

FCC TEST REPORT

FCC ID : SW7ICB263B
Applicant : SUPERTIC ELECTRONICS FACTORY
Address : Dingshan plaza road,Houjie town,Dongguan city,Guangdong
Manufacturer : The same as above
Address : The same as above
Equipment Under Test (EUT) :
Product Name : Bluetooth speaker
Model No. : ICB263B

Standards : FCC CFR47 Part 15 Section 15.247:2012

Date of Test : June 19~July 05, 2013
Date of Issue : July 09, 2013

Test Result : **PASS**

Remark:

* The sample described above has been tested to be in compliance with the requirements of ANSI C63.4:2003. The test results have been reviewed and comply with the rules listed above and found to meet their essential requirements.

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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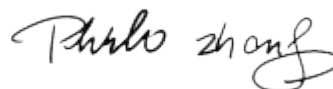
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Compiled by:

Approved by:



Zero Zhou / Project Engineer



Philo Zhong / 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
Spurious RF Conducted Emissions from out of band	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
Radiofrequency radiation exposure evaluation	2.1093	PASS

3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	2
3 CONTENTS	3
4 GENERAL INFORMATION	5
4.1 GENERAL DESCRIPTION OF E.U.T.	5
4.2 DETAILS OF E.U.T.	5
4.3 TEST FACILITY	5
4.4 TEST LOCATION	5
5 EQUIPMENT USED DURING TEST	6
5.1 EQUIPMENTS LIST	6
5.2 MEASUREMENT UNCERTAINTY	6
5.3 TEST EQUIPMENT CALIBRATION	6
6 CONDUCTED EMISSION	7
6.1 E.U.T. OPERATION	7
6.2 EUT SETUP	7
6.3 CONDUCTED EMISSION TEST RESULT	8
7 SPURIOUS RADIATED EMISSIONS	10
7.1 EUT OPERATION :	10
7.2 TEST SETUP	11
7.3 SPECTRUM ANALYZER SETUP	12
7.4 TEST PROCEDURE	13
7.5 CORRECTED AMPLITUDE & MARGIN CALCULATION	13
7.6 SUMMARY OF TEST RESULTS	14
8 SPURIOUS RF CONDUCTED EMISSIONS FROM OUT OF BAND	22
8.1 TEST PROCEDURE	22
8.2 TEST RESULT	22
9 BAND EDGE MEASUREMENT	32
9.1 TEST PROCEDURE	32
9.2 TEST RESULT:	33
10 20 DB BANDWIDTH MEASUREMENT	41
10.1 TEST PROCEDURE:	41
10.2 TEST RESULT:	41
11 MAXIMUM PEAK OUTPUT POWER	47
11.1 TEST PROCEDURE:	47
11.2 TEST RESULT:	47
12 HOPPING CHANNEL SEPARATION	53
12.1 TEST PROCEDURE:	53
12.2 TEST RESULT:	53
13 NUMBER OF HOPPING FREQUENCY	59
13.1 TEST PROCEDURE:	59
13.2 TEST RESULT:	59
14 DWELL TIME	61
14.1 TEST PROCEDURE:	61

14.2	TEST RESULT:.....	61
15	ANTENNA REQUIREMENT	63
16	RADIOFREQUENCY RADIATION EXPOSURE EVALUATION	64
16.1	REQUIEMTS:	64
16.2	THE PROCEDURES / LIMIT	64
16.3	MPE CALCULATION METHOD.....	65
17	PHOTOGRAPHS – TEST SETUP	66
17.1	RADIATED EMISSIONS.....	66
17.2	CONDUCTED EMISSIONS	67
18	PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	68
18.1	EUT – EXTERNAL VIEW.....	68
18.2	EUT – INTERNAL VIEW.....	71
18.3	EUT-RF MODULE VIEW	74

4 General Information

4.1 General Description of E.U.T.

Product Name	: Bluetooth speaker
Model No.	: ICB263B
Model Description	: N/A
Operation Frequency	: 2402MHz ~ 2480MHz, 79 channels in total, separated by 1MHz
Type of Modulation	: GFSK, Pi/4DQPSK, 8DPSK
Oscillator	: 16 MHz
Antenna installation	: PCB Printed Antenna
Antenna Gain	: 0dBi

4.2 Details of E.U.T.

Technical Data	: DC 5V, 0.8A Powered from Adapter (Input: 100-240V~, 50/60Hz, 0.15A)
Adapter	: Manufacturer: Mass Power M/N: SCF0500080A1BB

4.3 Test Facility

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

- **IC – Registration No.: 7760A**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.
Registration 7760A, July 12, 2012.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

4.4 Test Location

All the tests were performed at:
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Aug. 13,2012	Aug. 12,2013
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Aug. 13,2012	Aug. 12,2013
3.	Cable	LARGE	RF300	EW02014-3	Aug.14,2012	Aug. 13,2013
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer	Agilent	E7405A	MY45114943	Aug. 13,2012	Aug. 12,2013
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Aug. 13,2012	Aug. 12,2013
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr. 20,2013	Apr. 19,2014
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr. 20,2013	Apr. 19,2014
5.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	399	Aug. 13,2012	Aug. 12,2013
6.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
7.	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-148	Aug. 13,2012	Aug. 12,2013
8.	Cable	Top	EWO2014-7	-	Apr. 20,2013	Apr. 19,2014
9.	Cable	Top	TYPE16(13M)	-	Aug. 13,2012	Aug. 12,2013
Associated Equipment						
1.	IPOD	Apple	A1367	-	-	-

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
Bandwidth	$\pm 1.5 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Temperature	± 1 °C
DC Source	$\pm 0.05\%$
Radiated Emissions test	± 3.58 dB (9KH~30MHz)
	± 5.03 dB (30M~1000MHz)
	± 4.74 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 0.5 dB (9KHz~1000MHz)
	± 1 dB(1000M~26500MHz)
Conducted Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.3 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.

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

Atmospheric Pressure: 1012 mbar

EUT Operation:

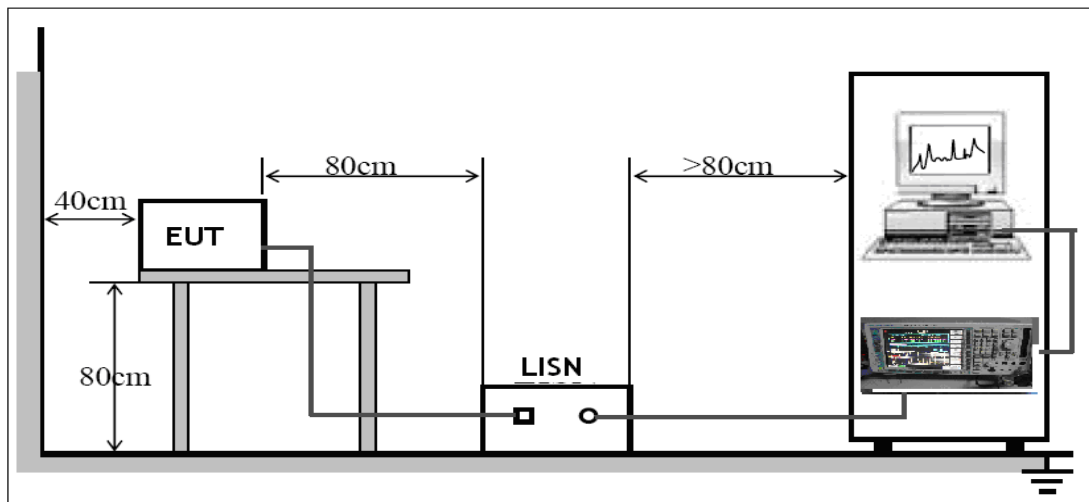
The EUT was tested in Bluetooth linking mode. The test data were shown as follow.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz 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.

6.2 EUT Setup

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

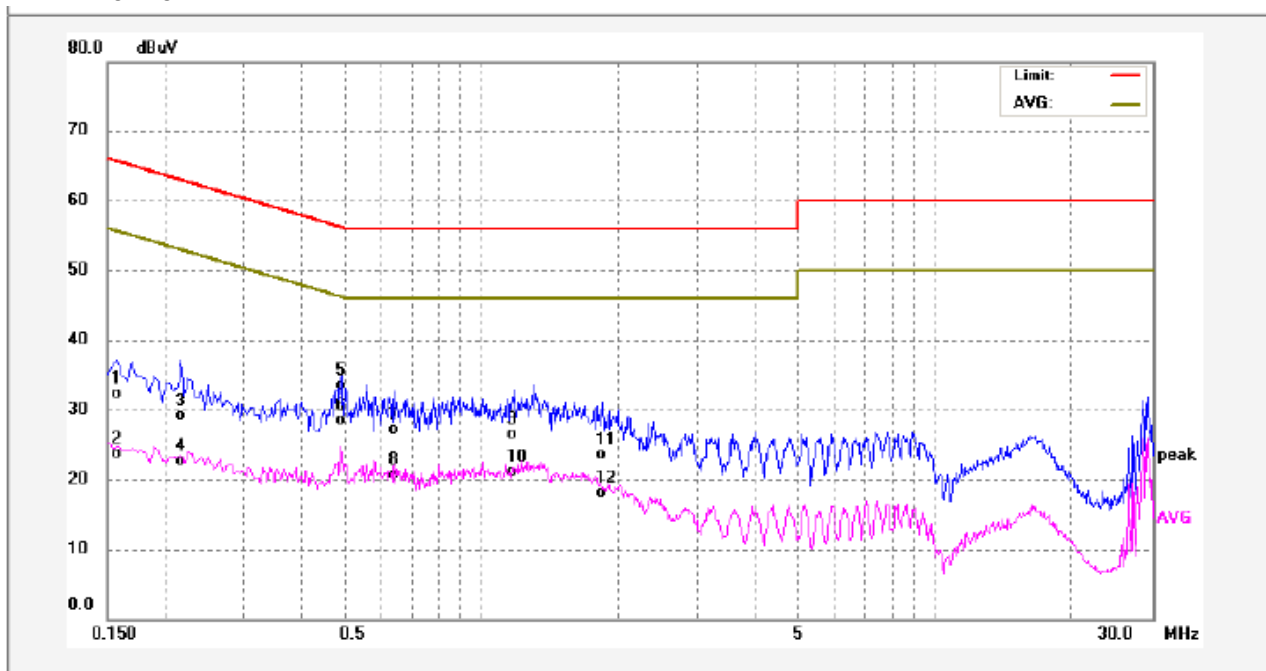


6.3 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

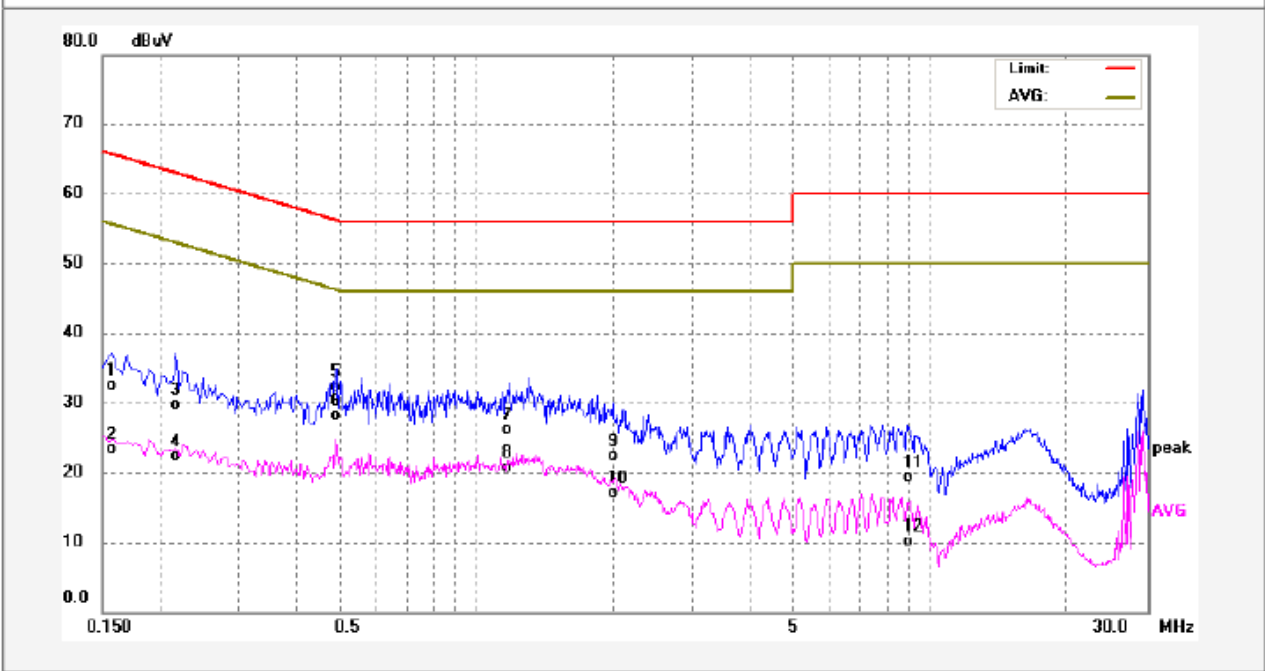
The worst mode: Bluetooth linking Mode

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	21.17	11.19	32.36	65.56	-33.20	QP	
2	0.1580	12.43	11.19	23.62	55.56	-31.94	AVG	
3	0.2180	17.72	11.30	29.02	62.89	-33.87	QP	
4	0.2180	11.49	11.30	22.79	52.89	-30.10	AVG	
5	0.4940	22.26	11.31	33.57	56.10	-22.53	QP	
6	0.4940	17.18	11.31	28.49	46.10	-17.61	AVG	
7	0.6419	15.70	11.33	27.03	56.00	-28.97	QP	
8	0.6419	9.46	11.33	20.79	46.00	-25.21	AVG	
9	1.1820	15.25	11.18	26.43	56.00	-29.57	QP	
10	1.1820	9.88	11.18	21.06	46.00	-24.94	AVG	
11	1.8540	12.28	11.20	23.48	56.00	-32.52	QP	
12	1.8540	6.94	11.20	18.14	46.00	-27.86	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	21.27	11.19	32.46	65.56	-33.10	QP	
2	0.1580	12.12	11.19	23.31	55.56	-32.25	AVG	
3	0.2180	18.42	11.30	29.72	62.89	-33.17	QP	
4	0.2180	11.04	11.30	22.34	52.89	-30.55	AVG	
5	0.4940	21.09	11.31	32.40	56.10	-23.70	QP	
6	0.4940	16.78	11.31	28.09	46.10	-18.01	AVG	
7	1.1820	14.92	11.18	26.10	56.00	-29.90	QP	
8	1.1820	9.53	11.18	20.71	46.00	-25.29	AVG	
9	1.9940	11.18	11.20	22.38	56.00	-33.62	QP	
10	1.9940	5.91	11.20	17.11	46.00	-28.89	AVG	
11	8.9140	8.00	11.29	19.29	60.00	-40.71	QP	
12	8.9140	-1.25	11.29	10.04	50.00	-39.96	AVG	

7 Spurious Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: DA 00-705

Test Result: PASS

Frequency Range: 16MHz to 25GHz

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	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation :

Operating Environment:

Temperature: 25.5 °C

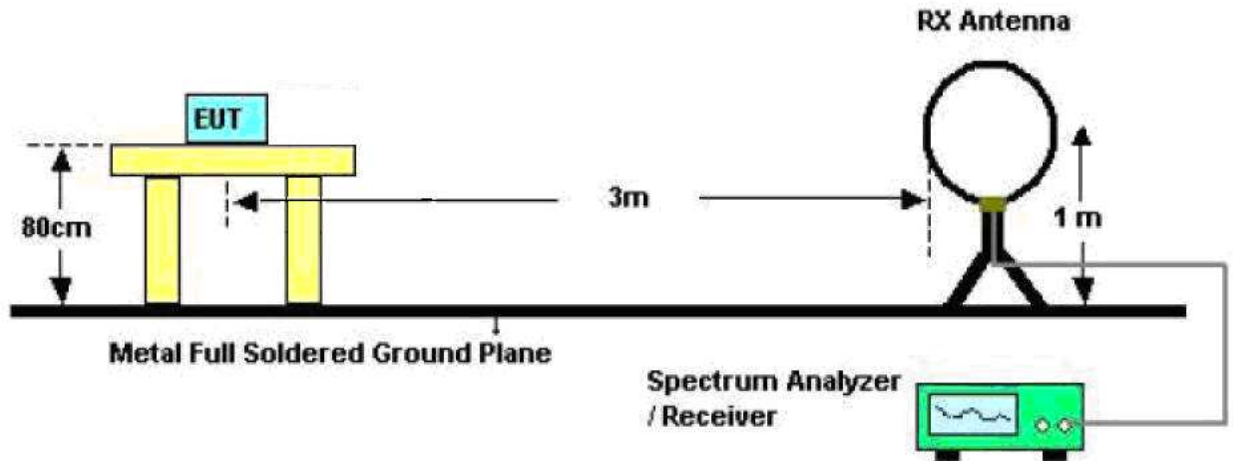
Humidity: 51 % RH

Atmospheric Pressure: 1011 mbar

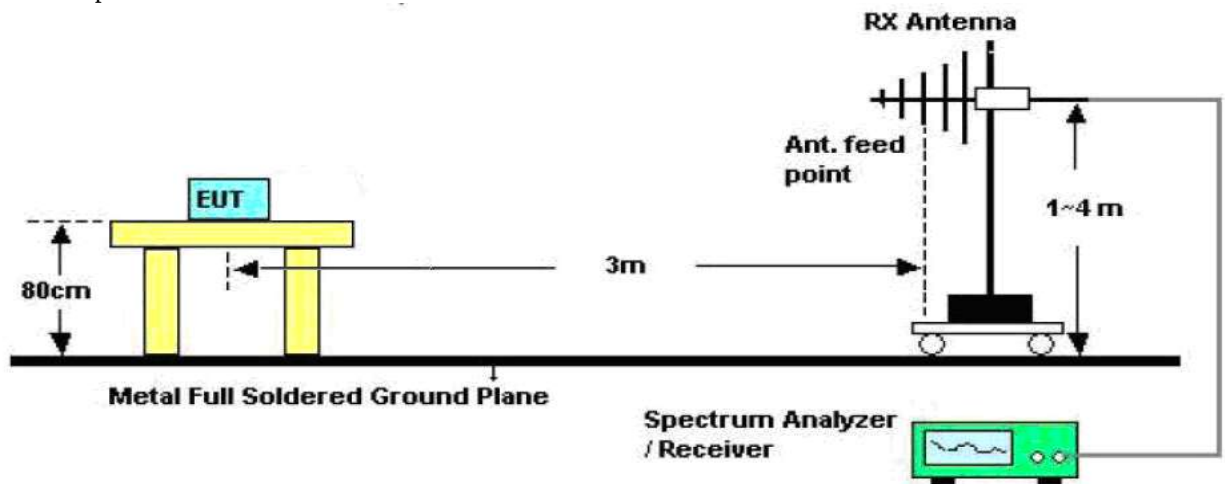
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

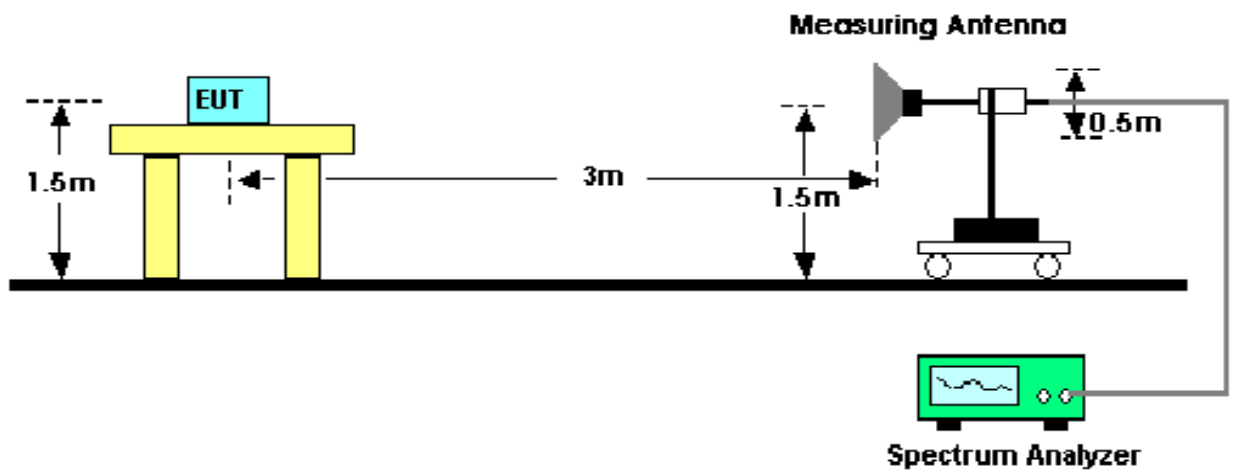
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 16MHz to 25000MHz.

Below 30MHz

Sweep SpeedAuto
IF Bandwidth10KHz
Video Bandwidth10KHz
Resolution Bandwidth10KHz

30MHz ~ 1GHz

Sweep SpeedAuto
IF Bandwidth120 KHz
Video Bandwidth100KHz
Quasi-Peak Adapter Bandwidth120 KHz
Quasi-Peak Adapter ModeNormal
Resolution Bandwidth100KHz

Above 1GHz

Sweep SpeedAuto
IF Bandwidth120 KHz
Video Bandwidth3MHz
Quasi-Peak Adapter Bandwidth120 KHz
Quasi-Peak Adapter ModeNormal
Resolution Bandwidth1MHz

7.4 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.
7. The radiation measurements are tested under X-axes position(X denotes lying on the table, the worst radiation emissions were shown as follow.
8. New battery was used during the test.

