





Korea Technology Institute Co., Ltd.

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Test Report

Test Report No.:	KT103EF08001		
Registration No.:	99058		
Applicant:	Digitalway Co., Ltd.		
Applicant Address:	Korea Design Center, 344-1 Ya'tap 1-dong, Bundang-gu, Seongnam City Gyeonggi-do, 463-828 Korea		
Product:	MP3 Player		
FCC ID:	RFSFY200	Model No.	FY200
Receipt No.:	03-0817	Date of receipt:	August 23, 2003
Date of Issue:	August 29, 2003		
Testing location	Korea Technology Institute Co., Ltd. 51-19, Sanglim3-Ri, Docheok-Myeun, Gwangju-Shi, Gyeongki-Do, Korea		
Test Standards:	FCC/ANSI. C63.4: 2001		
Rule Parts: FCC	Part 15		
Equipment Class:	Class B		
Test Result:	The above-mentioned product has been tested with compliance.		
Tested by: E.S. Park / Engineer  _____ Signature Date		Approved by: G. C. Min /President  _____ Signature Date	
Other Aspects:			
Abbreviations:	* OK, Pass=passed * Fail=failed * N/A=not applicable		
 <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 is based on a single evaluation of one sample of the above mentioned. - This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government. - We certify this test report has been based on the measurement standards that is traceable to the national or international standards. 			



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1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. Korea Technology Institute Co., Ltd. performed all measurements reported herein. And were made under Chief Engineer's supervisor.

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

2. Test Site

Korea Technology Institute Co., Ltd.

2.1 Location

51-19, Sanglim3-Ri, Docheok-Myeun, Gwangju-Shi, Gyeongki-Do, Korea

The Test Site is in compliance with ANSI C63.4/2001 for measurement of radio Interference.



2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

- Conducted Emissions

Kind of Equipment	Type	S/N	Calibrated until
Spectrum Analyzer	R3261C	61720417	11.2003
Field Strength Meter	ESPC	832827/011	9.2003
LISN	KNW407	8-1157-2	10.2003
LISN	EM-7823	115019	1.2004
Conducted Cable	N/A	N/A	11.2003

- Radiated Emissions

Kind of Equipment	Type	S/N	Calibrated until
Field Strength Meter	ESIB 40	100093 1088.7490K40	1.2004
Spectrum Analyzer	R3261C	61720417	11.2003
Pre Amplifier	8447D	2944A06874	11.2003
BiconiLog Antenna	3142B	1705	12.2003
Bilog Antenna	CBL6140A	1217	5.2004
Open Site Cable	N/A	N/A	11.2003
Antenna Mast	DETT-03	N/A	N/A
Antenna & Turntable controller	DETT-04	91X519	N/A

2.3 Test Date

Date of Application: August 23, 2003

Date of Test: August 25, 2003

2.4 Test Environment

See each test item's description.



3. Description of the tested samples

The EUT is MP3 Player.

3.1. Rating and Physical Characteristics

Compression format	MP3 (8 ~ 320 kbps), WMA (5 ~ 192 kbps), ASF
Built-in memory capacity	128/256/512 MB
LCD display	FSTN type graphical 3-line LCD (Dual-color LED backlights – orange, yellow green)
Language support	36 languages
Display language	English
File transfer rate	Max. 4.5 Mbps
Earphone output	12 mW (R: 6 mW, L: 6 mW)
Signal-to-noise ratio	90 dB
Output frequency range	20 Hz ~ 20 KHz
Battery	AAA alkaline battery
Continuous playback time	Max. 14 hours (128 kbps MP3 file playback)
FM frequency range	76 ~ 108.0 MHz
FM output	10mW (R: 5 mW, L: 5 mW)
Signal-to-noise ratio of FM radio	45 dB
Dimensions/Weight	30(W) × 86.2(H) × 16(D)mm / 32g (Battery excluded)

3.2. Submitted Documents

- User's Guide
- Block Diagram



4. Measurement Conditions

Testing Input Voltage: AC 230V

4.1 Modes of Operation

The EUT was in the following operation mode during all testing;

- 1) Display H pattern on monitor.

4.2 Additional Equipment

DEVICE TYPE	Manufacturer	M/N	S/N	FCC ID
PC	Compaq computer Corp.	ARMADA M700	3J14FmpzBD2C	-

