



NMB TECHNOLOGIES CORP. TEST REPORT

FOR THE

MICROSOFT® WIRELESS COMFORT KEYBOARD 1.0A, MODEL 1027

FCC PART 15 SUBPART C SECTIONS 15.215 & 15.227

COMPLIANCE

DATE OF ISSUE: MAY 6, 2004

PREPARED FOR:

NMB Technologies Corp.
9730 Independence Avenue
Chatsworth, CA 91311

P.O. No.: PQ19559
W.O. No.: 81934

PREPARED BY:

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Date of test: March 31 – May 6, 2004

Report No.: FC04-029

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ADMINISTRATIVE INFORMATION

DATE OF TEST: March 31 – May 6, 2004

DATE OF RECEIPT: March 31, 2004

PURPOSE OF TEST: To demonstrate the compliance of the Microsoft® Wireless Comfort Keyboard 1.0A, Model 1027 with the requirements for FCC Part 15 Subpart C Sections 15.215 & 15.227 devices.

TEST METHOD: ANSI C63.4 (1992)

MANUFACTURER: NMB/Minebea Thai Ltd.
1, Moo 7, Phaholyothin Road, Km.51
Tambon Chiang Rak Noi, Amphoe Bang Pa-In
Ayutthaya Province 13180
Thailand

REPRESENTATIVE: Jamin Pandana

TEST LOCATION: CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92621

SUMMARY OF RESULTS

As received, the NMB Technologies Corp. Microsoft® Wireless Comfort Keyboard 1.0A, Model 1027 was found to be fully compliant with the following standards and specifications:

FCC Standard	FCC Section	Canadian Standard	Canadian Section	Test Description
47CFR	15.215(c)	RSS 210	5.9.1	99% Emissions Bandwidth Requirement
47CFR	15.227(a)	RSS 210	8.6.1	Carrier Output Limitation
47CFR	15.227(b)	RSS 210	8.6.1	Spurious Emissions Limitation
ANSI C63.4 (1992)		ANSI C63.4 (1992)		Test Method
100638		IC 3172-D		Site File No.

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply. Conducted emissions not required for this device.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:



Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:



Stuart Yamamoto, EMC Engineer

FCC 15.31(e) Voltage Variations

The equipment under test is battery operated.

FCC 15.31(m) Number Of Channels

This device operates on two channels.

FCC 15.33(a) Frequency Ranges Tested

15.227 Radiated Emissions: 25 MHz – 4 GHz. The 8 MHz clock is for the digital portion of the EUT only.

FCC 15.203 Antenna Requirements

The equipment under tests antenna is located internally. It is not accessible to the user unless the equipment under test is disassembled. Also, the antenna connector is not a standard antenna jack.

FCC 15.215 Additional Provisions to the General Radiated Emission Limitations

The fundamental frequency was kept within the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. Refer to Appendix B for the test equipment used and Appendix C for the occupied bandwidth plot(s).

Eut Operating Frequency

The EUT was operating at 27.095 MHz & 27.195 MHz

Temperature And Humidity During Testing

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was representative a production unit.

The following model has been tested by CKC Laboratories:

Wireless Keyboard, MSVT DV2

The following additional models are identical electrically to the one which was tested, or any differences between them do not affect their EMC characteristics, and therefore they comply to the level of testing equivalent to the tested models.

Microsoft® Wireless Comfort Keyboard 1.0A, Model No. 1027

EQUIPMENT UNDER TEST

Microsoft® Wireless Comfort Keyboard 1.0A (3 each)

Manuf: NMB Technologies Corp.
Model: 1027
Serial: 0059, 0090 & 0099
FCC ID: C3K1027 (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Monitor

Manuf: Dell
Model: P793
Serial: KR-04D025-47602-23Q-D9ZX

USB Zip Drive

Manuf: ZIP Disk
Model: Z100USB
Serial: PSA009A07M

Computer

Manuf: Dell Corporation
Model: Optiplex GX260
Serial: C4HVL11

Mouse

Manuf: Logitech
Model: M-SAW34
Serial: LZB21670338

Printer

Manuf: Lexmark
Model: Z53
Serial: 03230287625

Receiver

Manuf: NMB Technologies Corp.
Model: 1012
Serial: 0059, 0090 & 0099

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the EUT. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: Fundamental Emission Levels

FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
27.095	49.4	8.8		1.0		59.2	80.0	-20.8	L
27.095	49.4	8.8		1.0		59.2	80.0	-20.8	L
27.095	49.0	8.8		1.0		58.8	80.0	-21.2	L
27.195	49.3	8.8		1.0		59.1	80.0	-20.9	L
27.195	49.1	8.8		1.0		58.9	80.0	-21.1	L
27.195	49.0	8.8		1.0		58.8	80.0	-21.2	L

Test Method: ANSI C63.4 (1992)
 Spec Limit: FCC Part 15 Subpart C Section 15.227 (a)
 Test Distance: 3 Meters

NOTES: L = Loop

COMMENTS: The EUT is placed stand-alone on the wooden tabletop. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 23°C, Humidity: 40%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries.

