

# Electromagnetic Emission

## FCC MEASUREMENT REPORT

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### CERTIFICATION OF COMPLIANCE

### FCC Part 15 Certification Measurement

**PRODUCT** : TV encoder  
**MODEL/TYPE NO** : G3 PC2TV  
**FCC ID** : RLJG3PC2TV  
**APPLICANT** : MobiDic Co., Ltd.  
706 Sunil Techno Pia 440, Sangdaewon-dong,  
Jungwon-gu, Seongnam-si, Gyeonggi-do, 462-120, Korea  
Attn. : Jeung Ho, Kim / Research Engineer  
**Manufacturer** : C&C TECH CO., LTD.  
233, Gaup-ri, Yeouju-eup, Yeouju-gun, Kyungki-do, Korea  
**FCC CLASSIFICATION** : Part 15 Class B Unintentional Radiators  
Computing Device Peripheral (JBP)  
**FCC RULE PART(S)** : FCC Part 15 Subpart B  
**FCC PROCEDURE** : Certification  
**TRADE NAME** : N/A  
**TEST REPORT No.** : E03.1101. FCC.558N  
**DATES OF TEST** : October 29~31, 2003  
**DATES OF ISSUE** : November 1, 2003  
**TEST LABORATORY** : ETL Inc ( FCC Registration Number : 95422)  
584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do,  
469-885, Korea  
Tel : (031) 885-0072 Fax : (031) 885-0074

This TV encoder, Model G3 PC2TV has been tested in accordance with the measurement procedures specified in ANSI C63.4-1992 at the ETL/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart B : Unintentional Radiators.

I attest to the accuracy of data. All measurement herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

*Yo han, Park*

Name : Yo han, park

Title : Chief Engineer & Lab.Manager

**E-RAE Testing Laboratory Inc.**  
584 Sangwhal-ri, Kanam-myon,  
Yoju-kun, Kyounggi-do, 469-885, Korea



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## FCC MEASUREMENT REPORT

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**Scope** – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

### General Information

**Applicant Name** : MobiDic Co., Ltd.

**Address** : 706 Sunil Techno Pia 440, Sangdaewon-dong,  
Jungwon-gu, Seongnam-si, Gyeonggi-do, 462-120, Korea

**Attention** : Jeung Ho, Kim / Research Engineer

- **EUT Type** : TV encoder
- **Model Number** : G3 PC2TV
- **FCC Identifier** : RLJG3PC2TV
- **S/N** : N/A
- **Modulation** : N/A
- **FCC Rule Part(s)** : Part 15 Subpart B Unintentional Radiators
- **Test Procedure** : ANSI C63.4-1992
- **FCC Classification** : Part 15 Class B Unintentional Radiators  
Computing Device Peripheral (JBP)
- **Dates of Tests** : October 29~31, 2003
- **Place of Tests** : ETL Inc  
EMC Testing Lab (FCC Registration Number : 95422)  
584, Sangwhal-Ri, Kanam-Myun, Yoju-Kun,  
Kyounggi-Do, Korea  
Tel : (031) 885-0072 Fax : (031) 885-0074
- **Test Report No.** : E03.1101.FCC.558N

## 1. INTRODUCTION

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The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyounggi-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission(Registration Number : 95422 ).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the MobiDic Co., Ltd., Model: G3 PC2TV

## 2. PRODUCT INFORMATION

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### 2.1 Equipment Description