4.3 Uncertainty

- 1) Radiated disturbance

U_c (Combined standard Uncertainty) = $\pm 1.8\text{dB}$

Expanded uncertainty $U = K U_c$

$K = 2$

$\therefore U = \pm 3.6\text{dB}$

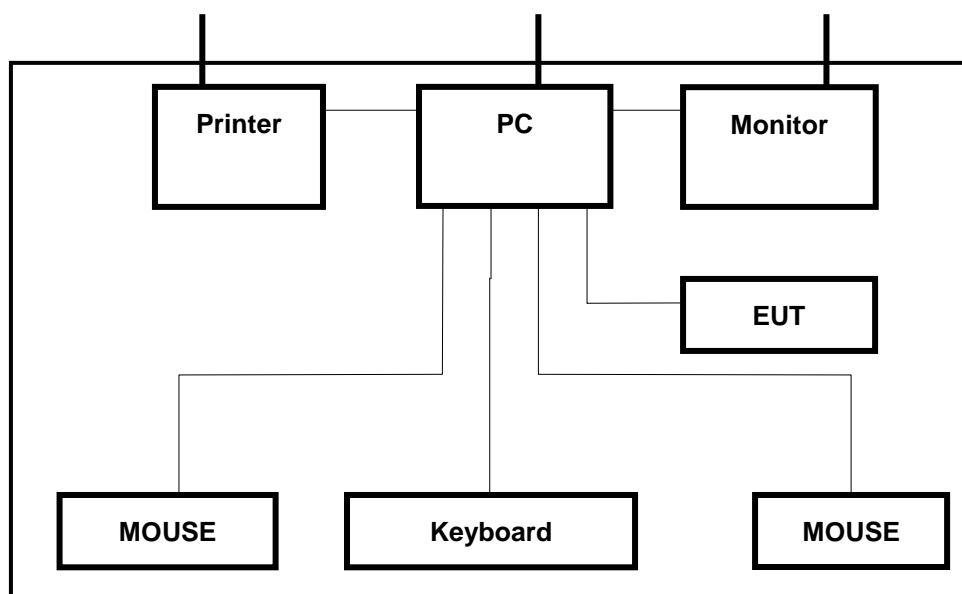
- 2) Conducted disturbance

$U_c = \pm 0.88\text{dB}$

$U = K U_c = 2 \times U_c = \pm 1.8\text{dB}$



4.4 Test Setup



— Signal Line
— Power Line



5. EMISSION Test

5.1. Conducted Emissions

Result:

Pass

The line-conducted facility is located inside a 2.3M x 3.5M x 5.5M shielded closure.

The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 605-05. A 1m x 1.5m wooden table 80cm high is placed 80cm away from the conducting ground plane and 40cm away from the sidewall of the shielded room. Electro-Metroics Model EM-7823 (9kHz-30MHz) 50ohm/50 uH Line-Impedance Stabilization Networks (LISN) are bonded to the shielded room.

The EUT is powered from the Electro-Metroics LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN are filtered by a high-current high-insertion loss shield enclosures power line filters (100dB 14kHz-1GHz).

The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure.

All electrical cables are shielded by copper pipe with inner diameter of 1".

If the EUT is a DC-Powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Rohde & Schwarz LISN.

All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.

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 spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150kHz to 30MHz with 100msec. Sweep time.

The frequency producing the maximum level was reexamined using EMI field Intensity meter (ESPC). The detector function was set to CISPR quasi-peak mode.

The bandwidth of the receiver was set to 10kHz. The EUT, support equipment, and interconnecting Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; if applicable; whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in photograph of conducted test.

Each EME reported was calibrated using self-calibrating mode.



