



FCC/IC TEST REPORT

Reference No. : G-45-2012-01226
Applicant : SAMSUNG ELECTRONICS CO., LTD.
Equipment Under Test (EUT) :
 Product Name : PICO PROJECTOR
 Model Name : EAD-R10
Applied Standards : FCC Part 15 : 2009, Subpart B, Class B
 FCC Part 15 : 2010, Subpart B, Class B (Not KOLAS Accredited)
 ANSI C63.4 : 2003
 CISPR 22 : 2008
 ICES-003 Issue 4 : 2004
Date of Receipt : April 27, 2012
Date of Test : May 10, 2012 ~ May 11, 2012
Date of Issue : May 16, 2012
Test Results : Complied

Tested by	:		 ----- Jerry Jeong
Reviewed by	:		 ----- Forest Lee

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA. These Results are deemed satisfactory evidence of compliance with industry Canada interface causing Equipment standard ICES-003.

Remarks :

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1. General Information

1.1 Client Information

Applicant : SAMSUNG ELECTRONICS CO., LTD.
Address of Applicant : 416, Maetan 3 dong, Yeongtong-gu, Suwon-city,
Gyeonggi-do, Korea
Manufacturer : Samsung Electronics Huizhou Co., Ltd.
Address of Manufacturer : Chenjiang, Town, Huizhou City, Guangdong Province,
China

1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd. (Gunpo Laboratory)
18-34, Sanbon-dong, Gunpo, Gyeonggi-do, Korea
435-040
FCC Registration No. : 367021
IC Company No. : 4620F
Phone : + 82 31 428 5700
Fax : + 82 31 427 2370
e-mail : forest.lee@sgs.com

1.3 General Information of E.U.T.

Product Name	PICO PROJECTOR
Model Name	EAD-R10
Serial No.	-
Hardware Version	REV1.0
Software Version	SW1.0
FCC ID	A3LEAD-R10
IC Number	649E-EAD-R10
EMI Classification	Class B
Rated Voltage	Input (100 ~ 240) Va.c., (50/60)Hz, 0.35 A Output 5 Vd.c., 2 A
Test Voltage	120 Va.c., 60 Hz (Travel Adapter)
Battery	3.7 Vd.c., 1650 mAh, 6.11 Wh
Highest Internal Frequency	Max. 222 MHz

1.4 Operating Modes and Conditions

Operating mode	Operating condition
Mode 1 MHL Sink Mode	MHL Sink Mode
Mode 2 HDMI Sink Mode	HDMI Sink Mode
Mode 3 MHL Dongle Mode	MHL Dongle Mode

1.5 Auxiliary Equipments

Description	Model	Serial No.	Manufacturer
Mobile Phone	SHV-E160S	R33C210HZWW	Samsung Electronics Co., Ltd.
Mobile Phone	GT-I9250	R27BB67822L	Samsung Electronics Co., Ltd.
GALAXY Player	YP-GB70	131B620043	Samsung Electronics Co., Ltd.
PICO Projector	EAD-R10	-	Samsung Electronics Co., Ltd.

Note: Auxiliary equipments are declared according to FCC procedure.

1.6 Cable List

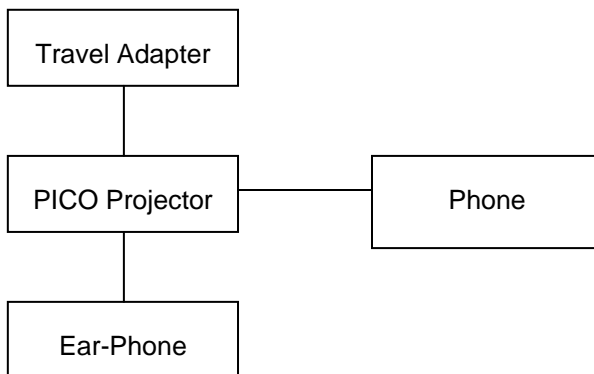
Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
MHL Sink Mode					
PICO Projector	DC IN	Travel Adapter	DC OUT	1.4	Shield
	MHL HDMI IN	Phone	MHL	1.5	Shield
	Audio OUT	Ear-Phone	-	1.4	Shield
Travel Adapter	AC IN	AC Source	-	-	-
HDMI Sink Mode					
PICO Projector	DC IN	Travel Adapter	DC OUT	1.4	Shield
	MHL HDMI IN	GALAXY Player	Mini HDMI	1.7	Shield
	Audio OUT	Ear-Phone	-	1.4	Shield
Travel Adapter	AC IN	AC Source	-	-	-
MHL Dongle Mode					
PICO Projector (EUT)	DC IN	Travel Adapter	DC OUT	1.4	Shield
	MHL HDMI IN	Phone	MHL	1.5	Shield
	HDMI OUT	PICO Projector	MHL HDMI IN	1.4	Shield
Travel Adapter	AC IN	AC Source	-	-	-

1.7 System Configurations

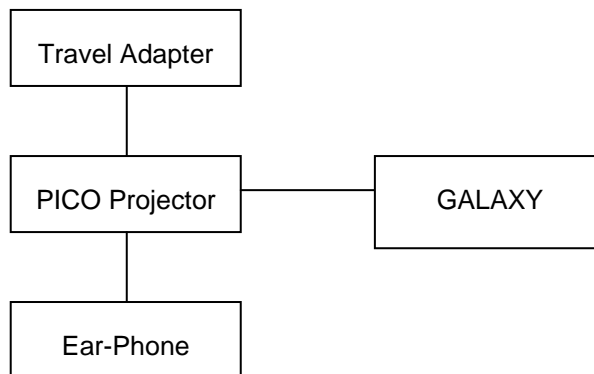
Description	Model	Serial No.	Manufacturer
Main Board	EAD_R10_REV1.0	-	-
SUB Board	EAD-R10-SUB-REV0.0	-	-
Zoom Key Board	EAD-R10 ZOOM KEY Rev0.1	-	-
Battery	EB524759VA	TH1C102GS/5-B	SAMSUNG
Travel Adapter	ETA-P11X	-	TIANJIN E&P ELECTRONICS Inc.
Ear-Phone	-	-	SAMSUNG
Lens	-	-	-

1.8 Test System Layout

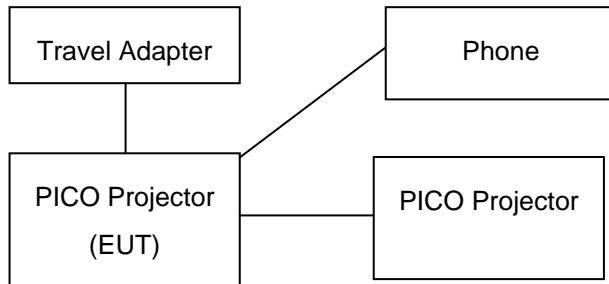
- MHL Sink Mode



- HDMI Sink Mode



- MHL Dongle Mode



1.9 Modifications

There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 : 2009, Subpart B, Class B FCC Part 15 : 2010, Subpart B, Class B (Not KOLAS Accredited) ICES-003 Issue 4 : 2004	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Basic Standards	Results
Conducted Emission	ANSI C63.4 : 2003. CAN/CSA-CEI/IEC CISPR 22 : 02 (Not KOLAS Accredited)	Complied
Radiated Emission	ANSI C63.4 : 2003 CAN/CSA-CEI/IEC CISPR 22 : 02 (Not KOLAS Accredited)	Complied

Note : Test

methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Basic Standards	Test Results
Conducted Emission	ANSI C63.4 : 2003 CAN/CSA-CEI/IEC CISPR 22 : 02 (Not KOLAS Accredited)	Complied
Radiated Emission	ANSI C63.4 : 2003 CAN/CSA-CEI/IEC CISPR 22 : 02 (Not KOLAS Accredited)	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	N/A
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m & 3 m
	Above 1 GHz	1 MHz	3 m

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

2.2.2 Test Limits

-Conducted Emission Limits

Frequency Range	Limits(dB(μ V))		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

Frequency Range	Limits(dB(μ V/m))		Class
	Quasi-peak		
30 MHz ~ 230 MHz	40		Class A (10m method)
230 MHz ~ 1 GHz	47		
30 MHz ~ 230 MHz	40.5		Class B (3m method)
230 MHz ~ 1 GHz	47.5		

-Radiated Emission Limits above 1 GHz (3m method)

Frequency Range	Limits(dB(μ V/m))		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
Above 1 GHz	54	74	Class B

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3m distance not 10m distance.

