FCC TEST REPORT

FCC ID:VIXSPKA75

Product Name	:	Karaoke System with Bluetooth
Model Name	:	SPKA75
Brand Name	:	SINGSATION
Report No.	:	PTC19071503802E-FC01

Prepared for

Voxx Accessories Corp.

3502 Woodview Trace, Suite 220, Indianapolis, IN 46268, USA

Prepared by

Dongguan Precise Testing & Certification Corp., Ltd.

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

1 TEST RESULT CERTIFICATION

Applicant	:	Voxx Accessories Corp.
Address	:	3502 Woodview Trace, Suite 220, Indianapolis, IN 46268, USA
Manufacturer	:	Dong Guan Lightion Electronics Co., LTD.
Address	:	Meilin District. Dalingshan Dongguan Guangdong ,China
Product name	:	Karaoke System with Bluetooth
Model name	:	SPKA75
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2013
Test Date	:	July 25, 2019 to August 10, 2019
Date of Issue	:	August 12, 2019
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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Test Engineer:

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager

Contents

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:

1. The EUT is powered by full-charged battery during the test.

3 TEST FACILITY

Dongguan Precise Testing & Certification Corp., Ltd.

Address: Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1

4 General Information

4.1 General Description of E.U.T.

Product Name	:	Karaoke System with Bluetooth
Model Name	:	SPKA75
Bluetooth Version	:	BT 5.0
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	79 channels
Antenna Type	:	PCB Antenna
Antenna Gain	:	0 dBi
Type of Modulation	:	GFSK, Π/4-DQPSK, 8DPSK
Power supply	:	For Adapter Model: YHSW-100100U Input: 100-240V~50/60Hz Output: 10.0 V ⎓ 1.0 A
Hardware Version	:	V1.0
Software Version	:	V1.0

4.2 Test Mode

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

The EUT has been tested under TX operating condition.

This EUT is a FHSS system, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes GFSK, Π/4-DQPSK, 8DPSK have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test.

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	-	-

Channel	Frequency(MHz)
0	2402
39	2441
78	2480

5 Equipment During Test

5.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	Sep.19, 2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Sep.19, 2019
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Sep.19, 2019
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Sep.19, 2019

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep.19, 2019
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Sep.19, 2019
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Sep.19, 2019
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep.19, 2019
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep.19, 2019
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Sep.19, 2019
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Sep.19, 2019
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Sep.19, 2019
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep.19, 2019

Radiated Emission (Test Frequency from 18GHz-25GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-26.5GHz	Aug.25, 2019
Test Receiver	R&S	ESPI	101396	9KHz-7GHz	Aug.25, 2019
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	Aug.25, 2019
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Aug.25, 2019
RF Cable	R&S	R204	R21X	1GHz-40GHz	Aug.25, 2019
Antenna Connector	Florida RF Labs	N/A	RF01#	N/A	Aug.25, 2019

Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep.19, 2019
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep.19, 2019
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep.19, 2019

5.2 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

5.3 Description of Support Units

Equipment	Model No.	Series No.
Adapter	For Adapter Model: YHSW-100100U Input: 100-240V~50/60Hz Output: 10.0 V ⎓ 1.0 A	N/A

6 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)

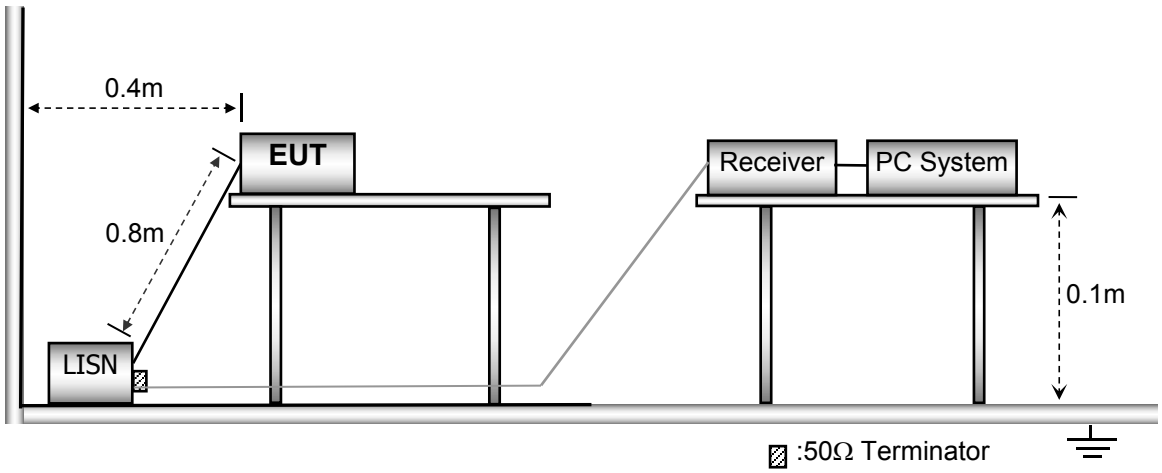
6.1 E.U.T. Operation

Operating Environment **:**

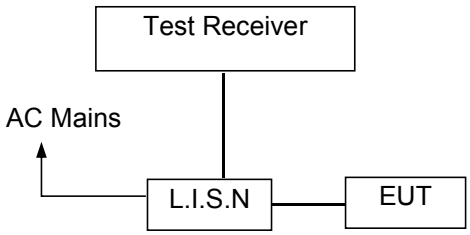
Temperature:	:	23.8 °C
Humidity:	:	47 % RH
Atmospheric Pressure:	:	100.11 kPa
Test Voltage	:	AC 120V/60Hz

6.2 EUT Setup

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



6.3 Test SET-UP (Block Diagram of Configuration)



6.4 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m 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.

6.5 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.

6.6 Measurement Description

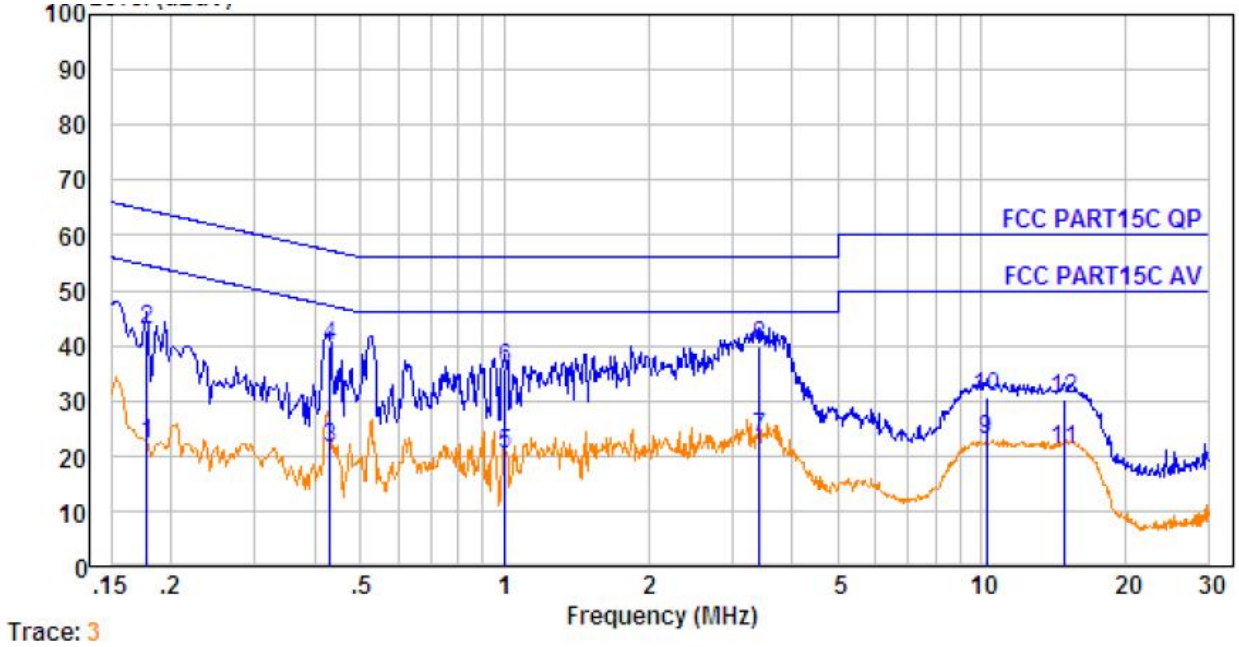
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Pass

