

DECLARATION OF CONFORMITY

We; Hanwha Techwin Co., Ltd.

DECLARE UNDER OUR SOLE RESPONSIBILITY THAT THE PRODUCT;

Report No: KES-E1-17T0217

**Type of
equipment:** DVR

Model Name: HRD-442P

Variant Model: -

Applicant: Hanwha Techwin Co., Ltd.

Address: 1204, Changwon-daero, Seongsan-gu,
Chang-won-si, Gyeongsangnam-do, Korea

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

Address: No.11 Weiliu Rd, Micro-Electronic
Industrial Park, TEDA, Tianjin,
300385, people's Republic of China

Test standards : AS/NZS CISPR22:2009+A1:2010

Classification: C-Tick

The above equipment was tested by EMC compliance Testing Laboratory for with the requirements of C-tick Rules and Regulations. The results of testing in this report apply to the product / system which was tested only.

Mar. 15, 2017
(Date of issue)

(Name and signature of authorized person)



EMC TEST REPORT For C-TICK

Test Report No. : KES-E1-17T0217
Date of Issue : Mar, 15, 2017
Product name : DVR
Model/Type No. : HRD-442P
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 : Feb, 21, 2017
Test date : Mar, 10, 2017 ~ Mar, 13, 2017
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Test

Jin Bae, Lee
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

**KES Co., Ltd.**

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Test report No.:
KES-E1-17T0217
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Mar, 15, 2017	KES-E1-17T0217	Issued

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1.0 General Product Description

Main Specifications of EUT are:

item		Details
Video	Input	4channel BNC : AHD(~4MP), TVI(~2MP), CVI(~2MP), NTSC/PAL
	Resolution	2560x1440, 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, 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	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(16), 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, Motion (※ All Search Included Preview Function)
	Playback function	Fast Forward/Backward (x2,x4,x8,x16,x32,x64) ※ 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),
	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
	Web Browser	Windows OS : Internet Explorer 8, 9, 10, Firefox 3.6 or higher, Chrome 12 or higher Mac OS : Safari 5 or higher, Firefox 3.6 or higher
Smart phone	Viewer Software	SSM, Webviewer, SmartViewer, iPOLIS mobile viewer, WiseNet Mobile (~Apr. 2017)
	Platform	Android, ios
	Protocol support	RTP, RTSP, HTTP, CGI(SUNAPI)
	Control	Live(8ch) : Multi-Profile Support Playback(1ch) Event push
Storage	Remote users Maximum	Search (3), Live Unicast (10), Multicast (20)
	Internal	Up to 2 SATA HDDs (0~8TB HDD)
	External (E-SATA Interface)	USB(for Backup)
Security	File Format (Back-up)	BU(DVR Player), SEC(Include Player), AVI
	Password Protection	1 Admin, 10 Group , 10 User per 1 Group
	Data Authentication	Watermark
Easy Configuration		P2P (TUTK)



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Interface		
Monitors	VGA	1 VGA (1920x1080, 1280x1024, 1280x720)
	Composite(Spot)	BNC(1CH) ※ Included OSD On Screen, Multi mode Support
	Loop Outputs	-
Audio	Inputs/Output	4CH 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), Rating : 30V DC/2A, 250V AC/0.25A
	Remote notification	Notification via e-mail
Connections	Ethernet	1 RJ45 10/100/1000 Base-T
	Serial interface	RS-485(Full Duplex) for PTZ, Samsung System Keyboard
	USB	2 ports(Front)
	e-SATA	-
	Application Suoport	Mouse, IR Remocon, SPC-2000 (RS-485 protocol)
	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	-
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)	TBD W370.0x H 44.0 x D 320(14.57" x 1.73" x 12.6")
	Weight (With hard disks)	TBD Approx. 2.68Kg(5.91lb)
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)

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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 ☒ 240 Vac ☐ 100 Vac ☐ 24ac ☐ 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-442P	-	Hanwha Techwin Co., Ltd.	E.U.T
AC / DC Adaptor	FSP040-RHAN2	-	Zhonghan Electronics(Shenzhen) Co., Ltd.	-
Mouse1	MOEIUOA	PMX-MMOEIUA(B)	PRIMAX ELECTRONICS LTD.	-
Remote Controller	EP10-000331A	-	Samsung Techwin (Sta)	-
HDD	WD10PURX	WCC4J7TS2NSC	WD Purple	2 TB



1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	X56K	HN11N5151FJ0045W	HANSUNG	-
Notebook Adaptor	A12-120P1A	F180271552011758	CHICONY POWER TECHNOLOGY CO.,LTD.	-
MONITOR1	SMT-2232	C95V67VF900015Y	Weihei Daewoo Electronics Co., Ltd.	-
MONITOR2	LT23C350	009MHYCH106388P	Samsung Electro-Mechanics Co.,Ltd	-
MONITOR2 Adaptor	A4514_DSM	CN07BN4400721ASE3 8GCOY0XS	Samsung Electro-Mechanics Co.,Ltd	-
MONITOR3	HSTND-7041-L	6CM6020YQQ	HP Inc.	-
CAMERA x 4	SDC-8440BC	-	Hanwha Techwin (Tianjin) Co.,Ltd	-
CAMERA AC / DC Adaptor	EO-1210	-	EO Electronics	-
I Phone	A1530	-	APPLE	-
Speaker	BR-100A	-	Britz International Co., Ltd.	-
MIC	CMK-303	-	CAMAC	-
Mouse2	SMB-400	0DJM010118	SEJIN ELECTRON INC.	-
2.0 USB Memory	-	-	SanDisk	64 GB
Alarm1	-	-	-	-
Alarm2	-	-	-	-

1.6 External I / O Cabling

Start		END		Cable Spec.	
Description	I / O Port	Description	I / O Port	Length	Shield
DVR (E.U.T)	RJ-45	Notebook	RJ-45	3.0	U
	BNC	MONITOR1	BNC	3.0	S
	HDMI	MONITOR2	HDMI	1.5	S
	D-SUB	MONITOR3	D-SUB	1.5	S
	BNC x 4	CAMERA x 4	BNC x 4	10.0	S
	RCA	Speaker	RCA	1.4	U
	RCA	MIC	RCA	1.2	U
	USB	2.0 USB Memory	USB	-	U
	2 Pin	Alarm1	2 Pin	3.5	U
	2 Pin	Alarm2	2 Pin	3.5	U
	USB	Mouse1	USB	1.5	U
	RS 232	Mouse2	RS 232	1.2	U
	-	Remote Controller	-	-	-
Notebook	3.5 mm	I Phone	3.5 mm	1.0	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

