Electromagnetic Network Global

EMC DIRECTIVE 2014/30/EU

VERIFICATION COMPLIANCE STATEMENT

For the

Product	**: Water purifier**
Model	**: INFINITE-S**
Multiple Model	**: INFINITE-L, INFINITE-M, INFINITE-20**
Applicant	**: WACO Corp.**
Standards	**: EN 55014-1, EN 55014-2, EN 61000-3-2 and EN 61000-3-3**

We hereby certify that the above product has been tested by us with the listed standards and found in compliance with the EMC Directive. The test data and results are issued on the test report no. TR-W1907-007

Signature

Choi, Young-min / Technical Manager
Date: 2019-07-12

Test Laboratory: ENG Co., Ltd.

CE EMC TEST REPORT

Project Number	**: EA1907C-025**
Test Report Number	**: TR-W1907-007**
Type of Equipment	**: Water purifier**
Model Name	**: INFINITE-S**
Multiple Model Name	**: INFINITE-L, INFINITE-M, INFINITE-20**
Applicant	**: WACO Corp.**
Address	**: A-301, Hagye Technotwon, 10, Nowon-ro 15-gil, 139-727, Nowon-gu, Seoul, Rep. of Korea**
Manufacturer	**: WACO Corp.**
Address	**: A-301, Hagye Technotwon, 10, Nowon-ro 15-gil, 139-727, Nowon-gu, Seoul, Rep. of Korea**
Product Standard	**: EN 55014-1:2017, EN 55014-2:2015, Category II EN 61000-3-2: 2014, and EN 61000-3-3: 2013**
Total page of Report	**: 52 pages**
Date of Receipt	**: 2019-07-03**
Date of Issue	**: 2019-07-12**
Test Result	**: PASS**

This test report only contains the result of a single test of the sample supplied for the examination.
It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by Chu, Woo-Sik / Senior Engineer _____ (Signature) 2019-07-12 (Date)

Reviewed by Choi, Young-min / Technical Manager _____ (Signature) 2019-07-12 (Date)

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Release Control Record

Issue Report No.	Issued Date	Details/Revisions
TR-W1907-007	2019-07-12	Initial Release

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1. TEST SUMMARY

1.1 Test standards and results

The sample submitted for evaluation (Hereafter refer to as the EUT) has been tested in accordance with the following standards.

EMISSION					
STANDARDS	**TEST NAME**	**RESULTS**			
EN 55014-1:2017	Mains terminal continuous disturbance voltage	**P**			
	Mains terminal discontinuous disturbance voltage	**P**			
	Disturbance Power	**P**			
	Radiated emission			**N.T**	Note1
EN 61000-3-2:2014	Harmonic current emission	**P**			
EN 61000-3-3:2013	Voltage changes, voltage fluctuations and flicker	**P**			
IMMUNITY					
STANDARDS	**TEST NAME**	**RESULTS**			
EN 55014-2:2015 (Category II)	Electrostatic Discharge Immunity	**P**			
	Radiated RF E-Field (80 ~ 1 000) MHz)			**N.T**	Note 2
	Electrical Fast Transient / Burst Immunity	**P**			
	Surge Immunity	**P**			
	Conducted RF Field Immunity (0.15 ~ 80) MHz	**P**			
	Voltage Dips, Interruptions Immunity	**P**			

Remark:

P means Passed F means Failed N.T. means Not Tested

Note 1: This test was replaced with disturbance power and the EUT met the limit of the additional margin in the 200 MHz to 300 MHz band and the EUT uses a clock frequency of less than 30 MHz.

Note 2: This test was not applicable, because the EUT is subjected to category II equipment.

1.2 Purpose of the test

To determine whether the equipment under test fulfills the EMC requirements of the standards stated in section 1.1 acc. to the applicant's requirement.

1.3 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

1.4 Test Facility

The measurement facilities are located at 135-60 Gyeongchung-daero, Gonjiam-eup, Gwangju-si, Gyeonggi-do 12813, Korea. Our test facilities areaccredited as a Conformity Assessment Body (CAB) by the FCC and ISED Canada, designated by the RRA (National Radio Research Agency), and accredited by KOLAS (Korea Laboratory Accreditation Scheme) in Korea and approved by TUV Rheinland, TUV SÜD and Korean Register of Shipping according to the requirement of ISO/IEC 17025.

Laboratory Qualification	Registration No.	Mark
FCC	KR0160	
ISED Canada	12721A	
RRA	KR0160	National Radio Research Agency
TUV Rheinland	UA 50314109-0002	
TUV SÜD	CARAT 094465 0004 Rev.00	
Korean Agency for Technology and Standards	KT733	
Korea Register of Shipping	PCT40841-TL001	

Remark. This report is not related to KOLAS accreditation and relevant regulation.

2. EUT (Equipment Under Test)

2.1 Photo of the EUT

2.2 General Description

The WACO Corp., Model INFINITE-S (referred to as the EUT in this report) is a Water purifier. The product specification described herein was obtained from product data sheet or user's manual.

Rating of Input Power	220-240 V~, 50/60 Hz
Power Consumption	430 W

2.3 Additional Model

Model Name	Model Difference
INFINITE-S	Basic Model
INFINITE-L	These models are identical to basic model except for capacity of the water pail and size of enclosure. (No electrical difference)
INFINITE-M	
INFINITE-20	
NOTE: The Manufacturer has declared to all the additional model names into basic model name without any further evaluation by ENG Co., Ltd.	

3. TEST CONDITION

3.1 Equipment Used During Test

The following peripheral devices and/or interface cables were connected during the measurement:

Description	Model No.	Serial No.	Manufacturer.
Water purifier (EUT)	INFINITE-S	N/A	WACO Corp.
Pump	N/A	N/A	N/A

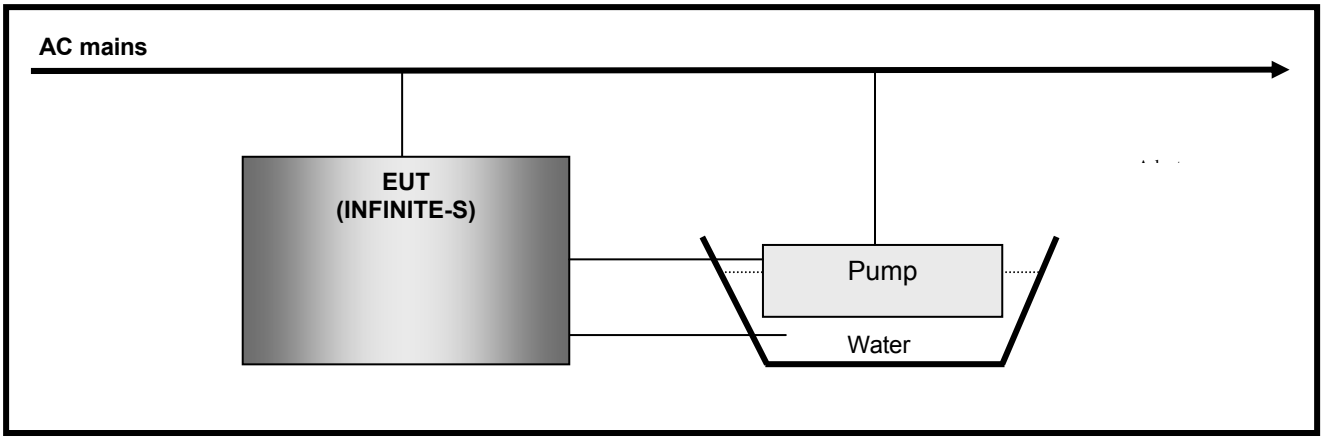
3.2 Cable Description

Ports Name	Shielded (Y/N)	Ferrite Bead (Y/N)	Length (m)	Connected to
AC IN	N	N	1.5	AC mains
Hose connector	-	-	3.0	Pump

3.3 Mode of operation during the test

Test Mode	Description
# 1	After connecting the pump to the water inlet of the EUT, it was operated with cold water mode continuously during the test.
# 2	After connecting the pump to the water inlet of the EUT, it was operated with hot water mode continuously during the test.

3.4 Test Setup Drawing



3.5 EUT Modifications

During the testing, following modifications were implemented on the EUT by the manufacturer.

- The noise filter was added on inner AC input line. (Mfg: WOONYOUNG, M/N: WYFS15T1B)

4. Evaluation during Immunity Tests

4.1 Function Test

Verification of correct function was carried out before and after each immunity tests.

4.2 Criteria of acceptance acc. to EN 55014-2

Criterion	Description
A	The apparatus shall continue to operate as intended during the 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.
B	The apparatus shall continue to operate as intended after the 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 to persist after the test. 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.
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.

* The selection, the specification of functions, and the permissible degradation is left to the responsibility of the manufacturer.

4.3 EUT Specific Performance Criteria

No specific performance criteria was provided by the manufacturer.

4.4 Functions Monitored During and After Immunity Test

Description
Observed the operating state and display state of EUT during the test.

5. Measurement uncertainty

5.1 Emission:

Test Items	Frequency range	Uncertainty
Continuous Disturbance Voltage	150 kHz ~ 30 MHz	2.03 dB
Disturbance Power	30 MHz ~ 300 MHz	2.81 dB
Radiated electromagnetic field	30 MHz ~ 1 000 MHz	4.50 dB
	1 000 MHz ~ 18 000 MHz	4.09 dB
Harmonic Current	50 Hz ~ 2 kHz	0.2 %
Voltage Fluctuation and Flicker	N/A	5.0 %

The measurement uncertainties are given with at least 95 % confidence.

