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Report No.: SHEM130900182404

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1 Cover Page**RF TEST REPORT For BT**

Application No.:	SHEM1309001824RF
Applicant:	Hansong (Nanjing) Technology Ltd.
FCC ID:	XCO-SOUNDBAR2
IC ID:	7756A-SOUNDBAR2
Equipment Under Test (EUT):	
NOTE: The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Soundtrack 2 System
Model No.(EUT):	Soundtrack 2
Standards:	FCC PART 15 Subpart C: 2012 RSS-210 Issue 8 (December 2010) RSS-Gen Issue 3 (December 2010)
Date of Receipt:	September 12, 2013
Date of Test:	September 13, 2013 to September 26, 2013
Date of Issue:	October 11, 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.**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00	/	October 11, 2013	/	Original

Authorized for issue by:				
Engineer		Eddy Zong		
		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	PASS
20dB Occupied Bandwidth	FCC Part 15, Subpart C Section 15.247 (a)(1)	RSS 210 A 8.1(a)	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

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5 General Information

5.1 Client Information

Applicant: Hansong (Nanjing) Technology Ltd.
Address of Applicant: 8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China
Manufacturer: Not supplied by the client.
Address of Manufacturer: Not supplied by the client.
Factory: Not supplied by the client.
Address of Factory: Not supplied by the client.

5.2 General Description of E.U.T.

Product Name: Soundtrack 2 System
Model No.(EUT): Soundtrack 2
Product Description: Portable Product

5.3 Details of E.U.T.

Operation Frequency: 2402MHz~2480MHz
Bluetooth Version: 3.0+EDR
Modulation Technique: FHSS(GFSK, π/4DQPSK, 8DPSK)
Number of Channel: 79
Antenna Type: Plug-in antenna
Antenna Gain: 2 dBi
Adapter: Manufacturer: GOLDEN PROFIT ELECTRONICS LTD.
Model No.: GPE060D-200250D
Rated Input: 100-240V AC 50/60Hz, 1.5A
Rated Output: 20V DC 2500mA
Cable length: AC port: About 150cm Length
DC port: About 170cm Length
Engineering Mode: Using test software to control EUT working in continuous transmitting, and select channel and modulation type



5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Serial No.	Supplied by
Labtop	ThinkPad X100e	2876A65	/	SGS

Software name	Manufacturer	Supplied By
Blue Test3 (For CSR)	N/A	Client/SGS

5.5 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

5.6 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

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Due date
1	Spectrum Analyzer	Rohde & Schwarz	FSP-30	2705121009	2014-2-22
2	EMI test receiver	Rohde & Schwarz	ESU40	100109	2014-02-22
3	Horn Antenna (1GHz to 18GHz)	SCHWARZBECK	BBHA9120D	9120D-679	2014-03-06
4	Horn Antenna (14GHz to 40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170373	2014-03-06
5	ANTENNA (25MHz to 2GHz)	SCHWARZBECK	VULB9168	9168-313	2014-03-06
6	Ultra broadband antenna (30MHz to 3GHz)	Rohde & Schwarz	HL562	100227	2013-10-08
7	Horn Antenna (1GHz to 18GHz)	Rohde & Schwarz	HF906	100284	2014-06-01
8	Active Loop Antenna (9kHz to 30MHz)	Rohde & Schwarz	FMZB 1519	1519-034	2014-07-27
9	High-low temperature cabinet	Suzhou Zhihe	TL-40	50110050	2014-04-12
10	Tunable Notch Filter	Wainwright instruments GmbH	WRCT800.0 /880.0-0.2/40-5SSK	9	2014-06-01
11	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	2014-06-01
12	Low noise amplifier	TESEQ	LNA6900	70133	2014-02-22
13	Attenuator	HUAXIANG	TS2-6dB	11051002	/
14	Attenuator	HUAXIANG	TS2-6dB	11051001	/
15	AC power stabilizer	WOCEN	6100	51122	2014-06-01
16	DC power	QJE	QJ30003SII	611145	2014-06-01

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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 -1020 mbar

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:

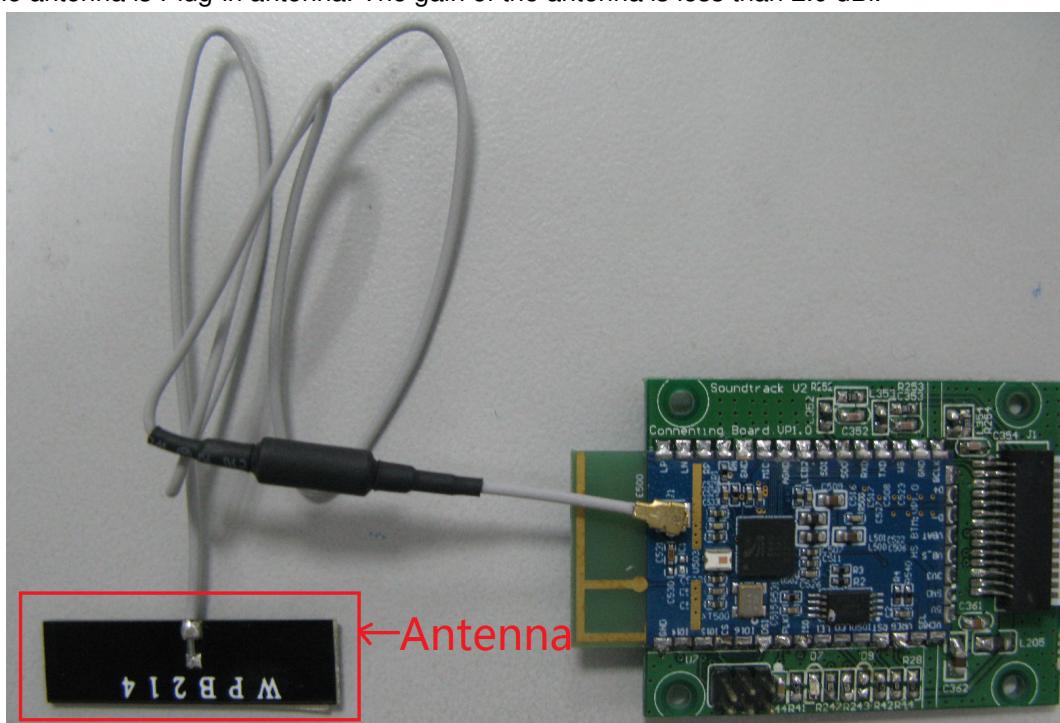
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 Plug-in antenna. The gain of the antenna is less than 2.0 dBi.



7.3 Conducted Emissions on Mains Terminals

Test Requirement: FCC Part 15C, Section 15.207
RSS-Gen Section 7.2.4

Test Method: ANSI C63.10:2009 Section 6.2

Test Result: Pass

Test Voltage: AC 120V 60Hz

Frequency Range: 150 KHz to 30 MHz

Class/Severity: Class B

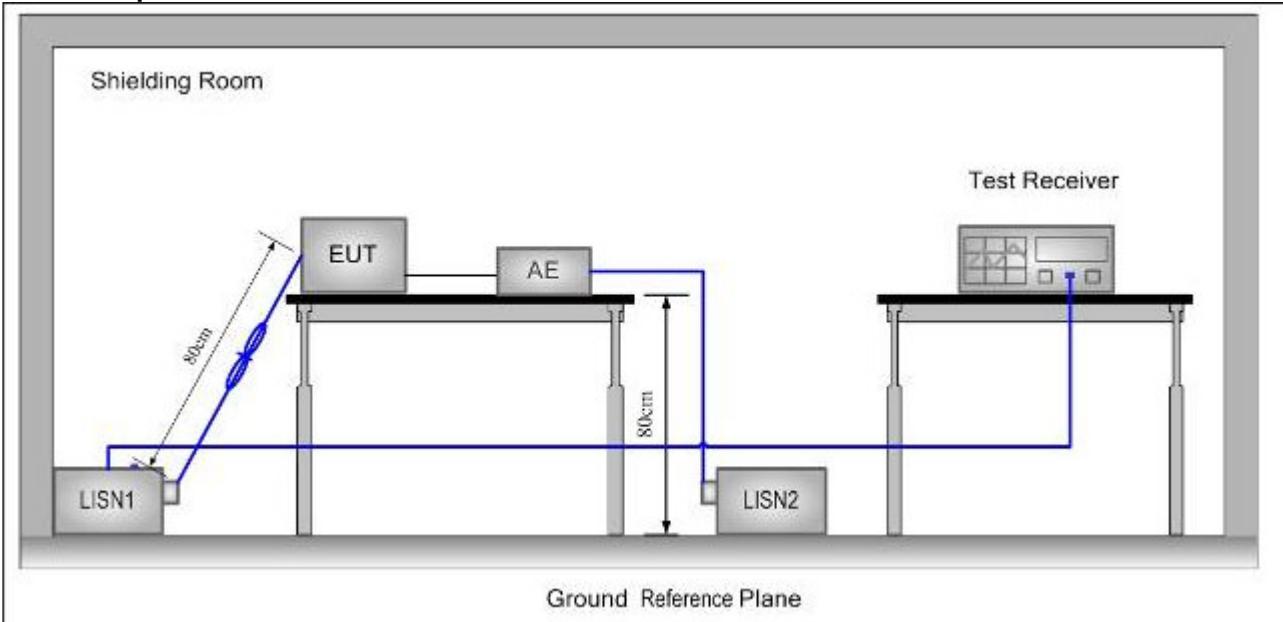
Test mode: Engineering mode

Limit:

Frequency range MHz	Class B Limits dB (μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.
Note2: The lower limit is applicable at the transition frequency.

Test Setup and Procedure



1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment was at least 0.8 m from the LISN.

Measurement Data

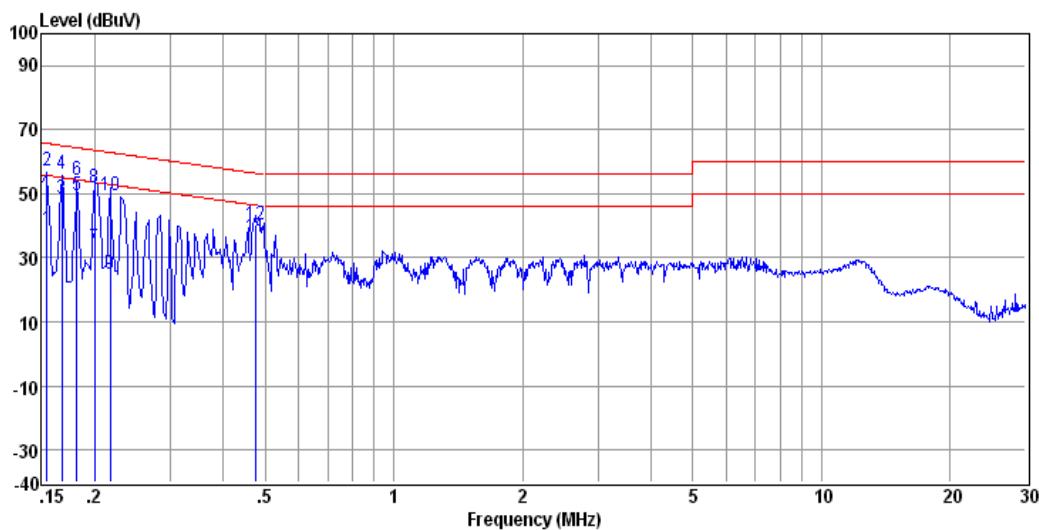
Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected.

Please see the attached Quasi-peak and Average test results.

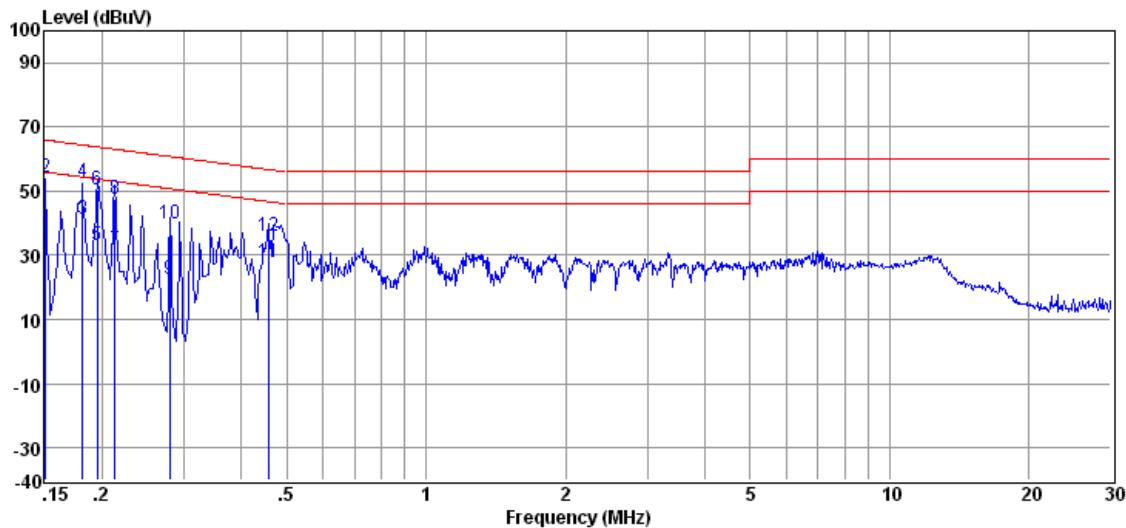
Level = Read Level + LISN/ISN Factor + Cable Loss.

Test Mode: Engineering mode

Test Port: AC Live Line



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dB μ V)	(dB)	(dB)	(dB μ V)	(dB μ V)	(dB)	
1	0.155	38.75	0.19	0.10	39.04	55.74	-16.70	Average
2	0.155	56.85	0.19	0.10	57.14	65.74	-8.60	QP
3	0.168	48.21	0.16	0.10	48.47	55.08	-6.61	Average
4	0.168	56.05	0.16	0.10	56.31	65.08	-8.77	QP
5	0.182	49.30	0.14	0.10	49.54	54.42	-4.88	Average
6	0.182	54.22	0.14	0.10	54.46	64.42	-9.96	QP
7	0.200	32.74	0.10	0.10	32.94	53.62	-20.68	Average
8	0.200	51.76	0.10	0.10	51.96	63.62	-11.66	QP
9	0.217	24.87	0.11	0.10	25.08	52.92	-27.84	Average
10	0.217	49.14	0.11	0.10	49.35	62.92	-13.57	QP
11	0.474	36.12	0.19	0.10	36.41	46.45	-10.04	Average
12	0.474	40.25	0.19	0.10	40.54	56.45	-15.91	QP

Test Mode: Engineering mode**Test Port:** AC Neutral Line

Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dB μ V)	(dB)	(dB)	(dB μ V)	(dB μ V)	(dB)	
1	0.151	34.27	0.20	0.10	34.57	55.93	-21.36	Average
2	0.151	54.05	0.20	0.10	54.35	65.93	-11.58	QP
3	0.182	40.92	0.13	0.10	41.15	54.42	-13.27	Average
4	0.182	52.74	0.13	0.10	52.97	64.42	-11.45	QP
5	0.196	33.13	0.11	0.10	33.34	53.80	-20.46	Average
6	0.196	50.18	0.11	0.10	50.39	63.80	-13.41	QP
7	0.213	31.64	0.10	0.10	31.84	53.10	-21.26	Average
8	0.213	47.51	0.10	0.10	47.71	63.10	-15.39	QP
9	0.280	22.14	0.10	0.10	22.34	50.81	-28.47	Average
10	0.280	39.76	0.10	0.10	39.96	60.81	-20.85	QP
11	0.456	27.79	0.10	0.10	27.99	46.76	-18.77	Average
12	0.456	35.85	0.10	0.10	36.05	56.76	-20.71	QP

7.4 20dB Occupied Bandwidth

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

Test Method: ANSI C63.10:2009 Clause 6.9.1

Final Test Mode: Engineering mode

Test Procedure:

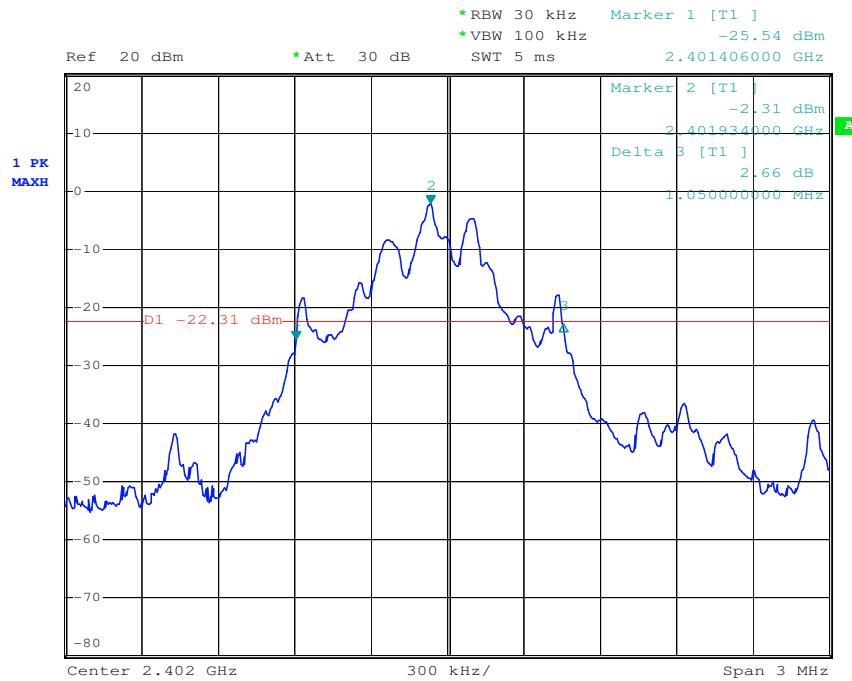
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3. Set the spectrum analyzer: RBW \geq 1% of the 20dB bandwidth (set 30 kHz). VBW \geq RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points.

Test date

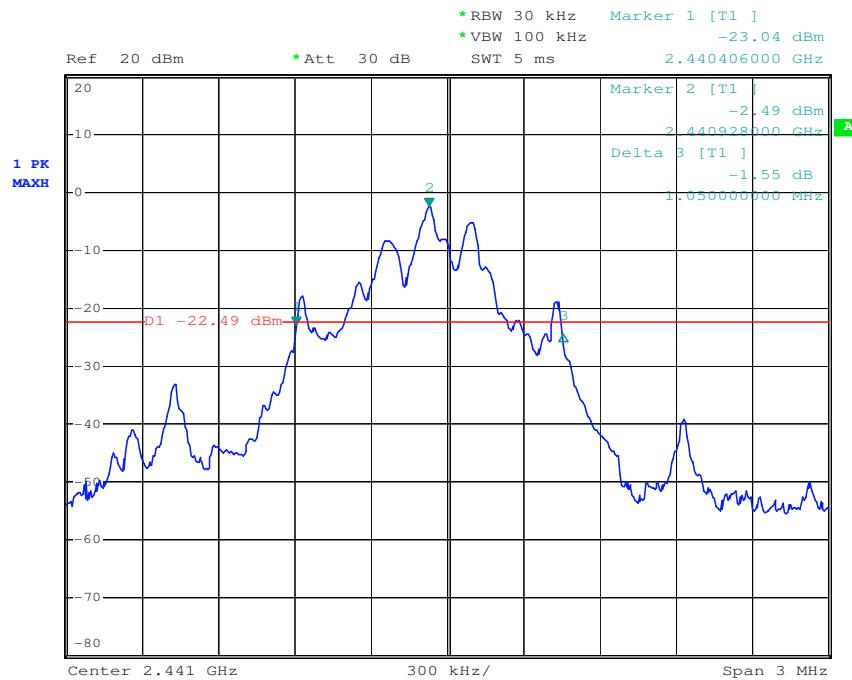
Test Channel	Channel Frequency (MHz)	Modulation	Bandwidth(MHz)
Low	2402	GFSK	1.050
Middle	2441	GFSK	1.050
High	2480	GFSK	1.050
Low	2402	$\pi/4$ DQPSK	1.176
Middle	2441	$\pi/4$ DQPSK	1.050
High	2480	$\pi/4$ DQPSK	1.122
Low	2402	8DPSK	1.188
Middle	2441	8DPSK	1.194
High	2480	8DPSK	1.194

Test plot as follows:

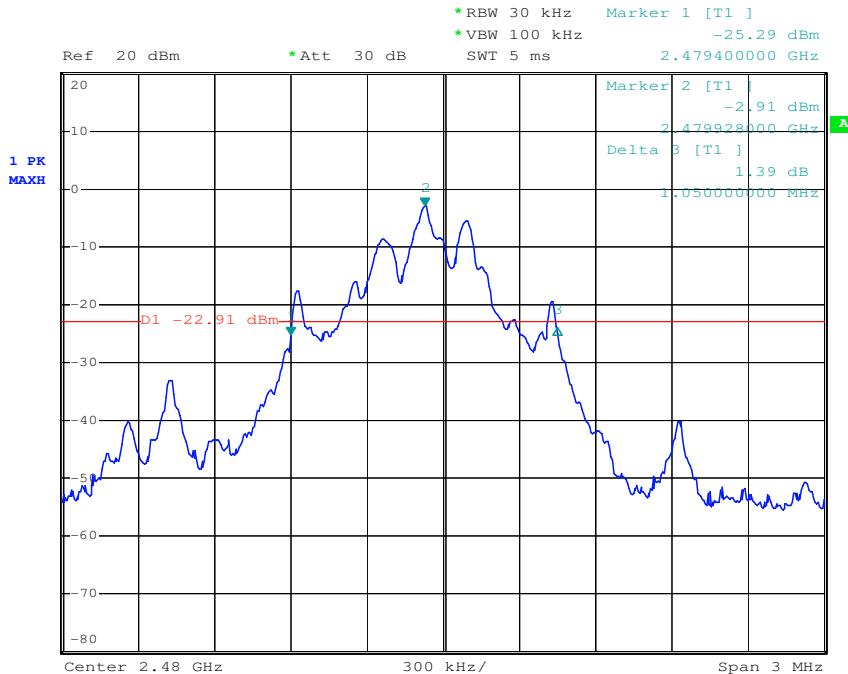
Test mode:	GFSK	Test channel:	Lowest
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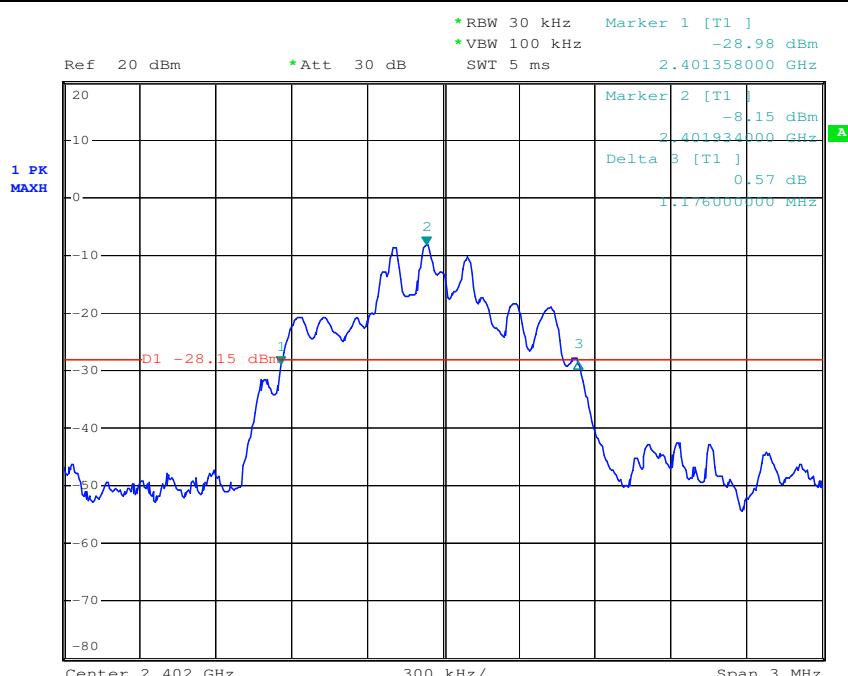
Test mode:	GFSK	Test channel:	Middle
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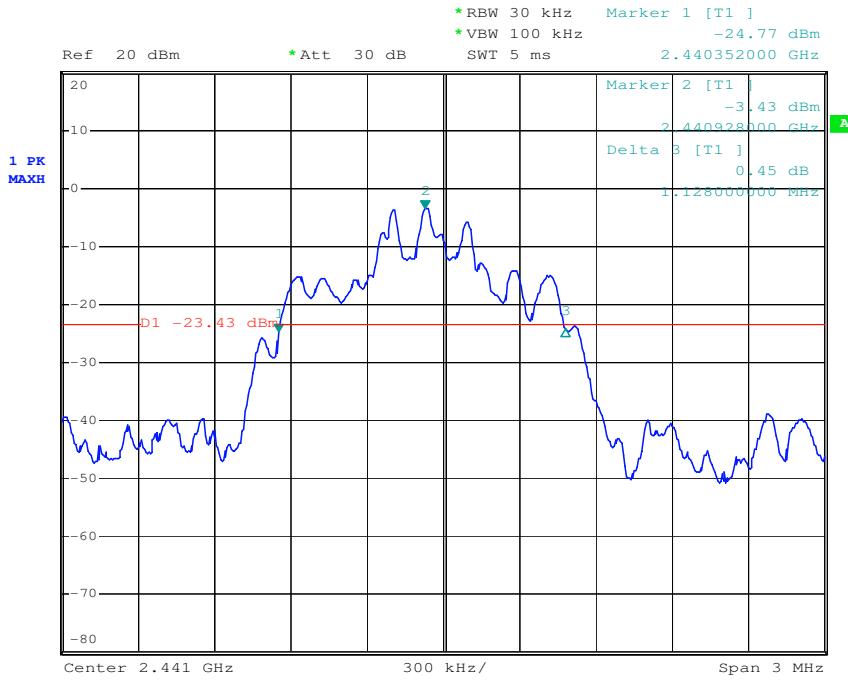
Test mode:	GFSK	Test channel:	Highest
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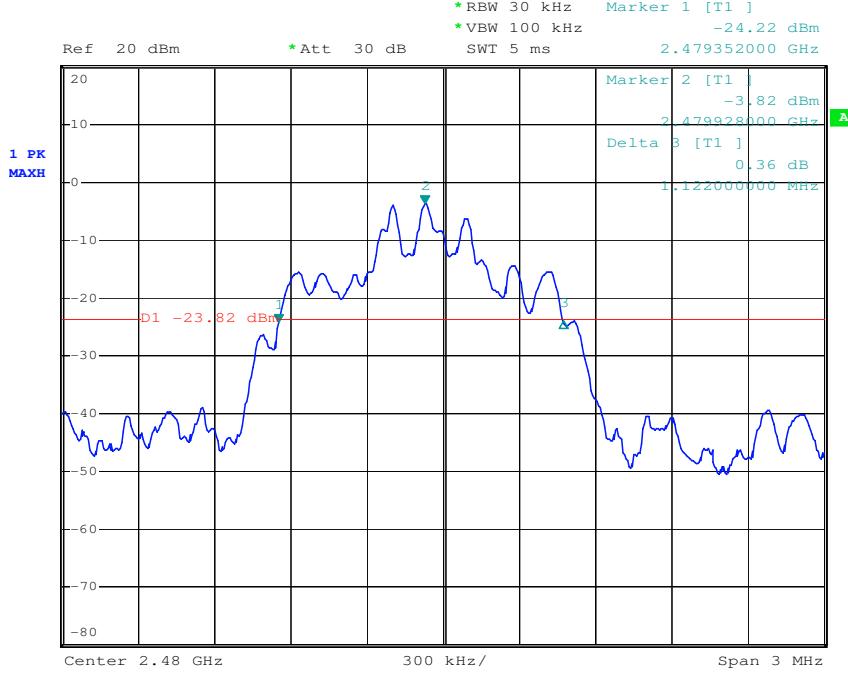
Test mode:	$\pi/4$ DQPSK	Test channel:	Lowest
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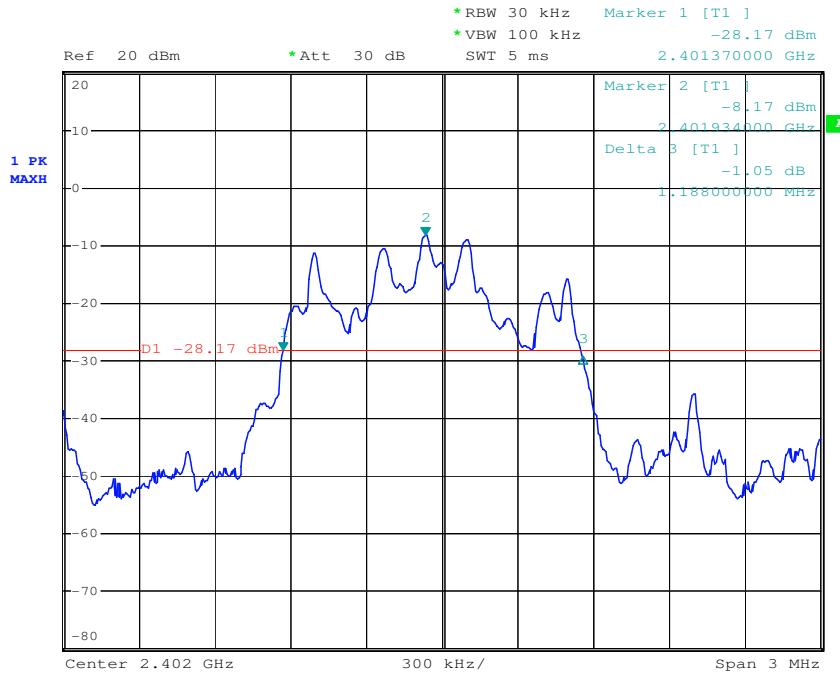
Test mode:	$\pi/4$ DQPSK	Test channel:	Middle
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Test mode:	$\pi/4$ DQPSK	Test channel:	Highest
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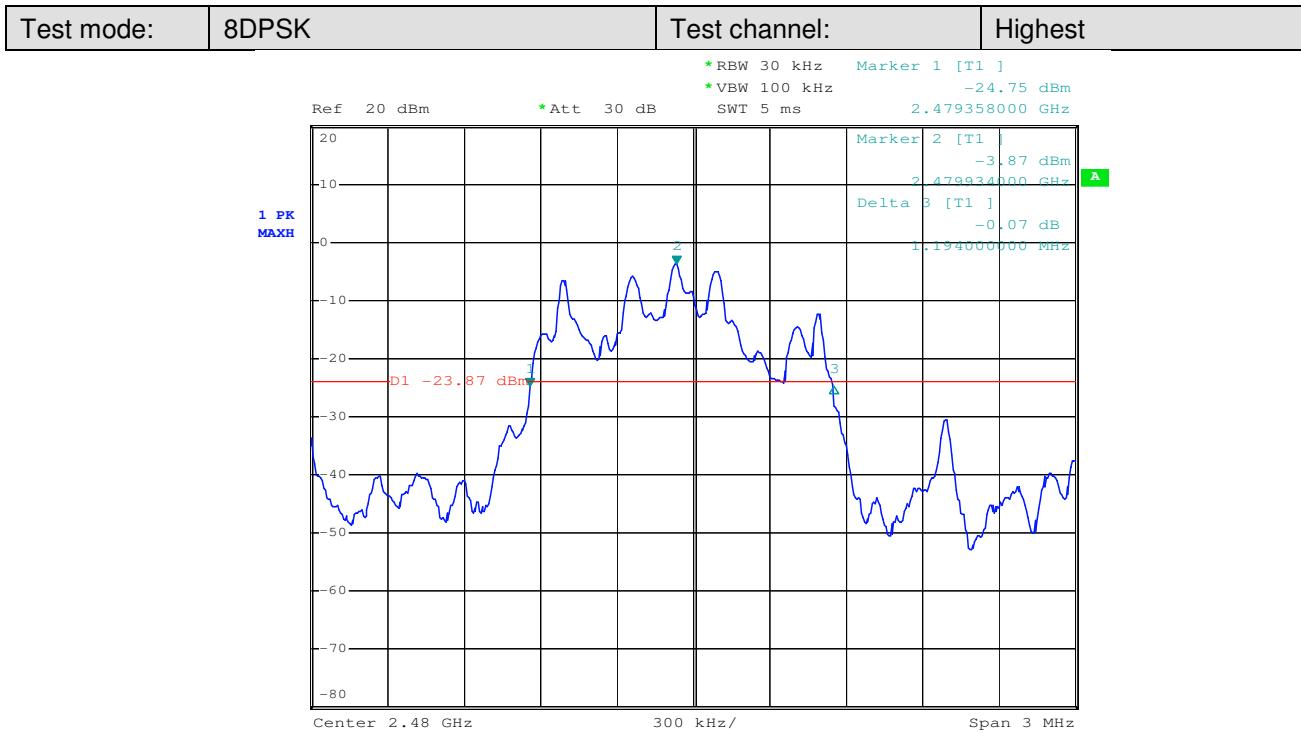


Test mode:	8DPSK	Test channel:	Lowest
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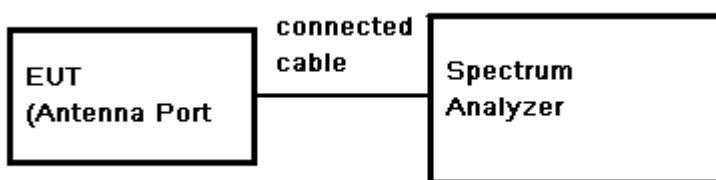
Test mode:	8DPSK	Test channel:	Middle
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7.5 Conducted Peak Output Power

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 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 1 watt (30.0dBm) limit applies.
Final Test Mode:	Engineering 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 = 3 MHz, Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

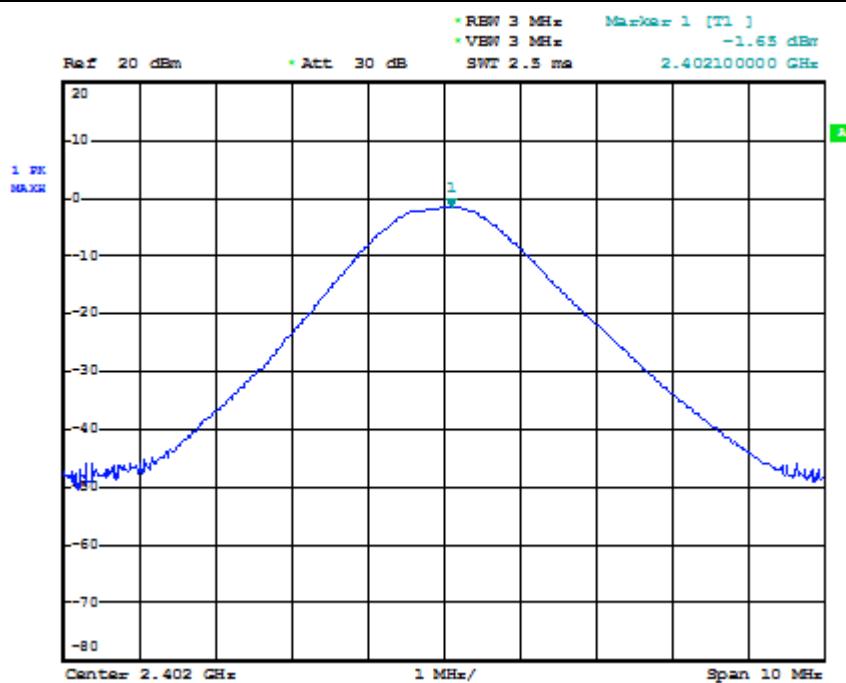


Test Results record:

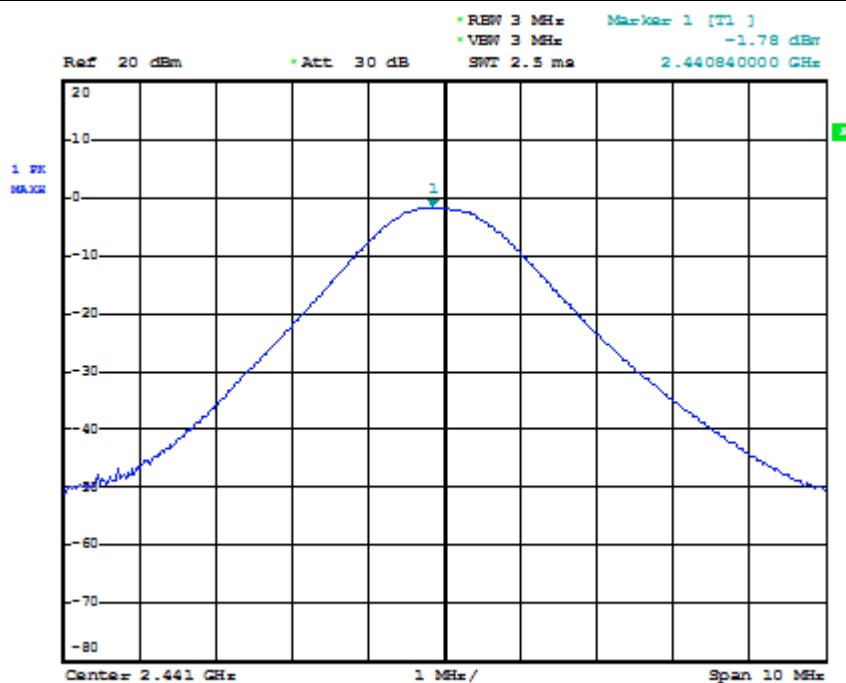
Test Channel	Modulation	Fundamental Frequency (MHz)	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Lowest	GFSK	2402	-1.65	0.5	-1.15	30	31.15
Middle	GFSK	2441	-1.78	0.5	-1.28	30	31.28
Highest	GFSK	2480	-2.33	0.5	-1.83	30	31.83
Lowest	$\pi/4$ DQPSK	2402	-1.77	0.5	-1.27	30	31.27
Middle	$\pi/4$ DQPSK	2441	-1.08	0.5	-0.58	30	30.58
Highest	$\pi/4$ DQPSK	2480	-1.16	0.5	-0.66	30	30.66
Lowest	8DPSK	2402	-1.42	0.5	-0.92	30	30.92
Middle	8DPSK	2441	-0.83	0.5	-0.33	30	30.33
Highest	8DPSK	2480	-1.33	0.5	-0.83	30	30.83

Test result plot as follows:

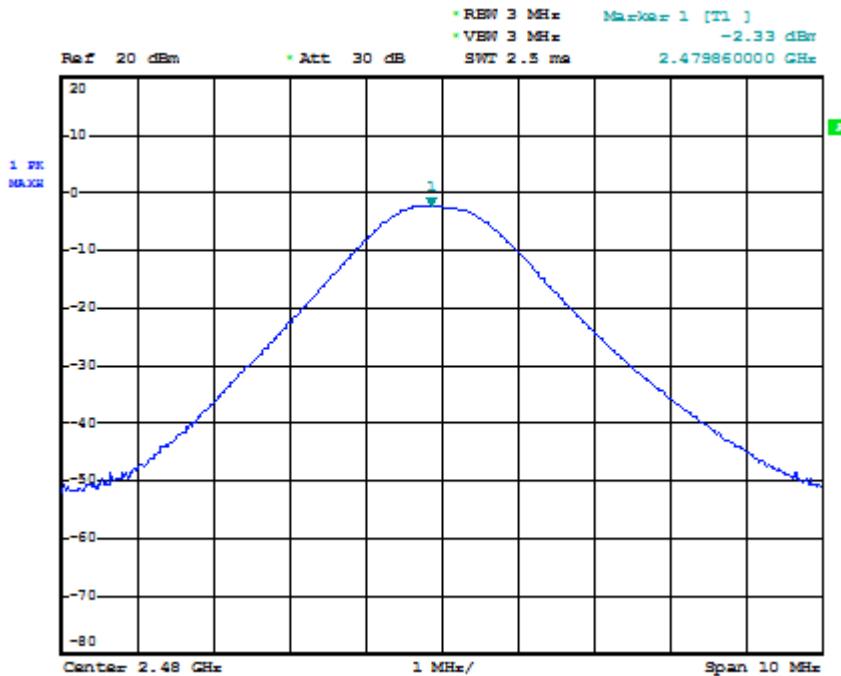
Test mode:	GFSK	Test channel:	Lowest
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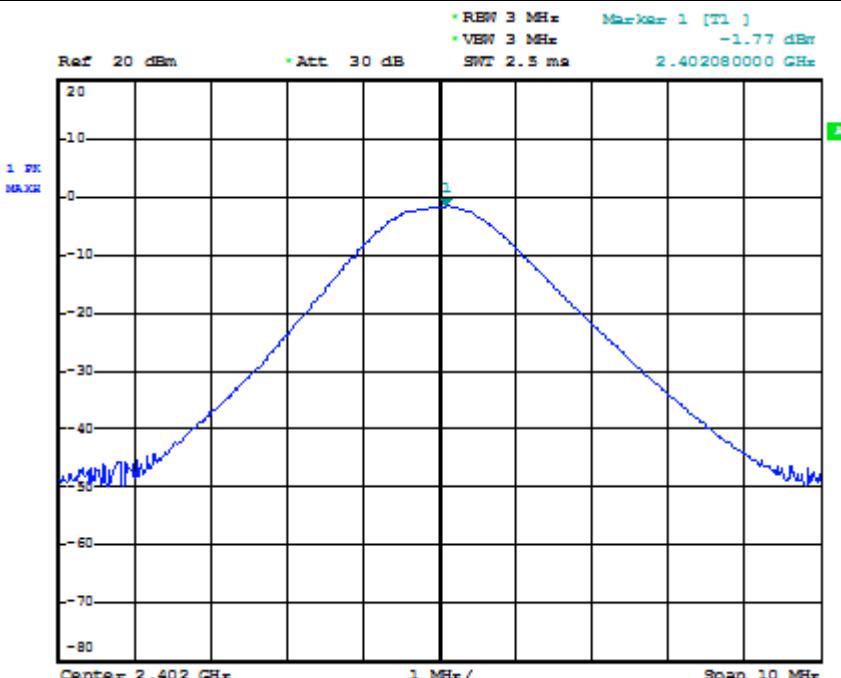
Test mode:	GFSK	Test channel:	Middle
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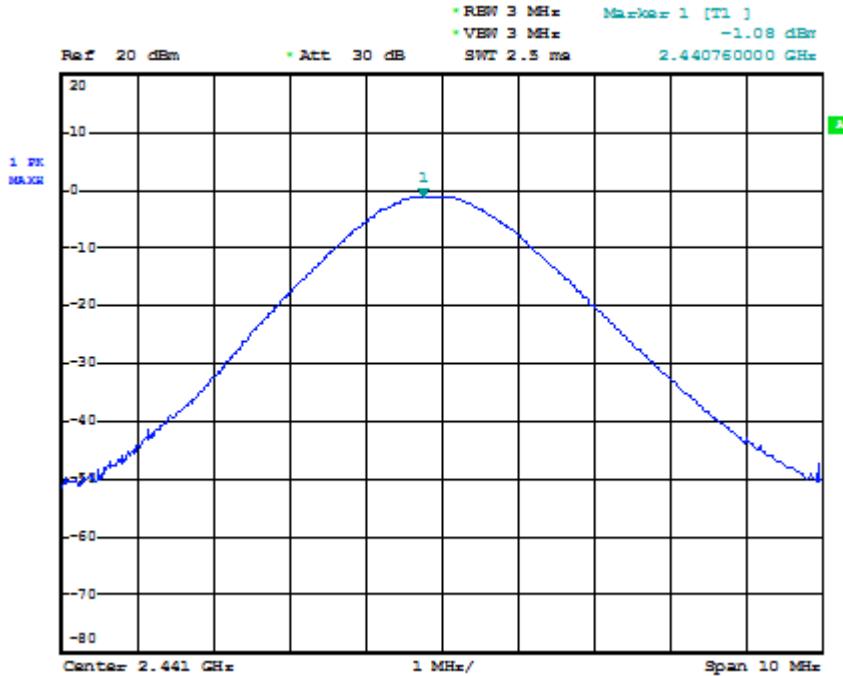
Test mode:	GFSK	Test channel:	Highest
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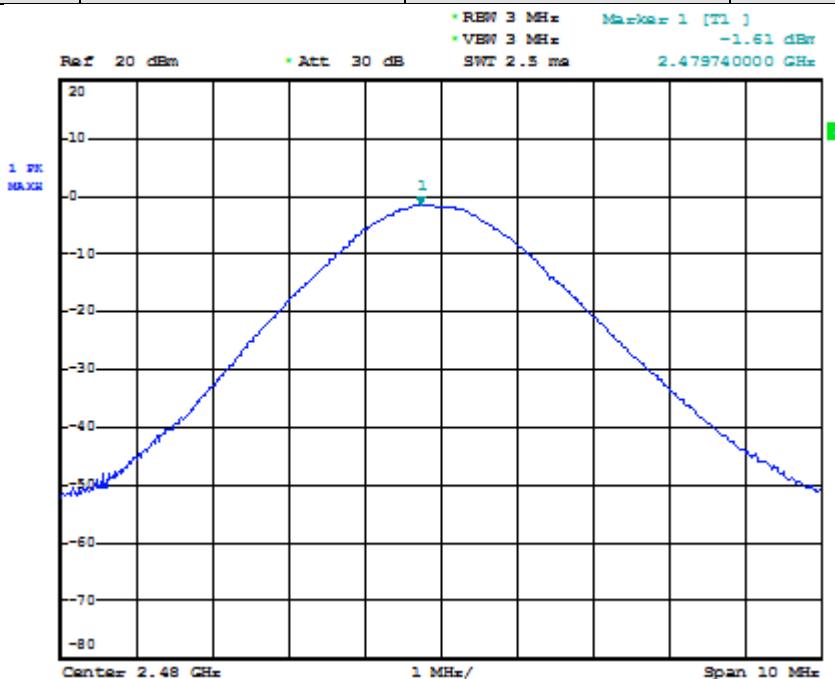
Test mode:	π/4DQPSK	Test channel:	Lowest
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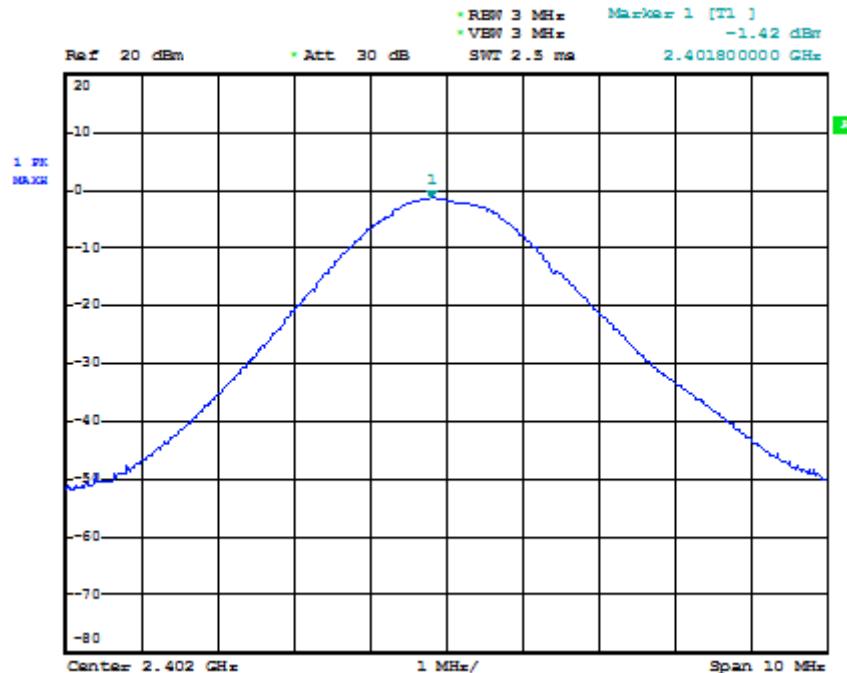
Test mode:	π/4DQPSK	Test channel:	Middle
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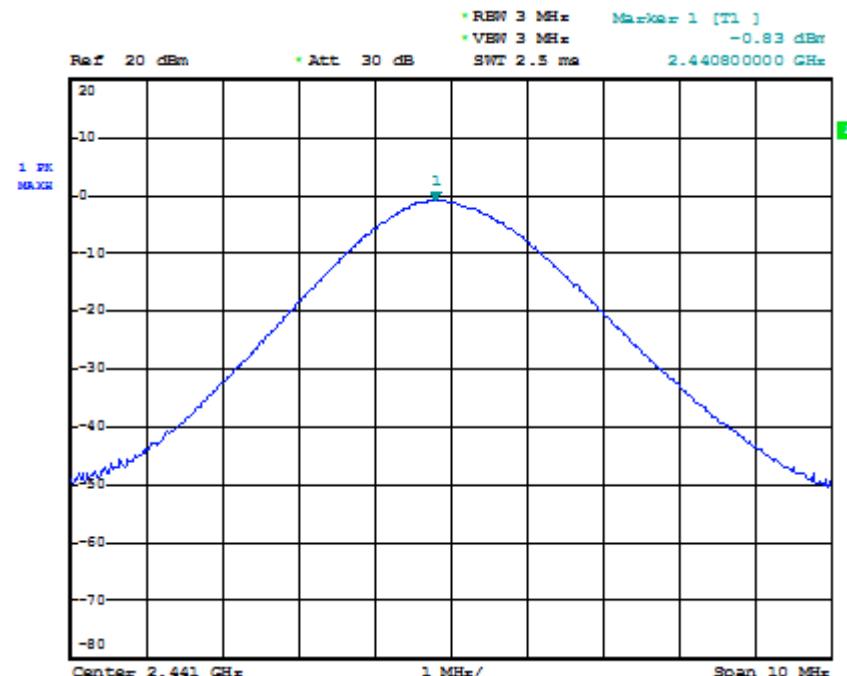
Test mode:	π/4DQPSK	Test channel:	Highest
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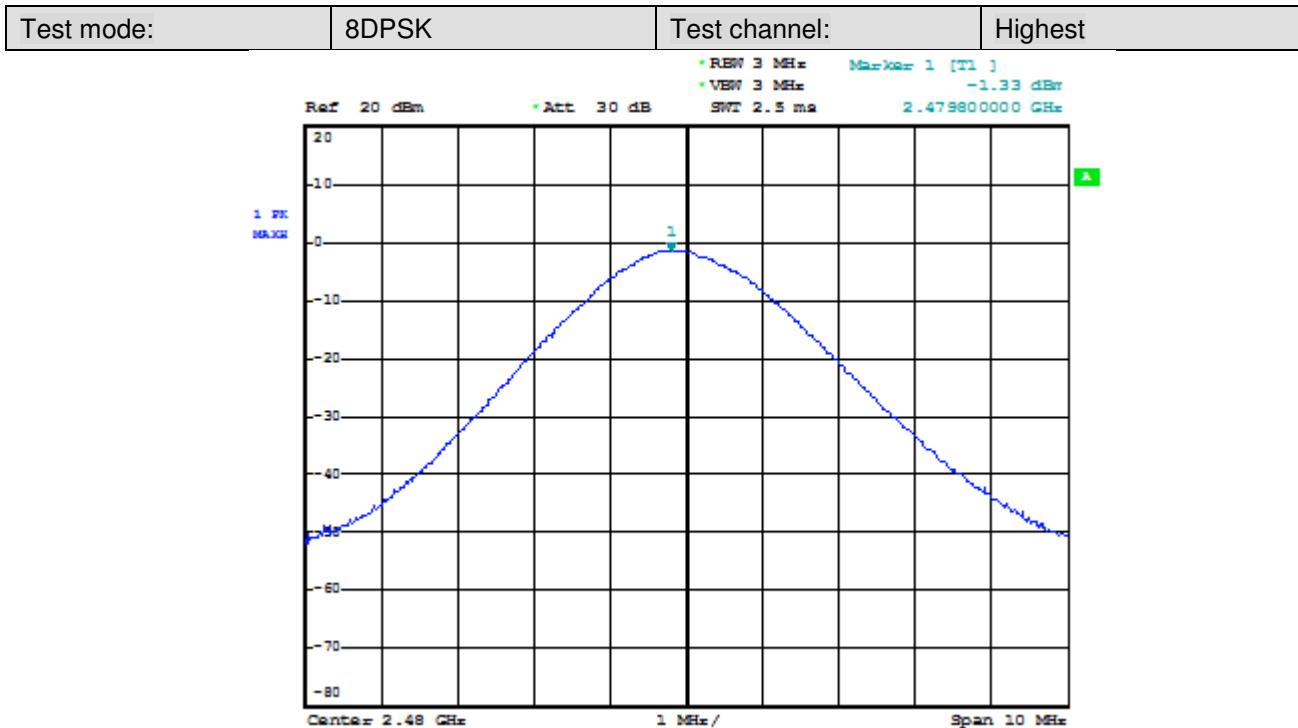


