

FCC PART 15 CLASS B EMI MEASUREMENT AND TEST REPORT


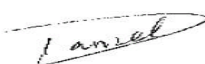
For

NMB TECHNOLOGIES INC.

9730 Independence Ave.,
Chatsworth, CA 91311

FCC ID: AQ6-7R15

2005-03-11

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Computer Keyboard - ITE
Test Engineer: Jerry Wang / 	
Report No.: R0503023	
Test Date: 2005-03-01, 2005-03-03	
Reviewed By: Daniel Deng / 	
Prepared By: Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732-9164	

Note: This test report is specially limited to the use of the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product Endorsement by NVLAP or any agency of the U.S. Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *NMB Technologies Inc.* product, model: RT7R15 for NMB and Y-BN52 for Logitech, or the "EUT" as referred to this report is a Computer Keyboard which measures approximately 48.0cm L x 23.0cmW x 3.5cmH with weight 1.25LB.

**The test data gathered are from production sample, serial number: 0502010076, provided by the manufacturer.*

Objective

This Class B report is prepared on behalf of *NMB Technologies Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with U.S.A. FCC Class B and Canada ICES-003 issue 4 limits for conducted and radiated margin requirements for Information Technology Equipment.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted 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 radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Article 8 of the VCCI regulations. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC 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 is attached hereinafter and can also be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

Justification

The EUT was tested in accordance with ANSI C63.4-2003.

EUT Exercise Software

The EUT exercising software program was designed to exercise the various installed components in accordance with ANSI C63.4-2003.

Special Accessories

The unit was tested with the normally supplied cabling and accessories provided by the supporting equipment and no special accessories were used.

Schematics / Block Diagram

Please refer to Exhibit C.

Equipment Modifications

No modifications were made to the EUT.

Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell PC System	Motherboard	N/A	MX-03E851-12416-18Q-048J	DOC
Dell	POWER SUPPLY	PS-5251-2D	C00277522	DOC
IBM	Hard Drive	IC35L020AVER0	TH-01FNM-12567-17K-7R85	DOC
Samsung	CD-ROM	SM-308	KR-00J304-36521	DOC
Sony	Floppy Drive	MPF920-F	20080561	DOC
Dell	Chassis	Mid Tower ATX	US-03F364-03731	None
Dell PC System	PC System	8300/09	FQBWL31	DOC
Dell	Motherboard	E210882	CN-0M2035-48111-36Q-06VY	
Lite-On. I. T. Corp	CD-Rom	LTN-486S	0T0799	DOC
H.L Data Storage	CD-RW/DVD-Rom	GCC-4480B	KR-05X840-35831-379-A059	DOC
NEC	Floppy	FD1231M	JFML373E6196	DOC
Seagate	Hard Disk	ST340014A	3JX3CQ1G	DOC

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	PC System	Mid Tower ATX	X05-52710	None
Dell	LCD Flat panel	2000FP	TW-09E249-46635-2CJ-OGFL	DOC
Dell	Mouse	63618-OEM	8783844-7	N/A
EVEREX	Modem	EV-945	NONE	E3E5UVEV-945
HP	ThinkJet Printer	2225C+	2821S14783	DS16XU2225
Dell	PC System	8300/09	FQBWL31	DOC
View Sonic	Monitor	S7773	N/A	DOC

