Nemko USA, Inc.
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CERTIFICATION TEST REPORT

PART 15.247, SUBPART C

RSS-210 - LOW POWER LICENSE EXEMPT RADIO-COMMUNICATION DEVICES (ALL FREQUENCY BANDS)

DECLARATION OF CONFORMANCE PROCEDURES
TEST REPORT

For The **Rack Mount System**

Model: **DX200**

PREPARED FOR:

HME
14110 Stowe Drive
Poway, CA 92064

PREPARED ON **4-7-05**

REPORT NUMBER: **2005 030172-FCC**

PROJECT NUMBER: **25-172-HME**

Total Pages: 36

DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	4-7-05	Prepared By: A. LAUDANI
-	4-7-05	Initial Release: F. Fleury

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4 (1992) "Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz":

- The unit described in this report was received at Nemko USA, Inc.'s facilities on March 11, 2004. Testing was performed on the unit described in this report on March 11, 2004 to March 16, 2004.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), NVLAP or any other government agency.

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CERTIFICATION

Nemko USA, Inc., an independent Electromagnetic Compatibility (EMC) Test Laboratory, produced this Test Report and performed the Radio Frequency Interference (RFI) testing and data evaluation contained herein.

Nemko USA, Inc.'s measurement facility is currently registered with the United States Federal Communications Commission (FCC) in accordance with the provisions of 47 United States Code (CFR) Part 2, Subpart I, Section 2.948(a). A current description of Nemko USA, Inc.'s measurement facility is on file with the FCC. Nemko USA Inc. has additionally satisfied the FCC that it complies with the requirements set forth in 47 CFR Part 2, Subpart I, Section 2.948(d) regarding the accreditation of EMC laboratories.

The RFI testing, test data collection and test data evaluation were accomplished in accordance with the ANSI C63.4-1992 Standard, and in accordance with the applicable sections of the FCC rules (47 CFR Parts 2 and 15). The testing was also accomplished in accordance with Industry Canada's ICES-003 standard for unintentional radiating device per EMCAB-3, Issue 3 (May 1998). The administrative summary of this test report provides a description of the test sample.

I hereby certify that the test data, test data evaluation, and equipment configurations used to compile this test report are a true and accurate representation of the test sample's radio frequency interference characteristics as of the test date(s), and, for the design of the test sample.

Test Supervisor: *Chip Fleury*

Chip Fleury, Frontline Manager Nemko USA, Inc.

ADMINISTRATIVE DATA AND TEST SUMMARY

1.1. Administrative Data

CLIENT: **HME**
14110 Stowe Drive
Poway, CA 92064

CONTACT: Nirosh Wijayaratne

DATE (S) OF TEST: March 21, 2005 to March 23, 2005

EQUIPMENT UNDER TEST (EUT): **Rack Mount System**

FCCID# **BYMBS200**

Model **DX200**

Condition Upon Receipt Suitable for Test

TEST SPECIFICATION: FCC, Part 15.247, Subpart C,

Test Summary

Specification	*Frequency Range*	*Compliance Status*
FCC, CFR 47, Section 15.207	0.15 MHz - 30.00 MHz	PASS
FCC, CFR 47, Section 15.209	30 MHz – 10th Harmonic	PASS
FCC CFR 47, §15.247 Plus Bandedge	2400-2483.5 MHz	PASS
RSS-210 - Low Power License Exempt Radio-communication Devices (All Frequency Bands)	2400-2483.5 MHz	PASS

Test Supervisor: *Chip Fleury*
Chip Fleury, Frontline Manager Nemko USA, Inc.

Refer to the test results section for further details.

2. SYSTEM CONFIGURATION

The DX200 is a **Rack Mount System**.

2.1. System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - **Rack Mount System**	**HME** **Rack Mount System** Serial #:	Twin lead from Power Supply
Power supply	**HME** Power Supply Model # Serial #	3-conductor power cord

2.2. Device Interconnection and I/O Cables

CONNECTION	I/O CABLE
No connections	

3. DESCRIPTION OF TEST SITE AND EQUIPMENT

3.1. Description of Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022 (1987), CISPR 16 and 22 (1985) and ANSI C63.4-1992 documents. The OATS normalized site attenuation characteristics are verified for compliance every year.

4. DESCRIPTION OF TESTING METHODS

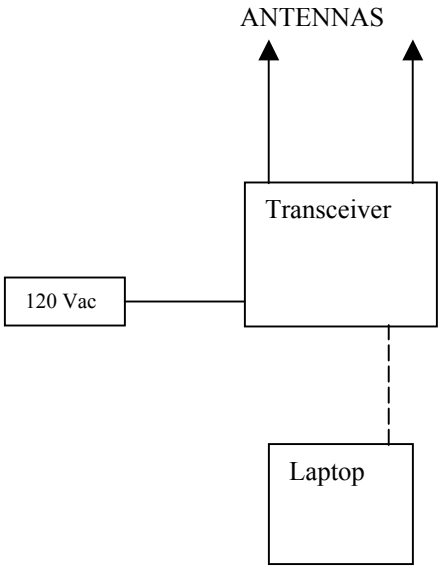
4.1. Introduction

As required in 47 CFR, Parts 2 and 15, the methods employed to test the radiated and conducted emissions (as applicable) of the EUT are those contained within the American National Standards Institute (ANSI) document C63.4-1992, titled "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." All applicable FCC Rule Sections that provide further guidance for performance of such testing are also observed.

For General Test Configuration please refer to Figure 1 on the following page.

Digital devices sold in Canada are required to comply with the Interference Causing Equipment Standard for Digital Apparatus, ICES-003. These test methods and limits are specified in the Canadian Standards Association's (CSA) Standard C108.8-M1983 (1-1-94 version) and are "essentially equivalent" with FCC, Part 15 and CISPR 22 (EN55022) rules for unintentional radiators per EMCAB-3, Issue 3 (May 1998). No further testing is required for compliance to ICES-003.

