TEST REPORT

Product	:	WIFI+BT Module
Trade mark	:	GSD
Model/Type reference	:	WCT0SR2311
Serial Number	:	N/A
Report Number	:	EED32L00189801
FCC ID	:	2AC23-WCT0S
Date of Issue	:	Feb. 27, 2020
Test Standards	:	47 CFR Part 15Subpart C
Test result	:	PASS

Prepared for:

Hui Zhou Gaoshengda Technology Co.,LTD
NO.75 Zhongkai Development Area,Huizhou,Guangdong, China

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested By:	mark. chen.	Compiled by:	Smile Zhong
	Mark Chen		Smile Zhong
Reviewed by:	Ware Xin	Approved by:	Sam Chuang
	Ware Xin		Sam Chuang
Date:	Feb. 27, 2020		Check No.: 3096370616

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

2 Version

Version No.	Date	Description
00	Feb. 27, 2020	Original

3 Test Summary

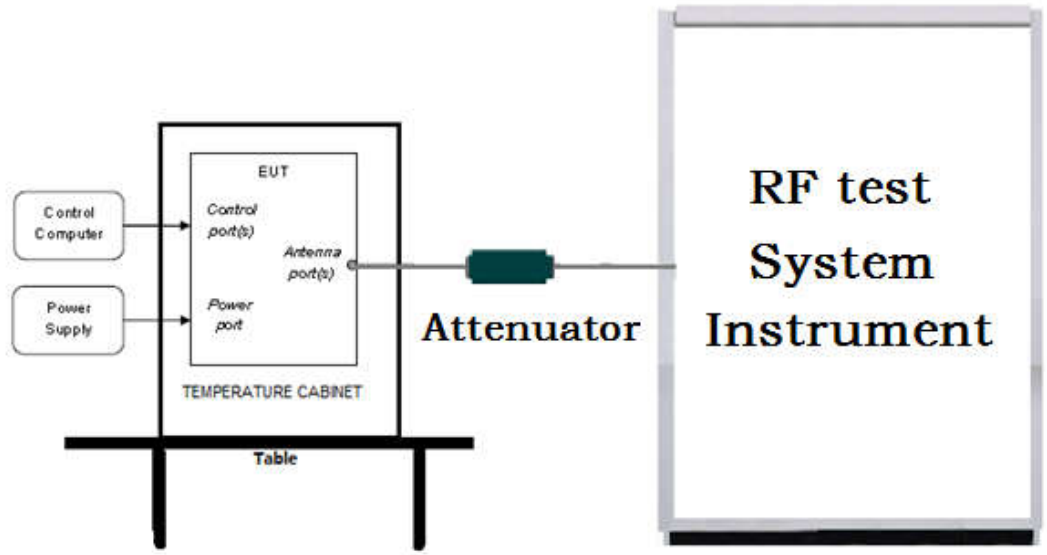
Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Remark: Test according to ANSI C63.4-2014 & ANSI C63.10-2013. The tested sample(s) and the sample information are provided by the client.			

4 Content

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:

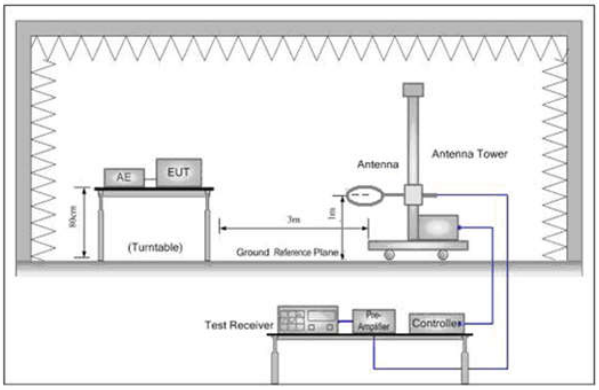


Figure 1. Below 30MHz

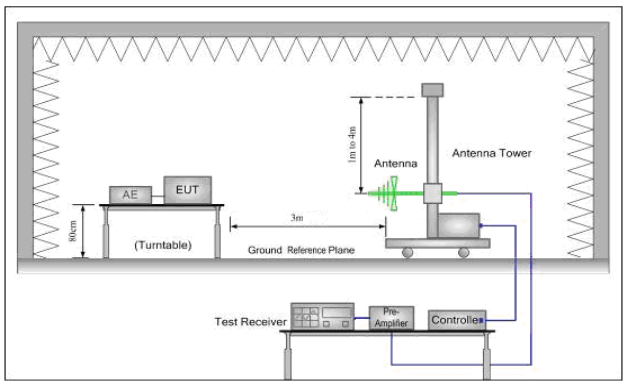


Figure 2. 30MHz to 1GHz

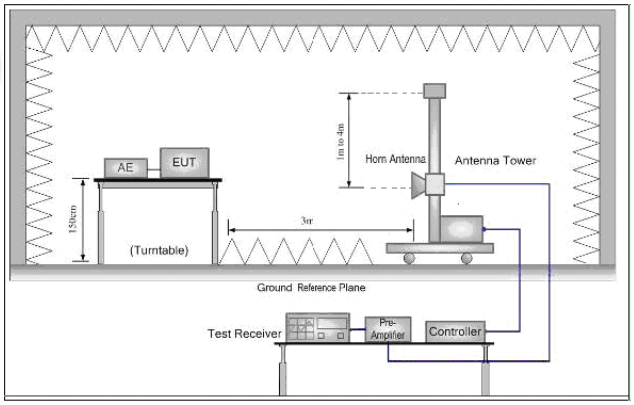
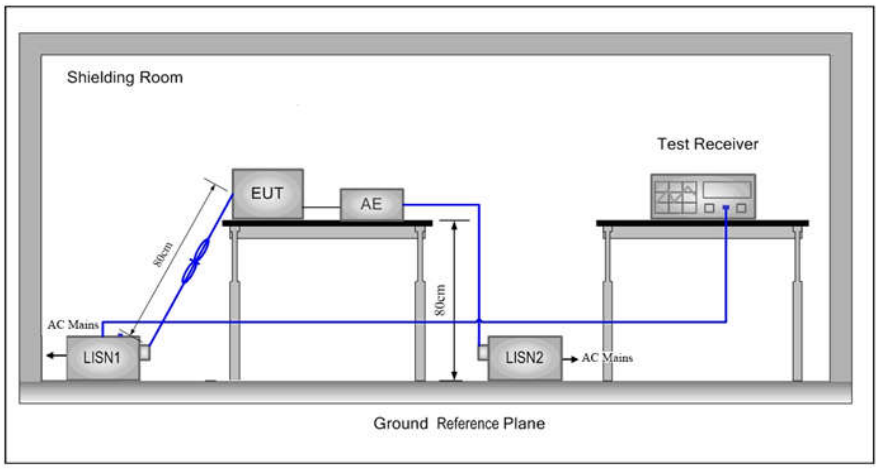


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	55 % 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 1	Channel 20	Channel 40
		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:	Hui Zhou Gaoshengda Technology Co.,LTD
Address of Applicant:	NO.75 Zhongkai Development Area,Huizhou,Guangdong, China
Manufacturer:	Hui Zhou Gaoshengda Technology Co.,LTD
Address of Manufacturer:	NO.75 Zhongkai Development Area,Huizhou,Guangdong, China
Factory:	Hui Zhou Gaoshengda Technology Co.,LTD
Address of Factory:	NO.75 Zhongkai Development Area,Huizhou,Guangdong, China

6.2 General Description of EUT

Product Name:	WIFI+BT Module
Model No.(EUT):	WCT0SR2311
Trade mark:	GSD
EUT Supports Radios application:	BT4.1 Dual mode 2402MHz to 2480MHz
Power Supply:	DC 5V
Sample Received Date:	Jul. 17, 2019
Sample tested Date:	Jul. 17, 2019 to Sep. 09, 2019