5.2 Immunity

Test Items	Frequency range	Uncertainty
Electrostatic Discharge	N/A	Met the specified requirements in the standard
RF Electromagnetic Field	80 MHz ~ 3 GHz	1 V/m: 0.15 V/m, 3 V/m: 0.45 V/m, 10 V/m: 1.5 V/m , 20 V/m: 3 V/m
Electrical Fast Transient/Burst	N/A	Met the specified requirements in the standard
Surge	N/A	
Conducted RF Field	150 kHz ~ 80 MHz	1 V: 0.31 V, 3 V: 0.93 V, 10 V: 3.10 V
Power Frequency Magnetic Field	N/A	Met the specified requirements in the standard
Voltage dips and Short Interruptions	N/A	

The measurement uncertainties are given with at least 95 % confidence.

6. EMISSION TESTS

6.1 MAIN TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

6.1.1 Test setup

The EUT was placed on the floor as typical applications. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

The test set-up photos are included in appendix I.

Used Software for measurement is EMC 32 supplied by Rohde & Schwarz.

6.1.2 Test Result

Date of Test	2019-07-10	Temperature	22.8 °C
Test Mode	Mode #1, Mode #2	Relative humidity	53.0 % R.H.
Resolution bandwidth	9 kHz	Frequency range	0.15 MHz ~ 30 MHz
Test Result	***PASS***	Tested By	Im, Jin-young

6.1.3 Sample Calculated Example

At 5.31 MHz QP Limit = 60.0 dBμV

Correction Factor (C. Factor) of LISN, Pulse Limiter and cable loss at 5.31 MHz = 9.7 dB

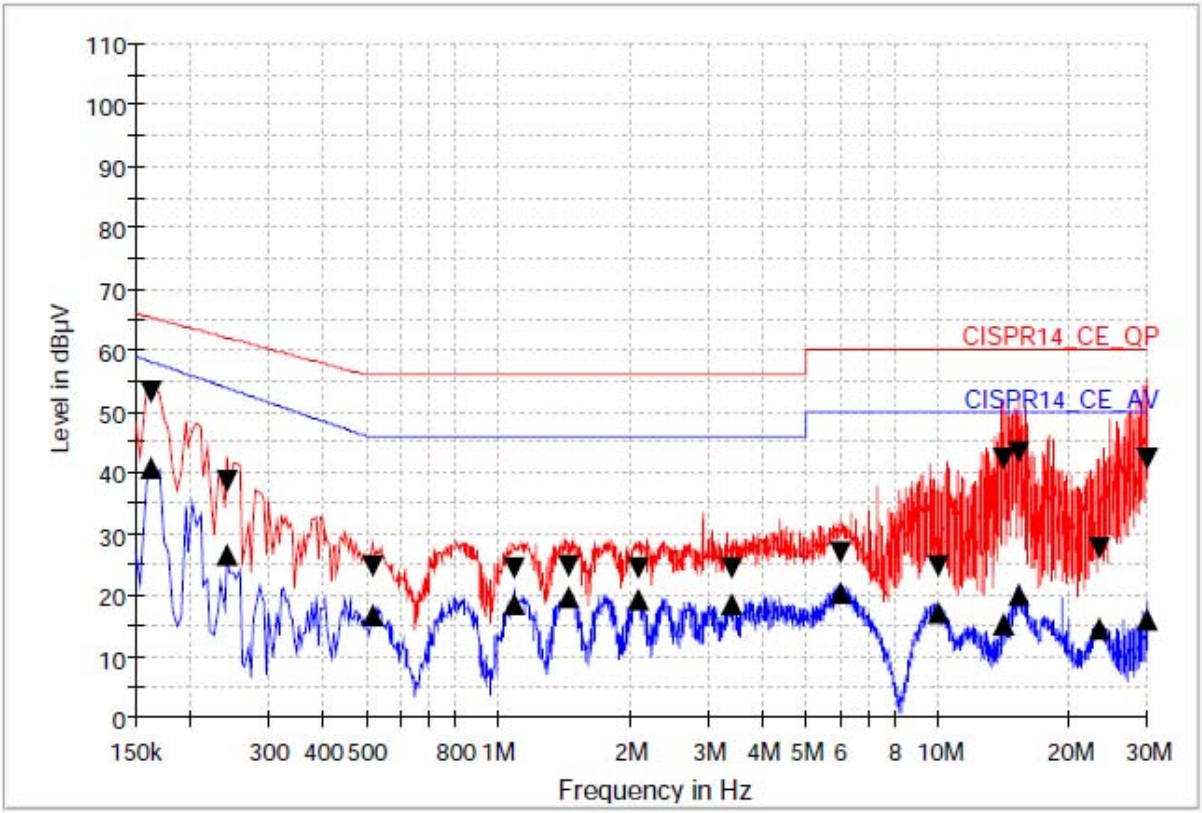
Q.P Reading from the Test receiver = 50 dBμV

(Calculated value for system losses by software EMC32 manufactured by Rohde & Schwarz)

Therefore Q.P Margin = 60 - 50 = 10 so the EUT has 10.0 dB margin at 5.31 MHz

6.1.4 Test data

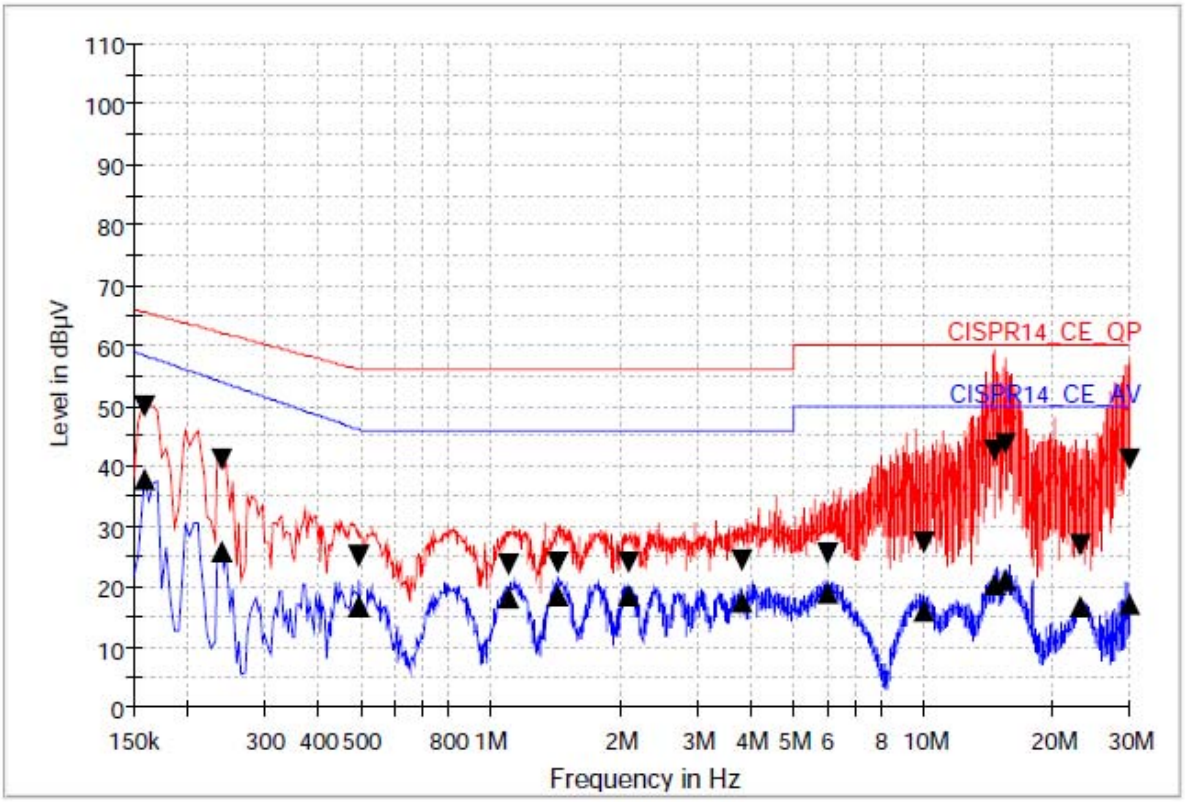
Mode #1	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.162000	53.2	40.9	9.000	L1	9.8	12.2	65.4	17.3	58.2
0.242000	38.7	26.5	9.000	L1	9.7	23.3	62.0	27.3	53.8
0.518000	24.6	16.7	9.000	L1	9.7	31.4	56.0	29.3	46.0
1.086000	24.2	18.5	9.000	L1	9.8	31.8	56.0	27.5	46.0
1.442000	24.6	19.5	9.000	L1	9.8	31.4	56.0	26.5	46.0
2.086000	24.5	19.4	9.000	L1	9.8	31.5	56.0	26.6	46.0
3.410000	24.3	18.7	9.000	L1	10.0	31.7	56.0	27.3	46.0
6.030000	26.8	20.3	9.000	L1	10.1	33.2	60.0	29.7	50.0
10.002000	24.9	17.3	9.000	L1	10.2	35.1	60.0	32.7	50.0
14.146000	42.2	15.4	9.000	L1	10.3	17.8	60.0	34.6	50.0
15.302000	43.2	20.1	9.000	L1	10.3	16.8	60.0	29.9	50.0
23.458000	27.5	14.7	9.000	L1	10.4	32.5	60.0	35.3	50.0
29.978000	42.2	16.0	9.000	L1	10.6	17.8	60.0	34.0	50.0