The Equipment Under Test (EUT) is the MobiDic Co., Ltd. / TV encoder / G3 PC2TV

Please refer to Users manual

### 2.2 General Specification

- Chassis Type : N/A
- List of Each OSC. Or X-Tal. Freq. ( $\geq 1\text{MHz}$ ) : OSC- 27.0MHz
- Chipset Brand & Part No. : NJU4066BM – JRC, AIT2138KL – AITECH, IC42S16100\_7T – IC81
- Number of Layers : Main board – 4Layers
- Type : PCI Type
- Input Video Signal : VGA 15Pin RGB
- Input Audio Signal : Stereo Analog Audio
- Output Video Signal : Composite Video, RCA
- Output Audio Signal : Stereo Analog Audio, RCA
- Power : 3.3V & 5.0V
- Analog, Non-interlaced RGB input
- H & V underscan
- Multiple frequency input : 640 X 480 @ 60~85Hz, 800 X 600 @ 56~75Hz, 1024 X 768 @ 60~70Hz
- Advanced Flic-Free<sup>TM</sup> : Digital Filter
- Multiple output formats : NTSC, PAL
- 3Channel 10-bit output D/A converters
- Simultaneous display on PC
- Simultaneous Composite outputs
- Audio In/Outputs
- For Windows 98 & Me : Pentium 200MMX(or equivalent) with 32MB RAM,  
: Spare PCI slot, sound card with headphones or powered speakers attached
- For Windows 2000 & XP : Pentium 200MMX(or equivalent) with 32MB RAM (128MB recommended), 33MB DISC Space  
: Spare PCI slot, sound card with headphones or powered speakers attached

### 3. DESCRIPTION OF TESTS

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#### 3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with § 12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment ". The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50 /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located inside a shielded room 1m X 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the side wall of the shielded room. Two EMCO 3825/2 LISN are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from the another EMCO LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. Non-inductive bundling to a 1m length shortened all interconnecting cables more than 1m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the EMI Test receiver ESHS 30 to determine the frequency producing the max. emission from the EUT. The frequency producing the max. level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 to 30MHz. The bandwidth of the EMI Test receiver ESHS 30 & Spectrum Analyzer R3261A was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

### 3. DESCRIPTION OF TESTS

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#### 3.2 Radiated Emission Measurement

Radiated emission measurements were in accordance with § 12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment ". The measurements were performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Quasi-peak" within a bandwidth of 120KHz.

- Procedure of Test

Preliminary measurements were made at 3 meter using broadband antennas, and spectrum analyzer to determined the frequency producing the max. emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using SchwarzBeck Log-Bicon antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 10-meters. The test equipment was placed on a wooden turn-table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the max. emission. Each emission was maximized by: varying the mode of operation to the EUT and/or support equipment and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

## 4. TEST CONDITION

### 4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

### 4.2 EUT operation

The EUT was connected as user's guide. And during the test executed test program for EMI Test Program with "H" Pattern display on LCD Monitor.

| Operating Mode        | Worst case |
|-----------------------|------------|
| Stand by              | X          |
| TV Receiving          | X          |
| " H " Pattern Display | O          |

| Resolution | Frequency      | Worst case |
|------------|----------------|------------|
| 640 X 480  | 37.5KHz/75.0Hz | X          |
| 800 X 600  | 46.8KHz75.0Hz  | X          |
| 1024 X 768 | 56.5KHz70.0Hz  | O          |

**O: Worst case investigated during the Test**

### 4.3 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

#### EUT – TV encoder (MobiDic Co., Ltd.)

FCC ID : RLJG3PC2TV  
Model Name : G3 PC2TV  
Serial No. : N/A  
Manufacturer : C&C TECH CO., LTD.  
Power Supply Type : N/A, Power supply from DC 3.3V, 5V of PCI Slot  
Power Cord : N/A  
Port : RGB IN: 1, RGB OUTPUT: 1, AV IN & OUT: 1

#### Support Unit 1 – PC (DELL)

FCC ID : DOC  
Model Name : MMP  
Serial No. : BK1W31S  
Manufacturer : DELL  
Power Supply Type : Switching  
Power Cord : Non-Shielded, Detachable, 1.2m  
Port : RGB IN:1, Parallel:1, RS-232:2, PS/2: 2, USB: 2, RJ-45:1  
: Audio in:1, Audio out:1, MIC IN:1





Support Unit 2 – Keyboard (Compaq Korea Co., Ltd.)

FCC ID : DOC  
Model Name : KB-9963  
Serial No. : B26960LGAML00X  
Manufacturer : Chicony Electronics  
Power Supply Type : N/A  
Power Cord : N/A  
Data Cable : Shielded: 1.2m

Support Unit 3 - MOUSE (LOGITECH)

FCC ID : JNZ201213  
Model Name : M-S48a  
Serial No. : HCA13711225  
Manufacturer : LOGITECH  
Power Supply Type : N/A  
Power Cord : N/A  
Data Cable : Shielded, 1.2m

Support Unit 5 – USB MOUSE (LOGITECH)

FCC ID : JNZ211360  
Model Name : M-U48a  
Serial No. : N/A  
Manufacturer : LOGITECH  
Power Supply Type : N/A  
Power Cord : N/A  
Data Cable : Shielded, 1.0m

Support Unit 6 – Serial Mouse (Tremon Enterprises Co., Ltd.)

