IST EMC LAB.

E M I S S I O N T E S T R E P O R T

Test report file No. : **02-IST-027/FB** Date of issue : Feb. 21, 2002.

Model / Type No. : AR-210

Kind of product : MP3 Player

Brand name : DUAL Play

Applicant : Hyun Won Inc.

Manufacturer : Hyun Won Inc.

Address : 333-1, Shindae-Ri, Kumho-Eup, Youngcheon-City, Kyoungbuk, Korea.

Test result according to the regulation(s)

■ Positive ☐ Negative

at page 3.

This test report without appendix consists of 20 pages.
It is not allowed to copy this report even partly without the allowance of the Test Laboratory.
This equipment is complied with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.

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DIRECTORY

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B) Test Data.

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TEST REGULATIONS

The tests were performed according to the following regulations ;

■ - FCC Part 15, Subpart B (Unintentional Radiators, Class B)

Information of Test Laboratory

IST EMC Lab.

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ENVIRONMENTAL CONDITIONS

Temperature	8
Humidity	46 %
Atmospheric pressure	1003 mbar

TEST CONDITIONS

The **measurement of the conducted emissions (Interference voltage)** was performed in a shielded room.

Test location :

☒ Shielded room. No.1 ☐ Compact chamber 2

Used testing instruments :

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESH 3	Test Receiver	Rohde & Schwarz	Jun. 16, 2001	861742/015
3725/2	LISN	EMCO	Jul. 30, 2001	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 26, 2001	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 13, 2001	357.8810.52

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement Procedures :

Conducted emissions measurments were made in accordance with ANSI C-63.4-1992, "Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The measurement were performed over the frequency range of 0.45MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to an EMI/Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an IF bandwidth of 10kHz or for "quasi-peak" within a bandwidth of 9kHz.

All used test-instruments as well as the test-accessories are calibrated regularly.

Test engineer :

Y.J.Kim / Research Engineer
IST EMC Lab.

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The **measurement of the radiated emissions (Electric field)** in the frequency range from 30 MHz to 1GHz was performed in horizontal and vertical antenna polarization at a open-site which meet the site attenuation requirement of ANSI C63.4-1992 and a test distance of :

Location :	☒ Open Site No. 1	☐ Open Site No. 2	☐ Open Site No. 3
Distance :	☒ 3 meters	☐ 10 meters	

Used testing instruments :

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVP	Test Receiver	Rohde & Schwarz	Jun. 12, 2001	861744/018
VULB 9160	Antenna	Schwarzbeck	Jun. 04, 2001	3048

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement procedures

Radiated measurements were in accordance with ANSI C63.4-1992 "Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The measurements were performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a EMI/Field Intensity Meter. The measurements were made with the detector set for "quasi-peak" within a bandwidth of 120kHz.

All used test-instruments as well as the test-accessories are calibrated regularly.

Test engineer :

Y.J.Kim / Research Engineer
IST EMC Lab.

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EQUIPMENT UNDER TEST

Equipment Description

The Equipment Under Test (EUT) is the **MP3 Player of Hyun Won Inc.**

Outer dimensions	100.4(W) x 63.8(H) x 12.0(D) (mm)
Weight	55g(including the batteries 66g)
Power requirements	DC 1.2V, Ni-Mn battery
Flash memory	64MB On-board(expandable to 256MB though) Multi Media Card(MMC) Slot
Singnal to Noise Ratio	90dB
Effective maximum output	5mW
Frequency Range	20Hz ~ 20kHz
PC Interface	USB(Universal Serial Bus)
File download speed	down to 2.5Mbps internal memory, 900Kbps MMC
PC OS	Windows 98, ME, 2000

EUT Type :

☒ Table-Top.
☐ Floor-Standing.
☐ Table-Top and Floor-Standing(Combination).

Operation – mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

☐ Standby.
☒ Operational Condition : - Download files from PC to EUT.
- Play

Configuration of the equipment under test :

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

Equipment	Type	Brand	Serial No
Laptop	ARMADA E500	COMPAQ	AE5 P3600T4X12DC6458
Mouse	M-S48a	HP	LZE01000039

Connecting Interface Cables :
- USB I/O cable(with core) : 1.5m
- Earphone cable : 0.85 m

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TEST RESULT

Download Mode :

Conducted emissions : 450 kHz - 30 MHz

The requirements are. ☒ KEPT ☐ NOT KEPT

Min. limit margin 9.8 dB at 14.0211 MHz

Remarks : See test-graph to be attached at pages 13~15.

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are. ☒ KEPT ☐ NOT KEPT

Min. limit margin 12.1 dB at 50.0 MHz

Remarks : See test-data at page 16~17.

Play Mode :

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are. ☒ KEPT ☐ NOT KEPT

Min. limit margin 13.5 dB at 372.2 MHz

Remarks : See test-data at page 18~19.

