

## TEST REPORT

**Product** : Monster Bluetooth Headphones  
**Trade mark** : Monster  
**Model/Type reference** : 190693  
**Serial Number** : N/A  
**Report Number** : EED32J00013902  
**FCC ID** : RJE190693  
**Date of Issue** : Feb. 21, 2017  
**Test Standards** : 47 CFR Part 15Subpart C (2015)  
**Test result** : PASS

Prepared for:

**Monster LLC**

**3837 Bay Lake Trail, Suite 103, North Las Vegas, NV 89030 USA**

Prepared by:

**Centre Testing International Group Co., Ltd.**

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Feb. 21, 2017

Check No.: 2496567469



## 2 Version

Version No.	Date	Description
00	Feb. 21, 2017	Original

### 3 Test Summary

Test Item	Test Requirement	Test method	Result
<b>Antenna Requirement</b>	47 CFR Part 15Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
<b>AC Power Line Conducted Emission</b>	47 CFR Part 15Subpart C Section 15.207	ANSI C63.10-2013	PASS
<b>Conducted Peak Output Power</b>	47 CFR Part 15Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013/ KDB 558074 D01v03r05	PASS
<b>6dB Occupied Bandwidth</b>	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013/ KDB 558074 D01v03r05	PASS
<b>Power Spectral Density</b>	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013/ KDB 558074 D01v03r05	PASS
<b>Band-edge for RF Conducted Emissions</b>	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013/ KDB 558074 D01v03r05	PASS
<b>RF Conducted Spurious Emissions</b>	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013/ KDB 558074 D01v03r05	PASS
<b>Radiated Spurious Emissions</b>	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
<b>Restricted bands around fundamental frequency (Radiated Emission)</b>	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 and the sample information are provided by the client.

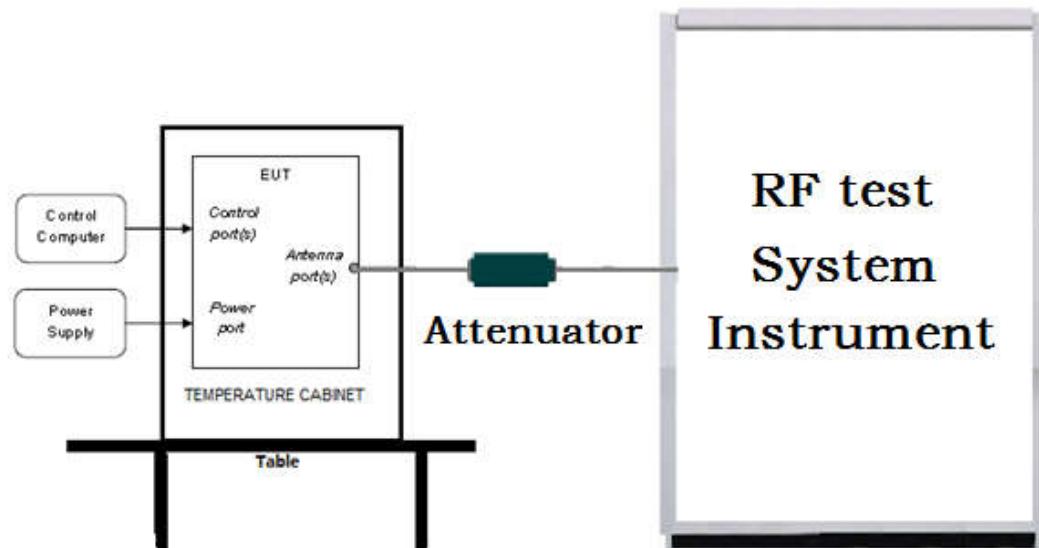
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## 5 Test Requirement

### 5.1 Test setup

#### 5.1.1 For Conducted test setup



#### 5.1.2 For Radiated Emissions test setup

##### Radiated Emissions setup:

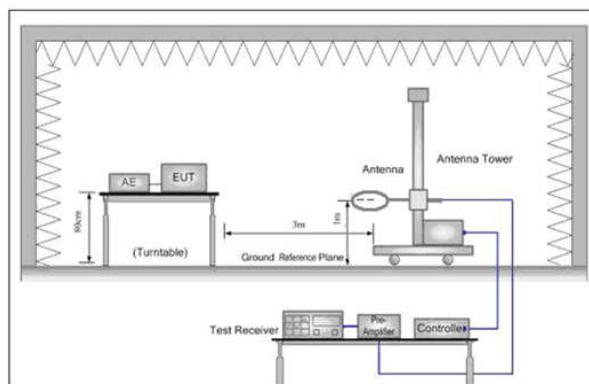


Figure 1. Below 30MHz

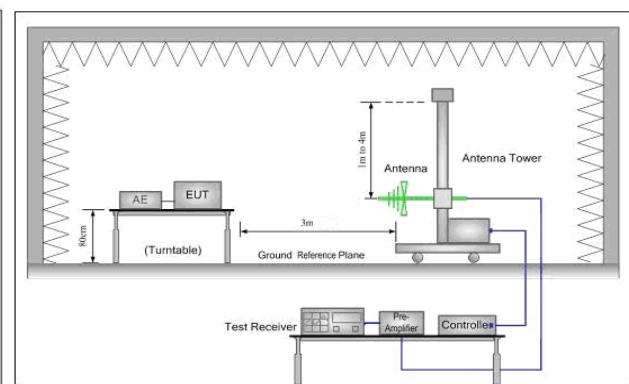


Figure 2. 30MHz to 1GHz

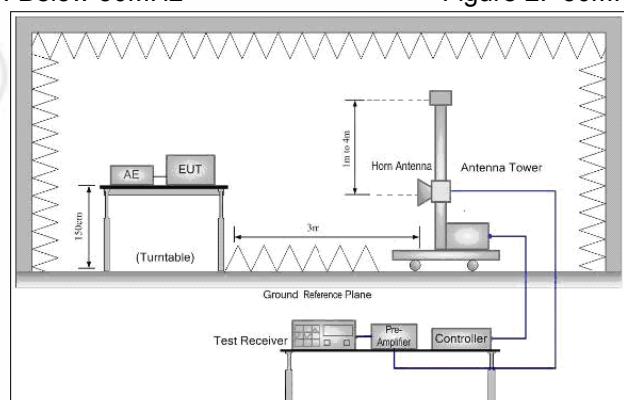
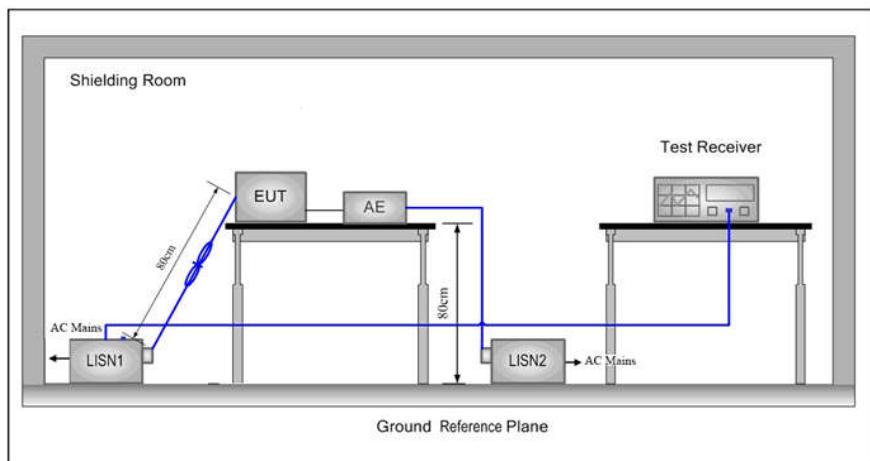


Figure 3. Above 1GHz

### 5.1.3 For Conducted Emissions test setup

#### Conducted Emissions setup



## 5.2 Test Environment

### Operating Environment:

Temperature:	24°C
Humidity:	51% RH
Atmospheric Pressure:	1010mbar

## 5.3 Test Condition

Test channel:

Test Mode	Tx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel 40
		2402MHz	2440MHz	2480MHz
Transmitting mode:	The EUT transmitted the continuous modulation test signal at the specific channel(s).			

## 6 General Information

### 6.1 Client Information

Applicant:	Monster LLC
Address of Applicant:	3837 Bay Lake Trail, Suite 103, North Las Vegas, NV 89030 USA
Manufacturer:	Monster LLC
Address of Manufacturer:	3837 Bay Lake Trail, Suite 103, North Las Vegas, NV 89030 USA
Factory:	CRESYN ELECTRONICS (DONGGUAN) CO., LTD
Address of Factory:	Lin-Cun Industry Zone, Tangxia, Dongguan, Guangdong, China

### 6.2 General Description of EUT

Product Name:	Monster Bluetooth Headphones
Model No.(EUT):	190693
Trade mark:	Monster
EUT Supports Radios application:	BT4.1 Dual mode
Power Supply:	3.7V/560mAh(Lithium Battery)
USB cable:	60cm(Unshielded)
Sample Received Date:	Feb. 07, 2017
Sample tested Date:	Feb. 07, 2017 to Feb. 21, 2017

### 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:	Power(Ext, Int): 50, 50(manufacturer declare)
Test Software of EUT:	CSR Blue Test3 2.5.8 (manufacturer declare)
Antenna Type:	Monopole Antenna
Antenna Gain:	0dBi
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 with associated equipment below.

