

Test Report (Bluetooth)

Applicant: Omate Limited.

Address of Applicant: Room 1101,11/F San Toi Building, No.139 Connaught Road, HongKong, China

Manufacturer/ Factory: Umeox Innovation Co., Ltd.

Address of Manufacturer/ Factory: 1208-09, Tsinghua IT Port R&D Building, North Area, Hi-Tech Park, Nanshan District, Shenzhen 518057 China

Equipment Under Test (EUT)

Product Name: 4G Video Call Smart Watch

Model No.: O6L, Omate x Nash, O6L, Freedom 2, O6_V1, S6

Trade Mark: Omate

FCC ID: 2ABF5-O6L

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

Date of sample receipt: Mar. 01, 2020

Date of Test: Mar. 01 – Apr. 29, 2020

Date of report issued: Apr. 30, 2020

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	Apr. 30, 2020	Original

Prepared By:



Date:

Apr. 30, 2020

Project Engineer

Check By:



Date:

Apr. 30, 2020

Reviewer

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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 Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.
2. Test according to ANSI C63.10:2013

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(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:	4G Video Call Smart Watch
Model No.:	O6L, Omate x Nash, O6L, Freedom 2, O6_V1, S6
Test Model No:	O6L
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.	
Test sample(s) ID:	GTS202004000211-1
Sample(s) Status:	Engineer sample
Serial No.:	869363030262663
Hardware Version:	O6_MB_V2.0
Software Version:	O6L_V1.0
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Antenna Type:	Integral Antenna
Antenna gain:	0.41dBi(Declared by applicant)
Power supply:	DC 3.8V, 620mAh Rechargeable Li-ion Battery

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

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	2441MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
<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 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations: ● FCC —Registration No.: 381383 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. ● IC —Registration No.: 9079A 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 ● NVLAP (LAB CODE:600179-0) Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

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	9.2(L)*6.2(W)* 6.4(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	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

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.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 26 2019	June. 25 2020
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 26 2019	June. 25 2020
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. 26 2019	June. 25 2020
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 26 2019	June. 25 2020
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 26 2019	June. 25 2020

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 26 2019	June. 25 2020
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 26 2019	June. 25 2020
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 26 2019	June. 25 2020
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 26 2019	June. 25 2020
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 26 2019	June. 25 2020
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 26 2019	June. 25 2020
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 26 2019	June. 25 2020

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
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(c) (1)(i) requirement: (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.	
E.U.T Antenna: <i>The antenna is integral antenna, the best case gain of the antenna is 0.41dBi, reference to the appendix II for details</i>	

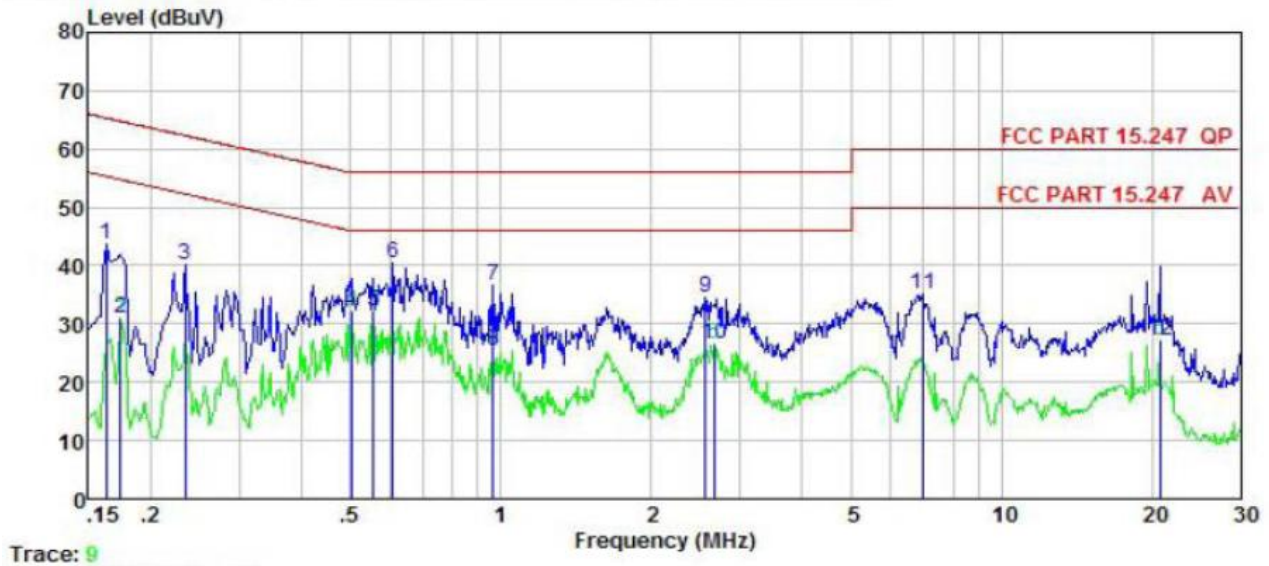
7.2 Conducted Emissions

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:	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	
* Decreases with the logarithm of the frequency.						
Test setup:	Reference Plane <i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i>					
Test procedure:	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. 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). 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 C63.10:2013 on conducted measurement.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

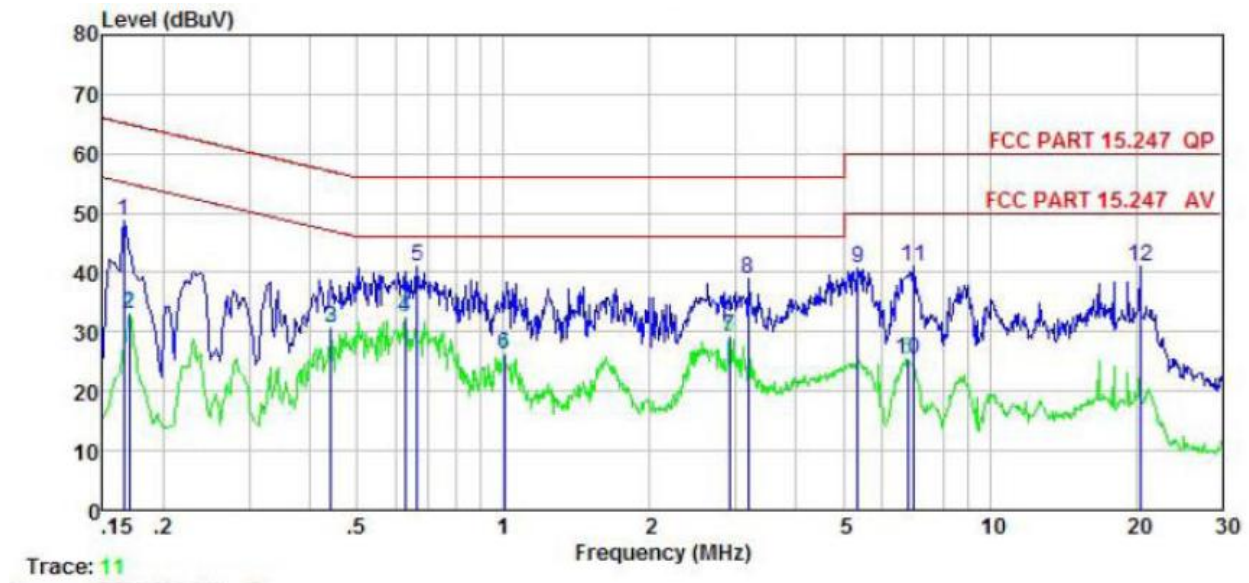
Measurement data:

Line:



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	32.85	0.17	10.77	43.79	65.34	-21.55	QP
2	0.174	20.10	0.16	10.77	31.03	54.77	-23.74	Average
3	0.234	29.16	0.14	10.75	40.05	62.30	-22.25	QP
4	0.502	21.30	0.12	10.76	32.18	46.00	-13.82	Average
5	0.555	21.30	0.12	10.76	32.18	46.00	-13.82	Average
6	0.608	29.62	0.13	10.77	40.52	56.00	-15.48	QP
7	0.963	25.53	0.13	10.86	36.52	56.00	-19.48	QP
8	0.963	14.32	0.13	10.86	25.31	46.00	-20.69	Average
9	2.567	23.38	0.15	10.94	34.47	56.00	-21.53	QP
10	2.664	15.40	0.16	10.93	26.49	46.00	-19.51	Average
11	6.951	24.17	0.25	10.80	35.22	60.00	-24.78	QP
12	20.704	16.10	0.28	10.92	27.30	50.00	-22.70	Average

Neutral:

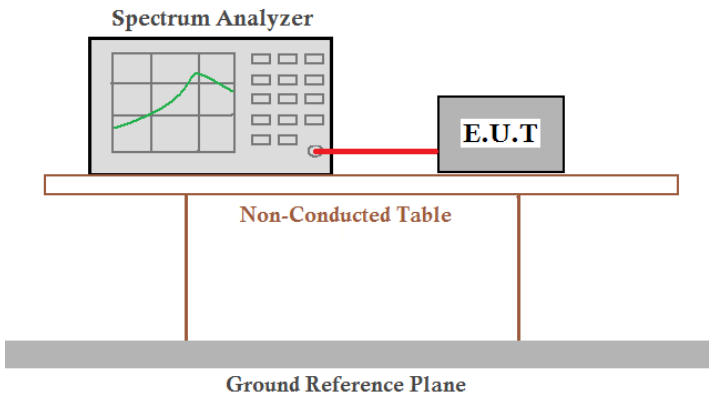


	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	Level	Line	Limit	Remark
		dBuV	dB	dB	dBuV	dBuV	dB	
1	0.166	36.93	0.97	10.77	48.67	65.16	-16.49	QP
2	0.170	21.41	0.96	10.77	33.14	54.94	-21.80	Average
3	0.442	18.95	0.97	10.74	30.66	47.02	-16.36	Average
4	0.627	20.63	0.97	10.77	32.37	46.00	-13.63	Average
5	0.665	29.28	0.97	10.77	41.02	56.00	-14.98	QP
6	1.005	14.39	0.97	10.87	26.23	46.00	-19.77	Average
7	2.915	17.33	0.99	10.92	29.24	46.00	-16.76	Average
8	3.190	27.17	0.99	10.91	39.07	56.00	-16.93	QP
9	5.362	28.84	1.01	10.84	40.69	60.00	-19.31	QP
10	6.769	13.67	1.02	10.81	25.50	50.00	-24.50	Average
11	6.951	29.15	1.02	10.80	40.97	60.00	-19.03	QP
12	20.377	29.28	0.69	10.93	40.90	60.00	-19.10	QP

