EMC TEST REPORT For CE

Test Report No.	:	KES-E1-18T0349-R1
Date of Issue	:	Jul. 27, 2020
Product name	:	2M LENS Module
Model/Type No.	:	SLA-2M2400Q
Variant Model	:	SLA-2M2402D
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. 15, 2018 ~ Jun. 16, 2018
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Kang Hyeon, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jun. 26, 2018	KES-E1-18T0349	Issued
Jul. 27, 2020	KES-E1-18T0349-R1	Reissue due to the addition of a derived model

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1.0 General Product Description

Main Specifications of EUT are:

SLA-2M2400Q
1/2.8" 2M CMOS
1945(H) x 1109(V) 2.16M
1945(H) x 1097(V) 2.13M
Progressive Scan
Color : 0.055Lux(F2.0, 1/30sec, 30IRE) B/W : 0.055Lux(F2.0, 1/30sec, 30IRE)
50dB
150dB
Electrical
2.4mm
F2.0
Fixed focal
M12 Lens module with main unit
Black / Plastic

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1.1 Test Voltage & Frequency

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

Voltage ☒ 230Vac ☐ 100 Vac ☐ 24 Vac ☐ 12 Vdc ☐ PoE

Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Added a simple variant model for the purpose of the vendor management and a country of origin for the dualization.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
2M LENS Module	SLA-2M2400Q	-	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	-
2M LENS Module	SLA-2M2800Q	-	Hanwha Techwin (Tianjin) Co.,Ltd	1EA
2M LENS Module	SLA-2M3600Q		Hanwha Techwin (Tianjin) Co.,Ltd	1EA
2M LENS Module	SLA-2M6000Q	-	Hanwha Techwin (Tianjin) Co.,Ltd	1EA
POE Adaptor	PT-PSE109GBRO-A	PT1817220025	PROCET	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
2M LENS Module (EUT)	-	NETWORK CAMERA	-	-	U
NETWORK CAMERA	-	2M LENS Module	-	-	-
	-	2M LENS Module	-	-	-
	-	2M LENS Module	-	-	
	RJ-45	POE Adaptor	RJ-45	4.0	U
Notebook	RJ-45	POE Adaptor	RJ-45	4.0	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

Test Mode	operating
POE	E.U.T Monitoring, Ping Test

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

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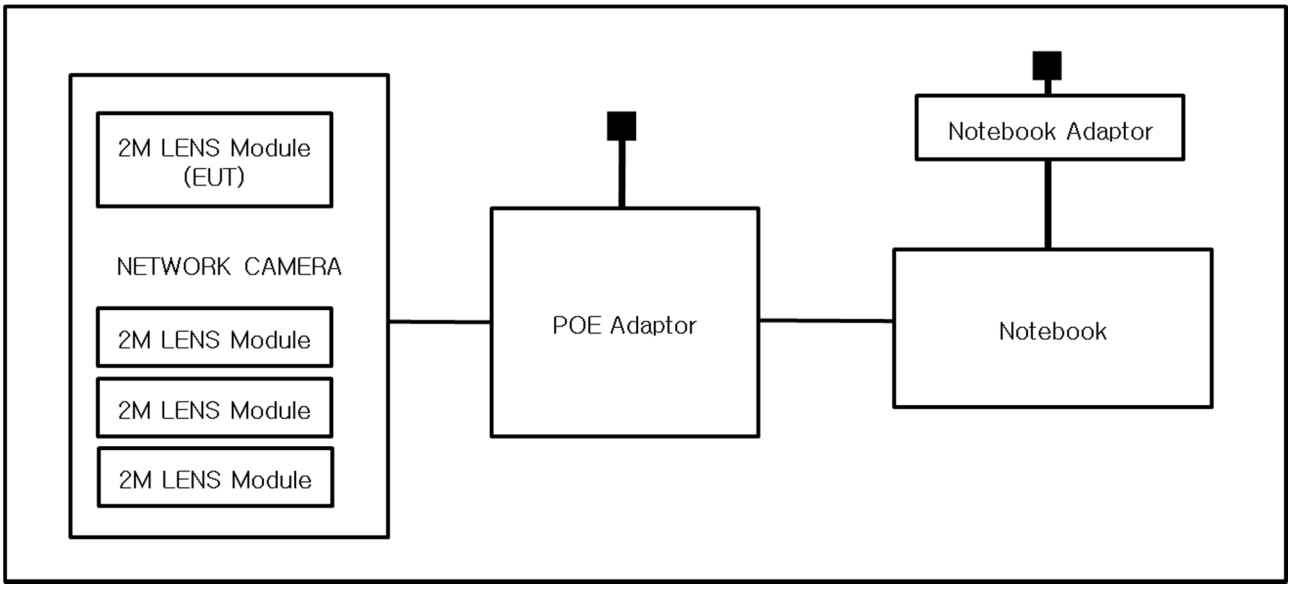
1.8 Configuration

■ AC Main
□ DC Main



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-Anechoic 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-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, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	KR0100
Canada	**ISED**	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	23298-1
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-20056, C-20036, T-20040, G-20057
Europe	**TÜV SÜD**	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	CARAT 001633 0003

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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. 15, 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: 23,0 ℃
Relative Humidity: 48,6 % R.H.
.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See 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 #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: ℃
Relative Humidity: % R.H.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks
N/A

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2.3 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Jun. 15, 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 ℃
Relative Humidity: 56,2 % R.H.

Frequency Range of Measurement
30 ㎒ to 1 ㎓

Instrument Settings
IF Band Width: 120 ㎑

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 ㎓)

Test Date
Jun. 15, 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: 23,0 ℃
Relative Humidity: 48,6 % R.H.

Frequency Range of Measurement
1 ㎓ to 6 ㎓

Instrument Settings
IF Band Width: 1 ㎒

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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2.5 Harmonic Current Emissions

Test Date
Jun. 16, 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: 23,2 ℃
Relative Humidity: 49,0 % 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
Jun. 16, 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: 23,2 ℃
Relative Humidity: 49,0 % 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 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.

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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 dBμV.

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 dBμV, 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 dBμV, 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 dBμV.

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.

