

TEST REPORT



DT&C Co., Ltd.

42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No. : DREFCC1807-0216

2. Client / Applican

- Name : Aurender Inc.
- Address : #1612, Obiz Tower, 126, Beolmal-ro, Dongan-gu, Anyang-si, Gyeonggi-do, South Korea

3. Use of Report : Grant of Certification

4. Product Name / Model Name : High Fidelity wireless Receiver / Aurender SW-TX

5. Test Standard : ANSI C63.4:2014
FCC Part 15 Subpart B (Class B digital devices)

6. Date of Test : Jul. 02. 2018 ~ Jul. 02. 2018

7. Testing Environment : Temperature (23 ~ 25) °C , Humidity (48 ~ 49) % R.H.

8. Test Result : Refer to the attached Test Result

Affirmation	Tested by	 (Signature)	Reviewed by	 (Signature)
	Name : SooHyun Bang		Name : HyungJun Kim	

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.

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Jul. 09. 2018

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

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1. General Remarks

This report contains the result of tests performed by :

DT&C Co., Ltd.

42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042

<http://www.dtc.net>

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

DT&C Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Remark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
	South Africa	SABS	0006	ISO/IEC 17025
Site Filing	USA	FCC	KR0034 101842 678747, 596748, 804488, 165783	Accredited 2.948 Listed
	Canada	IC	5740A-3 5740A-4	Registered
	Japan	VCCI	C-1427 R-1364, R-3385, R-4076, R-4180, R-4496 T-1442, G-10338, G-754, G-10815	Registered
Certification	Korea	KC	KR0034	Designation
	Germany	TUV	CARAT 17 11 89112 005	ISO/IEC 17025

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".

3. General Information of EUT

Applicant	Aurender Inc. #1612, Obiz Tower, 126, Beolmal-ro, Dongan-gu, Anyang-si, Gyeonggi-do, South Korea
Manufacturer	Aurender Inc. #1612, Obiz Tower, 126, Beolmal-ro, Dongan-gu, Anyang-si, Gyeonggi-do, South Korea
Factory	SMTRONICS 603BL-19LT, 199, Seonggok-ro, Danwon-gu, Ansan-si, Gyeonggi-do
Product Name	High Fidelity wireless Receiver
Model Name	Aurender SW-TX
Add Model Name	None
Operation Frequency	48 MHz
Rated Power	DC 5 V
FCC ID	2AO2TAURENDERSWTX
Remarks	None

Related Submittal(s) / Grant(s)
Original submittal only

4. EUT Operations and Test Configurations

4.1 Principle of Configuration Selection

Emission :

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use. For each testing mode different configurations were used, Refer to the individual tests.

4.2 EUT Operation Mode

No.	Mode	Description
1	BT	The notebook sound signal is transmitted as a wireless signal, and the sound signal is output to the Bluetooth amplifier.
Note) Due to the characteristics of the product, the 2.4 GHz band is set as an exclusion band because the wireless function can't be turned off.		

4.3 Test Configuration Mode

No.	Mode	Description
1	BT	Connects to a notebook USB port and Bluetooth pairing to a Bluetooth amplifier.

4.4 Supported Equipment

Used*	Product Type	Manufacturer	Model	Remarks
AE	Notebook	CHICONY POWER TECHNOLOGY (CHONGQING)CO.,LTD.	HSTNN-CA40	None
AE	AC Adapter #1	HSTNN-Q95C	HP	None
AE	High-Fidelity Wireless Speaker	Aurender Inc.	Aurender S5W	None
AE	AC Adapter #2	Shenzhen Fuyuan dian Power Co., Ltd.	FY2402000	None
*Abbreviations: AE - Auxiliary/Associated Equipment, or SIM - Simulator				

4.5 EUT In/Output Port

Name	Type*	Cable Max. >3 m	Cable Shielded	Cable Back shell	Remarks
EUT	USB A type	-	Shield	Metal	None
Notebook	DC Input	1.5	Non-Shield	Plastic	None
AC Adapter #1	AC Input	1.5	Non-Shield	Plastic	None
High-Fidelity Wireless Speaker	DC Input	1.0	Non-Shield	Plastic	None
AC Adapter #2	AC Input	1.8	Non-Shield	Plastic	None
*Abbreviations: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port TP = Telecommunication Ports					

4.6 Test Voltage and Frequency

Case	Voltage (V)	Frequency (Hz)	Phases	Remarks
1	AC 120	60	Single	None

5. Test Summary

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4:2014	C
Radiated Disturbance	ANSI C63.4:2014	C
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		
Note)		

The data in this test report are traceable to the national or international standards.