7.5 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

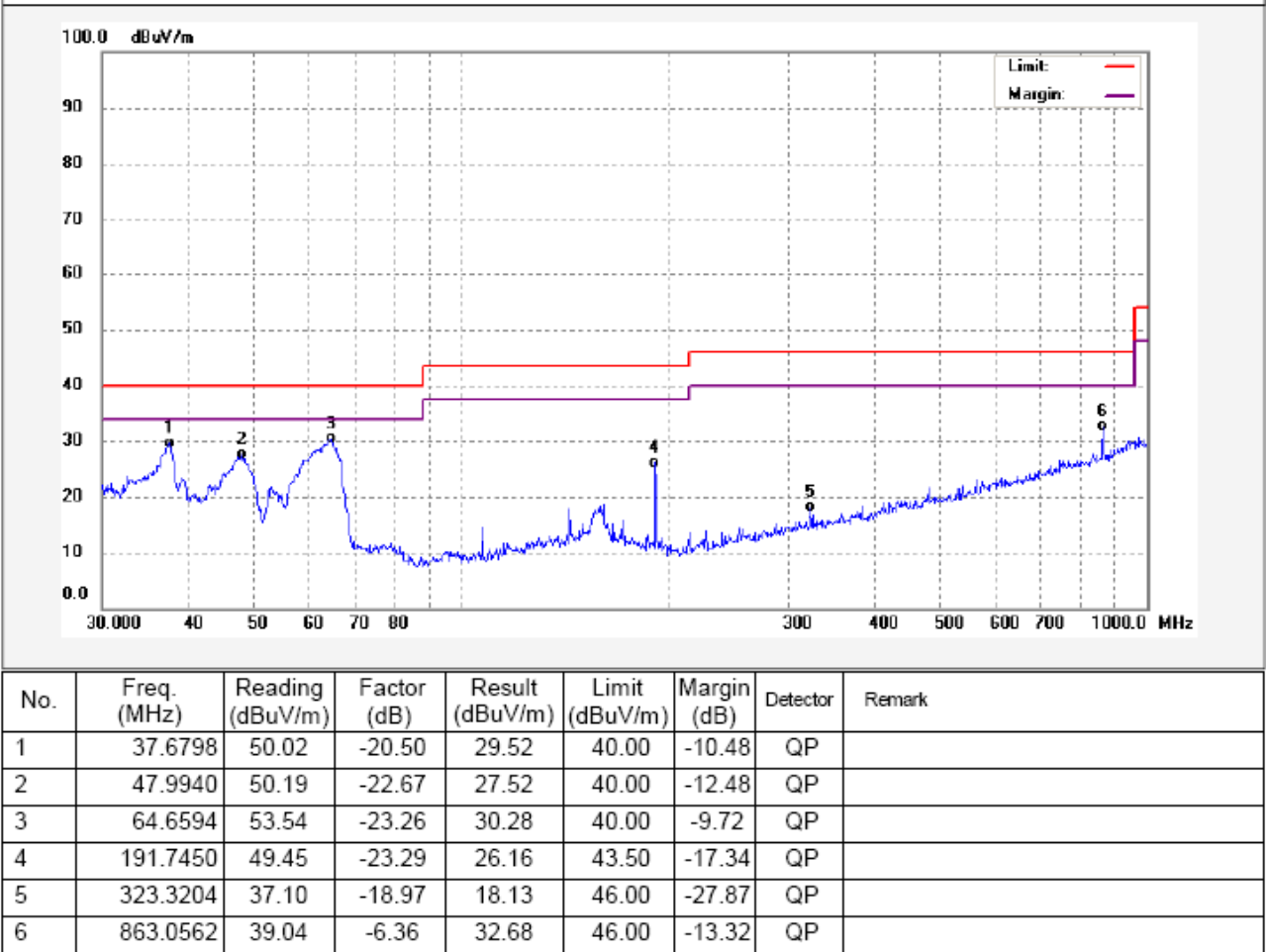
Test Frequency :Below 30MHz

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

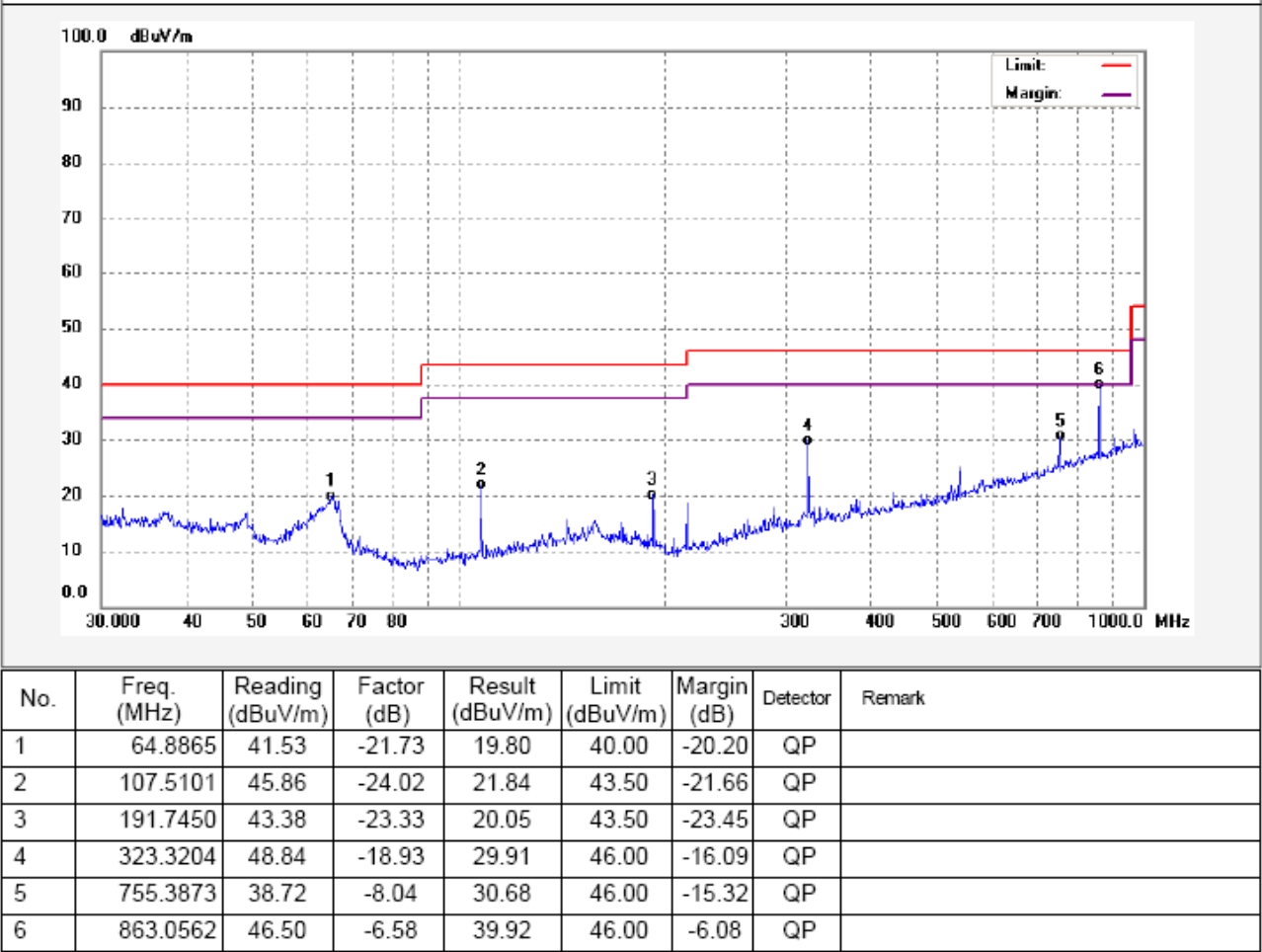
Test Frequency : 30MHz ~ 1000MHz

Test worst mode: Bluetooth linking

Antenna polarization: Vertical



Antenna polarization: Horizontal

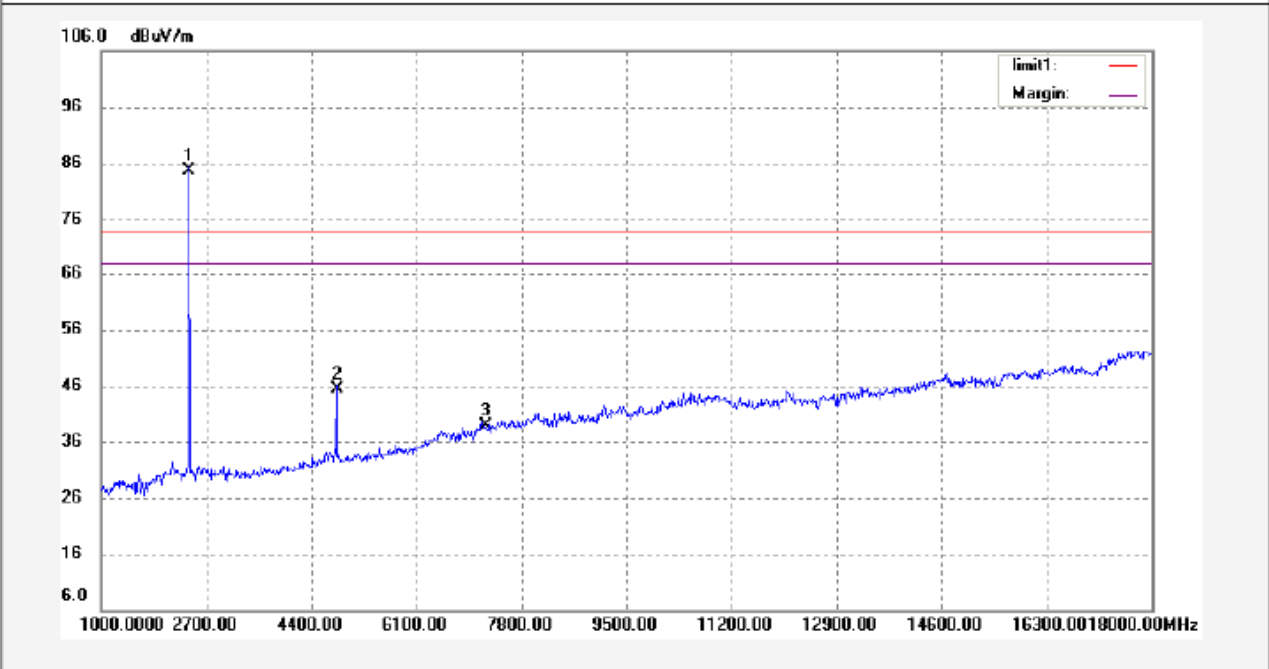


Test Frequency: 1GHz ~ 18GHz

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

Test mode: transmitting at lower channel

Antenna polarization: Vertical

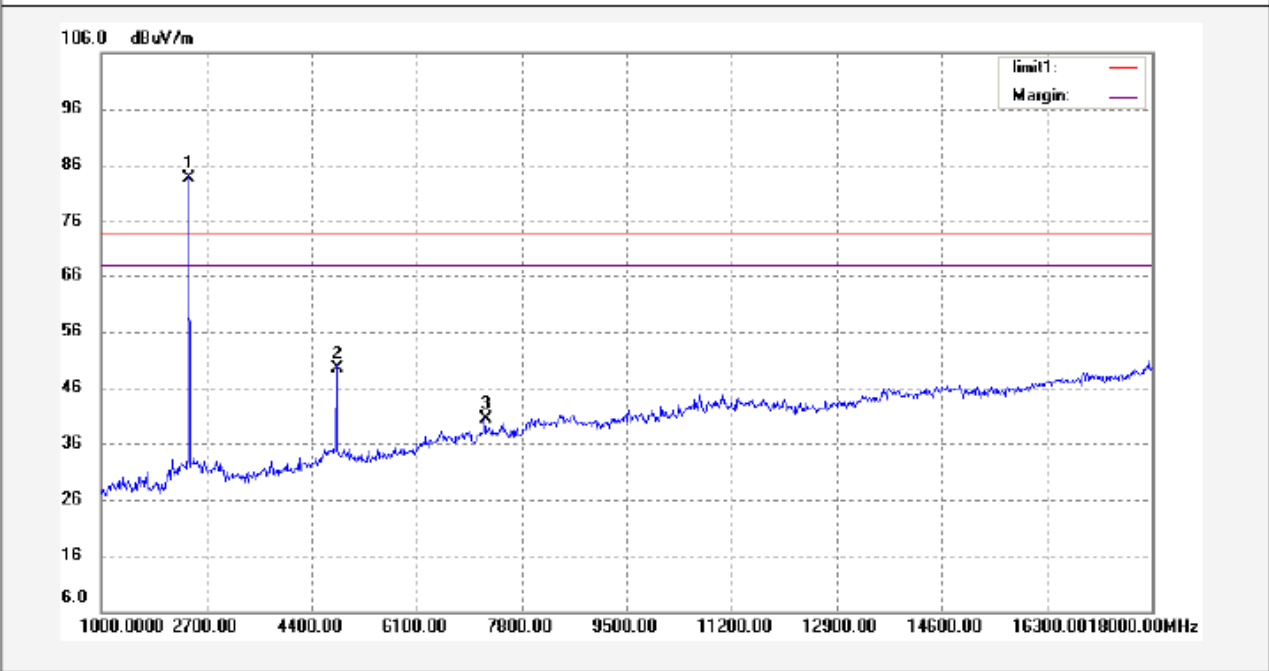


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2402.000	100.21	-15.58	84.63	74.00	10.63	peak	
2	4804.000	57.24	-11.97	45.27	74.00	-28.73	peak	
3	7206.000	46.21	-7.21	39.00	74.00	-35.00	peak	

No.	Freq. (MHz)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	4804.000	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.
3	7206.000	-	-	-	-	AV	

Remark: Mark1 is fundamental wave which is should be ignored.

Antenna polarization: Horizontal



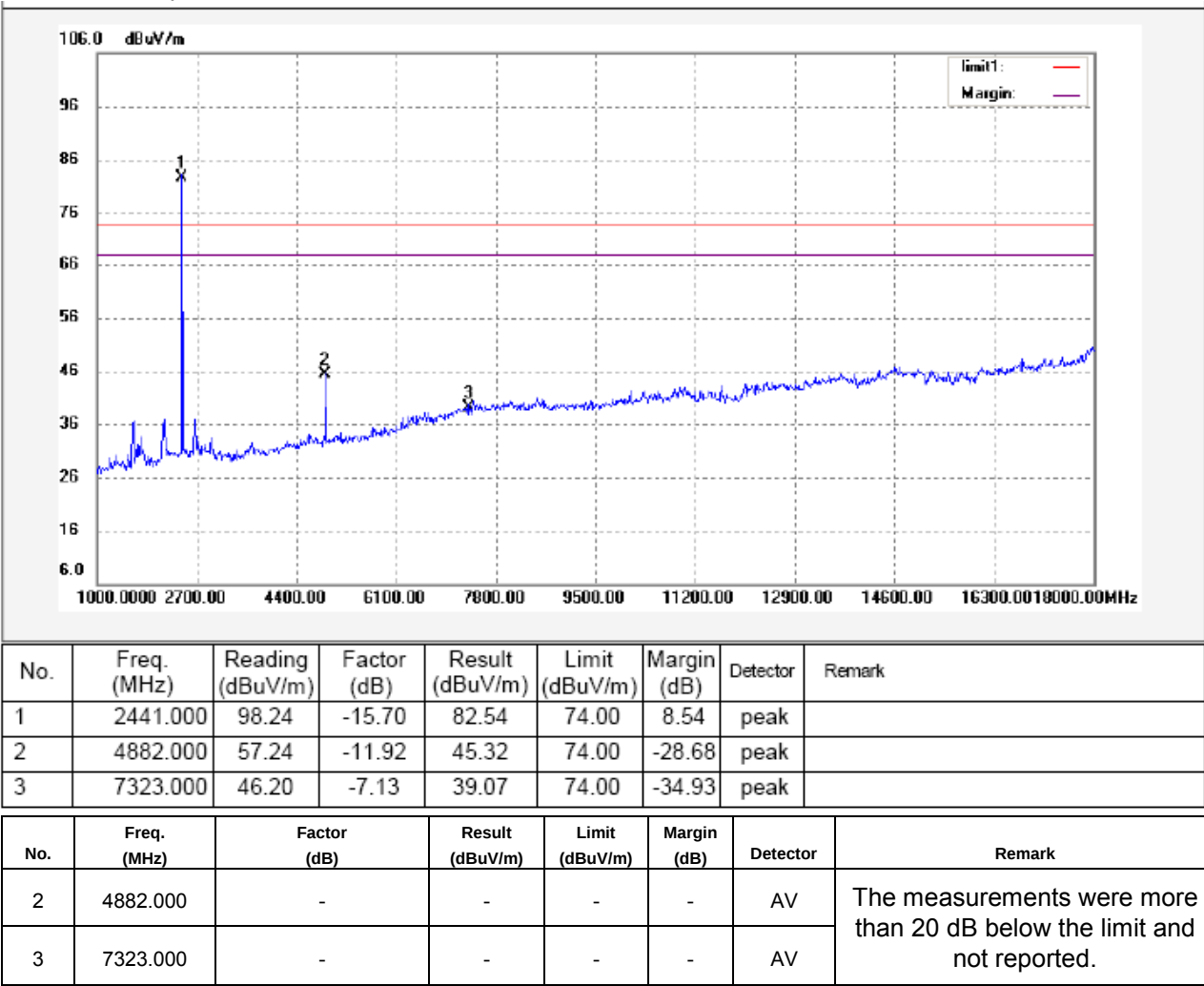
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2402.000	99.25	-15.58	83.67	74.00	9.67	peak	
2	4804.000	61.24	-11.97	49.27	74.00	-24.73	peak	
3	7206.000	47.55	-7.21	40.34	74.00	-33.66	peak	

No.	Freq. (MHz)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	4804.000	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.
3	7206.000	-	-	-	-	AV	

Remark: Mark1 is fundamental wave which is should be ignored.

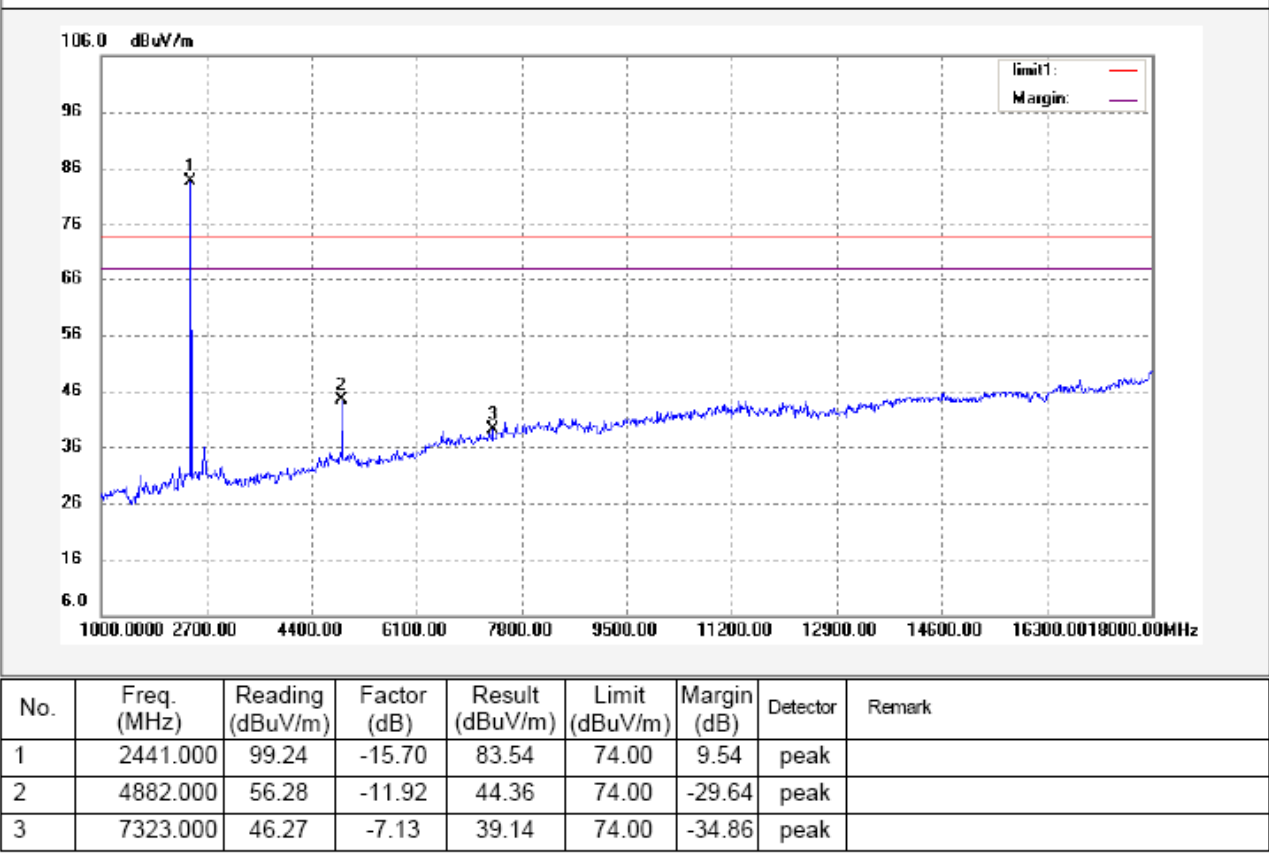
Test mode: transmitting at middle channel

Antenna polarization: Vertical



Remark: Mark1 is fundamental wave which is should be ignored.

Antenna polarization: Horizontal

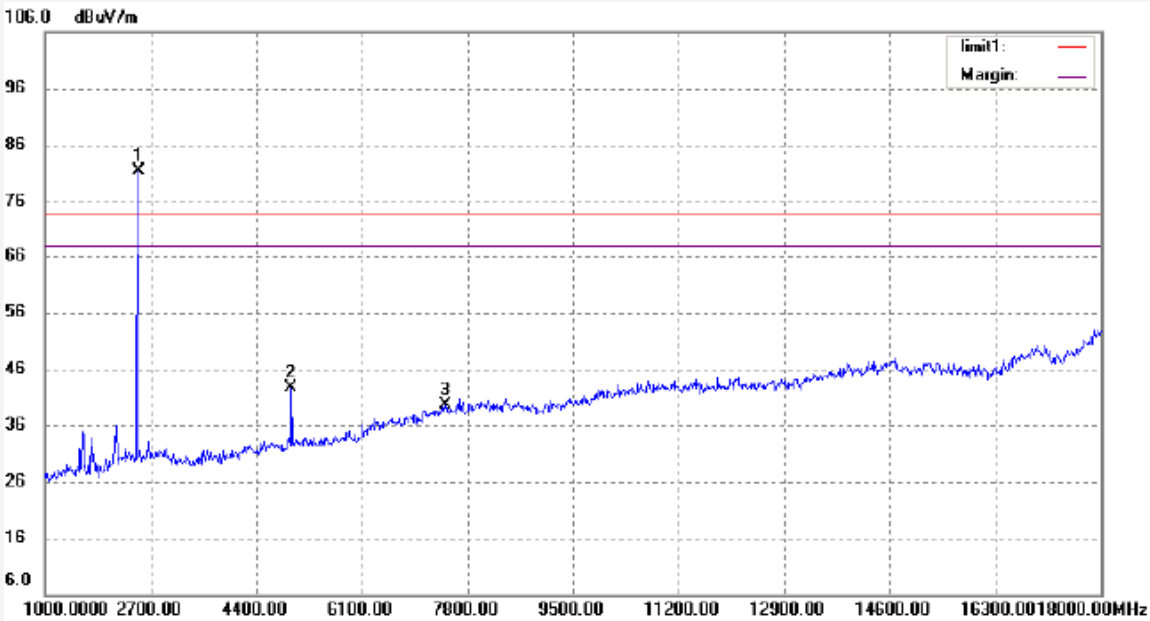


No.	Freq. (MHz)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	4882.000	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.
3	7323.000	-	-	-	-	AV	

Remark: Mark 1 is fundamental which should be ignored.

Test mode: transmitting at upper channel

Antenna polarization: Vertical

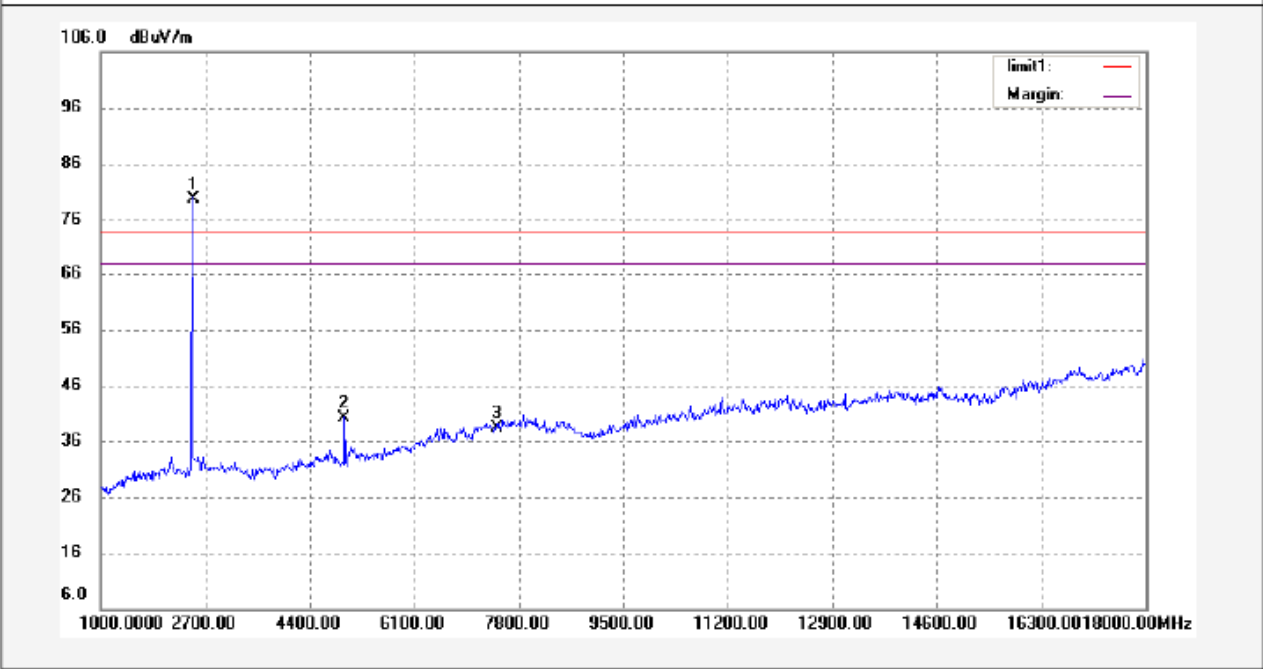


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2480.000	96.94	-15.68	81.26	74.00	7.26	peak	
2	4960.000	54.40	-11.77	42.63	74.00	-31.37	peak	
3	7440.000	46.67	-6.93	39.74	74.00	-34.26	peak	

No.	Freq. (MHz)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	4960.000	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.
3	7440.000	-	-	-	-	AV	

Remark: Mark 1 is fundamental which should be ignored.

Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2480.000	95.26	-15.68	79.58	74.00	5.58	peak	
2	4960.000	52.01	-11.77	40.24	74.00	-33.76	peak	
3	7440.000	45.26	-6.93	38.33	74.00	-35.67	peak	

No.	Freq. (MHz)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	4960.000	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.
3	7440.000	-	-	-	-	AV	

Remark: Mark 1 is fundamental which should be ignored.

Test Frequency :Above 18GHz

The measurement is performed up to 25GHz, and all other emissions are more than 20dB below the limit, therefore the results above 18GHz is not recorded in this report.

8 Spurious RF Conducted Emissions from out of band

Test Requirement: FCC Part 15.247(d) 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.

Test Method: DA 00-705

Test Status: TX mode

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 to span from the lowest frequency generated in the device up to and including the tenth harmonic of the highest fundamental frequency.
3. Set RBW = 100kHz and VBW = 300kHz.Sweep =auto.
4. mark the worst point and record.

8.2 Test Result

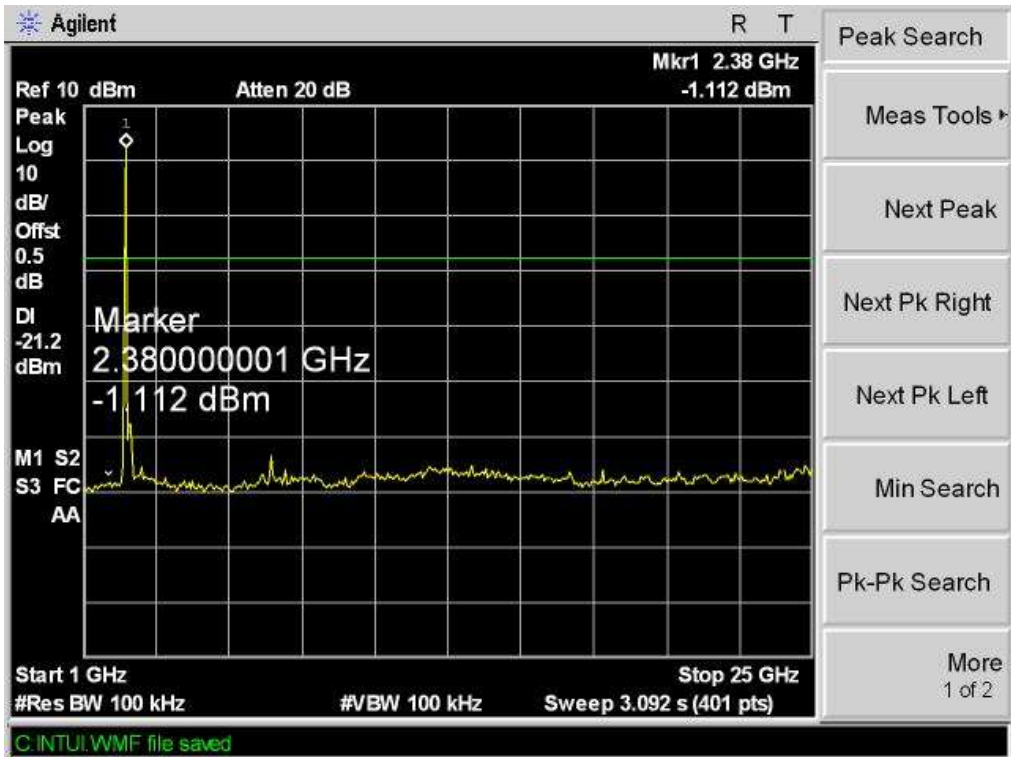
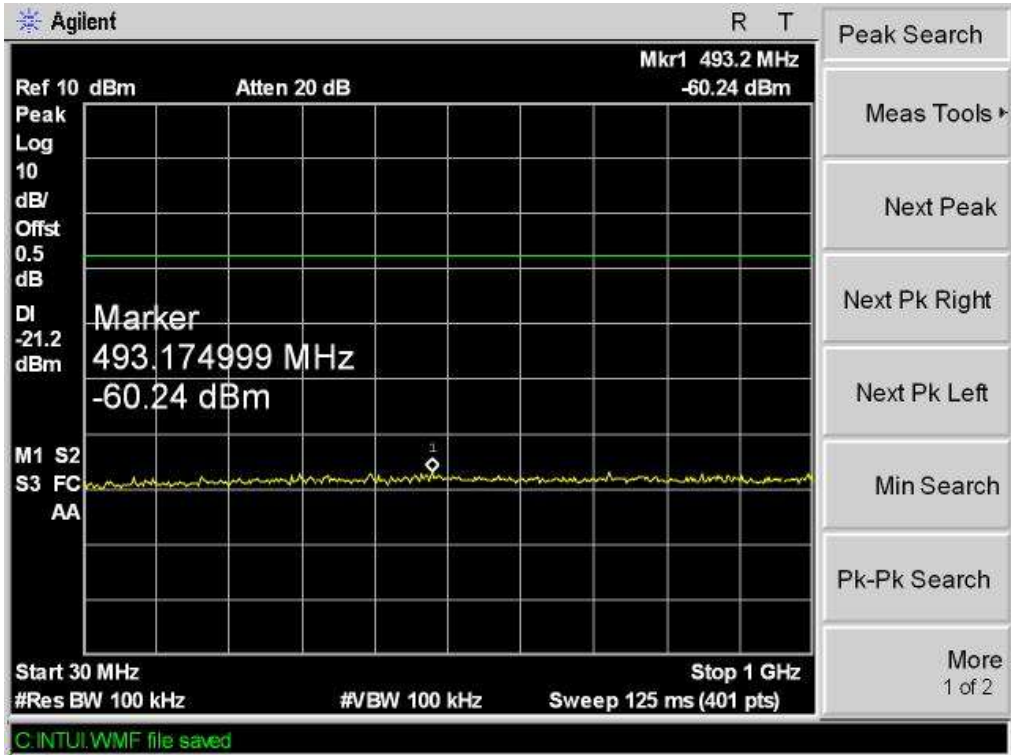
Test Frequency: Below 30MHz

Remark: For emissions below 30MHz,no emission higher than background level, so the data does not show in the report.

