Measurement/Technical Report

Intel Corporation
Intel Emergency Management Card

FCC ID: EJMNPDPEMC2

April 22, 1998

This report concerns (check one): Original Grant __X__ Class II Change _____

Equipment Type: Class B Computing Device / LAN Adapter

Deferred grant requested per 47 CFR 0.457 (d)(1)(ii)? yes _____ no __X__

If yes, defer until: _____N/A_____ date

Intel Corporation agrees to notify the Commission by: _____N/A_____ date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37: yes _____ no __X__

If no, assumed Part 15, Subpart B for unintentional radiators - new 47 CFR [10-1-92] provision.

Report prepared by:

Northwest EMC, Inc.
120 South Elliott Road, Suite 300
Newberg, OR 97132
(503) 537-0728
fax: (503) 537-0735

Table of Contents

1.0 General Information

1.1 Product Description

Manufactured By ..... Intel Corporation

Address ..... 5200 NE Elam Young Parkway Hillsboro, OR 97124

Test Requested By: ..... Richard Abel

Model ..... Intel Emergency Management Card

FCC ID EJMNPDPEMC2

Serial Number(s) INBS81600005

Date of Test ..... April 22, 1998

Job Number INTE1760

The Equipment Under Test (EUT) is the Intel Corporation Emergency Management Card, FCC ID EJMNPDEMC2. The EUT is a PCI add in card that monitors the host server's vital signs such as voltages, temperatures, etc. It has the ability to communicate this information to remote services by Ethernet, or serial link. Additionally, console redirection will allow remote diagnostics and fault recovery. The EUT operates in a network at 10 MegaBits-per-Second (MBpS).

Hardware Description:

- Clocks/Oscillators Frequencies: 20 MHz, 50 MHz.
- Ports: Serial, RJ-45, IPM

ınts

	Description and Serial No.
C2	Intel Corporation Emergency Management Card, Serial No. INBS81600005.
	IBM Model 33G5430, Serial No. 23-G51151.
C	NMB Model RT101+, Serial No. 80530392.
/MA	NEC Model JC-1532VMA-2, Serial No. 3262102NA.
	Gateway Model G6-266, Serial No. 0008529499.
	Hewlett Packard Model C2121A, Serial No. US39J25029
	Hewlett Packard, Model C2114A, Serial No. MY41ID0Z7
	Epson LX-300 Model P850A, Serial No. 1YLY172977.
	Micron Model SCOLBUCMIC23A, Serial No. 200087007.
	Compaq Presario 1510, Serial No. 603BD02HB614.
\215	Digital Model RT101, Serial No. 71341074.

Cables:

Item	Description
Parallel Printer Cable	2 meters in length. Shielded with braid over foil and no ferrite beads. Connected from the host PC parallel port to the parallel printer.
Network Cable	20 meters in length. Not shielded and no ferrite beads. Plastic RJ-45 connectors. Connected from the EUT Data Port to the Remote PC.
Serial Printer Cable (2)	1.5 meters in length. Shielded with no ferrite beads. Connected from the COM1 port of the host PC to the serial printer.
Video Cable	1.1 meters in length. Shielded, with a metal backshell and one molded ferrite bead at the PC end of the cable. Permanently attached to the monitor and connected to the VGA port of the host PC.
Mouse Cable	1.8 meters in length. Metal connector backshells. Permanently attached to the mouse and connected to a 9-pin to PS/2 adapter that is connected to the PC mouse port (supplied with the mouse).
Keyboard Cable	1.4 meters in length (Coiled), with a metal connector backshell. Permanently attached to the keyboard and connected to the PS/2 keyboard port of the EUT.
Serial Printer DC Cable (2)	1.9 meters in length. No shielding and no ferrite beads. Permanently attached to the serial printer AC adapter and connected to the serial printer.
Serial Printer AC Cable (2)	1.9 meters in length. No shielding and no ferrite beads. Permanently attached to the serial printer AC adapter and connected to the AC Mains.
Parallel Printer DC Cable	1.8 meters in length. No shielding and no ferrite beads. Permanently attached to the parallel printer AC adapter and connected to the parallel printer.
Parallel Printer AC Cable	1.8 meters in length. No shielding and no ferrite beads. Permanently attached to the parallel printer AC adapter and connected to the AC Mains.
Monitor AC Cable	1.9 meters in length. No shielding and no ferrite beads. Connected from AC input of the monitor to the AC mains.
EUT Power	1.9 meters in length. No shielding and no ferrite beads. Connected form AC input of the EUT to the AC mains.
IPM Cable	1.0 meters in length. No shielding with a ferrite bead attached. Connected from the EUT to the IPM.

1.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance of 10 meters. Please reference Appendix I for further detail on Test Methodology.

1.5 Test Facility

The Open Area Test Site and conducted measurement facility used to collect the radiated and conducted data is located at

Northwest EMC, Inc.
120 South Elliott Road, Suite 300
Newberg, OR 97132
(503) 537-0728
Fax: 537-0735

The Open Area Test Site, and conducted measurement facility is located in Newberg, OR, at the address shown above. These sites have been fully described in reports filed with the FCC (Federal Communications Commission), and accepted by the FCC in letters maintained in our files.

Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. NVLAP Lab Code: 200059-0.

