



# FCC RADIO TEST REPORT

**FCC ID** : 2ADCB-RMODIT  
**Equipment** : N-Light Wireless RF Module  
**Brand Name** : Acuity Brands Lighting Inc.  
**Model Name** : RMODITHP  
**Applicant** : Acuity Brands Lighting Inc.  
One Lithonia Way, Conyers GA 30012  
**Manufacturer** : Acuity Brands Lighting Inc.  
One Lithonia Way, Conyers GA 30012  
**Standard** : FCC Part 15 Subpart C §15.247

The product was received on Jun. 06, 2019 and testing was started from Jun. 12, 2019 and completed on Jun. 14, 2019. We, Sporton International (USA) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of government.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of Sporton International (USA) Inc., the test report shall not be reproduced except in full.

Approved by: Ken Chen

**Sporton International (USA) Inc.**

1175 Montague Expressway, Milpitas, CA 95035



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## History of this test report

Report No.	Version	Description	Issued Date
FR190605001A	01	Initial issue of report	Aug. 02, 2019

## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(b)(3)	Peak Output Power	Pass	-
3.2	15.247(d)	Radiated Band Edges and Spurious Emission	Pass	Under limit 5.93 dB at 4804.000 MHz
3.3	15.203 & 15.247(b)	Antenna Requirement	Pass	-

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Report Producer: Maggie Chiang**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Bluetooth and UHF

Product Specification subjective to this standard	
Antenna Type	Bluetooth: Monopole Antenna UHF: Monopole Antenna

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.3 Testing Location

Test Site	Sporton International (USA) Inc.	
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300	
Test Site No.	Sporton Site No.	
	TH01-CA	03CH02-CA

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

### Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 2 Test Configuration of Equipment Under Test

### 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

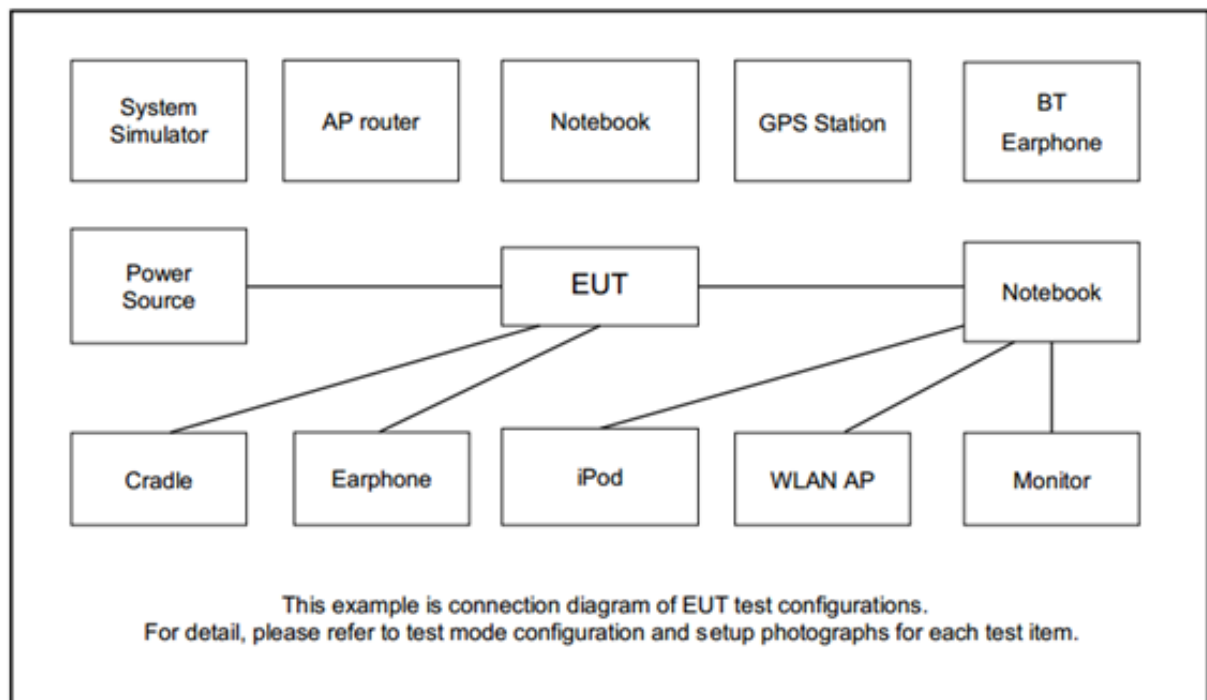
## 2.2 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned antenna in two test angles ( $0^\circ$  and  $90^\circ$ ). The worst cases ( $0^\circ$ ) were recorded in this report.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth – LE / GFSK
Radiated Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps

## 2.3 Connection Diagram of Test System





## 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	DC Power supply	Topward	3303D	NA	N/A	Unshielded, 1.8m

## 2.5 EUT Operation Test Setup

The RF test items, utility “tk” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



### 3 Test Result

#### 3.1 Output Power Measurement

##### 3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

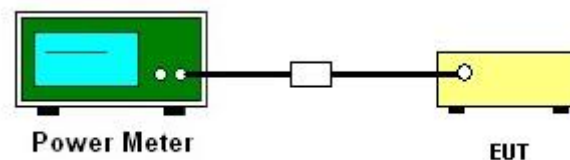
##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator.
3. The path loss was compensated to the results for each measurement.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of Peak Output Power

Please refer to Appendix A.

## 3.2 Radiated Band Edges and Spurious Emission Measurement

### 3.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

### 3.2.2 Measuring Instruments

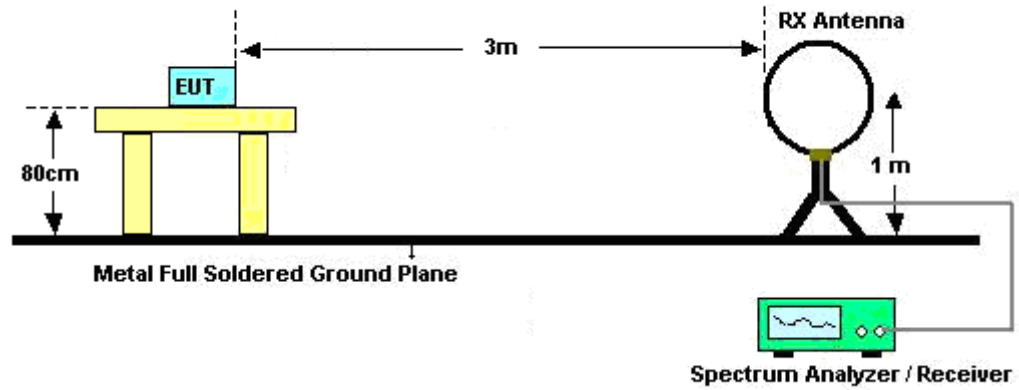
See list of measuring equipment of this test report.

### 3.2.3 Test Procedures

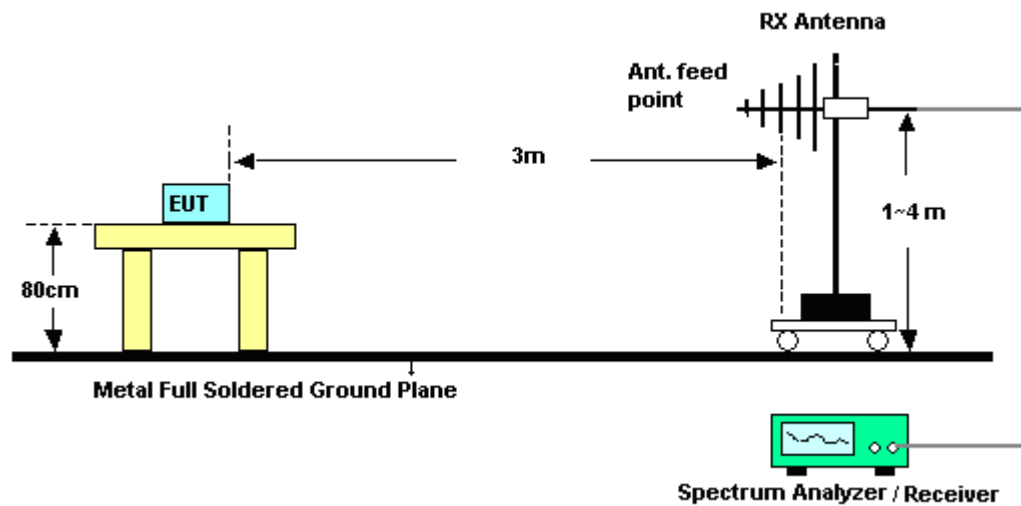
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1 \text{ GHz}$ ;  $\text{VBW} \geq \text{RBW}$ ; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1 \text{ GHz}$  for peak measurement.  
For average measurement:
    - $\text{VBW} = 10 \text{ Hz}$ , when duty cycle is no less than 98 percent.
    - $\text{VBW} \geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.2.4 Test Setup

