CE TEST REPORT

Report Number	:	ETLE120203.0100	Report Issue Date :	February 27, 2012

Model / Serial No.	:	POU SIS (SR) / NONE
Multiple Model Name	:	POU SIS (SU)
Product Type	:	POU Sanitization
Brand Name	:	HYUNDAI WACORTEC
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)	:	EN 55014-1: 2006 + A1: 2009 EN 55014-2: 1997 + A1: 2001 + A2: 2008
Test Result	:	■ Positive
Total pages including Attachments	:	33

Prepared by:	Reviewed by:
Jae Young, Kwon (Test Engineer)	Hyung Min, Choi (Chief Engineer)
February 27, 2012	February 27, 2012

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

EMC TEST STANDARD(S)

The emc tests were performed according to the following standards:

■ EMC - Directive 2004/108/EC and its amendments

■ EN 55014-1: 2006 + A1: 2009

■ Household appliances and similar
☐ Portable tools
☐ Section 7.3.6 Electric and electronic toys Category B

■ EN 55014-2: 1997 + A1: 2001 + A2: 2008

☐ Category - I ■ Category - II
☐ Category - III ☐ Category - IV

■ IEC 61000-4-2: 1995 + A1: 1998 + A2: 2000
☐ IEC 61000-4-3: 2006 + A1: 2007
■ IEC 61000-4-4: 2004
☐ IEC 61000-4-5: 2005
■ IEC 61000-4-6: 2003 + A1: 2004 + A2: 2006
☐ IEC 61000-4-8: 1993 + A1: 2000
☐ IEC 61000-4-11: 2004

☐ EN 61000-3-2: 2006

☐ EN 61000-3-3: 2008

Note: *For undated references, the latest edition of the publication at the time of testing (including amendments) was applied.*

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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	:	(25 ± 10) °C
Humidity	:	(45 ± 15) % R.H.
Atmospheric Pressure	:	(96 ± 10) kPa

POWER SUPPLY SYSTEM UTILIZED

Power supply system ■ DC 24 V

SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)

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

Serial Number: none

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.

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Conducted Emission (Interference Voltage) Test

Conducted emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz on the 240 V AC power and return leads of the EUT according to the methods defined in EN 55014-1.
The EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference plane and placed 0.4 m from a vertical ground plane which is connected to the horizontal metal ground plane.

■ **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(μV)]	Average limit [dB(μV)]
Mains terminals	0.15 to 0.5	66 to 56	59 to 46
	0.5 to 5	56	46
	5 to 30	60	50

Uncertainty of Measurement

Test Item	Uncertainty of Measurement	Remark
Conducted Emission	± 3.36 dB	The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor of $k = 2$. Providing a level of confidence of approximately 95 %.

☐ Pass ☐ Fail

Minimum limit margin	dB	at	2	MHz
Maximum limit exceeding	dB	at		MHz

Remarks: This test was not applied. Because, EUT power supplies from a DC 24 V.

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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 EN55014-1.
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	9.26	dB	at	30.000	MHz
Maximum limit exceeding		dB	at		MHz

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

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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 EN55014-1.

The EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference plane and placed 0.4 m from a vertical ground plane which is connected to the horizontal metal ground plane.

■ **Test not applicable**

☐ Test area - shielded room of ETL Inc.
☐ Test area - EMC test room of Korea Testing & Research Institute

Used test instruments and test accessories please see Attachment B.

☐ Pass ☐ Fail

Remarks: This test was not applied. Because, EUT power supplies from a DC 24 V.

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Harmonic Current Emissions and Flicker

Power Frequency Harmonics Tests: The measured values of the harmonics components of the input current, including line current and neutral current, shall be compared with the limits given in EN 61000-3-2.
Flicker Emission Tests: The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance.

■ **Test not applicable**

☐ Test area - ETL Harmonics test room
☐ Anechoic chamber
☐ Full compact chamber

Used test instruments and test accessories please see Attachment B.

☐ Pass ☐ Fail

Remarks: This test was not applied. Because, EUT power supplies from a DC 24 V.