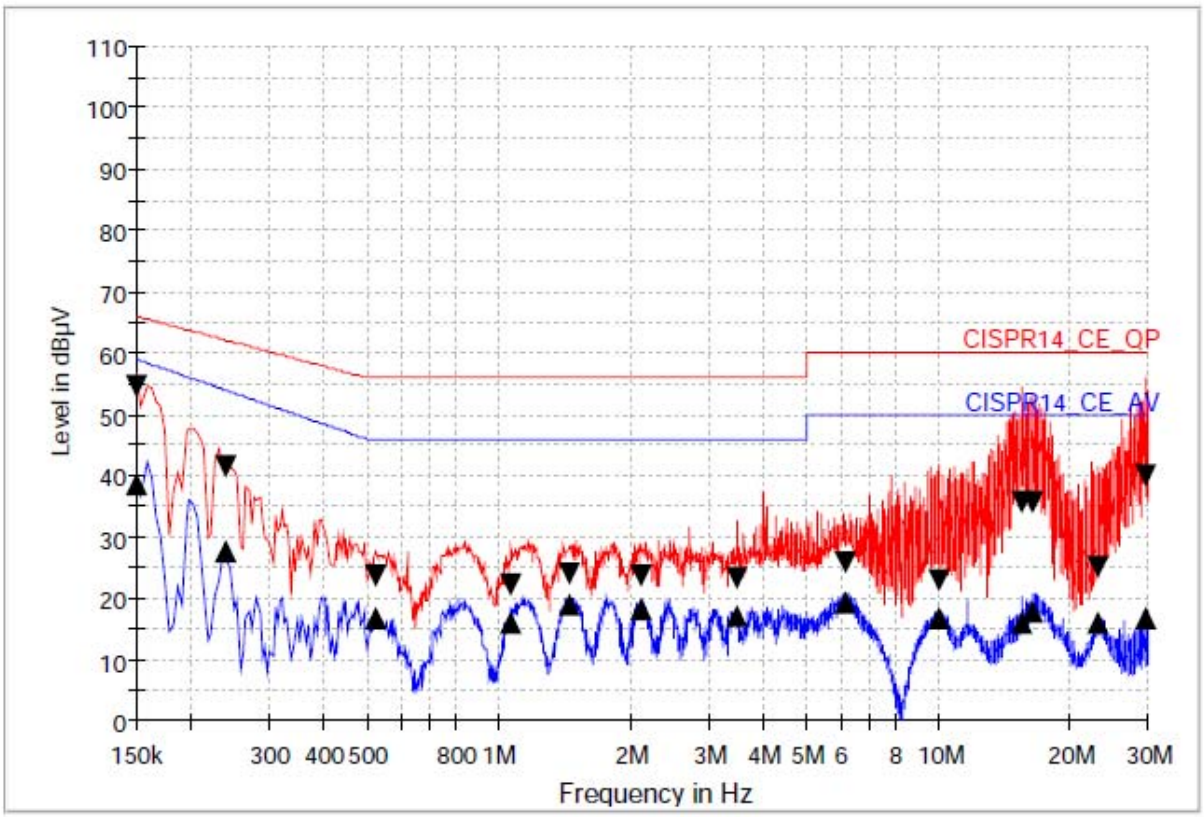
Mode #1	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.158000	49.8	37.9	9.000	N	9.8	15.8	65.6	20.6	58.4
0.238000	41.1	25.9	9.000	N	9.7	21.1	62.2	28.2	54.0
0.498000	25.1	16.7	9.000	N	9.7	30.9	56.0	29.4	46.0
1.098000	23.8	18.1	9.000	N	9.8	32.2	56.0	27.9	46.0
1.438000	24.0	18.7	9.000	N	9.8	32.0	56.0	27.3	46.0
2.094000	23.9	18.6	9.000	N	9.8	32.1	56.0	27.4	46.0
3.814000	24.2	17.5	9.000	N	10.0	31.8	56.0	28.5	46.0
6.002000	25.5	18.9	9.000	N	10.1	34.5	60.0	31.1	50.0
10.002000	27.4	16.1	9.000	N	10.2	32.6	60.0	33.9	50.0
14.682000	42.7	20.5	9.000	N	10.3	17.3	60.0	29.5	50.0
15.506000	43.5	21.1	9.000	N	10.3	16.5	60.0	28.9	50.0
23.090000	27.0	16.6	9.000	N	10.4	33.0	60.0	33.4	50.0
29.978000	41.0	17.1	9.000	N	10.6	19.0	60.0	32.9	50.0

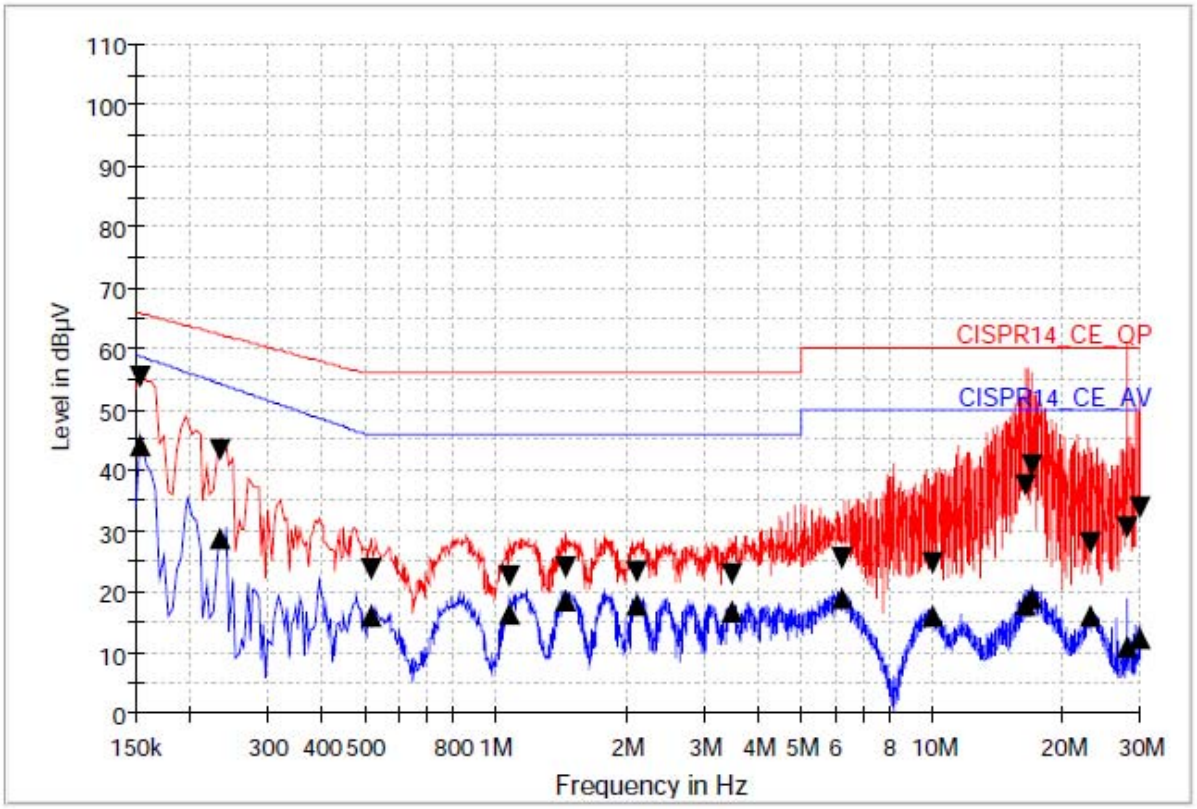
Mode #2	HOT LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.150000	54.5	38.6	9.000	L1	9.7	11.5	66.0	20.4	59.0
0.238000	41.6	27.7	9.000	L1	9.7	20.6	62.2	26.4	54.0
0.526000	23.8	16.6	9.000	L1	9.7	32.2	56.0	29.4	46.0
1.070000	22.3	16.2	9.000	L1	9.8	33.7	56.0	29.8	46.0
1.446000	24.2	18.9	9.000	L1	9.8	31.8	56.0	27.1	46.0
2.106000	23.7	18.3	9.000	L1	9.9	32.3	56.0	27.7	46.0
3.470000	23.2	17.2	9.000	L1	10.0	32.8	56.0	28.8	46.0
6.122000	26.0	19.3	9.000	L1	10.1	34.0	60.0	30.7	50.0
10.002000	23.0	16.6	9.000	L1	10.2	37.0	60.0	33.4	50.0
15.554000	35.8	16.1	9.000	L1	10.3	24.2	60.0	33.9	50.0
16.334000	35.7	17.7	9.000	L1	10.3	24.3	60.0	32.3	50.0
23.118000	25.2	15.9	9.000	L1	10.4	34.8	60.0	34.1	50.0
29.746000	40.0	16.9	9.000	L1	10.6	20.0	60.0	33.1	50.0