-Conducted Disturbance

Frequency [MHz]	Phase	Result [dB μ V]	Detector	Limit [dB μ V]	Margin [dB]
0.15908	N	51.70	QP	65.51	13.81

-Radiated Disturbance

Frequency [MHz]	Pol.	Result [dB μ V/m]	Detector	Limit [dB μ V/m]	Margin [dB]
41.387	V	28.16	QP	40.00	11.84

6. Test Environment

Test Items	Test date (YYYY-MM-DD)	Temp. (°C)	Humidity (% R.H.)	Pressure (kPa)
Conducted Disturbance	2018-07-02	25	48	-
Radiated Disturbance	2018-07-02	23	49	-

7. Test Results : Emission

7.1 Conducted Disturbance

ANSI C63.4	Mains terminal disturbance voltage		Result
<u>Method:</u> The AMN placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN. The measuring port of the LISN for EUT was connected to spectrum analyzer. Using conducted emission test software, the emissions were scanned with peak detector mode. After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has Quasi-Peak detector and CISPR Average detector. For (0.15 ~ 30) MHz frequency range, Quasi-Peak detector with 10 kHz RBW and 30 kHz VBW was used. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.			Comply
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point	
	150 kHz to 30 MHz	Mains	
EUT mode (Refer to clauses 4)	Test configuration mode	1	
	EUT Operation mode	1	
Limits – Class A			
Frequency (MHz)	Limit dBµV		
	Quasi-Peak	Average	
0.15 to 0.50	79	66	
0.50 to 30	73	60	
Limits – Class B			
Frequency (MHz)	Limit dBµV		
	Quasi-Peak	Average	
0.15 to 0.50	66 to 56	56 to 46	
0.50 to 5	56	46	
5 to 30	60	50	

Measurement uncertainty	
Expended uncertainty U (95 %, Confidence level, $k = 2$)	2.36 dB

Measurement Instrument					
Description	Model	Manufacturer	Identifier	Cal. Date	Cal. Due
MEASUREMENT SOFTWARE	EMI-C VER. 2.00.0171	TSJ	N/A	N/A	N/A
EMI TEST RECEIVER	ESR7	ROHDE&SCHWARZ	101109	2017.11.16	2018.11.16
LISN	ENV21	ROHDE&SCHWARZ	101979	2017.10.10	2018.10.10
LISN	LISN1600	TTI	197204	2018.06.07	2019.06.07
TRANSIENT LIMITER	TL-B0930A	EMCIS	11002	2017.09.07	2018.09.07

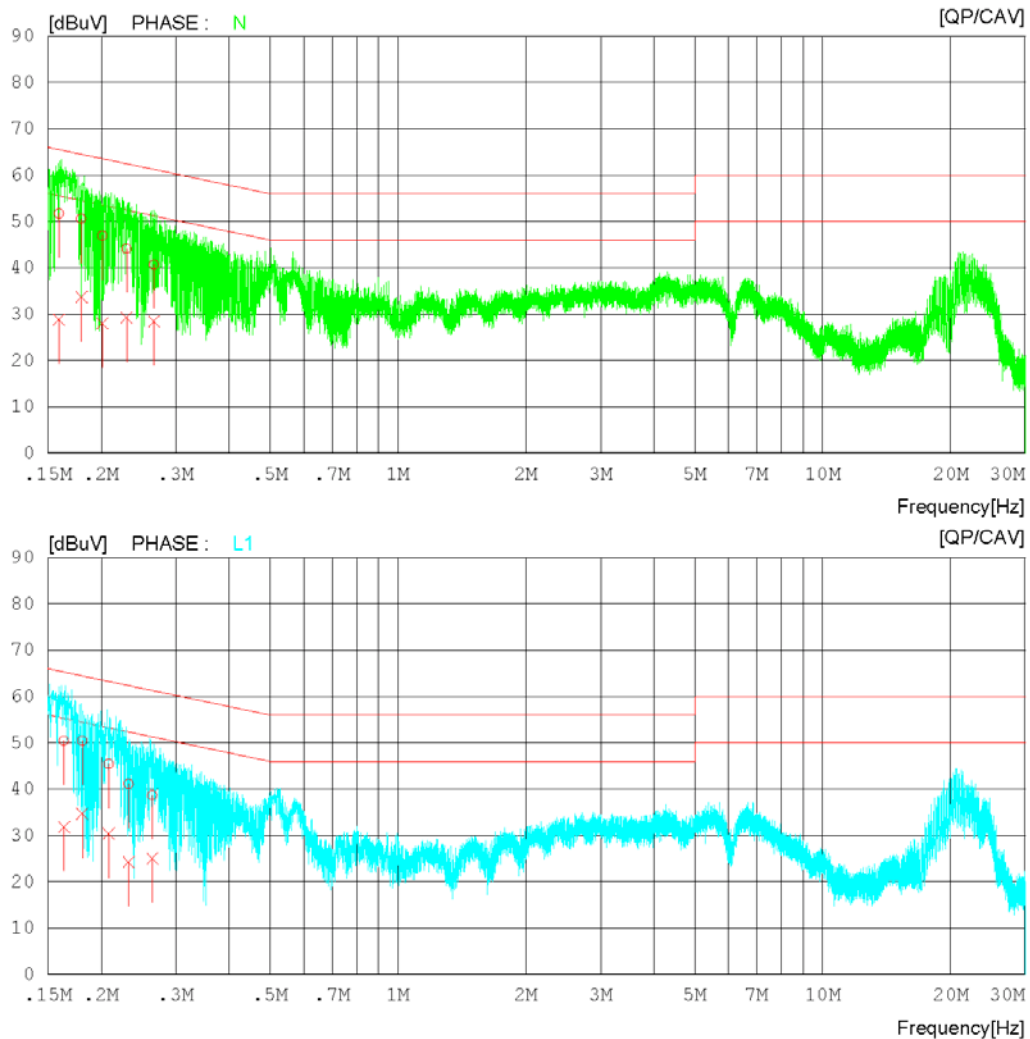
Mains terminal disturbance voltage _Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	120	Test Frequency (Hz)	60