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Electrostatic Discharge (ESD) Immunity Test

Tests were conducted in accordance with IEC 61000-4-2.
The test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.

☐ **Test not applicable**

■ ETL test room

Used test instruments and test accessories please see Attachment B.

Test specifications:

Discharge Voltage (Air):	■ 2.0 kV	■ 4.0 kV
	■ 6.0 kV	■ 8.0 kV
Discharge Voltage (Contact):	■ 2.0 kV	■ 4.0 kV
Discharge Impedance:	■ 330 Ω/150 pF	
Discharge Repetition Rate:	■ 1 s	
Number of Discharges:	■ 10 at all locations	
Kind of Discharges:	■ Air discharge	
	■ Contact discharge	
Polarity:	■ Positive	■ Negative
Location of Discharge:	■ See Photograph (ESD Point map)	
	■ Each location on the surface touchable by hand	
	■ HCP, VCP	

Required performance criterion: B

Test results: **PASS (Met criterion A)**

Remarks: No false or other malfunctions were observed during and after the test.
Please refer to the test point map in next page.

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Test data

Test Point	Discharge Type	Discharge voltage [± kV]	Result
HCP, VCP	Indirect	2 / 4	Met criterion A
1. LED indicator	Air	2 / 4 / 6 / 8	Met criterion A
2. Case	Air	2 / 4 / 6 / 8	Met criterion A
3. DC Input inlet	Air	2 / 4 / 6 / 8	Met criterion A
4. Screw point	Contact	2 / 4	Met criterion A

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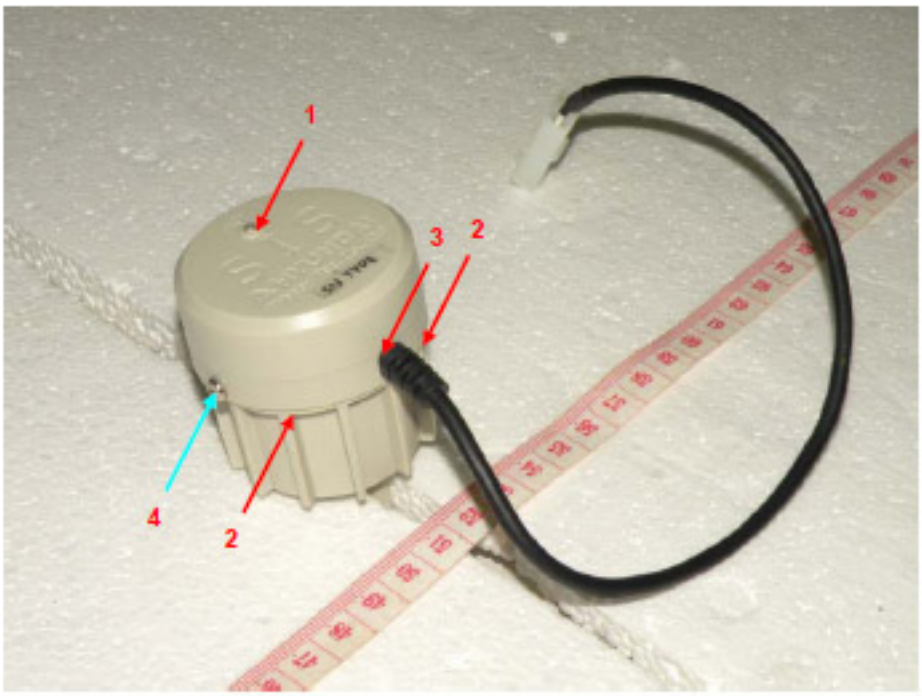
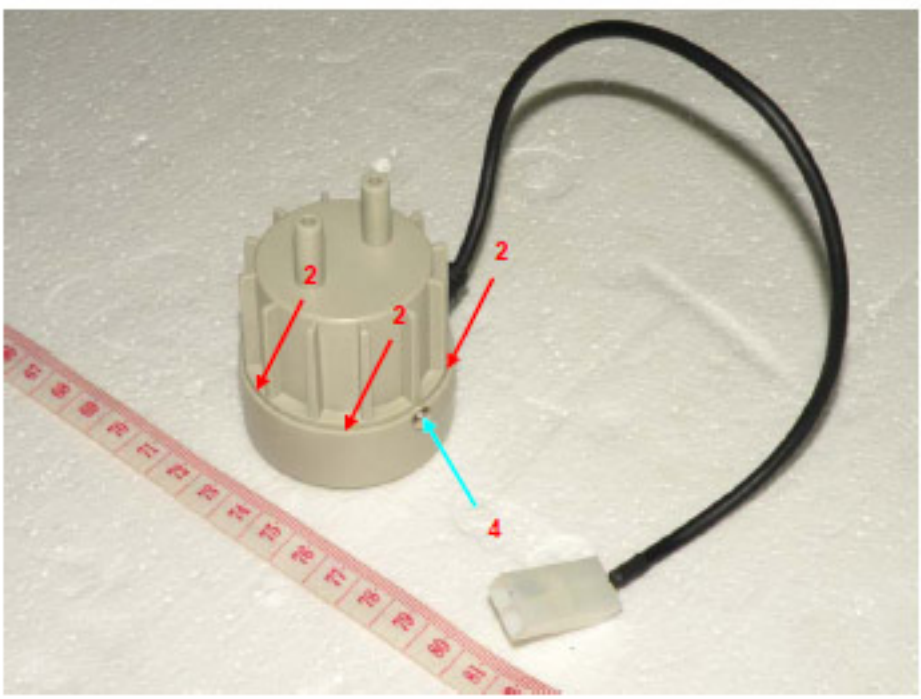
CONTACT → AIR →





