date : Jan, 16, 2017 – Jan, 18, 2017  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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EMC Test Engineer

Reviewed by

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**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
Jan. 25, 2017	KES-E1-17T0069	Issued
Oct. 23, 2017	KES-E1-17T0069-R1	Standard Revision

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## 1.0 General Product Description

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

HCM-9020VQ	
구분	Spec
<b>Video</b>	
Imaging Device	1/3" Panasonic 2M CMOS sensor x 4
Total Pixels	1,956(H) x 1,266(V) X 4ea pixels
Effective Pixels	1,944(H) x 1,092(V) X 4ea pixels
Scanning System	Progressive Scan
Min. Illumination	Color(at Day) : 0.1Lux (4mm, F2.6, 30IRE) / 0.01Lux 이 이하 (6mm, F2.0, 30IRE) B/W(at Night) : 0.01Lux (4mm, F2.6, 50IRE) / 0.01Lux 이 이하 (6mm, F2.0, 50IRE)
S / N Ratio	55dB (AGC off, Weight on)
Video Output	CVBS : 1.0Vpp / 75Ω composite
Resolution	1920 x 1080
Max. Framerate	30fps @1080p, 30fps@ 720p
<b>Pan / Tilt / Rotate</b>	
CAMERA Angle Range	Tilt 0° ~ 60° / Rotate 360°
<b>Lens Type</b>	
Focal Length (Zoom Ratio)	4mm x 2, 6mm x2
Max. Aperture Ratio	F2.6( =4mm ), F2.0( =6mm ),
Angular Field of View	[4mm] H : 80.20° / V : 46.08° / D : 95.24° [6mm] H : 51.66° / V : 30.46° / D : 60.78°
Min. Object Distance	0.5m (1.64ft)
Focus Control	Fixed
Lens Type	Fixed
Mount Type	Board-in type
Auto Back Focus(ABF)	-
<b>Operational</b>	
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 ※ OSD control via coaxial

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Camera Title	OFF / ON (Displayed 8 characters)
Day & Night	AUTO (ICR) / COLOR / B/W
Backlight Compensation	OFF / HLC / BLC / WDR
Wide Dynamic Range	100dB of Above
Contrast Enhancement	-
Digital Noise Reduction	OFF / LOW / MIDDLE / HIGH
Defog	AUTO / MANUAL / OFF
Digital Image Stabilization	-
Motion Detection	OFF / ON (4 zones polygon x 4CH)
Privacy Masking	OFF / ON ( =BOX_16ea, POLYGON_8ea ) X 4CH
Gain Control	0 ~ 10
White Balance	ATW / AUTO-EX / PRESET / MANUAL
LDC (Lens Distortion Correction)	-
Electronic Shutter Speed	1/30(1/25)-1/30,000 sec
Digital Zoom	-
Reverse	OFF / MIRROR / FLIP
Profile	-
Intelligent Video Analytics	-
Alarm	OUT 4
Remote control interface	Coaxial
Protocol	Pelco-C (Coaxitron)
Video Transmission Distance	500m(75-5 Coaxial Cable)
<b>Environmental</b>	
Operating Temperature / Humidity	-30°C ~ +50°C (-4°F ~ +122°F) / Less than 90% RH * Start up should be done at above -10°C
Ingress Protection	IP66
Vandal Resistance	TBD( =IK10 )
<b>Electrical</b>	
Input Voltage/Current	Dual ( 24VAC, 12VDC)
Power Consumption	DC12V : 8.36W(MAX_TDN ON) AC24V : 8.36W(MAX_TDN ON)
<b>Mechanical</b>	
Color / Material	Ivory/Metal
Dimension (WxHxD)	199 x 87
Weight	4.4 lbs (2kg)

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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 ☐ 220 Vac ☐ 230 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	HCM-9020VQP	-	CPRO ELECTRONICE Co., Ltd.	E.U.T

## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
HD DVR	SRD-494N1T	ZBJ96V2G40004FM	HANHWA TECHWIN CO., LTD.	-
HD DVR Adapter	ADP-4812	-	Hanwha Techwin (Tianjin) Co., Ltd.	-
MONITOR	HSTND-7041-L	6CM6020YQQ	HP Inc.	-
CONTROLLER	SPC-1010	C50E67WD601003	SamSung Techwin Co.,Ltd	-
CONTROLLER Adapter	RS-AB1000	-	Dongguan Jinhuaasheng Power Technology Co.,Ltd.	-
Alarm	-	-	-	-



## 1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
CCTV CAMERA (E.U.T)	BNC x 4	HD DVR	BNC x 4	3.0	S
	2 Pin	CONTROLLER	2 Pin	3.0	U
	2 Pin	Alarm	2 Pin	3.0	U
HD DVR	D-SUB	MONITOR	D-SUB	1.5	S

\* Unshielded=U, Shielded=S

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

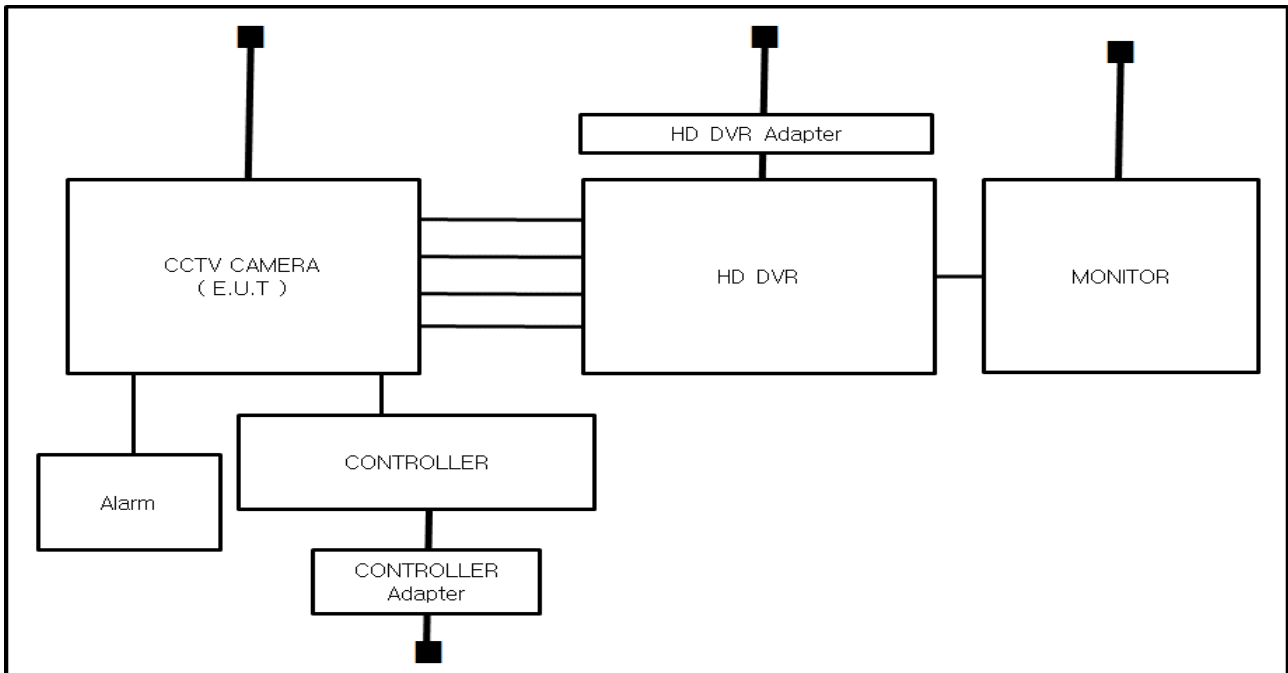
Test mode	operating
AC, DC	E.U.T Monitoring

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

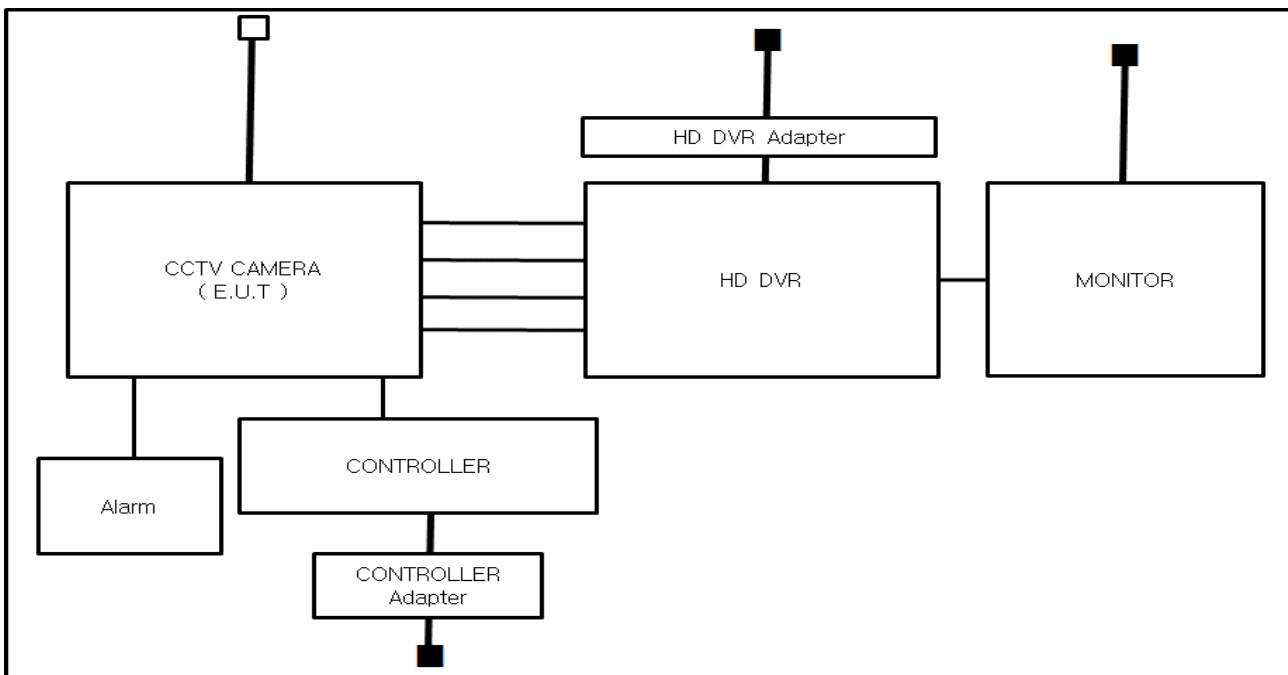
## 1.8 Configuration

■ AC Main  
□ DC 12 V Main

- AC 24 V Mode



- DC 12 V Mode



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## 1.9 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.

