FCC RADIO TEST REPORT
FCC ID: 2AEF8B-01

Product： Stereo Bluetooth Sport Earbuds

Trade Name：

Model Name：B-01, B-02,B-03,B-04,B-05,B-06

Prepared for

Dongguan XinYao Electronic Industrial Co., LTD

Liuhua Street, Xiakou, Dongcheng District, Dongguan, Guangdong, China

Prepared by

DongGuan Precise Testing Service Co.,Ltd.

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

TEST RESULT CERTIFICATION

Applicant's name ..... Dongguan XinYao Electronic Industrial Co., LTD
Address .....Liuhua Street, Xiakou, Dongcheng District, Dongguan, Guangdong, China

Manufacture's Name... Dongguan XinYao Electronic Industrial Co., LTD
Address .....Liuhua Street, Xiakou, Dongcheng District, Dongguan, Guangdong, China

Product description

Product name ..... Stereo Bluetooth Sport Earbuds

Model and/or type reference B-01, B-02,B-03,B-04,B-05,B-06

In all, the original product and the alternative product are the same.

Standards ..... FCC Part15.247

Test procedure ..... ANSI C63.4-2014

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

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Date of Test .....

Date (s) of performance of tests ..... Mar. 24, 2015 ~ April. 01, 2015

Date of Issue April.01, 2015

Test Result ..... **Pass**

Tested by **:** maike Huang

Maike Huang / Engineer

Authorized Signatory **:**

Chris Du / Manager

2 Test Summary

Test Items	Test Requirement	Result
Spurious Radiated Emissions	15.205(a) 15.209 15.247(d)	PASS
Band edge Emissions	15.247(d)	PASS
Conducted Emissions	15.207	PASS
20dB Bandwidth	15.215c 15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS

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3 General Information

3.1 General Description of E.U.T.

Product Name : Stereo Bluetooth Sport Earbuds

Model No. : B-01, B-02,B-03,B-04,B-05,B-06

Brand Name :

Operation Frequency : 2402MHz ~ 2480MHz,79 channels in total, separated by 1MHz

Type of Modulation : GFSK, Pi/4DQPSK, 8DPSK

Oscillator : 16 MHz for RF module

Antenna installation : Chip Antenna

Antenna Gain : 0 dBi

3.2 Details of E.U.T.

Technical Data : (1)DC 3.7V from battery

3.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2402	2	2403	3	2404	4	2405
5	2406	6	2407	7	2408	8	2409
9	2410	10	2411	11	2412	12	2413
13	2414	14	2415	15	2416	16	2417
17	2418	18	2419	19	2420	20	2421
21	2422	22	2423	23	2424	24	2425
25	2426	26	2427	27	2428	28	2429
29	2430	30	2431	31	2432	32	2433
33	2434	34	2435	35	2436	36	2437
37	2438	38	2439	39	2440	40	2441
41	2442	42	2443	43	2444	44	2445
45	2446	46	2447	47	2448	48	2449
49	2450	50	2451	51	2452	52	2453
53	2454	54	2455	55	2456	56	2457
57	2458	58	2459	59	2460	60	2461
61	2462	62	2463	63	2464	64	2465
65	2466	66	2467	67	2468	68	2469
69	2470	70	2471	71	2472	72	2473
73	2474	74	2475	75	2476	76	2477
77	2478	78	2479	79	2480	-	-

3.4 Description of Support Units

No.	Equipment	Manufacturer	Model No.	Serial No.
1.	Adapter	Flextronics	A1402	N/A

3.5 Test Facility

The test facility has a test site registered with the following organizations:

Dongguan Dongdian Testing Service Co., Ltd
Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808
FCC Registration No.: 270092

4 Equipment Used during Test

4.1 Equipments List

Mains Terminal Disturbance Voltage (Conducted Emission)						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Next Due CAL Date**
1.	Test Receiver	R&S	ESU8	100316	2014/10/25	2015/10/24
2.	Current Probe	R&S	EZ-17	100532	2014/10/25	2015/10/24
3.	Two Line V-Network	R&S	ENV216	101109	2014/10/25	2015/10/24
4	Passive Voltage Probe	R&S	ESH2-Z3	100169	2014/10/25	2015/10/24
5	V-Network	R&S	ESH3-Z6	100694	2014/10/25	2015/10/24
6	V-Network	R&S	ESH3-Z6	100690	2014/10/25	2015/10/24
7	Artificial mains	R&S	ESH2-Z5	100309	2014/10/25	2015/10/24
8	Pulse Limiter	R&S	ESH3-Z2	101242	2014/10/25	2015/10/24
3m Semi-anechoic Chamber for Radiation						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Next Due CAL Date**
1	EMI Test Receiver	R&S	ESU8	100316	2014/10/25	2015/10/24
2	Double Ridged Horn Antenna	R&S	HF907	100276	2014/11/01	2015/10/31
3	Log-periodic Dipole Antenna	R&S	HL223	100435	2014/11/01	2015/10/31
4	Biconical Antenna	R&S	HK116	100431	2014/10/25	2015/10/24
5	Pre-amplifer	Schwarzbeck	VULB 9163	9163-462	2014/04/12	2015/04/11
6	Signal Conditioning Unit	R&S	SCU-08	10008	2014/10/25	2015/10/24
7	Rod Antenna	R&S	HFH2-Z6	100386	2014/11/01	2015/10/31
8	Pre-amplifer	R&S	SCU-01	10049	2014/10/25	2015/10/24
9	Active loop antenna	Schwarzbeck	FMZB1519	1519-038	2014/11/01	2015/10/31
10	Antenna connector (Conducted test)	Top	DQT011	032	2014/10/25	2015/10/24
11	Coaxial Cable (below 1GHz)	DTB	966 cable 2#	-	2014/11/01	2015/10/31
12	Coaxial Cable (above 1GHz)	DTB	966 cable 3#	EW02014-7	2014/11/01	2015/10/31
13	Horn Antenna	SCHWARZBECK	BBHA9170	9172-324	2014/10/25	2015/10/24
14	Signal Amplifier	Agilent	8449B	3008A00124	2014/10/25	2015/10/24

4.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Temperature	± 1 °C
DC Source	±0.05%
Radiated Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 4.74 dB (Horn antenna 1000M~25000MHz)
Conducted Emissions test	3.64dB (150kHz~30MHz)

4.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No. 110 Dongguan Zhuang RD. Guangzhou, P.R.China.

5 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2014
Test Result:	PASS
Frequency Range:	150 kHz to 30 MHz
Class:	Class B
Test Voltage:	AC 120V/60Hz
Limit:	66-56 dBμV between 0.15 MHz & 0.5 MHz 56 dBμV between 0.5 MHz & 5MHz 60 dBμV between 5 MHz & 30MHz
Detector:	Peak for pre-scan (9 kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

5.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

Atmospheric Pressure: 1012 mbar

EUT Operation:

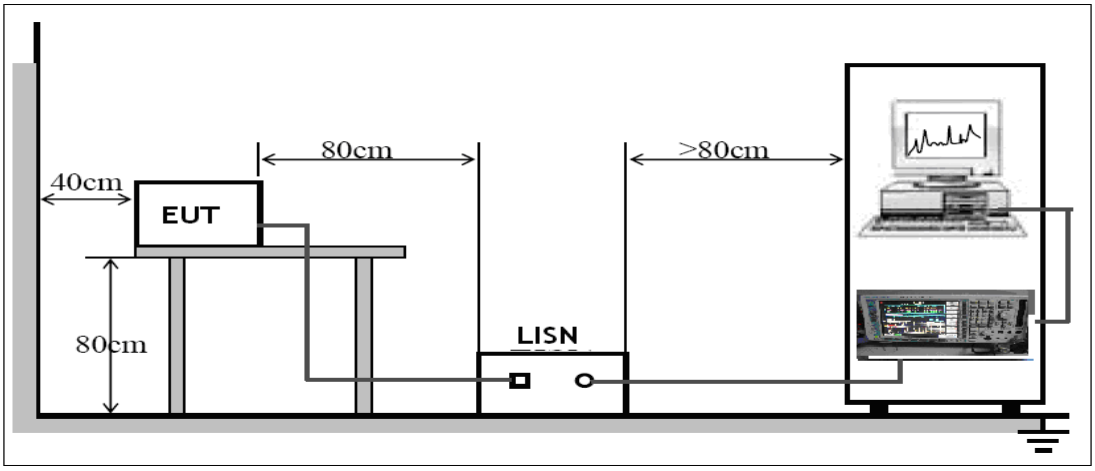
The pre-test was performed in Bluetooth linking, and the data were shown as follow.

The EUT was tested according to ANSI C63.4:2014. The frequency spectrum from 150 kHz to 30MHz was investigated.

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

5.2 EUT Setup

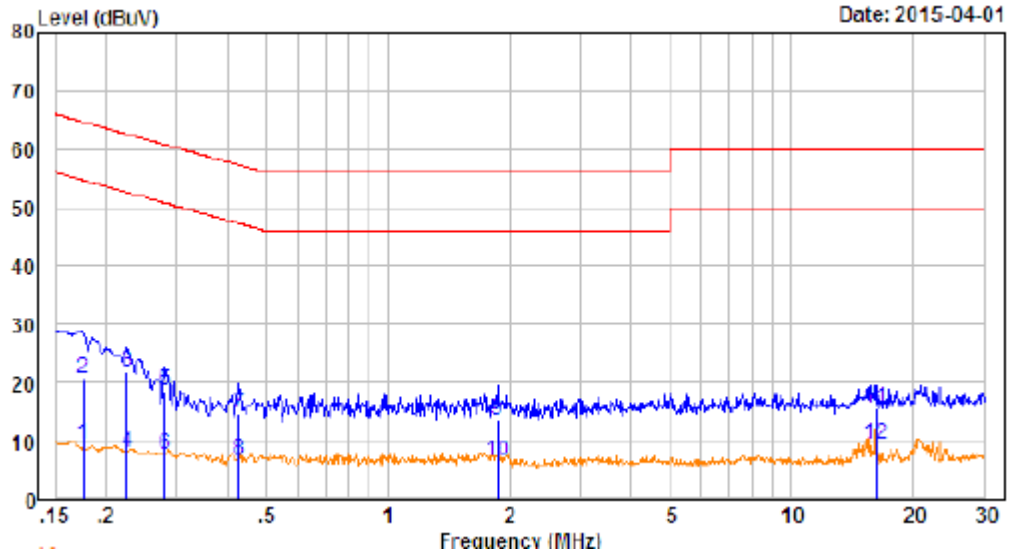
The EUT was placed on the test table in shielding room.



5.3 Conducted Emission Test Result

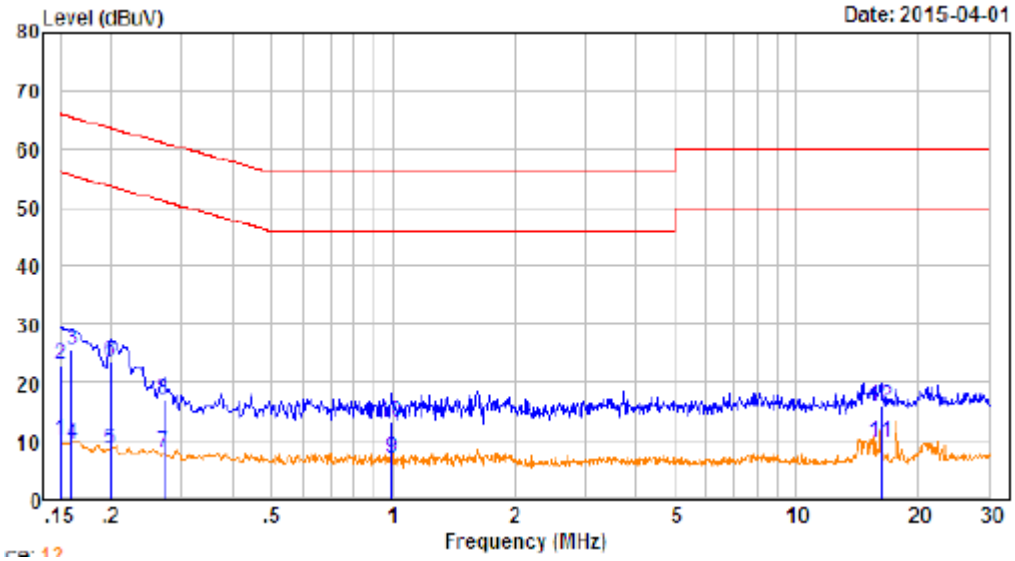
Test Mode: Charging

Line:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.176	10.61	0.60	-1.80	9.41	54.69	-45.28	Average
2.	0.176	10.61	0.60	9.60	20.81	64.69	-43.88	QP
3.	0.226	10.62	0.60	10.77	21.99	52.61	-30.62	Average
4.	0.226	10.62	0.60	-3.23	7.99	62.61	-54.62	QP
5.	0.280	10.62	0.60	7.43	18.65	50.81	-32.16	Average
6.	0.280	10.62	0.60	-3.57	7.65	60.81	-53.16	QP
7.	0.426	10.64	0.60	3.57	14.81	47.33	-32.52	Average
8.	0.426	10.64	0.60	-4.43	6.81	57.33	-50.52	QP
9.	1.868	10.70	0.60	2.20	13.50	46.00	-32.50	Average
10.	1.868	10.70	0.60	-4.80	6.50	56.00	-49.50	QP
11.	16.226	10.78	0.60	4.21	15.59	50.00	-34.41	Average
12.	16.226	10.78	0.60	-1.79	9.59	60.00	-50.41	QP