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EFT/Burst Immunity Test

Tests were conducted in accordance with IEC 61000-4-4.

☐ **Test not applicable**

■ ETL test room

Used test instruments and test accessories please see Attachment B.

Test specifications:

Pulse Amplitude - AC Power Port:	☐ 1.0 kV
Pulse Amplitude - DC Power Port:	■ 0.5 kV
Signal Port:	☐ 0.5 kV
Burst Frequency:	■ 5.0 kHz
Time of Coupling:	■ 120 s
Polarity:	■ Positive ■ Negative

Location of Coupling

	Name of lines	Type	Length	Remarks
■	DC Power line	Unshielded	0.5 m	

Required performance criterion: B

Test result: **PASS (Met criterion A)**

Test data

Line	Line for test	Test level [± kV]	Coupling Method	Result
DC-mains	(+) + (-)	0.5	CDN	Met criterion A

Remarks: No false or other malfunctions were observed during and after the test.

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Surge Immunity Test

Tests were conducted in accordance with IEC 61000-4-5.

■ **Test not applicable**

☐ ETL test room

Used test instruments and test accessories please see Attachment B.

Test specifications:

Pulse Amplitude - AC Power Port:	☐ 1.0 kV	☐ 2.0 kV
Pulse Amplitude - DC Power Port:	☐ 0.5 kV	
Signal Port:	☐ 0.5 kV	
Source Impedance:	☐ 2 Ω + 18 μF	☐ 12 Ω + 9 μF
	☐ 42 Ω + 0.1 μF	
Number of Surges:	☐ 5 surges/angle	
Angle:	☐ 0°	☐ 90°
	☐ 180°	☐ 270°
Repetition Rate:	☐ 60 s	
Polarity:	☐ Positive	☐ Negative

Location of Coupling

	Name of lines	Type	Length	Remarks
☐	-	-	-	-

Required performance criterion: B

Test result: N/A

Test data

Line	Line for test	Test level [± kV]	Coupling Method	Result
-	-	-	-	-

Remarks: This test was not applied. Because, EUT power supplies from a DC 24 V.

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Conducted Disturbance Immunity Test

Tests were conducted in accordance with IEC 61000-4-6 over the frequency range of 0.15 MHz to 230 MHz.

