

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : OT-192-RED-110

AGR No. : A192A-109

Applicant : ESN CO., LTD.

Address : #405 Tongmyong Industry-Cooperation Bldg, 428 Sinseon-ro, Namgu, Busan, Korea

Manufacturer : ESN CO., LTD.

Address : #405 Tongmyong Industry-Cooperation Bldg, 428 Sinseon-ro, Namgu, Busan, Korea

FCC ID. : 2ASU8KLST-G001WH

Type of Equipment : Bottle Sterilizer

Model Name : KLST-G001WH

Multiple Model Name : KLST-G001BK

Serial number : N/A

Total page of Report : 22 pages (including this page)

Date of Incoming : February 07, 2019

Date of Issuing : February 25, 2019

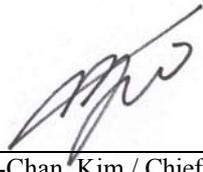
SUMMARY

The equipment complies with the requirement of *FCC CFR 47 PART 15 SUBPART B Class B, Section 15.101.*

This test report contains only the results of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by:


Eung-Chan, Kim / Chief Engineer
ONETECH Corp.

Approved by:


Gea-Won, Lee / Exe. Managing Director
ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-192-RED-110	February 25, 2019	Initial Release	All

1. VERIFICATION OF COMPLIANCE

- . APPLICANT : ESN CO., LTD.
- . ADDRESS : #405 Tongmyong Industry-Cooperation Bldg, 428 Sinseon-ro, Namgu, Busan, Korea
- . Manufacturer : ESN CO., LTD.
- . ADDRESS : #405 Tongmyong Industry-Cooperation Bldg, 428 Sinseon-ro, Namgu, Busan, Korea
- . Factory : NPLUS CO., LTD.
- . ADDRESS : 92, Tekeunobaelli-ro, Jillye-myeon, Gimhae-si, Gyeongsangnam-do, Korea.
- . MODEL NAME : KLST-G001WH, KLST-G001BK
- . SERIAL NUMBER : N/A
- . BRAND/TRADE NAME : N/A
- . DATE : February 25, 2019

EQUIPMENT CLASS	Class B digital devices
E.U.T. DESCRIPTION	Bottle Sterilizer
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2014
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
STANDARDS	FCC Part 15, Section 15.101 (CLASS B)
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	10 m Semi anechoic chamber

ONETECH Corp. tested the above equipment in accordance with the requirements set forth in the above standard. The test results show that equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.107	Conducted Emission Limits	Met the Limit / PASS
15.109	Radiated Emission Limits	Met the Limit / PASS

3. GENERAL INFORMATION

3.1 Product Description

The ESN CO., LTD., Model KLST-G001WH (referred to as the EUT in this report) is a Bottle Sterilizer. Product specification described herein was obtained from product data sheet or user’s manual.

CHASSIS TYPE	Plastic
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	Below 15 MHz
ELECTRICAL RATING	Adaptor : AC 120 V, 60 Hz
NUMBER OF PCB LAYERS (P. C. BOARD NAME)	N/A
EXTERNAL CONNECTOR	DC IN

3.2 Model Differences

- The following lists consist of the added model and their differences.

Model Name	Differences	Tested
KLST-G001WH	Basic Model	<input checked="" type="checkbox"/>
KLST-G001BK	The model is similar to the basic model except for the color only.	<input type="checkbox"/>

3.3 Related Submittal(s) / Grant(s)

Original submittal only

3.4 Test System Details

The model numbers for all the equipments, which were used in the tested system, is:

Model	Manufacturer	Description	Connected to
KLST-G001WH	ESN CO., LTD.	HDNS AVM	-
EP-TA12KWK	RFTECH THAI NGUYEN CO., LTD	Adaptor	EUT

3.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2014. Radiated testing was performed at a distance of 10 m from EUT to the antenna.

