

FCC Verification Test Report

For

HB Optoelectronics Co., Ltd

EUT Name: DLP Pico Projector
Model No.: HBP200, HBP200+, HBP200++
Brand Name: HB OPTO

Prepared By:

Asia Institute Technology (Dongguan) Limited

Date of Receipt: Apr. 23, 2012
Date of Test: Apr. 24~25, 2012
Date of Issue: May. 05, 2012
Test Result: Pass

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Verification of Compliance

Client Information:

Applicant: HB Optoelectronics Co., Ltd
Applicant add.: 2F.,No.300, Ruekuang Rd.,Taipei 114, Taiwan

EUT Information:

EUT Name: DLP Pico Projector
Model No.: HBP200, HBP200+, HBP200++
Brand Name: HB OPTO

Test procedure used: FCC Part 15 Subpart B Class B
ICES-003

This device described above has been tested by Asia Institute Technology (Dongguan) Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC and IC requirements. And it is applicable only to the tested sample identified in the report.

Reviewed by: Seal-Chen
Test director

Approved by: Jensen. vlv
Technical director

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2 Test Summary

Test	Test Requirement	Test Method	Criterion	Result
Mains Terminals Disturbance Voltage, 150kHz to 30MHz	FCC Part 15 Subpart B ICES-003	FCC Part 15 Subpart B ANSI C63.4: 2009	Limits	PASS
Radiated Emissions 30MHz to 1GHz	FCC Part 15 Subpart B ICES-003	FCC Part 15 Subpart B ANSI C63.4: 2009	Limits	PASS

Remark: None

Model description: The HBP200+ and HBP200++ are equipped with the special battery, and HBP200 has no battery. The difference between HBP200+ and HBP200++ is only the different battery.

2.1 Measurement Uncertainty

The report uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

No.	Item	Frequency Range	U , Value
1	Power Line Conducted Emission (Conduction 1)	150KHz~30MHz	1.18 dB
2	Power Line Conducted Emission (Conduction 2)	150KHz~30MHz	2.00 dB
3	Disturbance Power Emission (Conduction 1)	30MHz~300MHz	3.12 dB
4	Radiated Emission Test	30MHz~1GHz	3.40 dB
5	Radiated Emission Test	1GHz~18GHz	3.30 dB

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dongguan) Limited have been registered by Federal Communications Commission (FCC) on Nov.20, 2009.

.Industry Canada(IC)-Registration No: IC6819A-1 & IC6819A-2

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Asia Institute Technology (Dongguan) Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Nov.07, 2010.

.VCCI- Registration No: 2705

The 3m/10m Open Area Test Site, Shielding Room and 3m Chamber of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Jan.24, 2010 and Oct. 30, 2010. The Telecommunication Ports Conducted Disturbance Measurement of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Sep. 06, 2011.

.TUV Rhineland

Asia Institute Technology (Dongguan) Limited has been assessed on Dec.29, 2011 that it can carry out EMC tests by order and under supervision of TUV Rhineland.

.ITS- Registration No: TMPSHA031

Asia Institute Technology (Dongguan) Limited has been assessed and included in Intertek Shanghai TMP Program regarding Laboratory facilities and test equipment on Jul.22, 2011.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

4 General Information

4.1 General Description of EUT

Manufacturer:	HB Optoelectronics Co., Ltd			
Manufacturer Address:	2F.,No.300, Ruekuang Rd.,Taipei 114, Taiwan			
EUT Name:	DLP Pico Projector			
Model No:	HBP200+			
Brand Name:	HB OPTO			
Serial No:	HBP200, HBP200++			
Power Supply:	Input: DC 19V 2.4A			
Test Supply:	DC 19V from battery or adapter, AC 120V/60Hz for adapter			
Power Cord:	N/A			
Signal Cable:	a 1.0meter/shielded/detachable/with 2 cores HDMI line and a 0.9meter/shielded/detachable /with 2 cores VGA line			
Key component's information:				
No.	component name	Brand Name	Model No:	Serial No:
1	N/A	N/A	N/A	N/A

4.1.1 EUT Test Mode

Test Mode			Configuration
Mode 1	DC 19V from adapter, AC 120V/60Hz for adapter	Mode 1-1	The EUT is connecting to Secure Digital Memory Card for playing.
		Mode 1-2	The EUT is connecting to DVD player for playing.
		Mode 1-3	The EUT is connecting to PC with HDMI line for playing.
		Mode 1-4	The EUT is connecting to PC with VGA line for playing.
		Mode 1-5	The EUT is connecting to USB flash disk for playing.
Mode 2	DC 19V from battery	Mode 2-1	The EUT is connecting to Secure Digital Memory Card for playing.
		Mode 2-2	The EUT is connecting to DVD player for playing.
		Mode 2-3	The EUT is connecting to PC with HDMI line for playing.
		Mode 2-4	The EUT is connecting to PC with VGA line for playing.
		Mode 2-5	The EUT is connecting to USB flash disk for playing.
Mode 3	DC 19V from battery, AC 120V/60Hz for adapter	Mode 3-1	The EUT is connecting to Secure Digital Memory Card for playing.
		Mode 3-2	The EUT is connecting to DVD player for playing.
		Mode 3-3	The EUT is connecting to PC with HDMI line for playing.
		Mode 3-4	The EUT is connecting to PC with VGA line for playing.
		Mode 3-5	The EUT is connecting to USB flash disk for playing.

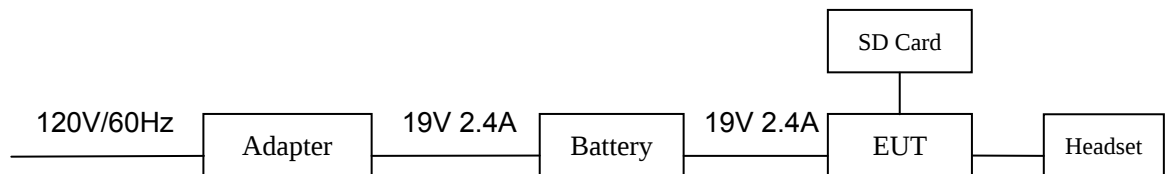
4.2 Description of Test setup

EUT was tested in normal configuration (Please See following Block diagram).

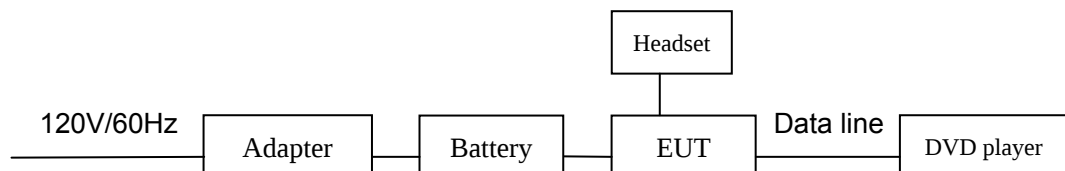
Through experiments, the Mode 3 is the worst mode.

1. Block diagram of EUT configuration

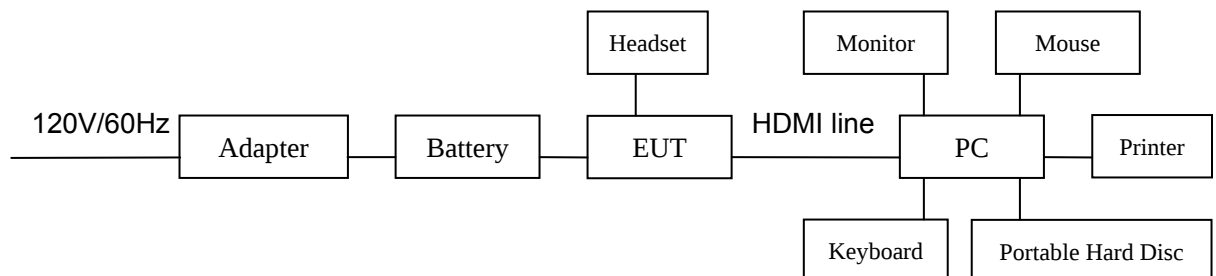
Mode 3-1:



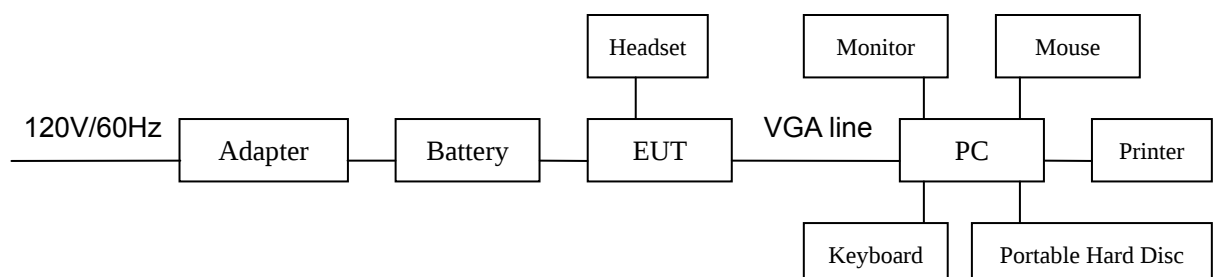
Mode 3-2:



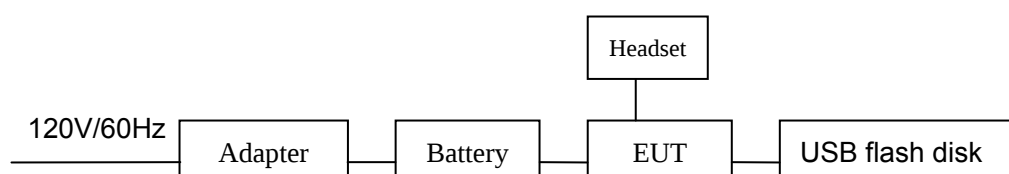
Mode 3-3:



Mode 3-4:



Mode 3-5:



4.3 Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	signal cable
1	Personal computer	H P	DX2310	CNG8250MZ3	1.8m/unshielded /detachable	N/A
2	Monitor	DELL	T980KACDK21SN	TWS20006045	1.8m/unshielded /detachable	1.8m/shielded /detachable
3	Keyboard	DELL	SK-8115	CN-ONM432-71616-81M-OLKB	N/A	1.5m/unshielded /undetachable
4	Mouse	Microsoft	X800898	30603	N/A	1.5m/unshielded /undetachable
5	Printer	EPSON	STYLUS C45	FY9YC48288	1.5m/unshielded /detachable	1.8m/unshielded /detachable
6	Portable Hard Disc	ALUMINUM	3.5 HDD Storage Box	06832c009	1.8m/unshielded /detachable	1.2m/unshielded /detachable
7	DVD player	PHILIPS	DVP5986K/93	N/A	1.4m/unshielded /undetachable	1.2m/shielded /detachable
8	Headset	QINLIA	N/A	N/A	N/A	2m/shielded /undetachable

4.4 EUT Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	HDMI line	Copartner	N/A	N/A	N/A	N/A	1.0m/shielded /detachable/with 2 cores
2	VGA line	Copartner	N/A	N/A	N/A	N/A	0.9m/shielded /detachable/with 2 cores

5 Equipments List For All Test Items

☒ Radiation Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3132	160400005	2012.04.07	2013.04.06
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2011.10.21	2012.10.20
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2012.04.07	2013.04.06
4	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2011.09.02	2012.09.01
5	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2011.09.01	2012.09.01

☒ 1# Conduction Test equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI Test Receiver	R&S	ESCI	100124	2011.12.28	2012.12.27
2	LISN	Kyoritsu	KNW-242	8-837-4	2012.04.07	2013.04.06
3	LISN	Kyoritsu	KNW-407	8-1789-3	2012.04.07	2013.04.06
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2012.04.07	2013.04.06

Note:

1. ☐ is not applicable in this Test Report. ☒ is applicable in this Test Report.

6.1 Mains Terminals Disturbance Voltage Measurement

Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximized peak within 6dB of Average Limit
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Temperature:	20°C	Humidity:	48% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	Mode 1/ Mode 2/ Mode 3			The Worst Mode:	Mode 3-2	

1.2 Test Specification

The diagram illustrates the test setup for EUT immunity testing. It shows two tables on a hatched ground plane. The left table, representing the Equipment Under Test (EUT), has a height of 80cm. A vertical line to its right is labeled 'V.C.P.' (Vertical Center Plane) with a horizontal distance of 40cm from the table. A horizontal arrow labeled 'H.C.P.' (Horizontal Center Plane) points towards the setup. A LISN (Line Impedance Stabilization Network) is connected to the bottom of the EUT table. The right table, representing the Test Receiver, has a 'Pulse Limiter' connected to its input and the LISN. The 'Test Receiver' is connected to the output of the 'Pulse Limiter'.

EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

6.1.3 Measurement Data

An initial pre-scan was performed on the live and neutral lines.

Quasi-peak or average measurements were performed at the frequency which maximum peak emissions were detected.

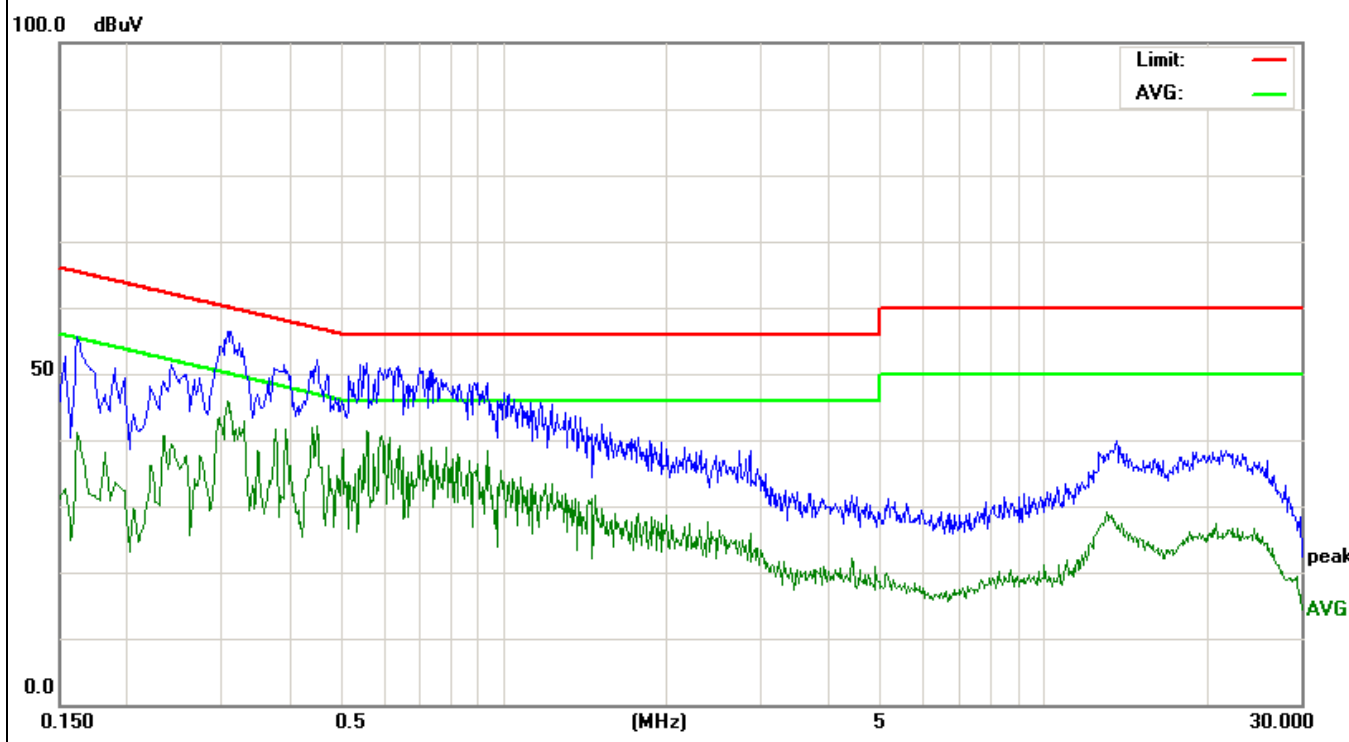
Please refer to the attached quasi-peak & average measurement data for reference.

EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-2	Phase :	Line
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.1620	11.68	44.01	29.38	55.69	41.06	65.36	55.36	-9.67	-14.30
*0.3064	10.71	45.79	35.10	56.50	45.81	60.07	50.07	-3.57	-4.26
0.4500	10.44	41.67	31.72	52.11	42.16	56.87	46.87	-4.76	-4.71
0.9340	10.19	38.10	28.28	48.29	38.47	56.00	46.00	-7.71	-7.53
13.0899	1.34	36.59	27.69	37.93	29.03	60.00	50.00	-22.07	-20.97
20.9220	1.43	35.34	25.89	36.77	27.32	60.00	50.00	-23.23	-22.68

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case

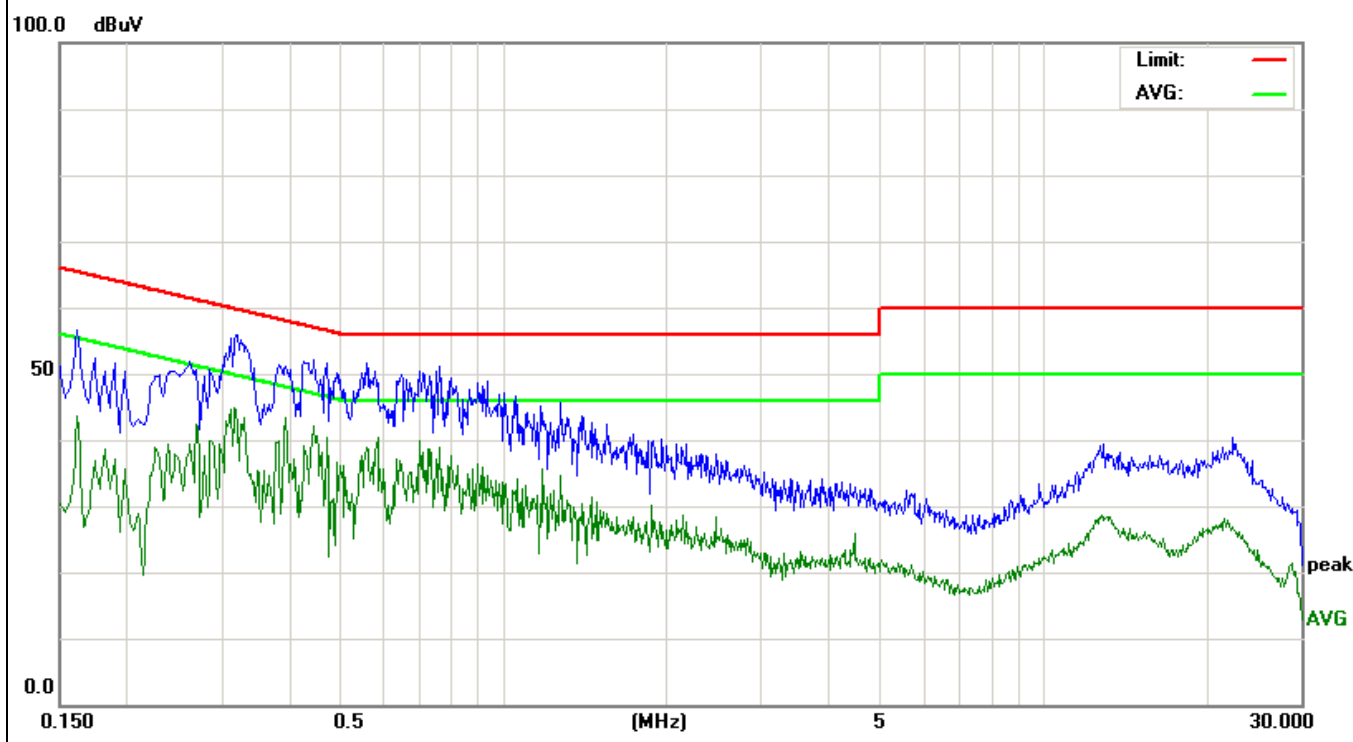


EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-2	Phase :	Neutral
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.1620	11.68	44.96	31.89	56.64	43.57	65.36	55.36	-8.72	-11.79
*0.3180	10.69	44.41	34.24	55.10	44.93	59.76	49.76	-4.66	-4.83
0.5823	10.31	38.44	30.08	48.75	40.39	56.00	46.00	-7.25	-5.61
1.1815	10.18	34.04	25.33	44.22	35.51	56.00	46.00	-11.78	-10.49
12.8338	1.34	35.98	27.33	37.32	28.67	60.00	50.00	-22.68	-21.33
21.6858	1.44	35.77	26.58	37.21	28.02	60.00	50.00	-22.79	-21.98

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case

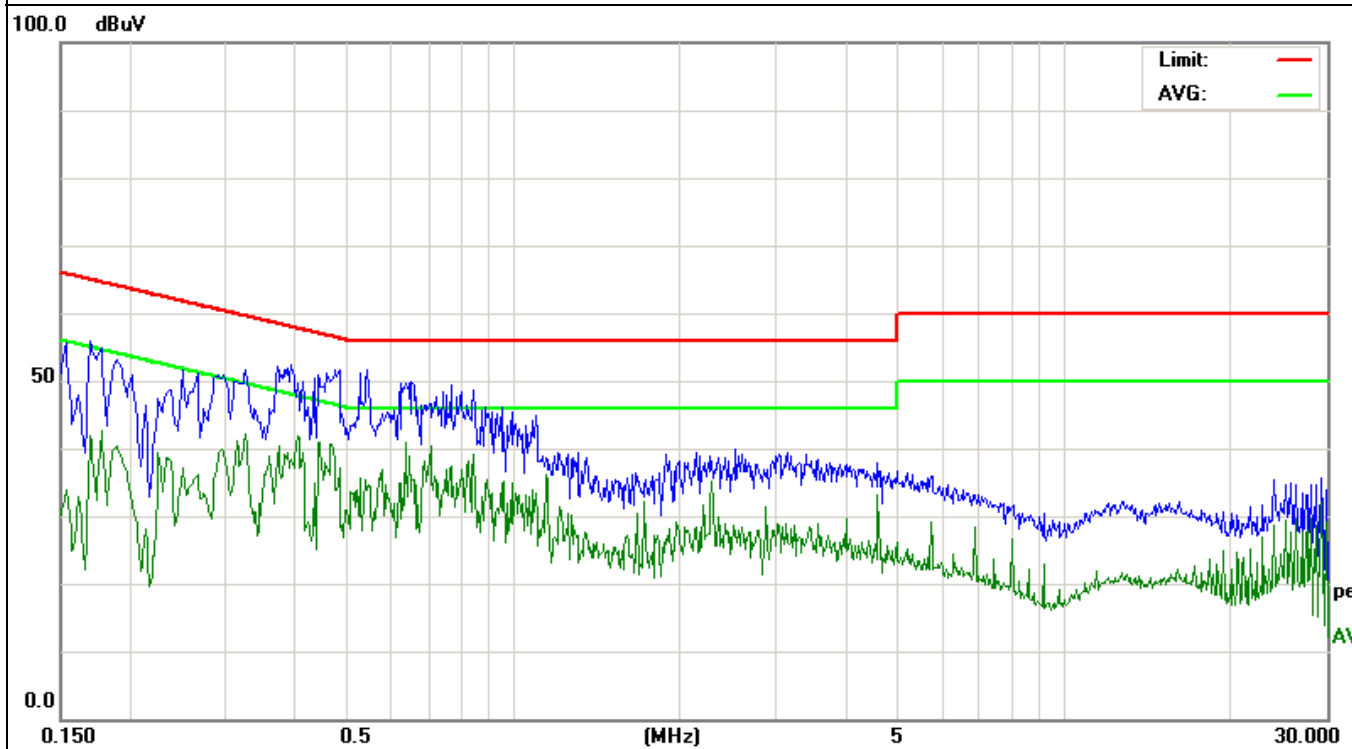


EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-4	Phase :	Line
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.1779	11.41	43.46	31.27	54.87	42.68	64.58	54.58	-9.71	-11.90
0.3260	10.67	40.91	31.37	51.58	42.04	59.55	49.55	-7.97	-7.51
*0.6340	10.29	39.27	30.49	49.56	40.78	56.00	46.00	-6.44	-5.22
1.1457	10.19	28.41	26.05	38.60	36.24	56.00	46.00	-17.40	-9.76
2.2940	10.17	27.63	24.92	37.80	35.09	56.00	46.00	-18.20	-10.91
29.2820	1.46	34.06	30.63	35.52	32.09	60.00	50.00	-24.48	-17.91

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case



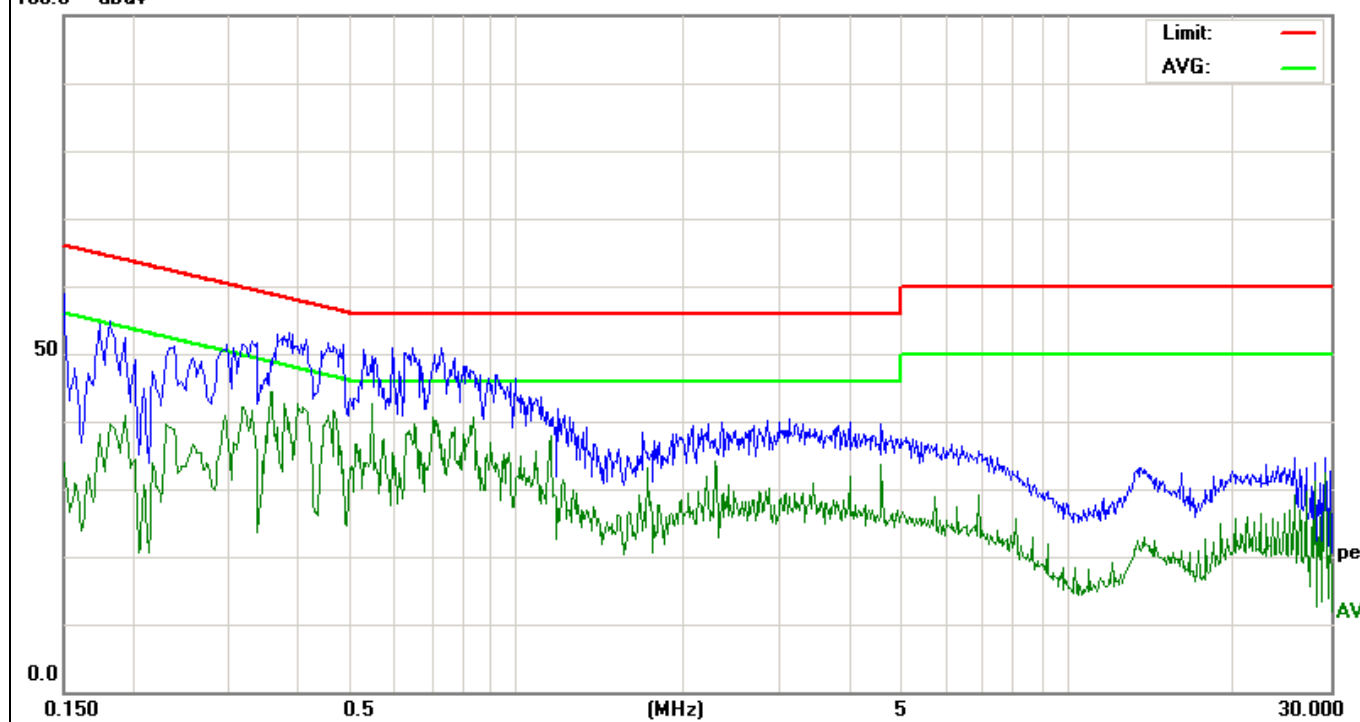
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-4	Phase :	Neutral
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)		Emission Level (dBμV)		Limits (dBμV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.3180	10.69	40.77	31.45	51.46	42.14	59.76	49.76	-8.30	-7.62
*0.5460	10.32	39.28	32.18	49.60	42.50	56.00	46.00	-6.40	-3.50
1.1496	10.18	30.27	27.80	40.45	37.98	56.00	46.00	-15.55	-8.02
2.2940	10.17	27.23	24.05	37.40	34.22	56.00	46.00	-18.60	-11.78
4.5937	10.18	29.33	23.52	39.51	33.70	56.00	46.00	-16.49	-12.30
29.2860	1.46	33.22	31.00	34.68	32.46	60.00	50.00	-25.32	-17.54

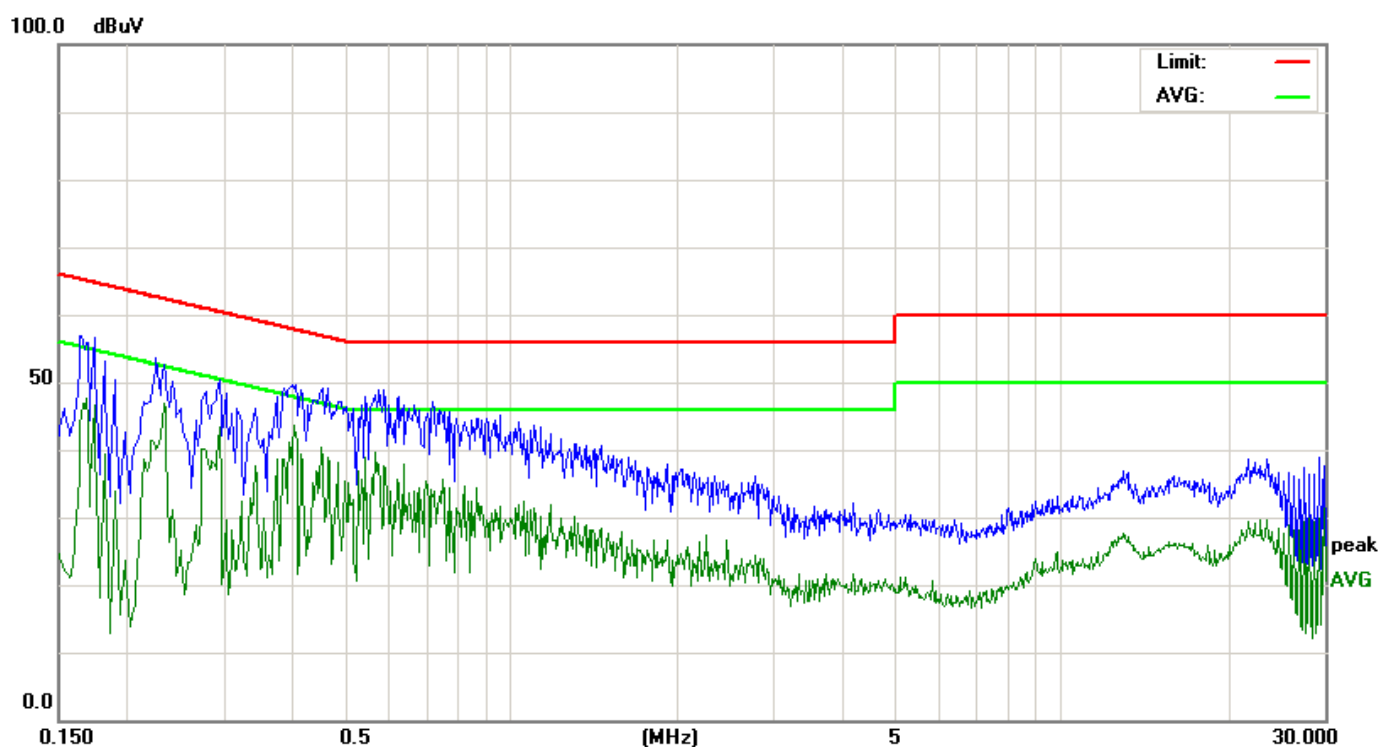
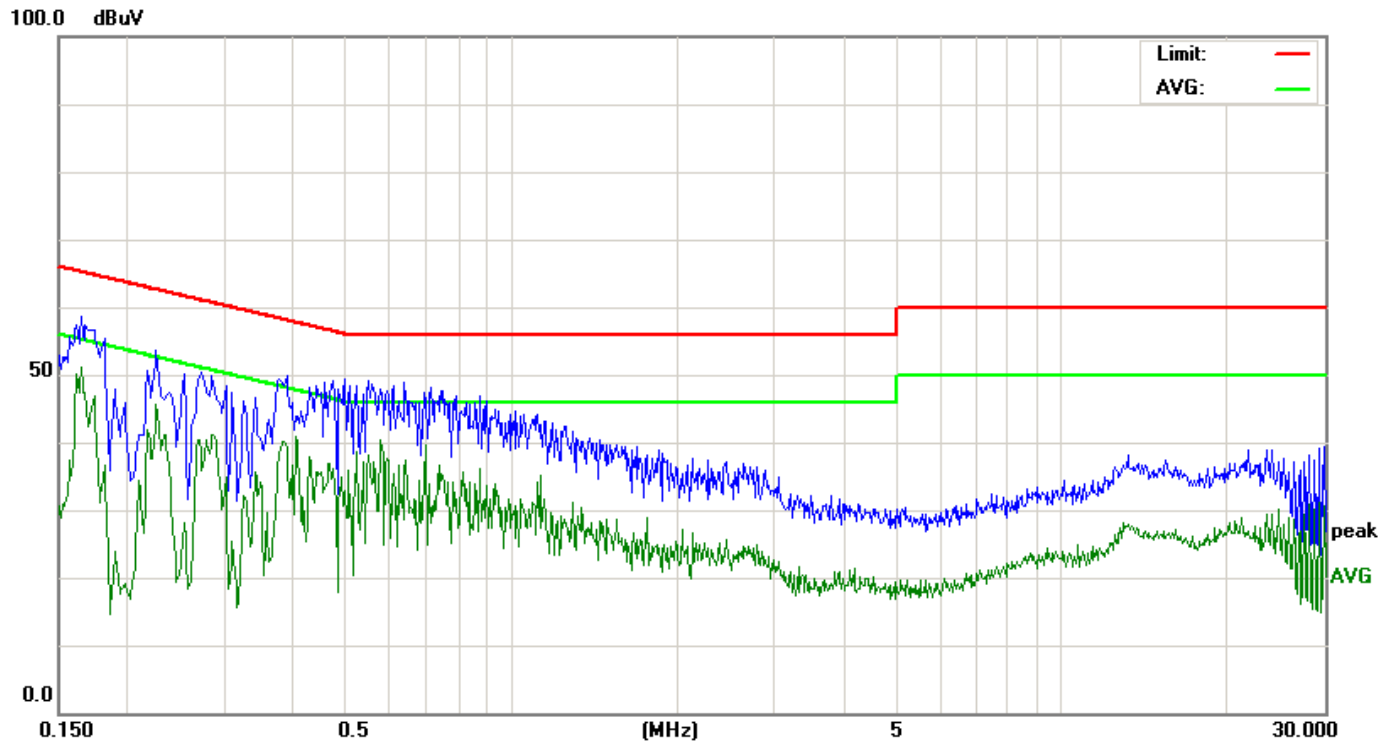
Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case

