

EMC TEST REPORT

According to

EN 55014-1 : 2006+A2:2011

EN 61000-3-2 : 2014

EN 61000-3-3 : 2013/A1:2017

EN 55014-2 : 2015

*Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus
Part 1: Emission;*

Limits - Limits for harmonic current emissions (equipment input current up to and including $\leq 16A$ per phase);

Limits - Limitation of voltage changes, voltage fluctuations and flicker in public

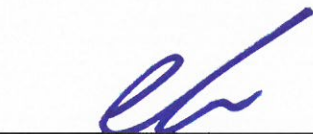
low-voltage supply systems, for equipment with rated current $\leq 16 A$ per phase and not subject to conditional connection;

*Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus
Part 2: Immunity - Product family standard;*

Test Report No. : CSTS-CE19/EMC0008 (Rev. 0)
Test Date : Jul. 05, 2019 ~ Jul. 08, 2019
Issue Date : Jul. 12, 2019
Equipment : Near infrared skin massage
Model Name : LUBIT
Applicant : IDEA-ON CO., LTD
703 NO, 96, Cheonsu 14-ro, Dongnam-gu, Cheonan-si,
Chungcheongnam-do, Korea

This report applies only to the product named in the title of this report manufactured at the location indicated. Test results apply only to the particular equipment and functionality described in this test report.

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1. General Description of EUT

1.1 Applicant

Company Name	IDEA-ON CO., LTD	
Address	703 NO, 96, Cheonsu 14-ro, Dongnam-gu, Cheonan-si, Chungcheongnam-do, Korea	
Contact Person	HYEONG DU HAN / Manager	
Tel. / Fax.	Tel.) +82-41-568-8885	Fax.) +82-41-564-8885
E-Mail	idea-on@naver.com	

1.2 Manufacturer

Company Name	IDEA-ON CO., LTD	
Address	703 NO, 96, Cheonsu 14-ro, Dongnam-gu, Cheonan-si, Chungcheongnam-do, Korea	
Contact Person	HYEONG DU HAN / Manager	
Tel. / Fax.	Tel.) +82-41-568-8885	Fax.) +82-41-564-8885
E-Mail	idea-on@naver.com	

1.3 Test Condition of EUT

Trade Name	-
Product Name	Near infrared skin massage
Model Name	LUBIT
Serial Number	N/A
Input rating	230 V~, 50 Hz

1.4 Technical Description of EUT

Power	DC 5 V (USB Power / without AC/DC Adapter)
Light	LED
Power consumption	2.5 W
Battery	Li-Ion Battery (3.7 V, 3500 mAh)
Port	Micro USB
Size	152 x 32 x 60 mm

2. General Information of Test

2.1 Test Facility

This test was carried out by CSTech, Inc.	
Test Site Location	520-5, Dangseong-ro, Songsan-myeon, Hwaseong-si, Gyeonggi-do, Korea Tel.) +82-31-493-2001 Fax.) +82-31-493-2055

2.2 Standard Applicable for Testing

Standards	Status
EN 55014-1 : 2006+A2:2011	Applicable
EN 61000-3-2 : 2014	Applicable
EN 61000-3-3 : 2013/A1:2017	Applicable
EN 55014-2 : 2015, Category II , Category III	Applicable

Note : Table of tests are performed out under each category of equipment.

2.3 Deviation from The Standards

Standards	Deviation
IEC 61000-4-2 : 2008	Applicable
IEC 61000-4-3 : 2006/A1:2007/A2:2010	Applicable
IEC 61000-4-4 : 2012	Applicable
IEC 61000-4-5 : 2014	Applicable
IEC 61000-4-6 : 2013	Applicable
IEC 61000-4-8 : 2009	Not Applicable
IEC 61000-4-11 : 2004	Applicable

2.4 Summary of Test Results

Standard	Description	Test Result
EN 55014-1	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus Part 1: Emission	■ Pass □ Fail
EN 61000-3-2	Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	■ Pass □ Fail
EN 61000-3-3	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection	■ Pass □ Fail
EN 55014-2	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus -Part 2: Immunity -Product family standard	■ Pass □ Fail
IEC 61000-4-2	Testing and measurement techniques - Electrostatic discharge immunity test	■ Pass □ Fail
IEC 61000-4-3	Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	■ Pass □ Fail
IEC 61000-4-4	Testing and measurement techniques - Electrical fast transient/burst immunity test	■ Pass □ Fail
IEC 61000-4-5	Testing and measurement techniques - Surge immunity test	■ Pass □ Fail
IEC 61000-4-6	Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	■ Pass □ Fail
IEC 61000-4-8	Testing and measurement techniques - Power frequency magnetic field immunity test	□ Pass □ Fail
IEC 61000-4-11	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	■ Pass □ Fail

2.5 Description of EUT modification

The tested device is not modified anything, mechanical or circuits to improve EMC status during the test. No EMI suppression device(s) was added and/or modified during testing.

2.6 Description of Model Name

Not Applicable

2.7. Description of the differences between Basic Model and Alt. Model.

Not Applicable

2.8 Description of Test System (EMI and EMS)

2.8.1 Internal Board Configuration of EUT

Description	Model	Serial No.	Manufacturer
Main Board	EMGY LANTERN V1.8	N/A	N/A
LED Board x3	EMGY LANTERN LED V1.7	N/A	N/A
Battery	SA-3500MKE	N/A	SHINA C&C

2.8.2 Configuration of Test Setup

Description	Model	Serial No.	Manufacturer
Near infrared skin massage (EUT)	LUBIT	N/A	IDEA-ON CO., LTD
Adapter (Near infrared skin massage)	EP-TA20KWK	N/A	Dongguan City Yingju Electronics Co., Ltd.

2.9 Type of Cables Used

Mode : Category II

Device From		Device To		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length(m)	Shield
EUT	Micro USB	Adapter (Near infrared skin massage)	USB	1.5	Shielded
Adapter (Near infrared skin massage)	AC In	AC Line	AC POWER	0.8	Unshielded

Mode : Category III

Device From		Device To		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length(m)	Shield
EUT	-	-	-	-	-

2.10 Operation of EUT

Operating Voltage : AC 230 V, 50 Hz

Operating condition :

Mode : Category II / Category III

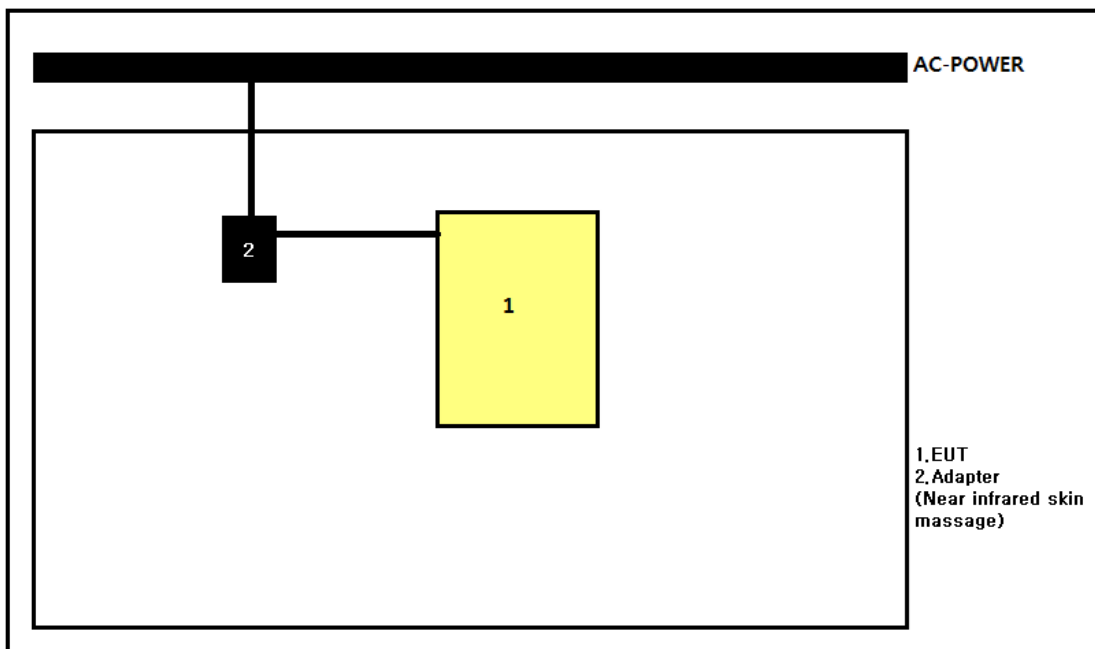
The EUT was operated in “Maximum century Mode” and the test engineer observed whether the EUT was operated normally during the test.

