



Product Name: Remote Control Bulb	Report No: FCC022022-1002RF5
Product Model: YL-QP-APP-01	Security Classification: Open
Version: V1.0	Total Page: 46

TIRT Testing Report

Prepared By:	Checked By:	Approved By:	
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Stone Tang	Randy Lv	Daniel Chen	

RF TEST REPORT

FCC ID: 2AZRW-YLLEDQAP

According to

47 CFR FCC Part 15, Subpart C(Section 15.247)

ANSI C63.10:2013

Equipment : Remote Control Bulb
Model No. : YL-QP-APP-01
Trademark : /
Product No. : 20220310003198
Applicant : Dong Guan Ya Li Electric Appliance Co., Ltd.
THE FIVE STREET JINQIANLING JITIGANG HUANGJIANG
TOWN,DONGGUAN CITY, GUANGDONG 523000 CHINA

- The test result referred exclusively to the presented test model /sample.
- Without written approval of TIRT Inc. the test report shall not reproduced except in full.
- Test Date: 2022.03.09-2022.04.29
- Receipt date: 2022.03.09

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen
Add: 101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street,
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History of this test report

Original Report Issue Date: 2022.05.25

- ☒ No additional attachment
- ☐ Additional attachments were issued following record

Attachment No.	Issue Date	Description

1. General Information

1.1 Applicant

Dong Guan Ya Li Electric Appliance Co., Ltd.

THE FIVE STREET JINQIANLING JITIGANG HUANGJIANG TOWN,DONGGUAN CITY,
GUANGDONG 523000 CHINA

1.2 Manufacturer

Dong Guan Ya Li Electric Appliance Co., Ltd.

THE FIVE STREET JINQIANLING JITIGANG HUANGJIANG TOWN,DONGGUAN CITY,
GUANGDONG 523000 CHINA

1.3 Factory

Dong Guan Ya Li Electric Appliance Co., Ltd.

THE FIVE STREET JINQIANLING JITIGANG HUANGJIANG TOWN,DONGGUAN CITY,
GUANGDONG 523000 CHINA

1.4 Basic Description of Equipment Under Test

Items	Description	
Equipment Name	Remote Control Bulb	
Model Number	YL-QP-APP-01	
Trademark	/	
Power Supply	Input:120Vac,60Hz	
Operating Temperature	-40~105℃	
EUT Stage	☐ Product Unit	☒ Final-Sample
Radio Type	BLE	
Modulation Type	GFSK	
Frequency Range	2402-2480 MHz	
Data Rate	1 Mbps	
Number of Operated Channel	40	

40 channels are provided for BLE(1M)

Channel No.	Frequency (MHz)	Channel No.	Frequency
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

1.5 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	1.9

2. Summary of Test Results

2.1 Summary of Test Items

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Test item	FCC Clause	Results	Remarks
AC Power Conducted Emission	15.207	Pass	Meet the requirement of the limit
Radiated Emission and Band Edge Measurement	15.205/15.209 /15.247(d)	Pass	Meet the requirement of the limit
Conducted Band Edge	15.247(d)	Pass	Meet the requirement of the limit
6dB Bandwidth	15.247(a)(2)	Pass	Meet the requirement of the limit
Conducted Power	15.247(b)	Pass	Meet the requirement of the limit
Power Spectral Density	15.247(e)	Pass	Meet the requirement of the limit
Antenna Requirements	15.203	Compliance	The EUT has one internal antenna arrangement for BLE which was permanently attached and the antenna gain is 1.9 dBi, Impedance is 50Ω fulfill the requirement of this section. Please refer to the product photos.
Note: NA denotes Not Applicable in this part			

2.2 Application of Standard

47 CFR FCC Part 15, Subpart C (Section 15.247)

KDB 558074 D01 DTS Meas Guidance v04

ANSI C63.10:2013

2.3 Test Instruments

No.	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Receiver	Rohde&Schwarz	ESCI	1166.5950.03	2022/11/16
2	AMN	Rohde&Schwarz	ENV216	3560.6550.05	2022/11/09
3	AMN	Schwarzbeck	NSLK8127	#829	2022/11/09
4	ECSI RF IN RF Cable	Rohde&Schwarz	RP-X1	\	2022/11/18
5	ECSI RF IN RF Cable	Rohde&Schwarz	Sapre sm	\	2022/11/09
6	EMI Receiver	Rohde&Schwarz	ESR7	102013	2022/11/09
7	Spectrum analyzer	Rohde&Schwarz	FSV30	103741	2022/11/09
8	Spectrum analyzer	KEYSIGHT	N9010A-44	MY51440158	2022/11/09
9	Integral Antenna	Schwarzbeck	VULB 9163	VULB 9163-361	2022/11/09
10	Integral Antenna	Schwarzbeck	BBHA 9120D	BBHA 9120D 1201	2022/11/09
11	Integral Antenna	Schwarzbeck	BBHA 9170	9170#685	2022/11/09
12	Preamplifier	CD Systems Inc	PAP-03036-30	85060000	2022/11/09
13	Preamplifier	Schwarzbeck	BBV9721	9721-019	2022/11/09
14	Preamplifier	emci	EMC01264 5SE	980417	2022/11/09
15	ECSI RF IN RF Cable	Rohde&Schwarz	AP-X1	\	2022/11/09
16	Spectrum Analyzer	Agilent	N9010A	MY52221119	2022/11/09
17	Power Collection Unit	Tonscend	JS0806-2	188060134	2022/09/12
18	Tonscend Test System	Tonscend	2.6.77.0518	NA	NA
19	Temp&Humidity Recorder	Anymetre	JR900	NA	2022/11/03

2.4 Test Mode and Channel

Frequency Range : 2402-2480 MHz				
Test Items	Mode	Data Rate	Channel	Antenna
AC Power Conducted Emission	BLE(1M)	1Mbps	19	1
Radiated Emission and Band Edge Measurement	BLE(1M)	1 Mbps	01/19/39	1
Conducted Band Edge	BLE(1M)	1 Mbps	01/19/39	1
6dB Bandwidth	BLE(1M)	1 Mbps	01/19/39	1
Conducted Power	BLE(1M)	1 Mbps	01/19/39	1
Power Spectral Density	BLE(1M)	1 Mbps	01/19/39	1

2.5 Test Condition

Applicable to	Environmental conditions	Input Power	Tested by
AC Power Conducted Emission	24.6°C, 56 % RH	120Vac, 60Hz	Stone Tang
Radiated Emission and Band Edge Measurement	24.2°C, 55 % RH	120Vac, 60Hz	Stone Tang
Conducted Band Edge	24.6°C, 56 % RH	120Vac, 60Hz	Stone Tang
6dB Bandwidth	24.6°C, 56 % RH	120Vac, 60Hz	Stone Tang
Conducted Power	24.6°C, 56 % RH	120Vac, 60Hz	Stone Tang
Power Spectral Density	24.6°C, 56 % RH	120Vac, 60Hz	Stone Tang

2.6 Duty Cycle of Test Signal

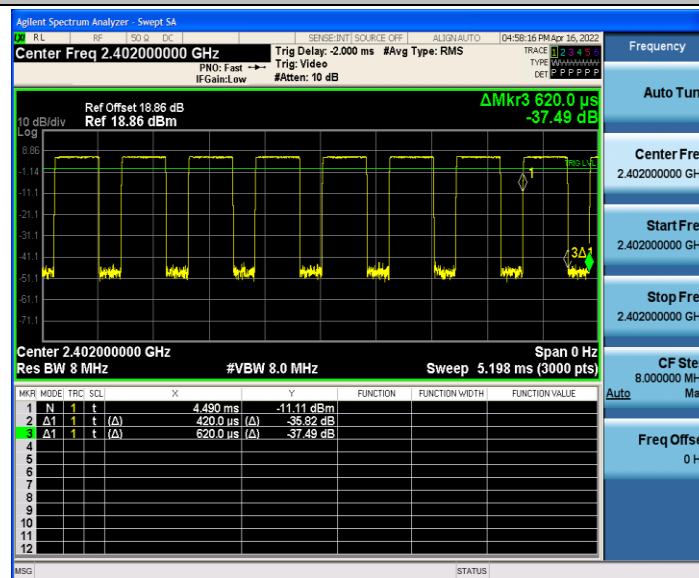
If duty cycle is $\geq 98\%$, duty factor is not required.

If duty cycle is $< 98\%$, duty factor shall be considered.

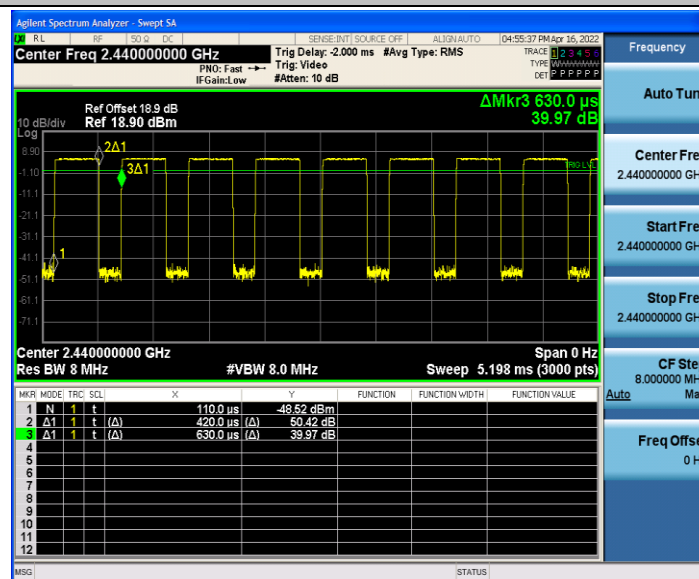
So all the duty factor of other test mode shall be considered.