3.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at:

- 1) 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
- 2) 12-5, Jinsaegol-gil 75 beon-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666/ T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

4. SYSTEM TEST CONFIGURATION

4.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BOARD	N/A	N/A	N/A

4.2 Mode of operation during the test

- Checked the sensor detection mode after the EUT was connected to notebook PC.
- Input power condition during the measurements was AC 120 V / 60 Hz

4.3 Cable Description

Ports Name	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
DC IN	N	N	N	1.5	Adaptor

4.4 Equipment Modifications

- None.

4.5 Configuration of Test System

Line Conducted Test: The EUT was connected to LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2014 7.3.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4: 2014 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 10 m semi anechoic chamber.

5. PRELIMINARY TEST

5.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worst operating condition (Please check one only)
Dry sterilization Mode	X

5.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worst operating condition (Please check one only)
Dry sterilization Mode	X

6. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

6.1 Conducted Emission Test

6.1.1 Operating Environment

Temperature : 22.3 °C
 Relative humidity : 45.6 % R.H.

6.1.2 Test Setup

The photocopier that the EUT has been inserted in was placed on an insulator above the reference ground plane. The power of photocopier was fed through a 50 Ω/ 50 μH + 5 Ω LISN. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

6.1.3 Measurement uncertainty

Conducted emission, quasi-peak detection : ± 2.84 dB
 Conducted emission, CISPR-average detection : ± 2.84 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

5.1.4 Limit

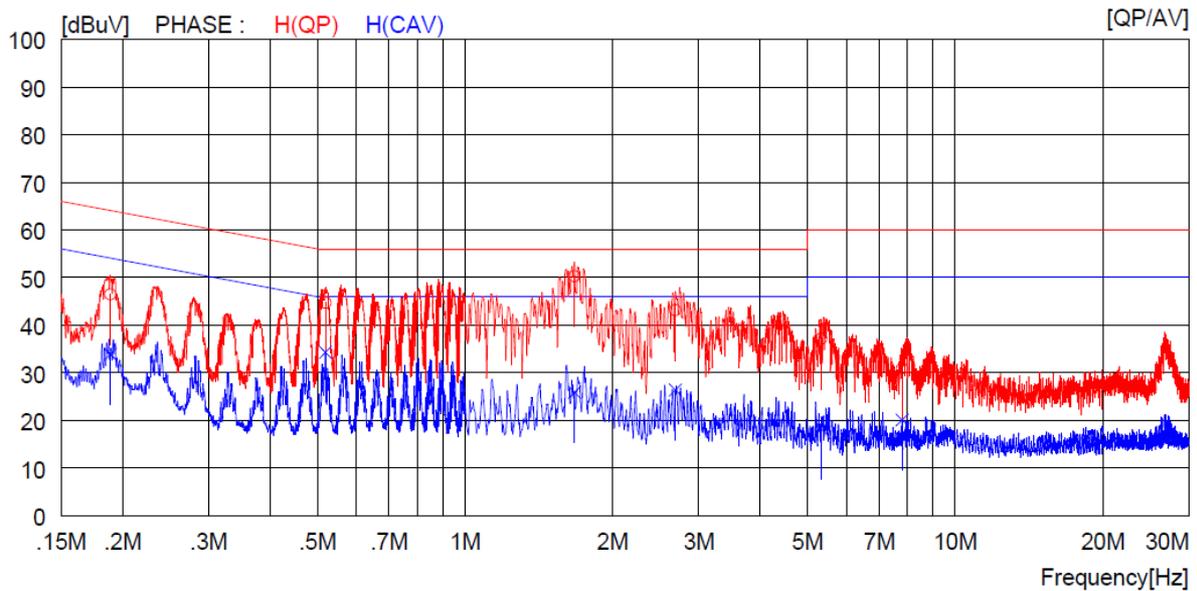
Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	CISPR Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