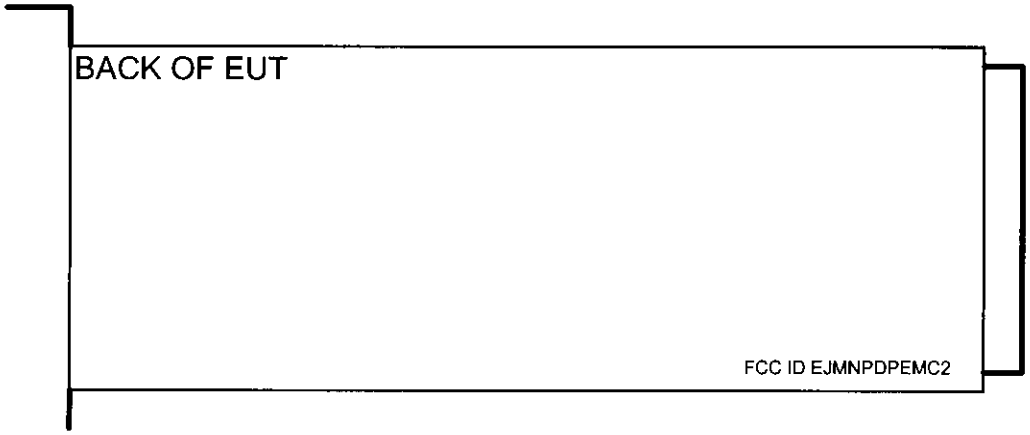
Northwest EMC, Inc. has been assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

2.0 Product Labeling

Figure 2.1 FCC ID Label

The FCC ID shown above is silk-screened on to the printed circuit board of the EUT (see next page). The Compliance Statement, as described in 47 CFR 15.19(a)(3), is in the Users Manual.

Figure 2.2 Location of Label on EUT



3.0 System Test Configuration

3.1 Justification

The EUT was configured in a test mode to simulate typical use. Cables were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O Cables. The mode of operation utilized for testing was selected in order to best simulate typical EUT use. The EUT was connected to a remote server via an ethernet connection. The server utilized software that would continuously ping the EUT. This provided full functionality of the ethernet and digital components of the EUT.

3.2 EUT Exercise Software

The EUT was transmitting data using ***PING.EXE*** software, operating under the ***DOS 6.2*** operating software. This allowed the EUT to continuously transmit and receive data packets to the remote PC. This software was used since it would simulate full functionality of the ethernet and digital components of the EUT.

3.3 Special Accessories

No special accessories will be sold with the EUT.

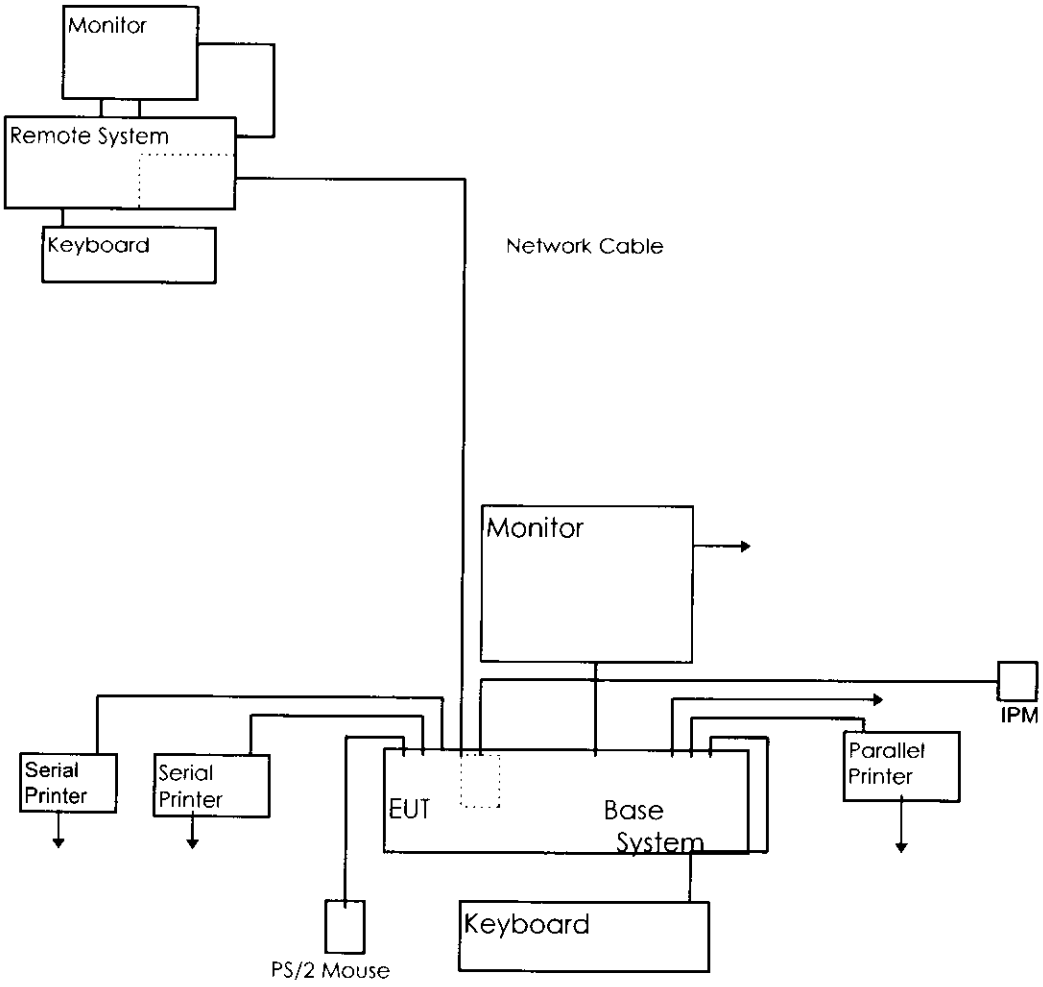
3.4 Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered by the applicant.

