

### FCC Report (Bluetooth)

**Applicant:** Shenzhen Qianhai YueDong Smart Wearable Equipment Co., Ltd.

**Address of Applicant:** Room 201, Building A, No. 1, Qianwan 1st Road, SZ-HK Cooperation Area, Qianhai, Shenzhen, Guangdong, China.

**Manufacturer/Factory:** Shenzhen Qianhai YueDong Smart Wearable Equipment Co., Ltd.

**Address of Manufacturer/Factory:** Room 201, Building A, No. 1, Qianwan 1st Road, SZ-HK Cooperation Area, Qianhai, Shenzhen, Guangdong, China.

**Equipment Under Test (EUT)**

Product Name: YueDong Smart Wristband

Model No.: YD618, YD818, YD918, YD518, YD118, YD218

Trade mark: N/A

**FCC ID:** 2APVK-YD618

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247

**Date of sample receipt:** May 15, 2018

**Date of Test:** May 15, 2018- August 21, 2018

**Date of report issued:** August 21, 2018

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



**Robinson Lo**

**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

Version No.	Date	Description
00	August 21, 2018	Original

Prepared By:

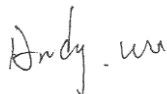


Date:

August 21, 2018

Project Engineer

Check By:



Date:

August 21, 2018

Reviewer

## 3 Contents

	Page
1 COVER PAGE.....	1
2 VERSION.....	2
3 CONTENTS.....	3
4 TEST SUMMARY .....	4
5 GENERAL INFORMATION .....	5
5.1 GENERAL DESCRIPTION OF EUT .....	5
5.2 TEST MODE .....	7
5.3 DESCRIPTION OF SUPPORT UNITS.....	7
5.4 TEST FACILITY.....	7
5.5 TEST LOCATION .....	7
5.6 ADDITIONAL INSTRUCTIONS .....	8
5.7 DESCRIPTION OF SUPPORT UNITS.....	8
6 TEST INSTRUMENTS LIST.....	9
7 TEST RESULTS AND MEASUREMENT DATA .....	10
7.1 ANTENNA REQUIREMENT .....	10
7.2 CONDUCTED EMISSIONS .....	11
7.3 CONDUCTED OUTPUT POWER .....	14
7.4 CHANNEL BANDWIDTH .....	16
7.5 POWER SPECTRAL DENSITY.....	18
7.6 BAND EDGES.....	20
7.6.1 Conducted Emission Method .....	20
7.6.2 Radiated Emission Method .....	21
7.7 SPURIOUS EMISSION.....	27
7.7.1 Conducted Emission Method .....	27
7.7.2 Radiated Emission Method .....	29
8 TEST SETUP PHOTO.....	36
9 EUT CONSTRUCTIONAL DETAILS.....	38

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013.

### Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 General Description of EUT

Product Name:	YueDong Smart Wristband
Model No.:	YD618, YD818, YD918, YD518, YD118, YD218
Test Model No:	YD618
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color and model name for commercial purpose.</i>	
Sample(s) Status:	Engineer sample
Quantity of tested samples	1
Serial No.:	N/A
Tested Sample(s) ID:	N/A
Hardware Version:	YD618_V1.1
Software Version:	V1.1.28.0.0
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	MULTILAYER CERAMIC ANTENNA
Antenna Gain:	2.0dBi
Power Supply:	DC 3.8V by battery or DC 5V from adapter input AC 120V, 60Hz
Bluetooth Version:	4.2

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
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

## 5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode, duty cycle 100%.
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

## 5.3 Description of Support Units

None
------

## 5.4 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"><li>● <b>FCC —Registration No.: 381383</b> Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383, January 08, 2018.</li><li>● <b>Industry Canada (IC) —Registration No.: 9079A-2</b> The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.</li></ul>
---

## 5.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

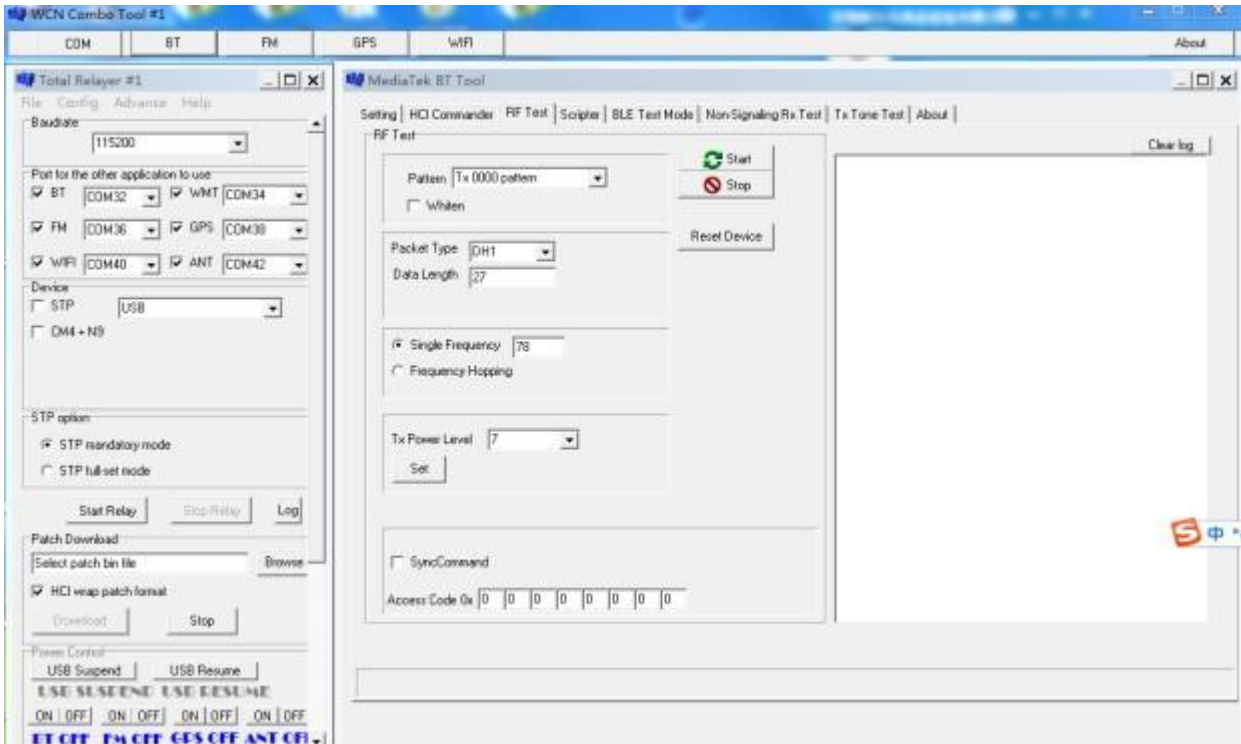
## 5.6 Additional instructions

Software (Used for test) from client

Mode	Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.
------	--

Power level setup in software			
Test Software Name	WCN Combo Tool		
Test Software Version	W1537		
Support Units (Software installation media)	Description	Manufacturer	Model
	Laptop	Apple	A1278
Mode	Channel	Frequency (MHz)	Soft Set
GFSK	CH1	2402	TX LEVEL is built-in set parameters and cannot be changed and selected.
	CH21	2442	
	CH40	2480	

Run Software:



## 5.7 Description of Support Units

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
1	Notebook	Acer	ZQT	/	DOC



## 6 Test Instruments list

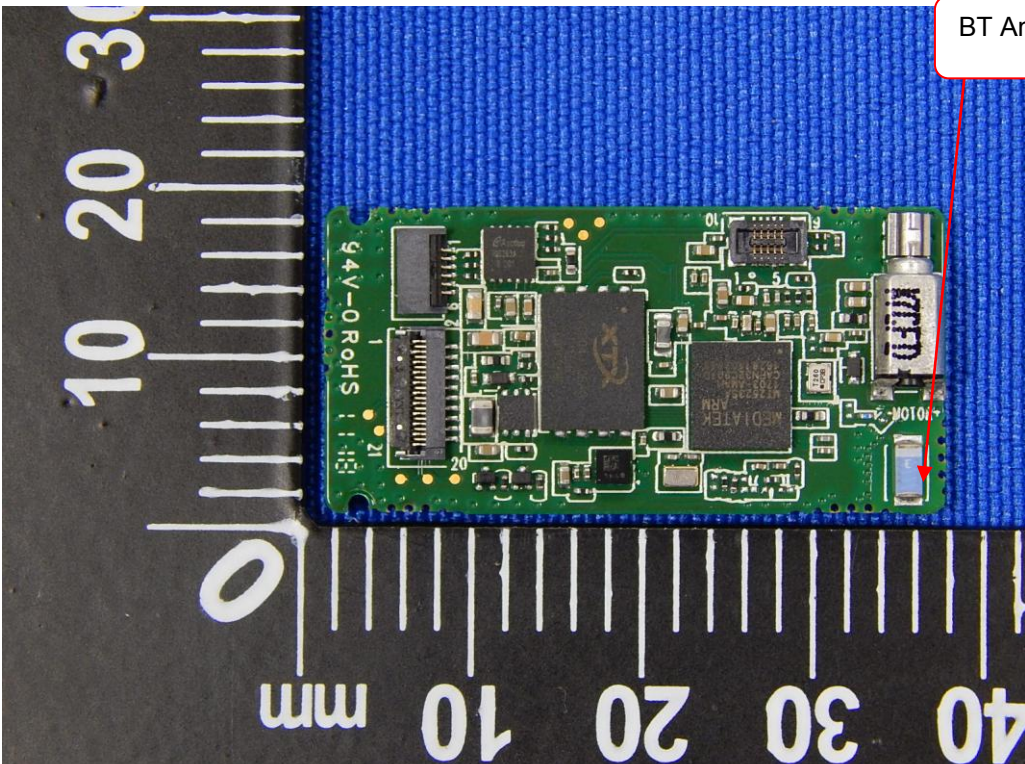
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 28 2017	June 27 2018
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 28 2017	June 27 2018
5	Loop Antenna	SCHWARZBECK	FMZB 1519B	GTS200	June 28 2017	June 27 2018
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 28 2017	June 27 2018
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2017	June 27 2018
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 28 2017	June 27 2018
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	June 28 2017	June 27 2018
11	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
12	Coaxial cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
13	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 28 2017	June 27 2018
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 28 2017	June 27 2018
16	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2017	June 27 2018
17	Band filter	Amindeon	82346	GTS219	June 28 2017	June 27 2018

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June 28 2017	June 27 2018
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 28 2017	June 27 2018
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June 28 2017	June 27 2018
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June 28 2017	June 27 2018

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 28 2017	June 27 2018

## 7 Test results and Measurement Data

### 7.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<p><b>15.203 requirement:</b></p> <p>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.</p> <p><b>15.247(c) (1)(i) requirement:</b></p> <p>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<b>E.U.T Antenna:</b>	
<p><i>The antenna is MULTILAYER CERAMIC ANTENNA, the best case gain of the antenna is 2.0dBi</i></p> 	

## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Test Frequency Range:	150KHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</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>* Decreases with the logarithm of the frequency.</p>	Frequency range (MHz)	Limit (dBuV)		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 (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test setup:	<p><i>Remark</i>  E.U.T: Equipment Under Test  LISN: Line Impedance Stabilization Network  Test table height=0.8m</p>														
Test procedure:	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2009 on conducted measurement.</li> </ol>														
Test Instruments:	Refer to section 6.0 for details														
Test mode:	Refer to section 5.2 for details														
Test results:	Pass														

### Measurement data

Test result for BT4.2 BLE (GFSK: 2440MHz), AC 120V/ 60Hz

Line:

### Conducted Emission Measurement



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1590	46.45	9.66	56.11	65.52	-9.41	QP	
2		0.1590	34.42	9.66	44.08	55.52	-11.44	AVG	
3		0.2070	39.44	9.67	49.11	63.32	-14.21	peak	
4		0.2610	31.78	9.69	41.47	61.40	-19.93	peak	
5		0.4590	24.16	9.71	33.87	56.71	-22.84	peak	
6		4.7010	29.50	10.13	39.63	56.00	-16.37	peak	
7		23.3220	32.16	10.67	42.83	60.00	-17.17	peak	

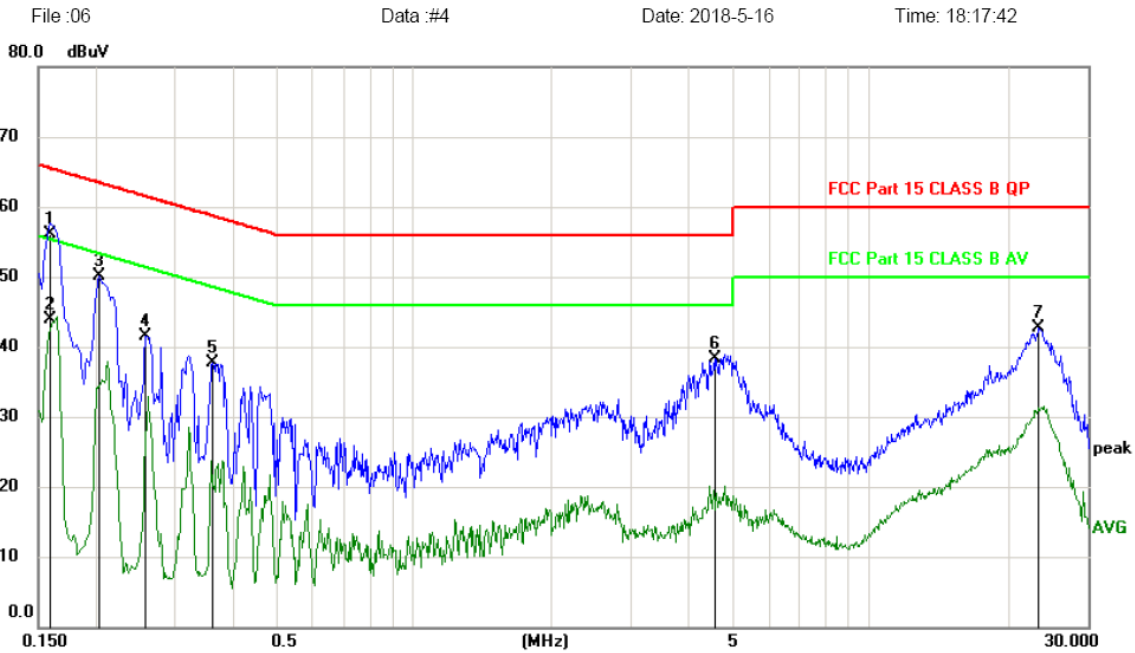
\*:Maximum data    x:Over limit    !:over margin

Note: Measurement=Reading Level+Correc Factor.    Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Test result for BT4.2 BLE (GFSK: 2440MHz), AC 120V/ 60Hz

Neutral:

### Conducted Emission Measurement

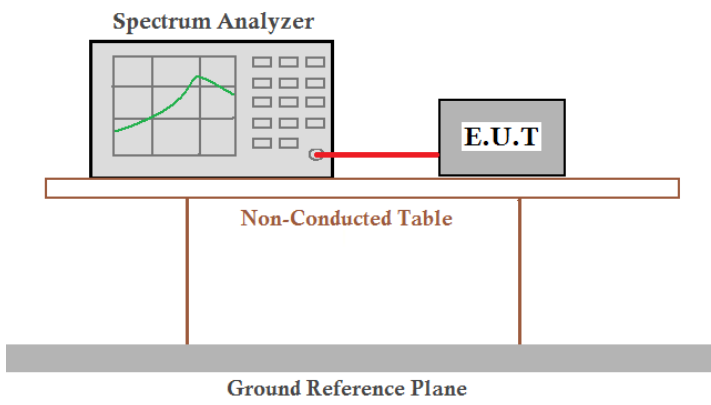


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1590	46.47	9.66	56.13	65.52	-9.39	QP	
2		0.1590	34.20	9.66	43.86	55.52	-11.66	AVG	
3		0.2040	40.48	9.67	50.15	63.45	-13.30	peak	
4		0.2580	31.75	9.69	41.44	61.50	-20.06	peak	
5		0.3630	27.98	9.70	37.68	58.66	-20.98	peak	
6		4.5570	28.24	10.13	38.37	56.00	-17.63	peak	
7		23.4810	32.11	10.68	42.79	60.00	-17.21	peak	

\*:Maximum data    x:Over limit    !:over margin

Note: Measurement=Reading Level+Correc Factor.    Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

### 7.3 Conducted Output Power

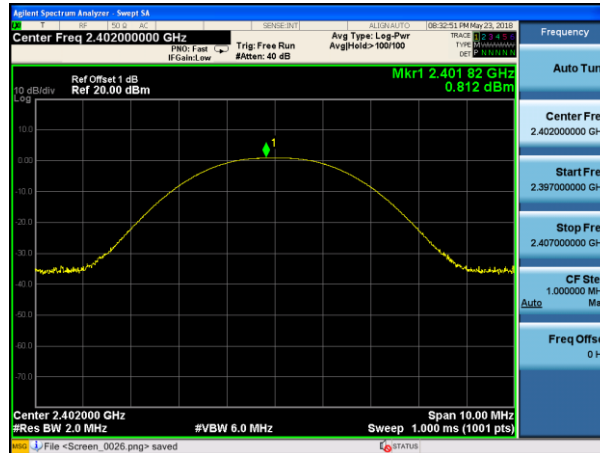
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

#### Measurement Data

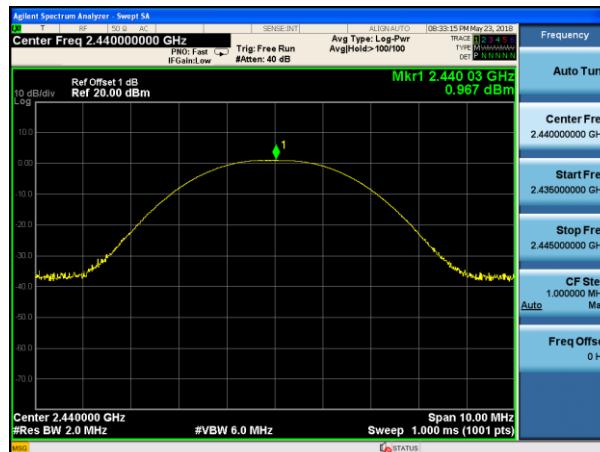
Test channel	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	0.812	30.00	Pass
Middle	0.967		
Highest	-0.853		



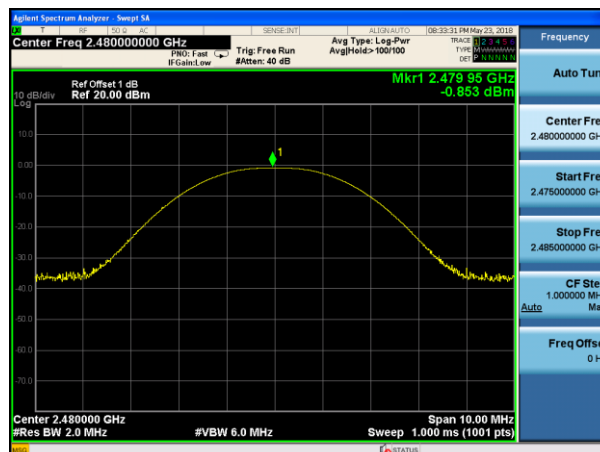
Test plot as follows:



Lowest channel

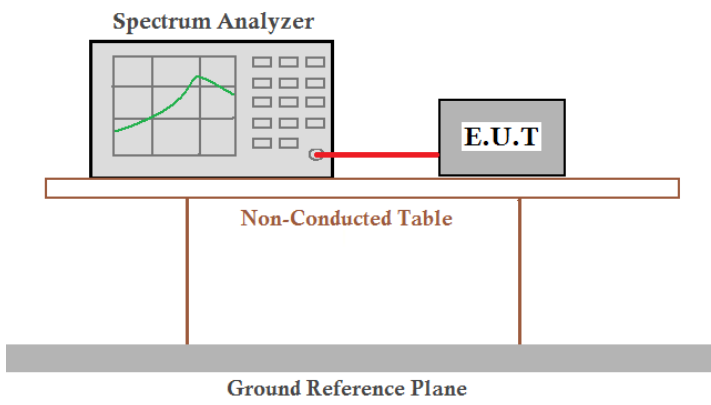


Middle channel



Highest channel

## 7.4 Channel Bandwidth

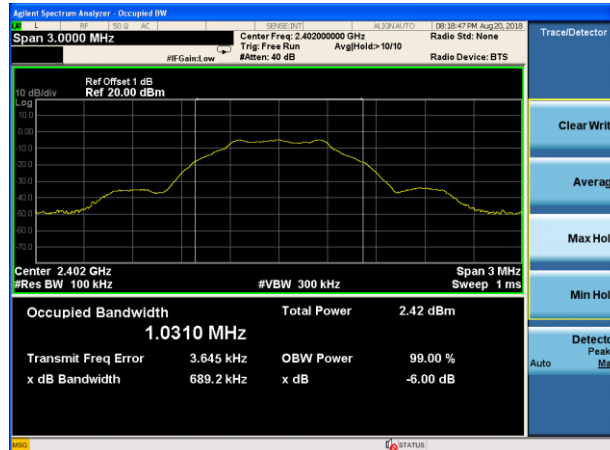
Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	>500KHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer and an E.U.T. (Equipment Under Test) are connected by a red cable. Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

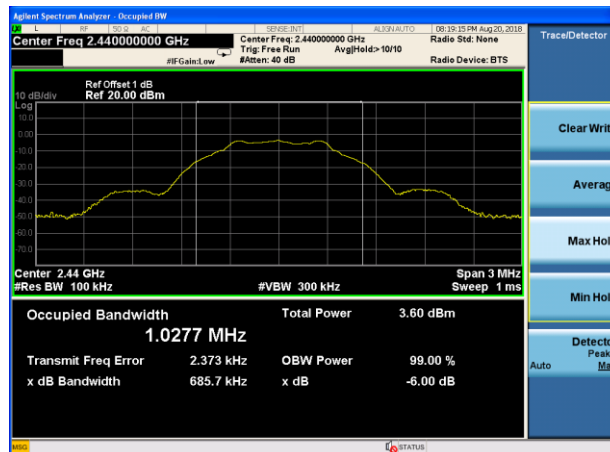
Test channel	Channel Bandwidth (MHz)	Limit(KHz)	Result
Lowest	0.6892	>500	Pass
Middle	0.6857		
Highest	0.6872		



