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|  | ESTECH Co., Ltd. 3rd Fl., Chungdam Bldg., 119-1 Chungdam-dong, Kangnamgu, Seoul |   | Electromagnetic Interference Test Report |
|---|---|---|---|

Compliance Test Report for FCC

| | | | | |
|---|--|---|---|------------------|
| Report Number | | ESTF150406-002 | | |
| Applicant | Company name | DG Lab Co., Ltd. | | |
| | Address | Room 306, Han-Sol B/D # 145-1, GuMi-Dong, BunDang-Gu, SeongNam-City, KyeongGi-Do, Korea | | |
| | Telephone | 82-31-711-0534 | | |
| Product | Product name | MP PLAYER | | |
| | Model No. | DG-150 | Manufacturer | DG Lab Co., Ltd. |
| | Serial No. | NONE | Country of origin | Korea |
| Test date | 2004-06-03 | ~ | 2004-06-07 | Date of issue |
| Testing location | ESTECH. Co., Ltd. 97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea | | | |
| Standard | FCC PART 15 2002 , ANSI C 63.4 2001 | | | |
| Test item | <input checked="" type="checkbox"/> Conducted Emission | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B | Test result |
| | <input checked="" type="checkbox"/> Radiated Emission | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B | Test result |
| Measurement facility registration number | | 94696 | | |
| Tested by | Senior Engineer J.M. Yang | | (Signature)  | |
| Reviewed by | Director T.K. Lee | | (Signature)  | |
| Abbreviation | OK, Pass = Passed, Fail = Failed, N/A = not applicable | | | |
| <p>* Note</p> <ul style="list-style-type: none"> - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test result based on a single evaluation of one sample of the above mentioned | | | | |

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1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.

ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co. Ltd

Head Office : 3 rd Fl., Chungdam Bldg., 119-1 Chungdam-dong Kangnam-gu , Seoul, Korea
 (Safety & Telecom. Test Lab)

EMC Test Lab : 58-1 Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea
 97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea

1.3 Official Qualification(s)

MIC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Filed Laboratory at Federal Communications Commission

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test

Product : MP PLAYER
 Model Number : DG-150
 Serial Number : NONE
 Manufacturer : DG Lab Co., Ltd.
 Country of origin : Korea
 Rating : 120V, 60Hz
 Receipt Date : 2004-05-31

2.2 General descriptions of EUT

| | | |
|-----------------------|--|------------------|
| Size | 28.4 * 94.2 * 26.6mm (W X L X H) | |
| Weight | 38g (without battery) | |
| Memory | (128MB/256MB/512MB) built in Memory | |
| Battery | AAA type battery * 1EA | |
| Main Clock | 6Mhz | |
| Audio Output | Earphones | 6.0 mW / 16Ω |
| | S/N Ratio | 90 dB |
| | Output Frequency | 20 Hz ~ 20 KHz |
| FM | Earphones | 6.0 mW / 16Ω |
| | S/N Ratio | 50 dB |
| | Output Frequency | 88 MHz ~ 108 MHz |
| Voice-Recording | Approx. 17 hrs - (256MB ,ADPCM) | |
| LCD | Graphic 3 Line with Backlight | |
| Language | Multi-Languages (Korean, English, Chinese, Japanese) | |
| Download Speed | 4 Mbps (Depending on PC) | |
| Max. Playing Time | Approx. 10 hrs (128 kbps, MP3, 20 Volume, Normal EQ) | |
| Operating Temperature | 0 ~ 40 °C | |
| USB | Supporting USB 1.1 (Plug & Play) | |
| OS | Wind98/SE(with driver) , WindME/2000/XP , Mac 9.0 or above | |

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3. Test Standards

Test Standard : FCC PART 15 (2002)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

Test Method : ANSI C 63.4 (2001)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised of multiple units



