

TEST REPORT

Product : Bluetooth Device
Trade mark : SEEKCY
Model/Type reference : S7U
Serial Model : /
Report Number : EED39N00022301
FCC ID : 2AIWM-000003
Date of Issue : Apr 21, 2021

Test Standard	Result
<input checked="" type="checkbox"/> 47 CFR Part 15 Subpart C	PASS

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检验检测专用章
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Date:

Apr 21, 2021

Check No.: 3915540460

Modification Record

No.	Last Report No.	Modification Description
1	EED39N00022301	First report

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1. 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
Maximum conducted output power	47 CFR Part 15Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
DTS Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Maximum 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:

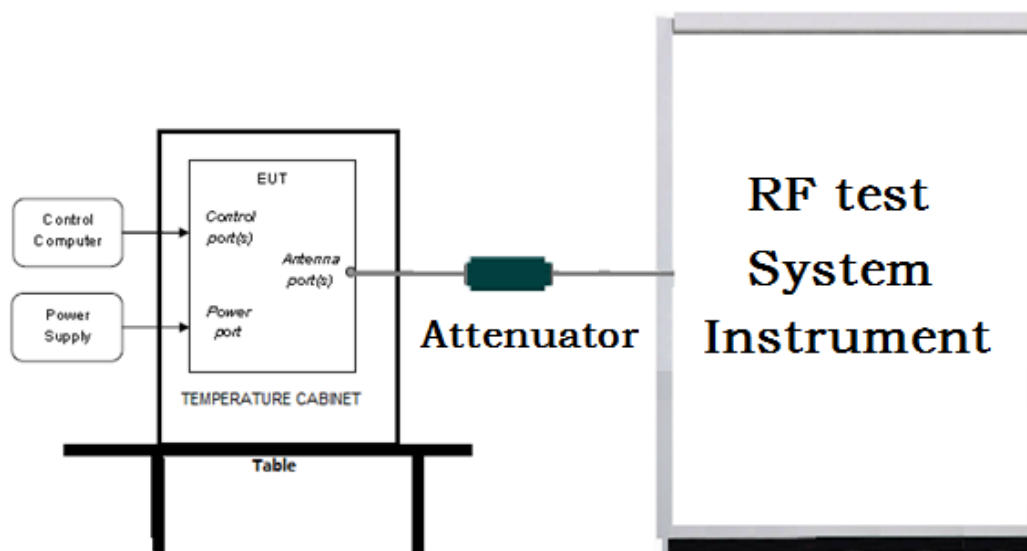
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

The tested samples and the sample information are provided by the client.

2. Test Requirement

2.1. Test Setup

For Conducted Emissions Test Setup



For Radiated Emissions Test Setup

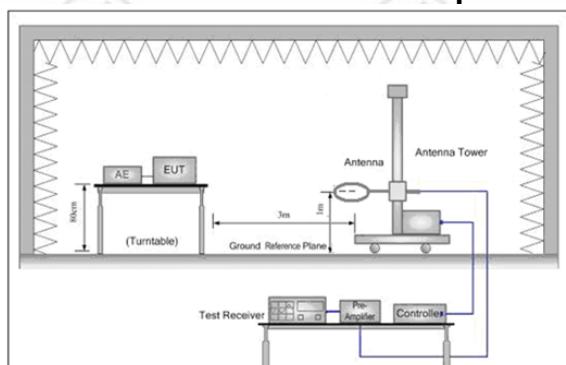


Figure 1. Below 30MHz

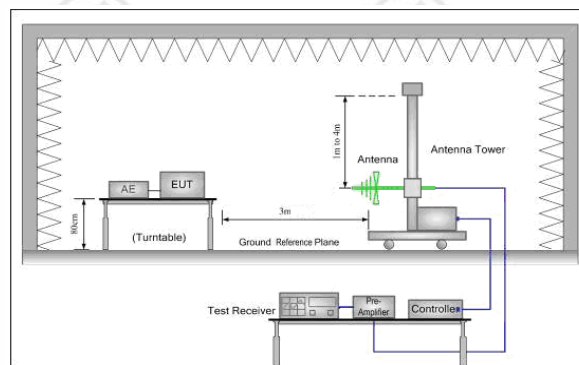


Figure 2. 30MHz to 1GHz

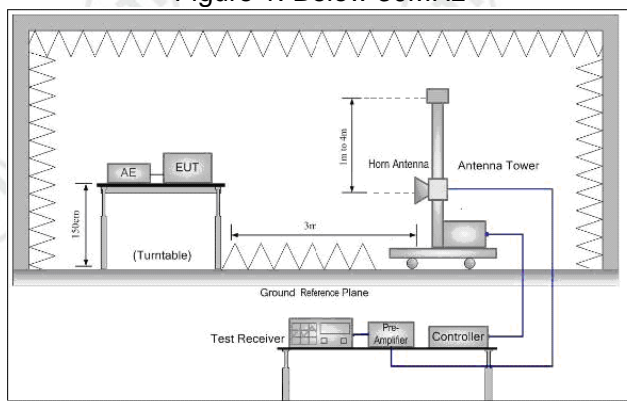
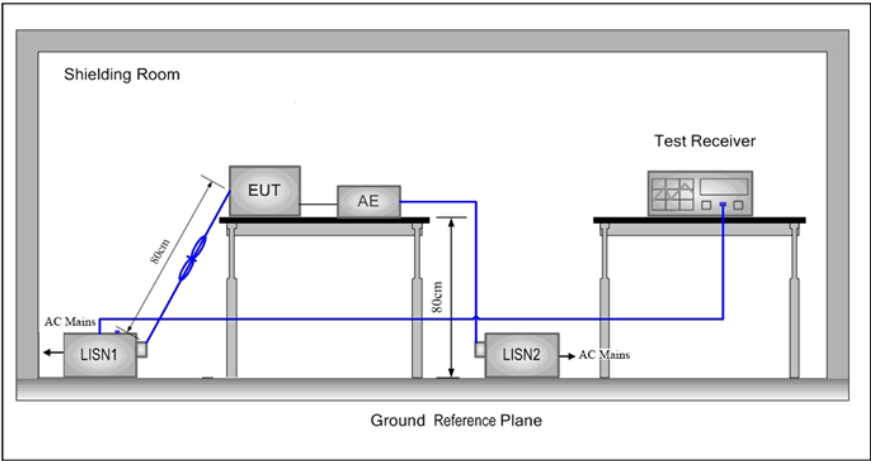


Figure 3. Above 1GHz

For Conducted Emissions Test Setup



2.2. Test Environment

Operating Environment:	
Temperature:	19.5 °C
Humidity:	49.2 % RH
Atmospheric Pressure:	1024mbar

2.3. Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel 40
		2402MHz	2440MHz	2480MHz
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.			

3. General Information

3.1. Client Information

Applicant:	Suzhou Seekcy Electronic Technology Co.,Ltd.
Address of Applicant:	A-401,Building 16,SISPA,NO.328,Xinghu Street,Suzhou Industrial Park Jiangsu
Manufacturer:	Suzhou Seekcy Electronic Technology Co.,Ltd.
Address of Manufacturer:	A-401,Building 16,SISPA,NO.328,Xinghu Street,Suzhou Industrial Park Jiangsu

3.2. General Description of EUT

Product Name:	Bluetooth Device
Model No.(EUT):	S7U
Trade Mark:	SEEKCY
EUT Supports Radios application:	Bluetooth V5.0 BLE
Power Supply:	Input: DC 3.6V Battery: DC3.6V (Lithium battery)
Sample Received Date:	Apr 07, 2021
Sample tested Date:	Apr 07, 2021 to Apr 19, 2021

3.3. Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	Bluetooth LE5.0
Modulation Technique:	DSSS
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Mobile production
Test Software of EUT:	Protest TOOL (manufacturer declare)
Antenna Type:	PCB Antenna
Antenna Gain ^① :	5.0dBi
Test Voltage:	DC3.6V

Note: 1 The antenna gain is provided by the client and we Centre Testing International (Suzhou) CO., LTD. test lab is not responsible for the accuracy of the antenna gain information.

