EMC TEST REPORT For VCCI

Test Report No.	:	KES-E1-17T0436
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

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. 12, 2017	KES-E1-17T0436	Issued

TABLE OF CONTENTS

1.0 General Product Description

Main Specifications of EUT are:

		HRD-440
Video	Inputs	4channel BNC : AHD(2MP, 4MP), HDTVI(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//PIP/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

	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	**Easy Configuration**	**P2P (TUTK) (Jun. 2017 ~)**
Interface		
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 Supoort	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
Lauguage	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)

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 ☒ 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
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

1.7 EUT Operating Mode(s)

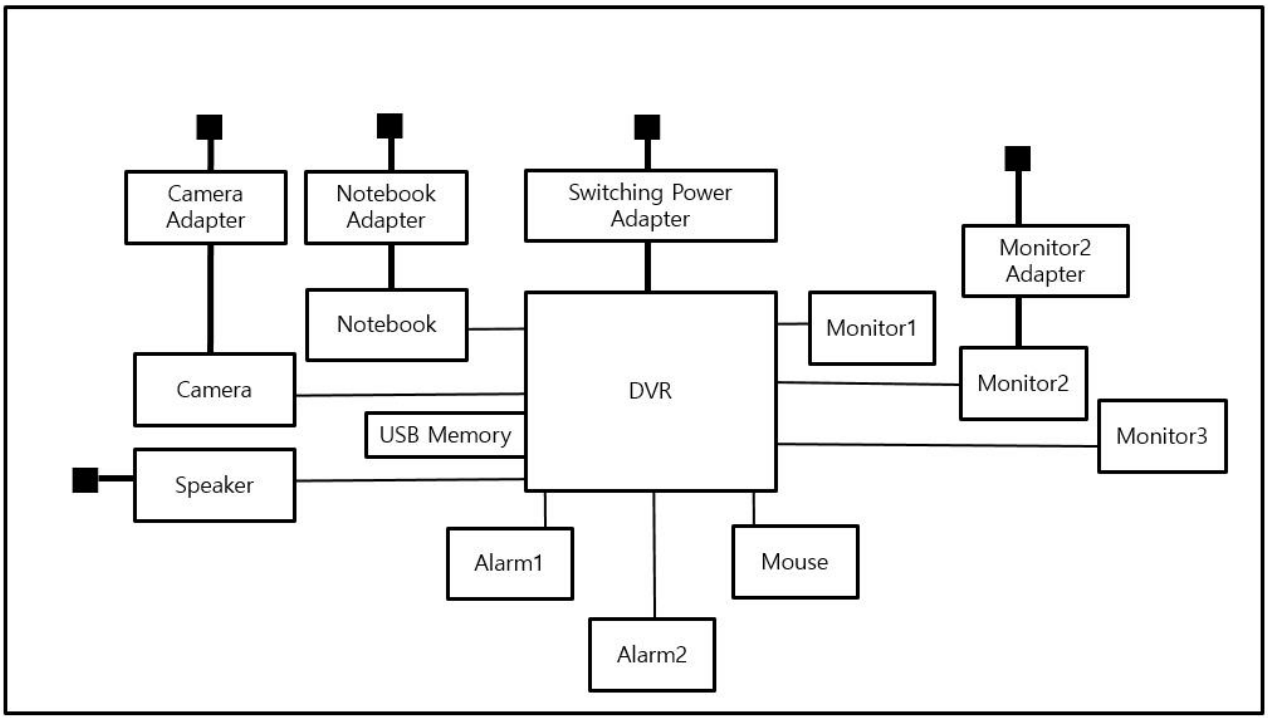
Test mode	operating
Operating mode	E.U.T Monitoring, Ping Test

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

1.8 Configuration

■ AC Main
□ DC Main

- DC 12 V Mode



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.	
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)	KOREA LABORATORY ACCREDITATION SCHEME KOLAS TESTING NO. 489

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 55032:2015 ☐ 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 ℃
Relative Humidity: 47,2 %

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.

2.2 Conducted Emissions at Telecommunication 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
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	08, 11, 2017
☒	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	08, 11, 2017

Test Conditions
Temperature: 22,6 ℃
Relative Humidity: 47,2 %

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. 04, 2017

Test Location
☒ OPEN AREA TEST SITE #1 ☐ OPEN AREA TEST SITE #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	-	-	-	-
☒	EMI TEST RECEIVER	ESVS10	Rohde & Schwarz	826008/014	04, 18, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	04, 14, 2018

Test Conditions
Temperature: 22,4℃
Relative Humidity: 65,0 %

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. 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 ℃
Relative Humidity: 43,9 %

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.

