



ELECTROMAGNETIC RESEARCH INSTITUTE



EMI TEST REPORT

Emission of electromagnetic disturbance

Test Report No. : ERI-FCC04-0004
Equipment : DIGITAL AUDIO PLAYER
Name of basic model : ORC-300
Family model : None
Manufacturer : ORACOM Co., Ltd.
Applicant : ORACOM Co., Ltd.
Tested date : 2004.01.12
Issued date : 2004.01.15
Test results : PASS
Test Standards : FCC Part 15 Subpart B (Class B)
/digital devices & peripherals

Test Procedure and Items:

- AC Power line Conducted emissions measurement : ANSI C63.4-1992
- Radiated emissions measurement : ANSI C63.4-1992

Tested by: GWEON, HUR

Approved by: UK-CHO, RIM

The results in this report apply only to the sample tested.
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APPENDIX

(None)

1. CLIENT INFORMATION

The EUT has been tested by request of :

Company : ORACOM Co.,Ltd.
Address : #720, Osan-Dong, Osan, Kyungki-Do, Korea, 447-802
Name of contact : -
Telephone : +82-31-379-5008
Facsimile : +82-31-375-8978

2. LABORATORY INFORMATION

The 10m full-anechoic chamber and/or EMC facilities are used for these testing.
These facilities were accredited by KOLAS, EK, MIC of Korea and FCC of USA.

Address

ELECTROMAGNETIC RESEARCH INSTITUTE.

66-6, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

Telephone No. : +82-31-336-1186~7

Facsimile No. : +82-31-336-1184

Registered No.

KOLAS : 111

EK : J

MIC : KR0030

FCC Filing No. : 302567

3. EQUIPMENT UNDER TEST INFORMATION(EUT)

3.1 Identification of the EUT

Type of equipment : DIGITAL AUDIO PLAYER
Model name : ORC-300
Used clock : 11,2896MHz
Brand name : -
Manufacturer : ORACOM Co.,Ltd.
Address : #720, Osan-Dong, Osan, Kyungki-Do, Korea, 447-802
Telephone : +82-31-379-5008
Facsimile : +82-31-375-8978
Country of origin : KOREA
Rating : DC 1.5V

3.2 Additional information about the EUT

Class B, Family Models List: None

3.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT.

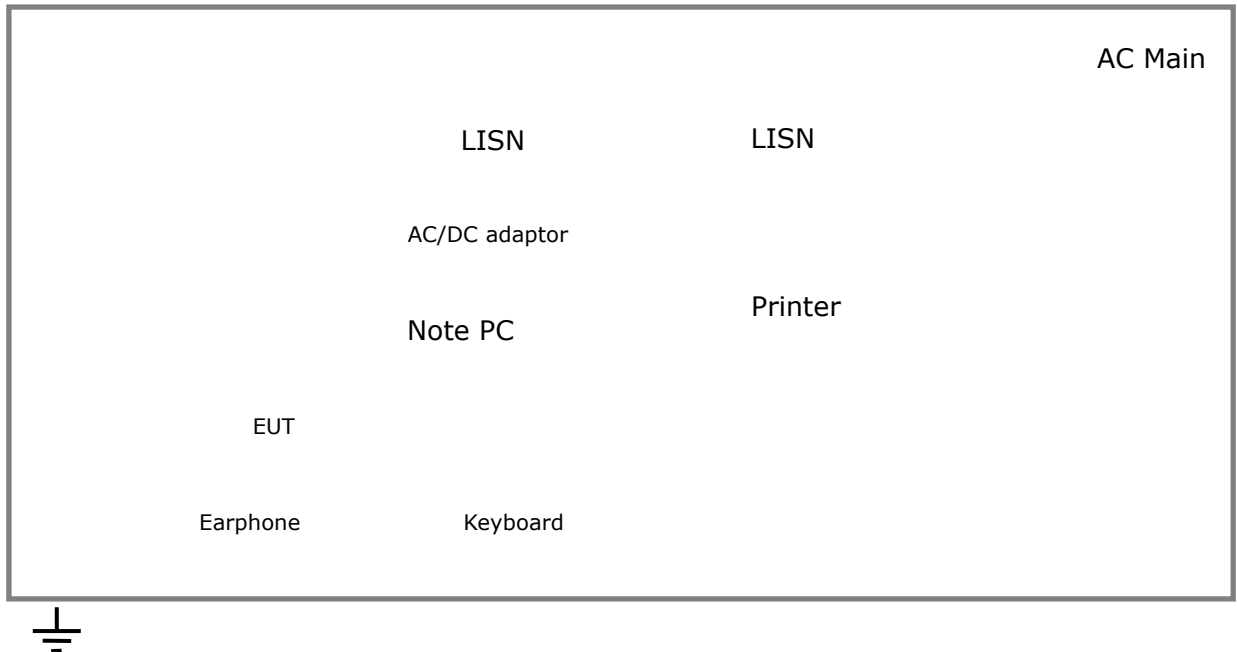
Description	Model No.	Serial No.	Manufacture
Printer	C6427A	CN13V1B1SZ	HP
Note pc	CM2080	5Y17JNZ9R892	LG
AC/DC adaptor	ADP-60DB	MJD012400851 6	DELTA ELECTRONICS Co., Ltd.
Keyboard	SDM4510UH	4M020619	SAMSUNG
Earphone	-	-	-