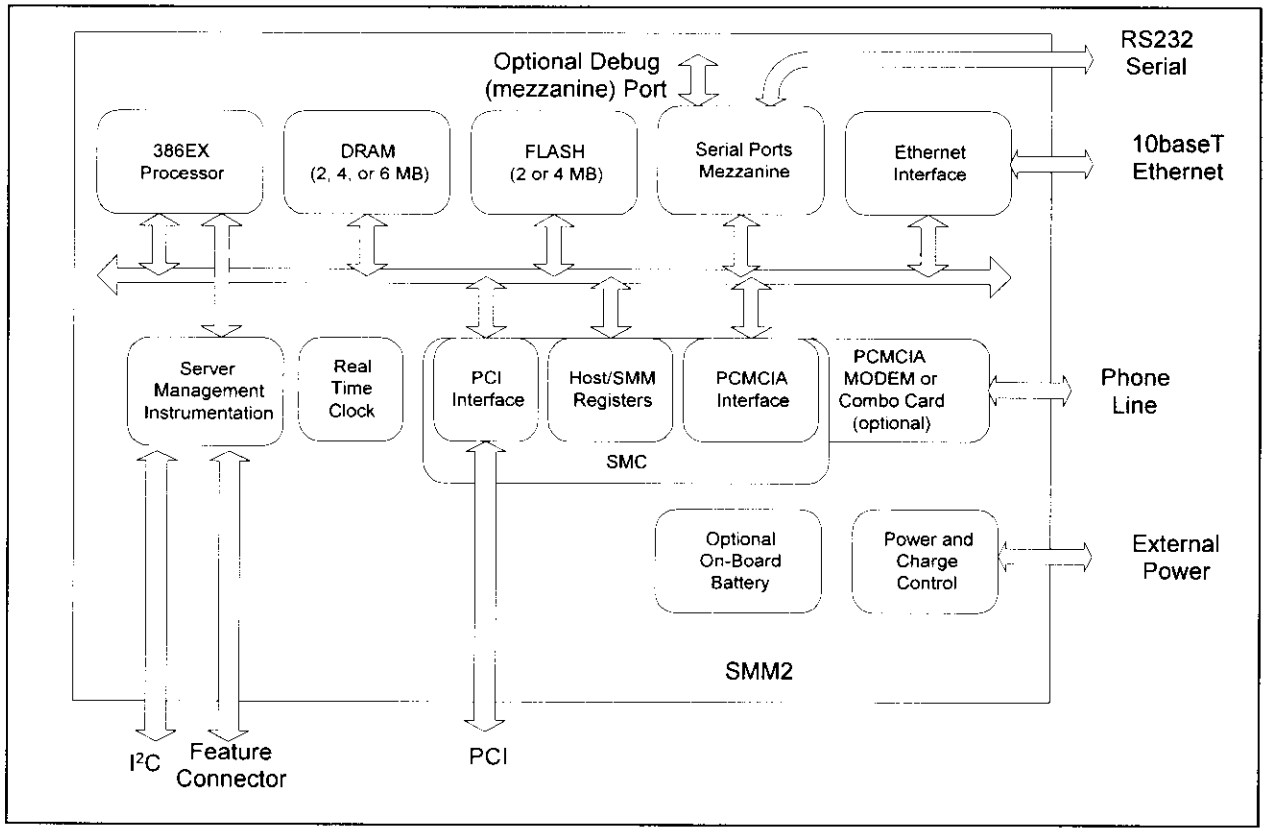
3.5 Configuration of Tested System

The EUT was placed in an Option Slot of the host PC. A full system configuration was used as per ANSI C63.4 (section 11.2) consisting of a Personal Computer, keyboard, mouse, monitor, modem, and 2 printers. A remote PC with a LAN adapter installed was placed in a remote location, to provide a system for the EUT to communicate with. The test software which exercised the EUT was run off of the hard disk inside the PC.

Figure 3.1: Configuration of Tested System



4.0 Block Diagram of EUT



4.1 Block Diagram Description

Refer to figure 4.0 for the block diagram.

µProcessor (386EX)

The main processor for the Server Monitor Module is a 25 MHz Intel 386EX embedded processor. This processor accesses the DRAM (including shared memory), FLASH memory, NIC, PCMCIA port, Microcontroller, and the PCI bus.

Clocking

The 386EX will be clocked by an output of the SMC. The SMC takes a 50 MHz oscillator output as an input and can either pass the 50 MHz directly to the 386EX or divide it by 3,9, or 27 to allow for lower power operation. The 386EX divides its clock by two internally so that the resulting operating frequencies are 25, 8.33, 2.77, or 0.926 MHz.

System DRAM

System DRAM will be added to the card using 2 MB, 16 bit wide parts (1M X 16) placed in from one to three locations. This allows either 2 MB, 4 MB, or 6 MB depending on how the board is stuffed. DRAM address multiplexing, RAS, and CAS control, and refresh will be done by the SMC.

Flash Memory

Flash Memory will consist of a single 28F016SA or 28F032SA device. This will allow 2MB or 4MB of nonvolatile code and data storage. This memory is available to the 386EX and is also available to the host through a 32KB memory window and a 4KB Expansion ROM window managed by the SMC.

Serial Ports

Two serial ports are available on the 386EX. One of these ports (PORT0) will not be used for serial communications. The other port (PORT1) will be routed through a voltage level shif IC then to a connector. This port may be used directly or tied to an external modem.

