Engineering and Testing for EMC and Safety Compliance

FCC CERTIFICATION OF A

CLASS B DIGITAL DEVICE

NMB Technologies, Inc.
9730 Independence Ave.
Chatsworth, CA 91311
818-341-3355

MODEL: RT3602

FCC ID: AQ6-3602

September 25, 2000

Standards Referenced for this Report	
Part 2: 1999	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 1999	§15.109: Radiated Emissions Limits
ANSI C63.4-1992	Standard Format Measurement/Technical Report Personal Computer and Peripherals

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
15(b)				

REPORT PREPARED BY:

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1 GENERAL INFORMATION

The following FCC Certification for a Class B Digital Device is prepared for ***NMB Technologies, Inc.*** in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commission's rules and regulations. The equipment under test (EUT) was the ***RT3602; FCC ID: AQ6-3602***. The test results reported in this document relate only to the item that was tested.

All measurements contained in this report were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms with the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurement were performed manually at Rhein Tech Laboratories, Inc. The radiated emissions measurements required by the rules were performed on the three meter, open field test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data has been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. Rhein Tech, Labs, Inc. is accepted by the FCC as a facility available to do measurement work for others on a contract basis.

1.1 RELATED SUBMITTALS & GRANTS

This is an original application for certification.

1.2 MODIFICATIONS

Modifications were not made while testing.

1.3 TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of three meters.

1.4 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated June 24, 1996, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2 TESTED SYSTEM DETAILS

2.1 Components Used With EUT

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test.

2.1.1 External Components

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
CAMERA	INTEL CORPORATION	CS430	30021543	DOC	SHIELDED I/O	011151
TELEPHONE	PANASONIC	KX-T7020	2GIA003103	N/A	UNSHIELDED I/O	900697
AUDIO DEVICE	RADIO SHACK	SCP-59	N/A	N/A	SHIELDED I/O	900691
MICROPHONE	GATEWAY 2000, INC.	MODEM SPEAKERPHONE	N/A	N/A	SHIELDED I/O	010153
SPEAKER	CAMBRIDGE SOUND SYSTEMS	GCS 200	SBS51-0001	N/A	UNSHIELDED I/O UNSHIELDED POWER	011537
SPEAKER	CAMBRIDGE SOUND SYSTEMS	GCS 200	SBS51-0001	N/A	UNSHIELDED I/O	011538
JOYSTICK	MICROSOFT	X03-57540	7596071-00000	SAMPLE	SHIELDED I/O	010315
MODEM	US ROBOTICS	0413	8390364645141	DOC	SHIELDED I/O UNSHIELDED POWER	900421
MOUSE	MICROSOFT CORPORATION	INTELLIMOUSE USB	PS/2 MOUSE	SAMPLE	SHIELDED WITH FERRITE 2 COMP. I/O	012302
PRINTER	HEWLETT PACKARD	C6413B DESKJET 832C	MY97U1201K	DOC	SHIELDED I/O UNSHIELDED POWER	011170
MONITOR	LG ELECTRONICS	EV500A (15")	15017E059522U	BEJCB575B	SHIELDED, FERRITE BOTH ENDS I/O UNSHIELDED POWER	011565
SYSTEM	GATEWAY COMPANIES, INC.	MICRO ATX	N/A	DOC		011680

2.1.2 Internal Components

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
MEMORY	MICRON	MT4LSDT464AG-10CB2	32MB DIMM	N/A	N/A	011687
MODEM	GVC	2B5	G9C6HMX	DK4F1156IVR9	UNSHIELDED I/O	011685
CPU	INTEL CORPORATION	CELERON 700 MHZ (S370)	T010A280-0321	N/A	N/A	012012
MOTHERBOARD	INTEL CORPORATION	BRYANT	IUW201801239	N/A	INTERNAL I/O INTERNAL POWER	012027
CD-ROM DRIVE	MITSUMI	CRMC-FX4821T	FFF006735	OC	INTERNAL I/O INTERNAL POWER	011682
POWER SUPPLY	ASTEC CUSTOM POWER	ATX93-3405	2983227305	N/A	UNSHIELDED POWER	012112
HARD DRIVE	IBM	DPTA-371360	JHTOE175	N/A	INTERNAL I/O INTERNAL POWER	011683
FLOPPY DRIVE	MITSUMI	D353M3	9K22GG1117	N/A	INTERNAL I/O INTERNAL POWER	011684