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Test Set-Up
(Type : AR-210, Mode: Download Mode)

Conducted emission 450kHz ~ 30MHz

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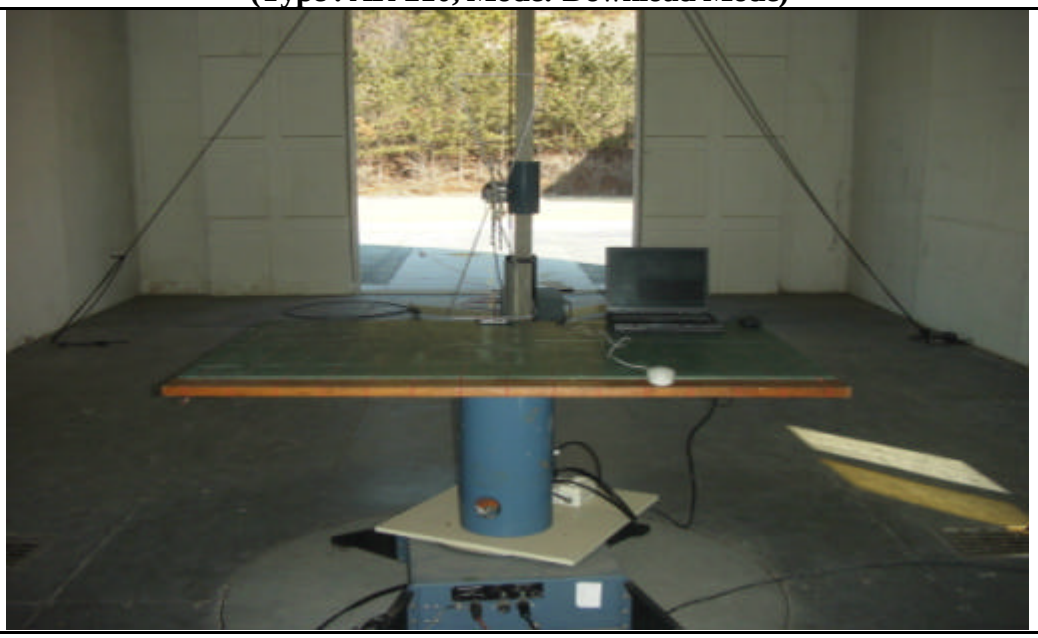
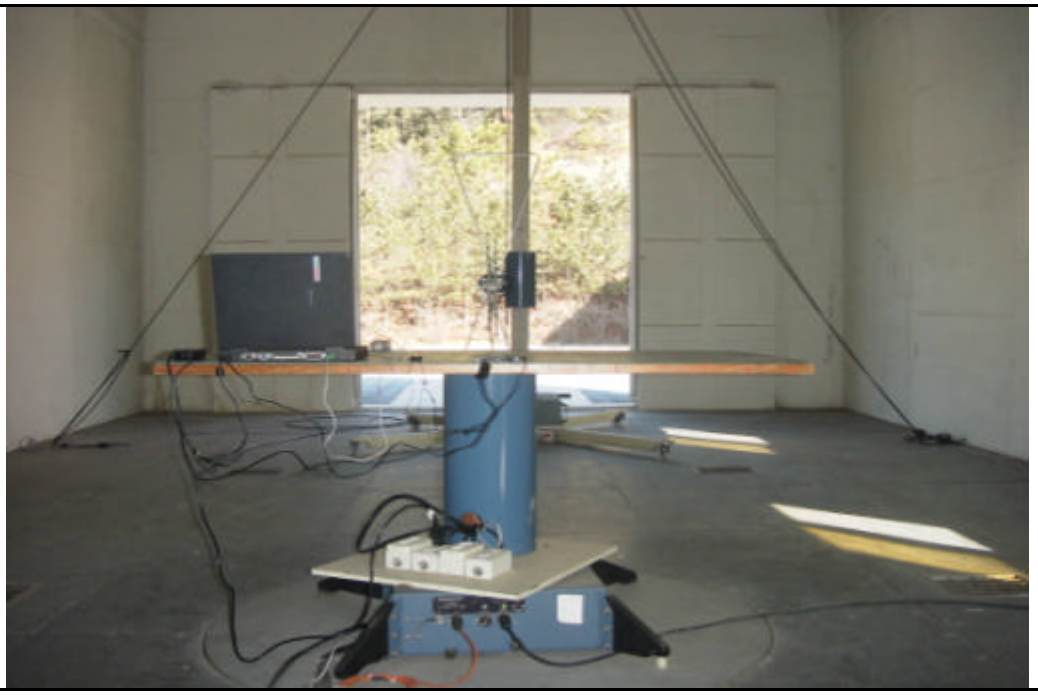
Test Set-Up
(Type : AR-210, Mode: Download Mode)



