

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : W17NR-D072
AGR No. : A17NA-073
Applicant : Guru
Address : NO.301, Ilsanplaza, 22, Gobong-ro 278beon-gil, Ilsandong-gu, Goyang-si, Gyeonggi-do, 10338, South Korea
Manufacturer : Guru
Address : NO.301, Ilsanplaza, 22, Gobong-ro 278beon-gil, Ilsandong-gu, Goyang-si, Gyeonggi-do, 10338, South Korea
Type of Equipment : Household robots
FCC ID. : 2AOFHGURU-PEDDY-VER
Model Name : PEDDY
Multiple Model Name : N/A
Serial number : N/A
Total page of Report : 13 pages (including this page)
Date of Incoming : November 17, 2017
Date of issue : November 23, 2017

SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C Section 15.247**

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

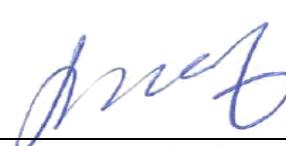
It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by:



Jae-Ho Lee / Chief Engineer
ONETECH Corp.

Approved by:



Keun-Young, Choi / Vice President
ONETECH Corp.

CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE	4
2. TEST SUMMARY	5
2.1 TEST ITEMS AND RESULTS	5
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS.....	5
2.3 RELATED SUBMITTAL(S) / GRANT(S)	5
2.4 PURPOSE OF THE TEST	5
2.5 TEST METHODOLOGY.....	5
2.6 TEST FACILITY.....	5
3. GENERAL INFORMATION	6
3.1 PRODUCT DESCRIPTION.....	6
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....	6
4. EUT MODIFICATIONS.....	7
5. SYSTEM TEST CONFIGURATION	8
5.1 JUSTIFICATION	8
5.2 PERIPHERAL EQUIPMENT	8
5.3 MODE OF OPERATION DURING THE TEST	8
5.4 CONFIGURATION OF TEST SYSTEM	9
6. PRELIMINARY TEST	9
6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....	9
6.2 GENERAL RADIATED EMISSIONS TESTS	9
7. RADIATED EMISSION TEST	10
7.1 OPERATING ENVIRONMENT	10
7.2 TEST SET-UP	10
7.3 TEST EQUIPMENT USED	10
7.4 TEST DATA FOR TRANSMITTING MODE	11
7.4.1 Test data for Below 30 MHz	11
7.4.2 Test data for 30 MHz ~ 1 GHz	12
7.4.3 Test data for above 1 GHz	13

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W17NR-D072	November 23, 2017	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant : Guru
Address : NO.301, Ilsanplaza, 22, Gobong-ro 278beon-gil, Ilsandong-gu, Goyang-si, Gyeonggi-do, 10338, South Korea
Contact Person : Sung su yeo / Team manager
Telephone No. : +82-70-8288-8311
FCC ID : 2AOFHGURU-PEDDY-VER
Model Name : PEDDY
Serial Number : N/A
Date : November 23, 2017

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
KIND OF EQUIPMENT	Household robots
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT	Certification
AUTHORIZATION REQUESTED	
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

- The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (2)	Minimum 6 dB Bandwidth	PASS (See Note 1)
15.247 (b) (3)	Maximum Peak Conducted Output Power	PASS (See Note 1)
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	PASS (See Note 1)
15.247 (d)	Radiated Emission which fall in the Restricted Band	PASS (See Note 1)
15.247 (e)	Peak Power Spectral Density	PASS (See Note 1)
15.209	Radiated Emission Limits	Met the Limit / PASS
15.207	Conducted Limits	PASS (See Note 1)
15.203	Antenna Requirement	PASS (See Note 1)

Note 1: The conducted test items are substituted with the test results of the granted BLE Module (FCC ID: 2AEEY-PBLN51822). The test report No. is W163R-D031. Refer to the test report for the detailed results.

2.2 Additions, deviations, exclusions from standards

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

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 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 43-14, Jinsaegol-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

3. GENERAL INFORMATION

3.1 Product Description

The Guru, Model PEDDY (referred to as the EUT in this report) is a Household robots. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Household robots
Operating Frequency	2 402 MHz ~ 2 480 MHz
RF Output Power	-1.72 dBm
Number of Channel	40 Channel
Modulation Type	GFSK
Antenna Type	PCB Antenna
Antenna Gain	3.789 dBi
List of each Osc. or crystal Freq.(Freq. \geq 1 MHz)	8 MHz
Rated Supply Voltage	DC 5.0 V

3.2 Alternative type(s)/model(s); also covered by this test report.

- None

4. EUT MODIFICATIONS

1. Non-conformance before debugging: Radiated Emission is Failed. (30 MHz ~ 1 GHz)

- Cable: All cable in the below pictures are copper shielded.
- All ferrite core are apply same as below pictures.
- All motors are covers cooper shield case.



