FCC TEST REPORT

FCC ID: 2AK4R-NEON808

Product Name	:	BLUETOOTH SPEAKER
Model Name	:	Neon808 (Please refer to the model list on P7)
Brand Name	:	Ridgeway
Report No.	:	PTCDQ03170751801-FC01

Prepared for

RIDER BEST.INC

428 SOUTH 9TH AVE,CITY OF INDUSTRY CA 91746 USA Minor Outlying Islands

Prepared by

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming Community,
Dongcheng District, Dongguan, Guangdong, China

1TEST RESULT CERTIFICATION

Applicant's name	:	RIDER BEST.INC
Address	:	428 SOUTH 9TH AVE,CITY OF INDUSTRY CA 91746 USA Minor Outlying Islands
Manufacture's name	:	DONGGUGAN FALAOU ELECTRICAL APPLIANCES CO.,LTD
Address	:	No.46, HuaBu Tang, ChangAnTang Village, DongKeng Town, DongGuan City, GuangDong Province, China
Product name	:	BLUETOOTH SPEAKER
Model name	:	Neon808 (Please refer to the model list on P7)
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013
Test Date	:	July 01, 2017 to July 11, 2017
Date of Issue	:	July 12, 2017
Test Result	:	Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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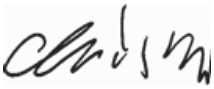
Testing Engineer

August Qiu

Authorized Signatory

Chris Du



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2 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
Conduct Emission	15.207	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable

3 General Information

3.1 General Description of E.U.T.

Product Name	:	BLUETOOTH SPEAKER
Model Name	:	Neon808 (Please refer to the model list on P7)
Bluetooth Version	:	BT2.1+EDR
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	79 channels
Antenna Type	:	Inverse F antenna
Antenna Gain	:	2.1dBi
Type of Modulation	:	GFSK, π/4DQPSK, 8DPSK
Power supply for Test	:	AC 100-240V, 60Hz

3.2 Model List

Neon880	Neon1280	Laser880	QS-870	QS-1270	Band655	BS-6530
Neon881	Neon1281	Laser881	QS-871	QS-1271	Band656	BS-6531
Neon882	Neon1282	Laser882	QS-872	QS-1272	Band657	BS-6532
Neon883	Neon1283	Laser883	QS-873	QS-1273	Band658	BS-6533
Neon885	Neon1285	Laser885	QS-875	QS-1275	Band659	QS-6530
Neon886	Neon1286	Laser886	QS-876	QS-1276	Disco655	QS-6531
Neon887	Neon1287	Laser887	QS-877	QS-1277	Disco656	QS-6532
Neon888	Neon1288	Laser888	QS-878	QS-1278	Disco657	QS-6533
Neon889	Neon1289	Laser889	QS-879	QS-1279	Disco658	QS-6535
Neon890	Neon1290	Laser890	QS-880	QS-1280	Disco659	QS-6536
Neon891	Neon1291	Laser891	QS-881	QS-1281	Laser808	
Neon892	Neon1292	Laser892	QS-882	QS-1282	FS-LG01	
Neon893	Neon1293	Laser893	QS-883	QS-1283	FS-LG02	
Neon1080	Neon1580	Laser1080	QS-1071	QS-1570	FS-LG03	
Neon1081	Neon1581	Laser1081	QS-1072	QS-1571	FS-LG04	
Neon1082	Neon1582	Laser1082	QS-1073	QS-1572	FS-LG05	
Neon1083	Neon1583	Laser1083	QS-1075	QS-1573	FS-LG06	
Neon1085	Neon1585	Laser1085	QS-1076	QS-1575	FS-LG07	
Neon1086	Neon1586	Laser1086	QS-1077	QS-1576	FS-LG08	
Neon1087	Neon1587	Laser1087	QS-1078	QS-1577	FS-LG09	
Neon1088	Neon1588	Laser1088	QS-1079	QS-1578	FS-LG10	
Neon1089	Neon1589	Laser1089	QS-1080	QS-1579	FS-LG11	
Neon1090	Neon1590	Laser1090	QS-1081	QS-1580	FS-LG12	
Neon1091	Neon1591	Laser1091	QS-1082	QS-1581	FS-LG13	
Neon1092	Neon1592	Laser1092	QS-1083	QS-1582	FS-LG14	
Neon1093	Neon1593	Laser1093	QS-1085	QS-1583	FS-LG15	

Note: These models are identical, and all models have the same RF module and Antenna, except for decorative parts in front panels, color of enclosure, and model no. for trading purpose.

3.3 Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	-	-

3.4 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	**Low channel**	**Middle channel**	**High channel**
Transmitting	2402MHz	2441MHz	2480MHz
Hopping	2402-2480MHz		
Tests Carried Out Under FCC part 15.207			
Test Item	Test Mode		
Conduction Emission, 0.15MHz to 30MHz	BT Communication		

4 Equipment During Test

4.1 Equipments List

RF Conducted Test							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	July 16, 2017	July 15, 2018	1 year
2	EXA Signal Analyzer	Keysight	N9010A	MY50520207 526B25MPB W7X	July 16, 2017	July 15, 2018	1 year
3	EMI Test Receiver	R&S	ESCI	101155	July 16, 2017	July 15, 2018	1 year
4	Humidity Chamber	GF	GTH-225-40-1P	IAA061225	July 16, 2017	July 15, 2018	1 year
5	USB RF power sensor	DARE	RPR3006W	15I00041SNO 01	July 16, 2017	July 15, 2018	1 year
Radiated Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde&Schwarz	ESCI	101417	July 16, 2017	July 15, 2018	1 year
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	July 16, 2017	July 15, 2018	1 year
3	Amplifier	EM	EM-30180	060538	July 16, 2017	July 15, 2018	1 year
4	Horn Antenna	SCHWARZBECK	BBHA9120D	1246	July 16, 2017	July 15, 2018	1 year
5	Horn Antenna	SCHWARZBECK	BBHA9170D	1412	July 16, 2017	July 15, 2018	1 year
6	Coaxial Cable(below 1GHz)	LARGE	CALB1	-	July 16, 2017	July 15, 2018	1 year
7	Coaxial Cable(above 1GHz)	LARGE	CALB2	-	July 16, 2017	July 15, 2018	1 year

Conducted Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	R&S	ESCI	101155	July 16, 2017	July 15, 2018	1 year
2	LISN	SCHWARZBECK	NSLK 8128	8128-289	July 16, 2017	July 15, 2018	1 year
3	Cable	LARGE	RF300	-	July 16, 2017	July 15, 2018	1 year

4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

5 Conducted Emission

Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207
Test Method:	:	ANSI C63.10:2013
Test Result:	:	PASS
Frequency Range:	:	150kHz to 30MHz
Class/Severity:	:	Class B
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

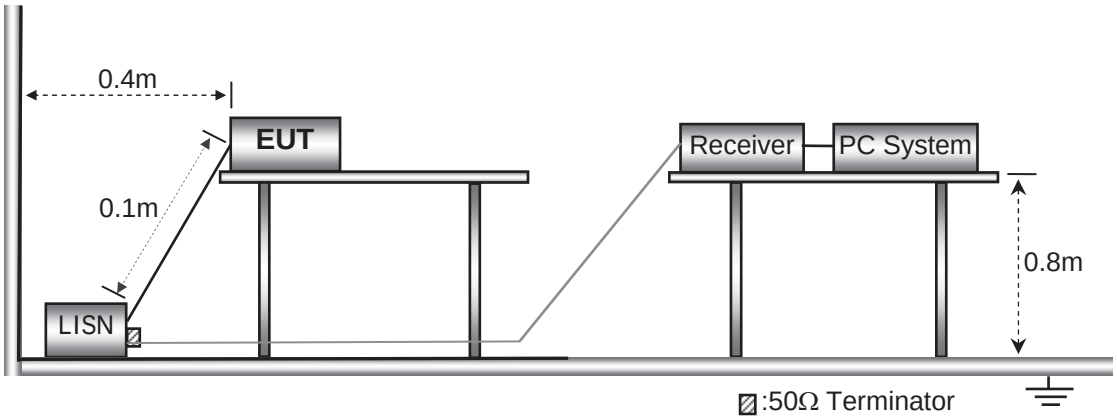
5.1 E.U.T. Operation

Operating Environment **:**

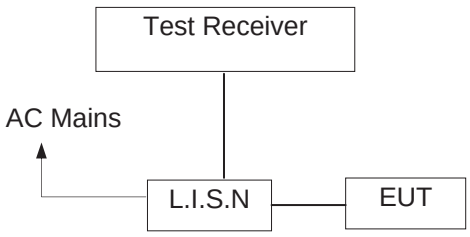
Temperature:	:	25.5 °C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.2kPa
EUT Operation **:**	:	Refer to section 3.3

5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10: 2013..



5.3 Test SET-UP (Block Diagram of Configuration)



5.4 Measurement Procedure:

1. The EUT was placed on a table, which is 0.1 m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

5.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

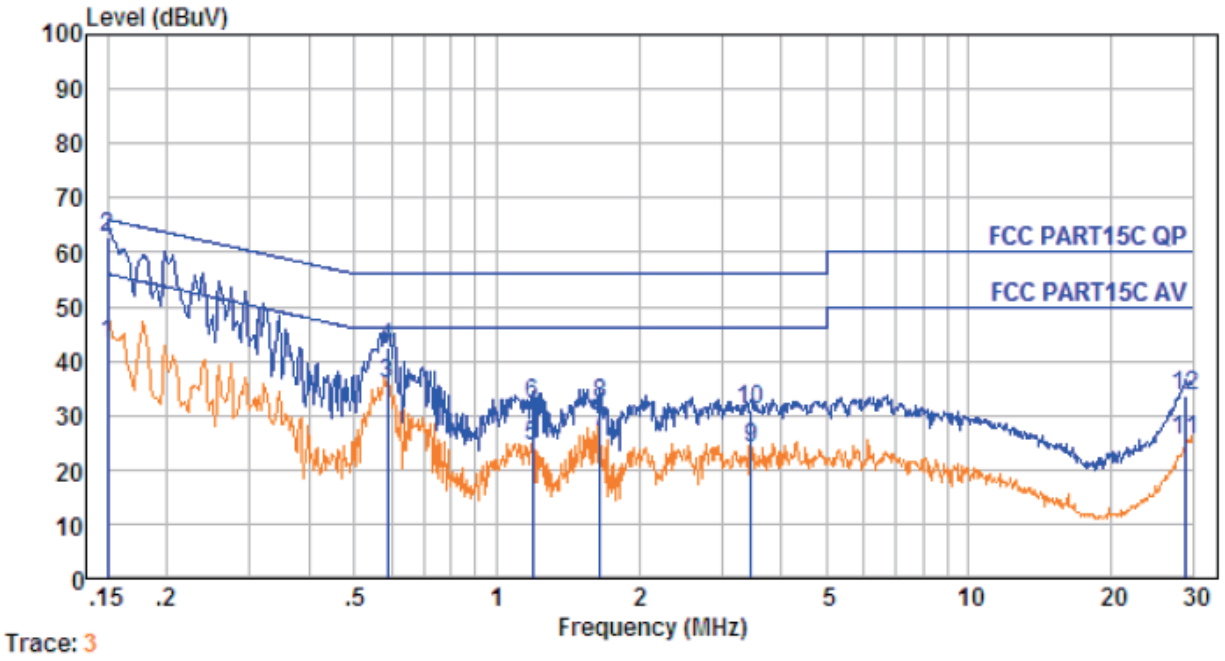
Note:
1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

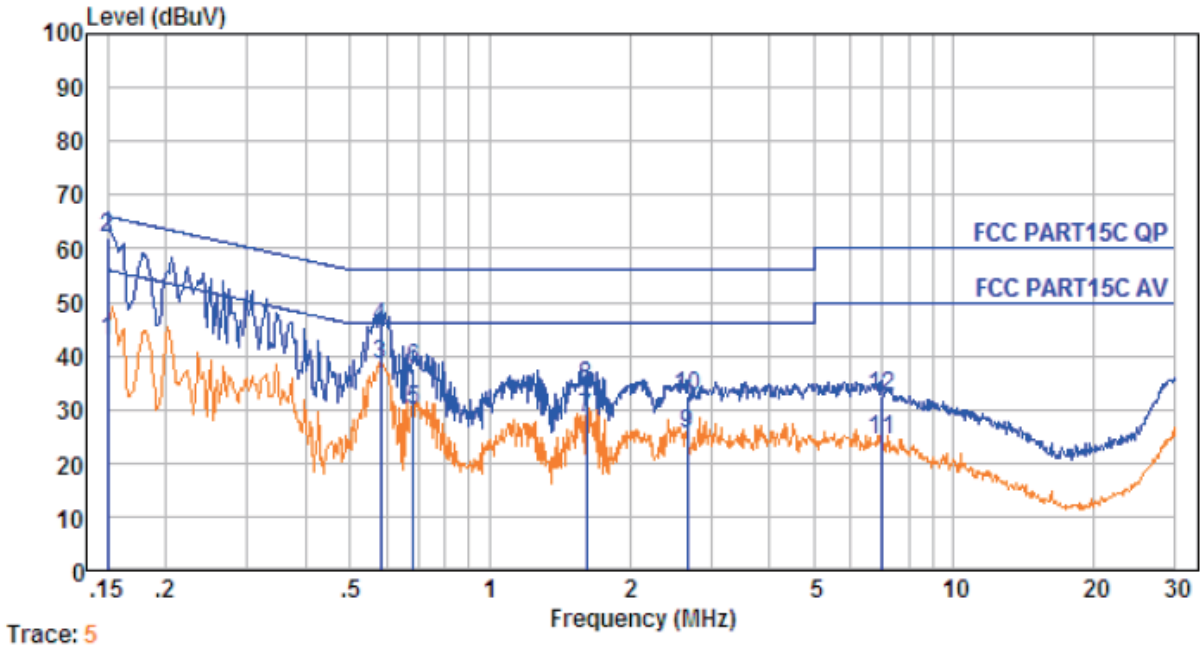
5.7 Conducted Emission Test Result

Line-120V:



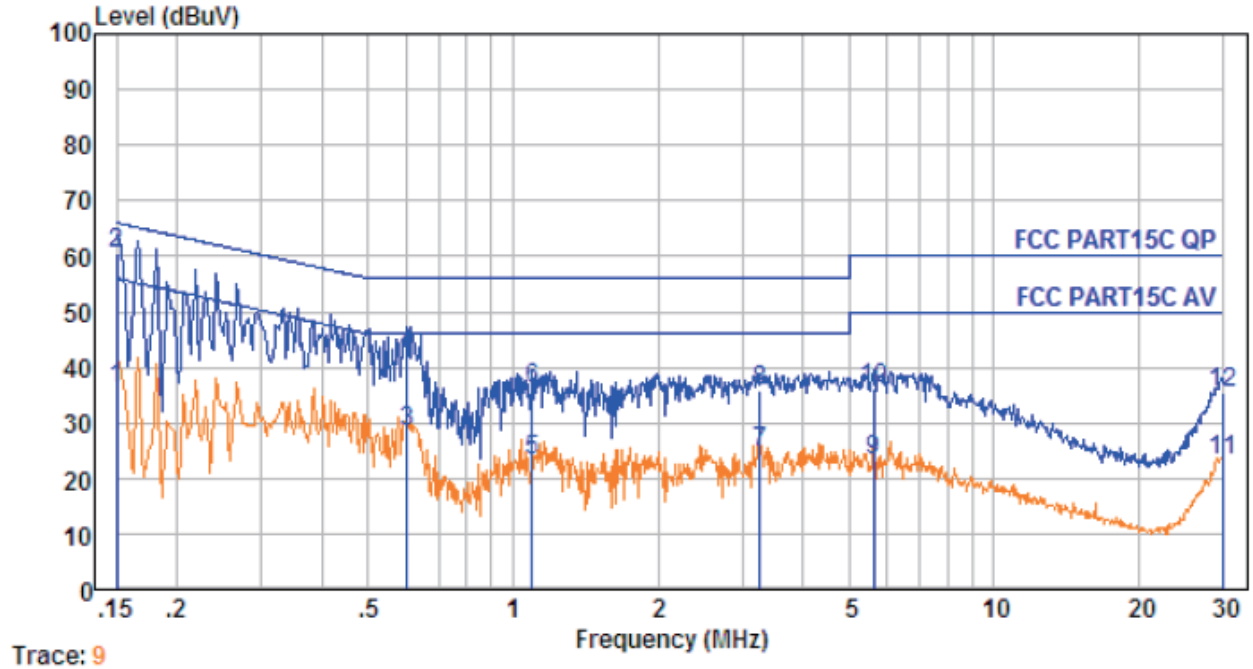
No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	31.80	43.00	56.00	-13.00	Average
2.	0.150	10.60	0.60	51.70	62.90	66.00	-3.10	QP
3.	0.589	10.66	0.60	24.35	35.61	46.00	-10.39	Average
4.	0.589	10.66	0.60	31.35	42.61	56.00	-13.39	QP
5.	1.191	10.68	0.60	13.00	24.28	46.00	-21.72	Average
6.	1.191	10.68	0.60	21.00	32.28	56.00	-23.72	QP
7.	1.654	10.69	0.60	15.67	26.96	46.00	-19.04	Average
8.	1.654	10.69	0.60	20.67	31.96	56.00	-24.04	QP
9.	3.454	10.72	0.60	12.65	23.97	46.00	-22.03	Average
10.	3.454	10.72	0.60	19.65	30.97	56.00	-25.03	QP
11.	28.908	10.80	0.60	14.02	25.42	50.00	-24.58	Average
12.	28.908	10.80	0.60	22.02	33.42	60.00	-26.58	QP

Neutral-120V:



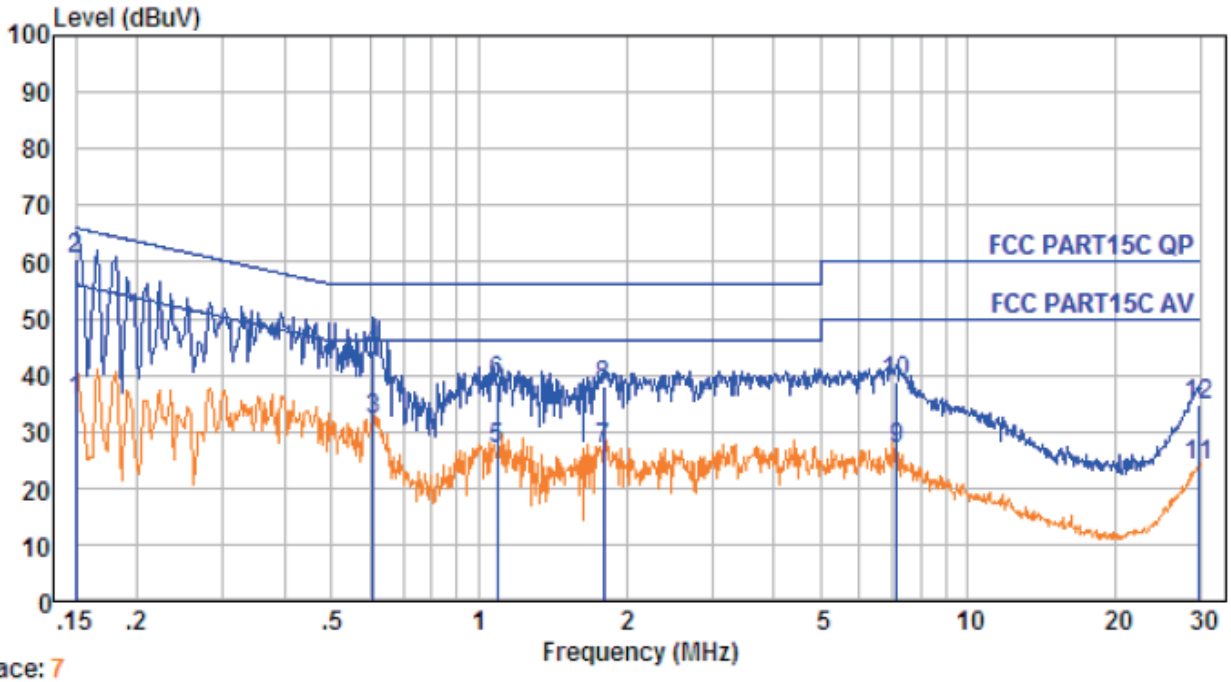
No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	31.50	42.70	56.00	-13.30	Average
2.	0.150	10.60	0.60	50.80	62.00	66.00	-4.00	QP
3.	0.582	10.66	0.60	27.26	38.52	46.00	-7.48	Average
4.	0.582	10.66	0.60	34.26	45.52	56.00	-10.48	QP
5.	0.683	10.66	0.60	18.55	29.81	46.00	-16.19	Average
6.	0.683	10.66	0.60	26.55	37.81	56.00	-18.19	QP
7.	1.619	10.69	0.60	17.11	28.40	46.00	-17.60	Average
8.	1.619	10.69	0.60	23.11	34.40	56.00	-21.60	QP
9.	2.664	10.71	0.60	14.08	25.39	46.00	-20.61	Average
10.	2.664	10.71	0.60	21.08	32.39	56.00	-23.61	QP
11.	6.988	10.75	0.60	13.17	24.52	50.00	-25.48	Average
12.	6.988	10.75	0.60	21.17	32.52	60.00	-27.48	QP

