Lab Code: 200167-0

FCC PART 15B/ICES-003, CLASS B
TEST AND MEASUREMENT REPORT

For

NVIDIA Corporation

2701 San Tomas Expressway,
Santa Clara, CA 95050, USA

FCC ID: VOB-P753A
Model: P753

Report Type:	**Product Type:**
Original Report	Wireless Hub for 3D Vision System

Test Engineer:	Chakrit Thammanavarat
Report Number:	R1009233
Report Date:	2010-11-16
Reviewed By:	Victor Zhang RF Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1009233	Original Report	2010-11-16

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of NVIDIA Corporation., *FCC ID: VOB-P753A,* , *model*: *P753,* which will be henceforth in this report referred to as the EUT (Equipment under Test). The EUT is wireless hub for 3D vision Pro is part of a system that enables the users to experience 3D images on 3D capable displays.

1.2 Mechanical Description of EUT

The EUT measures approximately 60 mm **(L)** x 60 mm **(W)** x 40mm **(H)** and weighs approximately 73 g.

The data gathered are from a typical production sample provided by the manufacturer with sample number: R1009233-1 testing assigned by BACL.

1.3 Objective

This report is prepared on behalf of NVIDIA Corporation in accordance with Part 15, Subparts A and B of the Federal Communications Commission rules, and Issue 4 of Industry Canada ICES-003, Interference – Causing Equipment Standards for Digital Apparatus.

The objective is to determine compliance with Part 15B of the FCC Rules and Industry Canada ICES-003 Standard using CISPR 22: 2006 Standard, Class B limits for conducted and radiated emission requirements for Information Technology Equipment.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.249 submission with same FCC ID, report number: R1009233-249.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All tests were performed at Bay Area Compliance Laboratories Corp.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values ranging from ±2.0 dB for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2698 and R-2463. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2001670.htm

2 System Test Configuration

2.1 Justification

The EUT was configured in accordance to ANSI C63.4-2003 Standards.

2.2 EUT Exercise Software

The software to exercise the unit was provided by the client.

2.3 Equipment Modifications

No modifications were made to the EUT.

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2.6 Local Support Equipment Details

Manufacturer	Description	Model No.	Serial No.
Samsung	Monitor	2233RZ	CM22H1LQB00241V
Dell	Desktop	DCD0	00045-841-663-763
Dell	Keyboard	L100	-
Dell	Mouse	-	-
NVIDIA Corporation	3D Glasses	P703	R1009234-1

2.7 Internal Configurations Details

Manufacturer	Description	Model No.	Serial No.
NVIDIA Corporation	Main Board	600-50753-1001-300 A.9	P753-A03-0012

3 Summary of Test Results

Standards	Descriptions	Result(s)
FCC §15.107 IC ICES-003 §5.3	AC Line Conducted Emissions	Compliant
FCC §15.109 IC ICES-003 §5.5	Radiated Spurious Emissions	Compliant

4 FCC §15.107 & IC ICES-003 §5.3 – AC Line Conducted Emissions

4.1 Applicable Standard

As per FCC §15.107 and IC ICES-003 §5.3: Conducted Limits

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Table 1- Limits for conducted disturbance at the mains ports of class B ITE

Frequency range (MHz)	Limits (dBμV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

