FCC CERTIFICATION TEST REPORT

For

FCC ID: 2AR3Z-UNA-X

IC: 24615-UNAX

Report Reference No. ..... :	19EFAS09065 2421
A2LA Cert. No ..... :	4893.01
Date of issue ..... :	2019-09-12
Testing Laboratory ..... :	DongGuan ShuoXin Electronic Technology Co., Ltd.
Address ..... :	Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China
Applicant's name ..... :	POW AUDIO INC
Address ..... :	116 John Street， Suite 415 ，Lowell， MA 01582， USA
Manufacturer ..... :	ShenZhen JiLongChang Electronics Co.,Ltd

Test specification:

Test item description ..... :	Portable Speaker
Trade Mark ..... :	POW AUDIO INC
Model/Type reference ..... :	POW Una X
Ratings ..... :	DC 5V from adapter or DC 7.4V from battery

Responsible Engineer : Smile Wang

Smile Wang

Authorized Signatory: King Wang

King Wang

TABLE OF CONTENTS

TEST REPORT DECLARE

Applicant	:	POW AUDIO INC
Address	:	116 John Street， Suite 415 ，Lowell， MA 01582， USA
Equipment under Test	:	Portable Speaker
Test Model No	:	POW Una X
Manufacturer	:	ShenZhen JiLongChang Electronics Co.,Ltd
Address	:	134 Gangzai street,Furong Industrial park,Shajing,Bao'an District,Shenzhen City,Guangdong province,China

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C (15.247), RSS-247 Issue 2: February 2017, RSS-Gen Issue 5: March 2019
Test procedure used: ANSI C63.10:2013, DA 00-705.

We Declare:

The equipment described above is tested by DongGuan ShuoXin Electronic Technology Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and DongGuan ShuoXin Electronic Technology Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	19EFAS09065 2421		
Date of Test:	2019-09-04	**Date of Report**:	2019-09-12

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of DongGuan ShuoXin Electronic Technology Co., Ltd.

1. SUMMARY OF TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	**Standard**	**Results**
Bandwidth	FCC Part 15: 15.247(a)(1) RSS-Gen clause 6.7 & ANSI C63.10: Clause 6.9	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) RSS-247 Issue 2:5.1b)	PASS
Number Of Hopping Frequency	FCC Part 15: 15.247(a)(1)(iii) RSS-247 Issue 2:5.1d)	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii) RSS-247 Issue 2:5.1d)	PASS
Maximum Output Power	FCC Part 15: 15.247(b)(1) RSS-247 Issue 2 5.4 b)	PASS
Band Edge Emission	FCC Part 15: 15.247(d) RSS-247 clause 5.5	PASS
Radiated Spurious Emissions	FCC Part 15.205 / 15.209 RSS-Gen clause 8.9 8.10	PASS
Antenna requirement	FCC Part 15: 15.203 RSS-Gen clause 6.8	PASS
Conducted Emission	FCC Part 15.207 RSS-Gen clause 8.8	PASS

2. GENERAL TEST INFORMATION

2.1. DESCRIPTION OF EUT

EUT* Name	:	Portable Speaker
Model Number	:	POW Una X
EUT function description	:	Portable Speaker
Power supply	:	DC 5V from adapter or DC 7.4V from battery
Adaptor		N/A
Operation frequency	:	2402-2480MHz
Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Antenna Type	:	PCB Antenna, maximum PK gain:0 dBi
Date of Receipt	:	2019-09-04
Sample Type	:	N/A

2.2. ACCESSORIES OF EUT

Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.3. ASSISTANT EQUIPMENT USED FOR TEST

Description of Assistant equipment	Manufacturer	Model number or Type	EMC Compliance	SN
/	/	/	/	/

2.4. BLOCK DIAGRAM OF EUT CONFIGURATION FOR TEST

The EUT has been tested as an independent unit. The following support were used to form a representative test configuration during the tests.

Remark: This product supports GFSK, π/4-DQPSK, 8DPSK running at 1,2,3Mbps.

Tested mode, channel, and data rate information			
Mode	data rate (Mpbs) (see Note)	Channel	Frequency (MHz)
GFSK	1	Low :CH0	2402
	1	Middle: CH39	2441
	1	High: CH78	2480
π/4-DQPSK	2	Low :CH0	2402
	2	Middle: CH39	2441
	2	High: CH78	2480
8DPSK	3	Low :CH0	2402
	3	Middle: CH39	2441
	3	High: CH78	2480
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			

2.5. TEST ENVIRONMENT CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.6. MEASUREMENT UNCERTAINTY

Test Item	Uncertainty
Uncertainty for Conduction emission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	±0.048kHz
Uncertainty for conducted RF Power	±0.32dB

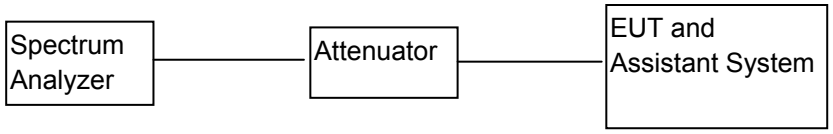
Note：This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 20DB BANDWIDTH &99% BANDWIDTH

3.1. TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/25/2020	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2019/12/17	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2019/12/17	1 Year
4	Spectrum analyzer	R&S	FSV40	101470	2020/06/28	1 Year

3.2. BLOCK DIAGRAM OF TEST SETUP



3.3. LIMITS

No limit requirement.

3.4. TEST PROCEDURE

(1) Configure EUT and assistant system according clause 2.4 and 3.2.

(2) Connect EUT's antenna output to spectrum analyzer by RF cable.

(3) Configure EUT work in test mode as stated in clause 2.4.

(4) Set the spectrum analyzer as follows:

RBW:	30KHz
VBW:	100KHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode:	Max hold

(5) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB and 99% bandwidth relative to the maximum level measured in the fundamental emission.

3.5. TEST RESULT

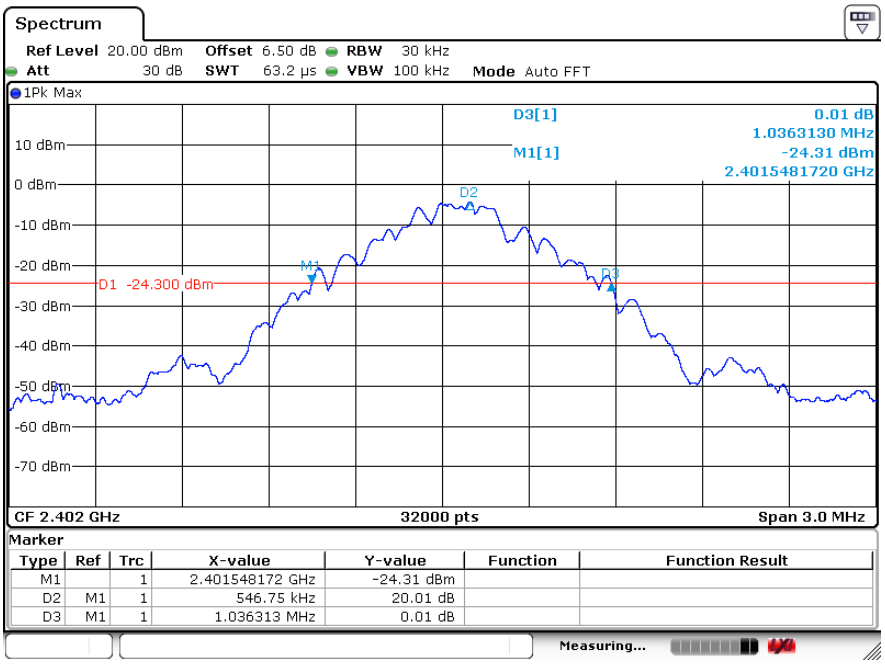
Mode	Freq (MHz)	20dB (MHz)	99%OBW (MHz)	Conclusion
GFSK	2402	1.036	0.923	PASS
	2441	1.037	0.925	PASS
	2480	1.038	0.921	PASS

Mode	Freq (MHz)	20dB (MHz)	99%OBW (MHz)	Conclusion
π/4-DQPSK	2402	1.353	1.197	PASS
	2441	1.359	1.198	PASS
	2480	1.358	1.200	PASS

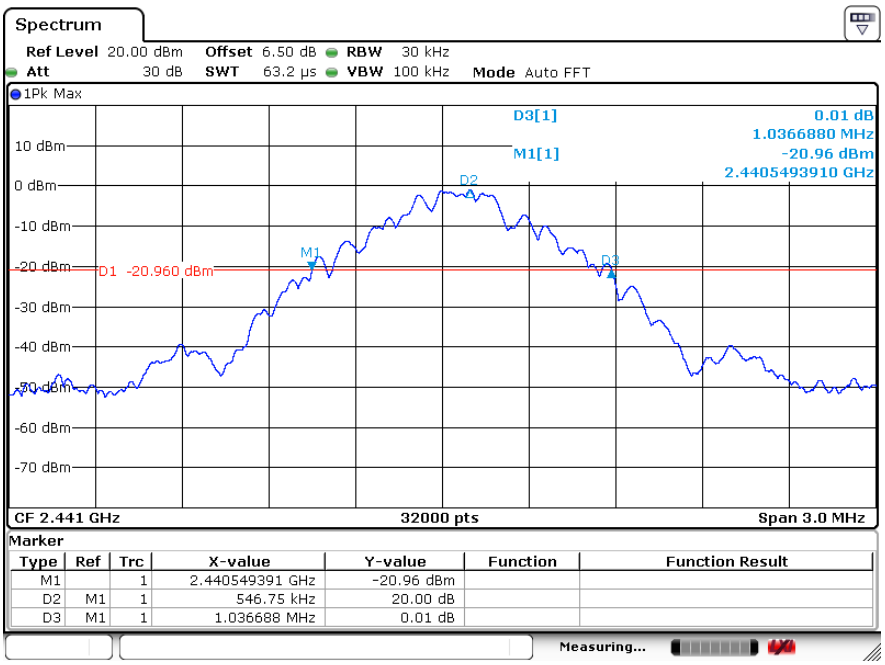
Mode	Freq (MHz)	20dB (MHz)	99%OBW (MHz)	Conclusion
8DPSK	2402	1.297	1.183	PASS
	2441	1.301	1.184	PASS
	2480	1.300	1.186	PASS

3.6. ORIGINAL TEST DATA

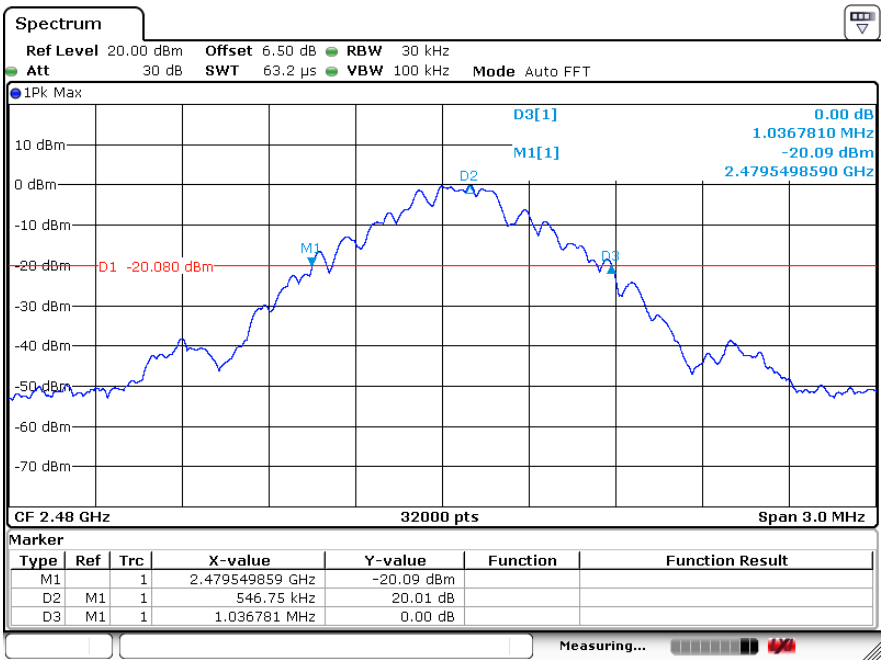
GFSK 2402MHZ



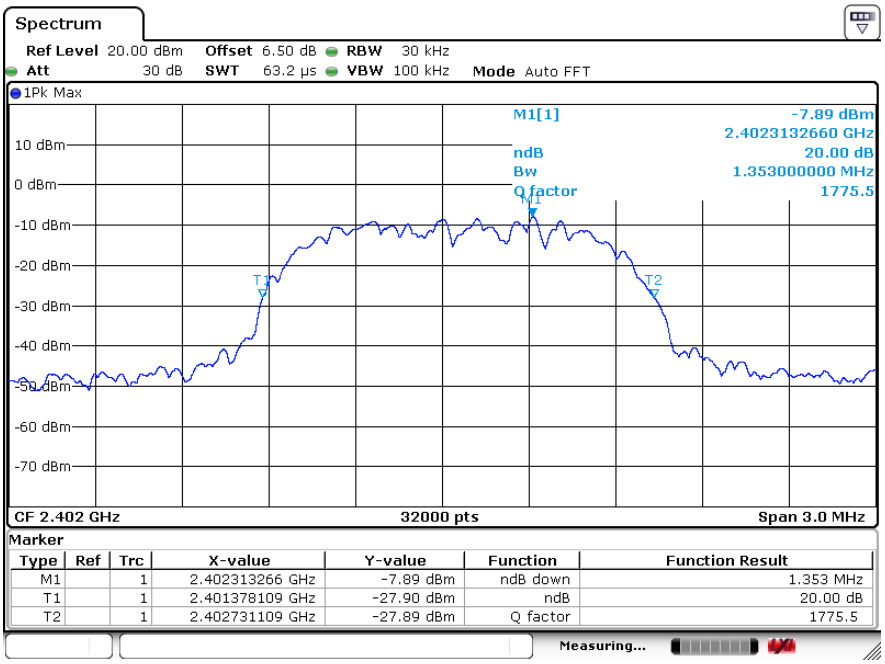
GFSK 2441MHZ



GFSK 2480MHZ



П/4-DQPSK 2402MHZ



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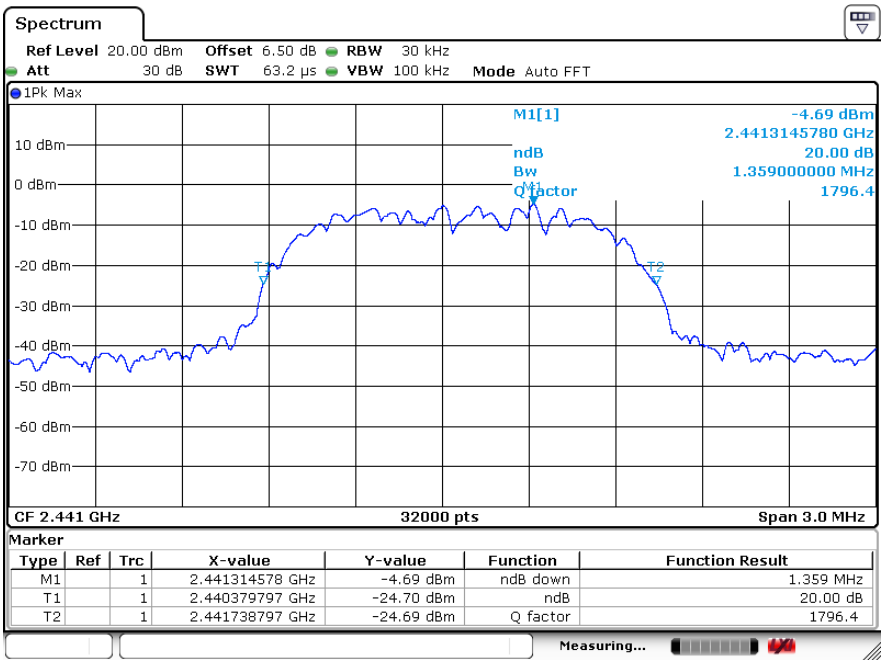
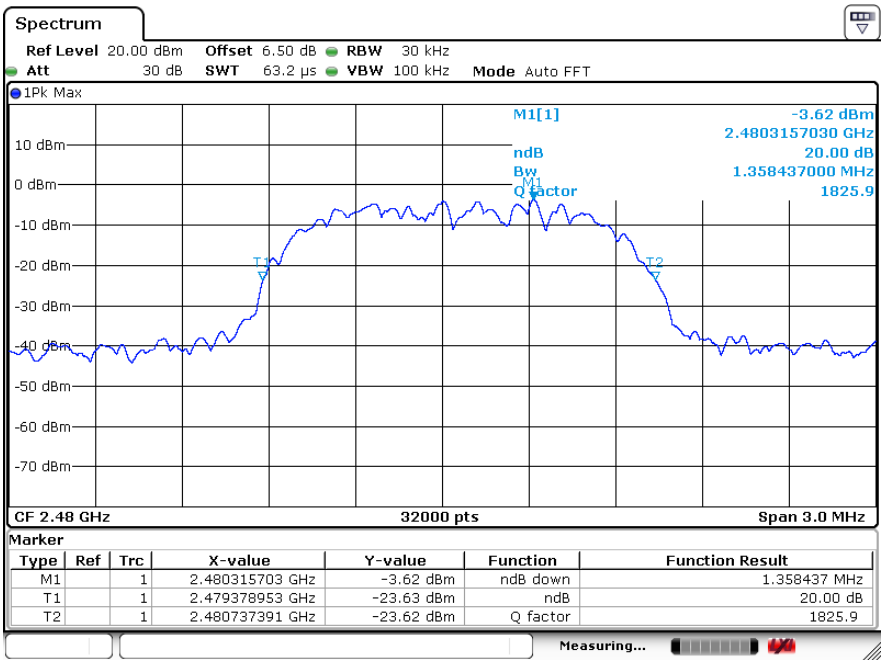
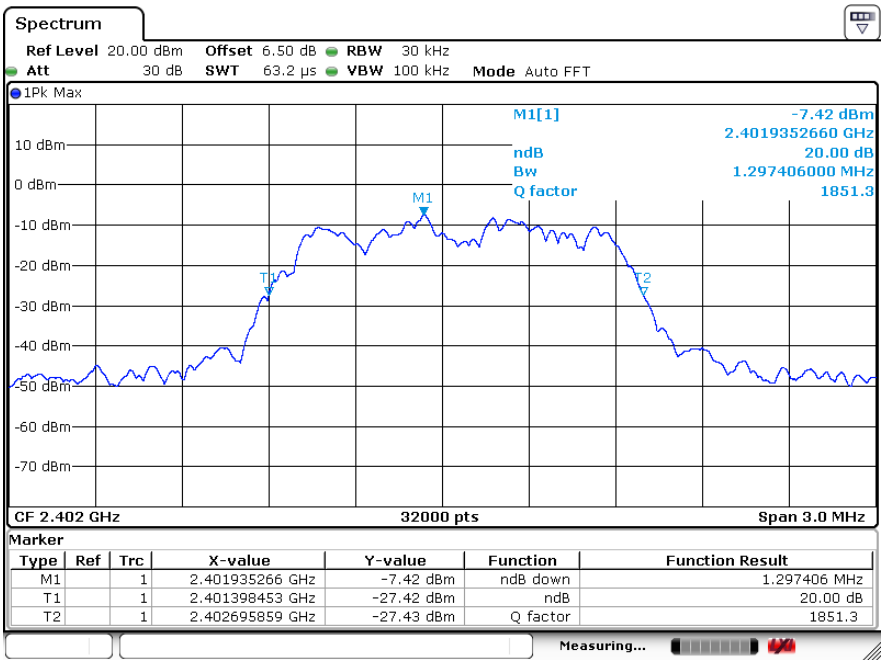