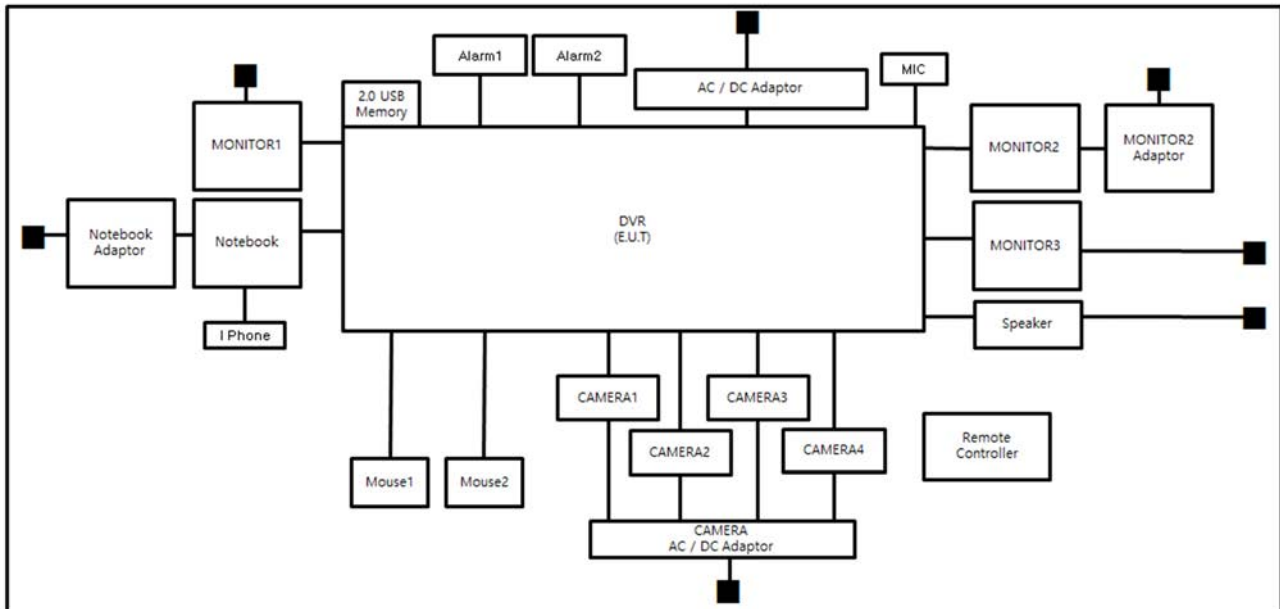
operating
E.U.T Monitoring, Ping Test

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

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1.8 Configuration

■ AC Main
□ DC Main



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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, Yeosu-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)	

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 55032:2012

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



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☐ **VCCI V-3 / 2015.04**

☐ Class A

☐ Class B

☒ **AS/NZS CISPR22:2009 + A1:2010**

☒ Class A

☐ Class B

☐ **47 CFR Part 15, Subpart B**

☐ CISPR 22:2009 +A1:2010

☐ Class A

☐ Class B

☐ ANSI C63.4-2009

☐ **IC Regulation ICES-003 : 2016**

☐ CAN/CSA CISPR 22-10

☐ Class A

☐ Class B

☐ ANSI C63.4-2014

☐ **RE- Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

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

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Mar, 13, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	05, 02, 2017
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	Shield Room #3	-	SEMITEC	-	-
☒	EMI Test S/W	EMC32	R & S	9.12.00	-

Test Conditions

Temperature: 21,3 °C
Relative Humidity: 32,8 %

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.2 Conducted Emissions at Telecommunication Ports

Test Date

Mar, 13, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test Receiver	ESR3	R & S	101783	05, 03, 2017
☒	LISN	ENV216	R & S	101137	02, 03, 2018
☒	LISN	ENV216	R & S	101786	05, 02, 2017
☒	8-Wire ISN CAT3	CAT3 8158	Schwarzbeck Mess	8158-0019	04, 01, 2017
☒	8-Wire ISN CAT5	CAT5 8158	Schwarzbeck Mess	8158-0030	04, 01, 2017
☒	8-Wire ISN CAT6	NTFM 8158	Schwarzbeck Mess	8158-0029	08, 11, 2017
☒	PULSE LIMITER	ESH3-Z2	R & S	101914	12, 13, 2017
☒	Shield Room #3	-	SEMITEC	-	-
☒	EMI Test S/W	EMC32	R & S	9.12.00	

Test Conditions

Temperature: 21,3 °C

Relative Humidity: 32,8 %

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

RemarksSee Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Mar, 10, 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 Receiver	ESVS10	Rohde & Schwarz	826008/014	04, 18, 2017
☒	Trilog-Broadband ANT	VULB9163	Schwarzbeck	714	11, 28, 2018
☒	OATS	-	KES	-	-
☒	Antenna Mast	-	DAEIL EMC	-	-
☒	Turn Table	-	DAEIL EMC	-	-
☒	EMI Test S/W	-	-	-	-

Test Conditions

Temperature: 9,8 °C
Relative Humidity: 36,0 %

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Mar, 10, 2017

Test Location

Semi Anechoic Chamber #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	Log-Periodic Antenna	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018
☒	EMI Test Receiver	ESU26	R & S	100552	04, 24, 2017
☒	Broadband Coaxial Preamplifier	BBV 9718	Schwarzbeck Mess - Elektronik	9718-246	10, 14, 2017
☒	Semi Anechoic Chamber #2	-	SEMITEC	-	-
☒	Antenna Mast	-	AUDIX	-	-
☒	Turn Table	-	AUDIX	-	-
☒	EMI Test S/W	e3	AUDIX	8.083b	-

Test Conditions

Temperature: 20,6 °C

Relative Humidity: 36,1 %

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.

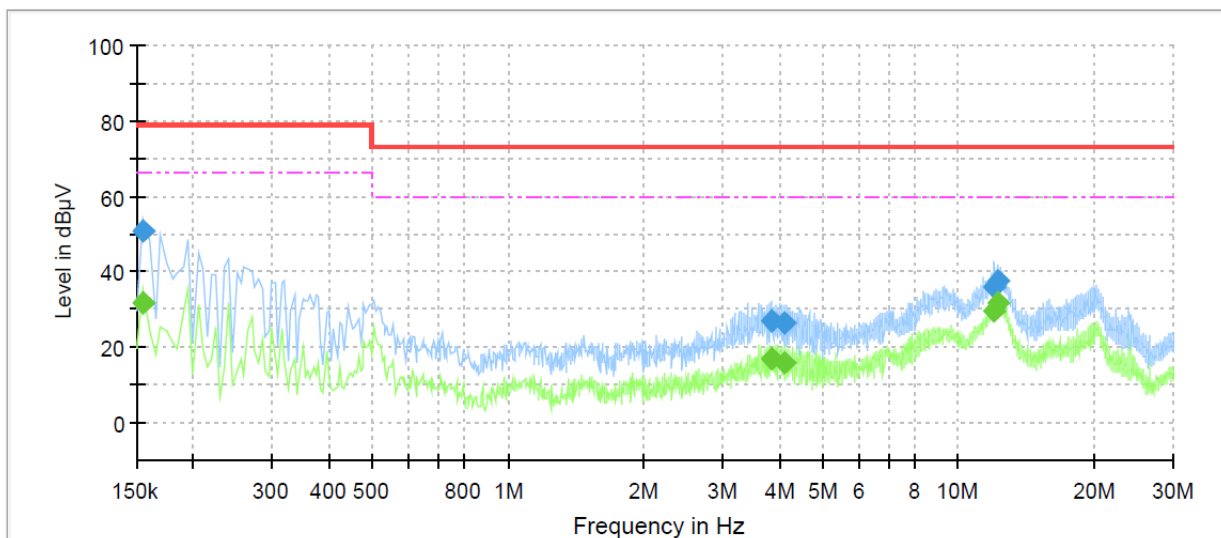
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

[HOT]

Common Information

Test Description: Conducted Emission
Model No.: HRD-442P
Mode: H
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	31.94	66.00	34.06	1000.0	9.000	L1	21.0
0.155000	50.84	---	79.00	28.16	1000.0	9.000	L1	21.0
3.835000	---	16.79	60.00	43.21	1000.0	9.000	L1	19.7
3.835000	27.06	---	73.00	45.94	1000.0	9.000	L1	19.7
4.125000	---	16.13	60.00	43.87	1000.0	9.000	L1	19.7
4.125000	26.29	---	73.00	46.71	1000.0	9.000	L1	19.7
12.045000	---	29.75	60.00	30.25	1000.0	9.000	L1	19.9
12.045000	36.08	---	73.00	36.92	1000.0	9.000	L1	19.9
12.270000	---	31.81	60.00	28.19	1000.0	9.000	L1	20.0
12.270000	37.54	---	73.00	35.46	1000.0	9.000	L1	20.0