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Duty Factor
BLE_1M	Ant1	2402	0.42	0.62	67.74	1.69
		2440	0.42	0.63	66.67	1.76
		2480	0.42	0.62	67.74	1.69

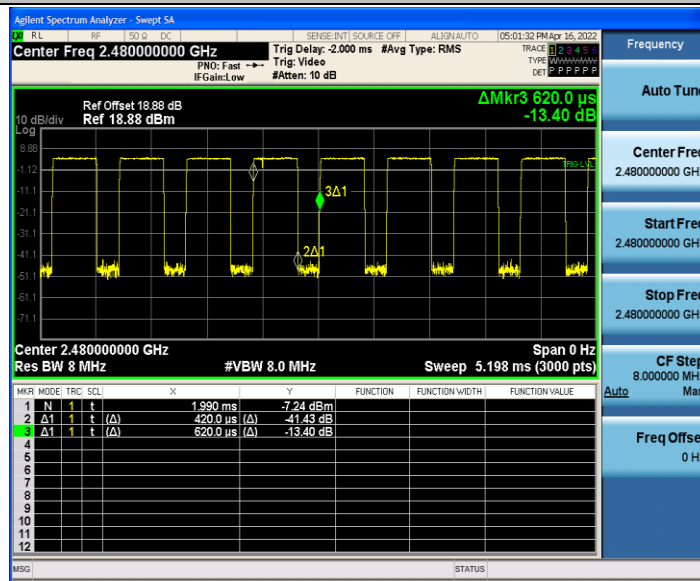
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



2.7 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	± 142.12 KHz
RF power conducted	± 0.74 dB
RF power radiated	± 3.25 dB
Conduction Emissions(150kHz~30MHz)	± 3.1 dB
Spurious emissions, radiated (9KHz~30MHz)	± 4.2 dB
Spurious emissions, radiated (30MHz~1GHz)	± 4.6 dB
Spurious emissions, radiated (1GHz ~ 18GHz)	± 4.9 dB
Humidity	$\pm 4.6\%$
Temperature	$\pm 0.7^{\circ}\text{C}$
Time	$\pm 1.25\%$

2.8 Test Location

Company:	Beijing TIRT Technology Service Co.,Ltd Shenzhen
Address:	101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China
CNAS Registration Number:	CNAS L14158
A2LA Registration Number	6049.01
Telephone:	+86-0755-27087573

2.9 Deviation from Standards

None

2.10 Abnormalities from Standard Conditions

None

3. Test Procedure And Results

3.1 AC Power Line Conducted Emission

3.1.1 Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3.1.2 Test Peripherals

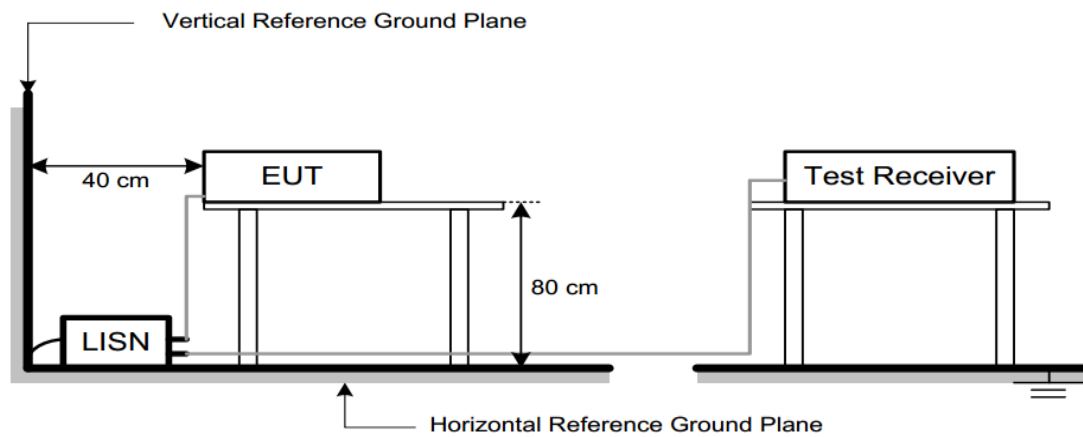
Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Record PC	Lenovo	M4500T	NA
2	Control PC	Lenovo	M4500T	NA

3.1.3 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☐ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ● : Test ○ : No Test	

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

3.1.4 Test Setup



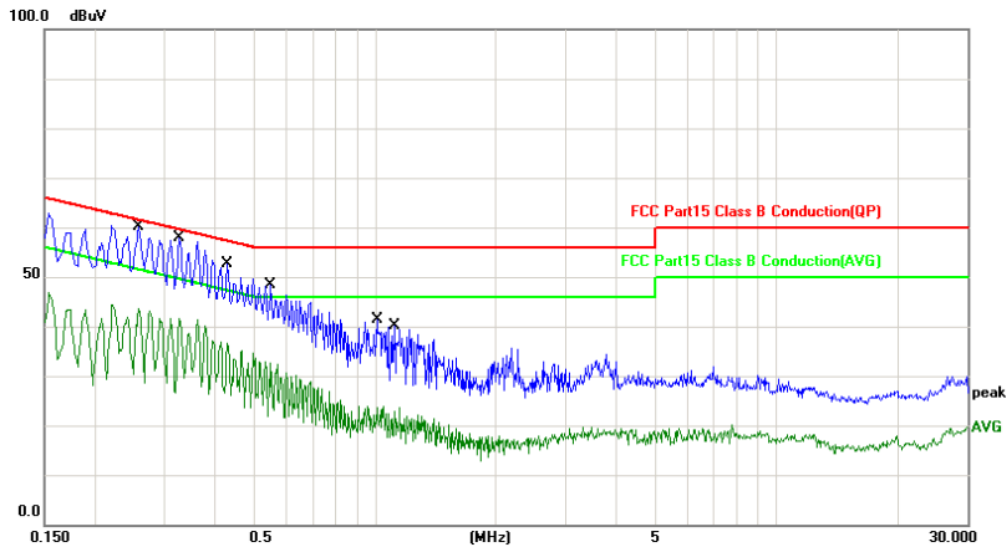
3.1.5 Test Result

Note:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Measurement = Reading + Correct Factor.
3. Over = Measurement - Limit

150kHz~30MHz	Test mode: BLE(1M)	Test Channel:19
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Line



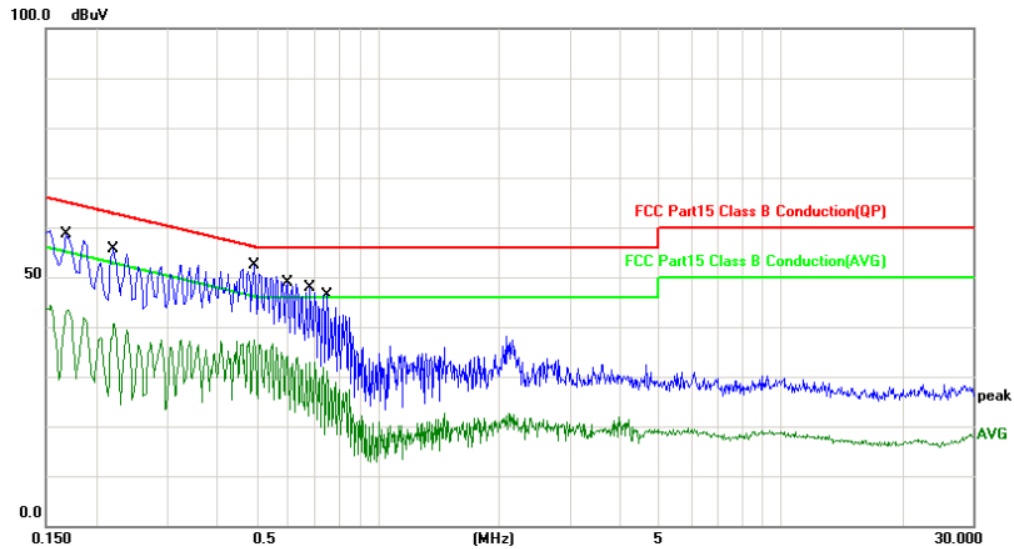
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1	*	0.2580	40.68	19.53	60.21	61.50	-1.29	QP	
2		0.2580	24.32	19.53	43.85	51.50	-7.65	AVG	
3		0.3260	38.39	19.52	57.91	59.55	-1.64	QP	
4		0.3260	23.98	19.52	43.50	49.55	-6.05	AVG	
5		0.4300	33.13	19.53	52.66	57.25	-4.59	QP	
6		0.4300	21.09	19.53	40.62	47.25	-6.63	AVG	
7		0.5500	28.74	19.53	48.27	56.00	-7.73	QP	
8		0.5500	12.35	19.53	31.88	46.00	-14.12	AVG	
9		1.0140	21.66	19.66	41.32	56.00	-14.68	QP	
10		1.0140	11.65	19.66	31.31	46.00	-14.69	AVG	
11		1.1180	20.39	19.69	40.08	56.00	-15.92	QP	
12		1.1180	12.97	19.69	32.66	46.00	-13.34	AVG	

150kHz~30MHz

Test mode: BLE(1M)

