TEST REPORT

Product	:	Electric Bicycles
Trade mark	:	ARIV
Model/Type reference	:	Merge (folding), Meld (non-folding)
ACT Job Number	:	1028.0001.002 (Merge), 1028.0002.001 (Meld)
Serial Number	:	N/A
Report Number	:	EED32K00244301
Date of Issue	:	Sep. 18, 2019
Test Standards	:	47 CFR Part 15Subpart C
Test result	:	PASS

Prepared for:

General Motors LLC
300 Renaissance Center Detroit, MI 48243 UNITED STATES

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
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Tested By:	Jay Zheng	Compiled by:	Alex Wu
Reviewed by:	Ware Xin	Approved by:	Kevin Yang
Date:	Sep. 18, 2019		Check No.: 3336881454

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2 Version

Version No.	Date	Description
00	Sep. 18, 2019	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

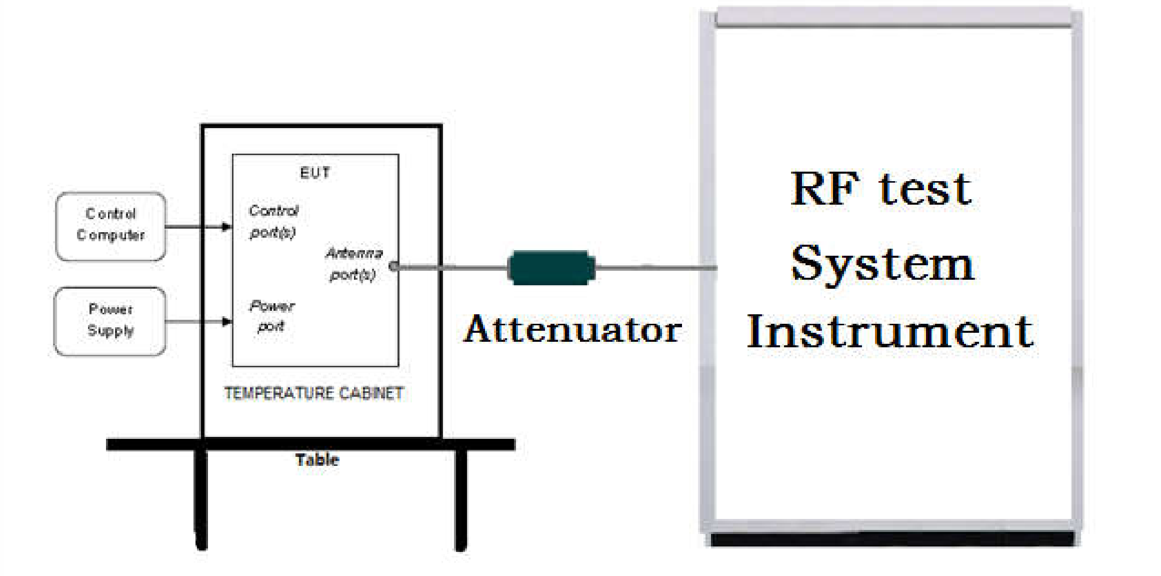
Remark:
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.
The tested sample(s) and the sample information are provided by the client.
Model No.: Merge (folding), Meld (non-folding)
both produced by General Motors share the same electrical circuit design, layout, components, internal wiring, shell material and shape except the following points:
1) The Meld (non-folding) (1028.0002.001)has a non-folding frame. The frame profile looks like the Merge (folding) (1028.0001.002), but does not have the hinges allowing the frame to fold.
2) The Meld (non-Folding) (1028.0002.001) has a chain drive instead of the belt drive that is on Merge (folding) (1028.0001.002) so there are a few different drivetrain components:
a.The crankset (part that the pedals attach to) is designed for a chain instead of a belt
b.The rear wheel has a cog that is designed for a chain instead of a belt
c.instead of a belt it has a chain connecting those parts
The test model is Merge (folding) and the test results are applicable to the others.

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:

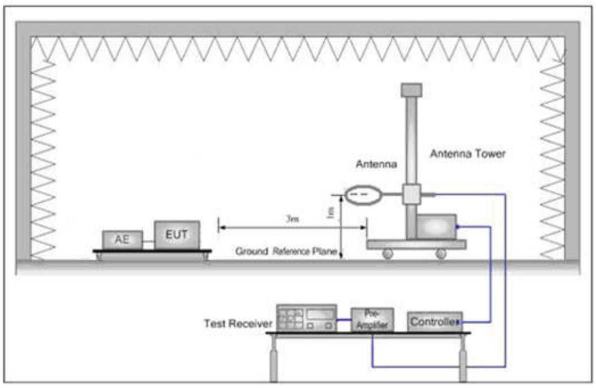


Figure 1. Below 30MHz

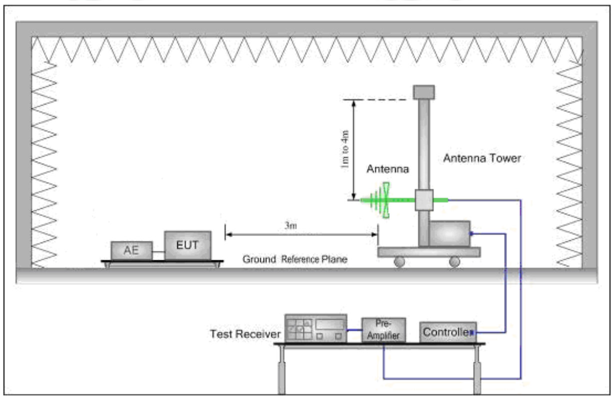


Figure 2. 30MHz to 1GHz

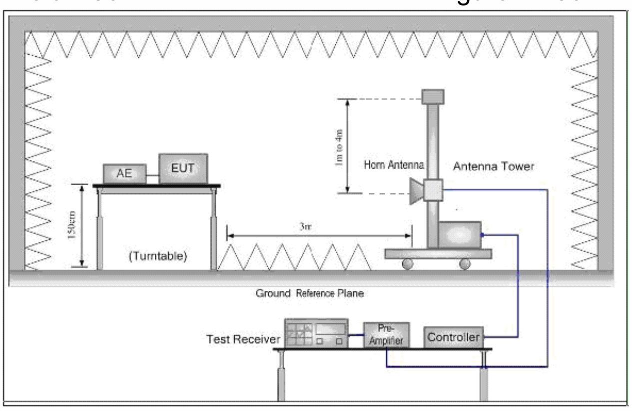
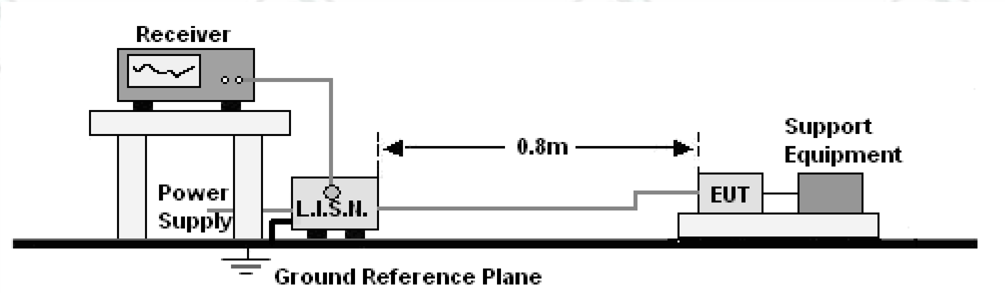


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment for RF Conducted test:	
Temperature:	24°C
Humidity:	52% RH
Atmospheric Pressure:	101kPa

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
TX mode	The EUT transmitted the continuous signal at the specific channel(s).			

6 General Information

6.1 Client Information

Applicant:	General Motors LLC
Address of Applicant:	300 Renaissance Center Detroit, MI 48243 UNITED STATES
Manufacturer:	G-ONE TECH （VIETNAM）COMPANY LIMITED
Address of Manufacturer:	No. 8B VSIP IIA, Street. 30, Vietnam-Singapore Industrial Park IIA, Vinh Tan Commune, Tan Uyen Town, Binh Duong Province, Vietnam
Factory：	G-ONE TECH （VIETNAM）COMPANY LIMITED
Address of Factory:	No. 8B VSIP IIA, Street. 30, Vietnam-Singapore Industrial Park IIA, Vinh Tan Commune, Tan Uyen Town, Binh Duong Province, Vietnam

6.2 General Description of EUT

Product Name:	Electric Bicycles	
Model No.(EUT):	Merge (folding), Meld (non-folding)	
Test Model No.:	Merge (folding)	
Trade Mark:	ARIV	
EUT Supports Radios application:	3G Band2, Band5; 4G Band2, Band4, Band5, Band17 BT 4.1 BT Single mode, 2402MHz to 2480MHz GPS L1:1559MHz to 1610MHz	
Power Supply:	Adapter	Model: BC1315 1.01 Input: 100-240VAC, 50/60Hz, 2.0A Output: +49.2V⎓1.75A
	Battery	Battery 43V DC
Firmware version:	GMD-4513001; GMT-5303202(manufacturer declare)	
Hardware version:	GMD-V5.1; GMT-V3.0(manufacturer declare)	
Sample Received Date:	Sep. 06, 2018	
Sample tested Date:	Sep. 20, 2018 to Sep. 18, 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:	N/A(manufacturer declare)
Test Software of EUT:	uEnergyTest (manufacturer declare)
Antenna Type:	PCB
Antenna Gain:	-0.23dBi
Test Voltage:	AC 120V, 60Hz