◆ 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))

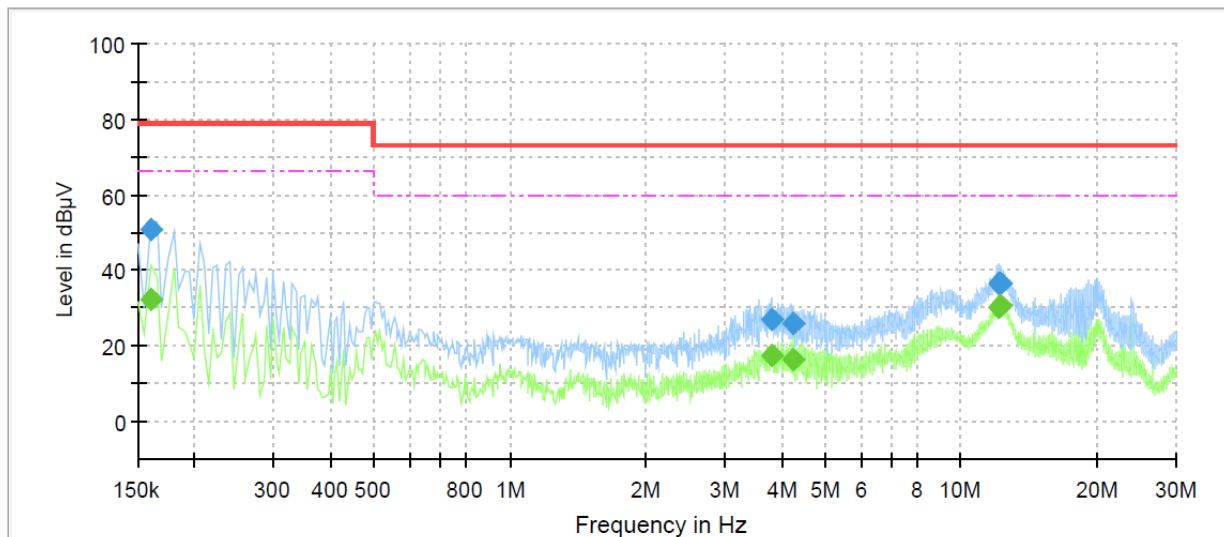
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[NEUTRAL]

Common Information

Test Description: Conducted Emission
Model No.: HRD-442P
Mode: N
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	32.25	66.00	33.75	1000.0	9.000	N	21.0
0.160000	51.07	---	79.00	27.93	1000.0	9.000	N	21.0
3.785000	---	17.37	60.00	42.63	1000.0	9.000	N	19.7
3.785000	27.03	---	73.00	45.97	1000.0	9.000	N	19.7
4.235000	---	16.34	60.00	43.66	1000.0	9.000	N	19.7
4.235000	25.91	---	73.00	47.09	1000.0	9.000	N	19.7
12.140000	---	30.19	60.00	29.81	1000.0	9.000	N	20.0
12.140000	36.40	---	73.00	36.60	1000.0	9.000	N	20.0
12.295000	---	30.70	60.00	29.30	1000.0	9.000	N	20.0
12.295000	36.59	---	73.00	36.41	1000.0	9.000	N	20.0

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

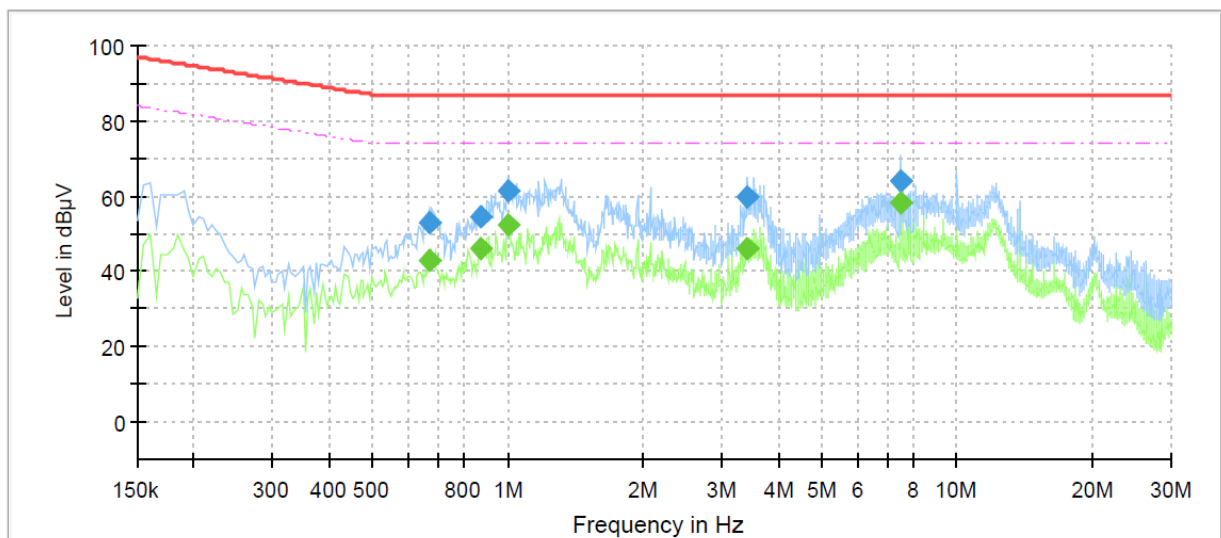
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Conducted Emissions at Telecommunication Ports

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRD-442P
Mode: 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)
0.670000	---	42.72	74.00	31.28	1000.0	9.000	Single Line	20.6
0.670000	52.96	---	87.00	34.04	1000.0	9.000	Single Line	20.6
0.875000	---	46.26	74.00	27.74	1000.0	9.000	Single Line	20.5
0.875000	54.28	---	87.00	32.72	1000.0	9.000	Single Line	20.5
1.000000	---	52.60	74.00	21.40	1000.0	9.000	Single Line	20.4
1.000000	61.16	---	87.00	25.84	1000.0	9.000	Single Line	20.4
3.430000	---	46.24	74.00	27.76	1000.0	9.000	Single Line	19.8
3.430000	60.07	---	87.00	26.93	1000.0	9.000	Single Line	19.8
7.500000	---	58.46	74.00	15.54	1000.0	9.000	Single Line	19.9
7.500000	64.29	---	87.00	22.71	1000.0	9.000	Single Line	19.9