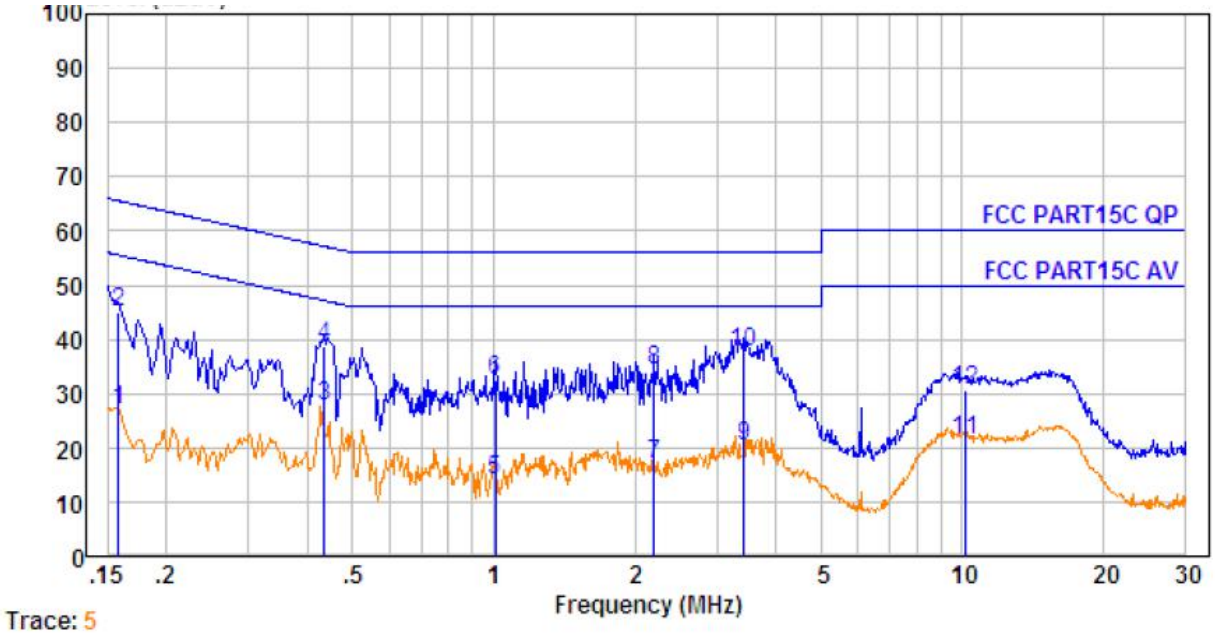
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (GFSK) are recorded in the following pages and the others modulation methods do not exceed the limits.

Line -120V/60Hz:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBµV	Emission Level dBµV	Limit dBµV	Over Limit dB	Remark
1.	0.178	0.25	9.55	12.35	22.15	54.59	-32.44	Average
2.	0.178	0.25	9.55	33.15	42.95	64.59	-21.64	QP
3.	0.431	0.41	9.75	11.38	21.54	47.24	-25.70	Average
4.	0.431	0.41	9.75	29.61	39.77	57.24	-17.47	QP
5.	1.005	0.46	9.82	10.07	20.35	46.00	-25.65	Average
6.	1.005	0.46	9.82	25.67	35.95	56.00	-20.05	QP
7.	3.417	0.47	9.89	12.84	23.20	46.00	-22.80	Average
8.	3.417	0.47	9.89	29.64	40.00	56.00	-16.00	QP
9.	10.233	0.56	9.96	12.33	22.85	50.00	-27.15	Average
10.	10.233	0.56	9.96	20.16	30.68	60.00	-29.32	QP
11.	14.907	0.56	10.01	10.46	21.03	50.00	-28.97	Average
12.	14.907	0.56	10.01	19.64	30.21	60.00	-29.79	QP

Neutral -120V/60Hz:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBµV	Emission Level dBµV	Limit dBµV	Over Limit dB	Remark
1.	0.158	0.22	9.54	17.10	26.86	55.56	-28.70	Average
2.	0.158	0.22	9.54	35.26	45.02	65.56	-20.54	QP
3.	0.435	0.41	9.78	17.52	27.71	47.15	-19.44	Average
4.	0.435	0.41	9.78	28.61	38.80	57.15	-18.35	QP
5.	1.010	0.46	9.85	3.88	14.19	46.00	-31.81	Average
6.	1.010	0.46	9.85	22.18	32.49	56.00	-23.51	QP
7.	2.201	0.47	9.89	6.69	17.05	46.00	-28.95	Average
8.	2.201	0.47	9.89	23.97	34.33	56.00	-21.67	QP
9.	3.417	0.47	9.93	9.96	20.36	46.00	-25.64	Average
10.	3.417	0.47	9.93	27.16	37.56	56.00	-18.44	QP
11.	10.125	0.56	10.00	10.78	21.34	50.00	-28.66	Average
12.	10.125	0.56	10.00	20.15	30.71	60.00	-29.29	QP

Remark|:
1. Factor = AMN Factor + Cable Loss.
   Emission Level = Reading + Factor
   Margin=Emission Level-Limit

7 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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature : 25.0 °C