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.1
Modulation Technique:	DSSS
Modulation Type:	GFSK
Number of Channel:	40
Test Power Grade:	Default
Test Software of EUT:	Bluetooth RF Test Tool V5.1.1.1
Antenna Type and Gain:	Type: PIFA antenna Gain:2dBi
Test Voltage:	DC 5V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

6.4 Description of Support Units

The EUT has been tested independently

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)**
Signal Generator	Keysight	E8257D	MY53401106	03-01-2019	02-29-2020
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-01-2019	02-29-2020
Attenuator	HuaXiang	SHX370	15040701	03-01-2019	02-29-2020
Signal Generator	Keysight	N5181A	MY46240094	03-01-2019	02-29-2020
Signal Generator	Keysight	N5182B	MY53051549	03-01-2019	02-29-2020
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	10-12-2018	10-11-2019
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-09-2019	01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA09 CL12-0395-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08 CL12-0393-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04 CL12-0396-002	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03 CL12-0394-001	---	01-09-2019	01-08-2020
Communicati on test set	R&S	CMW500	107929	04-28-2019	04-27-2020
DC Power	Keysight	E3642A	MY54426035	03-01-2019	02-29-2020
PC-1	Lenovo	R4960d	---	03-01-2019	02-29-2020
BT&WI-FI Automatic control	R&S	OSP120	101374	03-01-2019	02-29-2020
RF control unit	JS Tonscend	JS0806-2	15860006	03-01-2019	02-29-2020
RF control unit	JS Tonscend	JS0806-1	15860004	03-01-2019	02-29-2020
RF control unit	JS Tonscend	JS0806-4	158060007	03-01-2019	02-29-2020
BT&WI-FI Automatic test software	JS Tonscend	JSTS1120-2	---	03-01-2019	02-29-2020
high-low temperature test chamber	DongGuangQi nZhuo	LK-80GA	QZ20150611 879	03-01-2019	02-29-2020

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	05-20-2019	05-19-2020
Temperature/ Humidity Indicator	Defu	TH128	/	06-14-2019	06-13-2020
Communication test set	Agilent	E5515C	GB47050534	03-01-2019	02-28-2022
Communication test set	R&S	CMW500	102898	01-18-2019	01-17-2020
LISN	R&S	ENV216	100098	05-08-2019	05-07-2020
LISN	schwarzbeck	NNLK8121	8121-529	05-08-2019	05-07-2020
Voltage Probe	R&S	ESH2-Z3 0299.7810.56	100042	06-13-2017	06-12-2020
Current Probe	R&S	EZ-17 816.2063.03	100106	05-20-2019	05-19-2020
ISN	TESEQ	ISN T800	30297	01-16-2019	01-15-2020
Barometer	changchun	DYM3	1188	06-20-2019	06-19-2020

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	9163-401	12-21-2018	12-20-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-26-2019	07-25-2020
Microwave Preamplifier	Agilent	8449B	3008A02425	07-12-2019	07-11-2020
Microwave Preamplifier	Tonscend	EMC051845SE	980380	01-16-2019	01-15-2020
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-24-2021
Horn Antenna	ETS-LINDGREN	3117	00057410	06-05-2018	06-04-2021
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	374	06-05-2018	06-04-2021
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041.6042	07-26-2019	07-25-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Spectrum Analyzer	R&S	FSP40	100416	04-28-2019	04-27-2020
Receiver	R&S	ESCI	100435	05-20-2019	05-19-2020
Receiver	R&S	ESCI7	100938-003	11-23-2018	11-22-2019
Multi device Controller	maturo	NCD/070/10711112	---	01-09-2019	01-08-2020
Signal Generator	Agilent	E4438C	MY45095744	03-01-2019	02-29-2020
Signal Generator	Keysight	E8257D	MY53401106	03-01-2019	02-29-2020
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	10-12-2018	10-11-2019
Communication test set	Agilent	E5515C	GB47050534	03-01-2019	02-28-2022
Cable line	Fulai(7M)	SF106	5219/6A	01-09-2019	01-08-2020
Cable line	Fulai(6M)	SF106	5220/6A	01-09-2019	01-08-2020
Cable line	Fulai(3M)	SF106	5216/6A	01-09-2019	01-08-2020
Cable line	Fulai(3M)	SF106	5217/6A	01-09-2019	01-08-2020
High-pass filter	Sinoscite	FL3CX03WG18NM12-0398-002	---	01-09-2019	01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA09CL12-0395-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08CL12-0393-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04CL12-0396-002	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03CL12-0394-001	---	01-09-2019	01-08-2020

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	06-19-2019	06-18-2020
Receiver	Keysight	N9038A	MY57290136	03-27-2019	03-26-2020
Spectrum Analyzer	Keysight	N9020B	MY57111112	03-27-2019	03-26-2020
Spectrum Analyzer	Keysight	N9030B	MY57140871	03-27-2019	03-26-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-075	04-25-2018	04-24-2021
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
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	Schwarzbeck	BBHA 9170	9170-829	04-25-2018	04-24-2021
Communication Antenna	Schwarzbeck	CLSA 0110L	1014	02-14-2019	02-13-2020
Biconical antenna	Schwarzbeck	VUBA 9117	9117-381	04-25-2018	04-24-2021
Horn Antenna	ETS-LINDGREN	3117	00057407	07-10-2018	07-09-2021
Preamplifier	EMCI	EMC184055SE	980596	05-22-2019	5-21-2020
Communication test set	R&S	CMW500	102898	01-18-2019	01-17-2020
Preamplifier	EMCI	EMC001330	980563	05-08-2019	05-07-2020
Preamplifier	Agilent	8449B	3008A02425	07-12-2019	07-11-2020
Temperature/ Humidity Indicator	biaozhi	GM1360	EE1186631	04-30-2019	04-29-2020
Signal Generator	KEYSIGHT	E8257D	MY53401106	03-01-2019	02-29-2020
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	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	01-09-2019	01-08-2020
Cable line	Times	EMC104-NMNM-1000	SN160710	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	01-09-2019	01-08-2020
Cable line	Times	HF160-KMKM-3.00M	393493-0001	01-09-2019	01-08-2020

8 Radio Technical Requirements Specification

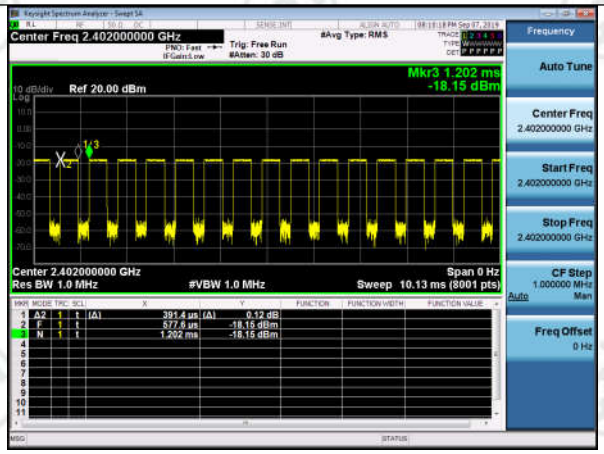
Reference documents for testing:

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)

Duty Cycle			
Configuration	**TX ON(ms)**	**TX ALL(ms)**	**Duty Cycle(%)**
BLE	0.3914	0.6244	62.68%



