TEST REPORT

Product	:	Finger Vein Identification Private Box
Trade mark	:	qin
Model/Type reference	:	PB-FV01
Serial Number	:	N/A
Report Number	:	EED32M00293401
FCC ID	:	2AXSTPBFV01US
Date of Issue	:	Oct. 26, 2020
Test Standards	:	47 CFR Part 15 Subpart C
Test result	:	PASS

Prepared for:

Shenzhen Duoqin Technology Co., Ltd.
2 floor, 9 building, Dezhi Hi-Tech, Yang Tian Road,
Baoan District, ShenZhen, China.

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
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Compiled by:	Sunlight Sun	Reviewed by:	Tom chen
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Approved by:	Sam Chuang	Date:	Oct. 26, 2020
	Sam Chuang		

CENTRE TESTING INTERNATIONAL GROUP CO.,LTD. CTI Report Seal

Check No.: 3096316755

2 Version

Version No.	Date	Description
00	Oct. 26, 2020	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15 Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

Remark:
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.
Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

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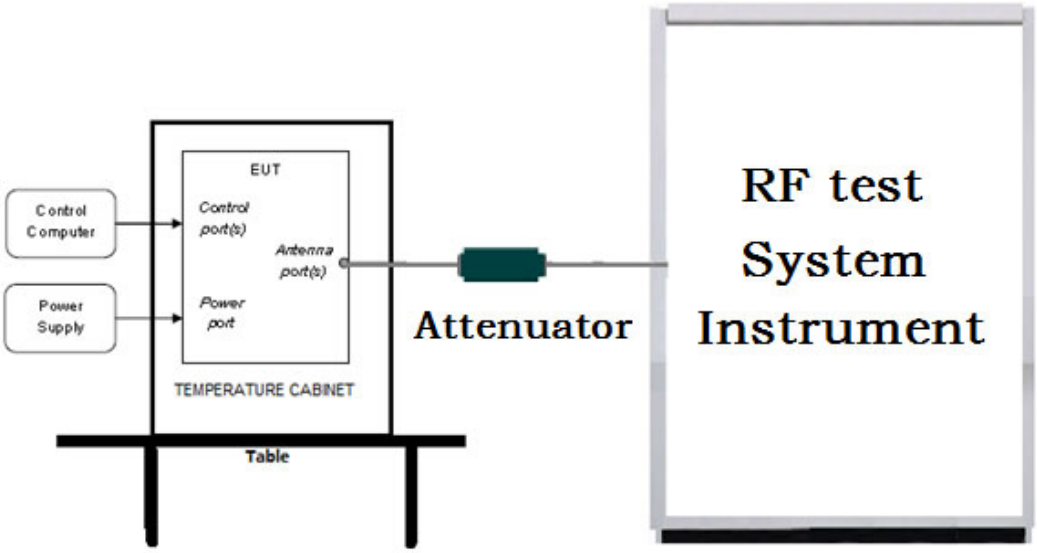
5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

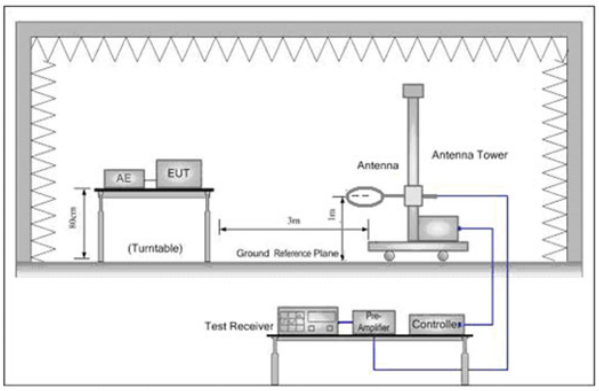


Figure 1. Below 30MHz

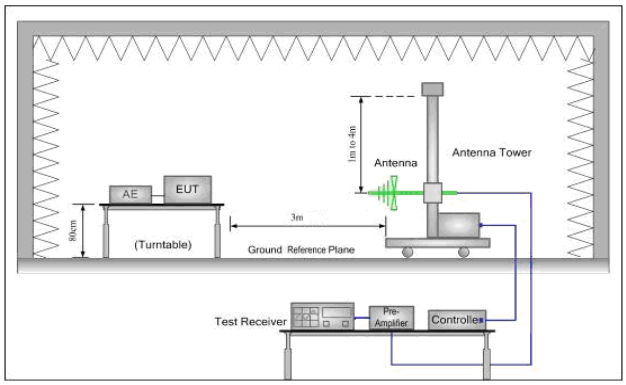


Figure 2. 30MHz to 1GHz

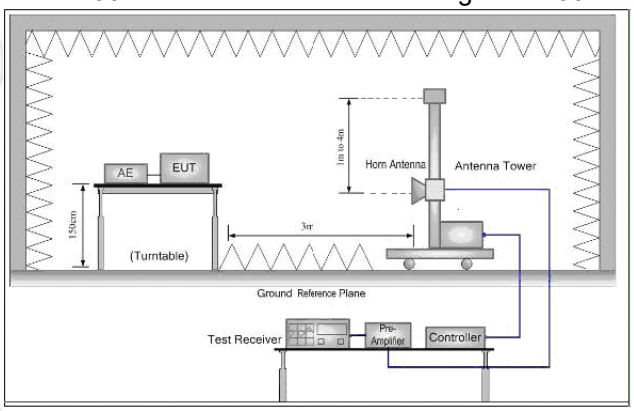
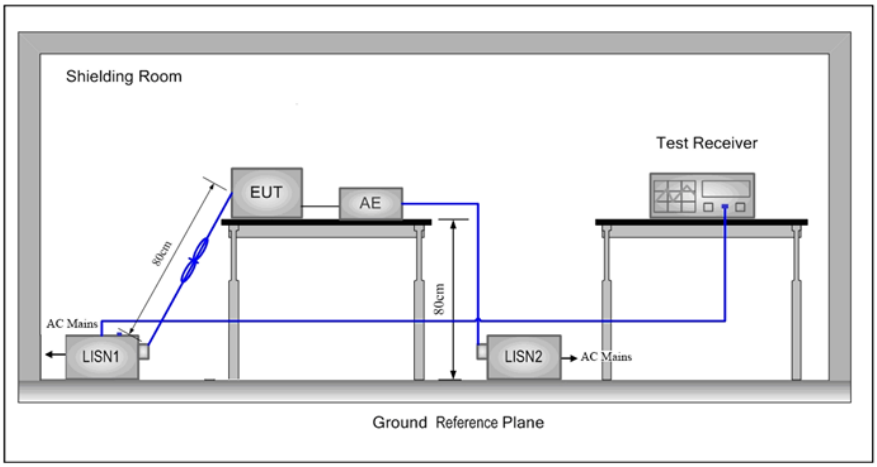


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 0	Channel 19	Channel 39
		2402MHz	2440MHz	2480MHz
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.			

6 General Information

6.1 Client Information

Applicant:	Shenzhen Duoqin Technology Co., Ltd.
Address of Applicant:	2 floor, 9 building, Dezhi Hi-Tech, Yang Tian Road, Baoan District, ShenZhen, China.
Manufacturer:	Shenzhen Duoqin Technology Co., Ltd.
Address of Manufacturer:	2 floor, 9 building, Dezhi Hi-Tech, Yang Tian Road, Baoan District, ShenZhen, China.
Factory:	Shenzhen H&h Intelligent Manufacturing Co., Ltd.
Address of Factory:	SZZT Industrial Park, NO.3 Tongguan Road, TianLiao Community, YuTang street, Guangming District, Shenzhen, China.

