

EMI TEST REPORT

FCC PART 15 CLASS B

for

Maxan Systems Co., Ltd.
#1-84, Woulam-dong, Dalseo-gu,
Daegu 704-832,
KOREA

on the

Compact PC
A400-A
FCC ID: QIDA400-A

Issued Date : Dec 05, 2002
Report Number : KSQ-FCC021205

Prepared By:

Test Date: Dec 03, 2002

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Signature

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Printed Name

J. J. Ha

Signature



Korea Standard Quality Laboratories

Testing Laboratories for EMC and Safety Compliance

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1. General Information

1.1 Introduction

The EMI Test Report of Information Technology Equipment is prepared on behalf of named applicant in accordance with the ANSI C63.4-1992. The test results reported in this document relate only to the item that was tested.

The detailed description of the measurement facility was found to be in compliance with the requirement of Section 2.948 of the FCC Rules. The Federal Communications Commission has the reports on file and is listed under Registration Number 100384. The scope of the accreditation covers the FCC Method - 47 CFR Part 15 or 18 of the Commission's Rules.

All measurements contained in this report were conducted in accordance with ANSI C63.4-1992. The instrumentation utilized for the measurements conforms with CISPR16 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed yearly on the instruments by a local calibration laboratories.

All radiated and conducted emission measurements are performed manually at Korea Standard Quality Laboratories (hereinafter referred to as "KSQLab"), #102, Jangduk-Dong, Hwasung-Shi, Kyunggi-Do, KOREA. The radiated emission measurements required by the FCC Rules were performed on 3 meter or 10 meter, Open Area Test Site, test range maintained by KSQLab. Complete ANSI 63.4-1992 description and site attenuation measurement data records are maintained at the test facility and have 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 same facility. The KSQLab EMC test facility in Hwasung-Shi are designated testing laboratory according to ISO/IEC 17025 by Radio Research Laboratory (RRL), Ministry of Information and Communication.

1.2 Product Description for Equipment Under Test (EUT)

Main Specification of Maxan Systems Co., Ltd.'s Ultra-Compact PC, Model No: A400-A, are:

- * CPU : Intel FC-370 Celeron 1.3GHz
- * Chipset : VIA VT8606 and VT8231
- * Memory : Onboard 144pin SODIMM socket up to 256MB (PC-100/133/166)
- * IDE : Onboard Ultra DMA/100 bus master IDE channels up to 4 ATAPI devices
- * Sound : AC97 3D audio interface with mono Mic input & stereo Line level output
- * I/O Ports : 1 - VGA (S3 Savage4 4x 32MB); 2 - PS/2 (Keyboard/Mouse)
1 - Parallel (EPP/ECP support); 1 - Serial (16C550 support)
2 - USB (USB Spec 1.2 support); 1 - Ethernet (10/100Base-T)
3 - Audio (Line-Out/Line-In/Mic-In); 2 - TV out (Composite/S-Video)
1 - Fiber Optic SPDIF(5.1 channel); 1 - Composite SPDIF

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1.3 Support Equipment

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|-------------|--------------|---------------|-------------------------|----------|
| Compact PC | A400-A | 4A0211012 | Maxan Systems Co., Ltd. | EUT |
| VGA Monitor | DP15LS | H1EK403730 | Samsung Electronics | DoC(A3L) |
| Keyboard | SEM-DT35 | 22022689 | Samsung Electro-Mecha | DoC(E2X) |
| Mouse | 76FSERIAL9D | 1005213 | Microsoft Corp. | C3K |
| Printer | 6XU2225C | 3037S84200 | Hewlett Packard | DSI |
| PC Camera | PCC2200 | PK2-0020 | Pro-chips | none |
| Speaker | GL-2000 | none | Comsources | none |
| Microphone | JPM601 | none | Hi-sonic | none |
| TV Monitor | DTQ-1457VW | DGN5415896 | Daewoo Electronics | none |
| AC Adapter | LSE9901B1260 | A2023029718 | Lishin International | DoC |