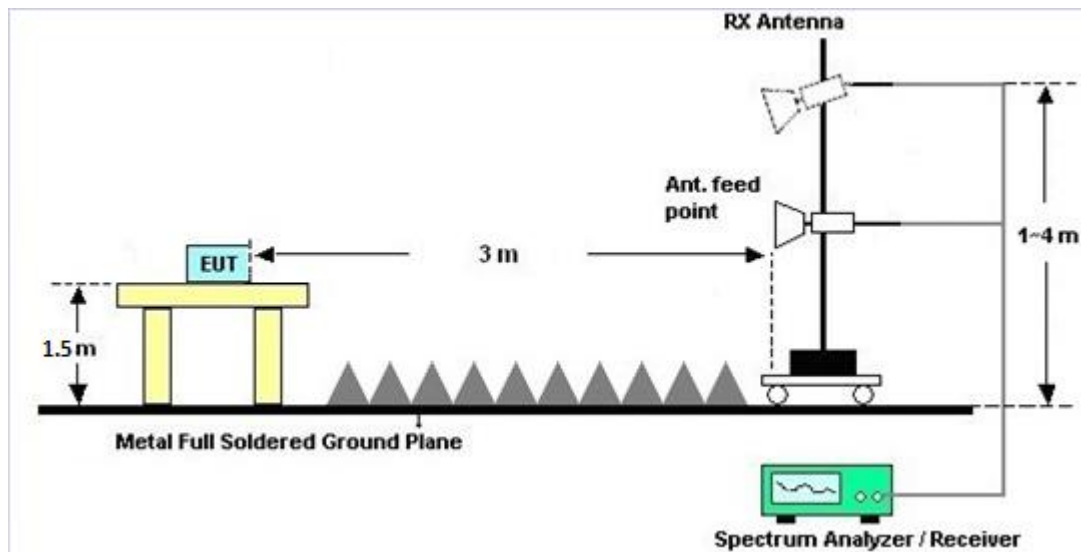
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

### 3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

### 3.2.7 Duty Cycle

Please refer to Appendix D.