Mode #2	NEUTRAL LINE



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.154000	55.2	43.9	9.000	N	9.7	10.6	65.8	14.8	58.7
0.234000	43.2	28.9	9.000	N	9.7	19.1	62.3	25.3	54.2
0.518000	23.6	16.1	9.000	N	9.7	32.4	56.0	29.9	46.0
1.082000	22.7	16.5	9.000	N	9.8	33.3	56.0	29.5	46.0
1.454000	23.9	18.6	9.000	N	9.8	32.1	56.0	27.4	46.0
2.114000	23.4	17.8	9.000	N	9.9	32.6	56.0	28.2	46.0
3.482000	22.8	16.7	9.000	N	10.0	33.2	56.0	29.3	46.0
6.230000	25.5	19.0	9.000	N	10.1	34.5	60.0	31.0	50.0
10.002000	24.9	15.9	9.000	N	10.2	35.1	60.0	34.1	50.0
16.442000	37.6	17.8	9.000	N	10.3	22.4	60.0	32.2	50.0
16.934000	40.9	19.0	9.000	N	10.3	19.1	60.0	31.0	50.0
23.198000	28.2	15.9	9.000	N	10.4	31.8	60.0	34.1	50.0
28.122000	30.7	11.0	9.000	N	10.5	29.3	60.0	39.0	50.0

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
29.938000	33.7	12.4	9.000	N	10.6	26.3	60.0	37.6	50.0

6.2 MAINS TERMINALA DISCONTINUOUS DISTURBANCE VOLTAGE

6.2.1 Test setup

The EUT was placed on the floor as typical applications. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the referenc e ground system and all power lines were filtered from ambient.

The test set-up photo is included in appendix II.

Used Software for measurement is CMS supplied by AFJ Instruments.

6.2.2 Test result

Date of Test	2019-07-10	Temperature	23.4 °C
Test Mode	Mode #1, Mode #2	Relative humidity	52.2 % R.H.
Observation time (min)	120	***Test Result***	***PASS***
Tested By	Im, Jin-young		

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6.2.3 Test data

Mode #1

	150 kHz	500 kHz	1.4 MHz	30 MHz
First Run				
Short	0	0	0	0
Long	0	0	0	0
Fast Long	0	0	0	0
Total Clicks	0	0	0	0
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
Sw.Op.	0	0	0	0
4.2.3.4 events	0	0	0	0
Limit dBuV	66	56	56	60
N	0.00	0.00	0.00	0.00
	PASS	**PASS**	**PASS**	**PASS**

150 kHz	No Clicks	500 kHz	No Clicks
1.4 MHz	No Clicks	30 MHz	No Clicks

Mode #2

	150 kHz	500 kHz	1.4 MHz	30 MHz
First Run				
Short	0	0	0	0
Long	0	0	0	0
Fast Long	0	0	0	0
Total Clicks	0	0	0	0
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
Sw.Op.	0	0	0	0
4.2.3.4 events	0	0	0	0
Limit dBuV	66	56	56	60
N	0.00	0.00	0.00	0.00
	PASS	**PASS**	**PASS**	**PASS**

150 kHz	No Clicks	500 kHz	No Clicks
1.4 MHz	No Clicks	30 MHz	No Clicks

6.3 DISTURBANCE POWER

6.3.1 Test setup

The EUT was placed on a non-metallic table approximately 0.8 m above the ground plane. At the rear side of the EUT, a non-metallic table of length 6 m was placed to provide for movement of the absorbing clamp. The absorbing clamp was applied successively to all leads whose length was 25 cm or longer, unscreened and screened. The frequency spectrum from 30 MHz to 300 MHz was scanned and emission levels maximized at each frequency recorded. The AC mains cable was varied in length to 6.0 m in order to determine the maximum emission levels.

The test set-up photo is included in appendix III.

Used Software for measurement is EMC 32 supplied by Rohde & Schwarz.

6.3.2 Test result

Date of Test	2019-07-10	Temperature	21.7 °C
Test Mode	Mode #1, Mode #2	Relative humidity	53.2 % R.H.
Resolution bandwidth	120 kHz	Frequency range	30 MHz ~ 300 MHz
Coupling Location	AC In	***Test Result***	***Pass***
Tested By	Im, Jin-young		

6.3.3 Sample Calculated Example

At 30 MHz QP Limit = 45.0 dBpW

Correction Factor (Corr.) of Absorbing Clamp, Attenuator and Cable loss at 30 MHz = 10.0 dB

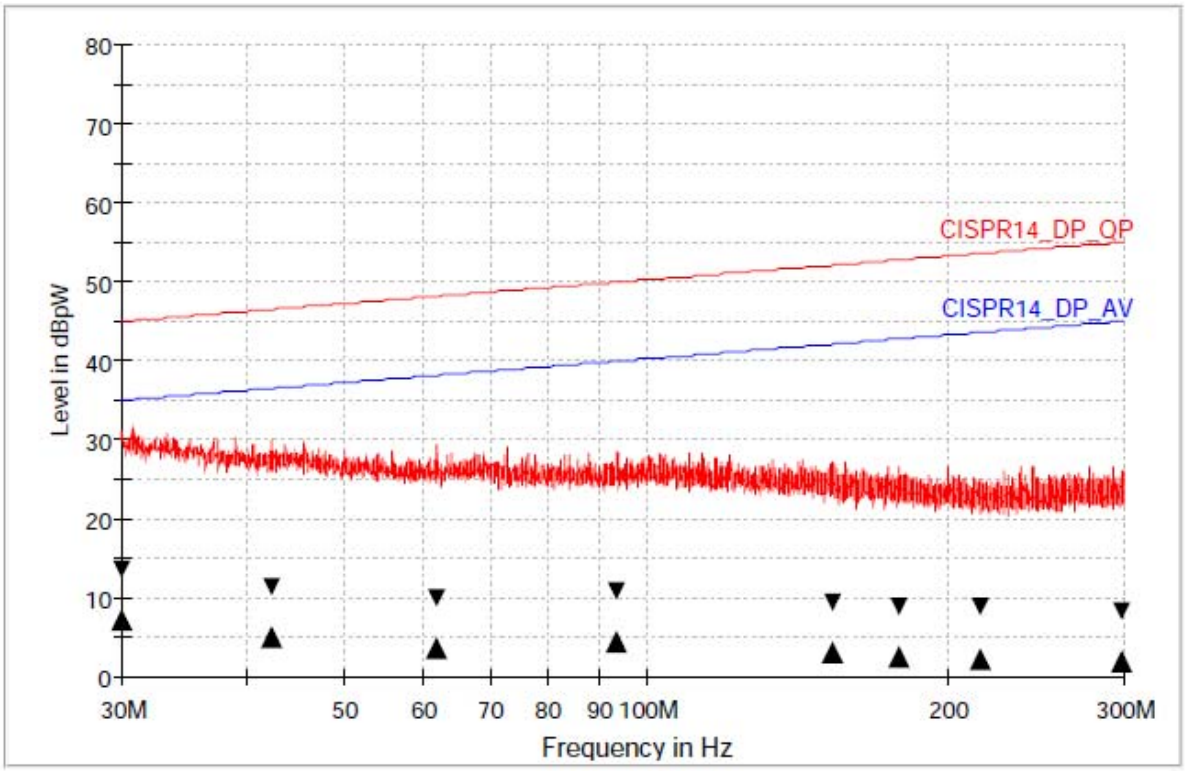
Q.P Reading from the Test receiver = 30 dBpW

(Calculated value for system losses by software EMC32 manufactured by Rohde & Schwarz)