Note)

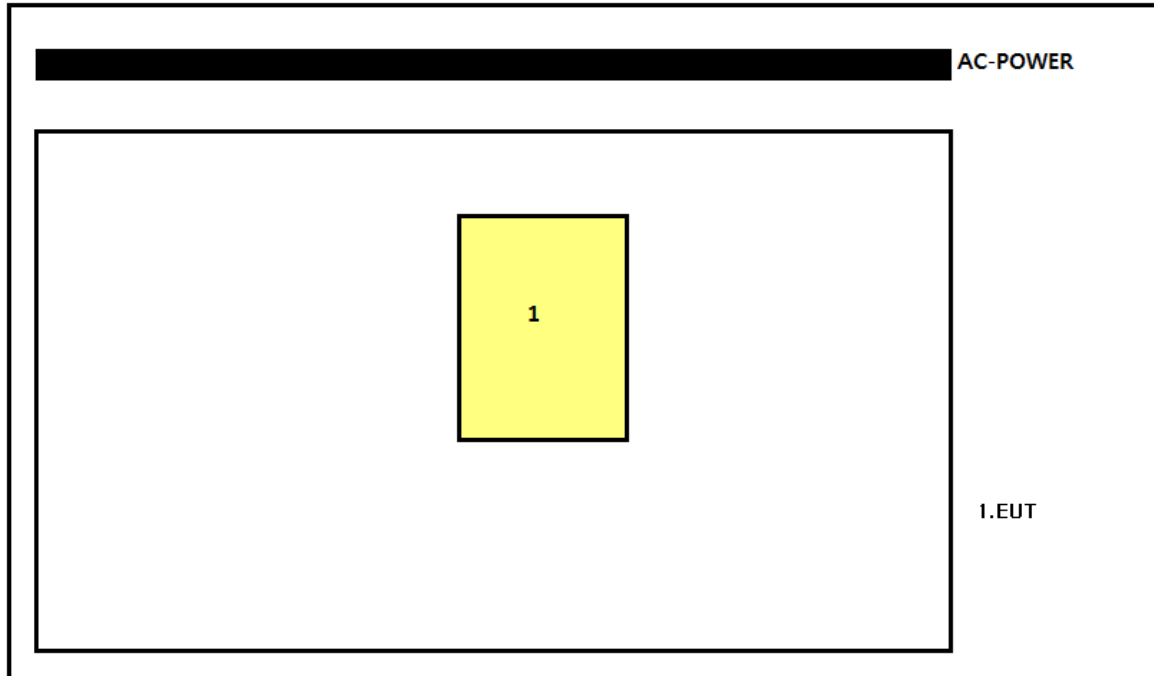
- Continuous interference tests were neutral to neutral and worst-case for discontinuous interference tests.

2.11 Test System Layout on EUT and Peripherals

Mode : Category II



Mode : Category III



3. Test Data

3.1 Conducted Emission Test

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz on the 230 VAC power and return leads of the EUT according to the methods defined in European Standard EN55014-1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 3.1.5. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

3.1.1 Test Condition

Frequency Range of Test : 150 kHz to 30 MHz

Test Standard : EN 55014-1 : 2006+A2:2011

Test Date : Jul. 05, 2019

Item : At main terminals

Temperature/Humidity : (24 ± 2) °C / (41 ± 2) % R.H.

3.1.2 Limits of Conducted Emission

Item	Frequency Range (MHz)	Limits[dB(μV)]	
		Quasi-Peak	Average-Peak
At main terminals	0.15 ~ 0.5	66 ~ 56	59 ~ 46
	0.5 ~ 5	56	46
	5 ~ 30	60	50

3.1.3 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMI Receiver	ER-30	LIG NEX 1	L0903A002	Feb. 27, 2020	■
LISN	LN2-16	EMCIS	LN10010	Feb. 27, 2020	□
LISN	ENV216	ROHDE& SCHWARZ	101781	Jan. 03, 2020	■

3.1.4 Test Result of Conducted Emission

EUT : LUBIT

Input Voltage : AC 230 V, 50 Hz

Conducted Emission Test Results: PASS

Test data

Freq. (MHz)	Loss (dB)		Pol. (L/N)	Quasi-Peak Mode			CISPR-Average Mode		
	LISN	Cable		Limit [dB(μV)]	Measure [dB(μV)]	Result [dB(μV)]	Limit [dB(μV)]	Measure [dB(μV)]	Result [dB(μV)]
0.164	9.89	0.03	L	65.26	34.11	44.0	58.04	18.20	28.1
0.972	9.72	0.04	N	56.00	26.49	36.3	46.00	20.37	30.1
1.942	9.64	0.05	N	56.00	30.19	39.9	46.00	24.51	34.2
2.904	9.64	0.07	L	56.00	30.21	39.9	46.00	23.87	33.6
5.611	9.64	0.11	N	60.00	28.36	38.1	50.00	19.43	29.2
8.136	9.65	0.14	L	60.00	28.46	38.3	50.00	17.23	27.0
11.526	9.67	0.17	N	60.00	30.01	39.9	50.00	20.72	30.6
12.097	9.67	0.18	L	60.00	31.89	41.7	50.00	21.84	31.7

Notes:

All modes of operation were investigated and the worst-case emissions are reported. See the plots in next pages.
Measurement uncertainty estimated at 2.3 dB.

However, influenced by the sample and the environmental impact is not taken into account.

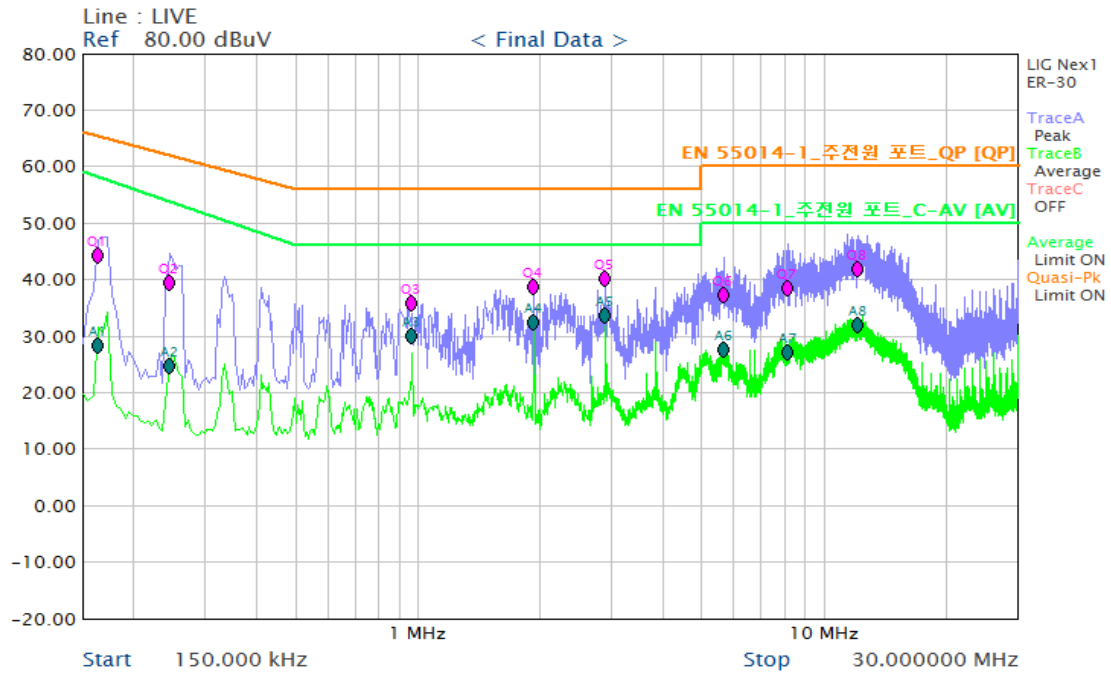
The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k=2$.