Line -240V:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	29.67	40.87	56.00	-15.13	Average
2.	0.150	10.60	0.60	50.67	61.87	66.00	-4.13	QP
3.	0.166	10.60	0.60	27.55	38.75	55.16	-16.41	Average
4.	0.166	10.60	0.60	49.55	60.75	65.16	-4.41	QP
5.	0.182	10.61	0.60	26.22	37.43	54.42	-16.99	Average
6.	0.182	10.61	0.60	48.22	59.43	64.42	-4.99	QP
7.	0.601	10.66	0.60	19.04	30.30	46.00	-15.70	Average
8.	0.601	10.66	0.60	34.04	45.30	56.00	-10.70	QP
9.	5.623	10.74	0.60	11.00	22.34	50.00	-27.66	Average
10.	5.623	10.74	0.60	25.00	36.34	60.00	-23.66	QP
11.	30.000	10.80	0.60	12.92	24.32	50.00	-25.68	Average
12.	30.000	10.80	0.60	24.92	36.32	60.00	-23.68	QP

Neutral -240V:



Trace: 7

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	24.40	35.60	56.00	-20.40	Average
2.	0.150	10.60	0.60	49.20	60.40	66.00	-5.60	QP
3.	0.608	10.66	0.60	20.98	32.24	46.00	-13.76	Average
4.	0.608	10.66	0.60	32.98	44.24	56.00	-11.76	QP
5.	1.088	10.68	0.60	15.57	26.85	46.00	-19.15	Average
6.	1.088	10.68	0.60	27.57	38.85	56.00	-17.15	QP
7.	1.800	10.69	0.60	15.69	26.98	46.00	-19.02	Average
8.	1.800	10.69	0.60	26.69	37.98	56.00	-18.02	QP
9.	7.137	10.75	0.60	15.46	26.81	50.00	-23.19	Average
10.	7.137	10.75	0.60	27.46	38.81	60.00	-21.19	QP
11.	29.527	10.80	0.60	12.44	23.84	50.00	-26.16	Average
12.	29.527	10.80	0.60	23.44	34.84	60.00	-25.16	QP

6 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: : ANSI C63.10:2013

Test Result: : PASS

Measurement Distance: : 3m

Limit: : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

6.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

Humidity: : 51.1 % RH

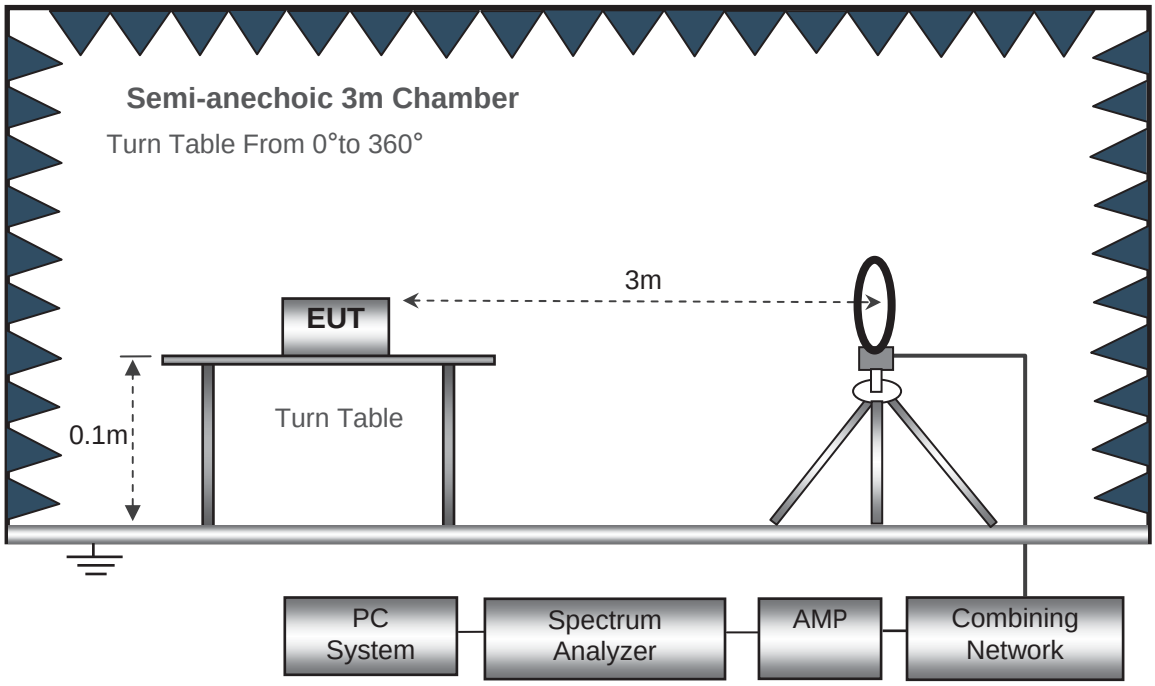
Atmospheric Pressure: : 101.2kPa

EUT Operation : : Refer to section 3.3

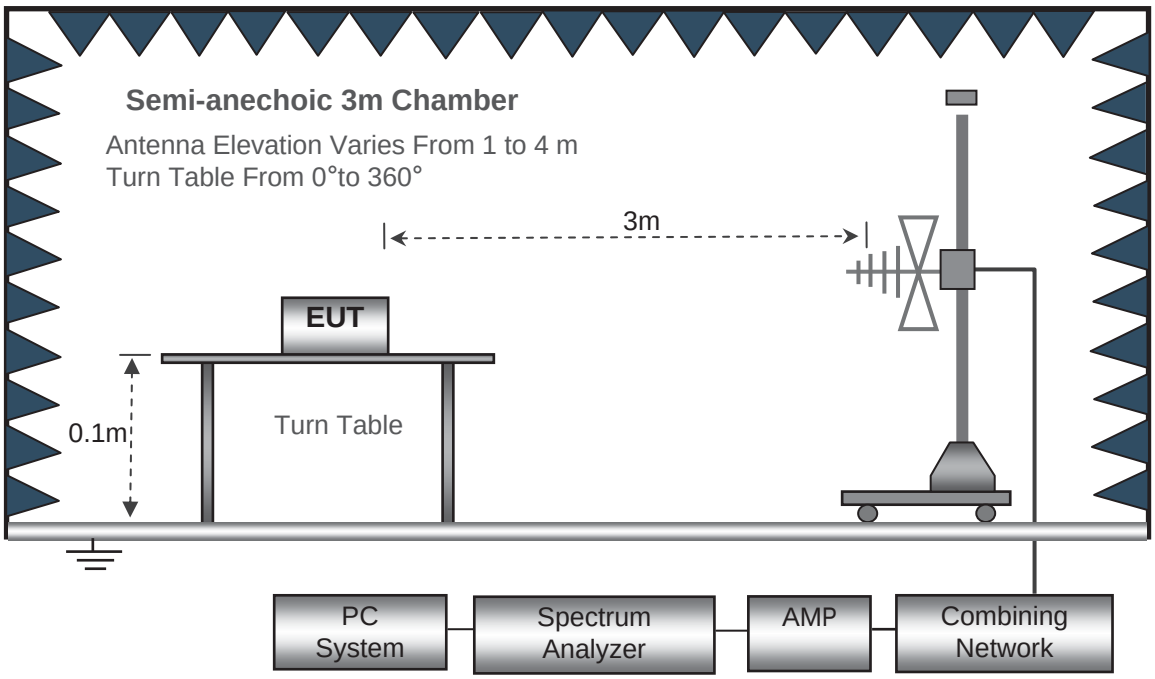
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

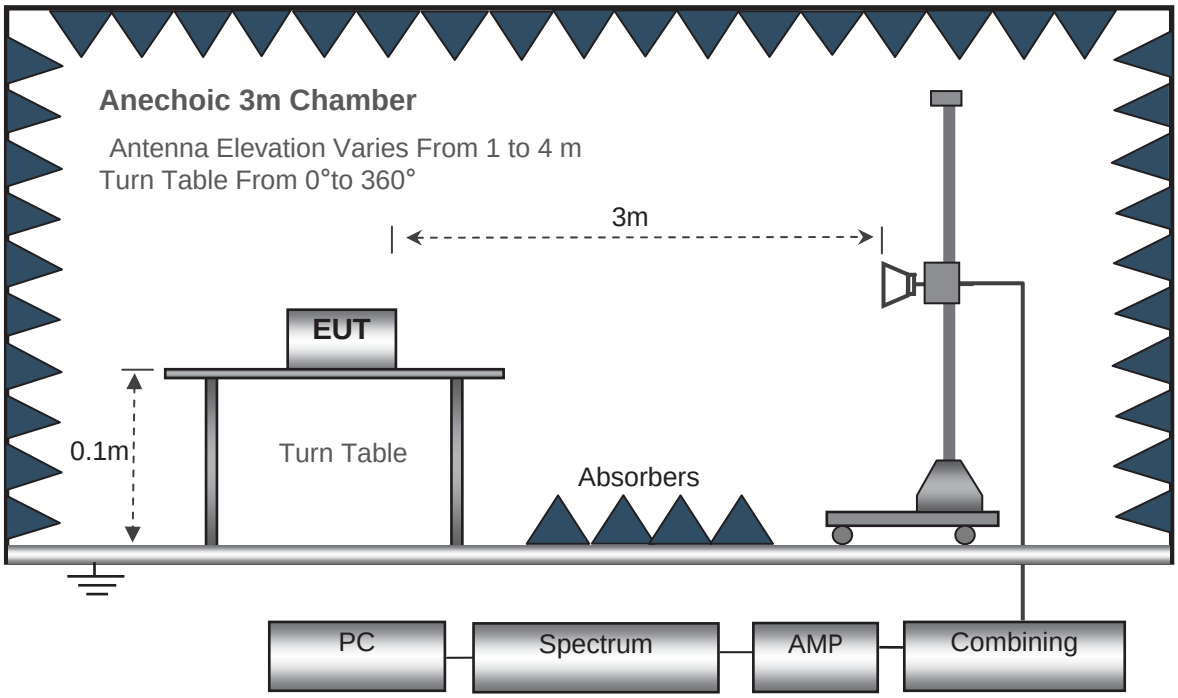
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



6.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

6.4 Test Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.1m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 0.1m above ground plane.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. In the frequency above 1GHz, Place the measurement antenna 3m away from the EUT for each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6. Repeat above procedures until the measurements for all frequencies are complete.

6.5 Summary of Test Results

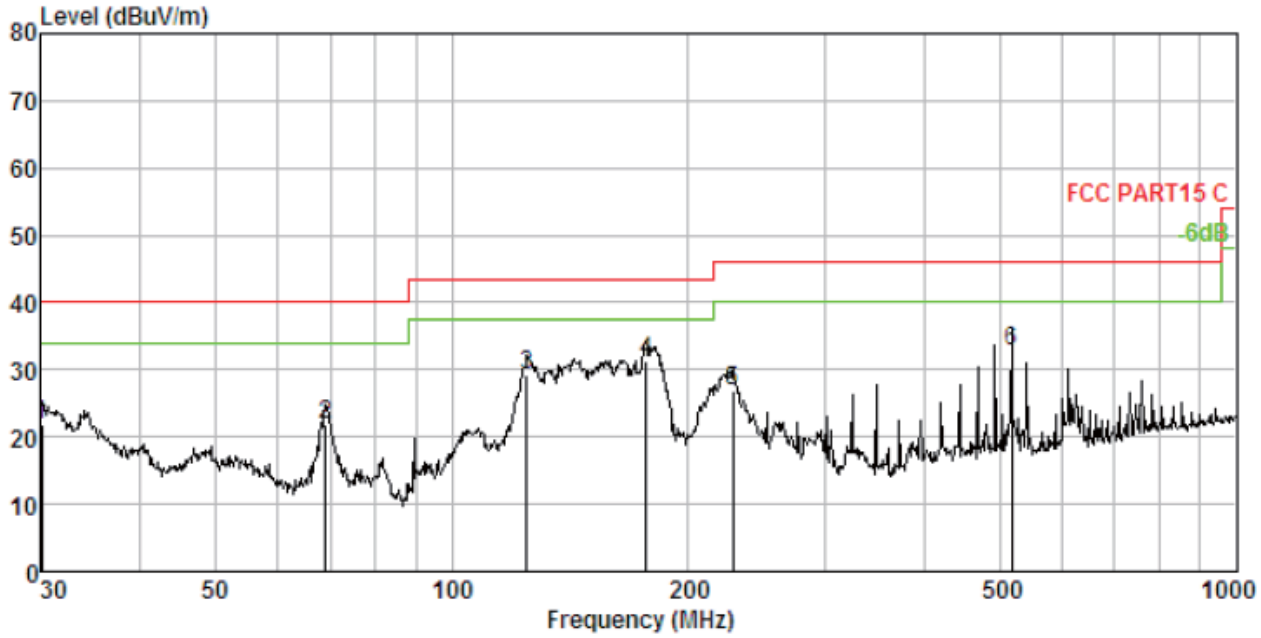
Test Frequency: Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 1GHz

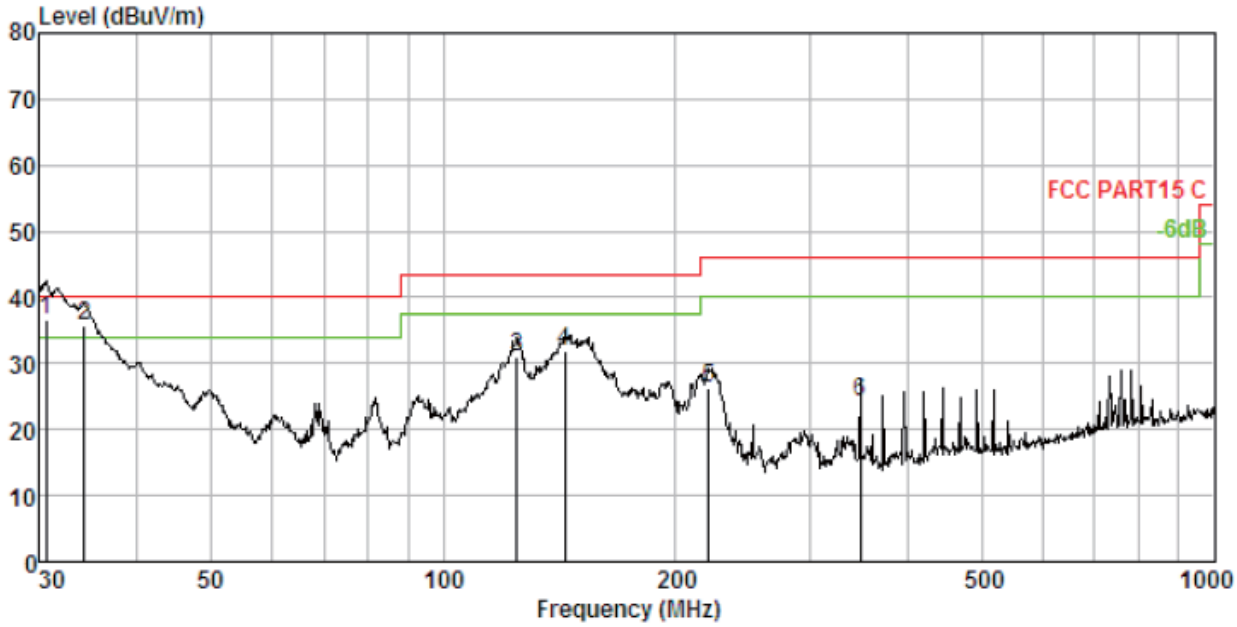
Remark: only the worst data(GFSK modulation mode) were reported.

Test Plot : Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	30.000	1.06	13.24	37.62	29.97	21.95	40.00	-18.05	QP
2.	69.114	1.81	10.31	40.06	30.26	21.92	40.00	-18.08	QP
3.	124.569	2.34	12.31	44.96	30.47	29.14	43.50	-14.36	QP
4.	176.888	2.66	12.71	46.37	30.59	31.15	43.50	-12.35	QP
5.	228.490	2.89	11.17	43.63	30.68	27.01	46.00	-18.99	QP
6.	517.248	3.63	17.29	42.92	30.96	32.88	46.00	-13.12	QP

Test plot : Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	30.531	1.07	13.24	52.40	29.98	36.73	40.00	-3.27	QP
2.	34.276	1.18	13.35	51.33	30.02	35.84	40.00	-4.16	QP
3.	124.569	2.34	12.31	46.80	30.47	30.98	43.50	-12.52	QP
4.	143.830	2.47	13.57	46.27	30.52	31.79	43.50	-11.71	QP
5.	221.392	2.86	10.83	43.26	30.67	26.28	46.00	-19.72	QP
6.	348.027	3.27	14.21	37.66	30.82	24.32	46.00	-21.68	QP

Above 1000MHz:

GFSK Low Channel (2402MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4804	30.33	AV	V	28.56	4.23	27.46	35.66	54	-18.34
4804	35.05	AV	H	28.56	4.23	27.46	40.38	54	-13.62
4804	34.16	PK	V	28.56	4.23	27.46	39.49	74	-34.51
4804	34.28	PK	H	28.56	4.23	27.46	39.61	74	-34.39
17805	26.28	AV	V	31.06	6.18	26.53	36.99	54	-17.01
17805	25.48	AV	H	31.06	6.18	26.53	36.19	54	-17.81
17805	32.14	PK	V	31.06	6.18	26.53	42.85	74	-31.15
17805	33.09	PK	H	31.06	6.18	26.53	43.8	74	-30.2

GFSK Middle Channel (2441MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4882	31	AV	V	29.43	5.96	29.46	36.93	54	-17.07
4882	30.59	AV	H	29.43	5.96	29.46	36.52	54	-17.48
4882	34.82	PK	V	29.43	5.96	29.46	40.75	74	-33.25
4882	36.12	PK	H	29.43	5.96	29.46	42.05	74	-31.95
17806	26.28	AV	V	31.06	6.83	32.14	32.03	54	-21.97
17806	25.06	AV	H	31.06	6.83	32.14	30.81	54	-23.19
17806	28.72	PK	V	31.06	6.83	32.14	34.47	74	-39.53
17806	27.46	PK	H	31.06	6.83	32.14	33.21	74	-40.79

GFSK High Channel (2480MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4960	31.25	AV	V	24.82	2.93	23.45	35.55	54	-18.45
4960	30.49	AV	H	24.82	2.93	23.45	34.79	54	-19.21
4960	29.86	PK	V	24.82	2.93	23.45	34.16	74	-39.84
4960	28.45	PK	H	24.82	2.93	23.45	32.75	74	-41.25
17808	26.33	AV	V	33.27	3.85	28.75	34.7	54	-19.3
17808	27.04	AV	H	33.27	3.85	28.75	35.41	54	-18.59
17808	32.16	PK	V	33.27	3.85	28.75	40.53	74	-33.47
17808	31.46	PK	H	33.27	3.85	28.75	39.83	74	-34.17

π/4-DQPSK Low Channel (2402MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4804	29.86	AV	V	27.86	5.53	26.96	36.29	54	-17.71
4804	33.24	AV	H	27.86	5.53	26.96	39.67	54	-14.33
4804	32.05	PK	V	27.86	5.53	26.96	38.48	74	-35.52
4804	31.69	PK	H	27.86	5.53	26.96	38.12	74	-35.88
17809	27.43	AV	V	30.46	7.05	25.73	39.21	54	-14.79
17809	28.66	AV	H	30.46	7.05	25.73	40.44	54	-13.56
17809	29.15	PK	V	30.46	7.05	25.73	40.93	74	-33.07
17809	30.46	PK	H	30.46	7.05	25.73	42.24	74	-31.76

π/4-DQPSK Middle Channel (2441MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4882	32.66	AV	V	28.72	5.43	30.42	36.39	54	-17.61
4882	31.25	AV	H	28.72	5.43	30.42	34.98	54	-19.02
4882	30.29	PK	V	28.72	5.43	30.42	34.02	74	-39.98
4882	29.46	PK	H	28.72	5.43	30.42	33.19	74	-40.81
17800	33.04	AV	V	30.22	5.83	31.26	37.83	54	-16.17
17800	32.16	AV	H	30.22	5.83	31.26	36.95	54	-17.05
17800	31.42	PK	V	30.22	5.83	31.26	36.21	74	-37.79
17800	30.26	PK	H	30.22	5.83	31.26	35.05	74	-38.95