Associated equipment name	Manufacture	model	Serial number	Supplied by
AE1	Mouse	L.Selectron	OP-308	F0729003225KOSG
AE2	Laptop	Lenovo	E46L	EB22995690
AE3	Keyboard	L.Selectron	KB-101A	C0503005704BTZJ

## 6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385

No tests were sub-contracted.

## 6.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### CNAS-Lab Code: L1910

Centre Testing International Group Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories..

### A2LA-Lab Cert. No. 3061.01

Centre Testing International Group Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### FCC-Registration No.: 886427

Centre Testing International Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 886427.

**IC-Registration No.: 7408A-2**

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A-2 .

**IC-Registration No.: 7408B-1**

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B-1.

**NEMKO-Aut. No.: ELA503**

Centre Testing International Group Co., Ltd. has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

**VCCI**

The Radiation 3 & 10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.

Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563.

Telecommunication Ports Conducted Disturbance Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.

The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

## **6.7 Deviation from Standards**

None.

## **6.8 Abnormalities from Standard Conditions**

None.

## **6.9 Other Information Requested by the Customer**

None.

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

No.	Item	Measurement Uncertainty
1	Radio Frequency	$7.9 \times 10^{-8}$
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

## 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	04-01-2016	03-31-2017
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2016	03-31-2017
Signal Generator	Keysight	N5182B	MY53051549	04-01-2016	03-31-2017
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	TTF20120439	01-11-2017	01-10-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	003	01-11-2017	01-10-2018
DC Power	Keysight	E3642A	MY54436035	04-01-2016	03-31-2017
BT&WI-FI Automatic control	R&S	OSP120	101374	04-01-2016	03-31-2017
RF control unit	JS Tonscend	JS0806-2	158060006	04-01-2016	03-31-2017

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100009	06-16-2016	06-15-2017
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2016	04-26-2017
LISN	R&S	ENV216	100098	06-16-2016	06-15-2017
LISN	schwarzbeck	NNLK8121	8121-529	06-16-2016	06-15-2017
Current Probe	R&S	EZ17	100106	06-16-2016	06-15-2017
ISN	TESEQ GmbH	ISN T800	30297	01-27-2017	01-25-2018

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	TTE20130797	06-05-2016	06-05-2019
TRILOG Broadband Antenna	SCHWARZBEC K	VULB9163	9163-484	05-23-2016	05-22-2017
Microwave Preamplifier	Agilent	8449B	3008A02425	02-16-2017	02-15-2018
Horn Antenna	ETS-LINDGREN	3117	00057407	07-20-2015	07-18-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Microwave Preamplifier	A.H.SYSTEMS	PAP-1840-60	6041.6042	06-30-2015	06-28-2018
Horn Antenna	A.H.SYSTEMS	SAS-574 374	374	06-30-2015	06-28-2018
Spectrum Analyzer	R&S	FSP40	100416	06-16-2016	06-15-2017
Receiver	R&S	ESCI	100435	06-16-2016	06-15-2017
LISN	schwarzbeck	NNBM8125	81251547	06-16-2016	06-15-2017
LISN	schwarzbeck	NNBM8125	81251548	06-16-2016	06-15-2017
Signal Generator	Agilent	E4438C	MY45095744	04-01-2016	03-31-2017
Signal Generator	Keysight	E8257D	MY53401106	04-01-2016	03-31-2017
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2016	04-26-2017
Cable line	Fulai(7M)	SF106	5219/6A	01-11-2017	01-10-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5217/6A	01-11-2017	01-10-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	TTF20120439	01-11-2017	01-10-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	003	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA09 CL12-0395-001	TTF20120434	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA08 CL12-0393-001	TTF20120435	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA04 CL12-0396-002	TTF20120436	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA03 CL12-0394-001	TTF20120437	01-11-2017	01-10-2018

## 8 Radio Technical Requirements Specification

### Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C (2015)	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

### Test Results List:

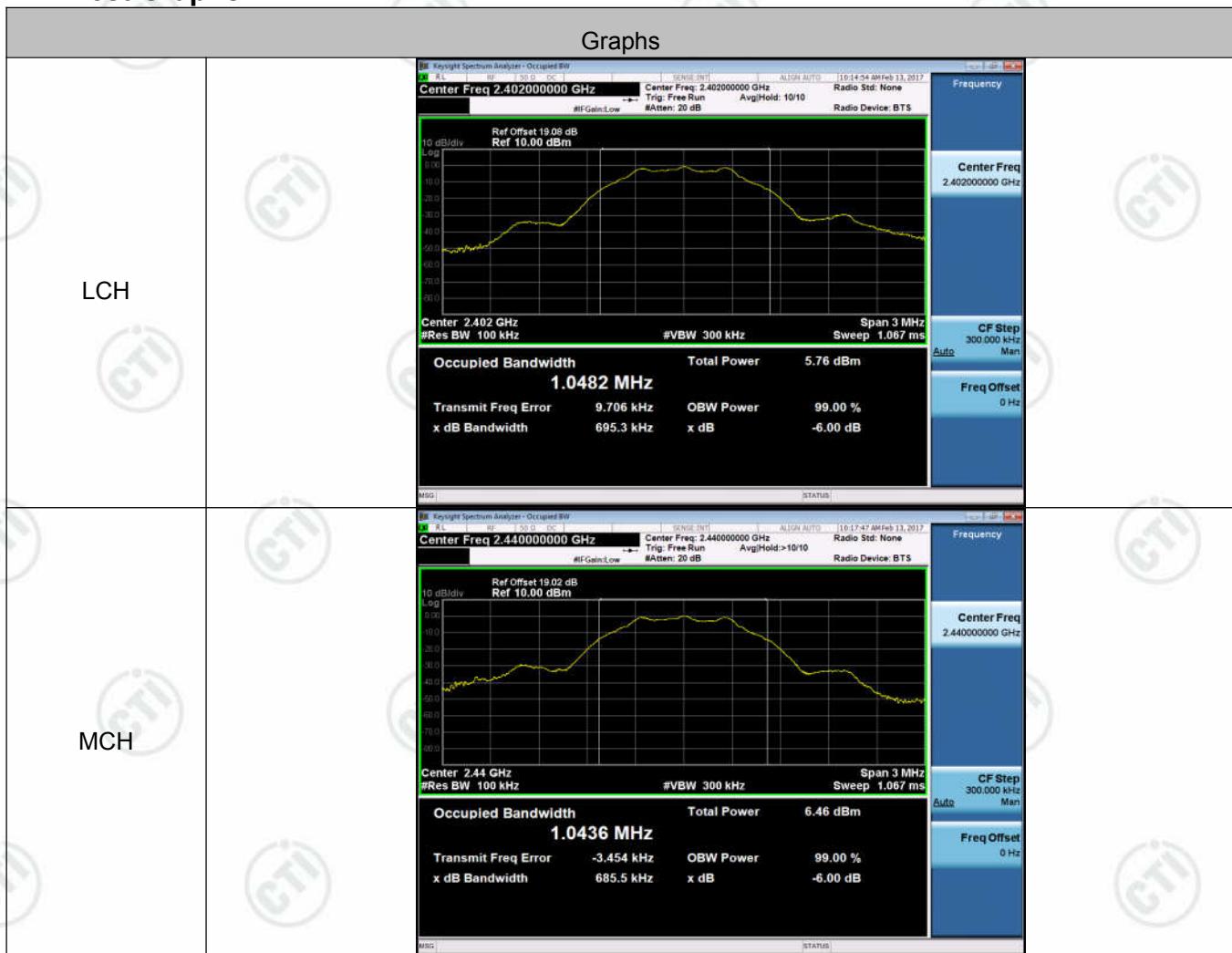
Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	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)

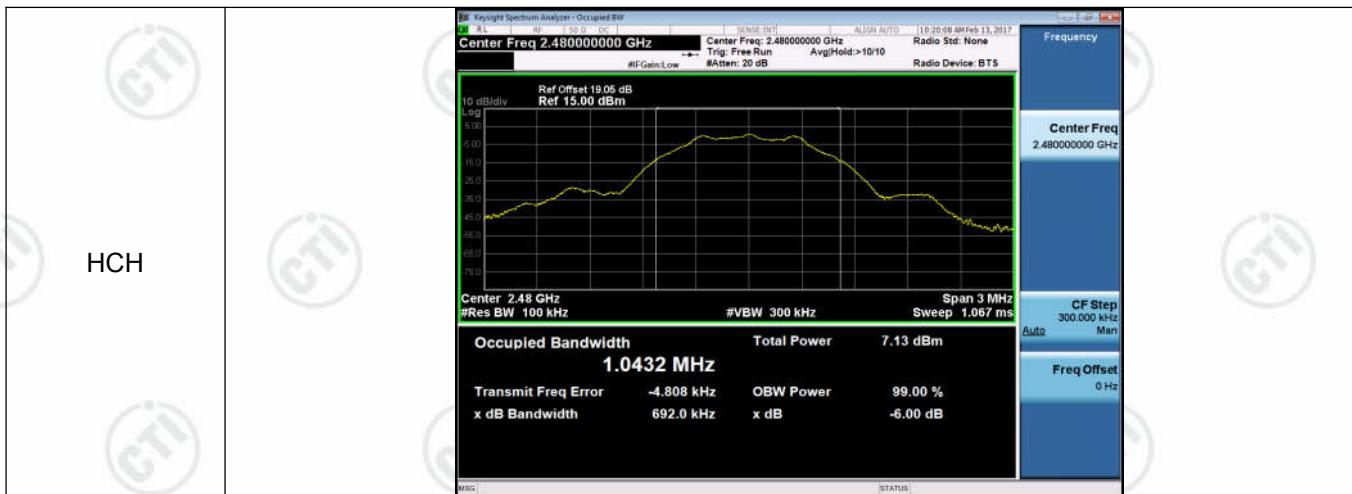
## Appendix A): 6dB Occupied Bandwidth

### Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict	Remark
BLE	LCH	0.6953	1.0482	PASS	Peak detector
BLE	MCH	0.6855	1.0436	PASS	
BLE	HCH	0.6920	1.0432	PASS	