## 1.10 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 22.

## 1.11 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



☐ **VCCI V-3 / 2015.04**

☐ Class A

☐ Class B

☐ **AS/NZS CISPR22:2009 +A1:2010**

☐ 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, 16, 2017

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	02, 04, 2017
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	05, 02, 2017
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R&S	101914	12, 13, 2017
<input checked="" type="checkbox"/>	Shield Room #3	-	SEMITEC	-	-
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R&S	9.12.00	-

### Test Conditions

Temperature: 24,1 °C

Relative Humidity: 40,2 %

### 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 Receiver	ESR3	R&S	101783	05, 03, 2017
<input type="checkbox"/>	LISN	ENV216	R&S	101137	02, 04, 2017
<input type="checkbox"/>	LISN	ENV216	R&S	101786	05, 02, 2017
<input type="checkbox"/>	8-Wire ISN CAT3	CAT3 8158	Schwarzbeck Mess	8158-0019	04, 01, 2017
<input type="checkbox"/>	8-Wire ISN CAT5	CAT5 8158	Schwarzbeck Mess	8158-0030	04, 01, 2017
<input type="checkbox"/>	8-Wire ISN CAT6	NTFM 8158	Schwarzbeck Mess	8158-0029	08, 11, 2017
<input type="checkbox"/>	Electro wave Shieldroom	-	SEMITEC	-	-
<input type="checkbox"/>	EMI Test S/W	EMC32	R&S	9.12.00	-

### 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

Jan, 17, 2017

### Test Location

☐ Open Area Test Site #1

☒ Open Area Test Site #2

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI TEST Receiver	ESR3	R&S	101781	05, 03, 2017
<input checked="" type="checkbox"/>	Trilog-Broadband ANT	VULB 9163	Schwarzbeck	714	11, 28, 2018
<input checked="" type="checkbox"/>	Open Area Test Site	-	KES	-	-
<input checked="" type="checkbox"/>	Antenna Mast	-	DAEIL EMC	-	-
<input checked="" type="checkbox"/>	Turn Table	-	DAEIL EMC	-	-
<input checked="" type="checkbox"/>	EMI Test S/W	-	-	-	-

### Test Conditions

Temperature: 1,8 °C

Relative Humidity: 55,0 %

### 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, 16, 2017

**Test Location**

Semi Anechoic Chamber #2

**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 07, 2017
<input checked="" type="checkbox"/>	EMI Test Receiver	ESU26	R&S	100552	04, 24, 2017
<input checked="" type="checkbox"/>	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 14, 2017
<input checked="" type="checkbox"/>	Semi Anechoic Chamber #2	-	SEMITEC	-	-
<input checked="" type="checkbox"/>	Antenna Mast	-	AUDIX	-	-
<input checked="" type="checkbox"/>	Turn Table	-	AUDIX	-	-
<input checked="" type="checkbox"/>	EMI Test S/W	e3	AUDIX	8.083b	-

**Test Conditions**

Temperature: 24,1 °C

Relative Humidity: 40,2 %

**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.



## 2.5 Harmonic Current Emissions

### Test Date

N/A

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	AC Source	ACS 500 N	EM TEST	V1024106760	08, 08, 2017
<input type="checkbox"/>	Digital Power Analyzer	DPA 500 N	EM TEST	V1024106759	08, 08, 2017
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

### Test Conditions

Temperature: °C

Relative Humidity: %

### Classification of Equipment for Harmonic Current Emissions

- ☐ Class A
- ☐ Class B
- ☐ Class C(Below 25 W)
- ☐ Class C(Above 25 W)
- ☐ Class D

### Test Results

The requirements are:

- ☐ PASS
- ☐ NOT PASS
- ☒ NOT APPLICABLE

### Remarks

N/A Because the E.U.T power is less than 75 W, limits are not specified.





## 2.6 Voltage Fluctuations and Flicker

### Test Date

N/A

### Test Location

Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	AC Source	ACS 500 N	EM test	V1024106760	08, 08, 2017
<input type="checkbox"/>	Digital Power Analyzer	DPA 500 N	EM test	V1024106759	08, 08, 2017
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST AG	5.4.8.0	-

### Test Conditions

Temperature:

°C

Relative Humidity:

%

### Test Results

The requirements are:

- ☐ PASS  
☐ NOT PASS  
☒ NOT APPLICABLE

### Remarks

AC / DC Mode N/A : E.U.T power is AC / DC limits are not specified.

### 3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 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

Jan, 18, 2017

### Test Location

EMS-ESD: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2017
<input checked="" type="checkbox"/>	HCP	-	Noise Ken	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-
<input checked="" type="checkbox"/>	EMS Test S/W	-	-	-	-

### Test Conditions

Temperature: 23,8 °C  
Relative Humidity: 38,7 %  
Atmospheric Pressure: 100,4 kPa

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

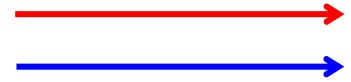
Notes: HCP: Horizontal coupling plane  
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

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**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	Screw	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	Screw	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

Jan, 16, 2017

### Test Location

EMS-RS: ☐ Semi Anechoic Chamber #1☒ Semi Anechoic Chamber #2

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Signal Generator	ESG-3000A	HP	US37040210	11, 01, 2017
<input checked="" type="checkbox"/>	Amplifier	ITA0300-200	Infinitech	-	11, 01, 2017
<input checked="" type="checkbox"/>	Amplifier	ITA0750-200	Infinitech	-	11, 01, 2017
<input checked="" type="checkbox"/>	Amplifier	ITA1500-100	Infinitech	-	11, 01, 2017
<input checked="" type="checkbox"/>	Amplifier	ITA2500-100	Infinitech	-	11, 01, 2017
<input checked="" type="checkbox"/>	GPIB INTERFACE CONTROL	SYSTEM CONTROL UNIT	Infinitech	-	-
<input checked="" type="checkbox"/>	POWER SUPPLY	SYSTEM POWER SUPPLY	Infinitech	-	-
<input checked="" type="checkbox"/>	Power Meter	E4419B	Agilent	MY45101506	06, 27, 2017
<input checked="" type="checkbox"/>	Average Power Sensor	E9301A	Agilent	-	06, 27, 2017
<input checked="" type="checkbox"/>	Average Power Sensor	E9301A	Agilent	MY41495698	11, 17, 2017
<input checked="" type="checkbox"/>	Stacked Double Log-Per- Antenna	STPL9128 D	SCHWARZBECK	9128D038	-
<input checked="" type="checkbox"/>	Semi Anechoic Chamber #2	-	SEMITEC	-	-
<input checked="" type="checkbox"/>	EMS Test S/W	KTI_RS2012	KOREA TECHNOLOGY INSTITUTE CO., LTD	2.1.1	

### Test Conditions

Temperature: 24,1 °C  
Relative Humidity: 40,2 %  
Atmospheric Pressure: 100,2 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.

### 3.3 Electrical Fast Transients/Bursts

#### Reference Standard

EN 61000-4-4:2012

#### Test Date

Jan, 17, 2017

#### Test Location

EMS-EFT: Electro wave Shieldroom

#### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
<input checked="" type="checkbox"/>	Capacitive Coupling Clamp	HFK	EM TEST	070925	06, 27, 2017
<input checked="" type="checkbox"/>	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST AG	5.0.9.0	-

#### Test Conditions

Temperature: 23,3 °C  
Relative Humidity: 38,1 %  
Atmospheric Pressure: 99,8 kPa

#### Test Specifications

Pulse Amplitude & Polarity:  
(DC Power Lines) ☐ ± 1.0 kV ☒ ± 2.0 kV  
☐ ± 4.0 kV

Pulse Amplitude & Polarity:  
(Other supply / Signal Lines) ☐ ± 0.5 kV ☒ ± 1.0 kV  
☐ ± 2.0 kV

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☐ 5 kHz ☒ 100 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ 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
Alarm	Complied	Complied
CONTROLLER	Complied	Complied



- 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
Alarm	Complied	Complied
CONTROLLER	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

Jan, 17, 2017

### Test Location

EMS-Surge: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
<input checked="" type="checkbox"/>	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
<input type="checkbox"/>	CDN	CNV 504N	EM TEST	V0936105121	06, 27, 2017
<input type="checkbox"/>	CDN	CNV 508T5	EM TEST	P1549168422	04, 27, 2017
<input checked="" type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1551168979	04, 27, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST AG	5.0.9.0	-

### Test Conditions

Temperature: 23,3 °C  
Relative Humidity: 38,1 %  
Atmospheric Pressure: 99,8 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
L – PE	-	-
N – PE	-	-

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L1-PE	-	-
L2-PE	-	-

**Signal Lines**☒ Line to Earth – Common Mode

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

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**- DC 12 V Mode**☐ Line to Line – Differential Mode

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

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L1-PE	Complied	Complied
L2-PE	Complied	Complied

**Signal Lines**☒ Line to Earth – Common Mode

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



## 3.5 Conducted Disturbance

### Reference Standard

EN 61000-4-6:2014

### Test Date

Jan, 18, 2017

### Test Location

EMS-CS: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Continuous Wave Generator	CWS 500N1	EM TEST	V0936105119	08, 08, 2017
<input checked="" type="checkbox"/>	6 dB 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-T2-RJ11	EM TEST	0909-07	08, 08, 2017
<input type="checkbox"/>	CDN	CDN-T4	EM TEST	0909-08	08, 08, 2017
<input type="checkbox"/>	CDN	CDN-T8RJ45	EM TEST	0909-09	08, 08, 2017
<input type="checkbox"/>	CDN	CDN-AF2	EM TEST	0909-10	08, 08, 2017
<input type="checkbox"/>	CDN	CDN-AF4	EM TEST	0909-11	08, 08, 2017
<input checked="" type="checkbox"/>	EM Injection Clamp	EM 101	Liithi	35943	02, 04, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST AG	5.3.7	-

### Test Conditions

Temperature: 23,8 °C  
Relative Humidity: 38,7 %  
Atmospheric Pressure: 100,4 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
L1 - L2	CDN ( <input type="checkbox"/> M2, <input type="checkbox"/> M3)	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
BNC	Complied	Complied
Alarm	Complied	Complied
CONTROLLER	Complied	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	Complied	Complied
Alarm	Complied	Complied
CONTROLLER	Complied	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

Jan, 17, 2017

### Test Location

EMS-Voltage dip: Electro wave Shieldroom

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	Ultra Compact Simulator	UCS 500 N5	EM TEST	V0936105120	06, 27, 2017
<input checked="" type="checkbox"/>	Motor Variac	MV2616	EM TEST	V0936105123	06, 27, 2017
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST AG	5.0.9.0	-

### Test Conditions

Temperature: 23,3 °C

Relative Humidity: 38,1 %

Atmospheric Pressure: 99,8 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 /5000	<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 /5000	<u>Complied</u>

- Voltage variations

<input checked="" type="checkbox"/> Unom + 10 %	<input checked="" type="checkbox"/> 253 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

- The test has been tested using the AC Adapter.

## APPENDIX A – TEST DATA

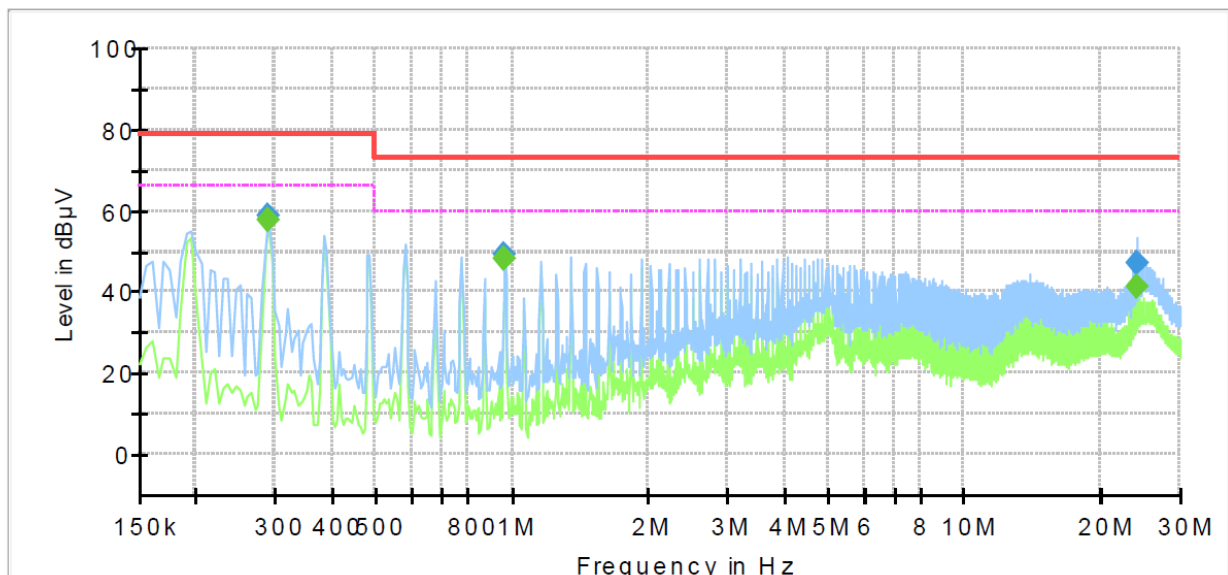
### Conducted Emissions at Mains Power Ports