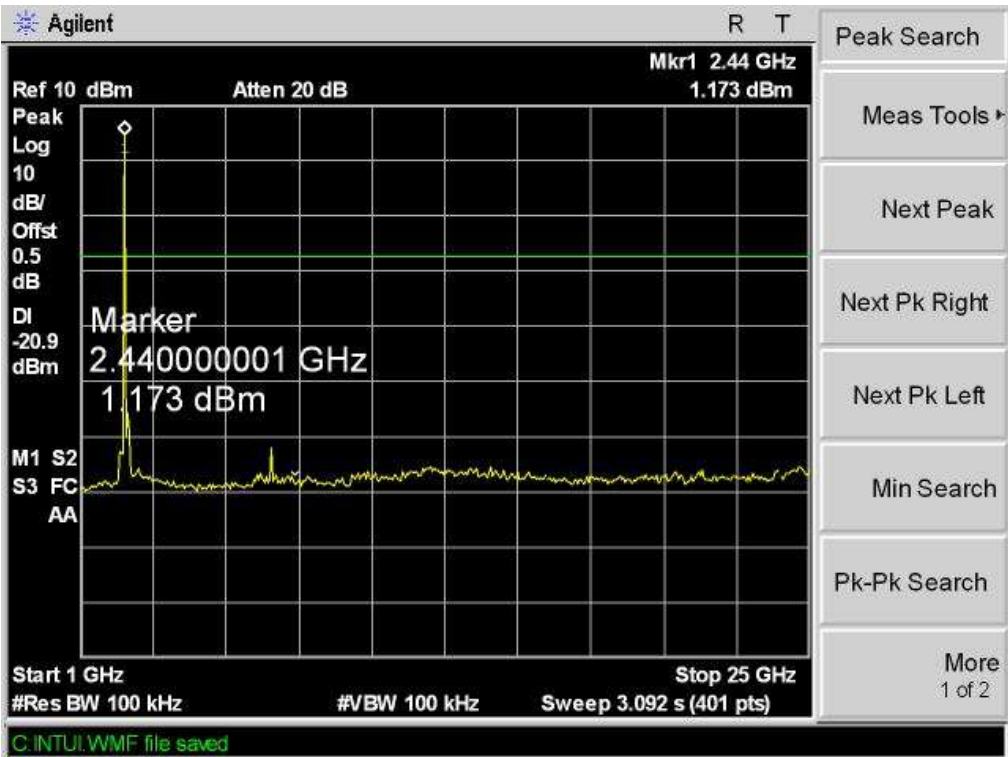
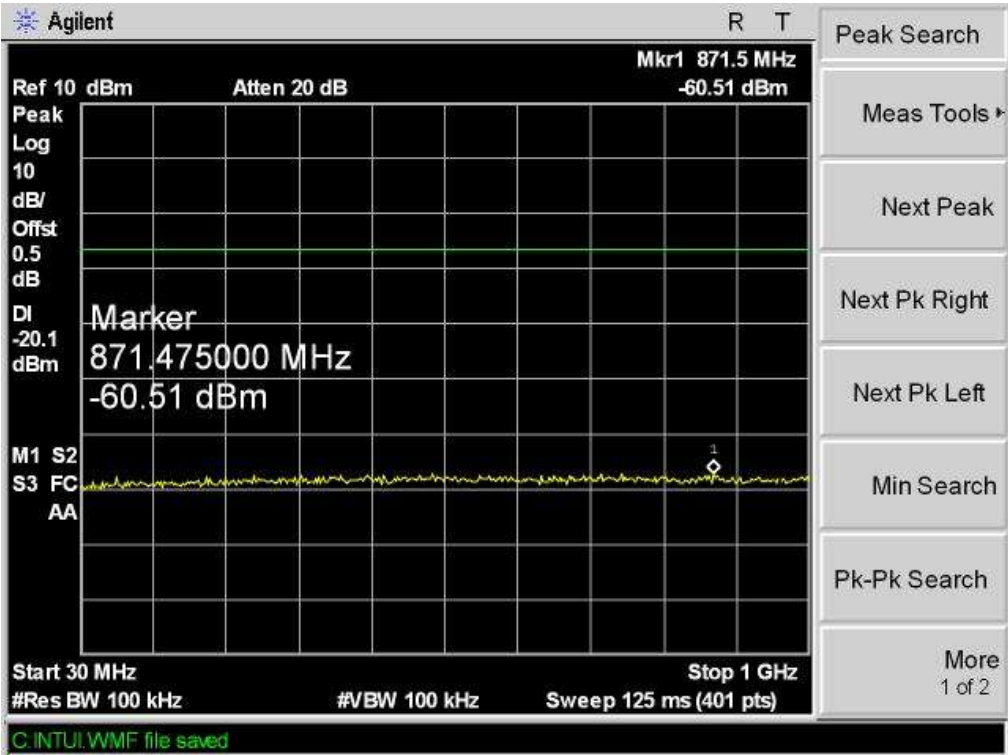
Test Frequency: 30MHz ~ 25GHz

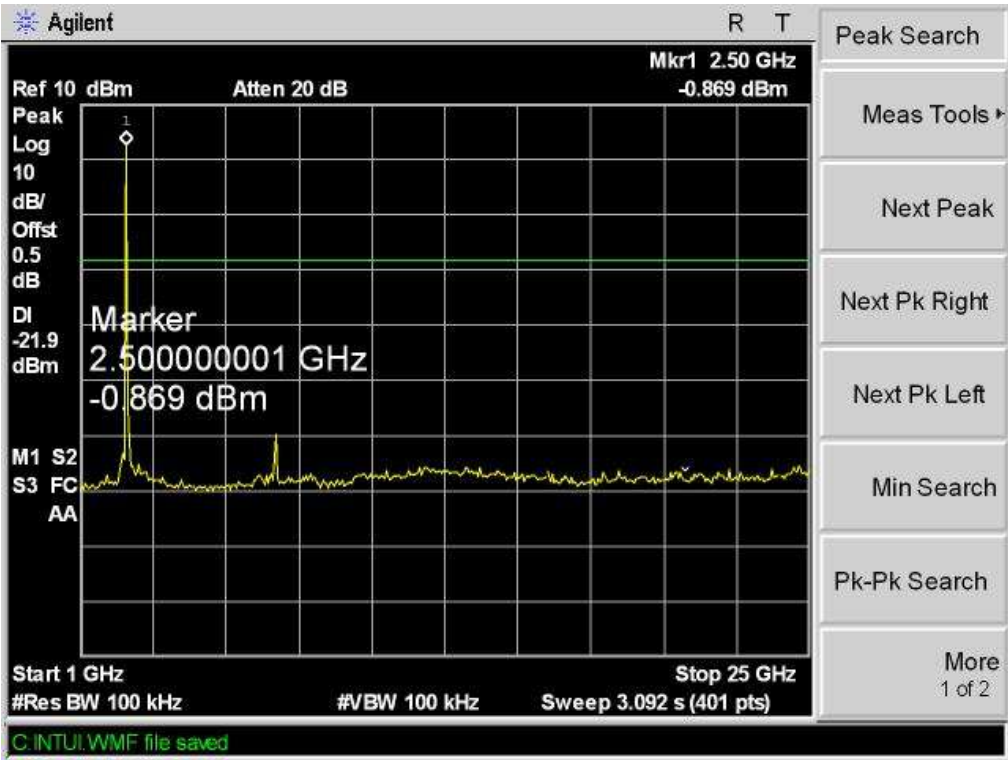
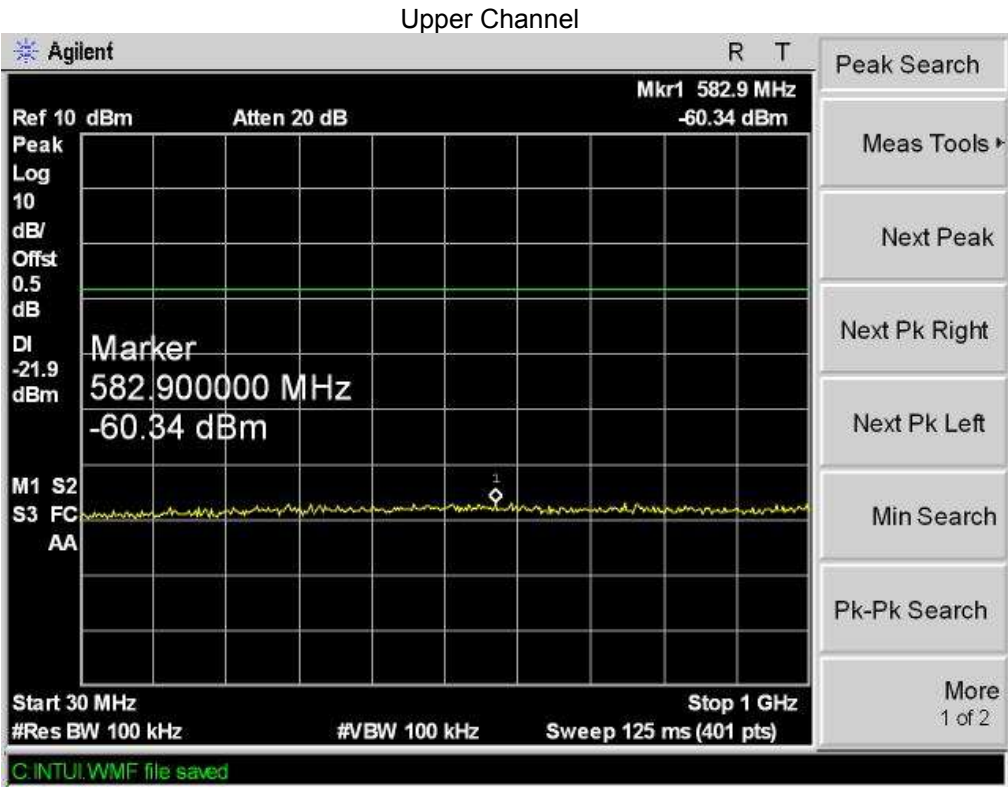
Test result plots shown as follows:

Modulation:GFSK
Lower Channel



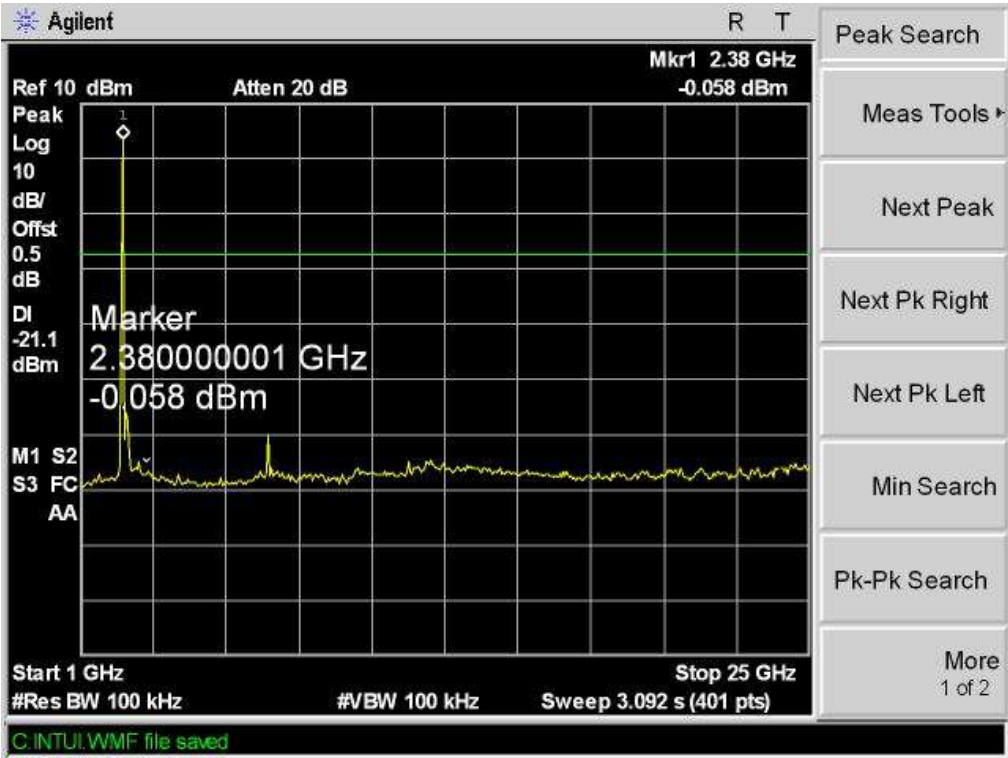
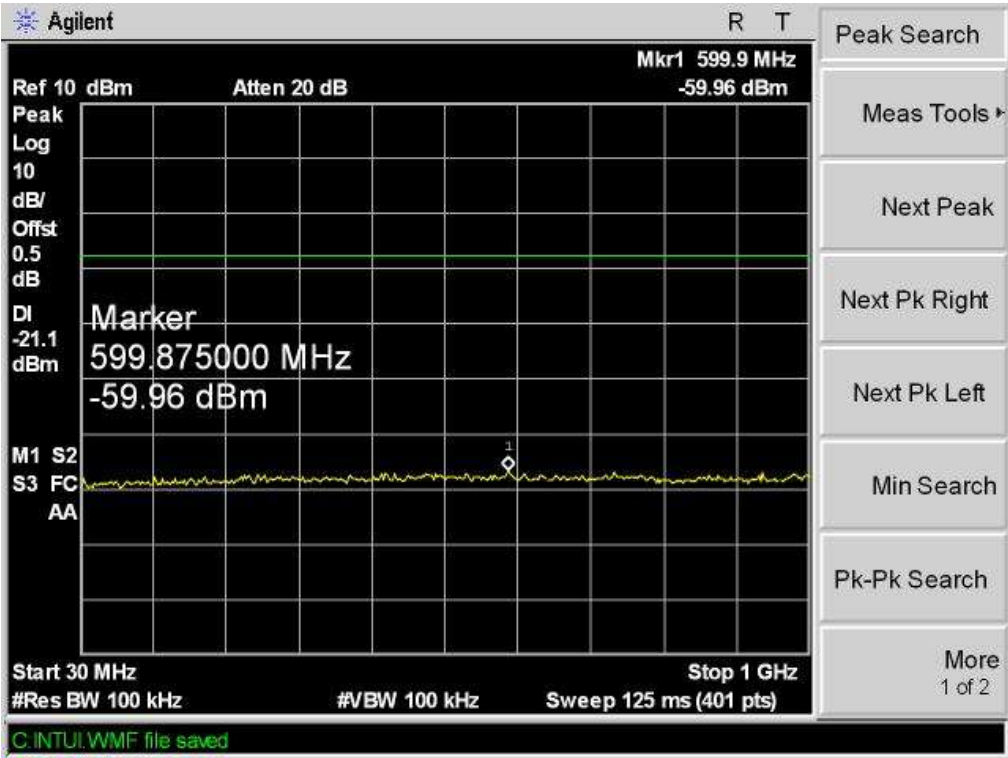
Middle Channel

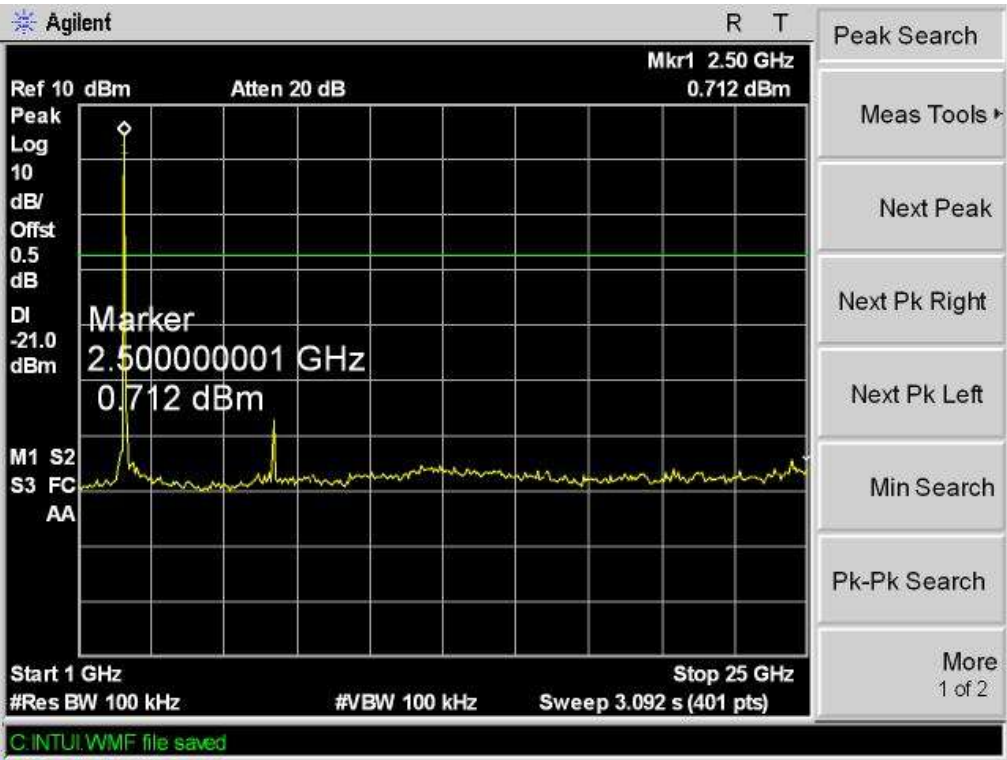
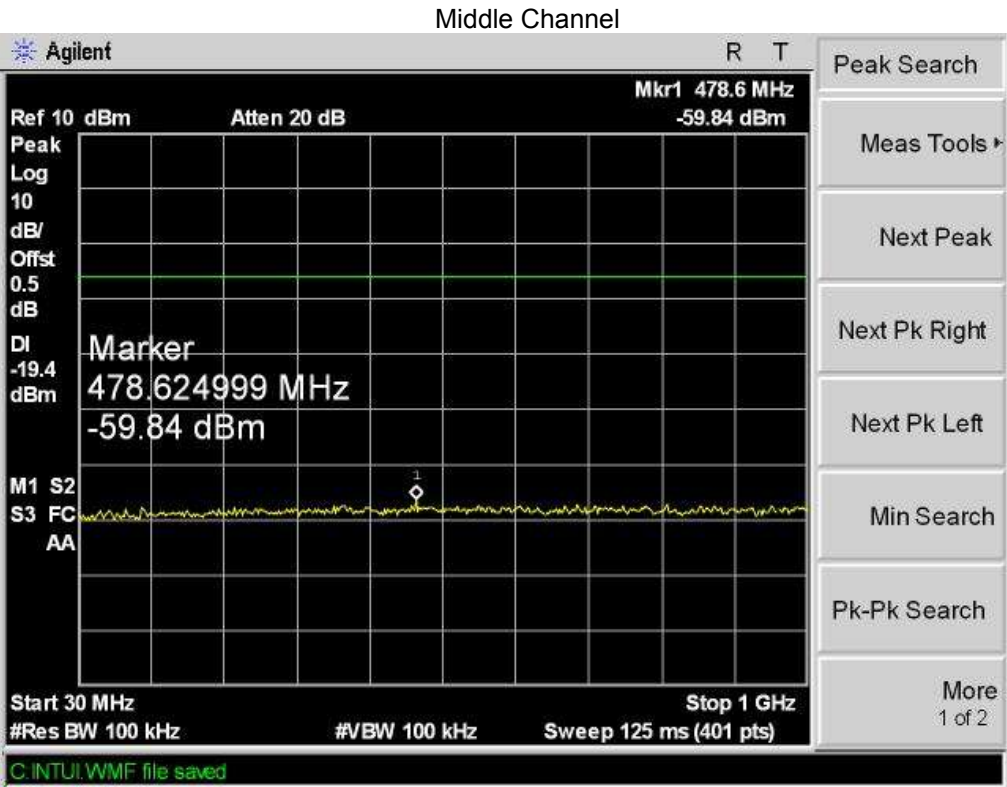




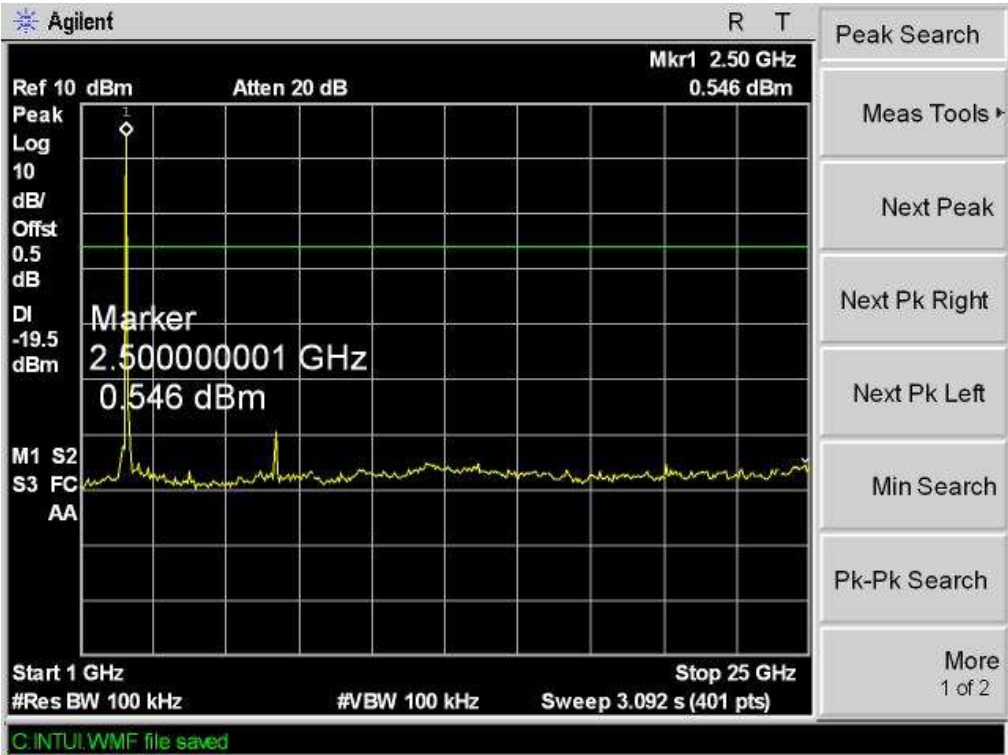
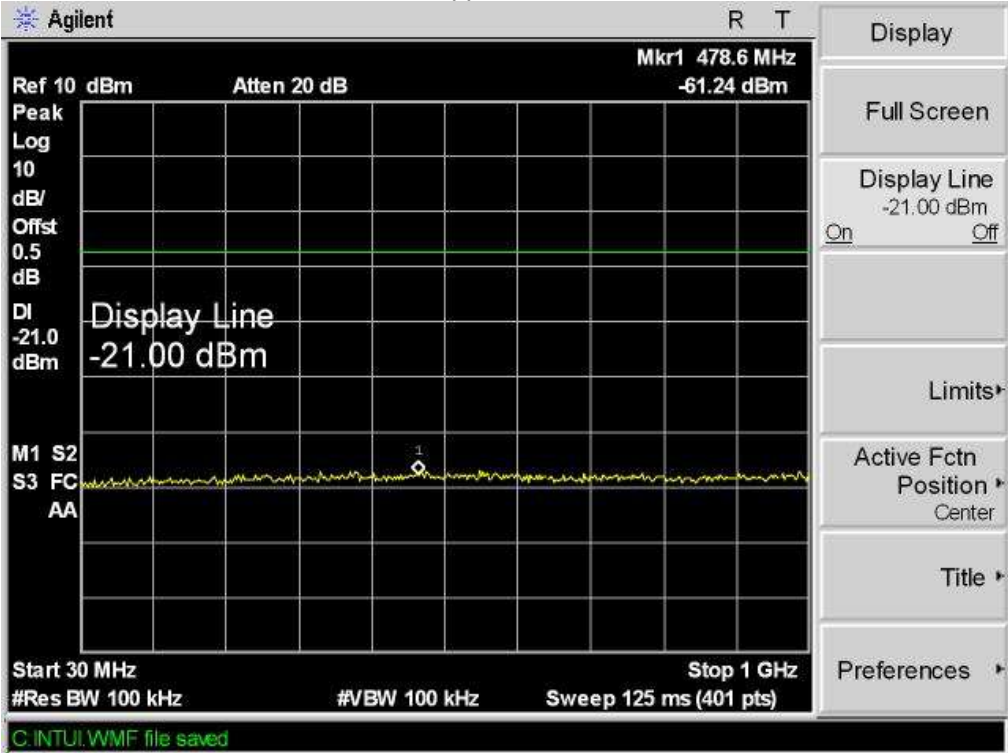
Modulation: Pi/4DQPSK