1.4 Host System Configuration

| Description | Model Number | Serial Number | Manufacturer | Remarks |
|----------------|--------------|---------------|-------------------------|---------|
| Mother Board | MSC-760 | 00061E002CC9 | Maxan Systems Co., Ltd. | - |
| Daughter Board | OPT 760-A | none | Maxan Systems Co., Ltd. | - |
| Hard Drive | IS25N040AT | D4L51X9A | IBM Storage Products | 40GB |
| DVD-ROM Drive | DRN-8080B | 1BZN012591 | LG Electronics Inc. | 8X/32X |

1.5 External I/O Cabling

| Description | Length (m) | Port/From | Port/To | Remarks |
|------------------|------------|-----------|-------------|----------|
| Video Cable | 1.5 | Dsub/EUT | Monitor | Shielded |
| Keyboard Cable | 2.0 | PS2/EUT | Keyboard | Shielded |
| Mouse Cable | 2.0 | Dsub/EUT | Mouse | Shielded |
| Printer Cable | 1.5 | Dsub/EUT | Printer | Shielded |
| USB Cable | 2.0 | USB/EUT | PC Camera | Shielded |
| Speaker Cable | 1.0 | Jack/EUT | Speaker | Shielded |
| Microphone Cable | 2.0 | Jack/EUT | Microphone | Shielded |
| Composite Cable | 2.0 | RCA/EUT | TV Monitor | Shielded |
| Ethernet Cable | 10.0 | LAN/EUT | Network Hub | UTP |