### 3.2.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.



### **3.3 Antenna Requirements**

#### **3.3.1 Standard Applicable**

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

#### **3.3.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

#### **3.3.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	45142595	N/A	Aug. 07, 2018	Jun. 12, 2019	Aug. 06, 2019	Conducted (TH01-CA)
Power Meter	Anritsu	ML2495A	1804004	N/A	Aug. 09, 2018	Jun. 12, 2019	Aug. 08, 2019	Conducted (TH01-CA)
Power Sensor	Anritsu	MA2411B	1726149	300MHz~40GHz	Aug. 09, 2018	Jun. 12, 2019	Aug. 08, 2019	Conducted (TH01-CA)
Spectrum Analyzer	Rohde & Schwarz	FSV 40	101089	10Hz~40GHz	Aug. 23, 2018	Jun. 12, 2019	Aug. 22, 2019	Conducted (TH01-CA)
Power Supply	Rohde & Schwarz	SPS-606	GES851982	N/A	Aug. 16, 2018	Jun. 12, 2019	Aug. 15, 2019	Conducted (TH01-CA)
Bilog Antenna	TESEQ	6111D	50392	30MHz~1GHz	May 15, 2019	Jun. 12, 2019~ Jun. 14, 2019	May 14, 2020	Radiation (03CH02-CA)
Horn Antenna	SCHWARZBECK	BBHA 9120D	01895	1GHz~18GHz	Jul. 30, 2018	Jun. 12, 2019~ Jun. 14, 2019	Jul. 29, 2019	Radiation (03CH02-CA)
Amplifier	SONOMA	310N	372240	N/A	Aug. 02, 2018	Jun. 12, 2019~ Jun. 14, 2019	Aug. 01, 2019	Radiation (03CH02-CA)
Preamplifier	Keysight	83017A	MY53270323	1GHz~26.5GHz	Sep. 11, 2018	Jun. 12, 2019~ Jun. 14, 2019	Sep. 10, 2019	Radiation (03CH02-CA)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055000	1GHz~18GHz	Jul. 31, 2018	Jun. 12, 2019~ Jun. 14, 2019	Jul. 30, 2019	Radiation (03CH02-CA)
Spectrum Analyzer	Keysight	N9010A	MY57420221	10Hz~44GHz	Aug. 07, 2018	Jun. 12, 2019~ Jun. 14, 2019	Aug. 06, 2019	Radiation (03CH02-CA)
Filter	Wainwright	WLK12-1200-1272-11000-40SS	SN2	1.2G Low Pass	Aug. 03, 2018	Jun. 12, 2019~ Jun. 14, 2019	Aug. 02, 2019	Radiation (03CH02-CA)
Filter	Wainwright	WHKX12-1080-1200-15000-60ST	SN7	1.2G High Pass	Aug. 03, 2018	Jun. 12, 2019~ Jun. 14, 2019	Aug. 02, 2019	Radiation (03CH02-CA)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN10	3G Highpass	Aug. 03, 2018	Jun. 12, 2019~ Jun. 14, 2019	Aug. 02, 2019	Radiation (03CH02-CA)
Hygrometer	TESEO	608-H1	45142602	N/A	Aug. 07, 2018	Jun. 12, 2019~ Jun. 14, 2019	Aug. 06, 2019	Radiation (03CH02-CA)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Jun. 12, 2019~ Jun. 14, 2019	N/A	Radiation (03CH02-CA)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jun. 12, 2019~ Jun. 14, 2019	N/A	Radiation (03CH02-CA)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jun. 12, 2019~ Jun. 14, 2019	N/A	Radiation (03CH02-CA)

## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.4
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	6.5
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	6.3
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**Appendix A. Test Result of Conducted Test Items**

Test Engineer:	Jordan Huang	Temperature:	21~25	°C
Test Date:	2019/6/12	Relative Humidity:	51~54	%

**TEST RESULTS DATA**  
**Peak Power Table**

Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)
BLE	1Mbps	1	0	2402	9.50	30.00
BLE	1Mbps	1	19	2440	9.48	30.00
BLE	1Mbps	1	39	2480	9.42	30.00



## Appendix B. Radiated Spurious Emission

Test Engineer :	Watt Tseng	Temperature :	23~26°C
		Relative Humidity :	50~57%

### 2.4GHz 2400~2483.5MHz

#### BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
BLE CH 00 2402MHz		2381.19	50.42	-23.58	74	41.2	27.34	13.98	32.1	301	45	P	H
		2381.19	24.19	-29.81	54	-	-	-	-	-	-	A	H
	*	2402	104.3	-	-	95.03	27.38	13.98	32.09	301	45	P	H
	*	2402	78.07	-	-	-	-	-	-	-	-	A	H
													H
													H
		2315.88	50.52	-23.48	74	41.5	27.19	13.97	32.14	400	334	P	V
		2315.88	24.29	-29.71	54	-	-	-	-	-	-	A	V
	*	2402	102.28	-	-	93.01	27.38	13.98	32.09	400	334	P	V
	*	2402	76.05	-	-	-	-	-	-	-	-	A	V
													V
													V
BLE CH 19 2440MHz		2349.2	50.42	-23.58	74	41.29	27.27	13.98	32.12	182	323	P	H
		2349.2	24.19	-29.81	54	-	-	-	-	-	-	A	H
	*	2440	101.19	-	-	91.8	27.47	13.99	32.07	182	323	P	H
	*	2440	74.96	-	-	-	-	-	-	-	-	A	H
		2489.12	50.96	-23.04	74	41.44	27.58	13.99	32.05	182	323	P	H
		2489.12	24.73	-29.27	54	-	-	-	-	-	-	A	H
		2374	50.49	-23.51	74	41.3	27.32	13.98	32.11	400	140	P	V
		2374	24.26	-29.74	54	-	-	-	-	-	-	A	V
	*	2440	98.84	-	-	89.45	27.47	13.99	32.07	400	140	P	V
	*	2440	72.61	-	-	-	-	-	-	-	-	A	V
		2490.24	50.55	-23.45	74	41.03	27.58	13.99	32.05	400	140	P	V
		2490.24	24.32	-29.68	54	-	-	-	-	-	-	A	V