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3.1 Electrostatic Discharge

Reference Standard
EN 61000-4-2:2009

Test Date
Jun. 16, 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: 23,2 ℃
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 99,9 ㎪

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 →

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. 15, 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: 22,3 ℃
Relative Humidity: 57,1 % R.H.
Atmospheric Pressure: 100,3 ㎪

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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

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. 16, 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: 23,2 ℃
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 99,9 ㎪

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 ㎸ ☐ ± 4.0 ㎸	☒ ± 2.0 ㎸
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 ㎸ ☐ ± 2.0 ㎸	☐ ± 1.0 ㎸
Burst Period:	☒ 300 ㎳	☐ 2 s
Repetition Rate:	☐ 5 ㎑	☒ 100 ㎑
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 (㎸)	(-) Burst (㎸)
L – N - PE	Complied	Complied

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

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

☐ Signal ports and telecommunication ports – Coupling Clamp used

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

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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3.4 Surge Transients

Reference Standard
EN 61000-4-5:2014

Test Date
Jun. 16, 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	11, 27, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	11, 27, 2018
☐	CDN	CNV 508N1	EM TEST	P1551168979	11, 28, 2018
☐	CDN	CNV 508T5	EM TEST	P1549168422	12, 18, 2018

Test Conditions
Temperature: 23,2 ℃
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 99,9 ㎪

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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

☒ 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. 16, 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: 23,2 ℃
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 99,9 ㎪

Test Specifications

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

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

Modulation: ☒ AM, 80 %, 1 ㎑ sine wave
☒ PM, 1 ㎐ (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
-	CDN (☐M2, ☐M3)	-

☐ 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

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3.6 Voltage Dips and Short Interruptions

Reference Standard
EN 61000-4-11:2004

Test Date
Jun. 16, 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: 23,2 ℃
Relative Humidity: 49,0 % R.H.
Atmospheric Pressure: 99,9 ㎪

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Test Specifications & Observations/Remarks

(Test Voltage : 230 V (ac))

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

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	Complied
☒ Unom - 15 %	☒ 195.5 V (ac)	Complied

Observations:
Complied – No degradation of function

Test Results
☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria
☐ NOT APPLICABLE

Remarks
N/A

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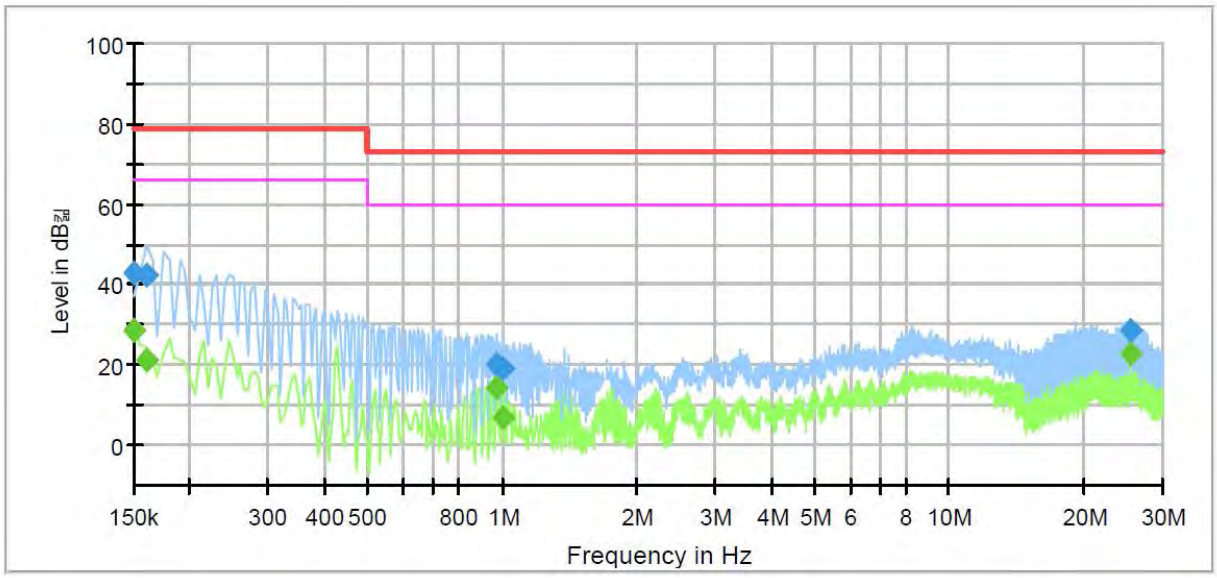
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SLA-2M2400Q
Mode	CE
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dB㎶)	CAverage (dB㎶)	Limit (dB㎶)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	28.63	66.00	37.37	1000.0	9.000	L1	9.6
0.150000	42.93	---	79.00	36.07	1000.0	9.000	L1	9.6
0.160000	---	20.97	66.00	45.03	1000.0	9.000	L1	9.6
0.160000	42.49	---	79.00	36.51	1000.0	9.000	L1	9.6
0.975000	---	14.19	60.00	45.81	1000.0	9.000	L1	10.0
0.975000	20.28	---	73.00	52.72	1000.0	9.000	L1	10.0
1.000000	---	7.14	60.00	52.86	1000.0	9.000	L1	10.0
1.000000	19.16	---	73.00	53.84	1000.0	9.000	L1	10.0
25.360000	---	22.80	60.00	37.20	1000.0	9.000	L1	10.2
25.360000	28.37	---	73.00	44.63	1000.0	9.000	L1	10.2

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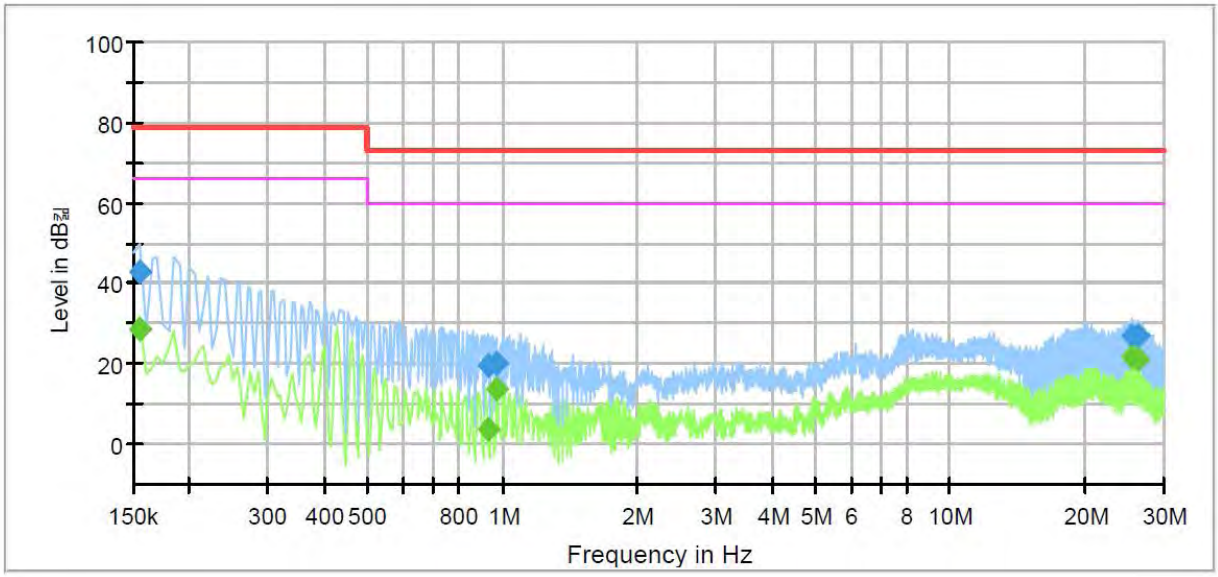
[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SLA-2M2400Q
Mode	CE
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dB㎶)	CAverage (dB㎶)	Limit (dB㎶)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	28.46	66.00	37.54	1000.0	9.000	N	9.6
0.155000	42.93	---	79.00	36.07	1000.0	9.000	N	9.6
0.925000	---	3.51	60.00	56.49	1000.0	9.000	N	10.0
0.925000	19.50	---	73.00	53.50	1000.0	9.000	N	10.0
0.975000	---	13.69	60.00	46.31	1000.0	9.000	N	10.0
0.975000	19.99	---	73.00	53.01	1000.0	9.000	N	10.0
25.355000	---	21.49	60.00	38.51	1000.0	9.000	N	10.2
25.355000	27.04	---	73.00	45.96	1000.0	9.000	N	10.2
26.340000	---	21.16	60.00	38.84	1000.0	9.000	N	10.2
26.340000	26.85	---	73.00	46.15	1000.0	9.000	N	10.2