- AC 24 V Mode

[HOT]

### Common Information

Test Description: Conducted Emission  
Model No.: HCM-9020VQP  
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)
0.290000	---	57.60	66.00	8.40	1000.0	9.000	L1	20.8
0.290000	58.64	---	79.00	20.36	1000.0	9.000	L1	20.8
0.965000	---	48.33	60.00	11.67	1000.0	9.000	L1	20.2
0.965000	49.20	---	73.00	23.80	1000.0	9.000	L1	20.2
24.115000	---	41.39	60.00	18.61	1000.0	9.000	L1	20.4
24.115000	47.11	---	73.00	25.89	1000.0	9.000	L1	20.4

#### ◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

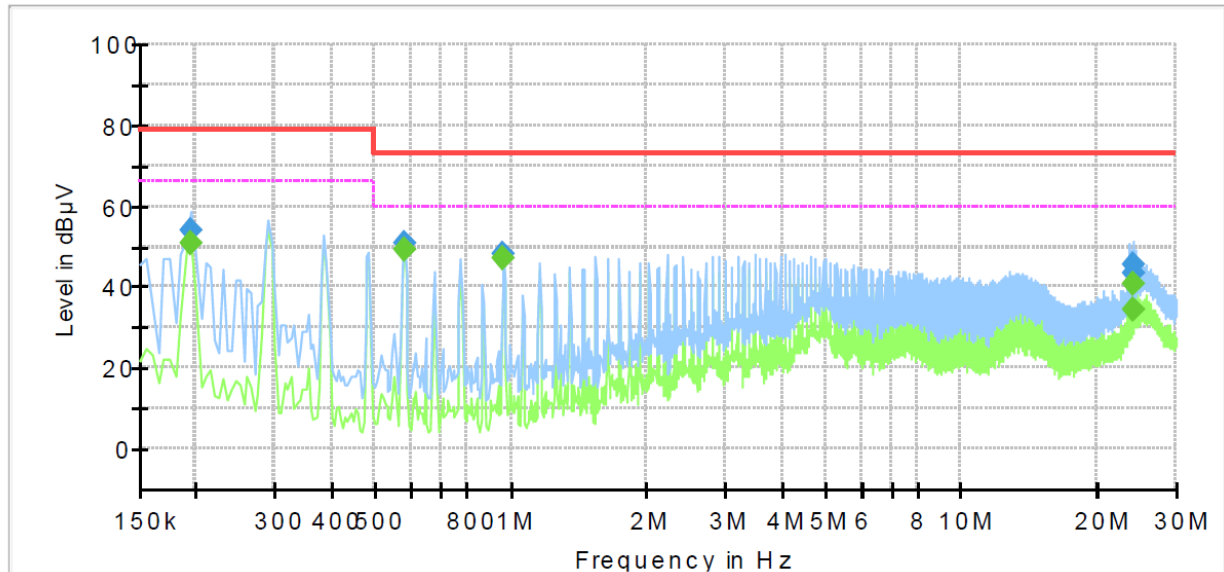
Corr. : Correction values (LISN FACTOR+ Cable Loss)



**[NEUTRAL]**

## Common Information

Test Description: Conducted Emission  
Model No.: HCM-9020VQP  
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)
0.195000	---	50.75	66.00	15.25	1000.0	9.000	N	20.9
0.195000	53.93	---	79.00	25.07	1000.0	9.000	N	20.9
0.580000	---	49.11	60.00	10.89	1000.0	9.000	N	20.5
0.580000	51.06	---	73.00	21.94	1000.0	9.000	N	20.5
0.965000	---	47.16	60.00	12.84	1000.0	9.000	N	20.2
0.965000	48.03	---	73.00	24.97	1000.0	9.000	N	20.2
24.010000	---	40.68	60.00	19.32	1000.0	9.000	N	20.3
24.010000	45.68	---	73.00	27.32	1000.0	9.000	N	20.3
24.220000	---	34.49	60.00	25.51	1000.0	9.000	N	20.4
24.220000	43.20	---	73.00	29.80	1000.0	9.000	N	20.4

### ◆ 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)





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## 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)

---

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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)

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## Radiated Electric Field Emissions(Below 1 GHz)

- AC 24 V Mode

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB $\mu$ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]
259.88	15.24	V	1.08	12.67	4.80	32.71	47.00	14.29
297.00	23.48	H	3.98	13.36	5.13	41.97	47.00	5.03
445.52	21.45	H	3.92	16.40	6.74	44.59	47.00	2.41
593.98	13.38	V	1.10	19.20	7.78	40.36	47.00	6.64
668.29	14.39	H	3.79	19.55	8.29	42.23	47.00	4.77
742.50	8.99	V	1.09	20.22	8.96	38.17	47.00	8.83

\* H : Horizontal, V : Vertical

### ◆ Calculation

Corrected Amplitude [dB $\mu$ V] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

- DC 12 V Mode

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB $\mu$ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]
259.88	17.58	V	1.00	12.67	4.80	35.05	47.00	11.95
297.00	23.56	H	3.89	13.36	5.13	42.05	47.00	4.95
445.50	14.34	V	1.10	16.40	6.74	37.48	47.00	9.52
519.66	7.54	H	3.97	17.74	7.16	32.44	47.00	14.56
594.50	7.85	V	1.38	19.21	7.78	34.84	47.00	12.16
668.29	14.13	H	3.68	19.55	8.29	41.97	47.00	5.03

\* H : Horizontal, V : Vertical

### ◆ Calculation

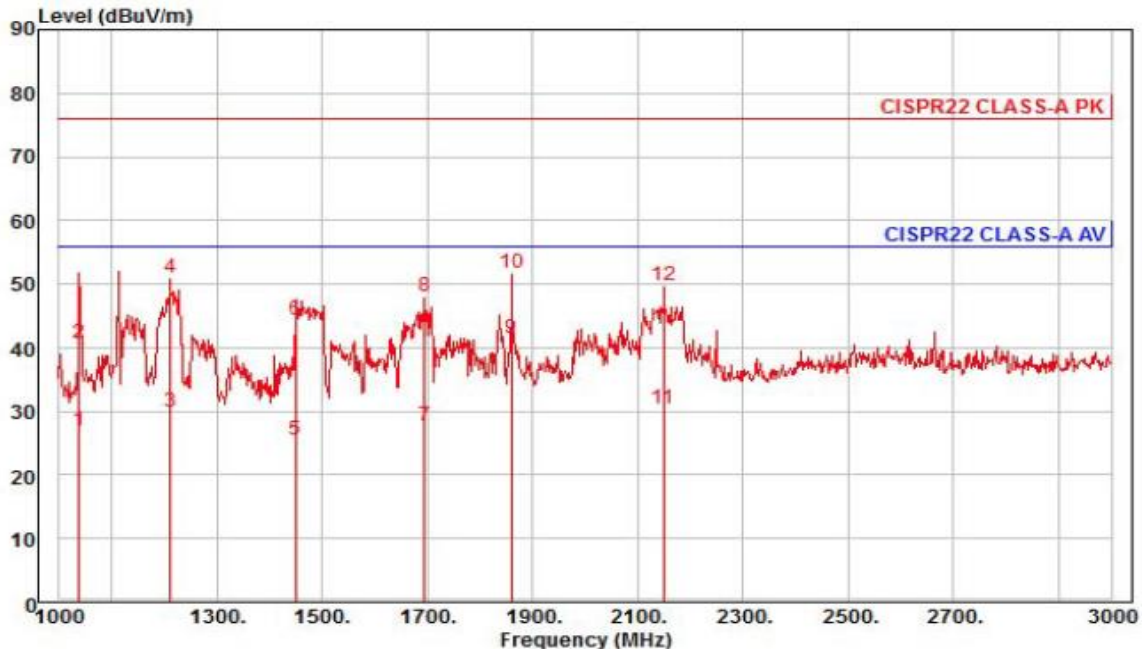
Corrected Amplitude [dB $\mu$ V] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

## Radiated Electric Field Emissions(Above 1 GHz)

- AC 24 V Mode



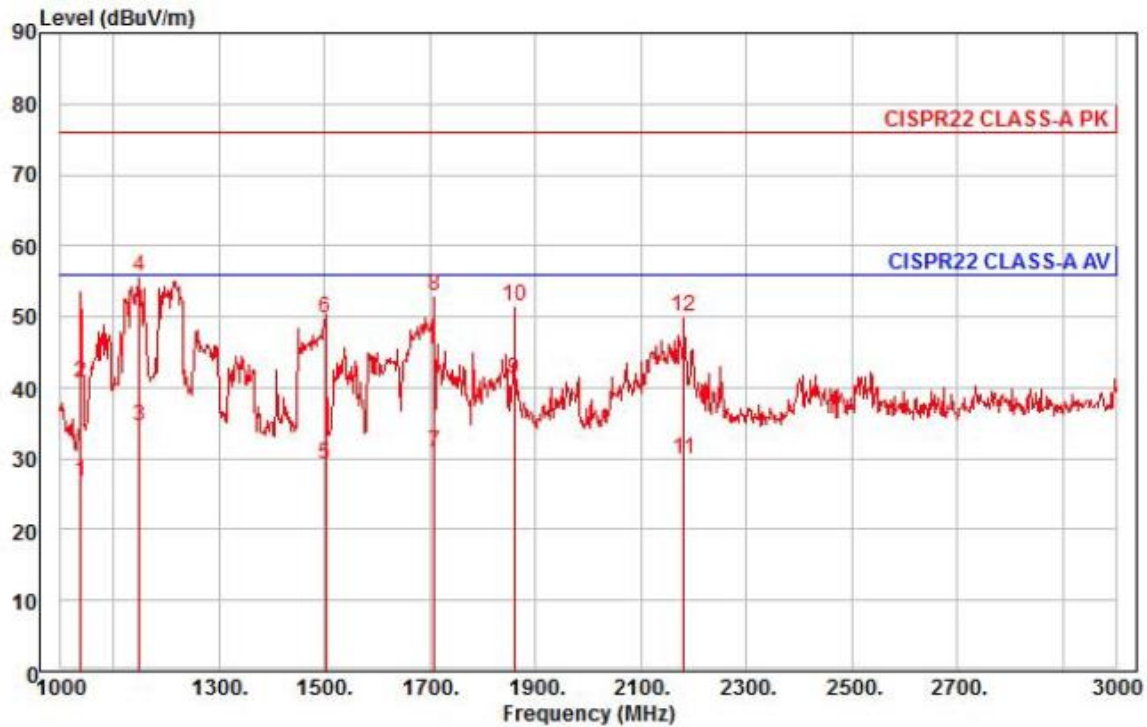
Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : AC 24 V  
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1038.00	36.25	24.06	6.60	40.00	248	56.00	-29.09	horizontal	Average
2	1038.00	50.17	24.06	6.60	40.00	248	76.00	-35.17	horizontal	Peak
3	1212.00	37.64	24.75	7.17	39.58	12	56.00	-26.02	horizontal	Average
4	1212.00	58.59	24.75	7.17	39.58	12	76.00	-25.07	horizontal	Peak
5	1450.00	31.00	25.70	7.87	39.15	56	56.00	-30.58	horizontal	Average
6	1450.00	49.92	25.70	7.87	39.15	56	76.00	-31.66	horizontal	Peak
7	1694.00	31.80	26.67	8.55	39.27	46	56.00	-28.25	horizontal	Average
8	1694.00	52.00	26.67	8.55	39.27	46	76.00	-28.05	horizontal	Peak
9 pp	1860.00	44.46	27.32	8.98	39.34	289	56.00	-14.58	horizontal	Average
10 pk	1860.00	54.75	27.32	8.98	39.34	289	76.00	-24.29	horizontal	Peak
11	2148.00	31.92	28.24	9.68	39.41	48	56.00	-25.57	horizontal	Average
12	2148.00	51.35	28.24	9.68	39.41	48	76.00	-26.14	horizontal	Peak

