Microtest
微测检测

Test Report

FCC ID:A4VXAM37

Date of issue: Aug. 13, 2018

Report Number:	MTi180808E033
Sample Description:	XOUNDBAR W
Model(s):	XAM37
Applicant:	Xmi Pte Ltd
Address:	11 Lor 3 Toa Payoh, Blk B #01-16/17 Singapore 319579
Date of Test:	July 30, 2018 – Aug. 13, 2018

Shenzhen Microtest Co., Ltd.
http://www.mtitest.com

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TEST REPORT

Applicant's name:	Xmi Pte Ltd
Address:	11 Lor 3 Toa Payoh, Blk B #01-16/17 Singapore 319579
Manufacture's name:	Xmi Pte Ltd
Address:	2F, 1st Building, Hui Huang Industrial Zone, Xitian Community, Guangming New District, Shenzhen, China.
Product name:	XOUNDBAR W
Trademark:	X-mini
Model name:	XAM37
Standards:	FCC Part 15.247
Test Procedure:	ANSI C63.10-2013 KDB 174176 D01 Line Conducted FAQ v01r01

This device described above has been tested by Shenzhen Microtest Co., Ltd. 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.

Tested by:	Demi Mu	Aug. 13 , 2018
Reviewed by:	Blue. Zheng	Aug. 13 , 2018
Approved by:	Smith Chen	Aug. 13 , 2018

1 General Information

1.1 Description of EUT

Product name:	XOUNDBAR W
Trade Name:	X-mini
Model name:	XAM37
Series model:	N/A
Difference in series models:	N/A
Operation Frequency	2402-2480MHz
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Bit Rate of Transmitter:	1 Mbps,2 Mbps,3 Mbps
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi
Max. Output Power:	0.595dBm
Hardware Version:	V1.0
Software Version:	V1.0
Battery:	DC 3.7V 800mAh
Power source:	DC 5V from adapter or DC 3.7V from battery
Adapter information:	N/A

1.2 Operation channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466

11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454	--	--
26	2428	53	2455	--	--

1.3 Test channel list

Channel	Channel	Frequency (MHz)
Low	00	2402
Middle	39	2441
High	79	2480

1.4 Ancillary equipment list

Equipment	Model	S/N	Manufacturer	Certificate type
Adapter	HW-059200CHQ	/	Huawei	/

1.5 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
/	/	/	/	/	/

Note:

(1)The support equipment was authorized by Declaration of Confirmation.

(2)For detachable type I/O cable should be specified the length in cm in『Length』column.

2 Summary of Test Results

Test procedures according to the technical standards:

Standard Section	Test Item	Result	Remark
15.203/15.247(c)	Antenna requirement	Pass	
15.247(b)(1)	Peak output power	Pass	
15.207	Conducted emission	Pass	
15.247(d)	Band edge	Pass	
15.205/15.209	Spurious emission	Pass	
15.247(a)(1)	20dB occupied bandwidth	Pass	
15.247(a)(1)	Carrier Frequencies Separation	Pass	
15.247(a)(1)	Hopping channel number	Pass	
15.247(a)(1)	Dwell time	Pass	

3 Test Facilities and Accreditations

3.1 Test laboratory

Test Laboratory	Shenzhen Microtest Co., Ltd.
Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
FCC Registration No.:	448573

3.2 Environmental conditions

Temperature:	20ºC~30ºC
Humidity	30%~70%
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

The reported uncertainty of measurement y ± U · where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2 · providing a level of confidence of approximately 95 %

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(<1G)	±4.68dB
5	All emissions, radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

3.4 Test software

Software Name	Manufacturer	Model	Version
RF Test System	Farad	LZ-RF	Lz_Rf 3A3

4 Equipment List

Equipment No.	Equipment Name	Manufacturer	Model	Serial No.	Calibration date	Due date
MTI-E001	Spectrum Analyzer	Agilent	E4407B	MY41441082	2017/09/18	2018/09/17
MTI-E002	CMU 200 universal radio communication tester	Rohde&schwarz	CMU 200	114587	2017/09/18	2018/09/17
MTI-E004	EMI Test Receiver	Rohde&schwarz	ESPI	1000314	2017/09/18	2018/09/17
MTI-E006	Broadband antenna	schwarabeck	VULB9163	872	2017/09/18	2018/09/17
MTI-E007	Horn antenna	schwarabeck	BBHA9120D	1201	2017/09/18	2018/09/17
MTI-E014	amplifier	America	8447D	3113A06150	2017/09/18	2018/09/17
MTI-E015	Conduction Immunity Signal Generator	Schloder	CDG6000	126A1343/2015	2017/09/18	2018/09/17
MTI-E016	Coupled decoupling network	Schloder	CDA M2/M3	A2210332/2015	2017/09/18	2018/09/17
MTI-E032	Comprehensive test instrument	Rohde&schwarz	CMW500	124192	2017/09/13	2018/09/12
MTI-E034	amplifier	Agilent	8449B	3008A02400	2017/08/22	2018/08/21
MTI-E040	Spectrum analyzer	Agilent	N9020A	MY49100060	2017/09/05	2018/09/04
MTI-E041	Signal generator	Agilent	N5182A	MY49060455	2017/09/23	2018/09/22
MTI-E042	Analog signal generator	Agilent	E4421B	GB40051240	2017/09/23	2018/09/22
MTI-E043	Power probe	Dare Instruments	RPR3006W	16I00054SNO16	2017/09/29	2018/09/28
MTI-E047	10dB attenuator	Mini-Circuits	UNAT-10+	15542	2017/09/24	2018/09/23
MTI-E049	spectrum analyzer	Rohde&schwarz	FSP-38	100019	2017/09/18	2018/09/17
MTI-E050	PSG Signal generator	Agilent	E8257D	MY46520873	2017/09/24	2018/09/23
MTI-E051	Active Loop Antenna 9kHz - 30MHz	Schwarzbeek	FMZB 1519 B	00044	2017/09/26	2018/09/25
MTI-E052	18-40GHz amplifier	Chengdu step Micro Technology	ZLNA-18-40G-21	1608001	2017/09/18	2018/09/17
MTI-E053	15-40G Antenna	Schwarzbeek	BBHA9170	BBHA9170582	2017/09/18	2018/09/17
Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).						

5 Test Result

5.1 Antenna requirement

5.1.1 Standard requirement

15.203 requirement: For intentional device, according to 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

5.1.2 EUT Antenna

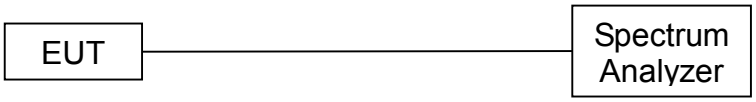
The EUT antenna is PCB antenna (0dBi). It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.

5.2 Peak output power

5.2.1 Limit

FCC Part15 Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247(b)(3)	Peak output power	Power<1W(30dBm)	2400-2483.5

5.2.2 Test setup



5.2.3 Test procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting:
RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz)
RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz)
(3) The EUT was set to continuously transmitting in the max power during the test.

5.2.4 Test results

Test data

EUT：	XOUNDBAR W	Model Name ：	XAM37
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V

GFSK

Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	-2.938	30
CH39	2441	-4.440	30
CH78	2480	-4.781	30

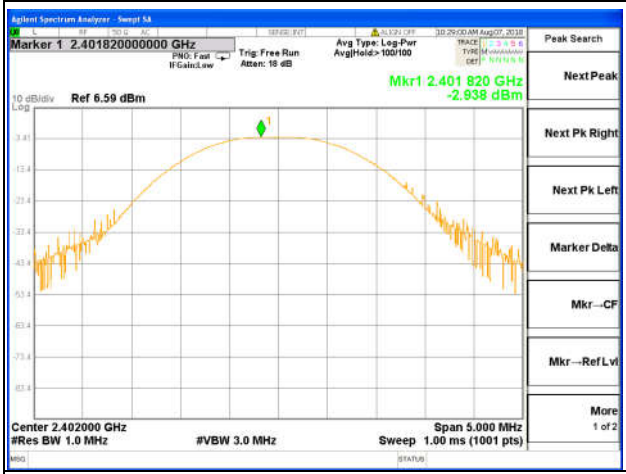
π/4-DQPSK

Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	0.595	21
CH39	2441	-0.864	21
CH78	2480	-1.081	21

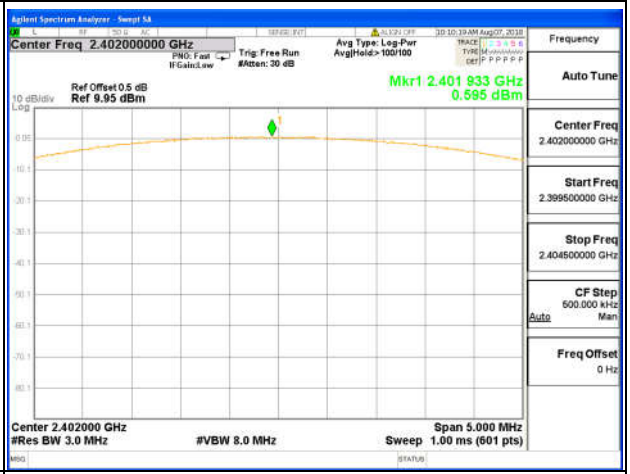
8DPSK

Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	0.527	21
CH39	2441	-0.470	21
CH78	2480	-0.521	21