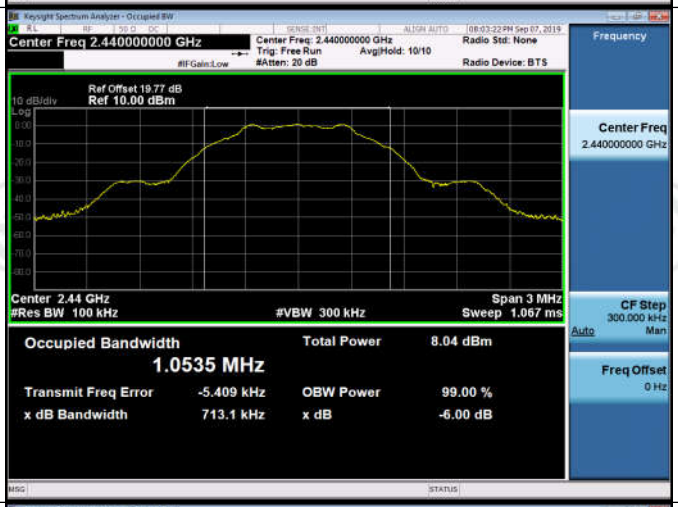
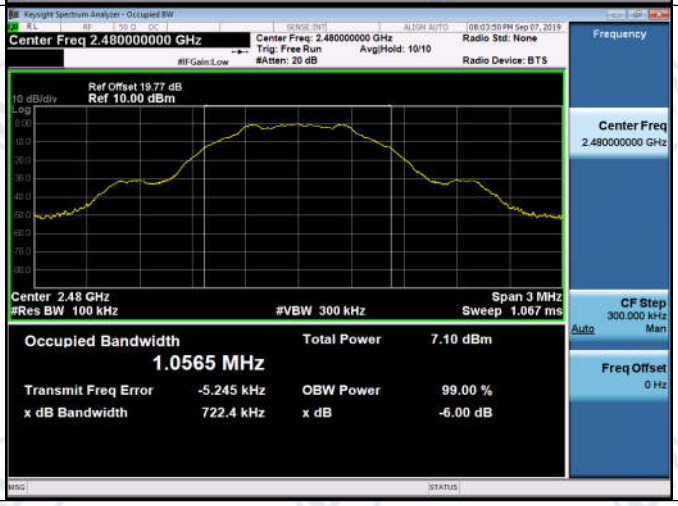
Appendix A): 6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict
BLE	LCH	0.7209	1.0400	PASS
BLE	MCH	0.7131	1.0431	PASS
BLE	HCH	0.7224	1.0412	PASS

Test Graphs

Graphs		
LCH		
MCH		
HCH		

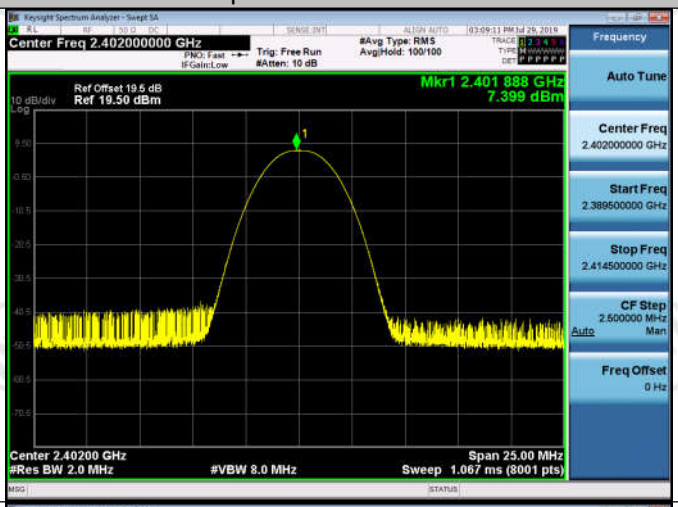
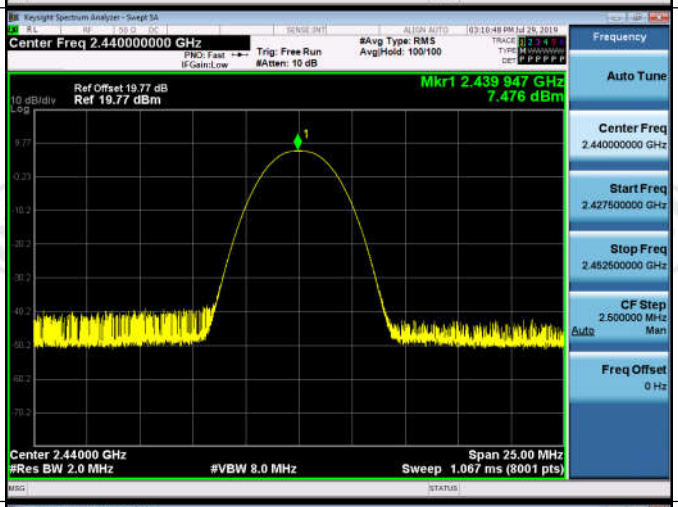
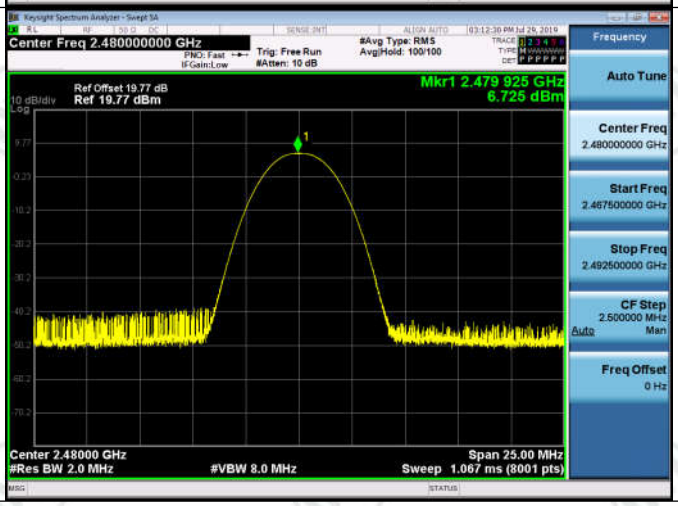
Graphs			
LCH			
MCH			
HCH			

Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	7.399	PASS
BLE	MCH	7.476	PASS
BLE	HCH	6.725	PASS

Test Graphs

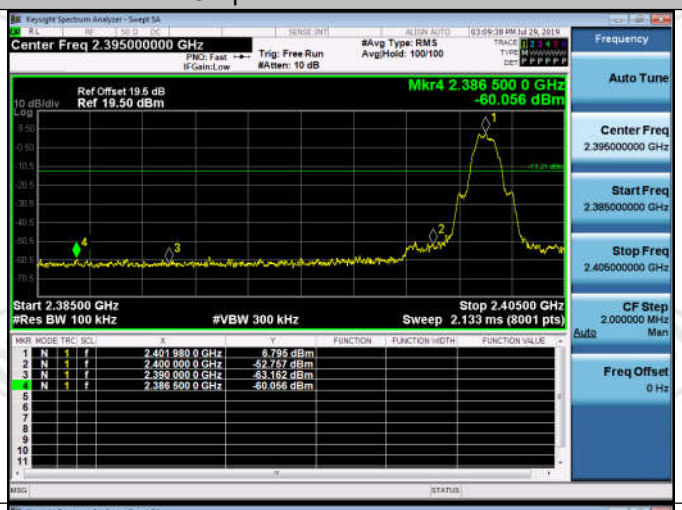
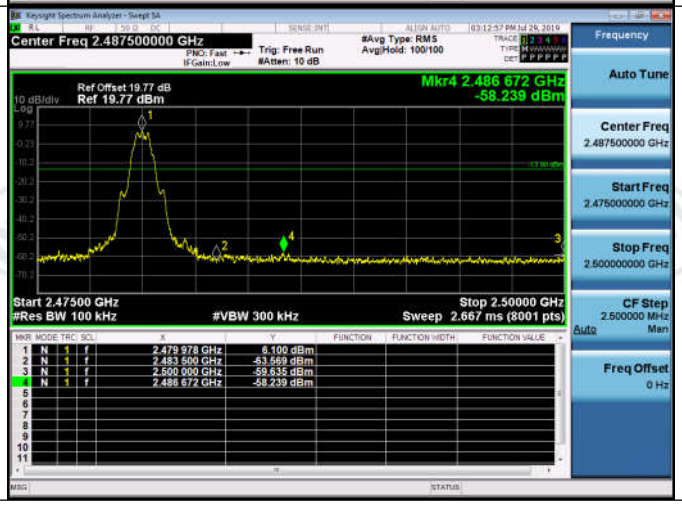
Graphs		
LCH		
MCH		
HCH		