6.2 General Description of EUT

Product Name:	Finger Vein Identification Private Box	
Model No.(EUT):	PB-FV01	
Trade mark:	qin	
Frequency Range of Operation:	2400MHz to 2483.5MHz	
Power Supply:	Battery:	LSP 18650 3.7V 4400mAh
Sample Received Date:	Sep. 16, 2020	
Sample tested Date:	Sep. 16, 2020 to Oct. 16, 2020	

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	BLE
Modulation Technique:	DSSS
Modulation Type:	GFSK
Number of Channel:	40
Test Power Grade:	Default
Test Software of EUT:	nRFgo Studio
Antenna Type and Gain:	Type: PIFA antenna Gain: 4.23dBi
Test Voltage:	Battery 3.7V

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

6.4 Description of Support Units

The EUT has been tested with associated equipment below

Associated equipment name		Manufacture	model	S/N serial number	Supplied by	Certification
AE1	Notebook	HP	HSTNN-I17C	5CG5192QSM	HP	CE&FCC

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd
Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China
Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
No tests were sub-contracted.
FCC Designation No.: CN1164

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

7 Equipment List

RF test system					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Spectrum Analyzer	Keysight	N9010A	MY54510339	02-17-2020	02-16-2021
Signal Generator	Keysight	N5182B	MY53051549	02-17-2020	02-16-2021
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	06-29-2020	06-28-2021
High-pass filter	Sinoscite	FL3CX03WG18NM 12-0398-002	---	---	---
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	---	---
DC Power	Keysight	E3642A	MY56376072	02-17-2020	02-16-2021
PC-1	Lenovo	R4960d	---	---	---
BT&WI-FI Automatic control	R&S	OSP120	101374	02-17-2020	02-16-2021
RF control unit	JS Tonscend	JS0806-2	158060006	02-17-2020	02-16-2021
BT&WI-FI Automatic test software	JS Tonscend	JS1120-3	---	---	---

Conducted disturbance Test					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100435	04-28-2020	04-27-2021
Temperature/ Humidity Indicator	Defu	TH128	/	---	---
LISN	R&S	ENV216	100098	03-05-2020	03-04-2021
Barometer	changchun	DYM3	1188	---	---

3M full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
RSE Automatic test software	JS Tonscend	JS36-RSE	10166	---	---
Receiver	Keysight	N9038A	MY57290136	03-05-2020	03-04-2021
Spectrum Analyzer	Keysight	N9020B	MY57111112	03-05-2020	03-04-2021
Spectrum Analyzer	Keysight	N9030B	MY57140871	03-05-2020	03-04-2021
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-1148	04-25-2018	04-24-2021
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-25-2018	04-24-2021
Horn Antenna	ETS-LINDGREN	3117	00057407	07-10-2018	07-09-2021
Preamplifier	EMCI	EMC184055SE	980596	05-20-2020	05-19-2021
Preamplifier	EMCI	EMC001330	980563	04-22-2020	04-21-2021
Preamplifier	JS Tonscend	980380	EMC051845 SE	01-09-2020	01-08-2021
Temperature/ Humidity Indicator	biaozhi	GM1360	EE1186631	04-27-2020	04-26-2021
Fully Anechoic Chamber	TDK	FAC-3	---	01-17-2018	01-16-2021
Filter bank	JS Tonscend	JS0806-F	188060094	04-10-2018	04-09-2021
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	---	---
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	---	---
Cable line	Times	EMC104-NMNM-1000	SN160710	---	---
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	---	---
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	---	---
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	---	---
Cable line	Times	HF160-KMKM-3.00M	393493-0001	---	---

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	05-16-2020	05-15-2021
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Receiver	R&S	ESCI7	100938-003	10-21-2019	10-20-2020
Multi device Controller	maturo	NCD/070/10711112	---	---	---
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	06-29-2020	06-28-2021
Cable line	Fulai(7M)	SF106	5219/6A	---	---
Cable line	Fulai(6M)	SF106	5220/6A	---	---
Cable line	Fulai(3M)	SF106	5216/6A	---	---
Cable line	Fulai(3M)	SF106	5217/6A	---	---

8 Radio Technical Requirements Specification

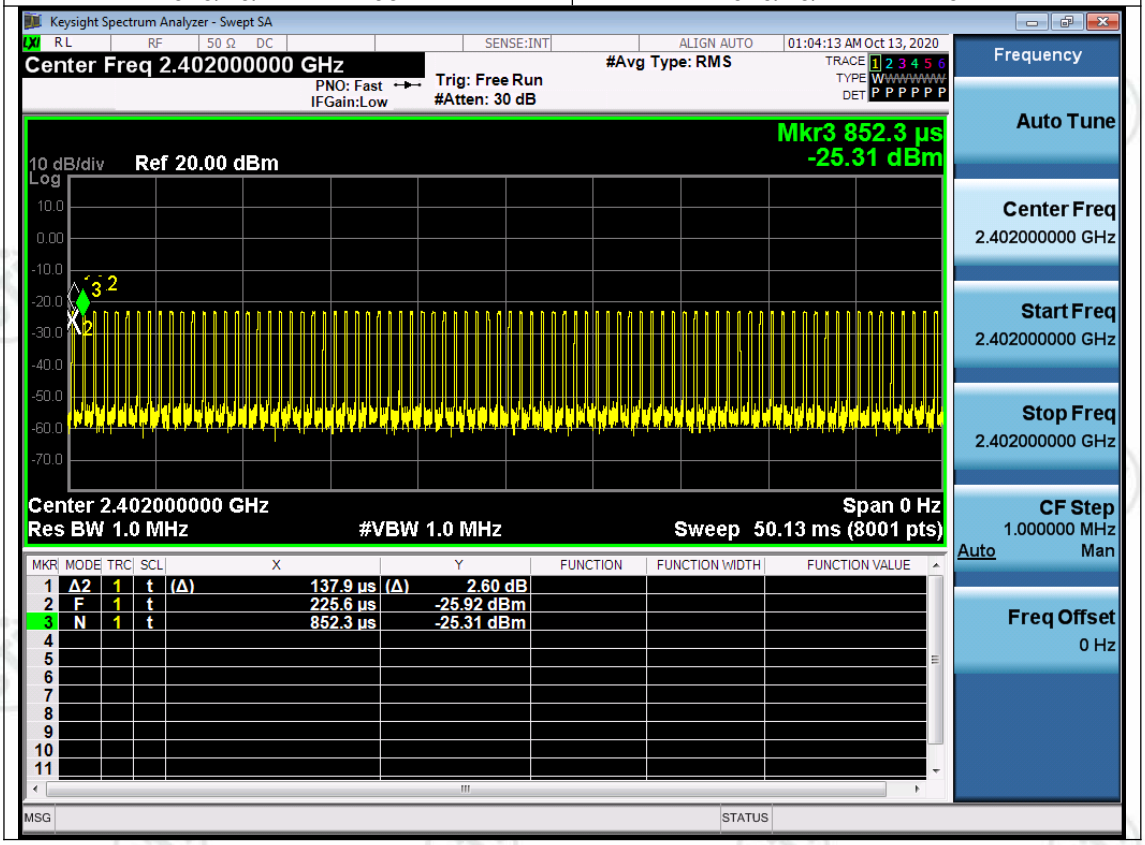
Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices

Test Results List:

Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

Test Case: Duty Cycle	
Mode: BLE	Ant: Ant1
Channel: 2402	Voltage: VN
Temperature: TN	**Result:** **PASS** **Value:22%;0.1378666666575ms**
Start Time: 2020/10/12 22:24:09	End Time: 2020/10/12 22:24:16