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

3.4. Description of Support Units

The EUT has been tested independently.

3.5. Test Location

All test facilities used to collect the test data are located at Building 18, Zhihui New Town Ecological Industrial Park, No. 1206, Jinyang East Road, Lujia Town, Kunshan, Jiangsu, China.

3.6. Test Facility

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

A2LA-Lab Cert. No. 5734.01

Centre Testing International (Suzhou) 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-Designation No.:CN1290

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.:CN1290

3.7. Deviation from Standards

None.

3.8. Abnormalities from Standard Conditions

None.

3.9. Other Information Requested by the Customer

None.

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

No.	Item	Measurement Uncertainty
1	Occupied Bandwidth	0.56%
2	RF Power conducted	0.59 dB
3	Power Spectral Density, conducted	2.37 dB
4	Unwanted Emission, conducted	2.68 dB
5	All Emission, radiated	4.41 dB(30MHz-1GHz)
		4.99 dB(1GHz-18GHz)
		5.307 dB(18GHz-40GHz)
6	Temperature test	0.54°C
7	Humidity test	1.62%
8	DC and low frequency voltages test	1.14%

4. Equipment List

RF test system					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	R&S	SMB100A	182002	2020-10-23	2021-10-22
Communication test set test set	R&S	CMW500	107929	2020-04-27	2021-04-26
Spectrum Analyzer	R&S	FSV40	101588	2020-10-23	2021-10-22
Vector signal generator	R&S	SMBV100B	101985	2020-10-23	2021-10-22
Temperature/Humidity Indicator	testo	608-H1	1945222628	2020-12-10	2021-11-08
Switch Automatic control	R&S	OSP-B157W8	101111	2020-10-23	2021-10-22
High-low temperature chamber	GIANT FORCE	GTH-800-40-CP	MAA1908-003	2020-12-08	2021-12-07
Automatic test software	Shenzhen JS TONSCEND	/	V2.6.77.0518	/	/

966 Semi-anechoic Chamber					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESU8	100537	2020-12-10	2021-12-09
Spectrum analyzer	R&S	FSV40	101185	2020-12-10	2021-12-09
Preamplifier (30MHz~1GHz)	SONOMA	317	393347	2020-12-04	2021-12-03
Preamplifier (1GHz~18GHz)	R&S	SCU-18D	1987397	2020-12-10	2021-12-09
Preamplifier (18GHz~40GHz)	/	MTLNA1804003 0235	12009007	2020-10-23	2021-10-22
Loop Antenna (9kHz~30MHz)	TESEQ	HLA6121	54575	2021-02-27	2022-02-26
Antenna (30MHz~1GHz)	SCHWARZBEC K	VULB9163	9163-965	2020-10-16	2021-10-15
Antenna (1GHz~18GHz)	R&S	HF907	102524	2020-12-15	2021-12-14
Antenna (18GHz~40GHz)	R&S	BBHA9170	1032	2020-10-23	2021-10-22
Band rejection filter	Xi'an xingbo	XBLBQ-DZA81	200827-1-02	/	/

5. Radio Technical Requirements Specification

5.1. 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 Unlicensed Wireless Devices

5.2. Test Results List

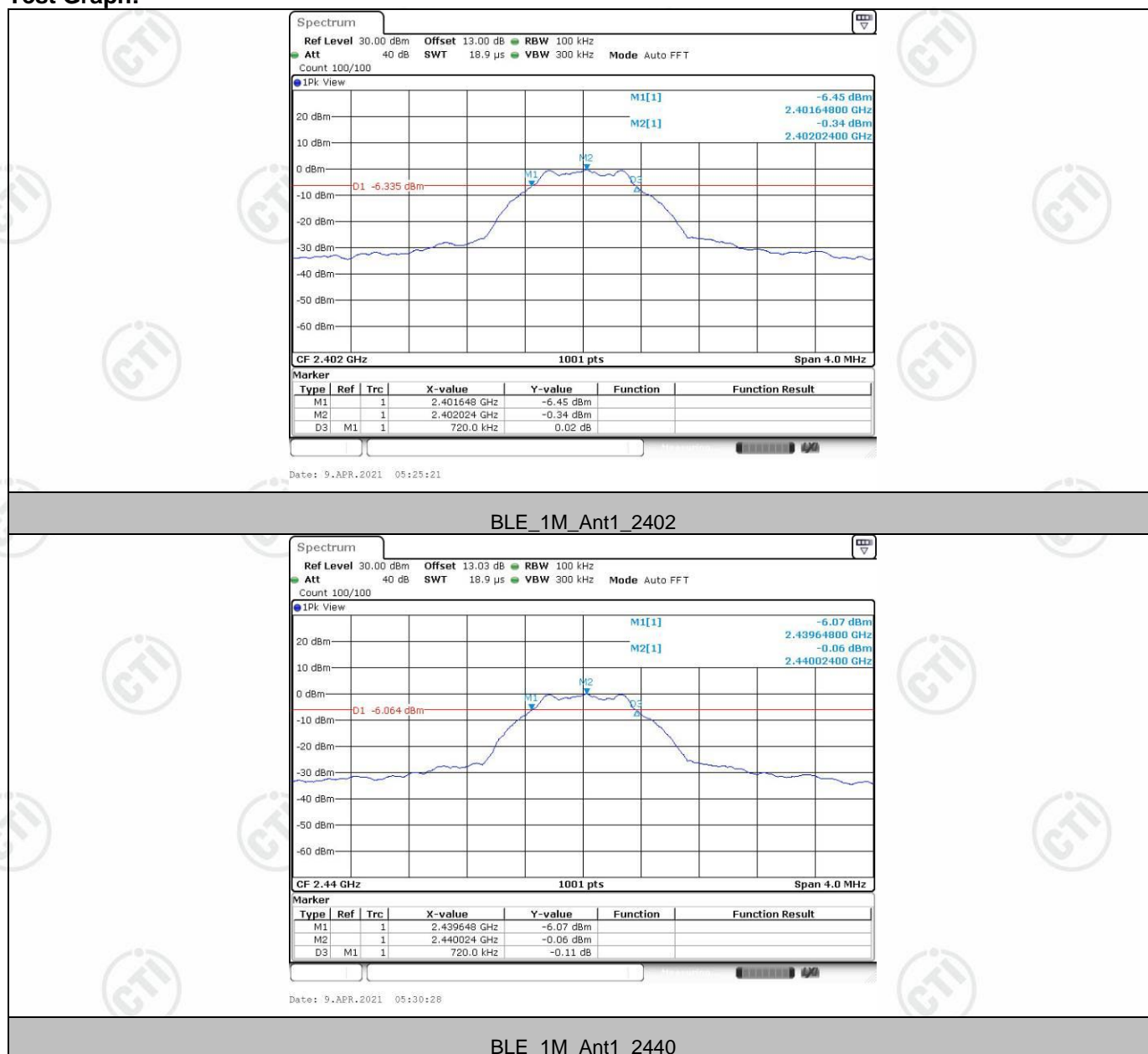
Test requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10 Section 11.8.1	DTS Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10 Section 11.9.1	Maximum conducted output power	PASS	Appendix B)
Part15C Section 15.247 (e)	ANSI C63.10 Section 11.10.2	Maximum power spectral density	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10 Section 11.13.3.2	Band-edge for RF Conducted Emissions	PASS	Appendix D)
Part15C Section 15.247(d)	ANSI C63.10 Section 11.11	Conducted Spurious Emissions	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 Section 6.2	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10 Section 6.10.5	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10 Section 6.4,6.5,6.6	Radiated Spurious Emissions	PASS	Appendix I)