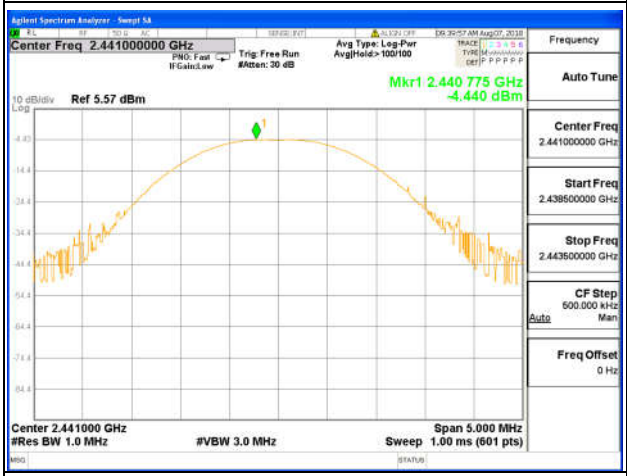
GFSK TX CH00



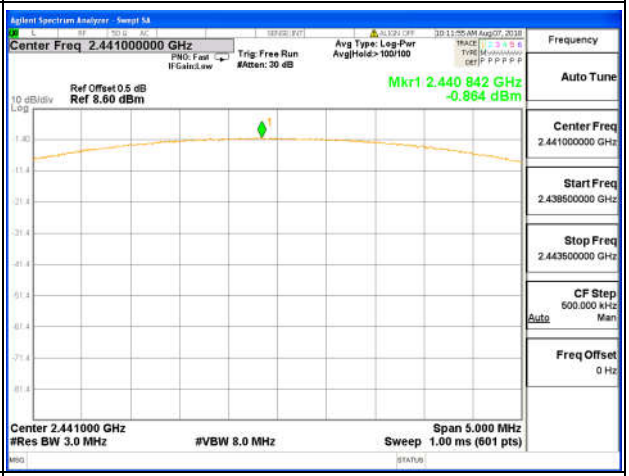
π/4-DQPSK TX CH00



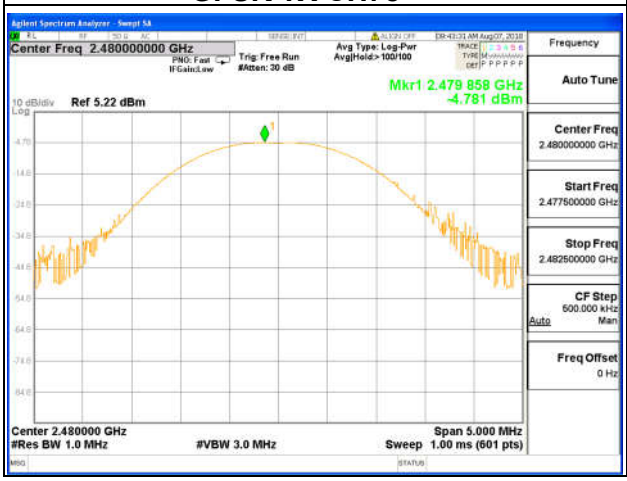
GFSK TX CH39



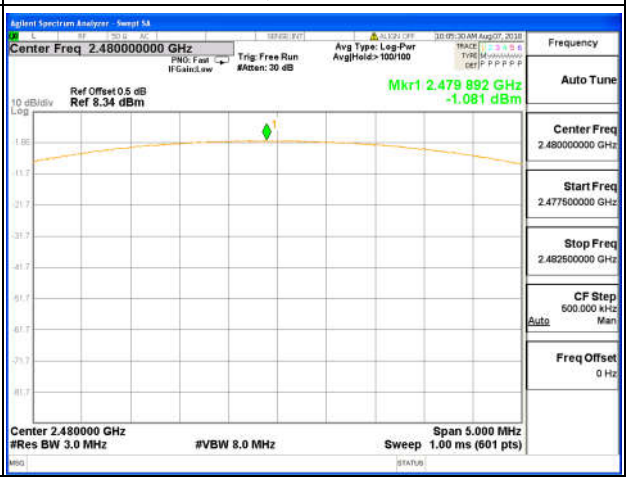
π/4-DQPSK TX CH39

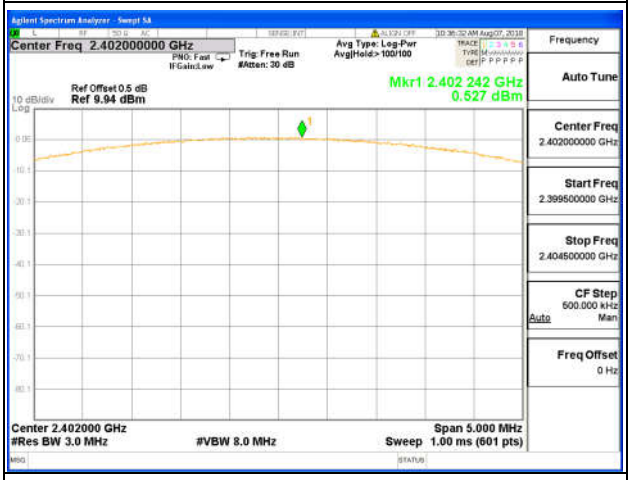
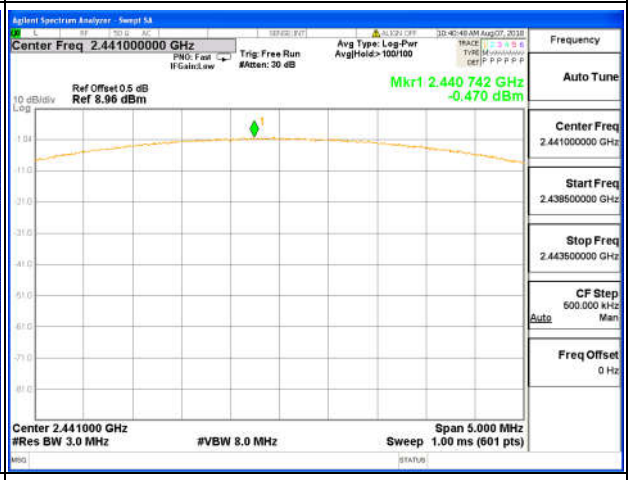
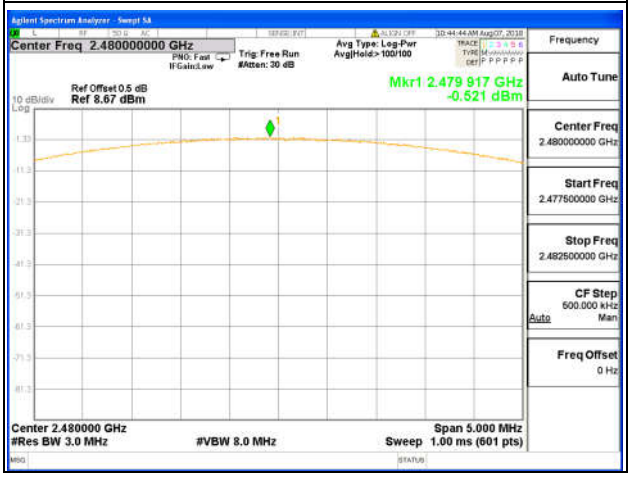


GFSK TX CH78



π/4-DQPSK TX CH78



8DPSK TX CH00	8DPSK TX CH39
	
8DPSK TX CH78	
	

5.3 Conducted emission

5.3.1 Limits

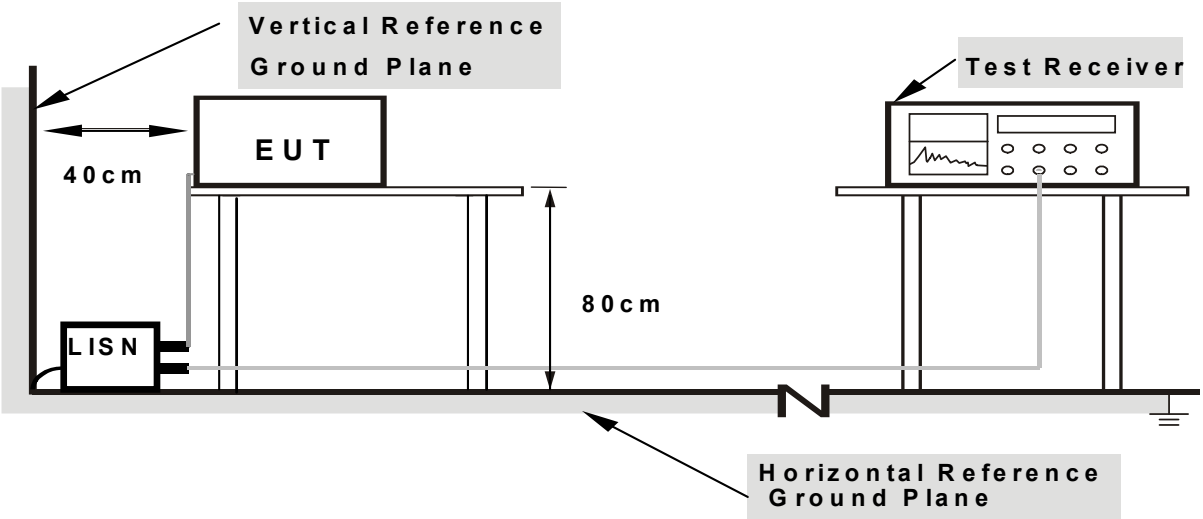
FREQUENCY (MHz)	Class B (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

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.

5.3.2 Test setup



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

5.3.3 Test procedure

a. EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b. The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

c. The EUT was placed 0.8 meters from the horizontal ground plane with EUT 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/ 50uH of coupling impedance for the measuring instrument.

d. 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.

e. I/O cables that 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.

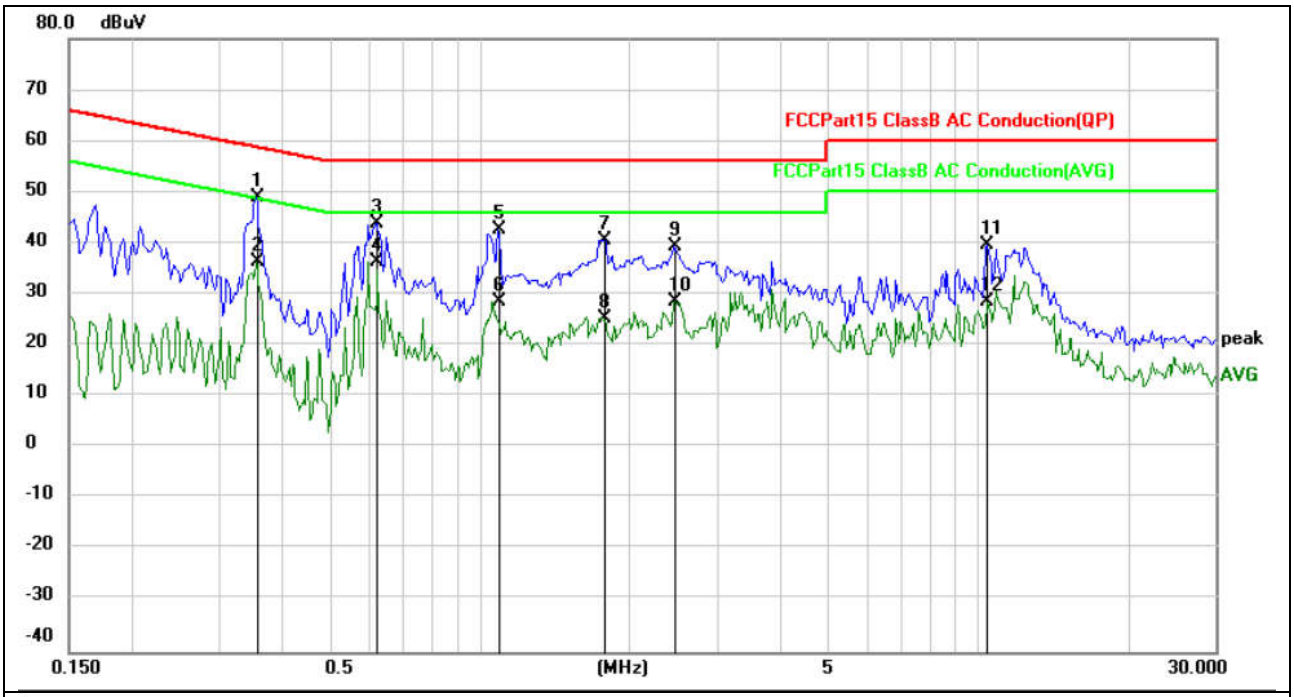
f. LISN at least 80 cm from nearest part of EUT chassis.