### ◆ Calculation

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

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



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : AC 24 V  
Memo : 1 ~ 3 GHz

	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1038.00	36.01	24.06	6.60	40.00	133	56.00	-29.33	vertical
2	1038.00	49.99	24.06	6.60	40.00	133	76.00	-35.35	vertical
3	1148.00	42.77	24.50	6.97	39.73	21	56.00	-21.49	vertical
4 pk	1148.00	64.02	24.50	6.97	39.73	21	76.00	-20.24	vertical
5	1502.00	34.46	25.90	8.02	39.18	21	56.00	-26.80	vertical
6	1502.00	55.09	25.90	8.02	39.18	21	76.00	-26.17	vertical
7	1708.00	34.87	26.72	8.59	39.27	21	56.00	-25.09	vertical
8	1708.00	56.95	26.72	8.59	39.27	21	76.00	-23.01	vertical
9 pp	1860.00	44.15	27.32	8.98	39.34	256	56.00	-14.89	vertical
10	1860.00	54.62	27.32	8.98	39.34	256	76.00	-24.42	vertical
11	2182.00	31.23	28.33	9.76	39.41	357	56.00	-26.09	vertical
12	2182.00	51.44	28.33	9.76	39.41	357	76.00	-25.88	vertical

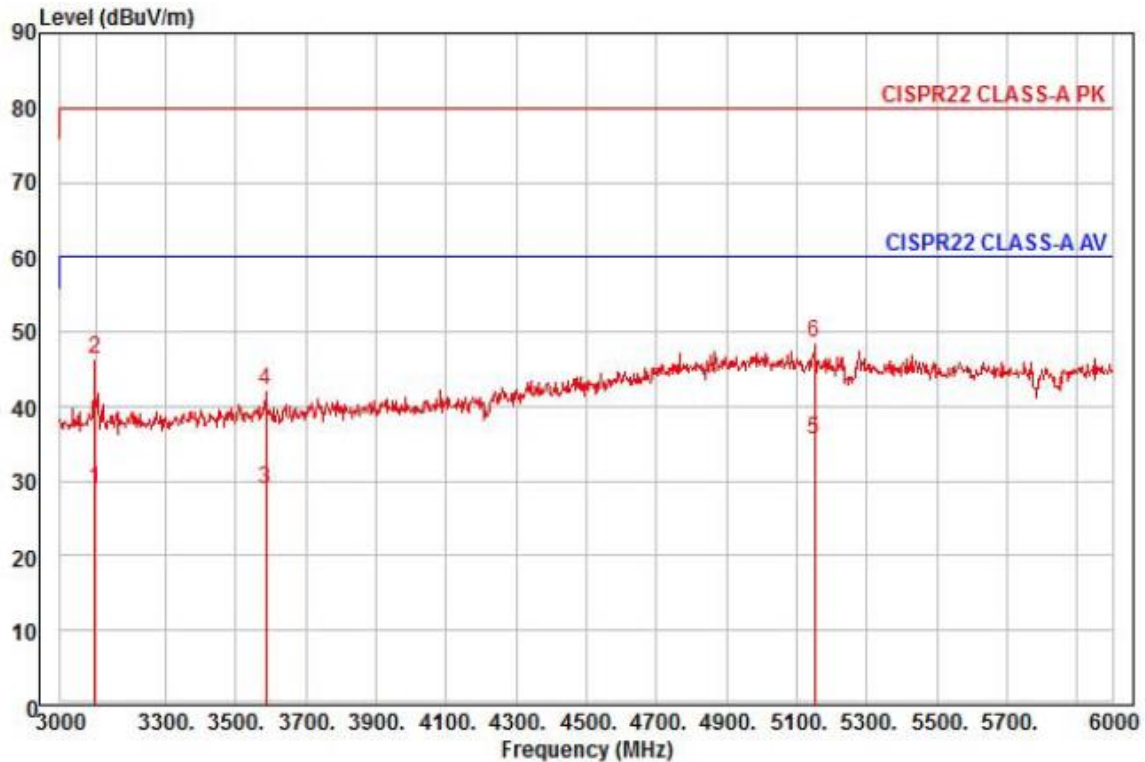
#### ◆ Calculation

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

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

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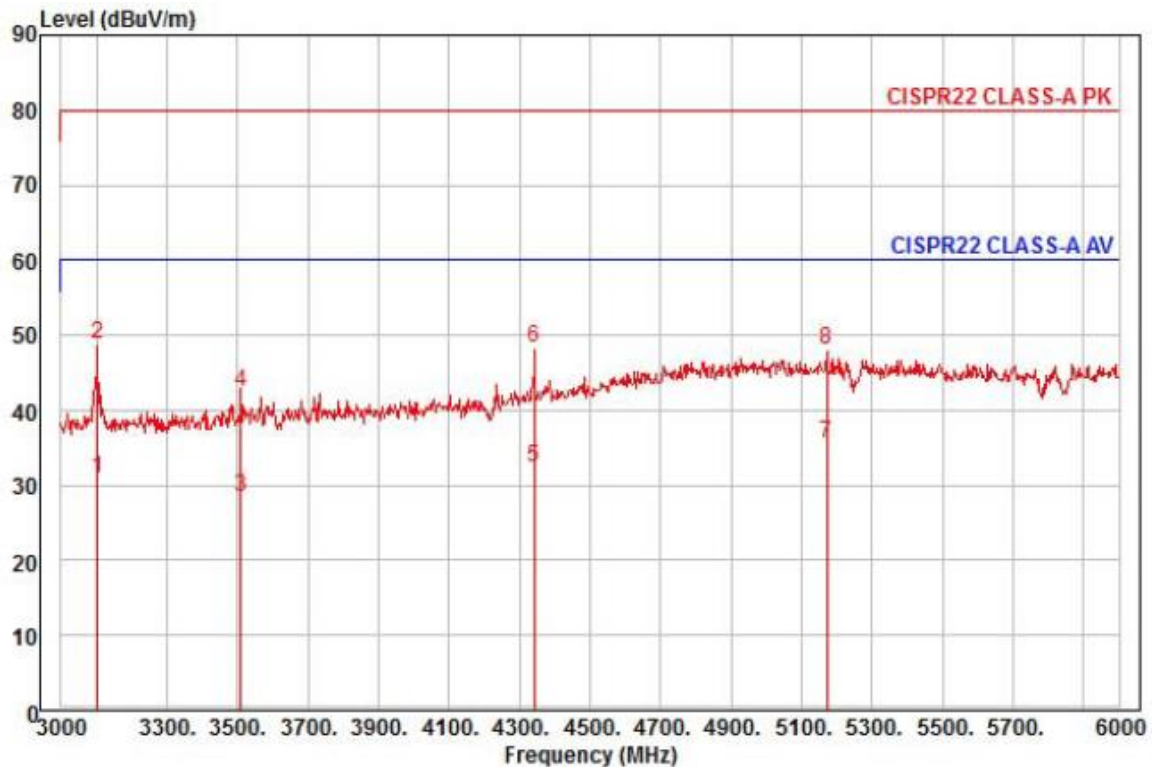
Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : AC 24 V  
Memo : 3 ~ 6 GHz

	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3099.00	26.72	30.50	11.88	40.26	196	60.00	-31.16	horizontal Average
2	3099.00	44.32	30.50	11.88	40.26	196	80.00	-33.56	horizontal Peak
3	3585.00	25.59	31.31	12.78	40.85	63	60.00	-31.17	horizontal Average
4	3585.00	38.82	31.31	12.78	40.85	63	80.00	-37.94	horizontal Peak
5 pp	5151.00	23.11	37.41	15.61	40.52	124	60.00	-24.39	horizontal Average
6 pk	5151.00	36.14	37.41	15.61	40.52	124	80.00	-31.36	horizontal Peak

#### ◆ Calculation

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

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



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : AC 24 V  
Memo : 3 ~ 6 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3102.00	28.91	30.50	11.88	40.27	234	60.00	-28.98	vertical	Average
2 pk	3102.00	46.73	30.50	11.88	40.27	234	80.00	-31.16	vertical	Peak
3	3510.00	25.58	31.19	12.64	40.88	34	60.00	-31.47	vertical	Average
4	3510.00	39.41	31.19	12.64	40.88	34	80.00	-37.64	vertical	Peak
5	4341.00	25.09	33.96	14.17	40.75	157	60.00	-27.53	vertical	Average
6	4341.00	40.97	33.96	14.17	40.75	157	80.00	-31.65	vertical	Peak
7 pp	5172.00	22.99	37.37	15.65	40.56	56	60.00	-24.55	vertical	Average
8	5172.00	35.57	37.37	15.65	40.56	56	80.00	-31.97	vertical	Peak

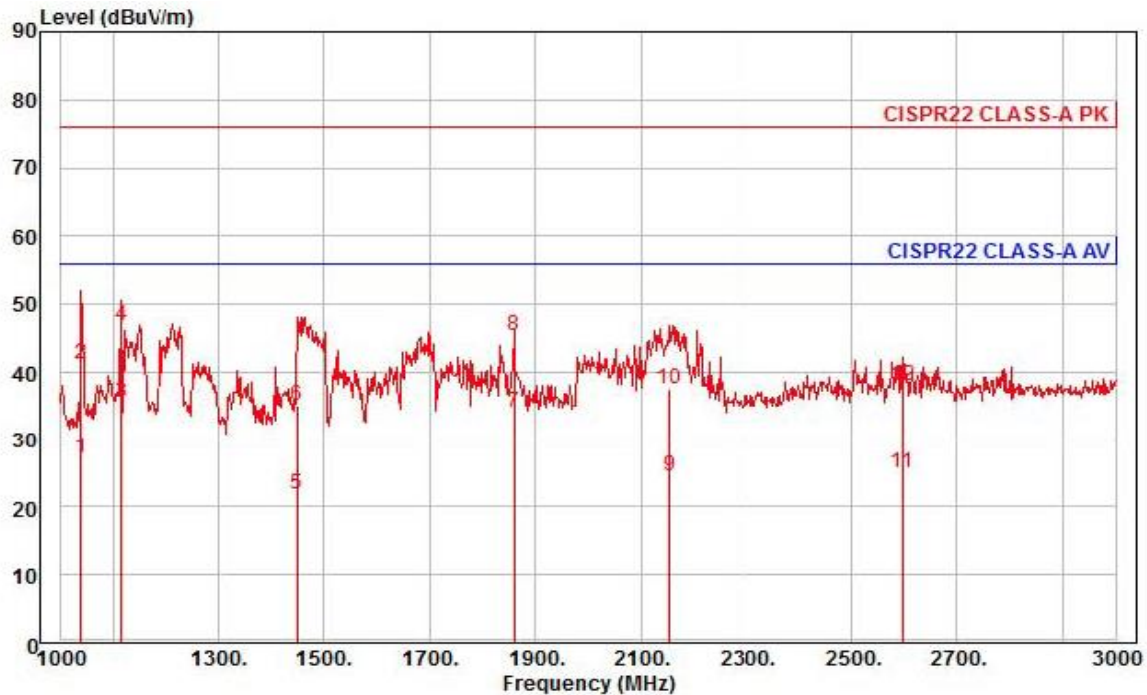
#### ◆ Calculation

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

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

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# - DC 12 V Mode



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : DC 12 V  
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1038.00	36.47	24.06	6.60	40.00	139	56.00	-28.87	horizontal	Average
2	1038.00	50.56	24.06	6.60	40.00	139	76.00	-34.78	horizontal	Peak
3 pp	1114.00	44.24	24.36	6.86	39.82	262	56.00	-20.36	horizontal	Average
4 pk	1114.00	55.40	24.36	6.86	39.82	262	76.00	-29.20	horizontal	Peak
5	1450.00	27.37	25.70	7.87	39.15	53	56.00	-34.21	horizontal	Average
6	1450.00	40.64	25.70	7.87	39.15	53	76.00	-40.94	horizontal	Peak
7	1860.00	37.12	27.32	8.98	39.34	265	56.00	-21.92	horizontal	Average
8	1860.00	48.40	27.32	8.98	39.34	265	76.00	-30.64	horizontal	Peak
9	2154.00	26.01	28.26	9.69	39.41	45	56.00	-31.45	horizontal	Average
10	2154.00	38.90	28.26	9.69	39.41	45	76.00	-38.56	horizontal	Peak
11	2598.00	24.63	29.35	10.74	39.65	23	56.00	-30.93	horizontal	Average
12	2598.00	37.45	29.35	10.74	39.65	23	76.00	-38.11	horizontal	Peak