Appendix C): Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	6.795	-60.056	-13.21	PASS
BLE	HCH	6.100	-58.239	-13.9	PASS

Test Graphs

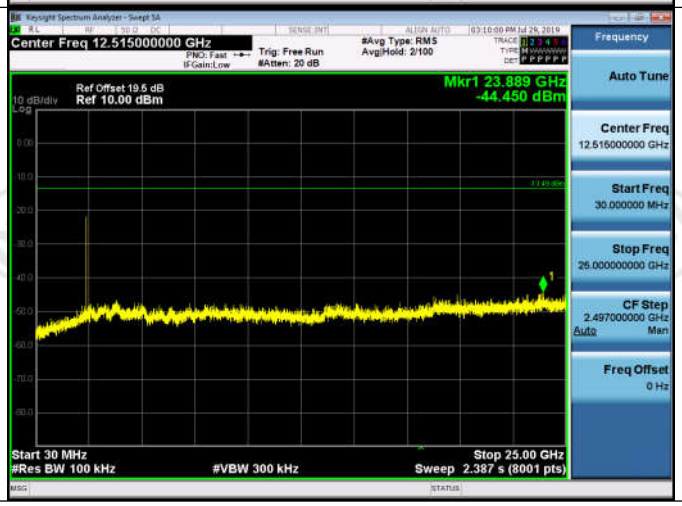
Graphs		
LCH		
HCH		

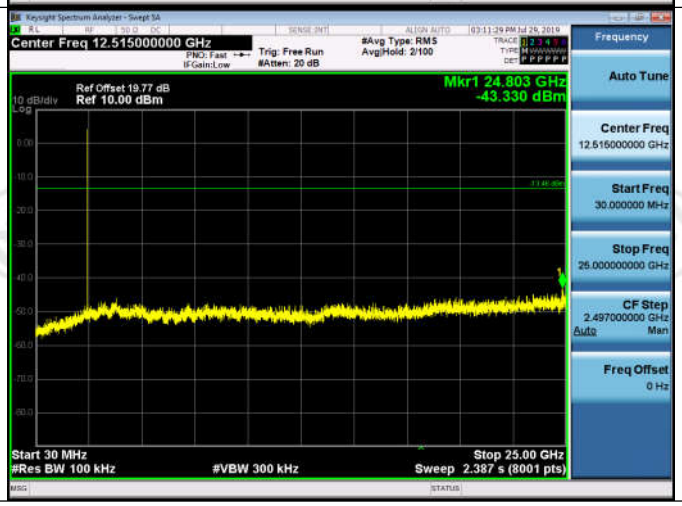
Appendix D): RF Conducted Spurious Emissions

Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	6.51	<Limit	PASS
BLE	MCH	6.543	<Limit	PASS
BLE	HCH	5.768	<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	-10.670	PASS
BLE	MCH	-10.195	PASS
BLE	HCH	-11.115	PASS

Test Graphs

Graphs		
LCH		
MCH		
HCH		

Appendix F): Antenna Requirement

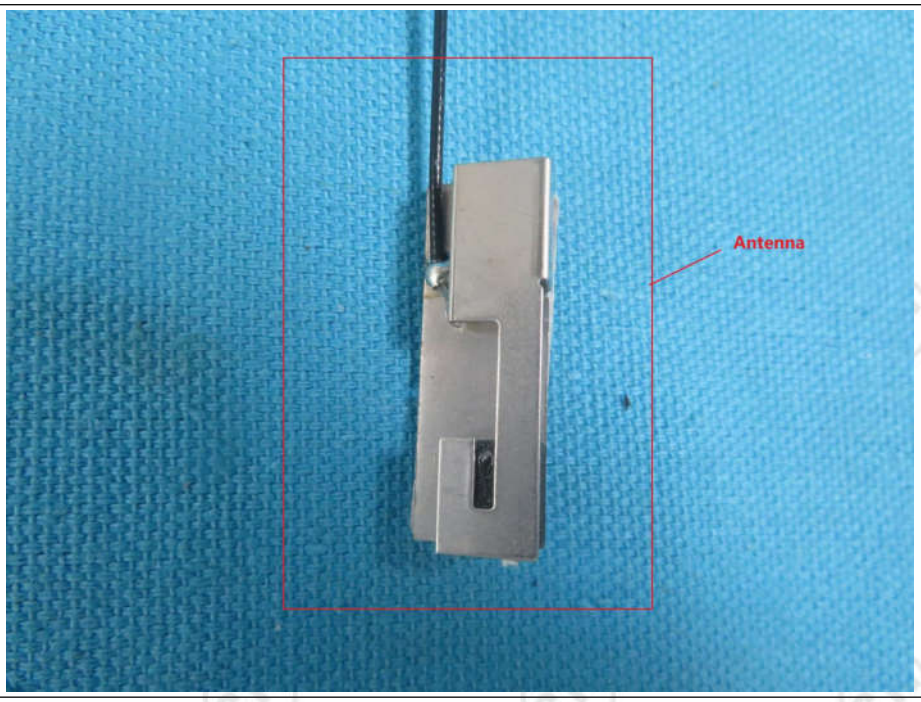
15.203 requirement:

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 integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.

Appendix G): AC Power Line Conducted Emission

Test Procedure:	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.
Limit:	

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* 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

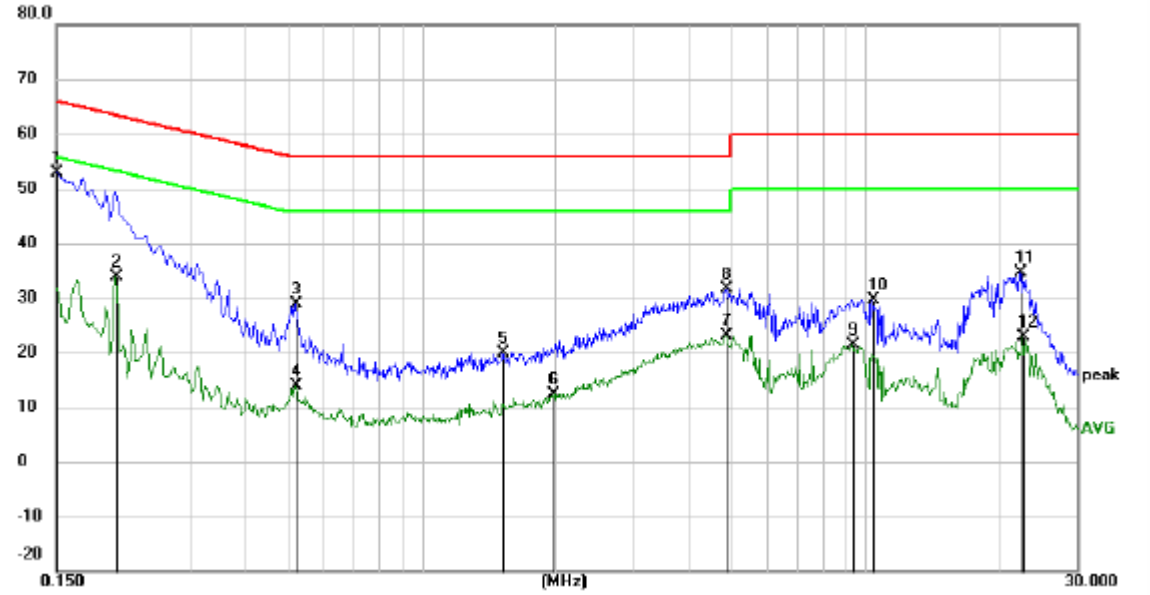
Measurement Data

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.