<b>BLE CH 39 2480MHz</b>	*	2480	102.88	-	-	93.38	27.56	13.99	32.05	120	51	P	H
	*	2480	76.65	-	-	-	-	-	-	-	-	A	H
		2483.52	58.01	-15.99	74	48.51	27.56	13.99	32.05	120	51	P	H
		2483.52	31.78	-22.22	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	101.52	-	-	92.02	27.56	13.99	32.05	364	342	P	V
	*	2480	75.29	-	-	-	-	-	-	-	-	A	V
		2483.56	56.59	-17.41	74	47.09	27.56	13.99	32.05	364	342	P	V
		2483.56	30.36	-23.64	54	-	-	-	-	-	-	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



## 2.4GHz 2400~2483.5MHz

## BLE (Harmonic @ 3m)

BLE	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	68.07	-5.93	74	86.4	31.25	6.9	56.48	100	73	P	H
		4804	41.84	-12.16	54	-	-	-	-	-	-	A	H
													H
													H
		4804	64.04	-9.96	74	82.37	31.25	6.9	56.48	295	357	P	V
		4804	37.81	-16.19	54	-	-	-	-	-	-	A	V
													V
													V
BLE CH 19 2440MHz		4880	63.51	-10.49	74	81.59	31.38	6.99	56.45	100	31	P	H
		4880	37.28	-16.72	54	-	-	-	-	-	-	A	H
		7320	43.17	-30.83	74	55.54	36.2	8.05	56.62	100	0	P	H
		7320	16.94	-37.06	54	-	-	-	-	-	-	A	H
		4880	59.03	-14.97	74	77.11	31.38	6.99	56.45	299	194	P	V
		4880	32.8	-21.2	54	-	-	-	-	-	-	A	V
		7320	44.18	-29.82	74	56.55	36.2	8.05	56.62	100	0	P	V
		7320	17.95	-36.05	54	-	-	-	-	-	-	A	V
BLE CH 39 2480MHz		4960	60.16	-13.84	74	77.97	31.53	7.08	56.42	100	30	P	H
		4960	33.93	-20.07	54	-	-	-	-	-	-	A	H
		7440	44.58	-29.42	74	56.38	36.53	8.14	56.47	100	0	P	H
		7440	18.35	-35.65	54	-	-	-	-	-	-	A	H
		4960	55.97	-18.03	74	73.78	31.53	7.08	56.42	283	12	P	V
		4960	29.74	-24.26	54	-	-	-	-	-	-	A	V
		7440	43.74	-30.26	74	55.54	36.53	8.14	56.47	100	0	P	V
		7440	17.51	-36.49	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

## Emission below 1GHz

## 2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	(dBμV)	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)
2.4GHz  BLE  LF		115.36	28.55	-14.95	43.5	42.43	17.4	1.13	32.41	100	0	P	H
		130.88	25.87	-17.63	43.5	39.38	17.7	1.2	32.41	-	-	P	H
		258.92	29.58	-16.42	46	40.41	20.01	1.66	32.5	-	-	P	H
		327.79	29.94	-16.06	46	40.91	19.76	1.85	32.58	-	-	P	H
		407.33	30.71	-15.29	46	39.06	22.14	2.12	32.61	-	-	P	H
		611.03	24.84	-21.16	46	29.4	25.62	2.65	32.83	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
		115.36	22.83	-20.67	43.5	36.71	17.4	1.13	32.41	-	-	P	V
		170.65	20.36	-23.14	43.5	35.68	15.73	1.35	32.4	-	-	P	V
		259.89	30.24	-15.76	46	40.9	20.18	1.66	32.5	-	-	P	V
		327.79	33.48	-12.52	46	44.45	19.76	1.85	32.58	100	0	P	V
		406.36	30.77	-15.23	46	39.18	22.08	2.12	32.61	-	-	P	V
		611.03	24.78	-21.22	46	29.34	25.62	2.65	32.83	-	-	P	V
													V
													V
													V
													V
													V
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>

**A calculation example for radiated spurious emission is shown as below:**

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =  
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)  
= 55.45 (dBμV/m)
2. Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
2. Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