### Test Graphs





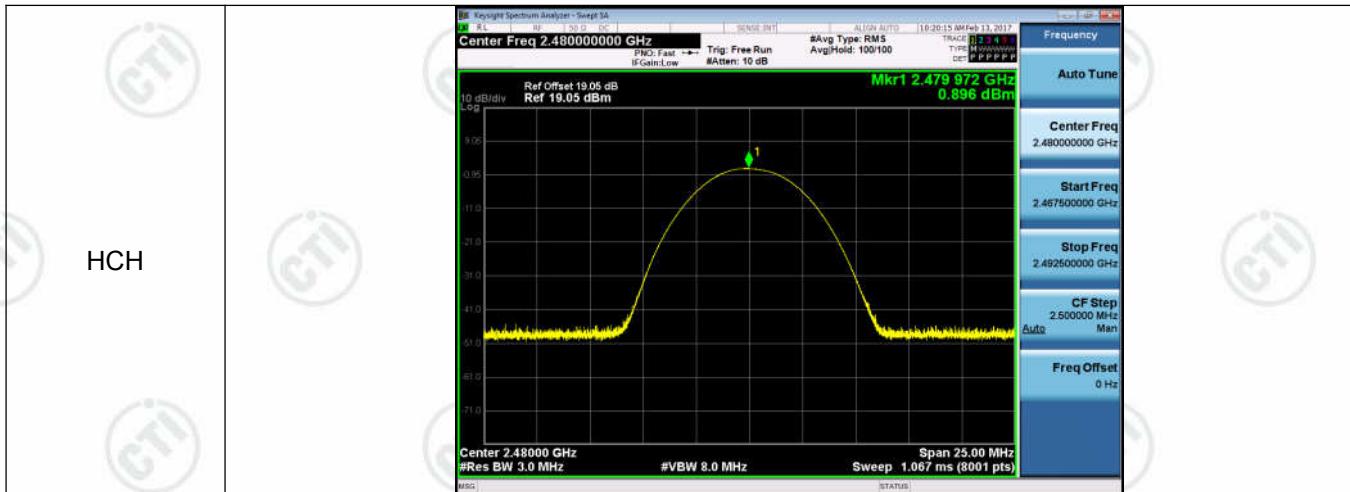
## Appendix B): Conducted Peak Output Power

### Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	-0.443	PASS
BLE	MCH	0.425	PASS
BLE	HCH	0.896	PASS

### Test Graphs



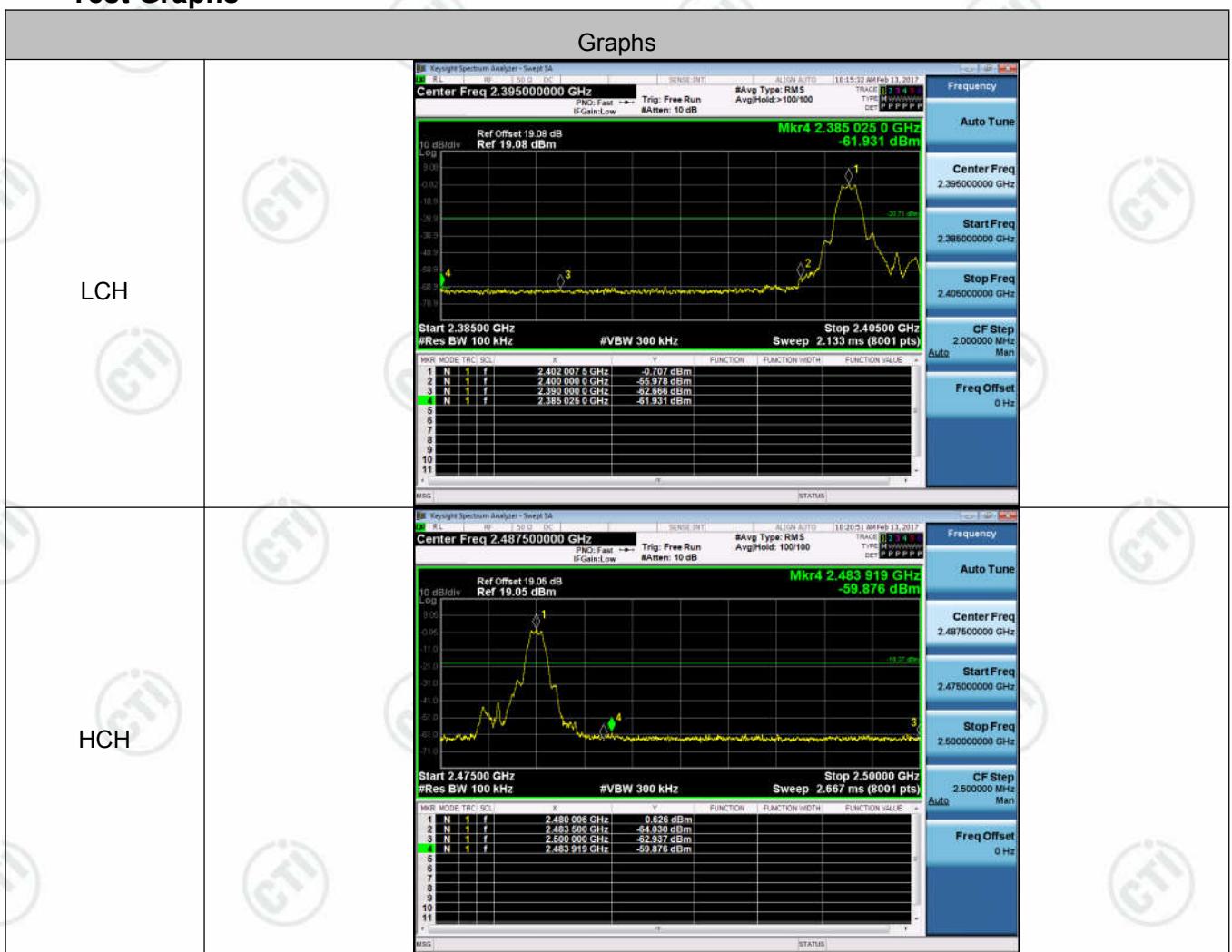


## Appendix C): Band-edge for RF Conducted Emissions

**Result Table**

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	-0.707	-61.931	-20.71	PASS
BLE	HCH	0.626	-59.876	-19.37	PASS