Neutral:



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.150	10.60	0.60	-1.20	10.00	56.00	-46.00	Average
2.	0.150	10.60	0.60	11.90	23.10	66.00	-42.90	QP
3.	0.160	10.60	0.60	14.34	25.54	55.47	-29.93	Average
4.	0.160	10.60	0.60	-1.66	9.54	65.47	-55.93	QP
5.	0.200	10.61	0.60	-2.70	8.51	53.62	-45.11	Average
6.	0.200	10.61	0.60	12.30	23.51	63.62	-40.11	QP
7.	0.270	10.62	0.60	-3.15	8.07	51.12	-43.05	Average
8.	0.270	10.62	0.60	5.85	17.07	61.12	-44.05	QP
9.	0.994	10.67	0.60	-4.04	7.23	46.00	-38.77	Average
10.	0.994	10.67	0.60	1.96	13.23	56.00	-42.77	QP
11.	16.226	10.78	0.60	-1.54	9.84	50.00	-40.16	Average
12.	16.226	10.78	0.60	4.46	15.84	60.00	-44.16	QP

6 Spurious Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: DA 00-705

Test Result: PASS

Measurement Distance: 3m

Limit:

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

6.1 EUT Operation :

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

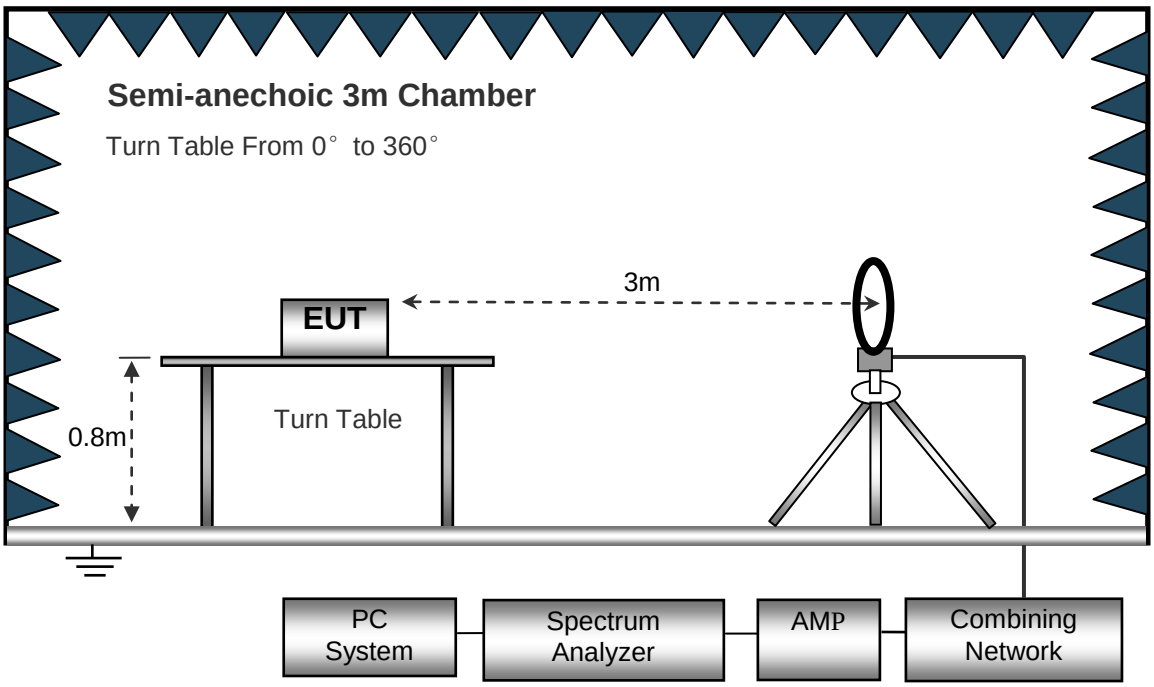
Atmospheric Pressure:1010 mbar

Operation Mode:

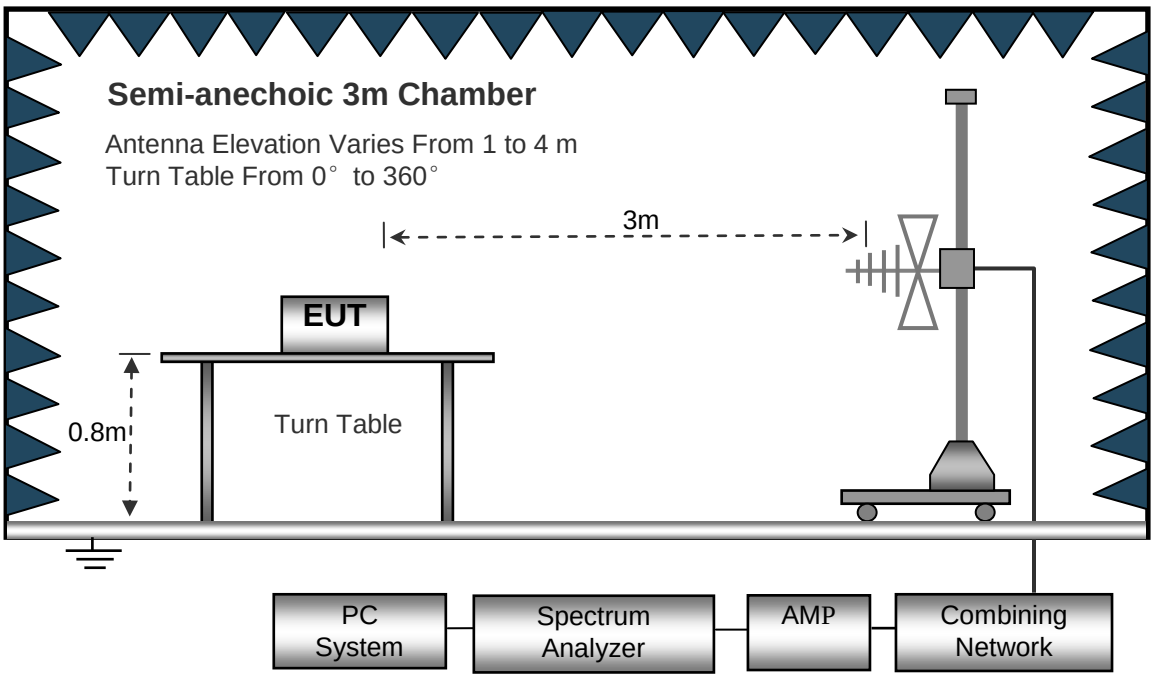
The EUT was tested in transmitting mode, and the data were shown as follow.

6.2 Test Setup

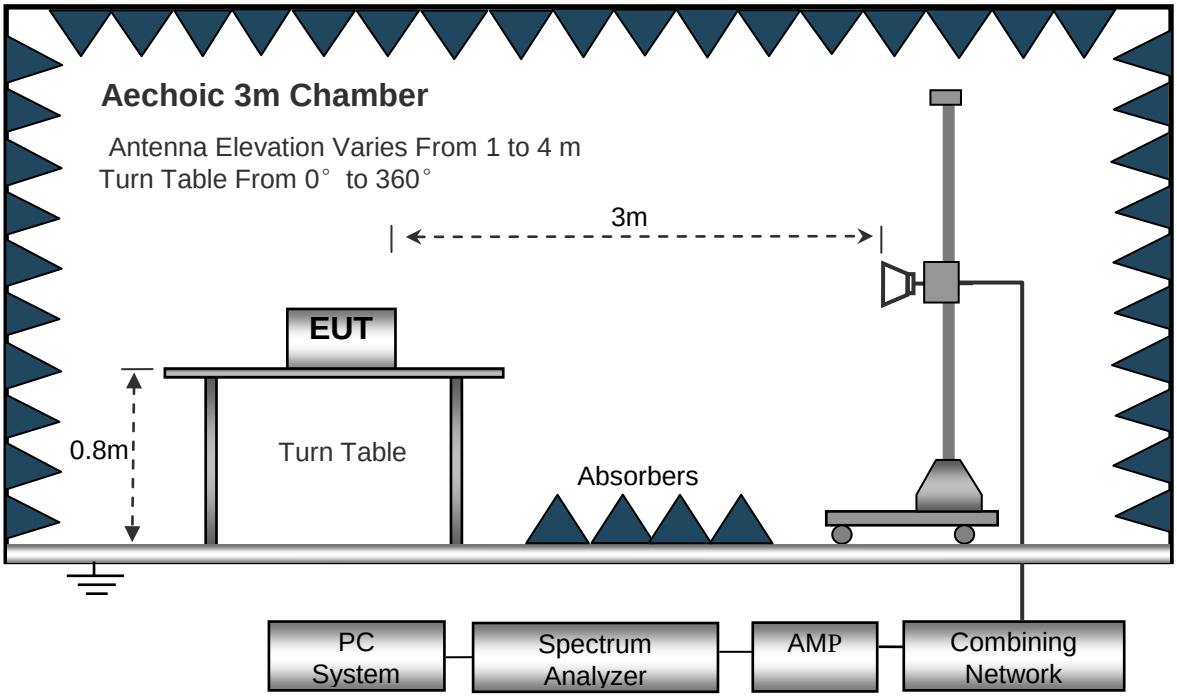
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4:2014.
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



6.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 9kHz to 25000MHz.

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz

Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

6.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

6.6 Summary of Test Results

Test Frequency: Below 30MHz

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

Test Frequency: 30MHz ~ 18GHz

Test mode: transmitting

Test Frequency: 18~25GHz

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

All the modulation modes were tested, the data of the worst mode (GFSK) were recorded in the following pages.

Freq.	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Lower Channel 2402MHz									
150.42	18.34	PK	135	1.3	H	17.12	35.46	40.00	-4.54
150.42	17.75	PK	135	2.1	V	17.12	34.87	40.00	-5.13
4804.00	56.75	PK	324	1.4	V	-1.06	55.69	74.00	-18.31
4804.00	45.31	Ave	324	1.4	V	-1.06	44.25	54.00	-9.75
7206.00	45.63	PK	175	1.1	H	1.33	46.96	74.00	-27.04
7206.00	34.98	Ave	175	1.1	H	1.33	36.31	54.00	-17.69
2347.58	41.25	PK	264	1.4	V	-13.19	28.06	74.00	-45.94
2347.58	32.38	Ave	264	1.4	V	-13.19	19.19	54.00	-34.81
2368.63	45.21	PK	324	1.4	H	-13.14	32.07	74.00	-41.93
2368.63	39.31	Ave	324	1.8	H	-13.14	26.17	54.00	-27.83
2488.97	42.18	PK	5	1.1	V	-13.08	29.10	74.00	-44.90
2488.97	36.37	Ave	5	1.0	V	-13.08	23.29	54.00	-30.71

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Center Channel 2441MHz									
150.42	18.34	PK	135	1.3	H	17.12	35.46	40.00	-4.54
150.42	17.75	PK	135	2.1	V	17.12	34.87	40.00	-5.13
4882.00	58.32	PK	353	1.0	V	-0.62	57.26	74.00	-16.74
4882.00	47.87	Ave	353	1.0	V	-0.62	46.81	54.00	-7.19
7323.00	46.35	PK	200	1.7	H	2.21	47.68	74.00	-26.32
7323.00	36.31	Ave	200	1.7	H	2.21	37.64	54.00	-16.36
2317.53	41.42	PK	127	1.2	V	-13.19	28.23	74.00	-45.77
2317.53	32.16	Ave	127	1.2	V	-13.19	18.97	54.00	-35.03
2351.46	45.34	PK	216	1.5	H	-13.14	32.20	74.00	-41.80
2351.46	34.17	Ave	216	1.5	H	-13.14	21.03	54.00	-32.97
2495.09	45.34	PK	208	1.7	V	-13.08	32.26	74.00	-41.74
2495.09	37.34	Ave	208	1.7	V	-13.08	24.26	54.00	-29.74

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Upper Channel 2480MHz									
150.42	18.34	PK	135	1.3	H	17.12	35.46	40.00	-4.54
150.42	17.75	PK	135	2.1	V	17.12	34.87	40.00	-5.13
4960.00	56.35	PK	201	1.0	V	-0.24	56.11	74.00	-17.89
4960.00	45.49	Ave	201	1.0	V	-0.24	45.25	54.00	-8.75
7440.00	44.75	PK	78	1.9	H	2.84	47.59	74.00	-26.41
7440.00	36.64	Ave	78	1.9	H	2.84	39.48	54.00	-14.52
2331.40	41.27	PK	125	1.7	V	-13.19	28.08	74.00	-45.92
2331.40	31.33	Ave	125	1.7	V	-13.19	18.14	54.00	-35.86
2374.48	43.76	PK	137	1.3	H	-13.14	30.62	74.00	-43.38
2374.48	33.58	Ave	137	1.3	H	-13.14	20.44	54.00	-33.56
2489.03	43.34	PK	243	1.7	V	-13.08	30.26	74.00	-43.74
2489.03	36.74	Ave	243	1.7	V	-13.08	23.66	54.00	-30.34

7 Band Edge Measurement

Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	DA 00-705
Limit:	40.0 dBuV/m between 30MHz & 88MHz; 43.5 dBuV/m between 88MHz & 216MHz; 46.0 dBuV/m between 216MHz & 960MHz; 54.0 dBuV/m above 960MHz. 74.0 dBuV/m for peak above 1GHz 54.0 dBuV/m for AVG above 1GHz

7.1 Test Procedure

1. The EUT was placed on a turntable which is 0.8m above ground plane

2. Measurement Distance is 3m

3. Detector: For Peak value:
RBW = 1 MHz for f ≥ 1 GHz
VBW ≥ RBW; Sweep = auto
Detector function = peak
Trace = max hold
For AVG value:
RBW = 1 MHz for f ≥ 1 GHz
VBW = 10Hz; Sweep = auto
Detector function = AVG
Trace = max hold

4. Continuous transmitting

5. Both hopping-on mode and hopping-off mode had been pre-tested and only the worst case (hopping–off mode) was recorded in the test report.

