EMC TEST REPORT For CE

Test Report No.	:	KES-E1-17T0487-R1
Date of Issue	:	May. 16, 2019
Product name	:	DECORDER
Model/Type No.	:	SPD-150P
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	:	Jul. 07, 2017
Test date	:	Jul. 21, 2017 – Jul. 24, 2017
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Young Suk, Song
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jul. 28, 2017	KES-E1-17T0487	Issued
May. 16, 2019	KES-E1-17T0487-R1	Changed customer's address and factory addition due to customer request.

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1.0 General Product Description

Main Specifications of E.U.T are:

H/W	CPU		Embedded CPU
	Operating System		Embedded Linux
	Output	HDMI	1ch (up-to 4K)
		VGA	1ch (DB15 1ea)
		CVBS	1ch, 704x480 (30fps), 704x576 (25fps)
	External	Ethernet	1ea (10/100/1000BASE-T)
		USB	USB 2.0 2ea
		Audio In/Out	1 out
	Environmental	Operating Temperature	+0°C to +40°C(+32°F to +104°F)
		Humidity	20% ~ 85% RH
	Electrical	Power	DC12V, PoE(IEEE802.3af)
		Power Consumption	Max. 8.4W(12VDC), Max. 8.4W(PoE)
	Mechanical	Color / Material	Dark Gray
		Dimension (WxHxD)	178 x 34 x 128mm (7.0" x 1.3" x 5.0")
		Weight	Approx. 0.68Kg
S/W	Video	Codec	H.265/H.264/MJPEG
		Network Performance	200Mbps
		Max. Channel	48@D1
		Max. Decoding Performance	30fps@8MP, up-to 12MP
		Division (/monitor)	**Clone mode** **1/4/6/8/9/13/16/25/36(32)/2V/3V** **Expand mode** **(HDMI) 1/4/6/8/9/13/16/25/36(32)/2V/3V** **(VGA) 1/4/6/8/9/13/16/2V/3V**
		Layout	Up-to 20
	Audio	Codec	G.711/G.726/AAC
	Management		Local GUI
	Time Setting		NTP/Manual
	Dynamic DNS		미지원

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
DECORDER	SPD-150P	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T
AC / DC Adaptor	2ACB022F	-	Channel Well Technology (Guangzhou) Co., Ltd.	-
Mouse	MOEIUOA	-	PRIMAX ELECTRONICS LTD.	-

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
POE Adaptor 1	GS728TPP	-	NETGEAR, INC.	-
MONITOR 1	HSTND-7041-L	6CM6020YQQ	HP Inc.	-
MONITOR 2	E2318HN	-	DELL	-
MONITOR 3	SMT-2232	C95V67VF900015Y	Weihai Daewoo Electronics Co., Ltd.	-
Camera	SND-L6013R	-	Hanwha Techwin (Tianjin) Co.,Ltd.	-
POE Adaptor 2	ANY4805C-LT1	10H300002	ANY ELECTRONICS CO., LTD	-
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-

1.6 External I/O Cabling

- AC / DC Adaptor Mode

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
NETWORK CAMERA (E.U.T)	D-SUB	MONITOR 1	D-SUB	1.6	S
	HDMI	MONITOR 2	HDMI	1.8	S
	BNC	MONITOR 3	BNC	3.0	S
	RJ-45 (DATA)	POE Adaptor 2	RJ-45 (DATA)	3.0	U
	3.5 ㎜	Speaker	3.5 ㎜	1.6	U
	USB	Mouse	USB	1.7	U
Camera	RJ-45 (POE)	POE Adaptor 2	RJ-45 (POE)	3.0	U

- POE Mode

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
NETWORK CAMERA (E.U.T)	RJ-45 (POE)	POE Adaptor 1	RJ-45 (POE)	3.0	U
	D-SUB	MONITOR 1	D-SUB	1.6	S
	HDMI	MONITOR 2	HDMI	1.8	S
	BNC	MONITOR 3	BNC	3.0	S
	3.5 ㎜	Speaker	3.5 ㎜	1.6	U
	USB	Mouse	USB	1.7	U
Camera	RJ-45 (POE)	POE Adaptor 1	RJ-45 (POE)	3.0	U

* Unshielded=U, Shielded=S

1.7 E.U.T Operating Mode(s)

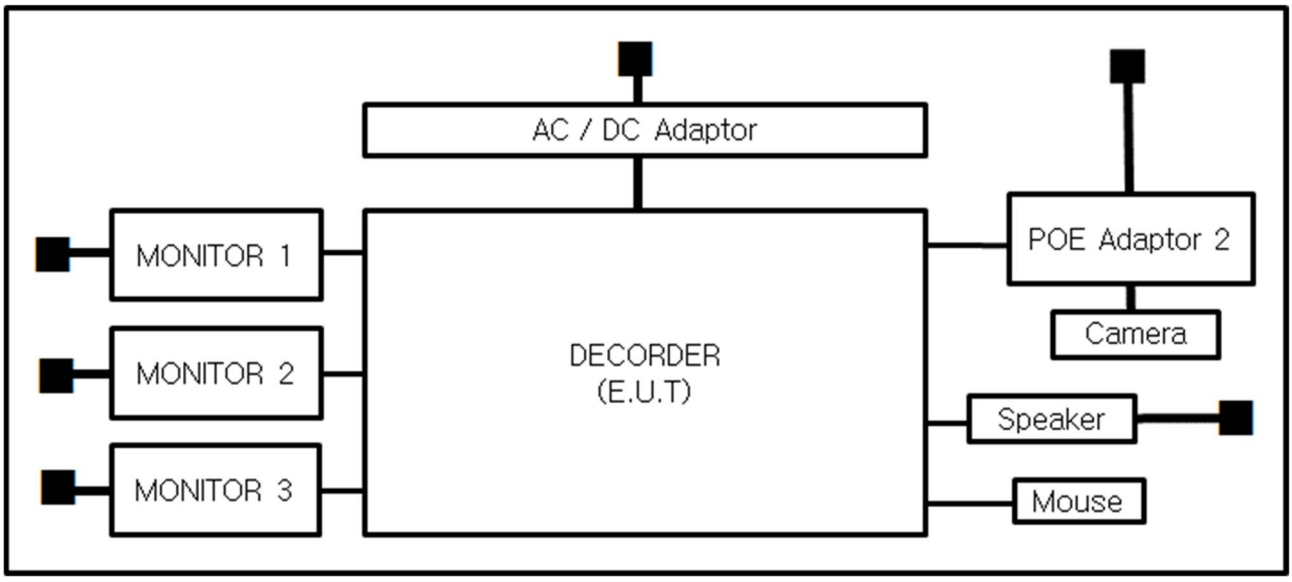
Test mode	operating
AC / DC Adaptor	E.U.T Monitoring
POE	E.U.T Monitoring

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

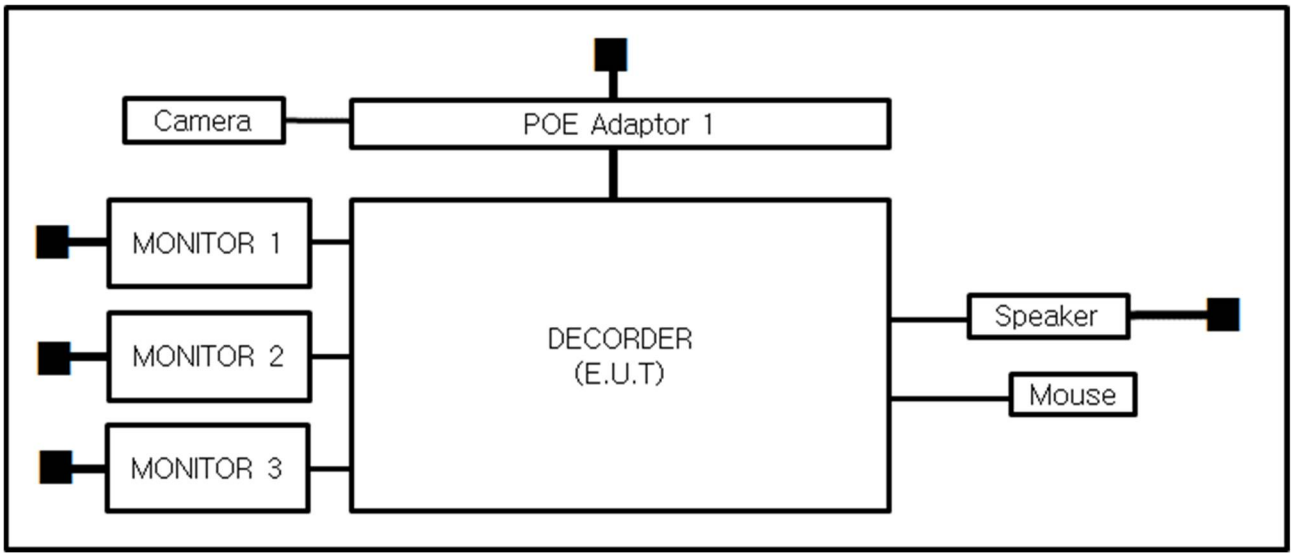
1.8 Configuration

■ AC Main
□ DC Main

- AC / DC Adaptor Mode



- POE Mode



1.9 Remarks when standards applied

- The adaptor is included by the manufacturer.

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

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 +A1:2014		
☒ EN 61000-3-2:2014		
☒ EN 61000-3-3:2013		
☐ EN 61326-1:2013		

☐ **VCCI V-3 / 2015.04** ☐ Class A ☐ Class B

☐ **AS/NZS CISPR22:2009 +A1:2010** ☐ Class A ☐ Class B

☐ **47 CFR Part 15, Subpart B**

- ☐ CISPR 22:2009 +A1:2010 ☐ Class A ☐ Class B
- ☐ ANSI C63.4-2009

☐ **IC Regulation ICES-003 : 2016**

- ☐ CAN/CSA CISPR 22-10 ☐ Class A ☐ Class B
- ☐ ANSI C63.4-2014

☐ **RE– Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

- ☐ Equipment for fixed use
- ☐ Equipment for vehicular use
- ☐ Equipment for portable use

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

2.1 Conducted Emissions at Mains Power Ports

Test Date
Jul. 21, 2017

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	04, 27, 2018
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017

Test Conditions
Temperature: 21,3 ℃
Relative Humidity: 44,3 %
.

