

FCC TEST REPORT

Reference No. : G-45-2018-03458

Applicant : LG Electronics USA

Equipment Under Test (EUT) :

Product Name : LG IoT Hub

Model Name : AIGC92W

Alt.Model Name : AIGB92W

Applied Standards : FCC Part 15 Subpart B

ANSI C 63.4:2014

FCC ID : BEJ-AIGC92W

Date of Receipt : November 8, 2018

Date of Test : November 9, 2018 ~ November 12, 2018

Date of Issue : September 3, 2019

Test Results : Complied

Tested by :



Yongtae Yu

Reviewed by :



Paul Kang

Remarks :

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Revision History

Revision	Report Number	Description
0	F690501/RF-EMC004248(G)	Initial
1	F690501/RF-EMC004248-1(G)	- Added Alt.Model name - Change Basic model name, Product name, Applicant address, and Manufacturer address.
2	F690501/RF-EMC004248-2(G)	Corrected internal clock frequency and address of Manufacturer.

1. General Information

1.1 Client Information

Applicant : LG Electronics USA
- Address of Applicant : 1000 Sylvan Avenue Englewood Cliffs New Jersey United States 07632

Manufacturer : LG Electronics Inc.
- Address of Manufacturer : 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea (Republic of)

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, 15807, Republic of Korea.

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1.3 General Information of E.U.T.

Classification	Description
Product Name	LG IoT Hub
Model Name	AIGC92W
Alt.Model Name	AIGB92W
Model Differences	Same to Basic model, but Alt.model name is made for marketing purpose.
Serial No.	None
EMI Classification	Class B
Internal Clock Frequency	Zigbee : 38.4 MHz, WiFi : 25 MHz
Test Voltage	120 V~, 60 Hz(for Travel Adapter)
Operating Voltage	5 Vd.c.
Operating Temperature	(-)20 °C ~ (+)50 °C

1.4 Operating Modes and Conditions

Operating Mode	Percussor
1)Communication Mode	LG IoT Hub is communicated with the notebook computer using a Teraterm.

1.5 Auxiliary Equipments

Description	Model	Serial No.	Manufacturer
Monitor Adapter	ADP-40DD B	-	DELTA ELECTRONICS, INC.
LCD Monitor	S2740Lb	-	DELL INC.
Notebook Adapter	ADP-40PH AD	-	DELTA ELECTRONICS, INC.
Notebook Computer	LGE-DMLGX14(B)	008QTEQ024836	LG Electronics Co., Ltd.
SD Card	-	-	SanDisk
Keyboard	SKS-9000UB	-	S&J CO.,LTD.
Mouse	-	-	-
Earphone	-	-	-
Travel Adapter	MCS-01WPE	EAY64329303	PNTELECOM