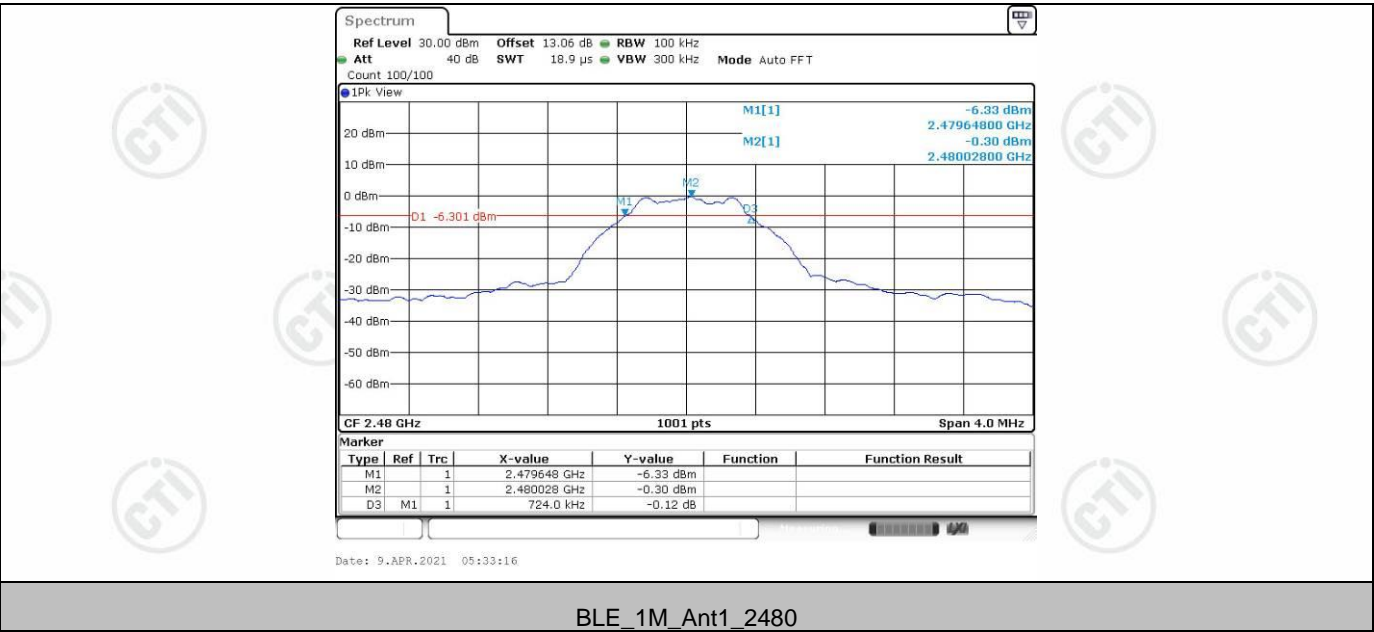
Appendix A): DTS Bandwidth

Result Table:

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.720	2401.648	2402.368	0.5	PASS
		2440	0.720	2439.648	2440.368	0.5	PASS
		2480	0.724	2479.648	2480.372	0.5	PASS

Test Graph:



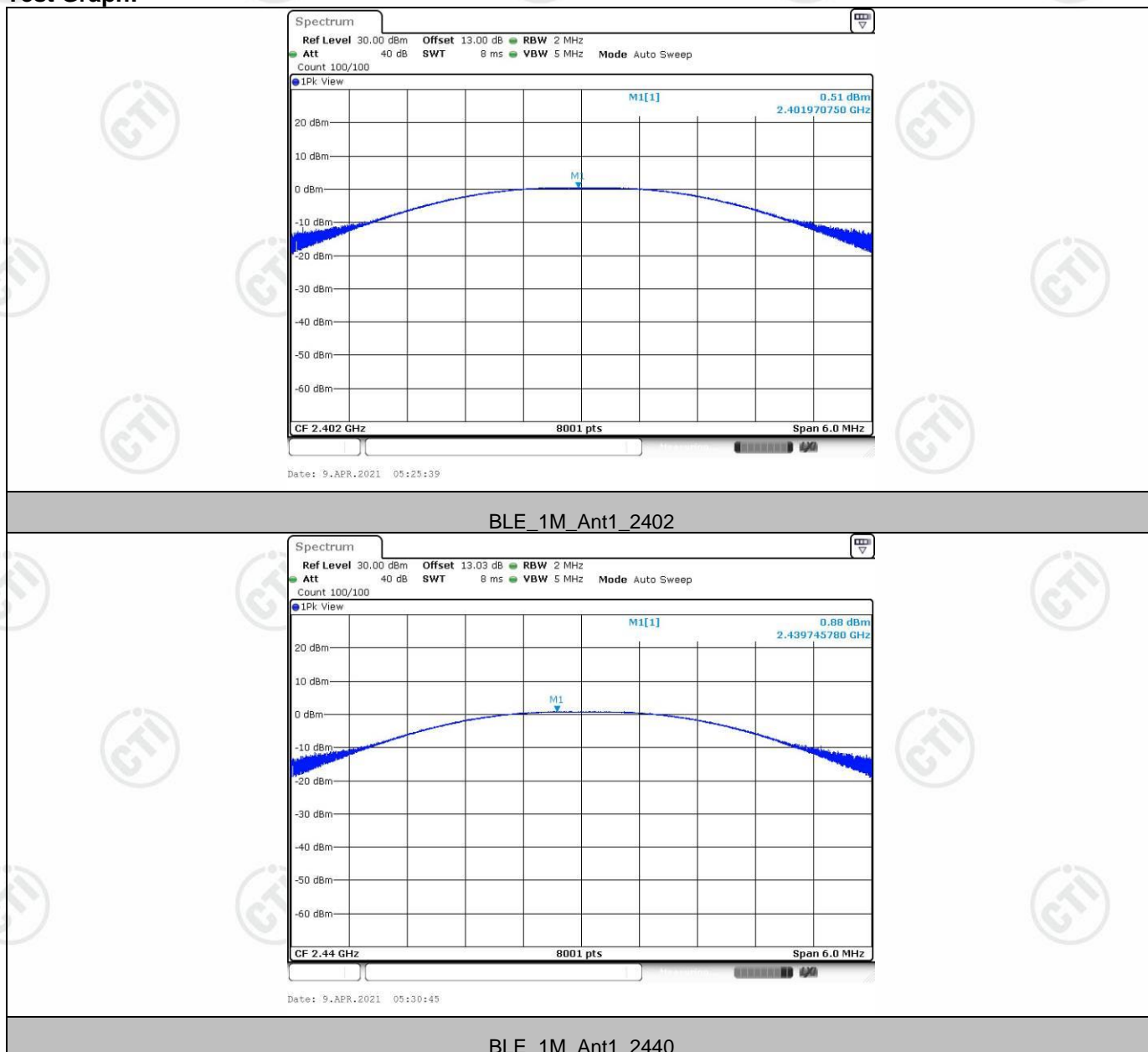


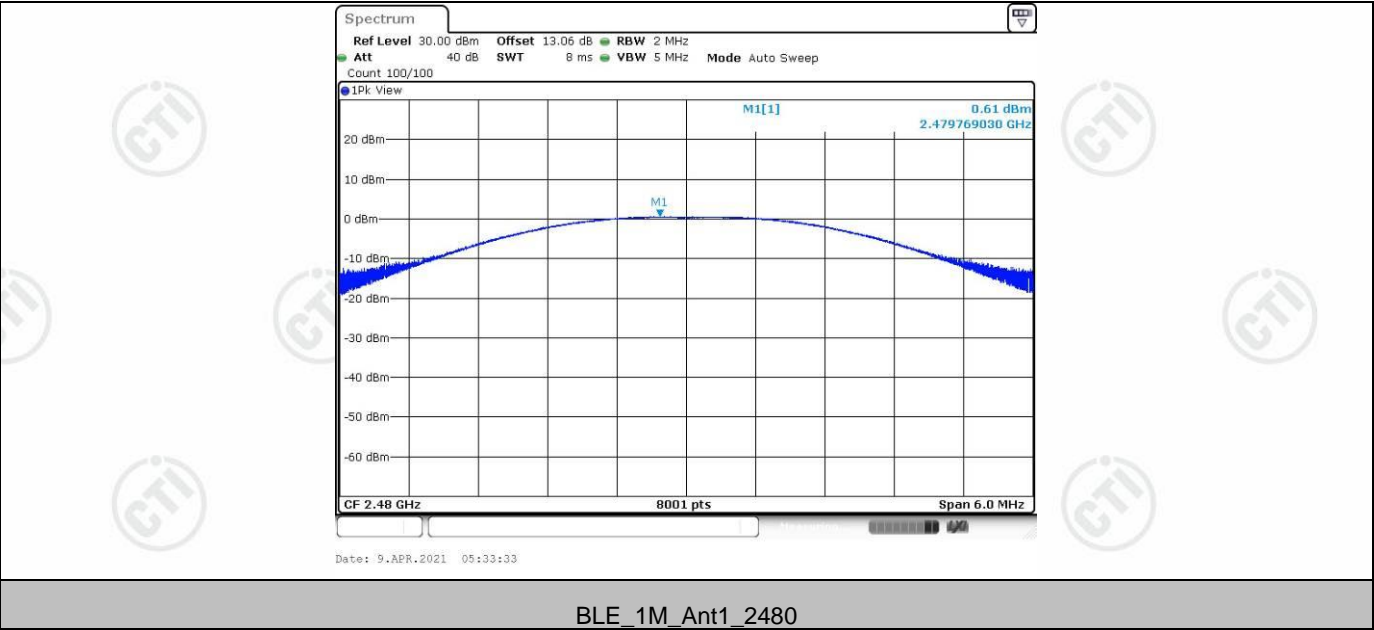
Appendix B): Maximum conducted output power