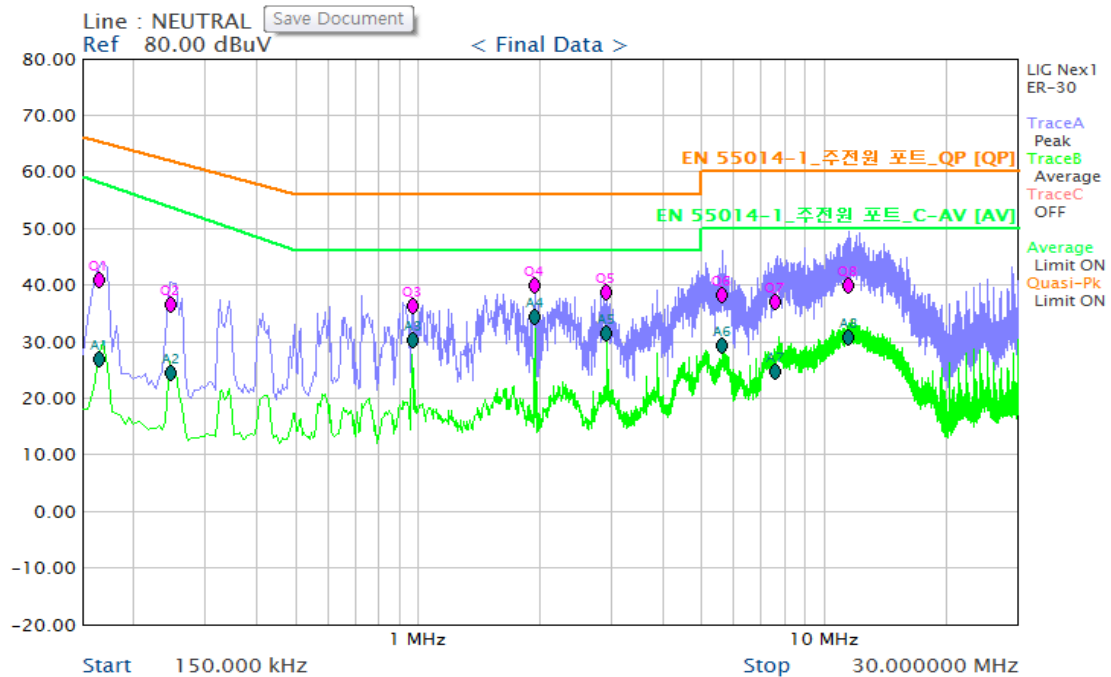
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PLOTS OF EMISSIONS

[LINE: LIVE]



[LINE: NEUTRAL]



3.1.5 Photograph(s) of Conducted Emission Test Configuration

[Front]



[Rear]



3.2 Main Terminal Discontinuous Disturbance (Click) Test

The EUT was placed on a wooden table, 40 centimeters height above the floor. Power was fed to the EUT through a 50 ohm/ 50 uH + 5 ohm Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

3.2.1 Test Condition

Frequency Range of Test : 150 kHz, 500 kHz, 1.4 MHz, 30 MHz

Test Standard : EN 55014-1 : 2006+A2:2011

Test Date : Jul. 06, 2019

Run Duration : 120 min

Temperature/Humidity : (24 ± 1) °C / (43 ± 2) % R.H.

3.2.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMI TEST RECEIVER	9010	NARDA Safety Test Solutions	696WX20805	Nov. 02, 2019	■
Four-channel simultaneous click measurement	Click4E	NARDA Safety Test Solutions	030WX20112	N/A	■
Click Analyzer	9010-CLICK	NARDA Safety Test Solutions	010WX10204	N/A	■
ARTIFICIAL MAINS NETWORK	L2-16B	NARDA Safety Test Solutions	000WX20812	Nov. 02, 2019	■

3.2.3 Test Result of Main Terminal Discontinuous Disturbance (Click) Test

EUT : LUBIT

Input Voltage : AC 230 V, 50 Hz

Main Terminal discontinuous Disturbance (Click) Test Results: PASS

Test data

Frequency (MHz)	Limit (dBμV)	≤10 ms	≤20 ms	≤0.2 s	From Exception E4	Other than click (ms)	Total Clicks	Time min.	N Rate	+Lq (dB)	Result
0.15	66	0	0	0	0	0	0	120	0	110	PASS
0.5	56	0	0	0	0	0	0	120	0	100	PASS
1.4	56	0	0	0	0	0	0	120	0	100	PASS
30	60	0	0	0	0	0	0	120	0	104	PASS



Tested by : Park, Sang Hoon

3.2.4 Photograph(s) of Main Terminal Discontinuous Disturbance (Click) Test



3.3 Disturbance Power Test

The EUT was placed on a non-metallic table approximately 0.8 meters 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 main cable was varied in length to 6.0 meters in order to determine the maximum emission levels.

3.3.1 Test Condition

Frequency Range of Test : 30 MHz to 300 MHz

Test Standard : EN 55014-1 : 2006+A2:2011

Test Date : Jul. 05, 2019

Temperature/Humidity : (24 ± 2) °C / (41 ± 2) % R.H.

3.3.2 Limits of Disturbance Power

Item	Frequency Range (MHz)	Limits[dB(μV)]	
		Quasi-Peak	Average-Peak
Household and similar appliances	30 ~ 300	45 ~ 55	35 ~ 45

3.3.3 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMI Receiver	ER-30	LIG NEX 1	L0903A002	Feb. 27, 2020	■
Absorbing Clamp	MDS-21	Luthi Elektronik	3813	Jul. 19, 2019	■
6dB Attenuator	N-ATTEUATOR(2W)	SRT	N/A	Jul. 19, 2019	■

3.3.4 Test Result of Disturbance Power Test

EUT : LUBIT

Test distance : 6 m

Radiated Emission Test Results: PASS

Test data

FREQ. [MHz]	Reading [dB(pW)]		Correction [dB]			Limit [dB(pW)]		Result [dB(pW)]	
	[QP]	[C-AV]	Conversion Value	Absorbing Clamp	Cable Loss	[QP]	[C-AV]	[QP]	[C-AV]
32.59	16.91	10.5	-17.00	26.32	0.80	45.36	35.36	27.0	20.6
36.47	17.11	9.3	-17.00	25.58	0.82	45.85	35.85	26.5	18.7
40.20	21.55	14.7	-17.00	24.38	0.85	46.27	36.27	29.8	22.9
45.61	27.38	20.2	-17.00	23.77	0.95	46.82	36.82	35.1	27.9
107.71	13.49	10.7	-17.00	21.59	1.59	50.55	40.55	19.7	16.9
165.80	26.67	19.8	-17.00	20.09	1.95	52.42	42.42	31.7	24.9
180.98	24.73	17.8	-17.00	19.58	2.06	52.81	42.81	29.4	22.4
203.21	27.25	20.4	-17.00	18.83	2.09	53.31	43.31	31.2	24.4

Notes :

Result = Reading + (Conversion Value + Absorbing Clamp factor + Cable loss)

Measurement uncertainty estimated at 4.5 dB.

However, influenced by the sample and the environmental impact is not taken into account.

The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k=2$.



Tested by : Park, Sang Hoon

3.3.5 Photograph(s) of Disturbance Power Test



3.4 Radiated Emission Test

Radiated emission from 30 MHz to 1 000 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 the open-field site, 0.8 meter above the ground plane, as shown in section 3.4.5 The interface cables and equipment positions were varied within limits of reasonable application to determine the positions production maximum radiated emissions.

3.4.1 Test Condition

Frequency Range of Test : 30 MHz ~ 1 000 MHz

Test Standard : EN 55014-1 : 2006+A2:2011

Test Date : Jul. 05, 2019

Class : B

Temperature/Humidity : (28 ± 3) °C / (63 ± 2) % R.H.

