



EMC TEST REPORT For IC

Test Report No. : KES-E1-17T0438
Date of Issue : Jul. 12, 2017
Product name : DVR
Model/Type No. : HRD-440N
Variant Model : -
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 1204, Changwon-daero, Seongsan-gu Changwon-si,
Gyeongsangnam-do, Korea
Manufacturer : Hanwha Techwin (Tianjin) Co., Ltd
Manufacturer Address : No.11 Weiliu Rd, Micro-Electronic Industrial
Park, TEDA, Tianjin, 300385, People's Republic of China.
Date of Receipt : Jun. 20, 2017
Test date : Jul. 04, 2017 – Jul. 06, 2017
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-E1-17T0438
Page (2) of (29)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Jul. 12, 2017	KES-E1-17T0438	Issued

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TABLE OF CONTENTS

1.0	General Product Description.....	4
1.1	Test Voltage & Frequency	6
1.2	Variant Model Differences.....	6
1.3	Device Modifications	6
1.4	Equipment Under Test.....	6
1.5	Support Equipments	7
1.6	External I/O Cabling	8
1.7	EUT Operating Mode(s)	8
1.8	Configuration.....	9
1.9	Calibration Details of Equipment Used for Measurement	10
1.10	Test Facility	10
1.11	Laboratory Accreditations and Listings	10
2.0	Test Regulations.....	11
2.1	Conducted Emissions Mains Power Ports.....	13
2.2	Radiated Electric Field Emissions(Below 1 GHz)	14
2.3	Radiated Electric Field Emissions(Above 1 GHz)	15
APPENDIX A – TEST DATA.....		16
Conducted Emissions at Mains Power Ports.....		16
Radiated Electric Field Emissions(Below 1 GHz)		18
Radiated Electric Field Emissions(Above 1 GHz).....		19
Test Setup Photos and Configuration		23
Conducted Voltage Emissions		23
Radiated Electric Field Emissions(Below 1 GHz)		24
Radiated Electric Field Emissions(Above 1 GHz).....		25
EUT External Photographs.....		26
EUT Internal Photographs		27

1.0 General Product Description

Main Specifications of EUT are:

HRD-440		
Video	Inputs	4channel BNC : AHD(2MP, 4MP), HDTV(Only 2MP), HDCVI(Only 2MP), NTSC/PAL
	Resolution	2560x1440, 2048x1536, 1920 x 1080, 1280 x 720, 960 x 480, 704 x 480 / 960 x 576, 704 x 576
Live	Frame rate	120fps, 100fps
	Resolution	2560x1440, 2048x1536, 1920 x 1080, 1280 x 720, 960 x 480, 704 x 480, 960 x 576, 704 x 576
	Multi Screen display	1/4/PI/Sequence
Performance		
Operating System	Embedded	Linux
Recording	Compression	H.264, Wisestream
	Record Rate(Analog)	NTSC : Up to 60fps@4MP / PAL : Up to 50fps@4MP
		NTSC : Up to 120fps@1920 x 1080 / PAL : Up to 100fps@1920 x 1080
		NTSC : Up to 120fps @ 1280 x 720, 928x480, 704x480, 704x240, 352x240 PAL: Up to 100fps @ 1280 x 720, 928x576, 704x576, 704x288, 352x288
	Mode	Manual, Schedule (Continuous/Event), Event(Pre/Post), Time lapse (1~30 fps(N), 1~25fps(P))
	Event	Video Loss, Motion(Level 1~10), Alarm Input(4), Tampering(Level Low,Medium, High)
	Overwrite modes	Continuous
	Pre-alarm	Up to 30 sec (5,10,20,30 Sec)
	Post-Alarm	Up to 6 hour (5,10,20,30 sec,1,3,5,10,20 min,1,2,3,4,5,6 hour)
Search & Playback	Search mode	Date/time, Event, Back up, POS(SD Signal only), Motion (※ All Search Included Preview Function)
	Playback function	Fast Forward/Backward (x2,x4,x8,x16,x32,x64, x256) ※Backward Play with I-frame Only, Slow Forward/Backward (x1/2,x1/4,x1/8) Step Forward/Backward ※ Backward Play with I-frame Only
	Simultaneous playback	4CH(Local Monitor, CMS)
Network(IPv4)	Transmission speed	Record(Main) Stream) 4MP : 15fps/CH, 3MP : 18fps/CH, 1080p/720p/WD1/4CIF/CIF : 30fps/CH(N), 25fps/CH(P) Network(Sub) Stream) WD1/4CIF : 12fps/CH, 2CIF/CIF/QVGA/QCUF : 30fps/CH(N), 25fps/CH(P)
	Transmission Bandwidth	Up to 64Mbps
	Bandwidth control	Selectable
	Stream	Record Stream and Network Stream Selectable (at monitoring Viewer)
	Remote users Maximum	Search(3)/Live Unicast(10)/Live Multicast(20)
	Protocol support	TCP/IP,DHCP,PPPoE,SMTP,NTP,HTTP,DDNS,RTP,RTSP,SNMP SUNAPI
	OS	Supported OS : Windows 7, 8, 10, Mac OS X 10.9, 10.10, 10.11
	Web Browser	- Plug-in free web viewer Supported web browsers : Google Chrome 47, MS Edge 20
		- Plug-in Webviewer Supported web browsers : MS Explorer 11, Mozilla Firefox 43, Apple Safari 9 ※ Mac OS X only
	Viewer Software	SSM, Webviewer, SmartViewer, iPOLiS mobile viewer, WiseNet Mobile (~Apr. 2017)
Smart phone	Platform	Android, iOS
	Protocol support	RTP, RTSP, HTTP, CGI(SUNAPI)
	Control	Live(8ch) : Multi-Profile Support Playback(1ch) Event push



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Test report No.:
KES-E1-17T0438
Page (5) of (29)