I^2C

There is an I^2C port available to the 386EX. This port is implemented using a Philips PCF8584 and an analog multiplexer. Chip select is from CS6 on the 386EX and multiplexer control is done through the microcontroller. The interrupt into the 386EX for this part is shared by the microcontroller and the mezzanine connector. For more information on programming the PCF8584 please refer to the data sheet.

Ethernet Interface

To provide network connectivity to SMM2, a 10BASE-T Ethernet interface has been built onto the board. This interface uses an Intel 82595FX Ethernet Controller. An RJ-45 connector will be provided to interface to a twisted pair cable. Two indicator LEDs are provided at the I/O bracket to indicate Link (Green) and Activity (Yellow). These LEDs are built into the RJ45 connector.

4.1 Block Diagram Description con't

PCI Interface and Host SMM2 Registers (SMC)

This card is designed to be placed on a PCI bus. The logic for this interface, as well as most of the other glue logic needed by the board is designed into a custom ASIC referred to as SMC. Additionally, there are other registers used by the software and hardware that are inside the SMC.

Feature Connector to Host

For compatibility with previous Server Monitor Module implementations, a Feature Connector is available. The signals available on the Feature Connector are:

- I²C interface
- Keyboard lock
- System Management Interrupt
- Power Supply Off
- Host Line Power OK
- Nonmaskable Interrupt
- Host Auxiliary Voltage
- Baseboard Reset
- Secure Mode
- Chassis Open Indicator

Microcontroller

The microcontroller is a PIC14000 made by Microchip Technology, Inc.. It performs the following functions in the SMM2:

Analog/Digital Conversion on eleven instrumentation channels that measure system voltages and temperatures and battery charge/discharge current.

Battery Charge Control. Intelligently manages battery charging to maximize battery life and control current draw from the host.

Power System Control. Switches the SMM2 to battery power if other power supplies fail, disconnects the host interfaces (including PCI) if host power fails, shuts down power to all of the SMM2 except itself upon command (to conserve battery power), and disconnects batteries from the circuit, including itself, if battery voltage drops too low (to prevent over-discharge) or if the board is removed from the host system (to prevent shorting if the board is placed on a conductive surface).

System Power-up and Reset. Can power up and reset the SMM2 if host power returns, if a ring-indicate is signaled by a modem, or at a preset time. Can also reset the SMM2 upon command.

I²C Interface. Allows the 386EX to send and receive messages to/from the host using the I²C bus.

Real Time Clock. Manages an interface to a real time clock chip. Can supply accurate tome to the SMM2 upon command. Also uses the RTC for system wake-up at a preset time.

External UPS Control. Controls a signal to a connector that can be used to turn an external UPS or power switch on or off at a preset time.

4.1 Block Diagram Description con't

I²C

As a manufacturing option, the SMM2 can have one of two I²C controllers. One is built into the Microcontroller, the other is a Phillips PFC8584. If the Phillips part is installed, the Microcontroller I²C is still present but is only used to access the Real Time Clock. Whichever controller is used is connected to two I²C connectors (J9 and J6) via a multiplexer. Only one may be used at a time. Selection of which one is active is done by issuing a command to the microcontroller.

Battery Charge Control

If the optional six-cell (7.2V nominal) NiMH (Nickel Metal Hydride) battery is attached to the board, the microcontroller will mange the charging of this battery.

Power Control

The Server Monitor Module may be required to operate even when there is no power available on the PCI bus. To accomplish this, power can be derived from several different sources. These included the PCI bus, external power through a power jack, and a backup battery. The circuitry will intelligently switch between these sources as needed.

Battery Disconnect Relay

To avoid the possibility of parts being live when the board is removed from the server, the microcontroller can tell when the board has been removed and disconnect the lines from the battery to the board. Sensing of the PCI bus is accomplished through the RD4/AN4 input on the microcontroller.

IPM (Intelligent Power Monitor) support

On host systems that do not support the Feature Connector (Section 0 and Section ERROR! Reference source not found.) a signal has been provided to control an external power switch. This signal must be valid at all times and must survive resets and power downs. To accomplish this , the signal is taken from the square wave output of the Real Time Clock. This signal may be programmed as an I/O pin and can be set to either high or low. It is an open drain signal and is used to turn on a pnp transistor which drives +5V (current limited to about 50mA) to the connector pin. The 386EX can issue a command to the microcontroller to cause the signal to be asserted or deasserted at a particular time.

SMC Interface

A two wire interface connects the microcontroller to the SMC. The microcontroller and the 386EX communicate through this medium.

6.0 Conducted Emissions Data

6.1 The initial step in collecting conducted data is a spectrum analyzer, peak scan of the entire measurement range. All signals with less than 2 dB margin are then measured using a quasi-peak detector. Complete graphs and data sheets may be referenced on the following pages. Minimum margins are listed below:

CISPR 22 Class B Specification Limits

PC Power

Frequency (MHz)	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)*	Lead
0.313	41.9	49.9	8.0	High
0.311	41.8	49.9	8.1	High
0.310	41.7	50.0	8.3	High
0.413	38.3	47.6	9.3	High
0.308	37.9	~~47.6~~ 50.0	9.7	High

Frequency (MHz)	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)*	Lead
0.311	41.9	50.0	8.1	Low
0.315	41.2	49.8	8.6	Low
0.314	41.2	49.9	8.7	Low
0.316	40.4	49.8	9.4	Low
0.309	40.6	50.0	9.4	Low

All readings listed above are Peak, using an IF Bandwidth of 9 kHz, a video filter was not used.
Judgment: Passed, minimum margin of 8.0 dB.