☐ Test not applicable

■ ETL test room

Used test instruments and test accessories please see Attachment B.

Test specifications:

Frequency Range:	■ 0.15 MHz - 230 MHz
Voltage Level (EMF):	■ 1 V
Modulation:	■ AM 1 kHz at 80 %
	☐ Pulse 1 Hz
Step/Dwell Time:	■ 1 %/3 s

Location of Coupling

	Name of lines	Type	Length	Remarks
■	DC Power line	Unshielded	0.3 m	

Required performance criterion: **A**

Test result: **PASS (Met criterion A)**

Test data

Frequency Range [MHz]	Line for test	Test level [V]	Coupling Method	Result
0.15 - 230	DC-mains	1	CDN	Met criterion A

Remarks: No false or other malfunctions were observed during and after the test.

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Voltage Dips, Interruptions & Variations Immunity Test

Voltage variations tests were conducted in accordance with IEC 61000-4-11.

■ Test not applicable

☐ ETL test room

Used test instruments and test accessories please see Attachment B.

Test specifications:

Nominal Mains Voltage (V_{NOM}):	☐ 230 Vac	
Level of Reduction (dip):	☐ 10 Period at 60 % of V_{NOM}	
	☐ 50 Period at 30 % of V_{NOM}	
Duration of Interruption:	☐ 0.5 Period at 100 % of V_{NOM}	
Voltage Fluctuation:	☐ V_{NOM} + 10 %	☐ V_{NOM} – 10 %
Required performance criterion:	10 Period at 60 % of V_{NOM}	C(Voltage dips)
	50 Period at 30 % of V_{NOM}	C(Voltage dips)
	0.5 Period at 100 % of V_{NOM}	C(Voltage interruptions)
Test result:	**N/A**	

Test data

Test	Test Level [% of V_{NOM}]	Period	Result
Voltage dips	60	10	-
Voltage dips	30	50	-
Voltage interruption	100	0.5	-

Remarks: This test was not applied. Because, EUT power supplies from a DC 24 V.

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Equipment Under Test (EUT) Test Operation Mode:

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

■ Standby mode

■ During the test, EUT was the continuous water circulation mode.

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
■	DC Power Supply	DP30-05A	0300266	TOYO TECH
■	Pump	NONE	NONE	NONE
■	Adapter (for Pump)	NONE	NONE	NONE

Type of Cables Used

Device from	Device to	Type of Cable(Port)	Length[m]	Type of shield
EUT	DC Power Supply	DC Input	2.0	Unshielded
Pump	Adapter	DC Input	1.0	Unshielded
DC Power Supply	Power socket	AC Input	2.0	Unshielded

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GENERAL REMARKS:

The Equipment Under Test (EUT) is the POU Sanitization. (model: POU SIS (SR)).

The model POU SIS (SR) is that was tested.

The multi model POU SIS (SU) is same as basic model POU SIS (SR) except for model designation.

SUMMARY:

All tests according to the regulations cited on page 3 were

■ Performed

☐ **Not** Performed

Criterion description

Criterion A : The apparatus shall continue to operate as intended during test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion B : The apparatus shall continue to operate as intended after test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion C : Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Monitoring: Testing was observed to motion of the LED of the product.

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:	February 03, 2012
Test start date:	February 06, 2012
Test end date:	February 08, 2012

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Photograph of test setup: Disturbance Power

