SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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FCC Part 15C TEST REPORT

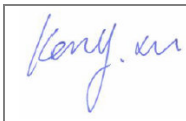
Application No. :	SHEM1304000522RF
Applicant:	Hansong (Nanjing) Technology Ltd.
FCC ID:	XCO-KMCSTADIUM
IC:	7756A-KMCSTADIUM
Equipment Under Test (EUT): **NOTE:** The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Airplay Speaker
Brand Name:	Klipsch
Model:	Klipsch STADIUM
Standards:	FCC PART 15 SUBPART C, Section 15.247:2012 RSS-210 Issue 8 (December 2010) RSS-Gen Issue 3 (December 2010)
Date of Receipt:	April 17, 2013
Date of Test:	Mat 09, 2013 to May 15, 2013
Date of Issue:	July 16, 2013
Test Result:	**PASS ***

* In the configuration tested, the EUT (Equipment under test) complied with the standards specified above.

Tony Wu
E&E Section Manager
SGS-CSTC (Shanghai) Co., Ltd.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00	/	July 15, 2013	/	Original

Authorized for issue by:				
Engineer		Zenger Zhang **Print Name**		
Clerk		Susie Liu **Print Name**		
Reviewer		Keny Xu **Print Name**		

3 Test Summary

Test Item	FCC Test Requirement	IC Test Requirement	Test method	Result
Antenna Requirement	FCC Part 15, Subpart C Section 15.203/15.247 (c)	RSS-Gen 7.1.2	---	PASS
AC Power Line Conducted Emission	FCC Part 15, Subpart C Section 15.207	RSS-Gen Section 7.2.4	ANSI C63.10 (2009) Section 6.2	N/A
20dB Occupied Bandwidth	FCC Part 15, Subpart C Section 15.247 (a)(1)	RSS 210 A 8.1(b)	ANSI C63.10 (2009) Section 6.9.1	PASS
Conducted Peak Output Power	FCC Part 15, Subpart C Section 15.247 (b)(1)	RSS 210 A 8.4(2)	ANSI C63.10 (2009) Section 6.10.1	PASS
Carrier Frequencies Separation	FCC Part 15, Subpart C Section 15.247 (a)(1)	RSS 210 A 8.1(b)	ANSI C63.10 (2009) Section 7.7.2	PASS
Hopping Channel Number	FCC Part 15, Subpart C Section 15.247 (b)	RSS 210 A 8.1(d)	ANSI C63.10 (2009) Section 7.7.3	PASS
Dwell Time	FCC Part 15, Subpart C Section 15.247 (a)(1)	RSS 210 A 8.1(d)	ANSI C63.10 (2009) Section 7.7.4	PASS
RF Conducted Spurious Emissions	FCC Part 15, Subpart C Section 15.247(d)	RSS 210 A 8.5	ANSI C63.10 (2009) Section 7.7.10	PASS
Radiated Spurious emissions	FCC Part 15, Subpart C Section 15.209 and Section 15.205	RSS-Gen section 4.9	ANSI C63.10 (2009) Section 6.12	PASS
Radiated Band-edge	FCC Part 15, Subpart C Section 15.205	RSS-Gen section 4.9	ANSI C63.10 (2009) Section 6.5	PASS
99% Occupied Bandwidth	---	RSS-Gen section 4.6.1	RSS-Gen section 4.6.1	Test

Remark: the device is power supplied by battery, so the Conducted Emission is not application.

4 Contents

5 General Information

5.1 Client Information

Applicant:	Hansong (Nanjing) Technology Ltd.
Address of Applicant:	8th Kangping Road, Jiangning Economy& Technology Development Zone, 211106 Nanjing, People's Republic of China
Manufacturer:	Klipsch Group Inc
Address of Manufacturer:	3502 Woodview Trace, Indianapolis IN 46268, USA
Factory:	Not supplied by the client.

5.2 General Description of E.U.T.

Product Name	Airplay Speaker
Brand Name:	Klipsch
Model No:	Klipsch STADIUM

5.3 Technical Specifications:

Operation Frequency:	2402MHz~2480MHz
Modulation Technique:	3.0+EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Power Supply:	AC 100-240V
Antenna Type	Integral
Antenna Gain	1.9dBi

5.4 Support Software for Testing

The EUT has been tested with support equipments as below.

Software Name	Manufacturer	Supplied by Client or SGS?
Bule Test3 (For CSR)	N/A	SGS

5.5 Details of Test Mode

Test Mode	Description of Test Mode
BT transmitting mode	Keep the EUT on continue BT transmitting mode.

5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
No.588 West Jindu Road, Songjiang District, Shanghai, China.201612.

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

  CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2015-02-22.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

  The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

  The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively. Date of Registration: 2012-05-29. Date of Expiry: 2015-05-28.

6 Equipments Used during Test

Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2013-02-23	2014-02-22
2	Line impedance stabilization network	SCHWARZBECK	NSLK8127	8127-490	2013-02-23	2014-02-22
3	Line impedance stabilization network	ETS	3816/2	00034161	2013-02-23	2014-02-22

☒ **RF Test**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100109	2013-02-23	2014-02-22
2	Horn Antenna	SCHWARZBECK	BBHA9120 D	9120D-679	2013-03-07	2014-03-06
3	Horn Antenna	Rohde & Schwarz	HF906	100284	2013-06-03	2014-06-01
4	ANTENNA	SCHWARZBECK	VULB9168	9168-313	2013-03-07	2014-03-06
5	Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 373	2013-03-07	2014-03-06
6	Ultra broadband antenna	Rohde & Schwarz	HL562	100227	2012-10-09	2013-10-08
7	Atmosphere pressure meter	Shanghai ZhongXuan Electronic Co;Ltd	BY — 2009P	--	2012-10-09	2013-10-08
8	CLAMP METER	FLUKE	316	86080010	2013-06-03	2014-06-01
9	Thermo-Hygrometer	ZHICHEN	ZC1-2	01050033	2012-10-09	2013-10-08

10	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT1800.0/2000.0-0.2/40-5SSK	11	2013-06-03	2014-06-01
11	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT800.0/880.0-0.2/40-5SSK	9	2013-06-03	2014-06-01
12	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	2013-06-03	2014-06-01
13	Low nosie amplifier	TESEQ	LNA6900	70133	2013-02-23	2014-02-22

7 Test Results

7.1 E.U.T. test conditions

Test Power: AC 120V, 60Hz

Requirements: 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Operating Environment:

Temperature: 20.0 -25.0 °C

Humidity: 35-75 % RH

Atmospheric Pressure: 992 -102.0 kPa

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top. 1 near middle and 1 near bottom

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

Test frequency is the lowest channel: 0 channel (2402MHz), middle channel: 39 channel (2441MHz) and highest channel: 78 channel (2480MHz) with fixed at channel.

7.2 Antenna Requirement

Standard requirement

15.203 requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The gain of the antenna is less than 1.9 dBi.

7.3 20dB Occupied Bandwidth

Test Requirement: FCC Part 15 C Section 15.247 (a)(1)
RSS 210 A 8.1(b)

Test Method: ANSI C63.10:2009 Clause 6.9.1

Test Date: May 13, 2013

Final Test Mode: BT transmitting mode

Test Procedure:

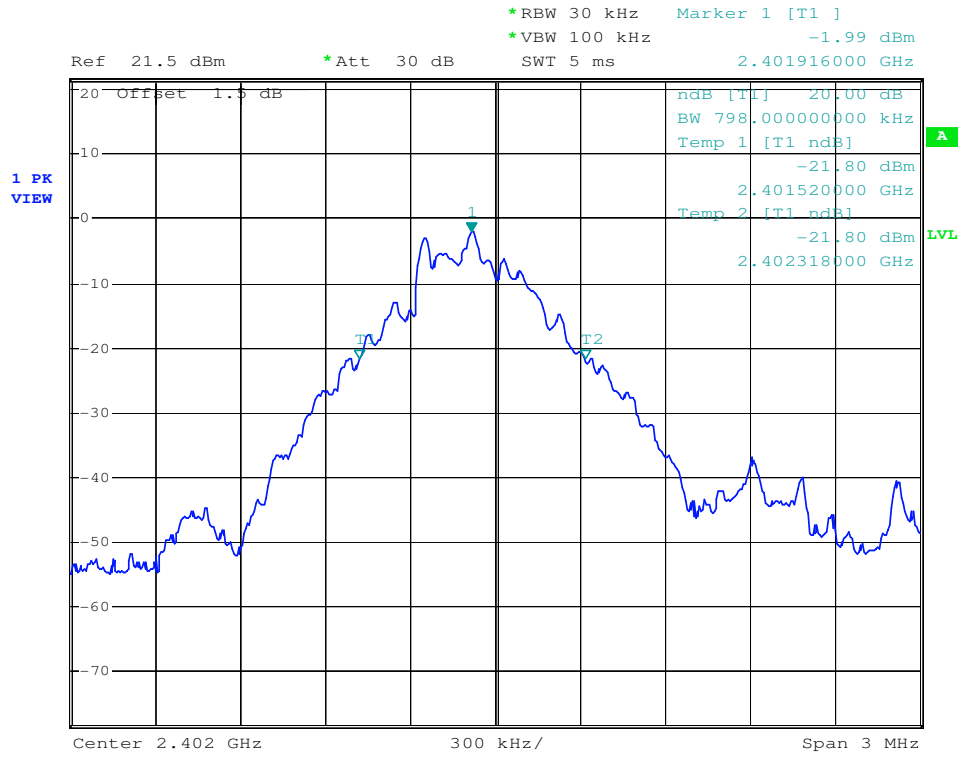
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on the hopping channel;
3. Set the spectrum analyzer: RBW >= 1% of the 20dB bandwidth (set 100kHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points.

Test date

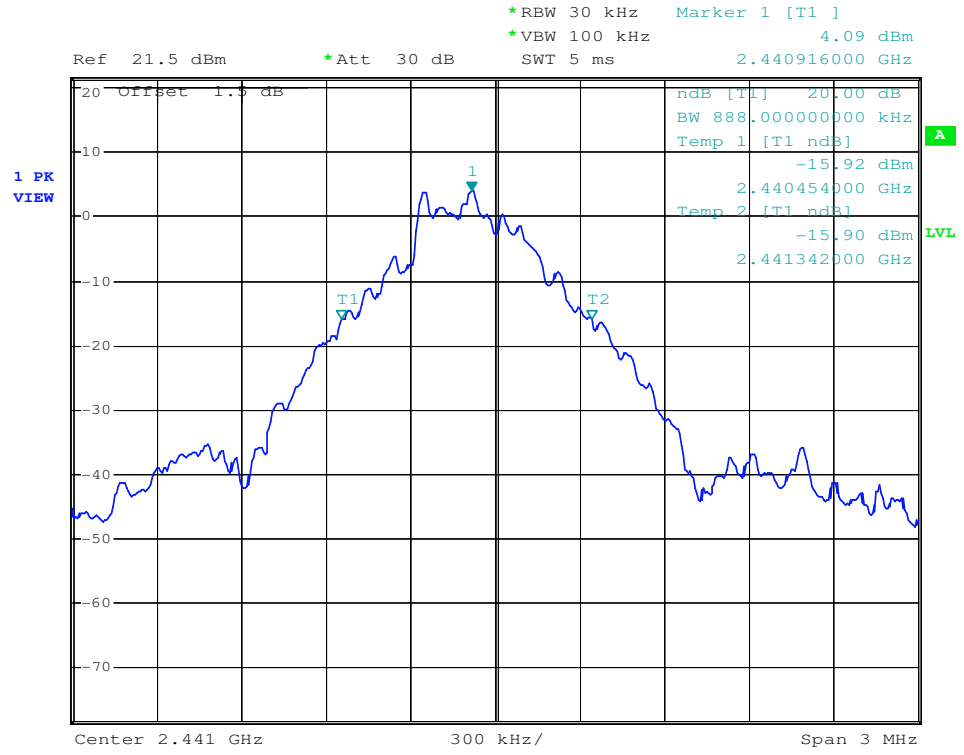
Test Channel	Channel Frequency (MHz)	Modulation	Bandwidth(MHz)
Low	2402	GFSK	0.798
Middle	2441	GFSK	0.888
High	2480	GFSK	0.816
Low	2402	π/4DQPSK	1.206
Middle	2441	π/4DQPSK	1.224
High	2480	π/4DQPSK	1.206
Low	2402	8DPSK	1.206
Middle	2441	8DPSK	1.206
High	2480	8DPSK	1.200

Test plot as follows:

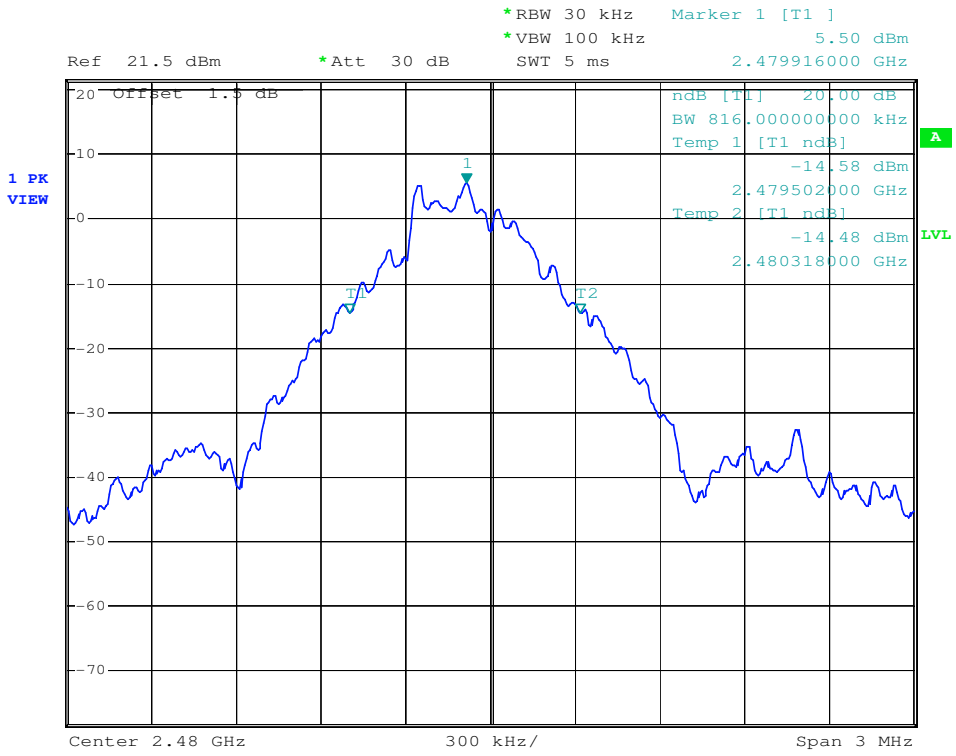
Test mode:	GFSK	Test channel:	Lowest



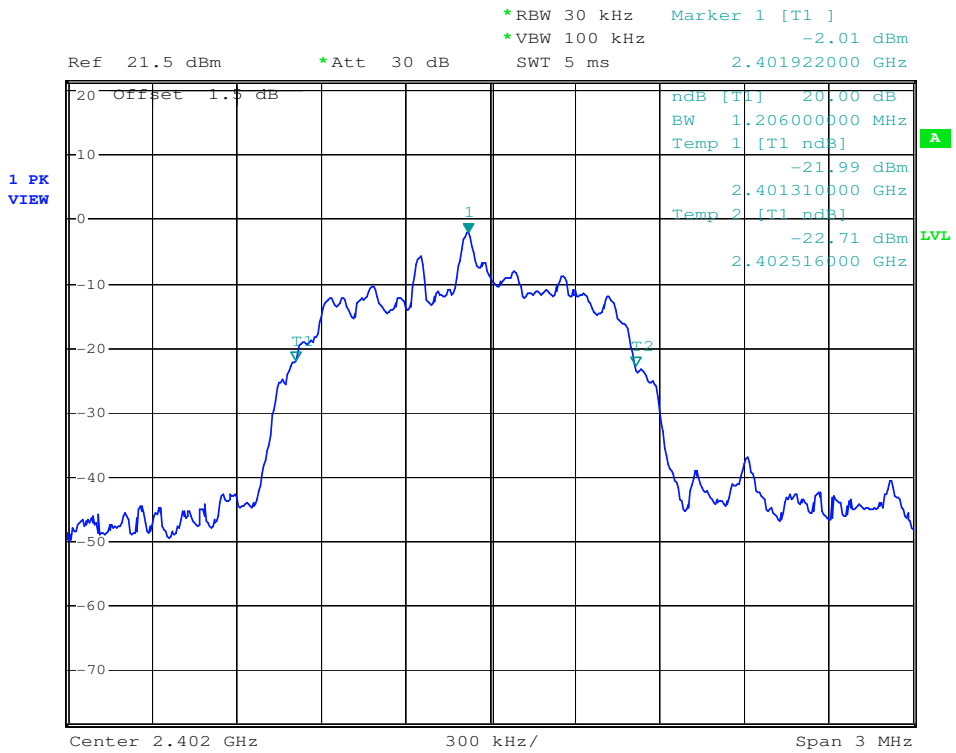
Test mode:	GFSK	Test channel:	Middle



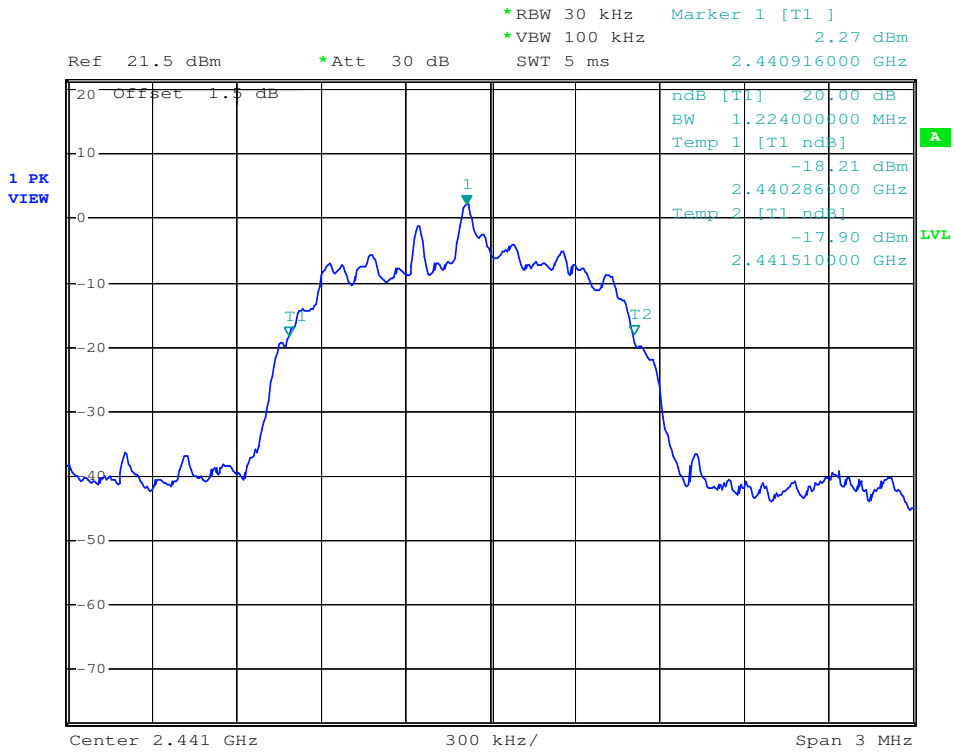
Test mode:	GFSK	Test channel:	Highest



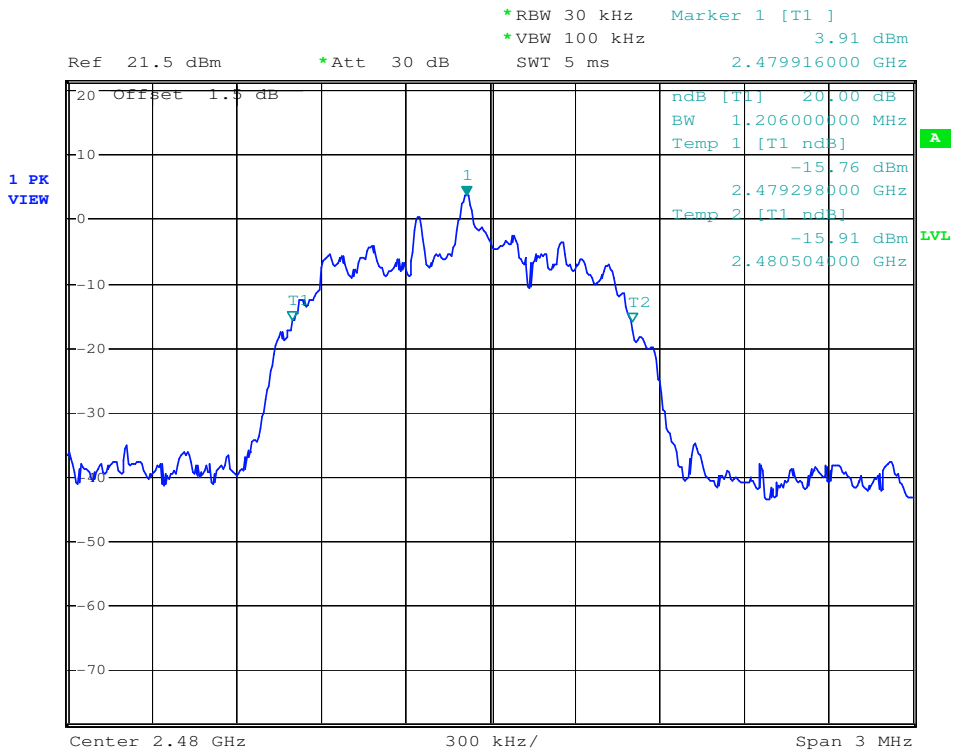
Test mode:	π/4DQPSK	Test channel:	Lowest



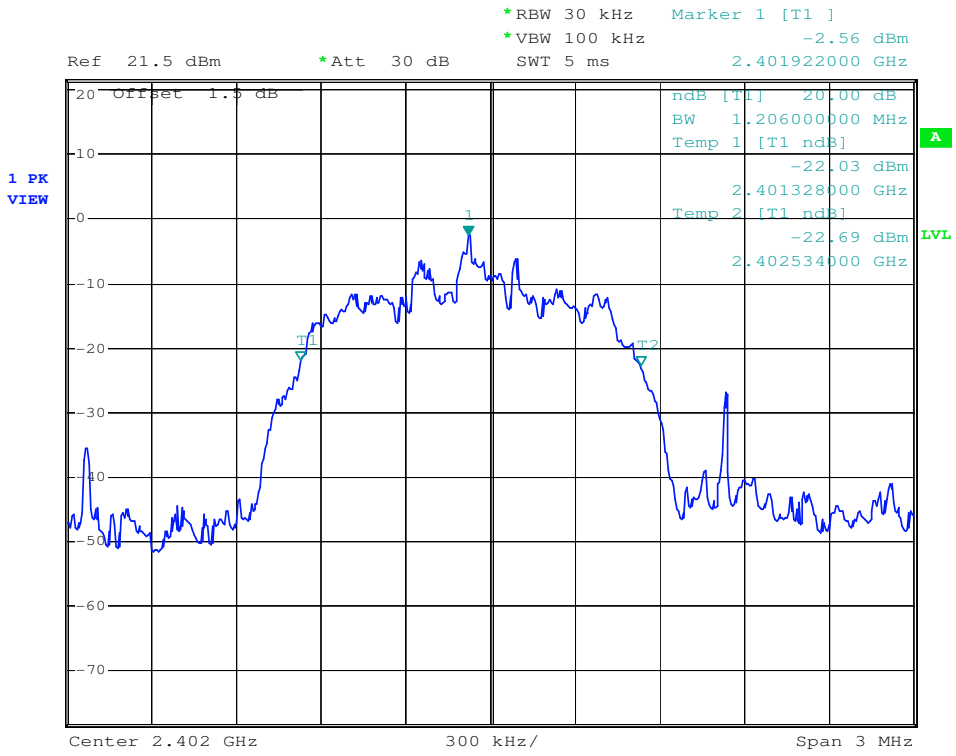
Test mode:	π/4DQPSK	Test channel:	Middle