Printed Circuit Boards in EUT

Manufacturer/Description	Rev.	# of Layers	Crystals (MHz)
NMB	03	2	N/A

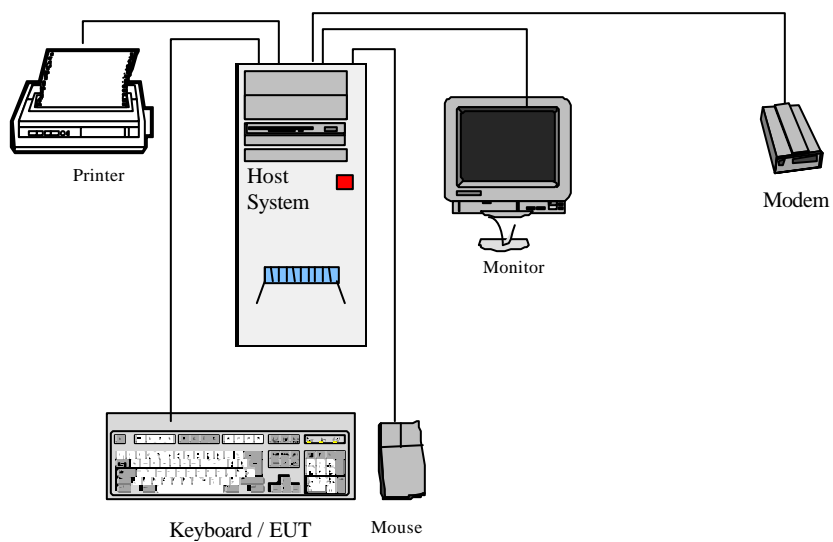
Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Power Supply	PS-5251-2D	C00277522	DOC

Interface Ports and Cabling

Cable Description	Length (M)	Port/From	To
Shielded Cable	1.5	USB Port / Host	EUT
Shielded Cable	1.5	PS2 Port / Host	EUT
Shielded Cable	1.5	Mouse Port / Host	Dell Mouse
Shielded Cable	1.5	Parallel / Host	HP Printer
Shielded Cable	2	Serial / Host	Modem
Shielded Video Cable	2	VGA / Host	Monitor

Configuration of Test System



SUMMARY OF TEST REPORT

RULE	DESCRIPTION	RESULTS
15.107	Conducted Emissions	Compliant
15.109	Radiated Emissions	Compliant*
15.19	Labelling Requirements	Compliant
15.21, 15.105	Information to the User	Compliant
15.27	Special Accessories	Compliant

*For PS2 is Within the Measurement of Uncertainty

§15.107 - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 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 host PC was connected to 120Vac/60Hz power source.

Receiver Setup

The receiver was set to investigate the frequency from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial-Mains networks	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15
Fluke	Calibrated Voltmeter	189	18485-38	2004-07-18

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

Test Procedure

During the conducted emission test, the power cord of the host PC was connected to the mains outlet of the first LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Average readings are distinguished with an "Ave". Quasi-peak readings are distinguished with an "Qp".

Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	45%
ATM Pressure:	1020 mbar

The testing was performed by Jerry Wang on 2005-03-01.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Conducted limits for a Class B device, with the worst margin reading of:

-11.3 dB at 0.160 MHz on the Line conductor.

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.160	44.2	Ave	Line	55.46	-11.3
2.510	33.9	Ave	Line	46.00	-12.1
4.540	33.5	Ave	Neutral	46.00	-12.5
0.245	35.2	Ave	Line	51.92	-16.7
0.160	38.0	Ave	Neutral	55.46	-17.5
0.245	32.3	Ave	Neutral	51.92	-19.6
0.160	44.9	QP	Line	65.46	-20.6
2.510	34.8	QP	Line	56.00	-21.2
4.540	33.6	QP	Neutral	56.00	-22.4
0.160	40.7	QP	Neutral	65.46	-24.8
0.245	35.5	QP	Line	61.92	-26.4
0.245	34.9	QP	Neutral	61.92	-27.0