FCC ID : JKGMUS5S01  
Model Name : MUS5S  
Serial No. : N/A  
Manufacturer : Tremon Enterprises Co., Ltd  
Power Supply Type : N/A  
Power Cord : N/A  
Data Cable : Shielded, 1.2m

Support Unit 7 – Color Video Monitor (Samyang Electronics Co., Ltd.)

FCC ID : N/A  
Model Name : MCM-144  
Serial No. : 11AA500030  
Manufacturer : Samyang Electronics Co., Ltd  
Power Supply Type : Switching  
Power Cord : Non-Shielded, Detachable, 1.2m  
Data Port : Video In: 2, Video Out: 2, Audio In: 2, Audio Out: 2

## 5. TEST RESULTS

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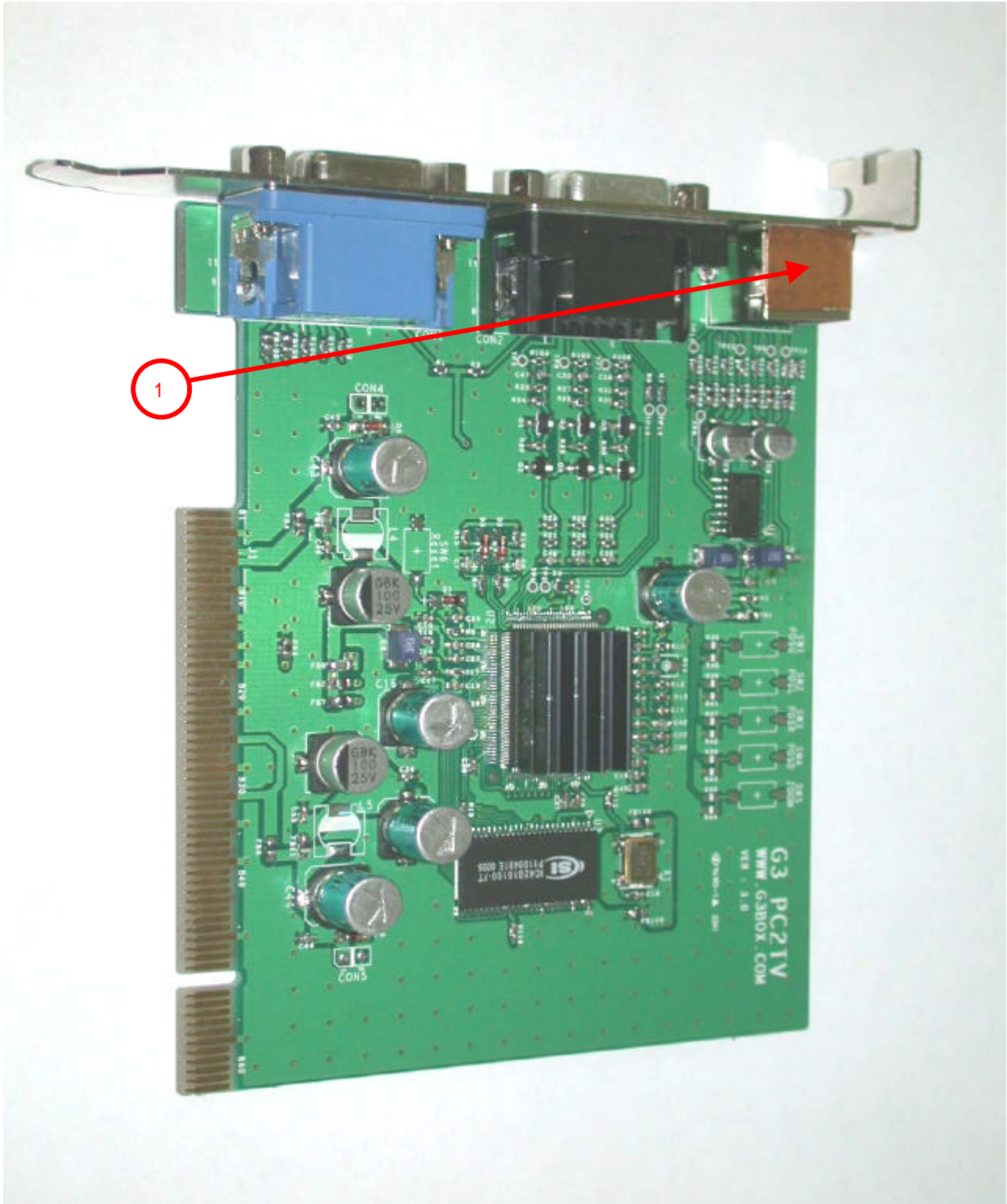
### 5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