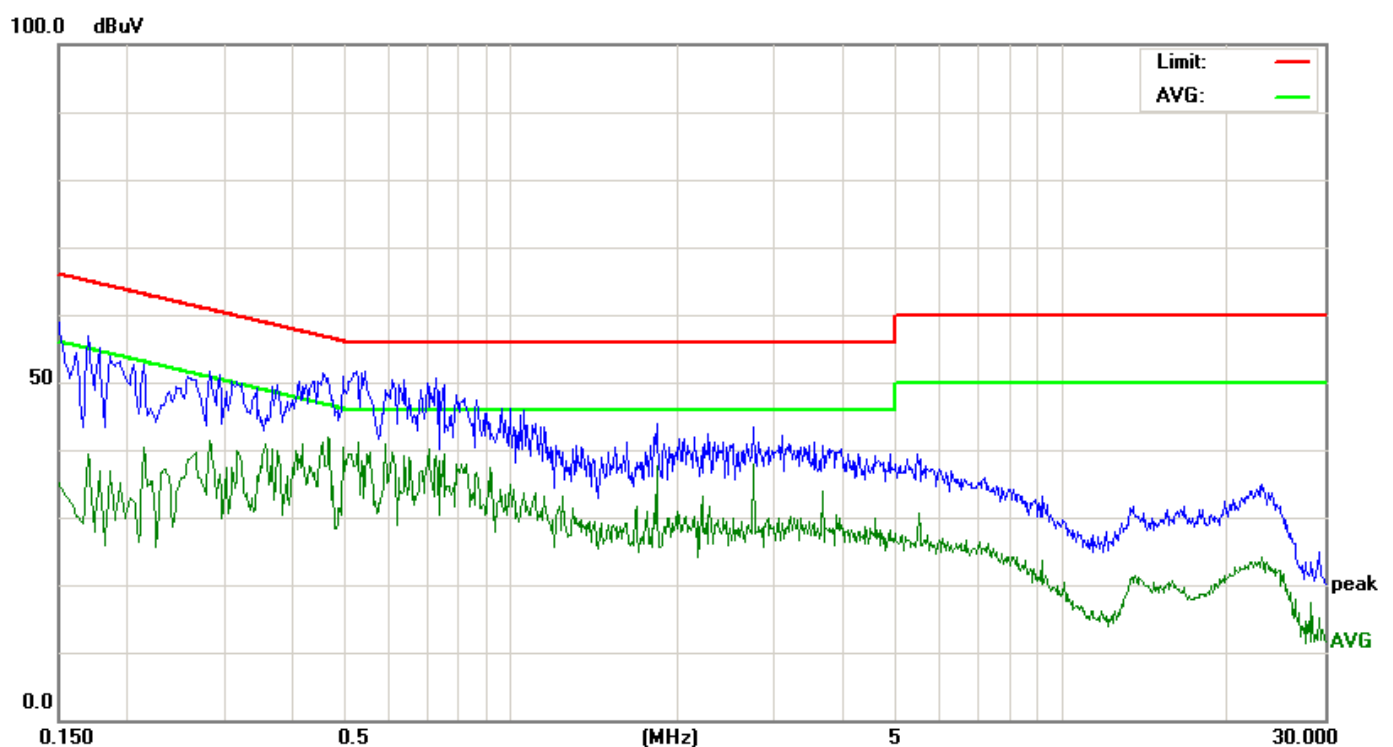
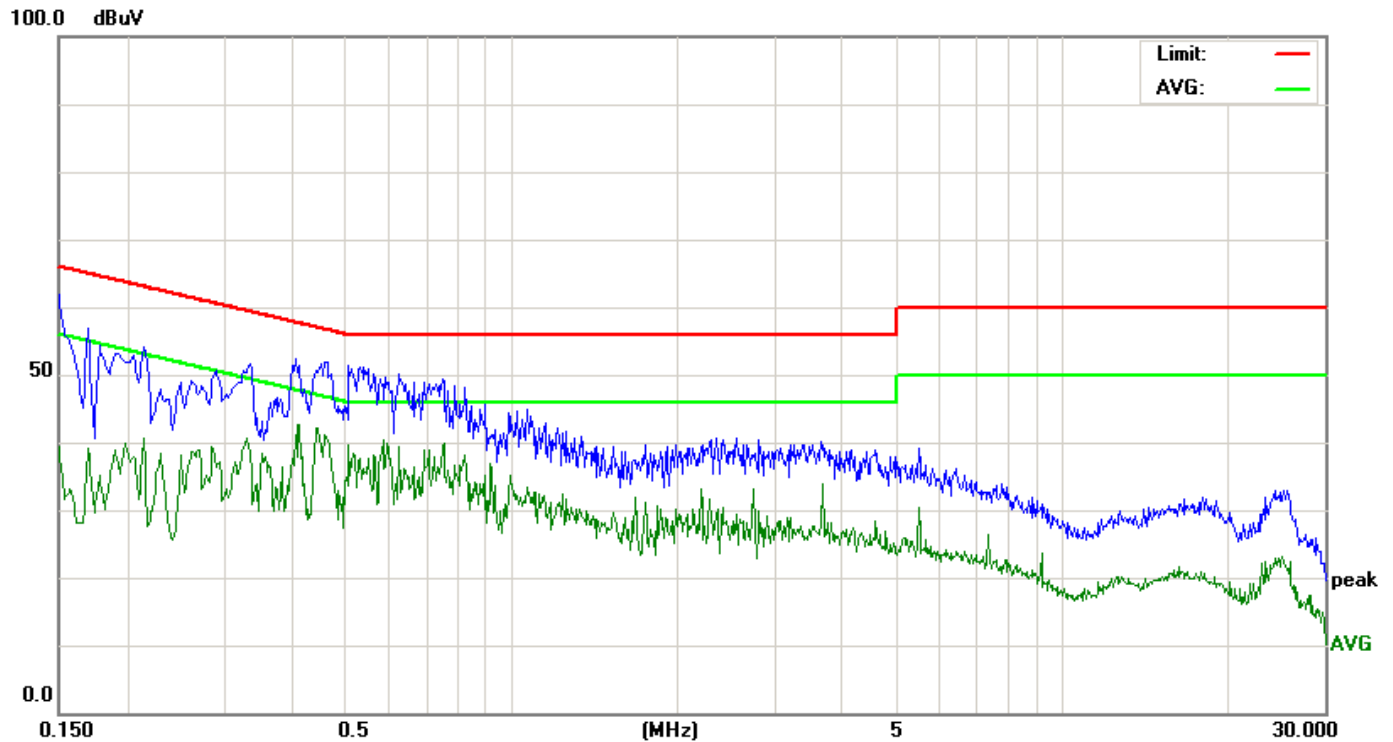
100.0 dBμV



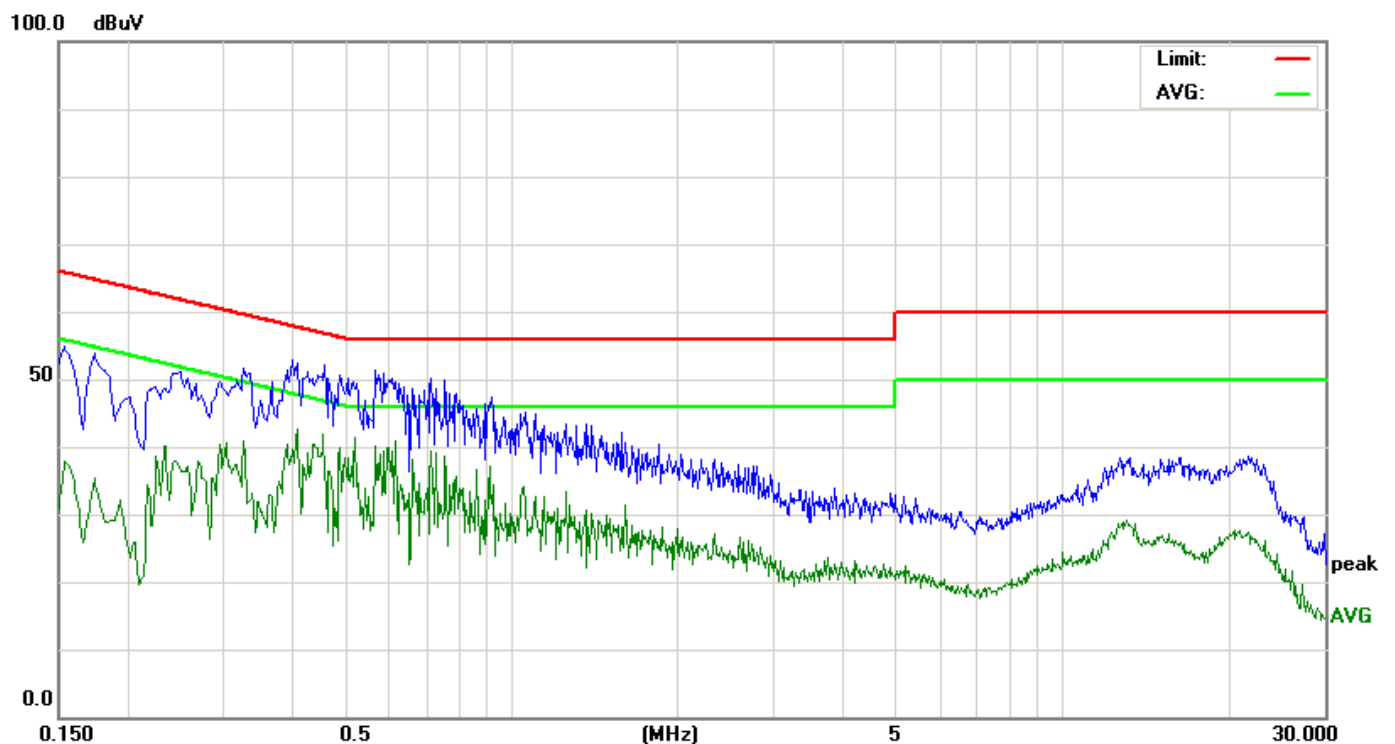
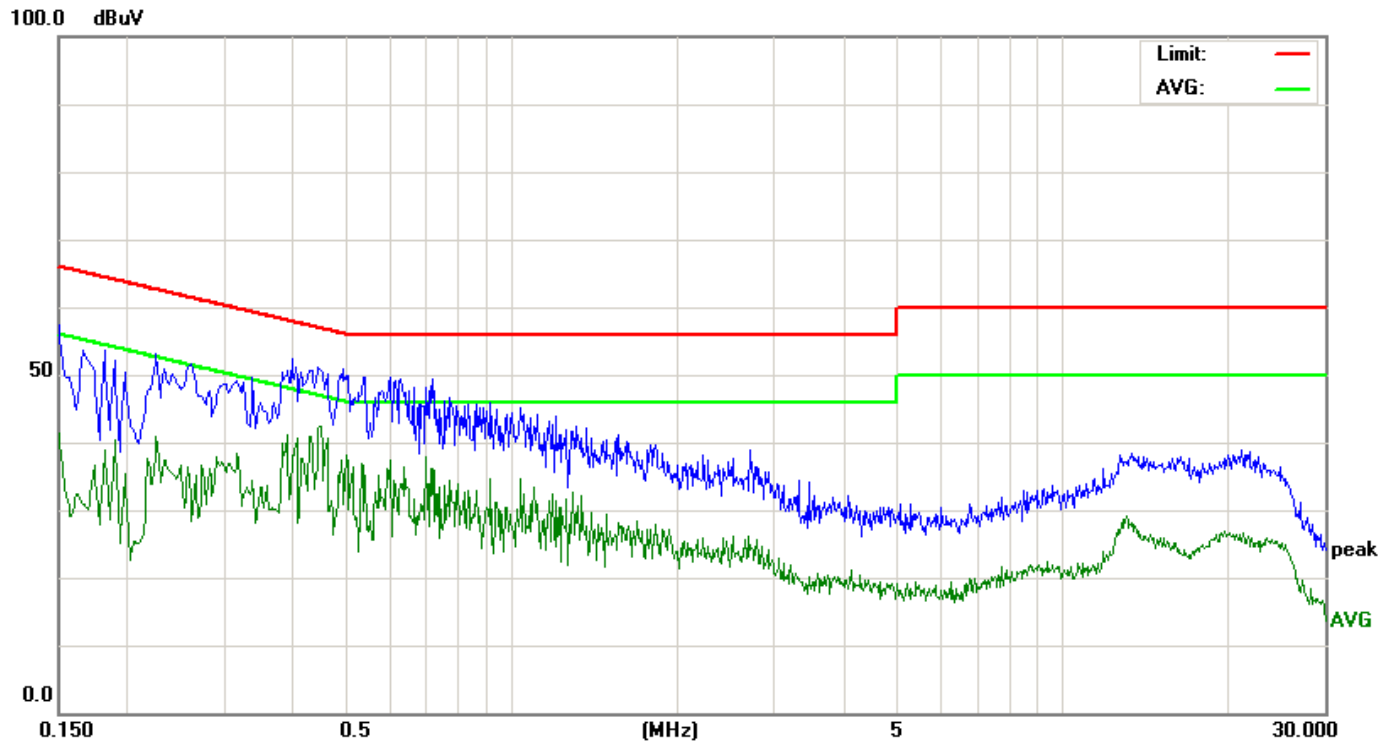
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-1	Phase :	Line/ Neutral
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		



EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-3	Phase :	Line/ Neutral
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		



EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Date :	2012-04-24
Test Mode:	Mode 3-5	Phase :	Line/ Neutral
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		



6.1.4 Test Setup Photograph

Model: HBP200+ Mode: 3-2



Model: HBP200+ Mode: 3-2



Model: HBP200+ Mode: 3-4



Model: HBP200+ Mode: 3-4



6.2 Radiated Emission Measurement

Limits of Radiated Emission Measurement

Frequency (MHz)	☐ Class A (10m)	☒ Class B (3m)
	Quasi-Peak dB(μ V/m)	Quasi-Peak dB(μ V/m)
30 ~ 88	39.0	40.0
88 ~ 216	43.5	43.5
216 ~ 960	46.5	46.0
Above 960	49.5	54.0

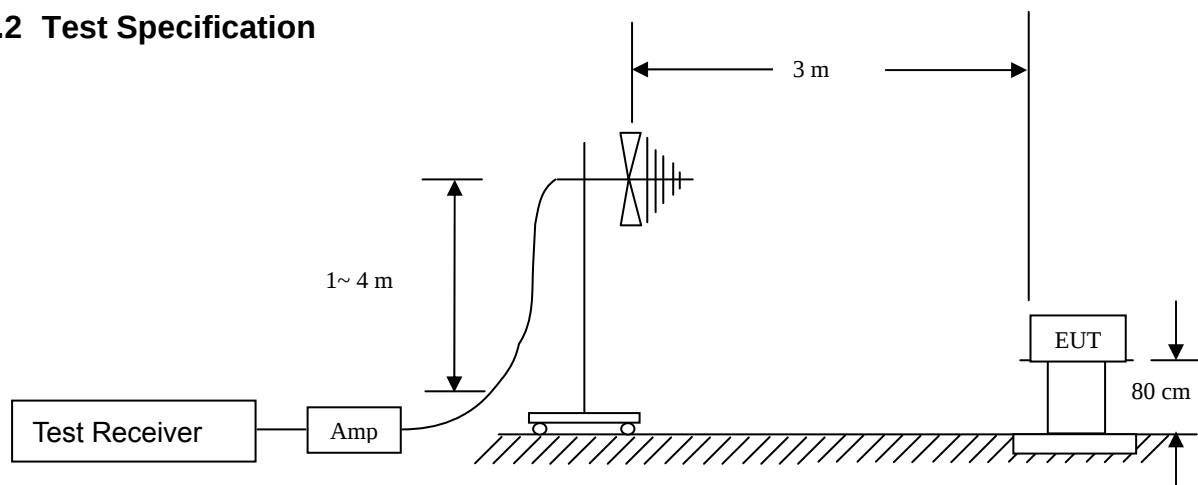
Detector:

Peak for pre-scan (120kHz resolution bandwidth)
 Quasi-Peak if maximum peak within 6dB of limit

6.2.1 E.U.T. Operation

Temperature:	23°C	Humidity:	50% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	Mode 1/ Mode 2/ Mode 3			The Worst Mode:	Mode 3-2	

6.2.2 Test Specification



EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested.

6.2.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyzers in peak detection mode. The EUT was measured by Biology antenna with 2 orthogonal polarities and peak emissions from the EUT were detected within 6dB of the class B limit line.

The following quasi-peak measurements were performed on the EUT.