Therefore Q.P Margin = 45 - 30 = 15 so the EUT has 15.0 dB margin at 30 MHz

6.3.4 Test data

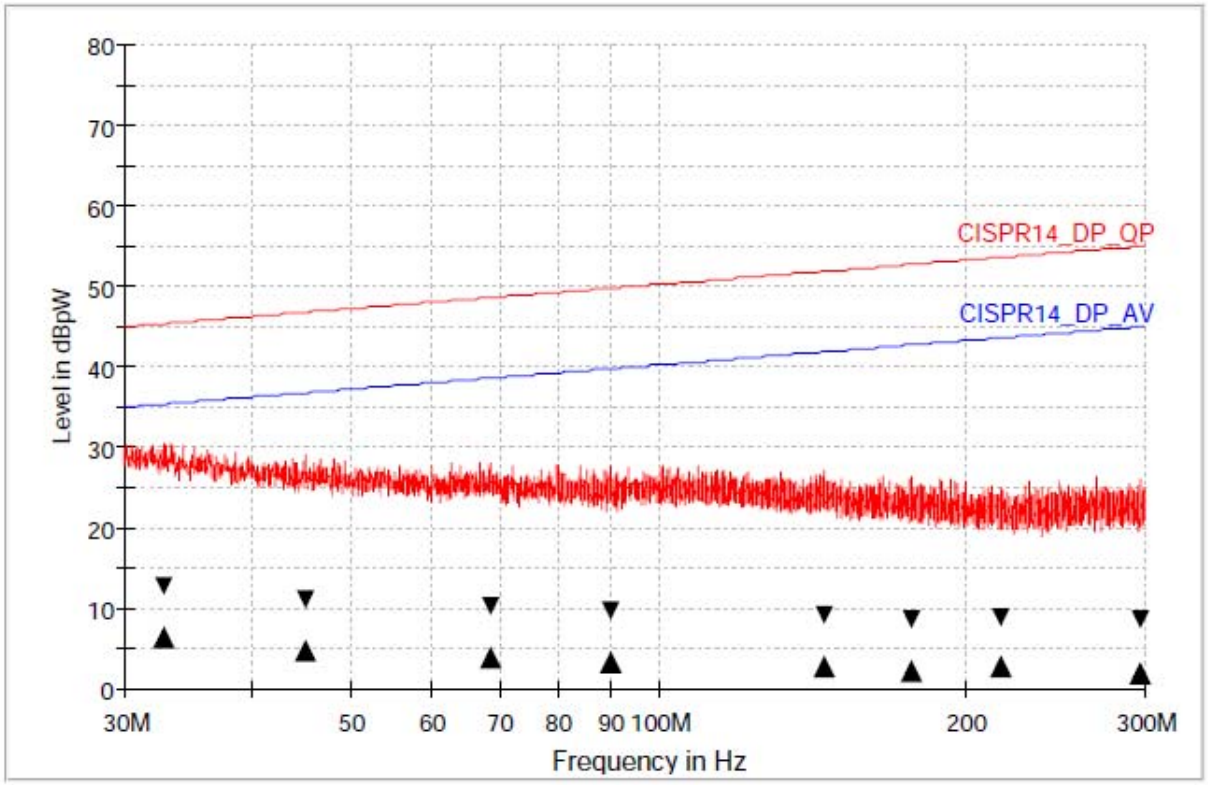
Mode #1



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBpW)	CAverage (dBpW)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBpW)	Margin - CAV (dB)	Limit - CAV (dBpW)
30.000000	13.5	7.2	120.000	9.1	31.5	45.0	27.8	35.0
42.400000	11.5	4.9	120.000	7.1	35.0	46.5	31.6	36.5
61.960000	10.1	3.7	120.000	5.6	38.1	48.1	34.5	38.1
93.520000	10.9	4.4	120.000	5.8	39.0	49.9	35.5	39.9
153.320000	9.4	3.0	120.000	4.4	42.7	52.1	39.1	42.1
178.600000	8.8	2.4	120.000	3.8	44.0	52.7	40.4	42.7
216.160000	8.8	2.3	120.000	3.1	44.8	53.6	41.3	43.6
299.080000	8.3	1.8	120.000	3.5	46.7	55.0	43.2	45.0

Mode #2



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBpW)	CAverage (dBpW)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBpW)	Margin - CAV (dB)	Limit - CAV (dBpW)
32.800000	12.9	6.5	120.000	8.6	32.5	45.4	28.9	35.4
45.160000	11.2	4.8	120.000	6.9	35.6	46.8	32.0	36.8
68.480000	10.3	3.9	120.000	5.8	38.2	48.6	34.7	38.6
89.840000	9.8	3.4	120.000	5.7	40.0	49.8	36.4	39.8
145.640000	9.1	2.7	120.000	4.6	42.8	51.9	39.2	41.9
177.200000	8.7	2.3	120.000	3.8	44.0	52.7	40.4	42.7
216.960000	9.0	2.6	120.000	3.1	44.6	53.6	40.9	43.6
297.160000	8.6	2.1	120.000	3.6	46.4	55.0	42.9	45.0

6.4 HARMONIC CURRENT EMISSIONS

6.4.1 Test setup

Harmonics of the fundamental current were measured up to 2 kHz using a universal power analyzer. The measurements were carried out under steady conditions and using average.

Before making measurements, it is necessary for the EUT to decide which class the EUT fulfills into; A, B, C or D.

The test set-up photo is included in appendix IV.

6.4.2 Test result

Date of Test	2019-07-12	Temperature	21.5 °C
Test Mode	Mode #1, Mode #2	Relative humidity	53.2 % R.H.
Test Result	***Pass***	Tested By	Im, Jin-young

Note: See next page for Harmonic Current on AC mains test data.

6.4.3 Test data for Mode #1

E. U. T. Result

Harmonic(s) > 200%:	
Order (n):	None
Harmonic(s) with average > 90%:	
Order (n):	None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

-

6.4.3 Test data

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	561.944E-3			
2	23.633E-3	2.431	972.00E-3	PASS
3	37.818E-3	1.827	2.07	PASS
4	4.866E-3			PASS
5	6.520E-3	0.636	1.03	PASS
6	2.130E-3			PASS
7	5.344E-3	0.771	693.00E-3	PASS
8	1.162E-3			PASS
9	1.993E-3			PASS
10	1.009E-3			PASS
11	1.522E-3			PASS
12	921.496E-6			PASS
13	1.828E-3			PASS
14	1.015E-3			PASS
15	1.622E-3			PASS
16	783.335E-6			PASS
17	1.223E-3			PASS
18	1.126E-3			PASS
19	1.123E-3			PASS
20	755.401E-6			PASS
21	1.348E-3			PASS
22	926.778E-6			PASS
23	1.283E-3			PASS
24	939.657E-6			PASS
25	1.499E-3			PASS
26	1.308E-3			PASS
27	1.794E-3			PASS
28	2.344E-3			PASS
29	2.818E-3			PASS
30	1.701E-3			PASS
31	1.746E-3			PASS
32	1.141E-3			PASS
33	1.429E-3			PASS
34	1.042E-3			PASS
35	1.714E-3			PASS
36	1.129E-3			PASS
37	1.277E-3			PASS
38	829.670E-6			PASS
39	1.644E-3			PASS
40	826.271E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	589.406E-3			
2	26.355E-3	1.220	2.16	PASS
3	47.743E-3	1.038	4.60	PASS
4	5.788E-3			PASS
5	9.167E-3	0.402	2.28	PASS
6	2.871E-3			PASS
7	5.560E-3			PASS
8	1.544E-3			PASS
9	2.562E-3			PASS
10	1.209E-3			PASS
11	2.317E-3			PASS
12	1.057E-3			PASS
13	2.042E-3			PASS
14	1.211E-3			PASS
15	1.765E-3			PASS
16	927.650E-6			PASS
17	1.314E-3			PASS
18	1.212E-3			PASS
19	1.252E-3			PASS
20	839.895E-6			PASS
21	1.479E-3			PASS
22	1.097E-3			PASS
23	1.446E-3			PASS
24	1.129E-3			PASS
25	1.649E-3			PASS
26	1.855E-3			PASS
27	2.012E-3			PASS
28	3.274E-3			PASS
29	3.661E-3			PASS
30	2.160E-3			PASS
31	2.214E-3			PASS
32	1.357E-3			PASS
33	1.628E-3			PASS
34	1.351E-3			PASS
35	1.962E-3			PASS
36	1.346E-3			PASS
37	1.486E-3			PASS
38	981.140E-6			PASS
39	1.757E-3			PASS
40	991.332E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.50	100.652		
2	88.26E-3	0.038	0.2	PASS
3	137.68E-3	0.060	0.9	PASS
4	9.96E-3	0.004	0.2	PASS
5	35.76E-3	0.016	0.4	PASS
6	16.63E-3	0.007	0.2	PASS
7	86.05E-3	0.037	0.3	PASS
8	10.64E-3	0.005	0.2	PASS
9	92.51E-3	0.040	0.2	PASS
10	17.68E-3	0.008	0.2	PASS
11	21.68E-3	0.009	0.1	PASS
12	16.71E-3	0.007	0.1	PASS
13	123.85E-3	0.054	0.1	PASS
14	9.25E-3	0.004	0.1	PASS
15	46.93E-3	0.020	0.1	PASS
16	9.62E-3	0.004	0.1	PASS
17	64.57E-3	0.028	0.1	PASS
18	11.70E-3	0.005	0.1	PASS
19	105.27E-3	0.046	0.1	PASS
20	8.57E-3	0.004	0.1	PASS
21	32.55E-3	0.014	0.1	PASS
22	9.03E-3	0.004	0.1	PASS
23	95.00E-3	0.041	0.1	PASS
24	11.85E-3	0.005	0.1	PASS
25	50.67E-3	0.022	0.1	PASS
26	10.42E-3	0.005	0.1	PASS
27	56.06E-3	0.024	0.1	PASS
28	9.53E-3	0.004	0.1	PASS
29	71.72E-3	0.031	0.1	PASS
30	9.16E-3	0.004	0.1	PASS
31	27.99E-3	0.012	0.1	PASS
32	10.70E-3	0.005	0.1	PASS
33	61.02E-3	0.027	0.1	PASS
34	10.72E-3	0.005	0.1	PASS
35	29.91E-3	0.013	0.1	PASS
36	9.37E-3	0.004	0.1	PASS
37	42.90E-3	0.019	0.1	PASS
38	11.36E-3	0.005	0.1	PASS
39	53.31E-3	0.023	0.1	PASS
40	9.98E-3	0.004	0.1	PASS

