



EMC TEST REPORT For CE

Test Report No. : KES-E1-18T0366

Date of Issue : Jun. 26, 2018

Product name : 5M LENS Module

Model/Type No. : SLA-5M3700Q

Variant Model : -

Applicant : Hanwha Techwin Co., Ltd.

Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA

Manufacturer : 1. Hanwha Techwin (Tianjin) Co.,Ltd.
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
3. D-TECH CO.,LTD.

Manufacturer Address : 1. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
2. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
3. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do,
Korea (Suwon Industrial Complex)

Date of Receipt : Jun. 12, 2018

Test date : Jun. 12, 2018 ~ Jun. 13, 2018

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.



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Test report No.:
KES-E1-18T0366
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jun. 26, 2018	KES-E1-18T0366	Issued

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1.0 General Product Description

Main Specifications of EUT are:

SLA-5M3700Q
1/1.8" 5M CMOS
3096(H) x 2094(V)
2616(H) x 1976(V)
Progressive Scan
Color : 0.16Lux(F1.6, 1/30sec, 30IRE)
B/W : 0.16Lux(F1.6, 1/30sec, 30IRE)
50dB
120dB
Electrical
3.7mm
F1.6
H:97.5°, V:71.9°, D:126.2°
-
-
Fixed focal
M12 Lens module with main unit
Black / Plastic



1.1 Test Voltage & Frequency

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

Voltage ☒ 230Vac ☐ 100 Vac ☐ 24 Vac ☐ 12 Vdc ☐ PoE
Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
5M LENS Module	SLA-5M3700Q	-	Hanwha Techwin (Tianjin) Co.,Ltd	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	ProBook4430s	-	HP	-
Notebook Adaptor	SeriesPPP0009H	-	CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD,	-
NETWORK CAMERA	PNM-9000VQ	-	Hanwha Techwin (Tianjin) Co.,Ltd	-
5M LENS Module	SLA-5M4600Q	-	Hanwha Techwin (Tianjin) Co.,Ltd	1EA
5M LENS Module	SLA-5M7000Q	-	Hanwha Techwin (Tianjin) Co.,Ltd	2EA
POE Adaptor	PT-PSE109GBRO-A	PT1817220025	PROCET	-



1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
5M LENS Module (EUT)	-	NETWORK CAMERA	-	-	-
NETWORK CAMERA	-	5M LENS Module	-	-	-
	-	5M LENS Module	-	-	-
	RJ-45	POE Adaptor	RJ-45	4.0	U
	RJ-45	POE Adaptor	RJ-45	4.0	U

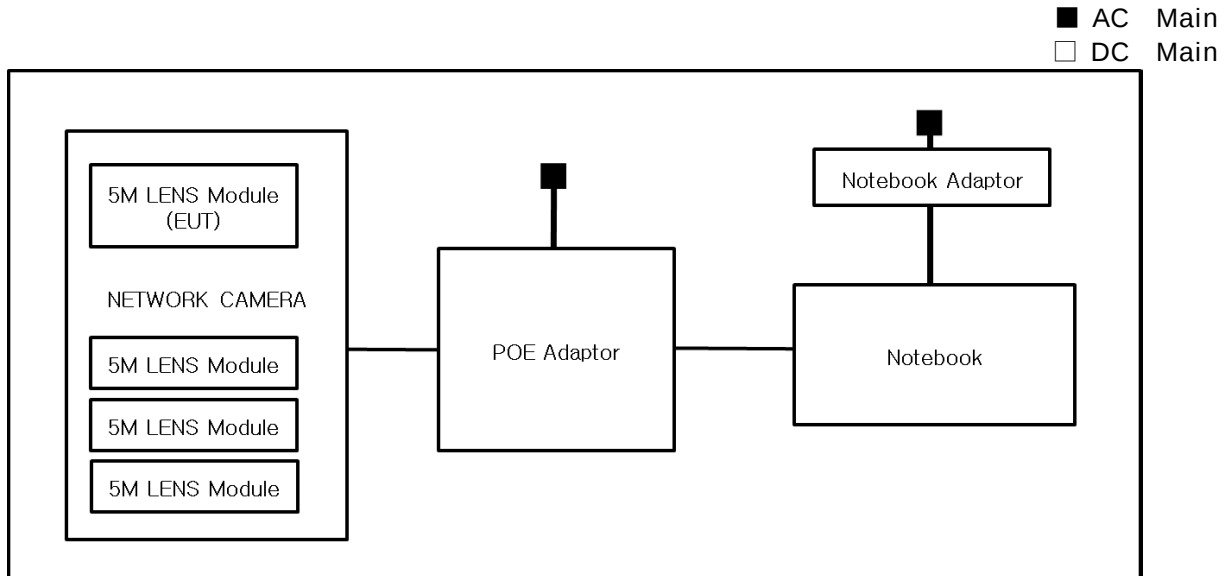
* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

Test Mode	operating
POE	EUT Monitoring, Ping Test

EUT Test operating S/W		
Name	Version	Manufacture Company
WebViewer	-	Hanwha Techwin Co., Ltd.

1.8 Configuration



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, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	 23298-1
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
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001

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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/AC:2013

☒ 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



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- | | | |
|---|----------------------------------|----------------------------------|
| ☐ 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 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Jun. 12, 2018

Test Location

Electro wave Shieldroom #3

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	04, 25, 2019
☒	LISN	ENV216	R & S	101137	01, 31, 2019
☒	LISN	ENV216	R & S	101786	04, 25, 2019

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 48,6 % 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

See Appendix A for test data.



2.2 Conducted Emissions at Telecommunication Ports

Test Date

N/A

Test Location

Electro wave Shieldroom #3

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	04, 25, 2019
☐	LISN	ENV216	R & S	101137	01, 31, 2019
☐	LISN	ENV216	R & S	101786	04, 25, 2019
☐	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 22, 2019
☐	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 22, 2019
☐	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 10, 2018

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

N/A



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jun. 12, 2018

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, 11, 2019
☒	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018

Test Conditions

Temperature: 22,0 °C
Relative Humidity: 54,1 % 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



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jun. 12, 2018

Test Location

SEMI ANECHOIC CHAMBER #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	e3	AUDIX	8.083b	-
☒	EMI TEST RECEIVER	ESU26	R & S	100552	04, 18, 2019
☒	PREAMPLIFIER	8449B	AGILENT	8008A01640	01, 11, 2019
☐	ATTENUATOR	8491A	HP	32173	03, 21, 2019
☒	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	05, 18, 2019

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 48,6 % 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

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Jun. 13, 2018

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 09, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,6 % 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



2.6 Voltage Fluctuations and Flicker

Test Date

Jun. 13, 2018

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2018
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,6 % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4:2011 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

Jun. 13, 2018

Test Location

EMS-ESD: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 21, 2019
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,8 % R.H.
Atmospheric Pressure: 99,5 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

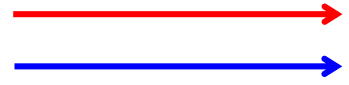
Discharge Voltage:	Contact	Air	HCP	VCP
	☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