Results of Conducted Emission

DT&C
Date 2018-07-02

Order No. DTNC1806-04846
Power Supply AC 120 V 60 Hz
Temp/Humi/Atm 25 'C_48 % R.H.
Test Condition BT

LIMIT : CISPR32_B QP
CISPR32_B AV



Results of Conducted Emission

DT&C
Date 2018-07-02

Order No. DTNC1806-04846
Power Supply AC 120 V 60 Hz
Temp/Humi/Atm 25 'C_48 % R.H.
Test Condition BT

LIMIT : CISPR32_B QP
CISPR32_B AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	CAV [dBuV]		QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	
1	0.15908	31.76	8.87	19.94	51.70	28.81	65.51	55.51	13.81	26.70	N
2	0.17968	30.56	13.74	19.97	50.53	33.71	64.50	54.50	13.97	20.79	N
3	0.20150	26.97	7.99	20.03	47.00	28.02	63.55	53.55	16.55	25.53	N
4	0.22950	24.19	9.30	19.92	44.11	29.22	62.47	52.47	18.36	23.25	N
5	0.26636	20.84	8.66	19.87	40.71	28.53	61.23	51.23	20.52	22.70	N
6	0.16350	30.43	11.80	20.01	50.44	31.81	65.28	55.28	14.84	23.47	L1
7	0.18050	30.40	14.66	20.04	50.44	34.70	64.46	54.46	14.02	19.76	L1
8	0.20858	25.37	10.39	20.01	45.38	30.40	63.26	53.26	17.88	22.86	L1
9	0.23216	21.17	4.28	19.91	41.08	24.19	62.37	52.37	21.29	28.18	L1
10	0.26402	18.74	5.09	19.90	38.64	24.99	61.30	51.30	22.66	26.31	L1

Calculation

N : Neutral phase, L1 : Live phase
C.FACTOR(dB) : Pulse Limiter(dB) + Cable loss(dB) + Insertion loss of LISN(dB)
Result(dBμV) : Reading Value(dBμV) + C.FACTOR(dB)
Margin(dB) : Limit(dBμV) - Result(dBμV)

7.2 Radiated Disturbance

ANSI C63.4	Radiated disturbance 30 MHz –XX GHz**			Result
<u>Method:</u> Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. For final measurement below 1 GHz frequency range, Quasi-Peak detector with (RBW = 120 kHz Bandwidth) was used. For final measurement above 1 GHz frequency range, Peak detector with (RBW = 1 MHz Bandwidth) and CISPR Average detector with (RBW = 1 MHz Bandwidth) were used.				Comply
EUT mode (Refer to clauses 4)	Test configuration mode		1	
	EUT Operation mode		1	
Radiated Disturbance below 1 000 MHz				
Frequency range (MHz)	Quasi-peak limit dBµV/m			
	Class A (10 m distance)		Class B (3 m distance)	
30 to 88	39.1		40	
88 to 216	43.5		43.5	
216 to 960	46.4		46	
960 to 1 000	49.5		54	
According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards(CISPR), Pub. 22 shown as below.				
Frequency range (MHz)	Quasi-peak limit dBµV/m			
	Class A (10 m distance)		Class B (10 m distance)	
30 to 230	40		30	
230 to 1 000	47		37	
Radiated Disturbance for above 1 000 MHz at a measurement distance of 3 m				
Frequency range (GHz)	Peak limit dBµV/m		Average limit dBµV/m	
	Class A	Class B	Class A	Class B
1 to 40	80	74	60	54
The test frequency range of Radiated Disturbance measurements are listed below.				
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)			Upper frequency of measurement range (MHz)	
Below 108			1 000	
108 – 500			2 000	
500 – 1 000			5 000	
Above 1 000			5 th harmonic of the highest frequency or 40 GHz, whichever is lower	
Measurement uncertainty				
Expended uncertainty <i>U</i> (95 %, Confidence level, <i>k</i> = 2)			4.16 dB, (30 ~ 1 000) MHz 3.74 dB, (1 ~ 6) GHz	