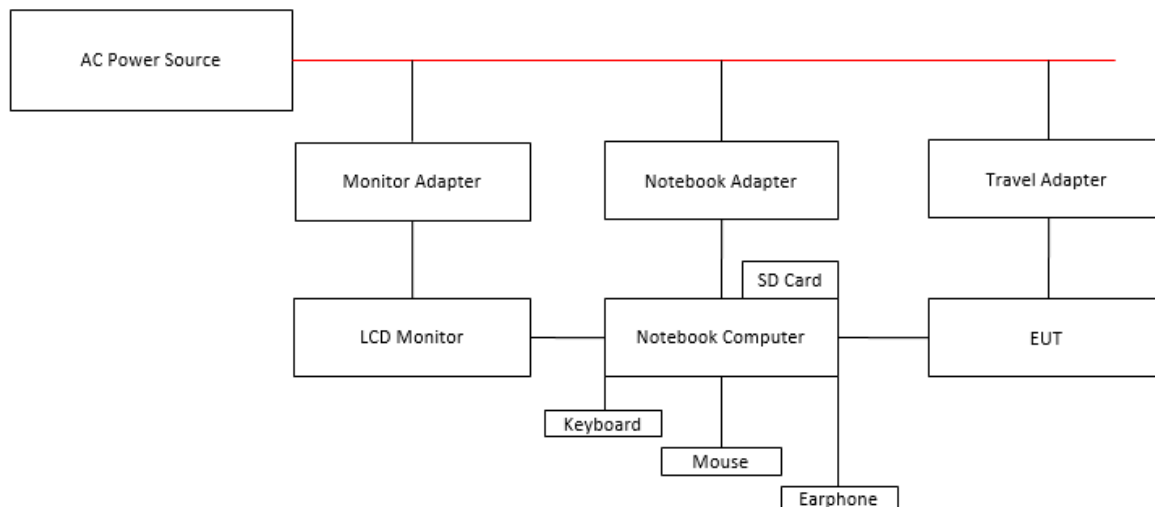
1.6 Cable List

Start		END		Cable Spec.		Used core
Name	I/O Port	Name	I/O Port	Length	Shield	
AC Power Source	AC OUT	Monitor Adapter	AC IN	1.1	Shield	No
	AC OUT	Notebook Adapter	AC IN	1.2	Shield	No
	AC OUT	Travel Adapter	AC IN	1.1	Shield	No
Monitor Adapter	DC OUT	LCD Monitor	DC IN	0.9	Shield	No
Notebook Adapter	DC OUT	Notebook Computer	DC IN	0.8	Shield	No
Travel Adapter	DC OUT	EUT	DC IN	0.5	Shield	No
Notebook Computer	RGB Port	LCD Monitor	RGB Port	1.3	Shield	No
	USB	EUT	-	0.1	Shield	No
	USB	Keyboard	-	1.7	Shield	No
	USB	Mouse	-	1.5	Shield	No
	AUX	Earphone	-	1.2	Shield	No
	-	SD Card	-	-	-	-

1.7 System Configurations

Description	Model	Serial No.	Manufacturer
Main Board	TWFB-R1030	044EAF56FC60	-

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 63.4:2014 FCC Part 15 Subpart B	Complied
Radiated Emission	ANSI C 63.4:2014 FCC Part 15 Subpart B	Complied

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

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2.1 Test Results

Test Items	Basic Standards	Test Results
Conducted Emission	ANSI C 63.4:2014 FCC Part 15 Subpart B	Complied
Radiated Emission	ANSI C 63.4:2014, 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 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m&3 m
	Above 1 GHz	1 MHz	3 m

2.2.2 Test Limits

-Conducted Emission Limits at Mains Port

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

-Radiated Emission Limits below 1 GHz

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

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

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

2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) 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	2019.05.14
Test Receiver	ESCI 7	R & S	100911	2019.02.20

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

Temperature : (minimum 23.1, maximum 23.4) °C

Humidity : (minimum 33.0, maximum 34.0) %R.H.

Atmospheric Pressure : (100.7) kPa

Test Date : November 12, 2018

Freq. (MHz)	Line (H/N)	Level (dB μ V)		CL (dB)	LISN (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q/P	A/V			Q/P	A/V	Q/P	A/V	Q/P	A/V
0.41	N	33.52	24.82	0.08	9.80	43.40	34.70	57.63	47.63	14.23	12.93
0.41	H	35.62	24.82	0.08	9.50	45.20	34.40	57.57	47.57	12.37	13.17
0.75	H	35.60	29.80	0.20	9.50	45.30	39.50	56.00	46.00	10.70	6.50
0.75	N	26.50	18.00	0.20	9.80	36.50	28.00	56.00	46.00	19.50	18.00
1.49	H	32.51	25.71	0.29	9.50	42.30	35.50	56.00	46.00	13.70	10.50
1.49	N	26.21	18.11	0.29	9.80	36.30	28.20	56.00	46.00	19.70	17.80
2.20	N	22.33	13.53	0.37	9.80	32.50	23.70	56.00	46.00	23.50	22.30
3.48	H	32.69	19.89	0.36	9.55	42.60	29.80	56.00	46.00	13.40	16.20
8.96	H	37.68	28.58	0.05	9.67	47.40	38.30	60.00	50.00	12.60	11.70
9.12	N	29.18	15.18	0.05	10.07	39.30	25.30	60.00	50.00	20.70	24.70
9.28	H	33.98	22.68	0.04	9.68	43.70	32.40	60.00	50.00	16.30	17.60
12.59	H	33.79	22.89	0.01	9.80	43.60	32.70	60.00	50.00	16.40	17.30
13.14	N	28.60	15.10	0.01	10.29	38.90	25.40	60.00	50.00	21.10	24.60