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

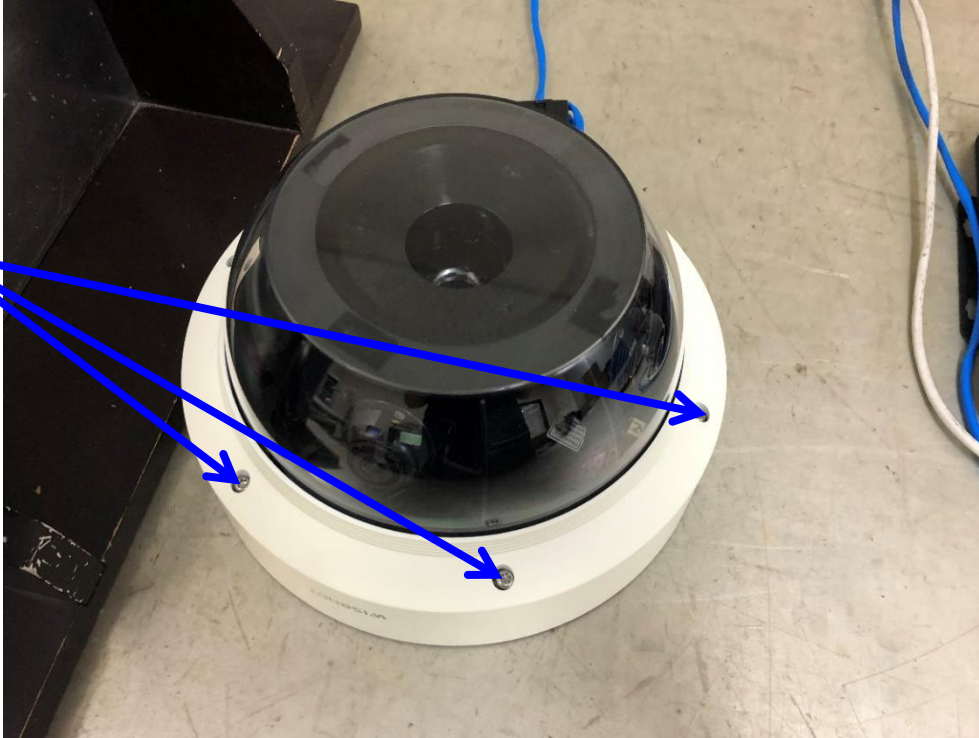
Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



1



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Test Data**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

N/A

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3.2 Radiated Electric Field Immunity

Reference Standard

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

Test Date

Jun. 13, 2018

Test Location

EMS-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	R & S	177586	08, 07, 2018
☒	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 07, 2018
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 07, 2018
☒	POWER METER	NRP2	R & S	103475	08, 07, 2018
☒	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 07, 2018
☒	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 07, 2018
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
☒	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 07, 2018
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions

Temperature: 23,1 °C
Relative Humidity: 55,0 % R.H.
Atmospheric Pressure: 99,7 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

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

N/A

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3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Jun. 13, 2018

Test Location

EMS-EFT: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
☐	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2018

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,8 % R.H.
Atmospheric Pressure: 99,5 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

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

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

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

N/A



3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Jun. 13, 2018

Test Location

EMS-Surge: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	10, 16, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
☐	CDN	CNV 508N1	EM TEST	P1551168979	04, 25, 2019
☐	CDN	CNV 508T5	EM TEST	P1549168422	04, 25, 2019

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,8 % R.H.
Atmospheric Pressure: 99,5 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

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Test Data

☒ 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	Complied	Complied
N – PE	Complied	Complied

Signal Lines

☐ Line to Earth – Common Mode

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

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

N/A

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Jun. 13, 2018

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, 07, 2018
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 07, 2018
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 07, 2018
☐	CDN	CDN T8RJ45	EM TEST	0909-09	08, 07, 2018
☐	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 02, 2019

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,8 % R.H.
Atmospheric Pressure: 99,5 kPa

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

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N - PE	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
-	-	-

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

N/A



3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Jun. 13, 2018

Test Location

EMS-Voltage dip: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
☒	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 48,8 % R.H.
Atmospheric Pressure: 99,5 kPa



Test Specifications & Observations/Remarks

(Test Voltage : 230 V (ac))

<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>Complied</u>

- Voltage variations

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

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.



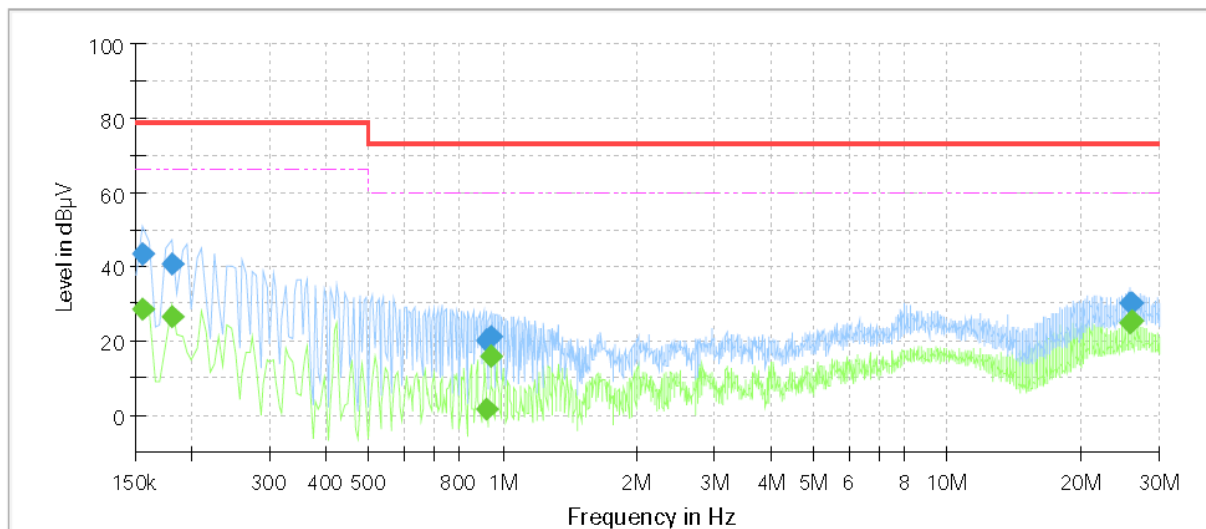
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: SLA-5M3700
Mode: CE
Operator Name: KES



Final Result

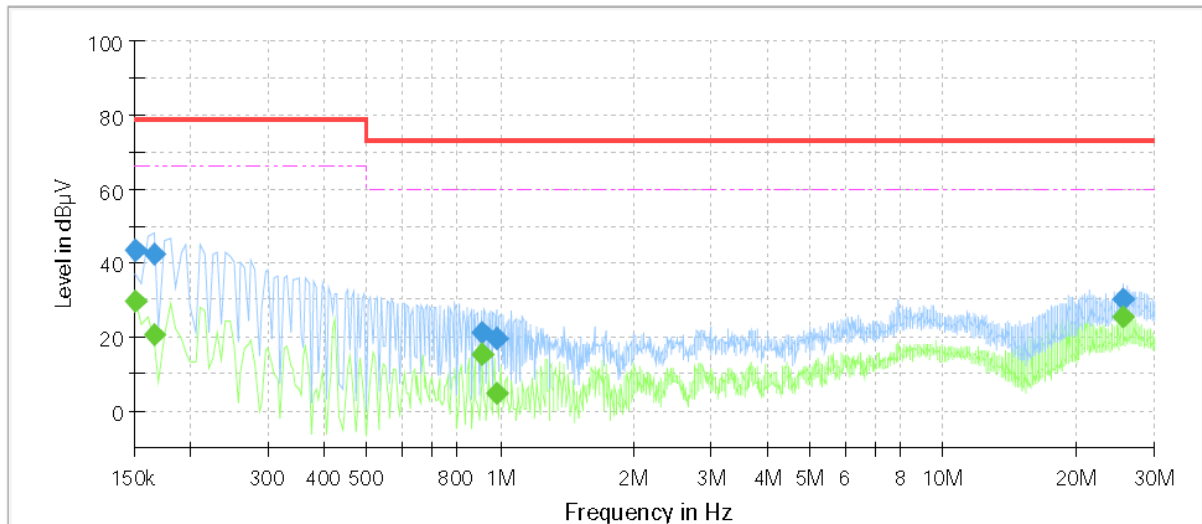
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	28.56	66.00	37.44	1000.0	9.000	L1	9.6
0.155000	43.46	---	79.00	35.54	1000.0	9.000	L1	9.6
0.180000	---	26.45	66.00	39.55	1000.0	9.000	L1	9.6
0.180000	40.76	---	79.00	38.24	1000.0	9.000	L1	9.6
0.920000	---	1.81	60.00	58.19	1000.0	9.000	L1	10.0
0.920000	20.05	---	73.00	52.95	1000.0	9.000	L1	10.0
0.940000	---	15.96	60.00	44.04	1000.0	9.000	L1	10.0
0.940000	21.00	---	73.00	52.00	1000.0	9.000	L1	10.0
25.850000	---	25.12	60.00	34.88	1000.0	9.000	L1	10.2
25.850000	30.22	---	73.00	42.78	1000.0	9.000	L1	10.2
26.050000	---	25.27	60.00	34.73	1000.0	9.000	L1	10.2
26.050000	30.23	---	73.00	42.77	1000.0	9.000	L1	10.2