Lower Channel



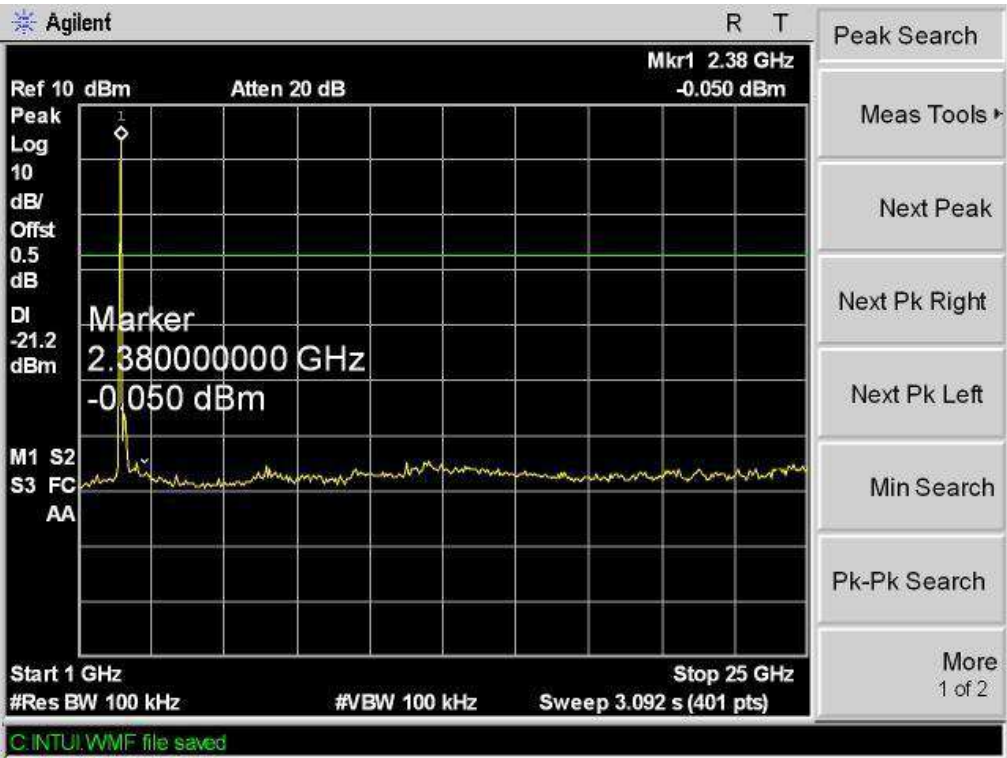
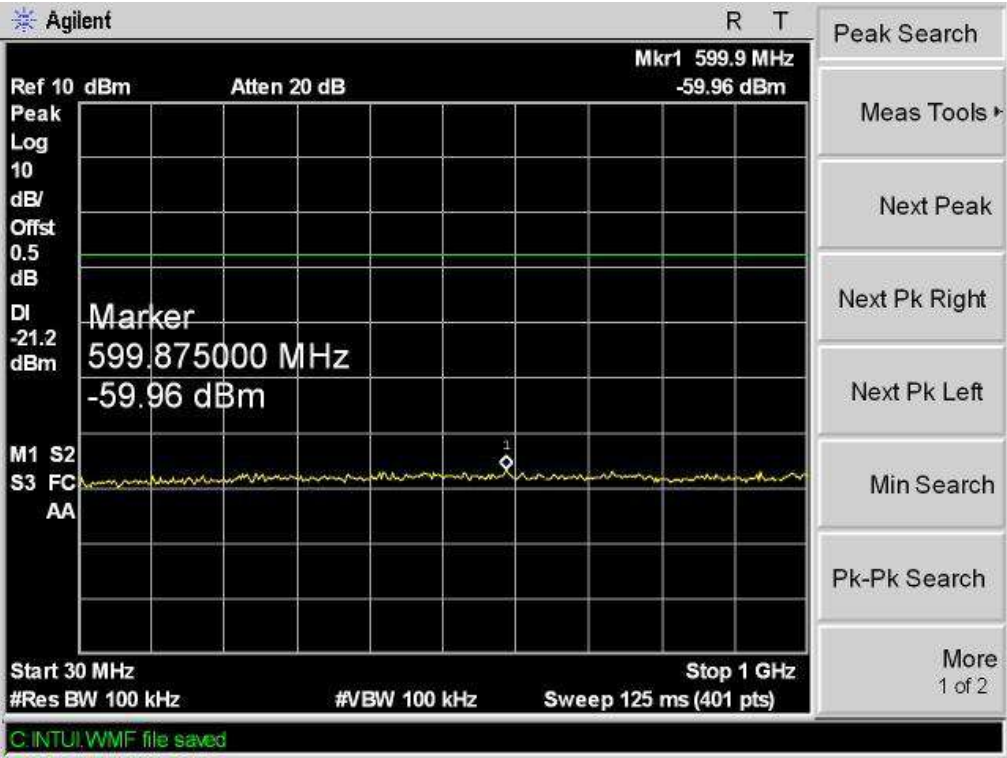


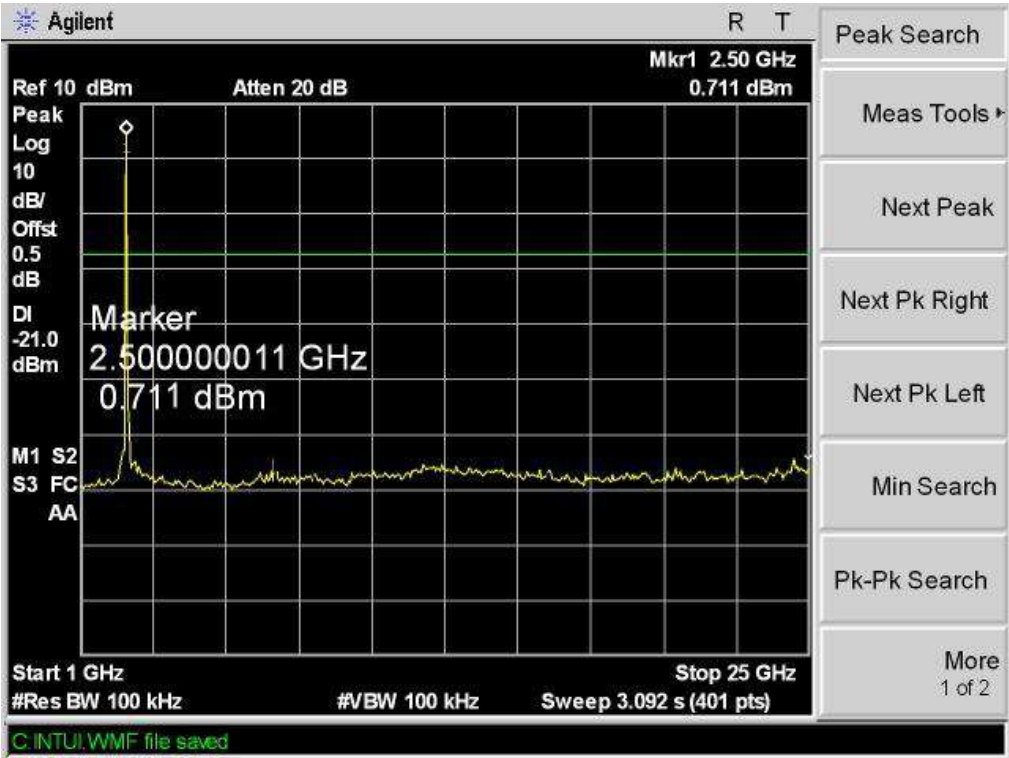
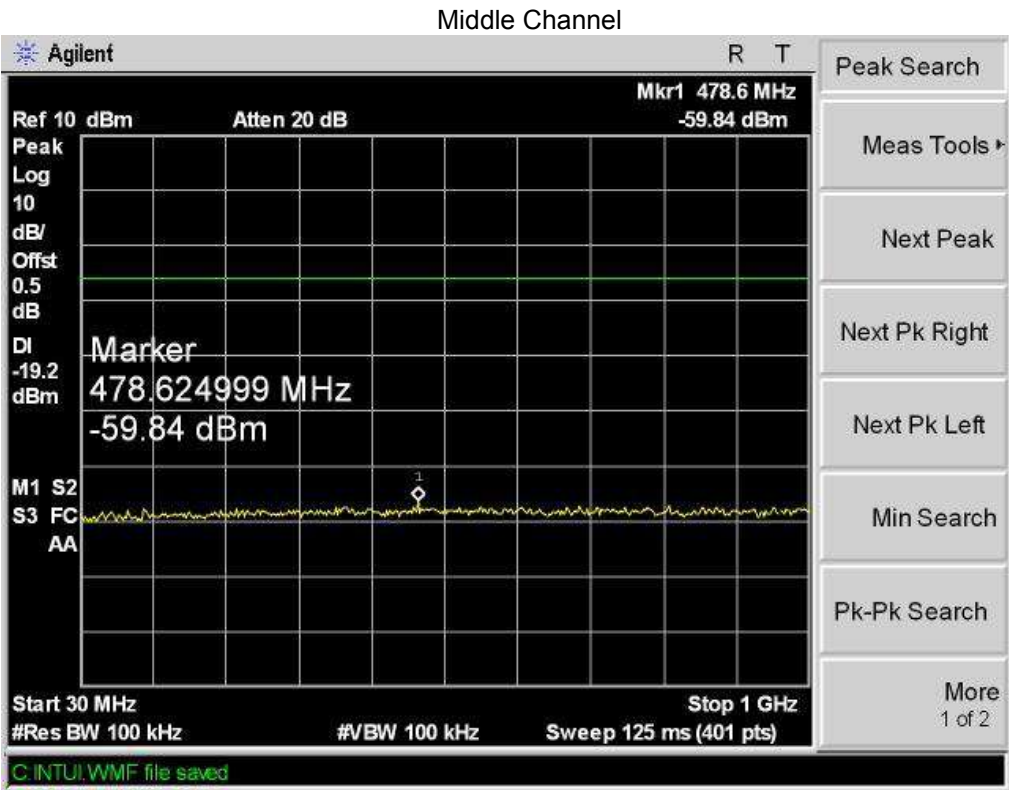
Upper Channel



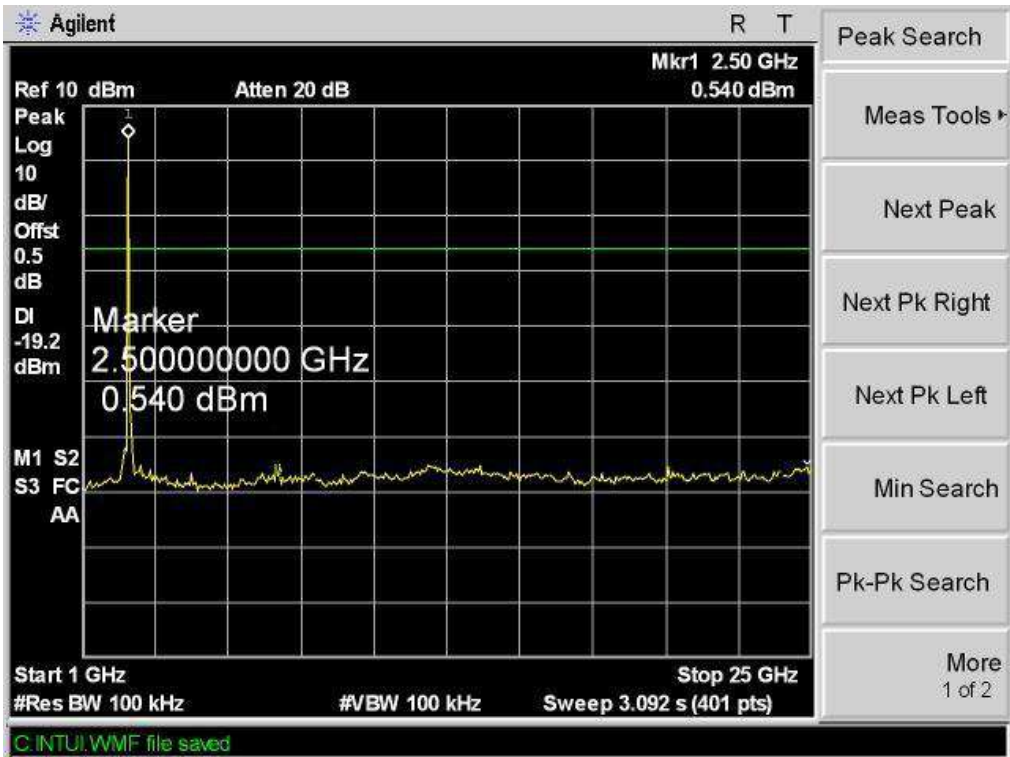
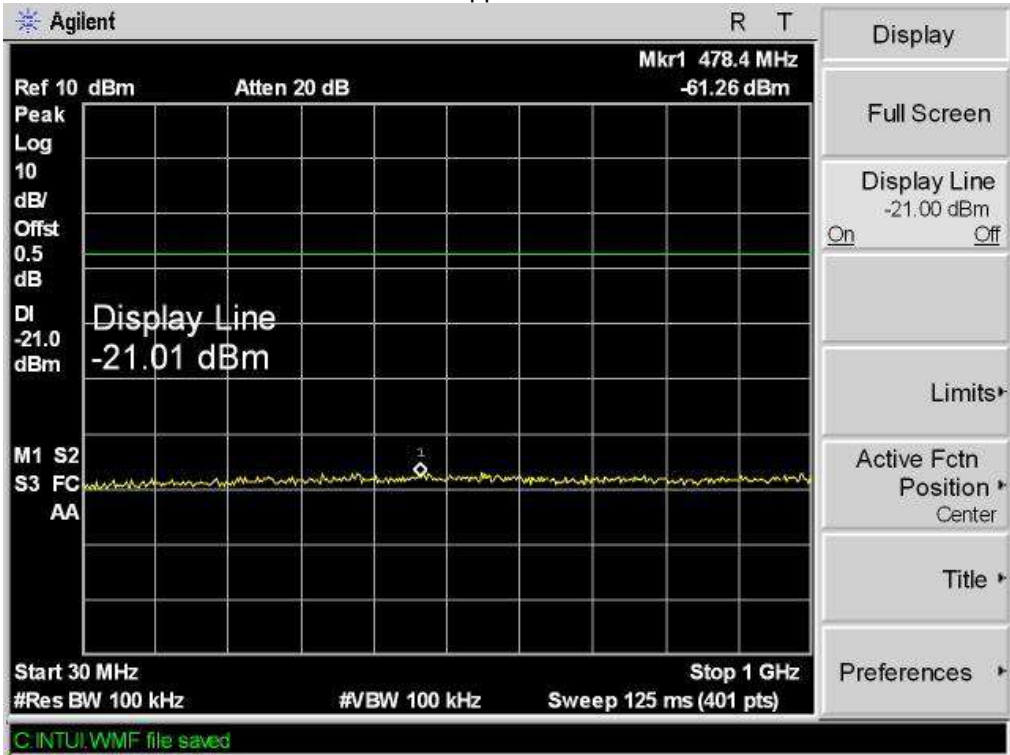
Modulation: 8DPSK

Lower Channel





Upper Channel



9 Band Edge Measurement

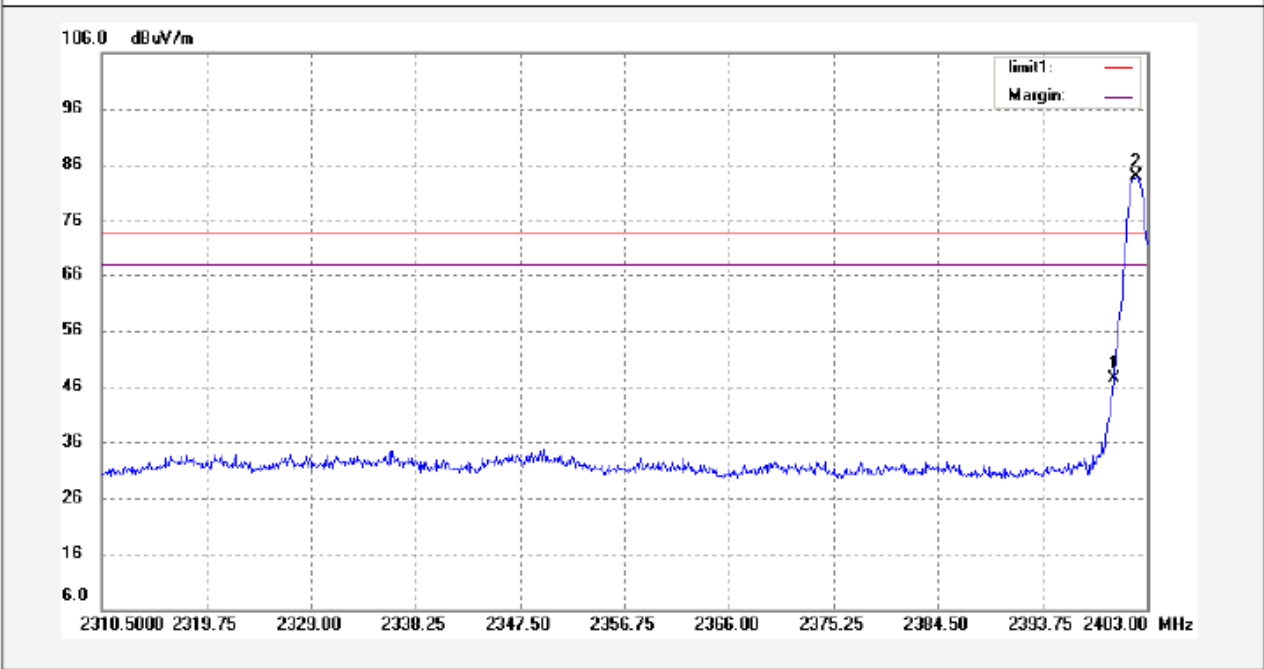
Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	DA 00-705
Limit:	40.0 dBuV/m between 30MHz & 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

9.1 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 $f \geq 1$ GHz
VBW $\geq$ RBW; Sweep = auto
Detector function = peak
Trace = max hold
 - For AVG value:
RBW = 1 MHz for $f \geq 1$ GHz
VBW = 10Hz; Sweep = auto
Detector function = AVG
Trace = max hold
4. Hopping off and hopping on modes were tested, the worst data were shown as follow.

9.2 Test Result:

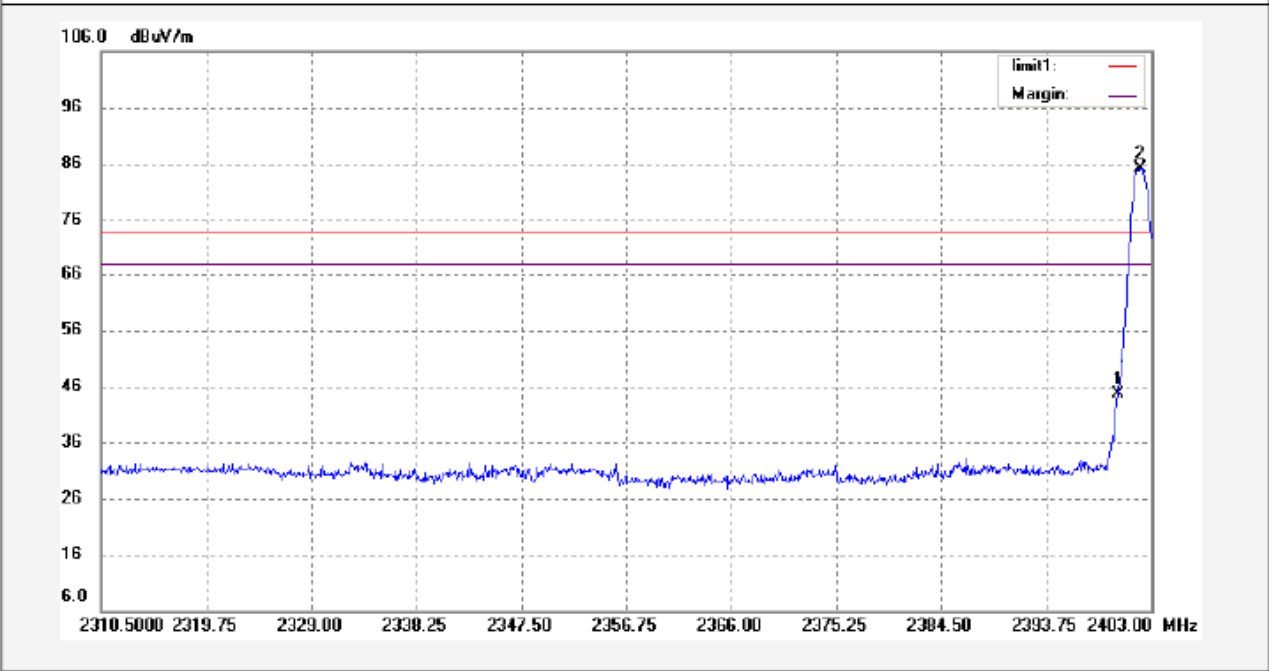
Test Method: Radiated
Test mode: Hopping off
Modulation:GFSK(the worst mode)
Lower Channel – Peak, Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	63.07	-15.58	47.49	74.00	-26.51	peak	
2	2402.075	99.36	-15.59	83.77	74.00	9.77	peak	

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.

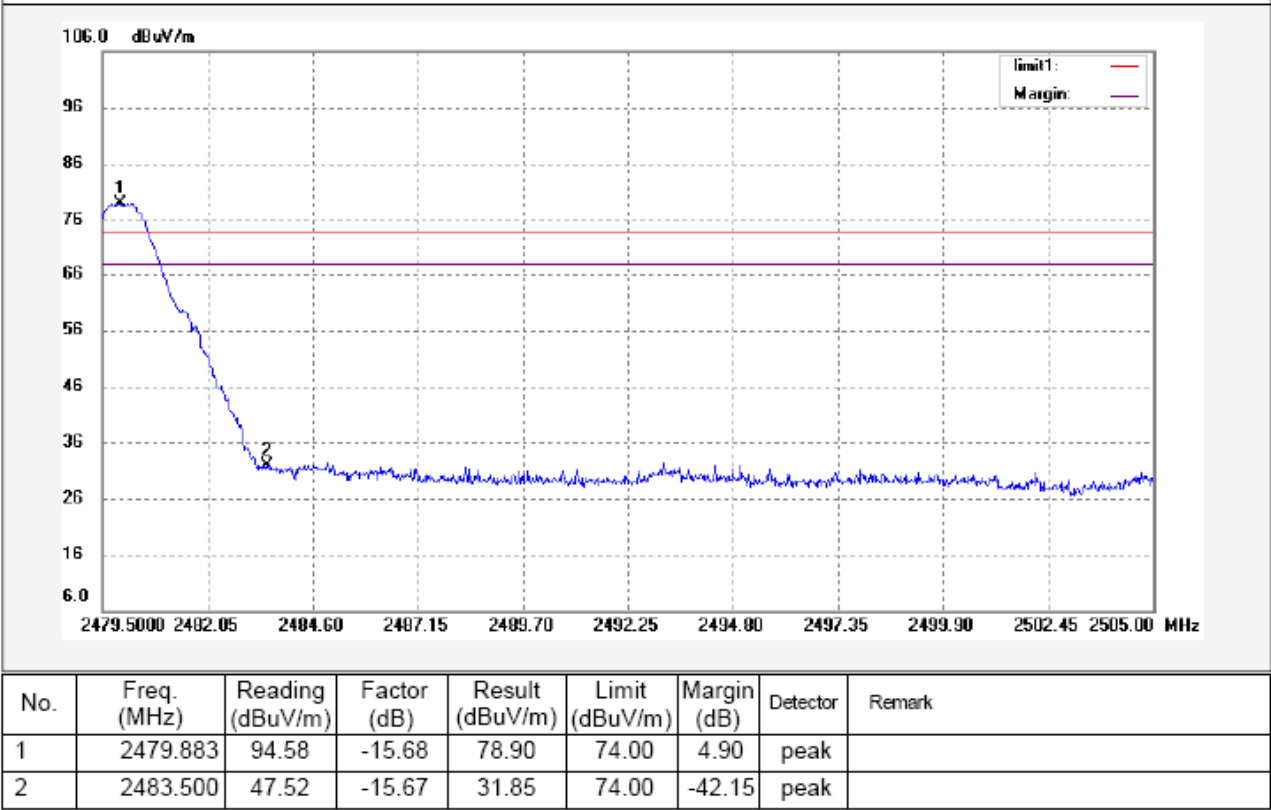
Lower Channel – Peak, Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	60.17	-15.58	44.59	74.00	-29.41	peak	
2	2401.983	100.62	-15.59	85.03	74.00	11.03	peak	

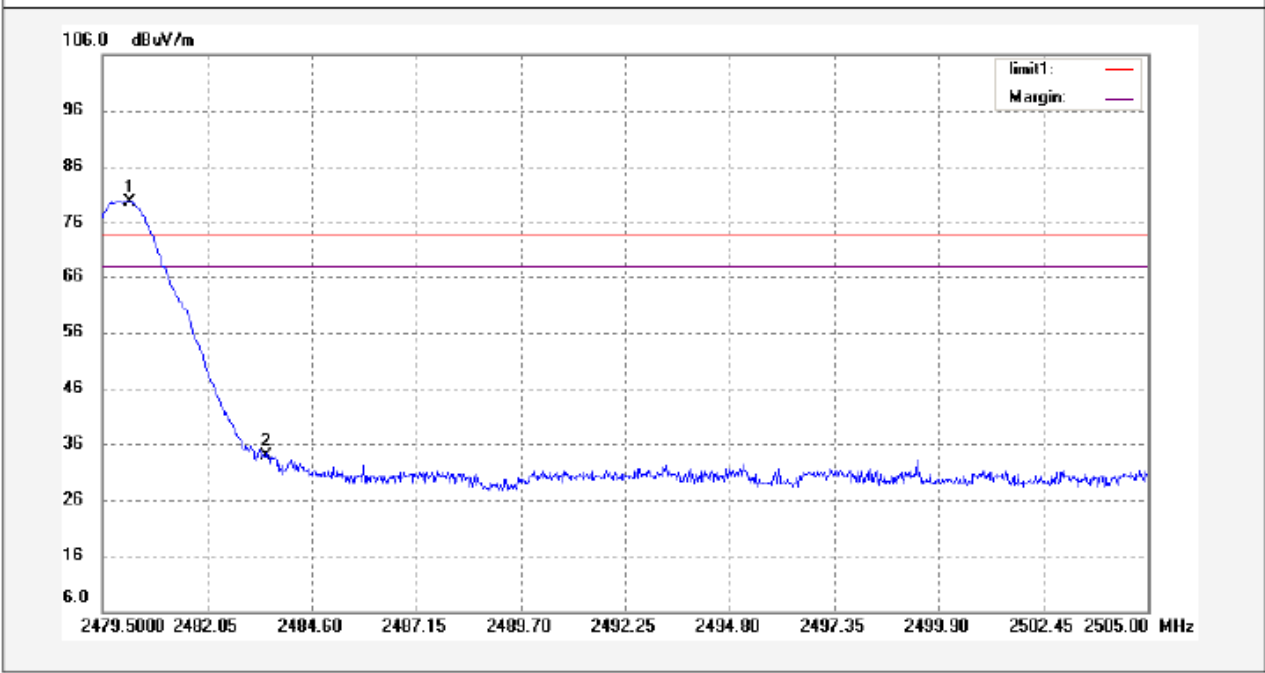
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.