Table 2: FCC 15.227(b) Six Highest Radiated Emission Levels

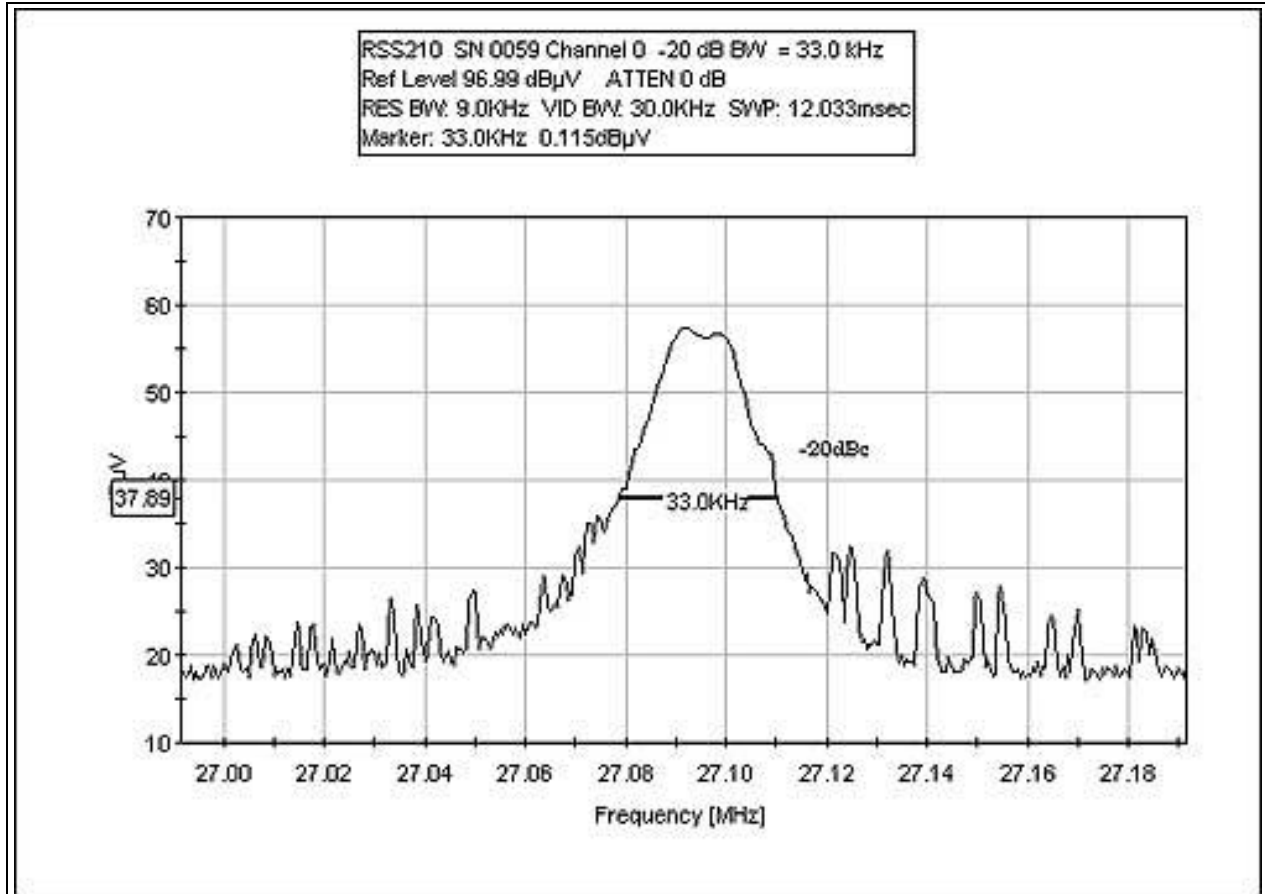
FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
54.188	38.3	7.8	-27.0	1.6		20.7	40.0	-19.3	H
54.386	40.6	7.7	-27.0	1.6		22.9	40.0	-17.1	H
54.392	41.0	7.7	-27.0	1.7		23.4	40.0	-16.6	H
54.395	38.1	7.7	-27.0	1.7		20.5	40.0	-19.5	H
255.398	38.9	10.6	-26.3	3.9		27.1	46.0	-18.9	H
256.295	37.9	10.6	-26.3	3.9		26.1	46.0	-19.9	H

Test Method: ANSI C63.4 (1992)
 Spec Limit: FCC Part 15 Subpart C Section 15.227(b)
 Test Distance: 3 Meters

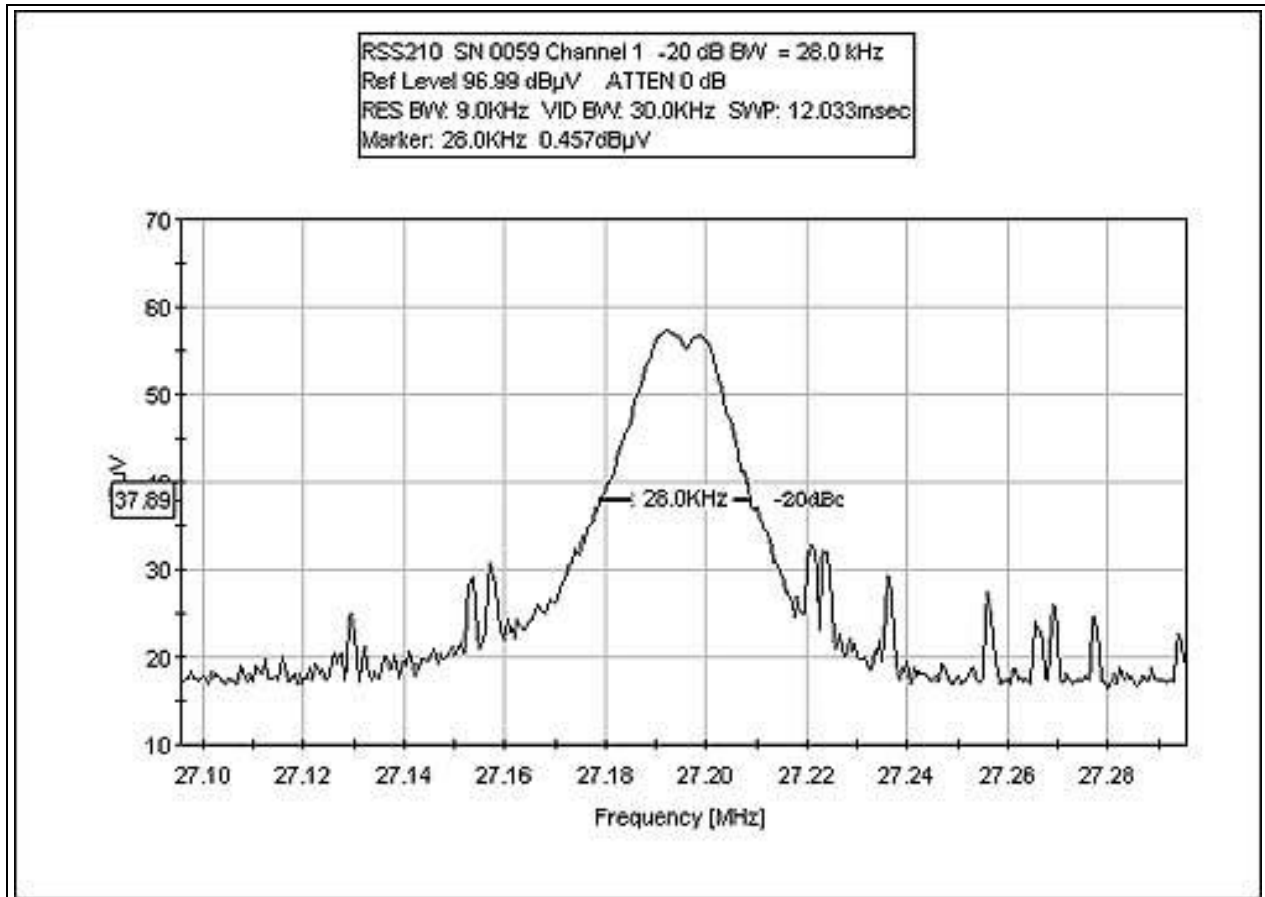
NOTES: H = Horizontal Polarization

COMMENTS: The EUT is placed stand alone on the wooden table top. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 18°C, Humidity: 60%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries. Data represents the EUT in both Channel 0 and Channel 1. The frequency range of measurement was from 8 MHz to 4 GHz, but no emissions were found within 20 dB of the limit in the 8 MHz – 30 MHz range. The bandwidths used are as follows: 150 kHz-30 MHz; SA RBW=100 kHz, SA VBW=100 kHz QPA BW=9kHz; 30 MHz-1000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=120kHz; 1000 MHz-4000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=NA.