♦ Calculation
QuasiPeak[㏈uV] / CAverage [㏈uV] = Reading Value[㏈uV] + Corr. [㏈]
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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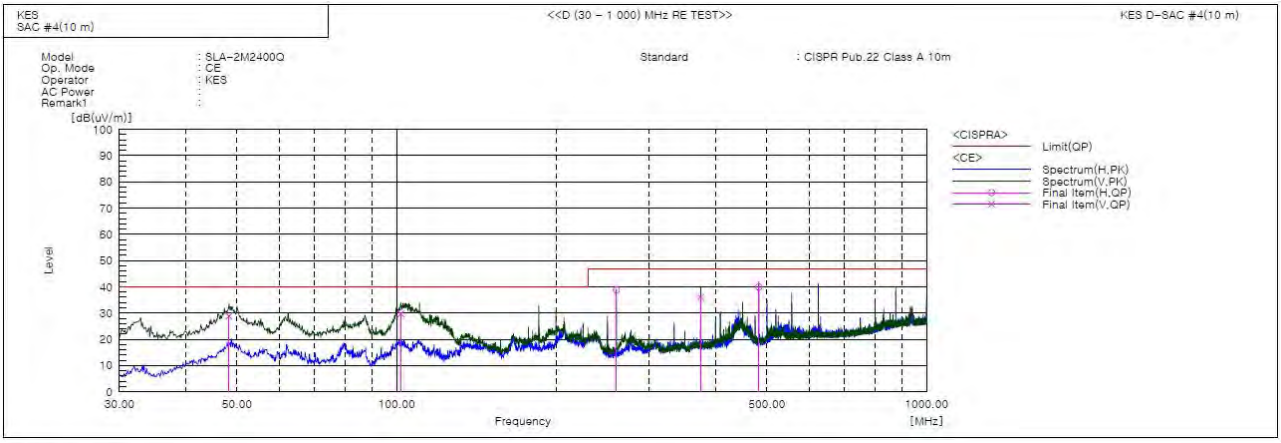
Radiated Electric Field Emissions(Below 1 ㎓)



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	48.309	V	57.3	-28.5	28.8	40.0	11.2	150.0	322.0	
2	101.901	V	58.7	-29.0	29.7	40.0	10.3	100.0	194.0	
3	259.890	H	64.9	-26.1	38.8	47.0	8.2	400.0	251.0	
4	374.956	V	58.4	-22.4	36.0	47.0	11.0	400.0	215.0	
5	482.626	H	59.3	-19.4	39.9	47.0	7.1	200.0	114.0	

♦ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)
Result(QP) [dB(㎶/m)] = (Reading(QP)[dB(㎶)] + c.f[dB(1/m)]
Margin(QP)[dB] = Limit[dB(㎶/m)] - Result(QP) [dB(㎶/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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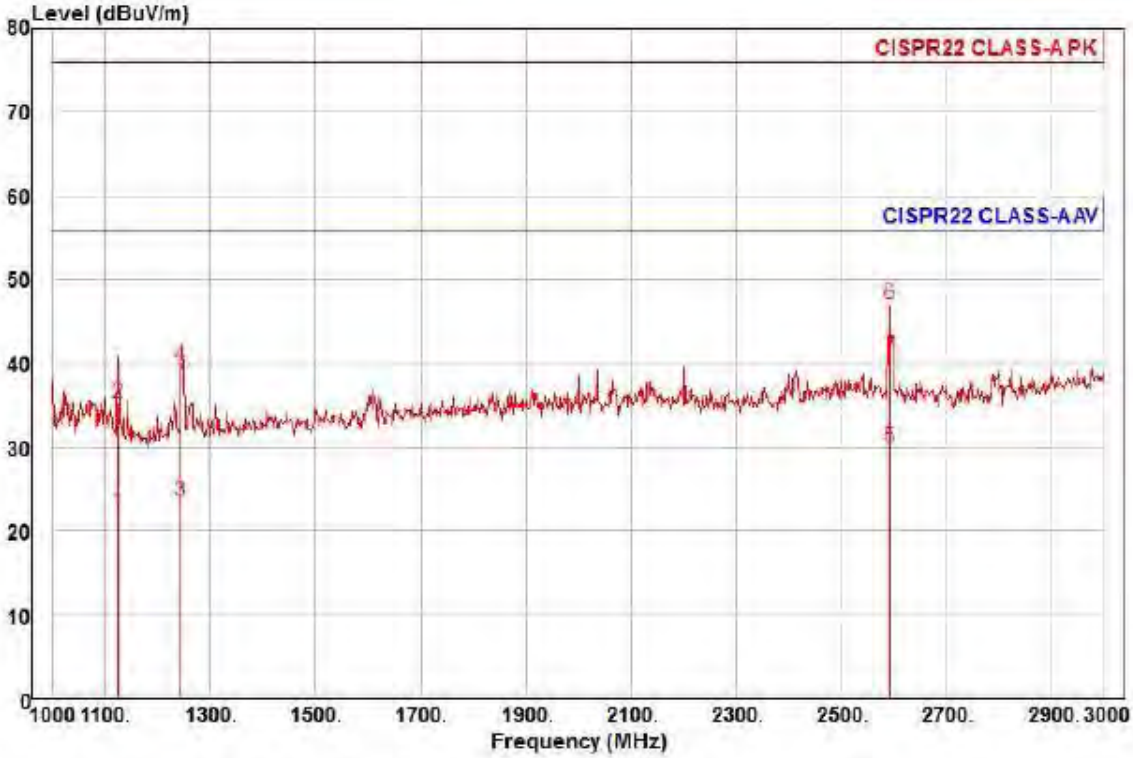
Radiated Electric Field Emissions(Above 1 GHz)



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-2M2400
Mode : CE
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	1124.00	32.50	22.88	6.31	39.49	158	56.00	-33.80	horizontal	Average
2	1124.00	45.59	22.88	6.31	39.49	158	76.00	-40.71	horizontal	Peak
3	1244.00	32.68	23.24	6.65	39.03	237	56.00	-32.46	horizontal	Average
4	1244.00	48.97	23.24	6.65	39.03	237	76.00	-36.17	horizontal	Peak
5 pp	2594.00	30.22	27.95	9.85	38.07	222	56.00	-26.05	horizontal	Average
6 pk	2594.00	47.37	27.95	9.85	38.07	222	76.00	-28.90	horizontal	Peak