	Remote users Maximum	Search (3), Live Unicast (10), Multicast (20)
Storage	Internal	1 SATA HDDs (0~6TB HDD)
	External (e-SATA Interface)	USB(for Backup)
	File Format (Back-up)	BU(DVR Player), SEC(Include Player), AVI
Security	Password Protection	1 Admin, 10 Group, 10 User per 1 Group
	Data Authentication	Watermark
Easy Configuration Interface	Easy Configuration	P2P (TUTK) (Jun. 2017 ~)
Monitors	VGA	1 VGA (1920x1080, 1280x1024, 1280x720)
	HDMI	1 HDMI (4K(3840 x 2160), 2K(2560 x 1440), 1920x1080, 1280x1024, 1280x720)
	Composite(Spot)	BNC(1CH) * Included OSD On Screen, Multi mode Support
	Loop Outputs	-
Audio	Inputs/Output	1CH line in / 1CH line out
	Compression	G.711
	Sampling rate	8KHz
Alarm	Inputs/Outputs	Terminal 4 Inputs (NO/NC) / Terminal 1 relay Outputs (NO/NC)
	Remote notification	Notification via e-mail
Connections	Ethernet	1 RJ45 10/100/1000 Base-T
	Serial interface	RS-485(Half Duplex) for PTZ, Samsung System Keyboard
	USB	1 ports(USB 3.0, Rear), 1 ports(USB 2.0, Front)
	e-SATA	N/A
	Application Support	Mouse, IR Remocon
	Protocol support(RS-485)	Samsung-E/Samsung-T/Pelco-D/Pelco-p/Panasonic/ Phillips/ AD/ DIAMOND/ ERNA/ KALATEL/ VCL TP/VICON/ ELMO/GE
	Protocol support(Coaxial)	NTSC/PAL : Pelco-C (Coaxitron) AHD : ACP(AHD Coax Protocol)
General		
Electrical	Input Voltage/Current	DC12V Adaptor(100~250V AC ±10% , 50/60Hz)
	Power consumption	Max. 36W (1x1T HDD)
Environmental	Operating Temperature/Humidity	+0°C to +40°C (+32°F to +104°F) / 20% to 85% RH
Mechanical	Dimension (W x H x D)	W300x H 48x D 208.7
	Weight (with hard disks)	Approx. 1.79Kg
Language	GUI	English, French, German, Spanish, Italian, Russian, Polish, Czech, Turkish, Netherlands Portuguese, Swedish, Danish, Rumania, Serbia, Croatia, Hungary, Greek, Finnish, Norwegian, Korean, Japanese, Chinese(Traditional), Thai, Taiwanese(25 Language)
	Web Browser	English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian, Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese(Simplified), Japanese, Thai (23 Language)

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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 ☐ 230 Vac ☒ 120 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
DVR	HRD-440N	-	Hanwha Techwin (Tianjin) Co.,Ltd	E.U.T
Switching Power Adapter	FSP040-RHAN2	-	FSP GROUP INC.	E.U.T



1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	LG15N54	410NZGK015231	LG	-
Notebook Adapter	ADP-90WH B	84ZW19F1663	DELTA ELECTRONICS(JIANGSU) LTD.	-
Monitor1	SMT-2232	C95V67VF900025B	Weihai Daewoo Electronics Co., Ltd.	-
Monitor2	24M47VQ	702NTQDA3604	LG	-
Monitor Adapter2	ADS-40FSG-19 19025GPG-1	EAY62768621	Shenzhen Honor Electronic Co., Ltd.	-
Monitor3	W2261VT	005NDCRDV451	LG Electronics NanJing Display Co., Ltd	-
Mouse	-	-	-	-
Speaker	SB-700Plus	-	WEMA INT	-
Alarm1	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Alarm2	-	-	-	-
CAMERA	SDH-C74041- CAM	-	Hanwha Techwin	-
CAMERA Adapter	FSP060-DIBAN2	-	FSP GROUP INC.	-
USB Memory	SDCZ73	-	SANDISK	

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
DVR (E.U.T)	BNC	Monitor1	VIDEO IN	3.2	U
	D-SUB	Monitor2	D-SUB	1.6	U
	HDMI	Monitor3	HDMI	1.8	U
	RJ-45	Notebook	RJ-45	4.0	U
	VIDEO IN	CAMERA	VIDEO OUT	3.0	U
	AUDIO OUT	Speaker	AUDIO IN	1.9	U
	2PIN	Alarm1	-	3.1	U
	2PIN	Alarm2	-	3.1	U
	USB	USB Memory	-	-	-
	USB	Mouse	-	1.5	U

* Unshielded = U, Shielded = S

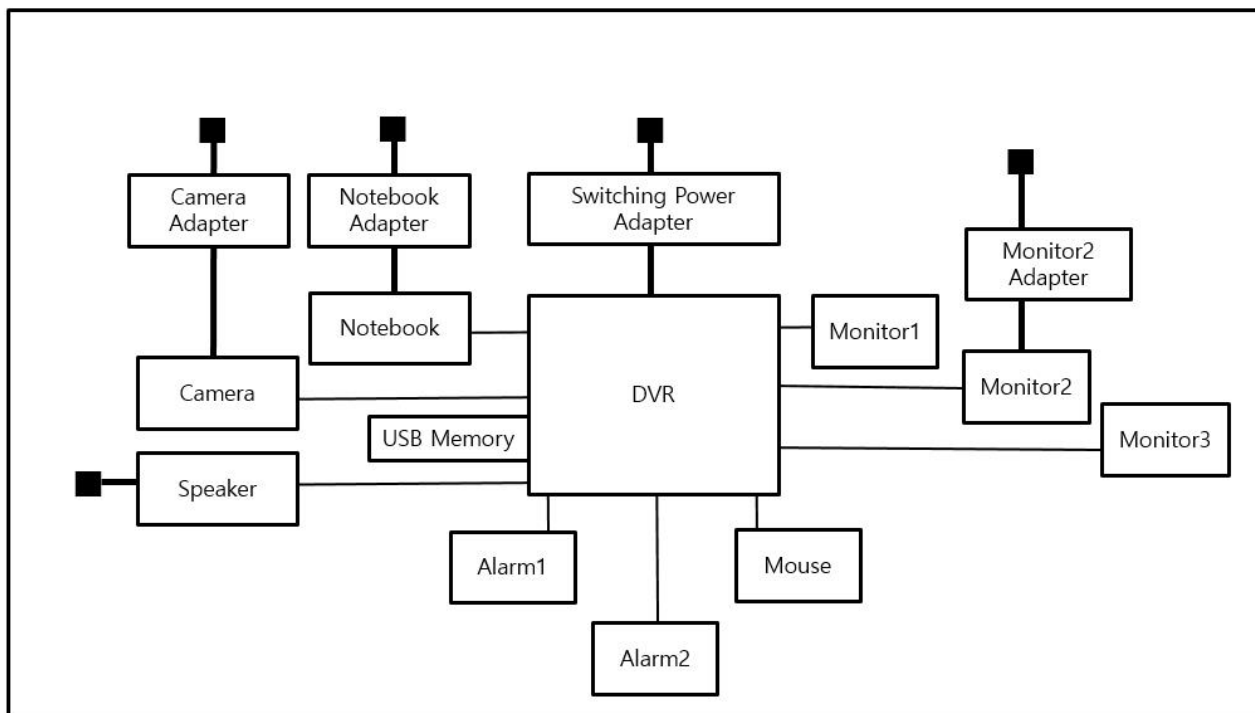
1.7 EUT Operating Mode(s)