Radiated emission 30MHz ~ 1000MHz



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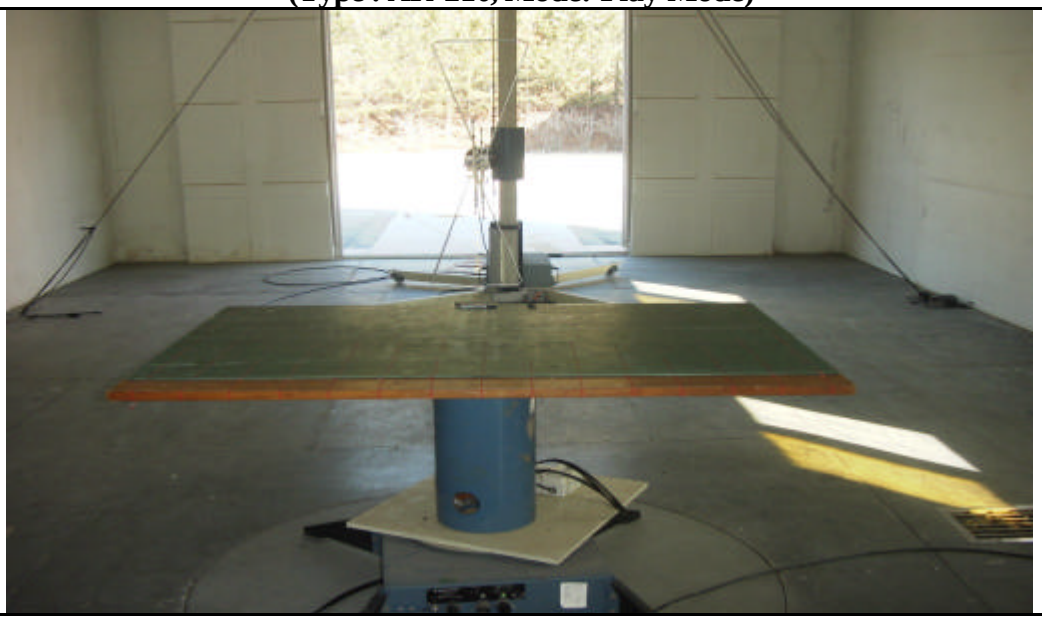
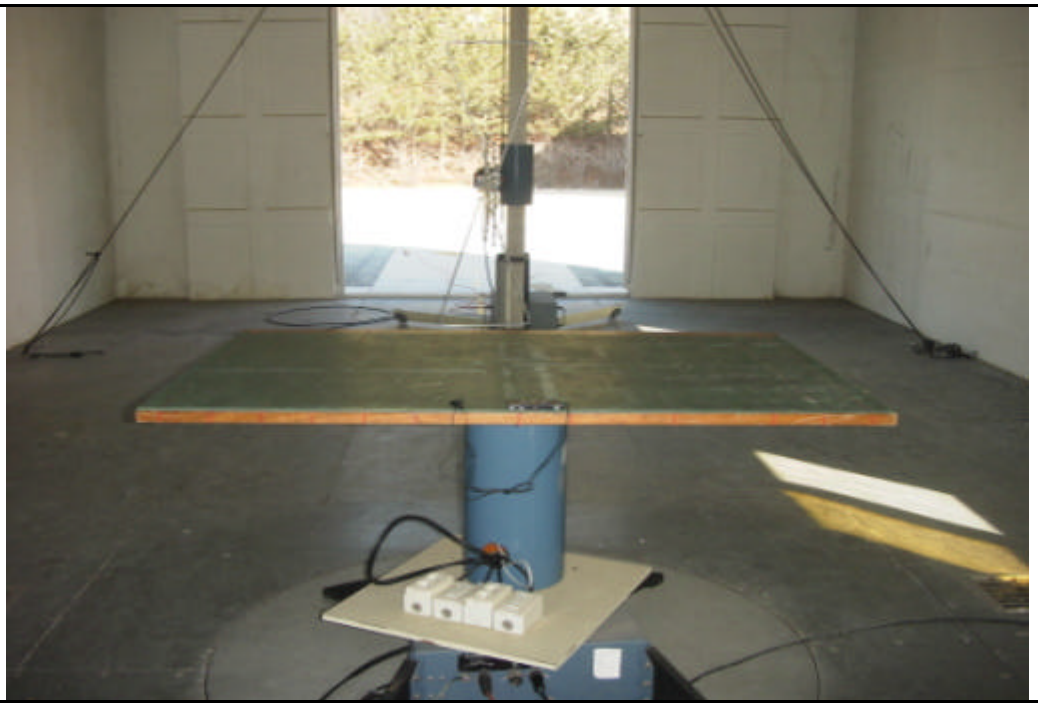
Test Set-Up
(Type : AR-210, Mode: Play Mode)