4.2 EUT Setup

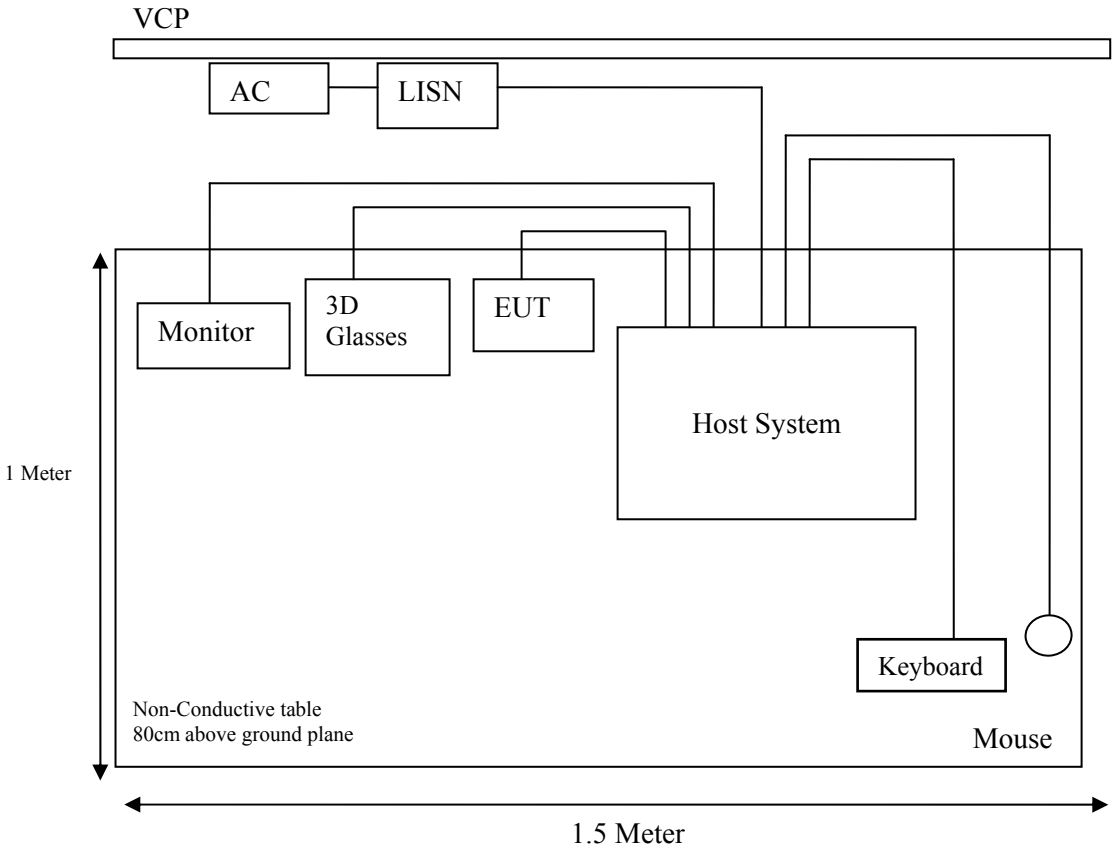
The conducted emissions tests were performed in the 5 meter test chamber, using the setup in accordance with FCC Part 15 measurement procedures. The specifications used were in accordance with FCC Part 15B and IC ICES-003 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The EUT was connected to Host system via USB cable and the host system was connected to 120 VAC/ 60 Hz power source.

4.3 Test Setup Block Diagram



4.4Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Solar Electronics	LISN	9252-R-24-BNC	511205	2010-06-25
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2010-06-10

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

4.5 Test Procedure

During the conducted emissions test, the power cord of the host system was connected to the LISN.

Maximization procedure was performed on the six (6) highest emission readings from the EUT.

4.6 Test Environmental Conditions

Temperature:	18~21 °C
Relative Humidity:	30~35 %
ATM Pressure:	101.2-102.2kPa

The testing was performed by Kevin Li on 2010-09-29 in 5 meter chamber 3.

4.7 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Cable Loss, and Attenuator Factor adding to the Indicated Reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Cable Loss + Attenuator Factor

For example, a Corrected Amplitude of 34.08 dBuV/m = Indicated Reading (23.85 dBuV) + Cable Factor (0.22 dB) + Attenuator Factor (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Class B Limit