3.4.2 Limits of Radiated Emission

Frequency Range (MHz)	Limits [dB(μV)]	
	Quasi-Peak	Average-Peak
30~230	30	N/A
230~1 000	37	N/A

3.4.3 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMI Test Receiver	ESVS10	ROHDE&SCHWARZ	833206/010	Jul. 17, 2019	■
AMPLIFIER	310N	SONOMA INSTRUMENT	185976	Jan. 03, 2020	■
BILOG ANTENNA	HL562	ROHDE&SCHWARZ	100134	Mar. 12, 2020	■

3.4.4 Test Result of Radiated Emission

EUT : LUBIT

Test distance : 10 m

Radiated Emission Test Results: N/A

Test data

Freq. (MHz)	Reading [dB(μV)]	Pol. (H/V)	Ant. Height (m)	Correction		Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin (dB)
				A.F. (dB)	C.L.& Other(dB)			
112.34	37.5	H	2.1	9.33	-29.79	30.00	17.1	12.93
124.68	37.1	H	2.4	8.96	-29.68	30.00	16.4	13.59
179.02	41.6	H	1.9	8.23	-29.29	30.00	20.5	9.46
208.55	40.3	H	2.0	7.97	-29.13	30.00	19.1	10.88
375.53	44.8	H	2.7	13.55	-28.31	37.00	30.0	6.99
461.22	36.9	V	1.1	15.33	-27.87	37.00	24.4	12.60
564.38	36.5	V	1.7	17.25	-27.58	37.00	26.2	10.83
697.97	35.9	V	1.5	19.01	-27.09	37.00	27.8	9.17

Notes :

*H : Horizontal polarization, **V: Vertical polarization

Result = Reading + Antenna factor + Cable loss + Amplifier factor

Margin Value = Emission Level – Result

All modes of operation were investigated and the worst-case emissions are reported. See the plots in next pages.

Measurement uncertainty estimated at Horizontal polarization : 3.5 dB, Vertical polarization : 3.7 dB.

However, influenced by the sample and the environmental impact is not taken into account.

The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k=2$.



Tested by : Park, Sang Hoon

3.4.5 Photograph(s) of Radiated Emission Configuration

[Front]



[Rear]



3.5 Power Frequency Harmonics and Flicker Emission Test

Power Frequency Harmonics Tests:

The measured values of the harmonics components of the input current, including line current and neutral and neutral current, shall be compared with the limits given in Clause 7 of 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. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of $\pm 8\%$ is achieved during the whole assessment procedure. (EN 61000-3-3)

3.5.1 Test Condition

EUT : LUBIT
Test Standard : EN 61000-3-2 : 2014
EN 61000-3-3 : 2013/A1:2017
Test Date : Jul. 06, 2019
Device Class : A
Temperature/Humidity/Pressure : $(24 \pm 1)^\circ\text{C}$ / $(42 \pm 2)\%$ R.H.

3.5.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
Precision Power Analyzer	LMG670	ZES ZIMMER	2381607	Jan. 07, 2020	■
Reference Impedance	NI2415	ZES ZIMMER	B1607111	Jan. 07, 2020	■
AC Power Source/ Programmable Controllers	395AMXT-UPC32/ M5283	Pacific	1279	Feb. 28, 2020	■

3.5.3 Test Result of Power Frequency Harmonics and Flicker Emission Tests

Power Frequency Harmonics : PASS
Flicker Emission Tests : PASS

3.5.4 Harmonics and Flicker Emission Test Result

[Harmonics]

Result Overview

Test Name	Test Result	Limit Usage	Info
Supply Voltage Frequency Test (61000-4-7) [L1]	OK		50.00 Hz (50.00 Hz \pm 0.5%)
Supply peak voltage test (61000-4-7) [L1]	OK		
Positive peak test	OK		All positive peak values within the allowed range
Negative peak test	OK		All negative peak values within the allowed range
Supply peak position test (61000-4-7) [L1]	OK		All peak values within the allowed range
Supply Voltage Harmonic Distortion Test (61000-4-7) [L1]	OK		
Table 1 Harmonic Current Test (61000-3-2) [L1]	OK		
Harmonic Current Test 100%	OK		
Harmonic Current Test 150%	OK		
Harmonic Current Test 200%	OK		
POHC Test	OK		POHC Limit met (0.014 A \leq 0.251 A)

[Harmonics]

Result Plots

Table 1 Harmonic Current Test (61000-3-2) [L1] >> Harmonic Current Test 100%

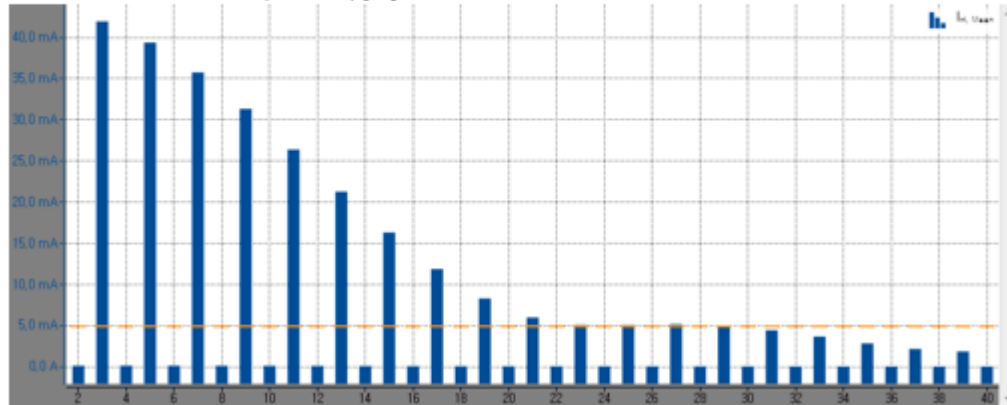


Table 1 Harmonic Current Test (61000-3-2) [L1] >> POHC Test



[Flicker]

Additional Measurands - Informative

Additional Measurands

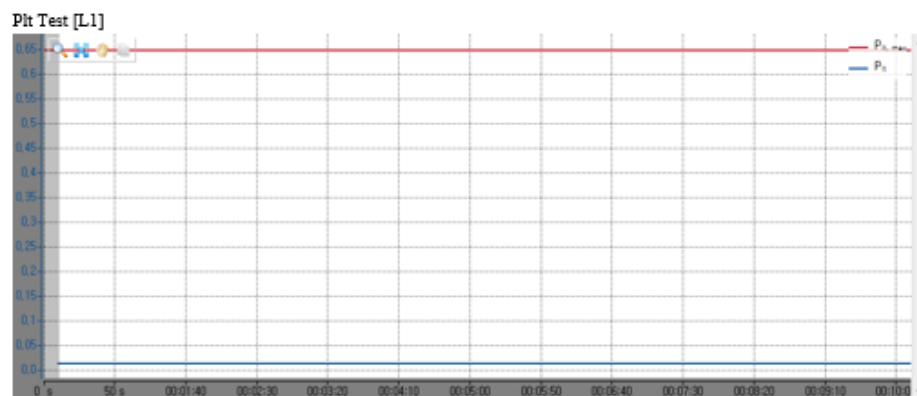
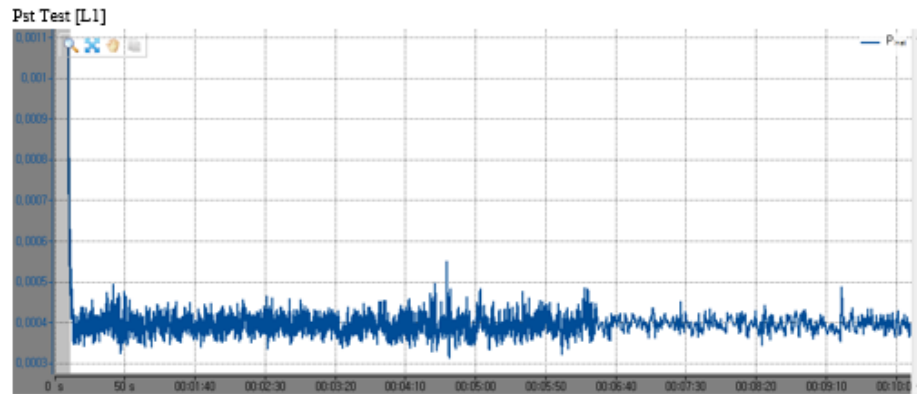
$U_{rms, L1}$	230.53 V	$U_{pp, L1}$	652.885 V	$U_{dc, L1}$	191.934 mV
$U_{cf, L1}$	1.41684	$I_{rms, L1}$	97.8751 mA	$I_{pf, L1}$	822.086 mA
$I_{dc, L1}$	6.41551 mA	$I_{cf, L1}$	4.27889	P_{L1}	9.89633 W
Q_{L1}	20.2771 var	S_{L1}	22.5632 VA	PF_{L1}	0.43861
$f_{cycle, L1}$	50.0017 Hz	$P_{st, L1}(1)$	0.01516	$P_{h, L1}$	0.01516

Result Overview

Test Name	Test Result	Limit Usage	Info
Dc Test [L1]	OK	2.4%	$0.1\% \leq 3.3\%$
Dmax Test [L1]	OK	2.0%	$0.1\% \leq 4.0\%$
Pst Test [L1]	OK	1.5%	$0.015 \leq 1.000$
Plt Test [L1]	OK	2.3%	$0.015 < 0.650$
Tmax Test [L1]	OK		

[Flicker]

Result Plots



Tested by : Park, Sang Hoon

3.5.5 Photograph(s) of Harmonics and Flicker Emission Tests Configuration.

[Harmonics and Flicker Emission]



3.6 Electrostatic Discharge Immunity Test

In order to minimize the impact of environmental parameters on test results, the tests shall be carried out in climatic and electromagnetic reference conditions as specified in IEC 61000-4-2 of 8.1.1 and 8.1.2. 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. The testing shall be performed by direct and indirect application of discharges to the EUT according to a test plan.