For the actual test configuration, please refer to the related Item –EUT Test Photos.

5.3.4 Test results

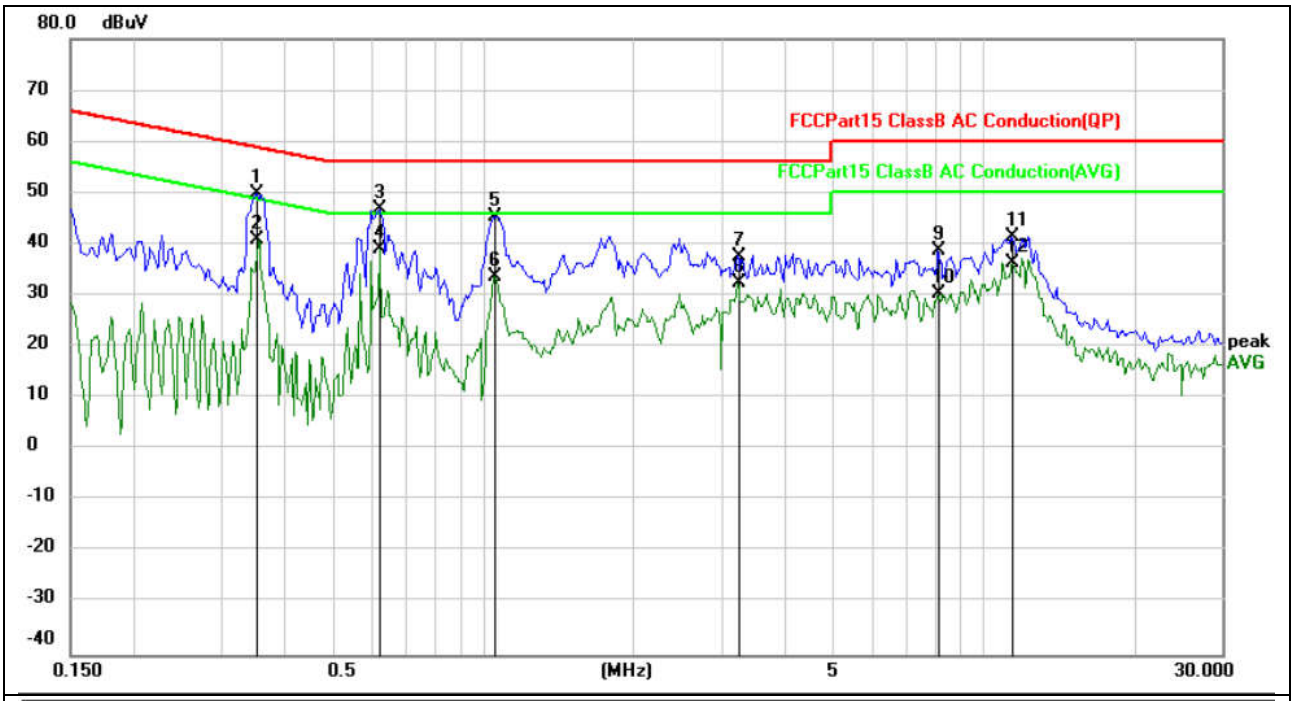
Test data

EUT：	XOUNDBAR W	Model Name. ：	XAM37
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from adapter AC 120V/60Hz	Test Mode：	TX



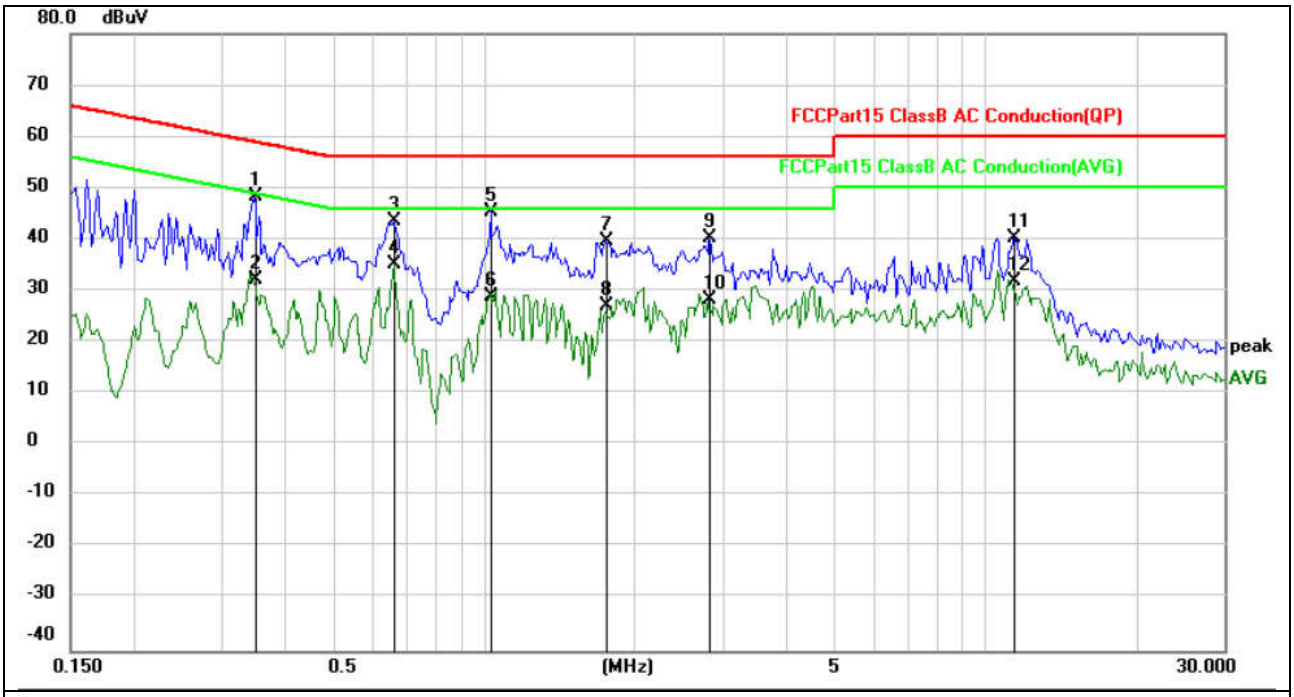
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3570	47.34	1.57	48.91	58.80	-9.89	QP	
2		0.3570	34.69	1.57	36.26	48.80	-12.54	AVG	
3		0.6188	42.35	1.57	43.92	56.00	-12.08	QP	
4	*	0.6188	34.76	1.57	36.33	46.00	-9.67	AVG	
5		1.0914	41.16	1.58	42.74	56.00	-13.26	QP	
6		1.0914	27.05	1.58	28.63	46.00	-17.37	AVG	
7		1.7750	39.03	1.59	40.62	56.00	-15.38	QP	
8		1.7750	23.65	1.59	25.24	46.00	-20.76	AVG	
9		2.4547	37.98	1.27	39.25	56.00	-16.75	QP	
10		2.4547	27.24	1.27	28.51	46.00	-17.49	AVG	
11		10.4414	39.16	0.38	39.54	60.00	-20.46	QP	
12		10.4414	28.21	0.38	28.59	50.00	-21.41	AVG	

EUT：	XOUNDBAR W	Model Name. ：	XAM37
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from adapter AC 120V/60Hz	Test Mode：	TX



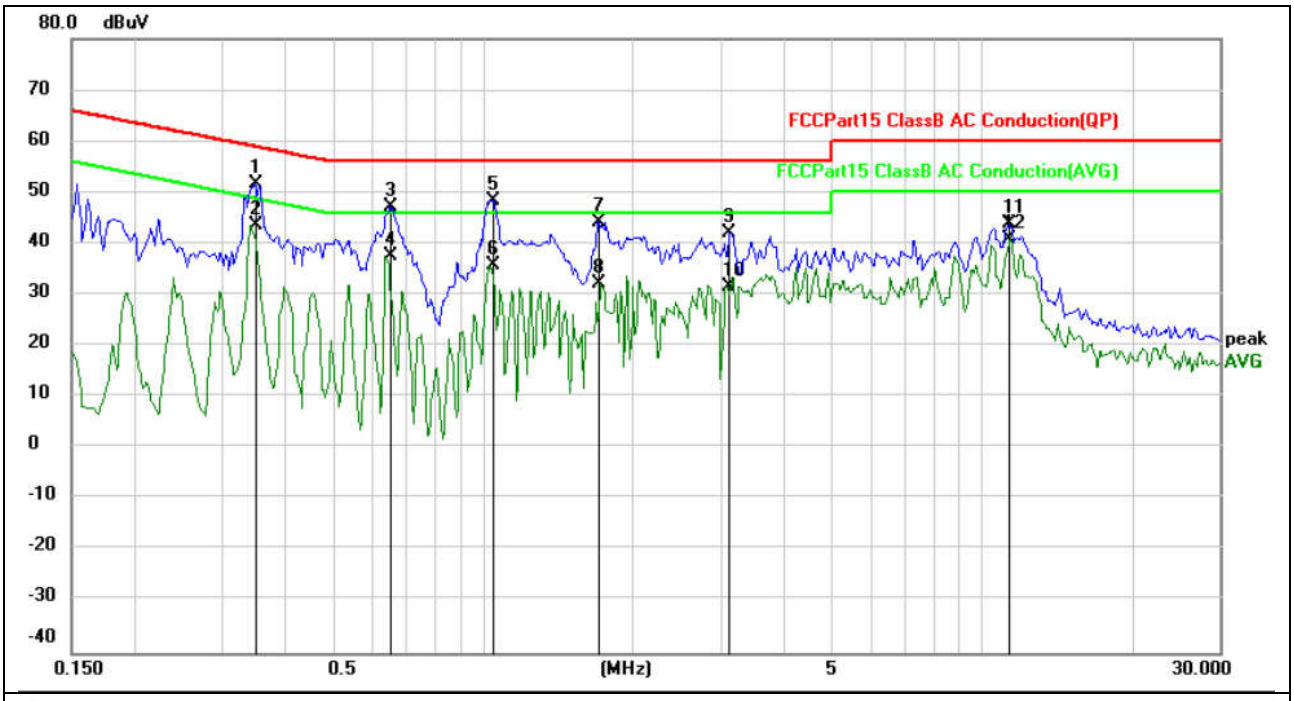
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3531	48.32	1.57	49.89	58.89	-9.00	QP	
2		0.3531	39.38	1.57	40.95	48.89	-7.94	AVG	
3		0.6227	45.36	1.57	46.93	56.00	-9.07	QP	
4	*	0.6227	37.47	1.57	39.04	46.00	-6.96	AVG	
5		1.0523	43.81	1.58	45.39	56.00	-10.61	QP	
6		1.0523	31.99	1.58	33.57	46.00	-12.43	AVG	
7		3.2344	36.71	0.99	37.70	56.00	-18.30	QP	
8		3.2344	31.50	0.99	32.49	46.00	-13.51	AVG	
9		8.1094	38.32	0.38	38.70	60.00	-21.30	QP	
10		8.1094	30.03	0.38	30.41	50.00	-19.59	AVG	
11		11.4297	40.95	0.37	41.32	60.00	-18.68	QP	
12		11.4297	35.95	0.37	36.32	50.00	-13.68	AVG	