**Both peak and average measured complies with the limit line, so test result is “PASS”.**



## Appendix C. Radiated Spurious Emission Plots

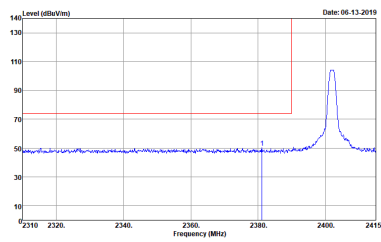
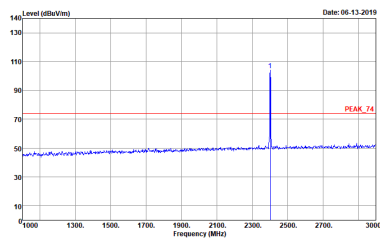
Test Engineer :	Watt Tseng	Temperature :	23~26°C
		Relative Humidity :	50~57%

## Note symbol

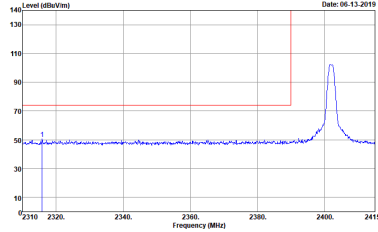
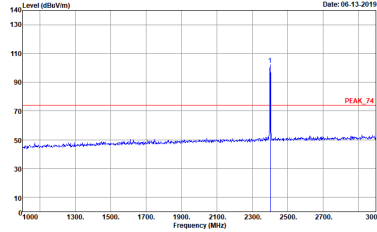
-L	Low channel location
-R	High channel location

## 2.4GHz 2400~2483.5MHz

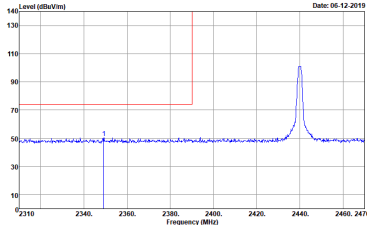
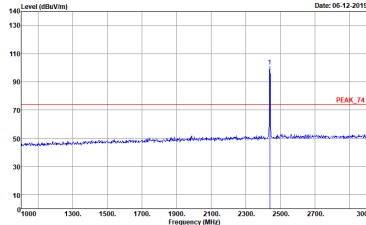
## BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	 <p>Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 91200-HF_01895 HORIZONTAL Detector : Peak Project : 190605001 Mode : 1 Power : DC 7V</p>	 <p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 HORIZONTAL Detector : Peak Project : 190605001 Mode : 1 Power : DC 7V</p>

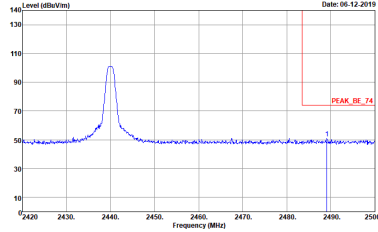


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	 <p>           Site : 03CH02-CA            Condition : PEAK_74 3m HORN 91200-HF_01895 VERTICAL            Detector : Peak            Project : 190605001            Mode : 1            Power : DC 7V         </p>	 <p>           Site : 03CH02-CA            Condition : PEAK_74 3m HORN 91200-HF_01895 VERTICAL            Detector : Peak            Project : 190605001            Mode : 1            Power : DC 7V         </p>

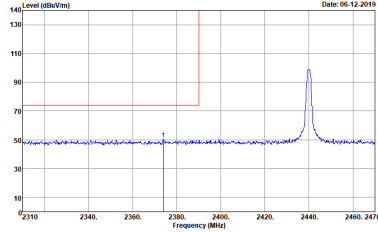
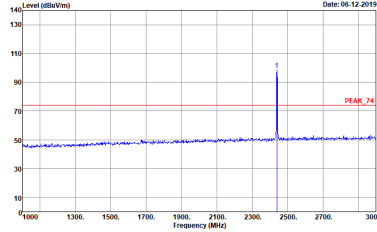


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	<div><p>Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 9120D-HF_01895 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 190605001 Mode : 2 Power : DC 7V</p></div>	<div><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 9120D-HF_01895 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 190605001 Mode : 2 Power : DC 7V</p></div>