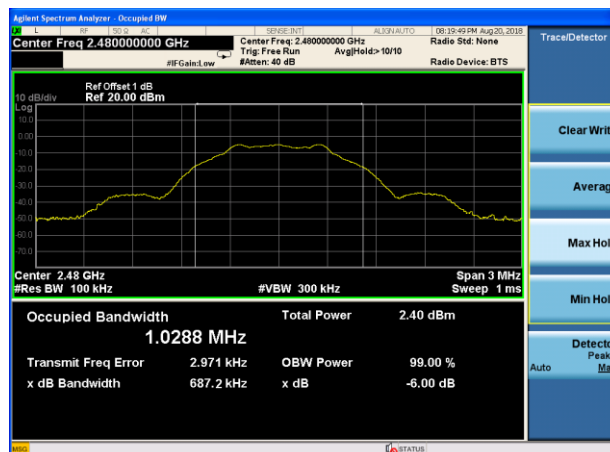
Test plot as follows:



Lowest channel

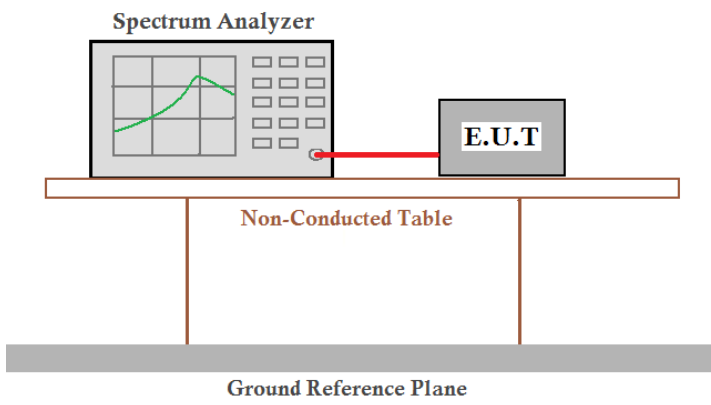


Middle channel



Highest channel

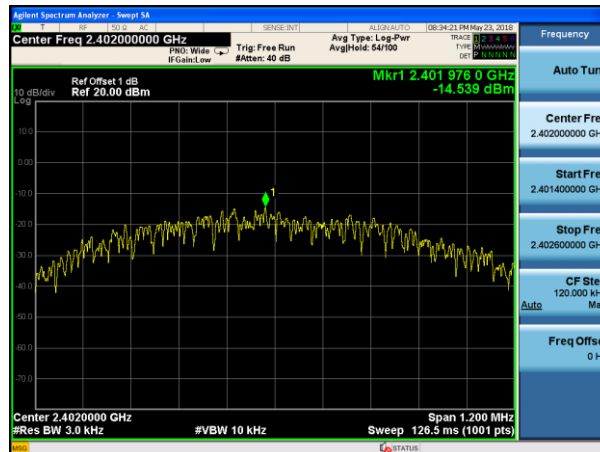
## 7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	8dBm/3kHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

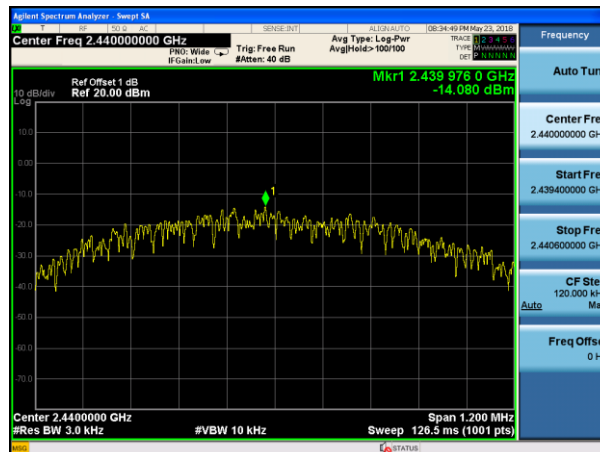
### Measurement Data

Test channel	Power Spectral Density (dBm)	Limit(dBm/3kHz)	Result
Lowest	-14.539	8.00	Pass
Middle	-14.080		
Highest	-15.969		

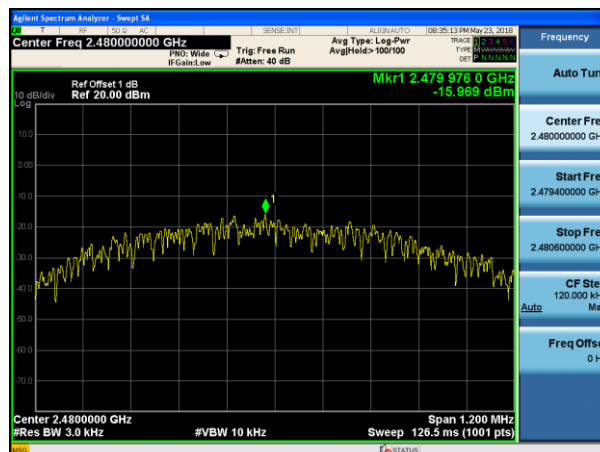
Test plot as follows:



Lowest channel



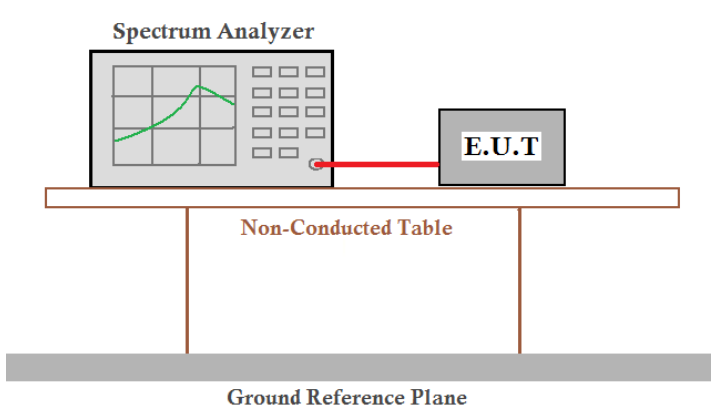
Middle channel



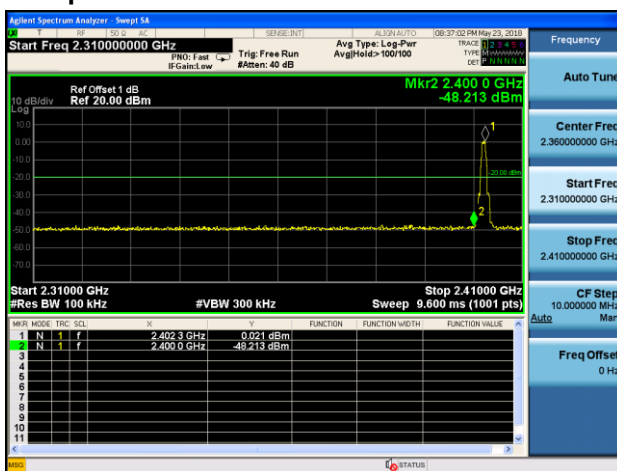
Highest channel

## 7.6 Band edges

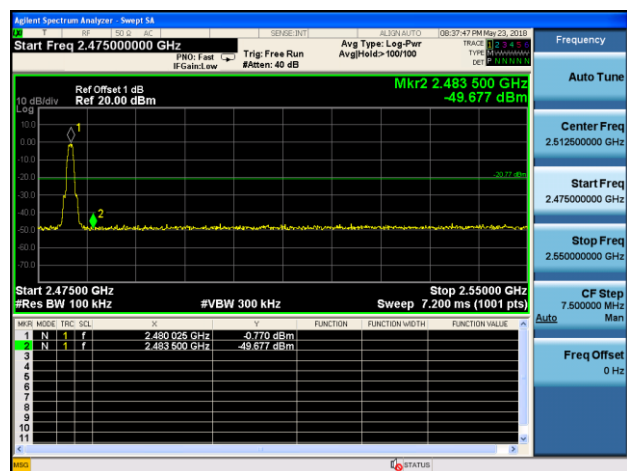
### 7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. The table is supported by two legs and sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Test plot as follows:



Lowest channel



Highest channel

## 7.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		RMS	1MHz	3MHz	Average
Limit:	Frequency	Limit (dBuV/m @3m)		Value	
	Above 1GHz	54.00		Average	
		74.00		Peak	
Test setup:					
Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. 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>3. 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>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. 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.</li> <li>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test</li> </ol>				

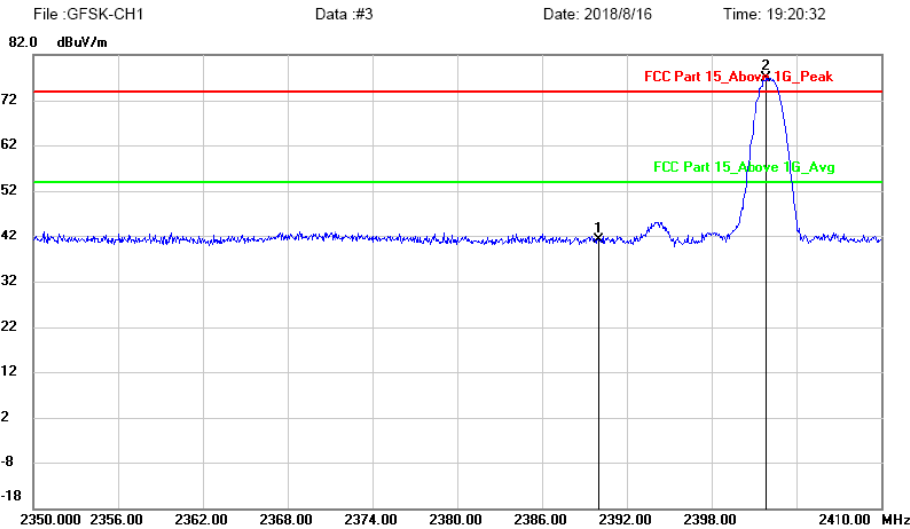
	worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Polarization: Vertical

Test Mode:

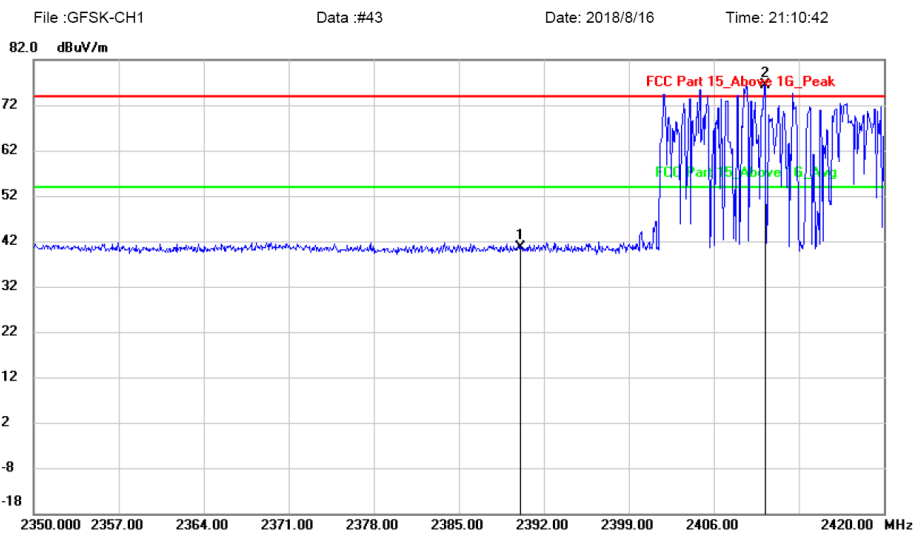
GFSK-Low

**Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		2390.000	44.51	-3.40	41.11	74.00	-32.89	peak		
2	*	2401.900	80.27	-3.41	76.86	74.00	2.86	peak		

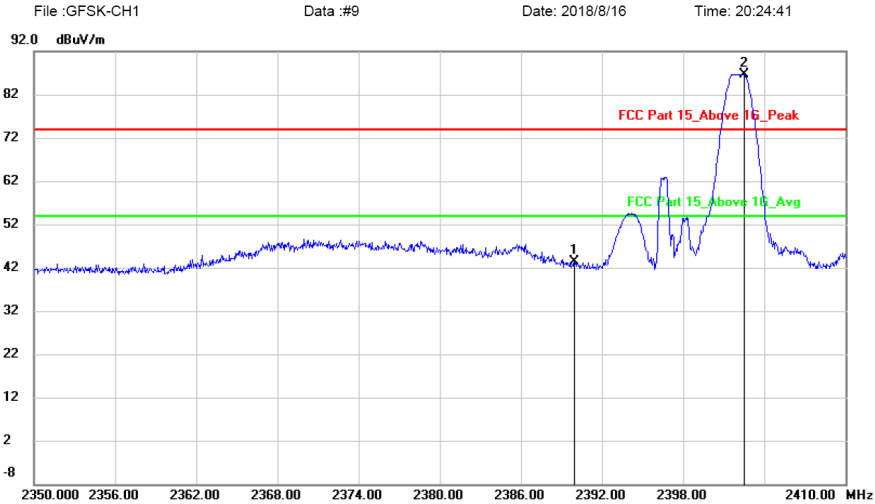
**hopping-off  
Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		2390.000	44.04	-3.40	40.64	74.00	-33.36	peak		
2	*	2410.200	79.78	-3.40	76.38	74.00	2.38	peak		

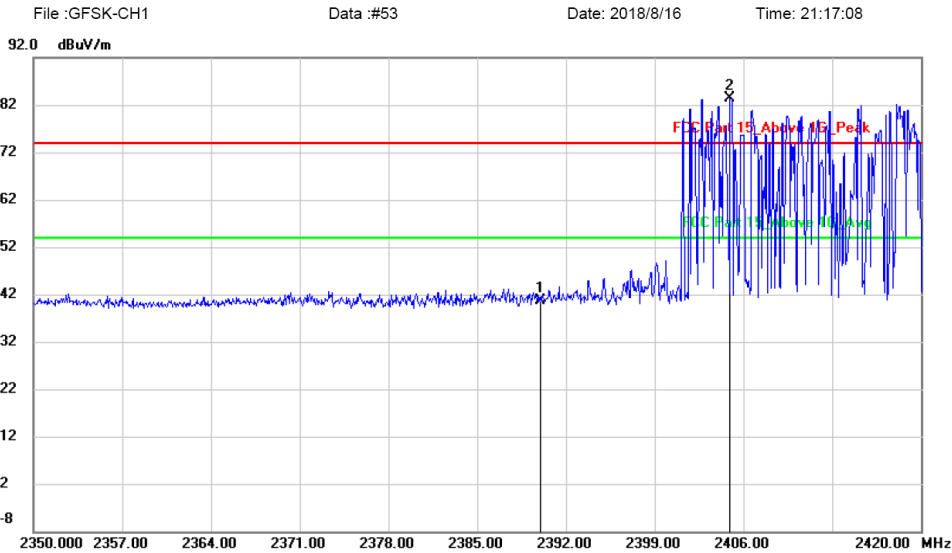
hopping-on

Polarization: Horizontal: Test Mode: GFSK-Low  
**Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2390.000	46.75	-3.40	43.35	74.00	-30.65	peak		
2	*	2402.500	89.99	-3.41	86.58	74.00	12.58	peak		

**hopping-off**  
**Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2390.000	43.95	-3.40	40.55	74.00	-33.45	peak		
2	*	2404.950	86.81	-3.41	83.40	74.00	9.40	peak		