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

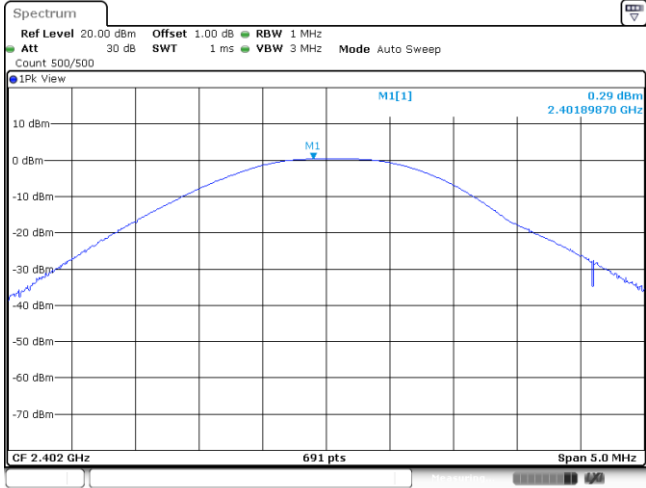
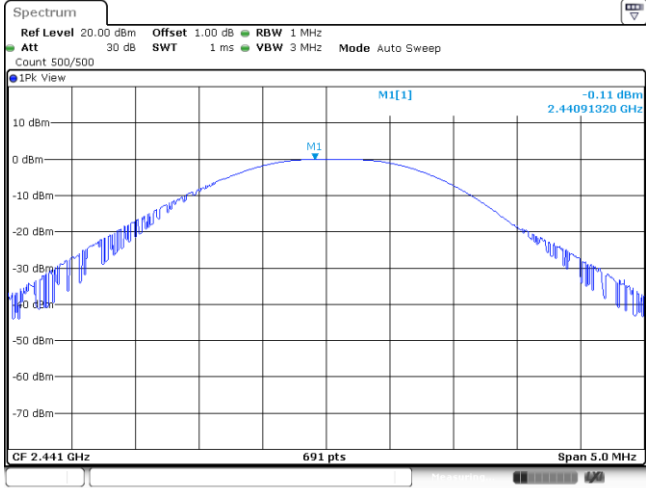
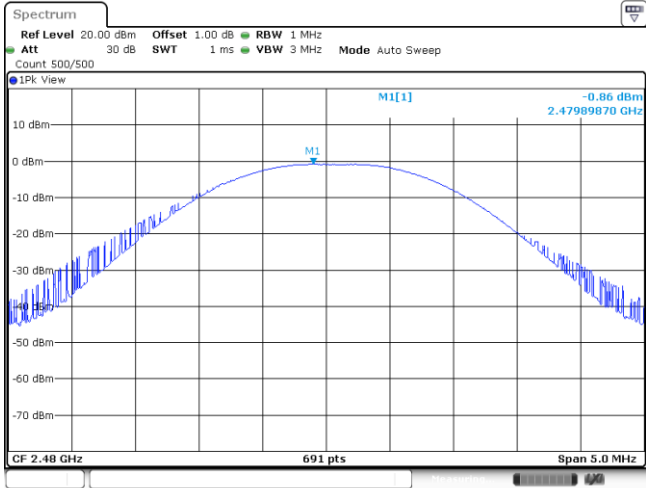
7.3 Conducted Peak Output Power

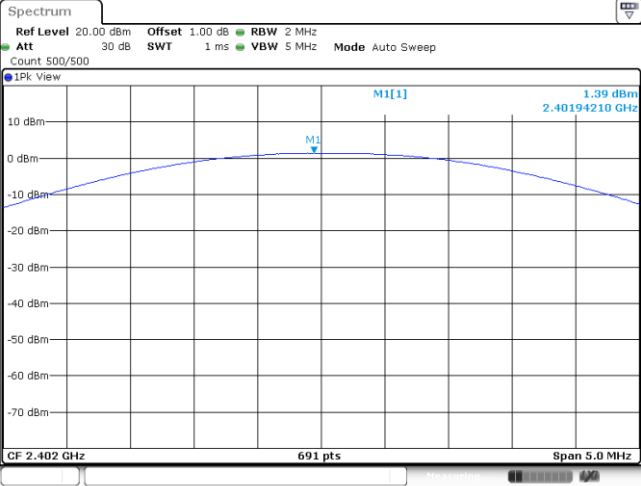
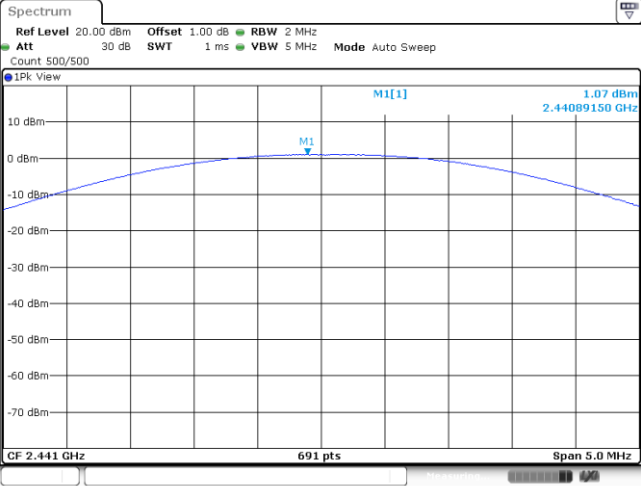
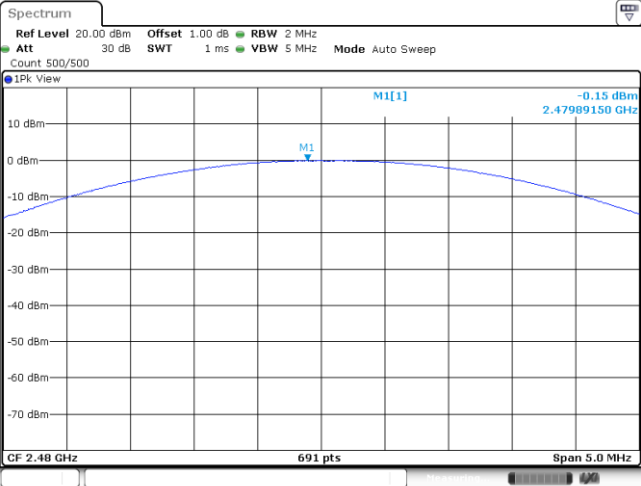
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013
Limit:	20.97dBm
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Mode	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
GFSK	Lowest	0.29	20.97	Pass
	Middle	-0.11		
	Highest	-0.86		
$\pi/4$ -DQPSK	Lowest	1.39	20.97	Pass
	Middle	1.07		
	Highest	-0.15		
8-DPSK	Lowest	1.54	20.97	Pass
	Middle	1.23		
	Highest	0.13		

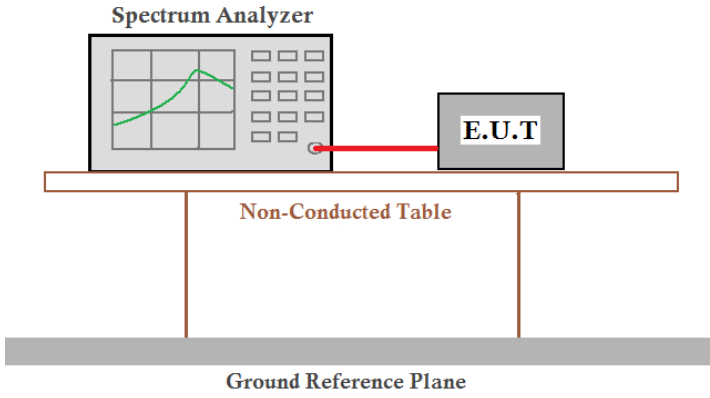
Test plot as follows:

Modulation Type:	GFSK
Lowest	 0.29 dBm 2.40109870 GHz CF 2.402 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:02:42
Middle	 -0.11 dBm 2.44091320 GHz CF 2.441 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:03:15
Highest	 -0.86 dBm 2.47989870 GHz CF 2.48 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:03:44

Modulation Type:	$\pi/4$ DQPSK
CH00	 1.39 dBm 2.40194210 GHz CF 2.402 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:12:14
CH39	 1.07 dBm 2.44089150 GHz CF 2.441 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:14:53
CH78	 -0.15 dBm 2.47989150 GHz CF 2.48 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:18:33

Modulation Type:		8DPSK
CH00	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 1.00 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View M1[1] 1.54 dBm 2.4025070 GHz CF 2.402 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:20:27	
CH39	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 1.00 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View M1[1] 1.23 dBm 2.44107960 GHz CF 2.441 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:23:09	
CH78	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 1.00 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View M1[1] 0.13 dBm 2.48003620 GHz CF 2.48 GHz 691 pts Span 5.0 MHz Date: 25/MAR/2020 16:25:51	

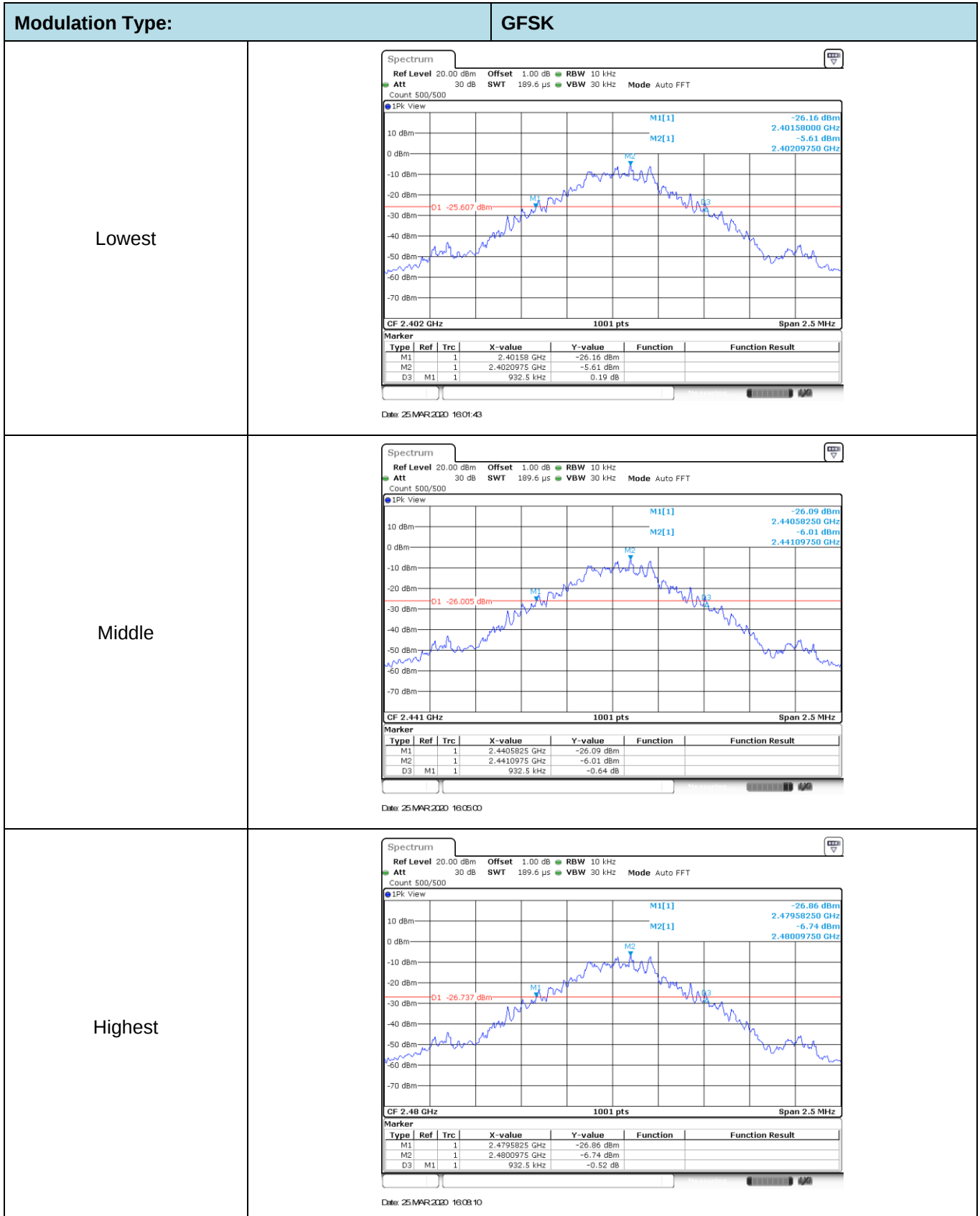
7.4 20dB Emission Bandwidth

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

Measurement Data

Mode	Test channel	20dB Emission Bandwidth (KHz)	Result
GFSK	Lowest	932.5	Pass
	Middle	932.5	
	Highest	932.5	
$\pi/4$ -DQPSK	Lowest	1285.0	Pass
	Middle	1282.5	
	Highest	1282.5	
8-DPSK	Lowest	1282.5	Pass
	Middle	1282.5	
	Highest	1282.5	