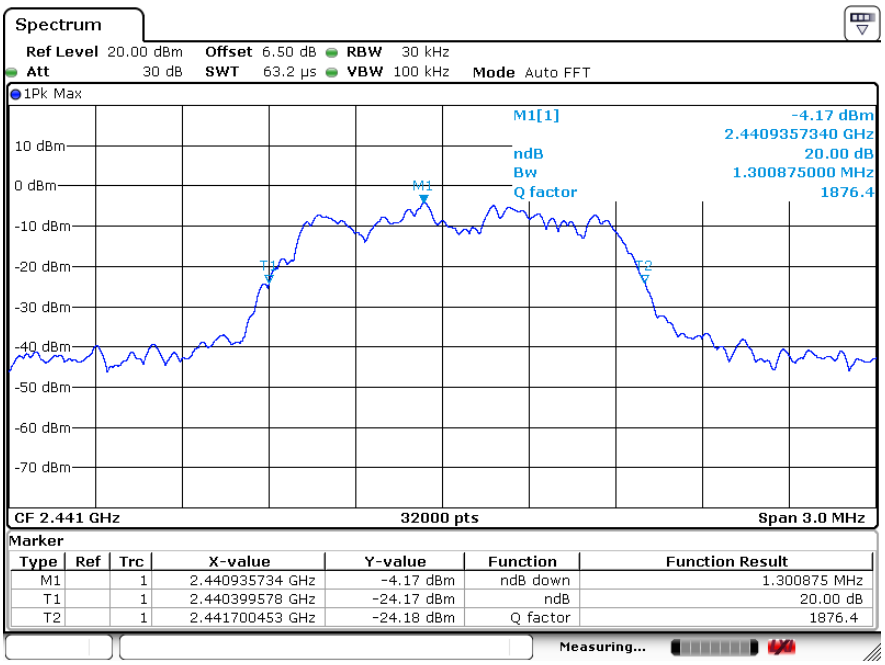
Π/4-DQPSK 2480MHZ



8DPSK 2402MHZ



8DPSK 2441MHZ



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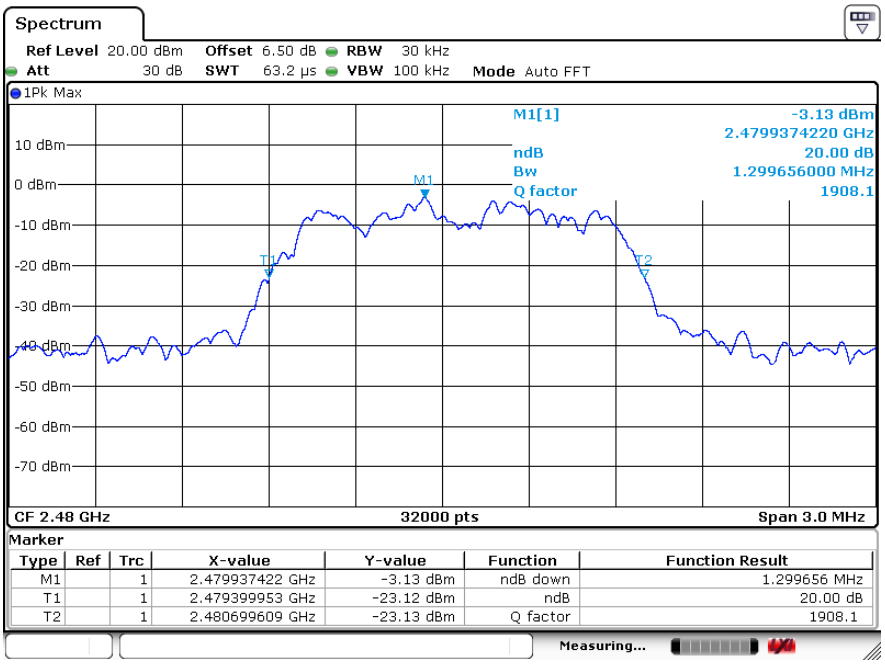

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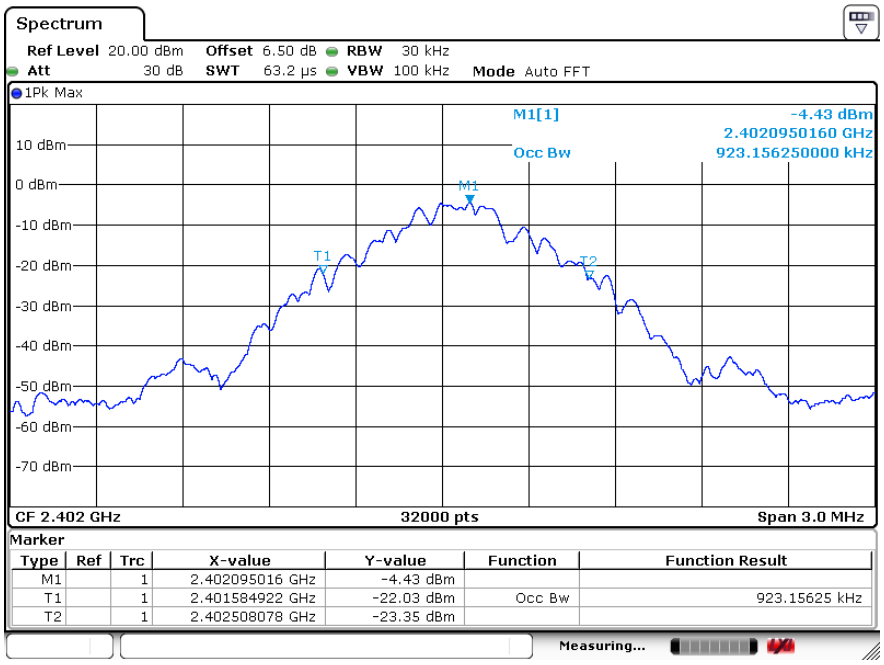

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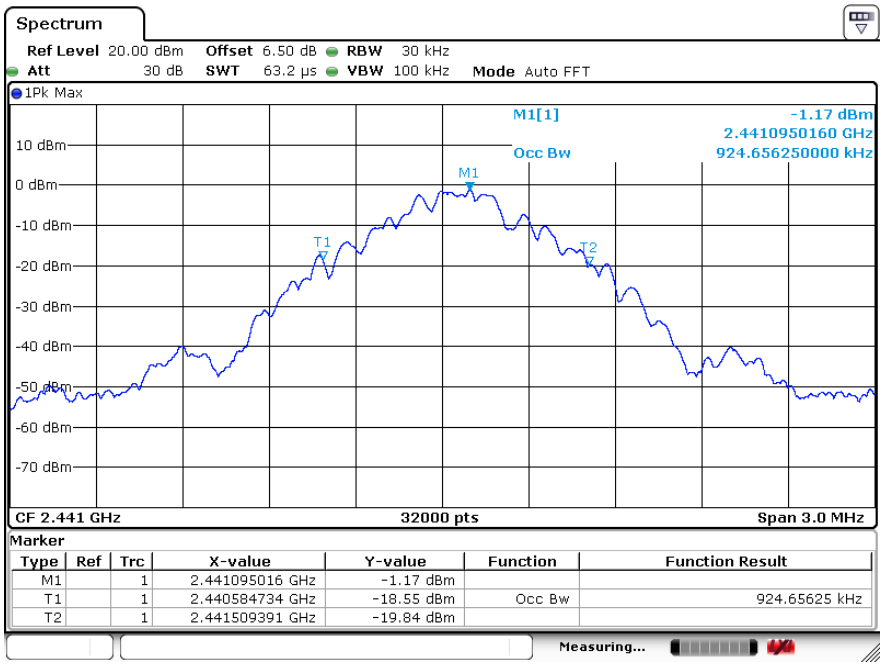
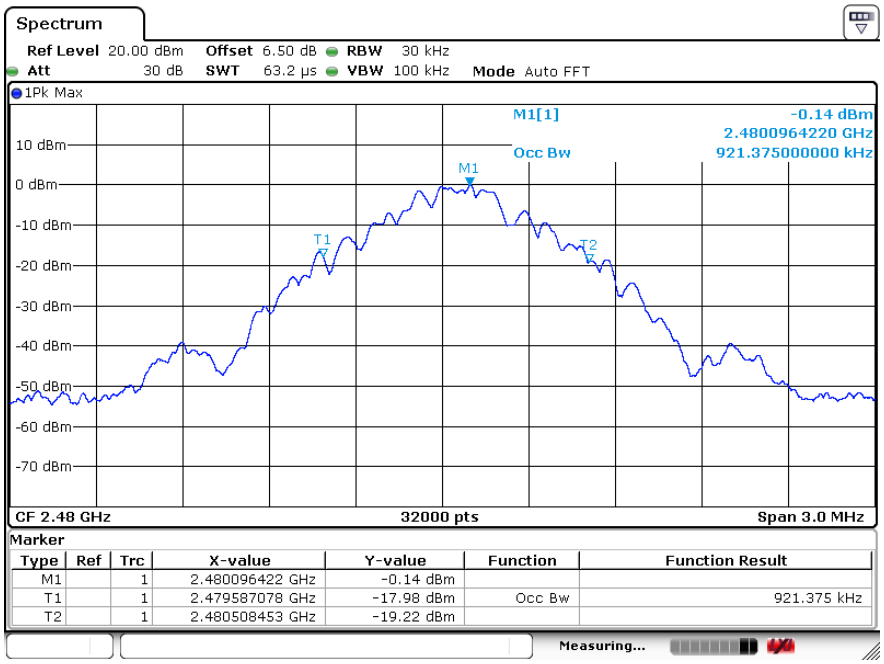
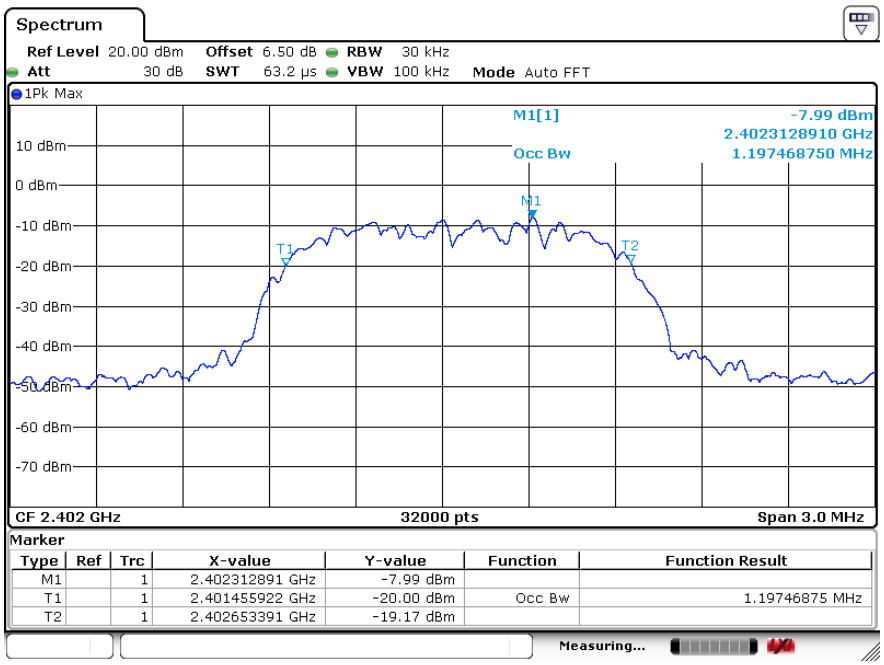


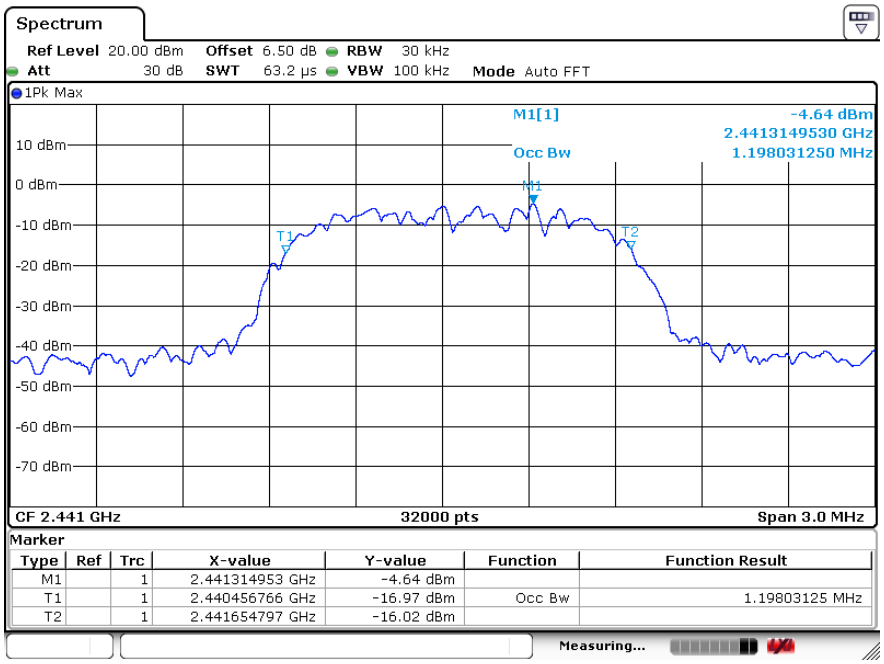
GFSK 2480MHZ



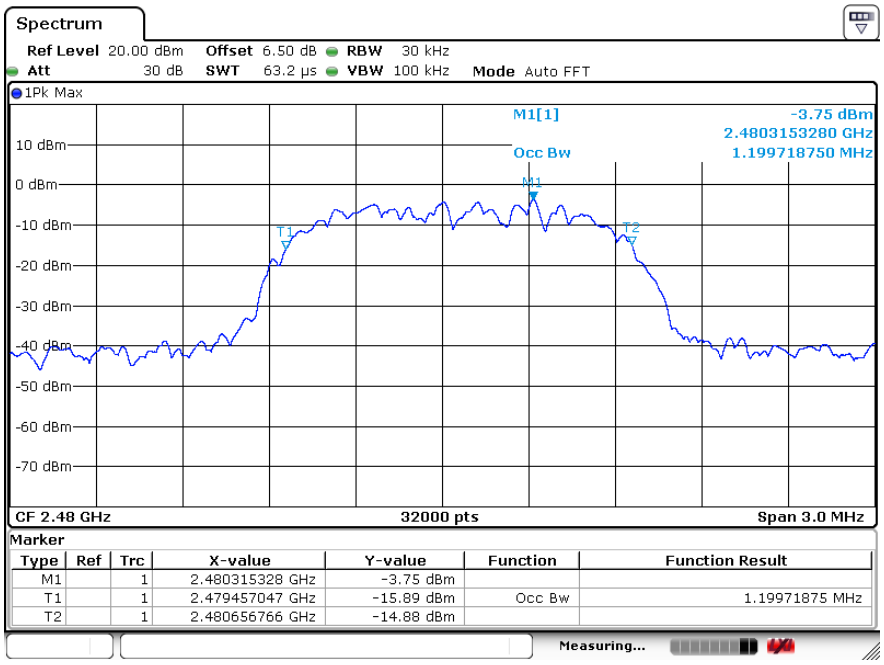
Π/4-DQPSK 2402MHZ



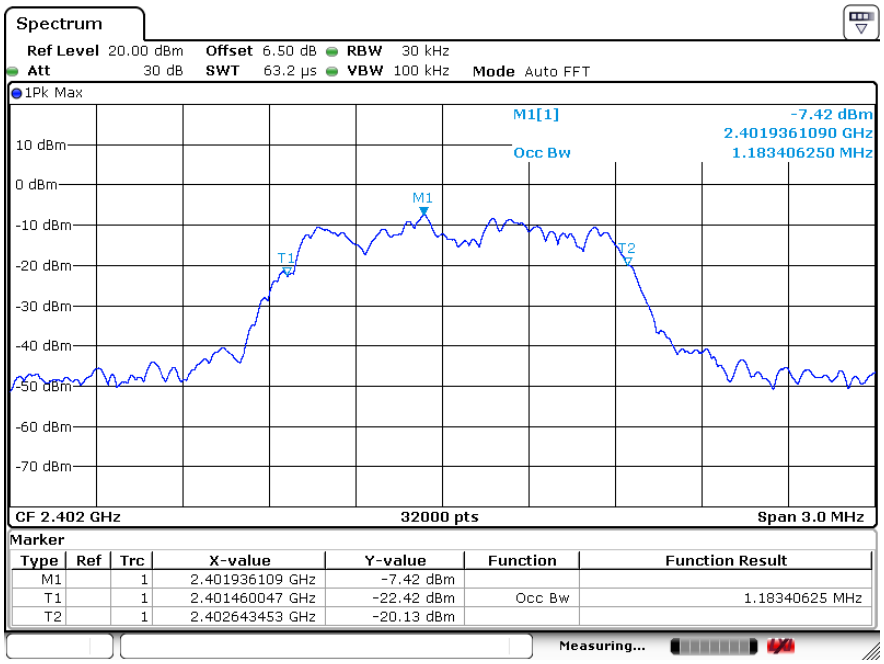
Π/4-DQPSK 2441MHZ



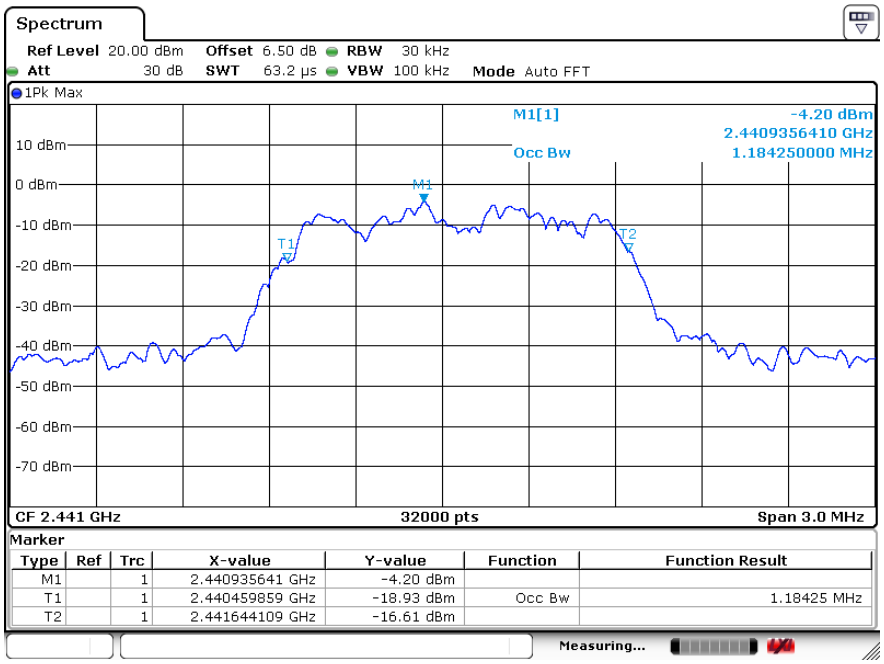
Π/4-DQPSK 2480MHZ



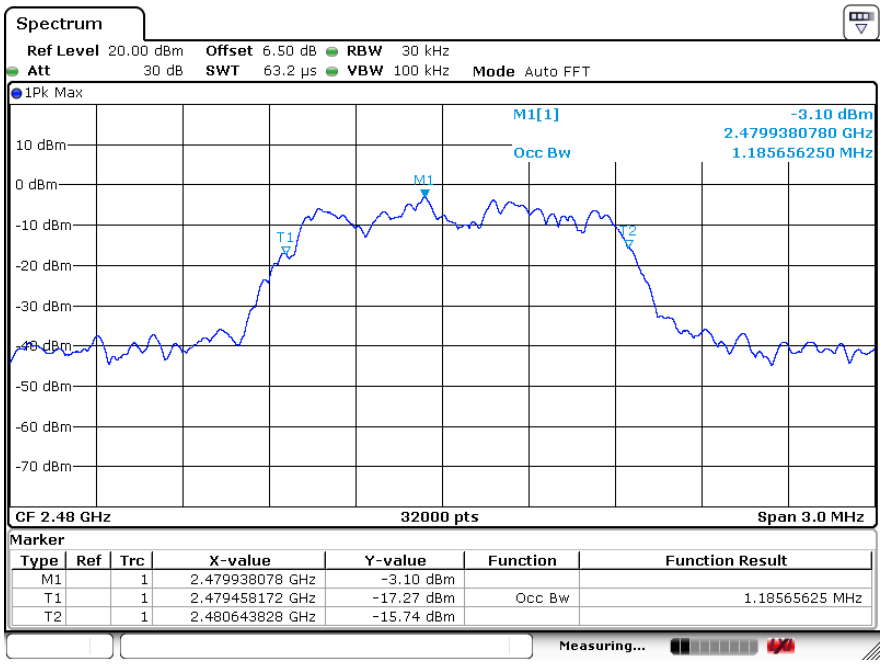
8DPSK 2402MHZ



8DPSK 2441MHZ



8DPSK 2480MHZ



4. CARRIER FREQUENCY SEPARATION TEST

4.1. TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/25/2020	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2019/12/17	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2019/12/17	1 Year
4	Spectrum analyzer	R&S	FSV40	101470	2020/06/28	1 Year

4.2. THE REQUIREMENT FOR SECTION 15.247(A)(1)

Section 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 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly

ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

4.3. EUT CONFIGURATION ON MEASUREMENT

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4. OPERATING CONDITION OF EUT

（1）Setup the EUT and simulator as shown as Section 6.1.

（2）Turn on the power of all equipment.

（3）Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz.

We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

4.5. TEST PROCEDURE

（1）The transmitter output was connected to the spectrum analyzer through a low loss cable.

（2）Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 3 MHz.

（3）Set the adjacent channel of the EUT maxhold another trace.