3.6.1 Test Condition

EUT : **LUBIT**

Test Method : IEC 61000-4-2 : 2008

Test Date : Jul. 06, 2019

Performance criterion : B

Temperature/Humidity/Pressure : $(24 \pm 1) ^\circ\text{C}$ / $(42 \pm 2) \% \text{ R.H.}$ / $(101 \pm 2) \text{ kPa}$

3.6.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
ESD SIMULATOR	ESS-2000	NOISEKEN	6000C03060	May. 08, 2020	■
ESD GUN	TC-815P	NOISEKEN	600003073	May. 08, 2020	■
HCP	N/A	CSTech	N/A	N/A	■
VCP	N/A	CSTech	N/A	N/A	■

3.6.3 Test Result of Electrostatic Discharge Immunity Test

Electrostatic Discharge Immunity Test : PASS

Test data

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	Enclosure (Front), Button	-	A
8	+/-	Enclosure (Rear)	-	A
8	+/-	Enclosure (Left)	-	A
8	+/-	Enclosure (Right)	-	A
8	+/-	Enclosure (Top)	-	A
8	+/-	Enclosure (Bottom), Micro USB	-	A



Indirect Application			Test Results
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge
4	+/-	HCP/VCP	A

Note.

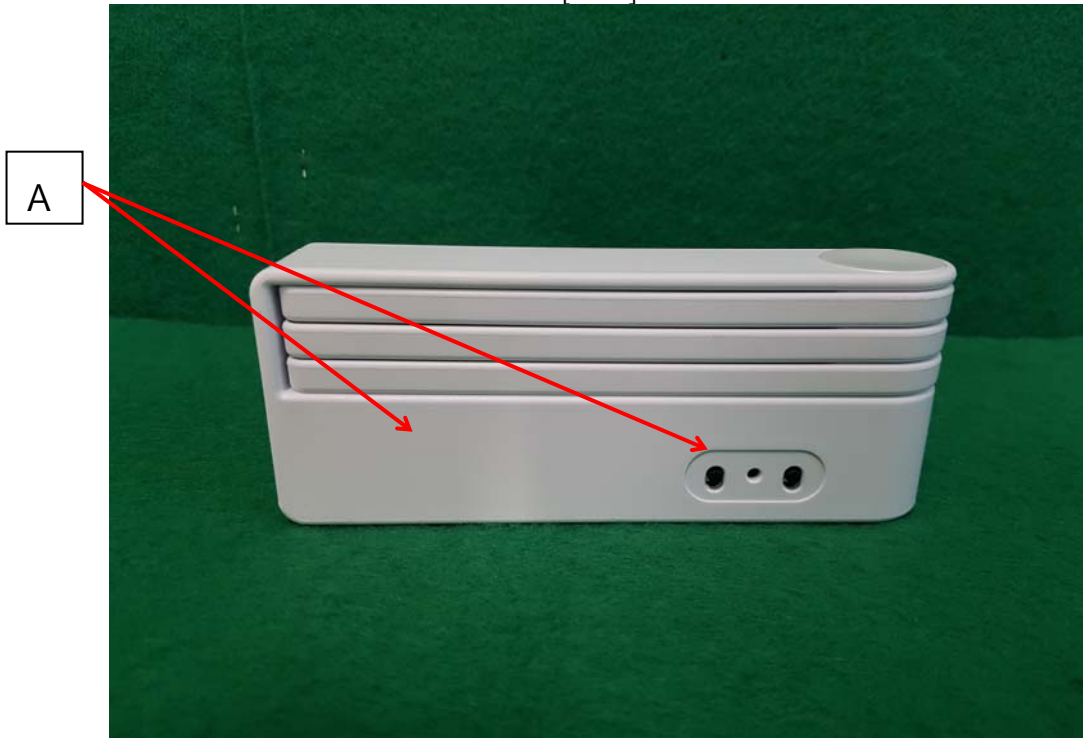
- The test results for each mode are the same.



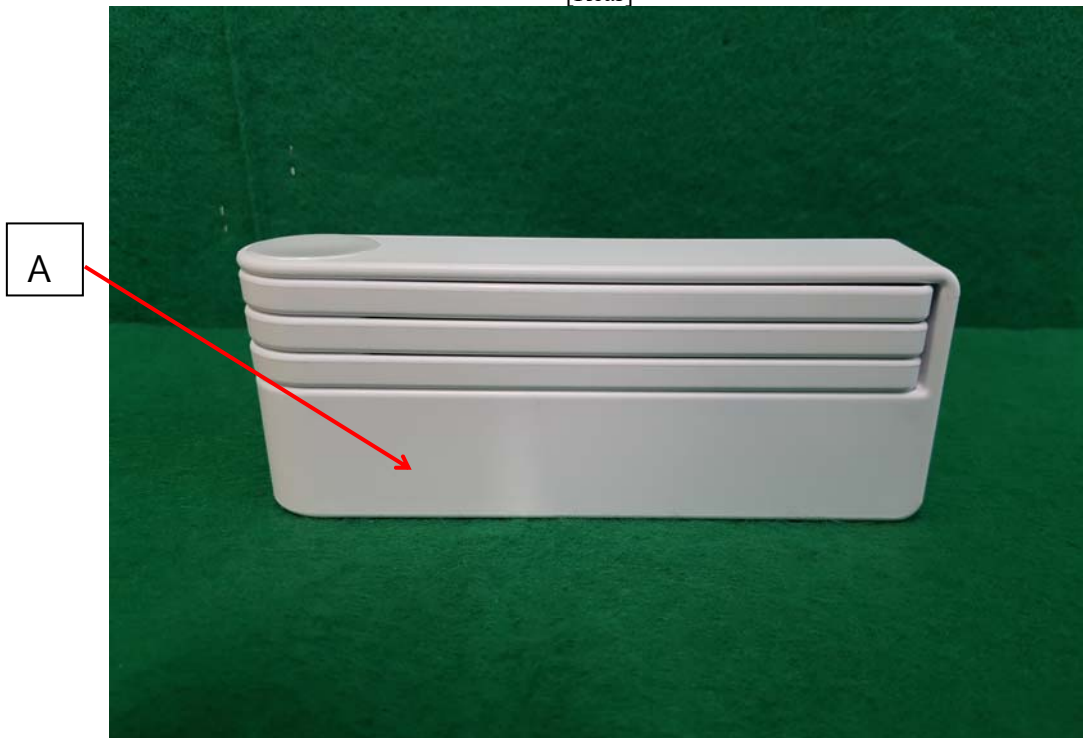
Tested by : Park, Sang Hoon

[Test Point] Air Discharge (A) 
 Contact Discharge (C) 

[Front]