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Settings
IF Band Width: 9 ㎑

Test Results
The requirements are:

☐ PASS
☐ NOT PASS
☒ NOT APPLICABLE

Remarks
-

2.2 Conducted Emissions at Telecommunication Ports

Test Date
Jul. 21, 2017 / Jul. 23, 2017

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	04, 27, 2018
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 29, 2018
☒	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 29, 2018
☐	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 11, 2017

Test Conditions
Temperature: 21,3 ℃ / 22,4 ℃
Relative Humidity: 44,3 % / 49,4 %

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.

2.3 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Jul. 24, 2017

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

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, 18, 2018
☒	AMPLIFIER	SCU 01	R & S	100603	12, 13, 2017
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

Test Conditions
Temperature: 23,9 ℃
Relative Humidity: 51,6 %

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.

2.4 Radiated Electric Field Emissions(Above 1 ㎓)

Test Date
Jul. 23, 2017

Test Location
SEMI ANECHOIC CHAMBER #3

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	ESR7	R & S	101190	08, 08, 2017
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2018
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions
Temperature: 23,6 ℃
Relative Humidity: 51,9 %

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.

2.5 Harmonic Current Emissions

Test Date
Jul. 21, 2017

Test Location
Electro wave Shieldroom

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, 2017
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	08, 08, 2017

Test Conditions
Temperature: 21,3 ℃
Relative Humidity: 44,3 %

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
Jul. 21, 2017

Test Location
Electro wave Shieldroom

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, 2017
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	08, 08, 2017

Test Conditions
Temperature: 21,3 ℃
Relative Humidity: 44,3 %

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:
EN 50130-4:2011 +A1:2014 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such Flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to EUT
(e.g. no corruption of memory or changes to programmable setting etc.)

(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and

(c) there is no observable deterioration of the picture at 1 V/m.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

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

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,

and no such flickering of indicators oeuvres at U = 130 $dB\mu V$.

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 $dB\mu V$, 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 $dB\mu V$, 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 $dB\mu V$.

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

3.1 Electrostatic Discharge

Reference Standard
EN 61000-4-2:2009

Test Date
Jul. 23, 2017

Test Location
EMS-ESD: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	-	-	-	-
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2018
☒	HCP	-	Noise Ken	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature:	22,4 ℃
Relative Humidity:	49,4 %
Atmospheric Pressure:	99,9 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

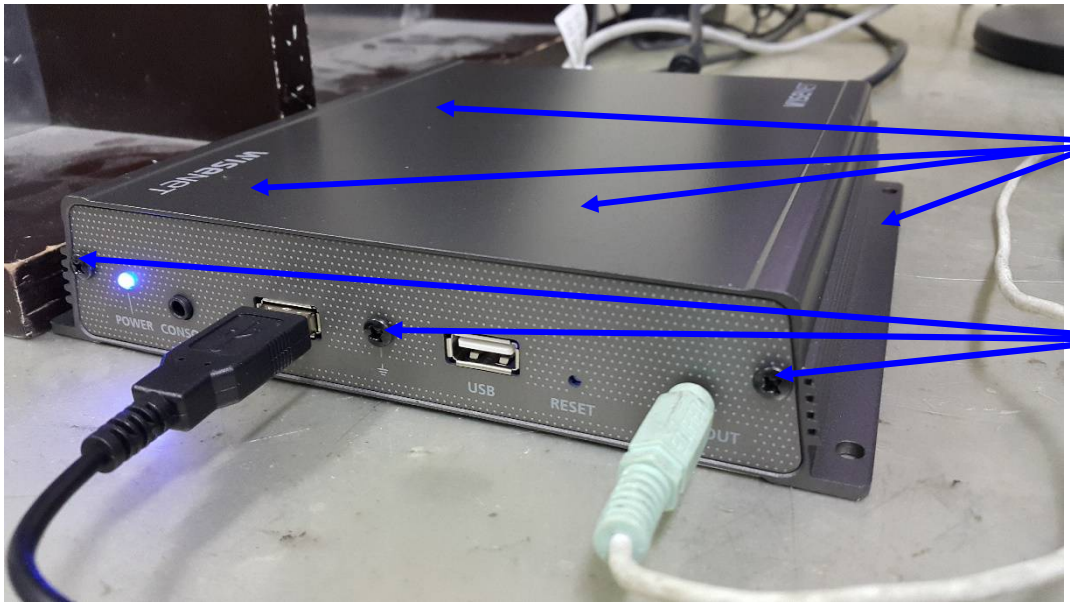
Discharge Voltage:	Contact	Air	HCP	VCP
	☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

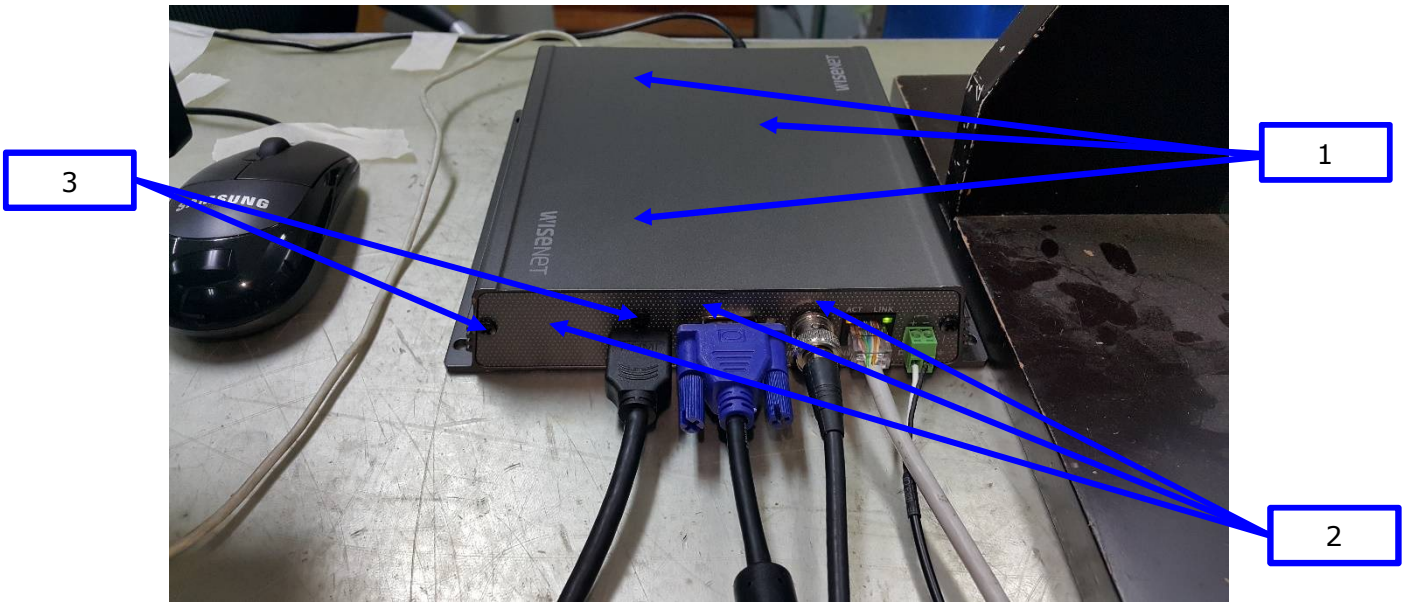
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact





Test Data

- AC / DC Adaptor Mode

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact D.	Complied	-
2	Ports	Contact D.	Complied	-
3	Screw	Contact D.	Complied	-

- POE Mode

Indirect Discharge

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

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Surface	Contact D.	Complied	-
2	Ports	Contact D.	Complied	-
3	Screw	Contact D.	Complied	-

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.2 Radiated Electric Field Immunity

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

Test Date
Jul. 23, 2017

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	08, 08, 2017
☒	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 08, 2017
☒	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 08, 2017
☒	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 08, 2017
☒	POWER METER	NRP2	R & S	103475	08, 08, 2017
☒	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 08, 2017
☒	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 08, 2017
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	–

Test Conditions

Temperature: 23,6 ℃
Relative Humidity: 51,9 %
Atmospheric Pressure: 99,6 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

Test Data

- AC / DC Adaptor Mode

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

- POE Mode

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

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.3 Electrical Fast Transients/Bursts

Reference Standard
EN 61000-4-4:2012

Test Date
Jul. 24, 2017

Test Location
EMS-EFT: Electro wave Shieldroom

Test Equipment

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

Test Conditions

Temperature:	23,1 ℃
Relative Humidity:	51,3 %
Atmospheric Pressure:	98,9 ㎪

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	

Test Data

- AC / DC Adaptor Mode

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

Mode of Application	Observations	
	(+) Burst (㎸)	(-) Burst (㎸)
L – N	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 (㎸)
RJ-45	Complied	Complied
BNC	Complied	Complied

- POE Mode

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

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

☐ 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 (㎸)
RJ-45	Complied	Complied
BNC	Complied	Complied

Note: "Blank" = Not performed
Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.4 Surge Transients

Reference Standard
EN 61000-4-5:2014

Test Date
Jul. 24, 2017

Test Location
EMS-Surge: Electro wave Shieldroom

Test Equipment

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

Test Conditions

Temperature:	23,1 ℃
Relative Humidity:	51,3 %
Atmospheric Pressure:	98,9 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

Signal Lines

Source Impedance: 42 ohm for common mode
Surge Amplitude: Common Mode
☒ (0,5 / 1,0) kV

Number of Surges: ☒ 5 Surges

Polarity: ☒ Positive & Negative

Repetition Rate: ☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

Test Data

- AC / DC Adaptor Mode

☒ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (㎸)	(-) Surge (㎸)
RJ-45	Complied	Complied
BNC	Complied	Complied

- POE Mode

☐ Line to Line – Differential Mode

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

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (㎸)	(-) Surge (㎸)
RJ-45	Complied	Complied
BNC	Complied	Complied

Note: "Blank" = Not performed

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6:2014

Test Date
Jul. 24, 2017

Test Location
EMS-CS: Electro wave Shieldroom

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, 08, 2017
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 08, 2017
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 08, 2017
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 08, 2017
☒	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 03, 2018

Test Conditions

Temperature:	23,1 ℃
Relative Humidity:	51,3 %
Atmospheric Pressure:	98,9 kPa

Test Specifications

Frequency range:	☒ 150 ㎑ to 100 ㎒	☐ 150 ㎑ to 80 ㎒
Voltage Level:	☐ 1 Vrms ☒ 10 Vrms	☐ 3 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:	☒ A	

Test Data

- AC / DC Adaptor Mode

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L – N	CDN (☒M2, ☐M3)	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
RJ-45	CDN T8	Complied
BNC	EM Injection Clamp	Complied

- POE Mode

☐ Input a.c. power ports

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

☐ Input d.c. power ports

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

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN T8	Complied
BNC	EM Injection Clamp	Complied

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

Observations:
Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria.