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

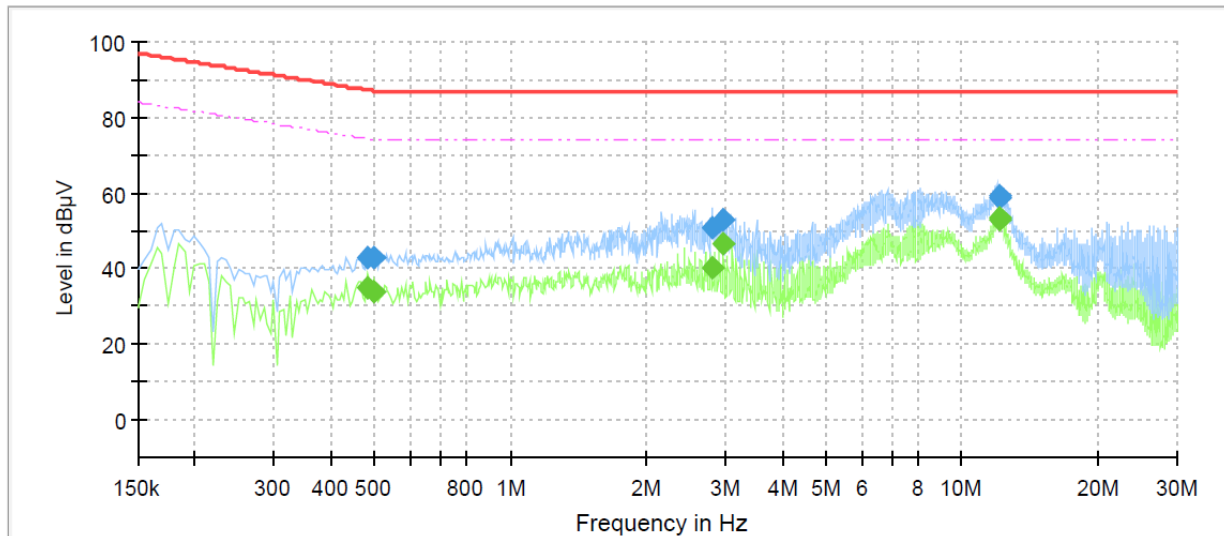
Reading Value : Not shown in the table.

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

[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRD-442P
Mode: 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)
0.485000	---	35.14	74.25	39.11	1000.0	9.000	Single Line	20.4
0.485000	42.71	---	87.25	44.54	1000.0	9.000	Single Line	20.4
0.500000	---	33.98	74.00	40.02	1000.0	9.000	Single Line	20.4
0.500000	42.95	---	87.00	44.05	1000.0	9.000	Single Line	20.4
2.795000	---	40.04	74.00	33.96	1000.0	9.000	Single Line	19.4
2.795000	50.71	---	87.00	36.29	1000.0	9.000	Single Line	19.4
2.970000	---	46.64	74.00	27.36	1000.0	9.000	Single Line	19.3
2.970000	52.71	---	87.00	34.29	1000.0	9.000	Single Line	19.3
12.070000	---	53.30	74.00	20.70	1000.0	9.000	Single Line	19.5
12.070000	59.30	---	87.00	27.70	1000.0	9.000	Single Line	19.5
12.100000	---	53.14	74.00	20.86	1000.0	9.000	Single Line	19.5
12.100000	58.81	---	87.00	28.19	1000.0	9.000	Single Line	19.5

◆ 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 (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

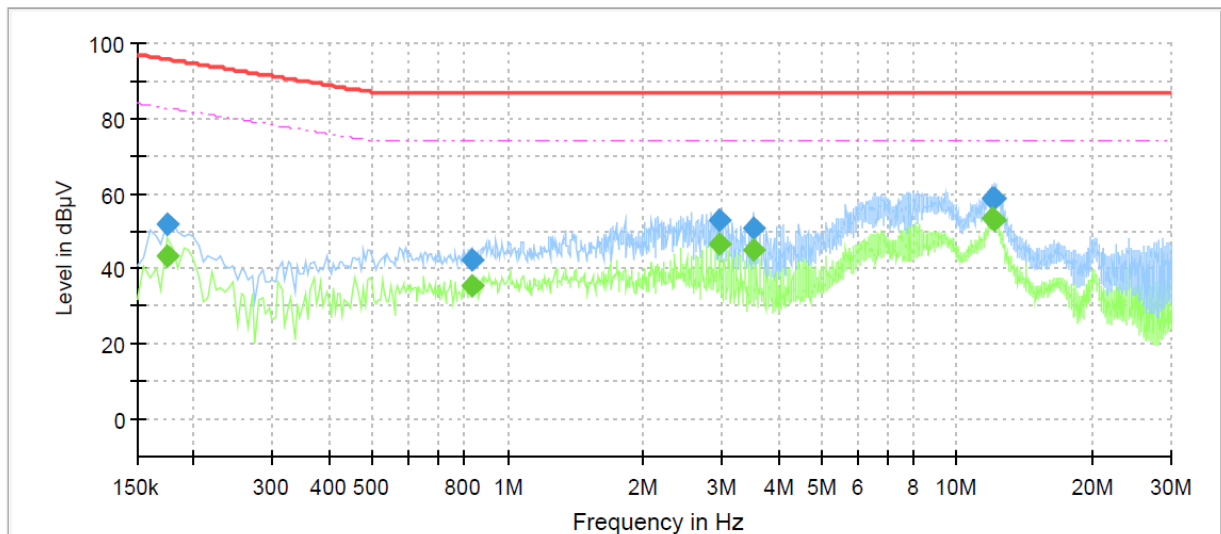
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[1 000 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: HRD-442P
Mode: 1 000 Mbps
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.175000	---	43.45	82.72	39.27	1000.0	9.000	Single Line	20.9
0.175000	52.03	---	95.72	43.69	1000.0	9.000	Single Line	20.9
0.830000	---	35.60	74.00	38.40	1000.0	9.000	Single Line	19.9
0.830000	42.48	---	87.00	44.52	1000.0	9.000	Single Line	19.9
2.970000	---	46.77	74.00	27.23	1000.0	9.000	Single Line	19.3
2.970000	52.74	---	87.00	34.26	1000.0	9.000	Single Line	19.3
3.510000	---	45.02	74.00	28.98	1000.0	9.000	Single Line	19.3
3.510000	50.97	---	87.00	36.03	1000.0	9.000	Single Line	19.3
11.955000	---	53.35	74.00	20.65	1000.0	9.000	Single Line	19.5
11.955000	58.73	---	87.00	28.27	1000.0	9.000	Single Line	19.5
12.120000	---	53.09	74.00	20.91	1000.0	9.000	Single Line	19.5
12.120000	58.93	---	87.00	28.07	1000.0	9.000	Single Line	19.5

◆ 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 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]
252.36	14.20	H	3.98	12.53	3.71	30.44	47.00	16.56
371.65	13.70	V	1.01	14.99	4.40	33.09	47.00	13.91
500.00	15.70	H	4.00	17.35	5.20	38.25	47.00	8.75
592.84	12.30	V	1.02	19.18	5.83	37.31	47.00	9.69
625.69	11.40	V	1.00	19.40	5.94	36.74	47.00	10.26
742.68	10.90	H	3.99	20.23	6.67	37.80	47.00	9.20