2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and Average detector and using the software of ES-K1(Version V1.71 from R&S). The final test data was measured using a Quasi-Peak detector and Average detector.

2.3.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Two-Line V-Network	ENV216	R & S	100190	2012.01.09
Artificial Mains Networks	ESH2-Z5	R & S	100280	2012.04.06
Test Receiver	ESHS10	R & S	863365/018	2011.07.07

2.3.2 Test Site

Shield Room in Gunpo Laboratory

2.3.3 Environment Conditions

Temperature : 27.4 ~ 28.5

Humidity : 34.0 %R.H. ~ 36.0 %R.H.

Atmospheric Pressure : 100.5 kPa ~ 100.6 kPa

Test Date : May 10, 2012

- MHL Sink Mode

Freq. (MHz)	Line (H/N)	Level (dB μ V)		CL (dB)	LISN (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q/P	A/V			Q/P	A/V	Q/P	A/V	Q/P	A/V
0.44	H	34.40	22.00	0.06	9.57	44.03	31.63	57.06	47.06	13.03	15.43
0.45	N	33.40	21.50	0.07	9.65	43.12	31.22	56.88	46.88	13.76	15.66
0.54	H	31.30	20.60	0.07	9.57	40.94	30.24	56.00	46.00	15.06	15.76
0.57	N	30.50	16.70	0.07	9.65	40.22	26.42	56.00	46.00	15.78	19.58
1.04	N	28.60	15.50	0.09	9.66	38.35	25.25	56.00	46.00	17.65	20.75
7.20	H	34.40	25.80	0.02	9.63	44.05	35.45	60.00	50.00	15.95	14.55

- HDMI Sink Mode

Freq. (MHz)	Line (H/N)	Level (dB μ V)		CL (dB)	LISN (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q/P	A/V			Q/P	A/V	Q/P	A/V	Q/P	A/V
0.33	H	29.20	20.00	0.06	9.57	38.83	29.63	59.45	49.45	20.62	19.82
0.49	N	28.40	16.60	0.07	9.65	38.12	26.32	56.17	46.17	18.05	19.85
0.51	H	33.20	23.00	0.07	9.57	42.84	32.64	56.00	46.00	13.16	13.36
1.13	H	27.30	18.30	0.09	9.58	36.97	27.97	56.00	46.00	19.03	18.03
7.41	H	33.70	25.90	0.02	9.63	43.35	35.55	60.00	50.00	16.65	14.45
20.08	N	29.90	16.50	0.25	9.83	39.98	26.58	60.00	50.00	20.02	23.42

- MHL Dongle Mode

Freq. (MHz)	Line (H/N)	Level (dB μ V)		CL (dB)	LISN (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q/P	A/V			Q/P	A/V	Q/P	A/V	Q/P	A/V
0.33	H	30.70	23.30	0.06	9.57	40.33	32.93	59.45	49.45	19.12	16.52
0.51	H	31.70	25.70	0.07	9.57	41.34	35.34	56.00	46.00	14.66	10.66
0.64	N	26.40	16.60	0.07	9.65	36.12	26.32	56.00	46.00	19.88	19.68
1.13	H	28.80	26.20	0.09	9.58	38.47	35.87	56.00	46.00	17.53	10.13
7.41	H	31.20	28.40	0.02	9.63	40.85	38.05	60.00	50.00	19.15	11.95
20.08	N	30.50	19.70	0.25	9.83	40.58	29.78	60.00	50.00	19.42	20.22

Measurement Uncertainty : ± 4.12 dB (The confidential level is about 95%, K=2)

- Note :
- Line (H) : Hot
 - Line (N) : Neutral
 - CL: Cable Loss
 - LISN : LISN Factor
 - Result = Level + CL + LISN
 - Margin = Limit – Result

See Appendix A (Conducted Emission)

2.4 Radiated Emission

The initial preliminary exploratory scans were performed at 3 m distance over the measuring frequency range(30 MHz to 6 GHz) using a max hold mode incorporating a Peak detector and using the software of EP5RE(Version Ver3.10.20 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz at 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

2.4.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Horn Antenna	HF906	R & S	100326	2011.11.23
Signal Conditioning Unit	SCU 18	R & S	10117	2012.01.12
Bilog Antenna	VULB9163	SCHWARZBEC K MESS- ELEKTRONIK	396	2011.05.12
Test Receiver	ESU26	R & S	100109	2012.02.21
Amplifier	8447F	HP	2944A03909	2011.07.04

Note : Only the calibration period of Antennas is 2 years but the period of every equipment is 1 year.

2.4.2 Test Site

3 m Semi-Anechoic Chamber in Gunpo Laboratory

2.4.3 Environment Conditions

Below 1 GHz (3 m method)

Temperature : 25.2 ~ 25.5

Humidity : 41.0 %R.H. ~ 42.0 %R.H.

Atmospheric Pressure : 100.4 kPa

Test Date : May 11, 2012

- MHL Sink Mode

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A ($^{\circ}$)	H (m)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.45	48.40	V	198.0	1.00	10.33	0.56	27.20	32.09	40.50	8.41
74.22	44.70	V	100.0	1.00	7.99	0.89	27.29	26.29	40.50	14.21
99.36	42.50	H	205.0	3.10	11.71	1.06	27.49	27.78	40.50	12.72
197.89	45.40	H	295.0	2.90	10.88	1.49	26.72	31.05	40.50	9.45
222.75	50.10	H	165.0	2.10	11.73	1.56	26.65	36.74	40.50	3.76
270.32	47.30	H	97.0	1.20	12.63	1.71	26.56	35.08	47.50	12.42

- HDMI Sink Mode

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A ($^{\circ}$)	H (m)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.65	46.10	V	170.0	1.10	10.43	0.57	27.20	29.90	40.50	10.60
89.78	39.10	H	200.0	3.20	10.24	0.99	27.42	22.91	40.50	17.59
148.50	40.40	H	125.0	4.00	8.40	1.24	27.11	22.93	40.50	17.57
197.89	47.10	H	65.0	3.00	10.88	1.49	26.72	32.75	40.50	7.75
266.60	45.20	H	326.0	2.00	12.63	1.69	26.57	32.95	47.50	14.55
371.28	48.40	H	85.0	1.10	13.42	2.02	27.07	36.77	47.50	10.73

- MHL Dongle Mode

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A ($^{\circ}$)	H (m)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
30.45	42.70	V	226.0	1.00	10.33	0.56	27.20	26.39	40.50	14.11
74.22	50.50	V	281.0	2.10	7.99	0.89	27.29	32.09	40.50	8.41
148.46	43.80	V	272.0	1.20	8.40	1.24	27.11	26.33	40.50	14.17
222.75	47.70	H	78.0	1.10	11.73	1.56	26.65	34.34	40.50	6.16
262.48	54.40	H	67.0	1.00	12.63	1.68	26.58	42.13	47.50	5.37
371.24	51.90	H	176.0	1.00	13.42	2.02	27.07	40.27	47.50	7.23

Measurement Uncertainty (Horizontal) : \pm 5.44 dB (The confidential level is about 95%, K=2)

Measurement Uncertainty (Vertical) : \pm 5.81 dB (The confidential level is about 95%, K=2)

Note: • AF = Antenna Factor
 • Pol.(H) = Horizontal
 • Margin = Limit – F/S
 • A : Angle
 • CL = Cable Loss
 • Pol.(V) = Vertical
 • F/S = Level + AF + CL – Amp.
 • H : Height
 • F/S = Field Strength
 • Amp. = Amplifier Gain

Above 1 GHz (3 m method)

Temperature : 24.6 ~ 24.9

Humidity : 41.0 %R.H. ~ 42.0 %R.H.