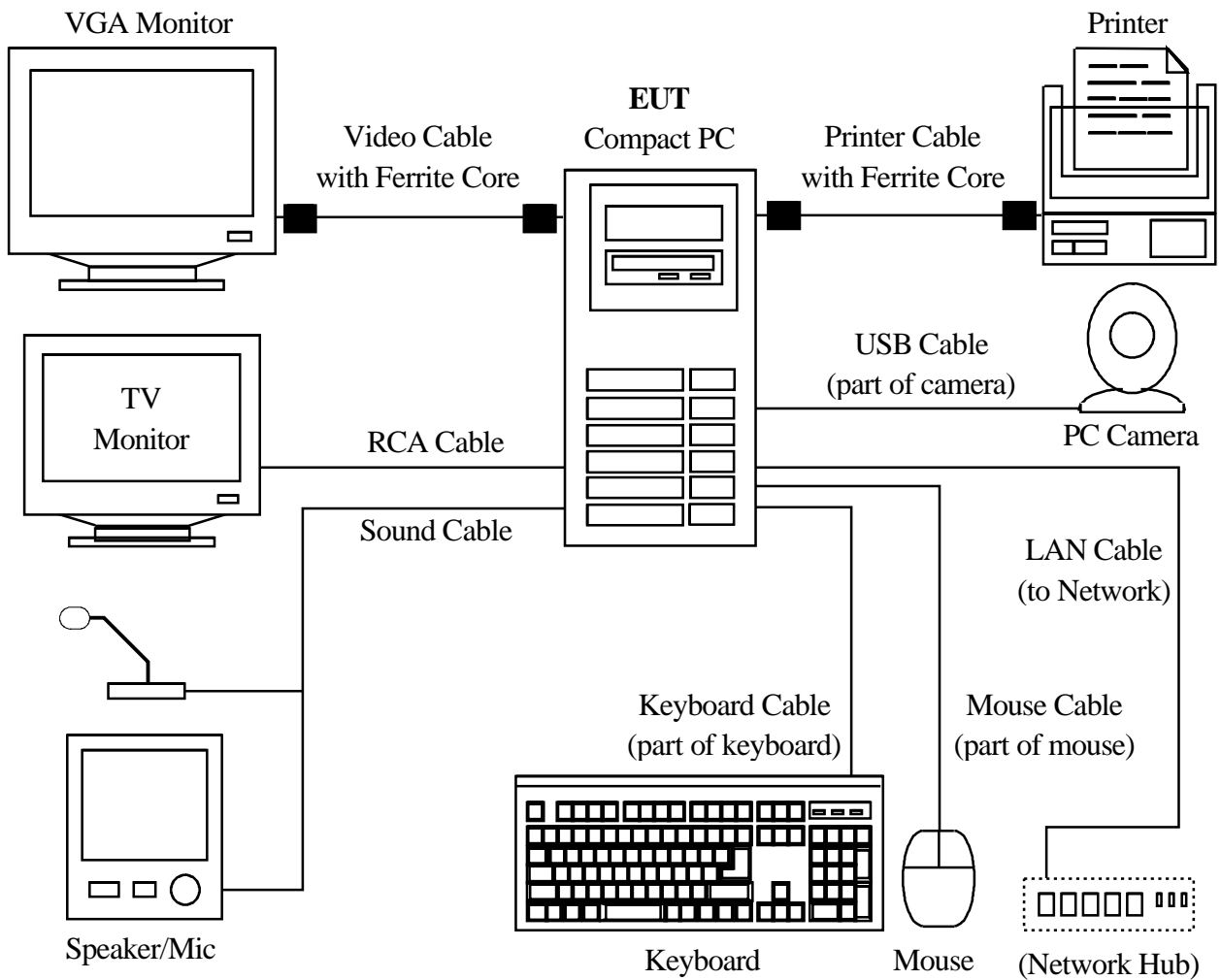
1.6 Special Accessories

As shown in section 1.8, all interface cables used for compliance testing are shielded as normally supplied or by use respective component manufacturers.

1.7 EUT Modifications

No modifications were made to the EUT in order to achieve and maintain compliance to the standards described in this report.

1.8 Configuration of Test System



2. Test Performed

2.1 Conducted Emission Measurements

2.1.1 Test Description

The power line conducted emission measurements were performed in a shielded enclosure, using the setup in accordance with ANSI C63.4-1992 conducted emission measurement procedure.

2.1.2 Test Equipments

| Description | Manufacturer | Model Number | Serial Number | Cal. Due |
|-------------------|-----------------|--------------|---------------|----------|
| Spectrum Analyzer | Advantest | 3261A | 21720240 | 10, 2003 |
| LISN1 | Electro Metrics | ANS-25/2 | 2535 | 10, 2003 |
| LISN2 | Kyoritsu | KNW-407 | 8-1010-14 | 10, 2003 |
| Plotter | Hewlett Packard | 7550B | 3050A14513 | n/a |

2.1.3 Test Environments

| Ambient Temperatures | Relative Humidity |
|----------------------|-------------------|
| 15~35 °C | 30~60 % |

2.1.4 Test Limits

| Frequency (MHz) | CISPR22 Limits | | | |
|--------------------|----------------|--------------|----------------|---------|
| | Class B (dBuV) | | Class A (dBuV) | |
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 to 0.50 | 66.0 to 56.0 | 56.0 to 46.0 | 79.0 | 66.0 |
| 0.50 to 5.00 | 56.0 | 46.0 | 73.0 | 60.0 |
| 5.00 to 30.00 | 60.0 | 50.0 | 73.0 | 60.0 |

2.1.5 Test Exercise Program

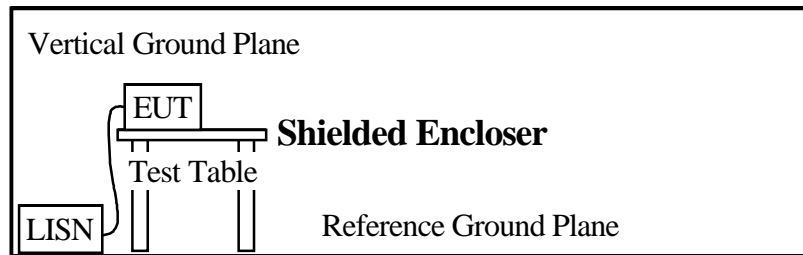
Please refer to section 2.2.5 for the test exercise program.

