



KES Co., Ltd.

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Report No.:

KES-EM-22T0184-R1

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EMC TEST REPORT For CE

Test Report No. : KES-EM-22T0184-R1
Date of Issue : Feb. 24, 2023
Product name : CCTV CAMERA
Model/Type No. : HCD-6070R
Variant Model : SCD-6085R, HCD-6080R
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED
2. D-TECH CO.,LTD.
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
Date of Receipt : Jan. 25, 2022
Test date : Jan. 27, 2022 ~ Jan. 30, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Soo, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS.

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Feb. 09, 2022	KES-EM-22T0184	Issued
Feb. 24, 2023	KES-EM-22T0184-R1	Change the Applicant and manufacturer at the request of the customer

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1.0 General Product Description

Main Specifications of EUT 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 : 0.2Lux (F1.4, 50IRE); 0.11Lux (F1.4, 30IRE) B/W : 0Lux(IR LED on)
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
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	0° ~ 350° / 0° ~ 67° / 0° ~ 355°
Lens Type	
Focal Length (Zoom Ratio)	2.8 ~ 12mm (4.3x) varifocal
Max. Aperture Ratio	F1.4
Angular Field of View	H : 103.8°(Wide) ~ 32.4°(Tele) / V : 53.7°(Wide) ~ 18.4°(Tele) D : 121.9°(Wide) ~ 37.1°(Tele)
Min. Object Distance	0.5m (1.64ft)
Focus Control	Manual
Lens Type	DC Auto Iris
Mount Type	Board-in type
Auto Back Focus(ABF)	-
Operational	
IR LED	
Viewable length	20m (65.62ft)
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)
Day & Night	Auto (ICR) / 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
Remote control interface	Coaxial
Protocol	NTSC/PAL : Pelco-C (Coaxitron) AHD : ACP(AHD Coax Protocol)
Video Transmission Distance	500m(5C2V Coaxial Cable)
Environmental	
Operating Temperature / Humidity	-10°C ~ +55°C (+14°F ~ +131°F) / Less than 90% RH
Ingress Protection	-
Vandal Resistance	-
Electrical	
Input Voltage/Current	Dual (24VAC±10% & 12VDC±10%)
Power Consumption	4.2W
Mechanical	
Color / Material	Ivory / Plastic
Dimension (WxHxD)	119.8*119.8*98.5mm
Weight	360G

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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.

☒ AC 230 V, 50 Hz

1.2 Variant Model Differences

Add derivative model for vendor management.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
CCTV CAMERA	HCD-6070R	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT
AC-DC ADAPTOR	DAD12050DKA	-	Dream Electronic Co., Ltd.	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC ADAPTOR	-	-	-	-
DVR	SDH- C85105BFN/UC	180100045180116 0006	HANWHA VISION VIETNAM COMPANY LIMITED	-
DVR ADAPTOR	PA-1051-0	L21125029645	Dongguang Lite Power 2nd Planet	-
ALARM	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
MONITOR	SMT-2232	C95V67VF900025 B	Weihai Daewoo Electronics Co., Ltd.	-
MOUSE	AA-SM4PCPB	-	Acrox Technologies Co., Ltd.	-



1.6 External I/O Cabling

■ AC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
CCTV CAMERA (EUT)	AC IN	AC ADAPTOR	AC OUT	2.0	U
	Alarm OUT	ALARM	Alarm IN	3.0	U
	BNC	DVR	BNC	3.0	S
DVR	USB	MOUSE	USB	1.8	U
	VGA	MONITOR	VGA	1.6	S

* Unshielded=U, Shielded=S

■ DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
CCTV CAMERA (EUT)	DC IN	AC-DC ADAPTOR (EUT)	DC OUT	2.0	U
	Alarm OUT	ALARM	Alarm IN	3.0	U
	BNC	DVR	BNC	3.0	S
DVR	USB	MOUSE	USB	1.8	U
	VGA	MONITOR	VGA	1.6	S

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

■ D AC / DC Mode

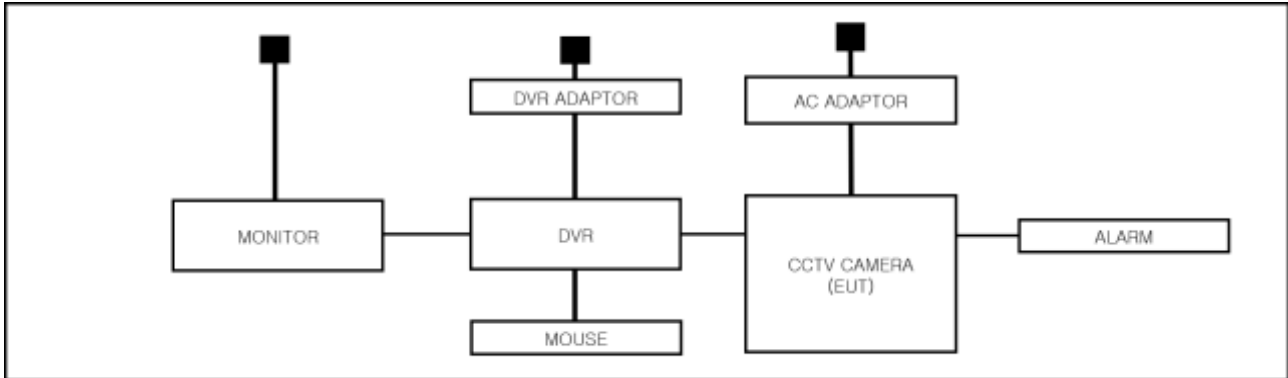
Test mode	operating
OP	The test was performed while checking whether the camera image was normally output on the monitor connected to the DVR.

EUT Test operating S/W		
Name	Version	Manufacture Company
-	-	-

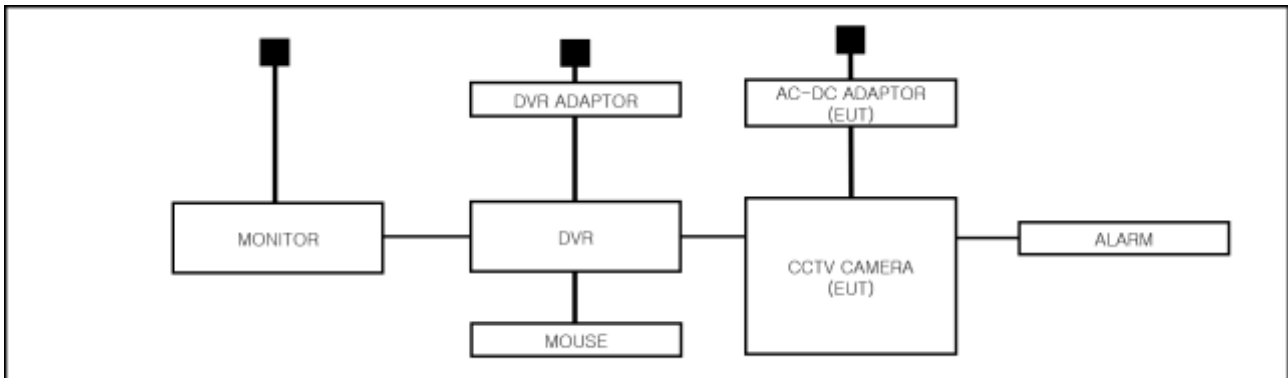
1.8 Configuration

■ AC Main
 □ DC Main

■ AC Mode



■ DC Mode



1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

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

1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298
JAPAN	VCCI	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)	 C-20136, T-20137, R-20181, G-20176
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0004



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ **EMC – Regulations 2016**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Jan. 27, 2022

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
☒	LISN	ENV216	R & S	101787	12, 27, 2022
☒	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022

Test Conditions

Temperature: (22,9 ± 0,0) °C

Relative Humidity: (42,4 ± 0,2) % R.H.