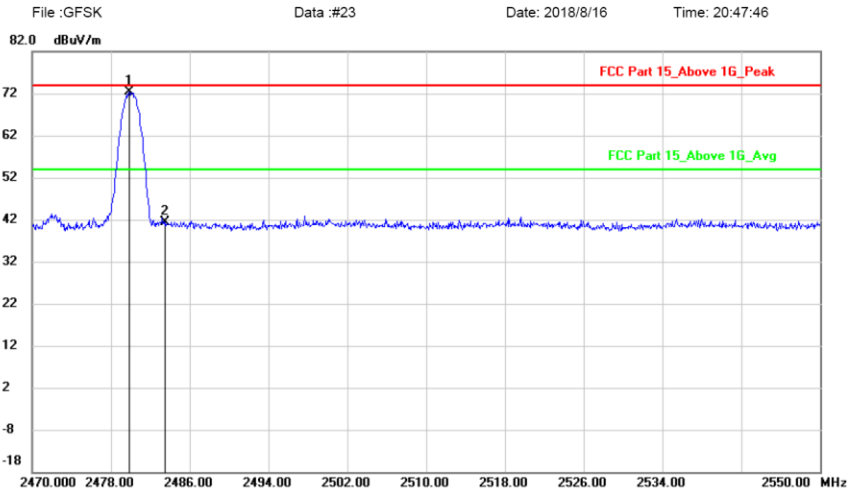
**hopping-on**



Polarization: Vertical

Test Mode: GFSK-High

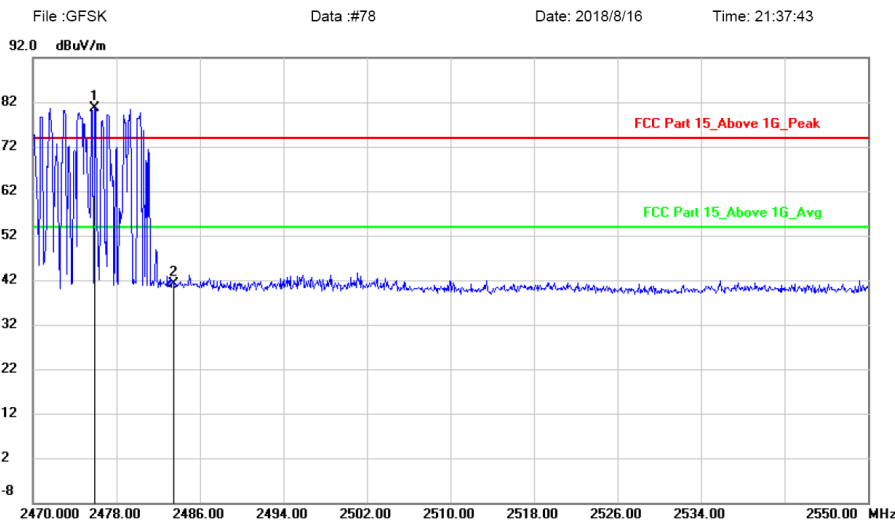
**Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1	*	2479.840	75.64	-3.38	72.26	74.00	-1.74	peak	
2		2483.500	44.81	-3.38	41.43	74.00	-32.57	peak	

hopping-off

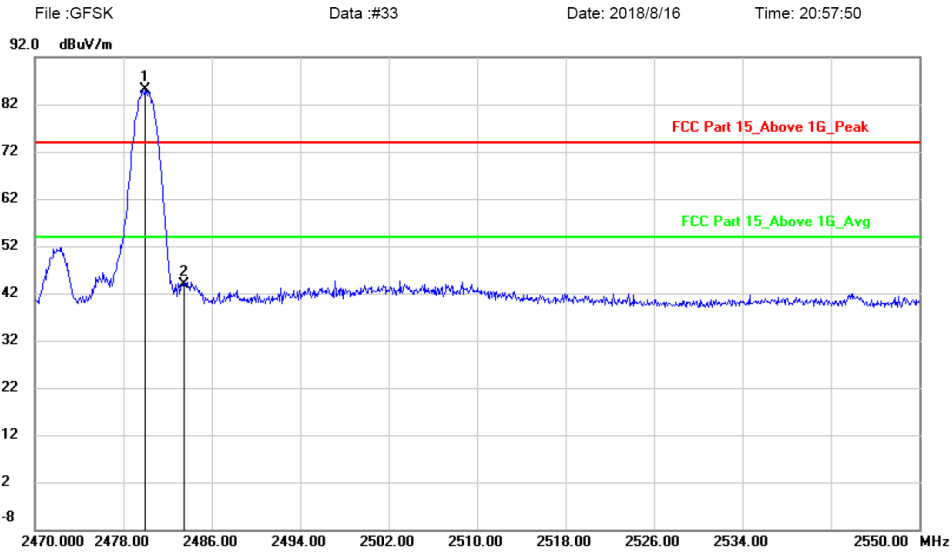
**Radiated Emission Measurement**



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1	*	2475.920	84.06	-3.39	80.67	74.00	6.67	peak	
2		2483.500	44.63	-3.38	41.25	74.00	-32.75	peak	

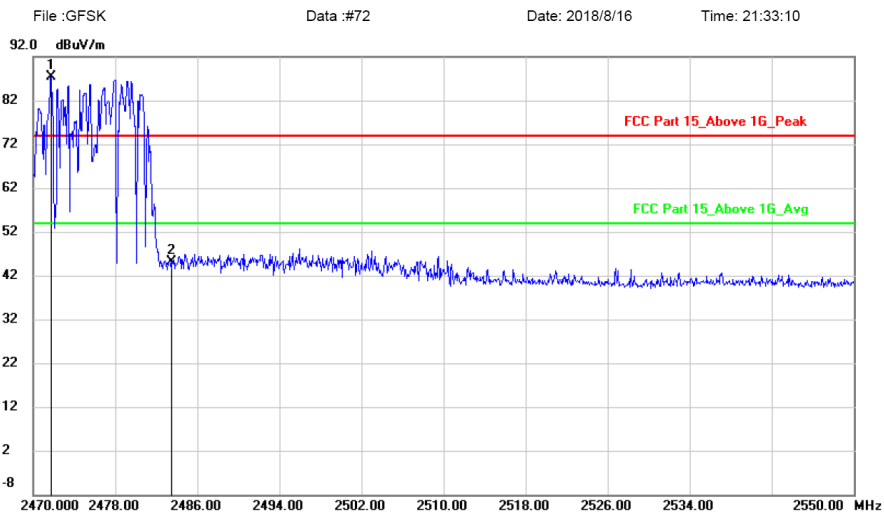
hopping-on

Polarization: Horizontal Test Mode: GFSK-High  
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1	*	2480.000	88.39	-3.38	85.01	74.00	11.01	peak	
2		2483.500	47.16	-3.38	43.78	74.00	-30.22	peak	

hopping-off  
Radiated Emission Measurement



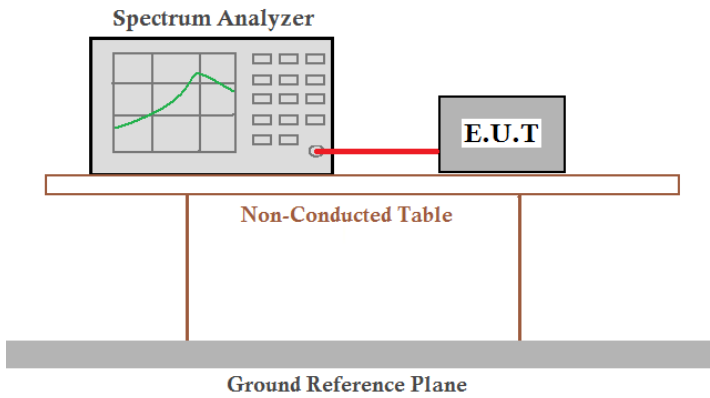
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1	*	2471.760	90.71	-3.39	87.32	74.00	13.32	peak	
2		2483.500	48.60	-3.38	45.22	74.00	-28.78	peak	

hopping-on

Note: 1. \*:Maximum data; x:Over limit; !:over margin.  
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

## 7.7 Spurious Emission

### 7.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V04
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:  
Lowest channel



30MHz~25GHz

Middle channel



30MHz~25GHz

Highest channel



30MHz~25GHz

## 7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
RMS		1MHz	3MHz	Average	
Limit:	Frequency	Limit (dBuV/m @3m)		Value	
	30MHz-88MHz	40.00		Quasi-peak	
	88MHz-216MHz	43.50		Quasi-peak	
	216MHz-960MHz	46.00		Quasi-peak	
	960MHz-1GHz	54.00		Quasi-peak	
	Above 1GHz	54.00		Average	
74.00		Peak			
Test setup:	Below 1GHz				
Above 1GHz					

<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8 meters below 1G and 1.5 meters above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. 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>3. 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>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. 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.</li> <li>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.</li> </ol>
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>
<p>Test results:</p>	<p>Pass</p>

Remark: 1. During the test, pre-scan the GFSK modulation, and found the GFSK modulation low channel which it is worse case.