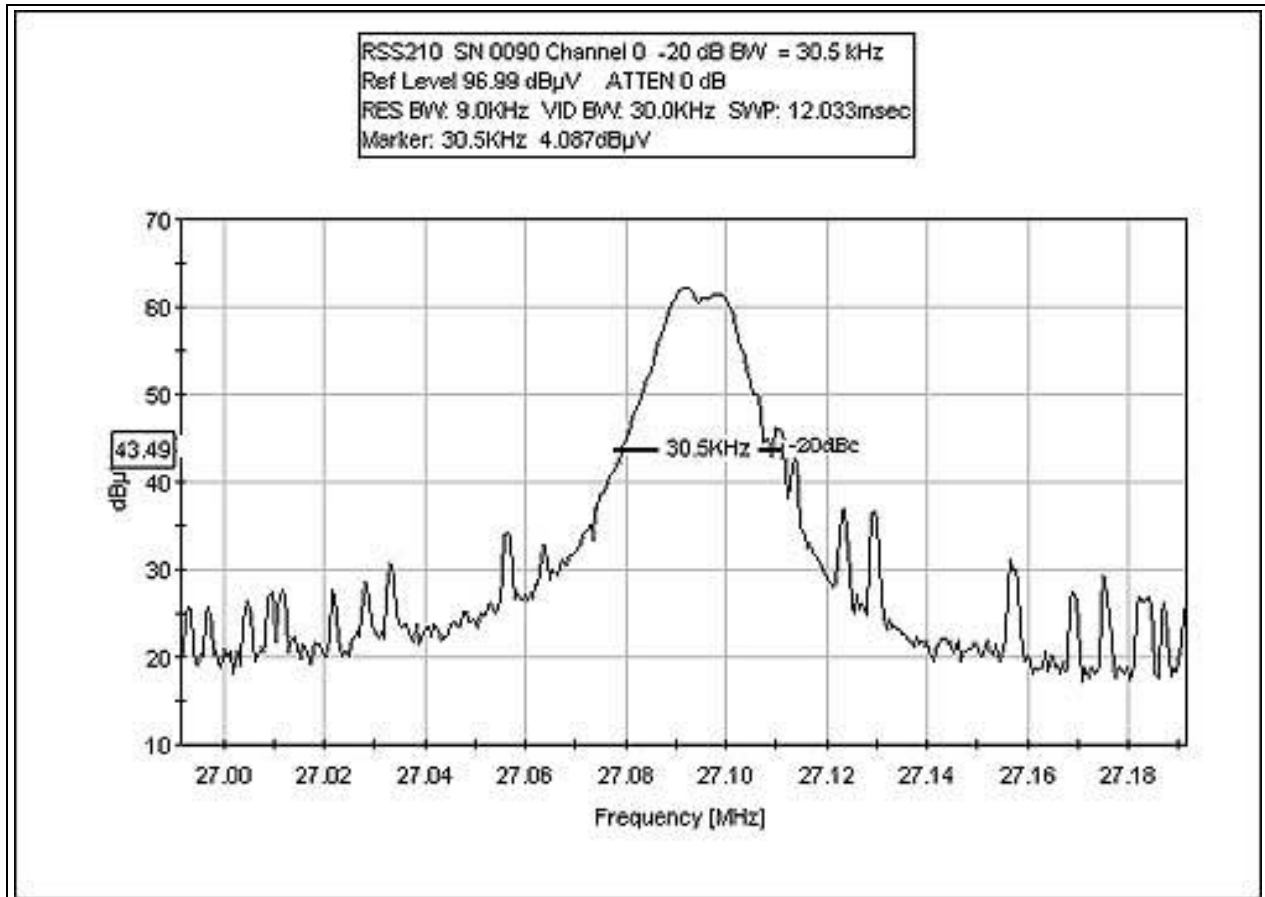
FCC 15.215(c)/RSS 210 20 dB Bandwidth Channel 0, S/N 0059



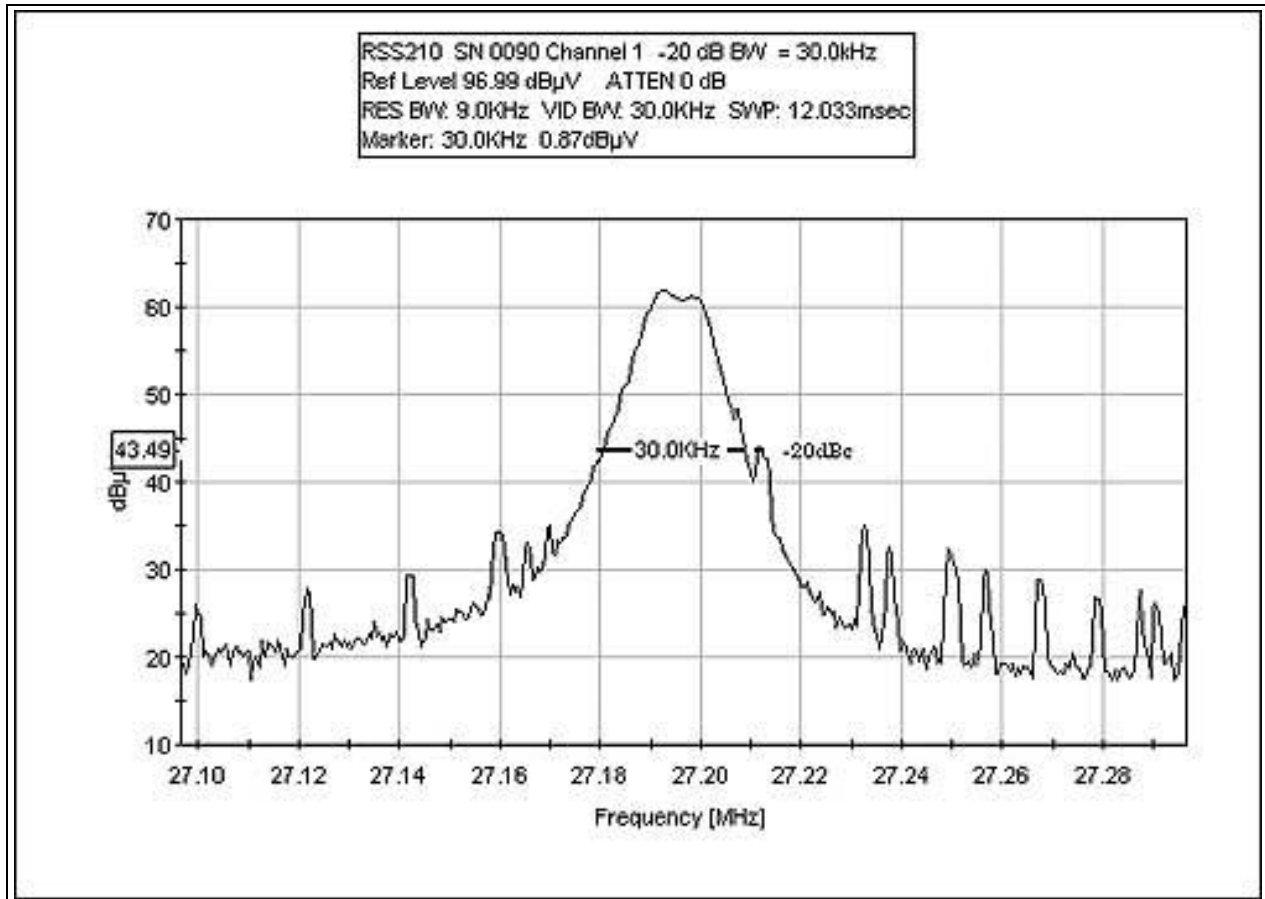
FCC 15.215(c)/RSS 210 20 dB Bandwidth Channel 1, S/N 0059