Upper Channel – Peak, Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	2483.000	-	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.

Upper Channel – Peak, Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2480.163	95.31	-15.68	79.63	74.00	5.63	peak	
2	2483.500	49.45	-15.67	33.78	74.00	-40.22	peak	

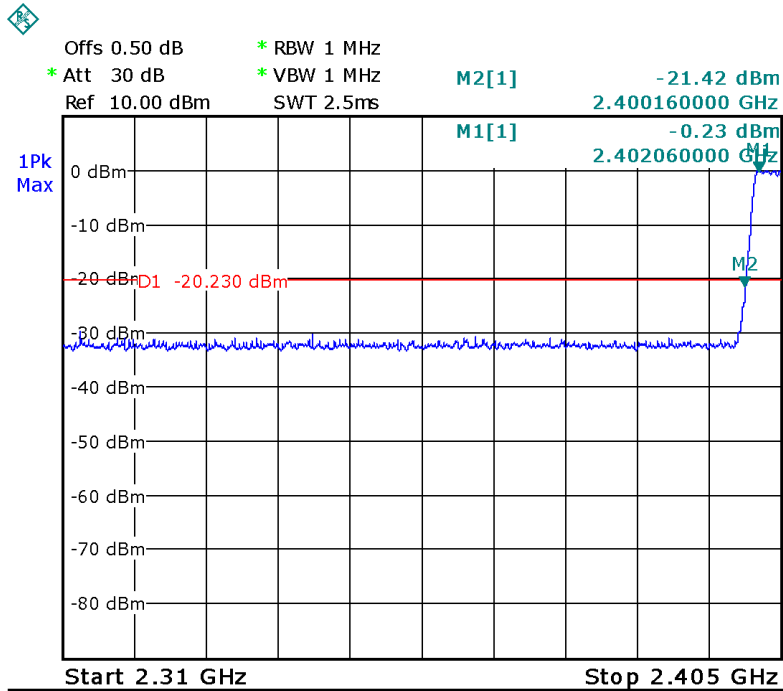
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
2	2483.000	-	-	-	-	-	AV	The measurements were more than 20 dB below the limit and not reported.

Test Method:Conducted

Test mode: Hopping on

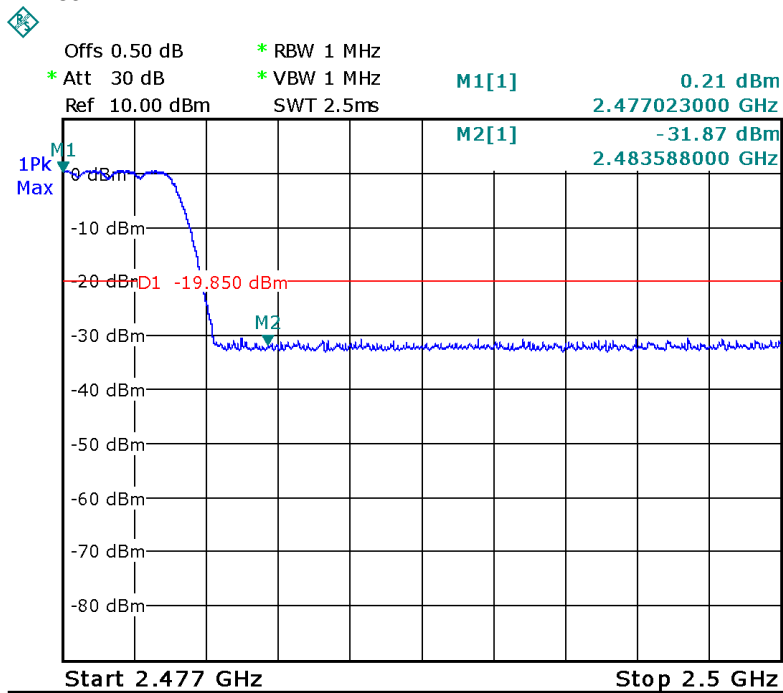
Modulation:GFSK

Lower Channel – Peak



Date: 21.JUN.2013 17:30:15

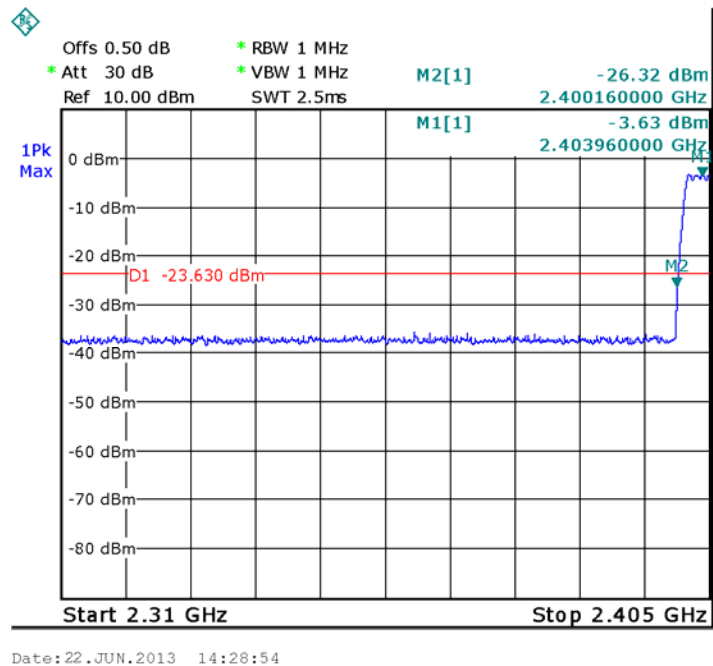
Upper Channel – Peak



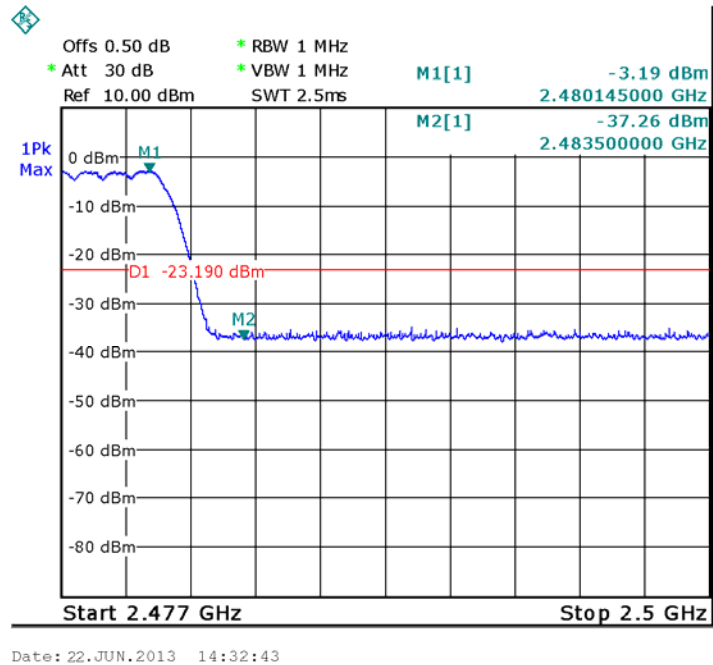
Date: 21.JUN.2013 17:35:25

Modulation:8DPSK(Test mode: Hopping on)

Lower Channel – Peak



Upper Channel – Peak

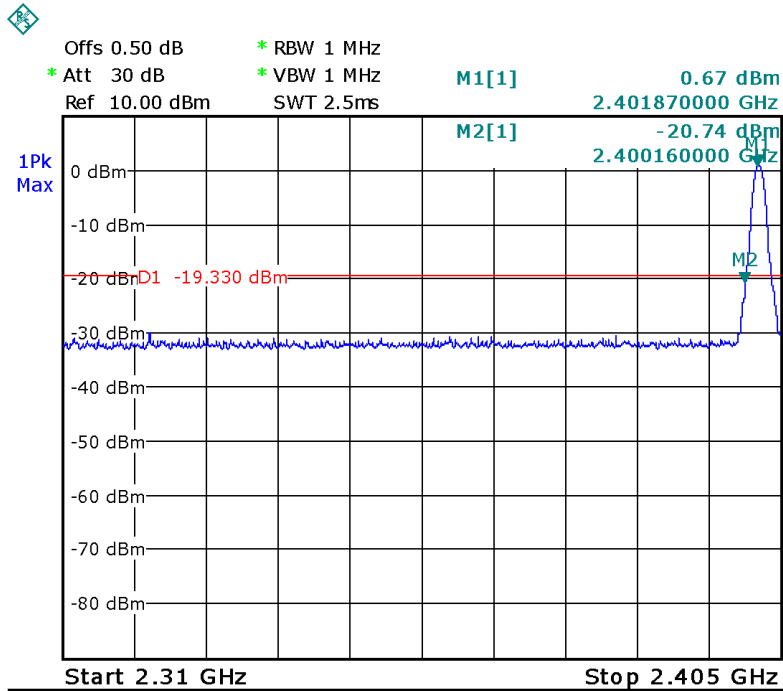


Test Method:Conducted

Test mode: Hopping off

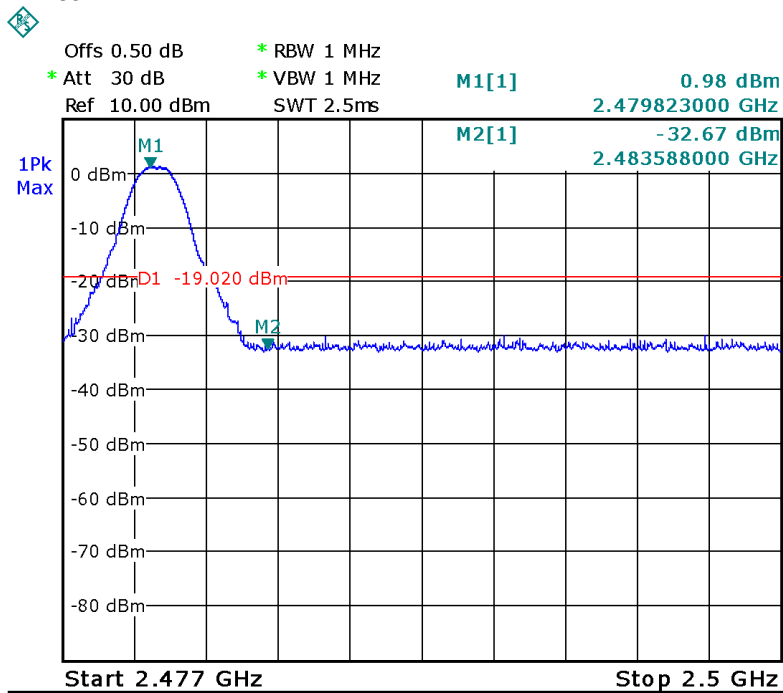
Modulation:GFSK

Lower Channel – Peak



Date: 21.JUN.2013 17:29:19

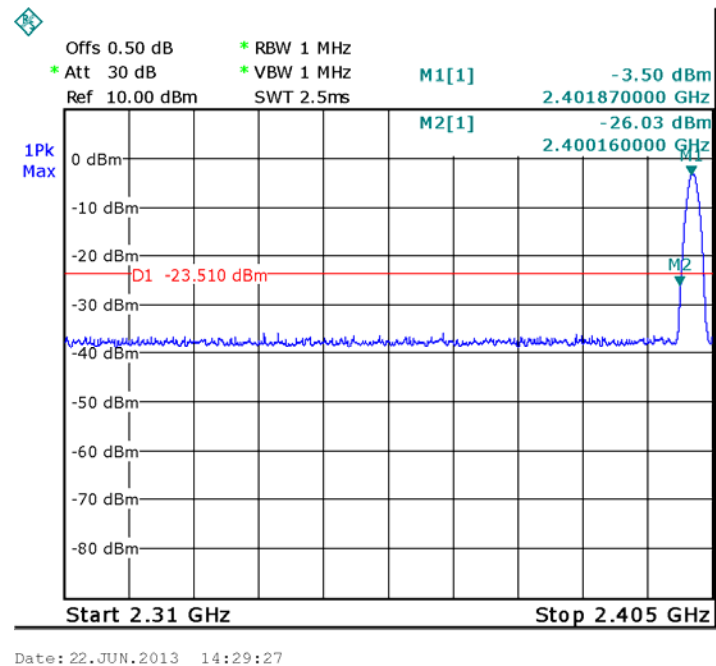
Upper Channel – Peak



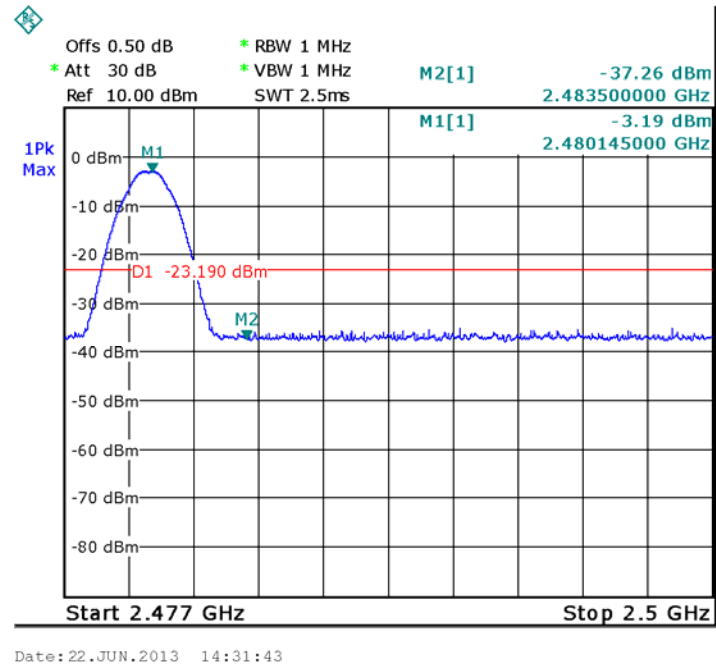
Date: 21.JUN.2013 17:36:42

Modulation:8DPSK(Test mode: Hopping off)

Lower Channel – Peak



Upper Channel – Peak



10 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.

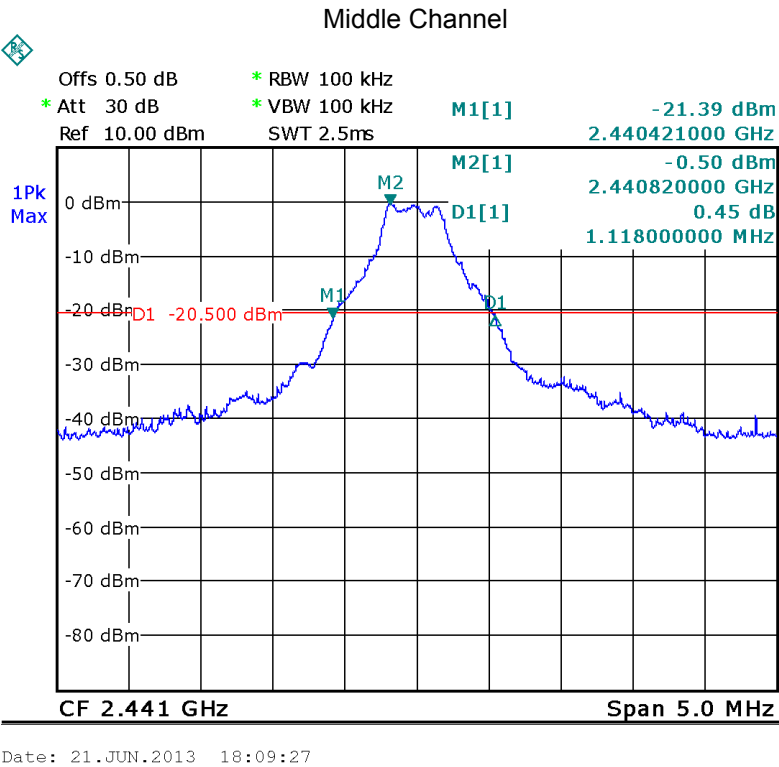
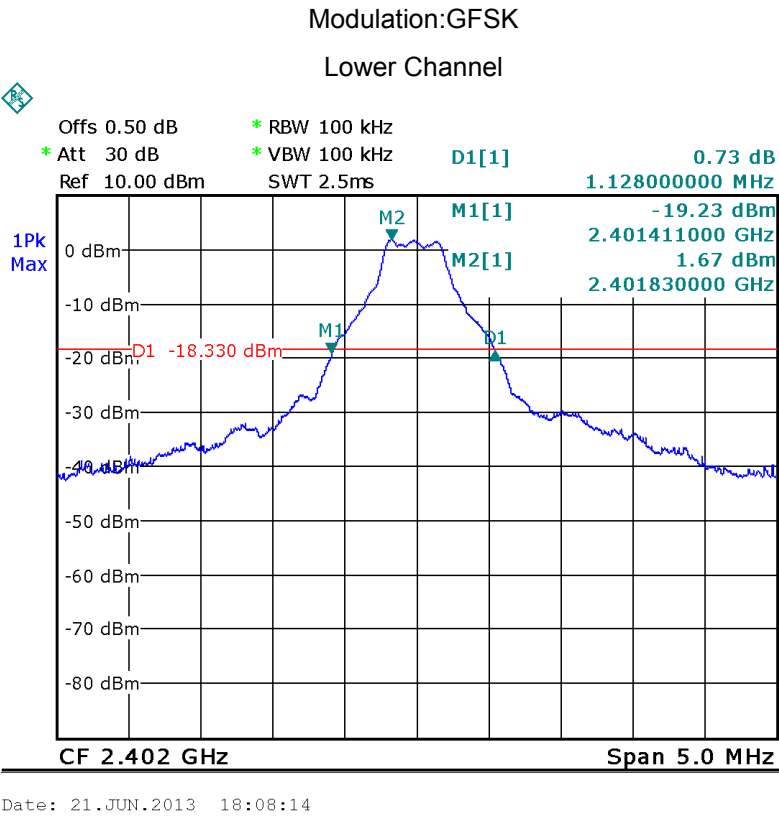
10.1 Test Procedure:

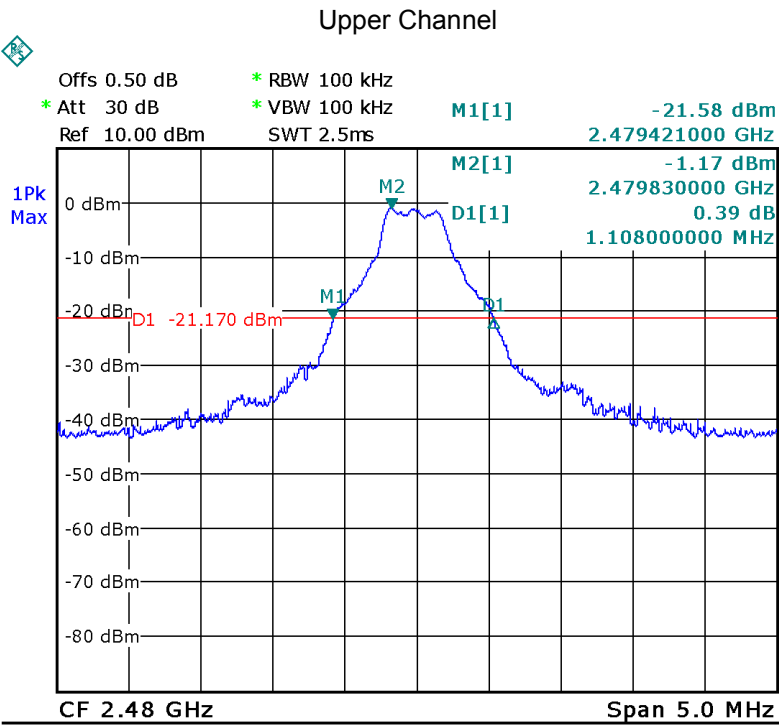
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 100kHz

10.2 Test Result:

Modulation	Test Channel	Bandwidth(MHz)
GFSK	Lower	1.128
	Middle	1.118
	Upper	1.108
Pi/4DQPSK	Lower	1.367
	Middle	1.327
	Upper	1.347
8DPSK	Lower	1.367
	Middle	1.337
	Upper	1.357

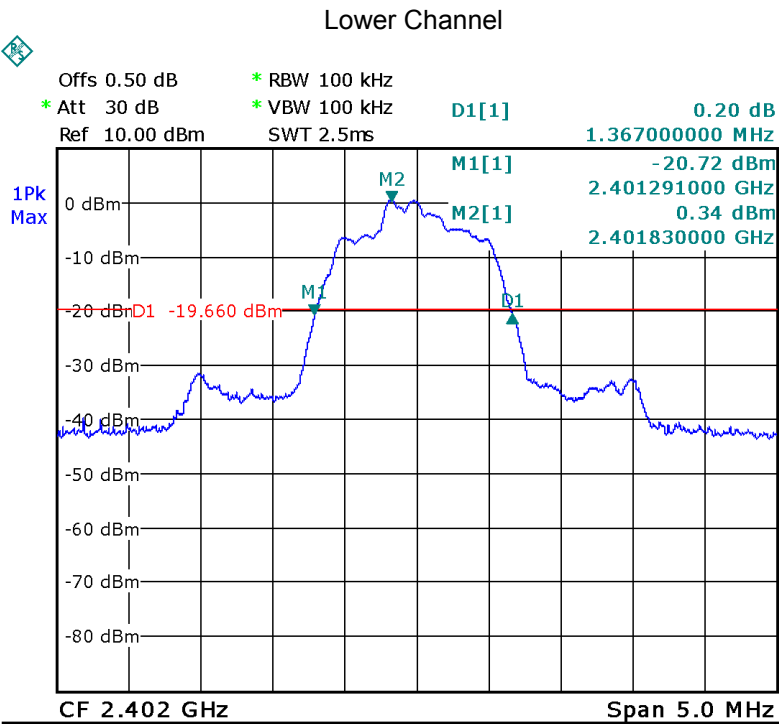
Test result plot as follows:



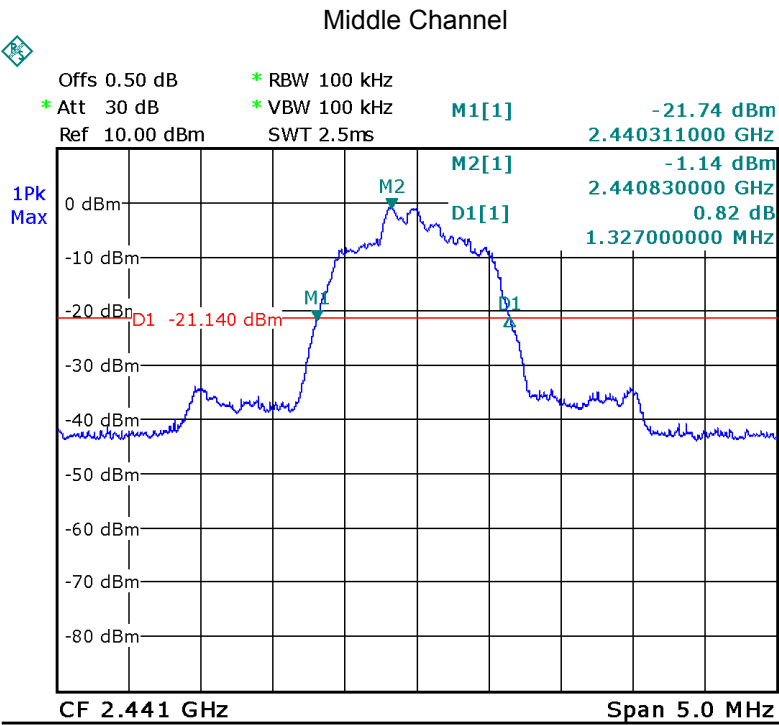


Date: 21.JUN.2013 18:10:29

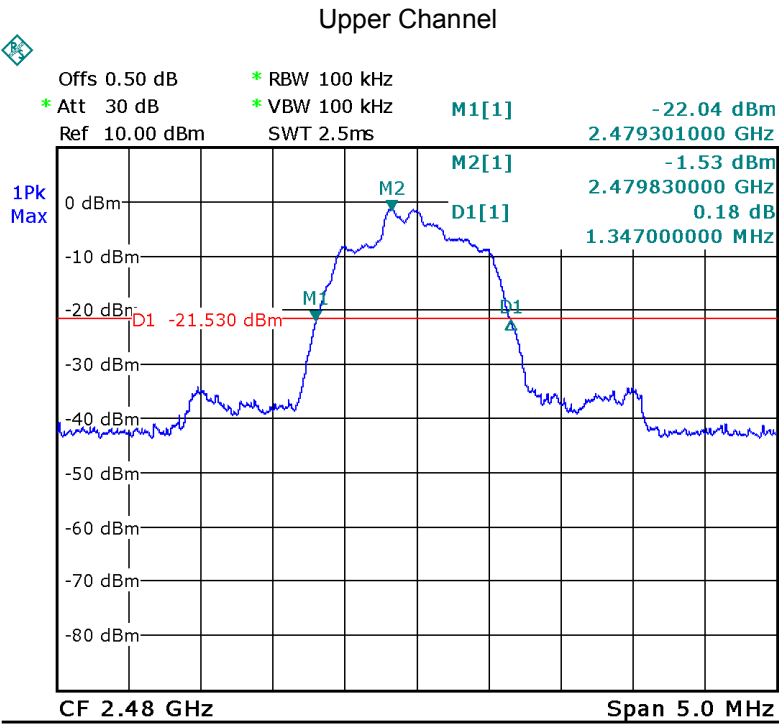
Modulation: Pi/4DQPSK



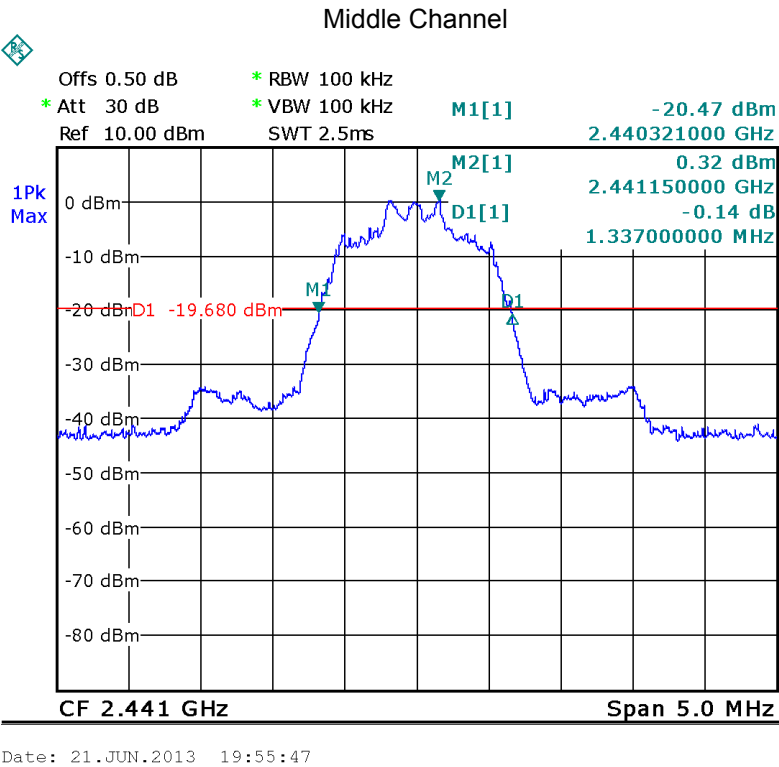
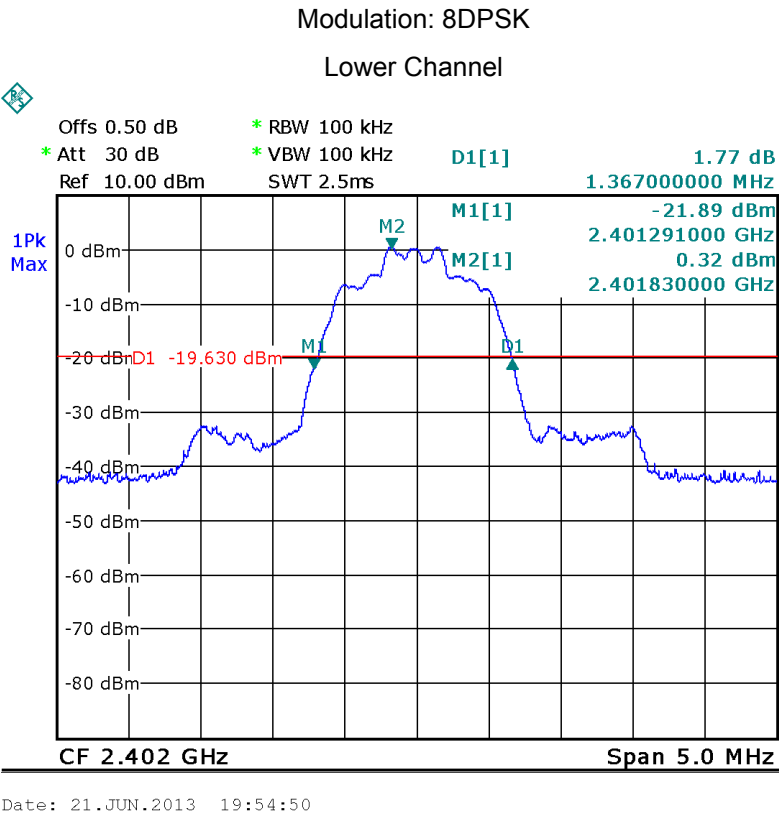
Date: 21.JUN.2013 18:11:48

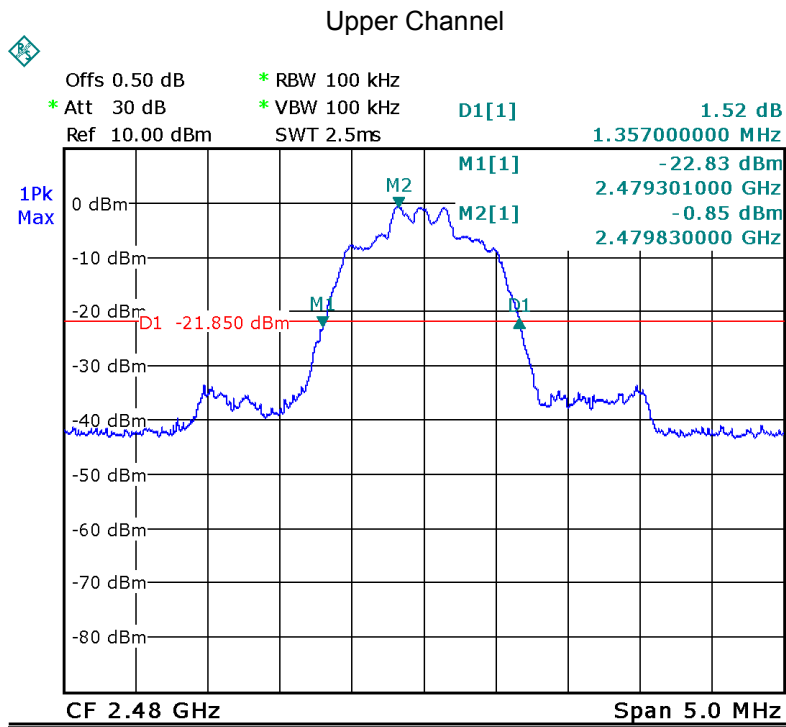


Date: 21.JUN.2013 18:13:01



Date: 21.JUN.2013 18:14:02





Date: 21.JUN.2013 19:56:56

11 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 2400-2483.5 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 other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result "Number of Hopping Frequency" of this document. The 1watts (30 dBm) limit applies.
Test mode:	Test in fixing frequency transmitting mode.

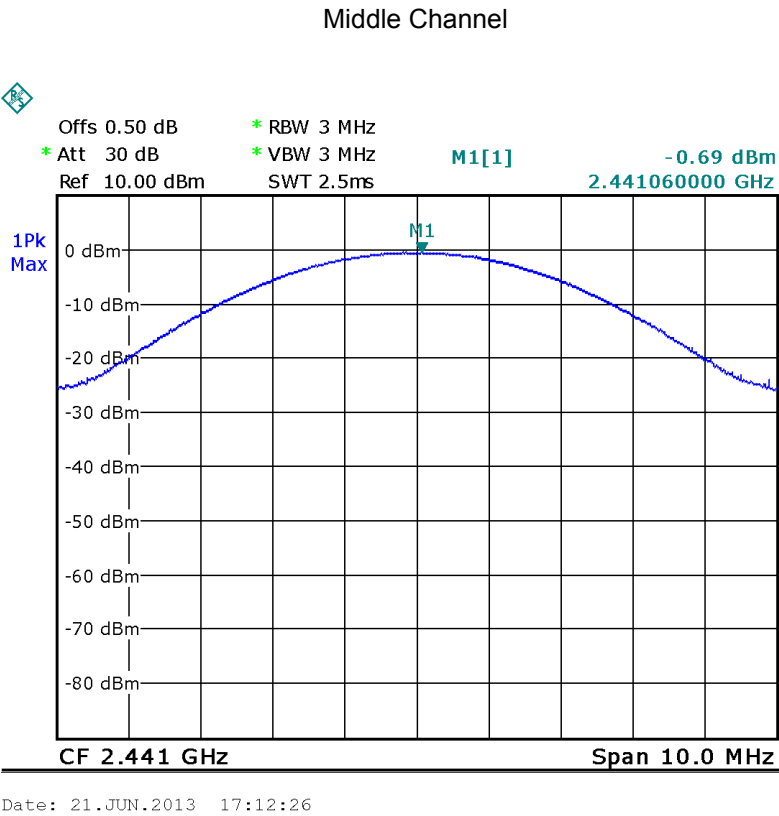
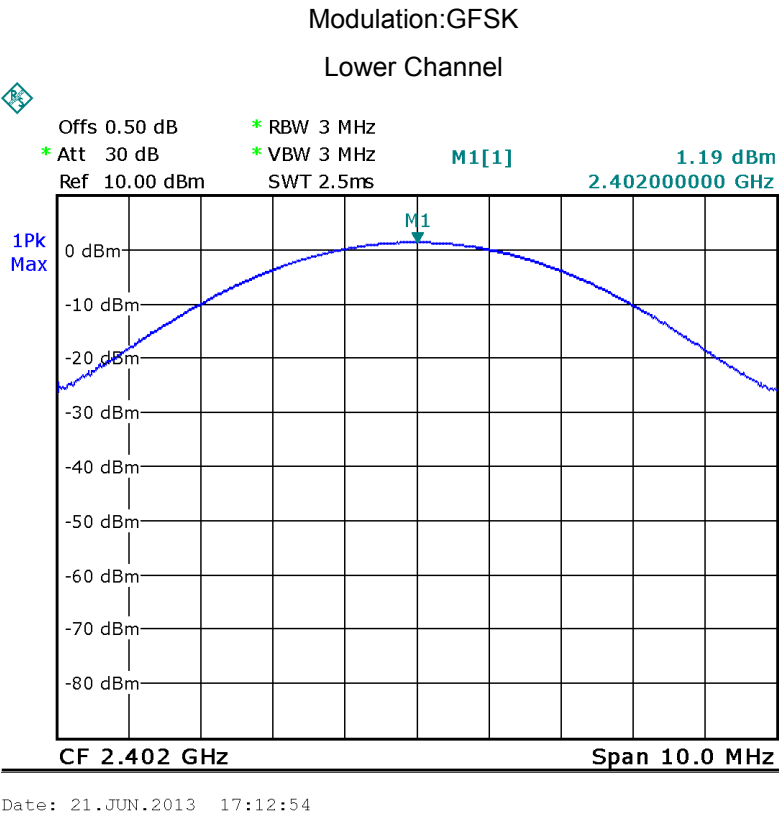
11.1 Test Procedure:

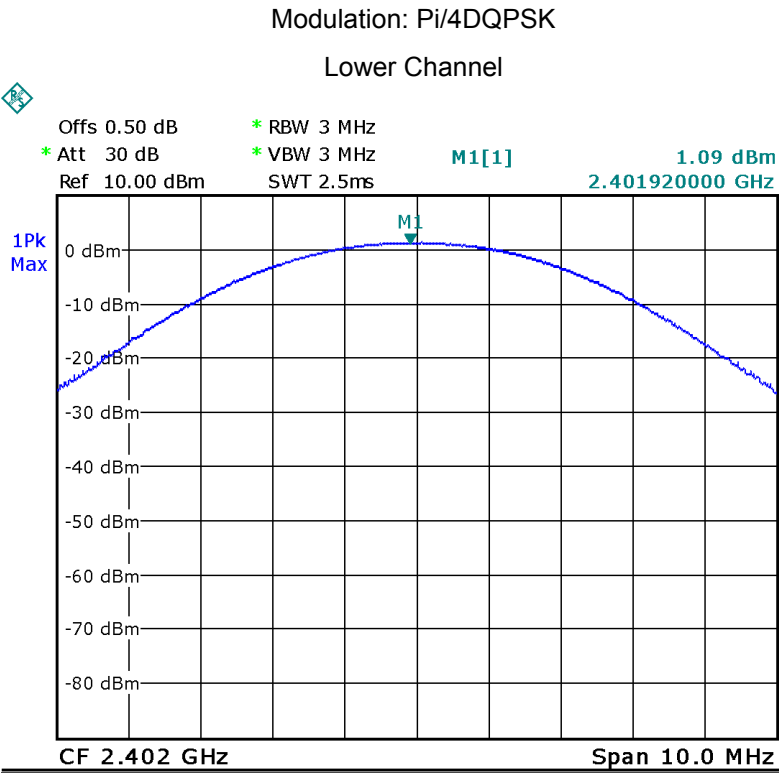
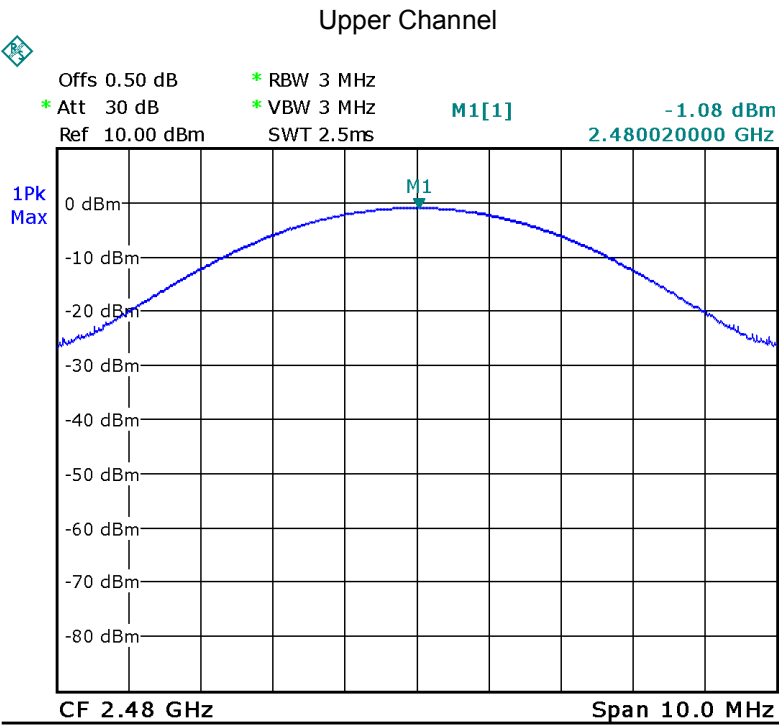
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

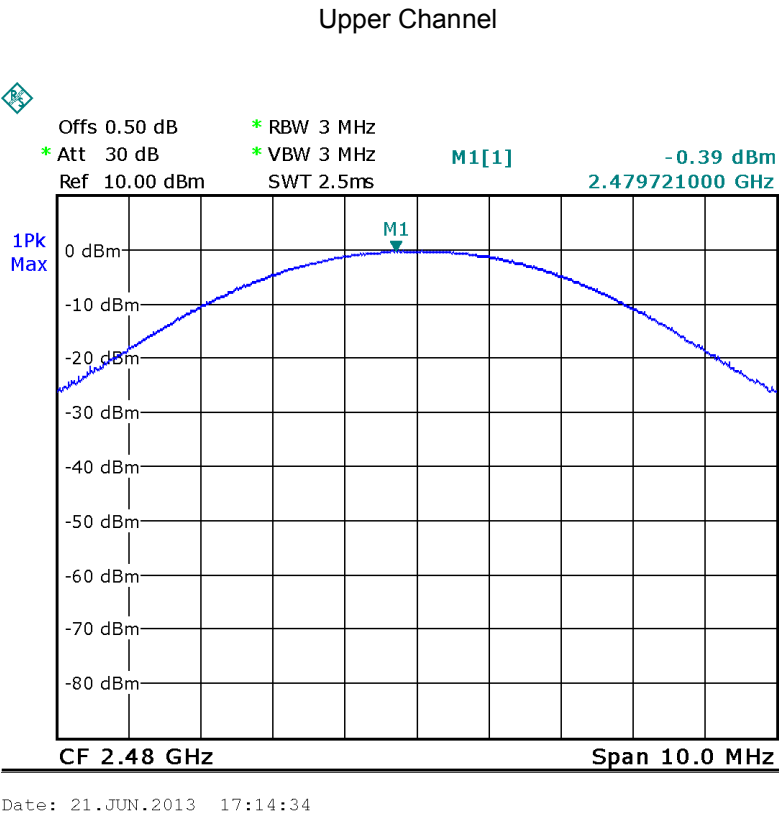
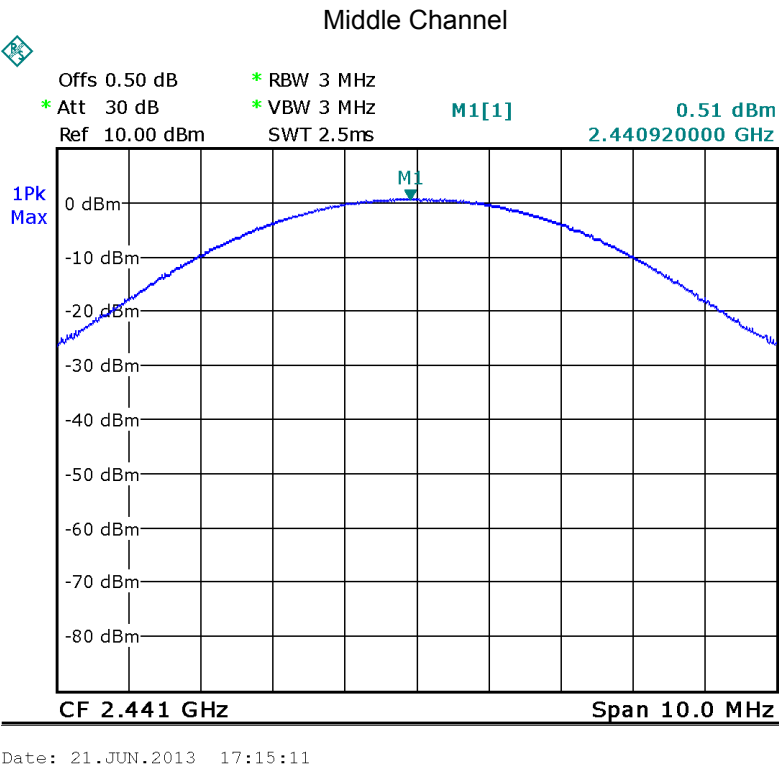
11.2 Test Result:

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Lower	1.19	30
	Middle	-0.69	30
	Upper	-1.08	30
Pi/4DQPSK	Lower	1.09	30
	Middle	0.51	30
	Upper	-0.39	30
8DPSK	Lower	1.20	30
	Middle	0.52	30
	Upper	-0.55	30

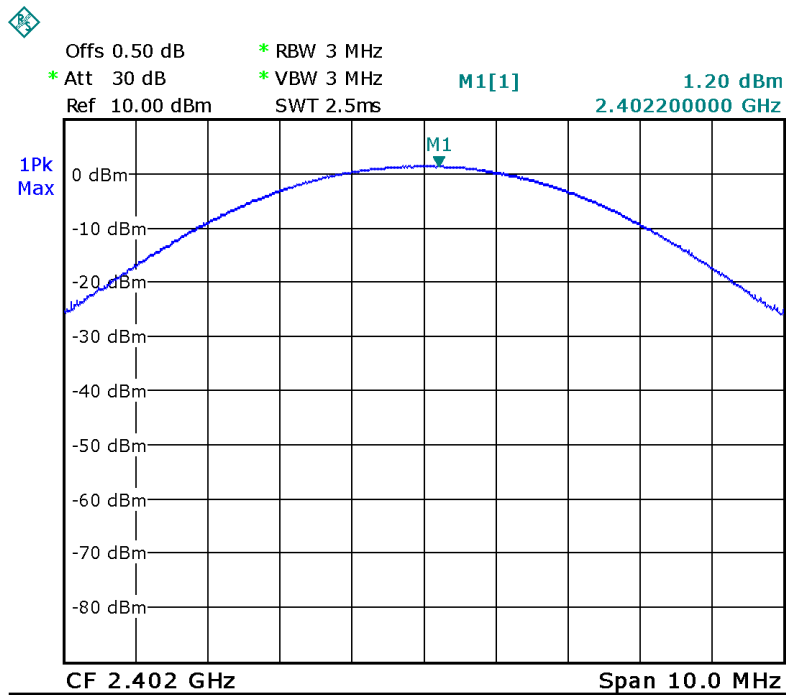
Test result plot as follows:





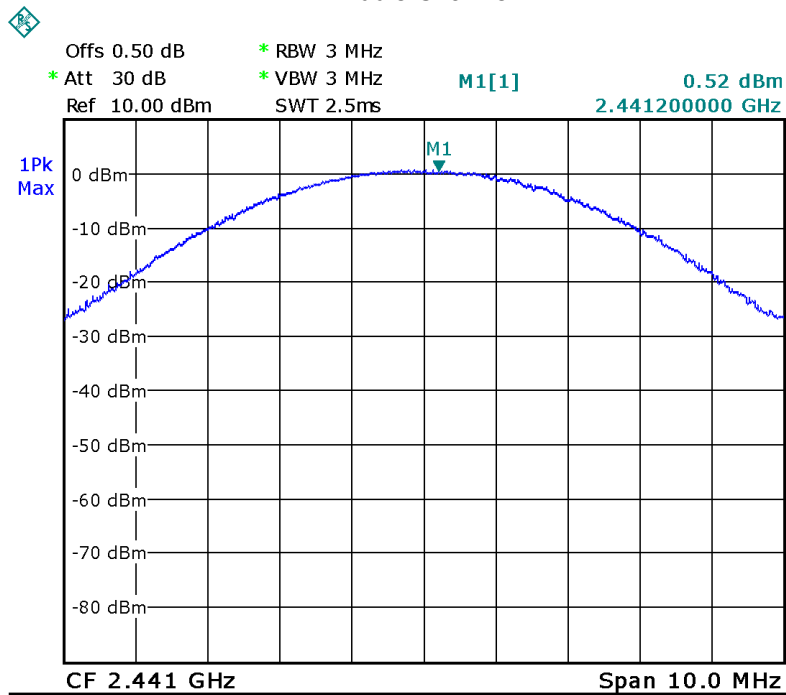


Modulation: 8DPSK
Lower Channel



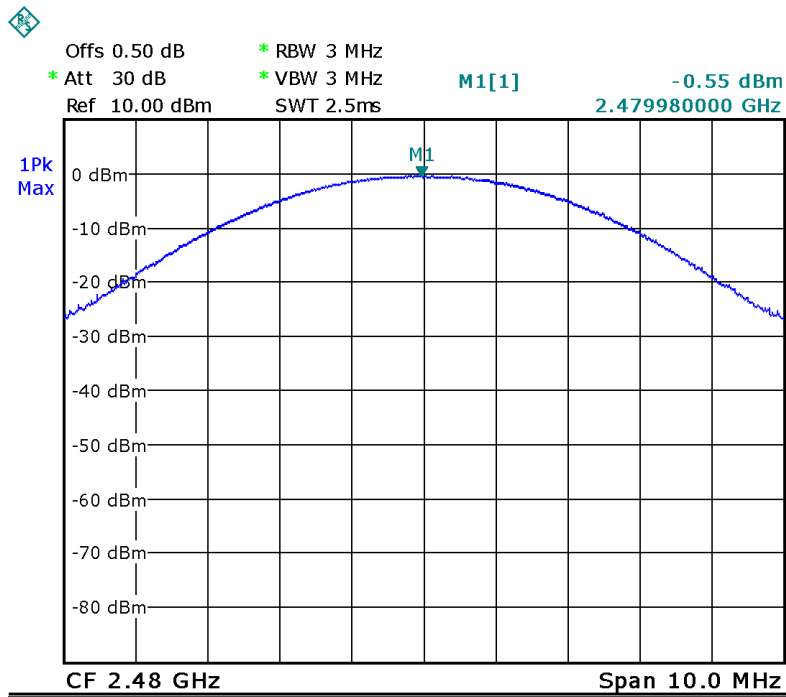
Date: 21.JUN.2013 17:16:24

Middle Channel



Date: 21.JUN.2013 17:16:52

Upper Channel



Date: 21.JUN.2013 17:17:22

12 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 2400-2483.5 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 1W.

Test Mode: Test in hopping transmitting operating mode.

