TEST REPORT

Report Number	:	ETLE100630.0236	Report issue date:	November 22, 2010

Model / Serial No.	:	W2-310-2 / NONE
Multiple Model Name	:	W2-300, W2-310-1
Product Type	:	Bottled Water Cooler
Brand Name	:	HYUNDAI
Applicant	:	HYUNDAI Wacor Tec Co., Ltd.
Address	:	684-49, Gongreung-Dong, Nowon-Ku, Seoul, Korea
Manufacturer	:	HYUNDAI Wacor Tec Co., Ltd.
Address	:	684-49, Gongreung-Dong, Nowon-Ku, Seoul, Korea
Test Standard(s)	:	J55014-1(H20) CISPR14-1: 1993 + A1: 1996
Test Result	:	■ **Positive**
Total pages including Attachments	:	32

Prepared by:	Reviewed by:
Jae Young, Kwon (Test Engineer)	Yo Han, Park (Chief Engineer)
November 22, 2010	November 22, 2010

ETL Inc.
371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
Tel : 82-2-858-0786 Fax : 82-2-858-0788

DIRECTORY

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

TEST STANDARD(S)

The emc tests were performed according to the following standards:

- J55014-1(H20)
- CISPR14-1: 1993 + A1: 1996

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

ADDRESS OF THE TEST LABORATORY

■ **Seoul EMC Laboratory**

#371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea

☐ **Hwaseong Open Area Test Site**

#499-1, Sagot-ri, Seosin-myeon, Hwaseong-si, Gyeonggi-do, 445-882, Korea

ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

Temperature	:	15 °C - 35 °C
Humidity	:	30 %R.H. - 60 %R.H.
Atmospheric Pressure	:	86 kPa - 106 kPa

POWER SUPPLY SYSTEM UTILIZED

Power supply system ■ AC 100 V; 50 Hz/60 Hz; 2.0 A (Cold); 400 W (Hot)

SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)

Number of received / tested samples: **1 / 1**

Serial Number: none

VOLTAGE RANGE TEST

Preliminary test has been performed with voltage conditions of from 100 V (50 Hz / 60 Hz) at the frequencies of 160 kHz and 50 MHz to determine maximum disturbance voltage condition.
A test at about 160 kHz and at about 50 MHz shall be made over a range of 0.9 to 1.1 times the rated voltage in order to check whether the level of disturbance varies considerably with the supply voltage.
The frequencies of 160 kHz measurement result is maximum disturbance voltage condition.
But the frequency of 50 MHz measurement result is no maximum disturbance voltage condition. So conducted emissions test condition is AC 110 V, 50 Hz and AC 110 V, 60 Hz. And discontinuous disturbance emissions test condition is normal AC 110 V, 50 Hz and AC 110 V, 60 Hz

DEFINITIONS FOR SYMBOLS USED IN THIS TEST REPORT

■ The black square indicates that the listed condition, standard or equipment is applicable for this report.

☐ Blank box indicates that the listed condition, standard or equipment was not applicable for this report.

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Conducted Emission (Interference Voltage) Test

Conducted emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz on the 110 V AC power and return leads of the EUT according to the methods defined in J55014-1(H20).
The EUT was floor-standing arrangement. The EUT was placed on the horizontal ground reference plane, orientated for normal use, but separated from metallic contact with the ground reference plane of insulation.

☐ **Test not applicable**

■ Test area - shielded room
☐ Anechoic chamber
☐ Full compact chamber

Used test instruments and test accessories please see Attachment B.

Type	Frequency Range [MHz]	Quasi-Peak limit [dB(㎶)]	Average limit [dB(㎶)]
Mains terminals	0.15 to 0.5	66 to 56	59 to 46
	0.5 to 5	56	46
	5 to 30	60	50

■ **Pass** ☐ **Fail**

Minimum limit margin	23.57	dB	at	0.779	MHz
Maximum limit exceeding		dB	at		MHz

Remarks: Please refer to the test data and graph in Attachment A.

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Disturbance Power Emissions Test

Disturbance power emissions form 30 MHz to 300 MHz were measured with a bandwidth of 120 kHz according to the methods defines in J55014-1(H20).
The EUT was placed on a nonmetallic stand in a shielded room, 0.8 m above the ground plane.

☐ **Test not applicable**

■ Test area - compact chamber

Used test instruments and test accessories please see Attachment B.

Type	Frequency Range [MHz]	Quasi-Peak limit [dB(pW)]	Average limit [dB(pW)]
Household	30 - 300	45 - 55	35 - 45

■ **Pass** ☐ **Fail**

Minimum limit margin	11.23	dB	at	130.100	MHz
Maximum limit exceeding		dB	at		MHz

Remarks: Please refer to the test data and graph in Attachment A.