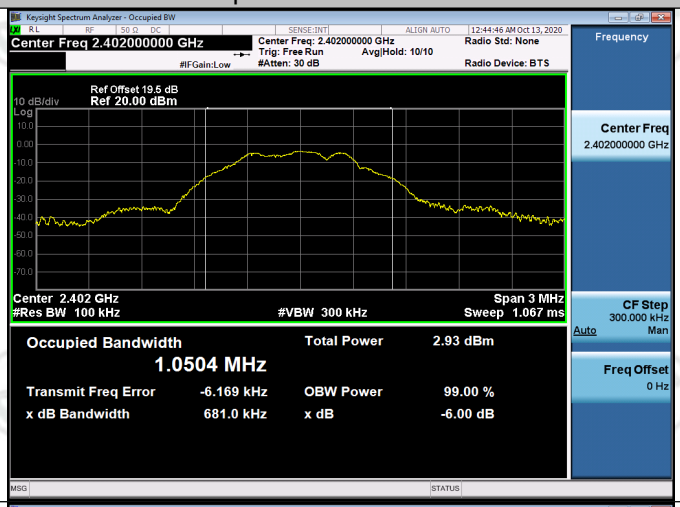


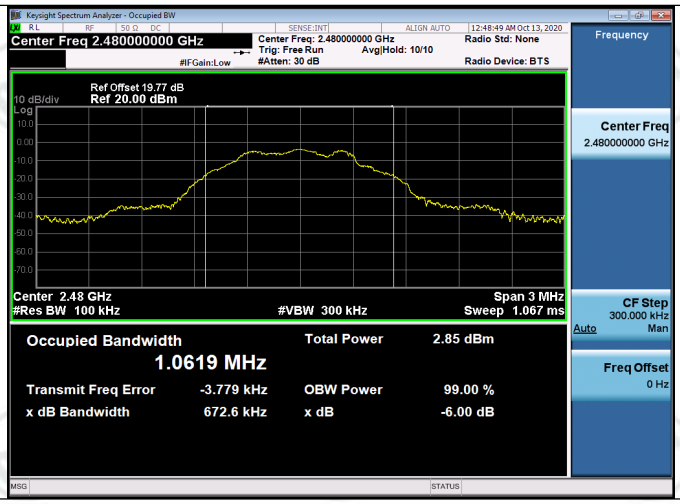
Appendix A): 6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	Verdict
BLE	LCH	0.6810	PASS
BLE	MCH	0.6890	PASS
BLE	HCH	0.6726	PASS

Test Graphs

Graphs			
LCH			
MCH			

HCH	 Keysight Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run Avg|Hold: 10/10 #Atten: 30 dB Radio Std: None Radio Device: BTS 12:48:49 AM Oct 13, 2020 Frequency Ref Offset 19.77 dB 10 dB/div Ref 20.00 dBm Log Center Freq 2.480000000 GHz Center 2.48 GHz #Res BW 100 kHz #VBW 300 kHz Span 3 MHz Sweep 1.067 ms CF Step 300.000 kHz Auto Man Occupied Bandwidth 1.0619 MHz Total Power 2.85 dBm Transmit Freq Error -3.779 kHz OBW Power 99.00 % x dB Bandwidth 672.6 kHz x dB -6.00 dB Freq Offset 0 Hz MSG STATUS

99% OBW

Mode	Channel	99% OBW[MHz]	Verdict
BLE	LCH	1.0071	PASS
BLE	MCH	1.0087	PASS
BLE	HCH	1.0126	PASS

Test Graphs

Graphs			
LCH			
MCH			

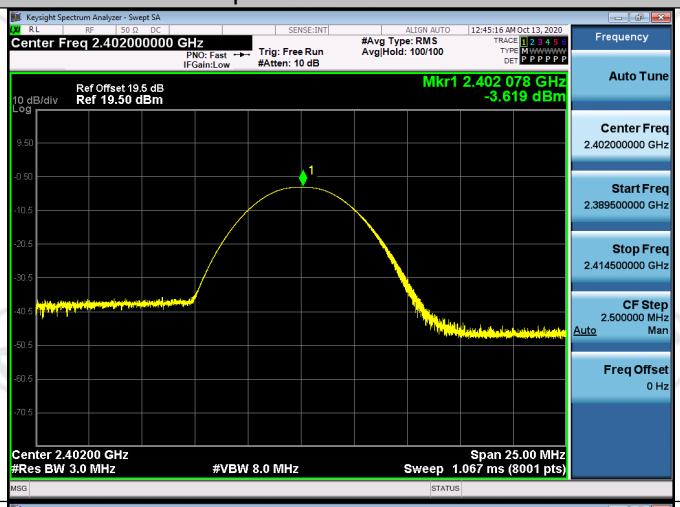
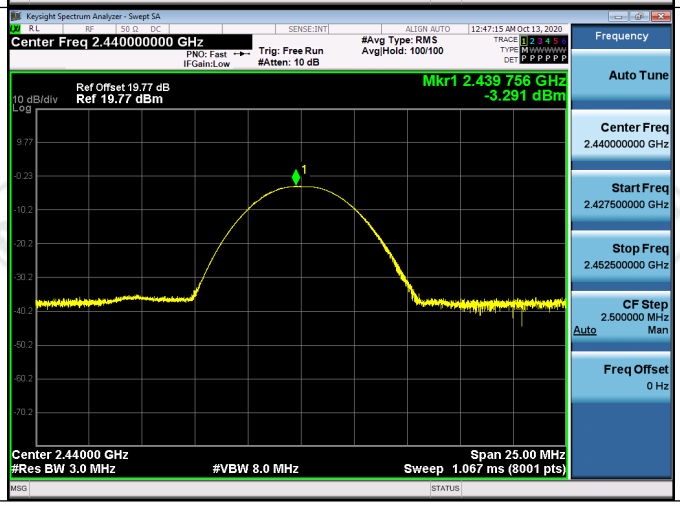
HCH	Keysight Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run Avg|Hold: 10/10 #Atten: 30 dB Radio Std: None Radio Device: BTS 01:00:12 AM Oct 13, 2020 Frequency Ref Offset 19.77 dB 10 dB/div Ref 20.00 dBm Log Center Freq 2.480000000 GHz Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms CF Step 300.000 kHz Auto Man Occupied Bandwidth 1.0126 MHz Total Power 3.13 dBm Transmit Freq Error -2.226 kHz OBW Power 99.00 % x dB Bandwidth 393.2 kHz x dB -6.00 dB Freq Offset 0 Hz MSG STATUS

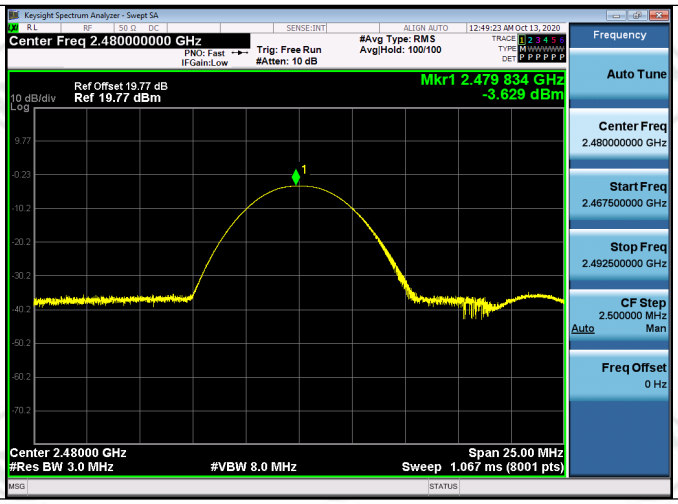
Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	-3.619	PASS
BLE	MCH	-3.291	PASS
BLE	HCH	-3.629	PASS