Radiated emission 30MHz ~ 1000MHz



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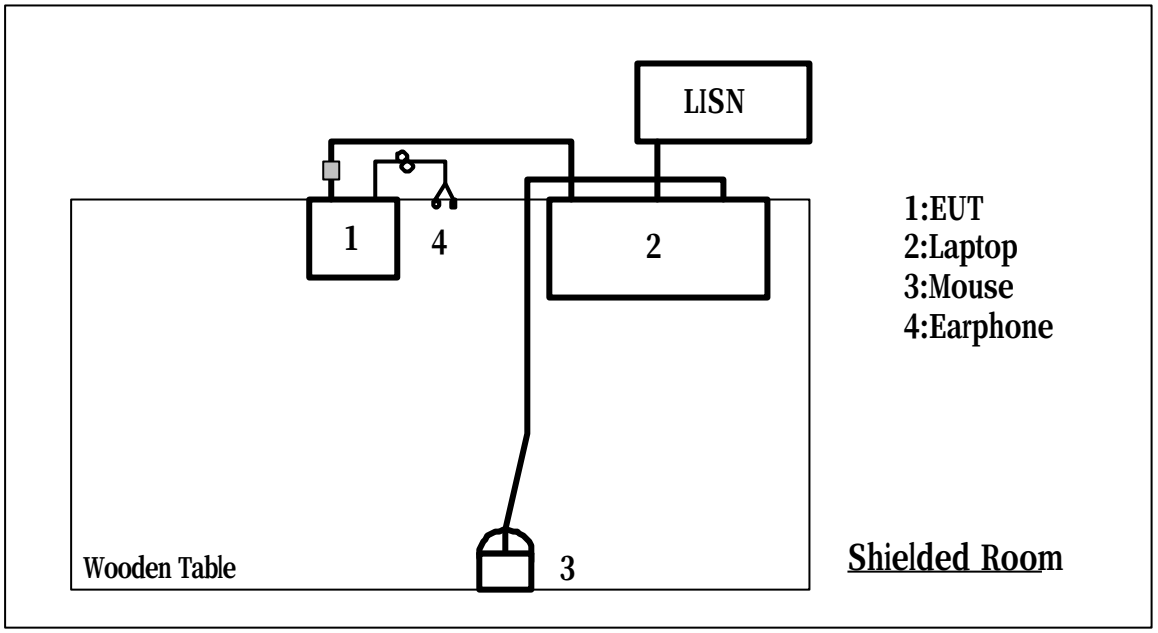
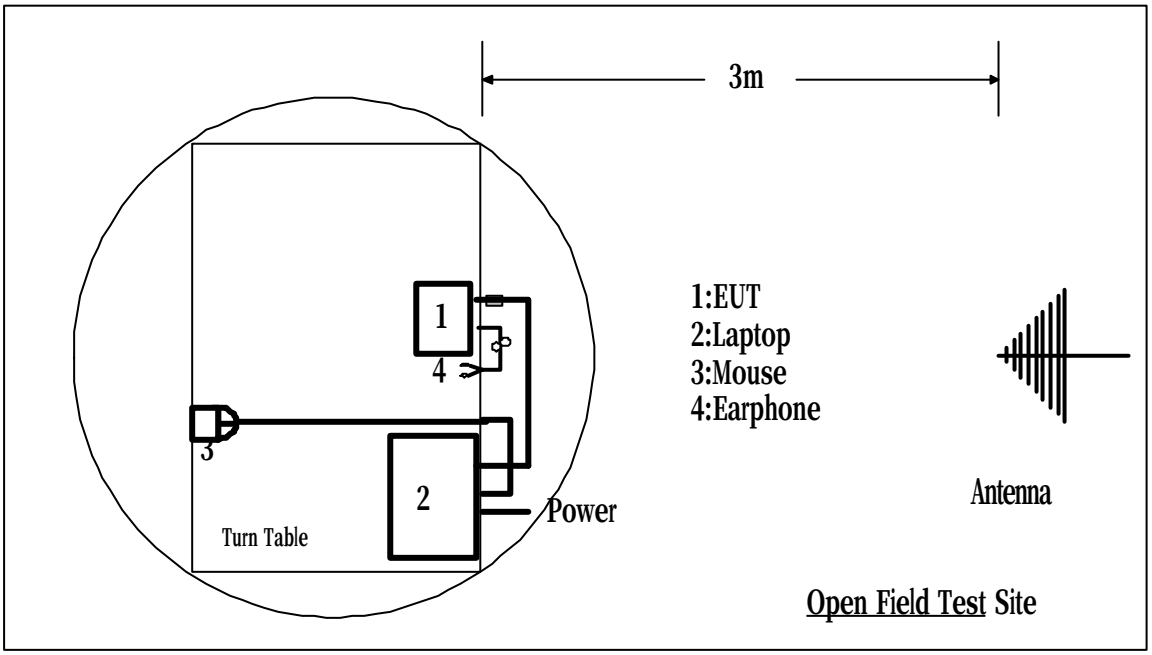
Test Set-Up
(Type : AR-210, Mode: Download Mode)