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Discontinuous Disturbance Emissions Test

Discontinuous disturbance emissions form 148.5 kHz to 30 MHz were measured with a bandwidth of 9 kHz according to the methods defines in J55014-1(H20).

The EUT was floor-standing arrangement. The EUT was placed on the horizontal ground reference plane, orientated for normal use, but separated from metallic contact with the ground reference plane of insulation.

☐ **Test not applicable**

■ Test area - shielded room

Used test instruments and test accessories please see Attachment B.

■ **Pass** ☐ **Fail**

Remarks: Please refer to the test data in Attachment A.

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Equipment Under Test (EUT) Test Operation Mode:

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

■ Standby mode

■ During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically

Configuration of the equipment under test:

■ See constructional data form in Attachment D - Page D2

☐ See product information form(s) in Attachment D - Page D3

The following devices and interface cables were connected during the testing:

Peripheral devices

	Type	Model	Serial No.	Manufacturer
☐	-	-	-	-

Type of Cables Used

Device from	Device to	Type of Cable(Port)	Length[m]	Type of shield
EUT	Power socket	AC Input	1.5	Unshielded

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

GENERAL REMARKS:

The Equipment Under Test (EUT) is the Bottled Water Cooler (model: W2-310-2)

The model W2-310-2 is basic model that was tested.

The multi model W2-300 is identical to basic model, except for model designation, external design and dimension.

The multi model W2-310-1 is identical to basic model, except for model designation and dimension.

Model	Dimension
W2-310-2 (Basic model)	310 mm (W) x 310 mm (D) x 1 090 mm (H)
W2-300	310 mm (W) x 310 mm (D) x 970 mm (H)
W2-310-1	310 mm (W) x 310 mm (D) x 970 mm (H)

SUMMARY:

All tests according to the regulations cited on page 3 were

■ Performed

☐ **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements cited on page 3.

☐ - **Does not** fulfill the general approval requirements cited on page 3.

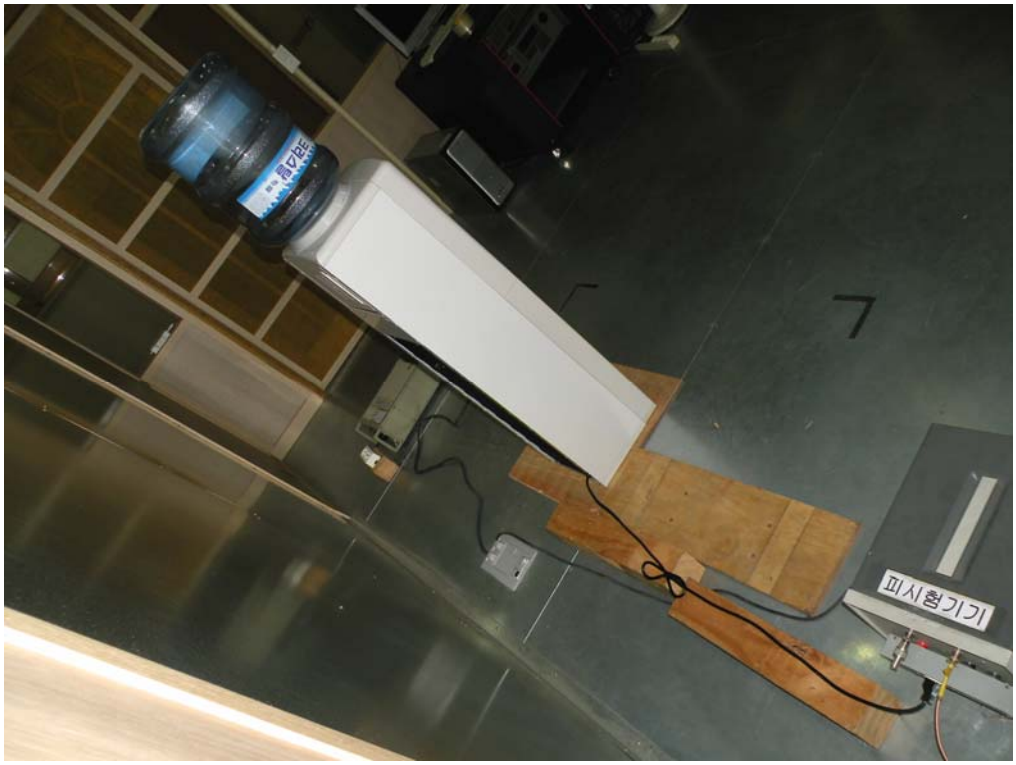
Date of receipt of test sample: June 30, 2010

Test start date: August 12, 2010

Test end date: August 13, 2010

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Photograph of test setup: Conducted emissions 150 kHz - 30 MHz



Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Photograph of test setup: Disturbance Power

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Photograph of test setup: Discontinuous Disturbance

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Attachment A

Test Data

and

Test Setup Drawing(s)

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Conducted Emissions Measurement

EUT	Bottled Water Cooler / W2-310-2 (S/N: N/A)
Limit apply to	J55014-1(H20)
Test Date	August 12, 2010
Operating Condition	During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically
Operating Spec.	110 V, 50 Hz
Result	Passed by 23.57 dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 9 kHz)

Frequency [MHz]	Result [dB(μV)]		Phase (*H/**N)	Limit [dB(μV)]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0.194	32.91	-	H	63.86	-	30.95	-
0.217	28.30	-	H	62.93	-	34.63	-
0.285	31.43	-	H	60.67	-	29.24	-
0.657	29.79	-	H	56.00	-	26.21	-
0.718	28.25	-	N	56.00	-	27.75	-
0.779	32.43	-	H	56.00	-	23.57	-
9.380	26.82	-	H	60.00	-	33.18	-
16.070	31.68	-	H	60.00	-	28.32	-
24.100	25.85	-	N	60.00	-	34.15	-

NOTES:

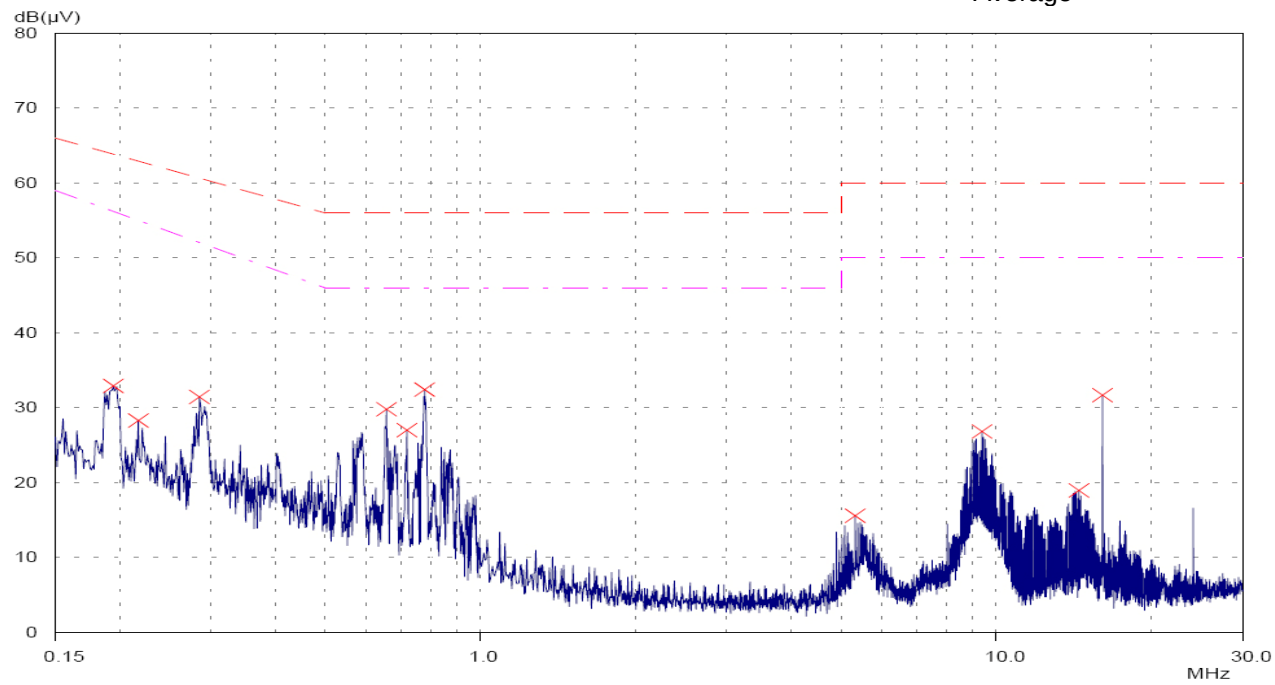
1. *** H : HOT Line , **N : Neutral Line**
2. **Margin value = Limit – Result**
3. **All conditions were investigated and the worst-case emissions are reported.**
4. **If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.**