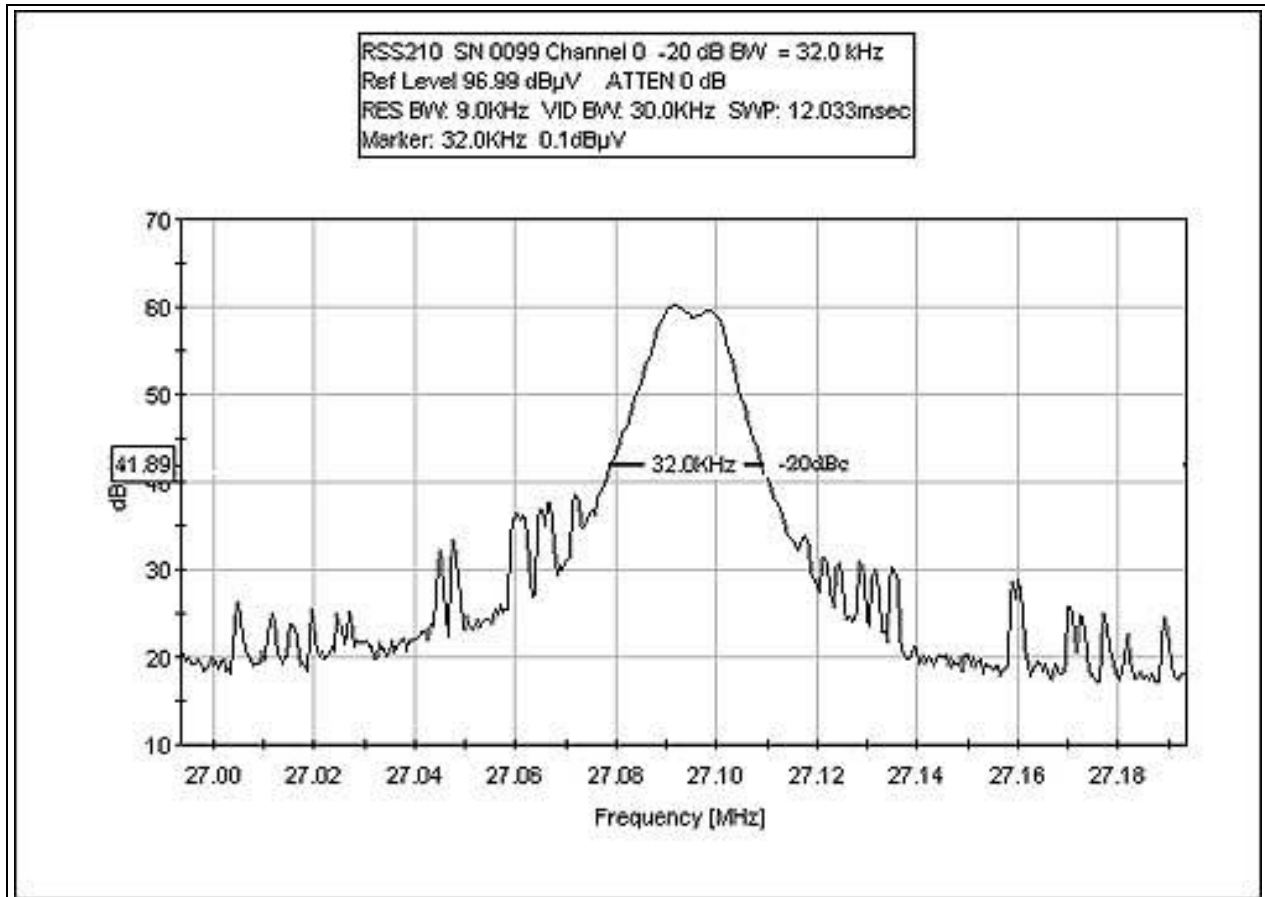
FCC 15.215(c)/RSS 210 20 dB Bandwidth Channel 0, S/N 0090