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	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	Keysight	E8257D	MY53401106	03-02-2018 03-01-2019	03-01-2019 02-29-2020
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-02-2018 03-01-2019	03-01-2019 02-29-2020
Signal Generator	Keysight	N5182B	MY53051549	03-02-2018 03-01-2019	03-01-2019 02-29-2020
High-pass filter	Sinoscite	FL3CX03WG18N M12-0398-002	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
DC Power	Keysight	E3642A	MY54426035	03-02-2018 03-01-2019	03-01-2019 02-29-2020
PC-1	Lenovo	R4960d	---	03-02-2018 03-01-2019	03-01-2019 02-29-2020
BT&WI-FI Automatic control	R&S	OSP120	101374	03-02-2018 03-01-2019	03-01-2019 02-29-2020
RF control unit	JS Tonscend	JS0806-2	15860006	03-02-2018 03-01-2019	03-01-2019 02-29-2020
RF control unit	JS Tonscend	JS0806-1	15860004	03-02-2018 03-01-2019	03-01-2019 02-29-2020
RF control unit	JS Tonscend	JS0806-4	158060007	03-02-2018 03-01-2019	03-01-2019 02-29-2020
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	03-02-2018 03-01-2019	03-01-2019 02-29-2020
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	10-12-2018	10-11-2019

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	05-25-2018 05-20-2019	05-24-2019 05-18-2020
Temperature/ Humidity Indicator	Defu	TH128	/	07-02-2018 06-14-2019	07-01-2019 06-12-2020
Communication test set	Agilent	E5515C	GB47050534	03-02-2018 03-01-2019	03-01-2019 02-29-2020
Communication test set	R&S	CMW500	102898	01-19-2018 01-18-2019	01-18-2019 01-17-2020
LISN	R&S	ENV216	100098	05-10-2018 05-08-2019	05-10-2019 05-06-2020
Voltage Probe	R&S	ESH2-Z3 0299.7810.56	100042	06-13-2017	06-11-2020
Current Probe	R&S	EZ-17 816.2063.03	100106	05-30-2018 05-20-2019	05-29-2019 05-18-2020
ISN	TESEQ	ISN T800	30297	01-17-2018 01-16-2019	01-16-2019 01-15-2020

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	---	06-04-2016 05-04-2019	06-03-2019 05-22-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	12-21-2018	12-20-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-30-2018 07-26-2019	07-29-2019 07-25-2020
Microwave Preamplifier	Agilent	8449B	3008A02425	08-21-2018 07-12-2019	08-20-2019 07-11-2020
Microwave Preamplifier	Tonscend	EMC051845SE	980380	01-17-2018 01-16-2019	01-16-2019 01-15-2020
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-23-2021
Horn Antenna	ETS-LINDGREN	3117	00057410	06-05-2018	06-03-2021
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	374	06-05-2018	06-04-2021
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041.6041	08-08-2018 07-26-2019	08-07-2019 07-25-2020
Preamplifier	EMCI	EMC001330	980563	06-20-2018 05-08-2019	06-19-2019 05-06-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-075	04-25-2018	04-23-2021
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018 04-28-2019	05-10-2019 04-26-2020
Receiver	R&S	ESCI	100435	05-25-2018 05-20-2019	05-24-2019 05-18-2020
Receiver	R&S	ESCI7	100938-003	11-23-2018	11-22-2019
Multi device Controller	maturo	NCD/070/10711 112	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
LISN	schwarzbeck	NNBM8125	81251547	05-11-2018 05-08-2019	05-10-2019 05-06-2020
LISN	schwarzbeck	NNBM8125	81251548	05-11-2018 05-08-2019	05-10-2019 05-06-2020
Signal Generator	Agilent	E4438C	MY45095744	03-02-2018 03-01-2019	03-01-2019 02-29-2020
Signal Generator	Keysight	E8257D	MY53401106	03-02-2018 03-01-2019	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	03-02-2018 03-01-2019	03-01-2019 02-29-2020
Cable line	Fulai(7M)	SF106	5219/6A	01-10-2018 01-09-2019	01-09-2019 01-08-2020
Cable line	Fulai(6M)	SF106	5220/6A	01-10-2018 01-09-2019	01-09-2019 01-08-2020
Cable line	Fulai(3M)	SF106	5216/6A	01-10-2018 01-09-2019	01-09-2019 01-08-2020
Cable line	Fulai(3M)	SF106	5217/6A	01-10-2018 01-09-2019	01-09-2019 01-08-2020
Communication test set	R&S	CMW500	104466	01-10-2018 01-09-2019	01-09-2019 01-08-2020
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-10-2018 01-09-2019	01-09-2019 01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-10-2018 01-09-2019	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)

Appendix A): 6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict
BLE	LCH	0.7264	1.0428	PASS
BLE	MCH	0.7112	1.0427	PASS
BLE	HCH	0.7334	1.0454	PASS

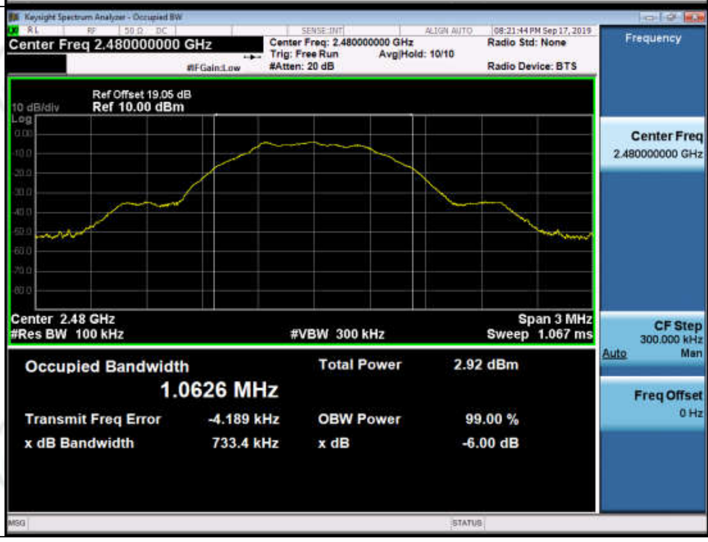
Test Graphs

Graphs

LCH

MCH

HCH



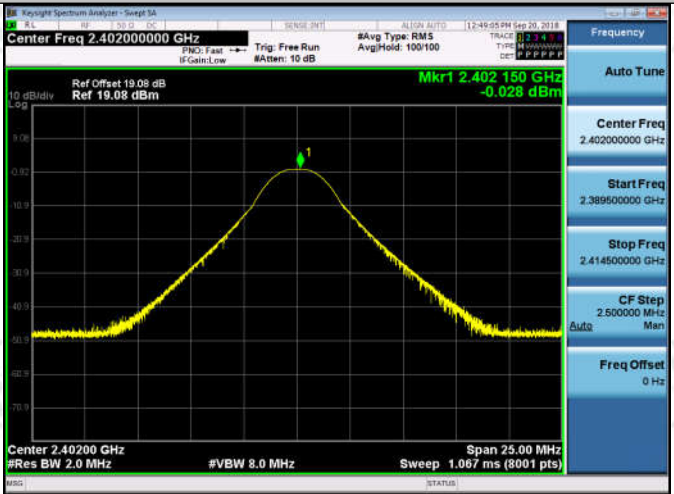
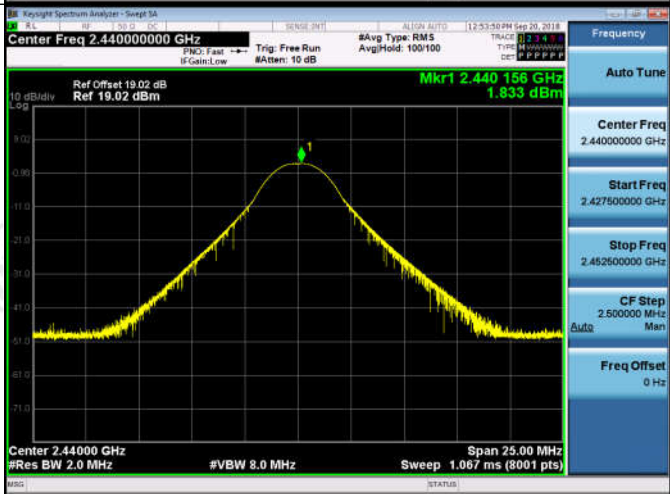
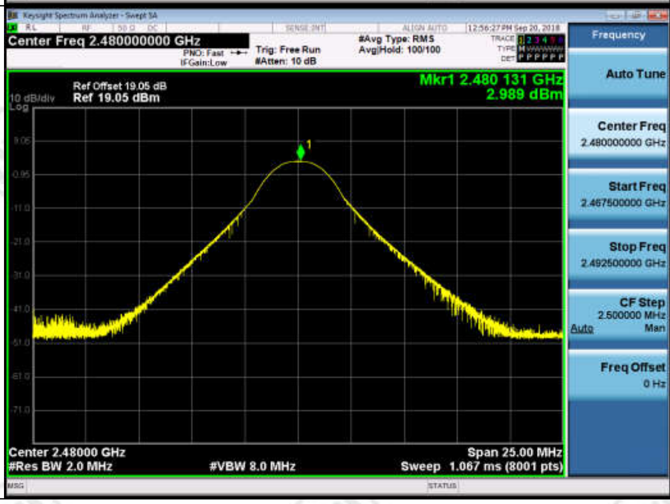
Graphs		
LCH		
MCH		
HCH		

Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	-0.028	PASS
BLE	MCH	1.833	PASS
BLE	HCH	2.989	PASS

Test Graphs

Graphs		
LCH		
MCH		
HCH		

Duty Cycle			
Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
BLE	1.0000	1.0000	100.00%

Appendix C): Band-edge for RF Conducted Emissions

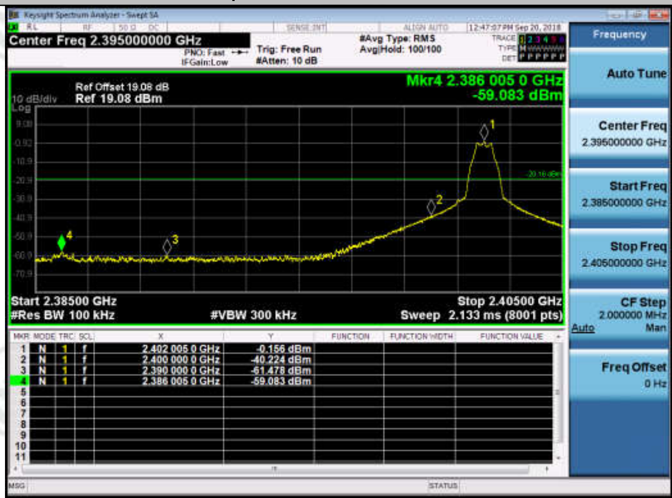
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	-0.156	-59.083	-20.16	PASS
BLE	HCH	2.765	-45.102	-17.24	PASS

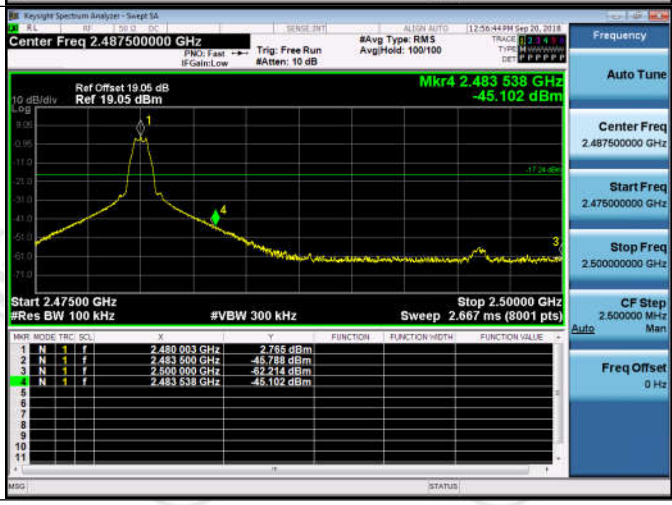
Test Graphs

Graphs

LCH



HCH



Appendix D): RF Conducted Spurious Emissions

Result Table

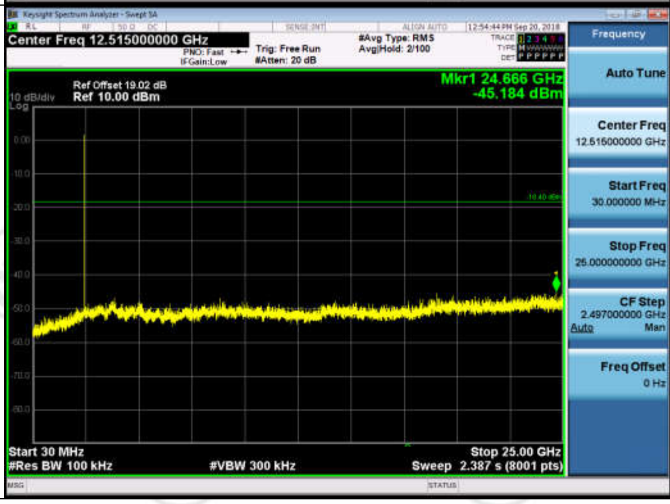
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	-0.262	<Limit	PASS
BLE	MCH	1.599	<Limit	PASS
BLE	HCH	2.667	<Limit	PASS

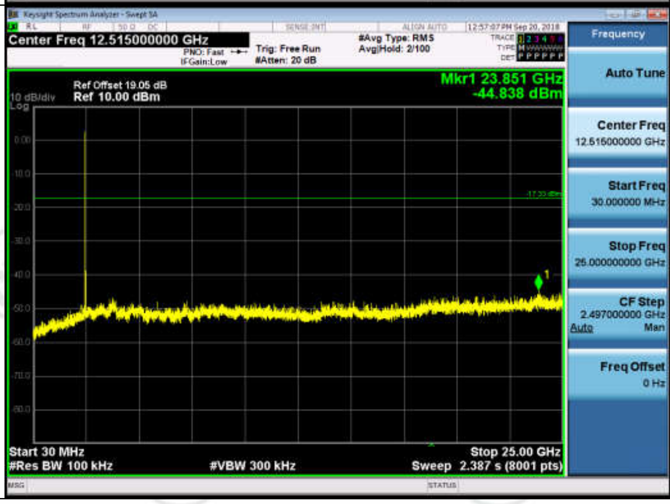
Test Graphs

BLE_LCH_Graphs

Pref/BLE/LCH

Puw/BLE/LCH

BLE_MCH_Graphs			
Pref/BLE/MCH			
Puw/BLE/MCH			

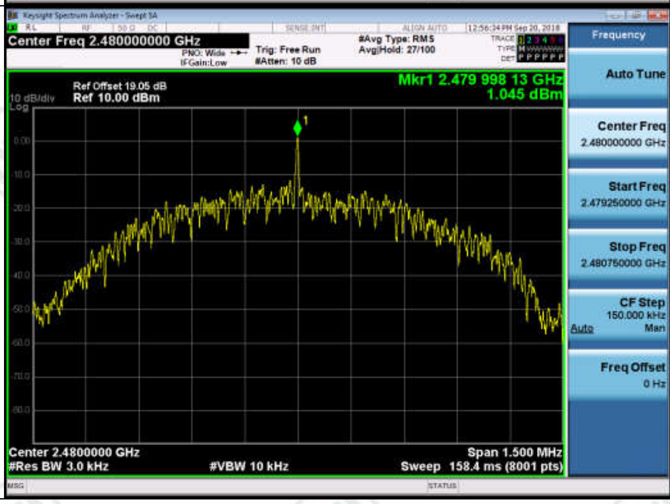
<table>
<tr><th colspan="4">BLE_HCH_Graphs</th></tr>
<tr><td>Pref/BLE/HCH</td><td></td><td>
</td><td></td></tr>
<tr><td>Puw/BLE/HCH</td><td></td><td>
</td><td></td></tr>
</table>

Appendix E): Power Spectral Density

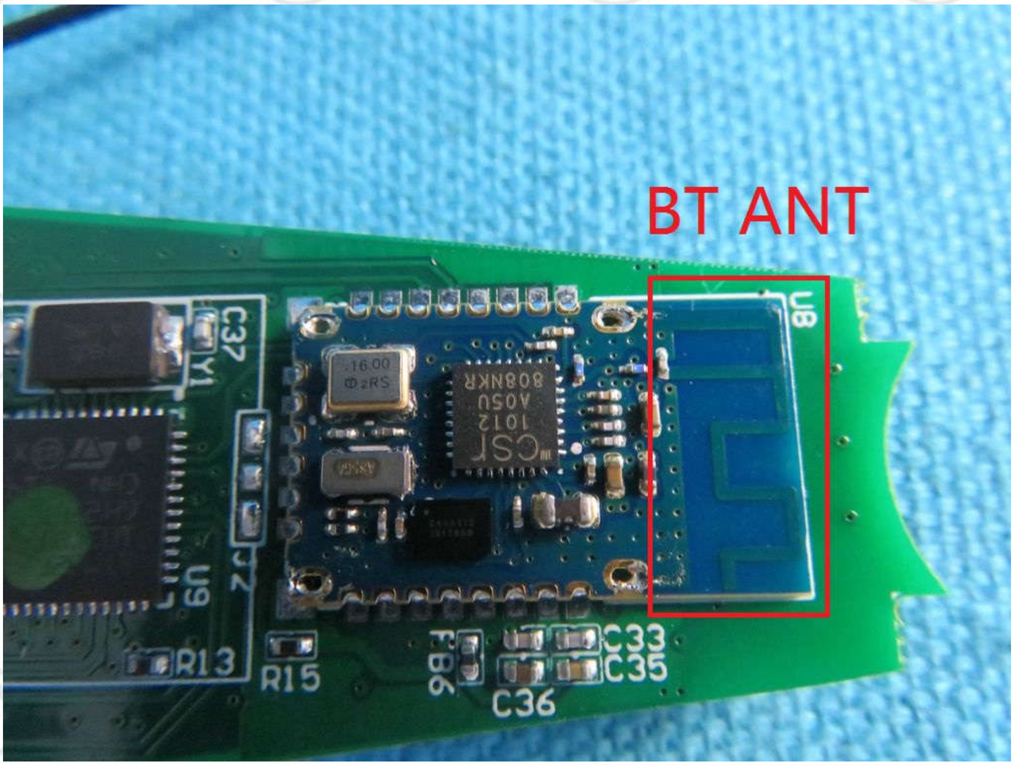
Result Table

Mode	Channel	PSD [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE	LCH	-0.227	8	PASS
BLE	MCH	-0.028	8	PASS
BLE	HCH	1.045	8	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 PCB antanna and no consideration of replacement. The best case gain of the antenna is -0.23dBi. 	