### Test Graphs

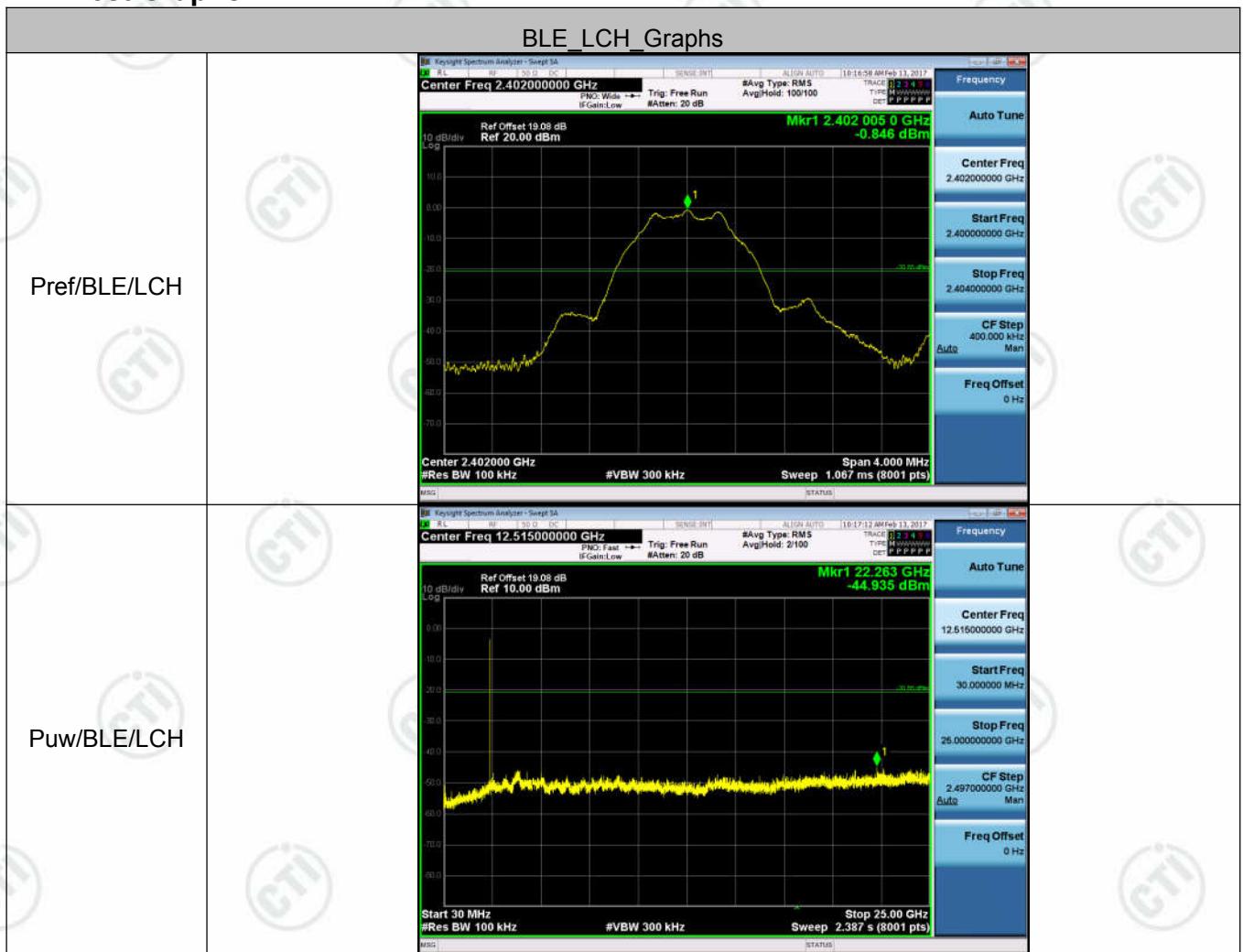


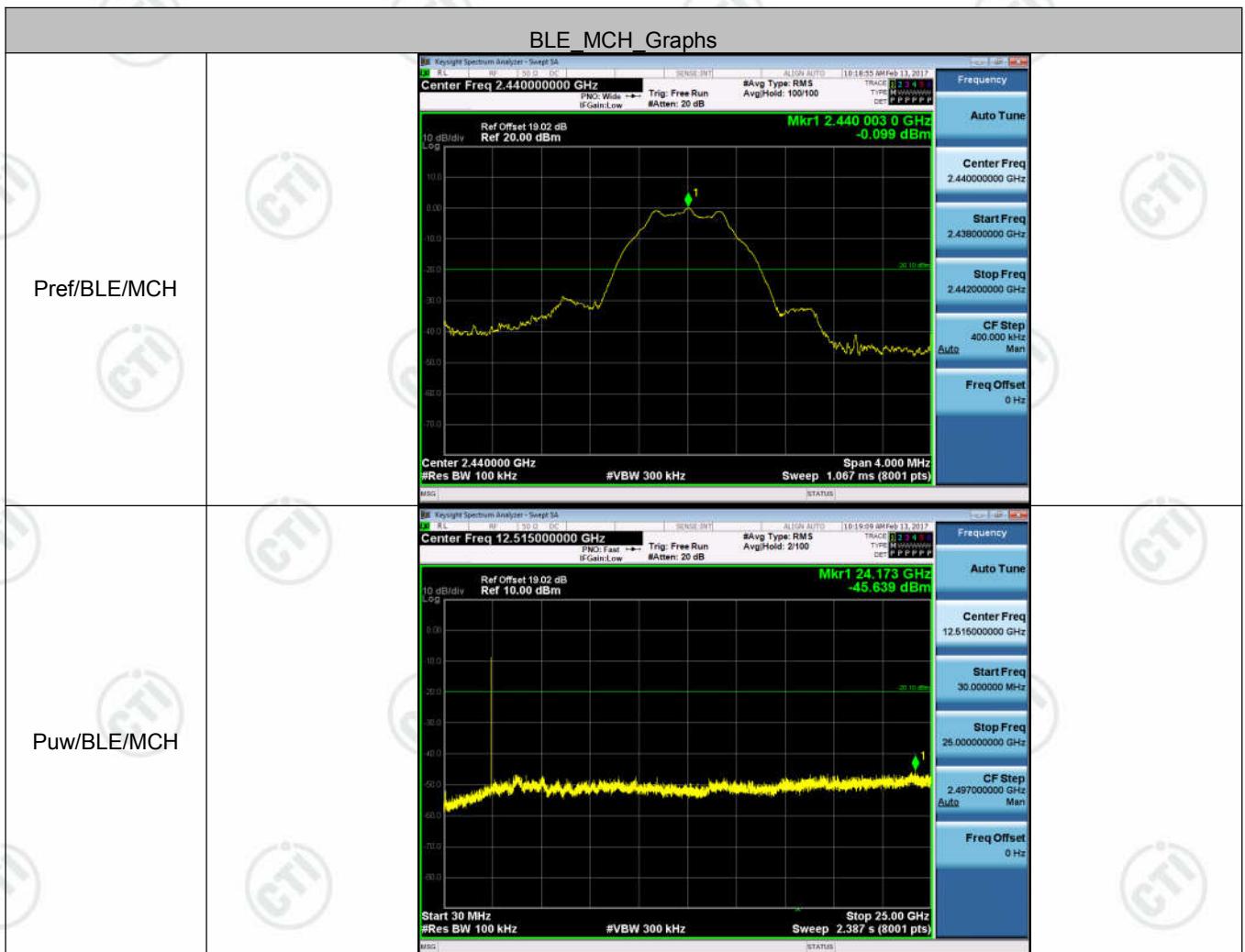
## Appendix D): RF Conducted Spurious Emissions

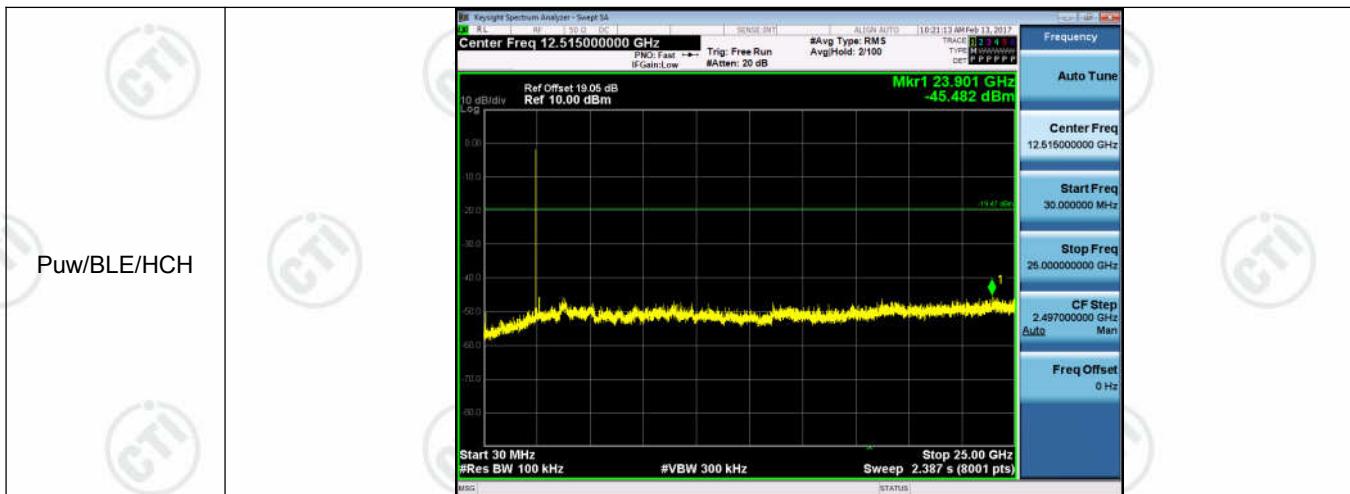
**Result Table**

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	-0.846	<Limit	PASS
BLE	MCH	-0.099	<Limit	PASS
BLE	HCH	0.533	<Limit	PASS