4. CONTINUOUS DISTURBANCE VOLTAGE, MAIN TERMINAL : Frequency range 0.15 MHz to 30 MHz

4.1 Operating environment

Temperature : 21.0 °C
Relative Humidity : 60.0 %

4.2 Test set-up and test procedures



The mains terminal disturbance voltage was measured with the equipment under test(EUT) in a shield room. The EUT was connected to an artificial mains network(LISN) placed on the floor. The EUT was placed on non-metallic table 0.4m above the metallic, grounded floor. The distance to other metallic surface was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

4.3 Operation Conditions

Upload mode

4.4 Test instrument

Instrument	Model No	Serial No.	Makers	Next cal.date	Used
Test receiver	ESCS30	100021	R&S	2005. 1. 24	x
L.I.S.N.	ESH3-Z5	827246/008	R&S	2004. 3. 19	x
	ESH3-Z5	831887/018	R&S	2004. 3. 19	x
Shield room	8 × 6 × 3.3m/H	-	-	-	x

4.5 Test results(Test mode: Upload mode)

Date of test: Jan 12, 2004

An overview sweep performed with peak detector & average detector are included in the report **as test reports.**

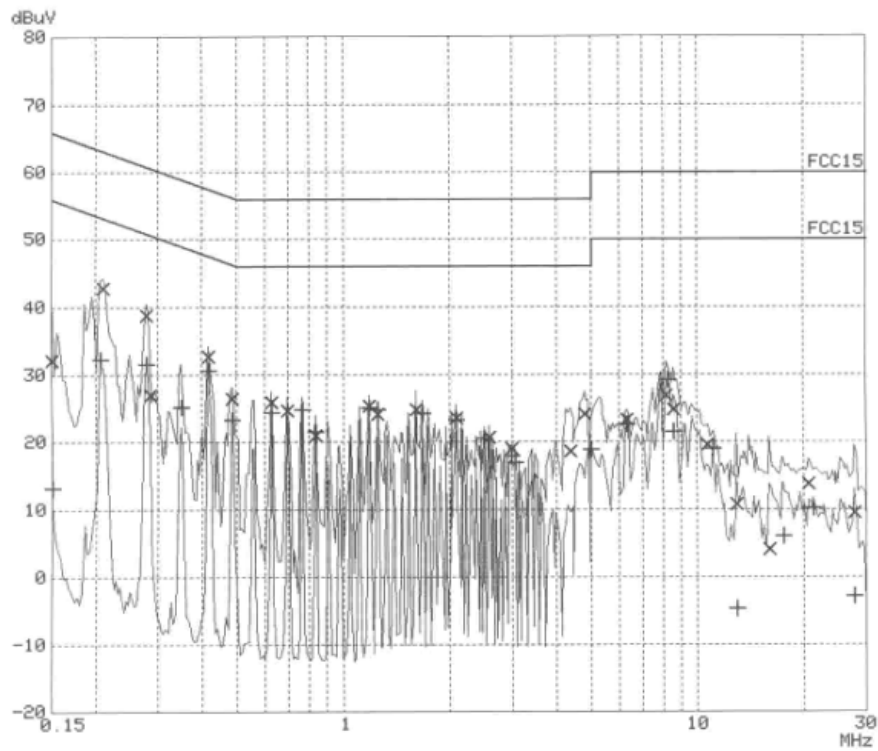
Frequency	Tested	LISN	Meter		Limits	
Range	Freq.		Reading			
			QP	AV	QP	AV
[MHz]	[MHz]		[dBuV]		[dBuV]	
0.15 - 30(MHz)	0.150	H	32.8	12.4	66.0	56.0
	0.210	N	42.8	32.0	63.1	53.1
	0.279	N	38.9	31.6	60.9	50.9
	0.348	H	29.8	25.3	59.0	49.0
	0.417	N	32.8	30.6	57.5	47.5
	0.627	N	26.0	24.4	56.0	46.0
	1.527	H	25.0	24.5	56.0	46.0
	4.800	N	24.2	23.3	56.0	46.0
	8.140	N	26.9	24.8	60.0	50.0
	26.32	H	22.7	32.0	60.0	50.0