Humidity : 49.5% RH

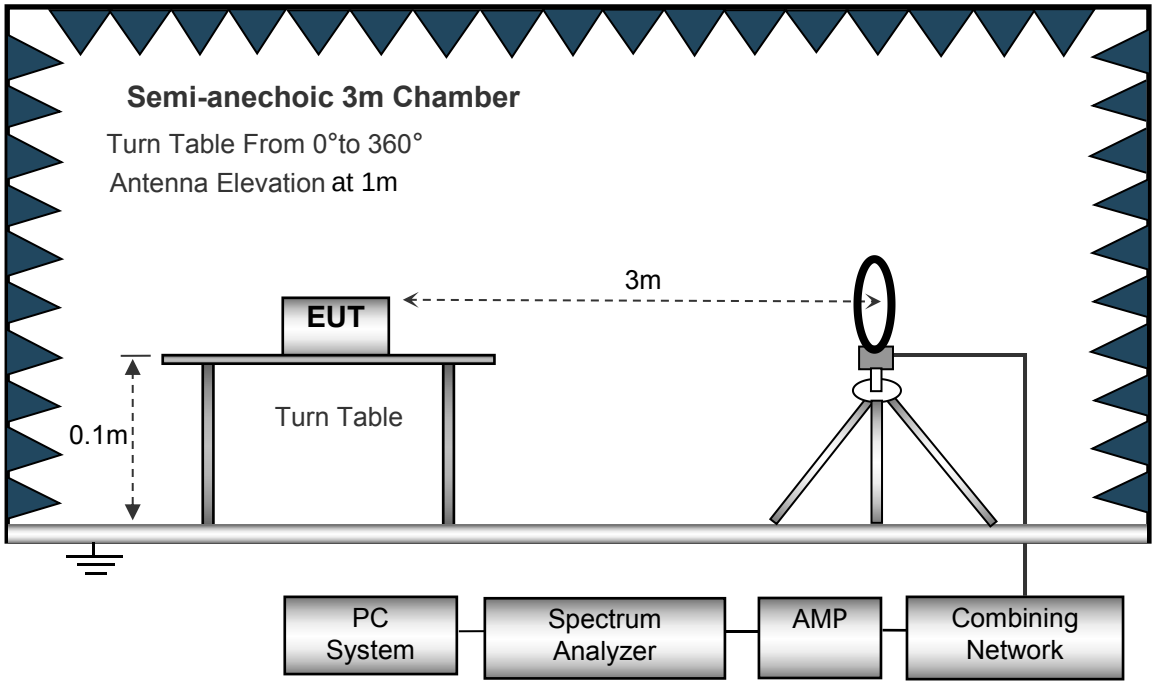
Atmospheric Pressure : 100.22kPa

Test Voltage : AC 120V/60Hz

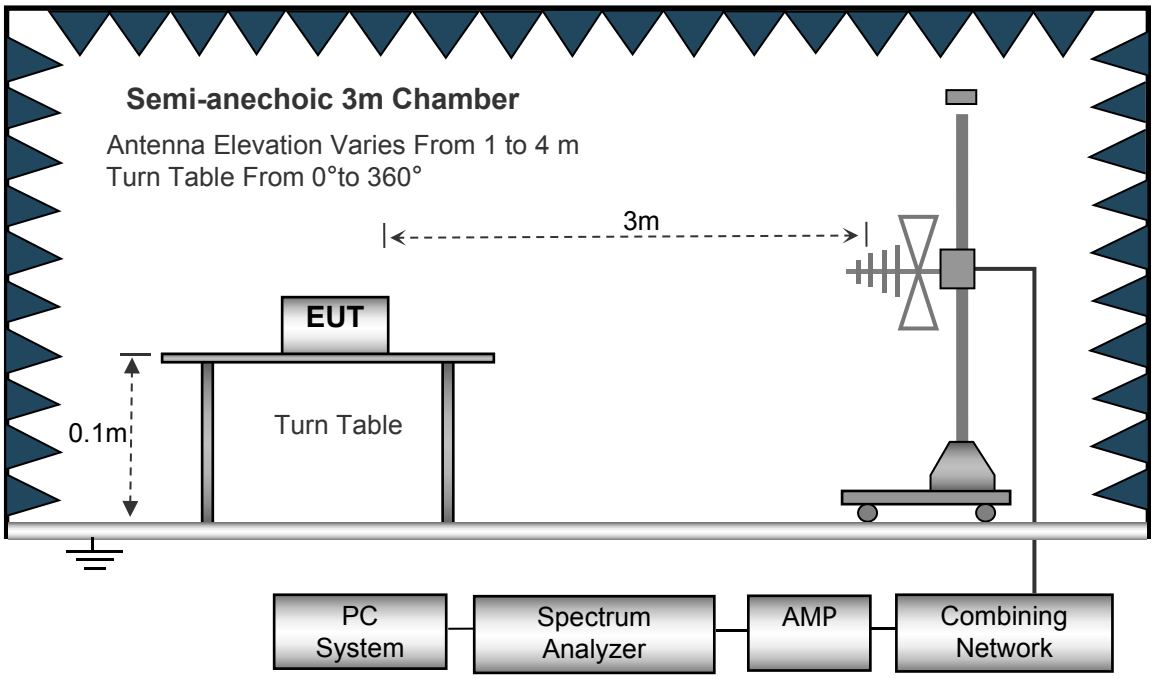
7.2 Test Setup

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

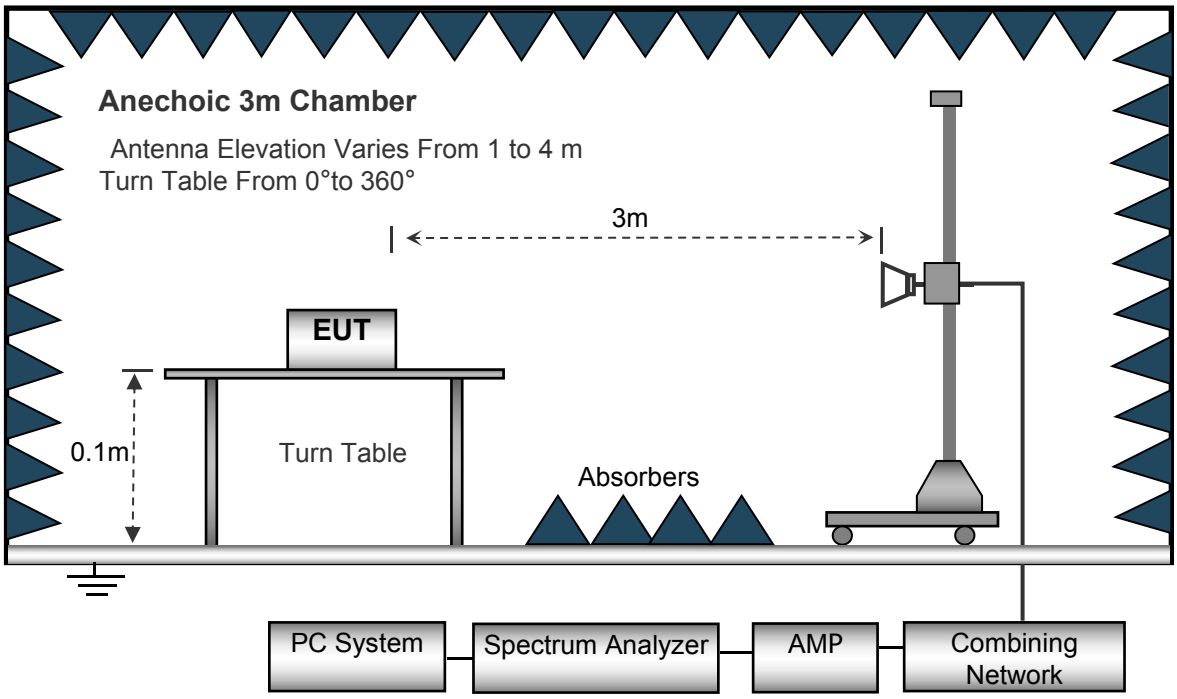
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 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

7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.

2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

5. Set to the maximum power setting and enable the EUT transmit continuously.

6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.

7. Test Procedure of measurement (For Above 1GHz):

1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).

2) Change the antenna polarization and repeat 1) with vertical polarization.

3) Make a hardcopy of the spectrum.

4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

5) Change the analyser mode to Clear/ Write and found the cone of emission.

6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.

7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.

8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

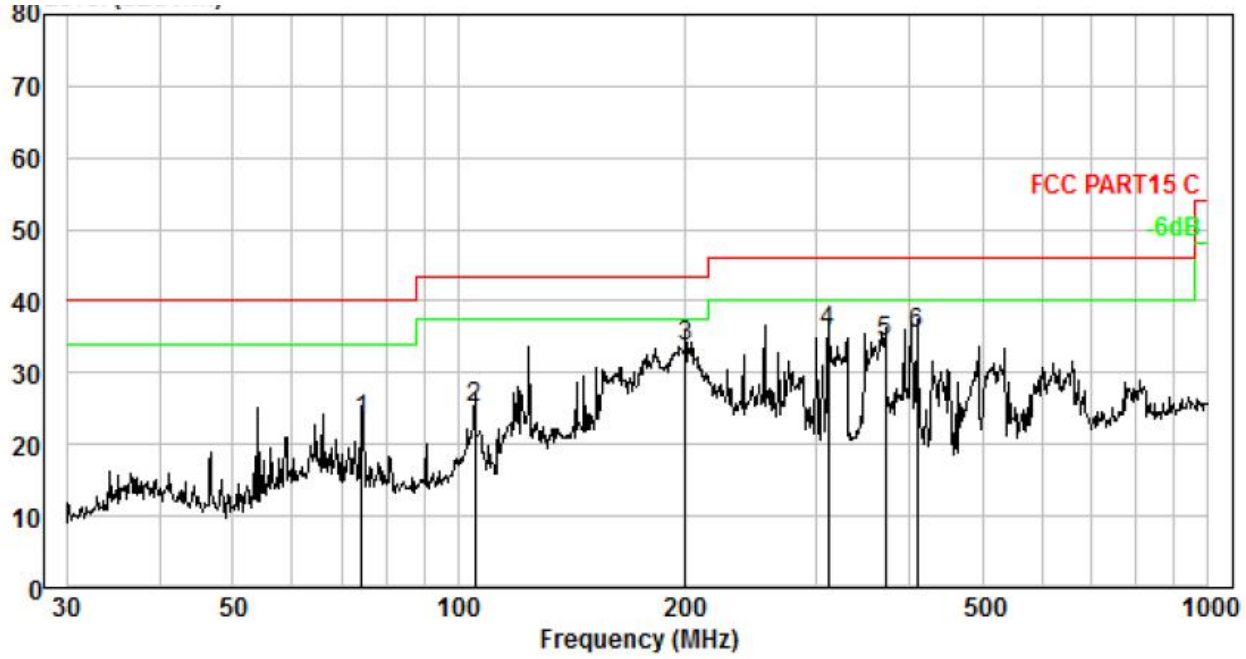
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