### Test Graphs





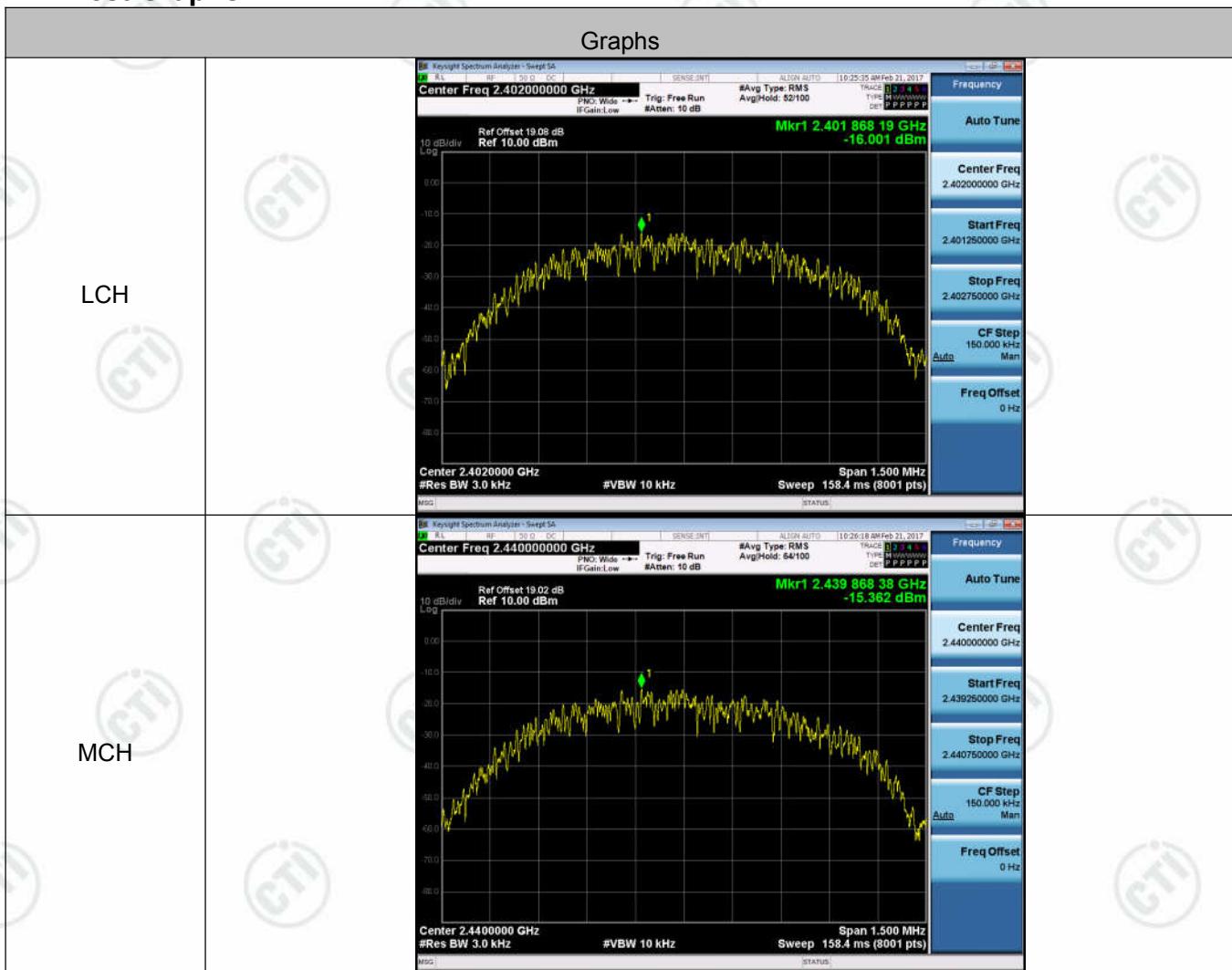


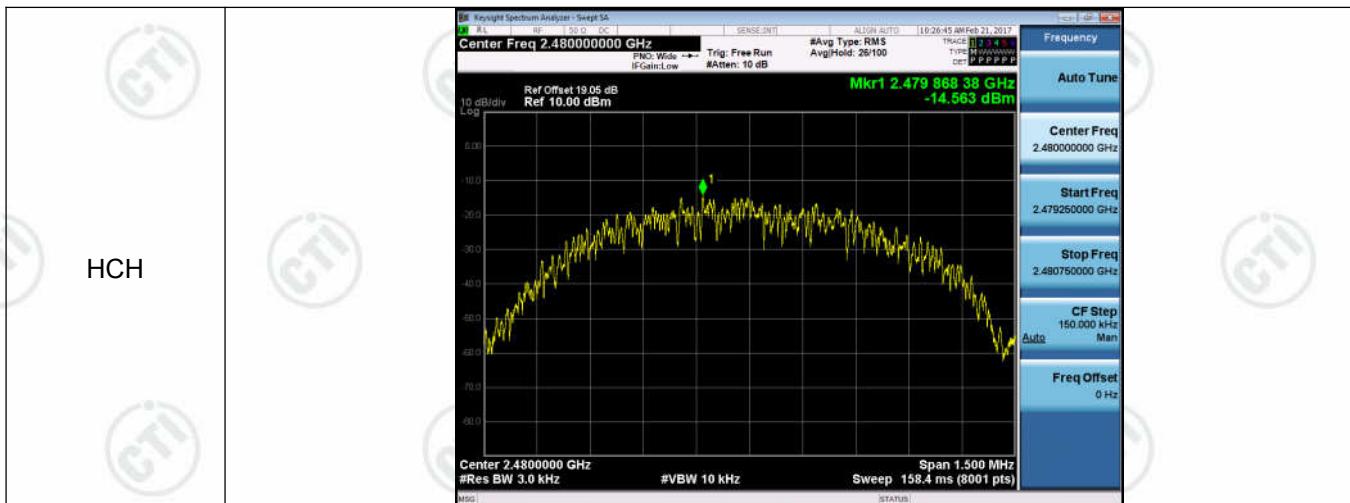
## Appendix E): Power Spectral Density

**Result Table**

Mode	Channel	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE	LCH	-16.001	8	PASS
BLE	MCH	-15.362	8	PASS
BLE	HCH	-14.563	8	PASS

**Test Graphs**





## Appendix F): Antenna Requirement

### 15.203 requirement:

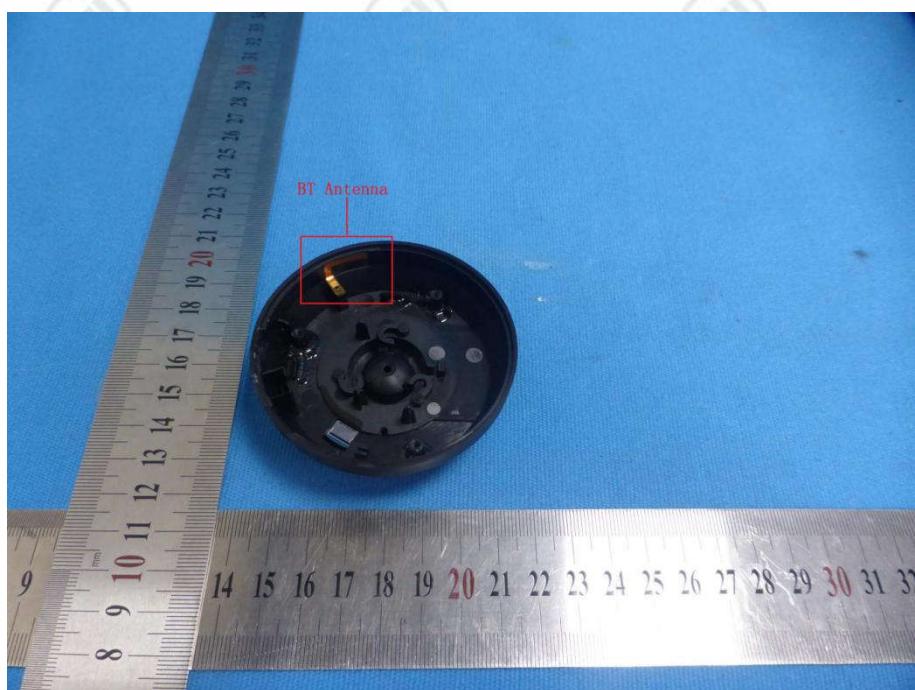
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 Monopole Antenna and no consideration of replacement. The best case gain of the antenna is 0dBi.