π/4-DQPSK High Channel (2480MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4960	30.26	AV	V	23.05	2.96	22.49	33.78	54	-20.22
4960	29.43	AV	H	23.05	2.96	22.49	32.95	54	-21.05
4960	28.04	PK	V	23.05	2.96	22.49	31.56	74	-42.44
4960	27.66	PK	H	23.05	2.96	22.49	31.18	74	-42.82
17825	30.26	AV	V	31.63	3.24	25.73	39.4	54	-14.6
17825	31.46	AV	H	31.63	3.24	25.73	40.6	54	-13.4
17825	28.49	PK	V	31.63	3.24	25.73	37.63	74	-36.37
17825	35.05	PK	H	31.63	3.24	25.73	44.19	74	-29.81

8DPSK Low Channel (2402MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4804	30.22	AV	V	29.63	4.69	27.83	36.71	54	-17.29
4804	31.24	AV	H	29.63	4.69	27.83	37.73	54	-16.27
4804	29.52	PK	V	29.63	4.69	27.83	36.01	74	-37.99
4804	28.41	PK	H	29.63	4.69	27.83	34.9	74	-39.1
17804	29.62	AV	V	31.04	6.72	26.96	40.42	54	-13.58
17804	28.46	AV	H	31.04	6.72	26.96	39.26	54	-14.74
17804	30.66	PK	V	31.04	6.72	26.96	41.46	74	-32.54
17804	32.04	PK	H	31.04	6.72	26.96	42.84	74	-31.16

8DPSK Middle Channel (2441MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4882	30.33	AV	V	29.63	4.72	29.68	35	54	-19
4882	30.15	AV	H	29.63	4.72	29.68	34.82	54	-19.18
4882	29.68	PK	V	29.63	4.72	29.68	34.35	74	-39.65
4882	28.42	PK	H	29.63	4.72	29.68	33.09	74	-40.91
17809	31.06	AV	V	31.25	6.29	30.18	38.42	54	-15.58
17809	32.45	AV	H	31.25	6.29	30.18	39.81	54	-14.19
17809	30.69	PK	V	31.25	6.29	30.18	38.05	74	-35.95
17809	29.59	PK	H	31.25	6.29	30.18	36.95	74	-37.05

8DPSK High Channel (2480MHz)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4960	31	AV	V	25.85	5.72	25.04	37.53	54	-16.47
4960	32.26	AV	H	25.85	5.72	25.04	38.79	54	-15.21
4960	29.46	PK	V	25.85	5.72	25.04	35.99	74	-38.01
4960	28.05	PK	H	25.85	5.72	25.04	34.58	74	-39.42
17843	31.26	AV	V	30.44	4.86	26.69	39.87	54	-14.13
17843	30.69	AV	H	30.44	4.86	26.69	39.3	54	-14.7
17843	29.75	PK	V	30.44	4.86	26.69	38.36	74	-35.64
17843	28.68	PK	H	30.44	4.86	26.69	37.29	74	-36.71

Radiated band edge:

GFSK

Frequency	S.A Reading	Pol.	Ant. Factor	Cable Loss	Pre-Amp. Gain	Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
(MHz)	(dBuV)	(H/V)	(dB/m)	(dB)	(dB)	PK	AV	PK	AV	PK	AV
2398.66	42.26	V	30.59	7.04	22.69	57.2	43.06	74	54	-16.8	-10.94
2399.61	40.69	H	30.59	7.04	22.69	55.63	41.58	74	54	-18.37	-12.42
2484.56	41.95	V	30.59	7.04	22.69	56.89	42.15	74	54	-17.11	-11.85
2484.12	39.56	H	30.59	7.04	22.69	54.5	39.45	74	54	-19.5	-14.55

π/4-DQPSK

Frequency	S.A Reading	Pol.	Ant. Factor	Cable Loss	Pre-Amp. Gain	Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
(MHz)	(dBuV)	(H/V)	(dB/m)	(dB)	(dB)	PK	AV	PK	AV	PK	AV
2398.66	41.22	V	30.59	7.04	22.69	56.16	40.22	74	54	-17.84	-13.78
2399.61	40.65	H	30.59	7.04	22.69	55.59	40.62	74	54	-18.41	-13.38
2484.56	42.84	V	30.59	7.04	22.69	57.78	39.46	74	54	-16.22	-14.54
2484.12	43.18	H	30.59	7.04	22.69	58.12	38.42	74	54	-15.88	-15.58

8DPSK

Frequency	S.A Reading	Pol.	Ant. Factor	Cable Loss	Pre-Amp. Gain	Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
(MHz)	(dBuV)	(H/V)	(dB/m)	(dB)	(dB)	PK	AV	PK	AV	PK	AV
2398.74	44.25	V	30.59	7.04	22.69	59.19	39.52	74	54	-14.81	-14.48
2399.05	43.15	H	30.59	7.04	22.69	58.09	40.22	74	54	-15.91	-13.78
2483.95	42.19	V	30.59	7.04	22.69	57.13	39.7	74	54	-16.87	-14.3
2484.13	42.08	H	30.59	7.04	22.69	57.02	38.16	74	54	-16.98	-15.84

Note: 1. The testing has been conformed to 10*2480MHz=24800MHz.
2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Emission Level = Reading + Factor
Margin=Emission Level-Limit

7 CONDUCTED SPURIOUS AND BAND EDGE EMISSION

7.1 REQUIREMENT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

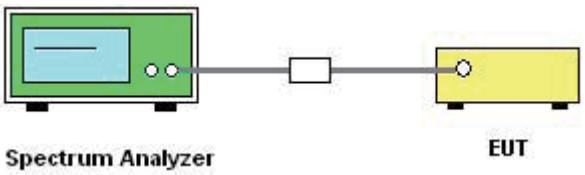
7.2 TEST PROCEDURE

For Conducted Test

1. The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.
2. The spectrum from 30MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

EMI Test Receiver	Setting
Attenuation	Auto
RBW	100KHz
VBW	300KHz
Detector	Peak
Trace	Max hold

7.3 TEST SETUP



7.4 EUT OPERATION CONDITIONS

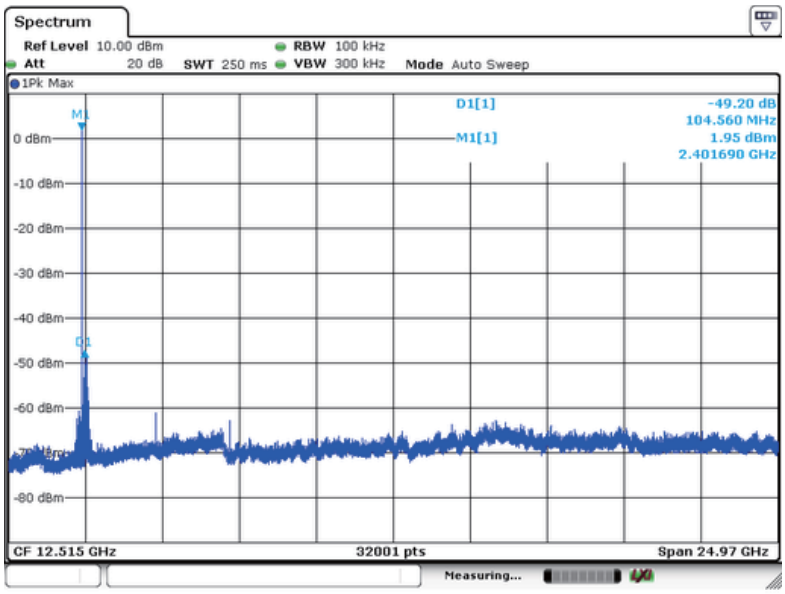
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