Test mode	operating
Operating mode	E.U.T Monitoring, Ping Test

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

1.8 Configuration

■ AC Main
□ DC Main



1.9 Calibration Details of Equipment Used for Measurement

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

1.10 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

1.11 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 R-4308, C-4798, T-2311, G-914
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
KOREA	MSIP	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1
Europe	CE	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	KOLAS	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 61547 :2009

☐ EN 55032:2012

☐ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☐ EN 50130-4:2011 +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 Mains Power Ports

Test Date

Jul. 05, 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	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 11, 2018
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 13, 2017

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 47,2 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Jul. 04, 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	-	-	-	-
☒	EMI TEST RECEIVER	ESVS10	R & S	826008/014	04, 18, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018

Test Conditions

Temperature: 23,5 °C

Relative Humidity: 51,9.%

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.



2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Jul. 06, 2017

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, 19, 2018
☒	PREAMPLIFIER	8449B	AGILENT	3008A01729	05, 31, 2018
☒	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018

Test Conditions

Temperature: 22,2 °C

Relative Humidity: 43,9 %

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.

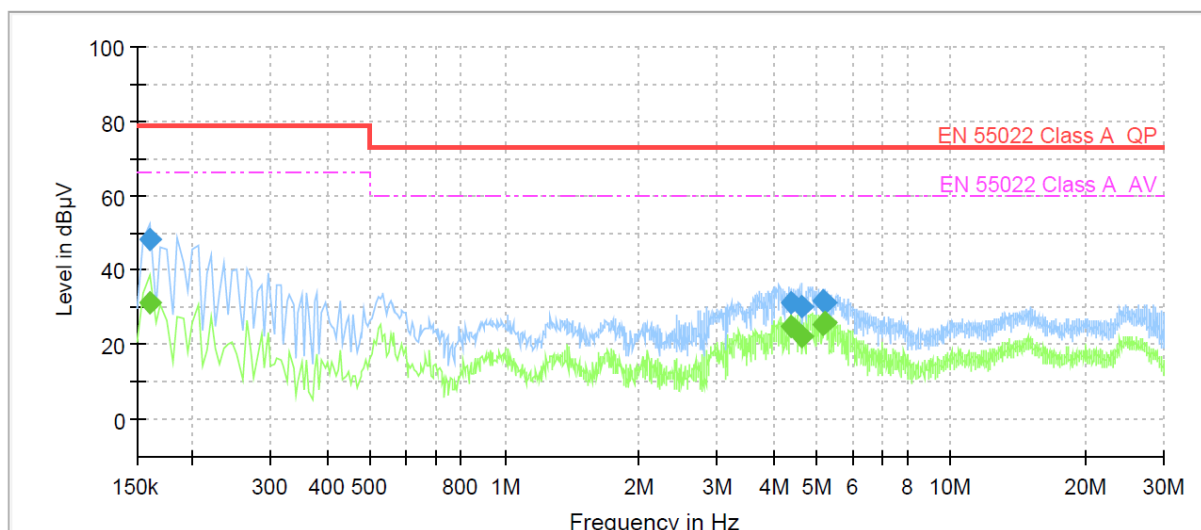
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	HRD-440N
Mode	AC120V60HZ_IC
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	---	31.44	66.00	34.56	1000.0	9.000	L1	20.9
0.160000	47.99	---	79.00	31.01	1000.0	9.000	L1	20.9
4.390000	---	24.66	60.00	35.34	1000.0	9.000	L1	19.7
4.390000	31.14	---	73.00	41.86	1000.0	9.000	L1	19.7
4.625000	---	22.41	60.00	37.59	1000.0	9.000	L1	19.7
4.625000	29.95	---	73.00	43.05	1000.0	9.000	L1	19.7
5.145000	---	25.58	60.00	34.42	1000.0	9.000	L1	19.7
5.145000	31.53	---	73.00	41.47	1000.0	9.000	L1	19.7
5.200000	---	26.03	60.00	33.97	1000.0	9.000	L1	19.7
5.200000	31.38	---	73.00	41.62	1000.0	9.000	L1	19.7