Measurement Instrument					
Description	Model	Manufacturer	Identifier	Cal. Date	Cal. Due
MEASUREMENT SOFTWARE	EMI-R VER. 2.00.0177	TSJ	N/A	N/A	N/A
EMI TEST RECEIVER	ESU	ROHDE&SCHWARZ	100469	2018.06.28	2019.06.28
TRILOG BROAD BAND ANTENNA	VULB9160	SCHWARZBECK	9160-3339	2017.04.21	2019.04.21
LOW NOISE PRE AMPLIFIER	MLA-100K01-B01-26	TSJ	1252741	2018.02.19	2019.02.19
HORN ANTENNA	3117	ETS-LINDGREN	00152093	2018.03.26	2020.03.26
PRE AMPLIFIER	8449B	H.P	3008A00887	2017.09.06	2018.09.06
HORN ANTENNA	EM-6969	ELECTRO-METRICS	156	2017.02.10	2019.02.10
PREAMPLIFIER	MLA-0618-B03-34	TSJ	1785642	2018.01.02	2019.01.02
(NOTE : THE MEASUREMENT ANTENNAS WERE CALIBRATED IN ACCORDANCE TO THE REQUIREMENTS OF C63.5-2006.)					

Radiated disturbance at (30 ~ 1000) MHz _Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	120	Test Frequency (Hz)	60

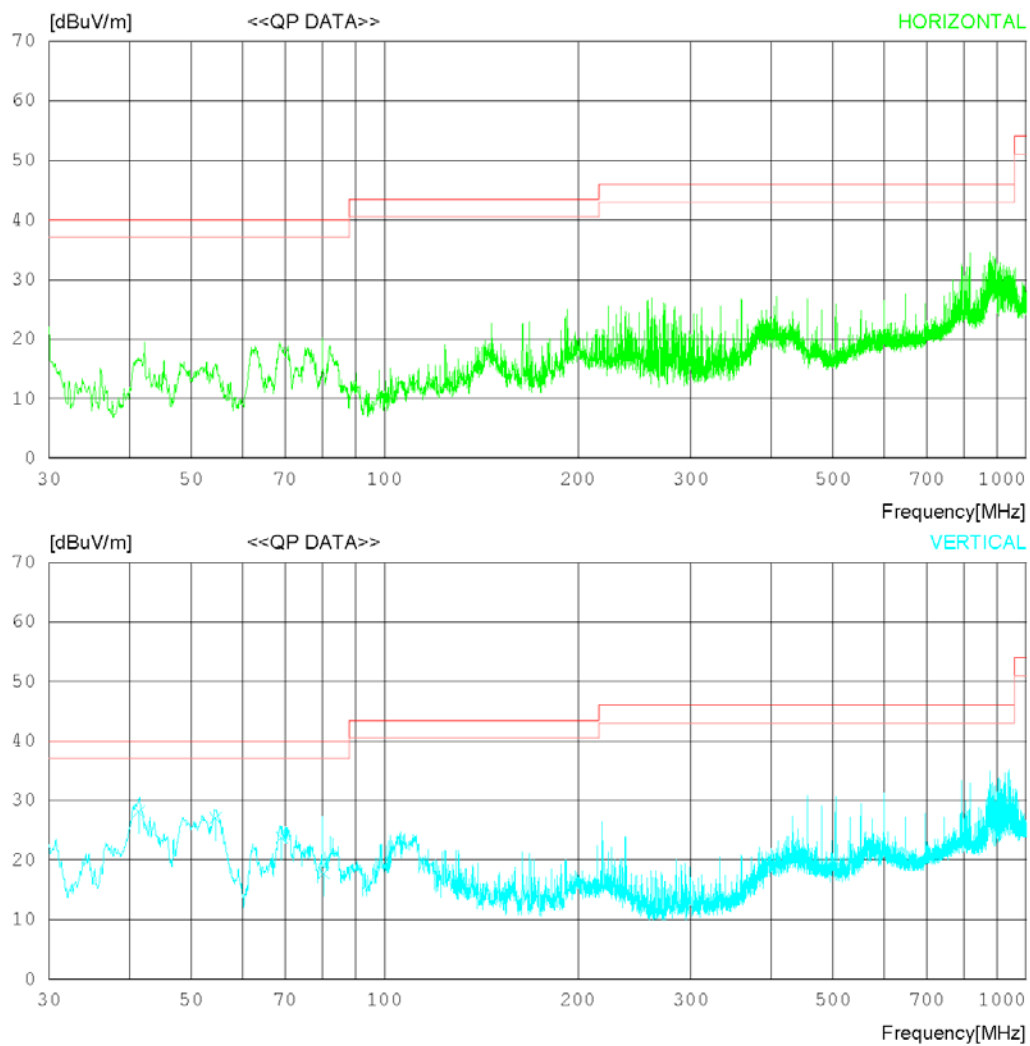
RADIATED EMISSION

Date 2018-07-02

Order No. DTNC1806-04846
Power Supply AC 120 V 60 Hz
Temp/Humi 23 °C_49 % R.H.
Test Condition BT

