FCC TEST REPORT

Reference No. : **G-44-2016-00153**

Applicant : **3.14 Co., Ltd.**

Equipment Under Test (EUT) :

Product Name: KamiBot

Model Name: KamiBot-001

Applied Standards : **FCC Part 15 Subpart B**

ANSI C 63.4:2009

Date of Receipt : **January 15, 2016**

Date of Test : **May 4, 2016 ~ May 12, 2016**

Date of Issue : **May 16, 2016**

Test Results : **Complied**

Tested by : ----------
Clark Lee

Reviewed by : ----------
Paul Kang

Remarks :

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1. General Information

1.1 Client Information

Applicant : 3.14 Co., Ltd.
Address of Applicant : 467, Dongdaegu-ro, Dong-gu, Daegu, Republic of Korea

Manufacturer : 3.14 Co., Ltd.
Address of Manufacturer : 467, Dongdaegu-ro, Dong-gu, Daegu, Republic of Korea

1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd.
Giheung 1 Laboratory : 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
Giheung 2 Laboratory : 23, Giheungdanji-ro 24beon-gil, Giheung-gu,Yongin-si, Gyeonggi-do, Republic of Korea
Gunpo Laboratory : 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 435-040 Republic of Korea

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1.3 General Information of E.U.T.

Product Name	KamiBot
Model Name	KamiBot-001
Serial No.	-
FCC ID	2AH2J-KAMIBOT
EMI Classification	Class B
Rated Voltage	100 - 240 V~,50/ 60 Hz
Test Voltage	120 V~, 60 Hz
Highest Internal Frequency	16 MHz
Description	Device controlled with Bluetooth LE communication.

1.4 Operating Modes and Conditions

Operating mode	Operating condition
1) Charging mode	Charging status

1.4.1 Monitoring Method

- Checking the status of Battery charge.

1.5 Auxiliary Equipments

Description	Model	Serial No.	Manufacturer
Mobile Phone	-	-	SAMSUNG
TRAVEL ADAPTER	GB4943-2001	-	SAMSUNG

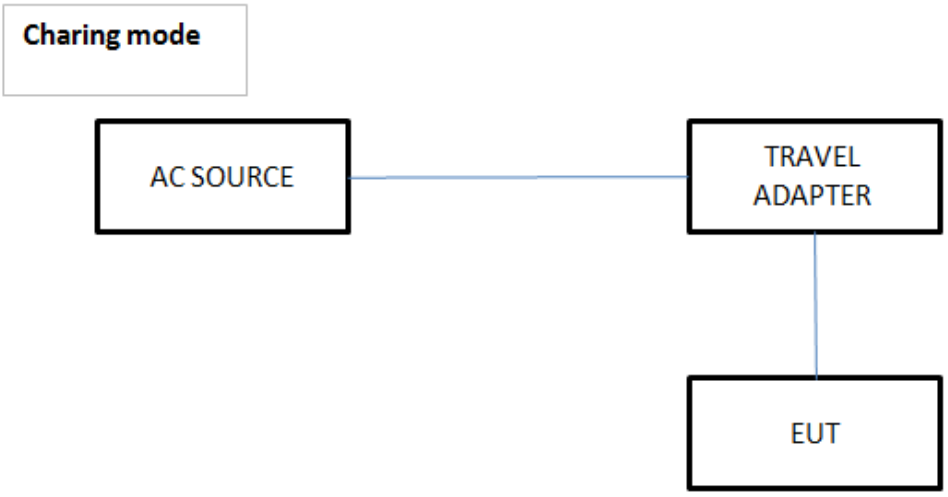
1.6 Cable List

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
EUT	DC IN	TRAVEL ADAPTER	DC OUT	0.8	Unshield
TRAVEL ADAPTER	AC IN	AC SOURCE	AC OUT	-	Unshield

1.7 System Configurations

Description	Model	Serial No.	Manufacturer
	-	-	-
	Kami Bot Ver 0.1	-	3.14 Co., Ltd.
	HC-SR04	-	-
	Micro Servo 9g	-	Tower Pro™
	Kami Bot Ver 1.0	-	3.14 Co., Ltd.
	Kami Bot Ver 1.0	-	3.14 Co., Ltd.