* H : Horizontal, V : Vertical

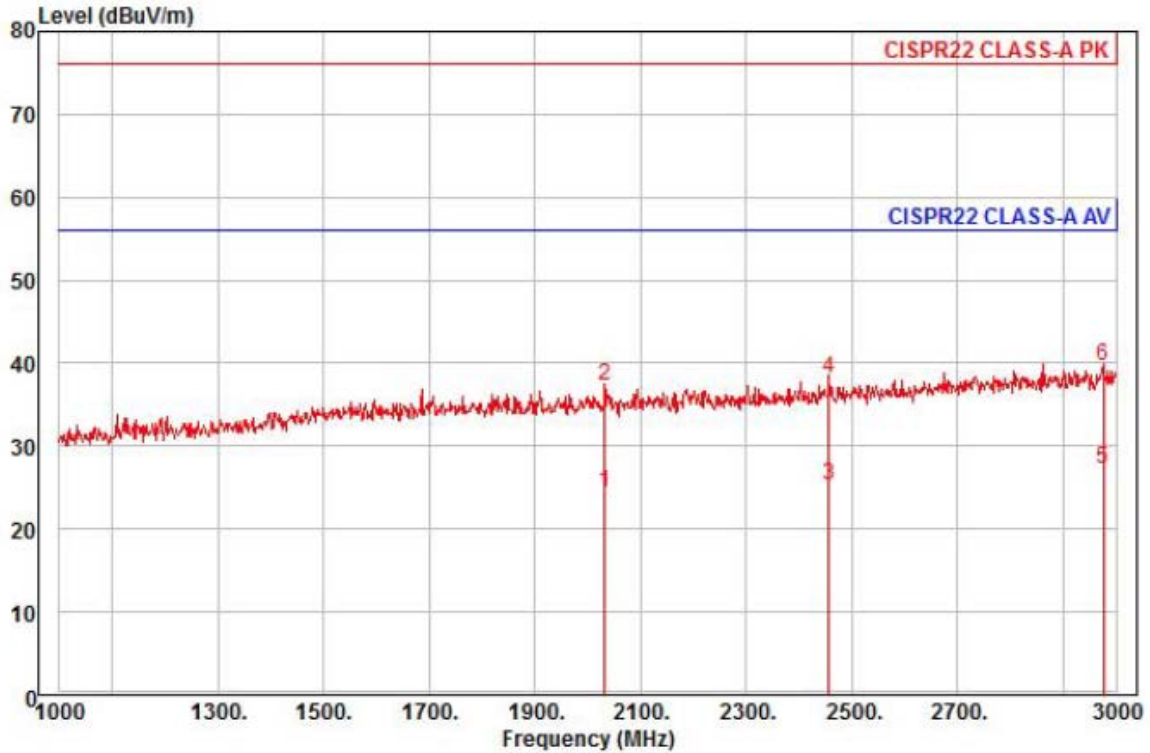
◆ Calculation

Corrected Amplitude [dB μ V] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

Radiated Electric Field Emissions(Above 1 GHz)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-442P
Mode :
Memo : 1 ~ 3 GHz

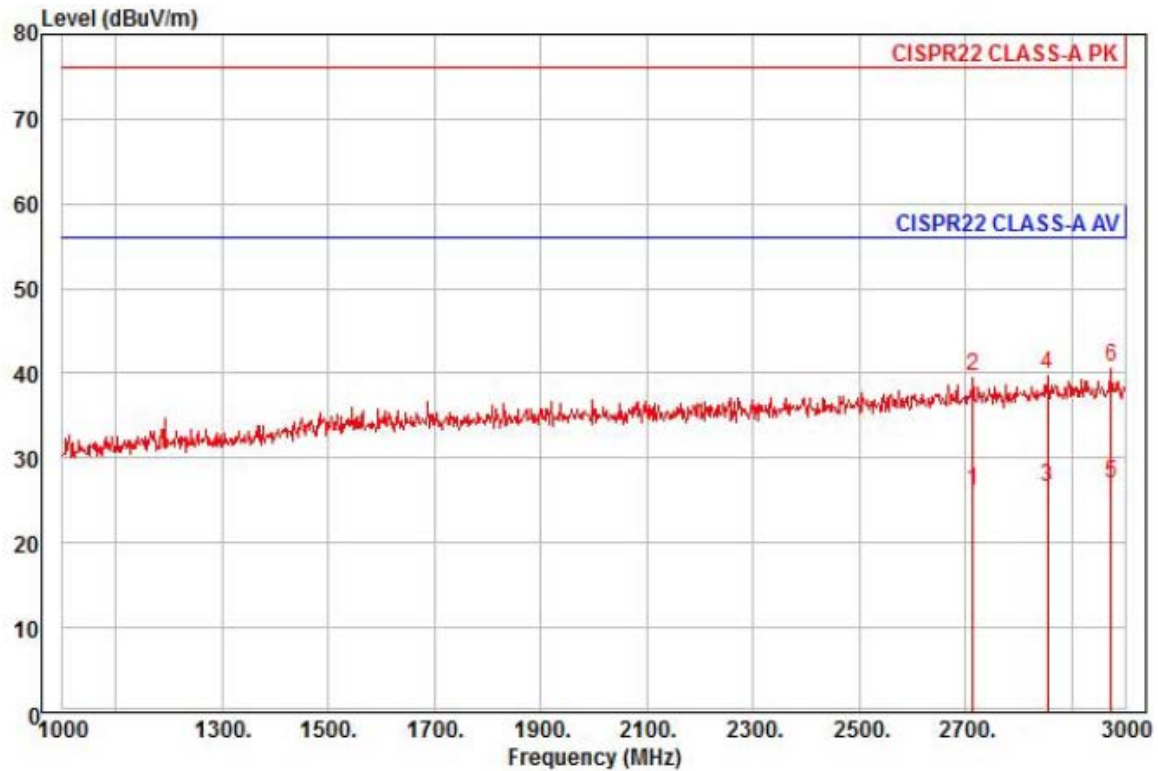
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	2032.00	28.60	25.73	9.41	39.41	12	56.00	-31.67	horizontal	Average
2	2032.00	41.64	25.73	9.41	39.41	12	76.00	-38.63	horizontal	Peak
3	2456.00	26.86	27.40	10.44	39.48	136	56.00	-30.78	horizontal	Average
4	2456.00	39.84	27.40	10.44	39.48	136	76.00	-37.80	horizontal	Peak
5 pp	2976.00	25.94	29.68	11.64	40.08	27	56.00	-28.82	horizontal	Average
6 pk	2976.00	38.40	29.68	11.64	40.08	27	76.00	-36.36	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 Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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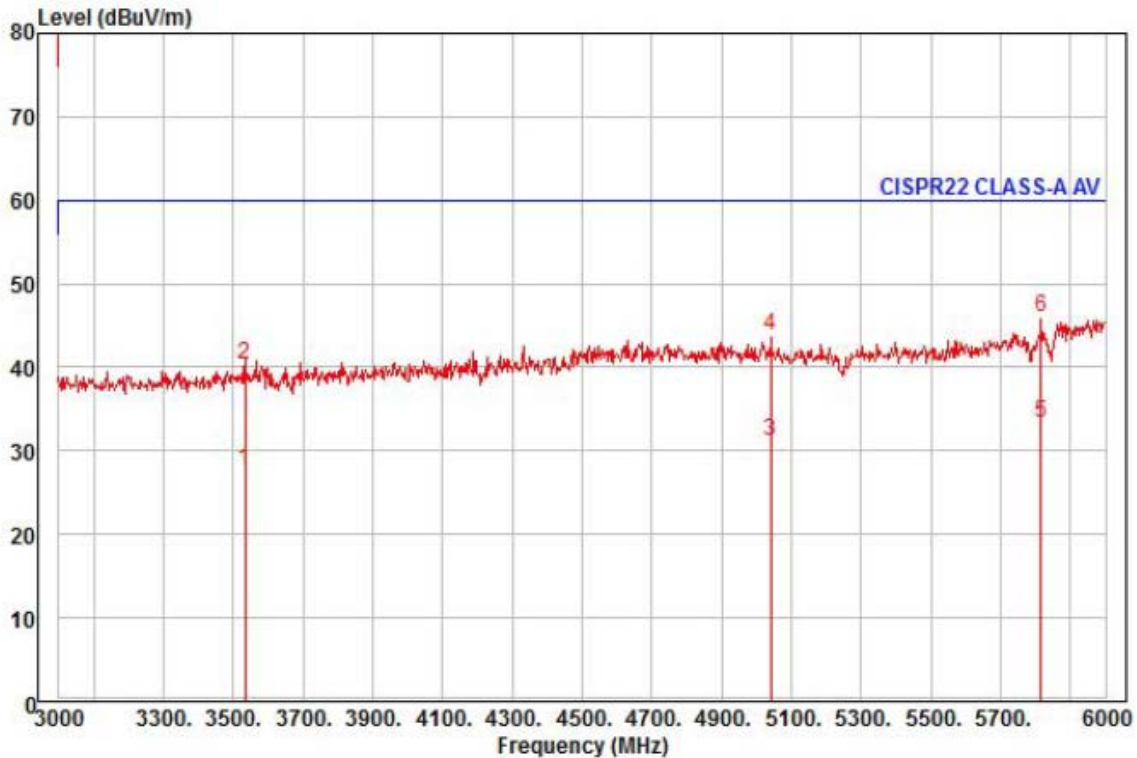
Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-442P
Mode :
Memo : 1 ~ 3 GHz