3.6 Voltage Dips and Short Interruptions

Reference Standard
EN 61000-4-11:2004

Test Date
Jul. 24, 2017

Test Location
EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.3.9	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N5T	EM TEST	P1317117973	02, 08, 2018
☒	MOTOR VARIAC	MV2616	EM TEST	V0936105123	02, 08, 2018
☒	CDN	CNV 508N1	EM TEST	P1551168979	04, 26, 2018

Test Conditions

Temperature:	23,1 ℃
Relative Humidity:	51,3 %
Atmospheric Pressure:	98,9 kPa

Test Specifications & Observations/Remarks

(Test Voltage : 50 ㎐)

Test Level	Duration [in period/ms (50 ㎐)]	Results
☒ 20 % dip	☒ 250 / 5000	Complied
☒ 30 % dip	☒ 25 / 500	Complied
☒ 60 % dip	☒ 10 / 200	Complied
☒ 100 % dip	☒ 250 / 5000	Complied

- Voltage cariations

☒ 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
PASS Required Performance Criteria.

APPENDIX A – TEST DATA

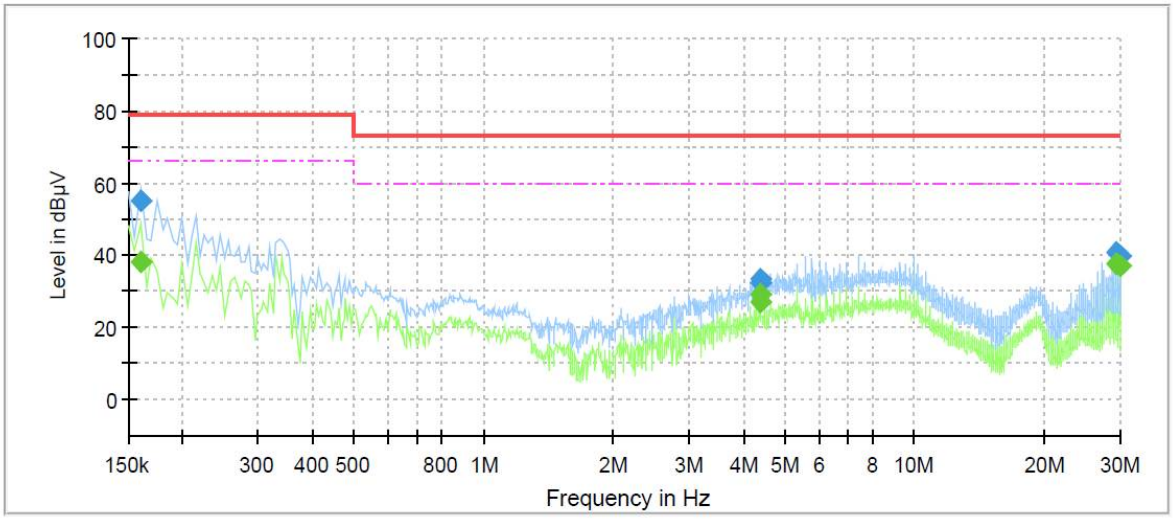
Conducted Emissions at Mains Power Ports

[HOT]

- AC / DC Adaptor Mode

Common Information

Test Description:	Conducted Emission
Model No.:	SPD-150P
Mode	DC_H
Operator Name:	KES



Final_Result

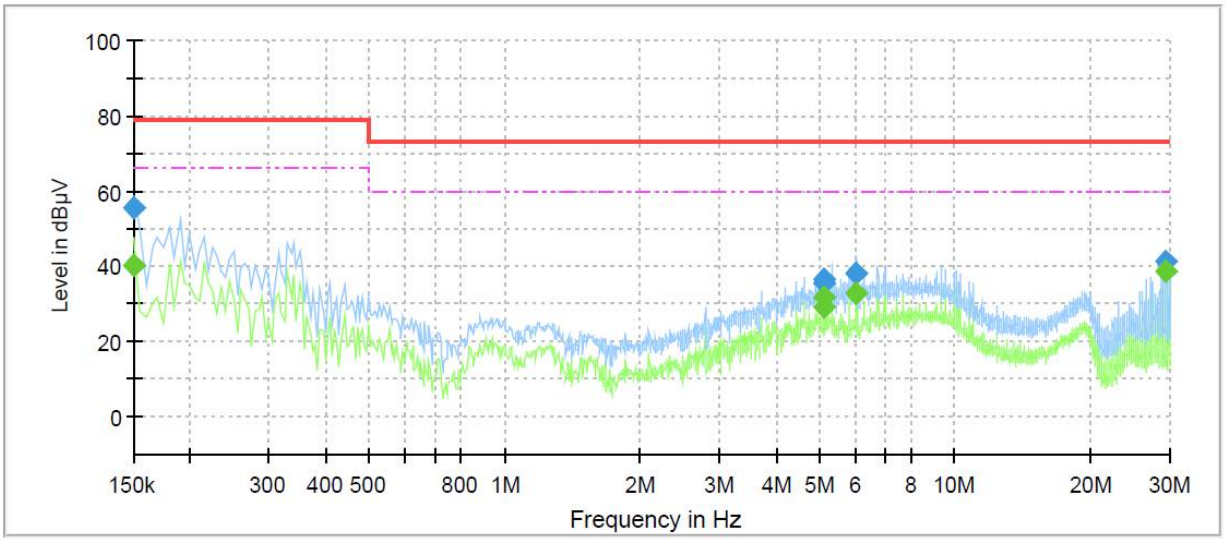
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	38.22	66.00	27.78	1000.0	9.000	L1	21.0
0.160000	54.95	---	79.00	24.05	1000.0	9.000	L1	21.0
4.400000	---	27.20	60.00	32.80	1000.0	9.000	L1	19.7
4.400000	32.30	---	73.00	40.70	1000.0	9.000	L1	19.7
4.405000	---	29.14	60.00	30.86	1000.0	9.000	L1	19.7
4.405000	33.55	---	73.00	39.45	1000.0	9.000	L1	19.7
29.235000	---	37.74	60.00	22.26	1000.0	9.000	L1	20.3
29.235000	40.64	---	73.00	32.36	1000.0	9.000	L1	20.3
29.905000	---	36.98	60.00	23.02	1000.0	9.000	L1	20.3
29.905000	39.62	---	73.00	33.38	1000.0	9.000	L1	20.3

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))

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SPD-150P
Mode	DC_N
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	40.12	66.00	25.88	1000.0	9.000	N	21.0
0.150000	55.48	---	79.00	23.52	1000.0	9.000	N	21.0
5.120000	---	31.54	60.00	28.46	1000.0	9.000	N	19.8
5.120000	36.79	---	73.00	36.21	1000.0	9.000	N	19.8
5.125000	---	28.92	60.00	31.08	1000.0	9.000	N	19.8
5.125000	35.74	---	73.00	37.26	1000.0	9.000	N	19.8
6.050000	---	32.84	60.00	27.16	1000.0	9.000	N	19.8
6.050000	38.18	---	73.00	34.82	1000.0	9.000	N	19.8
29.235000	---	38.87	60.00	21.13	1000.0	9.000	N	20.3
29.235000	41.42	---	73.00	31.58	1000.0	9.000	N	20.3

♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

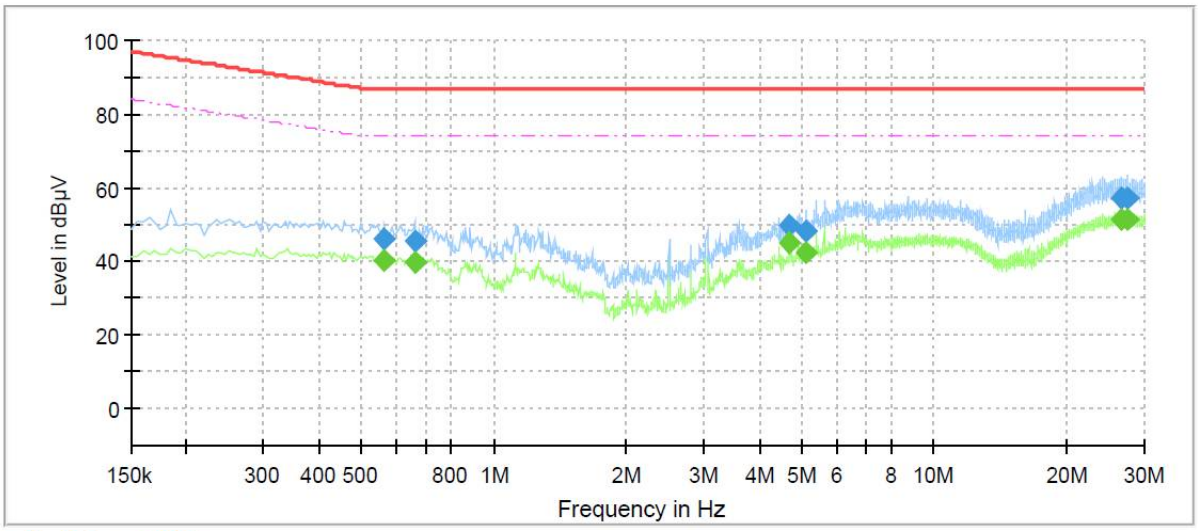
Conducted Emissions at Telecommunication Ports