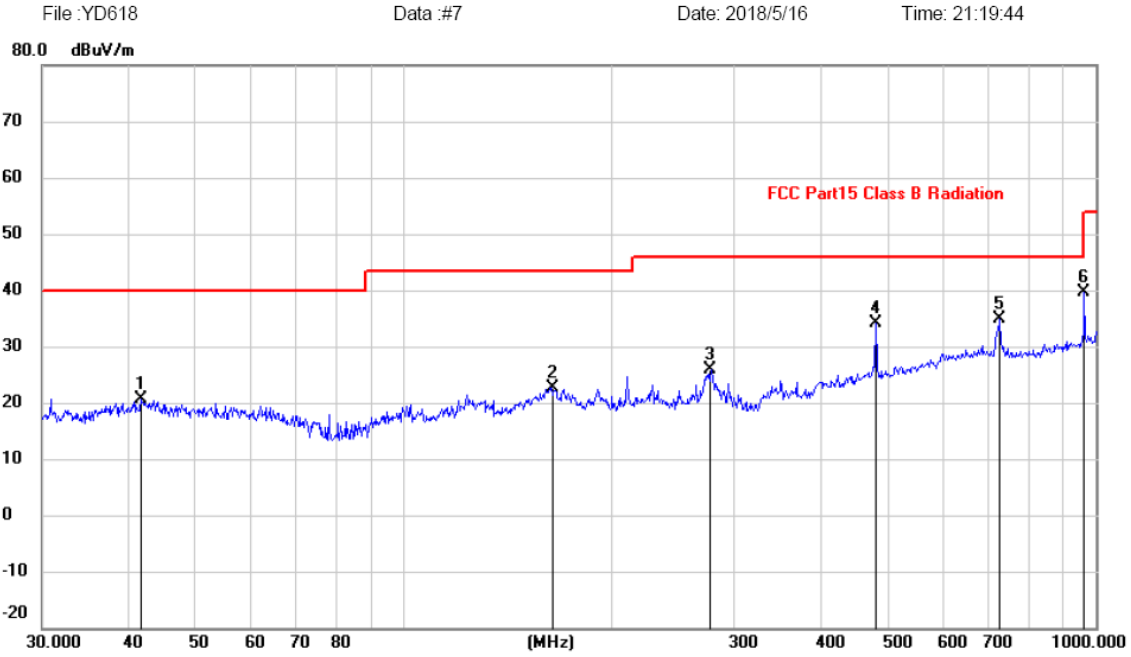
2.Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

3.The test data below 30MHz is too lower than the limit, so not show in this report.

Test result for BT4.2 BLE (Channel 2440MHz), DC 3.8V

**Vertical:**

### Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		41.7129	6.48	14.12	20.60	40.00	-19.40			peak
2		163.7549	8.37	14.28	22.65	43.50	-20.85			peak
3		278.0668	13.02	12.94	25.96	46.00	-20.04			peak
4		480.5276	17.12	17.08	34.20	46.00	-11.80			peak
5	*	726.8052	13.51	21.33	34.84	46.00	-11.16			peak
6		965.5420	15.67	23.88	39.55	54.00	-14.45			peak

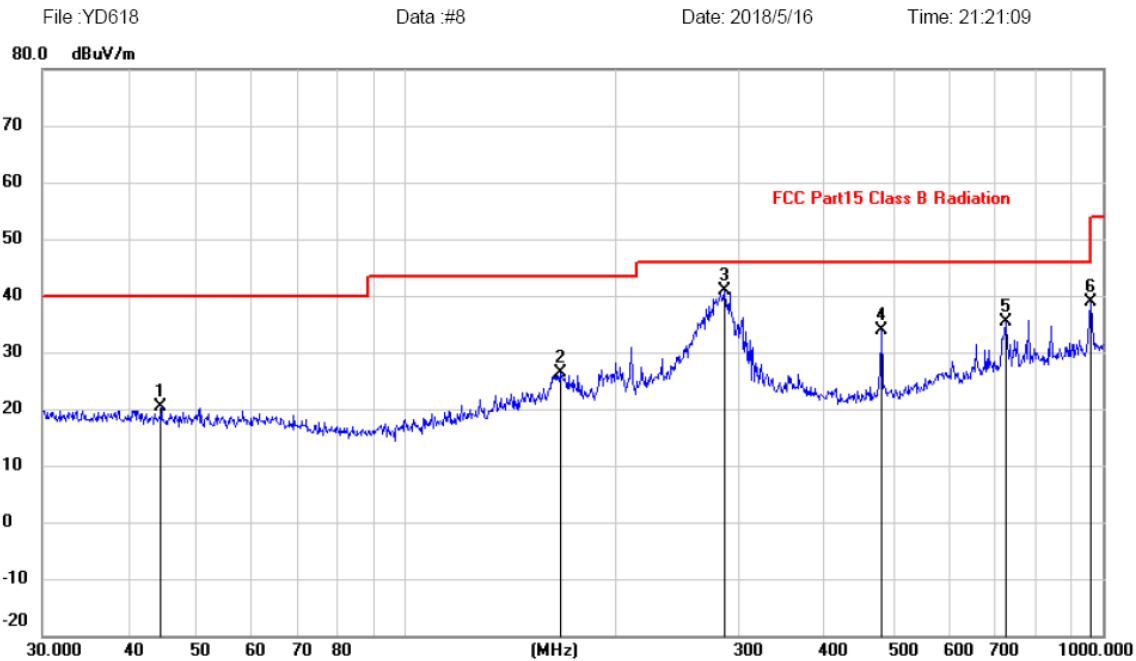
Note:1. \*:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Test result for BT4.2 BLE (Channel 2440MHz), DC 3.8V

Horizontal:

### Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		44.4307	6.52	13.79	20.31	40.00	-19.69	peak		
2		166.0680	12.20	14.09	26.29	43.50	-17.21	peak		
3	*	285.9778	27.73	13.06	40.79	46.00	-5.21	peak		
4		480.5276	16.69	17.08	33.77	46.00	-12.23	peak		
5		724.2611	14.23	21.24	35.47	46.00	-10.53	peak		
6		962.1621	14.91	23.91	38.82	54.00	-15.18	peak		

Note:1. \*:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.