2.1.6 Test Procedure

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 6dB bandwidth was set to 9kHz. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 150kHz to 30MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with the EUT exercise program loaded, and the emissions were scanned between 150kHz to 30MHz on the HOT side and NEUTRAL side, herein referred to as H and N, respectively.

2.1.7 Test Configuration



2.1.8 Test Results

According to the data in section 2.1.9, the EUT complied with the CISPR22 limits, and had the worst margin reading of:

-19.0dB at 4.90MHz in the HOT (LIVE) side.

2.1.9 Test Data

| Line Conducted Emission | | | | CISPR22 Class B | | |
|-------------------------|------------------|-------------------|-------------------|------------------|-----------|-------------|
| Frequency (MHz) | Amplitude (dBuV) | Phase Hot/Neutral | Detector QP/AV/PK | Applicable Limit | | Margin (dB) |
| | | | | QP (dBuV) | AV (dBuV) | |
| 0.15 | 40.5 | H | PK | 66.0 | 56.0 | -25.5 |
| 0.16 | 46.5 | H | PK | 65.5 | 55.5 | -19.0 |
| 0.17 | 45.3 | H | PK | 65.0 | 55.0 | -19.7 |
| 0.20 | 35.0 | H | PK | 63.6 | 53.6 | -28.6 |
| 0.22 | 36.2 | H | PK | 63.2 | 53.2 | -27.0 |
| 0.31 | 33.4 | H | PK | 62.1 | 52.1 | -28.7 |
| 3.07 | 34.4 | N | PK | 56.0 | 46.0 | -21.6 |
| 3.18 | 36.7 | H | PK | 56.0 | 46.0 | -19.3 |
| 3.32 | 35.2 | N | PK | 56.0 | 46.0 | -20.8 |
| 4.01 | 35.8 | H | PK | 56.0 | 46.0 | -20.2 |
| 4.18 | 35.9 | H | PK | 56.0 | 46.0 | -20.1 |
| 4.90 | 37.0 | H | PK | 56.0 | 46.0 | -19.0 |
| 5.35 | 36.2 | H | PK | 60.0 | 50.0 | -23.8 |
| 5.72 | 37.0 | H | PK | 60.0 | 50.0 | -23.0 |
| 6.00 | 36.1 | H | PK | 60.0 | 50.0 | -23.9 |
| 6.05 | 37.2 | N | PK | 60.0 | 50.0 | -22.8 |
| 9.65 | 40.5 | H | PK | 60.0 | 50.0 | -19.5 |
| 9.80 | 37.8 | N | PK | 60.0 | 50.0 | -22.2 |

Temperature: 24 °C

Humidity: 52 %

Test Date: Dec 03, 2002

Tested by: Y. Choi

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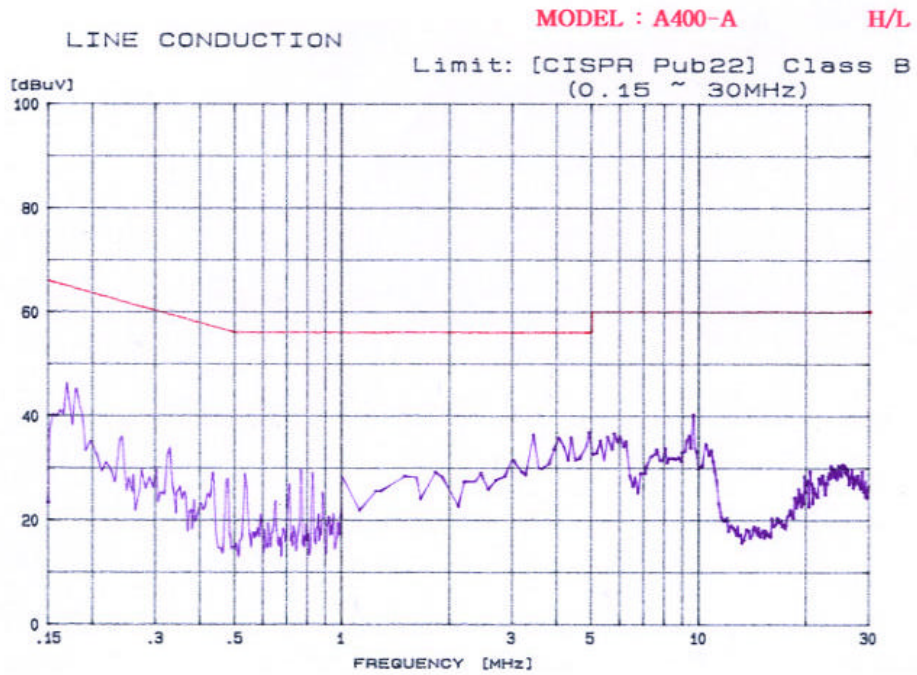


