TEST REPORT

Product	:	E-POS
Trade mark	:	RONGTA
Model/Type reference	:	AP02, AP02A, AP02B, RP02, TP02, TP02A, TP02B, SP02, SP02A, SP02B
Serial Number	:	N/A
Report Number	:	EED32J00230702
FCC ID	:	2AD6G-AP02
Date of Issue	:	Jan. 26, 2018
Test Standards	:	47 CFR Part 15 Subpart C
Test result	:	PASS

Prepared for:

XIAMEN RONGTA TECHNOLOGY CO., LTD.
3F-1/E Building, No.195 Gaoqishe, Gaodian Village,
Dianqian Street Office, Huli District, Xiamen City, 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:	Tom chen (Test Project)	Compiled by:	Mill chen (Project Engineer)
Reviewed by:	Kevin yang (Reviewer)	Approved by:	Sheek Luo (Lab supervisor)
Date:	Jan. 26, 2018		Check No.:2447672866

CENTRE TESTING INTERNATIONAL GROUP CO.,LTD. Report Seal

2 Version

Version No.	Date	Description
00	Jan. 26, 2018	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/ KDB 558074 D01v04	PASS
6dB Occupied Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
Power Spectral Density	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
RF Conducted Spurious Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013/ KDB 558074 D01v04	PASS
Duty cycle	47 CFR Part 15 Subpart C Section 15.35(c)	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

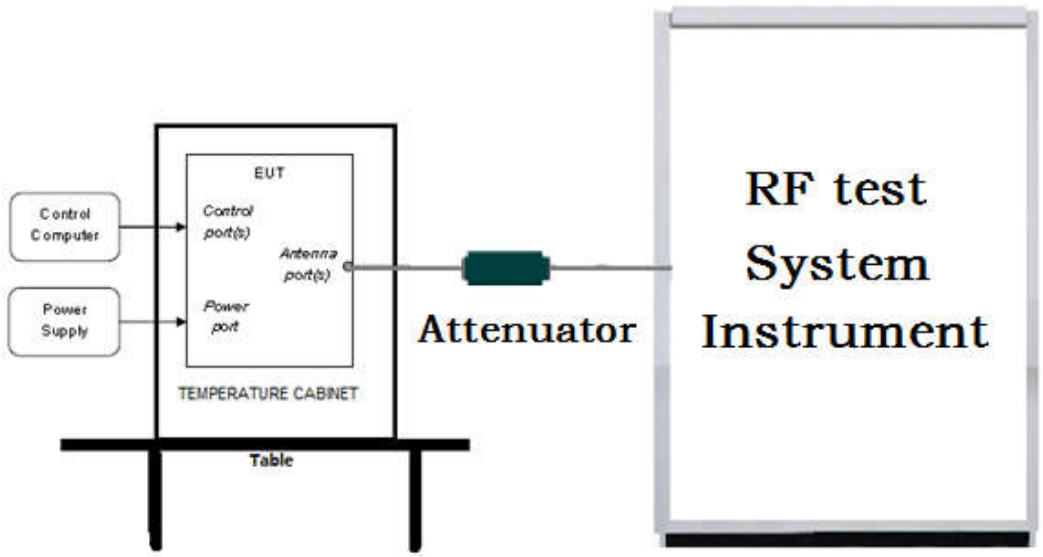
Remark:
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.
The tested sample and the sample information are provided by the client.
Model No.:AP02, AP02A, AP02B, RP02, TP02, TP02A, TP02B, SP02, SP02A, SP02B
Only the model AP02 was tested, since their electrical circuit design, layout, components and internal wiring are identical. Only the model name and color are different.

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:

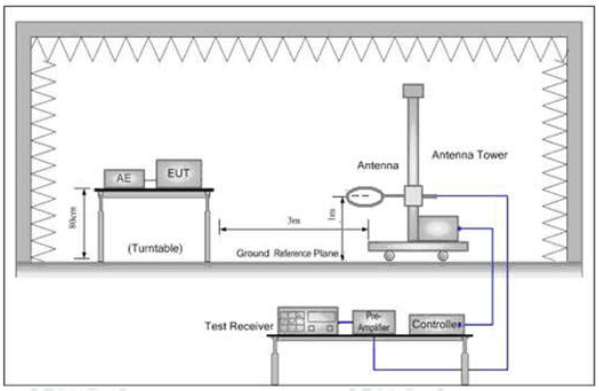


Figure 1. Below 30MHz

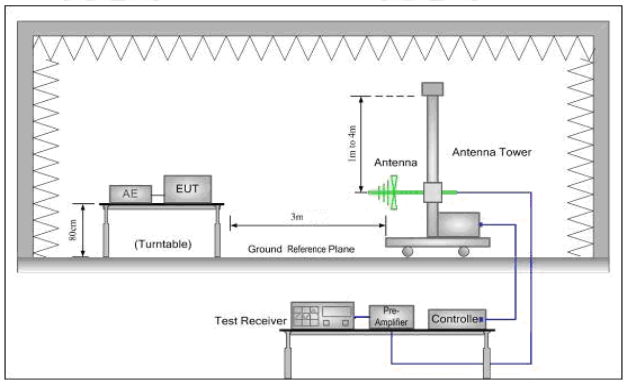


Figure 2. 30MHz to 1GHz

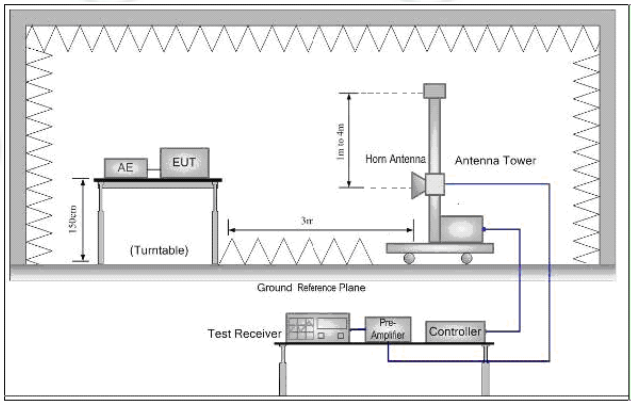
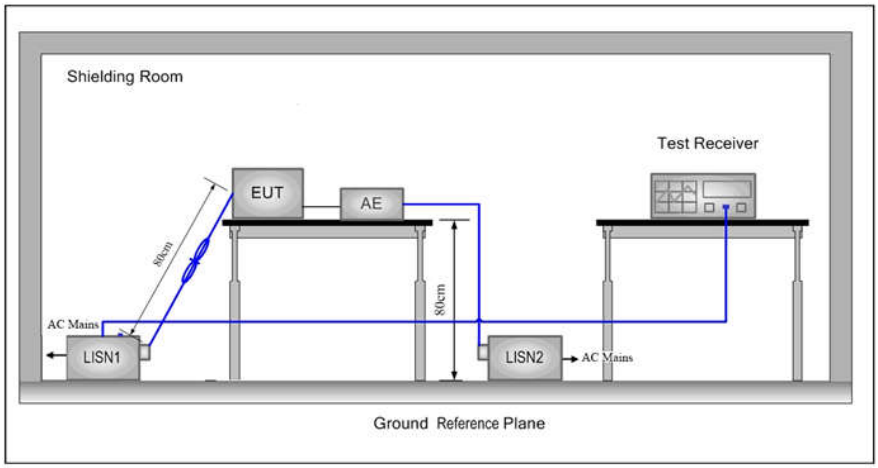


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	23°C
Humidity:	55% 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:	Keep the EUT at Transmit mode.			