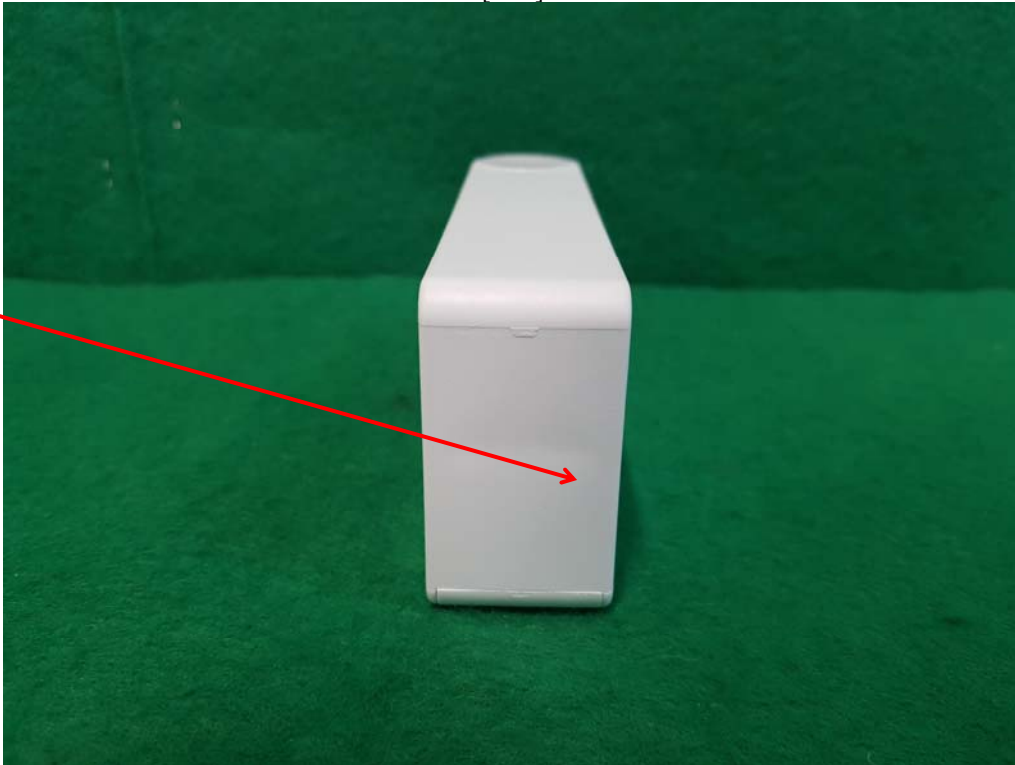


[Rear]



[Left]

A

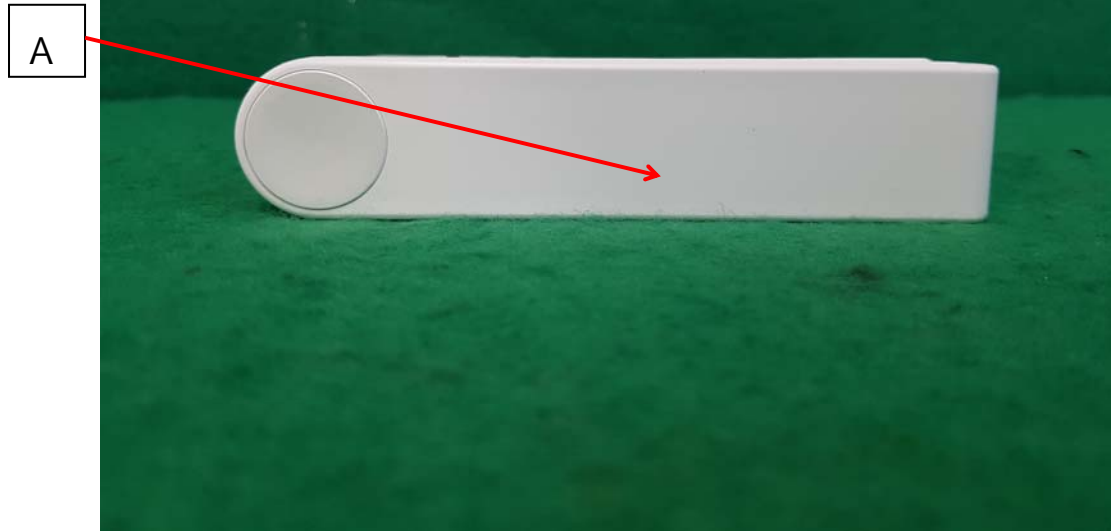


[Right]

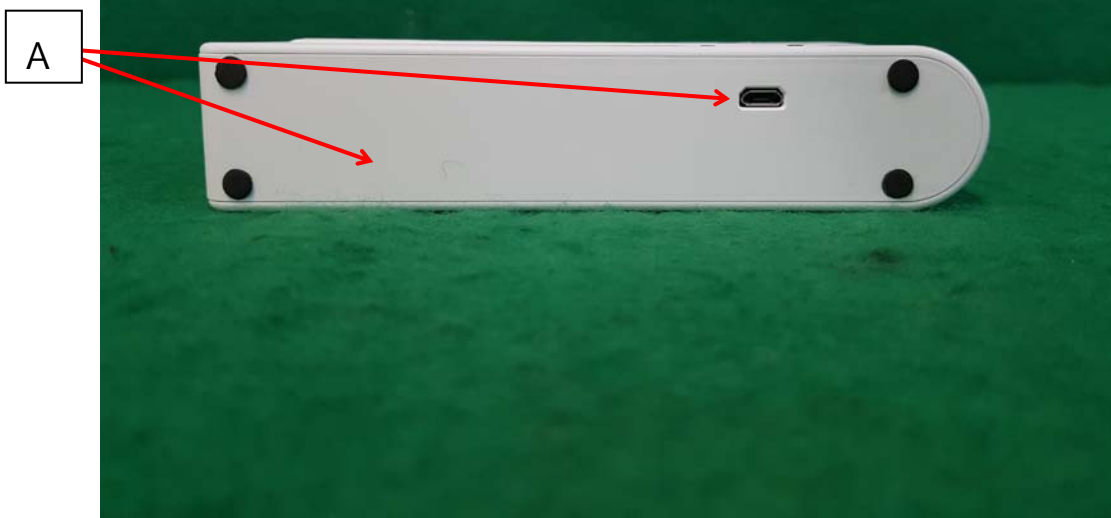
A



[Top]



[Bottom]



3.6.4 Photograph(s) of Electrostatic Discharge Immunity Test Configuration

[Electrostatic Discharge Immunity Test]

Mode : Category II



Mode : Category III



3.7 Radio Frequency Electromagnetic field immunity Test

Tests were conducted in accordance with IEC 61000-4-3 over the frequency range of 80 MHz to 1 GHz. The transmitting antenna was located 3 meters from the EUT at a height. Front, sides and back of the EUT were exposed to a uniform field of 3 V/m using both horizontal and vertical antenna polarizations.

3.7.1 Test Condition

EUT : **LUBIT**
Test Standard : IEC 61000-4-3 : 2006+A1:2007+A2:2010
Test Date : Jul. 06, 2019
Test field strength (V/m) : 3 V/m
Performance criterion : A
Temperature/Humidity/Pressure : (23 ± 2) °C / (43 ± 2) % R.H.

3.7.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	USE
Modular EMC Test Systems	CTR1009B#20	DARE Instruments	17I00026S NO93	Jul. 18, 2019	■
USB RF power sensor	RPR2006C	DARE Instruments	18I00006S NO23	N/A	■
Power Sensor	NRP-Z91	ROHDE& SCHWARZ	100435	Feb. 27, 2020	■
Power Amplifier	BLWA 0830-160 /100/40D	BONN	076680B	Feb. 27, 2020	■
High Gain Log-Periodic Ant.	HL046E	ROHDE& SCHWARZ	100056	N/A	■

3.7.3 Test Result of Radio Frequency Electromagnetic field immunity Test

Electromagnetic Field Immunity Test : N/A

Test data

Frequency Range (MHz)	Position (Angle)	Antenna Polarity	Field Strength (V/m)	Modulation	Result (Criteria)
80 - 1 000	Front, Rear, Left, Right	Vertical, Horizontal	3	80 %AM(1 kHz)	N/A



Tested by : Park, Sang Hoon

3.7.4 Photograph(s) of Radiated Electromagnetic field immunity Test Configuration

[Radio Frequency Electromagnetic field immunity Test]



3.8 Electrical fast transient/Burst immunity Test

Tests were conducted in accordance with IEC 61000-4-4. Tests were performed to 1 kV to AC Power lines and 0.5 kV to signal Connected directly to power supply network cables.