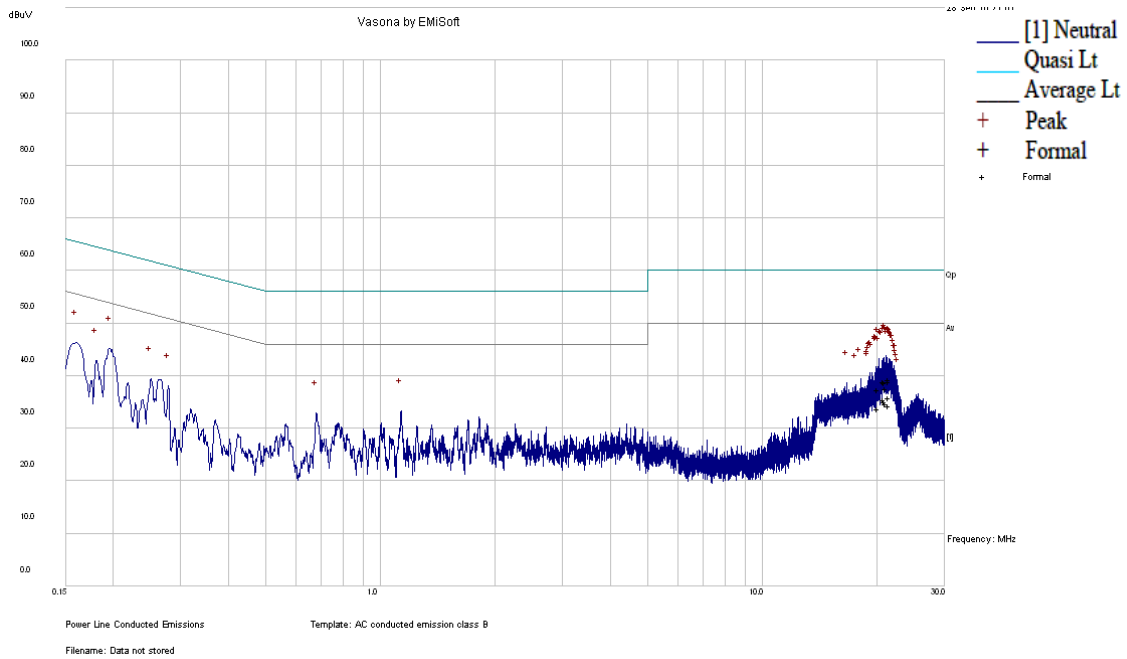
4.8 Summary of Test Results

According to the recorded data, the EUT complied with FCC Part 15B and IC ICES-003 Standard, Class B limits, and had the worst margin reading of:

Connection: Host system connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-8.23	0.678012	Neutral	0.15 to 30

4.9 Conducted Emissions Test Plots and Data

120 V, 60 Hz – Line



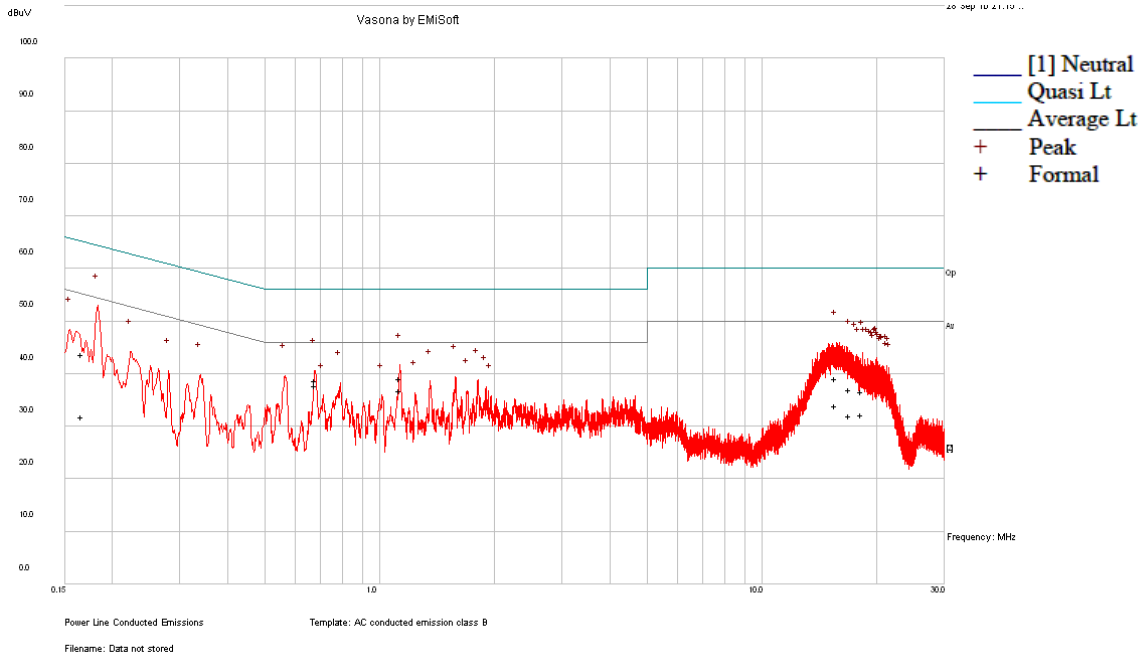
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
21.00767	38.65	Line	60	-21.35
21.12725	37.51	Line	60	-22.49
20.81660	38.84	Line	60	-21.16
21.50632	38.93	Line	60	-21.07
20.12713	37.43	Line	60	-22.57
21.44090	39.33	Line	60	-20.67

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
21.00767	35.18	Line	50	-14.82
21.12725	34.62	Line	50	-15.38
20.81660	35.39	Line	50	-14.61
21.50632	34.26	Line	50	-15.74
20.12713	33.73	Line	50	-16.27
21.44090	35.87	Line	50	-14.13

120 V, 60 Hz – Neutral



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
0.166293	43.70	Neutral	65.14	-21.45
15.61321	39.11	Neutral	60.00	-20.89
1.128210	39.04	Neutral	56.00	-16.96
0.678012	38.69	Neutral	56.00	-17.31
16.92515	37.09	Neutral	60.00	-22.91
18.30172	36.69	Neutral	60.00	-23.31