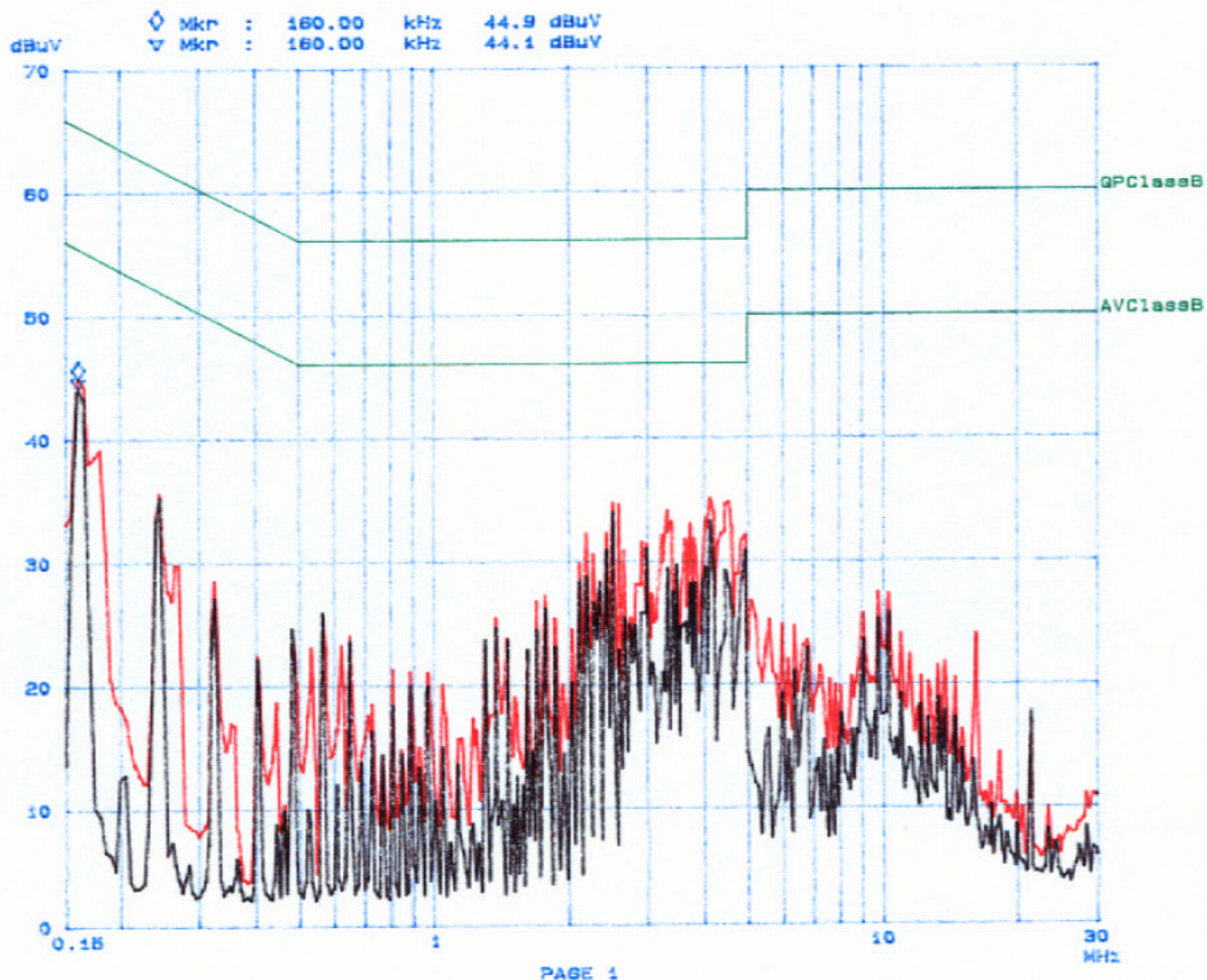
Plots of Conducted Emission

The plots of conducted emission are presented hereinafter as reference.

Bay Area Compliance Laboratory Corp
Class B*Jerry 2015-3-1*
26. Feb 05 06:56EUT: RT7R15/Y-BN52
Manuf: NMB
Op Cond: Normal
Operator: Jerry
Comment: L
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	X-Time	Atten	Preamplifier
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF



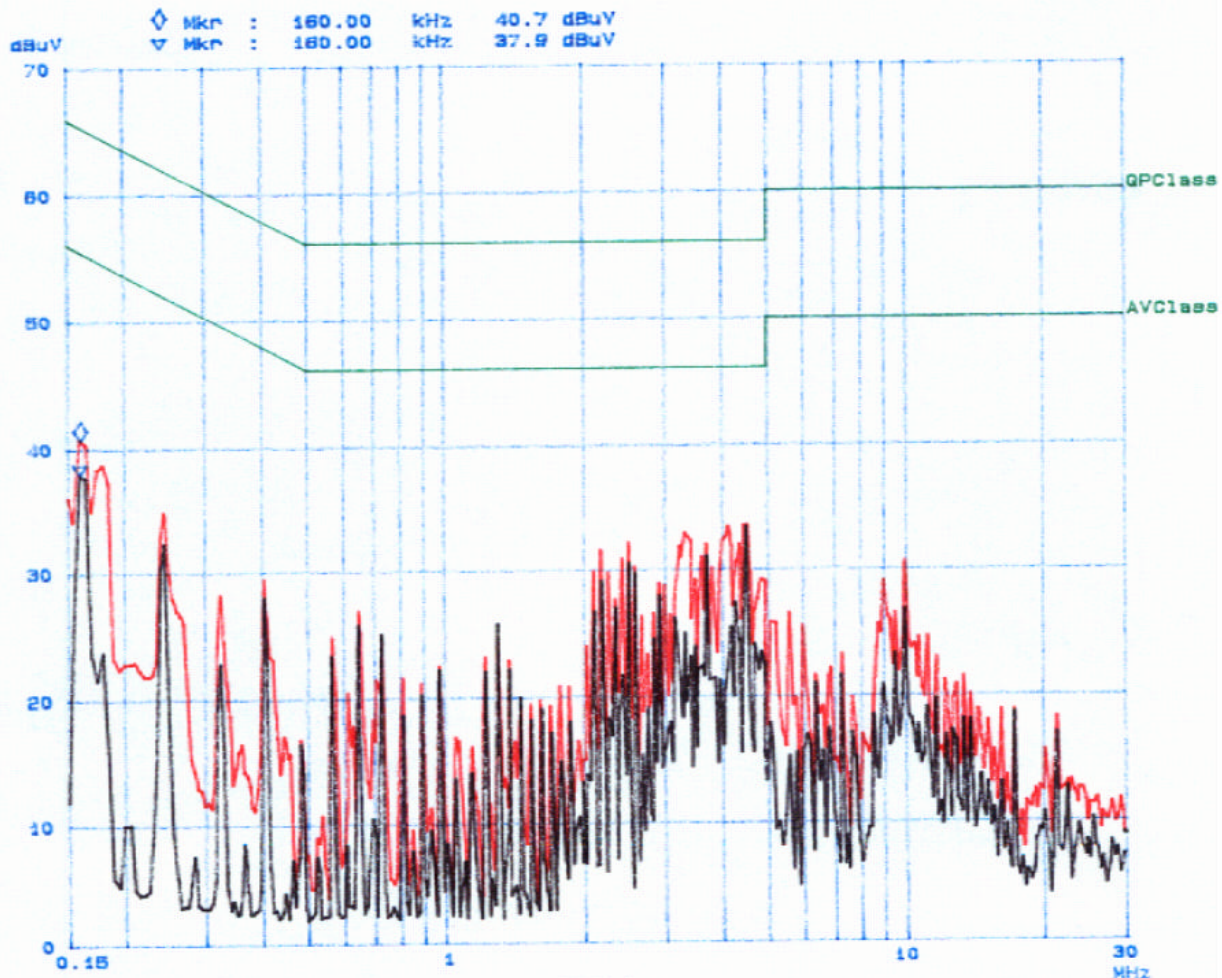
Bay Area Compliance Laboratory Corp
Class B

Jenny 2005-3-1
26. Feb 05 07:24

EUT: RT7R15/Y-BN52
Manuf: NMB
Op Cond: Normal
Operator: Jenny
Comment: N
120VAC

Scan Settings (3 Ranges)

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF



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§15.109 - RADIATED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, 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 EMI Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2003. The specification used was the FCC 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 host PC was connected to 120Vac/60Hz power source.

Receiver Setup

The system was tested to 1000 MHz.

