FCC PART 15.247

TEST REPORT

For

Zhongshan K-mate General Electronics Co., Ltd.

NO.2 ,5th Xinsheng Street,Gangkou Town, Zhongshan City, Guangdong,China

FCC ID: WAD-BTC008L

Report Type:	Product Type:
Original Report	Bluetooth FM Transmitter

Test Engineer:	Dean Liu
Report Number:	RDG150427002-00A
Report Date:	2015-05-27
Reviewed By:	Sula Huang RF Leader
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Zhongshan K-mate General Electronics Co., Ltd.'*s product, model *BTC008L (FCC ID: WAD-BTC008L)* (the "EUT") in this report is a *Bluetooth FM Transmitter,* which was measured approximately: 17.5 cm (L) x 8.4 cm (W) x 4.6 cm (H), rated input voltage: DC12V-24V from car cigarette socket.

All measurement and test data in this report was gathered from production sample serial number: 150427002 (Assigned by BACL, Dongguan). The EUT was received on 2015-04-28.

Objective

This report is prepared on behalf of *Zhongshan K-mate General Electronics Co., Ltd.* 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 DTS submissions with FCC ID: WAD-BTC008L.
FCC Part 15C DXX submissions with FCC ID: WAD-BTC008L.

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).

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 06, 2015. 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.

EUT Exercise Software

Test Software Version		CSR Bluetest 3		
Test Frequency		2402MHz	2441MHz	2480MHz
Power Level Setting	GFSK	63	63	63
	π/4-DQPSK	100	100	100
	8DPSK	100	100	100

Equipment Modifications

No modification was made to the EUT.

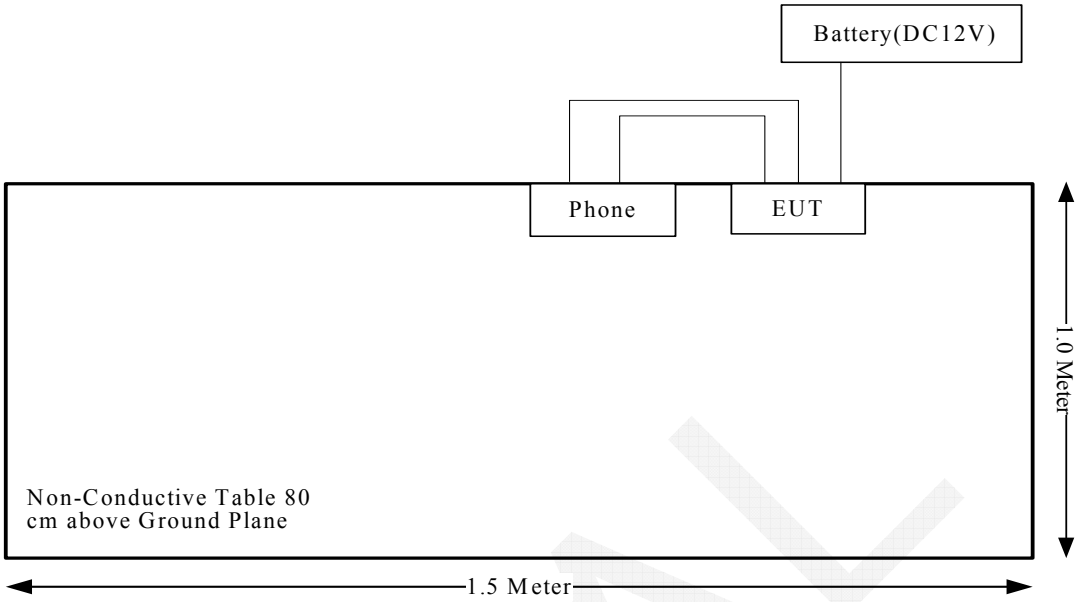
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Meizu	Mobile phone	N460	750BBKS22SF3

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	no	no	0.6	EUT	Mobile Phone
Audio Cable	no	no	1.2	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	Not Applicable
§15.205, §15.209, §15.247(d)	Spurious 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 is battery operated equipment.

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 = 5.79 dBm (3.79mW) at 2480 MHz
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 3.79/5*(√2.48) = 1.19 < 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 one integral antenna arrangement for BT, which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT 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

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.