6 General Information

6.1 Client Information

Applicant:	XIAMEN RONGTA TECHNOLOGY CO., LTD.
Address of Applicant:	3F-1/E Building, No.195 Gaoqishe, Gaodian Village, Dianqian Street Office, Huli District, Xiamen City, China
Manufacturer:	XIAMEN RONGTA TECHNOLOGY CO., LTD.
Address of Manufacturer:	3F-1/E Building, No.195 Gaoqishe, Gaodian Village, Dianqian Street Office, Huli District, Xiamen City, China
Factory:	XIAMEN RONGTA TECHNOLOGY CO., LTD.
Address of Factory:	4,5F, G Plant, Gaoqi Industrial Zones, Huli District, Xiamen City, China

6.2 General Description of EUT

Product Name:	E-POS
Mode No.(EUT):	AP02, AP02A, AP02B, RP02, TP02, TP02A, TP02B, SP02, SP02A, SP02B
Test Mode:	AP02
Trade Mark:	RONGTA
EUT Supports Radios application	BT4.0, BT3.0 2402-2480MHz, WiFi b/g/n(HT20) 2.4G wifi 2412-2462MHz, GPRS 850/1900 , UMTS（3G）WCDMA Band II/WCDMA Band V
Hardware version:	C(Manufacturer declare)
Software version :	1.0.0(Manufacturer declare)
Power Supply:	DC 5V by Adapter
	Adapter: Input AC 100-240V,50/60Hz,0.5A. Output DC5V 1A
	DC 3.7V by Battery
	Battery: 3.7V, 6000mAh, 22.2Wh
Sample Received Date:	Oct. 19, 2017
Sample tested Date:	Oct. 19, 2017 to Jan. 26, 2018

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.0
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Portable
Test Power Grade:	N/A
Test software of EUT	Engineering mode
Antenna Type:	Integral
Antenna Gain:	1.95dBi
Test Voltage:	AC 120V, 60Hz DC 3.7V

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 Facility

Test location

The test site a is located on *Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China.* Test site at Centre Testing International Group Co., Ltd has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

FCC-Designation No.: CN1164

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 American association for Centre Testing International Group Co., Ltd. EMC laboratory accreditation 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	0.31dB (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**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Signal Generator	Keysight	E8257D	MY53401106	04-01-2016	03-13-2018
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2016	03-13-2018
Signal Generator	Keysight	N5182B	MY53051549	04-01-2016	03-13-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2017	01-11-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-11-2018	01-10-2019
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2017	01-11-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-11-2018	01-10-2019
DC Power	Keysight	E3642A	MY54436035	04-01-2016	03-31-2018
PC-1	Lenovo	R4960d	---	04-01-2016	03-31-2018
power meter & power sensor	R&S	OSP120	101374	04-01-2016	03-13-2018
RF control unit	JS Tonscend	JS0806-2	158060006	04-01-2016	03-13-2018
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	04-01-2016	03-31-2018

Conducted disturbance Test					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100009	06-14-2017	06-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-08-2017	05-07-2018
LISN	R&S	ENV216	100098	06-13-2017	06-12-2018
LISN	schwarzbeck	NNLK8121	8121-529	06-13-2017	06-12-2018
Voltage Probe	R&S	ESH2-Z3	--	06-13-2017	06-12-2018
Current Probe	R&S	EZ17	100106	06-13-2017	06-12-2018
ISN	TESEQ GmbH	ISN T800	30297	02-23-2017	02-22-2018

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-05-2016	06-05-2019
TRILOG Broadband Antenna	SCHWARZBECK	VULB9163	9163-484	05-23-2017	05-22-2018
Horn Antenna	ETS-LINDGREN	3117	00057410	06-30-2015	06-28-2018
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	06-13-2017	06-12-2018
Receiver	R&S	ESCI	100435	06-14-2017	06-13-2018
Multi device Controller	maturo	NCD/070/10711 112	---	01-12-2017	01-11-2018
Multi device Controller	maturo	NCD/070/10711 112	---	01-11-2018	01-10-2019
LISN	schwarzbeck	NNBM8125	81251547	06-13-2017	06-12-2018
LISN	schwarzbeck	NNBM8125	81251548	06-13-2017	06-12-2018
Signal Generator	Agilent	E4438C	MY45095744	03-14-2017	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-08-2017	05-07-2018
Cable line	Fulai(7M)	SF106	5219/6A	01-12-2017	01-11-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-12-2017	01-11-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-12-2017	01-11-2018
Cable line	Fulai(3M)	SF106	5217/6A	01-12-2017	01-11-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2017	01-11-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-11-2018	01-10-2019
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2017	01-11-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-11-2018	01-10-2019
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-11-2018	01-10-2019
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-11-2018	01-10-2019
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-11-2018	01-10-2019
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-11-2018	01-10-2019

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/KDB 558074	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10/KDB 558074	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10/KDB 558074	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10/KDB 558074	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10/KDB 558074	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.35 (c)	ANSI 63.10	Duty cycle	PASS	Appendix F)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix G)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix I)
Part15C Section 15.205/15.209	K ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix J)

Appendix A): 6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict	Remark
BLE	LCH	0.6816	1.0341	PASS	Peak detector
BLE	MCH	0.6850	1.0335	PASS	
BLE	HCH	0.6817	1.0336	PASS	

Test Graphs

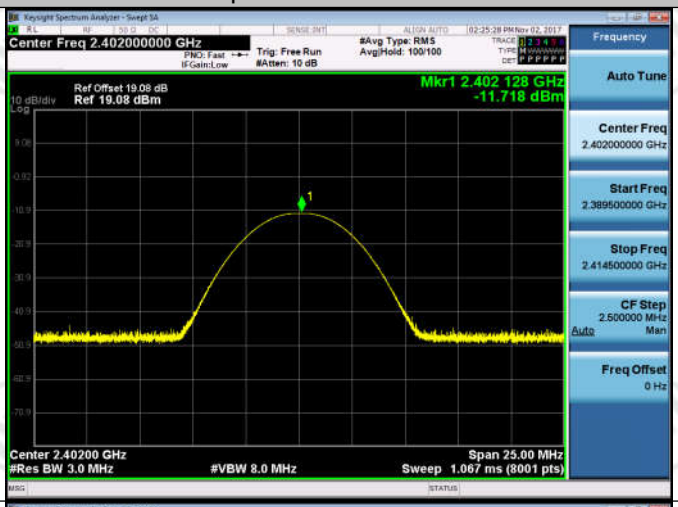
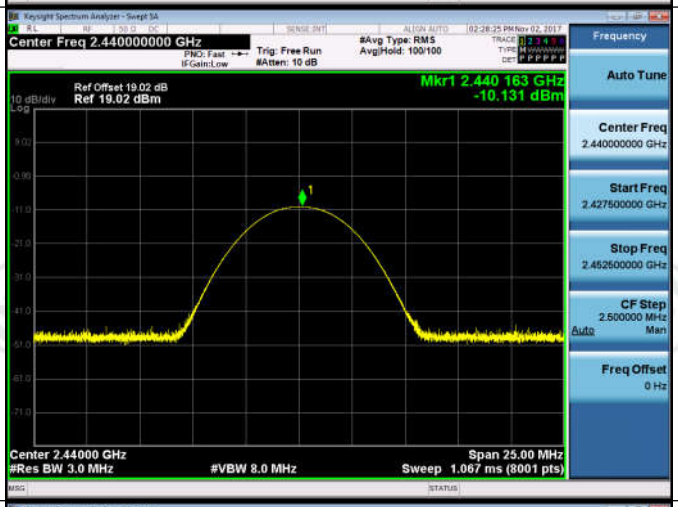
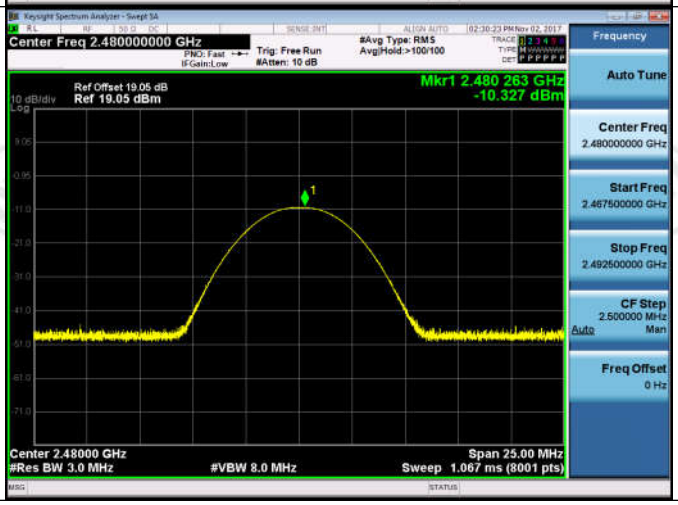
Graphs		
LCH		
MCH		
HCH		

Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	-11.718	PASS
BLE	MCH	-10.131	PASS
BLE	HCH	-10.327	PASS

Test Graphs

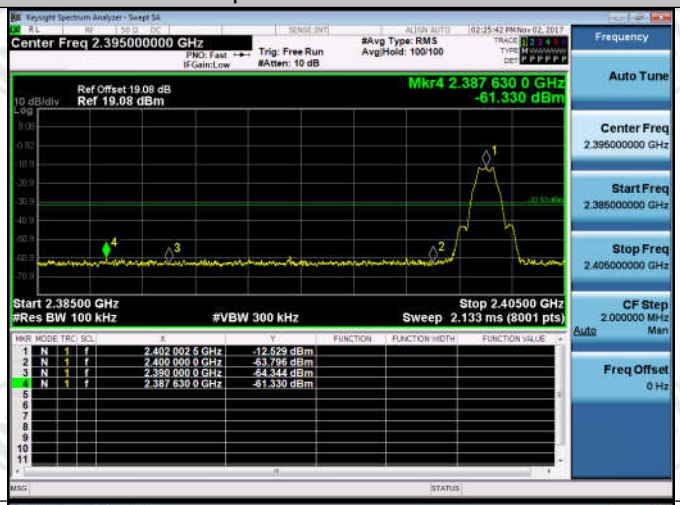
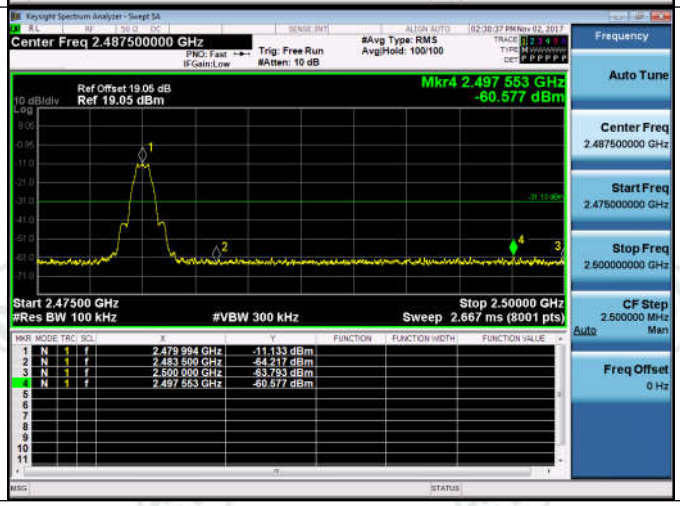
Graphs		
LCH		
MCH		
HCH		

Appendix C): Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	-12.529	-61.330	-32.53	PASS
BLE	HCH	-11.133	-60.577	-31.13	PASS

Test Graphs

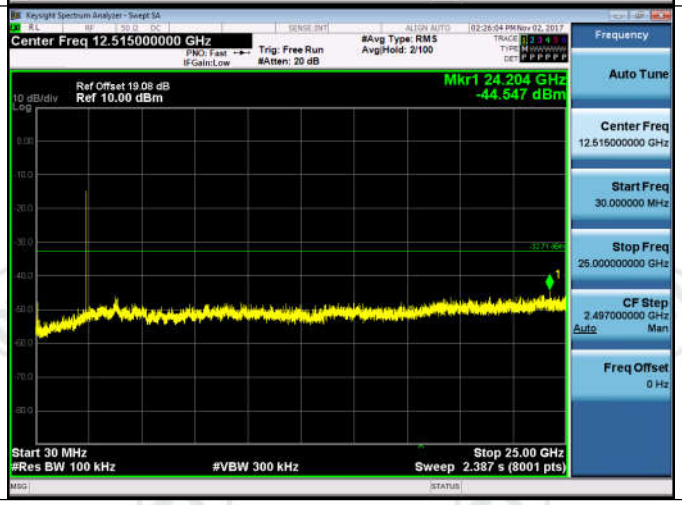
Graphs	
LCH	
HCH	

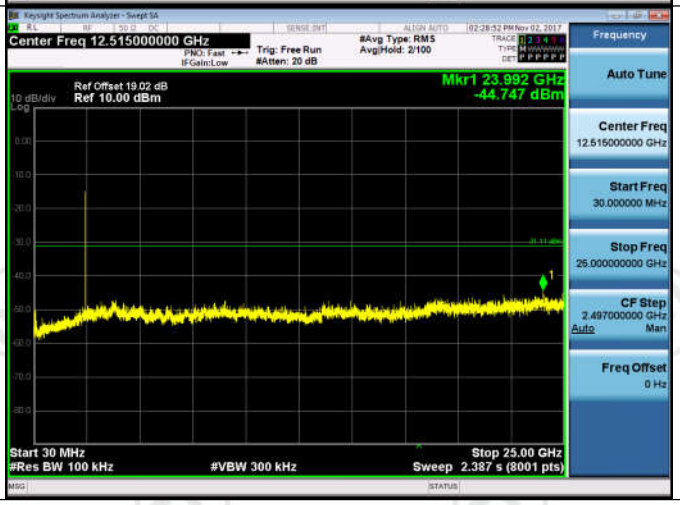
Appendix D): RF Conducted Spurious Emissions