Picture 1 : Conducted emission 450kHz ~ 30MHz



Picture 2 : Radiated emission 30MHz ~ 1000MHz

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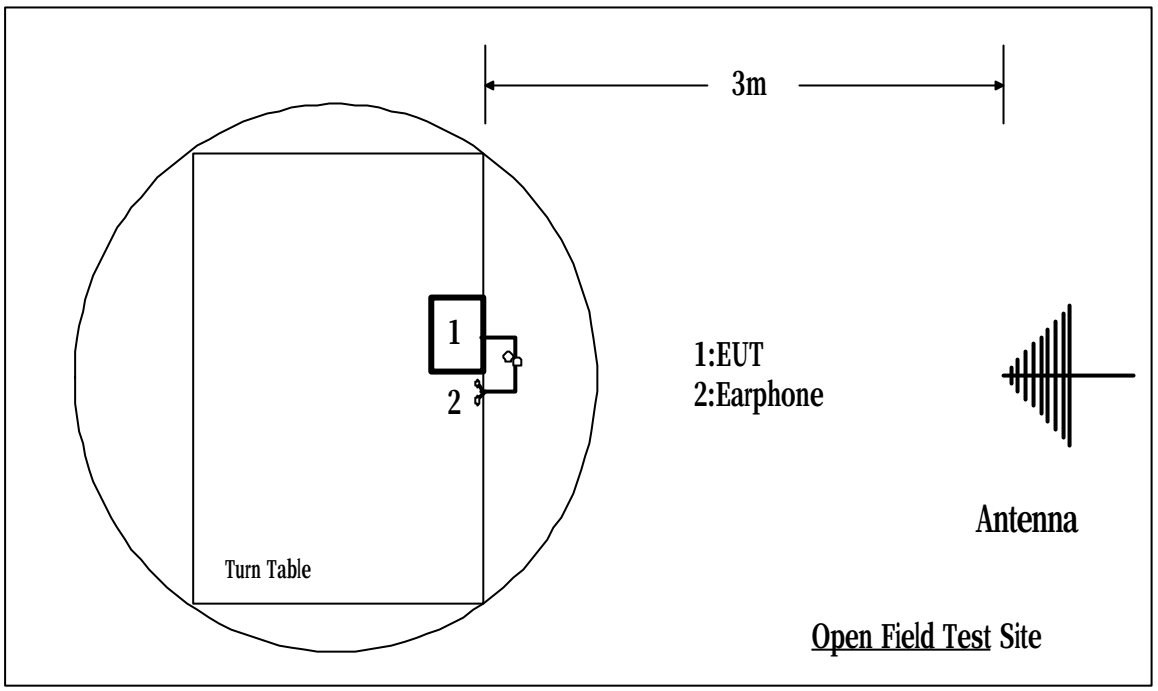
Test Set-Up
(Type : AR-210, Mode: Play Mode)



Picture 3 : Radiated emission 30MHz ~ 1000MHz

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Conducted Emission Test Data

Type : AR-210
Manufacturer : Hyun Won Inc.
Operation mode : Download files from PC to EUT
Date : Feb. 18, 2002

Frequency [MHz]	Reading [dBm V]	Insertion loss [dB]	Phase (L1/N)	Result [dBm V]	Limit [dBm V]	Margin [dB]
0.4802	22.7	0.8	L1	23.5	48.0	24.5
1.0210	20.9	0.8		21.7	48.0	26.3
5.0121	23.9	0.8		24.7	48.0	23.3
6.9373	24.1	0.8		24.9	48.0	23.7
14.0211	37.4	0.8		38.2	48.0	9.8
26.0789	21.0	0.8		21.8	48.0	26.2
1.4568	25.3	0.8	N	26.1	48.0	21.9
3.0784	26.7	0.8		27.5	48.0	20.5
4.0014	27.0	0.8		27.8	48.0	20.2
7.0007	28.6	0.8		29.4	48.0	18.6
7.8114	27.3	0.8		28.1	48.0	19.9
14.0219	37.0	0.8		37.8	48.0	10.2
Cable loss are less than 0.1 dB						

*L1 : Live Line
**N : Neutral Line
*** **Please refer to data graphs at page 14 ~ 15**