Test Channel:19

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1685	36.65	19.70	56.35	65.03	-8.68	QP	
2		0.1685	25.35	19.70	45.05	55.03	-9.98	AVG	
3		0.2220	34.65	19.70	54.35	62.74	-8.39	QP	
4		0.2220	24.15	19.70	43.85	52.74	-8.89	AVG	
5 *		0.4940	30.13	19.74	49.87	56.10	-6.23	QP	
6		0.4940	18.36	19.74	38.10	46.10	-8.00	AVG	
7		0.5980	26.65	19.76	46.41	56.00	-9.59	QP	
8		0.5980	16.65	19.76	36.41	46.00	-9.59	AVG	
9		0.6820	25.35	19.79	45.14	56.00	-10.86	QP	
10		0.6820	15.31	19.79	35.10	46.00	-10.90	AVG	
11		0.7500	24.16	19.80	43.96	56.00	-12.04	QP	
12		0.7500	12.68	19.80	32.48	46.00	-13.52	AVG	

3.2 Radiated Emission and Band Edge

3.2.1 Limit

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency (MHz)	Distance Meters(m)	Field Strength Limit	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 – 0.49	300	2400/F(kHz)	-
0.490 – 1.705	30	24000/F(kHz)	-
1.705 – 30	30	30	-
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Note: (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

3.2.2 Test Peripherals

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Record PC	Lenovo	M4500T	NA
2	Control PC	Lenovo	M4500T	NA

3.2.3 Test Procedure

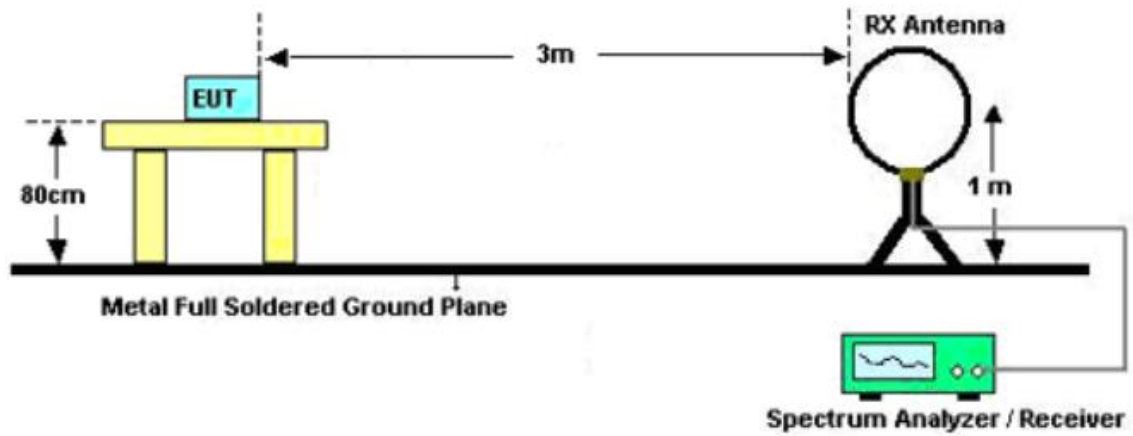
Test Method	
☐ Conducted Measurement	☒ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

a) The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)

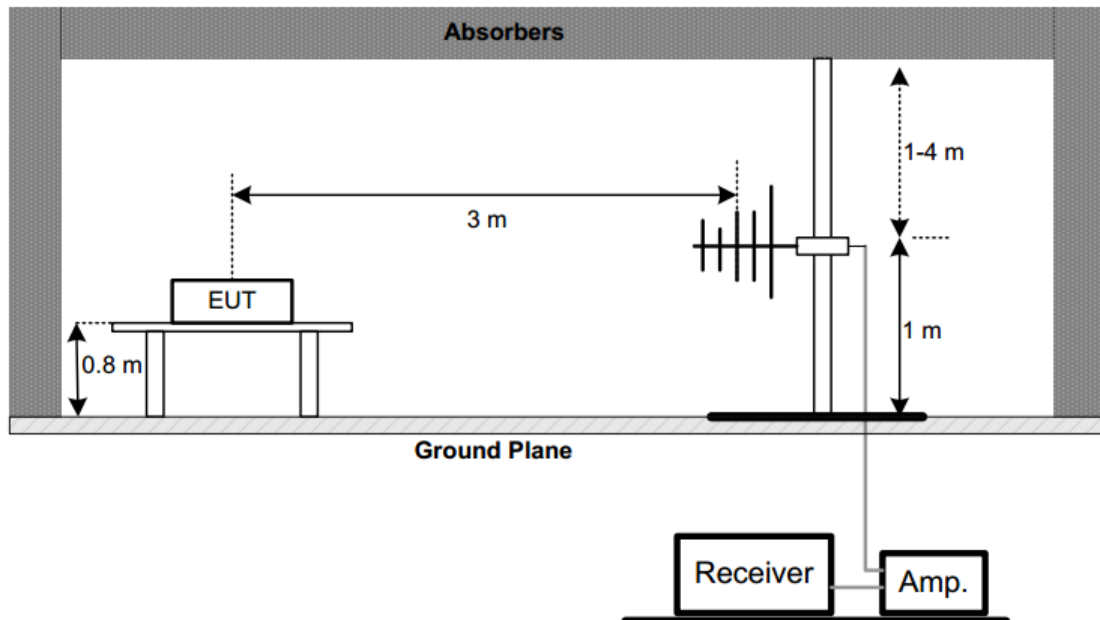
- b) The measuring distance of 3 m or 1.5m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c) The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e) The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f) The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g) All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- h) All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i) For the actual test configuration, please refer to the related Item -EUT Test Photos.

3.2.4 Test Setup

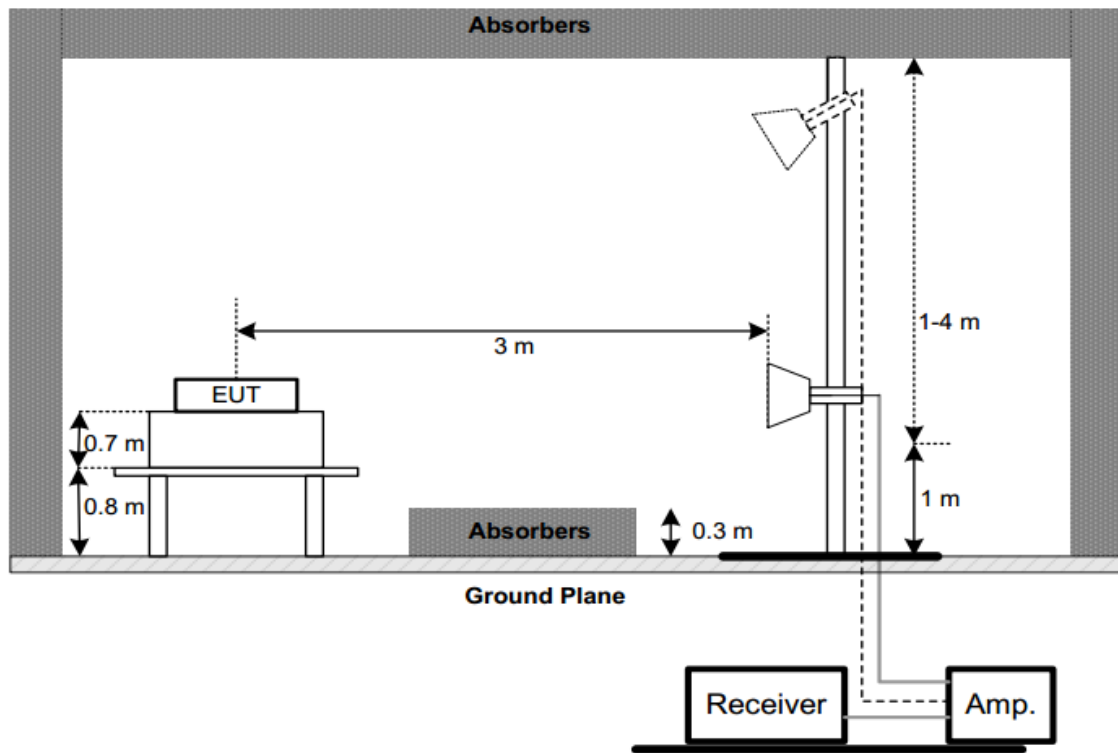
(A) Radiated Emission Test Set-Up Frequency Below 30 MHz



(B) Radiated Emission Test Set-Up Frequency 30 MHz-1000 MHz



(C) Radiated Emission Test Set-Up Frequency Above 1 GHz



3.2.5 Test Result

1) Radiated emission: 9KHz-30MHz

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 semi-Anechoic chamber, and the result came out very similar.