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

RemarksSee Appendix A for test data.

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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
☐	EMI Test S/W	EMC32	R & S	9.12.00	-
☐	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
☐	LISN	ENV216	R & S	101787	12, 27, 2022
☐	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
☐	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022
☐	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 28, 2022
☐	CDN	CDNS502A	TESEQ	40431	12, 27, 2022

Test Conditions

Temperature: (±) °C

Relative Humidity: (±) % R.H.

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

Does not apply because there is no signal line ports.

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2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jan. 27, 2022

Test Location☐ OPEN AREA TEST SITE #2☒ SEMI ANECHOIC CHAMBER #4(10m)**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	04, 01, 2022
☒	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2022

Test Conditions

Temperature: (23,0 ± 0,2) °C

Relative Humidity: (43,4 ± 0,0) % R.H.

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.

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2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jan. 28, 2022

Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	04, 01, 2022
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022
☒	PREAMPLIFIER	8449B	HP	3008A00538	06, 21, 2022

Test Conditions

Temperature: (22,8 ± 0,2) °C

Relative Humidity: (42,8 ± 0,2) % R.H.

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

RemarksSee Appendix A for test data.

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2.5 Harmonic Current Emissions

Test Date

Jan. 27, 2022

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2022
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (23,0 ± 0,2) °C
Relative Humidity: (42,8 ± 0,2) % R.H.

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

See Appendix A for test data.



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2.6 Voltage Fluctuations and Flicker

Test Date

Jan. 27, 2022

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2022
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (23,0 ± 0,0) °C
Relative Humidity: (42,8 ± 0,2) % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

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3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 / BS 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
BS EN 61000-4-2:2009

Test Date

Jan. 29, 2022

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	02, 01, 2022
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (23,0 ± 0,0) °C
Relative Humidity: (43,5 ± 0,0) % R.H.
Atmospheric Pressure: (100,9 ± 0,0) kPa

Test Specifications

Discharge Factor: ≥ 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
	☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

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

Required Performance Criteria: ☒ Complied

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Location of Discharge:

Air
Contact

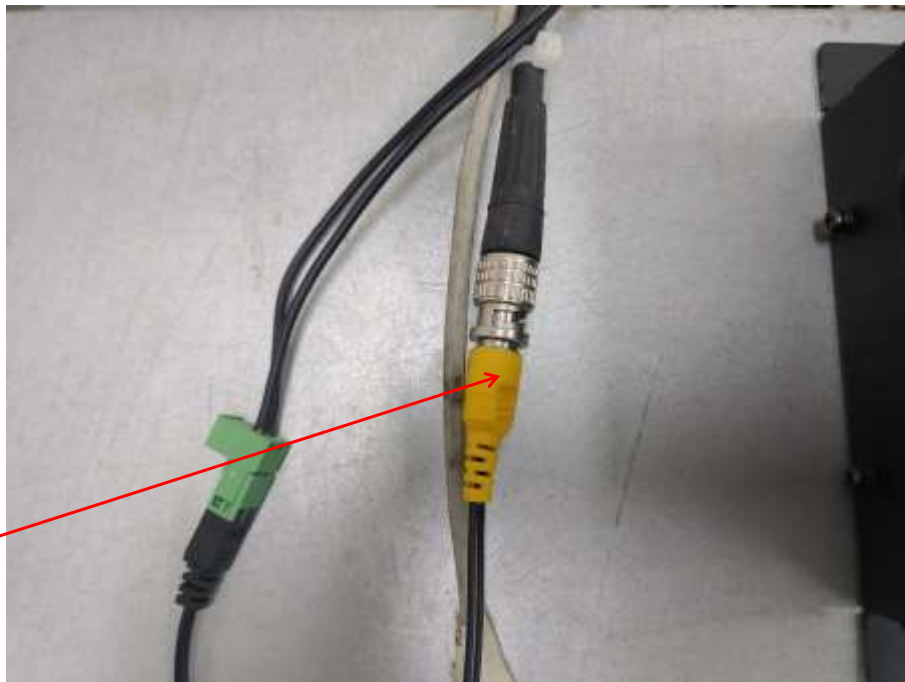


■ AC Mode



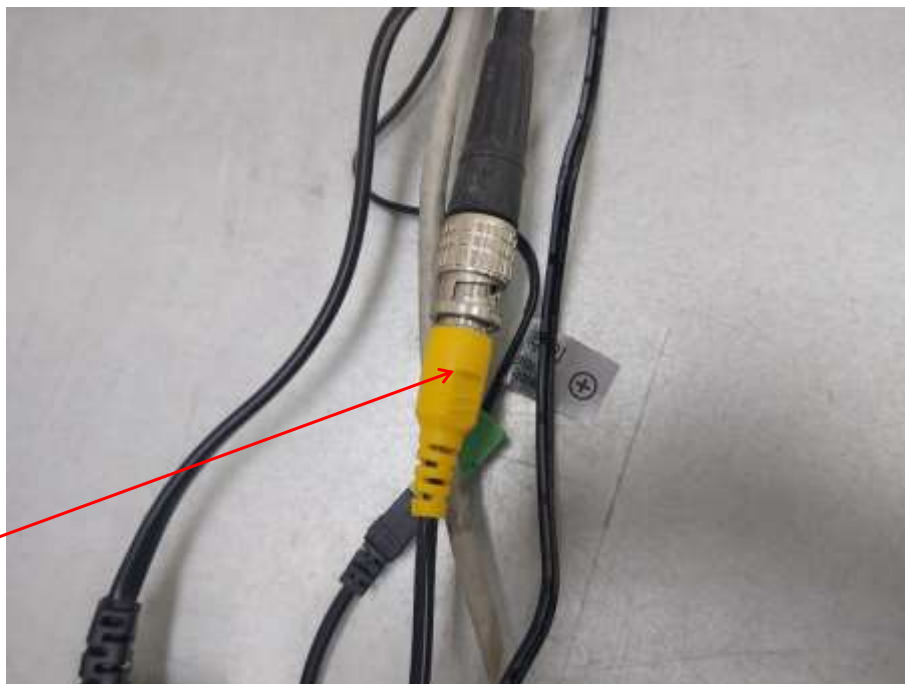
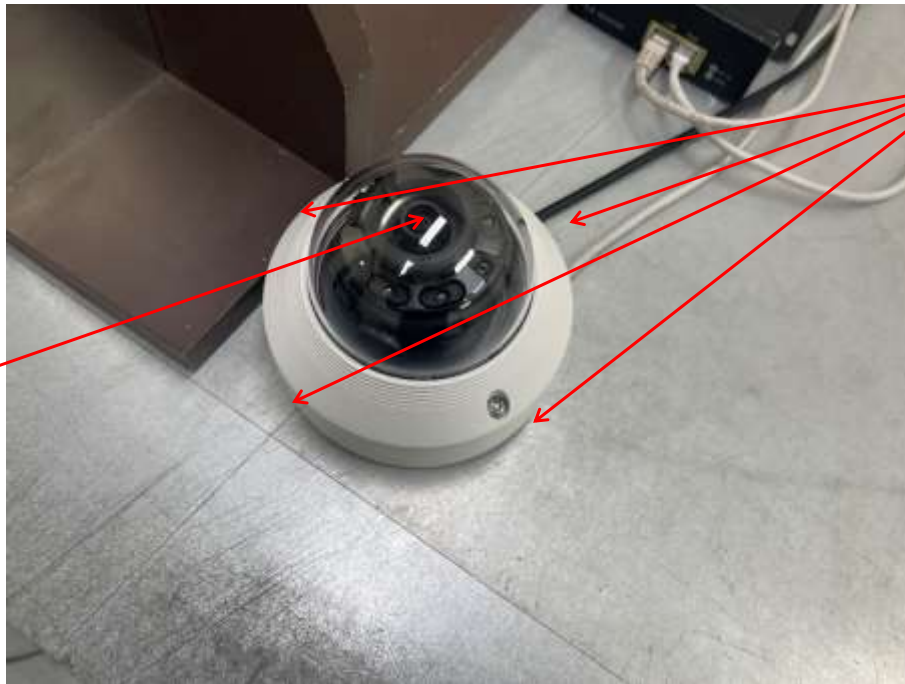
1