Jae Young, Kwon
Test Engineer

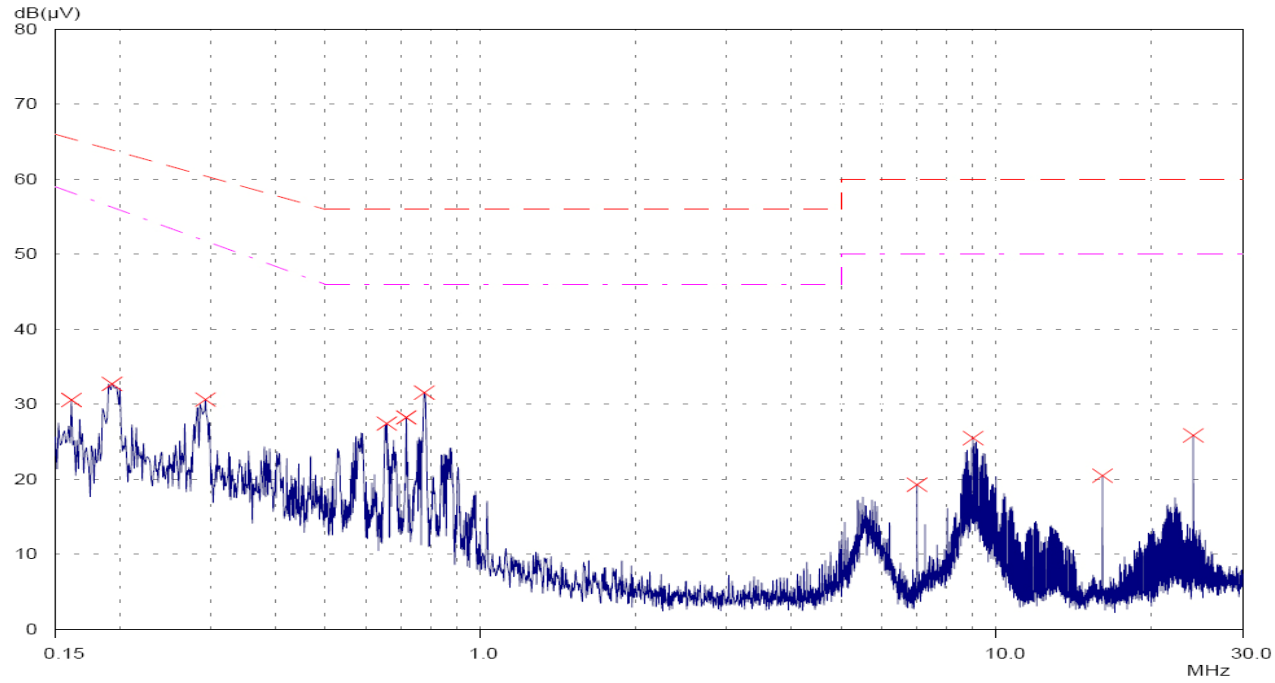
Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Line Polarity : Hot

Limit : Quasi-Peak
Average



Line Polarity : Neutral



Quasi-peak

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

EUT	Bottled Water Cooler / W2-310-2 (S/N: N/A)
Limit apply to	J55014-1(H20)
Test Date	August 12, 2010
Operating Condition	During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically
Operating Spec.	110 V, 60 Hz
Result	Passed by 23.78 dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 9 kHz)

Frequency [MHz]	Result [dB(μV)]		Phase (*H/**N)	Limit [dB(μV)]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0.173	29.62	-	N	64.82	-	35.20	-
0.193	34.19	-	N	63.91	-	29.72	-
0.284	31.91	-	H	60.70	-	28.79	-
0.656	27.74	-	H	56.00	-	28.26	-
0.780	32.22	-	N	56.00	-	23.78	-
0.846	27.78	-	N	56.00	-	28.22	-
9.440	26.50	-	H	60.00	-	33.50	-
16.070	31.33	-	H	60.00	-	28.67	-
24.100	25.85	-	N	60.00	-	34.15	-

NOTES:

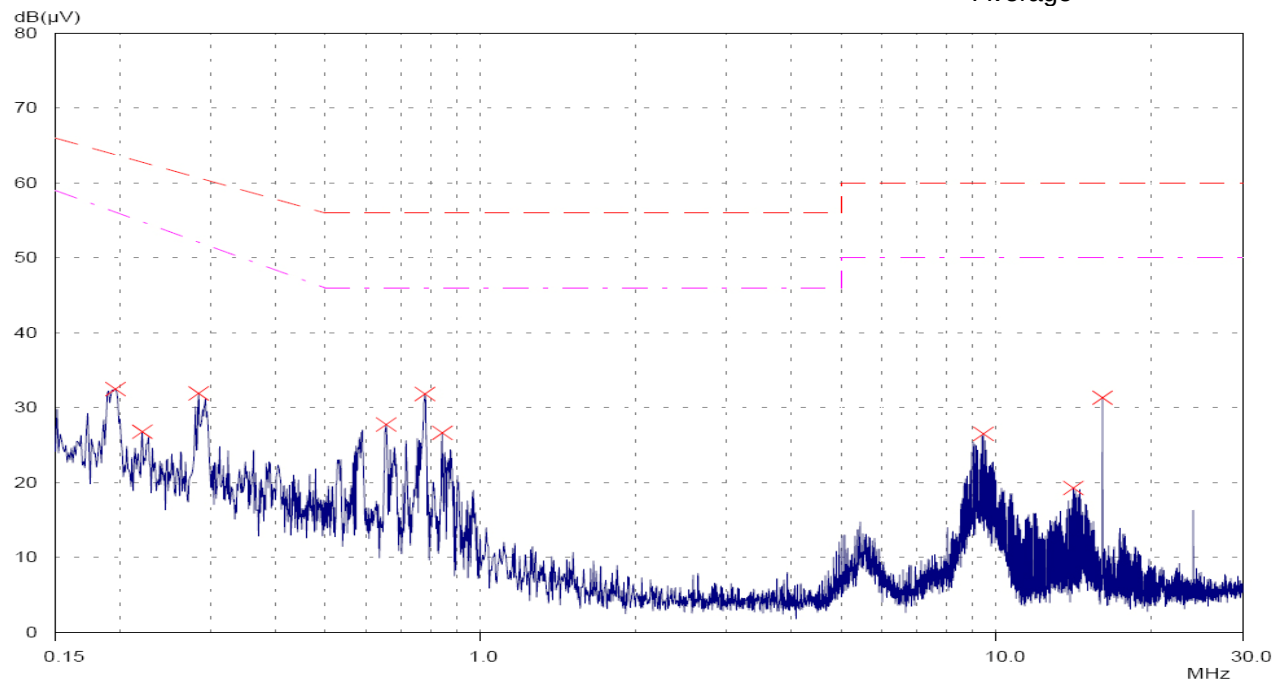
1. *** H : HOT Line , **N : Neutral Line**
2. **Margin value = Limit – Result**
3. **All conditions were investigated and the worst-case emissions are reported.**
4. **If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.**

Jae Young, Kwon
Test Engineer

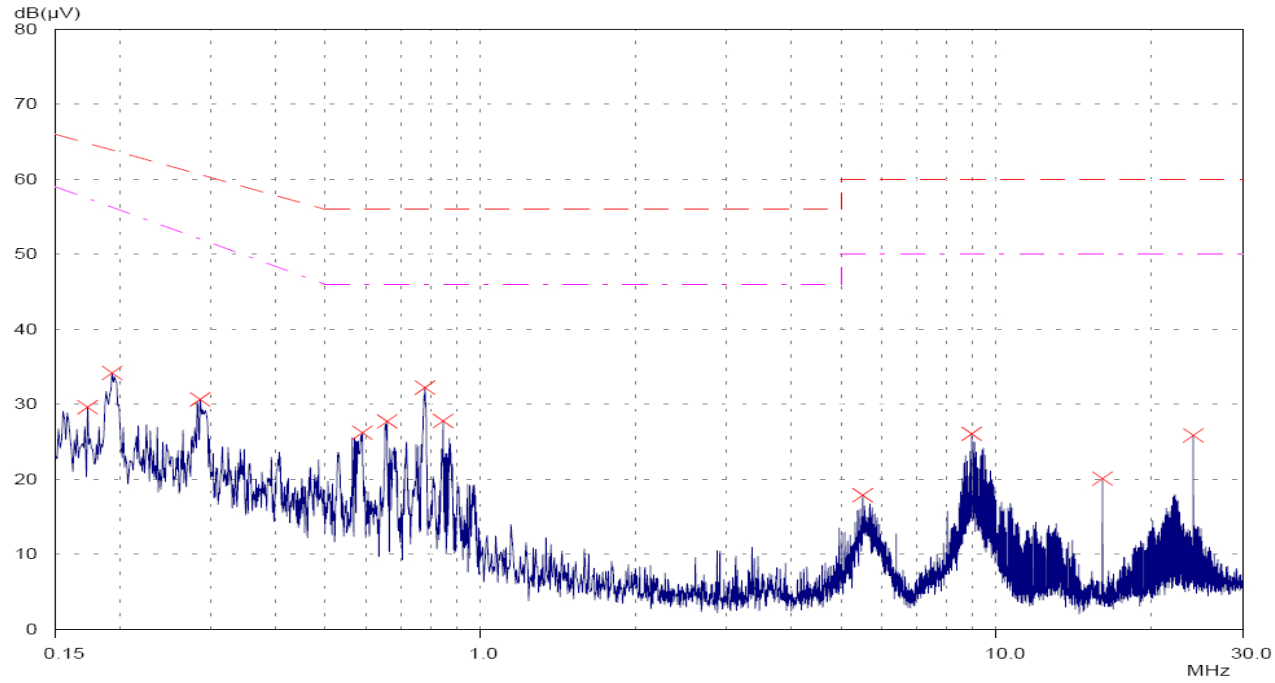
Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Line Polarity : Hot