Figure 1. General EUT Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

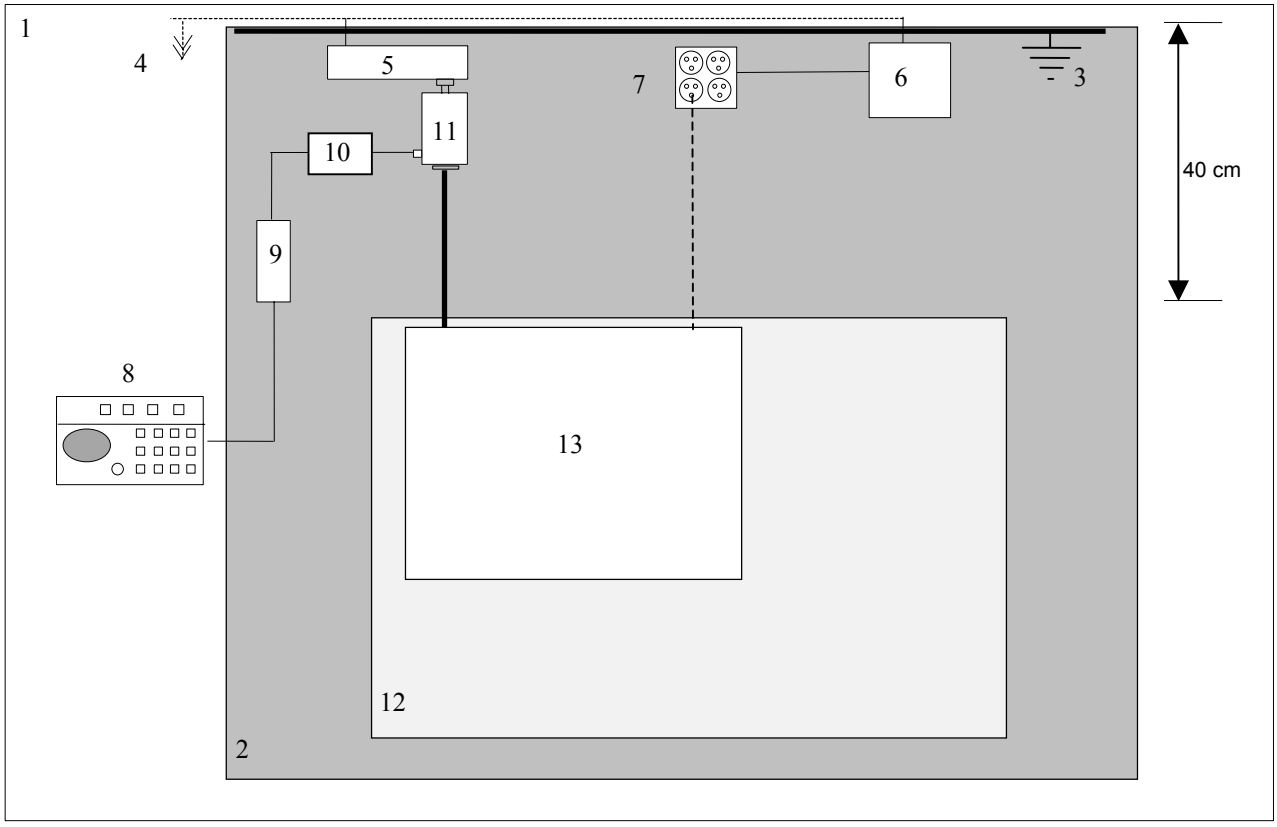
1. Test Laboratory
2. AC Power for Peripheral Devices (120V, 60 cycles, single phase)

4.2. Configuration and Methods of Measurements for Conducted Emissions

Section 7 of ANSI C63.4 determines the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Tabletop devices are placed on a non-conducting surface 80 centimeters above the ground plane floor and 40 centimeters from the ground plane wall. The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. The EUT is powered via a Line Impedance Stabilization Network (LISN). The emissions are recorded using the required bandwidth of 9 kHz in the quasi-peak mode. The average amplitude is also observed employing a 10 kHz bandwidth to determine the presence of broadband RFI. When such interference is caused by broadband sources (as defined by the FCC and ANSI Rules), the deviation guidelines contained in Section 11.3.1 of ANSI C63.4 are employed, which allows a correction factor of 13 dB to be subtracted from the quasi-peak reading. The emission levels are then compared to the applicable FCC limits to determine compliance.

For Conducted Emissions Test Configuration please refer to Figure 2 on the following page.

Figure 2. Conducted Emissions Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

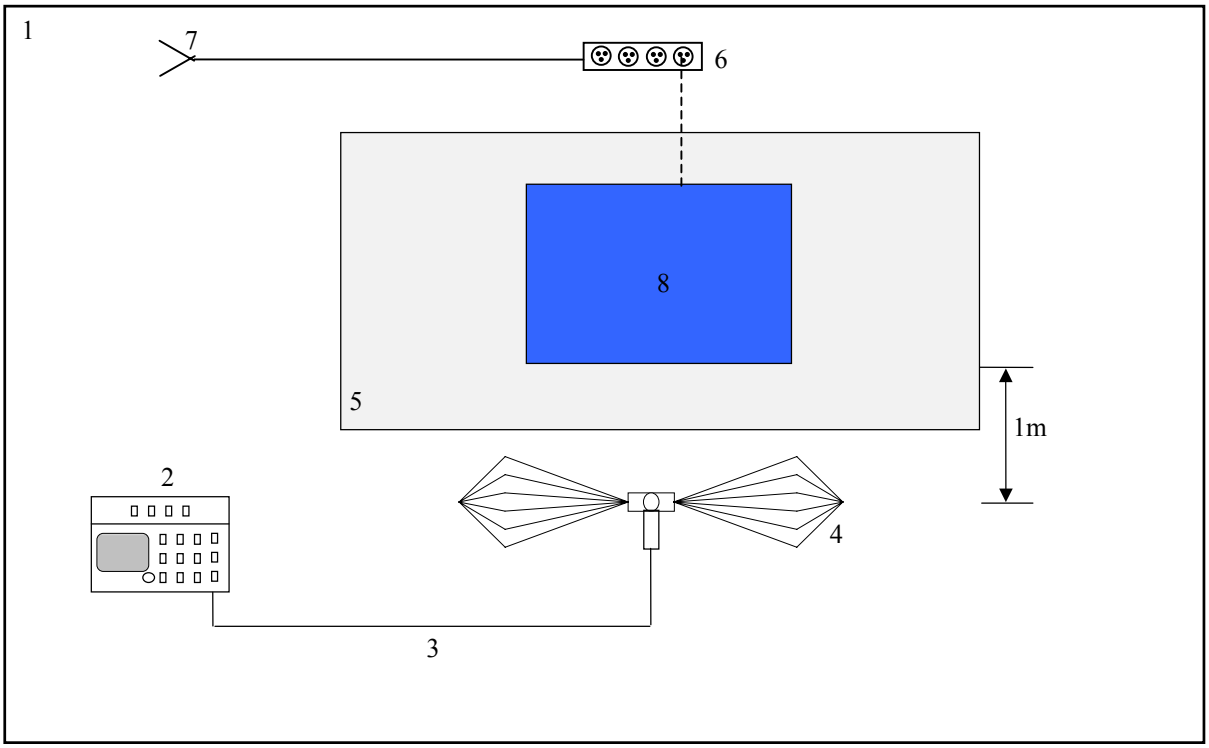
1. Test Laboratory (6 X 6 meters)
2. Ground Plane (15 square meters)
3. Vertical Conducting Wall (Grounded through Ground Plane via 10' ground rod)
4. AC Power for Devices
5. Power Line Filter, Lindgren, 120 dB, 30 amp
6. Line Impedance Stabilization Network (LISN) for peripheral devices
7. Power Distribution Box for peripheral devices
8. Spectrum Analyzer with Quasi-Peak Adapter
9. High Pass Filter
10. Transient Limiter
11. LISN for EUT
12. Non-Conducting table 80 cm above ground plane

4.3. Configuration and Methods of Measurements for Frequency Identification

When performing all testing of equipment, the actual emissions of the EUT are segregated from ambient signals present within the laboratory or the open-field test range. Preliminary testing is performed to ensure that ambient signals are sufficiently low to allow for proper observation of the emissions from the EUT. Incoming power lines are filtered using a 120 dB, 30-ampere; 115/208-volt filter to assist in reducing ambient signals for tests of levels of conducted emissions. Ambients within the laboratory are compared to those noted at the nearby open-field site to discriminate between signals produced from the EUT and ambient signals. In the event that a significant emission is produced by the EUT at a frequency which is also demonstrating significant ambient signals, the spectrum analyzer is placed in the peak mode, the bandwidth is narrowed, the EUT's signal is centered on the analyzer, the scan width is expanded to 50 kHz while monitoring the audio to ensure that only the EUT signal is present, the analyzer is switched to quasi-peak mode, and the level of the EUT signal is recorded.

For Frequency ID Test Configuration please refer to Figure 3 on the following page.