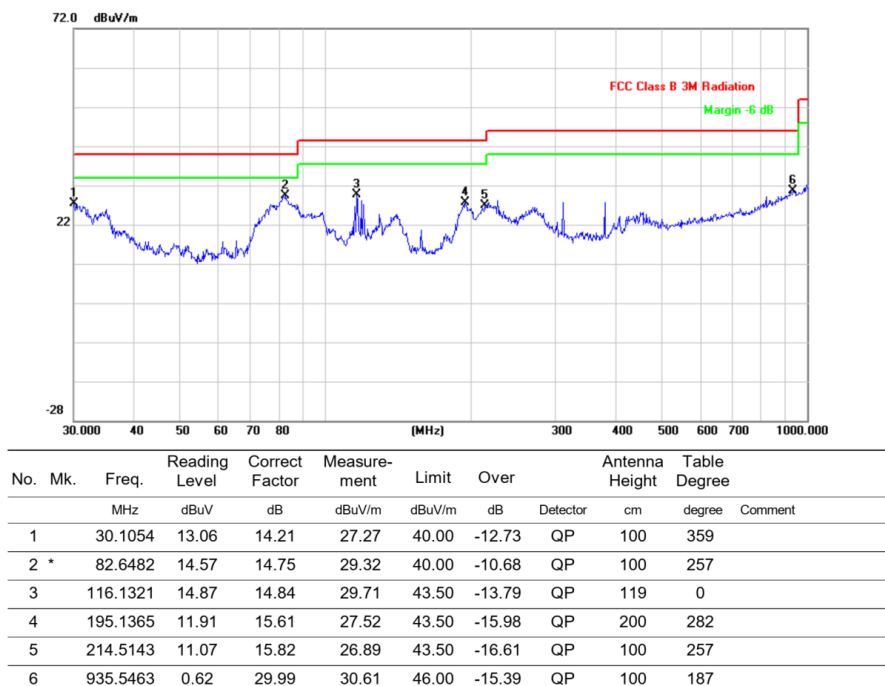
2) Radiated emission: 30MHz-1G

Note:

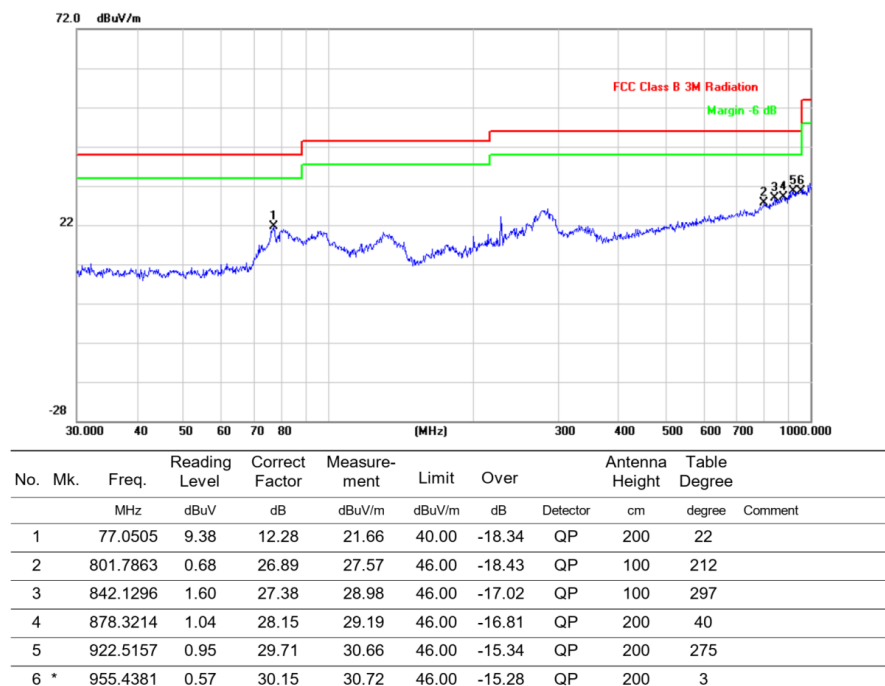
1. Measurement = Reading + Correct Factor.
2. Over = Measurement - Limit

Below 1G (30MHz~1GHz)	Test mode: BLE_1M	Test Channel:19
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VERTICAL



HORIZONTAL



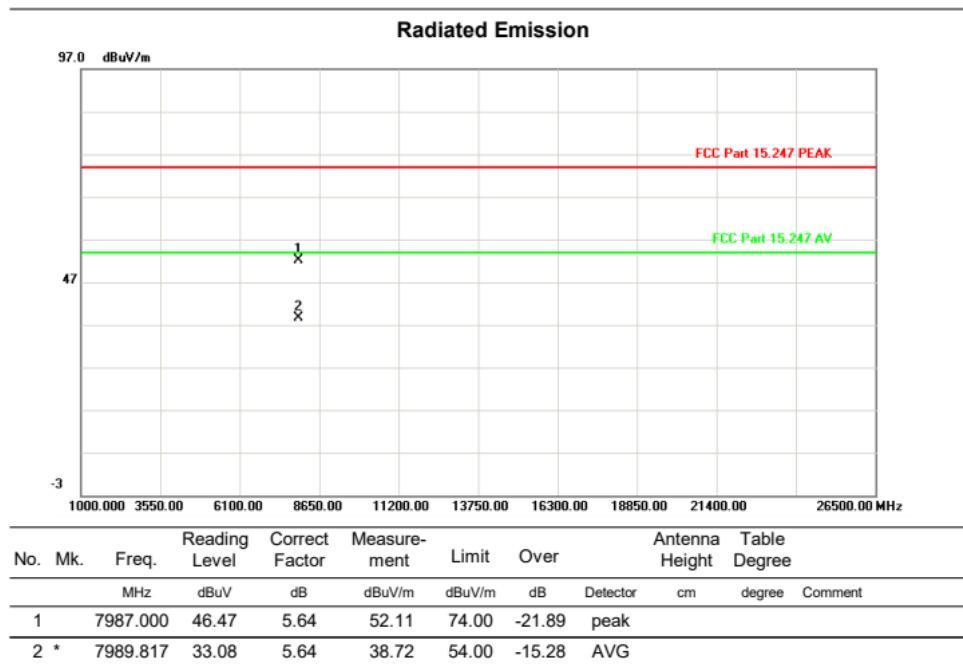
3) Radiated emission: Above 1G

Note:

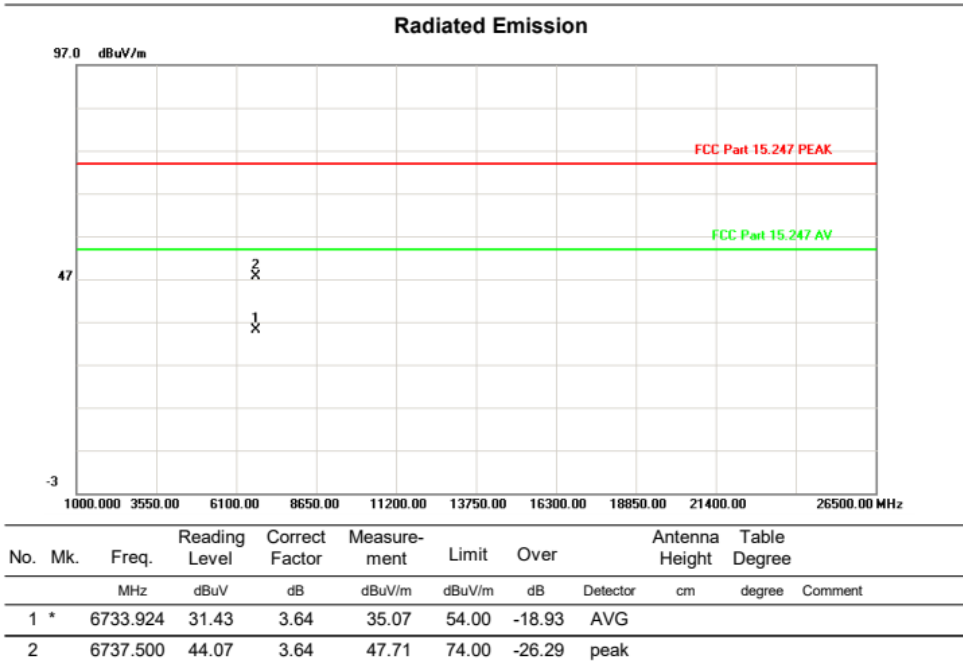
1. Measurement = Reading + Correct Factor.
2. Over = Measurement - Limit

Above 1G (1GHz~26.5GHz)	Test mode: BLE_1M	Test Channel:0
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VERTICAL



HORIZONTAL



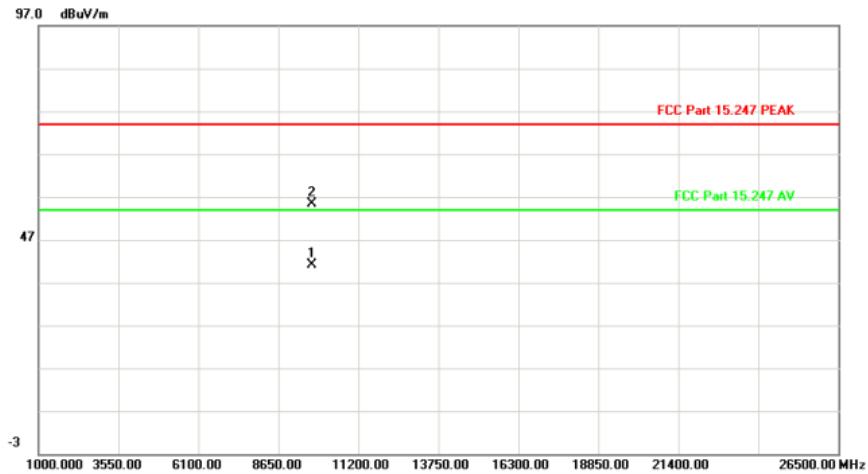
Above 1G (1GHz~26.5GHz)