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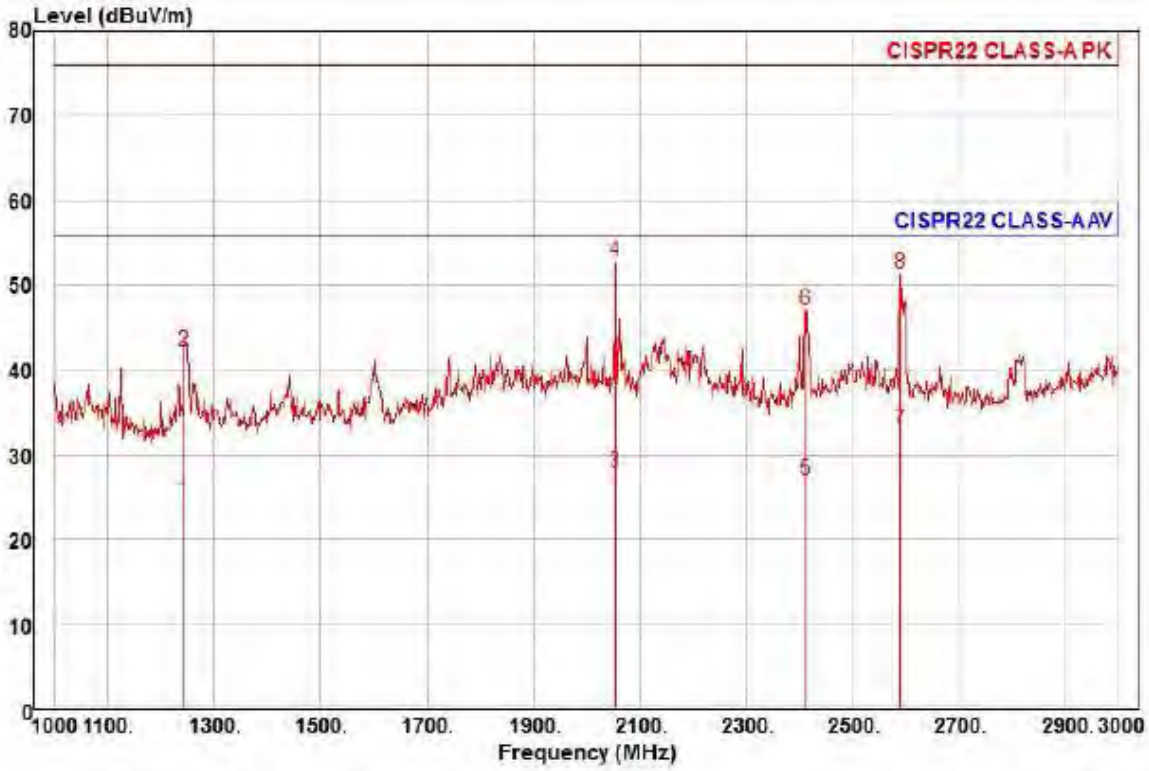

Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-2M2400
Mode : CE
Memo : (1 ~ 3) GHz

	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	1244.00	33.77	23.24	6.65	39.03	183	56.00	-31.37	vertical	Average
2	1244.00	51.28	23.24	6.65	39.03	183	76.00	-33.86	vertical	Peak
3	2054.00	31.40	26.17	8.60	38.33	119	56.00	-28.16	vertical	Average
4 pk	2054.00	56.30	26.17	8.60	38.33	119	76.00	-23.26	vertical	Peak
5	2412.00	28.35	27.26	9.43	38.10	168	56.00	-29.06	vertical	Average
6	2412.00	48.50	27.26	9.43	38.10	168	76.00	-28.91	vertical	Peak
7 pp	2590.00	33.17	27.93	9.84	38.07	236	56.00	-23.13	vertical	Average
8	2590.00	51.70	27.93	9.84	38.07	236	76.00	-24.60	vertical	Peak

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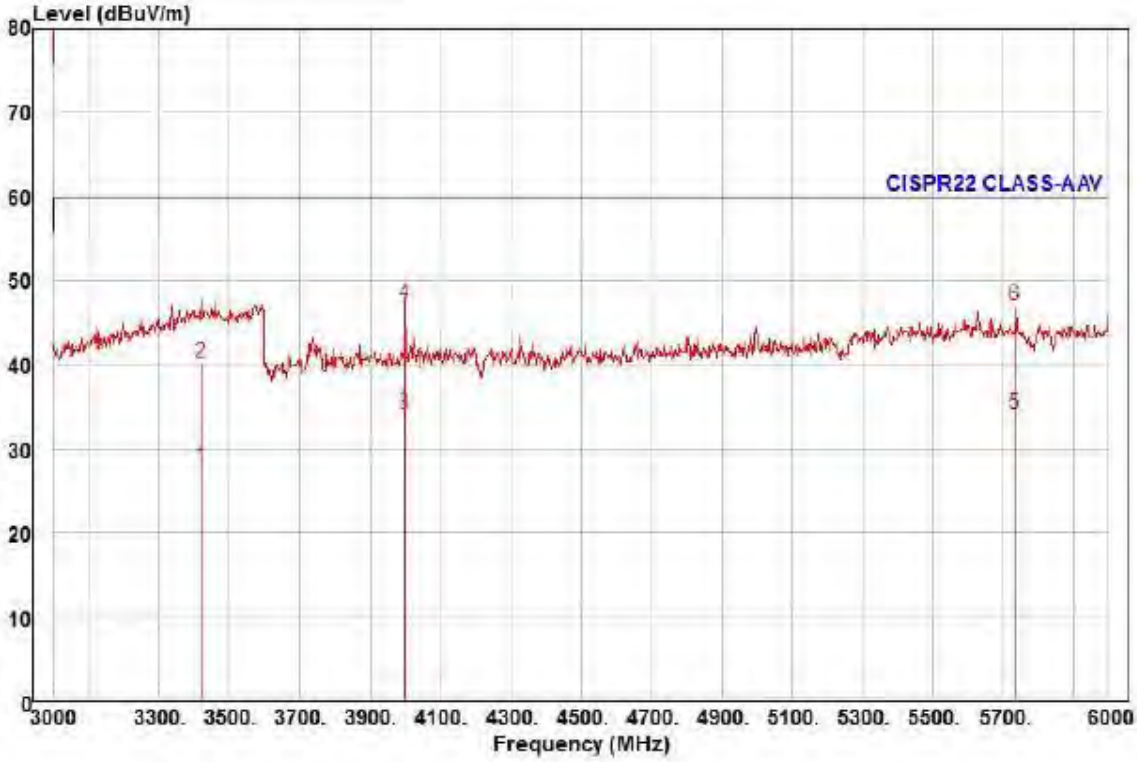

Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-2M2400
Mode : CE
Memo : (3 ~ 6) GHz

	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	3417.00	23.78	30.92	11.45	38.27	130	60.00	-32.12	horizontal	Average
2	3417.00	36.26	30.92	11.45	38.27	130	80.00	-39.64	horizontal	Peak
3	3999.00	27.31	32.50	12.19	37.84	338	60.00	-25.84	horizontal	Average
4 pk	3999.00	40.48	32.50	12.19	37.84	338	80.00	-32.67	horizontal	Peak
5 pp	5736.00	21.70	35.72	15.03	38.21	2	60.00	-25.76	horizontal	Average
6	5736.00	34.54	35.72	15.03	38.21	2	80.00	-32.92	horizontal	Peak

