



ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number : E02NR-046

Applicant : BTC KOREA CO., LTD.

Address : BTC Bldg.307, Yangjae-Dong, Seocho-Ku, Seoul, Korea

Manufacturer : BTC KOREA CO., LTD.

Address : 439-1, Sanggi-Li, Pongdam-Eub, Hwasung-Si, Kyungki-Do, Korea

Type of Equipment : LCD MONITOR

FCC ID. : LAKNF1500MA

Model / Type No. : NF-1500MA

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : October 24, 2002

Date of issue : November 20, 2002

SUMMARY

The equipment complies with the regulation; *PART 15 SUBPART B, Class B Computing Device Peripherals.*

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

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**1. VERIFICATION OF COMPLIANCE**

APPLICANT : BTC KOREA CO., LTD.
ADDRESS : BTC Bldg.307, Yangjae-Dong, Seocho-Ku, Seoul, Korea
CONTACT PERSON : Mr. ILJUN, CHOI / Manager
TELEPHONE NO. : +82-2-3461-6466
FCC ID : LAKNF1500MA
MODEL NO/NAME : NF-1500MA
SERIAL NUMBER : N/A
DATE : November 20, 2002

| | |
|---|--|
| DEVICE TYPE | Peripheral Device for Class B Personal Computing Device -UNINTENTIONAL RADIATOR |
| E.U.T. DESCRIPTION | LCD MONITOR |
| THIS REPORT CONCERNS | ORIGINAL GRANT |
| MEASUREMENT PROCEDURES | ANSI C63.4/1992 |
| TYPE OF EQUIPMENT TESTED | PRE-PRODUCTION |
| KIND OF EQUIPMENT AUTHORIZATION REQUESTED | CERTIFICATION |
| EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART (S) | PART 15 SUBPART B, SECTION 15.101 |
| MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE | N/A |
| FINAL TEST WAS CONDUCTED ON | 3 METER OPEN AREA TEST SITE |

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



2. GENERAL INFORMATION

2.1 Product Description

The BTC KOREA CO., LTD., Model NF-1500MA (referred to as the EUT in this report) is a 15.1" LCD MONITOR, which has ports for the Audio In/Out Jack, DC-In jack and VGA input jack. The Product specification described herein was obtained from product data sheet or user's manual.

| | |
|--|--|
| CHASSIS TYPE | Plastic – Non coated |
| LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz) | 12.000 MHz on the main board |
| LCD PANEL SPEC. | HSD150MX49 / HANNSTAR DISPLAY CORP. |
| INPUT VIDEO SIGNAL | VGA Compatible Analog RGB |
| DISPLAY MODE | Normally White |
| DISPLAY RESOLUTION | Maximum: 1024 X 768, 75Hz |
| POWER REQUIREMENT | DC 12V, 3.3A, 40W(Max) from the AC/DC Adaptor |
| USED AC/DC ADAPTERS | LSE9902B1240 manufactured by LI SHIN |
| NUMBER OF LAYERS | Main Board: 4 Layers OSD Board & Inverter Board: 2 Layers |
| EXTERNAL CONNECTORS | DC Inlet, D-Sub 15pin Connector, Audio In/Out Jack |

Model Differences:

-. None

2.2 Related Submittal(s) / Grant(s)

-. Original submittal only



2.3 Test System Details

The model numbers for all the equipments, which were used in the tested system, is:

| Model | Manufacturer | Description | FCC ID | Connected to |
|--------------|---------------------|---------------------------|-------------|--------------|
| NF-1500MA | BTC KOREA CO., LTD. | TFT-LCD Monitors (EUT) | LAKNF1500MA | PC |
| LSE9902B1240 | LI SHIN | AC/DC ADAPTER | N/A | EUT |
| GX240 | DELL Computer Corp. | PC | DoC | EUT |
| SK-8110 | SILITEK | KEYBOARD | DoC | PC |
| P801 | SAMSUNG | MOUSE | JNZ21167 | PC |
| 2225C | HP | PRINTER | DSI6XU2225 | PC |
| 020-0470 | CARDINAL | MODEM | GDE0196 | PC |

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/1992.

Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Gwangju-Si, Gyeonggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)



3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

| DEVICE TYPE | MANUFACTURER | MODEL/PART NUMBER | FCC ID |
|----------------------|------------------------|-------------------|--------|
| Main Board | BTC KOREA CO., LTD. | NFX10 | N/A |
| DC/AC Inverter Board | FRONTEK CO., LTD. | P1521E01 | N/A |
| OSD Board | BTC KOREA CO., LTD. | NF-1500MAC | N/A |
| LCD Panel | HANNSTAR DISPLAY CORP. | HSD150MX49 | N/A |

3.2 EUT exercise Software

The windows program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. This program was included into HOST. Once loaded, this program sequentially exercises each system component in turn. The sequence used is: (1) series of “H” characters are printed on the monitor until the screen is completely full, (2) copy series of “H” characters to mass storage device (if one is used), (3) print series of “H” characters to printer. The complete cycle is repeated continuously.

The test was performed about each resolution from minimum resolution to maximum resolution for getting maximum noise level and the investigated maximum resolution mode of the EUT was 1024 X 768, 75Hz.



3.3 Cable Description

| | Power Cord Shielded (Y/N) | I/O cable Shielded (Y/N) | Length (M) |
|-------------------|--------------------------------------|-------------------------------------|-------------------|
| LCD MONITOR (EUT) | N | Y | 1.8(P), 1.2(S) |
| AC/DC ADAPTER | N | N/A | 1.8(P) |
| PERSONAL COMPUTER | N | Y | 1.8(P), 1.2(S) |
| KEYBOARD | N/A | Y | 1.5(S) |
| MOUSE | N/A | Y | 1.5(S) |
| PRINTER | N | Y | 1.8(P), 1.2(S) |
| MODEM | N | Y | 1.8(P), 1.2(S) |

* The marked “(S)” means the Signal Cable and “(P)” means the Power Cable.

3.4 Noise Suppression Parts on Cable

| | Ferrite Bead (Y/N) | Location | Metal Hood (Y/N) | Location |
|-------------------|-------------------------------|-----------------|-----------------------------|-----------------|
| LCD MONITOR (EUT) | Y for Video & Audio | BOTH END | Y | BOTH END |
| AC/DC ADAPTER | Y | EUT END | Y | EUT END |
| PERSONAL COMPUTER | - | - | - | - |
| KEYBOARD | N | N/A | Y | PC END |
| MOUSE | N | N/A | Y | PC END |
| PRINTER | N | N/A | Y | BOTH END |
| MODEM | N | N/A | Y | BOTH END |

3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by ONETECH Corp. during compliance testing:

“There were no Modified items during EMI test”



3.6 Configuration of Test System

Line Conducted Test: The power of the EUT was supplied by AC/DC adapter and the adapter was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

| Operation Mode | The Worse operating condition (Please check one only) |
|------------------------|---|
| Resolution: 640 X 480 | |
| Resolution: 800 X 600 | |
| Resolution: 1024 X 768 | X |

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

| Operation Mode | The Worse operating condition (Please check one only) |
|------------------------|---|
| Resolution: 640 X 480 | |
| Resolution: 800 X 600 | |
| Resolution: 1024 X 768 | X |

**5. FINAL RESULT OF MEASUREMENT**

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

Humidity Level : 38% Temperature : 20°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107
 Type of Test : CLASS B
 Result : PASSED BY -4.17 dB at 0.18 MHz when used a Peak detector mode

EUT : LCD MONITOR Date : October 29, 2002
 Operating Condition : Continuously displayed "H" characters on the screen of the EUT
 Detector : CISPR Quasi-Peak and Average(6 dB Bandwidth: 9 kHz)
 Resolution : 1024 X 768, 75Hz