Atmospheric Pressure : 100.3 kPa ~ 100.4 kPa

Test Date : May 11, 2012
- MHL Sink Mode

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A (°)	H (m)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Peak Detector										
1039.58	54.20	V	215.9	1.10	24.03	3.74	42.96	39.00	74.00	35.00
1261.67	47.80	V	220.3	1.10	25.25	4.06	42.77	34.34	74.00	39.66
Average Detector										
1039.58	29.50	V	215.9	1.10	24.03	3.74	42.96	14.30	54.00	39.70
1261.67	28.70	V	220.3	1.10	25.25	4.06	42.77	15.24	54.00	38.76

- HDMI Sink Mode

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A (°)	H (m)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Peak Detector										
1589.56	43.20	H	166.0	2.00	25.25	4.40	42.70	30.14	74.00	43.86
1987.70	44.70	H	85.0	2.00	27.86	4.78	42.69	34.64	74.00	39.36
Average Detector										
1589.56	29.40	H	166.0	2.00	25.25	4.40	42.70	16.34	54.00	37.66
1987.70	26.70	H	85.0	2.00	27.86	4.78	42.69	16.64	54.00	37.36

- MHL Dongle Mode

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A (°)	H (m)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Peak Detector										
1039.58	54.20	H	65.7	1.10	24.03	3.74	42.96	39.00	74.00	35.00
1484.79	49.80	H	143.8	1.10	25.15	4.30	42.70	36.55	74.00	37.45
Average Detector										
1039.58	30.40	H	65.7	1.10	24.03	3.74	42.96	15.20	54.00	38.80
1484.79	32.10	H	143.8	1.10	25.15	4.30	42.70	18.85	54.00	35.15

 Measurement Uncertainty (Horizontal) : \pm 4.80 dB (The confidential level is about 95%, K=2)

 Measurement Uncertainty (Vertical) : \pm 4.82 dB (The confidential level is about 95%, K=2)

 Note:

- AF = Antenna Factor
- CL = Cable Loss
- F/S = Field Strength
- Pol.(H) = Horizontal
- Pol.(V) = Vertical
- Amp. = Amplifier Gain
- Margin = Limit – F/S
- F/S = Level + AF + CL – Amp.
- A : Angle
- H : Height

See Appendix B (Radiated Emission)