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 12mm above the 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:	(see table below)

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

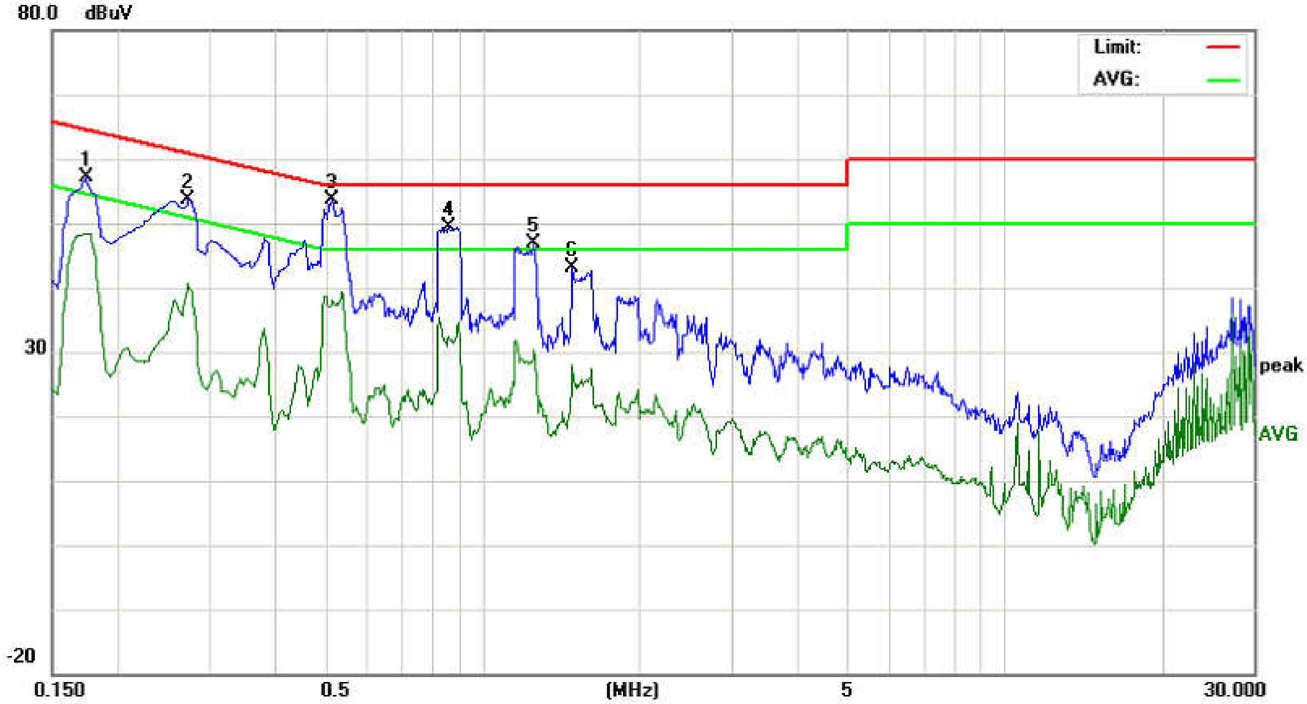
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

NOTE : The lower limit is applicable at the transition frequency

Test Ambient:	Temp.: 22°C	Humid.: 53%	Press.: 101kPa

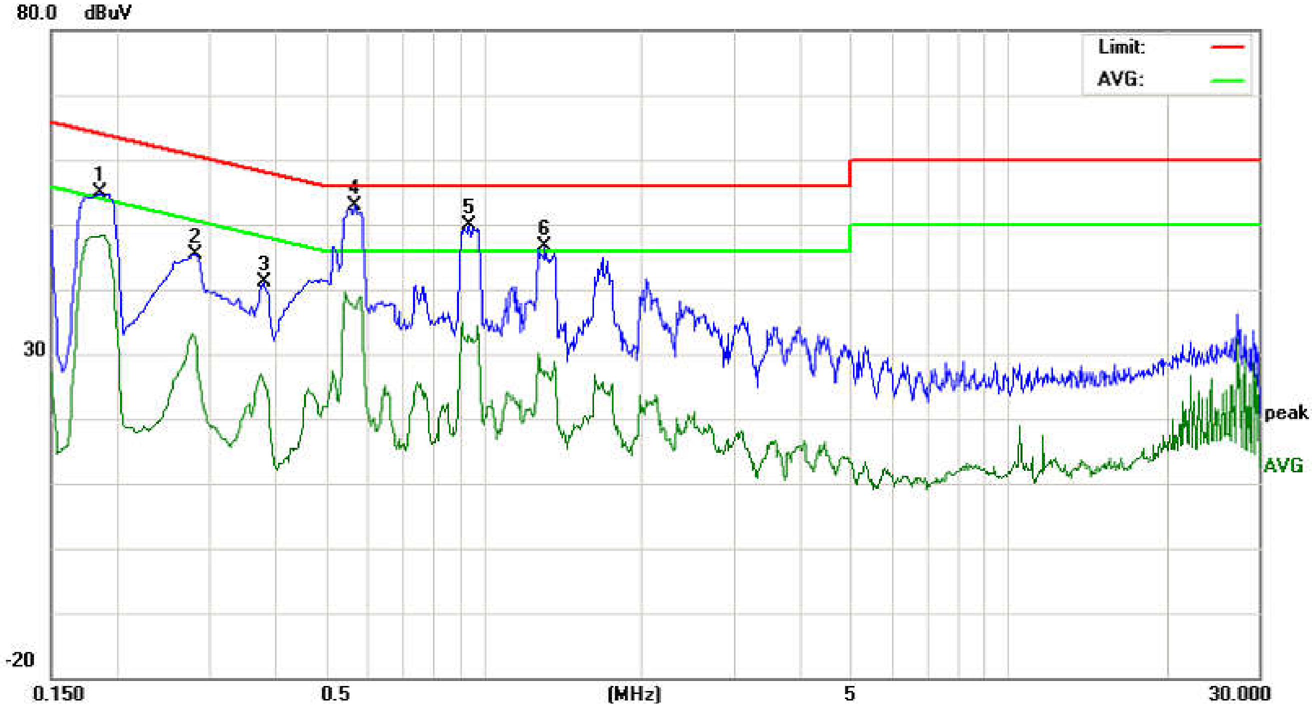
Measurement Data
An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1740	47.24	44.00	38.44	9.91	57.15	53.91	48.35	64.76	54.76	-10.85	-6.41	P	
2	0.2740	43.67	40.00	30.67	9.98	53.65	49.98	40.65	60.99	50.99	-11.01	-10.34	P	
3	0.5140	43.63	40.70	27.35	9.91	53.54	50.61	37.26	56.00	46.00	-5.39	-8.74	P	
4	0.8660	39.64	36.20	22.46	9.81	49.45	46.01	32.27	56.00	46.00	-9.99	-13.73	P	
5	1.2579	37.01	34.50	20.66	9.79	46.80	44.29	30.45	56.00	46.00	-11.71	-15.55	P	
6	1.4900	33.24	29.10	18.11	9.77	43.01	38.87	27.88	56.00	46.00	-17.13	-18.12	P	

Neutral line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1860	44.87	42.10	38.30	9.91	54.78	52.01	48.21	64.21	54.21	-12.20	-6.00	P	
2	0.2819	35.47	31.50	22.68	9.98	45.45	41.48	32.66	60.76	50.76	-19.28	-18.10	P	
3	0.3820	31.11	27.80	15.41	9.91	41.02	37.71	25.32	58.23	48.23	-20.52	-22.91	P	
4	0.5700	42.84	36.20	27.05	10.00	52.84	46.20	37.05	56.00	46.00	-9.80	-8.95	P	
5	0.9420	39.93	35.80	22.96	9.82	49.75	45.62	32.78	56.00	46.00	-10.38	-13.22	P	
6	1.3099	36.72	32.70	17.64	9.78	46.50	42.48	27.42	56.00	46.00	-13.52	-18.58	P	

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:

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:

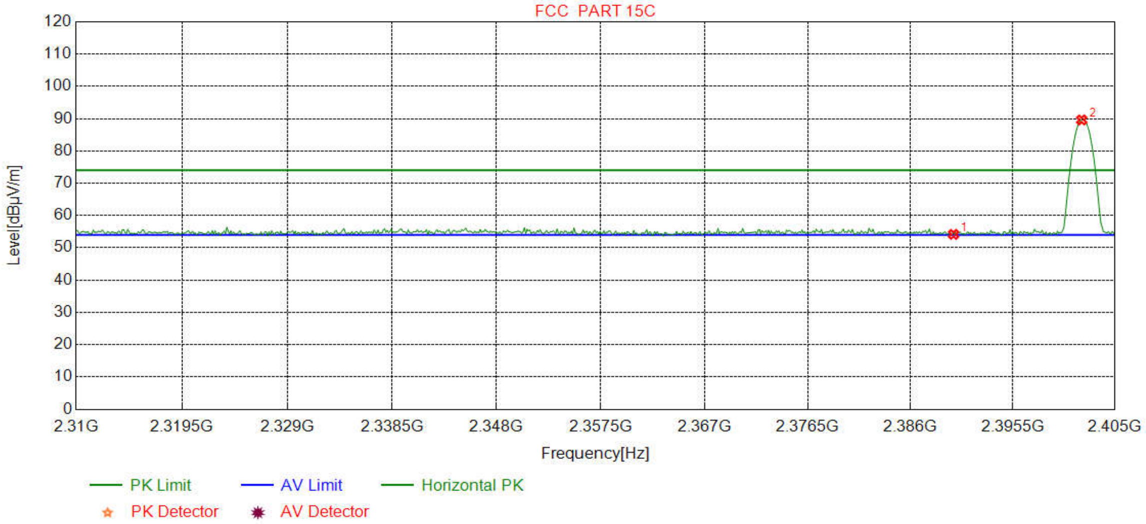
Frequency	Limit (dBµV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Ambient:	Temp.: 21°C	Humid.: 56%	Press.: 101kPa