7.5 TEST RESULTS

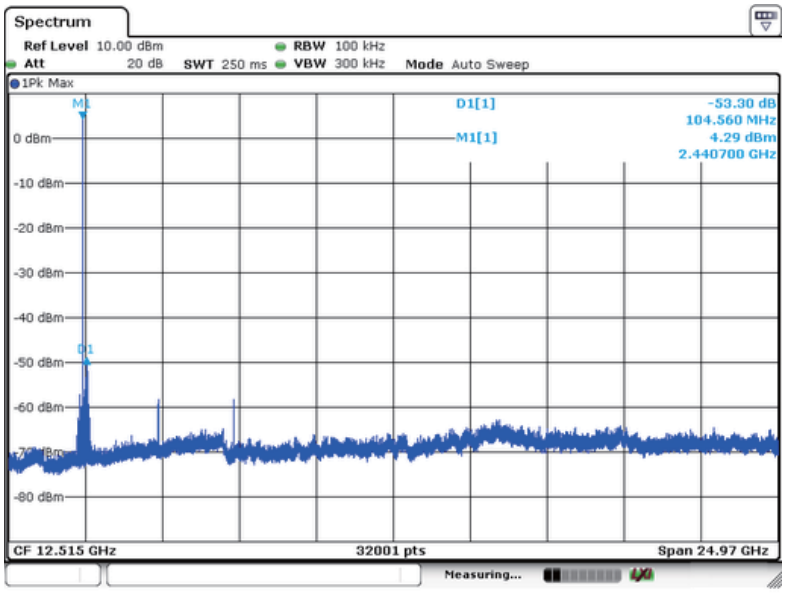
Conducted Spurious

GFSK

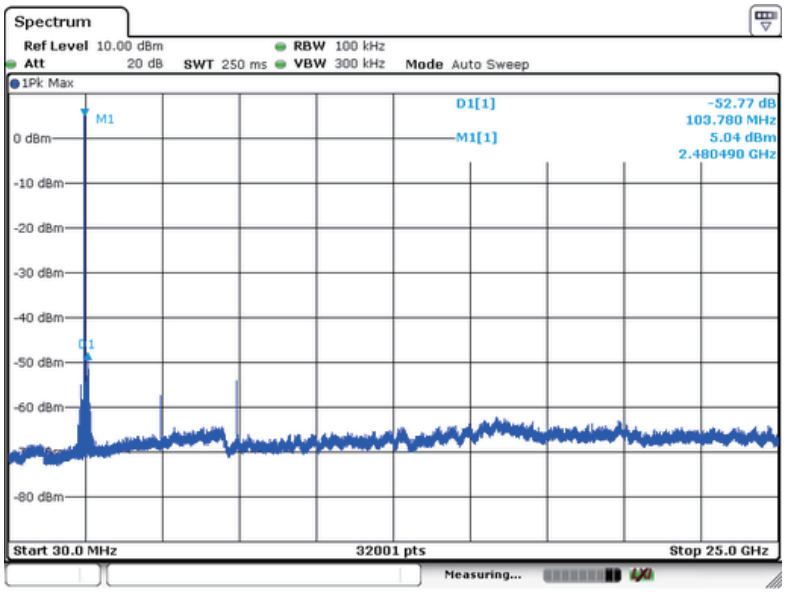
Low Channel



Middle Channel

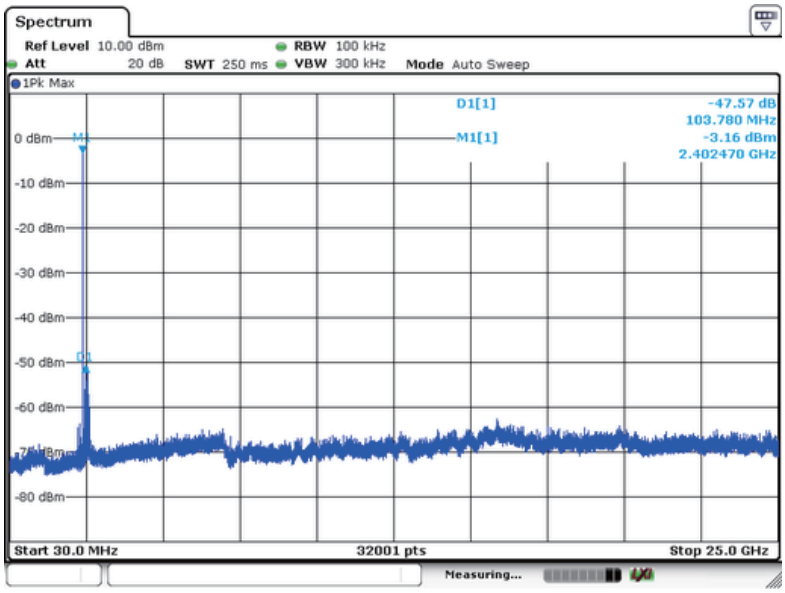


High Channel

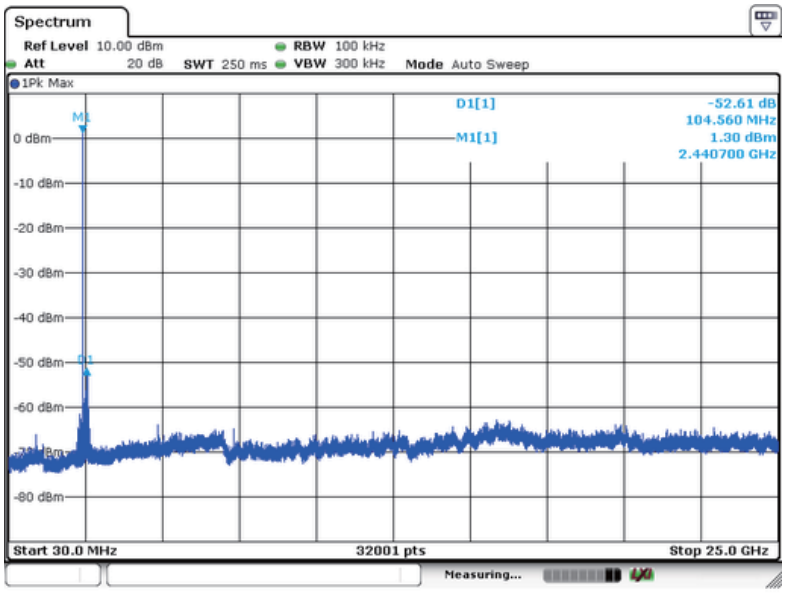


π/4-DQPSK

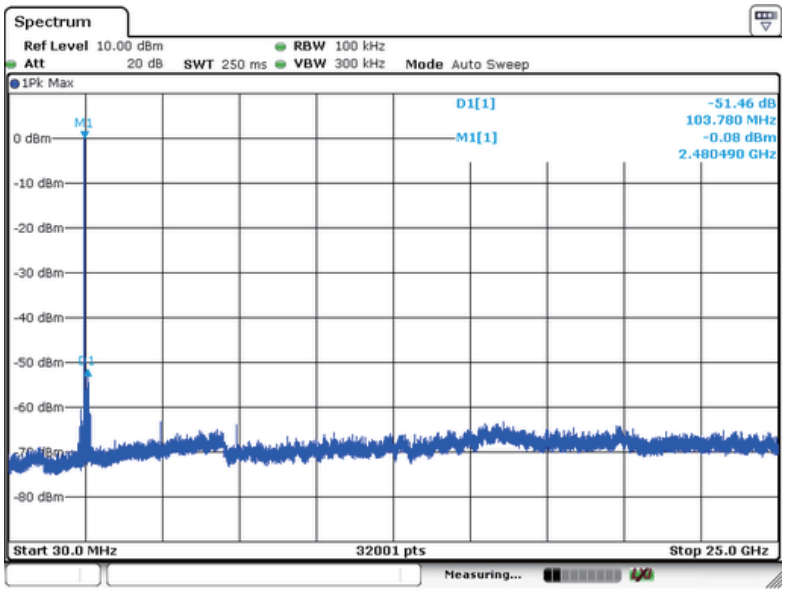
Low Channel



Middle Channel

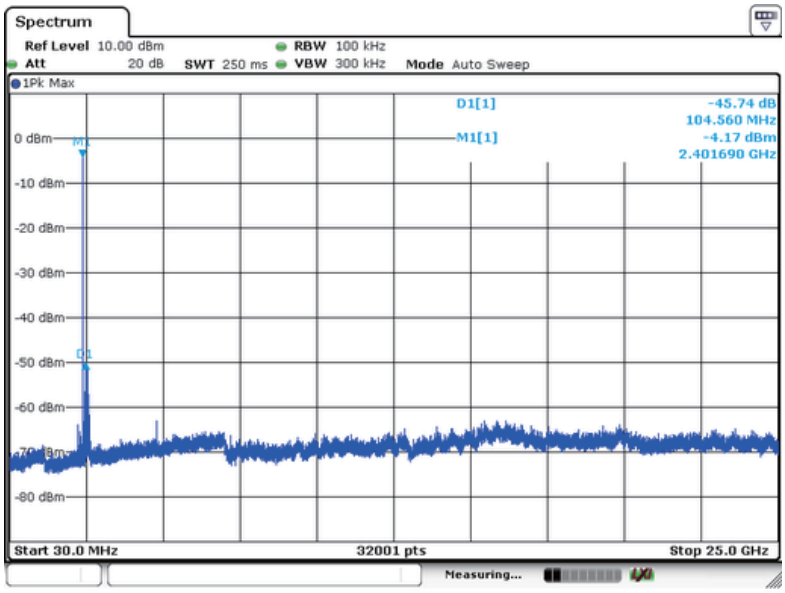


High Channel

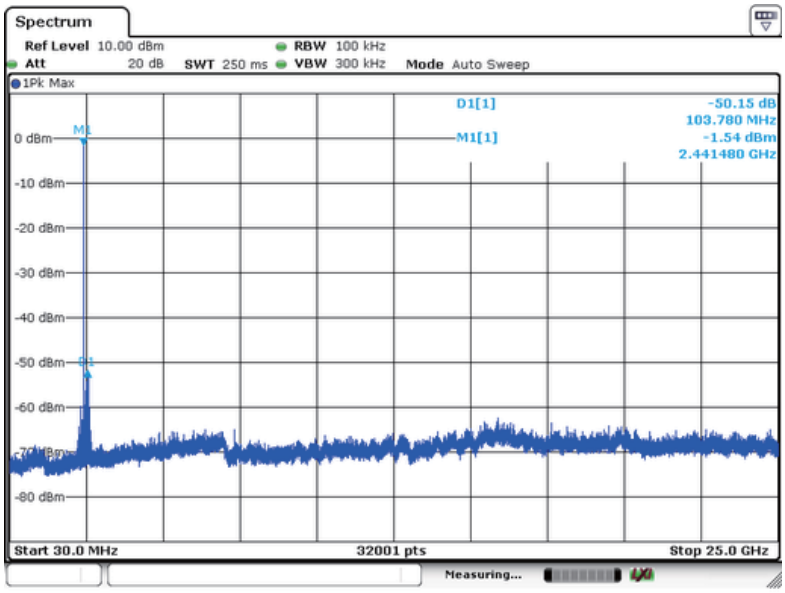


8DPSK

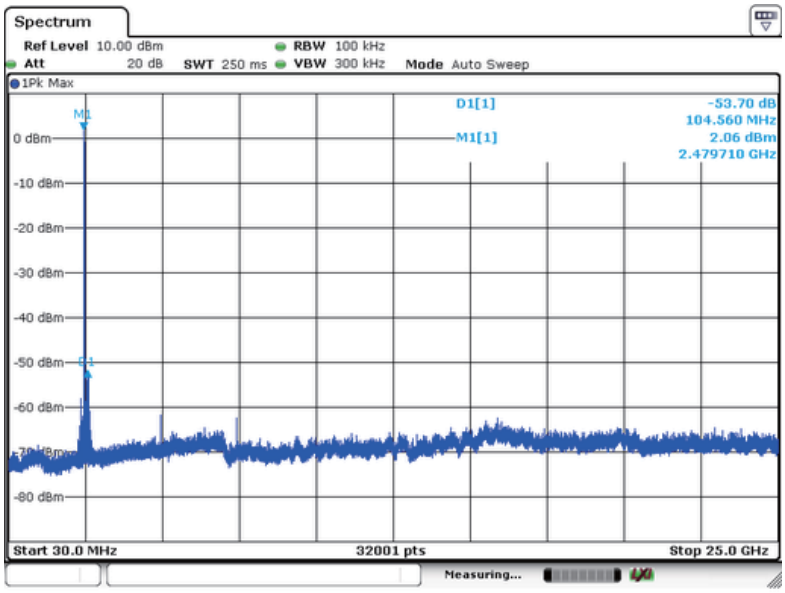
Low Channel



Middle Channel



High Channel

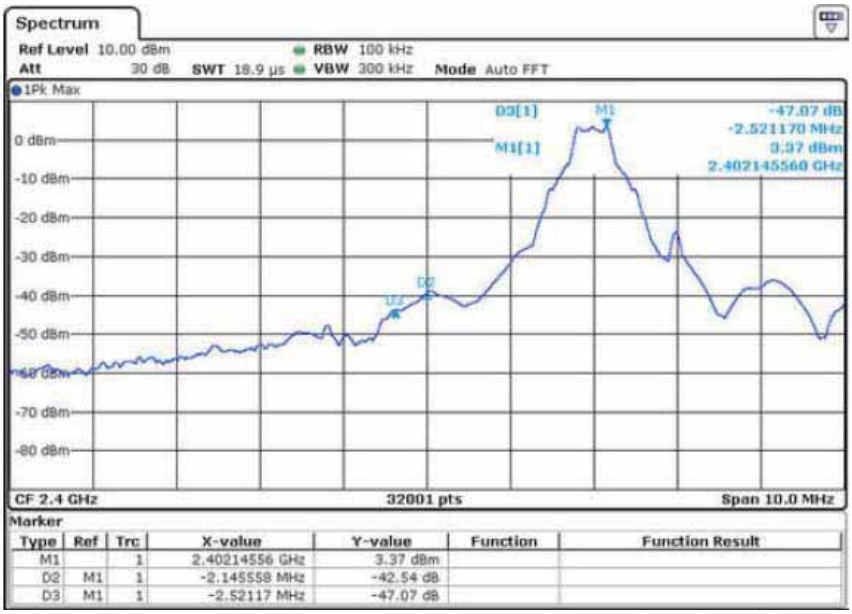


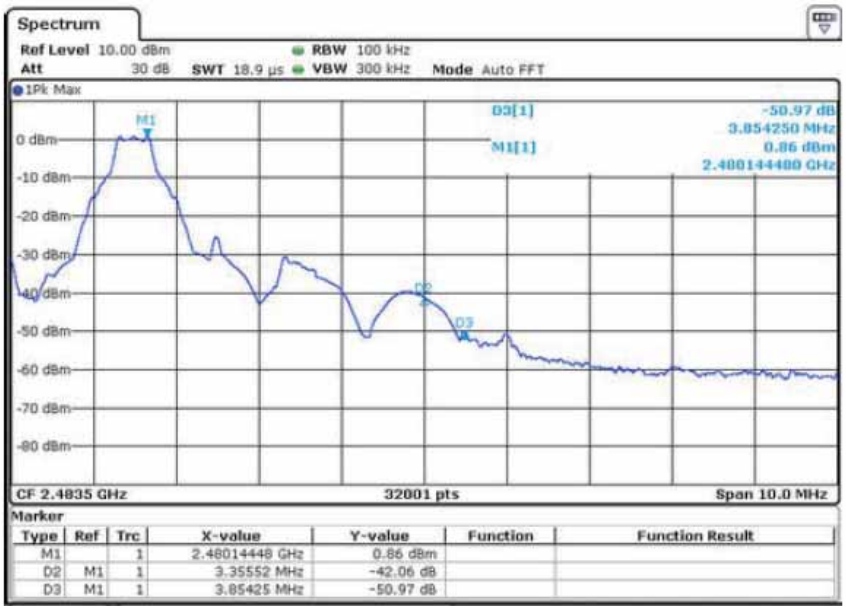
Conducted Band Edge

For Non-Hopping Mode:

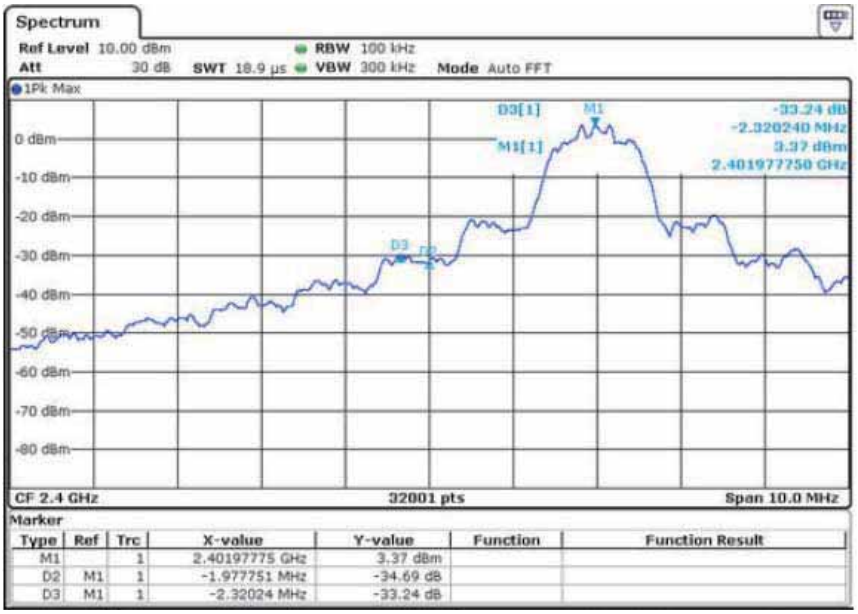
Frequency(MHz)	Modulation	Peak Power Output (dBm)	Emission Read Value (dBm)	Result of Band edge (dBc)	Band Edge Limit (dBc)
2399.48	GFSK	3.37	-47.07	50.44	>20dBc
2399.68	π/4-DQPSK	3.37	-33.24	36.61	>20dBc
2399.52	8DPSK	3.33	-34.57	37.90	>20dBc
2483.85	GFSK	0.86	-50.97	51.83	>20dBc
2484.12	π/4-DQPSK	0.84	-44.84	45.68	>20dBc
2484.17	8DPSK	0.80	-50.45	51.25	>20dBc

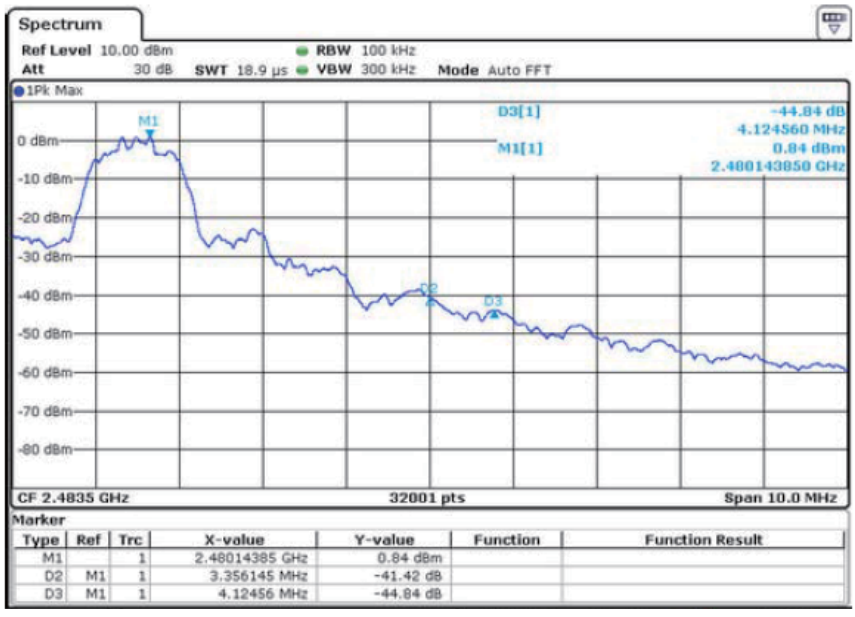
GFSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-47.07 dB
-2.521170 MHz
M1[1]
3.37 dBm
2.402145560 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40214556 GHz 3.37 dBm
D2 M1 1 -2.145558 MHz -42.54 dB
D3 M1 1 -2.52117 MHz -47.07 dB

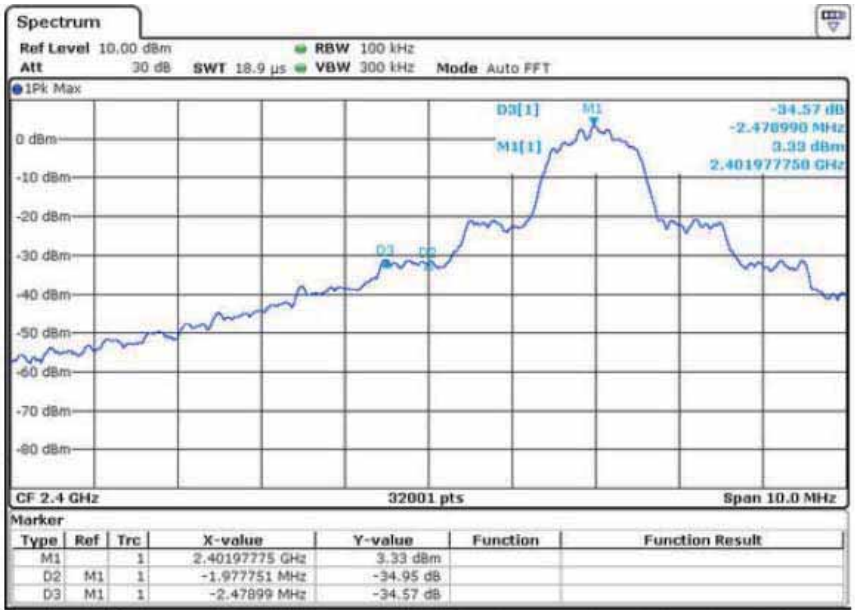

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-50.97 dB
3.854250 MHz
M1[1]
0.86 dBm
2.480144480 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4835 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.48014448 GHz 0.86 dBm
D2 M1 1 3.35552 MHz -42.06 dB
D3 M1 1 3.85425 MHz -50.97 dB

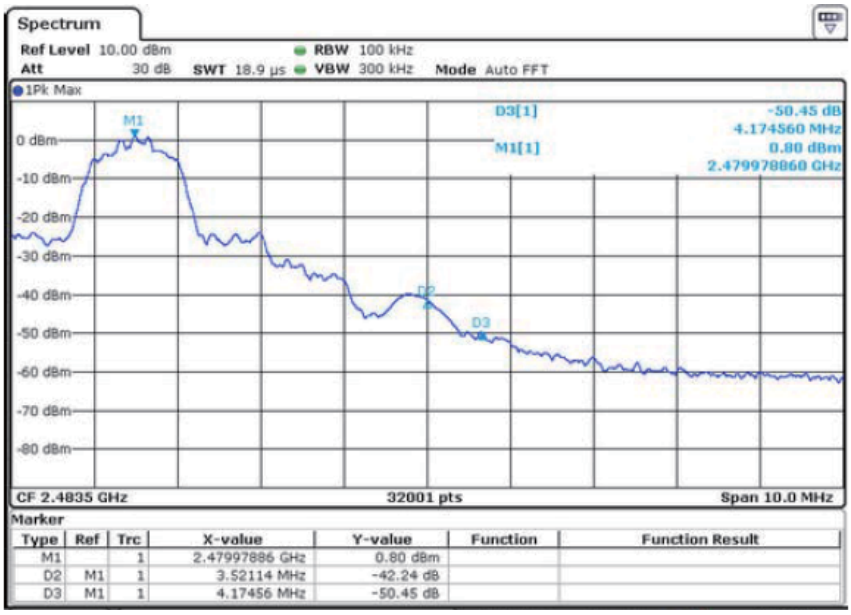
π/4-DQPSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1] -33.24 dB
-2.320240 MHz
M1[1] 3.37 dBm
2.401977750 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40197775 GHz 3.37 dBm
D2 M1 1 -1.977751 MHz -34.69 dB
D3 M1 1 -2.32024 MHz -33.24 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1] -44.84 dB
4.124560 MHz
M1[1] 0.84 dBm
2.480143850 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4835 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.48014385 GHz 0.84 dBm
D2 M1 1 3.356145 MHz -41.42 dB
D3 M1 1 4.12456 MHz -44.84 dB

8DPSK

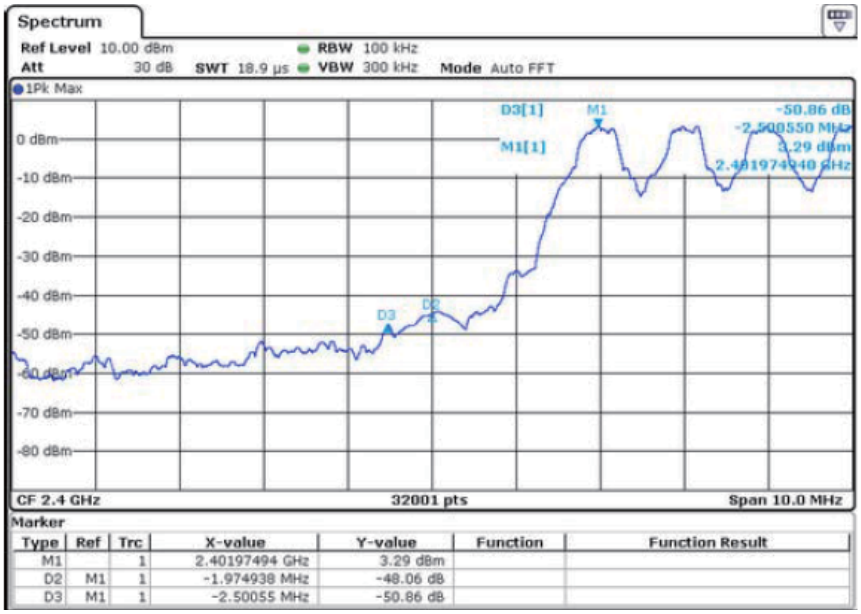

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1] -34.57 dB
-2.478990 MHz
M1[1] 3.33 dBm
2.401977750 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40197775 GHz 3.33 dBm
D2 M1 1 -1.977751 MHz -34.95 dB
D3 M1 1 -2.47899 MHz -34.57 dB

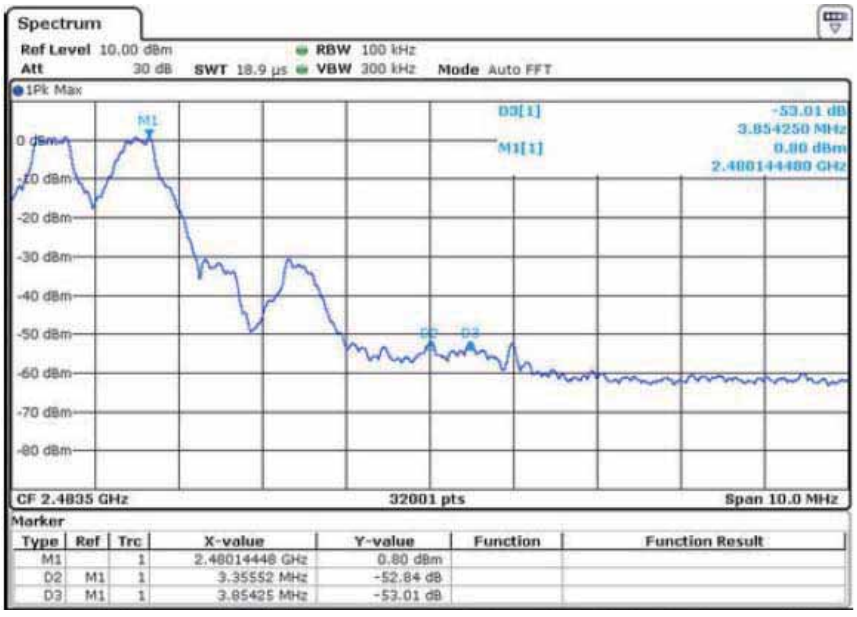

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1] -50.45 dB
4.174560 MHz
M1[1] 0.80 dBm
2.479978860 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4835 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47997886 GHz 0.80 dBm
D2 M1 1 3.52114 MHz -42.24 dB
D3 M1 1 4.17456 MHz -50.45 dB

For Hopping Mode:

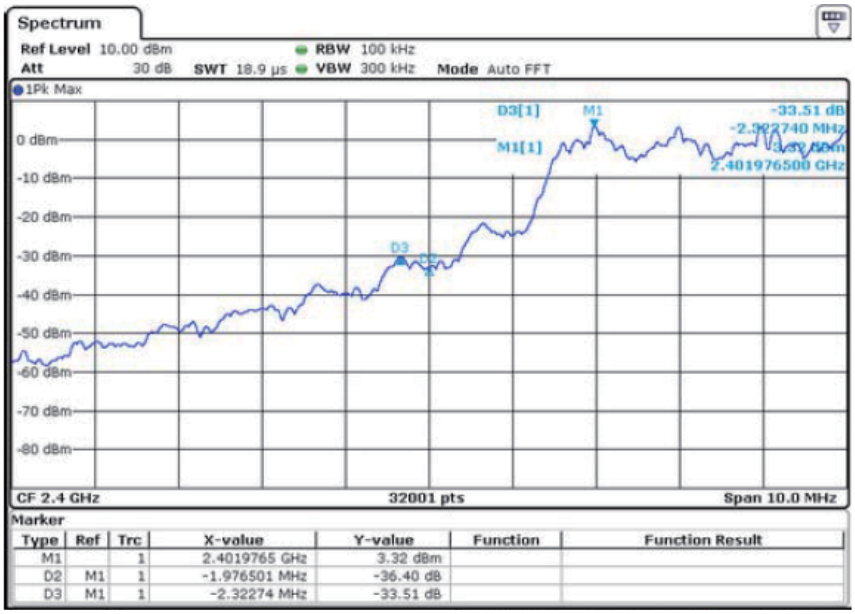
Frequency(MHz)	Modulation	Peak Power Output (dBm)	Emission Read Value (dBm)	Result of Band edge (dBc)	Band Edge Limit (dBc)
2399.50	GFSK	3.29	-50.86	54.15	>20dBc
2399.58	π/4-DQPSK	3.32	-33.51	36.83	>20dBc
2400.02	8DPSK	3.25	-35.74	38.99	>20dBc
2483.85	GFSK	0.80	-53.01	53.81	>20dBc
2484.36	π/4-DQPSK	0.80	-47.93	48.73	>20dBc
2483.52	8DPSK	0.73	-53.24	53.97	>20dBc

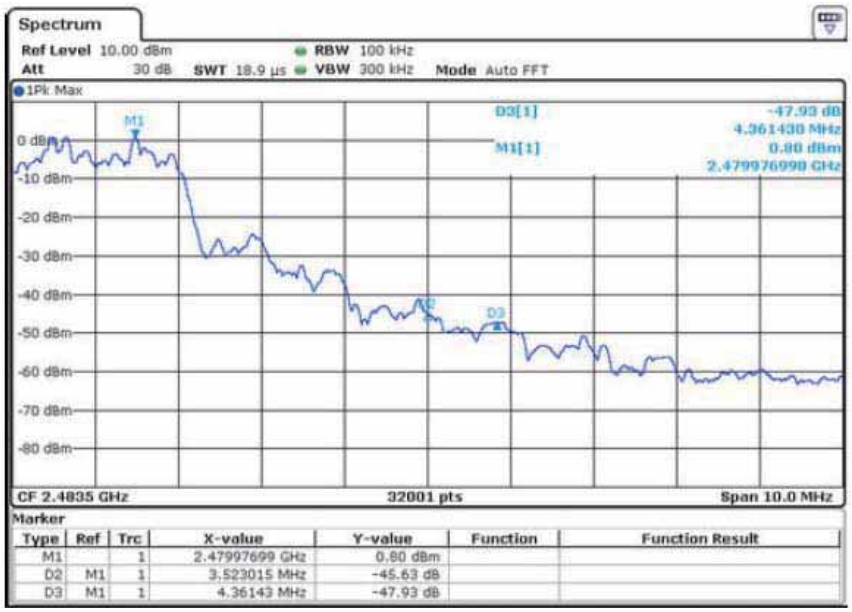
GFSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-50.86 dB
-2.500550 MHz
M1[1]
3.29 dBm
2.401974940 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40197494 GHz 3.29 dBm
D2 M1 1 -1.974938 MHz -48.06 dB
D3 M1 1 -2.50055 MHz -50.86 dB