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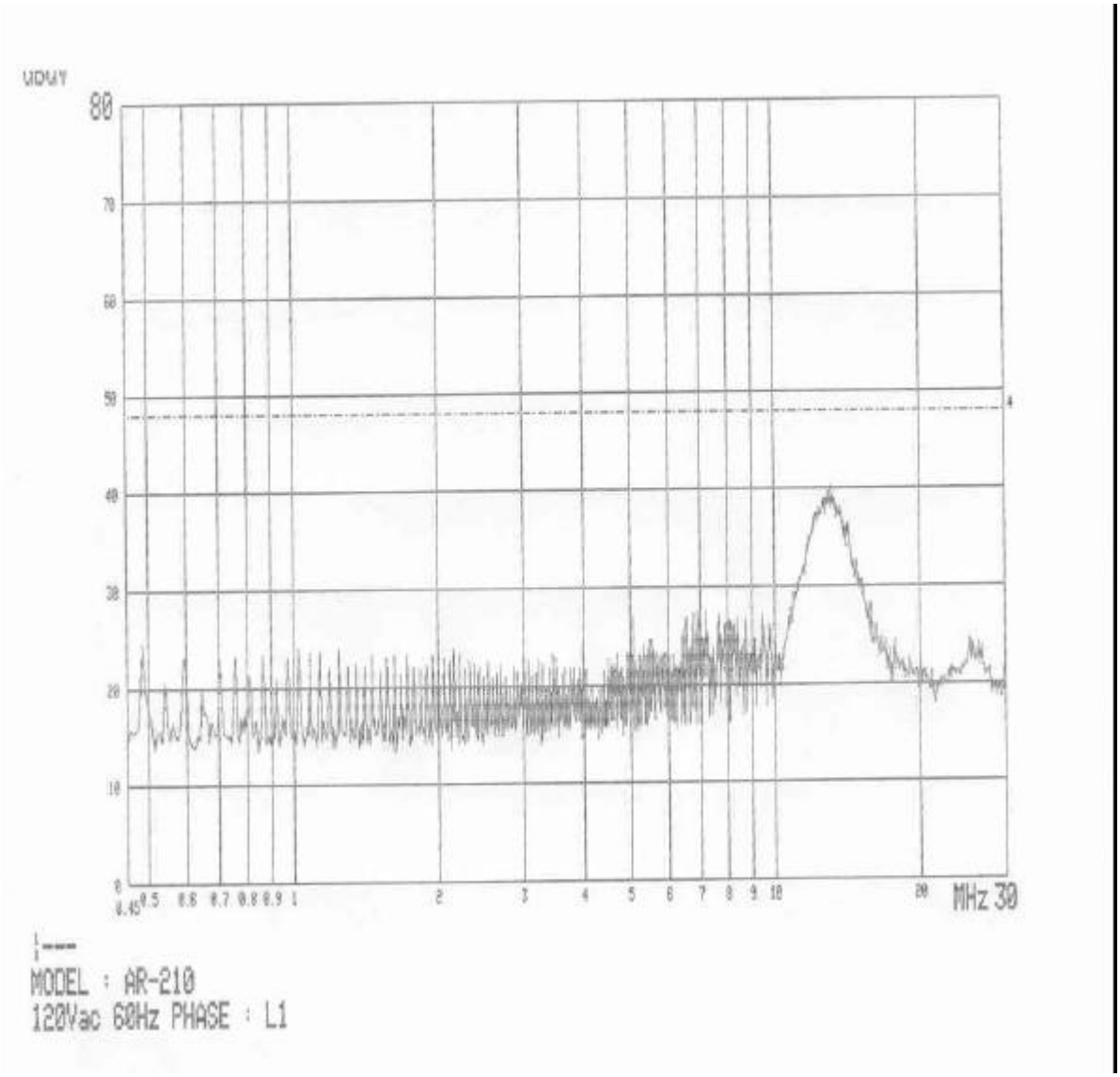

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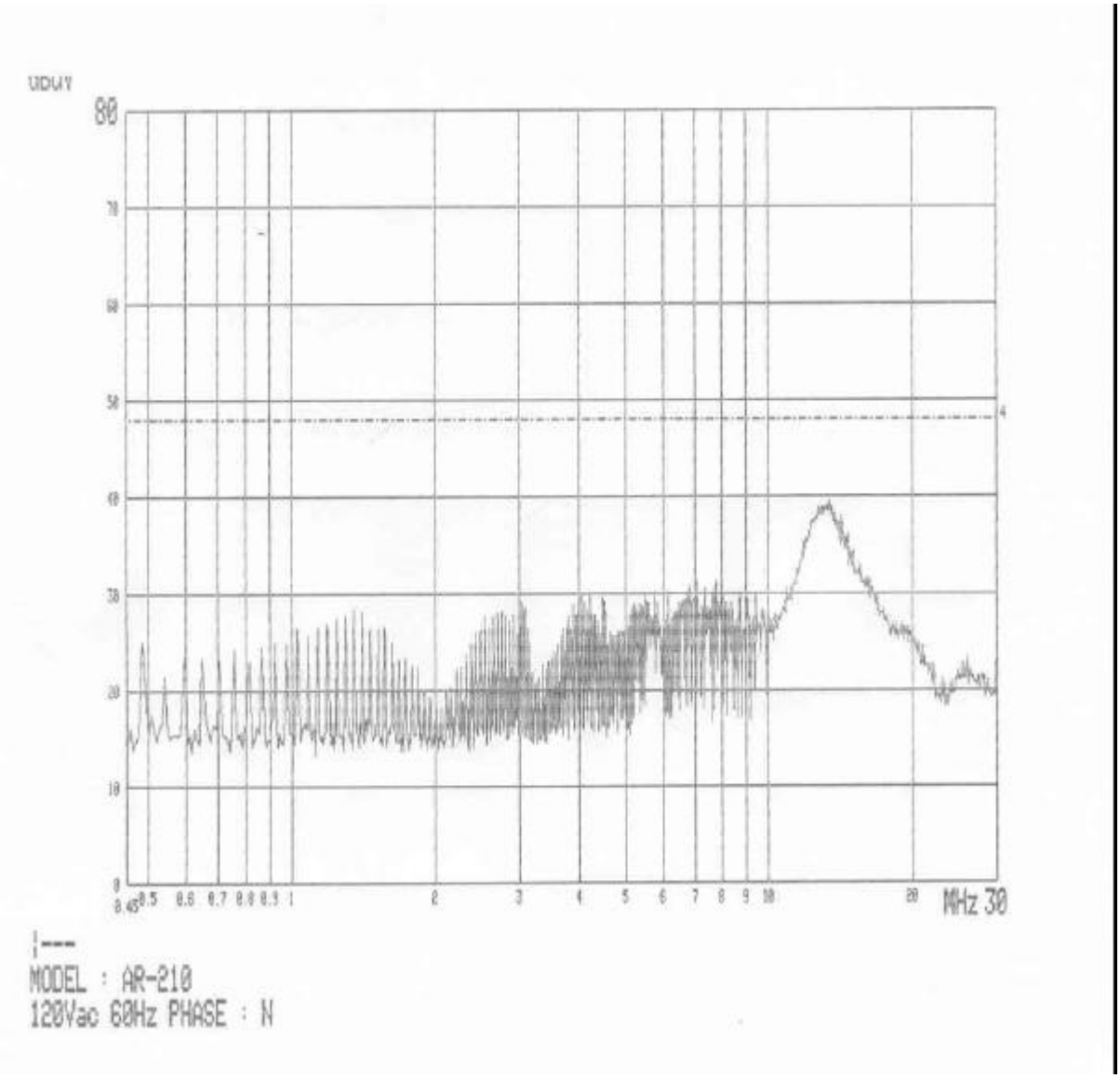