	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	2714.00	26.49	28.52	11.02	39.78	161	56.00	-29.75	vertical	Average
2	2714.00	39.87	28.52	11.02	39.78	161	76.00	-36.37	vertical	Peak
3	2854.00	26.13	29.14	11.36	39.94	26	56.00	-29.31	vertical	Average
4	2854.00	39.40	29.14	11.36	39.94	26	76.00	-36.04	vertical	Peak
5 pp	2974.00	25.89	29.67	11.64	40.08	359	56.00	-28.88	vertical	Average
6 pk	2974.00	39.61	29.67	11.64	40.08	359	76.00	-35.16	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 Value, 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(9149-255,2016-05-17) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-442P
Mode :
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	3534.00	25.47	30.36	12.69	40.87	30	60.00	-32.35	horizontal	Average
2	3534.00	38.15	30.36	12.69	40.87	30	80.00	-39.67	horizontal	Peak
3	5040.00	22.93	33.25	15.39	40.34	245	60.00	-28.77	horizontal	Average
4	5040.00	35.45	33.25	15.39	40.34	245	80.00	-36.25	horizontal	Peak
5 pp	5817.00	21.88	35.45	16.73	40.68	320	60.00	-26.62	horizontal	Average
6 pk	5817.00	34.57	35.45	16.73	40.68	320	80.00	-33.93	horizontal	Peak

◆ Calculation

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

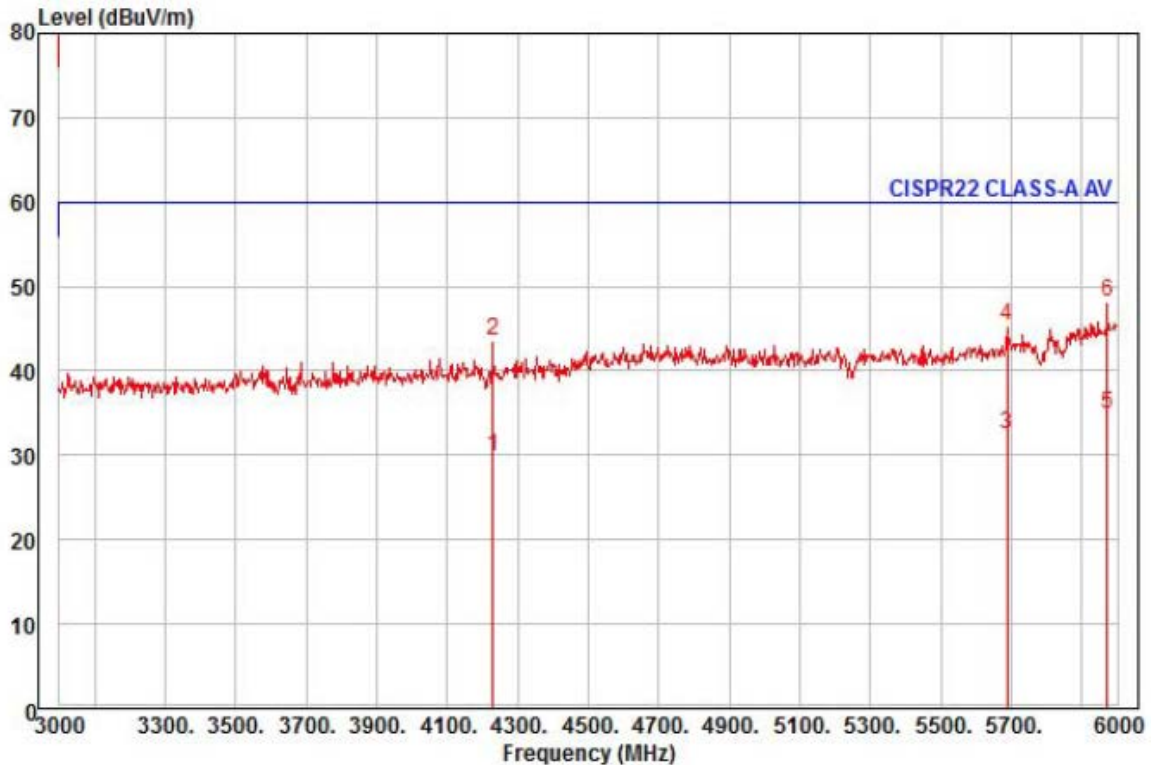
Over Limit : Margin Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor



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www.kes.co.kr

Test report No.:
KES-E1-17T0217
Page (26) of (35)



Site : chamber
Condition: CISPR22 CLASS-A PK 3m STLP9149(9149-255,2016-05-17) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : HRD-442P
Mode :
Memo : 3 ~ 6 GHz

		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	4230.00	24.58	32.04	13.99	40.73	157	60.00	-30.12	vertical	Average
2	4230.00	38.40	32.04	13.99	40.73	157	80.00	-36.30	vertical	Peak
3	5688.00	22.24	34.67	16.50	40.85	165	60.00	-27.44	vertical	Average
4	5688.00	34.92	34.67	16.50	40.85	165	80.00	-34.76	vertical	Peak
5 pp	5973.00	22.02	36.39	17.02	40.47	196	60.00	-25.04	vertical	Average
6 pk	5973.00	35.29	36.39	17.02	40.47	196	80.00	-31.77	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 Value, Read Level : Reading Value, Ant Factor : Ant Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

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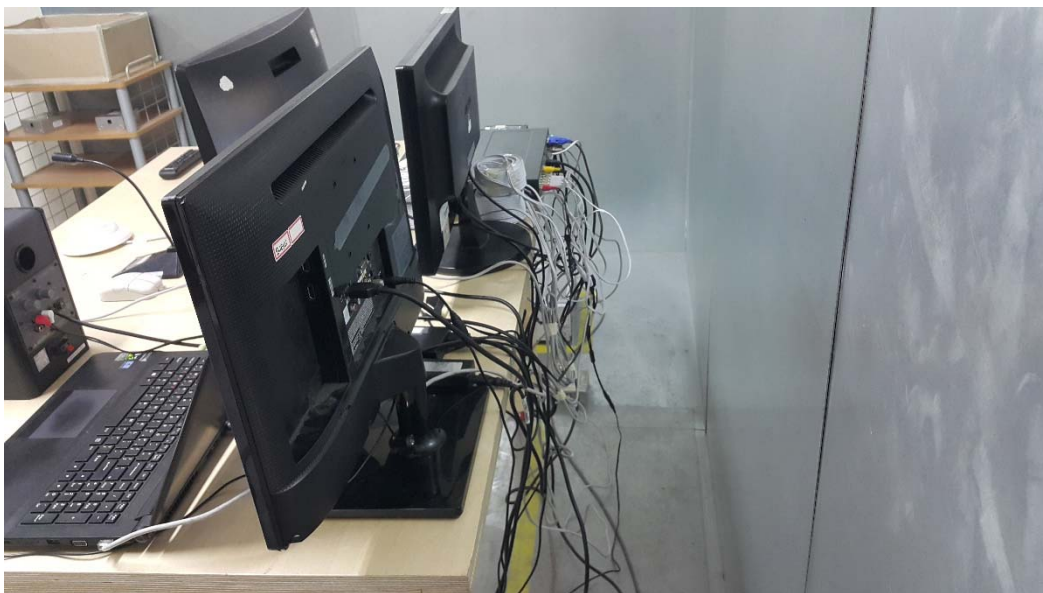
Test Setup Photos and Configuration