Test Graphs

Graphs			
LCH			
MCH			

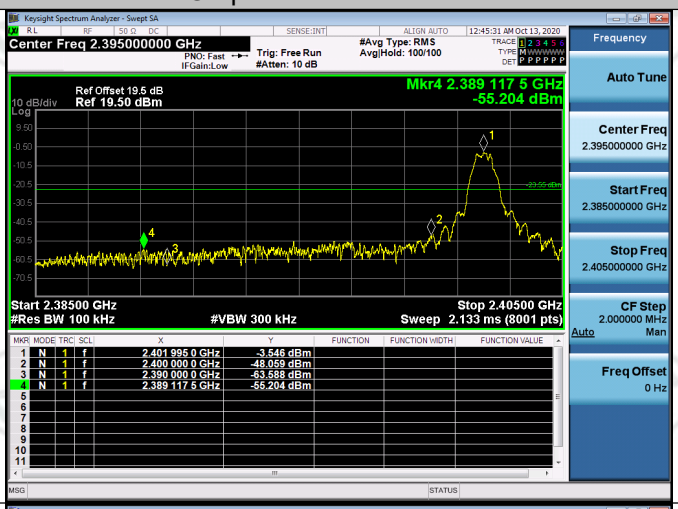
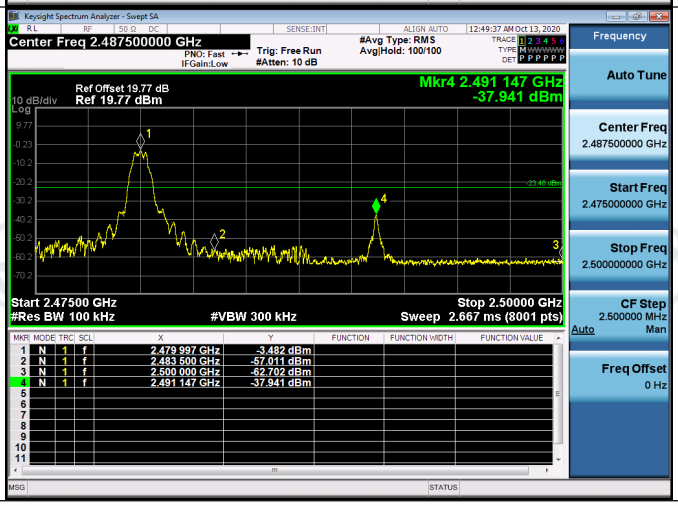
HCH		 Keysight Spectrum Analyzer - Swept SA Center Freq 2.480000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 10 dB #Avg Type: RMS Avg|Hold: 100/100 12:49:23 AM Oct 13, 2020 Ref Offset 19.77 dB 10 dB/div Ref 19.77 dBm Log Mkr1 2.479 834 GHz -3.629 dBm Center 2.48000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 25.00 MHz Sweep 1.067 ms (8001 pts) Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.467500000 GHz Stop Freq 2.492500000 GHz CF Step 2.500000 MHz Auto Man Freq Offset 0 Hz

Appendix C): Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	-3.546	-55.204	-23.55	PASS
BLE	HCH	-3.482	-37.941	-23.48	PASS

Test Graphs

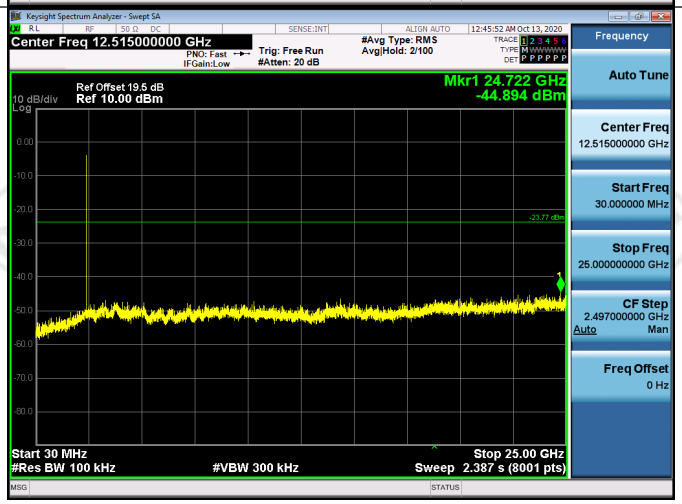
Graphs	
LCH	
HCH	

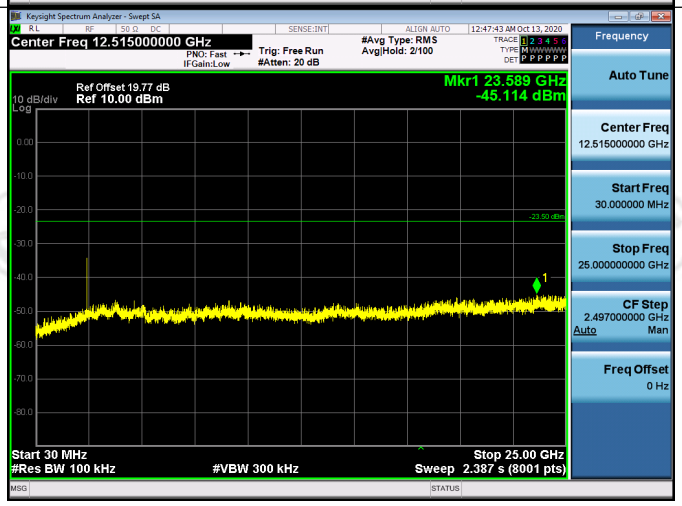
Appendix D): RF Conducted Spurious Emissions

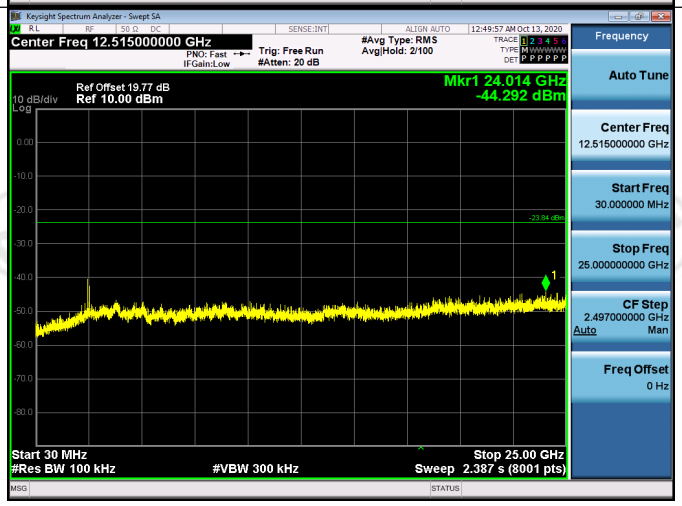
Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	-3.767	<Limit	PASS
BLE	MCH	-3.499	<Limit	PASS
BLE	HCH	-3.839	<Limit	PASS

Test Graphs

BLE_LCH_Graphs	
Pref/BLE/LCH	
Puw/BLE/LCH	

BLE_MCH_Graphs	
Pref/BLE/MCH	
Puw/BLE/MCH	

BLE_HCH_Graphs		
Pref/BLE/HCH		
Puw/BLE/HCH		

Appendix E): Power Spectral Density

Result Table

Mode	Channel	PSD [dBm]	Verdict
BLE	LCH	-18.189	PASS
BLE	MCH	-17.269	PASS
BLE	HCH	-17.148	PASS

Test Graphs

Graphs			
LCH			
MCH			

HCH		Keysight Spectrum Analyzer - Swept SA Center Freq 2.480000000 GHz PNO: Wide IFGain:Low Trig: Free Run #Atten: 10 dB #Avg Type: RMS Avg|Hold: 27/100 12:49:29 AM Oct 13, 2020 Ref Offset 19.77 dB 10 dB/div Ref 10.00 dBm Log Mkr1 2.480 004 69 GHz -17.148 dBm Center 2.4800000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 1.500 MHz Sweep 158.4 ms (8001 pts) Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.479250000 GHz Stop Freq 2.480750000 GHz CF Step 150.000 kHz Auto Man Freq Offset 0 Hz

Appendix F): Antenna Requirement

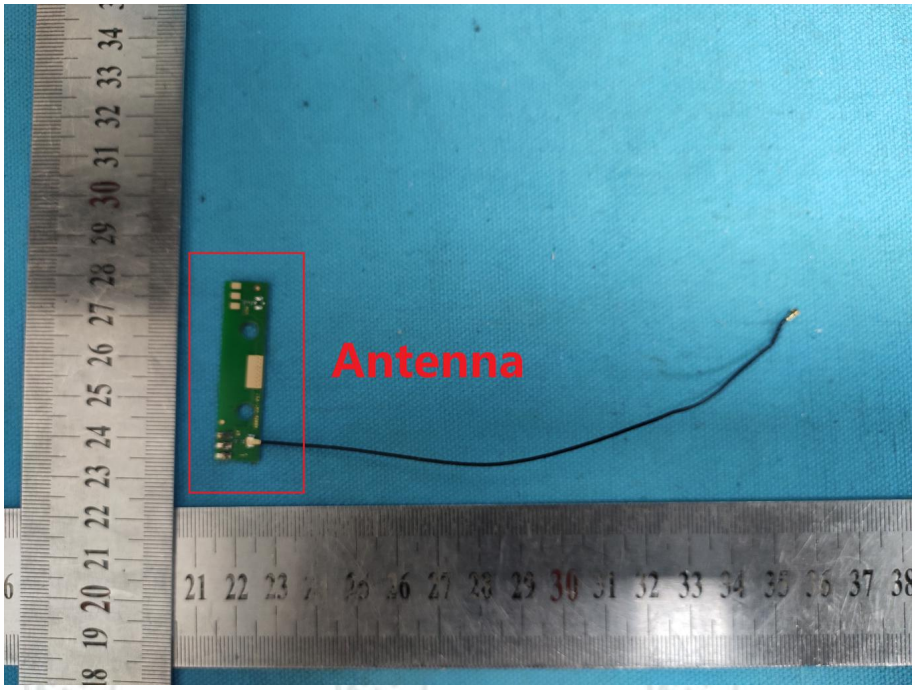
15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is PIFA antenna. The best case gain of the antenna is 4.23dBi.