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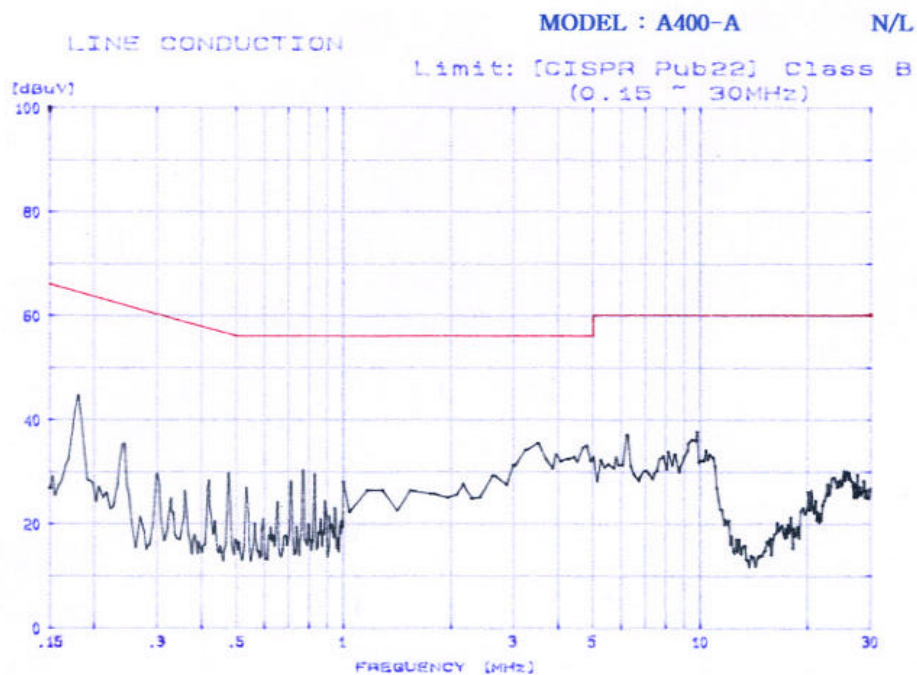
FCCID : QIDA400-A

2.1.10 Plots of Test Data

Polarization: HOT (LIVE)



Polarization: NEUTRAL



2.2 Radiated Emission Measurements

2.2.1 Test Description

The radiated emission measurements were performed in a Open Area Test Site (OATS), using the setup in accordance with ANSI C63.4-1992 radiated emission measurement procedure.

2.2.2 Test Equipments

| Description | Manufacturer | Model Number | Serial Number | Cal. Due |
|----------------------|-----------------|--------------|---------------|----------|
| Spectrum Analyzer | Hewlett Packard | 8568B | 3217A05629 | 08, 2003 |
| Spectrum Display | Hewlett Packard | 85682A | 3144A20886 | 08, 2003 |
| RF Preselector | Hewlett Packard | 85685A | 3221A01366 | 08, 2003 |
| Quasi-Peak Adapter | Hewlett Packard | 85650A | 3145A01652 | 08, 2003 |
| Biconical Antenna | Electro Metrics | BIA-30S | 164 | 10, 2003 |
| Log Periodic Antenna | Electro Metrics | LPA-30 | 387 | 10, 2003 |
| Turn Table | KSQ | KSQ-T10 | KSQ98121 | n/a |
| Antenna Mast | KSQ | KSQ-A10 | KSQ98122 | n/a |