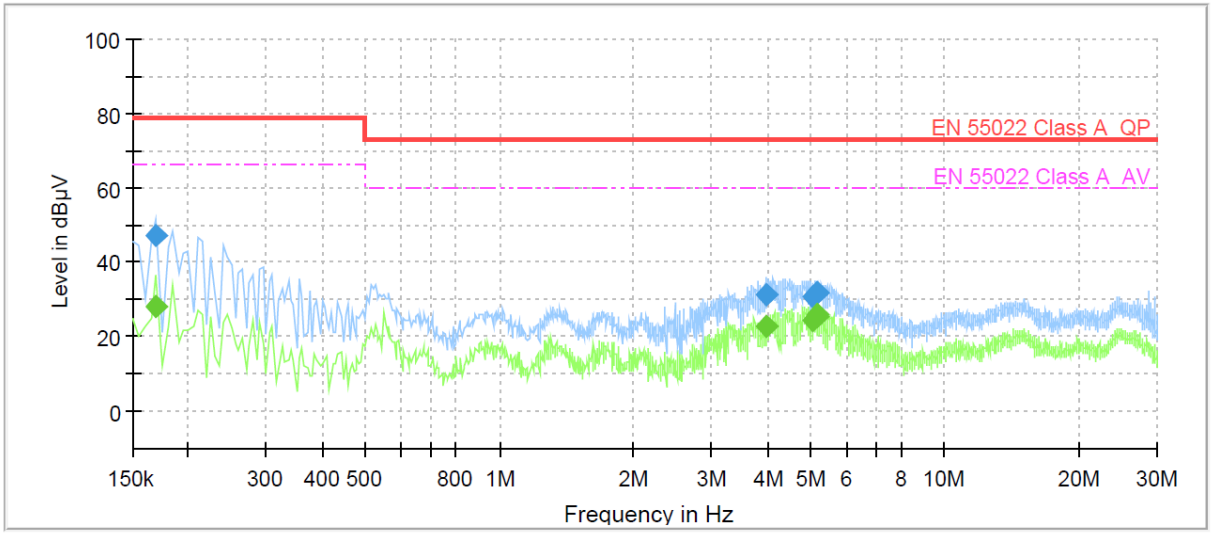
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	HRD-440N
Mode	AC100V50HZ
Operator Name:	KES



Final_Result

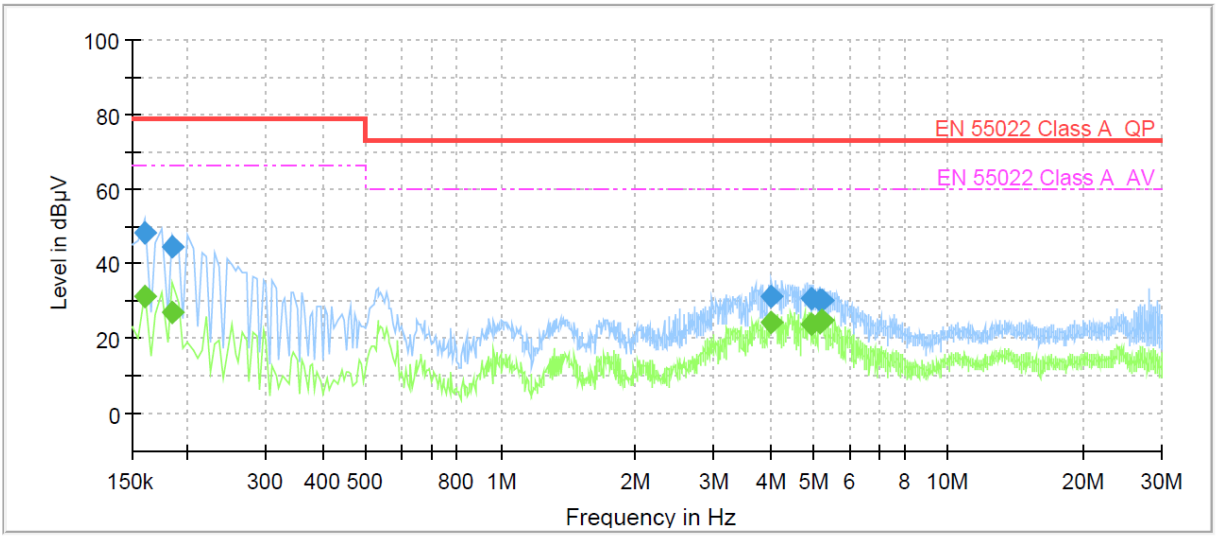
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.170000	---	27.84	66.00	38.16	1000.0	9.000	L1	20.8
0.170000	47.32	---	79.00	31.68	1000.0	9.000	L1	20.8
3.980000	---	22.94	60.00	37.06	1000.0	9.000	L1	19.7
3.980000	31.08	---	73.00	41.92	1000.0	9.000	L1	19.7
5.075000	---	24.15	60.00	35.85	1000.0	9.000	L1	19.7
5.075000	30.98	---	73.00	42.02	1000.0	9.000	L1	19.7
5.145000	---	25.54	60.00	34.46	1000.0	9.000	L1	19.7
5.145000	31.61	---	73.00	41.39	1000.0	9.000	L1	19.7
5.160000	---	25.81	60.00	34.19	1000.0	9.000	L1	19.7
5.160000	31.52	---	73.00	41.48	1000.0	9.000	L1	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))

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	HRD-440N
Mode	AC100V50HZ
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	---	31.22	66.00	34.78	1000.0	9.000	N	20.9
0.160000	48.30	---	79.00	30.70	1000.0	9.000	N	20.9
0.185000	---	27.11	66.00	38.89	1000.0	9.000	N	20.8
0.185000	44.65	---	79.00	34.35	1000.0	9.000	N	20.8
4.040000	---	24.17	60.00	35.83	1000.0	9.000	N	19.7
4.040000	31.29	---	73.00	41.71	1000.0	9.000	N	19.7
4.940000	---	23.86	60.00	36.14	1000.0	9.000	N	19.7
4.940000	30.51	---	73.00	42.49	1000.0	9.000	N	19.7
5.140000	---	24.15	60.00	35.85	1000.0	9.000	N	19.7
5.140000	30.37	---	73.00	42.63	1000.0	9.000	N	19.7
5.210000	---	24.87	60.00	35.13	1000.0	9.000	N	19.7
5.210000	30.21	---	73.00	42.79	1000.0	9.000	N	19.7