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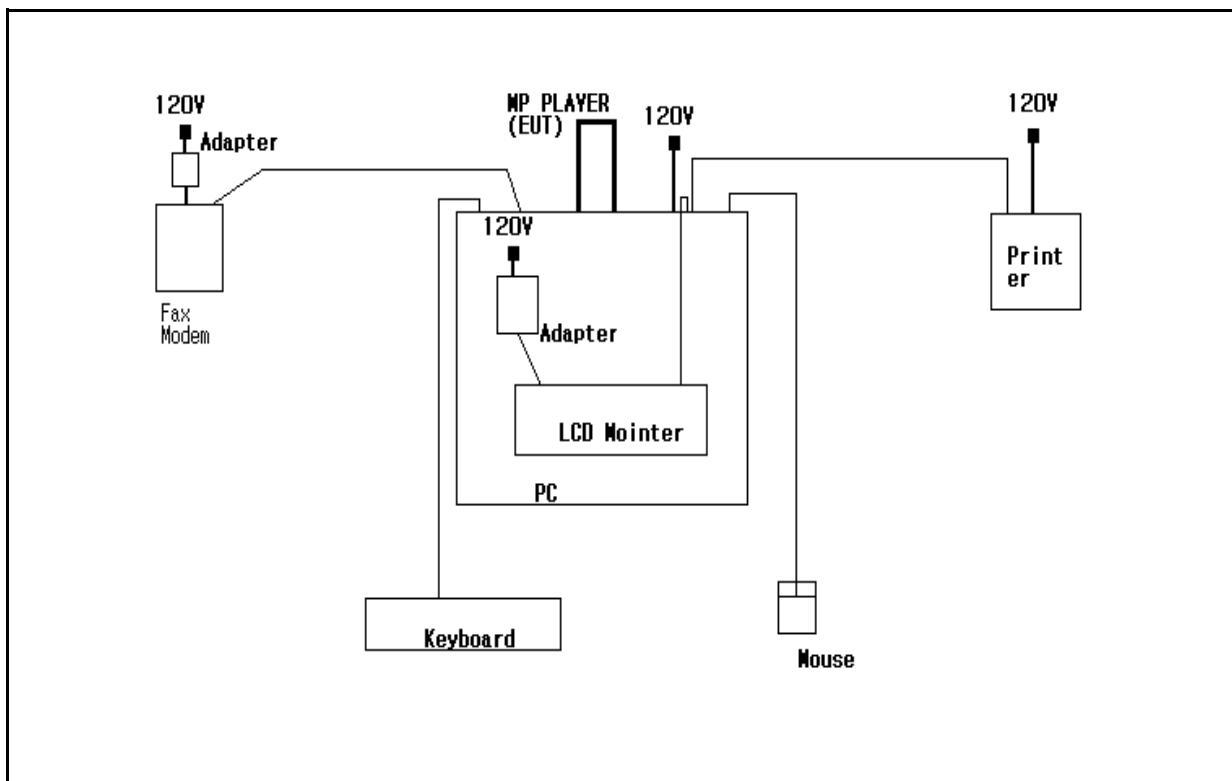
★ Testing EUT Under connecting PC

4. Measurement Condition

4.1 EUT Operation.

- * The EUT was in the following operation mode during all testing
- * The operational conditions of the EUT was determined by the manufacturer according to the typical use of the EUT with respect to the expected highest level of emission
- * After setting as test arrangement diagram, we test EUT under audio out and "H" character display

4.2 Configuration and Peripherals



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4.3 EUT and Support equipment

| Equipment Name | Model Name | S/N | Manufacturer | Remark (FCC ID) |
|-------------------|---------------|-----------------|--|--------------------|
| MP PLAYER | DG-150 | NONE | DG Lab Co., Ltd. | |
| Personal Computer | Optical GX 50 | NONE | DELL | |
| Lcd Monitor | KD17NS | N433H4KX300852K | Samsung Electronics.. Ltd. | |
| Adapter | APQ4914-UV | 0401011616AC | Anam Instruments Co., Ltd. | |
| Fax Modem | Modem / 5630 | 335630-01 | NONE | |
| Adapter | MSE -0930A | NONE | MyangSung | |
| Printer | LQ-570H+ | B1021095782 | Trigem Computer Inc. | |
| Keyboard | SEM-DT35 | 32006555 | Samsung Electro-mechanics Co., Ltd. | |
| Mouse | M-S48a | HCA31409057 | Logitech | |

4.4 Cable Connecting

| Start Equipment | | End Equipment | | Cable Standard | | Remark |
|-------------------|---------------|------------------|---------------|----------------|----------|--------|
| Name | I/O port | Name | I/O port | Length | Shielded | |
| MP PLAYER | USB | Personal Compute | USB | - | Shielded | |
| Personal Computer | Serial | Fax Modem | Serial | 2 | UnShield | |
| Personal Computer | PS/2 Keyboard | Keyboard | PS/2 Keyboard | 2 | UnShield | |
| Personal Computer | PS/2 Mouse | Mouse | PS/2 Mouse | 2 | UnShield | |
| Personal Computer | Parallel | Printer | Parallel | 2 | Shielded | |
| Personal Computer | Video | Lcd Monitor | Video | 2 | Shielded | |
| Lcd Monitor | Adapter | DC Power | Adapter | 2 | UnShield | |
| Fax Modem | Adapter | DC Power | Adapter | 2 | UnShield | |

5. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2002) & ANSI C 63.4 (2001). The test setup was made according to FCC Part 15 (2002) & ANSI C 63.4 (2001) on an open test site, which allows a 3m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test set-up.