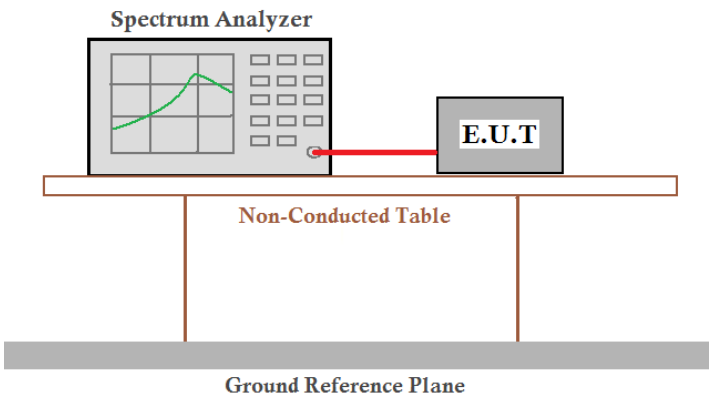
Test plot as follows:



Modulation Type:		$\pi/4$ DQPSK
Lowest	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View	

Modulation Type:		8DPSK																											
Lowest	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M2 -21.20 dBm 2.4013950 GHz -1.13 dBm 2.4022050 GHz D1 -21.131 dBm M1 D3 CF 2.402 GHz 1001 pts Span 2.5 MHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td></td><td>1</td><td>2.401395 GHz</td><td>-21.20 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.402205 GHz</td><td>-1.13 dBm</td><td></td><td></td></tr><tr><td>D3</td><td>M1</td><td>1</td><td>1.2825 MHz</td><td>-0.03 dB</td><td></td><td></td></tr></tbody></table> Date: 25/MAR/2020 16:19:55	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.401395 GHz	-21.20 dBm			M2		1	2.402205 GHz	-1.13 dBm			D3	M1	1	1.2825 MHz	-0.03 dB		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																							
M1		1	2.401395 GHz	-21.20 dBm																									
M2		1	2.402205 GHz	-1.13 dBm																									
D3	M1	1	1.2825 MHz	-0.03 dB																									
Middle	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M2 -21.74 dBm 2.4403950 GHz -1.58 dBm 2.4412050 GHz D1 -21.580 dBm M1 D3 CF 2.441 GHz 1001 pts Span 2.5 MHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td></td><td>1</td><td>2.440395 GHz</td><td>-21.74 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.441205 GHz</td><td>-1.58 dBm</td><td></td><td></td></tr><tr><td>D3</td><td>M1</td><td>1</td><td>1.2825 MHz</td><td>0.00 dB</td><td></td><td></td></tr></tbody></table> Date: 25/MAR/2020 16:22:28	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.440395 GHz	-21.74 dBm			M2		1	2.441205 GHz	-1.58 dBm			D3	M1	1	1.2825 MHz	0.00 dB		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																							
M1		1	2.440395 GHz	-21.74 dBm																									
M2		1	2.441205 GHz	-1.58 dBm																									
D3	M1	1	1.2825 MHz	0.00 dB																									
Highest	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M2 -23.69 dBm 2.4793950 GHz -3.25 dBm 2.4802050 GHz D1 -23.246 dBm M1 D3 CF 2.48 GHz 1001 pts Span 2.5 MHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td></td><td>1</td><td>2.479395 GHz</td><td>-23.69 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.480205 GHz</td><td>-3.25 dBm</td><td></td><td></td></tr><tr><td>D3</td><td>M1</td><td>1</td><td>1.2825 MHz</td><td>0.33 dB</td><td></td><td></td></tr></tbody></table> Date: 25/MAR/2020 16:25:11	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.479395 GHz	-23.69 dBm			M2		1	2.480205 GHz	-3.25 dBm			D3	M1	1	1.2825 MHz	0.33 dB		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																							
M1		1	2.479395 GHz	-23.69 dBm																									
M2		1	2.480205 GHz	-3.25 dBm																									
D3	M1	1	1.2825 MHz	0.33 dB																									

7.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	 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.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

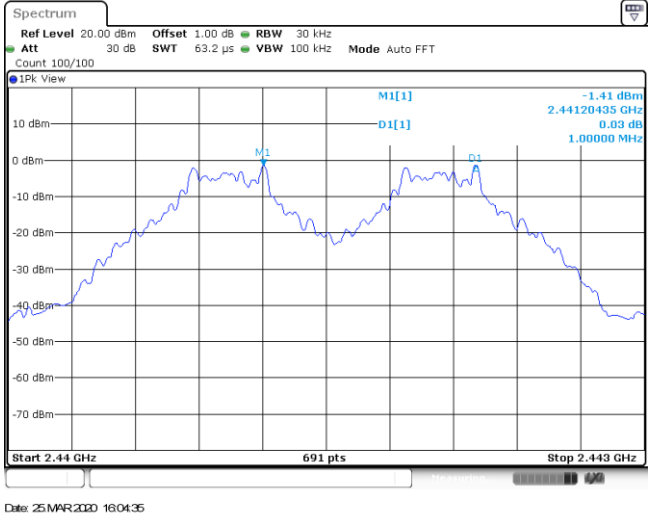
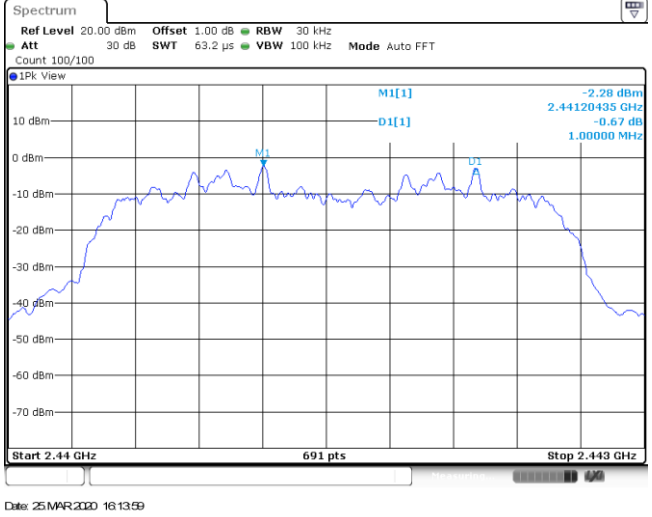
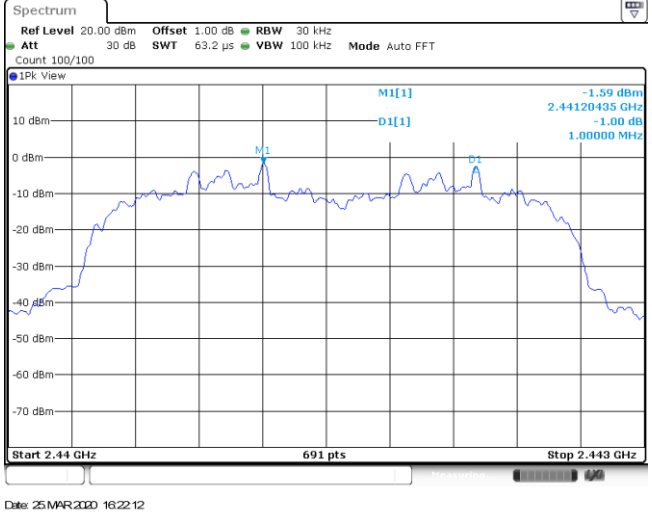
Measurement Data

Mode	Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
GFSK	Lowest	1000	756	Pass
$\pi/4$ -DQPSK	Lowest	1000	752	Pass
8-DPSK	Lowest	1000	784	Pass

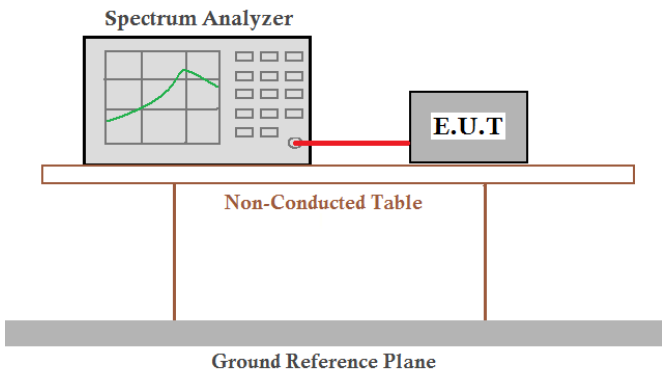
Note: According to section 7.4

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	932.5	932
$\pi/4$ -DQPSK	1285.0	857
8-DPSK	1282.5	855

Test plot as follows:

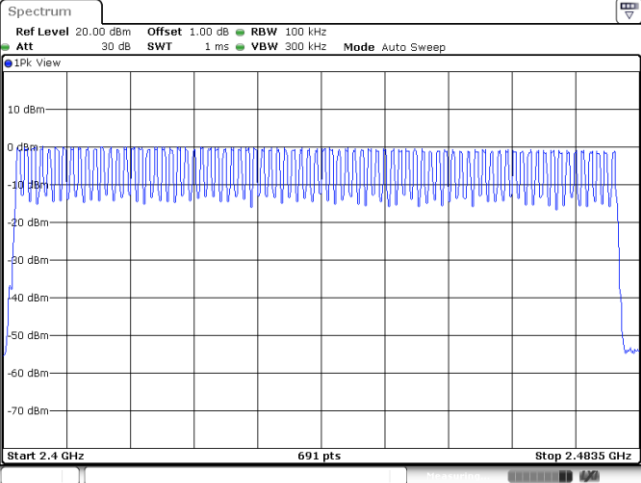
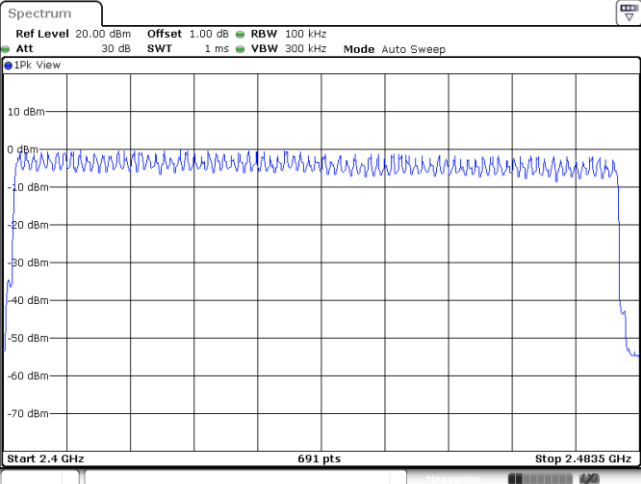
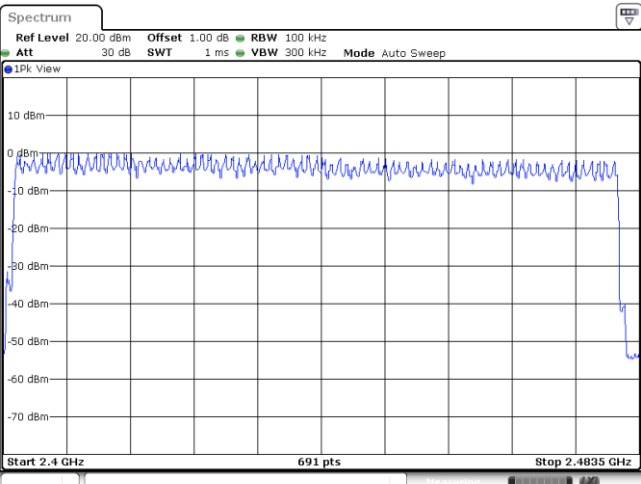
GFSK	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.2 μs VBW 100 kHz Mode Auto FFT Count 100/100 1Pk View M1[1] -1.41 dBm D1[1] -0.03 dB 2.44120435 GHz 1.00000 MHz Start 2.44 GHz 691 pts Stop 2.443 GHz Date: 25/MAR/2020 16:04:35
$\pi/4$DQPSK	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.2 μs VBW 100 kHz Mode Auto FFT Count 100/100 1Pk View M1[1] -2.28 dBm D1[1] -0.67 dB 2.44120435 GHz 1.00000 MHz Start 2.44 GHz 691 pts Stop 2.443 GHz Date: 25/MAR/2020 16:13:59
8DPSK	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.2 μs VBW 100 kHz Mode Auto FFT Count 100/100 1Pk View M1[1] -1.59 dBm D1[1] -1.00 dB 2.44120435 GHz 1.00000 MHz Start 2.44 GHz 691 pts Stop 2.443 GHz Date: 25/MAR/2020 16:22:12