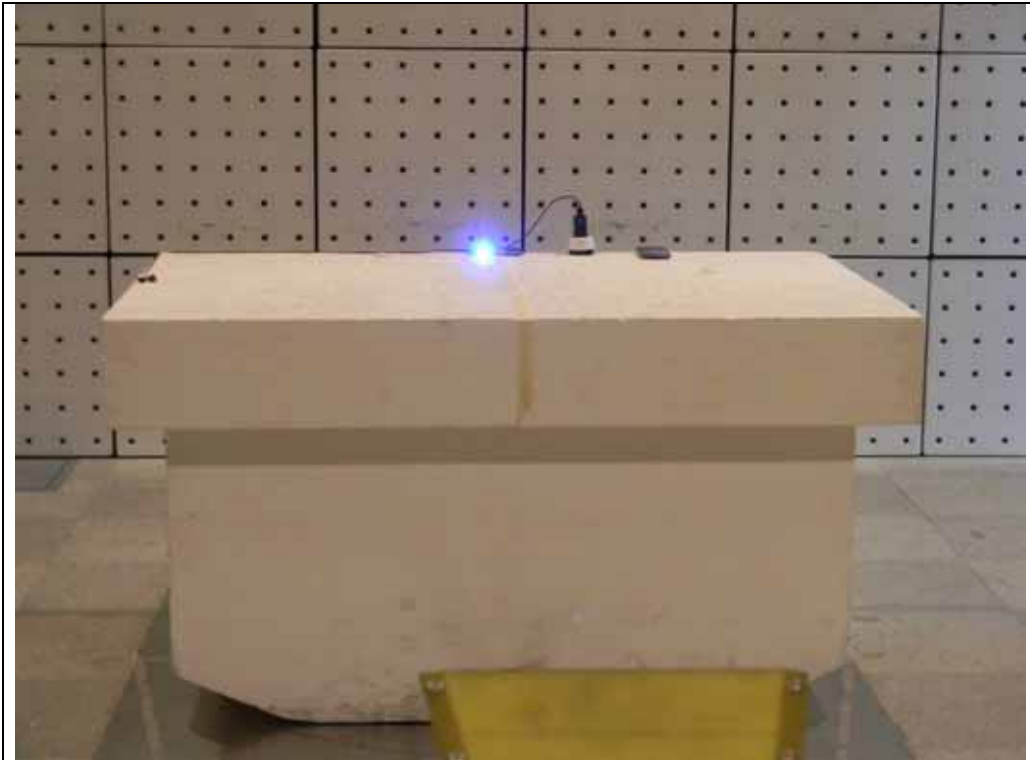
2.5 Photographs of Conducted Emission



2.6 Photographs of Radiated Emission (3m method below 1 GHz)



2.7 Photographs of Radiated Emission (3m method above 1 GHz)



3. Photographs of EUT

- Front View



- Rear View



● Front View of Lens



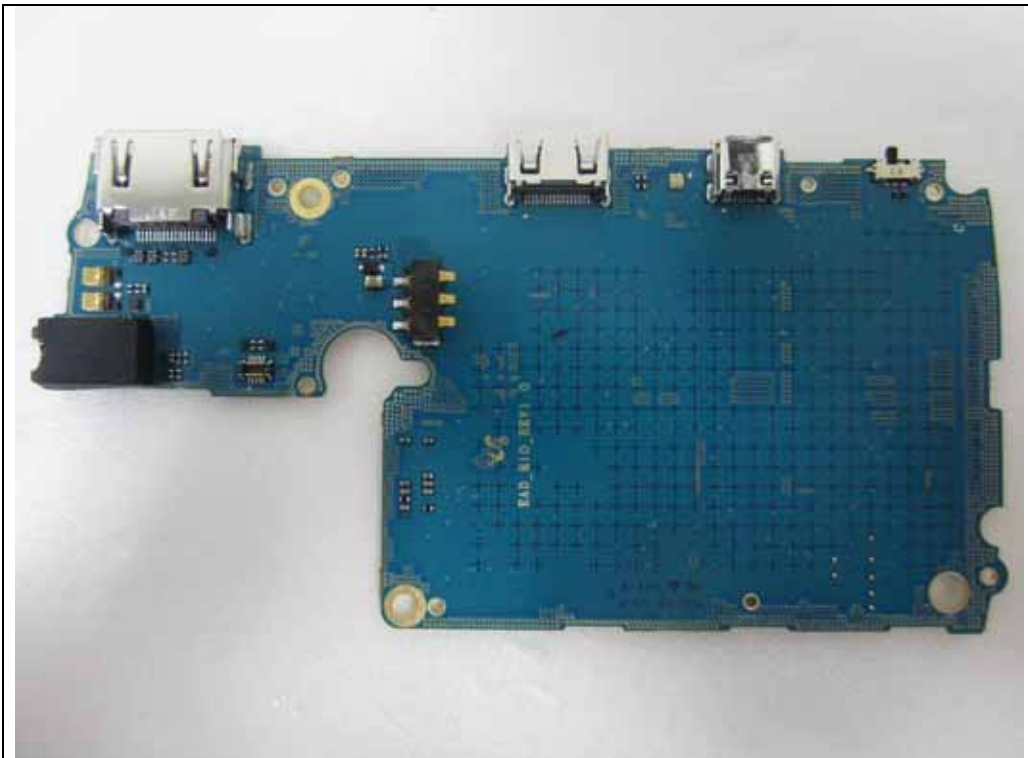
● Rear View of Lens