Fujitsu Power Supply

Frequency (MHz)	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)*	Lead
0.202	46.2	53.5	7.3	High
0.204	46.1	53.5	7.4	High
0.199	44.7	53.7	9.0	High
0.208	44.1	53.3	9.2	High
0.196	42.8	53.8	11.0	High

Frequency (MHz)	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)*	Lead
0.203	45.7	53.5	7.8	Low
0.202	45.4	53.5	8.1	Low
0.204	45.0	53.4	8.4	Low
0.206	44.7	53.4	8.7	Low
0.314	38.8	49.9	11.1	Low

All readings listed above are Peak, using an IF Bandwidth of 9 kHz, a video filter was not used.
Judgment: Passed, minimum margin of 7.3 dB.

Test Personnel:

Tester Signature:  Date: April 22, 1998

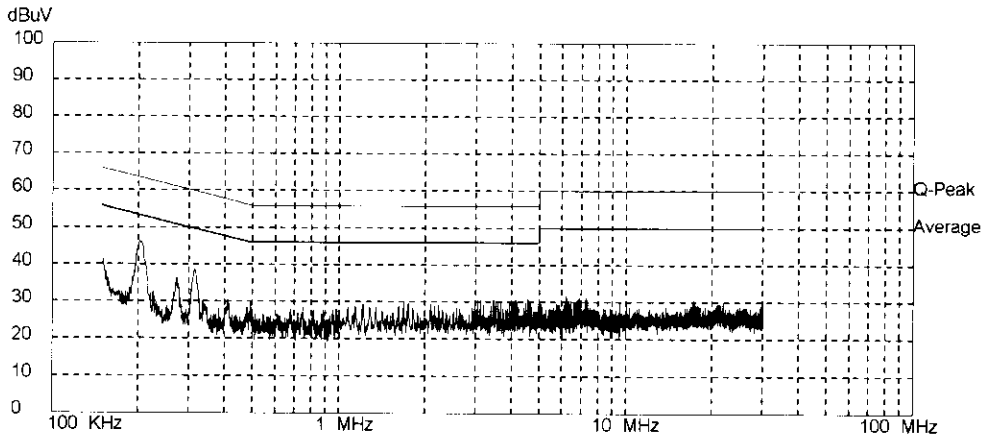
Typed/Printed Name: Dean Ghizzone

Northwest EMC, Inc.

Ver 5.4a, Jan 1997

Equipment Tested: Bonzai
Serial Number: 2
Manufacturer: Intel Corp.
Job Number: INTE1760
Date/Time: 04-22-1998 14:46:23
Tested By: Donald Facteau, EC
Comments: Board Installed w/power connector, all cable, shortened IPM
Run #13, added ferrite on IPM, Fujitsu Power 120V 60Hz mains

CISPR 22 Class B Conducted Limit (Average) High Line Peak data



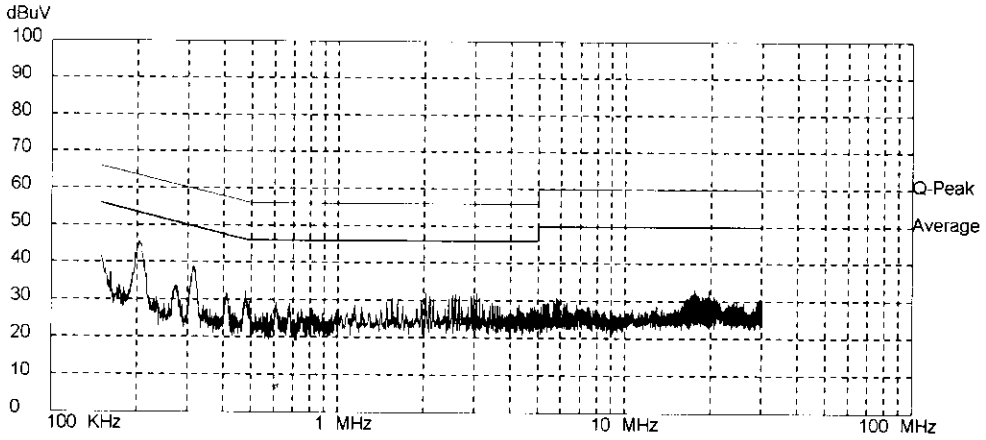
Frequency (MHz)	Meter Reading (dBuV)	Power Line	Correction Factor (dB/m)	Adjusted Level (dBuV)	Spec Limit (dBuV)	Compared To Limit (dB)
0.202	26.2	High	20.0	46.2	53.5	-7.3
0.204	26.1	High	20.0	46.1	53.4	-7.3
0.199	24.7	High	20.0	44.7	53.7	-9.0
0.208	24.1	High	20.0	44.1	53.3	-9.2
0.196	22.8	High	20.0	42.8	53.8	-11.0
0.315	18.5	High	20.0	38.5	49.8	-11.3
0.314	18.5	High	20.0	38.5	49.9	-11.4
0.312	18.5	High	20.0	38.5	49.9	-11.4
0.310	17.2	High	20.0	37.2	50.0	-12.8
0.309	16.6	High	20.0	36.6	50.0	-13.4
0.194	20.2	High	20.0	40.2	53.9	-13.7
0.271	16.6	High	20.0	36.6	51.1	-14.5
0.151	21.4	High	20.0	41.4	55.9	-14.5
4.968	10.9	High	20.4	31.3	46.0	-14.7
0.307	15.2	High	20.0	35.2	50.1	-14.9
0.320	14.8	High	20.0	34.8	49.7	-14.9
3.051	10.5	High	20.3	30.8	46.0	-15.2
4.146	10.5	High	20.3	30.8	46.0	-15.2
4.559	10.3	High	20.4	30.7	46.0	-15.3
3.115	10.3	High	20.3	30.6	46.0	-15.4

Northwest EMC, Inc.