6.4.4 Test data for Mode #2

E. U. T. Result

Harmonic(s) > 200%:	
Order (n):	None
Harmonic(s) with average > 90%:	
Order (n):	None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	2.037			
2	4.201E-3			PASS
3	1.101E-3			PASS
4	2.079E-3			PASS
5	1.853E-3			PASS
6	878.625E-6			PASS
7	946.084E-6			PASS
8	817.368E-6			PASS
9	1.468E-3			PASS
10	810.274E-6			PASS
11	1.334E-3			PASS
12	785.371E-6			PASS
13	1.417E-3			PASS
14	952.551E-6			PASS
15	1.659E-3			PASS
16	674.542E-6			PASS
17	1.155E-3			PASS
18	1.155E-3			PASS
19	1.683E-3			PASS
20	732.808E-6			PASS
21	963.430E-6			PASS
22	876.831E-6			PASS
23	1.561E-3			PASS
24	890.070E-6			PASS
25	1.287E-3			PASS
26	676.152E-6			PASS
27	1.337E-3			PASS
28	704.675E-6			PASS
29	2.192E-3			PASS
30	675.947E-6			PASS
31	1.448E-3			PASS
32	987.306E-6			PASS
33	1.998E-3			PASS
34	776.621E-6			PASS
35	1.363E-3			PASS
36	919.036E-6			PASS
37	1.646E-3			PASS
38	674.207E-6			PASS
39	1.328E-3			PASS
40	791.351E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	2.080			
2	19.456E-3	0.901	2.16	PASS
3	15.577E-3	0.339	4.60	PASS
4	11.804E-3			PASS
5	9.065E-3			PASS
6	6.984E-3			PASS
7	6.206E-3			PASS
8	5.223E-3			PASS
9	5.267E-3			PASS
10	4.435E-3			PASS
11	4.451E-3			PASS
12	3.703E-3			PASS
13	4.024E-3			PASS
14	3.462E-3			PASS
15	3.619E-3			PASS
16	2.873E-3			PASS
17	3.127E-3			PASS
18	3.044E-3			PASS
19	3.327E-3			PASS
20	2.476E-3			PASS
21	2.612E-3			PASS
22	2.449E-3			PASS
23	2.821E-3			PASS
24	2.289E-3			PASS
25	2.475E-3			PASS
26	2.004E-3			PASS
27	2.524E-3			PASS
28	1.962E-3			PASS
29	3.079E-3			PASS
30	1.804E-3			PASS
31	2.391E-3			PASS
32	2.081E-3			PASS
33	2.867E-3			PASS
34	1.872E-3			PASS
35	2.187E-3			PASS
36	1.847E-3			PASS
37	2.495E-3			PASS
38	1.611E-3			PASS
39	2.030E-3			PASS
40	1.627E-3			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.52	100.662		
2	87.93E-3	0.038	0.2	PASS
3	129.75E-3	0.056	0.9	PASS
4	10.88E-3	0.005	0.2	PASS
5	66.80E-3	0.029	0.4	PASS
6	15.78E-3	0.007	0.2	PASS
7	112.49E-3	0.049	0.3	PASS
8	6.25E-3	0.003	0.2	PASS
9	120.04E-3	0.052	0.2	PASS
10	17.71E-3	0.008	0.2	PASS
11	43.83E-3	0.019	0.1	PASS
12	14.85E-3	0.006	0.1	PASS
13	89.70E-3	0.039	0.1	PASS
14	7.26E-3	0.003	0.1	PASS
15	127.41E-3	0.055	0.1	PASS
16	10.03E-3	0.004	0.1	PASS
17	106.92E-3	0.046	0.1	PASS
18	13.04E-3	0.006	0.1	PASS
19	117.24E-3	0.051	0.1	PASS
20	11.29E-3	0.005	0.1	PASS
21	101.58E-3	0.044	0.1	PASS
22	11.82E-3	0.005	0.1	PASS
23	107.86E-3	0.047	0.1	PASS
24	13.76E-3	0.006	0.1	PASS
25	72.29E-3	0.031	0.1	PASS
26	13.23E-3	0.006	0.1	PASS
27	60.78E-3	0.026	0.1	PASS
28	11.92E-3	0.005	0.1	PASS
29	74.95E-3	0.033	0.1	PASS
30	9.37E-3	0.004	0.1	PASS
31	70.77E-3	0.031	0.1	PASS
32	12.29E-3	0.005	0.1	PASS
33	87.56E-3	0.038	0.1	PASS
34	10.21E-3	0.004	0.1	PASS
35	44.31E-3	0.019	0.1	PASS
36	11.29E-3	0.005	0.1	PASS
37	77.53E-3	0.034	0.1	PASS
38	11.24E-3	0.005	0.1	PASS
39	28.36E-3	0.012	0.1	PASS
40	9.10E-3	0.004	0.1	PASS

6.5 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER

6.5.1 Test setup

The voltage changes at the supply terminals were measured across the complex reference impedance Z = (0.4 + j0.25) Ω.

The short-term flicker values are measured during a time interval of 10 min. Dc = relative voltage change between two steady states and Dmax = maximum single voltage change, are measured over the reference impedance. Long-term flicker values were measured during 120 minutes.

The test set-up photo is included in appendix IV.

6.5.2 Test result

Date of Test	2019-07-12	Temperature	21.5 °C
Test Mode	Mode #1, Mode #2	Relative humidity	53.2 % R.H.
Test Result	***Pass***	Tested By	Im, Jin-young

6.5.3 Test data Mode #1

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.138	1.00	PASS
Plt	0.062	0.65	PASS
dc [%]	0.111	3.30	PASS
dmax [%]	0.156	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Detail Flicker data

Flicker measurement 1	EUT values	Limit	Result
Pst	0.138	1.00	PASS
dc [%]	0.013	3.30	PASS
dmax [%]	0.042	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 2	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.042	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 3	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.042	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 4	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.044	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 5	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.042	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 6	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.040	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 7	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.042	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 8	EUT values	Limit	Result
Pst	0.027	1.00	PASS
dc [%]	0.111	3.30	PASS
dmax [%]	0.156	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 9	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.040	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 10	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.040	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 11	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.040	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 12	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
Tmax [s]	0.000	0.50	PASS

6.5.4 Test data Mode #2

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.089	1.00	PASS
Plt	0.064	0.65	PASS
dc [%]	0.385	3.30	PASS
dmax [%]	0.419	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Detail Flicker data

Flicker measurement 1	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 2	EUT values	Limit	Result
Pst	0.059	1.00	PASS
dc [%]	0.384	3.30	PASS
dmax [%]	0.413	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 3	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 4	EUT values	Limit	Result
Pst	0.089	1.00	PASS
dc [%]	0.384	3.30	PASS
dmax [%]	0.417	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 5	EUT values	Limit	Result
Pst	0.058	1.00	PASS
dc [%]	0.384	3.30	PASS
dmax [%]	0.417	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 6	EUT values	Limit	Result
Pst	0.058	1.00	PASS
dc [%]	0.384	3.30	PASS
dmax [%]	0.410	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 7	EUT values	Limit	Result
Pst	0.057	1.00	PASS
dc [%]	0.383	3.30	PASS
dmax [%]	0.417	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 8	EUT values	Limit	Result
Pst	0.058	1.00	PASS
dc [%]	0.384	3.30	PASS
dmax [%]	0.408	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 9	EUT values	Limit	Result
Pst	0.086	1.00	PASS
dc [%]	0.384	3.30	PASS
dmax [%]	0.415	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 10	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 11	EUT values	Limit	Result
Pst	0.089	1.00	PASS
dc [%]	0.385	3.30	PASS
dmax [%]	0.419	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Flicker measurement 12	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.040	4.00	PASS
Tmax [s]	0.000	0.50	PASS

7. IMMUNITY TESTS

7.1 ELECTROSTATIC DISCHARGES IMMUNITY TEST

7.1.1 Test specification

Discharge Voltage	Air Discharge: 8 kV
	Contact Discharge: 4 kV
Polarity	Positive / Negative
Number of Discharge	10 at all test point
EUT-position	Table Top

7.1.2 Test setup

The EUT and all local support equipment were placed on non-metallic support 0.8 m above a reference g round plane (RGP) and the minimum distance between the EUT and any laboratory walls or any other m etallic surfaces shall be at least 1 meter and were put into operation according to the specified operating mode.

Air discharges were applied to non-metallic parts of the EUT and Contact discharges were applied to all a ccessible metallic parts. Discharges were also applied to the Vertical Coupling Plane, where applicable.

The test set-up photos are included in appendix V.