- AC / DC Adaptor Mode

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-150P
Mode	DC_10 Mbps
Operator Name:	KES



Final_Result

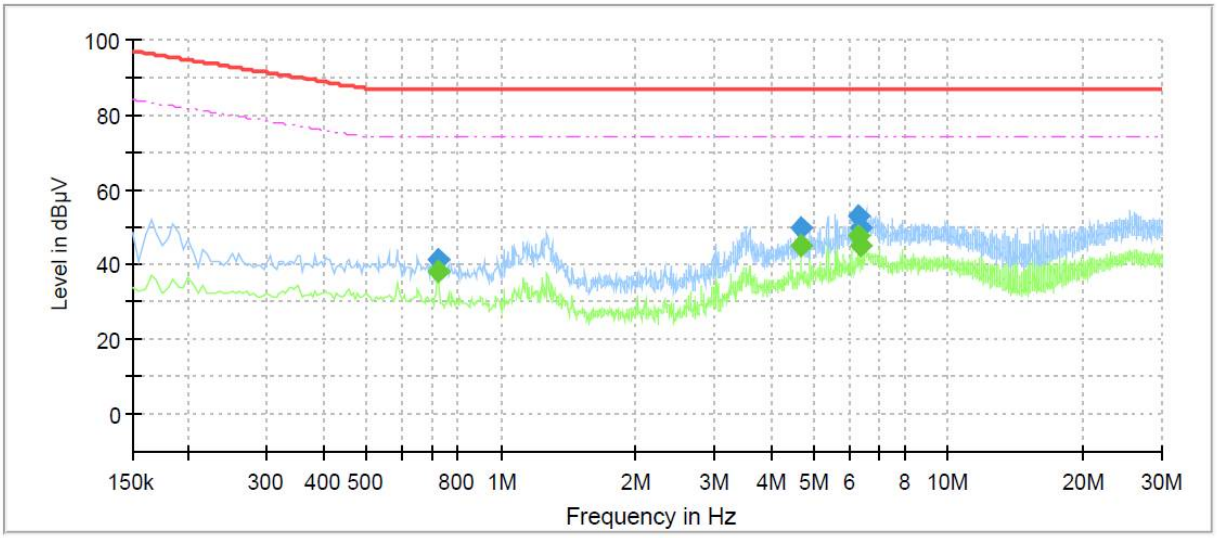
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.560000	---	40.34	74.00	33.66	1000.0	9.000	Single Line	20.8
0.560000	46.07	---	87.00	40.93	1000.0	9.000	Single Line	20.8
0.660000	---	39.67	74.00	34.33	1000.0	9.000	Single Line	20.7
0.660000	45.38	---	87.00	41.62	1000.0	9.000	Single Line	20.7
4.680000	---	44.96	74.00	29.04	1000.0	9.000	Single Line	19.8
4.680000	49.63	---	87.00	37.37	1000.0	9.000	Single Line	19.8
5.110000	---	42.34	74.00	31.66	1000.0	9.000	Single Line	19.8
5.110000	48.01	---	87.00	38.99	1000.0	9.000	Single Line	19.8
26.485000	---	51.47	74.00	22.53	1000.0	9.000	Single Line	20.1
26.485000	57.37	---	87.00	29.63	1000.0	9.000	Single Line	20.1
27.590000	---	51.28	74.00	22.72	1000.0	9.000	Single Line	20.1
27.590000	57.16	---	87.00	29.84	1000.0	9.000	Single Line	20.1

♦ 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))

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-150P
Mode	DC_100 Mbps
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.720000	---	37.88	74.00	36.12	1000.0	9.000	Single Line	20.1
0.720000	41.36	---	87.00	45.64	1000.0	9.000	Single Line	20.1
4.670000	---	44.93	74.00	29.07	1000.0	9.000	Single Line	19.3
4.670000	49.61	---	87.00	37.39	1000.0	9.000	Single Line	19.3
6.305000	---	47.50	74.00	26.50	1000.0	9.000	Single Line	19.4
6.305000	53.19	---	87.00	33.81	1000.0	9.000	Single Line	19.4
6.335000	---	44.93	74.00	29.07	1000.0	9.000	Single Line	19.4
6.335000	50.02	---	87.00	36.98	1000.0	9.000	Single Line	19.4

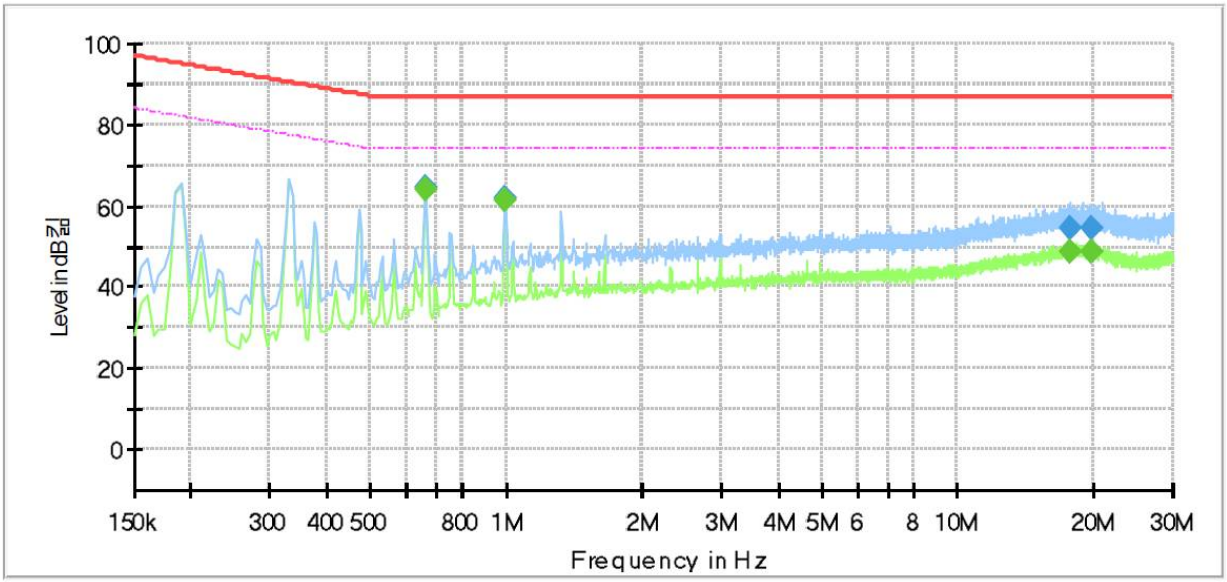
♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

- POE Mode

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-150P
Mode	POE_10 Mbps
Operator Name:	KES



Final_Result

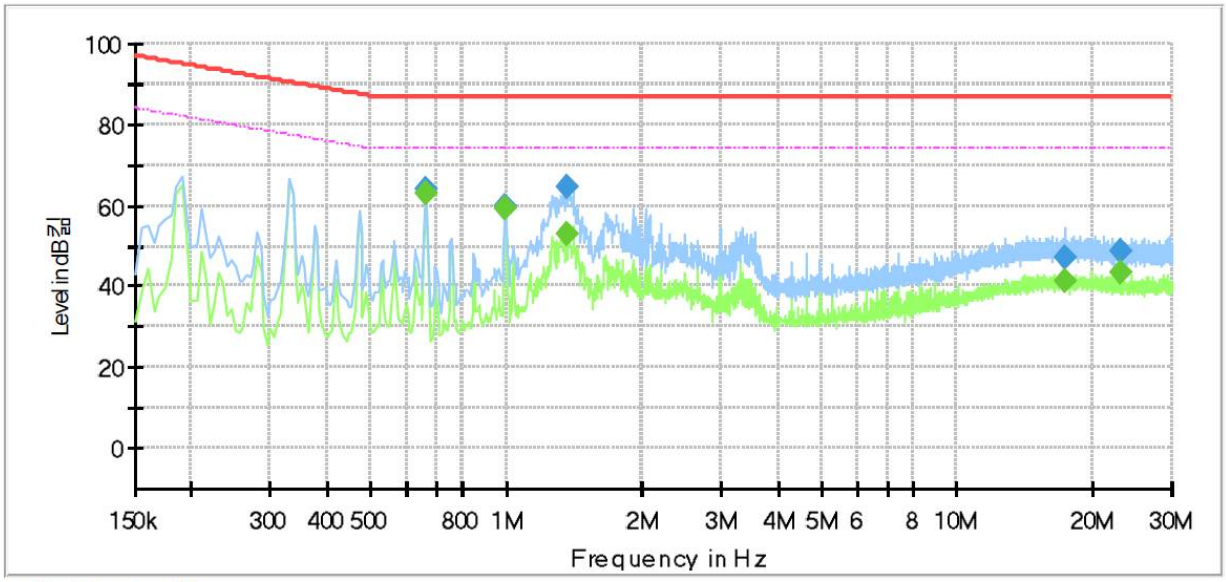
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.660000	---	64.07	74.00	9.93	1000.0	9.000	Single Line	19.9
0.660000	64.83	---	87.00	22.17	1000.0	9.000	Single Line	19.9
0.995000	---	61.37	74.00	12.63	1000.0	9.000	Single Line	20.0
0.995000	61.69	---	87.00	25.31	1000.0	9.000	Single Line	20.0
17.710000	---	48.92	74.00	25.08	1000.0	9.000	Single Line	20.0
17.710000	54.72	---	87.00	32.28	1000.0	9.000	Single Line	20.0
19.710000	---	48.96	74.00	25.04	1000.0	9.000	Single Line	20.0
19.710000	54.72	---	87.00	32.28	1000.0	9.000	Single Line	20.0

♦ 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))

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPD-150P
Mode	POE_100 Mbps
Operator Name:	KES