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



RADIATED EMISSION

Date 2018-07-02

Order No. DTNC1806-04846
Power Supply AC 120 V 60 Hz
Temp/Humi 23 °C_49 % R.H.
Test Condition BT

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB

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]
----- Vertical -----										
1	41.387	42.00	10.68	0.97	25.49	28.16	40.00	11.84	100	112
2	54.552	39.40	11.99	1.15	25.51	27.03	40.00	12.97	100	338
3	69.076	37.60	10.38	1.35	25.53	23.80	40.00	16.20	100	138
4	80.350	34.00	7.76	1.51	25.53	17.74	40.00	22.26	100	340

Radiated disturbance at (1 ~ 6) GHz _Peak measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	120	Test Frequency (Hz)	60

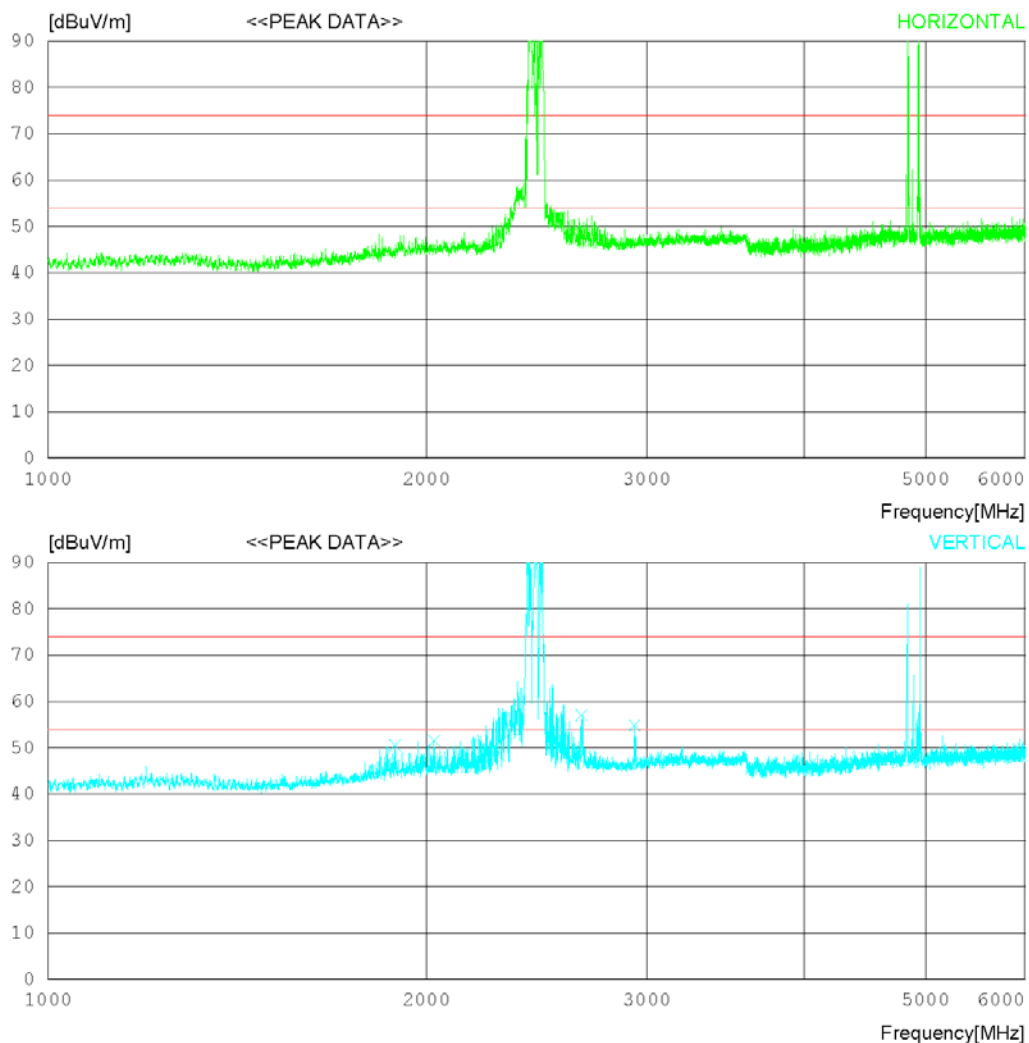
RADIATED EMISSION

Date 2018-07-02

Order No. DTNC1806-04846
Power Supply AC 120 V 60 Hz
Temp/Humi 23 'C_49 % R.H.
Test Condition BT

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Peak)
FCC Part15 Subpart.B Class B (3m) - 18G(Avg)



* Remark : (2,402 ~ 2,480) Mhz are BT frequency.
(4,804 ~ 4,960) Mhz are BT multiplication frequency.