5. SYSTEM TEST CONFIGURATION

5.1 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	PEDDY-V1.1	N/A
EXT Board	N/A	PEDDY-V1.1	N/A
Module	PROCHILD INC.	PBLN51822	2AEEY- PBLN51822

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
N/A	Xiaomi	Supplementary battery	EUT

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at 2 402 MHz, 2 440 MHz, and 2 480 MHz to get a maximum emission levels from the EUT. The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis, but the worst data was recorded in this report.

5.4 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The antenna of the EUT is a PCB Antenna, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
It is not need to test this requirement, because the power of the EUT is supplied by battery.	

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting mode	X

7. RADIATED EMISSION TEST

7.1 Operating environment

Temperature : 23 °C

Relative humidity : 44 % R.H.

7.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in 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.

7.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
□ - ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Oct. 27, 2017 (1Y)
■ - ESR	Rohde & Schwarz	EMI Test Receiver	101470	Oct. 27, 2017 (1Y)
□ - FSP	Rohde & Schwarz	Spectrum Analyzer	100017	Sep. 04, 2017 (1Y)
■ - 310N	Sonoma Instrument	AMPLIFIER	312544	Apr. 04, 2017 (1Y)
■ - FSV30	Rohde & Schwarz	Signal Analyzer	101200	Oct. 26, 2017 (1Y)
■ - SCU-18	Rohde & Schwarz	Pre-Amplifier	102346	Oct. 24, 2017 (1Y)
■ - MA-4000XPET	Innco Systems GmbH	Antenna Master	MA4000/509	N/A
□ - HD100	HD GmbH	Position Controller	N/A	N/A
■ - DT3000-3t	Innco Systems GmbH	Turn Table	N/A	N/A
□ - FMZB 1513	Schwarzbeck	LOOP ANTENNA	1513-235	Jun. 10, 2016 (2Y)
■ - VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	May 20, 2016 (2Y)
■ - BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 16, 2017 (2Y)
■ - BBHA9170	Schwarzbeck	Horn Antenna	BBHA91700179	Jul. 28, 2017 (2Y)
■ - SCU40A	Rohde & Schwarz	Pre-Amplifier	100436	Apr. 04, 2017 (1Y)

All test equipment used is calibrated on a regular basis.

7.4 Test data for Transmitting mode

7.4.1 Test data for Below 30 MHz

- Test Date : November 19, 2017
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dB μ V)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
Any emissions less than 20 dB below the limit were not observed.									



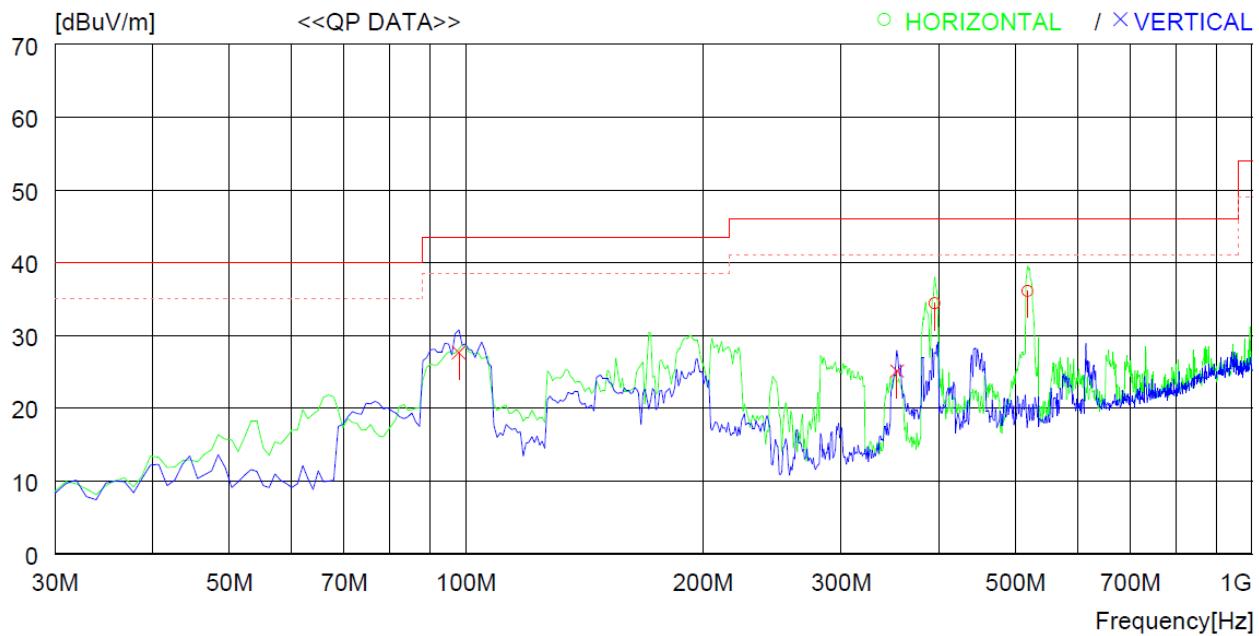
Tested by: Ha-Ram, Lee / Assistant Manager