（4）Measurement the channel separation

4.6. TEST RESULT

GFSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	>(25KHz or 2/3*20dB Bandwidth)	PASS
Middle	2441	0.999	>(25KHz or 2/3*20dB Bandwidth)	PASS
High	2479	0.999	>(25KHz or 2/3*20dB Bandwidth)	PASS

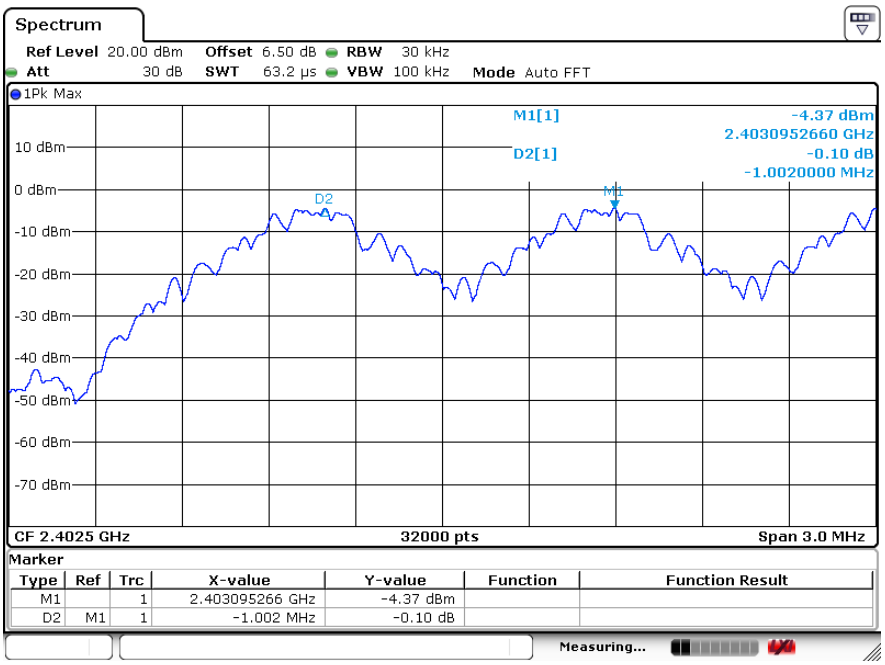
8DPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	0.999	>(25KHz or 2/3*20dB Bandwidth)	PASS
Middle	2441	0.999	>(25KHz or 2/3*20dB Bandwidth)	PASS
High	2479	0.999	>(25KHz or 2/3*20dB Bandwidth)	PASS

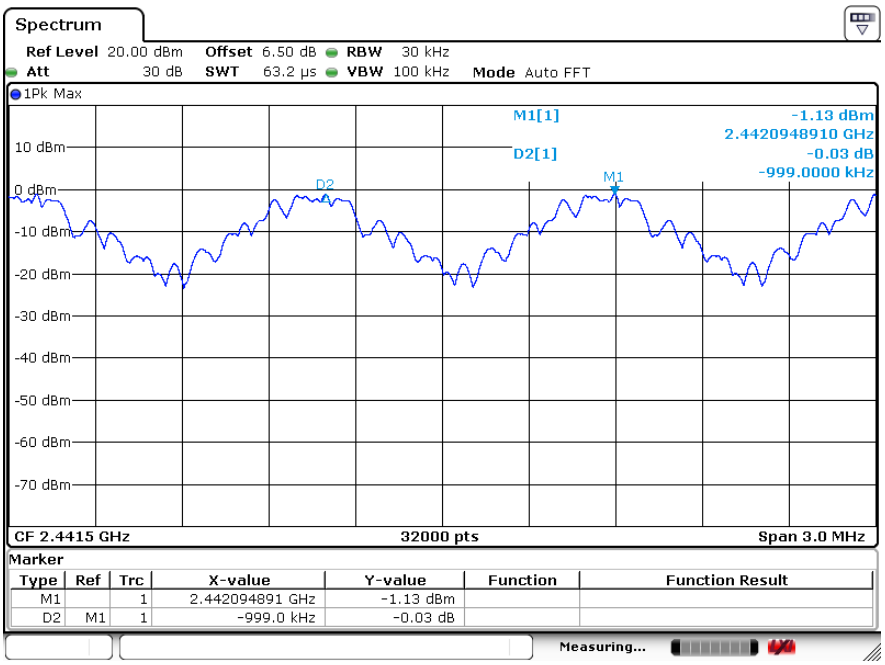
The spectrum analyzer plots are attached as below.

GFSK and 8DPSK is worse case and only reported.

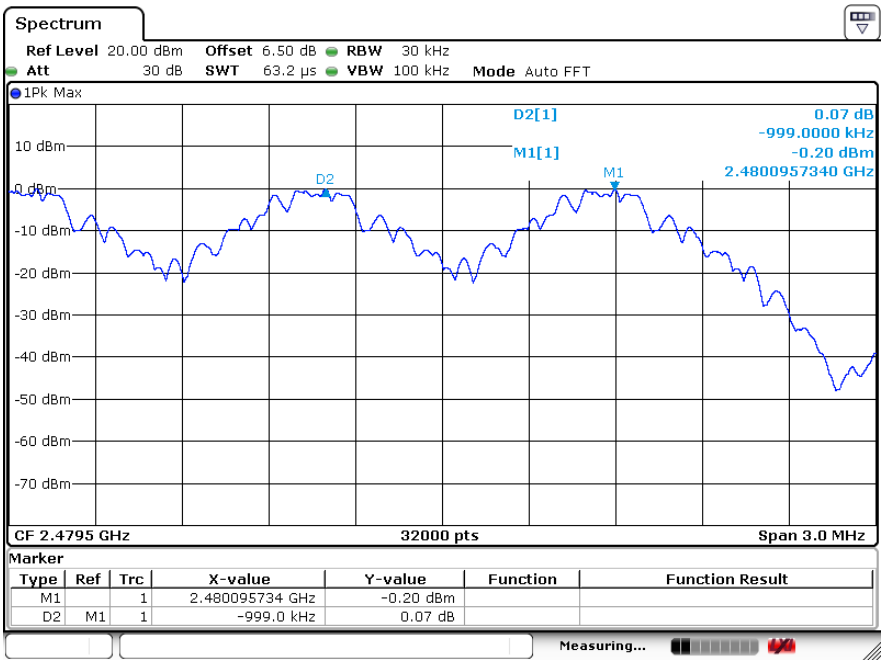
GFSK 2402MHZ



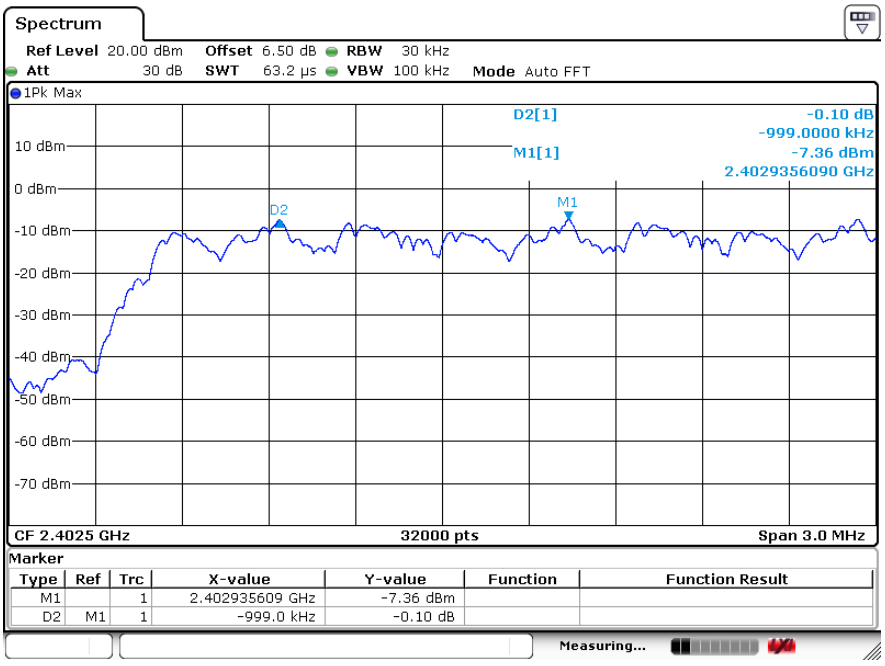
GFSK 2441MHZ



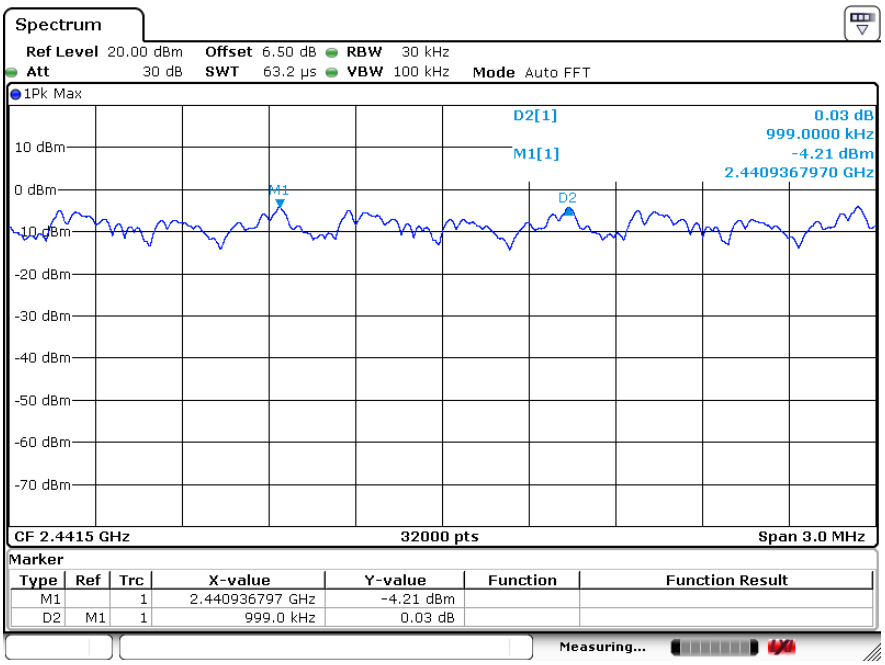
GFSK 2480MHZ



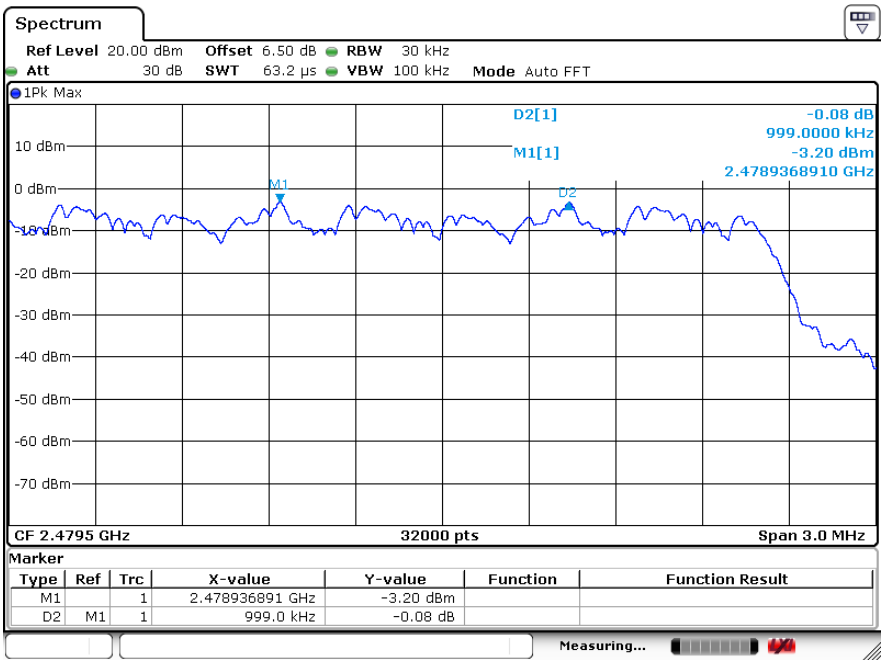
8DPSK 2402MHZ



8DPSK 2441MHZ



8DPSK 2480MHZ



5. NUMBER OF HOPPING FREQUENCY TEST

5.1. TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/25/2020	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2019/12/17	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2019/12/17	1 Year
4	Spectrum analyzer	R&S	FSV40	101470	2020/06/28	1 Year

5.2. THE REQUIREMENT FOR SECTION 15.247(A)(1)(III)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

5.3. EUT CONFIGURATION ON MEASUREMENT

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. OPERATING CONDITION OF EUT

（1）Setup the EUT and simulator as shown as Section 7.1.

（2）Turn on the power of all equipment.

（3）Let the EUT work in TX (Hopping on) modes measure it.

5.5. TEST PROCEDURE

（1）The transmitter output was connected to the spectrum analyzer through a low loss cable.

（2）Set the spectrum analyzer as Span=83.5MHz, RBW=100 kHz, VBW=300 kHz.

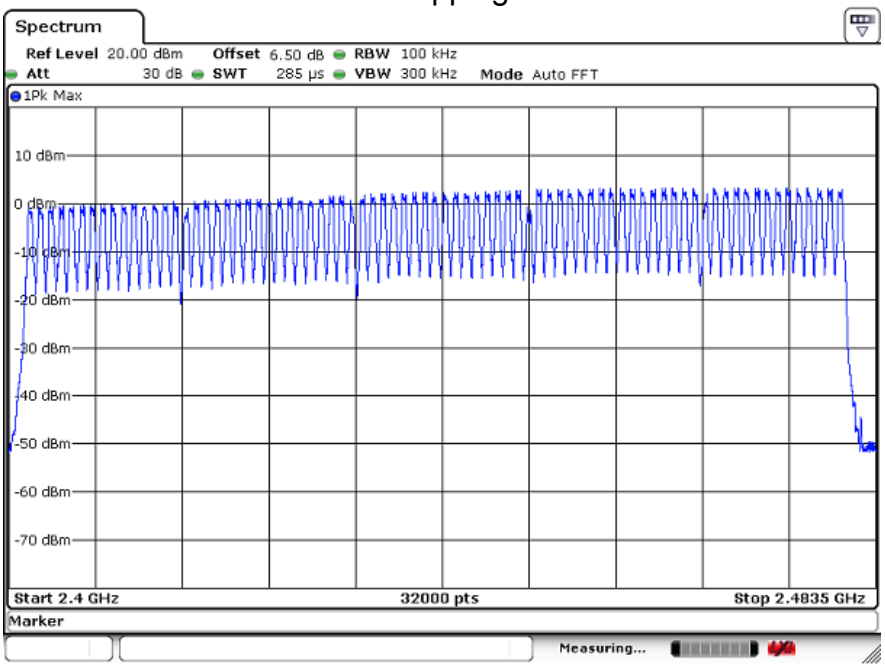
（3）Max hold, view and count how many channel in the band.

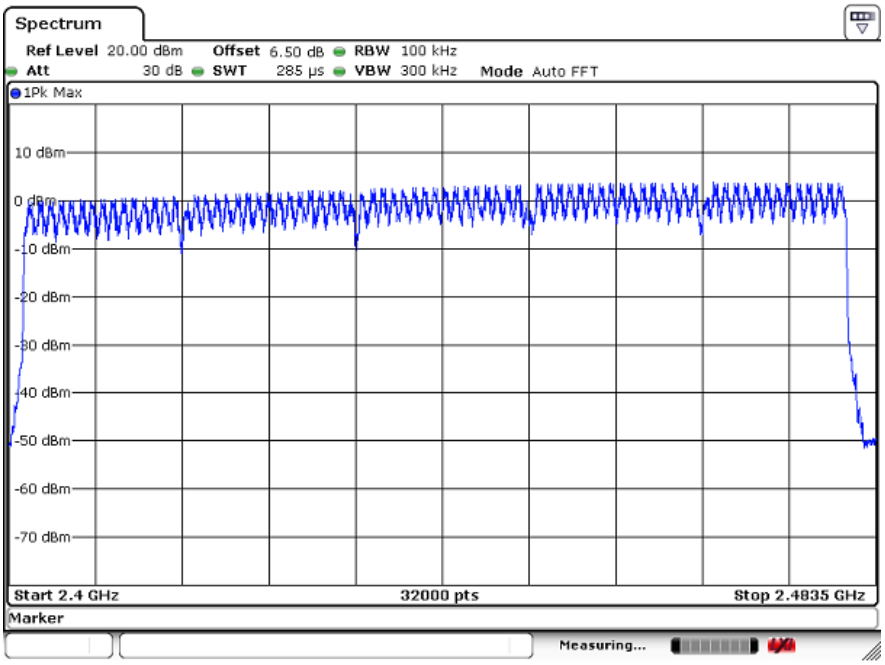
5.6. TEST RESULT

Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	≥15

The spectrum analyzer plots are attached as below

Number of hopping channels





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

6. DWELL TIME TEST

6.1. TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/25/2020	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2019/12/17	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2019/12/17	1 Year
4	Spectrum analyzer	R&S	FSV40	101470	2020/06/28	1 Year

6.2. THE REQUIREMENT FOR SECTION 15.247(A)(1)(III)

Section 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

6.3. EUT CONFIGURATION ON MEASUREMENT

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. OPERATING CONDITION OF EUT

（1）Setup the EUT and simulator as shown as Section 8.1.

（2）Turn on the power of all equipment.

（3）Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. TEST PROCEDURE

（1）The transmitter output was connected to the spectrum analyzer through a low loss cable.

（2）Set center frequency of spectrum analyzer = operating frequency.

（3）Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz

A Period Time = (channel number)*0.4

DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)

DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)

DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

6.6. TEST RESULT

GFSK

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.373	119.360	400
DH3	2402	1.628	260.480	400
DH5	2402	2.876	306.773	400

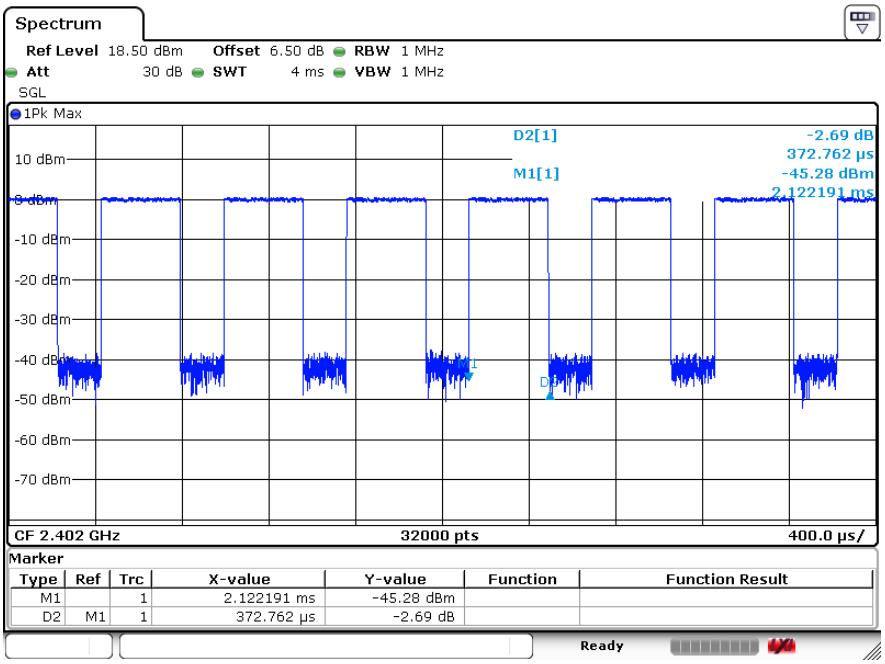
8DPSK

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.393	125.760	400
DH3	2402	1.643	262.880	400
DH5	2402	2.897	309.013	400

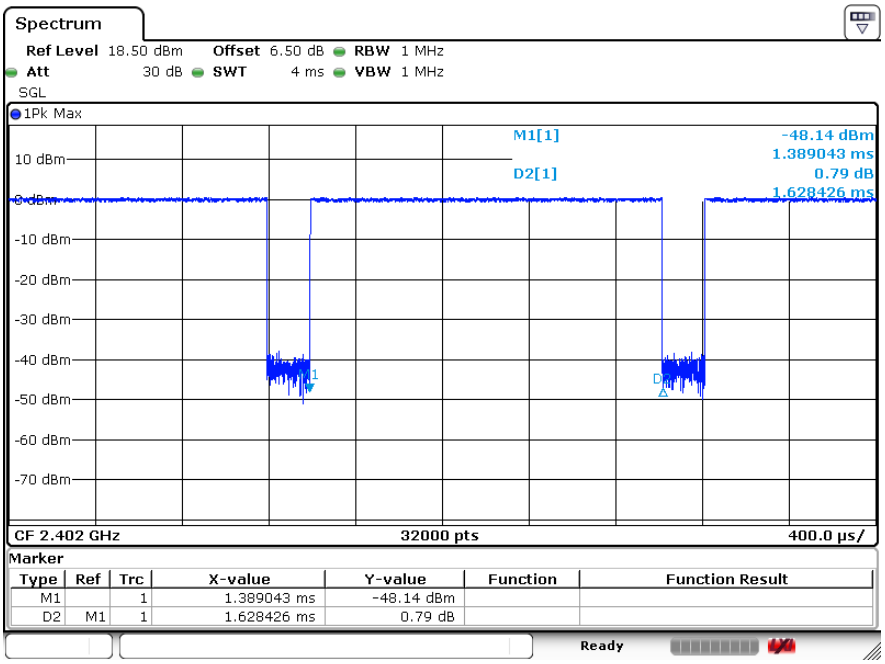
GFSK and 8DPSK is worse case and only reported.