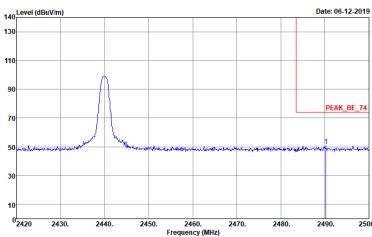


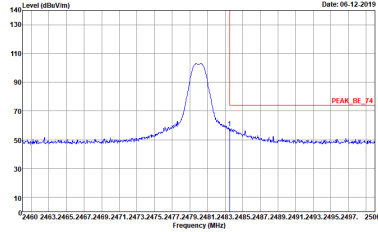
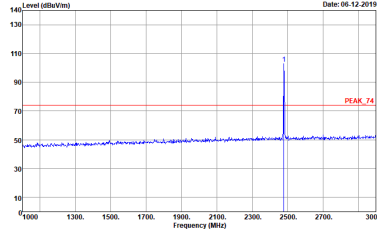
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	<div><p>Site : 08CH02-CA Condition : PEAK_BE_74 3m HORN 91200-HF_01895 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 1900605001 Mode : Z Power : DUT V</p></div>	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	<div><p>Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 91200-HF_01895 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 190605001 Mode : Z Power : DC 7V</p></div>	<div><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 190605001 Mode : Z Power : DC 7V</p></div>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	<div><p>Site : 08CH02-CA Condition : PEAK_BE_74 3m HORN 91200-HF_01895 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 1900605001 Mode : Z Power : D/C 7V</p></div>	Left blank

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	 <p>           Site : 03CH02-CA            Condition : PEAK_BE_74 3m HORN 91200-HF_01895 HORIZONTAL            Detector : Peak            Project : 190605001            Mode : 3            Power : DC 7V         </p>	 <p>           Site : 03CH02-CA            Condition : PEAK_74 3m HORN 91200-HF_01895 HORIZONTAL            Detector : Peak            Project : 190605001            Mode : 3            Power : DC 7V         </p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	<div><p>Level (dBm/Vm) Date: 06-12-2019</p><p>Frequency (MHz)</p><p>Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 91200-HF_01895 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 190605001 Mode : 3 Power : DC 7V</p></div>	<div><p>Level (dBm/Vm) Date: 06-12-2019</p><p>Frequency (MHz)</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 190605001 Mode : 3 Power : DC 7V</p></div>



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak	<div><p>Level (dBuV/m)</p><p>Date: 06-13-2019</p><p>PEAK 74</p><p>AVG 54</p><p>Frequency (MHz)</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-4F_01895 HORIZONTAL Detector : Peak Project : 190605001 Mode : 1 Power : DC 7V</p></div>	<div><p>Level (dBuV/m)</p><p>Date: 06-13-2019</p><p>PEAK 74</p><p>AVG 54</p><p>Frequency (MHz)</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-4F_01895 VERTICAL Detector : Peak Project : 190605001 Mode : 1 Power : DC 7V</p></div>



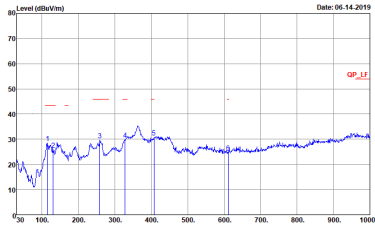
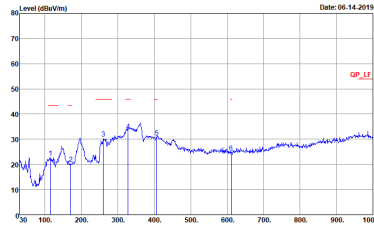


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak	<div><p>Level (dBuV/m)</p><p>Date: 06-13-2019</p><p>Frequency (MHz)</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 HORIZONTAL Detector : Peak Project : 190605001 Mode : 2 Power : DC 7V</p></div>	<div><p>Level (dBuV/m)</p><p>Date: 06-13-2019</p><p>Frequency (MHz)</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 VERTICAL Detector : Peak Project : 190605001 Mode : 2 Power : DC 7V</p></div>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak	<div><p>Level (dBuV/m)</p><p>Date: 06-13-2019</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 HORIZONTAL Detector : Peak Project : 190605001 Mode : 3 Power : DC 7V</p></div>	<div><p>Level (dBuV/m)</p><p>Date: 06-13-2019</p><p>Site : 03CH02-CA Condition : PEAK_74 3m HORN 91200-HF_01895 VERTICAL Detector : Peak Project : 190605001 Mode : 3 Power : DC 7V</p></div>