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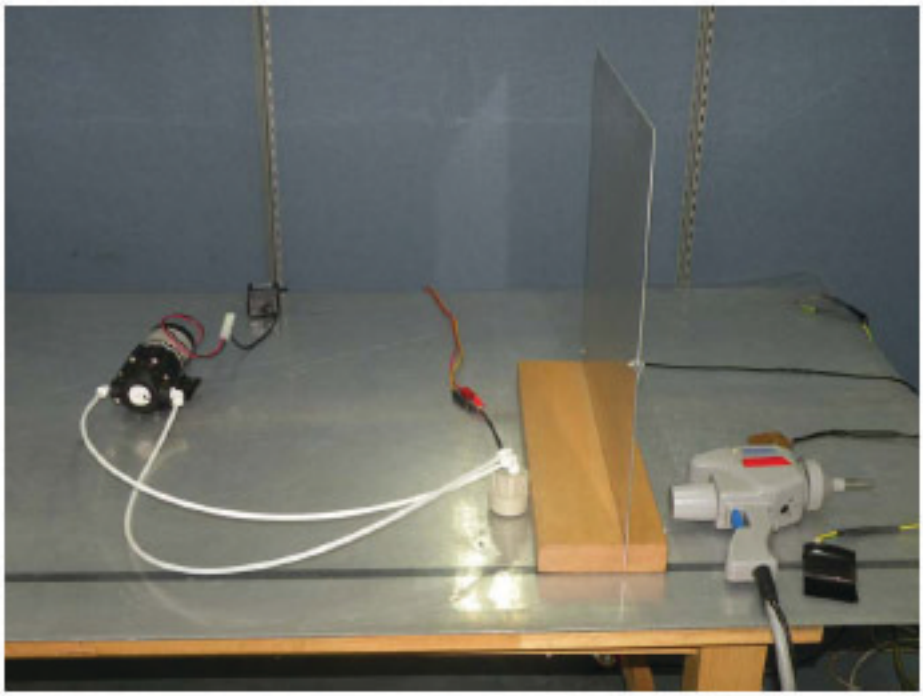
Photograph of test setup: Electrostatic discharge (ESD)



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Photograph of test setup: Fast transients (EFT/Burst)

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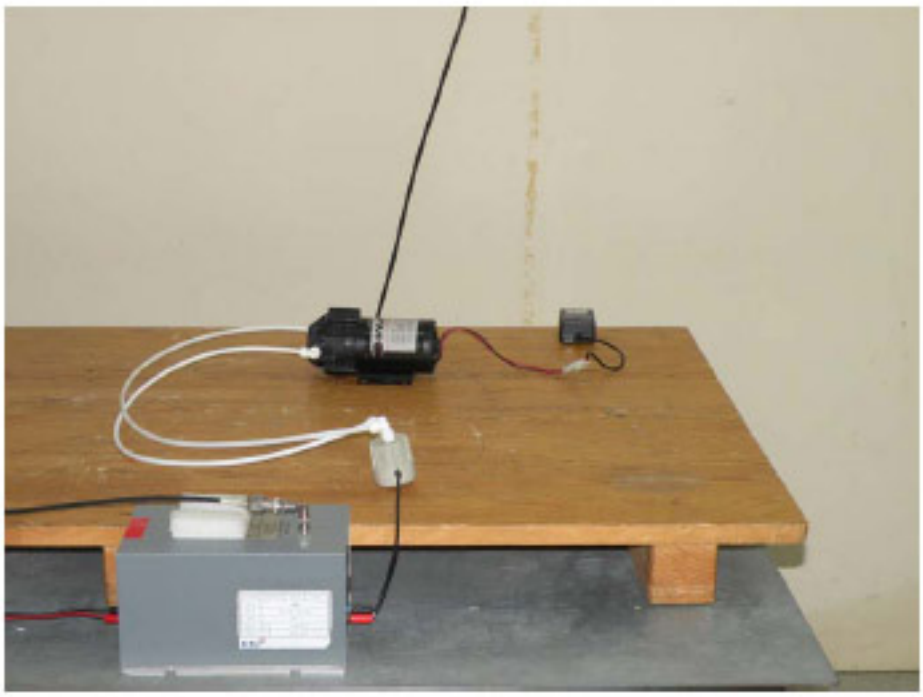
Photograph of test setup: Conducted disturbance



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Attachment A

Test Data

and

Test Setup Drawing(s)

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Disturbance Power Measurement

EUT	POU Sanitization / POU SIS (SR) (S/N: N/A)
Limit apply to	EN 55014-1
Test Date	February 06, 2012
Operating Condition	During the test, EUT was the continuous water circulation mode.
Operating Spec.	DC 24 V
Result	Passed by 9.26 dB