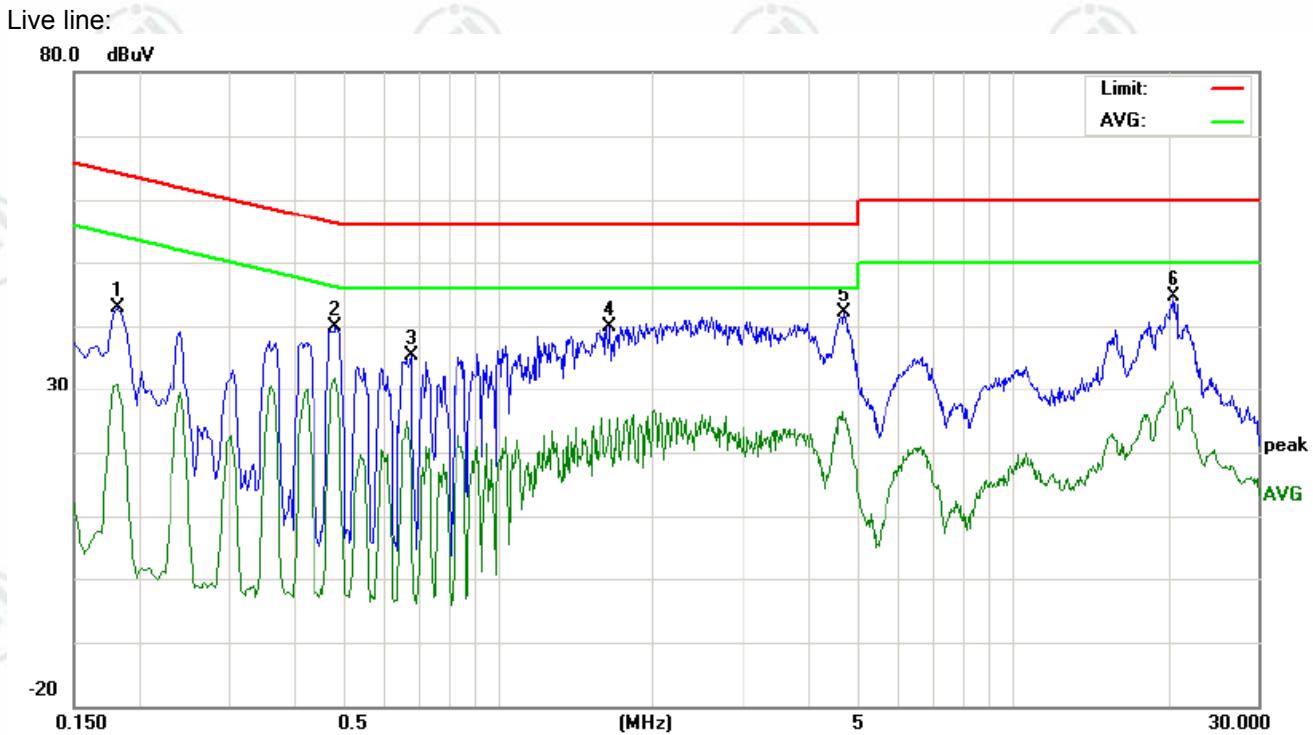
## Appendix G): AC Power Line Conducted Emission

Test Procedure:	<p>Test frequency range :150KHz-30MHz</p> <p>1)The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a <math>50\Omega/50\mu\text{H} + 5\Omega</math> 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.</p> <p>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,</p> <p>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.</p> <p>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.</p>																
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dB<math>\mu</math>V)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.</p> <p>NOTE : The lower limit is applicable at the transition frequency</p>			Frequency range (MHz)	Limit (dB $\mu$ V)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dB $\mu$ V)																
	Quasi-peak	Average															
0.15-0.5	66 to 56*	56 to 46*															
0.5-5	56	46															
5-30	60	50															

### Measurement Data

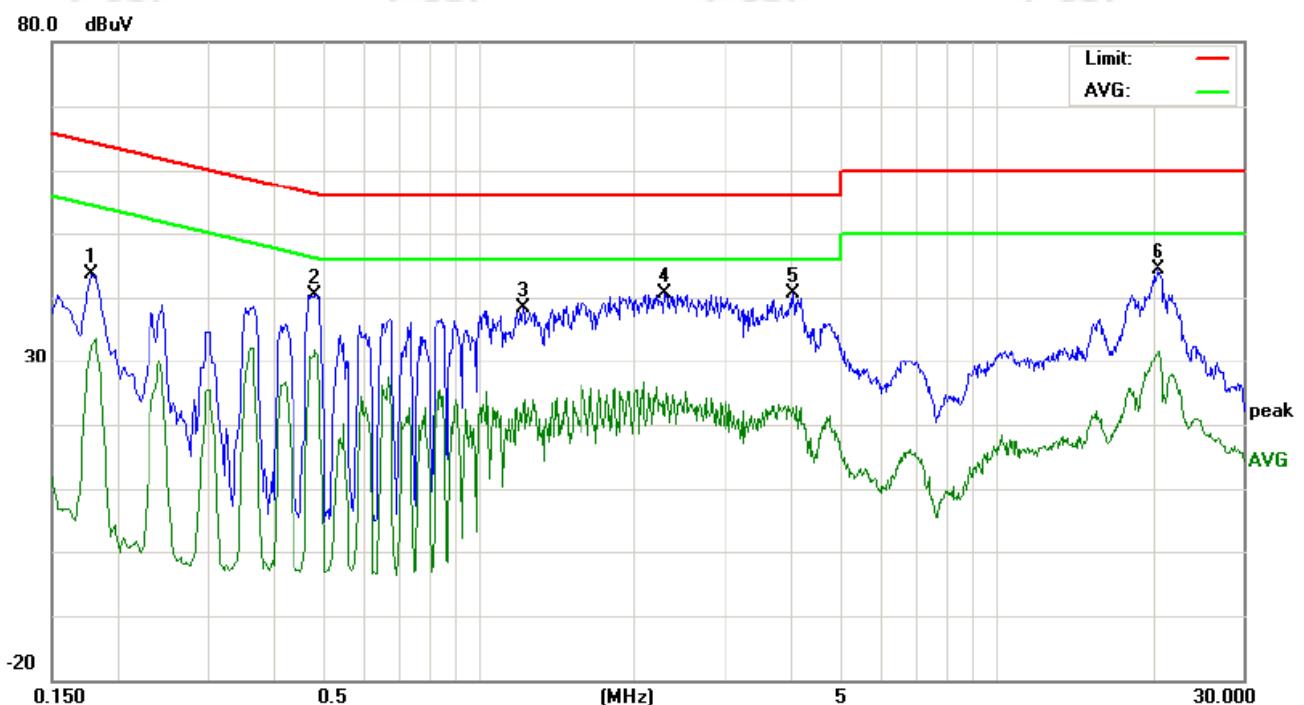
An initial pre-scan was performed on the live and neutral lines with peak detector.

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



No.	Freq.	Reading_Level		Correct Factor		Measurement		Limit		Margin			
		(dBuV)	(dBuV)	Peak	QP	Avg	Peak	QP	Avg	QP	Avg	(dB)	
	MHz	Peak	QP	Avg	dB	Peak	QP	Avg	QP	Avg	P/F	Comment	
1	0.1819	33.15		21.17	9.80	42.95		30.97	64.39	54.39	-21.44	-23.42	P
2	0.4860	29.86		22.02	9.90	39.76		31.92	56.24	46.24	-16.48	-14.32	P
3	0.6780	25.37		7.88	9.90	35.27		17.78	56.00	46.00	-20.73	-28.22	P
4	1.6620	29.90		15.29	9.90	39.80		25.19	56.00	46.00	-16.20	-20.81	P
5	4.7100	32.15		15.11	10.00	42.15		25.11	56.00	46.00	-13.85	-20.89	P
6	20.6500	34.84		20.72	9.80	44.64		30.52	60.00	50.00	-15.36	-19.48	P

Neutral line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor		Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		MHz	Peak	QP	Avg	dB	peak	QP	Avg	QP	Avg	QP	Avg		
1	0.1780	33.76		22.46	9.80	43.56		32.26	64.57	54.57	-21.01	-22.31	P		
2	0.4860	30.46		21.99	9.90	40.36		31.89	56.24	46.24	-15.88	-14.35	P		
3	1.2220	28.70		13.05	9.77	38.47		22.82	56.00	46.00	-17.53	-23.18	P		
4	2.2900	30.52		11.40	10.00	40.52		21.40	56.00	46.00	-15.48	-24.60	P		
5	4.0580	30.72		12.74	10.00	40.72		22.74	56.00	46.00	-15.28	-23.26	P		
6	20.6259	34.69		21.95	9.80	44.49		31.75	60.00	50.00	-15.51	-18.25	P		

Notes:

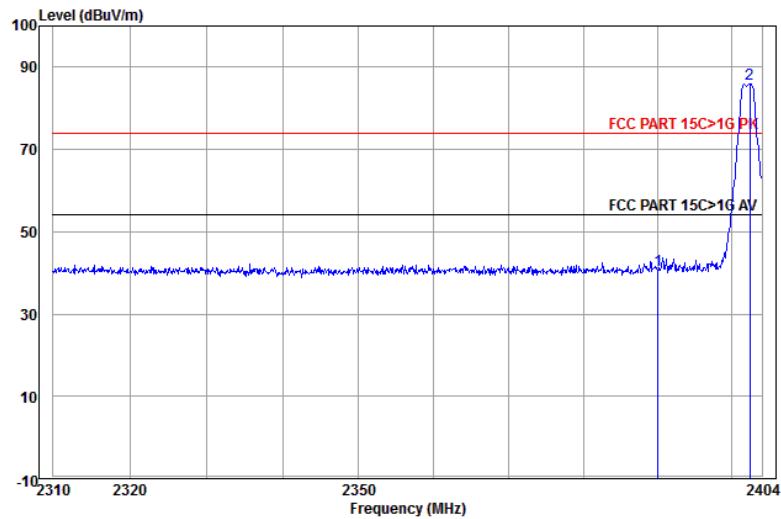
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

## 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:	<b>Below 1GHz test procedure as below:</b> <ul style="list-style-type: none"> <li>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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</li> </ul> <b>Above 1GHz test procedure as below:</b> <ul style="list-style-type: none"> <li>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).</li> <li>h. Test the EUT in the lowest channel , the Highest channel</li> <li>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.</li> <li>j. Repeat above procedures until all frequencies measured was complete.</li> </ul>				
Limit:	Frequency	Limit (dB $\mu$ V/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	