Figure 3. Frequency ID of Radiated Emissions Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Antenna to Spectrum Analyzer
4. Receive Antenna (basic relative position)
5. Non-Conducting table 80 cm above ground plane
6. Power strip for EUT and peripherals
7. AC power for devices
8. EUT Wireless Base Station and Associated System

4.4. Configuration and Methods of Measurements for Radiated Emissions

Section 8 of ANSI C63.4 determines the general configuration and procedures for measuring the radiated emissions of equipment under test. Initially, the primary emission frequencies are identified inside the test lab by positioning a broadband receive antenna one meter from the EUT to locate frequencies of significant radiation. Next, the EUT and associated system are placed on a turntable on a ten meter open area test site (registered with the FCC in accord with its Rules and ANSI C63.4) and the receive antenna is located at a distance of ten meters from the EUT.

The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. All significant radiated emissions are recorded when maximum radiation on each frequency is observed, in accordance with part 8 of ANSI C63.4-1992 and Section 15.33 of the FCC Rules. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to horizontal and vertical polarities, and the turntable is also rotated to determine the worst emitting configuration. The numerical results of the test are included herein to demonstrate compliance.

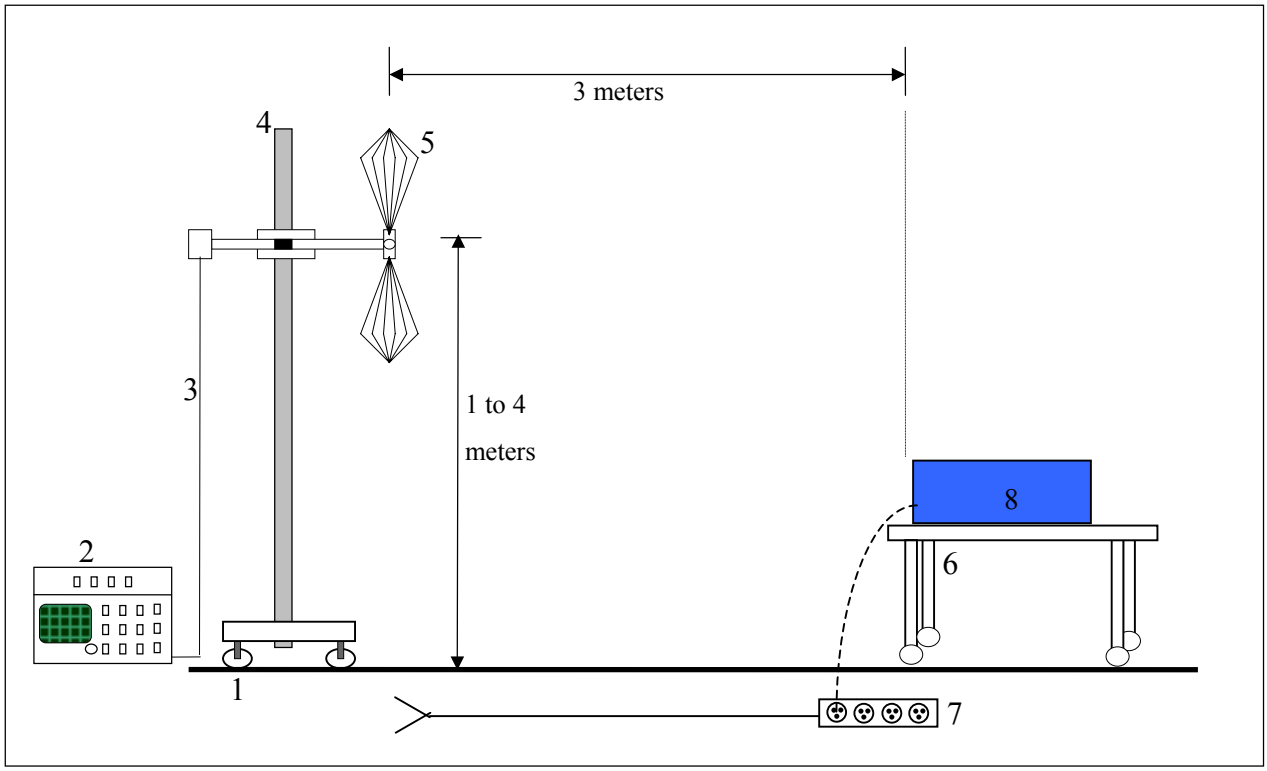
The numerical results that are applied to the emissions limits are arrived at by the following method:
Example: A=RR+CL+AF
A = Amplitude dBuV/M
RR = Receiver Reading dBuV
CL = cable loss dB
AF = antenna factor dBm-1

Example Frequency = 110MHz
18.5 dBuV (spectrum analyzer reading)
+3.0 dB (cable loss @ frequency)
21.5 dBuV
+15.4 dBm-1 (antenna factor @ frequency)
36.9 dBuV/M Final adjusted value

The final adjusted value is then compared to the appropriate emission limit to determine compliance.

For Radiated Emissions Test Configuration please refer to Figure 4 on the following page.