Disturbance Power Test Data

Frequency [MHz]	Result [dB(pW)]		Limit [dB(pW)]		Margin [dB]	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
30.000	35.76	21.68	45.02	35.02	9.26	13.34
71.900	27.04	18.50	46.55	36.55	19.51	18.05
74.700	26.98	19.19	46.64	36.64	19.66	17.45

NOTES:

1. **The result value was included the antenna factor and cable loss.**
2. **Margin value = Limit - Result**

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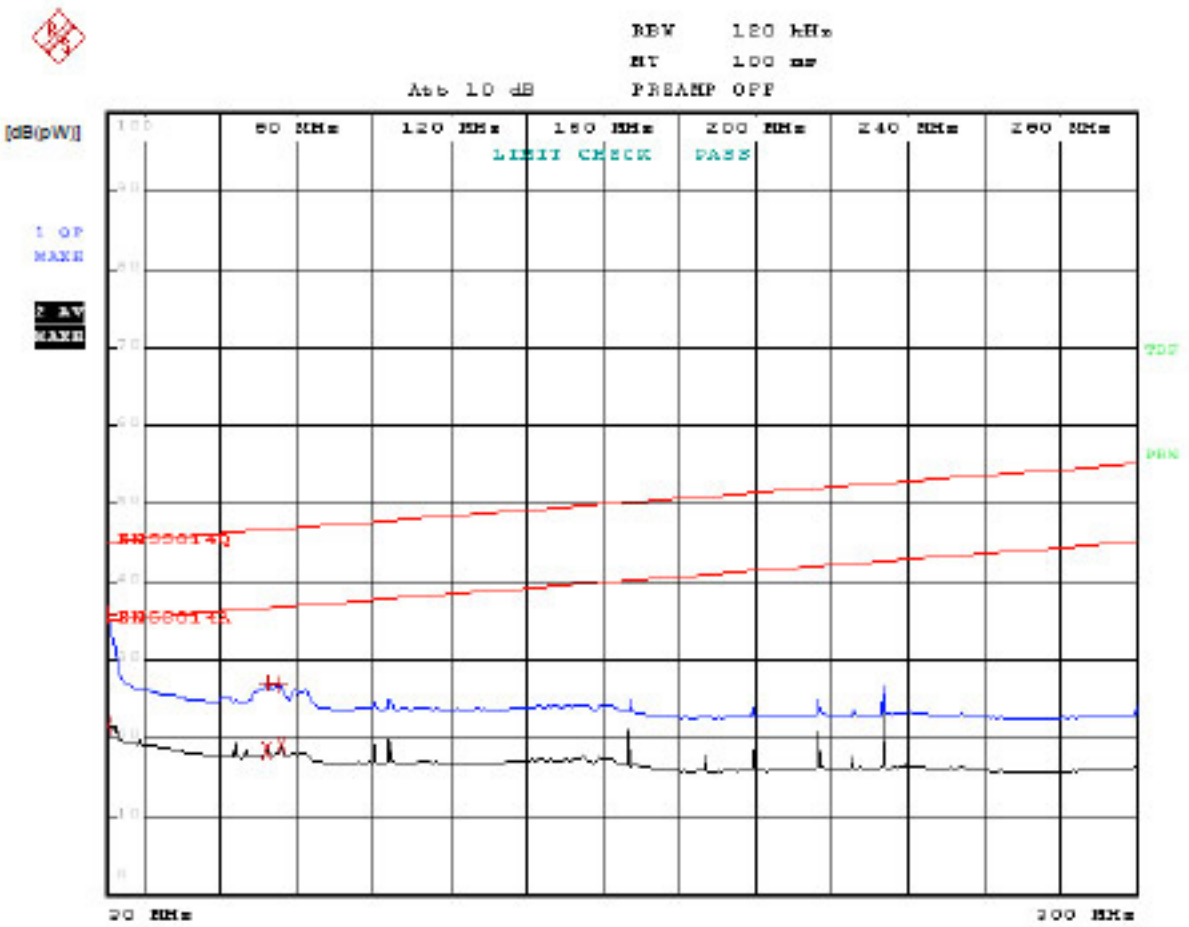