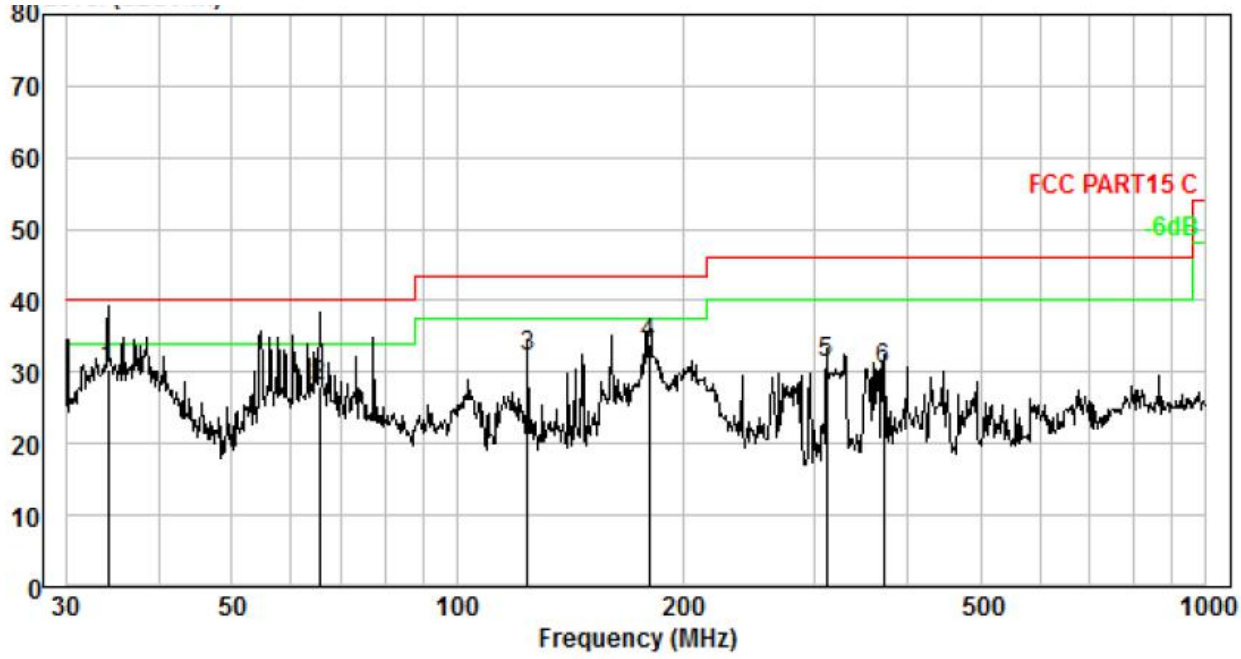
Please refer to the following test plots:

Test plot for 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.	74.396	2.76	9.88	41.10	30.29	23.45	40.00	-16.55	QP
2.	105.272	3.36	10.69	41.53	30.41	25.17	43.50	-18.33	QP
3.	200.688	4.47	10.39	49.46	30.63	33.69	43.50	-9.81	QP
4.	311.087	5.22	13.45	47.73	30.78	35.62	46.00	-10.38	QP
5.	370.702	5.53	14.66	44.94	30.84	34.29	46.00	-11.71	QP
6.	408.946	5.70	15.49	45.04	30.88	35.35	46.00	-10.65	QP

Test plot for 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.	34.156	1.43	13.34	45.70	30.02	30.45	40.00	-9.55	QP
2.	65.343	2.54	11.71	44.00	30.24	28.01	40.00	-11.99	QP
3.	124.133	3.65	12.28	46.85	30.46	32.32	43.50	-11.18	QP
4.	180.649	4.29	12.35	48.03	30.59	34.08	43.50	-9.42	QP
5.	311.087	5.22	13.45	43.51	30.78	31.40	46.00	-14.60	QP
6.	370.702	5.53	14.66	41.01	30.84	30.36	46.00	-15.64	QP

Remark|:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
   Margin=Emission Level-Limit

Test Frequency 1GHz-18GHz

Low Channel (2402MHz) Worst case GFSK								
Detector: Peak Value								
Frequency (MHz)	Reading Level (dBuV)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity (H/V)
4804	46.35	30.12	6.79	38.45	44.81	74	-29.19	V
4804	47.15	30.12	6.79	38.45	45.61	74	-28.39	H
7206	46.57	30.34	6.81	39.13	44.59	74	-29.41	V
7206	47.62	30.34	6.81	39.13	45.64	74	-28.36	H
9608	48.12	30.68	6.85	40.27	45.38	74	-28.62	V
9608	49.38	30.68	6.85	40.27	46.64	74	-27.36	H
Detector: Average Value								
4804	34.22	30.12	6.79	38.45	32.68	54	-21.32	V
4804	35.16	30.12	6.79	38.45	33.62	54	-20.38	H
7206	36.28	30.34	6.81	39.13	34.3	54	-19.7	V
7206	34.15	30.34	6.81	39.13	32.17	54	-21.83	H
9608	35.62	30.68	6.85	40.27	32.88	54	-21.12	V
9608	36.72	30.68	6.85	40.27	33.98	54	-20.02	H

Middle Channel (2441MHz) Worst case π/4-DQPSK								
Detector: Peak Value								
Frequency (MHz)	Reading Level (dBuV)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity (H/V)
4882	45.35	30.26	6.8	39.42	42.99	74	-31.01	V
4882	46.19	30.26	6.8	39.42	43.83	74	-30.17	H
7323	44.92	30.35	6.81	40.23	41.85	74	-32.15	V
7323	47.23	30.35	6.81	40.23	44.16	74	-29.84	H
9764	45.18	30.73	6.88	41.25	41.54	74	-32.46	V
9764	46.69	30.73	6.88	41.25	43.05	74	-30.95	H
Detector: Average Value								
4882	35.95	30.26	6.8	39.42	33.59	54	-20.41	V
4882	36.08	30.26	6.8	39.42	33.72	54	-20.28	H
7323	34.18	30.35	6.81	40.23	31.11	54	-22.89	V
7323	36.27	30.35	6.81	40.23	33.2	54	-20.8	H
9764	36.26	30.73	6.88	41.25	32.62	54	-21.38	V

9764	37.15	30.73	6.88	41.25	33.51	54	-20.49	H
Middle Channel (2480MHz) Worst case π/4-DQPSK								
Detector: Peak Value								
Frequency (MHz)	Reading Level (dBuV)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity (H/V)
4960	47.36	30.41	6.85	41.02	43.6	74	-30.4	V
4960	48.25	30.41	6.85	41.02	44.49	74	-29.51	H
7440	48.16	30.56	6.91	41.23	44.4	74	-29.6	V
7440	48.6	30.56	6.91	41.23	44.84	74	-29.16	H
9920	49.12	31.06	6.93	42.05	45.06	74	-28.94	V
9920	49.35	31.06	6.93	42.05	45.29	74	-28.71	H
Detector: Average Value								
4960	40.28	30.41	6.85	41.02	36.52	54	-17.48	V
4960	38.16	30.41	6.85	41.02	34.4	54	-19.6	H
7440	37.24	30.56	6.91	41.23	33.48	54	-20.52	V
7440	38.06	30.56	6.91	41.23	34.3	54	-19.7	H
9920	37.16	31.06	6.93	42.05	33.1	54	-20.9	V
9920	38.65	31.06	6.93	42.05	34.59	54	-19.41	H

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

Test Frequency: From 18GHz to 25GHz

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

8 CONDUCTED BAND EDGE EMISSION

8.1 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.

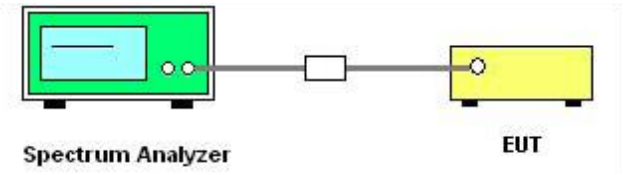
8.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

. For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 – 2403 MHz Upper Band Edge: 2479 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

8.3 TEST SETUP



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.