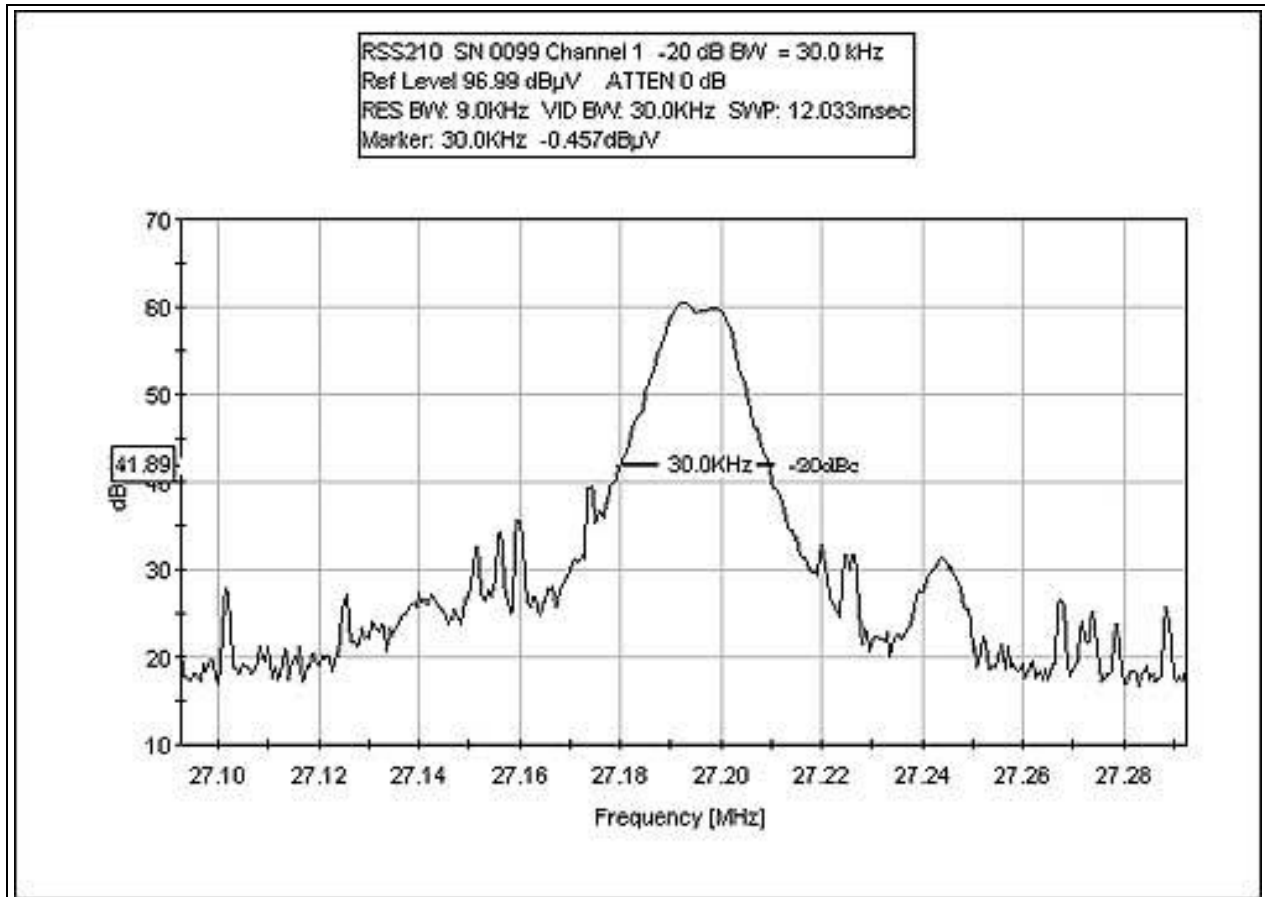
FCC 15.215(c)/RSS 210 20 dB Bandwidth Channel 1, S/N 0090



FCC 15.215(c)/RSS 210 20 dB Bandwidth Channel 0, S/N 0099



FCC 15.215(c)/RSS 210 20 dB Bandwidth Channel 1, S/N 0099



EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The radiated emissions data of the EUT was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated emissions data. For radiated measurements from 25 MHz to 30 MHz, the magnetic loop antenna was used. For frequencies from 30 to 1000 MHz, the biconilog antenna was used. The horn antenna was used for frequencies above 1000 MHz.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB μ V, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 25 MHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 1000 MHz was scanned with the biconilog antenna located about 1.5 meter above the ground plane in the vertical polarity. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. A scan of the FM band from 88 to 110 MHz was then made using a reduced resolution bandwidth and frequency span. The biconilog antenna was changed to the horizontal polarity and the above steps were repeated. For frequencies exceeding 1000 MHz, the horn antenna was used. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

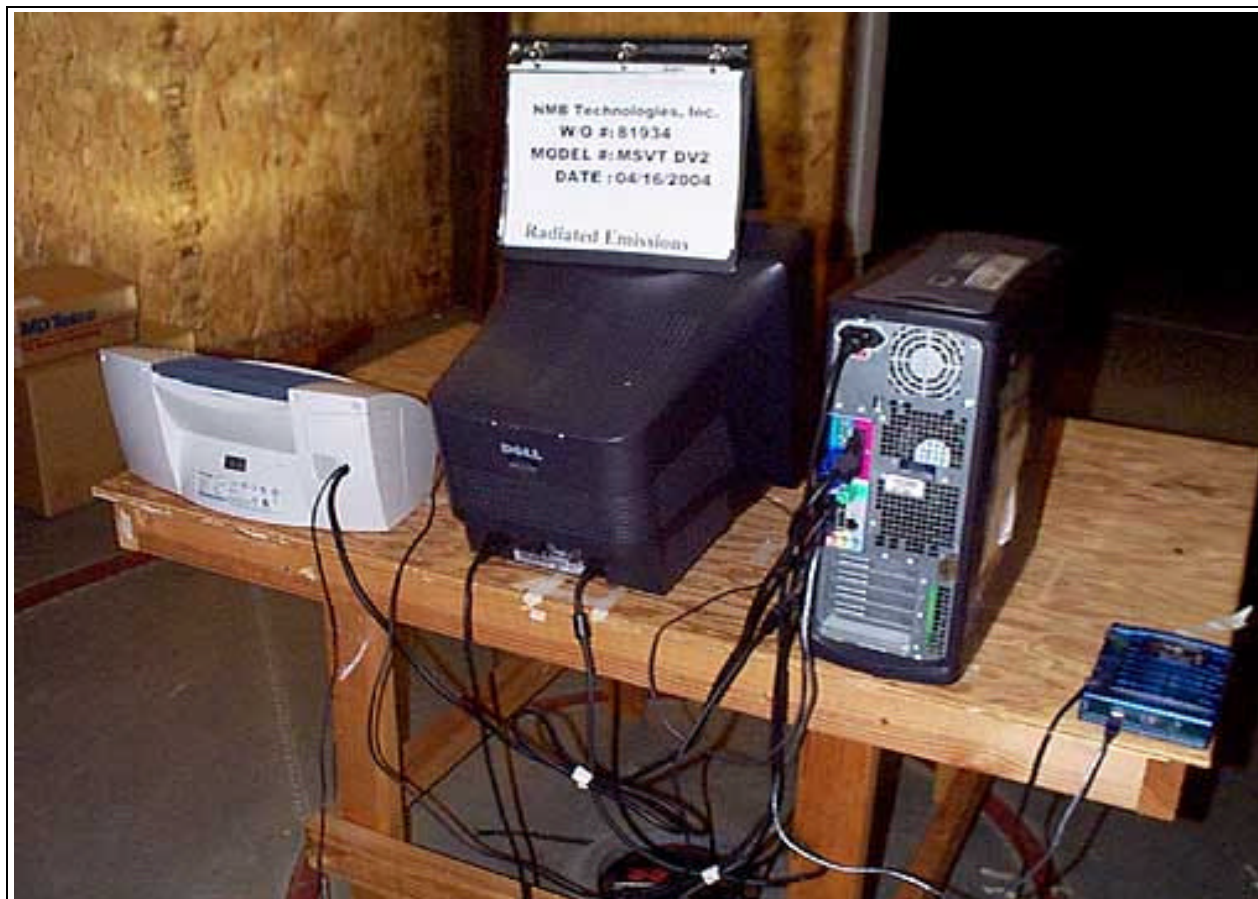
TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