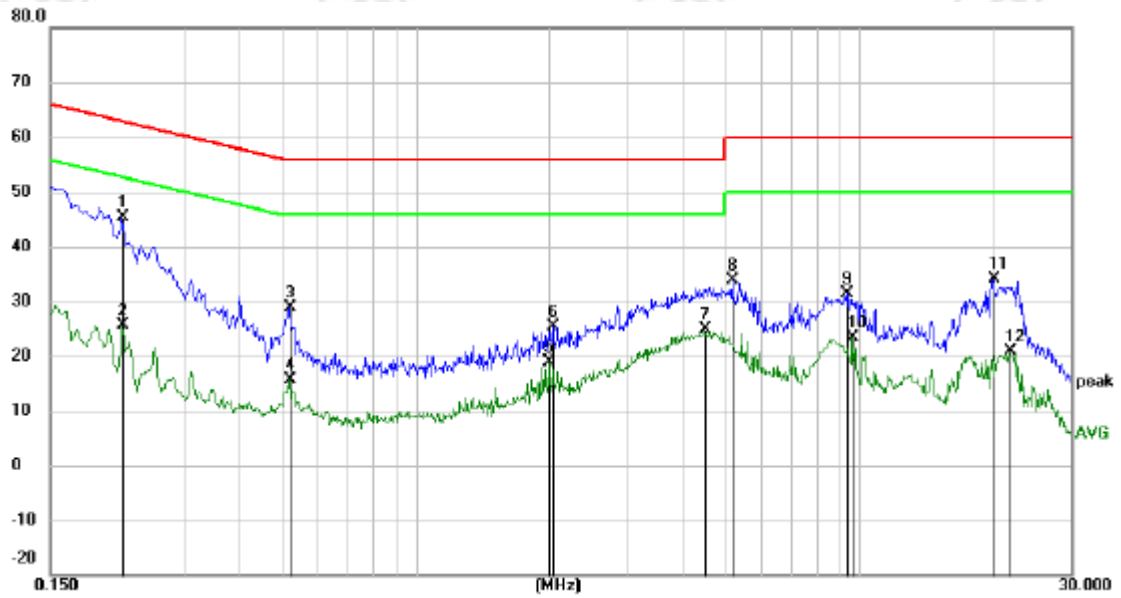
Product	:	WIFI+BT Module	**Model/Type reference**	:	WCT0SR2311
Temperature	:	21℃	**Humidity**	:	51%

Live line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	43.02	9.97	52.99	66.00	-13.01	peak	
2		0.2040	23.95	10.02	33.97	53.45	-19.48	AVG	
3		0.5190	18.82	10.02	28.84	56.00	-27.16	peak	
4		0.5190	3.89	10.02	13.91	46.00	-32.09	AVG	
5		1.5270	10.07	9.87	19.94	56.00	-36.06	peak	
6		1.9725	2.48	9.83	12.31	46.00	-33.69	AVG	
7		4.8345	13.34	9.83	23.17	46.00	-22.83	AVG	
8		4.8705	21.68	9.83	31.51	56.00	-24.49	peak	
9		9.3075	11.35	9.93	21.28	50.00	-28.72	AVG	
10		10.3425	19.63	9.96	29.59	60.00	-30.41	peak	
11		22.2314	24.64	9.94	34.58	60.00	-25.42	peak	
12		22.5960	12.83	9.94	22.77	50.00	-27.23	AVG	

Neutral line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.2175	35.30	10.03	45.33	62.91	-17.58	peak	
2		0.2175	15.61	10.03	25.64	52.91	-27.27	AVG	
3		0.5190	18.74	10.02	28.76	56.00	-27.24	peak	
4		0.5190	5.64	10.02	15.66	46.00	-30.34	AVG	
5		1.9995	8.98	9.83	18.81	46.00	-27.19	AVG	
6		2.0400	15.52	9.83	25.35	56.00	-30.65	peak	
7		4.4880	14.96	9.83	24.79	46.00	-21.21	AVG	
8		5.1765	23.96	9.83	33.79	60.00	-26.21	peak	
9		9.3569	21.43	9.94	31.37	60.00	-28.63	peak	
10		9.6090	13.45	9.95	23.40	50.00	-26.60	AVG	
11		19.9500	24.12	9.93	34.05	60.00	-25.95	peak	
12		21.8265	10.95	9.94	20.89	50.00	-29.11	AVG	

Notes:

1. *The following 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 v04, 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.

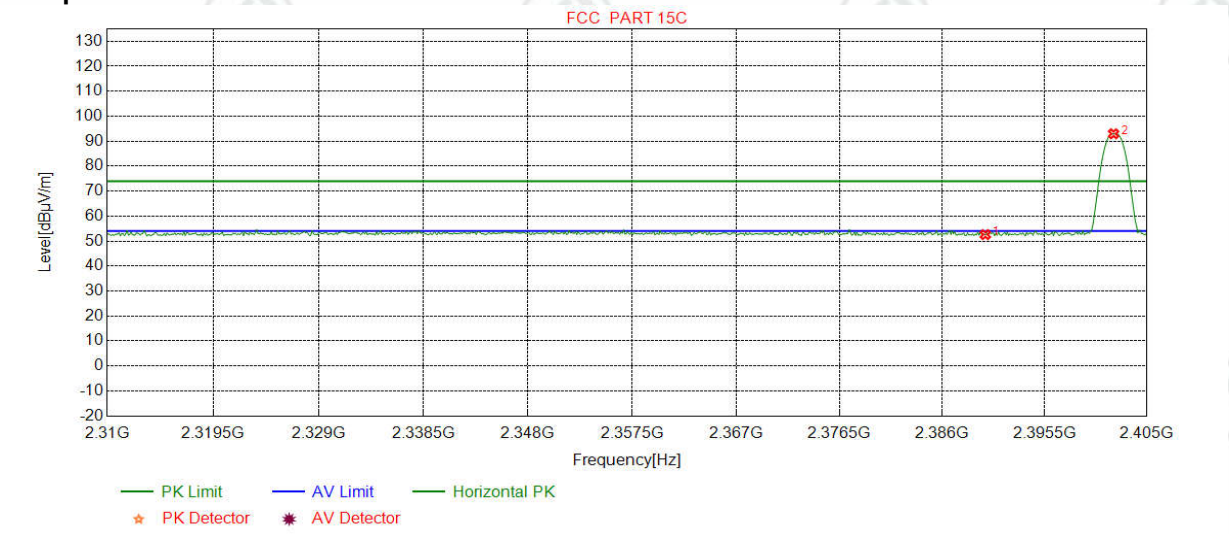
Limit:

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		

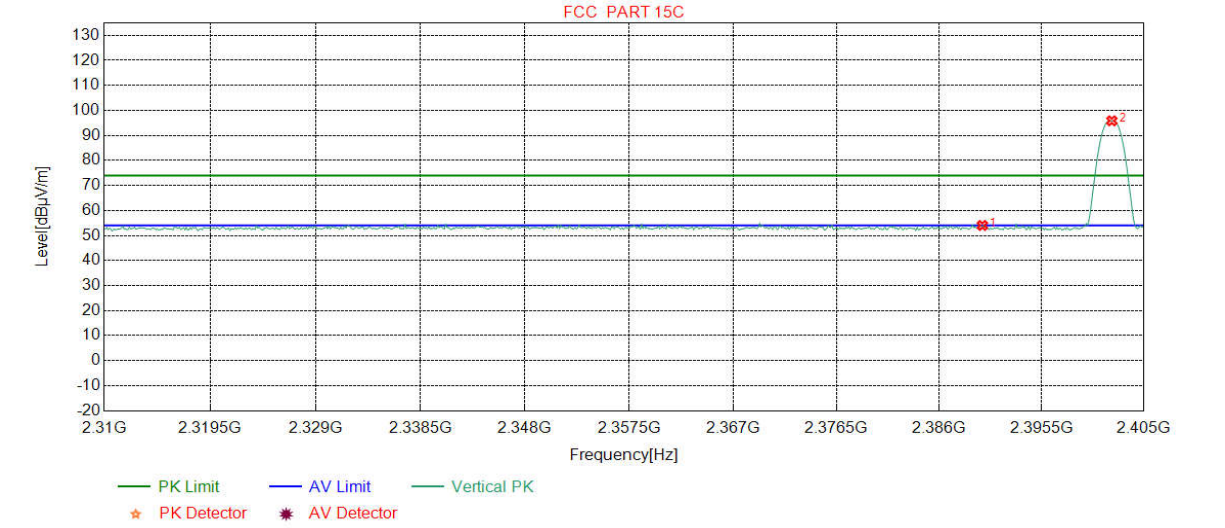
Test Graph



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	-42.44	49.41	52.59	74.00	21.41	Pass	Horizontal
2	2401.9086	32.26	13.31	-42.43	89.82	92.96	74.00	-18.96	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	PK		