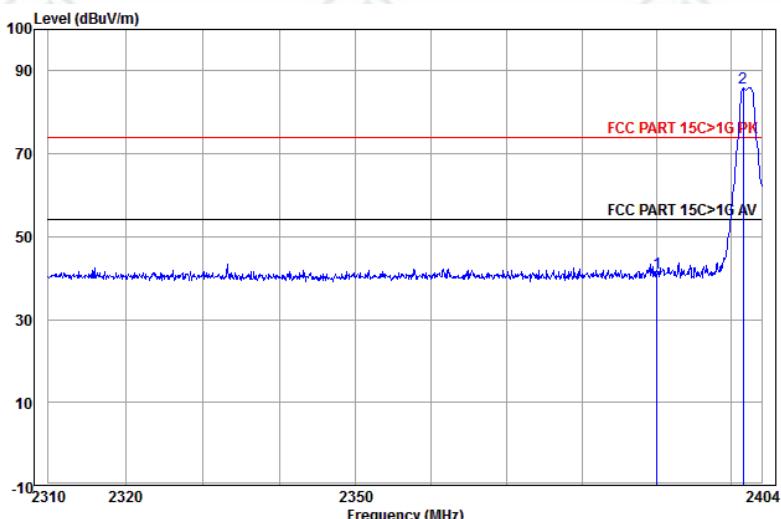
**Test plot as follows:**

Worse case mode:	GFSK		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



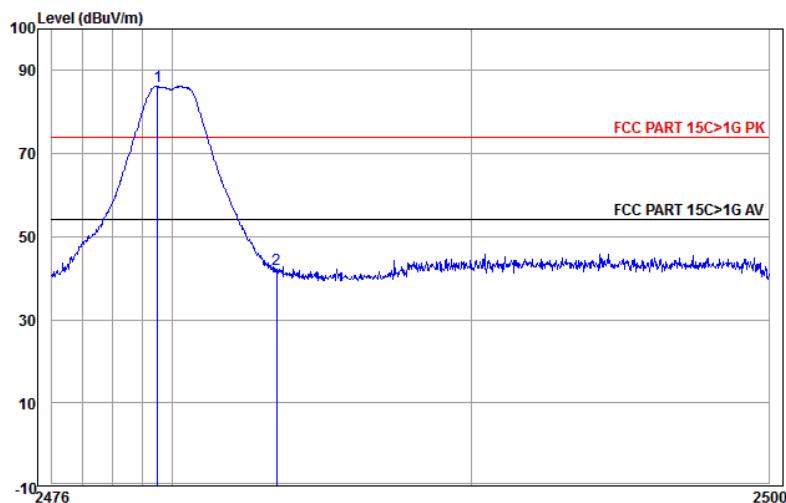
	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Line	Limit Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	32.53	4.28	44.03	47.85	40.63	74.00	-33.37 Horizontal
2 pp	2402.370	32.56	4.31	44.04	93.17	86.00	74.00	12.00 Horizontal

Worse case mode:	GFSK		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



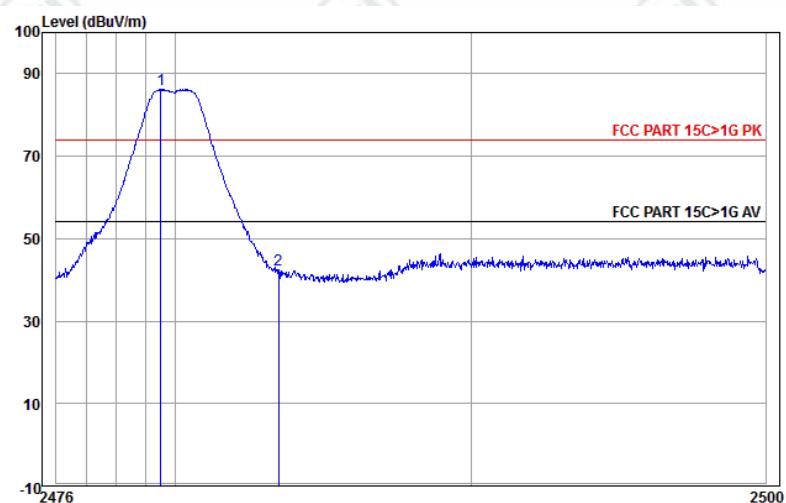
	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Line	Limit Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.000	32.53	4.28	44.03	48.41	41.19	74.00	-32.81 Vertical
2 pp	2401.508	32.56	4.31	44.04	93.23	86.06	74.00	12.06 Vertical

Worse case mode:	GFSK			
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak	



Freq	Ant Factor	Cable Loss Factor	Preamp Factor	Read Level		Limit Line	Over Limit	Over Line	Over Pol/Phase	Remark
				MHz	dB/m	dB	dB	dBuV	dBuV/m	dB
1	pp	2479.513	32.71	4.50	44.14	93.15	86.22	74.00	12.22	Horizontal
2		2483.500	32.71	4.51	44.14	49.07	42.15	74.00	-31.85	Horizontal

Worse case mode:	GFSK			
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak	



Freq	Ant Factor	Cable Loss Factor	Preamp Factor	Read Level		Limit Line	Over Limit	Over Line	Over Pol/Phase	Remark
				MHz	dB/m	dB	dB	dBuV	dBuV/m	dB
1	pp	2479.513	32.71	4.50	44.14	93.14	86.21	74.00	12.21	Vertical
2		2483.500	32.71	4.51	44.14	49.25	42.33	74.00	-31.67	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:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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:

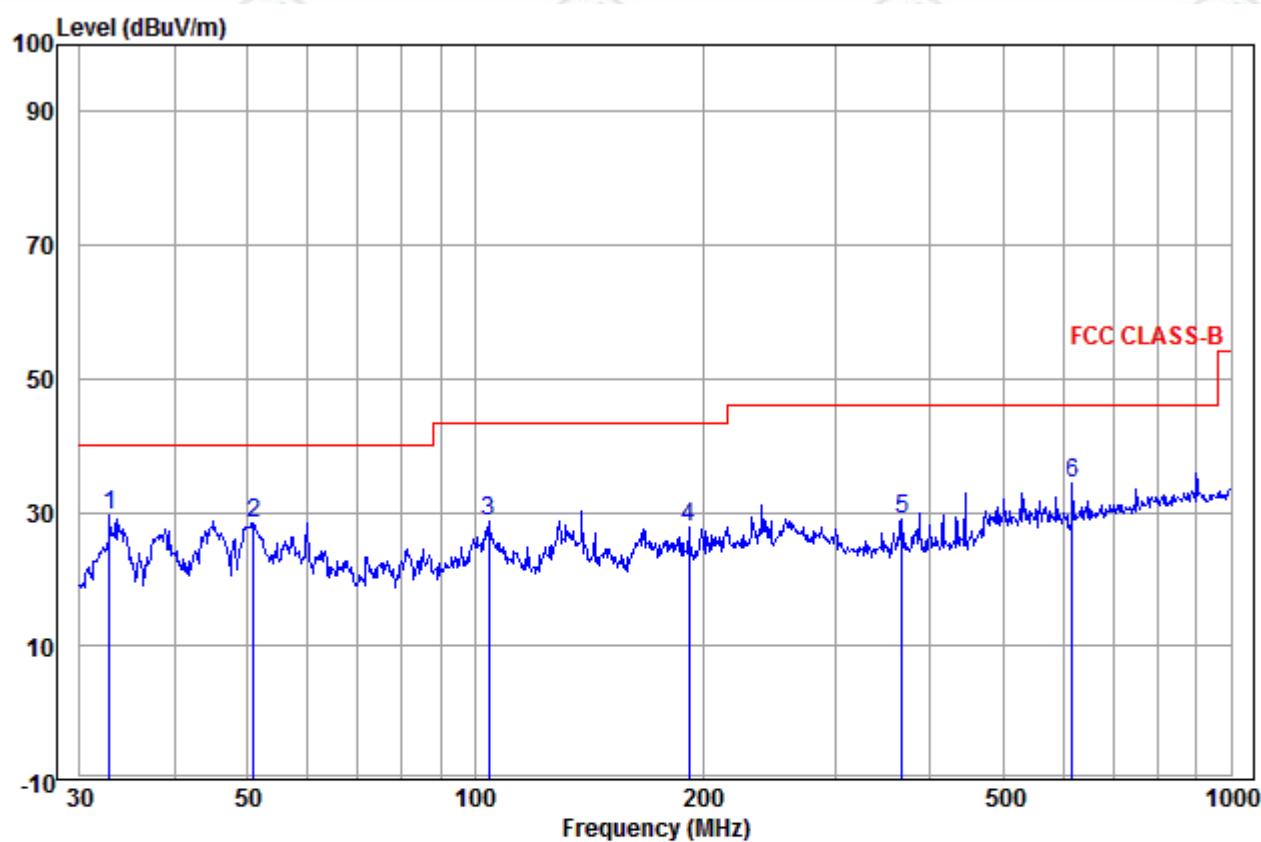
- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- The radiation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

Limit:	Frequency	Field strength (microvolt/meter)	Limit (dB $\mu$ V/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.