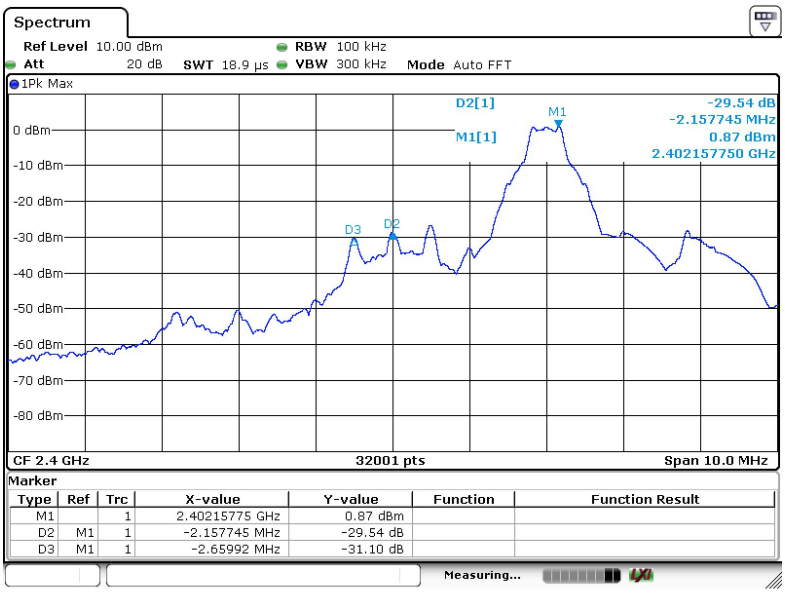
8.4 EUT OPERATION CONDITIONS

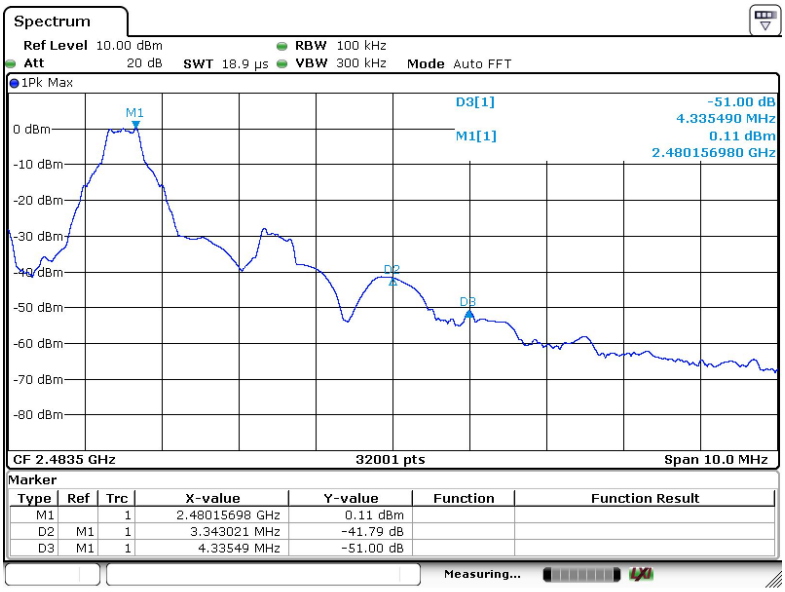
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 TEST RESULTS

For Non-Hopping Mode:

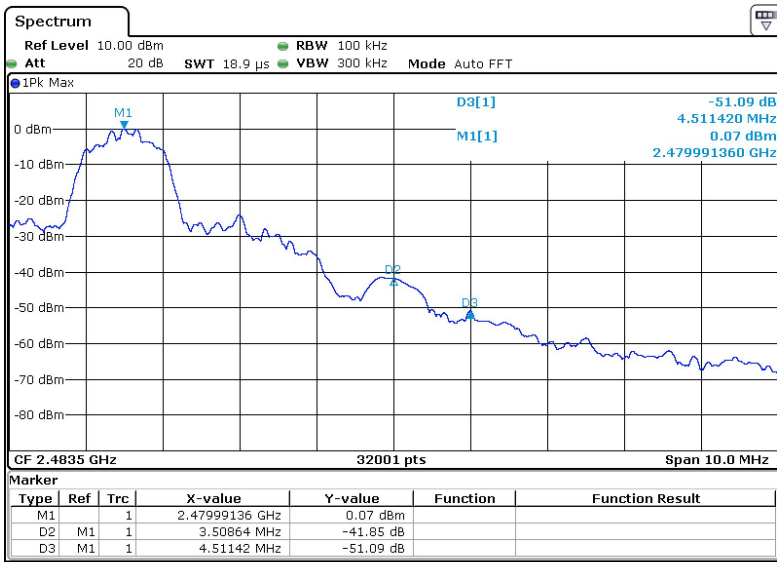
GFSK



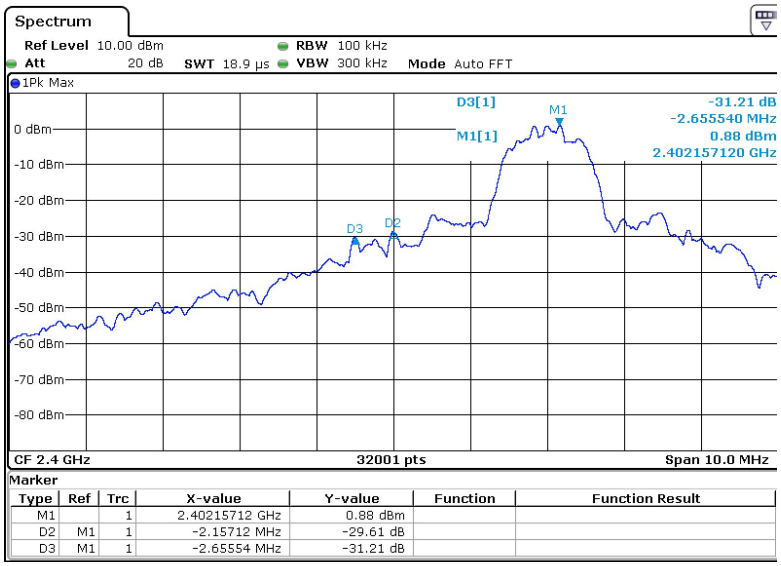


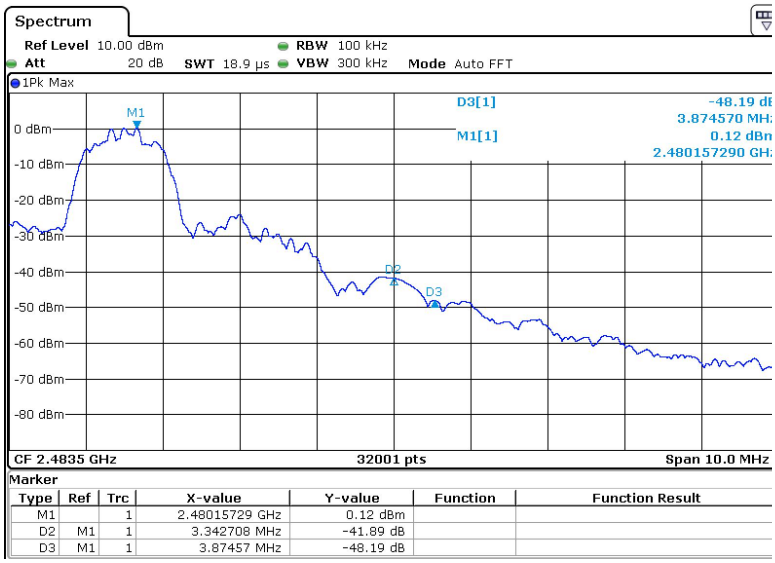
π/4-DQPSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-31.81 dB
-2.483050 MHz
M1[1]
0.83 dBm
2.401989310 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 2.40198931 GHz 0.83 dBm
D2 M1 1 -1.989313 MHz -29.52 dB
D3 M1 1 -2.48305 MHz -31.81 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-51.09 dB
4.511420 MHz
M1[1]
0.07 dBm
2.479991360 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 2.47999136 GHz 0.07 dBm
D2 M1 1 3.50864 MHz -41.85 dB
D3 M1 1 4.51142 MHz -51.09 dB