[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: SLA-5M3700
Mode: CE
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	29.65	66.00	36.35	1000.0	9.000	N	9.6
0.150000	43.20	---	79.00	35.80	1000.0	9.000	N	9.6
0.165000	---	20.82	66.00	45.18	1000.0	9.000	N	9.6
0.165000	42.17	---	79.00	36.83	1000.0	9.000	N	9.6
0.910000	---	15.44	60.00	44.56	1000.0	9.000	N	9.9
0.910000	21.07	---	73.00	51.93	1000.0	9.000	N	9.9
0.980000	---	4.58	60.00	55.42	1000.0	9.000	N	10.0
0.980000	19.59	---	73.00	53.41	1000.0	9.000	N	10.0
25.555000	---	25.63	60.00	34.37	1000.0	9.000	N	10.2
25.555000	30.43	---	73.00	42.57	1000.0	9.000	N	10.2

◆ 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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Conducted Emissions at Telecommunication Ports

[10 Mbps]

N/A

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[1 000 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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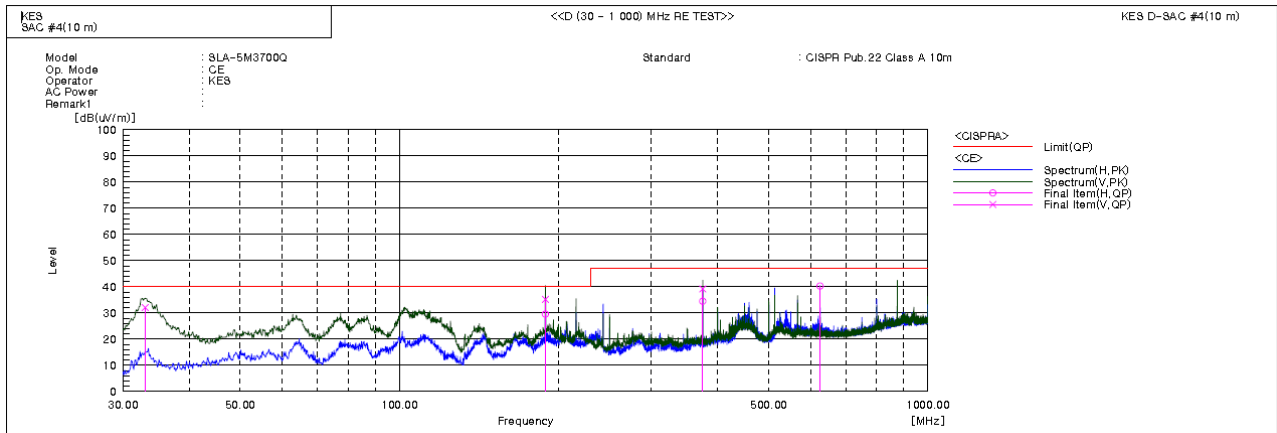


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Radiated Electric Field Emissions(Below 1 GHz)



Final Result

No.	Frequency (P)	Reading	c.f	Result	Limit	Margin	Height	Angle	Remark
	[MHz]	QP [dB(uV)]	[dB(1/m)]	QP [dB(uV/m)]	QP [dB(uV/m)]	QP [dB]	[cm]	[deg]	
1	33.031	V 64.7	-32.6	32.1	40.0	7.9	100.0	215.0	
2	188.959	H 58.4	-28.8	29.6	40.0	10.4	400.0	215.0	
3	188.959	V 64.0	-28.8	35.2	40.0	4.8	100.0	27.0	
4	374.956	H 56.9	-22.4	34.5	47.0	12.5	200.0	111.0	
5	374.956	V 61.6	-22.4	39.2	47.0	7.8	100.0	234.0	
6	625.095	H 55.9	-15.6	40.3	47.0	6.7	100.0	223.0	

◆ 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

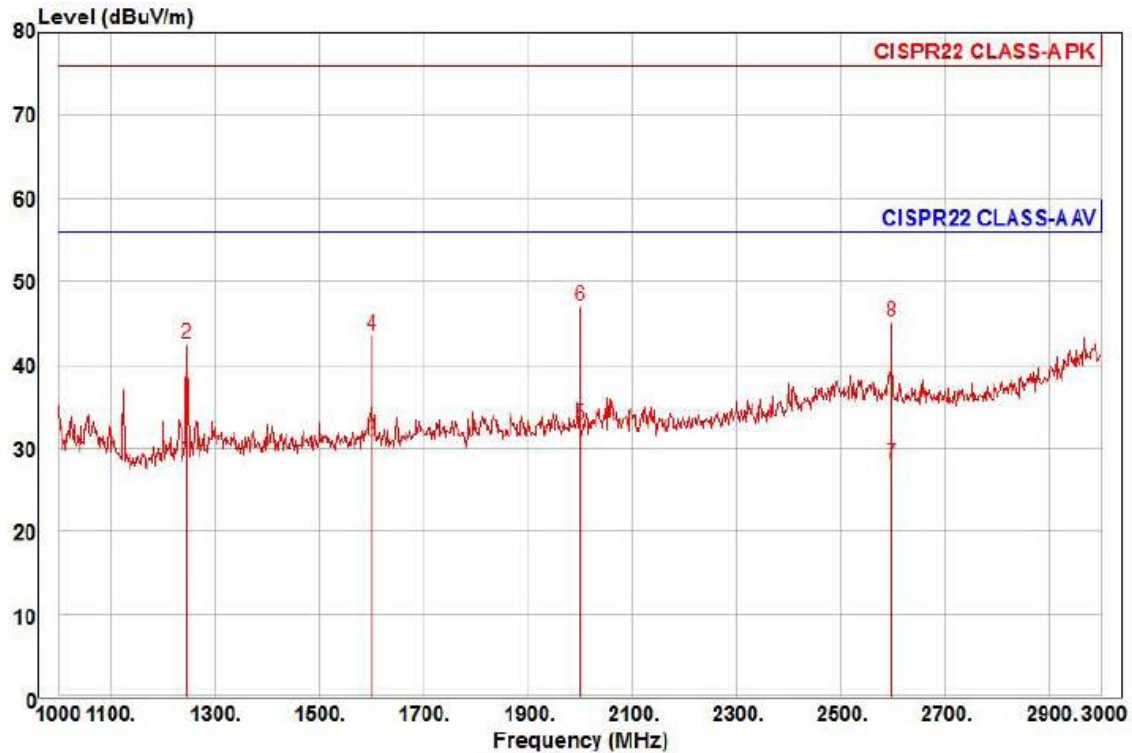


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Radiated Electric Field Emissions(Above 1 GHz)



Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-5M3700
Mode : CE
Memo : (1 ~ 3) GHz