Test mode:	8DPSK	Test channel:	Lowest
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Test mode:	8DPSK	Test channel:	Middle
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7.6 Carrier Frequencies Separated

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

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

Test result: Pass

Final Test Mode: Engineering mode

Test Procedure:

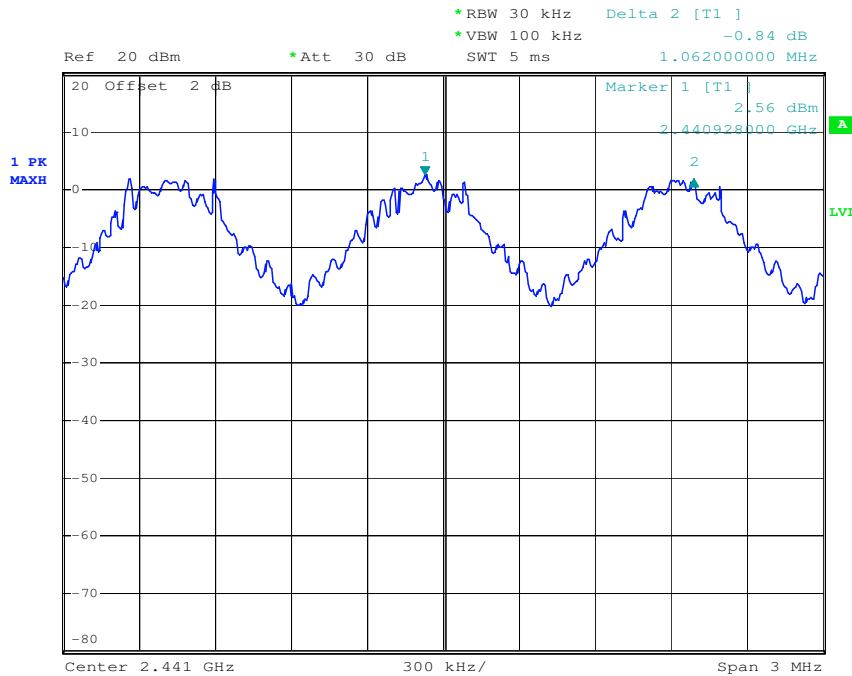
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW \geq 1% of the span (set 30 kHz). VBW \geq RBW, Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Maxhold.
3. Allow the trace to stabilize. Use the marker-delta 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)	GFSK	1.062	25kHz/700kHz	PASS
Middle Channels (channel 39 and channel 40)	$\pi/4$ DQPSK	1.002	25kHz/784kHz	PASS
Middle Channels (channel 39 and channel 40)	8DPSK	1.014	25kHz/796kHz	PASS

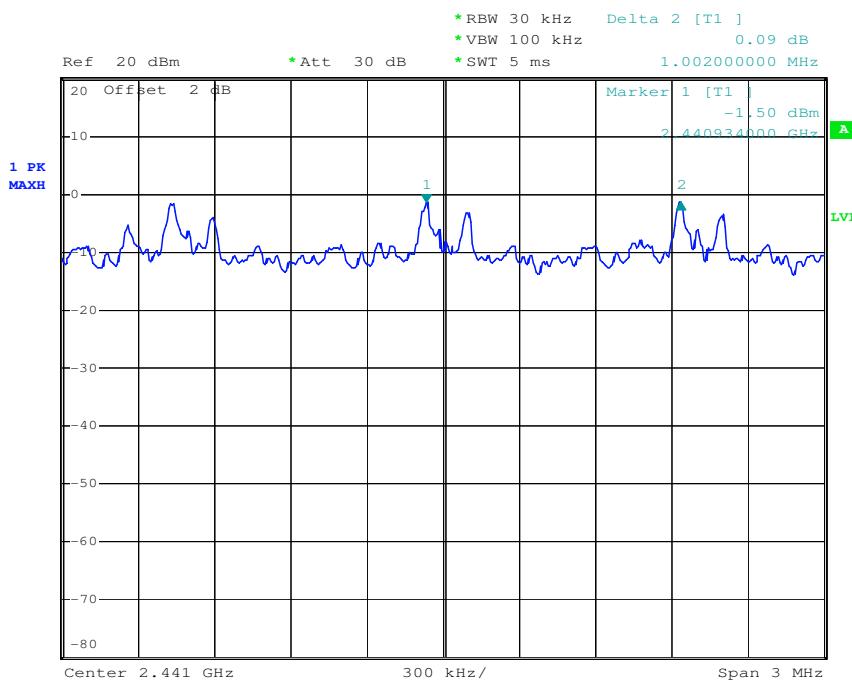
Note: 20dB bandwidth reference Section 7.4

Test plot as follows:

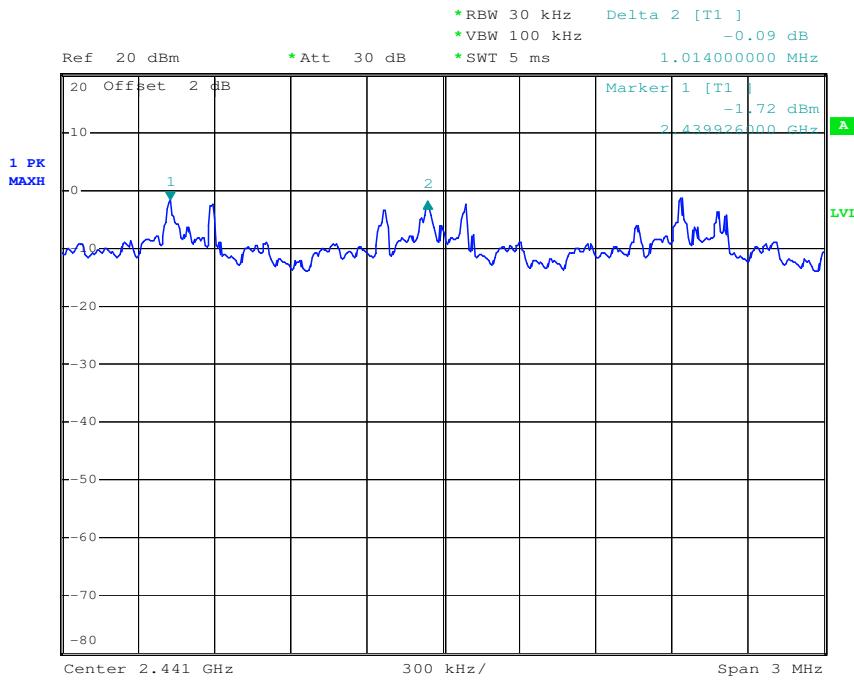
Test mode:	GFSK	Test channel:	Middle
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Test mode:	$\pi/4$ DQPSK	Test channel:	Middle
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Test mode:	8DPSK	Test channel:	Middle
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7.7 Hopping Channel Number

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

Limit: At least 15 channels

Test Result: Pass

Test Mode: Engineering mode

Test Procedure:

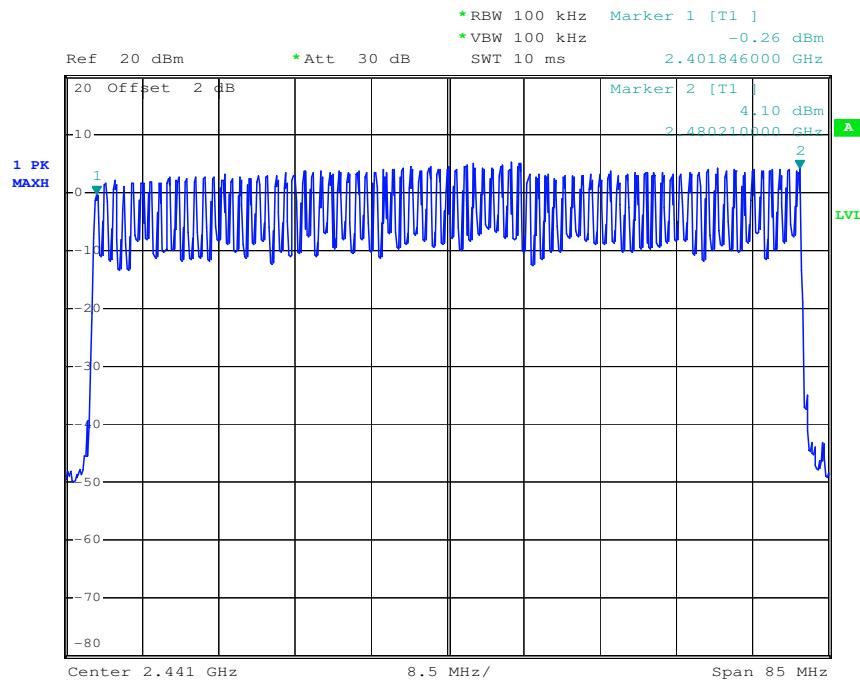
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up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

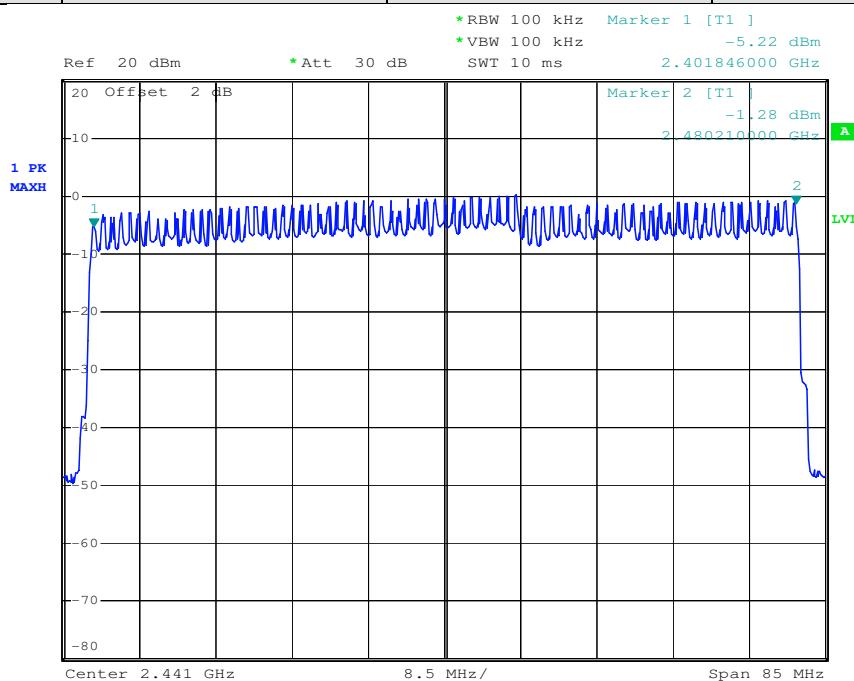
Mode	Hopping channel numbers	Limit	Results
8DPSK	79	≥15	Pass
GFSK	79	≥15	Pass
π/4DQPSK	79	≥15	Pass

Test plot as follows:

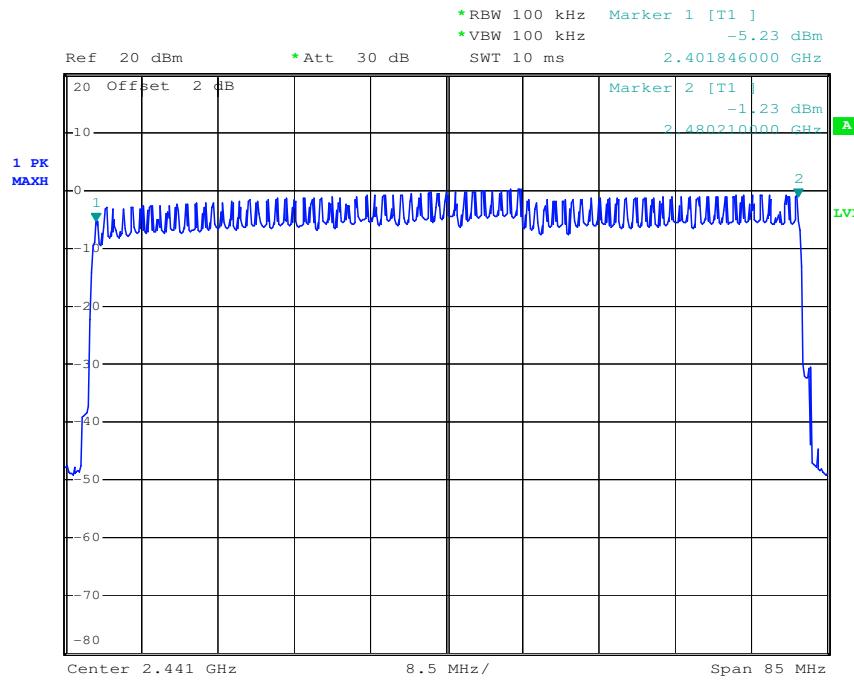
Test mode:	GFSK	Test channel:	Middle
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Test mode:	$\pi/4$ DQPSK	Test channel:	Middle
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Test mode:	8DPSK	Test channel:	Middle
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7.8 Dwell Time

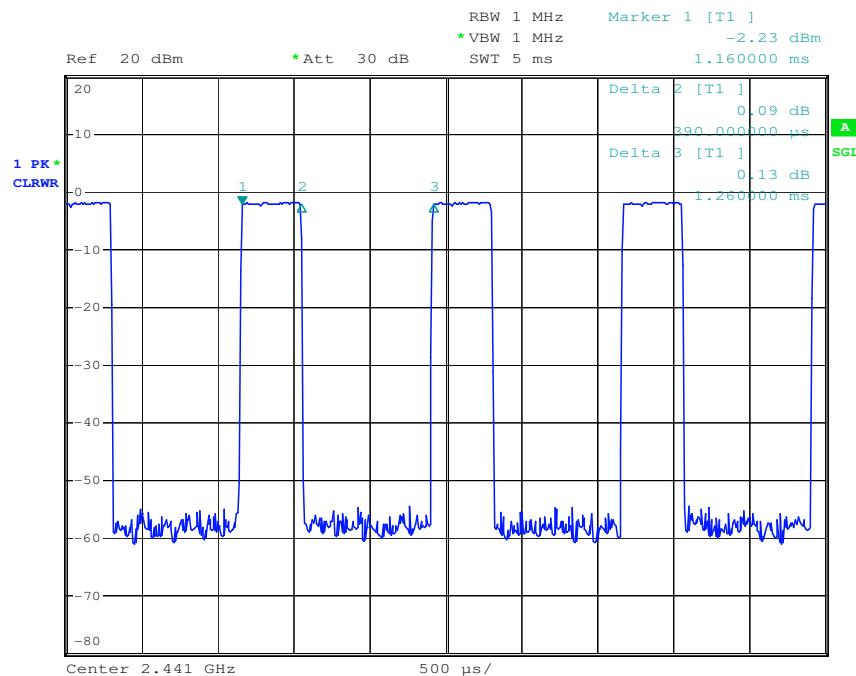
Test Requirement:	FCC Part 15 C Section 15.247(a)(1) RSS 210 A 8.1(d)
Test Method:	ANSI C63.10:2009 Clause 7.7.4
Test Date:	May 28, 2013
Limit:	Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel 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:	<ol style="list-style-type: none">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	0.390	201	0.078	0.4	Pass
		DH3	1.650	125	0.206	0.4	Pass
		DH5	2.880	90	0.259	0.4	Pass
	$\pi/4$ DQPSK	DH1	0.400	211	0.084	0.4	Pass
		DH3	1.660	140	0.232	0.4	Pass
		DH5	1.690	88	0.149	0.4	Pass
	8DPSK	DH1	0.400	164	0.066	0.4	Pass
		DH3	1.640	123	0.202	0.4	Pass
		DH5	2.900	102	0.296	0.4	Pass

Test plot as follows::

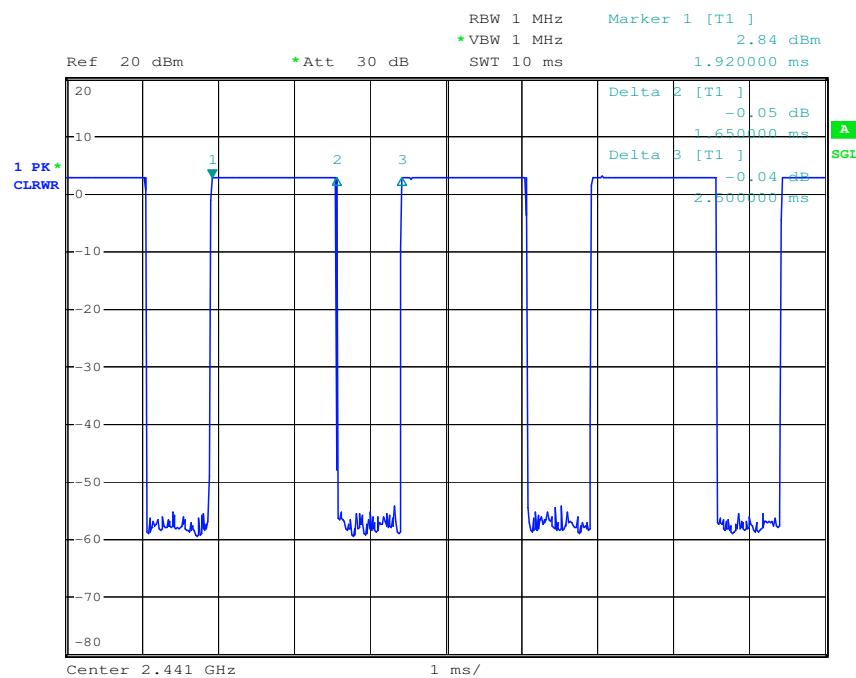
Frequency 2441MHz:

Modulation: GFSK-DH1



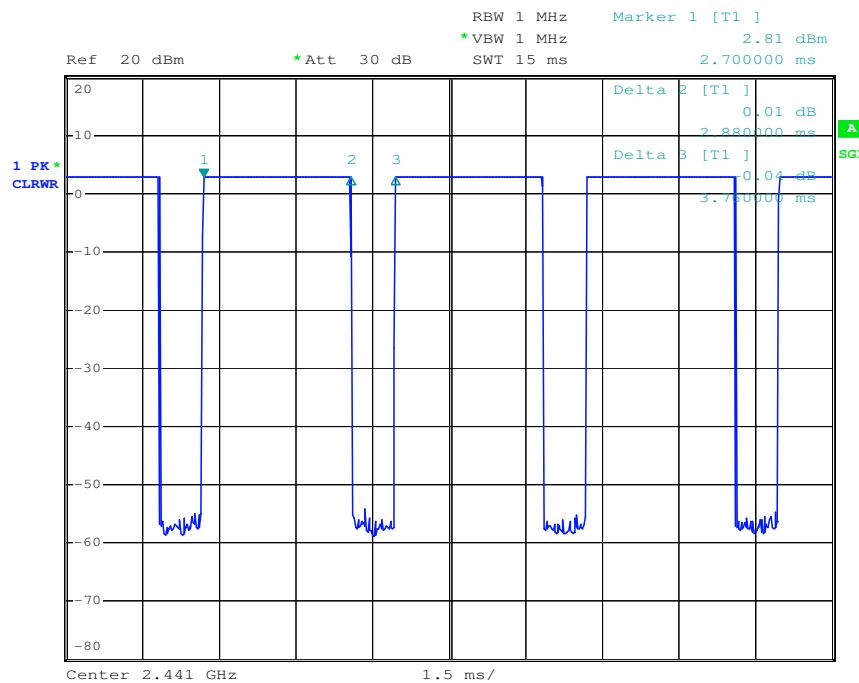
Frequency 2441MHz:

Modulation: GFSK- DH3

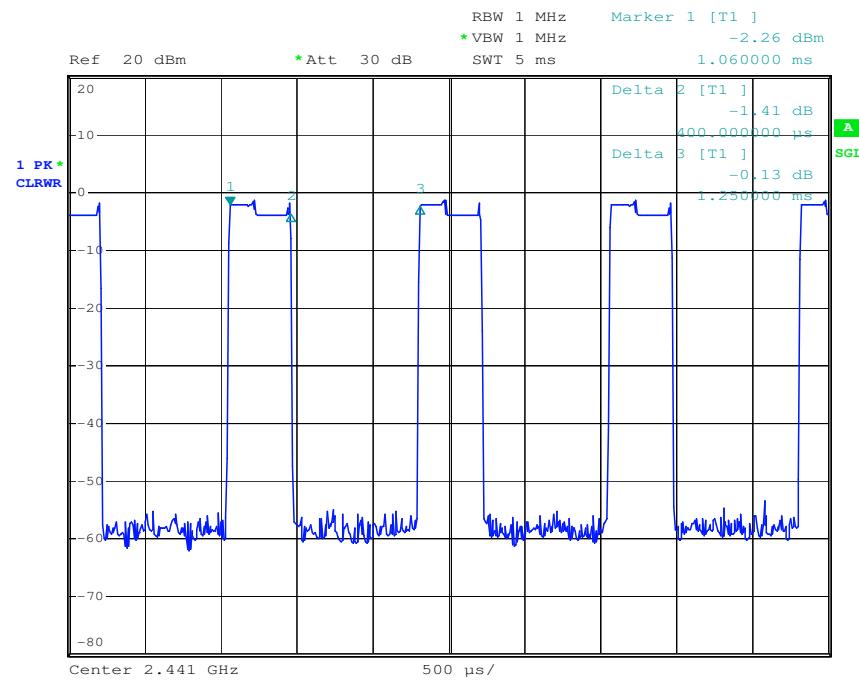


Frequency 2441MHz:

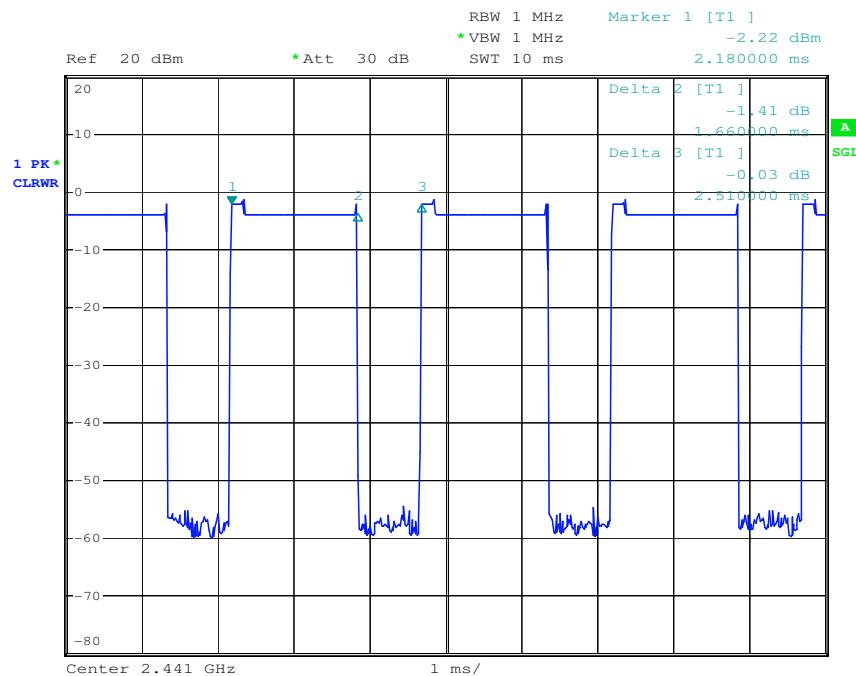
Modulation: GFSK- DH5



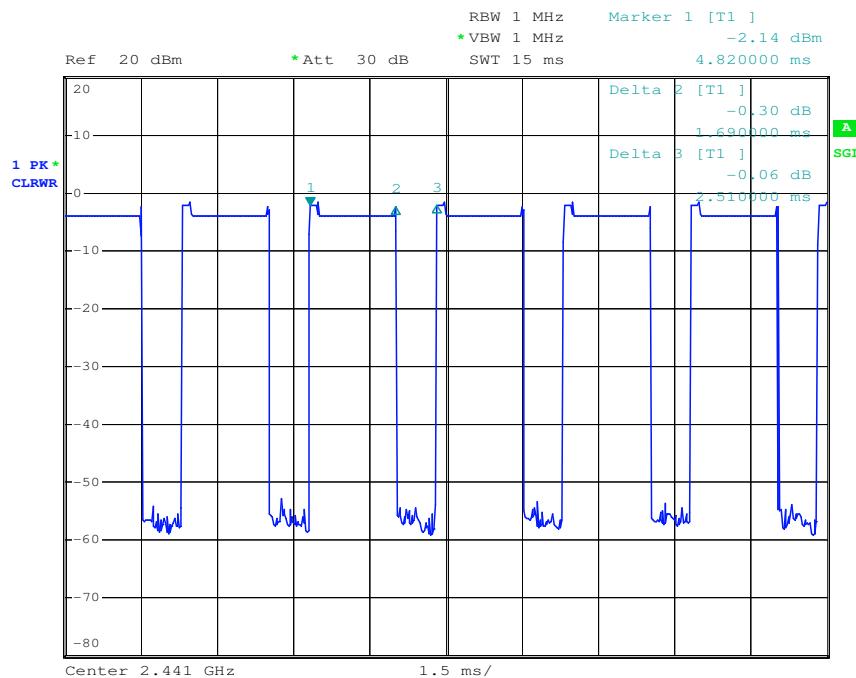
Frequency 2441MHz:

Modulation: $\pi/4$ DQPSK -DH1


Frequency 2441MHz:

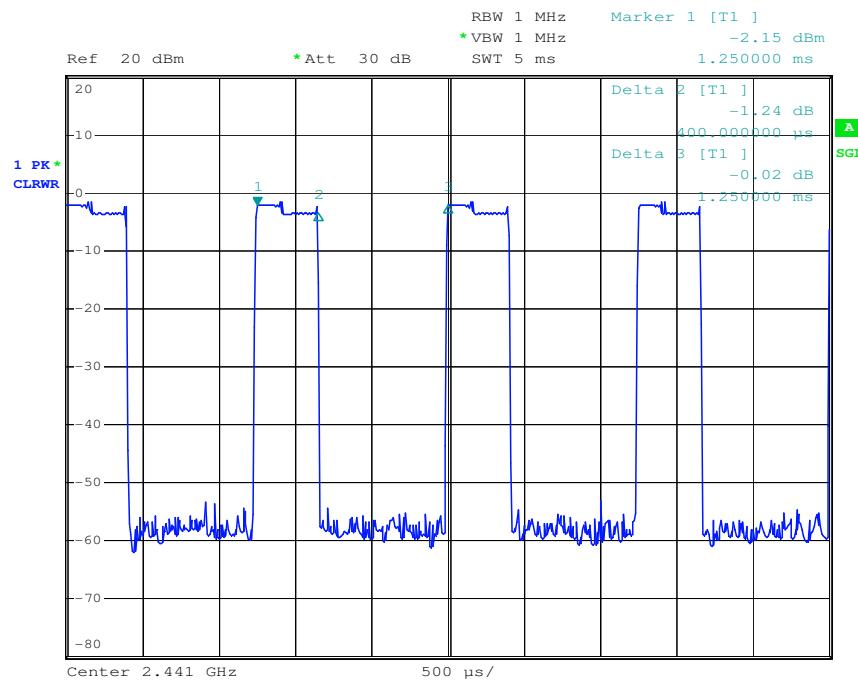
Modulation: $\pi/4$ DQPSK - DH3

Frequency 2441MHz:

Modulation: $\pi/4$ DQPSK - DH5

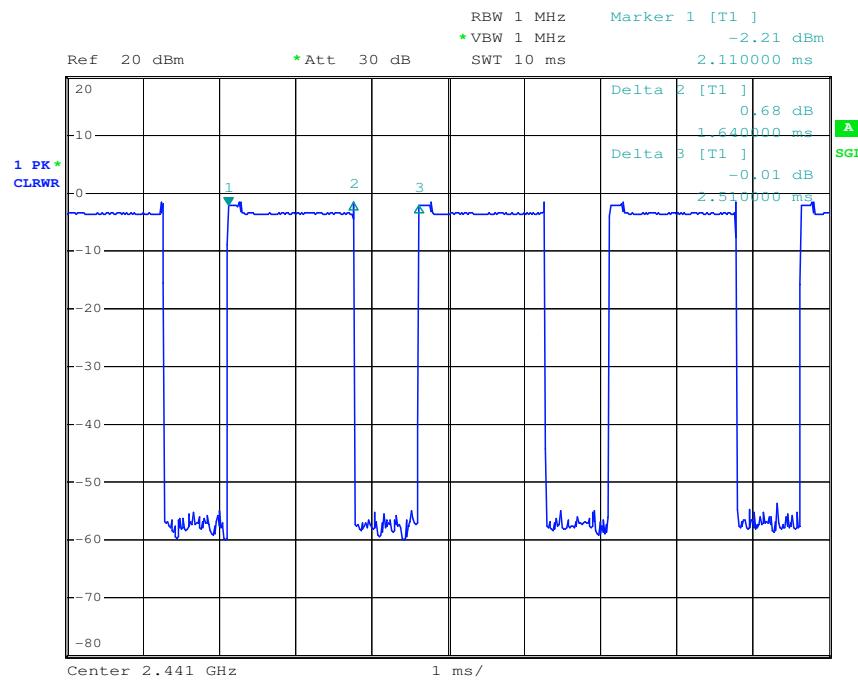
Frequency 2441MHz:

Modulation: 8DPSK -DH1



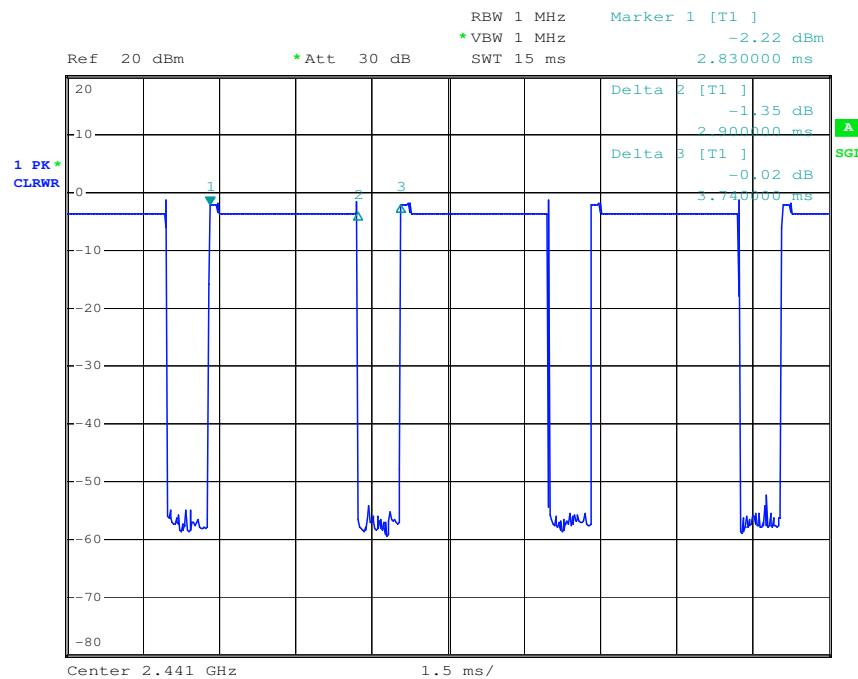
Frequency 2441MHz:

Modulation: 8DPSK - DH3



Frequency 2441MHz:

Modulation: 8DPSK - DH5



7.9 Conducted Spurious Emissions

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

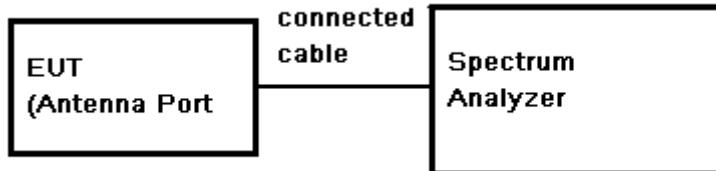
Test Method: ANSI C63.10:2009 Clause 7.7.10

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: Engineering mode

Test Result: Pass

Test Configuration:



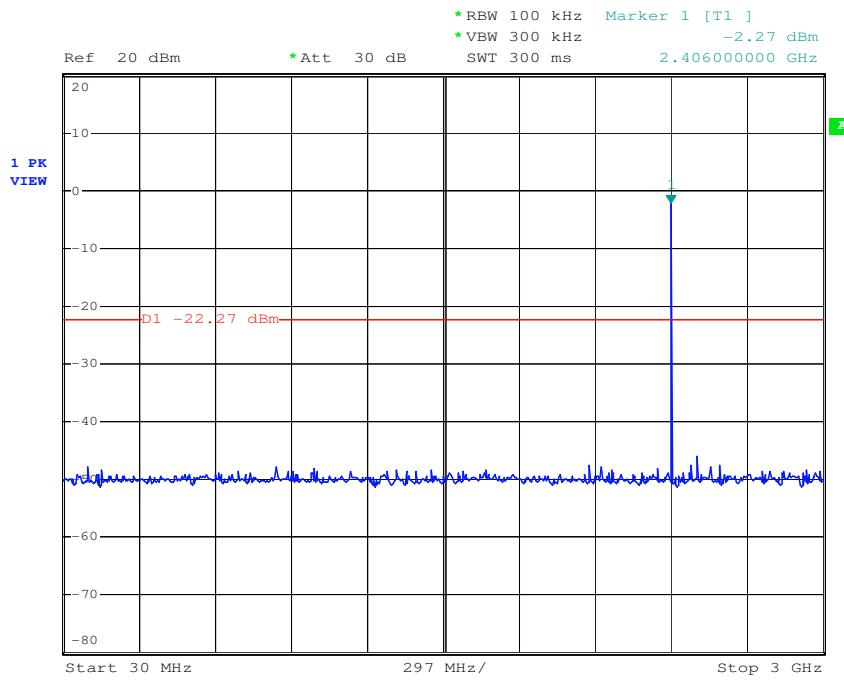
Test Procedure:

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).

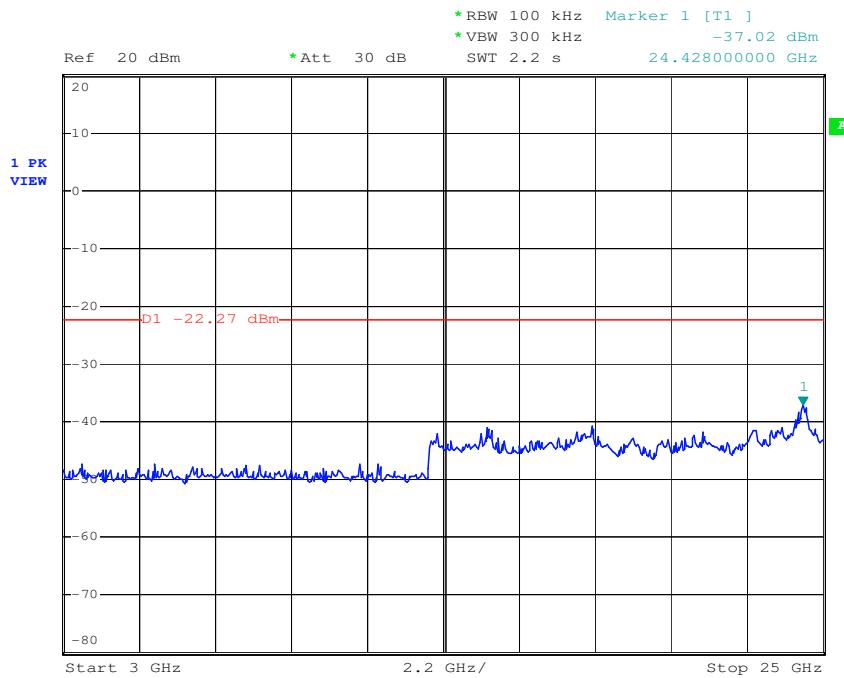
Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest
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30MHz-3GHz:

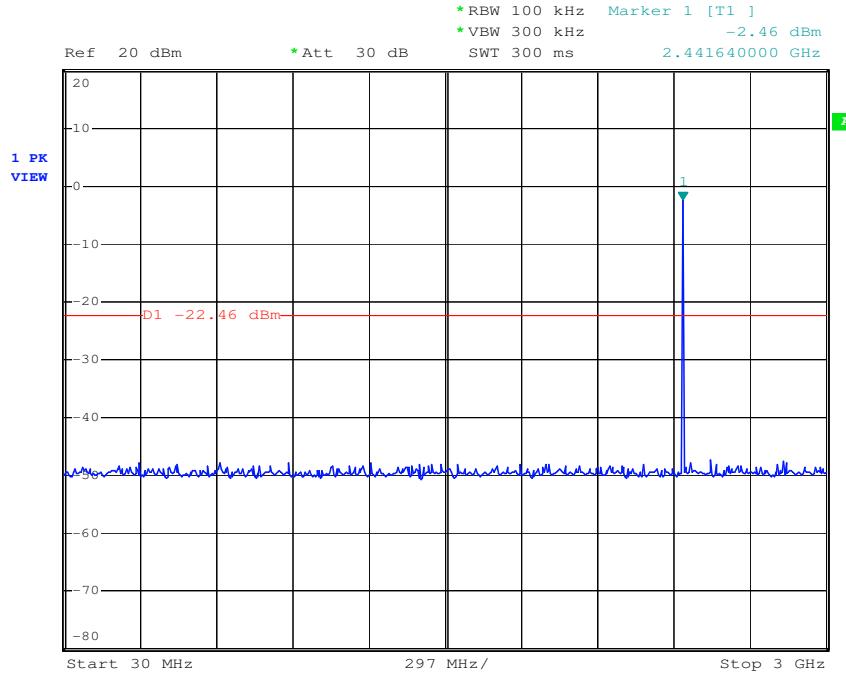


3GHz-25GHz:

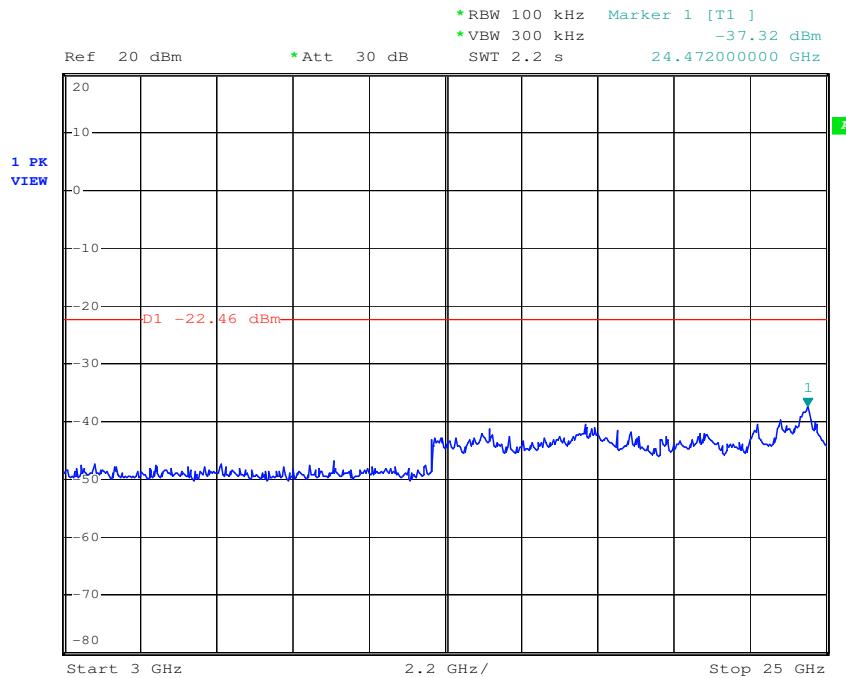


Test mode:	GFSK	Test channel:	Middle
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30MHz-3GHz:

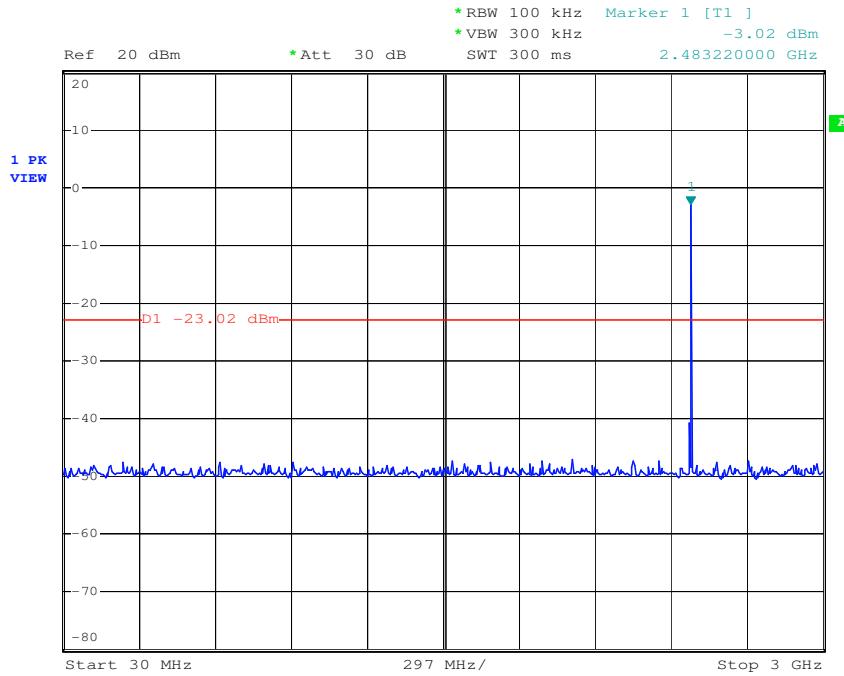


3GHz-25GHz:

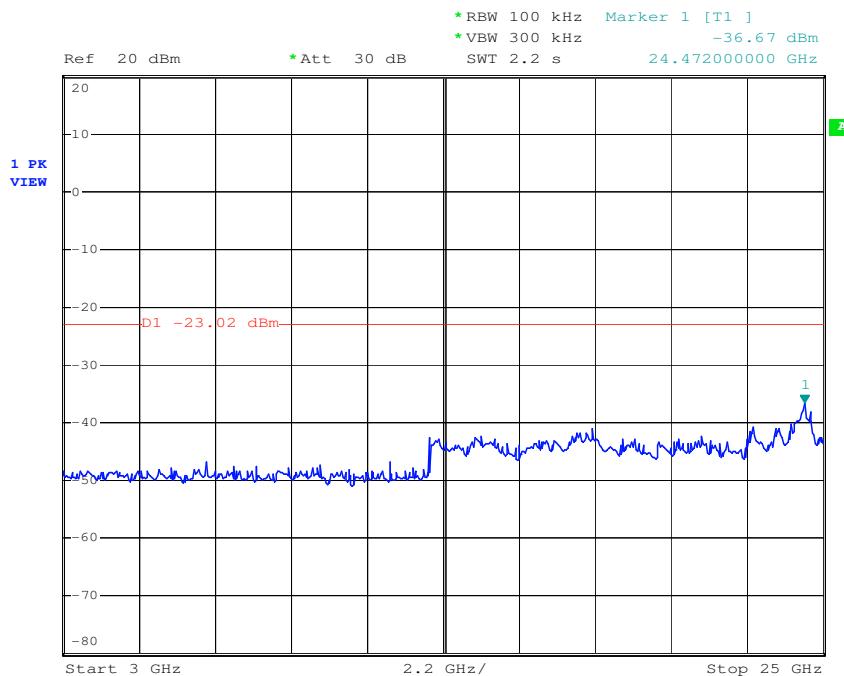


Test mode:	GFSK	Test channel:	Highest
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30MHz-3GHz:

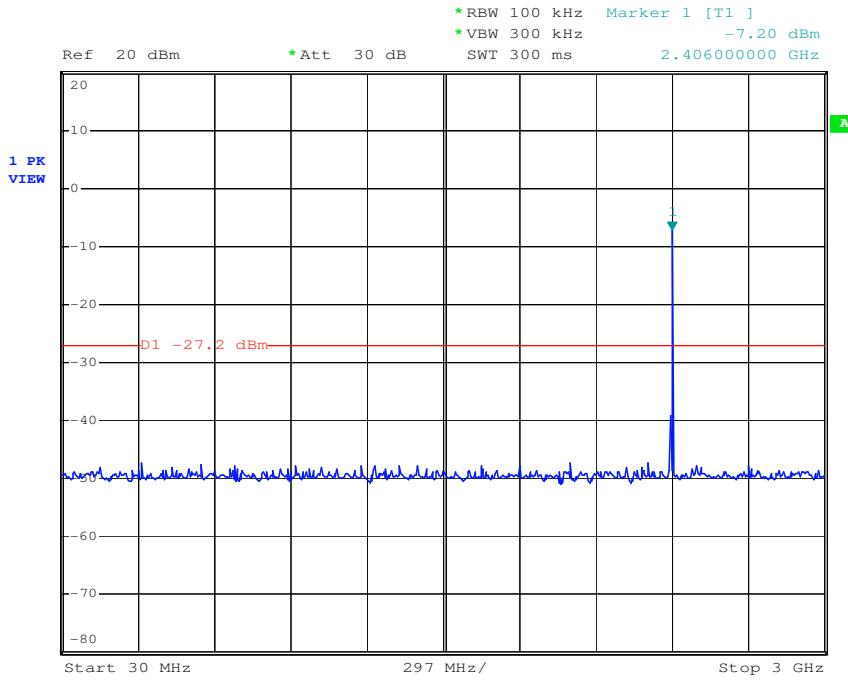


3GHz-25GHz:

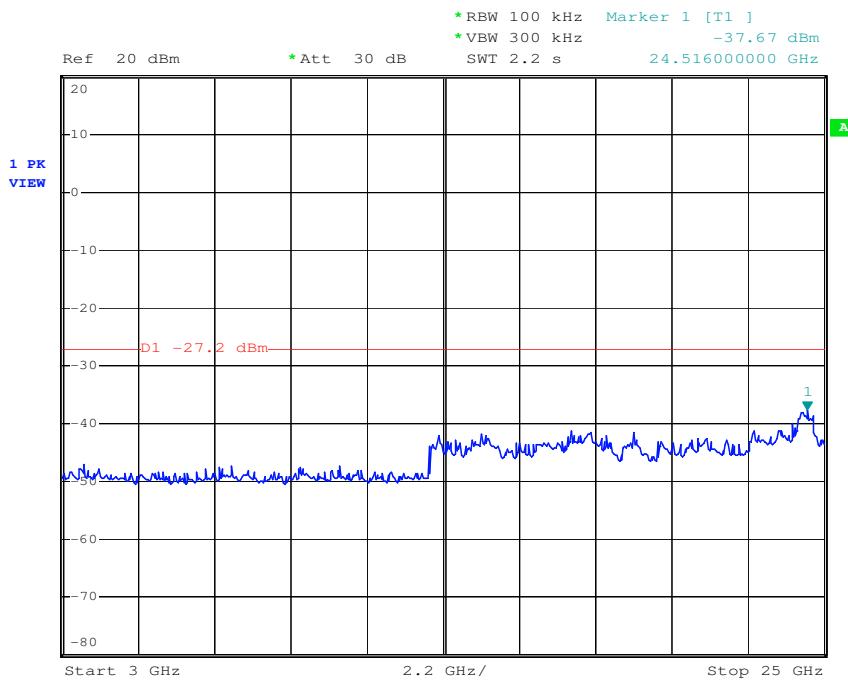


Test mode:	$\pi/4$ DQPSK	Test channel:	Lowest
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30MHz-3GHz:

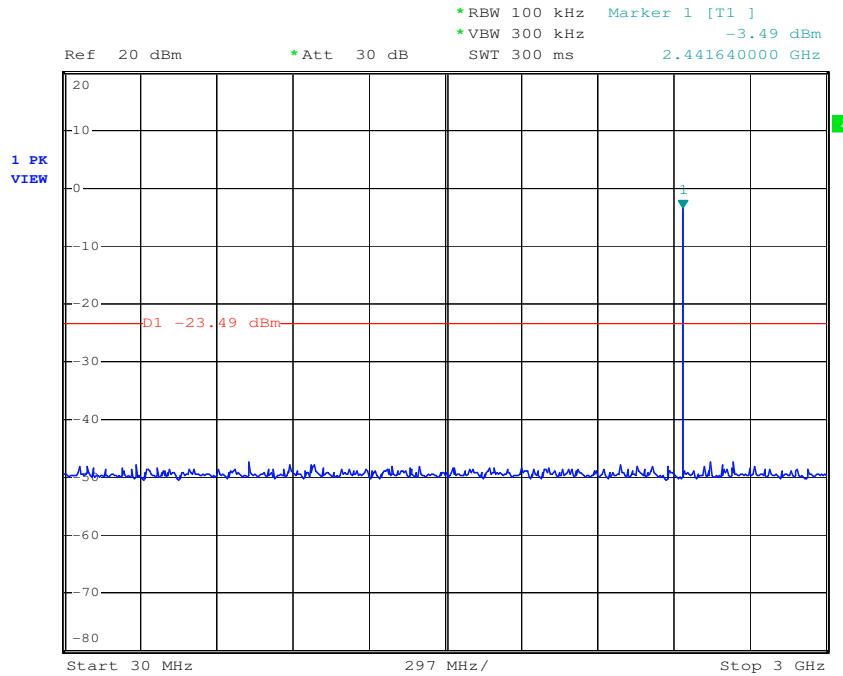


3GHz-25GHz:

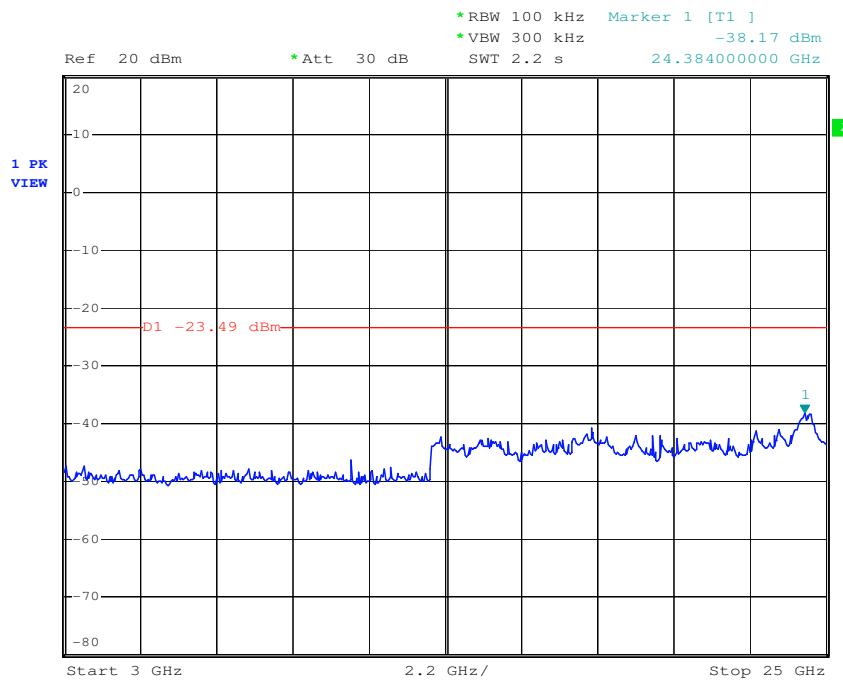


Test mode:	$\pi/4$ DQPSK	Test channel:	Middle
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30MHz-3GHz:

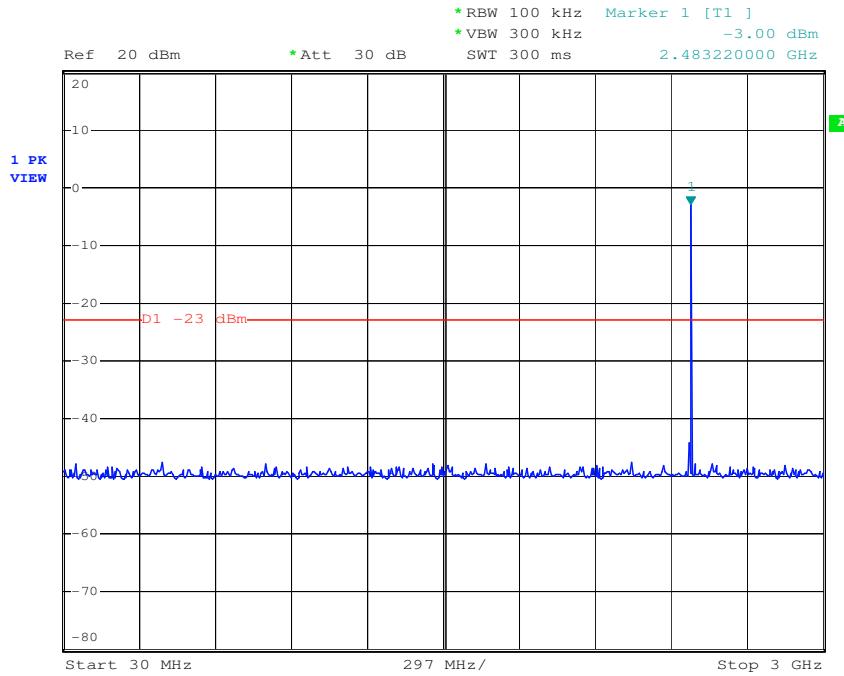


3GHz-25GHz:

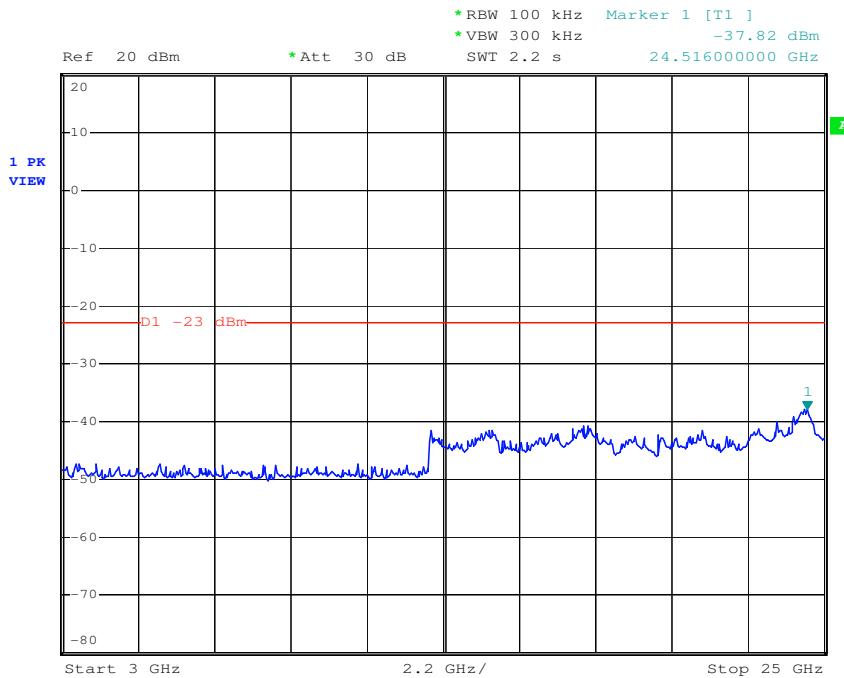


Test mode:	$\pi/4$ DQPSK	Test channel:	Highest
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30MHz-3GHz:

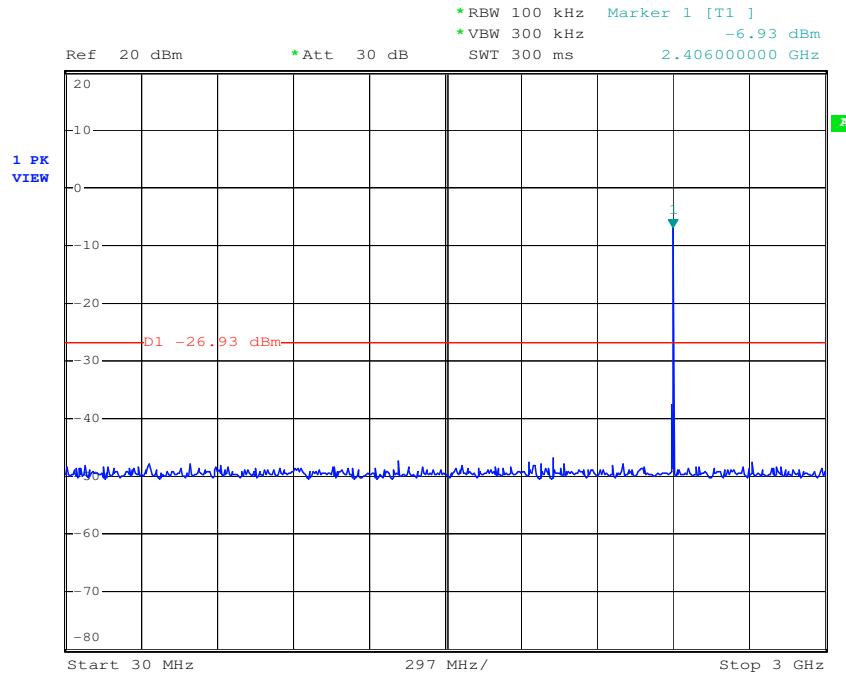


3GHz-25GHz:

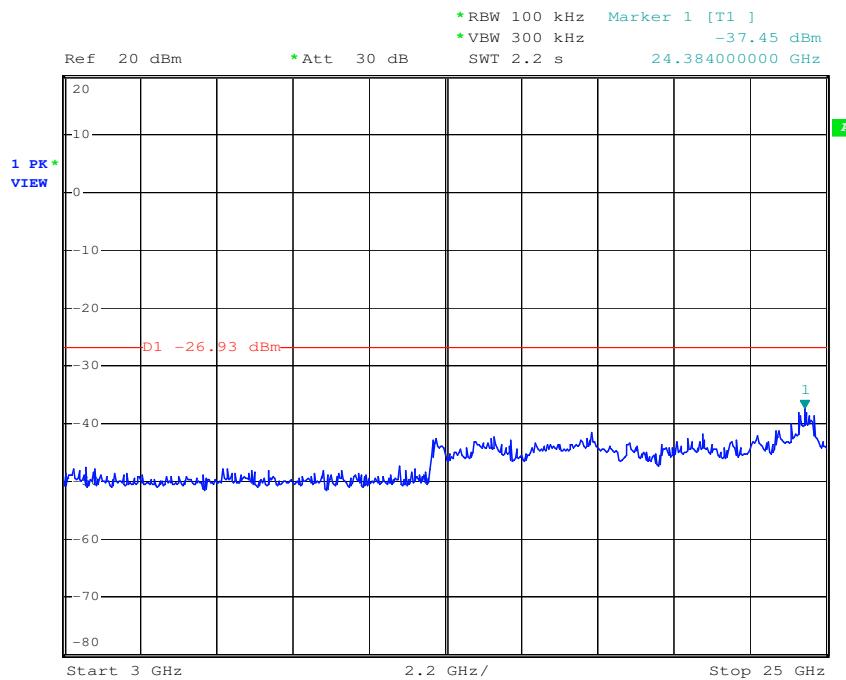


Test mode:	8DPSK	Test channel:	Lowest
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30MHz-3GHz:

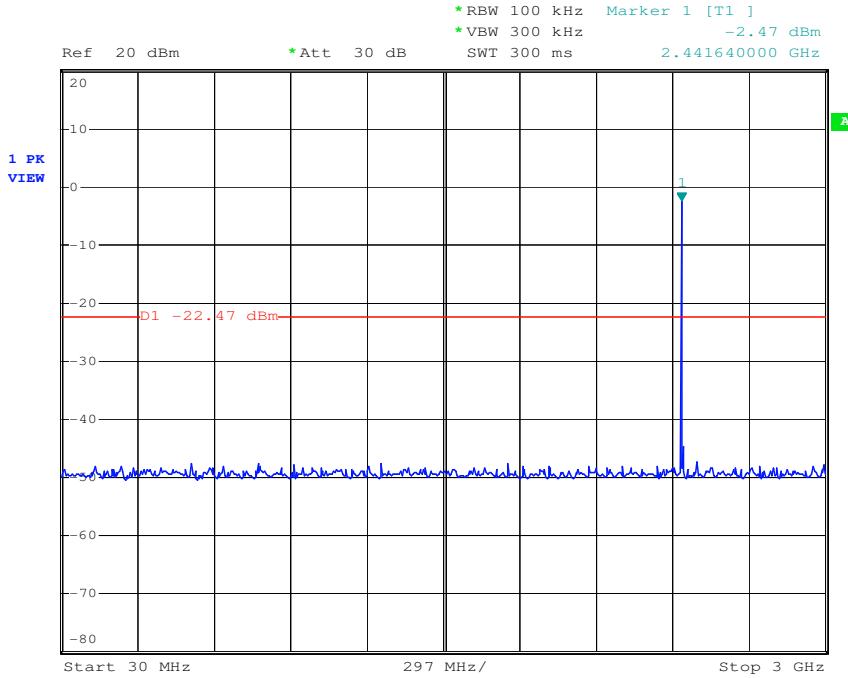


3GHz-25GHz:

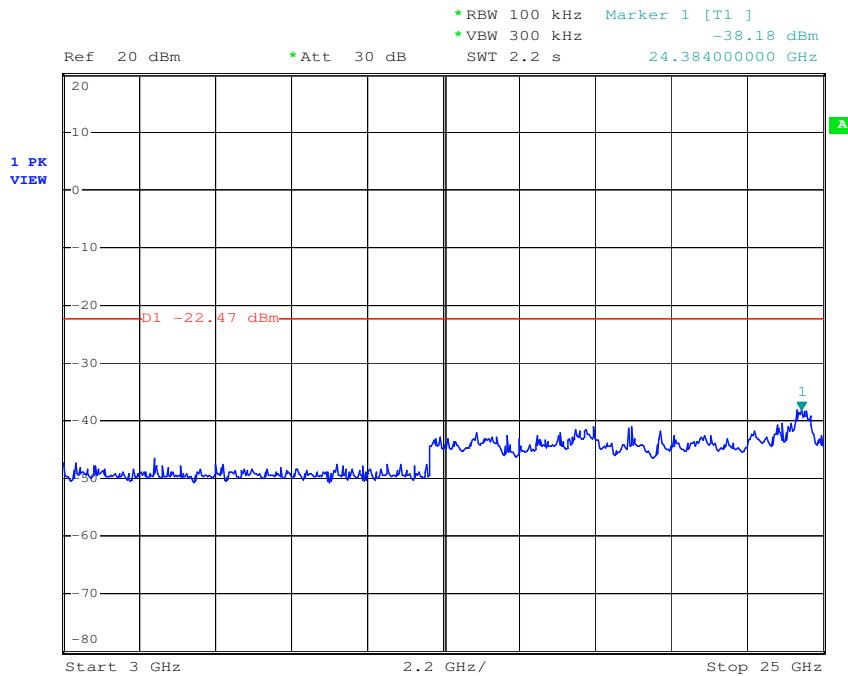


Test mode:	8DPSK	Test channel:	Middle
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30MHz-3GHz:

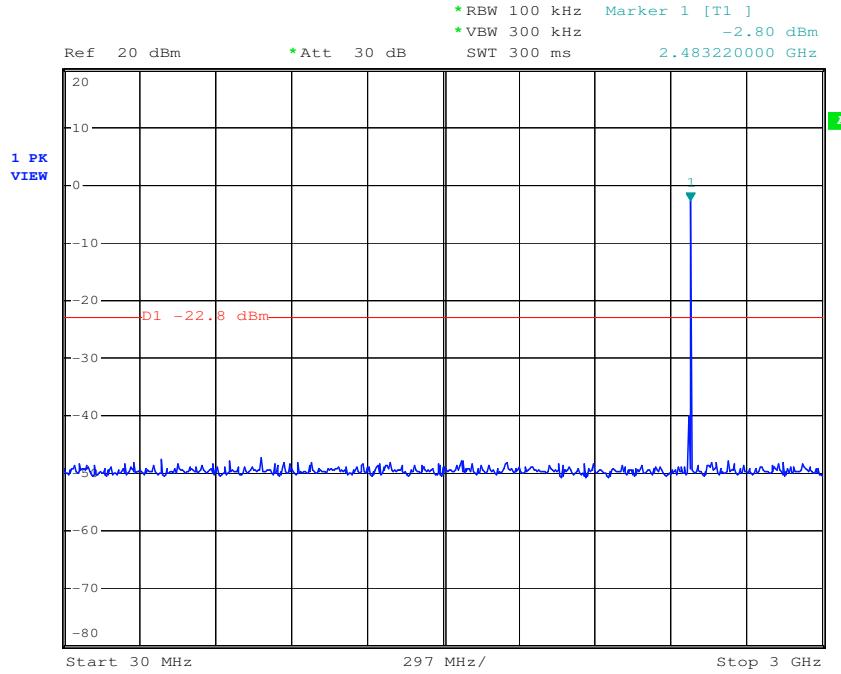


3GHz-25GHz:

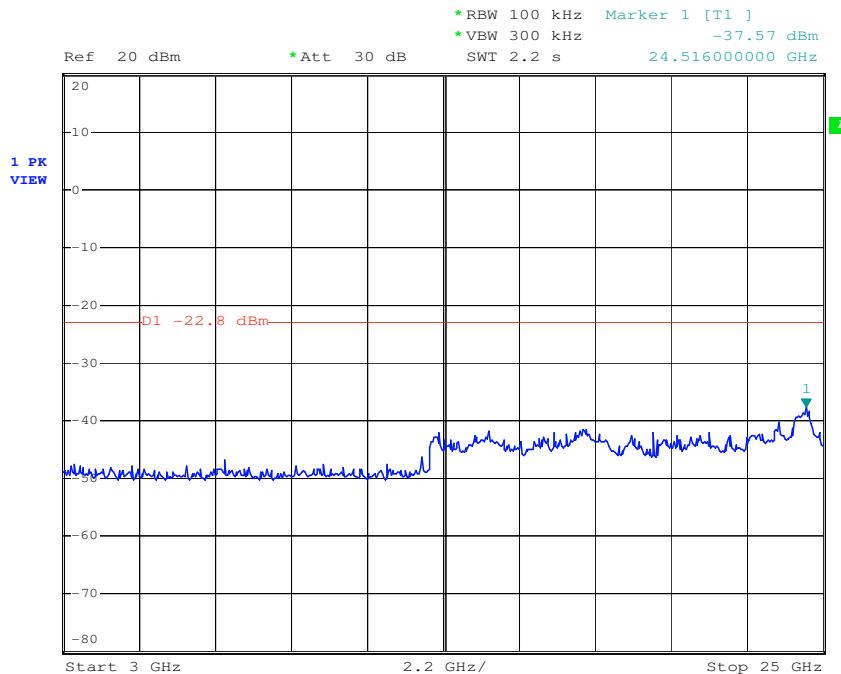


Test mode:	8DPSK	Test channel:	Highest
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30MHz-3GHz:



3GHz-25GHz:



7.10 Conducted Band-edge

Test Requirement: FCC Part 15 Section 15.247(d)

RSS-Gen section 4.9

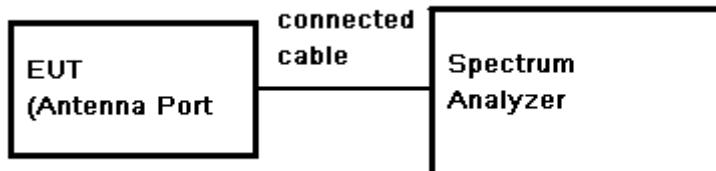
Test Method: ANSI C63.10:2009 Clause 7.7.10

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: Engineering mode

Test Result: Pass

Test Configuration:



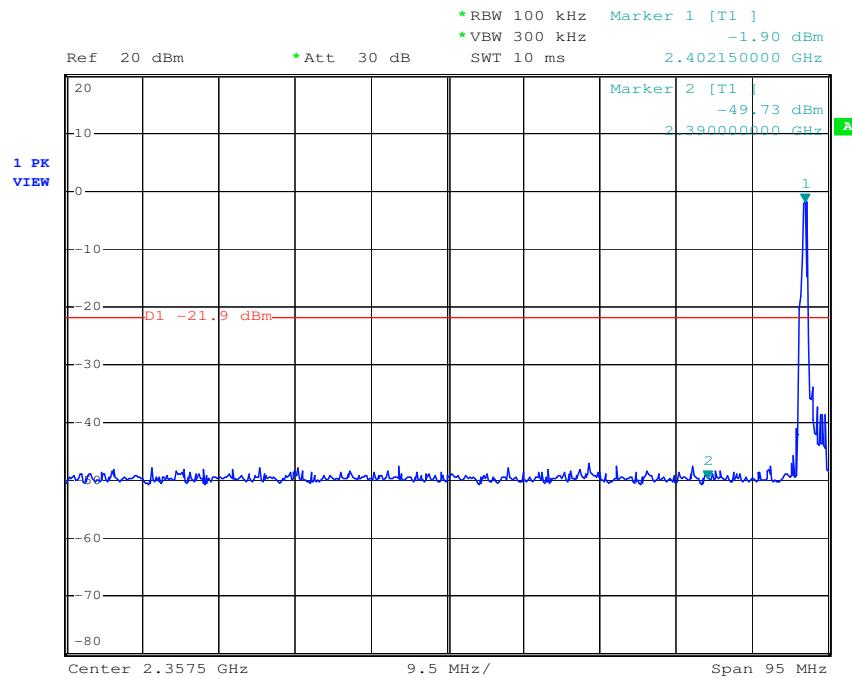
Test Procedure:

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:

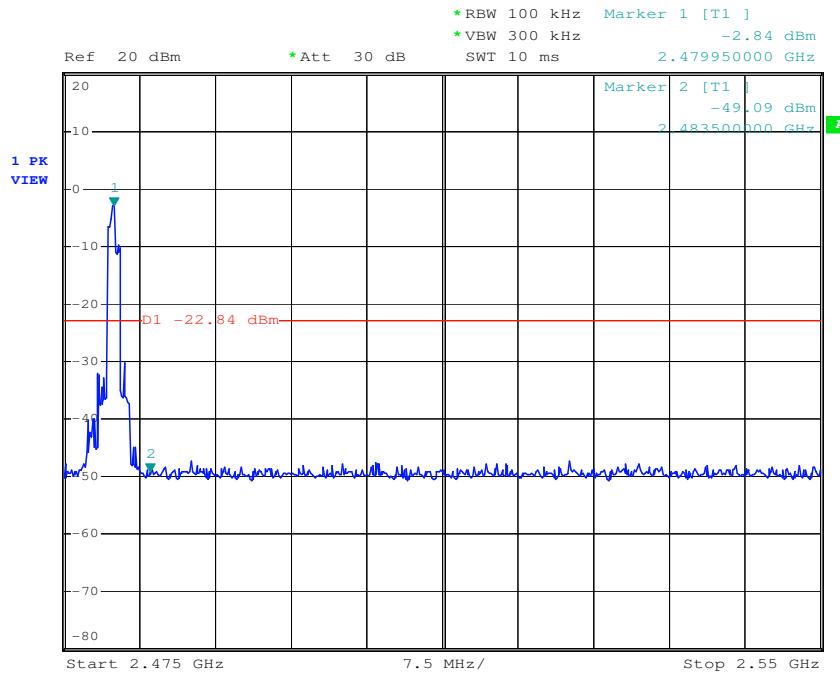
Test mode:	GFSK	Test channel:	Lowest
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For Static:



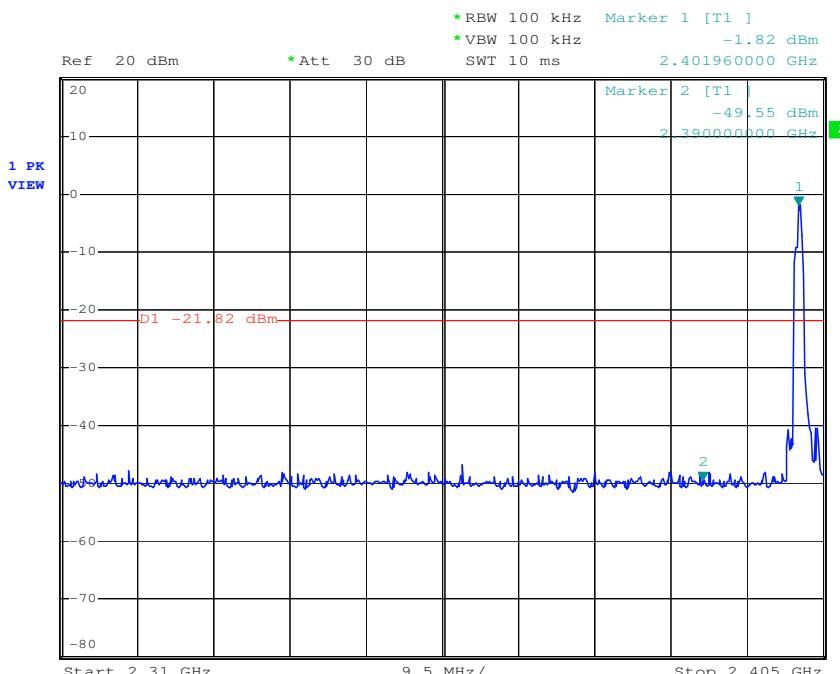
Test mode:	GFSK	Test channel:	Highest
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For Static:



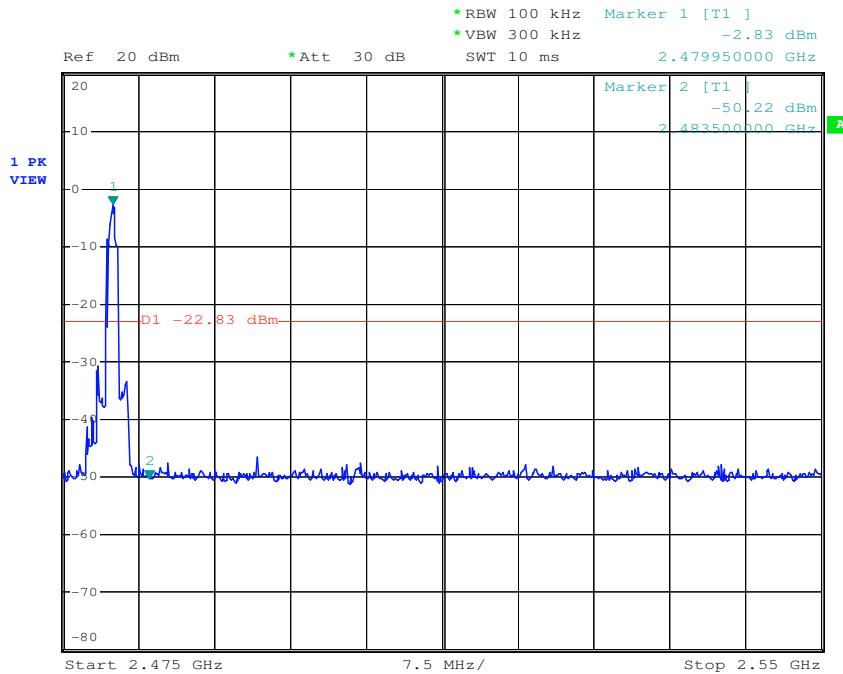
Test mode:	$\pi/4$ DQPSK	Test channel:	Lowest
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For Static:



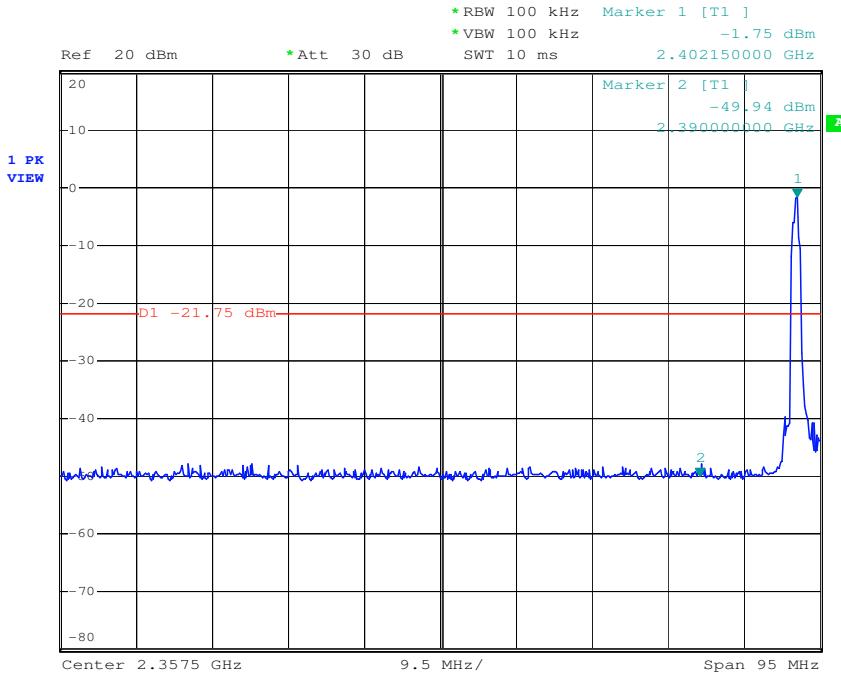
Test mode:	$\pi/4$ DQPSK	Test channel:	Highest
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For Static:



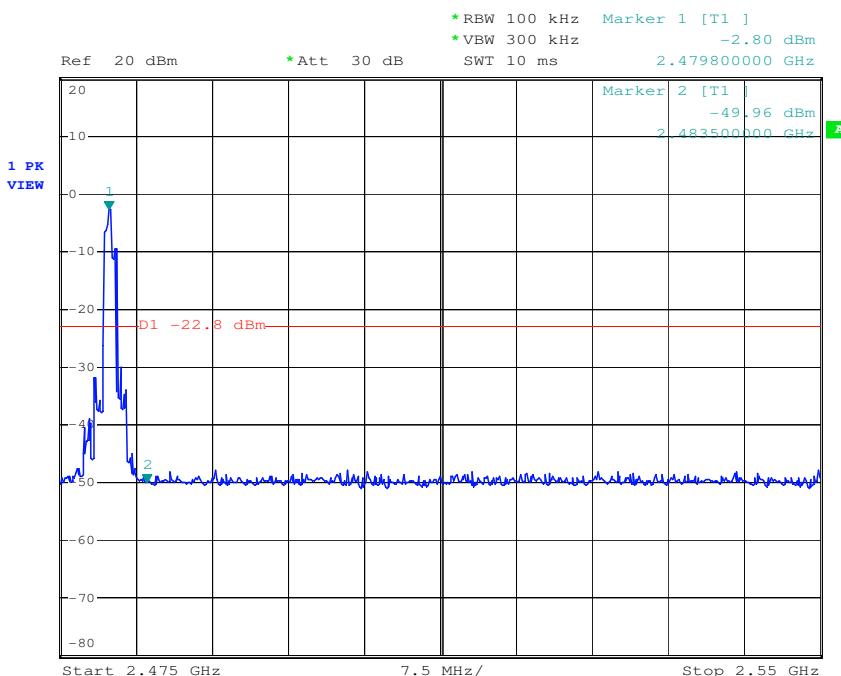
Test mode:	8DPSK	Test channel:	Lowest
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For Static:



Test mode:	8DPSK	Test channel:	Highest
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For Static:



7.11 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

Final Test Mode: Engineering 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 $f \geq 1$ GHz

VBW \geq RBW; Sweep = auto

Detector function = peak

Trace = max hold

For AV value:

RBW = 1 MHz for $f \geq 1$ GHz

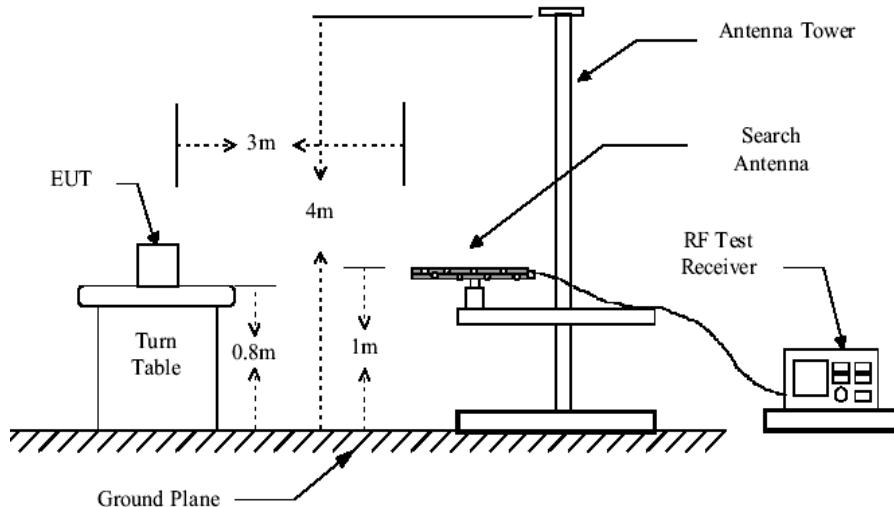
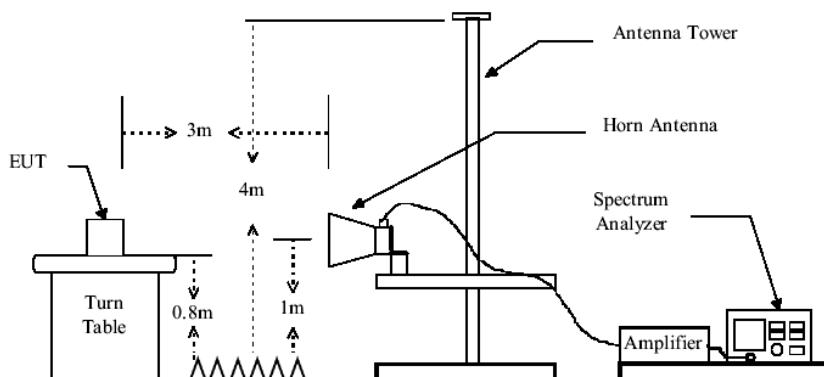
VBW = 10Hz; Sweep = auto

Detector function = peak

Trace = max hold

Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal

15.209 Limit:
40.0 dB μ V/m between 30MHz & 88MHz
43.5 dB μ V/m between 88MHz & 216MHz
46.0 dB μ V/m between 216MHz & 960MHz
54.0 dB μ V/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 noise 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 adapter, Compliance test was performed on worse case (8DPSK mode with adapter).