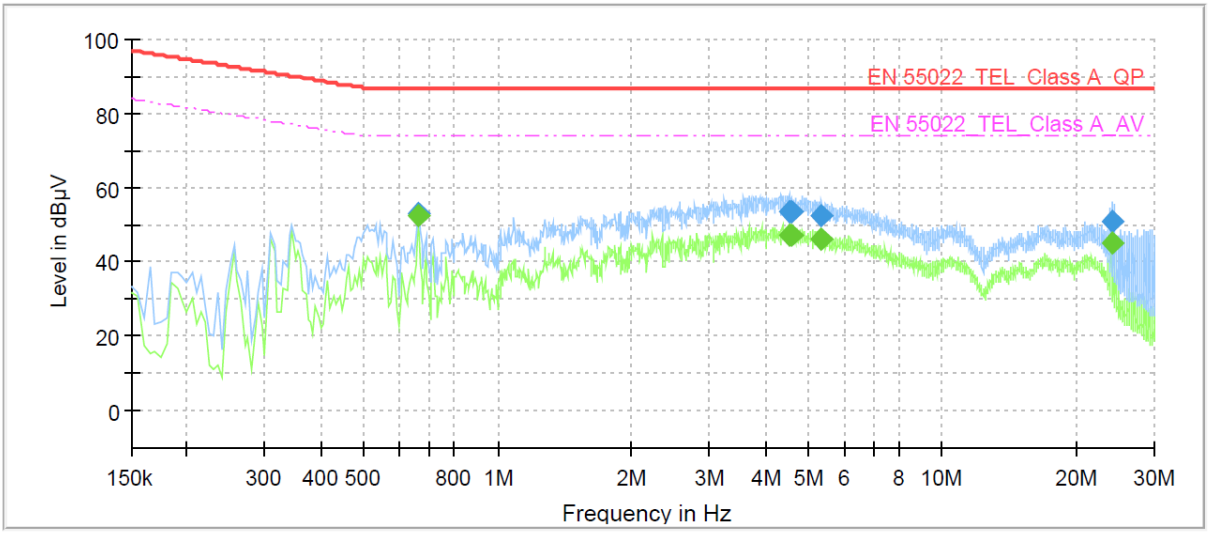
♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	HRD-440N
Mode	10M
Operator Name:	KES



Final_Result

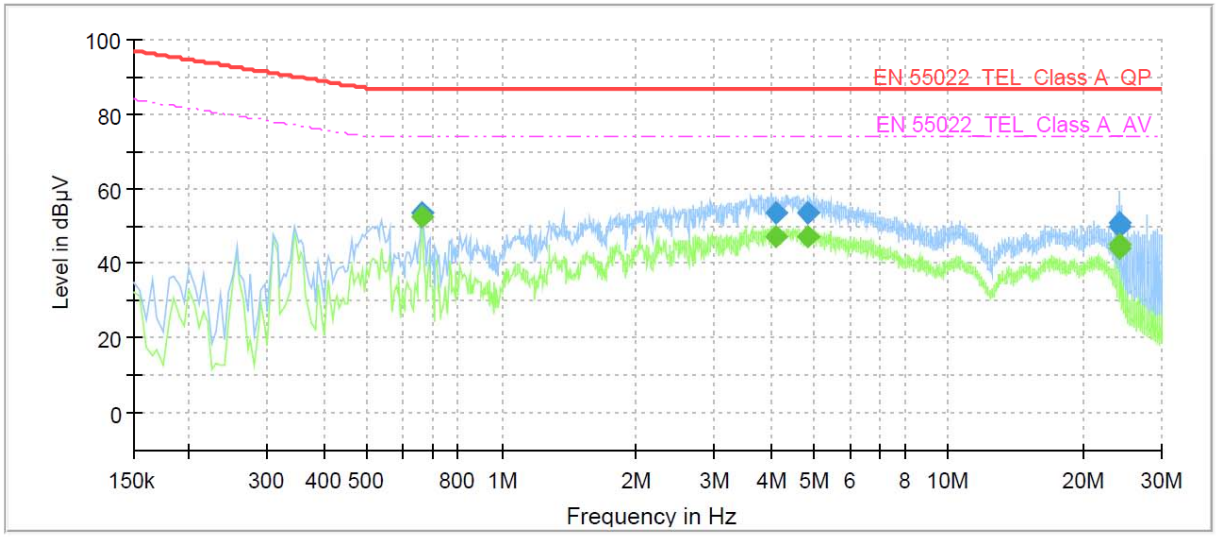
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.665000	---	52.25	74.00	21.75	1000.0	9.000	Single Line	20.2
0.665000	53.03	---	87.00	33.97	1000.0	9.000	Single Line	20.2
4.530000	---	47.09	74.00	26.91	1000.0	9.000	Single Line	19.4
4.530000	53.66	---	87.00	33.34	1000.0	9.000	Single Line	19.4
4.575000	---	47.30	74.00	26.70	1000.0	9.000	Single Line	19.4
4.575000	53.67	---	87.00	33.33	1000.0	9.000	Single Line	19.4
5.350000	---	45.87	74.00	28.13	1000.0	9.000	Single Line	19.5
5.350000	52.29	---	87.00	34.71	1000.0	9.000	Single Line	19.5
24.080000	---	45.06	74.00	28.94	1000.0	9.000	Single Line	20.4
24.080000	50.62	---	87.00	36.38	1000.0	9.000	Single Line	20.4

♦ 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))

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	HRD-440N
Mode	100M
Operator Name:	KES