Figure 4. Radiated Emissions Test Setup Diagram



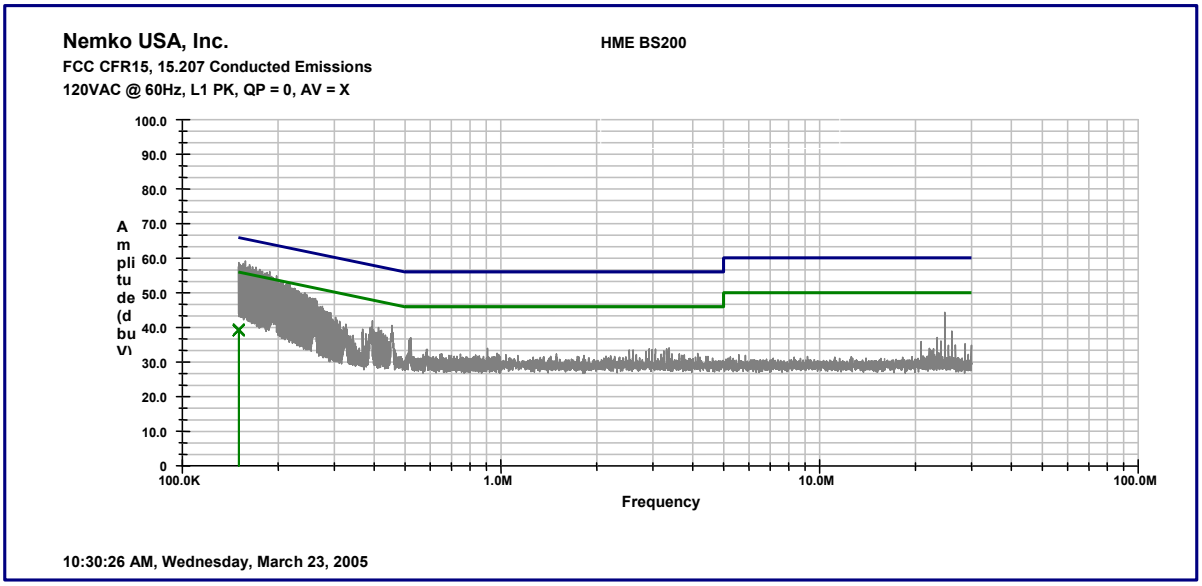
NOT TO SCALE

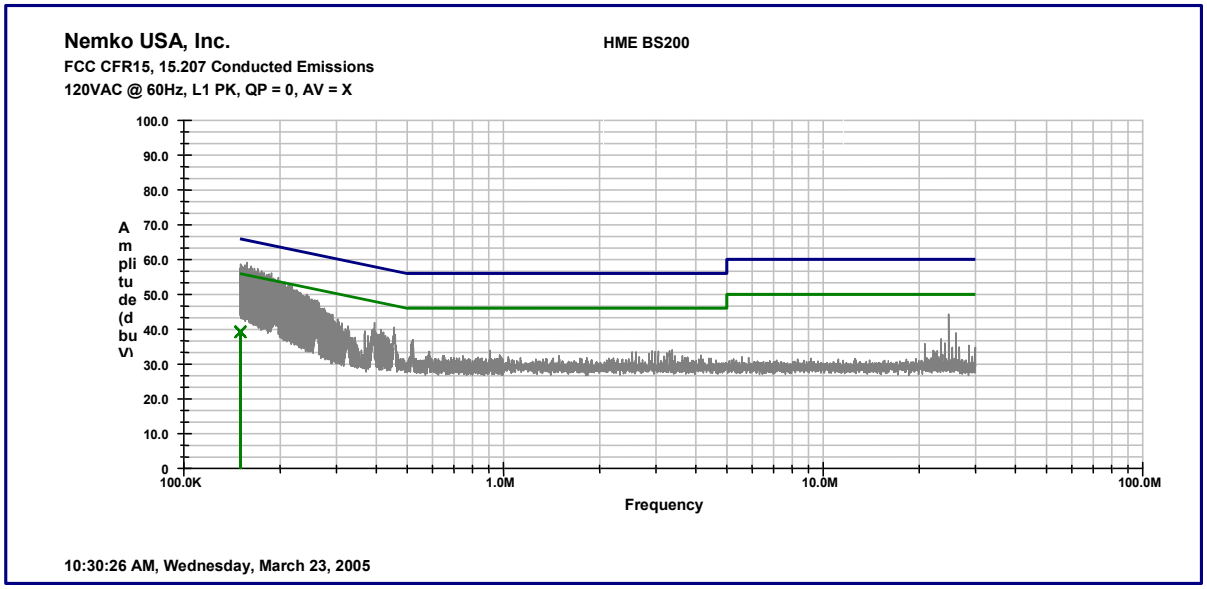
CONFIGURATION LEGEND

1. Ground plane (11 X 17 meters)
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Receive Antenna to Spectrum Analyzer
4. Antenna Mast with motorized mounting assembly
5. Receive Antenna (basic relative position)
6. Non-Conducting table 80 cm above ground plane
7. AC power for devices
8. EUT: Wireless Base Stationand Associated System

5. TEST RESULTS –Emissions Test Data

Client	**HME**	Temperature	71	°F
PAN #	**25-172-HME**	Relative Humidity	49	%
EUT Name	**Rack Mount System**	Barometric Pressure	30.2	Hg
EUT Model	**DX200**	Test Location	Enclosure 1	
Governing Doc	CFR 47, Part 15B	Test Engineer	Mike Krumweide	
Basic Standard	Sec. 15.207	Date	3-23-05	





Conducted Emissions Test Equipment

Client	**HME**	EUT Name	**Rack Mount System**
PAN #	25-172-HME	EUT Model	**DX200**

Asset Number	Description	Model Number	Serial Number	Last Cal	Cal Due
421	Quasi-Peak Adapter, HP	85650A	3145A01672	1/6/05	1/6/06
535	Spectrum Analyzer, HP	85680A	2517A01757	1/6/05	7/6/05
395	LISN, Solar	9348-50-R-24-BNC	941718	12/22/04	12/22/05
564	High Pass Filter, Solar	7801-5.0	853130	1/6/05	1/6/06
682	Transient Limiter, HP	11974A	3107A02633	8/6/04	8/6/05

Radiated Emissions

Complete _____ Job # : 25-172-HME Test # : _____
Preliminary _____ Page 1 of 2

Client Name : HM Electronics
EUT Name : Wireless Base Station
EUT Model # : BS200
EUT Part # :
EUT Serial # :
EUT Config. : Continuous Transmit

Specification : CFR47 Part 15, Subpart B, Class B Reference :

Rod. Ant. #:	NA	Temp. (deg. C) :	72	Date :	3/22/2005
Bicon Ant.#:	116	Humidity (%) :	55	Time :	
Log Ant.#:	110	EUT Voltage :	120	Staff :	MK
DRG Ant. #	NA	EUT Frequency :	60	Photo ID:	
Dipole Ant.#:	NA	Phase:	1	Peak Bandwidth:	100 kHz
Cable#:	SOATS2	Location:	SOATS	Video Bandwidth	100 kHz
Preamp#:	827	Distance:	3		
Spec An.#:	107				
QP #:	438				
PreSelect#:	NA				

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
37.78	v	0	50.1	17.5	1.1	32.6	36.1	39.1	-3.0	Pass	
68.38	v	0	49.8	7.7	1.5	32.4	26.6	39.1	-12.5	Pass	
121.3	v	0	40.8	13.6	1.8	32.6	23.6	43.5	-19.9	Pass	
122	v	0	43.4	13.6	1.8	32.6	26.2	43.5	-17.3	Pass	
200.01	v	0	45.2	11.6	1.8	32.7	25.9	43.5	-17.6	Pass	
211.9	v	0	43.4	11.2	1.8	32.7	23.7	43.5	-19.8	Pass	
640.08	v	0	42.6	19.7	2.9	32.6	32.6	46.4	-13.8	Pass	

Asset Number	Description	Model Number	Serial Number	Last Cal	Cal Due
116	Antenna, Bicon, EMCO	3110	1267	8/30/04	8/30/05
110	Antenna, LPA, Electrometrics	LPA-25	1217	10/4/04	10/4/05
827	Preamplifier, Com-Power	PA-103	161032	10/22/04	10/22/05
107	Spectrum Analyzer, HP	85680B	2415A00373	2/1/05	8/1/05
438	Quasi-Peak Adapter, HP	85650A	2521A00618	11/23/04	5/23/05

CFR 47 Part 15c §15.247 Test Results

15.247 Testing was initiated by the ELECTRONIC TECHNOLOGY SYSTEMS test report G0M20306-7970-P-15 published in three parts for the BYMBASE6000 for use with two antennas, Model 181and resumed at Nemko with the addition of the two 7dBi gain antennas, Model 171. Nemko Tests show the radiated spurious restricted bands and the band edge emissions still comply using the 7dBi gain antennas. The difference between the BYMBASE6000 and BYMBS200 were in regard to the analog audio circuit boards, with no changes to the RF boards. This summary lists the test results done by ELECTRONIC TECHNOLOGY SYSTEMS.

Antenna 1: 2 dBi gain -- Nearson Model 181
Antenna 2: 7 dBi gain – Nearson Model 171 – tested by Nemko

Base 6000 TestRpt1.pdf

Page 6 Use of an unique antenna connector
Page 7 Test Environment
Pages 8-14 Test Equipment
Page 17 Conductive and Radiated ERP/Peak Output Power
Pages 19--22 Out of Band Spurious Radiated Emissions, Radiated Emissions in Restricted bands
Page 23 Carrier Frequency Separation
Page 24 Number of Hopping Frequencies
Page 25 Time of Occupancy
Page 26 20 dB Bandwidth
Page 27 Band-edge Compliance

