

FCC PART 15.247

TEST REPORT

For

ShenZhen Rapoo Technology Co., Ltd.

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FCC ID: PP2H6080

Report Type: Original Report	Product Type: Bluetooth Foldable Headset
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *ShenZhen Rapoo Technology Co., Ltd.*'s product, model number: H6080 (FCC ID: PP2H6080) or ("EUT") in this report is a Bluetooth Foldable Headset, which was measured approximately: 16.0 cm (L) x 15.0 cm (W) x 5.0 cm (H), rated input voltage: DC 3.7V from lithium battery.

** All measurement and test data in this report was gathered from production sample serial number: 121024004 (Assigned by BACL, Dongguan). The EUT was received on 2012-11-01.*

Objective

This report is prepared on behalf of *ShenZhen Rapoo Technology Co., Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine the Bluetooth of EUT compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15 Subpart C DTS submissions with FCC ID: PP2H6080.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

The uncertainty of any RF tests which use conducted method measurement is ± 0.96 dB, the uncertainty of any radiation on emissions measurement is ± 4.0 dB

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

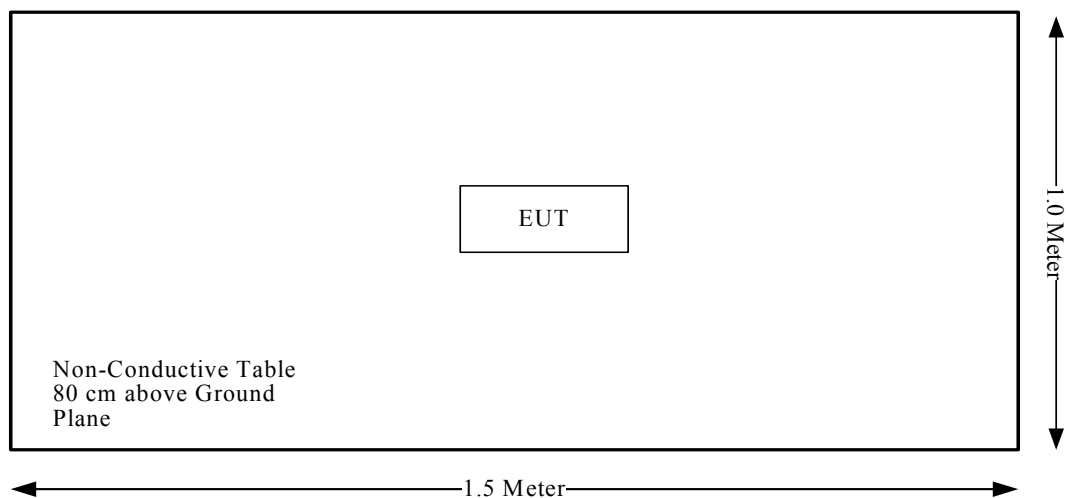
EUT Exercise Software

CSR bluesuite was performed.

Equipment Modifications

No modification was made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Not Applicable
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

Not Applicable:the EUT was powered by 3.7V lithium battery.

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1093- RF EXPOSURE

Applicable Standard

According to §15.247(e)(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 Mobile Portable RF Exposure V04, no SAR required if power is lower than the following threshold:

When routine evaluation is required for SAR and the output power is $\leq 60/f(\text{GHz})$ mW, the test reduction and test exclusion procedures given herein, or in KDB 616217 or KDB 648474, are applicable.

A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is $\leq 60/f(\text{GHz})$ mW or all measured 1-g SAR are < 0.4 W/kg. 10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested.

Measurement Result

Peak conducted output power= 5.64 dBm

Antenna gain = 1.39 dBi

SAR exclusion threshold= $60/f=60/2480=24.19$ mW = 13.84 dBm > 5.64 dBm

Therefore, the SAR evaluation is not necessary.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

Antenna Connector Construction

The EUT has an internal printed antenna permanently soldering on the printed circuit boards, which complied with 15.203, the maximum gain is 1.39 dBi, please refer to the internal photos.

Result: Compliance.

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

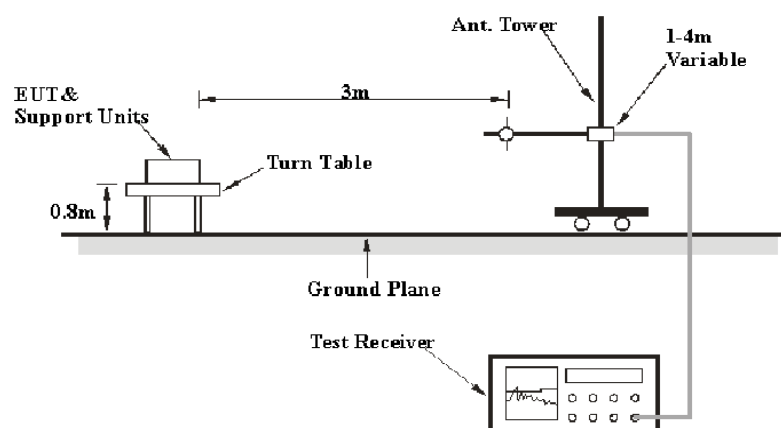
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

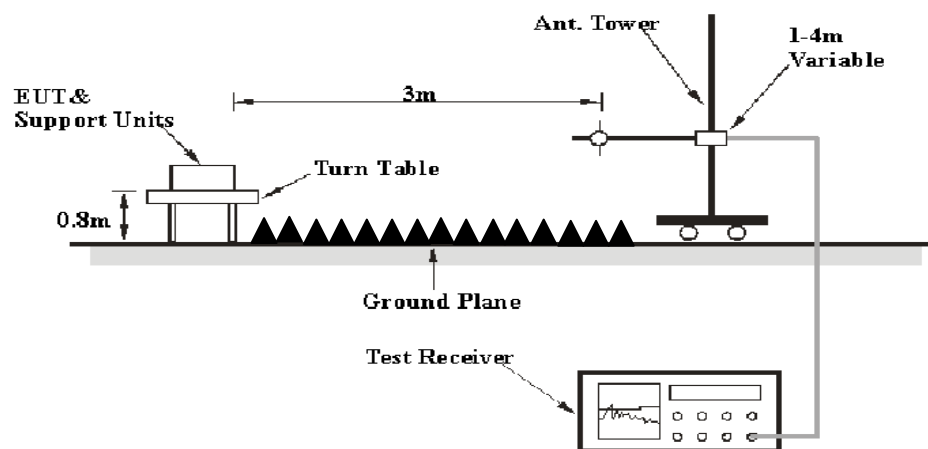
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Dongguan) is 4.0 dB(k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for all the test data recorded in the report.

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video BW</i>	<i>Detector</i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101121	2012-10-8	2013-10-7
Sunol Sciences	Hybrid Antennas	JB3	A060611-1	2011-9-6	2013-9-5
HP	Pre-amplifier	8447E	2434A02181	2012-10-8	2013-10-7
R&S	Spectrum Analyzer	FSEM	1079 8500	2012-10-9	2013-10-8
Dayang	Horn Antenna	OMCDH10180	10279001B	2010-7-30	2015-7-29
Mini-Circuits	Wideband Amplifier	ZVA-183-S+	96901149	2012-5-13	2013-5-12

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, and section 15.205, 15.209 and 15.247, with the worst margin reading of:

4.59 dB at 7323 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	25.9°C
Relative Humidity:	60%
ATM Pressure:	101kPa

The testing was performed by Leon Chen on 2012-11-05.

Test Mode: Transmitting

BDR- GFSK:

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2402(MHz)									
2402	68.05	AV	H	31.05	3.90	27.79	75.21	N/A	N/A
2402	94.32	PK	H	31.05	3.90	27.79	101.48	N/A	N/A
2402	69.52	AV	V	31.05	3.90	27.79	76.68	N/A	N/A
2402	99.1	PK	V	31.05	3.90	27.79	106.26	N/A	N/A
7206	50.67	PK	V	38.67	6.50	26.54	69.30	74.00	4.70
7206	26.40	AV	V	38.67	6.50	26.54	45.03	54.00	8.97
411.9	38.60	QP	H	16.51	2.46	21.80	35.77	46.00	10.23
4804	50.01	PK	V	33.17	4.67	27.34	60.51	74.00	13.49
9608	18.05	AV	H	38.52	8.75	26.39	38.92	54.00	15.08
4804	27.51	AV	V	33.17	4.67	27.34	38.01	54.00	15.99
411.9	32.5	QP	V	16.51	2.46	21.80	29.67	46.00	16.33
9608	31.42	PK	H	38.52	8.75	26.39	52.29	74.00	21.71
2390	20.36	AV	V	30.98	3.84	27.83	27.36	54.00	26.64
2390	36.36	PK	V	30.98	3.84	27.83	43.36	74.00	30.64
1234.65	19.35	AV	H	25.23	2.69	27.25	20.03	54.00	33.97
1234.65	34.25	PK	H	25.23	2.69	27.25	34.93	74.00	39.07
Middle Channel: 2441(MHz)									
2441	67.97	AV	H	31.27	3.99	27.69	75.54	N/A	N/A
2441	94.64	PK	H	31.27	3.99	27.69	102.21	N/A	N/A
2441	69.84	AV	V	31.27	3.99	27.69	77.41	N/A	N/A
2441	99.82	PK	V	31.27	3.99	27.69	107.39	N/A	N/A
7323	50.47	PK	V	38.88	6.72	26.67	69.41	74.00	4.59
7323	27.35	AV	V	38.88	6.72	26.67	46.29	54.00	7.71
4882	50.4	PK	V	33.34	4.75	27.04	61.45	74.00	12.55
392.78	36.21	QP	V	15.97	2.40	21.75	32.82	46.00	13.18
9764	18.62	AV	H	38.83	8.58	26.54	39.48	54.00	14.52
4882	28.15	AV	V	33.34	4.75	27.04	39.20	54.00	14.80
392.78	30.42	PK	H	15.97	2.40	21.75	27.03	46.00	18.97
9764	32.35	PK	H	38.83	8.58	26.54	53.21	74.00	20.79
1654.47	18.74	AV	H	26.52	3.17	27.22	21.21	54.00	32.79
1246.58	19.02	AV	V	25.25	2.71	27.20	19.77	54.00	34.23
1654.47	33.24	PK	H	26.52	3.17	27.22	35.71	74.00	38.29
1246.58	34.52	PK	V	25.25	2.71	27.20	35.27	74.00	38.73
High Channel: 2480(MHz)									
2480	67.44	AV	H	31.49	3.82	27.75	74.99	N/A	N/A
2480	92.66	PK	H	31.49	3.82	27.75	100.21	N/A	N/A
2480	70.37	AV	V	31.49	3.82	27.75	77.92	N/A	N/A
2480	100.84	PK	V	31.49	3.82	27.75	108.39	N/A	N/A
7440	48.32	PK	V	39.09	6.95	26.79	67.57	74.00	6.43
7440	27.63	AV	V	39.09	6.95	26.79	46.88	54.00	7.12
391.89	38.24	QP	H	15.95	2.39	21.75	34.83	46.00	11.17

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)	(dB)	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	51.3	PK	V	33.51	4.70	27.26	62.25	74.00	11.75
2483.5	53.19	PK	V	31.51	3.80	27.76	60.73	74.00	13.27
391.98	35.24	QP	V	15.95	2.39	21.75	31.83	46.00	14.17
4960	28.68	AV	V	33.51	4.70	27.26	39.63	54.00	14.37
9920	18.32	AV	H	39.14	8.41	26.70	39.17	54.00	14.83
2483.5	28.41	AV	V	31.51	3.80	27.76	35.95	54.00	18.05
9920	32.34	PK	H	39.14	8.41	26.70	53.19	74.00	20.81
1624.68	19.32	AV	H	26.32	3.18	27.31	21.51	54.00	32.49
1624.68	33.24	PK	H	26.32	3.18	27.31	35.43	74.00	38.57

EDR- π /4-DQPSK:

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2402(MHz)									
2402	67.15	AV	H	31.05	3.90	27.79	74.31	N/A	N/A
2402	92.13	PK	H	31.05	3.90	27.79	99.29	N/A	N/A
2402	68.89	AV	V	31.05	3.90	27.79	76.05	N/A	N/A
2402	96.74	PK	V	31.05	3.90	27.79	103.90	N/A	N/A
7206	47.46	PK	V	38.67	6.50	26.54	66.09	74.00	7.91
7206	25.71	AV	V	38.67	6.50	26.54	44.34	54.00	9.66
412.18	38.75	QP	V	16.52	2.46	21.80	35.93	46.00	10.07
9608	18.42	AV	H	38.52	8.75	26.39	39.29	54.00	14.71
412.18	32.62	QP	H	16.52	2.46	21.80	29.80	46.00	16.20
4804	46.35	PK	V	33.17	4.67	27.34	56.85	74.00	17.15
4804	25.66	AV	V	33.17	4.67	27.34	36.16	54.00	17.84
9608	32.32	PK	H	38.52	8.75	26.39	53.19	74.00	20.81
2390	20.12	AV	V	30.98	3.84	27.83	27.12	54.00	26.88
2390	35.71	PK	V	30.98	3.84	27.83	42.71	74.00	31.29
1542.54	18.76	AV	H	25.78	3.03	27.46	20.11	54.00	33.89
1542.54	33.21	PK	H	25.78	3.03	27.46	34.56	74.00	39.44
Middle Channel: 2441(MHz)									
2441	69.22	AV	H	31.27	3.99	27.69	76.79	N/A	N/A
2441	97.12	PK	H	31.27	3.99	27.69	104.69	N/A	N/A
2441	70.18	AV	V	31.27	3.99	27.69	77.75	N/A	N/A
2441	98.77	PK	V	31.27	3.99	27.69	106.34	N/A	N/A
7323	50.79	PK	V	38.88	6.72	26.67	69.73	74.00	4.27
7323	30.32	AV	V	38.88	6.72	26.67	49.26	54.00	4.74
420.63	36.14	QP	H	16.71	2.49	21.82	33.52	46.00	12.48
4882	48.64	PK	V	33.34	4.75	27.04	59.69	74.00	14.31
9764	18.62	AV	H	38.83	8.58	26.54	39.48	54.00	14.52
4882	27.06	AV	V	33.34	4.75	27.04	38.11	54.00	15.89
420.63	31.96	QP	V	16.71	2.49	21.82	29.34	46.00	16.66
9764	32.35	PK	H	38.83	8.58	26.54	53.21	74.00	20.79
2142.58	18.06	AV	H	29.60	3.53	27.79	23.40	54.00	30.60
1462.34	18.14	AV	V	25.46	2.92	27.27	19.24	54.00	34.76
2142.58	32.35	PK	H	29.60	3.53	27.79	37.69	74.00	36.31
1462.34	33.05	PK	V	25.46	2.92	27.27	34.15	74.00	39.85
High Channel: 2480(MHz)									
2480	68.21	AV	H	31.49	3.82	27.75	75.76	N/A	N/A
2480	96.8	PK	H	31.49	3.82	27.75	104.35	N/A	N/A
2480	69.67	AV	V	31.49	3.82	27.75	77.22	N/A	N/A
2480	99.49	PK	V	31.49	3.82	27.75	107.04	N/A	N/A
7440	47.22	PK	V	39.09	6.95	26.79	66.47	74.00	7.53
7440	27.04	AV	V	39.09	6.95	26.79	46.29	54.00	7.71
392.75	37.96	QP	V	15.97	2.40	21.75	34.57	46.00	11.43

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)	(dB)	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	48.95	PK	V	33.51	4.70	27.26	59.90	74.00	14.10
9920	17.68	AV	H	39.14	8.41	26.70	38.53	54.00	15.47
2483.5	50.63	PK	V	31.51	3.80	27.76	58.17	74.00	15.83
4960	26.32	AV	V	33.51	4.70	27.26	37.27	54.00	16.73
392.75	32.14	QP	H	15.97	2.40	21.75	28.75	46.00	17.25
2483.5	27.14	AV	V	31.51	3.80	27.76	34.68	54.00	19.32
9920	32.35	PK	H	39.14	8.41	26.70	53.20	74.00	20.80
1357.54	18.89	AV	H	25.36	2.91	27.44	19.72	54.00	34.28
1357.54	34.65	PK	H	25.36	2.91	27.44	35.48	74.00	38.52

EDR-8DPSK:

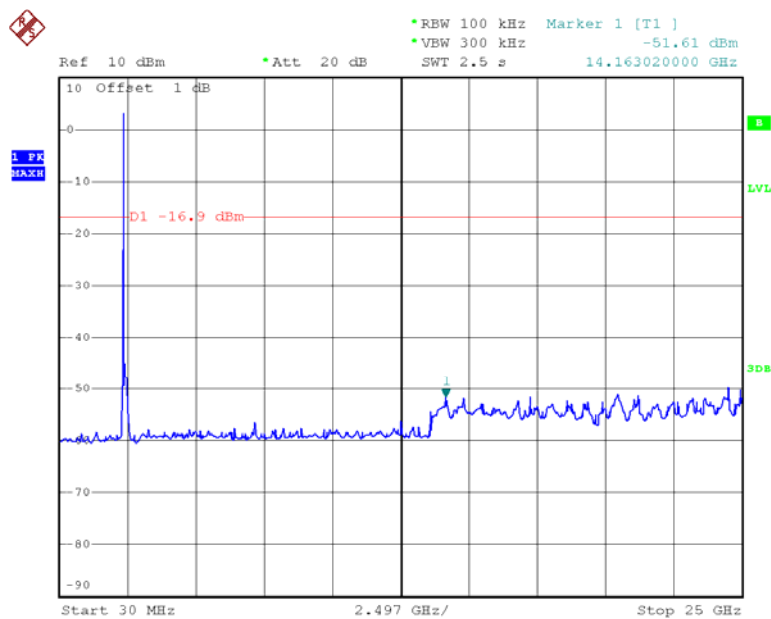
Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2402(MHz)									
2402	68.02	AV	H	31.05	3.90	27.79	75.18	N/A	N/A
2402	93.14	PK	H	31.05	3.90	27.79	100.30	N/A	N/A
2402	67.68	AV	V	31.05	3.90	27.79	74.84	N/A	N/A
2402	96.37	PK	V	31.05	3.90	27.79	103.53	N/A	N/A
7206	48.21	PK	V	38.67	6.50	26.54	66.84	74.00	7.16
7206	26.13	AV	V	38.67	6.50	26.54	44.76	54.00	9.24
412.35	38.68	QP	H	16.53	2.46	21.80	35.86	46.00	10.14
9608	18.06	AV	H	38.52	8.75	26.39	38.93	54.00	15.07
412.35	32.24	QP	V	16.53	2.46	21.80	29.42	46.00	16.58
4804	26.03	AV	V	33.17	4.67	27.34	36.53	54.00	17.47
4804	45.25	PK	V	33.17	4.67	27.34	55.75	74.00	18.25
9608	33.18	PK	H	38.52	8.75	26.39	54.05	74.00	19.95
2390	21.05	AV	V	30.98	3.84	27.83	28.05	54.00	25.95
2390	35.69	PK	V	30.98	3.84	27.83	42.69	74.00	31.31
1324.98	18.76	AV	H	25.32	2.73	27.34	19.47	54.00	34.53
1324.98	33.21	PK	H	25.32	2.73	27.34	33.92	74.00	40.08
Middle Channel: 2441(MHz)									
2441	68.36	AV	H	31.27	3.99	27.69	75.93	N/A	N/A
2441	98.21	PK	H	31.27	3.99	27.69	105.78	N/A	N/A
2441	71.03	AV	V	31.27	3.99	27.69	78.60	N/A	N/A
2441	99.04	PK	V	31.27	3.99	27.69	106.61	N/A	N/A
7323	50.14	PK	V	38.88	6.72	26.67	69.08	74.00	4.92
7323	29.68	AV	V	38.88	6.72	26.67	48.62	54.00	5.38
436.14	34.6	QP	H	16.91	2.49	21.86	32.14	46.00	13.86
9764	18.24	AV	H	38.83	8.58	26.54	39.10	54.00	14.90
4882	47.65	PK	V	33.34	4.75	27.04	58.70	74.00	15.30
4882	26.34	AV	V	33.34	4.75	27.04	37.39	54.00	16.61
436.14	28.9	QP	V	16.91	2.49	21.86	26.44	46.00	19.56
9764	32.57	PK	H	38.83	8.58	26.54	53.43	74.00	20.57
2612.57	17.26	AV	H	31.44	4.03	27.64	25.10	54.00	28.90
1758.35	17.68	AV	V	27.21	3.37	27.45	20.81	54.00	33.19
2612.57	32.57	PK	H	31.44	4.03	27.64	40.41	74.00	33.59
1758.35	33.32	PK	V	27.21	3.37	27.45	36.45	74.00	37.55
High Channel: 2480(MHz)									
2480	69.12	AV	H	31.49	3.82	27.75	76.67	N/A	N/A
2480	97.26	PK	H	31.49	3.82	27.75	104.81	N/A	N/A
2480	70.34	AV	V	31.49	3.82	27.75	77.89	N/A	N/A
2480	98.42	PK	V	31.49	3.82	27.75	105.97	N/A	N/A
7440	48.63	PK	V	39.09	6.95	26.79	67.88	74.00	6.12
7440	28.36	AV	V	39.09	6.95	26.79	47.61	54.00	6.39
392.72	39.12	QP	V	15.96	2.40	21.75	35.73	46.00	10.27

Frequency	Receiver		Rx Antenna		Cable	Amplifier	Corrected	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)	loss (dB)	Gain (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	48.63	PK	V	33.51	4.70	27.26	59.58	74.00	14.42
9920	18.24	AV	H	39.14	8.41	26.70	39.09	54.00	14.91
2483.5	51.36	PK	V	31.51	3.80	27.76	58.90	74.00	15.10
4960	27.29	AV	V	33.51	4.70	27.26	38.24	54.00	15.76
392.72	33.45	QP	H	15.96	2.40	21.75	30.06	46.00	15.94
2483.5	28.15	AV	V	31.51	3.80	27.76	35.69	54.00	18.31
9920	33.54	PK	H	39.14	8.41	26.70	54.39	74.00	19.61
1267.35	18.62	AV	H	25.27	2.65	27.21	19.33	54.00	34.67
1267.35	34.21	PK	H	25.27	2.65	27.21	34.92	74.00	39.08

Conducted Spurious Emissions at Antenna Port

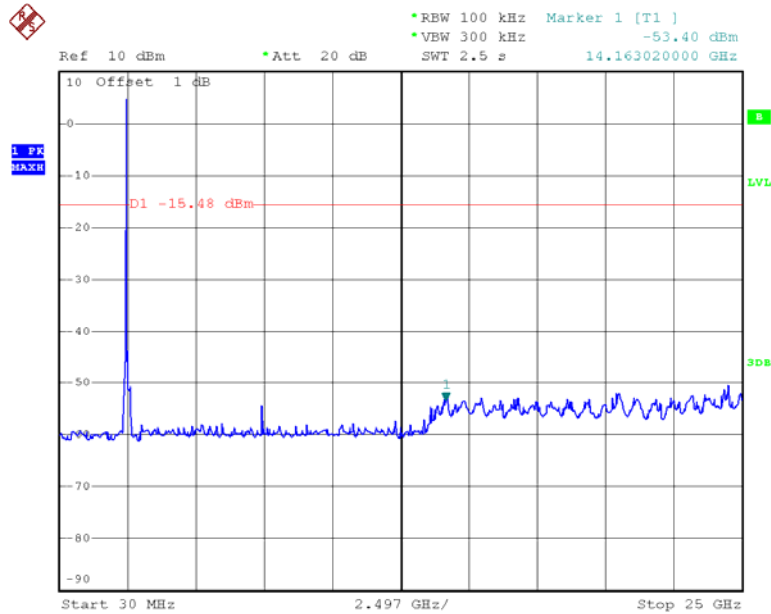
BDR- GFSK:

Low Channel



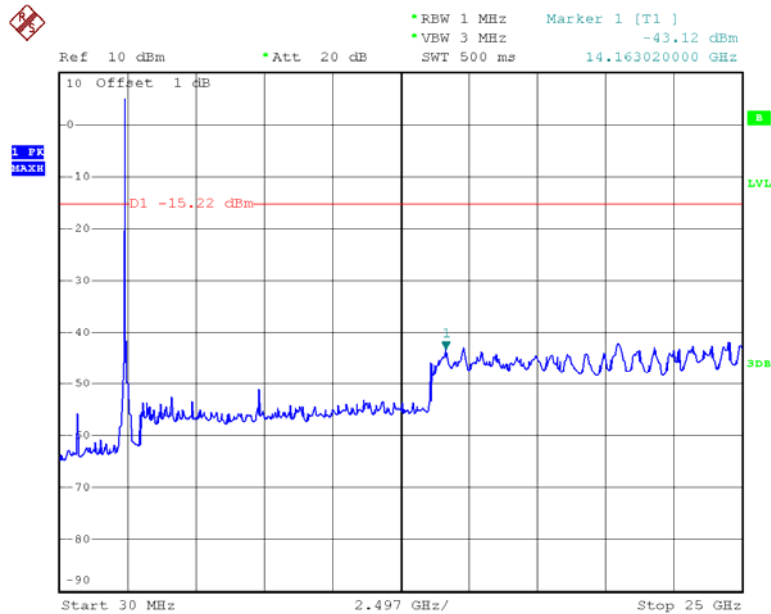
Date: 5.NOV.2012 09:21:05

Middle Channel

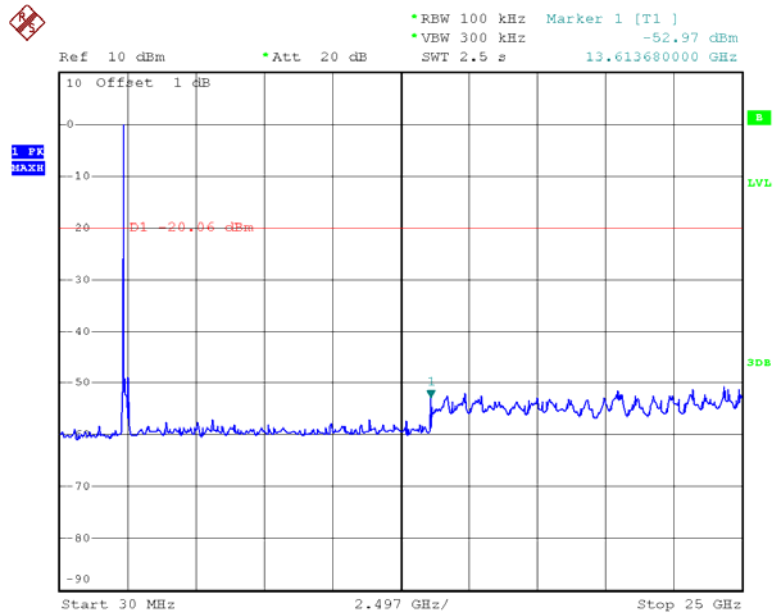


Date: 5.NOV.2012 09:42:45

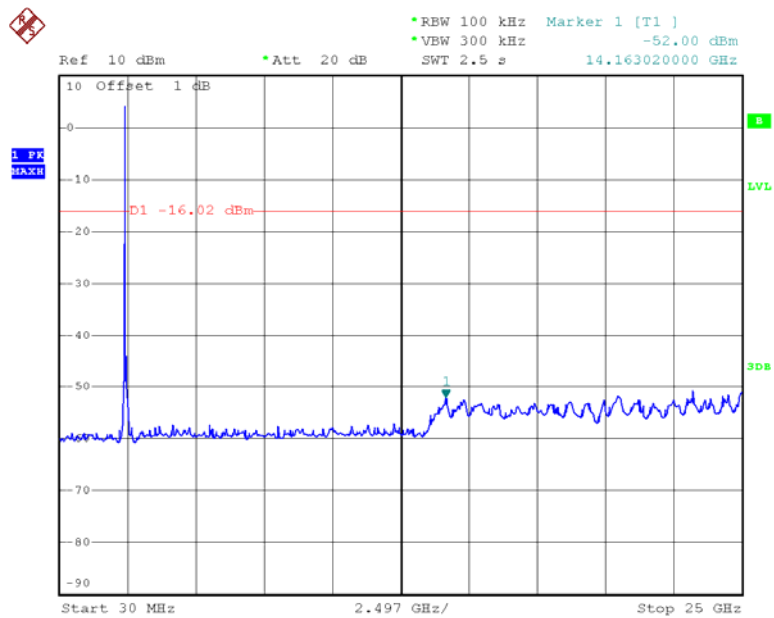
High Channel



Date: 5.NOV.2012 09:30:00

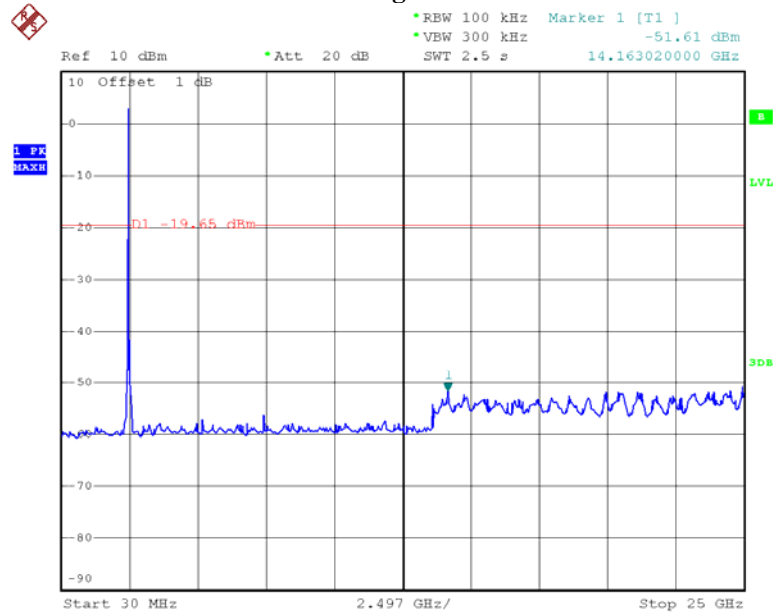
EDR- $\pi/4$ -DQPSK:**Low Channel**

Date: 5.NOV.2012 10:15:15

Middle Channel

Date: 5.NOV.2012 10:16:36

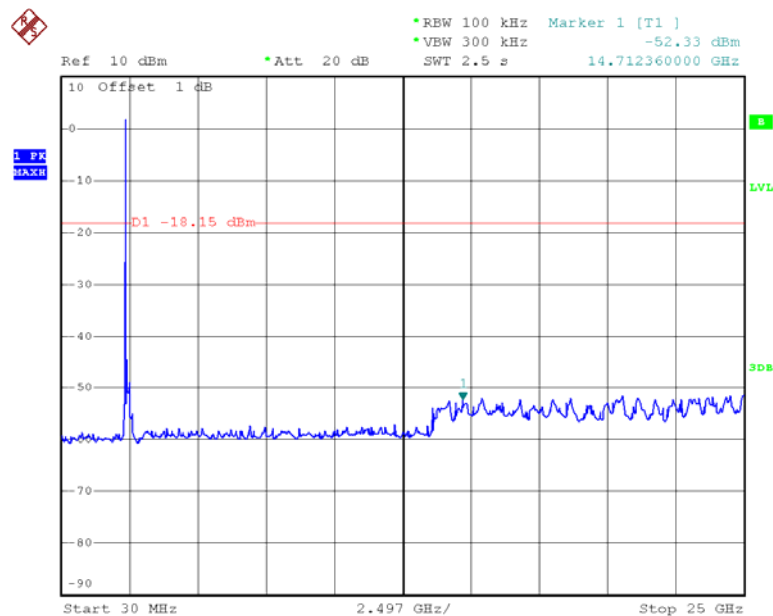
High Channel



Date: 5.NOV.2012 10:10:01

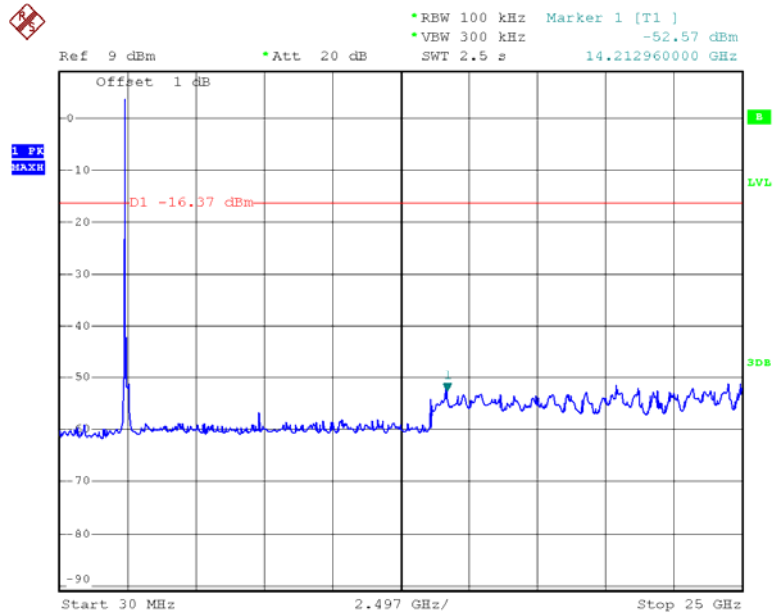
EDR-8DPSK:

Low Channel



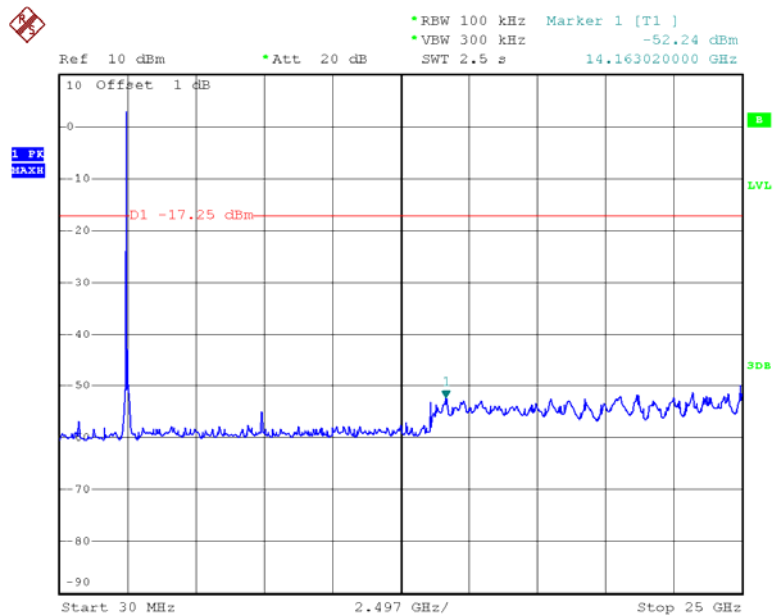
Date: 5.NOV.2012 10:47:33

Middle Channel



Date: 5.NOV.2012 10:51:23

High Channel



Date: 5.NOV.2012 12:12:10

FCC §15.247(a) (1) - CHANNEL SEPARATION TEST**Applicable Standard**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	48 %
ATM Pressure:	101kPa

* The testing was performed by Leon Chen on 2012-11-05.