Ver 5.4a, Jan 1997

Equipment Tested: Bonzai
Serial Number: 2
Manufacturer: Intel Corp.
Job Number: INTE1760
Date/Time: 04-22-1998 14:50
Tested By: Donald Facteau, EC
Comments: Board Installed w/power connector, all cable, shortened IPM
Run #14, added ferrite on IPM, Fujitsu Power 120V 60Hz mains

CISPR 22 Class B Conducted Limit (Average) Low Line Peak data



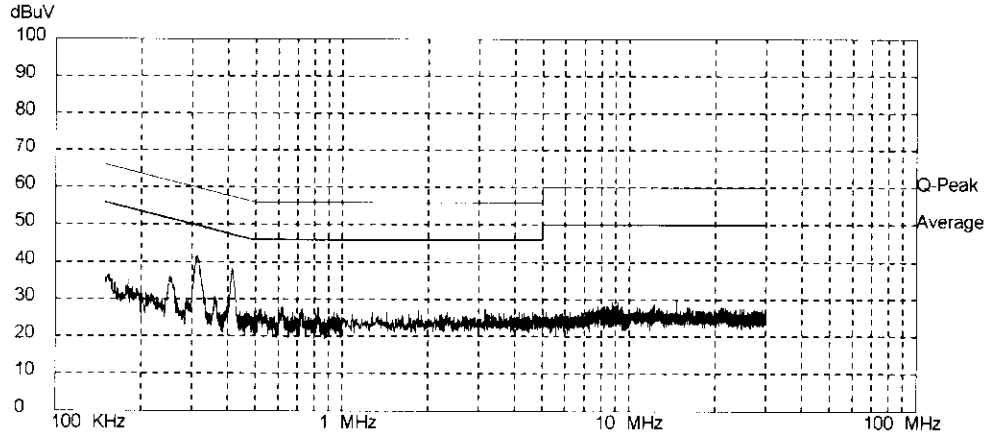
Frequency (MHz)	Meter Reading (dBuV)	Power Line	Correction Factor (dB/m)	Adjusted Level (dBuV)	Spec Limit (dBuV)	Compared To Limit (dB)
0.203	25.7	Low	20.0	45.7	53.5	-7.8
0.202	25.4	Low	20.0	45.4	53.5	-8.1
0.204	25.0	Low	20.0	45.0	53.4	-8.4
0.206	24.7	Low	20.0	44.7	53.4	-8.7
0.314	18.8	Low	20.0	38.8	49.9	-11.1
0.196	22.3	Low	20.0	42.3	53.8	-11.5
0.313	18.4	Low	20.0	38.4	49.9	-11.5
0.311	18.4	Low	20.0	38.4	49.9	-11.5
0.311	18.3	Low	20.0	38.3	49.9	-11.6
0.318	17.7	Low	20.0	37.7	49.8	-12.1
0.309	16.8	Low	20.0	36.8	50.0	-13.2
2.025	11.9	Low	20.2	32.1	46.0	-13.9
3.051	11.8	Low	20.3	32.1	46.0	-13.9
2.570	11.8	Low	20.2	32.0	46.0	-14.0
0.307	16.0	Low	20.0	36.0	50.1	-14.1
0.476	12.3	Low	20.0	32.3	46.4	-14.1
2.506	11.4	Low	20.2	31.6	46.0	-14.4
2.983	11.3	Low	20.3	31.6	46.0	-14.4
0.150	21.5	Low	20.0	41.5	56.0	-14.5
0.475	11.8	Low	20.0	31.8	46.4	-14.6

Northwest EMC, Inc.

Ver 5.4a. Jan 1997

Equipment Tested: Bonzai
Serial Number: 2
Manufacturer: Intel Corp.
Job Number: INTE1760
Date/Time: 04-22-1998 15:17:24
Tested By: Donald Facteau, EC
Comments: Board Installed w/power connector, all cable, shortened IPM
Run #19, added ferrite on IPM, PC Power 120V 60Hz mains

CISPR 22 Class B Conducted Limit (Average) High Line Peak data



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0.313	21.9	High	20.0	41.9	49.9	-8.0
0.311	21.8	High	20.0	41.8	49.9	-8.1
0.310	21.7	High	20.0	41.7	50.0	-8.3
0.413	18.3	High	20.0	38.3	47.6	-9.3
0.412	17.9	High	20.0	37.9	47.6	-9.7
0.308	20.3	High	20.0	40.3	50.0	-9.7
0.415	17.8	High	20.0	37.8	47.5	-9.7
0.416	17.6	High	20.0	37.6	47.5	-9.9
0.418	17.0	High	20.0	37.0	47.5	-10.5
0.410	16.3	High	20.0	36.3	47.6	-11.3
0.408	14.6	High	20.0	34.6	47.7	-13.1
0.407	13.2	High	20.0	33.2	47.7	-14.5
0.323	15.0	High	20.0	35.0	49.6	-14.6
0.250	16.3	High	20.0	36.3	51.8	-15.5
0.253	15.9	High	20.0	35.9	51.7	-15.8
0.302	14.1	High	20.0	34.1	50.2	-16.1
0.405	11.4	High	20.0	31.4	47.8	-16.4
0.326	13.2	High	20.0	33.2	49.6	-16.4
0.423	10.7	High	20.0	30.7	47.4	-16.7
0.403	11.1	High	20.0	31.1	47.8	-16.7

Northwest EMC, Inc.