Base 6000 TestRpt2-1.pdf

Plots for Peak Output Power and Carrier Power for Antennas 1 & 2

Base 6000 TestRpt2-2.pdf

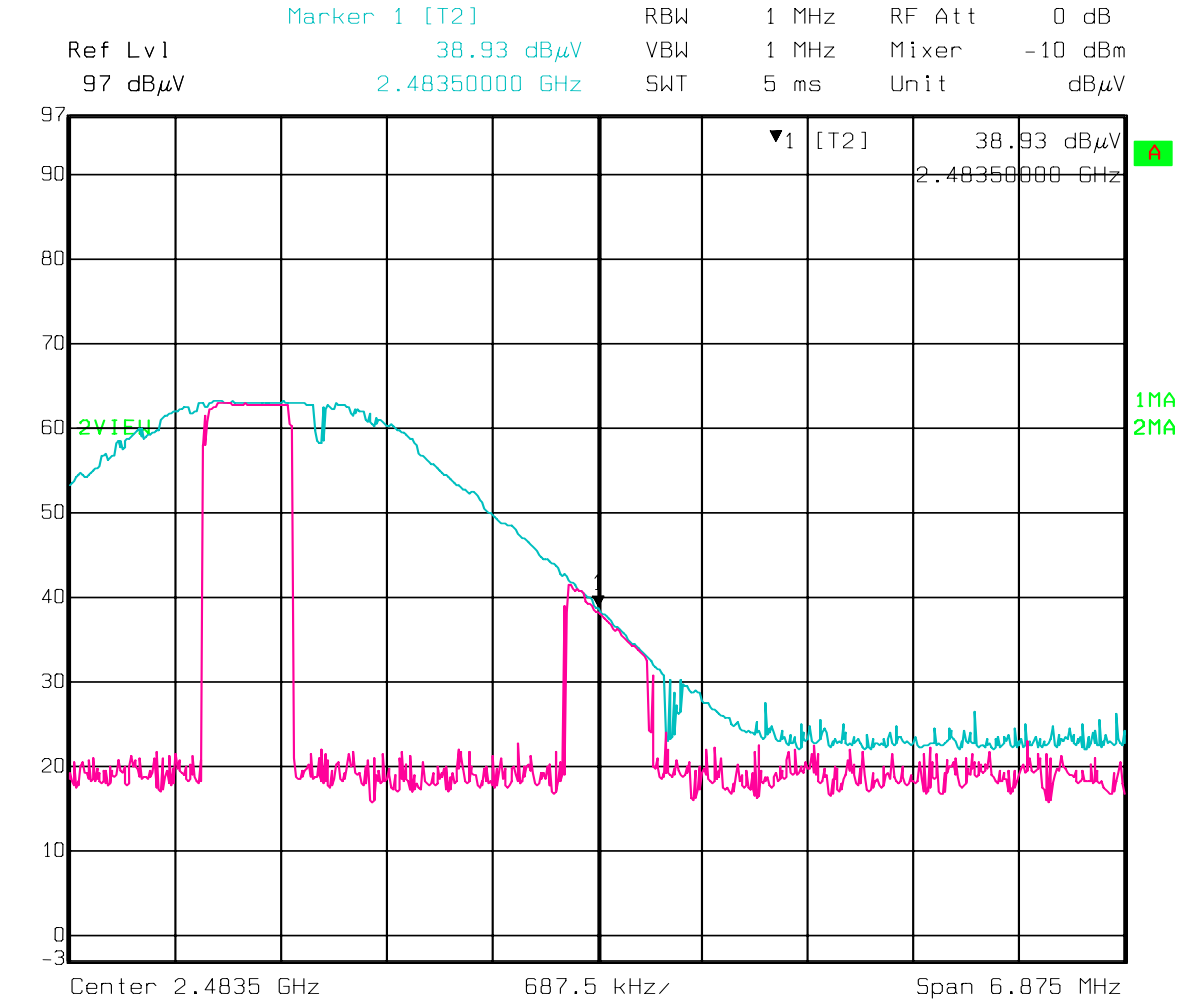
Plots for field strength of spurious emissions
Plots for Carrier frequency separation
Plots for Number of hopping frequencies
Plots for Time of Occupancy
Plots for 20 dB Bandwidth
Plots for Band-edge Compliance

Conducted RF Peak Output Power levels

Frequency	Conducted Power Level	ANT. GAIN*	ERP	ERP
GHz	**dBm**	**DBi**	**dBm**	**W**
2.401920	18.24	7	25.24	0.33
2.441664	18.68	7	25.68	0.37
2.481408	18.60	7	25.60	0.36

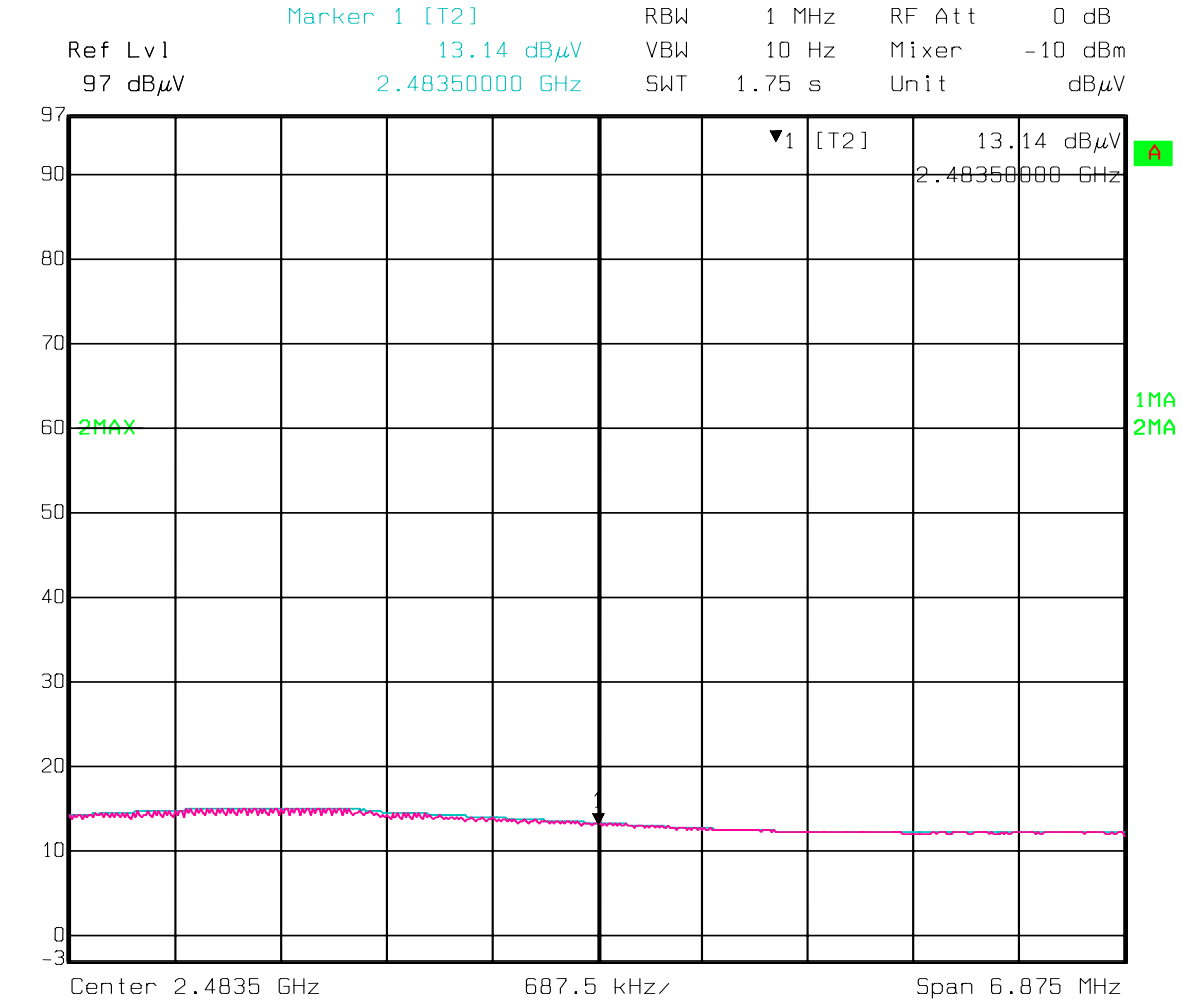
* Of antenna type with the most gain – Nearson Model 171

BANDEDGE PLOTS –Antenna 2



Date: 23.MAR.2005 15:16:42

BANDEGE PLOT—AVERAGE –Antenna 2



Restricted band 2310—2390 MHz was also noted as having no emissions to be measured.