5.1 Measurement equipments

| Equipment Name | Type | Manufacturer | Serial No. | Next Calibration date |
|-----------------------|-----------|-----------------|------------|-----------------------|
| Receiver | ESVS10 | Rohde & Schwarz | 838562/002 | 2005.1.12 |
| Spectrum Analyzer | R3261B | ADVANTEST | 1720302 | 2005.2.12 |
| LogBicon Antenna | VULB 9160 | S/B | 3142 | 2004.7.11 |
| Turn Table | 2087 | EMCO | 2129 | – |
| Antenna Mast | 2070-01 | EMCO | 9702-203 | – |
| ANT Mast Controller | 2090 | EMCO | 1535 | – |
| Turn Table Controller | 2090 | EMCO | 1535 | – |

5.2 Environmental Condition

Test Place : Open site(3m)

Temperature (°C) : 28 °C

Humidity (%) : 36 %

| | | | |
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5.3 Test data

Measurement Distance : 3 m

| Frequency (MHz) | Reading (dB μ V) | Position (V/H) | Height (m) | Correction Factor | | Result Value | | |
|--------------------|------------------------------|-------------------|---------------|--------------------|---------------|-------------------------|--------------------------|--------------------------|
| | | | | Ant Factor (dB) | Cable (dB) | Limit (dB μ V/m) | Result (dB μ V/m) | Margin (dB μ V/m) |
| 50.00 | 13.60 | V | 1.0 | 12.57 | 1.03 | 40.00 | 27.20 | (12.80) |
| 75.00 | 17.20 | V | 1.0 | 9.87 | 1.28 | 40.00 | 28.35 | (11.65) |
| 79.19 | 14.20 | H | 2.8 | 8.95 | 1.31 | 40.00 | 24.46 | (15.54) |
| 143.99 | 19.20 | H | 2.4 | 13.58 | 1.86 | 43.50 | 34.64 | (8.86) |
| 170.81 | 13.10 | H | 2.2 | 13.26 | 2.05 | 43.50 | 28.41 | (15.09) |
| 196.01 | 11.90 | H | 1.8 | 10.67 | 2.18 | 43.50 | 24.75 | (18.75) |
| 203.44 | 16.40 | H | 1.7 | 10.45 | 2.20 | 43.50 | 29.05 | (14.45) |
| 236.59 | 16.90 | H | 1.6 | 11.55 | 2.38 | 46.00 | 30.83 | (15.17) |
| 267.67 | 16.70 | H | 1.3 | 12.39 | 2.49 | 46.00 | 31.58 | (14.42) |
| 309.77 | 12.90 | H | 1.2 | 13.41 | 2.72 | 46.00 | 29.04 | (16.96) |
| 356.89 | 10.70 | H | 1.0 | 14.34 | 2.97 | 46.00 | 28.02 | (17.98) |
| 381.25 | 14.30 | H | 1.0 | 14.91 | 3.06 | 46.00 | 32.26 | (13.74) |
| 400.62 | 11.20 | H | 1.0 | 15.33 | 3.15 | 46.00 | 29.68 | (16.32) |
| 499.41 | 6.70 | V | 1.0 | 17.05 | 3.55 | 46.00 | 27.30 | (18.70) |
| 540.01 | 6.10 | H | 1.0 | 17.68 | 3.65 | 46.00 | 27.43 | (18.57) |
| 960.00 | 8.00 | H | 1.0 | 23.43 | 5.07 | 46.00 | 36.50 | (9.50) |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Remark | H : Horizontal, V : Vertical | | | | | | | |



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6. Measurement Condition

6.1 EUT Operation.

- * The EUT was in the following operation mode during all testing
- * The operational conditions of the EUT was determined by the manufacturer according to the typical use of the EUT with respect to the expected highest level of emission
- * Only, we test EUT under connecting earphone and audio out.