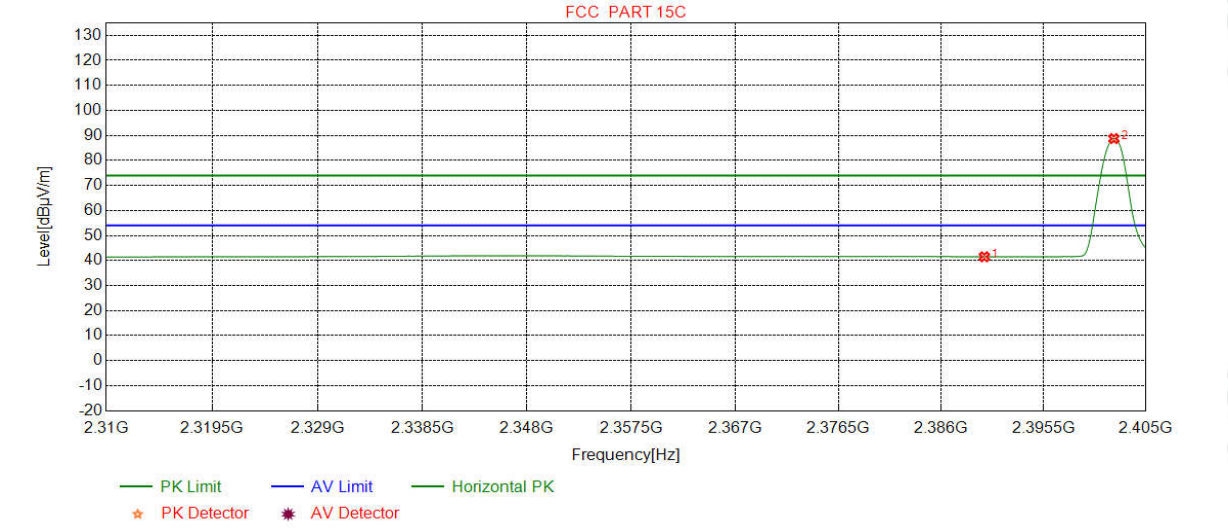
Test Graph



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	-42.44	50.84	54.02	74.00	19.98	Pass	Vertical
2	2402.0275	32.26	13.31	-42.43	92.70	95.84	74.00	-21.84	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		

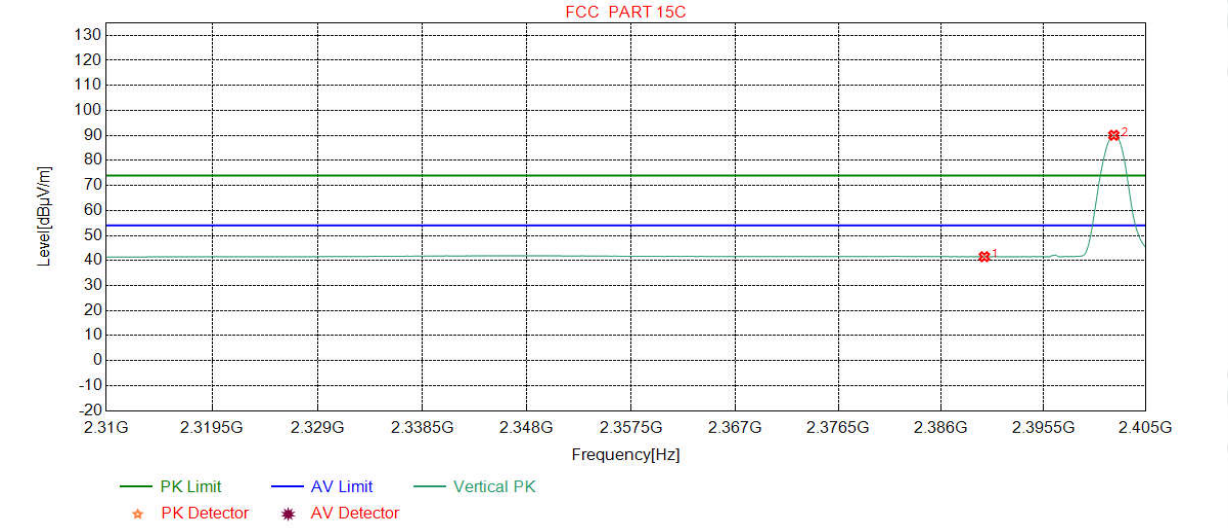
Test Graph



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	-42.44	38.32	41.50	54.00	12.50	Pass	Horizontal
2	2402.0275	32.26	13.31	-42.43	85.59	88.73	54.00	-34.73	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		

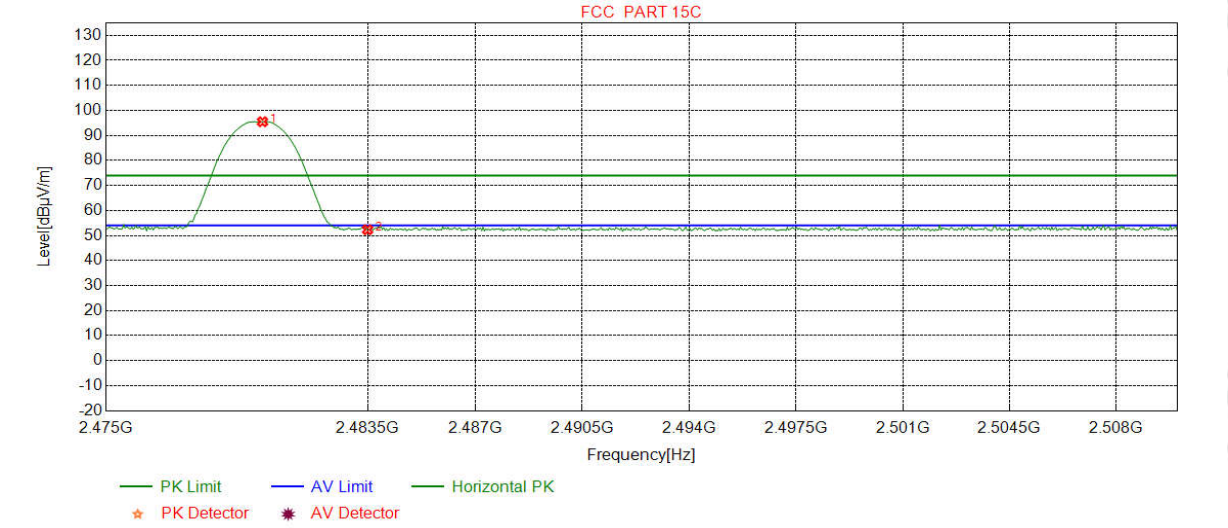
Test Graph



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	-42.44	38.36	41.54	54.00	12.46	Pass	Vertical
2	2402.0275	32.26	13.31	-42.43	86.91	90.05	54.00	-36.05	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	PK		