	Read Freq	Ant Level	Ant Factor	Cable Loss	Preamp Factor	TPos deg	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1246.00	37.69	23.25	6.66	39.02	312	56.00	-27.42	horizontal	Average
2	1246.00	51.70	23.25	6.66	39.02	312	76.00	-33.41	horizontal	Peak
3	1600.00	36.97	24.42	7.55	38.11	2	56.00	-25.17	horizontal	Average
4	1600.00	49.69	24.42	7.55	38.11	2	76.00	-32.45	horizontal	Peak
5 pp	2000.00	36.61	26.01	8.48	38.36	347	56.00	-23.26	horizontal	Average
6 pk	2000.00	50.90	26.01	8.48	38.36	347	76.00	-28.97	horizontal	Peak
7	2598.00	28.27	27.96	9.86	38.07	249	56.00	-27.98	horizontal	Average
8	2598.00	45.43	27.96	9.86	38.07	249	76.00	-30.82	horizontal	Peak

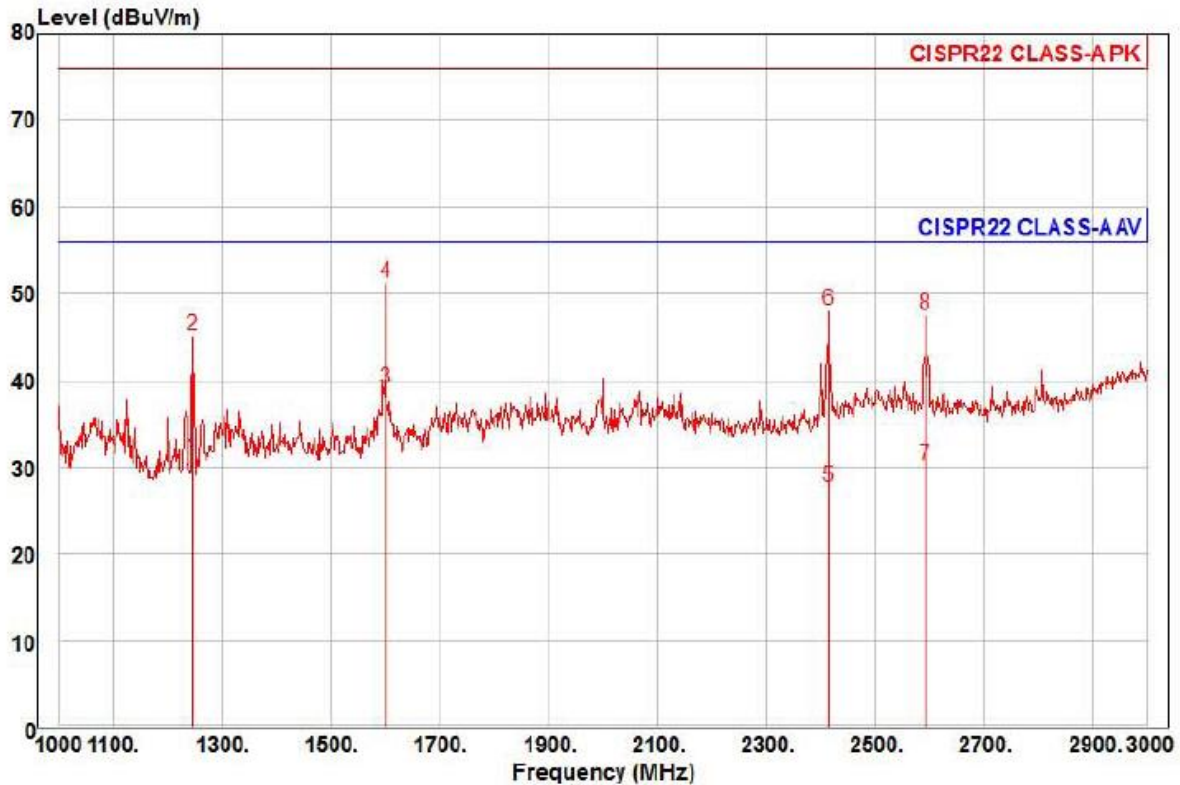
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-5M3700
Mode : CE
Memo : (1 ~ 3) GHz

	Read Freq	Ant 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	1246.00	40.12	23.25	6.66	39.02	197	56.00	-24.99	vertical	Average
2	1246.00	54.34	23.25	6.66	39.02	197	76.00	-30.77	vertical	Peak
3 pp	1600.00	45.18	24.42	7.55	38.11	347	56.00	-16.96	vertical	Average
4 pk	1600.00	57.34	24.42	7.55	38.11	347	76.00	-24.80	vertical	Peak
5	2414.00	29.04	27.27	9.43	38.10	314	56.00	-28.36	vertical	Average
6	2414.00	49.49	27.27	9.43	38.10	314	76.00	-27.91	vertical	Peak
7	2592.00	30.42	27.94	9.84	38.07	226	56.00	-25.87	vertical	Average
8	2592.00	47.93	27.94	9.84	38.07	226	76.00	-28.36	vertical	Peak

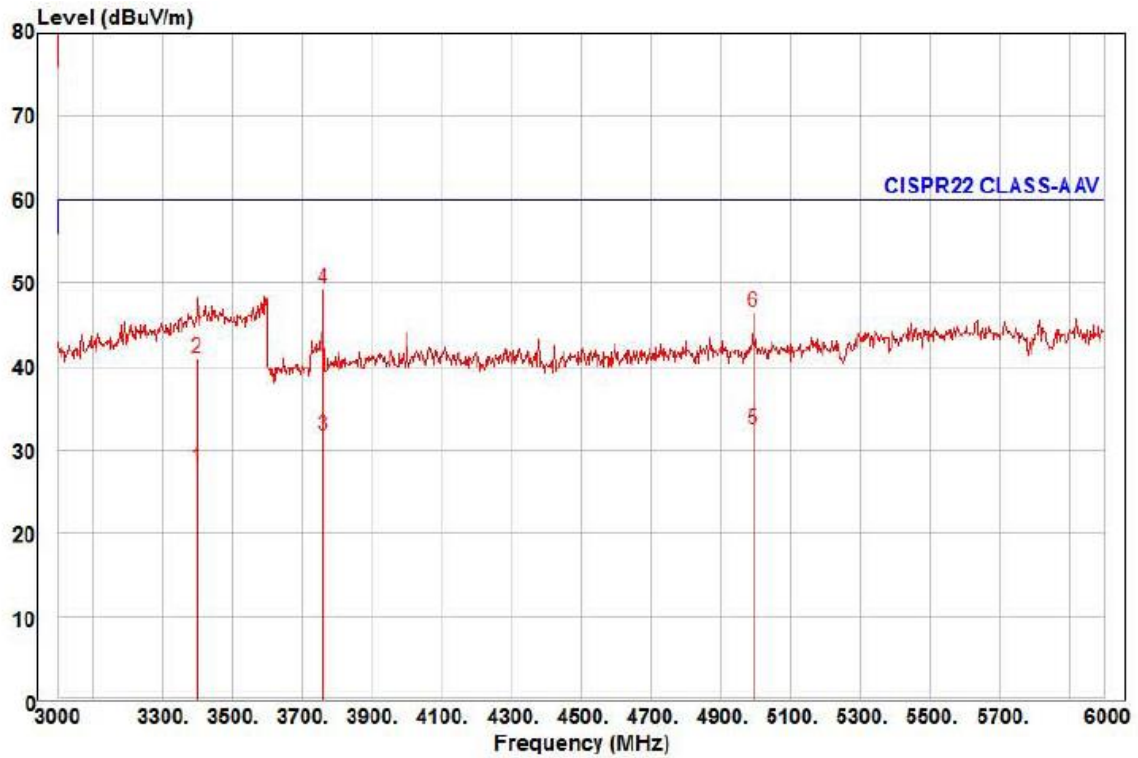
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-5M3700
Mode : CE
Memo : (3 ~ 6) GHz