NEMKO USA, Inc.

San Diego Headquarters:
11696 Sorrento Valley Rd.
San Diego, CA 92121
Tel: (858) 755-5525
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Radiated Emissions Data

Complete	YES				Job # :	25-172-HME	Test # : 1
Preliminary					Page	1	of 1
Client Name :	HM Electronics						
EUT Name :	Rack Mount System						
EUT Model # :	DX200						
EUT ANTENNA Part # :	Nearson S171XX-2450S						
EUT Serial # :							
EUT Config. :	Continuous TX						
	EMISSIONS SEARCHED BETWEEN 1000 MHz AND 24,500 MHz.						
Specification :	FCC Part 15.247C, 15.209, 15.205(a)				Reference :		
Rod. Ant. #:	NA	Temp. (deg. C) :	13		Date :	3/23/2005	
Bicon Ant.#:	NA	Humidity (%) :	77		Time :		
Log Ant.#:	NA	EUT Voltage :	120 Vac		Staff :	A. Laudani	
DRG Ant. #	529	EUT Frequency :	60 Hz		Photo ID:		
Dipole Ant.#:	NA	Phase:	1		Peak Res Bandwidth:	1 MHz	
Cable#:	40ft	Location:	SOATS		Peak Video Bandwidth	1 MHz	
Preamp#:	842	Distance:	3M		AVE Res Bandwidth:	1 MHz	
Spec An.#:	NA				AVE Video Bandwidth	10 Hz	
QP #:	NA						
PreSelect#:	NA						

	Meas. Freq. (MHz)	Vertical (dBuV) pk	Vertical (dBuV) av	Horizontal (dBuV) pk	Horizontal (dBuV) av	CF (db)	Max Level (dBuV/m) pk	Max Level (dBuV/m) av	Spec. Limit (dBuV/m) pk	Spec. Limit (dBuV/m) av	Margin dB pk	Margin dB av	EUT Rotation	Ant. Height	Pass Fail Unc.	Comment
	4804.0	53.2	44.3	53.7	43	-1.2	52.5	43.1	74.0	54.0	-21.5	-10.9		1.5	Pass	lowest channel
	4962.6	55.4	47.4	53	45.4	-1.2	54.2	46.2	74.0	54.0	-19.8	-7.8		1.5	Pass	mid channel
	7443.9	51.2	43.6	52.9	45.1	5.8	58.7	50.9	74.0	54.0	-15.3	-3.1		1.5	Pass	mid channel
	4883.2	53.8	44.4	54.7	50.5	-1.2	53.5	49.3	74.0	54.0	-20.5	-4.7		1.5	Pass	highest channel
	7324.8	56.1	47.8	51.1	39.9	5.8	61.9	53.6	74.0	54.0	-12.1	-0.4		1.5	Pass	highest channel
							Bandedge Measurement									
	RBW:	1MHz	100 kHz	1MHz	100 kHz											**Upper bandedge**
	2481.3	77.5	76.9	66.3	65.1	32.1	109.6	109						1.5		baseline peak power
			0.6		1.2											delta of peak power measured
P	2483.5	38.9		36.7		32.1	71	32.1	74.0		-3.0			1.5	Pass	1MHz/1MHz
A	2483.5		13.7		14.38	32.1	33.1	46.48		54.0		-7.5		1.5	Pass	1MHz/10Hz + delta
	2483.5	17.9	8.7	17.3	8.8	32.1	50	40.9	74.0	54.0	-24.0	-13.1		1.5	Pass	**Lower bandedge**
	2481.6	82.6		76.14		32.1	114.7	32.1						1.5		100 kHz/100 kHz
	2400	28.4		19.89		32.1	60.5	32.1	94.7		-34.2			1.5	Pass	limit -20 dBc (peak)

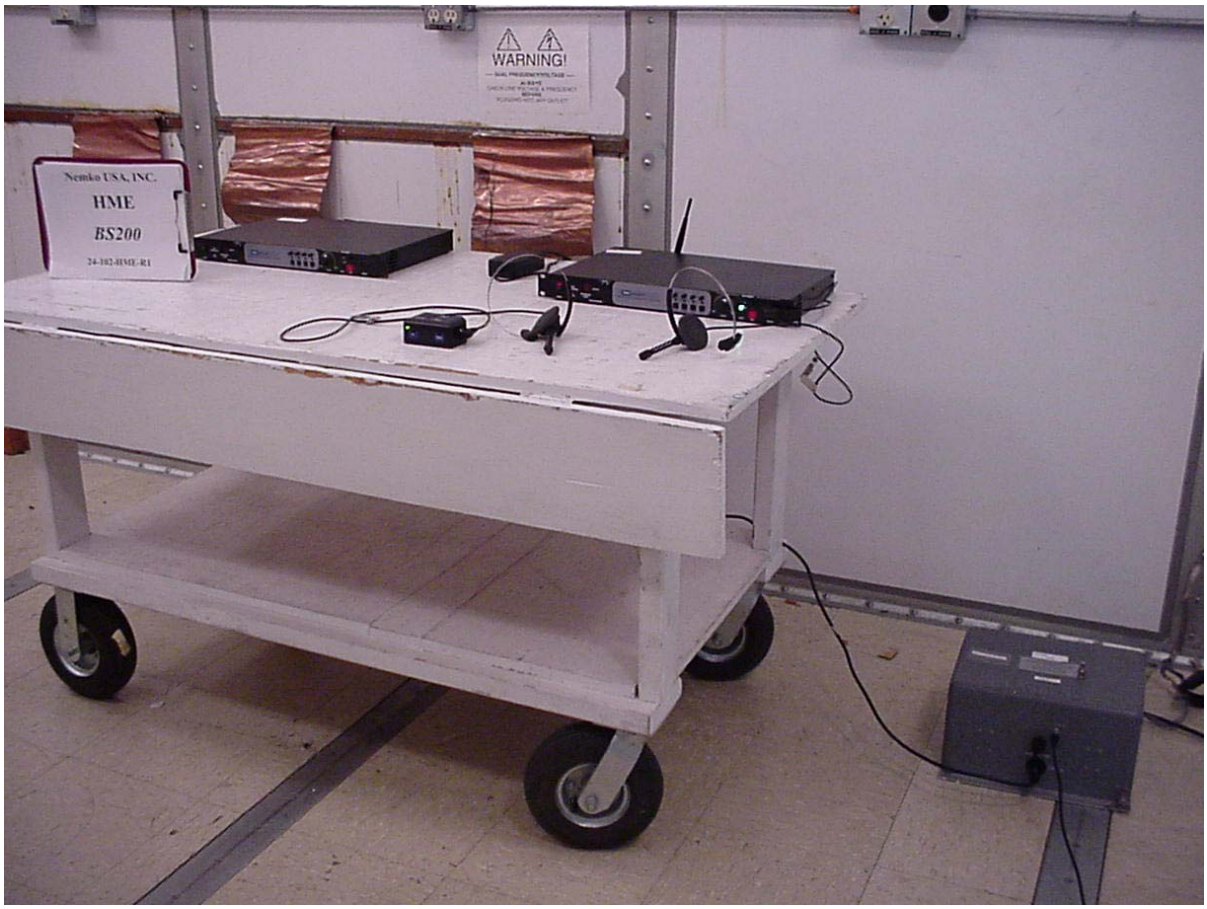
BANDEDGE PLOT OF PREVIOUS

Emissions Test Equipment

Client	**HME**	EUT Name	**Rack Mount System**
PAN #	25-172-HME	EUT Model	**DX200**