Limit : Quasi-Peak
Average



Line Polarity : Neutral



Quasi-peak

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Disturbance Power Measurement

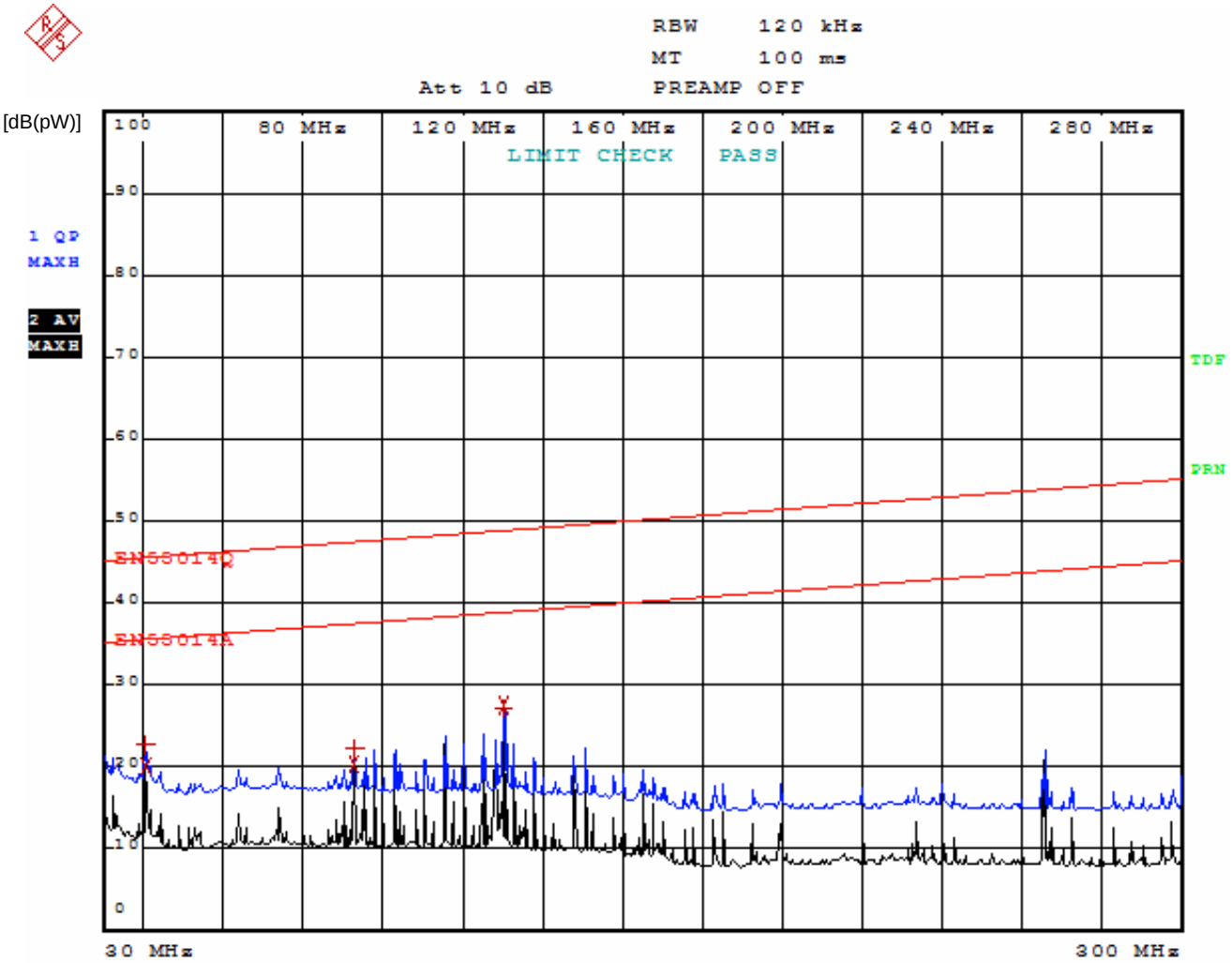
EUT	Bottled Water Cooler / W2-310-2 (S/N: N/A)
Limit apply to	J55014-1(H20)
Test Date	August 13, 2010
Operating Condition	During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically
Operating Spec.	110 V, 50 Hz
Result	Passed by 11.23 dB

Disturbance Power Test Data

Frequency [MHz]	Result [dB(pW)]		Limit [dB(pW)]		Margin [dB]	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
40.250	22.66	19.97	45.38	35.38	22.72	15.41
92.600	22.17	20.32	47.32	37.32	25.15	17.00
130.100	27.11	27.48	48.71	38.71	21.60	11.23