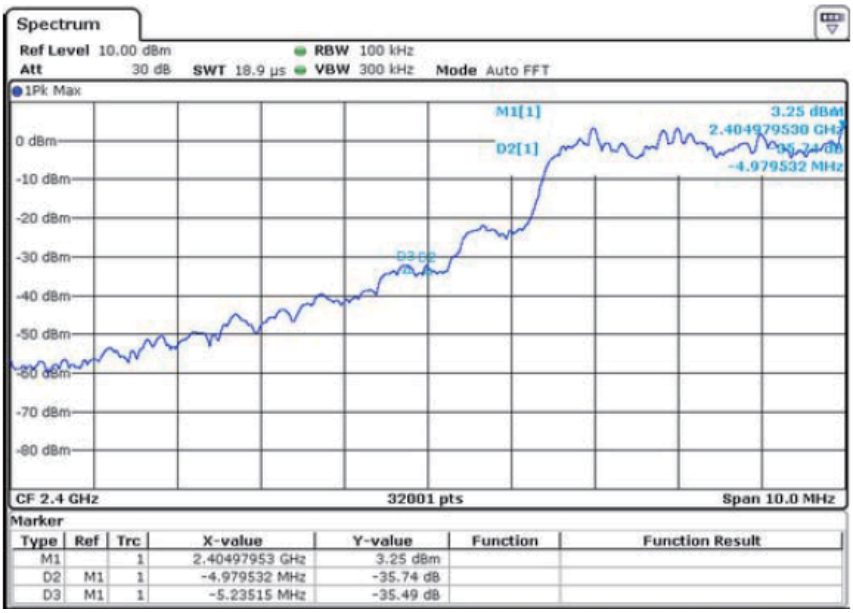

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-53.01 dB
3.854250 MHz
M1[1]
0.80 dBm
2.480144480 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4835 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.48014448 GHz 0.80 dBm
D2 M1 1 3.35552 MHz -52.84 dB
D3 M1 1 3.85425 MHz -53.01 dB

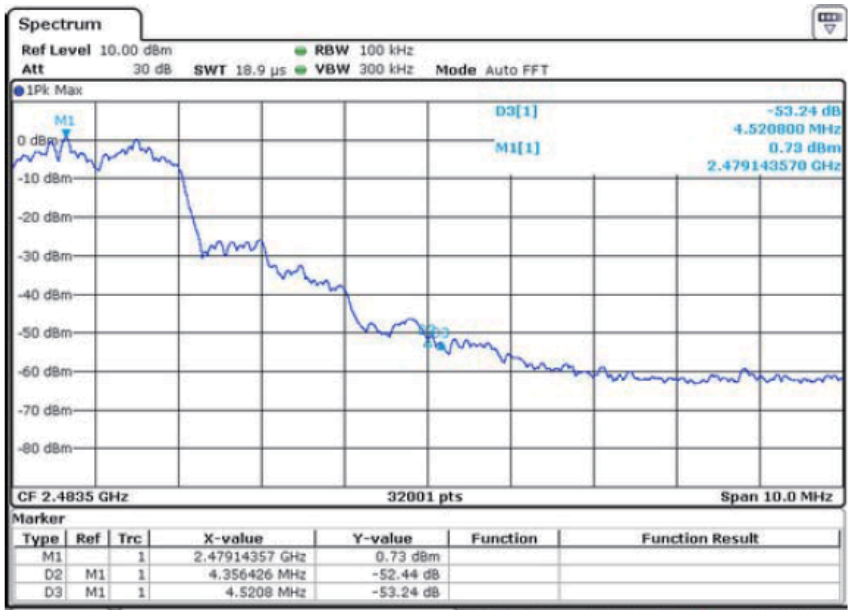
π/4-DQPSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-33.51 dB
-2.322740 MHz
M1[1]
2.401976500 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4019765 GHz 3.32 dBm
D2 M1 1 -1.976501 MHz -36.40 dB
D3 M1 1 -2.32274 MHz -33.51 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-47.93 dB
4.361430 MHz
M1[1]
0.80 dBm
2.479976990 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4835 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47997699 GHz 0.80 dBm
D2 M1 1 3.523015 MHz -45.63 dB
D3 M1 1 4.36143 MHz -47.93 dB

8DPSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
3.25 dBm
2.40497953 GHz
D2[1]
-35.74 dB
-4.979532 MHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40497953 GHz 3.25 dBm
D2 M1 1 -4.979532 MHz -35.74 dB
D3 M1 1 -5.23515 MHz -35.49 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1
D3[1]
-53.24 dB
4.520800 MHz
M1[1]
0.73 dBm
2.479143570 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4835 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47914357 GHz 0.73 dBm
D2 M1 1 4.356426 MHz -52.44 dB
D3 M1 1 4.5208 MHz -53.24 dB

8 20 dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Mode : Refer to section 3.3

8.1 Test Procedure

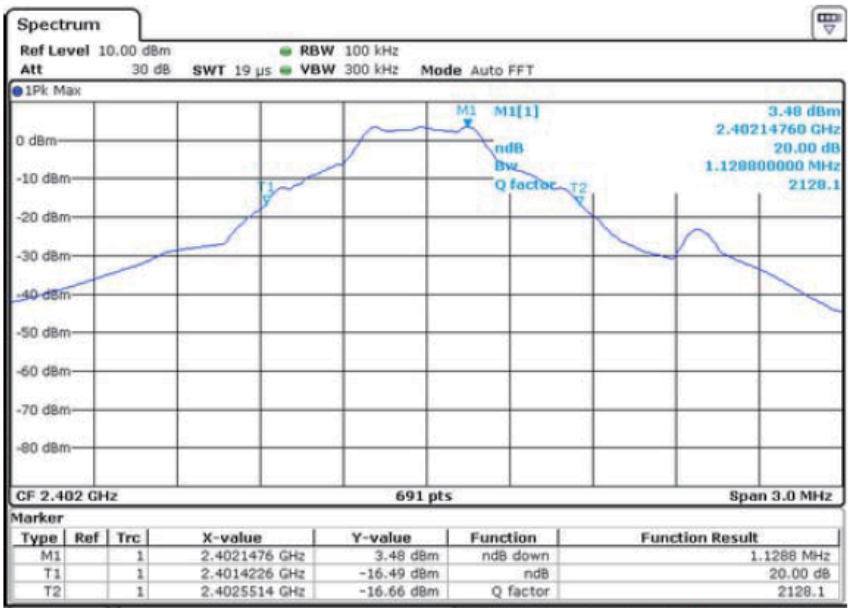
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

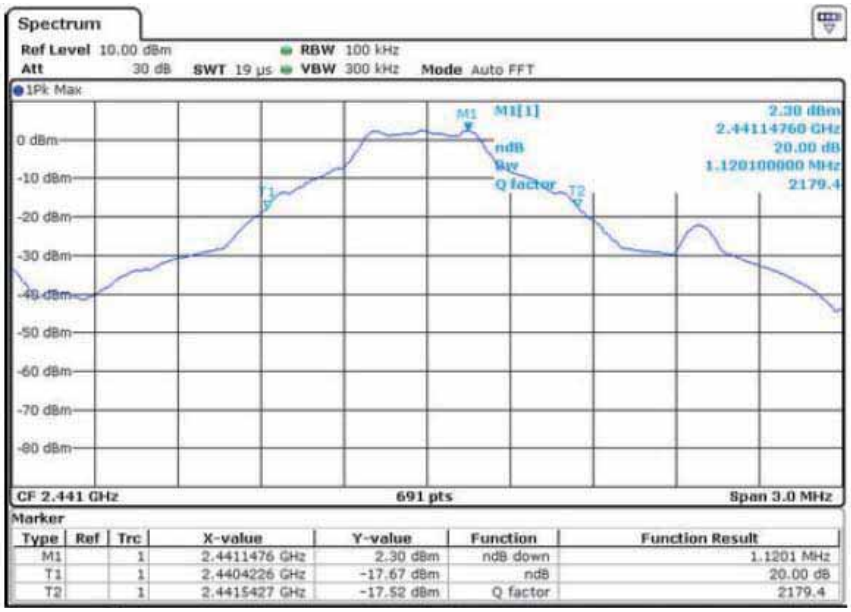
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

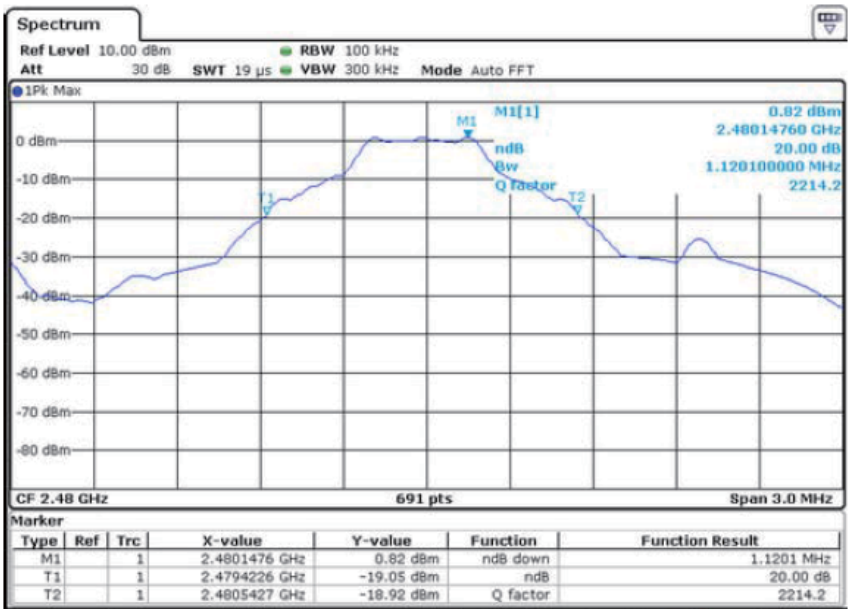
8.2 Test Result

Test Mode: CH00 / CH39 / CH78 (GFSK/(1Mbps)Mode)

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
00	2402	1129
39	2441	1120
78	2480	1120

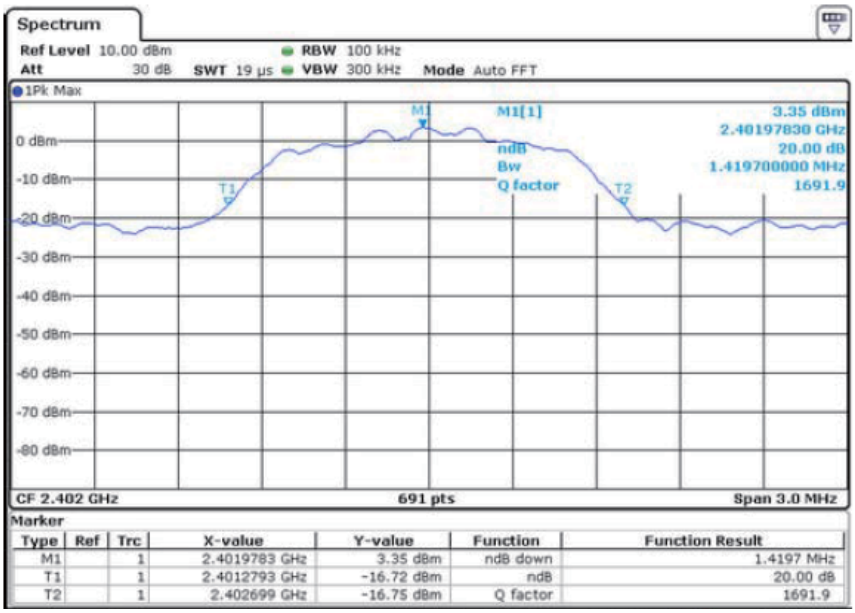

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
3.48 dBm
2.40214760 GHz
ndB 20.00 dB
Bw 1.128000000 MHz
Q factor 2128.1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4021476 GHz 3.48 dBm ndB down 1.1288 MHz
T1 1 2.4014226 GHz -16.49 dBm ndB 20.00 dB
T2 1 2.4025514 GHz -16.66 dBm Q factor 2128.1

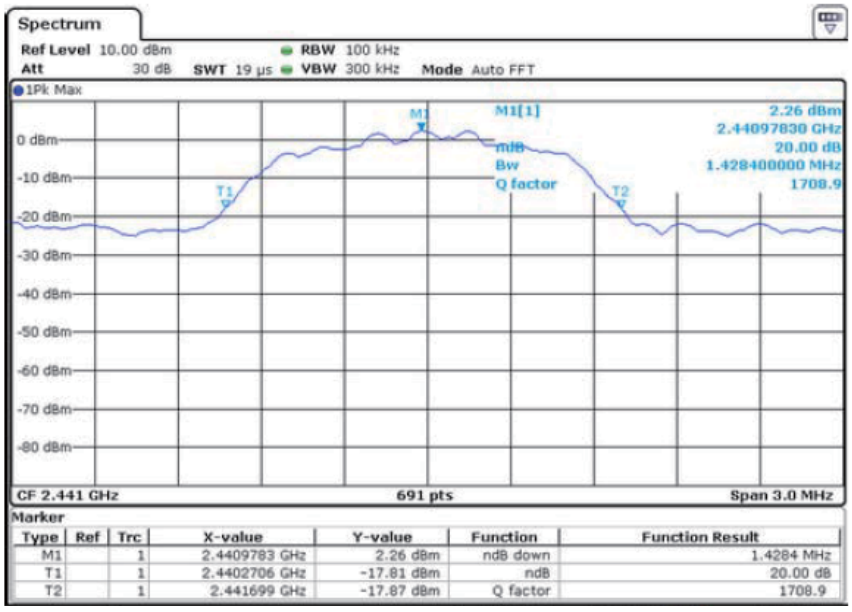

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
2.30 dBm
2.44114760 GHz
ndB 20.00 dB
Bw 1.120100000 MHz
Q factor 2179.4
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4411476 GHz 2.30 dBm ndB down 1.1201 MHz
T1 1 2.4404226 GHz -17.67 dBm ndB 20.00 dB
T2 1 2.4415427 GHz -17.52 dBm Q factor 2179.4

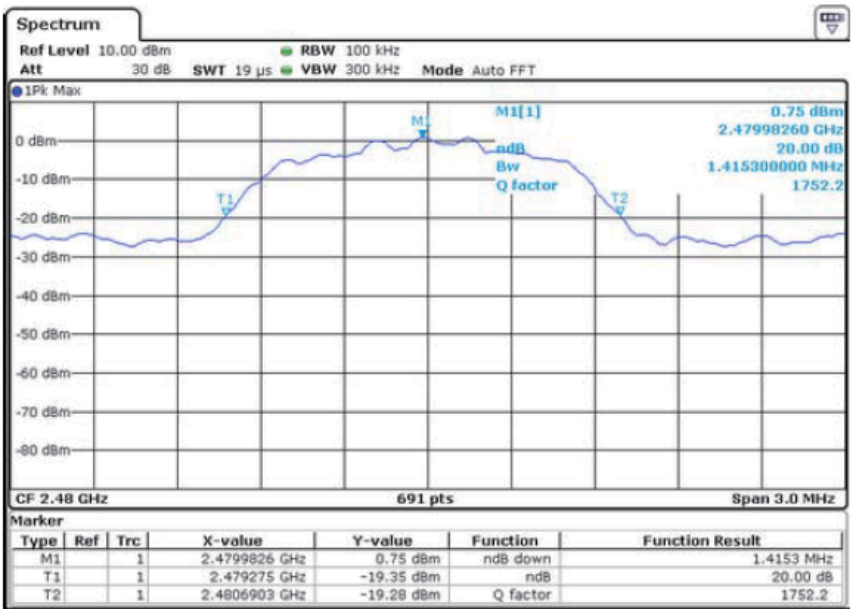


Test Mode: CH00 / CH39 / CH78 (Π/4-DQPSK /(2Mbps)Mode)

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
00	2402	1420
39	2441	1428
78	2480	1415

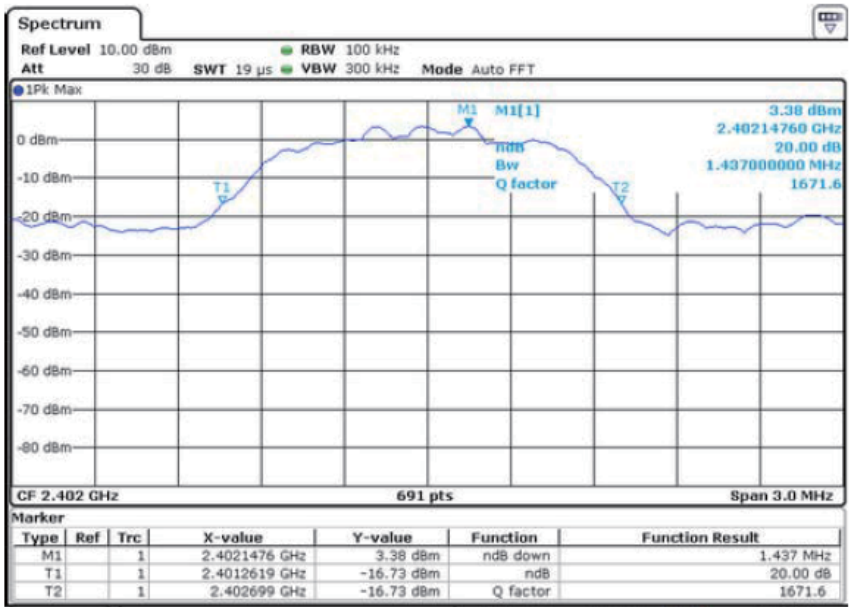

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
3.35 dBm
2.40197830 GHz
ndB 20.00 dB
Bw 1.419700000 MHz
Q factor 1691.9
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4019783 GHz 3.35 dBm ndB down 1.4197 MHz
T1 1 2.4012793 GHz -16.72 dBm ndB 20.00 dB
T2 1 2.402699 GHz -16.75 dBm Q factor 1691.9

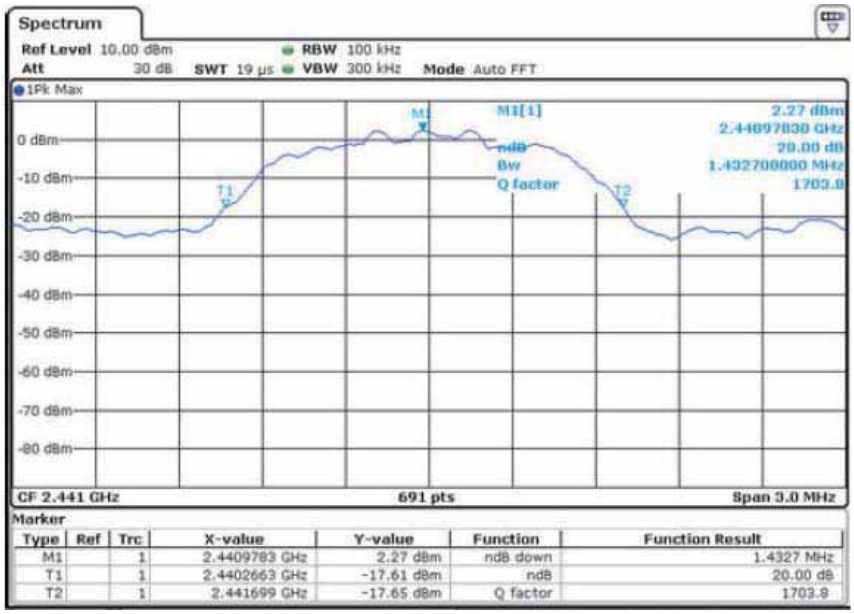

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
2.26 dBm
2.44097830 GHz
ndB 20.00 dB
Bw 1.428400000 MHz
Q factor 1708.9
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4409783 GHz 2.26 dBm ndB down 1.4284 MHz
T1 1 2.4402706 GHz -17.81 dBm ndB 20.00 dB
T2 1 2.441699 GHz -17.87 dBm Q factor 1708.9

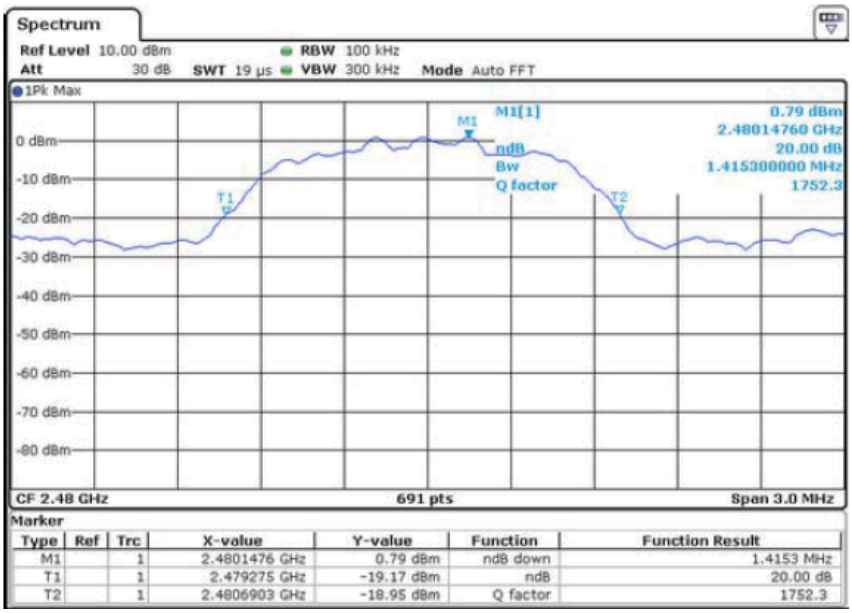


Test Mode: CH00 / CH39 / CH78 (8DPSK(3Mbps)Mode)

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
00	2402	1437
39	2441	1433
78	2480	1415


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
3.38 dBm
2.40214760 GHz
ndB 20.00 dB
Bw 1.437000000 MHz
Q factor 1671.6
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4021476 GHz 3.38 dBm ndB down 1.437 MHz
T1 1 2.4012619 GHz -16.73 dBm ndB 20.00 dB
T2 1 2.402699 GHz -16.73 dBm Q factor 1671.6


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
2.27 dBm
2.44097830 GHz
ndB 20.00 dB
Bw 1.432700000 MHz
Q factor 1703.8
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4409783 GHz 2.27 dBm ndB down 1.4327 MHz
T1 1 2.4402663 GHz -17.61 dBm ndB 20.00 dB
T2 1 2.441699 GHz -17.65 dBm Q factor 1703.9


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
0.79 dBm
2.48014760 GHz
ndB 20.00 dB
Bw 1.415300000 MHz
Q factor 1752.3
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
T1
T2
CF 2.48 GHz
691 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4801476 GHz 0.79 dBm ndB down 1.4153 MHz
T1 1 2.479275 GHz -19.17 dBm ndB 20.00 dB
T2 1 2.4806903 GHz -18.95 dBm Q factor 1752.3

9 Maximum Peak Output Power

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247 (b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt (30dBm). For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Refer to the result “Number of Hopping Frequency” of this document. The 0.125watts (20.97 dBm) limit applies.