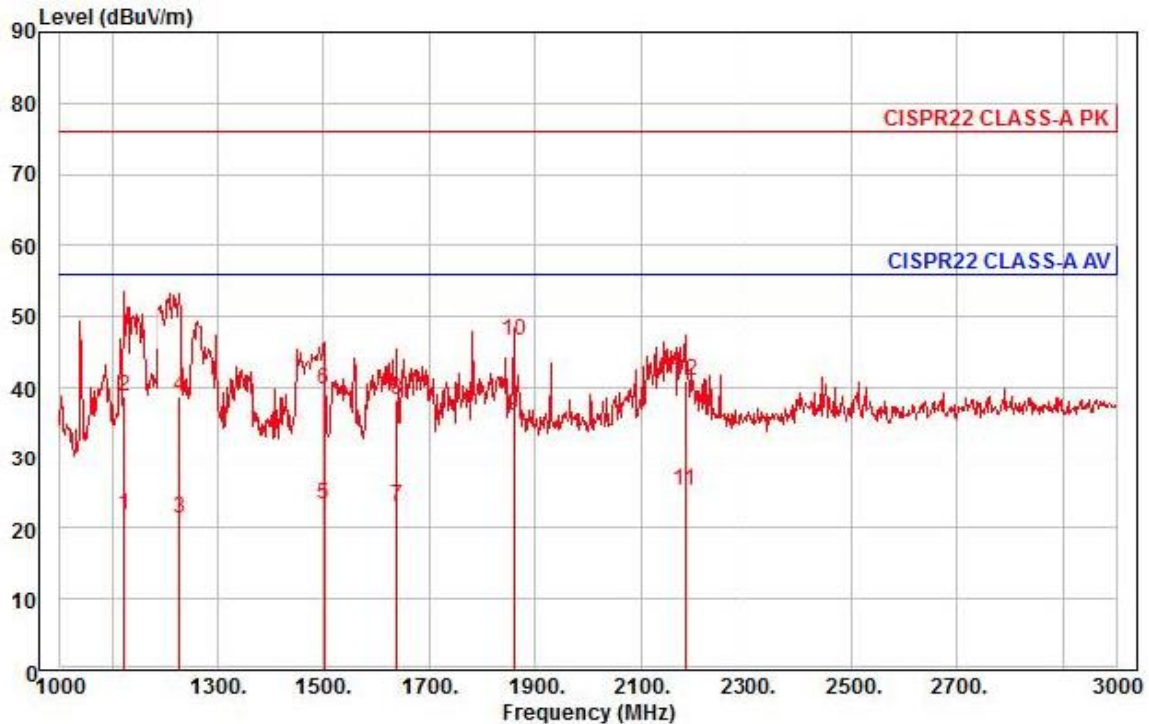
## ◆ Calculation

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

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

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Site : chamber

Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical

: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto

Project :

Model : HCM-9020VQP

Mode : DC 12 V

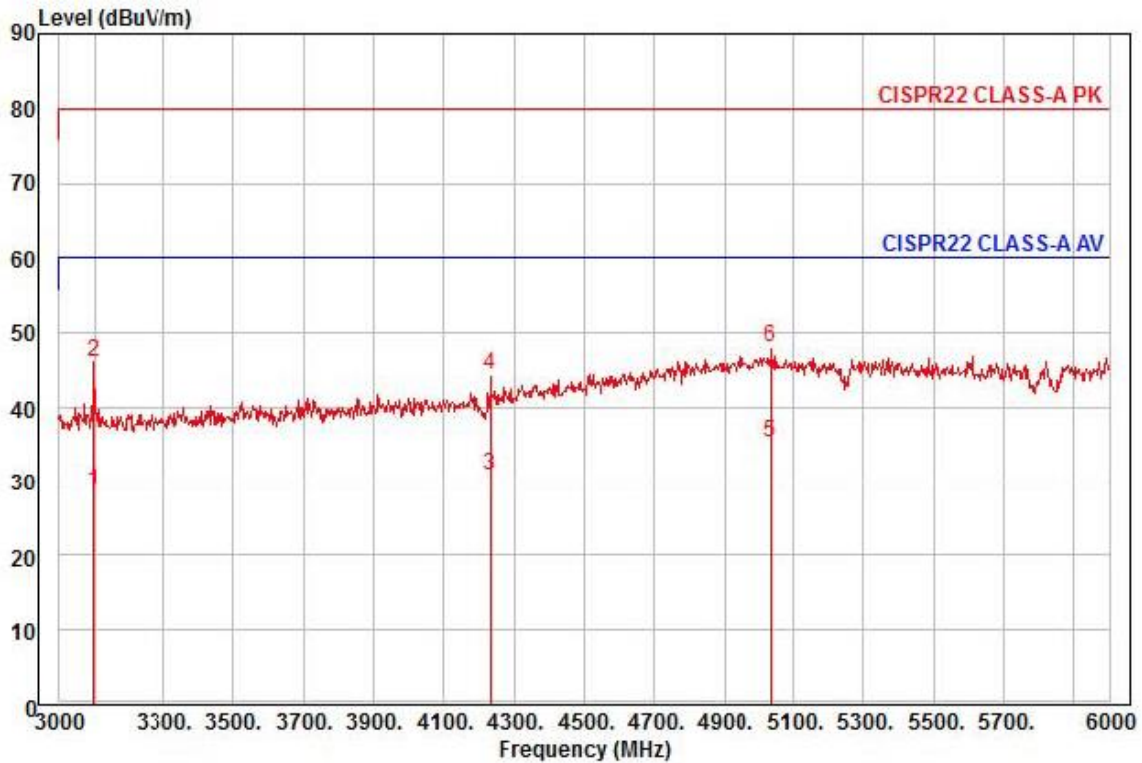
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1120.00	30.31	24.39	6.88	39.80	337	56.00	-34.22	vertical	Average
2	1120.00	47.27	24.39	6.88	39.80	337	76.00	-37.26	vertical	Peak
3	1228.00	28.83	24.82	7.22	39.54	331	56.00	-34.67	vertical	Average
4	1228.00	46.22	24.82	7.22	39.54	331	76.00	-37.28	vertical	Peak
5	1502.00	28.59	25.90	8.02	39.18	334	56.00	-32.67	vertical	Average
6	1502.00	45.00	25.90	8.02	39.18	334	76.00	-36.26	vertical	Peak
7	1640.00	27.50	26.45	8.41	39.24	359	56.00	-32.88	vertical	Average
8	1640.00	42.66	26.45	8.41	39.24	359	76.00	-37.72	vertical	Peak
9 pp	1860.00	39.00	27.32	8.98	39.34	256	56.00	-20.04	vertical	Average
10 pk	1860.00	49.66	27.32	8.98	39.34	256	76.00	-29.38	vertical	Peak
11	2184.00	26.69	28.33	9.76	39.41	357	56.00	-30.63	vertical	Average
12	2184.00	42.19	28.33	9.76	39.41	357	76.00	-35.13	vertical	Peak

#### ◆ Calculation

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

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



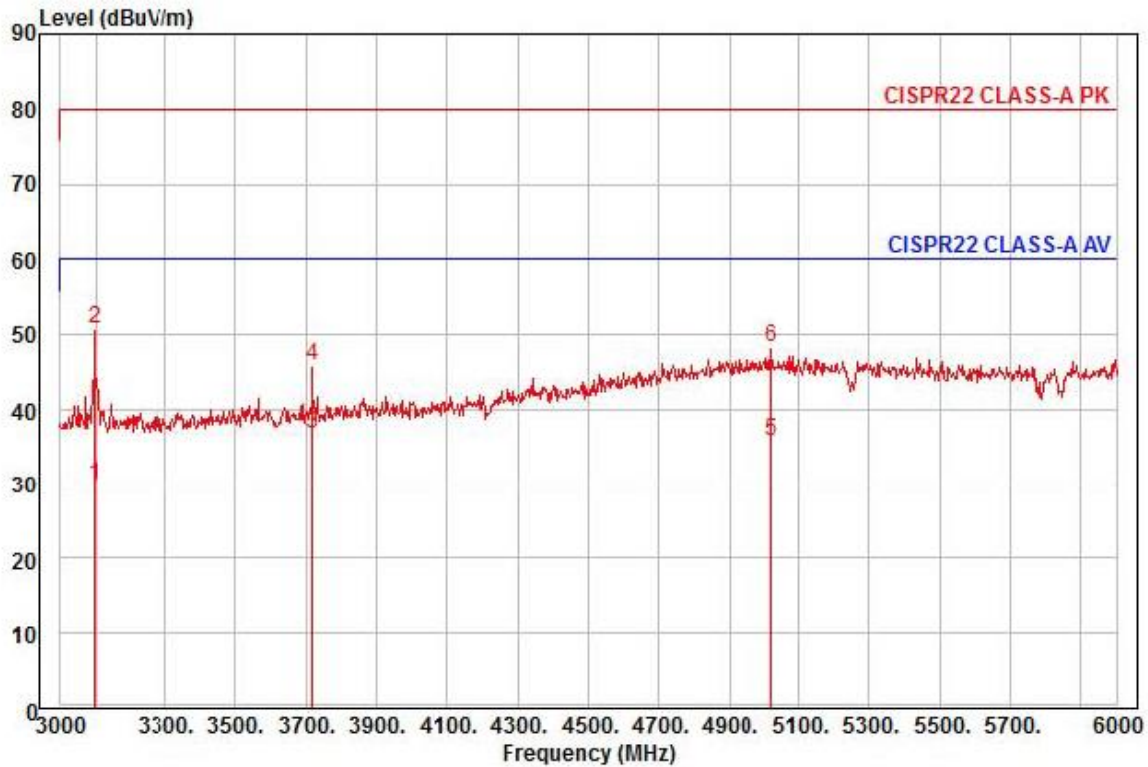
Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) horizontal  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : DC 12 V  
Memo : 3 ~ 6 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3099.00	26.51	30.50	11.88	40.26	353	60.00	-31.37	horizontal	Average
2	3099.00	43.98	30.50	11.88	40.26	353	80.00	-33.90	horizontal	Peak
3	4233.00	24.40	33.34	13.99	40.73	96	60.00	-29.00	horizontal	Average
4	4233.00	37.68	33.34	13.99	40.73	96	80.00	-35.72	horizontal	Peak
5 pp	5037.00	22.71	37.65	15.39	40.33	279	60.00	-24.58	horizontal	Average
6 pk	5037.00	35.47	37.65	15.39	40.33	279	80.00	-31.82	horizontal	Peak