Calculation

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

QuasiPeak / CAverage : The Final Value

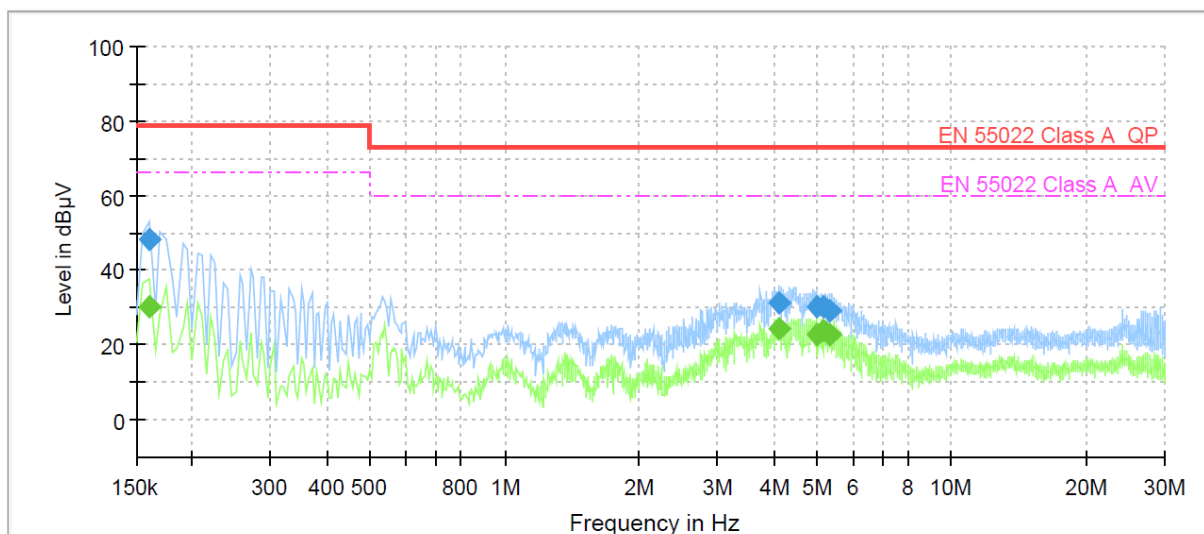
Reading Value : Not shown in the table.

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

[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: HRD-440N
Mode: AC120V60HZ_IC
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	---	30.07	66.00	35.93	1000.0	9.000	N	20.9
0.160000	48.04	---	79.00	30.96	1000.0	9.000	N	20.9
4.105000	---	24.56	60.00	35.44	1000.0	9.000	N	19.7
4.105000	31.34	---	73.00	41.66	1000.0	9.000	N	19.7
4.995000	---	22.77	60.00	37.23	1000.0	9.000	N	19.7
4.995000	30.25	---	73.00	42.75	1000.0	9.000	N	19.7
5.145000	---	24.11	60.00	35.89	1000.0	9.000	N	19.7
5.145000	30.37	---	73.00	42.63	1000.0	9.000	N	19.7
5.320000	---	22.73	60.00	37.27	1000.0	9.000	N	19.7
5.320000	29.17	---	73.00	43.83	1000.0	9.000	N	19.7

◆ 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))

Radiated Electric Field Emissions(Below 1 GHz)

Frequency	Amplitude	ANT	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin
[MHz]	[dB μ V]	Polar. (H/V)	[m]	ANT. [dB/m]	Cable [dB]	[dB μ V/m]	[dB μ V/m]	[dB]
41.88	8.30	V	1.00	12.39	1.57	22.26	40.00	17.74
249.95	18.40	H	4.00	12.49	3.69	34.58	47.00	12.42
296.99	20.80	H	4.00	13.36	4.08	38.24	47.00	8.76
499.97	14.00	H	2.00	17.35	5.20	36.55	47.00	10.45
742.59	11.70	H	1.00	20.22	6.67	38.59	47.00	8.41
932.00	13.90	H	1.73	23.48	7.50	44.88	47.00	2.12
1000.00	7.20	V	1.50	22.93	7.77	37.90	47.00	9.10

* H : Horizontal, V : Vertical

◆ Calculation

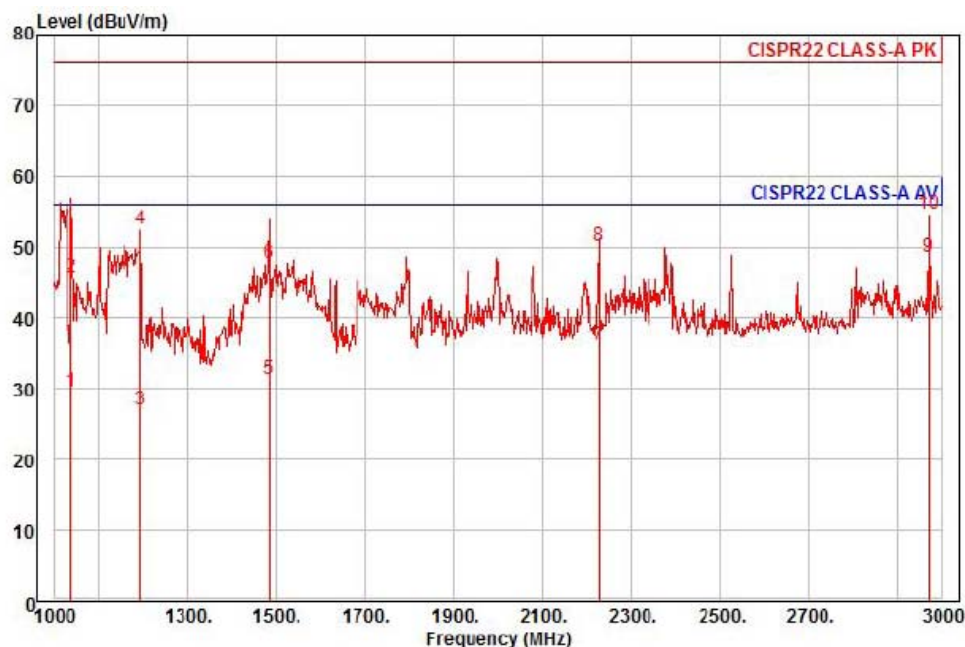
Result(QP) [dB(μ V/m)] = (Reading(QP)[dB(μ V)] + c.f[dB(1/m)])

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

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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

Radiated Electric Field Emissions(Above 1 GHz)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC120V 60HZ
Memo : (1 - 3)GHZ