3.8.1 Test Condition

EUT : **LUBIT**
Test Standard : IEC 61000-4-4 : 2012
Test Date : Jul. 08, 2019
Test Voltage : ± 1 kV (AC Power Port)
Performance criterion : B
Temperature/Humidity/Pressure : $(24 \pm 2) ^\circ\text{C}$ / $(42 \pm 1) \% \text{ R.H.}$

3.8.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMC Immunity Test System	IMU3000	EMC Partner	IMU3000 F5-S6-D-V-1509	Feb. 27, 2020	■

3.8.3 Test Result of Electrical fast transient/Burst immunity Test

Electromagnetic field immunity test : PASS

Test data

Line or Port	Voltage	Coupling	Inject Time (sec)	Result (performance criteria)
L	± 1 kV	Direct	120	PASS(A)
N	± 1 kV	Direct	120	PASS(A)
L – N	± 1 kV	Direct	120	PASS(A)



Tested by : Park, Sang Hoon

3.8.4 Photograph(s) of Electrical fast transient/Burst immunity Test Configuration

[Electrical fast transient/Burst immunity Test]



3.9 Surge immunity Test

Tests were conducted in accordance with IEC 61000-4-5. Tests were performed to 1.0 kV to AC Line to Line and 2.0 kV Line to Ground.

3.9.1 Test Condition

EUT : **LUBIT**
Test Standard : IEC 61000-4-5 : 2014
Test Date : Jul. 08, 2019
Test Voltage : ± 1 kV (Line to Line)
Performance criterion : B
Temperature/Humidity/Pressure : (24 ± 2) °C / (42 ± 1) % R.H.

3.9.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMC Immunity Test System	IMU3000	EMC Partner	IMU3000 F5-S6-D-V-1509	Feb. 27, 2020	■

3.9.3 Test Result of Surge immunity Test

Surge Immunity Test : PASS

Test data

Line or Port	Voltage	Coupling	Phase(Degree)	Inject (count-min)	Result (performance criteria)
L-N	± 1 kV	Direct	0, 90, 180, 270	5 times-5 min	PASS(A)



Tested by : Park, Sang Hoon

3.9.4 Photograph(s) of Surge immunity Test Configuration

[Surge immunity Test]



3.10 Conducted Immunity Test

Tests were conducted in accordance with IEC 61000-4-6. Over the frequency range of 150 kHz to 80 MHz. Tests were performed at 3 V on power line and signal line.

3.10.1 Test Condition

EUT : **LUBIT**
Test Standard : IEC 61000-4-6 : 2013
Test Date : Jul. 08, 2019
Frequency : 0.15 MHz to 230 MHz
Test Voltage : 3 V
Performance criterion : A
Temperature/Humidity/Pressure : $(24 \pm 2) ^\circ\text{C}$ / $(42 \pm 1) \% \text{ R.H.}$

3.10.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
POWER AMPLIFIER	DP70	PRANA R&D	1512-1811	Feb. 27, 2020	■
Modular EMC Test Systems	CTR1009B	DARE Instruments	15I00065SNO50	Feb. 27, 2020	■
Dual Directional Coupler	C6047-10	PRANA R&D	108932	Feb. 28, 2020	■
USB RF power sensor	RPR2006C	DARE Instruments	15I00037SNO38	Feb. 27, 2020	■
USB RF power sensor	RPR2006C	DARE Instruments	15I00037SNO39	Feb. 27, 2020	■
ATTENUATOR	ATT 6/75	EM TEST	0107-16	Feb. 28, 2020	■
CDN	M2/M3	EM TEST	0707-75	Feb. 28, 2020	■

3.10.3 Test Result of Conducted Immunity Test

Conducted immunity test : PASS

Test data

Line or Port	Frequency (MHz)	Coupling	Dwell time	Modulation	Step Size	Result (Criteria)
Main Power	0.15 - 230	CDN(M2)	3 s	80 %AM@1 kHz	1.0 %	Pass(A)



Tested by : Park, Sang Hoon

3.10.4 Photograph(s) of Conducted Immunity Test Configuration

[Conducted Immunity Test]



3.11 Power frequency magnetic field immunity Test

Power Frequency magnetic field tests were conducted in accordance with IEC 61000-4-8.

3.11.1 Test Condition

EUT :
Test Standard : IEC 61000-4-8 : 2009
Test Date :
Frequency :
magnetic field strength : 30 A/m
Performance criterion : A
Temperature/Humidity/Pressure : °C / % R.H.

3.11.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
MAGNETIC FIELD TEST GENERATOR	F-1000-4-8-G-125A	FCC	2088	Jul. 17, 2019	<input type="checkbox"/>
MAGNETIC FIELD IMMUNITY LOOP	F-1000-4-8/9/10-L-1 M	FCC	2087	Jul. 17, 2019	<input type="checkbox"/>

3.11.3 Test Result of Power Frequency Magnetic Field Immunity Test

Power frequency magnetic field immunity test : N/A

Test data

Induction coil Phase / Polarization	Criteria	Result (Performance criteria)
X	A	-
Y	A	-
Z	A	-

Note:

This test was not applied, Because the EUT was not sensitive to magnetic field.

3.11.4 Photograph(s) of Power frequency magnetic field immunity Test Configuration

[Power frequency magnetic field immunity Test]

N/A

3.12 Voltage Dips and Voltage interruptions immunity Test

Voltage Dips and interruptions tests were conducted in accordance with IEC 61000-4-11.

3.12.1 Test Condition

EUT : LUBIT
 Test Method : IEC 61000-4-11 : 2004
 Test Date : Jul. 08, 2019
 Voltage Dip : 100 %(0.5/0.5 period) : C
 Interruption : 60 %(10/12 period) : C
 30 %(25/30 period) : C
 Temperature/Humidity/Pressure : (24 ± 2) °C / (42 ± 1) % R.H.

3.12.2 Test Equipment List

Equipment Type	Model	Manufacture	Serial No.	Cal. Due Date	Use
EMC Immunity Test System	IMU3000	EMC Partner	IMU3000 F 5-S6-D-V-15 09	Feb. 27, 2020	■
AC DIPS INTERRUPTS AND VARIATION	VAR-EXT 1000	EMC Partner	VAR-EXT10 00-1536	N/A	■

3.12.3 Test Result of Voltage Dips and Voltage interruptions immunity Test

Voltage Dips and Voltage interruptions immunity test : PASS

Test data

Test Level %U _T	duration	Angle (°)	Criteria	Result (Performance criteria)
100	0.5/0.5	0, 90, 180, 270	C	PASS(A)
60	10/12	0, 90, 180, 270	C	PASS(A)
30	25/30	0, 90, 180, 270	C	PASS(A)

Notes :

The test results of 50 Hz and 60 Hz are same.



Tested by : Park, Sang Hoon

3.12.4 Photograph(s) of Voltage Dips and Voltage interruptions immunity Test Configuration

[Voltage Dips and Voltage interruptions immunity Test]



4. Photos of EUT

[Front]



[Rear]



[Left]



[Right]



[Top#1]



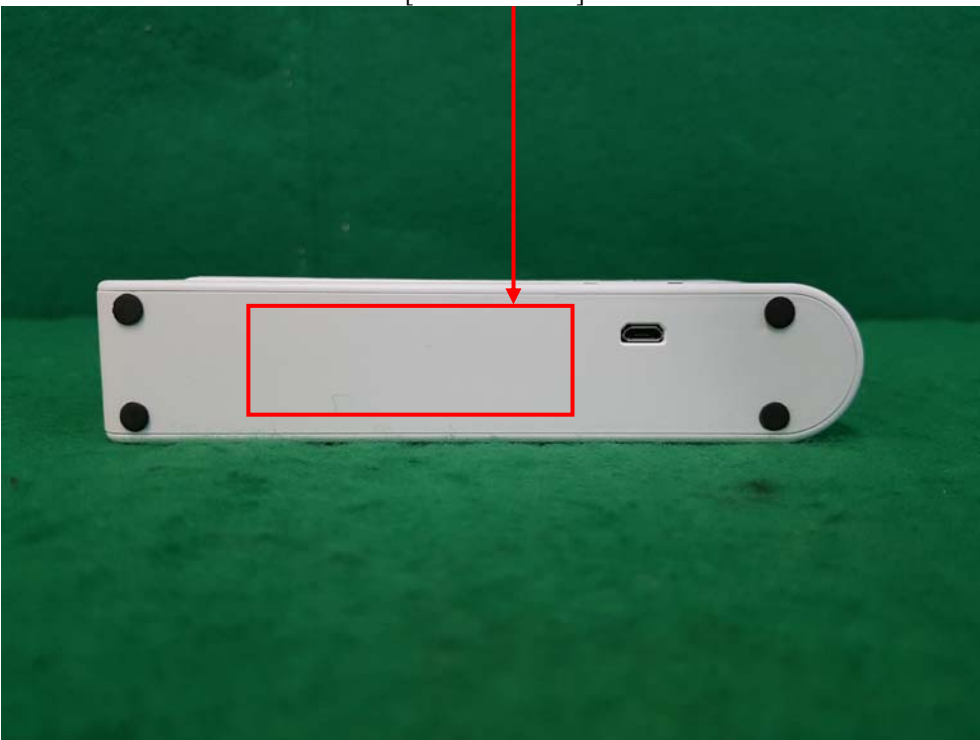
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[Bottom]



