LABCODE: 500069-0

FCC PART 15.247

TEST REPORT

For

Roam Data Inc.

280 Summer St Boston, Massachusetts

FCC ID: 2ABY6-RP750X

Report Type:	Product Type:
Original Report	mPOS

Test Engineer:	Leon Chen
Report Number:	R2XM140224050-00B
Report Date:	2014-03-21
Reviewed By:	Ivan Cao RF Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Roam Data Inc.*'s product, model number: *RP750x (FCC ID: 2ABY6-RP750X) or* ("EUT") in this report is a *mPOS,* which was measured approximately: 5.6 cm (L) x 10.1 cm (W) x 2.2 cm (H), rated input voltage: DC 3.7 V from lithium battery.

All measurement and test data in this report was gathered from production sample serial number: 140224050 (Assigned by BACL, Dongguan). The EUT was received on 2014-02-26.

Objective

This report is prepared on behalf of *Roam Data Inc.*in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules

The tests were performed in order to determine the Bluetooth BDR and EDR mode 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 15C DXX submissions with FCC ID: *2ABY6-RP750X* for RF ID mode.
FCC Part 15C DTS submissions with FCC ID: *2ABY6-RP750X* for Bluetooth LE mode.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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).

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 Communications 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 C63.4-2003.

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.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).

The current scope of accreditations can be found at http://ts.nist.gov/standards/scopes/5000690.htm

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was entrence by the software provided by manufacturer. And the engineering mode was controlled by the Bluetooth Tester.

EUT Exercise Software

Test Software Version	EDR_RF_test_Customer_080812.exe		
Test Frequency	2402MHz	2441MHz	2480MHz
GFSK	3	3	3
π /4-DQPSK	3	3	3

Equipment Modifications

No modification was made to the EUT.

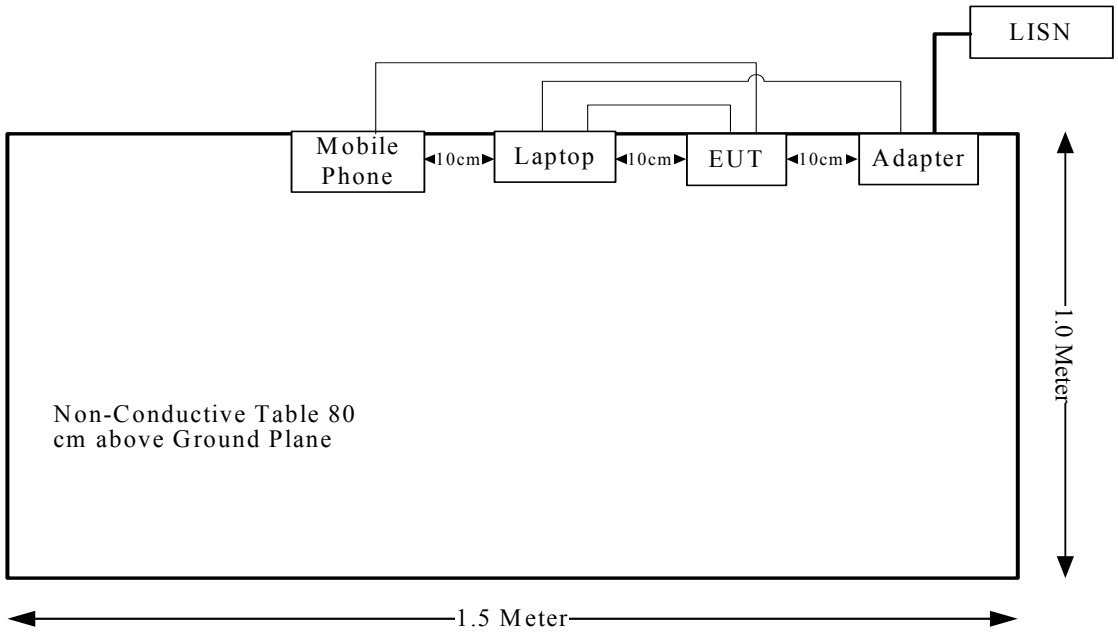
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
Nokia	Mobile phone	Lumia 520	N/A

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB line	No	No	0.5	EUT	Laptop
Audio line	No	No	0.8	EUT	Mobile phone

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	Compliace
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliace
§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

FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to§15.247(i) and §1.1310, 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 KDB447498 D01 General RF Exposure Guidance v05r02:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

The maximum conducted output power= 0.33 dBm=1.08mW at 2402MHz
[(max. power of channel, mW)/(min. test separation distance, mm)] · [√f(GHz)]
= 1.08/5*(√2.402) = 0.33 < 3.0

So the stand-alone 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 antenna for bluetooth, which the maximum gain is 0 dBi, please, refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

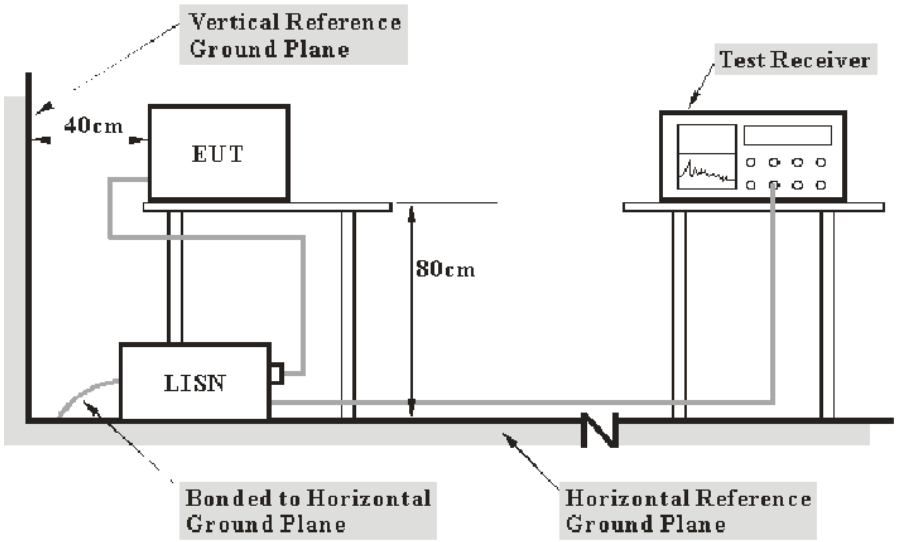
If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$

Herein,
V_C: corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN or ISN

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2013-11-20	2014-11-19
R&S	Two-line V-network	ENV216	3560.6550.12	2014-01-22	2015-01-21
R&S	L.I.S.N	ESH3-Z5	100113	N/A	N/A
BACL	Test Software	BACL-EMC	V1.0-2010	N/A	N/A

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

11.07 dB at **0.150 MHz** in the **Neutral** conducted mode

Test Data

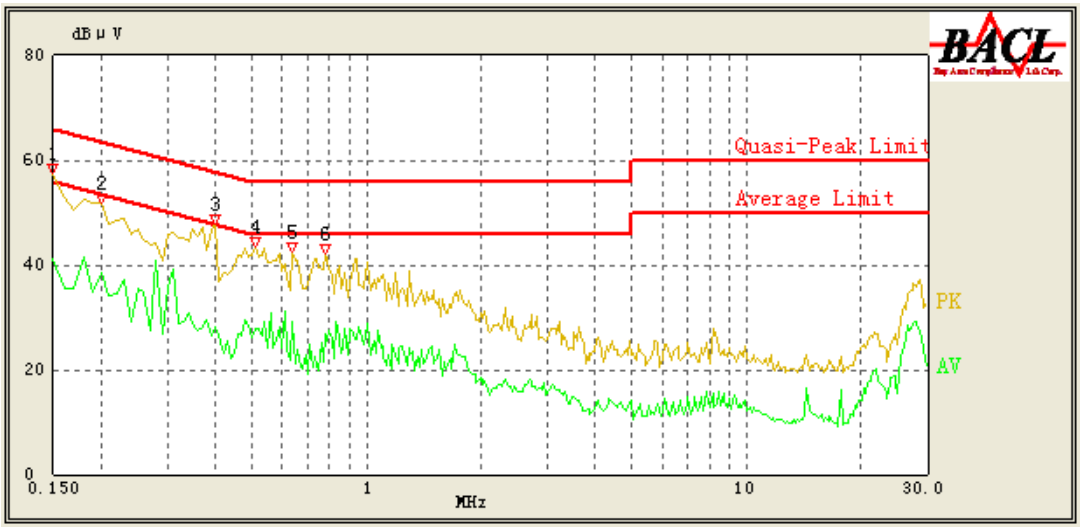
Environmental Conditions

Temperature:	20.9 °C
Relative Humidity:	56 %
ATM Pressure:	101.2 kPa

The testing was performed by Leon Chen on 2014-03-07.

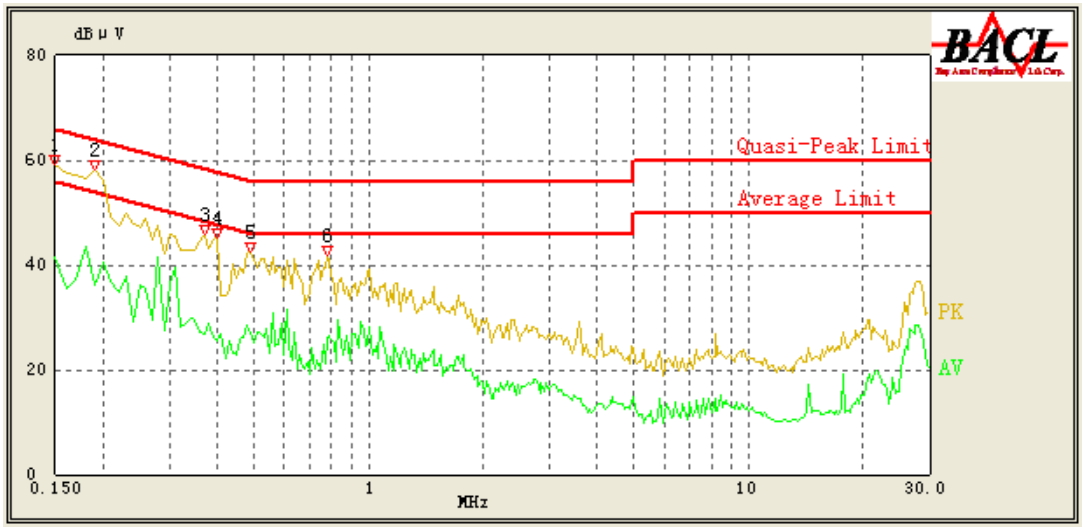
Test Mode: Transmitting

120 V, 60 Hz, Line:



Frequency (MHz)	Cord. Reading (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/AV/QP)
0.150	52.67	9.51	66.00	13.33	QP
0.150	41.04	9.51	56.00	14.96	AV
0.200	48.42	10.20	63.61	15.19	QP
0.200	38.60	10.20	53.61	15.01	AV
0.400	43.64	10.03	57.85	14.21	QP
0.400	28.09	10.03	47.85	19.76	AV
0.510	37.87	9.94	56.00	18.13	QP
0.510	27.78	9.94	46.00	18.22	AV
0.640	38.10	9.86	56.00	17.90	QP
0.640	29.29	9.86	46.00	16.71	AV
0.780	35.79	9.79	56.00	20.21	QP
0.780	26.97	9.79	46.00	19.03	AV

120 V, 60 Hz, Neutral:



Frequency (MHz)	Cord. Reading (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/AV/QP)
0.150	54.93	9.71	66.00	11.07	QP
0.150	41.61	9.71	56.00	14.39	AV
0.190	52.67	10.58	64.04	11.37	QP
0.190	36.22	10.58	54.04	17.82	AV
0.370	42.43	10.32	58.50	16.07	QP
0.370	26.89	10.32	48.50	21.61	AV
0.400	42.85	10.23	57.85	15.00	QP
0.400	25.66	10.23	47.85	22.19	AV
0.490	37.60	9.98	56.17	18.57	QP
0.490	27.28	9.98	46.17	18.89	AV
0.780	33.81	9.82	56.00	22.19	QP
0.780	26.28	9.82	46.00	19.72	AV

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

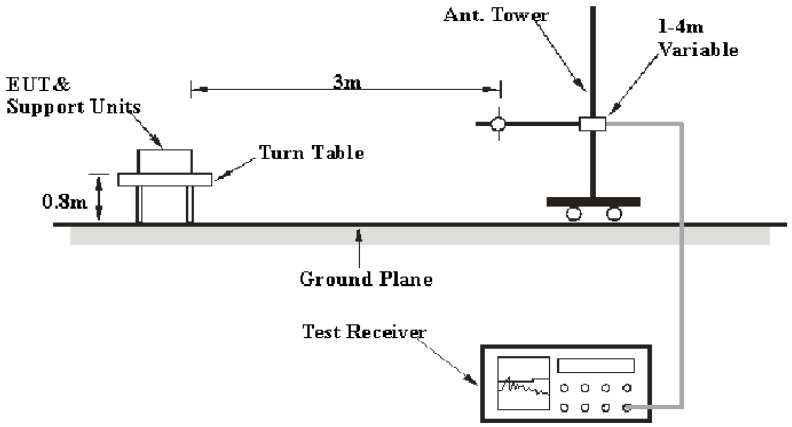
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 5.0 dB
200M~1GHz: 6.2 dB
1G~6GHz: 4.45 dB
6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