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
0.166293	31.88	Neutral	55.14	-23.26
15.61321	33.85	Neutral	50.00	-16.15
1.128210	36.72	Neutral	46.00	-9.28
0.678012	37.77	Neutral	46.00	-8.23
16.92515	31.96	Neutral	50.00	-18.04
18.30172	32.28	Neutral	50.00	-17.72

5 FCC §15.109 & IC ICES-003 §5.5 – Radiated Spurious Emissions

5.1 Applicable Standards

As per FCC §15.109 and IC ICES-003 §5.5: Radiated Spurious Emission Limits

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field Strength (µV/m)
30-88	100
88-216	150
216-960	200
Above 960	500

(g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment—Radio Disturbance Characteristics—Limits and Methods of Measurement."

Note: The CISPR 22 §6 Standard, Class B limits are applied to the test data hereinafter.

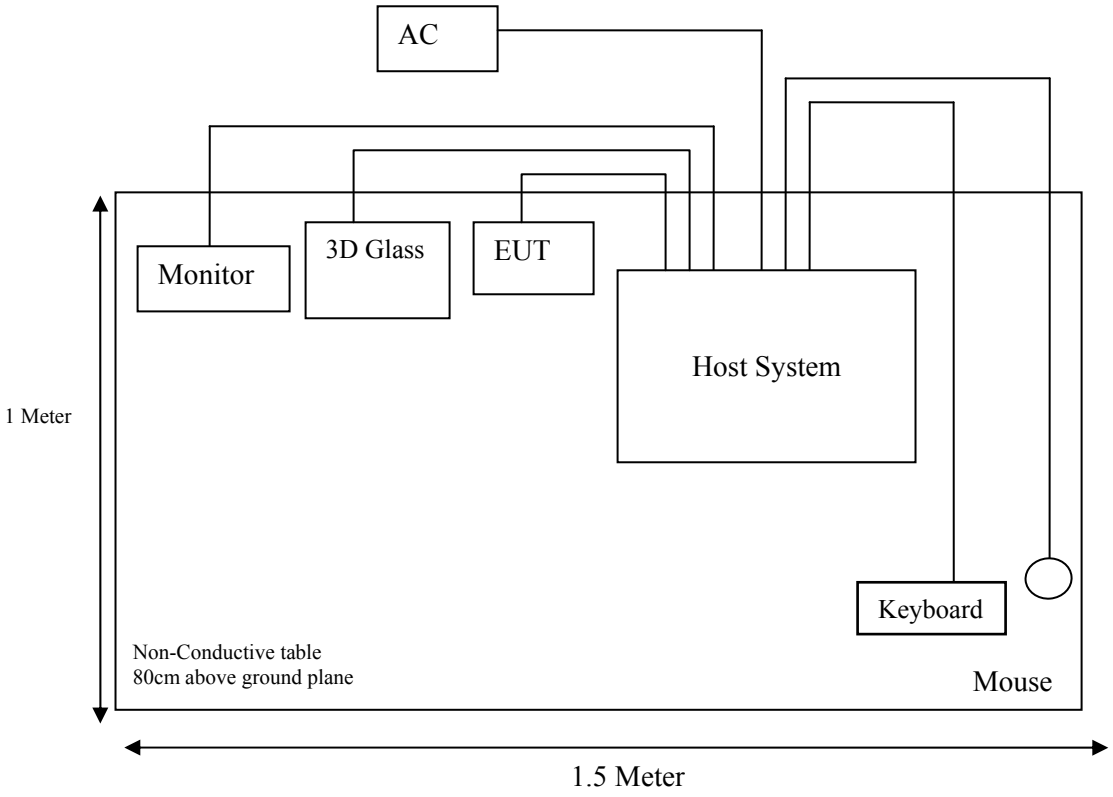
5.2 Test Setup

The radiated emissions tests were performed in the 10 meter test chamber, using the setup in accordance with ANSI C63.4-2003 measurement procedures. The specifications used were in accordance with CISPR 22 §6 Standard, Class B limits for frequencies between 30 MHz and 1 GHz, and FCC Part 15 Standard, Class B limits for frequencies above 1 GHz.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

5.3 Test Setup Block Diagram



5.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Hewlett Packard	Pre amplifier	8447D	2944A07030	2010-04-16
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2010-06-24
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2010-05-28
HP	Pre Amplifier	8449B	3147A00400	2010-02-01
A.R.A Inc.	Horn antenna	DRG-1181A	1132	2009-10-27
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

5.5 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions readings to ensure the EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings were performed only when an emission was found to be marginal (within -4 dB of specification limits).