| Test Rule Parts | Measurement Required            | Result               |
|-----------------|---------------------------------|----------------------|
| 15.107          | Conducted Emissions Measurement | Passed by – 12.20 dB |
| 15.109          | Radiated Emissions Measurement  | Passed by – 4.62 dB  |

The data collected shows that the MobiDic Co., Ltd., TV encoder, G3 PC2TV complies with technical requirements of above rules part 15.107 and 15.109 Class B Limits.

The equipment modified, mechanical or circuits to improve EMI status during a measurement.  
No EMI suppression device(s) was added and/or modified during testing.



# 1. Ground added in AV In, output port

## 5. TEST RESULTS

### 5.2 Conducted Emissions Measurement

|                       |  |
|-----------------------|--|
| EUT                   | TV encoder / G3 PC2TV (SN:N/A)                                 |
| Limit apply to        | 15.107 Class B   |
| Test Date             | October 30, 2003   |
| Operating Condition   | "H" Pattern display Mode, Resolution 1024 X 768 56.5KHz/70.0Hz |
| Environment Condition | Humidity Level : 50 %RH, Temperature : 18                      |
| Result                | Passed by - 12.20dB  |

### Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarization of live and neutral line.

Detector mode : CISPR Quasi-Peak mode ( 6dB Bandwidth : 9 KHz )

| Frequency<br>[MHz] | Reading<br>[dB $\mu$ V] |         | Phase<br>(*H/**N) | Limit<br>[dB $\mu$ V] |         | Margin<br>[dB] |         |
|--------------------|-------------------------|---------|-------------------|-----------------------|---------|----------------|---------|
|                    | Quasi-peak              | Average |                   | Quasi-peak            | Average | Q.Peak         | Average |
| 0.150              | 50.60                   | -       | N                 | 66.0                  | 56.0    | 15.40          | -       |
| 0.470              | 39.10                   | -       | H                 | 56.5                  | 46.5    | 17.40          | -       |
| 0.751              | 40.20                   | -       | N                 | 56.0                  | 46.0    | 15.80          | -       |
| 1.790              | 43.80                   | 33.50   | N                 |                       |         | 12.20          | 12.50   |
| 4.150              | 41.70                   | -       | N                 |                       |         | 14.30          | -       |
| 6.220              | 39.30                   | -       | H                 | 60.0                  | 50.0    | 20.70          | -       |
| 7.420              | 35.70                   | -       | H                 |                       |         | 24.30          | -       |