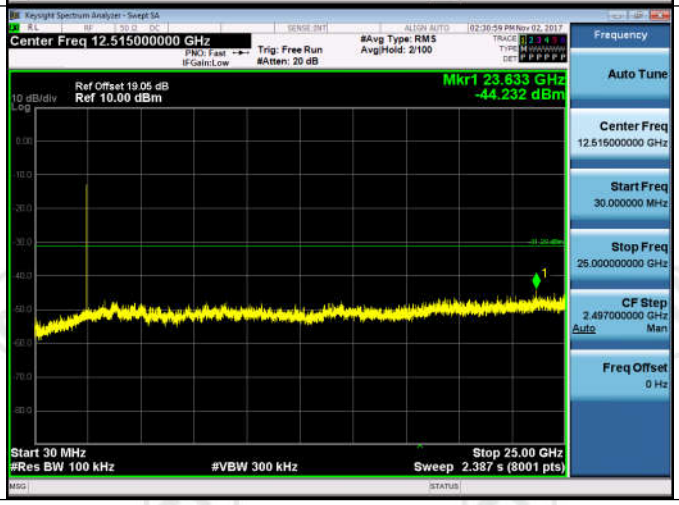
Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	-12.714	<Limit	PASS
BLE	MCH	-11.109	<Limit	PASS
BLE	HCH	-11.286	<Limit	PASS

Test Graphs

BLE_LCH_Graphs		
Pref/BLE/LCH		
Puw/BLE/LCH		

BLE_MCH_Graphs		
Pref/BLE/MCH		
Puw/BLE/MCH		

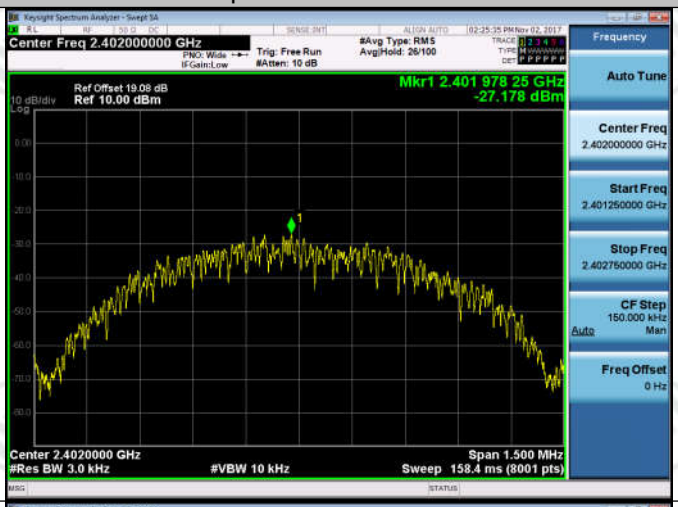
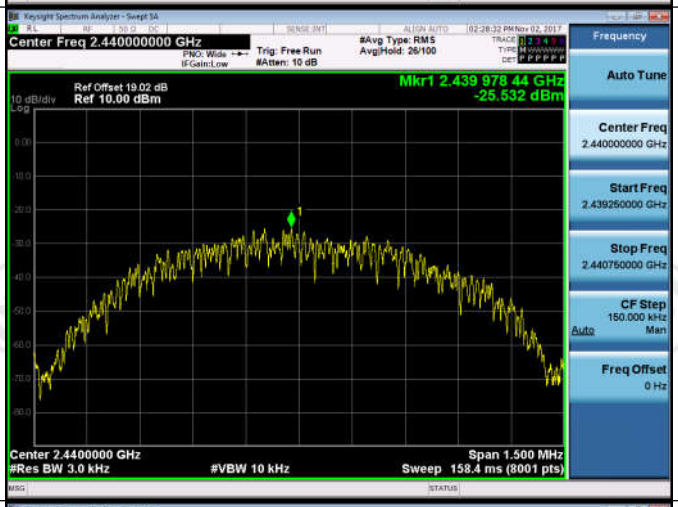
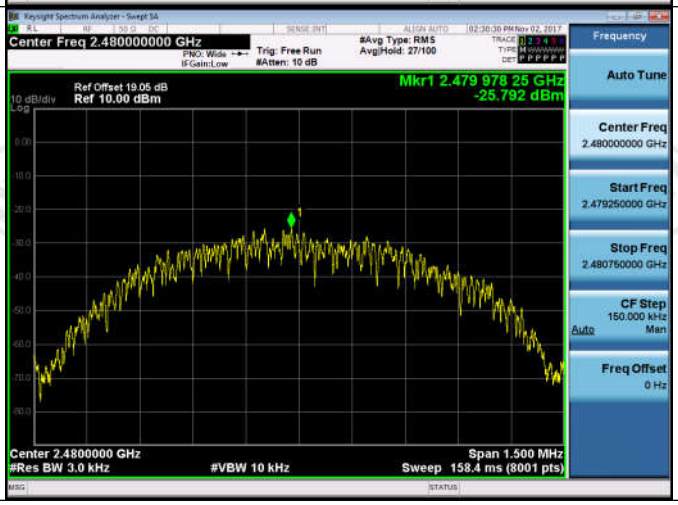
BLE_HCH_Graphs			
Pref/BLE/HCH			
Puw/BLE/HCH			

Appendix E): Power Spectral Density

Result Table

Mode	Channel	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE	LCH	-27.178	8	PASS
BLE	MCH	-25.532	8	PASS
BLE	HCH	-25.792	8	PASS

Test Graphs

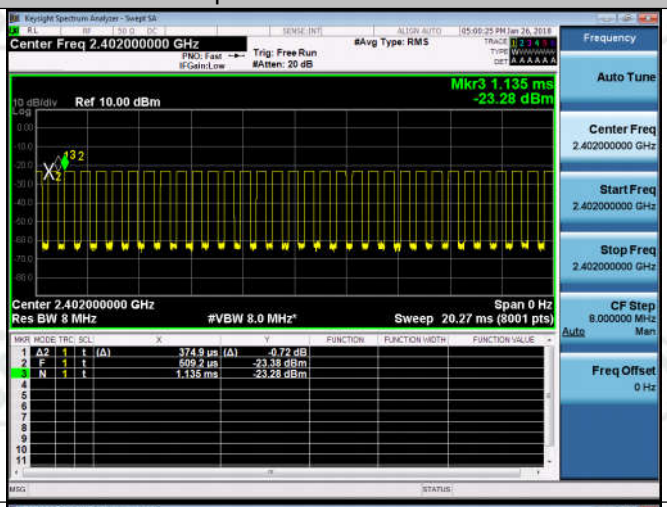
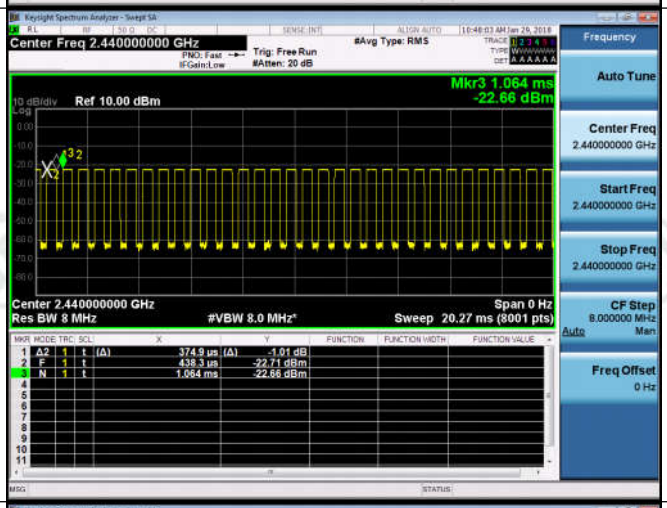
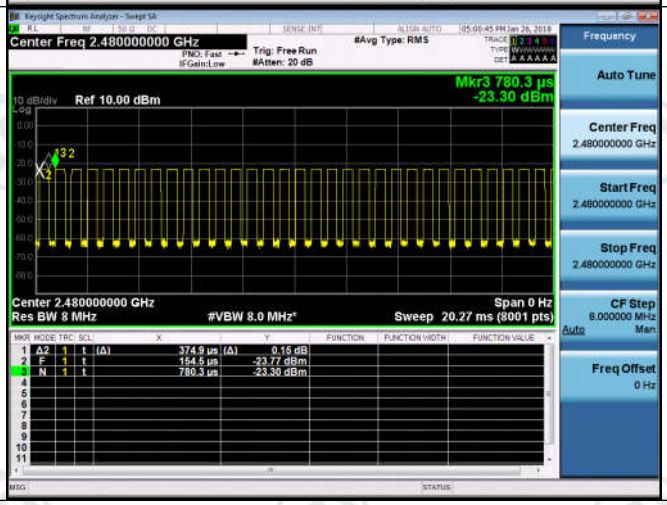
Graphs			
LCH			
MCH			
HCH			