Test Result: Compliance.

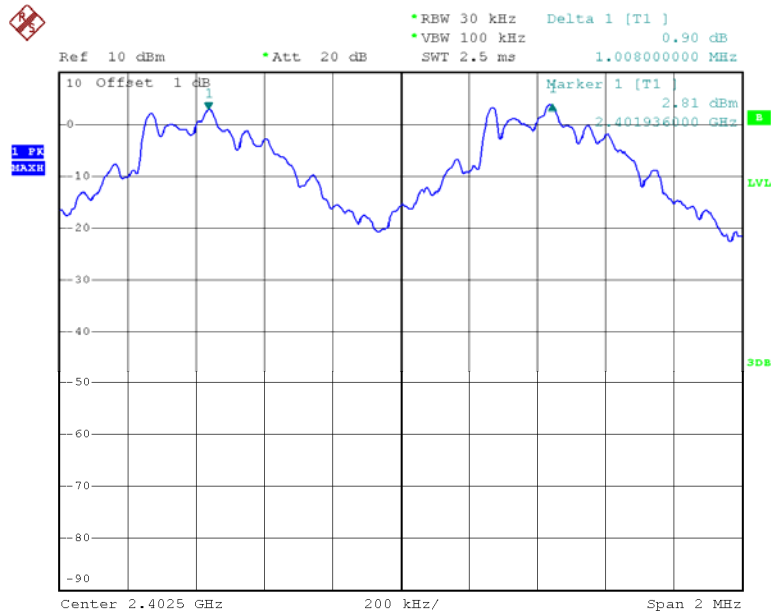
Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
BDR Mode (GFSK)	Low	2402	1.008	0.61	Pass
	Adjacent	2403			
	Middle	2441	1.004	0.61	Pass
	Adjacent	2442			
	High	2480	1.004	0.61	Pass
	Adjacent	2479			
EDR Mode ($\pi/4$ -DQPSK)	Low	2402	1.004	0.81	Pass
	Adjacent	2403			
	Middle	2441	1.008	0.82	Pass
	Adjacent	2442			
	High	2480	1.004	0.82	Pass
	Adjacent	2479			
EDR Mode (8DPSK)	Low	2402	1.004	0.81	Pass
	Adjacent	2403			
	Middle	2441	1.004	0.81	Pass
	Adjacent	2442			
	High	2480	1.004	0.81	Pass
	Adjacent	2479			

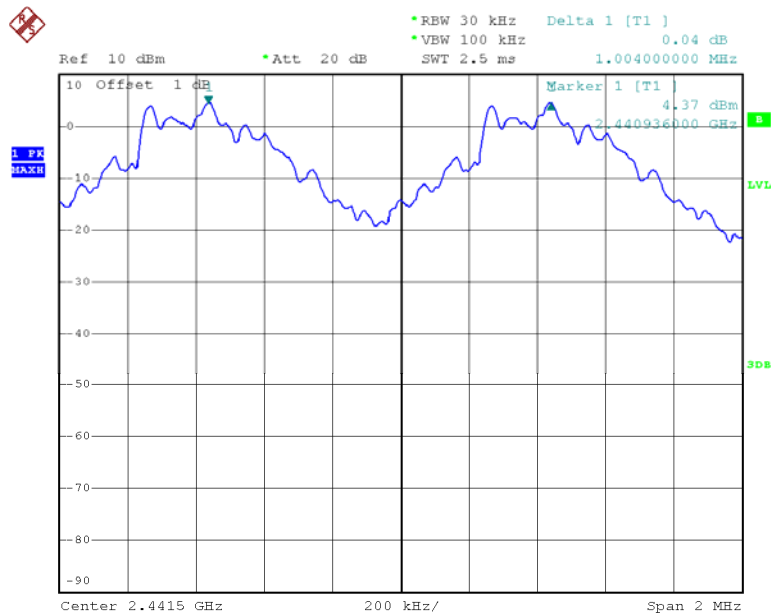
BDR- GFSK:

Low Channel



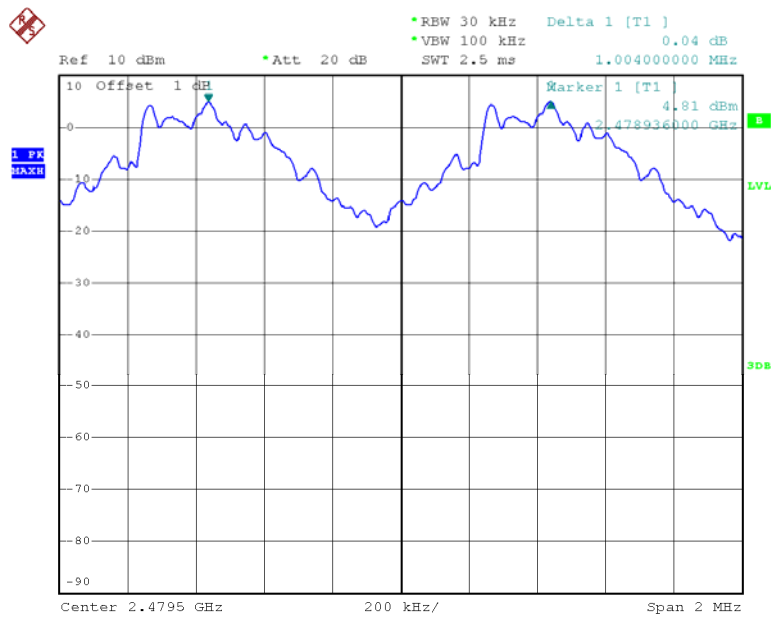
Date: 5.NOV.2012 09:49:59

Middle Channel



Date: 5.NOV.2012 09:49:09

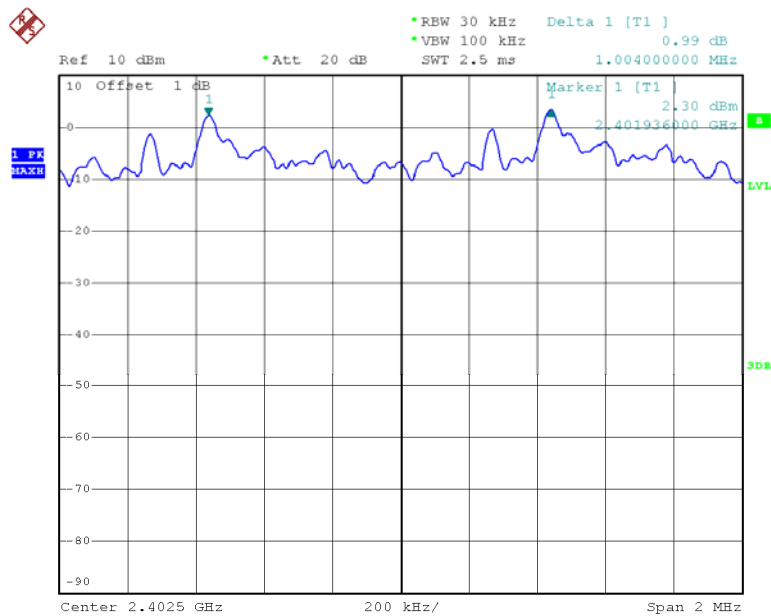
High Channel



Date: 5.NOV.2012 09:48:05

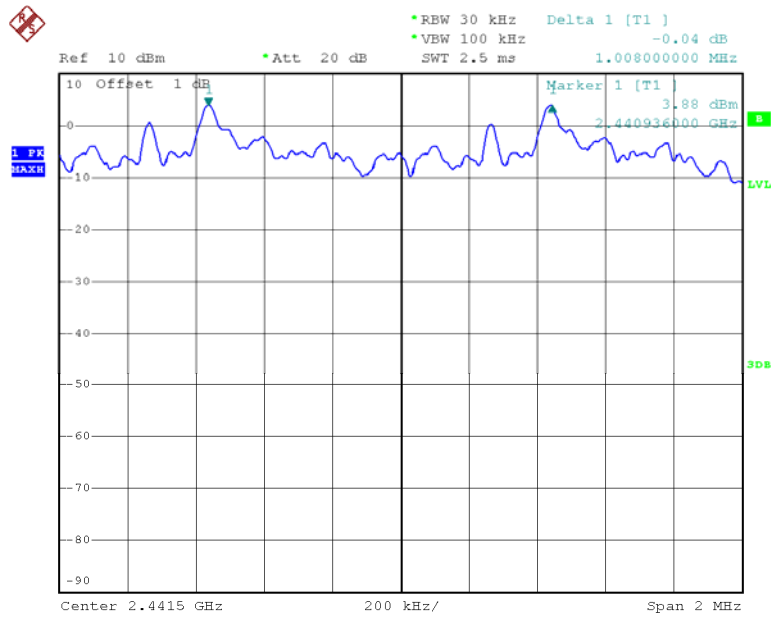
EDR Mode ($\pi/4$ -DQPSK):

Low Channel



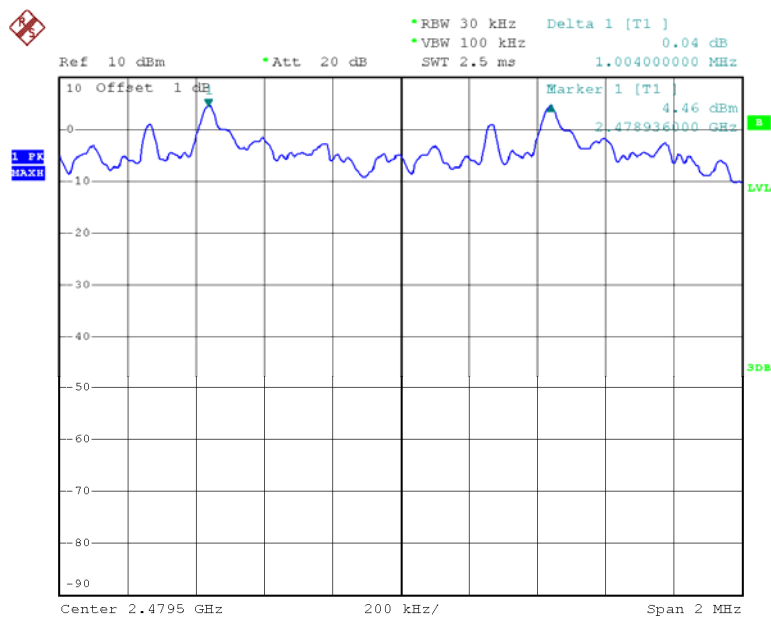
Date: 5.NOV.2012 10:27:22

Middle Channel



Date: 5.NOV.2012 10:28:18

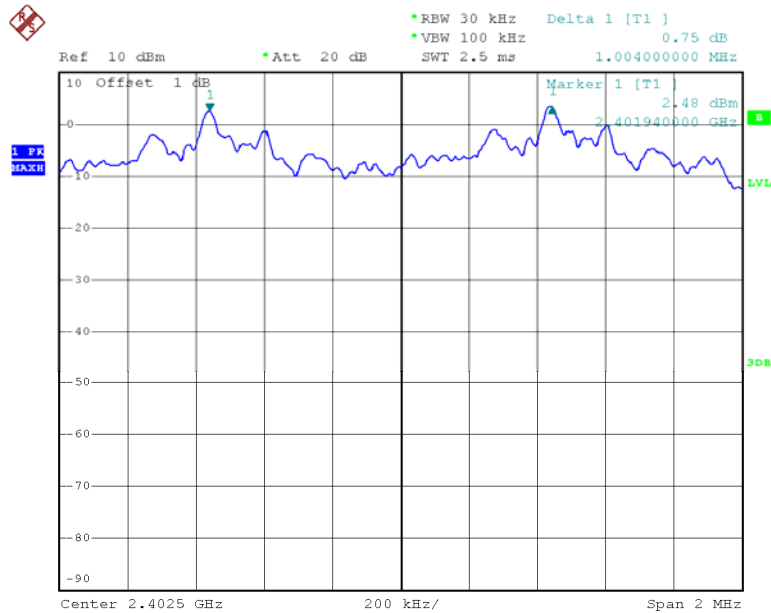
High Channel



Date: 5.NOV.2012 10:29:19

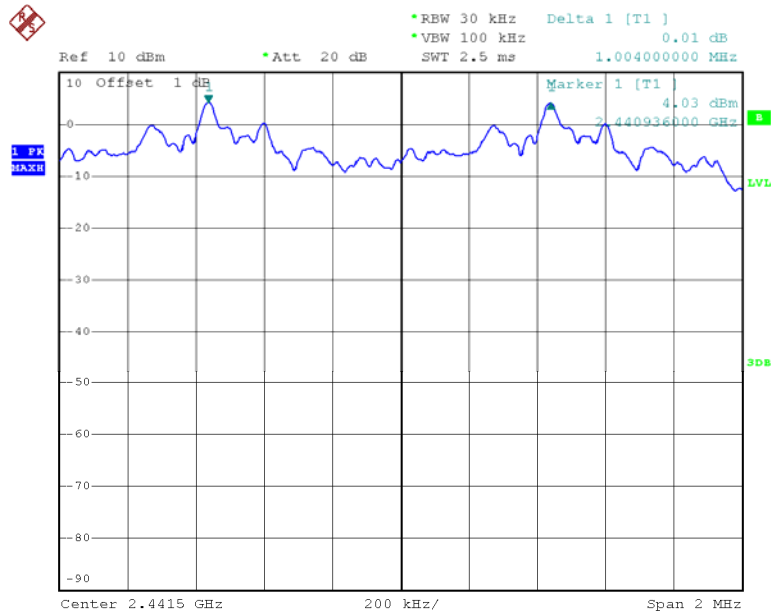
EDR Mode (8DPSK):

Low Channel



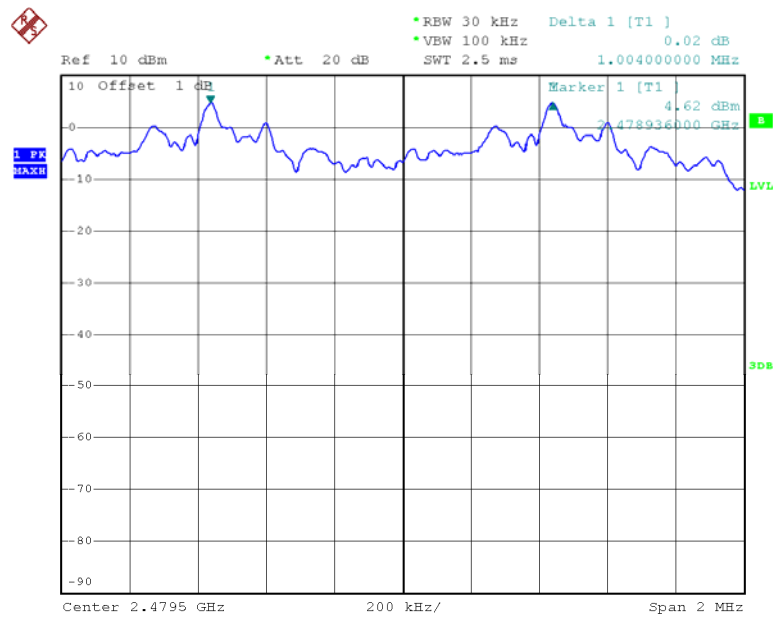
Date: 5.NOV.2012 12:17:07

Middle Channel



Date: 5.NOV.2012 12:16:14

High Channel



Date: 5.NOV.2012 12:15:27

FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING**Applicable Standard**

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	48 %
ATM Pressure:	101kPa

* The testing was performed by Leon Chen on 2012-11-05.

Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	0.92
	Middle	2441	0.92
	High	2480	0.92
EDR Mode ($\pi/4$ -DQPSK)	Low	2402	1.216
	Middle	2441	1.224
	High	2480	1.224
EDR Mode (8DPSK)	Low	2402	1.208
	Middle	2441	1.212
	High	2480	1.212

Please refer to the following plots.

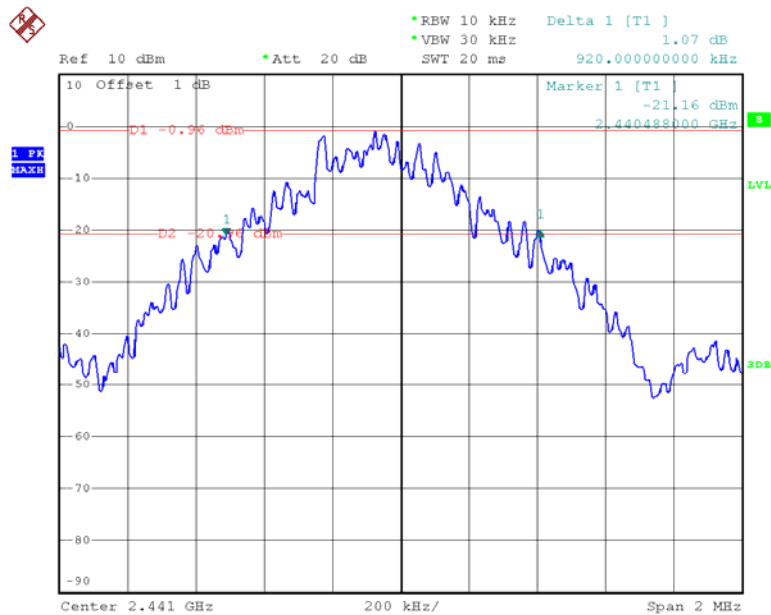
BDR Mode (GFSK):

Low Channel



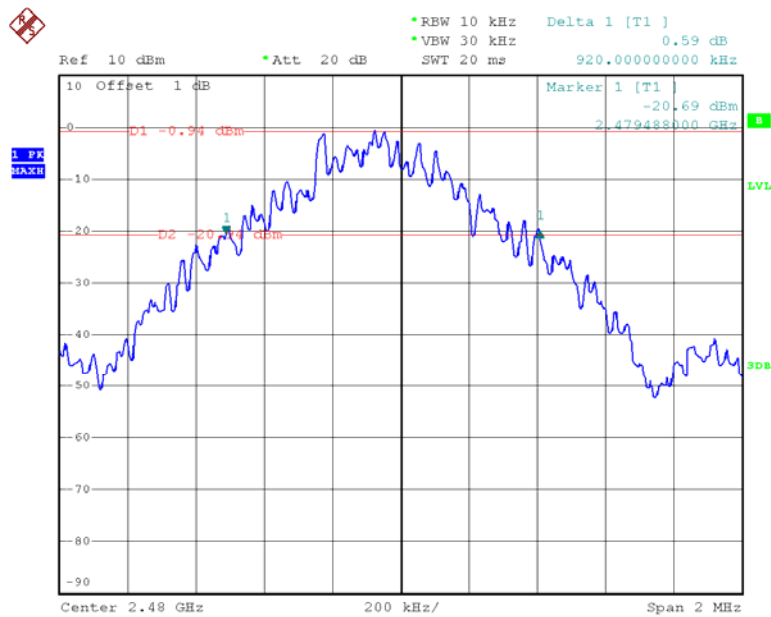
Date: 5.NOV.2012 09:13:50

Middle Channel



Date: 5.NOV.2012 09:30:55

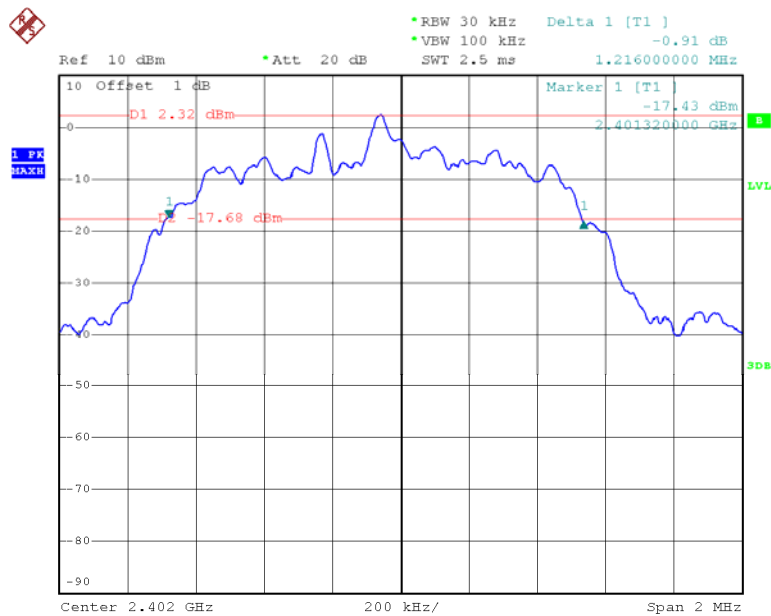
High Channel



Date: 5.NOV.2012 09:39:32

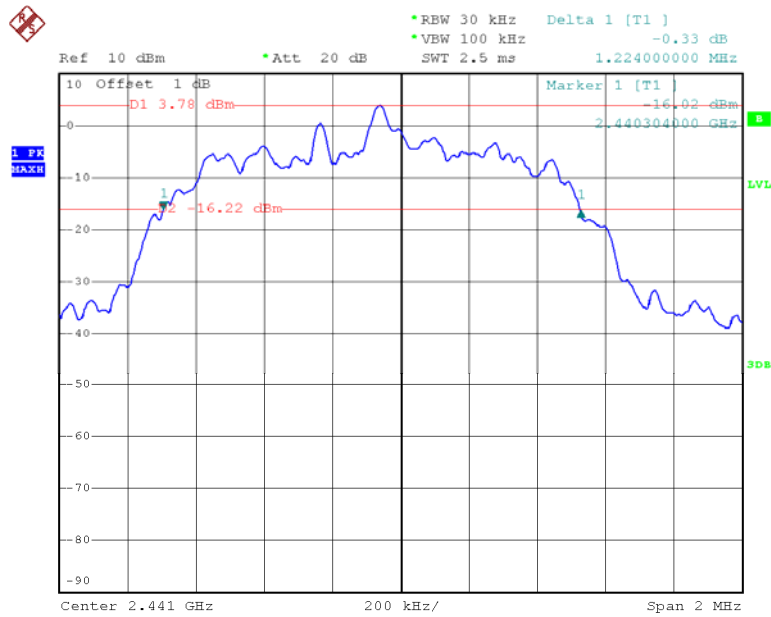
EDR Mode ($\pi/4$ -DQPSK):

Low Channel



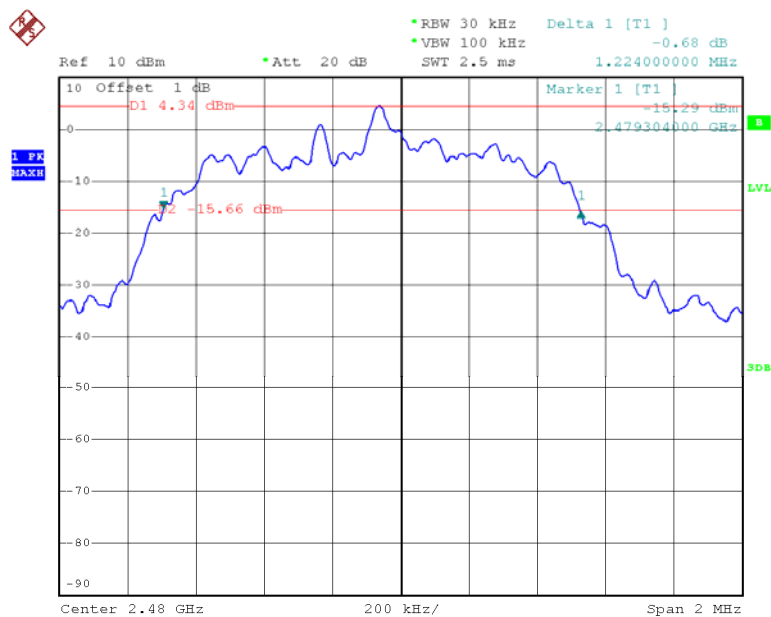
Date: 5.NOV.2012 10:22:26

Middle Channel



Date: 5.NOV.2012 10:12:45

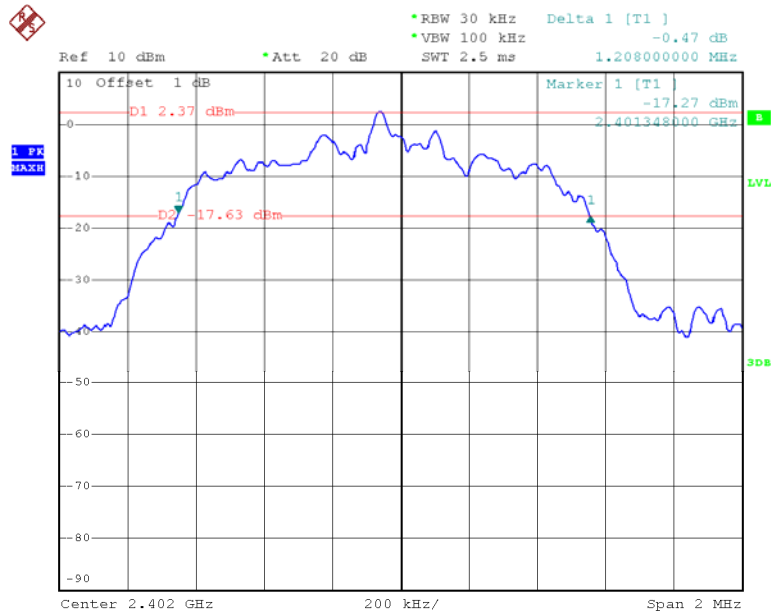
High Channel



Date: 5.NOV.2012 10:03:31

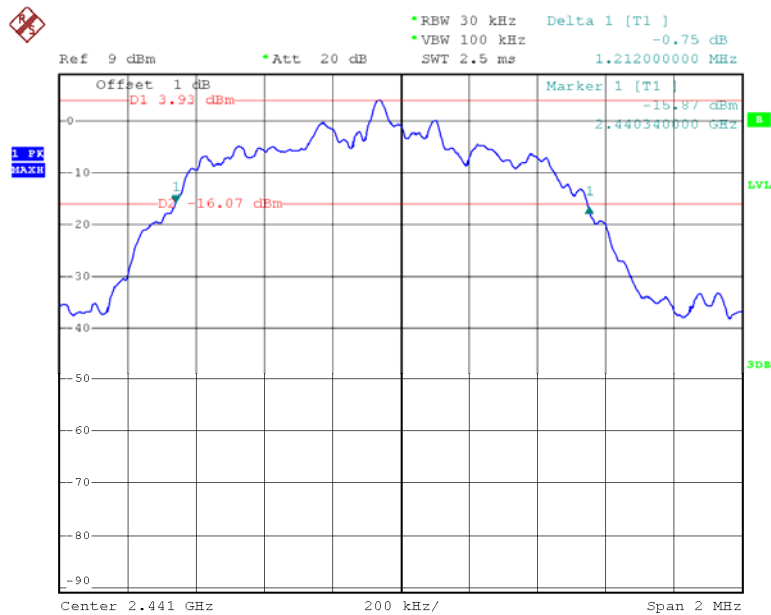
EDR Mode (8DPSK):

Low Channel



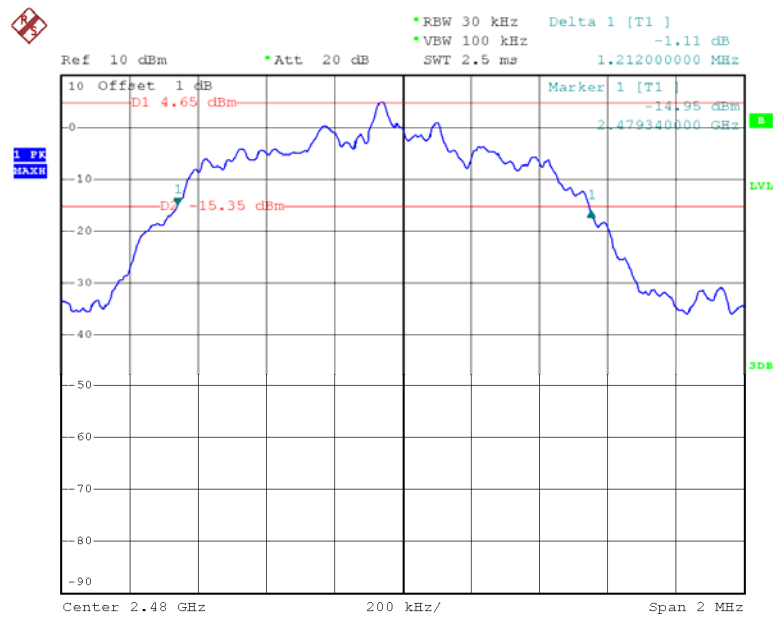
Date: 5.NOV.2012 10:43:42

Middle Channel



Date: 5.NOV.2012 10:52:49

High Channel



Date: 5.NOV.2012 12:13:59

FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST**Applicable Standard**

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 Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Data**Environmental Conditions**

Temperature:	26°C
Relative Humidity:	48 %
ATM Pressure:	101kPa

The testing was performed by Leon Chen on 2012-11-05.

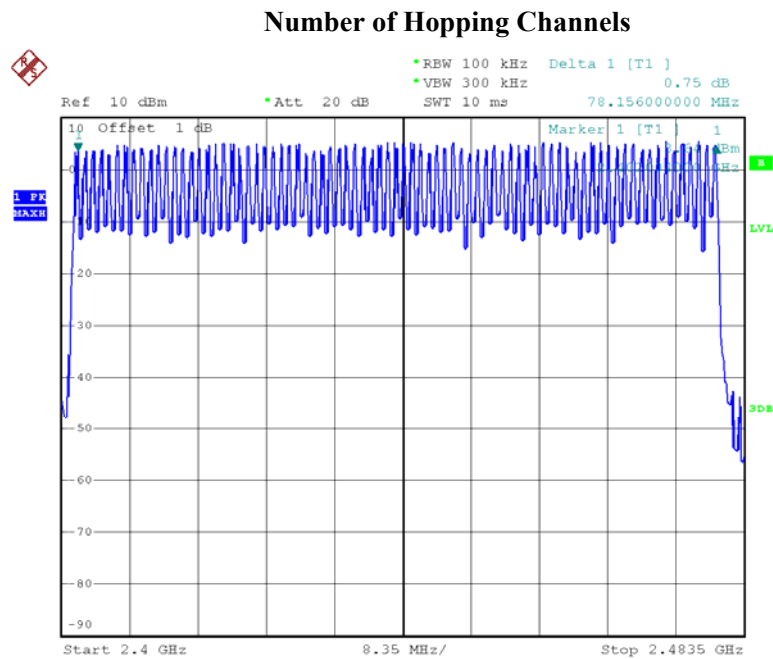
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥ 15

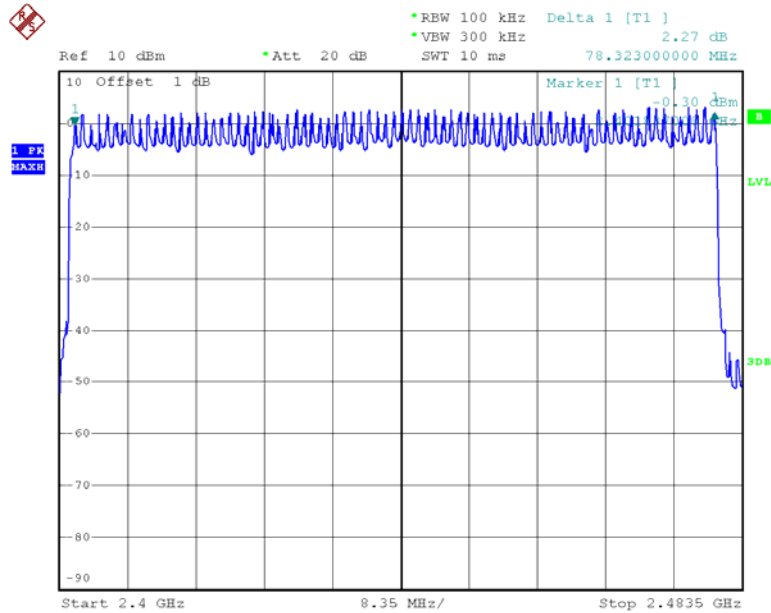
BDR Mode (GFSK):



Date: 5.NOV.2012 09:51:44

EDR Mode ($\pi/4$ -DQPSK):

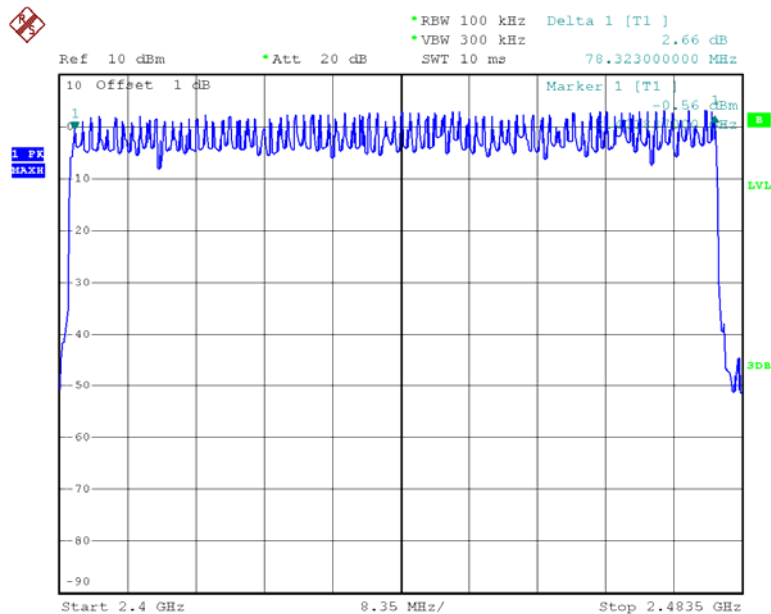
Number of Hopping Channels



Date: 5.NOV.2012 10:32:00

EDR Mode (8DPSK):

Number of Hopping Channels



Date: 5.NOV.2012 10:37:19

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)**Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz 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 Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as $0.4 \times \text{channel no. (s)}$, the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell Time= time slot length * hope rate/ number of hopping channels * 31.6s
Hop rate=1600/s

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	48 %
ATM Pressure:	101kPa

* The testing was performed by Leon Chen on 2012-11-05.