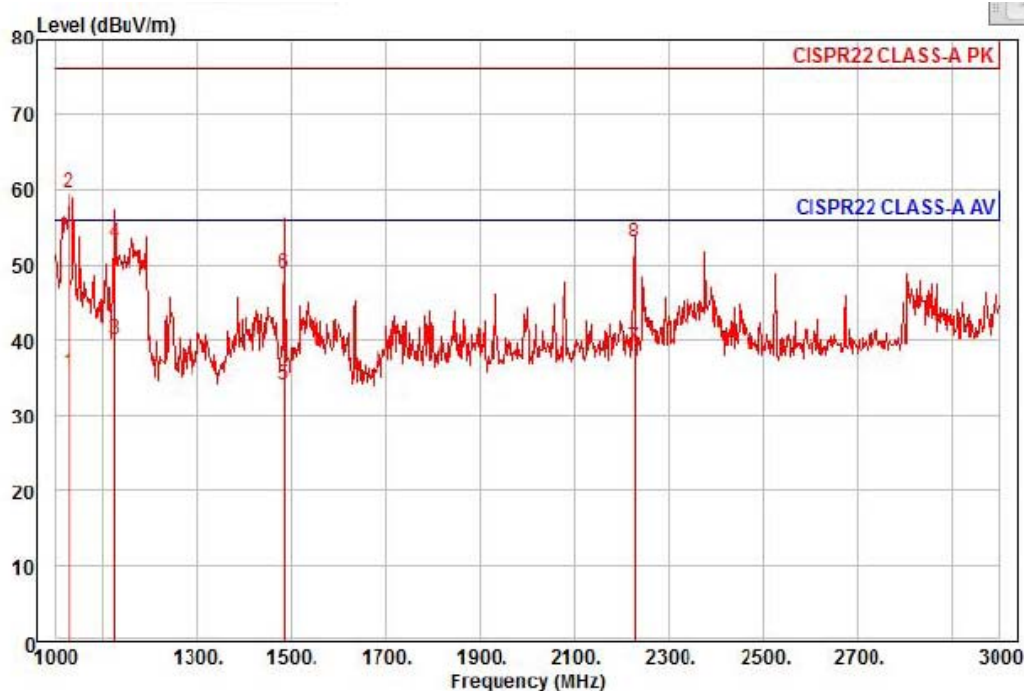
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1038.00	36.48	22.62	6.60	36.03	293	56.00	-26.33	horizontal	Average
2	1038.00	52.60	22.62	6.60	36.03	293	76.00	-30.21	horizontal	Peak
3	1194.00	32.75	23.09	7.12	35.89	39	56.00	-28.93	horizontal	Average
4	1194.00	58.12	23.09	7.12	35.89	39	76.00	-23.56	horizontal	Peak
5	1484.00	35.03	23.97	7.97	35.63	334	56.00	-24.66	horizontal	Average
6	1484.00	51.41	23.97	7.97	35.63	334	76.00	-28.28	horizontal	Peak
7	2228.00	34.81	26.70	9.87	35.26	25	56.00	-19.88	horizontal	Average
8	2228.00	48.83	26.70	9.87	35.26	25	76.00	-25.86	horizontal	Peak
9 pp	2970.00	42.96	29.61	11.63	35.55	36	56.00	-7.35	horizontal	Average
10 pk	2970.00	48.92	29.61	11.63	35.55	36	76.00	-21.39	horizontal	Peak

◆ Calculation

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

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC120V 60HZ
Memo : (1 - 3)GHZ

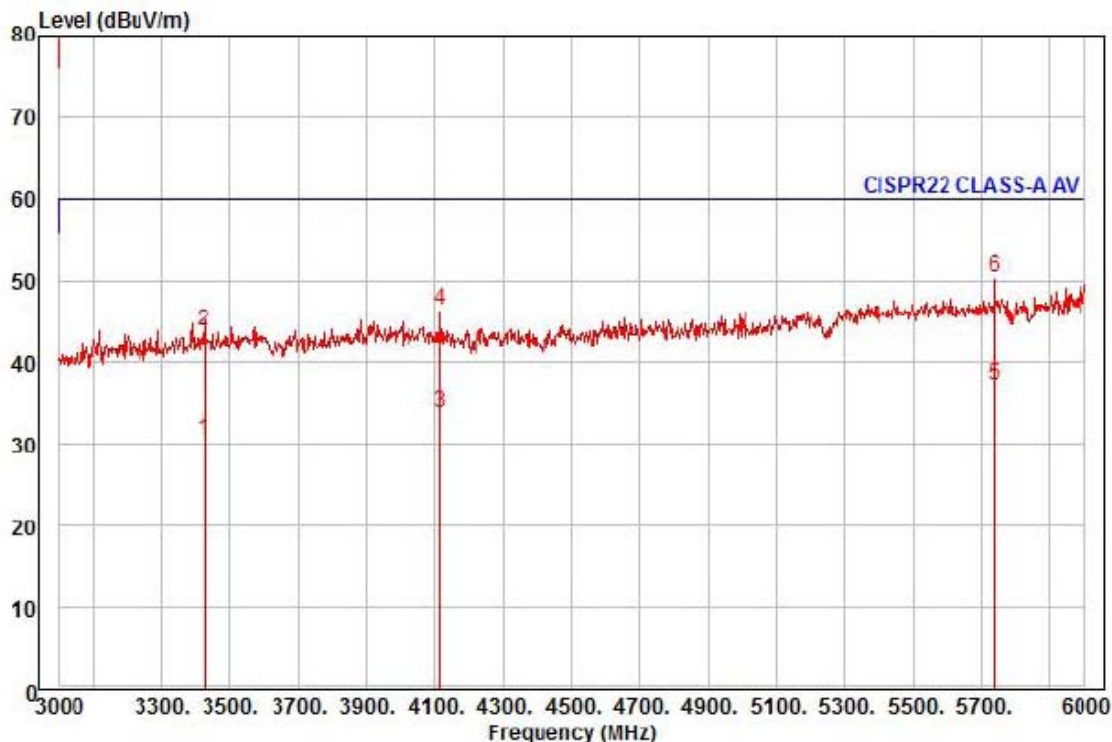
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1028.00	42.57	22.59	6.57	36.04	167	56.00	-20.31	vertical	Average
2 pk	1028.00	66.30	22.59	6.57	36.04	167	76.00	-16.58	vertical	Peak
3 pp	1124.00	46.28	22.88	6.89	35.95	206	56.00	-15.90	vertical	Average
4	1124.00	59.08	22.88	6.89	35.95	206	76.00	-23.10	vertical	Peak
5	1484.00	37.70	23.97	7.97	35.63	348	56.00	-21.99	vertical	Average
6	1484.00	52.62	23.97	7.97	35.63	348	76.00	-27.07	vertical	Peak
7	2228.00	37.64	26.70	9.87	35.26	6	56.00	-17.05	vertical	Average
8	2228.00	51.62	26.70	9.87	35.26	6	76.00	-23.07	vertical	Peak