Test plot as follows:

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	Peak		

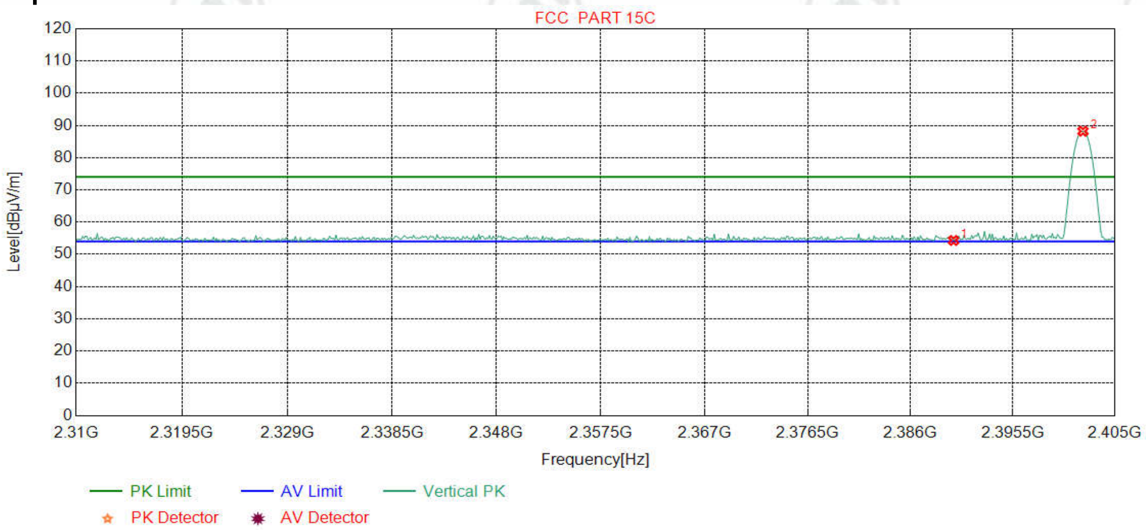
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	45.17	54.17	74.00	19.83	Pass	Horizontal
2	2401.9086	32.26	13.31	-36.60	80.64	89.61	-	-	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	Peak		

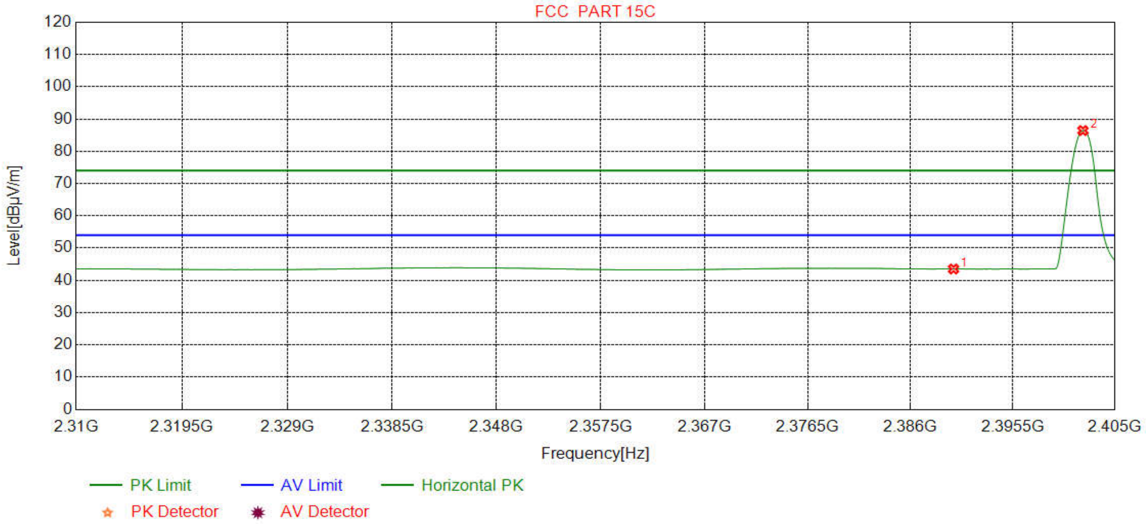
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	45.31	54.31	74.00	19.69	Pass	Vertical
2	2402.0275	32.26	13.31	-36.60	79.23	88.20	-	-	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		

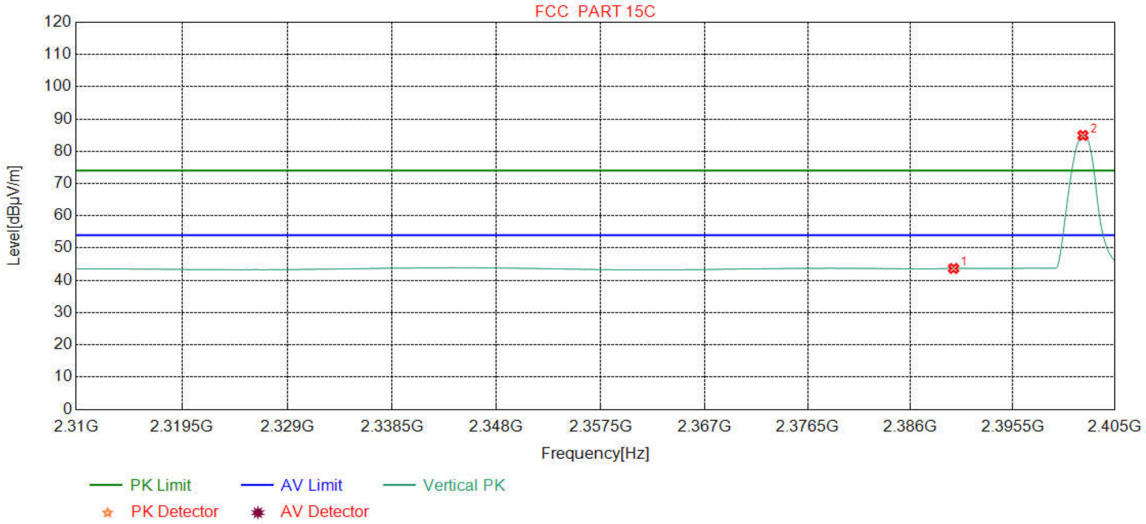
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	34.52	43.52	54.00	10.48	Pass	Horizontal
2	2402.0275	32.26	13.31	-36.60	77.46	86.43	-	-	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		

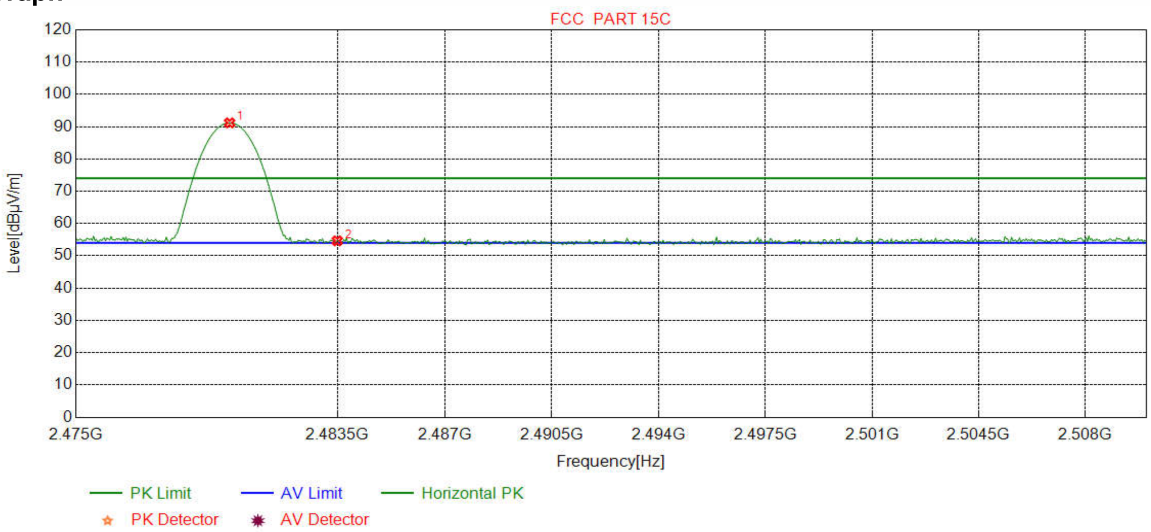
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	34.68	43.68	54.00	10.32	Pass	Vertical
2	2402.0275	32.26	13.31	-36.60	75.96	84.93	-	-	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	Peak		