Measurement Uncertainty : 3.21 dB (The confidential level is about 95%, k=2)

Note : • Line (H) : Hot
• CL: Cable Loss
• Result = Level + CL + LISN
• Line (N) : Neutral
• LISN : LISN Factor
• 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 m distance over the measuring frequency range(30 MHz to 13 GHz) using a max hold mode incorporating a Peak detector and using the software of EMC32(Version 8.50.0 from R&S) and EP5RE(Version Ver3.10.20 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz at 3 m distance and a Peak and Average detector above 1 GHz at 3 m 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	Cal Due. Date
Horn Antenna (RRA)	HF906	R & S	100326	2019.05.11
Signal Conditioning Unit	SCU 18	R & S	10117	2019.08.07
Test Receiver	ESU26	R & S	100109	2019.02.07
Bilog Antenna (RRA)	VULB9163	SCHWARZBECK	01126	2020.02.13
Amplifier	8447F	HP	2944A03909	2019.08.07

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 Gunpo Laboratory (Below 1 GHz, Above 1 GHz)

2.4.3 Environment Conditions and data

- Below 1 GHz

Temperature : (minimum 21.4, maximum 21.7) °C

Humidity : (minimum 36.0, maximum 37.0) %R.H.

Atmospheric Pressure : (100.5) kPa

Test Date : November 9, 2018

- Above 1 GHz

Temperature : (minimum 21.4, maximum 21.7) °C

Humidity : (minimum 36.0, maximum 37.0) %R.H.

Atmospheric Pressure : (100.5) kPa

Test Date : November 9, 2018

- Below 1 GHz (3 m method)

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)
55.99	43.10	V	22	100	12.63	1.33	27.79	29.27	40.00	10.73
66.29	45.30	V	113	100	9.96	1.44	27.77	28.93	40.00	11.07
148.14	44.60	V	275	100	7.93	2.09	27.60	27.02	43.50	16.48
249.99	50.40	H	3	196	12.85	2.69	27.20	38.74	46.00	7.26
296.14	47.90	H	191	100	13.84	2.90	27.11	37.53	46.00	8.47
374.15	44.10	H	127	100	15.77	3.29	27.64	35.52	46.00	10.48

Measurement Uncertainty (Horizontal) : 5.31 dB (The confidential level is about 95%, k=2)

Measurement Uncertainty (Vertical) : 5.73 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

- Above 1 GHz (3 m method)