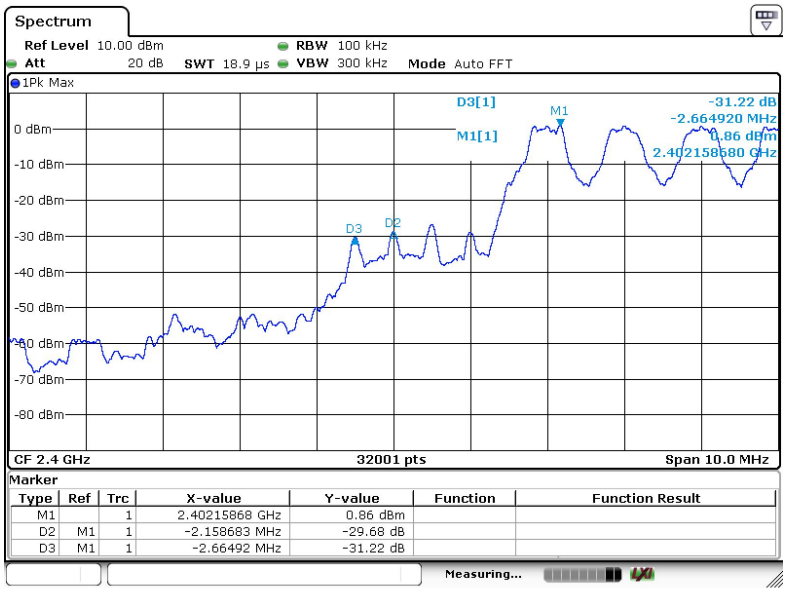
8DPSK

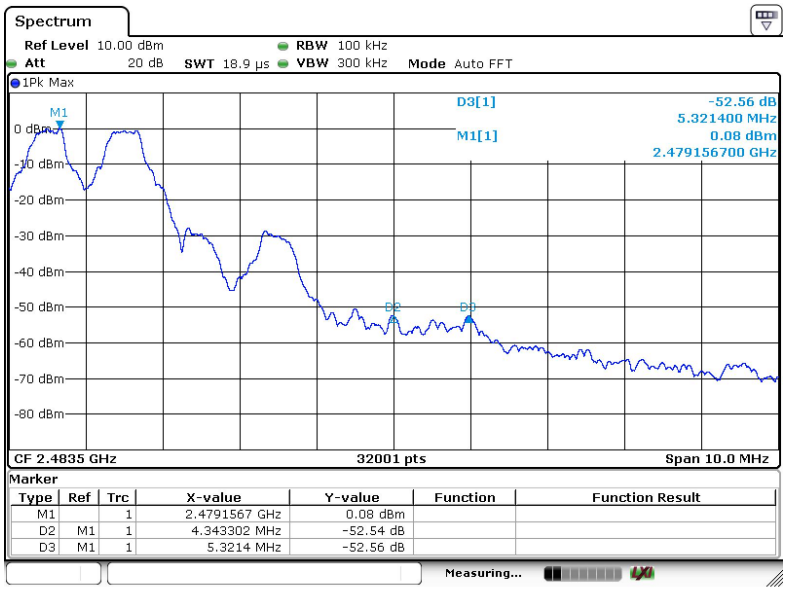

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-31.21 dB
-2.655540 MHz
M1[1]
0.88 dBm
2.402157120 GHz
M1
D3
D2
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40215712 GHz 0.88 dBm
D2 M1 1 -2.15712 MHz -29.61 dB
D3 M1 1 -2.65554 MHz -31.21 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-48.19 dB
3.874570 MHz
M1[1]
0.12 dBm
2.480157290 GHz
M1
D2
D3
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 2.48015729 GHz 0.12 dBm
D2 M1 1 3.342708 MHz -41.89 dB
D3 M1 1 3.87457 MHz -48.19 dB

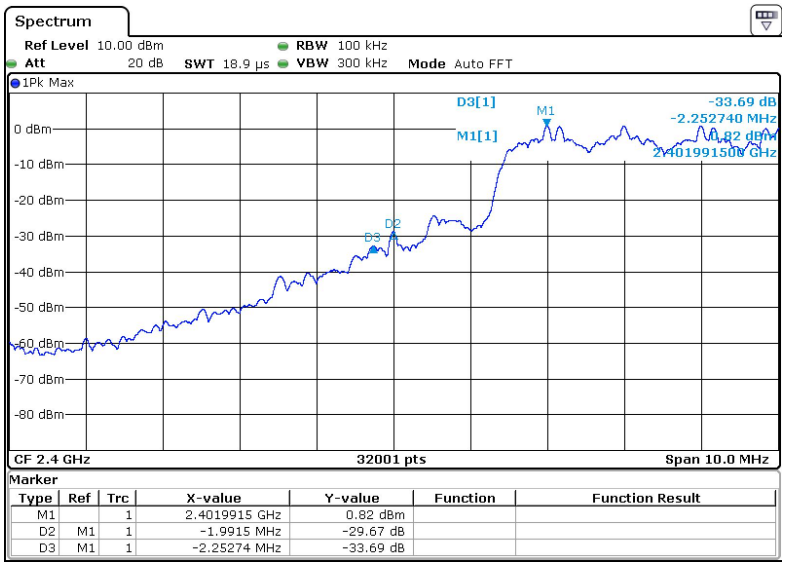
For Hopping Mode:

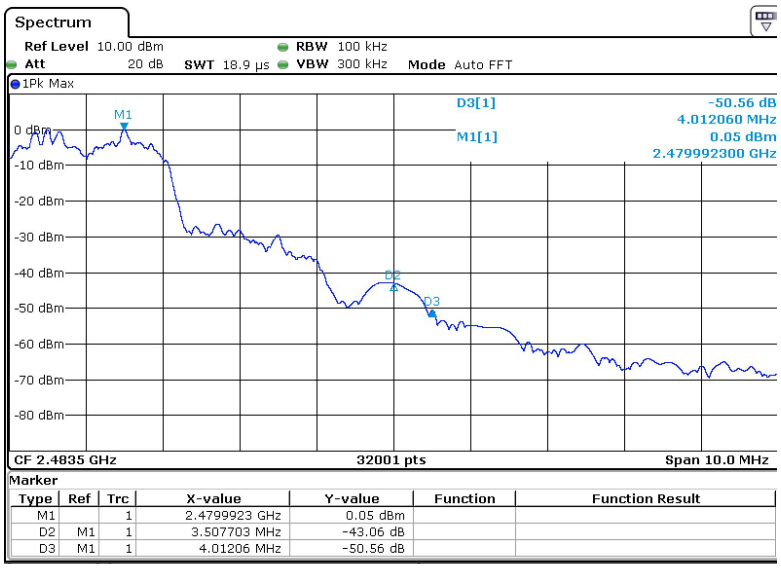
GFSK



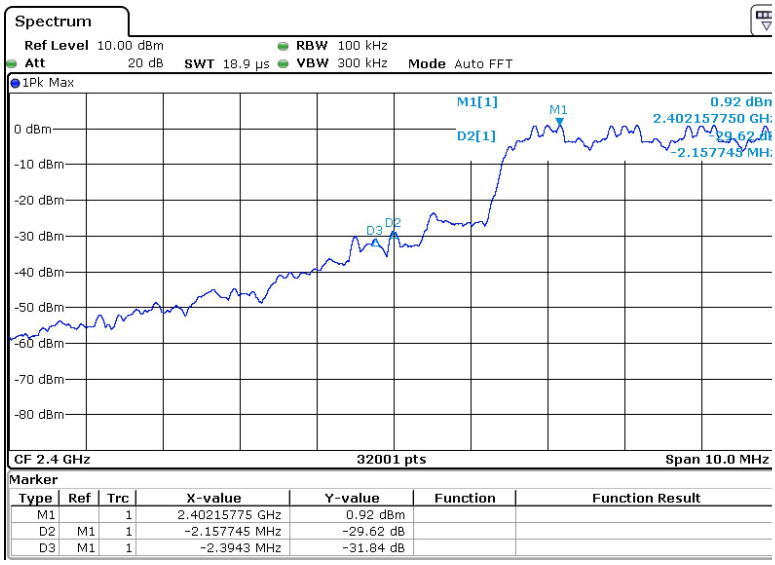


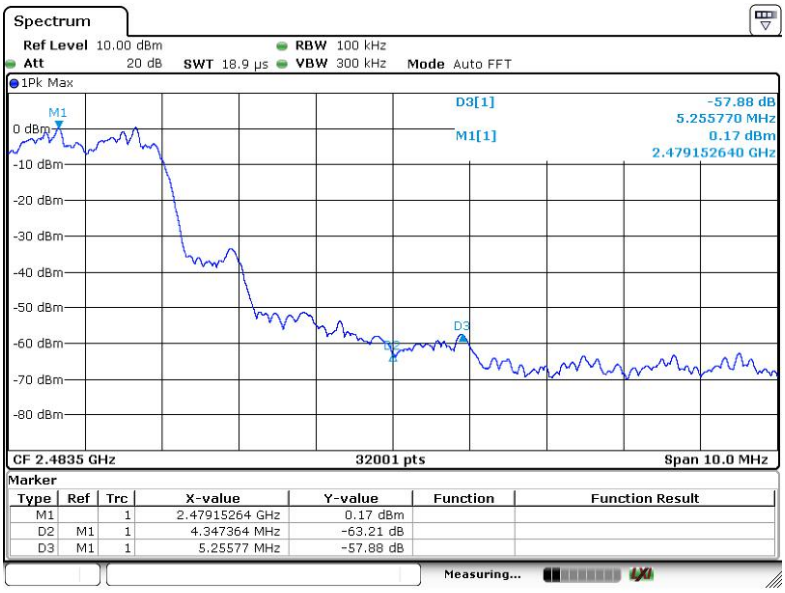
π/4-DQPSK


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-33.69 dB
-2.252740 MHz
M1[1]
0.82 dBm
2.401991500 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 2.4019915 GHz 0.82 dBm
D2 M1 1 -1.9915 MHz -29.67 dB
D3 M1 1 -2.25274 MHz -33.69 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-50.56 dB
4.012060 MHz
M1[1]
0.05 dBm
2.479992300 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 2.4799923 GHz 0.05 dBm
D2 M1 1 3.507703 MHz -43.06 dB
D3 M1 1 4.01206 MHz -50.56 dB

8DPSK

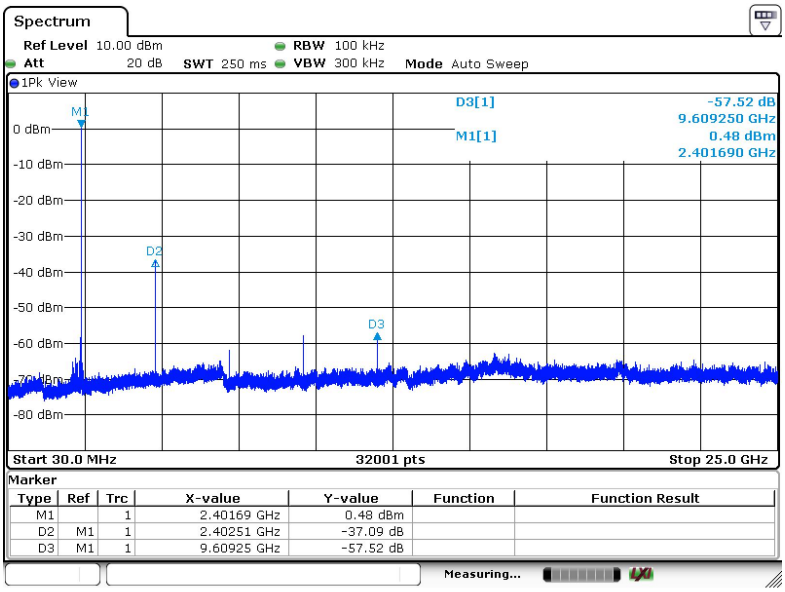

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
0.92 dBm
2.402157750 GHz
D2[1]
-29.62 dB
-2.157743 MHz
M1
D2
D3
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4 GHz
32001 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40215775 GHz 0.92 dBm
D2 M1 1 -2.157745 MHz -29.62 dB
D3 M1 1 -2.3943 MHz -31.84 dB


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
D3[1]
-57.88 dB
5.255770 MHz
M1[1]
0.17 dBm
2.479152640 GHz
M1
D3
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 2.47915264 GHz 0.17 dBm
D2 M1 1 4.347364 MHz -63.21 dB
D3 M1 1 5.25577 MHz -57.88 dB
Measuring...