Conducted Voltage Emissions



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Conducted Telecommunication Emissions



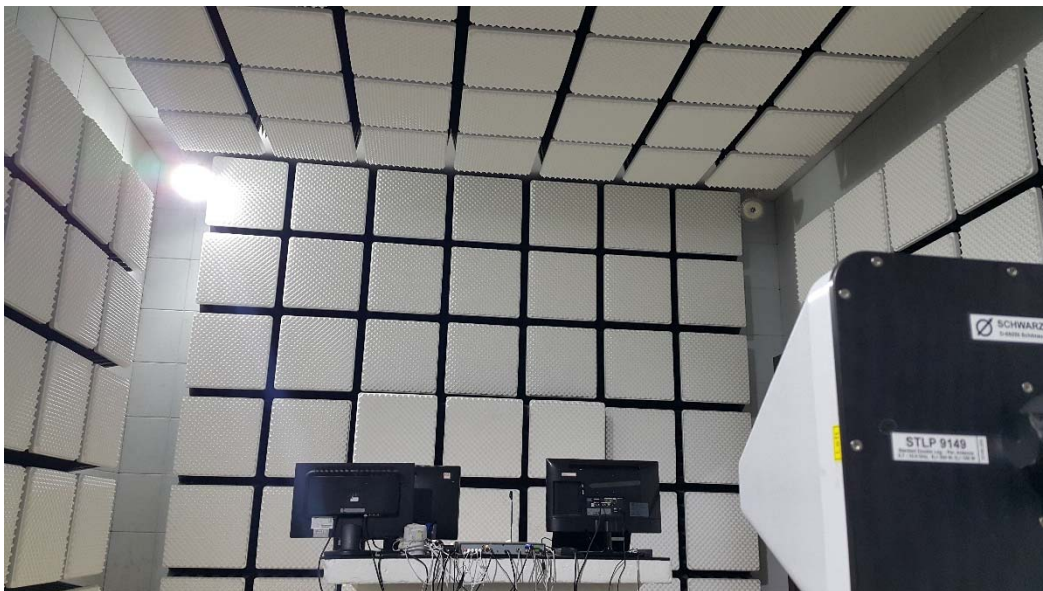
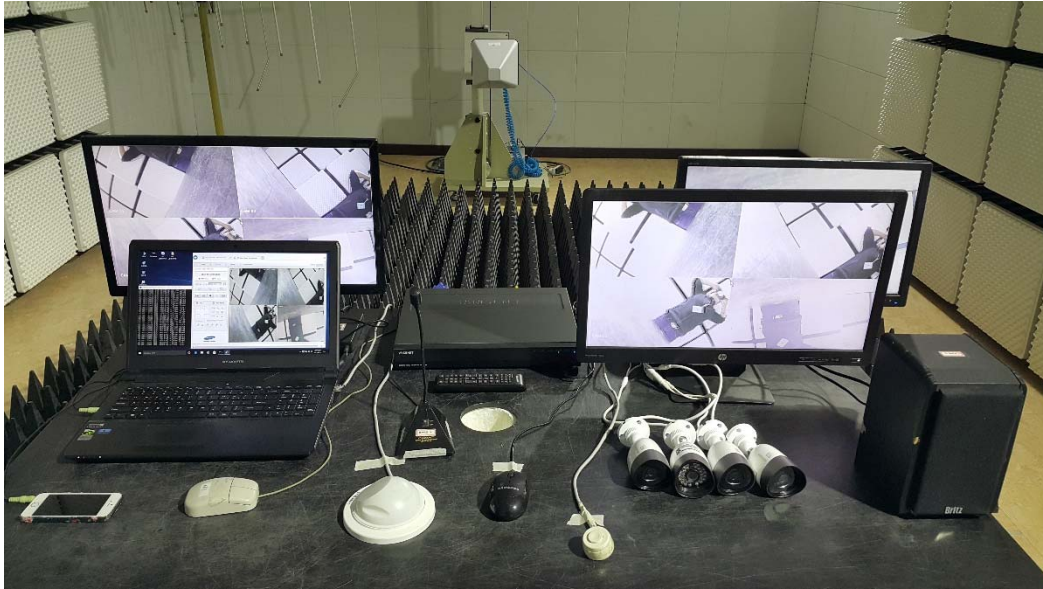
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Radiated Electric Field Emissions(Below 1 GHz)



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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

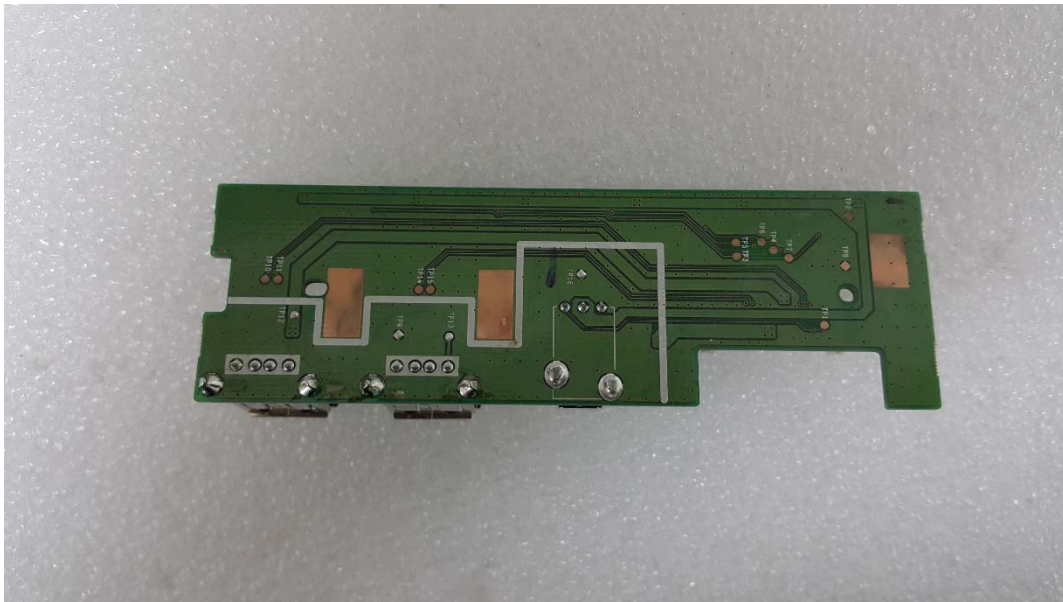
(Internal View)