7.2 Test Result:

Test result shown as follows:

GFSK

	Frequency (MHz)	Antenna polarization (H/V)	Test Frequency (MHz)	Emission (dBuV/m)	Band edge Limit (dBuV/m)		Result
				PK	PK	AV	Pass
Unhopping	<2400	H	2385.26	50.11	74.00	54.00	Pass
	<2400	V	2386.31	50.06	74.00	54.00	Pass
	>2483.5	H	2488.25	50.34	74.00	54.00	Pass
	>2483.5	V	2489.13	50.02	74.00	54.00	Pass

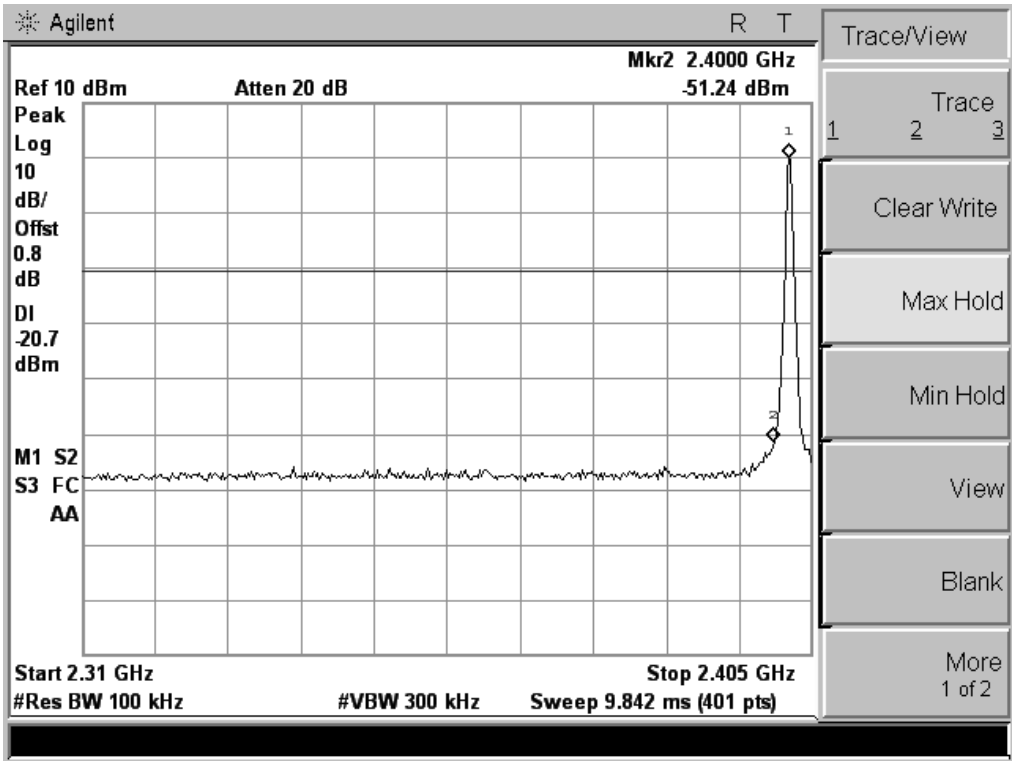
PI/4 DPSK

	Frequency (MHz)	Antenna polarization (H/V)	Test Frequency (MHz)	Emission (dBuV/m)	Band edge Limit (dBuV/m)		Result
				PK	PK	AV	Pass
Unhopping	<2400	H	2389.13	50.36	74.00	54.00	Pass
	<2400	V	2389.28	49.85	74.00	54.00	Pass
	>2483.5	H	2485.42	50.34	74.00	54.00	Pass
	>2483.5	V	2485.31	50.16	74.00	54.00	Pass

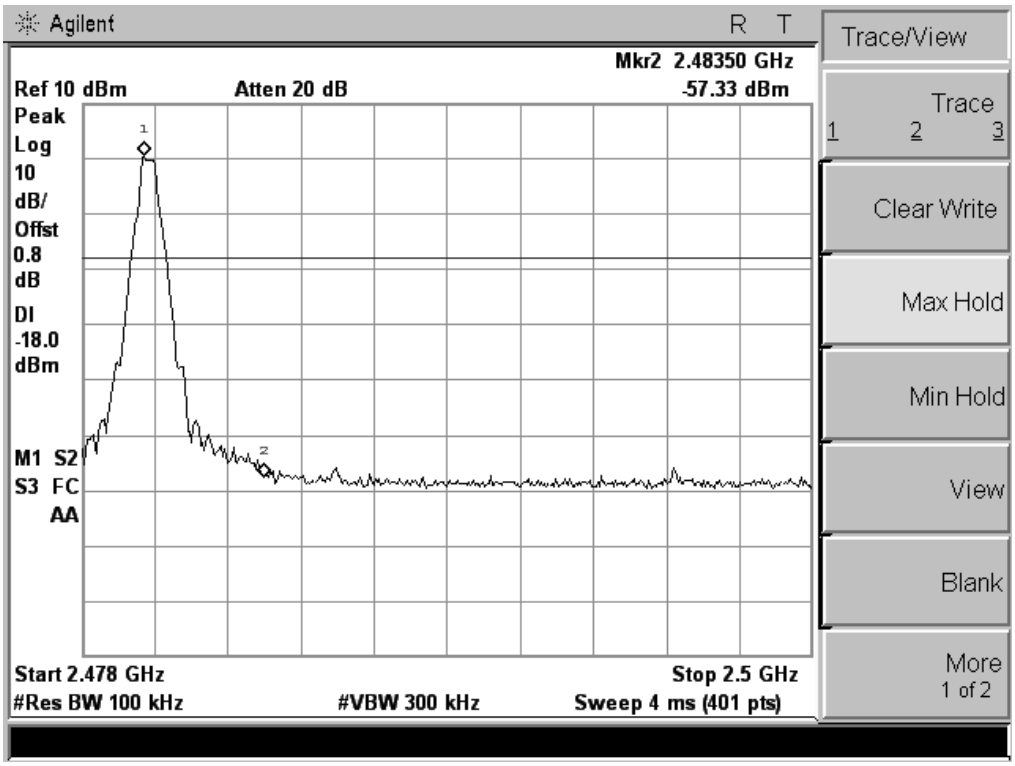
8-DPSK

	Frequency (MHz)	Antenna polarization (H/V)	Test Frequency (MHz)	Emission (dBuV/m)	Band edge Limit (dBuV/m)		Result
				PK	PK	AV	Pass
Unhopping	<2400	H	2386.47	50.12	74.00	54.00	Pass
	<2400	V	2387.31	49.74	74.00	54.00	Pass
	>2483.5	H	2484.61	50.11	74.00	54.00	Pass
	>2483.5	V	2486.74	50.28	74.00	54.00	Pass

GFSK

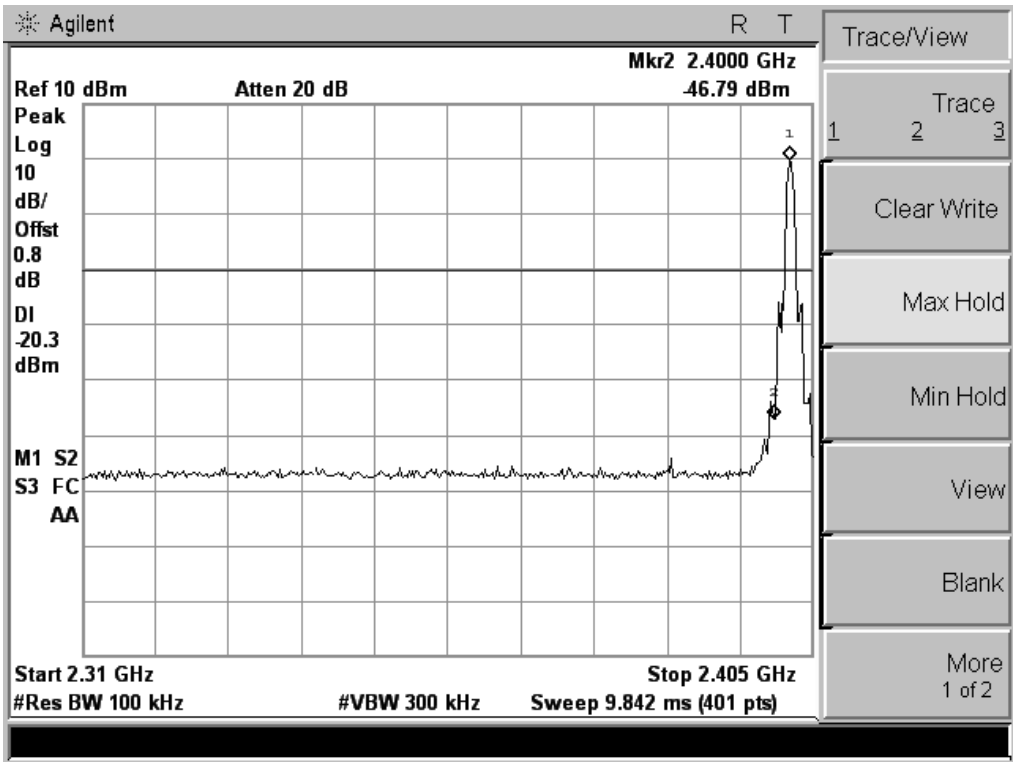


Low channel

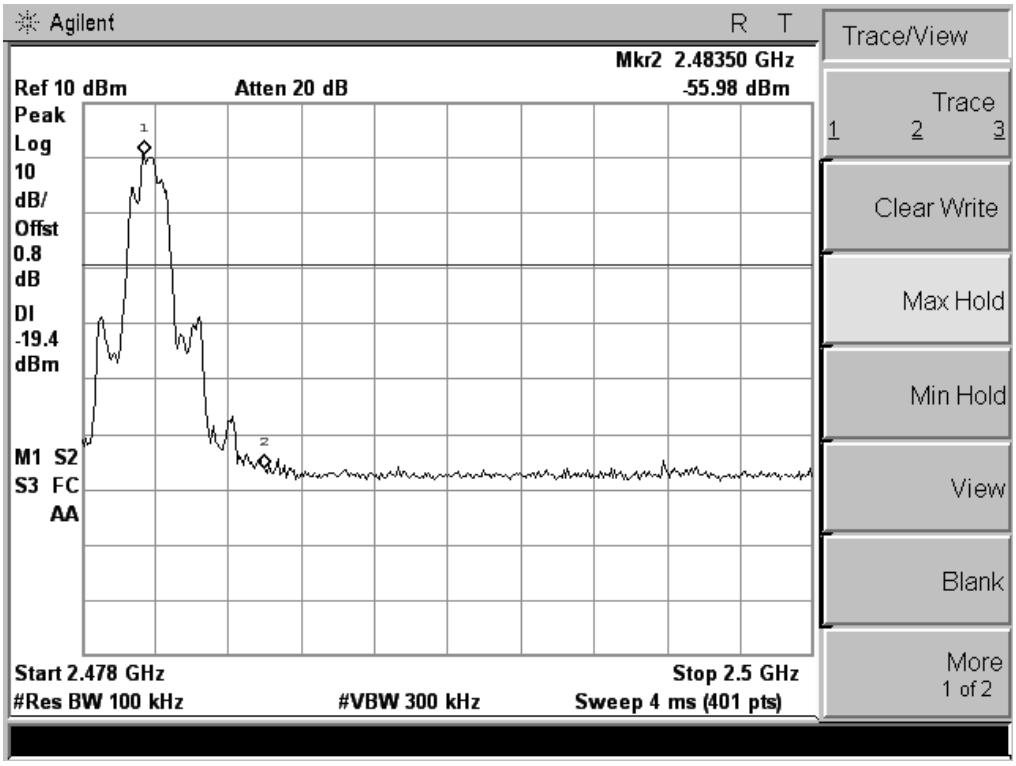


High channel

8-DPSK



Low channel



High channel

8 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Mode: Test in fixing operating frequency at low, Middle, high channel.