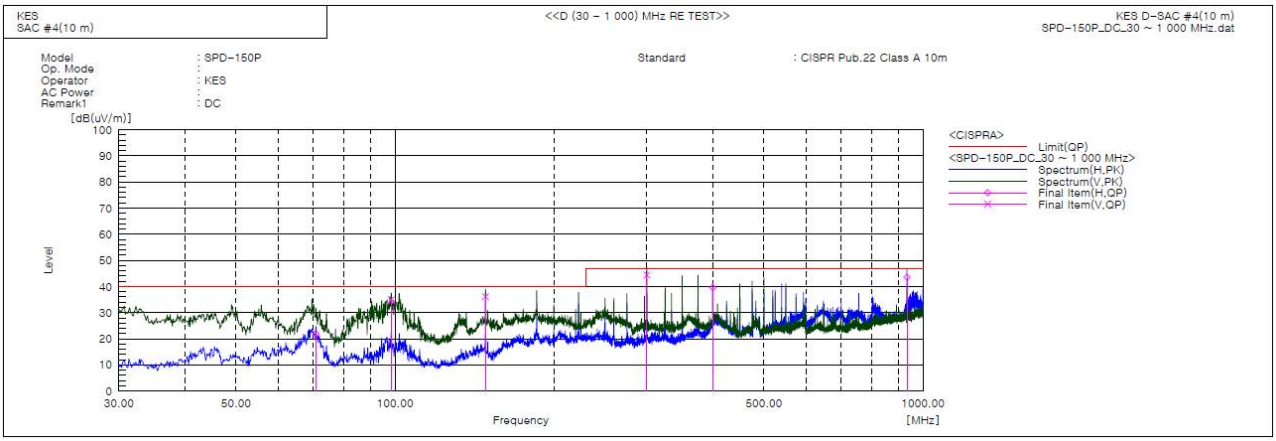
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.660000	---	63.21	74.00	10.79	1000.0	9.000	Single Line	19.4
0.660000	63.97	---	87.00	23.03	1000.0	9.000	Single Line	19.4
0.995000	---	59.54	74.00	14.46	1000.0	9.000	Single Line	19.5
0.995000	59.75	---	87.00	27.25	1000.0	9.000	Single Line	19.5
1.360000	---	52.80	74.00	21.20	1000.0	9.000	Single Line	19.5
1.360000	64.54	---	87.00	22.46	1000.0	9.000	Single Line	19.5
17.410000	---	41.49	74.00	32.51	1000.0	9.000	Single Line	19.5
17.410000	47.17	---	87.00	39.83	1000.0	9.000	Single Line	19.5
23.130000	---	43.43	74.00	30.57	1000.0	9.000	Single Line	19.4
23.130000	48.84	---	87.00	38.16	1000.0	9.000	Single Line	19.4

♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Radiated Electric Field Emissions(Below 1 ㎓)

- AC / DC Adaptor 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	70.861	H	54.0	-32.0	22.0	40.0	18.0	100.0	170.0	
2	98.385	V	63.3	-28.4	34.9	40.0	5.1	100.0	234.0	
3	148.461	V	67.5	-31.4	36.1	40.0	3.9	100.0	166.0	
4	299.992	V	68.2	-23.8	44.4	47.0	2.6	100.0	327.0	
5	400.055	H	59.8	-20.2	39.6	47.0	7.4	100.0	233.0	
6	933.070	H	52.7	-9.2	43.5	47.0	3.5	100.0	10.0	

♦ Calculation – SAC #4(10 m)

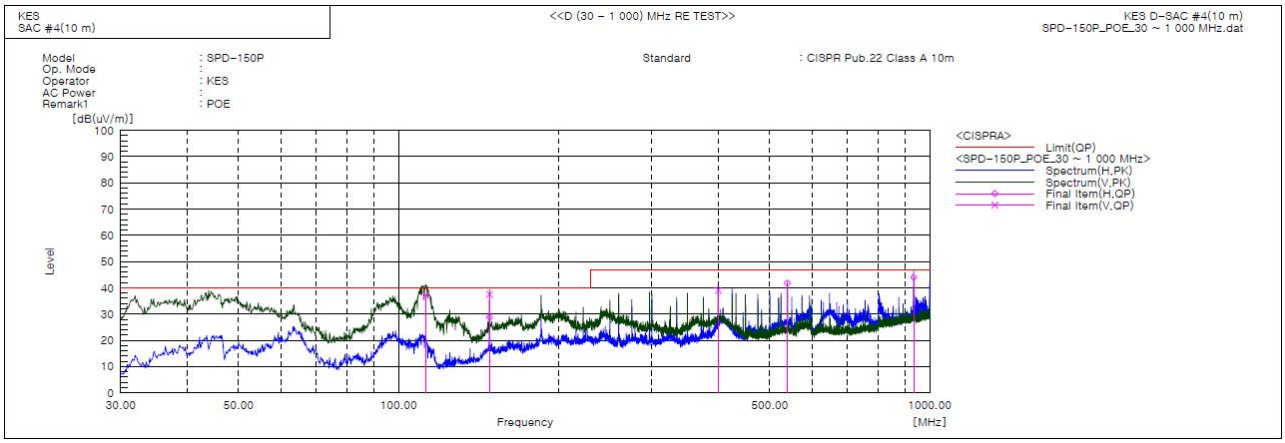
Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)]

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

- POE 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	112.571	V	66.8	-29.6	37.2	40.0	2.8	100.0	129.0	
2	148.461	H	60.2	-31.4	28.8	40.0	11.2	100.0	142.0	
3	148.483	V	68.9	-31.4	37.5	40.0	2.5	100.0	167.0	
4	400.055	V	59.2	-20.2	39.0	47.0	8.0	100.0	237.0	
5	539.978	H	57.8	-16.0	41.8	47.0	5.2	100.0	218.0	
6	933.070	H	53.2	-9.2	44.0	47.0	3.0	100.0	24.0	

♦ Calculation – SAC #4(10 m)

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

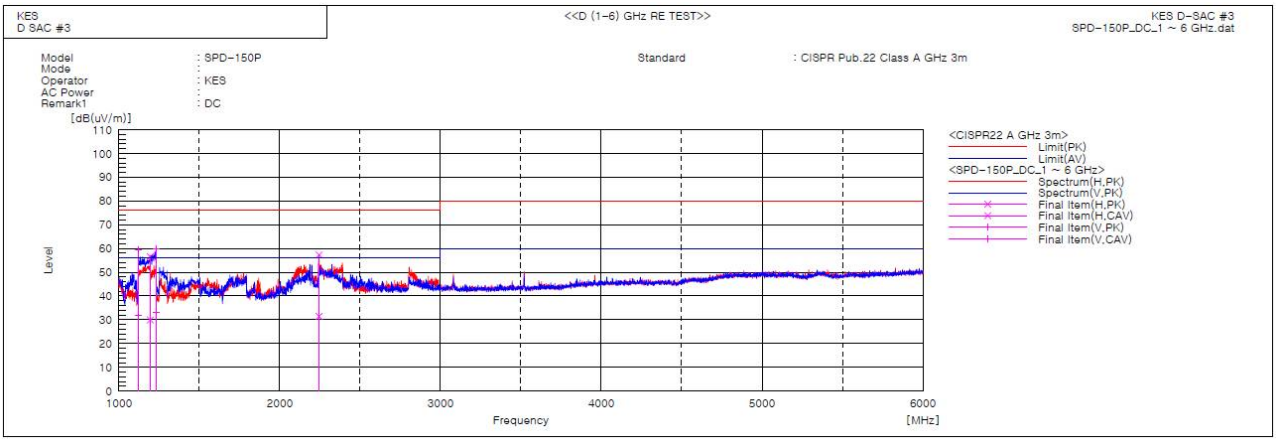
Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

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

Radiated Electric Field Emissions(Above 1 ㎓)

- AC / DC Adaptor Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1121.762	V	68.5	41.0	-9.1	59.4	31.9	76.0	56.0	16.6	24.1	100.0	24.0	
2	1194.610	H	65.2	38.5	-8.6	56.6	29.9	76.0	56.0	19.4	26.1	100.0	10.3	
3	1230.380	V	68.2	41.5	-8.3	59.9	33.2	76.0	56.0	16.1	22.8	100.0	20.4	
4	2244.850	H	57.7	31.8	-0.4	57.3	31.4	76.0	56.0	18.7	24.6	100.0	72.3	

♦ Calculation

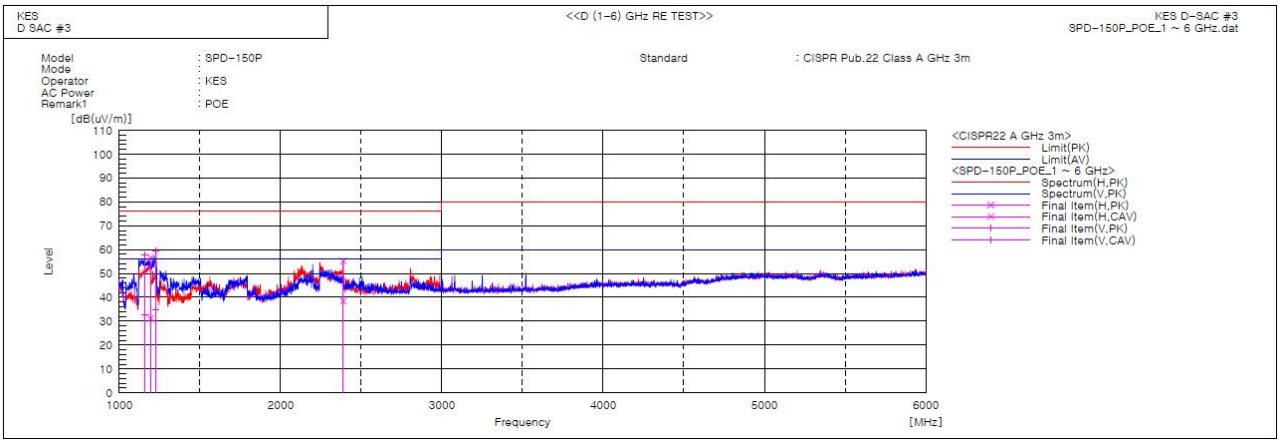
Result(PK/CAV) [dB(μV/m)] = (Reading(PK/CAV)[dB(μV)] + c.f[dB(1/m)]