6.2 Configuration and Peripherals



| | | | | |
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6.3 EUT and Support equipment

| Equipment Name | Model Name | S/N | Manufacturer | Remark (FCC ID) |
|----------------|------------|------|------------------|--------------------|
| MP PLAYER | DG-150 | NONE | DG Lab Co., Ltd. | |
| Earphone | NONE | NONE | NONE | |
| | | | | |
| | | | | |
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| | | | | |

6.4 Cable Connecting

| Start Equipment | | End Equipment | | Cable Standard | | Remark |
|-----------------|-----------|---------------|-----------|----------------|----------|--------|
| Name | I/O port | Name | I/O port | Length | Shielded | |
| MP PLAYER | Headphone | EarPhone | Headphone | 1.5 | UnShield | |
| | | | | | | |
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7. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2002) & ANSI C 63.4 (2001). The test setup was made according to FCC Part 15 (2002) & ANSI C 63.4 (2001) on an open test site, which allows a 3m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test set-up.

7.1 Measurement equipments

| Equipment Name | Type | Manufacturer | Serial No. | Next Calibration date |
|-----------------------|-----------|-----------------|------------|-----------------------|
| Receiver | ESVS10 | Rohde & Schwarz | 838562/002 | 2005.1.12 |
| Spectrum Analyzer | R3261B | ADVANTEST | 1720302 | 2005.2.12 |
| LogBicon Antenna | VULB 9160 | S/B | 3142 | 2004.7.11 |
| Turn Table | 2087 | EMCO | 2129 | – |
| Antenna Mast | 2070-01 | EMCO | 9702-203 | – |
| ANT Mast Controller | 2090 | EMCO | 1535 | – |
| Turn Table Controller | 2090 | EMCO | 1535 | – |

7.2 Environmental Condition

Test Place : Open site(3m)

Temperature (°C) : 28 °C

Humidity (%) : 37 %

| | | | |
|---|---|---|---|
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7.3 Test data

Measurement Distance : 3 m

| Frequency (MHz) | Reading (dB μ V) | Position (V/H) | Height (m) | Correction Factor | | Result Value | | |
|--------------------|---|-------------------|---------------|--------------------|---------------|-------------------------|--------------------------|--------------------------|
| | | | | Ant Factor (dB) | Cable (dB) | Limit (dB μ V/m) | Result (dB μ V/m) | Margin (dB μ V/m) |
| Low | | | | | | | | |
| 90.57(PK) | 12.80 | H | 1.80 | 9.35 | 1.47 | 48.00 | 23.62 | (24.38) |
| 90.57(AV) | 9.50 | H | 1.80 | 9.35 | 1.47 | 48.00 | 20.32 | (27.68) |
| Middle | | | | | | | | |
| 95.86(PK) | 13.90 | H | 1.90 | 9.85 | 1.47 | 48.00 | 25.22 | (22.78) |
| 95.86(AV) | 10.50 | H | 1.90 | 9.85 | 1.47 | 48.00 | 21.82 | (26.18) |
| High | | | | | | | | |
| 106.94(PK) | 10.90 | H | 1.8 | 10.82 | 1.6 | 48.0 | 23.32 | -24.68 |
| 106.94(AV) | 8.20 | H | 1.8 | 10.82 | 1.6 | 48.0 | 20.62 | -27.38 |
| 79.30 | 6.20 | H | 2.8 | 8.92 | 1.31 | 40.00 | 16.44 | (23.56) |
| 128.86 | 4.80 | H | 2.3 | 12.56 | 1.70 | 43.50 | 19.06 | (24.44) |
| 169.93 | 4.10 | H | 1.8 | 13.33 | 2.05 | 43.50 | 19.48 | (24.02) |
| 192.58 | 8.40 | H | 1.7 | 10.91 | 2.18 | 43.50 | 21.49 | (22.01) |
| 195.29 | 7.40 | H | 1.6 | 10.72 | 2.18 | 43.50 | 20.30 | (23.20) |
| 198.26 | 10.40 | H | 1.6 | 10.51 | 2.18 | 43.50 | 23.09 | (20.41) |
| 215.25 | 8.40 | H | 1.5 | 10.67 | 2.28 | 43.50 | 21.35 | (22.15) |
| 220.90 | 5.10 | H | 1.4 | 10.80 | 2.30 | 43.50 | 18.21 | (25.29) |
| 294.53 | 7.40 | H | 1.2 | 13.09 | 2.65 | 46.00 | 23.13 | (22.87) |
| 314.42 | 7.80 | H | 1.1 | 13.52 | 2.74 | 46.00 | 24.06 | (21.94) |
| 373.93 | 4.80 | H | 1.0 | 14.73 | 3.03 | 46.00 | 22.57 | (23.43) |
| 385.39 | 9.10 | H | 1.0 | 15.00 | 3.08 | 46.00 | 27.18 | (18.82) |
| Remark | H : Horizontal, V : Vertical *We measured the biggest value from 88 Mhz to 108 Mhz | | | | | | | |