◆ Calculation

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

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC120V 60HZ
Memo : (3 - 6)GHZ

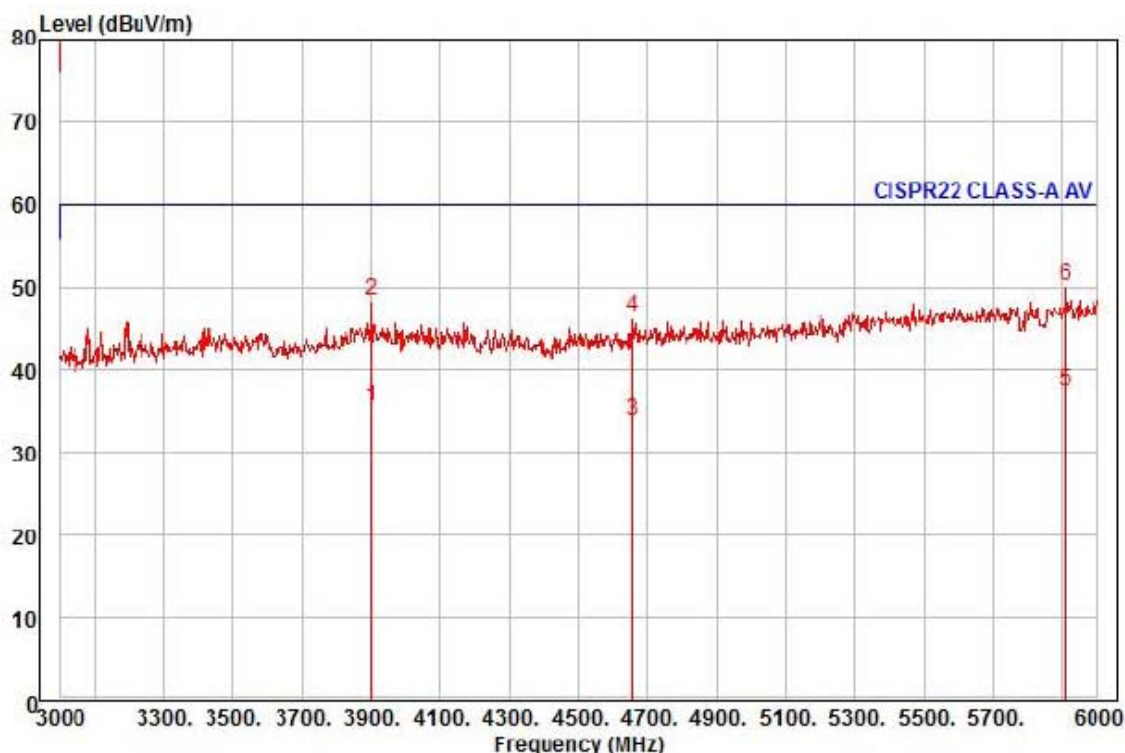
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3423.00	22.46	30.93	12.49	35.44	186	60.00	-29.56	horizontal	Average
2	3423.00	35.90	30.93	12.49	35.44	186	80.00	-36.12	horizontal	Peak
3	4116.00	22.81	32.47	13.78	35.32	189	60.00	-26.26	horizontal	Average
4	4116.00	35.57	32.47	13.78	35.32	189	80.00	-33.50	horizontal	Peak
5 pp	5739.00	20.55	35.73	16.59	35.67	245	60.00	-22.80	horizontal	Average
6 pk	5739.00	33.61	35.73	16.59	35.67	245	80.00	-29.74	horizontal	Peak

◆ Calculation

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

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC120V 60HZ
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	3900.00	25.29	32.23	13.37	35.31	226	60.00	-24.42	vertical	Average
2	3900.00	38.17	32.23	13.37	35.31	226	80.00	-31.54	vertical	Peak
3	4659.00	21.84	32.69	14.79	35.51	39	60.00	-26.19	vertical	Average
4	4659.00	34.48	32.69	14.79	35.51	39	80.00	-33.55	vertical	Peak
5 pp	5910.00	20.31	35.99	16.91	35.68	240	60.00	-22.47	vertical	Average
6 pk	5910.00	32.97	35.99	16.91	35.68	240	80.00	-29.81	vertical	Peak