Ver 5.4a, Jan 1997

Equipment Tested: Bonzai
Serial Number: 2
Manufacturer: Intel Corp.
Job Number: INTE1760
Date/Time: 04-22-1998 15:19:21
Tested By: Donald Facteau, EC
Comments: Board Installed w/power connector, all cable, shortened IPM
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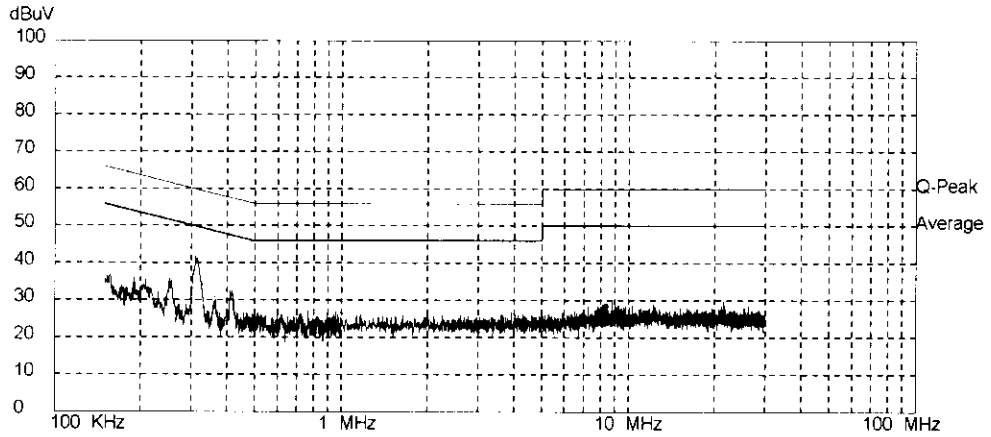

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0.315	21.2	Low	20.0	41.2	49.8	-8.6
0.314	21.2	Low	20.0	41.2	49.9	-8.7
0.309	20.6	Low	20.0	40.6	50.0	-9.4
0.316	20.4	Low	20.0	40.4	49.8	-9.4
0.319	18.5	Low	20.0	38.5	49.7	-11.2
0.305	18.1	Low	20.0	38.1	50.1	-12.0
0.303	16.7	Low	20.0	36.7	50.2	-13.5
0.322	15.5	Low	20.0	35.5	49.7	-14.2
0.325	14.8	Low	20.0	34.8	49.6	-14.8
0.410	12.6	Low	20.0	32.6	47.6	-15.0
0.416	12.4	Low	20.0	32.4	47.5	-15.1
0.412	11.9	Low	20.0	31.9	47.6	-15.7
0.412	11.9	Low	20.0	31.9	47.6	-15.7
0.324	13.7	Low	20.0	33.7	49.6	-15.9
0.251	15.8	Low	20.0	35.8	51.7	-15.9
0.418	11.2	Low	20.0	31.2	47.5	-16.3
0.255	15.2	Low	20.0	35.2	51.6	-16.4
0.255	15.2	Low	20.0	35.2	51.6	-16.4
0.409	10.7	Low	20.0	30.7	47.7	-17.0

7.0 Radiated Emissions Data

7.1 The following data lists the six most significant emission frequencies, total (corrected) levels, and specification margins. Correction factors, antenna height, table azimuth, etc., are contained in the data sheets immediately following. Explanation of the correction factors is given in paragraph 7.2 of this report. Complete graphs and data sheets may be referenced on the following pages. Minimum margins are listed below:

CISPR 22 Class B Specification Limits

100Mbits

Frequency (MHz)	Detection	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)*	Polarization
66.651	QP	27.1	30.0	2.9	Vertical
66.651	QP	26.8	30.0	3.2	Horizontal
199.954	PK	26.5	30.0	3.5	Horizontal
50.000	PK	26.5	30.0	3.5	Vertical
68.865	QP	26.2	30.0	3.8	Vertical
666.516	QP	33.0	37.0	4.0	Horizontal

Judgment: Passed, minimum margin of 2.9 dB.

Test Personnel:

Tester Signature:  Date: April 22, 1998

Typed/Printed Name: Dean Ghizzone

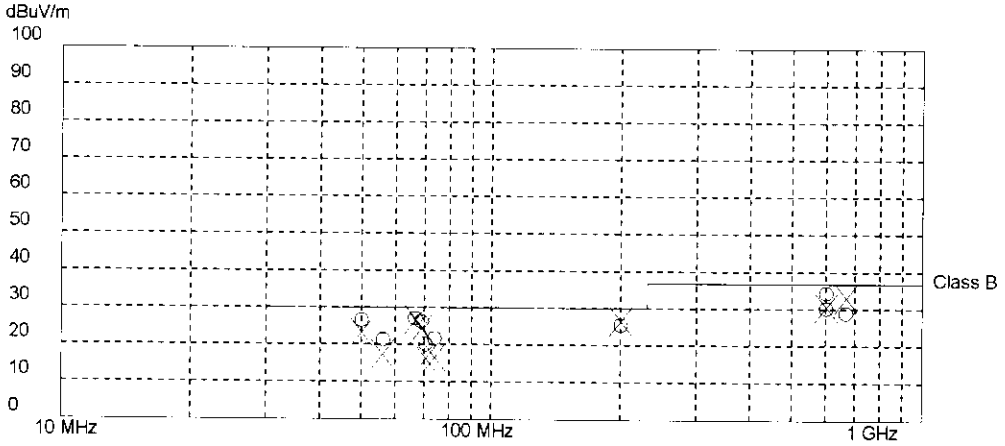
Northwest EMC, Inc.