7.6 Hopping Channel Number

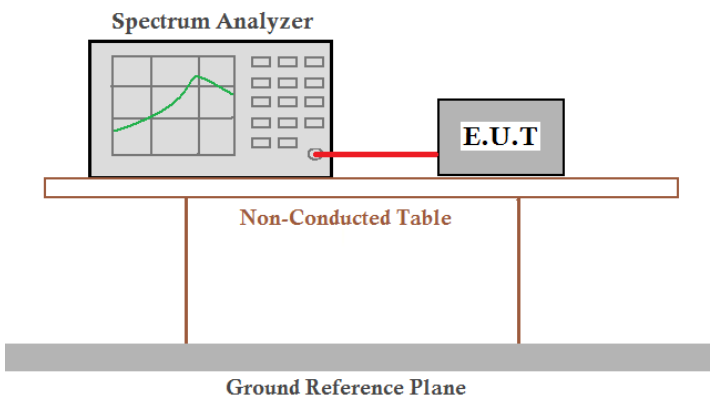
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK	79	15	Pass
$\pi/4$ -DQPSK	79	15	Pass
8-DPSK	79	15	Pass

GFSK	 Date: 25/MAR/2020 16:27:57
$\pi/4$DQPSK	 Date: 25/MAR/2020 16:29:36
8DPSK	 Date: 25/MAR/2020 16:30:55

7.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	 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 vertical legs and sits on a Ground Reference Plane, which is represented by a thick grey bar at the bottom.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Frequency	Packet	Dwell time(ms)	Limit(ms)	Result
2441MHz	DH1/2-DH1/3-DH1	124.8	400	Pass
2441MHz	DH3/2-DH3/3-DH3	264.0	400	Pass
2441MHz	DH5/2-DH5/3-DH5	308.27	400	Pass

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

Test channel: 2441MHz as below

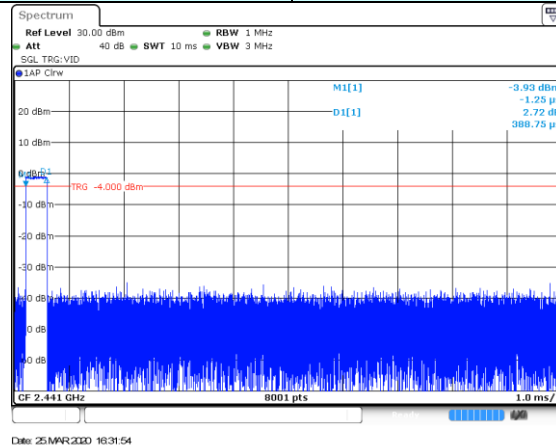
DH1/2-DH1/3-DH1 time slot = $0.39(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 124.8 \text{ms}$

DH3/2-DH3/3-DH3 time slot = $1.65(\text{ms}) \times (1600 / (4 \times 79)) \times 31.6 = 264.0 \text{ms}$

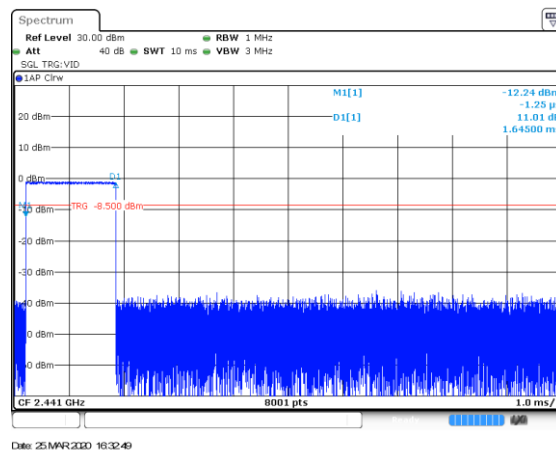
DH5/2-DH5/3-DH5 time slot = $2.89(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 308.27 \text{ms}$

Test plot as follows:

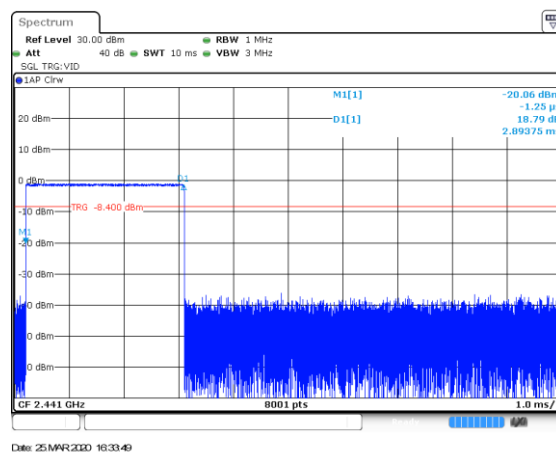
Test channel:	2441MHz
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DH1/2-DH1/3-DH1



DH3/2-DH3/3-DH3



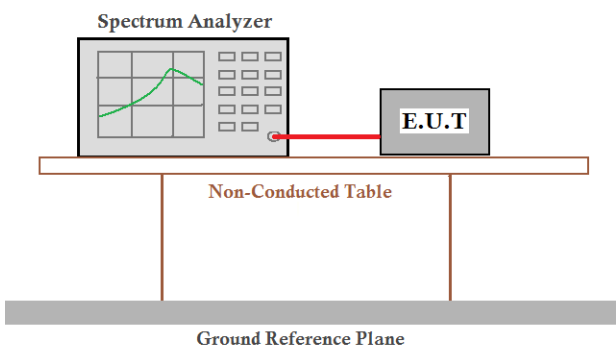
DH5/2-DH5/3-DH5

7.8 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)/g/h requirement:
a(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals. (g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section. (h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.	
EUT Pseudorandom Frequency Hopping Sequence	
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones. • Number of shift register stages: 9 • Length of pseudo-random sequence: $2^9 - 1 = 511$ bits • Longest sequence of zeros: 8 (non-inverted signal) Linear Feedback Shift Register for Generation of the PRBS sequence An example of Pseudorandom Frequency Hopping Sequence as follow: Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals. it permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted.	

7.9 Band Edge

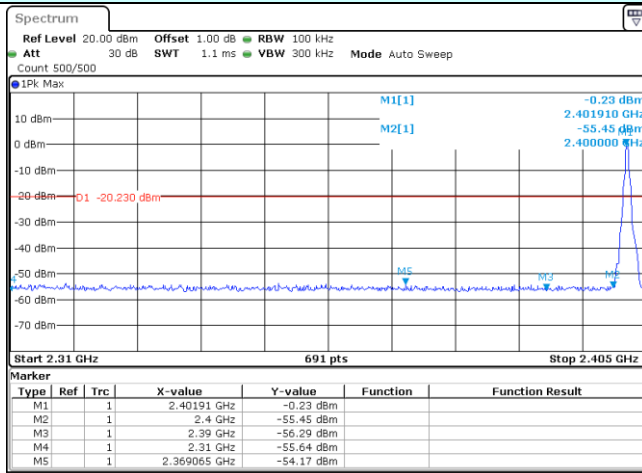
7.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
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:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a Ground Reference Plane, represented by a thick grey bar.
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:

GFSK Mode:

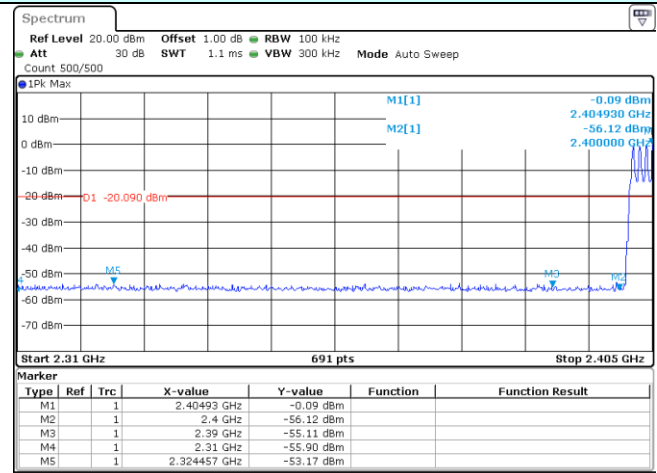
Test channel:



Date: 25 MAR 2020 16:03:00

No-hopping mode

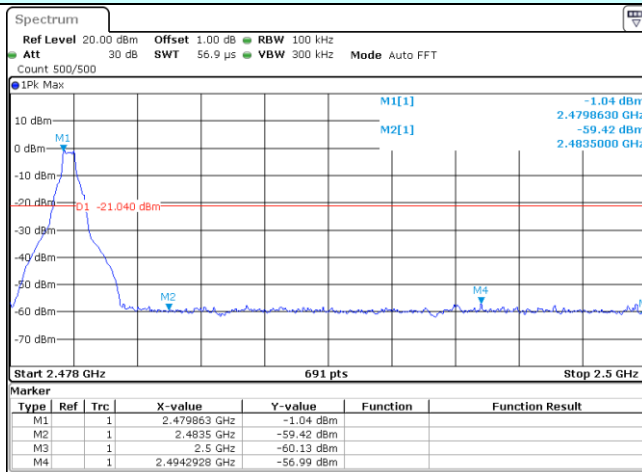
Lowest channel



Date: 25 MAR 2020 16:28:11

Hopping mode

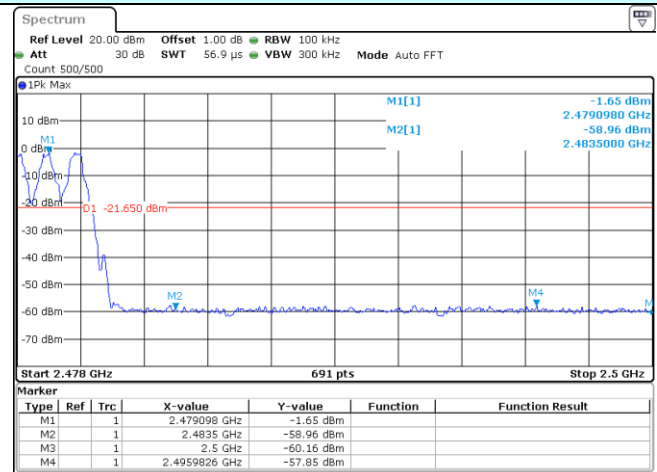
Test channel:



Date: 25 MAR 2020 16:08:58

No-hopping mode

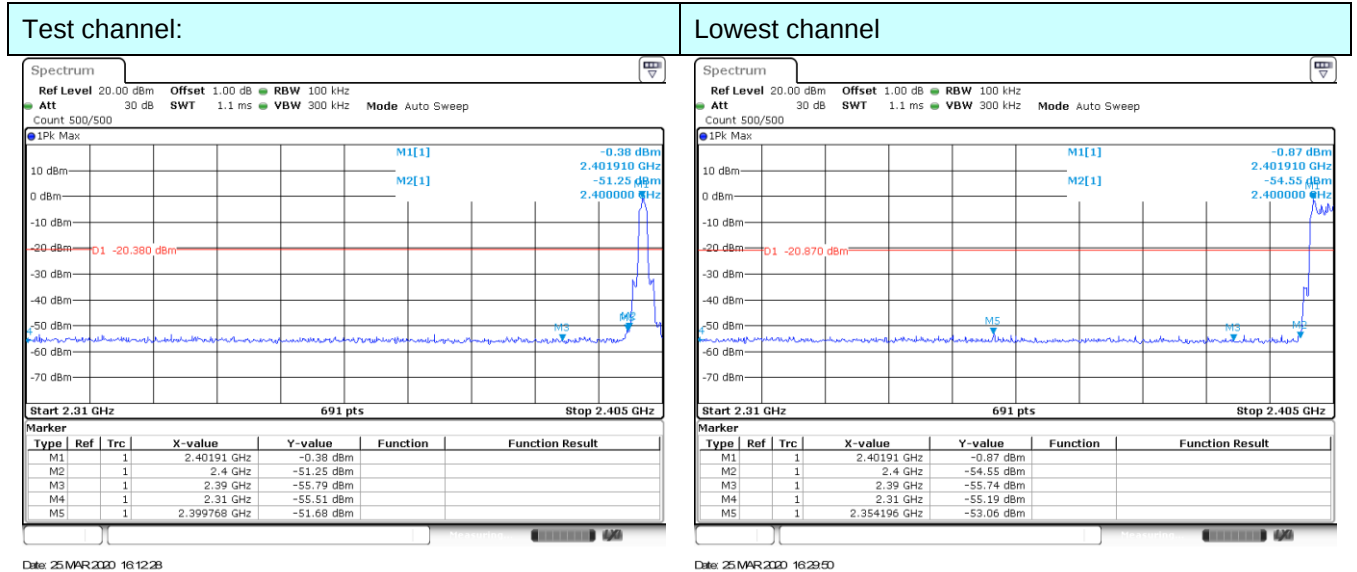
Highest channel



Date: 25 MAR 2020 16:28:29

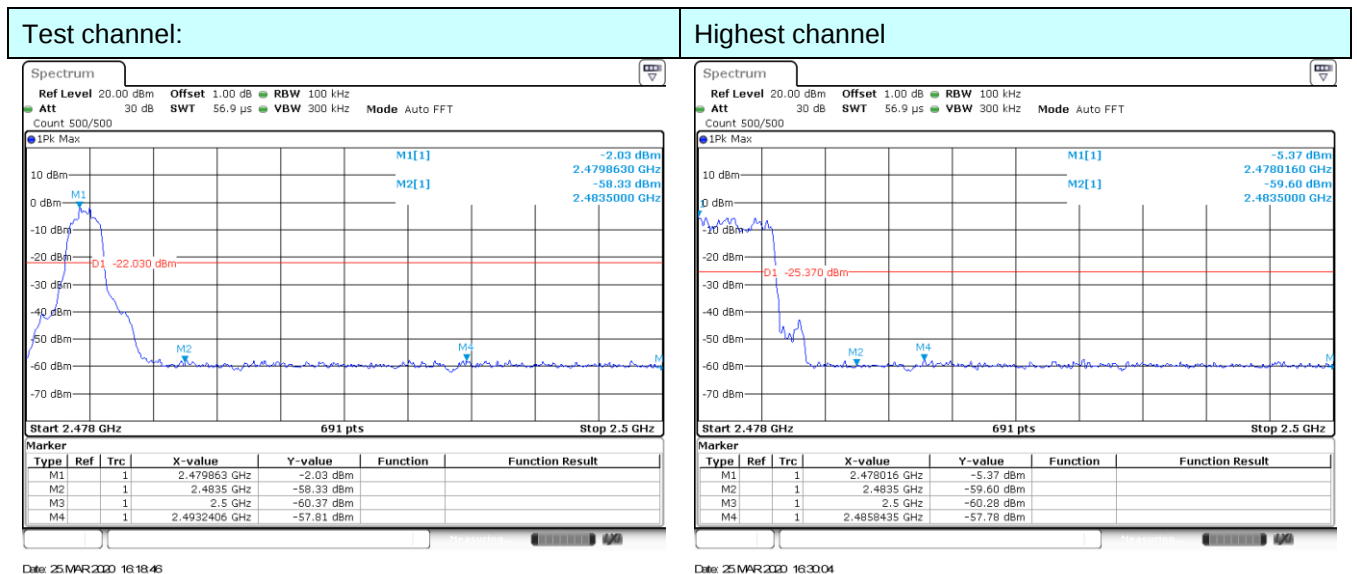
Hopping mode

$\pi/4$ -DQPSK Mode:



No-hopping mode

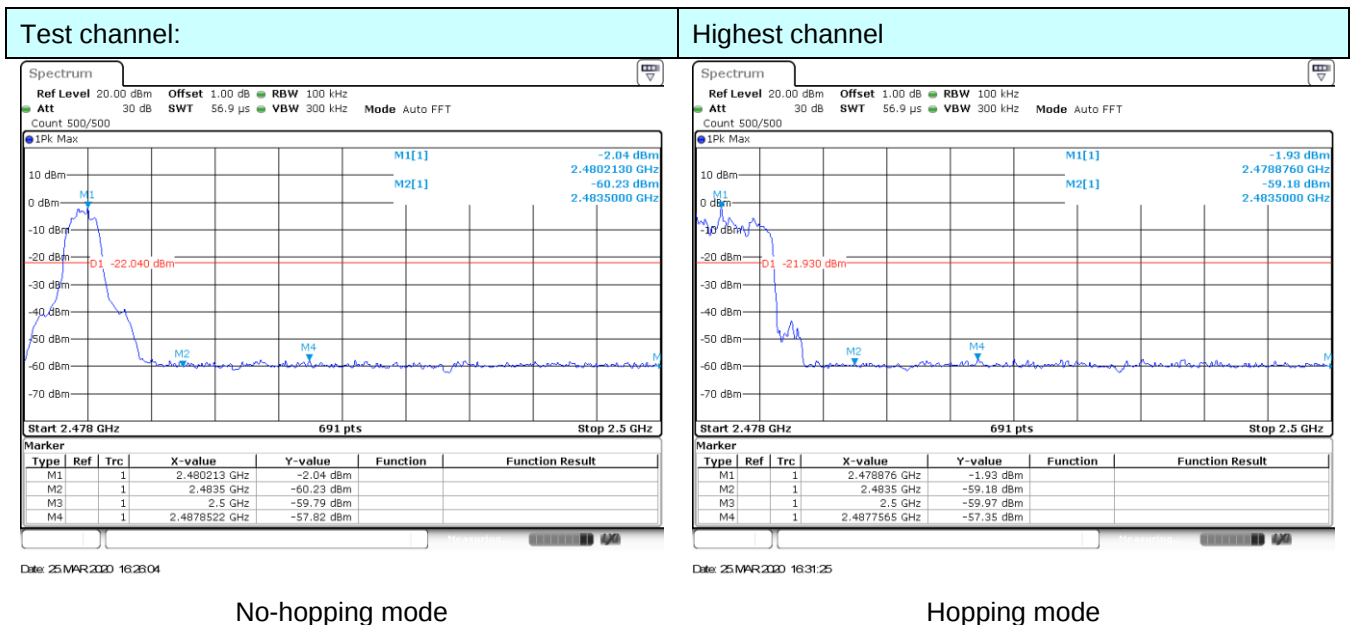
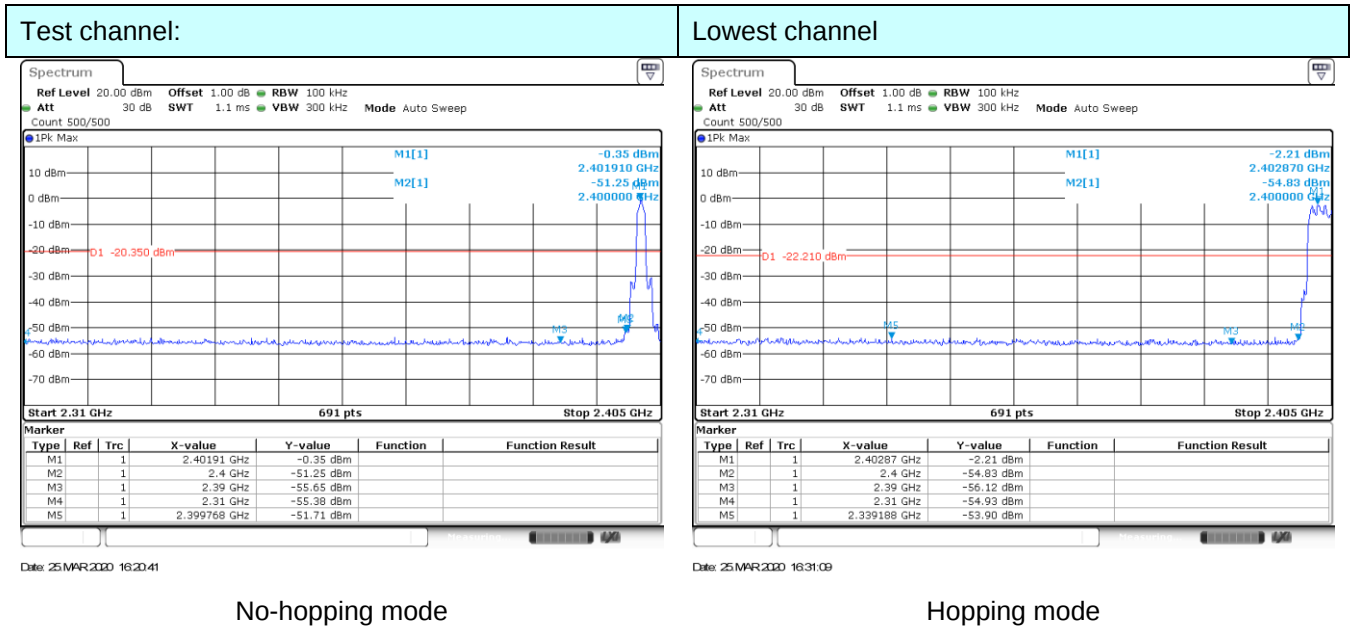
Hopping mode



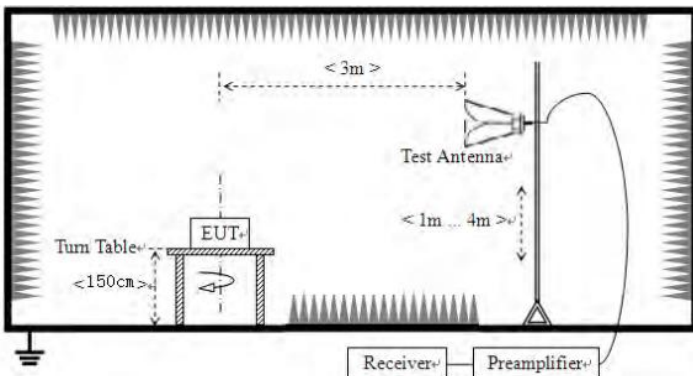
No-hopping mode

Hopping mode

8-DPSK Mode:



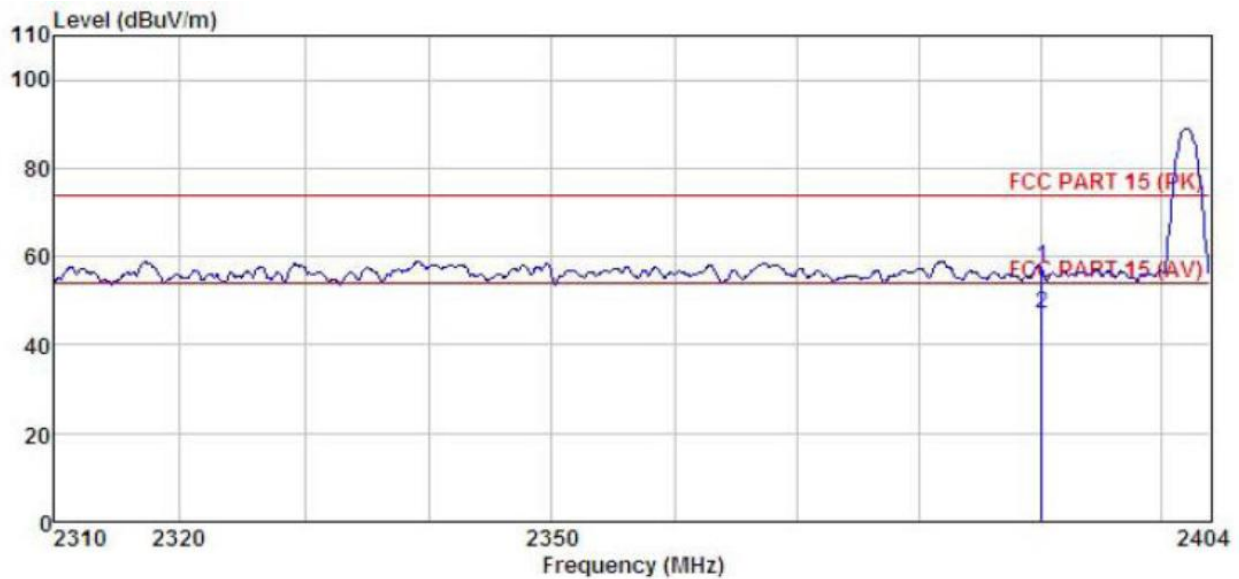
7.9.2 Radiated Emission Method

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	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Test setup:					
Test Procedure:	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. 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. 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. 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. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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.				
Test Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.2 for details				
Test results:	Pass				

Measurement Data

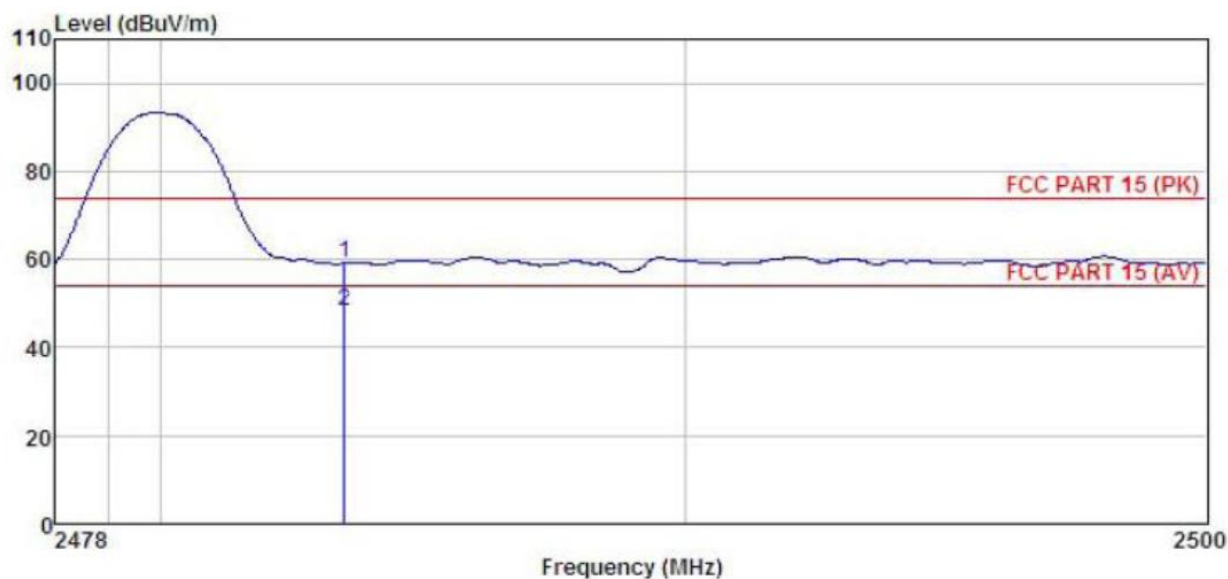
Test channel:	Lowest channel
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Horizontal:



	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2390.000	24.00	27.08	4.69	0.00	57.45	74.00 -16.55 Peak
2	2390.000	13.69	27.08	4.69	0.00	47.14	54.00 -6.86 Average

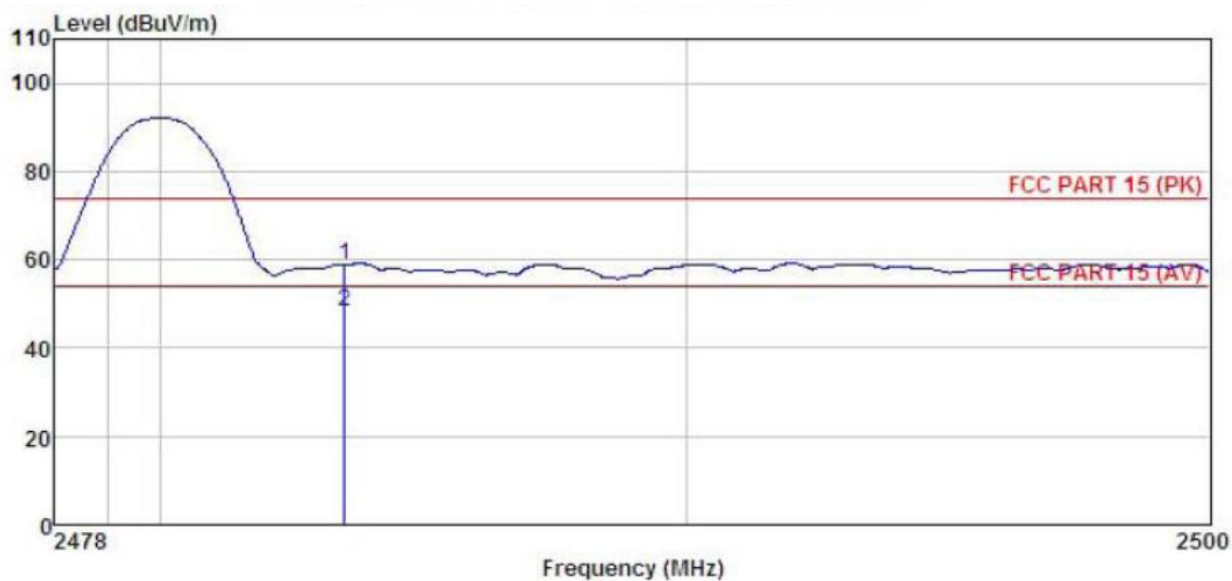
Vertical:



	Freq	ReadAntenna	Cable	Preamp	Limit	Over	
	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB
1	2483.500	25.35	27.36	4.81	0.00	59.22	74.00 -14.78 Peak
2	2483.500	14.47	27.36	4.81	0.00	48.34	54.00 -5.66 Average

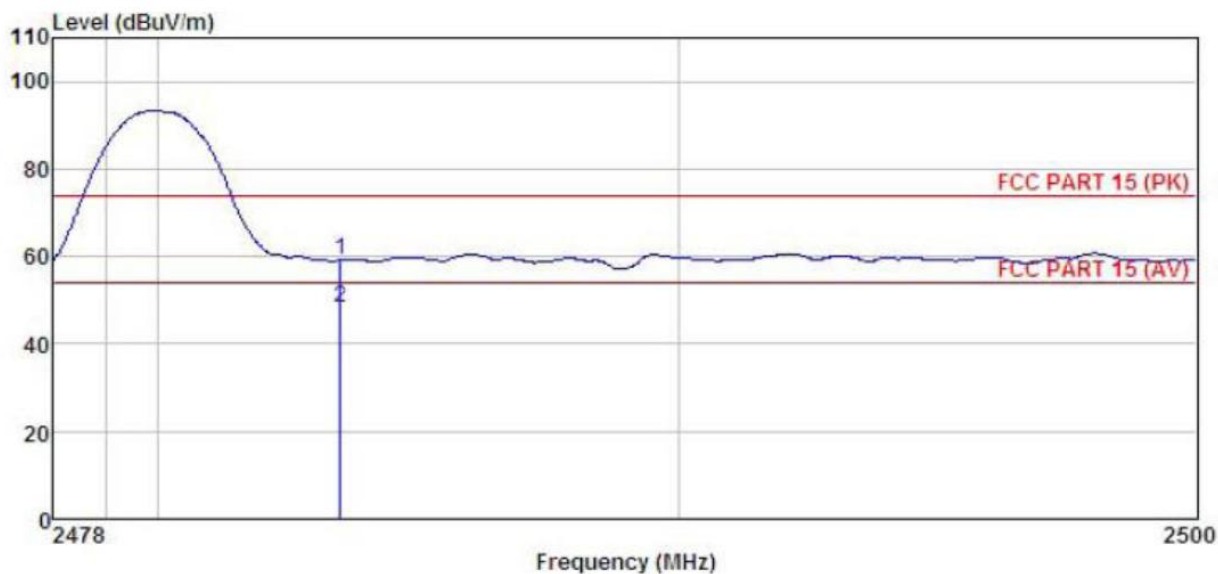
Test channel:	Highest channel
---------------	-----------------

Horizontal:



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	25.05	27.35	4.81	0.00	58.91	74.00	-15.09	Peak
2	2483.500	14.37	27.35	4.81	0.00	48.23	54.00	-5.77	Average

Vertical:



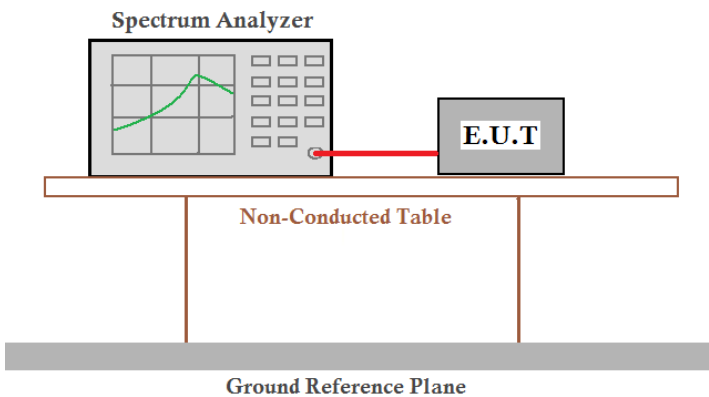
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	25.35	27.36	4.81	0.00	59.22	74.00	-14.78	Peak
2	2483.500	14.47	27.36	4.81	0.00	48.34	54.00	-5.66	Average

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.
4. During the test, pre-scan the GFSK, $\pi/4$ -DQPSK, 8-DPSK modulation, and found the GFSK modulation which it is worse case.