Test Mode : Refer to section 3.3

9.1 Test Procedure

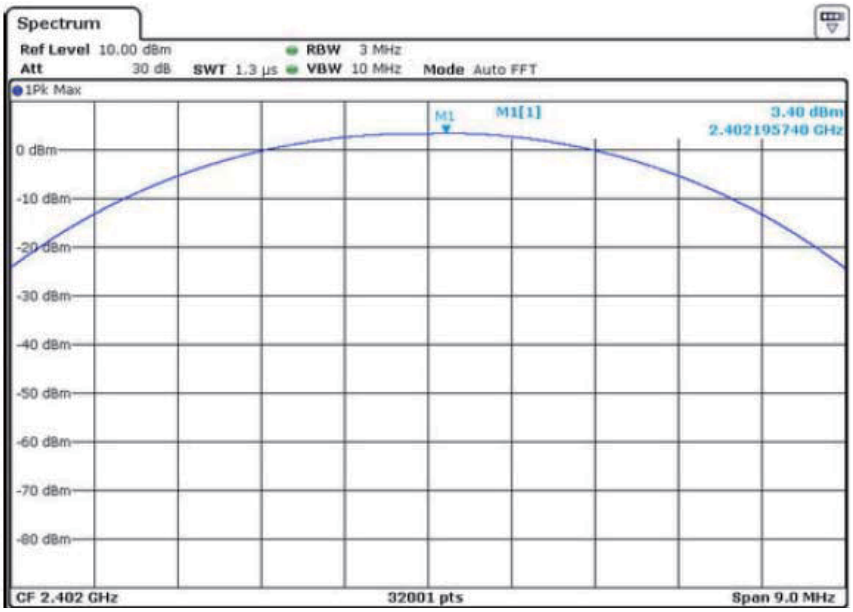
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

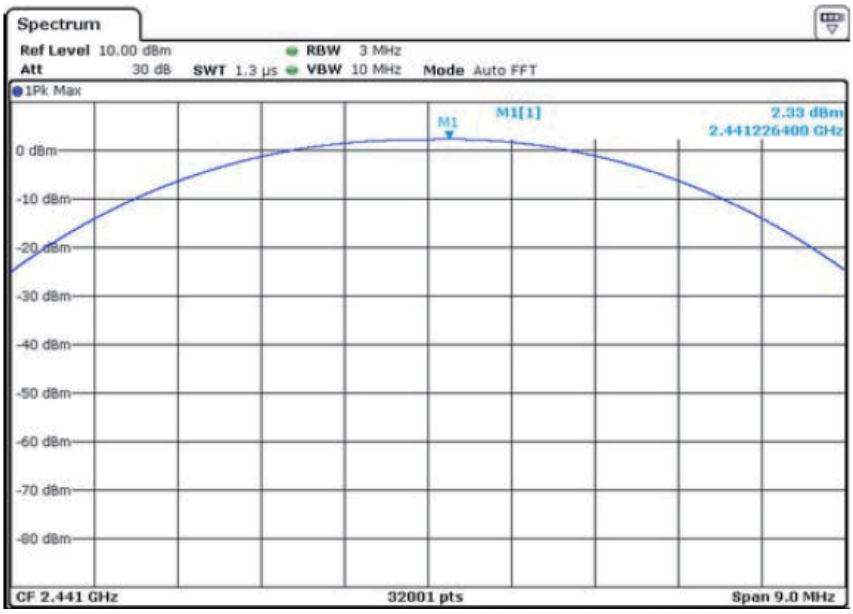
2. Set the spectrum analyser: RBW = 3 MHz. VBW =10 MHz. Sweep = auto; Detector Function = Peak.

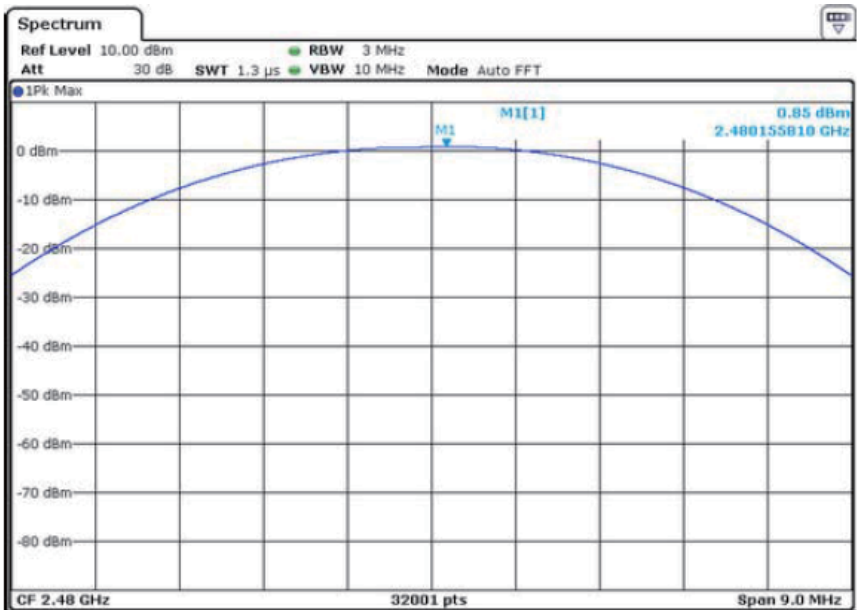
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

9.2 Test Result

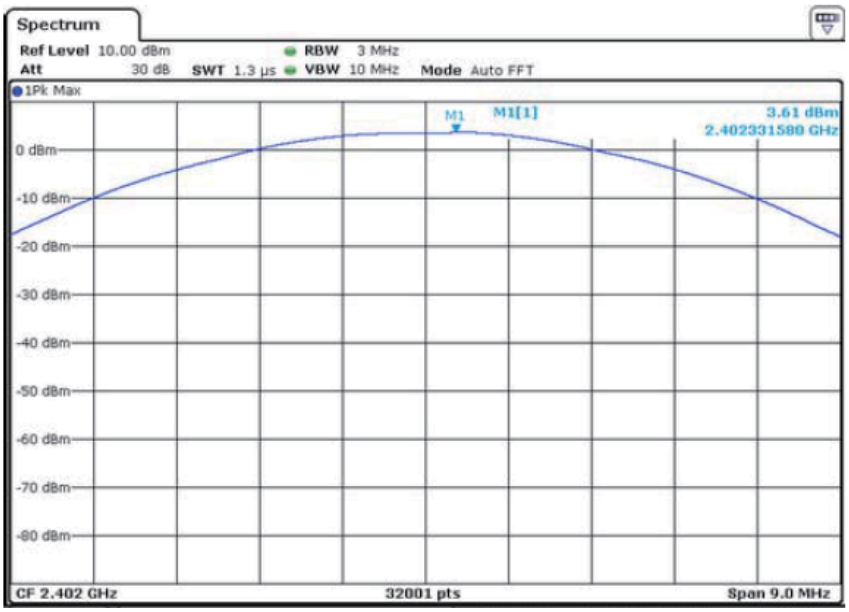
GFSK(1Mbps)					
Test Channel	Frequency	Conducted Output Peak Power	Conducted Output Peak Power	LIMIT	Pass/Fail
	(MHz)	(dBm)	(mW)	(mW)	
CH00	2402	3.40	2.188	125	Pass
CH39	2441	2.33	1.710	125	Pass
CH78	2480	0.85	1.216	125	Pass

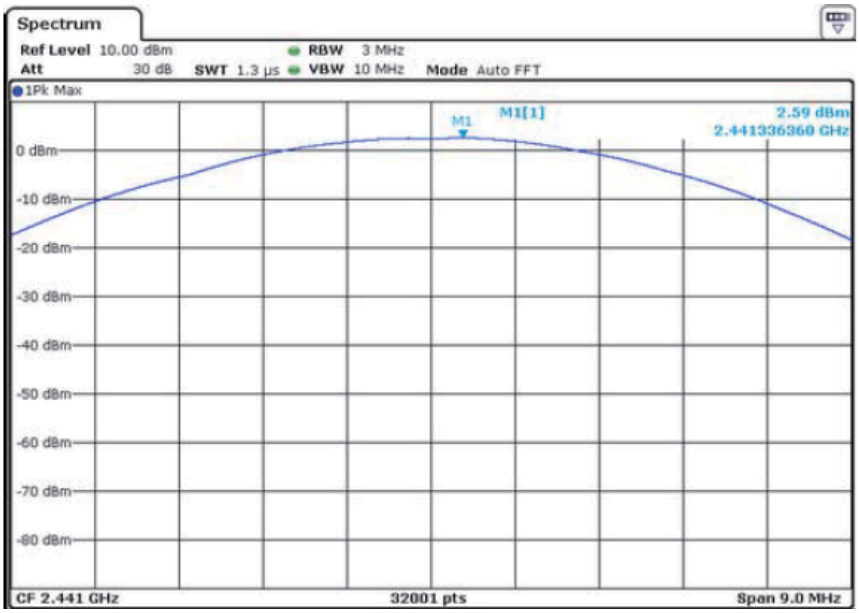

Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1
M1[1]
3.40 dBm
2.402195740 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
32001 pts
Span 9.0 MHz

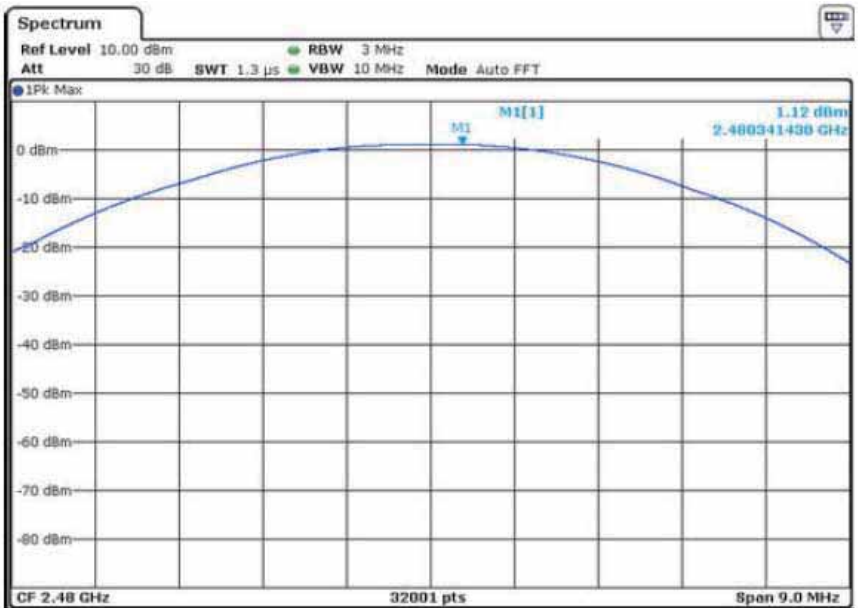

Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1
M1[1]
2.33 dBm
2.441226400 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
32001 pts
Span 9.0 MHz



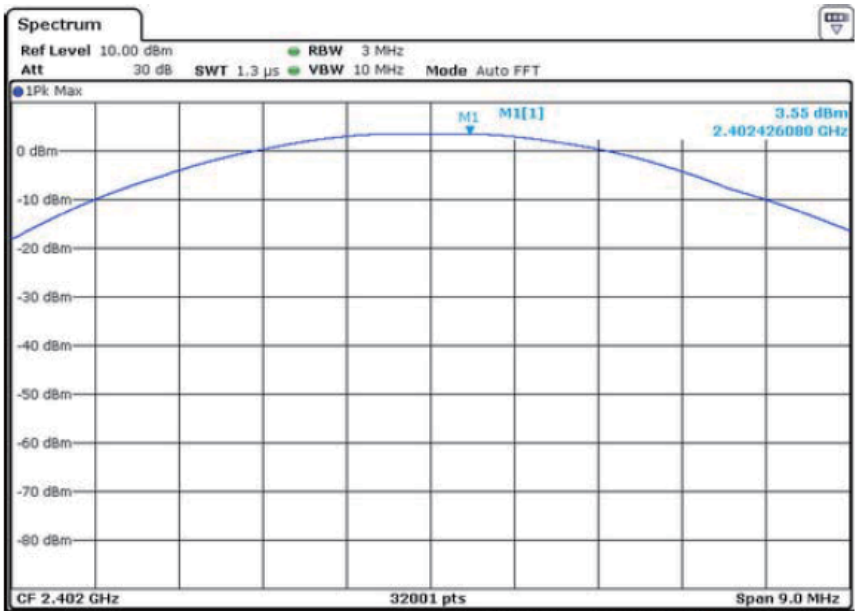
π/4QPSK(2Mbps)					
Test Channel	Frequency	Conducted Output Peak Power	Conducted Output Peak Power	LIMIT	Pass/Fail
	(MHz)	(dBm)	(mW)	(mW)	
CH00	2402	3.61	2.296	125	Pass
CH39	2441	2.59	1.816	125	Pass
CH78	2480	1.12	1.294	125	Pass

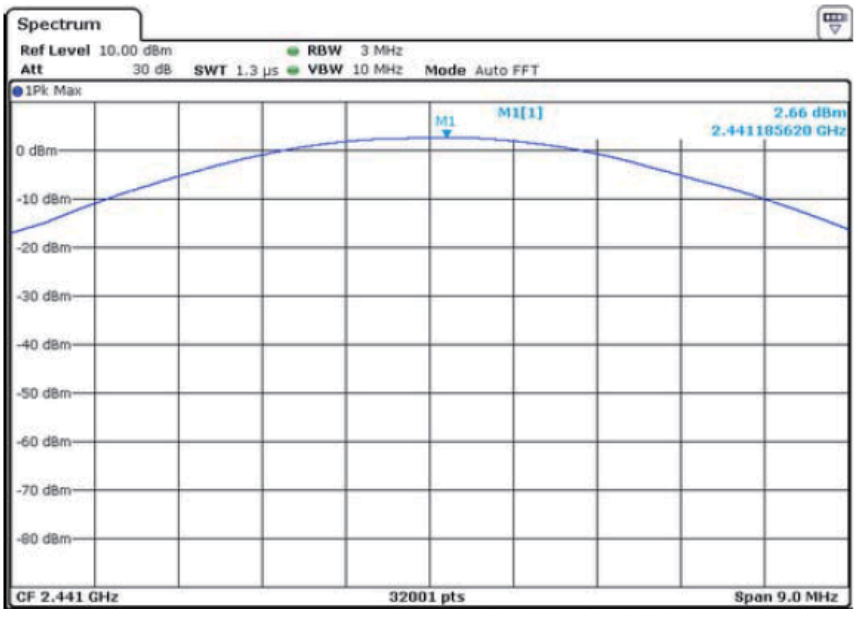

Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1
M1[1]
3.61 dBm
2.402331580 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
32001 pts
Span 9.0 MHz

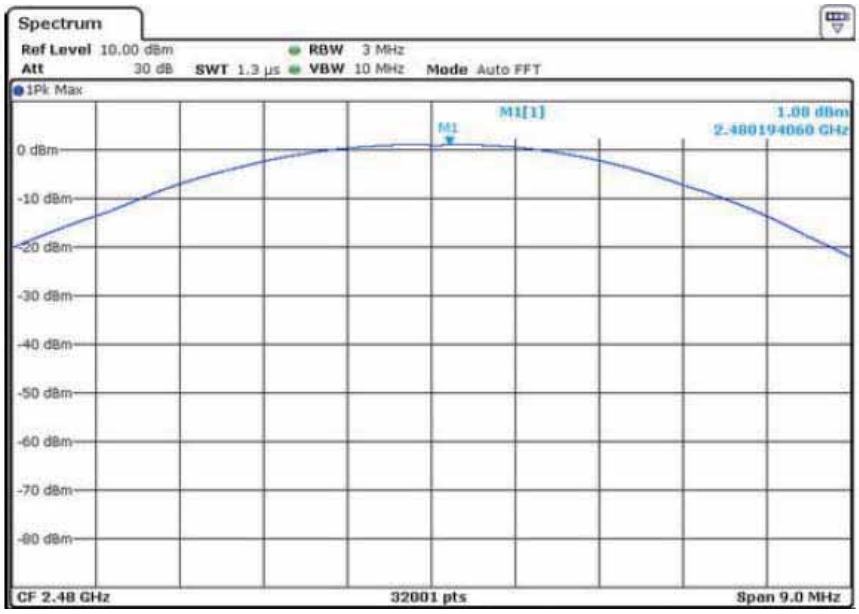

Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1
M1[1]
2.59 dBm
2.441336360 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
32001 pts
Span 9.0 MHz



8DPSK(3Mbps)					
Test Channel	Frequency	Conducted Output Peak Power	Conducted Output Peak Power	LIMIT	Pass/Fail
	(MHz)	(dBm)	(mW)	(mW)	
CH00	2402	3.55	2.265	125	Pass
CH39	2441	2.66	1.845	125	Pass
CH78	2480	1.08	1.282	125	Pass


Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1
M1[1]
3.55 dBm
2.402426080 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.402 GHz
32001 pts
Span 9.0 MHz


Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1
M1[1]
2.66 dBm
2.441185620 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
32001 pts
Span 9.0 MHz


Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB
SWT 1.3 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1[1]
1.08 dBm
2.480194060 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.48 GHz
32001 pts
Span 9.0 MHz

10 Hopping Channel Separation

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(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 2400-2483.5MHz 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 1W.
Test Mode	:	Hopping

10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

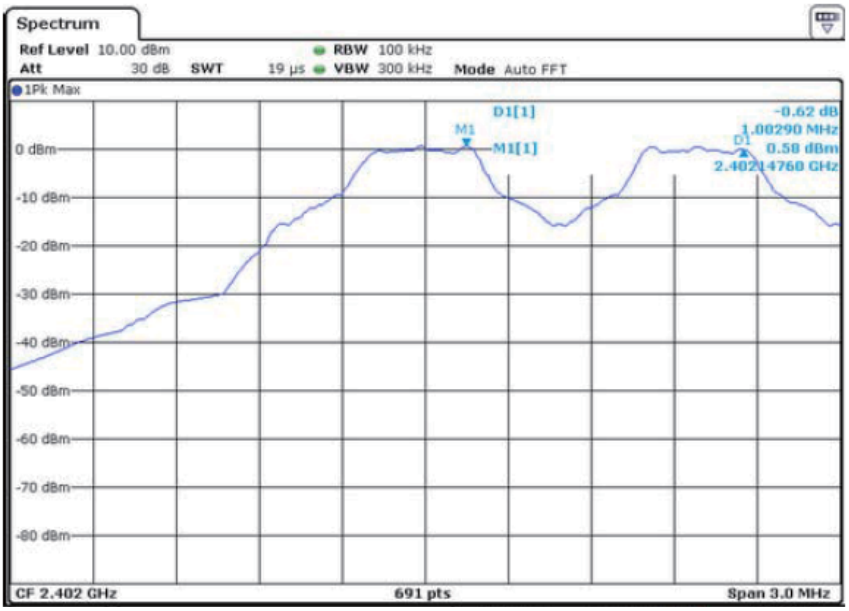
2. Set the spectrum analyzer: RBW = 100KHz. VBW = 300KHz , Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