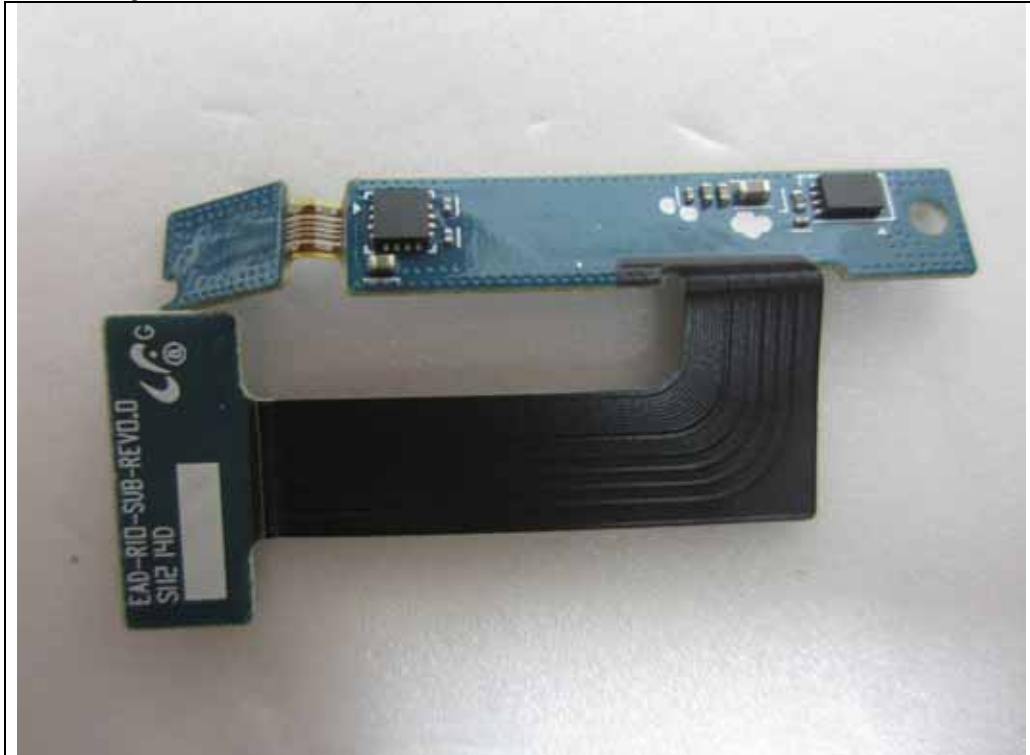
- **Top View of Main Board**



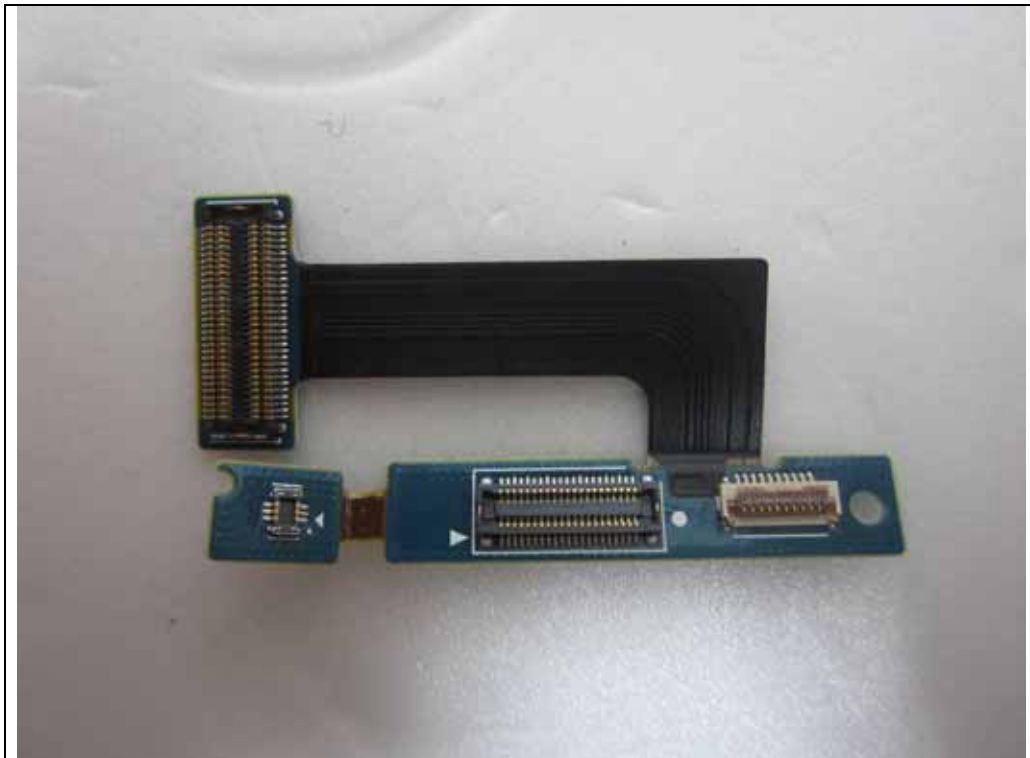
- **Bottom View of Main Board**



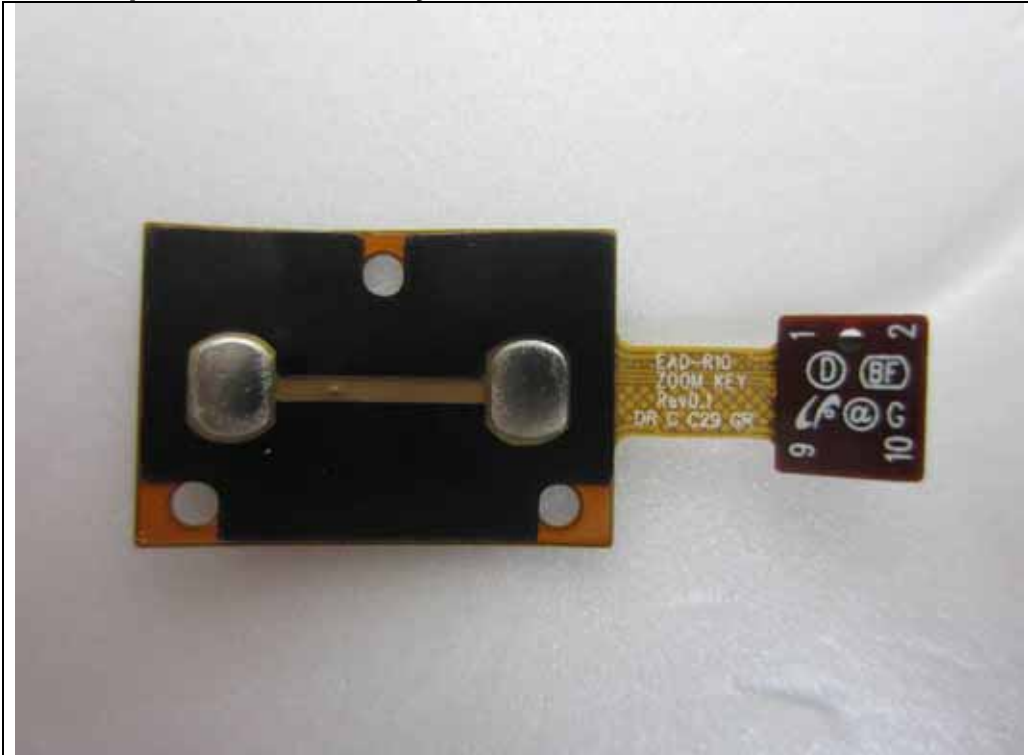
- Top View of Sub Board



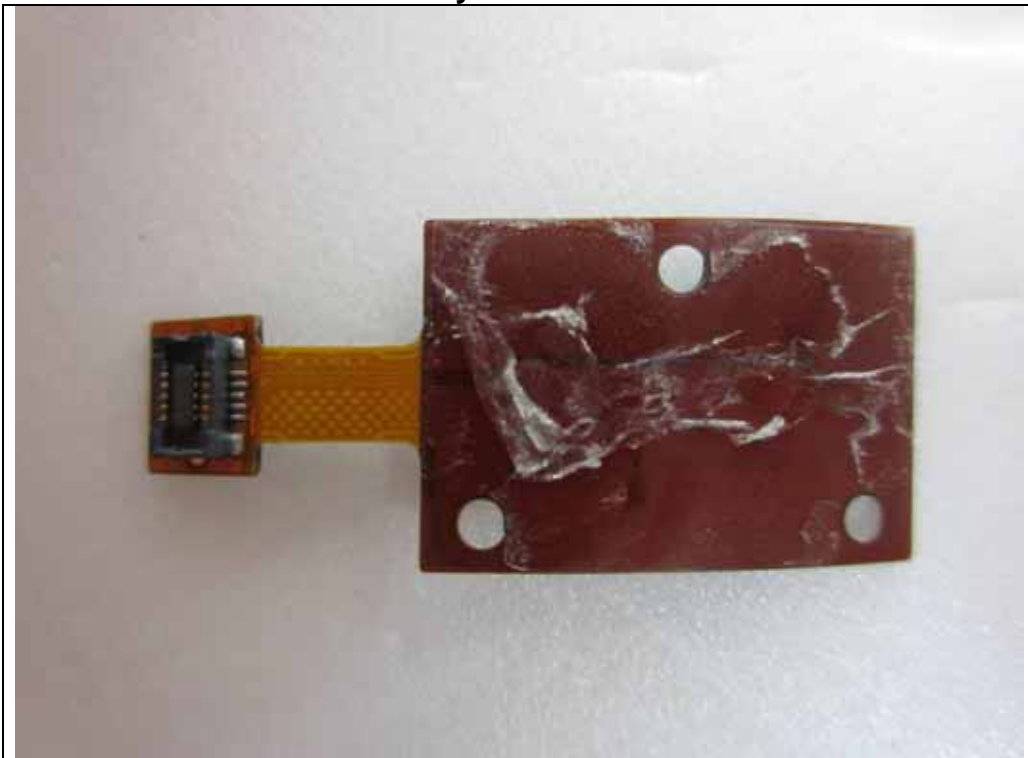
- Bottom View of Sub Board



● Top View of Zoom Key Board