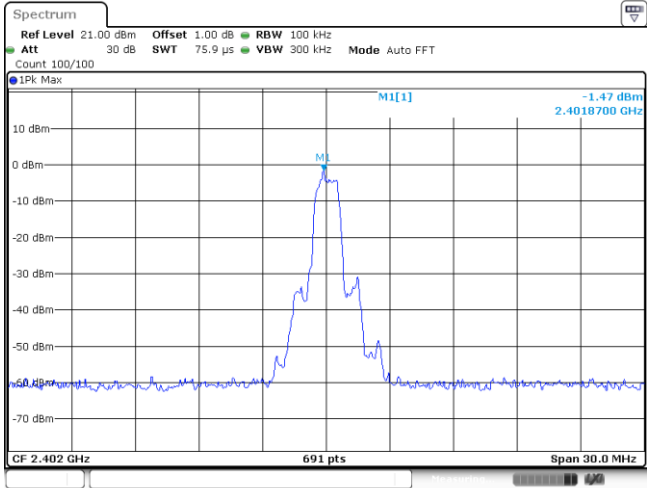
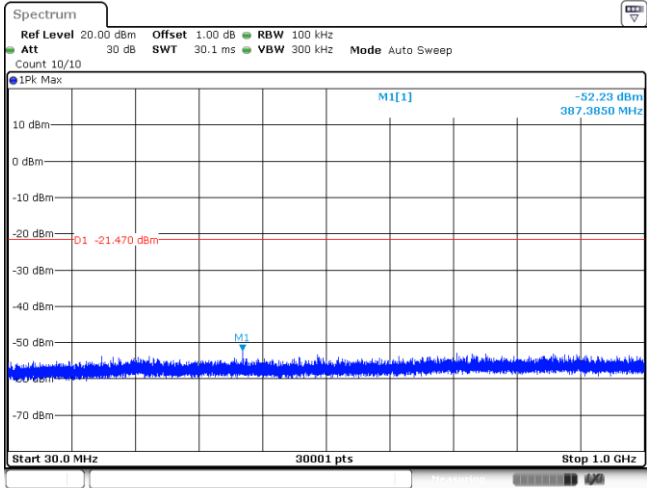
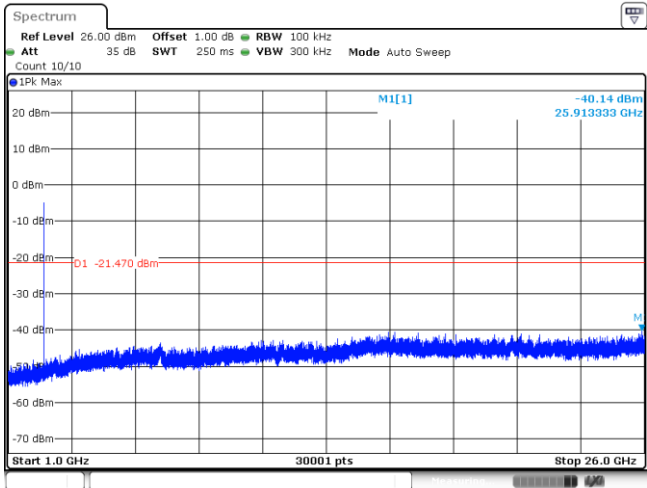
7.10 Spurious Emission

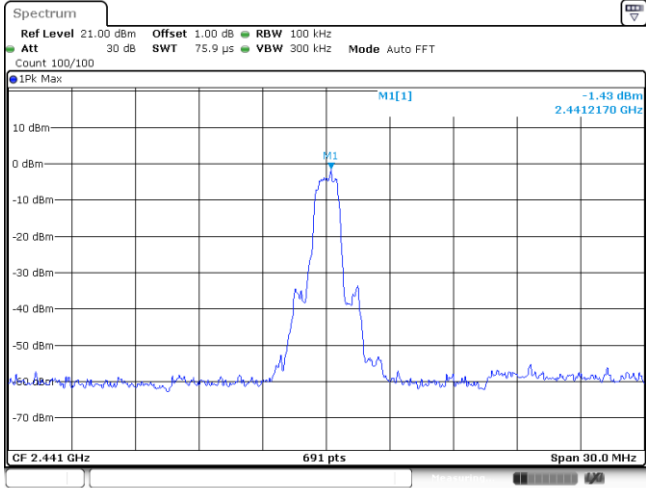
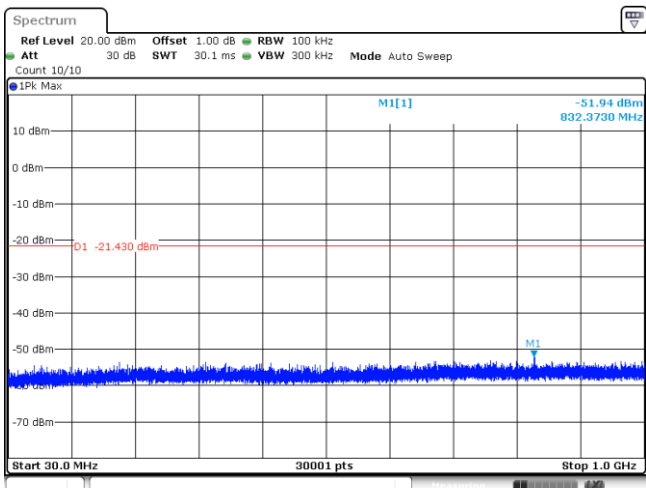
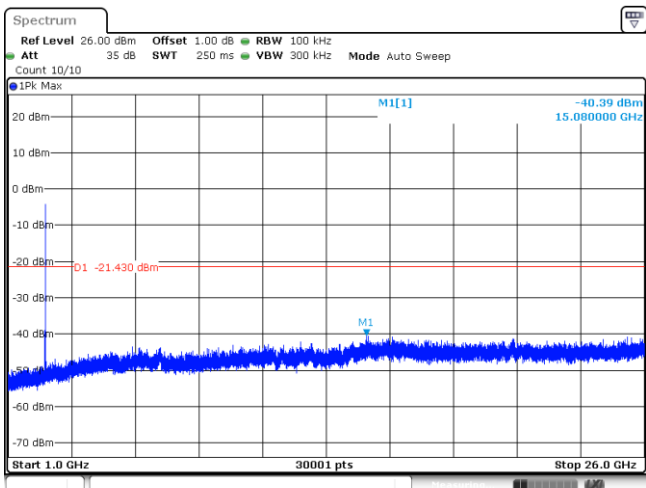
7.10.1 Conducted Emission Method

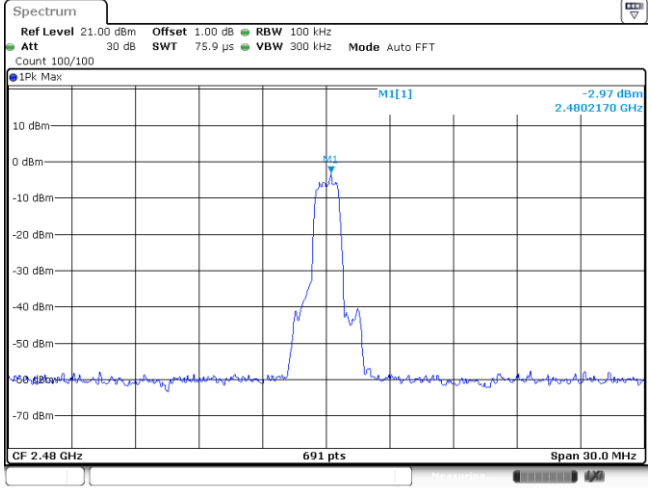
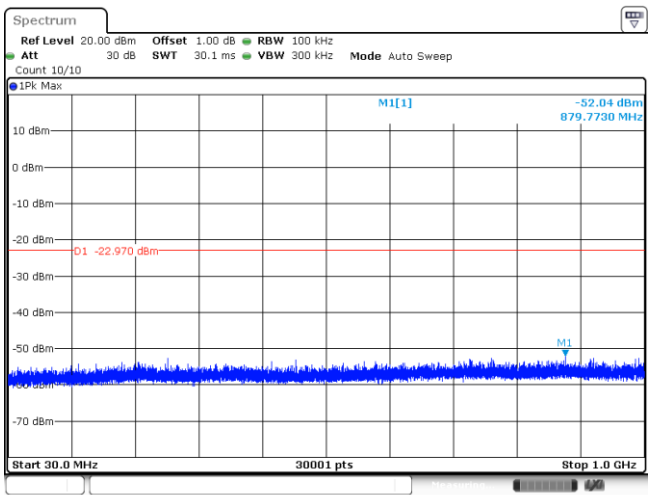
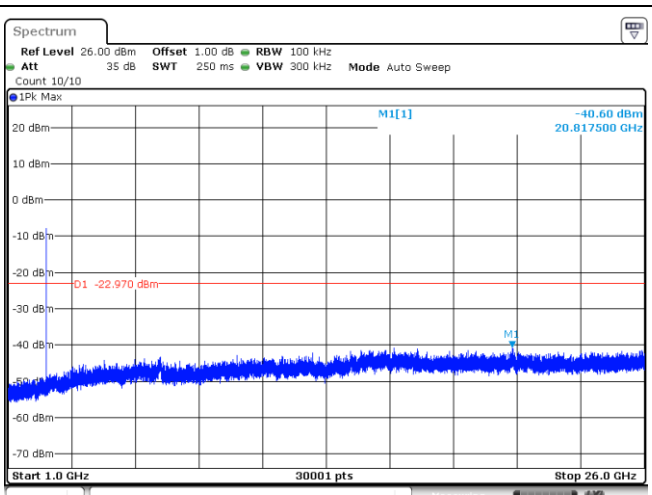
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below 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:	 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 two vertical legs. Below the table is a Ground Reference Plane, represented by a thick grey bar.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark:

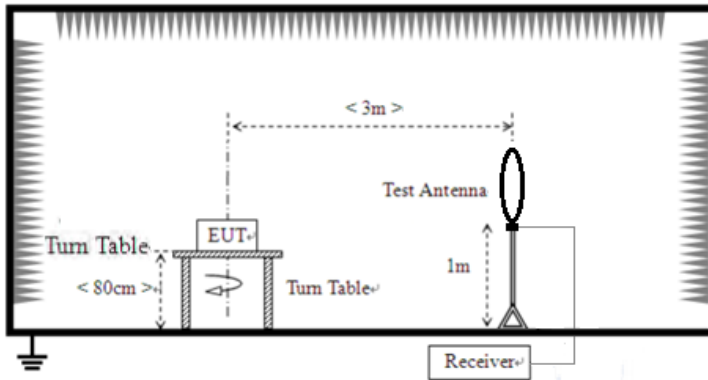
During the test, pre-scan the GFSK, $\pi/4$ -DQPSK, 8-DPSK modulation, and found the GFSK modulation which it is worse case.