The spectrum analyzer plots are attached as below:

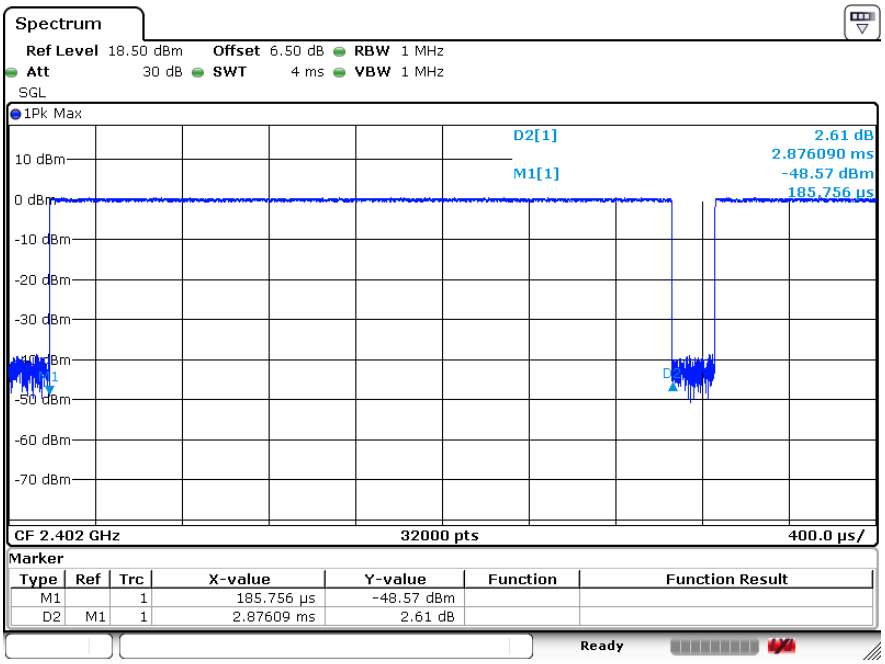
GFSK DH1



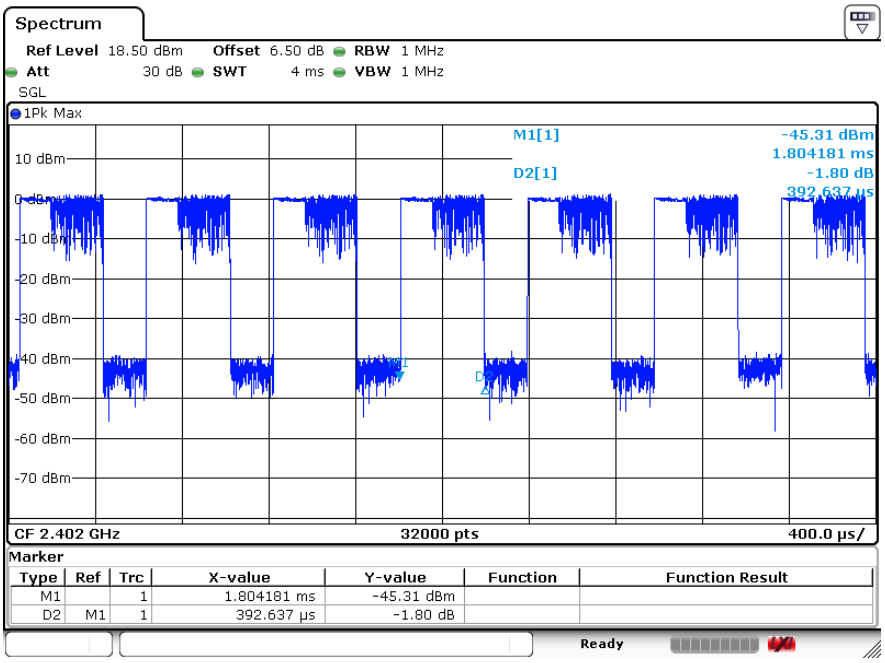
GFSK DH3



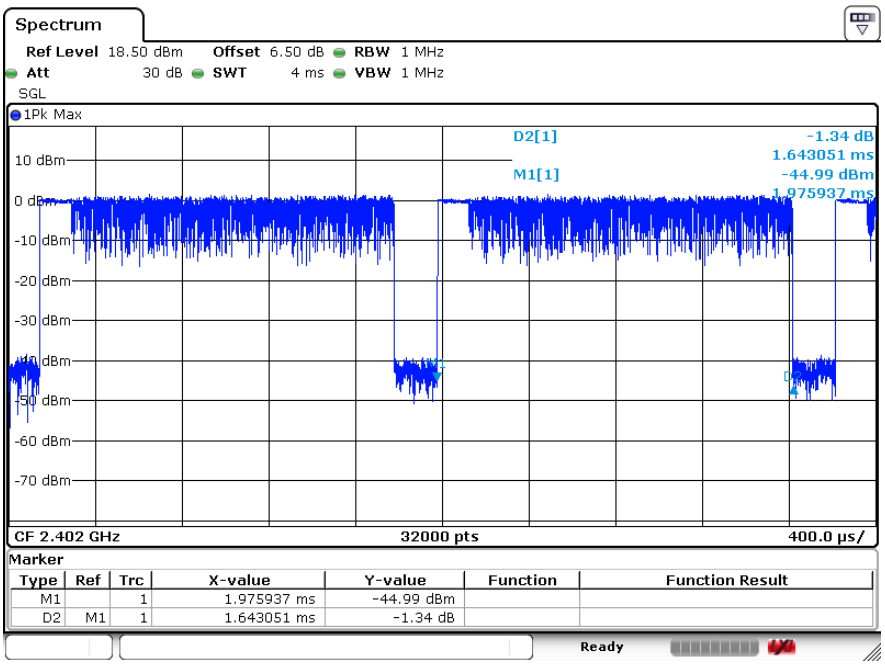
GFSK DH5



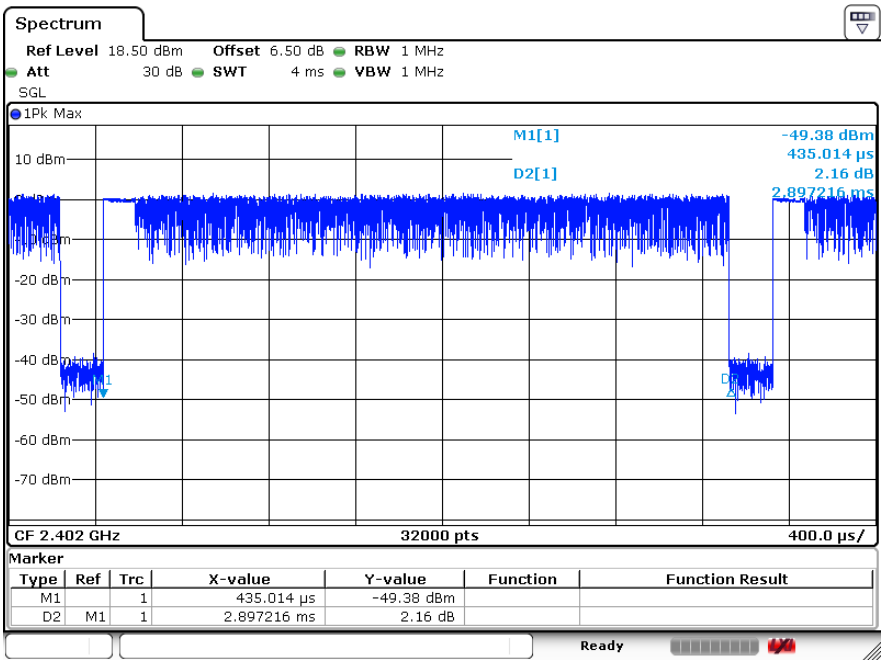
8DPSK DH1



8DPSK DH3



8DPSK DH5



7. MAXMUM OUTPUT POWER

7.1. TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/25/2020	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2019/12/17	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2019/12/17	1 Year
4	Spectrum analyzer	R&S	FSV40	101470	2020/06/28	1 Year

7.2. BLOCK DIAGRAM OF TEST SETUP

FCC:Same with 3.2

7.3. LIMITS

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz bands: 0.125 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4. TEST PROCEDURE

(1) Configure EUT and assistant system according clause 2.4 and 3.2

(2) Connect EUT's antenna output to spectrum analyzer by RF cable.

(3) Configure EUT work in test mode as stated in clause 2.4.

(4) Set the spectrum analyzer as follows:

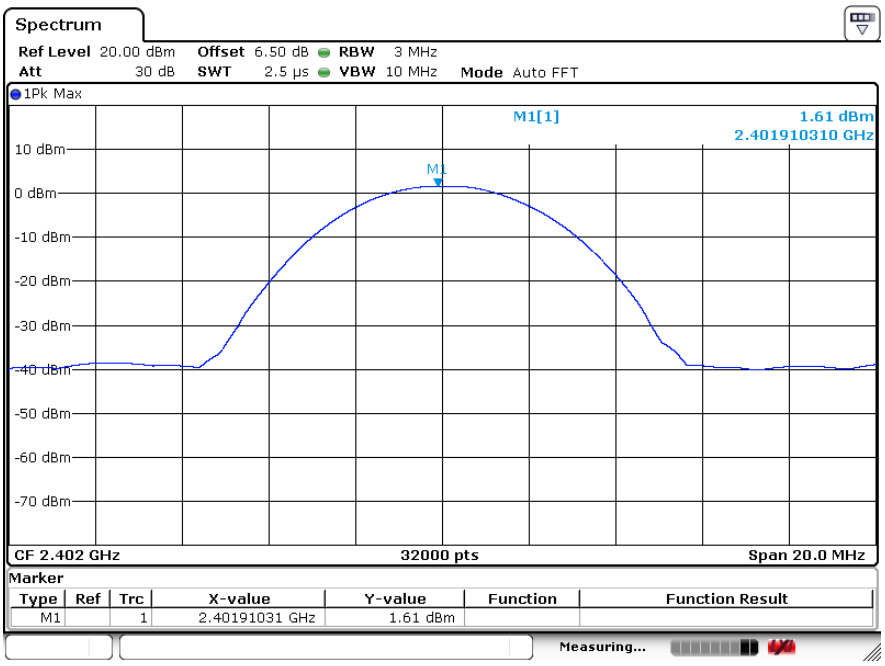
GFSK, π/4-DQPSK, 8DPSK	RBW:	3MHz
	VBW:	10MHz
Span		>1.5x 20dB bandwidth
Detector Mode:		Peak
Sweep time:		auto
Trace mode		Max hold

(5) Allow the trace to stabilize, Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges measure out the Average and PK output power.

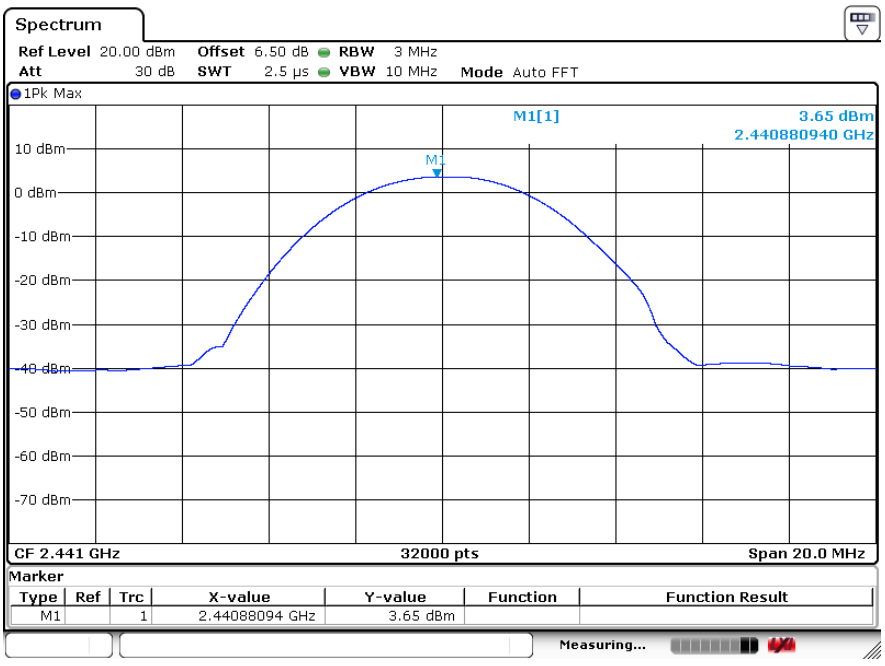
7.5. TEST RESULT

EUT Set Mode	Data Rate (Mbp/s)	Frequency (MHz)	Result(dBm)
			Peak
GFSK	1	2402	1.61
		2441	3.65
		2480	4.70
π/4-DQPSK	2	2402	1.59
		2441	4.76
		2480	5.55
8DPSK	3	2402	1.64
		2441	4.90
		2480	5.83
Limit: 21dBm		Conclusion: PASS	