7.1.3 Test result

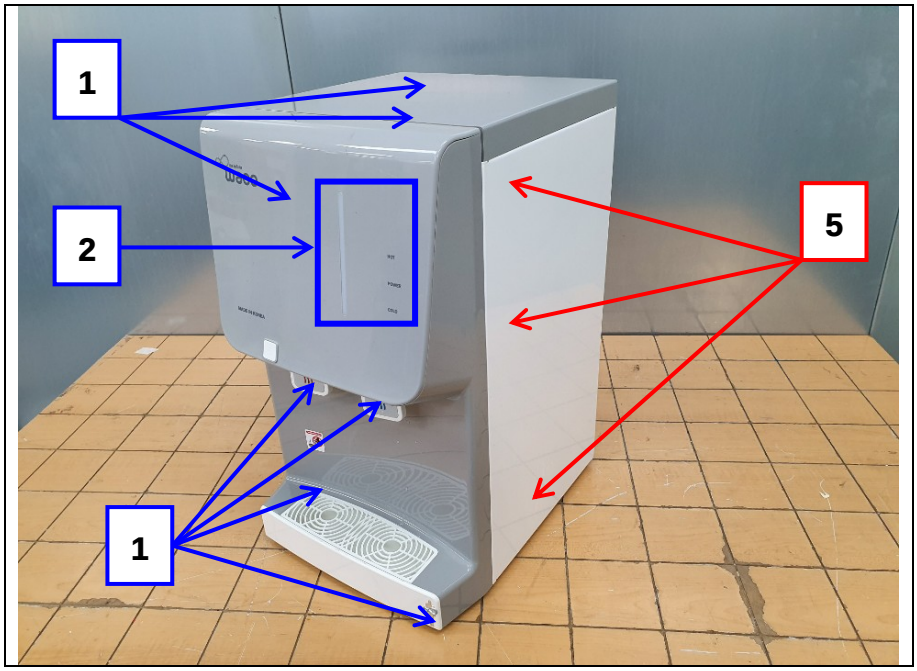
Date of Test	2019-07-11	Temperature	22.4 °C
Test Location	Shielded Room	Relative humidity	54.6 % R.H.
Test Mode	Mode #1, Mode #2	Atmospheric pressure	99.1 kPa
Required Criteria	***B***	***Test Result***	***PASS***
Tested By	Im, Jin-young		

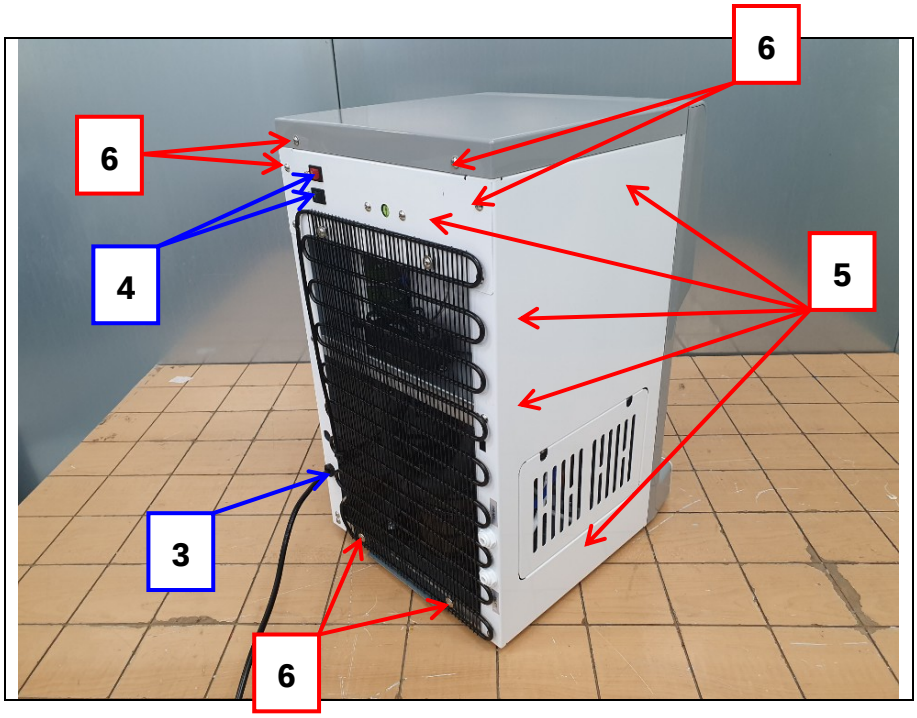
Test Data Mode #1, Mode #2			
ESD Points	**Test Level (±kV)**	**Result**	**Description**
(1) Enclosure (Plastic Part)	8 (Air)	A	There was no deviation from normal operating condition.
(2) LED	8 (Air)	A	
(3) AC IN	8 (Air)	A	
(4) Switch	8 (Air)	A	
(5) Enclosure (Metal Part)	4 (Contact)	A	
(6) Screws	4 (Contact)	A	
HCP / VCP	4 (Indirect)	A	

Note. The test points of the EUT are each location on the surface touchable by hand (see test point in next page)

7.1.4 Test Points

Air-Direct →
Contact-Direct →





7.2 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

7.2.1 Test specification

Test level	1 kV (AC Input), 0.5 kV (Signal line)
Burst frequency	5 kHz
Polarity	Positive / Negative
Coupling time	120 s
Coupling methods	AC mains – Coupling Decoupling Network (CDN)
	Signal line–Capacitive Coupling Clamp(CCC)
Lines for test	AC mains of the EUT
Type of line	Unshielded
EUT-position	Table Top

7.2.2 Test setup

The EUT and all cables to the EUT were placed on non-metallic support 0.1 m above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The minimum distance between the EUT and all other conductive structures (e.g. the walls of a shielded r oom), except the ground reference plane shall be more than 0.5 m. Unless otherwise specified in the pro duct standard or the product family standard, the length of the signal and power lines between the couplin g device and the EUT shall be 0.5 m ± 0.05 m. If the manufacturer provides a non-detachable supply ca ble more than 0.5 m ± 0.05 m long with the equipment, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1 m above the ground reference plane.

The test set-up photo is included in appendix VI.

7.2.3 Test result

Date of Test	2019-07-11	Temperature	23.5 °C
Test Location	Shielded Room	Relative humidity	54.2 % R.H.
Test Mode	Mode #1, Mode #2	Atmospheric pressure	99.1 kPa
Required Criteria	***B***	***Test Result***	***PASS***
Tested By	Im, Jin-young		

Test Data Mode #1					
Line for test		Coupling Method	Test level [± kV]	Result	Description
AC-mains	L	CDN	1	A	There was no deviation from normal operating condition.
	N	CDN	1	A	
	PE	CDN	1	A	
	L+N	CDN	1	A	
	L+PE	CDN	1	A	
	N+PE	CDN	1	A	
	L+N+PE	CDN	1	A	

Test Data Mode #2					
Line for test		Coupling Method	Test level [± kV]	Result	Description
AC-mains	L	CDN	1	B	The flicker was observed on the LED of EUT during the test, but return to normal operating condition after the test.
	N	CDN	1	B	
	PE	CDN	1	B	
	L+N	CDN	1	B	
	L+PE	CDN	1	B	
	N+PE	CDN	1	B	
	L+N+PE	CDN	1	B	

7.3 SURGE IMMUNITY TEST

7.3.1 Test specification

Test level	1 kV (Differential mode), 2 kV (Common mode)
Number of surge	5 surges / polarity
Polarity	Positive / Negative
Angle	90°(Positive) / 270°(Negative)
Repetition rate	60 s
Coupling methods	AC mains – Coupling Decoupling Network (CDN)
Lines for test	AC mains the EUT
Type of line	Unshielded
EUT-position	Table Top

7.3.2 Test setup

The EUT and all local support equipment were placed on a non-metallic support 0.8 m above a referen ce ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix VII.

7.3.3 Test result

Date of Test	2019-07-11	Temperature	22.9 °C
Test Location	Shielded Room	Relative humidity	53.7 % R.H.
Test Mode	Mode #1, Mode #2	Atmospheric pressure	99.1 kPa
Required Criteria	***B***	***Test Result***	***PASS***
Tested By	Im, Jin-young		

Test Data for Mode #1, Mode #2					
Line for test		**Coupling Method**	**Test level [± kV]**	**Result**	**Description**
AC-mains	L+ N	CDN	1	A	There was no deviation from normal operating condition.
	L+ PE	CDN	2	A	
	N + PE	CDN	2	A	

7.4 RF CONTINUOUS CONDUCTED IMMUNITY TEST

7.4.1 Test specification

Test level	3 V (AM 80 %, 1 kHz)
Frequency range	0.15 MHz ~ 230 MHz
Frequency step	1 %
Dwell time at each frequency	1 s
Coupling methods	AC mains, DC input – CDN
	Signal lines–EM clamp
Lines for test	AC mains of the EUT
Type of line	Unshielded
EUT-position	Table Top

7.4.2 Test setup

The EUT and all local support equipment were placed on a non-metallic support 0.1 m above a referen ce ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix VIII.

7.4.3 Test result

Date of Test	2019-07-11	Temperature	23.6 °C
Test Location	Shielded Room	Relative humidity	52.8 % R.H.
Test Mode	Mode #1, Mode #2	Atmospheric pressure	99.0 kPa
Required Criteria	***A***	***Test Result***	***PASS***
Tested By	Im, Jin-young		

Test Data for Mode #1, Mode #2			
Line for Test	**Coupling Method**	**Result**	**Description**
AC mains	CDN (M3)	A	There was no deviation from normal operation condition.

7.5 VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

7.5.1 Test specification

Nominal Mains Voltage (V_{NOM})	230 V~, 50 Hz / 60 Hz
Level of Reduction (dip)	25 / 30 cycles at 30 % of V_{NOM} 10 / 12 cycles at 60 % of V_{NOM} 0.5 cycles at 100 % of V_{NOM}
No. of dips/interruption	3
Interval	10 s
Type of line	Unshielded
EUT-position	Table Top

7.5.2 Test setup

The EUT and all local support equipment were placed on a non-metallic support 0.8 m above a referen ce ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix IX.