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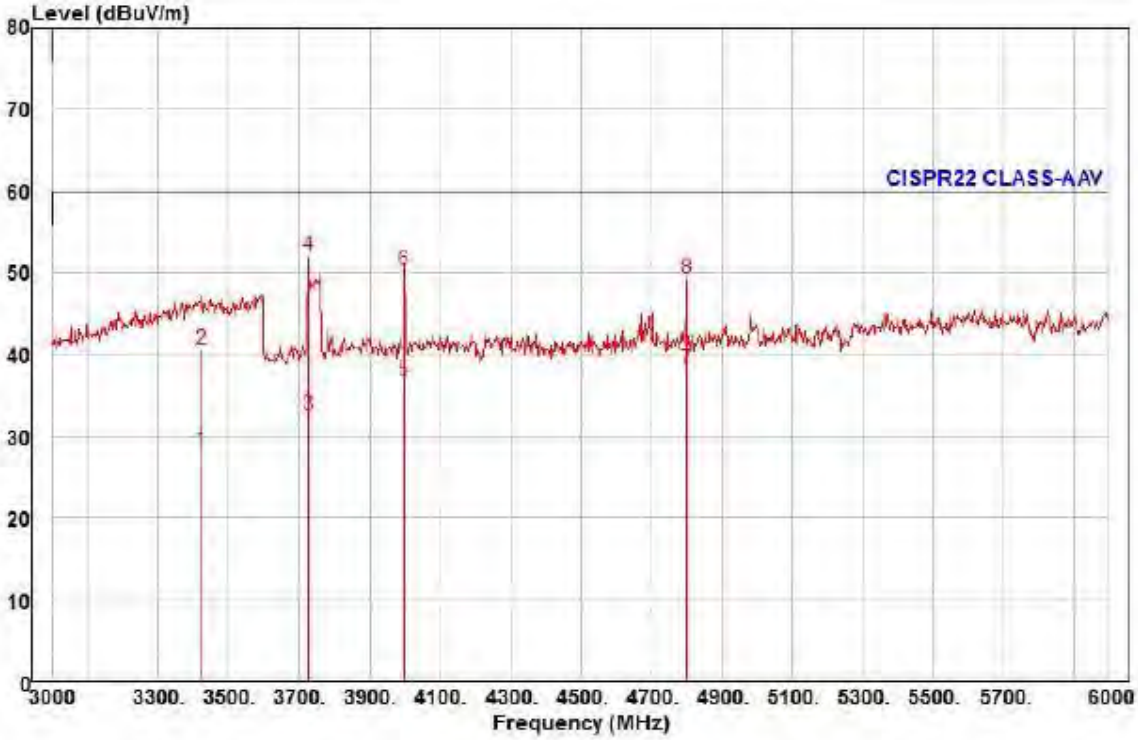

Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SLA-2M2400
Mode : CE
Memo : (3 ~ 6) GHz

	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	3423.00	24.05	30.93	11.46	38.27	3	60.00	-31.83	vertical	Average
2	3423.00	36.46	30.93	11.46	38.27	3	80.00	-39.42	vertical	Peak
3	3726.00	27.24	31.76	11.75	38.08	18	60.00	-27.33	vertical	Average
4 pk	3726.00	46.75	31.76	11.75	38.08	18	80.00	-27.82	vertical	Peak
5	3999.00	29.97	32.50	12.19	37.84	353	60.00	-23.18	vertical	Average
6	3999.00	43.57	32.50	12.19	37.84	353	80.00	-29.58	vertical	Peak
7 pp	4800.00	29.92	32.99	13.39	38.12	0	60.00	-21.82	vertical	Average
8	4800.00	41.05	32.99	13.39	38.12	0	80.00	-30.69	vertical	Peak

♦ Calculation
Result(PK/CAV) [dB(㎶/m)] = (Reading(PK/CAV)[dB(㎶)] + c.f[dB(1/m)]
Margin(PK/CAV)[dB] = Limit[dB(㎶/m)] - Result(PK/CAV) [dB(㎶/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	Ieff [A]	% of Limit	Limit [A]	Result
1	81.557E-3			
2	2.790E-3			PASS
3	72.081E-3	3.134	2.30	PASS
4	4.298E-3			PASS
5	69.641E-3	6.109	1.14	PASS
6	3.245E-3			PASS
7	66.471E-3	8.633	770.00E-3	PASS
8	3.048E-3			PASS
9	62.008E-3	15.502	400.00E-3	PASS
10	3.887E-3			PASS
11	57.038E-3	17.284	330.00E-3	PASS
12	3.107E-3			PASS
13	51.694E-3	24.616	210.00E-3	PASS
14	2.165E-3			PASS
15	45.848E-3	30.565	150.00E-3	PASS
16	1.862E-3			PASS
17	39.690E-3	29.989	132.35E-3	PASS
18	1.853E-3			PASS
19	33.170E-3	28.010	118.42E-3	PASS
20	1.517E-3			PASS
21	26.866E-3	16.717	160.71E-3	PASS
22	1.078E-3			PASS
23	21.429E-3	14.603	146.74E-3	PASS
24	939.640E-6			PASS
25	16.280E-3	12.059	135.00E-3	PASS
26	741.196E-6			PASS
27	11.513E-3	9.211	124.99E-3	PASS
28	704.917E-6			PASS
29	7.745E-3	6.655	116.39E-3	PASS
30	720.723E-6			PASS
31	4.704E-3			PASS
32	681.567E-6			PASS
33	2.460E-3			PASS
34	724.648E-6			PASS
35	2.203E-3			PASS
36	663.346E-6			PASS
37	2.828E-3			PASS
38	671.830E-6			PASS
39	3.270E-3			PASS
40	653.447E-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 - Harmonics (continued)

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	81.733E-3			
2	3.298E-3			PASS
3	72.269E-3	2.095	3.45	PASS
4	4.913E-3			PASS
5	69.815E-3	4.083	1.71	PASS
6	3.668E-3			PASS
7	66.658E-3	5.771	1.15	PASS
8	3.484E-3			PASS
9	62.169E-3	10.361	600.00E-3	PASS
10	4.433E-3			PASS
11	57.315E-3	11.579	495.00E-3	PASS
12	3.521E-3			PASS
13	51.793E-3	16.442	315.00E-3	PASS
14	2.600E-3			PASS
15	46.011E-3	20.450	225.00E-3	PASS
16	2.179E-3			PASS
17	39.795E-3	20.046	198.52E-3	PASS
18	2.126E-3			PASS
19	33.409E-3	18.808	177.63E-3	PASS
20	1.828E-3			PASS
21	26.996E-3	16.798	160.71E-3	PASS
22	1.229E-3			PASS
23	21.614E-3	14.729	146.74E-3	PASS
24	1.055E-3			PASS
25	16.416E-3	12.160	135.00E-3	PASS
26	836.534E-6			PASS
27	11.619E-3	9.296	124.99E-3	PASS
28	781.846E-6			PASS
29	7.831E-3	6.728	116.39E-3	PASS
30	795.238E-6			PASS
31	4.860E-3			PASS
32	778.966E-6			PASS
33	2.557E-3			PASS
34	839.065E-6			PASS
35	2.336E-3			PASS
36	728.991E-6			PASS
37	3.124E-3			PASS
38	763.802E-6			PASS
39	3.454E-3			PASS
40	729.186E-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 [%]	0.032	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