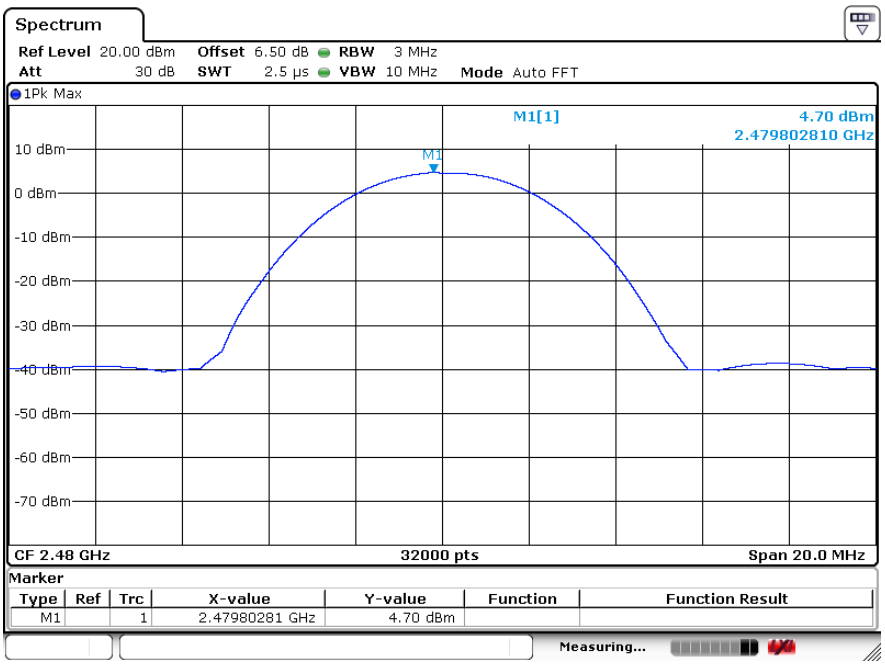
GFSK 2402MHz



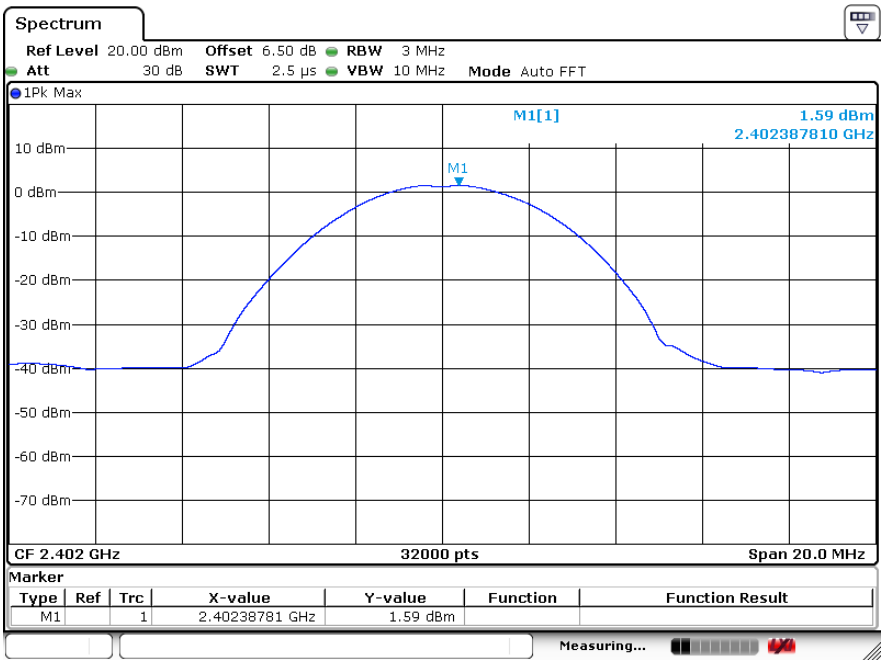
GFSK 2441MHz



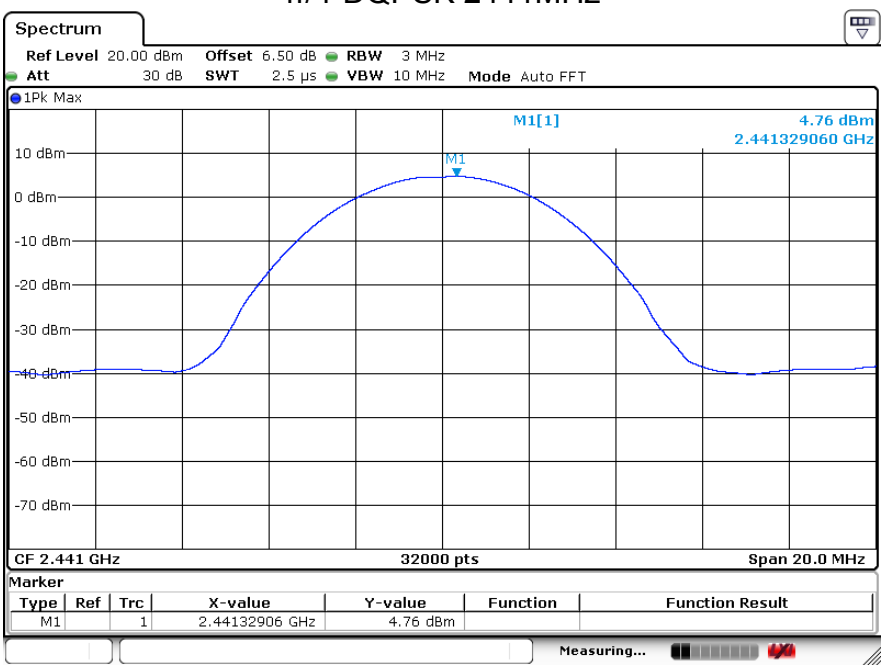
GFSK 2480MHz



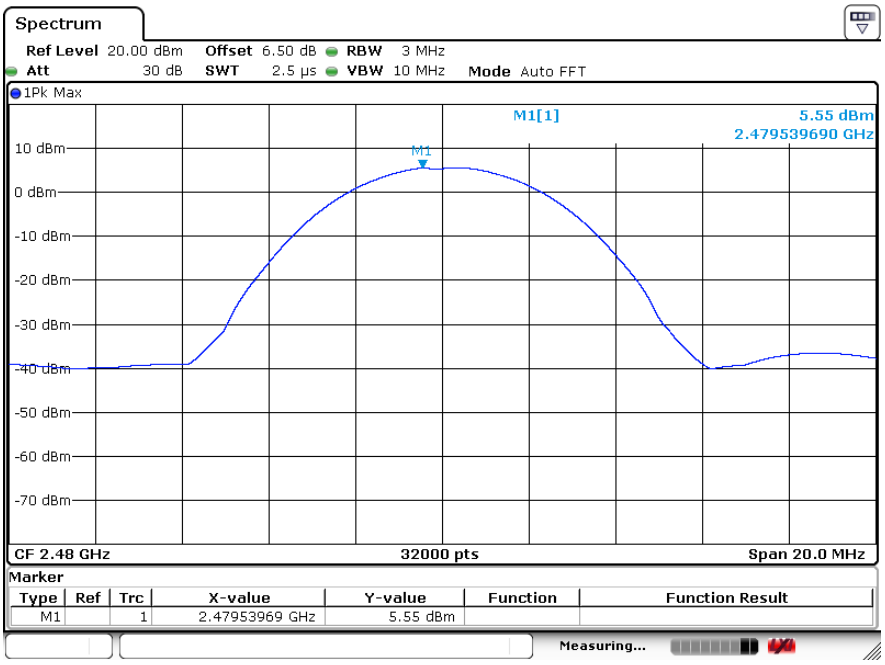
π/4-DQPSK 2402MHz



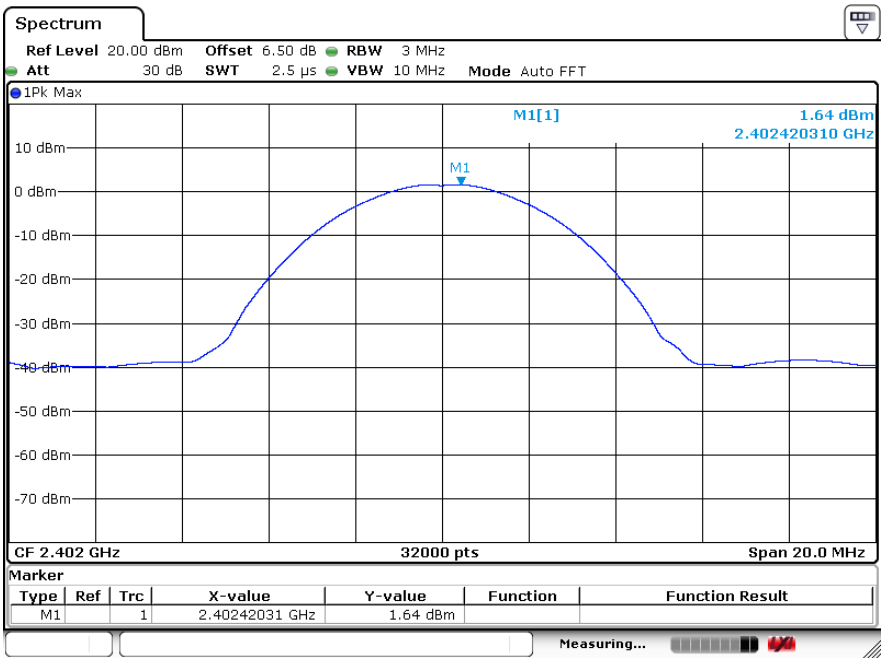
π/4-DQPSK 2441MHz



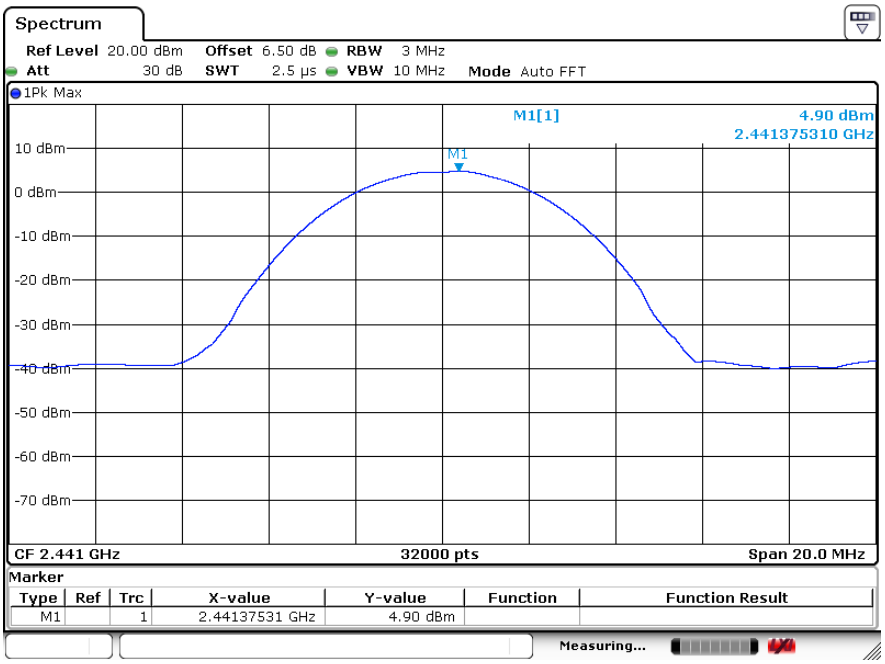
π/4-DQPSK 2480MHz



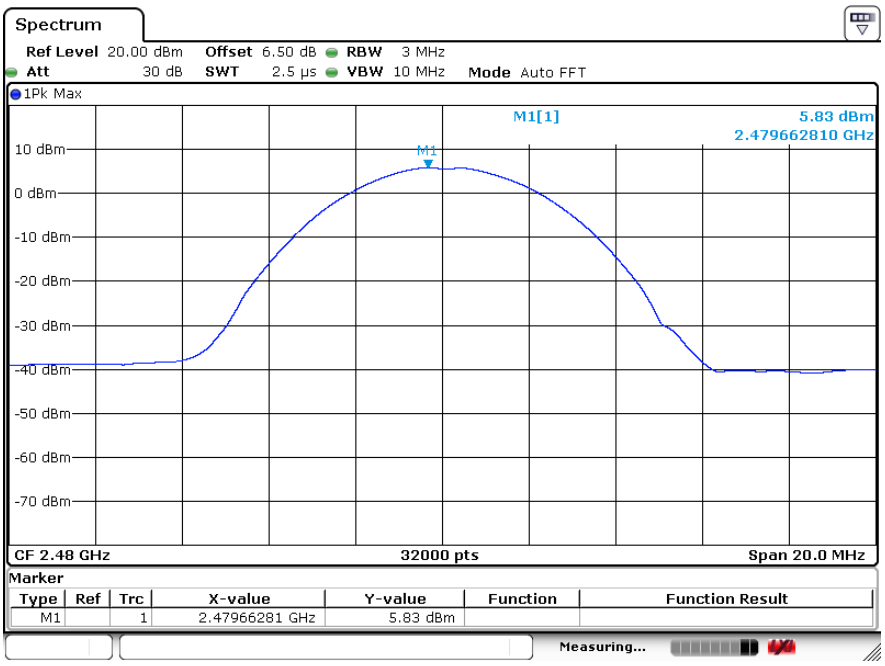
8DPSK 2402MHz



8DPSK 2441MHz



8DPSK 2480MHz



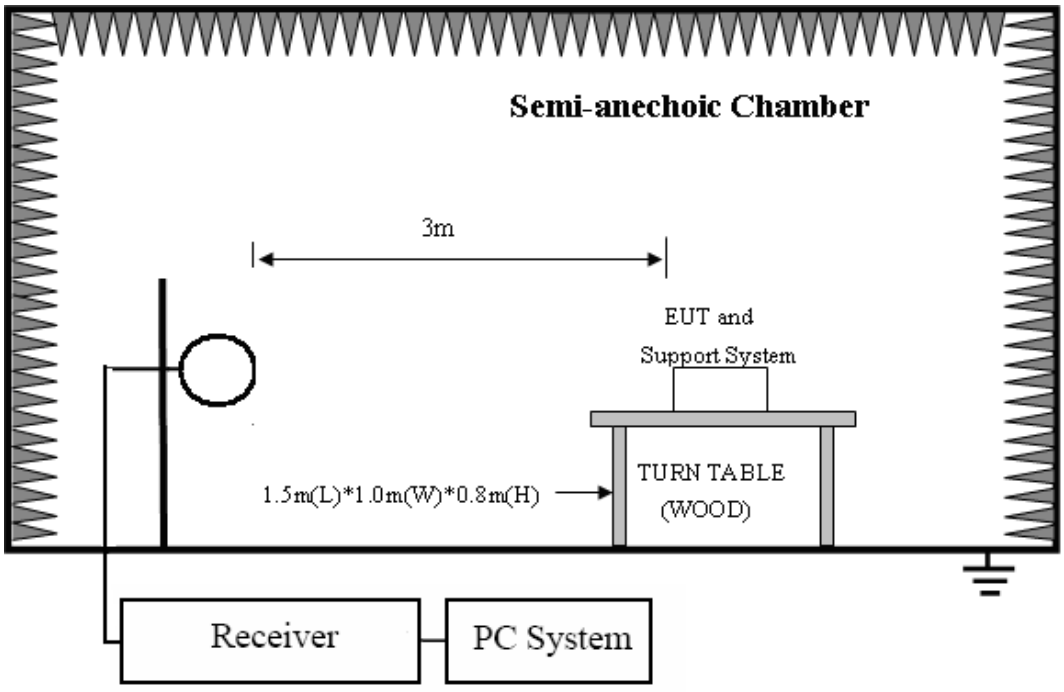
8. SPURIOUS EMISSION

8.1. TEST EQUIPMENT

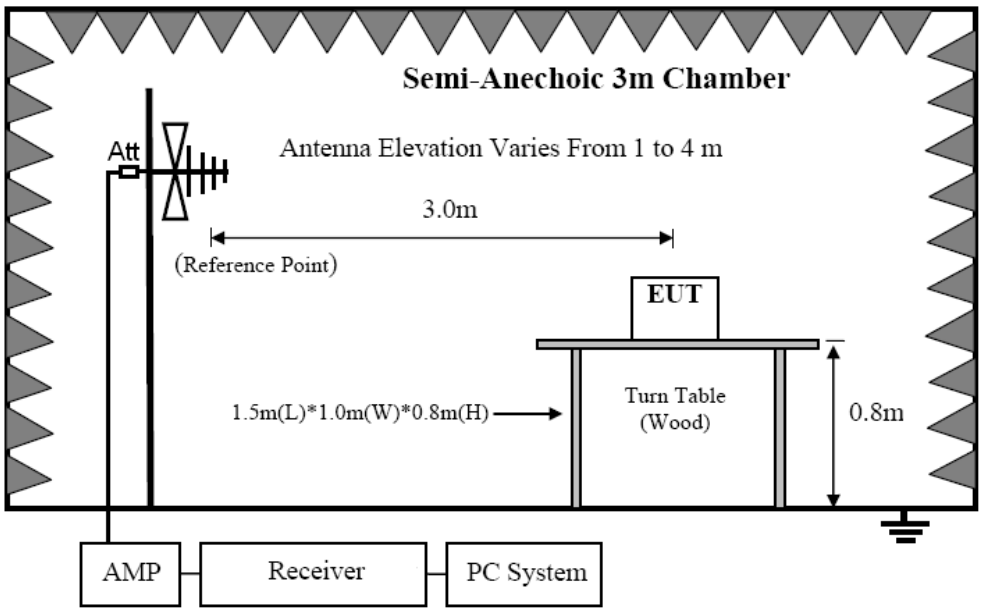
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2019/12/17	1 Year
2	Spectrum analyzer	R&S	FSU	1166.1660.26	2019/12/17	1 Year
3	Loop antenna	TESEQ	HLA6120	20129	2019/12/17	1 Year
4	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2019/12/17	1 Year
5	Double Ridged Horn Antenna	Schwarzbeck	BBHA9120D	9120D 1065	2019/12/17	1 Year
6	Horn Antenna	Schwarzbeck	BBHA 9170	9170 1248	2019/12/17	1 Year
7	Pre-amplifier	A.H.	PAM-1840VH	562	2019/12/17	1 Year
8	Pre-amplifier	R&S	AFS33-18002650-30-8P-44	SEL0080	2019/12/17	1 Year
9	Pre-Amplifier	HP	8449B	3274A06298	2019/12/17	1 Year
10	RF Cable	R&S	R01	10403	2019/12/17	1 Year
11	RF Cable	R&S	R02	10512	2019/12/17	1 Year

8.2. BLOCK DIAGRAM OF TEST SETUP

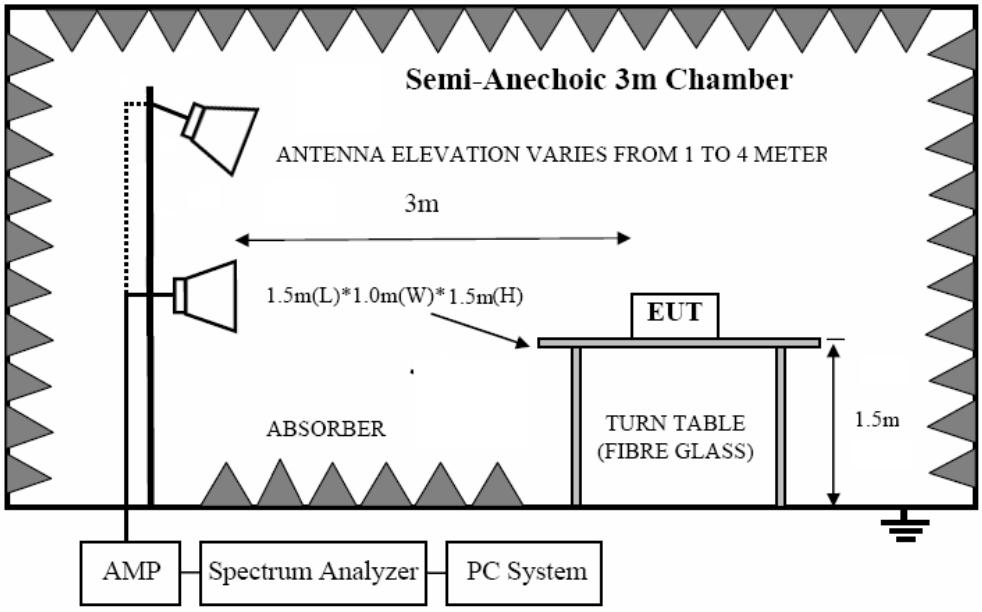
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3. LIMIT

8.3.1 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

8.3.2. Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$Limit_{3m}(dBuV/m) = Limit_{30m}(dBuV/m) + 40Log(30m/3m)$

8.3.3. Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 30dB below the fundamental emissions, or comply with 15.209 limits.

8.4. TEST PROCEDURE

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.4 and 7.2

(3) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used
9KHz-30MHz	Active Loop antenna
30MHz-1GHz	Trilog Broadband Antenna
1GHz-26.5GHz	Double Ridged Horn Antenna(1GHz-26.5GHz)

Remark: Because there is only a bottom noise above 18GHz, so the test report only put the data below 18GHz.

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 25GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) new battery is used during testing

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

(5) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(6) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz,110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(7) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9KHz-150KHz	200Hz
150KHz-30MHz	9KHz
30MHz-1GHz	120KHz

（8）For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure). Peak detector is used for Peak and AV measurement both.

8.5. TEST RESULT

Below 30M

EUT:	Portable Speaker	**Model No.:**	POW Una X
Temperature:	24℃	**Relative Humidity:**	55%
Distance:	3m	**Test Power:**	DC 5V
Polarization:	--	**Test Result:**	Pass
Test Mode:	Keeping TX mode	**Test By:**	Lake

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

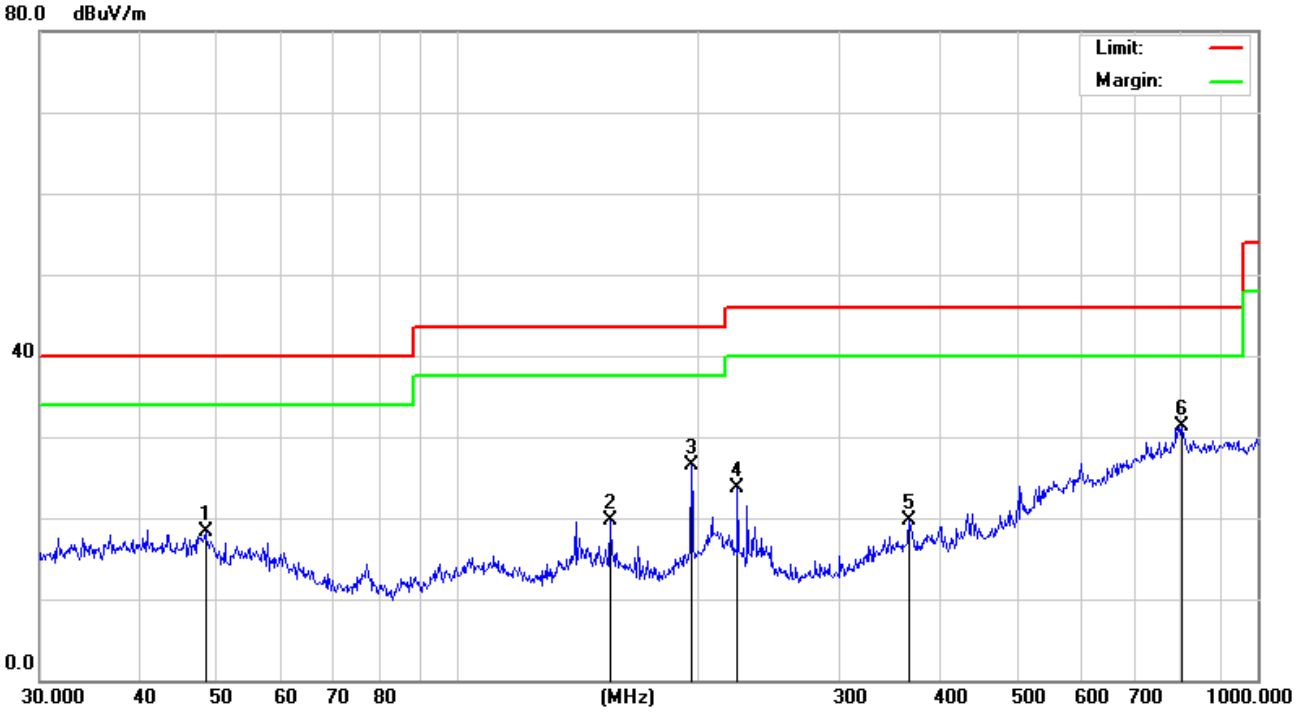
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =20 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor

Between 30M – 1000 MHz

EUT:	Portable Speaker	**Model No.:**	POW Una X
Temperature:	24℃	**Relative Humidity:**	55%
Distance:	3m	**Test Power:**	DC 5V
Polarization:	Vertical	**Test Result:**	Pass
Test Time:	2019-09-06	**Test By:**	Lake
Standard:	(RE)FCC PART 15		
Test Mode:	Keeping TX mode		

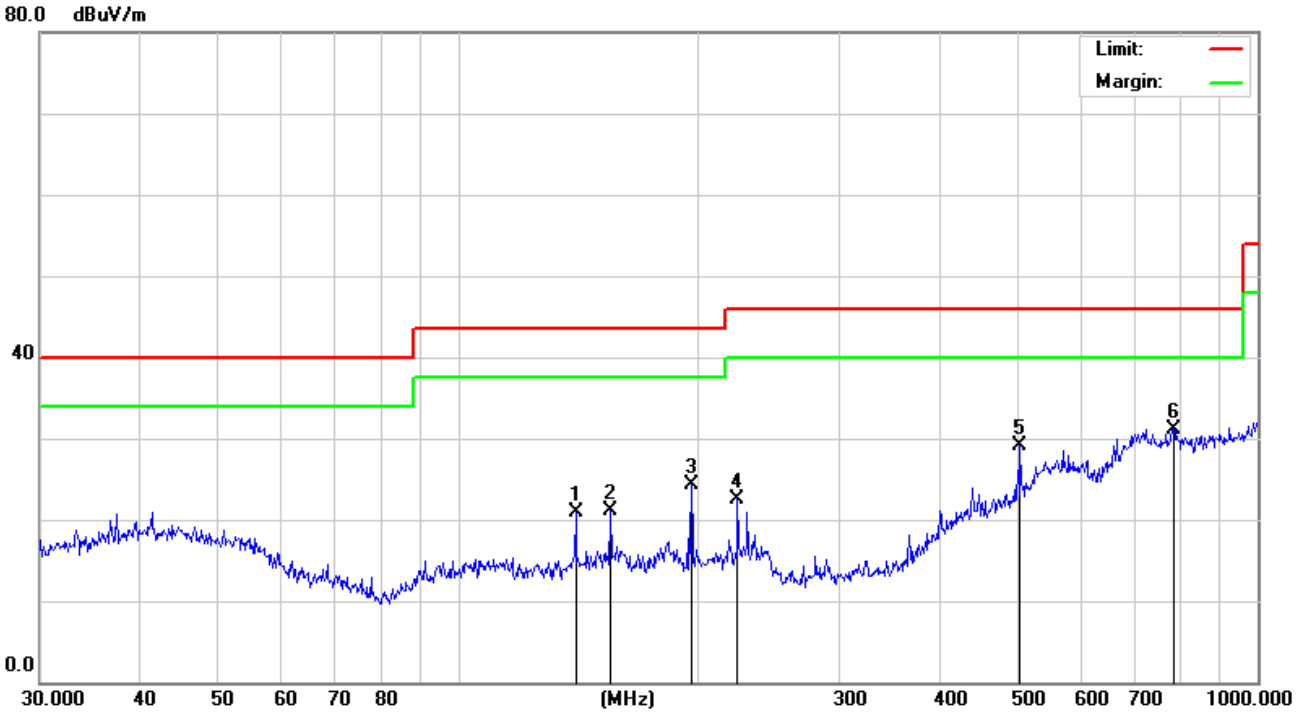


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		48.3318	23.94	-5.55	18.39	40.00	-21.61	peak
2		154.8204	27.72	-8.02	19.70	43.50	-23.80	peak
3		195.8220	33.57	-7.09	26.48	43.50	-17.02	peak
4		223.7333	30.68	-6.97	23.71	46.00	-22.29	peak
5		366.8231	24.02	-4.25	19.77	46.00	-26.23	peak
6	*	804.6028	23.66	7.60	31.26	46.00	-14.74	peak

The test result is calculated as the following:

(1) Result = Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
(3) Margin = Result - Limit

EUT:	Portable Speaker	Model No.:	POW Una X
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 5V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-09-06	Test By:	Lake
Standard:	(RE)FCC PART 15		
Test Mode:	Keeping TX mode		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		140.3421	27.95	-6.99	20.96	43.50	-22.54	peak
2		155.3644	27.68	-6.64	21.04	43.50	-22.46	peak
3		195.8220	31.83	-7.56	24.27	43.50	-19.23	peak
4		223.7334	29.12	-6.52	22.60	46.00	-23.40	peak
5		504.7062	27.21	1.80	29.01	46.00	-16.99	peak
6	*	782.3453	23.51	7.54	31.05	46.00	-14.95	peak

The test result is calculated as the following:

(1) Result = Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
(3) Margin = Result - Limit