#### ◆ Calculation

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

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



Site : chamber  
Condition: CISPR22 CLASS-A PK 3m HORN781(2015.05.07) vertical  
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto  
Project :  
Model : HCM-9020VQP  
Mode : DC 12 V  
Memo : 3 ~ 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3099.00	27.84	30.50	11.88	40.26	21	60.00	-30.04	vertical	Average
2	pk 3099.00	48.59	30.50	11.88	40.26	21	80.00	-29.29	vertical	Peak
3	pp 3720.00	33.01	31.54	13.03	40.80	325	60.00	-23.22	vertical	Average
4	3720.00	42.05	31.54	13.03	40.80	325	80.00	-34.18	vertical	Peak
5	5022.00	22.97	37.68	15.36	40.31	286	60.00	-24.30	vertical	Average
6	5022.00	35.66	37.68	15.36	40.31	286	80.00	-31.61	vertical	Peak

#### ◆ Calculation

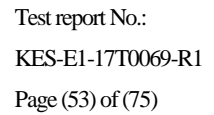
Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB]) - Limit Line[dBuV]

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

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**KES Co., Ltd.**

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
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www.kes.co.kr

Test report No.:

KES-E1-17T0069-R1

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## Test Data - Voltage Fluctuations

**Maximum Flicker results**

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

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## Test Setup Photos and Configuration

### Conducted Voltage Emissions

- AC 24 V Mode



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## Conducted Telecommunication Emissions

N/A

N/A

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

- AC 24 V Mode



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- DC 12 V Mode

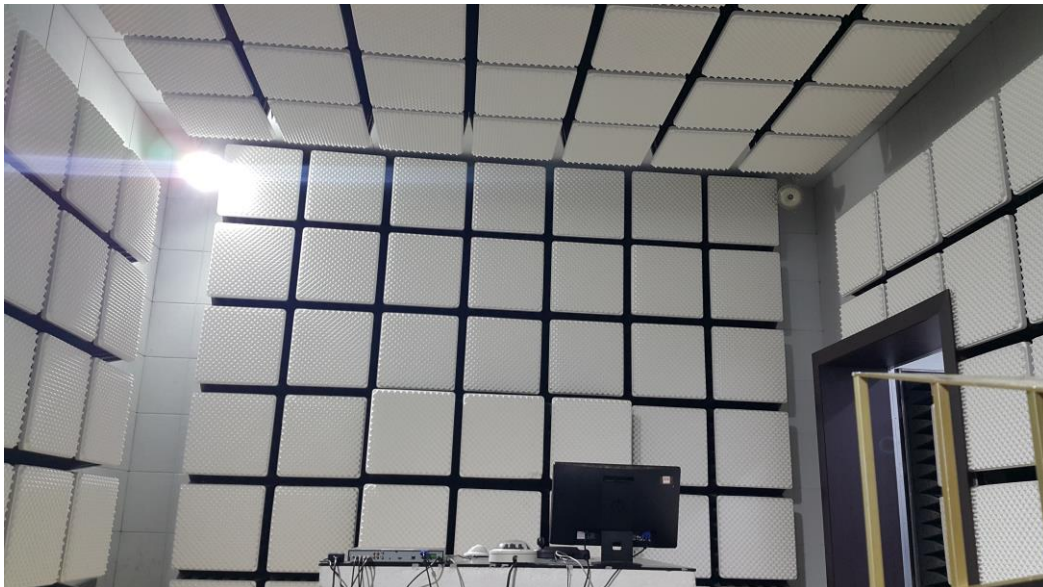
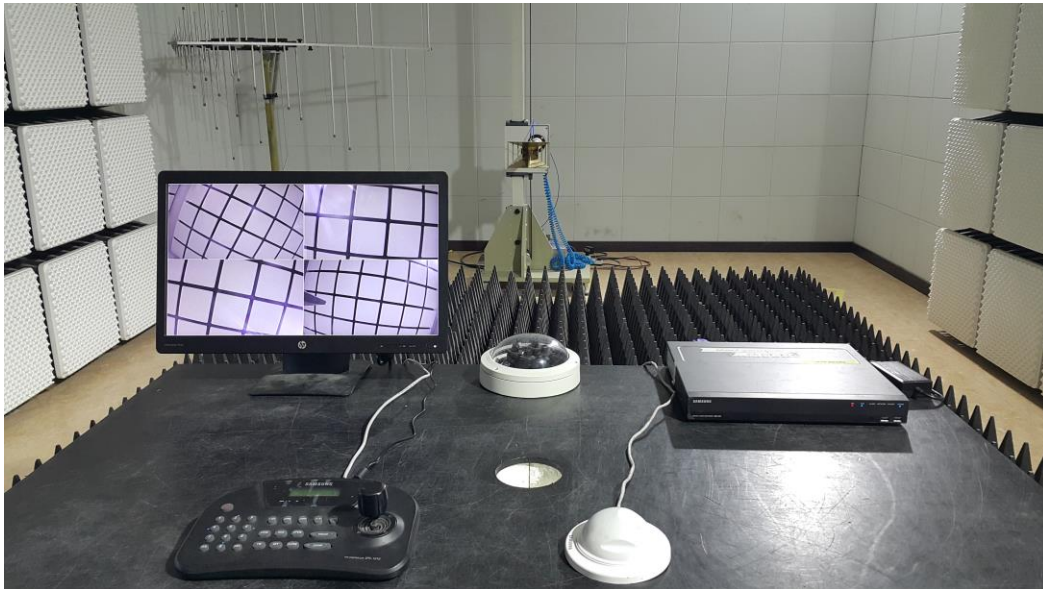


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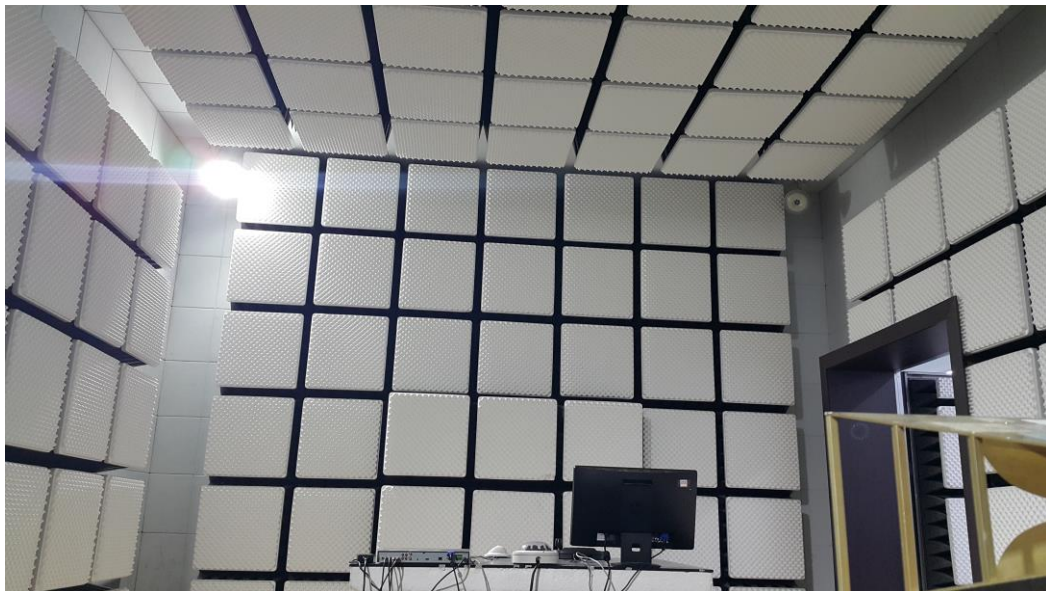
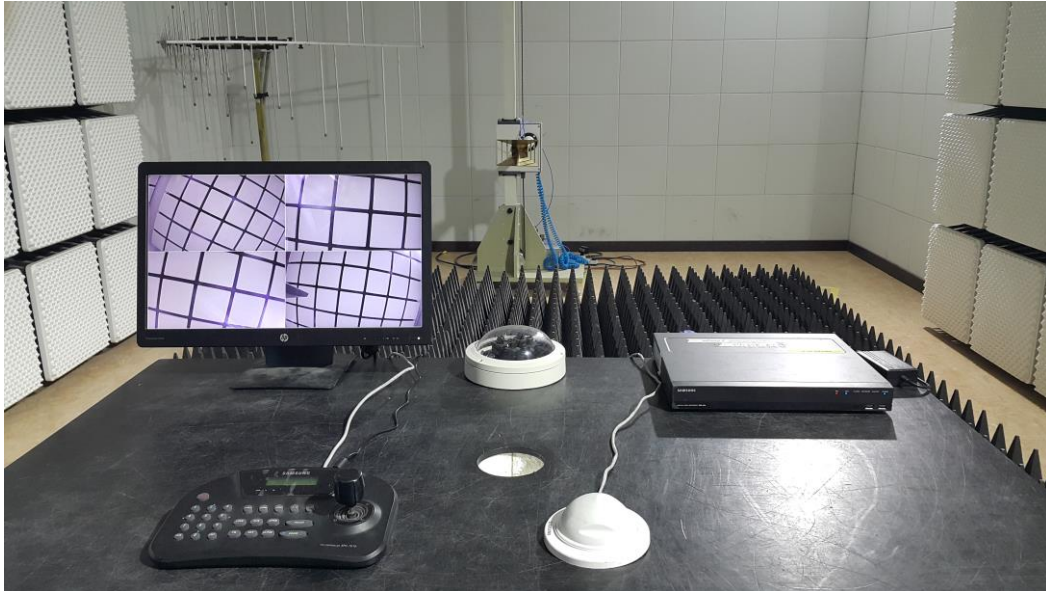
## Radiated Electric Field Emissions(Above 1 GHz)

- AC 24 V Mode



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- DC 12 V Mode



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Test report No.:

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## **Harmonic Current Emissions and Voltage Fluctuations and Flicker**

N/A

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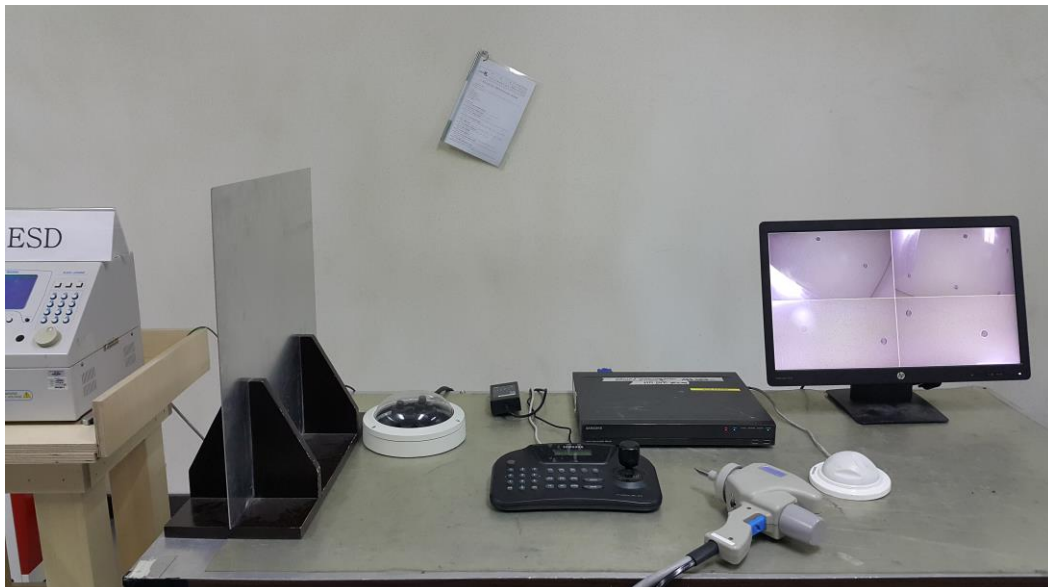