Freq. (MHz)	Level (dBμV)	Pol. (H/V)	A (°)	H (cm)	AF (dB)	CL (dB)	Amp. (dB)	CF (dB)	F/S (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Peak Detector											
1065.50	65.70	V	185	200	24.44	5.59	45.77	0.00	49.96	74.00	24.04
1399.00	63.10	V	358	100	25.16	6.47	45.70	0.00	49.03	74.00	24.97
2236.50	56.10	V	189	200	28.05	8.90	45.38	0.00	47.67	74.00	26.33
2239.50	58.10	H	191	100	28.05	8.90	45.38	0.00	49.67	74.00	24.33
2789.00	50.30	V	189	200	29.10	9.35	45.11	0.00	43.64	74.00	30.36
5999.98	44.20	V	291	100	34.41	13.04	44.50	0.00	47.15	74.00	26.85
Average Detector											
1065.50	59.20	V	185	200	24.44	5.59	45.77	0.00	43.46	54.00	10.54
1399.00	36.20	V	358	100	25.16	6.47	45.70	0.00	22.13	54.00	31.87
2236.50	32.10	V	189	200	28.05	8.90	45.38	0.00	23.67	54.00	30.33
2239.50	32.20	H	191	100	28.05	8.90	45.38	0.00	23.77	54.00	30.23
2789.00	31.10	V	189	200	29.10	9.35	45.11	0.00	24.44	54.00	29.56
5999.98	33.30	V	291	100	34.41	13.04	44.50	0.00	36.25	54.00	17.75

Measurement Uncertainty (Horizontal) : 5.73 dB (The confidential level is about 95%, k=2)

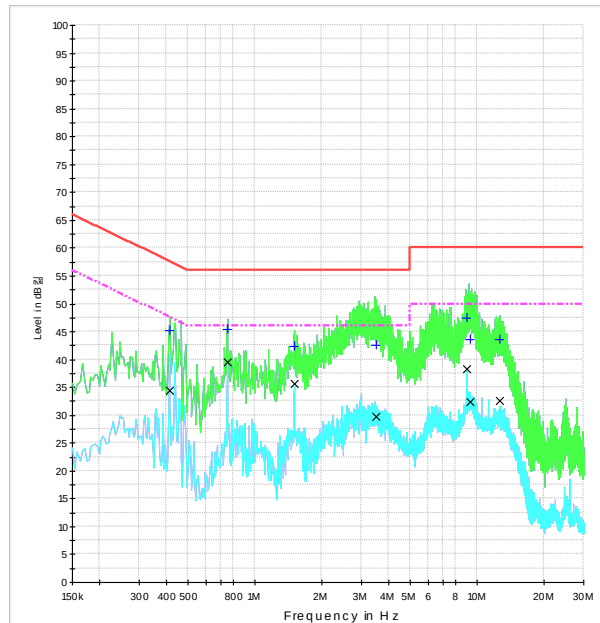
Measurement Uncertainty (Vertical) : 5.85 dB (The confidential level is about 95%, k=2)

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

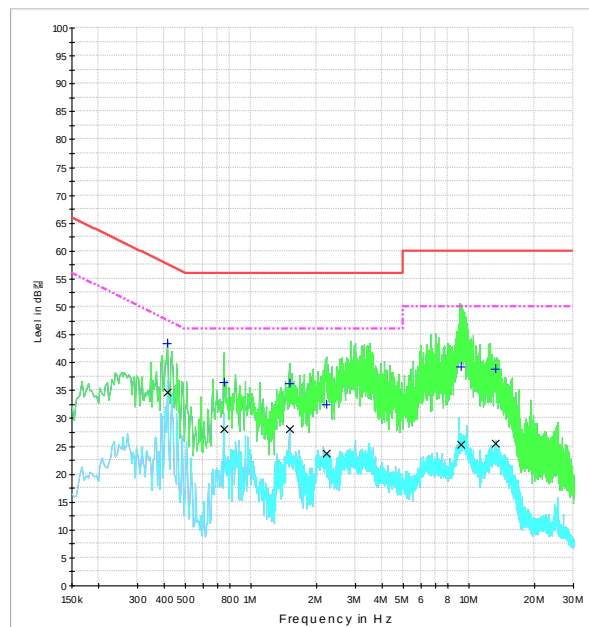
See Appendix B (Radiated Emission)