Final_Result

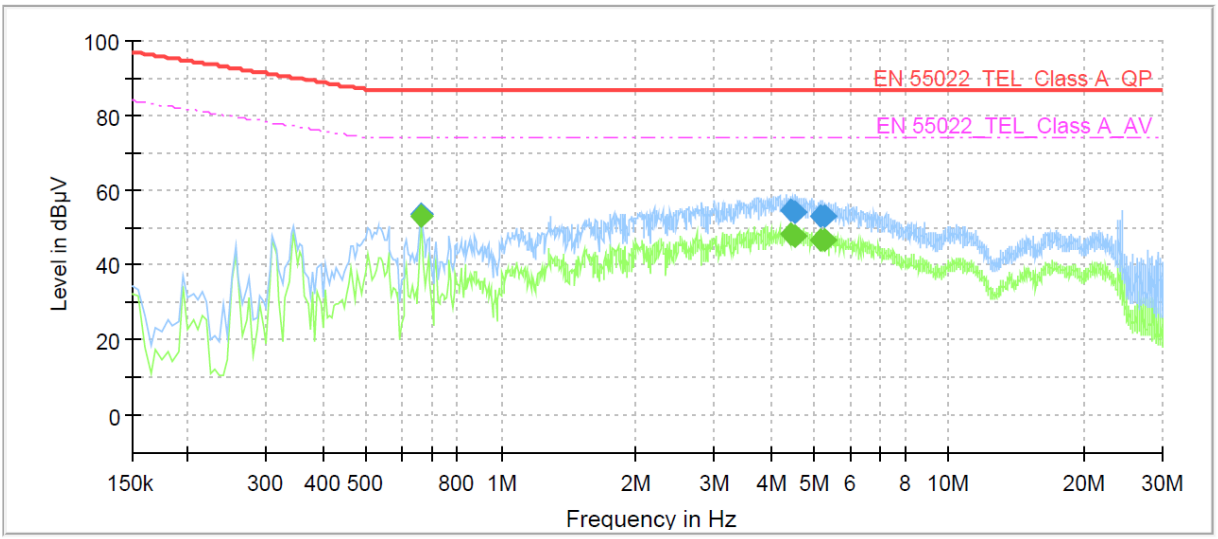
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.665000	---	52.53	74.00	21.47	1000.0	9.000	Single Line	20.5
0.665000	53.26	---	87.00	33.74	1000.0	9.000	Single Line	20.5
4.095000	---	47.13	74.00	26.87	1000.0	9.000	Single Line	19.7
4.095000	53.57	---	87.00	33.43	1000.0	9.000	Single Line	19.7
4.855000	---	47.13	74.00	26.87	1000.0	9.000	Single Line	19.7
4.855000	53.40	---	87.00	33.60	1000.0	9.000	Single Line	19.7
24.080000	---	45.23	74.00	28.77	1000.0	9.000	Single Line	20.6
24.080000	50.76	---	87.00	36.24	1000.0	9.000	Single Line	20.6
24.115000	---	43.68	74.00	30.32	1000.0	9.000	Single Line	20.6
24.115000	49.99	---	87.00	37.01	1000.0	9.000	Single Line	20.6

♦ 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))

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	HRD-440N
Mode	1000M
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.665000	---	52.86	74.00	21.14	1000.0	9.000	Single Line	20.4
0.665000	53.63	---	87.00	33.37	1000.0	9.000	Single Line	20.4
4.420000	---	48.10	74.00	25.90	1000.0	9.000	Single Line	19.7
4.420000	54.51	---	87.00	32.49	1000.0	9.000	Single Line	19.7
4.525000	---	47.79	74.00	26.21	1000.0	9.000	Single Line	19.7
4.525000	54.05	---	87.00	32.95	1000.0	9.000	Single Line	19.7
5.165000	---	46.68	74.00	27.32	1000.0	9.000	Single Line	19.7
5.165000	52.98	---	87.00	34.02	1000.0	9.000	Single Line	19.7
5.300000	---	46.38	74.00	27.62	1000.0	9.000	Single Line	19.7
5.300000	52.87	---	87.00	34.13	1000.0	9.000	Single Line	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 (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

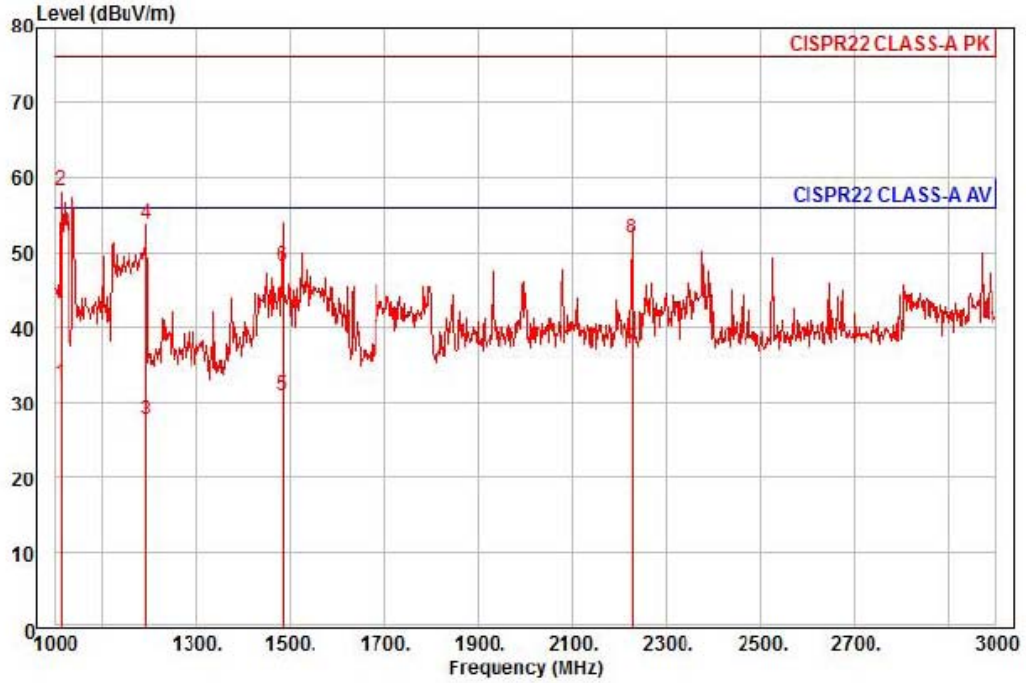
Radiated Electric Field Emissions(Below 1 ㎓)