2.2.3 Test Environments

| Ambient Temperatures | Relative Humidity |
|----------------------|-------------------|
| 15~35 °C | 30~60 % |

2.2.4 Test Limits

| Frequency (MHz) | FCC Part 15 Limits | | | |
|--------------------|--------------------|--------|--------------|--------|
| | Class B @3m | | Class A @10m | |
| | (dBuV/m) | (uV/m) | (dBuV/m) | (uV/m) |
| 30 to 88 | 40.0 | 100 | 39.5 | 90 |
| 88 to 216 | 43.5 | 150 | 43.5 | 150 |
| 216 to 960 | 46.0 | 200 | 46.5 | 210 |
| above 960 | 54.0 | 500 | 49.5 | 300 |

2.2.5 Test Exercise Program

The EUT test exercise program which generate a complete line of continuously repeating "H" pattern were used as the test program. The program sequentially exercises each system component by doing the following: 1) An "H" pattern is printed on the monitor; 2) Data is sent to the serial; 3) Printer prints a line of "H"s and; 4) Mass storage devices (HDD/CD-ROM) reads and writes the data. At the same time, Ethernet was executed "Network Neighborhood" to link with the remote server to receive and transmit data by UTP cable. The PS/2 keyboard and mouse were continuously scanned for data input activity during testing. The PC Camera were used to investigate USB port on the EUT. This represents the worst-case configuration.

2.2.6 Test Procedure

Before final measurements of radiated emission were made on the OATS, the EUT was scanned in semi-anechoic chamber in order to determine its emission spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

The radiated emission test was performed with EUT exercise program loaded, and the emissions were scanned between 30MHz to 1000MHz using a HP 8568B spectrum analyzer. The spectrum analyzer's 6dB bandwidth was set to 120kHz, and the analyzer was operated in the CISPR quasi-peak detection mode.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum emission levels. Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

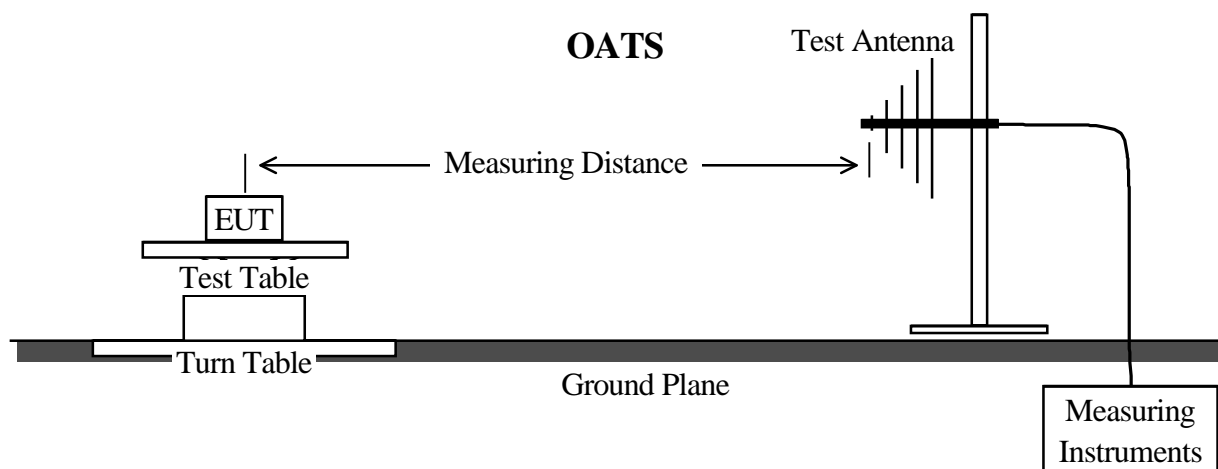
When any clock exceeds 108 MHz, the EUT was tested between 1 to 2 GHz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4-1992. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

2.2.7 Field Strength Calculation

The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor (CF) from the Measured Reading (MR). The basic equation with a sample calculation is as follows:

$$FS(dBuV/m) = MR(dBuV) + [AF(dB/m) + CF(dB)]$$

2.2.8 Test Configuration



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2.2.9 Test Results

According to the data in section 2.2.10, the EUT complied with the FCC Part 15 standards, and had the worst margin reading of:

-3.7dB at 430.30MHz in the VERTICAL antenna polarization.