Result Table:

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.51	<=30	PASS
		2440	0.88	<=30	PASS
		2480	0.61	<=30	PASS

Test Graph:





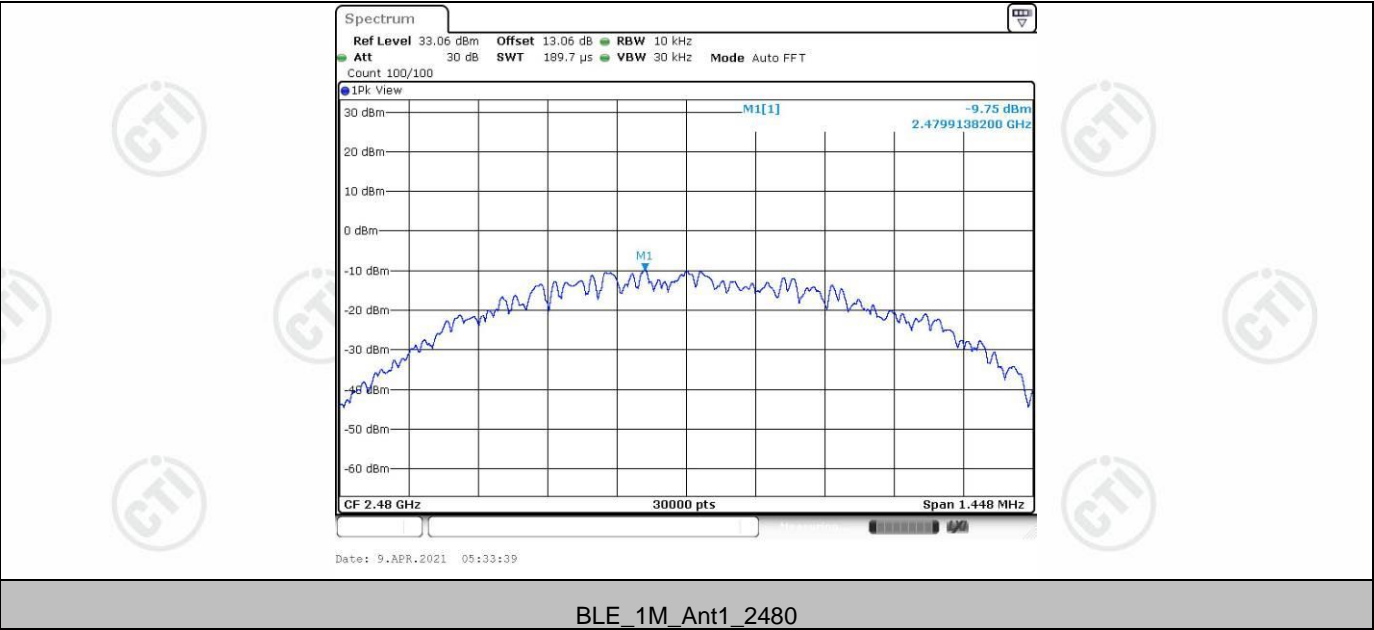
Appendix C): Maximum power spectral density

Result Table:

Test Mode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-9.93	<=8	PASS
		2440	-9.5	<=8	PASS
		2480	-9.75	<=8	PASS

Test Graph:





Appendix D): Band-edge for RF Conducted Emissions

Result Table:

Test Mode	Antenna	Ch Name	Channel	Ref Level[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.41	-37.77	<=-20.41	PASS
		High	2480	-0.30	-41.01	<=-20.3	PASS

Test Graph:



Appendix E): Conducted Spurious Emissions

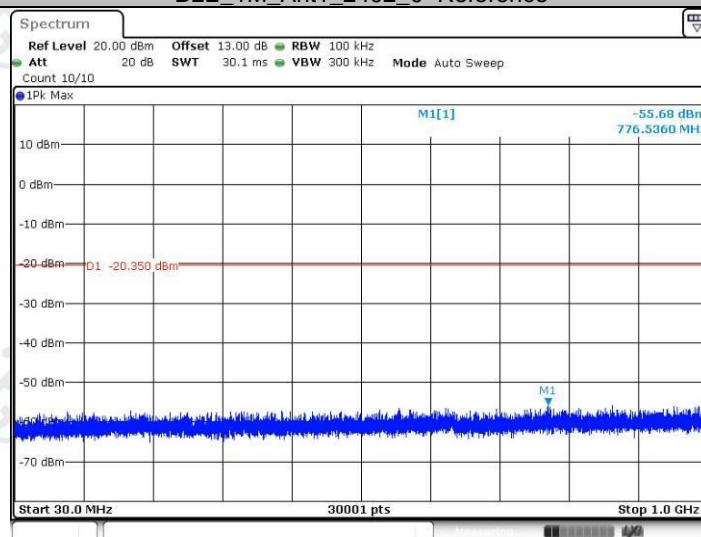
Result Table:

Test Mode	Antenna	Channel	Freq Range [MHz]	Ref Level [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-0.35	-0.35	---	PASS
			30~1000	-0.35	-55.68	<=-20.35	PASS
			1000~26500	-0.35	-46.72	<=-20.35	PASS
		2440	Reference	-0.12	-0.12	---	PASS
			30~1000	-0.12	-55.76	<=-20.12	PASS
			1000~26500	-0.12	-46.28	<=-20.12	PASS
		2480	Reference	-0.33	-0.33	---	PASS
			30~1000	-0.33	-55.44	<=-20.33	PASS
			1000~26500	-0.33	-46.5	<=-20.33	PASS

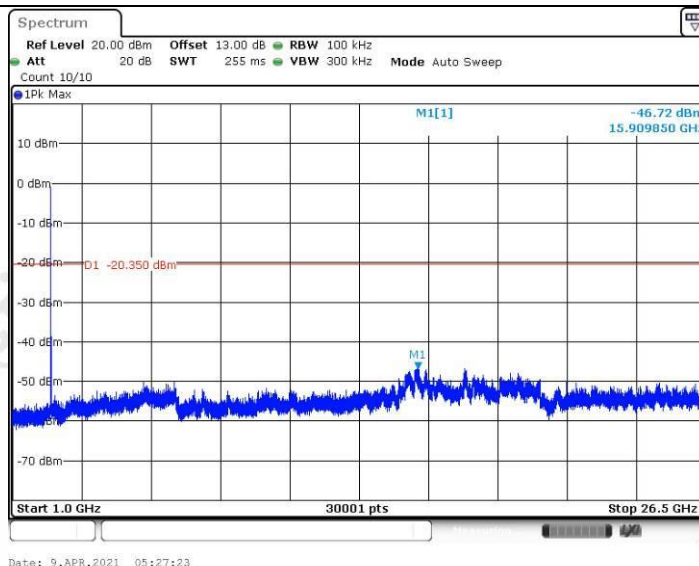
Test Graph:



BLE_1M_Ant1_2402_0~Reference



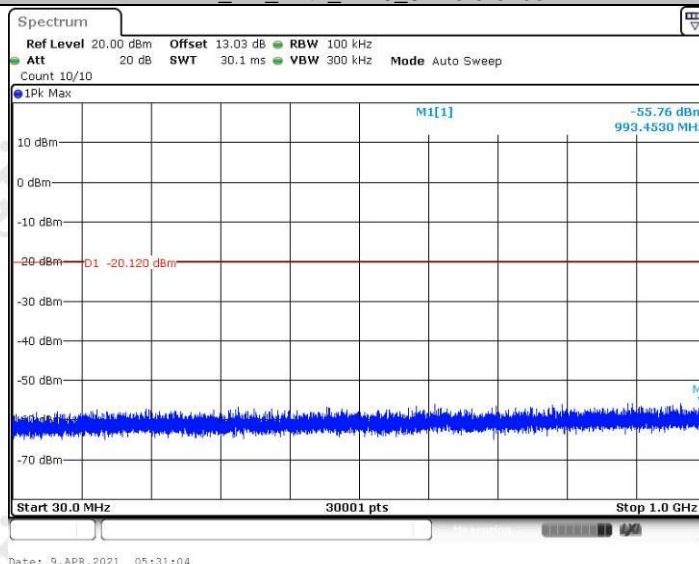
BLE_1M_Ant1_2402_30~1000



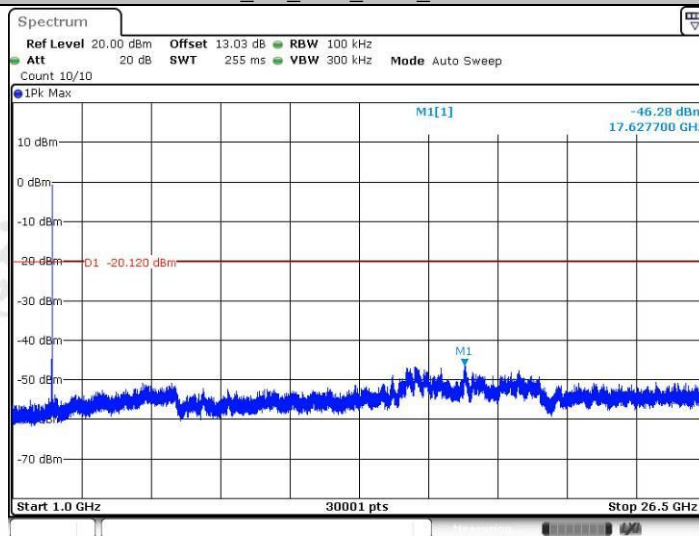
BLE_1M_Ant1_2402_1000~26500



BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



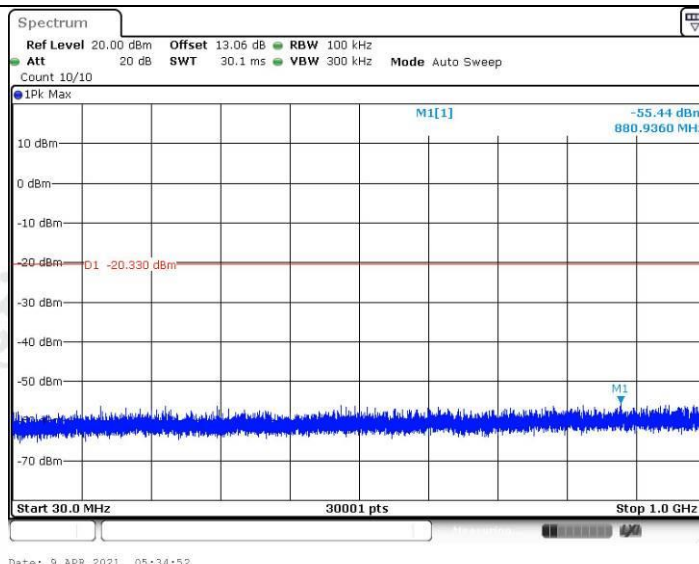
Date: 9.APR.2021 05:31:29

BLE_1M_Ant1_2440_1000~26500

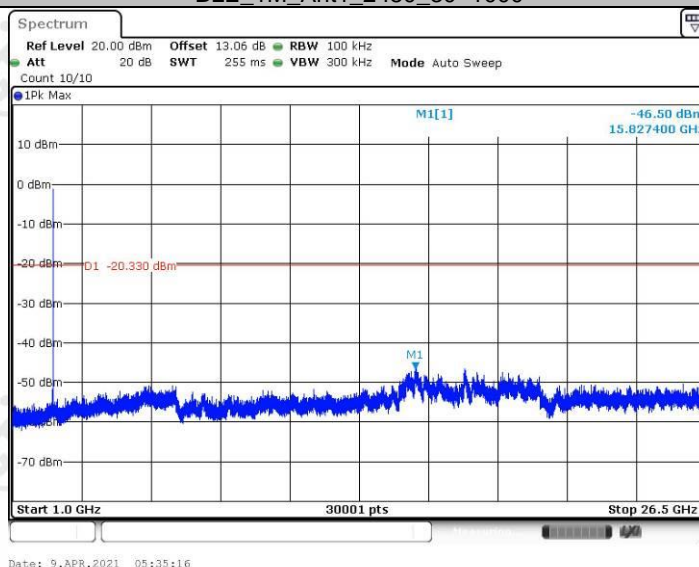


Date: 9.APR.2021 05:34:45

BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500

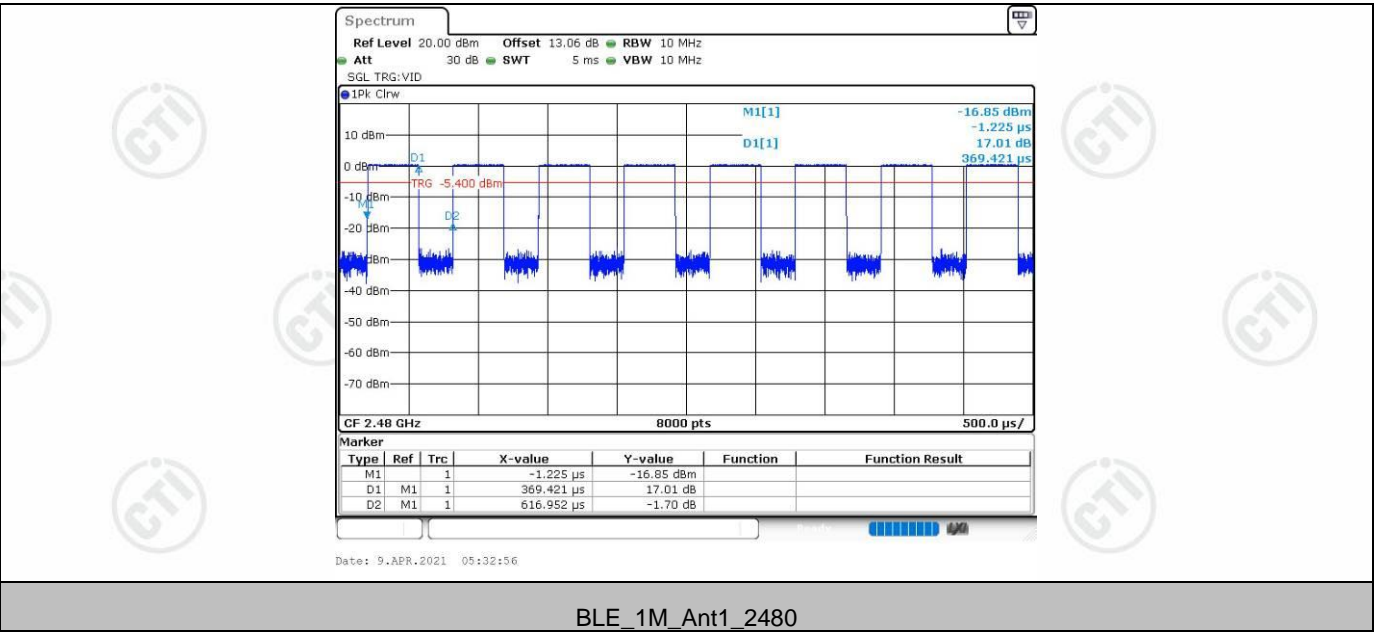
Duty Cycle

Result Table:

Test Mode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	X Factor	Limit	Verdict
BLE_1M	Ant1	2402	0.37	0.62	0.5968	59.68	2.24	---	PASS
		2440	0.37	0.62	0.5968	59.68	2.24	---	PASS
		2480	0.37	0.62	0.5968	59.68	2.24	---	PASS

Test Graph:





Appendix F): Antenna Requirement

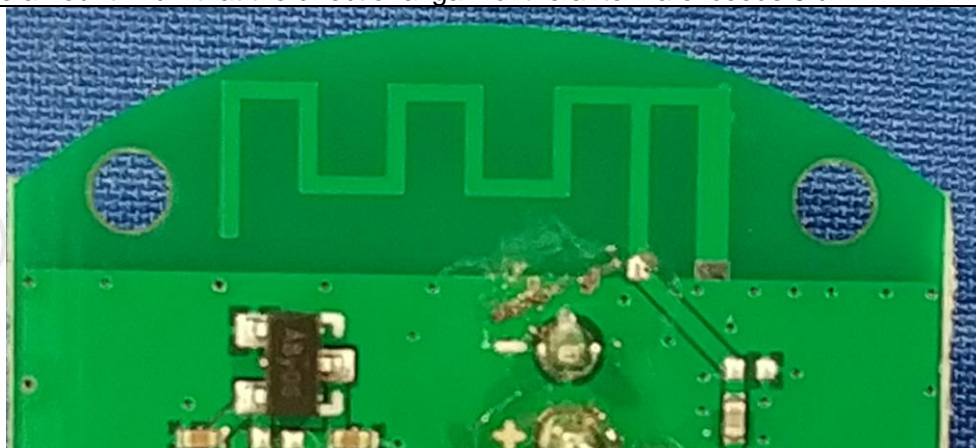
15.203 requirement:

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

15.247(b) (4) requirement:

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

EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement.

Appendix G): AC Power Line Conducted Emission

Test Procedure:	<p>Test frequency range :150KHz-30MHz</p> <ol style="list-style-type: none">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:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> <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 (dBμV)		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 (dBμV)														
	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.

Test result:

Not applicable, since the DUT is supplied by Lithium battery.

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

Receiver Setup:	<table><tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr><tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak</td></tr><tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr><tr><td>Peak</td><td>1MHz</td><td>1/T</td><td>Average</td></tr></table>	Frequency	Detector	RBW	VBW	Remark	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak	Above 1GHz	Peak	1MHz	3MHz	Peak	Peak	1MHz	1/T	Average	
Frequency	Detector	RBW	VBW	Remark																	
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak																	
Above 1GHz	Peak	1MHz	3MHz	Peak																	
	Peak	1MHz	1/T	Average																	
Test Procedure:	<p>Below 1GHz test procedure as below:</p> <ul style="list-style-type: none">a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3meter 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 <p>Above 1GHz test procedure as below:</p> <ul style="list-style-type: none">a. 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).b. Test the EUT in the lowest channel , the Highest channelc. 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.d. Repeat above procedures until all frequencies measured was complete.																				
Limit:	<table><tr><td>Frequency</td><td>Limit (dBμV/m @3m)</td><td>Remark</td></tr><tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr><tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr><tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr><tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr><tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr><tr><td>74.0</td><td>Peak Value</td></tr></table>	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
Frequency	Limit (dBμV/m @3m)	Remark																			
30MHz-88MHz	40.0	Quasi-peak Value																			
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960MHz-1GHz	54.0	Quasi-peak Value																			
Above 1GHz	54.0	Average Value																			
	74.0	Peak Value																			

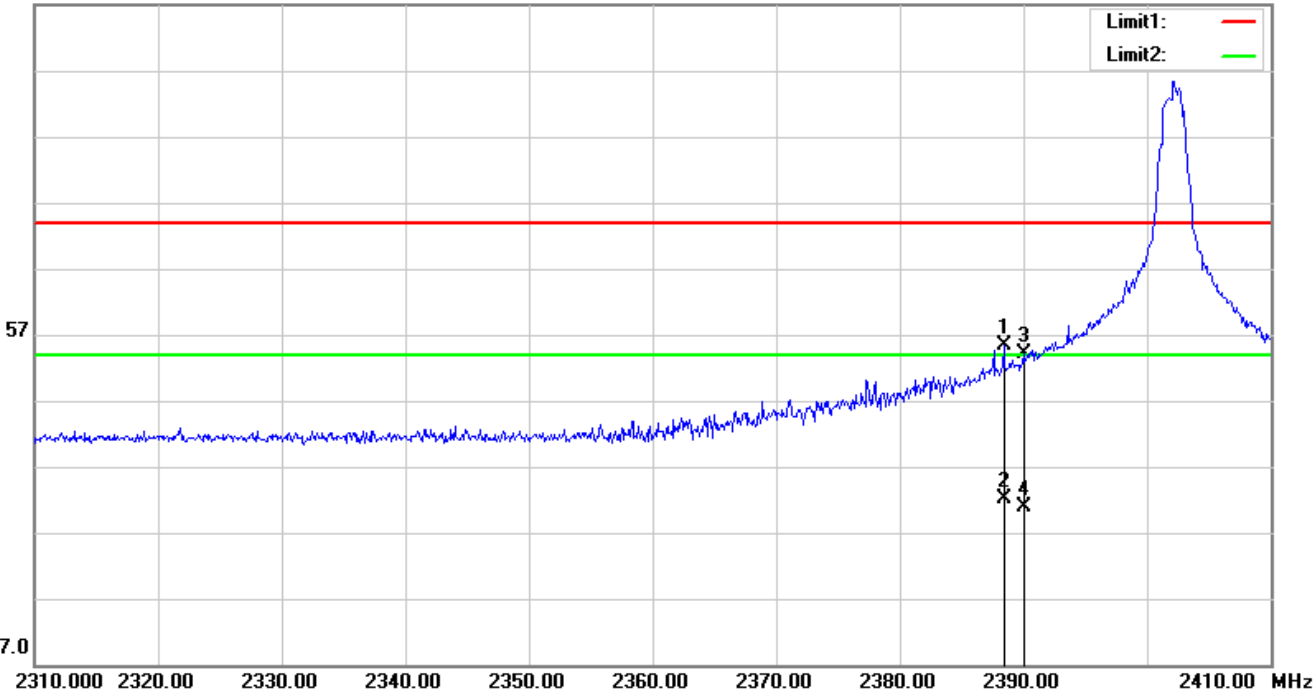
Report No. : EED39N00022301

Test plot as follows:

Mode:	GFSK Transmitting	Channel:	2402
Remark:	Horizontal		

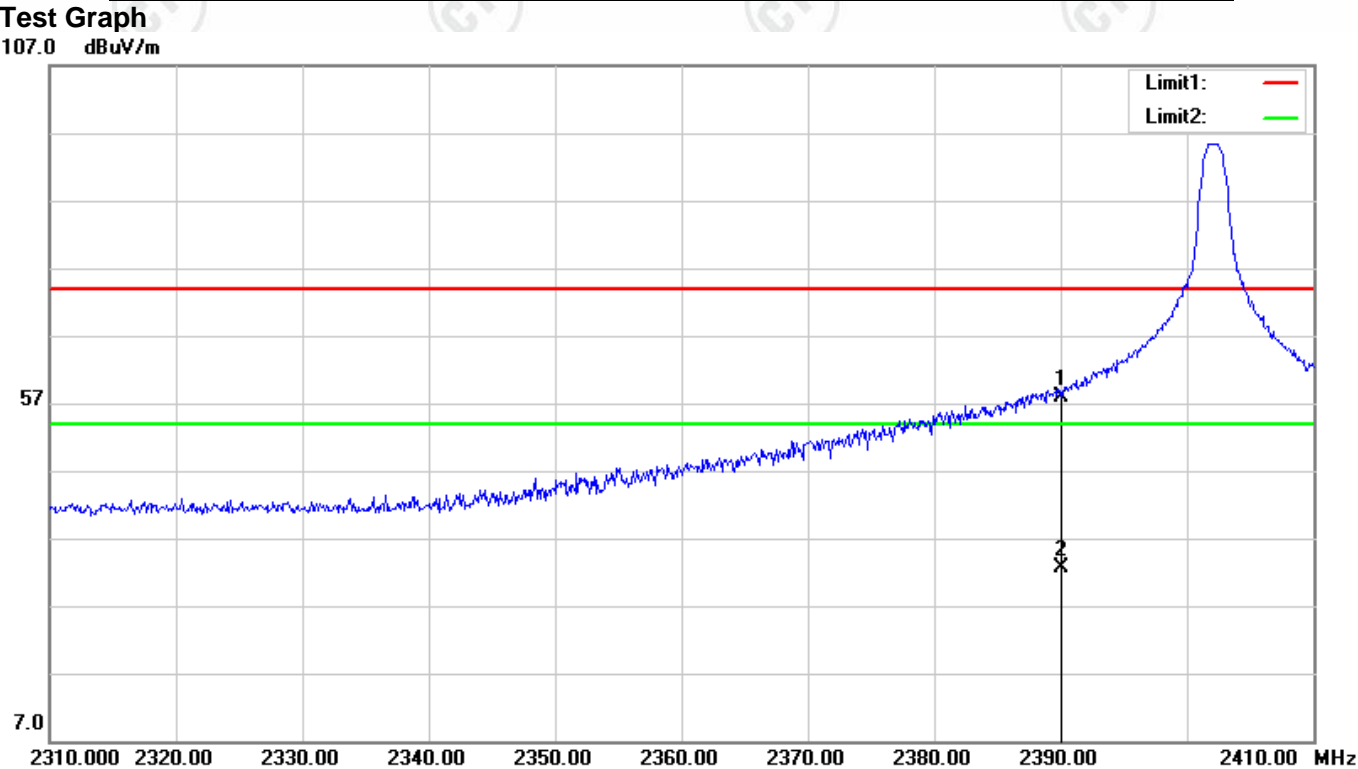
Test Graph

107.0 dBuV/m



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	2388.400	52.65	2.71	55.36	74.00	-18.64	100	161	peak
2	2388.400	29.53	2.71	32.24	54.00	-21.76	100	161	AVG
3	2390.000	51.30	2.71	54.01	74.00	-19.99	100	167	peak
4	2390.000	28.08	2.71	30.79	54.00	-23.21	100	167	AVG

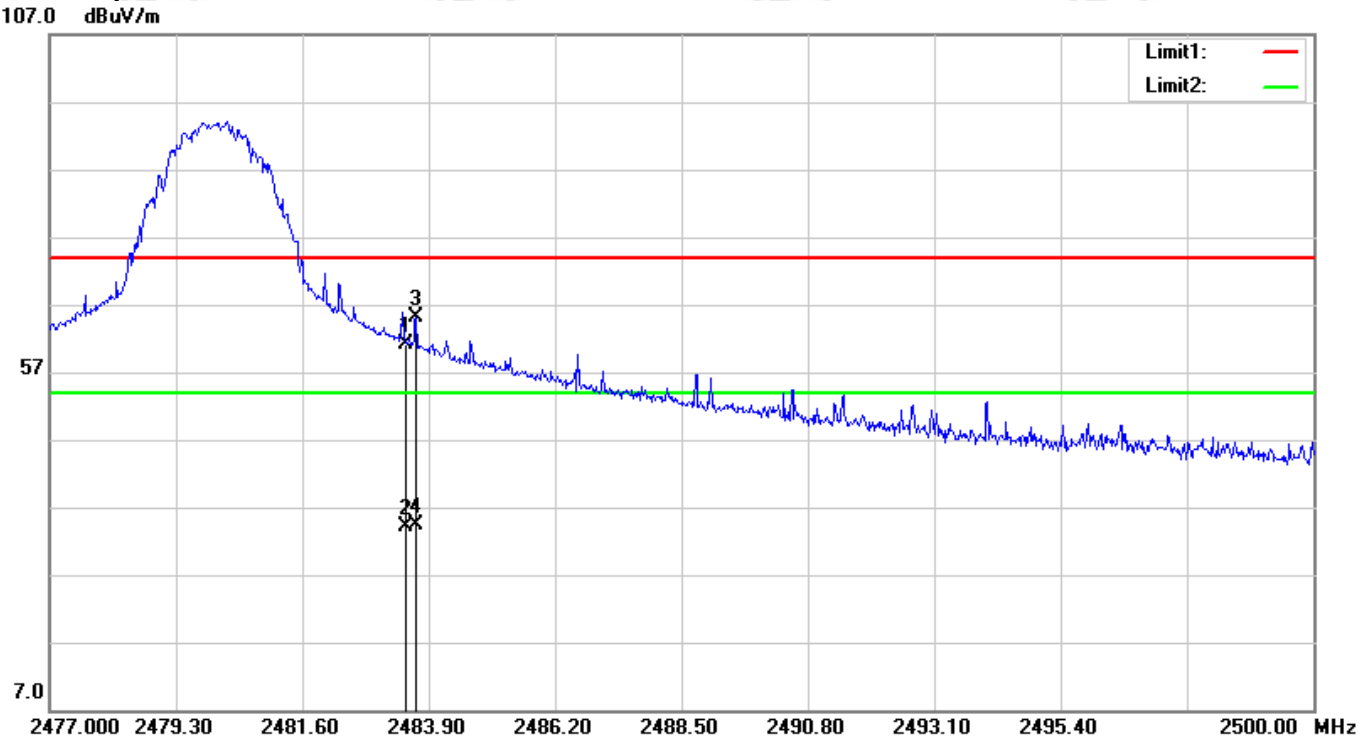
Mode:	GFSK Transmitting	Channel:	2402
Remark:	Vertical		



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	2390.000	55.28	2.71	57.99	74.00	-16.01	148	0	peak
2	2390.000	29.98	2.71	32.69	54.00	-21.31	148	1	AVG