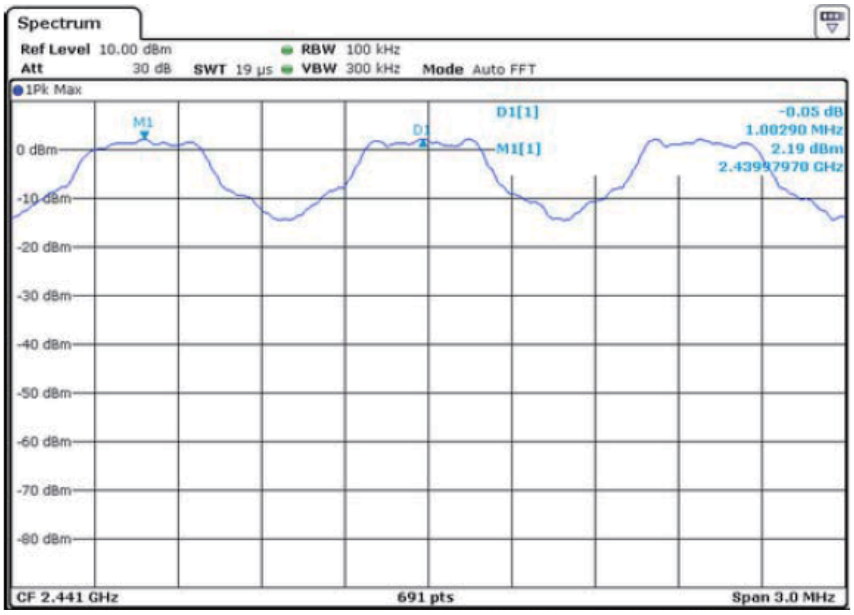
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

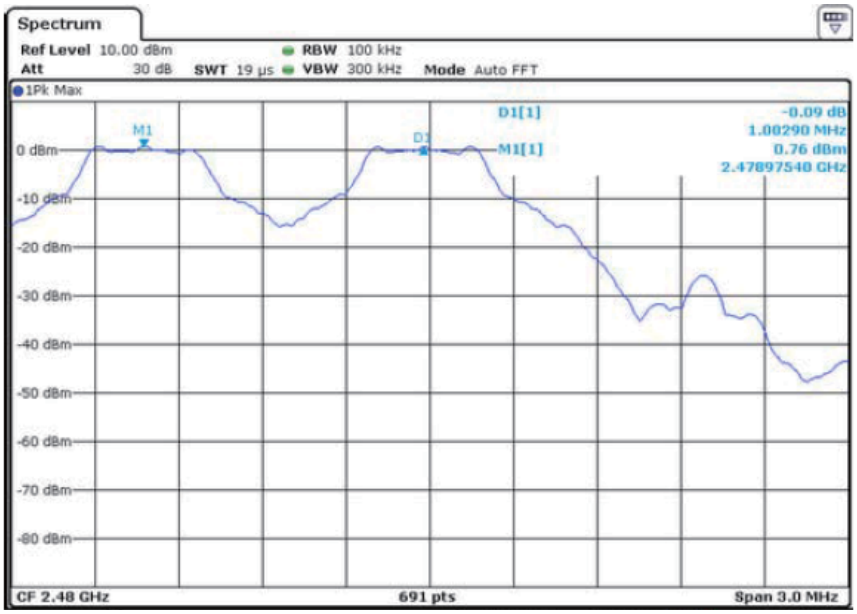
10.2 Test Result

Test Mode:	CH00 / CH39 / CH78 (GFSK(1Mbps) Mode)

Channel number	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW (kHz)
00	2402	1003	>753
39	2441	1003	>747
78	2480	1033	>747

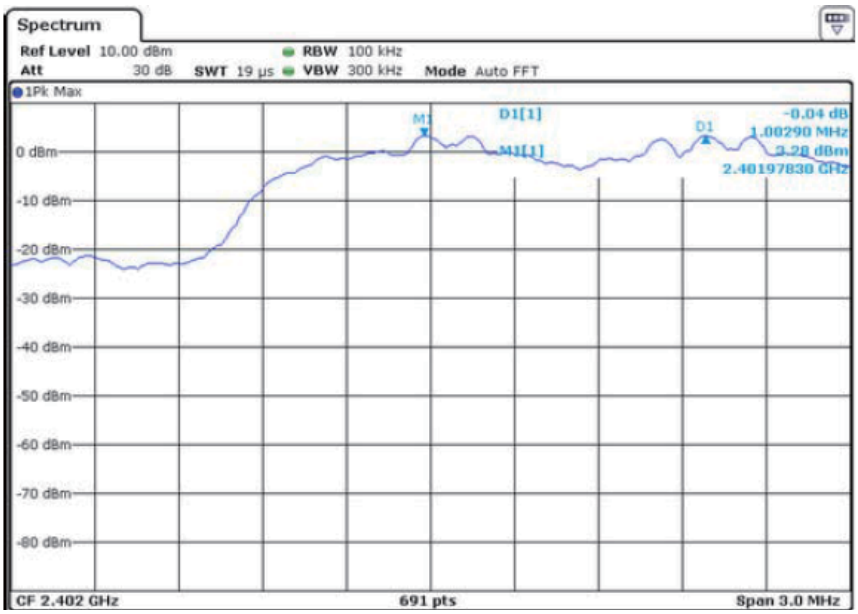


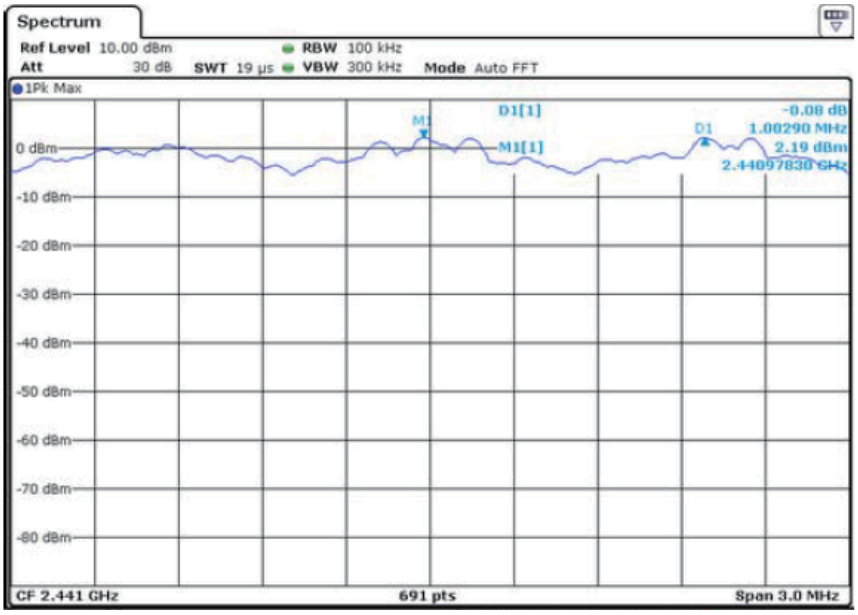

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1
D1
D1[1]
-0.05 dB
1.00290 MHz
M1[1]
2.19 dBm
2.43997970 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
691 pts
Span 3.0 MHz

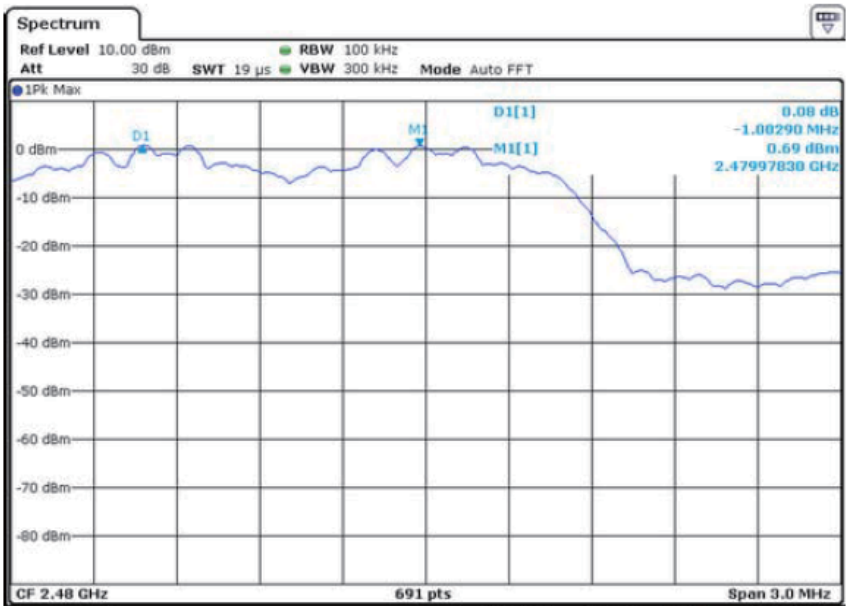

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1
D1
D1[1]
-0.09 dB
1.00290 MHz
M1[1]
0.76 dBm
2.47897540 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.48 GHz
691 pts
Span 3.0 MHz

Test Mode:	CH00 / CH39 / CH78 (π/4-DQPSK(2Mbps) Mode)

Channel number	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW(kHz)
00	2402	1003	>947
39	2441	1003	>952
78	2480	1003	>943

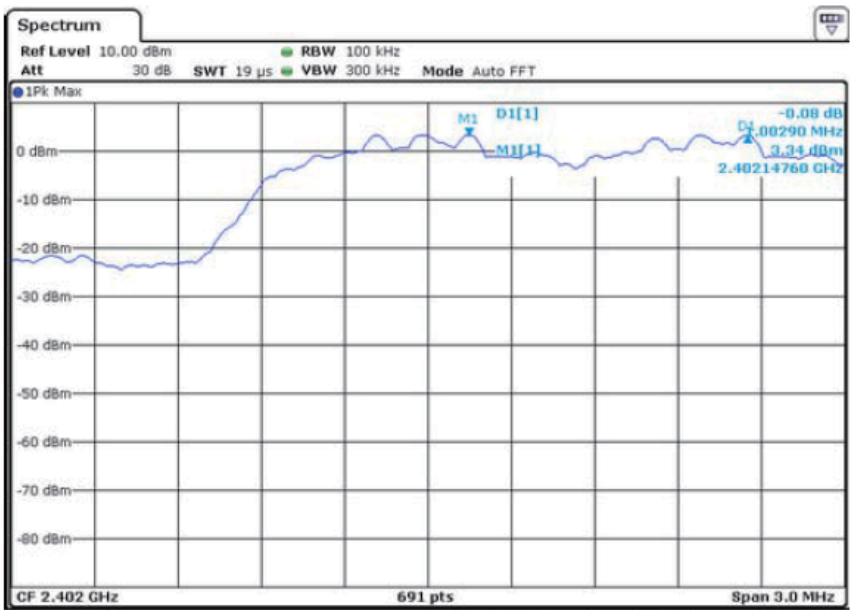


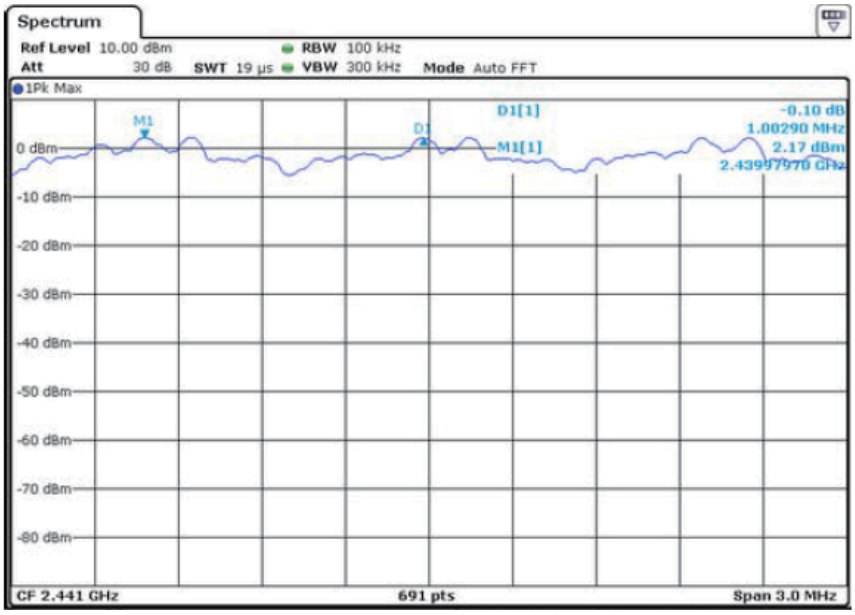

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D1[1]
-0.08 dB
1.00290 MHz
2.19 dBm
2.44097830 GHz
M1[1]
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
691 pts
Span 3.0 MHz

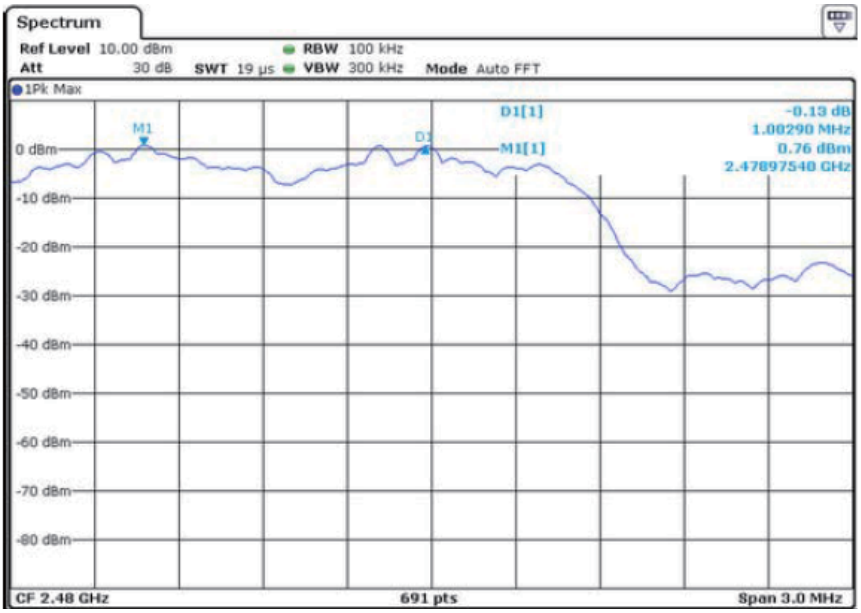

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D1[1]
0.08 dB
-1.00290 MHz
0.69 dBm
2.47997830 GHz
M1[1]
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.48 GHz
691 pts
Span 3.0 MHz

Test Mode:	CH00 / CH39 / CH78 (8DPSK(3Mbps)Mode)

Channel number	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW(kHz)
00	2402	1003	>958
39	2441	1003	>958
78	2480	1003	>943




Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1
D1
D1[1]
-0.10 dB
1.00290 MHz
M1[1]
2.17 dBm
2.43907970 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz
691 pts
Span 3.0 MHz


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1
D1
D1[1]
-0.13 dB
1.00290 MHz
M1[1]
0.76 dBm
2.47897540 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.48 GHz
691 pts
Span 3.0 MHz

11 Number of Hopping Frequency

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode	:	Hopping(GFSK)

11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

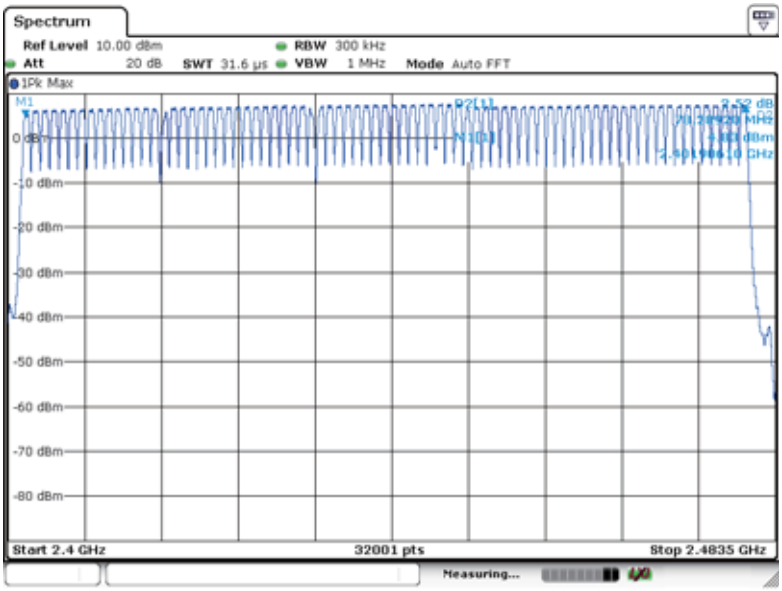
2. Set the spectrum analyzer: RBW = 300KHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.483GHz. Sweep=auto;

11.2 Test Result

Channel Number	Limit
79	≥15



12 Dwell Time

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
Test Mode	:	Hopping

12.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set spectrum analyzer span = 0. Centred on a hopping channel;

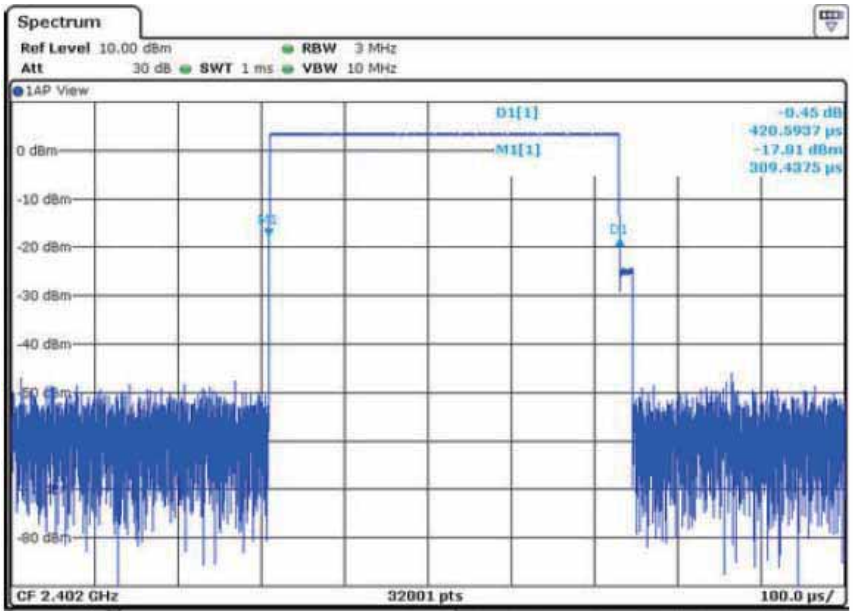
3. Set RBW = 3MHz and VBW = 10MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

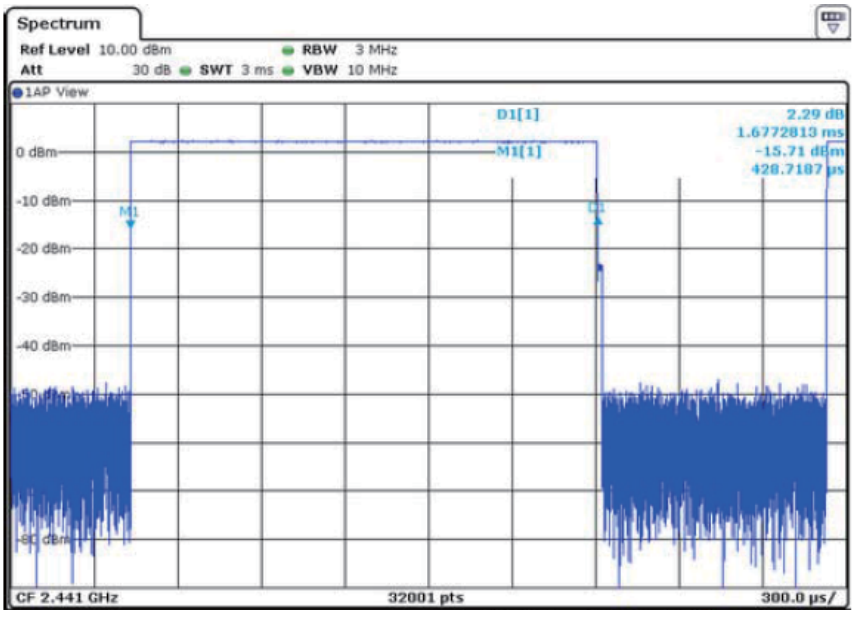
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

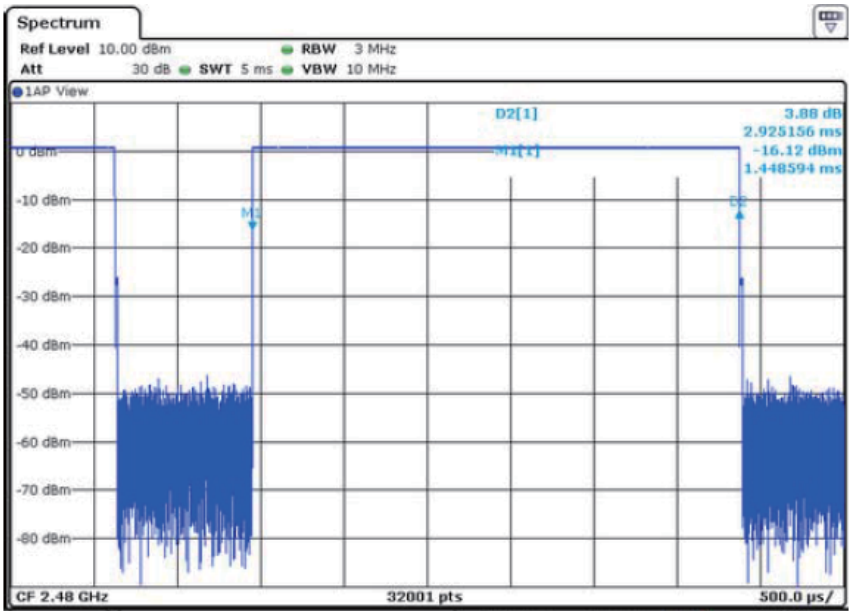
12.2 Test Result

GFSK(1Mbps)				
Mode	Number of transmission in a 31.6(79 Hopping*0.4)	Length of transmissions time(msec)	Result (msec)	Limit (msec)
DH1	1600/(2*79) x 31.6 = 320	0.421	134.72	400
DH3	1600/(4*79) x 31.6 =160	1.678	268.48	400
DH5	1600/(6*79) x 31.6 =106.67	2.925	312.01	400

Remark: The results of worst cased was recorded.


Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB SWT 1 ms VBW 10 MHz
1AP View
D1[1] -0.45 dB
420.5937 µs
M1[1] -17.91 dBm
389.4375 µs
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-80 dBm
CF 2.402 GHz
32001 pts
100.0 µs/

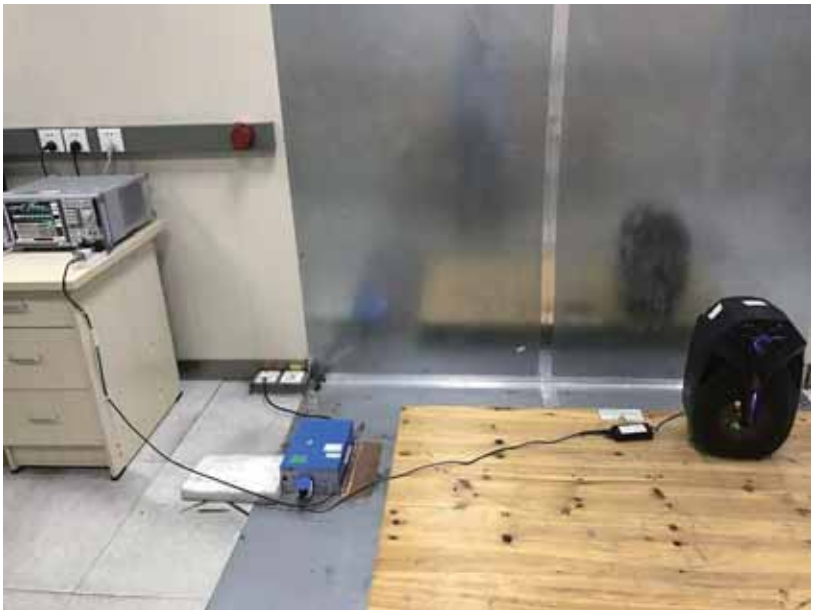

Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB SWT 3 ms VBW 10 MHz
1AP View
D1[1] 2.29 dB
1.6772813 ms
M1[1] -15.71 dBm
428.7187 µs
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
M1
D1
CF 2.441 GHz
32001 pts
300.0 µs/

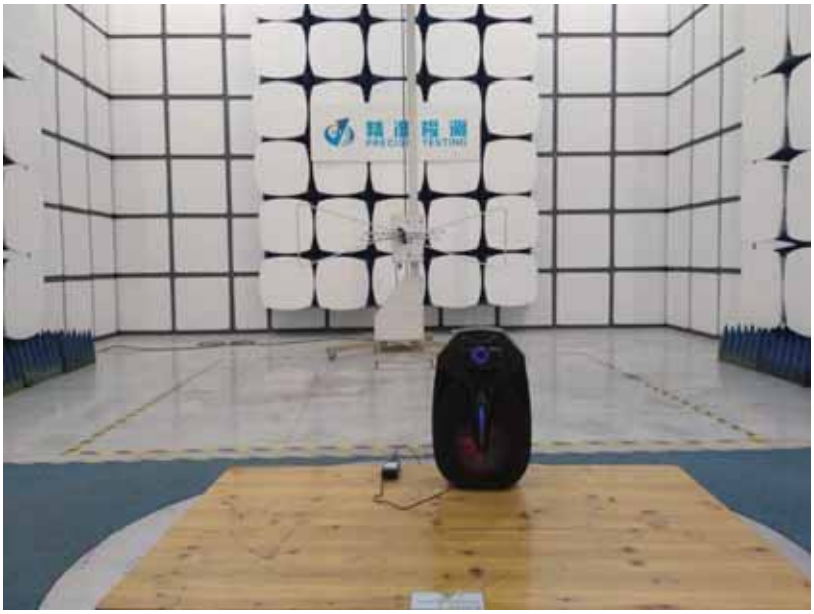

Spectrum
Ref Level 10.00 dBm
RBW 3 MHz
Att 30 dB SWT 5 ms VBW 10 MHz
1AP View
D2[1]
3.88 dB
2.925156 ms
-16.12 dBm
1.448594 ms
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
D2
CF 2.48 GHz
32001 pts
500.0 µs/

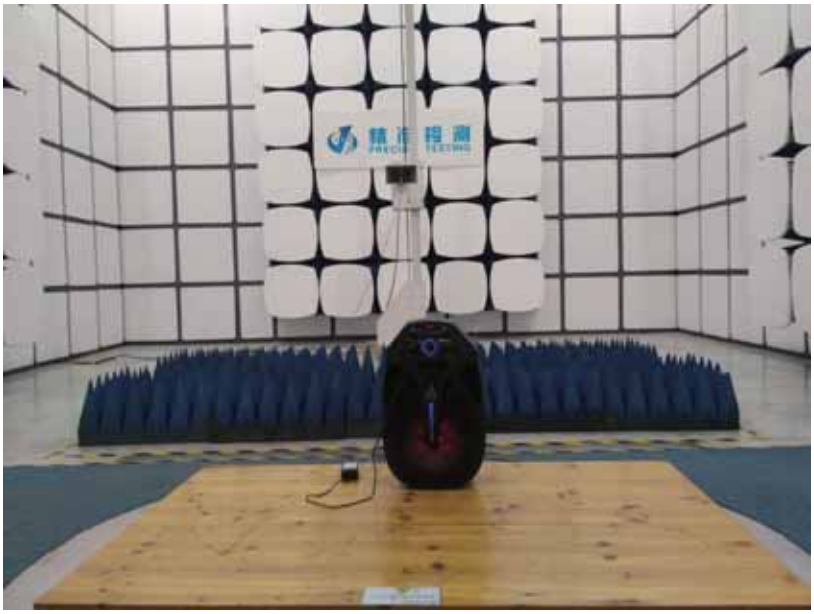
13 Antenna Requirement

According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an internal PCB Antenna, it meet the requirement of this section.

14 TEST PHOTOS

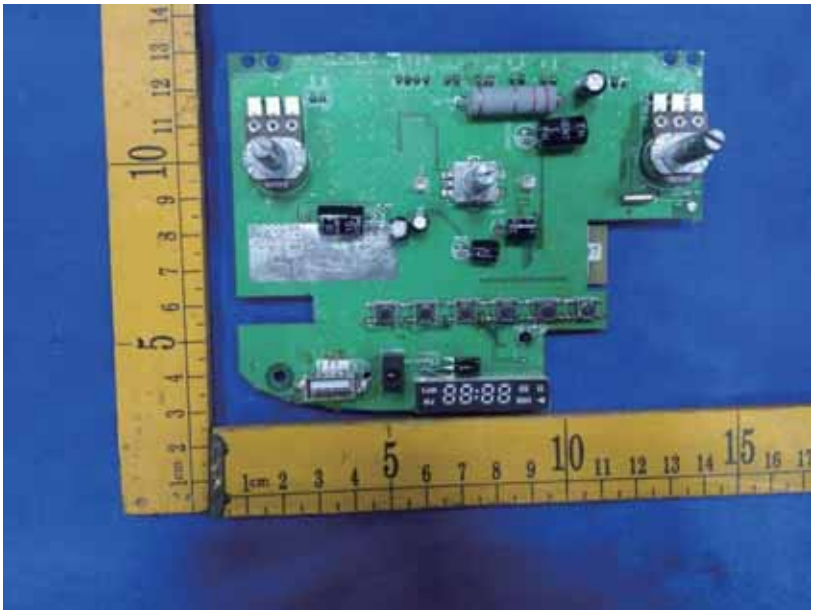


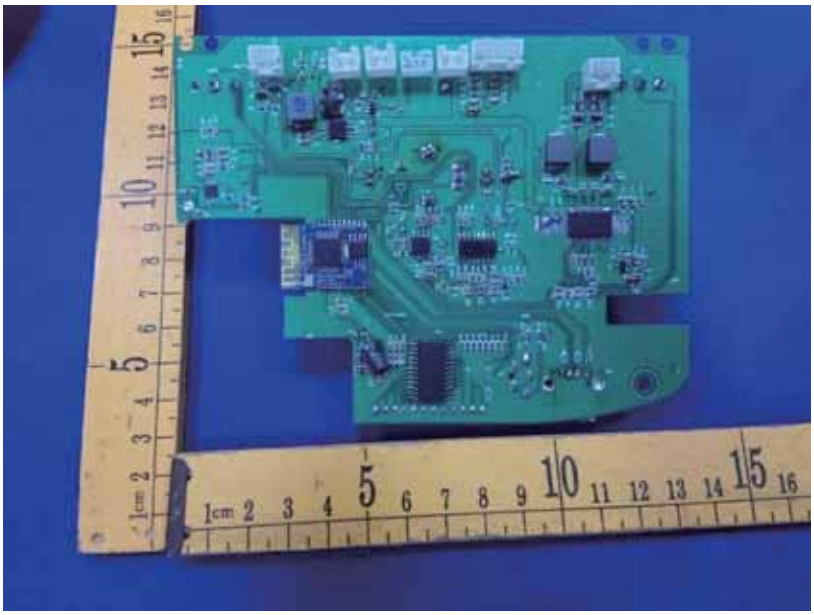


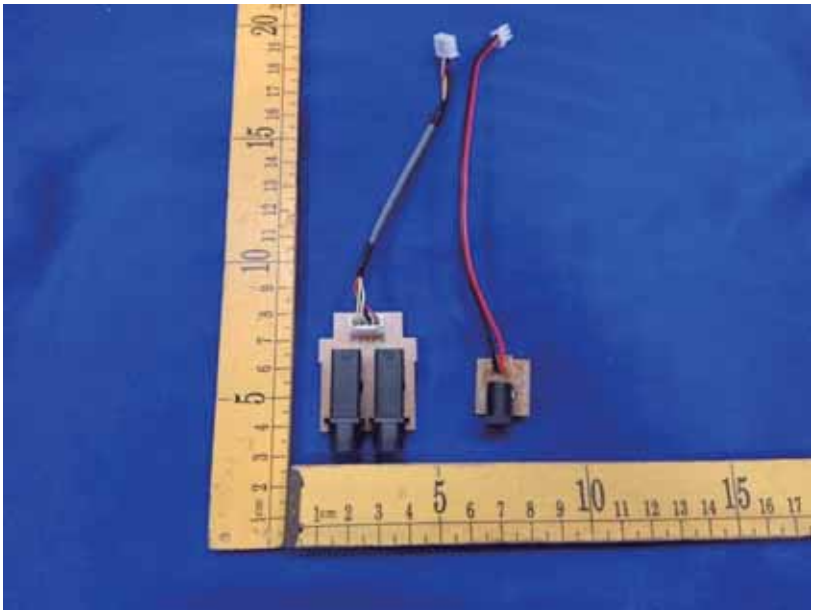


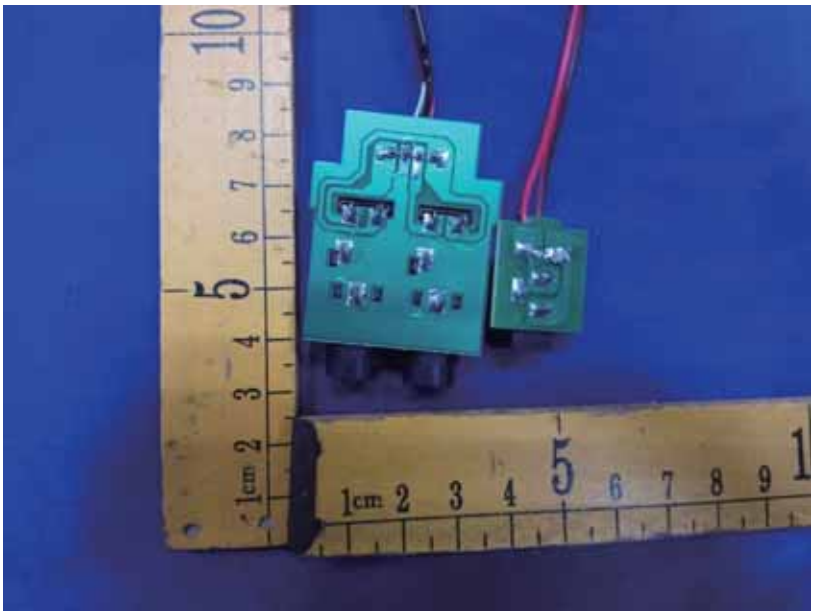
15 EUT PHOTOS

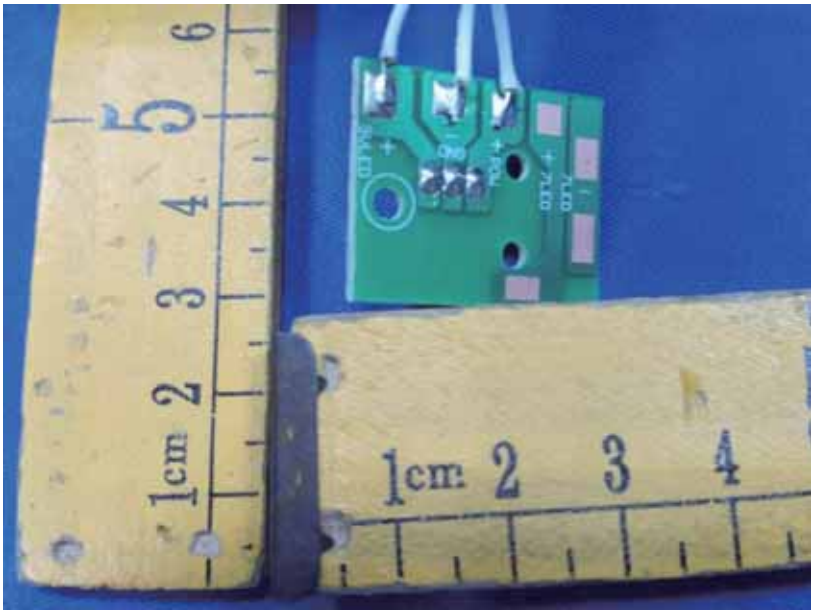

MIC
AUX
CH-
CH+
MODE/LIGHT
DC 15V
Laser808
Ridgeway
MIC VOL
VOL / MUTE
BASS VOL

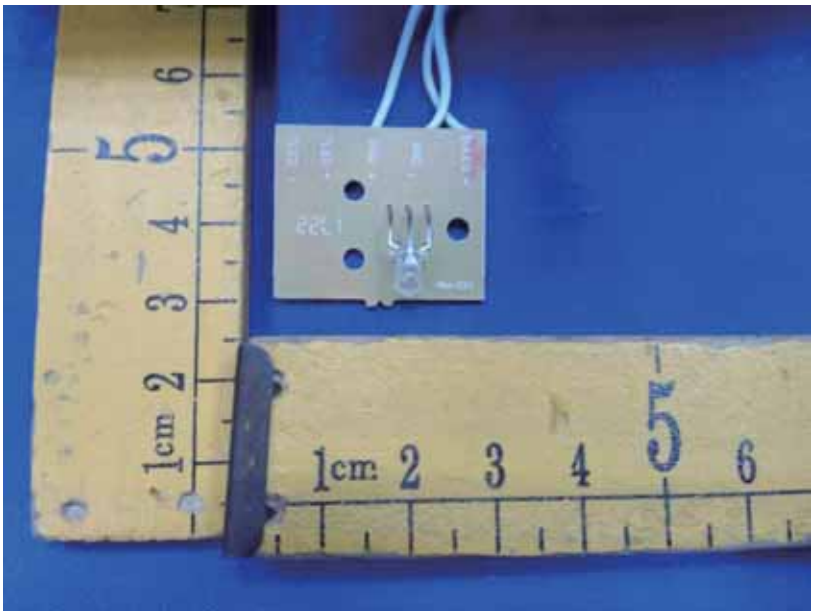


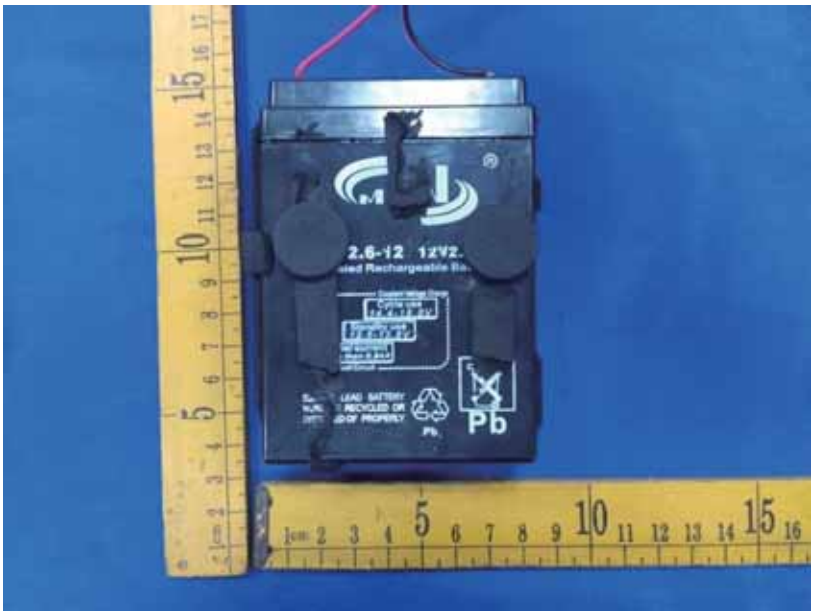


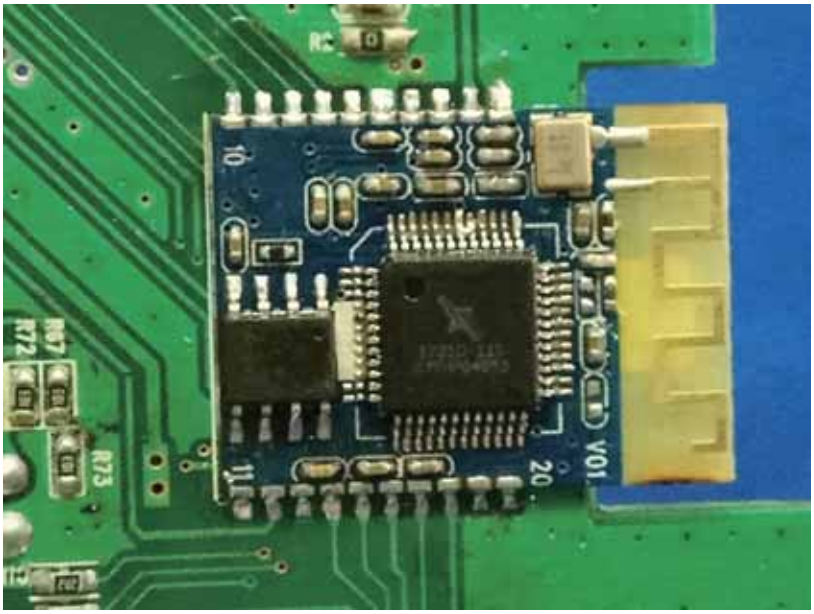





1cm 2 3 4


1cm 2 3 4 5 6


2.6-12 12V2.
Pb



********THE END REPORT********