5.1.5 Test data

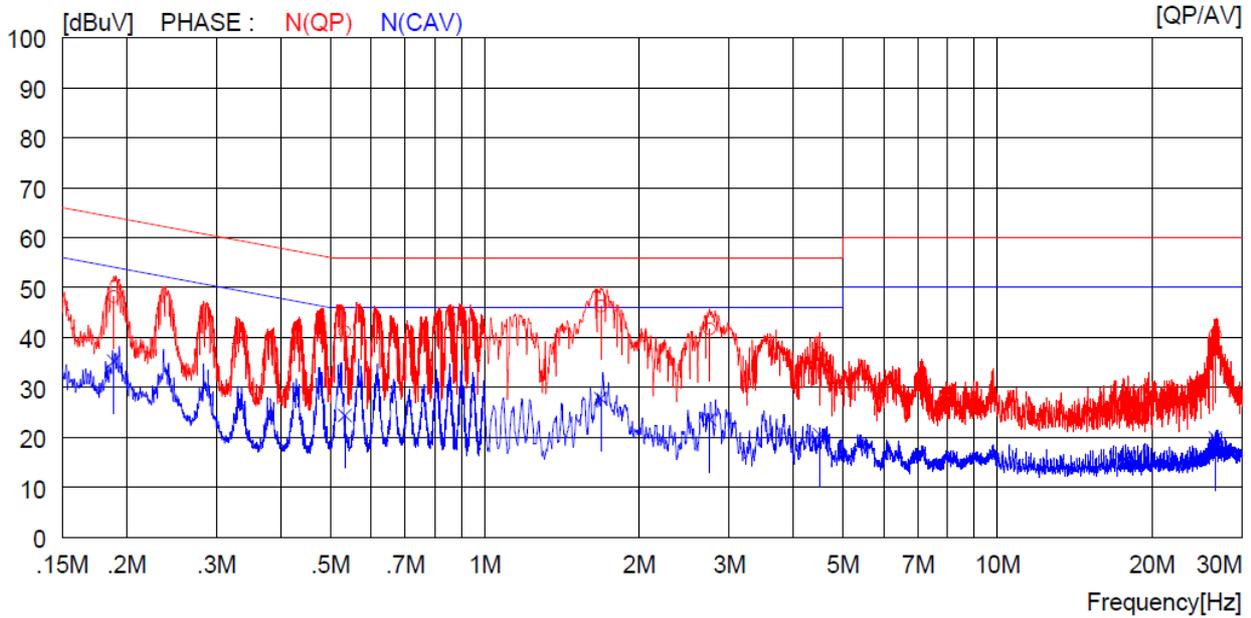
Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107 (a)
 Type of Test : CLASS B
 Result : PASSED BY 5.7 dB at 1.67200 MHz under CISPR-Average detector mode on HOT Line

EUT : KLST-G001WH, KLST-G001BK Date: February 13, 2019
 Detector : Q.P (6 dB Bandwidth: 9 kHz)
 Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]			
1	0.18900	36.4	----	10.1	46.5	----	64.1	----	17.6	----	H (QP)
2	0.51900	34.5	----	10.2	44.7	----	56.0	----	11.3	----	H (QP)
3	1.67200	40.1	----	10.2	50.3	----	56.0	----	5.7	----	H (QP)
4	2.68800	32.9	----	10.2	43.1	----	56.0	----	12.9	----	H (QP)
5	5.33000	26.9	----	10.2	37.1	----	60.0	----	22.9	----	H (QP)
6	7.79000	20.6	----	10.3	30.9	----	60.0	----	29.1	----	H (QP)
7	0.18900	----	23.8	10.1	----	33.9	----	54.1	----	20.2	H (CAV)
8	0.51900	----	24.1	10.2	----	34.3	----	46.0	----	11.7	H (CAV)
9	1.67200	----	15.7	10.2	----	25.9	----	46.0	----	20.1	H (CAV)
10	2.68800	----	16.2	10.2	----	26.4	----	46.0	----	19.6	H (CAV)
11	5.33000	----	8.0	10.2	----	18.2	----	50.0	----	31.8	H (CAV)
12	7.79000	----	9.8	10.3	----	20.1	----	50.0	----	29.9	H (CAV)

Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]			
1	0.18900	38.1	----	10.1	48.2	----	64.1	----	15.9	----	N (QP)
2	0.53400	30.9	----	10.2	41.1	----	56.0	----	14.9	----	N (QP)
3	1.68400	36.1	----	10.2	46.3	----	56.0	----	9.7	----	N (QP)
4	2.74400	31.5	----	10.2	41.7	----	56.0	----	14.3	----	N (QP)
5	4.49600	26.7	----	10.2	36.9	----	56.0	----	19.1	----	N (QP)
6	26.62000	30.0	----	10.6	40.6	----	60.0	----	19.4	----	N (QP)
7	0.18900	----	25.2	10.1	----	35.3	----	54.1	----	18.8	N (CAV)
8	0.53400	----	14.2	10.2	----	24.4	----	46.0	----	21.6	N (CAV)
9	1.68400	----	17.6	10.2	----	27.8	----	46.0	----	18.2	N (CAV)
10	2.74400	----	13.4	10.2	----	23.6	----	46.0	----	22.4	N (CAV)
11	4.49600	----	10.4	10.2	----	20.6	----	46.0	----	25.4	N (CAV)
12	26.62000	----	9.3	10.6	----	19.9	----	50.0	----	30.1	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The result level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by: Young-Jae, Kim / Engineer

6.2 Radiated Emission Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

6.2.1 Operating Environment

Temperature : 21.8 °C
 Relative humidity : 50.2 % R.H.

6.2.2 Test Setup

The radiated emissions measurements were on the 10 m, in 10 m semi anechoic chamber. The photocopier that the EUT has been inserted in was placed on an insulator above the ground plane.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.2.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 1 000 MHz : 4.50 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

6.2.4 Limit

Frequency of Emission (MHz)	Resolution bandwidth	Field strength @ 3 m (dBμV/m)	
		Quasi-peak	
30 ~ 88	120 kHz	40.0	
88 ~ 216		43.5	
216 ~ 230		46.0	
230 ~ 960		46.0	
960 ~ 1 000		54.0	
> 1 000	1 MHz	Peak Limit	CISPR Average Limit
		74.0	54.0

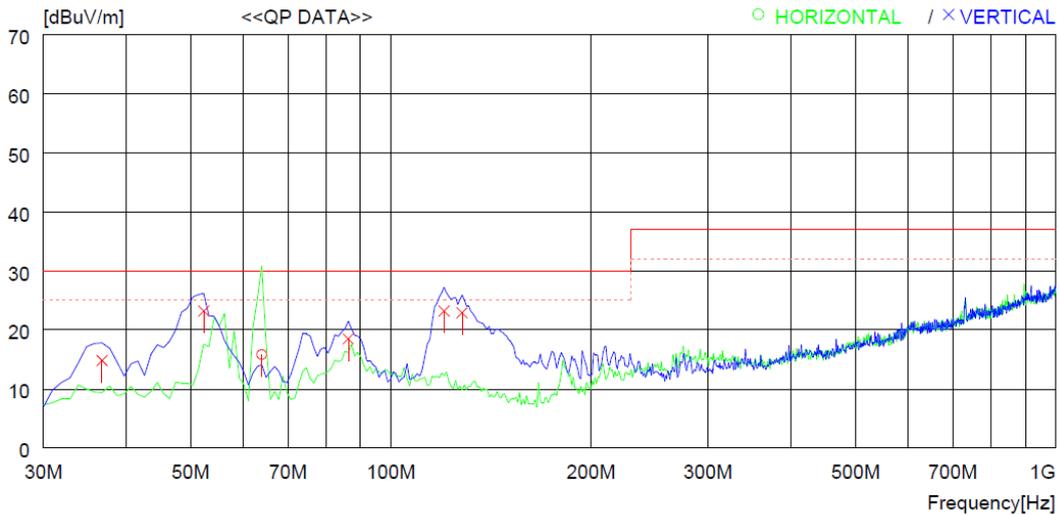
*Alternative to Limits for radiated disturbance of CISPR22 class B ITE at a measuring distance of 10 m