During the radiated emission test, the receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal Date
Agilent	Amplifier, Pre	8447D	2944A10187	2004-10-24
EMCO	Antenna, Bionical	3110B	9309-1165	2004-10-01
EMCO	Antenna, Log-Periodic	3146	2101	2004-11-08
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100044	2004-09-29
Sunol Sciences	System Controller	SC99V	122303-1	N/R

* **Statement of Traceability:** BACL Corp. certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the EUT all support equipment were connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions in the described configurations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "Qp" in the data table.

Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

Summary of Test Results

According to the data in following tables, the EUT complied with the CISPR 22 Class B standards, and had the worst margin of:

-4.6 dB (QP) at 84.12 MHz in the **Vertical** polarization, 30 to 1000 MHz For USB
-1.4 dB (QP) at 72.14 MHz in the **Horizontal** polarization, 30 to 1000 MHz For PS2*

*For PS2 the EUT measured -1.4 dB (QP) within the measurement uncertainty of ± 4.0 dB

Radiated Emissions Test Data, 3 meters

Environmental Conditions

Temperature:	21° C
Relative Humidity:	49%
ATM Pressure:	1019mbar

*Testing was performed by Jerry Wang on 2005-03-03.

Radiated Emissions Test Data – For USB

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC Limit	FCC Margin
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	dBuV/m	dB
84.12	52.3	200	1.2	V	9.6	1.9	28.4	35.4	40	-4.6QP
84.12	52.1	200	2.5	H	9.6	1.9	28.4	35.2	40	-4.8
72.1	51.2	190	1.2	V	9.6	1.8	28.4	34.2	40	-5.8
72.14	50.3	200	2.5	H	9.6	1.8	28.4	33.3	40	-6.7
168.27	47.3	180	3	H	13.3	2.7	27.9	35.4	43.5	-8.1
180.28	45.4	200	3	H	13.6	2.8	27.8	34.0	43.5	-9.5
192.32	44.2	270	2.5	H	14.4	2.9	27.7	33.8	43.5	-9.7
168.26	45.6	0	1.2	V	13.3	2.7	27.9	33.7	43.5	-9.8
108.16	48.2	270	3	H	11.4	2.1	28.2	33.5	43.5	-10.0
192.32	43.5	330	1.2	V	14.4	2.9	27.7	33.1	43.5	-10.4
180.27	44.2	30	1.2	V	13.6	2.8	27.8	32.8	43.5	-10.7

Radiated Emissions Test Data – For PS2

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC Limit	FCC Margin
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	dBuV/m	dB
72.14	55.6	200	3	H	9.6	1.8	28.4	38.6	40	-1.4QP
72.13	55.2	200	1.2	V	9.6	1.8	28.4	38.2	40	-1.8QP
84.17	52.3	30	1.2	V	9.6	1.9	28.4	35.4	40	-4.6QP
84.12	52.3	200	3	H	9.6	1.9	28.4	35.4	40	-4.6QP
75.11	50.9	200	2.5	H	9.5	1.8	28.4	33.8	40	-6.2
168.28	47.5	200	1.2	V	13.3	2.7	27.9	35.6	43.5	-7.9
180.28	46	300	3	H	13.6	2.8	27.8	34.6	43.5	-8.9
168.28	46.4	270	3	H	13.3	2.7	27.9	34.5	43.5	-9.0
180.27	45.5	200	1.2	V	13.6	2.8	27.8	34.1	43.5	-9.4
192.32	44.5	200	1.2	V	14.4	2.9	27.7	34.1	43.5	-9.4
108.16	48.5	180	3	H	11.4	2.1	28.2	33.8	43.5	-9.7
108.17	47.5	180	1.2	V	11.4	2.1	28.2	32.8	43.5	-10.7
120.18	46.4	200	3	H	12.1	2.4	28.2	32.7	43.5	-10.8
192.32	43.1	270	2.5	H	14.4	2.9	27.7	32.7	43.5	-10.8
150	44.3	300	3	H	13.0	2.5	28.0	31.8	43.5	-11.7
120.18	45.4	200	1.2	V	12.1	2.4	28.2	31.7	43.5	-11.8
150	42.4	180	1.2	V	13.0	2.5	28.0	29.9	43.5	-13.6