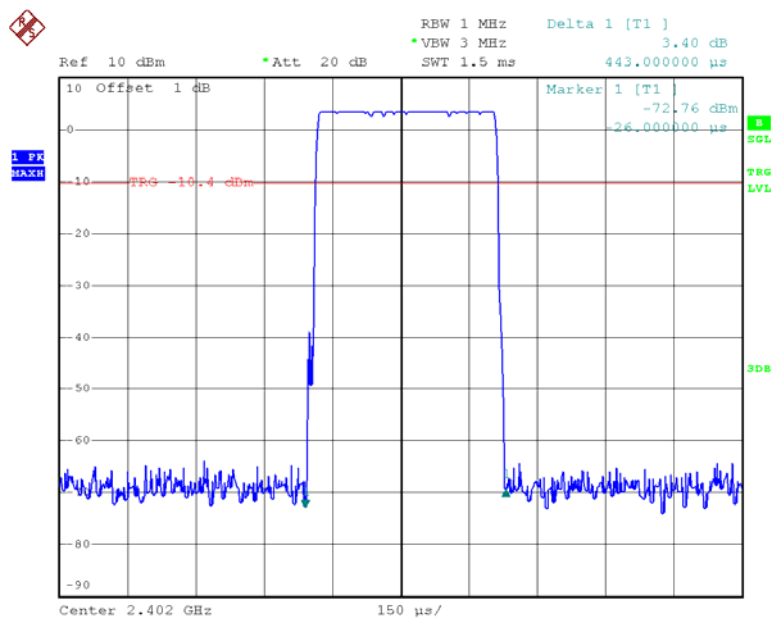
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

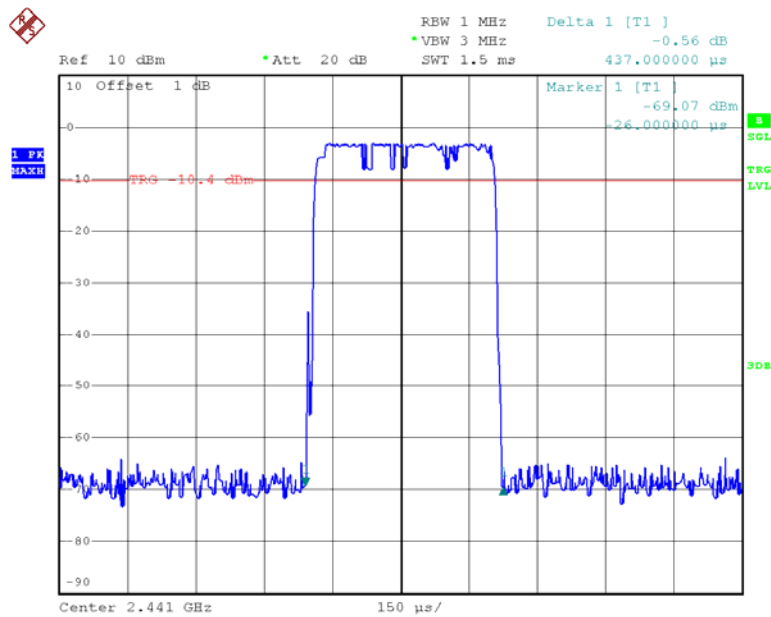
BDR Mode (GFSK)

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.443	0.142	0.4	Pass
	Middle	0.437	0.140	0.4	Pass
	High	0.440	0.141	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/2/79) $\times$ 31.6 s				
DH3	Low	1.722	0.276	0.4	Pass
	Middle	1.712	0.274	0.4	Pass
	High	1.712	0.274	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/4/79) $\times$ 31.6 s				
DH5	Low	3.040	0.324	0.4	Pass
	Middle	3.024	0.323	0.4	Pass
	High	3.008	0.321	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/6/79) $\times$ 31.6 s				

DH1:**Low Channel**

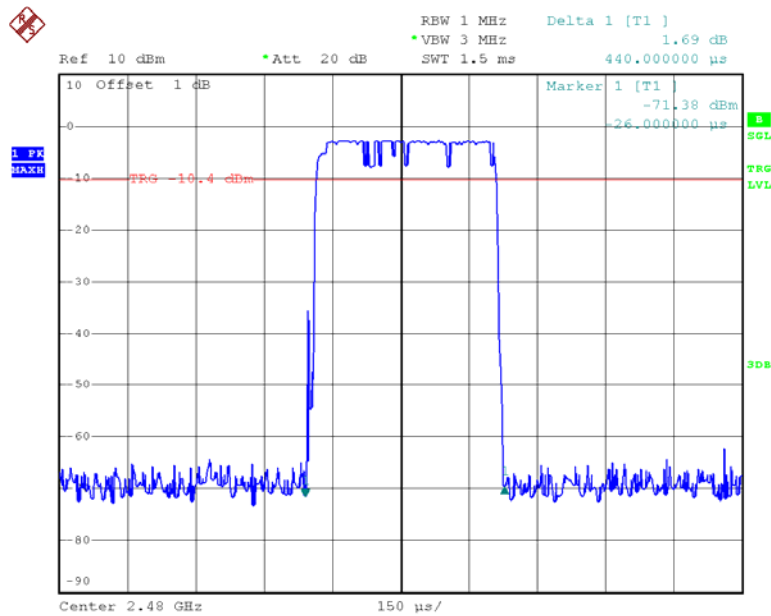
Date: 5.NOV.2012 12:49:51

Middle Channel



Date: 5.NOV.2012 12:50:13

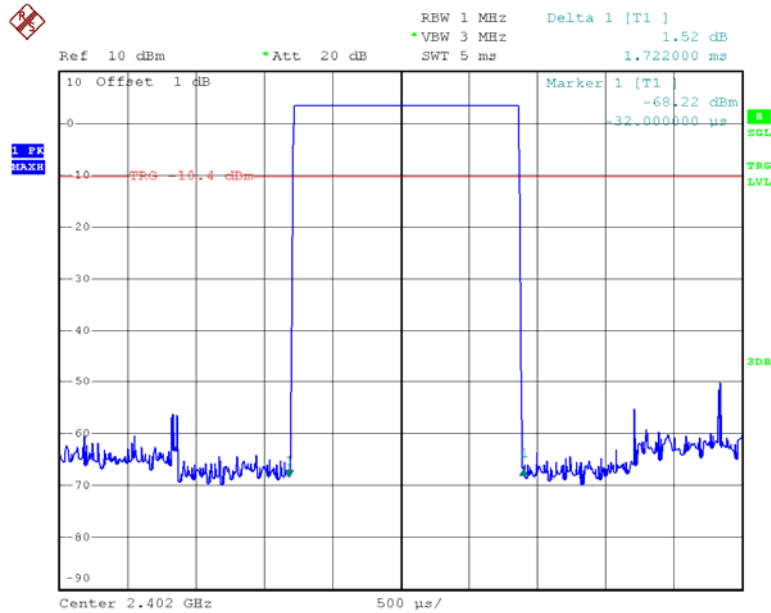
High Channel



Date: 5.NOV.2012 12:50:34

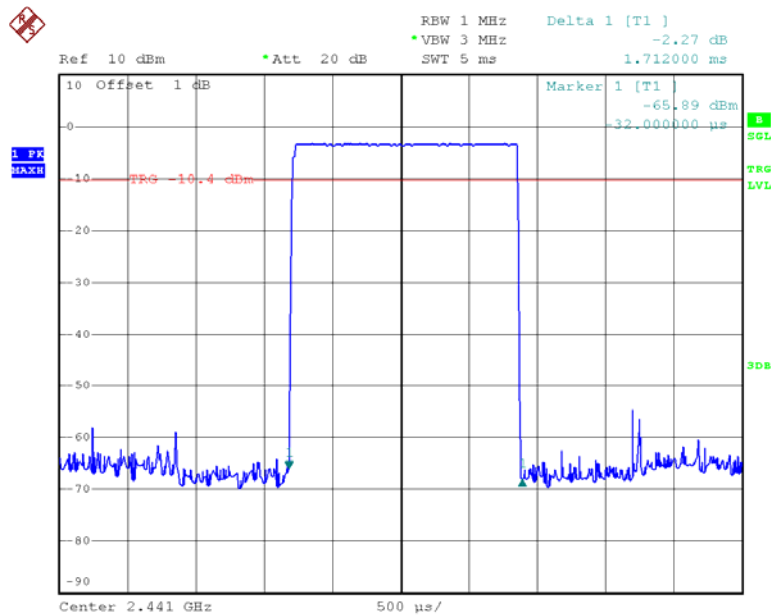
DH3:

Low Channel



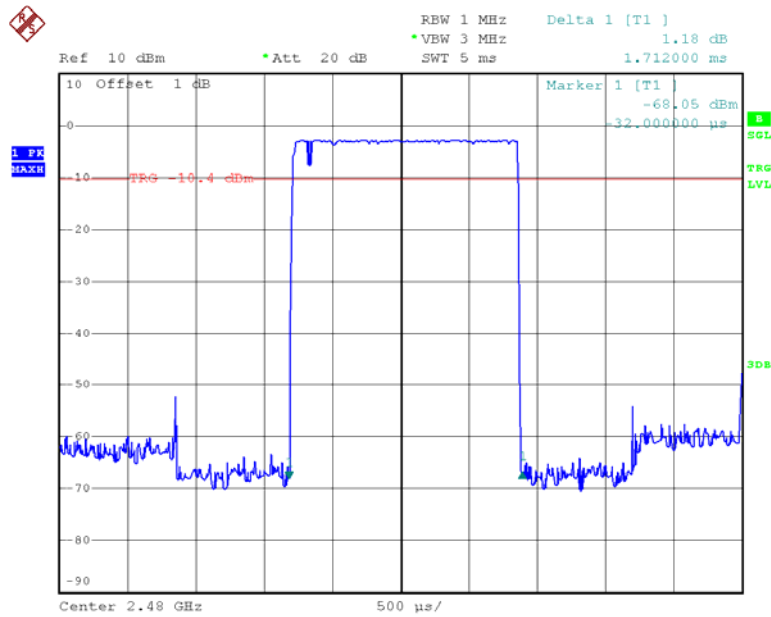
Date: 5.NOV.2012 12:48:44

Middle Channel



Date: 5.NOV.2012 12:48:24

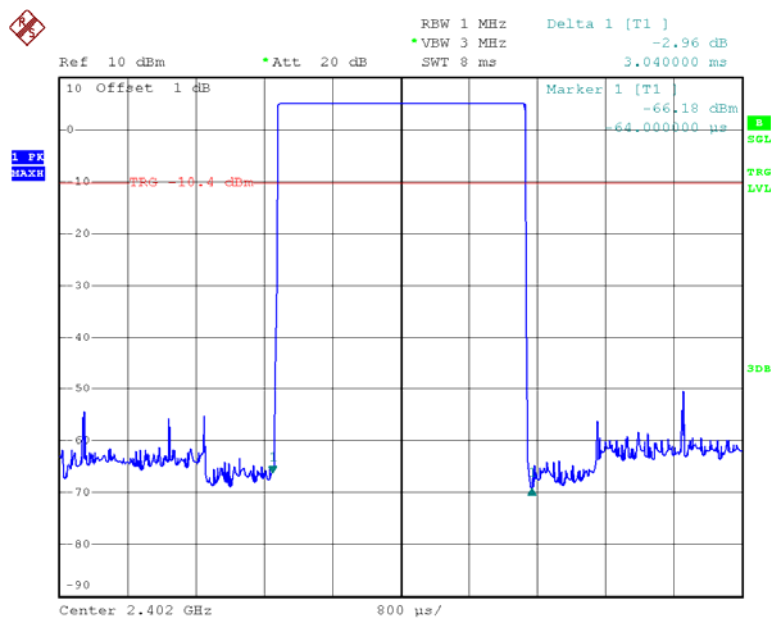
High Channel



Date: 5.NOV.2012 12:47:39

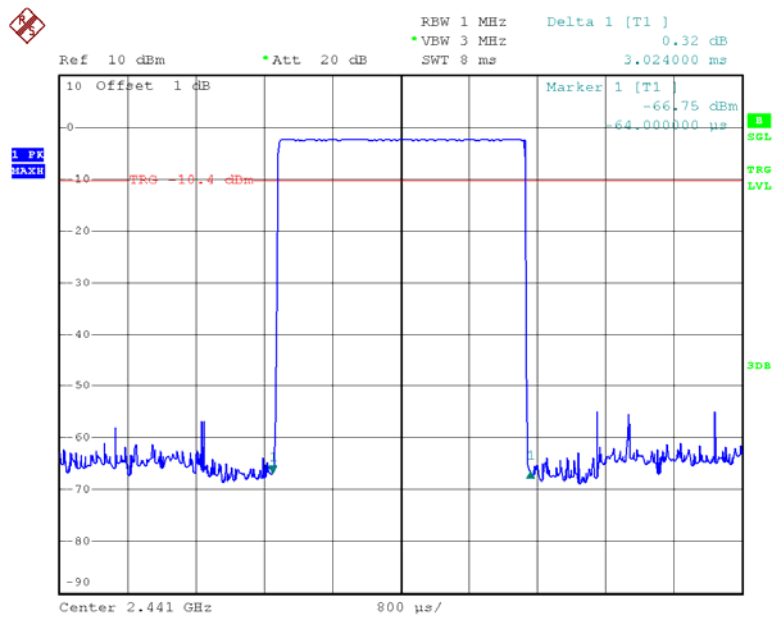
DH5:

Low Channel



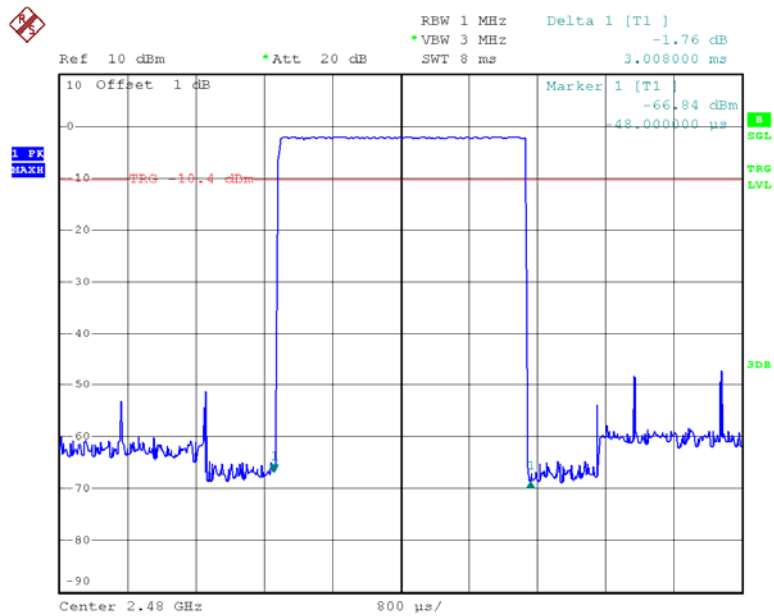
Date: 5.NOV.2012 12:41:30

Middle Channel



Date: 5.NOV.2012 12:40:16

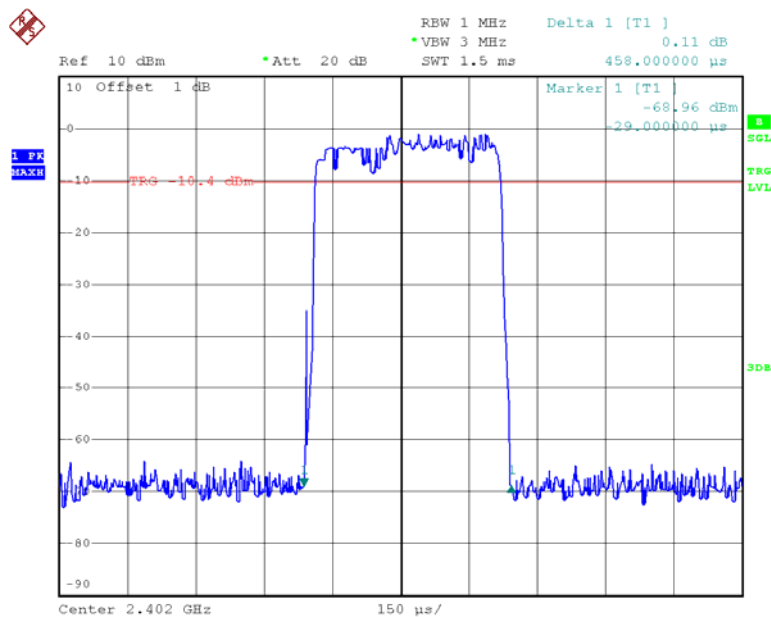
High Channel



Date: 5.NOV.2012 12:42:37

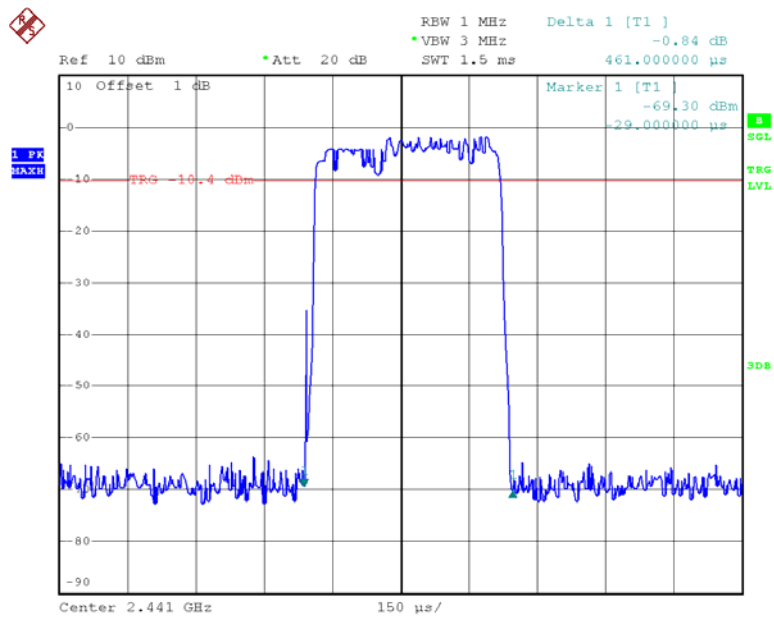
EDR Mode ($\pi/4$ -DQPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.458	0.147	0.4	Pass
	Middle	0.461	0.148	0.4	Pass
	High	0.458	0.147	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/2/79) $\times$ 31.6 s				
DH3	Low	1.738	0.278	0.4	Pass
	Middle	1.738	0.278	0.4	Pass
	High	1.738	0.278	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/4/79) $\times$ 31.6 s				
DH5	Low	2.986	0.319	0.4	Pass
	Middle	3.018	0.322	0.4	Pass
	High	3.002	0.320	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/6/79) $\times$ 31.6 s				

DH1:**Low Channel**

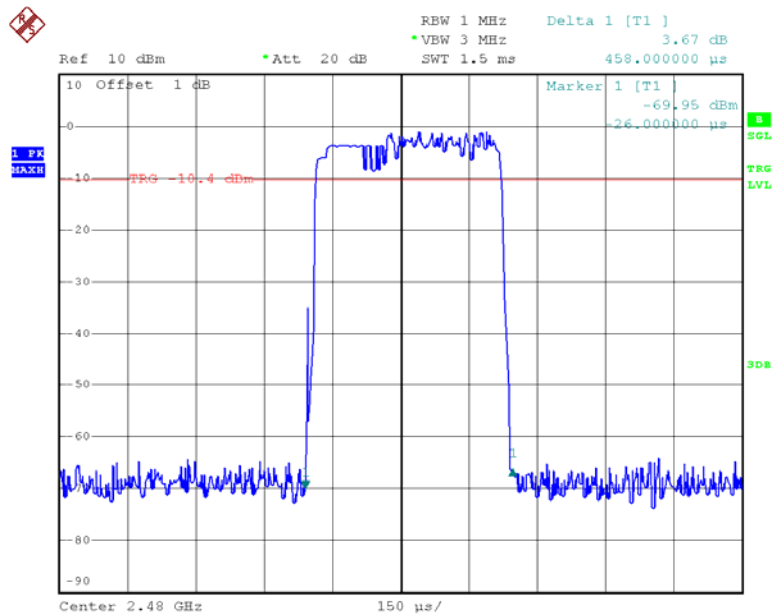
Date: 5.NOV.2012 12:53:54

Middle Channel



Date: 5.NOV.2012 12:53:37

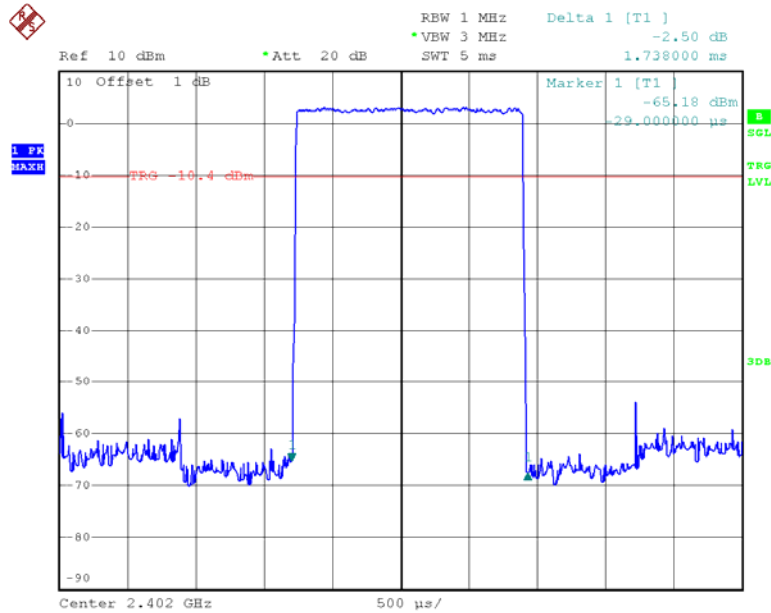
High Channel



Date: 5.NOV.2012 12:53:14

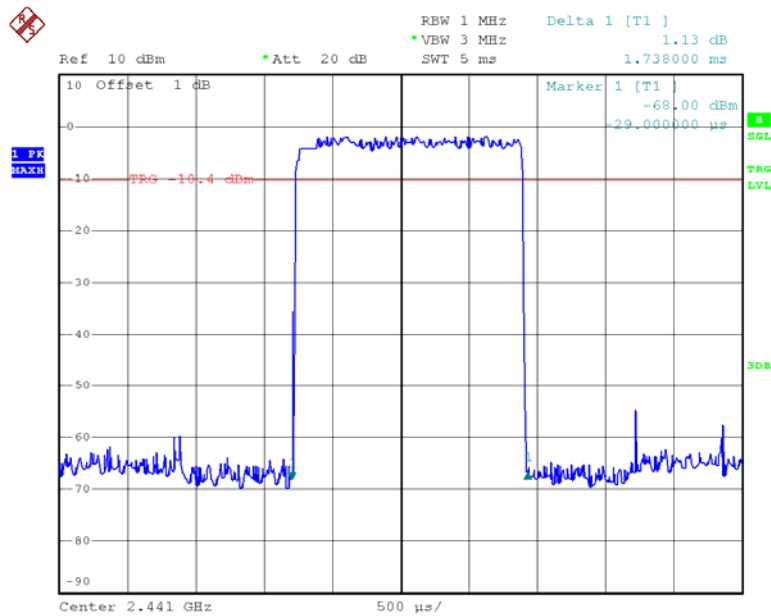
DH3:

Low Channel



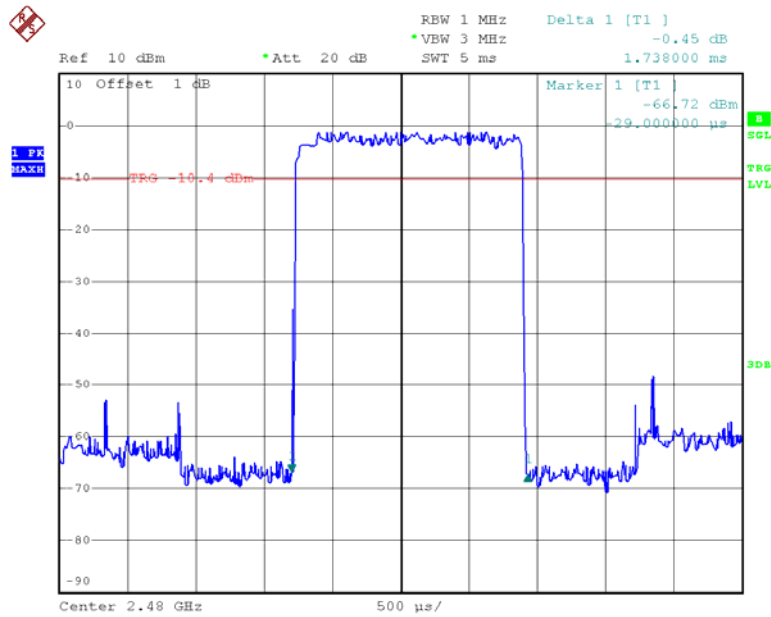
Date: 5.NOV.2012 12:57:07

Middle Channel



Date: 5.NOV.2012 12:56:36

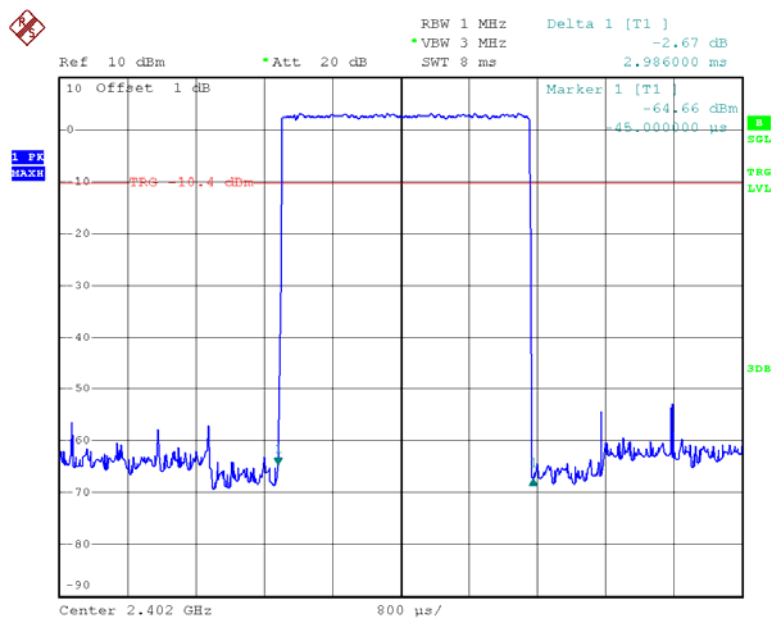
High Channel



Date: 5.NOV.2012 12:56:11

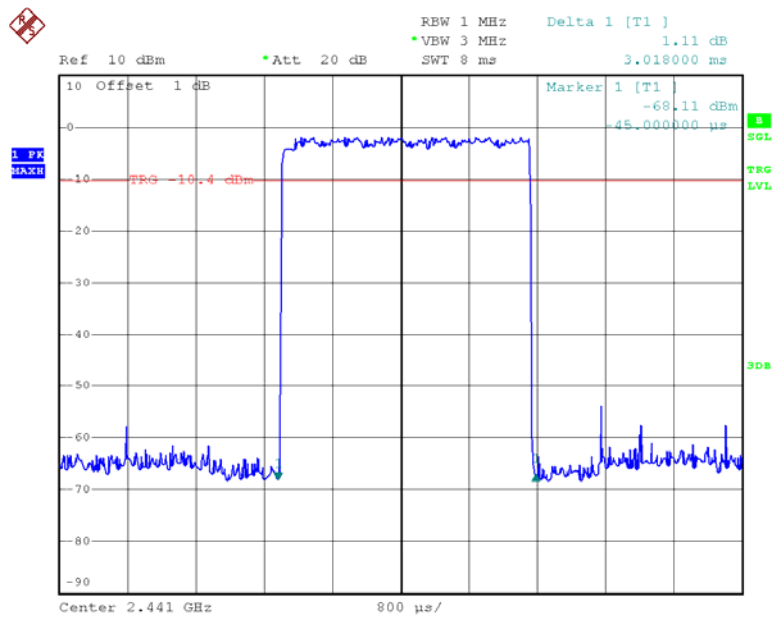
DH5:

Low Channel



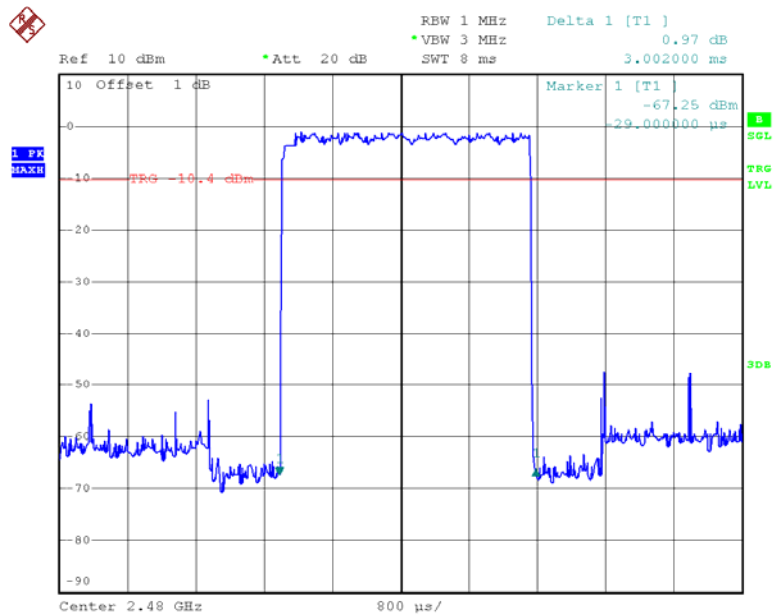
Date: 5.NOV.2012 12:59:10

Middle Channel



Date: 5.NOV.2012 12:59:34

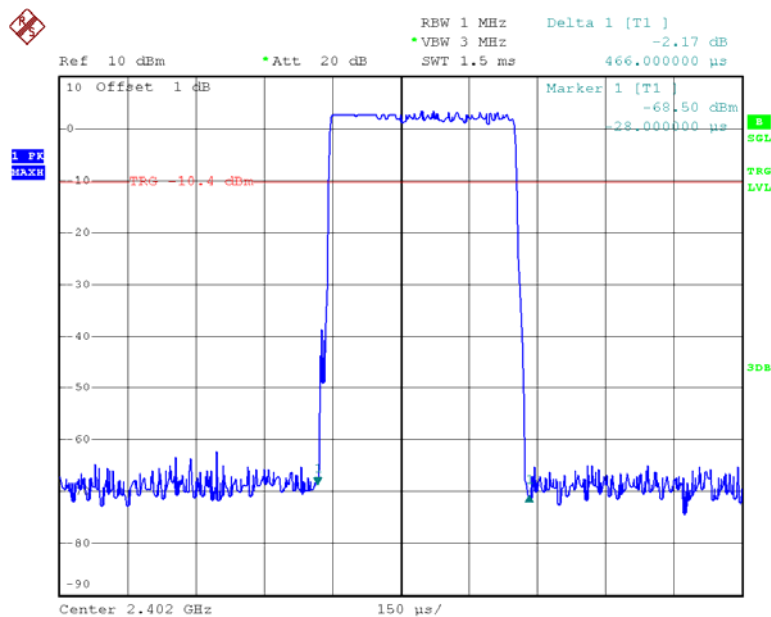
High Channel



Date: 5.NOV.2012 12:59:52

EDR Mode (8DPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.466	0.149	0.4	Pass
	Middle	0.457	0.146	0.4	Pass
	High	0.460	0.147	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/2/79) $\times$ 31.6 s				
DH3	Low	1.731	0.277	0.4	Pass
	Middle	1.731	0.277	0.4	Pass
	High	1.721	0.275	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/4/79) $\times$ 31.6 s				
DH5	Low	2.986	0.319	0.4	Pass
	Middle	2.986	0.319	0.4	Pass
	High	3.002	0.320	0.4	Pass
	Note: Dwell time=Pulse time (ms) $\times$ (1.6/6/79) $\times$ 31.6 s				