EUT：	XOUNDBAR W	Model Name. ：	XAM37
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from adapter AC 240V/60Hz	Test Mode：	TX



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3492	46.73	1.57	48.30	58.98	-10.68	QP	
2		0.3492	30.57	1.57	32.14	48.98	-16.84	AVG	
3		0.6617	42.07	1.57	43.64	56.00	-12.36	QP	
4		0.6617	33.55	1.57	35.12	46.00	-10.88	AVG	
5	*	1.0367	43.92	1.58	45.50	56.00	-10.50	QP	
6		1.0367	27.25	1.58	28.83	46.00	-17.17	AVG	
7		1.7437	37.97	1.58	39.55	56.00	-16.45	QP	
8		1.7437	25.39	1.58	26.97	46.00	-19.03	AVG	
9		2.8219	39.09	1.10	40.19	56.00	-15.81	QP	
10		2.8219	27.24	1.10	28.34	46.00	-17.66	AVG	
11		11.4375	39.86	0.37	40.23	60.00	-19.77	QP	
12		11.4375	31.63	0.37	32.00	50.00	-18.00	AVG	

EUT：	XOUNDBAR W	Model Name. ：	XAM37
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from adapter AC 240V/60Hz	Test Mode：	TX



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3492	49.94	1.57	51.51	58.98	-7.47	QP	
2	*	0.3492	42.03	1.57	43.60	48.98	-5.38	AVG	
3		0.6539	45.64	1.57	47.21	56.00	-8.79	QP	
4		0.6539	35.87	1.57	37.44	46.00	-8.56	AVG	
5		1.0444	46.81	1.58	48.39	56.00	-7.61	QP	
6		1.0444	34.06	1.58	35.64	46.00	-10.36	AVG	
7		1.7047	42.58	1.58	44.16	56.00	-11.84	QP	
8		1.7047	30.54	1.58	32.12	46.00	-13.88	AVG	
9		3.1211	41.08	1.00	42.08	56.00	-13.92	QP	
10		3.1211	30.42	1.00	31.42	46.00	-14.58	AVG	
11		11.3477	43.58	0.37	43.95	60.00	-16.05	QP	
12		11.3477	40.63	0.37	41.00	50.00	-9.00	AVG	

5.4 Radiated spurious emission

5.4.1 Limits

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

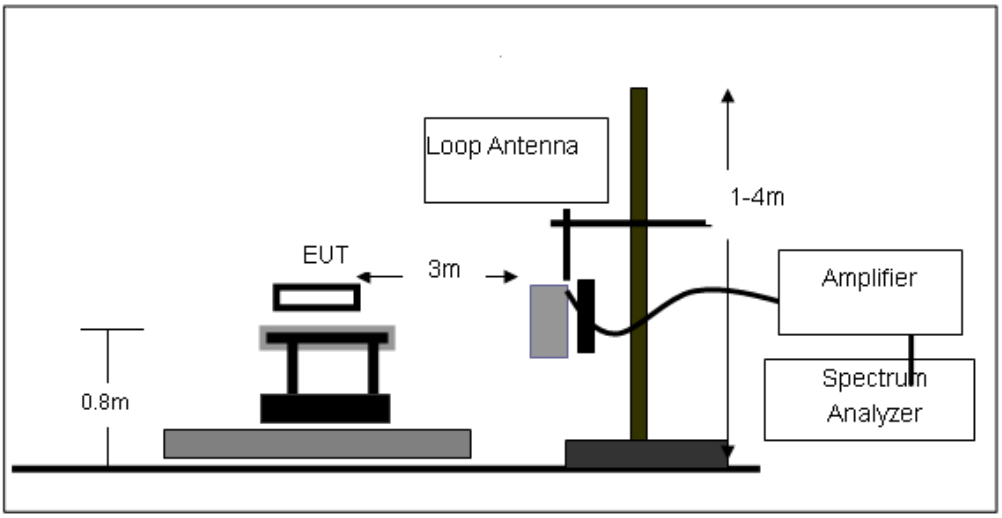
Frequency (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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

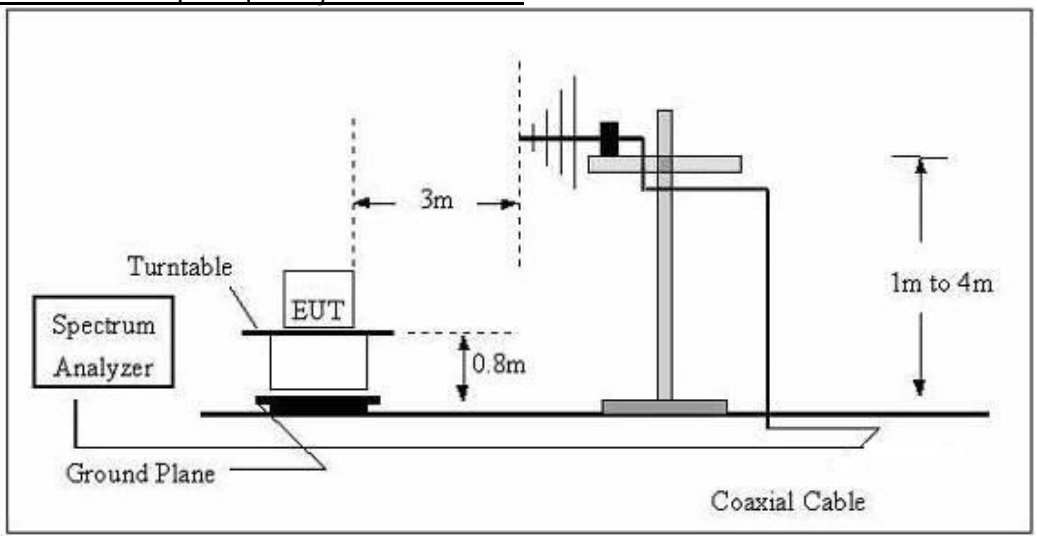
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

5.4.2 Test setup

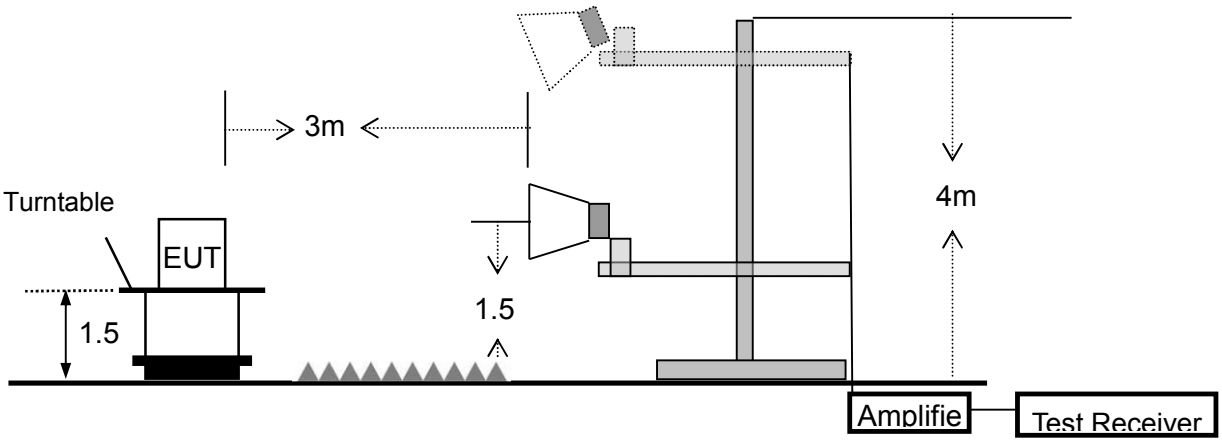
Radiated emission test-up frequency below 30MHz



Radiated emission test-up frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz



5.4.3 Test procedure

a. EUT operating conditions. The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

b. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

c. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

d. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

f. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

g. For the actual test configuration, please refer to the related Item –EUT Test photos.

Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

5.4.4 Test results

5.4.4.1 Radiation emission

Below 30MHz

EUT：	XOUNDBAR W	Model Name：	XAM37
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage：	DC 5V from adapter AC 120V/60Hz
Test Mode：	TX	Polarization :	--

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

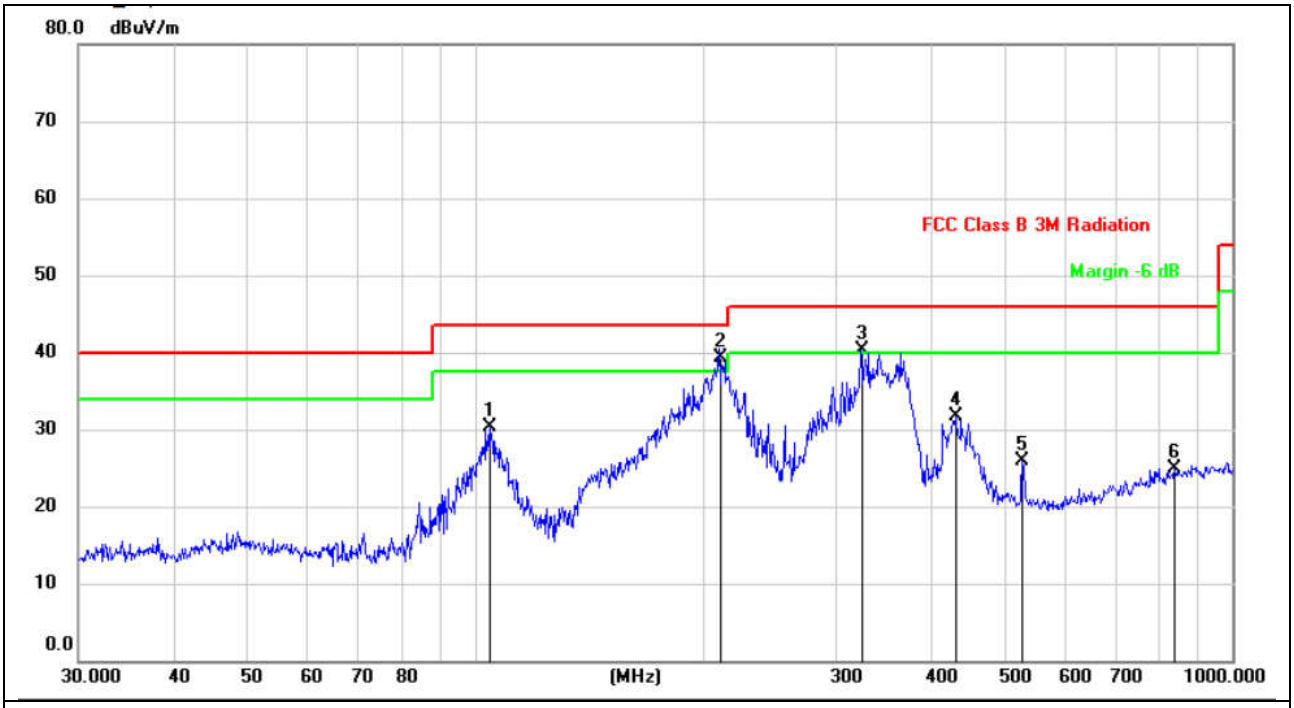
Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuV) + distance extrapolation factor.