<5 : mean less than 5dB

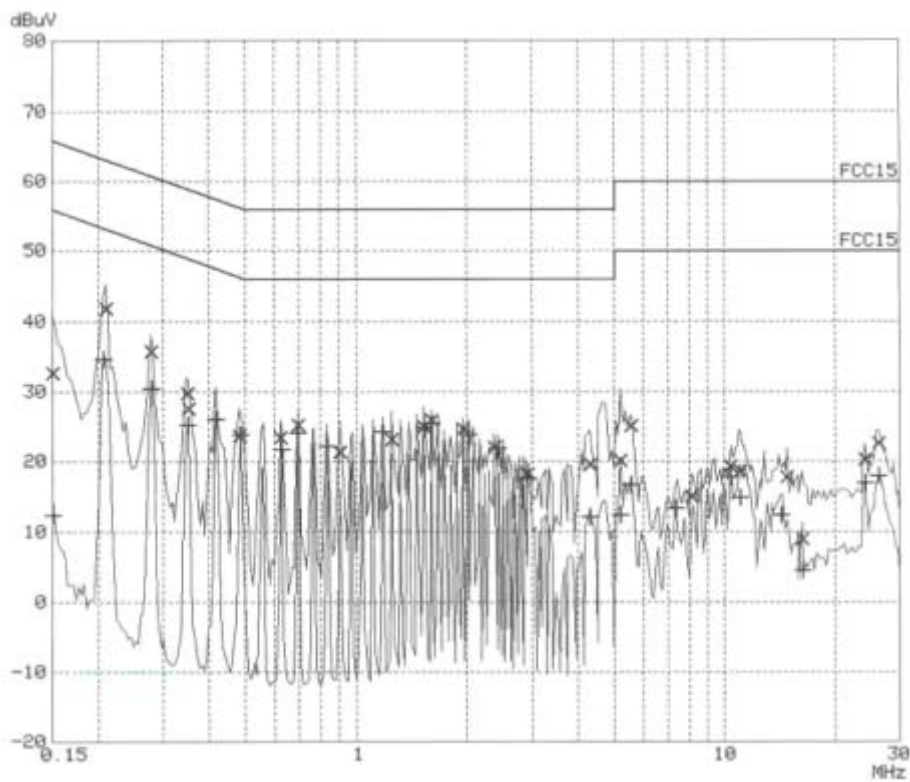
Other frequency keep over 20dB margin.

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.



[Live line]



[Neutral line]

5. RADIATED DISTURBANCE : 30MHz – 1000MHz

5.1 Operating environment

Temperature : 22.3 °C
Relative Humidity : 63.0 %

5.2 Test set-up

The frequency range investigated was 30 MHz to 1000 MHz.

All readings are quasi-peak unless stated otherwise.

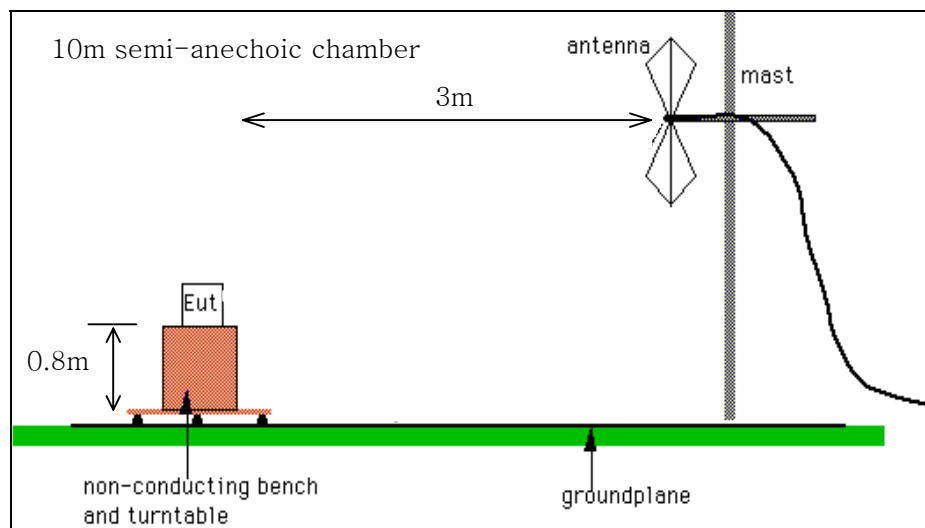
The half-wave dipole antenna was tuned to the frequency found during Preliminary radiated measurements. The EUT, support equipment and Interconnecting cables were re-configured to the set-up to the producing the Maximum emission for the frequency and were placed on top of a 0.8 meter High non-metallic 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.