7.4.2 Test data for 30 MHz ~ 1 GHz

Humidity Level : 44 % R.H. Temperature: 23 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Household robots Date: November 19, 2017

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA TABLE	
									Horizontal	Vertical
----- Horizontal -----										
1	394.720	47.3	15.7	4.6	33.2	34.4	46.0	11.6	100	359
2	517.910	46.8	17.4	5.2	33.3	36.1	46.0	9.9	200	331
----- Vertical -----										
3	97.900	46.2	12.0	2.4	33.0	27.6	43.5	15.9	300	0
4	353.010	38.9	14.9	4.4	33.1	25.1	46.0	20.9	400	39

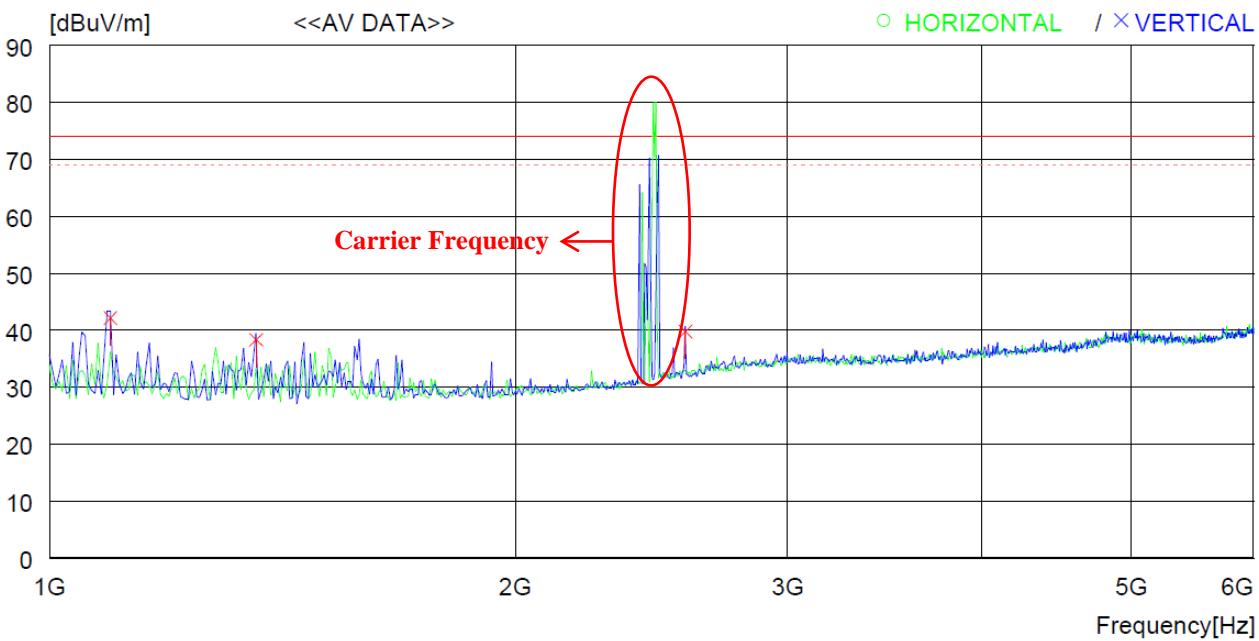
Tested by: Ha-Ram, Lee / Assistant Manager

7.4.3 Test data for above 1 GHz

Humidity Level : 44 % R.H. Temperature: 23 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247
 Result : PASSED

EUT : Household robots Date: November 19, 2017

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING AV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA TABLE	
									Vertical	Horizontal
<hr/>										
1	1095.000	50.5	24.9	6.7	40.0	42.1	74.0	31.9	100	0
2	1360.000	45.9	25.1	7.3	40.0	38.3	74.0	35.7	200	359
3	2575.000	42.4	27.6	9.7	40.0	39.7	74.0	34.3	100	0


Tested by: Ha-Ram, Lee / Assistant Manager