Between 30MHz – 1GHz

Note1 : Emission Level = Meter Reading + Factor, Margin= Emission Level- Limit, Factor = Antenna Factor + Cable Loss – Pre-amplifier.

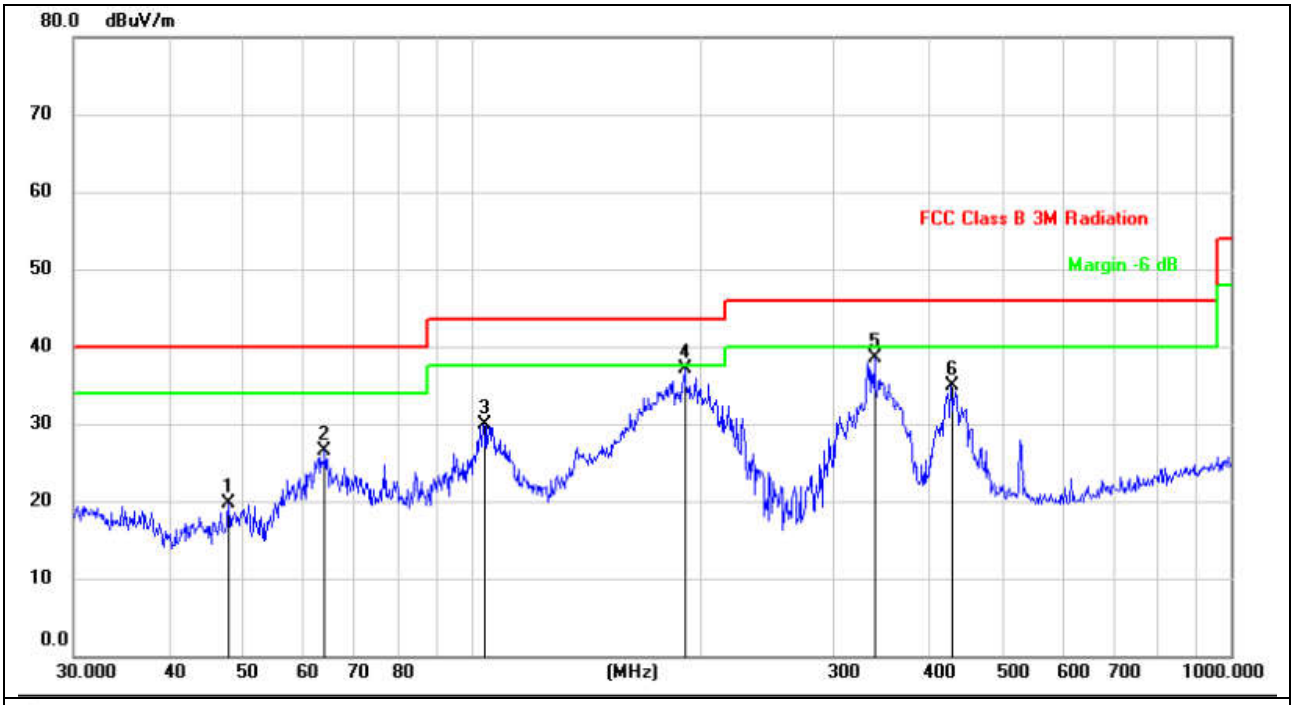
Note2 :The peak value is less than the AV value, AV value is not required Factor added by measurement software automatically.

EUT :	XOUNDBAR W	Model Name :	XAM37
Relative Humidity:	52%	Phase:	H
Pressure:	1010 hPa	Test Voltage :	DC 5V from adapter AC 120V/60Hz
Test Mode :	TX		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		104.5361	41.65	-11.44	30.21	43.50	-13.29	QP
2	*	210.0482	50.78	-11.38	39.40	43.50	-4.10	QP
3	!	323.3204	48.52	-8.14	40.38	46.00	-5.62	QP
4		431.0316	37.72	-6.09	31.63	46.00	-14.37	QP
5		528.2458	31.10	-5.15	25.95	46.00	-20.05	QP
6		839.1818	27.09	-2.20	24.89	46.00	-21.11	QP

EUT：	XOUNDBAR W	Model Name ：	XAM37
Relative Humidity:	52%	Phase:	V
Pressure：	1010 hPa	Test Voltage ：	DC 5V from adapter AC 120V/60Hz
Test Mode ：	TX		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		47.9940	29.36	-9.67	19.69	40.00	-20.31	QP
2		64.2074	38.75	-12.23	26.52	40.00	-13.48	QP
3		103.8055	41.26	-11.43	29.83	43.50	-13.67	QP
4	*	191.0738	47.76	-10.65	37.11	43.50	-6.39	QP
5		339.5888	46.21	-7.80	38.41	46.00	-7.59	QP
6		428.0193	41.01	-6.13	34.88	46.00	-11.12	QP

1G-25GHz

Note: (1) All Readings are Peak Value (VBW=3MHz) and AV Value (VBW=10Hz).
(2) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor
(3) All other emissions more than 20dB below the limit.

All the modulation modes have been tested, and the worst result was report as below:

Frequency	Read Level	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (2402 MHz)(π/4-DQPSK)--Above 1G									
4804.03	63.49	5.21	35.59	44.30	59.99	74.00	-14.01	Pk	Vertical
4804.03	42.15	5.21	35.59	44.30	38.65	54.00	-15.35	AV	Vertical
7206.27	60.23	6.48	36.27	44.60	58.38	74.00	-15.62	Pk	Vertical
7206.27	44.99	6.48	36.27	44.60	43.14	54.00	-10.86	AV	Vertical
4804.11	61.43	5.21	35.55	44.30	57.89	74.00	-16.11	Pk	Horizontal
4804.11	43.15	5.21	35.55	44.30	39.61	54.00	-14.39	AV	Horizontal
7206.22	64.07	6.48	36.27	44.52	62.30	74.00	-11.70	Pk	Horizontal
7206.22	46.93	6.48	36.27	44.52	45.16	54.00	-8.84	AV	Horizontal
Mid Channel (2441 MHz)(π/4-DQPSK)--Above 1G									
4882.4	62.90	5.21	35.66	44.20	59.57	74.00	-14.43	Pk	Vertical
4882.4	42.87	5.21	35.66	44.20	39.54	54.00	-14.46	AV	Vertical
7323.24	60.31	7.10	36.50	44.43	59.48	74.00	-14.52	Pk	Vertical
7323.24	47.37	7.10	36.50	44.43	46.54	54.00	-7.46	AV	Vertical
4882.11	60.98	5.21	35.66	44.20	57.65	74.00	-16.35	Pk	Horizontal
4882.11	49.46	5.21	35.66	44.20	46.13	54.00	-7.87	AV	Horizontal
7323.13	60.06	7.10	36.50	44.43	59.23	74.00	-14.77	Pk	Horizontal
7323.13	43.18	7.10	36.50	44.43	42.35	54.00	-11.65	AV	Horizontal
High Channel (2480 MHz)(π/4-DQPSK)-- Above 1G									
4960.4	67.41	5.21	35.52	44.21	63.93	74.00	-10.07	Pk	Vertical
4960.4	43.62	5.21	35.52	44.21	40.14	54.00	-13.86	AV	Vertical
7440.2	61.38	7.10	36.53	44.60	60.41	74.00	-13.59	Pk	Vertical
7440.2	44.98	7.10	36.53	44.60	44.01	54.00	-9.99	AV	Vertical
4960.23	68.42	5.21	35.52	44.21	64.94	74.00	-9.06	Pk	Horizontal
4960.23	47.77	5.21	35.52	44.21	44.29	54.00	-9.71	AV	Horizontal
7440.3	61.52	7.10	36.53	44.60	60.55	74.00	-13.45	Pk	Horizontal
7440.3	46.18	7.10	36.53	44.60	45.21	54.00	-8.79	AV	Horizontal

5.4.4.2 Band edge – radiated

All the modulation modes have been tested, and the worst result was report as below:

Frequency	Meter Reading	Cable Loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
1Mbps (π/4-DQPSK)-hopping									
2310.00	56.36	2.97	27.80	43.80	43.33	74	-30.67	Pk	Horizontal
2310.00	44.33	2.97	27.80	43.80	31.30	54	-22.70	AV	Horizontal
2310.00	59.31	2.97	27.80	43.80	46.28	74	-27.72	Pk	Vertical
2310.00	43.05	2.97	27.80	43.80	30.02	54	-23.98	AV	Vertical
2390.00	58.31	3.14	27.21	43.80	44.86	74	-29.14	Pk	Vertical
2390.00	43.48	3.14	27.21	43.80	30.03	54	-23.97	AV	Vertical
2390.00	58.18	3.14	27.21	43.80	44.73	74	-29.27	Pk	Horizontal
2390.00	42.79	3.14	27.21	43.80	29.34	54	-24.66	AV	Horizontal
2483.50	58.61	3.58	27.70	44.00	45.89	74	-28.11	Pk	Vertical
2483.50	43.38	3.58	27.70	44.00	30.66	54	-23.34	AV	Vertical
2483.50	58.99	3.58	27.70	44.00	46.27	74	-27.73	Pk	Horizontal
2483.50	42.34	3.58	27.70	44.00	29.62	54	-24.38	AV	Horizontal
1Mbps(π/4-DQPSK)- Non-hopping									
2310.00	56.36	2.97	27.80	43.80	43.33	74	-30.67	Pk	Horizontal
2310.00	44.89	2.97	27.80	43.80	31.86	54	-22.14	AV	Horizontal
2310.00	58.95	2.97	27.80	43.80	45.92	74	-28.08	Pk	Vertical
2310.00	42.37	2.97	27.80	43.80	29.34	54	-24.66	AV	Vertical
2390.00	59.61	3.14	27.21	43.80	46.16	74	-27.84	Pk	Vertical
2390.00	43.27	3.14	27.21	43.80	29.82	54	-24.18	AV	Vertical
2390.00	58.03	3.14	27.21	43.80	44.58	74	-29.42	Pk	Horizontal
2390.00	42.69	3.14	27.21	43.80	29.24	54	-24.76	AV	Horizontal
2483.50	58.57	3.58	27.70	44.00	45.85	74	-28.15	Pk	Vertical
2483.50	43.47	3.58	27.70	44.00	30.75	54	-23.25	AV	Vertical
2483.50	58.83	3.58	27.70	44.00	46.11	74	-27.89	Pk	Horizontal
2483.50	42.69	3.58	27.70	44.00	29.97	54	-24.03	AV	Horizontal

5.4.4.3 Spurious Emission in Restricted Band 3260MMHz-18000MHz

All the modulation modes have been tested, and the worst result was report as below:

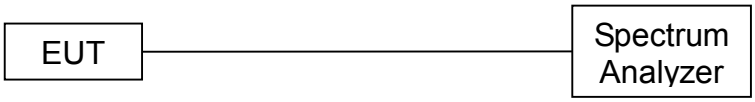
Frequency	Reading Level	Cable Loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
3260	60.21	4.04	29.57	44.70	49.12	74	-24.88	Pk	Vertical
3260	50.02	4.04	29.57	44.70	38.93	54	-15.07	AV	Vertical
3260	62.39	4.04	29.57	44.70	51.30	74	-22.70	Pk	Horizontal
3260	51.25	4.04	29.57	44.70	40.16	54	-13.84	AV	Horizontal
3332	65.15	4.26	29.87	44.40	54.88	74	-19.12	Pk	Vertical
3332	53.77	4.26	29.87	44.40	43.50	54	-10.50	AV	Vertical
3332	63.87	4.26	29.87	44.40	53.60	74	-20.40	Pk	Horizontal
3332	53.80	4.26	29.87	44.40	43.53	54	-10.47	AV	Horizontal
17797	43.14	10.99	43.95	43.50	54.58	74	-19.42	Pk	Vertical
17797	32.09	10.99	43.95	43.50	43.53	54	-10.47	AV	Vertical
17788	44.73	11.81	43.69	44.60	55.63	74	-18.37	Pk	Horizontal
17788	32.86	11.81	43.69	44.60	43.76	54	-10.24	AV	Horizontal

5.5 20dB occupied channel bandwidth

5.5.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247a(1)	20dB bandwidth	N/A	2400-2483.5

5.5.2 Test setup



5.5.3 Test procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting:
Bandwidth: RBW=30 kHz, VBW=100 kHz, detector= Peak

5.5.4 Test results

Test data

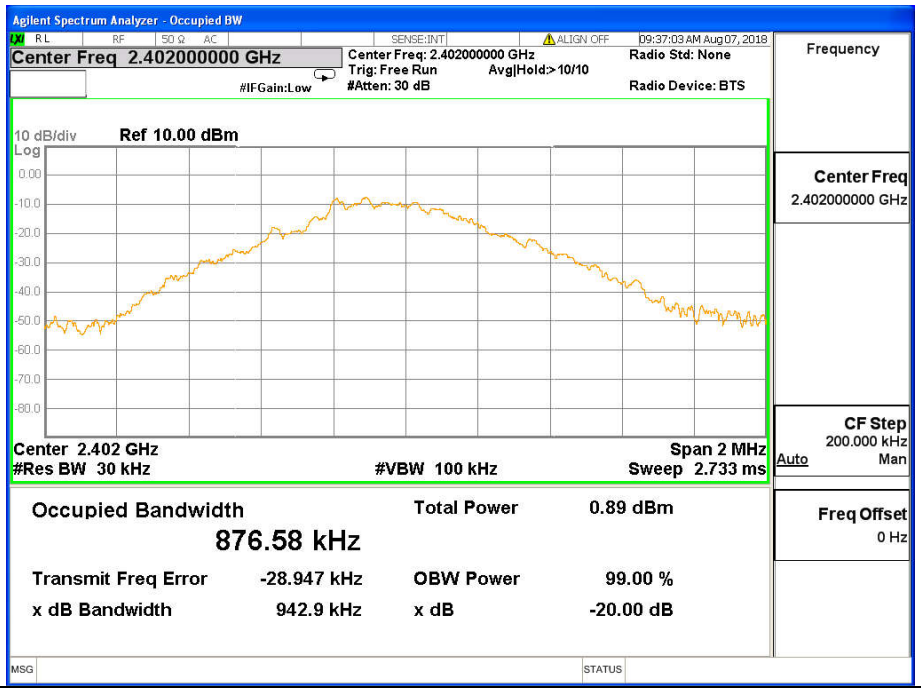
EUT：	XOUNDBAR W	Model Name ：	XAM37
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V

Mode	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Result
GFSK	2402	0.943	N/A	Pass
	2441	0.935	N/A	Pass
	2480	0.939	N/A	Pass
π/4-DQPSK	2402	1.303	N/A	Pass
	2441	1.300	N/A	Pass
	2480	1.281	N/A	Pass
8DPSK	2402	1.304	N/A	Pass
	2441	1.299	N/A	Pass
	2480	1.296	N/A	Pass

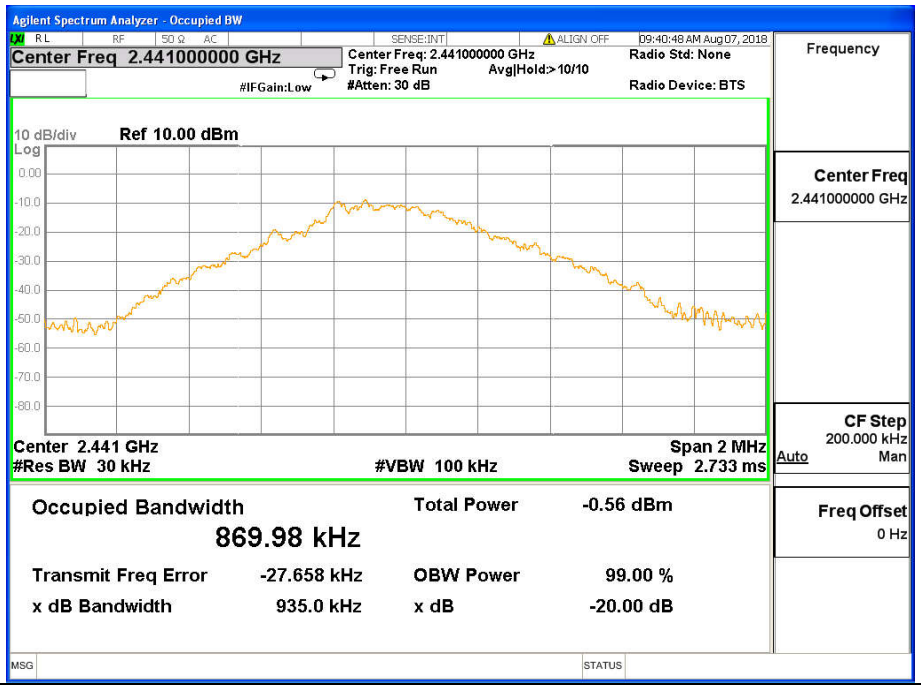
Test plots

GFSK mode

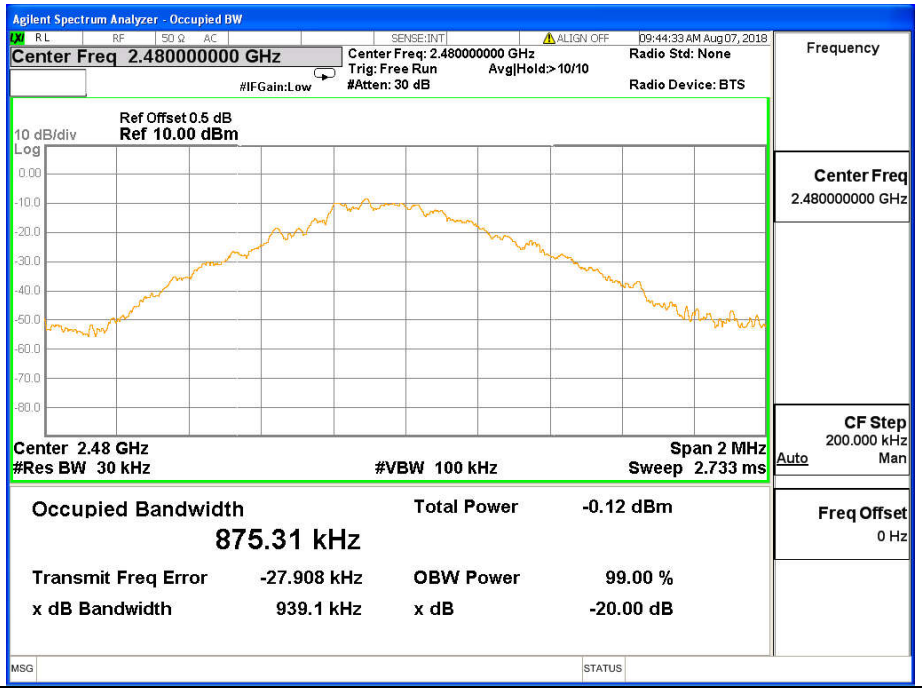
TX CH00



TX CH39

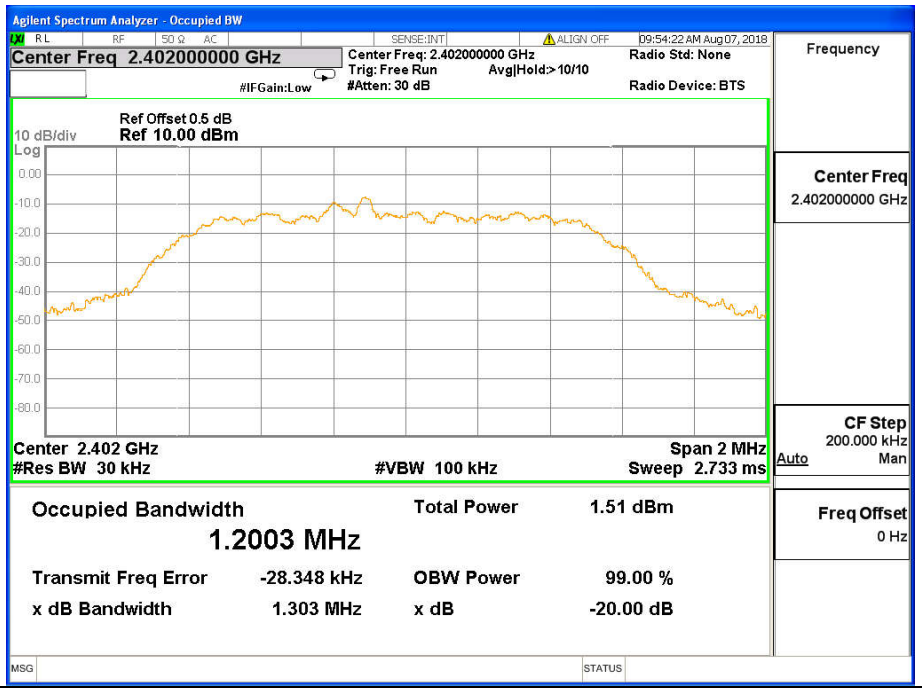


TX CH78



π/4-DQPSK

TX CH00



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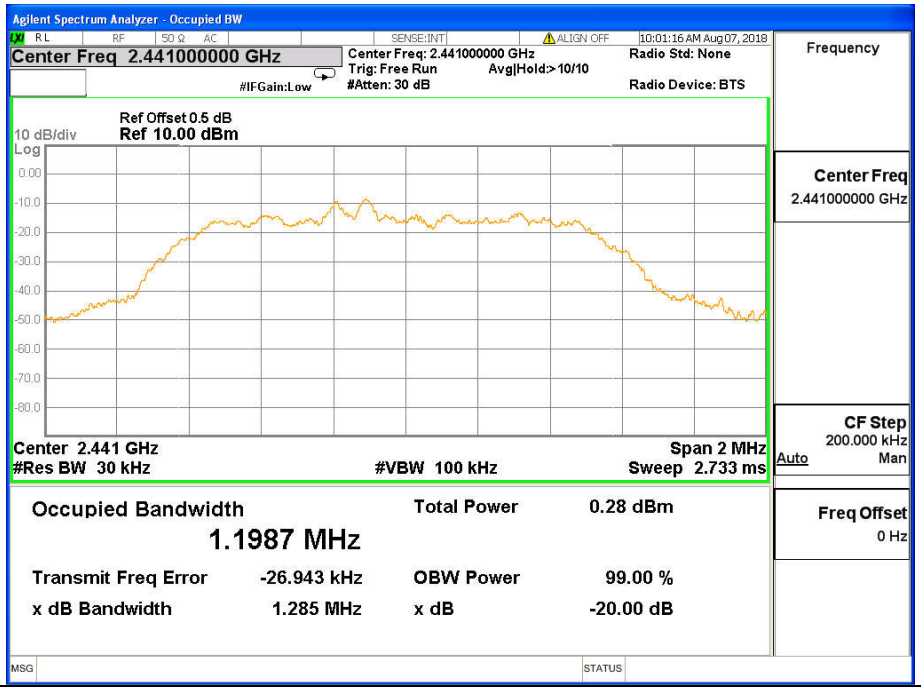