● Bottom View of Zoom Key Board



● Top View of Battery



● Bottom View of Battery



● Travel Adapter



● Travel Adapter Label



● Ear-Phone



● HDMI Cable

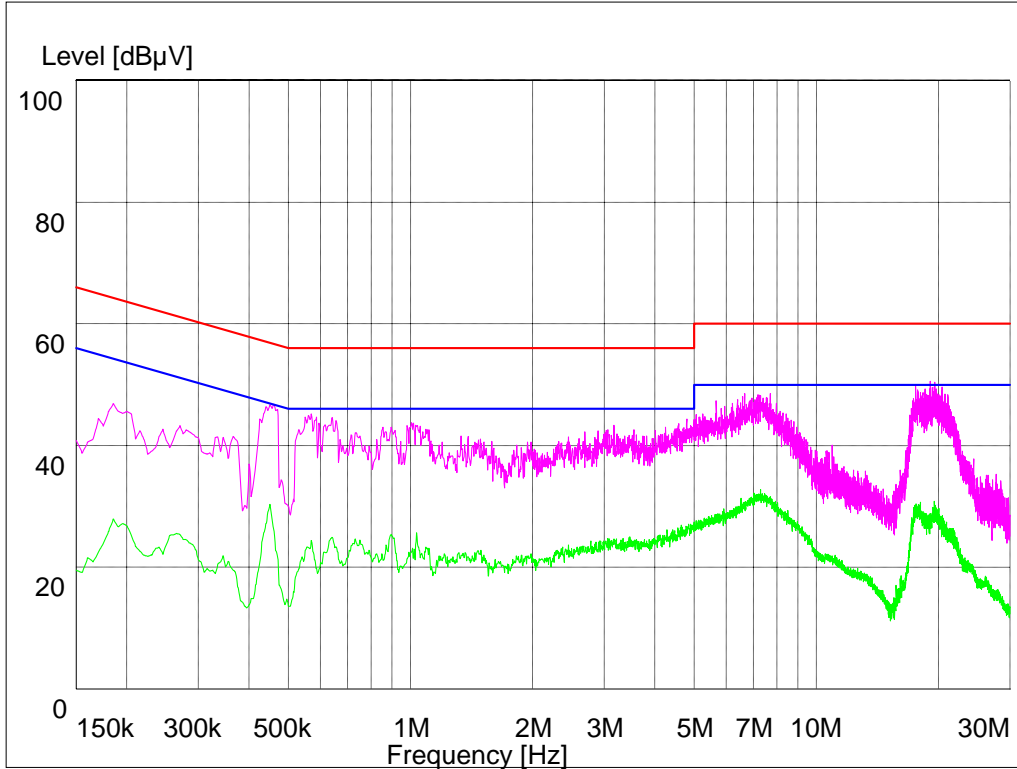


● Inside

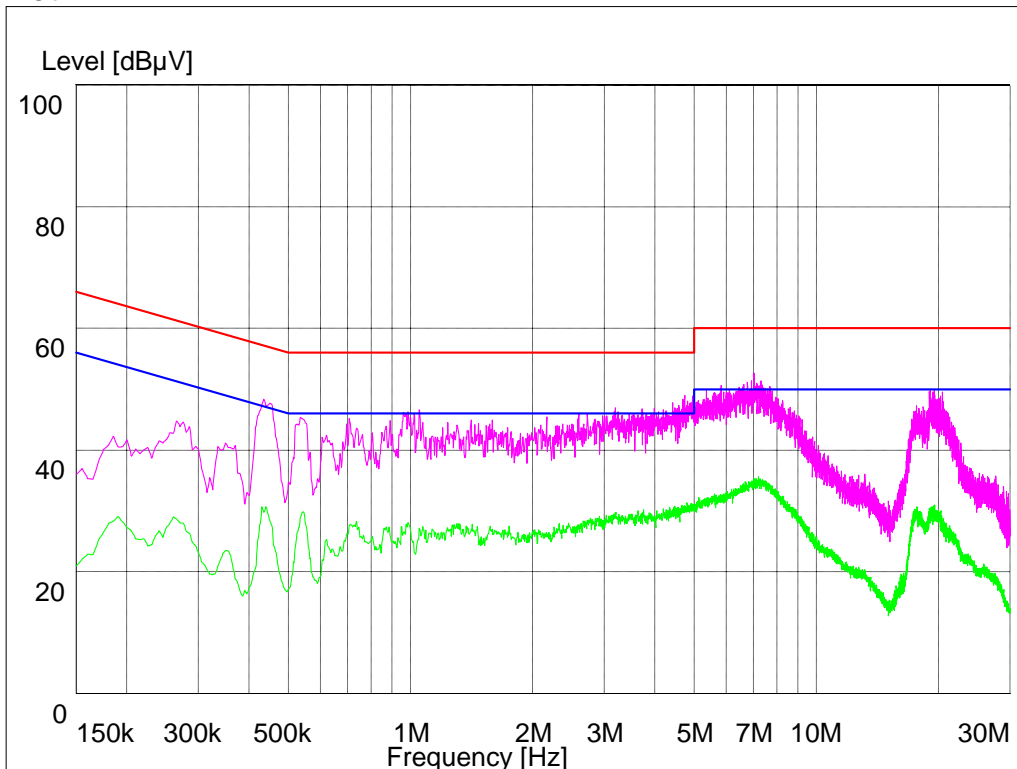


**Appendix A : Conducted Emission
- MHL Sink Mode**

Neutral

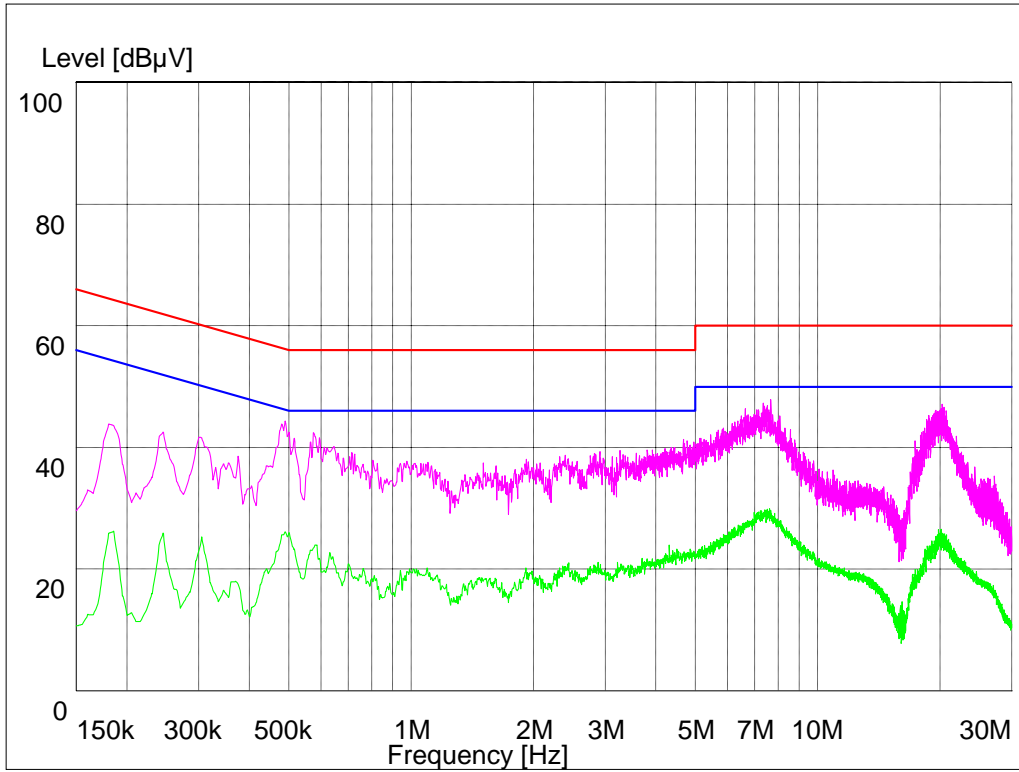