Asset Number	Description	Model Number	Serial Number	Last Cal	Cal Due
841	Preamp (40dB), Com-Power	PA-010	171007	11/17/04	11/17/05
835	Spectrum Analyzer, Rhode & Schwartz	RHDFSEK	829058/005	12/30/04	12/30/05
529	Antenna, DRWG, EMCO	3115	2505	3/30/04	3/30/05

Photograph 1. Conducted Emissions Test Configuration



Photograph 2. Radiated Emissions Test Configuration

APPENDIX A

A Conducted & Radiated Emissions Measurement Uncertainties

1. Introduction

ISO Standard 17025 and ANSI/NCSL Z540-1(1994) require that all measurements contained in a test report be "traceable". "Traceability" is defined in the *International Vocabulary of Basic and General Terms in Metrology* (ISO: 1993) as: "the property of the result of a measurement... whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, *all having stated uncertainties*".

The purposes of this Appendix are to "state the *Measurement Uncertainties*" of the conducted emissions and radiated emissions measurements contained in Section 5 of this Test Report, and to provide a practical explanation of the meaning of these measurement uncertainties.

2. Statement of the Worst-Case Measurement Uncertainties for the Conducted and Radiated Emissions Measurements Contained in This Test Report

Table 1: Worst-Case Expanded Uncertainty "U" of Measurement for a k=2 Coverage Factor

Conducted Emissions Measurement Detection Systems	**Applicable Frequency Range**	**"U" for a k=2 Coverage Factor**
HP8568B Spectrum Analyzer with QPA and HP8447F Preamplifier	150 kHz - 30 MHz	+/- 3.0 dB
HP8566B Spectrum Analyzer with QPA and Preselector	9 kHz - 30 MHz	+/- 2.9 dB
Radiated Emissions Measurement Detection Systems	**Applicable Frequency Range**	**"U" for a k=2 Coverage Factor**
HP8568B Spectrum Analyzer with QPA & HP8447F Preamplifier	30 MHz - 200 MHz	+4.0 dB, -4.1 dB
HP8568B Spectrum Analyzer with QPA & HP8447F Preamplifier	200 MHz-1000 MHz	+/- 3.5 dB
HP8566B Spectrum Analyzer with QPA & Preselector	30 MHz - 200 MHz	+3.9 dB, -4.0 dB
HP8566B Spectrum Analyzer with QPA & Preselector	200 MHz-1000 MHz	+/- 3.4 dB
HP8566B Spectrum Analyzer with QPA & HP 8449A Preamplifier	1 GHz - 18 GHz	+2.5 dB, -2.6 dB
HP8566B Spectrum Analyzer with QPA & HP8449A Preamplifier	18 GHz - 40 GHz	+/- 3.4 dB

NOTES:
1. Applies to 3 and 10 meter measurement distances
2. Applies to all valid combinations of Transducers (i.e. LISNs, Line Voltage Probes, and Antennas, as appropriate)
3. Excludes the Repeatability of the EUT

3. Practical Explanation of the Meaning of the Conducted and Radiated Emissions Measurement Uncertainties

In general, a "Statement of Measurement Uncertainty" means that with a certain (specified) confidence level, the "true" value of a measurand will be between a (stated) upper bound and a (stated) lower bound.

In the specific case of EMC Measurements in this test report, the measurement uncertainties of the conducted emissions measurements and the radiated emissions measurements have been calculated in accordance with the method detailed in the following documents:

- *ISO Guide to the Expression of Uncertainty in Measurement* (ISO, 1993)
- NIS 81:1994, *The Treatment of Uncertainty in EMC Measurements* (NAMAS, 1994)
- NIST Technical Note 1297(1994), *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results* (NIST, 1994)

The calculation method used in these documents requires that the stated uncertainty of the measurements be expressed as *an "expanded uncertainty", U, with a k=2 coverage factor*. The practical interpretation of this method of expressing measurement uncertainty is shown in the following example:

EXAMPLE: Assume that at 39.51 MHz, the (measured) radiated emissions level was equal to +26.5 dBuV/m, and that the +/- 2 standard deviations (i.e. 95% confidence level) measurement uncertainty was +/- 3.4 dB.

In the example above, the phrase "k = 2 Coverage Factor" simply means that the measurement uncertainty is stated to cover +/-2 standard deviations (i.e. a 95% confidence interval) about the measurand. The measurand is the radiated emissions measurement of +26.5 dBuV/m at 39.51 MHz, and the 95% bounds for the uncertainty are –3.4 dB to + 3.4 dB. One can thus be 95% confident that the "true" value of the radiated emissions measurement is between +23.1 dBuV/m and +29.5 dBuV/m. *In effect, this means that in the above example there is only a 2.5% chance that the "true" radiated emissions value exceeds +29.5 dBuV/m.*

APPENDIX B
Nemko USA, Inc.'s Test Equipment & Facilities Calibration Program

Nemko USA, Inc. operates a comprehensive Periodic Calibration Program in order to ensure the validity of all test data. Nemko USA's Periodic Calibration Program is fully compliant to the requirements of NVLAP Policy Guide PG-1-1988, ANSI/NCSL Z540-1 (1994), ISO 10012-1 (1993-05-01), ISO Standard 17025, ISO-9000 and EN 45001. Nemko USA, Inc.'s calibrations program therefore meets or exceed the US national commercial and military requirements [N.B. ANSI/NCSL Z540-1 (1994) replaces MIL-STD-45662A].

Specifically, all of Nemko USA's *primary reference standard devices* (e.g. vector voltmeters, multimeters, attenuators and terminations, RF power meters and their detector heads, oscilloscope mainframes and plug-ins, spectrum analyzers, RF preselectors, quasi-peak adapters, interference analyzers, impulse generators, signal generators and pulse/function generators, field-strength meters and their detector heads, etc.) and certain *secondary standard devices* (e.g. RF Preamplifiers used in CISPR 11/22 and FCC Part 15/18 tests) are periodically recalibrated by:

- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratories by NIST; or,
- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratory by another accreditation body (such as A2LA) that is mutually recognized by NIST; or,
- A manufacturer of Measurement and Test Equipment (M&TE), if the manufacturer uses NIST-traceable standards and is ISO Guide 25-accredited as calibration laboratory either by NIST or by another accreditation body (such as A2LA) that is mutually recognized by NIST; or
- A manufacturer of M&TE (or by a Nemko USA-approved independent third party metrology laboratory) that is not ISO Guide 25-accredited. (In these cases, Nemko USA conducts an annual audit of the manufacturer or metrology laboratory for the purposes of proving traceabilty to NIST, ensuring that adequate and repeatable calibration procedures are being applied, and verifying conformity with the other requirements of ISO Guide 25).