1.8 Test System Layout



1.9 Modifications

There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 Subpart B	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Basic Standards	Results
Conducted Emission	ANSI C 63.4:2009 FCC Part 15 Subpart B	Complied
Radiated Emission	ANSI C 63.4:2009 FCC Part 15 Subpart B	Complied

Note: Test methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Basic Standards	Test Results
Conducted Emission	ANSI C 63.4:2009 FCC Part 15 Subpart B	**Complied**
Radiated Emission	ANSI C 63.4:2009 FCC Part 15 Subpart B	**Complied**

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 ㎒ ~ 30 ㎒	9 ㎑	-
Radiated Emission	30 ㎒ ~ 1 ㎓	120 ㎑	10 m
	Above 1 ㎓	1 ㎒	3 m

2.2.2 Test Limits

-Conducted Emission Limits at Mains Port

Frequency Range	Limits(dB(㎶))		Class
	Quasi-peak	Average	
0.15 ㎒ ~ 0.5 ㎒	79	66	**Class A**
0.5 ㎒ ~ 30 ㎒	73	60	
0.15 ㎒ ~ 0.5 ㎒	66 to 56	56 to 46	**Class B**
0.5 ㎒ ~ 5 ㎒	56	46	
5 ㎒ ~ 30 ㎒	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 ㎒ to 0.5 ㎒.

-Radiated Emission Limits below 1 ㎓

Frequency Range	Limits(dB(㎶/m))	Class
	Quasi-peak	
30 ㎒ ~ 88 ㎒	39.1	**Class A**
88 ㎒ ~ 216 ㎒	43.5	
216 ㎒ ~ 960 ㎒	46.4	
960 ㎒ ~ 1 ㎓	49.5	
30 ㎒ ~ 88 ㎒	40	**Class B**
88 ㎒ ~ 216 ㎒	43.5	
216 ㎒ ~ 960 ㎒	46	
960 ㎒ ~ 1 ㎓	54	

-Radiated Emission Limits above 1 ㎓ (3m method)

Frequency Range	Limits(dB(㎶/m))		Class
	Average	Peak	
Above 1 ㎓	59.5	79.5	**Class A**
Above 1 ㎓	54	74	**Class B**

2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 ㎒ to 30 ㎒) using a max hold mode incorporating a Peak detector and Average detector and using the software of ES-K1(Version V1.71 from R&S). The final test data was measured using a Quasi-Peak detector and Average detector.

2.3.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Cal Due. Date
Two-Line V-Network	ENV216	R & S	100190	2016.12.21
Test Receiver	ESCI 7	R & S	100911	2016.12.22

Note : The calibration period of every equipment is 1 year.

2.3.2 Test Site

Shield Room in Gunpo Laboratory

2.3.3 Environment Conditions and data

- Conducted Emission at AC Mains Port

Temp. (Minimum 21.5 ℃, Maximum 22.0 ℃) ,
Humidity (Minimum 44.0 % R.H., Maximum 44.0 % R.H.)
Atmospheric Pressure : (Minimum 101.2 ㎪, Maximum 101.2 ㎪)

Test Date : May 12, 2016

Freq.	Line	Level (dBμV)		CL	LISN	Result (dBμV)		Limit (dBμV)		Margin (dB)	
(MHz)	(H/N)	Q/P	A/V	(dB)	(dB)	Q/P	A/V	Q/P	A/V	Q/P	A/V
0.18	N	33.69	14.89	0.01	9.70	43.40	24.60	64.72	54.72	21.32	30.12
0.18	H	30.39	12.59	0.01	9.60	40.00	22.20	64.49	54.49	24.49	32.29
0.67	H	21.69	12.29	0.01	9.60	31.30	21.90	56.00	46.00	24.70	24.10
0.67	N	18.19	6.69	0.01	9.70	27.90	16.40	56.00	46.00	28.10	29.60
10.59	H	31.24	20.44	0.16	9.70	41.10	30.30	60.00	50.00	18.90	19.70
10.96	N	28.13	17.73	0.17	9.80	38.10	27.70	60.00	50.00	21.90	22.30