Frequency	Amplitude	ANT Polar. (H/V)	ANT. Height	Correction Factor		Corrected Amplitude	Applicable Limit	Margin [dB]
[㎒]	[dBμV]		[m]	ANT. [dB/m]	Cable [dB]	[dBμV/m]	[dBμV/m]	
41.88	7.30	V	4.00	12.76	1.57	21.63	40.00	18.37
222.79	12.50	H	4.00	11.96	3.40	27.86	40.00	12.14
296.99	21.00	H	2.00	13.35	4.08	38.43	47.00	8.57
499.97	14.00	H	2.00	17.30	5.20	36.50	47.00	10.50
742.59	11.70	H	1.00	20.22	6.67	38.59	47.00	8.41
816.79	10.40	V	1.50	21.12	7.04	38.56	47.00	8.44
932.01	12.90	H	1.06	22.96	7.80	43.66	47.00	3.34

* H : Horizontal, V : Vertical

♦ Calculation
Corrected Amplitude [㏈uV] = Amplitude[㏈uV] + Correction Factor [㏈]
Corrected Amplitude : The Final Value, Amplitude : Reading Value,
Correction Factor : ANT FACTOR + Cable loss

Radiated Electric Field Emissions(Above 1 ㎓)



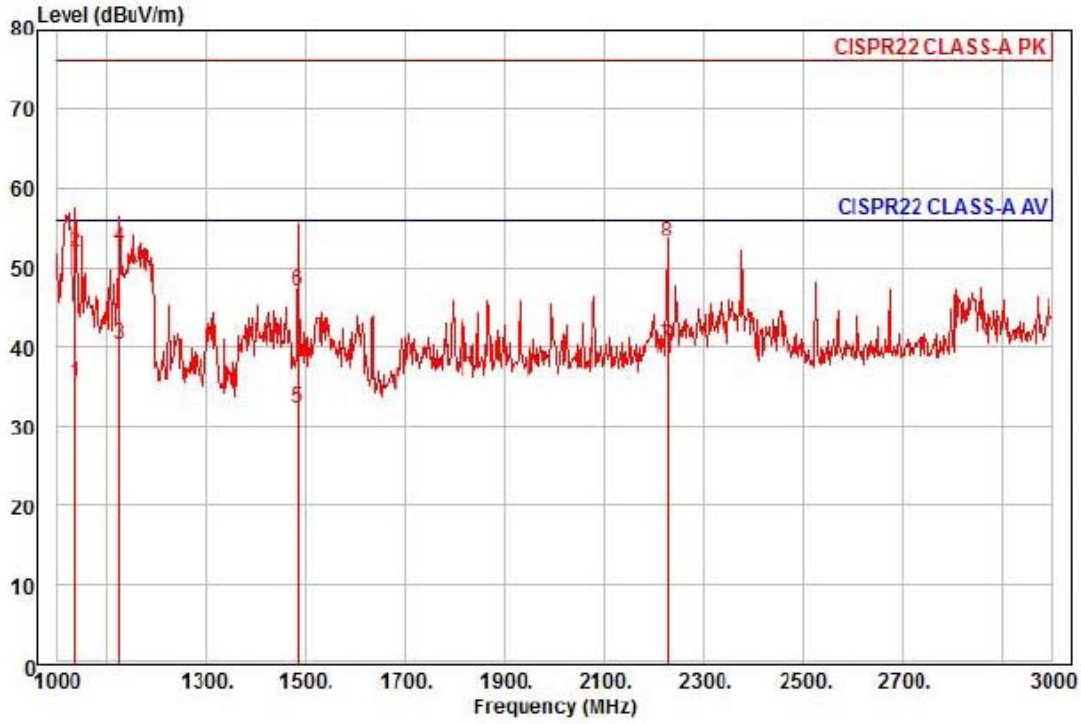
Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC100V 50HZ
Memo : (1 - 3)GHZ

	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	1012.00	39.50	22.54	6.52	36.05	30	56.00	-23.49	horizontal	Average
2 pp	1012.00	65.18	22.54	6.52	36.05	30	76.00	-17.81	horizontal	Peak
3	1194.00	33.32	23.09	7.12	35.89	7	56.00	-28.36	horizontal	Average
4	1194.00	59.49	23.09	7.12	35.89	7	76.00	-22.19	horizontal	Peak
5	1484.00	34.72	23.97	7.97	35.63	33	56.00	-24.97	horizontal	Average
6	1484.00	51.96	23.97	7.97	35.63	33	76.00	-27.73	horizontal	Peak
7 av	2228.00	36.02	26.70	9.87	35.26	39	56.00	-18.67	horizontal	Average
8	2228.00	50.63	26.70	9.87	35.26	39	76.00	-24.06	horizontal	Peak