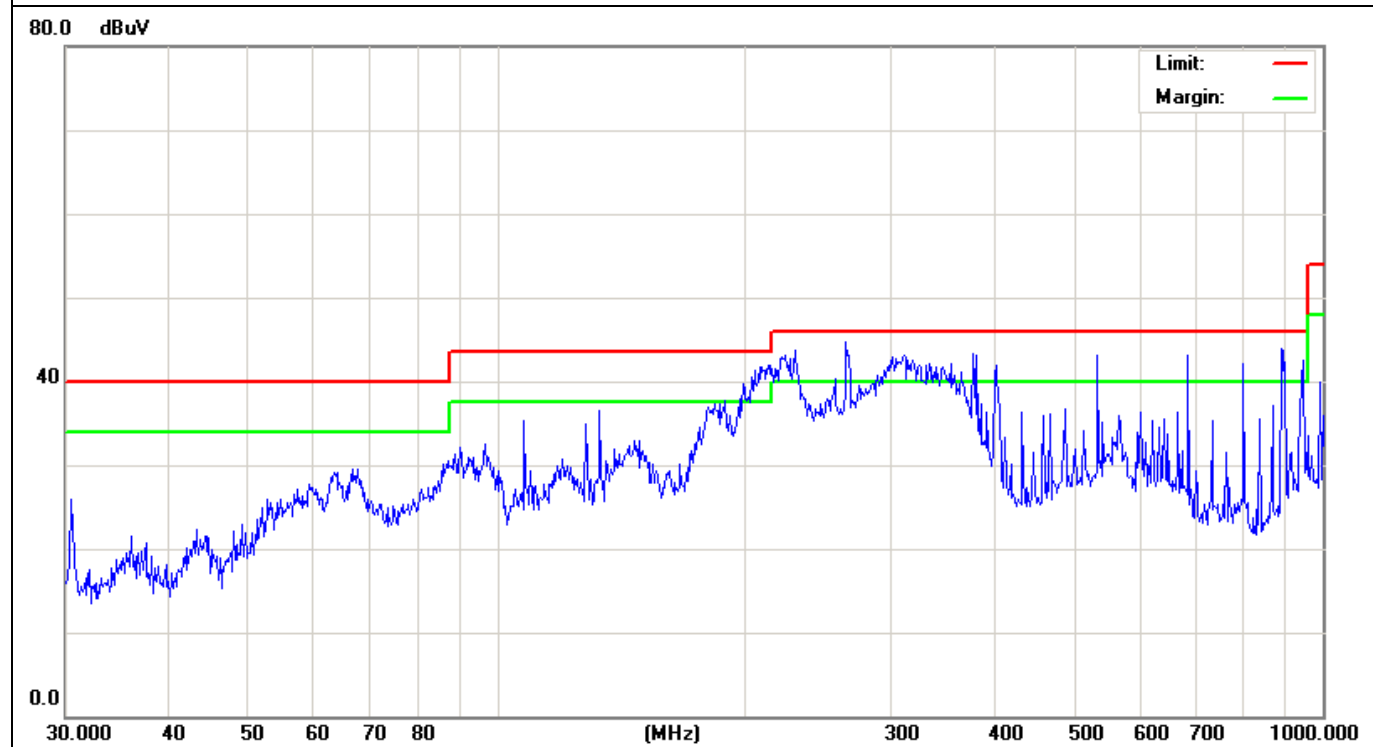
Between 30—1000MHz

EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-2	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
96.7749**	-16.17	48.74	32.57	43.50	-10.93
229.2931**	-10.30	53.20	42.90	46.00	-3.10
264.7456**	-11.33	54.00	42.67	46.00	-3.33
377.2590**	-8.34	49.36	41.02	46.00	-4.98
533.8318**	-4.15	46.89	42.74	46.00	-3.26
890.7278**	0.73	41.56	42.29	46.00	-3.71

Remark:

1. “ * ” Mark means readings are Peak Values.
2. “ ** ” Mark means readings are Quasi-Peak values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

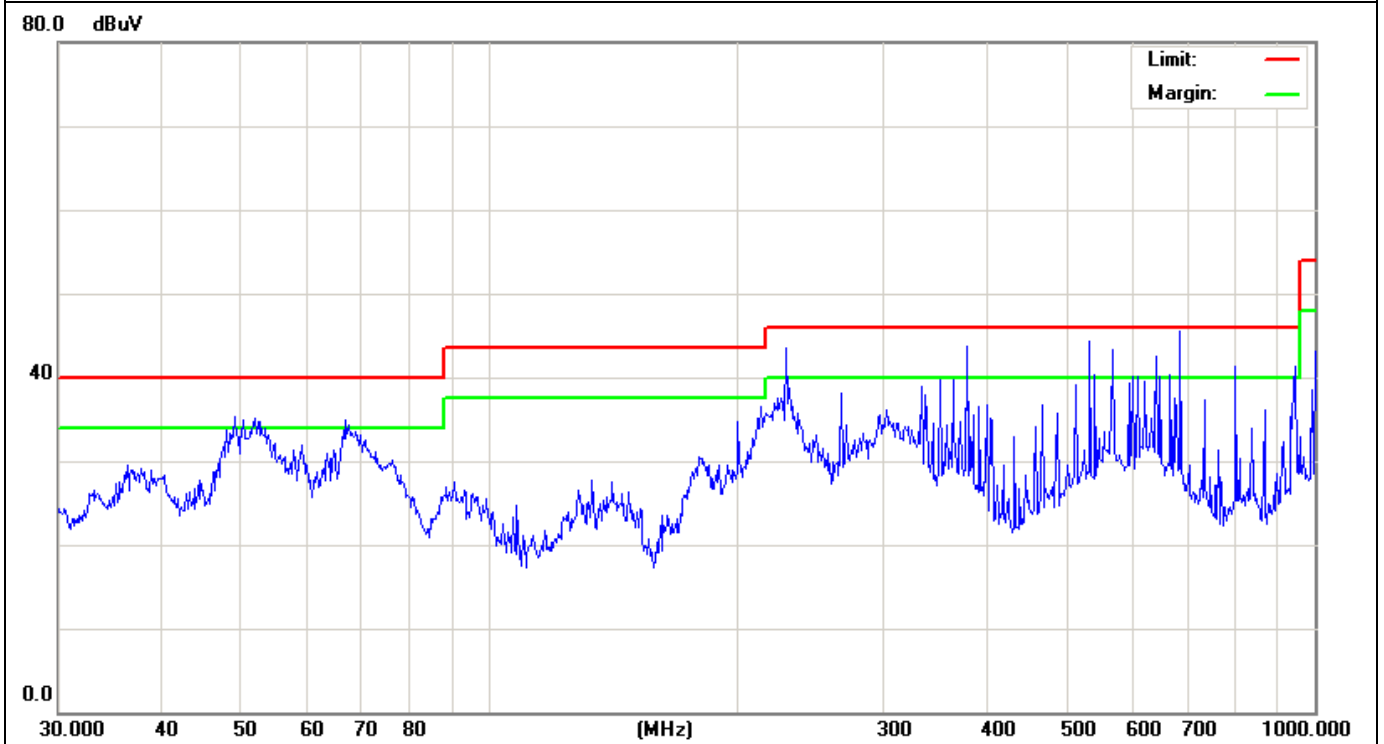


EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-2	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Factor (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
49.0144**	-15.06	50.44	35.38	40.00	-4.62
66.7325**	-16.96	51.92	34.96	40.00	-5.04
228.4902**	-10.38	52.56	42.18	46.00	-3.82
378.5842**	-8.27	50.23	41.96	46.00	-4.04
533.8318**	-4.15	47.00	42.85	46.00	-3.15
687.1507**	-0.11	43.10	42.99	46.00	-3.01

Remark:

1. " * " Mark means readings are Peak Values.
2. " ** " Mark means readings are Quasi-Peak values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

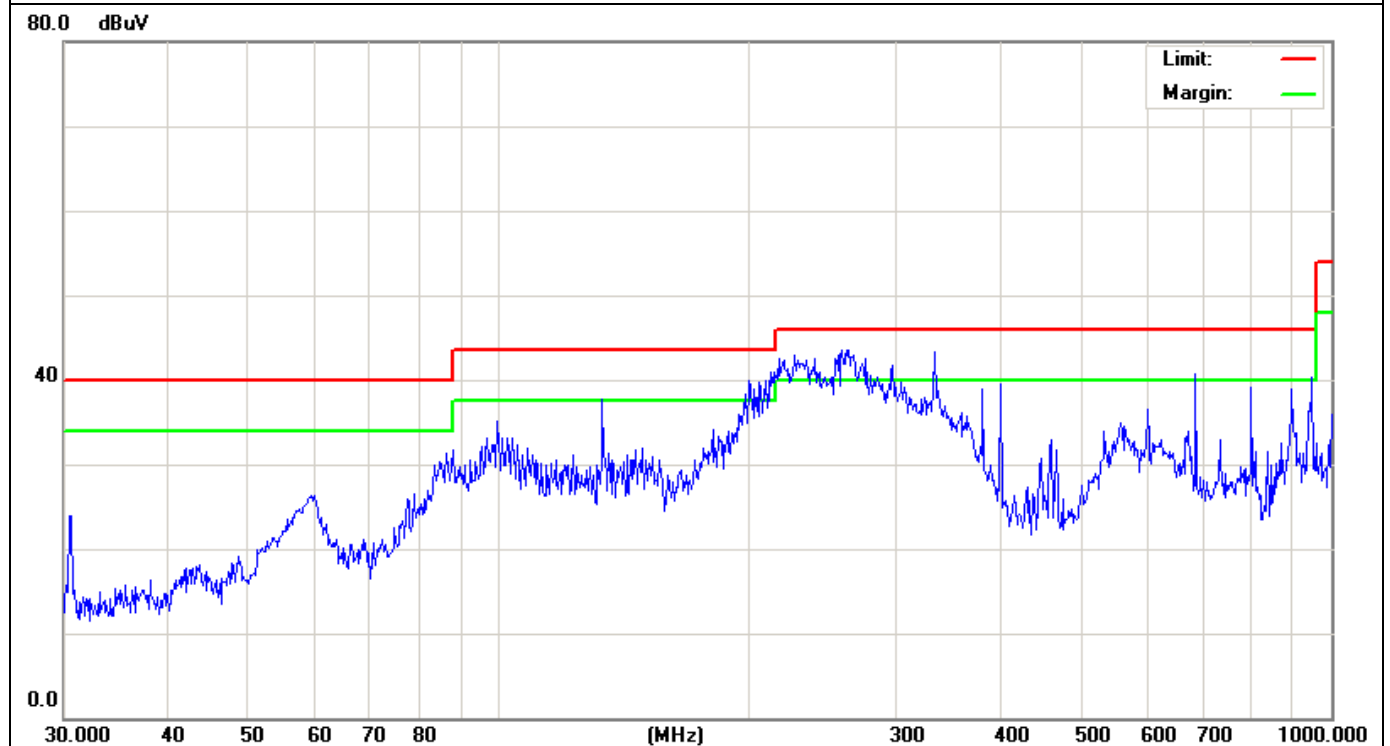


EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-4	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Factor	Meter Reading	Emission Level	Limits	Margin
(MHz)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
59.4405**	-14.85	41.10	26.25	40.00	-13.75
133.1511**	-12.42	50.13	37.71	43.50	-5.79
226.8934**	-10.55	53.49	42.94	46.00	-3.06
262.8955**	-11.30	54.72	43.42	46.00	-2.58
333.6865**	-9.36	52.74	43.38	46.00	-2.62
687.1507**	-0.11	40.83	40.72	46.00	-5.28

Remark:

1. " * " Mark means readings are Peak Values.
2. " ** " Mark means readings are Quasi-Peak values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

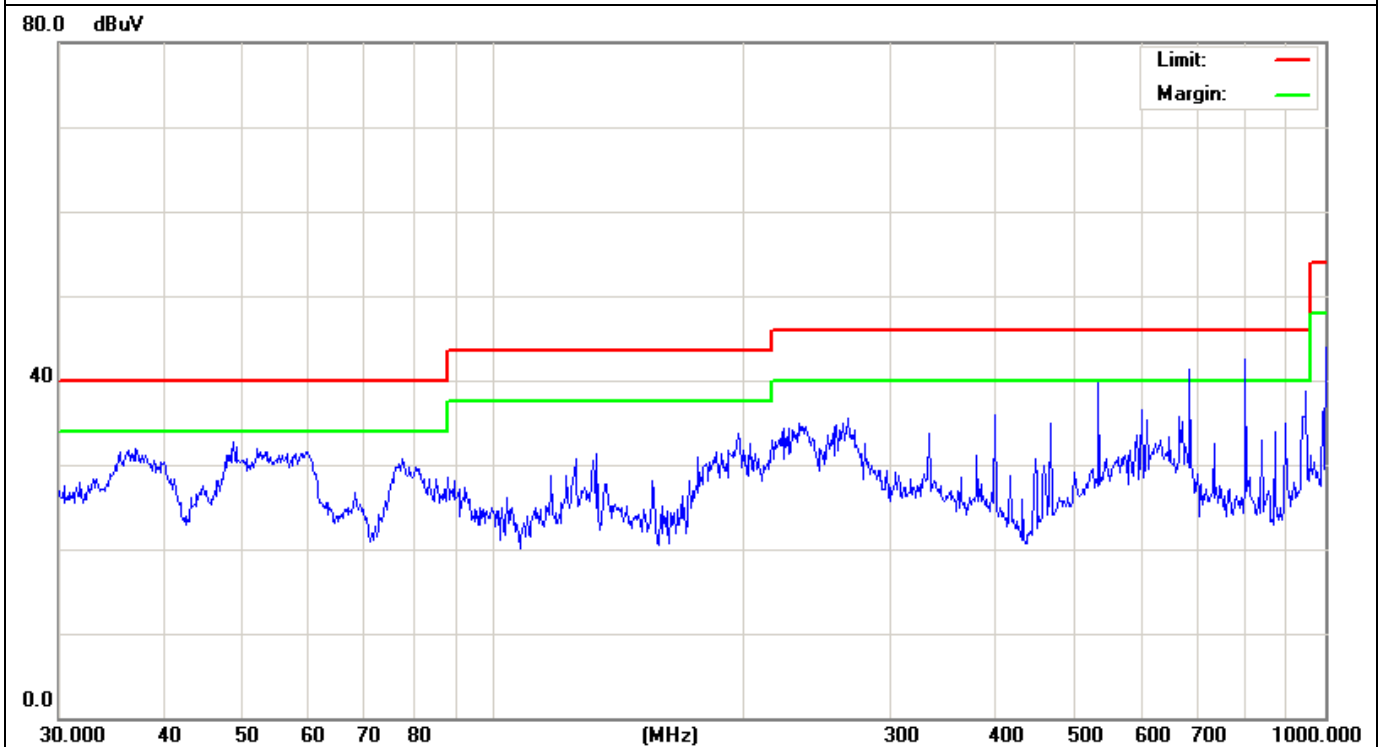


EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-4	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

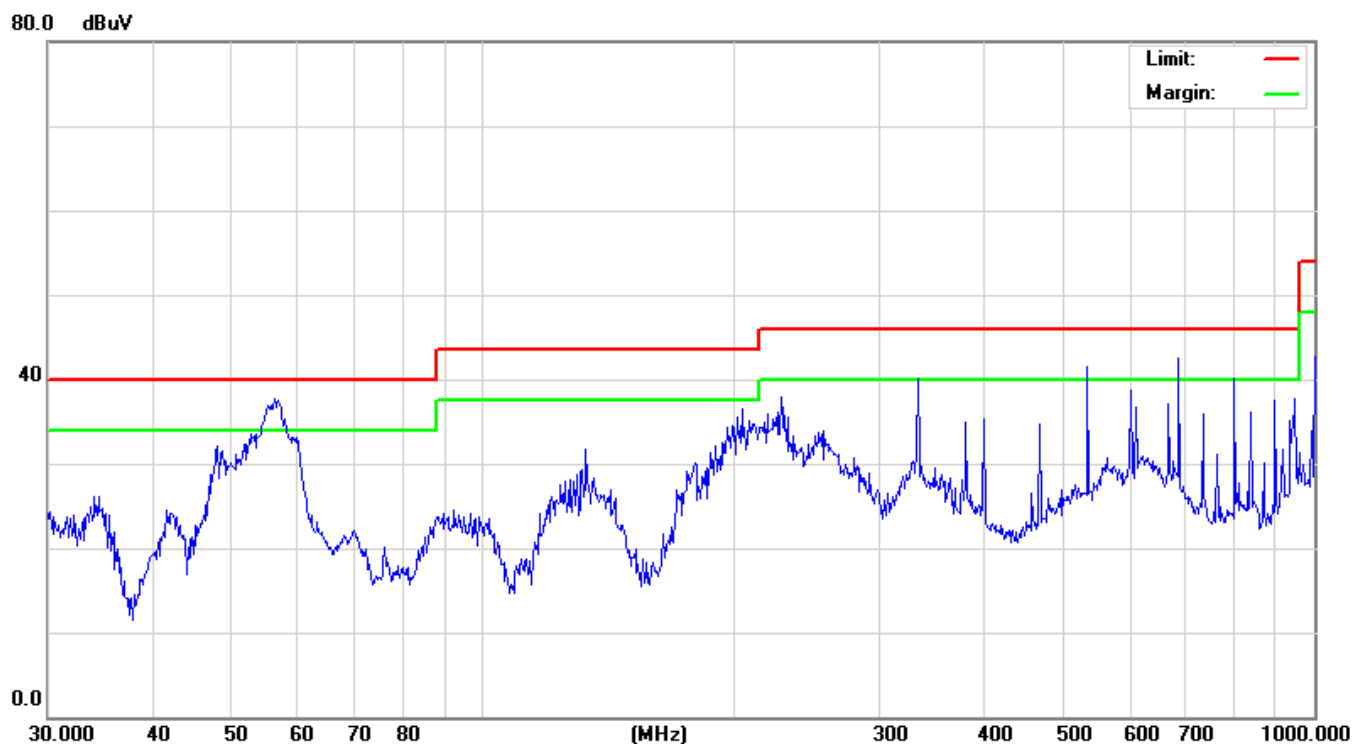
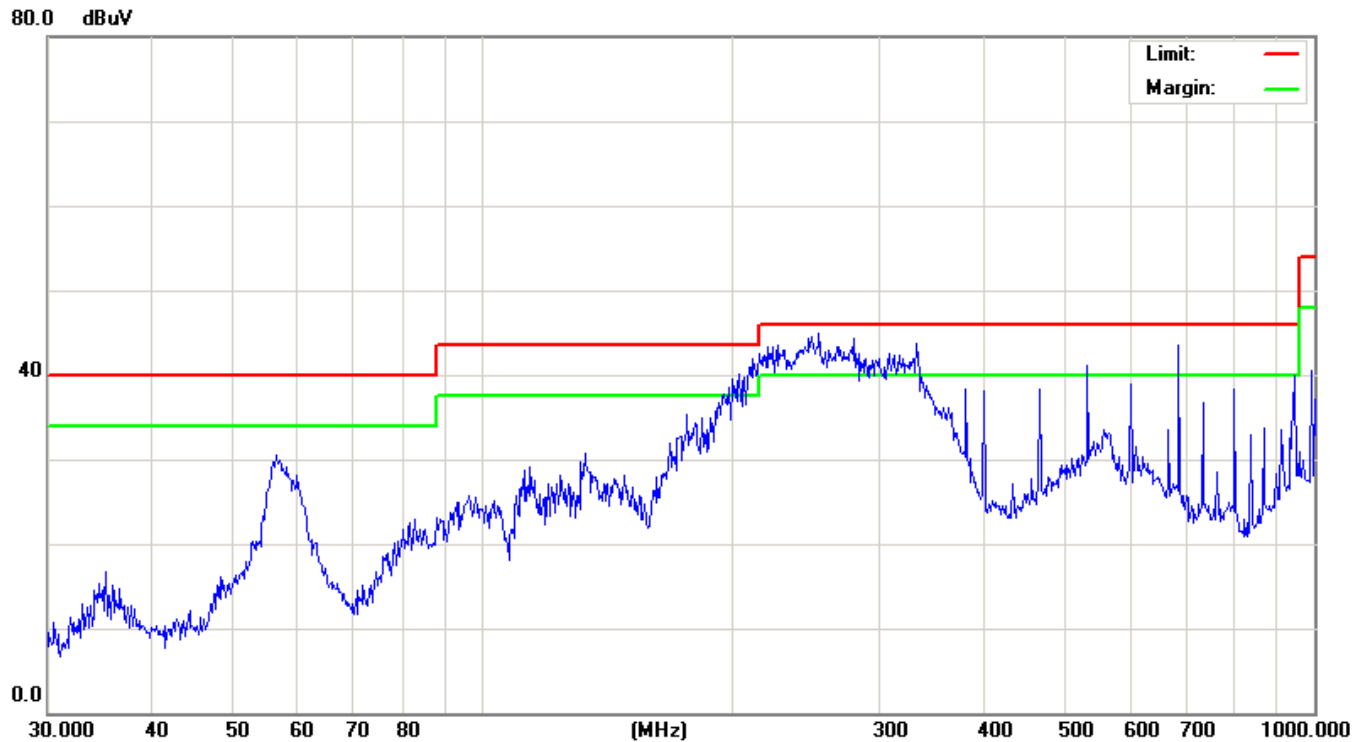
Frequency	Factor	Meter Reading	Emission Level	Limits	Margin
(MHz)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
37.0248**	-16.12	48.01	31.89	40.00	-8.11
48.6719**	-15.08	47.70	32.62	40.00	-7.38
77.5926**	-17.49	48.19	30.70	40.00	-9.30
197.1999**	-11.93	45.70	33.77	43.50	-9.73
533.8318**	-4.15	43.95	39.80	46.00	-6.20
801.7862**	-1.05	43.52	42.47	46.00	-3.53