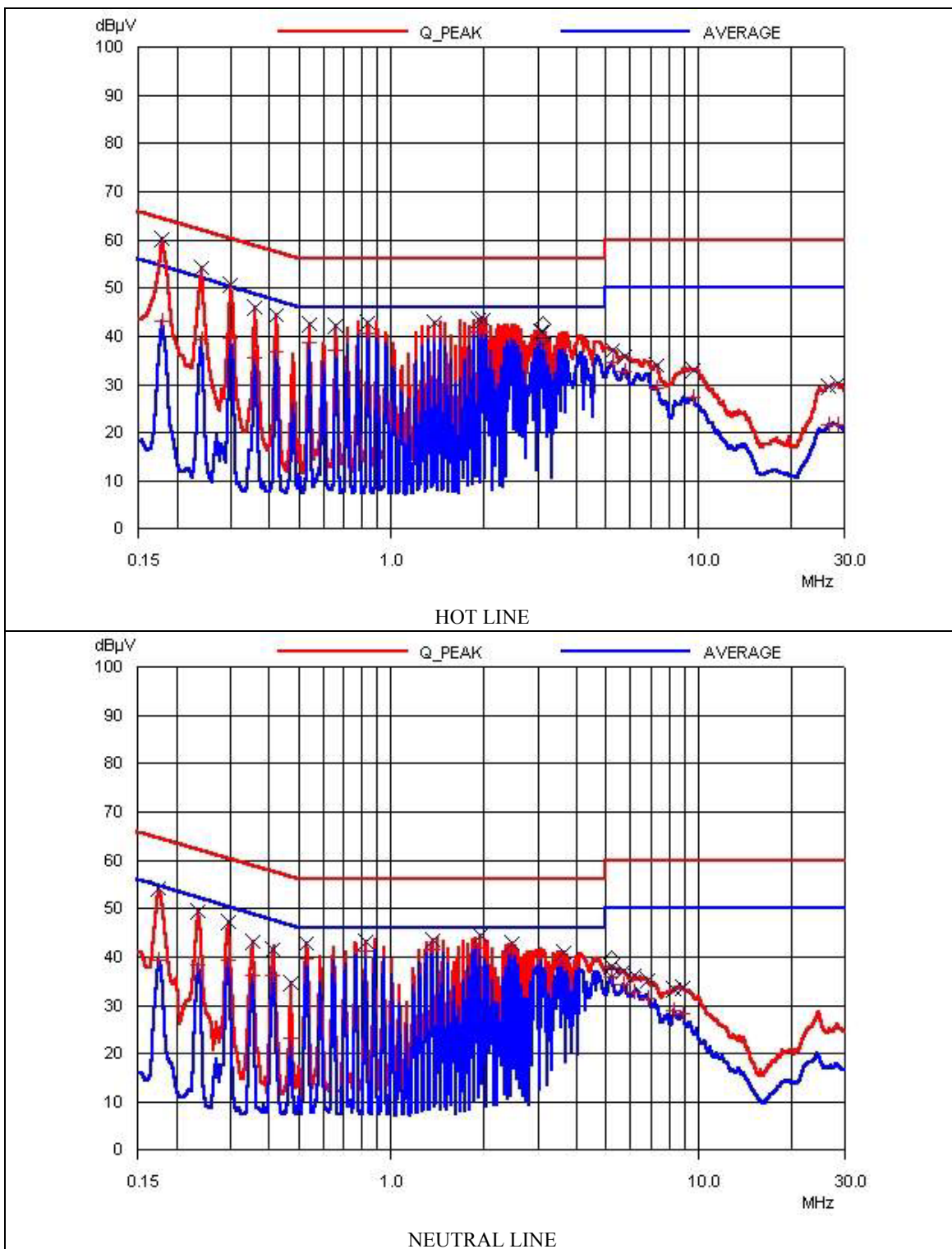
| Frequency (MHz) | Line | Quasi-Peak (dBuV) | | | Margin (dB) | Average (dBuV) | | Margin (dB) |
|-----------------|------|-------------------|---------------|--------|-------------|----------------|--------|-------------|
| | | Emission Level | Detector Mode | Limits | | Emission level | Limits | |
| 0.18 | H | 60.32 | P | 64.49 | -4.17 | 43.19 | 54.49 | -11.30 |
| 0.24 | H | 54.36 | P | 62.10 | -7.74 | 39.35 | 52.10 | -12.75 |
| 0.36 | H | 46.06 | P | 58.73 | -12.67 | 35.48 | 48.73 | -13.25 |
| 0.83 | N | 43.09 | P | 56.00 | -12.91 | 41.25 | 46.00 | -4.75 |
| 1.36 | N | 43.44 | P | 56.00 | -12.56 | 41.41 | 46.00 | -4.59 |
| 2.48 | N | 42.71 | P | 56.00 | -13.29 | 40.81 | 46.00 | -5.19 |
| 3.07 | H | 41.07 | P | 56.00 | -14.93 | 38.64 | 46.00 | -7.36 |
| 6.20 | N | 36.21 | P | 60.00 | -23.79 | 32.80 | 50.00 | -17.20 |

Line Conducted Emission Tabulated Data

Remark : "H": Hot Line, "N": Neutral line, "P": Peak detector, "Q.P.": Quasi-Peak Detector Mode

See Appendix I for an overview sweep performed with peak and average detector.