Hot

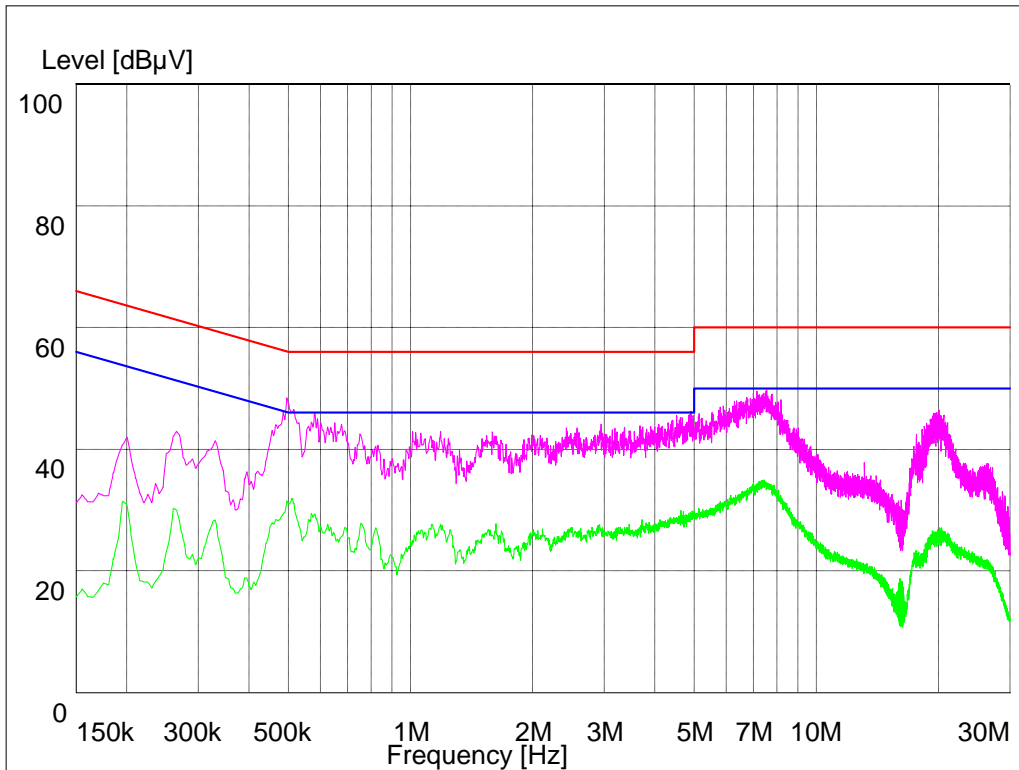


- HDMI Sink Mode

Neutral

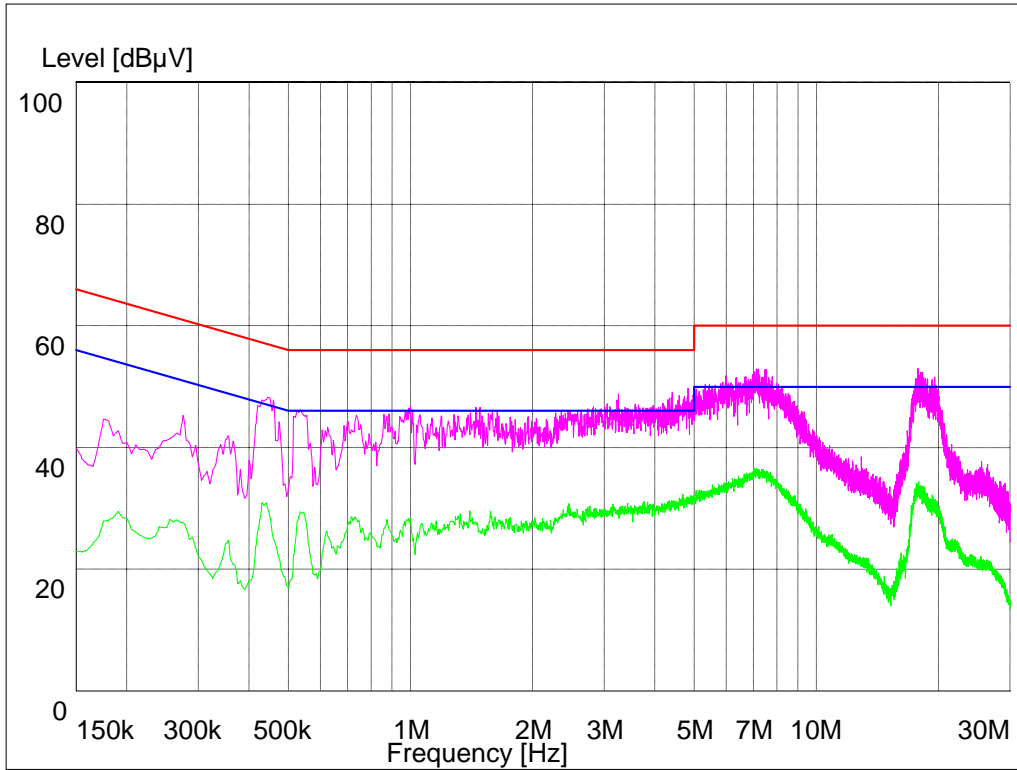


Hot

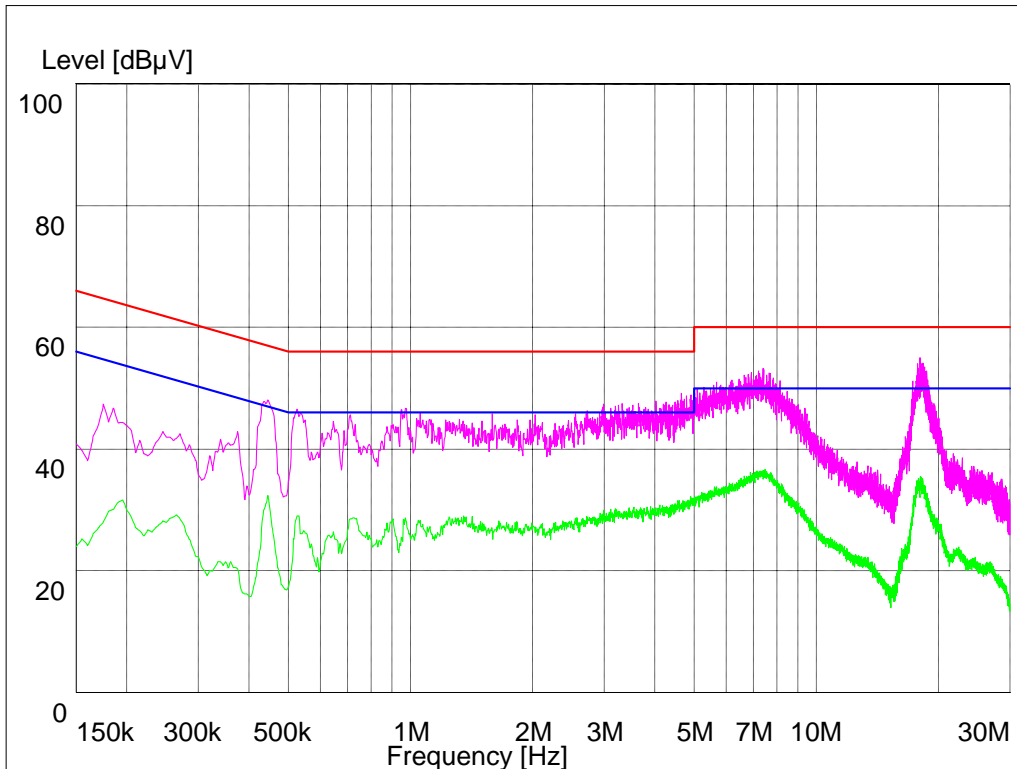


- MHL Dongle Mode

Neutral



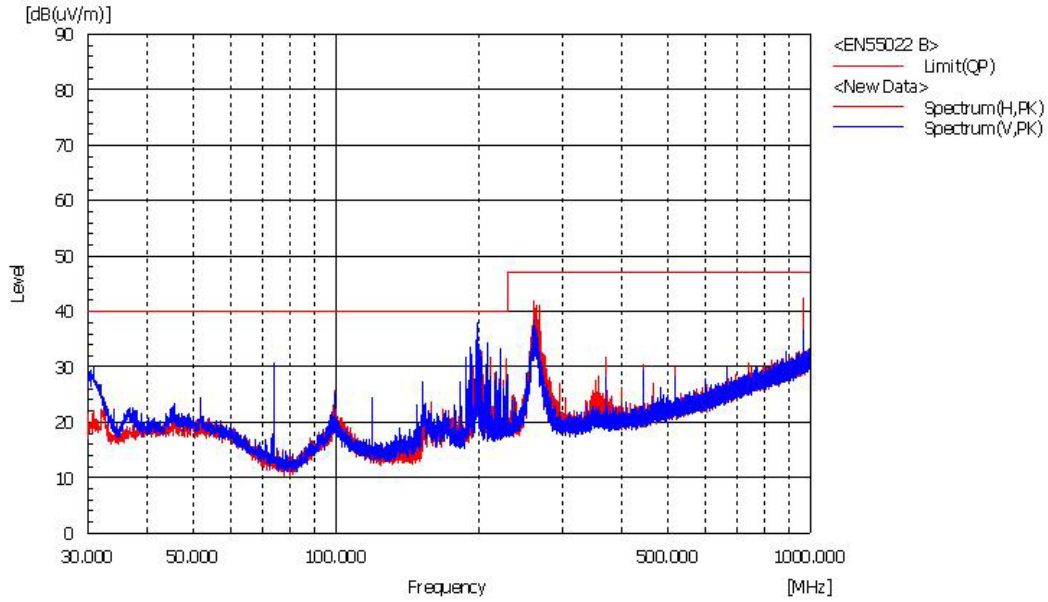
Hot



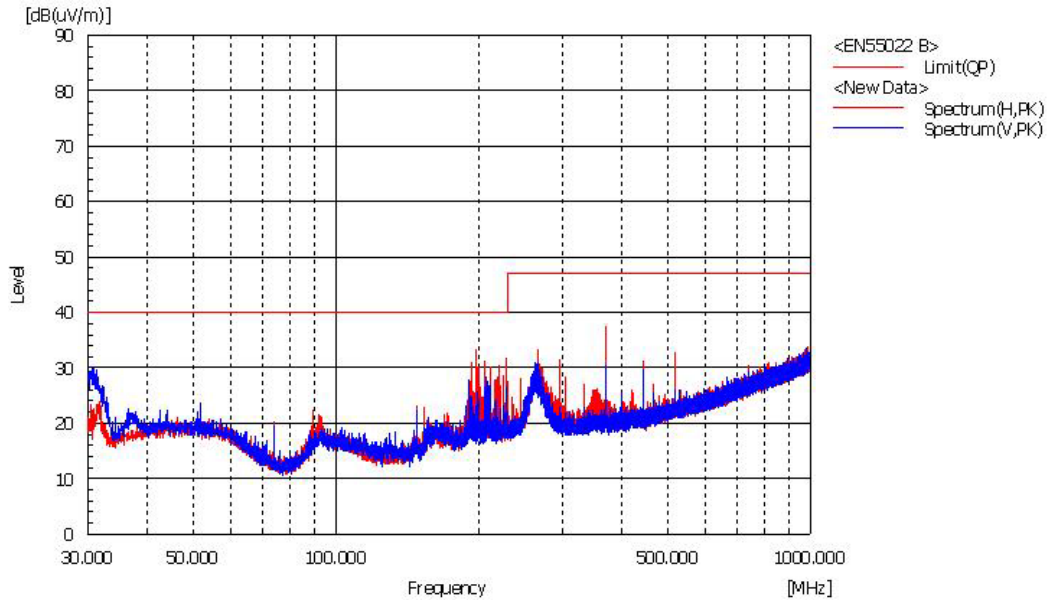
Appendix B : Radiated Emission (3m Scan Data)