Remark:

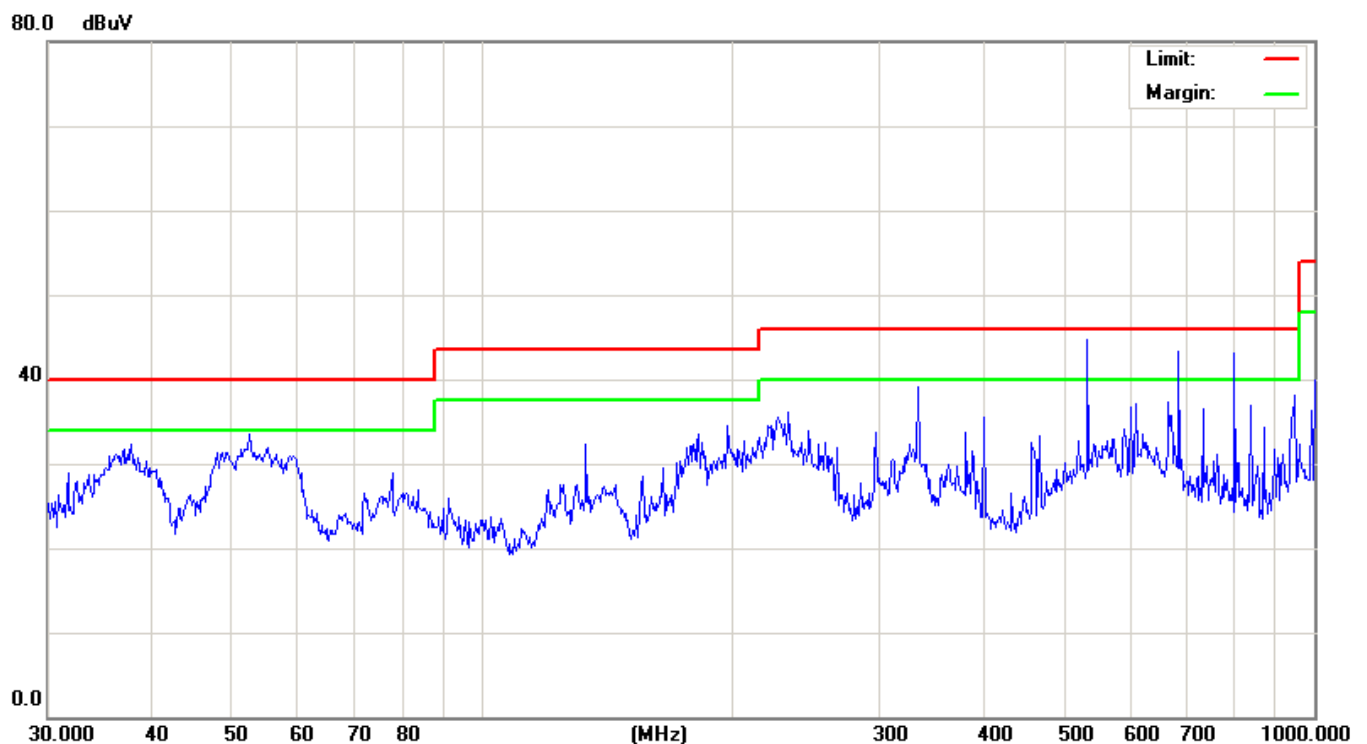
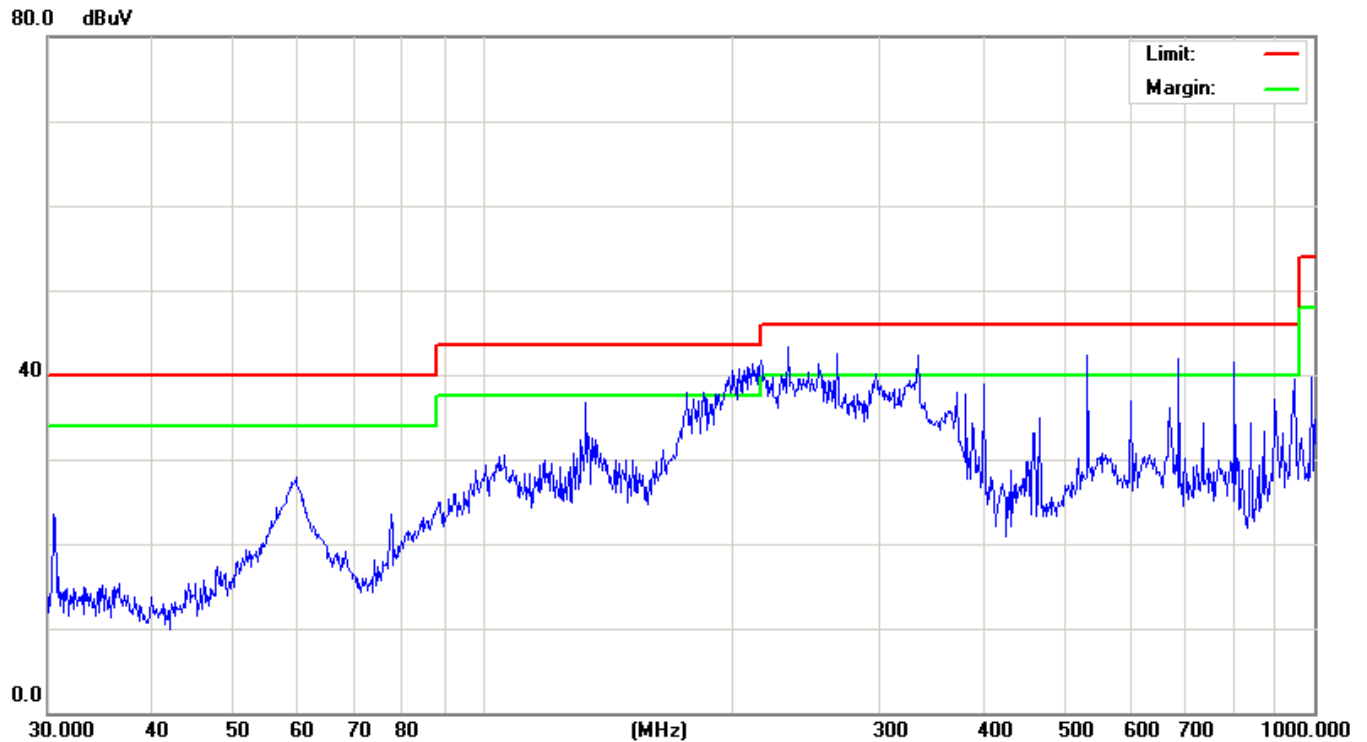
1. " * " Mark means readings are Peak Values.
2. " ** " Mark means readings are Quasi-Peak values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



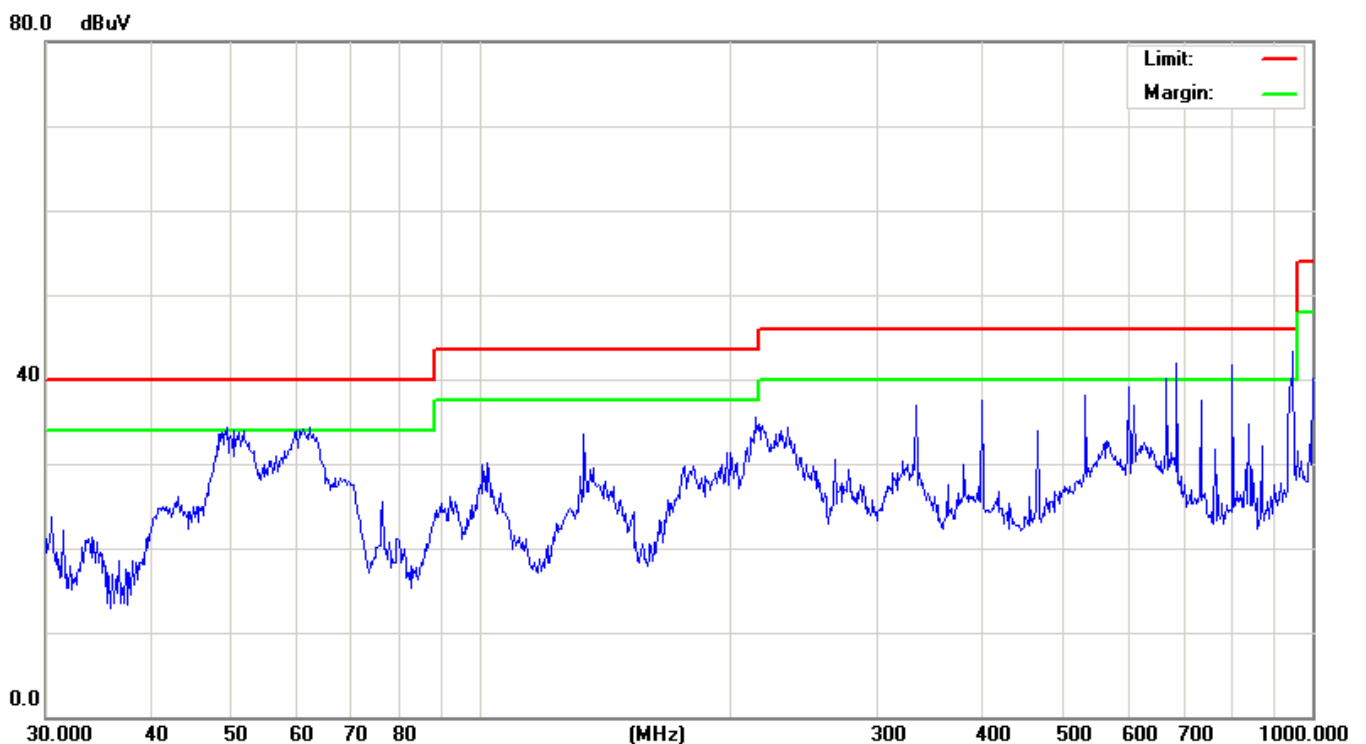
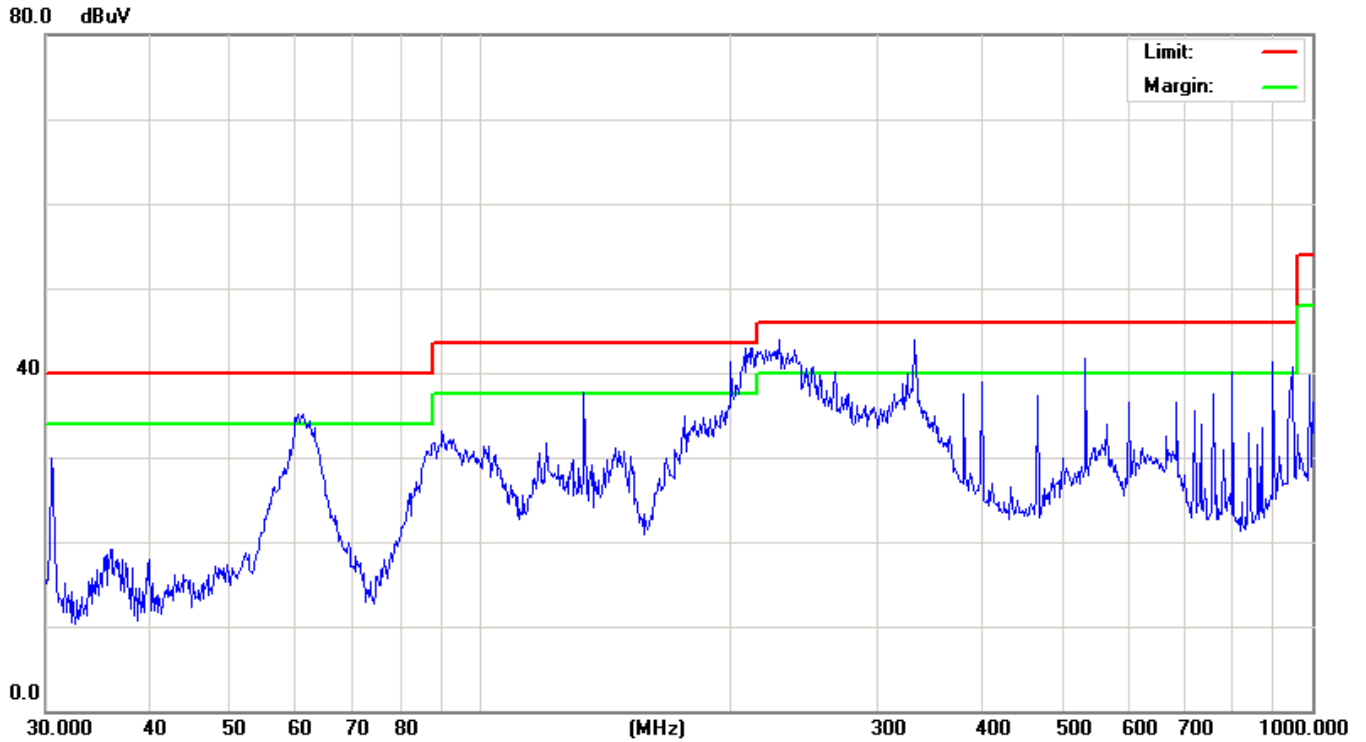
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-1	Phase :	Horizontal/Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		



EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-3	Phase :	Horizontal/Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		



EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-5	Phase :	Horizontal/Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		



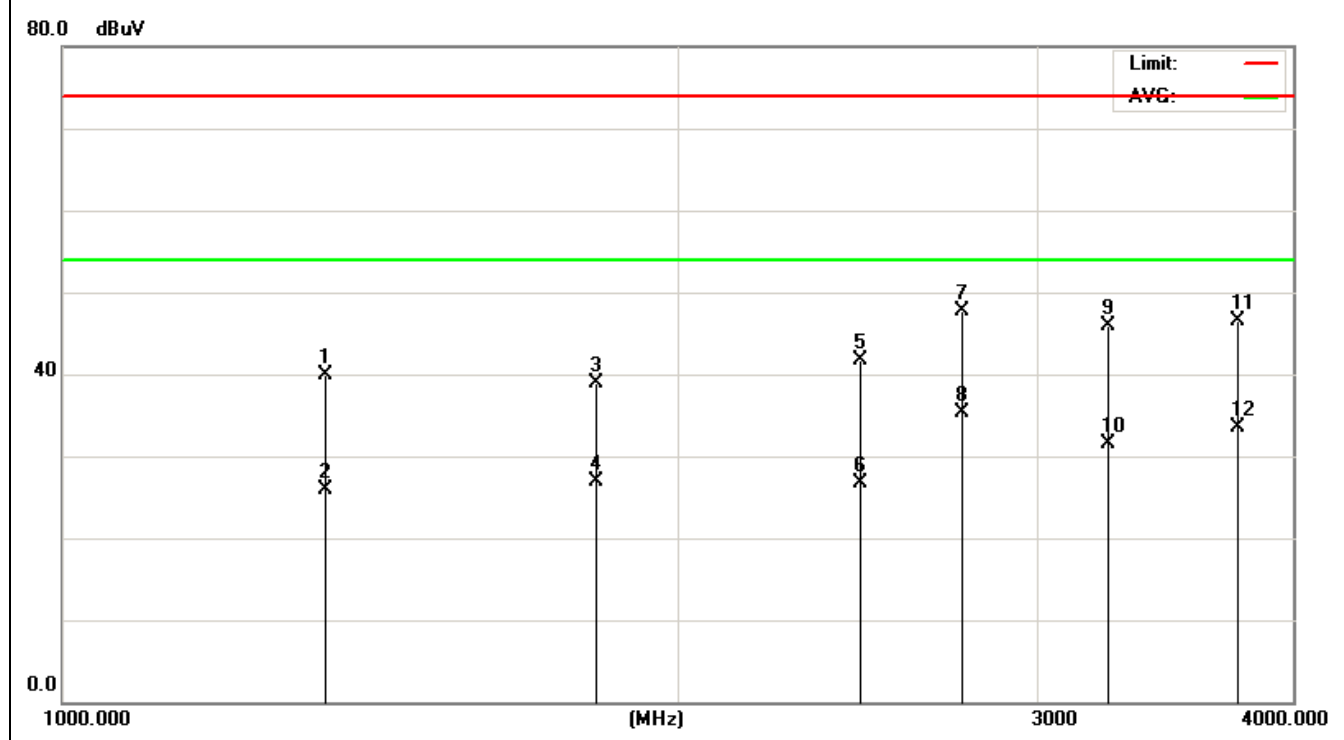
Between 1000—4000MHz

EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-2	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1344.540	50.25	36.28	-10.30	39.95	25.98	74.00	54.00	-34.05	-28.02
1824.610	48.28	36.35	-9.39	38.89	26.96	74.00	54.00	-35.11	-27.04
2453.530	46.93	31.92	-5.24	41.69	26.68	74.00	54.00	-32.31	-27.32
*2754.320	50.89	38.45	-3.19	47.70	35.26	74.00	54.00	-26.30	-18.74
3246.870	46.99	32.60	-1.14	45.85	31.46	74.00	54.00	-28.15	-22.54
3754.550	44.53	31.54	1.95	46.48	33.49	74.00	54.00	-27.52	-20.51