Jae Young, Kwon
Test Engineer

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788



Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

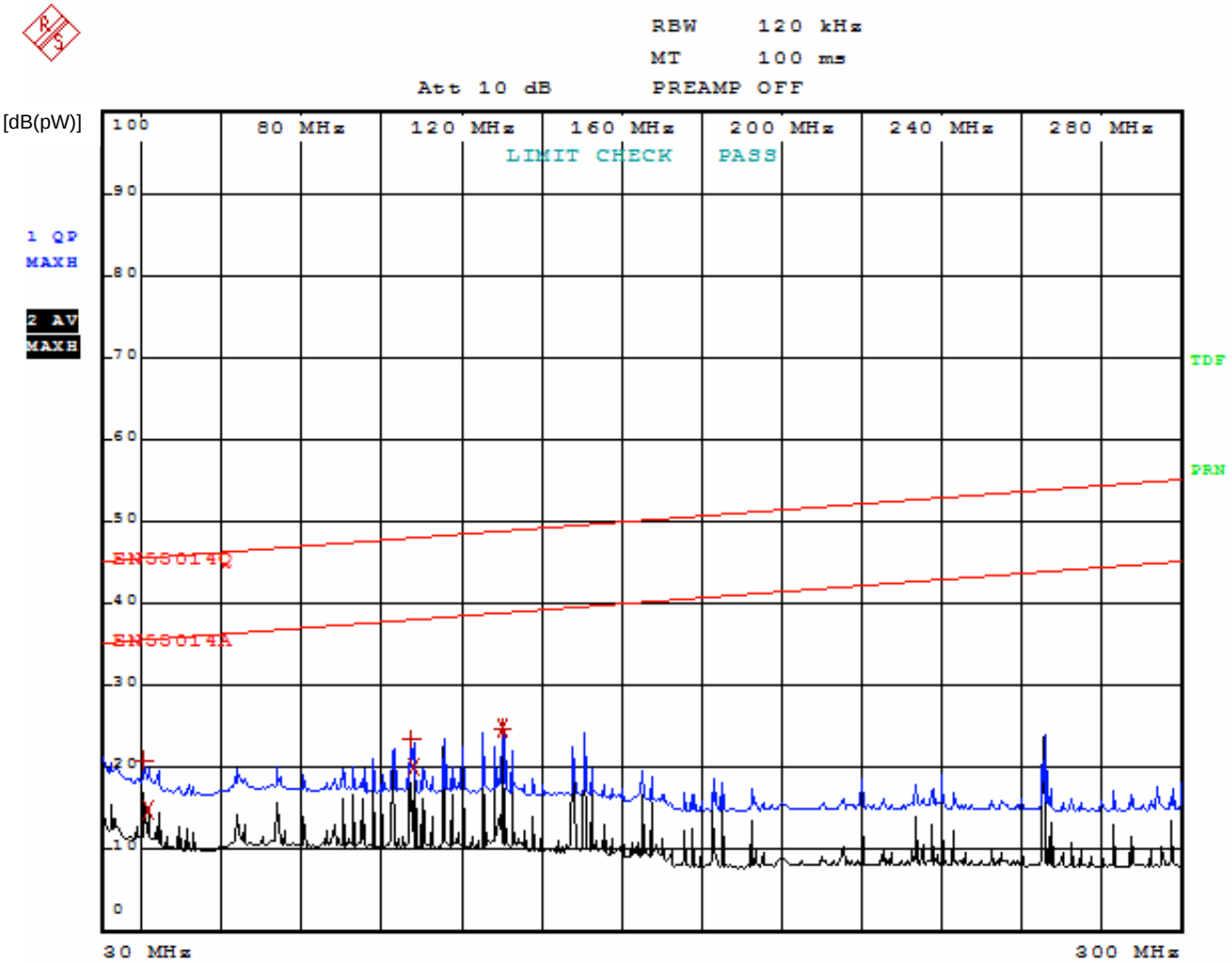
EUT	Bottled Water Cooler / W2-310-2 (S/N: N/A)
Limit apply to	J55014-1(H20)
Test Date	August 13, 2010
Operating Condition	During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically
Operating Spec.	110 V, 60 Hz
Result	Passed by 14.03 dB

Disturbance Power Test Data

Frequency [MHz]	Result [dB(pW)]		Limit [dB(pW)]		Margin [dB]	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
40.250	20.91	14.72	45.38	35.38	24.47	20.66
107.050	23.37	20.09	47.85	37.85	24.48	17.76
130.100	24.90	24.68	48.71	38.71	23.81	14.03

Jae Young, Kwon
Test Engineer

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788



Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Discontinuous Disturbance Measurement

EUT	Bottled Water Cooler / W2-310-2 (S/N: N/A)
Limit apply to	J55014-1(H20)
Test Date	August 12, 2010
Operating Condition	During the test, EUT was the continuous cooling & heating mode hold down that the discharge water periodically
Result	Passed