♦ Calculation

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

Over Limit : Marjin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



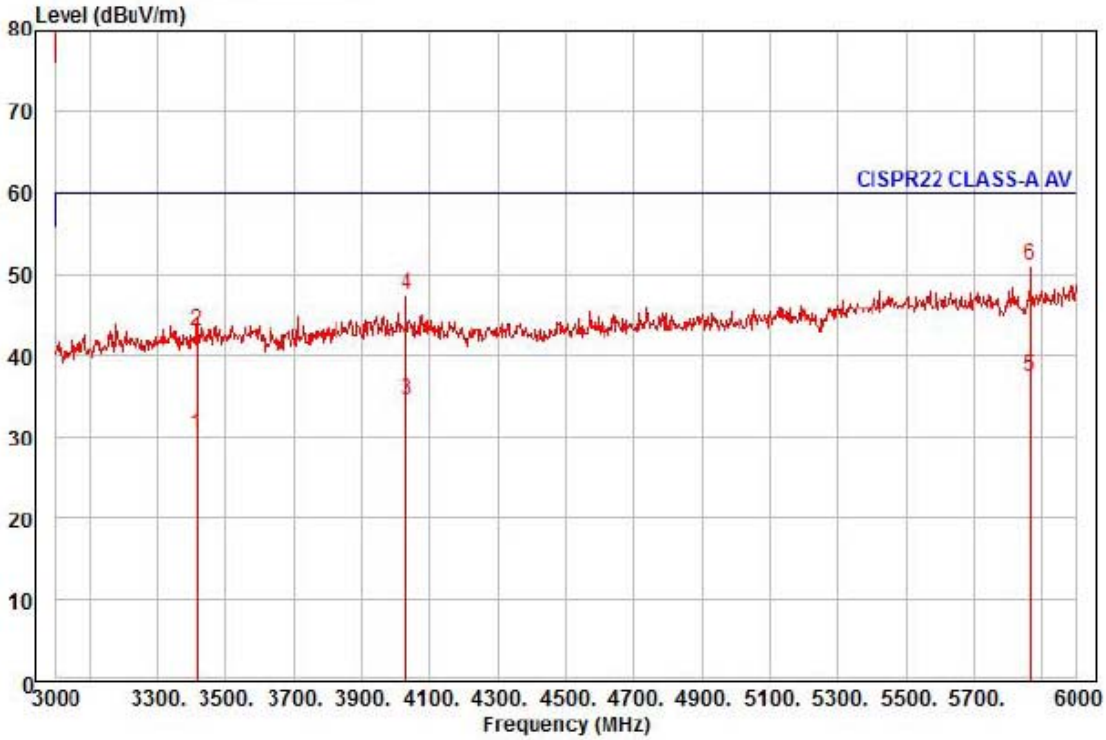
Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC100V 50HZ
Memo : (1 - 3)GHZ

	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	42.43	22.62	6.60	36.03	181	56.00	-20.38	vertical	Average
2	1038.00	58.75	22.62	6.60	36.03	181	76.00	-24.06	vertical	Peak
3 pp	1124.00	46.47	22.88	6.89	35.95	206	56.00	-15.71	vertical	Average
4	1124.00	58.81	22.88	6.89	35.95	206	76.00	-23.37	vertical	Peak
5	1484.00	35.91	23.97	7.97	35.63	342	56.00	-23.78	vertical	Average
6	1484.00	50.71	23.97	7.97	35.63	342	76.00	-28.98	vertical	Peak
7	2228.00	38.82	26.70	9.87	35.26	163	56.00	-15.87	vertical	Average
8 pk	2228.00	51.87	26.70	9.87	35.26	163	76.00	-22.82	vertical	Peak

♦ Calculation

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

Over Limit : Marjin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



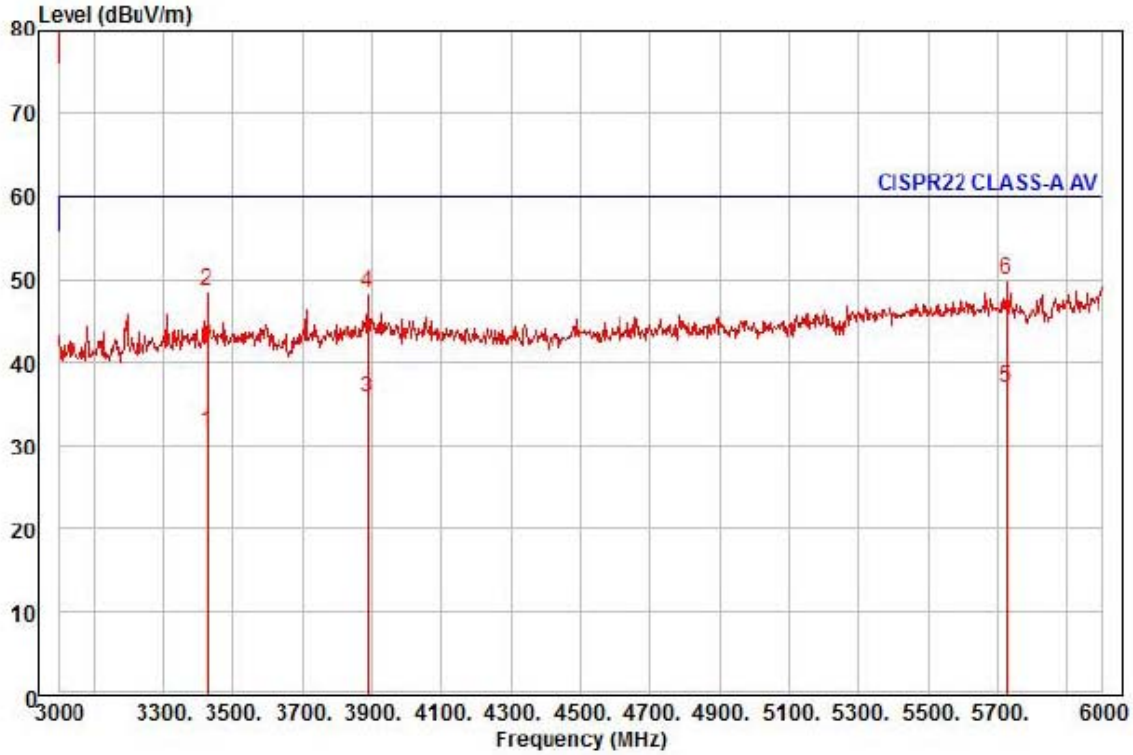
Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-440N
Mode : AC100V 50HZ
Memo : (3 - 6)GHZ