Between 1000M – 26500 MHz

EUT：	Portable Speaker	Model Name ：	POW Una X
Temperature：	25 ℃	Test Data	2019-09-06
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	1Mbps	Test Voltage ：	DC 5V from adapter
Measurement Distance	3 m	Frenqucy Range	1GHz to 25GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4804.000	61.89	5.06	66.95	74.00	-7.05	PEAK
4804.000	42.06	5.06	47.12	54.00	-6.88	AVERAGE
7206.000	44.27	7.03	51.3	74.00	-22.7	PEAK
7206.000	33.46	7.03	40.49	54.00	-13.51	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4804.000	60.06	5.06	65.12	74.00	-8.88	PEAK
4804.000	41.23	5.06	46.29	54.00	-7.71	AVERAGE
7206.000	42.29	7.03	49.32	74.00	-24.68	PEAK
7206.000	30.44	7.03	37.47	54.00	-16.53	AVERAGE

Note:

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Lowest channel: 2402 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	62.49	5.14	67.63	74.00	-6.37	PEAK
4882.000	39.87	5.14	45.01	54.00	-8.99	AVERAGE
7323.000	42.43	7.54	49.97	74.00	-24.03	PEAK
7323.000	30.15	7.54	37.69	54.00	-16.31	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	62.29	5.14	67.43	74.00	-6.57	PEAK
4882.000	41.46	5.14	46.6	54.00	-7.4	AVERAGE
7323.000	43.88	7.54	51.42	74.00	-22.58	PEAK
7323.000	33.57	7.54	41.11	54.00	-12.89	AVERAGE

Note:

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Highest Channel: 2441 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4960.000	62.86	5.22	68.08	74.00	-5.92	PEAK
4960.000	40.15	5.22	45.37	54.00	-8.63	AVERAGE
7440.000	45.63	8.06	53.69	74.00	-20.31	PEAK
7440.000	32.84	8.06	40.9	54.00	-13.1	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4960	59.81	5.22	65.03	74.00	-8.97	PEAK
4960	38.64	5.22	43.86	54.00	-10.14	AVERAGE
7440	41.53	8.06	49.59	74.00	-24.41	PEAK
7440	30.49	8.06	38.55	54.00	-15.45	AVERAGE

Note:

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Highest Channel: 2480 MHz

EUT：	Portable Speaker	Model Name ：	POW Una X
Temperature：	25 ℃	Test Data	2019-09-06
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	3Mbps	Test Voltage ：	DC 5V from adapter
Measurement Distance	3 m	Frenqucy Range	1GHz to 25GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4804.000	60.59	5.06	65.65	74.00	-8.35	PEAK
4804.000	39.87	5.06	44.93	54.00	-9.07	AVERAGE
7206.000	43.76	7.03	50.79	74.00	-23.21	PEAK
7206.000	35.54	7.03	42.57	54.00	-11.43	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4804.000	63.49	5.06	68.55	74.00	-5.45	PEAK
4804.000	40.87	5.06	45.93	54.00	-8.07	AVERAGE
7206.000	42.53	7.03	49.56	74.00	-24.44	PEAK
7206.000	32.48	7.03	39.51	54.00	-14.49	AVERAGE

Note:

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Lowest Channel: 2402 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	61.86	5.14	67.00	74.00	-7.00	PEAK
4882.000	41.94	5.14	47.08	54.00	-6.92	AVERAGE
7323.000	45.73	7.54	53.27	74.00	-20.73	PEAK
7323.000	36.25	7.54	43.79	54.00	-10.21	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	63.24	5.14	68.38	74.00	-5.62	PEAK
4882.000	43.89	5.14	49.03	54.00	-4.97	AVERAGE
7323.000	43.46	7.54	51	74.00	-23	PEAK
7323.000	32.75	7.54	40.29	54.00	-13.71	AVERAGE

Note:
Measurement Level = Reading Level + Factor
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier
Lowest Channel: 2441 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4960.000	61.89	5.22	67.11	74.00	-6.89	PEAK
4960.000	42.63	5.22	47.85	54.00	-6.15	AVERAGE
7440.000	44.58	8.06	52.64	74.00	-21.36	PEAK
7440.000	31.79	8.06	39.85	54.00	-14.15	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4960.000	63.64	5.22	68.86	74.00	-5.14	PEAK
4960.000	40.89	5.22	46.11	54.00	-7.89	AVERAGE
7440.000	41.67	8.06	49.73	74.00	-24.27	PEAK
7440.000	33.55	8.06	41.61	54.00	-12.39	AVERAGE

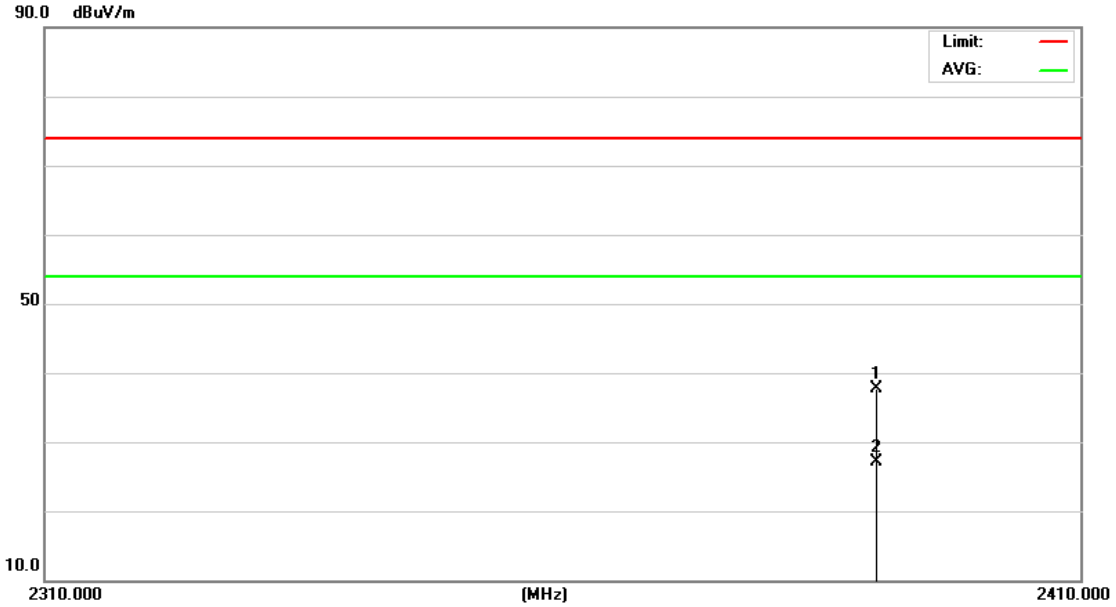
Note:
Measurement Level = Reading Level + Factor
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier
Lowest Channel: 2480 MHz

GFSK and 8DPSK is worse case and only reported.

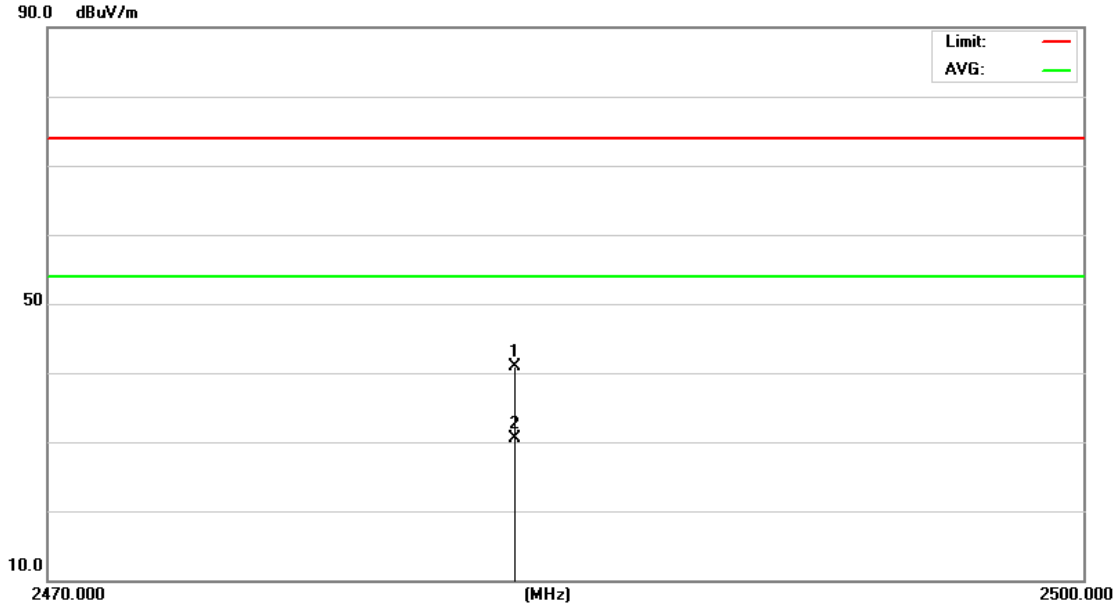
Restricted Bands Requirements

EUT：	**Portable Speaker**	**Model Name ：**	**POW Una X**
Temperature：	**25 ℃**	**Test Data**	**2019-09-06**
Pressure：	**1010 hPa**	**Relative Humidity：**	**60%**
Test Mode ：	**TX 1Mbps (worse case of all modes)**	**Test Voltage ：**	**DC 5V from adapter**
Note：	**1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz. 3. The data of 2390MHz and 2483.5MHz was the worst.**		

Vertical

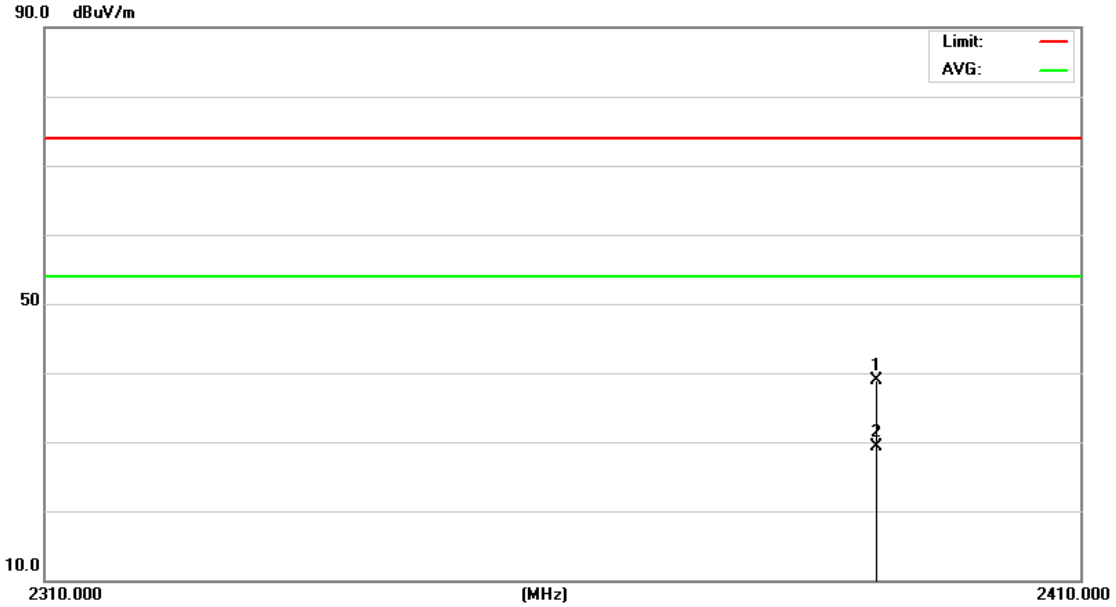


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2390.000	43.49	-5.79	37.70	74.00	-36.30	peak
2	*	2390.000	32.88	-5.79	27.09	54.00	-26.91	AVG

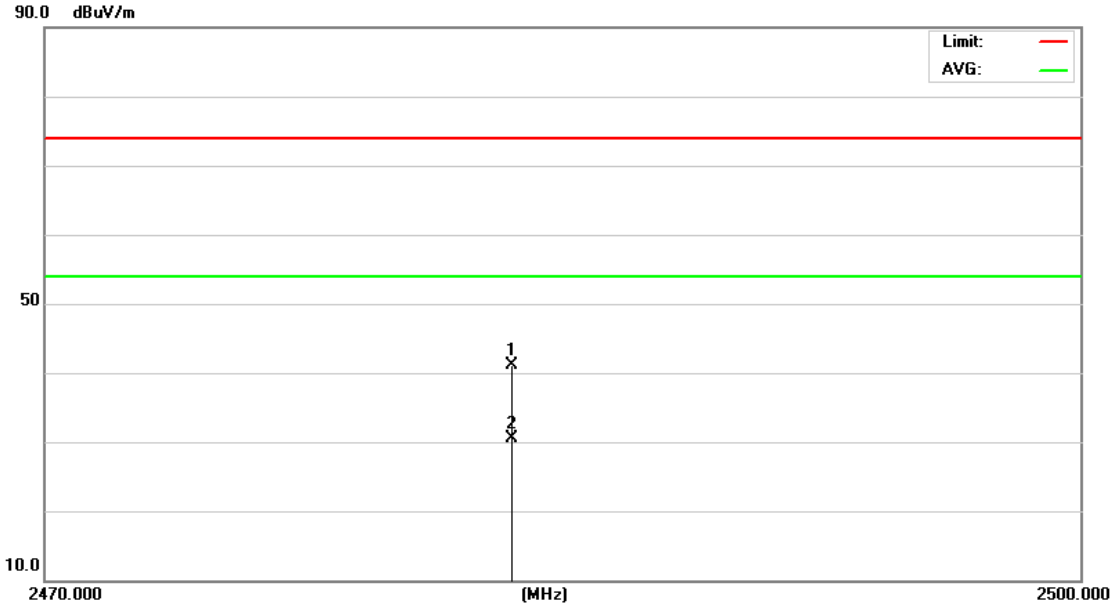


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	45.89	-4.98	40.91	74.00	-33.09	peak
2	*	2483.500	35.46	-4.98	30.48	54.00	-23.52	AVG

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2390.000	44.64	-5.79	38.85	74.00	-35.15	peak
2	*	2390.000	35.02	-5.79	29.23	54.00	-24.77	AVG



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	46.17	-4.98	41.19	74.00	-32.81	peak
2	*	2483.500	35.49	-4.98	30.51	54.00	-23.49	AVG

9. CONDUCTED EMISSION MEASUREMENT

9.1. POWER LINE CONDUCTED EMISSION LIMITS

(Frequency Range 150KHz-30MHz)

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

9.2. MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	12/17/2019
2	EMI Test Receiver	R&S	ESCI	101308	12/17/2019
3	LISN	AFJ	LS16	16011103219	12/17/2019
4	LISN	SCHWARZBECK	NSLK 8127	8127-432	12/17/2019
5	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

Rema: “N/A” denotes No Model No. , Serial No. or No Calibration specified.

9.3. TEST PROCEDURE

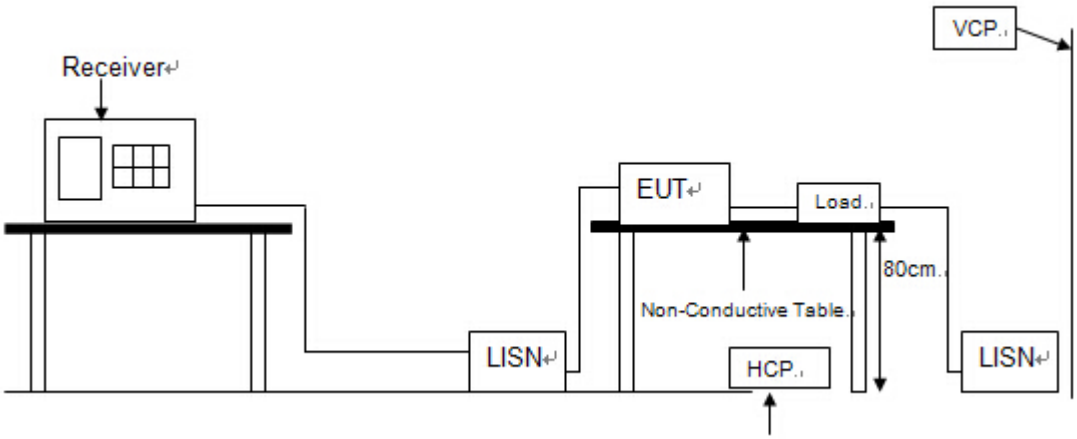
The EUT was placed on a non-conductive table, which is 0.8 meters above the horizontal reference ground plane and 0.4 meters from vertical reference ground plane. EUT has being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm / 50 uH of coupling impedance for the measuring instrument.
Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
I/O cables those are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
LISN at least 80 cm from nearest part of EUT chassis.

For the actual test configuration, please refer to the related paragraph – EUT Test Photo.

9.4. DEVIATION FROM TEST STANDARD

No deviation

9.5. TEST SETUP

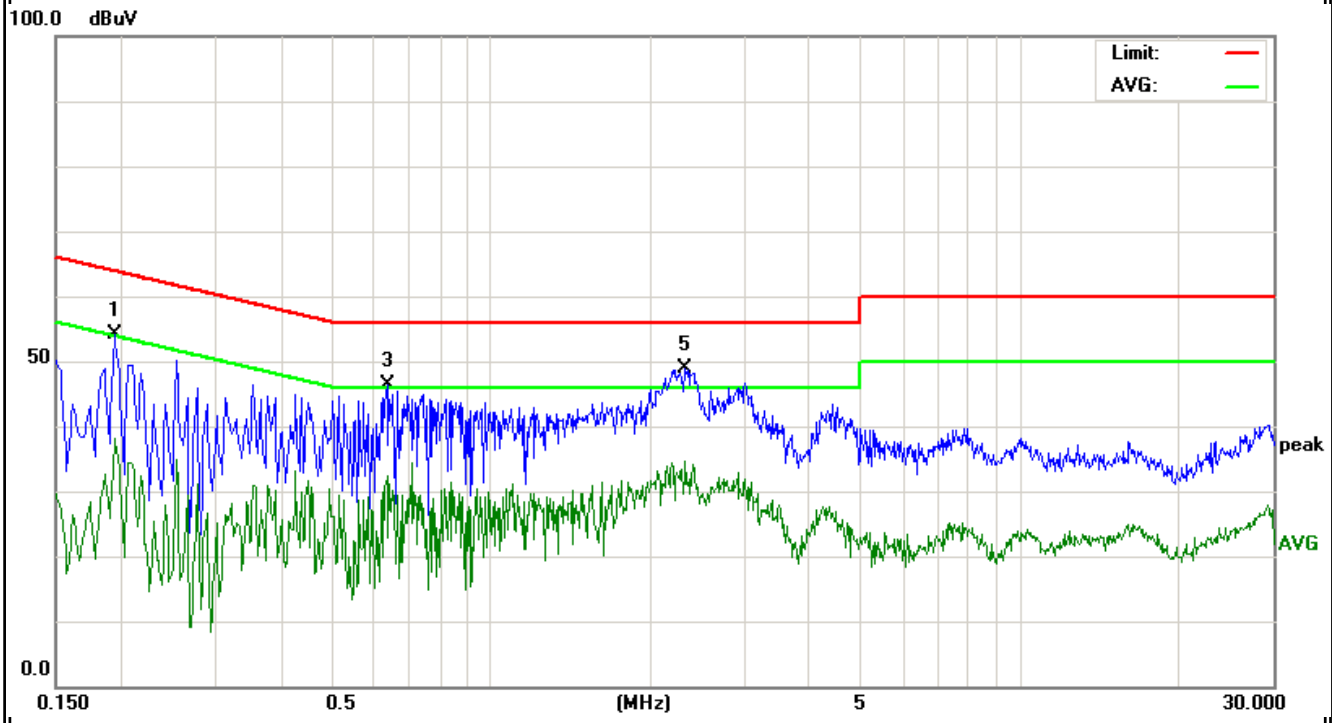


9.6. EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting mode.

9.7. TEST RESULTS

EUT:	Portable Speaker	Model No.:	POW Una X
Temperature:	24℃	Relative Humidity:	55%
Polarization:	L1	Test Power:	AC 120V/60Hz
Test Time:	2019-09-06	Test Result:	Pass
Standard:	(RE)FCC PART 15	Test By:	Lake
Test Mode:	Keeping TX mode		