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

- POE Mode



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1157.405	V	66.5	41.5	-8.8	57.7	32.7	76.0	56.0	18.3	23.3	100.0	19.6	
2	1195.581	H	65.2	39.8	-8.6	56.6	31.2	76.0	56.0	19.4	24.8	100.0	4.6	
3	1227.268	V	67.6	43.2	-8.3	59.3	34.9	76.0	56.0	16.7	21.1	100.0	11.5	
4	2389.372	H	55.1	38.3	0.1	55.2	38.4	76.0	56.0	20.8	17.6	100.0	50.5	

♦ 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

Harmonic Current Emissions and Voltage Fluctuations and Flicker

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	32.937E-3			
2	1.505E-3			PASS
3	25.277E-3	1.099	2.30	PASS
4	1.906E-3			PASS
5	25.925E-3	2.274	1.14	PASS
6	1.282E-3			PASS
7	26.215E-3	3.404	770.00E-3	PASS
8	1.314E-3			PASS
9	24.573E-3	6.143	400.00E-3	PASS
10	1.388E-3			PASS
11	23.535E-3	7.132	330.00E-3	PASS
12	1.296E-3			PASS
13	22.643E-3	10.782	210.00E-3	PASS
14	1.400E-3			PASS
15	21.394E-3	14.263	150.00E-3	PASS
16	1.220E-3			PASS
17	20.273E-3	15.318	132.35E-3	PASS
18	1.156E-3			PASS
19	18.989E-3	16.035	118.42E-3	PASS
20	1.160E-3			PASS
21	17.530E-3	10.908	160.71E-3	PASS
22	1.109E-3			PASS
23	16.091E-3	10.966	146.74E-3	PASS
24	1.133E-3			PASS
25	14.723E-3	10.906	135.00E-3	PASS
26	1.030E-3			PASS
27	13.421E-3	10.737	124.99E-3	PASS
28	1.102E-3			PASS
29	11.762E-3	10.106	116.39E-3	PASS
30	979.521E-6			PASS
31	10.426E-3	9.576	108.87E-3	PASS
32	956.385E-6			PASS
33	9.213E-3	9.008	102.27E-3	PASS
34	1.034E-3			PASS
35	7.666E-3	7.950	96.44E-3	PASS
36	910.063E-6			PASS
37	6.581E-3	7.215	91.21E-3	PASS
38	970.174E-6			PASS
39	5.395E-3	6.234	86.53E-3	PASS
40	927.150E-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.

Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	33.106E-3			
2	1.992E-3			PASS
3	26.008E-3	0.754	3.45	PASS
4	2.278E-3			PASS
5	26.101E-3	1.526	1.71	PASS
6	1.503E-3			PASS
7	26.425E-3	2.288	1.15	PASS
8	1.559E-3			PASS
9	24.816E-3	4.136	600.00E-3	PASS
10	1.629E-3			PASS
11	23.835E-3	4.815	495.00E-3	PASS
12	1.531E-3			PASS
13	22.765E-3	7.227	315.00E-3	PASS
14	1.639E-3			PASS
15	21.521E-3	9.565	225.00E-3	PASS
16	1.501E-3			PASS
17	20.371E-3	10.261	198.52E-3	PASS
18	1.402E-3			PASS
19	19.085E-3	10.744	177.63E-3	PASS
20	1.407E-3			PASS
21	17.626E-3	10.968	160.71E-3	PASS
22	1.342E-3			PASS
23	16.180E-3	11.026	146.74E-3	PASS
24	1.361E-3			PASS
25	14.815E-3	10.974	135.00E-3	PASS
26	1.265E-3			PASS
27	13.531E-3	10.825	124.99E-3	PASS
28	1.321E-3			PASS
29	11.858E-3	10.189	116.39E-3	PASS
30	1.135E-3			PASS
31	10.514E-3	9.657	108.87E-3	PASS
32	1.136E-3			PASS
33	9.353E-3	9.146	102.27E-3	PASS
34	1.200E-3			PASS
35	7.794E-3	8.082	96.44E-3	PASS
36	1.062E-3			PASS
37	6.691E-3	7.335	91.21E-3	PASS
38	1.131E-3			PASS
39	5.533E-3	6.393	86.53E-3	PASS
40	1.087E-3			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.

Test Data - Voltage Fluctuations

Maximum Flicker results

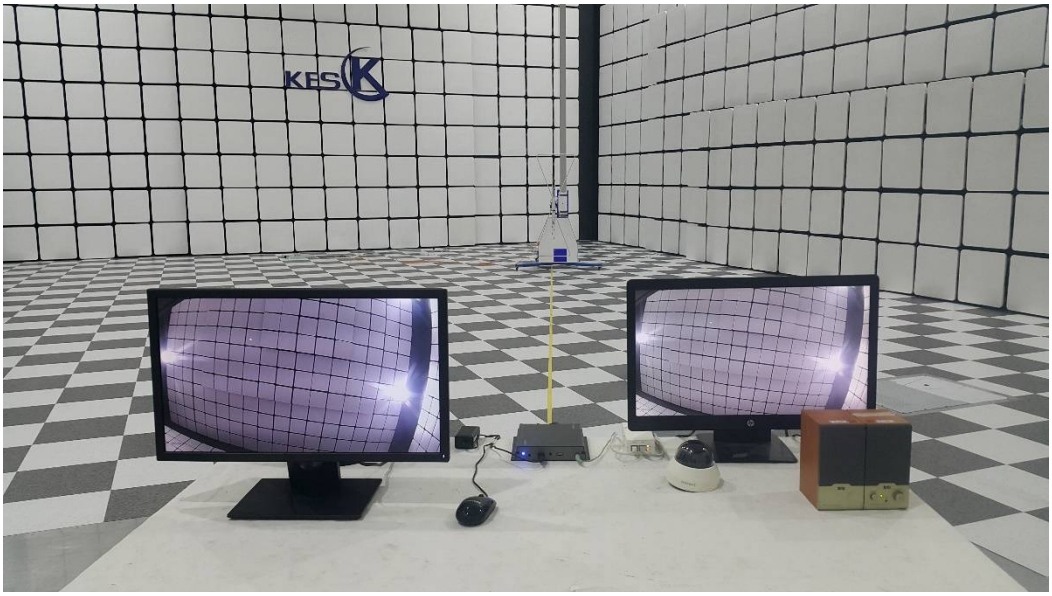
	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.033	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Test Setup Photos and Configuration

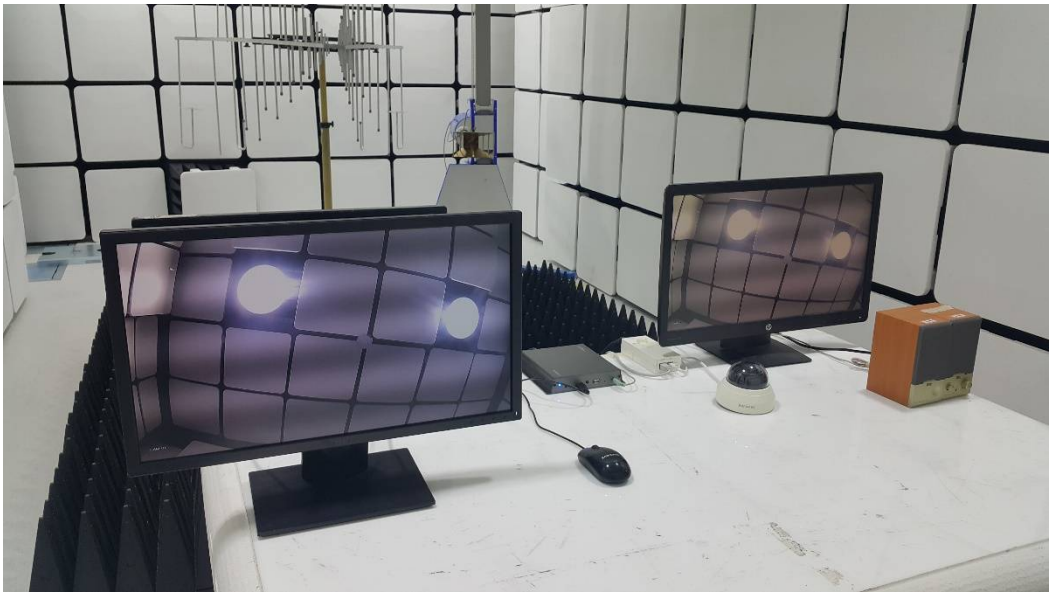
Conducted Voltage Emissions

Conducted Telecommunication Emissions

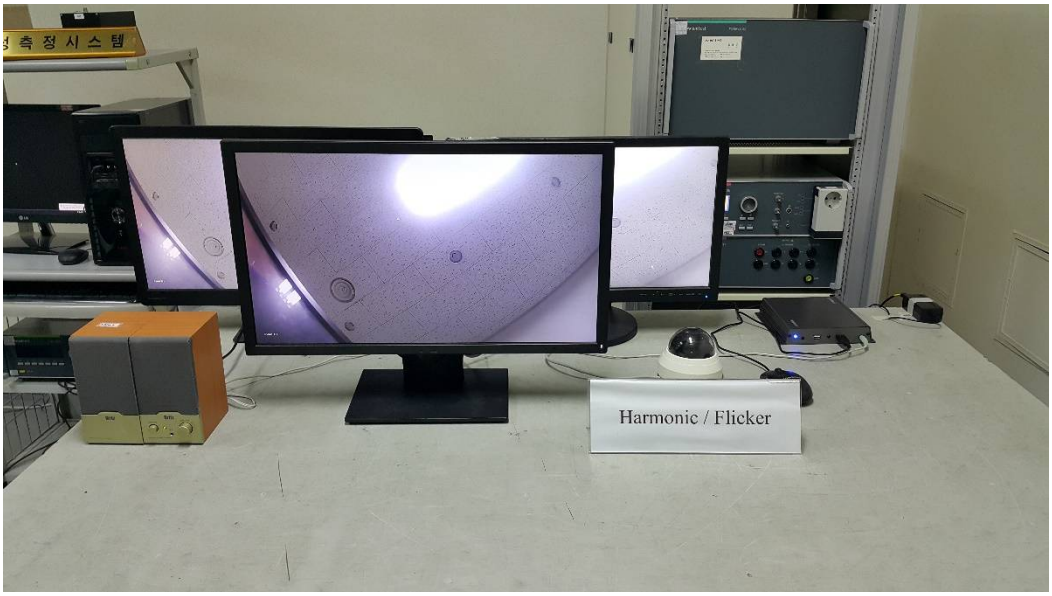
Radiated Electric Field Emissions(Below 1 ㎓)