2.2.10 Test Data

| Indicated | | Antenna | | Correction Factor | | Corrected Amplitude | FCC Part15 Class B | | |
|-----------------|--|--------------|------------|-------------------|------------|---------------------|---------------------------|--------------|-------------|
| Frequency (MHz) | Amplitude (dBuV/m) | Polar. (H/V) | Height (m) | Ant. (dB) | Cable (dB) | (dBuV/m) | Applicable Limit (dBuV/m) | Limit (uV/m) | Margin (dB) |
| 32.17 | 14.9 | H | 3.8 | 17.3 | 0.9 | 33.1 | 40.0 | 100 | -6.9 |
| 33.36 | 13.9 | H | 3.8 | 16.7 | 0.9 | 31.5 | 40.0 | 100 | -8.5 |
| 47.85 | 18.5 | H | 3.6 | 10.0 | 1.1 | 29.6 | 40.0 | 100 | -10.4 |
| 66.96 | 23.9 | H | 3.5 | 6.1 | 1.4 | 31.4 | 40.0 | 100 | -8.6 |
| 76.62 | 25.2 | H | 3.5 | 7.5 | 1.5 | 34.2 | 40.0 | 100 | -5.8 |
| 81.35 | 16.2 | H | 3.1 | 8.4 | 1.6 | 26.2 | 40.0 | 100 | -13.8 |
| 129.25 | 15.1 | H | 2.9 | 14.3 | 1.9 | 31.3 | 43.5 | 150 | -12.2 |
| 143.99 | 18.7 | V | 1.2 | 14.9 | 2.2 | 35.8 | 43.5 | 150 | -7.7 |
| 157.93 | 14.2 | V | 1.2 | 15.2 | 2.2 | 31.6 | 43.5 | 150 | -11.9 |
| 162.59 | 16.0 | V | 1.1 | 15.4 | 2.3 | 33.7 | 43.5 | 150 | -9.8 |
| 172.14 | 14.5 | V | 1.0 | 15.5 | 2.4 | 32.4 | 43.5 | 150 | -11.1 |
| 177.05 | 14.7 | V | 1.1 | 15.6 | 2.4 | 32.7 | 43.5 | 150 | -10.8 |
| 224.96 | 14.5 | V | 1.0 | 16.1 | 2.8 | 33.4 | 46.0 | 200 | -12.6 |
| 349.95 | 18.7 | V | 1.0 | 14.3 | 3.6 | 36.6 | 46.0 | 200 | -9.4 |
| 382.64 | 18.5 | V | 1.1 | 14.7 | 3.8 | 37.0 | 46.0 | 200 | -9.0 |
| 430.30 | 22.5 | V | 1.0 | 15.6 | 4.2 | 42.3 | 46.0 | 200 | -3.7 |
| 624.86 | 14.9 | V | 1.1 | 19.7 | 5.3 | 39.9 | 46.0 | 200 | -6.1 |
| 717.24 | 14.4 | V | 1.2 | 21.1 | 5.6 | 41.1 | 46.0 | 200 | -4.9 |
| - | - | - | - | - | - | - | 54.0 | 500 | - |
| up to 6.5GHz | <i>Test results were under the required limit with 20dB margin or more using Agilent 7405A EMC Analyzer and AH SAS-571 Horn Antenna.</i> | | | | | | | | |

Temperature: 24 °C

Humidity: 52 %

Test Date: Dec 03, 2002

Tested by: Y. Choi