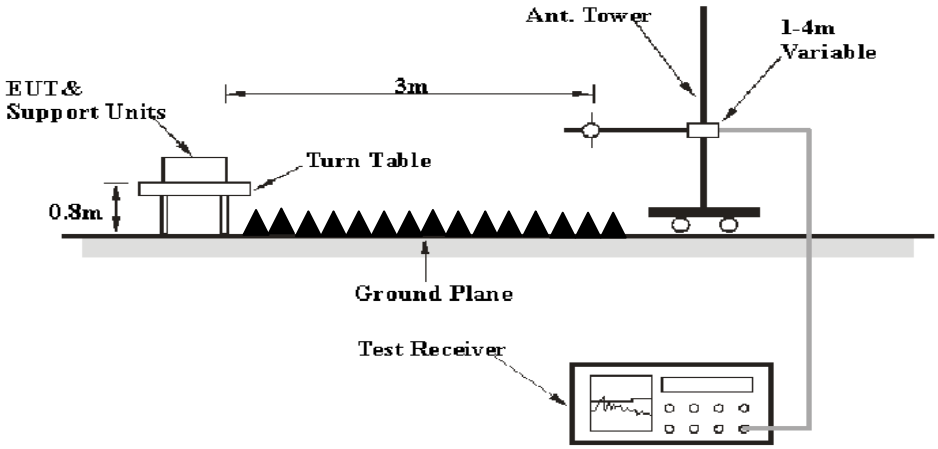
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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 C63.4-2003. 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.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source

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:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

During the radiated emissions, the EUT was connected to the 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
R&S	EMI Test Receiver	ESCI	100224	2013-05-06	2014-05-05
Sunol Sciences	Antenna	JB3	A060611-1	2011-09-06	2014-09-05
HP	Amplifier	8447E	2434A02181	2013-09-06	2014-09-05
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-05
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-18
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2013-06-16	2014-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2013-09-06	2014-09-05

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – 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:

16.44 dB at **9920 MHz** in the **Vertical** polarization in EDR Mode (π/4-DQPSK)

Test Data

Environmental Conditions

Temperature:	20.1~22.1 °C
Relative Humidity:	68~69 %
ATM Pressure:	101.2 kPa

The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.

Mode: Transmitting
BDR Mode (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	86.30	PK	H	25.65	4.42	27.32	89.05	N/A	N/A
2402	39.34	AV	H	25.65	4.42	27.32	42.09	N/A	N/A
2402	86.39	PK	V	25.65	4.42	27.32	89.14	N/A	N/A
2402	40.24	AV	V	25.65	4.42	27.32	42.99	N/A	N/A
2390	32.72	PK	V	25.61	4.39	27.32	35.40	74.00	38.60
2390	19.50	AV	V	25.61	4.39	27.32	22.18	54.00	31.82
4804	36.86	PK	V	30.59	5.98	27.41	46.02	74.00	27.98
4804	20.74	AV	V	30.59	5.98	27.41	29.90	54.00	24.10
7206	31.26	PK	V	34.09	7.45	25.91	46.89	74.00	27.11
7206	18.11	AV	V	34.09	7.45	25.91	33.74	54.00	20.26
9608	31.47	PK	V	35.96	8.80	27.55	48.68	74.00	25.32
9608	18.25	AV	V	35.96	8.80	27.55	35.46	54.00	18.54
3338.24	30.55	PK	V	28.28	5.47	27.25	37.05	74.00	36.95
3338.24	18.06	AV	V	28.28	5.47	27.25	24.56	54.00	29.44
406.32	28.73	QP	V	16.38	2.45	21.79	25.77	46.00	20.23
Middle Channel: 2441(MHz)									
2441	85.83	PK	H	25.75	4.40	27.34	88.64	N/A	N/A
2441	40.26	AV	H	25.75	4.40	27.34	43.07	N/A	N/A
2441	86.50	PK	V	25.75	4.40	27.34	89.31	N/A	N/A
2441	40.07	AV	V	25.75	4.40	27.34	42.88	N/A	N/A
4882	40.71	PK	V	30.79	6.08	27.42	50.16	74.00	23.84
4882	23.66	AV	V	30.79	6.08	27.42	33.11	54.00	20.89
7323	30.22	PK	V	34.38	7.51	25.88	46.23	74.00	27.77
7323	18.17	AV	V	34.38	7.51	25.88	34.18	54.00	19.82
9764	31.59	PK	V	36.33	8.83	27.20	49.55	74.00	24.45
9764	18.64	AV	V	36.33	8.83	27.20	36.60	54.00	17.40
1720.58	30.15	PK	V	24.04	3.51	27.64	30.06	74.00	43.94
1720.58	18.27	AV	V	24.04	3.51	27.64	18.18	54.00	35.82
3338.24	30.85	PK	V	28.28	5.47	27.25	37.35	74.00	36.65
3338.24	18.13	AV	V	28.28	5.47	27.25	24.63	54.00	29.37
406.32	27.80	QP	V	16.38	2.45	21.79	24.84	46.00	21.16
High Channel: 2480(MHz)									
2480	85.16	PK	H	25.85	4.48	27.36	88.13	N/A	N/A
2480	39.62	AV	H	25.85	4.48	27.36	42.59	N/A	N/A
2480	86.27	PK	V	25.85	4.48	27.36	89.24	N/A	N/A
2480	39.63	AV	V	25.85	4.48	27.36	42.60	N/A	N/A
2483.5	46.41	PK	V	25.86	4.49	27.36	49.40	74.00	24.60
2483.5	26.36	AV	V	25.86	4.49	27.36	29.35	54.00	24.65
4960	36.89	PK	V	31.00	5.90	27.43	46.36	74.00	27.64
4960	20.54	AV	V	31.00	5.90	27.43	30.01	54.00	23.99
7440	30.04	PK	V	34.66	7.58	25.97	46.31	74.00	27.69
7440	18.12	AV	V	34.66	7.58	25.97	34.39	54.00	19.61
9920	30.51	PK	V	36.71	8.87	26.66	49.43	74.00	24.57
9920	18.20	AV	V	36.71	8.87	26.66	37.12	54.00	16.88
3338.24	30.57	PK	V	28.28	5.47	27.25	37.07	74.00	36.93
3338.24	18.23	AV	V	28.28	5.47	27.25	24.73	54.00	29.27
406.32	28.08	QP	V	16.38	2.45	21.79	25.12	46.00	20.88

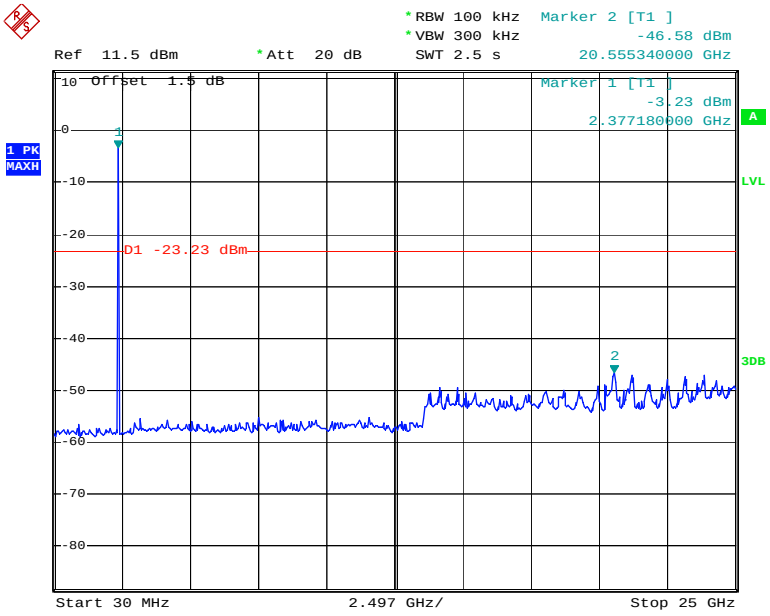
EDR Mode (π/4-DQPSK):

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	87.01	PK	H	25.65	4.42	27.32	89.76	N/A	N/A
2402	40.22	AV	H	25.65	4.42	27.32	42.97	N/A	N/A
2402	87.21	PK	V	25.65	4.42	27.32	89.96	N/A	N/A
2402	41.43	AV	V	25.65	4.42	27.32	44.18	N/A	N/A
2390	33.29	PK	V	25.61	4.39	27.32	35.97	74.00	38.03
2390	19.89	AV	V	25.61	4.39	27.32	22.57	54.00	31.43
4804	37.36	PK	V	30.59	5.98	27.41	46.52	74.00	27.48
4804	20.95	AV	V	30.59	5.98	27.41	30.11	54.00	23.89
7206	31.56	PK	V	34.09	7.45	25.91	47.19	74.00	26.81
7206	18.79	AV	V	34.09	7.45	25.91	34.42	54.00	19.58
9608	32.05	PK	V	35.96	8.80	27.55	49.26	74.00	24.74
9608	18.62	AV	V	35.96	8.80	27.55	35.83	54.00	18.17
3338.24	30.95	PK	V	28.28	5.47	27.25	37.45	74.00	36.55
3338.24	18.41	AV	V	28.28	5.47	27.25	24.91	54.00	29.09
406.32	28.57	QP	V	16.38	2.45	21.79	25.61	46.00	20.39
Middle Channel: 2441(MHz)									
2441	86.38	PK	H	25.75	4.40	27.34	89.19	N/A	N/A
2441	40.68	AV	H	25.75	4.40	27.34	43.49	N/A	N/A
2441	87.21	PK	V	25.75	4.40	27.34	90.02	N/A	N/A
2441	40.65	AV	V	25.75	4.40	27.34	43.46	N/A	N/A
4882	41.29	PK	V	30.79	6.08	27.42	50.74	74.00	23.26
4882	24.15	AV	V	30.79	6.08	27.42	33.60	54.00	20.40
7323	30.47	PK	V	34.38	7.51	25.88	46.48	74.00	27.52
7323	18.49	AV	V	34.38	7.51	25.88	34.50	54.00	19.50
9764	31.93	PK	V	36.33	8.83	27.20	49.89	74.00	24.11
9764	19.12	AV	V	36.33	8.83	27.20	37.08	54.00	16.92
1720.58	30.62	PK	V	24.04	3.51	27.64	30.53	74.00	43.47
1720.58	18.78	AV	V	24.04	3.51	27.64	18.69	54.00	35.31
3338.24	31.16	PK	V	28.28	5.47	27.25	37.66	74.00	36.34
3338.24	18.81	AV	V	28.28	5.47	27.25	25.31	54.00	28.69
406.32	28.32	QP	V	16.38	2.45	21.79	25.36	46.00	20.64
High Channel: 2480(MHz)									
2480	85.79	PK	H	25.85	4.48	27.36	88.76	N/A	N/A
2480	40.14	AV	H	25.85	4.48	27.36	43.11	N/A	N/A
2480	87.13	PK	V	25.85	4.48	27.36	90.10	N/A	N/A
2480	40.32	AV	V	25.85	4.48	27.36	43.29	N/A	N/A
2483.5	46.92	PK	V	25.86	4.49	27.36	49.91	74.00	24.09
2483.5	26.82	AV	V	25.86	4.49	27.36	29.81	54.00	24.19
4960	37.28	PK	V	31.00	5.90	27.43	46.75	74.00	27.25
4960	20.86	AV	V	31.00	5.90	27.43	30.33	54.00	23.67
7440	30.73	PK	V	34.66	7.58	25.97	47.00	74.00	27.00
7440	18.61	AV	V	34.66	7.58	25.97	34.88	54.00	19.12
9920	31.10	PK	V	36.71	8.87	26.66	50.02	74.00	23.98
9920	18.64	AV	V	36.71	8.87	26.66	37.56	54.00	16.44
3338.24	30.90	PK	V	28.28	5.47	27.25	37.40	74.00	36.60
3338.24	18.68	AV	V	28.28	5.47	27.25	25.18	54.00	28.82
406.32	28.22	QP	V	16.38	2.45	21.79	25.26	46.00	20.74