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8. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 to 30 MHz was measured in accordance to FCC Part 15 (2002) & ANSI C 63.4 (2001). The test setup was made according to FCC Part 15 (2002) & ANSI C 63.4 (2001) in a shielded. The EUT was placed on a non-conductive table at least 80 above the ground plan. A grounded vertical reference plane was positioned in a distance of 40cm from the EUT. The distance from the EUT to other metal surfaces was at least 0.8m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0m.. The test receiver with Quasi Peak detector complies with CISPR 16.

8.1 Measurement equipments

| Equipment Name | Type | Manufacturer | Serial No. | Next Calibration date |
|----------------|-----------|-----------------|------------|-----------------------|
| LISN | ESH3-Z5 | Rohde & Schwarz | 838979/010 | 2005. 2. 12 |
| LISN | NNLA8120A | Schwarzbeck | NONE | 2005. 2. 12 |
| TEST Receive | ESPC | Rohde & Schwarz | 838248/001 | 2005.1.29 |
| Pulse Limiter | ESH3Z2 | Rohde & Schwarz | NONE | 2003.7.4 |

8.2 Environmental Condition

Test Place : Shield Room

Temperature (°C) : 21°C

Humidity (%) : 41%

| | | | |
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8.3 Test data

| Frequency (MHz) | Correction Factor | | Line (H/N) | | | | | | |
|--------------------|--------------------------------|---------------|---------------|-----------------------|-------------------------|------------------------|-----------------------|-------------------------|------------------------|
| | Lisn (dB) | Cable (dB) | | Limit (dB μ V) | Reading (dB μ V) | Result (dB μ V) | Limit (dB μ V) | Reading (dB μ V) | Result (dB μ V) |
| 0.176 | 0.07 | 0.0 | H | 64.68 | 50.37 | 50.46 | 54.68 | | |
| 0.211 | 0.07 | 0.0 | H | 63.15 | 48.97 | 49.08 | 53.15 | | |
| 0.260 | 0.07 | 0.1 | N | 61.43 | 52.43 | 52.57 | 51.43 | | |
| 0.284 | 0.07 | 0.1 | H | 60.71 | 46.94 | 47.10 | 50.71 | | |
| 0.288 | 0.07 | 0.1 | N | 60.57 | 50.83 | 50.99 | 50.57 | | |
| 0.429 | 0.07 | 0.2 | H | 57.26 | 36.34 | 36.57 | 47.26 | | |
| 0.516 | 0.07 | 0.2 | N | 56.00 | 43.52 | 43.79 | 46.00 | | |
| 0.595 | 0.08 | 0.2 | N | 56.00 | 45.17 | 45.45 | 46.00 | | |
| 0.887 | 0.09 | 0.2 | N | 56.00 | 41.96 | 42.25 | 46.00 | | |
| 1.477 | 0.10 | 0.2 | H | 56.00 | 41.78 | 42.13 | 46.00 | | |
| 1.846 | 0.11 | 0.3 | H | 56.00 | 43.63 | 44.02 | 46.00 | 42.72 | 43.11 |
| 2.579 | 0.13 | 0.3 | N | 56.00 | 41.57 | 42.00 | 46.00 | | |
| 5.861 | 0.23 | 0.3 | N | 60.00 | 40.34 | 40.92 | 50.00 | | |
| 6.657 | 0.27 | 0.4 | H | 60.00 | 38.62 | 39.27 | 50.00 | | |
| 7.996 | 0.31 | 0.5 | N | 60.00 | 39.72 | 40.49 | 50.00 | | |
| 8.125 | 0.31 | 0.5 | H | 60.00 | 36.72 | 37.50 | 50.00 | | |
| 9.156 | 0.34 | 0.5 | N | 60.00 | 43.38 | 44.26 | 50.00 | | |
| 20.476 | 0.71 | 0.8 | H | 60.00 | 36.70 | 38.22 | 50.00 | | |
| | | | | | | | | | |
| Remark | H : Hot Line, N : Neutral Line | | | | | | | | |



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★ Testing EUT Under connecting PC

9. Photographs of test setup

9.1 Setup for Radiated Test : 30 ~ 1000 MHz

[Front]



[Rear]





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9.2 Setup for Radiated Test : 30 ~ 1000 MHz

[Front]



[Rear]





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9.3 Setup for Conducted Test : 0.15 ~ 30 MHz