DH1:**Low Channel**

Date: 5.NOV.2012 13:06:10

1. PK
MAXH

Ref 10 dBm Att 20 dB REW 1 MHz VEW 3 MHz SWT 1.5 ms Delta 1 [T1] 1.10 dB 457.000000 μs

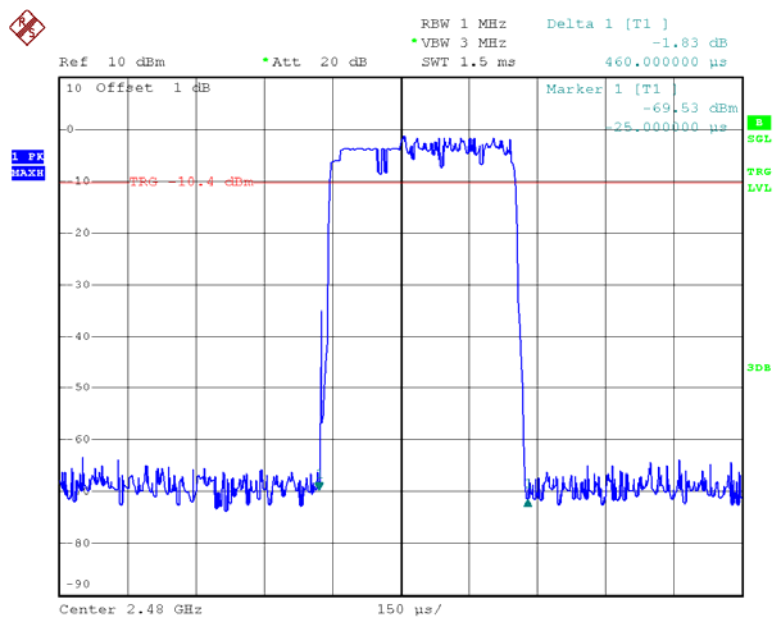
10 Offset 1 dB

Marker 1 [T1] -70.30 dBm -28.000000 μs

TRG -10.4 dBm

Center 2.441 GHz 150 μs/

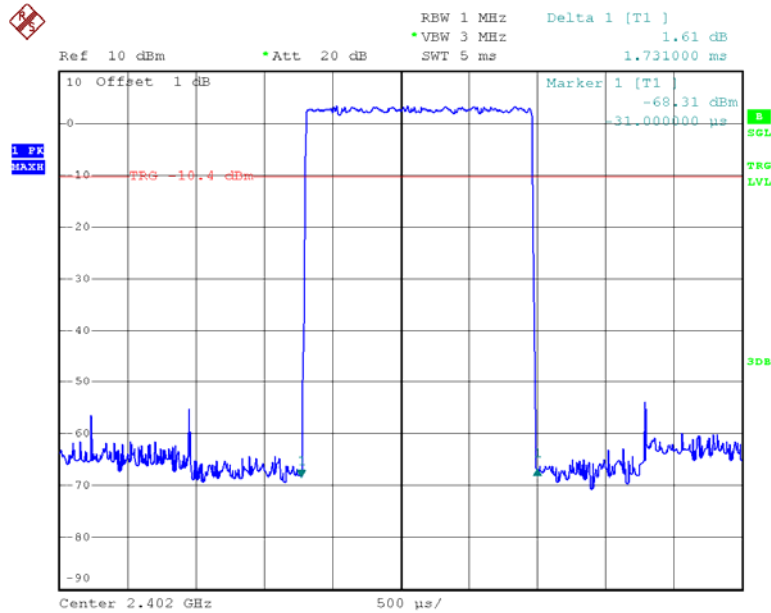
High Channel



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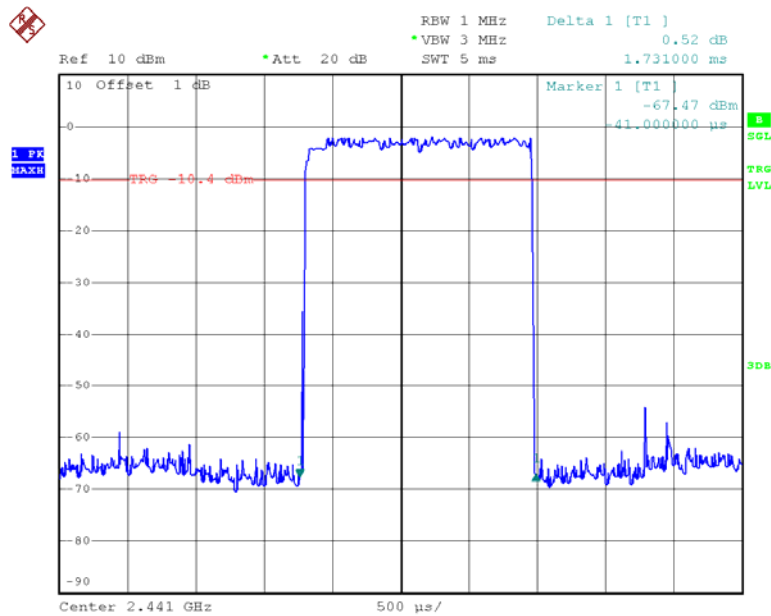
DH3:

Low Channel



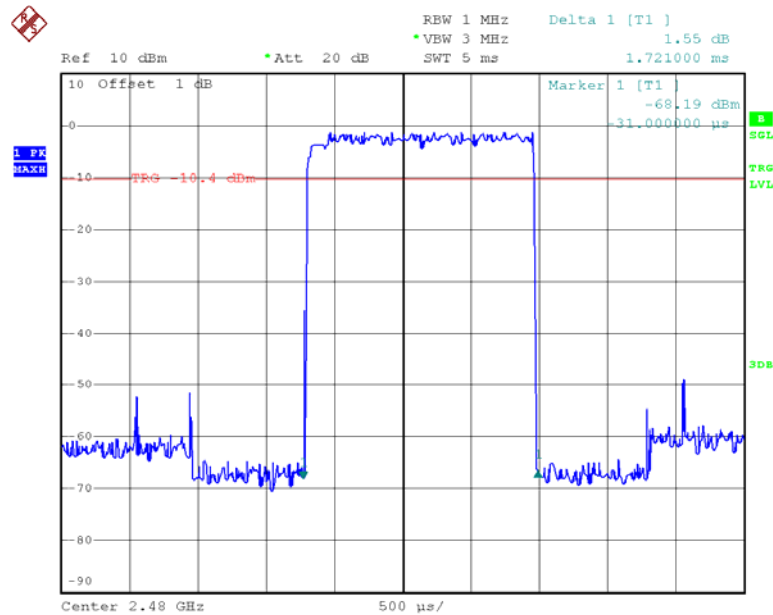
Date: 5.NOV.2012 13:03:06

Middle Channel



Date: 5.NOV.2012 13:03:24

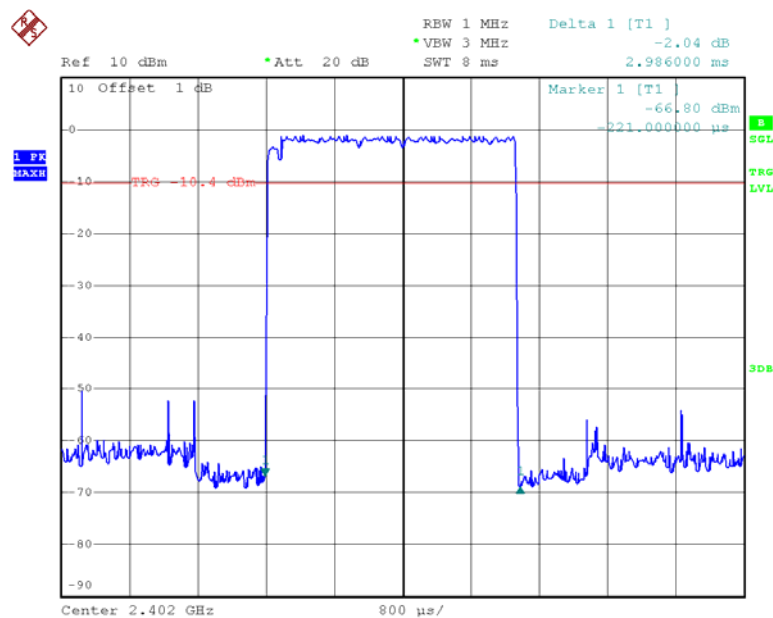
High Channel



Date: 5.NOV.2012 13:03:52

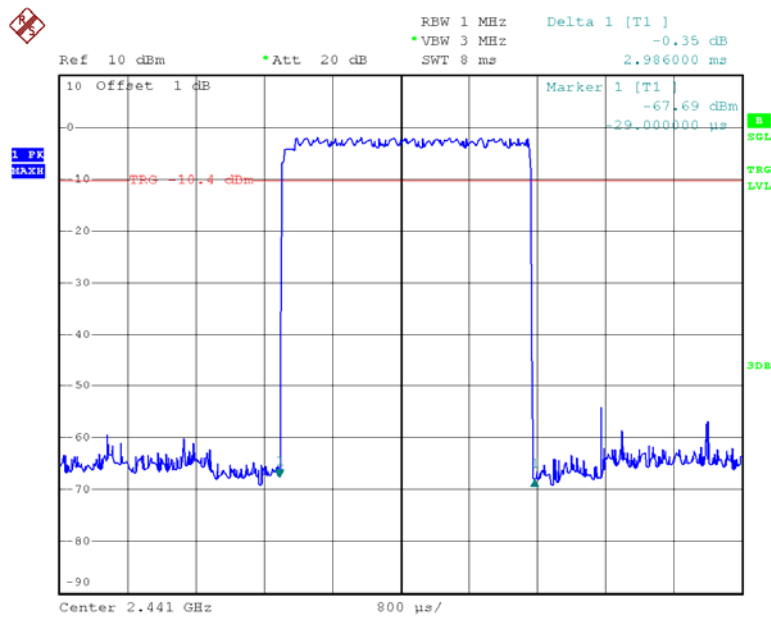
DH5:

Low Channel



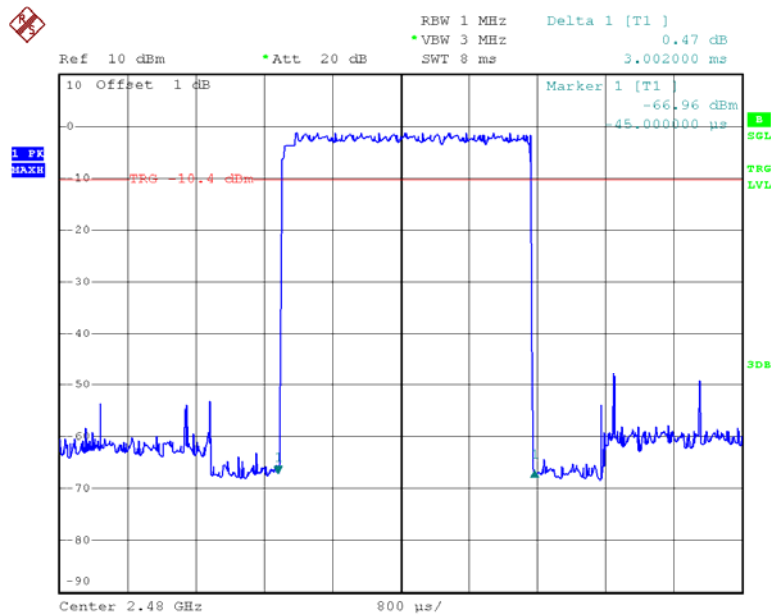
Date: 5.NOV.2012 13:01:56

Middle Channel



Date: 5.NOV.2012 13:01:31

High Channel



Date: 5.NOV.2012 13:01:12

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT**Applicable Standard**

According to §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

Test Procedure

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI test receiver.
3. Add a correction factor to the display.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	48%
ATM Pressure:	101kPa

* The testing was performed by Leon Chen on 2012-11-05.

Test Result: Compliance.

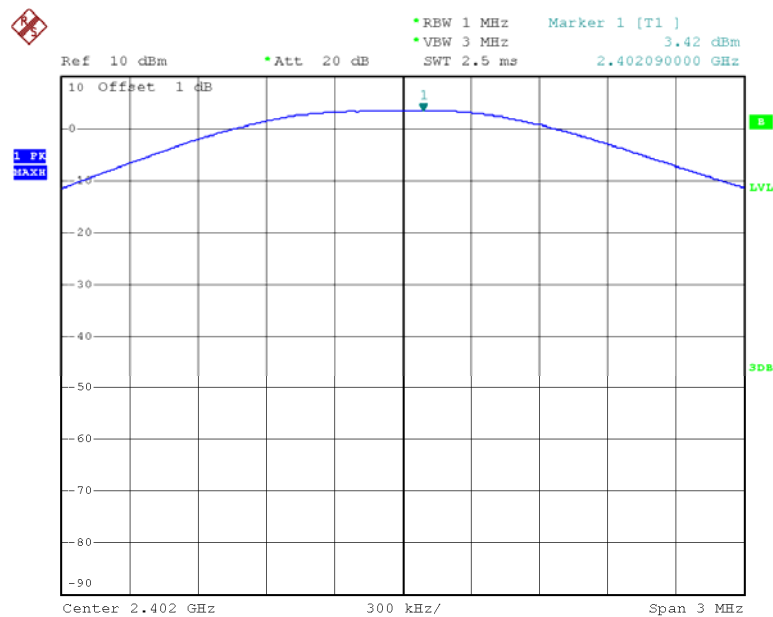
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
BDR Mode (GFSK)	Low	2402	3.42	30
	Middle	2441	4.90	30
	High	2480	5.29	30
EDR Mode ($\pi/4$ -DQPSK)	Low	2402	3.47	30
	Middle	2441	4.69	30
	High	2480	5.18	30
EDR Mode(8DPSK)	Low	2402	3.83	30
	Middle	2441	5.22	30
	High	2480	5.64	30

Note: The data above was tested in conducted mode.

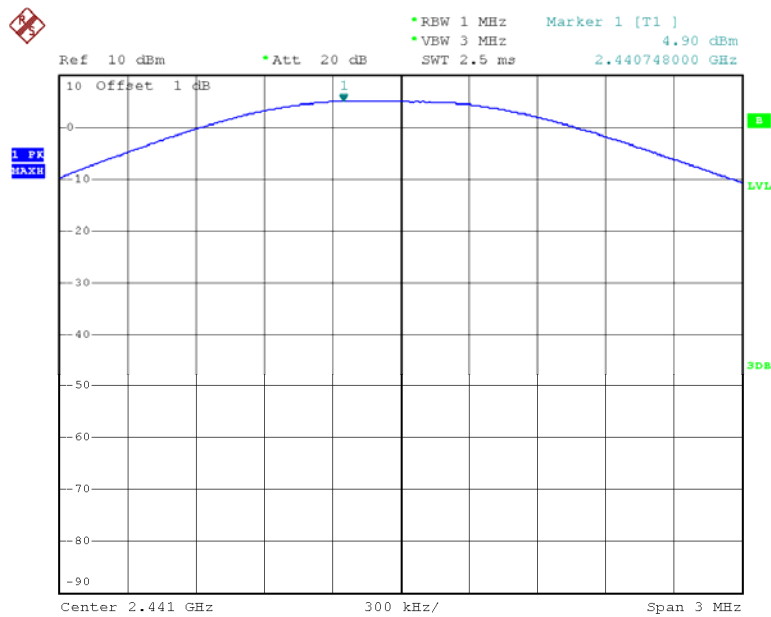
BDR Mode (GFSK):