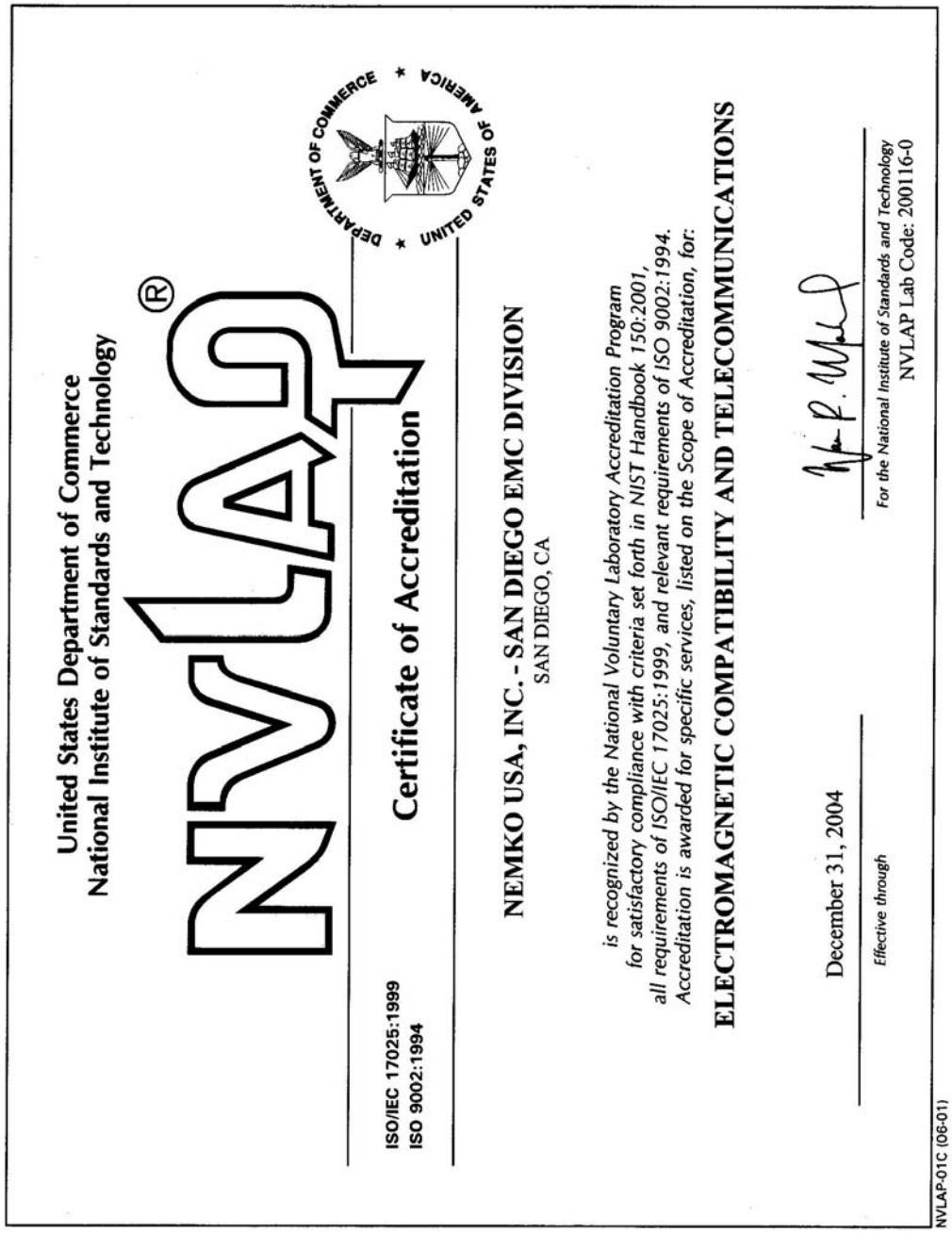
In all cases, the entity performing the Calibration is required to furnish Nemko USA with a calibration test report and/or certificate of calibration, and a "calibration sticker" on each item of M&TE that is successfully calibrated.

Calibration intervals are normally one year, except when the manufacture advises a shorter interval (e.g. the HP 8568B Spectrum Analyzer is recalibrated every six months) or if US Government directives or client requirements demand a shorter interval. Items of instrumentation/related equipment which fail during routine use, or which suffer visible mechanical damage (during use or while in transit), are sidelined pending repair and recalibration. (Repairs are carried out either in-house [if minor] or by a Nemko USA-approved independent [third party] metrology laboratory, or by the manufacturer of the item of M&TE).

Each antenna used for CISPR 11 and CISPR 22 and FCC Part 15 and Part 18 radiated emissions testing (and for testing to the equivalent European Norms) is calibrated annually by either a NIST (or A2LA) ISO Standard 17025-Accredited third-party Antenna Calibration Laboratory or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory. The antenna calibrations are performed using the methods specified in Annex G.5 of CISPR 16-1(1993) or ANSI C63.5-1991, including the "Three-Antenna Method". Certain other kinds of antennas (e.g. magnetic-shielded loop antennas) are calibrated annually by either a NIST (or A2LA) ISO Standard 17025-accredited third-party antenna calibration laboratory, or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory using the procedures specified in the latest version of SAE ARP-958.

In accordance with FCC and other regulations, Nemko USA recalibrates its suite of antennas used for radiated emissions tests on an annual basis. These calibrations are performed as a precursor to the FCC-required annual revalidation of the Normalized Site Attenuation properties of Nemko USA's Open Area Test Site. Nemko USA, Inc. uses the procedures given in both Subclause 16.6 and Annex G.2 of CISPR 16-1 (1993), and, ANSI C63.4-1992 when performing the normalized site attenuation measurements.

APPENDIX C
FCC and NVLAP Accreditation



United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

DEPARTMENT OF COMMERCE ★ UNITED STATES OF AMERICA ★

Certificate of Accreditation

ISO/IEC 17025:1999
ISO 9002:1994

NEMKO USA, INC. - SAN DIEGO EMC DIVISION
SAN DIEGO, CA

is recognized by the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria set forth in NIST Handbook 150:2001, all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

December 31, 2004
Effective through

For the National Institute of Standards and Technology
NVLAP Lab Code: 200116-0

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ISO/IEC 17025:1999
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Scope of Accreditation

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NVLAP Code	*Designation / Description*
Emissions Test Methods:	
12/CIS14	CISPR 14-1 (March 30, 2000): Limits and Methods of Measurement of Radio interference Characteristics of Household Electrical Appliances, Portable Tools and Similiar Electrical Apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993) with Amendments A1 (1997) & A2 (1999)
12/CIS14b	AS/NZS 1044 (1995)
12/CIS14c	CNS 13783-1
12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)

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NVLAP Code	*Designation / Description*
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/EM02a	IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A)
12/EM03b	IEC 61000-3-3 (2002-03), edition 1.1: EMC - Part 3-3: Limits - Limitations of voltage changes, voltage flucuations and flicker, in public low-voltage supply-systems, for equipment with rated current <=16 A per phase and not subject to conditional connections
12/F18	FCC OST/MP-5 (1986): FCC Methods of Measurement of Radio Noise Emissions for ISM Equipment (cited in FCC Method 47 CFR Part 18 - Industrial, Scientific, and Medical Equipment)
12/FCC15b	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart B: Unintentional Radiators
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment

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NVLAP Code	*Designation / Description*
Immunity Test Methods:	
12/I01	IEC 61000-4-2, Edition 2.1 (2001) including Amds. 1 & 2 and EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3 (2002) and EN 61000-4-3: Radiated Radio-Frequency Electromagnetic Field Immunity Test
12/I03	IEC 61000-4-4 (1995) + Amd. 1 (2000) & Amd. 2 (2001) and EN 61000-4-4: Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5 (1995) + Amd. 1 (2000) and EN 61000-4-5: Surge Immunity Test
12/I05	IEC 61000-4-6, Edition 2.0 (2003) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields
12/I06	IEC 61000-4-8, Edition 1.1 (2001) and EN 61000-4-8: Power Frequency Magnetic Field Immunity Test
12/I07	IEC 61000-4-11 (1994) + Amd. 1 (2000) and EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

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