[Front]



[Rear]





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10. Photographs of EUT

[Front]

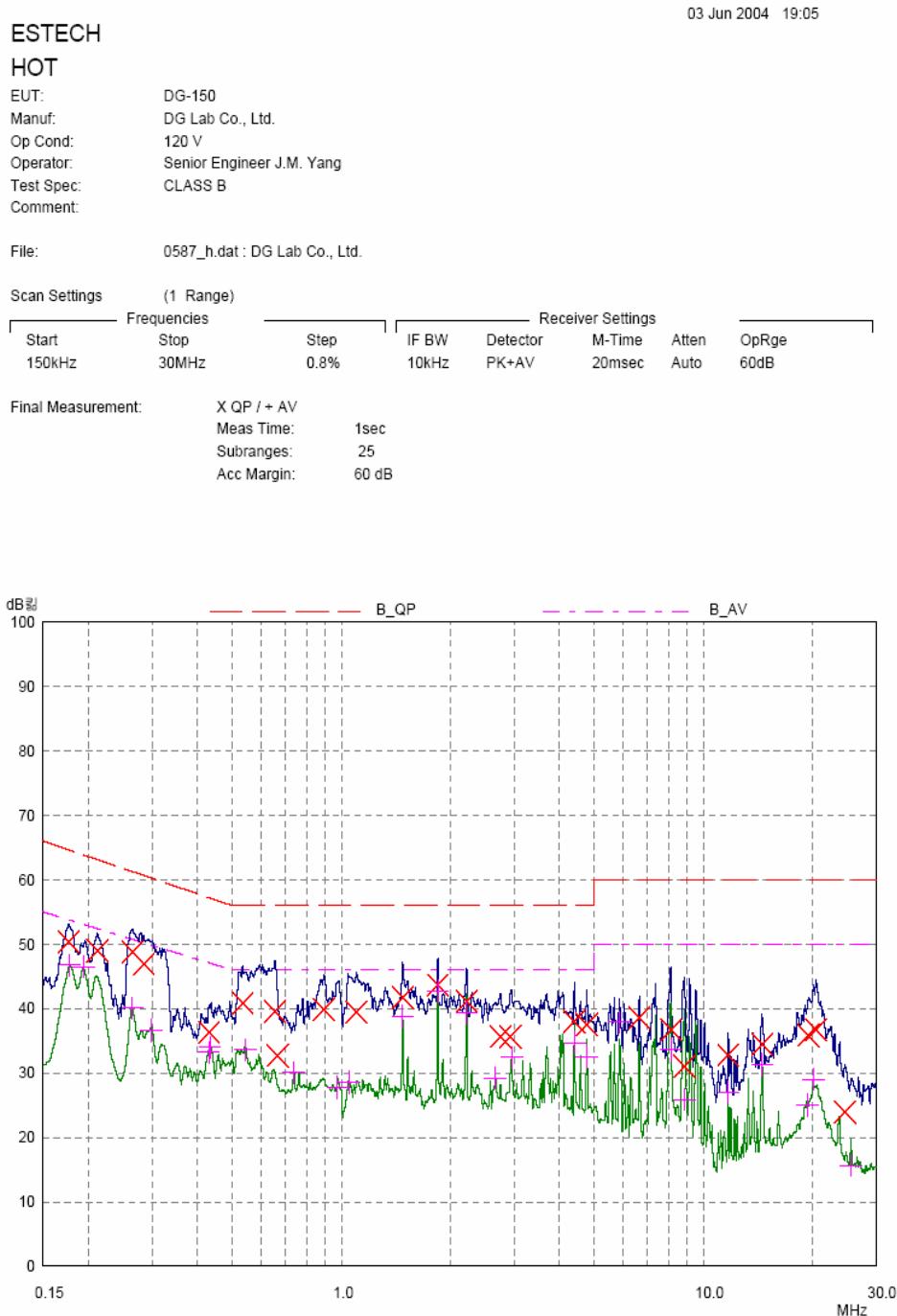


[Rear]