Appendix G): AC Power Line Conducted Emission

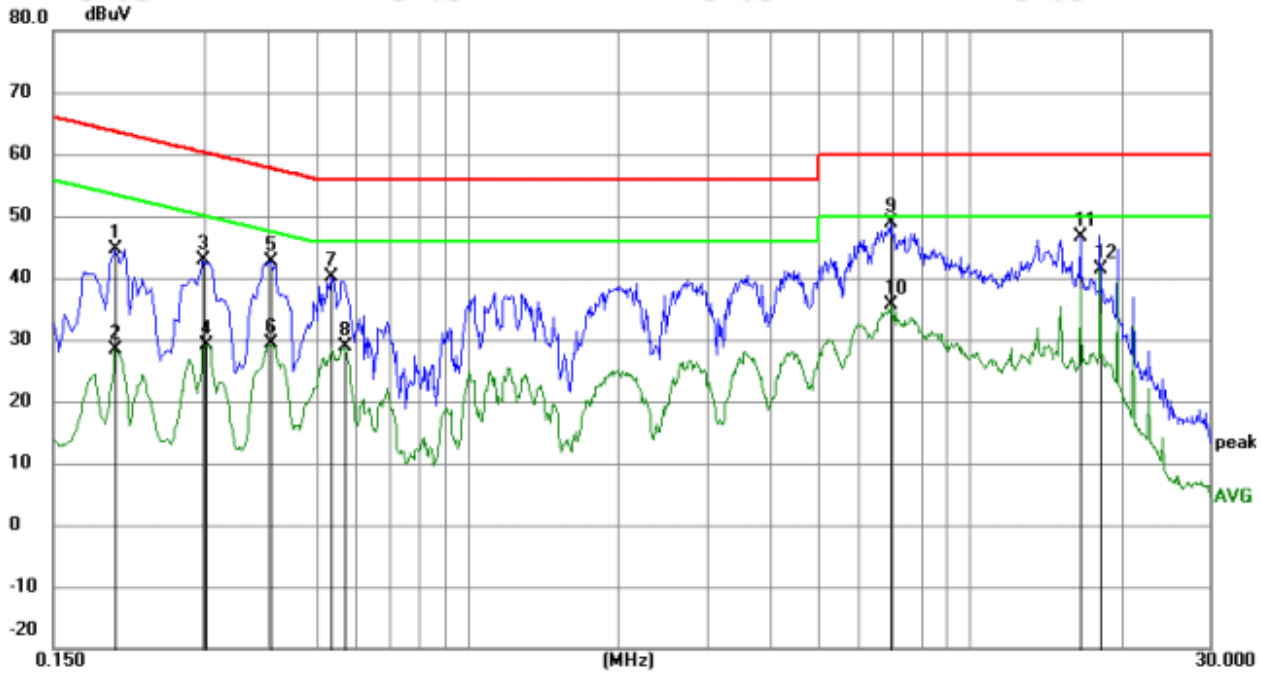
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1)The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBμV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
NOTE : The lower limit is applicable at the transition frequency</td></tr>
</table>

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

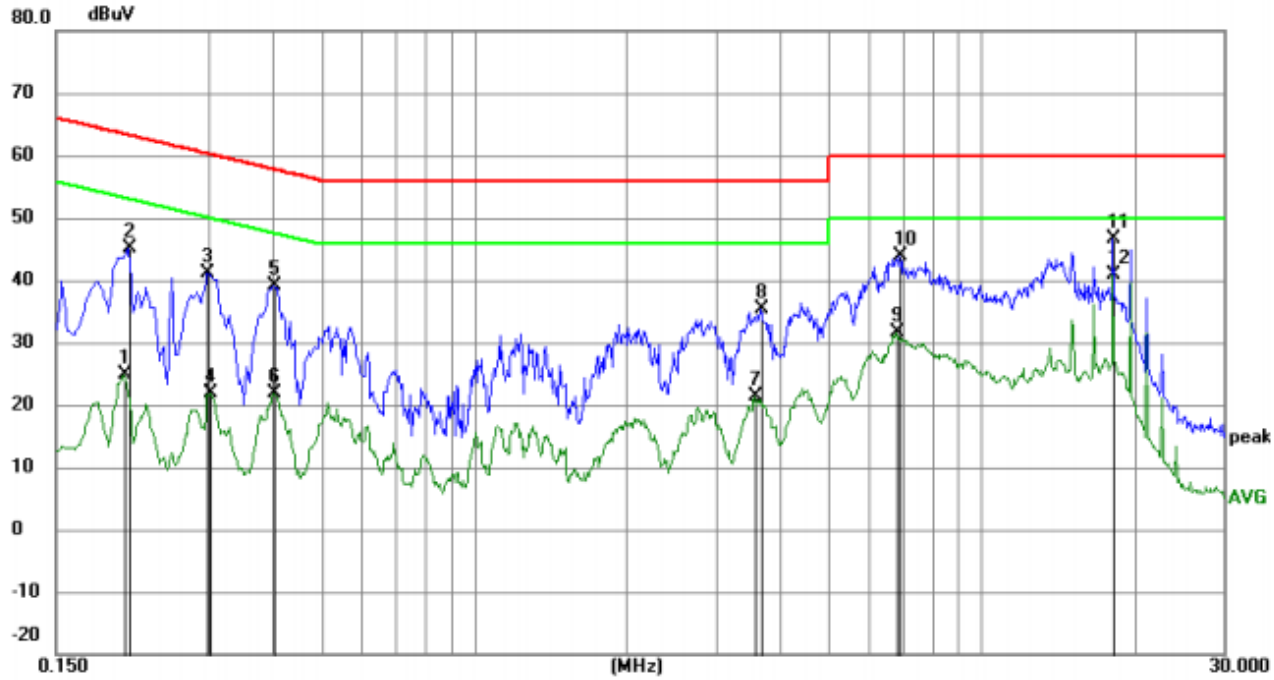
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1995	34.82	9.87	44.69	63.63	-18.94	QP	
2		0.1995	18.50	9.87	28.37	53.63	-25.26	AVG	
3		0.2985	32.75	10.07	42.82	60.28	-17.46	QP	
4		0.3030	19.15	10.07	29.22	50.16	-20.94	AVG	
5		0.4065	32.75	9.97	42.72	57.72	-15.00	QP	
6		0.4065	19.32	9.97	29.29	47.72	-18.43	AVG	
7		0.5370	30.24	9.99	40.23	56.00	-15.77	QP	
8		0.5730	18.78	10.04	28.82	46.00	-17.18	AVG	
9		6.9810	38.99	9.79	48.78	60.00	-11.22	QP	
10		6.9810	25.78	9.79	35.57	50.00	-14.43	AVG	
11		16.6605	36.72	9.94	46.66	60.00	-13.34	QP	
12	*	18.1770	31.30	9.96	41.26	50.00	-8.74	AVG	