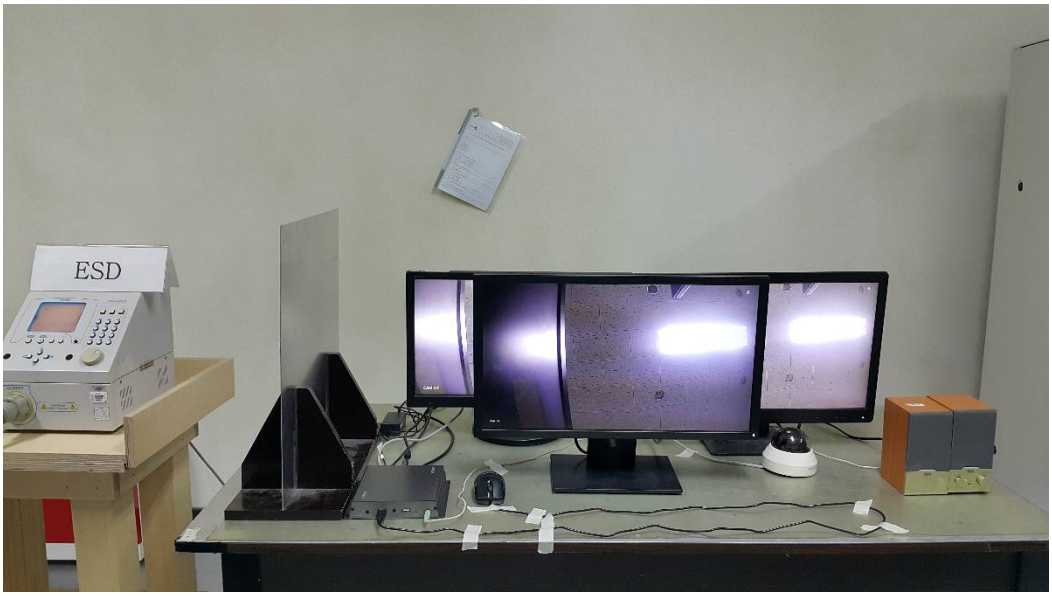
Radiated Electric Field Emissions(Above 1 ㎓)



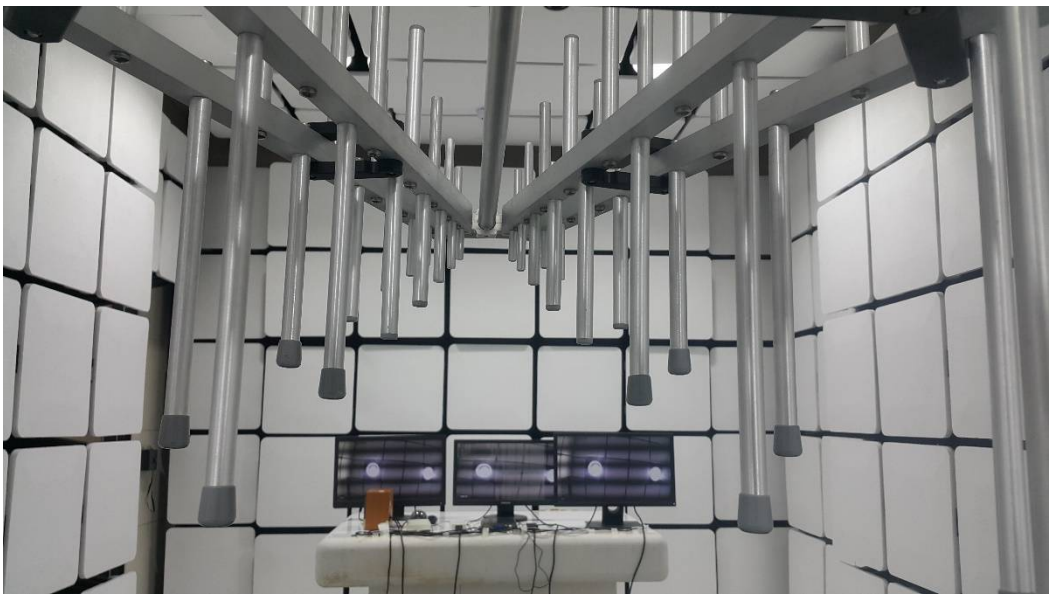
Harmonic Current Emissions and Voltage Fluctuations and Flicker