2.2 EUT

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
KEYBOARD (EUT)	**GATEWAY COMPANIES, INC.**	**RT3602**	**NO FERRITE**	**SAMPLE**	**SHIELDED I/O**	**012511**

2.3 CONFIGURATION OF TESTED SYSTEM

2.4 EUT EXERCISE SOFTWARE

The EUT exercise program used during radiated and conducted testing has been designed to exercise the various system components in a manner similar to a typical use. The software, contained on the hard disk drive, sequentially exercises each system component by doing the following: 1) an H prints on the monitor, 2) an H prints on the printer 3) an H is sent to serial ports, 4) a file is read from the floppy diskette, 5) a file is read from the hard drive and any other hard drive present, and 6) a file is read from the CD-ROM drive. Systems that utilize network cards are connected to a server and are configured to transmit and receive packets of data. The complete cycle takes less than one second and is repeated continually. The keyboard and mouse were continuously scanned for data input activity during testing. The EUT contains two USB ports. Two USB mice were used to investigate both USB ports on the EUT. This represents the worstcase configuration.

2.5 SPECIAL ACCESSORIES

The end user is advised that to use the same type cables as mentioned in this test report.

3 CONDUCTED

3.1 CONDUCTED TEST METHODOLOGY

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

3.2 CONDUCTED EMISSION DATA

Pk = Peak; QP = Quasi-Peak; Av = Average

3.2.1 Neutral Side (L1)

Temperature: 74°F Humidity: 40%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**CISPR B QP Limit (dBuV)**	**CISPR B QP Margin (dBuV)**	**CISPR B AV Limit (dBuV)**	**CISPR B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
0.203	Pk	46.0	0.8	46.8	63.5	-16.7	53.5	-6.7	Pass	
0.306	Pk	41.8	0.7	42.5	60.1	-17.6	50.1	-7.6	Pass	
0.408	Pk	36.1	0.6	36.7	57.7	-21.0	47.7	-11.0	Pass	
0.815	Pk	35.9	0.7	36.6	56.0	-19.4	46.0	-9.4	Pass	
0.916	Pk	35.4	0.7	36.1	56.0	-19.9	46.0	-9.9	Pass	
1.208	Pk	33.3	0.9	34.2	56.0	-21.8	46.0	-11.8	Pass	
9.020	Pk	40.2	2.4	42.6	60.0	-17.4	50.0	-7.4	Pass	

3.2.2 Hot Side (L2)

Temperature: 74°F Humidity: 40%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**CISPR B QP Limit (dBuV)**	**CISPR B QP Margin (dBuV)**	**CISPR B AV Limit (dBuV)**	**CISPR B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
0.202	Pk	48.7	0.6	49.3	63.5	-14.2	53.5	-4.2	Pass	
0.306	Pk	43.1	0.7	43.8	60.1	-16.3	50.1	-6.3	Pass	
0.408	Pk	35.1	0.6	35.7	57.7	-22.0	47.7	-12.0	Pass	
0.711	Pk	39.5	0.7	40.2	56.0	-15.8	46.0	-5.8	Pass	
0.813	Pk	40.4	0.8	41.2	56.0	-14.8	46.0	-4.8	Pass	
0.915	Pk	38.9	0.8	39.7	56.0	-16.3	46.0	-6.3	Pass	
1.004	Pk	33.0	0.9	33.9	56.0	-22.1	46.0	-12.1	Pass	
8.830	Pk	32.0	2.5	34.5	60.0	-25.5	50.0	-15.5	Pass	
10.560	Pk	31.0	2.7	33.7	60.0	-26.3	50.0	-16.3	Pass	

Test Personnel:

Signature: _____ **Date:** September 13, 2000

Typed/Printed Name: K. Franck Schuppius

4 RADIATED

4.1 RADIATED TEST METHODOLOGY

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When any clock exceeds 108 MHz, the EUT was tested between 1 to 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

4.2 RADIATED EMISSION DATA

The following data lists the significant emission frequencies. All readings are Quasi-Peak unless otherwise stated.