Neutral line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2040	14.99	9.88	24.87	53.45	-28.58	AVG	
2		0.2085	35.36	9.89	45.25	63.26	-18.01	QP	
3		0.2985	31.06	10.07	41.13	60.28	-19.15	QP	
4		0.3030	11.92	10.07	21.99	50.16	-28.17	AVG	
5		0.4020	29.12	9.97	39.09	57.81	-18.72	QP	
6		0.4020	11.83	9.97	21.80	47.81	-26.01	AVG	
7		3.5790	11.60	9.78	21.38	46.00	-24.62	AVG	
8		3.6780	25.59	9.78	35.37	56.00	-20.63	QP	
9		6.7830	21.78	9.79	31.57	50.00	-18.43	AVG	
10		6.9045	34.04	9.79	43.83	60.00	-16.17	QP	
11		18.1770	36.57	9.96	46.53	60.00	-13.47	QP	
12	*	18.1770	30.94	9.96	40.90	50.00	-9.10	AVG	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

Appendix H): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

Test method Refer as KDB 558074 D01 , Section 12.1

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. 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 from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. . Test the EUT in the lowest channel , the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

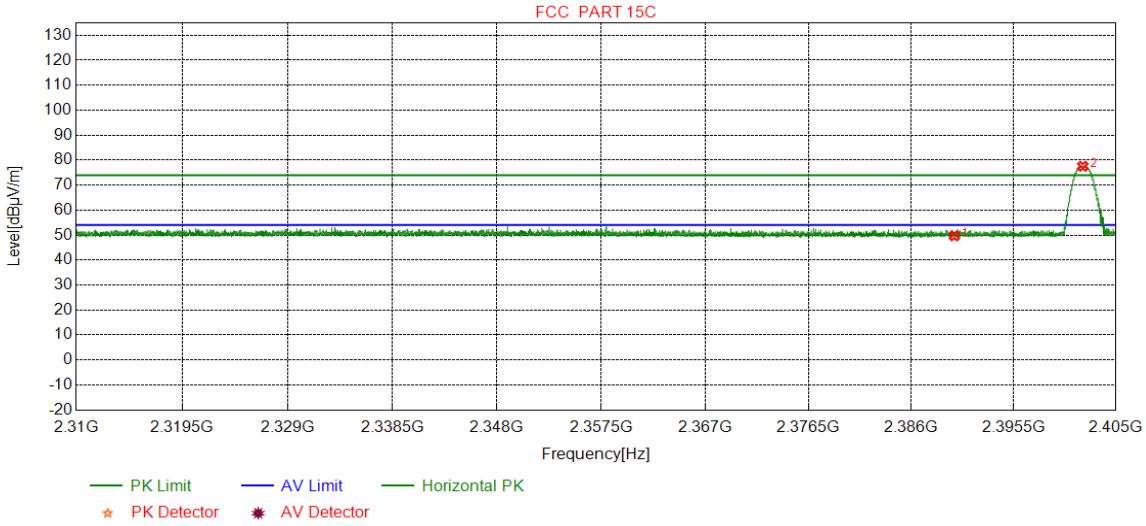
Limit:

Frequency	Limit (dBμV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test plot as follows:

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	PK		

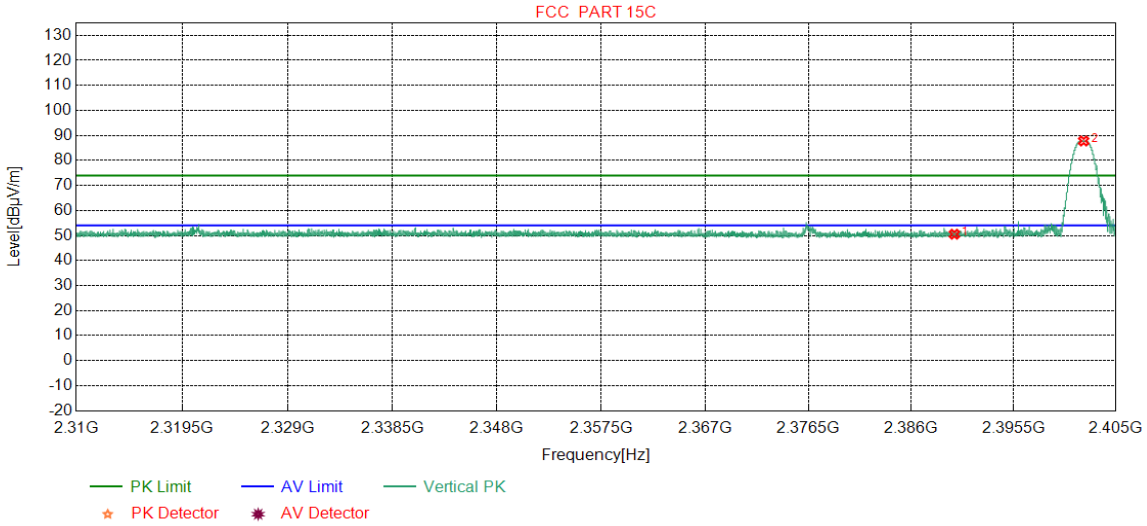
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-43.12	47.18	49.68	74.00	24.32	Pass	Horizonta
2	2401.9281	32.26	13.31	-43.12	75.10	77.55	74.00	-3.55	Pass	Horizonta

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	PK		

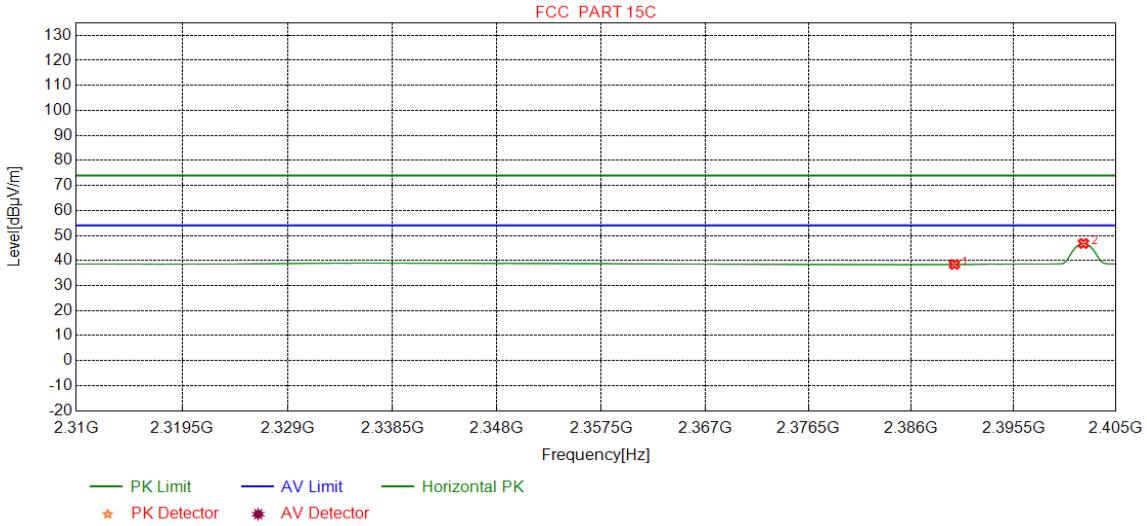
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-43.12	48.02	50.52	74.00	23.48	Pass	Vertical
2	2402.0105	32.26	13.31	-43.12	85.32	87.77	74.00	-13.77	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		