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Power Supply AC 120 V 60 Hz
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Test Condition BT

Memo

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FCC Part15 Subpart.B Class B (3m) - 18G(Avg)

No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	PEAK [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Vertical -----										
1	1888.750	47.50	30.99	4.54	32.47	50.56	74.0	23.44	100	171
2	2028.750	47.60	31.66	4.75	32.52	51.49	74.0	22.51	100	171
3	2659.375	51.70	32.68	5.29	32.56	57.11	74.0	16.89	100	0
4	2930.000	49.40	32.32	5.71	32.58	54.85	74.0	19.15	100	187

Radiated disturbance at (1 ~ 6) GHz _Average measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	120	Test Frequency (Hz)	60

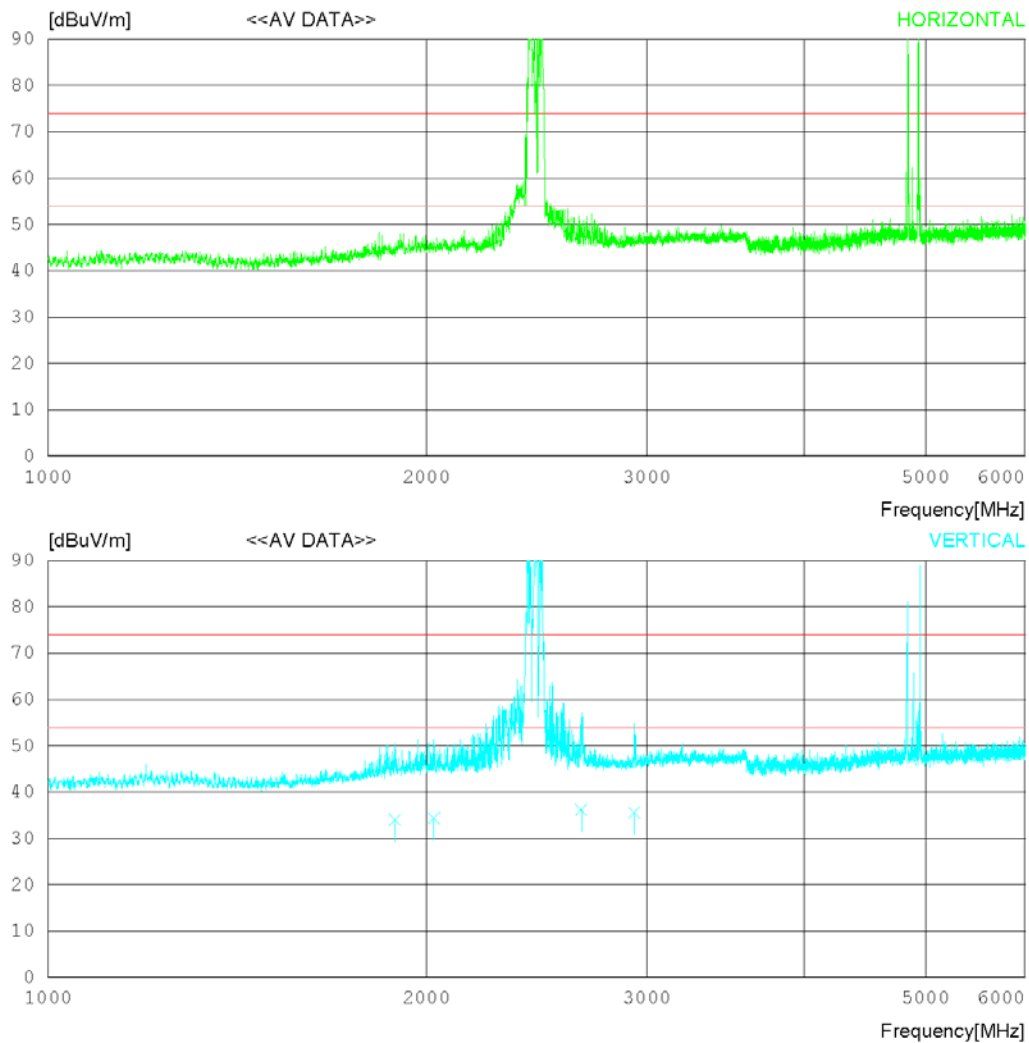
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Test Condition BT

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FCC Part15 Subpart.B Class B (3m) - 18G(Peak)

No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	CAV [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Vertical -----										
1	1888.750	30.90	30.99	4.54	32.47	33.96	54.00	20.04	100	151
2	2028.750	30.40	31.66	4.75	32.52	34.29	54.00	19.71	100	153
3	2659.375	30.70	32.68	5.29	32.56	36.11	54.00	17.89	100	344
4	2930.000	30.10	32.32	5.71	32.58	35.55	54.00	18.45	100	169

Radiated disturbance at (6 ~ 18) GHz _Peak measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	120	Test Frequency (Hz)	60