And this device(EUT) was tested in 3 orthogonal planes.

The antenna measured both horizontal and vertical polarization.



<General test set-up for radiated emissions>

5.3 Operation Conditions

Upload mode, Download mode, RECmode, Playmode, Tuner & others

5.4 Test instrument

Instrument	Model No.	Serial No.	Makers	Next cal.date	Used
Test receiver	ESCS30	100021	R&S	2005. 1. 24	x
L.I.S.N.	ESH3-Z5	827246/008	R&S	2004. 3. 19	
	ESH3-Z5	831887/018	R&S	2004. 3. 19	
Biconical Antenna	VHA9103	91031950	Schwarzbeck	2005.01.24	x
Log-Periodic Antenna	UHALP9108A	0392	Schwarzbeck	2005.01.23	x
Antenna Mast	MA240	N/A	HD	-	x
Turn Table	DT430S	N/A	HD	-	x

5.5 Test results(Test mode: Upload mode)

Date of test: Jan 12, 2004

Freq (MHz)	Reading (dBuV/m)	Ant	AF (dB)	CL (dB)	Result (dBuV/m)	Limit (dB)	Margin (dB)
76.60	28.42	H	6.48	1.70	36.60	40.00	3.40
111.70	14.94	H	13.86	2.30	31.10	43.50	12.40
149.50	18.41	H	14.99	2.40	35.80	43.50	7.70
199.40	13.87	H	16.29	2.80	32.96	43.500	10.54
547.00	12.73	H	18.16	5.00	35.89	46.00	10.11
746.00	9.34	H	20.28	5.70	35.32	46.00	10.68

* Receiving Antenna Mode : **Horizontal, Vertical**

* <5 : mean less than 5dB

Note : Reading = Test Receiver meter, P= Polarization → POL H = Horizontal POL V = Vertical A = Angle, AF = Antenna Factor CL = Cable Loss Result = Field Strength(AF + CL+ Reading)

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.

5.6 Test results(Test mode: Download mode)

Date of test: Jan 12, 2004

Freq (MHz)	Reading (dBuV/m)	Ant	AF (dB)	CL (dB)	Result (dBuV/m)	Limit (dB)	Margin (dB)
76.60	23.22	H	6.48	1.70	31.40	40.00	8.60
106.30	21.10	H	11.00	2.00	34.10	43.50	9.40
146.10	16.00	H	14.70	2.40	33.10	43.50	10.40
199.40	13.31	H	16.29	2.80	32.40	43.50	11.10
398.00	15.83	H	15.87	4.20	35.90	46.00	10.10
498.00	13.86	H	17.34	4.30	35.50	46.00	10.50

* Receiving Antenna Mode : **Horizontal, Vertical**

* <5 : mean less than 5dB

Note : Reading = Test Receiver meter, P= Polarization → POL H = Horizontal POL V = Vertical A = Angle, AF = Antenna Factor CL = Cable Loss Result = Field Strength(AF + CL+ Reading)

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.

5.7 Test results(Test mode: REC mode)

Date of test: Jan 12, 2004

Freq (MHz)	Reading (dBuV/m)	Ant	AF (dB)	CL (dB)	Result (dBuV/m)	Limit (dB)	Margin (dB)
102.0	11.02	H	10.31	2.00	23.33	43.50	20.17
235.9	5.02	H	16.95	3.00	24.97	46.00	21.03
305.0	11.00	H	13.72	3.60	28.32	46.00	17.68
328.0	10.73	H	13.85	3.70	28.28	46.00	17.72
374.0	10.05	H	15.17	4.00	29.22	46.00	16.78
396.0	6.91	H	15.87	4.20	26.98	46.00	19.02
475.0	5.10	H	17.06	4.20	26.36	46.00	19.64

* Receiving Antenna Mode : **Horizontal, Vertical**

* <5 : mean less than 5dB

Note : Reading = Test Receiver meter, P= Polarization → POL H = Horizontal POL V = Vertical A = Angle, AF = Antenna Factor CL = Cable Loss Result = Field Strength(AF + CL+ Reading)

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.