APPENDIX B

TEST EQUIPMENT LIST

FCC 15.215

Instrument	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	00312	HP	8568A	2106A02107	073102	073104
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
Microwave Pre-amp	00787	HP	83017A	3123A00282	042303	042305
Pre-amp	00010	HP	8447D	2727A05392	071602	071604
Antenna cable (10 meter site D)	NA	Andrew	LDF1-50	Cable#17	100203	100204
Antenna cable (Heliac)	NA	Andrew	LDF1-50	Cable#19	101303	101304
Preamp to SA Cable (3 feet)	NA	Pasternack	E100316-I	Cable #22	100603	100604
Coaxial Cable	NA	Pasternack	RG-214/U	Cable #33	032904	032905
Horn Antenna	01646	EMCO	3115	9603-4683	042503	042505
Coaxial Cable	02604	UTiFLEX	UFA147A- 0-0360- 200200	64639	012304	012305
Bilog Antenna	00851	Chase	CBL6111C	2629	031604	031606

FCC 15.227

Instrument	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	00312	HP	8568A	2106A02107	073102	073104
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
Microwave Pre-amp	00787	HP	83017A	3123A00282	042303	042305
Pre-amp	00010	HP	8447D	2727A05392	071602	071604
Antenna cable (10 meter site D)	NA	Andrew	LDF1-50	Cable#17	100203	100204
Antenna cable (Heliac)	NA	Andrew	LDF1-50	Cable#19	101303	101304
Preamp to SA Cable (3 feet)	NA	Pasternack	E100316-I	Cable #22	100603	100604
Coaxial Cable	NA	Pasternack	RG-214/U	Cable #33	032904	032905
Horn Antenna	01646	EMCO	3115	9603-4683	042503	042505
Coaxial Cable	02604	UTiFLEX	UFA147A- 0-0360- 200200	64639	012304	012305
Bilog Antenna	00851	Chase	CBL6111C	2629	031604	031606
Loop Antenna	00314	EMCO	6502	2014	072302	072304

APPENDIX C:
MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **NMB Technologies, Inc.**

Specification: **FCC 15.227(a)**

Work Order #: **81934**

Date: 05/06/2004

Test Type: **Maximized emission**

Time: 10:18:54

Equipment: **Wireless Keyboard**

Sequence#: 1

Manufacturer: NMB Technologies, Inc.

Tested By: Stuart Yamamoto

Model: MSVT DV2

S/N: 0059

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Wireless Keyboard*	NMB Technologies, Inc.	MSVT DV2	0059

Support Devices:

Function	Manufacturer	Model #	S/N
Monitor	Dell	P793	KR-04D025-47602-23Q-D9ZX
Computer	Dell Corporation	Optiplex GX260	C4HVL11
USB Zip Drive	ZIP Disk	Z100USB	PSA009A07M
Printer	Lexmark	Z53	03230287625
Mouse	Logitech	M-SAW34	LZB21670338
Receiver	NMB Technologies, Inc.	1012	0059

Test Conditions / Notes:

The EUT is placed stand-alone on the wooden tabletop. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 23°, Humidity: 40%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries.

Transducer Legend:

T1=Cable #33 45ft. RG-214/U	T2=Cable Heliac #17 84ft(10 meter)
T3=6502 Active Loop Antenna	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	Dist dB	Corr dB	Spec dBµV/m	Margin dB	Polar Ant
1	27.095M	48.9	+0.5	+0.5	+8.8	+0.0	58.7	80.0	-21.3	Loop
Channel 0, Antenna Facing EUT. EUT upright so internal antenna is facing Rx loop antenna.										
2	27.195M	48.9	+0.5	+0.5	+8.8	+0.0	58.7	80.0	-21.3	Loop
Channel 1, Antenna Facing side. EUT upright so internal antenna is facing Rx loop antenna.										

3	27.095M	48.8	+0.5	+0.5	+8.8	+0.0	58.6	80.0	-21.4	Loop
Channel 0, Antenna Facing side. EUT upright so internal antenna is facing Rx loop antenna.										
4	27.195M	48.4	+0.5	+0.5	+8.8	+0.0	58.2	80.0	-21.8	Loop
Channel 1, Antenna Facing EUT. EUT upright so internal antenna is facing Rx loop antenna.										
5	27.190M	45.0	+0.5	+0.5	+8.8	+0.0	54.8	80.0	-25.2	Loop
Channel 1, Antenna Facing EUT. EUT flat on tabletop.										
6	27.093M	44.9	+0.5	+0.5	+8.8	+0.0	54.7	80.0	-25.3	Loop
Channel 0, Antenna Facing EUT. EUT flat on tabletop.										
7	27.195M	40.7	+0.5	+0.5	+8.8	+0.0	50.5	80.0	-29.5	Loop
Channel 1, Antenna Facing side. EUT flat on tabletop.										
8	27.095M	40.3	+0.5	+0.5	+8.8	+0.0	50.1	80.0	-29.9	Loop
Channel 0, Antenna Facing side. EUT flat on tabletop.										

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **NMB Technologies, Inc.**

Specification: **FCC 15.227(a)**

Work Order #: **81934**

Date: 05/06/2004

Test Type: **Maximized emission**

Time: 10:50:16

Equipment: **Wireless Keyboard**

Sequence#: 2

Manufacturer: NMB Technologies, Inc.

Tested By: Stuart Yamamoto

Model: MSVT DV2

S/N: 0090

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Wireless Keyboard*	NMB Technologies, Inc.	MSVT DV2	0090

Support Devices:

Function	Manufacturer	Model #	S/N
Monitor	Dell	P793	KR-04D025-47602-23Q-D9ZX
Computer	Dell Corporation	Optiplex GX260	C4HVL11
USB Zip Drive	ZIP Disk	Z100USB	PSA009A07M
Printer	Lexmark	Z53	03230287625
Mouse	Logitech	M-SAW34	LZB21670338
Receiver	NMB Technologies, Inc.	1012	0090

Test Conditions / Notes:

The EUT is placed stand-alone on the wooden tabletop. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 23°C, Humidity: 40%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries.