8.1 Test Procedure:

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

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

8.2 Test Result:

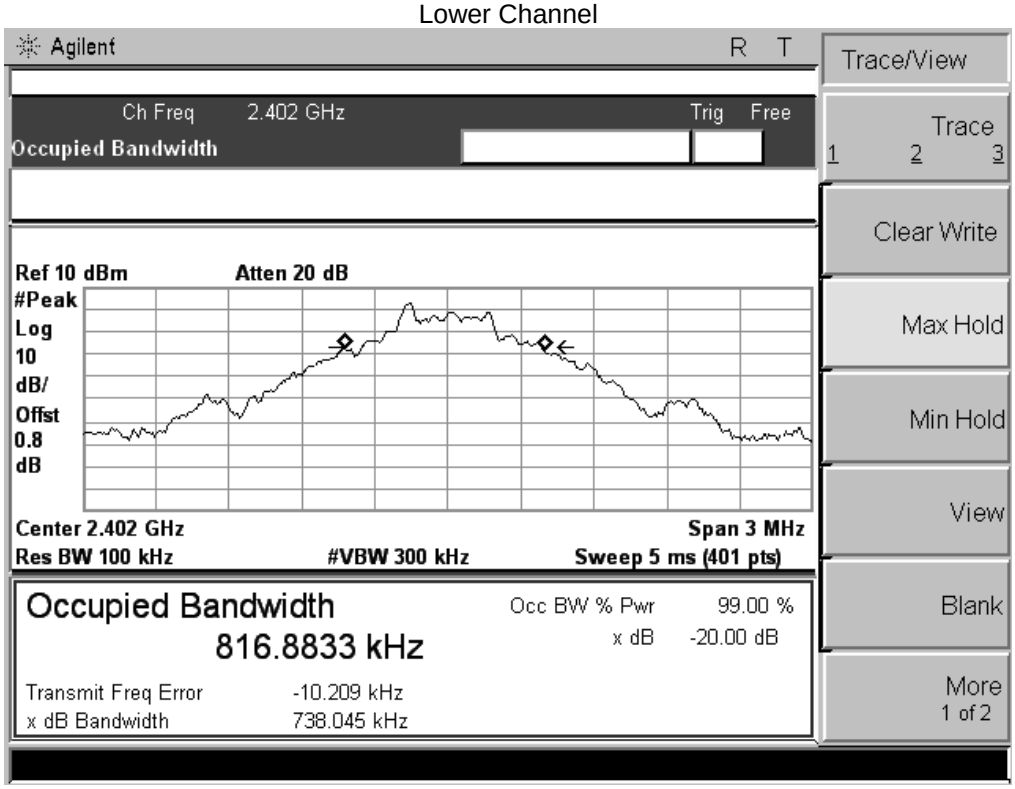
Modulation	Test Channel	Bandwidth(MHz)
GFSK	Lower	0.738
	Middle	0.821
	Upper	0.817
Pi/4DQPSK	Lower	1.117
	Middle	1.127
	Upper	1.113
8DPSK	Lower	1.170
	Middle	1.161
	Upper	1.166

Test result plot as follows:

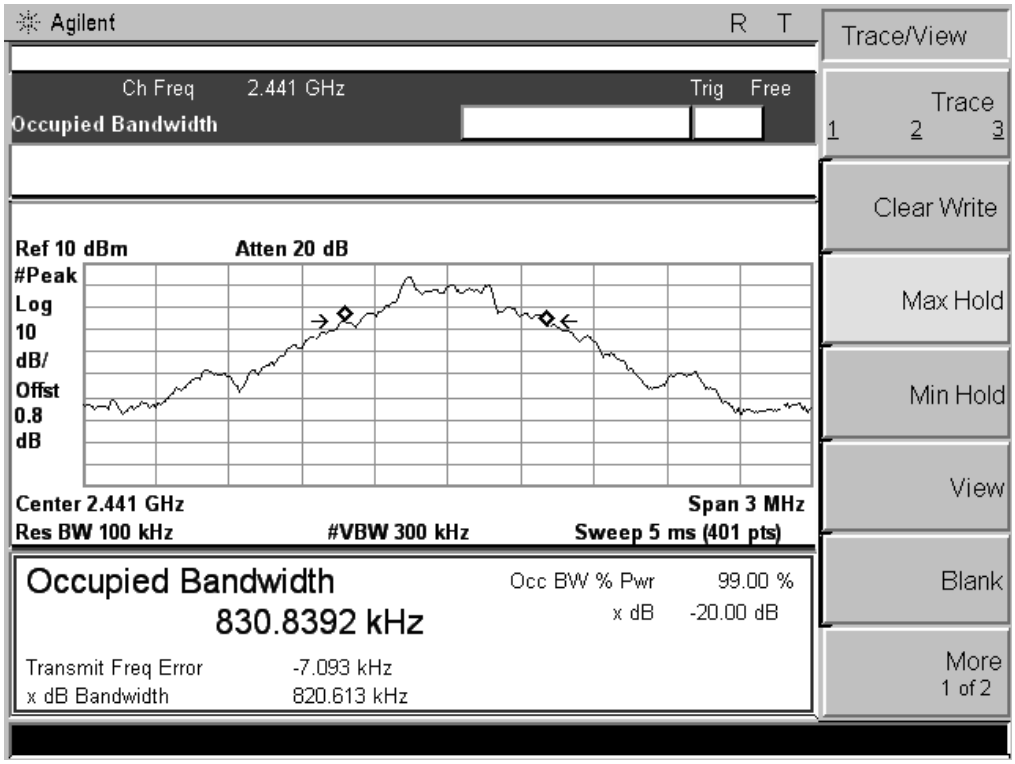
Note: The data only show the worst mode.