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

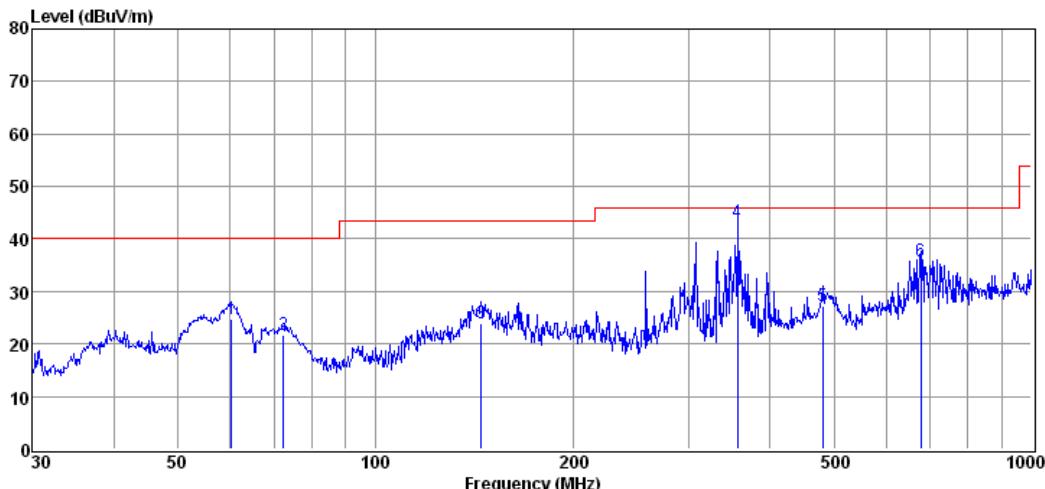
1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.

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.

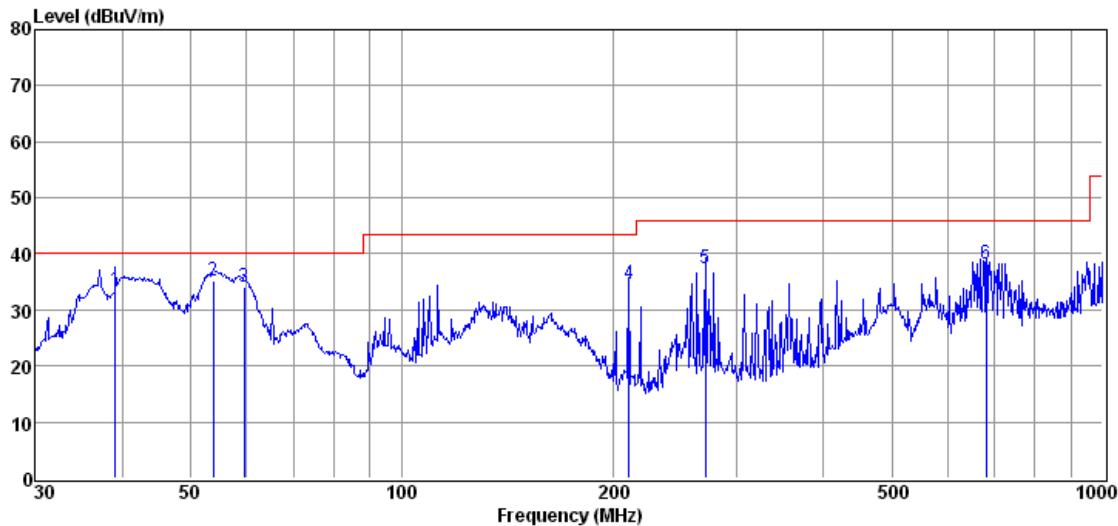
30MHz-1GHz:

Vertical:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dB μ V)	(dB/m)	(dB)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
1	60.28	36.53	12.16	24.70	0.73	24.72	40.00	-15.28	QP
2	72.34	35.35	10.33	24.70	0.82	21.80	40.00	-18.20	QP
3	144.84	35.10	12.39	24.70	1.25	24.04	43.50	-19.46	QP
4	356.68	51.71	13.79	24.47	2.14	43.17	46.00	-2.83	QP
5	480.53	32.65	16.34	24.38	2.55	27.16	46.00	-18.84	QP
6	677.58	36.64	20.13	24.10	3.07	35.74	46.00	-10.26	QP

Horizontal:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dB μ V)	(dB/m)	(dB)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
1	39.02	44.62	13.12	24.70	0.55	33.59	40.00	-6.41	QP
2	53.88	46.55	12.57	24.70	0.68	35.10	40.00	-4.90	QP
3	59.65	45.88	12.22	24.70	0.73	34.13	40.00	-5.87	QP
4	210.79	48.57	9.19	24.60	1.55	34.71	43.50	-8.79	QP
5	271.33	48.48	11.52	24.50	1.82	37.32	46.00	-8.68	QP
6	682.35	39.00	20.19	24.10	3.08	38.17	46.00	-7.83	QP



Test in **Channel Low** in transmitting status- **Horizontal** polarization

1GHz-12GHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	4795.25	30.10	8.31	38.41	74	-35.59	peak
2	7215.75	30.55	10.65	41.20	74	-32.80	peak
3	9624.50	31.55	14.25	45.80	74	-28.20	peak

Test in **Channel Low** in transmitting status- **Vertical** polarization

1GHz-12GHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	4795.25	30.85	8.31	39.16	74	-34.84	peak
2	7215.75	30.75	10.65	41.40	74	-32.60	peak
3	9624.50	31.10	14.25	45.35	74	-28.65	peak

Test in **Channel Middle** in transmitting status- **Horizontal** polarization

1GHz-12GHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	4877.50	30.07	8.83	38.90	74	-35.10	peak
2	7321.50	31.32	10.90	42.22	74	-31.78	peak
3	9765.50	30.71	14.43	45.14	74	-28.86	peak

Test in **Channel Middle** in transmitting status- **Vertical** polarization

1GHz-12GHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	4877.50	30.54	8.83	39.37	74	-34.63	peak
2	7321.50	31.35	10.90	42.25	74	-31.75	peak
3	9765.50	30.56	14.43	44.99	74	-29.01	peak



Test in **Channel High** in transmitting status- **Horizontal** polarization

1GHz-12GHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	4959.75	30.39	8.94	39.33	74	-34.67	peak
2	7427.25	32.46	11.14	43.60	74	-30.40	peak
3	9918.25	32.32	14.69	47.01	74	-26.99	peak

Test in **Channel High** in transmitting status- **Vertical** polarization

1GHz-12GHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
1	4459.75	30.84	6.95	37.79	74	-36.21	peak
2	7427.25	32.19	11.14	43.33	74	-30.67	peak
3	9918.25	32.42	14.69	47.11	74	-26.89	peak

Remark: No other radiation has been found.

If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

7.12 Band edge (Radiated Emission)

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 Requirement:

ANSI 63.10:2009 Clause 6.12

Measurement Distance:

3m (Semi-Anechoic Chamber)

Limit:

40.0 dB μ V/m between 30MHz & 88MHz;

43.5 dB μ V/m between 88MHz & 216MHz;

46.0 dB μ V/m between 216MHz & 960MHz;

54.0 dB μ V/m above 960MHz.

Detector:

For PK value:

RBW = 1 MHz for $f \geq 1$ GHz

VBW \geq RBW; Sweep = auto

Detector function = peak

Trace = max hold

For AV value:

RBW = 1 MHz for $f \geq 1$ 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 submitted.

Test Result:

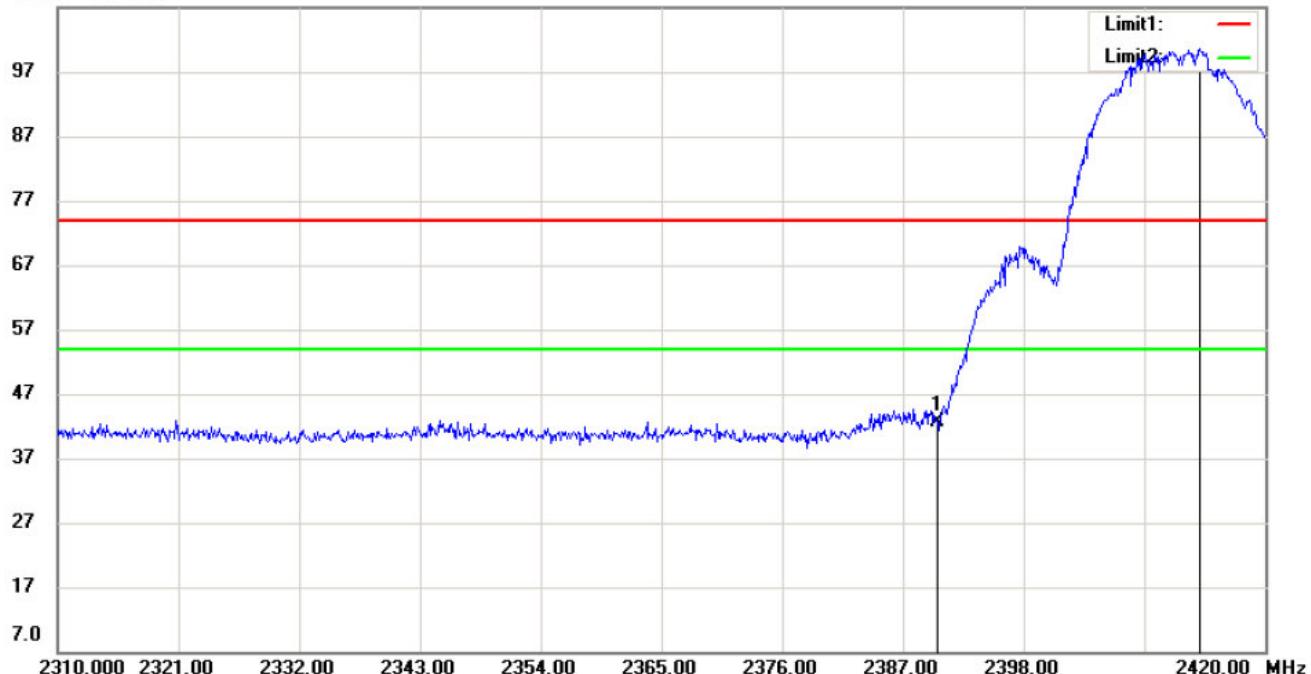
The EUT does meet the FCC requirements.

Test Result:

The EUT does meet the FCC requirements.

Measurement Result:**CH Low 2402MHz Radiated Bandedge****Modulation: GFSK****Horizontal, Peak Detector:**

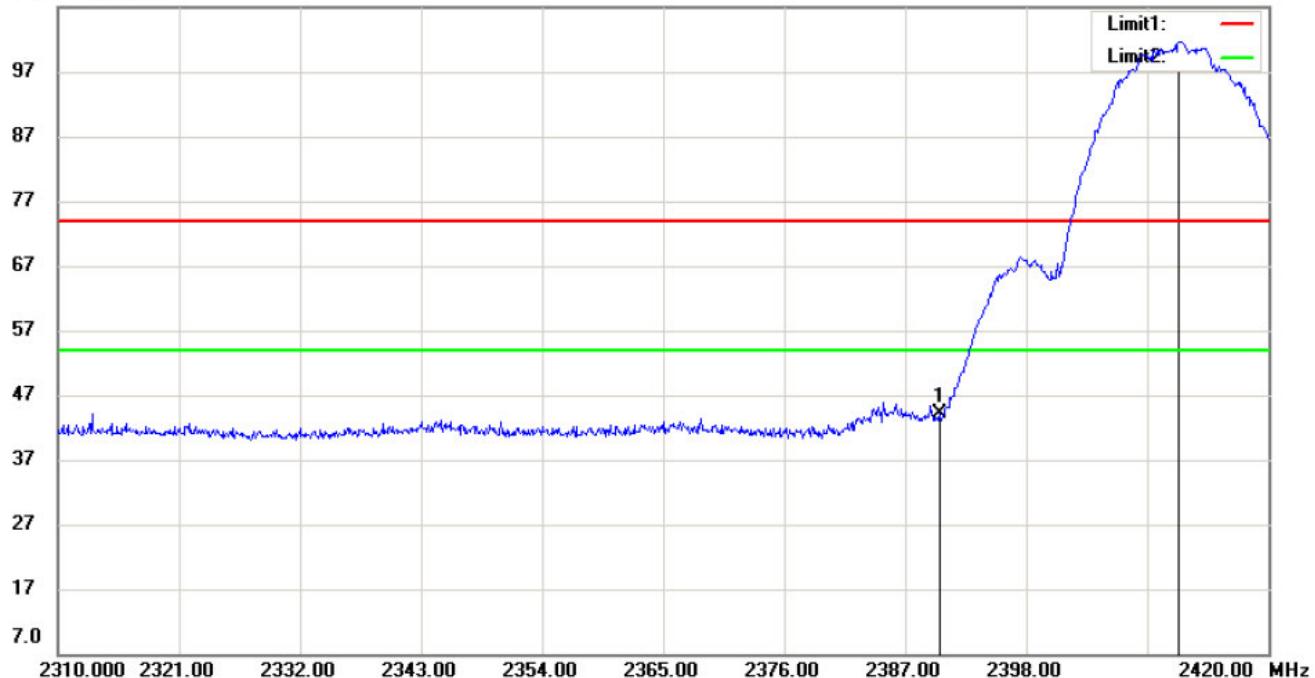
107.0 dBuV/m



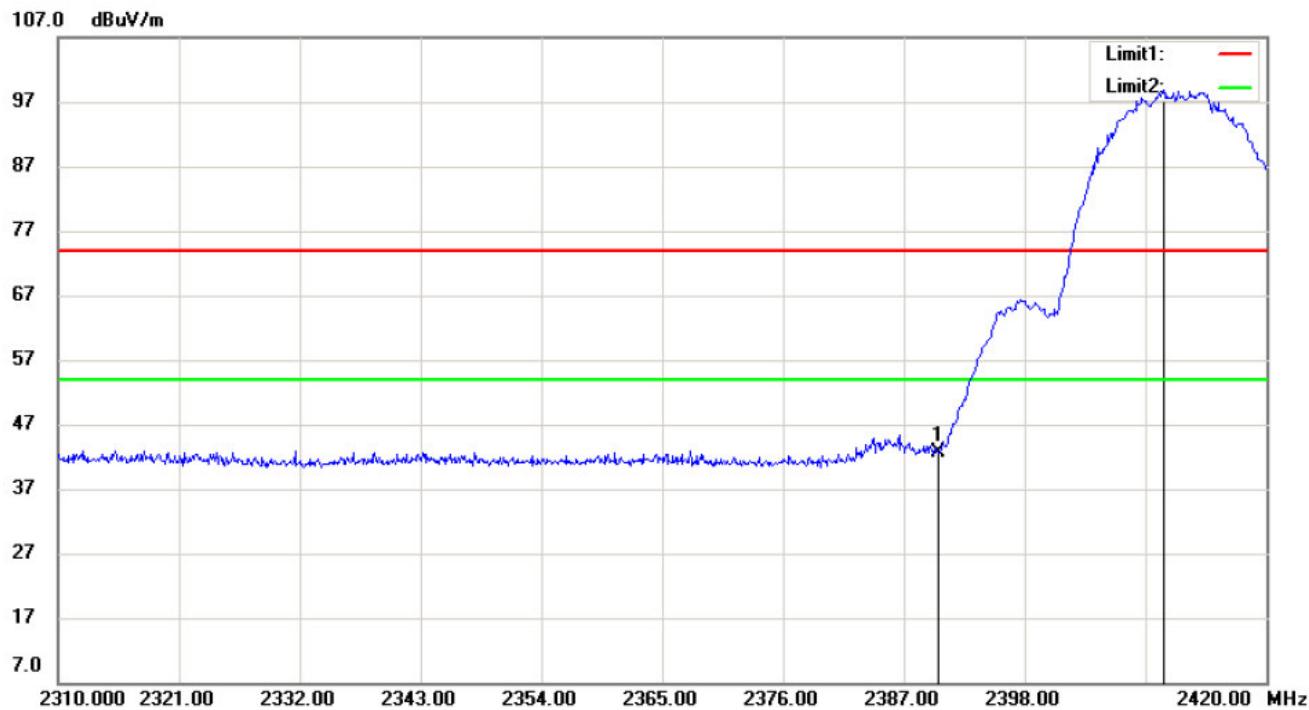
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2390.000	43.26	-0.56	42.70	54	-11.30	Peak
2	2414.060	101.18	-0.67	100.51	54	46.51	Peak

Vertical, Peak Detector:

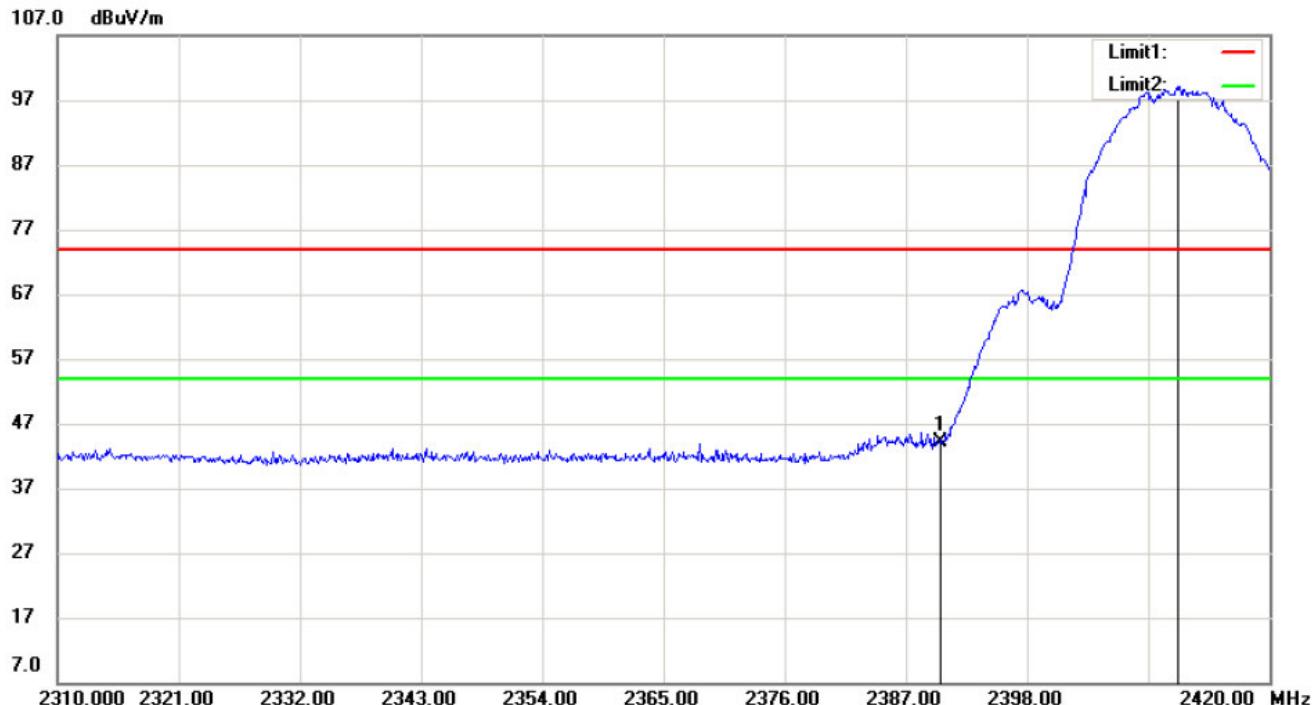
107.0 dBuV/m



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2390.000	44.57	-0.56	44.01	54	-9.99	Peak
2	2411.860	102.34	-0.67	101.67	54	47.67	Peak

CH Low 2402MHz Radiated Bandedge**Modulation: $\pi/4$ DQPSK****Horizontal, Peak Detector:**

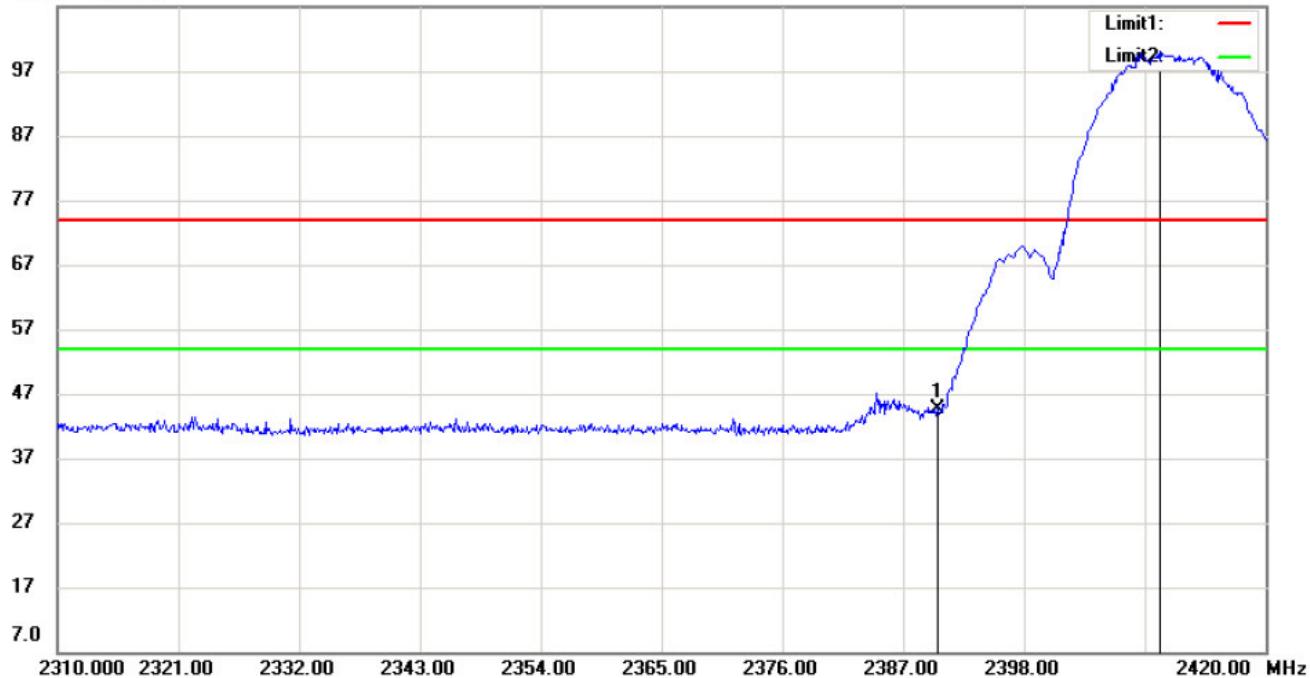
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2390.000	43.21	-0.56	42.65	54	-11.35	Peak
2	2410.650	99.42	-0.66	98.76	54	44.76	Peak

Vertical, Peak Detector:

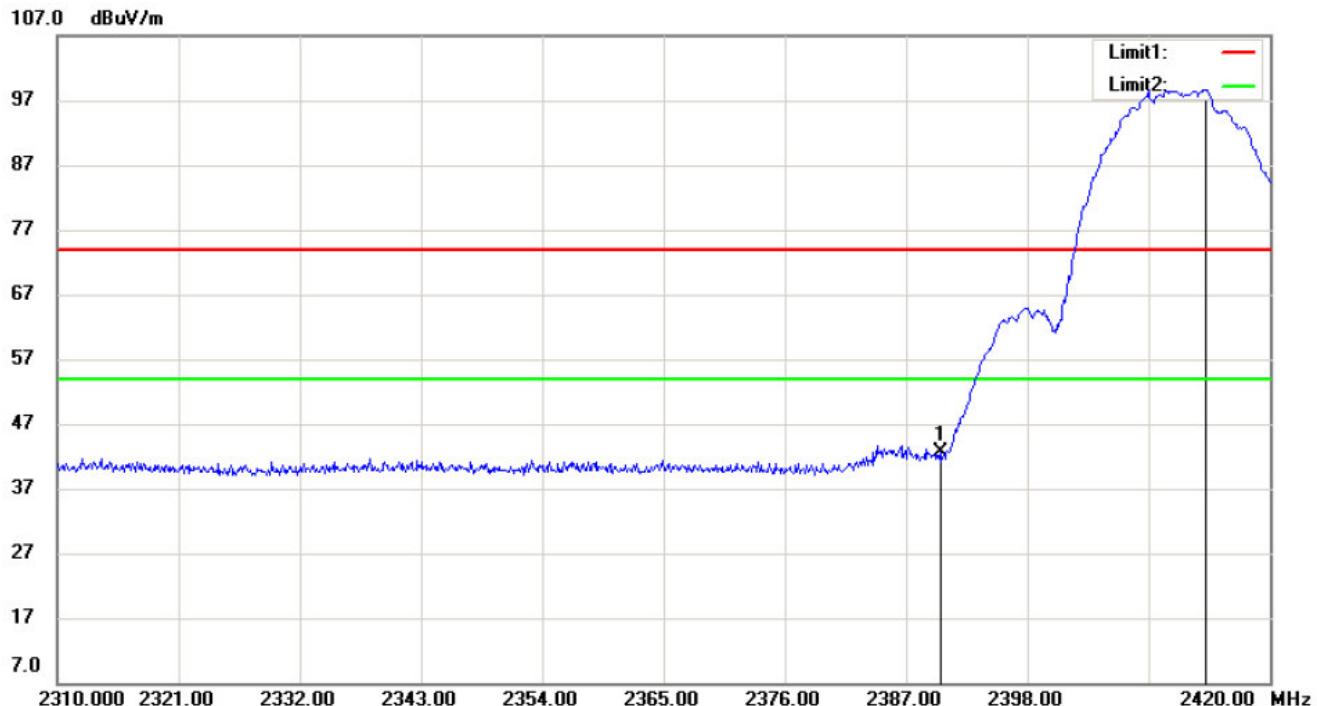
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2390.000	44.73	-0.56	44.17	54	-9.83	Peak
2	2411.750	99.74	-0.67	99.07	54	45.07	Peak

CH Low 2402MHz Radiated Bandedge**Modulation: 8DPSK****Horizontal, Peak Detector:**

107.0 dBuV/m

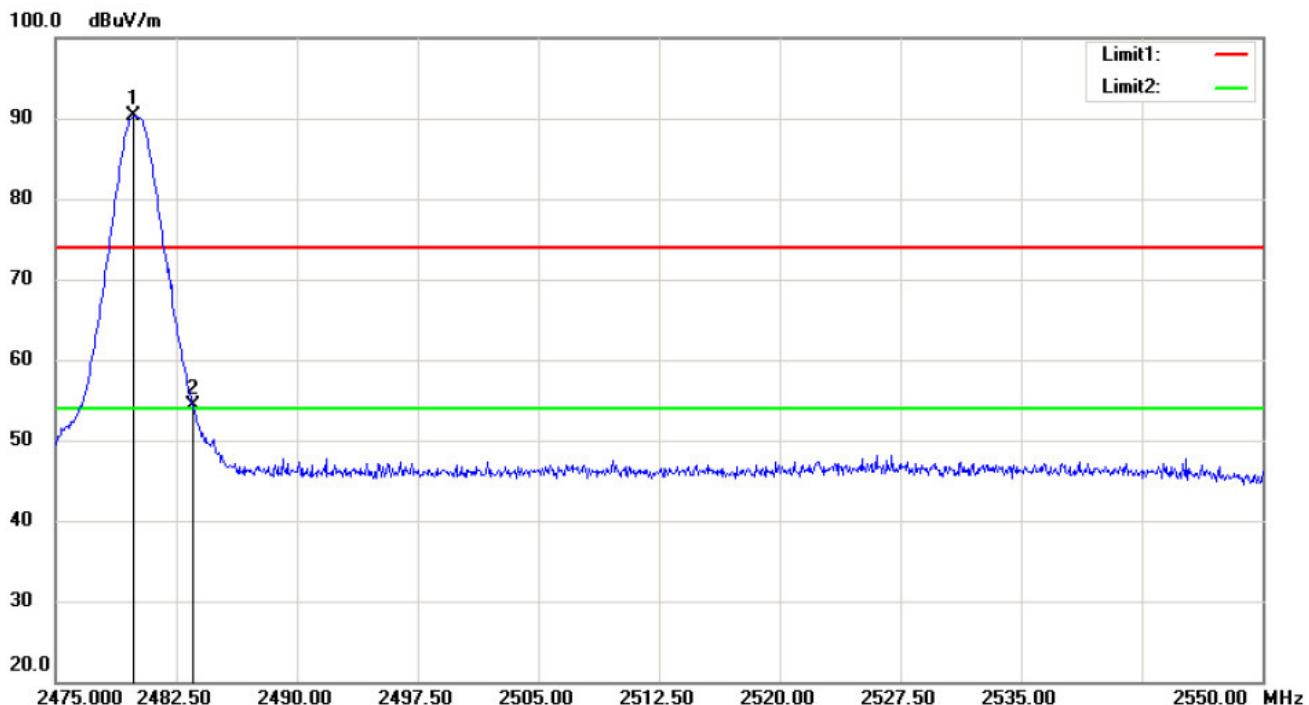


MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2390.000	45.08	-0.56	44.52	54	-9.48	Peak
2	2410.430	100.84	-0.66	100.18	54	46.18	Peak

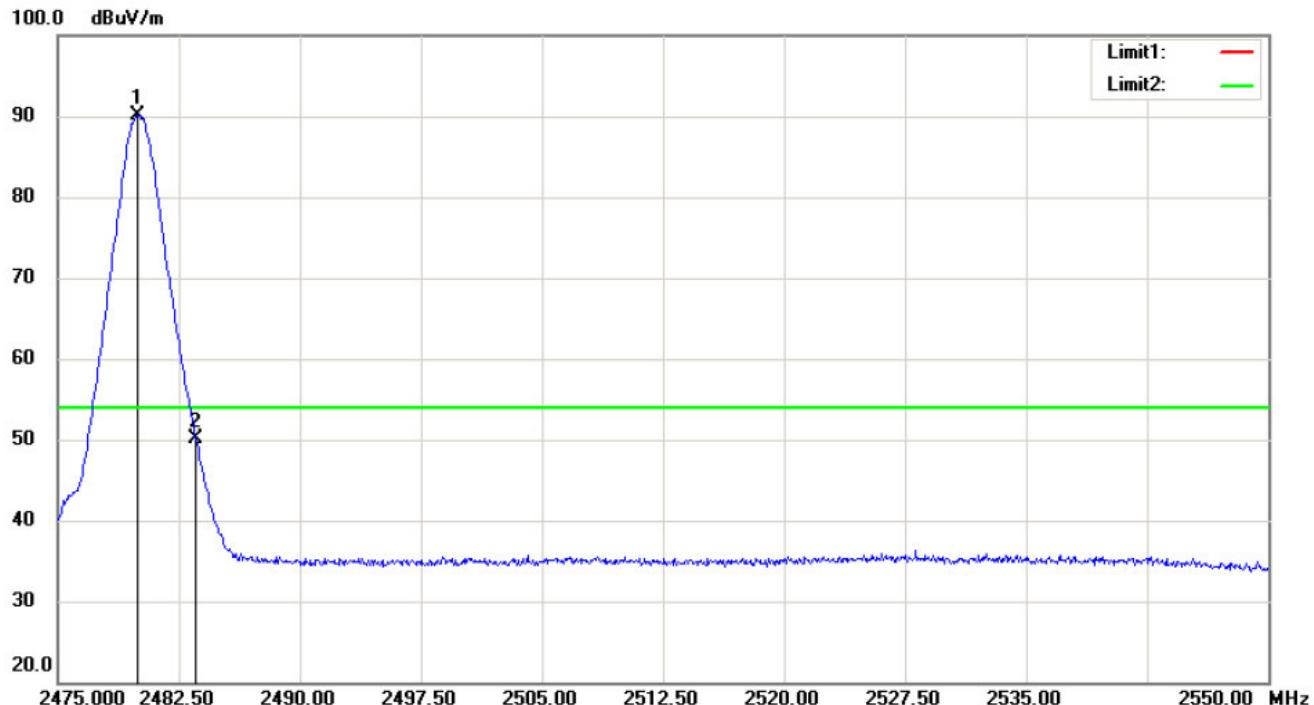
Vertical, Peak Detector:

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2390.000	43.20	-0.56	42.64	54	-11.36	Peak
2	2414.170	99.37	-0.67	98.70	54	44.70	Peak

Remark: Because of the Peak value below the AV Limit, so the AV test doesn't perform for this submission.

CH Low 2480MHz Radiated Bandedge**Modulation: GFSK****Horizontal, Peak Detector:**

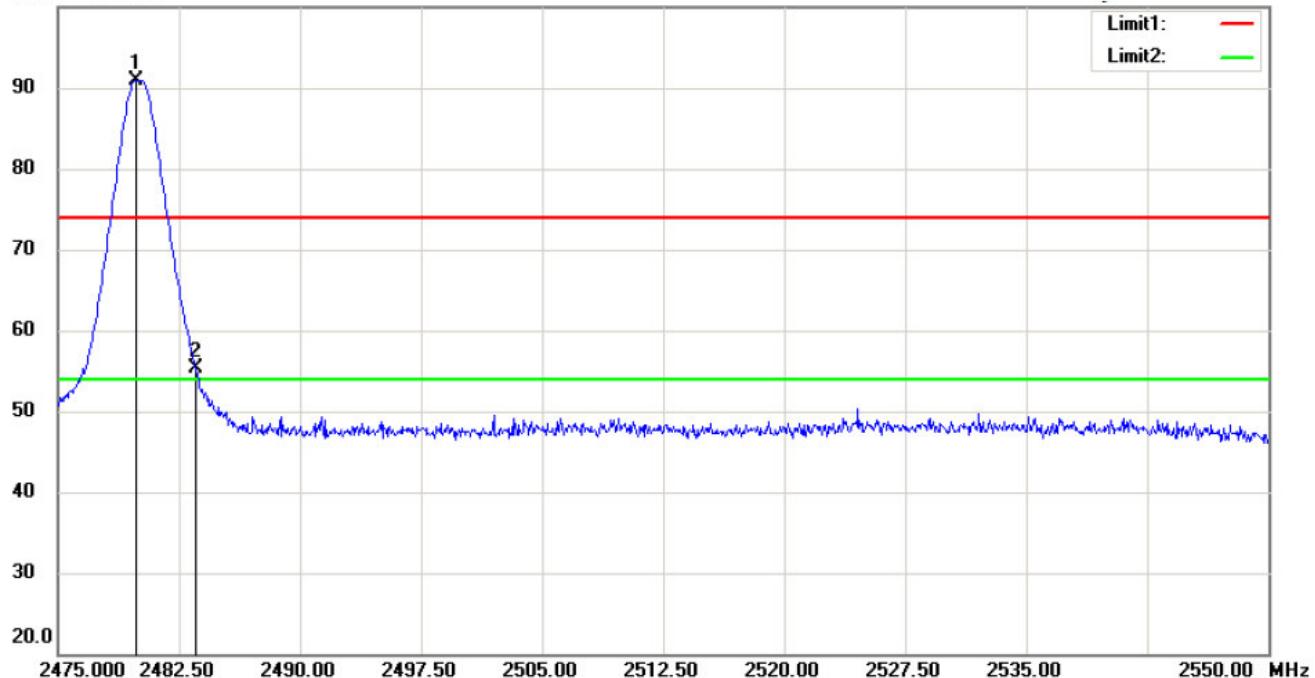
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2479.800	84.77	5.50	90.27	74	16.27	Peak
2	2483.550	48.86	5.50	54.36	74	-19.64	Peak

Horizontal, Average Detector:

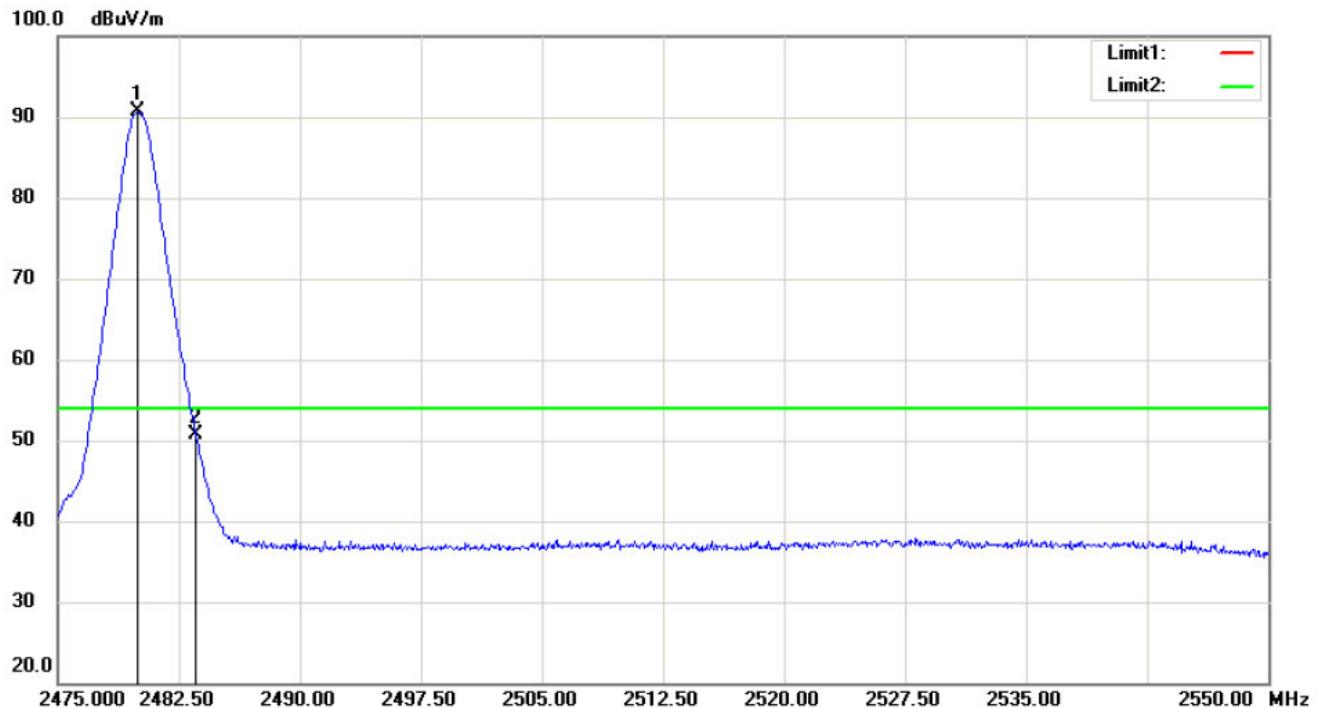
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2479.950	84.62	5.50	90.12	74	16.12	Peak
2	2483.550	44.59	5.50	50.09	74	-23.91	Peak

Vertical, Peak Detector:

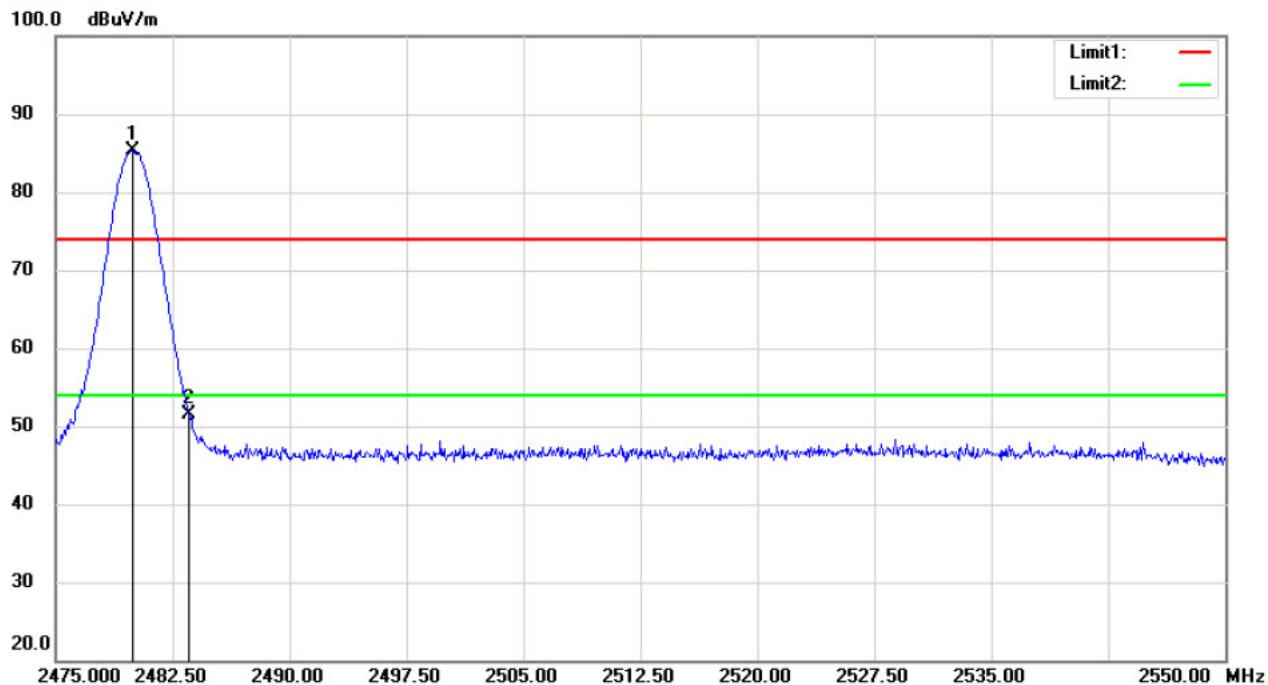
100.0 dBuV/m



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2479.875	85.43	5.50	90.93	74	16.93	Peak
2	2483.550	49.74	5.50	55.24	74	-18.76	Peak

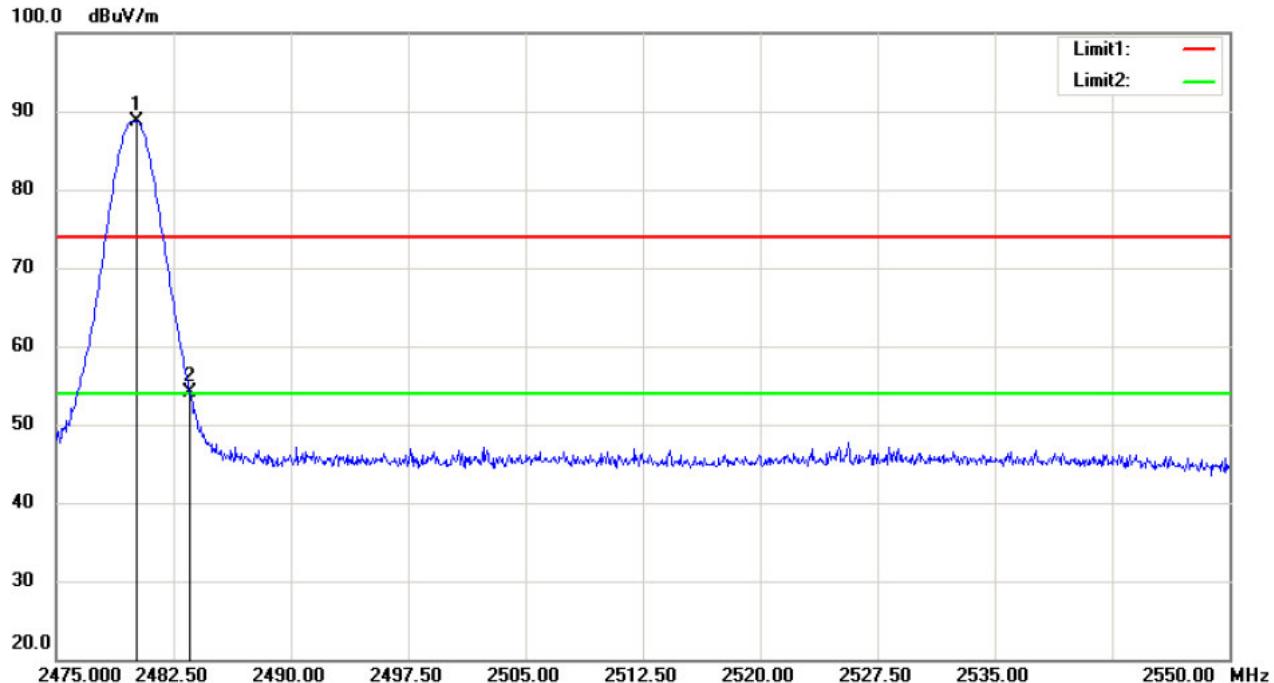
Vertical, Average Detector:

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2479.950	85.11	5.50	90.61	74	16.61	Peak
2	2483.550	45.15	5.50	50.65	74	-23.35	Peak

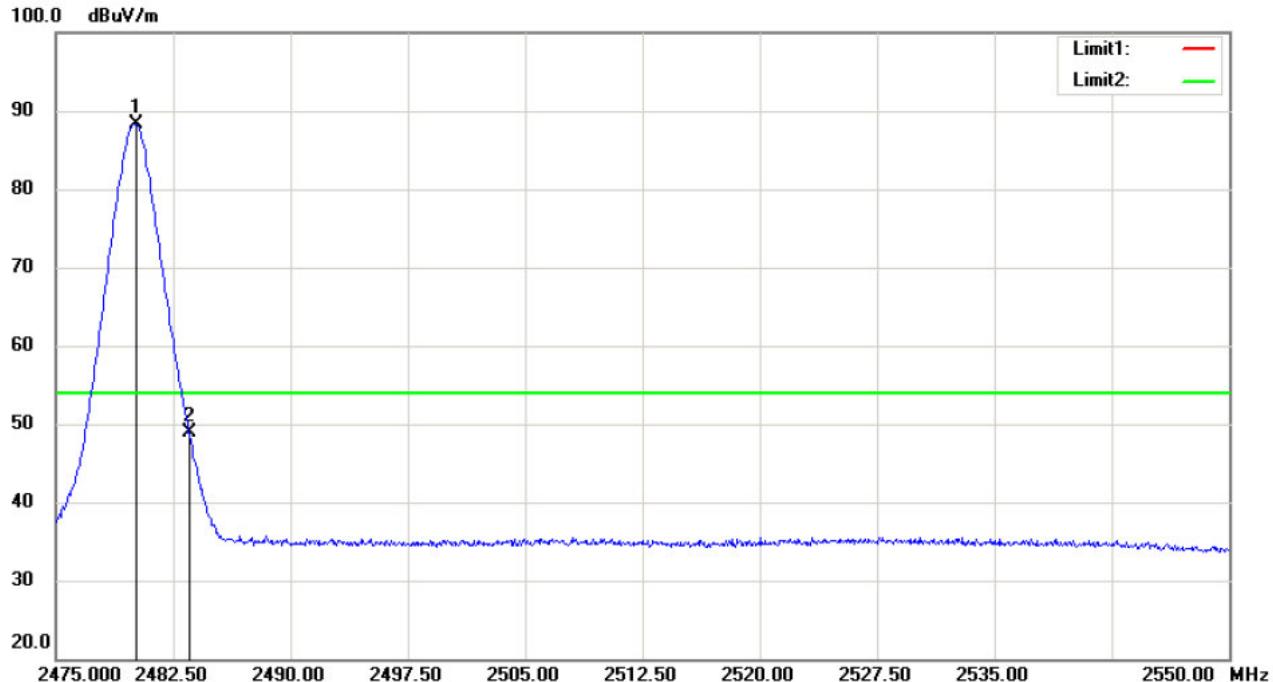
CH Low 2480MHz Radiated Bandedge**Modulation: $\pi/4$ DQPSK****Horizontal, Peak Detector:**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2479.950	79.81	5.50	85.31	54	31.31	Peak
2	2483.550	46.06	5.50	51.56	54	-37.27	Peak

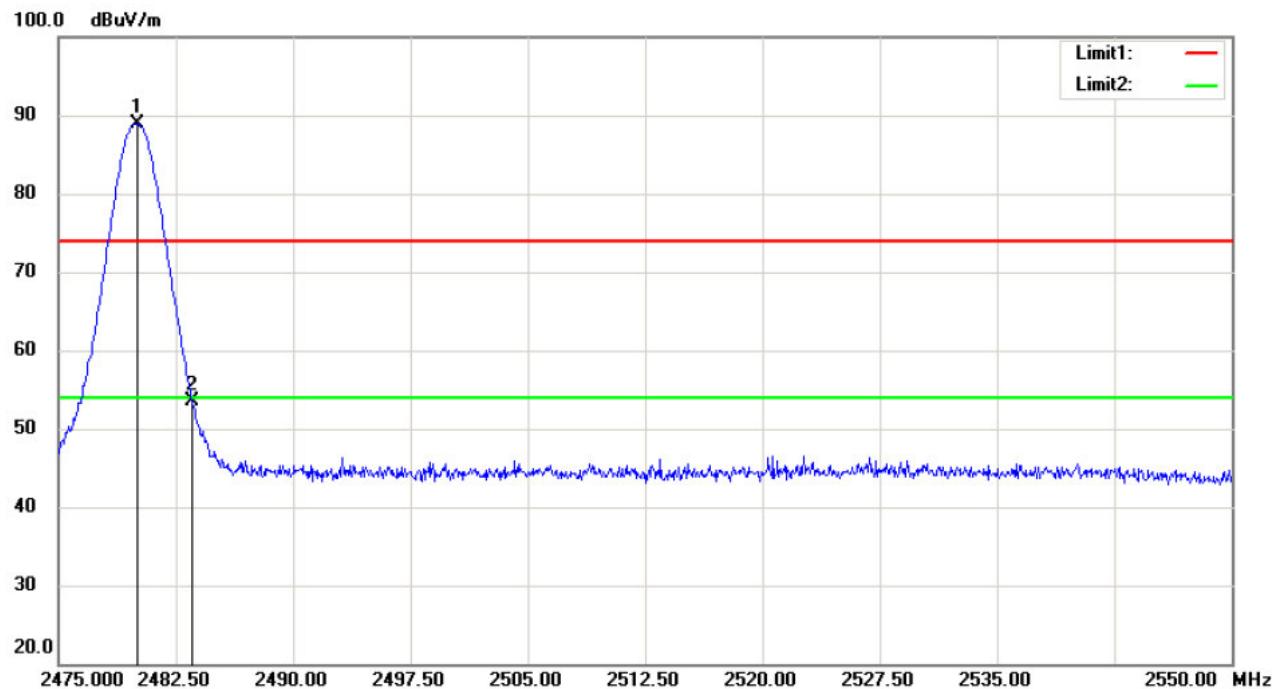
Remark: Because of the Peak value below the AV Limit, so the AV test doesn't perform for this submission.