Conducted Spurious Emissions at Antenna Port

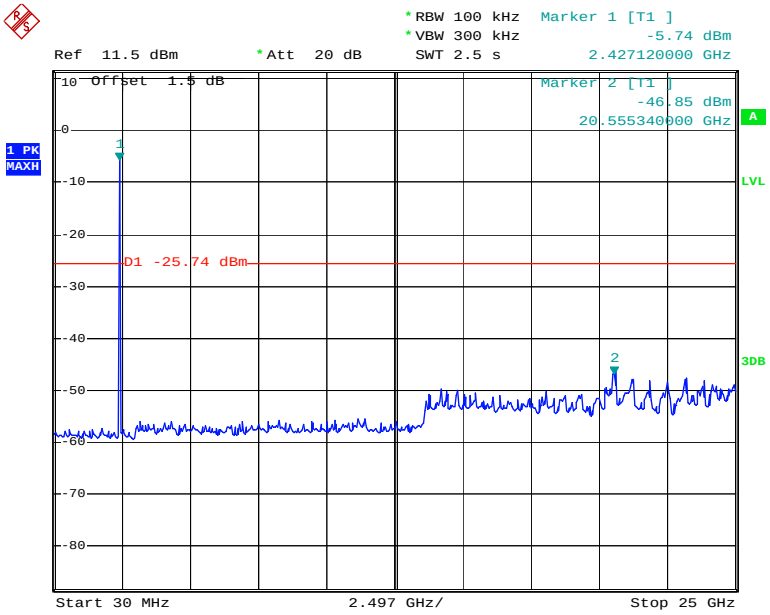
BDR Mode (GFSK):

Low Channel



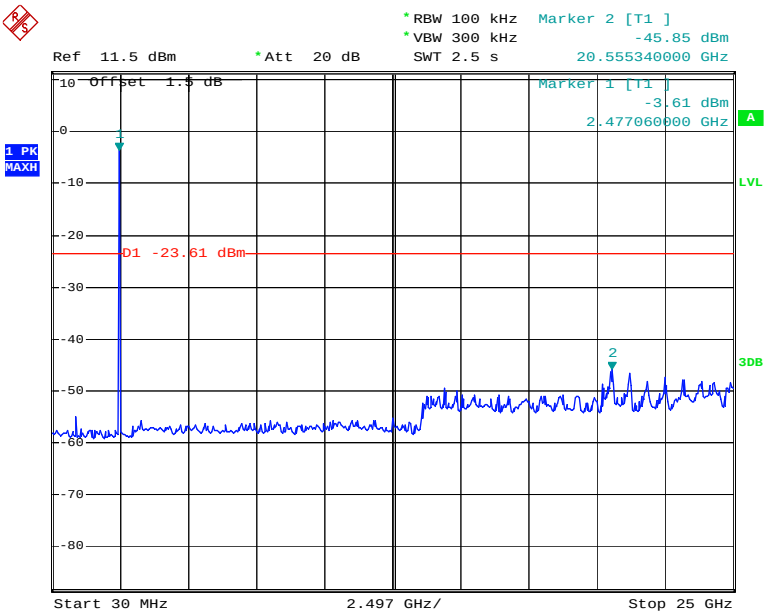
Date: 6.MAR.2014 14:41:02

Middle Channel



Date: 6.MAR.2014 14:39:25

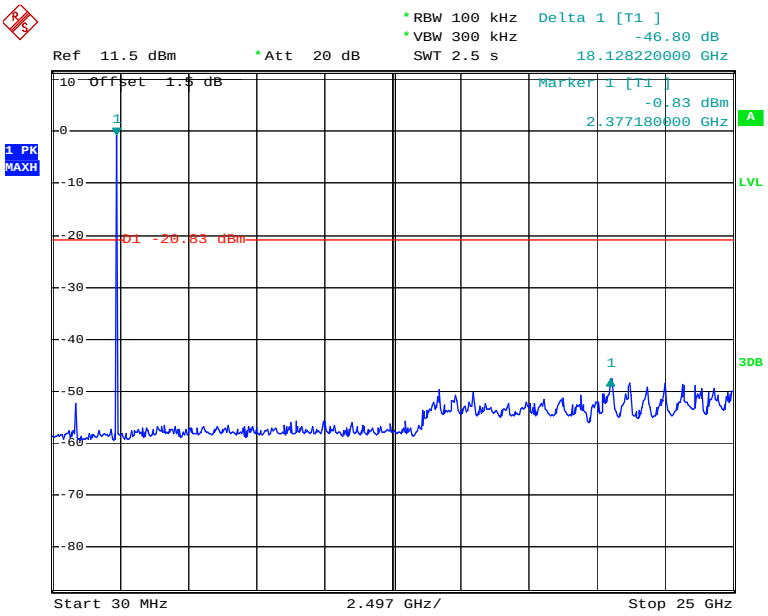
High Channel



Date: 6.MAR.2014 14:37:12

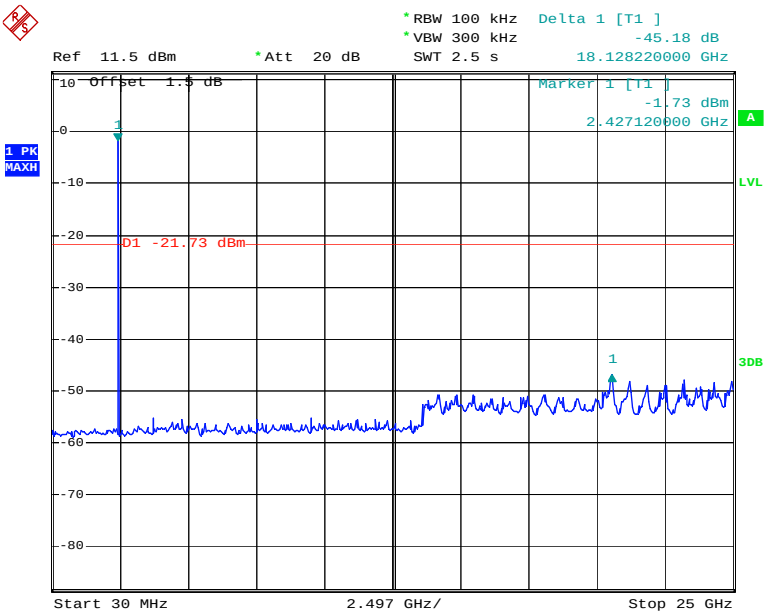
EDR Mode (π/4-DQPSK):

Low Channel



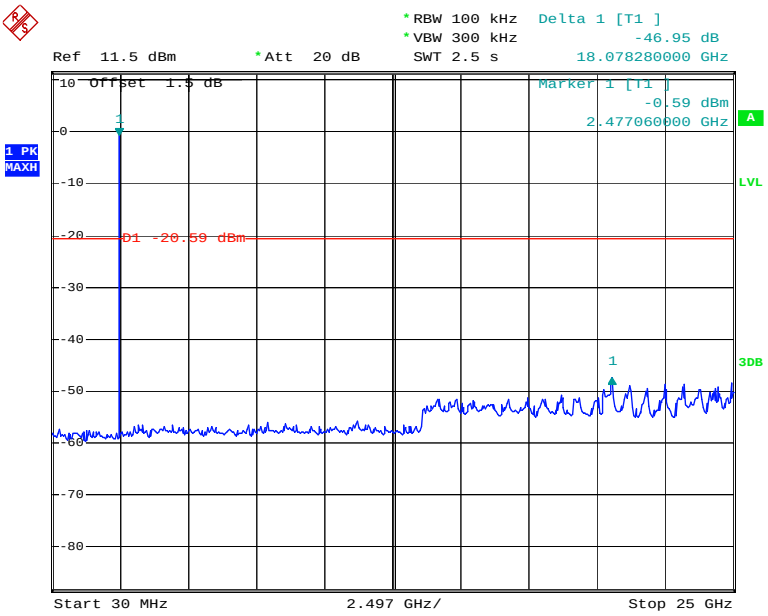
Date: 7.MAR.2014 12:14:13

Middle Channel



Date: 7.MAR.2014 12:27:13

High Channel



Date: 7.MAR.2014 12:20:53

FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping 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
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 10/30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another truce
3. Measure the channel separation.

Test Data

Environmental Conditions

Temperature:	19.7~23.5 °C
Relative Humidity:	43~53 %
ATM Pressure:	101.2 kPa

** The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.*

Test Result: Compliance.

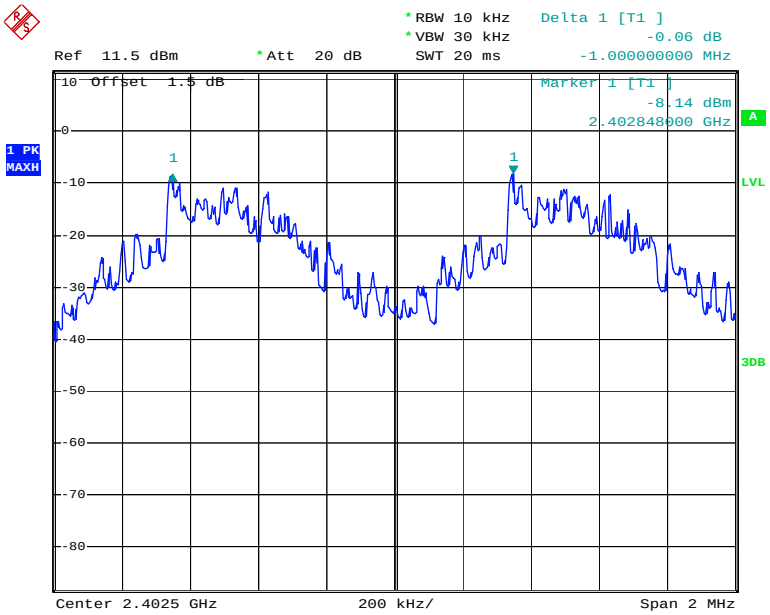
Please refer to following tables and plots

Test Mode: Transmitting

Test Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
BDR Mode (GFSK)	Low	2402	1.000	0.557	Pass
	Adjacent	2403			
	Middle	2441	1.000	0.557	Pass
	Adjacent	2440			
	High	2480	1.004	0.557	Pass
	Adjacent	2479			
EDR Mode (π/4-DQPSK)	Low	2402	1.004	0.840	Pass
	Adjacent	2403			
	Middle	2441	1.008	0.840	Pass
	Adjacent	2440			
	High	2480	1.000	0.840	Pass
	Adjacent	2479			

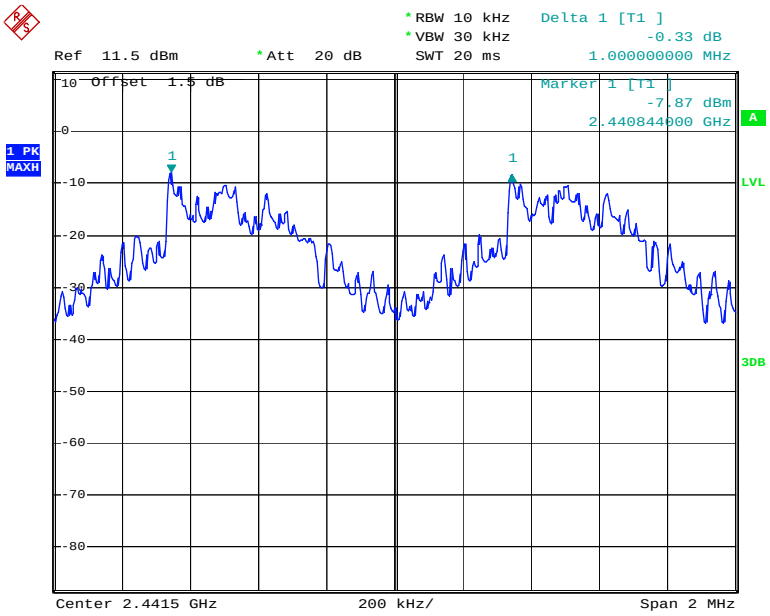
BDR Mode (GFSK):