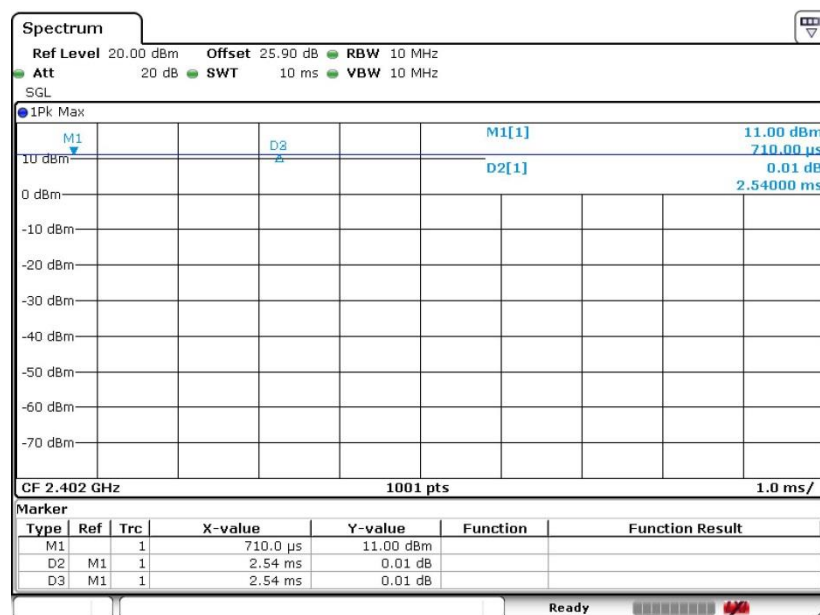
**Emission below 1GHz**
**2.4GHz BLE (LF)**

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	 <p>           Site : 03CH02-CA            Condition : QP_LF 3m B1LOG 6111D-LF_50392 HORIZONTAL            Detector : Peak            Project : 190605001            Mode : 7            Power : DC 7V         </p>	 <p>           Site : 03CH02-CA            Condition : QP_LF 3m B1LOG 6111D-LF_50392 VERTICAL            Detector : Peak            Project : 190605001            Mode : 7            Power : DC 7V         </p>

## Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
Bluetooth -LE	100	-	-	10Hz	0

### Bluetooth - LE



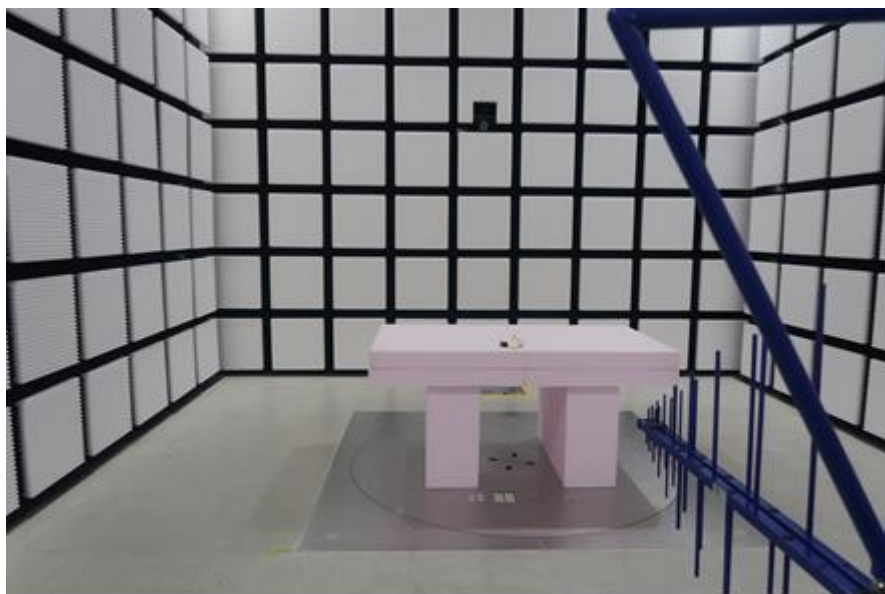
Date: 12 JUN 2019 10:00:03

## Appendix E. Setup Photographs

### <Radiated Emission>

Ant. 0°

LF



HF



————THE END————