[Label Location]



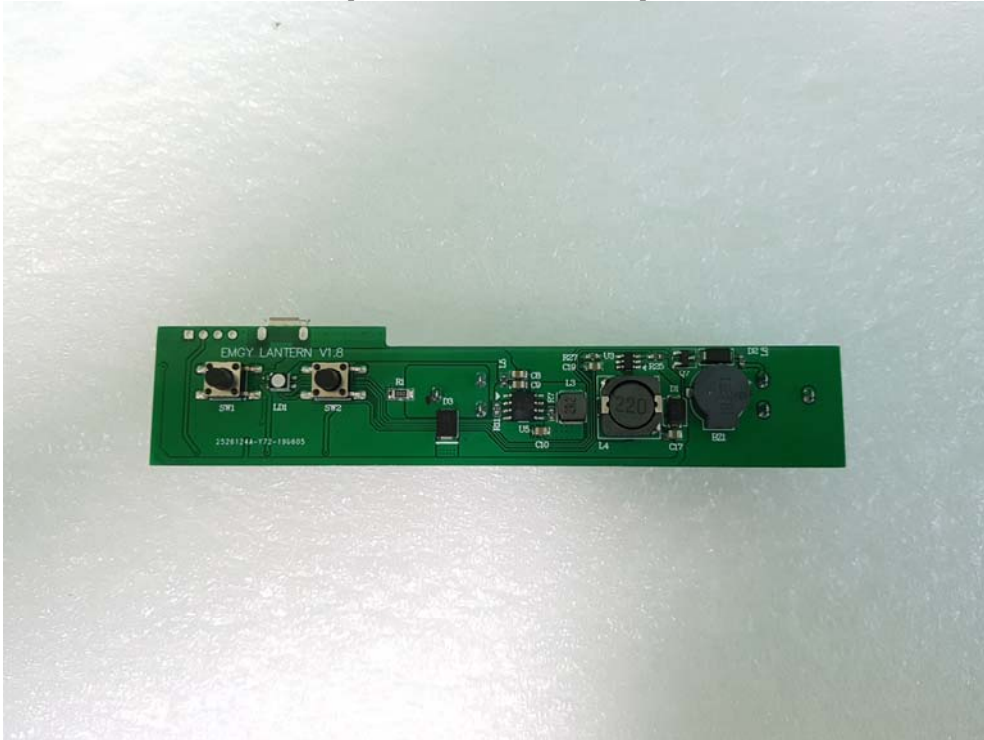
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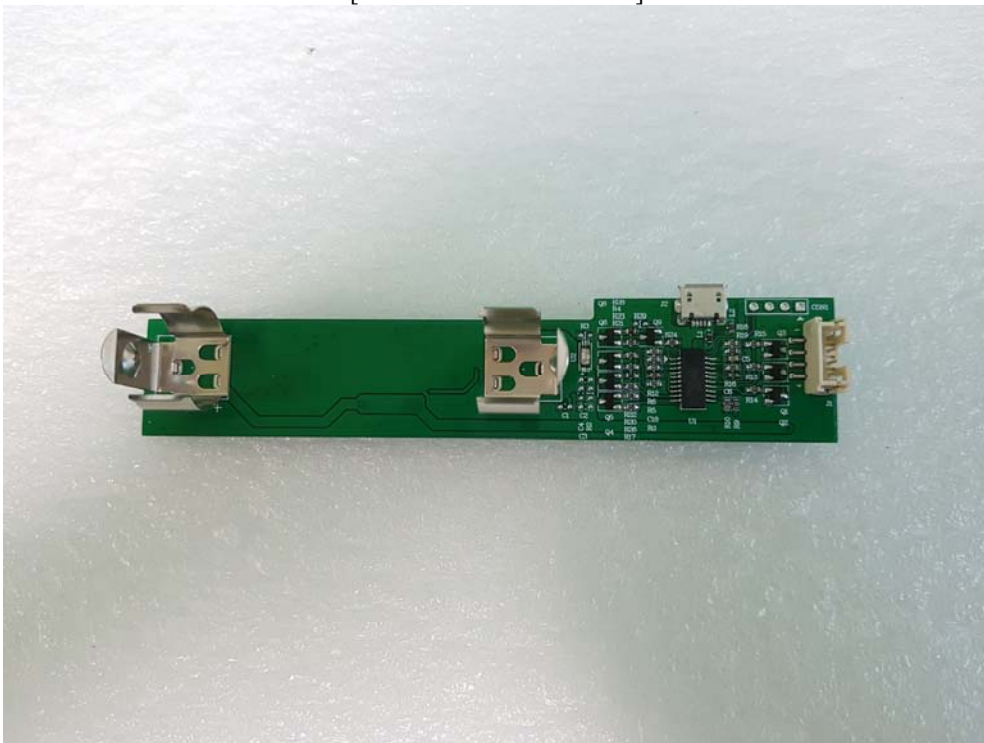
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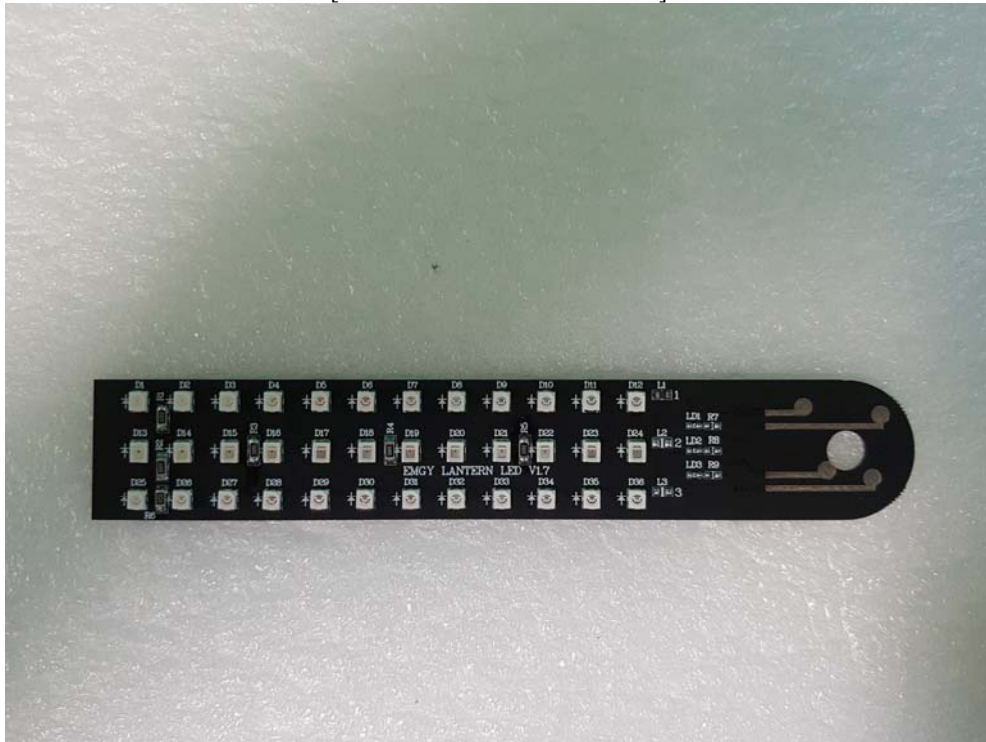
[Front View of Main Board]



[Rear View of Main Board]



[Front View of LED Board x 3]



[Rear View of LED Board x 3]



[Front View of Battery]



[Rear View of Battery]