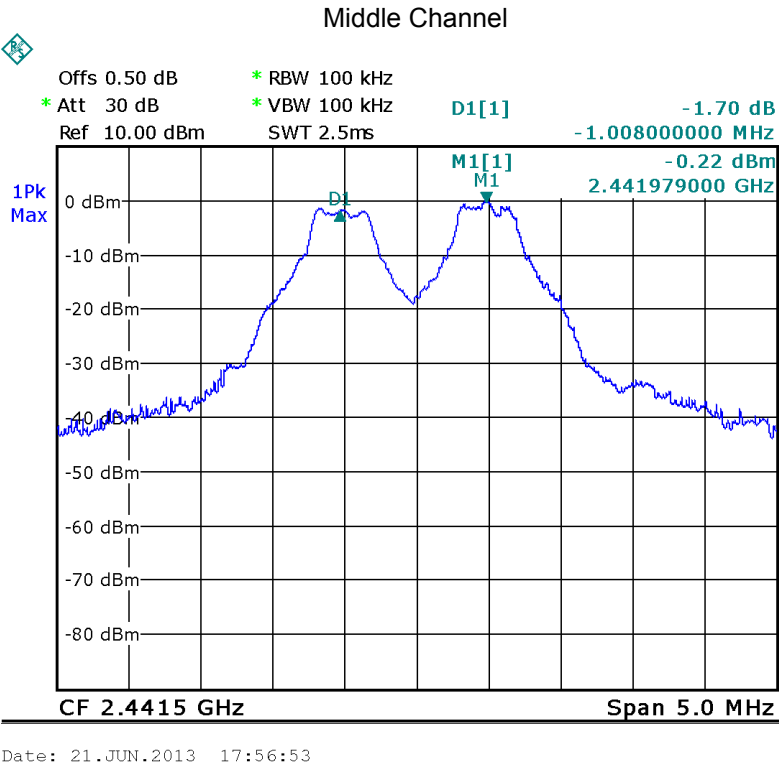
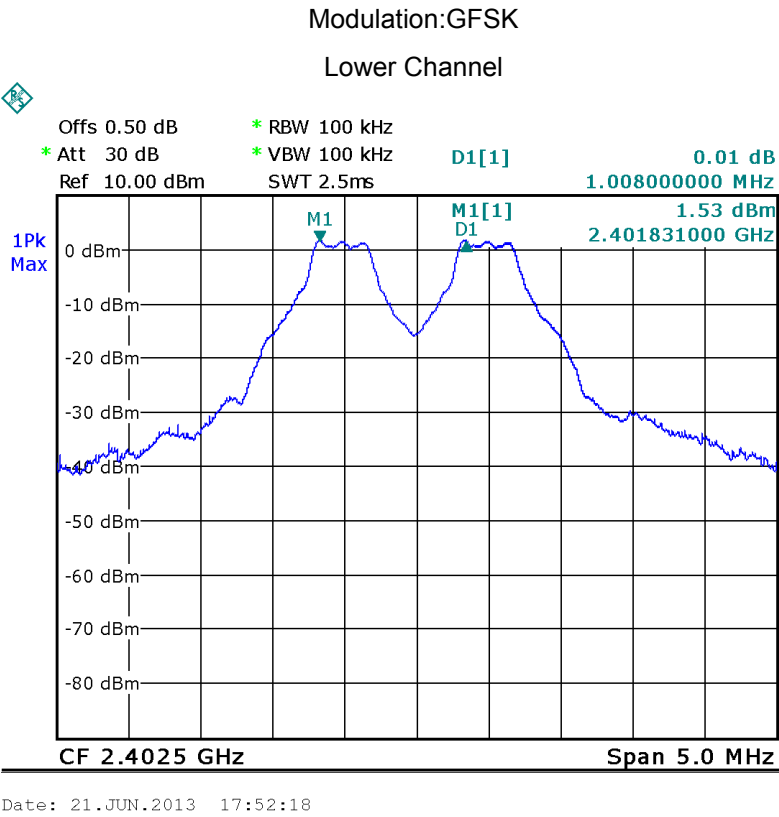
12.1 Test Procedure:

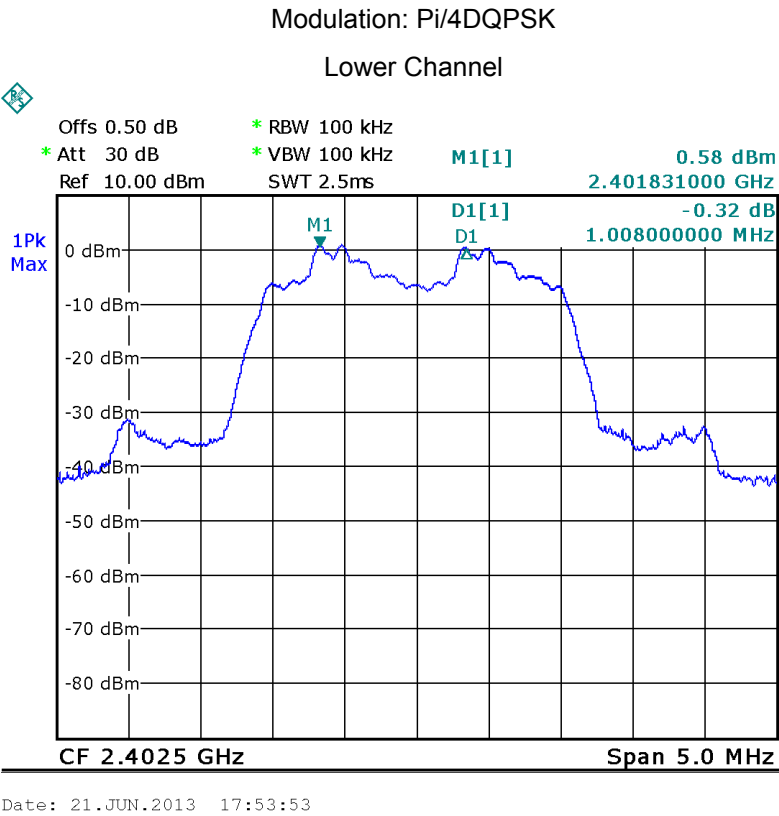
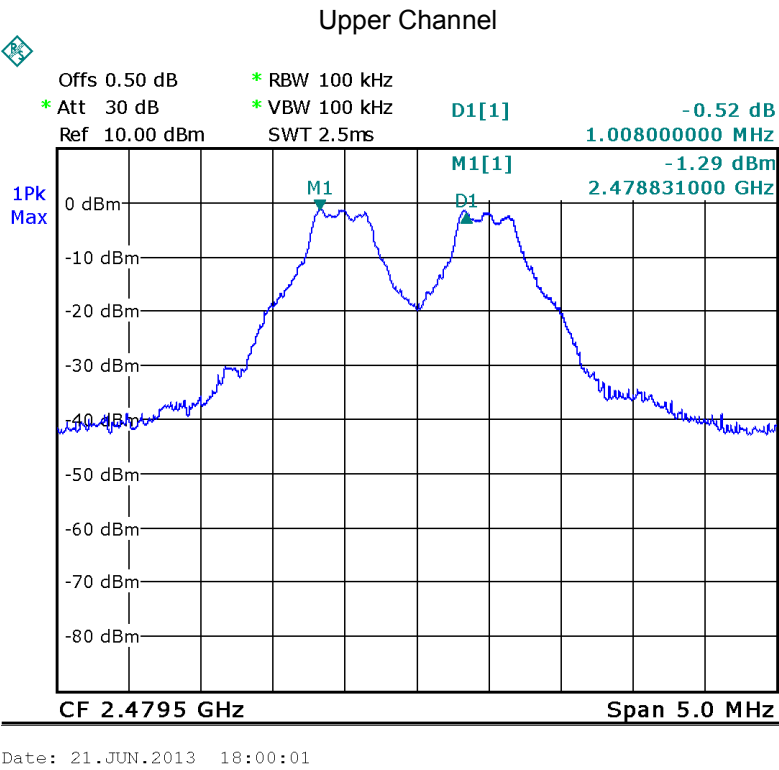
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW = 300KHz , Span = 5MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to 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.

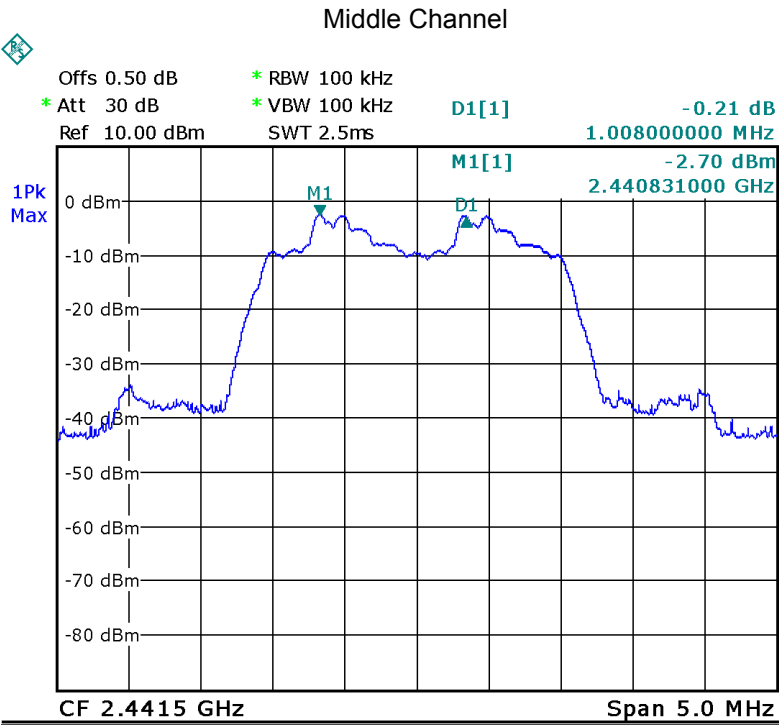
12.2 Test Result:

Modulation	Test Channel	Separation (MHz)
GFSK	Lower	1.008
	Middle	1.008
	Upper	1.008
Pi/4DQPSK	Lower	1.008
	Middle	1.008
	Upper	1.008
8DPSK	Lower	1.008
	Middle	1.008
	Upper	1.008

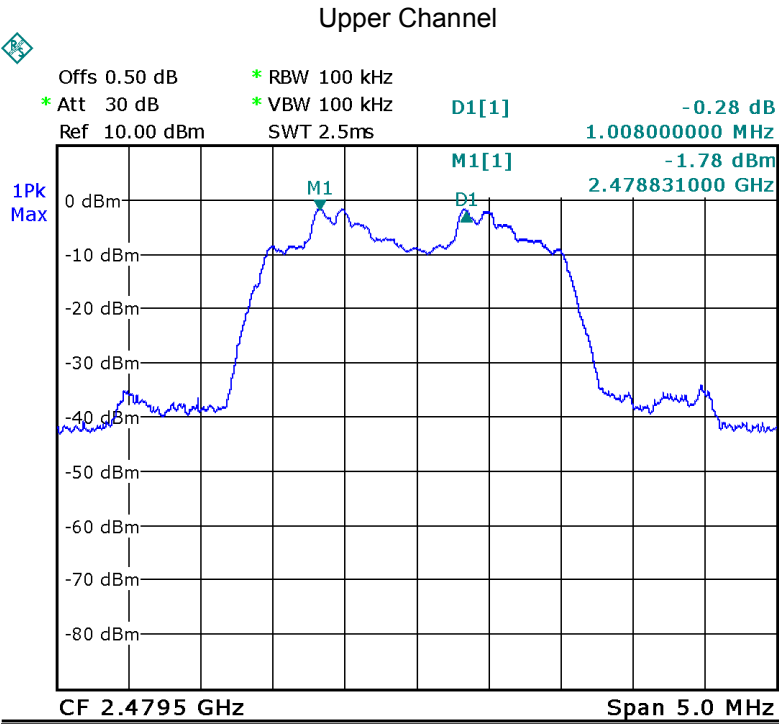
Test result plot as follows:



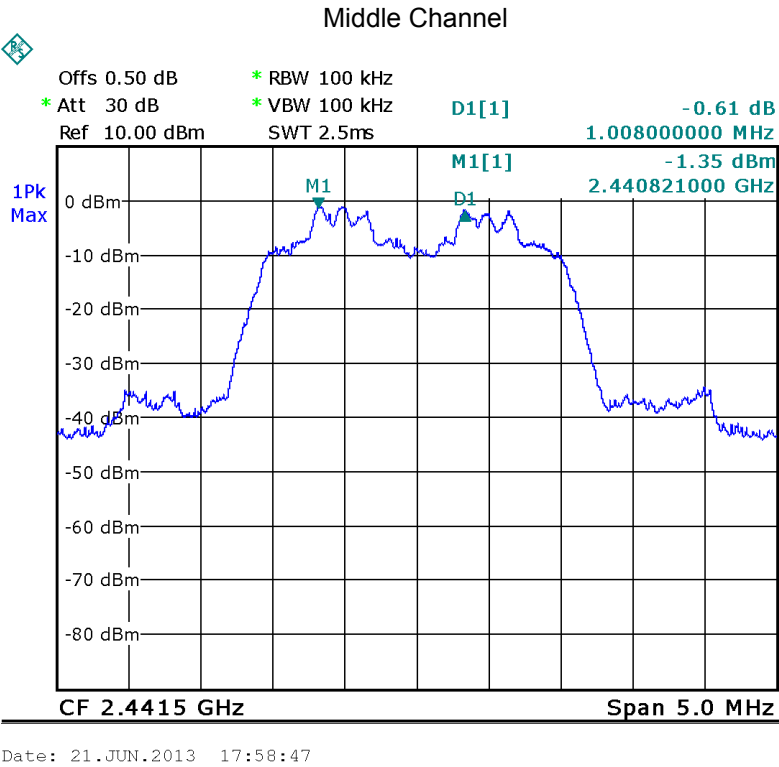
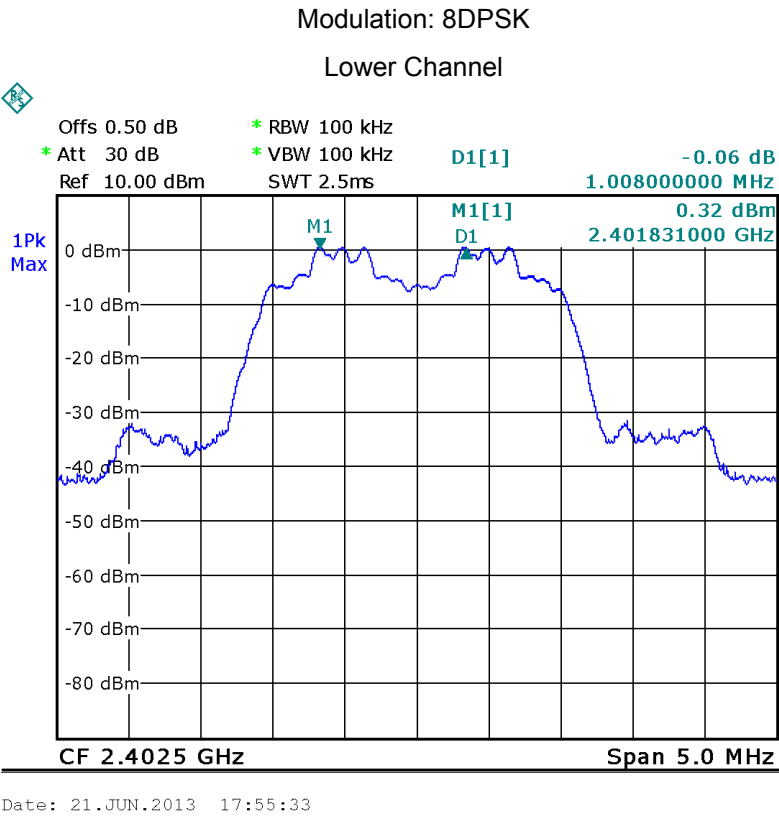


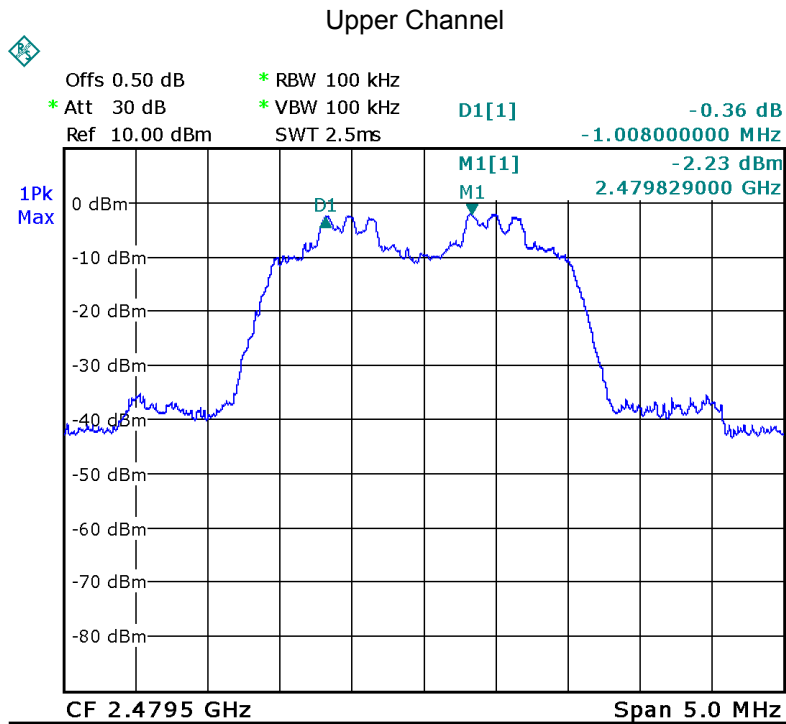


Date: 21.JUN.2013 17:57:49



Date: 21.JUN.2013 18:02:30





Date: 21.JUN.2013 18:04:19

13 Number of Hopping Frequency

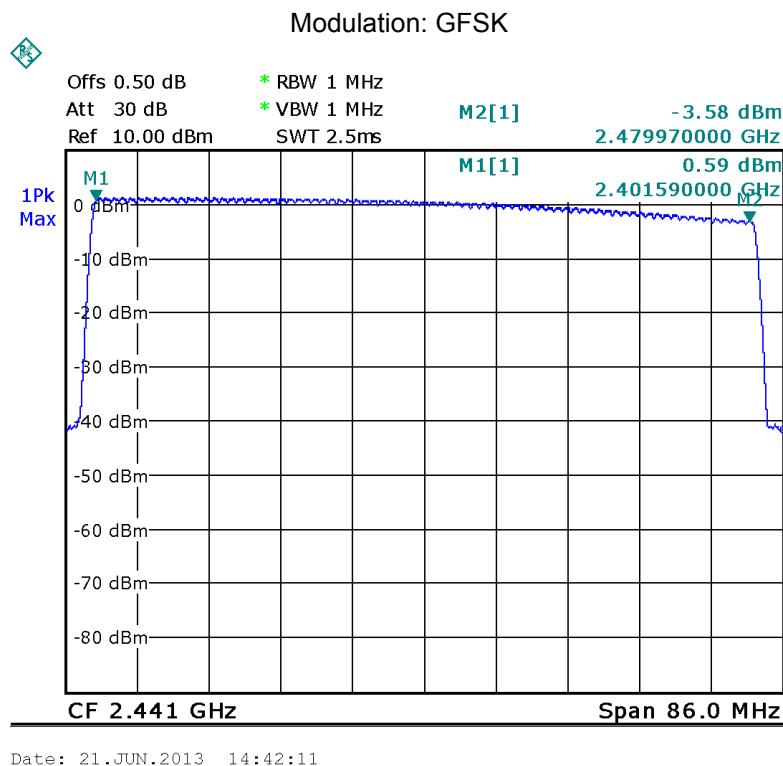
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode:	Test in hopping transmitting operating mode.

13.1 Test Procedure:

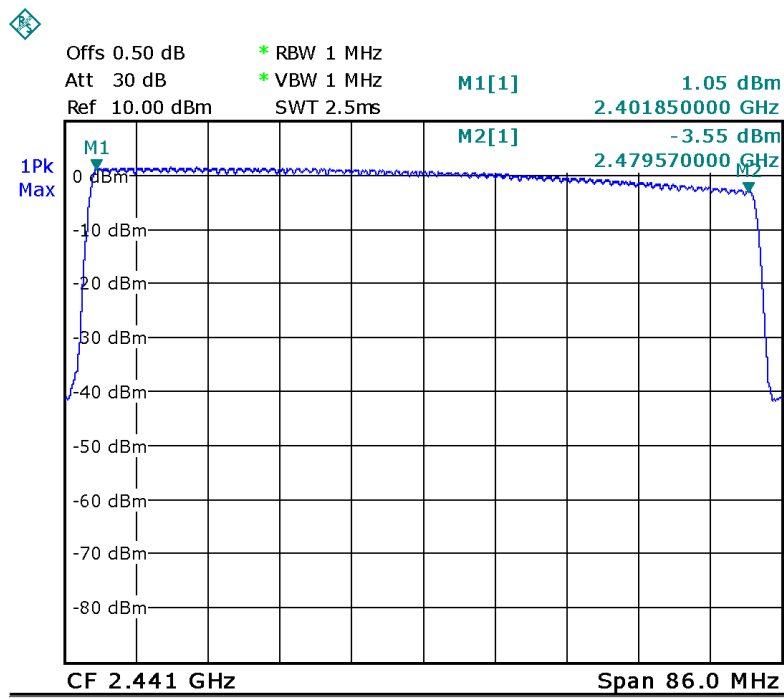
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Centre Frequency = 2.441GHz, Span = 86MHz. Sweep=auto;

13.2 Test Result:

Total Channels are 79 Channels.

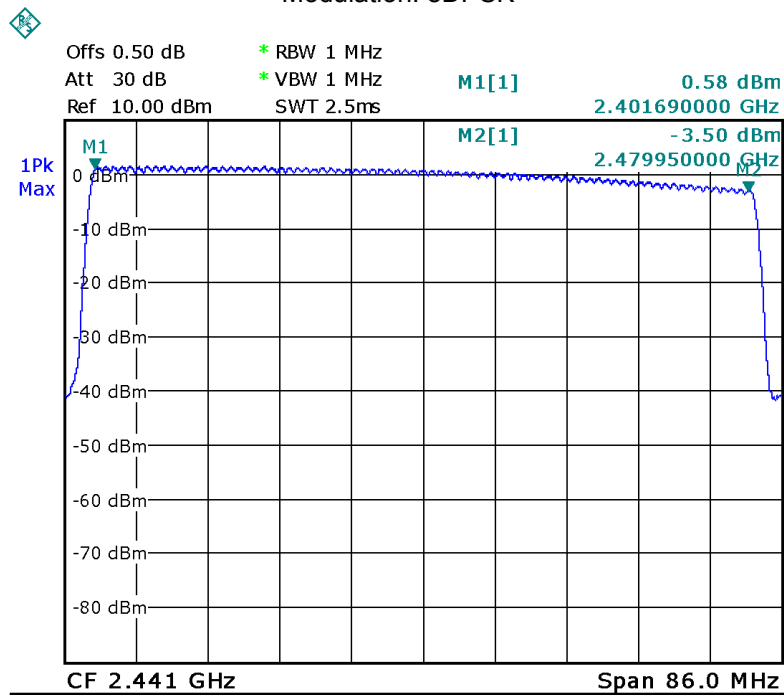


Modulation: Pi/4DQPSK



Date: 21.JUN.2013 14:41:05

Modulation: 8DPSK



Date: 21.JUN.2013 14:39:14

14 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 2400-2483.5 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.
Test Mode:	Test in hopping transmitting operating mode.

14.1 Test Procedure:

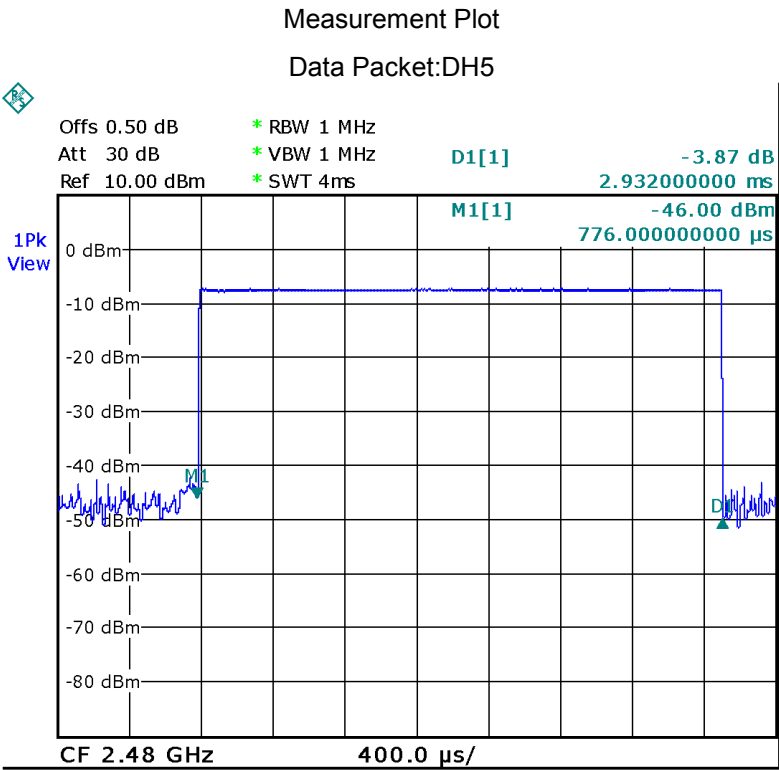
- 1.Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
- 2.Set spectrum analyzer span = 0. Centered on a hopping channel;
- 3.Set RBW = 1MHz and VBW = 1MHz. Sweep = as necessary to capture the entire dwell time per hopping channel.
- 4.Use the marker-delta 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).

14.2 Test Result:

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time(msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.932	0.31	0.4	Pass
AFH	20	53.34	2.932	0.17	0.4	Pass

Remark:

1. In normal mode, hopping rate is 1600hops/s with 6 slots in 79 hopping channels. With channel hopping rate $(1600 / 6 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.
2. In AFH mode, hopping rate is 800hops/s with 6 slots in 20 hopping channels. With channel hopping rate $(800 / 6 / 20)$ in Occupancy Time Limit (0.4×20) (s), Hops Over Occupancy Time comes to $(800 / 6 / 20) \times (0.4 \times 20) = 53.34$ hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time



Date: 21.JUN.2013 09:50:05

15 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 PCB printed antenna, fulfill the requirement of this section.

16 Radiofrequency radiation exposure evaluation

Test Requirement: FCC Part 1.1307

Test Mode: The EUT work in test mode(Tx).