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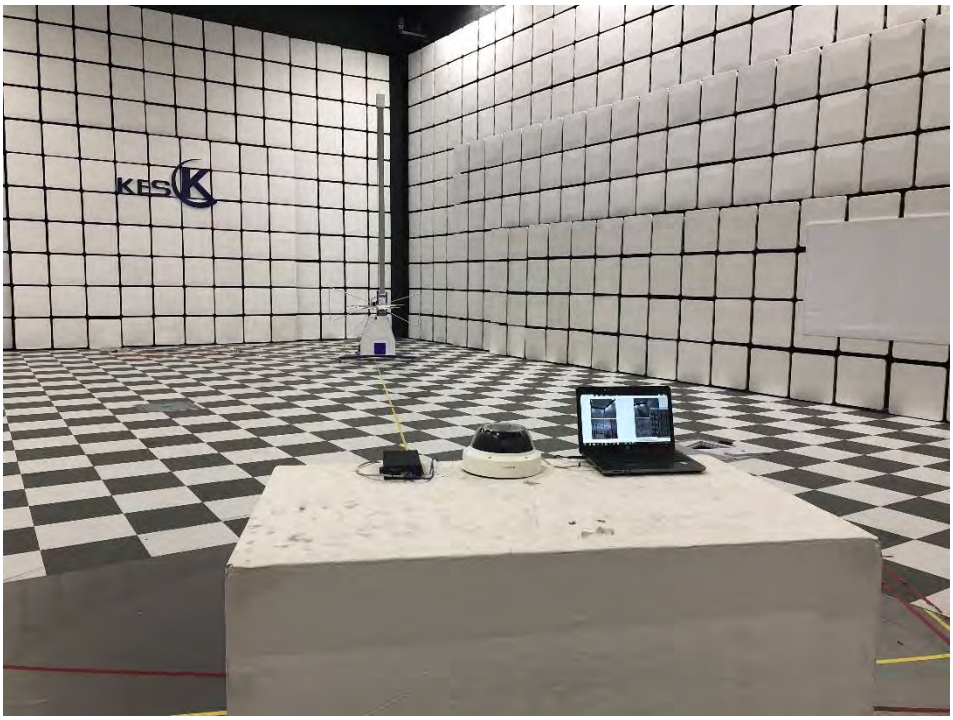
Radiated Electric Field Emissions(Below 1 ㎓)



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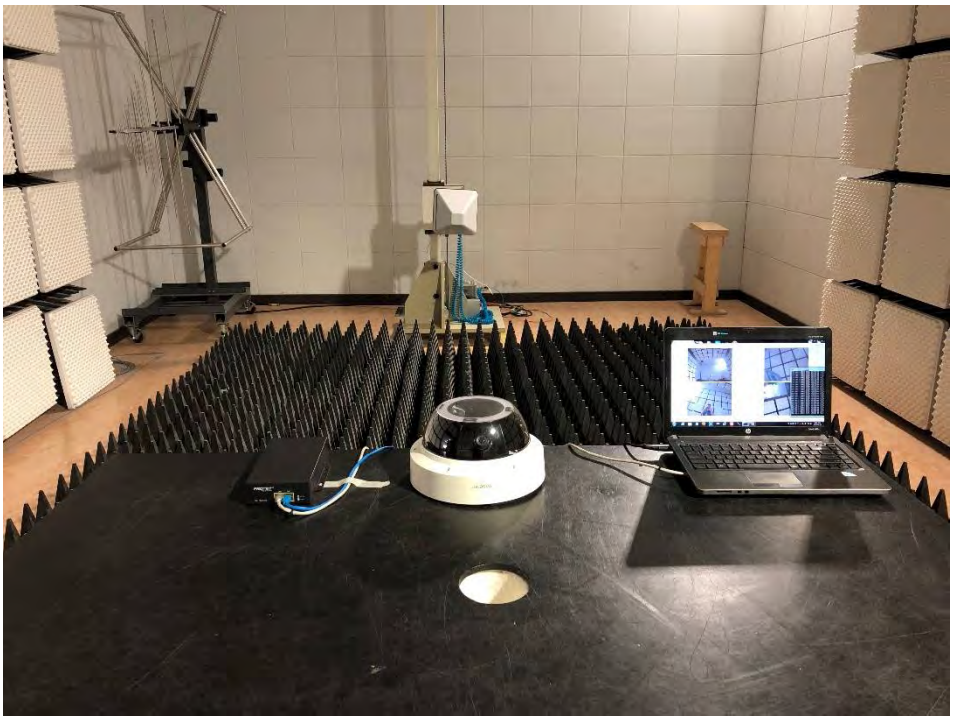
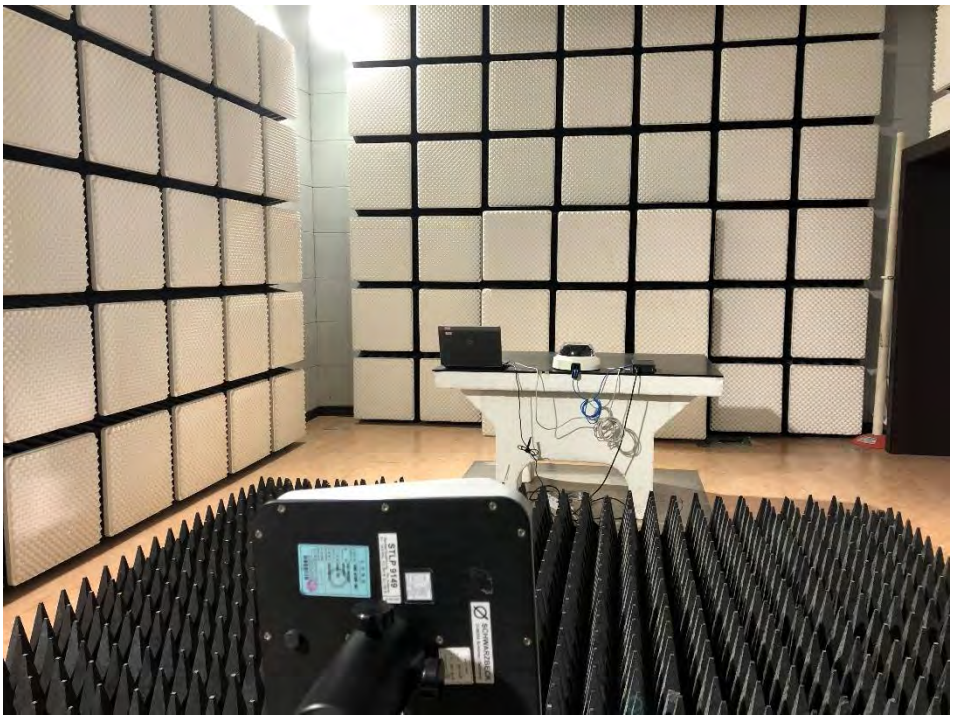
Radiated Electric Field Emissions(Above 1 GHz)