◆ Calculation

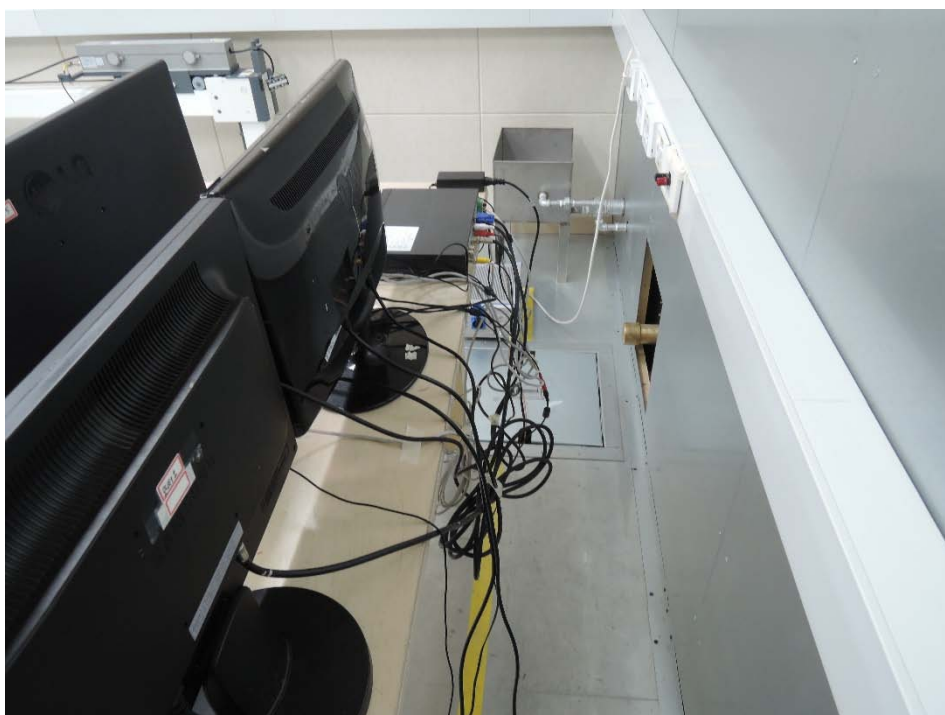
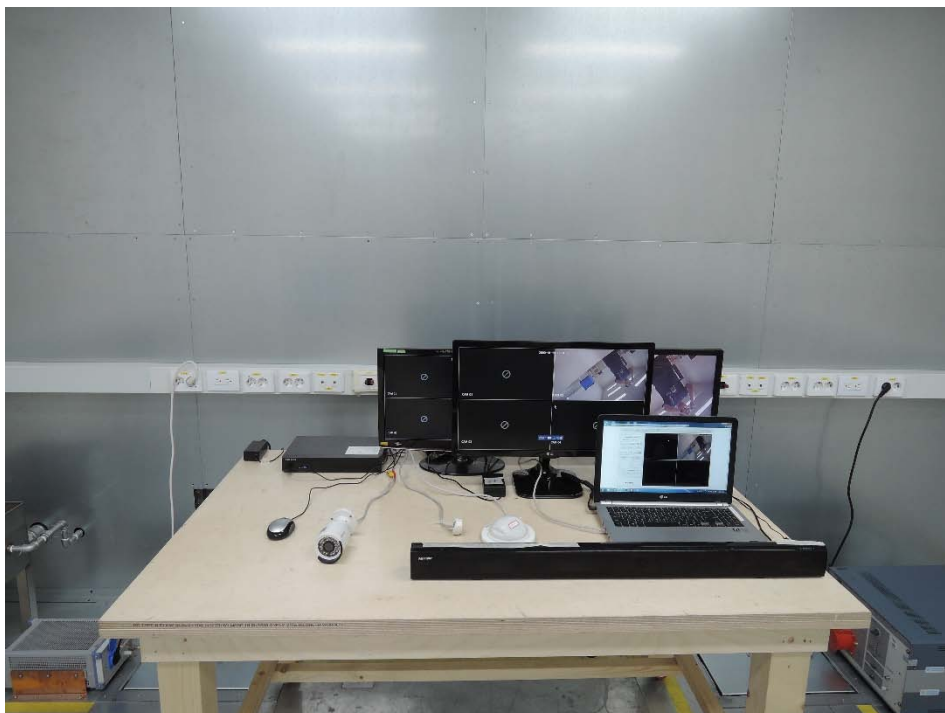
Over Limit [dB] = (Read Level[dBuV] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB])
- Limit Line[dBuV]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,