Below 1 GHz

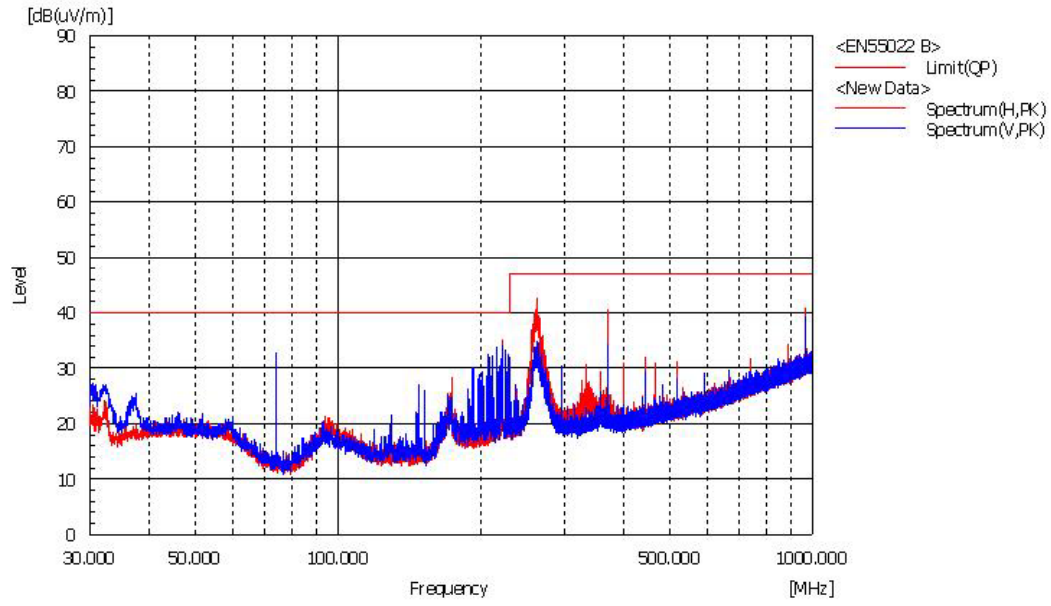
- MHL Sink Mode



- HDMI Sink Mode

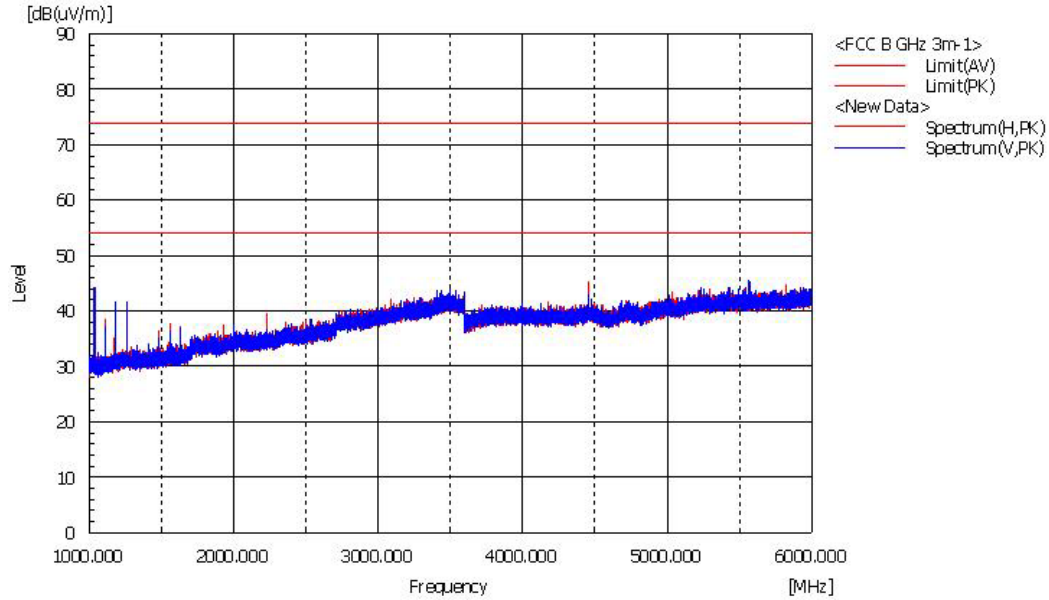


- MHL Dongle Mode

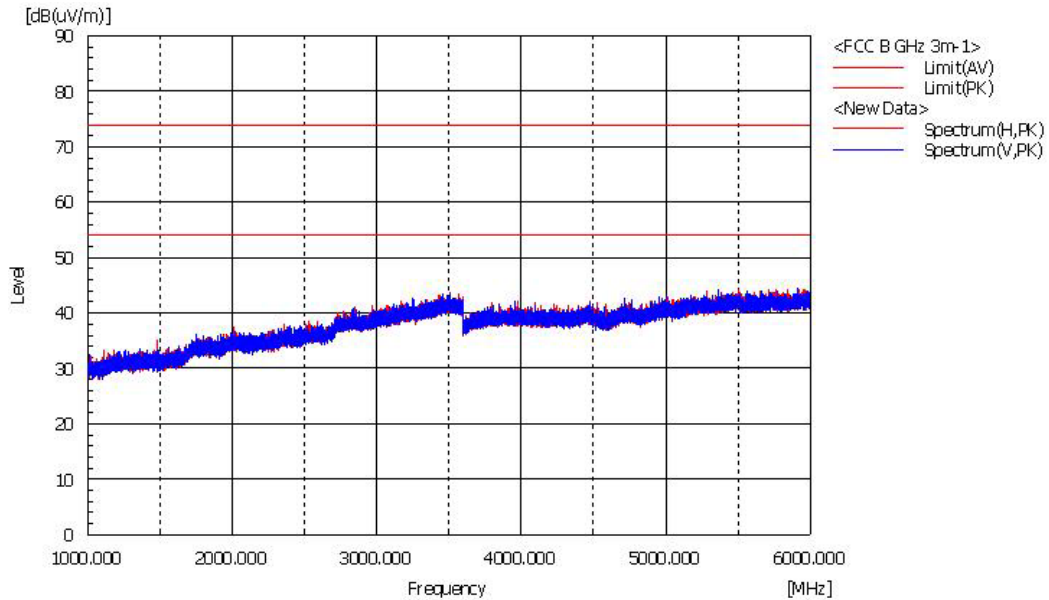


Above 1 GHz

- MHL Sink Mode



- HDMI Sink Mode



- MHL Dongle Mode