2



3

■ DC Mode





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Test Data**■ AC 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	Enclosure	Air Discharge	Complied	-
2	Lens	Air Discharge	Complied	-
3	Port	Air Discharge	Complied	-

■ DC 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	Enclosure	Air Discharge	Complied	-
2	Lens	Air Discharge	Complied	-
3	Port	Air Discharge	Complied	-
4	AC-DC ADAPTOR	Air 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

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3.2 Radiated Electric Field Immunity

Reference Standard

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

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

Test Date

Jan. 29, 2022

Test LocationEMS-RS: ☐ SEMI ANECHOIC CHAMBER #2☒ SEMI ANECHOIC CHAMBER #3**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	10.10.02	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 03, 2022
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 01, 2022
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 01, 2022
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2022

Test Conditions

Temperature: (23,0 ± 0,2) °C

Relative Humidity: (43,0 ± 0,4) % R.H.

Atmospheric Pressure: (101,0 ± 0,0) kPa

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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 Mode

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

■ DC 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

RemarksPASS Required Performance Criteria

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

BS EN 61000-4-4:2012

Test Date

Jan. 30, 2022

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

Test Conditions

Temperature: (22,7 ± 0,0) °C
Relative Humidity: (42,9 ± 0,0) % R.H.
Atmospheric Pressure: (100,7 ± 0,0) kPa

Test Specifications

Pulse Amplitude & Polarity:
(AC 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

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Test Data

■ AC Mode

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

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

☐ 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 Out	Complied	Complied

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

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

☐ 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 Out	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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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

BS EN 61000-4-5:2014

Test Date

Jan. 18, 2022

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
☐	CDN	CNV 508N1	EM TEST	P1610176296	12, 03, 2022

Test Conditions

Temperature: (22,7 ± 0,2) °C
Relative Humidity: (42,9 ± 0,2) % R.H.
Atmospheric Pressure: (100,7 ± 0,0) kPa

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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

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Test Data☒ AC 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)
L – PE	-	-
N – PE	-	-

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
BNC	CDN	Complied	Complied
	LINE	Complied	Complied

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■ DC 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)
L – PE	-	-
N – PE	-	-

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
BNC	CDN	Complied	Complied
	LINE	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

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

RemarksPASS Required Performance Criteria



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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

BS EN 61000-4-6:2014

Test Date

Jan. 28, 2022

Test Location

EMS-CS: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.7	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1	EM TEST	V0936105119	08, 03, 2022
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 03, 2022
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 03, 2022
☐	CDN	CDN T8RJ45	EM TEST	0909-09	08, 03, 2022
☒	EM INJECTION CLAMP	EM 101	Liithi	35943	08, 03, 2022

Test Conditions

Temperature: (23,1 ± 0,4) °C
Relative Humidity: (43,0 ± 0,2) % R.H.
Atmospheric Pressure: (100,9 ± 0,0) 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 Mode

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N	CDN	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
BNC	Clamp	Complied
Alarm Out	Clamp	Complied

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■ DC Mode☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N	CDN	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
BNC	Clamp	Complied
Alarm Out	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

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3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

BS EN 61000-4-11:2004

Test Date

Jan. 30, 2022

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.8	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	04, 01, 2022
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022

Test Conditions

Temperature: (22,7 ± 0,0) °C
Relative Humidity: (42,9 ± 0,0) % R.H.
Atmospheric Pressure: (100,7 ± 0,0) kPa

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Test Specifications & Observations/Remarks**■ AC Mode****- Voltage Dips and Short Interruptions**

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 20 % dip	☒ 250 / 5 000	<u>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5 000	<u>Degradation</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

■ DC Mode**- Voltage Dips and Short Interruptions**

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 20 % dip	☒ 250 / 5 000	<u>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5 000	<u>Degradation</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

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Observations:

Complied – No degradation of function

Degradation - See "Remarks "

Test Results

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

Remarks

During the test(100%, 250cycle), EUT was turned off but after the test, it was recovered by no operator's intervention.

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APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

■ AC Mode

[HOT]

Common Information

Test Description:

Model No.:

Phase:

Mode:

Operator Name:

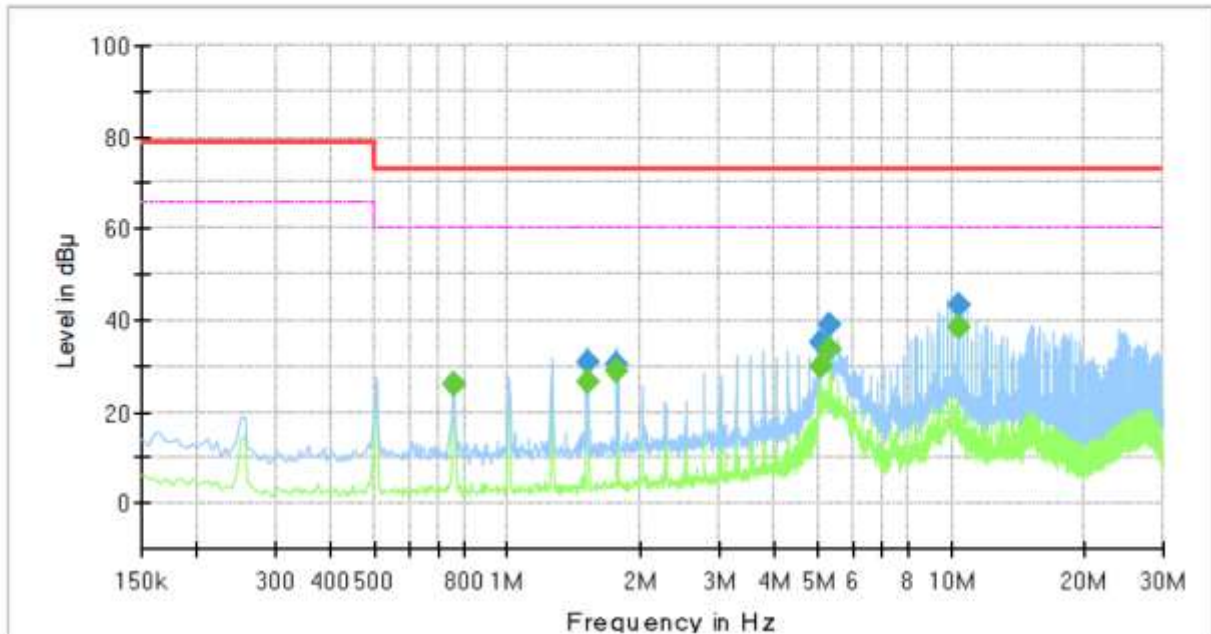
Conducted Emission

HCD-6070R

H

AC

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.755000	25.94	---	73.00	47.06	1000.0	9.000	L1	20.0
0.755000	---	25.79	60.00	34.21	1000.0	9.000	L1	20.0
1.515000	30.82	---	73.00	42.18	1000.0	9.000	L1	20.2
1.515000	---	26.64	60.00	33.36	1000.0	9.000	L1	20.2
1.765000	30.19	---	73.00	42.81	1000.0	9.000	L1	20.3
1.765000	---	28.77	60.00	31.23	1000.0	9.000	L1	20.3
5.045000	---	29.69	60.00	30.31	1000.0	9.000	L1	19.7
5.045000	35.13	---	73.00	37.87	1000.0	9.000	L1	19.7
5.300000	---	33.59	60.00	26.41	1000.0	9.000	L1	19.6
5.300000	38.95	---	73.00	34.05	1000.0	9.000	L1	19.6
10.345000	---	38.43	60.00	21.57	1000.0	9.000	L1	19.9
10.345000	43.33	---	73.00	29.67	1000.0	9.000	L1	19.9

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Report No.:

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[NEUTRAL]

Common Information

Test Description:

Model No.:

Phase:

Mode:

Operator Name:

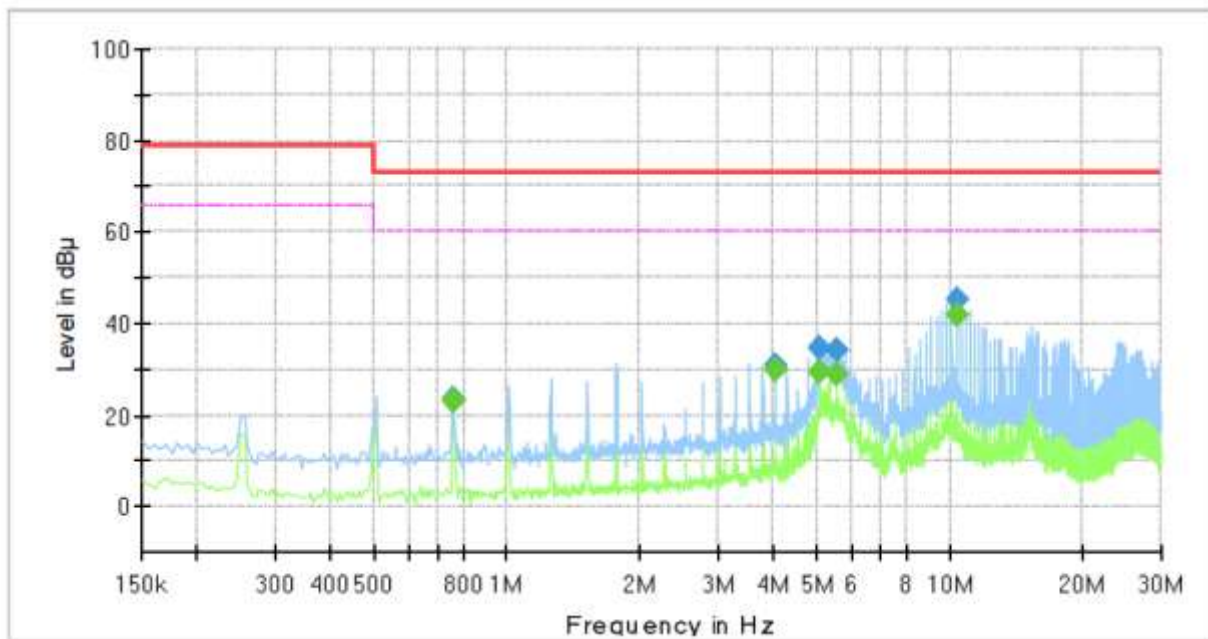
Conducted Emission

HCD-6070R

N

AC

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.755000	23.41	---	73.00	49.59	1000.0	9.000	N	20.0
0.755000	---	23.22	60.00	36.78	1000.0	9.000	N	20.0
0.760000	23.17	---	73.00	49.83	1000.0	9.000	N	20.0
0.760000	---	22.91	60.00	37.09	1000.0	9.000	N	20.0
4.040000	31.04	---	73.00	41.96	1000.0	9.000	N	19.9
4.040000	---	29.90	60.00	30.10	1000.0	9.000	N	19.9
5.050000	34.69	---	73.00	38.31	1000.0	9.000	N	19.7
5.050000	---	29.61	60.00	30.39	1000.0	9.000	N	19.7
5.550000	34.19	---	73.00	38.81	1000.0	9.000	N	19.6
5.550000	---	28.93	60.00	31.07	1000.0	9.000	N	19.6
10.350000	---	41.71	60.00	18.29	1000.0	9.000	N	19.9
10.350000	45.07	---	73.00	27.93	1000.0	9.000	N	19.9

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■ DC Mode

[HOT]

Common Information

Test Description:

Model No.:

Phase:

Mode:

Operator Name:

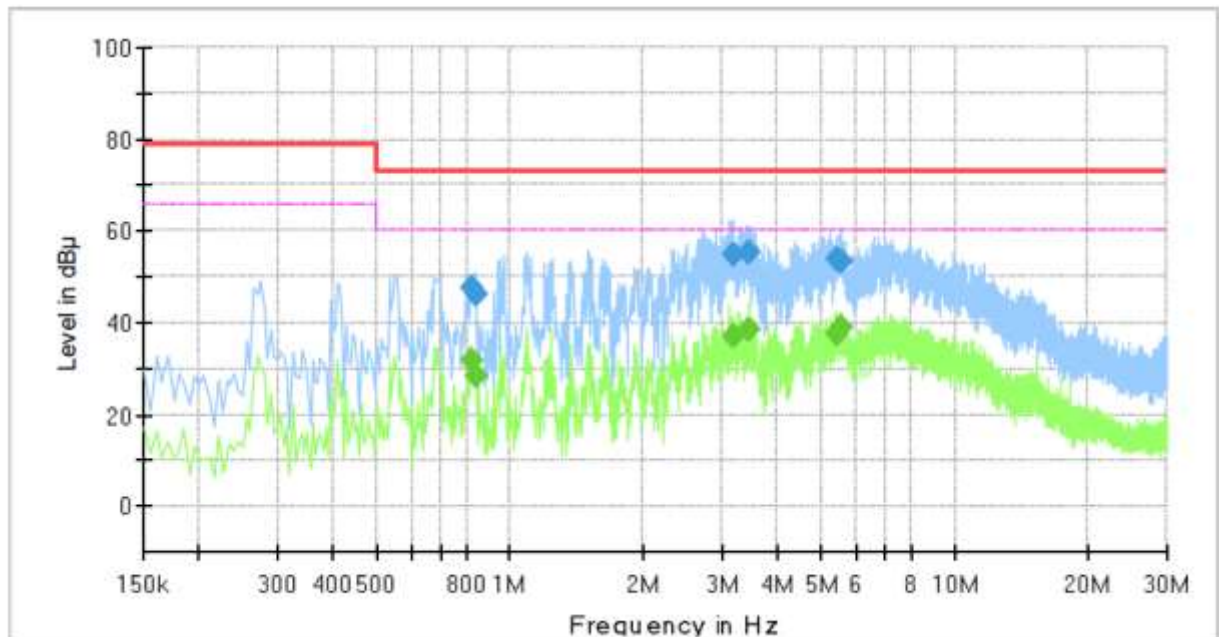
Conducted Emission

HCD-6070R

H

DC

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.815000	---	31.66	60.00	28.34	1000.0	9.000	L1	20.0
0.815000	47.73	---	73.00	25.27	1000.0	9.000	L1	20.0
0.835000	---	28.66	60.00	31.34	1000.0	9.000	L1	20.1
0.835000	46.28	---	73.00	26.72	1000.0	9.000	L1	20.1
3.170000	---	37.12	60.00	22.88	1000.0	9.000	L1	20.1
3.170000	55.01	---	73.00	17.99	1000.0	9.000	L1	20.1
3.460000	---	38.70	60.00	21.30	1000.0	9.000	L1	20.1
3.460000	55.18	---	73.00	17.82	1000.0	9.000	L1	20.1
5.450000	---	37.71	60.00	22.29	1000.0	9.000	L1	19.6
5.450000	53.98	---	73.00	19.02	1000.0	9.000	L1	19.6
5.560000	---	39.16	60.00	20.84	1000.0	9.000	L1	19.6
5.560000	53.55	---	73.00	19.45	1000.0	9.000	L1	19.6

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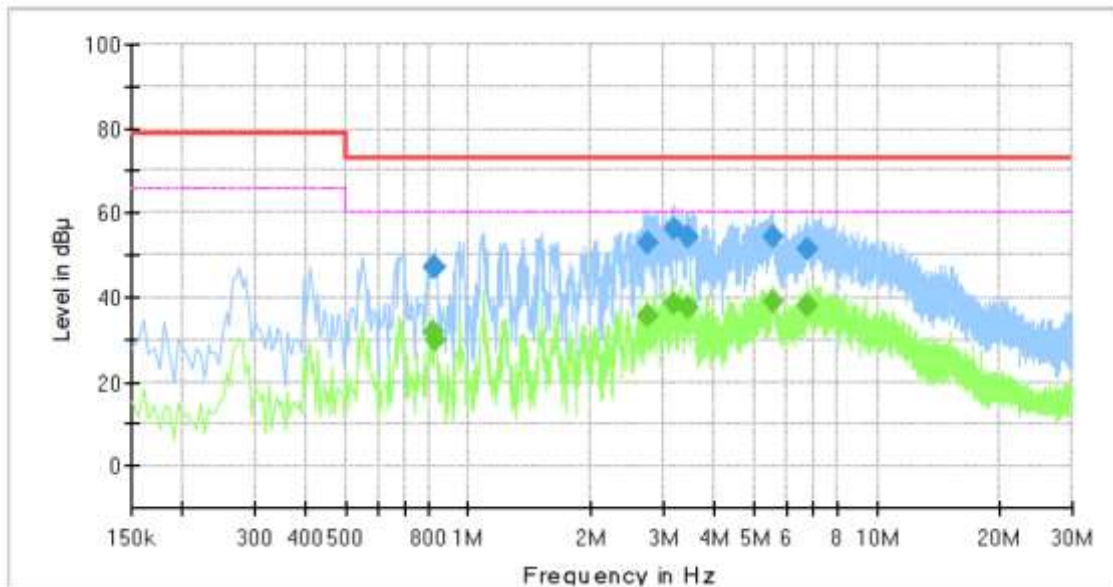
KES-EM-22T0184-R1

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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	HCD-6070R
Phase:	N
Mode:	DC
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.815000	47.22	---	73.00	25.78	1000.0	9.000	N	20.0
0.815000	---	31.60	60.00	28.40	1000.0	9.000	N	20.0
0.830000	47.05	---	73.00	25.95	1000.0	9.000	N	20.0
0.830000	---	29.72	60.00	30.28	1000.0	9.000	N	20.0
2.740000	---	35.82	60.00	24.18	1000.0	9.000	N	20.2
2.740000	52.70	---	73.00	20.30	1000.0	9.000	N	20.2
3.180000	56.20	---	73.00	16.80	1000.0	9.000	N	20.1
3.180000	---	38.50	60.00	21.50	1000.0	9.000	N	20.1
3.450000	---	37.65	60.00	22.35	1000.0	9.000	N	20.1
3.450000	54.50	---	73.00	18.50	1000.0	9.000	N	20.1
5.580000	54.13	---	73.00	18.87	1000.0	9.000	N	19.6
5.580000	---	38.93	60.00	21.07	1000.0	9.000	N	19.6
6.760000	51.57	---	73.00	21.43	1000.0	9.000	N	19.5
6.760000	---	38.13	60.00	21.87	1000.0	9.000	N	19.5

◆ 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))

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Report No.:

KES-EM-22T0184-R1

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Conducted Emissions at Telecommunication Ports

[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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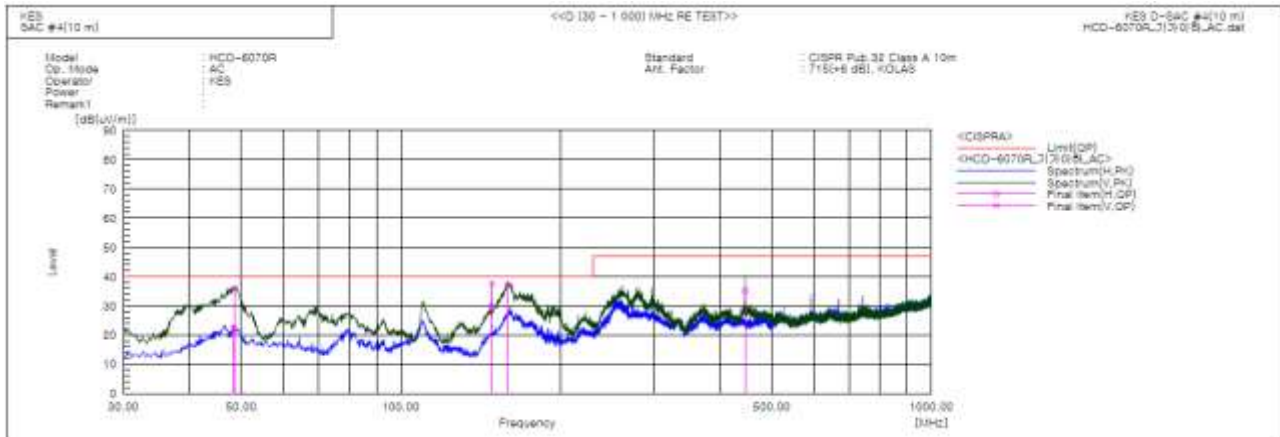
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Radiated Electric Field Emissions(Below 1 GHz)

■ AC 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	48.430	H	43.4	-21.0	22.4	40.0	17.6	391.0	31.0	
2	48.673	V	56.7	-20.9	35.8	40.0	4.2	109.0	280.0	
3	148.461	V	62.8	-25.2	37.6	40.0	2.4	113.0	181.0	
4	148.461	H	55.0	-25.2	29.8	40.0	10.2	292.0	216.0	
5	159.253	V	61.7	-24.6	37.1	40.0	2.9	125.0	173.0	
6	445.524	H	48.2	-13.0	35.2	47.0	11.8	398.0	159.0	