Version 5.2, Jan. 1998

EUT Name:	**Bonzai**
Serial Number:	**2**
Manufacturer:	**Intel Corp.**
Job Number:	**INTE1760**
Test Date:	**04-22-1998**
Tested By:	**Donald Facteau, EC**
Test Distance:	**10 meters.**
Comments:	**Board installed w/power connector, all cable, shortened IPM** **Run #13, added ferrite on IPM**

Horizontal= X
Vertical = O

CISPR 22 Class B (10 meter limit)



Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dB/m)	Antenna Horizontal Vertical	Preamp Gain (dB)	Cable Loss (dB)	Adjusted Level (dBuV/m)	Spec Limit (dBuV/m)	Table Azimuth (degree)	Antenna Height (meters)	Compared (To Limit) (dB)
599.999	41.8	QP	19.2	VLPA	32.0	5.3	34.3	37.0	225.0	1.0	-2.7
66.651	48.9	QP	8.8	VBIC	32.4	1.8	27.1	30.0	180.0	4.0	-2.9
66.651	48.6	QP	8.8	HBIC	32.4	1.8	26.8	30.0	270.0	4.0	-3.2
199.954	41.0	PK	14.7	HBIC	32.0	2.8	26.5	30.0	270.0	3.6	-3.5
50.000	47.2	PK	10.1	VBIC	32.4	1.6	26.5	30.0	90.0	1.0	-3.5
68.865	48.0	QP	8.7	VBIC	32.3	1.8	26.2	30.0	180.0	1.0	-3.8
666.516	38.3	QP	21.0	HLPA	32.0	5.7	33.0	37.0	150.0	1.0	-4.0
199.955	39.9	PK	14.7	VBIC	32.0	2.8	25.4	30.0	315.0	2.1	-4.6
68.862	46.2	QP	8.7	HBIC	32.3	1.8	24.4	30.0	180.0	4.0	-5.6
599.999	38.1	QP	19.2	HLPA	32.0	5.3	30.6	37.0	180.0	1.0	-6.4
600.001	37.7	PK	19.2	VLPA	32.0	5.3	30.2	37.0	225.0	1.0	-6.8
50.000	44.0	QP	10.1	HBIC	32.5	1.6	23.2	30.0	180.0	4.0	-6.8
666.516	34.2	QP	21.0	VLPA	32.0	5.7	28.9	37.0	180.0	1.0	-8.1
73.781	43.7	QP	8.5	VBIC	32.3	1.8	21.7	30.0	90.0	1.0	-8.3
56.042	42.8	QP	9.3	VBIC	32.4	1.6	21.3	30.0	180.0	1.0	-8.7
70.428	42.0	QP	8.6	VBIC	32.3	1.8	20.1	30.0	0.0	1.0	-9.9
56.002	38.7	PK	9.3	HBIC	32.4	1.6	17.2	30.0	0.0	3.5	-12.8
73.781	38.5	QP	8.5	HBIC	32.3	1.8	16.5	30.0	0.0	4.0	-13.5
70.428	38.1	QP	8.6	HBIC	32.3	1.8	16.2	30.0	0.0	4.0	-13.8

Temperature 70F 55% Humidity

7.2 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured level. The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

where : FS = Field Strength

RA = Measured Level

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/meter.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/meter
Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

7.3 Measurement Bandwidths

Peak Data

150 kHz - 30 MHz ..... 10 kHz
30 MHz - 1000 MHz ..... 100 kHz
1000 MHz - 2000 MHz ..... 1000 kHz

Quasi-peak Data

150 kHz - 30 MHz ..... 9 kHz
30 MHz - 1000 MHz ..... 120 kHz

All radiated measurements are quasi-peak unless otherwise stated. A video filter was not used.
All conducted measurements are peak unless otherwise stated. A video filter was not used.

8.0 Measurement Equipment

Instrument	Model	Serial No.	Freq Range	Last Cal	Cal Due
Spectrum Analyzer	HP 8567A	2718A00358	10 kHz - 1.5 GHz	04/21/98	04/21/99
Quasi Peak Adapter	HP 85650A	2811A01175	10 kHz - 1000 MHz	02/20/98	02/20/99
LISN	EMCO 3825/2	9206-1974	10 kHz - 50 MHz	09/19/97	09/19/98
LISN	Solar 9252-50-24-BNC	971602	10 kHz - 50 MHz	04/09/98	04/09/99
Log Periodic Antenna	EMCO 3146	9006-2809	200 MHz - 1000 MHz	01/31/98	01/31/99
Bicon Antenna	ARA BCD-235/B	1042	30 MHz - 200 MHz	01/31/98	01/31/99
Pre-Amplifier	AR LN1000AM3	21913	100 kHz - 1300 MHz	10/03/97	10/03/98

Appendix I: Measurement Procedures

Each frequency was measured in both the horizontal and vertical antenna polarization's.

The EUT position was maximized for each frequency, for both the horizontal and vertical antenna polarization's, using a remotely controlled turntable.

The antenna height was varied from 1 - 4 meters at each frequency, for both the horizontal and vertical positions to maximize the emission level.

The cable and peripheral positions were manipulated to ensure maximum levels at each frequency for both horizontal and vertical antenna polarization's.

Measurements 30 MHz - 1000 MHz are made at an antenna to EUT distance of 10 meters.

Measurements 1000 MHz - 2000 MHz are made at an antenna to EUT distance of 3 meters.