Appendix F): Duty Cycle

Result Table

Test Mode	Channel	Duty Cycle[%]	Verdict
GFSK	LCH	59.92	PASS
GFSK	MCH	59.92	PASS
GFSK	HCH	59.92	PASS

Test Graph

Graphs			
GFSK/LCH			
GFSK/MCH			
GFSK/HCH			

Appendix G): Antenna Requirement

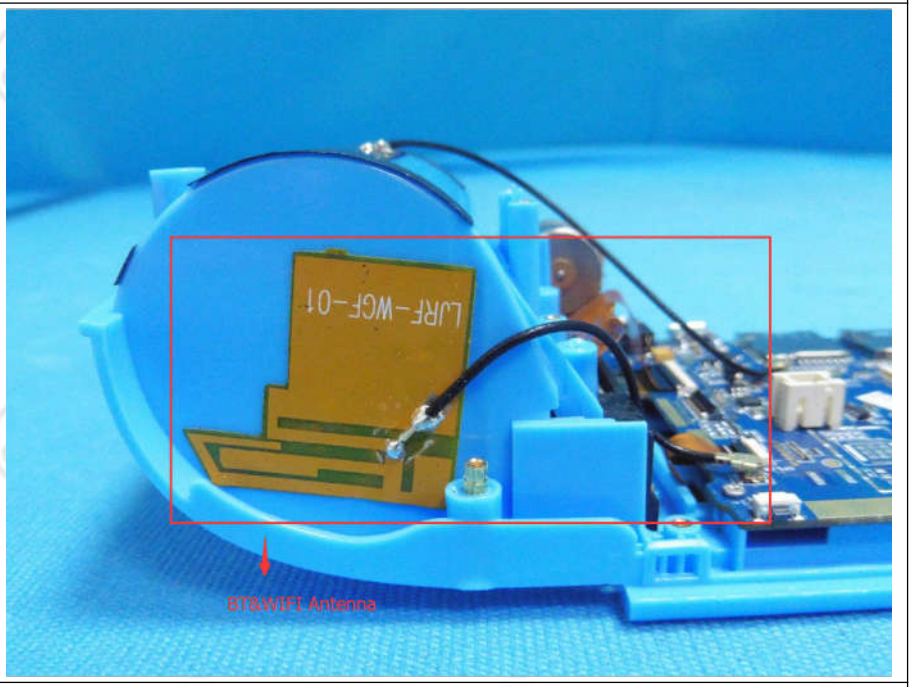
15.203 requirement:

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 1.95dBi.

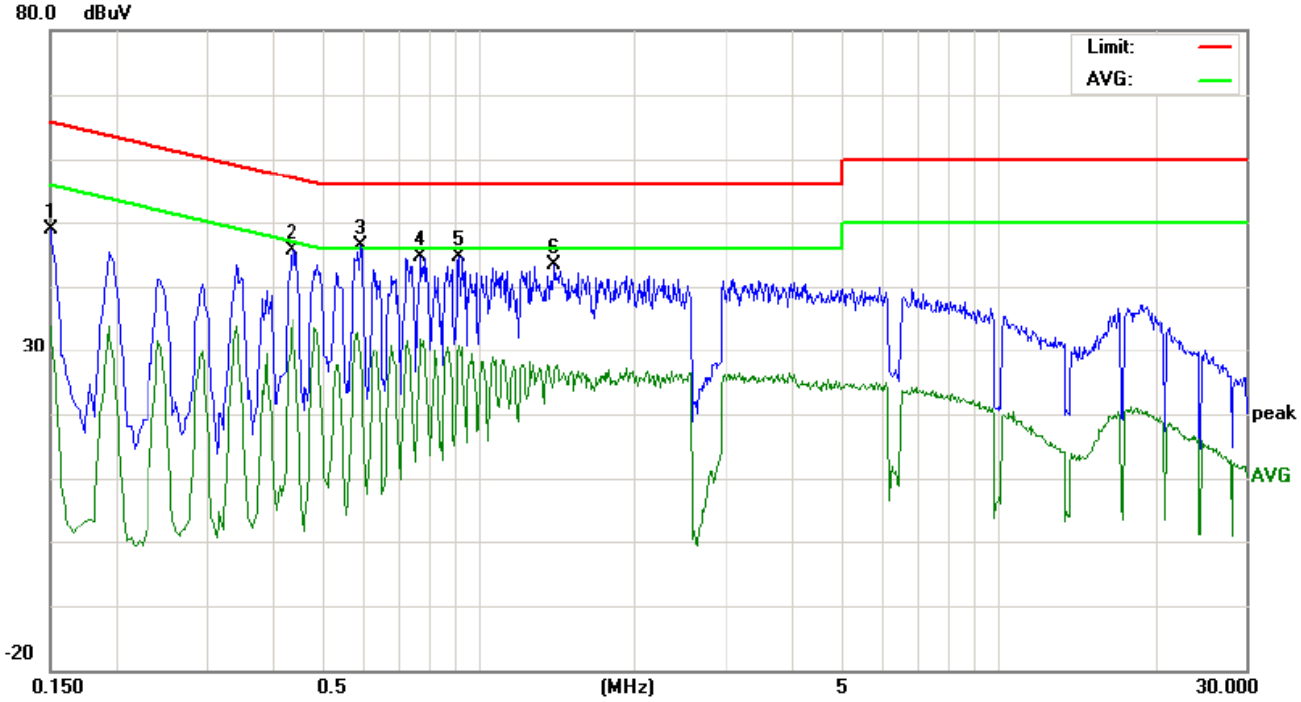
Appendix H): AC Power Line Conducted Emission