Frequency of Emission (MHz)	Resolution bandwidth	Field strength @ 10 m (dBμV/m)	
		Quasi-peak	
30 ~ 230	120 kHz	30.0	
230 ~ 1 000		37.0	

6.2.5 Test data

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (g)
 Type of Test : CLASS B
 Result : PASSED BY 6.8 dB at 52.310 MHz, 120.210

EUT : KLST-G001WH Date: February 11, 2019
 Frequency Range : 30 MHz ~ 1 000 MHz
 Detector : Q.P (6 dB Bandwidth: 120 kHz)
 Distance : 10 m



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	63.950	35.2	11.8	1.9	33.1	15.8	30.0	14.2	200	274
----- Vertical -----										
2	36.790	33.5	13.0	1.4	33.1	14.8	30.0	15.2	200	0
3	52.310	40.7	13.9	1.7	33.1	23.2	30.0	6.8	200	355
4	86.260	40.1	9.3	2.1	33.0	18.5	30.0	11.5	200	56
5	120.210	43.3	10.4	2.5	33.0	23.2	30.0	6.8	100	359
6	127.970	44.0	9.3	2.6	33.0	22.9	30.0	7.1	100	81

Remark: Margin (dB) = Limit – Result and Result = Reading Quasi-Peak + Antenna Factor + Loss – Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

Tested by: Young-Jae, Kim / Engineer

7. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses.

+	Meter reading	(dB μ V)
+	Cable Loss	(dB)
+	Antenna Factor	(dB/m)
=	Corrected Reading	(dB μ V/m)
Margin (dB)		
	Specification Limit	(dB μ V/m)
-	Corrected Reading	(dB μ V/m)
=	dB Relative to Spec	(\pm dB)