Measurement Uncertainty : 2.98 dB (The confidential level is about 95%, *k*=2)

Note : • Line (H) : Hot • Line (N) : Neutral
• CL: Cable Loss • LISN : LISN Factor
• Result = Level + CL + LISN • Margin = Limit – Result

See Appendix A (Conducted Emission at AC Mains Port)

2.4 Radiated Emission

The initial preliminary exploratory scans were performed at 3 ㎙ distance over the measuring frequency range(30 ㎒ to 1 ㎓) using a max hold mode incorporating a Peak detector and using the software of EP5RE(Version Ver3.10.20 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 ㎓ at 3 ㎙ distance. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

2.4.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Test Receiver	ESU26	R & S	100109	2017.03.07
Bilog Antenna	VULB9163	SCHWARZBECK MESS-ELEKTRONIK	396	2016.06.16
Amplifier	8447F	HP	2944A03909	2016.08.27

Note : Only the calibration period of Antennas is 2 years but the period of every equipment is 1 year.

2.4.2 Test Site

3m SEMI-ANECHOIC CHAMBER Giheung 2 Laboratory (Below 1 ㎓)

2.4.3 Environment Conditions and data

- Below 1 ㎓

Temperature : (minimum 22.2, maximum 22.6) ℃
Humidity : (minimum 40.0, maximum 40.0) %R.H.
Atmospheric Pressure : (101.2) ㎪

Test Date : May 04, 2016

Freq. (MHz)	Level (dB(μV))	Pol. (H/V)	A (°)	H (cm)	AF (dB/m)	CL (dB)	Amp. (dB)	Result (dB(μV/m))	Limit (dB(μV/m))	Margin (dB)
37.88	38.80	V	246	100	13.58	0.74	27.86	25.26	40.00	14.74
41.68	41.10	V	108	200	14.24	0.77	27.84	28.27	40.00	11.73
49.48	38.40	V	61	100	14.17	0.84	27.80	25.61	40.00	14.39
61.28	39.30	V	23	100	12.02	0.92	27.78	24.46	40.00	15.54
566.81	33.30	H	229	200	19.39	2.80	28.43	27.06	46.00	18.94
960.31	34.00	V	155	200	23.52	3.78	27.46	33.84	54.00	20.16

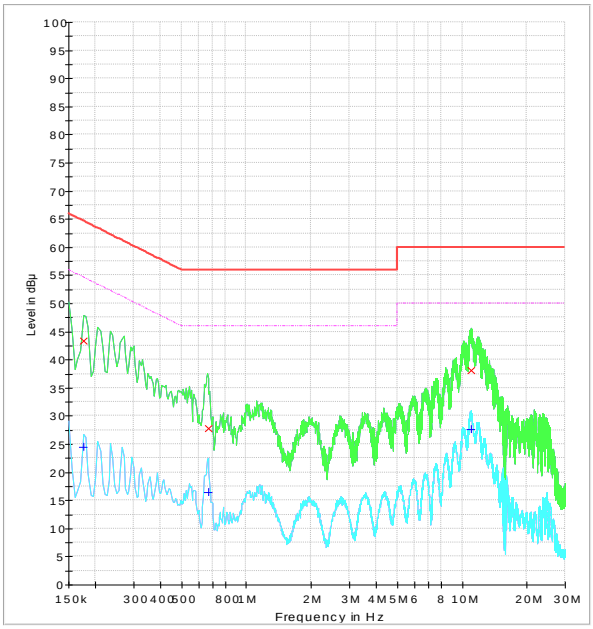
Measurement Uncertainty (Horizontal) : 5.17 dB (The confidential level is about 95%, *k*=2)
Measurement Uncertainty (Vertical) : 5.21 dB (The confidential level is about 95%, *k*=2)

Note 1:
- AF = Antenna Factor
- CL = Cable Loss
- Amp = Amplifier Gain
- POL H = Horizontal
- POL V = Vertical
- A : Angle
- H : Height
- Margin = Limit – Result
- Result = Level + AF + CL – Amp