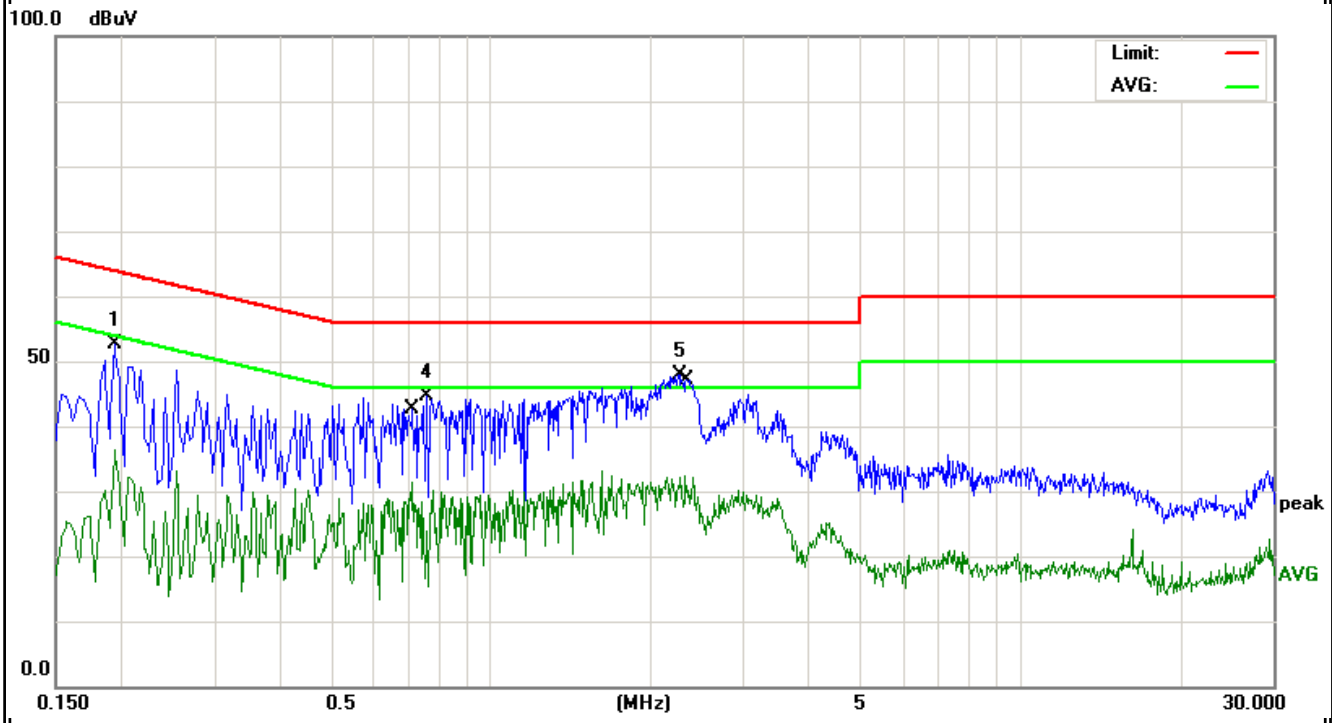


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1940	42.88	11.21	54.09	63.86	-9.77	peak
2		0.1940	26.86	11.21	38.07	53.86	-15.79	AVG
3		0.6340	36.40	9.99	46.39	56.00	-9.61	peak
4		0.6340	22.36	9.99	32.35	46.00	-13.65	AVG
5	*	2.3260	38.92	10.00	48.92	56.00	-7.08	peak
6		2.3260	24.63	10.00	34.63	46.00	-11.37	AVG

The test result is calculated as the following:

(1) Result = Reading + Correct Factor
(2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss +Attenuator
(3) Margin = Result - Limit

EUT:	Portable Speaker	Model No.:	POW Una X
Temperature:	24℃	Relative Humidity:	55%
Polarization:	N	Test Power:	AC 120V/60Hz
Test Time:	2019-09-06	Test Result:	Pass
Standard:	(RE)FCC PART 15	Test By:	Lake
Test Mode:	Keeping TX mode		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1940	41.52	11.21	52.73	63.86	-11.13	peak
2		0.1940	25.05	11.21	36.26	53.86	-17.60	AVG
3		0.7100	21.39	9.98	31.37	46.00	-14.63	AVG
4		0.7580	34.60	9.97	44.57	56.00	-11.43	peak
5	*	2.2620	37.99	10.00	47.99	56.00	-8.01	peak
6		2.3260	22.35	10.00	32.35	46.00	-13.65	AVG

The test result is calculated as the following:
(1) Result = Reading + Correct Factor
(2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss +Attenuator
(3) Margin = Result - Limit

10. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

10.1. TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2020/05/25	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2019/12/17	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2019/12/17	1 Year
4	Spectrum analyzer	R&S	FSV40	101470	2020/06/28	1 Year

10.2. LIMIT

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

10.3. TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

10.4. TEST RESULT

PASS (**See below detailed test result**.)

Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
GFSK Non-hopping			
2400	45.18	20	Pass
2483.5	58.41	20	Pass

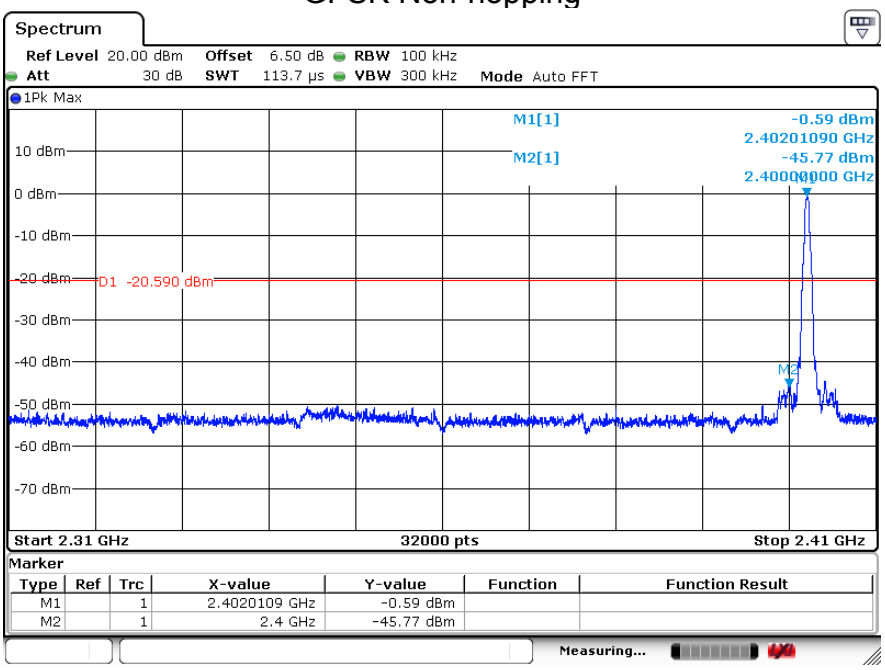
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
GFSK hopping			
2400	55.71	20	Pass
2483.5	54.96	20	Pass

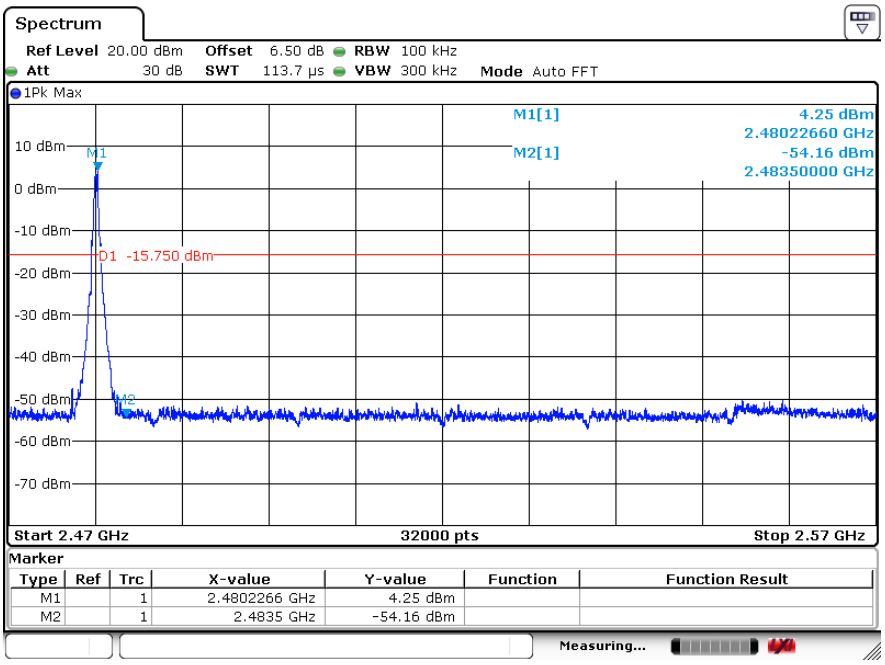
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
8DPSK Non-hopping			
2400	54.35	20	Pass
2483.5	57.14	20	Pass

Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
8DPSK hopping			
2400	50.06	20	Pass
2483.5	54.70	20	Pass

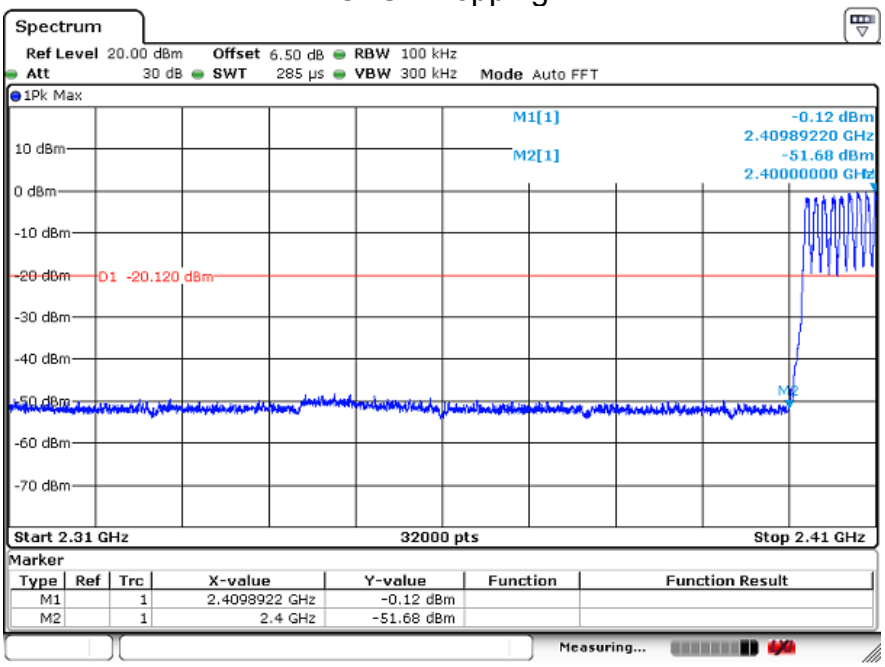
Note:GFSK and 8DPSK is worse case and only reported.