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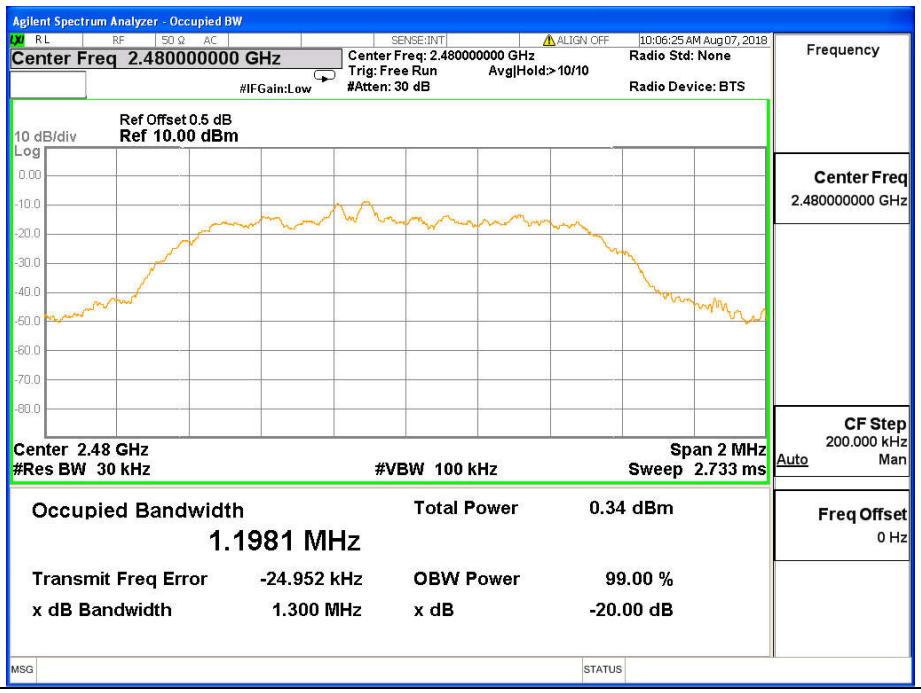
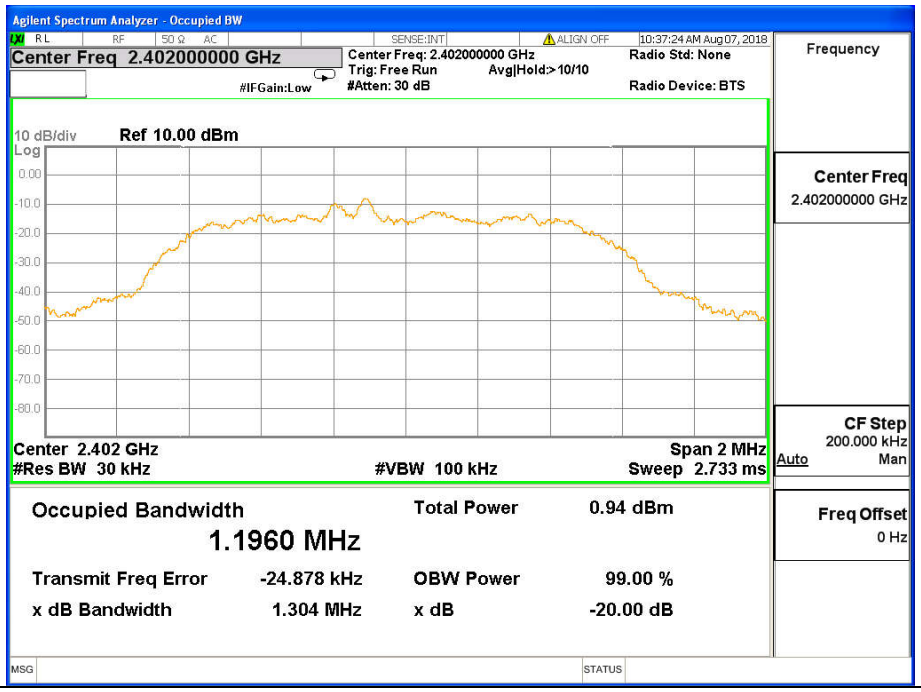


8DPSK

TX CH00



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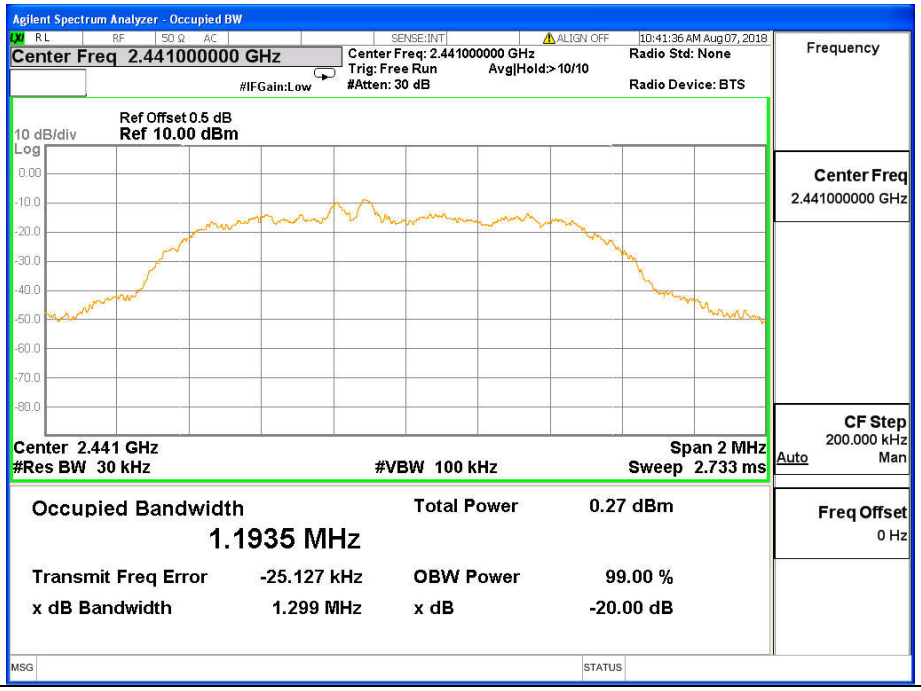
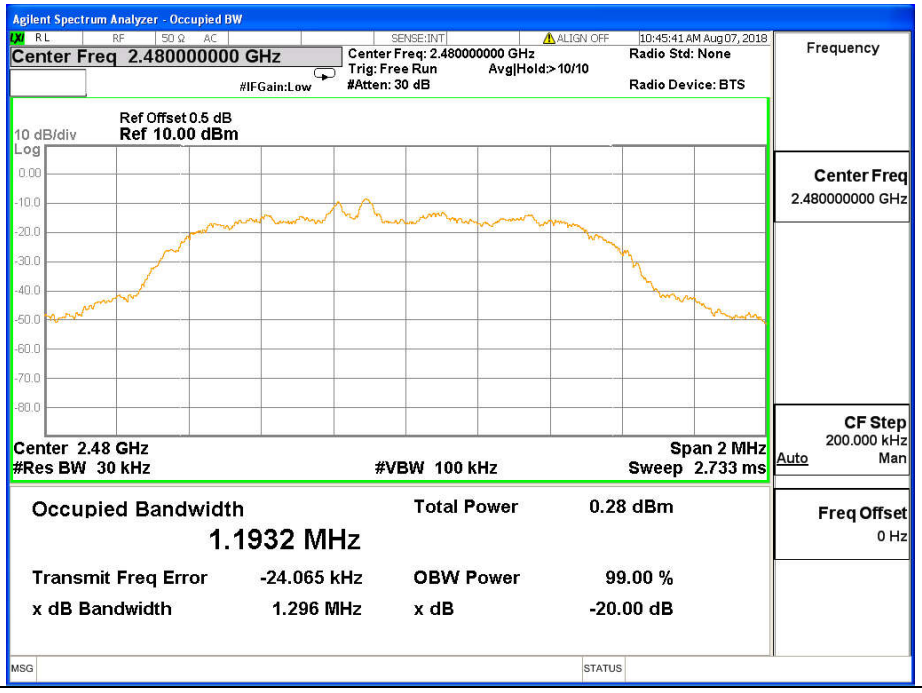


TX CH78


Agilent Spectrum Analyzer - Occupied BW
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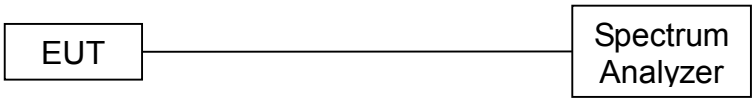
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
10:45:41 AM Aug 07, 2018
Frequency
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Log
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.733 ms
CF Step
200.000 kHz
Auto
Man
Occupied Bandwidth
1.1932 MHz
Total Power 0.28 dBm
Freq Offset
0 Hz
Transmit Freq Error -24.065 kHz
OBW Power 99.00 %
x dB Bandwidth 1.296 MHz
x dB -20.00 dB
MSG
STATUS

5.6 Carrier frequency separation

5.6.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247(a)(1)	Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth (Which is greater)	2400-2483.5

5.6.2 Test setup



5.6.3 Test procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting:
RBW=30 kHz, VBW=100 kHz, detector= Peak, Sweep Time =auto.
(3) The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Test.