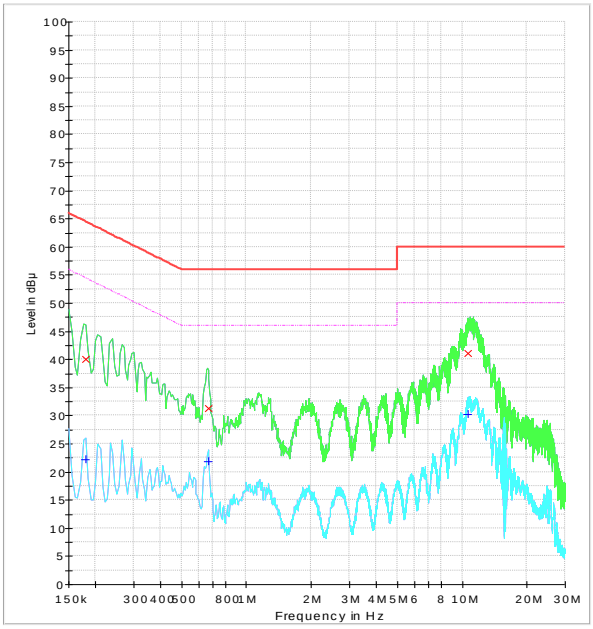
See Appendix B (Radiated Emission)

Appendix A : Conducted Emission at Mains Port

Neutral



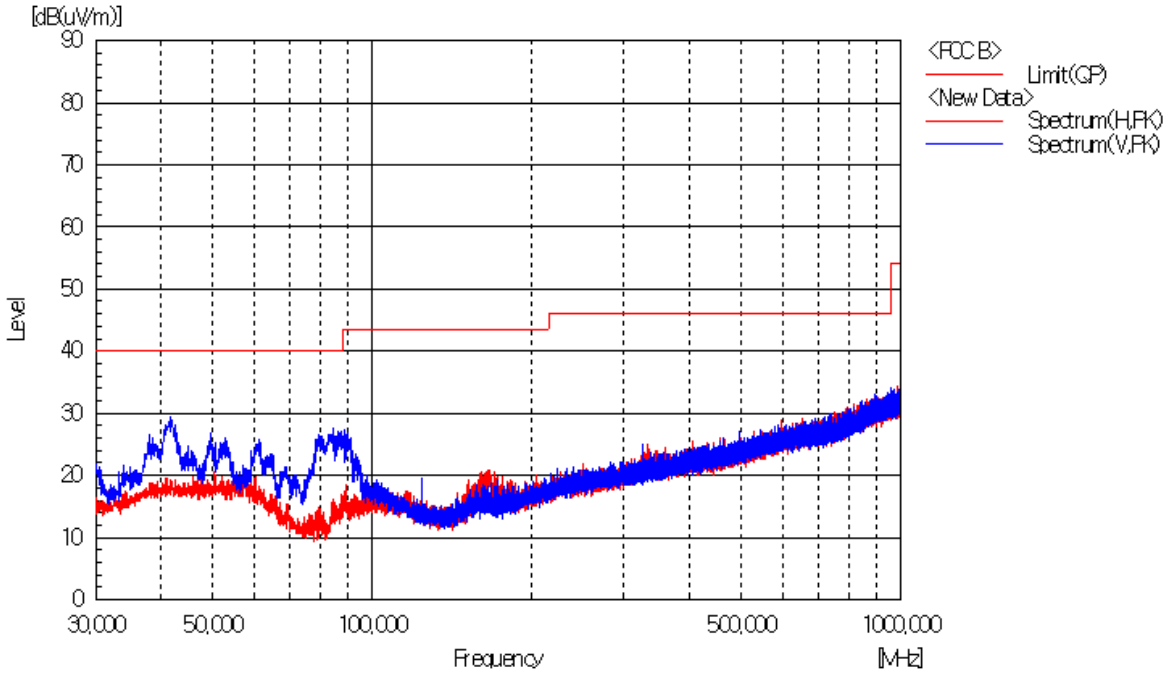
Hot



Appendix B : Radiated Emission

Below 1 ㎓

- Test Mode : Charging mode



- Test Mode : Bluetooth mode