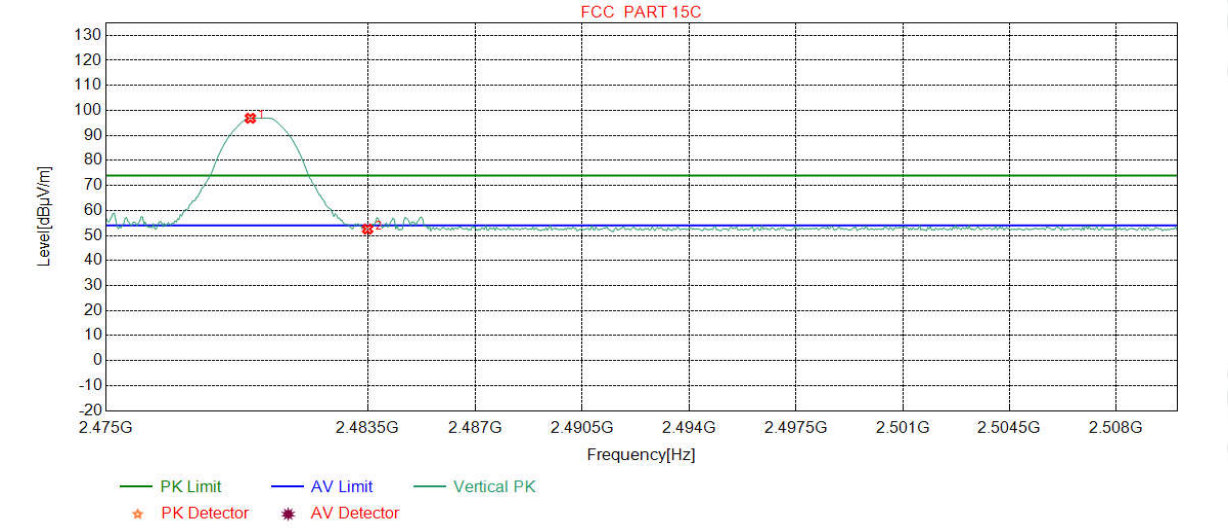
Test Graph



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	2480.0814	32.37	13.39	-42.40	92.11	95.47	74.00	-21.47	Pass	Horizontal
2	2483.5000	32.38	13.38	-42.40	48.96	52.32	74.00	21.68	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	PK		

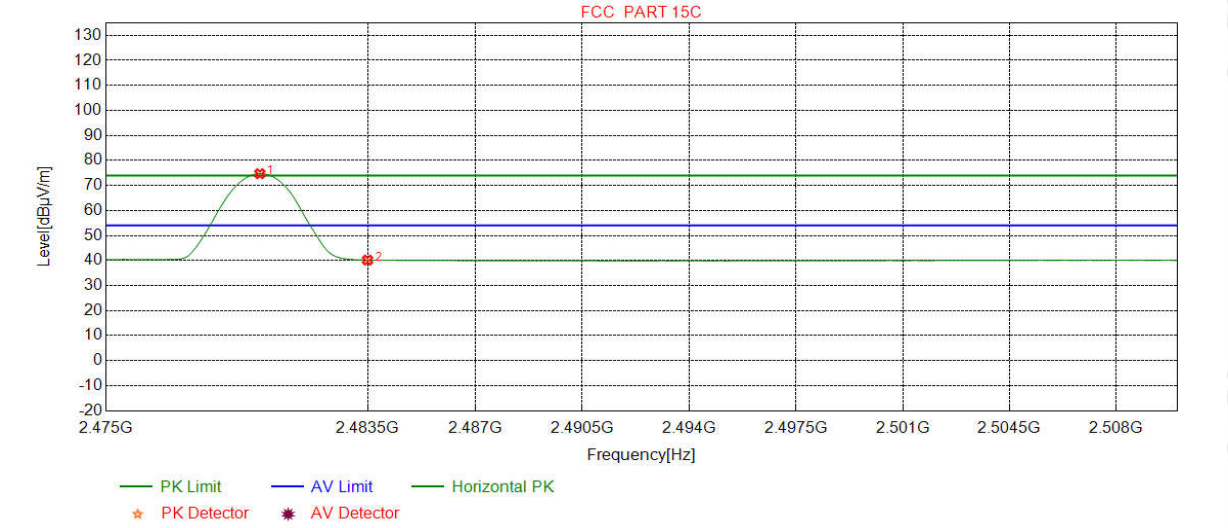
Test Graph



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	2479.6871	32.37	13.39	-42.39	93.49	96.86	74.00	-22.86	Pass	Vertical
2	2483.5000	32.38	13.38	-42.40	49.22	52.58	74.00	21.42	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	AV		

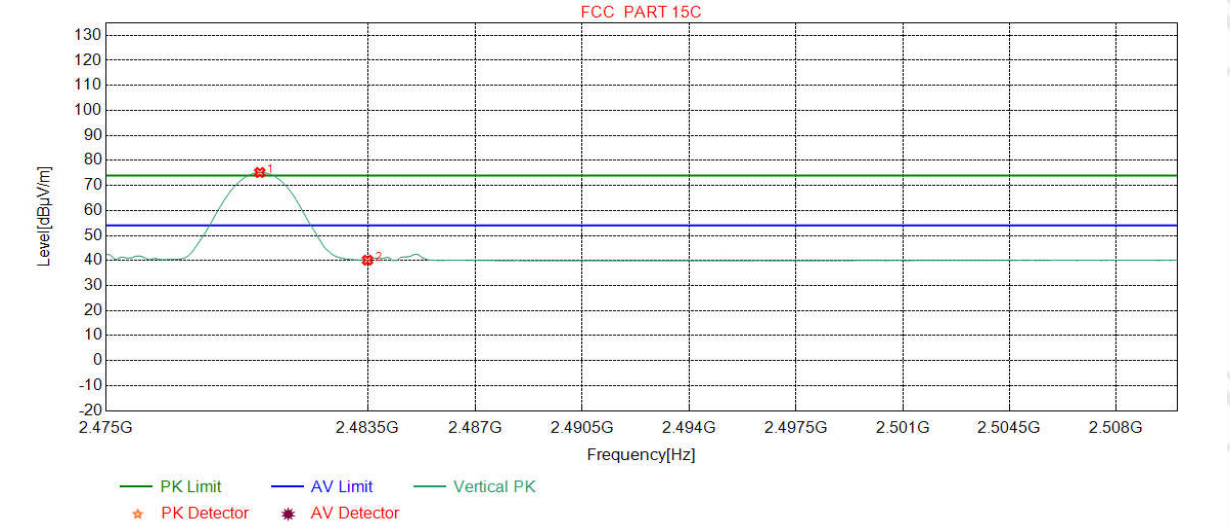
Test Graph



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	2479.9937	32.37	13.39	-42.39	71.34	74.71	54.00	-20.71	Pass	Horizontal
2	2483.5000	32.38	13.38	-42.40	36.80	40.16	54.00	13.84	Pass	Horizontal

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	2479.9937	32.37	13.39	-42.39	71.81	75.18	54.00	-21.18	Pass	Vertical
2	2483.5000	32.38	13.38	-42.40	36.78	40.14	54.00	13.86	Pass	Vertical