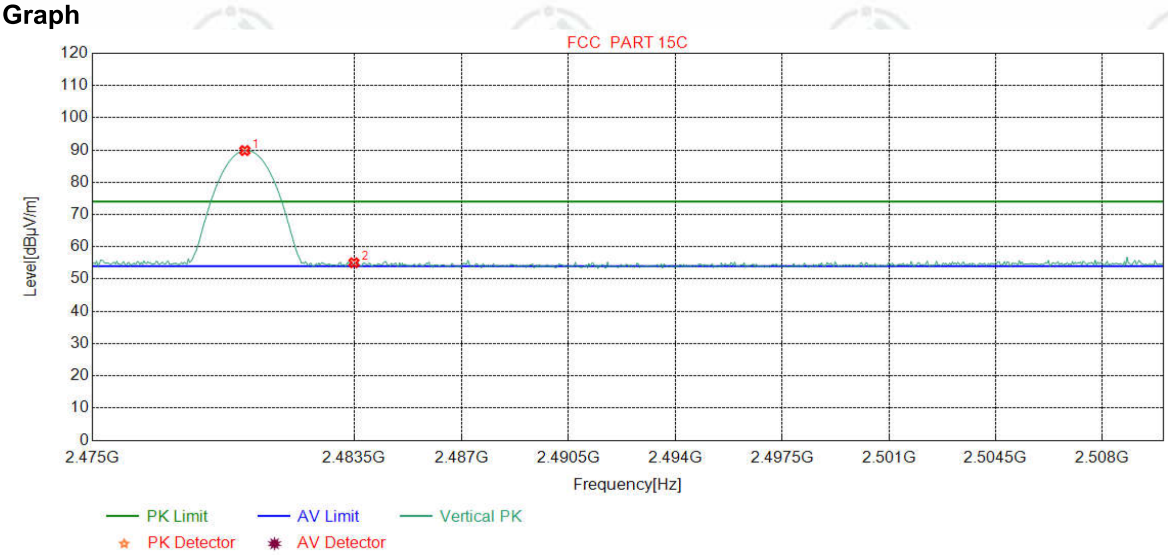
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	2479.9937	32.37	13.39	-36.77	82.20	91.19	74.00	-17.19	Pass	Horizontal
2	2483.5000	32.38	13.38	-36.80	45.68	54.64	-	-	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	Peak		

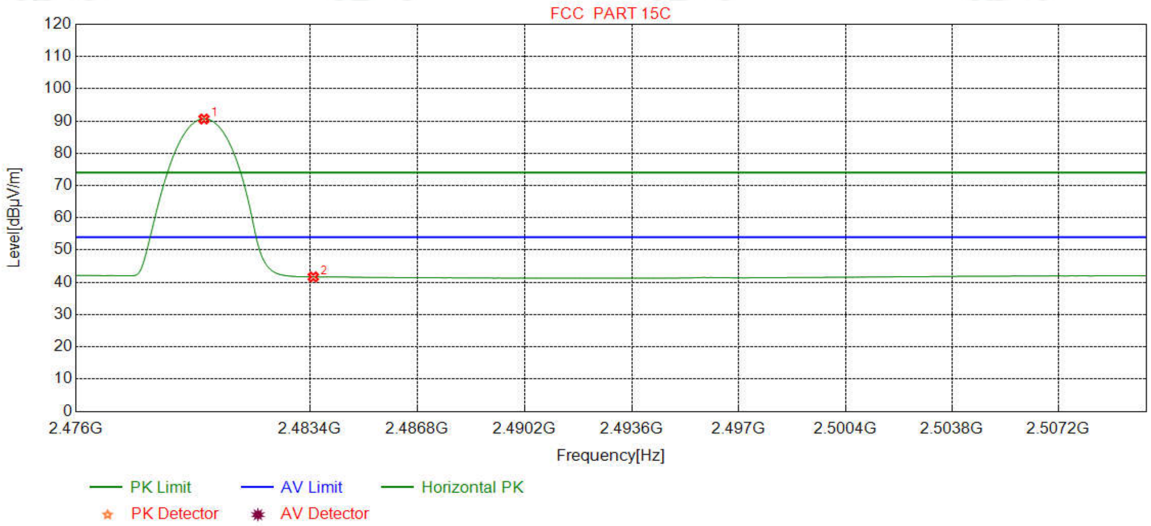
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	2479.9499	32.37	13.39	-36.77	80.85	89.84	-	-	Pass	Vertical
2	2483.5000	32.38	13.38	-36.80	46.10	55.06	74.00	18.94	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	AV		

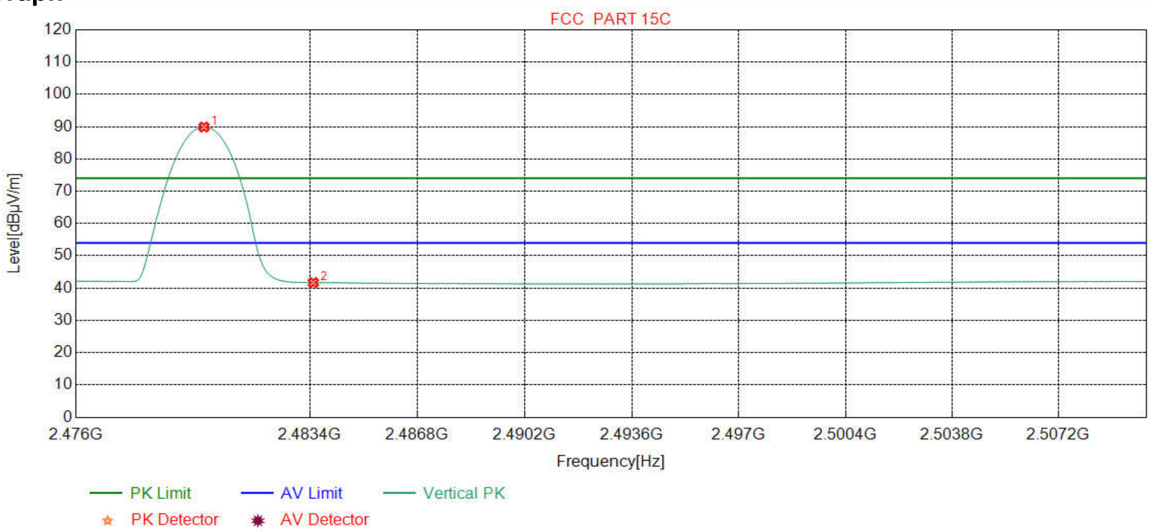
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	2480.0426	32.37	13.39	-36.77	81.65	90.64	-	-	Pass	Horizontal
2	2483.5000	32.38	13.38	-36.80	32.73	41.69	54.00	12.31	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]	Magin [dB]	Result	Polarity
1	2480.0426	32.37	13.39	-36.77	80.89	89.88	-	-	Pass	Vertical
2	2483.5000	32.38	13.38	-36.80	32.75	41.71	54.00	12.29	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:

a. The EUT was placed on the 12 mm 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.

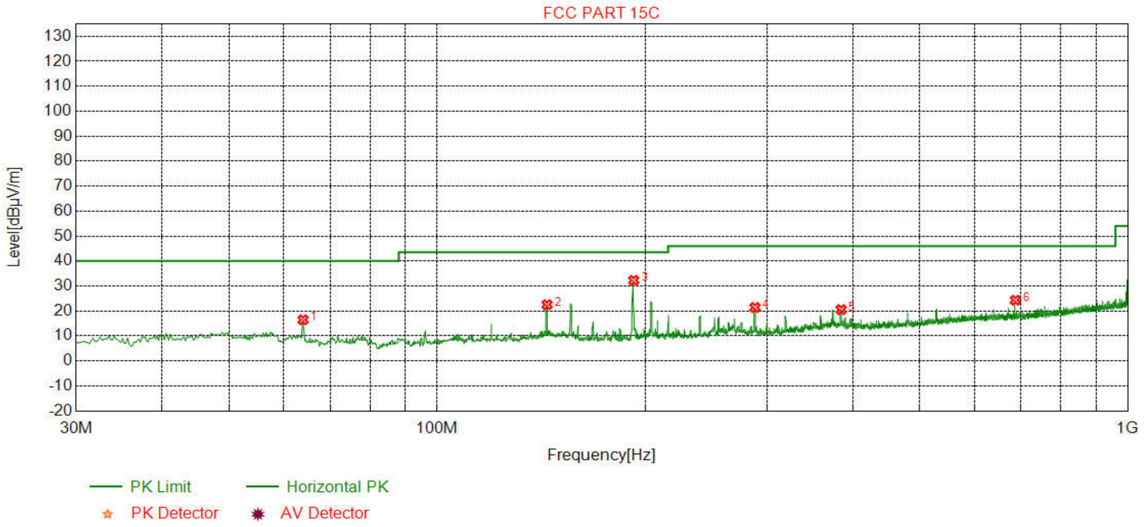
Test Ambient:	Temp.: 21°C	Humid.: 56%	Press.: 101kPa

Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

Mode:	BLE GFSK Transmitting	Channel:	2440
Remark:	QP		

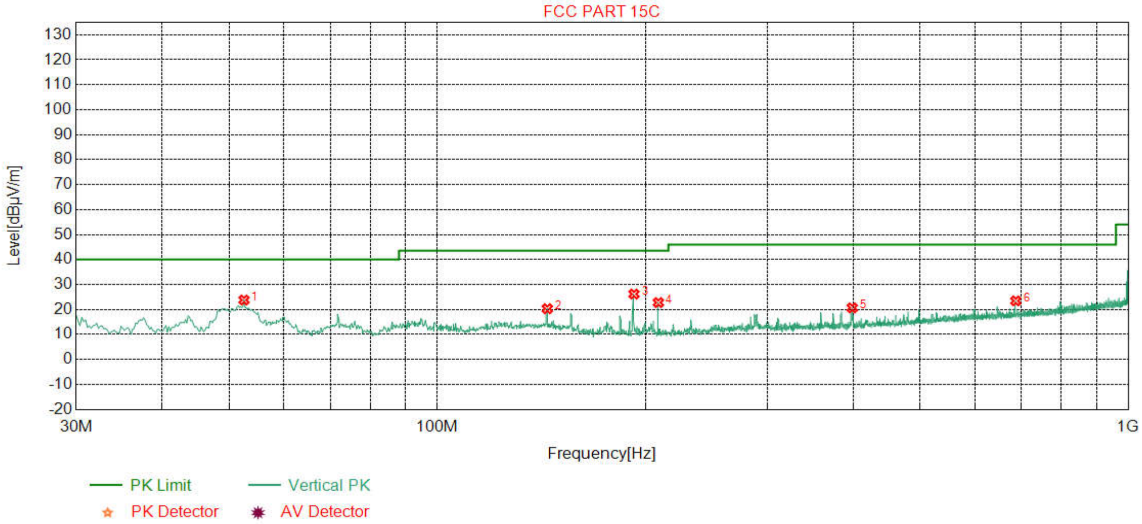
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	63.9568	10.57	0.92	-32.05	37.04	16.48	40.00	23.52	Pass	Horizontal
2	144.2889	7.35	1.42	-32.00	45.77	22.54	43.50	20.96	Pass	Horizontal
3	192.6045	10.20	1.63	-31.97	52.41	32.27	43.50	11.23	Pass	Horizontal
4	288.6537	12.97	2.02	-31.88	38.29	21.40	46.00	24.60	Pass	Horizontal
5	384.7029	15.06	2.33	-31.84	35.00	20.55	46.00	25.45	Pass	Horizontal
6	687.5975	19.70	3.14	-32.06	33.54	24.32	46.00	21.68	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2440
Remark:	QP		

Test Graph



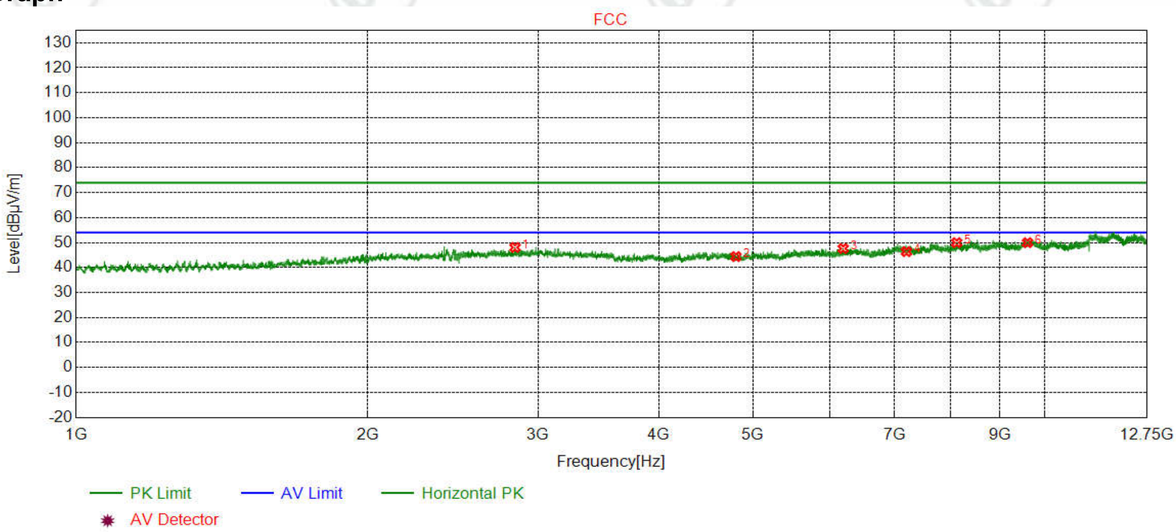
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Magin [dB]	Result	Polarity
1	52.5085	12.80	0.82	-32.10	42.28	23.80	40.00	16.20	Pass	Vertical
2	144.2889	7.35	1.42	-32.00	43.54	20.31	43.50	23.19	Pass	Vertical
3	192.6045	10.20	1.63	-31.97	46.32	26.18	43.50	17.32	Pass	Vertical
4	208.9038	11.13	1.71	-31.94	41.87	22.77	43.50	20.73	Pass	Vertical
5	398.6737	15.37	2.38	-31.77	34.66	20.64	46.00	25.36	Pass	Vertical
6	687.5975	19.70	3.14	-32.06	32.68	23.46	46.00	22.54	Pass	Vertical

Remark : All modes are tested, only the worst mode is reported.

Transmitter Emission above 1GHz

Mode:	BLE GFSK Transmitting	Channel: 2402	Remark: Peak

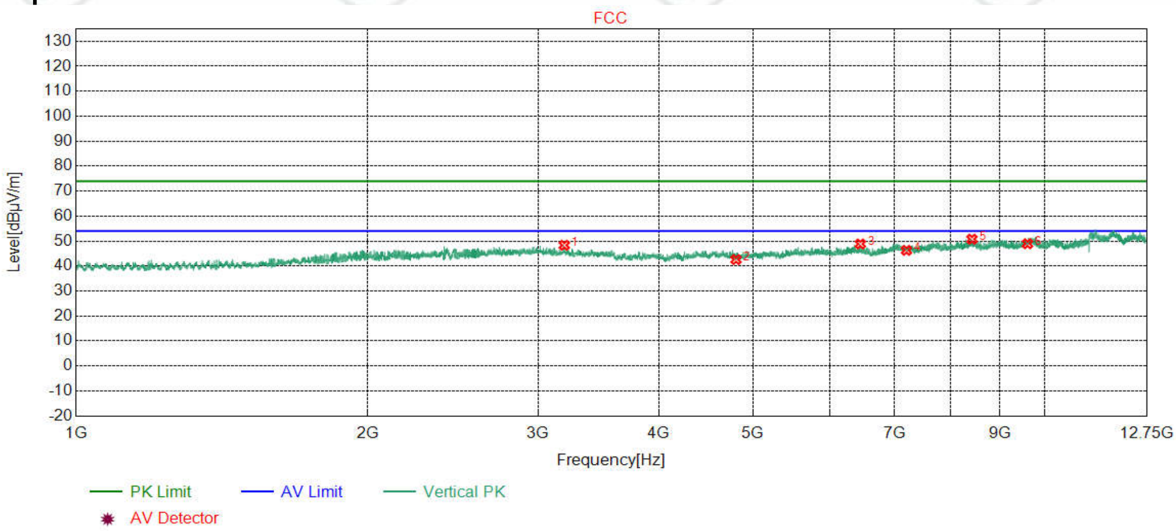
Test Graph



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	2840.3681	32.94	4.23	-36.91	47.78	48.04	74.00	25.96	Pass	H
2	4804.0000	34.50	4.55	-36.15	41.50	44.40	74.00	29.60	Pass	H
3	6198.3198	35.84	5.22	-36.33	42.87	47.60	74.00	26.40	Pass	H
4	7206.0000	36.31	5.81	-36.43	40.68	46.37	74.00	27.63	Pass	H
5	8120.2370	36.45	6.27	-36.52	43.76	49.96	74.00	24.04	Pass	H
6	9608.0000	37.64	6.63	-36.79	42.49	49.97	74.00	24.03	Pass	H

Mode:	BLE GFSK Transmitting	Channel: 2402	Remark: Peak

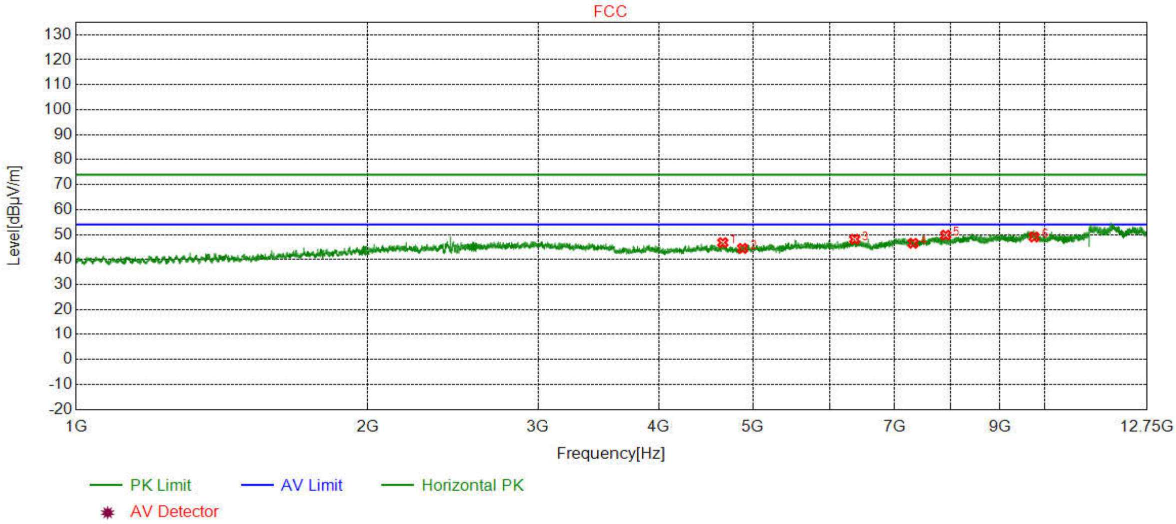
Test Graph



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	3193.0693	33.28	4.64	-36.73	47.12	48.31	74.00	25.69	Pass	V
2	4804.0000	34.50	4.55	-36.15	39.67	42.57	74.00	31.43	Pass	V
3	6456.7207	35.89	5.51	-36.25	43.69	48.84	74.00	25.16	Pass	V
4	7206.0000	36.31	5.81	-36.43	40.58	46.27	74.00	27.73	Pass	V
5	8419.5920	36.57	6.36	-36.33	44.16	50.76	74.00	23.24	Pass	V
6	9608.0000	37.64	6.63	-36.79	41.45	48.93	74.00	25.07	Pass	V