#### NOTES :

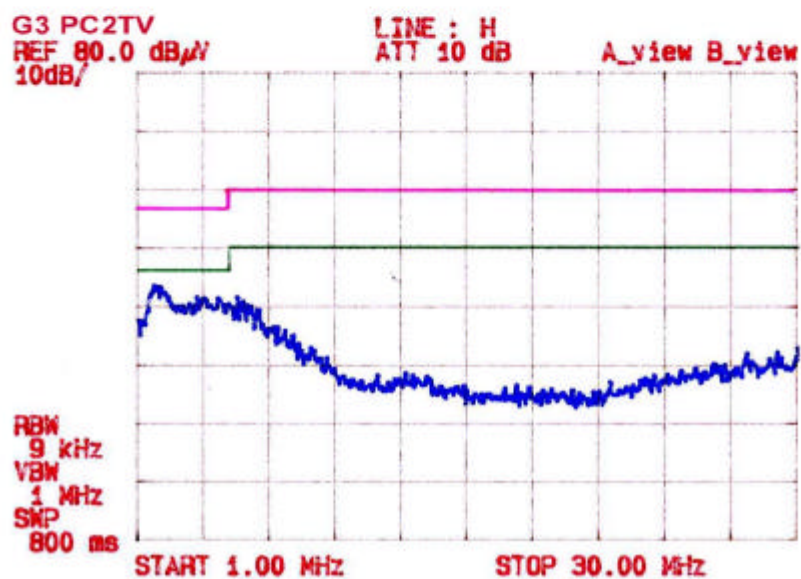
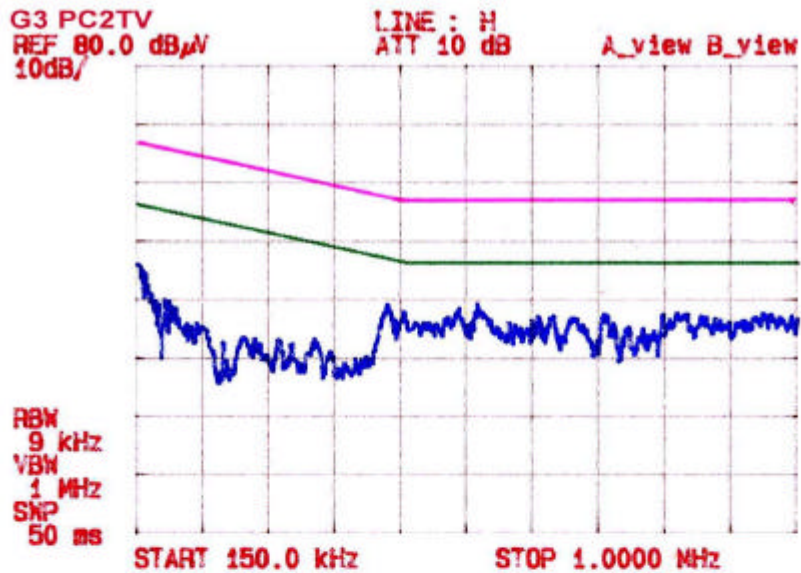
- \* H : HOT Line , \*\*N : Neutral Line
- Margin value = Limit - Reading
- Measurement were performed at the AC/DC Adapter Power Inlet in the frequency band of 150kHz ~ 30MHz according to the FCC Part 15.107 Class B
- If the Reading Quasi-Peak value is bellowed the Average Limit, Do not test Average Mode.