5.6.4 Test results

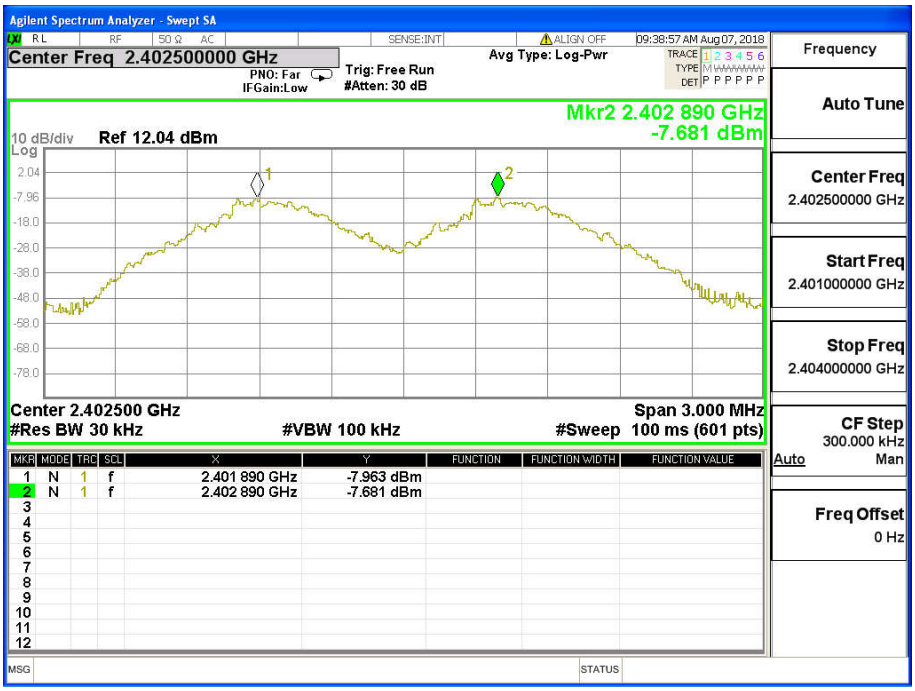
Test data

EUT：	XOUNDBAR W	Model Name ：	XAM37
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	GFSK π/4-DQPSK 8DPSK Mode, /CH00, CH39, CH78		

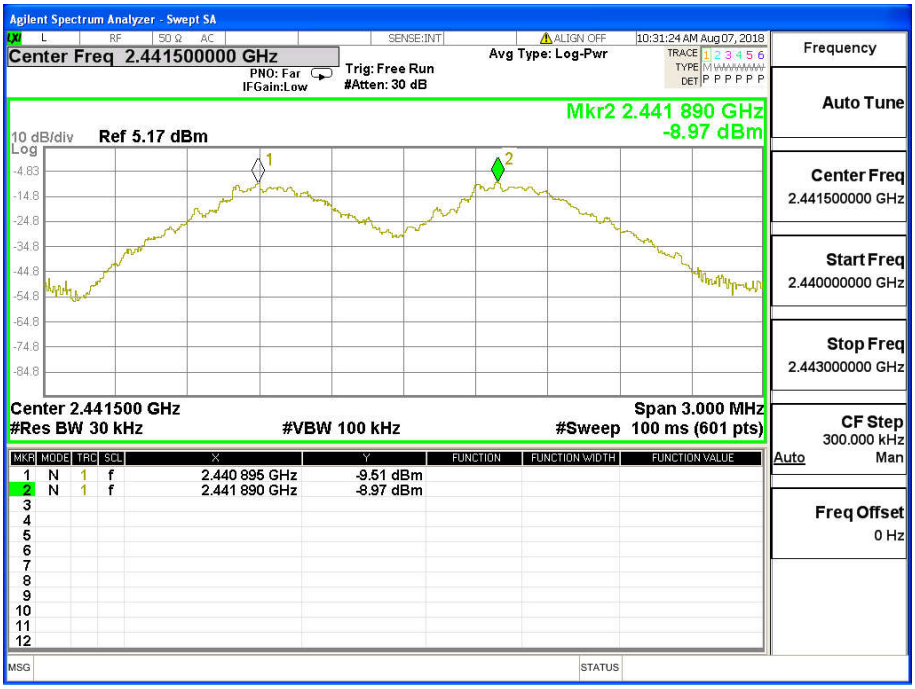
Mode	Channel	Frequency (MHz)	Test Result (KHz)	Limit (kHz)	Result
GFSK	Low	2402	1000	>628.667	Pass
	Middle	2441	995	>623.333	Pass
	High	2480	1000	>626.000	Pass
π/4-DQPSK	Low	2402	1005	>868.667	Pass
	Middle	2441	1000	>866.667	Pass
	High	2480	995	>854.000	Pass
8DPSK	Low	2402	1005	>869.333	Pass
	Middle	2441	1005	>866.000	Pass
	High	2480	1000	>864.000	Pass

Test plots

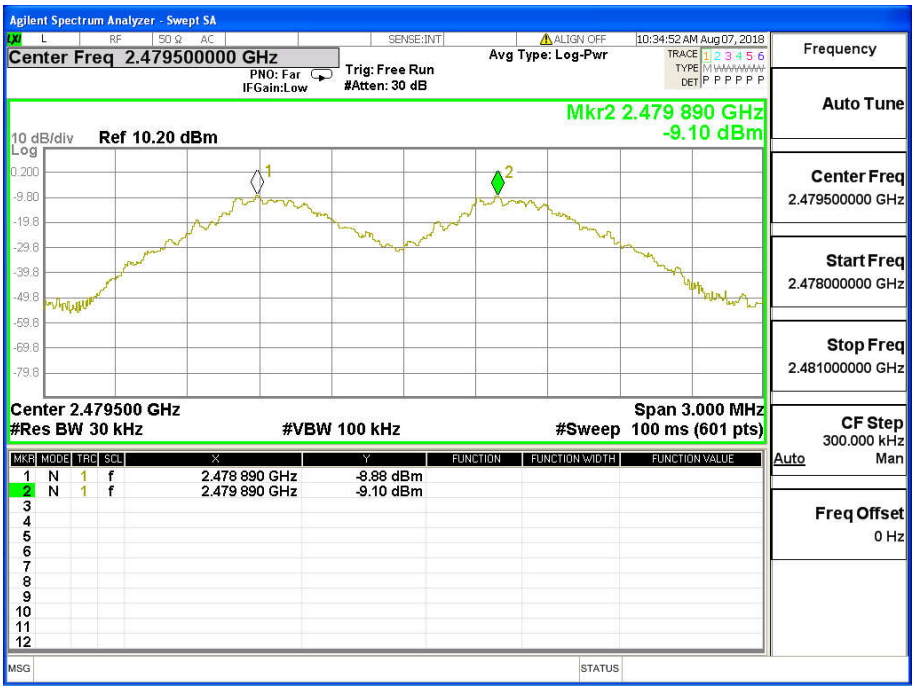
GFSK mode-CH00



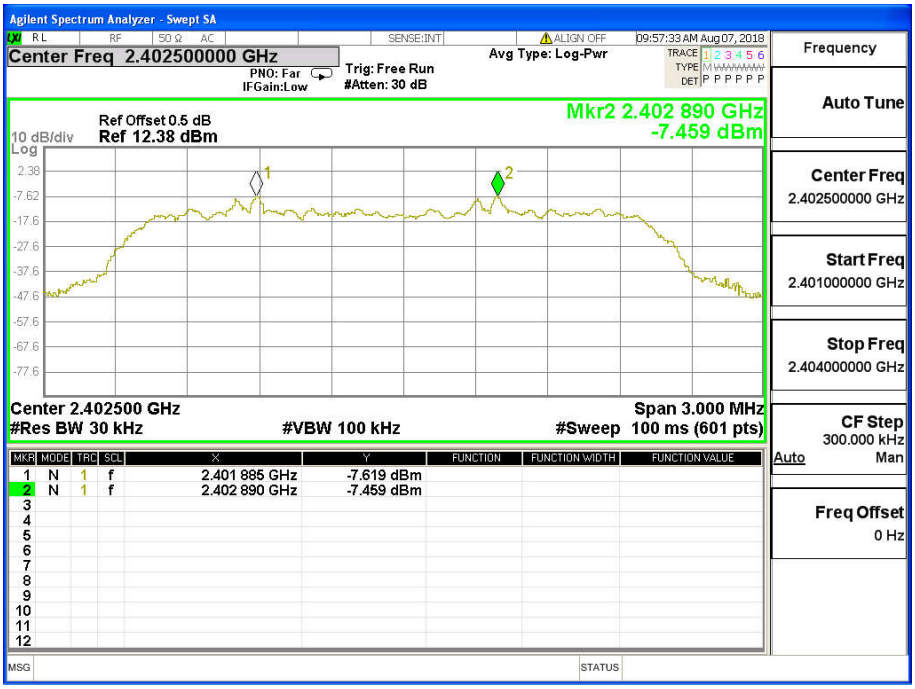
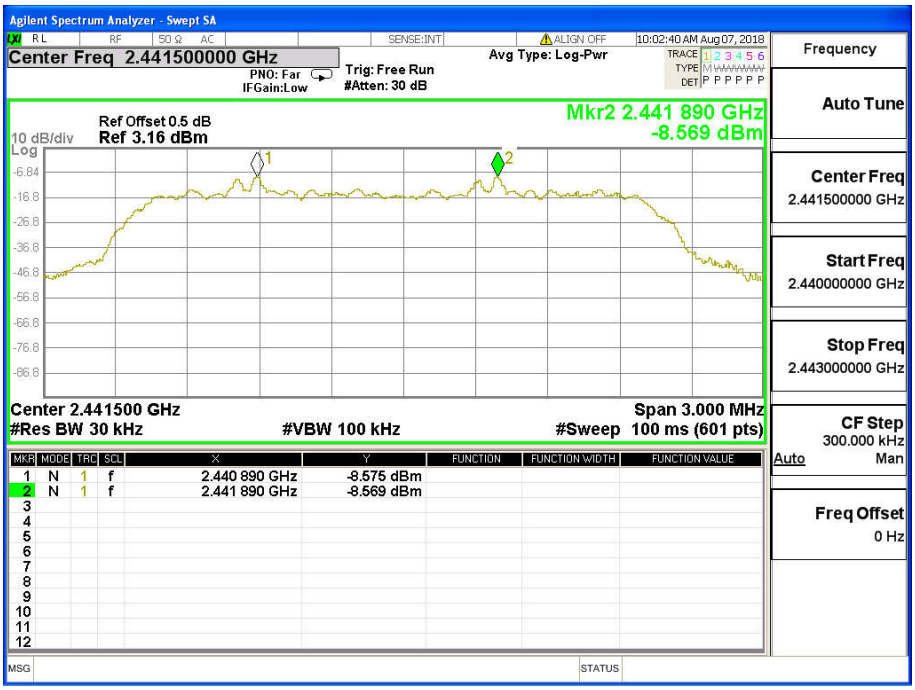
GFSK mode-CH39



GFSK mode-CH78



π/4-DQPSK mode-CH00



π/4-DQPSK mode-CH39