Modulation: GFSK

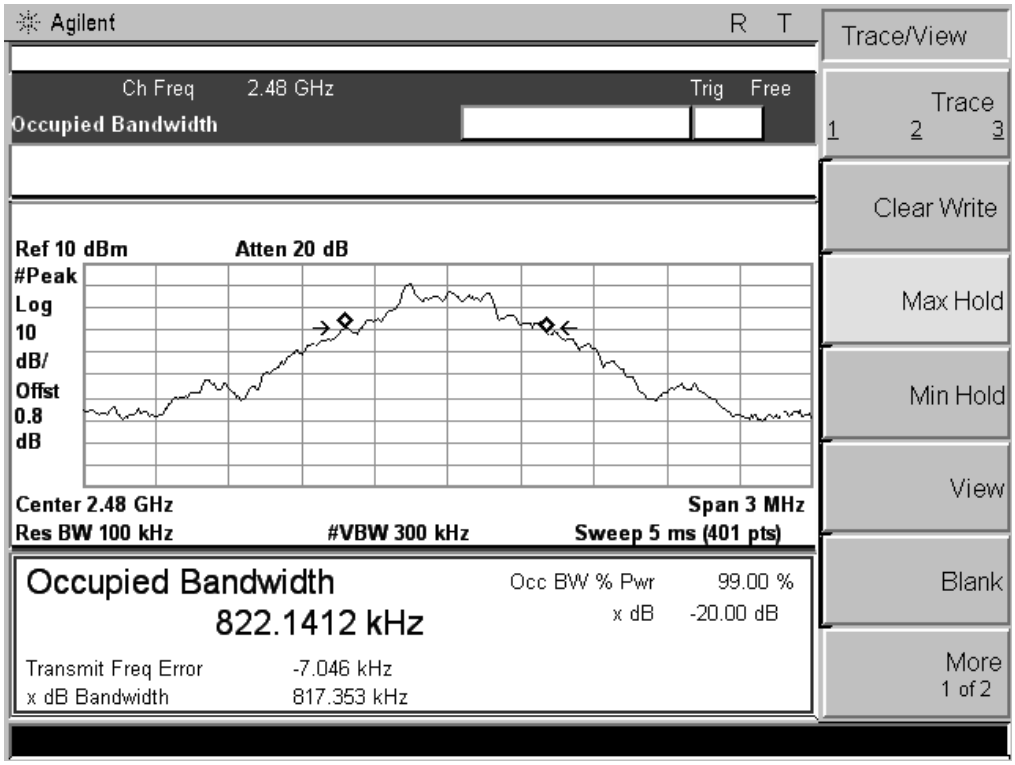
Lower Channel



Middle Channel

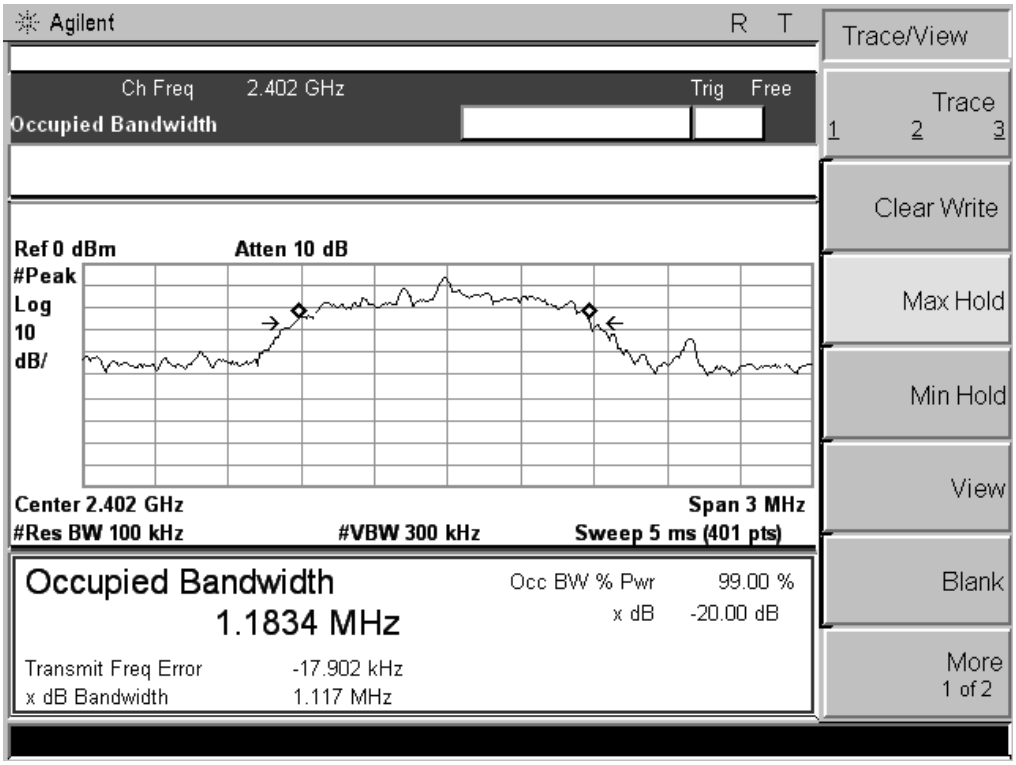


Upper Channel

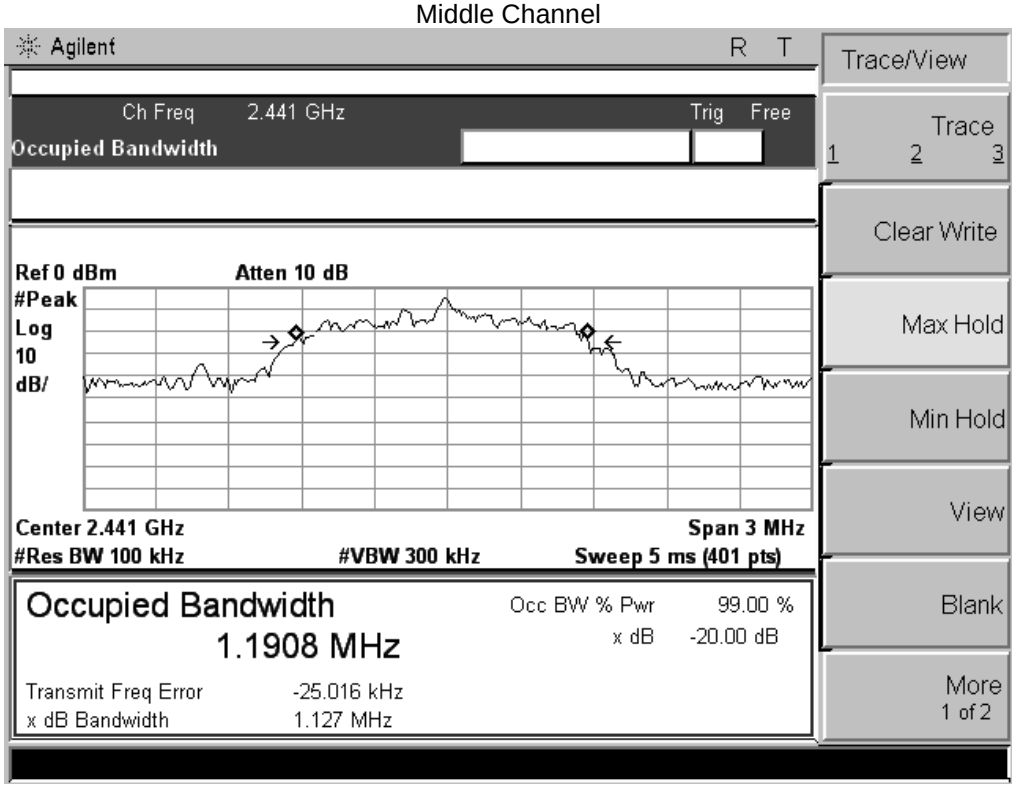


Modulation: PI/4DPSK

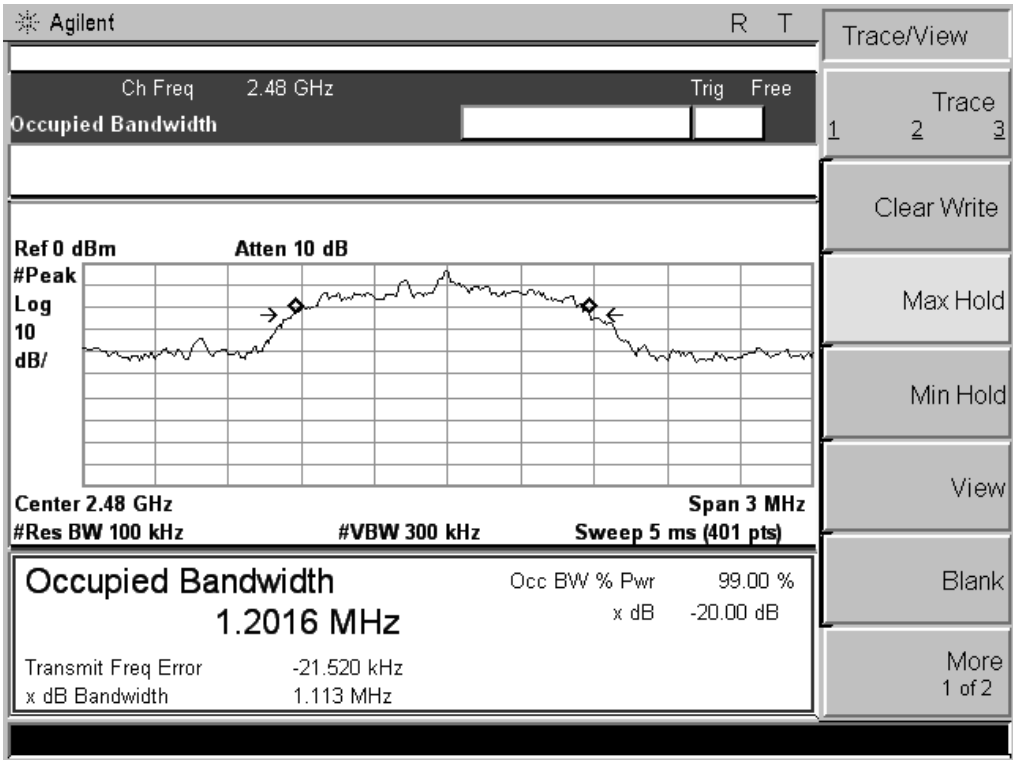
Lower Channel



Middle Channel

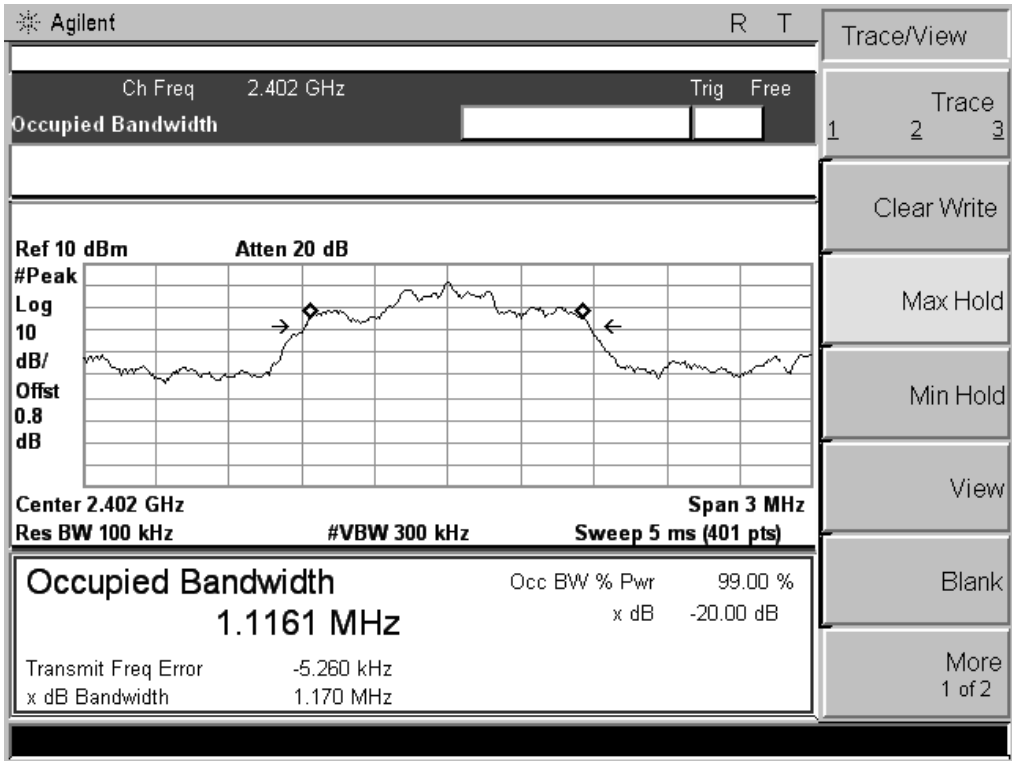


Upper Channel

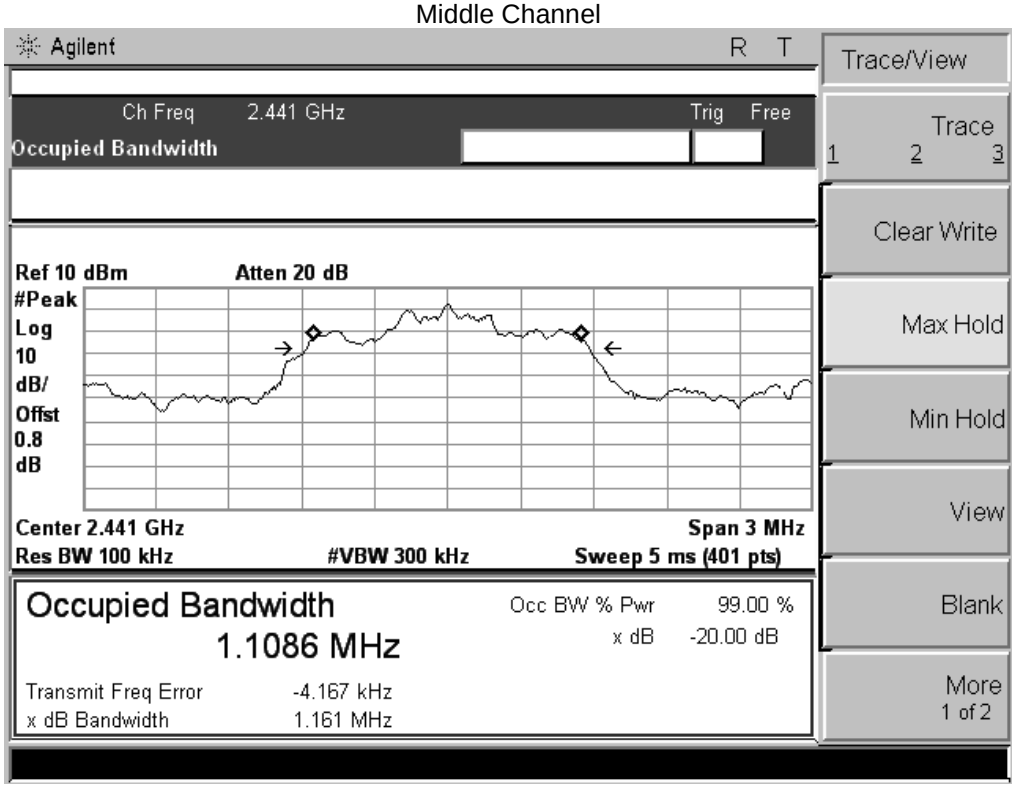

Agilent
R T
Ch Freq 2.48 GHz
Trig Free
Occupied Bandwidth
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Center 2.48 GHz
Span 3 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.2016 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -21.520 kHz
x dB Bandwidth 1.113 MHz
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

Modulation: 8DPSK

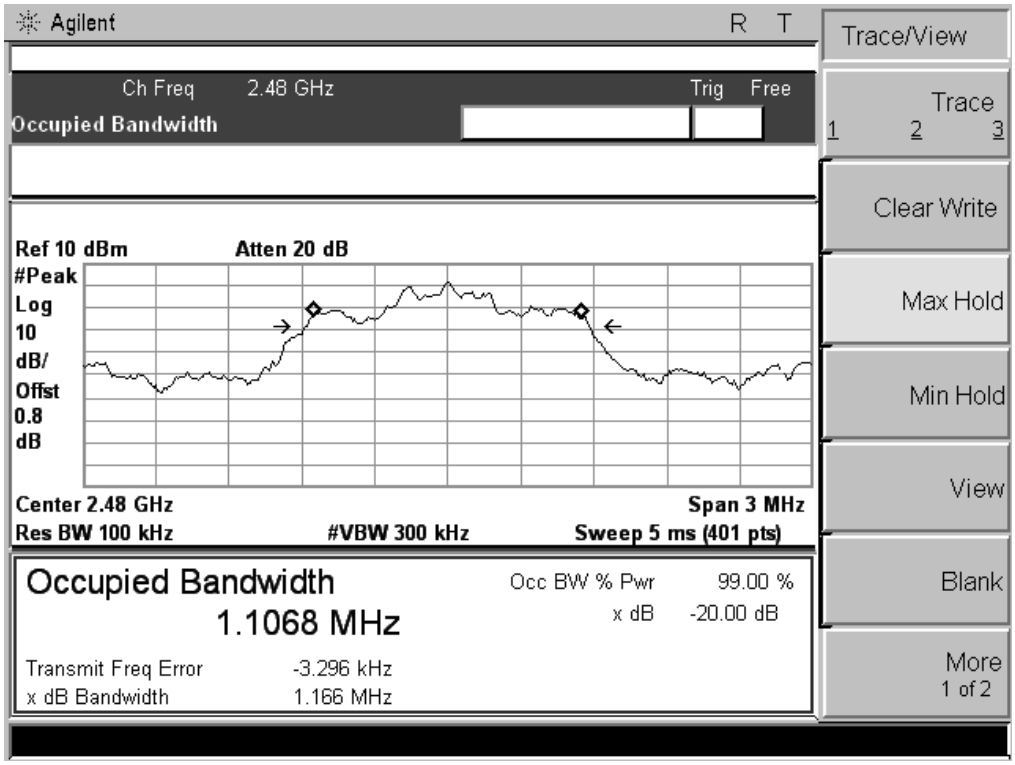
Lower Channel



Middle Channel



Upper Channel



9 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247 (b)(1), For frequency hopping systems operating in the 2400-2483 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all the other frequency of hopping systems in the 2400-2483 MHz band: 0.125 watts.

Refer to the result “Number of Hopping Frequency” of this document. The 1watts (30 dBm) limit applies.

Test mode: Test in fixing frequency transmitting mode.