	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	3399.00	23.84	30.87	11.44	38.26	303	60.00	-32.11	horizontal	Average
2	3399.00	36.95	30.87	11.44	38.26	303	80.00	-39.00	horizontal	Peak
3	3762.00	26.12	31.86	11.79	38.05	29	60.00	-28.28	horizontal	Average
4 pk	3762.00	43.67	31.86	11.79	38.05	29	80.00	-30.73	horizontal	Peak
5 pp	4992.00	23.53	33.39	13.63	38.06	292	60.00	-27.51	horizontal	Average
6	4992.00	37.53	33.39	13.63	38.06	292	80.00	-33.51	horizontal	Peak

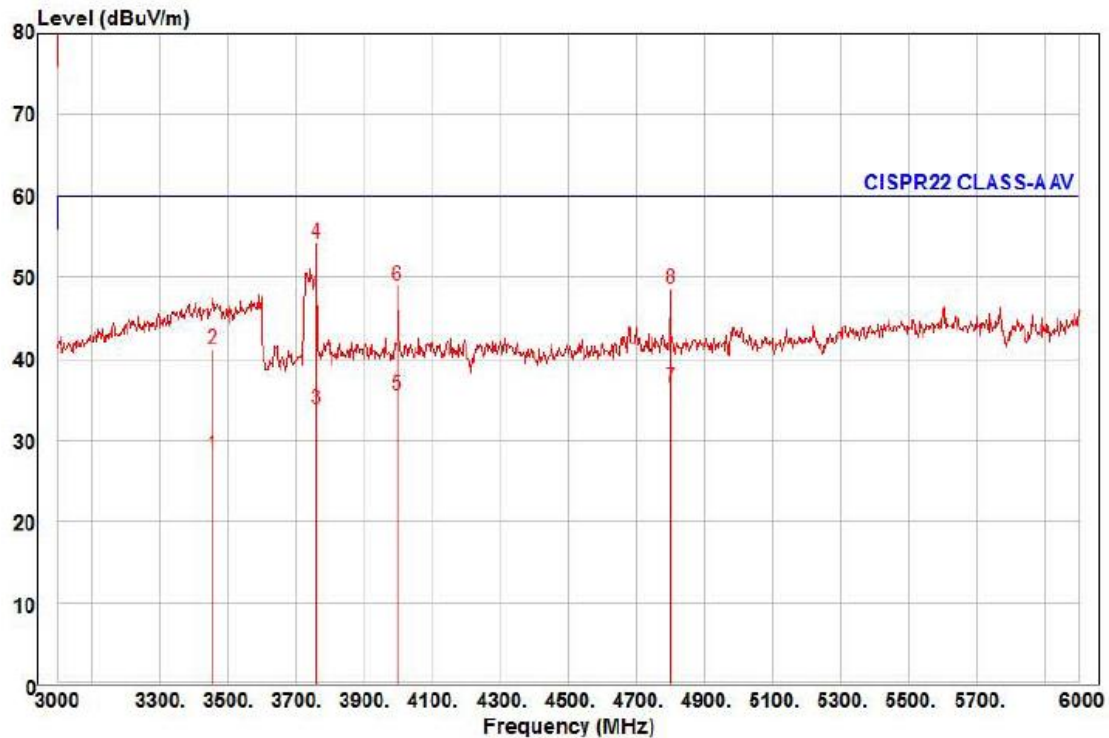
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-5M3700
Mode : CE
Memo : (3 ~ 6) GHz

	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	3456.00	24.03	31.03	11.49	38.27	113	60.00	-31.72	vertical	Average
2	3456.00	36.90	31.03	11.49	38.27	113	80.00	-38.85	vertical	Peak
3	3762.00	28.21	31.86	11.79	38.05	340	60.00	-26.19	vertical	Average
4 pk	3762.00	48.54	31.86	11.79	38.05	340	80.00	-25.86	vertical	Peak
5	3999.00	28.69	32.50	12.19	37.84	8	60.00	-24.46	vertical	Average
6	3999.00	42.14	32.50	12.19	37.84	8	80.00	-31.01	vertical	Peak
7 pp	4800.00	28.16	32.99	13.39	38.12	229	60.00	-23.58	vertical	Average
8	4800.00	40.44	32.99	13.39	38.12	229	80.00	-31.30	vertical	Peak

◆ Calculation

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

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

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

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

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Harmonic Current Emissions and Voltage Fluctuations and Flicker**Average harmonic current results**

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	81.655E-3			
2	2.775E-3			PASS
3	72.200E-3	3.139	2.30	PASS
4	4.289E-3			PASS
5	69.763E-3	6.120	1.14	PASS
6	3.263E-3			PASS
7	66.608E-3	8.650	770.00E-3	PASS
8	3.103E-3			PASS
9	62.140E-3	15.535	400.00E-3	PASS
10	3.930E-3			PASS
11	57.182E-3	17.328	330.00E-3	PASS
12	3.146E-3			PASS
13	51.863E-3	24.696	210.00E-3	PASS
14	2.199E-3			PASS
15	46.034E-3	30.689	150.00E-3	PASS
16	1.894E-3			PASS
17	39.860E-3	30.117	132.35E-3	PASS
18	1.883E-3			PASS
19	33.322E-3	28.139	118.42E-3	PASS
20	1.533E-3			PASS
21	27.039E-3	16.825	160.71E-3	PASS
22	1.070E-3			PASS
23	21.596E-3	14.717	146.74E-3	PASS
24	950.572E-6			PASS
25	16.421E-3	12.164	135.00E-3	PASS
26	750.027E-6			PASS
27	11.643E-3	9.315	124.99E-3	PASS
28	704.051E-6			PASS
29	7.865E-3	6.758	116.39E-3	PASS
30	746.696E-6			PASS
31	4.790E-3			PASS
32	666.364E-6			PASS
33	2.510E-3			PASS
34	698.740E-6			PASS
35	2.233E-3			PASS
36	643.429E-6			PASS
37	2.858E-3			PASS
38	658.405E-6			PASS
39	3.296E-3			PASS
40	645.386E-6			PASS

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.

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**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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www.kes.co.kr

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	81.872E-3			
2	3.107E-3			PASS
3	72.318E-3	2.096	3.45	PASS
4	4.742E-3			PASS
5	69.899E-3	4.088	1.71	PASS
6	3.539E-3			PASS
7	66.738E-3	5.778	1.15	PASS
8	3.370E-3			PASS
9	62.308E-3	10.385	600.00E-3	PASS
10	4.438E-3			PASS
11	57.491E-3	11.614	495.00E-3	PASS
12	3.452E-3			PASS
13	51.963E-3	16.496	315.00E-3	PASS
14	2.507E-3			PASS
15	46.165E-3	20.518	225.00E-3	PASS
16	2.117E-3			PASS
17	39.944E-3	20.120	198.52E-3	PASS
18	2.149E-3			PASS
19	33.515E-3	18.868	177.63E-3	PASS
20	1.765E-3			PASS
21	27.116E-3	16.872	160.71E-3	PASS
22	1.177E-3			PASS
23	21.739E-3	14.814	146.74E-3	PASS
24	1.056E-3			PASS
25	16.502E-3	12.224	135.00E-3	PASS
26	872.857E-6			PASS
27	11.727E-3	9.382	124.99E-3	PASS
28	778.796E-6			PASS
29	7.953E-3	6.833	116.39E-3	PASS
30	833.762E-6			PASS
31	4.889E-3			PASS
32	745.470E-6			PASS
33	2.605E-3			PASS
34	796.932E-6			PASS
35	2.341E-3			PASS
36	700.188E-6			PASS
37	3.068E-3			PASS
38	732.934E-6			PASS
39	3.407E-3			PASS
40	706.604E-6			PASS

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.