Harmonic Current Emissions and Voltage Fluctuations and Flicker

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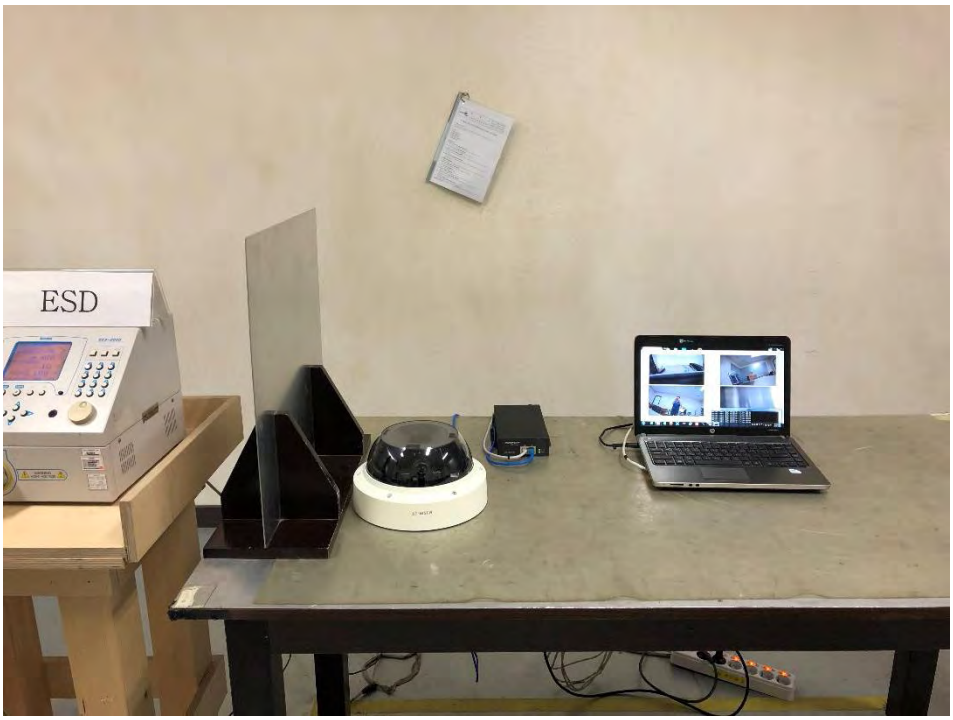
Electrostatic Discharge



Radiated Electric Field Immunity

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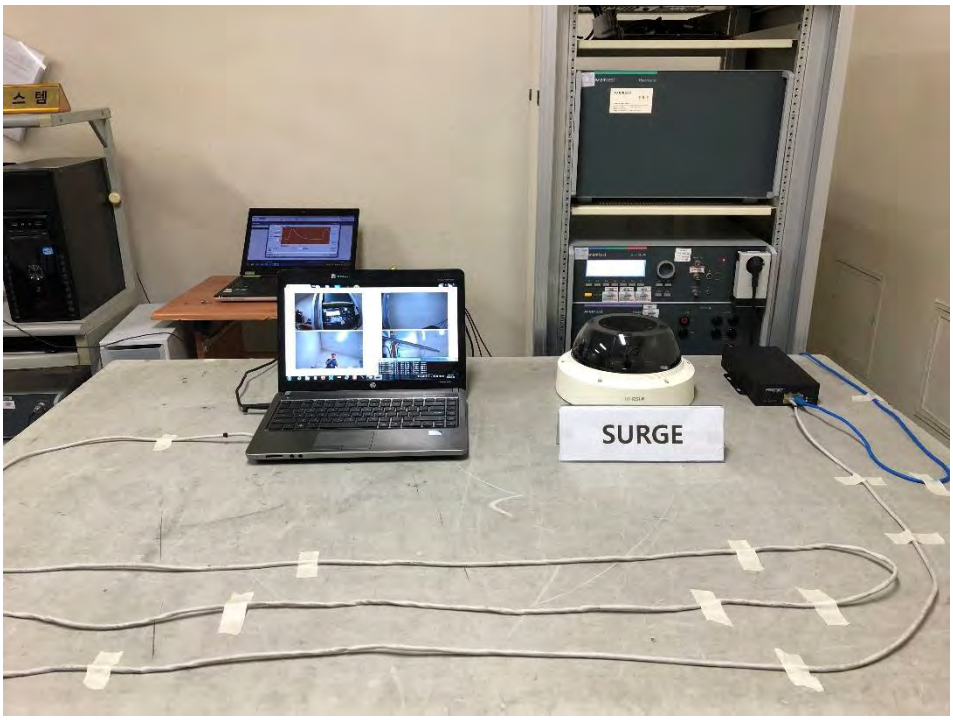
Electrical Fast Transients/Bursts

Surge Transients



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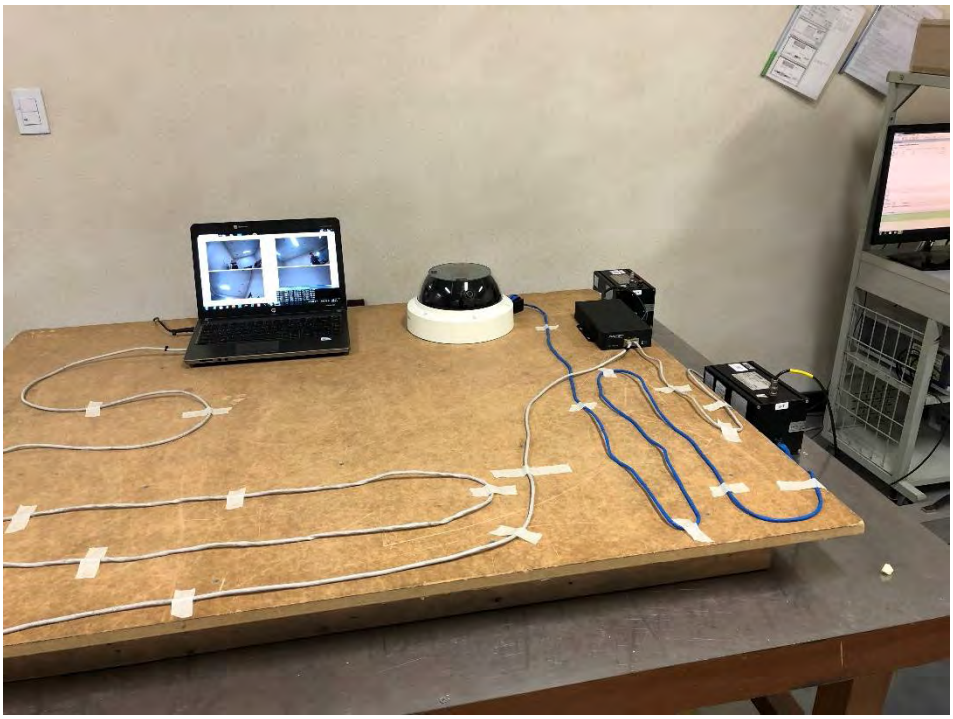
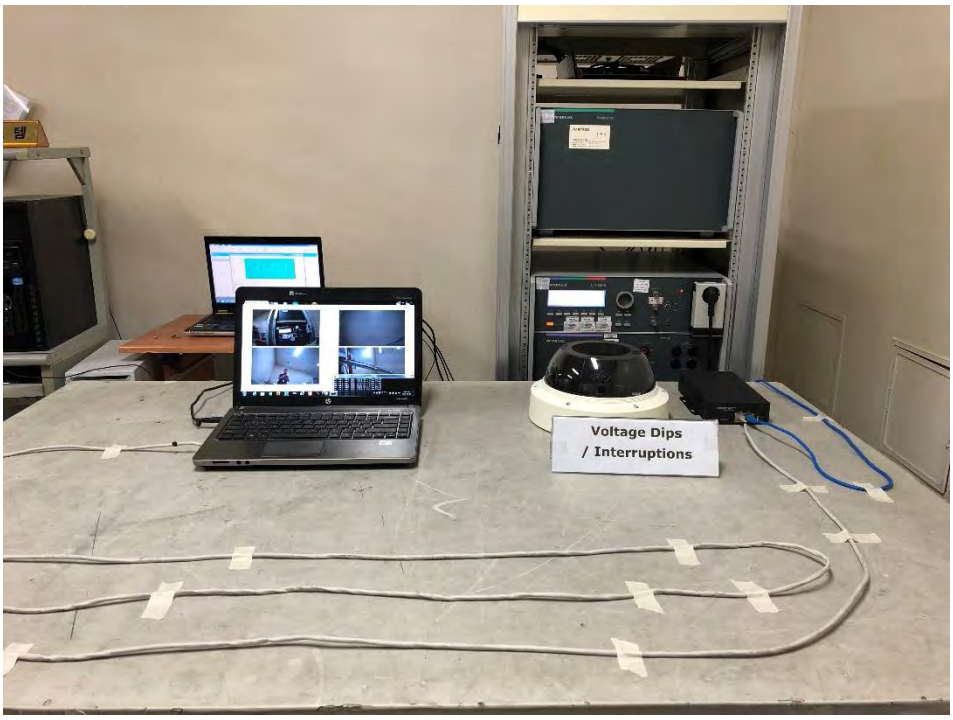
Conducted Disturbance



Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)

(Bottom)

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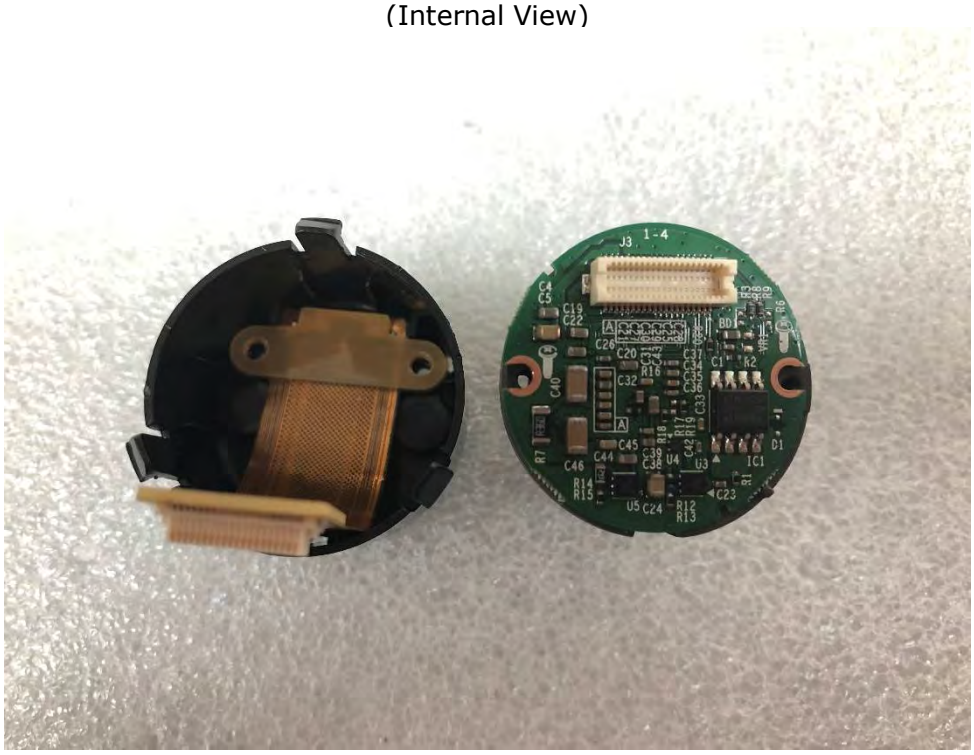
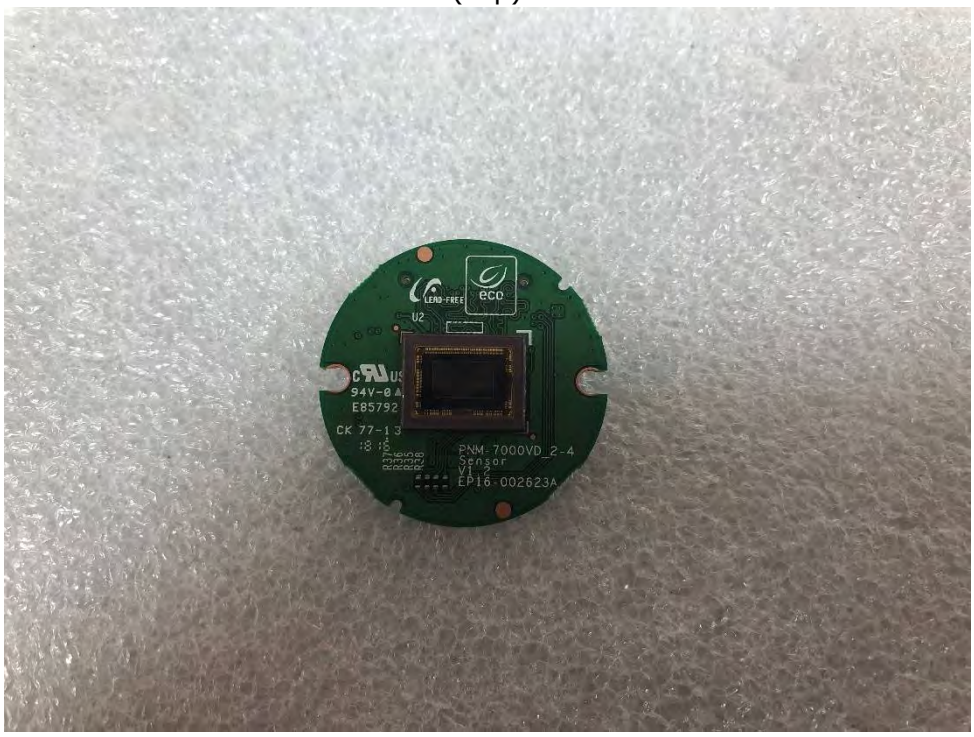
EUT Internal Photographs

(Internal View)



EUT Internal View – Board 1

(Top)



(Bottom)

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Label and Location

2M LENS Module

Model No : SLA-2M2400Q

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

Made in China

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