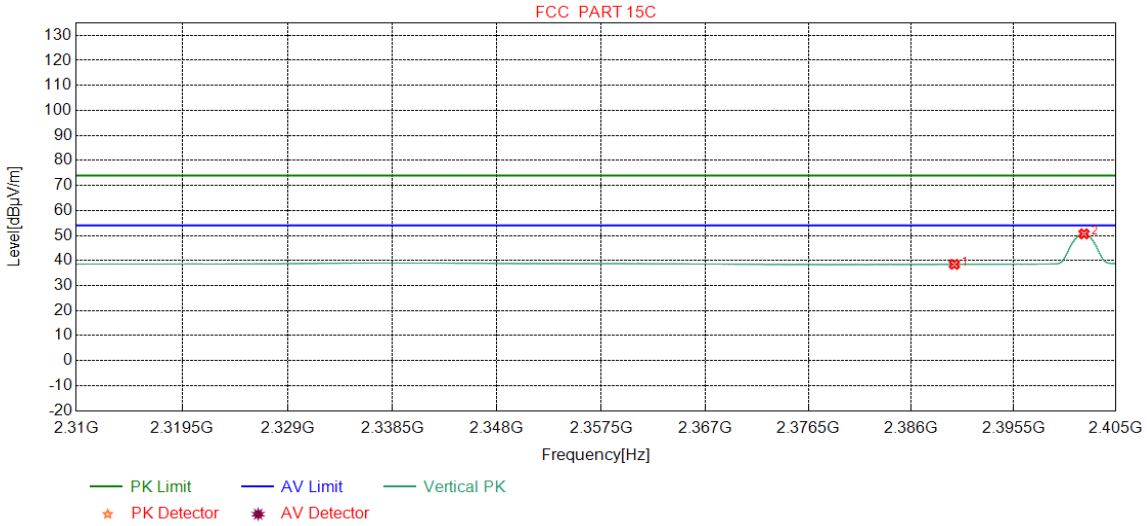
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-43.12	35.95	38.45	54.00	15.55	Pass	Horizonta
2	2401.9915	32.26	13.31	-43.12	44.37	46.82	54.00	7.18	Pass	Horizonta

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		

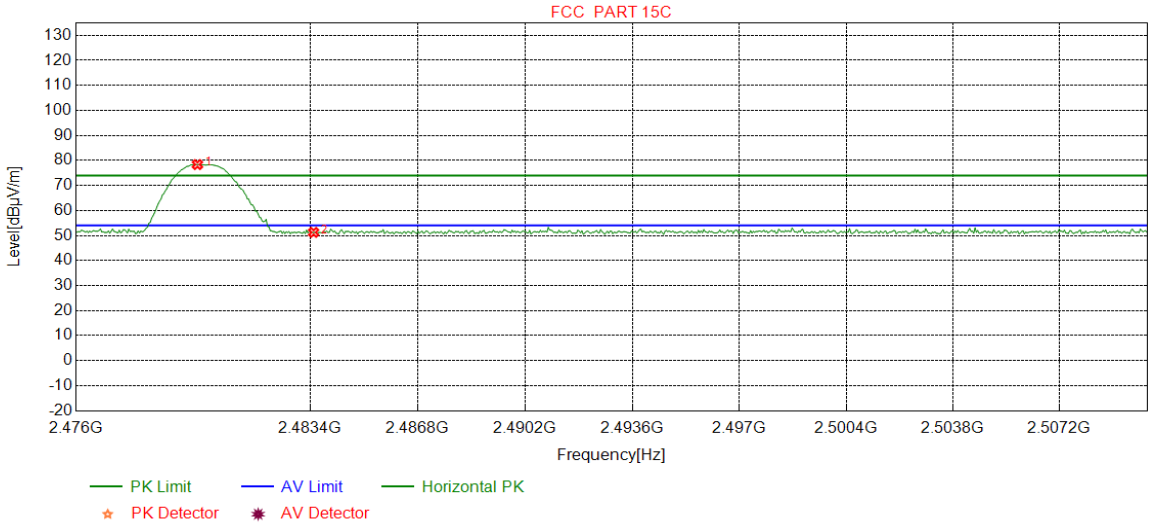
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-43.12	35.97	38.47	54.00	15.53	Pass	Average
2	2402.0421	32.26	13.31	-43.12	48.21	50.66	54.00	3.34	Pass	Average

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	PK		

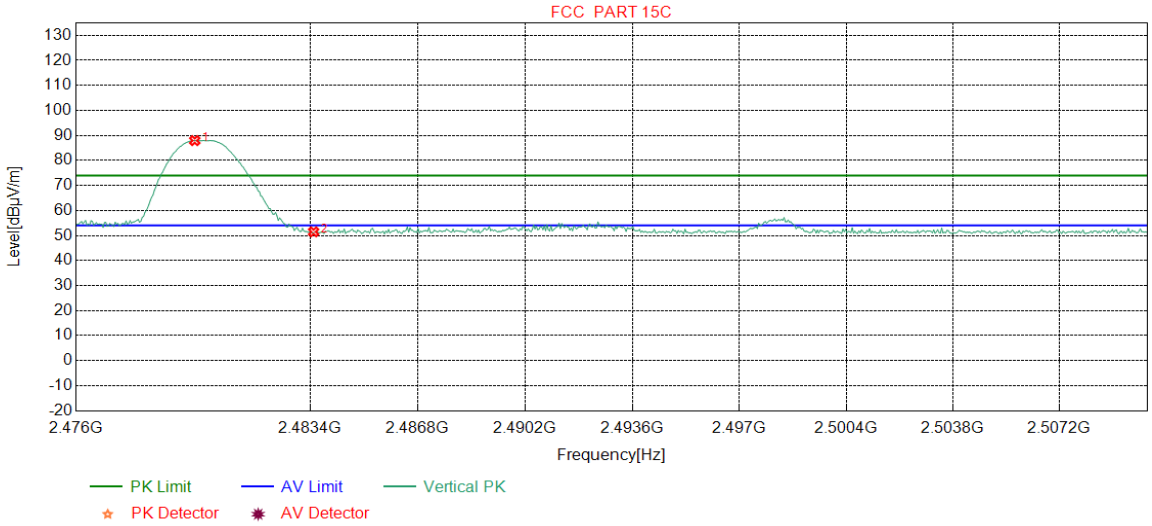
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2479.8298	32.37	13.39	-43.10	75.69	78.35	74.00	-4.35	Pass	Horizonta
2	2483.5000	32.38	13.38	-43.11	48.60	51.25	74.00	22.75	Pass	Horizonta

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	PK		

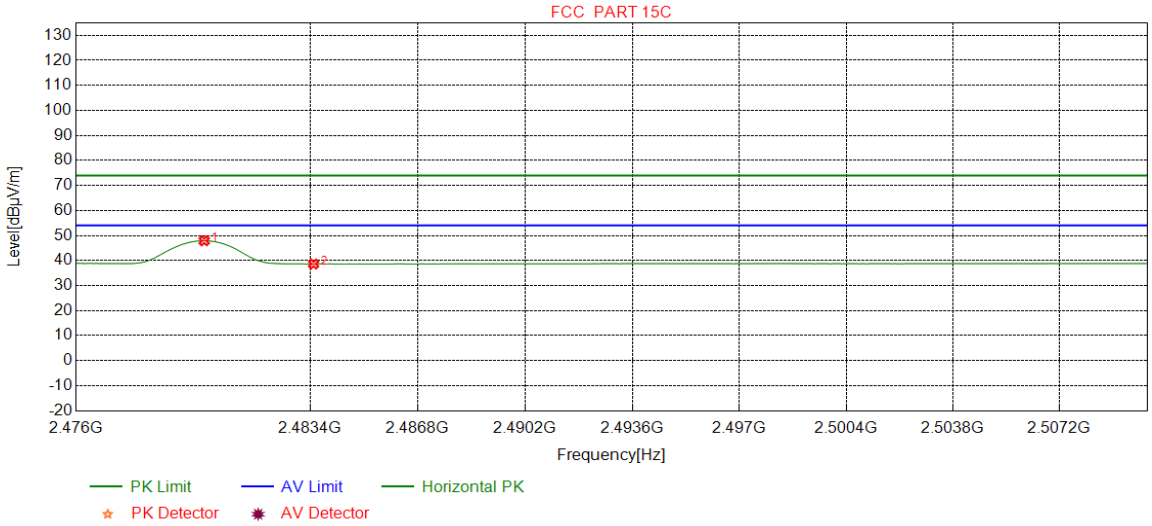
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2479.7447	32.37	13.39	-43.10	85.27	87.93	74.00	-13.93	Pass	Vertical
2	2483.5000	32.38	13.38	-43.11	48.82	51.47	74.00	22.53	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	AV		