16.1 Requirements:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

16.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

16.3 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric) , $\text{Gain}_{\text{numeric}} = 10^{(\text{dBi}/10)}$

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

Modulation	Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
GFSK	0	1	1.19	1.315	0.00026165	1
Pi/4DQPSK	0	1	1.09	1.285	0.000255694	1
8DPSK	0	1	1.20	1.318	0.000262253	1

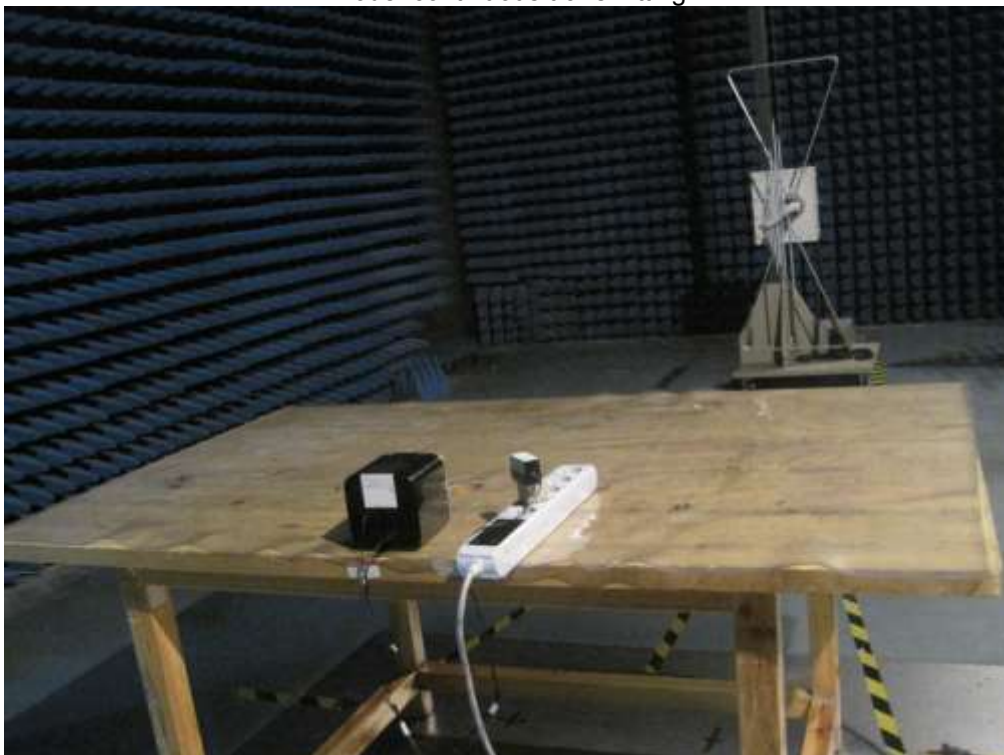
17 Photographs – Test Setup

17.1 Radiated Emissions

Below 30MHz
Mode: continuous transmitting



From 30-1000MHz
Mode: continuous transmitting

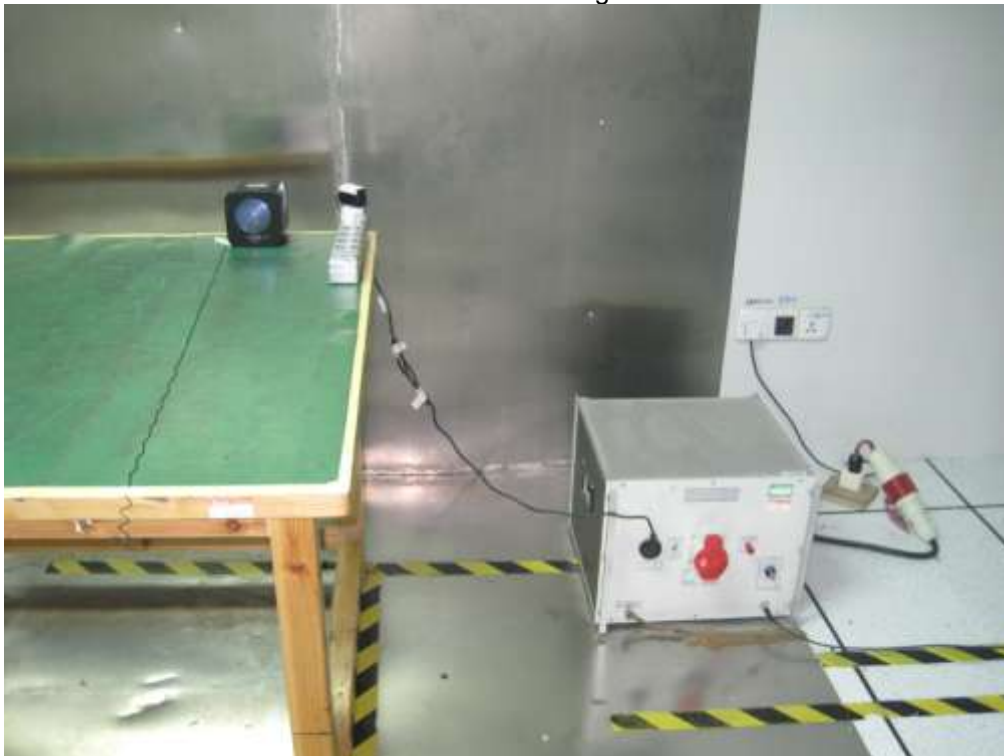


Above 1GHz
Mode: continuous transmitting



17.2 Conducted Emissions

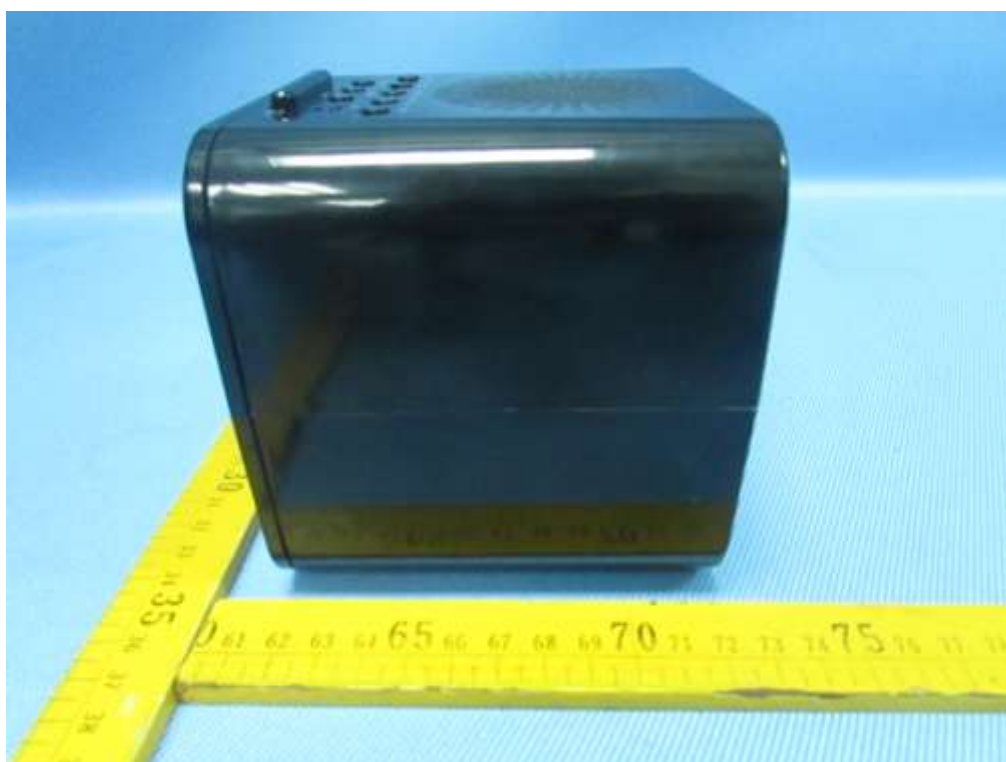
Mode: Bluetooth linking Mode



18 Photographs - Constructional Details

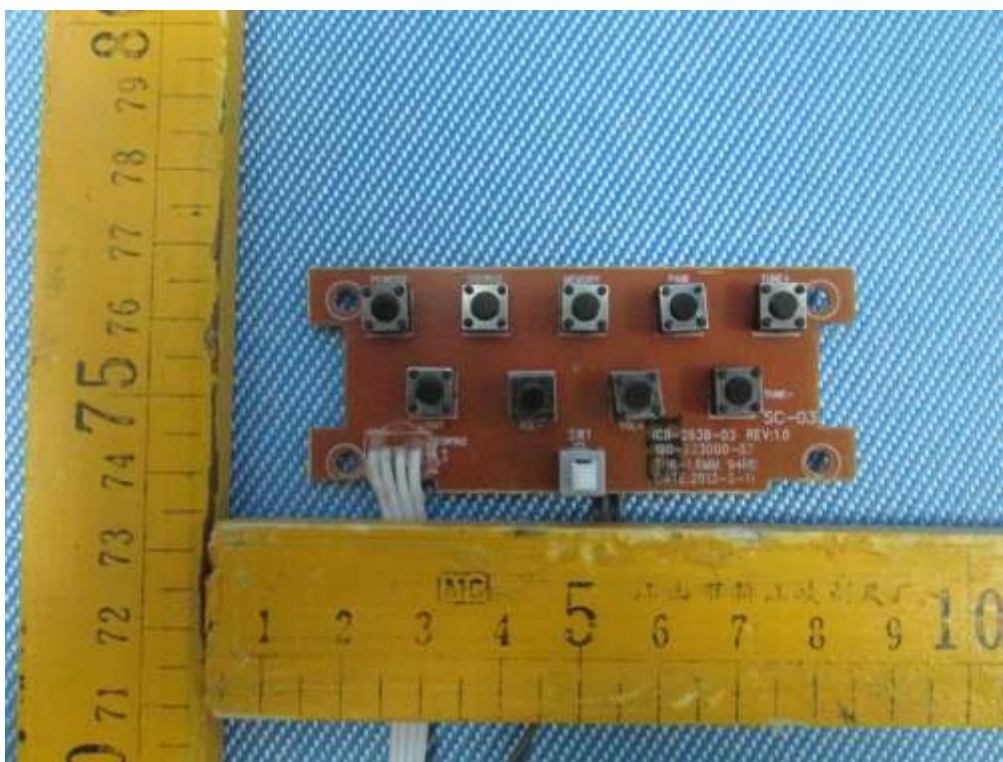
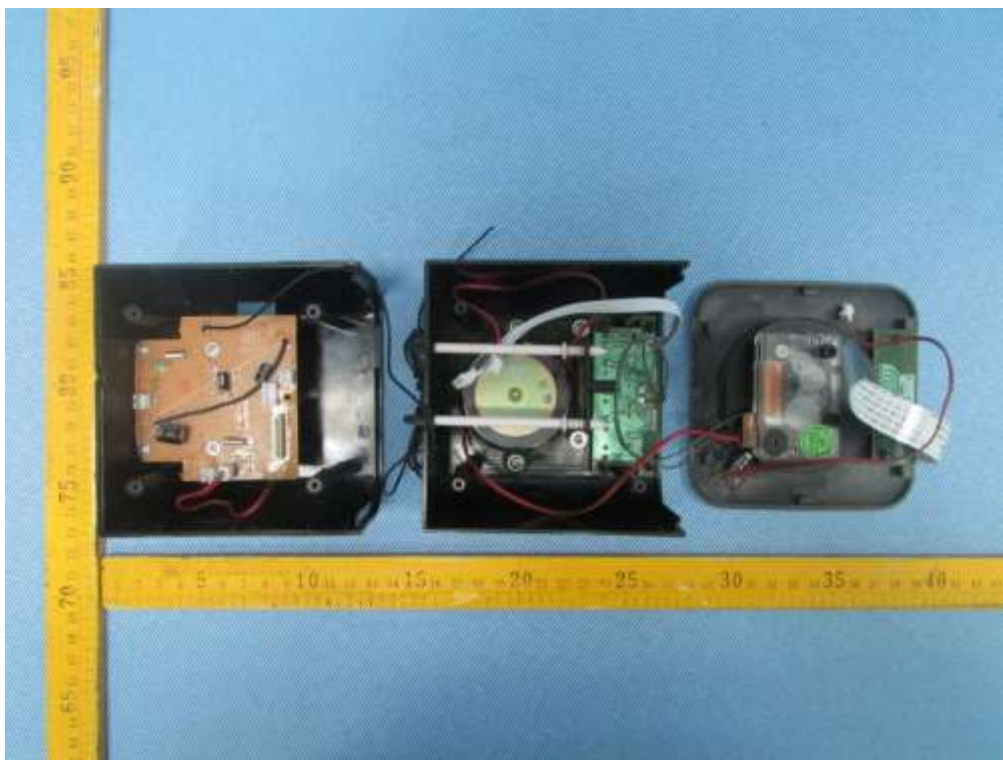
18.1 EUT – External View

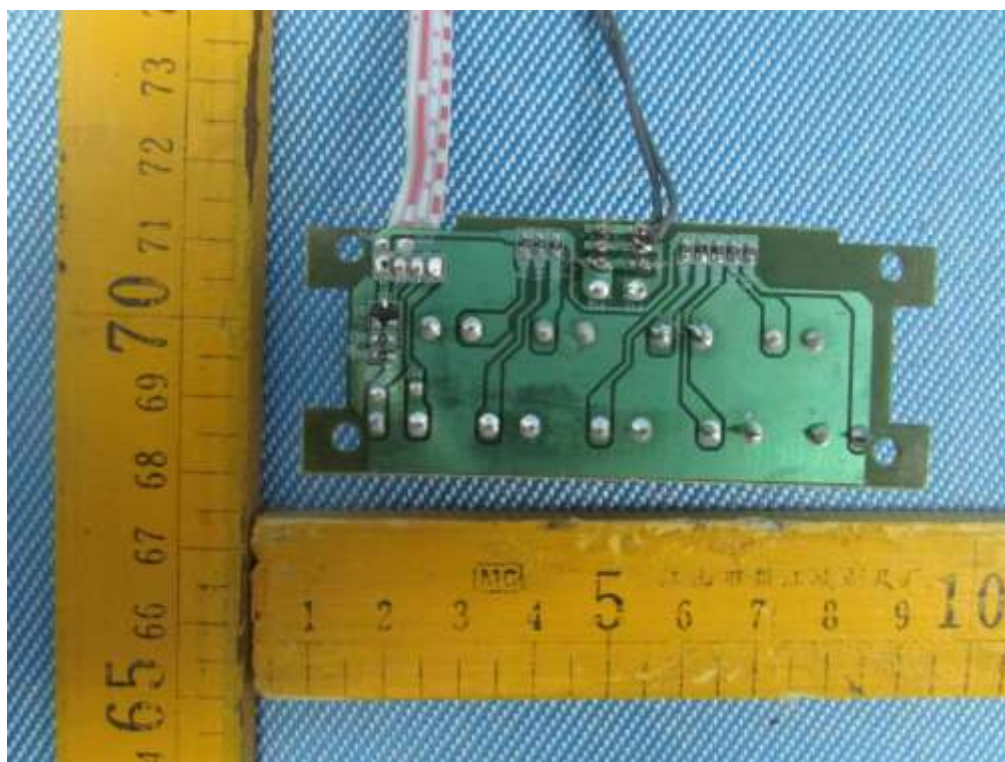


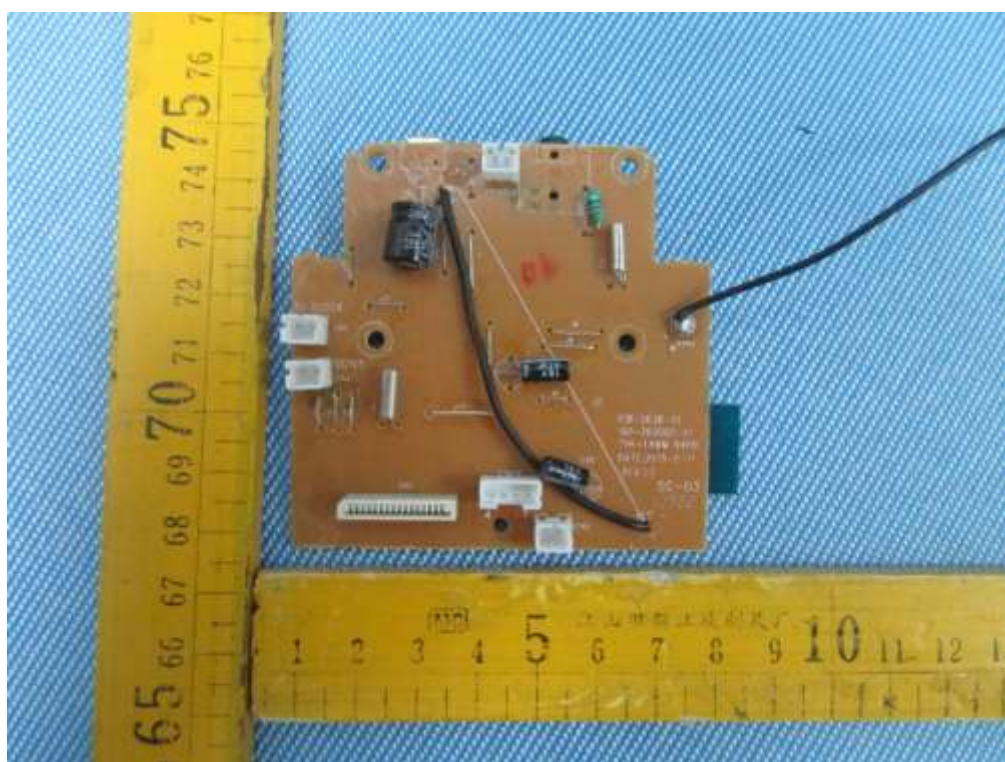


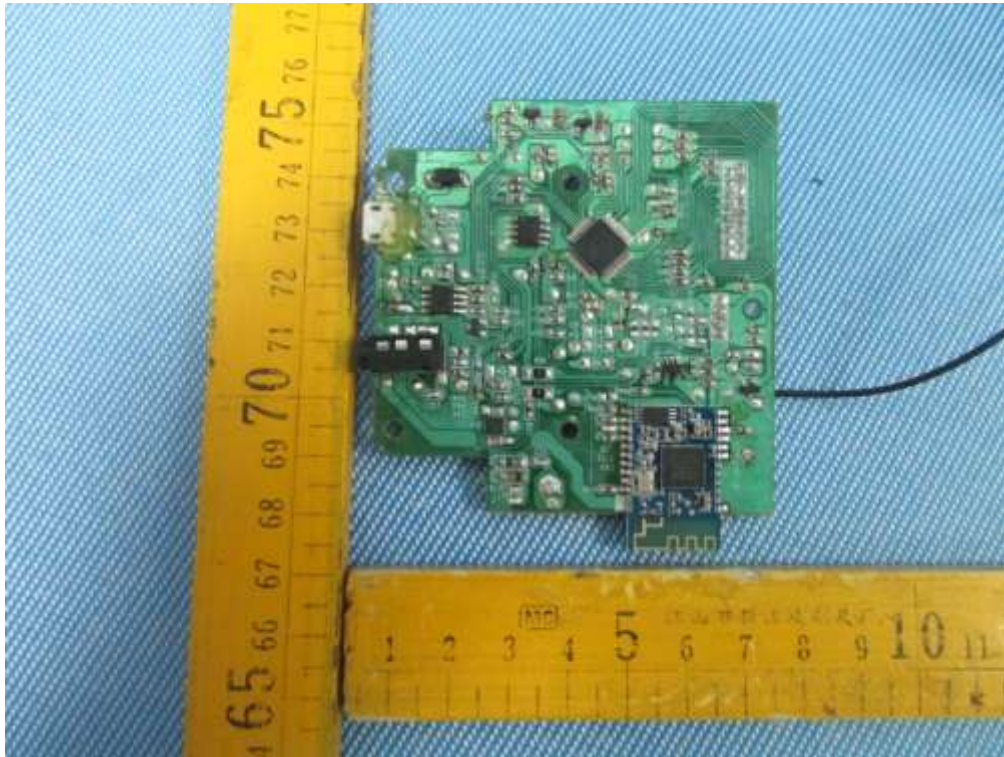


18.2 EUT – Internal View

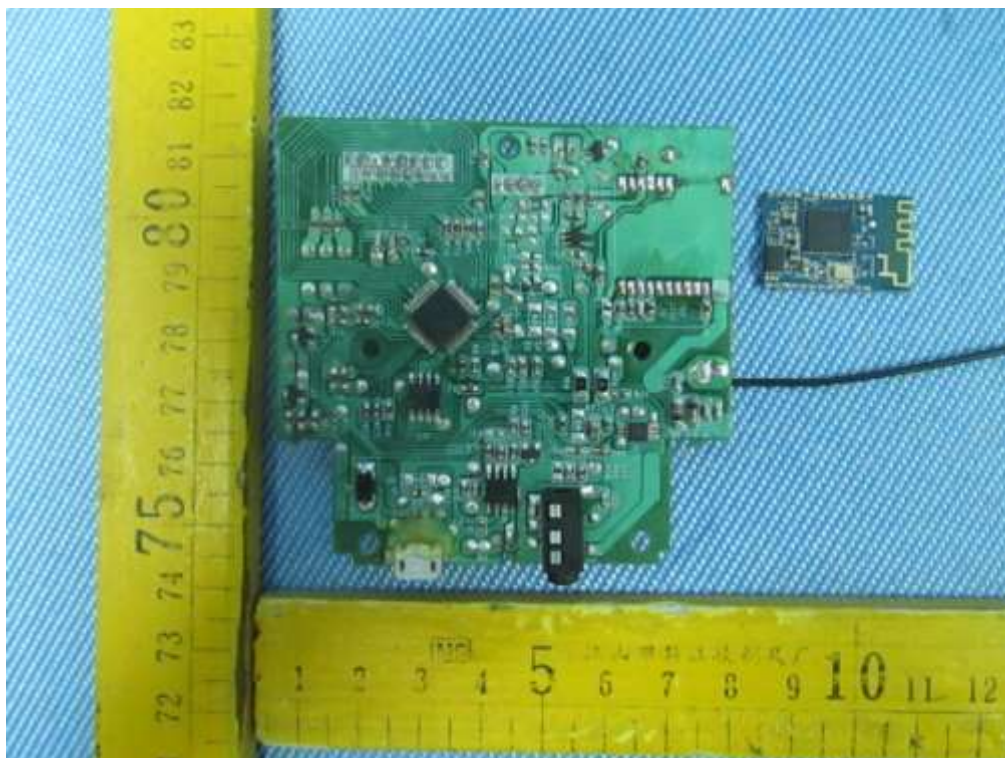


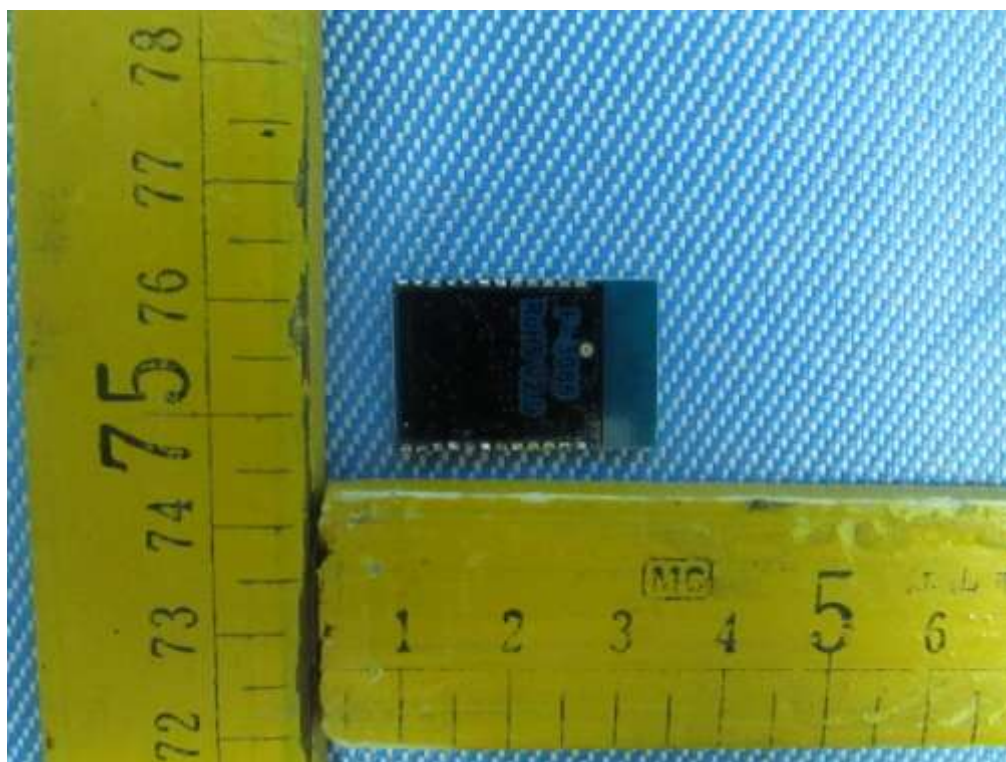
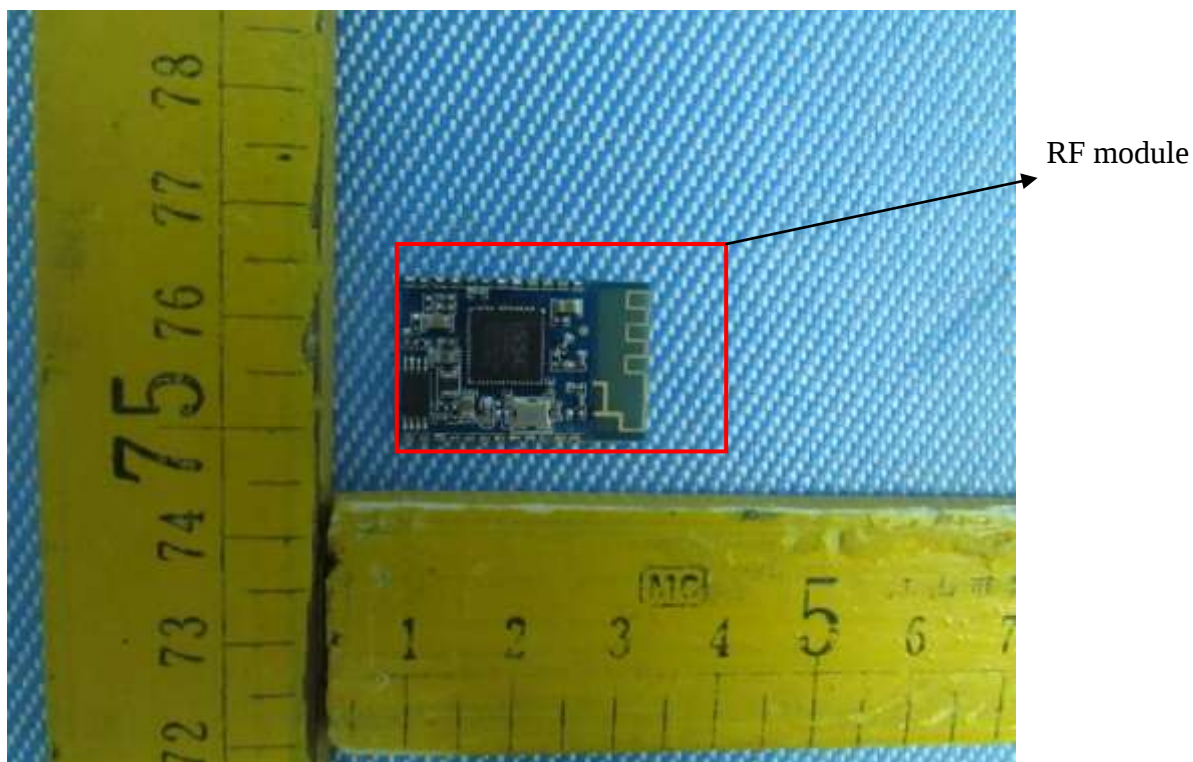






18.3 EUT-RF Module View





==End of test report==