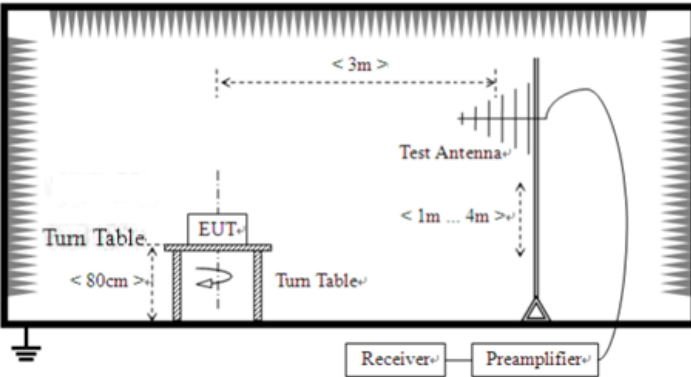
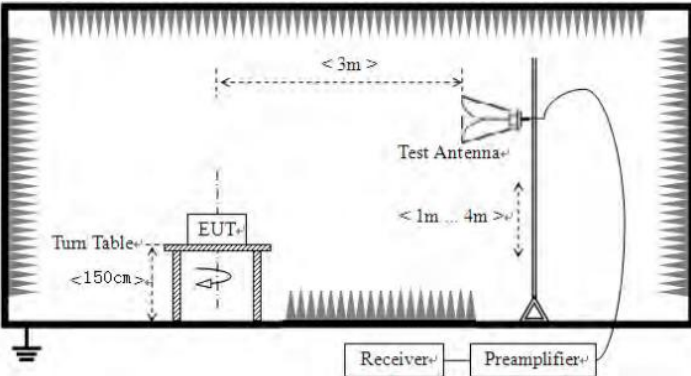
Test Item:	Spurious Emission	Modulation type:	8DPSK
Lowest Reference level	 CF 2.402 GHz 691 pts Span 30.0 MHz Date: 25/MAR/2020 16:20:47		
Lowest 30MHz~1000MHz	 Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 25/MAR/2020 16:21:03		
Lowest 1GHz~26GHz	 Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 25/MAR/2020 16:21:19		

Middle Reference level	 Date: 25/MAR/2020 16:24:15
Middle 30MHz~1000MHz	 Date: 25/MAR/2020 16:24:30
Middle 1GHz~26GHz	 Date: 25/MAR/2020 16:24:46

Highest Reference level	 CF 2.48 GHz 691 pts Span 30.0 MHz Date: 25/MAR/2020 16:28:10
Highest 30MHz~1000MHz	 Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 25/MAR/2020 16:28:26
Highest 1GHz~26GHz	 Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 25/MAR/2020 16:28:42

7.10.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz	2400/F(KHz)	QP	300m	
	0.490MHz-1.705MHz	24000/F(KHz)	QP	30m	
	1.705MHz-30MHz	30	QP	30m	
	30MHz-88MHz	100	QP	3m	
	88MHz-216MHz	150	QP		
	216MHz-960MHz	200	QP		
	960MHz-1GHz	500	QP		
	Above 1GHz	500	Average		
		5000	Peak		
Test setup:	For radiated emissions from 9kHz to 30MHz				
					

	For radiated emissions from 30MHz to 1GHz  For radiated emissions above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 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. 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. 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. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details

Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement data:*Remarks:*

1. During the test, pre-scan the GFSK, $\pi/4$ -DQPSK, 8-DPSK modulation, and found the 8DPSK modulation 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.

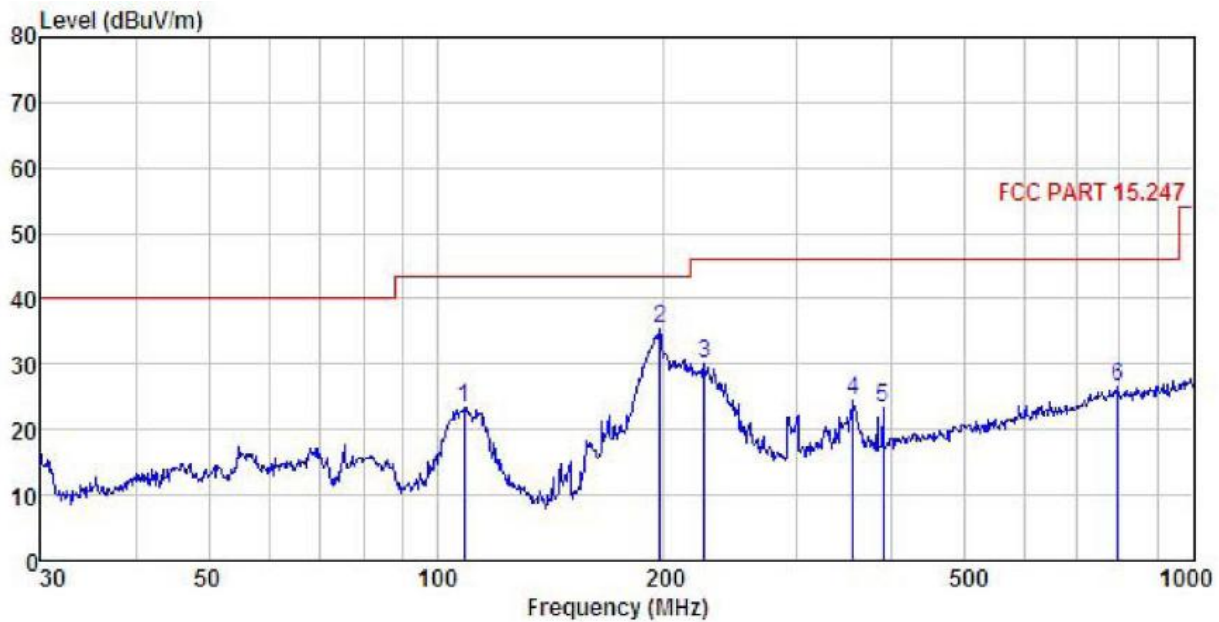
■ 9kHz~30MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

■ Below 1GHz

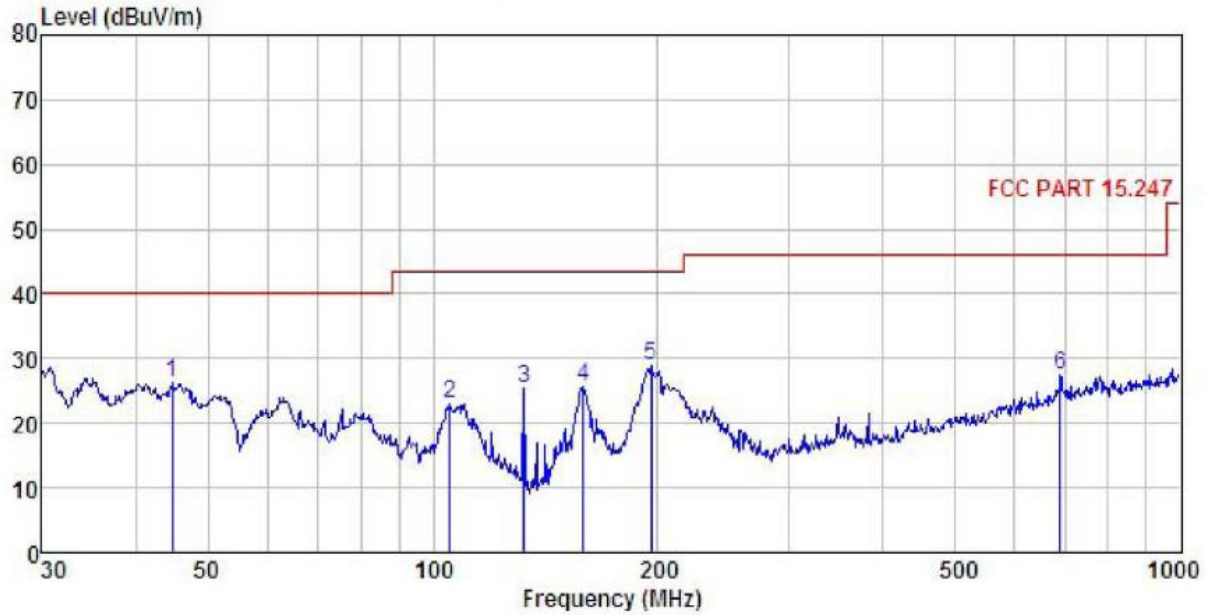
Pre-scan all test modes, found worst case at 8DPSK 2480MHz, and so only show the test result of 8DPSK 2480MHz

Horizontal:



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	108.647	38.69	12.22	2.03	29.47	23.47	43.50	-20.03	QP
2	197.200	49.89	11.42	2.85	28.85	35.31	43.50	-8.19	QP
3	226.099	43.37	12.49	2.84	28.67	30.03	46.00	-15.97	QP
4	355.427	35.20	14.70	3.10	28.58	24.42	46.00	-21.58	QP
5	389.355	33.51	15.32	3.08	28.73	23.18	46.00	-22.82	QP
6	793.396	29.47	21.00	4.35	28.23	26.59	46.00	-19.41	QP

Vertical:



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	44.743	41.08	13.66	1.28	29.86	26.16	40.00	-13.84	QP
2	105.272	38.52	12.02	2.00	29.49	23.05	43.50	-20.45	QP
3	132.221	43.70	8.56	2.32	29.32	25.26	43.50	-18.24	QP
4	158.668	43.31	9.04	2.57	29.14	25.78	43.50	-17.72	QP
5	195.822	43.48	11.38	2.84	28.86	28.84	43.50	-14.66	QP
6	689.565	32.15	19.80	4.11	28.69	27.37	46.00	-18.63	QP

■ Above 1GHz

Test channel:	Lowest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	36.05	31.78	8.60	32.09	44.34	74.00	-29.66	Vertical
7206.00	31.00	36.15	11.65	32.00	46.80	74.00	-27.20	Vertical
9608.00	30.73	37.95	14.14	31.62	51.20	74.00	-22.80	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	40.08	31.78	8.60	32.09	48.37	74.00	-25.63	Horizontal
7206.00	32.64	36.15	11.65	32.00	48.44	74.00	-25.56	Horizontal
9608.00	30.03	37.95	14.14	31.62	50.50	74.00	-23.50	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)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	25.10	31.78	8.60	32.09	33.39	54.00	-20.61	Vertical
7206.00	19.82	36.15	11.65	32.00	35.62	54.00	-18.38	Vertical
9608.00	18.98	37.95	14.14	31.62	39.45	54.00	-14.55	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	29.19	31.78	8.60	32.09	37.48	54.00	-16.52	Horizontal
7206.00	21.91	36.15	11.65	32.00	37.71	54.00	-16.29	Horizontal
9608.00	18.60	37.95	14.14	31.62	39.07	54.00	-14.93	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Middle channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	36.13	31.85	8.67	32.12	44.53	74.00	-29.47	Vertical
7323.00	31.05	36.37	11.72	31.89	47.25	74.00	-26.75	Vertical
9764.00	30.78	38.35	14.25	31.62	51.76	74.00	-22.24	Vertical
12205.00	*					74.00		Vertical
14646.00	*					74.00		Vertical
4882.00	40.18	31.85	8.67	32.12	48.58	74.00	-25.42	Horizontal
7323.00	32.70	36.37	11.72	31.89	48.90	74.00	-25.10	Horizontal
9764.00	30.09	38.35	14.25	31.62	51.07	74.00	-22.93	Horizontal
12205.00	*					74.00		Horizontal
14646.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	25.18	31.85	8.67	32.12	33.58	54.00	-20.42	Vertical
7323.00	19.88	36.37	11.72	31.89	36.08	54.00	-17.92	Vertical
9764.00	19.03	38.35	14.25	31.62	40.01	54.00	-13.99	Vertical
12205.00	*					54.00		Vertical
14646.00	*					54.00		Vertical
4882.00	29.27	31.85	8.67	32.12	37.67	54.00	-16.33	Horizontal
7323.00	21.97	36.37	11.72	31.89	38.17	54.00	-15.83	Horizontal
9764.00	18.66	38.35	14.25	31.62	39.64	54.00	-14.36	Horizontal
12205.00	*					54.00		Horizontal
14646.00	*					54.00		Horizontal

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Highest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	35.96	31.93	8.73	32.16	44.46	74.00	-29.54	Vertical
7440.00	30.94	36.59	11.79	31.78	47.54	74.00	-26.46	Vertical
9920.00	30.67	38.81	14.38	31.88	51.98	74.00	-22.02	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	39.97	31.93	8.73	32.16	48.47	74.00	-25.53	Horizontal
7440.00	32.57	36.59	11.79	31.78	49.17	74.00	-24.83	Horizontal
9920.00	29.97	38.81	14.38	31.88	51.28	74.00	-22.72	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)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	25.07	31.93	8.73	32.16	33.57	54.00	-20.43	Vertical
7440.00	19.81	36.59	11.79	31.78	36.41	54.00	-17.59	Vertical
9920.00	18.96	38.81	14.38	31.88	40.27	54.00	-13.73	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	29.16	31.93	8.73	32.16	37.66	54.00	-16.34	Horizontal
7440.00	21.90	36.59	11.79	31.78	38.50	54.00	-15.50	Horizontal
9920.00	18.59	38.81	14.38	31.88	39.90	54.00	-14.10	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “*”, means this data is too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. The test data shows only the worst case GFSK mode

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----