8. LIST OF TEST EQUIPMENT

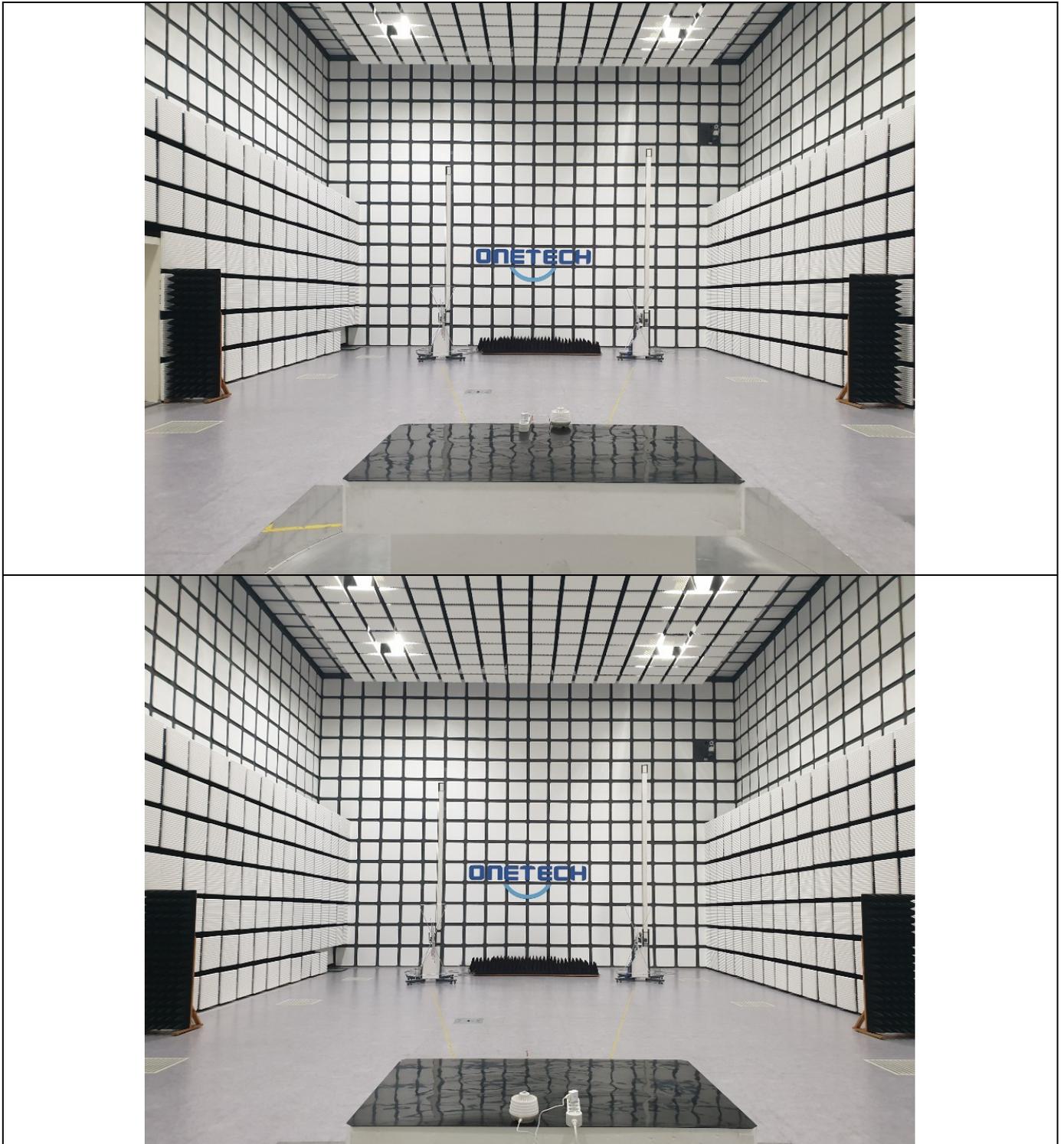
No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R & S	ESCI	101012	Oct. 22, 2018	One Year	■
2.			ESCI	101420	Mar. 28, 2018	One Year	□
3.			ESR	101470	Oct. 22, 2018	One Year	■
4.	Amplifier	Sonoma	310N	312544	Mar. 28, 2018	One Year	■
5.		Instrument	310N	312545	Mar. 28, 2018	One Year	□
6.		Hewlett Packard	8447D	2944A07777	Mar. 29, 2018	One Year	□
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Aug. 14, 2018	Two Years	□
8.			VULB9163	9163-255	Jun. 05, 2018	Two Years	■
9.	Horn Antenna	Schwarzbeck	BBHA9120D	BBHA9120D295	Aug 16, 2017	Two Years	□
10.	Amplifier	Schwarzbeck	BBV9718	310	Mar. 30, 2018	One Year	□
11.	LISN	EMCO	3825/2	9109-1867	Mar. 28, 2018	One Year	□
12.				9109-1869	Apr. 11, 2018	One Year	□
13.		Schwarzbeck	NSLK 8128	8128-216	Mar. 28, 2018	One Year	■
14.			NSLK 8126	8126-404	Apr. 04, 2018	One Year	□
15.			NSLK 8126	8126-480	Oct. 22, 2018	One Year	□
16.	Transient Limiter	Hewlett Packard	11947A	3107A02762	Mar. 28, 2018	One Year	■
17.	Controller	Innco System	CO3000	CO3000/904 /37211215/L	N/A	N/A	■
18.			CO3000	N/A	N/A	N/A	□
19.	Turn Table	Innco System	DT3000	930611	N/A	N/A	□
20.			DT5000-3t- Teagplatten	N/A	N/A	N/A	■
21.	Antenna Master	Innco System	MA-4000XPET	MA4000/509 /37211215/L	N/A	N/A	■
22.			MA4000-EP	N/A	N/A	N/A	□

Remark: Mark ■ mean used equipment.

APPENDIX I - TEST SET-UP PHOTOS: (Conducted emission)



APPENDIX II - TEST SET-UP PHOTOS: (Radiated emission)



APPENDIX III - PHOTOGRAPHS REPORT