Test mode: BLE_1M

Test Channel:19

VERTICAL

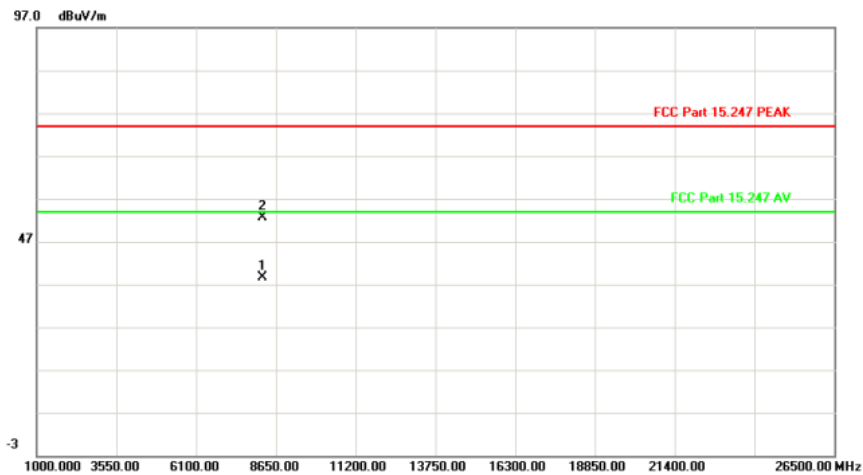
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	9717.743	32.65	8.43	41.08	54.00	-12.92	AVG		
2		9721.000	47.07	8.43	55.50	74.00	-18.50	peak		

HORIZONTAL

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	8214.462	32.58	5.97	38.55	54.00	-15.45	AVG		
2		8216.500	46.64	5.97	52.61	74.00	-21.39	peak		

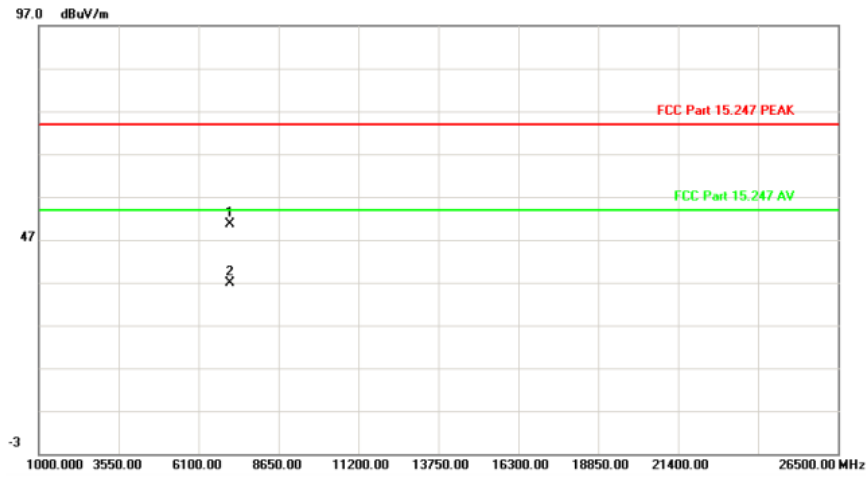
Above 1G (1GHz~26.5GHz)

Test mode: BLE_1M

Test Channel:39

VERTICAL

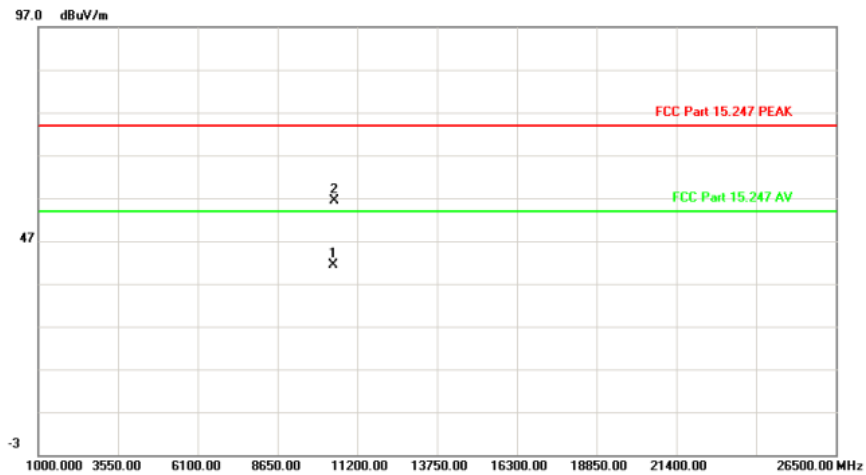
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		7094.500	46.42	4.19	50.61	74.00	-23.39	peak		
2	*	7094.640	32.59	4.19	36.78	54.00	-17.22	AVG		

HORIZONTAL

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	10450.850	32.55	8.92	41.47	54.00	-12.53	AVG		
2		10460.500	47.55	8.92	56.47	74.00	-17.53	peak		

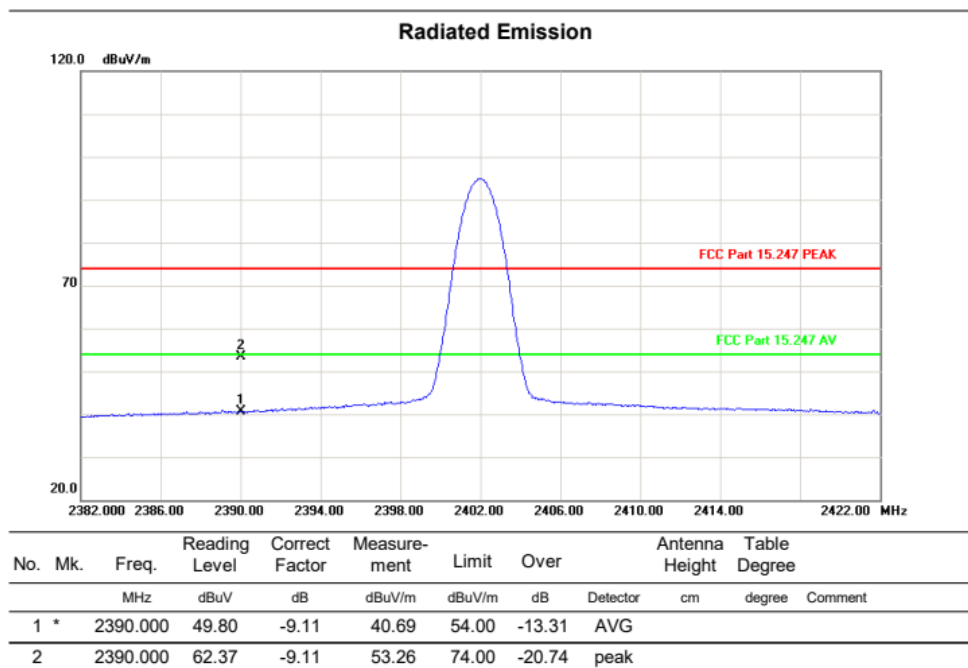
4) Radiated Band Edge

Note:

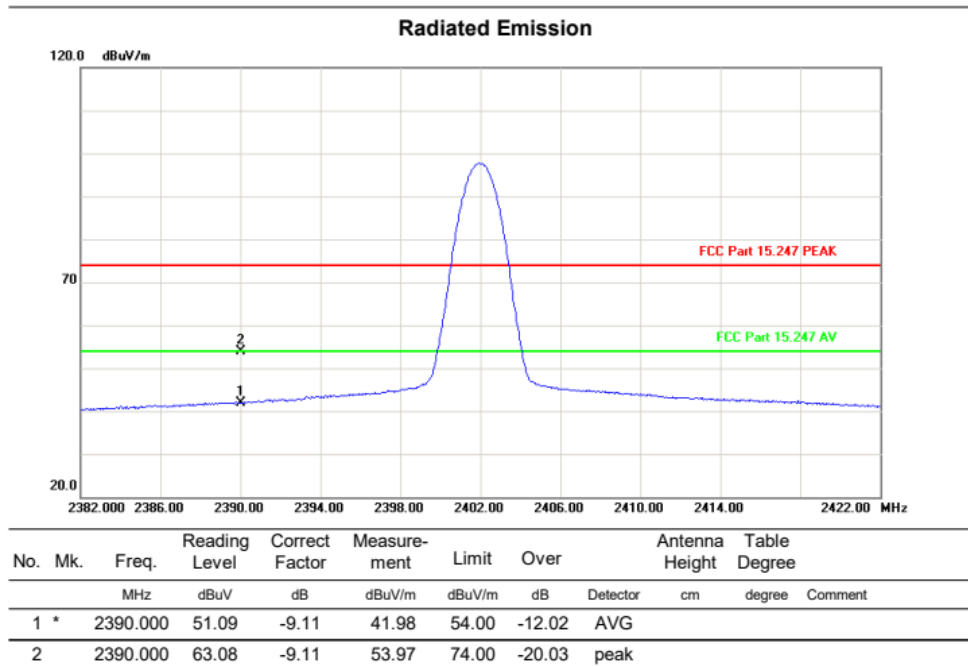
1. Measurement = Reading + Correct Factor.
2. Over = Measurement - Limit

Above 1G (1GHz~26.5GHz)	Test mode: BLE_1M	Test Channel:0
-------------------------	-------------------	----------------