Temperature: 90°F Humidity: 11%											
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/ Fail	Comments
50.550	Qp	H	90	1.0	34.8	-17.0	17.8	30.0	-12.2	Pass	
58.970	Qp	V	90	1.0	42.1	-18.3	23.8	30.0	-6.2	Pass	
63.500	Qp	V	90	1.0	37.0	-18.4	18.6	30.0	-11.4	Pass	
166.235	Qp	H	145	1.0	34.8	-12.4	22.4	30.0	-7.6	Pass	
243.015	Qp	V	180	1.0	39.3	-9.2	30.1	37.0	-6.9	Pass	
299.215	Qp	H	180	1.0	34.3	-7.1	27.2	37.0	-9.8	Pass	
332.460	Qp	H	180	1.0	34.4	-5.9	28.5	37.0	-8.5	Pass	
338.000	Qp	V	180	1.0	34.0	-5.6	28.4	37.0	-8.6	Pass	

Test Personnel:

Signature: _____ **Date:** September 13, 2000

Typed/Printed Name: K. Franck Schuppius

5 EMISSIONS EQUIPMENT LIST

RTL equipment for emission testing					
RTL Asset Number	**Manufacturer**	**Model**	**Part Type**	**Serial Number**	**Calibration due date**
900969	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz – 40 GHz)	2412A00414	03/23/01
900901	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz – 40 GHz)	3145A01599	11/09/00
900339	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz – 40 GHz)	2521A00743	03/27/01
900042	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz – 40 GHz)	2521A01032	11/09/00
900968	Hewlett Packard	8567A	Spectrum Analyzer (10 kHz - 1.5 GHz)	2602A00160	03/23/01
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	03/27/01
901053	Schaffner	CBL6112B	Bi-Log Chase Antenna (200 MHz – 2 GHz)	2648	07/24/01
900791	Schaffner - Chase	CBL6112	Antenna (25 MHz - 2 GHz)	2099	02/22/01
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020	N/A
900323	EMCO	3160-7	Horn Antennas (8,2-12,4 GHz)	9605-1054	N/A
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051	N/A
900338	EMCO	3160-10	Horn Antennas (26.5 - 40 GHz)	9606-1033	N/A
900970	Hewlett Packard	85662A	Spectrum Analyzer Display	254211239	03/23/01
900930	Hewlett Packard	85662A	Spectrum Analyzer Display	3144A20839	03/28/01
900902	Hewlett Packard	85662A	Spectrum Analyzer Display	2848A17585	11/09/00
900896	Hewlett Packard	85662A	Spectrum Analyzer Display	2816A16471	11/09/00
900726	Solar	7225-1	LISN	-	03/29/01
900727	Solar	7225-1	LISN	-	03/29/01
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1-26.5 GHz)	3008A00505	11/10/00
900077	Solar	7225-1	LISN		03/29/01
900078	Solar	7225-1	LISN		03/29/01
9000729	Solar	8130	Filter	947306	N/A
9000729	Solar	8130	Filter	947305	N/A

6 CONFORMANCE STATEMENT

Standards Referenced for this Report	
Part 2: 1999	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 1999	§15.109: Radiated Emissions Limits
ANSI C63.4-1992	Standard Format Measurement/Technical Report Personal Computer and Peripherals

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15 and ANSI C63.4 Certification methodology.

Signature:_____ Date: September 25, 2000

Typed/Printed Name: Desmond A. Fraser Position: President
(NVLAP Signatory)

NVLAP *Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.*

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.