7.5.3 Test result

Date of Test	2019-07-11	Temperature	24.8 °C
Test Location	Shielded Room	Relative humidity	51.5 % R.H.
Test Mode	Mode #1, Mode #2	Atmospheric pressure	99.0 kPa
Required Criteria	***C***	***Test Result***	***PASS***
Tested By	Im, Jin-young		

Test Data for Mode #1, Mode #2

Test	Reduction (% of V_{NOM})	Duration @50 Hz	Duration @ 60 Hz	Result	Description
Voltage dips	30	25 cycles	30 cycles	B	The flicker was observed on the LED of EUT during the test, but return to normal operating condition after the test.
	60	10 cycles	12 cycles	B	
	100	0.5 cycle	0.5 cycle	A	There was no deviation from normal operating condition

Appendix I - Test Setup Photo: Main Terminal Continuous Disturbance Voltage Test

Appendix II - Test Setup Photo: Main Terminal Discontinuous Disturbance Voltage Test

Appendix III - Test Setup Photo: Disturbance Power Test

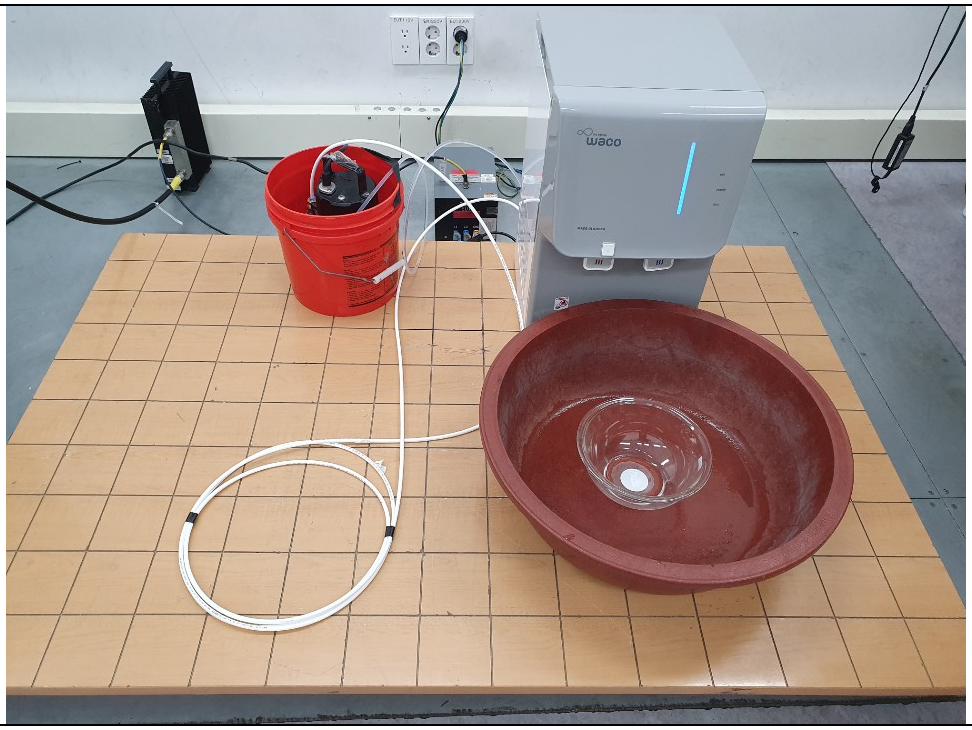
Appendix IV – Test Setup Photo: Harmonic Currents & Flicker Test

Appendix V - Test Setup Photo: Electrostatic Discharge Test

Appendix VI - Test Setup Photo: EFT/Burst Test

Appendix VII - Test Setup Photo: Surge Test

Appendix VIII - Test Setup Photo: Conducted RF Field Test



Appendix IX - Test Setup Photo: Voltage Dips & Interruption Test

Appendix X - Test Instrumentation

Name of Equipment	Model Number	Manufacturer	Serial Number	Last Cal.(Interval)	USE
For EMISSION					
EMI Test Receiver	ESCI 7	Rohde & Schwarz	100722	2019-01-18(1Y)	■
LISN	ENV216	Rohde & Schwarz	100110	2019-01-14(1Y)	■
LISN	LS16C	AFJ	16011403310	2018-07-27(1Y)	■
Loop Antenna	HFH2-Z2	Rohde & Schwarz	100341	2019-06-21(2Y)	□
Artificial Hand	N/A	N/A	N/A	N/A	□
Click Meter	CL55C	AFJ	55041413216	2018-07-27(1Y)	■
Absorbing Clamp	MDS-21	Rohde & Schwarz	100213	2019-02-12(1Y)	■
CO2000 Controller	CO2000	INNCO SYSTEM	CO2000/229/10030505/L	N/A	■
DP Cable Stand	KMS5300	INNCO SYSTEM	N/A	N/A	■
Test Receiver	ESU	Rohde & Schwarz	100303	2019-01-18(1Y)	□
TRILog Broadband Antenna	VULB9163	Schwarzbeck	9163-799	2017-10-23(2Y)	□
Preamp 9 kHz-1 GHz	310N	Sonoma Instrument	344015	2019-01-18(1Y)	□
Attenuators	6 dB	Rohde & Schwarz	272.4110.50	2019-01-18(1Y)	□
Antenna Master	MA4000-EP	INNCO SYSTEM	4600814	N/A	□
Turn Table	DT3000-3t	INNCO SYSTEM	1310814	N/A	□
CO3000 Controller	CO3000-4PORT	INNCO SYSTEM	CO3000/806/34130814/L	N/A	□
MANTELSTRON-SPERRZANGE DECOUPLING CLAMP	FTC 40X15 E	LUTHI	5352	2019-01-22(1Y)	□
Digital Power Analyzer For Harmonic & Flicker	DPA 500	EM Test	V0713102356	2019-01-31(1Y)	■
AC Power Source	ACS 500	EM Test	V0713102357	2018-07-27(1Y)	■
For IMMUNITY					
ESD Simulator	ESS-2000	NoiseKen	ESS04Z3791	2018-11-28(1Y)	■
ESD Gun	TC-815R	NoiseKen	ESS04Z3850	2018-11-28(1Y)	■
SIGNAL GENERATOR	SMT03	Rohde & Schwarz	SG00000005	2019-02-20(1Y)	□
Signal Generator	SMA100A	Rohde & Schwarz	101047	2019-01-18(1Y)	□
High Gain Log-Periodic Antenna	HL046E	Rohde & Schwarz	100014	2019-03-12(1Y)	□
DOPPEL STEG HORN Antenna	HF906	Rohde & Schwarz	100332	2019-02-14(2Y)	□
Amplifier	SSA502A	Sungsan	SSEC0001	2018-08-23(1Y)	□
Power Amplifier	250W1000A	Amplifier Research	0320414	2019-03-12(1Y)	□
Amplifier	SSA503A	Sungsan	SSEC0002	2018-11-01(1Y)	□
Amplifier	SSA505A	Sungsan	SSEC0003	2018-11-01(1Y)	□
Power meter	NRP2	Rohde & Schwarz	103736	2018-07-27(1Y)	□
Power Sensor	NRP-Z11	Rohde & Schwarz	102855	2019-01-18(1Y)	□
Power Sensor	NRP-Z51	Rohde & Schwarz	102735	2019-01-04(1Y)	□
Directional Coupler	DC6180A	Amplifier Research	0335536	2019-01-18(1Y)	□

Name of Equipment	Model Number	Manufacturer	Serial Number	Last Cal. (Interval)	USE
Directional Coupler	DC7144A	Amplifier Research	0320556	2019-01-18(1Y)	☐
Directional Coupler	SSA505	Sungsan	2801(A)	2018-11-21(1Y)	☐
Ultra Compact Simulator	UCS 500 N7	EM Test	V1047108018	2018-12-19(1Y)	■
Combined Coupling Decoupling Net.	CNI 503 B7	EM Test	V1047108019	2018-12-19(1Y)	■
Capacitive Coupling Clamp	HFK	EM Test	0306-45	2018-07-27(1Y)	☐
Signal Generator	SMA 100A	Rohde & Schwarz	101047	2019-01-18(1Y)	☐
Continuous Wave Simulator	CWS 500 N1.4	EM Test	V1229113209	2018-12-04(1Y)	■
Attenuator	150-A-FFN-06	Bird Technologies Group	0605	2019-01-18(1Y)	■
CDN	FCC-801-M1-16A	Fisher Custom	06006	2019-01-18(1Y)	☐
CDN	FCC-801-M2-16A	Fisher Custom	06004	2019-01-18(1Y)	☐
CDN	FCC-801-M3-16A	Fisher Custom	06006	2018-07-27(1Y)	■
CDN	FCC-801-M5-16A	Fisher Custom	03006	2019-01-18(1Y)	☐
EM Injection Clamp	F-203I-23MM	Fisher Custom	490	2019-01-30(1Y)	☐
Directional Coupler	DC2600A	Amplifier Research	0334631	2018-07-27(1Y)	☐
Termination	300-T-MN	Bird Technologies Group	0526	2019-02-14(1Y)	☐
Power Sensor	NRP-Z91	Rohde & Schwarz	100617	2018-07-27(1Y)	☐
Magnetic Field Antenna	MS 100N	EM Test	0512-11	2019-04-05(1Y)	☐
Current Transformer	MC 2630	EM Test	0912-66	2019-04-05(1Y)	☐
Current Transformer	MC 26100	EM Test	0407-02	2019-04-05(1Y)	☐
Ultra Compact Generator	UCS 500 M6B	EM Test AG	V0626101562	2019-01-18(1Y)	■
Motorized Variac	MV 2616	EM Test AG	V0626101563	2019-01-18(1Y)	■
AC & DC Power Source	3150AFX-4L	PACIFIC	110634101	2019-03-15(1Y)	☐