Transducer Legend:

T1=Cable #33 45ft. RG-214/U	T2=Cable Heliax #17 84ft(10 meter)
T3=6502 Active Loop Antenna	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	Dist dB	Corr dB	Spec dBµV/m	Margin dB	Polar Ant
1	27.095M	49.0	+0.5	+0.5	+8.8	+0.0	58.8	80.0	-21.2	Loop
Channel 0. EUT upright so internal antenna is facing Rx loop antenna.										
2	27.195M	49.0	+0.5	+0.5	+8.8	+0.0	58.8	80.0	-21.2	Loop
Channel 1. EUT upright so internal antenna is facing Rx loop antenna.										

3	27.095M	49.0	+0.5	+0.5	+8.8	+0.0	58.8	80.0	-21.2	Loop
Channel 0. EUT upright so internal antenna is facing Rx loop antenna.										
4	27.195M	48.9	+0.5	+0.5	+8.8	+0.0	58.7	80.0	-21.3	Loop
Channel 1. EUT upright so internal antenna is facing Rx loop antenna.										

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **NMB Technologies, Inc.**

Specification: **FCC 15.227(a)**

Work Order #: **81934**

Date: 05/06/2004

Test Type: **Maximized emission**

Time: 11:05:19

Equipment: **Wireless Keyboard**

Sequence#: 3

Manufacturer: NMB Technologies, Inc.

Tested By: Stuart Yamamoto

Model: MSVT DV2

S/N: 0099

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Wireless Keyboard*	NMB Technologies, Inc.	MSVT DV2	0099

Support Devices:

Function	Manufacturer	Model #	S/N
Monitor	Dell	P793	KR-04D025-47602-23Q-D9ZX
Computer	Dell Corporation	Optiplex GX260	C4HVL11
USB Zip Drive	ZIP Disk	Z100USB	PSA009A07M
Printer	Lexmark	Z53	03230287625
Mouse	Logitech	M-SAW34	LZB21670338
Receiver	NMB Technologies, Inc.	1012	0099

Test Conditions / Notes:

The EUT is placed stand-alone on the wooden tabletop. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 23°C, Humidity: 40%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries.

Transducer Legend:

T1=Cable #33 45ft. RG-214/U	T2=Cable Heliax #17 84ft(10 meter)
T3=6502 Active Loop Antenna	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	Dist dB	Corr dB	Spec dBµV/m	Margin dB	Polar Ant
1	27.095M	49.4	+0.5	+0.5	+8.8	+0.0	59.2	80.0	-20.8	Loop
Channel 0. EUT upright so internal antenna is facing Rx loop antenna.										
2	27.095M	49.4	+0.5	+0.5	+8.8	+0.0	59.2	80.0	-20.8	Loop
Channel 0. EUT upright so internal antenna is facing Rx loop antenna.										

3	27.195M	49.3	+0.5	+0.5	+8.8	+0.0	59.1	80.0	-20.9	Loop
Channel 1. EUT upright so internal antenna is facing Rx loop antenna.										
4	27.195M	49.1	+0.5	+0.5	+8.8	+0.0	58.9	80.0	-21.1	Loop
Channel 1. EUT upright so internal antenna is facing Rx loop antenna.										

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **NMB Technologies, Inc.**
 Specification: **FCC 15.227(b) / 15.209**
 Work Order #: **81934**
 Test Type: **Maximized emission**
 Equipment: **Wireless Keyboard**
 Manufacturer: NMB Technologies, Inc.
 Model: MSVT DV2
 S/N: 0059

Date: 04/01/2004
 Time: 15:04:31
 Sequence#: 4
 Tested By: Stuart Yamamoto

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP8568B	US40240225	03/11/2003	03/11/2004	2472

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Wireless Keyboard*	NMB Technologies, Inc.	MSVT DV2	0059

Support Devices:

Function	Manufacturer	Model #	S/N
Monitor	Dell	P793	KR-04D025-47602-23Q-D9ZX
Computer	Dell Corporation	Optiplex GX260	C4HVL11
USB Zip Drive	ZIP Disk	Z100USB	PSA009A07M
Printer	Lexmark	Z53	03230287625
Mouse	Logitech	M-SAW34	LZB21670338
Receiver	NMB Technologies, Inc.	1012	0059

Test Conditions / Notes:

The EUT is placed stand alone on the wooden table top. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 18°C, Humidity: 60%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries. Data represents the EUT in both Channel 0 and Channel 1. The frequency range of measurement was from 25 MHz to 4 GHz. The bandwidths used are as follows: 150 kHz-30 MHz; SA RBW=100 kHz, SA VBW=100 kHz QPA BW=9kHz; 30 MHz-1000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=120kHz; 1000 MHz-4000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=NA.

Transducer Legend:

T1=Chase bilog a/n 00851, s/n 2629	T2=Cable #33 45ft. RG-214/U
T3=Cable Heliac #17 84ft(10 meter)	T4=Cable#22 BNC (preamp to SA)
T5=Pre Amp 8447D AN 0010_071604	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	54.392M	41.0	+7.7 -27.0	+0.7	+0.8	+0.2	+0.0	23.4	40.0	-16.6	Horiz
2	255.398M	38.9	+10.6 -26.3	+1.8	+1.8	+0.3	+0.0	27.1	46.0	-18.9	Horiz
3	54.189M	37.4	+7.8 -27.0	+0.6	+0.8	+0.2	+0.0	19.8	40.0	-20.2	Horiz

4	239.440M	37.8	+10.5 -26.3	+1.7	+1.7	+0.3	+0.0	25.7	46.0	-20.3	Horiz
5	262.574M	36.8	+10.6 -26.2	+1.8	+1.8	+0.3	+0.0	25.1	46.0	-20.9	Horiz
6	255.421M	33.1	+10.6 -26.3	+1.8	+1.8	+0.3	+0.0	21.3	46.0	-24.7	Vert
7	81.585M	31.8	+7.8 -26.9	+0.9	+1.0	+0.2	+0.0	14.8	40.0	-25.2	Horiz
8	243.842M	32.5	+10.5 -26.3	+1.8	+1.8	+0.3	+0.0	20.6	46.0	-25.4	Horiz
9	81.279M	31.5	+7.8 -26.9	+0.9	+1.0	+0.2	+0.0	14.5	40.0	-25.5	Horiz
10	244.752M	31.7	+10.5 -26.3	+1.8	+1.8	+0.3	+0.0	19.8	46.0	-26.2	Horiz
11	135.992M	28.2	+11.9 -26.8	+1.3	+1.3	+0.2	+0.0	16.1	43.5	-27.4	Horiz
12	270.955M	30.2	+10.6 -26.2	+1.8	+1.8	+0.3	+0.0	18.5	46.0	-27.5	Horiz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **NMB Technologies, Inc.**

Specification: **FCC 15.227(b) / 15.209**

Work Order #: **81934**

Date: 04/01/2004

Test Type: **Maximized emission**

Time: 16:08:14

Equipment: **Wireless Keyboard**

Sequence#: 5

Manufacturer: NMB Technologies, Inc.