VERTICAL



HORIZONTAL



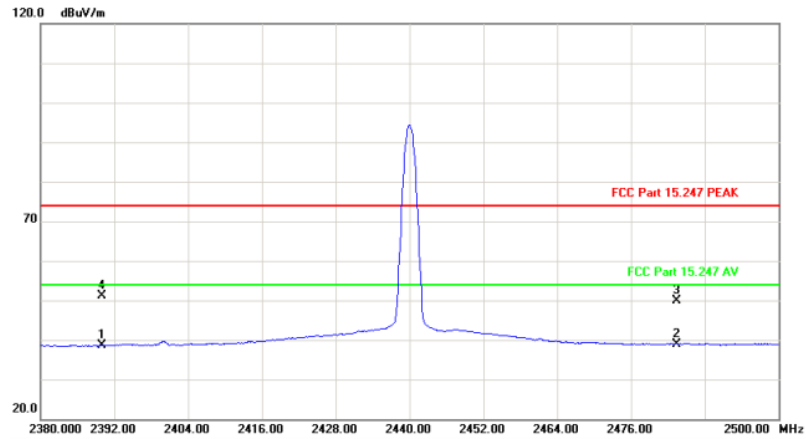
Above 1G (1GHz~26.5GHz)

Test mode: BLE_1M

Test Channel:19

VERTICAL

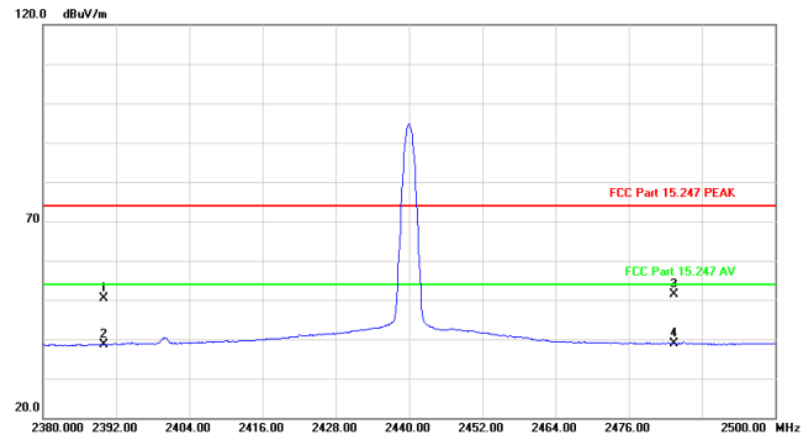
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2390.000	47.71	-9.11	38.60	54.00	-15.40	AVG		
2 *		2483.500	48.01	-9.08	38.93	54.00	-15.07	AVG		
3		2483.500	59.07	-9.08	49.99	74.00	-24.01	peak		
4		2390.000	60.25	-9.11	51.14	74.00	-22.86	peak		

HORIZONTAL

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2390.000	59.51	-9.11	50.40	74.00	-23.60	peak		
2		2390.000	47.72	-9.11	38.61	54.00	-15.39	AVG		
3		2483.500	60.46	-9.08	51.38	74.00	-22.62	peak		
4 *		2483.500	48.02	-9.08	38.94	54.00	-15.06	AVG		

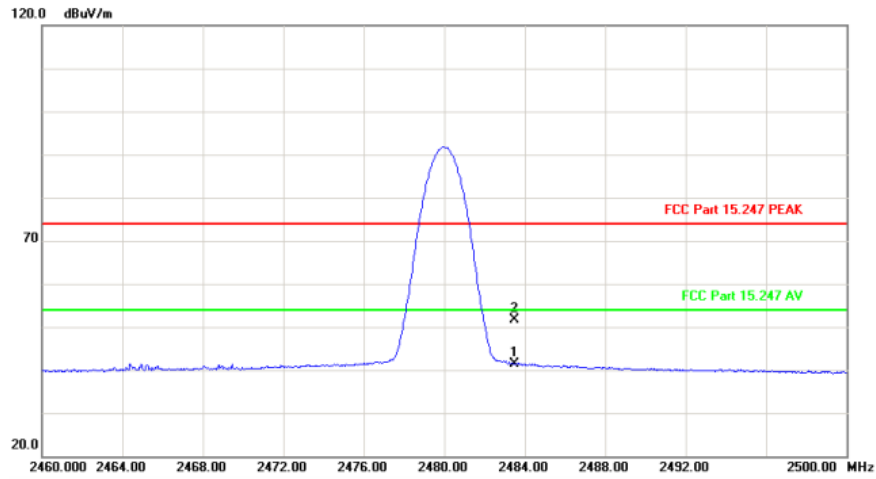
Above 1G (1GHz~26.5GHz)

Test mode: BLE_1M

Test Channel:39

VERTICAL

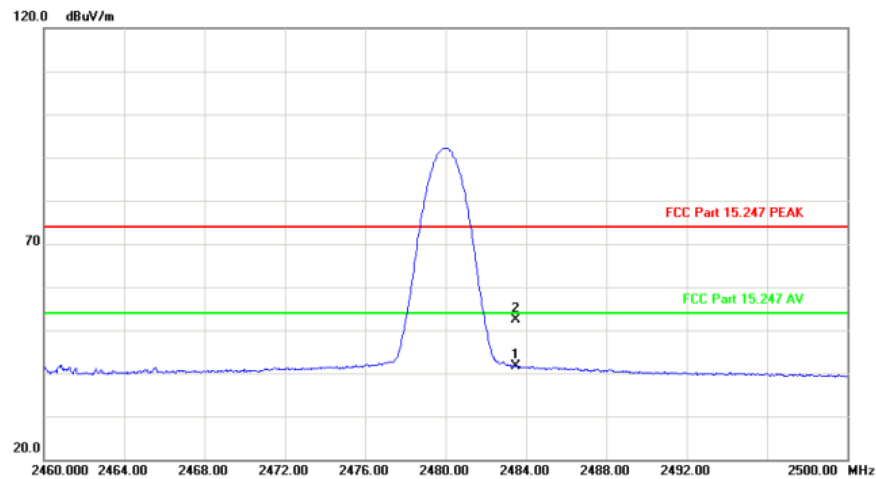
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	2483.500	50.37	-9.08	41.29	54.00	-12.71	AVG		
2		2483.500	60.67	-9.08	51.59	74.00	-22.41	peak		

HORIZONTAL

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	2483.500	50.71	-9.08	41.63	54.00	-12.37	AVG		
2		2483.500	61.45	-9.08	52.37	74.00	-21.63	peak		

3.3 Conducted Band Edge

3.3.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

3.3.2 Test Peripherals

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Record PC	Lenovo	M4500T	NA
2	Control PC	Lenovo	M4500T	NA

3.3.3 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☐ Lowest, Middle and Highest Channel	☒ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

a) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

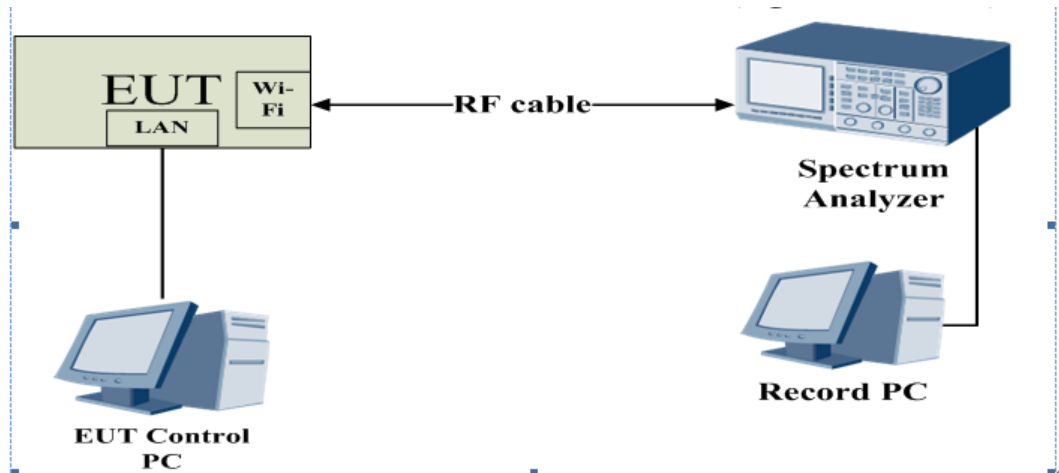
b) Spectrum Setting as below:

Centre Frequency	The centre frequency of the channel under test
RBW	100 kHz
VBW	300 kHz
Frequency span	2 x Nominal Channel Bandwidth
Detector Mode	Peak
N dB down	20
Trace Mode	Max Hold
Sweep Time	Auto Couple

Allow trace to full stabilize.