Appendix 1. Spectral diagram

*HOT



*NETRUL

ESTECH
NEUTRAL

03 Jun 2004 19:12

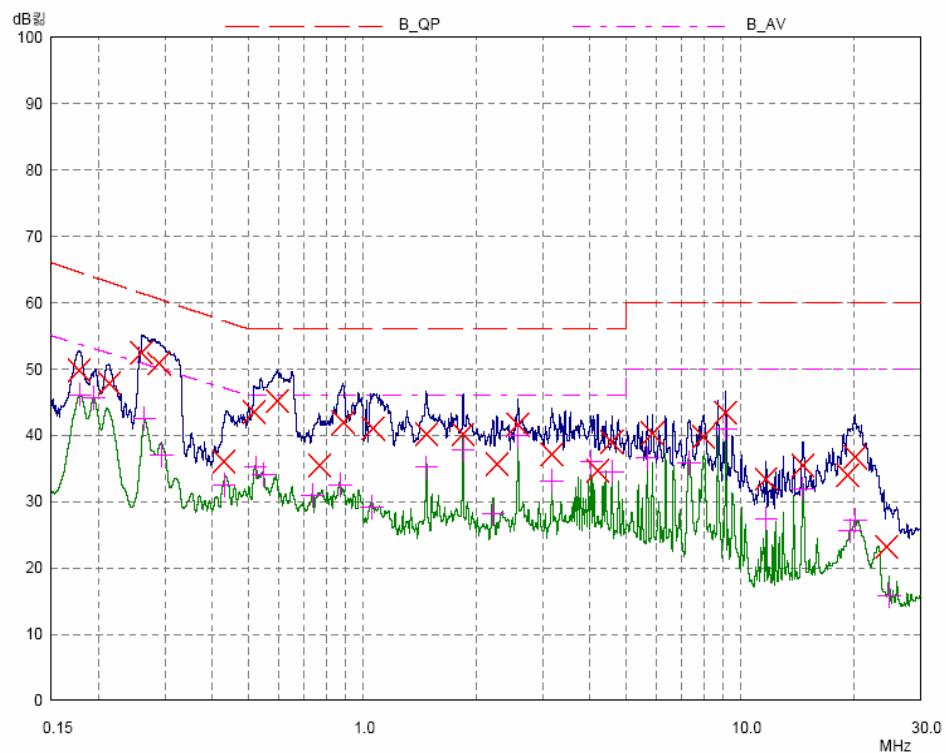
EUT: DG-150
Manuf: DG Lab Co., Ltd.
Op Cond: 120 V
Operator: Senior Engineer J.M. Yang
Test Spec: CLASS B
Comment:

File: 0587_n.dat : DG Lab Co., Ltd.

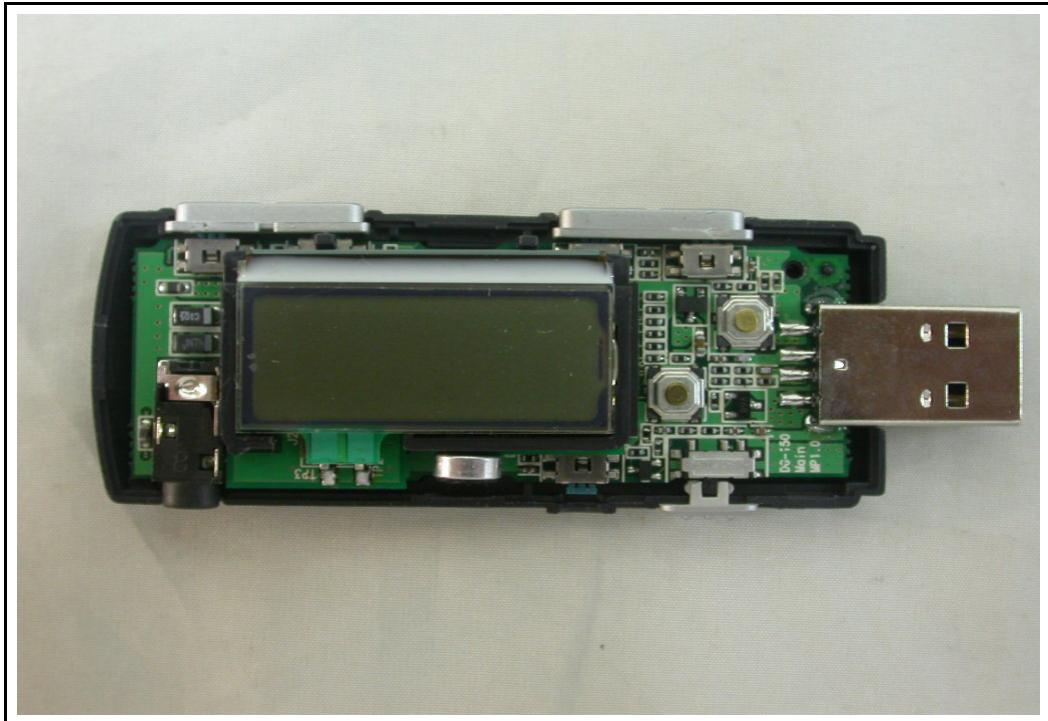
Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | |
|-------------|-------|------|-------------------|----------|--------|-------|-------|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | OpRge |
| 150kHz | 30MHz | 0.8% | 10kHz | PK+AV | 20msec | Auto | 60dB |