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

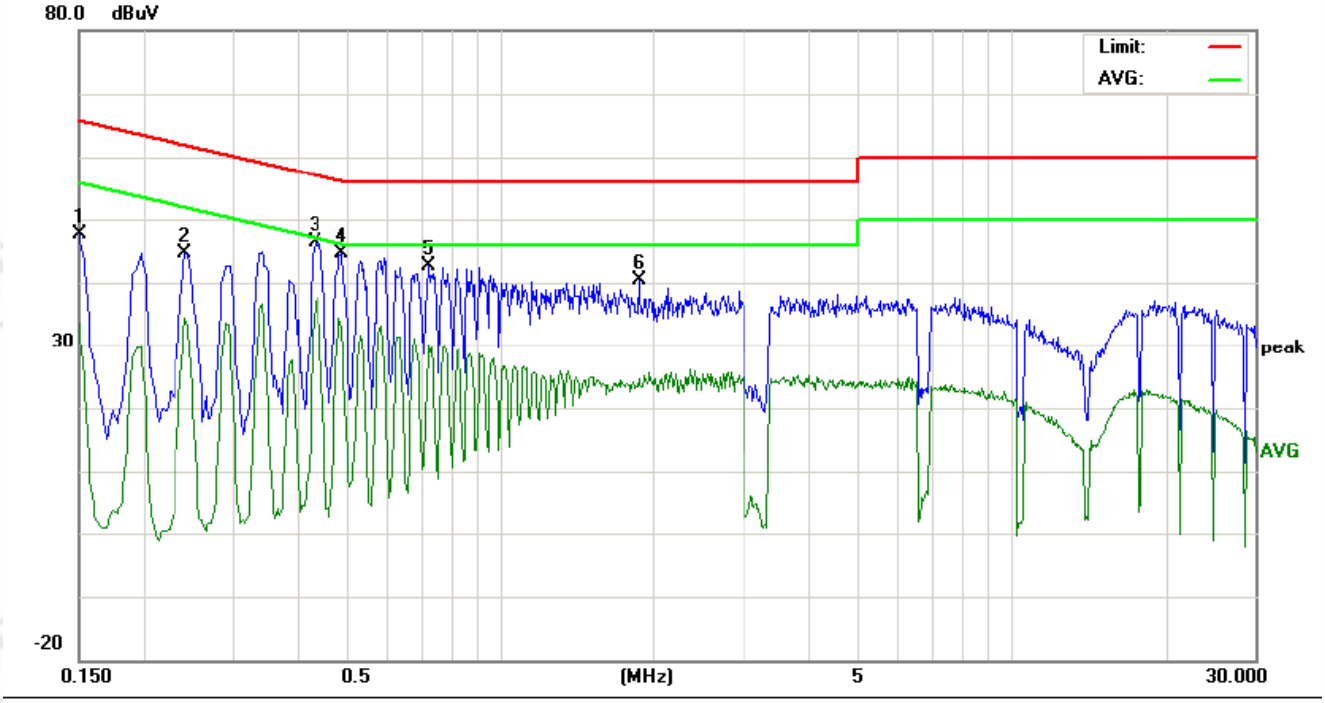
An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

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	0.1500	39.09	37.23	24.20	9.77	48.86	47.00	33.97	65.99	55.99	-18.99	-22.02	P	
2	0.4380	35.99	33.51	25.18	9.73	45.72	43.24	34.91	57.10	47.10	-13.86	-12.19	P	
3	0.5940	36.59	33.69	19.08	9.75	46.34	43.44	28.83	56.00	46.00	-12.56	-17.17	P	
4	0.7740	34.89	31.27	22.04	9.74	44.63	41.01	31.78	56.00	46.00	-14.99	-14.22	P	
5	0.9220	34.90	32.25	21.11	9.74	44.64	41.99	30.85	56.00	46.00	-14.01	-15.15	P	
6	1.4020	33.55	30.77	17.00	9.72	43.27	40.49	26.72	56.00	46.00	-15.51	-19.28	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	0.1500	37.94	35.15	23.84	9.77	47.71	44.92	33.61	65.99	55.99	-21.07	-22.38	P	
2	0.2420	34.89	32.65	24.54	9.74	44.63	42.39	34.28	62.02	52.02	-19.63	-17.74	P	
3	0.4340	36.66	34.65	26.53	9.74	46.40	44.39	36.27	57.18	47.18	-12.79	-10.91	P	
4	0.4900	34.96	32.44	23.41	9.71	44.67	42.15	33.12	56.17	46.17	-14.02	-13.05	P	
5	0.7260	32.85	30.22	20.43	9.75	42.60	39.97	30.18	56.00	46.00	-16.03	-15.82	P	
6	1.8700	30.64	28.07	14.79	9.72	40.36	37.79	24.51	56.00	46.00	-18.21	-21.49	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.

3. AC120V and 240V are tested and found the worst case is 120V, So only the 120V data were shown in the above.

Appendix I): 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.

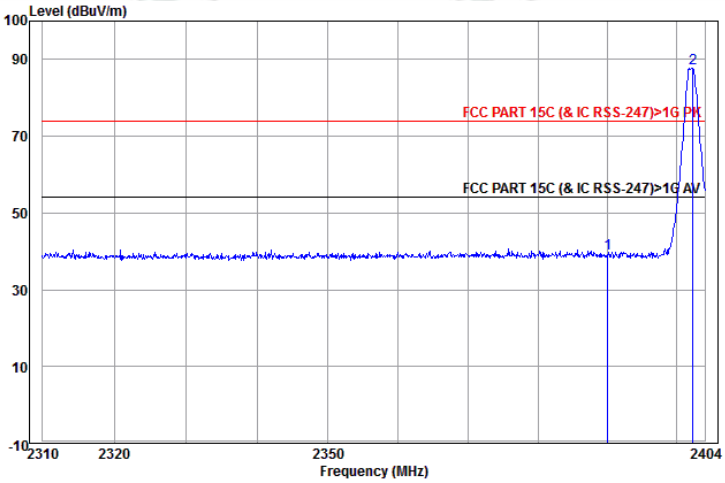
j. Repeat above procedures until all frequencies measured was complete.

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

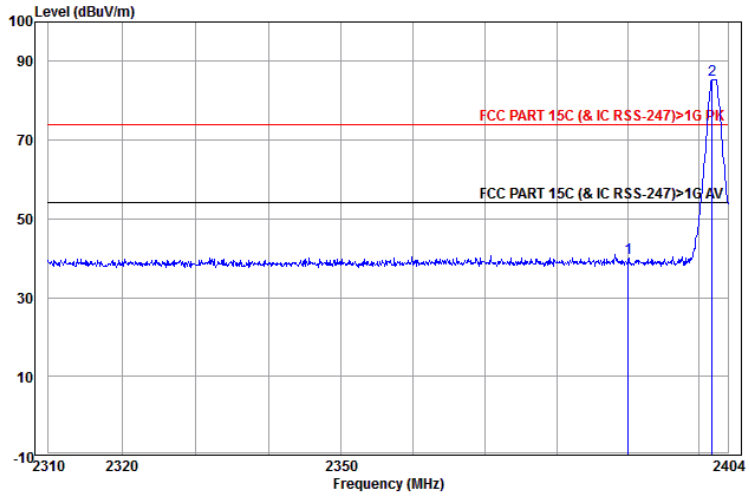
Test plot as follows:

Worse case mode:	GFSK		
Frequency: 2402MHz	Test channel: Lowest	Polarization: Horizontal	Remark: PK



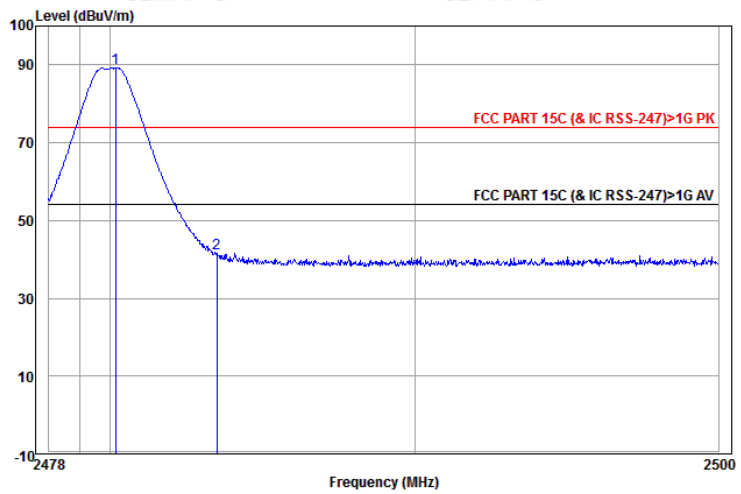
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	44.03	47.78	39.35	74.00	-34.65	Horizontal	Peak
2 pp	2402.275	32.56	3.08	44.04	96.13	87.73	74.00	13.73	Horizontal	Peak