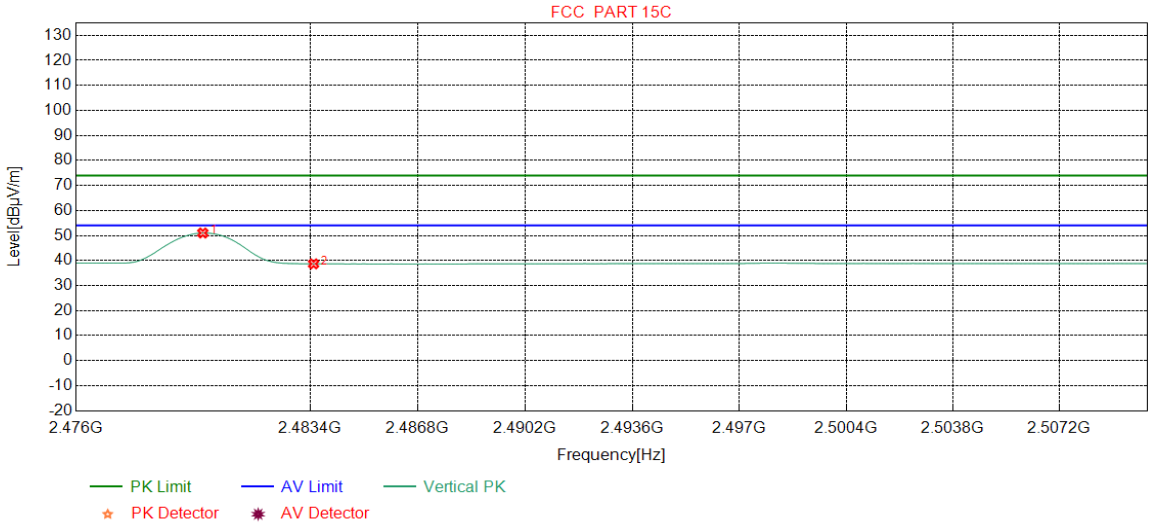
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2480.0426	32.37	13.39	-43.10	45.23	47.89	54.00	6.11	Pass	Horizonta
2	2483.5000	32.38	13.38	-43.11	35.96	38.61	54.00	15.39	Pass	Horizonta

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	AV		

Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2480.0000	32.37	13.39	-43.10	48.34	51.00	54.00	3.00	Pass	Vertical
2	2483.5000	32.38	13.38	-43.11	36.01	38.66	54.00	15.34	Pass	Vertical

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading -Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

Appendix I) Radiated Spurious Emissions

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

Test method Refer as KDB 558074 D01, Section 12.1

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. 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 from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

Mode:			BLE GFSK Transmitting					Channel:		2440	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	31.9402	10.58	0.64	-31.51	56.91	36.62	40.00	3.38	Pass	H	PK
2	120.0250	9.20	1.30	-32.07	58.43	36.86	43.50	6.64	Pass	H	PK
3	216.0646	11.32	1.75	-31.95	52.94	34.06	46.00	11.94	Pass	H	PK
4	383.9884	15.05	2.33	-31.86	49.07	34.59	46.00	11.41	Pass	H	PK
5	600.0290	19.00	2.96	-31.50	39.06	29.52	46.00	16.48	Pass	H	PK
6	844.9785	21.44	3.50	-31.82	36.78	29.90	46.00	16.10	Pass	H	PK
7	30.9701	10.54	0.63	-31.52	57.48	37.13	40.00	2.87	Pass	V	PK
8	120.0250	9.20	1.30	-32.07	46.93	25.36	43.50	18.14	Pass	V	PK
9	143.9864	7.34	1.41	-31.99	59.12	35.88	43.50	7.62	Pass	V	PK
10	240.0260	11.94	1.84	-31.90	52.94	34.82	46.00	11.18	Pass	V	PK
11	384.0854	15.05	2.33	-31.86	45.99	31.51	46.00	14.49	Pass	V	PK
12	600.1260	19.00	2.96	-31.51	39.69	30.14	46.00	15.86	Pass	V	PK

Transmitter Emission above 1GHz

Mode:			BLE GFSK Transmitting					Channel:		2402	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1320.0320	28.22	2.78	-42.77	56.34	44.57	74.00	29.43	Pass	H	PK
2	3986.0657	33.79	4.33	-43.00	49.28	44.40	74.00	29.60	Pass	H	PK
3	4804.1203	34.50	4.55	-42.80	51.02	47.27	74.00	26.73	Pass	H	PK
4	5970.1980	35.75	5.33	-42.60	49.43	47.91	74.00	26.09	Pass	H	PK
5	7673.3116	36.53	6.20	-42.13	49.03	49.63	74.00	24.37	Pass	H	PK
6	9657.4438	37.66	6.70	-42.10	49.18	51.44	74.00	22.56	Pass	H	PK
7	1991.6992	31.65	3.46	-43.18	59.48	51.41	74.00	22.59	Pass	V	PK
8	2320.5321	32.15	3.82	-43.13	58.59	51.43	74.00	22.57	Pass	V	PK
9	5938.1959	35.70	5.26	-42.60	49.24	47.60	74.00	26.40	Pass	V	PK
10	7639.3093	36.54	6.14	-42.12	48.68	49.24	74.00	24.76	Pass	V	PK
11	9135.4090	37.67	6.45	-42.03	49.62	51.71	74.00	22.29	Pass	V	PK
12	9710.4474	37.68	6.63	-42.10	49.81	52.02	74.00	21.98	Pass	V	PK

Mode:			BLE GFSK Transmitting					Channel:		2440	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1999.0999	31.69	3.47	-43.19	55.10	47.07	74.00	26.93	Pass	H	PK
2	3377.0251	33.35	4.54	-43.10	49.76	44.55	74.00	29.45	Pass	H	PK
3	5526.1684	35.04	5.16	-42.60	49.67	47.27	74.00	26.73	Pass	H	PK
4	6901.2601	36.06	5.88	-42.26	49.14	48.82	74.00	25.18	Pass	H	PK
5	7592.3062	36.56	6.06	-42.11	49.00	49.51	74.00	24.49	Pass	H	PK
6	9100.4067	37.68	6.44	-42.02	50.28	52.38	74.00	21.62	Pass	H	PK
7	1992.4993	31.65	3.46	-43.18	56.94	48.87	74.00	25.13	Pass	V	PK
8	2568.1568	32.51	4.09	-43.10	61.07	54.57	74.00	19.43	Pass	V	PK
9	4880.1253	34.50	4.80	-42.80	49.59	46.09	74.00	27.91	Pass	V	PK
10	6458.2305	35.89	5.51	-42.50	49.54	48.44	74.00	25.56	Pass	V	PK
11	9220.4147	37.66	6.51	-42.05	48.98	51.10	74.00	22.90	Pass	V	PK
12	11244.5496	38.75	7.24	-42.01	48.42	52.40	74.00	21.60	Pass	V	PK

Mode:			BLE GFSK Transmitting					Channel:		2480	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1319.6320	28.22	2.78	-42.77	56.03	44.26	74.00	29.74	Pass	H	PK
2	3934.0623	33.75	4.34	-43.02	50.48	45.55	74.00	28.45	Pass	H	PK
3	5018.1345	34.52	4.84	-42.79	50.21	46.78	74.00	27.22	Pass	H	PK
4	7659.3106	36.54	6.17	-42.14	49.16	49.73	74.00	24.27	Pass	H	PK
5	9648.4432	37.66	6.72	-42.10	49.18	51.46	74.00	22.54	Pass	H	PK
6	10622.5082	38.52	6.96	-41.99	48.79	52.28	74.00	21.72	Pass	H	PK
7	1795.8796	30.35	3.31	-42.70	55.27	46.23	74.00	27.77	Pass	V	PK
8	1994.0994	31.66	3.46	-43.18	56.43	48.37	74.00	25.63	Pass	V	PK
9	4959.1306	34.50	4.82	-42.80	52.22	48.74	74.00	25.26	Pass	V	PK
10	7659.3106	36.54	6.17	-42.14	49.16	49.73	74.00	24.27	Pass	V	PK
11	9265.4177	37.65	6.61	-42.05	49.42	51.63	74.00	22.37	Pass	V	PK
12	10348.4899	38.29	6.92	-42.03	48.77	51.95	74.00	22.05	Pass	V	PK

Note:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading -Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.