Test Engineer : C. S. Kim

## 5. TEST RESULTS

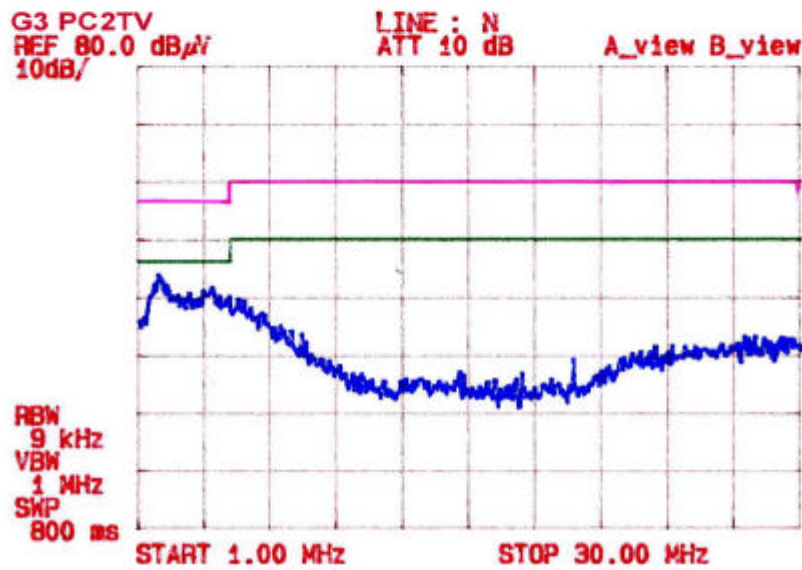
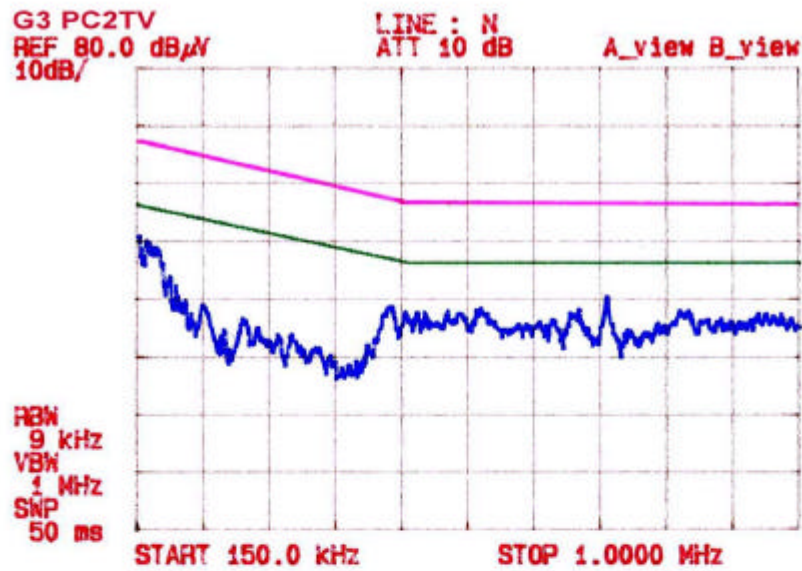
### *Line: HOT Line*





## 5.TEST RESULTS

### Line: Neutral Line



## 5. TEST RESULTS

### 5.3 Radiated Emissions Measurement

|                       |   |
|-----------------------|---|
| EUT                   | TV encoder / G3 PC2TV (SN:N/A)                                  |
| Limit apply to        | 15.109, Class B   |
| Test Date             | October 30, 2003  |
| Operating Condition   | " H " Pattern display Mode Resolution 1024 X 768 56.5KHz 70.0Hz |
| Environment Condition | Humidity Level : 50 %RH, Temperature : 18                       |
| Result                | Passed by - 4.62dB  |

### Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : CISPR Quasi-Peak mode ( 6dB Bandwidth : 120 kHz )

Measurement Distance : 10 meters

| Frequency [MHz] | Reading [dBμV] | Polarization (*H/**V) | Ant. Factor [dB] | Cable Loss [dB] | Emission Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------------|-----------------------|------------------|-----------------|-------------------------|----------------|-------------|
| 52.61           | 10.15          | V                     | 12.39            | 2.03            | 24.56                   | 30.0           | 5.44        |
| 188.01          | 10.98          | H                     | 10.35            | 3.68            | 25.01                   |                | 4.99        |
| 216.00          | 10.85          | H                     | 10.57            | 3.96            | 25.38                   |                | 4.62        |
| 232.03          | 14.14          | H                     | 11.36            | 4.12            | 29.62                   | 37.0           | 7.38        |
| 248.49          | 11.98          | H                     | 11.94            | 4.24            | 28.16                   |                | 8.84        |
| 320.67          | 9.08           | H                     | 14.57            | 5.07            | 28.72                   |                | 8.28        |
| 432.04          | 7.59           | H                     | 17.25            | 6.22            | 31.06                   |                | 5.94        |
| 472.05          | 5.79           | H                     | 18.21            | 6.53            | 30.53                   |                | 6.47        |

#### NOTES :

- \* H : Horizontal polarization , \*\* V : Vertical polarization
- Emission Level = Reading + Antenna factor + Cable loss
- Margin value = Limit - Emission Level
- The measurement was performed for the frequency range 30MHz ~ 1000MHz according to the CISPR 22 Class B