Tested by : Dan-ki, Lee / Test Engineer



**5.2 Radiated Emission Test**

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41 % Temperature : 18°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109
 Type of Test : CLASS B
 Result : PASSED BY -5.05 dB at 528.60 MHz

EUT : LCD MONITOR Date : October 29, 2002
 Operating Condition : Continuously displayed "H" characters on the screen of the EUT
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
 Distance : 3 Meter
 Resolution : 1024 X 768, 75Hz

| Radiated Emission | | Ant | Correction Factors | | Total | FCC CLASS B | |
|-------------------|----------------|------|--------------------|---------------|------------------|-------------------|----------------|
| Freq. (MHz) | Amp. (dBuV) | Pol. | Ant. (dBuV/m) | Cable (dB) | Amp. (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
| 73.50 | 24.12 | V | 7.23 | 1.00 | 32.35 | 40.00 | -7.65 |
| 110.14 | 19.86 | V | 12.88 | 1.20 | 33.94 | 43.50 | -9.56 |
| 128.52 | 21.96 | H | 13.04 | 1.26 | 36.26 | 43.50 | -12.09 |
| 135.86 | 22.10 | V | 12.72 | 1.29 | 36.11 | 43.50 | -7.39 |
| 139.64 | 21.50 | V | 12.57 | 1.31 | 35.38 | 43.50 | -8.12 |
| 143.18 | 20.80 | V | 12.85 | 1.32 | 34.97 | 43.50 | -8.53 |
| 440.60 | 19.30 | V | 16.09 | 2.52 | 37.91 | 46.00 | -8.09 |
| 462.60 | 20.50 | V | 16.63 | 2.58 | 39.71 | 46.00 | -6.29 |
| 528.60 | 20.60 | V | 17.61 | 2.74 | 40.95 | 46.00 | -5.05 |
| 536.00 | 19.90 | V | 17.77 | 2.75 | 40.42 | 46.00 | -5.58 |
| 558.10 | 15.20 | V | 18.17 | 2.80 | 36.17 | 46.00 | -9.83 |
| 566.00 | 17.50 | V | 18.27 | 2.83 | 38.60 | 46.00 | -7.40 |
| 572.90 | 15.90 | V | 18.36 | 2.86 | 37.12 | 46.00 | -8.88 |

Radiated Emission Tabulated Data

Tested by : Dan-Gi, Lee / Test Engineer



6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)



7. LIST OF TEST EQUIPMENT

| No. | EQUIPMENTS | MFR. | MODEL | SER. NO. | LAST CAL | DUE CAL | USE |
|-----|----------------------|------|-----------|-------------------------------------|----------|---------|-----|
| 1. | Test receiver | R/S | ESVS 10 | 827864/005 | OCT/02 | 12MONTH | ■ |
| 2. | Test receiver | R/S | ESHS10 | 834467/007 | APR/02 | 12MONTH | |
| 3. | Spectrum analyzer | HP | 8568B | 3026A0226 | APR/02 | 12MONTH | ■ |
| 4. | RF preselector | HP | 85685A | 3107A01264 | APR/02 | 12MONTH | ■ |
| 5. | Quasi-Peak Adapter | HP | 85650A | 3107A01542 | APR/02 | 12MONTH | ■ |
| 6. | Dipole Antenna | EMCO | 3121C | 9107-745 | JUN/02 | 12MONTH | |
| 7. | Biconical antenna | EMCO | 3104C | 9109-4441 9109-4443 9109-4444 | MAR/02 | 12MONTH | ■ |
| 8. | Log Periodic antenna | EMCO | 3146 | 9109-3213 9109-3214 9109-3217 | JUN/02 | 12MONTH | ■ |
| 9. | LISN | EMCO | 3825/2 | 9109-1867 9109-1869 | JUN/02 | 12MONTH | ■ |
| 10. | RF Amplifier | HP | 8447F | 3113A04554 | JUN/02 | N/A | |
| 11. | Spectrum Analyzer | HP | 8591A | 3131A02312 | APR/02 | 12MONTH | |
| 12. | Computer System | HP | 98581C | 98543A | N/A | N/A | ■ |
| | Hard disk drive | | 9153C | CMC762Z9153 | N/A | N/A | ■ |
| 13. | Plotter | HP | 7475A | 30052 22986 | N/A | N/A | ■ |
| 14. | Position Controller | EMCO | 1090 | 9107-1038 | N/A | N/A | ■ |
| 15. | Turn Table | EMCO | 1080-1.21 | 9109-1576 | N/A | N/A | ■ |
| 16. | Antenna Master | EMCO | 1070-1 | 9109-1624 | N/A | N/A | ■ |

* Mark “■” means used equipment.