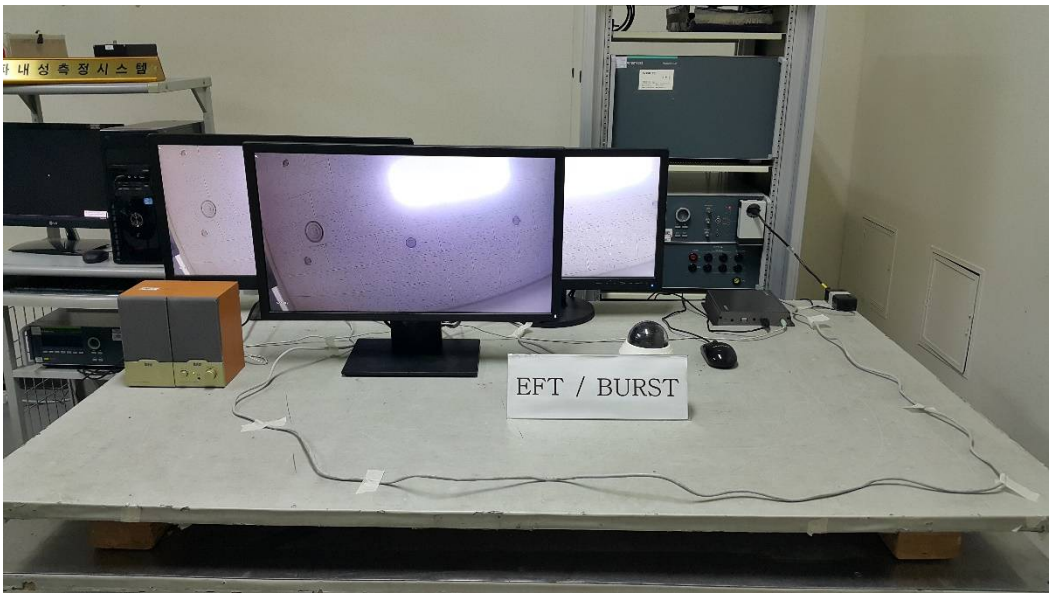
Electrostatic Discharge

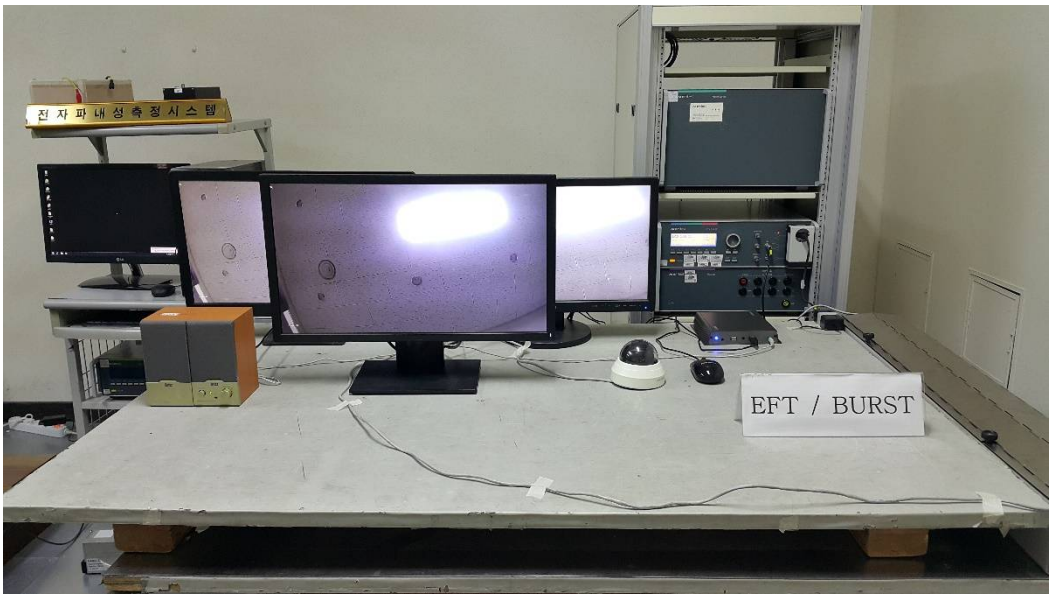


Radiated Electric Field Immunity



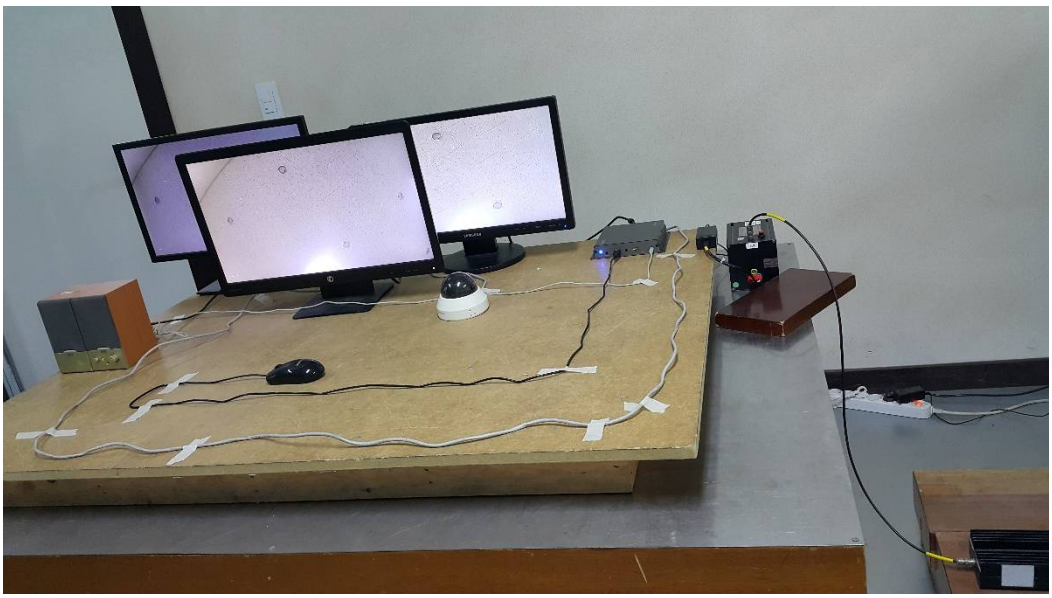
Electrical Fast Transients/Bursts





Surge Transients

Conducted Disturbance



Voltage Dips and Short Interruptions

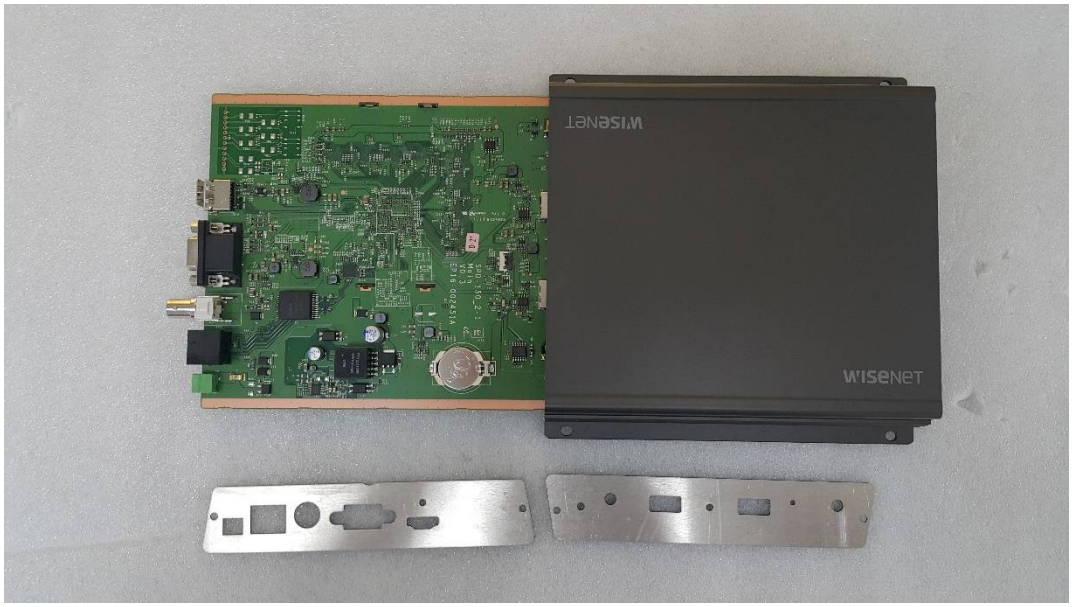
EUT External Photographs

(Top)

(Bottom)

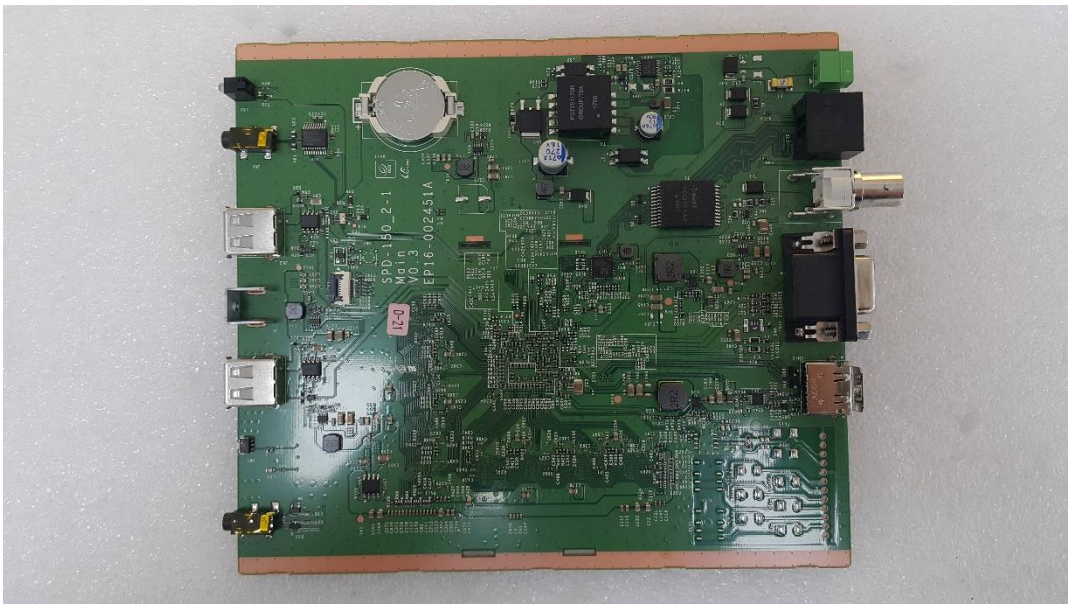
EUT Internal Photographs

(Internal View)

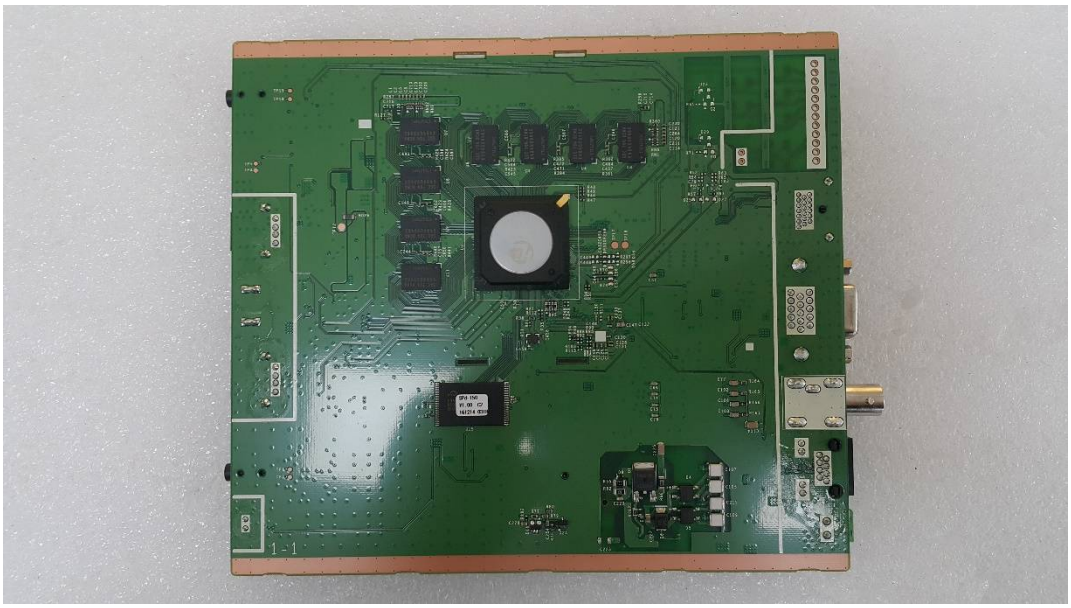


EUT Internal View – Board

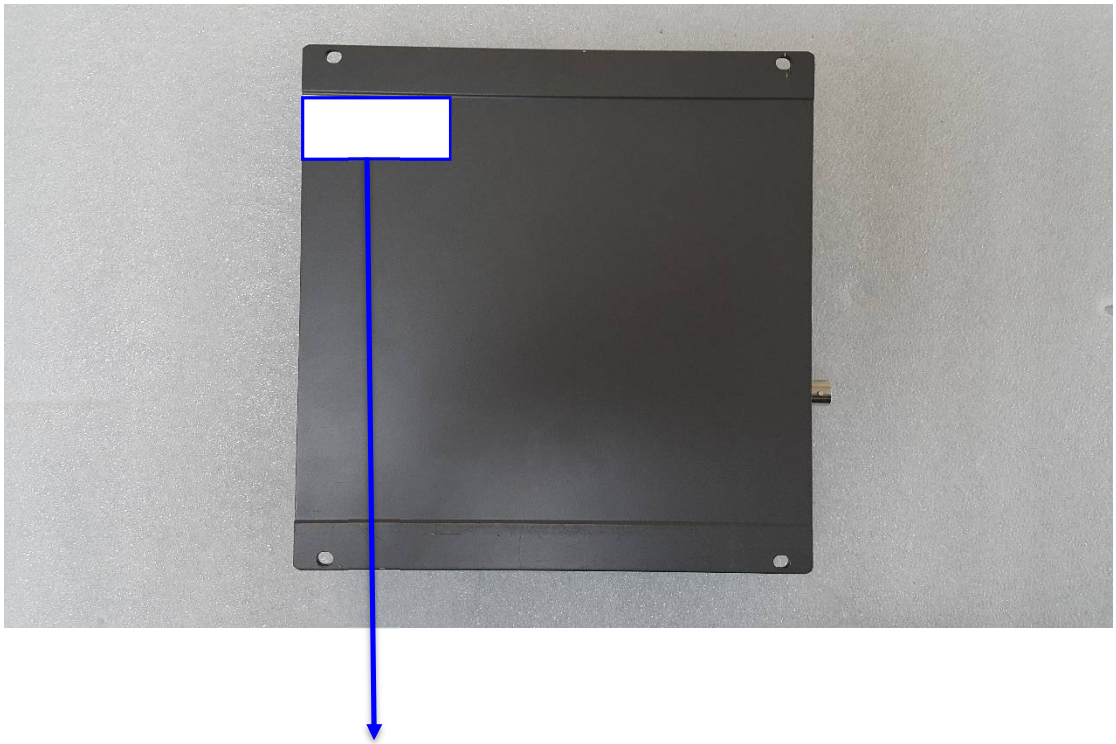
(Top)



(Bottom)



Label and Location



DECORDER

Model No : SPD-150P

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

Made in China