Output Power, Low



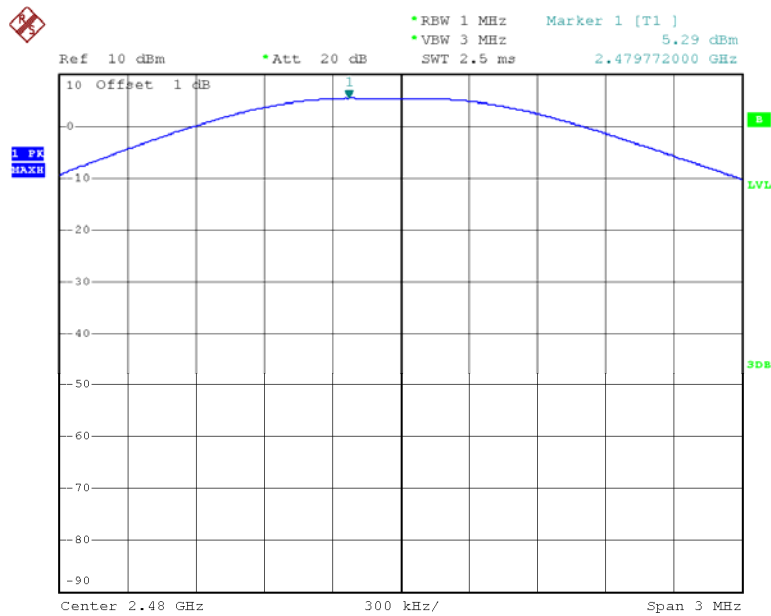
Date: 5.NOV.2012 09:11:29

Output Power, Middle



Date: 5.NOV.2012 09:25:19

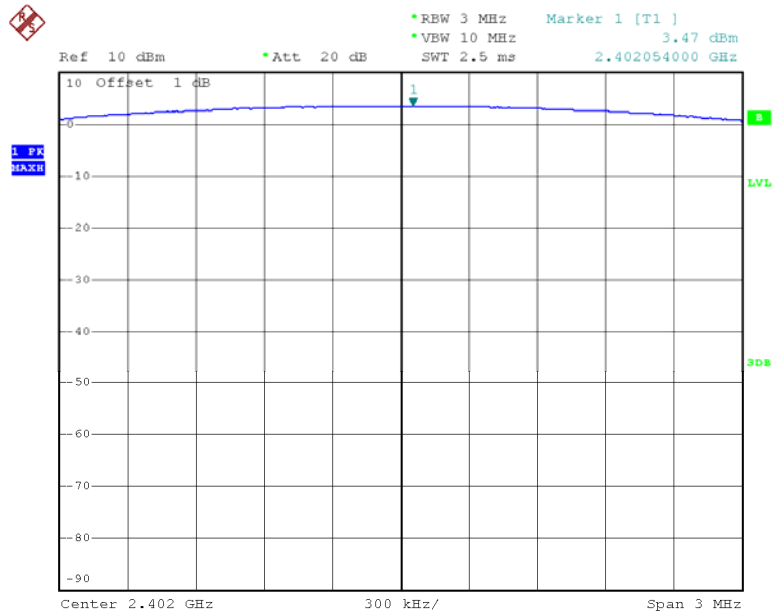
Output Power, High



Date: 5.NOV.2012 09:37:18

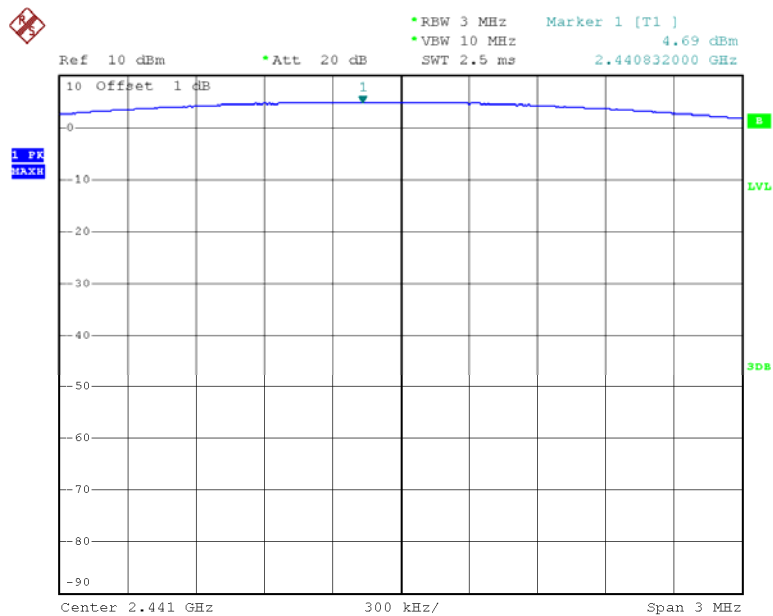
EDR Mode ($\pi/4$ -DQPSK):

Output Power, Low



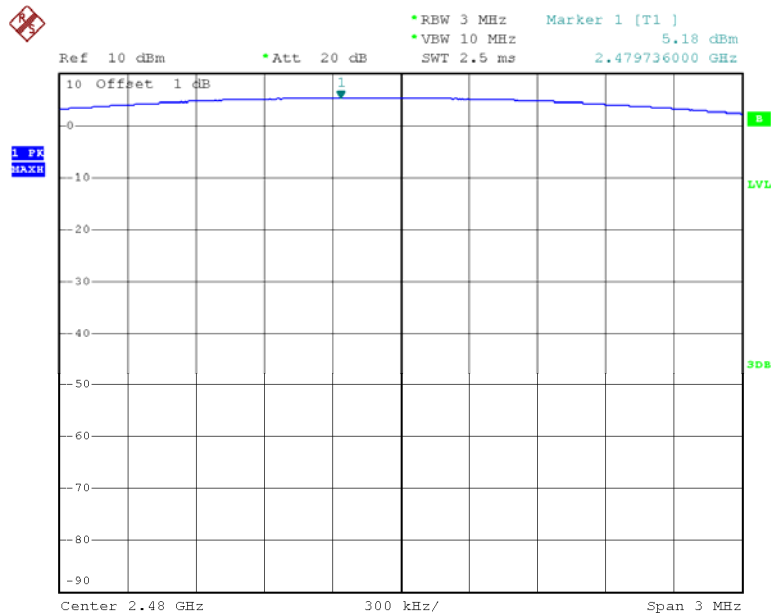
Date: 5.NOV.2012 10:18:35

Output Power, Middle



Date: 5.NOV.2012 10:10:59

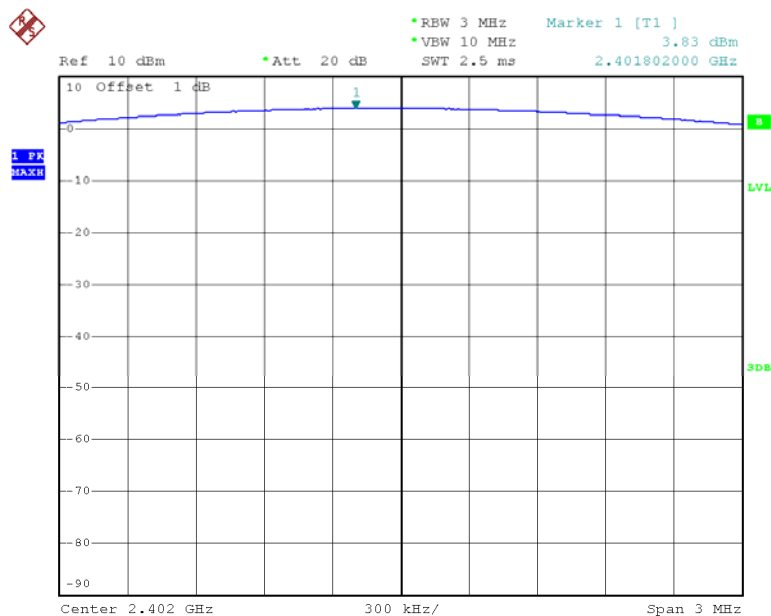
Output Power, High



Date: 5.NOV.2012 10:01:30

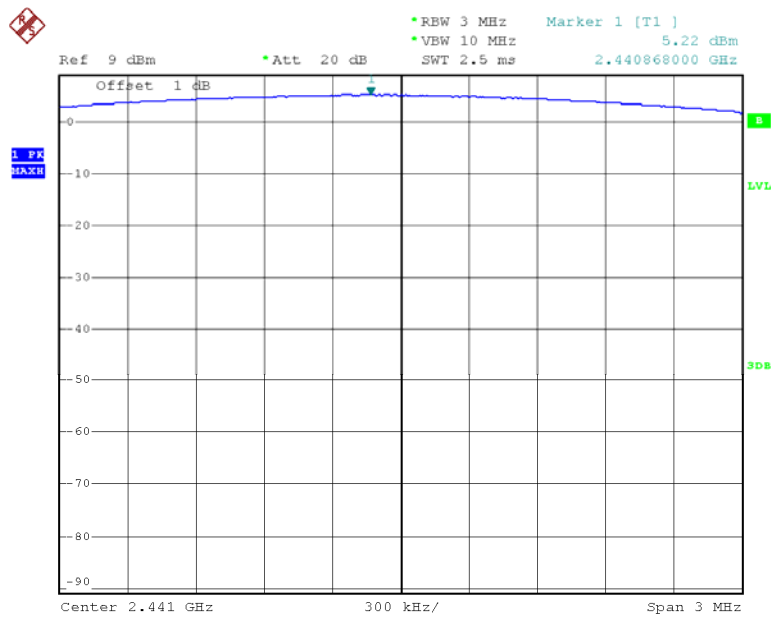
EDR Mode (8DPSK):

Output Power, Low



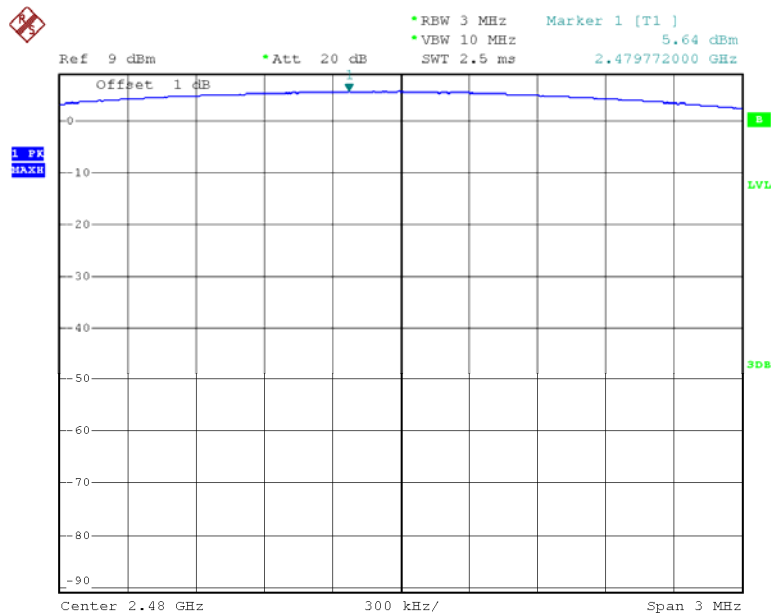
Date: 5.NOV.2012 10:40:17

Output Power, Middle



Date: 5.NOV.2012 10:53:55

Output Power, High



Date: 5.NOV.2012 10:56:07

FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Data

Environmental Conditions

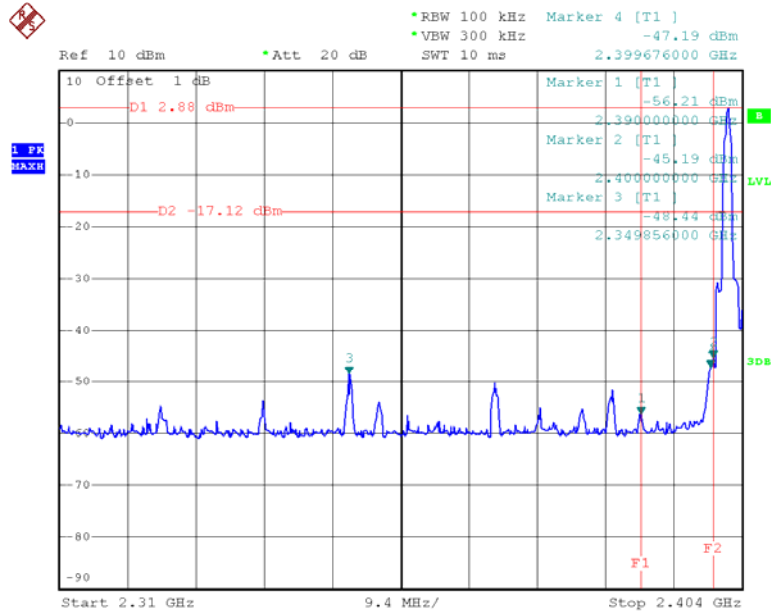
Temperature:	26 °C
Relative Humidity:	48 %
ATM Pressure:	101kPa

**The testing was performed by Leon Chen on 2012-11-05.*

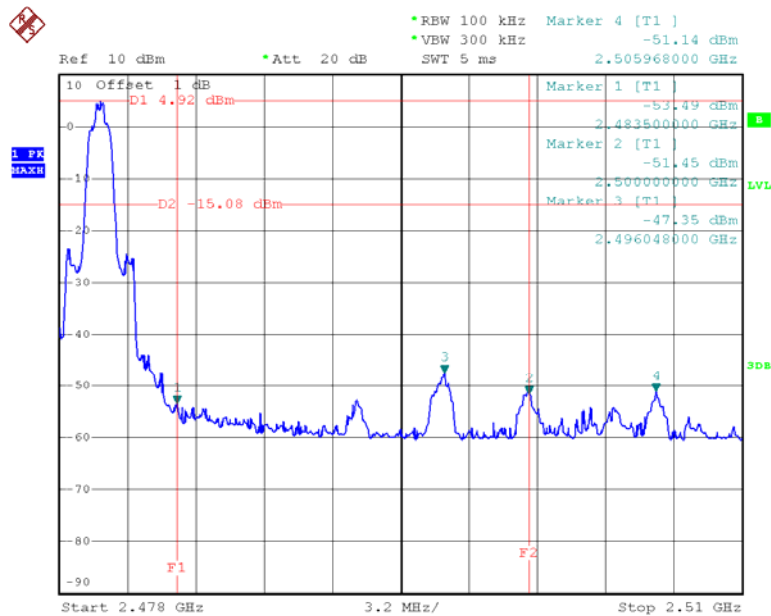
Band Edge, Left Side



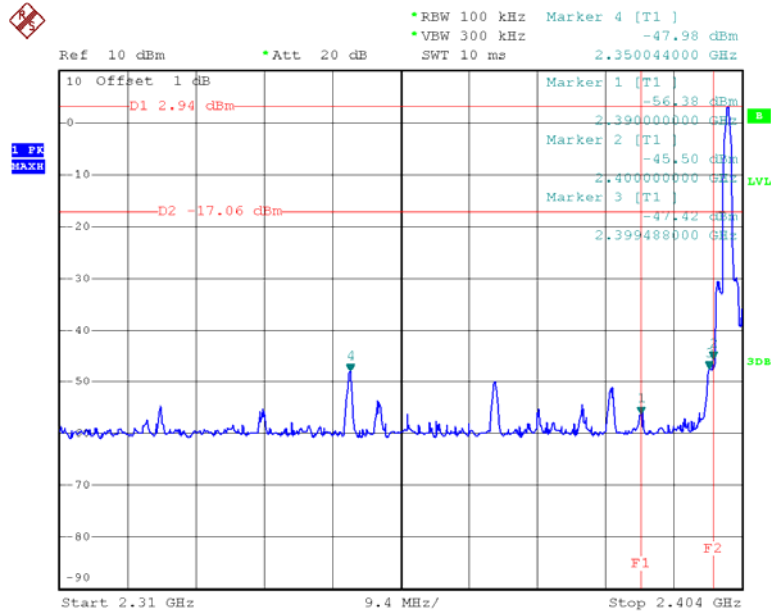
Date: 5.NOV.2012 09:42:04

EDR Mode ($\pi/4$ -DQPSK):**Band Edge, Left Side**

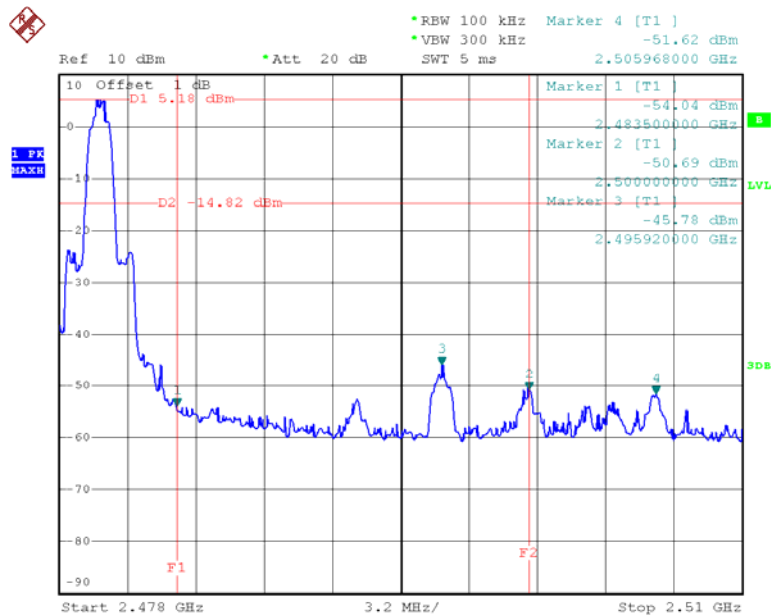
Date: 5.NOV.2012 10:25:30

Band Edge, Right Side

Date: 5.NOV.2012 10:08:45

EDR Mode (8DPSK):**Band Edge, Left Side**

Date: 5.NOV.2012 10:49:35

Band Edge, Right Side

Date: 5.NOV.2012 12:10:47

***** END OF REPORT *****