9.1 Test Procedure:

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

2. Set the spectrum analyzer: RBW = 1 MHz. VBW =3 MHz. Sweep = auto; Detector Function = Peak. If 20dB BW>1MHz, the RBW = 3 MHz, VBW =10 MHz

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

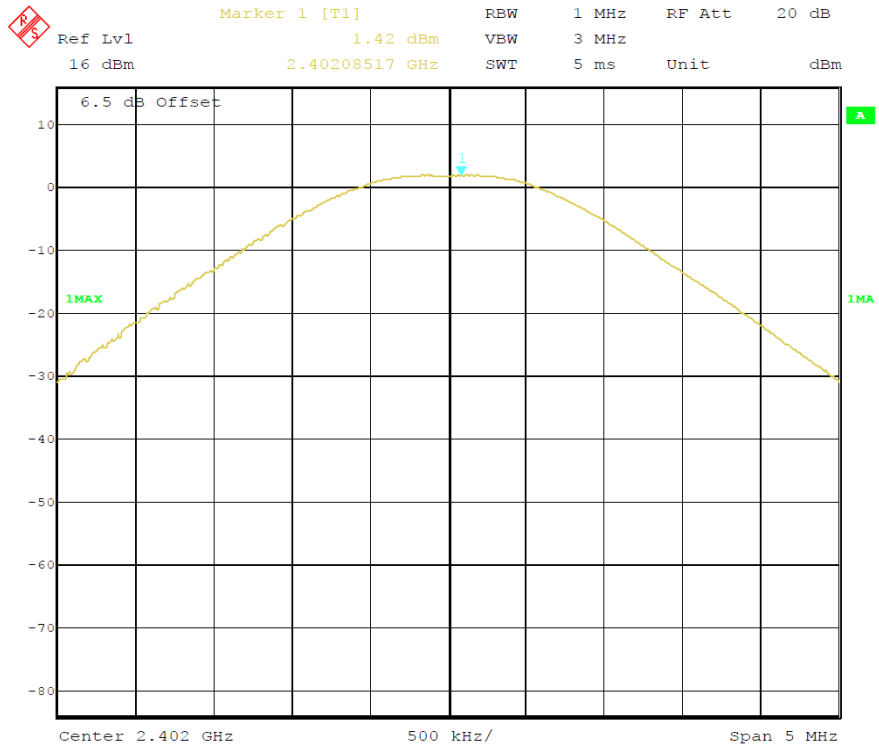
9.2 Test Result:

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Lower	1.42	30
	Middle	1.38	30
	Upper	1.32	30
Pi/4DQPSK	Lower	1.12	21
	Middle	1.43	21
	Upper	1.43	21
8DPSK	Lower	1.09	21
	Middle	1.09	21
	Upper	1.19	21

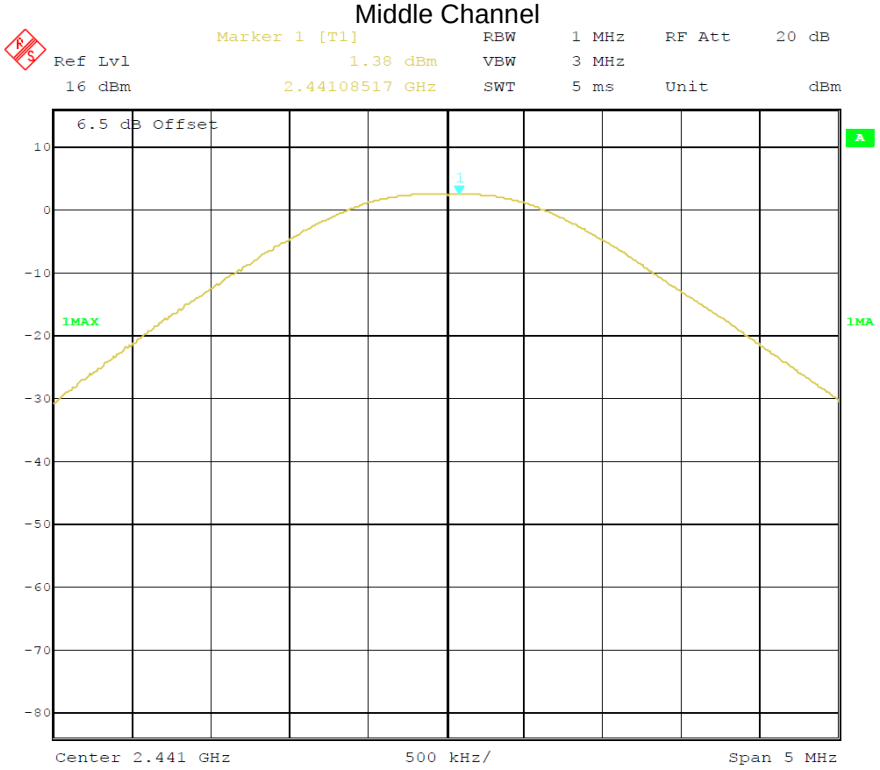
Test result plot as follows:

Modulation: GFSK

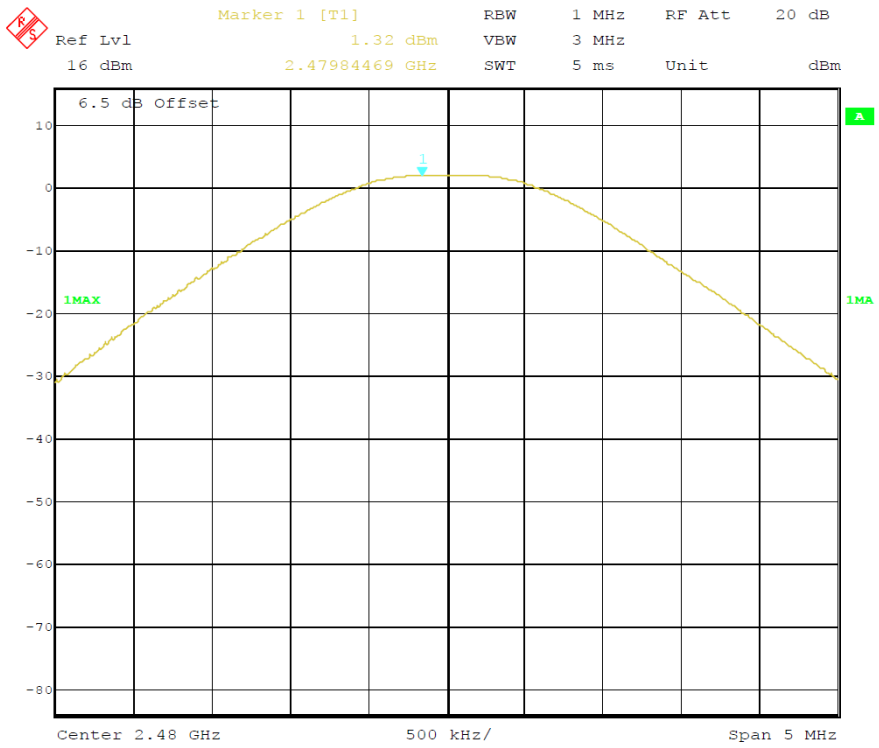
Lower Channel



Middle Channel

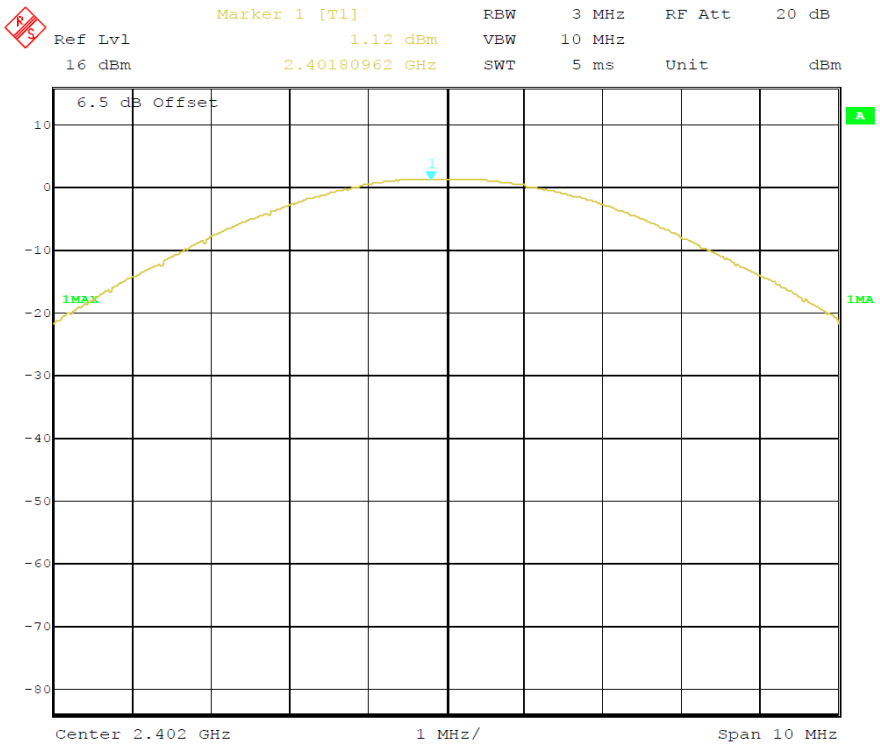


Upper Channel

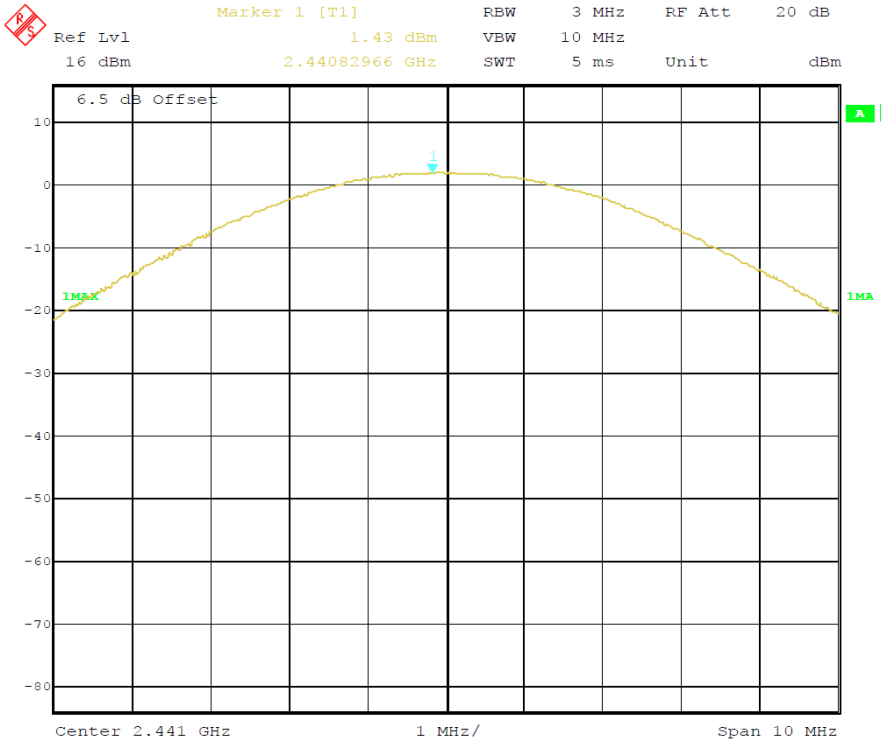


Modulation: PI/4 DQPSK

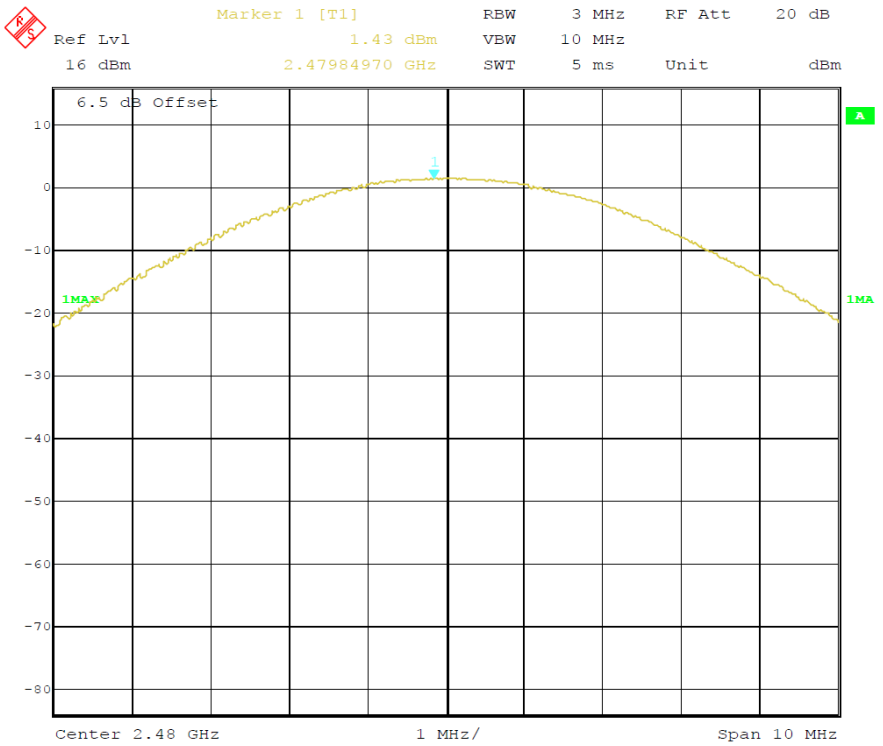
Lower Channel



Middle Channel

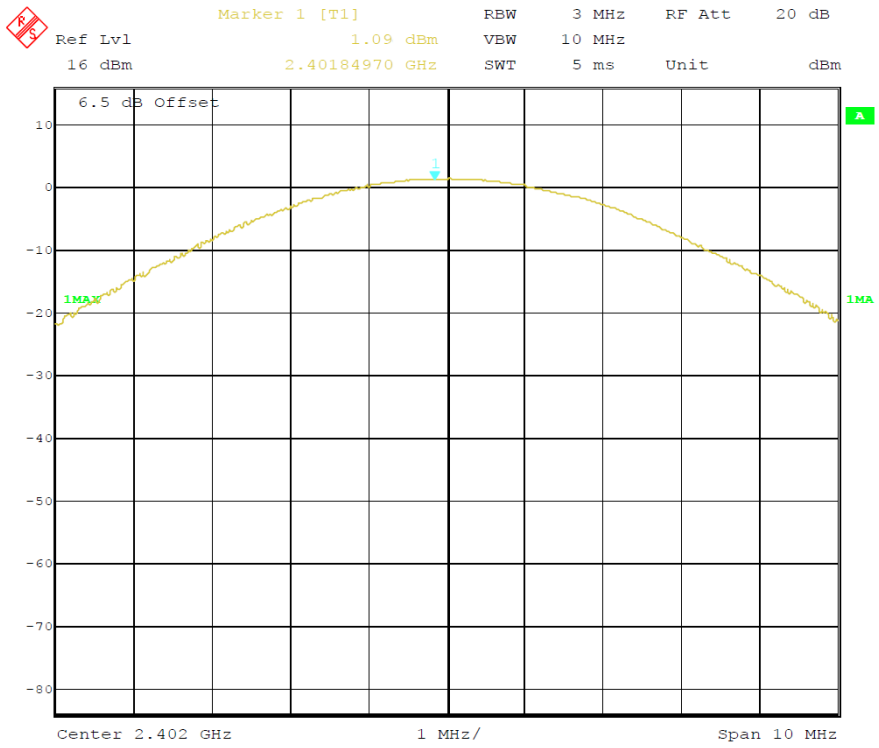


Upper Channel

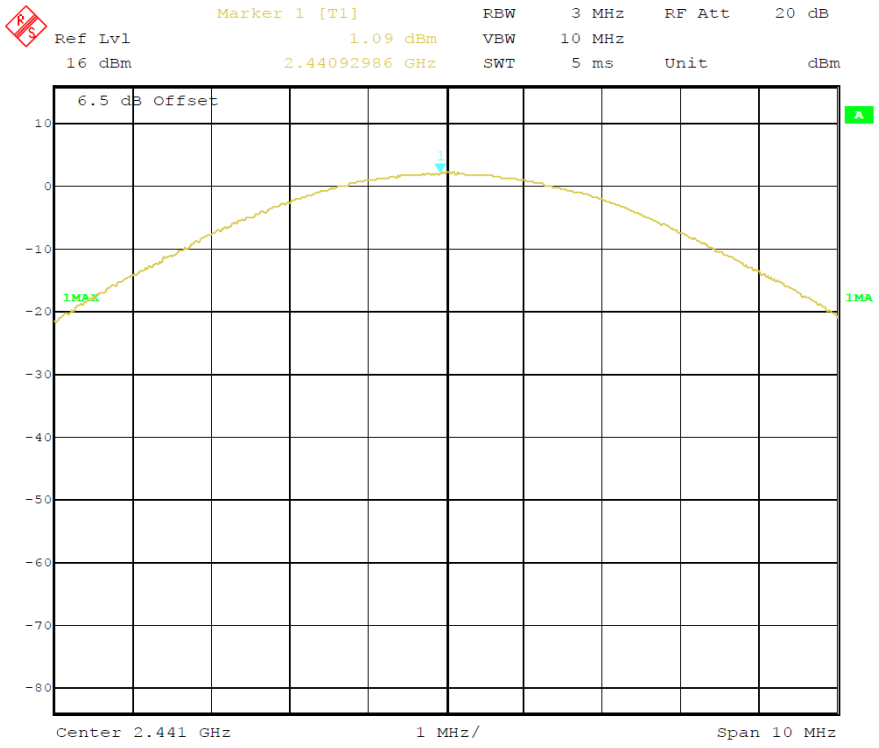


Modulation: 8DPSK

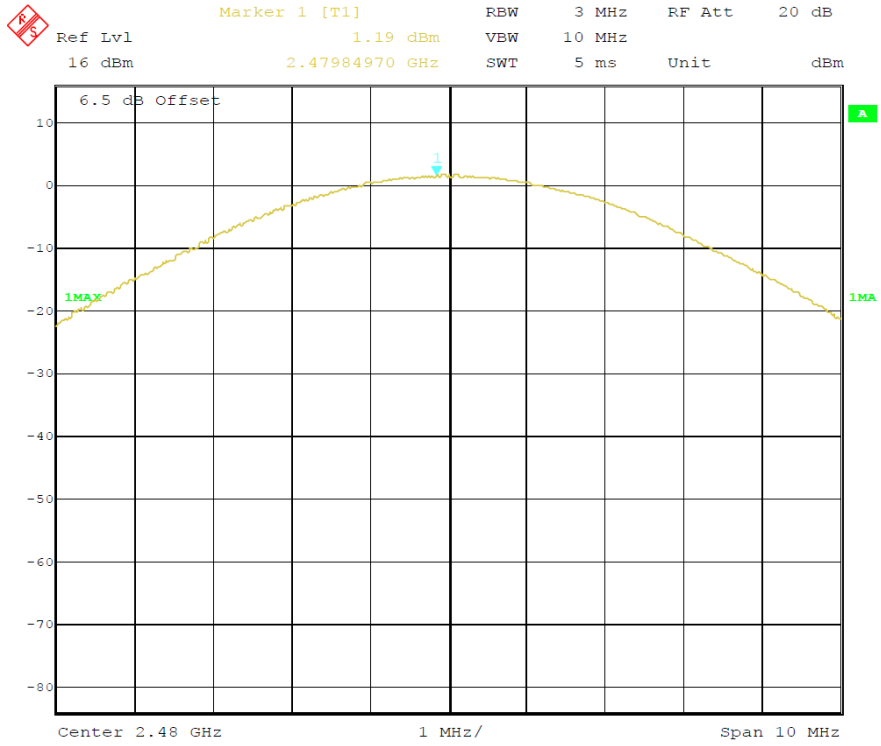
Lower Channel



Middle Channel



Upper Channel



10 Hopping Channel Separation

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483 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 1W.

Test Mode: Test in hopping transmitting operating mode.

10.1 Test Procedure:

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

2. Set the spectrum analyzer: RBW = 30KHz. VBW = 100KHz , Span = 2MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

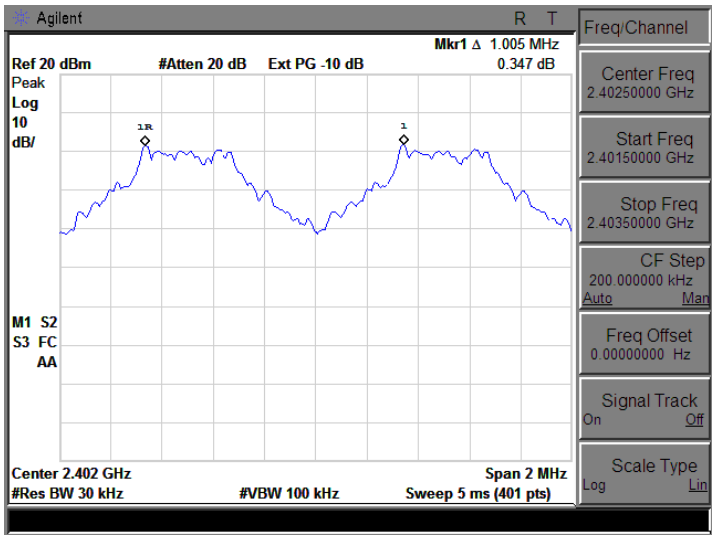
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

10.2 Test Result:

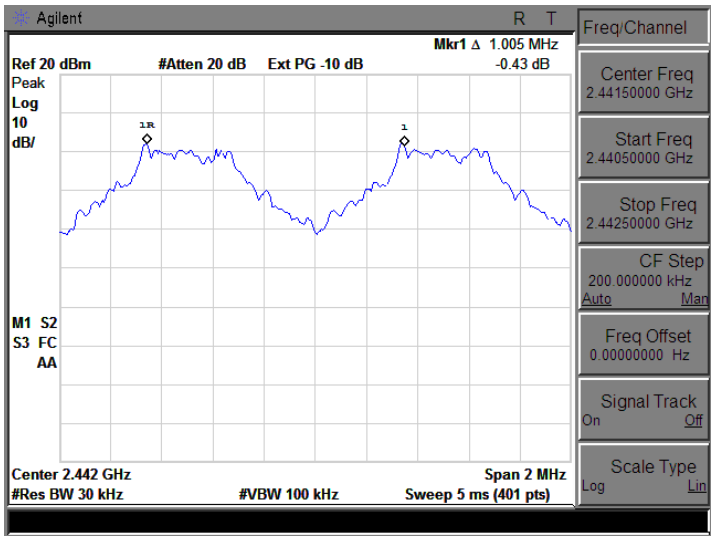
Modulation	Channel	Separation (MHz)
GFSK	Lower	1.00
Pi/4DQPSK	Middle	1.00
8DPSK	Upper	1.00

Test result plot as follows:

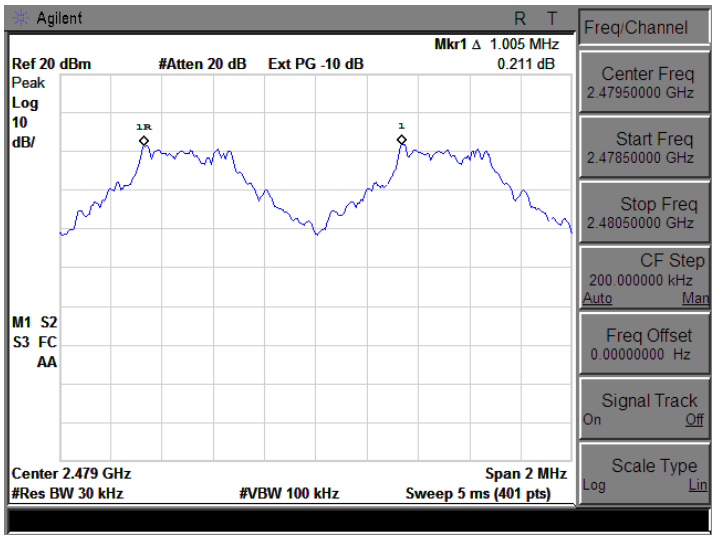
Lower



Middle



Upper



11 Number of Hopping Frequency

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483

MHz band shall use at least 15 channels.

Test Mode: Test in hopping transmitting operating mode.

11.1 Test Procedure:

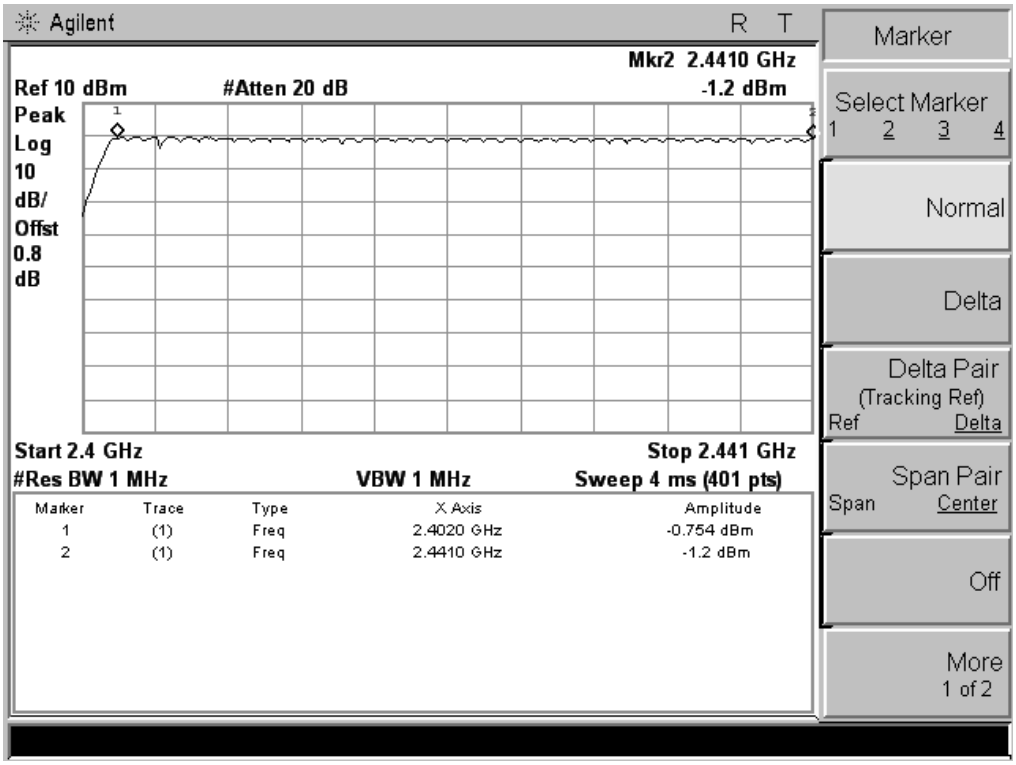
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