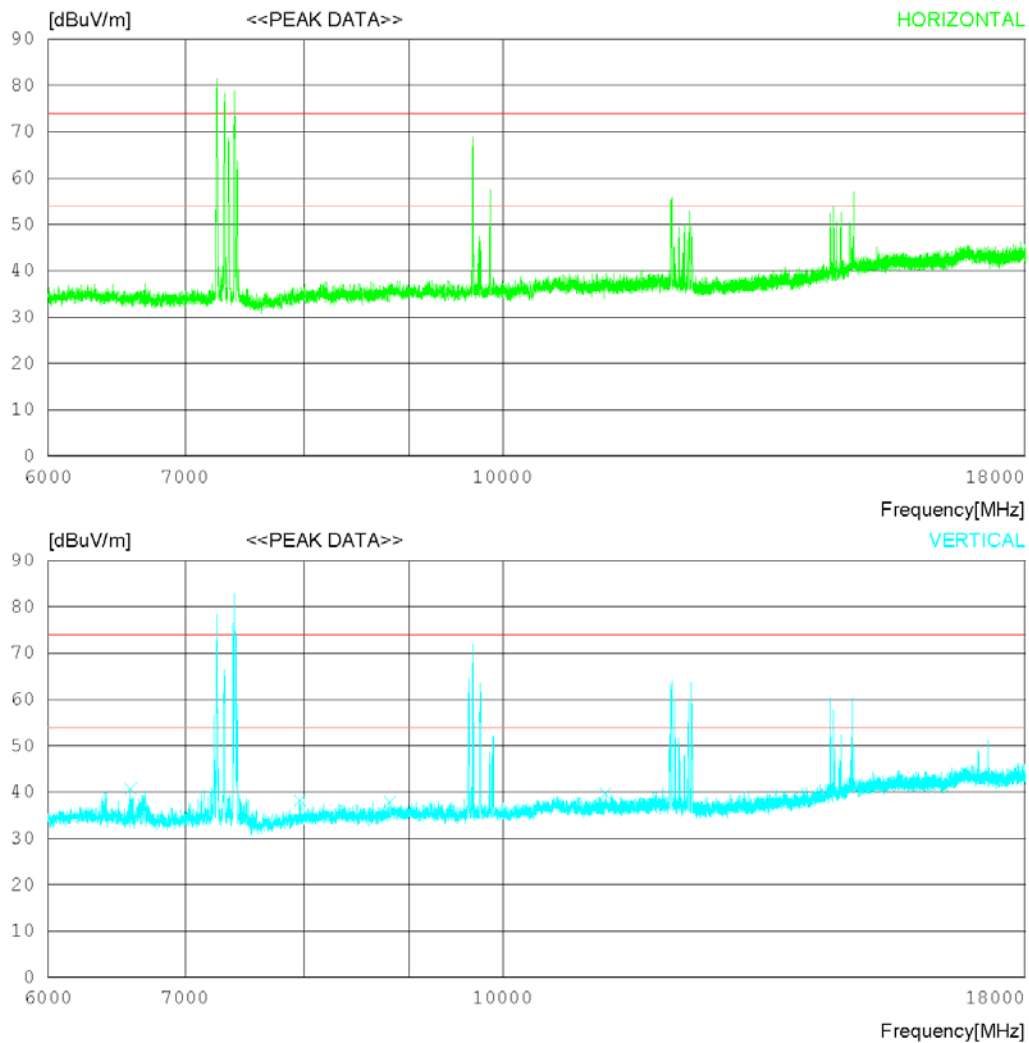
RADIATED EMISSION

Date 2018-07-02

Order No. DTNC1806-04846
Power Supply AC 120 V 60 Hz
Temp/Humi 23 'C_49 % R.H.
Test Condition BT

Model Name

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Peak)
FCC Part15 Subpart.B Class B (3m) - 18G(Avg)



* Remark : (7,206 ~ 7,440) Mhz, (9,608 ~ 9,920) Mhz, (12,010 ~ 12,400) Mhz, (14,412 ~ 14,880) Mhz are BT 3, 4, 5, 6 multiplication frequency.

RADIATED EMISSION

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Power Supply AC 120 V 60 Hz
Temp/Humi 23 °C_49 % R.H.
Test Condition BT

Model Name

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Peak)
FCC Part15 Subpart.B Class B (3m) - 18G(Avg)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Vertical -----										
1	6582.750	40.40	31.41	7.73	38.86	40.68	74.0	33.32	100	1
2	7960.500	36.00	31.35	8.72	37.90	38.17	74.0	35.83	100	347
3	8807.250	34.10	31.73	9.76	37.71	37.88	74.0	36.12	100	175
4	11226.750	33.20	32.77	11.43	37.68	39.72	74.0	34.28	100	1

Radiated disturbance at (6 ~ 18) GHz _Average measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	120	Test Frequency (Hz)	60