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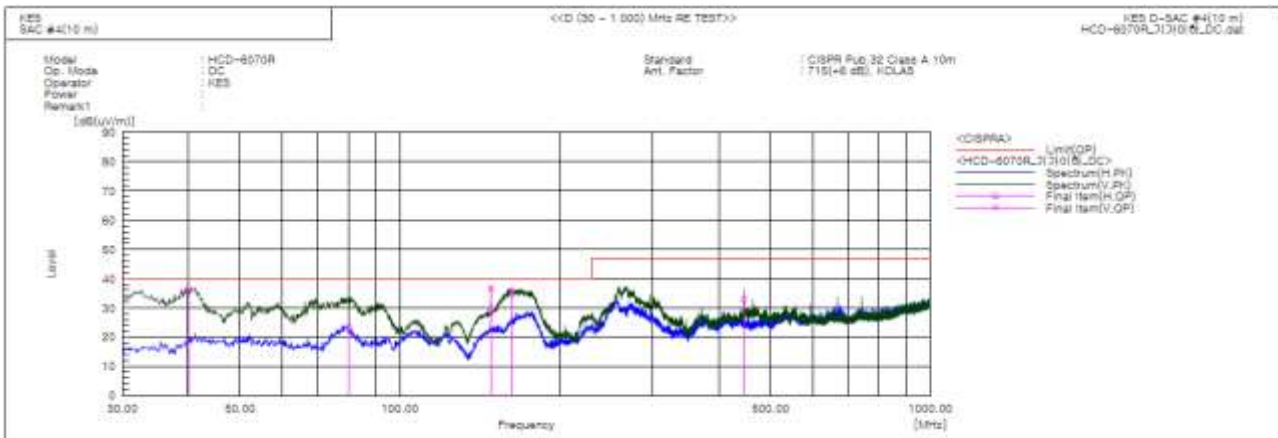


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DC Mode



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	39.700	V	58.5	-22.6	35.9	40.0	4.1	118.0	258.0	
2	80.198	H	50.8	-27.5	23.3	40.0	16.7	391.0	356.0	
3	148.461	V	61.8	-25.2	36.6	40.0	3.4	105.0	220.0	
4	148.461	H	54.5	-25.2	29.3	40.0	10.7	317.0	126.0	
5	162.405	V	60.2	-24.5	35.7	40.0	4.3	124.0	171.0	
6	445.524	H	45.8	-13.0	32.8	47.0	14.2	294.0	111.0	

◆ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)

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

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



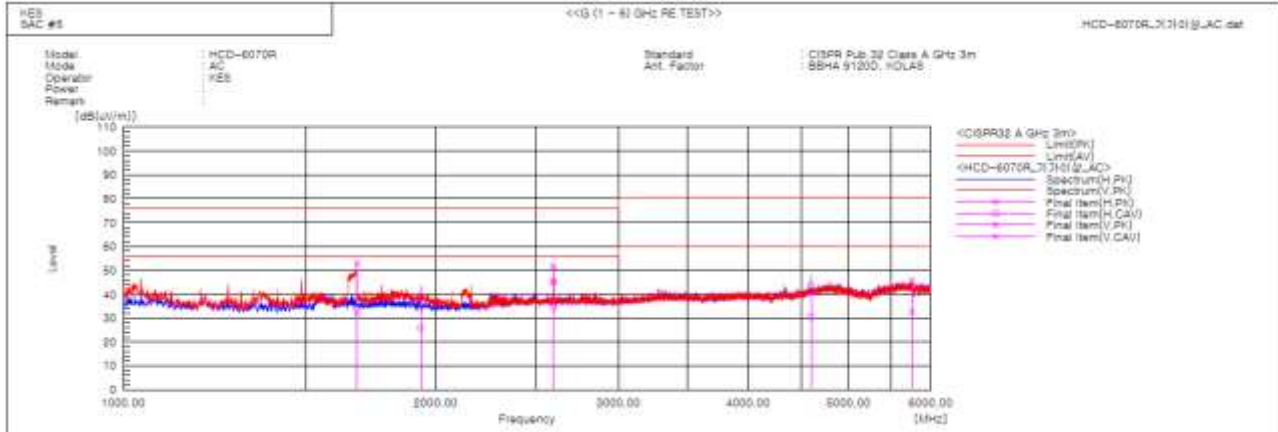
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Report No.:
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Radiated Electric Field Emissions(Above 1 GHz)

■ AC Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f	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	1679.375	V	57.6	36.8	-4.6	53.0	32.2	76.0	56.0	23.0	23.8	100.0	233.3	
2	1935.218	H	42.6	29.5	-3.7	38.9	25.8	76.0	56.0	37.1	30.2	100.0	256.3	
3	2597.497	H	46.3	35.4	-1.1	45.2	34.3	76.0	56.0	30.8	21.7	100.0	116.6	
4	2597.505	V	52.9	46.1	-1.1	51.8	45.0	76.0	56.0	24.2	11.0	100.0	201.2	
5	4800.104	H	39.4	26.1	4.4	43.8	30.5	80.0	60.0	36.2	29.5	100.0	356.9	
6	5755.625	V	38.8	25.6	7.1	45.9	32.7	80.0	60.0	34.1	27.3	100.0	239.2	

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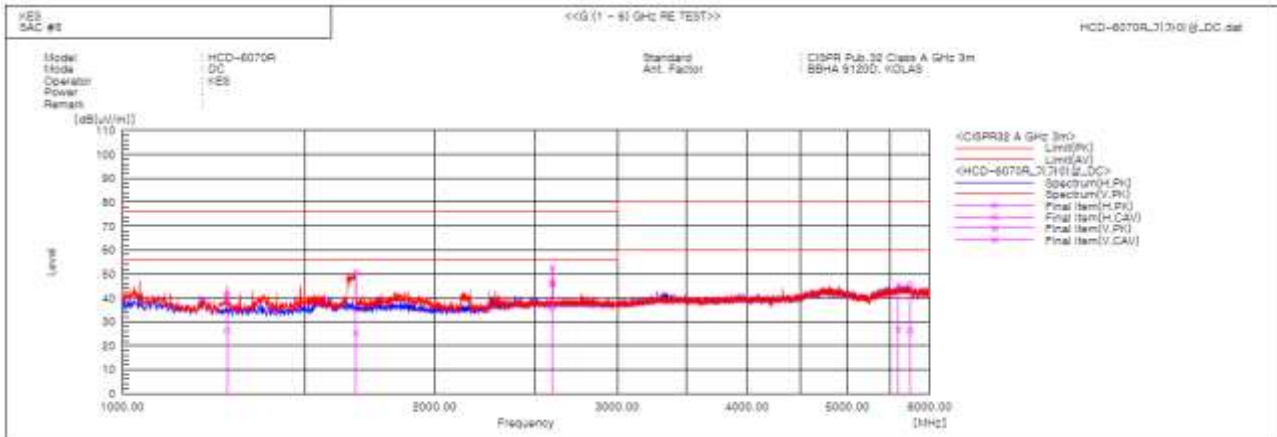


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Report No.:
KES-EM-22T0184-R1
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DC Mode



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]
1	1261.675	H	48.1	32.8	-6.6	41.5	26.2	76.0	56.0	34.5	29.8	100.0	50.1
2	1679.375	V	55.4	29.8	-4.6	50.8	25.2	76.0	56.0	25.2	30.8	100.0	235.9
3	2597.358	V	53.8	47.3	-1.1	52.7	46.2	76.0	56.0	23.3	9.8	100.0	234.5
4	2598.125	H	46.9	37.2	-1.1	45.8	36.1	76.0	56.0	30.2	19.9	100.0	29.1
5	5597.500	V	38.6	20.2	6.7	45.3	26.9	80.0	60.0	34.7	33.1	100.0	145.0
6	5744.375	H	38.4	19.1	7.1	45.5	26.2	80.0	60.0	34.5	33.8	100.0	286.4