	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	3414.00	22.46	30.91	12.47	35.44	300	60.00	-29.60	horizontal	Average
2	3414.00	35.00	30.91	12.47	35.44	300	80.00	-37.06	horizontal	Peak
3	4032.00	23.62	32.49	13.63	35.29	186	60.00	-25.55	horizontal	Average
4	4032.00	36.67	32.49	13.63	35.29	186	80.00	-32.50	horizontal	Peak
5 pp	5865.00	20.37	35.92	16.82	35.68	223	60.00	-22.57	horizontal	Average
6 pk	5865.00	33.96	35.92	16.82	35.68	223	80.00	-28.98	horizontal	Peak

♦ Calculation

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

Over Limit : Marjin, 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 : AC100V 50HZ
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	23.62	30.93	12.49	35.44	154	60.00	-28.40	vertical	Average
2	3423.00	40.54	30.93	12.49	35.44	154	80.00	-31.48	vertical	Peak
3	3888.00	25.47	32.20	13.35	35.31	228	60.00	-24.29	vertical	Average
4	3888.00	38.15	32.20	13.35	35.31	228	80.00	-31.61	vertical	Peak
5 pp	5724.00	20.48	35.71	16.57	35.67	26	60.00	-22.91	vertical	Average
6 pk	5724.00	33.35	35.71	16.57	35.67	26	80.00	-30.04	vertical	Peak

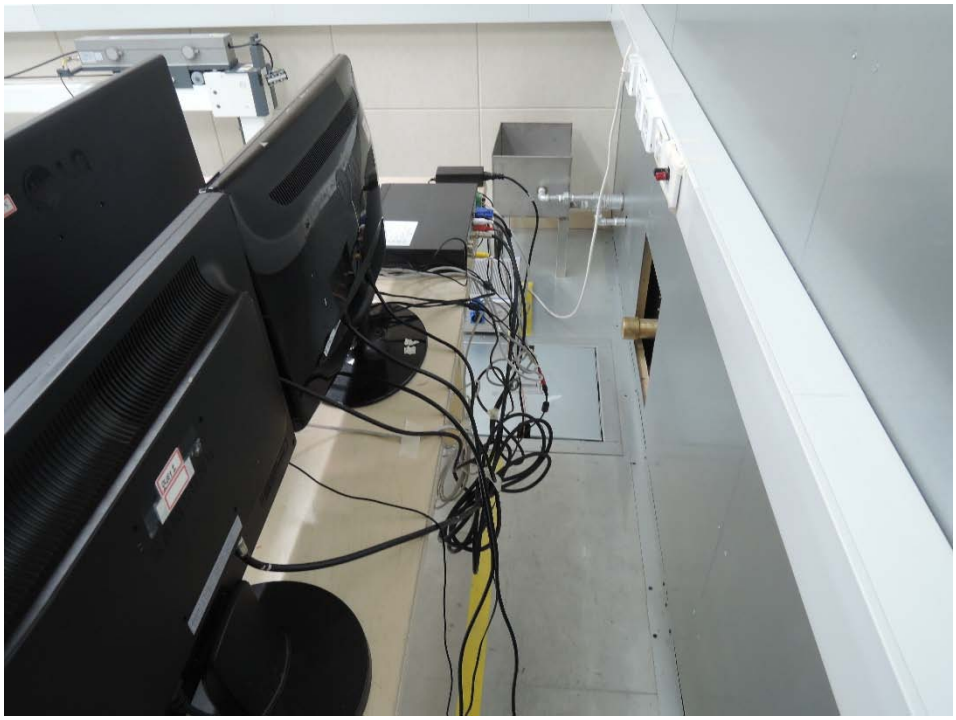
♦ Calculation

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

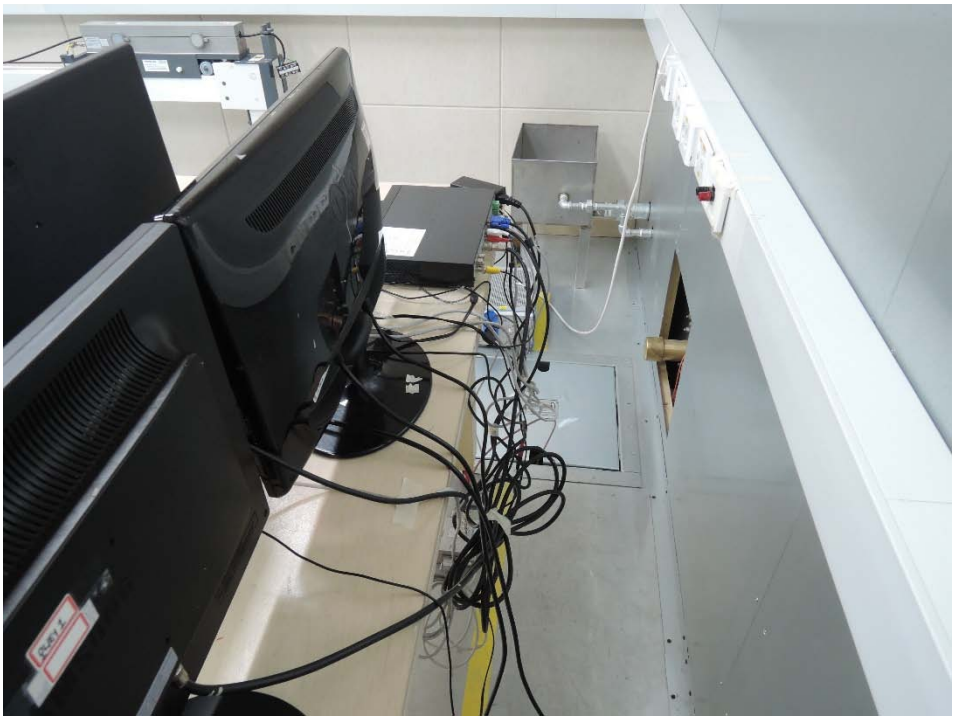
Over Limit : Marjin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