## Electrostatic Discharge

- AC 24 V Mode



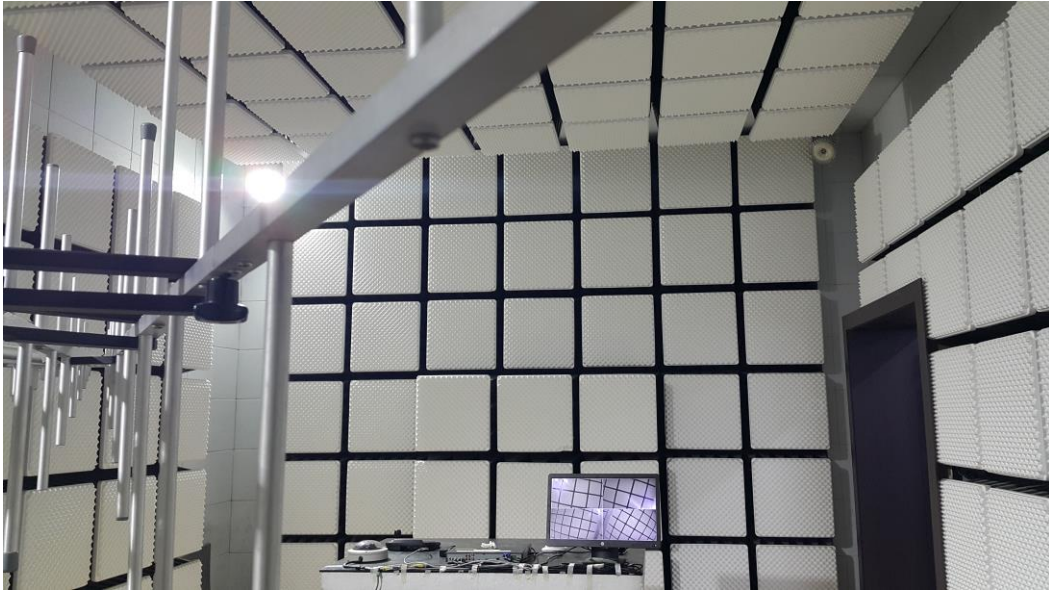
- DC 12 V Mode



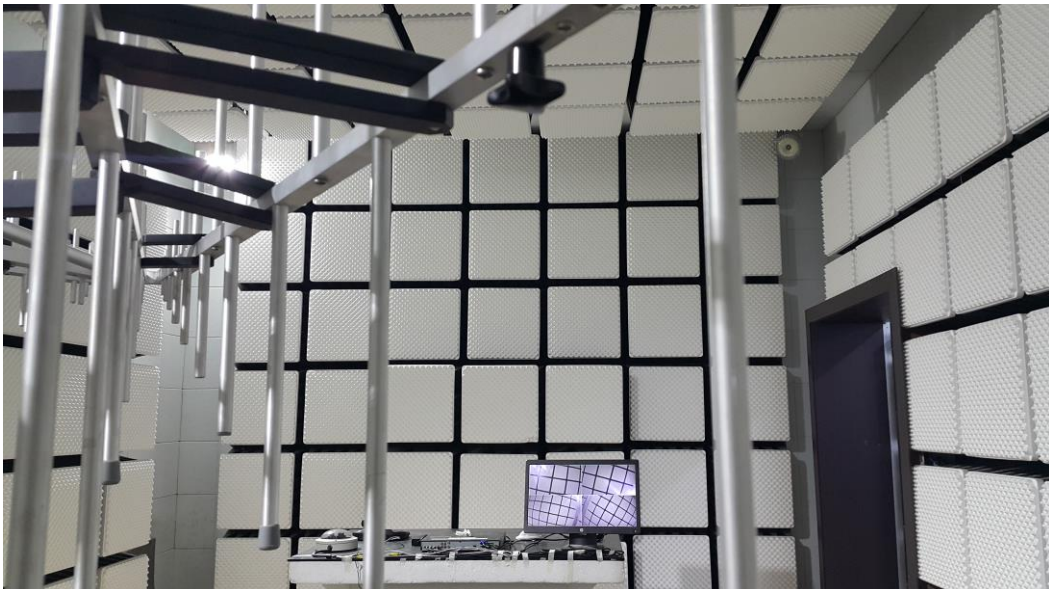
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## **Radiated Electric Field Immunity**

- AC 24 V Mode



- DC 12 V Mode



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## Electrical Fast Transients/Bursts

- AC 24 V Mode



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- DC 12 V Mode



## Surge Transients

- AC 24 V Mode



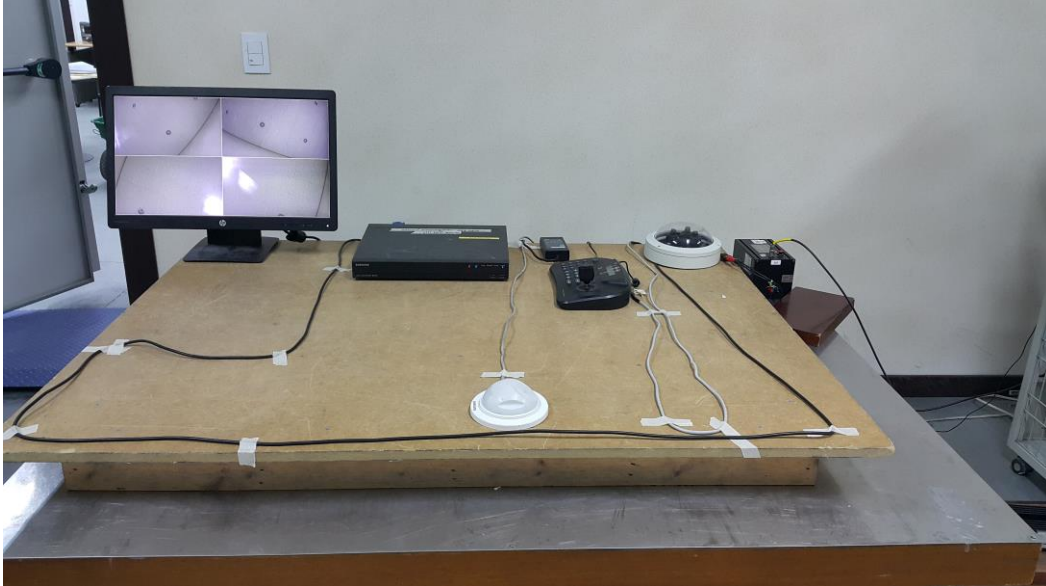
- DC 12 V Mode



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## Conducted Disturbance

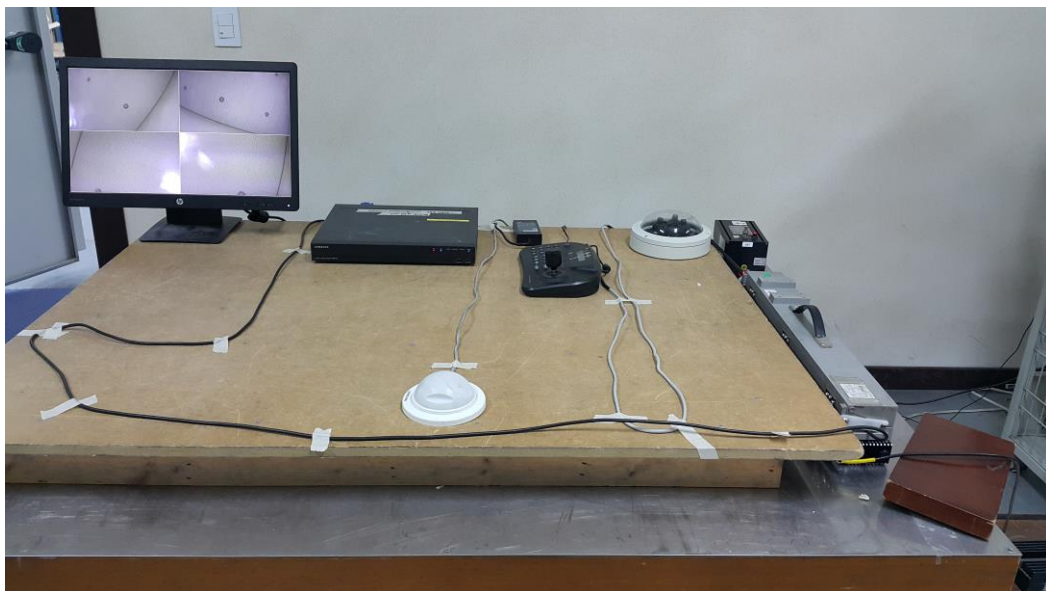
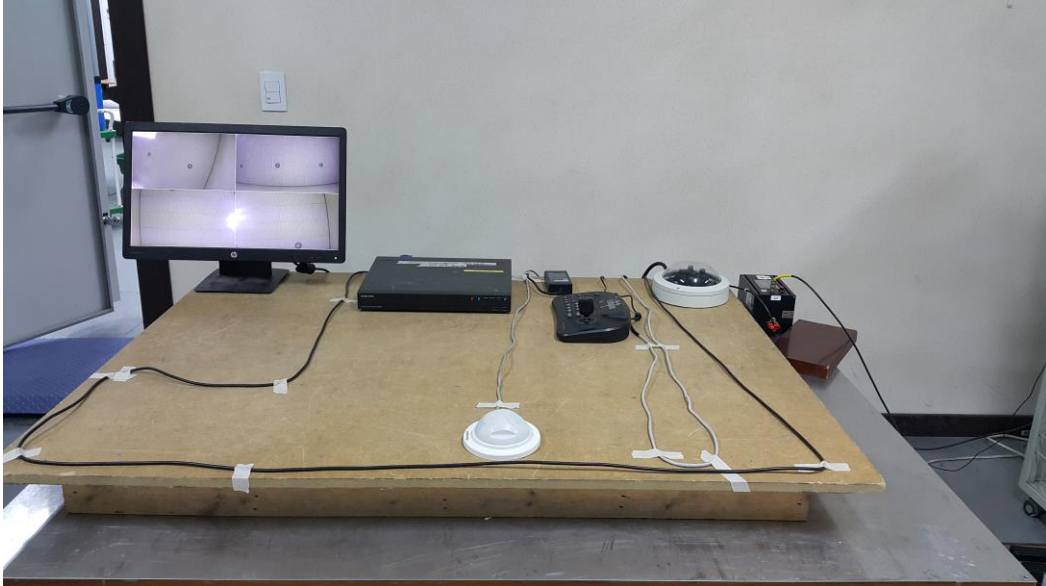
- AC 24 V Mode



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- DC 12 V Mode



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## Voltage Dips and Short Interruptions

- AC 24 V



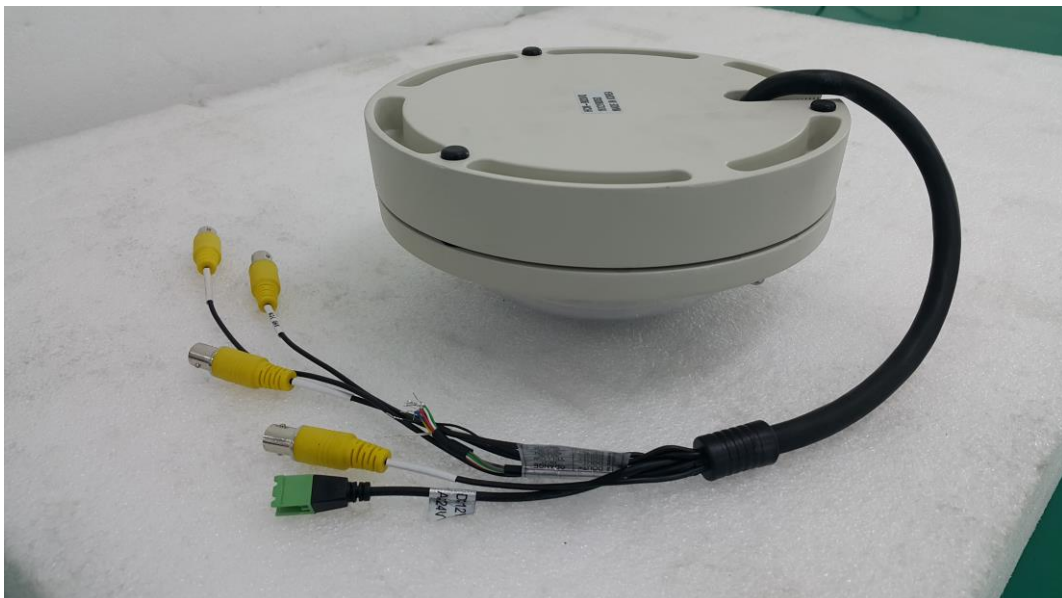
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## EUT External Photographs