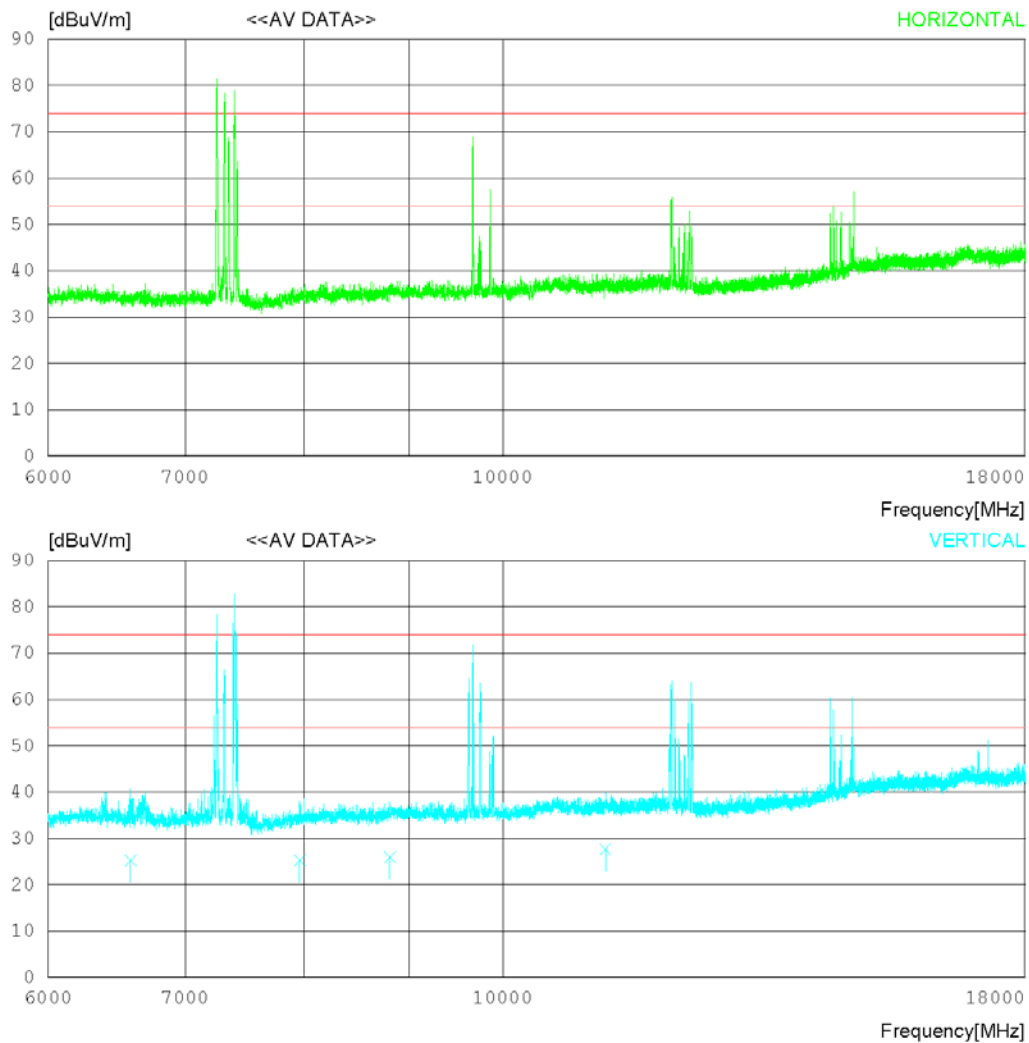
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Power Supply AC 120 V 60 Hz
Temp/Humi 23 'C_49 % R.H.
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LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Avg)
FCC Part15 Subpart.B Class B (3m) - 18G(Peak)



* Remark : (7,206 ~ 7,440) Mhz, (9,608 ~ 9,920) Mhz, (12,010 ~ 12,400) Mhz, (14,412 ~ 14,880) Mhz are BT 3, 4, 5, 6 multiplication frequency.

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FCC Part15 Subpart.B Class B (3m) - 18G(Peak)

No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	CAV [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Vertical -----										
1	6582.750	25.00	31.41	7.73	38.86	25.28	54.00	28.72	100	343
2	7960.500	23.10	31.35	8.72	37.90	25.27	54.00	28.73	100	327
3	8807.250	22.10	31.73	9.76	37.71	25.88	54.00	28.12	100	153
4	11226.750	21.10	32.77	11.43	37.68	27.62	54.00	26.38	100	351

Calculation

Result(dBuV/m) : Reading Value(dBuV) + Cable loss(dB) - Pre amplifier gain(dB) + Ant. Factor(dB)
Margin : Limit(dBuV/m) - Result(dBuV/m)

8. Revision History

Date	Description	Revised By	Reviewed By
Jul. 09. 2018	Initial report	SooHyun Bang	HyungJun Kim

-End of test report-