5.8 Test results(Test mode: Play mode)

Date of test: Jan 12, 2004

Freq (MHz)	Reading (dBuV/m)	Ant	AF (dB)	CL (dB)	Result (dBuV/m)	Limit (dB)	Margin (dB)
102.2	10.01	H	10.32	2.00	22.33	43.5	21.17
226.4	6.27	V	16.8	2.90	25.97	46.0	20.03
235.9	5.02	H	16.95	3.00	24.97	46.0	21.03
305.0	11.03	H	13.69	3.60	28.32	46.0	17.68
351.0	9.34	H	14.31	3.80	27.45	46.0	18.55
374.0	10.05	V	15.17	4.00	29.22	46.0	16.78
396.0	7.71	H	15.17	4.10	26.98	46.0	19.02
419.0	7.69	H	15.95	4.20	27.84	46.0	18.16

* Receiving Antenna Mode : **Horizontal, Vertical**

* <5 : mean less than 5dB

Note : Reading = Test Receiver meter, P= Polarization → POL H = Horizontal POL V = Vertical A = Angle, AF = Antenna Factor CL = Cable Loss Result = Field Strength(AF + CL+ Reading)

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.

5.9 Test results < Test mode: FM tuner >

Date of test: Jan 12, 2004

T.	Tested	Meter Reading (quasi-peak)		Limits	Total Loss	Margins	
Frequency	Frequency	H	V			H	V
[MHz]	[MHz]	[dBuV/m]	[dBuV/m]			[dBuV/m]	[dBuV/m]
87.5	98.2	6.5	6.1	43.5	11.9	25.1	25.5
	196.4	5.9	-	43.5	17.8	19.8	-
	294.6	-	6.8	46.0	24.3	-	14.9
	392.8	-	-	46.0	21.4	-	-
	491.0	-	-	46.0	23.9	-	-
	589.2	-	-	46.0	26.2	-	-
	687.4	-	-	46.0	28.7	-	-
	785.6	-	-	46.0	30.0	-	-
	883.8	-	-	46.0	31.9	-	-
	982.0	-	-	54.0	33.1	-	-
98.0	108.7	-	-	43.5	12.7	-	-
	217.4	7.8	6.2	46.0	18.9	19.3	20.9
	326.1	-	6.1	46.0	18.9	-	-
	434.8	-	-	46.0	22.4	-	-
	543.5	-	-	46.0	25.2	-	-
	652.2	-	-	46.0	27.5	-	-
	760.9	-	-	46.0	29.7	-	-
	869.6	-	-	46.0	31.8	-	-
	978.3	-	-	54.0	33.0	-	-
108.0	118.7	6.2	6.4	43.5	13.7	23.6	23.4
	237.4	-	-	46.0	19.0	-	-
	356.1	5.8	-	46.0	20.1	20.1	-
	474.8	-	-	46.0	23.4	-	-
	593.5	-	-	46.0	26.3	-	-
	712.2	-	-	46.0	29.1	-	-
	830.9	-	-	46.0	30.7	-	-
	949.6	-	-	46.0	32.1	-	-

* Meter reading: **Loss exclude**
 * Margins : **[Limits] - meter reading**
 * Receiving Antenna Mode: **Horizontal, Vertical**
 * 10m chamber
 * <5 : mean less than 5dB
 * **Measurement uncertainty** (K=2)
 30-300MHz : +3.96dB / -4.04dB
 300-1000MHz : +3.04dB / -3.00dB

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.

Others

Date of test: Jan 12, 2004

Tested Frequency	ANT Pol.	Meter Reading	Antenna Factor	Cable Loss	Results	Limits
[MHz]		[A] [dBuV/m]	[B] [dB]	[C] [dB]	[A+B+C] [dBuV/m]	[dBuV/m]
196.70	H	7.41	16.35	2.80	26.56	43.50
236.60	H	9.26	17.06	3.10	29.42	46.00
337.00	H	6.49	14.12	3.80	24.41	46.00
433.00	H	13.89	16.48	4.20	34.57	46.00
473.00	H	5.82	17.05	4.30	27.17	46.00
498.00	H	6.56	17.34	4.30	28.20	46.00

* Receiving Antenna Mode : **Horizontal, Vertical**

* Test distance: **3m** (10m Anechoic Chamber)

* <5 : mean less than 5dB

Note : Reading = Test Receiver meter, P= Polarization → POL H = Horizontal
POL V = Vertical A = Angle, AF = Antenna Factor CL = Cable Loss Result =
Field Strength(AF + CL+ Reading)

Result: Pass

The measured emissions level of the EUT have found the below of the specified limit.