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Test Data - Voltage Fluctuations**Maximum Flicker results**

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.035	4.00	PASS
Tmax [s]	0.000	0.50	PASS

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Test Setup Photos and Configuration

Conducted Voltage Emissions



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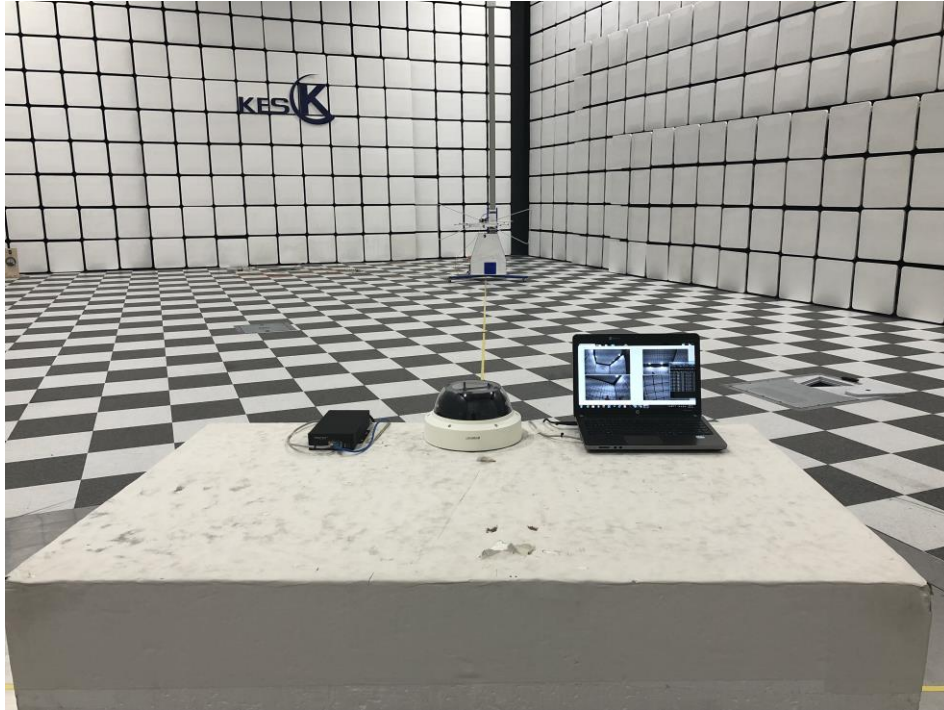
Conducted Telecommunication Emissions

N/A

N/A

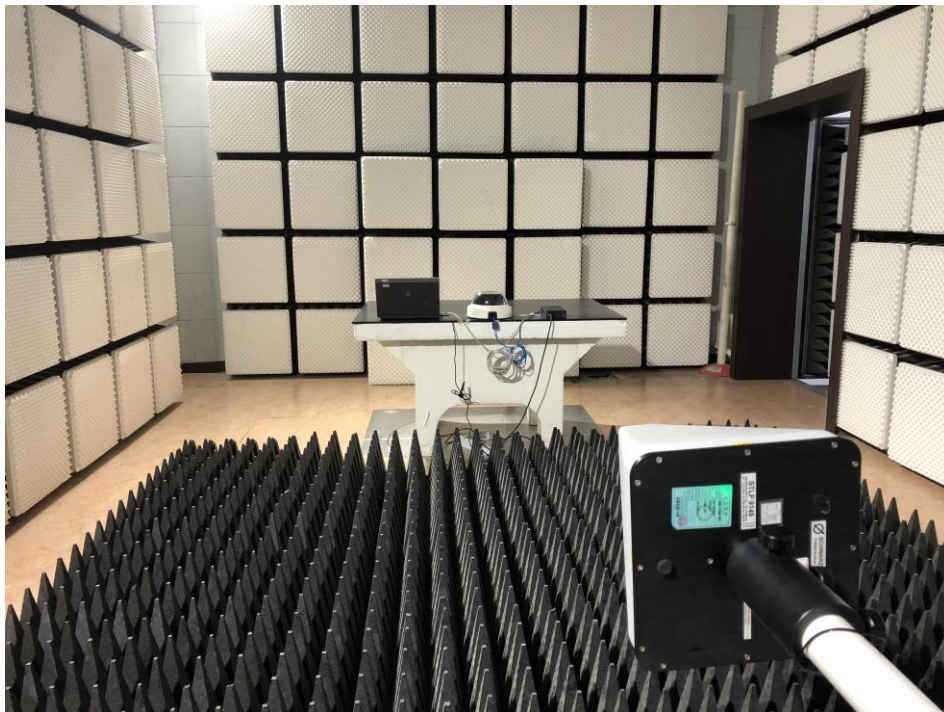
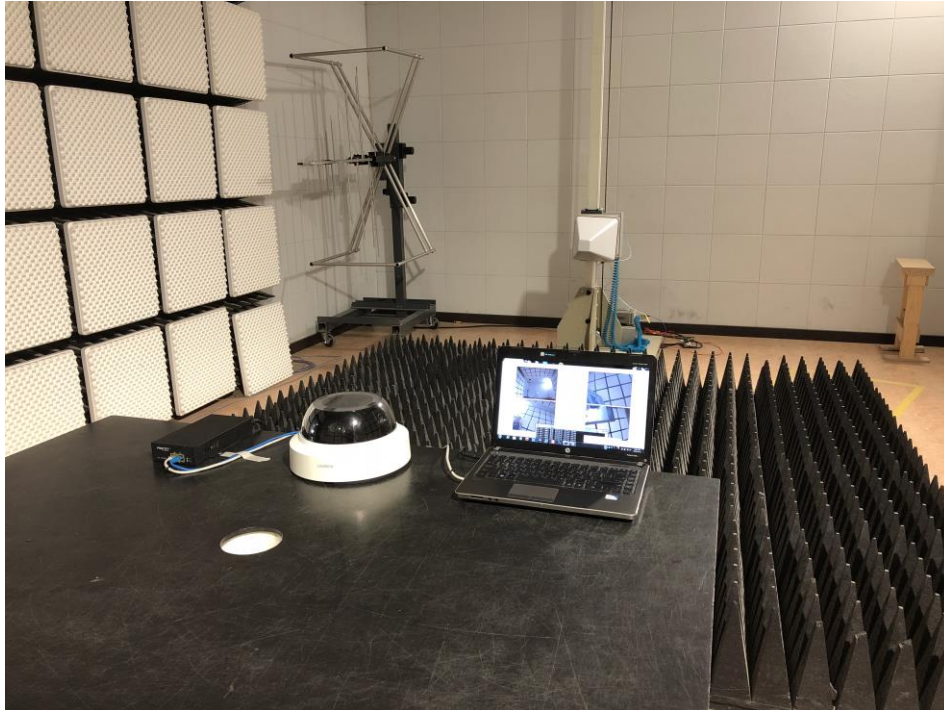
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker

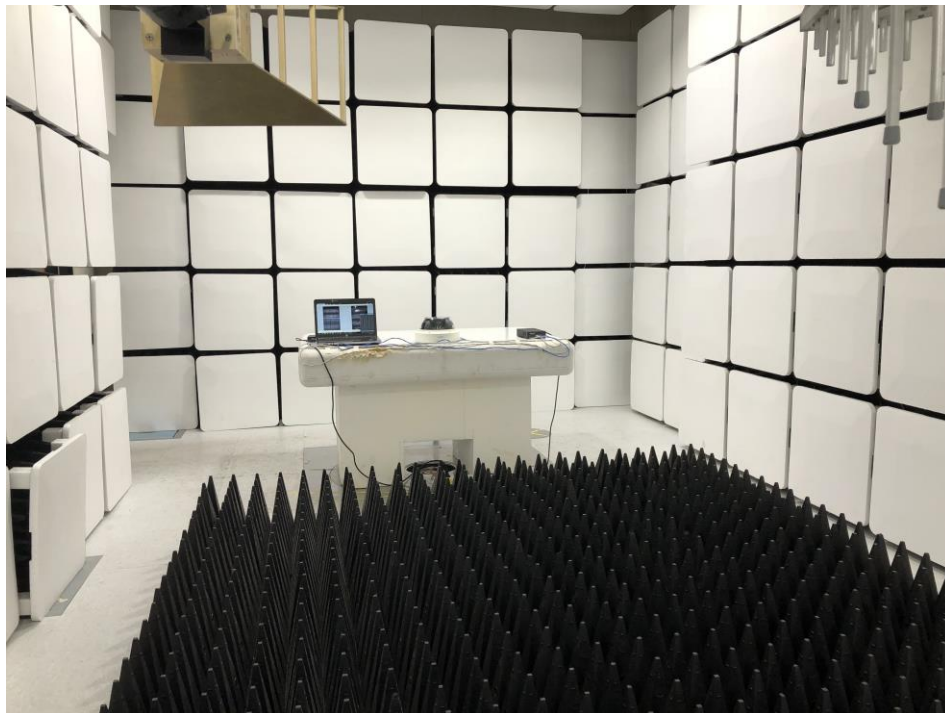


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Electrostatic Discharge



Radiated Electric Field Immunity

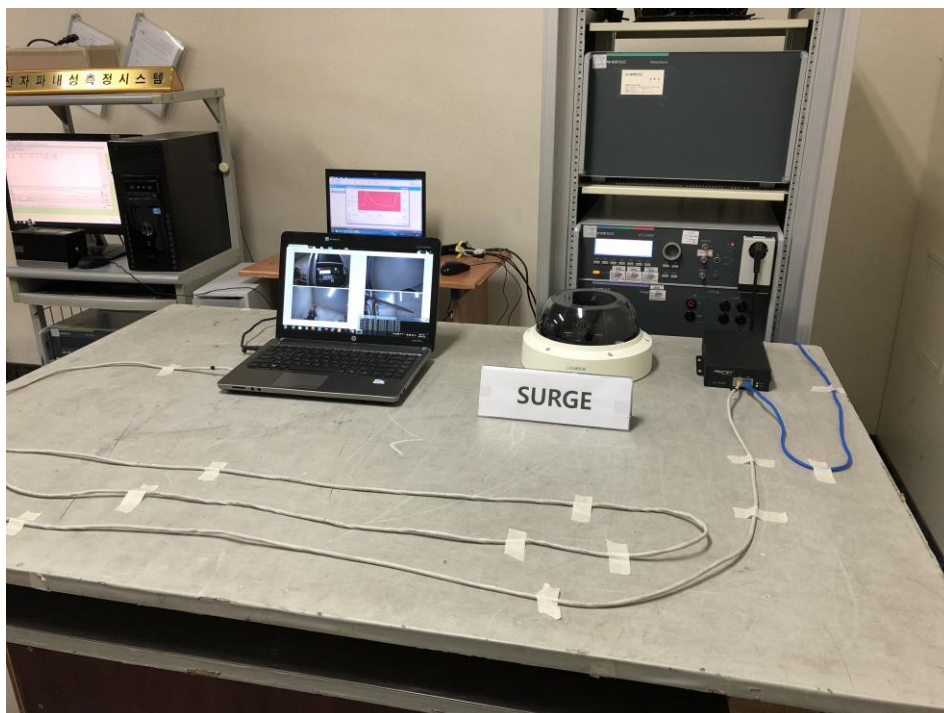


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Electrical Fast Transients/Bursts

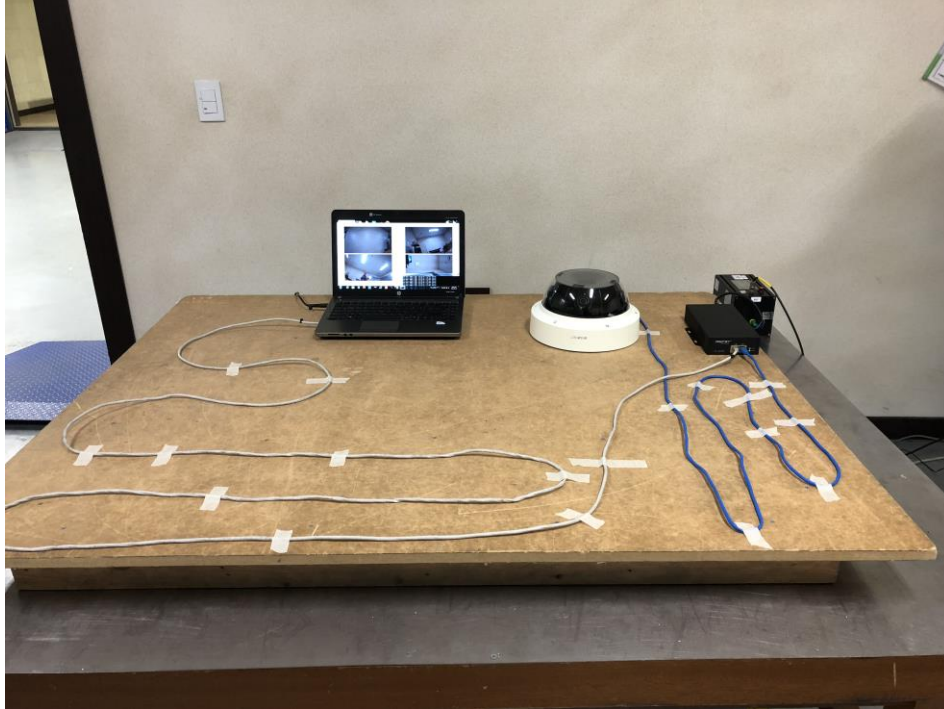


Surge Transients

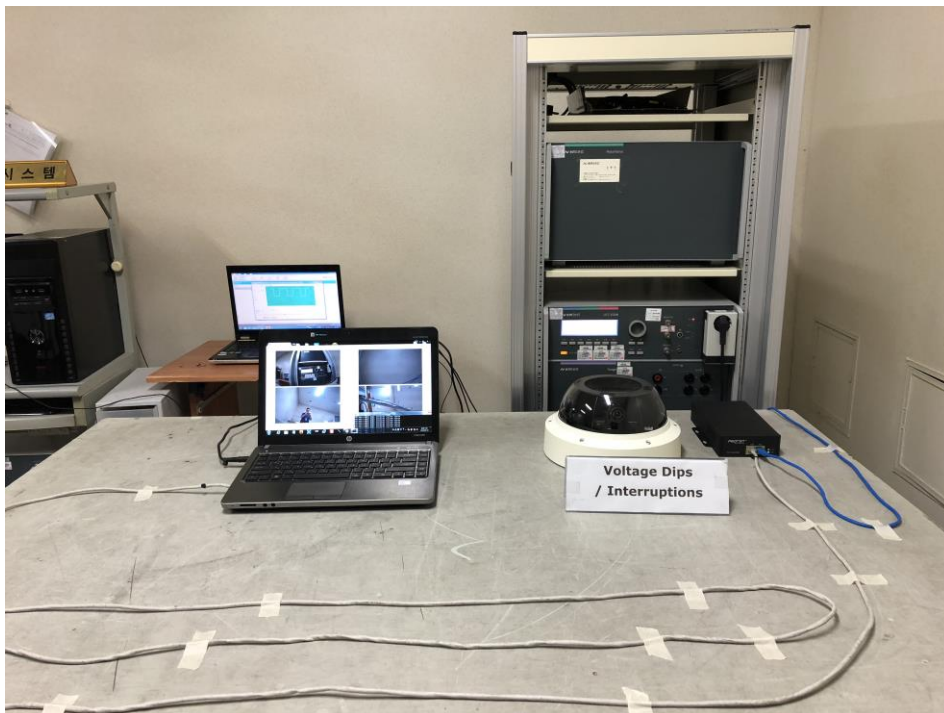


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Conducted Disturbance



Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)