Tested By: Stuart Yamamoto

Model: MSVT DV2

S/N: 0090

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Wireless Keyboard*	NMB Technologies, Inc.	MSVT DV2	0090

Support Devices:

Function	Manufacturer	Model #	S/N
Monitor	Dell	P793	KR-04D025-47602-23Q-D9ZX
Computer	Dell Corporation	Optiplex GX260	C4HVL11
USB Zip Drive	ZIP Disk	Z100USB	PSA009A07M
Printer	Lexmark	Z53	03230287625
Mouse	Logitech	M-SAW34	LZB21670338
Receiver	NMB Technologies, Inc.	1012	0090

Test Conditions / Notes:

The EUT is placed stand alone on the wooden table top. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 18°C, Humidity: 60%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries. Data represents the EUT in both Channel 0 and Channel 1. The frequency range of measurement was from 25 MHz to 4 GHz. The bandwidths used are as follows: 150 kHz-30 MHz; SA RBW=100 kHz, SA VBW=100 kHz QPA BW=9kHz; 30 MHz-1000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=120kHz; 1000 MHz-4000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=NA.

Transducer Legend:

T1=Chase bilog a/n 00851, s/n 2629	T2=Cable #33 45ft. RG-214/U
T3=Cable Heliac #17 84ft(10 meter)	T4=Cable#22 BNC (preamp to SA)
T5=Pre Amp 8447D AN 0010_071604	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	54.188M	38.3	+7.8 -27.0	+0.6	+0.8	+0.2	+0.0	20.7	40.0	-19.3	Horiz
2	54.395M	38.1	+7.7 -27.0	+0.7	+0.8	+0.2	+0.0	20.5	40.0	-19.5	Horiz
3	81.586M	36.5	+7.8 -26.9	+0.9	+1.0	+0.2	+0.0	19.5	40.0	-20.5	Horiz
4	255.502M	37.1	+10.6 -26.3	+1.8	+1.8	+0.3	+0.0	25.3	46.0	-20.7	Horiz

5	263.496M	34.8	+10.6 -26.2	+1.8	+1.8	+0.3	+0.0	23.1	46.0	-22.9	Horiz
6	239.535M	33.1	+10.5 -26.3	+1.7	+1.7	+0.3	+0.0	21.0	46.0	-25.0	Horiz
7	81.279M	31.8	+7.8 -26.9	+0.9	+1.0	+0.2	+0.0	14.8	40.0	-25.2	Horiz
8	108.781M	27.8	+10.7 -26.8	+1.0	+1.1	+0.2	+0.0	14.0	43.5	-29.5	Horiz
9	108.377M	27.1	+10.7 -26.8	+1.0	+1.1	+0.2	+0.0	13.3	43.5	-30.2	Horiz
10	216.760M	27.8	+10.2 -26.4	+1.6	+1.6	+0.3	+0.0	15.1	46.0	-30.9	Horiz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **NMB Technologies, Inc.**

Specification: **FCC 15.227(b) / 15.209**

Work Order #: **81934**

Date: 04/01/2004

Test Type: **Maximized emission**

Time: 16:47:16

Equipment: **Wireless Keyboard**

Sequence#: 5

Manufacturer: NMB Technologies, Inc.

Tested By: Stuart Yamamoto

Model: MSVT DV2

S/N: 0099

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Wireless Keyboard*	NMB Technologies, Inc.	MSVT DV2	0099

Support Devices:

Function	Manufacturer	Model #	S/N
Monitor	Dell	P793	KR-04D025-47602-23Q-D9ZX
Computer	Dell Corporation	Optiplex GX260	C4HVL11
USB Zip Drive	ZIP Disk	Z100USB	PSA009A07M
Printer	Lexmark	Z53	03230287625
Mouse	Logitech	M-SAW34	LZB21670338
Receiver	NMB Technologies, Inc.	1012	0099

Test Conditions / Notes:

The EUT is placed stand alone on the wooden table top. The "H" key of the EUT is pressed, sending data to the receiver and the computer displays the "H" character on the monitor. A desktop computer was used to establish the communication link and verify EUT operation and then removed from the test site. Channel 0 = 27.095 MHz. Channel 1 = 27.195 MHz. Temperature: 18°C, Humidity: 60%, Pressure: 100kPa. Voltage to EUT is supplied by two AA 1.5 VDC batteries. Data represents the EUT in both Channel 0 and Channel 1. The frequency range of measurement was from 25 MHz to 4 GHz. The bandwidths used are as follows: 150 kHz-30 MHz; SA RBW=100 kHz, SA VBW=100 kHz QPA BW=9kHz; 30 MHz-1000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=120kHz; 1000 MHz-4000 MHz; SA RBW=1 MHz, SA VBW=1 MHz, QPA BW=NA.

Transducer Legend:

T1=Chase bilog a/n 00851, s/n 2629	T2=Cable #33 45ft. RG-214/U
T3=Cable Heliac #17 84ft(10 meter)	T4=Cable#22 BNC (preamp to SA)
T5=Pre Amp 8447D AN 0010_071604	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	54.386M	40.6	+7.7 -27.0	+0.6	+0.8	+0.2	+0.0	22.9	40.0	-17.1	Horiz
2	256.295M	37.9	+10.6 -26.3	+1.8	+1.8	+0.3	+0.0	26.1	46.0	-19.9	Horiz
3	54.186M	37.7	+7.8 -27.0	+0.6	+0.8	+0.2	+0.0	20.1	40.0	-19.9	Horiz
4	248.268M	36.5	+10.6 -26.3	+1.8	+1.8	+0.3	+0.0	24.7	46.0	-21.3	Horiz

5	81.584M	35.1	+7.8 -26.9	+0.9	+1.0	+0.2	+0.0	18.1	40.0	-21.9	Horiz
6	240.262M	35.5	+10.5 -26.3	+1.7	+1.7	+0.3	+0.0	23.4	46.0	-22.6	Horiz
7	81.283M	33.3	+7.8 -26.9	+0.9	+1.0	+0.2	+0.0	16.3	40.0	-23.7	Horiz
8	263.620M	33.8	+10.6 -26.2	+1.8	+1.8	+0.3	+0.0	22.1	46.0	-23.9	Horiz
9	108.382M	30.8	+10.7 -26.8	+1.0	+1.1	+0.2	+0.0	17.0	43.5	-26.5	Horiz
10	108.781M	30.1	+10.7 -26.8	+1.0	+1.1	+0.2	+0.0	16.3	43.5	-27.2	Horiz