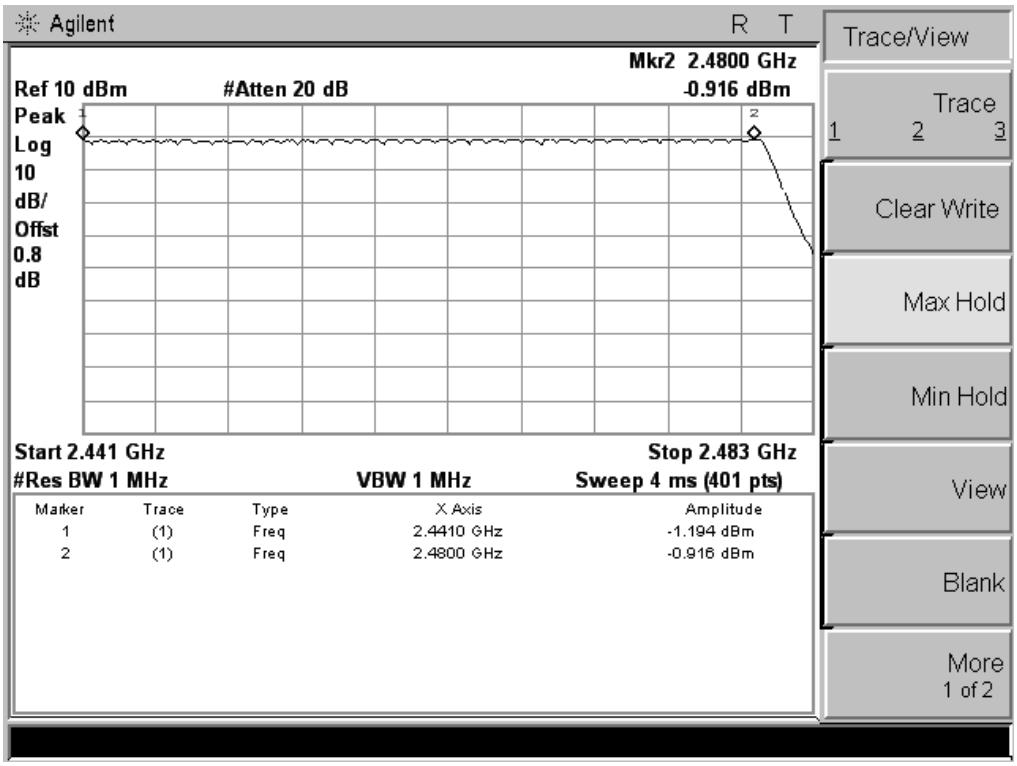
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

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

11.2 Test Result:

Total Channels are 79 Channels.


Agilent
R T
Mkr2 2.4410 GHz
Ref 10 dBm
#Atten 20 dB
-1.2 dBm
Peak
Log
10
dB/
Offst
0.8
dB
Start 2.4 GHz
Stop 2.441 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 4 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.4020 GHz -0.754 dBm
2 (1) Freq 2.4410 GHz -1.2 dBm
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
R T
Mkr2 2.4800 GHz
Ref 10 dBm
#Atten 20 dB
-0.916 dBm
Peak
Log
10
dB/
Offst
0.8
dB
Start 2.441 GHz
Stop 2.483 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 4 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.4410 GHz -1.194 dBm
2 (1) Freq 2.4800 GHz -0.916 dBm
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

12 Dwell Time

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483 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.

Test Mode: Test in hopping transmitting operating mode.

12.1 Test Procedure:

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

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

3.Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel.

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

12.2 Test Result:

Frequency	Packet	Dwell time(ms)	Limit(ms)	Result
2441MHz	DH1	268.8	400	Pass
	DH3	356.3	400	Pass
	DH5	375.0	400	Pass
	3-DH1	268.8	400	Pass
	3-DH3	358.4	400	Pass
	3-DH5	375.0	400	Pass

A period time = 0.4 (s) * 79 = 31.6(s)

DH1 time slot = 0.42(ms) * (1600/(1*79)) * 31.6 = 268.8 (ms)

DH3 time slot = 1.67 (ms) * (1600/(3*79)) * 31.6 = 356.3 (ms)

DH5 time slot = 2.93 (ms) * (1600/(5*79)) * 31.6 = 375.0 (ms)

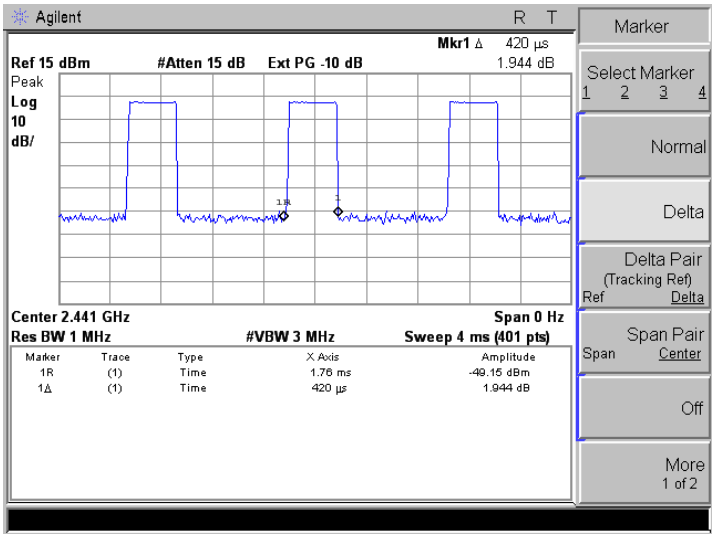
3-DH1 time slot = 0.42 (ms) * (1600/(1*79)) * 31.6 = 268.8 (ms)

3-DH3 time slot = 1.68 (ms) * (1600/(3*79)) * 31.6 = 358.4 (ms)

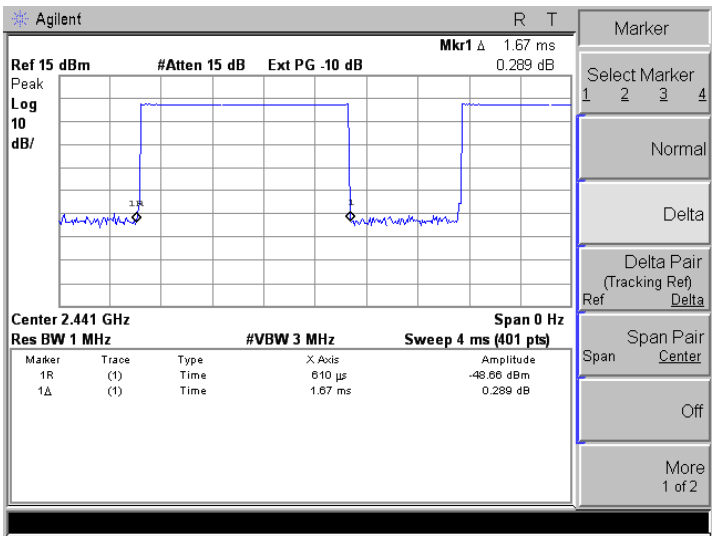
3-DH5 time slot = 2.93 (ms) * (1600/(5*79)) * 31.6 = 375.0 (ms)

Test plot as follows:

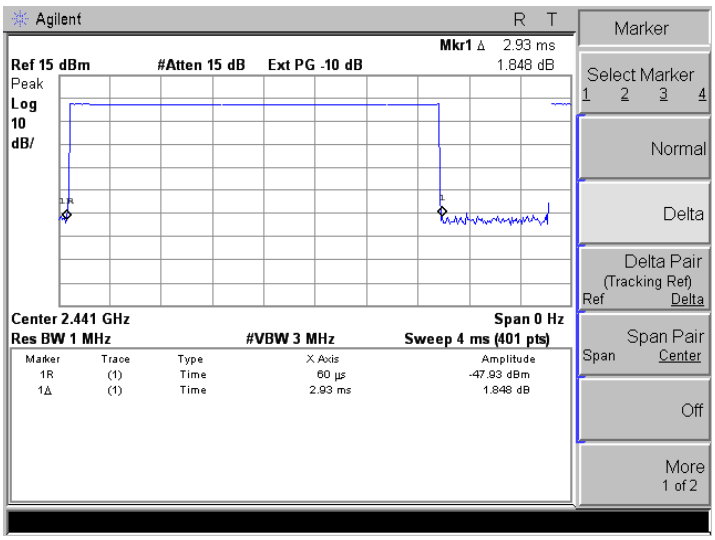
DH1



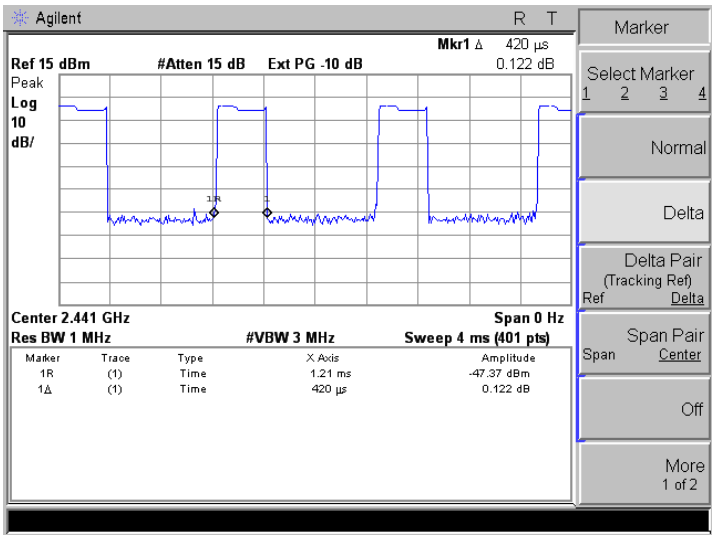
DH3



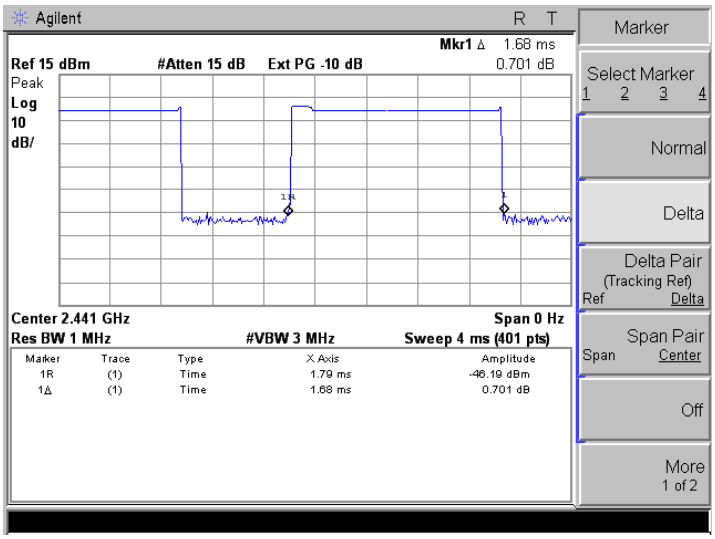
DH5



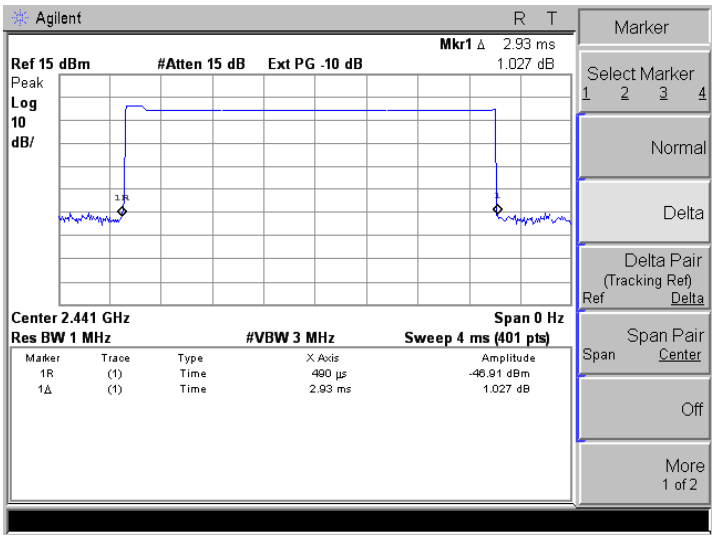
3-DH1



3-DH3



3-DH5



13 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a Chip Antenna, fulfill the requirement of this section.

========== End of Test Report ==========