Mode:	GFSK Transmitting	Channel:	2480
Remark:	Horizontal		

Test Graph

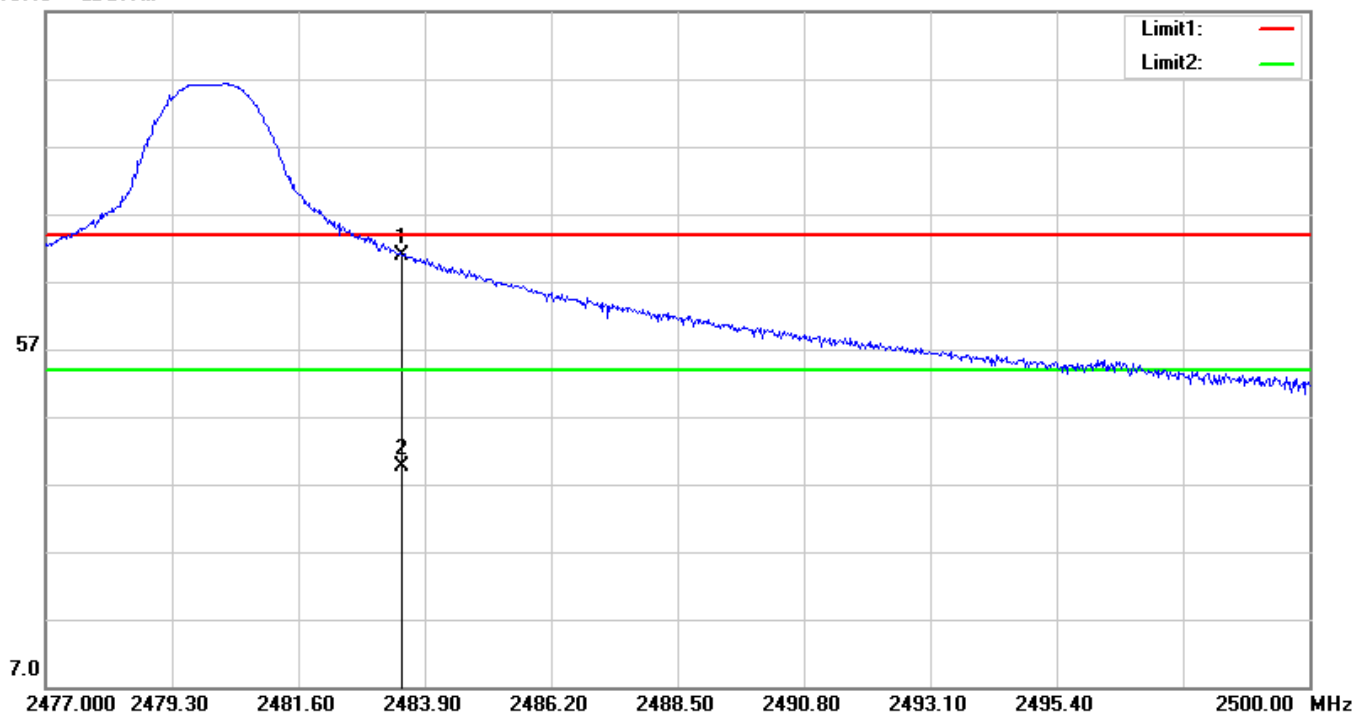


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	2483.500	58.28	2.92	61.20	74.00	-12.80	100	165	peak
2	2483.500	31.16	2.92	34.08	54.00	-19.92	100	165	AVG
3	2483.670	62.27	2.92	65.19	74.00	-8.81	100	360	peak
4	2483.670	31.41	2.92	34.33	54.00	-19.67	100	360	AVG

Mode:	GFSK Transmitting	Channel:	2480
Remark:	Vertical		

Test Graph

107.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	68.06	2.92	70.98	74.00	-3.02	200	120	peak
2	2483.500	36.73	2.92	39.65	54.00	-14.35	200	120	AVG

Note:

1)As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation. So, only the peak values are measured:

2) The field strength is calculated by adding the correct Factor. The basic equation with a sample calculation is as follows:

Final Test Level = Reading +Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

Appendix I): Radiated Spurious Emissions

Receiver Setup:	<table><tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr><tr><td>0.009MHz-0.090MHz</td><td>Peak</td><td>10kHz</td><td>30kHz</td><td>Peak</td></tr><tr><td>0.009MHz-0.090MHz</td><td>Average</td><td>10kHz</td><td>30kHz</td><td>Average</td></tr><tr><td>0.090MHz-0.110MHz</td><td>Quasi-peak</td><td>10kHz</td><td>30kHz</td><td>Quasi-peak</td></tr><tr><td>0.110MHz-0.490MHz</td><td>Peak</td><td>10kHz</td><td>30kHz</td><td>Peak</td></tr><tr><td>0.110MHz-0.490MHz</td><td>Average</td><td>10kHz</td><td>30kHz</td><td>Average</td></tr><tr><td>0.490MHz -30MHz</td><td>Quasi-peak</td><td>10kHz</td><td>30kHz</td><td>Quasi-peak</td></tr><tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak</td></tr><tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr><tr><td>Peak</td><td>1MHz</td><td>1/T</td><td>Average</td></tr></table>	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	1/T	Average
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	1/T	Average																																														
Test Procedure:	<p>Below 1GHz test procedure as below:</p> <ul style="list-style-type: none">a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters 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 (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. <p>Above 1GHz test procedure as below:</p> <ul style="list-style-type: none">a. 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).b. Test the EUT in the lowest channel, the middle channel, the Highest channelc. 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.d. Repeat above procedures until all frequencies measured was complete.																																																	
Limit:	<table><tr><th>Frequency</th><th>Field strength microvolt/meter</th><th>Limit (dBμV/m)</th><th>Remark</th><th>Measurement distance (m)</th></tr><tr><td>0.009MHz-0.490MHz</td><td>2400/F(kHz)</td><td>-</td><td>-</td><td>300</td></tr><tr><td>0.490MHz-1.705MHz</td><td>24000/F(kHz)</td><td>-</td><td>-</td><td>30</td></tr><tr><td>1.705MHz-30MHz</td><td>30</td><td>-</td><td>-</td><td>30</td></tr><tr><td>30MHz-88MHz</td><td>100</td><td>40.0</td><td>Quasi-peak</td><td>3</td></tr><tr><td>88MHz-216MHz</td><td>150</td><td>43.5</td><td>Quasi-peak</td><td>3</td></tr><tr><td>216MHz-960MHz</td><td>200</td><td>46.0</td><td>Quasi-peak</td><td>3</td></tr><tr><td>960MHz-1GHz</td><td>500</td><td>54.0</td><td>Quasi-peak</td><td>3</td></tr><tr><td>Above 1GHz</td><td>500</td><td>54.0</td><td>Average</td><td>3</td></tr></table> <p>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.</p>	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				
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																																														

Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz:

Mode:	GFSK Transmitting	Channel:	2402
Remark:			

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
60.0700	V	44.03	-21.87	22.16	40.00	-17.84	QP
631.4000	V	43.46	-13.58	29.88	46.00	-16.12	QP
746.8300	V	42.75	-11.92	30.83	46.00	-15.17	QP
828.3100	V	42.72	-11.19	31.53	46.00	-14.47	QP
879.7200	V	43.45	-10.31	33.14	46.00	-12.86	QP
986.4200	V	42.61	-9.23	33.38	54.00	-20.62	QP
59.1000	H	43.86	-21.78	22.08	40.00	-17.92	QP
543.1300	H	43.85	-15.40	28.45	46.00	-17.55	QP
643.0400	H	42.75	-13.62	29.13	46.00	-16.87	QP
759.4400	H	42.56	-11.80	30.76	46.00	-15.24	QP
828.3100	H	42.12	-11.19	30.93	46.00	-15.07	QP
944.7100	H	43.48	-9.49	33.99	46.00	-12.01	QP

Notes:

- 1) Through Pre-scan then find the GFSK-CH0 is the worst case mode and only the worst data was recorded.

Transmitter Emission above 1GHz:

Mode:	GFSK Transmitting	Channel:	2402
Remark:			

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	11166.000	31.64	16.79	48.43	74.00	-25.57	100	122	peak
2	14906.000	29.20	22.97	52.17	74.00	-21.83	200	103	peak
3	16827.000	27.06	25.07	52.13	74.00	-21.87	137	0	peak

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	12560.000	29.40	18.36	47.76	74.00	-26.24	200	87	peak
2	14600.000	29.83	22.31	52.14	74.00	-21.86	200	214	peak
3	17014.000	26.89	25.67	52.56	74.00	-21.44	200	166	peak

Mode:	GFSK Transmitting	Channel:	2440
Remark:			

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	12475.000	29.79	18.22	48.01	74.00	-25.99	125	0	peak
2	14906.000	28.42	22.97	51.39	74.00	-22.61	200	291	peak
3	16929.000	26.21	25.43	51.64	74.00	-22.36	211	21	peak

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	12458.000	29.90	18.20	48.10	74.00	-25.90	100	213	peak
2	14804.000	28.64	22.84	51.48	74.00	-22.52	100	27	peak
3	17167.000	26.00	25.53	51.53	74.00	-22.47	200	201	peak

Mode:	GFSK Transmitting	Channel:	2480
Remark:			

Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	13104.000	29.87	18.61	48.48	74.00	-25.52	200	75	peak
2	14889.000	29.07	22.95	52.02	74.00	-21.98	200	283	peak
3	17014.000	26.30	25.67	51.97	74.00	-22.03	100	196	peak

Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	11642.000	30.16	17.22	47.38	74.00	-26.62	100	12	peak
2	14260.000	30.21	21.92	52.13	74.00	-21.87	127	0	peak
3	15909.000	28.91	23.42	52.33	74.00	-21.67	200	336	peak

Note:

1) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak values are measured:

2) The field strength is calculated by adding the correct Factor. The basic equation with a sample calculation is as follows:

Final Test Level = Reading +Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz 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.