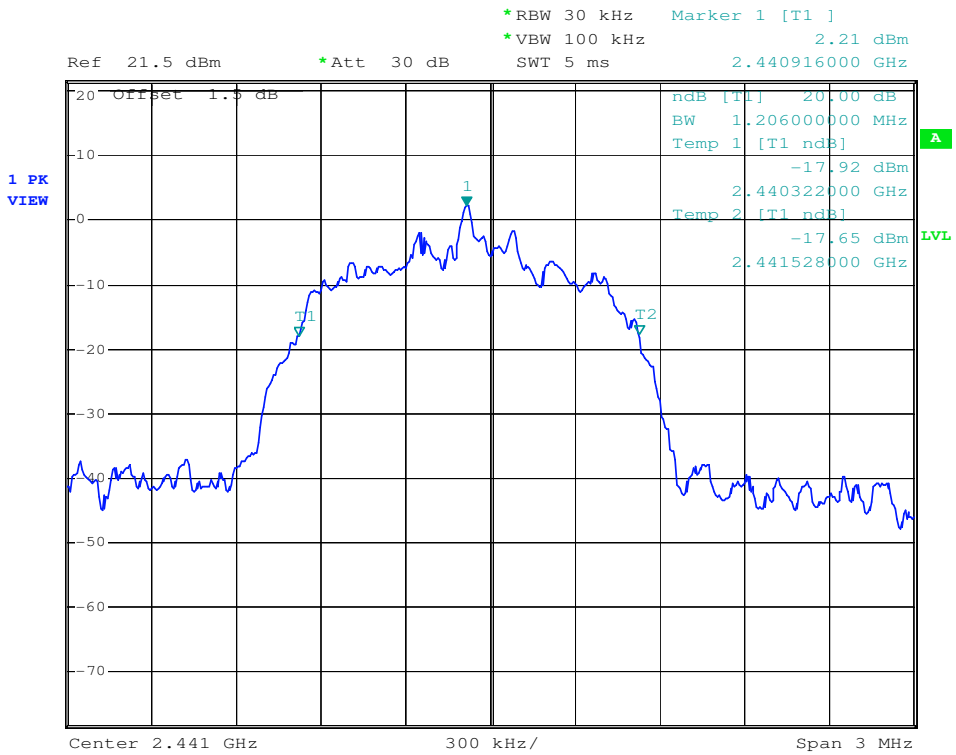
Test mode:	π/4DQPSK	Test channel:	Highest



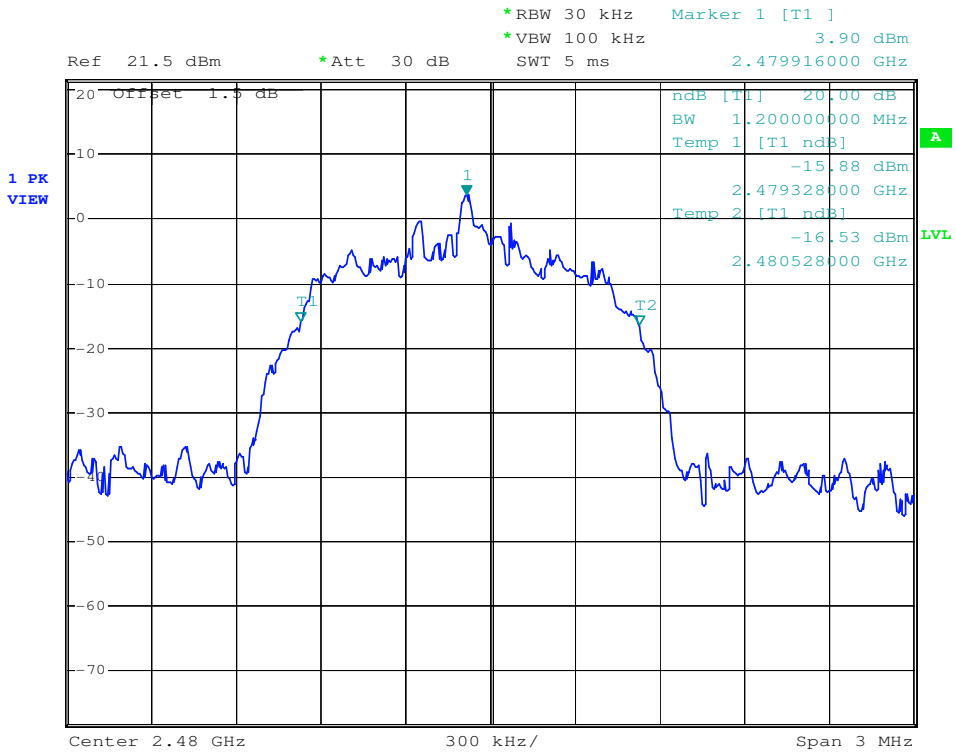
Test mode:	8DPSK	Test channel:	Lowest



Test mode:	8DPSK	Test channel:	Middle



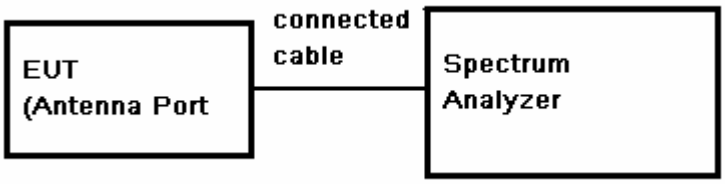
Test mode:	8DPSK	Test channel:	Highest



7.4 Conducted Peak Output Power

Test Requirement:	FCC Part 15.247 Section 15.247(b)(1) RSS 210 A 8.4(2)
Test Method:	ANSI C64.10:2009 Section 6.10.1
Test Date:	May 13, 2013
Test Result:	Pass
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 "Hopping channel number" of this document. The 0.125 watt (20.0dBm) limit applies.
Final Test Mode:	BT transmitting mode

Test Configuration:



Test Procedure:

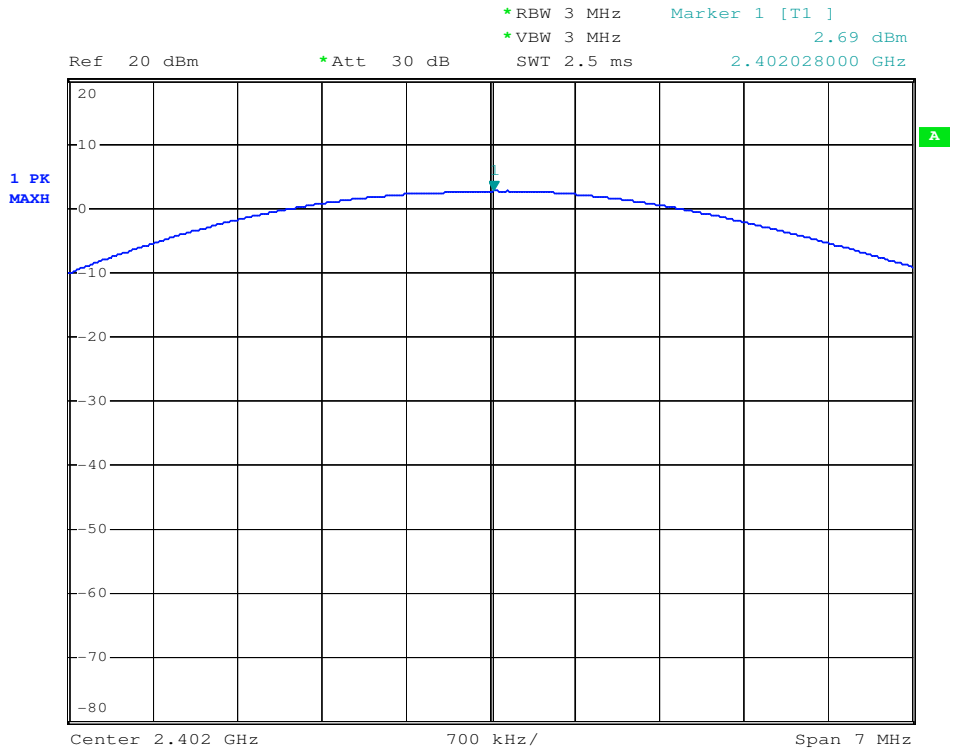
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz, VBW = 10 MHz, Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

Test Results record:

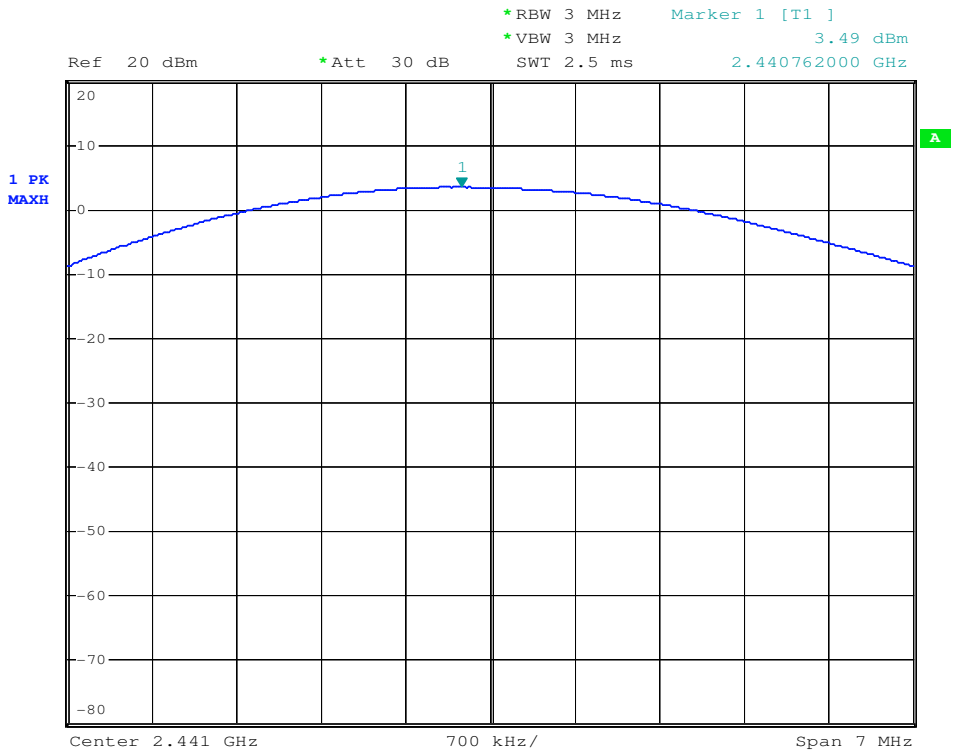
Test Channel	Modulation	Fundamental Frequency (MHz)	Reading Power (dBm)	Cable Loss (dB)	Output Peak Power(dBm)	Limit (dBm)	Margin (dB)
Lowest	GFSK	2402	2.69	1.5	4.19	20	-15.81
Middle	GFSK	2441	3.49	1.5	4.99	20	-15.01
Highest	GFSK	2480	4.90	1.5	6.40	20	-13.60
Lowest	π/4DQPSK	2402	0.28	1.5	1.78	20	-18.22
Middle	π/4DQPSK	2441	4.32	1.5	5.82	20	-14.18
Highest	π/4DQPSK	2480	5.64	1.5	7.14	20	-12.86
Lowest	8DPSK	2402	-0.12	1.5	1.38	20	-18.62
Middle	8DPSK	2441	4.51	1.5	6.01	20	-13.99
Highest	8DPSK	2480	5.86	1.5	7.36	20	-12.64

Test result plot as follows:

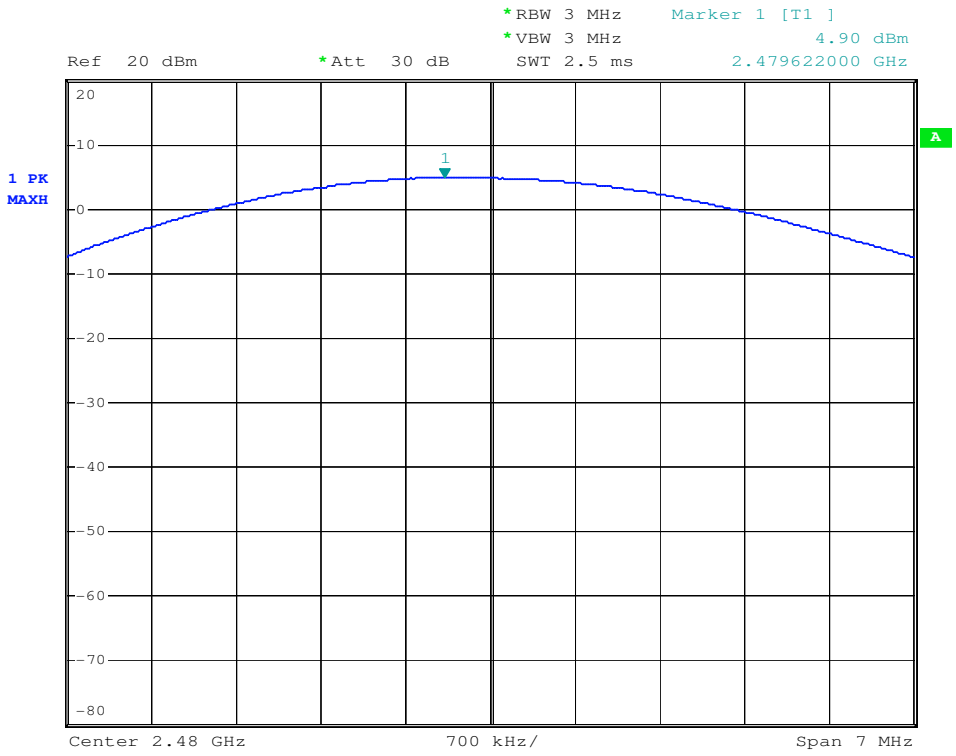
Test mode:	GFSK	Test channel:	Lowest



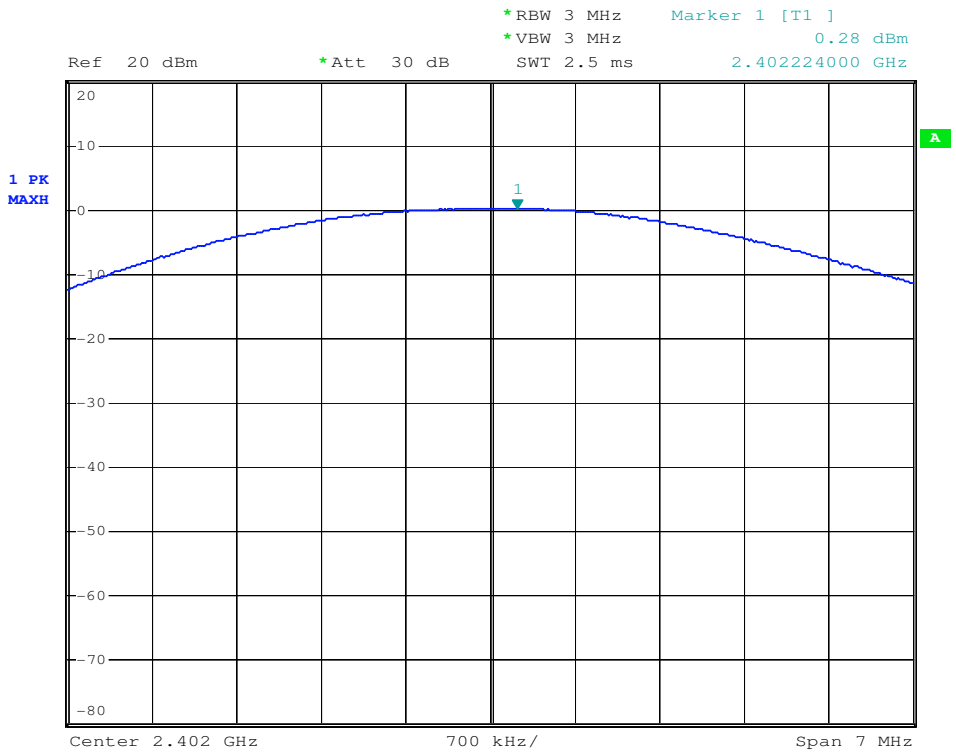
Test mode:	GFSK	Test channel:	Middle



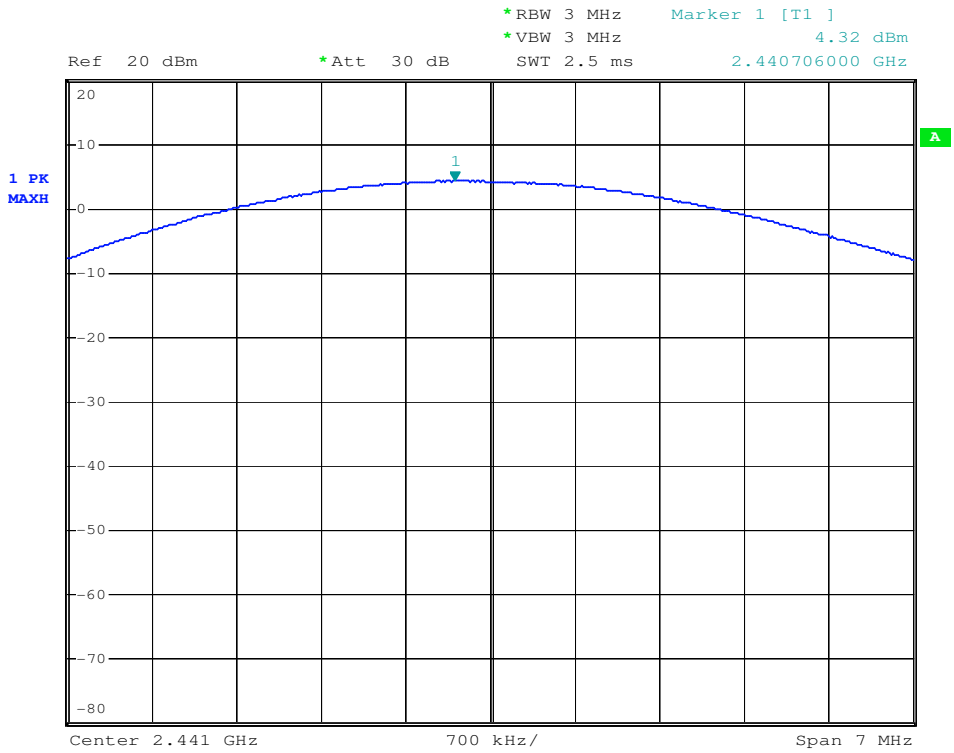
Test mode:	GFSK	Test channel:	Highest



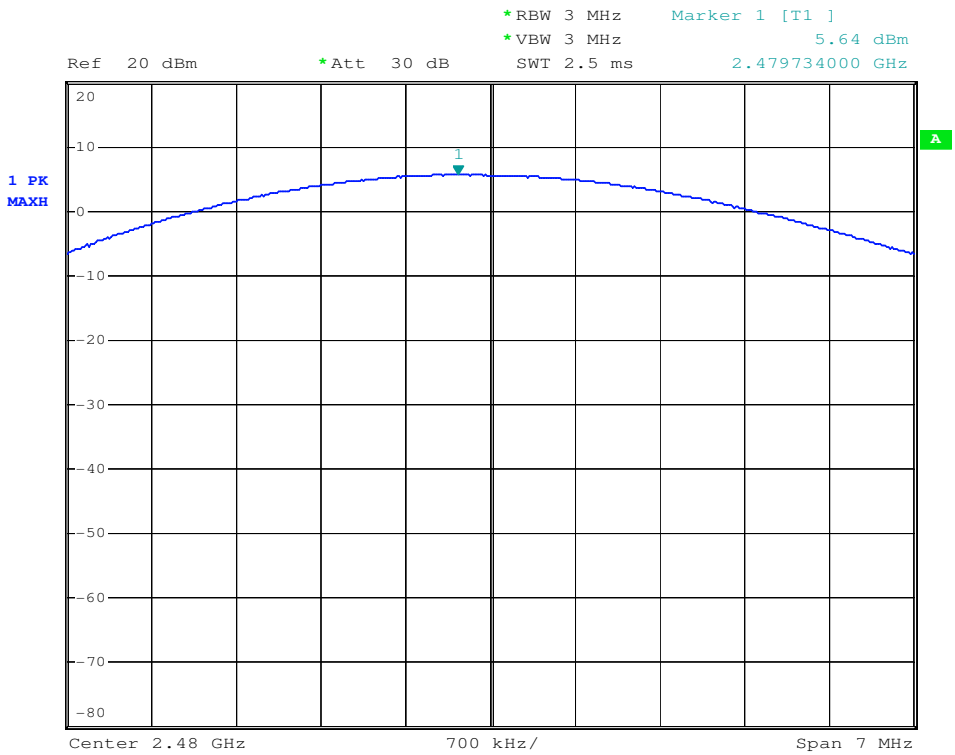
Test mode:	π/4DQPSK	Test channel:	Lowest



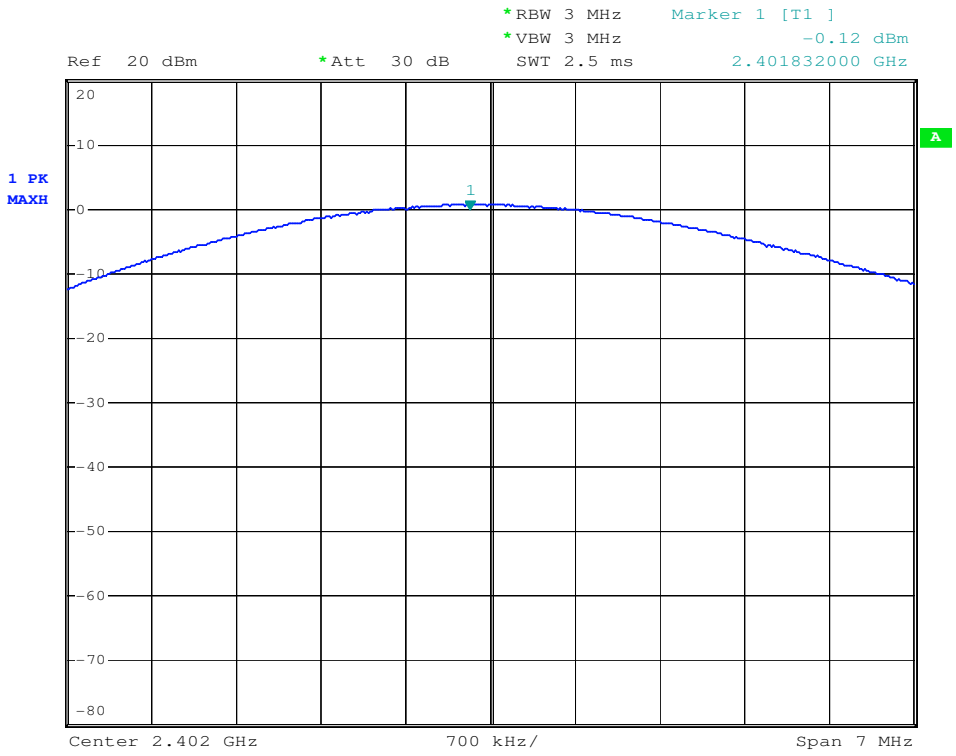
Test mode:	π/4DQPSK	Test channel:	Middle



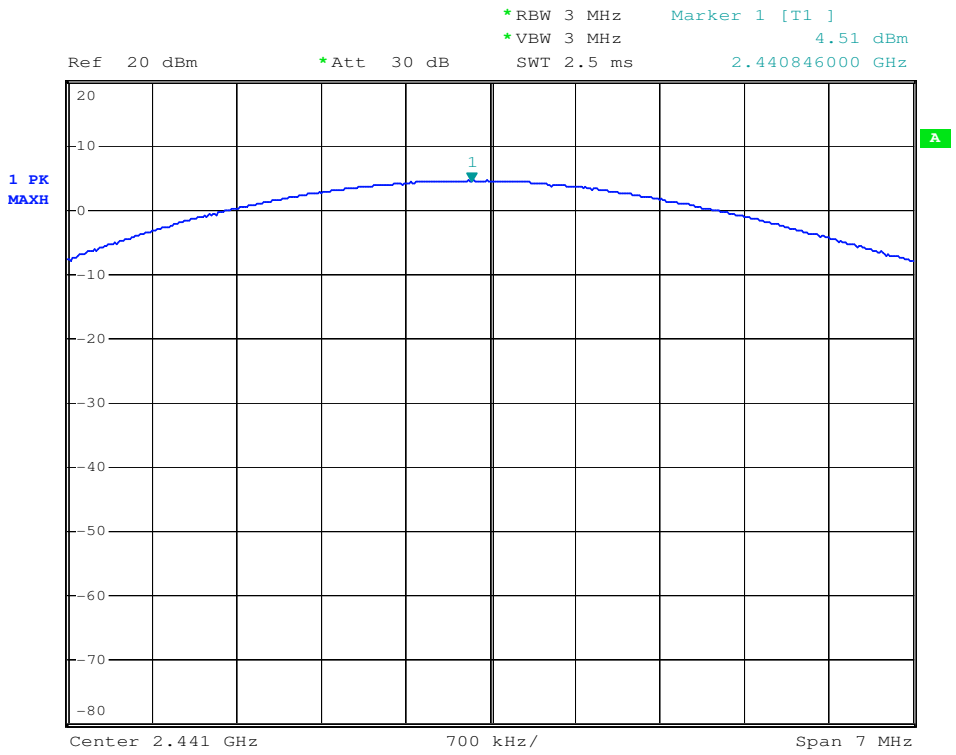
Test mode:	π/4DQPSK	Test channel:	Highest