Calculation

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

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



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ AC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.233			
2	0.002	0.209	1.080	n/a
3	0.075	3.266	2.300	PASS
4	0.001	0.273	0.430	n/a
5	0.013	1.109	1.140	PASS
6	0.001	0.263	0.300	n/a
7	0.006	0.795	0.770	PASS
8	0.001	0.369	0.230	n/a
9	0.007	1.691	0.400	PASS
10	0.001	0.401	0.184	n/a
11	0.005	1.372	0.330	n/a
12	0.001	0.509	0.153	n/a
13	0.003	1.367	0.210	n/a
14	0.001	0.705	0.131	n/a
15	0.002	1.153	0.150	n/a
16	0.001	0.622	0.115	n/a
17	0.001	1.104	0.132	n/a
18	0.001	0.698	0.102	n/a
19	0.001	0.811	0.118	n/a
20	0.001	0.817	0.092	n/a
21	0.001	0.519	0.161	n/a
22	0.001	0.834	0.084	n/a
23	0.001	0.604	0.147	n/a
24	0.001	0.965	0.077	n/a
25	0.001	0.652	0.135	n/a
26	0.001	1.172	0.071	n/a
27	0.001	0.631	0.125	n/a
28	0.001	0.958	0.066	n/a
29	0.001	0.632	0.116	n/a
30	0.001	1.086	0.061	n/a
31	0.001	0.641	0.109	n/a
32	0.001	1.348	0.058	n/a
33	0.001	0.649	0.102	n/a
34	0.001	1.390	0.054	n/a
35	0.001	0.810	0.096	n/a
36	0.001	1.232	0.051	n/a
37	0.001	0.793	0.091	n/a
38	0.001	1.421	0.048	n/a
39	0.001	0.968	0.087	n/a
40	0.001	1.490	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.



Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.233			
2	0.003	0.164	1.620	n/a
3	0.076	2.195	3.450	PASS
4	0.001	0.214	0.645	n/a
5	0.013	0.759	1.710	PASS
6	0.001	0.226	0.450	n/a
7	0.007	0.564	1.155	PASS
8	0.001	0.296	0.345	n/a
9	0.007	1.152	0.600	PASS
10	0.001	0.305	0.276	n/a
11	0.005	0.960	0.495	n/a
12	0.001	0.494	0.230	n/a
13	0.003	1.029	0.315	n/a
14	0.001	0.560	0.197	n/a
15	0.002	0.945	0.225	n/a
16	0.001	0.479	0.173	n/a
17	0.002	0.843	0.199	n/a
18	0.001	0.628	0.153	n/a
19	0.001	0.799	0.178	n/a
20	0.001	0.616	0.138	n/a
21	0.001	0.786	0.161	n/a
22	0.001	0.677	0.125	n/a
23	0.001	0.705	0.147	n/a
24	0.001	0.714	0.115	n/a
25	0.001	0.758	0.135	n/a
26	0.001	0.956	0.106	n/a
27	0.001	0.697	0.125	n/a
28	0.001	0.753	0.099	n/a
29	0.001	0.726	0.116	n/a
30	0.001	0.849	0.092	n/a
31	0.001	0.747	0.109	n/a
32	0.001	1.030	0.086	n/a
33	0.001	0.748	0.102	n/a
34	0.001	1.049	0.081	n/a
35	0.001	0.961	0.096	n/a
36	0.001	0.934	0.077	n/a
37	0.001	1.180	0.091	n/a
38	0.001	1.205	0.073	n/a
39	0.001	1.136	0.087	n/a
40	0.001	1.181	0.069	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.



■ DC Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.012			
2	0.001	0.103	1.080	n/a
3	0.010	0.448	2.300	PASS
4	0.001	0.344	0.430	n/a
5	0.010	0.879	1.140	PASS
6	0.001	0.484	0.300	n/a
7	0.010	1.241	0.770	PASS
8	0.001	0.534	0.230	n/a
9	0.009	2.280	0.400	PASS
10	0.001	0.798	0.184	n/a
11	0.009	2.623	0.330	PASS
12	0.001	0.696	0.153	n/a
13	0.008	3.840	0.210	PASS
14	0.001	0.807	0.131	n/a
15	0.007	4.925	0.150	PASS
16	0.001	0.869	0.115	n/a
17	0.007	5.011	0.132	PASS
18	0.001	0.956	0.102	n/a
19	0.006	5.005	0.118	PASS
20	0.001	1.215	0.092	n/a
21	0.005	3.136	0.161	PASS
22	0.001	1.138	0.084	n/a
23	0.004	2.889	0.147	n/a
24	0.001	1.592	0.077	n/a
25	0.004	2.612	0.135	n/a
26	0.001	1.292	0.071	n/a
27	0.003	2.223	0.125	n/a
28	0.001	1.413	0.066	n/a
29	0.002	1.902	0.116	n/a
30	0.001	1.494	0.061	n/a
31	0.002	1.428	0.109	n/a
32	0.001	1.562	0.058	n/a
33	0.001	1.171	0.102	n/a
34	0.001	1.951	0.054	n/a
35	0.001	1.052	0.096	n/a
36	0.001	1.744	0.051	n/a
37	0.001	1.128	0.091	n/a
38	0.001	1.865	0.048	n/a
39	0.001	1.402	0.087	n/a
40	0.001	1.934	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.



Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.013			
2	0.001	0.081	1.620	n/a
3	0.010	0.304	3.450	PASS
4	0.002	0.256	0.645	n/a
5	0.010	0.602	1.710	PASS
6	0.002	0.360	0.450	n/a
7	0.010	0.844	1.155	PASS
8	0.001	0.397	0.345	n/a
9	0.009	1.548	0.600	PASS
10	0.002	0.604	0.276	n/a
11	0.009	1.780	0.495	PASS
12	0.001	0.538	0.230	n/a
13	0.008	2.593	0.315	PASS
14	0.001	0.604	0.197	n/a
15	0.008	3.334	0.225	PASS
16	0.001	0.653	0.173	n/a
17	0.007	3.430	0.199	PASS
18	0.001	0.713	0.153	n/a
19	0.006	3.440	0.178	PASS
20	0.001	0.913	0.138	n/a
21	0.005	3.234	0.161	PASS
22	0.001	0.854	0.125	n/a
23	0.004	2.994	0.147	n/a
24	0.001	1.194	0.115	n/a
25	0.004	2.731	0.135	n/a
26	0.001	0.951	0.106	n/a
27	0.003	2.324	0.125	n/a
28	0.001	1.037	0.099	n/a
29	0.002	2.037	0.116	n/a
30	0.001	1.098	0.092	n/a
31	0.002	1.547	0.109	n/a
32	0.001	1.182	0.086	n/a
33	0.001	1.288	0.102	n/a
34	0.001	1.485	0.081	n/a
35	0.001	1.176	0.096	n/a
36	0.001	1.294	0.077	n/a
37	0.001	1.245	0.091	n/a
38	0.001	1.424	0.073	n/a
39	0.001	1.590	0.087	n/a
40	0.001	1.460	0.069	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

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Report No.:

KES-EM-22T0184-R1

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Test Data - Voltage Fluctuations

Maximum Flicker results

■ AC Mode

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

Maximum Flicker results

■ DC Mode

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ AC Mode



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■ DC Mode





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Conducted Emissions at Telecommunication Ports

N/A

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Radiated Electric Field Emissions(Below 1 GHz)