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	2480.175	83.26	5.50	88.76	74	14.76	Peak
2	2483.550	48.66	5.50	54.16	74	-19.84	Peak

Vertical, Average Detector:

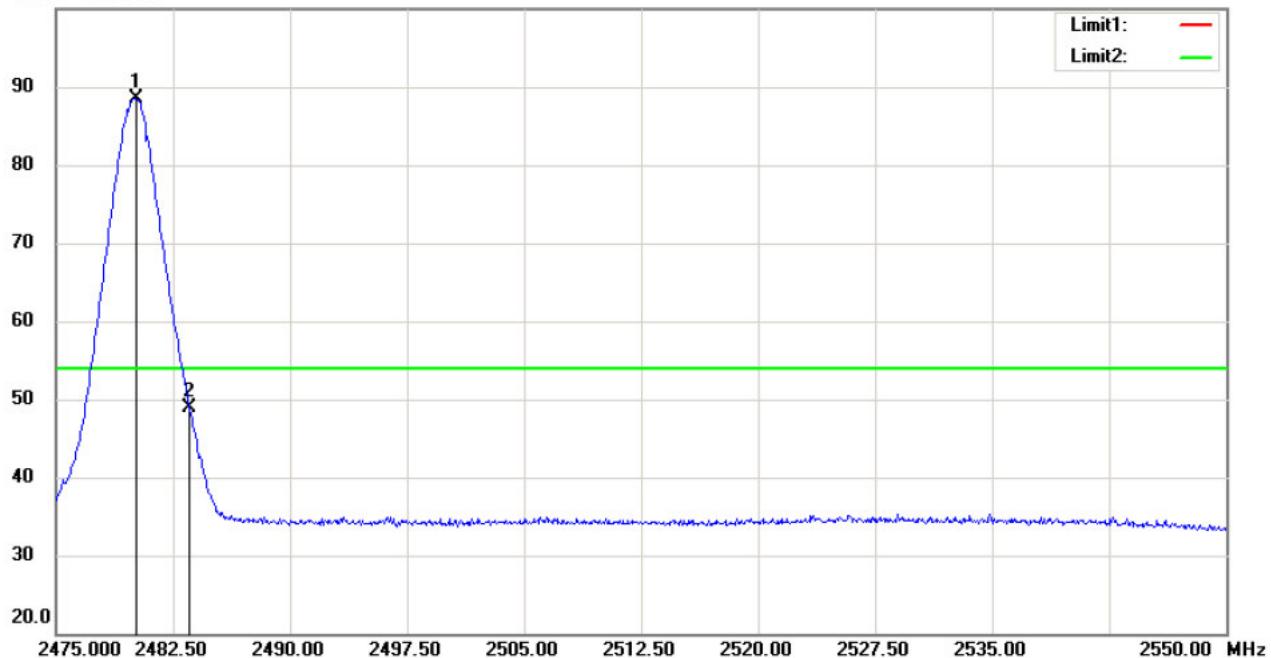
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2480.100	82.77	5.50	88.27	74	14.27	Peak
2	2483.550	43.31	5.50	48.81	74	-25.19	Peak

CH Low 2480MHz Radiated Bandedge**Modulation: 8DPSK****Horizontal, Peak Detector:**

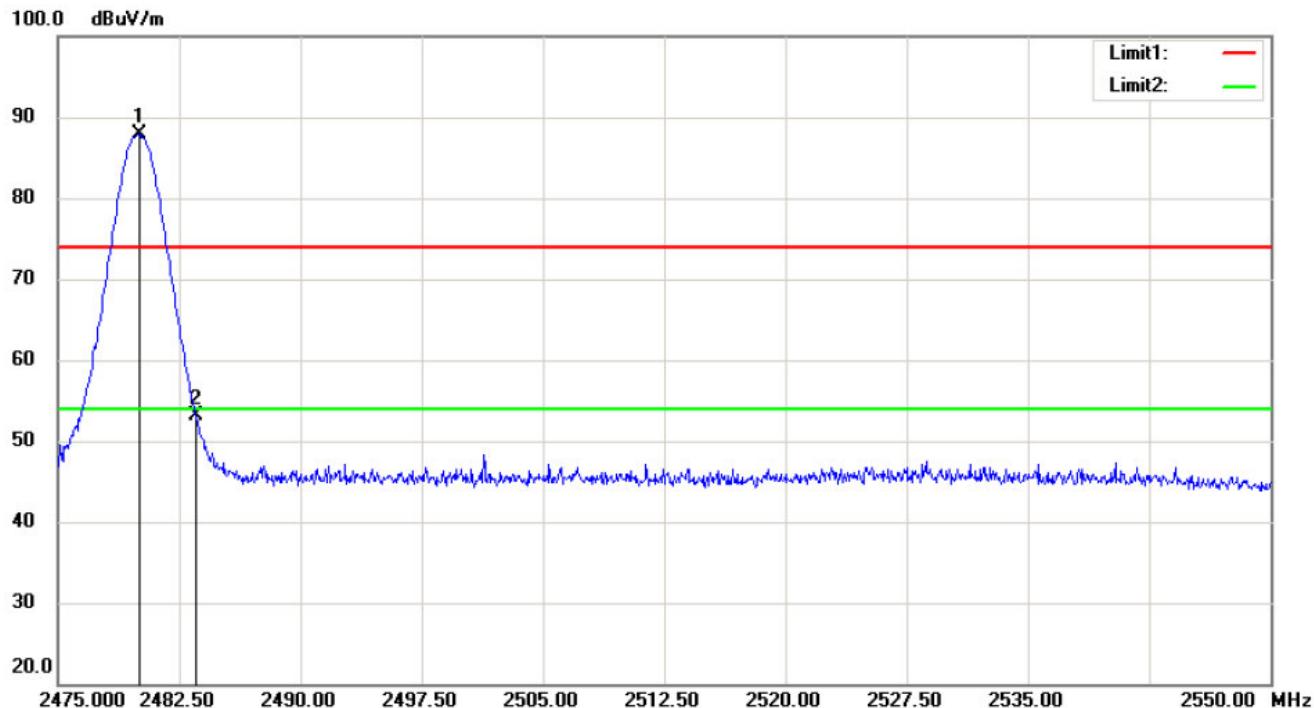
MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2480.025	83.50	5.50	89.00	74	15.00	Peak
2	2483.550	48.07	5.50	53.57	74	-20.43	Peak

Horizontal, Average Detector:

100.0 dBuV/m



MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dB uV/m)	Limit (dB uV/m)	Over Limit (dB)	Detector
1	2480.100	83.04	5.50	88.54	74	14.54	Peak
2	2483.550	43.49	5.50	48.99	74	-25.01	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	2480.025	82.35	5.50	87.85	54	33.85	Peak
2	2483.550	47.53	5.50	53.03	54	-37.27	Peak

Remark: Because of the Peak value below the AV Limit, so the AV test doesn't perform for this submission.

7.13 Occupied Bandwidth Test

Test Requirement: RSS-Gen Issue 3 Clause 4.6.1

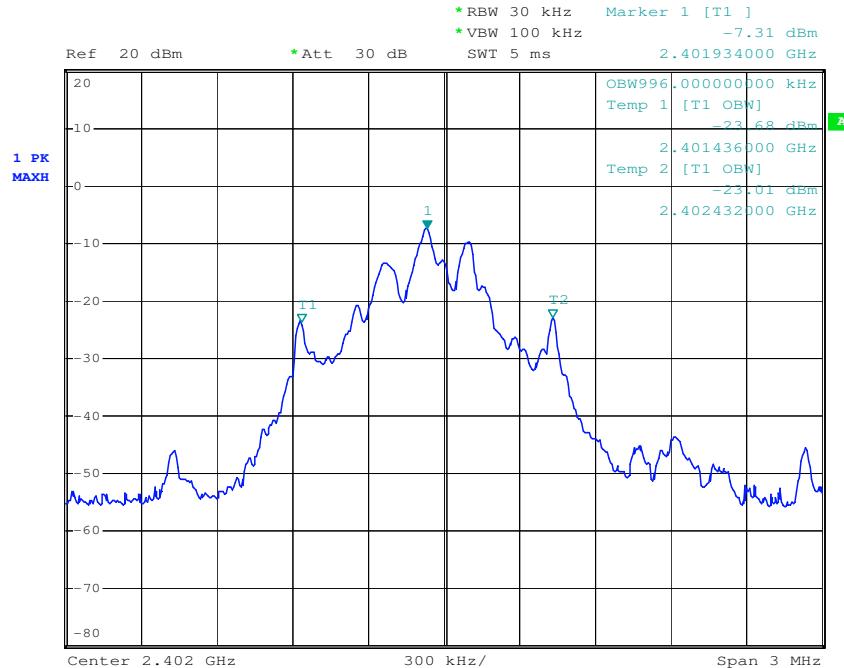
Standard Applicable According to the section RSS-Gen Issue 3 Clause 4.6.1

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.

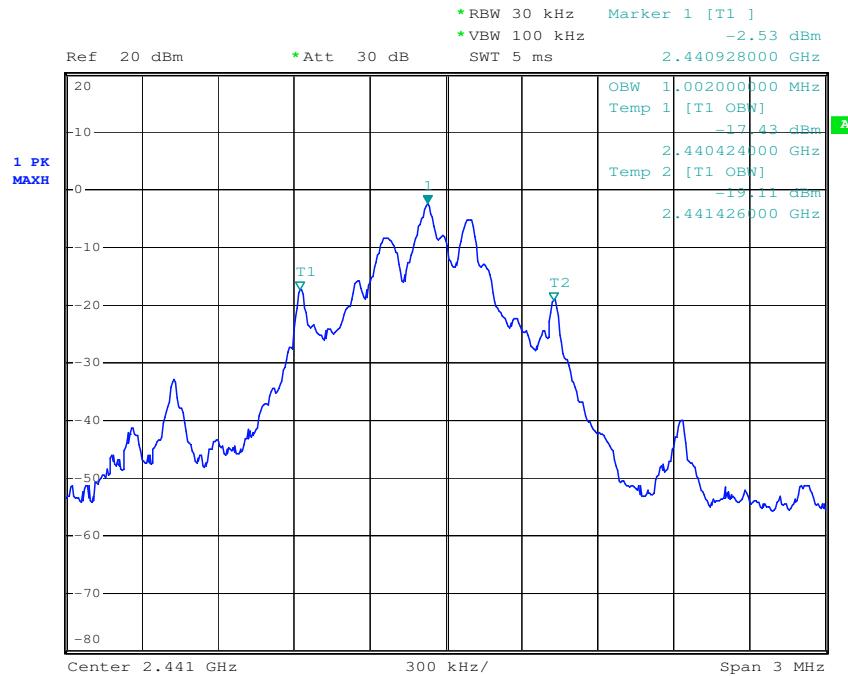
Measurement Result:

Test Mode	Channel	Frequency (MHz)	Bandwidth (MHz)
GFSK	LOW	2402	0.996
	MID	2441	1.002
	HIGH	2480	1.002
$\pi/4$ DQPSK	LOW	2402	1.086
	MID	2441	1.080
	HIGH	2480	1.086
8DPSK	LOW	2402	1.122
	MID	2441	1.128
	HIGH	2480	1.122

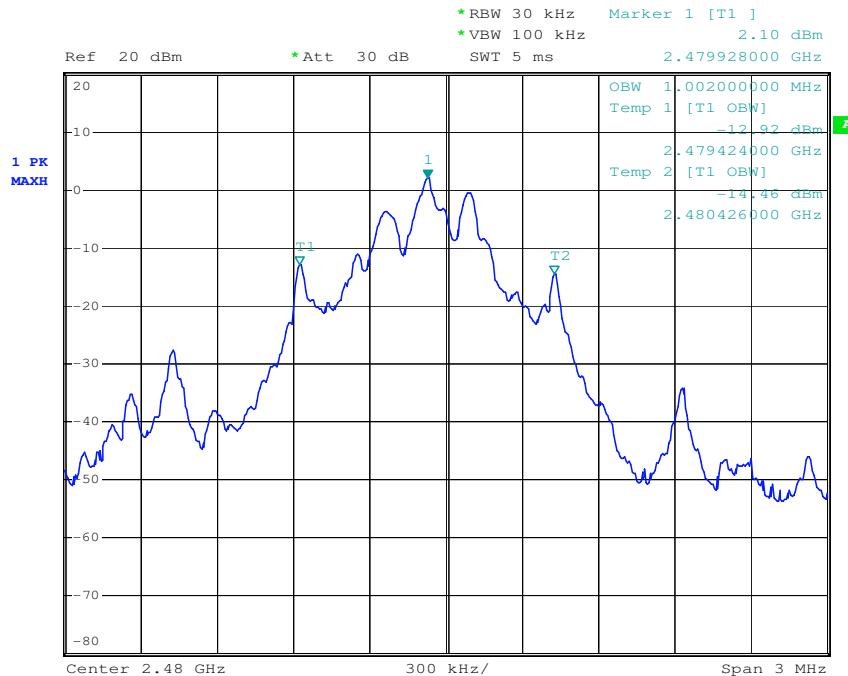
Test mode:	GFSK	Test channel:	Low
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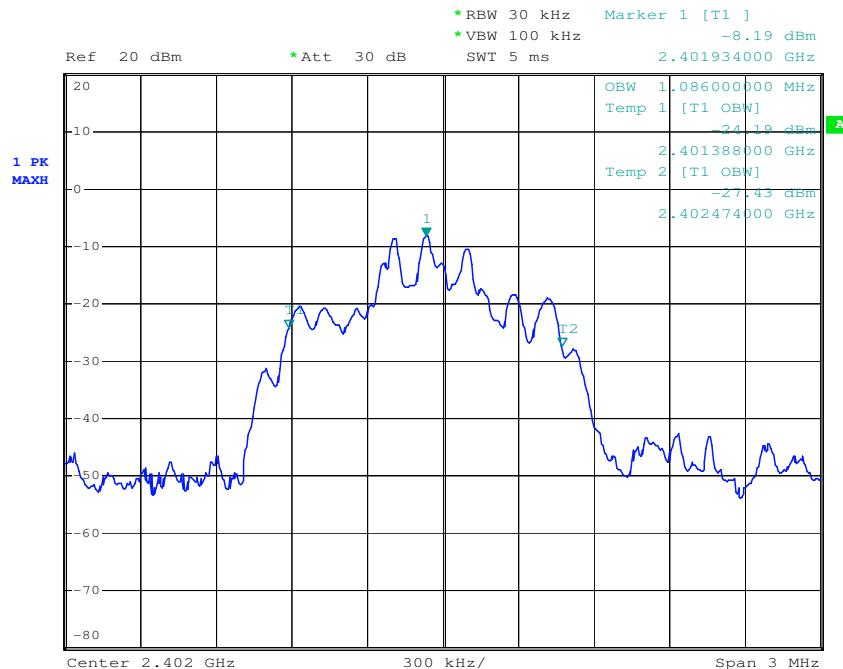
Test mode:	GFSK	Test channel:	Middle
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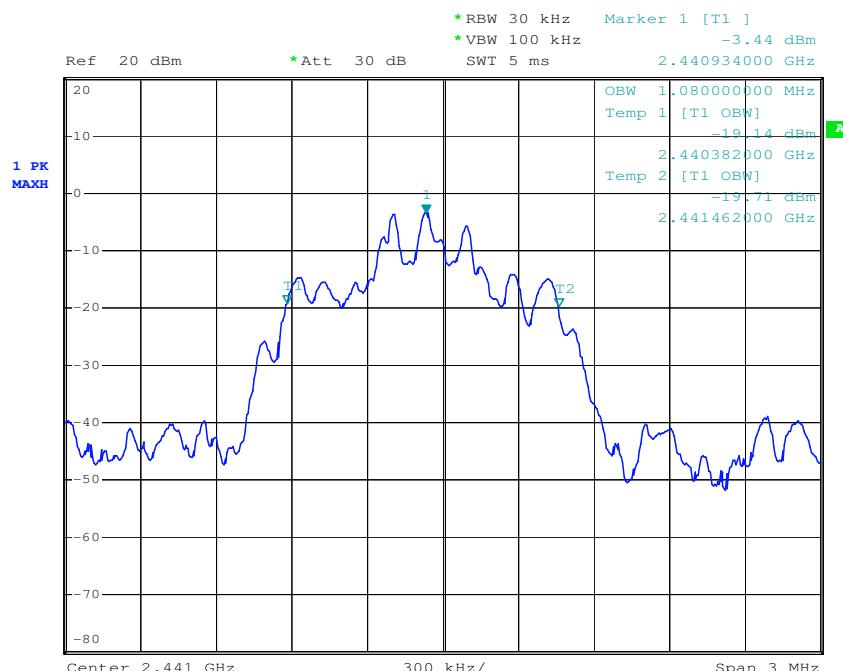
Test mode:	GFSK	Test channel:	High
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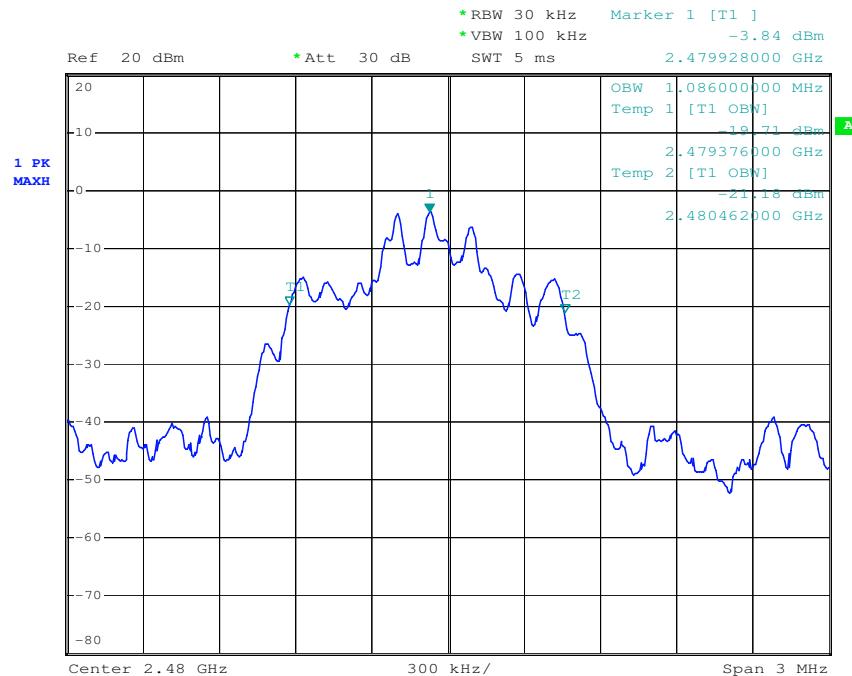
Test mode:	$\pi/4$ DQPSK	Test channel:	Low
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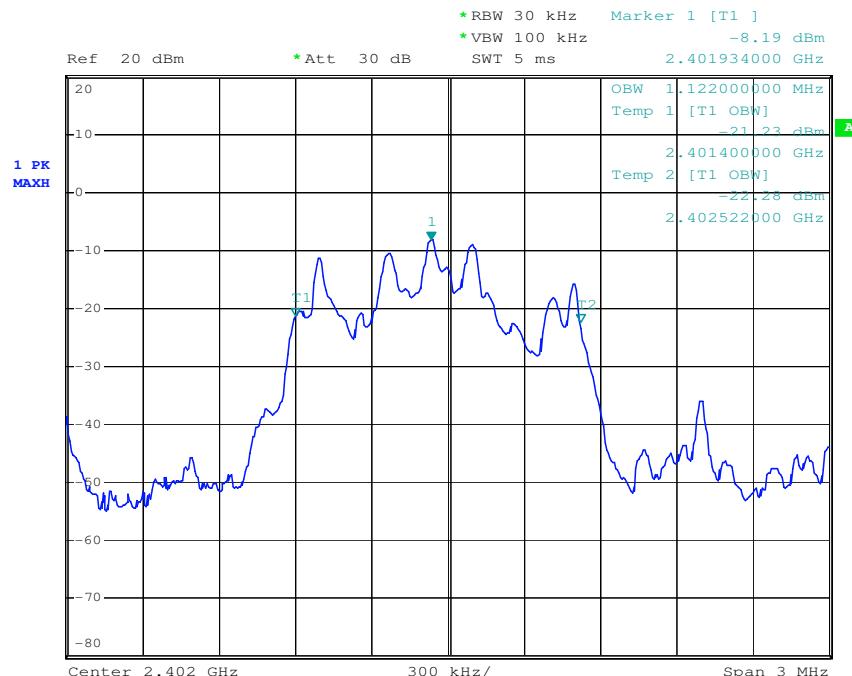
Test mode:	$\pi/4$ DQPSK	Test channel:	Middle
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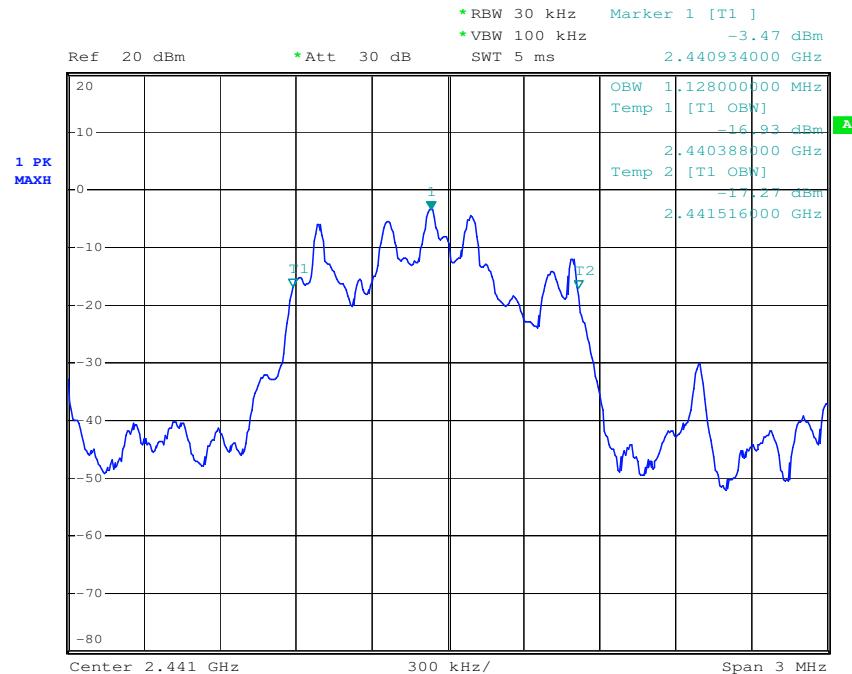
Test mode:	$\pi/4$ DQPSK	Test channel:	High
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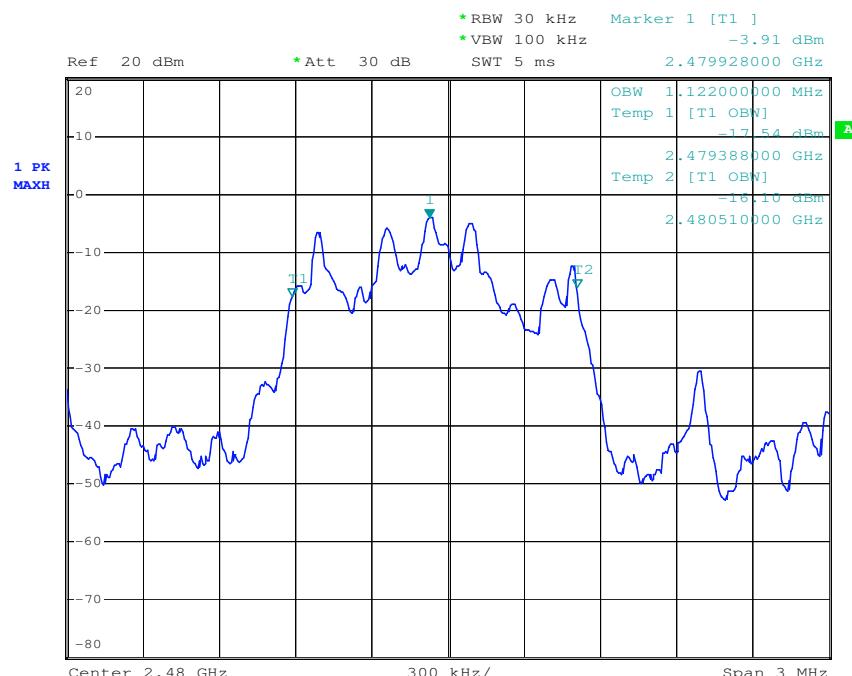
Test mode:	8DPSK	Test channel:	Low
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Test mode:	8DPSK	Test channel:	Middle
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Test mode:	8DPSK	Test channel:	High
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8 Test Setup Photographs

Refer to the < Soundtrack 2_Test Setup photos>.

9 EUT Constructional Details

Refer to the < Soundtrack 2_External Photos > & < Soundtrack 2_Internal Photos >.

--End of the Report--