Test Engineer : C. S. Kim

## 6. SAMPLE CALCULATION

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### Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.  
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

$$\text{dB}(\mu\text{V}/\text{m}) = 20 \log_{10} (\mu\text{V} / \text{m}) : \text{Equation 1}$$

$$\text{dB}\mu\text{V} = \text{dBm} + 107 : \text{Equation 2}$$

Example 1 : @ 1.790 MHz

|                          |   |                       |   |           |
|--------------------------|---|-----------------------|---|-----------|
| Class B Limit            | = | 630.96 $\mu\text{V}$  | = | 56.0 dBuV |
| Reading                  | = | 43.80 dBuV            |   |           |
| Convert to $\mu\text{V}$ | = | 154.88 $\mu\text{V}$  |   |           |
| Margin                   | = | 43.80 - 56.0          | = | - 12.20   |
|                          | = | -12.20 dB below Limit |   |           |

Example 2 : @ 216.0 MHz

|                             |   |                       |   |             |
|-----------------------------|---|-----------------------|---|-------------|
| Class B Limit               | = | 31.62 $\mu\text{V}$   | = | 30.0 dBuV/m |
| Reading                     | = | 10.85 dBuV            |   |             |
| Antenna Factor + Cable Loss | = | 14.53 dB              |   |             |
| Total                       | = |                       | = |             |
| Margin                      | = | 25.38 - 30.0          | = | - 4.62      |
|                             | = | - 4.62 dB below Limit |   |             |



## 7. TEST EQUIPMENT LIST

### List of Test Equipments Used for Measurements

|                                     | Test Equipment          | Model    | Mfg.         | Serial No.  | Cal. Date |
|-------------------------------------|-------------------------|----------|--------------|-------------|-----------|
| <input checked="" type="checkbox"/> | Spectrum Analyzer       | R3261A   | Advantest    | 21720033    | 03-10-24  |
| <input checked="" type="checkbox"/> | Receiver                | ESVS 10  | R & S        | 835165/001  | 03-03-21  |
| <input checked="" type="checkbox"/> | Receiver                | ESHS30   | R & S        | 84190/002   | 03-03-21  |
| <input checked="" type="checkbox"/> | Spectrum Analyzer       | E7402A   | HP           | US39110107  | 03-05-21  |
| <input checked="" type="checkbox"/> | LISN                    | 3825/2   | EMCO         | 9208-1995   | 02-12-27  |
| <input checked="" type="checkbox"/> | LISN                    | 3825/2   | EMCO         | 9006-1669   | 03-01-10  |
| <input checked="" type="checkbox"/> | Preamplifier            | HP8447D  | HP           | 2944A07626  | 03-01-10  |
| <input type="checkbox"/>            | Preamplifier            | HP 8347A | HP           | 2834A00544  | 03-05-23  |
| <input type="checkbox"/>            | LogBicon Antenna        | VULB9160 | Schwarz Beck | 3082        | 03-06-19  |
| <input checked="" type="checkbox"/> | LogBicon Antenna        | VULB9165 | Schwarz Beck | 2023        | 03-05-28  |
| <input checked="" type="checkbox"/> | Dipole Antenna          | VHAP     | Schwarz Beck | 964         | 03-05-09  |
| <input type="checkbox"/>            | Dipole Antenna          | VHAP     | Schwarz Beck | 965         | 02-07-03  |
| <input checked="" type="checkbox"/> | Dipole Antenna          | UHAP     | Schwarz Beck | 949         | 02-07-03  |
| <input type="checkbox"/>            | Dipole Antenna          | UHAP     | Schwarz Beck | 950         | 03-05-09  |
| <input type="checkbox"/>            | Broad-band Horn Antenna | 3115     | EMCO         | 9809-2334   | 03-03-31  |
| <input checked="" type="checkbox"/> | Turn-Table              | DETT-03  | Daeil EMC    | -           | N/A       |
| <input checked="" type="checkbox"/> | Antenna Master          | DEAM-03  | Daeil EMC    | -           | N/A       |
| <input checked="" type="checkbox"/> | Plotter                 | 7440A    | H.P          | 2725A 75722 | N/A       |
| <input checked="" type="checkbox"/> | Chamber                 | DTECO1   | DAETONG      | -           | N/A       |
| <input checked="" type="checkbox"/> | Thermo Hygrograph       | 3-3122   | ISUZU        | 3312201     | 03-01-10  |
| <input checked="" type="checkbox"/> | BaroMeter               | -        | Regulus      | -           | -         |