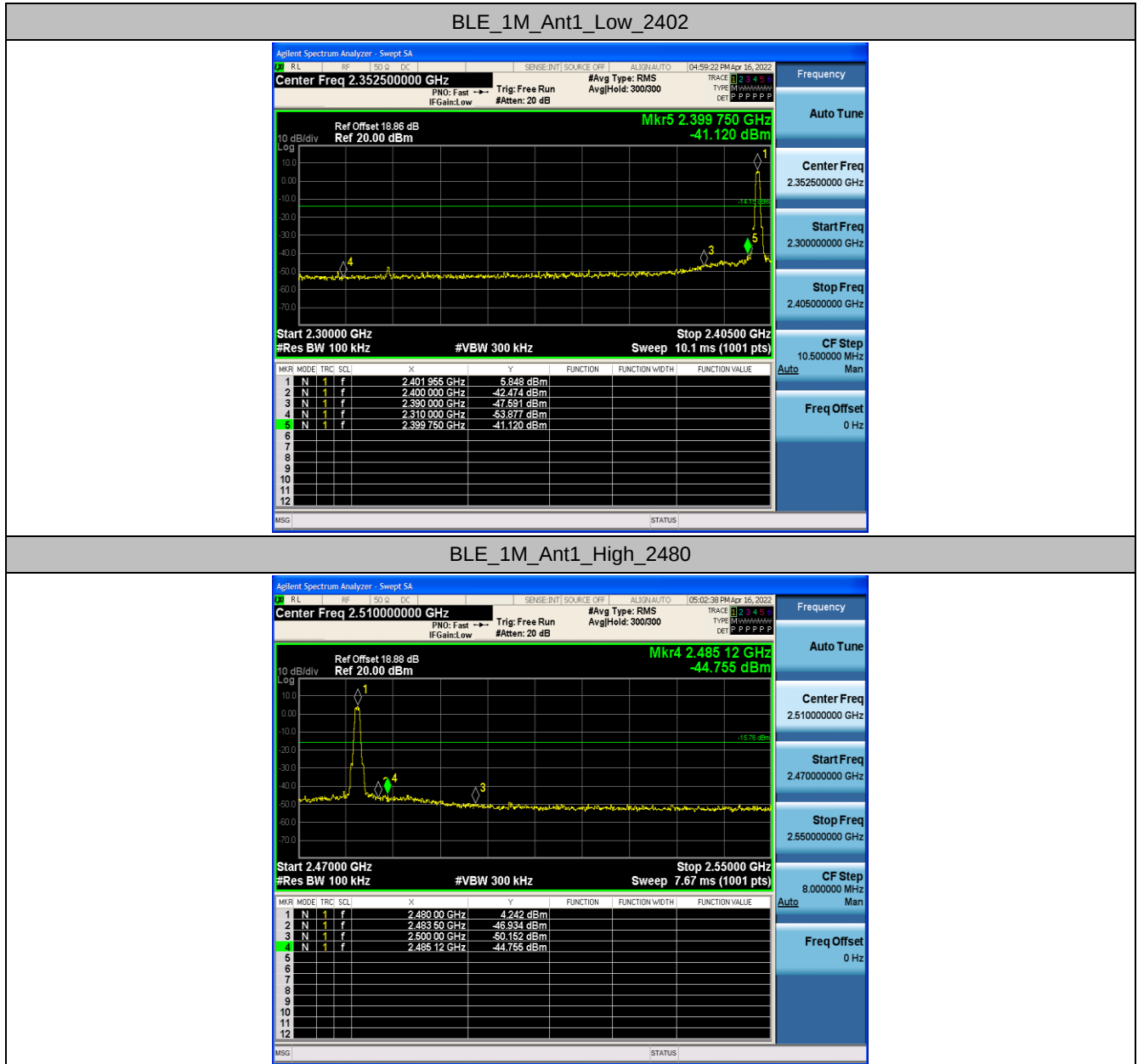
c) Use the peak marker function to determine the maximum power level in any 100kHz band segment within the fundamental EBW.

3.3.4 Test Setup



3.3.5 The Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	5.85	-41.12	≤-14.15	PASS
		High	2480	4.24	-44.76	≤-15.76	PASS



3.4 6dB Bandwidth

3.4.1 Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

3.4.2 Test Peripherals

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Record PC	Lenovo	M4500T	NA
2	Control PC	Lenovo	M4500T	NA

3.4.3 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ● : Test ○ : No Test	

a) The EUT shall be connected to the spectrum analyser, and the spectrum analyser is set as follow:

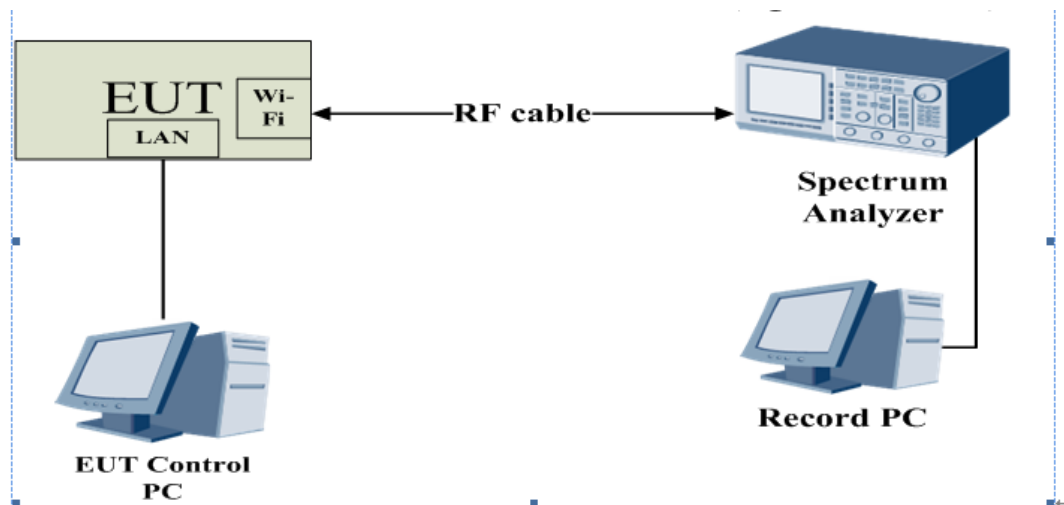
Centre Frequency	The centre frequency of the channel under test
RBW	100kHz
VBW	300kHz
Frequency span	2x Nominal Channel Bandwidth
Detector Mode	Peak
Trace Mode	Max Hold
Sweep Time	Auto Couple

b) Wait for the trace to stabilize then find the peak value of the trace and place the analyser marker on this peak.

c) Use the -6dB bandwidth function of the spectrum analyser to measure the 6dB Bandwidth of the EUT. This value shall be recorded.

d) Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

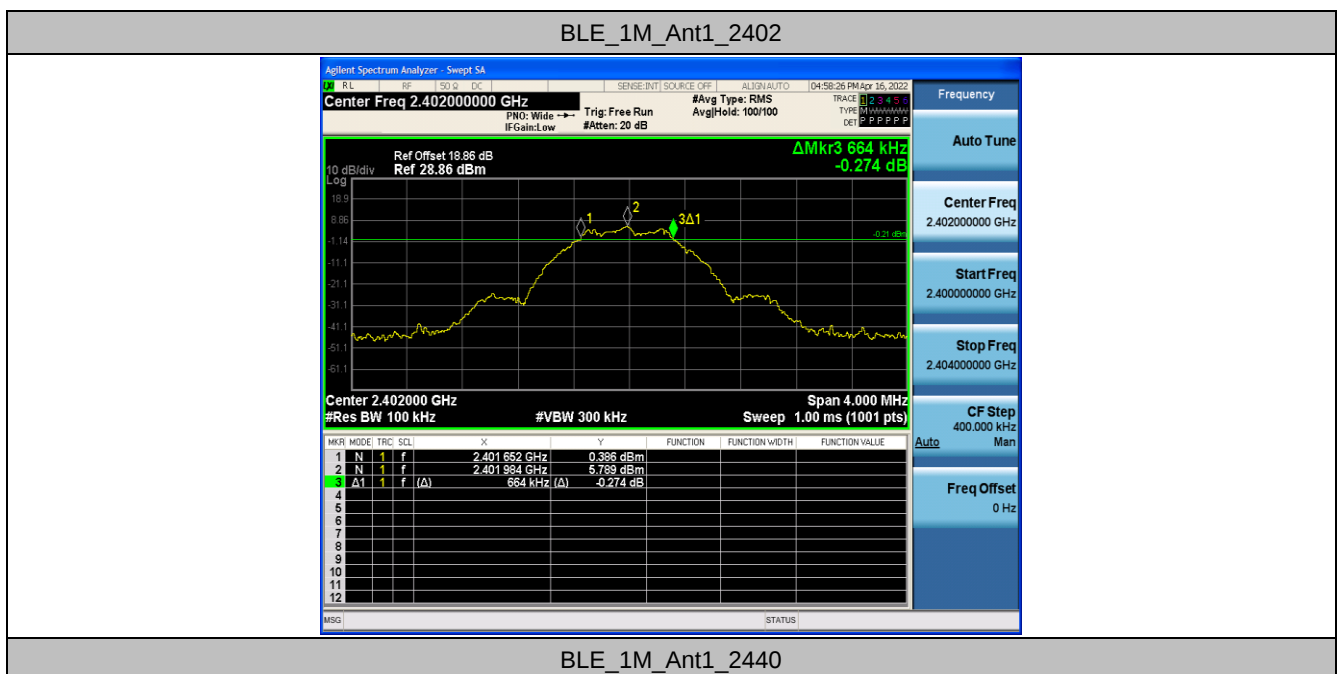
3.4.4 Test Setup



3.4.5 Test Result

6dB Bandwidth

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.664	2401.652	2402.316	0.5	PASS
		2440	0.664	2439.648	2440.312	0.5	PASS
		2480	0.672	2479.640	2480.312	0.5	PASS





BLE_1M_Ant1_2480



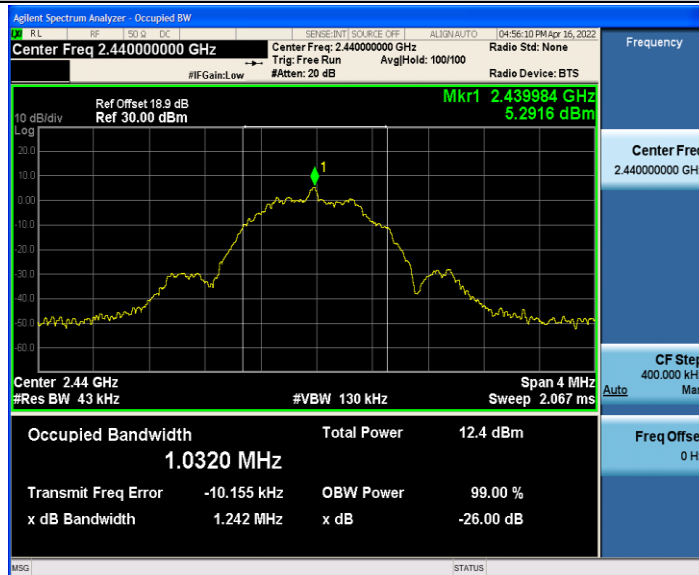
Occupied Channel Bandwidth

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0305	2401.475	2402.505	---	---
		2440	1.0320	2439.474	2440.506	---	---
		2480	1.0328	2479.473	2480.506	---	---

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



3.5 Conducted Output Power

3.5.1 Limit

For systems using digital modulation in the 2400~2483.5MHz, The Maximum output Power shall not exceed 1W(30dBm)

3.5.2 Test Peripherals

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Record PC	Lenovo	M4500T	NA
2	Control PC	Lenovo	M4500T	NA

3.5.3 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ● : Test ○ : No Test	

- a) The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- b) The maximum output power was performed in accordance with method 11.9.2.3 of ANSI C63.10.