Low Channel



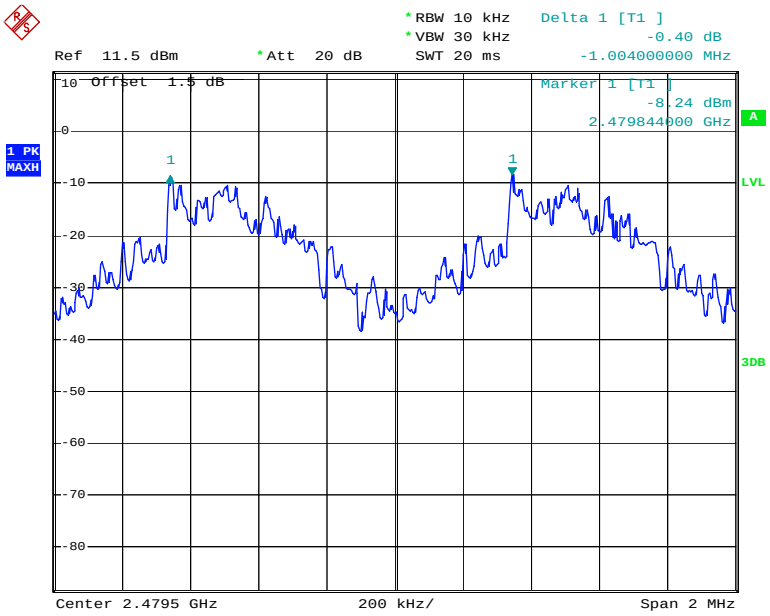
Date: 6.MAR.2014 14:16:45

Middle Channel



Date: 6.MAR.2014 14:18:57

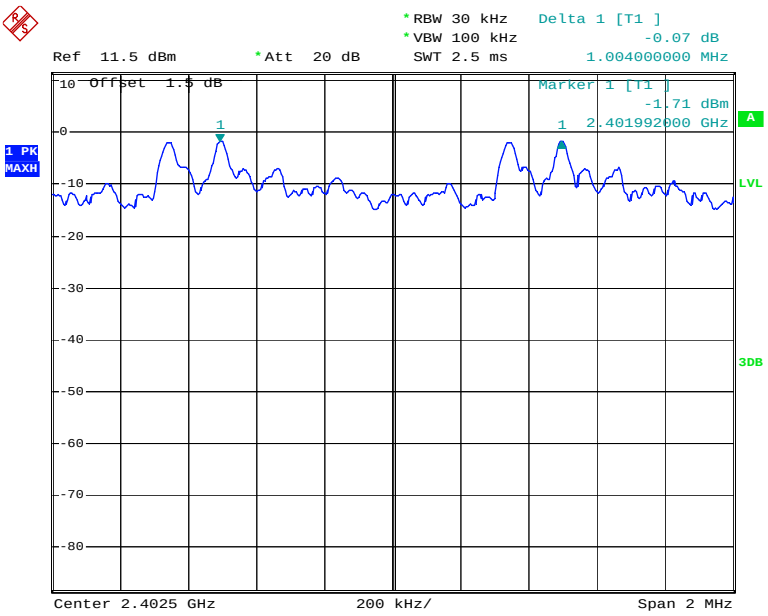
High Channel



Date: 6.MAR.2014 14:21:19

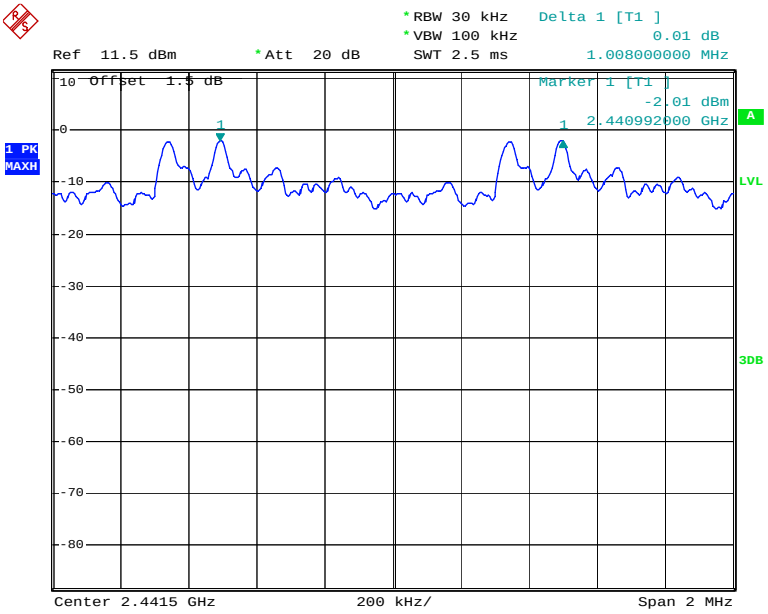
EDR Mode (π/4-DQPSK):

Low Channel



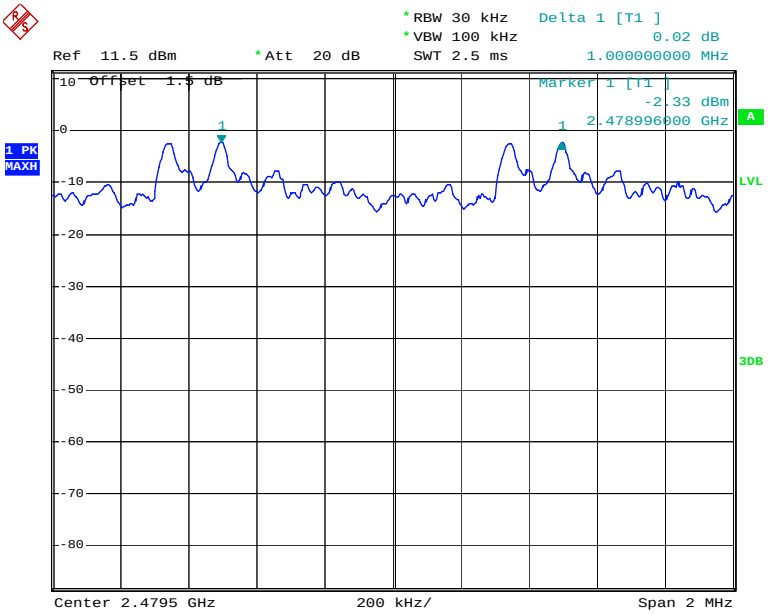
Date: 7.MAR.2014 12:17:47

Middle Channel



Date: 7.MAR.2014 12:18:25

High Channel



Date: 7.MAR.2014 12:18:58

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
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	19.7~23.5 °C
Relative Humidity:	43~53 %
ATM Pressure:	101.2 kPa

** The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.*

Test Result: Compliance.

Please refer to following tables and plots

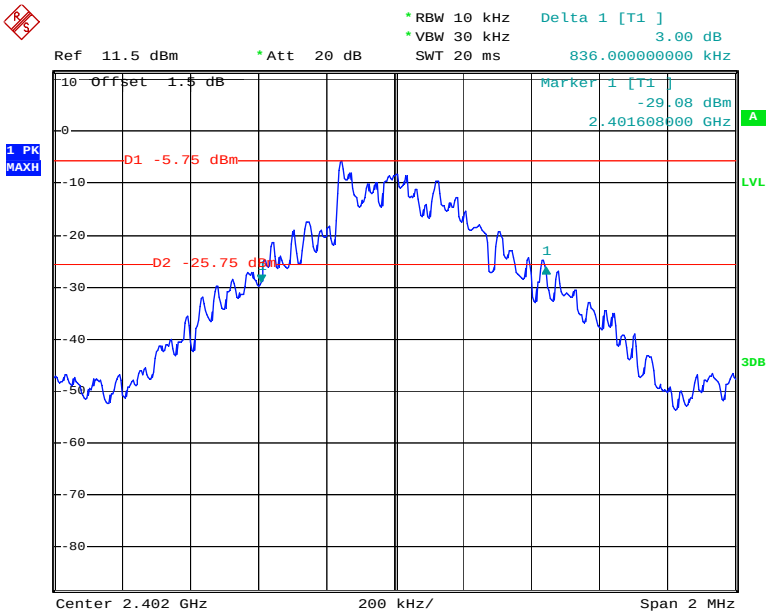
Test Mode: Transmitting

Test Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	0.836
	Middle	2441	0.832
	High	2480	0.836
EDR Mode (π/4-DQPSK)	Low	2402	1.252
	Middle	2441	1.260
	High	2480	1.252

Please refer to the following plots.

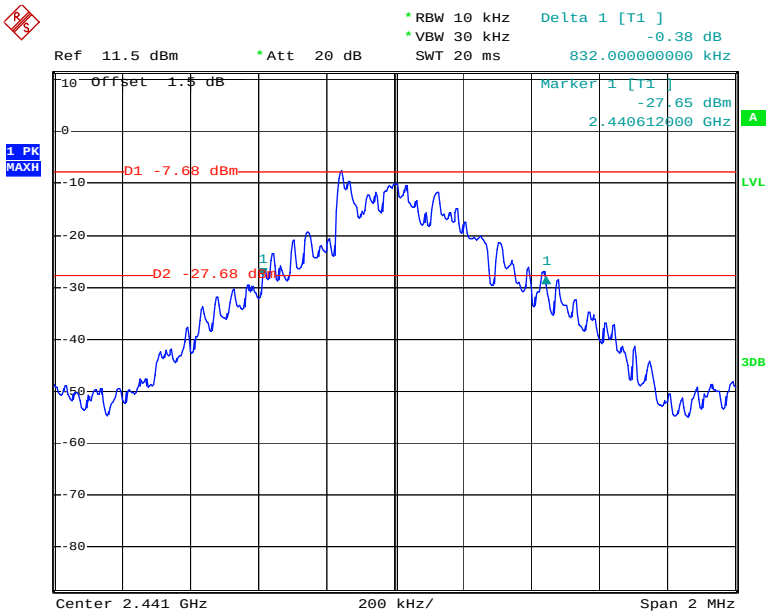
BDR Mode (GFSK):

Low Channel



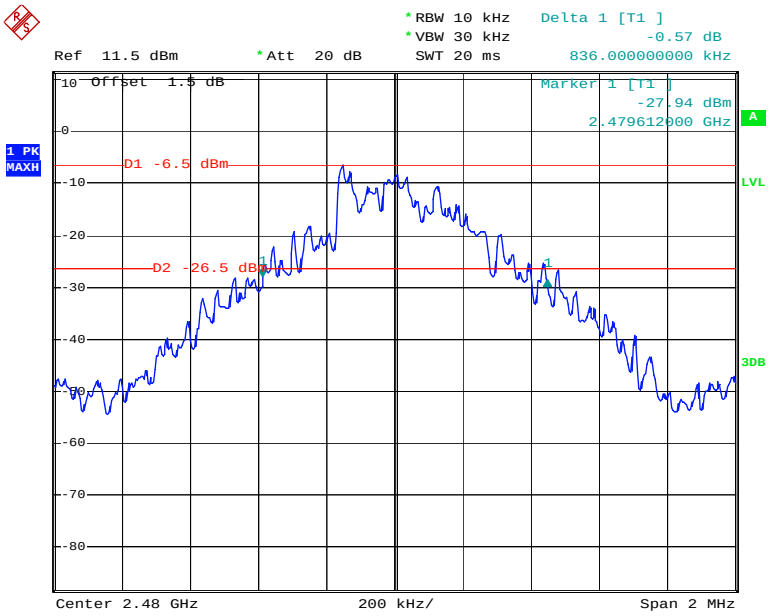
Date: 6.MAR.2014 13:54:40

Middle Channel



Date: 6.MAR.2014 15:01:17

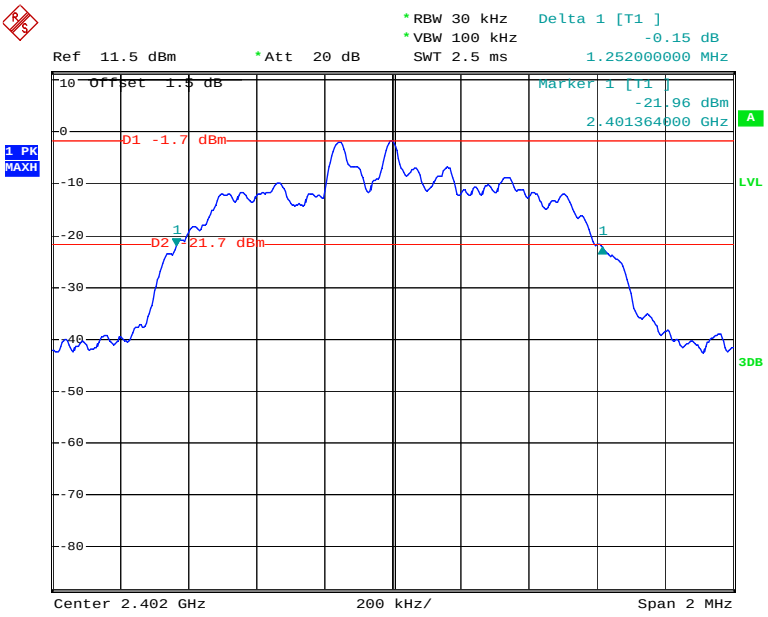
High Channel



Date: 6.MAR.2014 15:02:12

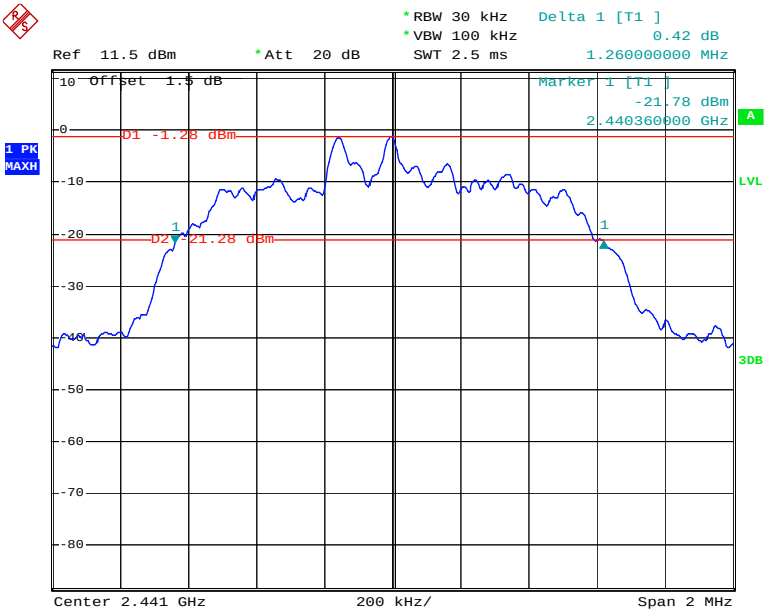
EDR Mode (π/4-DQPSK):