Phase : Hot(dB㎶)

Click	150 kHz	500 kHz	1.4 MHz	30 MHz
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0

Click	150 kHz	500 kHz	1.4 MHz	30 MHz
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0

Lc = 20 log (30/N) =
N = Click / min
Click = 10 ms < C time < 200 ms
(Industry machine + 10 dB)
Measurement Relay Time; 5 min

N < 0.2 (5min) + 44 dB
0.2 < N < 30 + Lc
N > 30 (2sec) + 0 dB

Click Frequency	150 kHz	500 kHz	1.4 MHz	30 MHz
Contin.Limit L st	66	56	56	60
Click Rate	0	0	0	0
Click level Lc	44	44	44	44
L = Lc + Lst	110	100	100	104
Number of Click	0	0	0	0
Number over limit	0	0	0	0
Passed	PASS	PASS	PASS	PASS

REMARKS:

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

TEST REPORT

Phase : Neutral(dBμV)

Click	150 kHz	500 kHz	1.4 MHz	30 MHz
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0

Click	150 kHz	500 kHz	1.4 MHz	30 MHz
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0

Lc = 20log (30/N) =
N = Click / min
Click = 10ms < C time < 200ms
(Industry machine + 10dB)
Measurement Relay Time; 5 min

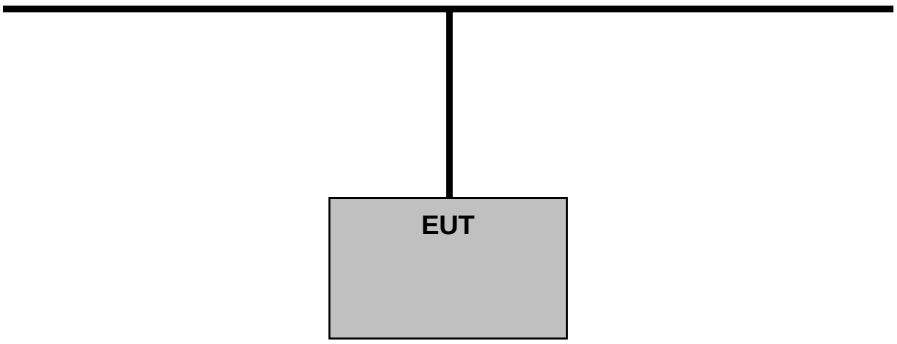
N < 0.2 (5min) + 44dB
0.2 < N < 30 + Lc
N > 30 (2sec) + 0dB

Click Frequency	150 kHz	500 kHz	1.4 MHz	30 MHz
Contin.Limit L st	66	56	56	60
Click Rate	0	0	0	0
Click level Lc	44	44	44	44
L = Lc + Lst	110	100	100	104
Number of Click	0	0	0	0
Numer over limit	0	0	0	0
Passed	PASS	PASS	PASS	PASS

REMARKS:

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

The setup drawing(s)



: Data Line

: Power Line

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Attachment B

List of Test Equipment

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Emission Test Equipments

	Description	Model Number	Manufacturer	Serial Number	Cal Due Date
■	EMI TEST Receiver	ESHS 30	R & S	840190/002	11.04.02
■	EMI TEST Receiver	ESPI3	R & S	100478	11.09.18
■	LISN	3825/2	EMCO	9208-1995	11.09.17
■	Absorbing Clamp	MDS-21	R & S	831676/013	11.03.31

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Attachment C

Constructional Photographs

of

Equipment Under Test (EUT)

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

View of front

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

View of rear

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

View of inside

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

Attachment D

Constructional Data Form

and

Product Information Form(s)

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788

CONSTRUCTION DATAFORM FOR EMC – TESTING

Applicant	: HYUNDAI Wacor Tec Co., Ltd.
Address	: 684-49, Gongreung-Dong, Nowon-Ku, Seoul, Korea
Factory	: HYUNDAI Wacor Tec Co., Ltd.
Address	: 684-49, Gongreung-Dong, Nowon-Ku, Seoul, Korea

Type	: Bottled Water Cooler	Rated voltage	: AC 100 V; 50 Hz/60 Hz; 2.0 A (Cold)
Serial No.	: NONE	Rated input power	: 400 W (Hot)
Protection type	:	Protection class	:

Configuration of equipment:

	Rev.	:
	Rev.	:
	Rev.	:

Source of interference	:
Internal frequency	:
Noise suppression components	:
Measures for electromagnetic shielding	:

Place of issue	date	Seal and signature of applicant

If applicable, if necessary complete overleaf

End of test report

Head Office : # 371-51 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea Tel : 82-2-858-0786 Fax : 82-2-858-0788