3.5.4 Test Setup



3.5.5 Table of Parameters of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

For Power Setting value

Test Software Version	Command		
Frequency (MHz)	2402	2440	2480
BLE(1M)	6	6	10

3.5.6 The Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	6.16	≤ 30	PASS
		2440	5.74	≤ 30	PASS
		2480	5.56	≤ 30	PASS

Note: The Duty Cycle Factor is compensated in the graph.

3.6 Power Spectral Density

3.6.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

3.6.2 Test Peripherals

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Record PC	Lenovo	M4500T	NA
2	Control PC	Lenovo	M4500T	NA

3.6.3 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ● : Test ○ : No Test	

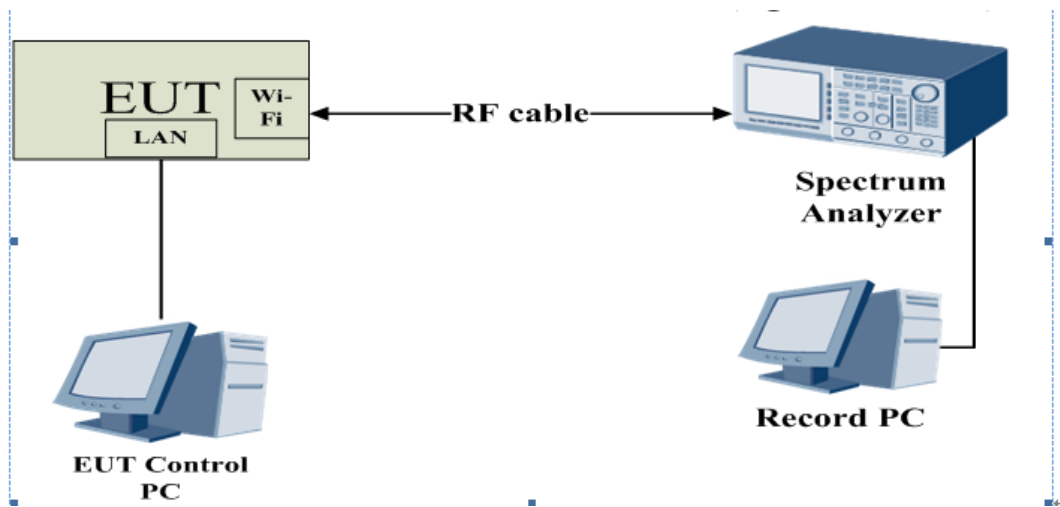
a) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below. Spectrum analyser settings as following:

RBW	3 kHz
VBW	10 kHz
Detector Mode	Peak
Trace Mode	Max Hold
Sweep Time	Auto

b) Wait for the trace to stabilize. Use the peak marker function to determine the maximum amplitude level within the RBW.

c) The value defined in step b shall be compared to the limits and be recorded .

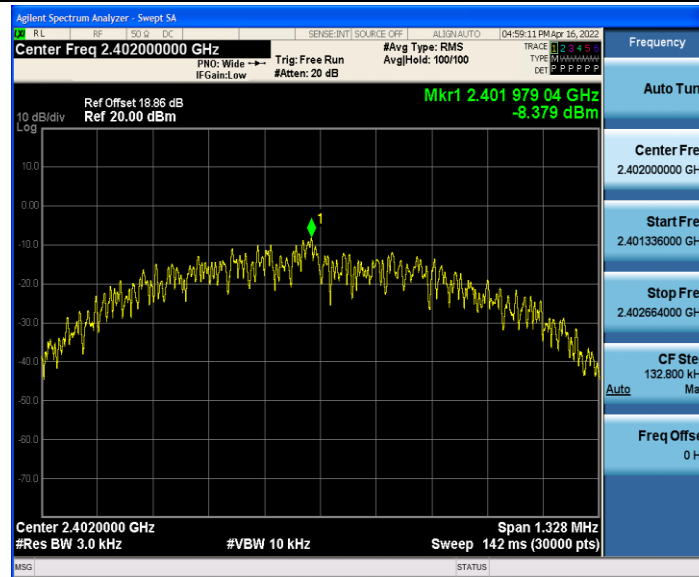
3.6.4 Test Setup



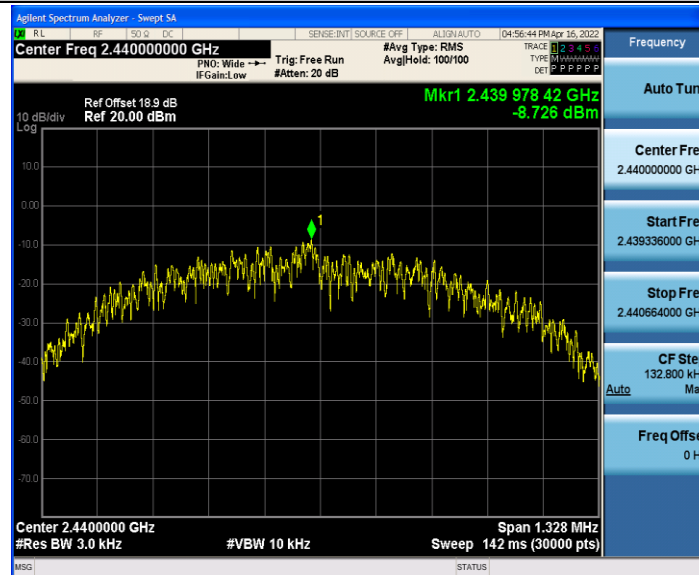
3.6.5 The Result

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-8.38	≤8.00	PASS
		2440	-8.73	≤8.00	PASS
		2480	-9.35	≤8.00	PASS

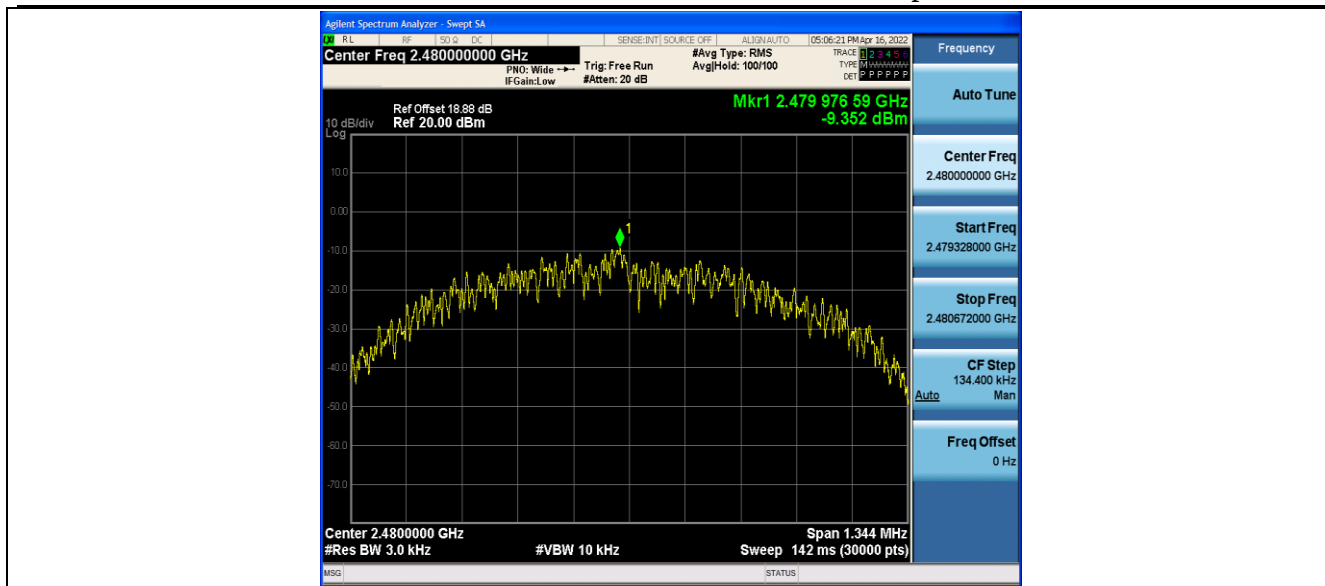
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



4. Photographs of Test Set-up

See the Appendix of Test setup Photographs.

5. Photographs of EUT

See the Appendix of External Photographs and Internal Photographs.

(END OF REPORT)