(Top)



(Bottom)



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## **EUT Internal Photographs**

(Internal View)

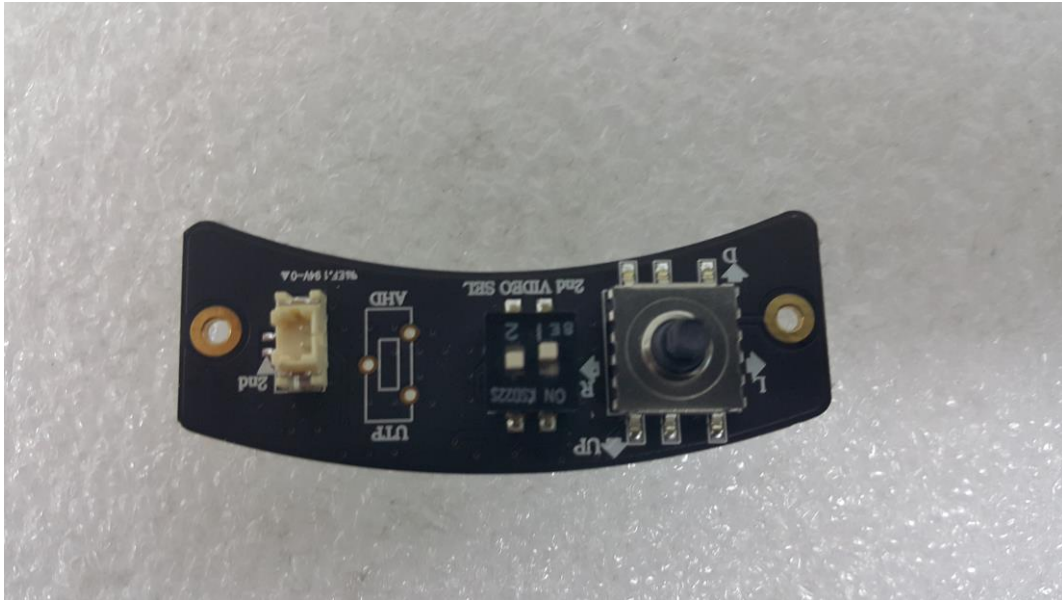


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## EUT Internal View – Board 1

(Top)



(Bottom)

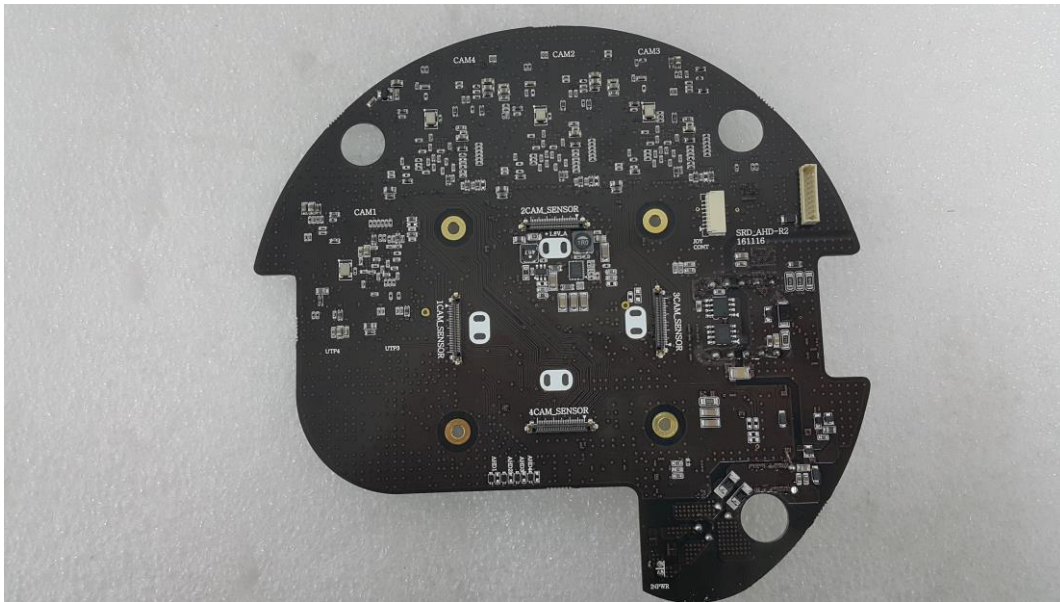


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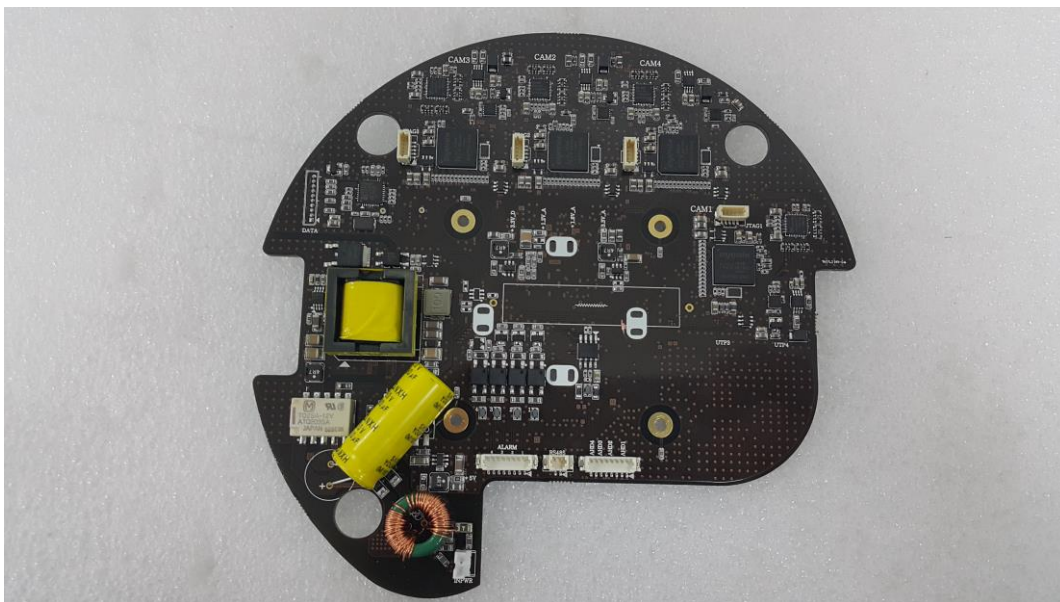


## EUT Internal View – Board 2

(Top)



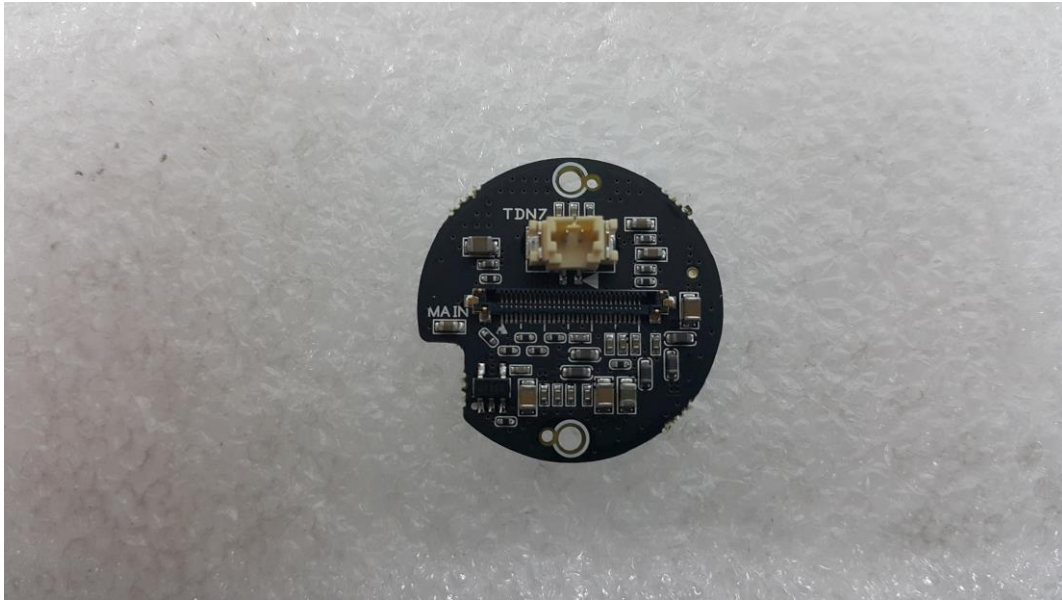
(Bottom)



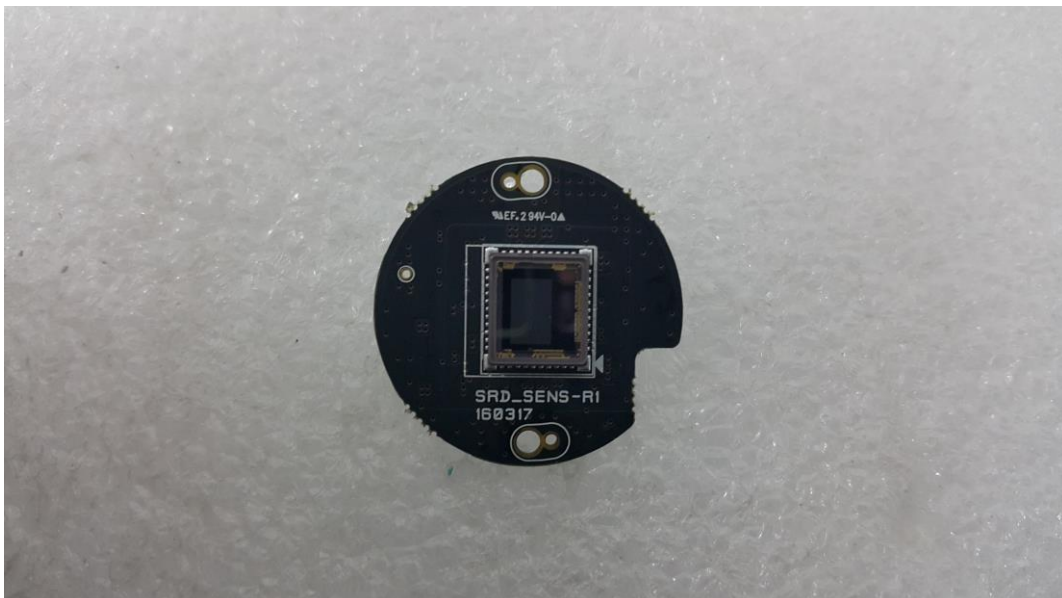
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.  
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

## EUT Internal View – Board 3

(Top)



(Bottom)



## Label and Location



### **NETWORK CAMERA**

Model No : HCM-9020VQP

Manufacturer : CPRO ELECTRONICE Co., Ltd.

Made in KOREA