Figure 1: Spectral Diagram, LINE-PE

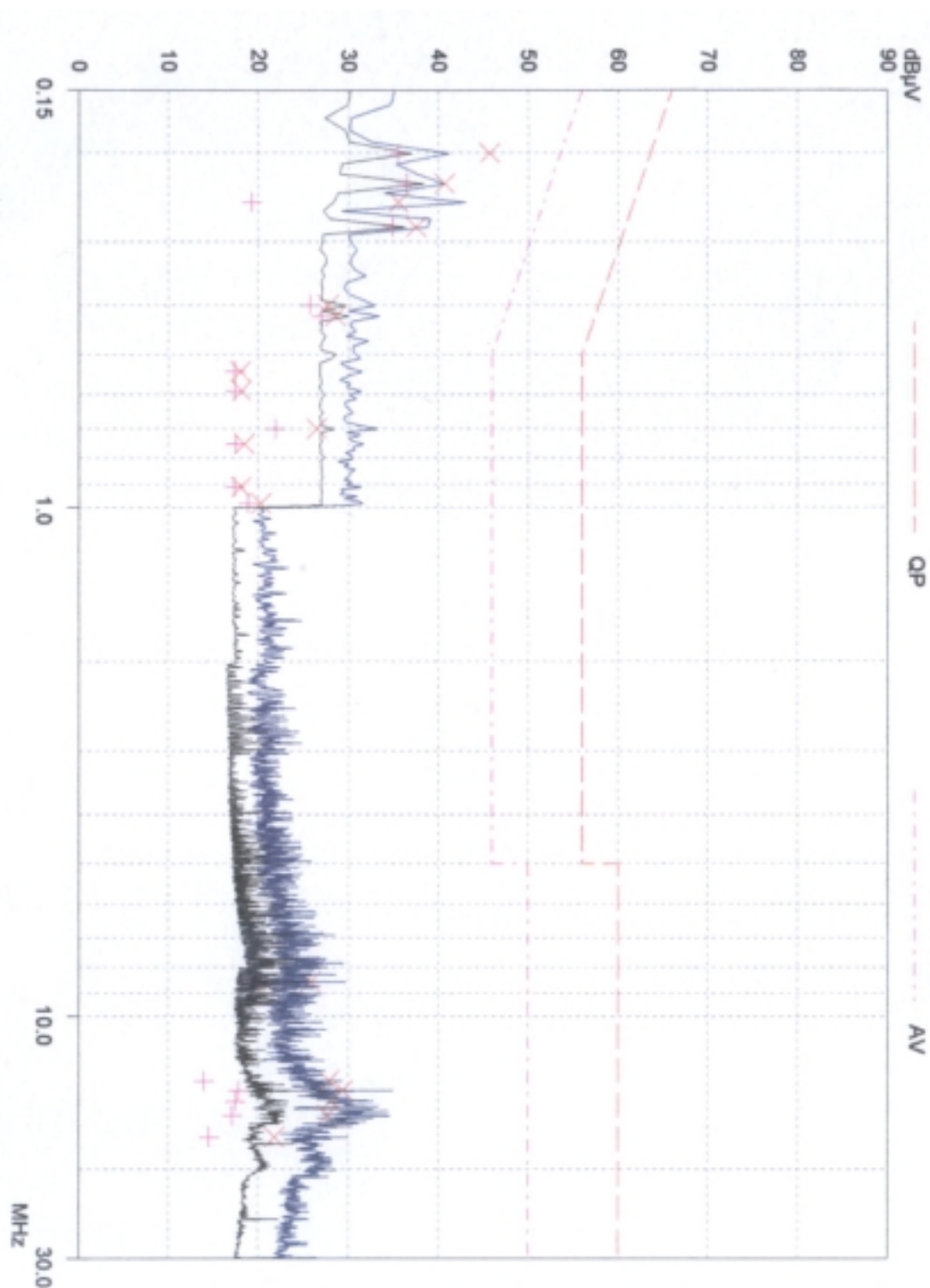




Figure 2: Spectral Diagram, NEUTRAL-PE

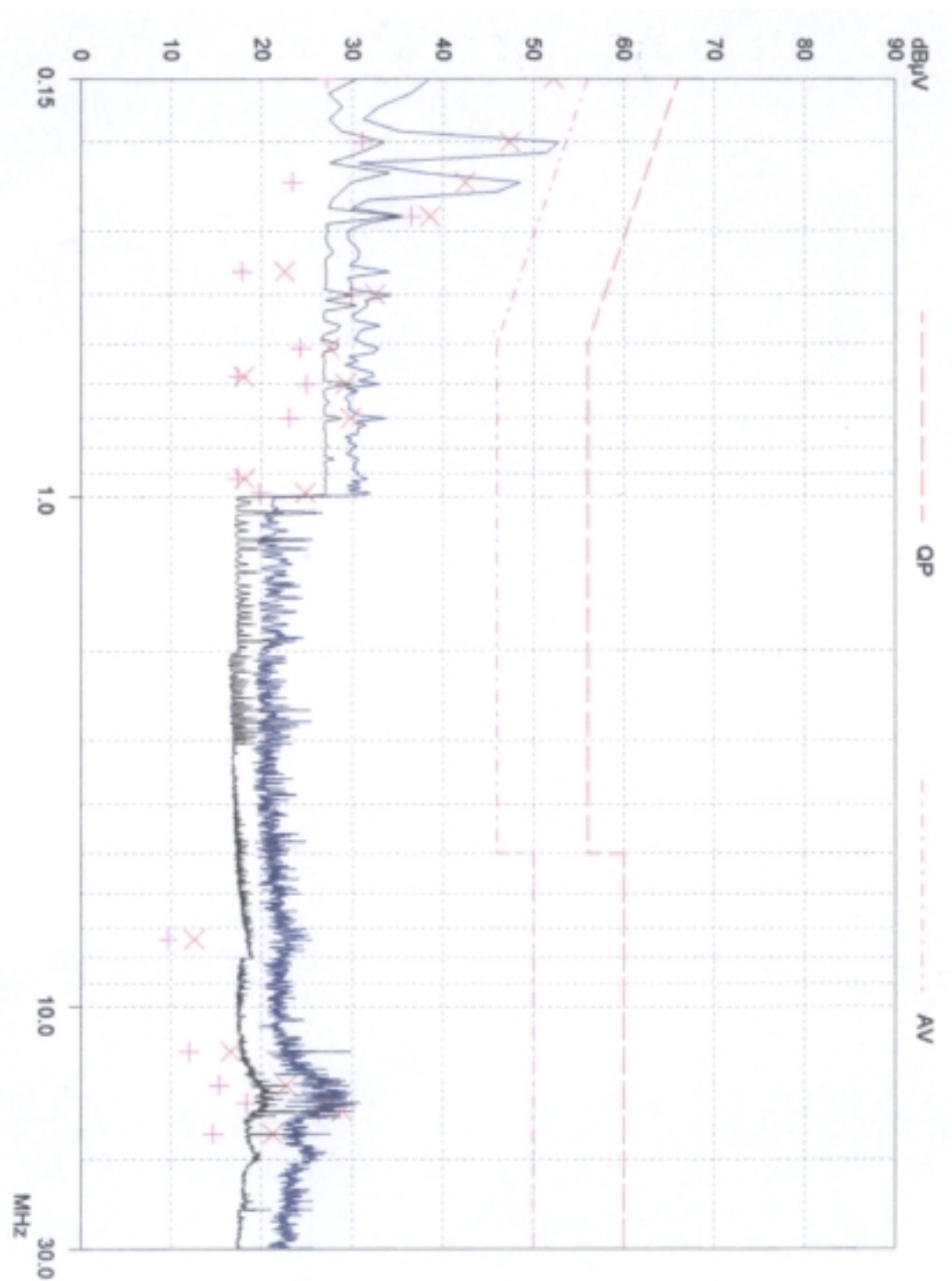




Table 2: Test Data, Conducted Emissions

Frequency (MHz)	(1) Reading (dB μ V)	Line	(2) Limit (dB μ V)	(3) Margin (dB)
0.15	52.62	L2	66.00	56.00
0.20	47.61	L2	63.61	53.61
0.23	40.88	L1	62.45	52.45
0.24	42.65	L2	62.10	52.10
0.28	38.75	L2	60.82	50.82
0.70	30.05	L2	56.00	46.00

NOTES:

1. All modes of operation were investigated
And the worst-case emissions are reported.
2. All other emissions are non-significant.
3. All readings are calibrated by self-mode in receiver.
4. Measurements using CISPR peak mode.
5. L1 = LINE-PE, L2 = NEUTRAL-PE
6. C/F = Correction Factor
7. C/L = Cable Loss
8. The limit for Class B digital device is 66dB μ V to 56dB μ V
from 150KHz to 500KHz, 56dB μ V from 500KHz to 5MHz, 60dB μ V Above 5MHz.

♣ Margin Calculation

$$(6) \text{ Margin} = (2) \text{ Limit} - (1) \text{ Reading}$$



5.2 Radiated Emissions

Result:

Pass

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband Amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and Investigated. The system configurations, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 2000 MHz using BiconiLog Antenna. About 2GHz, Double ridged horn Antenna was used.

Final measurements were made outdoors at 10-meter test range using EMCO antennas. The test equipment was placed on a wooden table situated on a 4x4 meter area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with Polyethylene film. 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 and investigated using EMIField Intensity Meter (ESIB40) R & S. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1 MHz depending on the frequency or type or signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated Measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8meter high non-metallic 1 x 1.5 meter table.

The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME 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 maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in photograph of radiated emission test. Each EME reported was calibrated using self-calibrating mode.



Table 3: Test Data, Radiated Emissions

Frequency (MHz)	Pol.	Height [m]	Angle [°]	(1) Reading (dB μ V)	(2) AFCL (dB/m)	(3) Actual (dB μ V/m)	(4) Limit (dB μ V/m)	(5) Margin (dB)
49.56	H	2.78	168	10.84	9.26	21.00	40.0	19.0
56.40	H	1.69	139	11.04	7.76	18.80	40.0	21.2
128.36	V	2.25	15	14.29	9.11	23.40	43.5	20.1
600.96	V	1.34	3	7.30	26.30	33.60	46.0	12.4
773.16	H	1.17	117	3.38	28.42	31.80	46.0	14.2
835.28	V	1.13	22	4.58	29.32	33.90	46.0	12.1

Table. Radiated Measurements at 3-meters

Notes: 1.All modes of operation were investigated.

And the worst-case emissions are reported.

2.All other emission is non-significant.

3.All readings are calibrated by self-mode in receiver.

4.Measurements using CISPR quasi-peak mode.

5.AFCL = Antenna factor and cable loss

6.H = Horizontal, V = Vertical Polarization

7. The limit for Class B digital device is 100uV(40dBuV) from 30MHz to 88MHz,
150 uV (43.5dBuV) from 88MHz to 216MHz, 200uV(46dBuV) from 216MHz to 960MHz
and 500 uV (54dBuV) from above 960MHz.

♣ Margin Calculation

(5) Margin = (4) Limit – (3) Actual

[(3) Actual = (1) Reading + (2) AFCL]