■ AC Mode



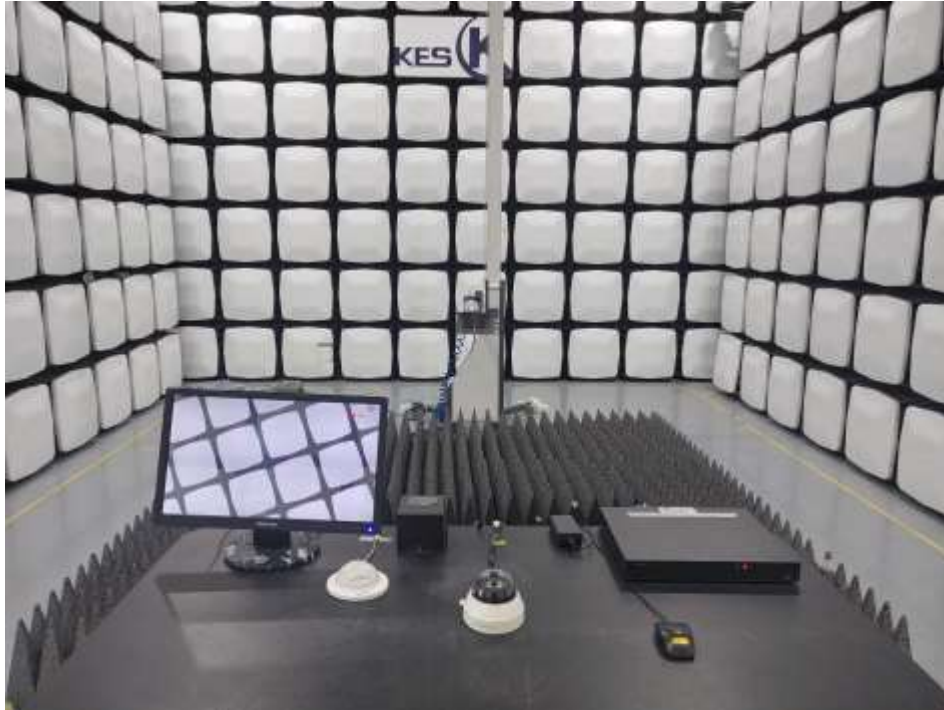
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■ DC Mode



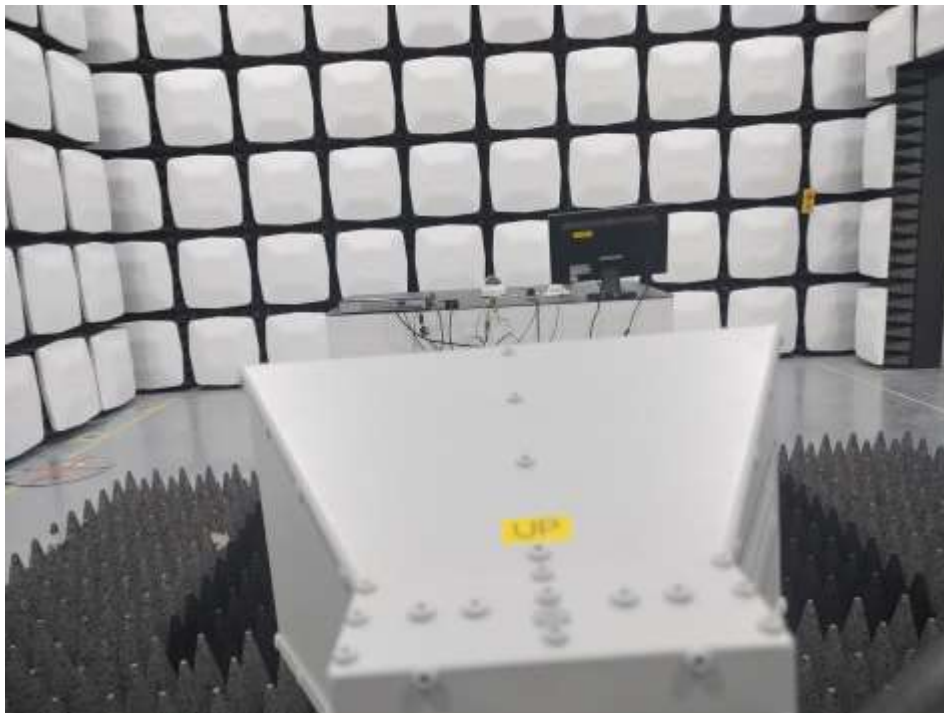
Radiated Electric Field Emissions(Above 1 GHz)

■ AC Mode



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■ DC Mode



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ AC Mode



■ DC Mode



Electrostatic Discharge

■ AC Mode



■ DC Mode



Radiated Electric Field Immunity

■ AC Mode



■ DC Mode



Electrical Fast Transients/Bursts

■ AC Mode



■ DC Mode



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Surge Transients

■ AC Mode



■ DC Mode



Conducted Disturbance

■ AC Mode



■ DC Mode



Voltage Dips and Short Interruptions

■ AC Mode



■ DC Mode



EUT External Photographs

(Top)



(Bottom)



EUT Internal Photographs

(Internal View)



EUT Internal View – Board 1

(Top)



(Bottom)



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EUT Internal View – Board 2

(Top)



(Bottom)



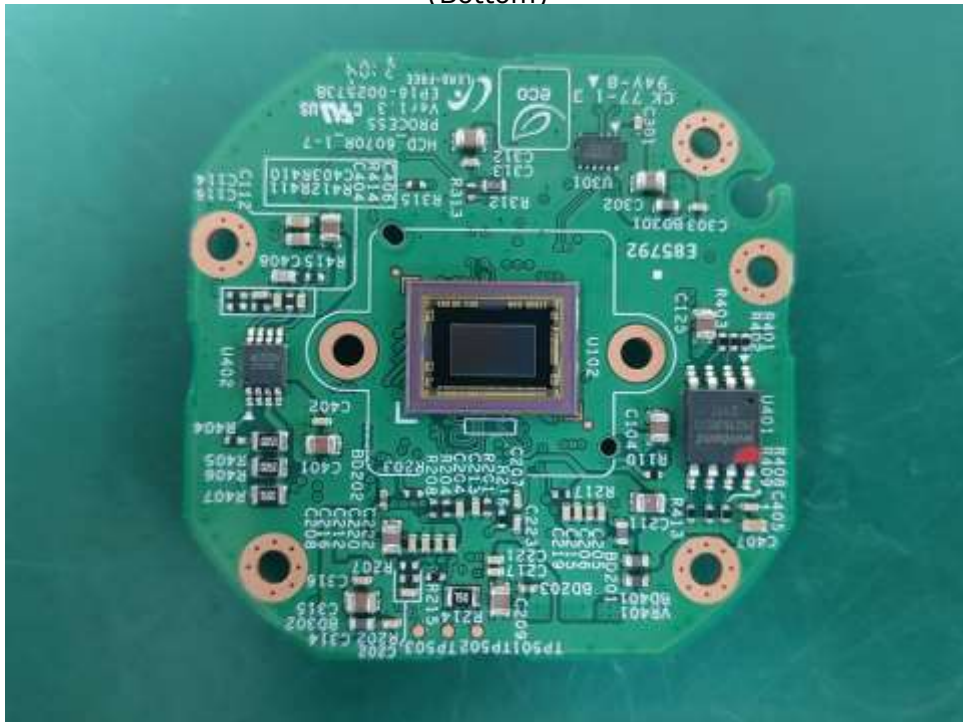
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EUT Internal View – Board 3

(Top)



(Bottom)



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EUT Internal View – Lens

(Top)



(Bottom)



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