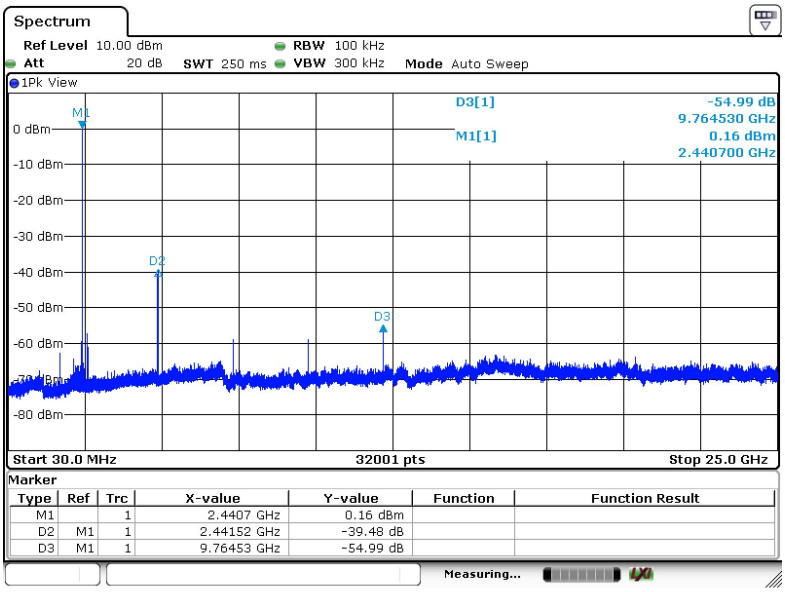
For Conduct spurious emissions

GFSK

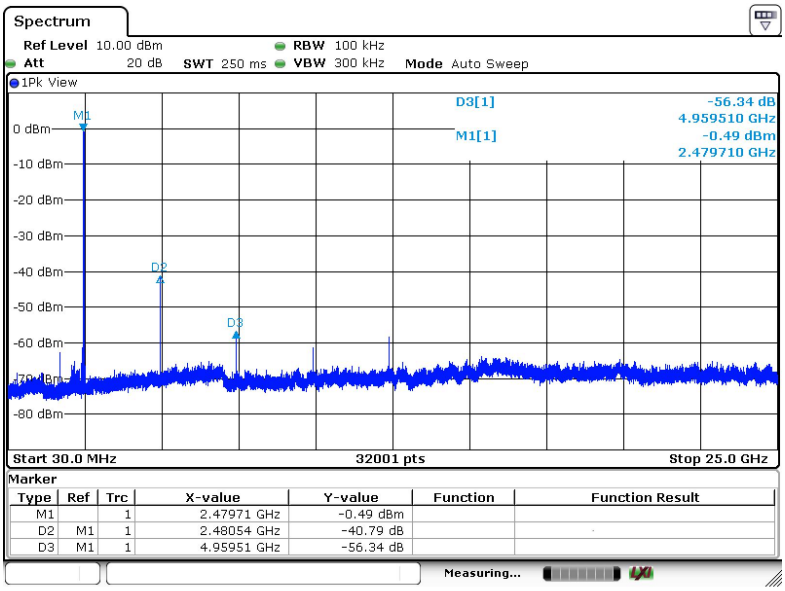
Low Channel



Middle Channel

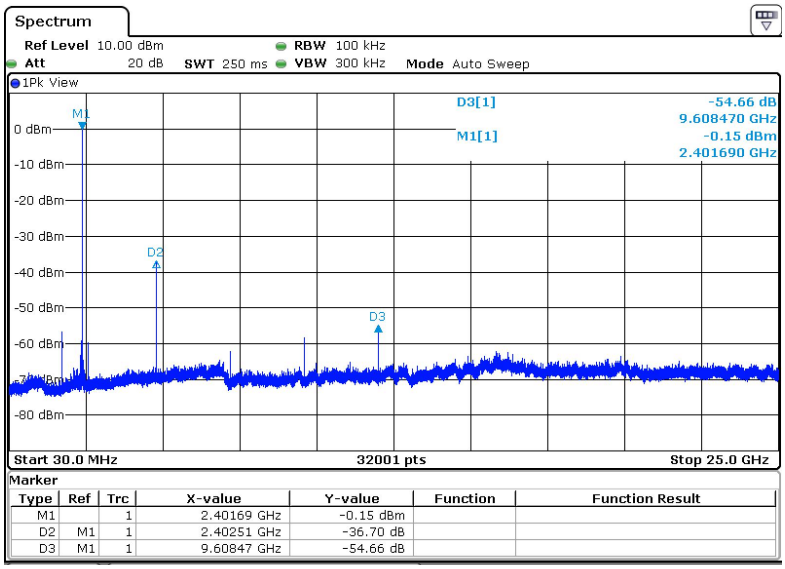


High Channel

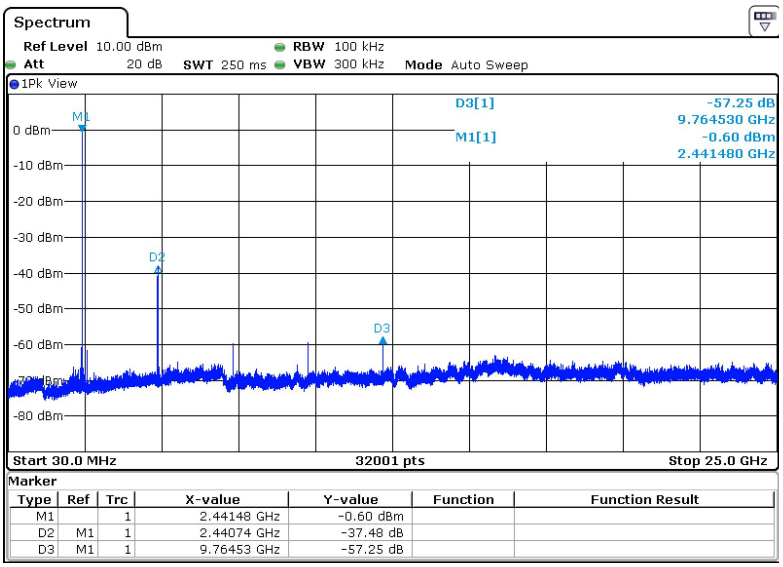


π/4-DQPSK

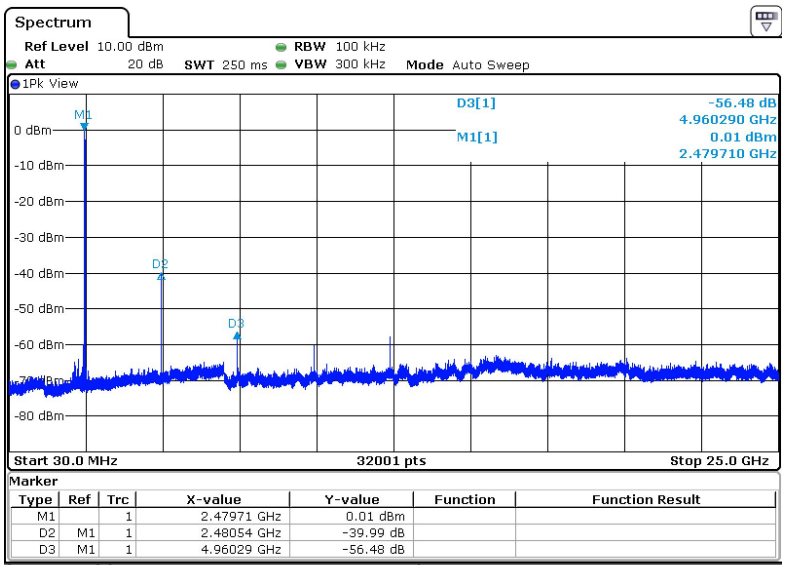
Low Channel



Middle Channel

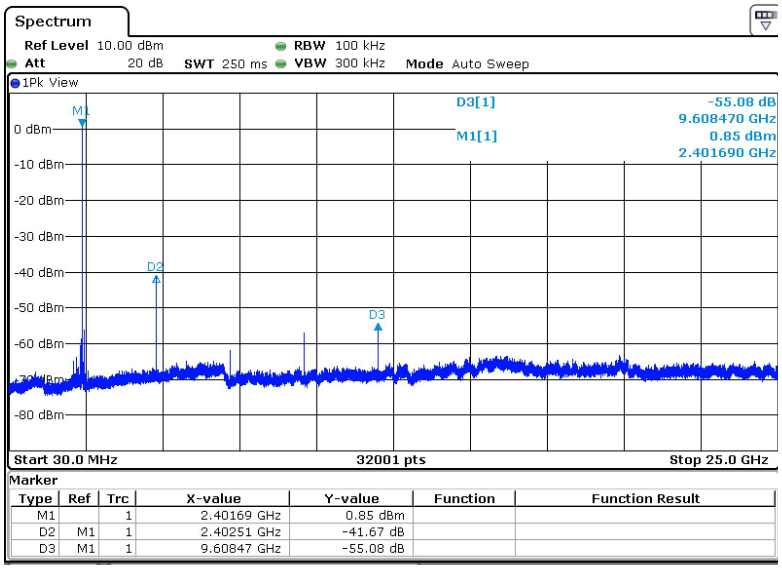


High Channel

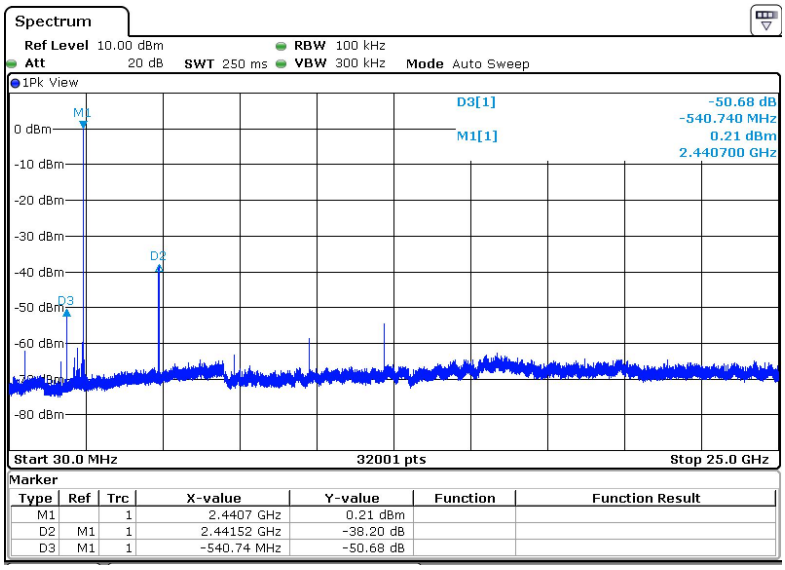


8DPSK

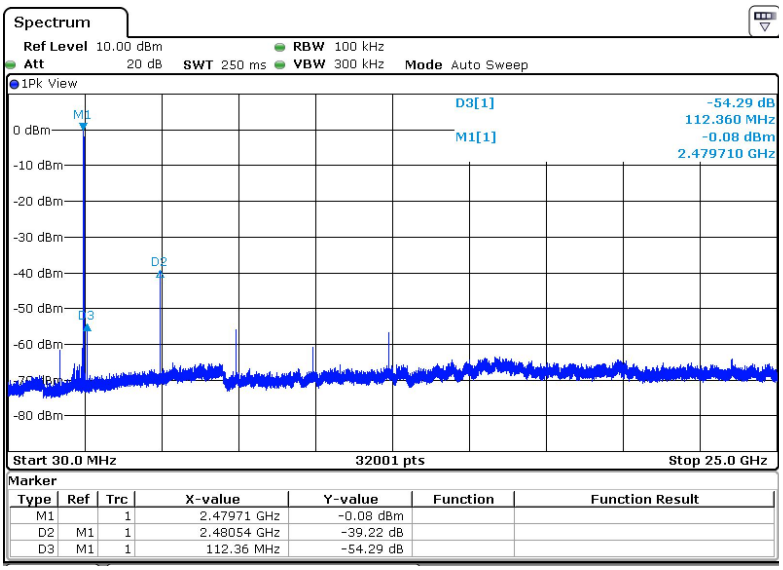
Low Channel



Middle Channel



High Channel


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 250 ms
VBW 300 kHz
Mode Auto Sweep
1Pk View
D3[1]
-54.29 dB
112.360 MHz
M1[1]
-0.08 dBm
2.479710 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
Start 30.0 MHz
32001 pts
Stop 25.0 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47971 GHz -0.08 dBm
D2 M1 1 2.48054 GHz -39.22 dB
D3 M1 1 112.36 MHz -54.29 dB