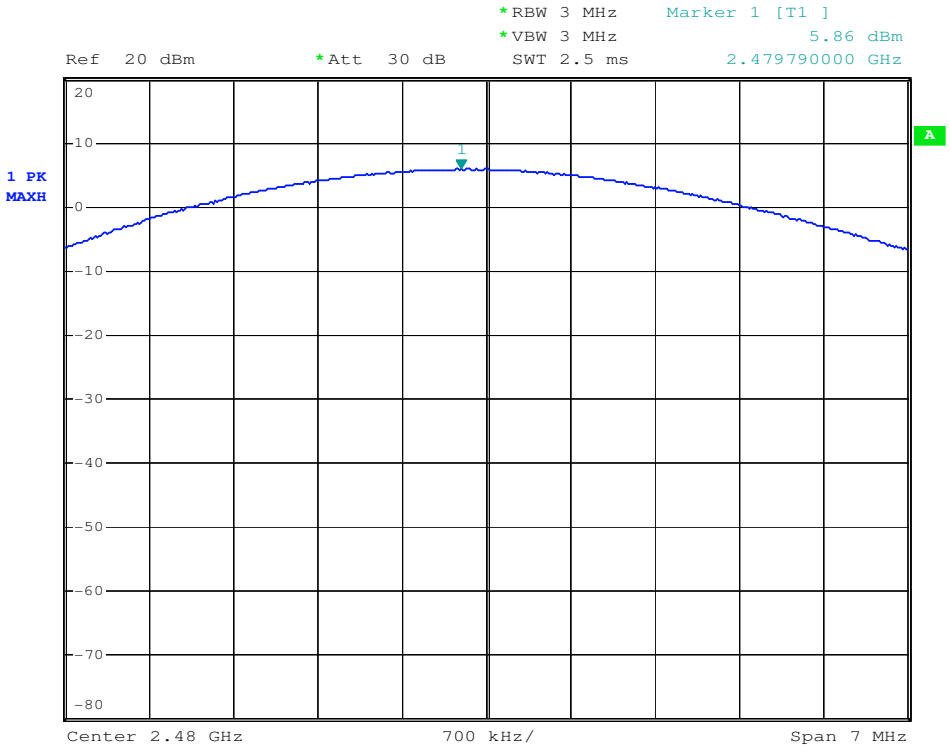
Test mode:	8DPSK	Test channel:	Lowest



Test mode:	8DPSK	Test channel:	Middle



Test mode:	8DPSK	Test channel:	Highest



7.5 Carrier Frequencies Separated

Test Requirement: FCC Part 15 C Section 15.247 (a)(1)
RSS 210 A 8.4(2)

Test Method: ANSI C63.10:2009 Clause 7.7.2

Test Date: May 13, 2013

Limit: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

Test result: Pass

Final Test Mode: BT transmitting mode

Test Procedure:

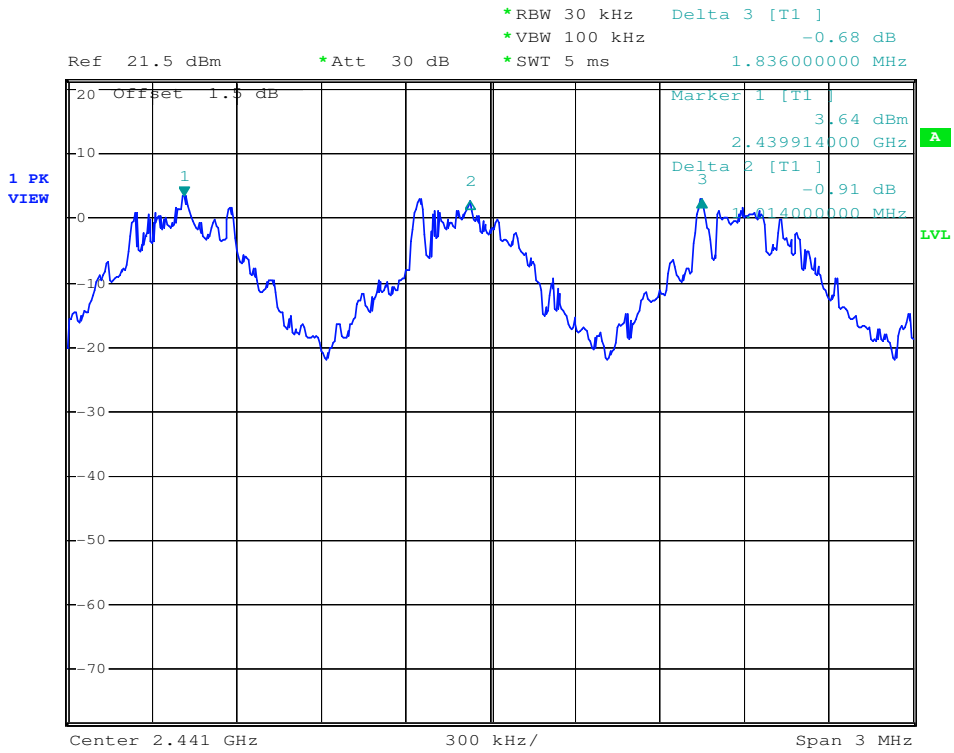
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW >= 1% of the span (set 100 kHz). VBW >= RBW , Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max,hold.
3. Allow the trace to stabilize. Use the marker-delta 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.

Test Channel	Modulation	Carrier Frequencies Separated (MHz)	Limit (25kHz or two-thirds of the 20 dB bandwidth)	Results
Middle Channels (channel 39 and channel 40)	8DPSK	1.014	25kHz/816kHz	PASS
Middle Channels (channel 39 and channel 40)	GFSK	0.990	25kHz/816kHz	PASS
Middle Channels (channel 39 and channel 40)	π/4DQPSK	1.002	25kHz/816kHz	PASS

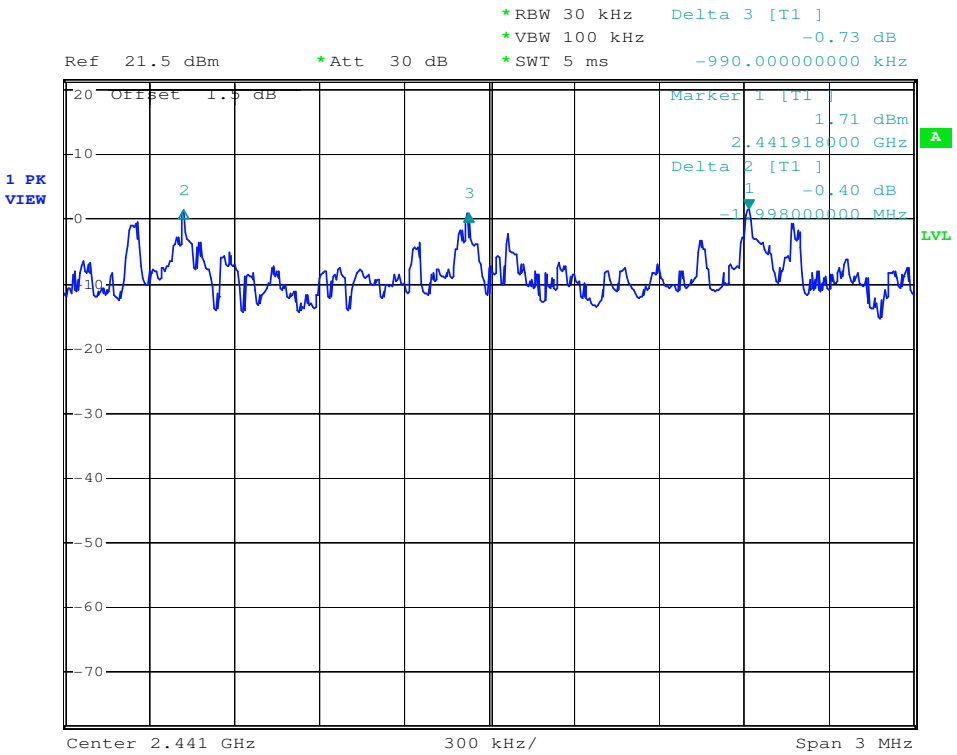
Note: 20dB bandwidth reference Section 7.3

Test plot as follows:

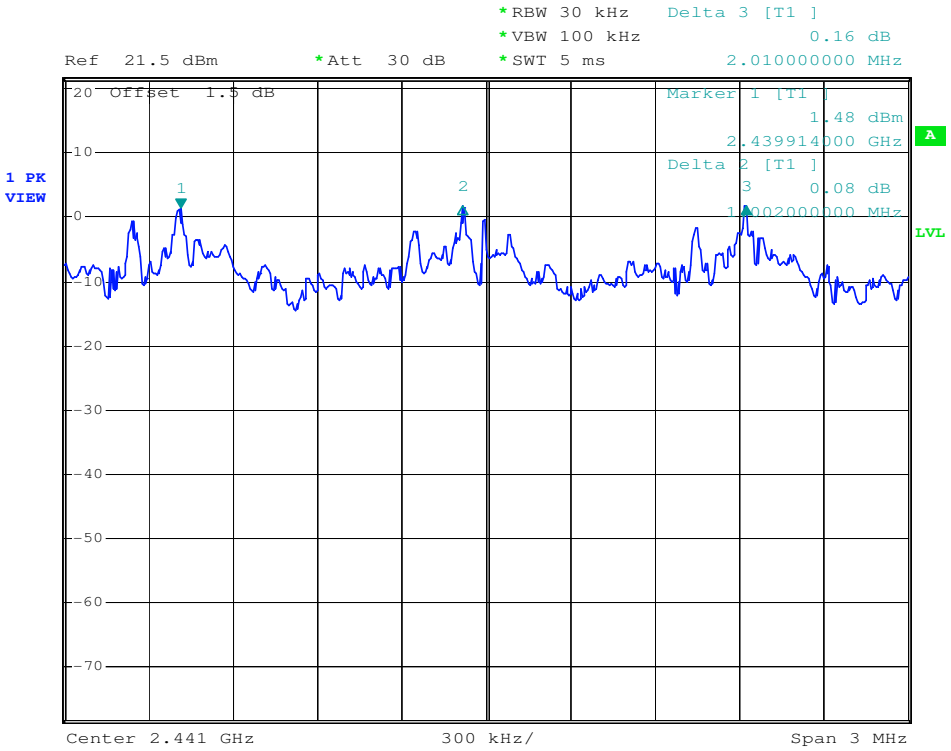
Test mode:	GFSK	Test channel:	Middle



Test mode:	π/4DQPSK	Test channel:	Middle



Test mode:	8DPSK	Test channel:	Middle



7.6 Hopping Channel Number

Test Requirement: FCC Part15 C Section 15.247(b)

RSS 210 A 8.1(d)

Test Method: ANSI C63.10:2009 Clause 7.7.3

Test Date: May 13, 2013

Limit: At least 15 channels

Test Result: Pass

Test Mode: BT transmitting mode

Test Procedure:

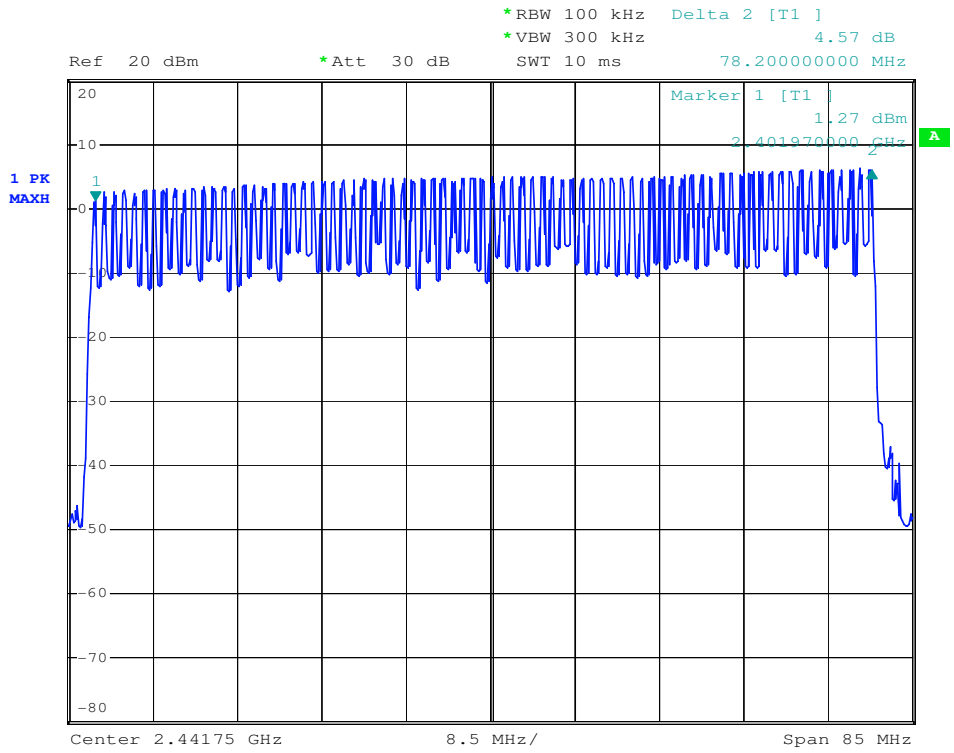
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 300 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up 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: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

Measurement Data

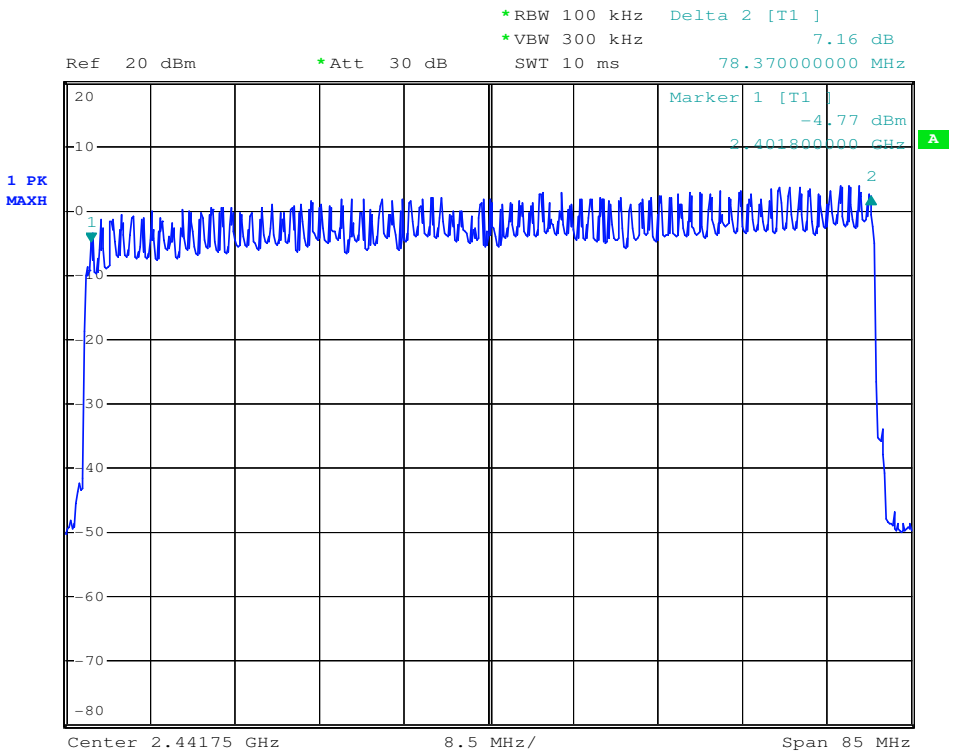
Mode	Hopping channel numbers	Limit	Results
8DPSK	79	≥15	Pass
GFSK	79	≥15	Pass
π/4DQPSK	79	≥15	Pass

Test plot as follows:

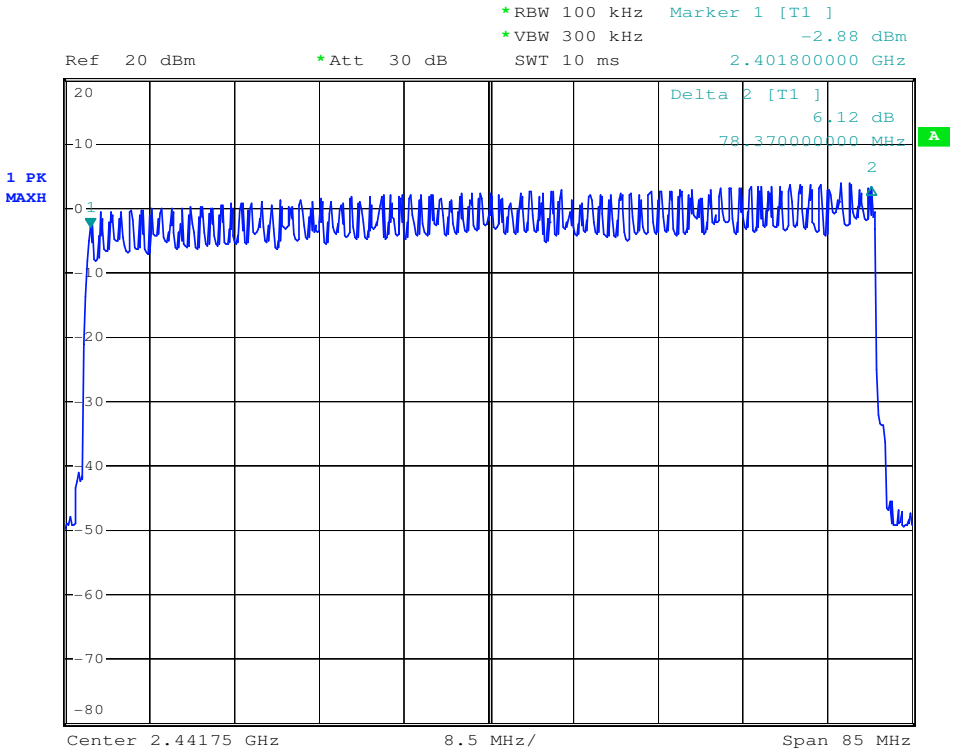
Test mode:	GFSK	Test channel:	Middle



Test mode:	π/4DQPSK	Test channel:	Middle



Test mode:	8DPSK	Test channel:	Middle



7.7 Dwell Time

Test Requirement: FCC Part 15 C Section 15.247(a)(1)

RSS 210 A 8.1(d)

Test Method: ANSI C63.10:2009 Clause 7.7.4

Test Date: May 13, 2013

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 Status: Hopping transmitting with all kind of modulation.

Test Result: Pass

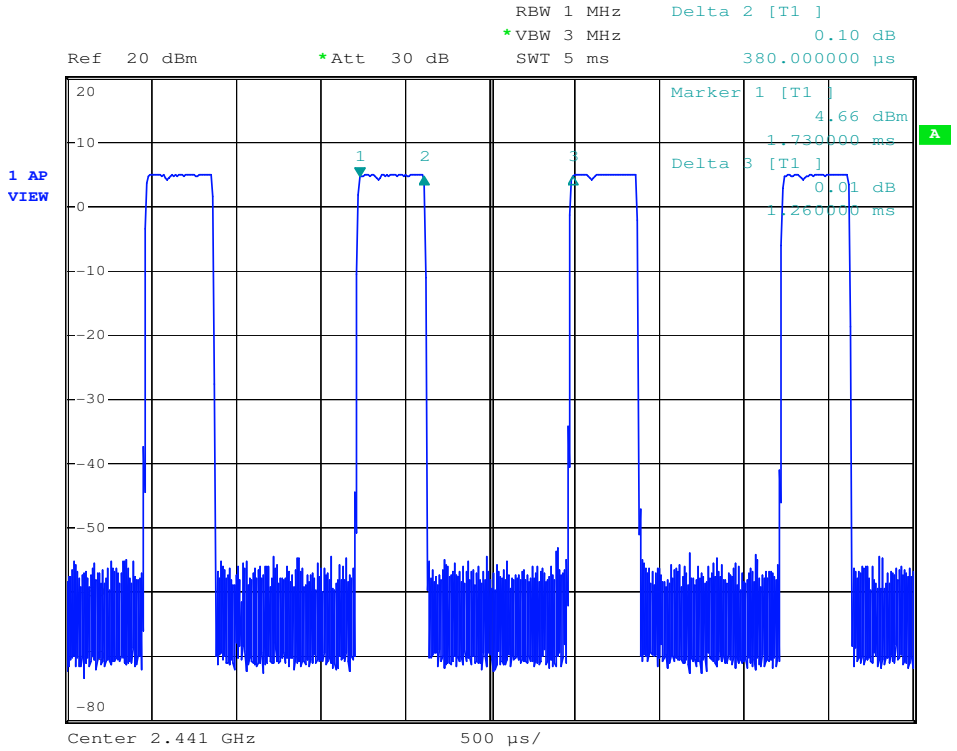
Test Procedure:

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. Use Emission width / No. of Hopping Channels in 31.6s to determine the dwell time.

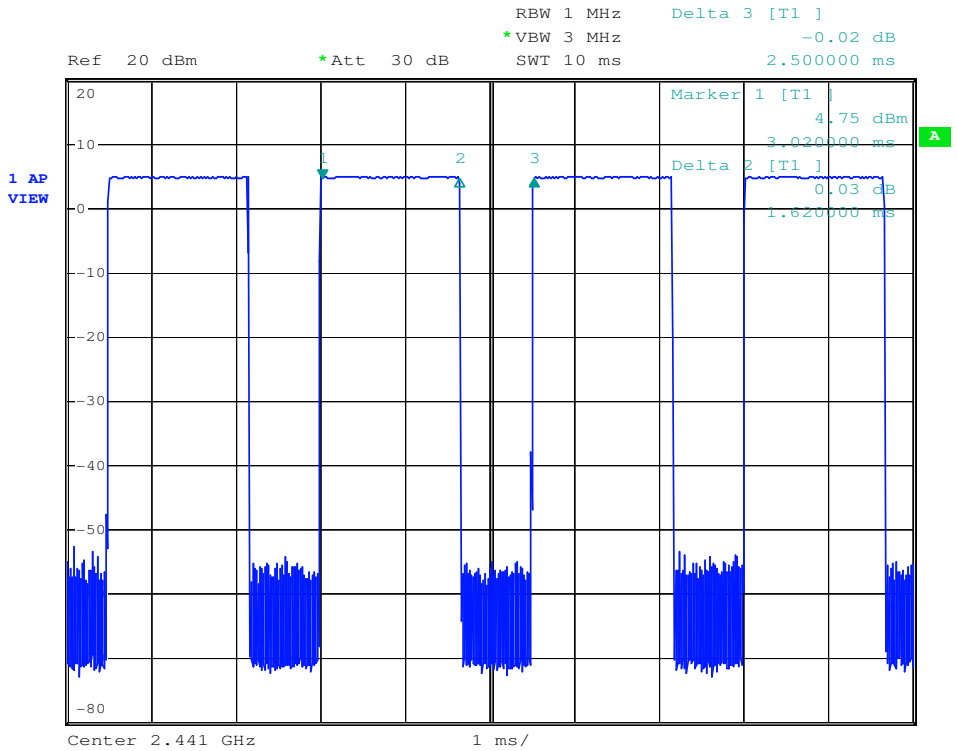
Frequency (MHz)	Modulation	Packet	Emission Width (ms)	Number of Hopping Channel in 31.6s	Average Time of Occupancy(s)	Limit(s)	Result
2441	GFSK	DH1	0.38	201	0.076	0.4	Pass
		DH3	1.62	125	0.203	0.4	Pass
		DH5	2.88	90	0.259	0.4	Pass
	π/4DQPSK	DH1	0.39	211	0.082	0.4	Pass
		DH3	1.65	140	0.231	0.4	Pass
		DH5	2.92	88	0.257	0.4	Pass
	8DPSK	DH1	0.40	164	0.065	0.4	Pass
		DH3	1.64	123	0.202	0.4	Pass
		DH5	2.92	102	0.298	0.4	Pass

Test plot as follows::