Low Channel



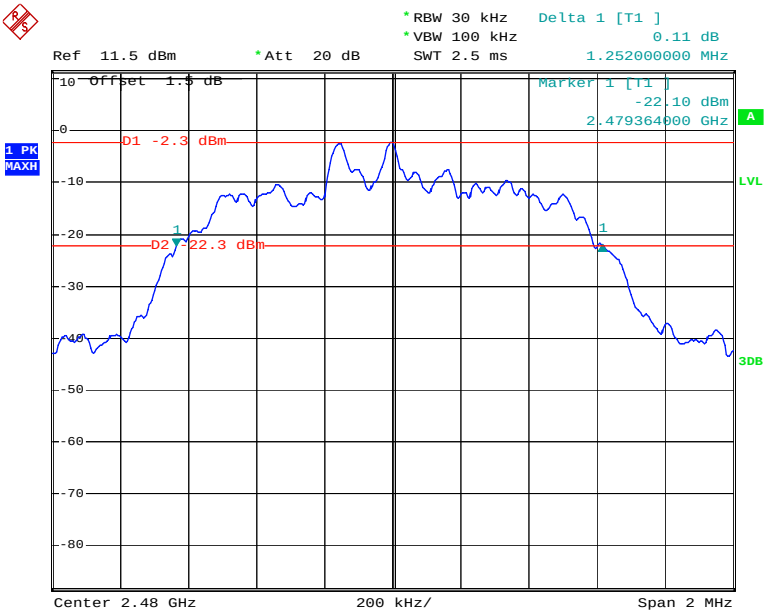
Date: 7.MAR.2014 12:12:49

Middle Channel



Date: 7.MAR.2014 12:25:03

High Channel



Date: 7.MAR.2014 12:19:51

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
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	19.7~23.5 °C
Relative Humidity:	43~53 %
ATM Pressure:	101.2 kPa

** The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.*

Test Result: Compliance.

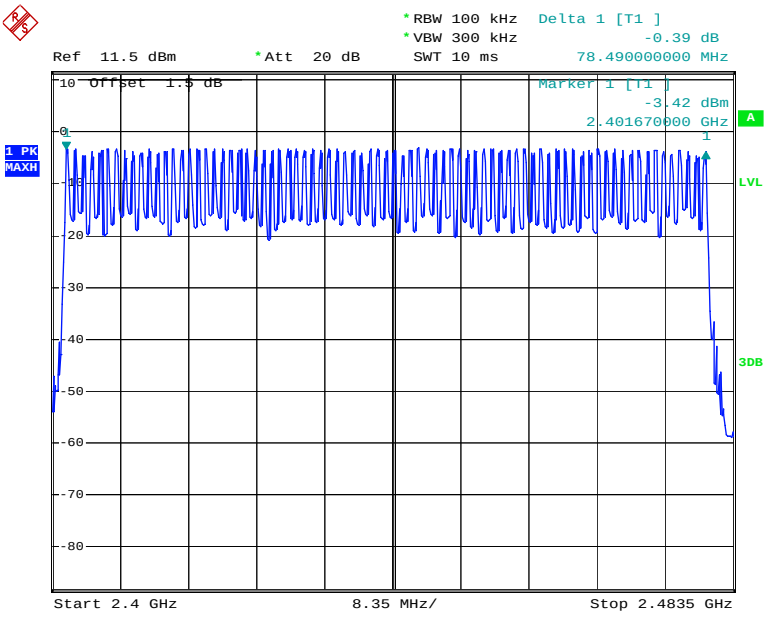
Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

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

Number of Hopping Channels

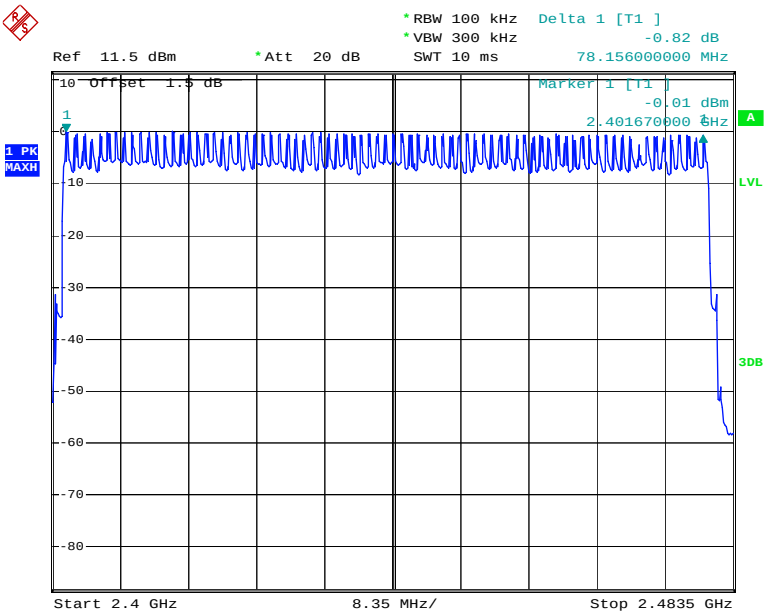


Date: 6.MAR.2014 14:23:41

EDR Mode (π/4-DQPSK):

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

Number of Hopping Channels



Date: 7.MAR.2014 12:30:06

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 * 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
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	19.7~23.5 °C
Relative Humidity:	43~53 %
ATM Pressure:	101.2 kPa

* *The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.*

Test Result: Compliance.

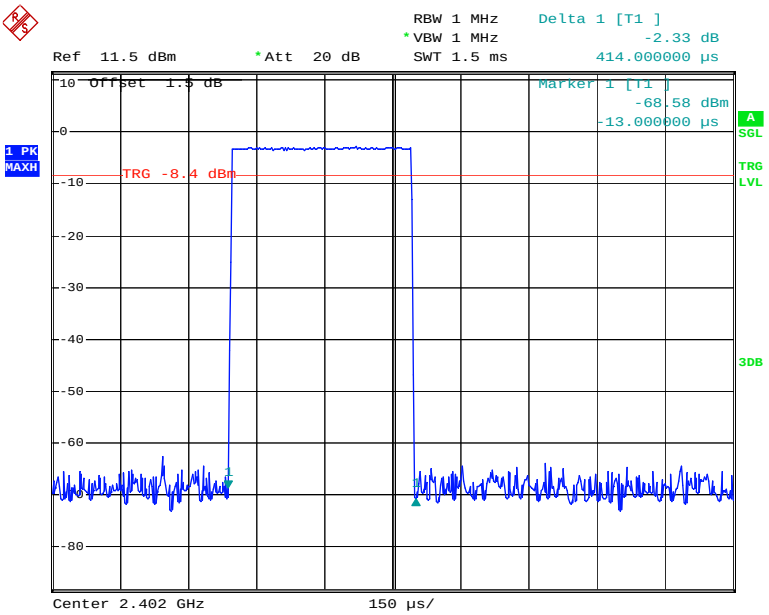
Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

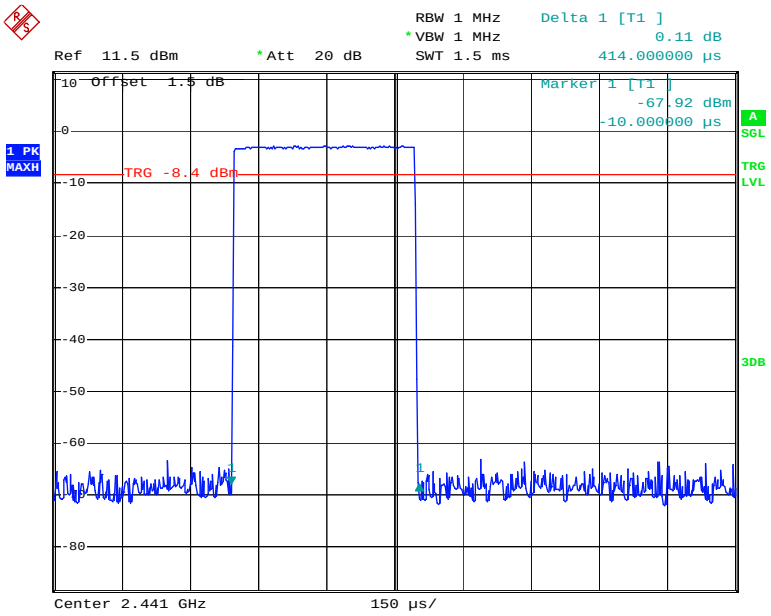
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.414	0.132	0.4	Pass
	Middle	0.414	0.132	0.4	Pass
	High	0.417	0.133	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.687	0.270	0.4	Pass
	Middle	1.687	0.270	0.4	Pass
	High	1.687	0.270	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	2.942	0.314	0.4	Pass
	Middle	2.952	0.315	0.4	Pass
	High	2.952	0.315	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel



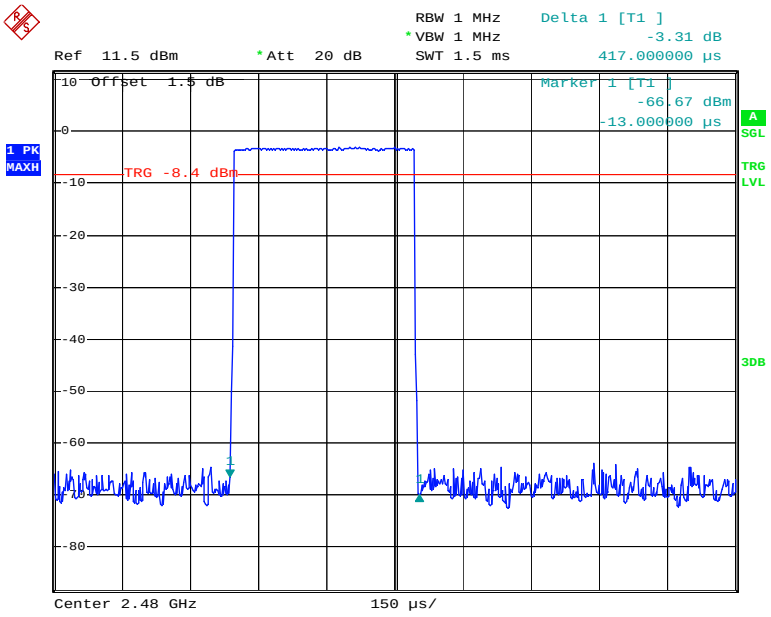
Date: 6.MAR.2014 14:11:49

DH1: Middle Channel



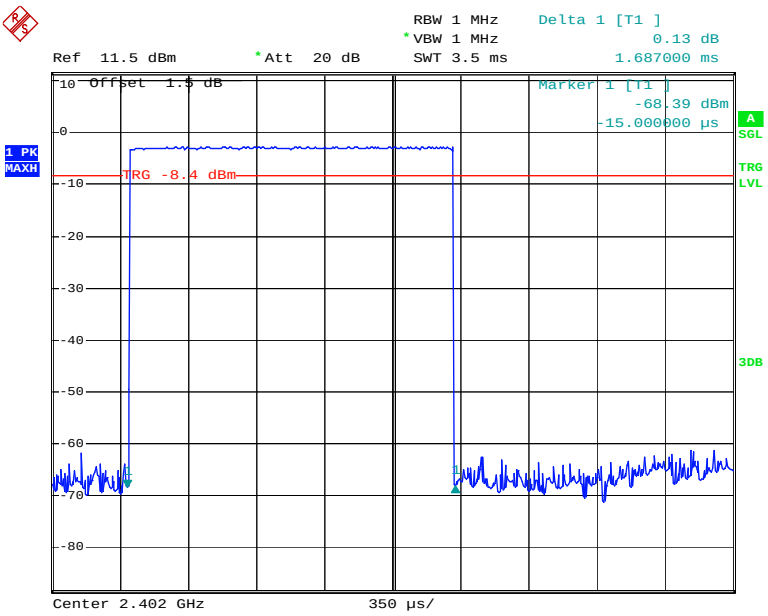
Date: 6.MAR.2014 14:14:19

DH1: High Channel



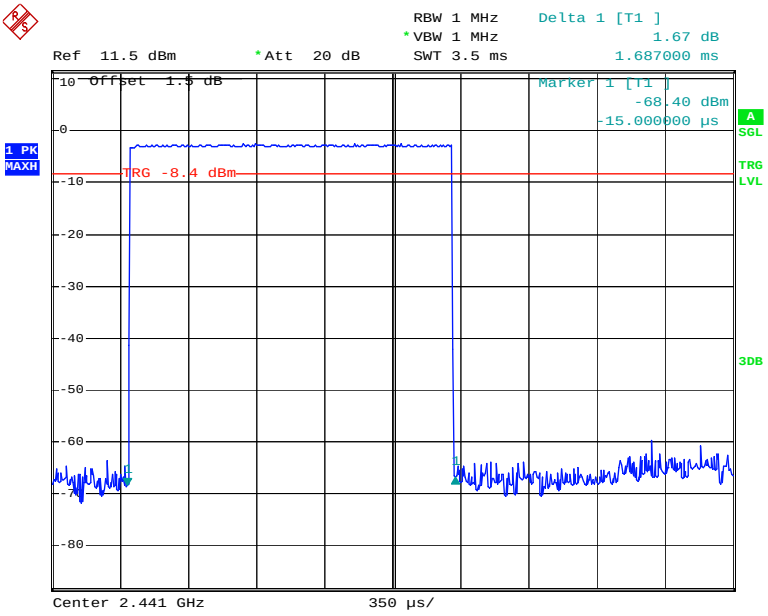
Date: 6.MAR.2014 14:14:40

DH3: Low Channel



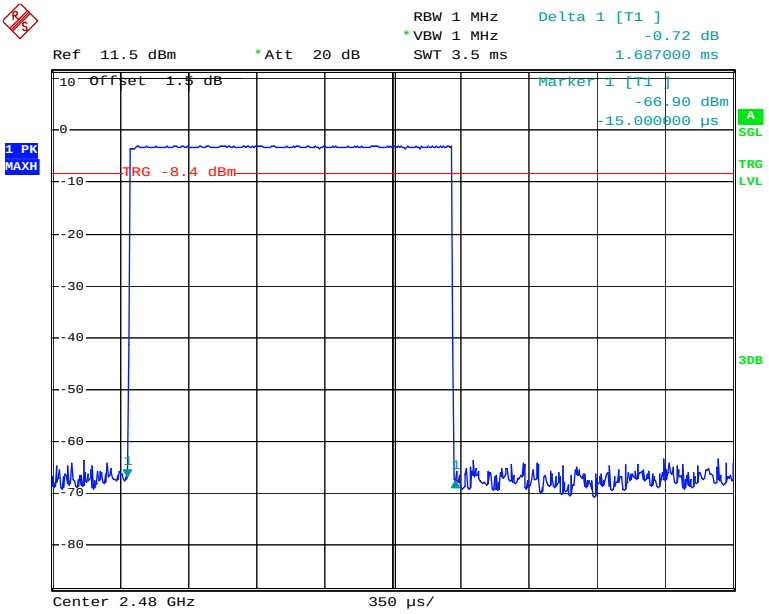
Date: 6.MAR.2014 15:04:00

DH3: Middle Channel



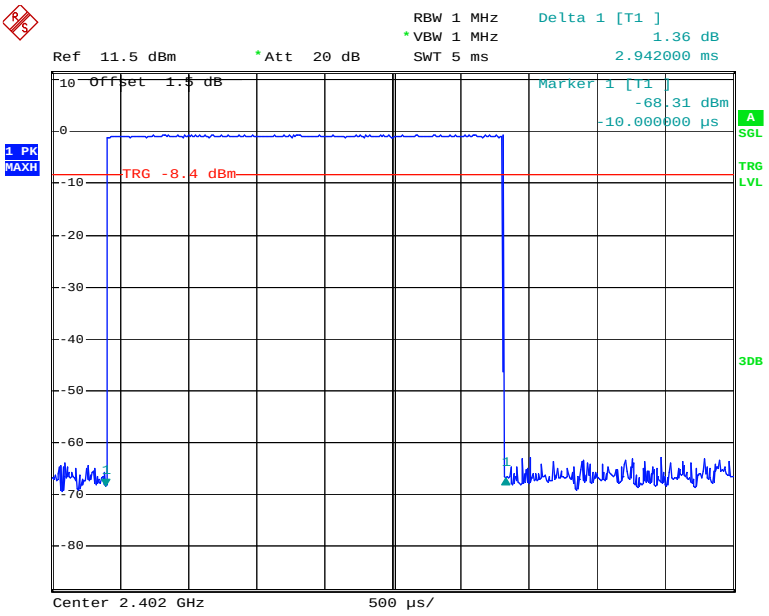
Date: 6.MAR.2014 15:03:49

DH3: High Channel



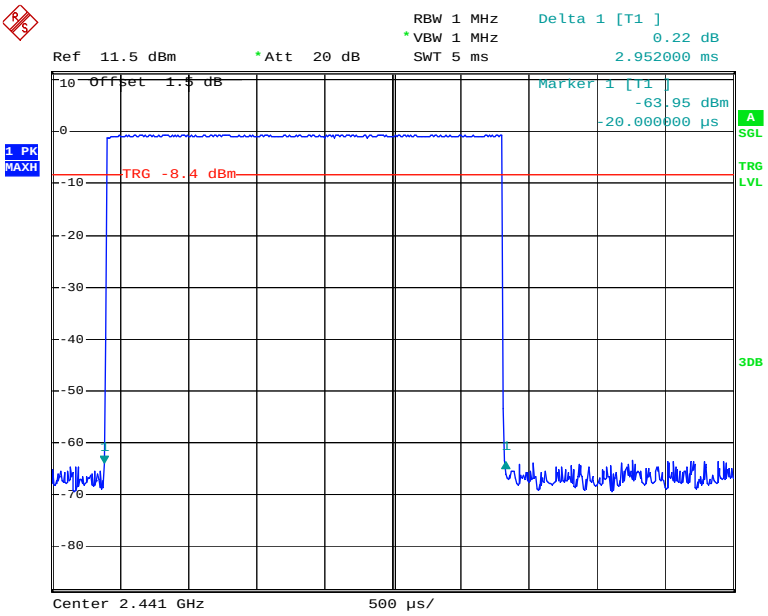
Date: 6.MAR.2014 15:03:37

DH5: Low Channel



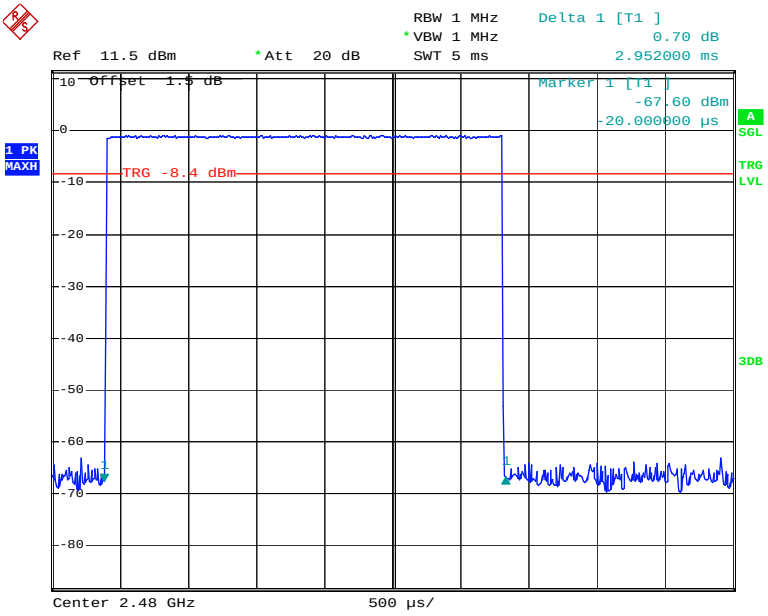
Date: 6.MAR.2014 15:05:09

DH5: Middle Channel



Date: 6.MAR.2014 15:05:21

DH5: High Channel

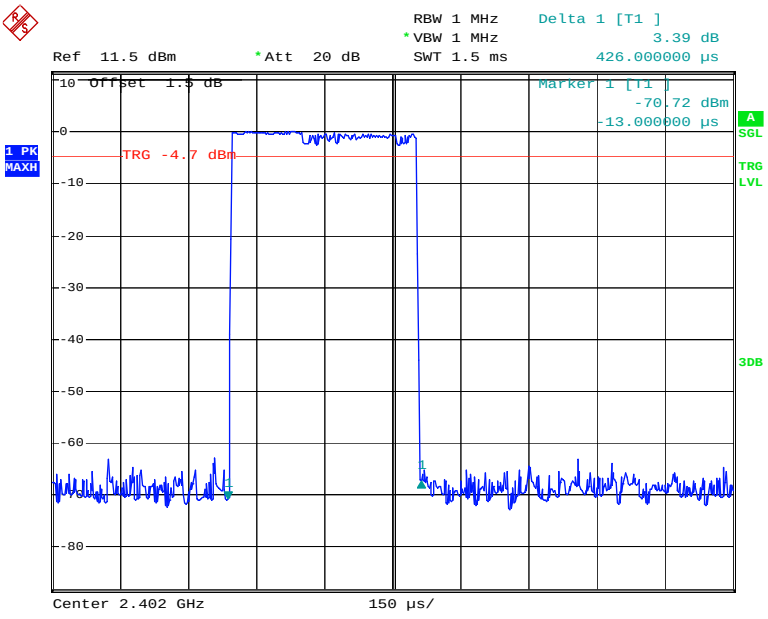


Date: 6.MAR.2014 15:05:35

EDR Mode (π/4-DQPSK):

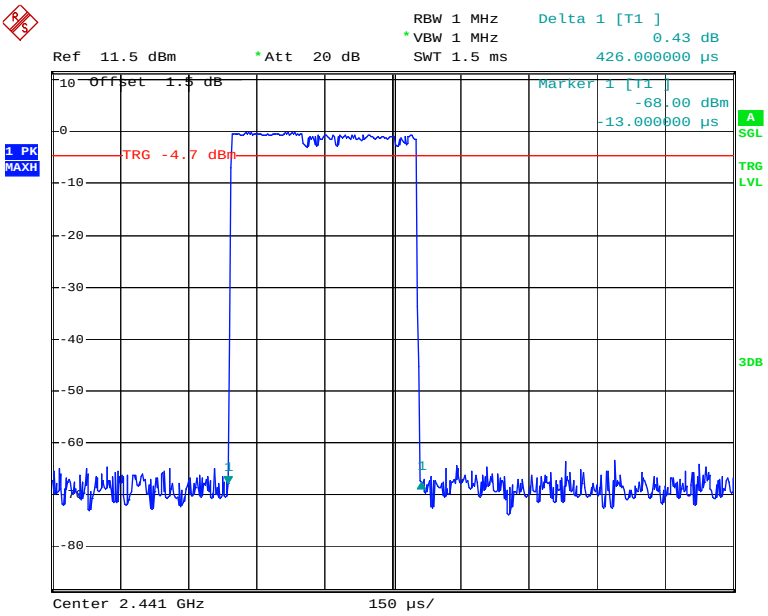
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.426	0.136	0.4	Pass
	Middle	0.426	0.136	0.4	Pass
	High	0.426	0.136	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.693	0.271	0.4	Pass
	Middle	1.693	0.271	0.4	Pass
	High	1.693	0.271	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	2.953	0.315	0.4	Pass
	Middle	2.953	0.315	0.4	Pass
	High	2.953	0.315	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel



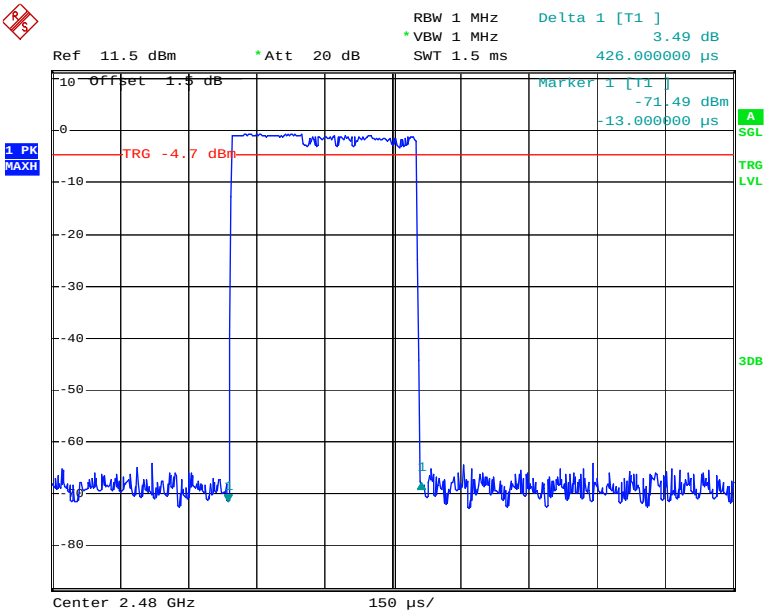
Date: 7.MAR.2014 12:31:28

DH1: Middle Channel



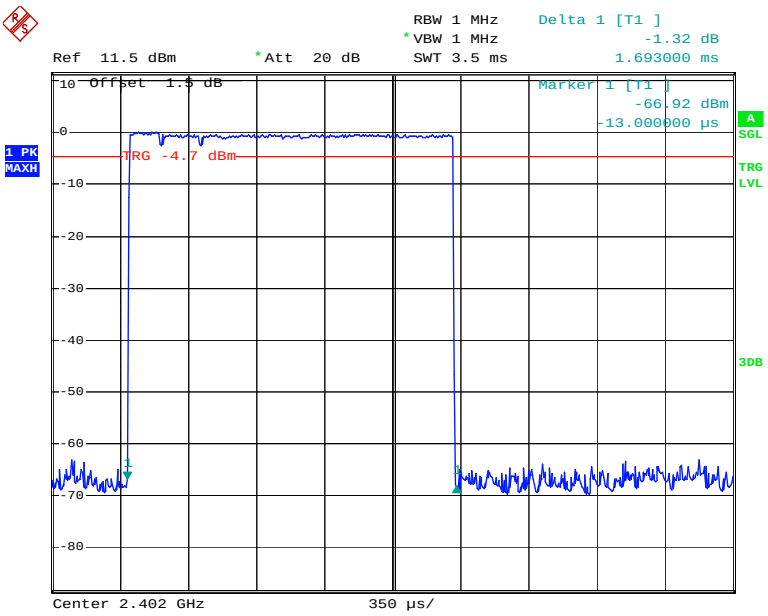
Date: 7.MAR.2014 12:31:35

DH1: High Channel



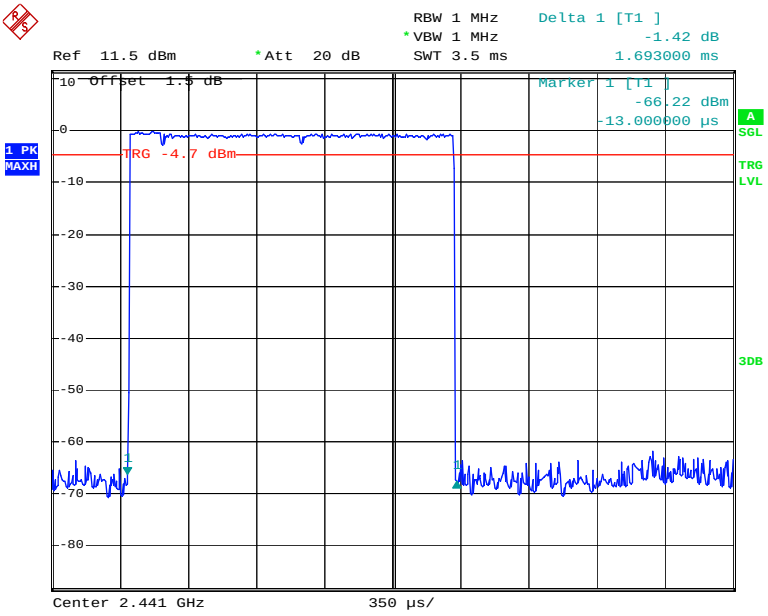
Date: 7.MAR.2014 12:31:40

DH3: Low Channel



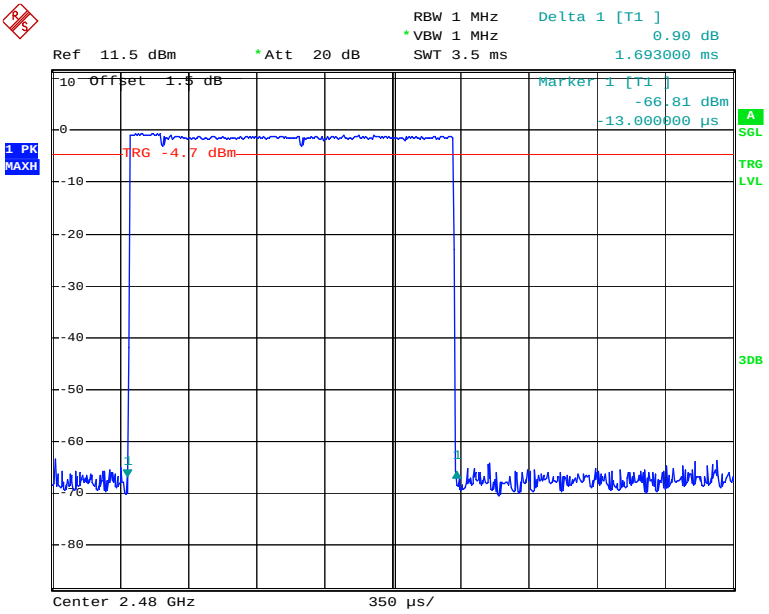
Date: 7.MAR.2014 12:32:37

DH3: Middle Channel



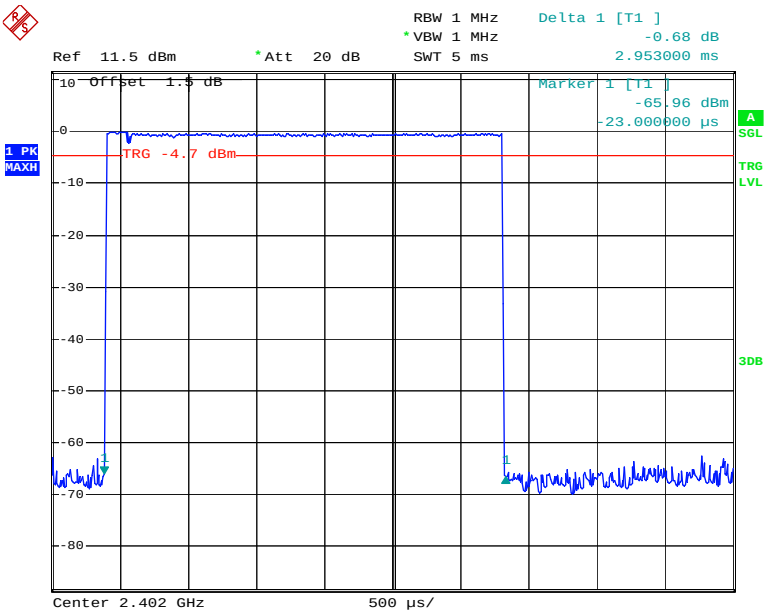
Date: 7.MAR.2014 12:32:32

DH3: High Channel



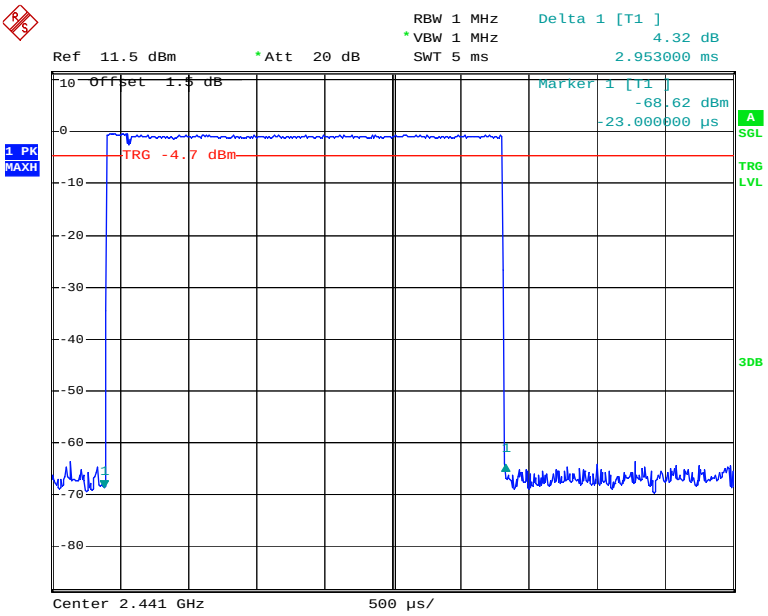
Date: 7.MAR.2014 12:32:20

DH5: Low Channel



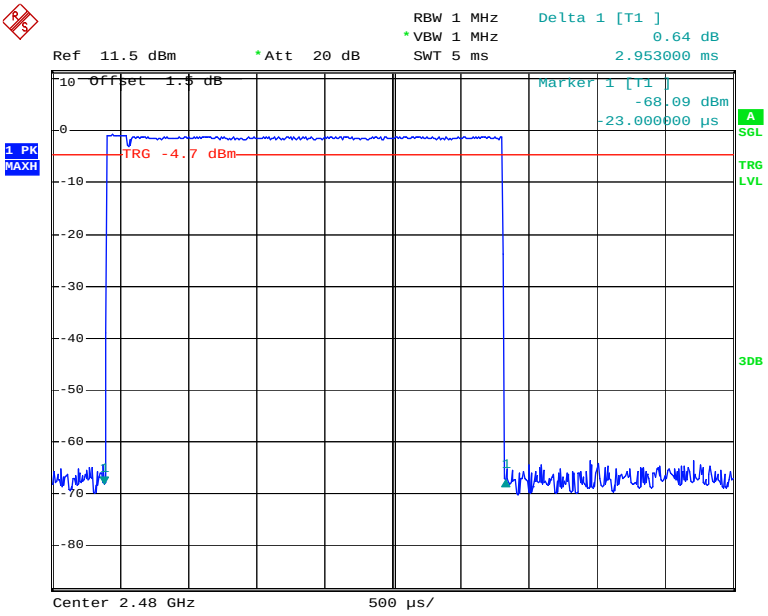
Date: 7.MAR.2014 12:33:15

DH5: Middle Channel



Date: 7.MAR.2014 12:33:20

DH5: High Channel



Date: 7.MAR.2014 12:33:25

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
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	19.7~23.5 °C
Relative Humidity:	43~53 %
ATM Pressure:	101.2 kPa

** The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.*

Test Result: Compliance.

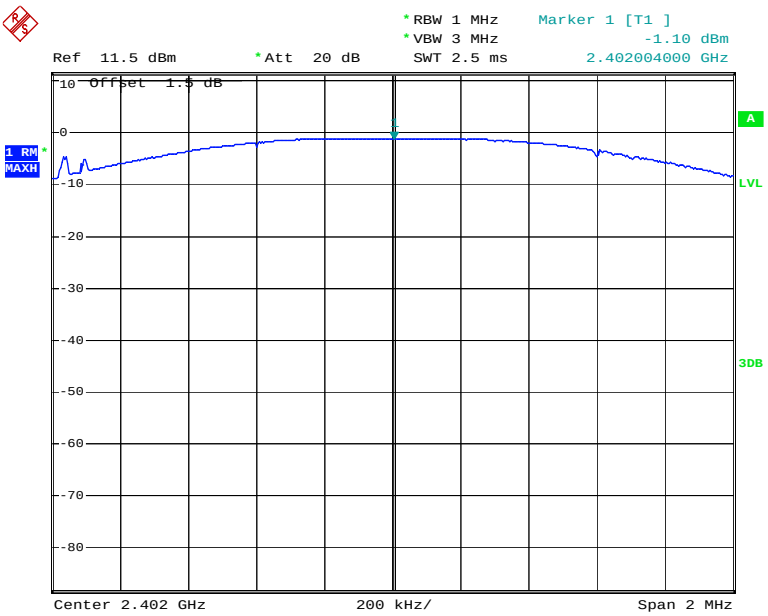
Test Mode: Transmitting

Test Mode	Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
BDR Mode (GFSK)	Low	2402	-1.10	30
	Middle	2441	-0.97	30
	High	2480	-1.32	30
EDR Mode (π/4-DQPSK)	Low	2402	0.33	30
	Middle	2441	0.05	30
	High	2480	-0.56	30

Note: The data above was tested in conducted mode.