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Radiation Test Data

Type : AR-210
Manufacturer : Hyun Won Inc.
Operation mode : Download files from PC to EUT
Test distance : 3 m
Antenna : VULB9160
Date : Feb. 19, 2002.

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
50.0	16.0	10.6	1.3	178	112	V	27.9	40.0	12.1
72.1	14.0	9.4	1.6	6	131	V	25.0	40.0	15.0
113.9	10.4	9.6	1.9	164	129	V	21.9	43.5	21.6
123.9	14.5	10.3	2.1	181	134	V	26.9	43.5	16.6
222.0	16.0	8.5	2.8	177	224	H	27.3	46.0	18.7
276.2	16.1	11.7	3.1	180	267	H	30.9	46.0	15.1
320.1	10.1	11.7	3.4	170	241	H	25.2	46.0	20.8
359.0	13.7	11.7	3.6	2	284	H	29.0	46.0	17.0
372.2	14.0	12.1	3.7	355	254	H	29.8	46.0	16.2

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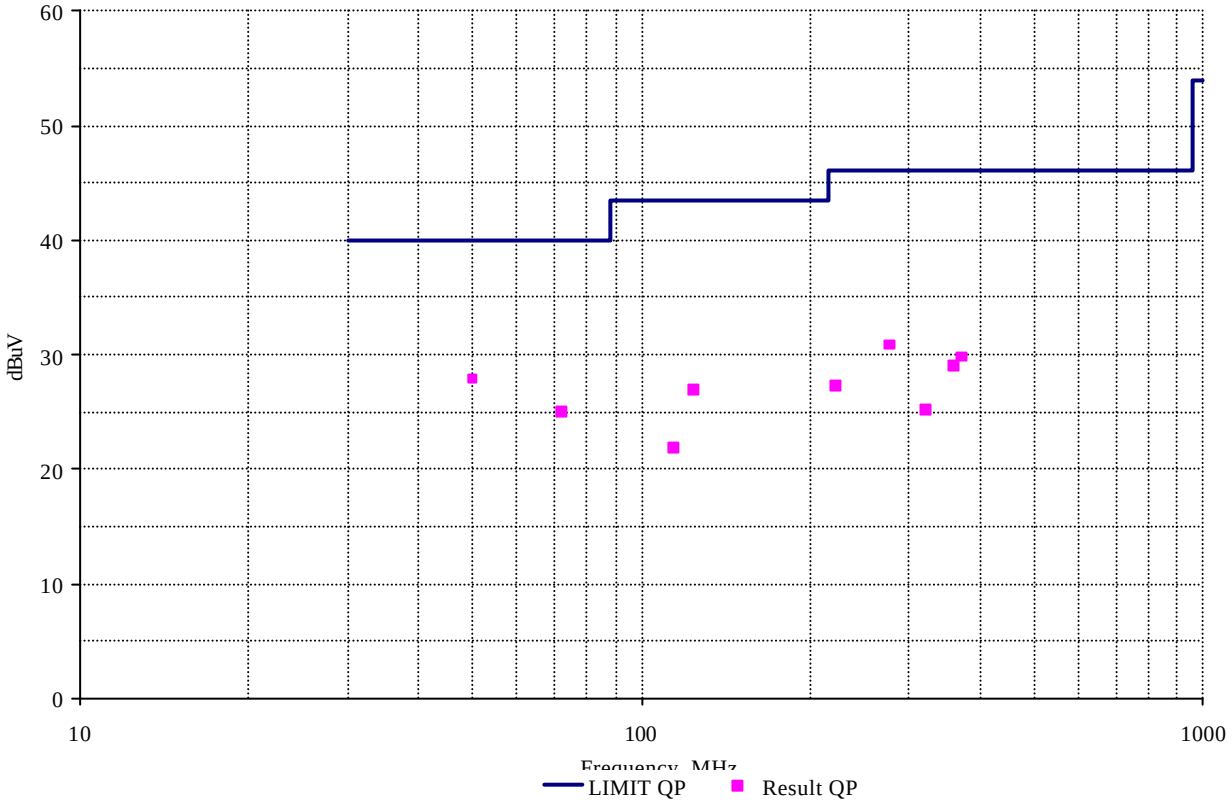
MEASUREMENT OF DISTURBANCE RADIATION



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Radiation Test Data

Type : AR-210
Manufacturer : Hyun Won Inc.
Operation mode : Play Mode
Test distance : 3 m
Antenna : VULB9160
Date : Feb. 19, 2002.