Final Measurement: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 60 dB

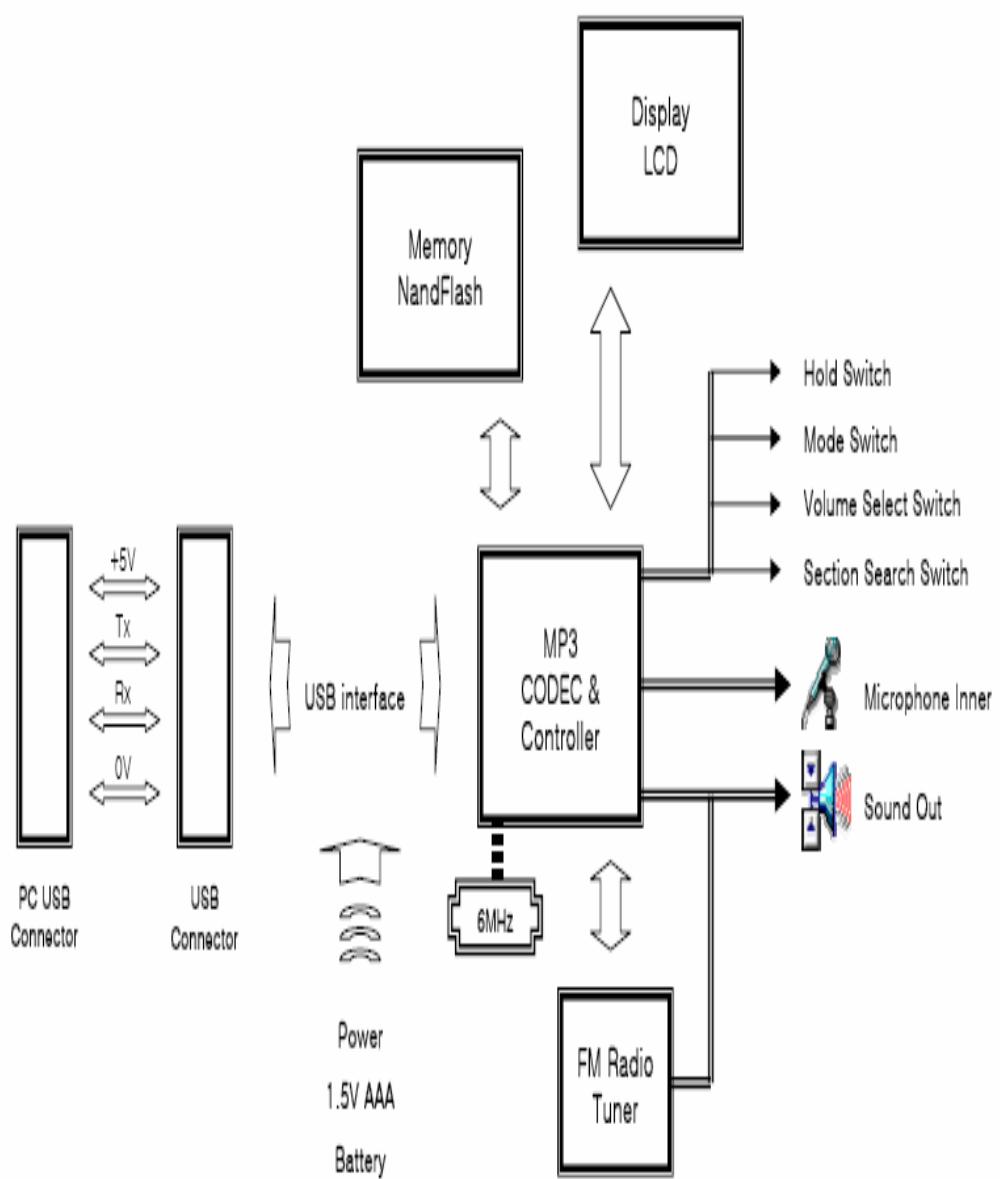


Appendix 2. Photographs of EUT in side PCB



Appendix 3. Block diagram of EUT

MP3 Player (DG-150) Block Diagram



Appendix 4. Circuit Diagram