**Above 1GHz**

Test channel:	Lowest
---------------	--------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	38.50	31.78	8.6	32.09	46.79	74.00	-27.21	Vertical
7206.00	32.54	36.15	11.65	32	48.34	74.00	-25.66	Vertical
9608.00	32.29	37.95	14.14	31.62	52.76	74.00	-21.24	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	42.75	31.78	8.6	32.09	51.04	74.00	-22.96	Horizontal
7206.00	34.88	36.15	11.65	32	50.68	74.00	-23.32	Horizontal
9608.00	31.41	37.95	14.14	31.62	51.88	74.00	-22.12	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	26.78	31.78	8.6	32.09	35.07	54.00	-18.93	Vertical
7206.00	21.93	36.15	11.65	32	37.73	54.00	-16.27	Vertical
9608.00	20.02	37.95	14.14	31.62	40.49	54.00	-13.51	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	31.31	31.78	8.6	32.09	39.60	54.00	-14.40	Horizontal
7206.00	23.80	36.15	11.65	32	39.60	54.00	-14.40	Horizontal
9608.00	20.79	37.95	14.14	31.62	41.26	54.00	-12.74	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. “\*”, means this data is too weak instrument of signal is unable to test.

Test channel:	Middle
---------------	--------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	38.57	31.85	8.67	32.12	46.97	74.00	-27.03	Vertical
7320.00	33.40	36.37	11.72	31.89	49.60	74.00	-24.40	Vertical
9760.00	31.94	38.35	14.25	31.62	52.92	74.00	-21.08	Vertical
12200.00	*					74.00		Vertical
14640.00	*					74.00		Vertical
4880.00	42.71	31.85	8.67	32.12	51.11	74.00	-22.89	Horizontal
7320.00	34.02	36.37	11.72	31.89	50.22	74.00	-23.78	Horizontal
9760.00	31.95	38.35	14.25	31.62	52.93	74.00	-21.07	Horizontal
12200.00	*					74.00		Horizontal
14640.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	26.33	31.85	8.67	32.12	34.73	54.00	-19.27	Vertical
7320.00	21.24	36.37	11.72	31.89	37.44	54.00	-16.56	Vertical
9760.00	20.70	38.35	14.25	31.62	41.68	54.00	-12.32	Vertical
12200.00	*					54.00		Vertical
14640.00	*					54.00		Vertical
4880.00	32.22	31.85	8.67	32.12	40.62	54.00	-13.38	Horizontal
7320.00	23.46	36.37	11.72	31.89	39.66	54.00	-14.34	Horizontal
9760.00	20.90	38.35	14.25	31.62	41.88	54.00	-12.12	Horizontal
12200.00	*					54.00		Horizontal
14640.00	*					54.00		Horizontal

*Remark:*

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor*
2. *“\*”, means this data is the too weak instrument of signal is unable to test.*

Test channel:	Highest
---------------	---------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	38.45	31.93	8.73	32.16	46.95	74.00	-27.05	Vertical
7440.00	33.34	36.59	11.79	31.78	49.94	74.00	-24.06	Vertical
9920.00	32.29	38.81	14.38	31.88	53.60	74.00	-20.40	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	43.17	31.93	8.73	32.16	51.67	74.00	-22.33	Horizontal
7440.00	34.76	36.59	11.79	31.78	51.36	74.00	-22.64	Horizontal
9920.00	32.67	38.81	14.38	31.88	53.98	74.00	-20.02	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

**Average value:**

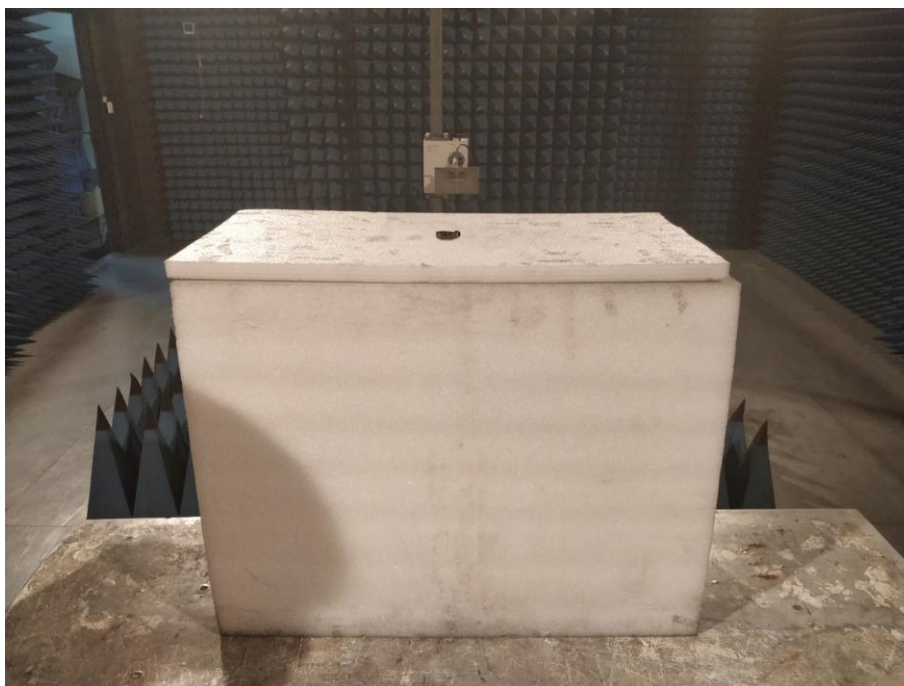
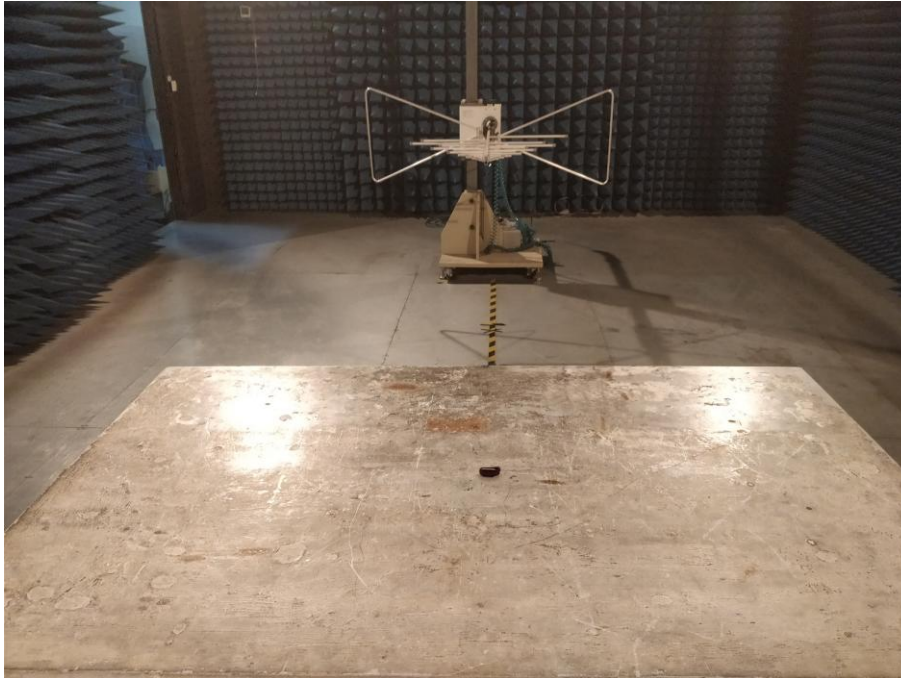
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	27.13	31.93	8.73	32.16	35.63	54.00	-18.37	Vertical
7440.00	21.29	36.59	11.79	31.78	37.89	54.00	-16.11	Vertical
9920.00	20.23	38.81	14.38	31.88	41.54	54.00	-12.46	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	31.30	31.93	8.73	32.16	39.80	54.00	-14.20	Horizontal
7440.00	23.98	36.59	11.79	31.78	40.58	54.00	-13.42	Horizontal
9920.00	20.41	38.81	14.38	31.88	41.72	54.00	-12.28	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. “\*”, means this data is the too weak instrument of signal is unable to test.

## 8 Test Setup Photo

Radiated Emission



## Conducted Emission



## 9 EUT Constructional Details

Please refer to report GTS201806000074F01.

-----End-----