Worse case mode:	GFSK		
Frequency: 2402MHz	Test channel: Lowest	Polarization: Vertical	Remark: PK



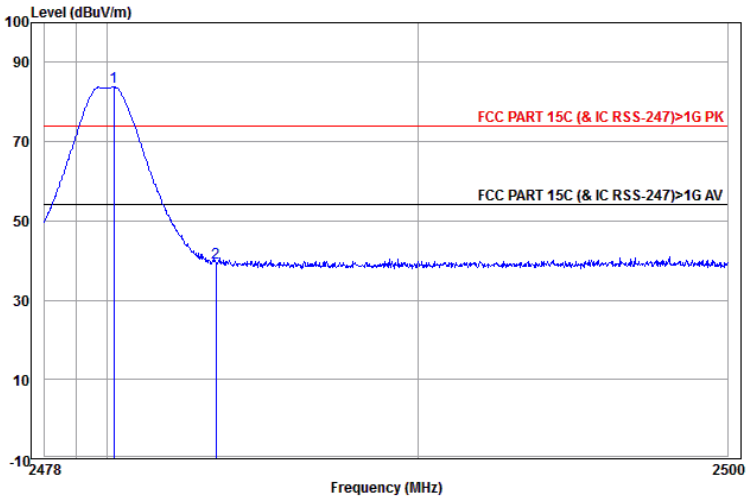
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	44.03	48.48	40.05	74.00	-33.95	Vertical	Peak
2 pp	2401.796	32.56	3.07	44.04	93.85	85.44	74.00	11.44	Vertical	Peak

Worse case mode:	GFSK		
Frequency: 2480MHz	Test channel: Highest	Polarization: Horizontal	Remark: PK



	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.191	32.71	3.12	44.14	97.55	89.24	74.00	15.24	Horizontal	Peak
2	2483.500	32.71	3.12	44.14	49.72	41.41	74.00	-32.59	Horizontal	Peak

Worse case mode:	GFSK		
Frequency: 2480MHz	Test channel: Highest	Polarization: Vertical	Remark: PK



	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.213	32.71	3.12	44.14	92.06	83.75	74.00	9.75	Vertical	Peak
2	2483.500	32.71	3.12	44.14	47.77	39.46	74.00	-34.54	Vertical	Peak

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 J): 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 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

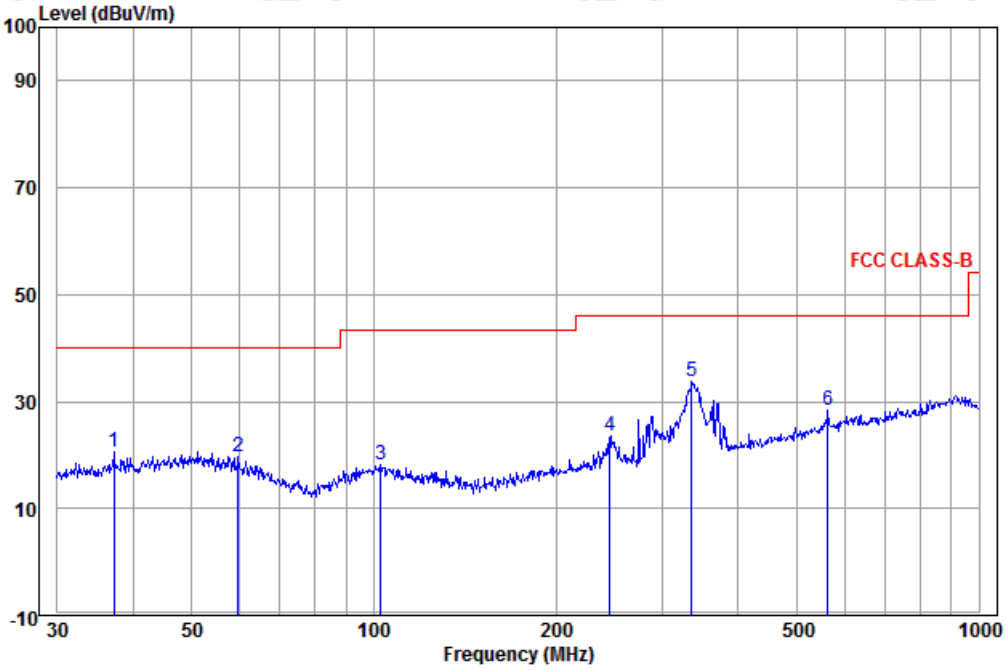
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

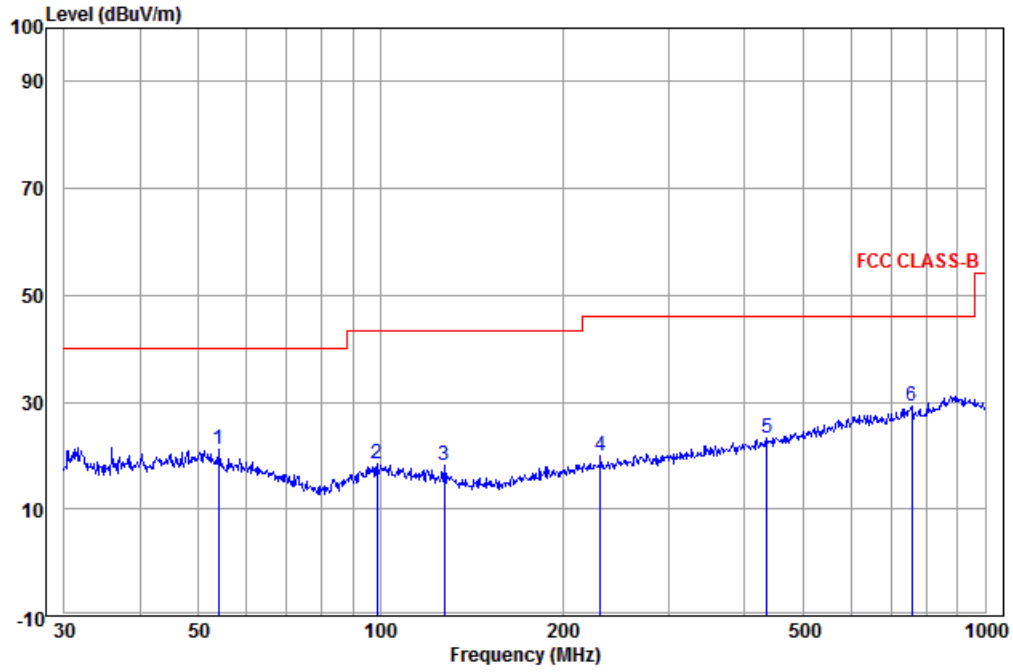
30MHz~1GHz (QP)

Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	37.155	13.31	0.06	7.15	20.52	40.00	-19.48	Horizontal	QP
2	59.649	13.15	0.21	6.37	19.73	40.00	-20.27	Horizontal	QP
3	102.719	12.26	0.59	5.30	18.15	43.50	-25.35	Horizontal	QP
4	245.951	12.52	1.32	9.61	23.45	46.00	-22.55	Horizontal	QP
5 pp	334.859	14.11	1.25	18.26	33.62	46.00	-12.38	Horizontal	QP
6	562.662	18.04	1.62	8.59	28.25	46.00	-17.75	Horizontal	QP

Vertical



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	53.882	13.98	0.15	6.99	21.12	40.00	-18.88	Vertical	QP
2	98.833	12.32	0.57	5.43	18.32	43.50	-25.18	Vertical	QP
3	127.665	10.27	0.60	7.25	18.12	43.50	-25.38	Vertical	QP
4	230.907	12.21	1.25	6.61	20.07	46.00	-25.93	Vertical	QP
5	435.590	15.92	1.43	5.96	23.31	46.00	-22.69	Vertical	QP
6 pp	755.387	19.53	2.50	7.09	29.12	46.00	-16.88	Vertical	QP

Transmitter Emission above 1GHz

Worse case mode:		GFSK		Test channel:		Lowest			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1238.405	30.32	1.92	44.33	46.29	34.20	74.00	-39.80	Pass	Horizontal
1581.218	31.02	2.39	43.91	46.28	35.78	74.00	-38.22	Pass	Horizontal
3776.385	32.96	4.02	44.62	47.12	39.48	74.00	-34.52	Pass	Horizontal
4804.000	34.69	5.98	44.60	42.73	38.80	74.00	-35.20	Pass	Horizontal
7206.000	36.42	6.97	44.77	42.92	41.54	74.00	-32.46	Pass	Horizontal
9608.000	37.88	6.98	45.58	43.13	42.41	74.00	-31.59	Pass	Horizontal
1207.279	30.24	1.87	44.37	46.93	34.67	74.00	-39.33	Pass	Vertical
3316.617	33.32	3.65	44.67	47.77	40.07	74.00	-33.93	Pass	Vertical
4804.000	34.69	5.98	44.60	43.37	39.44	74.00	-34.56	Pass	Vertical
5865.832	35.80	7.31	44.51	46.23	44.83	74.00	-29.17	Pass	Vertical
7206.000	36.42	6.97	44.77	43.87	42.49	74.00	-31.51	Pass	Vertical
9608.000	37.88	6.98	45.58	43.78	43.06	74.00	-30.94	Pass	Vertical

Worse case mode:		GFSK		Test channel:		Middle			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1374.639	30.62	2.12	44.15	46.77	35.36	74.00	-38.64	Pass	Horizontal
1943.292	31.62	2.78	43.55	46.39	37.24	74.00	-36.76	Pass	Horizontal
3757.208	32.97	4.01	44.62	47.06	39.42	74.00	-34.58	Pass	Horizontal
4880.000	34.85	6.13	44.60	44.13	40.51	74.00	-33.49	Pass	Horizontal
7320.000	36.43	6.85	44.87	43.11	41.52	74.00	-32.48	Pass	Horizontal
9760.000	38.05	7.12	45.55	41.88	41.50	74.00	-32.50	Pass	Horizontal
1135.731	30.07	1.75	44.48	46.60	33.94	74.00	-40.06	Pass	Vertical
1502.732	30.88	2.29	43.99	46.50	35.68	74.00	-38.32	Pass	Vertical
4159.927	33.20	4.57	44.60	45.85	39.02	74.00	-34.98	Pass	Vertical
4880.000	34.85	6.13	44.60	43.44	39.82	74.00	-34.18	Pass	Vertical
7320.000	36.43	6.85	44.87	43.13	41.54	74.00	-32.46	Pass	Vertical
9760.000	38.05	7.12	45.55	42.15	41.77	74.00	-32.23	Pass	Vertical

Worse case mode:		GFSK		Test channel:		Highest			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1263.883	30.38	1.96	44.29	47.44	35.49	74.00	-38.51	Pass	Horizontal
1805.005	31.40	2.64	43.68	46.77	37.13	74.00	-36.87	Pass	Horizontal
3728.625	33.00	3.99	44.62	46.61	38.98	74.00	-35.02	Pass	Horizontal
4960.000	35.02	6.29	44.60	42.61	39.32	74.00	-34.68	Pass	Horizontal
7440.000	36.45	6.73	44.97	43.77	41.98	74.00	-32.02	Pass	Horizontal
9920.000	38.22	7.26	45.52	42.18	42.14	74.00	-31.86	Pass	Horizontal
1185.958	30.19	1.84	44.40	45.35	32.98	74.00	-41.02	Pass	Vertical
1642.761	31.13	2.46	43.84	46.61	36.36	74.00	-37.64	Pass	Vertical
3516.592	33.16	3.82	44.64	46.07	38.41	74.00	-35.59	Pass	Vertical
4960.000	35.02	6.29	44.60	43.29	40.00	74.00	-34.00	Pass	Vertical
7440.000	36.45	6.73	44.97	43.36	41.57	74.00	-32.43	Pass	Vertical
9920.000	38.22	7.26	45.52	41.97	41.93	74.00	-32.07	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:

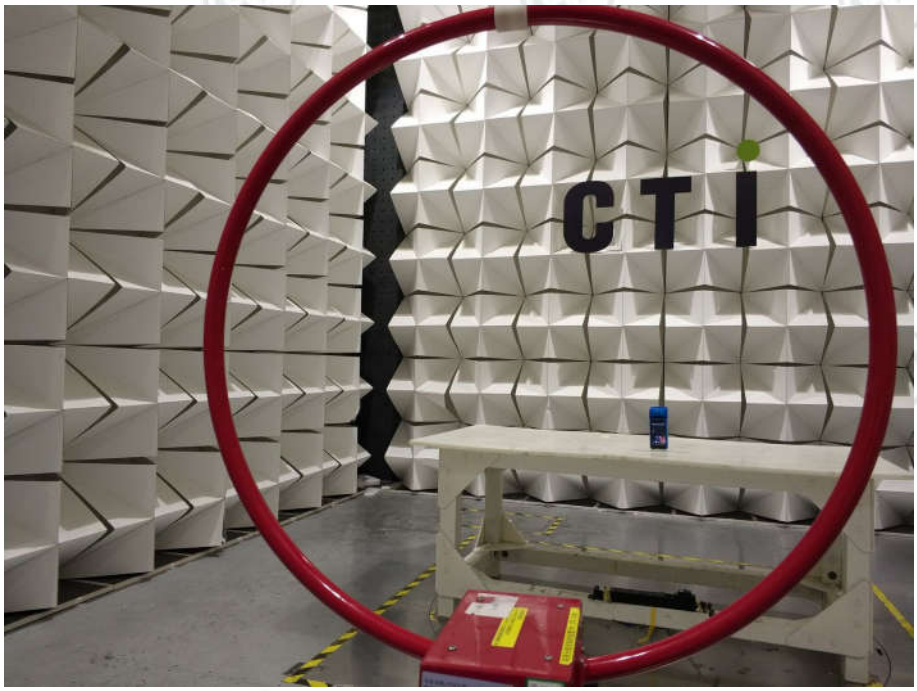
Final Test Level =Receiver Reading -Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

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 mode No.: AP02



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

Radiated spurious emission Test Setup-2(Below 1G)

Radiated spurious emission Test Setup-3(Above 1G)

Conducted Emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No. EED32J00230701 for EUT external and internal photos.

*** End of Report ***