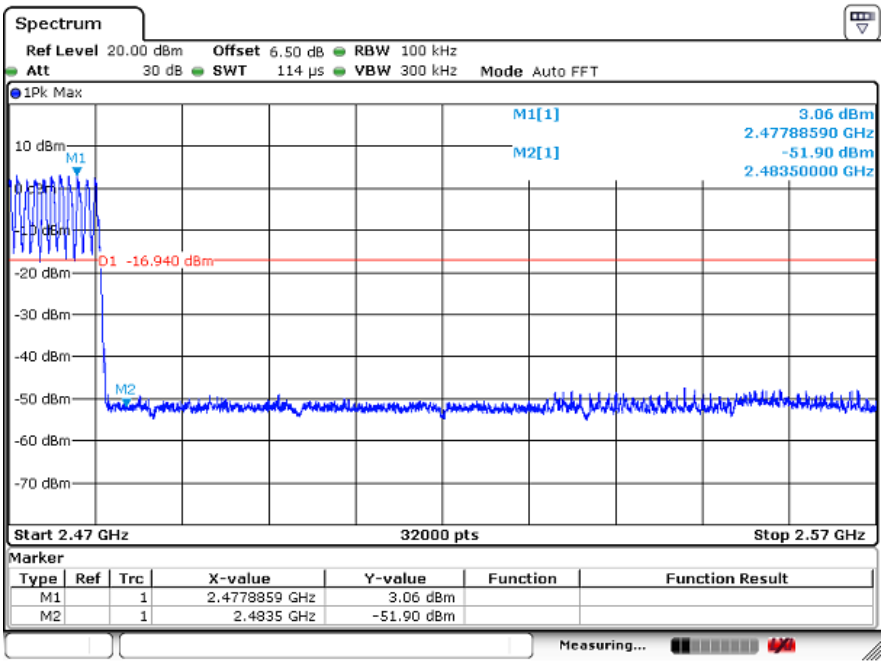
GFSK Non-hopping



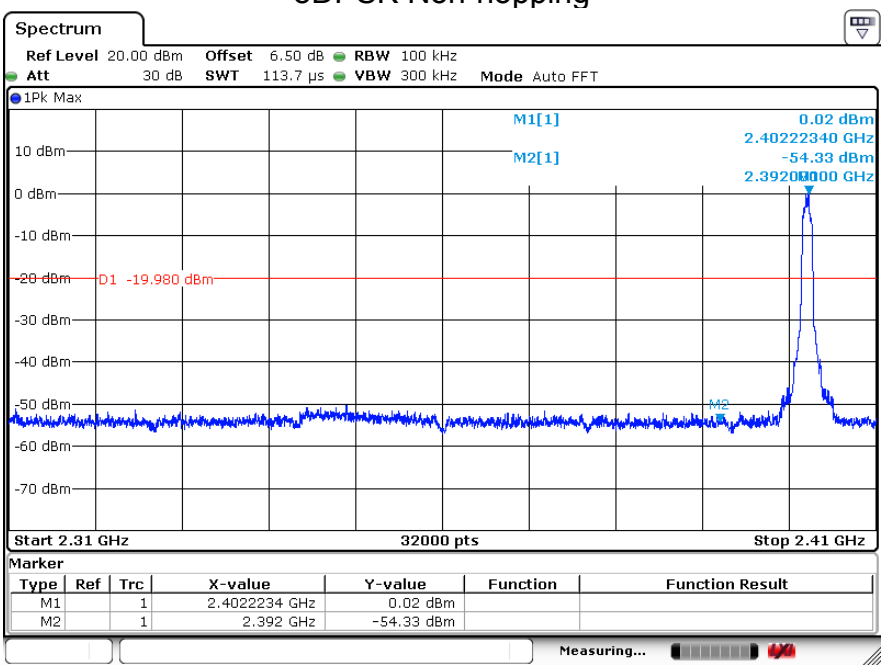


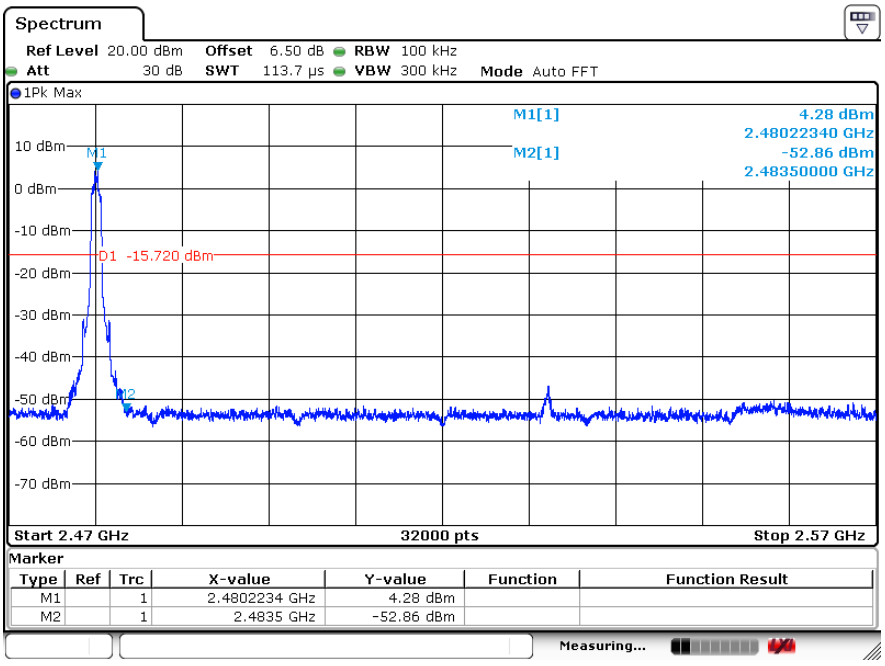
GFSK Hopping



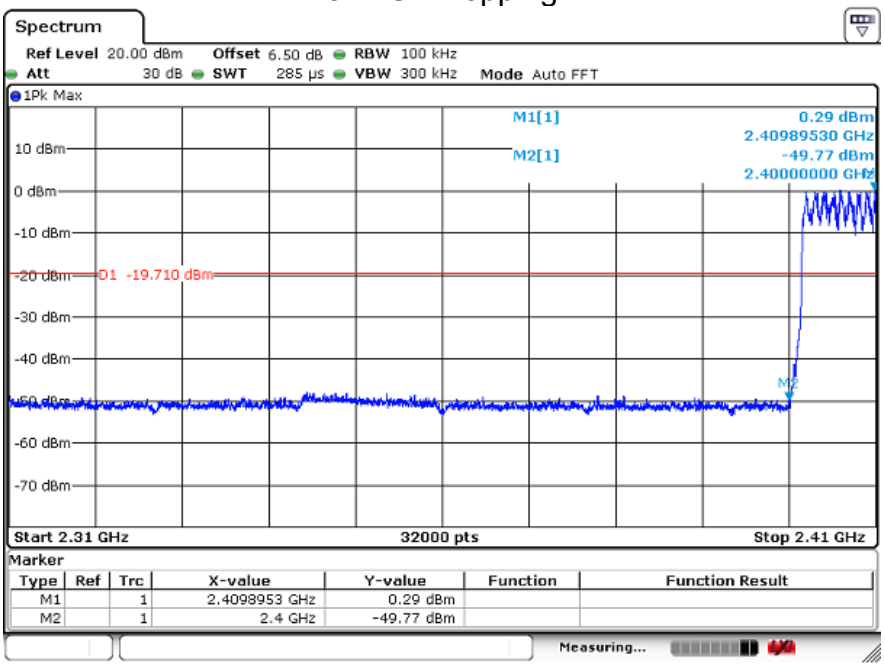


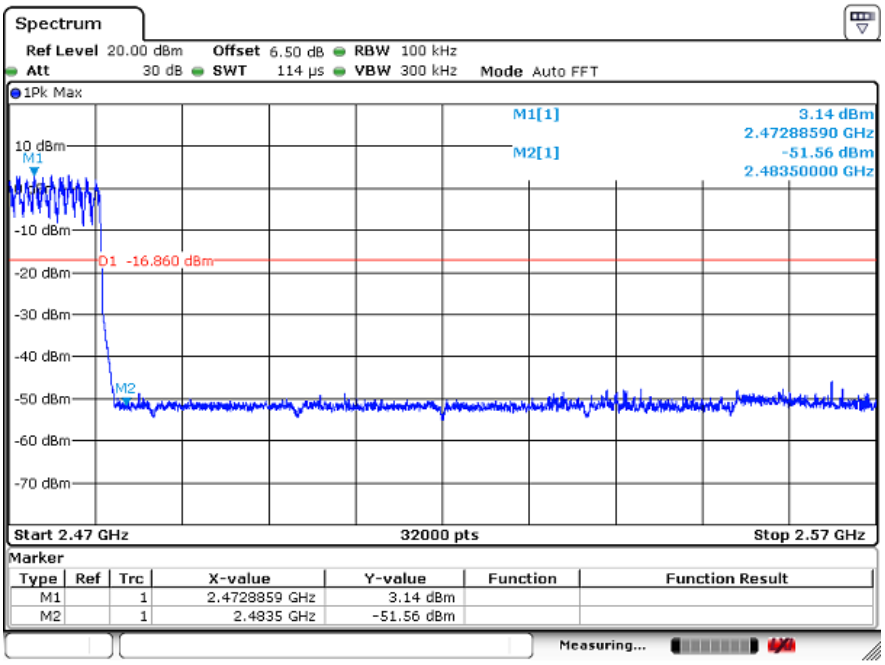
8DPSK Non-hopping



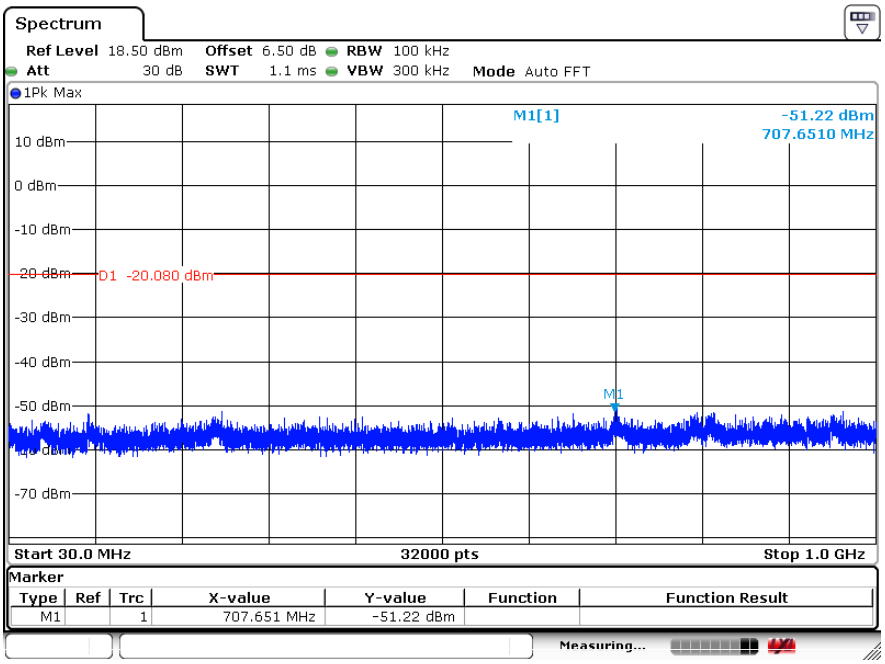


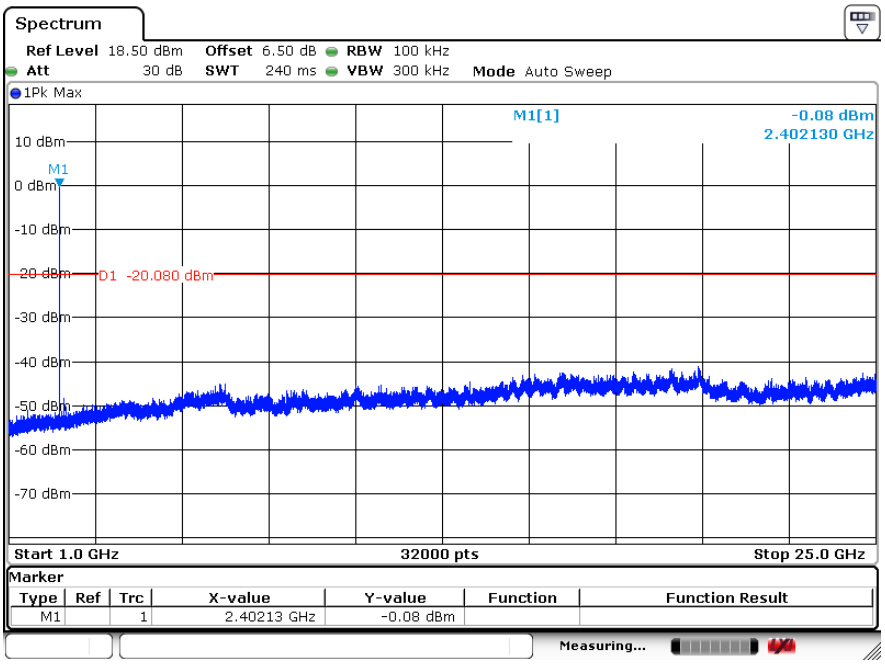
8DPSK Hopping



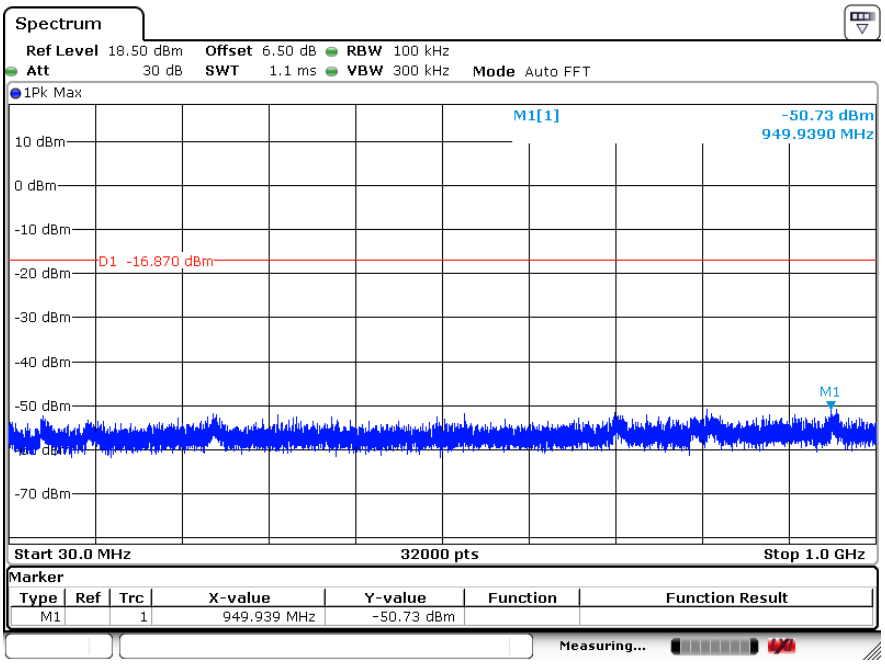


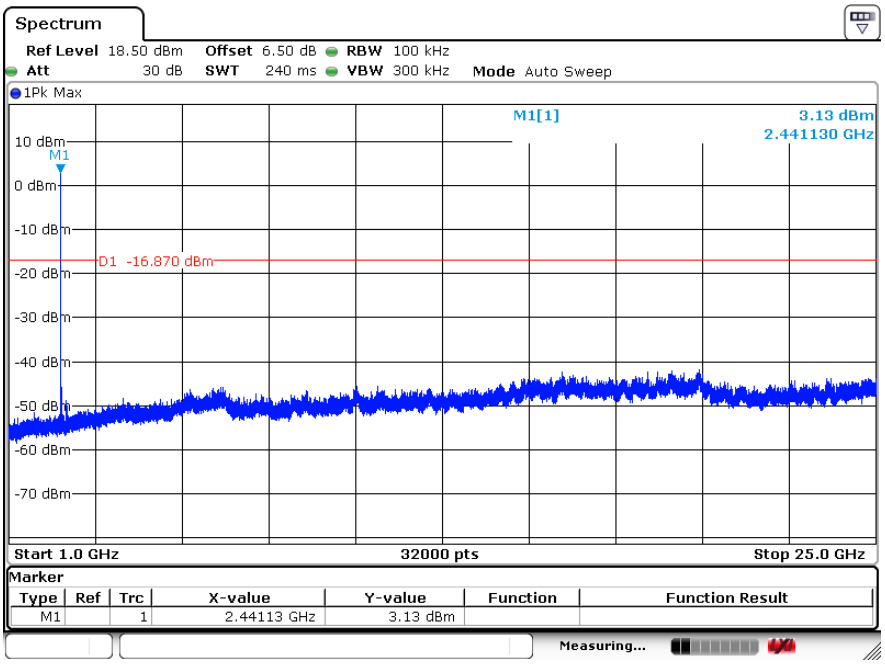
GFSK 2402MHz



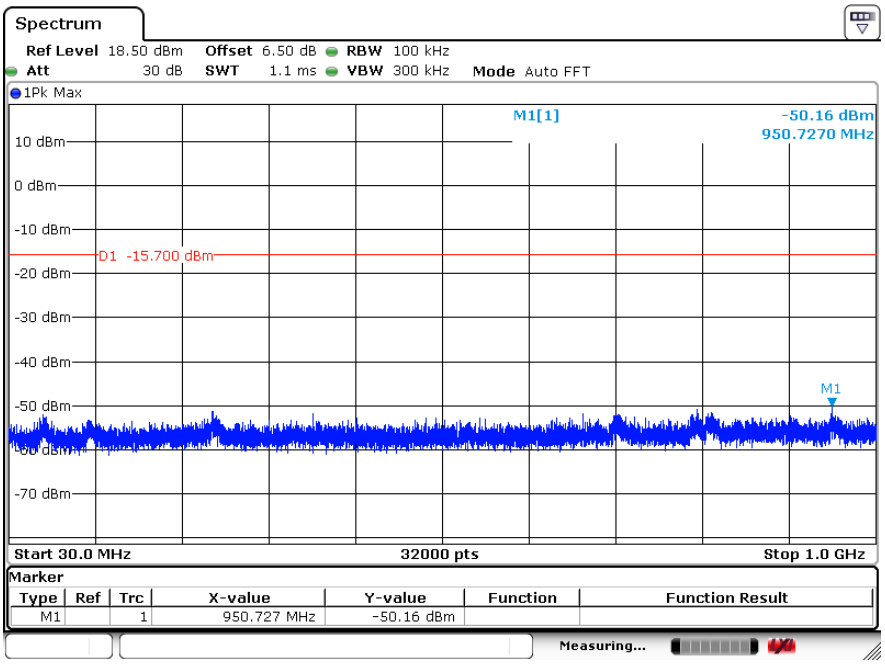


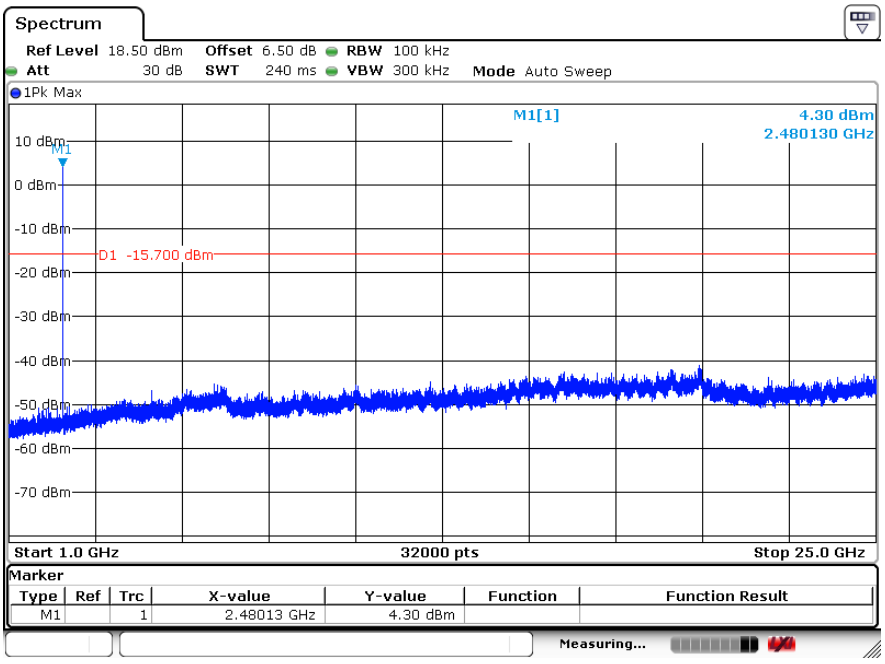
GFSK 2441MHz



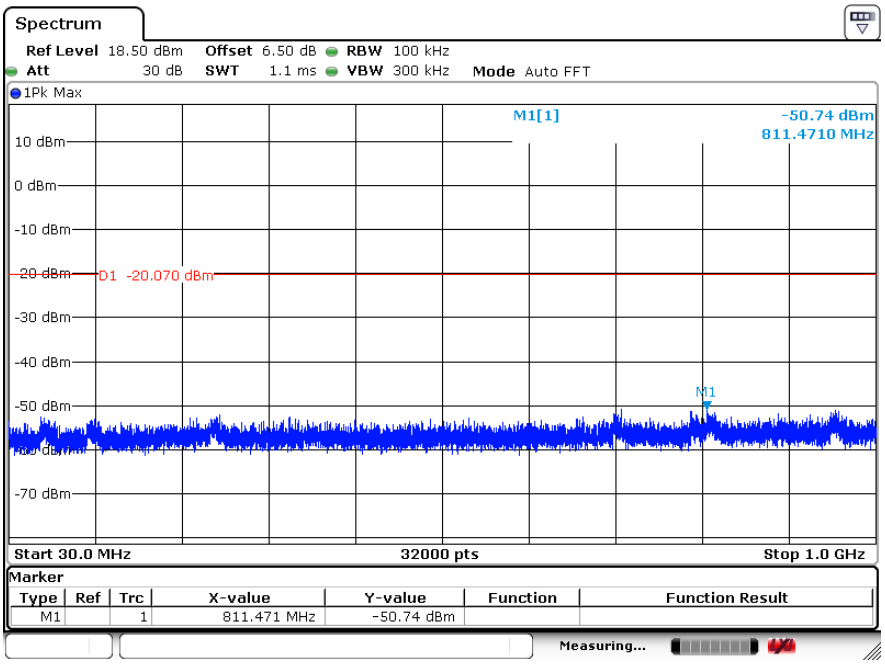


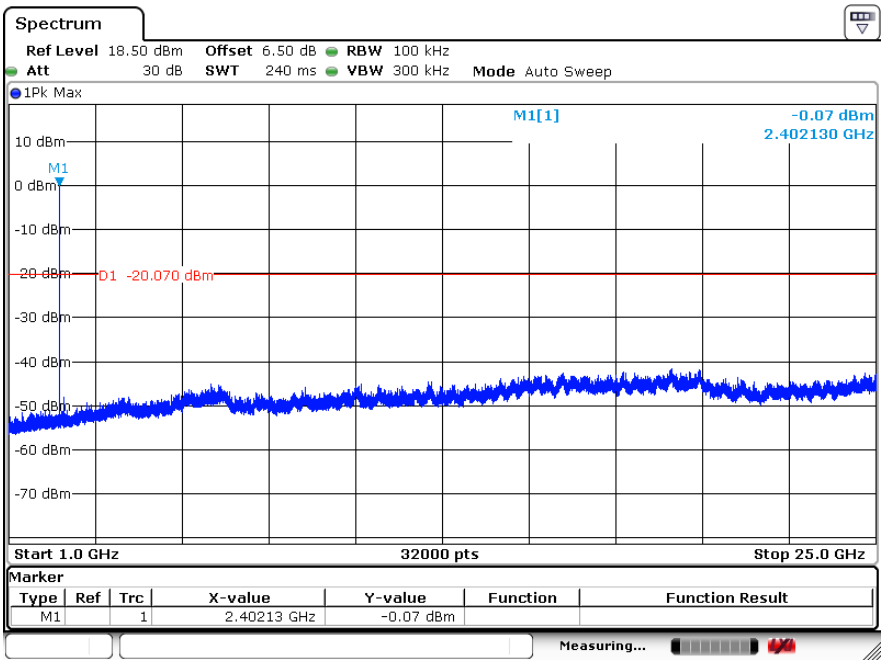
GFSK 2480MHz



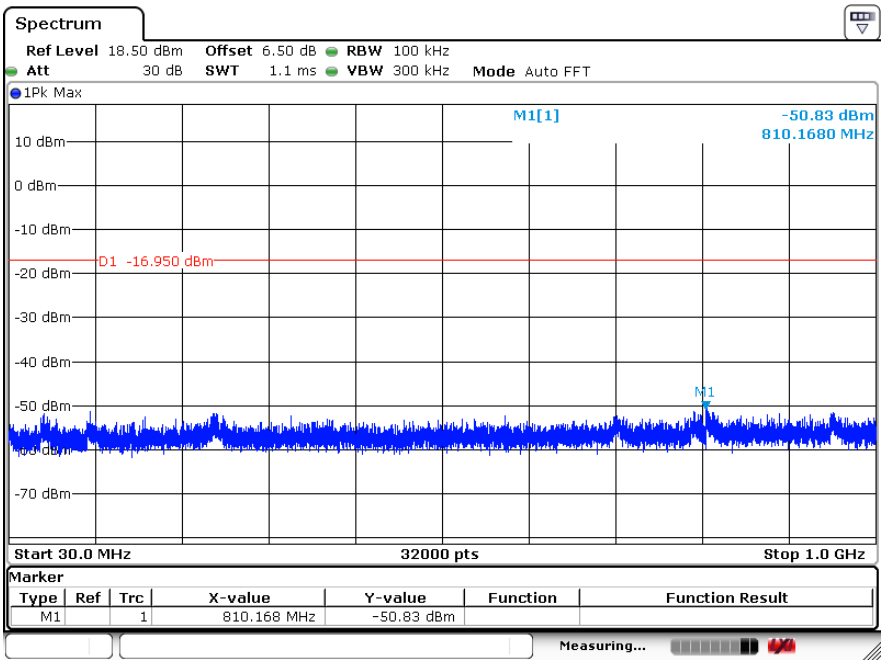


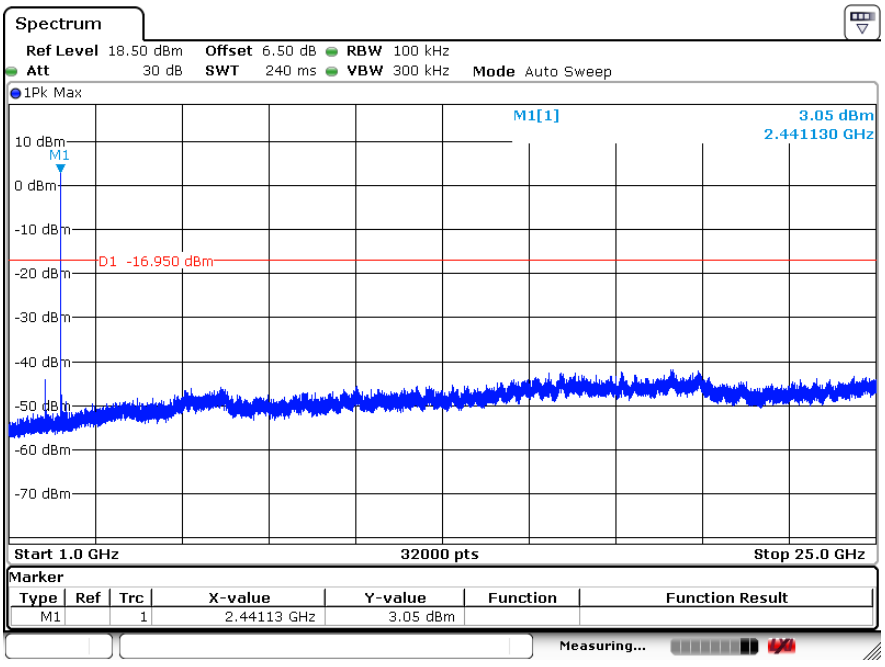
8DPSK 2402MHz



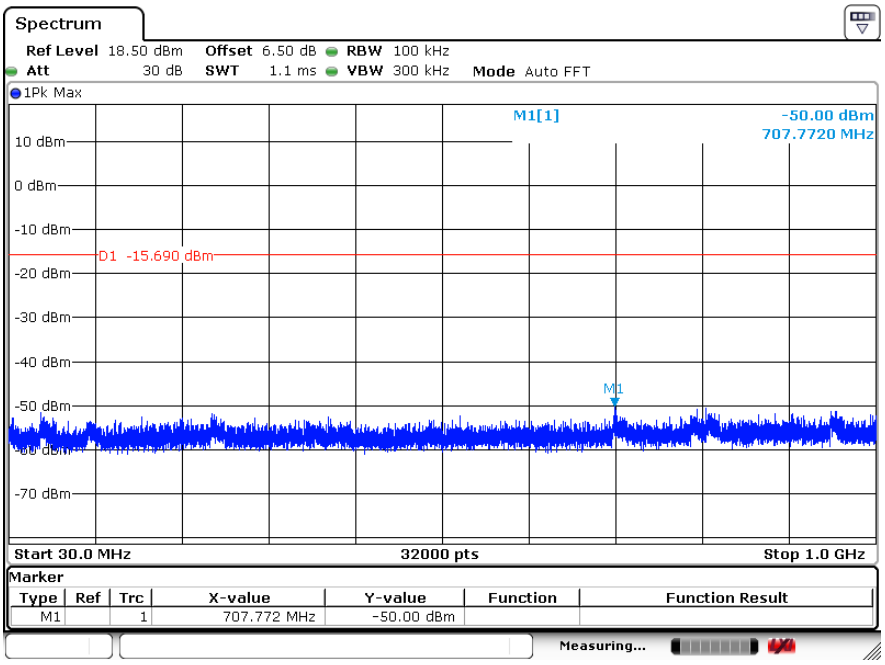


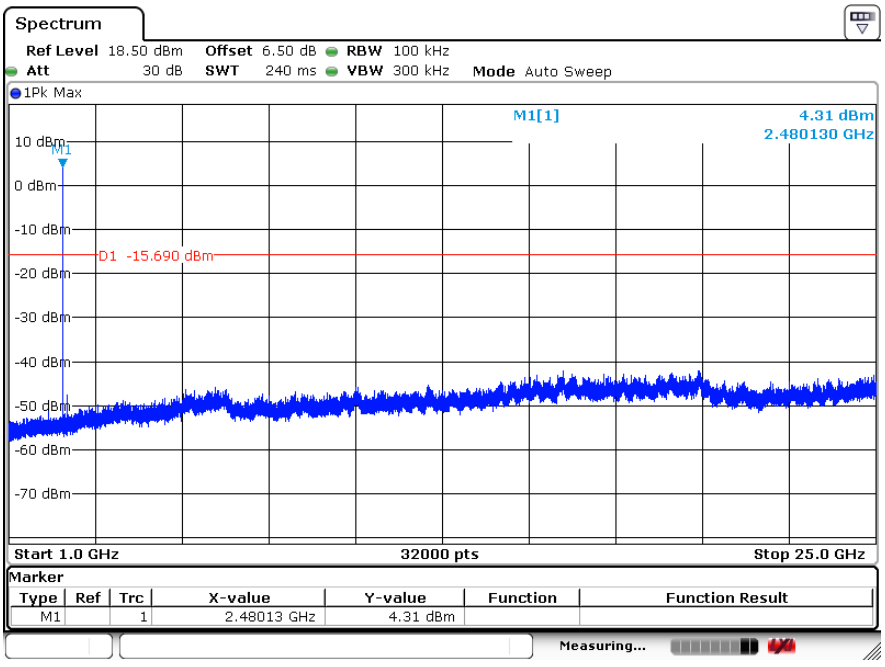
8DPSK 2441MHz





8DPSK 2480MHz





11. ANTENNA REQUIREMENTS

11.1. LIMIT

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. EUT ANTENNA

The EUT antenna is PCB antenna. It comply with the standard requirement.

END OF REPORT