Remark:

- Factor = Antenna Factor + Cable Loss – Pre-amplifier.
- ** means the worst case



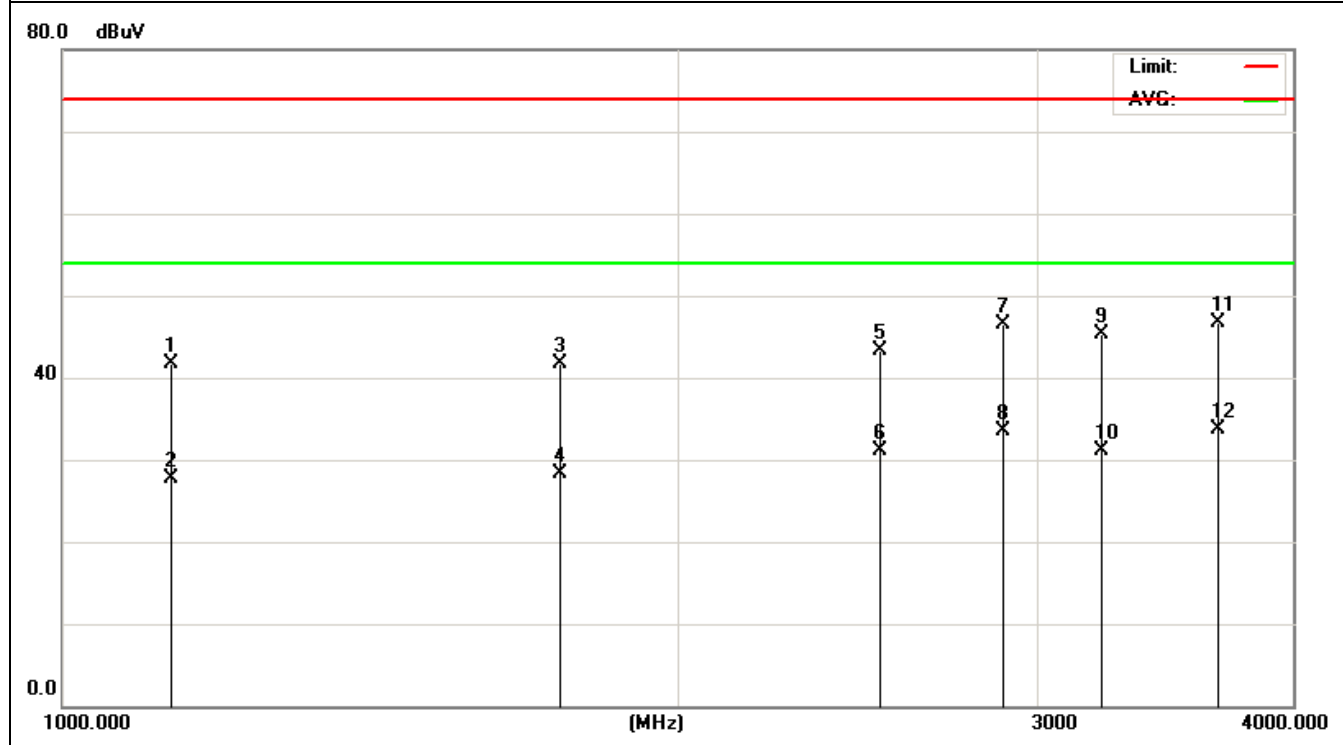
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-2	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1129.470	52.45	38.54	-10.76	41.69	27.78	74.00	54.00	-32.31	-26.22
1752.220	51.17	37.86	-9.48	41.69	28.38	74.00	54.00	-32.31	-25.62
2512.420	47.98	35.89	-4.75	43.23	31.14	74.00	54.00	-30.77	-22.86
2887.520	48.90	36.01	-2.43	46.47	33.58	74.00	54.00	-27.53	-20.42
3222.750	46.54	32.32	-1.16	45.38	31.16	74.00	54.00	-28.62	-22.84
*3672.540	45.48	32.48	1.18	46.66	33.66	74.00	54.00	-27.34	-20.34

Remark:

3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

4. '*' means the worst case



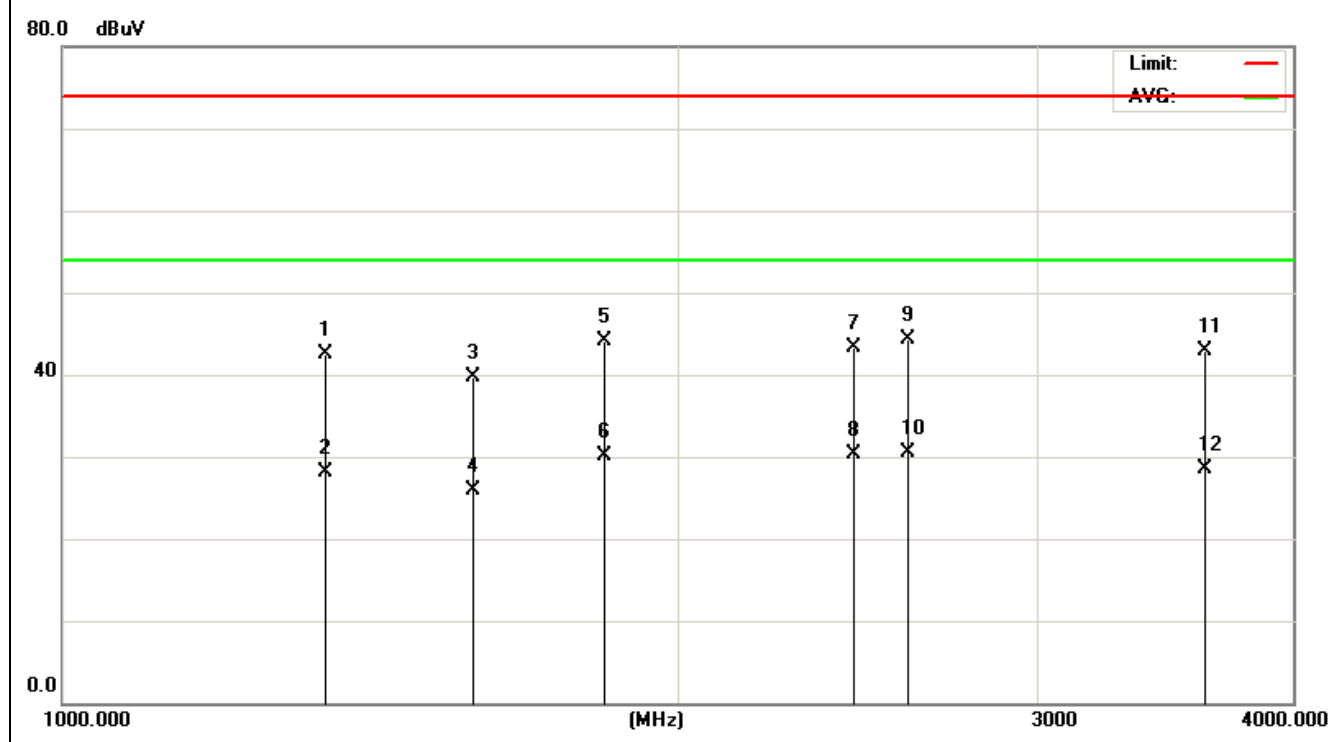
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-1	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1343.540	52.84	38.47	-10.30	42.54	28.17	74.00	54.00	-31.46	-25.83
1587.510	49.51	35.74	-9.88	39.63	25.86	74.00	54.00	-34.37	-28.14
1842.410	53.54	39.45	-9.43	44.11	30.02	74.00	54.00	-29.89	-23.98
2437.740	48.70	35.78	-5.38	43.32	30.40	74.00	54.00	-30.68	-23.60
*2589.140	48.54	34.77	-4.26	44.28	30.51	74.00	54.00	-29.72	-23.49
3624.450	42.23	27.84	0.72	42.95	28.56	74.00	54.00	-31.05	-25.44

Remark:

5. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

6. “*” means the worst case



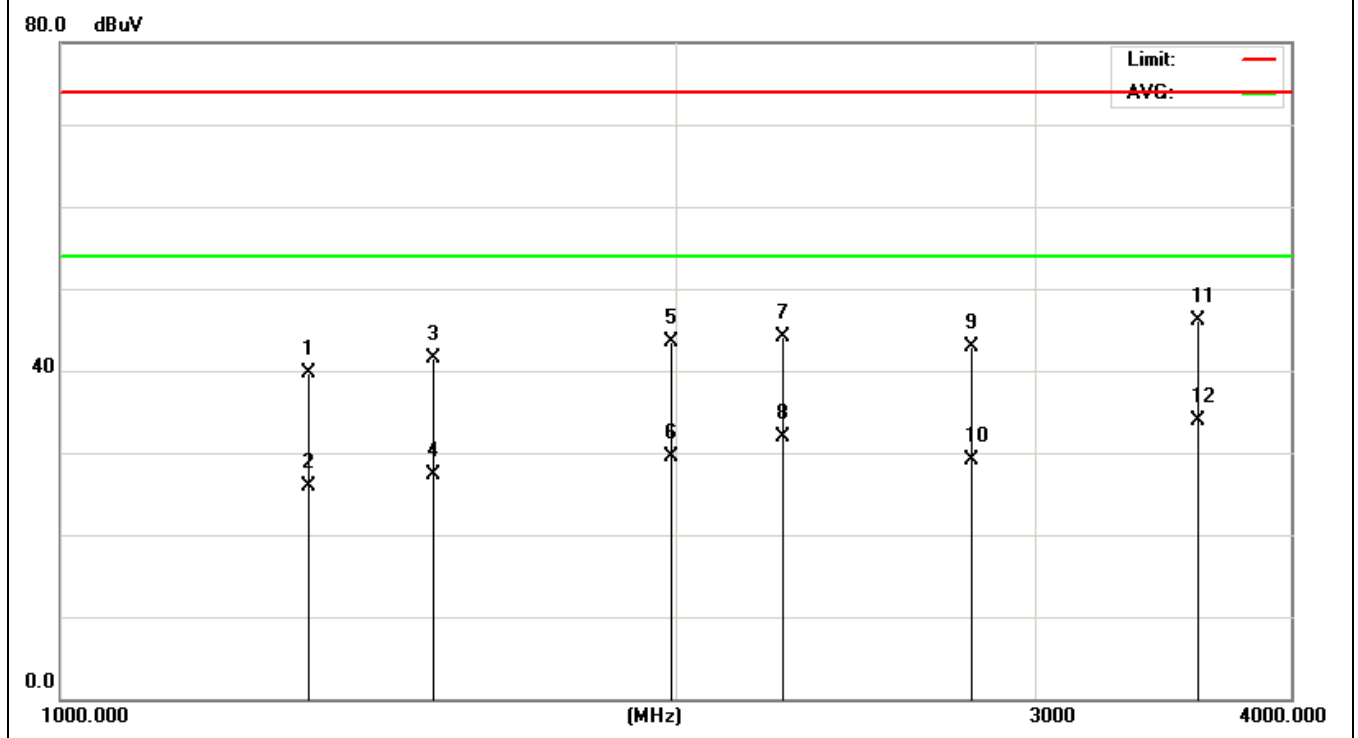
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-1	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1322.890	49.94	36.28	-10.31	39.63	25.97	74.00	54.00	-34.37	-28.03
1521.710	51.41	37.11	-9.86	41.55	27.25	74.00	54.00	-32.45	-26.75
1987.950	52.66	38.72	-9.14	43.52	29.58	74.00	54.00	-30.48	-24.42
*2254.750	51.08	38.76	-6.92	44.16	31.84	74.00	54.00	-29.84	-22.16
2789.210	45.92	31.95	-2.92	43.00	29.03	74.00	54.00	-31.00	-24.97
3599.820	45.58	33.35	0.49	46.07	33.84	74.00	54.00	-27.93	-20.16

Remark:

7. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

8. “*” means the worst case



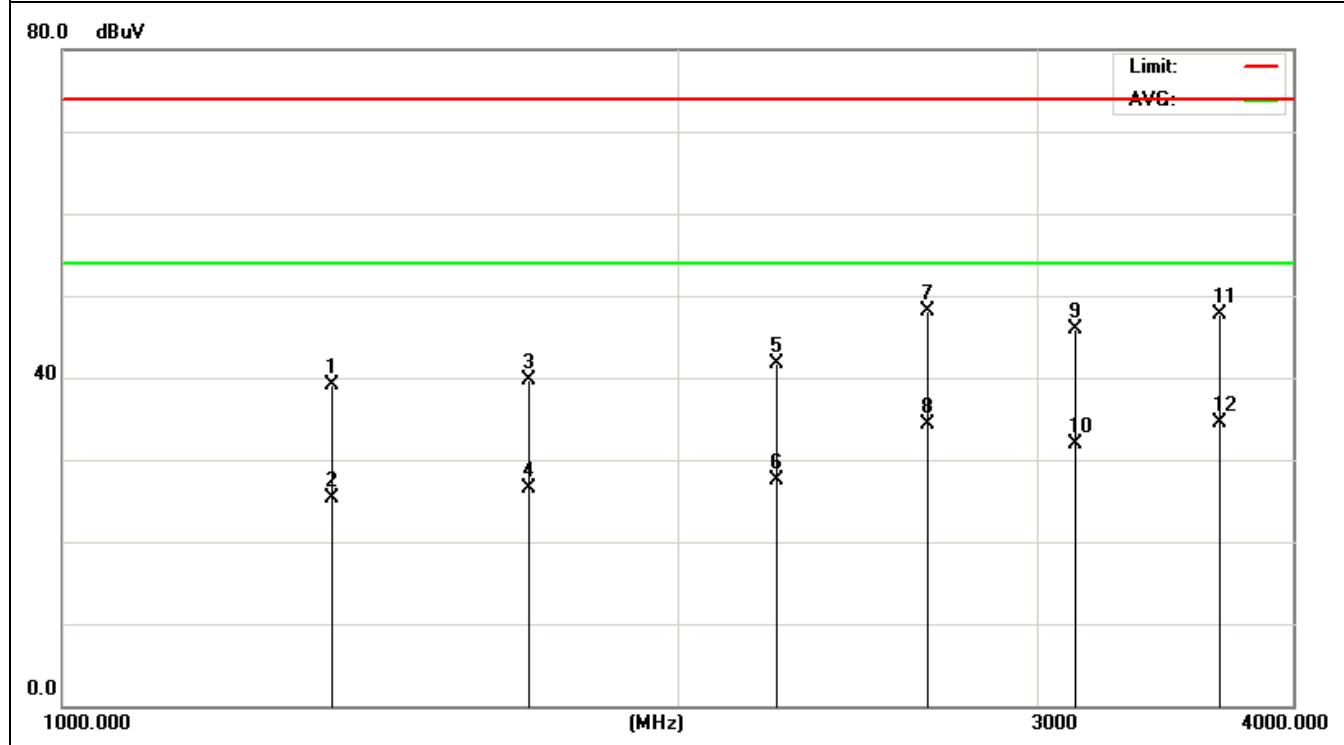
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-3	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1354.160	49.41	35.57	-10.29	39.12	25.28	74.00	54.00	-34.88	-28.72
1689.600	49.46	36.16	-9.66	39.80	26.50	74.00	54.00	-34.20	-27.50
2234.600	48.79	34.68	-7.10	41.69	27.58	74.00	54.00	-32.31	-26.42
2646.920	52.12	38.28	-3.92	48.20	34.36	74.00	54.00	-25.80	-19.64
3126.160	47.26	33.28	-1.38	45.88	31.90	74.00	54.00	-28.12	-22.10
*3682.850	46.49	33.25	1.27	47.76	34.52	74.00	54.00	-26.24	-19.48

Remark:

9. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

10. '*' means the worst case



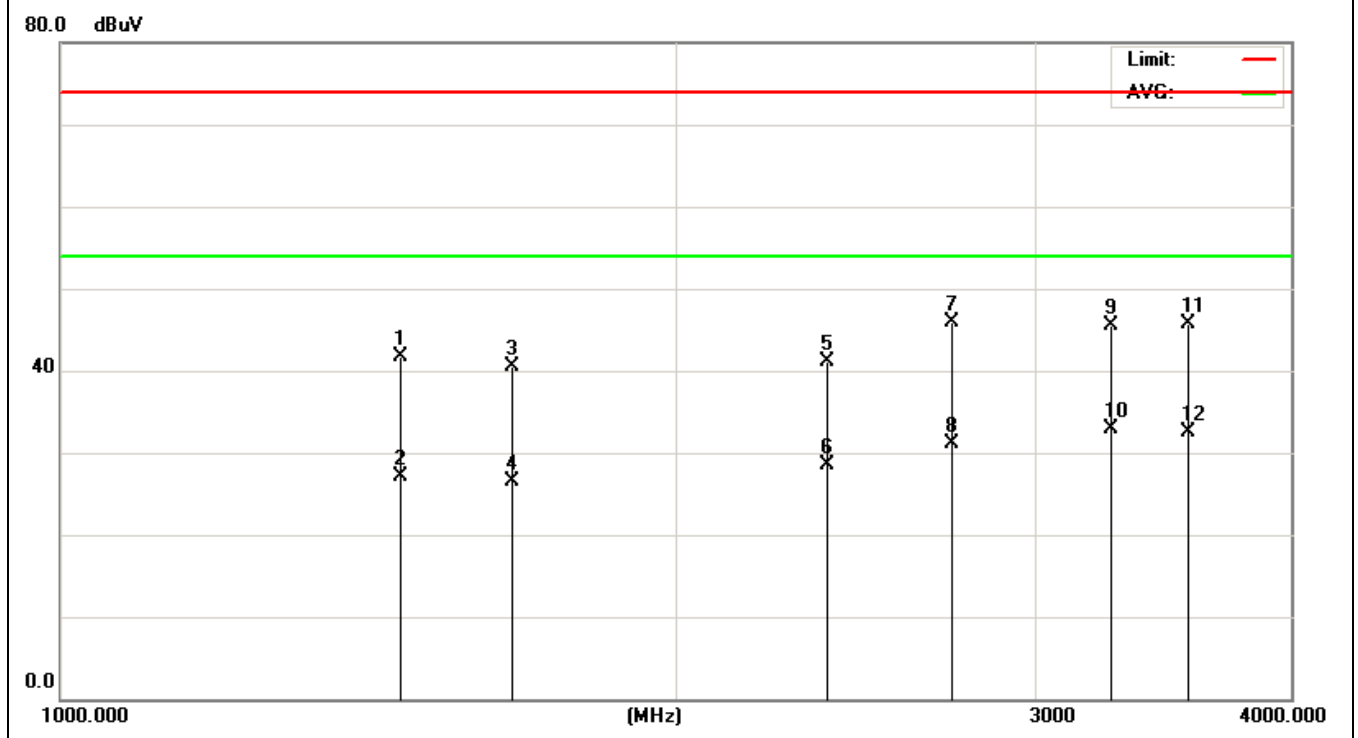
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-3	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1465.840	51.62	37.18	-10.01	41.61	27.17	74.00	54.00	-32.39	-26.83
1662.630	50.18	36.22	-9.73	40.45	26.49	74.00	54.00	-33.55	-27.51
2368.910	46.96	34.49	-5.95	41.01	28.54	74.00	54.00	-32.99	-25.46
2726.290	49.26	34.57	-3.39	45.87	31.18	74.00	54.00	-28.13	-22.82
*3265.520	46.60	34.06	-1.11	45.49	32.95	74.00	54.00	-28.51	-21.05
3563.110	45.53	32.34	0.12	45.65	32.46	74.00	54.00	-28.35	-21.54

Remark:

11. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

12. '*' means the worst case



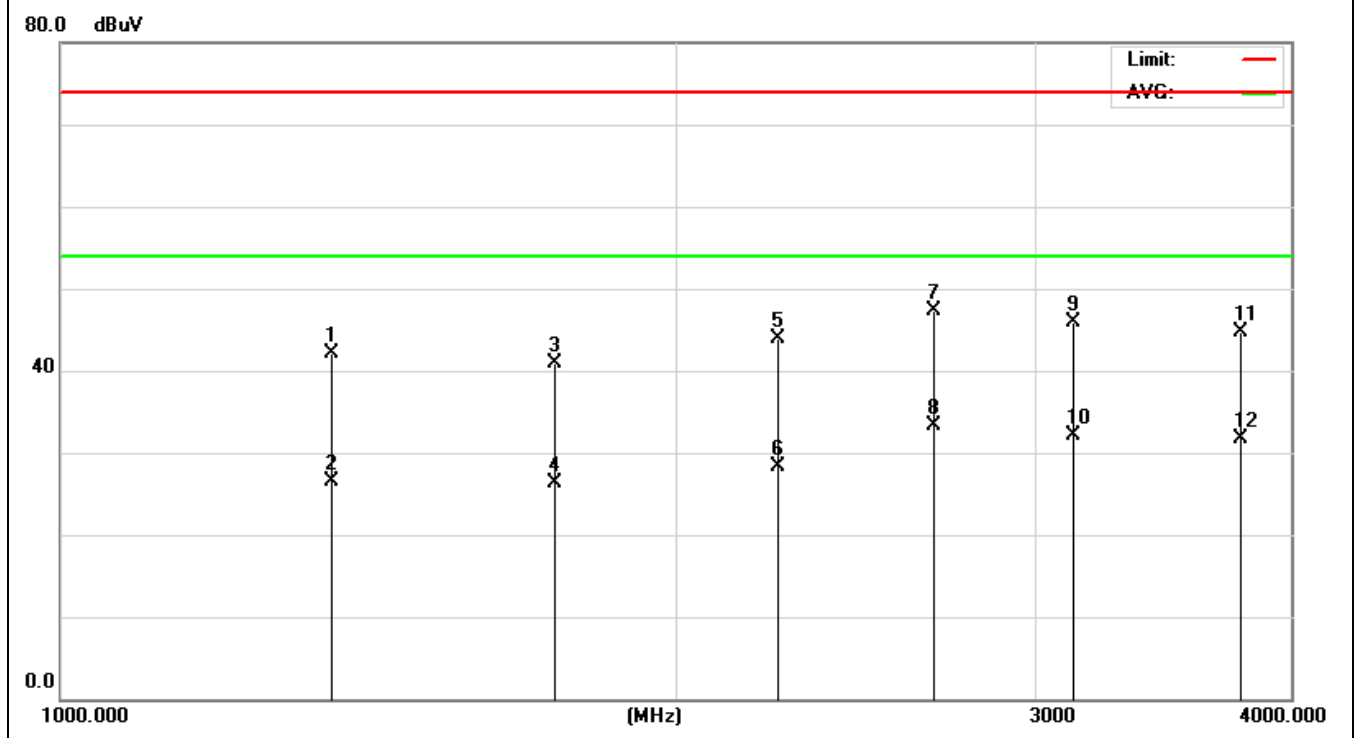
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-4	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Meter Reading (dBμV)		Factor (dB)	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
	QP	Average		QP	Average	QP	Average	QP	Average
1358.010	52.47	36.78	-10.29	42.18	26.49	74.00	54.00	-31.82	-27.51
1745.420	50.42	35.75	-9.50	40.92	26.25	74.00	54.00	-33.08	-27.75
2242.870	50.85	35.25	-7.04	43.81	28.21	74.00	54.00	-30.19	-25.79
*2675.720	51.03	37.10	-3.74	47.29	33.36	74.00	54.00	-26.71	-20.64
3127.240	47.24	33.56	-1.38	45.86	32.18	74.00	54.00	-28.14	-21.82
3774.780	42.50	29.52	2.13	44.63	31.65	74.00	54.00	-29.37	-22.35

Remark:

13. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

14. '*' means the worst case



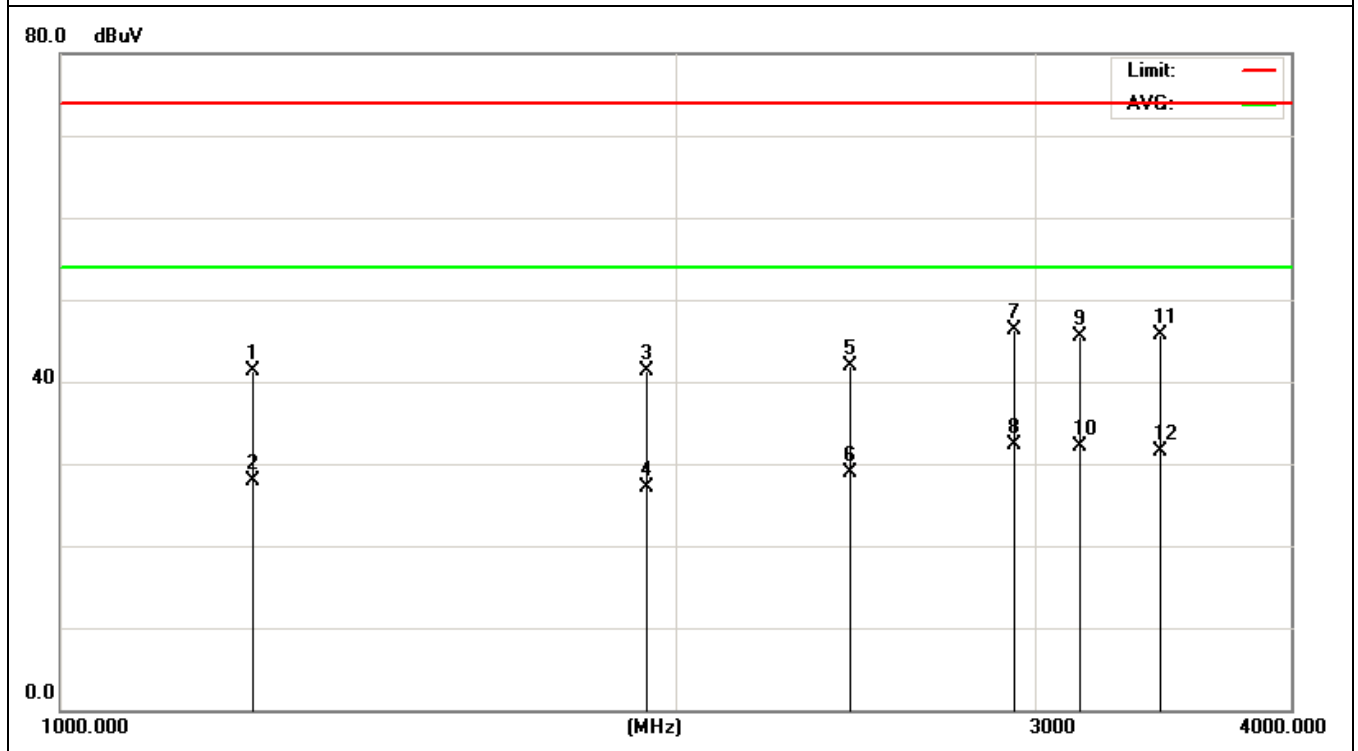
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-4	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency (MHz)	Meter Reading (dBμV)		Factor (dB)	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
	QP	Average		QP	Average	QP	Average	QP	Average
1242.750	51.71	38.42	-10.49	41.22	27.93	74.00	54.00	-32.78	-26.07
1932.320	50.69	36.45	-9.38	41.31	27.07	74.00	54.00	-32.69	-26.93
2434.530	47.34	34.36	-5.40	41.94	28.96	74.00	54.00	-32.06	-25.04
*2924.630	48.55	34.45	-2.20	46.35	32.25	74.00	54.00	-27.65	-21.75
3151.320	46.81	33.40	-1.32	45.49	32.08	74.00	54.00	-28.51	-21.92
3453.150	46.35	32.16	-0.70	45.65	31.46	74.00	54.00	-28.35	-22.54

Remark:

15. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

16. '*' means the worst case



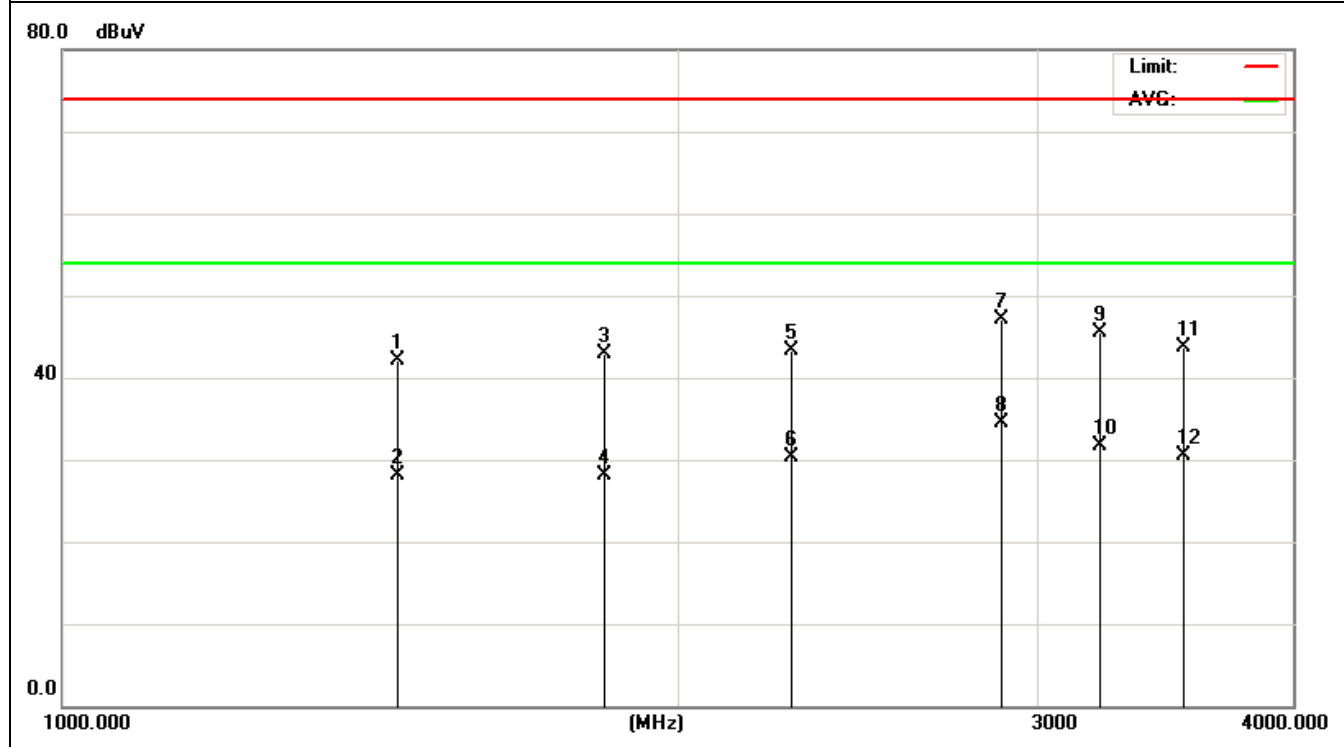
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-5	Phase :	Horizontal
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1459.860	52.10	38.12	-10.04	42.06	28.08	74.00	54.00	-31.94	-25.92
1842.750	52.42	37.54	-9.43	42.99	28.11	74.00	54.00	-31.01	-25.89
2272.480	49.98	37.09	-6.75	43.23	30.34	74.00	54.00	-30.77	-23.66
*2878.420	49.49	37.04	-2.48	47.01	34.56	74.00	54.00	-26.99	-19.44
3215.630	46.66	32.96	-1.17	45.49	31.79	74.00	54.00	-28.51	-22.21
3534.940	43.83	30.69	-0.17	43.66	30.52	74.00	54.00	-30.34	-23.48

Remark:

17. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

18. '*' means the worst case



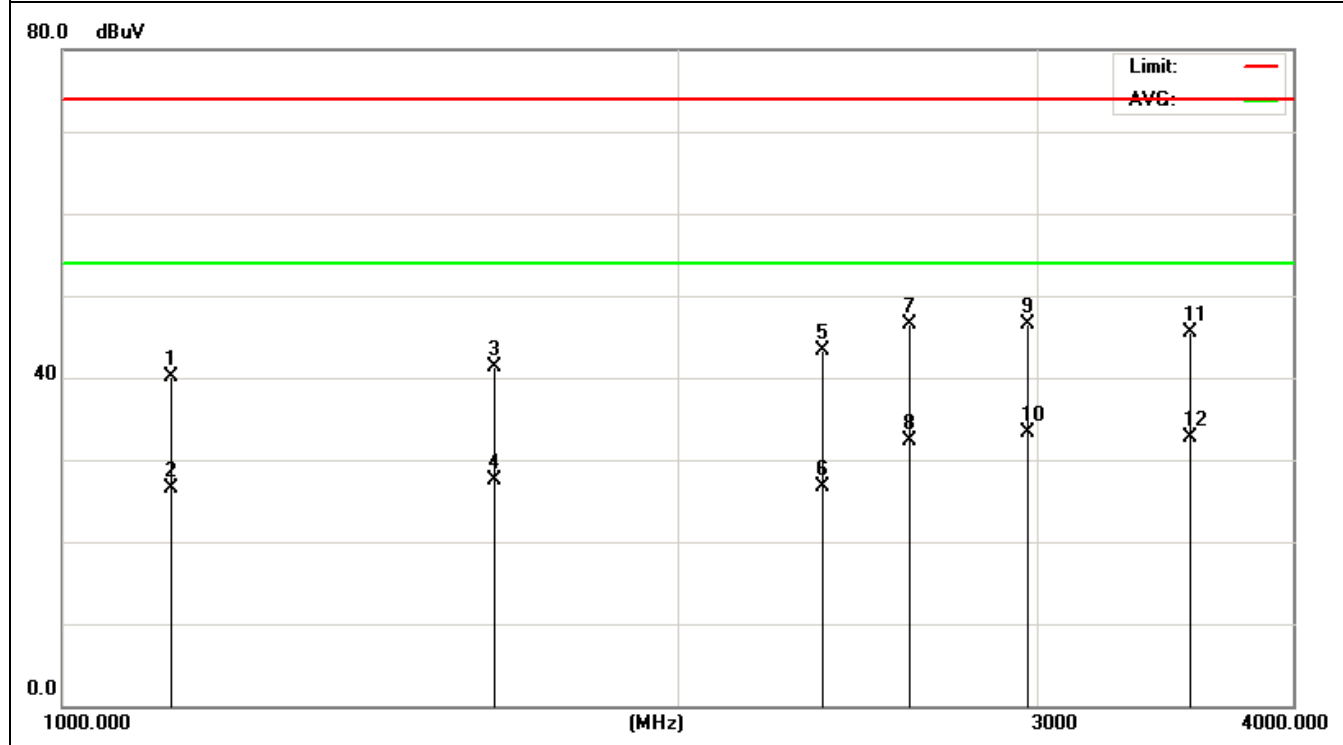
EUT:	DLP Pico Projector	Model Name :	HBP200+
Temperature:	23 °C	Relative Humidity:	50%
Pressure:	1010hPa	Test Date :	2012-04-25
Test Mode:	Mode 3-5	Phase :	Vertical
Test Voltage :	DC 19V from battery, AC 120V/60Hz for adapter		