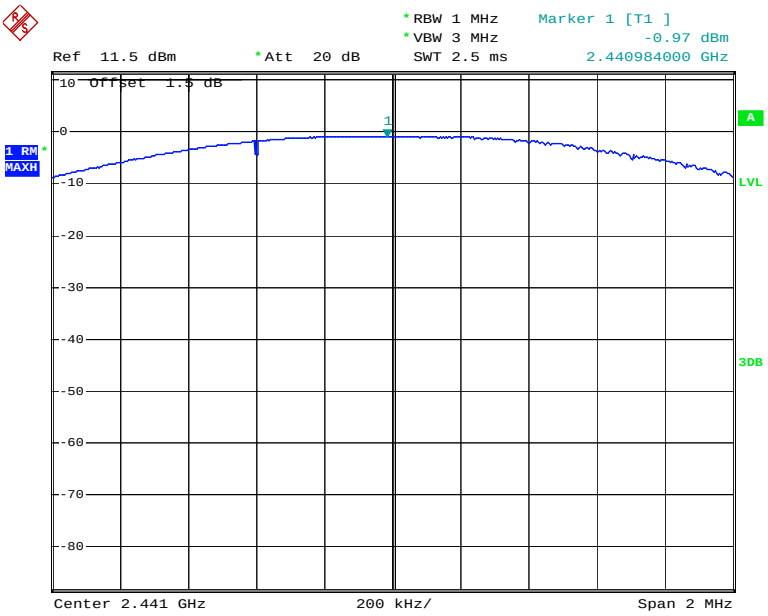
BDR Mode (GFSK):

Low Channel



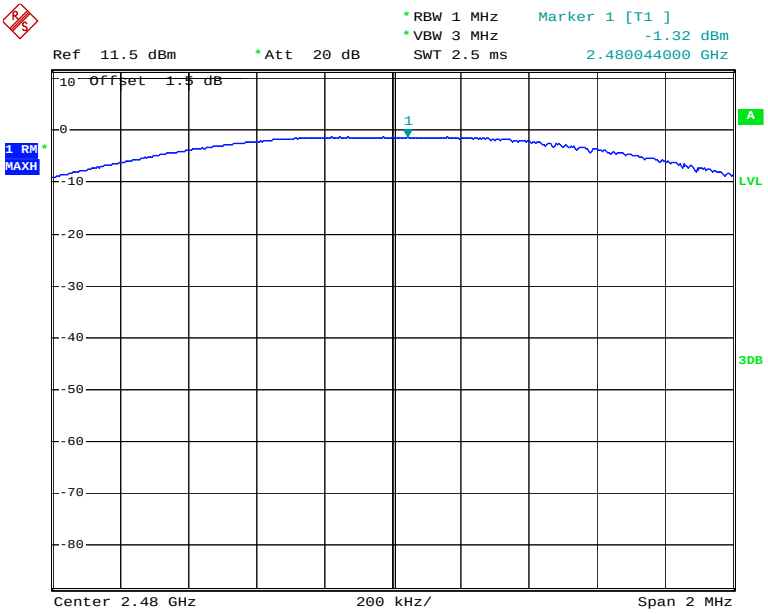
Date: 6.MAR.2014 13:56:48

Middle Channel



Date: 6.MAR.2014 14:33:22

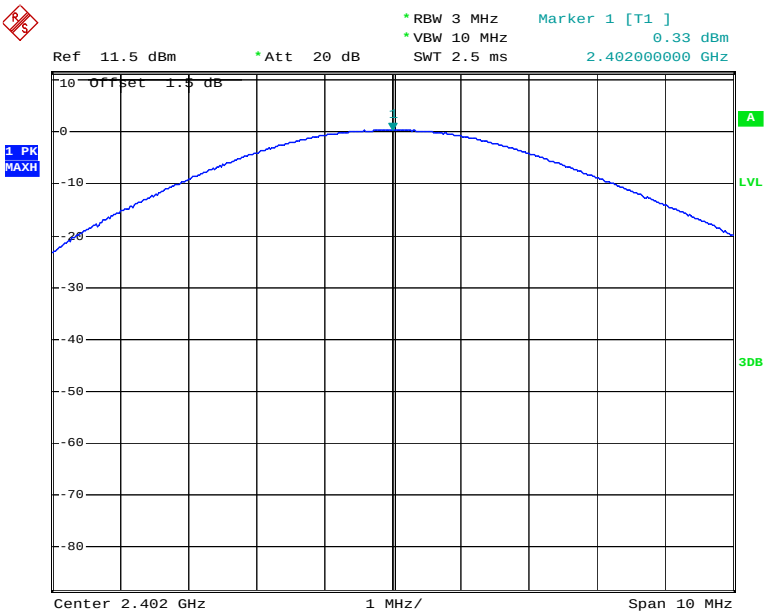
High Channel



Date: 6.MAR.2014 14:32:51

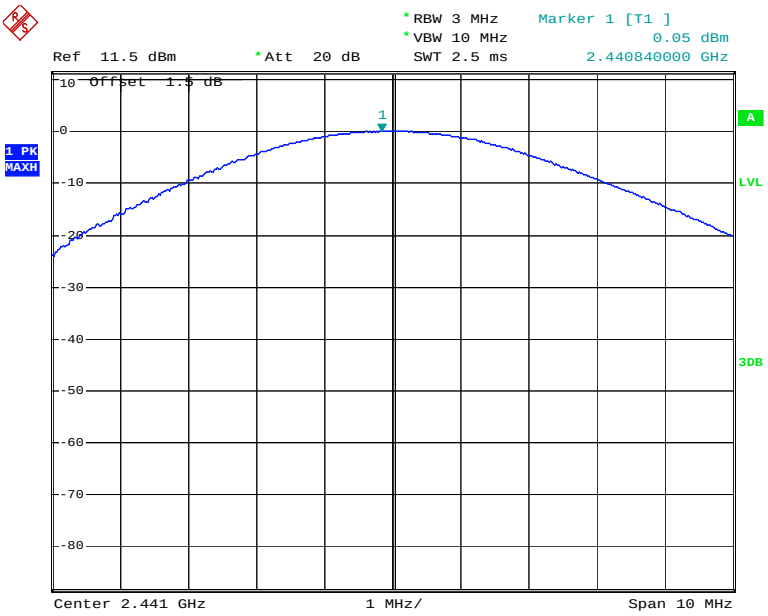
EDR Mode (π/4-DQPSK):

Low Channel



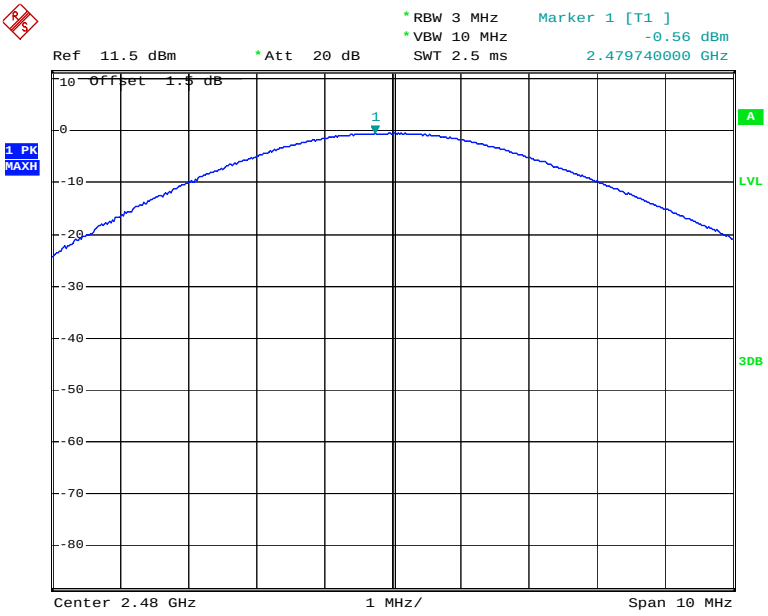
Date: 7.MAR.2014 12:58:11

Middle Channel



Date: 7.MAR.2014 12:58:24

High Channel



Date: 7.MAR.2014 12:58:35

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
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

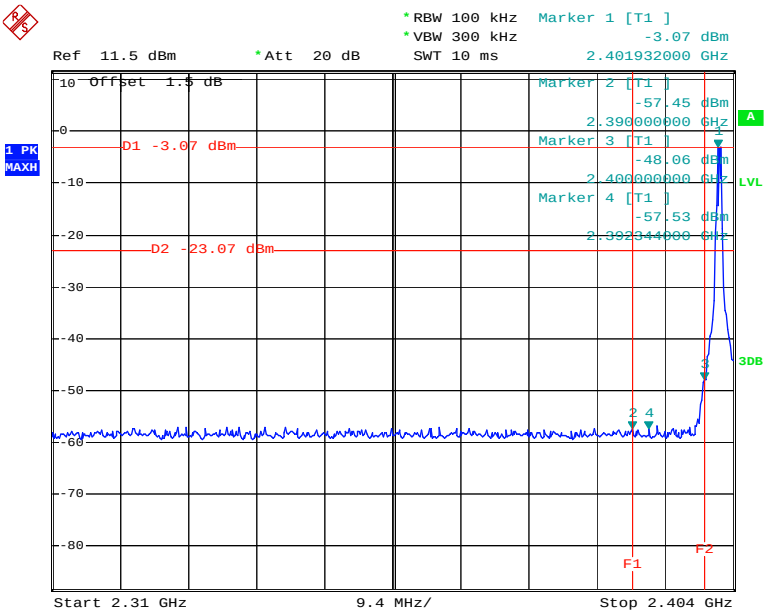
Temperature:	19.7~23.5 °C
Relative Humidity:	43~53 %
ATM Pressure:	101.2 kPa

** The testing was performed by Leon Chen from 2014-03-06 to 2014-03-07.*

Test Result: Compliance

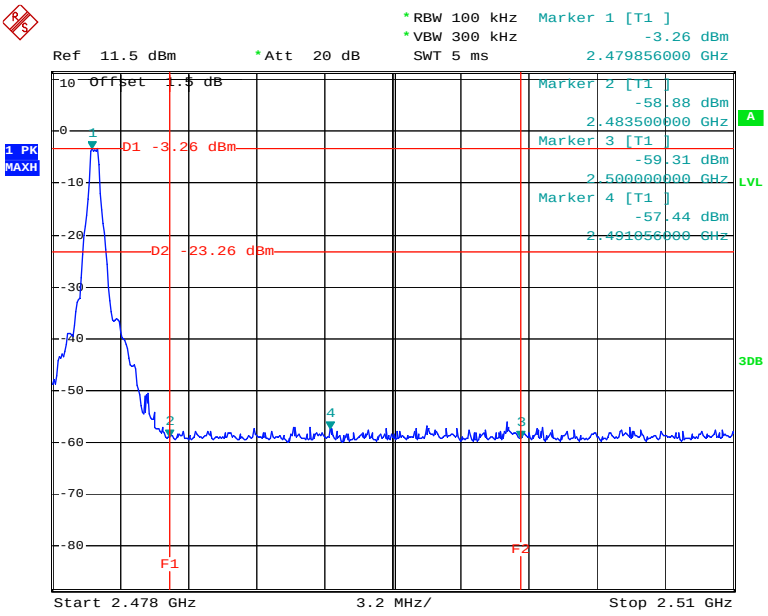
BDR Mode (GFSK):

Band Edge, Left Side



Date: 6.MAR.2014 14:42:44

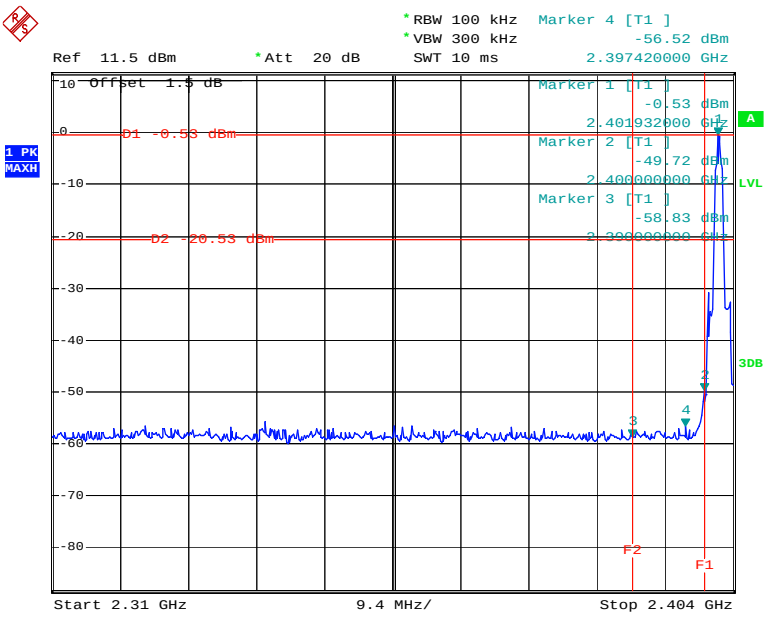
Band Edge, Right Side



Date: 6.MAR.2014 14:44:01

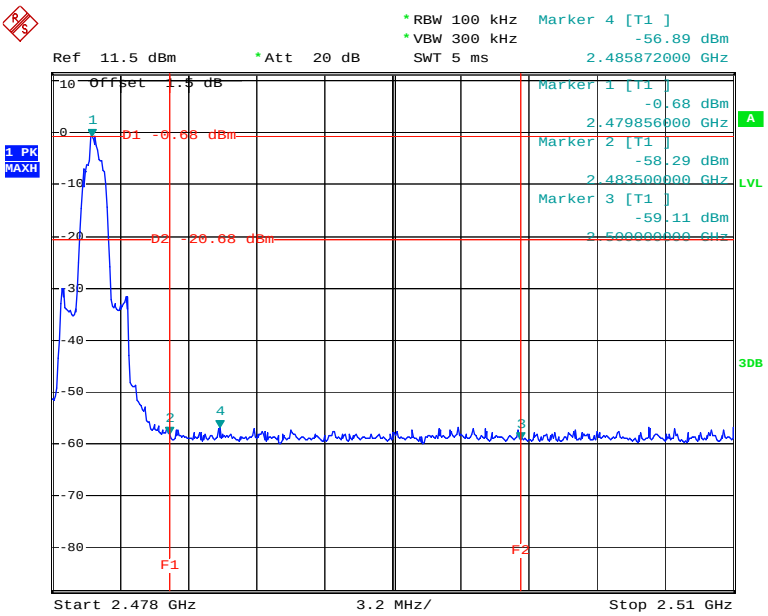
EDR Mode (π/4-DQPSK):

Band Edge, Left Side



Date: 7.MAR.2014 12:15:35

Band Edge, Right Side



Date: 7.MAR.2014 12:22:16

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