Cable Loss : Cable loss, Preamp Factor : Preamp Factor

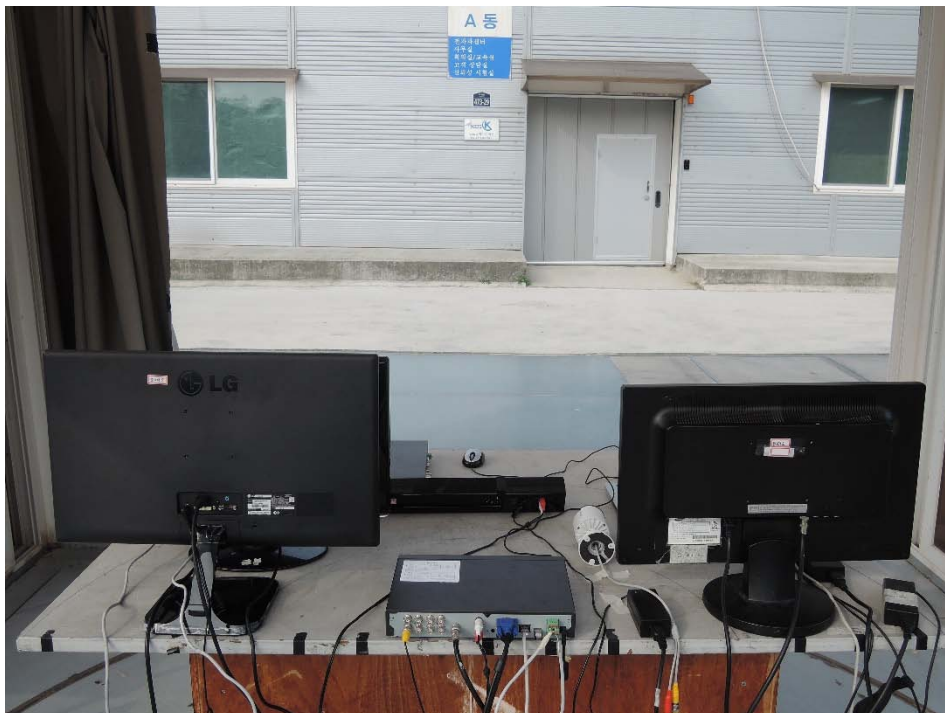
Test Setup Photos and Configuration

Conducted Voltage Emissions



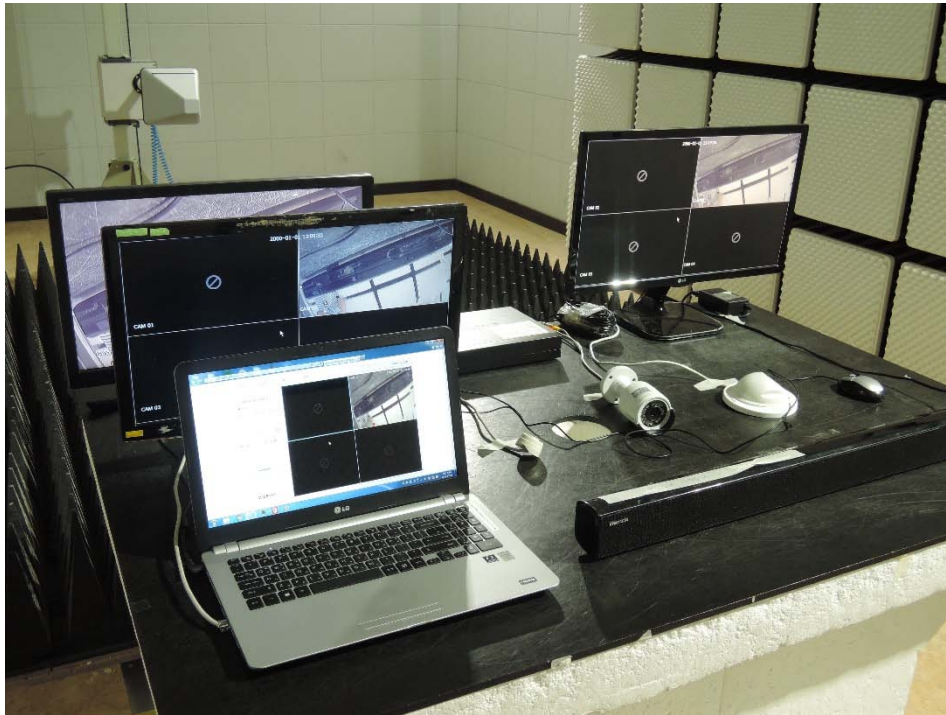
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

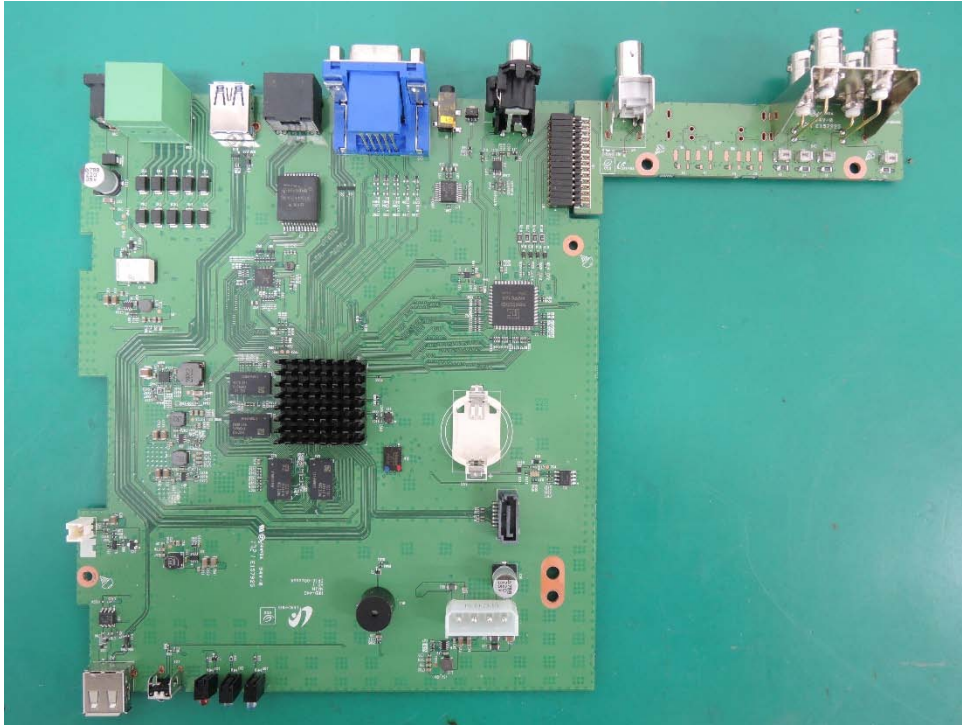
(Internal View)



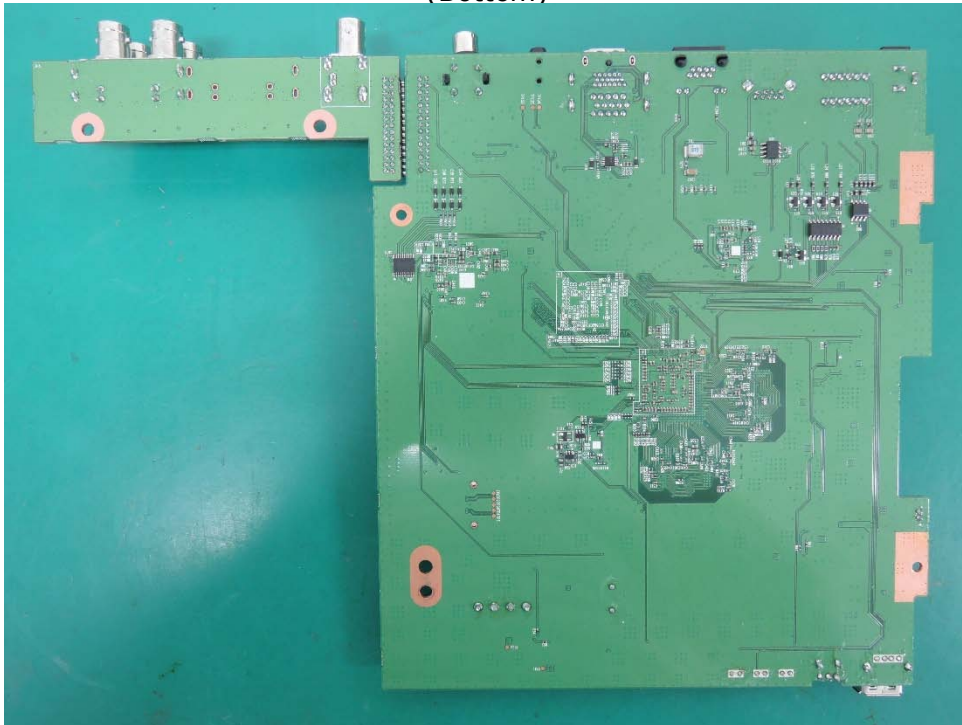
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EUT Internal View – Main Board

(Top)



(Bottom)



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Label Photographs



CAN ICES-3 (A)/NMB-3(A)

[LABEL VIEW]