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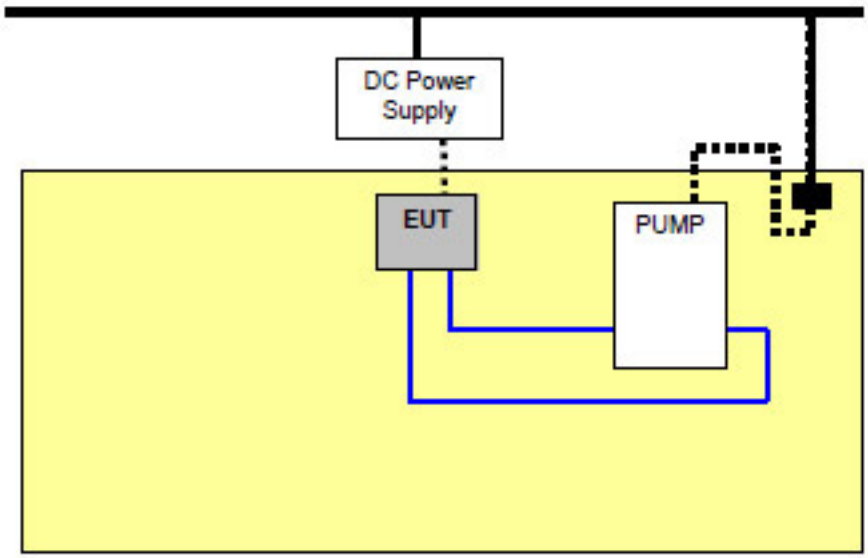
The setup drawing(s)



: Signal Line

: Water tube

: AC Power Line

: DC Power Line

: Adapter

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Attachment B

List of Test Equipment

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EMC Test Equipments

	Description	Model Number	Manufacturer	Serial Number	Cal. Date	Cal. Due Date
■	EMI Test Receiver	ESPI3	R&S	100478	11.09.15	12.09.15
■	Absorbing Clamp	MDS-21	R&S	831676/013	11.02.23	12.02.23
■	Electrostatic Discharge Simulator & ESD Gun	ESS-2002 & TC-815R	NOISEKEN	ESS0827924 & ESS0827983	11.09.19	12.09.19
■	EMC Generator	EMC Pro	KeyTek	9912296	11.09.15	12.09.15
■	Signal Generator	2025	IFR	202301/933	11.03.23	12.03.23
■	RF Power Meter	4232A	Boonton	42001	11.09.16	12.09.16
■	Power Sensors	51011	Boonton	31619 / 31620	11.09.16	12.09.16
■	Dual Directional Coupler	C3653	Werlatone	7825	11.03.22	12.03.22
■	Amplifier	AR75A250	Amplifier Research	27568	N/A	N/A
■	CDN	FCC-801-M2-25A	FCC	2011	11.03.23	12.03.23
■	Attenuator 10 dB	40-10-33	Weinschel	PY709	11.03.22	12.03.22

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Attachment C

Constructional Photographs

of

Equipment Under Test (EUT)

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View of front

View of rear

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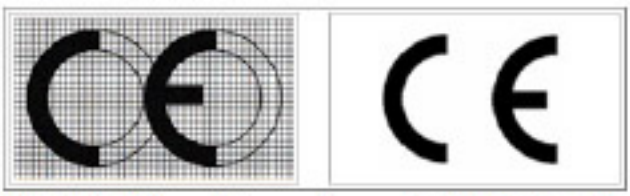
CE Marking Information



Note. The 'CE' marking must have a height of at least 5 mm. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.