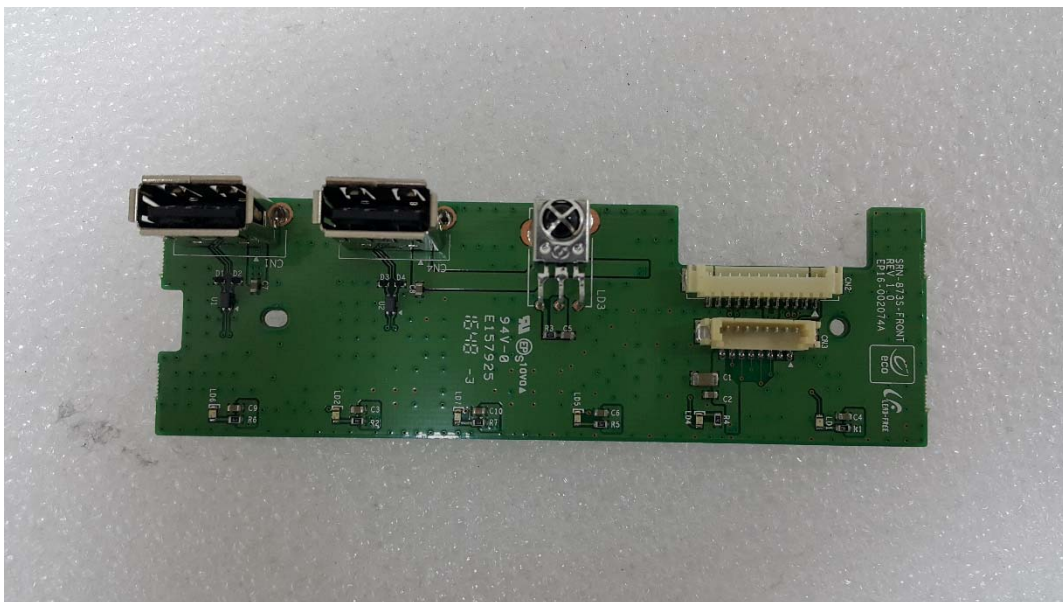
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EUT Internal View – Board 1

(Top)



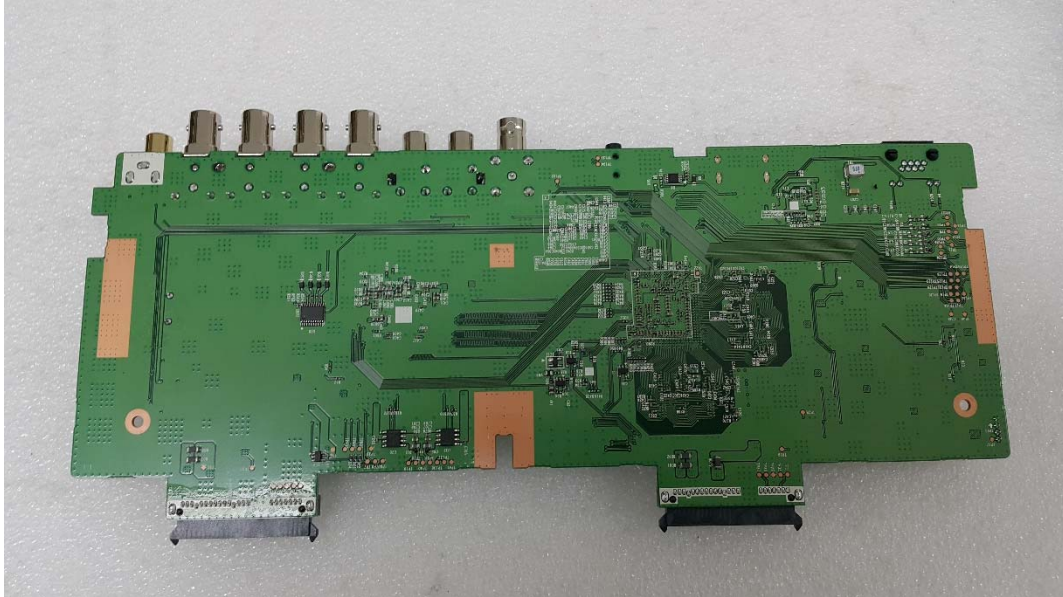
(Bottom)



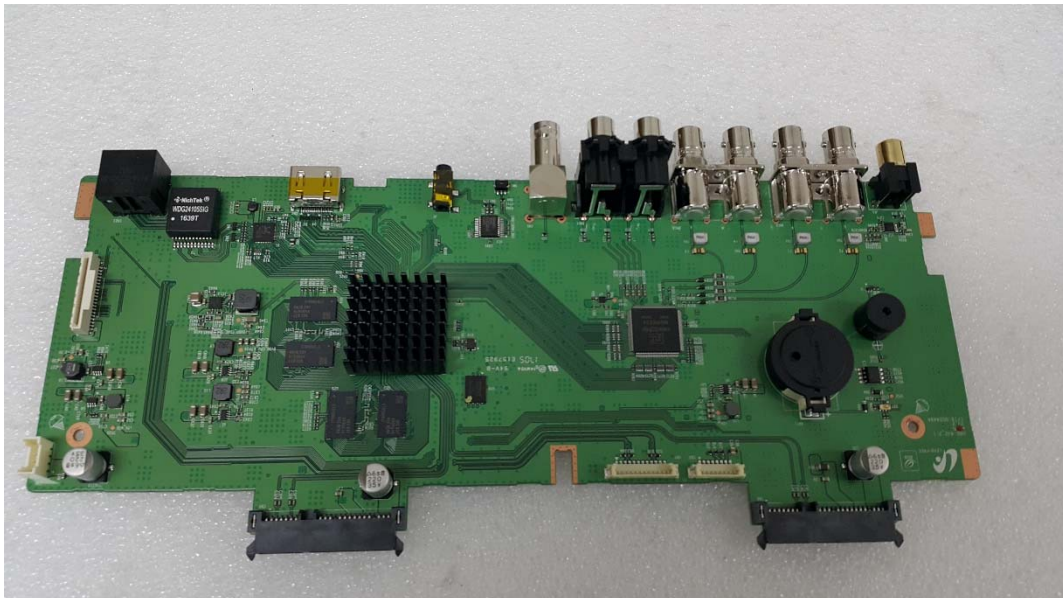
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EUT Internal View – Board 2

(Top)



(Bottom)



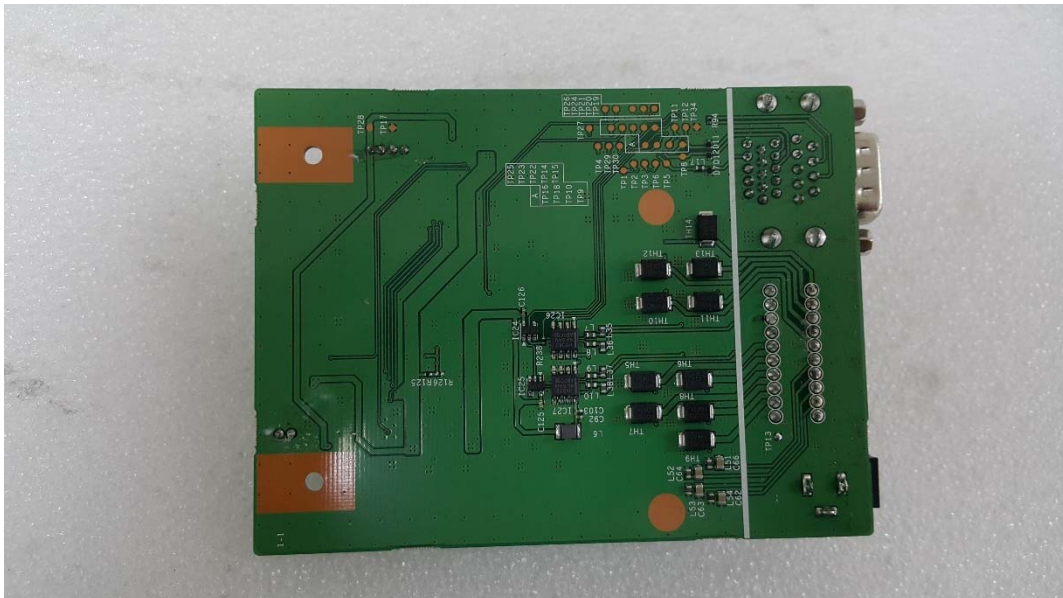
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EUT Internal View – Board 3

(Top)



(Bottom)



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