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*

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 v04, 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:		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	36.6937	11.24	0.67	-32.11	36.85	16.65	40.00	23.35	Pass	H	PK
2	54.6405	12.46	0.84	-32.09	31.62	12.83	40.00	27.17	Pass	H	PK
3	87.5268	8.83	1.08	-32.08	35.74	13.57	40.00	26.43	Pass	H	PK
4	226.1536	11.58	1.78	-31.92	41.12	22.56	46.00	23.44	Pass	H	PK
5	452.1862	16.23	2.52	-31.87	41.48	28.36	46.00	17.64	Pass	H	PK
6	879.7080	21.86	3.55	-31.66	34.86	28.61	46.00	17.39	Pass	H	PK
7	54.9315	12.41	0.84	-32.08	40.75	21.92	40.00	18.08	Pass	V	PK
8	71.8112	8.66	0.97	-32.06	38.39	15.96	40.00	24.04	Pass	V	PK
9	130.0170	7.70	1.33	-32.02	37.14	14.15	43.50	29.35	Pass	V	PK
10	208.8859	11.13	1.71	-31.94	47.02	27.92	43.50	15.58	Pass	V	PK
11	452.2832	16.24	2.52	-31.88	39.81	26.69	46.00	19.31	Pass	V	PK
12	844.9785	21.44	3.50	-31.82	36.23	29.35	46.00	16.65	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	36.6937	11.24	0.67	-32.11	36.61	16.41	40.00	23.59	Pass	H	PK
2	88.4969	9.05	1.09	-32.08	34.75	12.81	43.50	30.69	Pass	H	PK
3	130.0170	7.70	1.33	-32.02	38.28	15.29	43.50	28.21	Pass	H	PK
4	226.0566	11.58	1.78	-31.92	41.23	22.67	46.00	23.33	Pass	H	PK
5	452.1862	16.23	2.52	-31.87	41.71	28.59	46.00	17.41	Pass	H	PK
6	974.9715	22.55	3.75	-30.95	37.15	32.50	54.00	21.50	Pass	H	PK
7	54.2524	12.52	0.83	-32.08	40.98	22.25	40.00	17.75	Pass	V	PK
8	71.9082	8.64	0.97	-32.05	38.79	16.35	40.00	23.65	Pass	V	PK
9	208.8859	11.13	1.71	-31.94	47.32	28.22	43.50	15.28	Pass	V	PK
10	452.2832	16.24	2.52	-31.88	38.63	25.51	46.00	20.49	Pass	V	PK
11	649.9890	19.40	3.10	-32.07	35.66	26.09	46.00	19.91	Pass	V	PK
12	974.9715	22.55	3.75	-30.95	35.36	30.71	54.00	23.29	Pass	V	PK

Mode:			BLE GFSK Transmitting					Channel:		2480	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Preamp gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	36.5967	11.21	0.67	-32.11	37.05	16.82	40.00	23.18	Pass	H	PK
2	87.7208	8.88	1.08	-32.09	35.20	13.07	40.00	26.93	Pass	H	PK
3	226.0566	11.58	1.78	-31.92	41.90	23.34	46.00	22.66	Pass	H	PK
4	452.3802	16.24	2.52	-31.88	40.53	27.41	46.00	18.59	Pass	H	PK
5	687.5318	19.70	3.14	-32.06	36.60	27.38	46.00	18.62	Pass	H	PK
6	974.9715	22.55	3.75	-30.95	35.24	30.59	54.00	23.41	Pass	H	PK
7	54.4464	12.49	0.84	-32.09	40.11	21.35	40.00	18.65	Pass	V	PK
8	120.0250	9.20	1.30	-32.07	36.43	14.86	43.50	28.64	Pass	V	PK
9	208.8859	11.13	1.71	-31.94	46.94	27.84	43.50	15.66	Pass	V	PK
10	290.7621	13.02	2.03	-31.88	41.23	24.40	46.00	21.60	Pass	V	PK
11	452.2832	16.24	2.52	-31.88	39.18	26.06	46.00	19.94	Pass	V	PK
12	974.9715	22.55	3.75	-30.95	36.37	31.72	54.00	22.28	Pass	V	PK

Transmitter Emission above 1GHz

Mode:			BLE GFSK Transmitting					Channel:		2402	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Preamp gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1200.4200	28.10	2.66	-42.89	57.51	45.38	74.00	28.62	Pass	H	PK
2	1677.6678	29.57	3.17	-42.71	55.44	45.47	74.00	28.53	Pass	H	PK
3	3064.0043	33.23	4.80	-42.09	50.09	46.03	74.00	27.97	Pass	H	PK
4	6231.2154	35.85	5.30	-41.14	46.50	46.51	74.00	27.49	Pass	H	PK
5	8970.3980	37.63	6.35	-40.66	45.37	48.69	74.00	25.31	Pass	H	PK
6	13064.6710	39.57	8.10	-41.66	46.90	52.91	74.00	21.09	Pass	H	PK
7	1199.8200	28.10	2.66	-42.89	60.79	48.66	74.00	25.34	Pass	V	PK
8	1680.8681	29.59	3.18	-42.71	56.85	46.91	74.00	27.09	Pass	V	PK
9	3370.0247	33.35	4.54	-41.90	49.59	45.58	74.00	28.42	Pass	V	PK
10	7629.3086	36.55	6.13	-40.83	46.62	48.47	74.00	25.53	Pass	V	PK
11	11230.5487	38.74	7.22	-41.23	47.04	51.77	74.00	22.23	Pass	V	PK
12	14253.7503	39.95	8.58	-41.77	47.57	54.33	74.00	19.67	Pass	V	PK

Mode:			BLE GFSK Transmitting					Channel:		2440	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Preamp gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1199.6200	28.10	2.66	-42.89	58.84	46.71	74.00	27.29	Pass	H	PK
2	1683.4683	29.61	3.18	-42.70	55.19	45.28	74.00	28.72	Pass	H	PK
3	3598.0399	33.48	4.34	-41.61	48.95	45.16	74.00	28.84	Pass	H	PK
4	5908.1939	35.65	5.10	-41.00	45.90	45.65	74.00	28.35	Pass	H	PK
5	8189.3460	36.48	6.37	-40.83	46.58	48.60	74.00	25.40	Pass	H	PK
6	12401.6268	39.54	7.85	-41.12	46.81	53.08	74.00	20.92	Pass	H	PK
7	1200.4200	28.10	2.66	-42.89	58.75	46.62	74.00	27.38	Pass	V	PK
8	1677.2677	29.57	3.17	-42.71	56.40	46.43	74.00	27.57	Pass	V	PK
9	4740.1160	34.50	4.70	-40.71	45.48	43.97	74.00	30.03	Pass	V	PK
10	7481.2988	36.58	5.92	-40.79	47.40	49.11	74.00	24.89	Pass	V	PK
11	12459.6306	39.58	7.65	-41.11	46.26	52.38	74.00	21.62	Pass	V	PK
12	15733.8489	41.37	9.72	-43.17	47.28	55.20	74.00	18.80	Pass	V	PK

Mode:			BLE GFSK Transmitting					Channel:		2480	
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Preamp gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1200.4200	28.10	2.66	-42.89	59.40	47.27	74.00	26.73	Pass	H	PK
2	1678.0678	29.58	3.17	-42.71	55.67	45.71	74.00	28.29	Pass	H	PK
3	3353.0235	33.34	4.52	-41.90	49.88	45.84	74.00	28.16	Pass	H	PK
4	5549.1699	35.08	5.16	-40.69	46.20	45.75	74.00	28.25	Pass	H	PK
5	8242.3495	36.50	6.23	-40.79	47.07	49.01	74.00	24.99	Pass	H	PK
6	11768.5846	39.11	7.47	-41.29	46.39	51.68	74.00	22.32	Pass	H	PK
7	1200.2200	28.10	2.66	-42.89	59.92	47.79	74.00	26.21	Pass	V	PK
8	1500.4500	28.40	2.99	-42.67	58.32	47.04	74.00	26.96	Pass	V	PK
9	3738.0492	33.59	4.32	-41.32	49.67	46.26	74.00	27.74	Pass	V	PK
10	4770.1180	34.50	4.59	-40.68	46.96	45.37	74.00	28.63	Pass	V	PK
11	7054.2703	36.15	5.70	-41.14	46.26	46.97	74.00	27.03	Pass	V	PK
12	10134.4756	37.99	6.87	-40.62	46.74	50.98	74.00	23.02	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.