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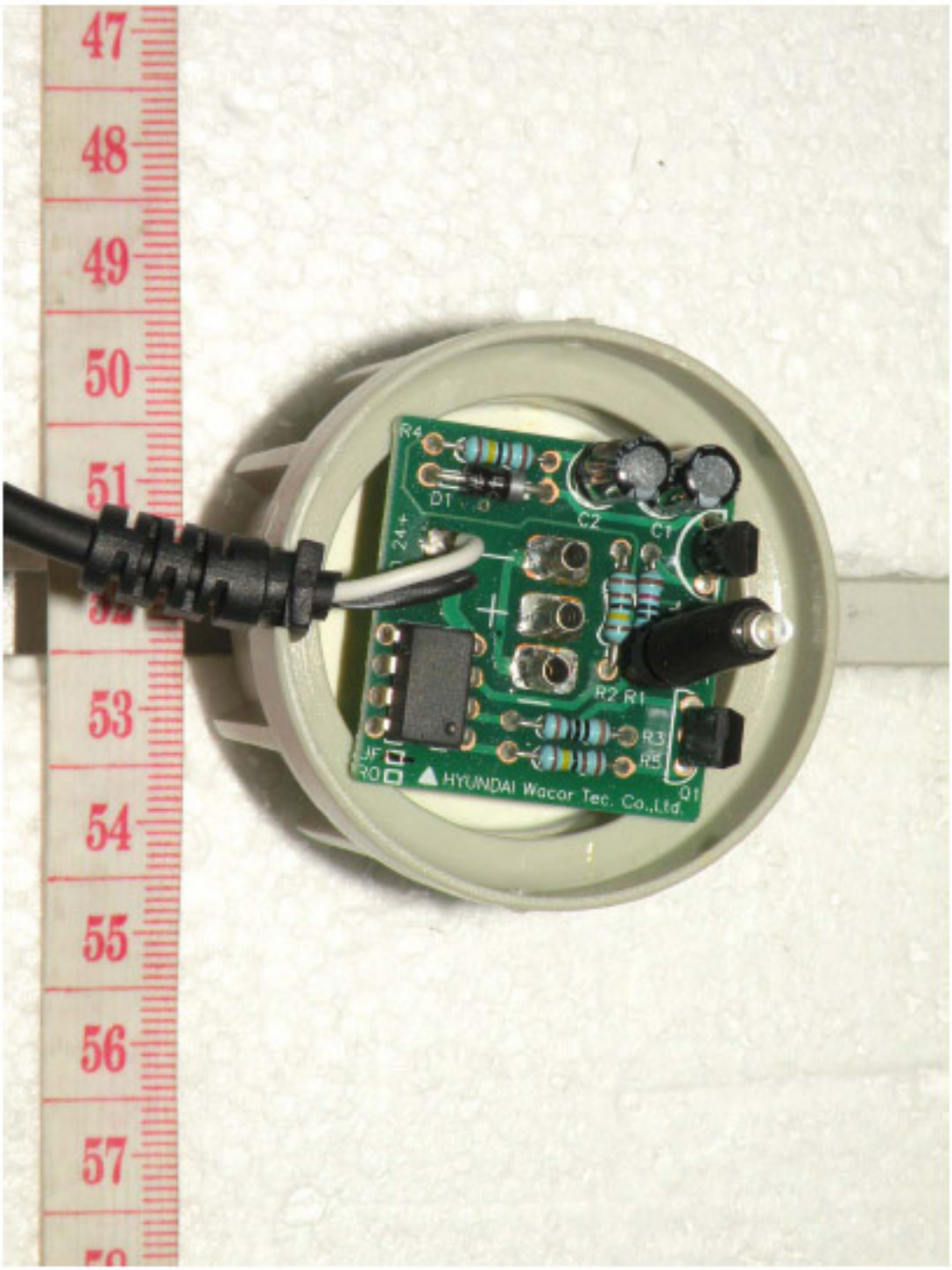
Internal view of EUT



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Attachment D

Constructional Data Form

and

Product Information Form(s)

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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	: POU SIS (SR)	Rated voltage input	: DC 24 V
Serial No.	: NONE	Rated input power	:
Protection type	:	Protection class	:

Configuration of equipment:

	Rev.	:
	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

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