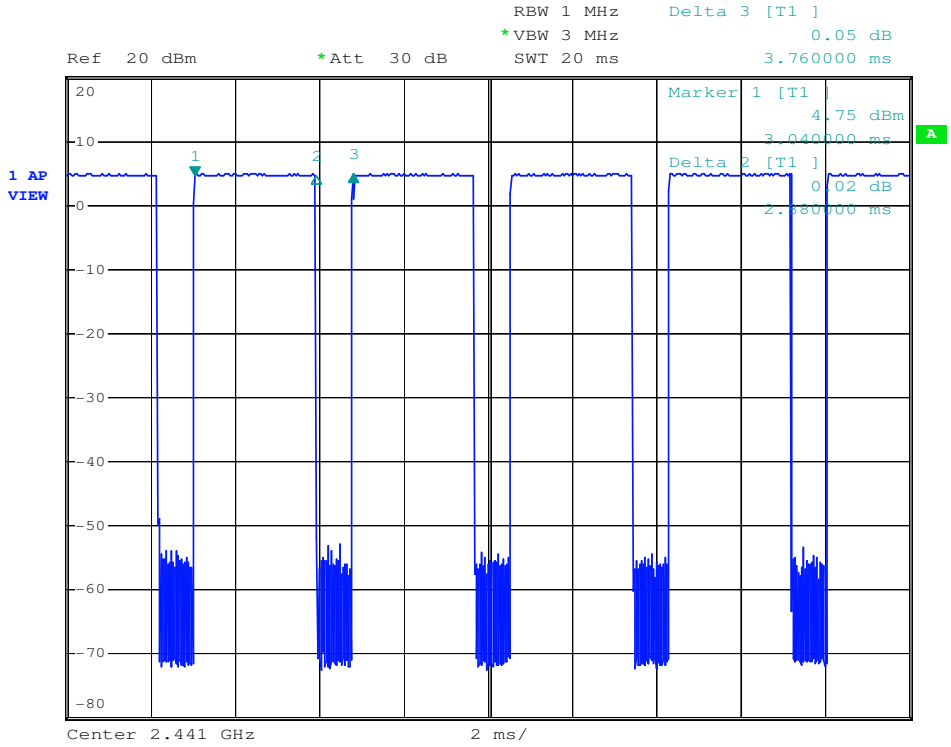
Frequency 2441MHz: Modulation: GFSK-DH1



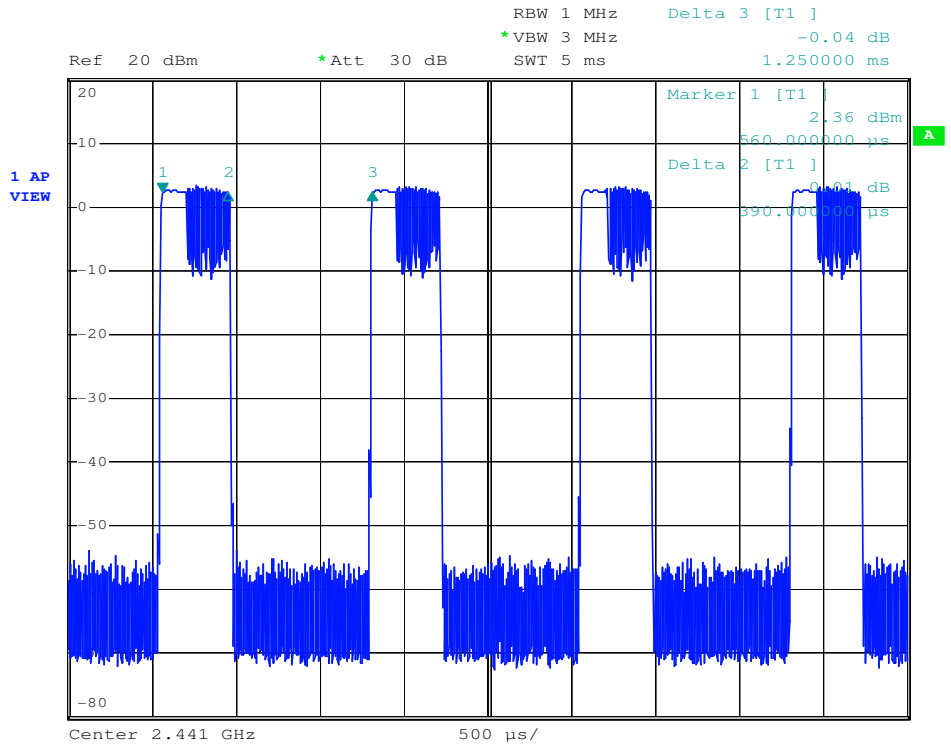
Frequency 2441MHz: Modulation: GFSK- DH3



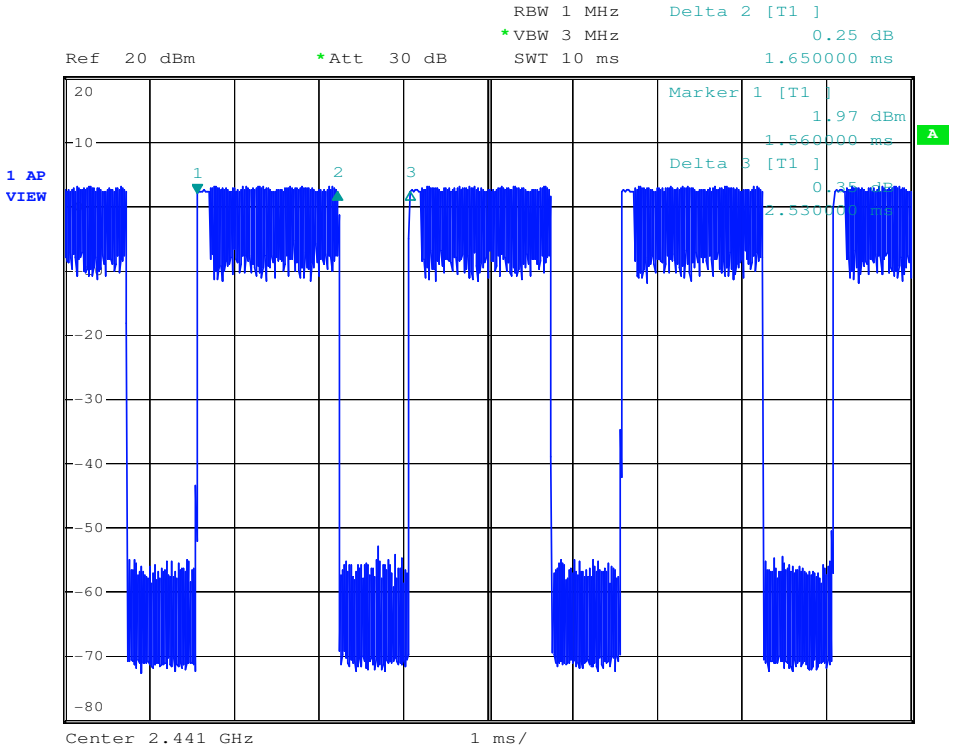
Frequency 2441MHz: Modulation: GFSK- DH5



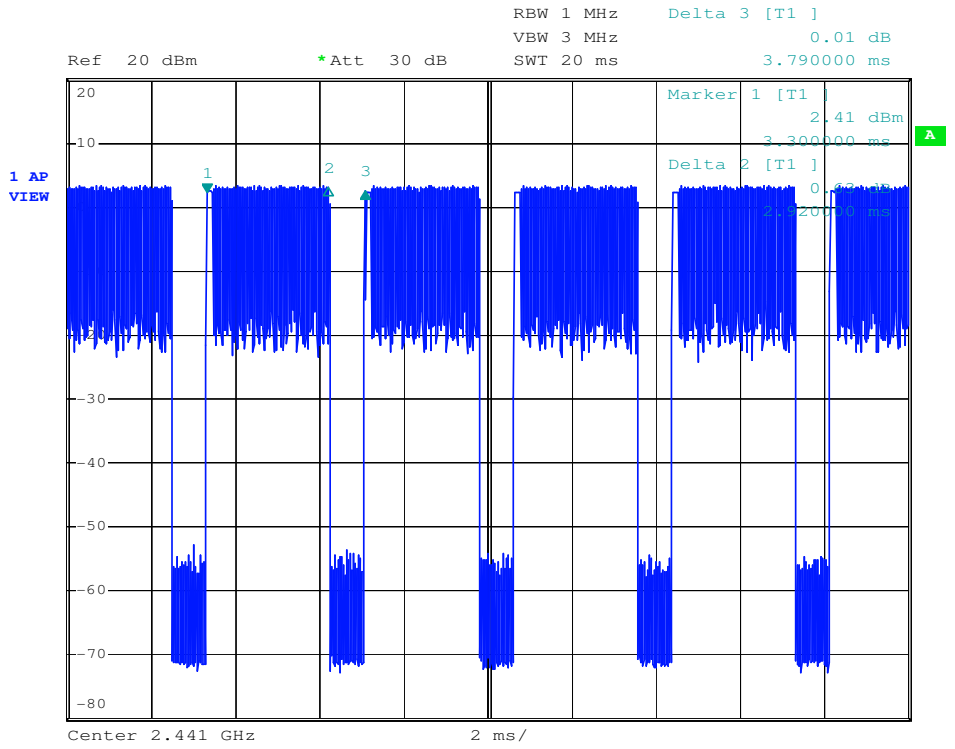
Frequency 2441MHz: Modulation: π/4DQPSK -DH1



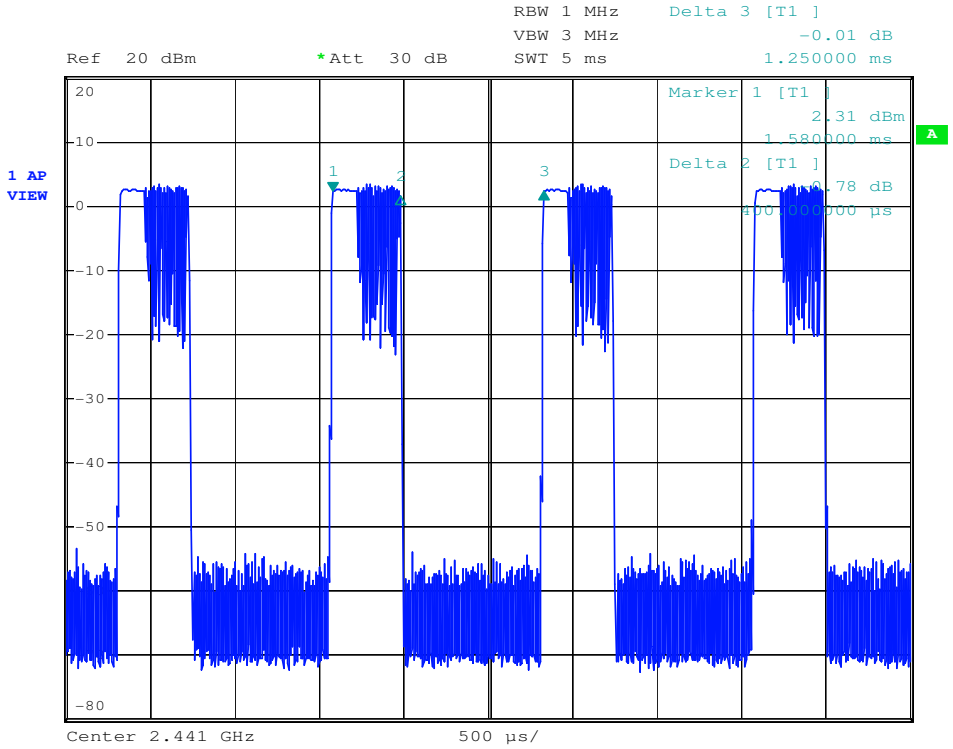
Frequency 2441MHz: Modulation: π/4DQPSK - DH3



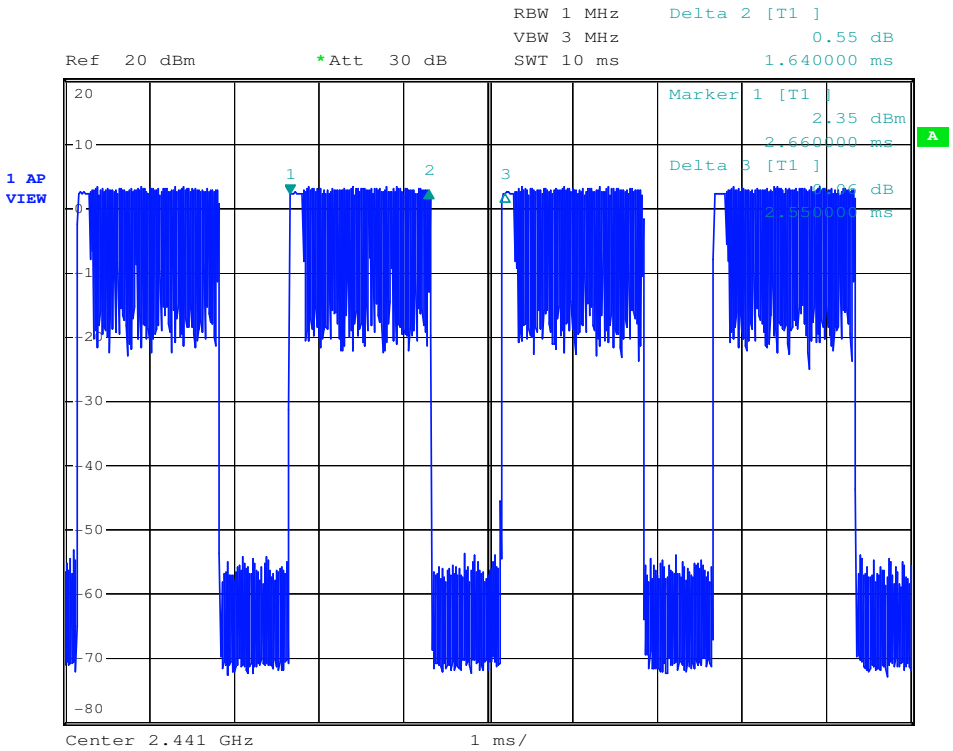
Frequency 2441MHz: Modulation: π/4DQPSK - DH5



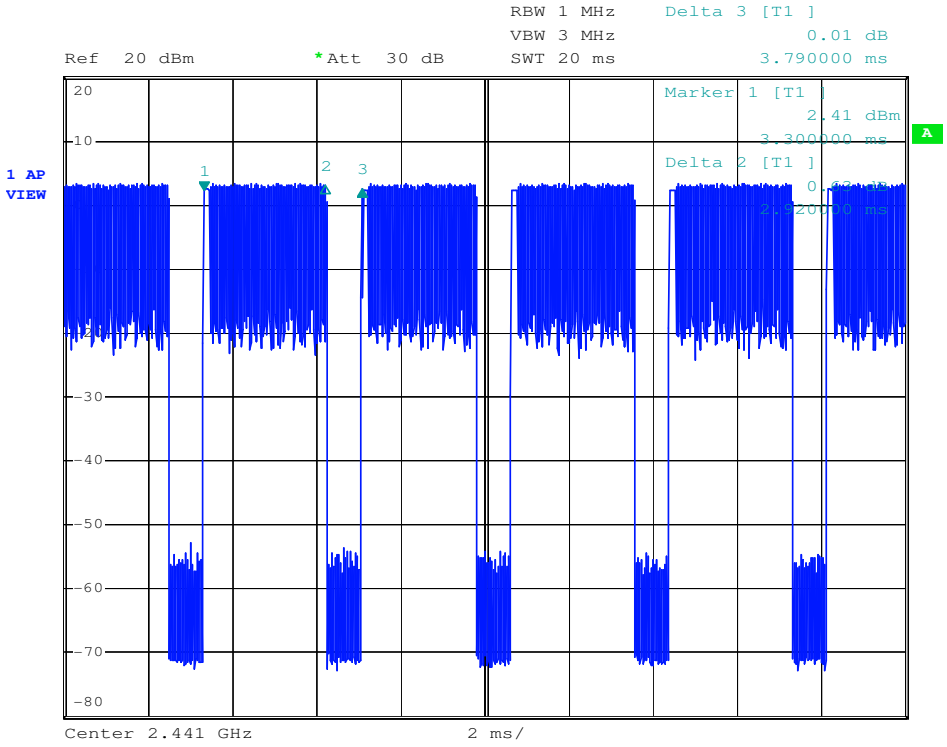
Frequency 2441MHz: Modulation: 8DPSK –DH1



Frequency 2441MHz: Modulation: 8DPSK - DH3



Frequency 2441MHz: Modulation: 8DPSK - DH5



7.8 Conducted Spurious Emissions

Test Requirement: FCC Part 15 Section 15.247(d)
RSS 210 A 8.5

Test Method: ANSI C63.10:2009 Clause 7.7.10

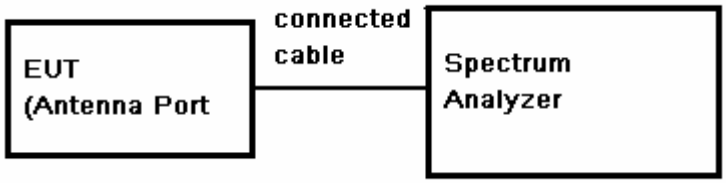
Test Date: May 09, 2013

Limit: (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.

Final Test Mode: EUT on transmitting mode, From the Pre-test find the 8DPK is the worst case. So the results show the worst results into the report.

Test Result: Pass

Test Configuration:



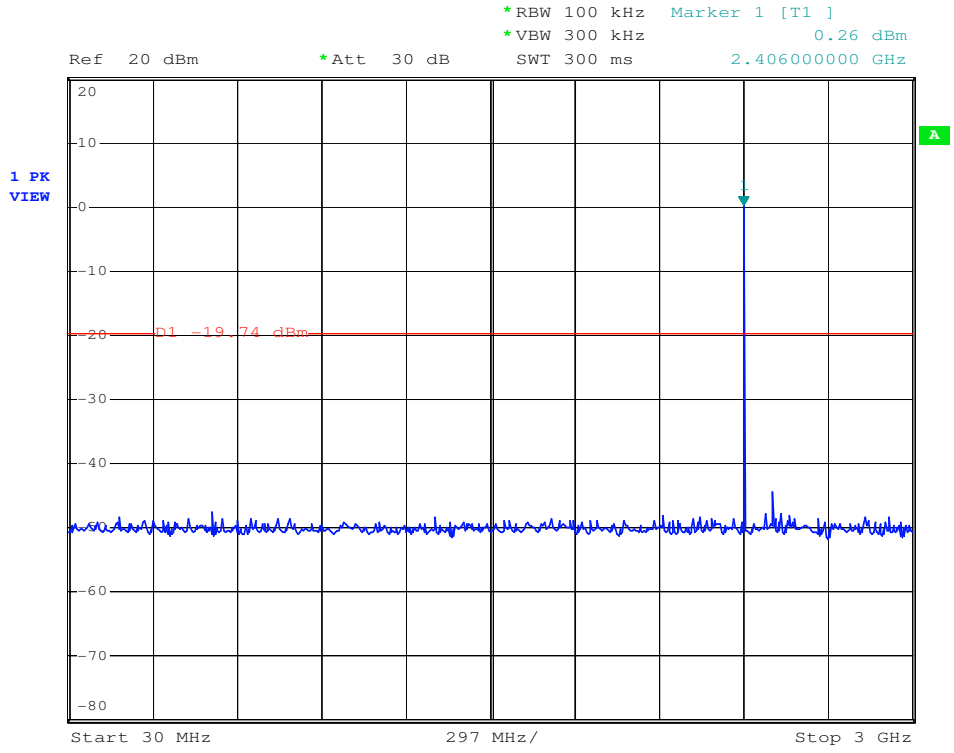
Test Procedure: 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

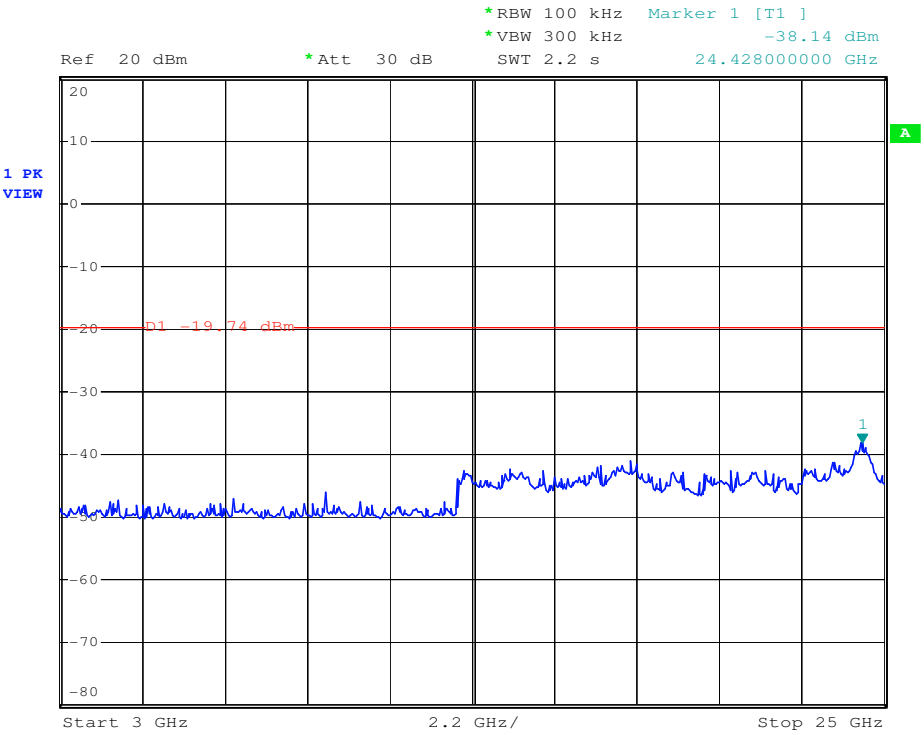
Test plot as follows:

Frequency:	2402MHz	Test channel:	Lowest

For 30MHz-3GHz:

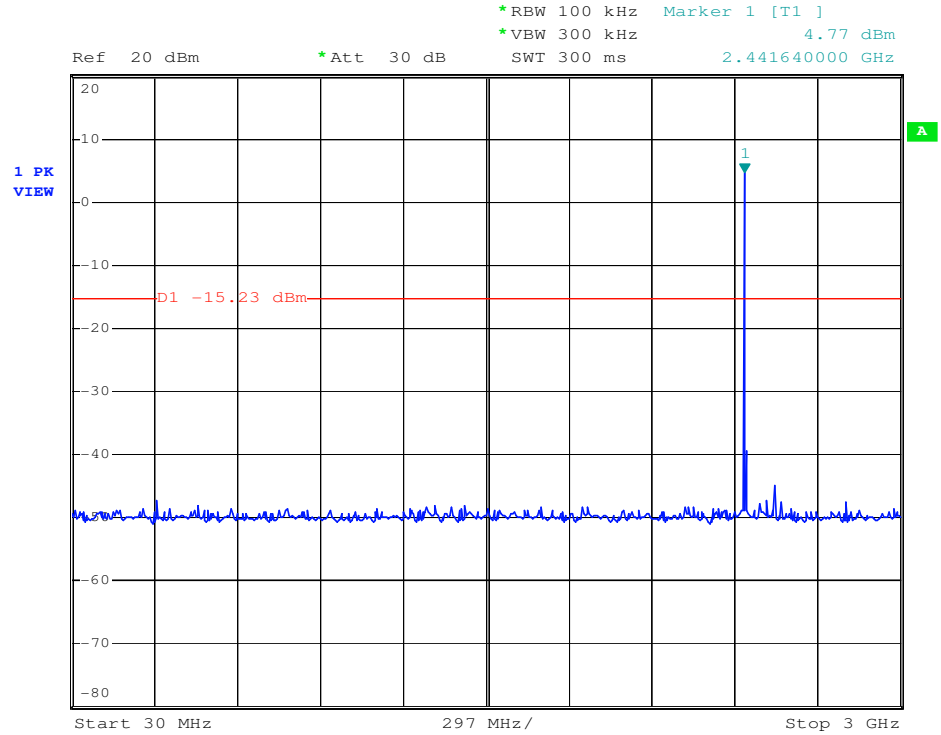


For 3GHz-25GHz:

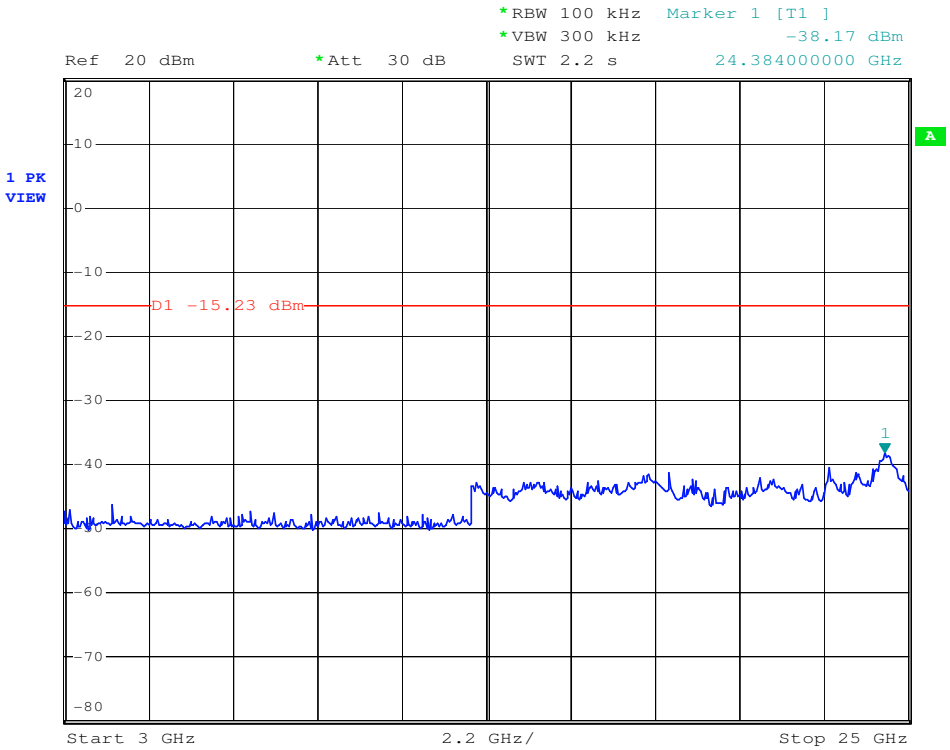


Frequency:	2441MHz	Test channel:	Middle

For 30MHz-3GHz:

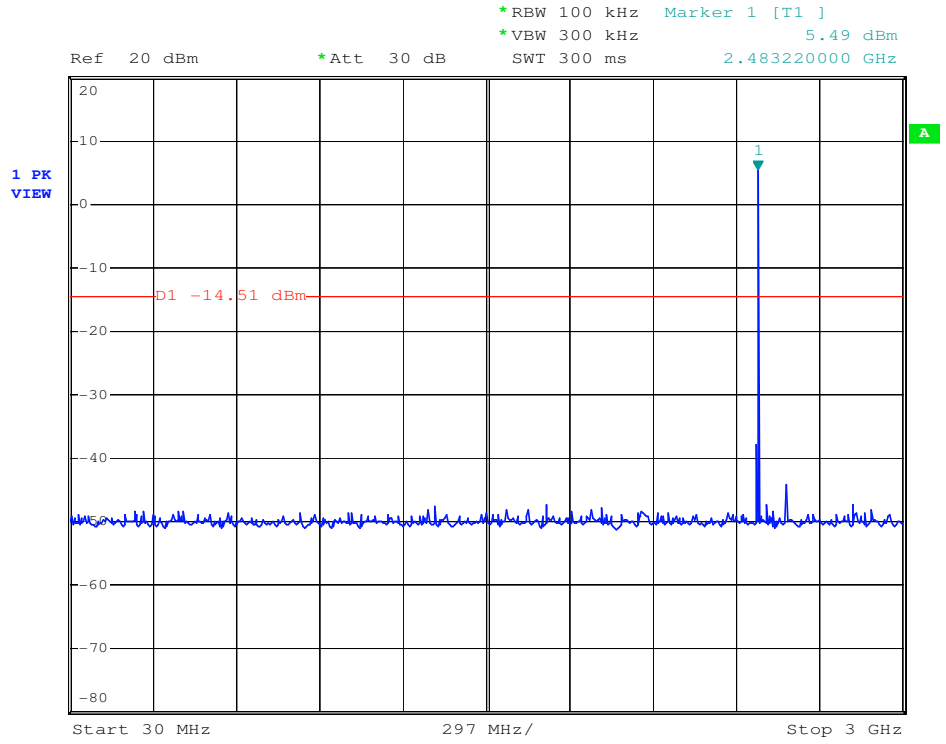


For 3GHz-25GHz:

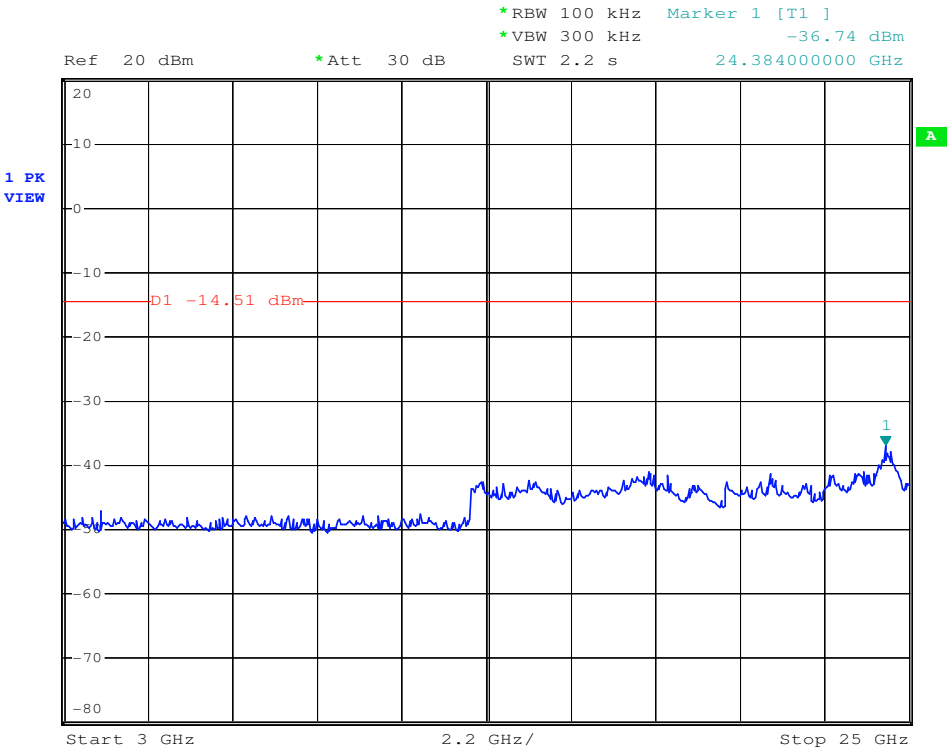


Frequency:	2480MHz	Test channel:	Highest

For 30MHz-3GHz:



For 3GHz-25GHz:



7.9 Conducted Band-edge

Test Requirement: FCC Part 15 Section 15.247(d)
RSS-Gen section 4.9

Test Method: ANSI C63.10:2009 Clause 7.7.10

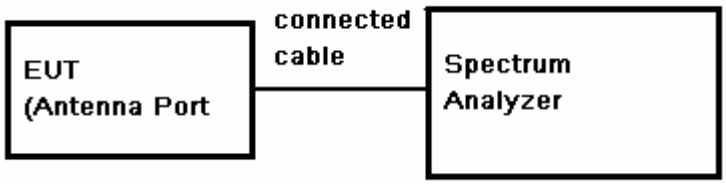
Test Date: May 09, 2013

Limit: (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.

Final Test Mode: BT transmitting mode

Test Result: Pass

Test Configuration:



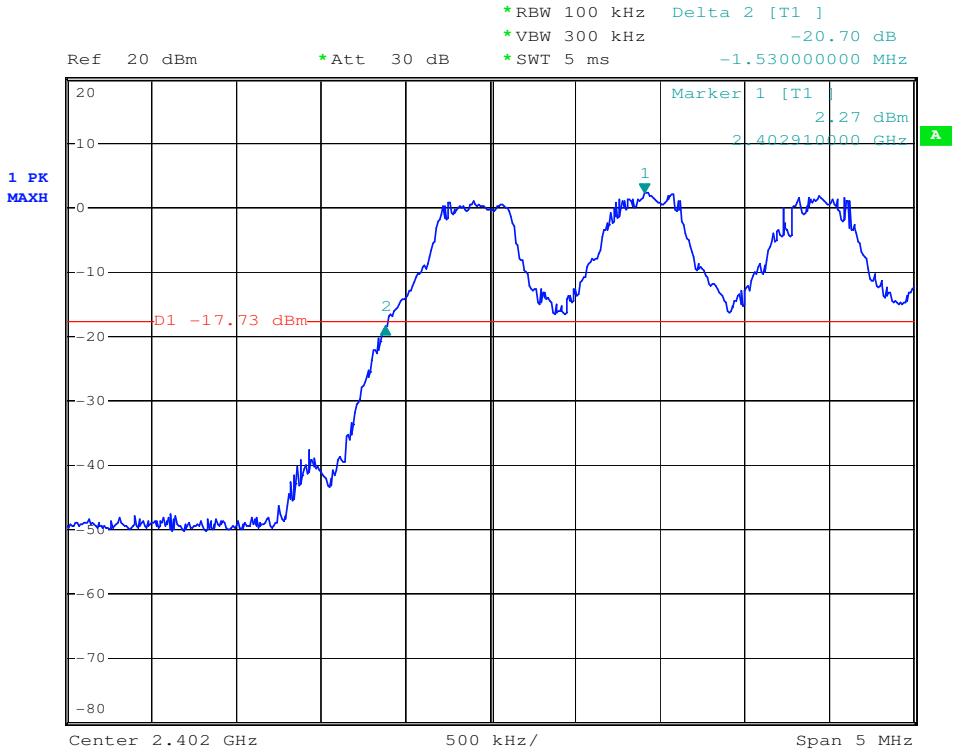
Test Procedure: 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

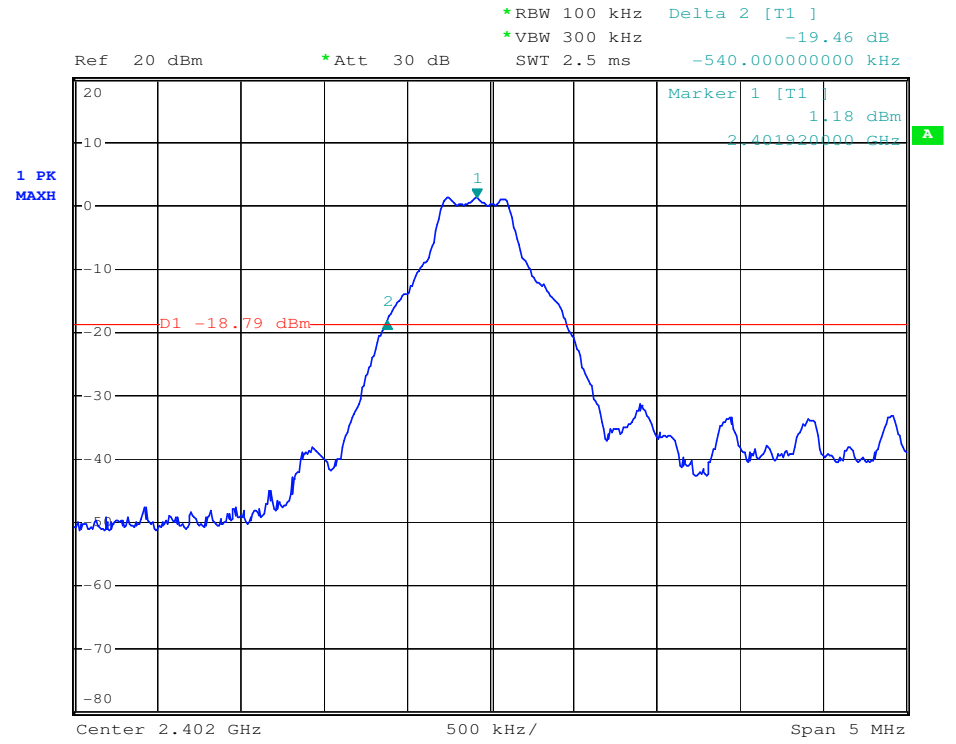
Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest

For Hopping:

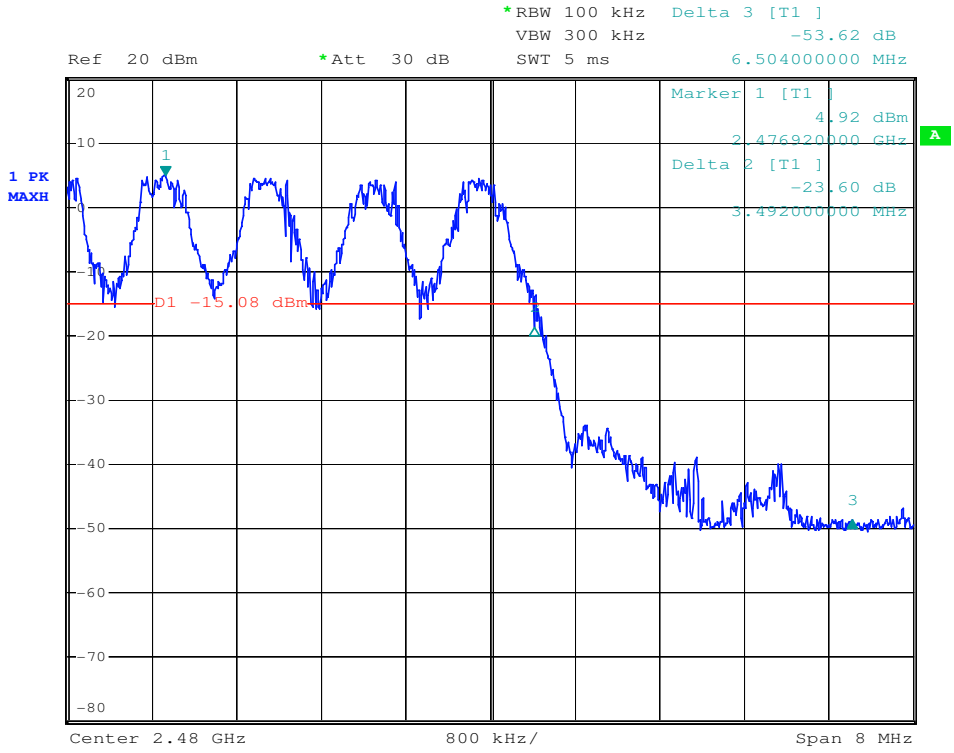


For Static:

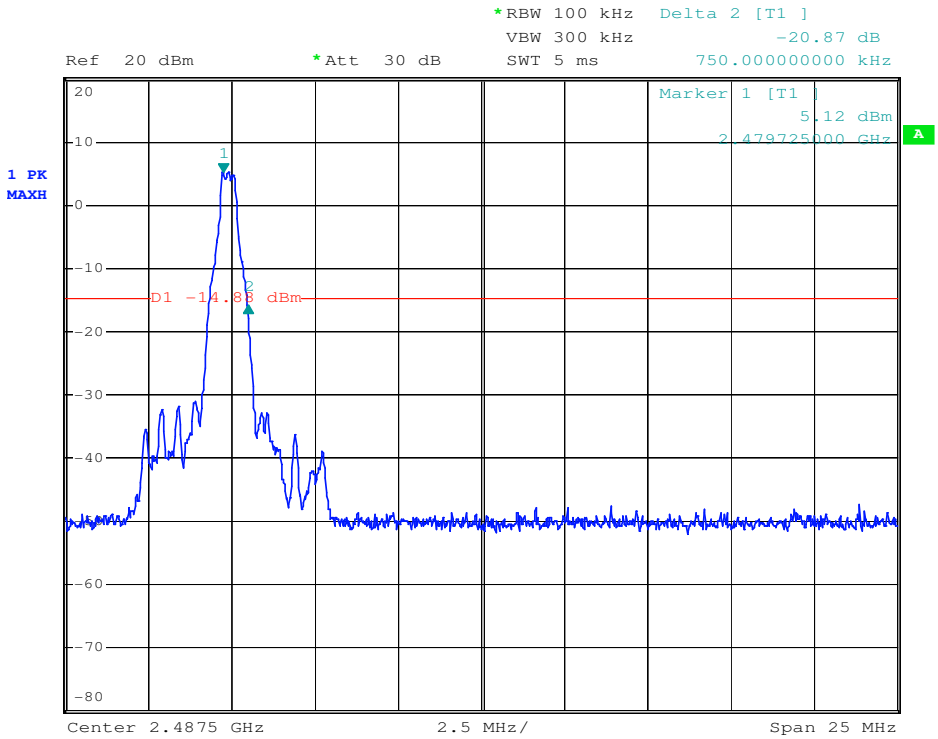


Test mode:	GFSK	Test channel:	Highest

For Hopping:

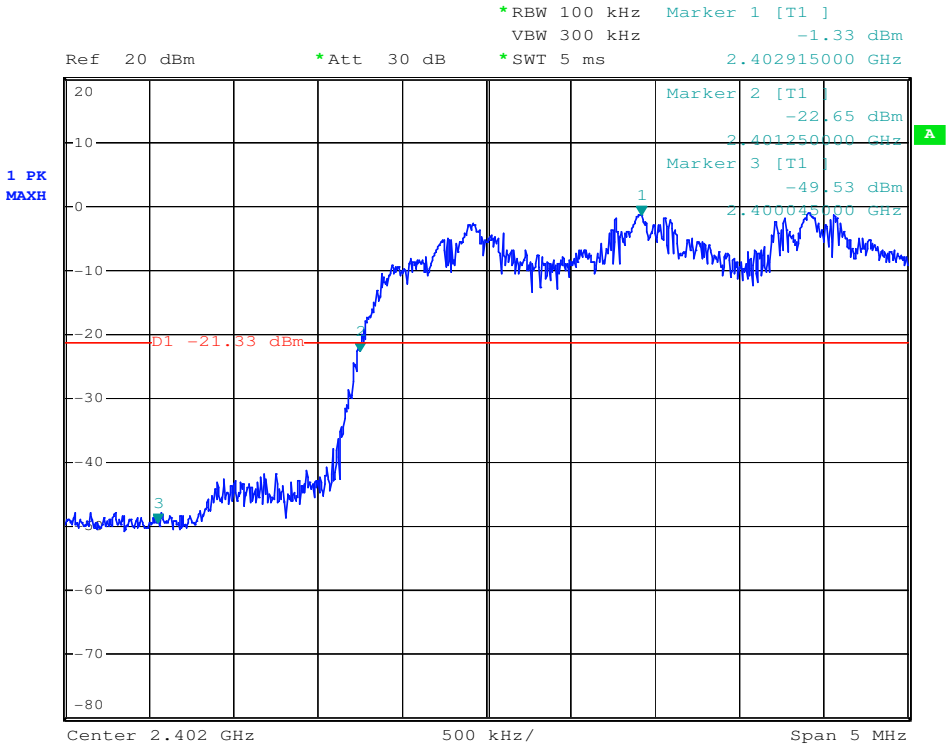


For Static:

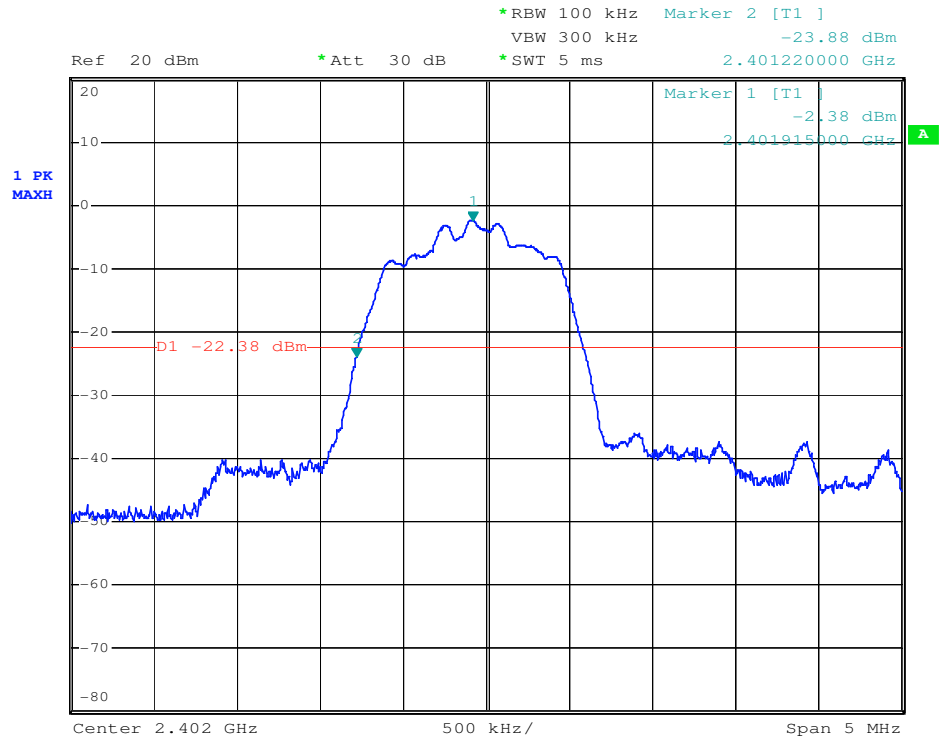


Test mode:	π/4DQPSK	Test channel:	Lowest

For Hopping:

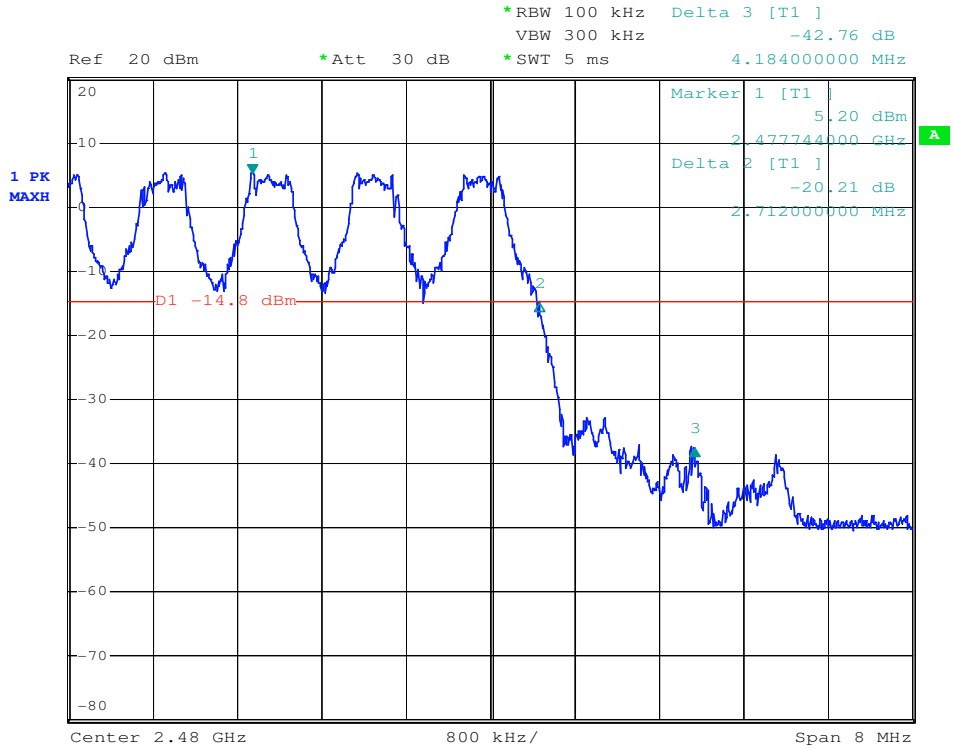


For Static:

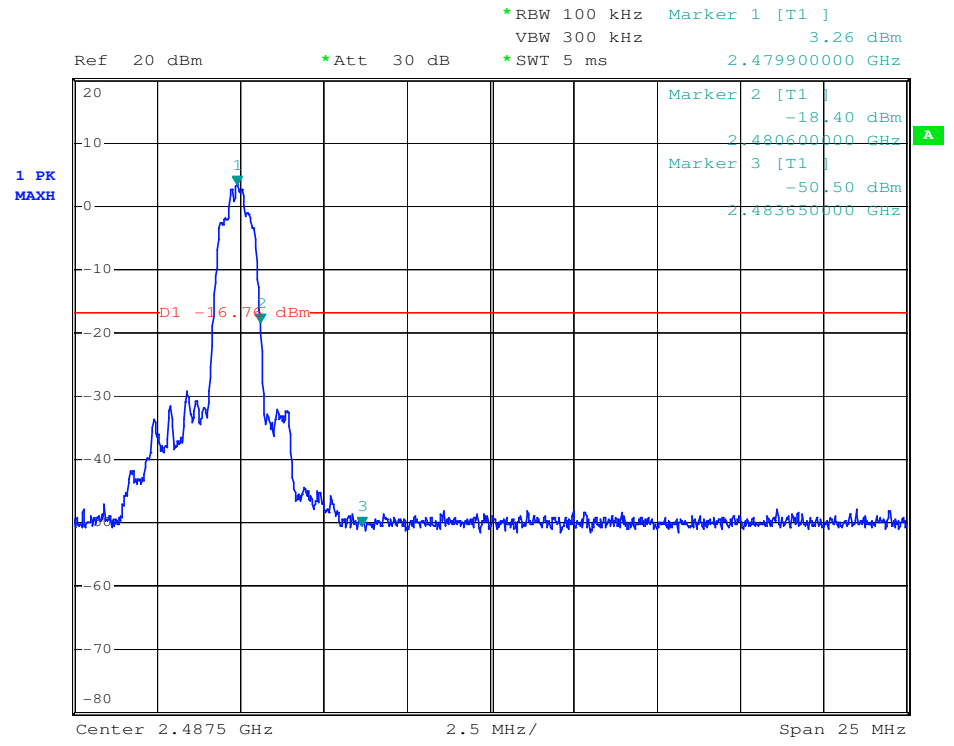


Test mode:	π/4DQPSK	Test channel:	Highest

For Hopping:

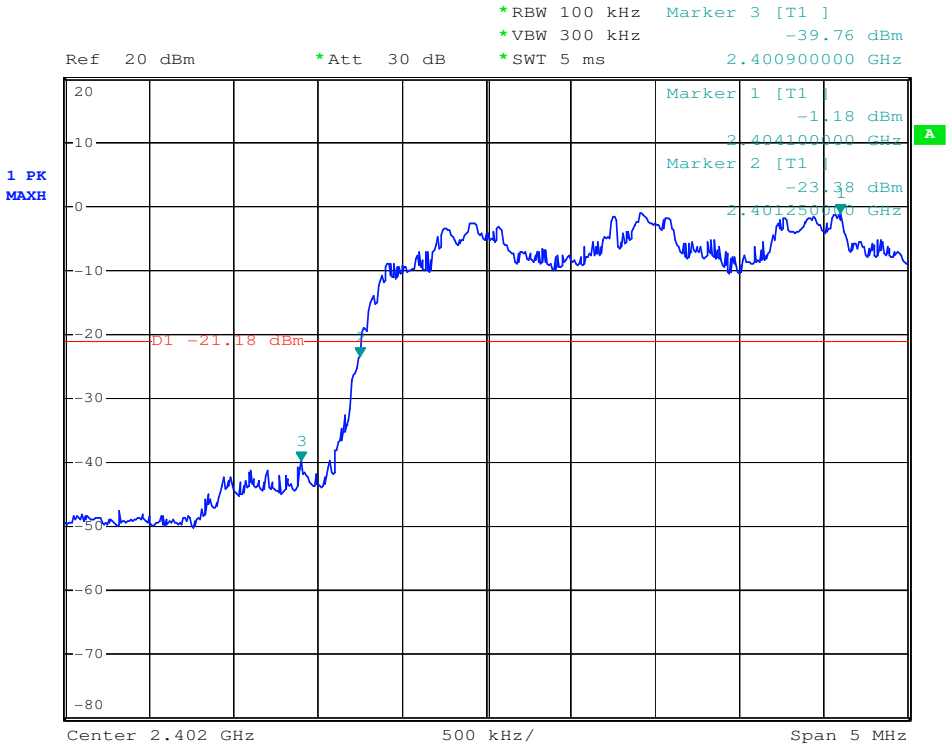


For Static:

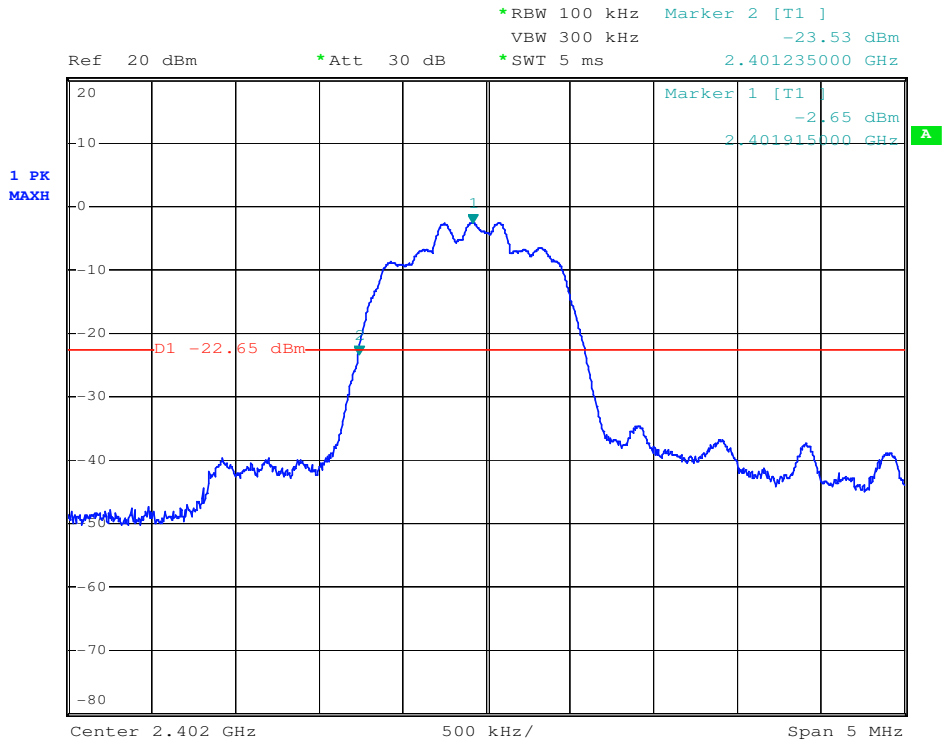


Test mode:	8DPSK	Test channel:	Lowest

For Hopping:

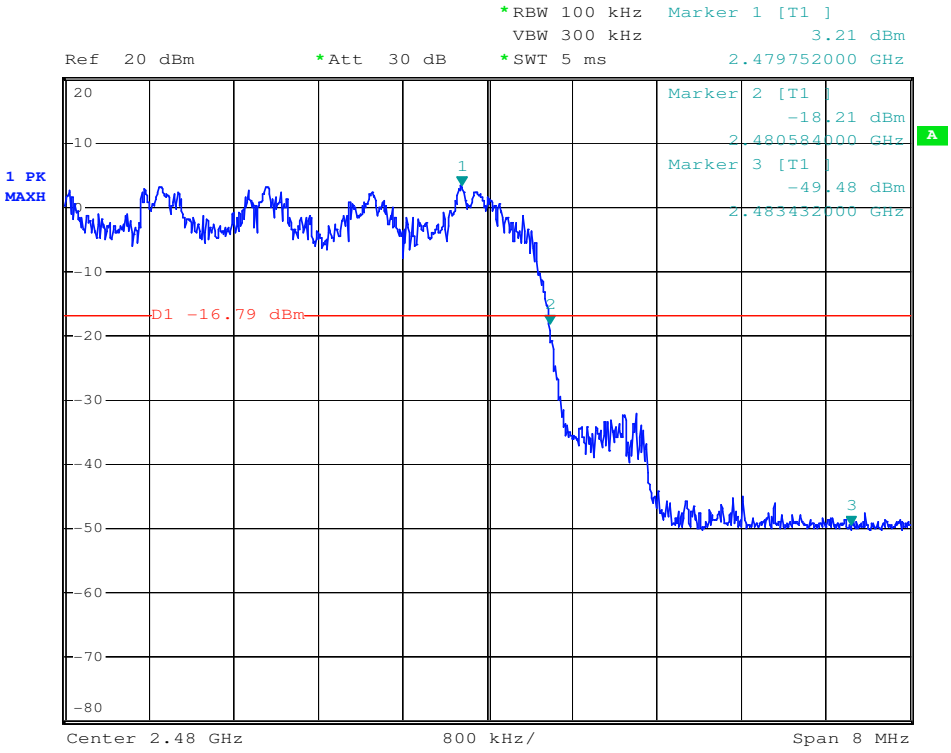


For Static:

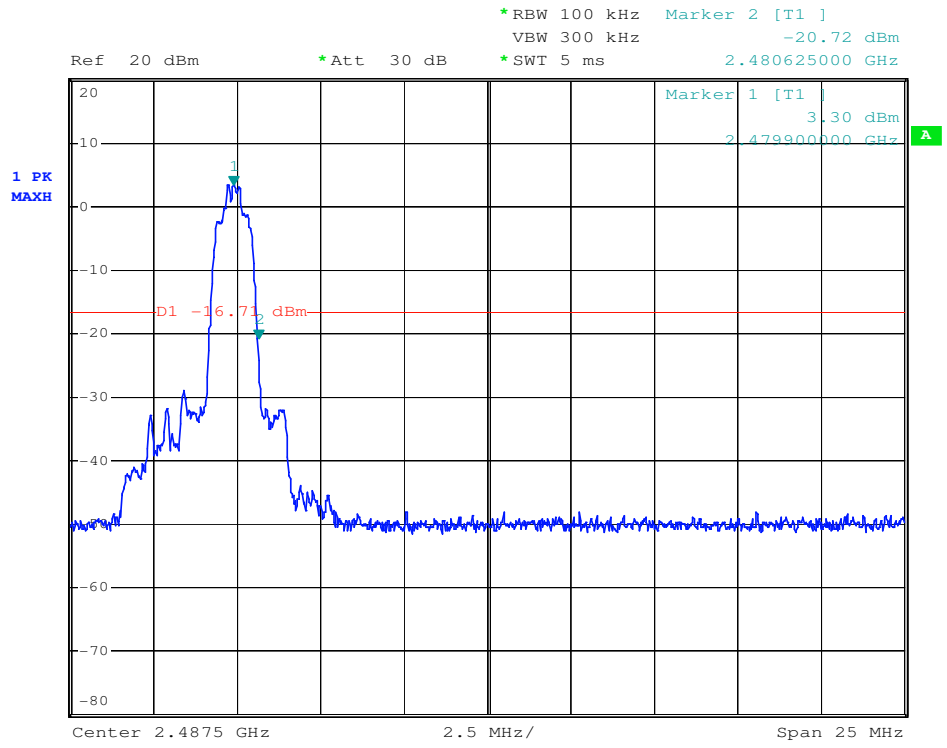


Test mode:	8DPSK	Test channel:	Highest

For Hopping:



For Static:



7.10 Radiated Spurious Emissions

Test Requirement:	FCC Part 15 Section 15.209 and Section 15.205 RSS-Gen section 4.9
Test Method:	ANSI C63.10:2009 Clause 6.12
Test Date:	May 15, 2013
Final Test Mode:	BT transmitting mode
Test site/setup:	Measurement Distance: 3m (Semi-Anechoic Chamber) Test instrumentation resolution bandwidth 120 kHz and Quasi-Peak detector applies (30 MHz - 1000 MHz). For PK value: RBW = 1 MHz for f ≥ 1 GHz VBW ≥ RBW; Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for f ≥ 1 GHz VBW =10Hz; Sweep = auto Detector function = peak Trace = max hold Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal
15.209 Limit:	40.0 dBμV/m between 30MHz & 88MHz 43.5 dBμV/m between 88MHz & 216MHz 46.0 dBμV/m between 216MHz & 960MHz 54.0 dBμV/m above 960MHz

Test Configuration:

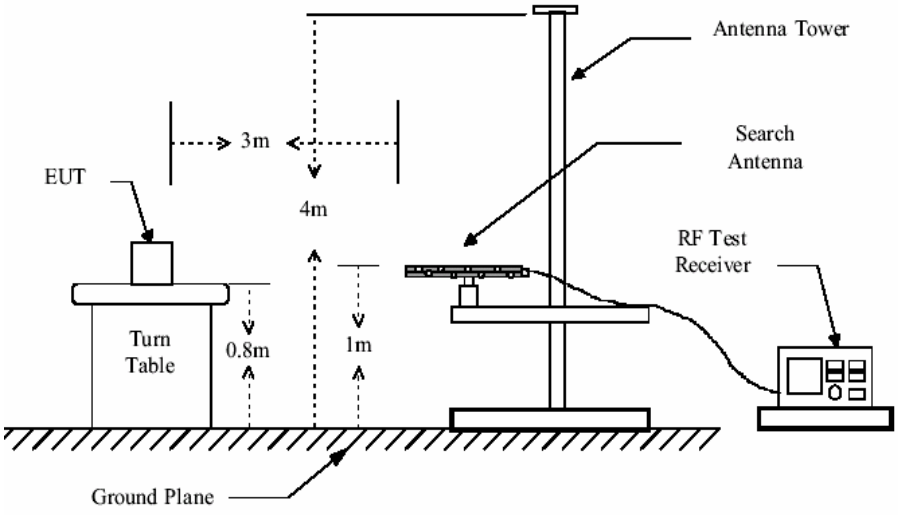


Figure 1. 30MHz to 1GHz radiated emissions test configuration

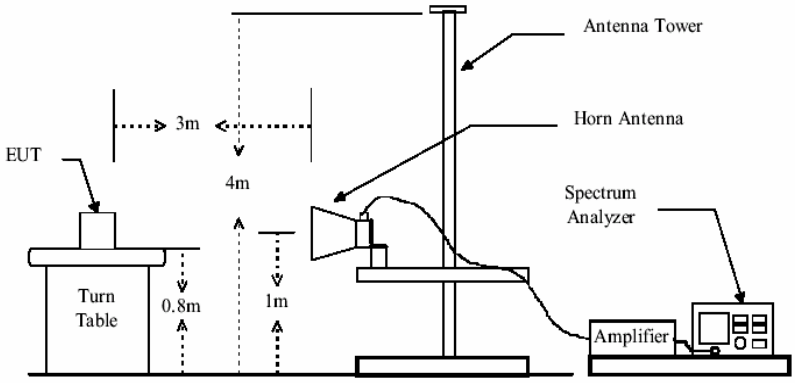


Figure 2. Above 1GHz radiated emissions test configuration

Test Procedure:

The procedure used was ANSI Standard C63.10:2009. The receiver was scanned from 30MHz to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

Low nosie amplifier was used below 1GHz,High pass Filter was used above 3GHz.

Between 1G and 3GHz, we did not use any amplifier or filter.

Pre-test was performed on GFSK and EDR mode with charging mode and only battery power mode, Compliance test was performed on worse case (8DPSK mode).

Test were performed for there spatial orthogonal(X, Y, Z), the worst test data (X orthogonal)

was sumitted.

1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.

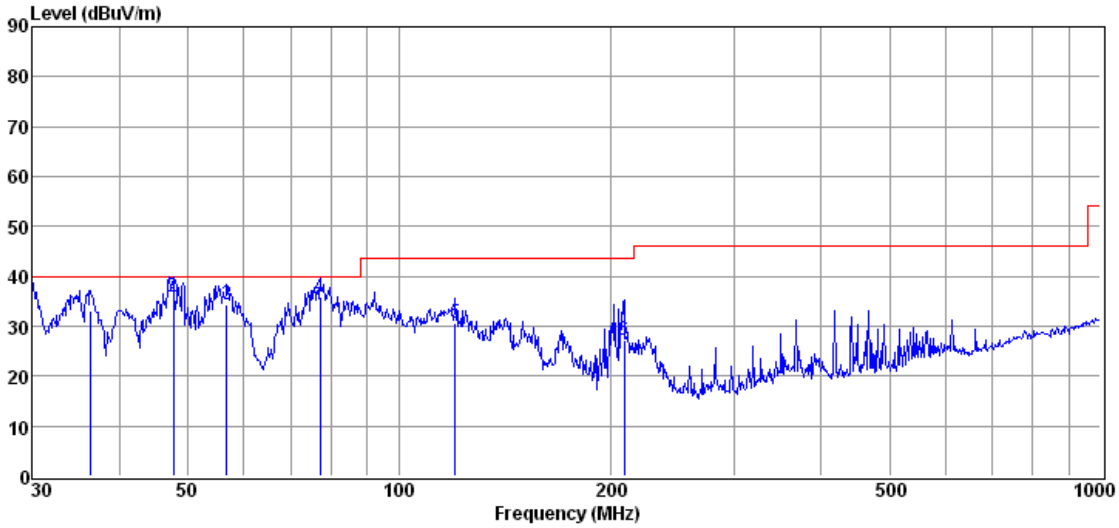
As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Below show the worst Test results:

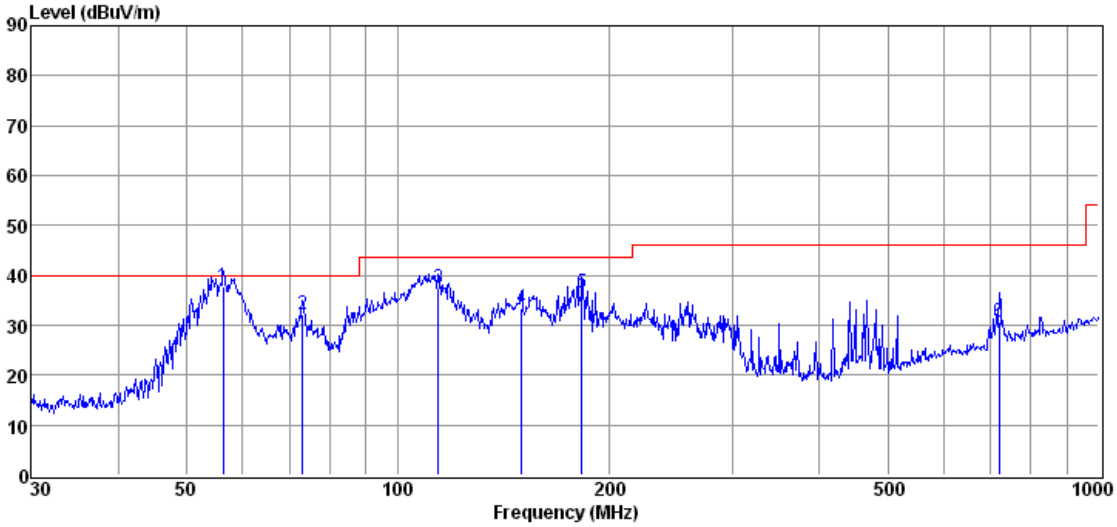
30MHz to 1GHz

BT transmitting mode **Test Antenna Status:** Vertical



Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Preamp Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
36.25	44.78	12.62	24.70	0.51	33.21	40.00	-6.79	QP	Vertical
47.64	47.13	12.94	24.70	0.63	36.00	40.00	-4.00	QP	Vertical
56.76	45.88	12.39	24.70	0.70	34.27	40.00	-5.73	QP	Vertical
77.25	50.45	9.35	24.70	0.85	35.95	40.00	-4.05	QP	Vertical
120.28	43.99	10.21	24.70	1.14	30.64	43.50	-12.86	QP	Vertical
209.31	41.19	9.21	24.60	1.55	27.35	43.50	-16.15	QP	Vertical

BT transmitting mode **Test Antenna Status:** Horizontal



Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Preamp Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
56.32	49.39	12.42	24.70	0.70	37.81	40.00	-2.19	QP	Horizontal
73.23	45.75	10.15	24.70	0.82	32.02	40.00	-7.98	QP	Horizontal
114.21	50.35	10.56	24.70	1.11	37.32	43.50	-6.18	QP	Horizontal
150.06	44.28	12.70	24.70	1.27	33.55	43.50	-9.95	QP	Horizontal
183.18	49.04	10.65	24.60	1.43	36.52	43.50	-6.98	QP	Horizontal
721.73	30.39	21.01	24.10	3.23	30.53	46.00	-15.47	QP	Horizontal

1GHz-12GHz:

BT transmitting mode	8DPSK	**Test Channel:**	Low	**Test Antenna:**	Horizontal

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	AV Limit (dBuV/m)	Over limit (dB)	Detector
1	5680	41.18	1.44	42.62	54	-11.38	peak
2	7468	39.26	7.57	46.83	54	-7.17	peak
3	9580	38.85	11.79	50.64	54	-3.36	peak
4	11152	37.96	9.73	47.69	54	-6.31	peak

BT transmitting mode	8DPSK	Test Channel:	Low	Test Antenna:	Vertical

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	AV Limit (dBuV/m)	Over limit (dB)	Detector
1	5680	41.74	1.44	43.18	54	-10.82	peak
2	7564	39.13	7.74	46.87	54	-7.13	peak
3	9520	39.11	11.89	51.00	54	-3.00	peak
4	11176	38.23	9.7	47.93	54	-6.07	peak

BT transmitting mode	8DPSK	Test Channel:	Middle	Test Antenna:	Horizontal

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	AV Limit (dBuV/m)	Over limit (dB)	Detector
1	5752	41.75	1.59	43.34	54	-10.66	peak
2	7528	38.66	7.73	46.39	54	-7.61	peak
3	9520	38.85	11.89	50.74	54	-3.26	peak
4	11164	38.38	9.72	48.1	54	-5.90	peak

BT transmitting mode	8DPSK	Test Channel:	Middle	Test Antenna:	Vertical

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	AV Limit (dBuV/m)	Over limit (dB)	Detector
1	5668	41.56	1.42	42.98	54	-11.02	peak
2	7564	38.69	7.74	46.43	54	-7.57	peak
3	9544	37.74	11.84	49.58	54	-4.42	peak
4	11164	37.73	9.72	47.45	54	-6.55	peak

BT transmitting mode	8DPSK	Test Channel:	High	Test Antenna:	Horizontal

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	AV Limit (dBuV/m)	Over limit (dB)	Detector
1	5848	41.23	1.8	43.03	54	-10.97	peak
2	7540	38.75	7.72	46.47	54	-7.53	peak
3	9604	38.31	11.76	50.07	54	-3.93	peak
4	11212	38.16	9.64	47.8	54	-6.20	peak

BT transmitting mode	8DPSK	Test Channel:	High	Test Antenna:	Vertical

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	AV Limit (dBuV/m)	Over limit (dB)	Detector
1	5644	41.7	1.36	43.06	54	-10.94	peak
2	7564	38.44	7.74	46.18	54	-7.82	peak
3	9508	38.35	11.9	50.25	54	-3.75	peak
4	11188	37.22	9.68	46.9	54	-7.10	peak

Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

Remark: No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.

7.11 Band edge (Radiated Emission)

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:	ANSI 63.10:2009 Clause 6.12
Test Date:	May 15, 2013
Measurement Distance:	3m (Semi-Anechoic Chamber)
Limit:	40.0 dBμV/m between 30MHz & 88MHz; 43.5 dBμV/m between 88MHz & 216MHz; 46.0 dBμV/m between 216MHz & 960MHz; 54.0 dBμV/m above 960MHz.
Detector:	For PK value: RBW = 1 MHz for f ≥ 1 GHz VBW ≥ RBW; Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for f ≥ 1 GHz VBW =10Hz; Sweep = auto Detector function = peak Trace = max hold

According to section,15.35(b) for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

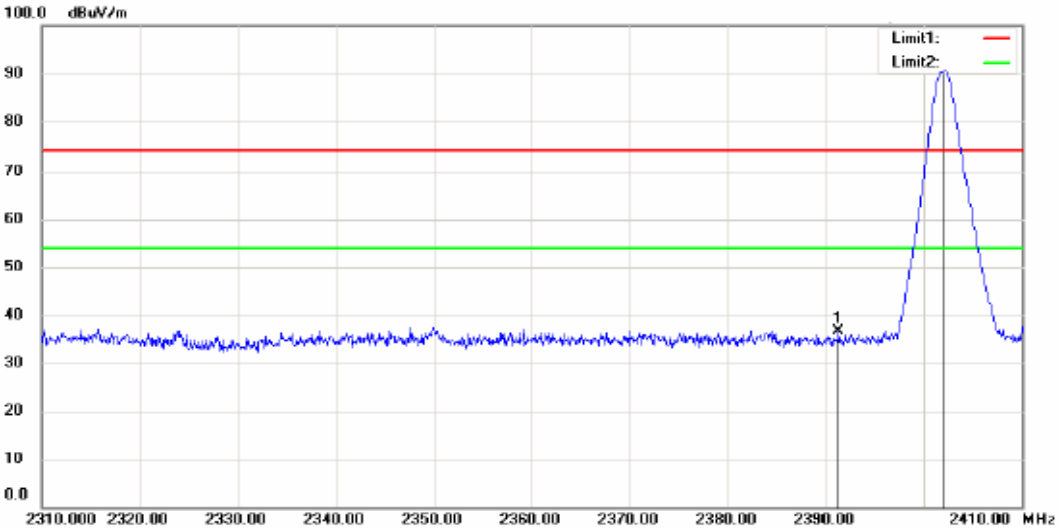
Pre-test were performed for there spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was sumitted.

Test Result: The EUT does meet the FCC requirements.