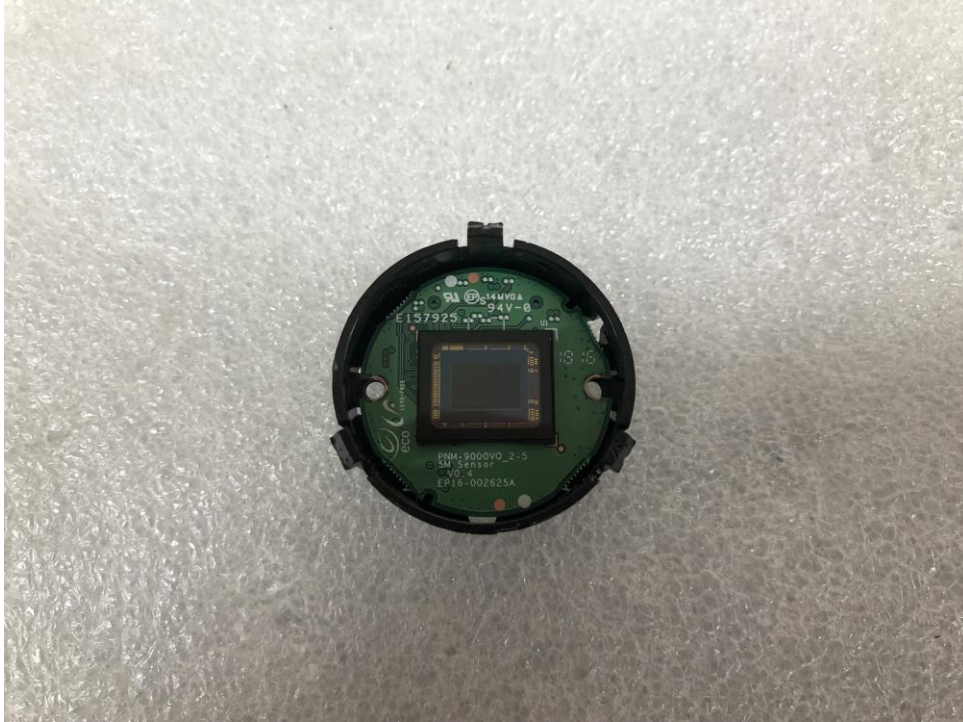
(Bottom)



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EUT Internal Photographs

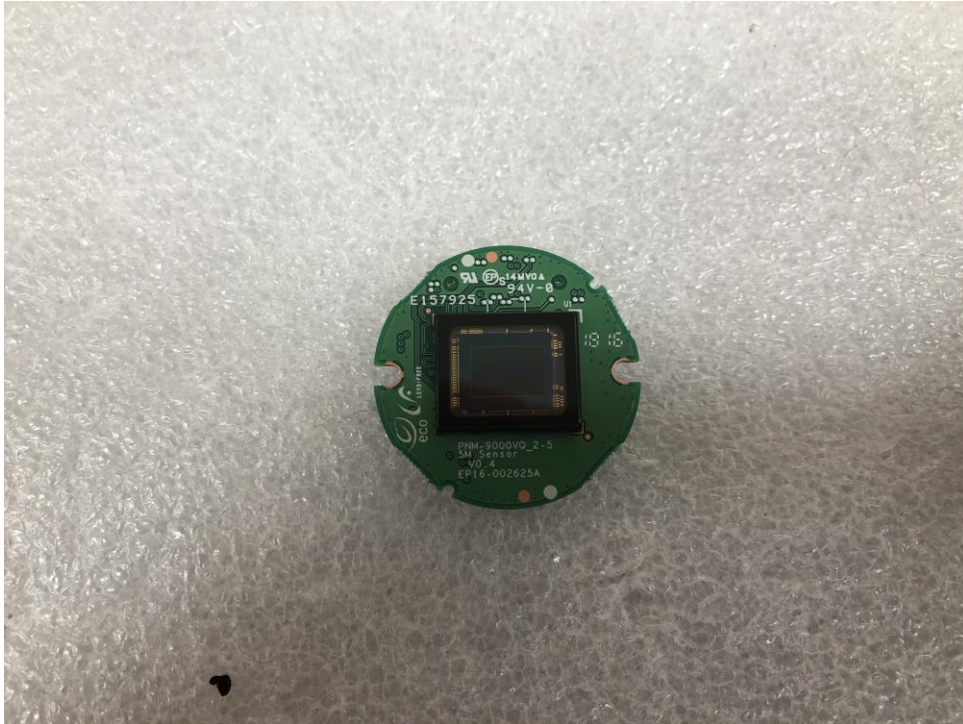
(Internal View)



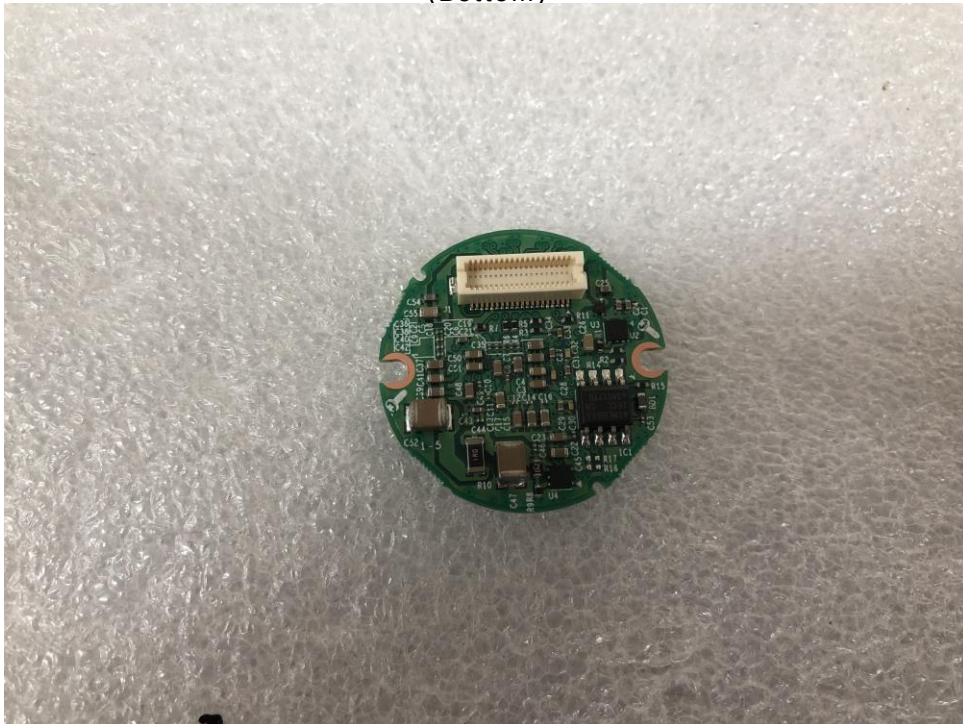
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EUT Internal View – Board

(Top)



(Bottom)



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Label and Location



5M LENS Module

Model No : SLA-5M3700Q

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

Made in China