5.6 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	42 %
ATM Pressure:	101.4 kPa

The testing was performed by Chakrit Thammanavarat on 2010-10-05 in 10m chamber 1.

5.7 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna and Attenuator Factor, Cable Loss and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Loss + Attenuator Factor – Amplifier Gain

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Class B Limit

5.8 Summary of Test Results- 30 MHz to 1GHz

According to the recorded data, the EUT complied with FCC §15.109 Standard, Class B limits, and had the worst margin reading – when calculated using CISPR 22 §6 Standard, Class B limits – of:

Freq Range: 30 MHz-1GHz			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
4.15	160.5763	Vertical	30-1000

FCC 15.109

Freq Range: Above 1 GHz			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-	-	-	Above 1 GHz

Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.

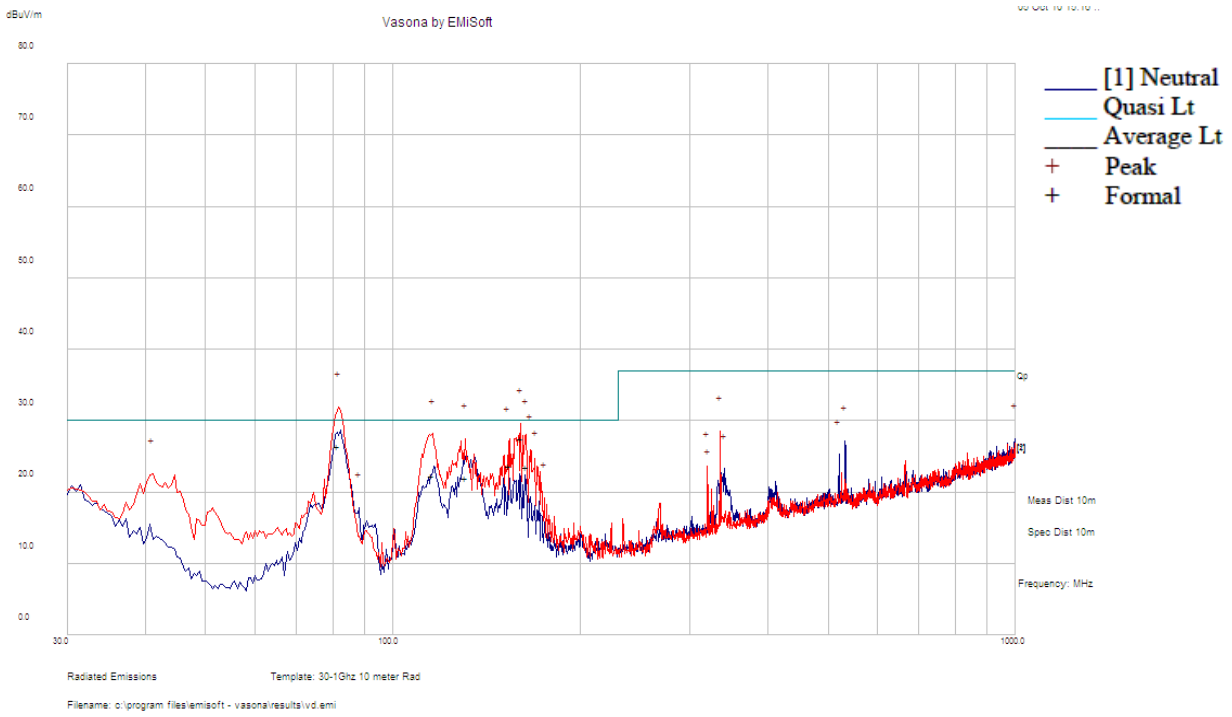
CISPR 22

Freq Range: Above 1GHz			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-	-	-	Above 1 GHz

Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.

5.9 Radiated Emissions Test Plots and Data

1) 30 MHz – 1 GHz Measured at 10 Meter Distance



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (V/H)	Turntable Azimuth (degree)	Limit (dBuV/m)	Margin (dB)
81.6495	26.41	111	V	56	30	-3.59 *
160.5763	25.85	102	V	326	30	-4.15
153.3888	23.70	145	V	338	30	-6.30
163.7420	23.51	204	V	346	30	-6.49
115.5953	22.28	232	V	16	30	-7.72
131.0585	22.07	188	V	250	30	-7.93

* The Frequency 81.6495 MHz came from the support equipment.

2) Above 1 G Hz Measured at 3 Meter Distance – FCC 15.109

Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)			
-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)			
-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.

3) Above 1 G Hz Measured at 3 Meter Distance – CISPR22

Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)			
-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)			
-	-	-	-	-	-	-

Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.