Appendix A : Conducted Emission at Mains Port

Hot

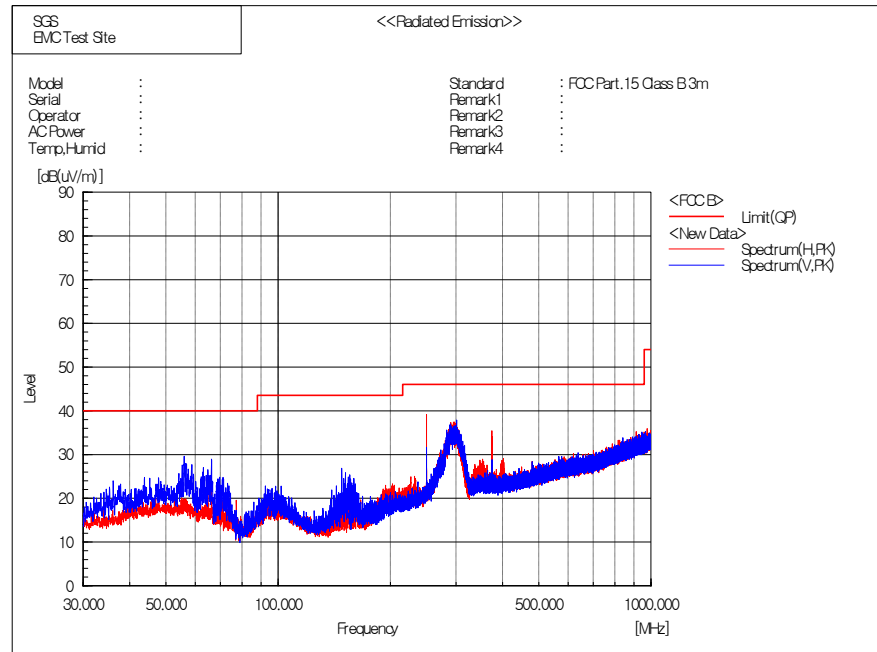


Neutral

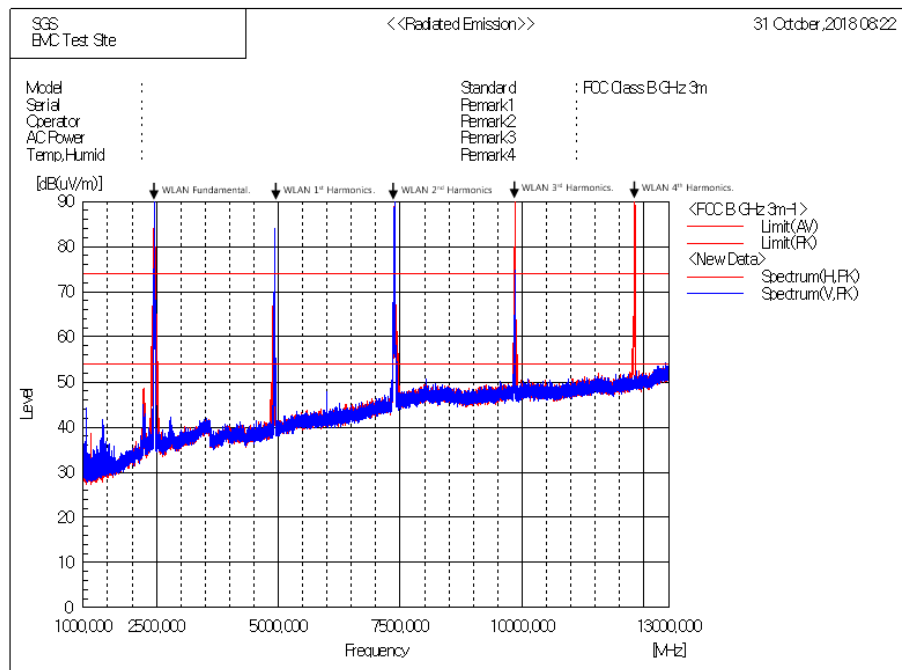


Appendix B : Radiated Emission

Below 1 GHz



Above 1 GHz



- End of the Report -