Measurement Result:

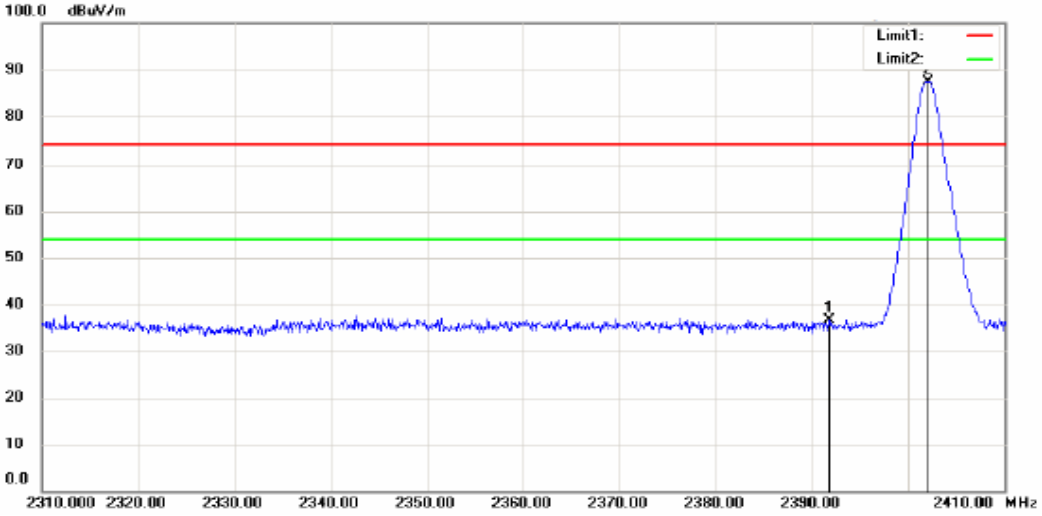
CH Low 2402MHz Radiated Bandedge **Modulation: GFSK**

Horizontal, Peak Detector:



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over limit (dB)	Detector
1	2391.300	43.09	-6.55	36.54	54	-17.46	Peak
2	2402.100	97.16	-6.54	90.62	54	36.62	Peak

Vertical, Peak Detector:

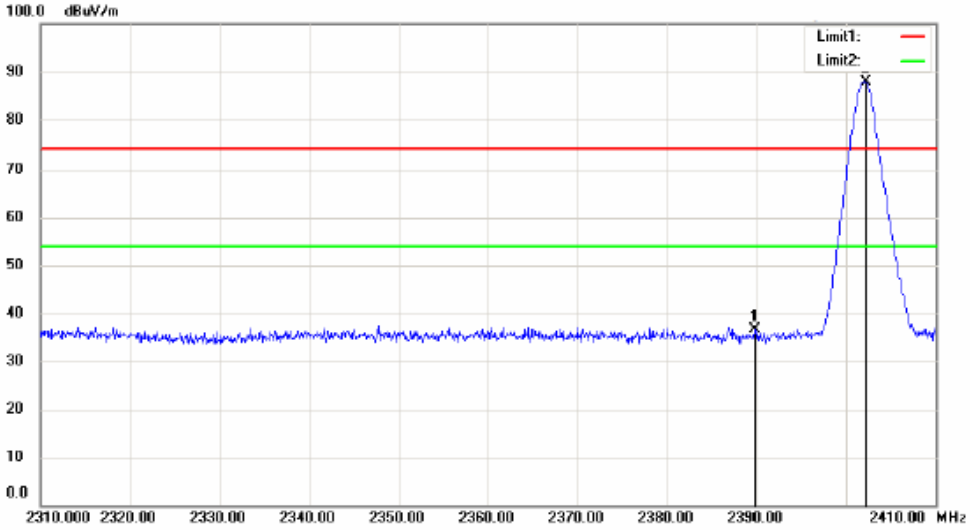


MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over limit (dB)	Detector
1	2391.800	43.15	-6.55	36.60	54	-17.40	Peak
2	2402.100	94.03	-6.54	87.49	54	33.49	Peak

Measurement Result:

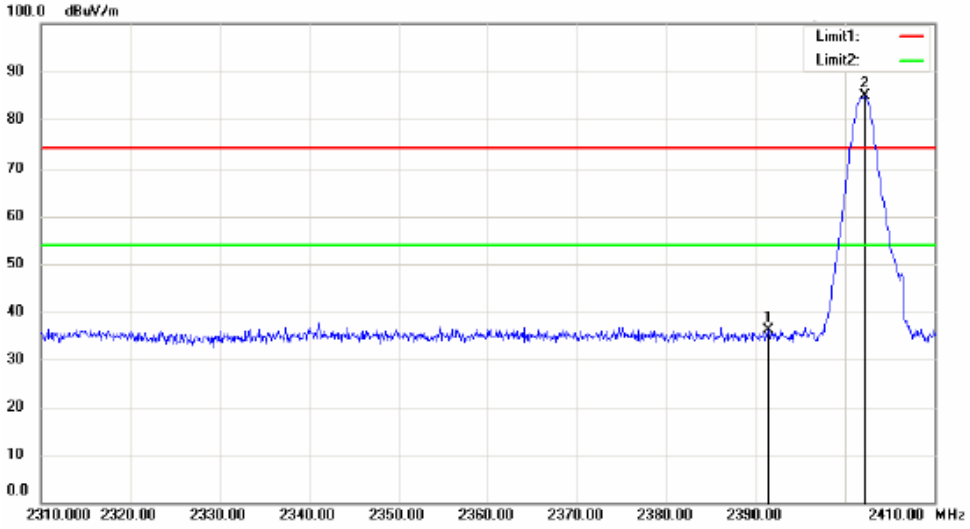
CH Low 2402MHz Radiated Bandedge **Modulation:** π/4DQPSK

Horizontal, Peak Detector:



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over limit (dB)	Detector
1	2389.800	43.13	-6.55	36.58	54	-17.42	Peak
2	2402.200	94.44	-6.54	87.90	54	33.90	Peak

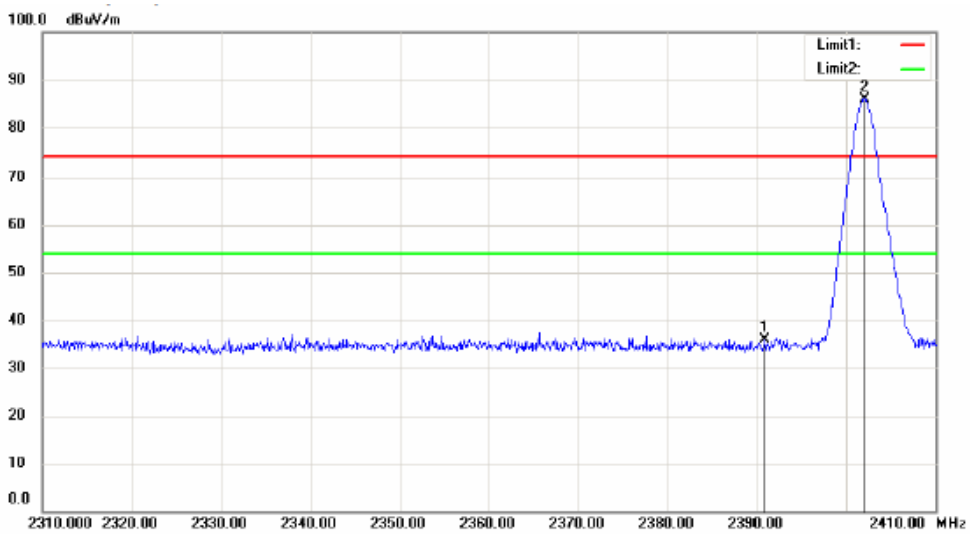
Vertical, Peak Detector:



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over limit (dB)	Detector
1	2391.400	42.59	-6.55	36.04	54	-17.96	Peak
2	2402.200	91.40	-6.54	84.86	54	30.86	Peak

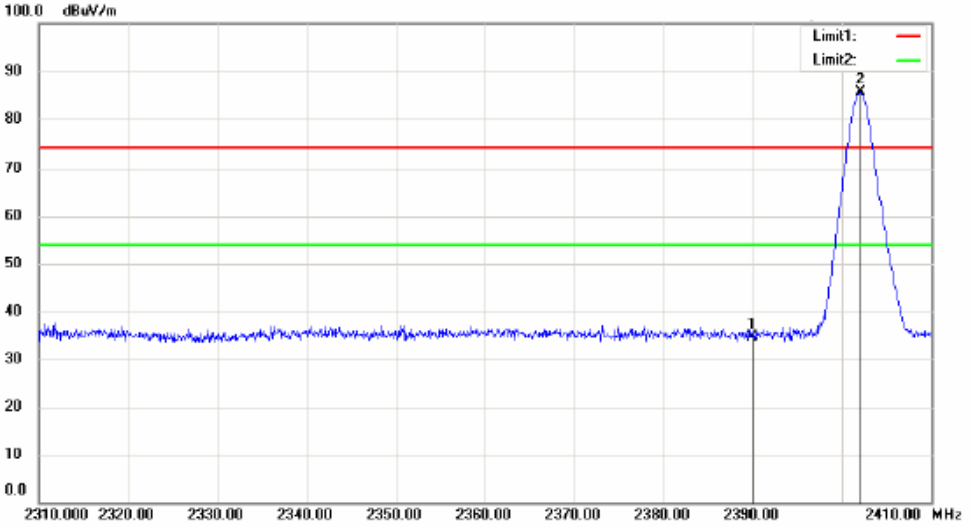
CH Low 2402MHz Radiated Bandedge **Modulation: 8DPSK**

Horizontal, Peak Detector:



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over limit (dB)	Detector
1	2390.900	42.39	-6.55	35.84	54	-18.16	Peak
2	2402.100	92.44	-6.54	85.90	54	31.90	Peak

Vertical, Peak Detector:

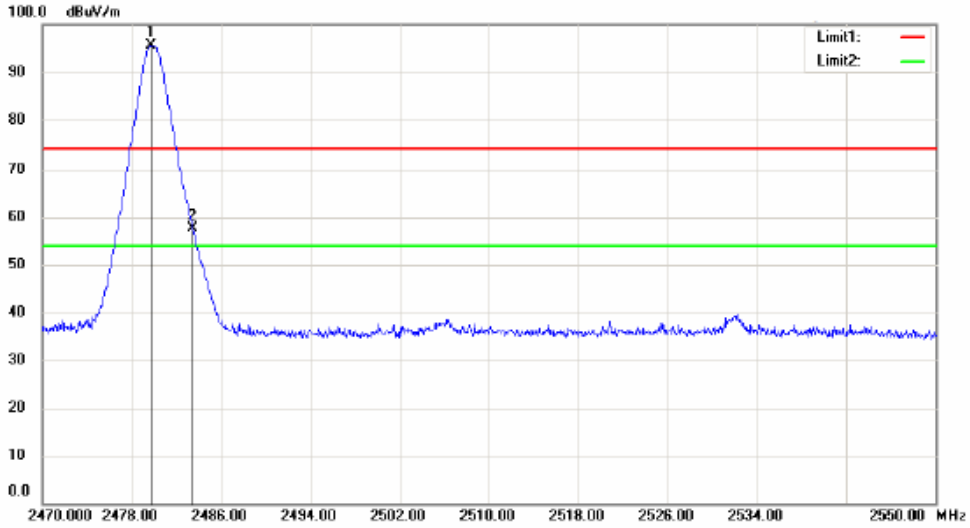


MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over limit (dB)	Detector
1	2389.900	41.09	-6.55	34.54	54	-19.46	Peak
2	2402.200	92.12	-6.54	85.58	54	31.58	Peak

Measurement Result:

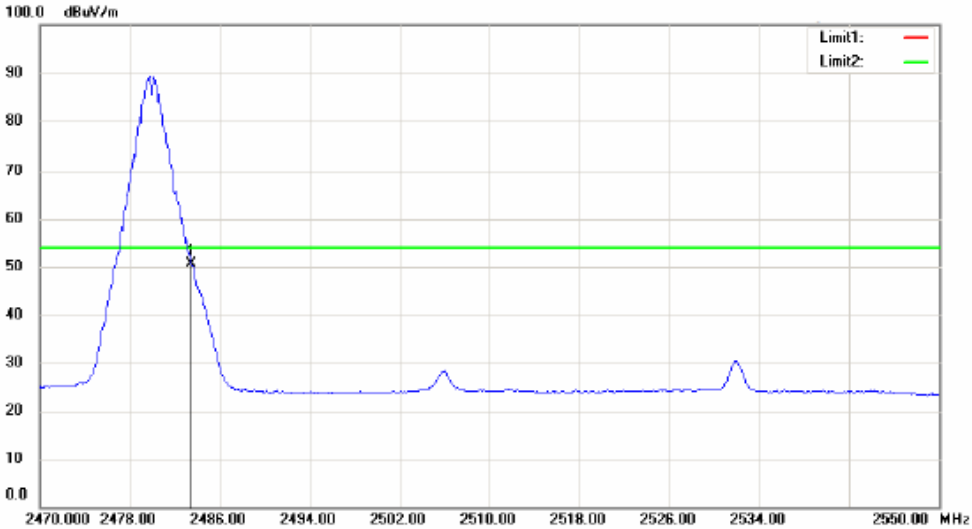
CH Low 2480MHz Radiated Bandedge **Modulation: GFSK**

Horizontal, Peak Detector:



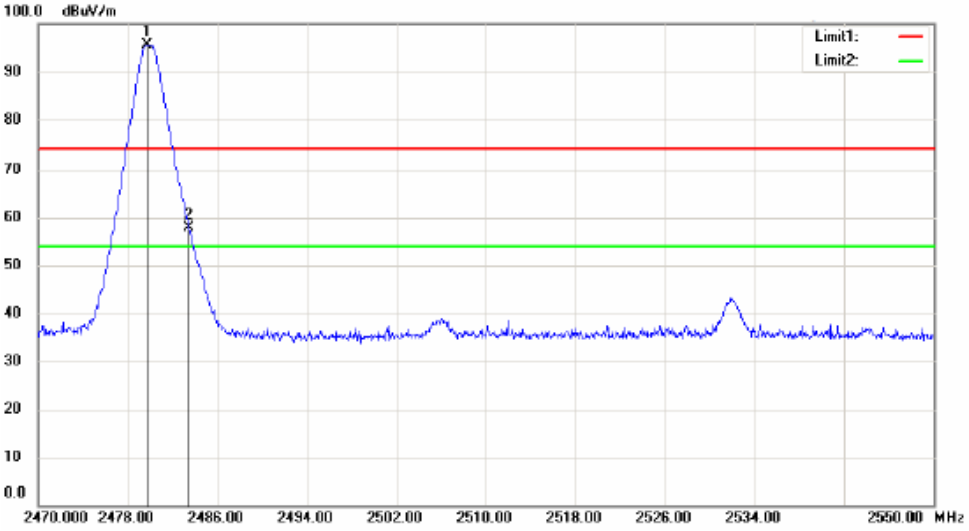
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2479.760	101.95	peak	-6.42	95.53	74.00	21.53
2	2483.520	63.99	peak	-6.41	57.58	74.00	-16.42

Horizontal, Average Detector:



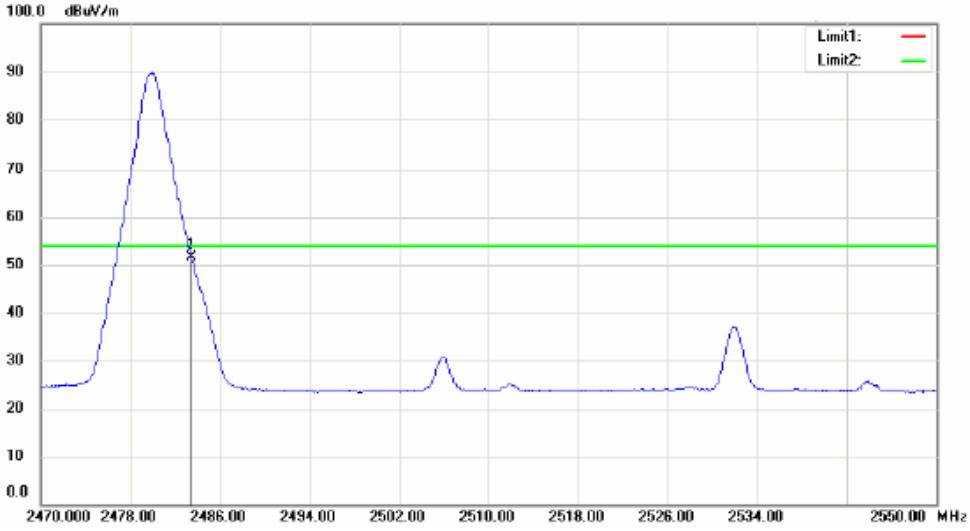
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2483.520	57.16	peak	-6.41	50.75	54.00	-3.25

Vertical, Peak Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2479.760	102.07	peak	-6.42	95.65	74.00	21.65
2	2483.520	64.27	peak	-6.41	57.86	74.00	-16.14

Vertical, Average Detector:

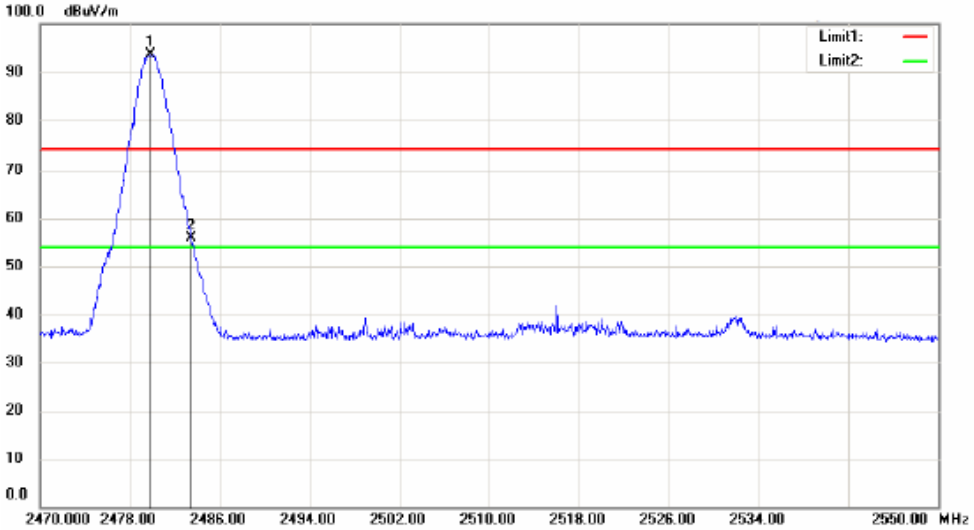


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2483.520	58.09	peak	-6.41	51.68	54.00	-2.32

Measurement Result:

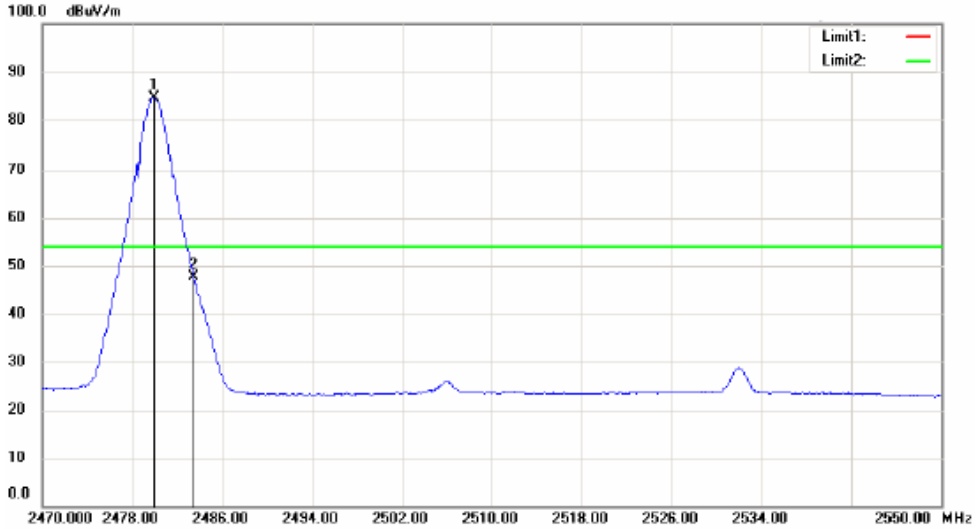
CH Low 2480MHz Radiated Bandedge **Modulation:** π/4DQPSK

Horizontal, Peak Detector:



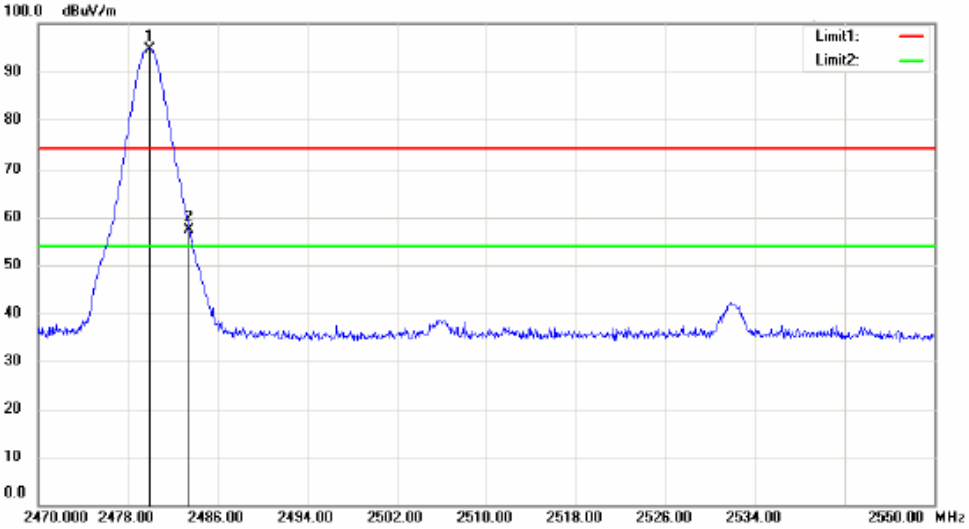
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2479.840	100.08	peak	-6.42	93.66	74.00	19.66
2	2483.520	62.40	peak	-6.41	55.99	74.00	-18.01

Horizontal, Average Detector:



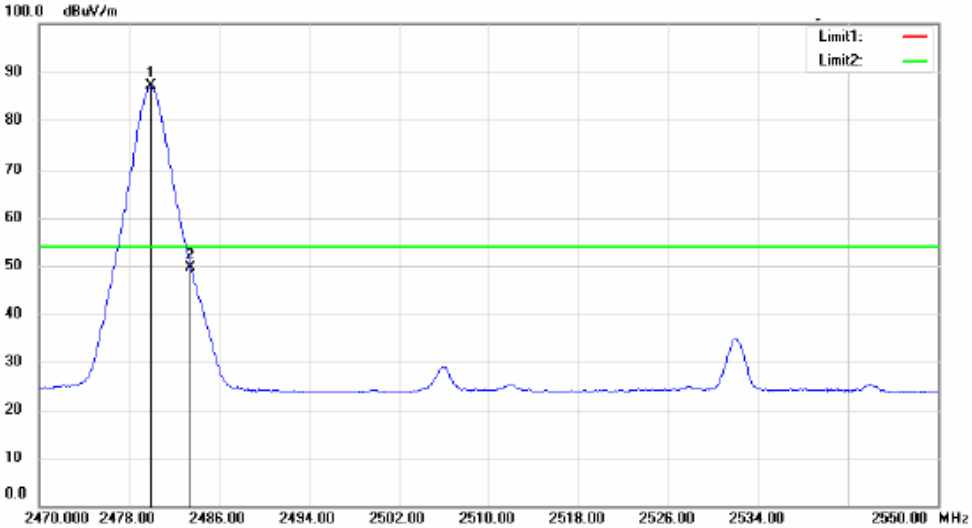
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2480.000	91.05	peak	-6.42	84.63	54.00	30.63
2	2483.520	54.12	peak	-6.41	47.71	54.00	-6.29

Vertical, Peak Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2480.000	101.08	peak	-6.42	94.66	74.00	20.66
2	2483.520	63.70	peak	-6.41	57.29	74.00	-16.71

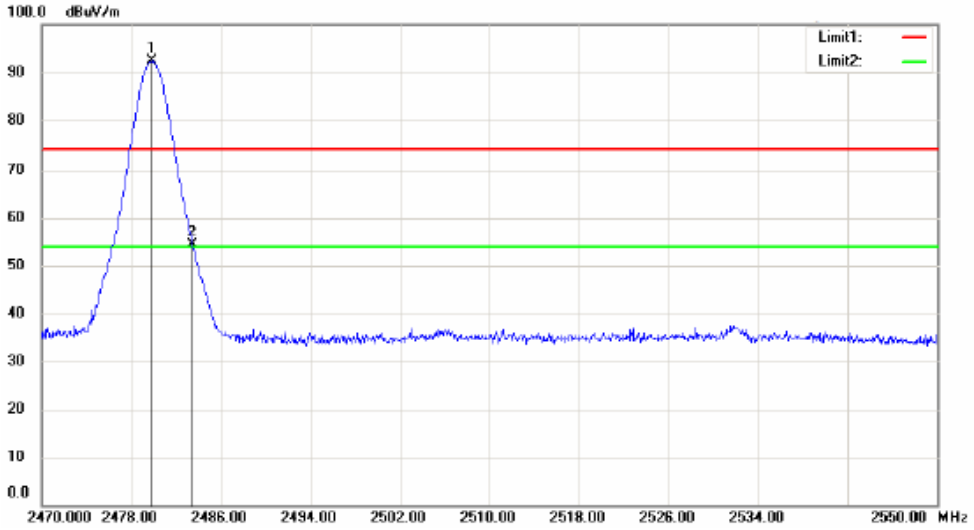
Vertical, Average Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2479.920	93.44	peak	-6.42	87.02	54.00	33.02
2	2483.520	56.13	peak	-6.41	49.72	54.00	-4.28

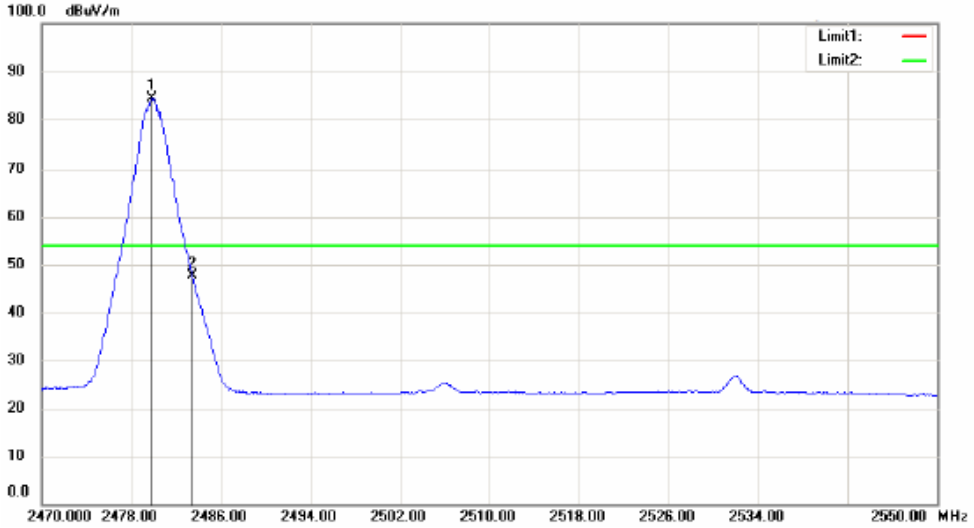
CH Low 2480MHz Radiated Bandedge **Modulation: 8DPSK**

Horizontal, Peak Detector:



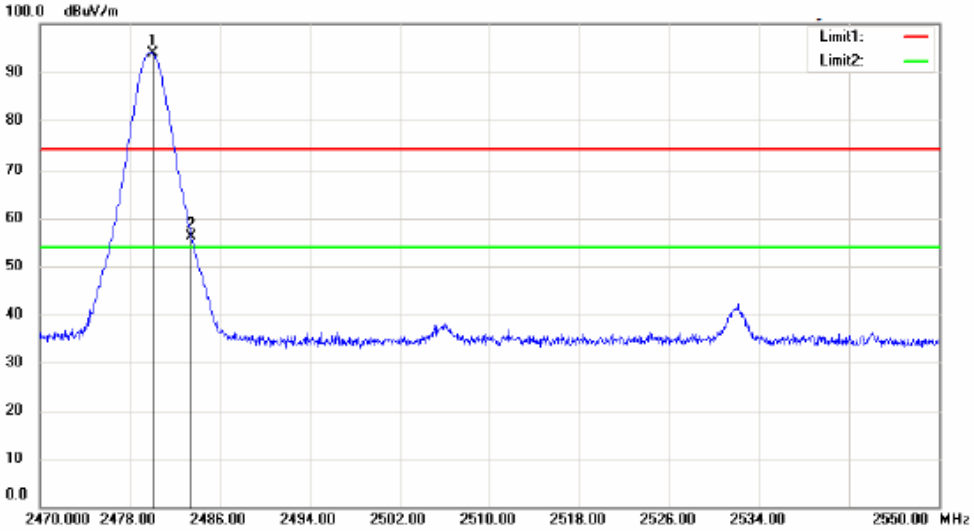
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2479.840	98.73	peak	-6.42	92.31	74.00	18.31
2	2483.520	60.76	peak	-6.41	54.35	74.00	-19.65

Horizontal, Average Detector:



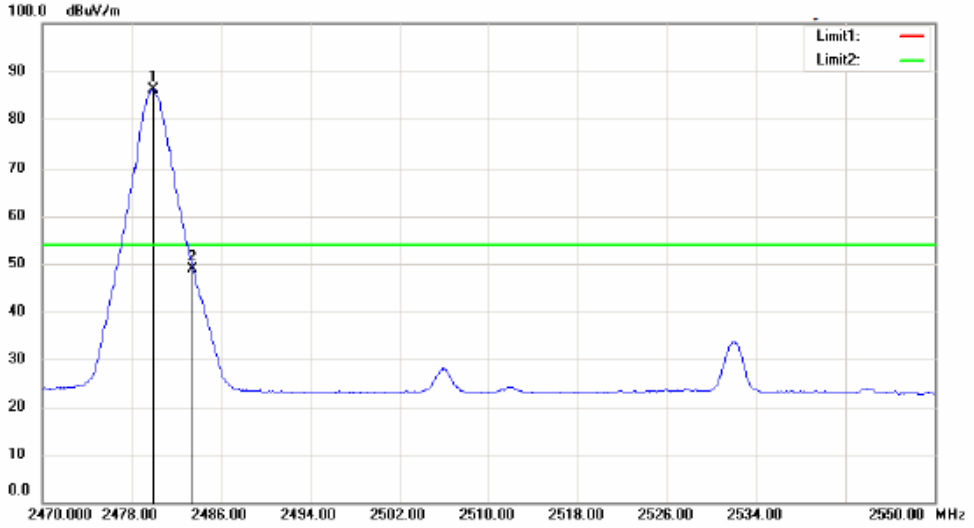
Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2479.840	90.75	peak	-6.42	84.33	54.00	30.33
2	2483.520	54.07	peak	-6.41	47.66	54.00	-6.34

Vertical, Peak Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2480.080	100.22	peak	-6.42	93.80	74.00	19.80
2	2483.520	62.62	peak	-6.41	56.21	74.00	-17.79

Vertical, Average Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2480.000	92.56	peak	-6.42	86.14	54.00	32.14
2	2483.520	55.28	peak	-6.41	48.87	54.00	-5.13

7.12 Occupied Bandwidth Test

Test Requirement: RSS-Gen Issue 3 Clause 4.6.1

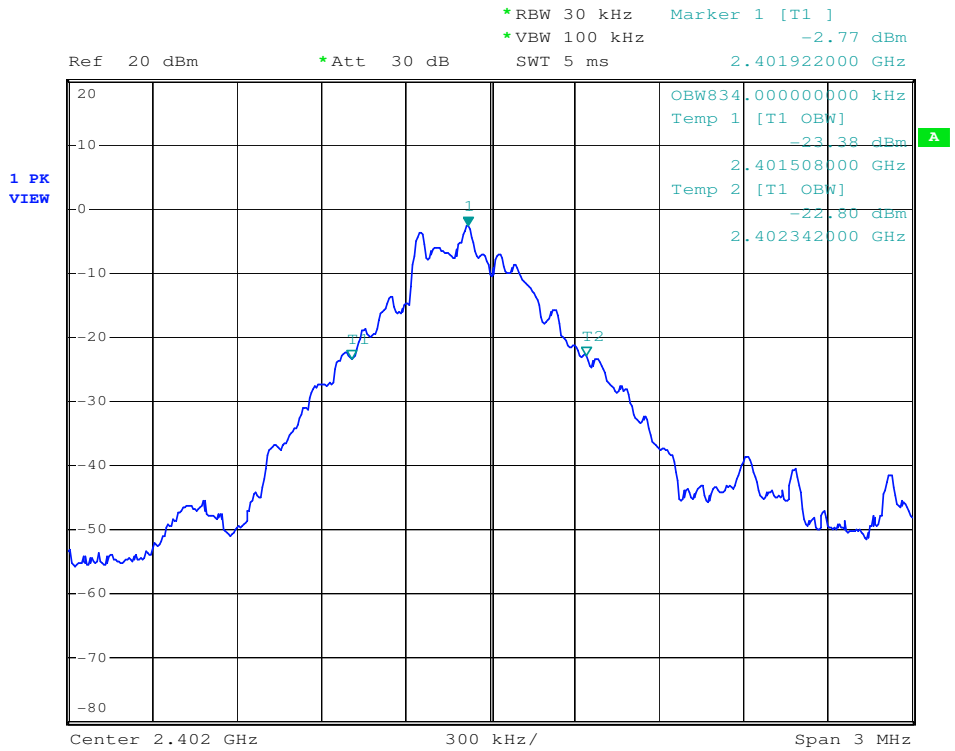
Standard Applicable According to the section RSS-Gen Issue 3 Clause 4.6.1

EUT Setup The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer with the resolutions set at 100kHz,the video bandwidth set at 300kHz.

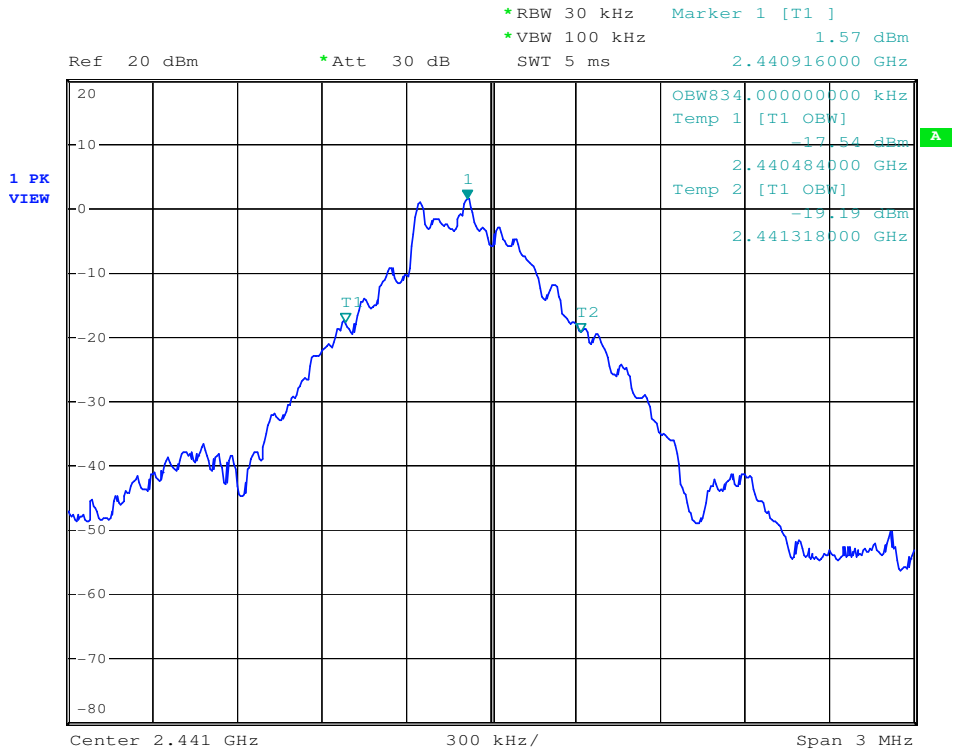
Measurement Result:

Test Mode	Channel	Frequency (MHz)	Bandwidth (MHz)
GFSK	LOW	2402	0.834
	MID	2441	0.834
	HIGH	2480	0.840
π/4DQPSK	LOW	2402	1.164
	MID	2441	1.164
	HIGH	2480	1.164
8DPSK	LOW	2402	1.146
	MID	2441	1.140
	HIGH	2480	1.152

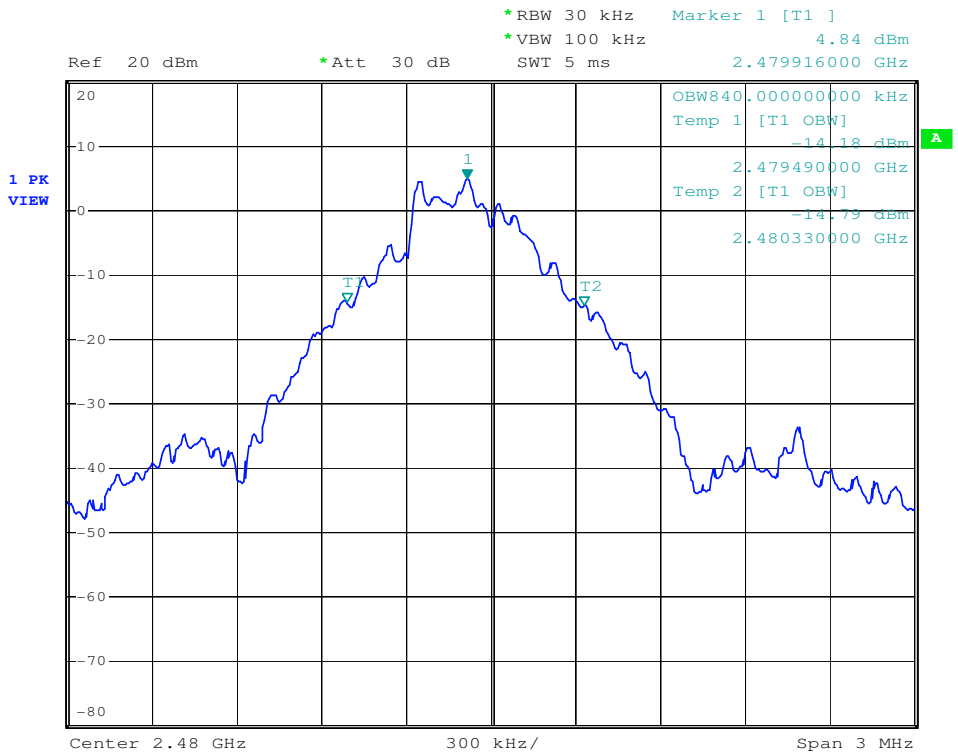
Test mode:	GFSK	Test channel:	Low



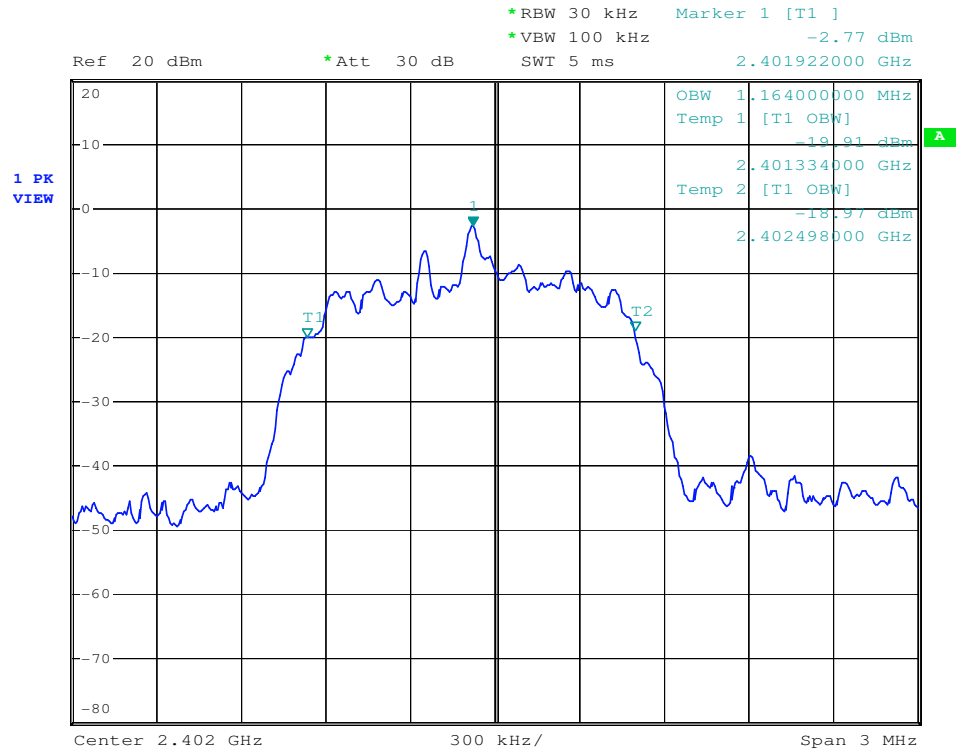
Test mode:	GFSK	Test channel:	Middle



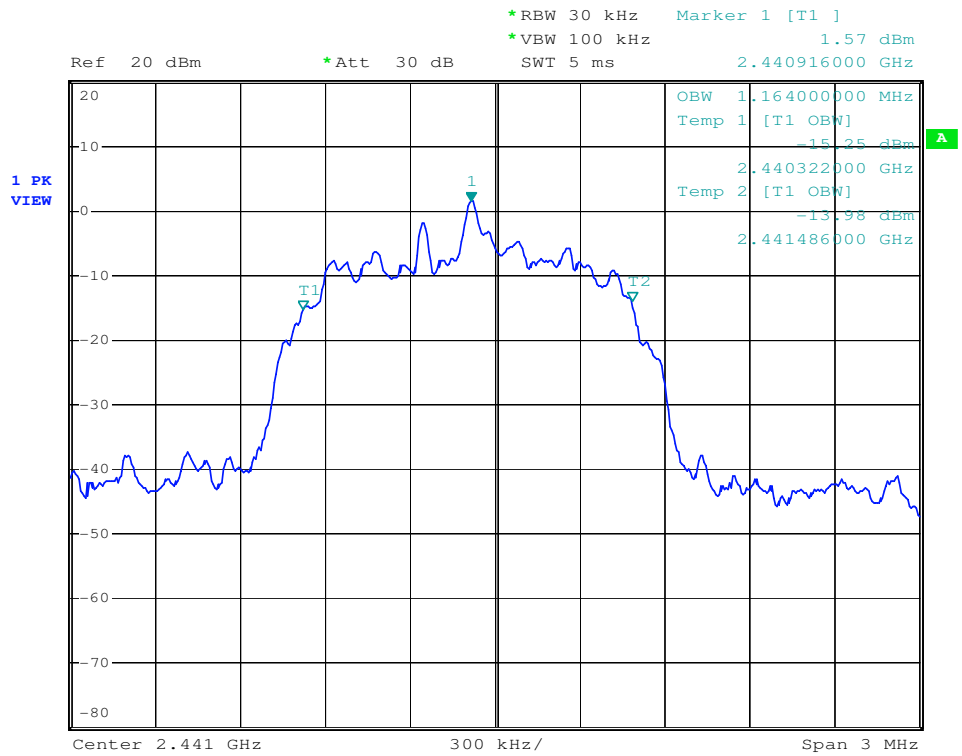
Test mode:	GFSK	Test channel:	High



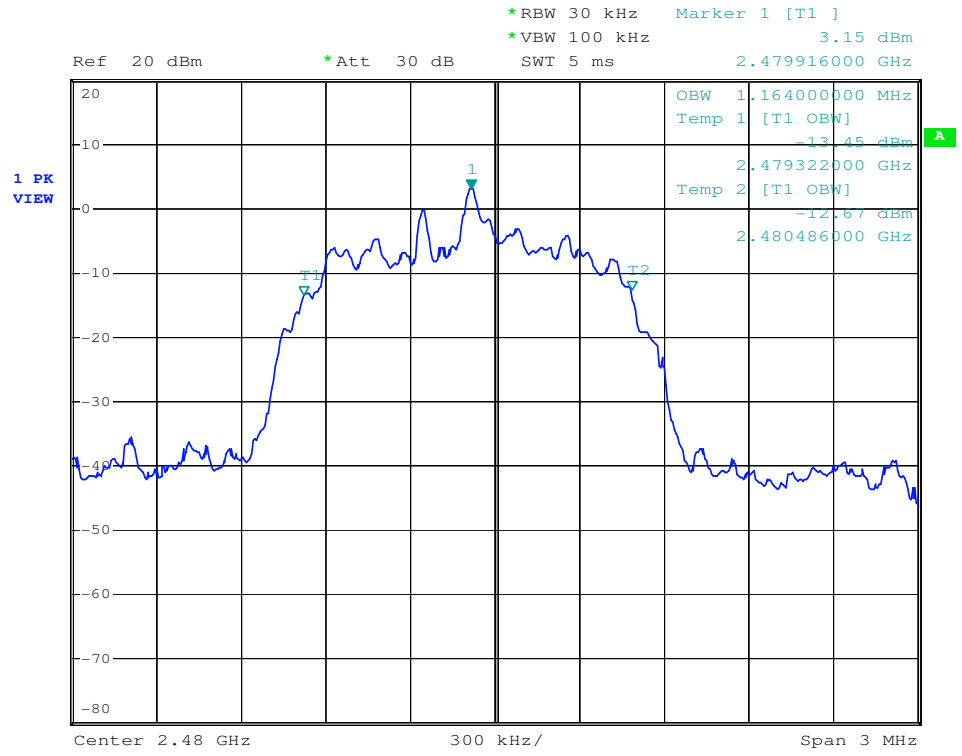
Test mode:	π/4DQPSK	Test channel:	Low



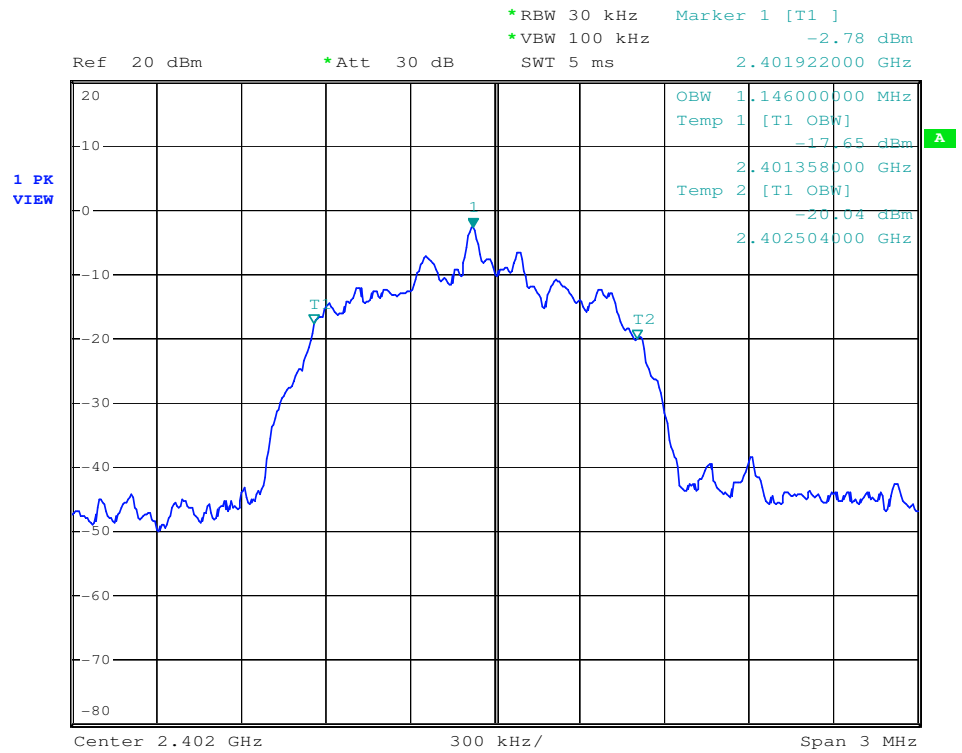
Test mode:	π/4DQPSK	Test channel:	Middle



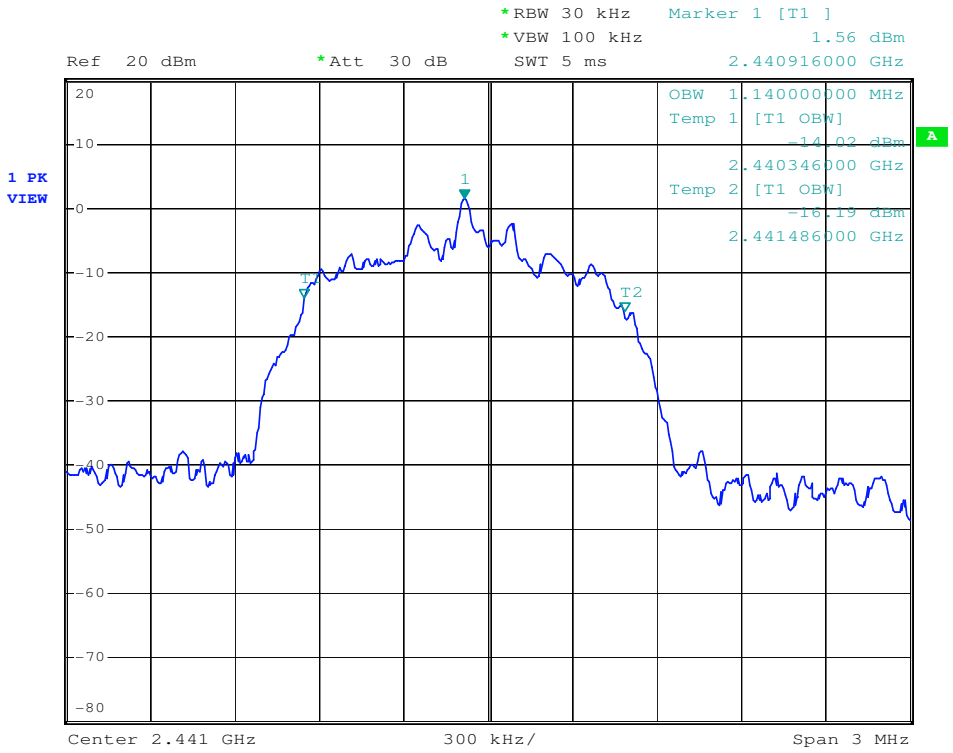
Test mode:	π/4DQPSK	Test channel:	High



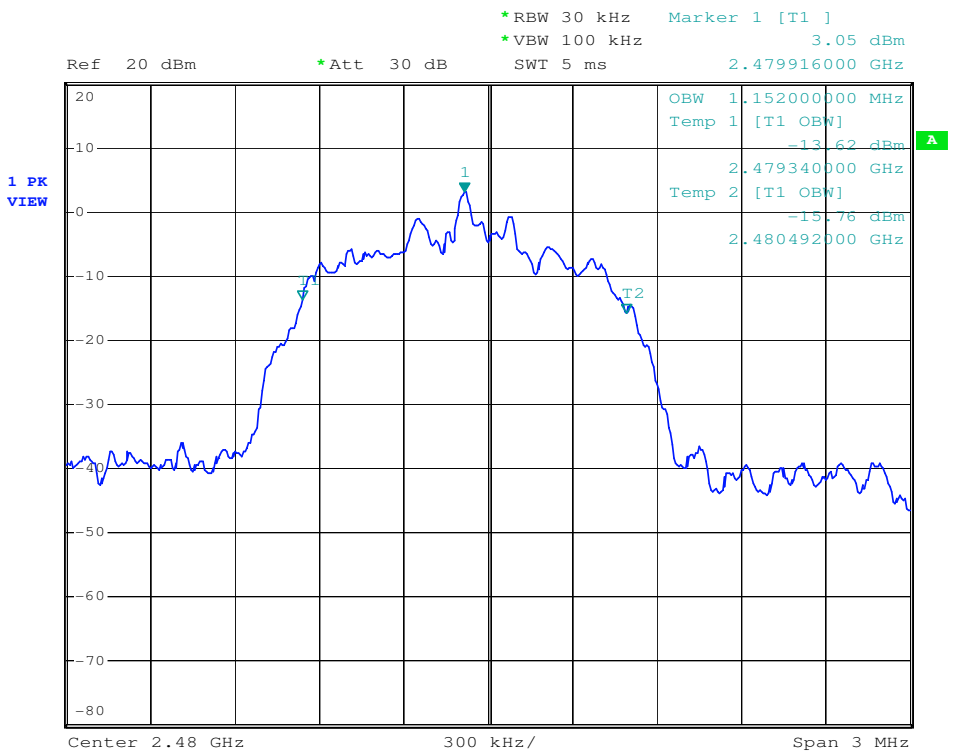
Test mode:	8DPSK	Test channel:	Low



Test mode:	8DPSK	Test channel:	Middle



Test mode:	8DPSK	Test channel:	High



8 Test Setup Photographs

Refer to the < studium_Test Setup photos>.

9 EUT Constructional Details

Refer to the < studium _External Photos > & < studium _Internal Photos >.

End of Report