Mode:	BLE GFSK Transmitting	Channel: 2440	Remark: Peak

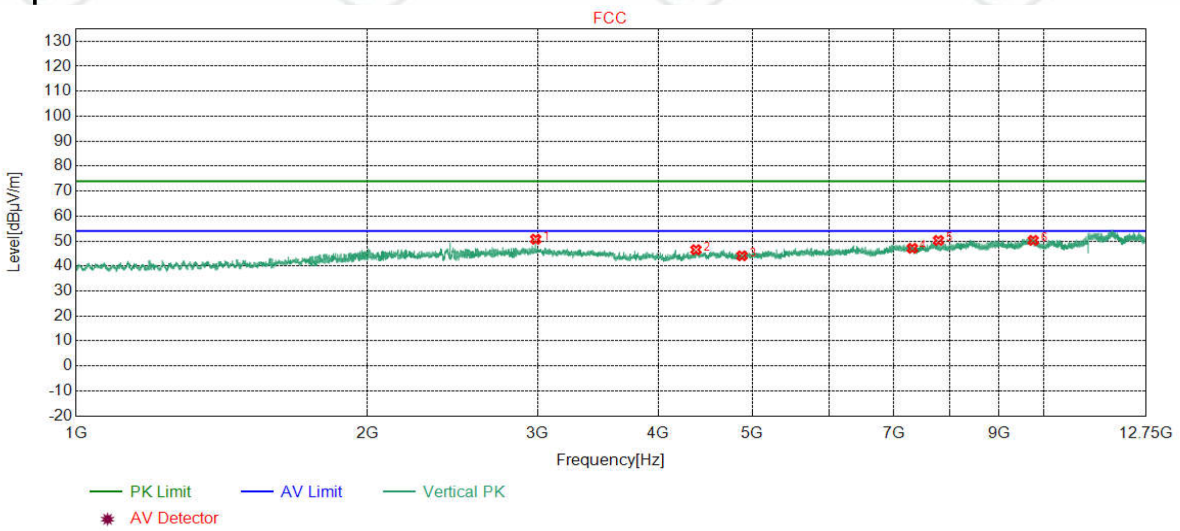
Test Graph



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	4655.7156	34.50	4.85	-36.16	43.58	46.77	74.00	27.23	Pass	H
2	4880.0000	34.50	4.80	-36.09	41.25	44.46	74.00	29.54	Pass	H
3	6369.9370	35.87	5.40	-36.21	43.07	48.13	74.00	25.87	Pass	H
4	7320.0000	36.42	5.85	-36.38	40.62	46.51	74.00	27.49	Pass	H
5	7910.5911	36.44	6.03	-36.26	43.56	49.77	74.00	24.23	Pass	H
6	9760.0000	37.70	6.73	-36.81	41.41	49.03	74.00	24.97	Pass	H

Mode:	BLE GFSK Transmitting	Channel: 2440	Remark: Peak

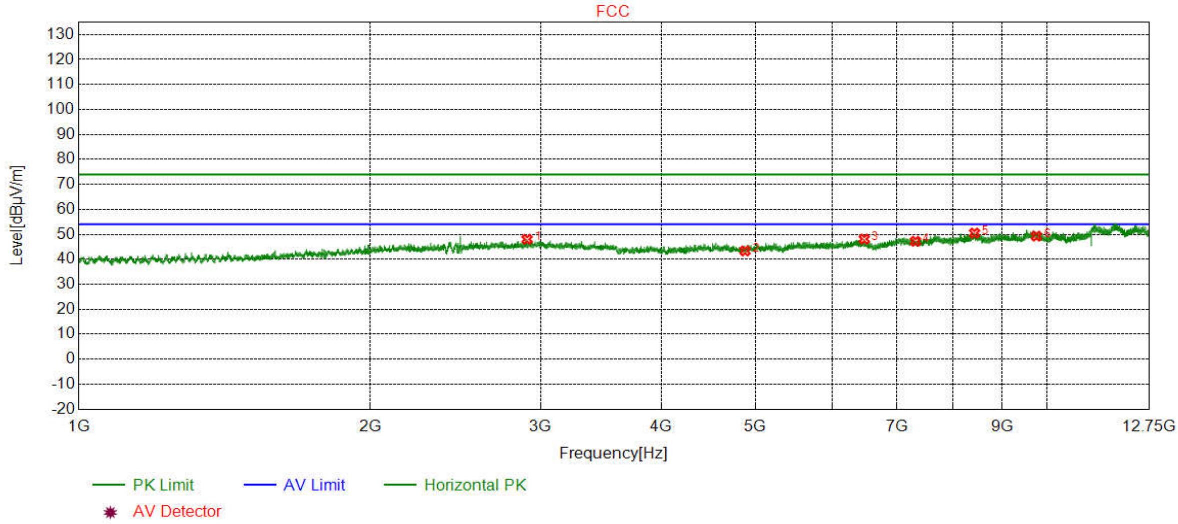
Test Graph



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	2986.7974	33.18	4.51	-36.74	49.80	50.75	74.00	23.25	Pass	V
2	4373.9124	34.32	4.53	-36.27	43.95	46.53	74.00	27.47	Pass	V
3	4880.0000	34.50	4.80	-36.09	40.88	44.09	74.00	29.91	Pass	V
4	7320.0000	36.42	5.85	-36.38	41.21	47.10	74.00	26.90	Pass	V
5	7788.7039	36.48	6.13	-36.61	44.26	50.26	74.00	23.74	Pass	V
6	9760.0000	37.70	6.73	-36.81	42.65	50.27	74.00	23.73	Pass	V

Mode:	BLE GFSK Transmitting	Channel: 2480	Remark: Peak

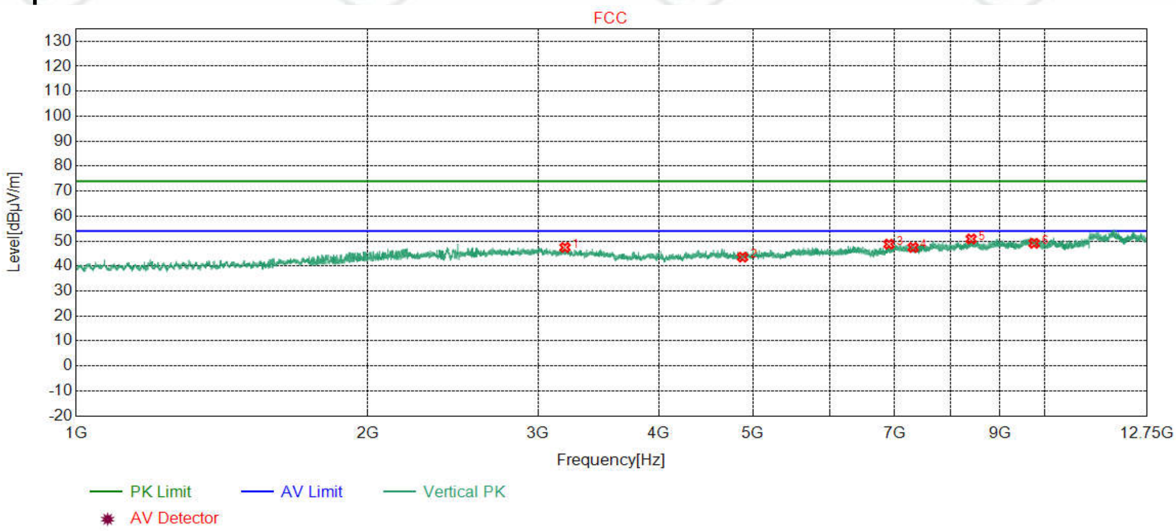
Test Graph



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	2905.1810	33.05	4.38	-36.64	47.21	48.00	74.00	26.00	Pass	H
2	4880.0000	34.50	4.80	-36.09	40.12	43.33	74.00	30.67	Pass	H
3	6480.1230	35.90	5.49	-36.24	42.94	48.09	74.00	25.91	Pass	H
4	7320.0000	36.42	5.85	-36.38	41.32	47.21	74.00	26.79	Pass	H
5	8423.4923	36.57	6.36	-36.33	43.90	50.50	74.00	23.50	Pass	H
6	9760.0000	37.70	6.73	-36.81	41.66	49.28	74.00	24.72	Pass	H

Mode:	BLE GFSK Transmitting	Channel: 2480	Remark: Peak

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	3198.9199	33.28	4.65	-36.70	46.21	47.44	74.00	26.56	Pass	V
2	4880.0000	34.50	4.80	-36.09	40.35	43.56	74.00	30.44	Pass	V
3	6911.1161	36.06	5.86	-36.27	43.13	48.78	74.00	25.22	Pass	V
4	7320.0000	36.42	5.85	-36.38	41.55	47.44	74.00	26.56	Pass	V
5	8403.9904	36.56	6.34	-36.28	44.22	50.84	74.00	23.16	Pass	V
6	9760.0000	37.70	6.73	-36.81	41.48	49.10	74.00	24.90	Pass	V

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 10GHz 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.