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
234.8	14.0	9.8	2.8	2	236	H	26.6	46.0	19.4
360.0	12.3	11.7	3.6	357	214	H	27.6	46.0	18.4
372.2	16.7	12.1	3.7	180	202	H	32.5	46.0	13.5
384.3	11.5	12.5	3.8	185	229	H	27.8	46.0	18.2

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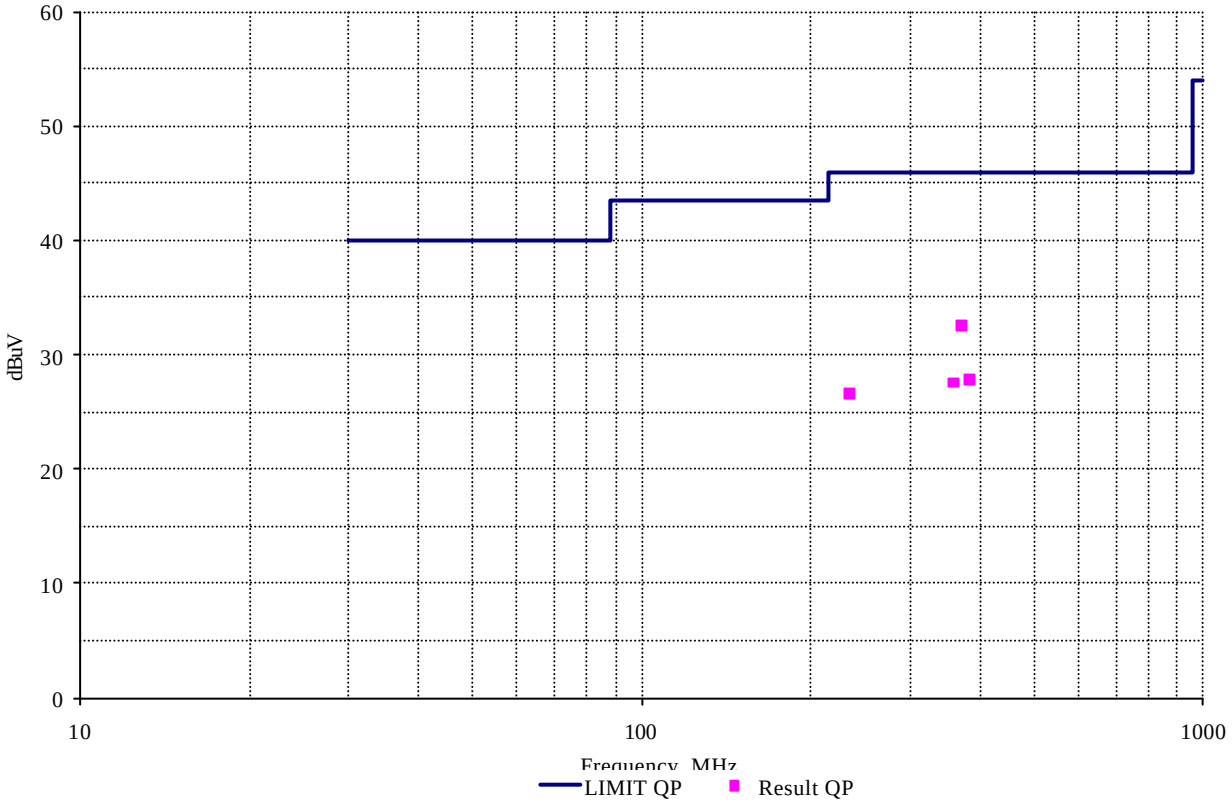
MEASUREMENT OF DISTURBANCE RADIATION



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SUMMARY

GENERAL REMARKS :

The equipment is not modified anything, mechanical or circuit to improve EMI status during a measurement and complied the regulation "Part 15 subpart B Class B of CFR 47"

FINAL JUDGMENT :

The requirements according to the technical regulations are

☒ Kept ☐ Not kept

The equipment under test does

☒ Fulfill the general approval requirements mentioned on page 3.
☐ Not fulfill the general approval requirements mentioned on page 3.

Begin of testing : Feb. 18, 2002

End of testing : Feb. 19, 2002

Reviewed by :

Joon H. Lee, EMC Manager
IST EMC Lab.

Approved by :

G. Chung, Chief of EMC Lab.

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