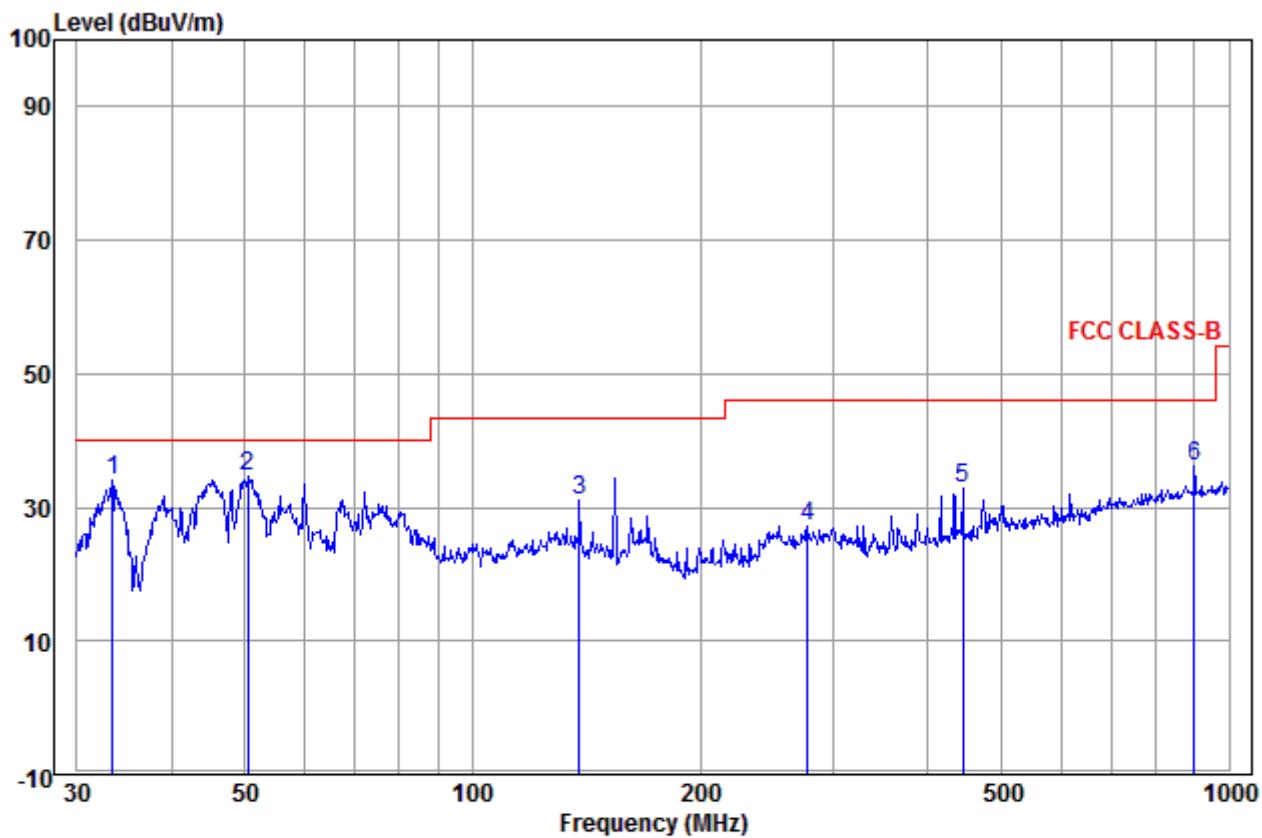
**Radiated Spurious Emissions test Data:  
Radiated Emission below 1GHz**

30MHz~1GHz (QP)		
Test mode:	Transmitting	Horizontal



Freq	Ant Factor	Ant	Cable	Read	Limit Line	Over Limit	Remark
		MHz	dB/m	dB	dBuV	dBuV/m	dB
1 pp	32.864	13.04	0.98	15.62	29.64	40.00	-10.36
2	50.942	14.97	1.40	11.96	28.33	40.00	-11.67
3	104.170	12.85	1.57	14.35	28.77	43.50	-14.73
4	191.745	11.32	2.12	14.44	27.88	43.50	-15.62
5	366.823	15.33	2.74	11.01	29.08	46.00	-16.92
6	616.372	19.07	3.53	11.77	34.37	46.00	-11.63

Test mode:	Transmitting	Vertical
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	Freq	Ant Factor	Ant	Cable	Read	Limit	Over	Remark
			MHz	dB/m	dB	dBuV	dBuV/m	
1	33.445	13.14	0.94	19.84	33.92	40.00	-6.08	
2 pp	50.409	15.04	1.40	18.08	34.52	40.00	-5.48	
3	138.387	10.40	1.58	19.11	31.09	43.50	-12.41	
4	277.094	13.02	2.37	11.82	27.21	46.00	-18.79	
5	444.851	17.02	2.97	12.73	32.72	46.00	-13.28	
6	900.147	22.40	4.34	9.46	36.20	46.00	-9.80	

**Transmitter Emission above 1GHz**

Worse case mode:		GFSK		Test channel:		Lowest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Level (dB $\mu$ V/m)	Limit Line (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1495.101	30.86	2.82	44.00	54.30	43.98	74.00	-30.02	Pass	H
2129.789	31.99	3.60	43.69	53.26	45.16	74.00	-28.84	Pass	H
2558.193	32.85	4.68	44.23	53.80	47.10	74.00	-26.90	Pass	H
4809.499	34.70	5.11	44.60	47.11	42.32	74.00	-31.68	Pass	H
7209.015	36.42	6.67	44.78	43.99	42.30	74.00	-31.70	Pass	H
9611.663	37.89	7.73	45.58	44.88	44.92	74.00	-29.08	Pass	H
1597.401	31.05	2.92	43.89	53.91	43.99	74.00	-30.01	Pass	V
2558.193	32.85	4.68	44.23	54.73	48.03	74.00	-25.97	Pass	V
3003.173	33.60	5.62	44.70	51.57	46.09	74.00	-27.91	Pass	V
4809.499	34.70	5.11	44.60	47.24	42.45	74.00	-31.55	Pass	V
7209.015	36.42	6.67	44.78	43.60	41.91	74.00	-32.09	Pass	V
9611.663	37.89	7.73	45.58	44.62	44.66	74.00	-29.34	Pass	V

Worse case mode:		GFSK		Test channel:		Middle	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Level (dB $\mu$ V/m)	Limit Line (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1668.044	31.18	2.98	43.81	54.54	44.89	74.00	-29.11	Pass	H
2597.564	32.93	4.77	44.27	56.69	50.12	74.00	-23.88	Pass	H
3003.173	33.60	5.62	44.70	49.59	44.11	74.00	-29.89	Pass	H
4883.519	34.86	5.08	44.60	43.62	38.96	74.00	-35.04	Pass	H
7319.964	36.43	6.77	44.87	45.27	43.60	74.00	-30.40	Pass	H
9759.591	38.05	7.60	45.55	40.79	40.89	74.00	-33.11	Pass	H
1498.912	30.87	2.83	44.00	54.16	43.86	74.00	-30.14	Pass	V
2124.374	31.98	3.59	43.68	51.54	43.43	74.00	-30.57	Pass	V
2597.564	32.93	4.77	44.27	55.78	49.21	74.00	-24.79	Pass	V
4883.519	34.86	5.08	44.60	44.97	40.31	74.00	-33.69	Pass	V
7319.964	36.43	6.77	44.87	47.05	45.38	74.00	-28.62	Pass	V
9759.591	38.05	7.60	45.55	41.28	41.38	74.00	-32.62	Pass	V

Worse case mode:		GFSK		Test channel:		Highest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Level (dB $\mu$ V/m)	Limit Line (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1659.574	31.16	2.97	43.82	54.21	44.52	74.00	-29.48	Pass	H
2637.542	33.00	4.86	44.32	56.59	50.13	74.00	-23.87	Pass	H
4958.678	35.01	5.05	44.60	43.89	39.35	74.00	-34.65	Pass	H
5732.974	35.70	6.83	44.52	46.29	44.30	74.00	-29.70	Pass	H
7432.622	36.44	6.87	44.96	43.52	41.87	74.00	-32.13	Pass	H
9909.795	38.21	7.48	45.52	44.21	44.38	74.00	-29.62	Pass	H
1498.912	30.87	2.83	44.00	53.48	43.18	74.00	-30.82	Pass	V
1978.23	31.67	3.21	43.52	52.24	43.60	74.00	-30.40	Pass	V
2637.542	33.00	4.86	44.32	55.42	48.96	74.00	-25.04	Pass	V
4958.678	35.01	5.05	44.60	47.42	42.88	74.00	-31.12	Pass	V
7432.622	36.44	6.87	44.96	43.77	42.12	74.00	-31.88	Pass	V
9909.795	38.21	7.48	45.52	44.34	44.51	74.00	-29.49	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 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.

## PHOTOGRAPHS OF TEST SETUP

Test model No.: 190693



**Radiated spurious emission Test Setup-1(Below 30MHz)**



**Radiated spurious emission Test Setup-1(30MHz-1GHz)**



**Radiated spurious emission Test Setup-3(Above 1GHz)**



**Conducted Emissions Test Setup**

## PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No.EED32J00013901 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.