Frequency	Meter Reading (dBμV)		Factor	Emission Level (dBμV)		Limits (dBμV)		Margin (dBμV)	
(MHz)	QP	Average	(dB)	QP	Average	QP	Average	QP	Average
1128.710	50.95	37.34	-10.77	40.18	26.57	74.00	54.00	-33.82	-27.43
1625.920	51.08	37.32	-9.82	41.26	27.50	74.00	54.00	-32.74	-26.50
2354.550	49.42	32.87	-6.07	43.35	26.80	74.00	54.00	-30.65	-27.20
2596.410	50.63	36.42	-4.21	46.42	32.21	74.00	54.00	-27.58	-21.79
*2964.120	48.34	35.19	-1.93	46.41	33.26	74.00	54.00	-27.59	-20.74
3564.100	45.34	32.58	0.13	45.47	32.71	74.00	54.00	-28.53	-21.29

Remark:

19. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

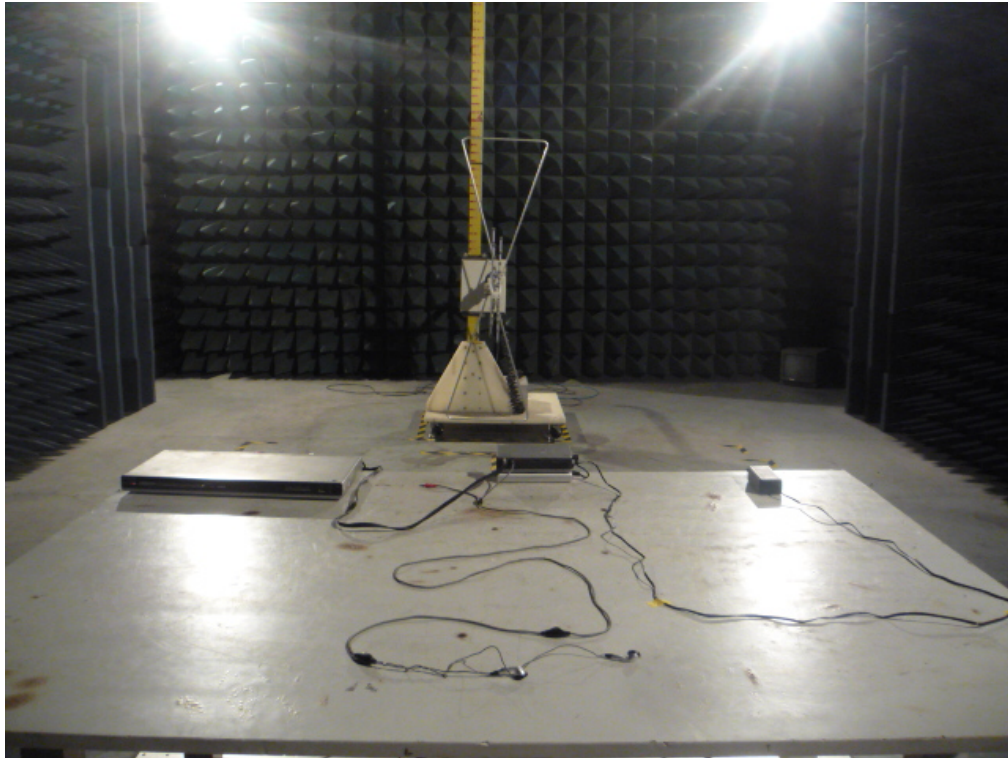
20. '*' means the worst case



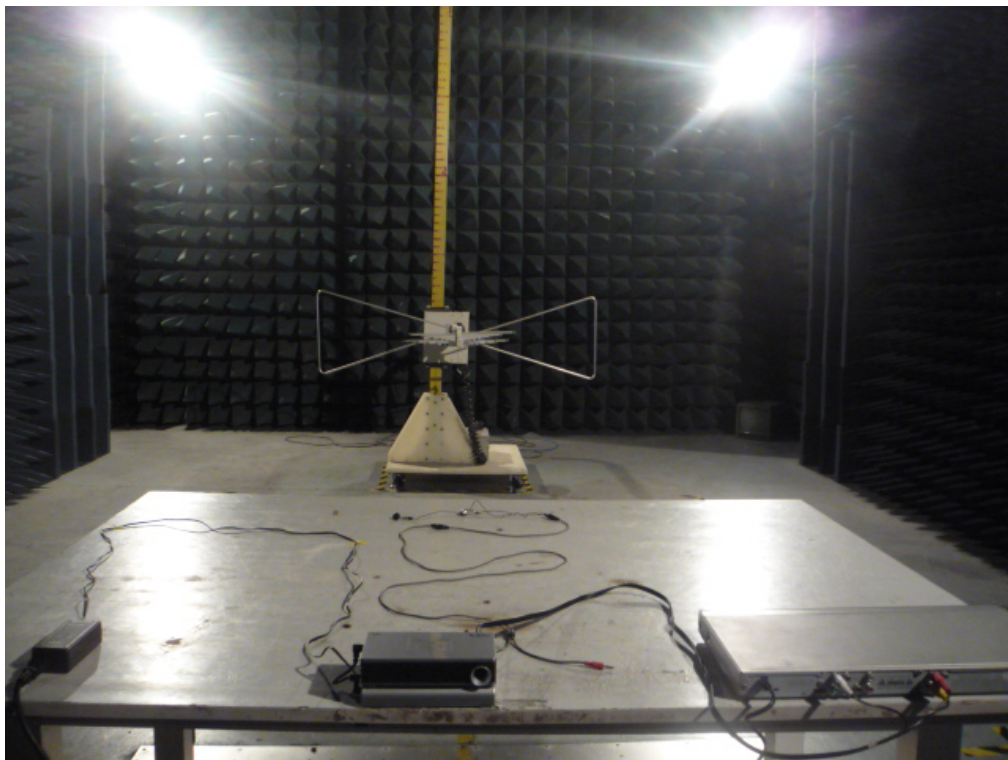
6.2.4 Test Setup photograph

Between 30—1000MHz

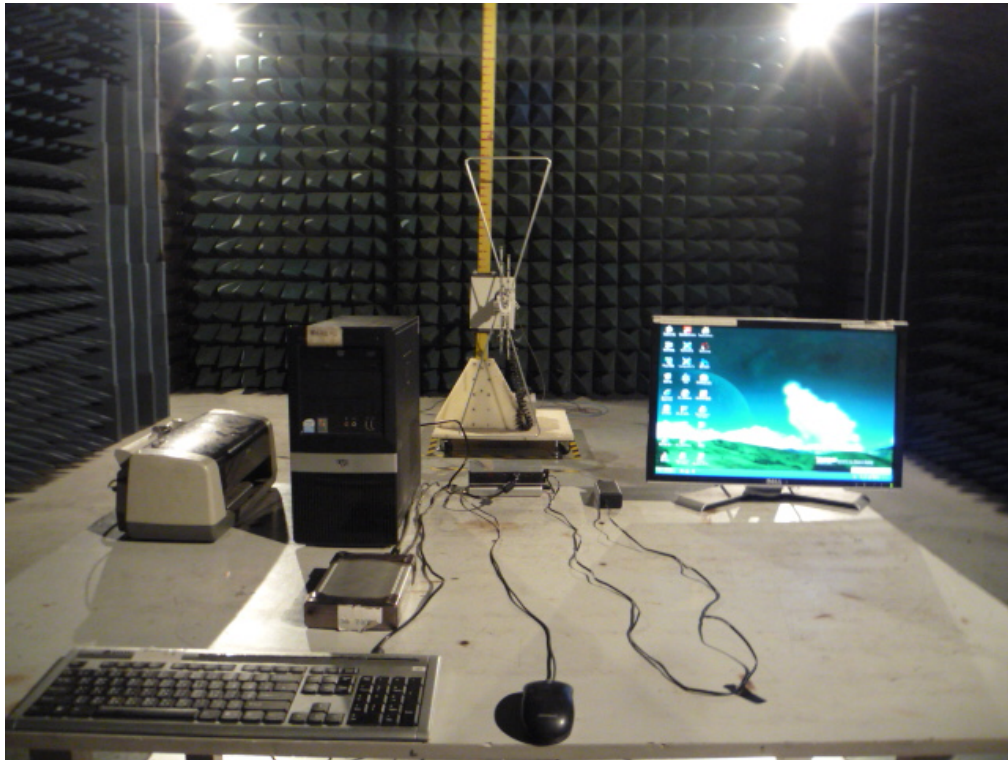
Model: HBP200+ Mode: 3-2



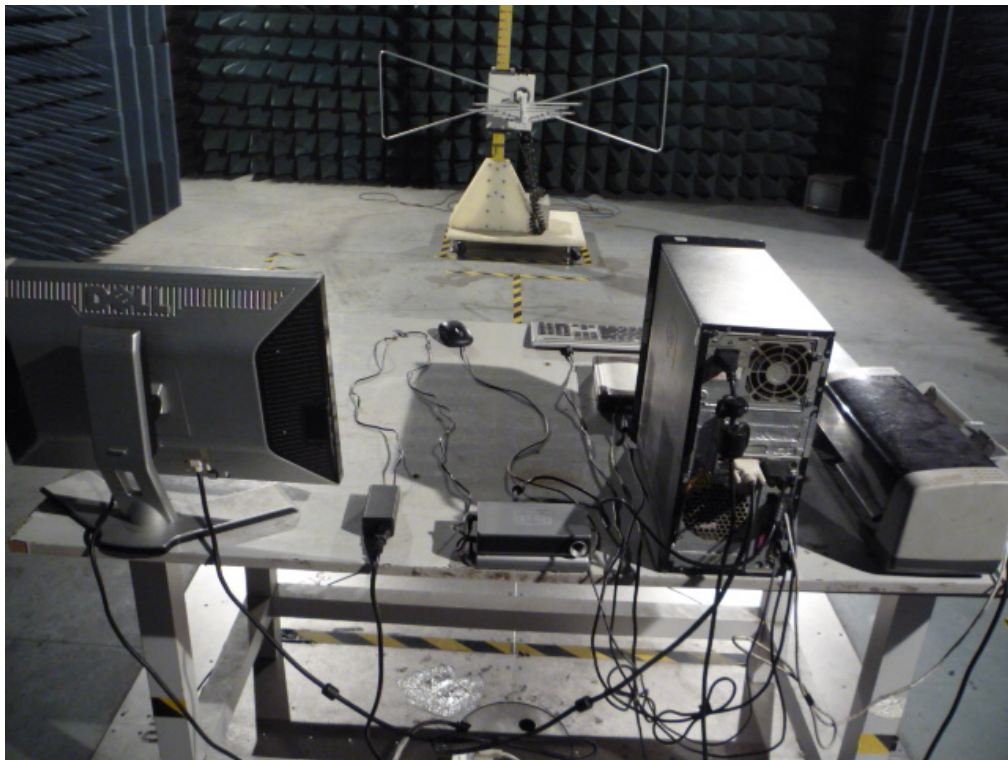
Model: HBP200+ Mode: 3-2



Model: HBP200+ Mode: 3-4

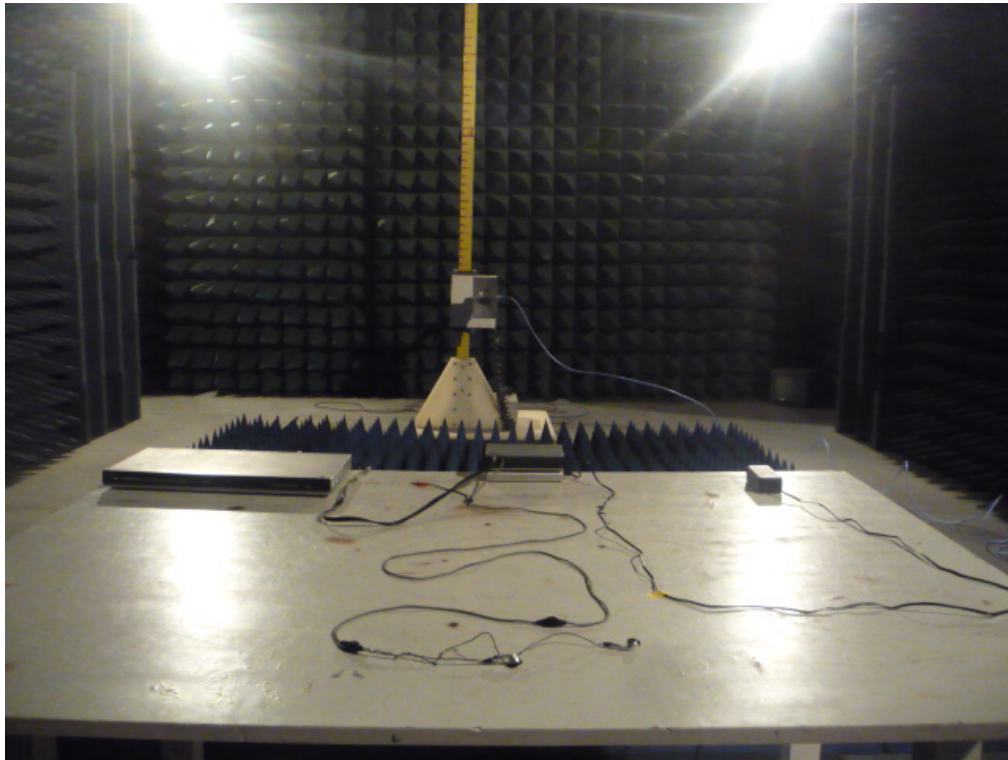


Model: HBP200+ Mode: 3-4

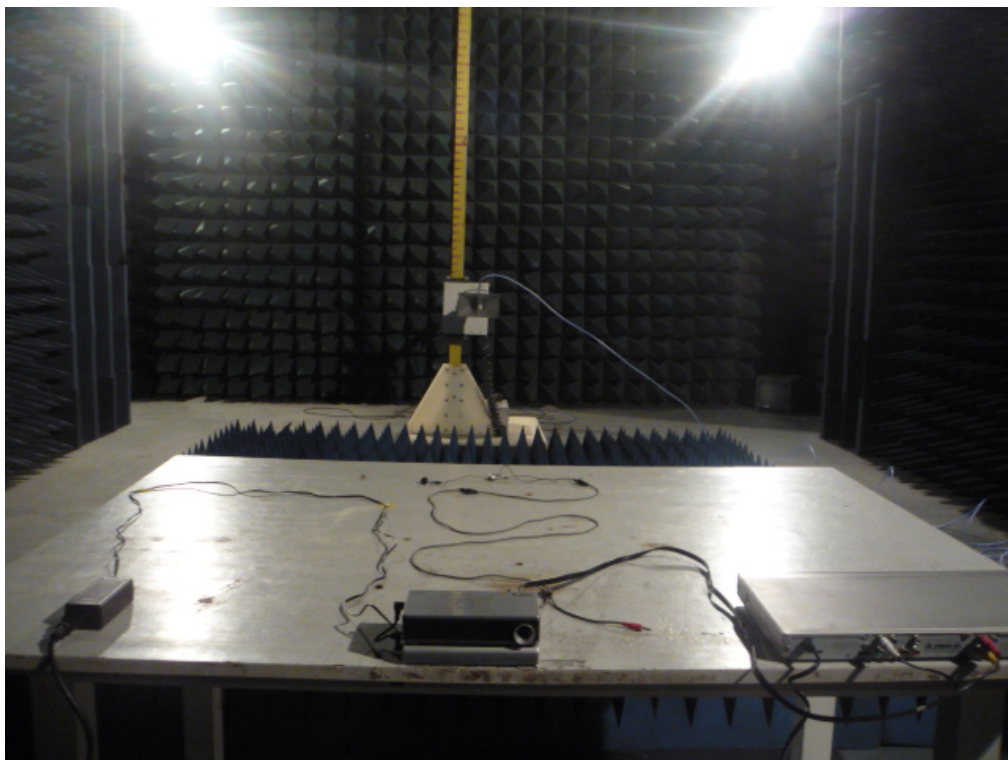


Between 1000—4000MHz

Model: HBP200+ Mode: 3-2



Model: HBP200+ Mode: 3-2



Model: HBP200+ Mode: 3-4



Model: HBP200+ Mode: 3-4