Test Setup Photos and Configuration

Conducted Voltage Emissions

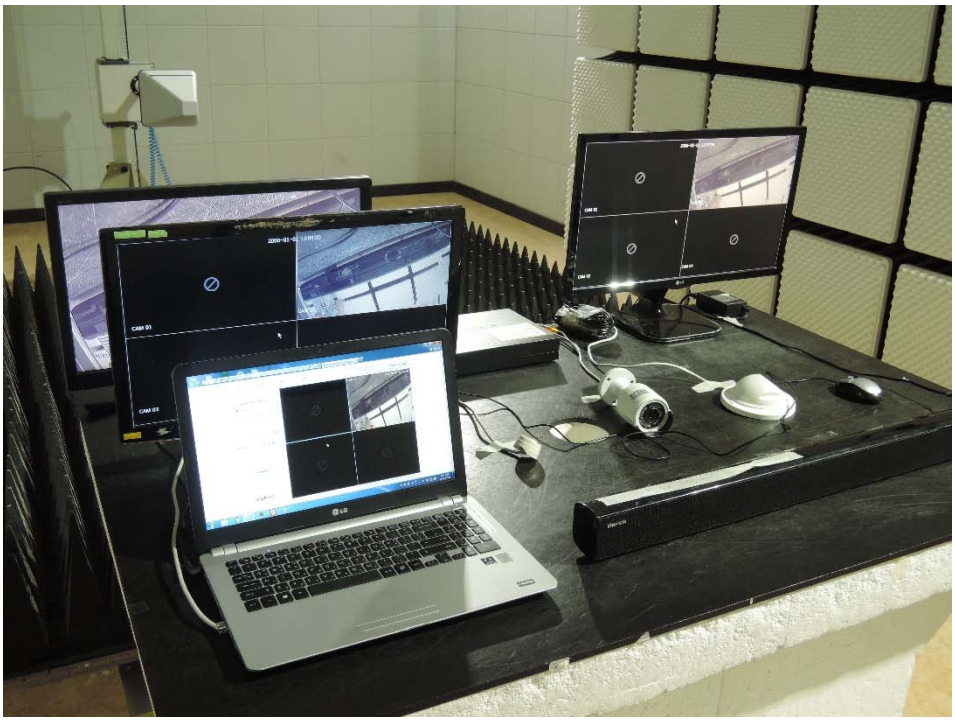


Conducted Telecommunication Emissions



Radiated Electric Field Emissions(Below 1 ㎓)

Radiated Electric Field Emissions(Above 1 ㎓)



EUT External Photographs

(Top)

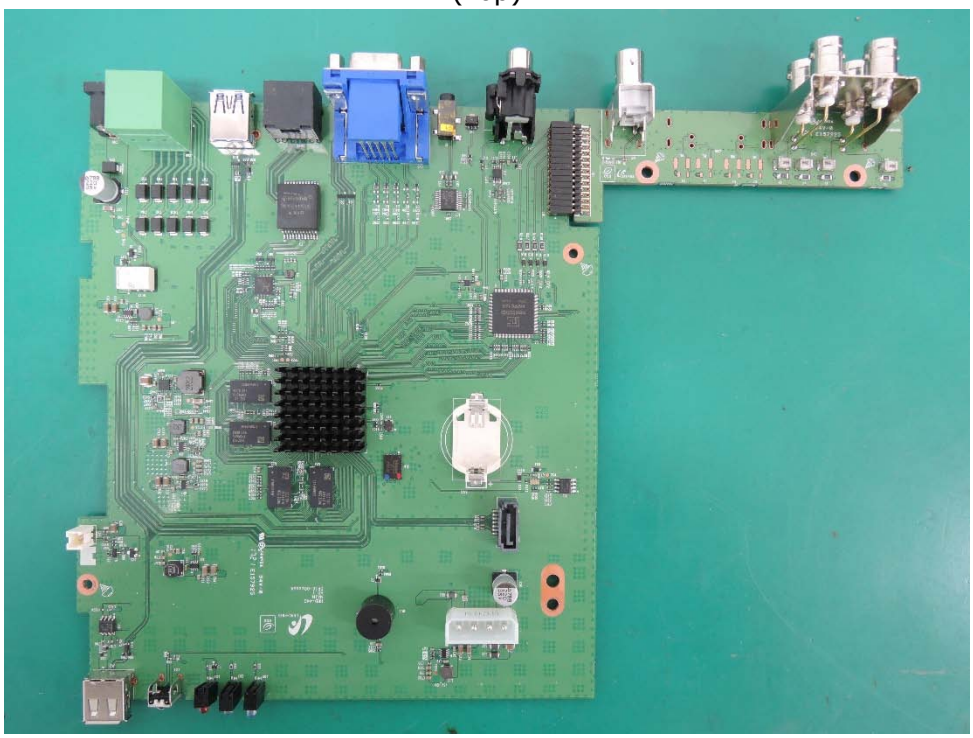
(Bottom)

EUT Internal Photographs

(Internal View)

EUT Internal View – Main Board

(Top)



(Bottom)