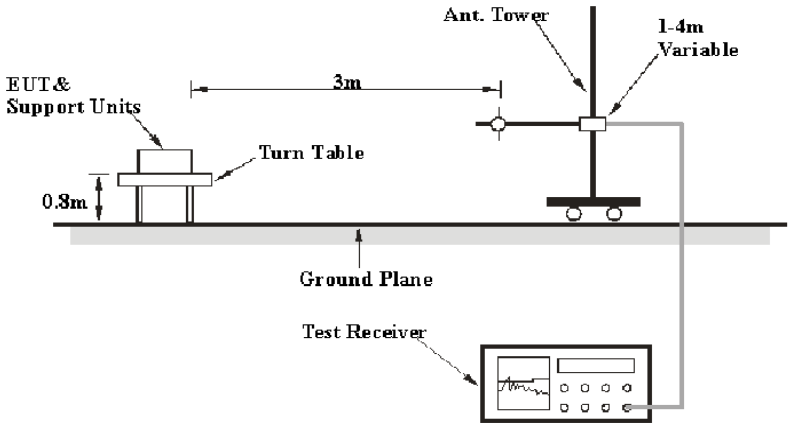
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 5.0 dB
200M~1GHz: 6.2 dB
1G~6GHz: 4.45 dB
6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

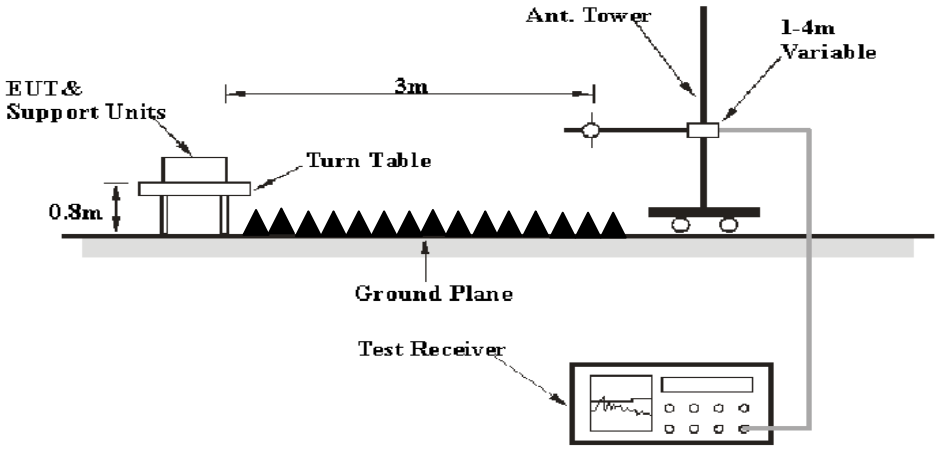
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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 C63.4-2009. 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.

The spacing between the peripherals was 10 cm.

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
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2014-12-04	2015-12-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, 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:

16.62 dB at **9920 MHz** in the **Vertical** polarization of BDR Mode (GFSK)

Test Data

Environmental Conditions

Temperature:	25.3 °C
Relative Humidity:	54 %
ATM Pressure:	100.2 kPa

** The testing was performed by Dean Liu on 2015-05-04.*

Test 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	90.74	PK	H	25.65	3.66	27.32	92.73	N/A	N/A
2402	80.23	AV	H	25.65	3.66	27.32	82.22	N/A	N/A
2402	94.57	PK	V	25.65	3.66	27.32	96.56	N/A	N/A
2402	83.77	AV	V	25.65	3.66	27.32	85.76	N/A	N/A
2390	36.46	PK	V	25.61	3.63	27.32	38.38	74.00	35.62
2390	23.74	AV	V	25.61	3.63	27.32	25.66	54.00	28.34
4804	36.41	PK	V	30.59	5.06	27.41	44.65	74.00	29.35
4804	23.29	AV	V	30.59	5.06	27.41	31.53	54.00	22.47
7206	32.54	PK	V	34.09	6.61	25.91	47.33	74.00	26.67
7206	19.34	AV	V	34.09	6.61	25.91	34.13	54.00	19.87
9608	30.75	PK	V	35.96	8.53	27.55	47.69	74.00	26.31
9608	18.06	AV	V	35.96	8.53	27.55	35.00	54.00	19.00
2133	36.29	PK	V	24.95	3.20	27.35	37.09	74.00	36.91
2133	21.92	AV	V	24.95	3.20	27.35	22.72	54.00	31.28
251	27.6	QP	V	12.15	1.91	21.49	20.17	46.00	25.83
Middle Channel: 2441 MHz									
2441	91.03	PK	H	25.75	3.76	27.34	93.20	N/A	N/A
2441	80.5	AV	H	25.75	3.76	27.34	82.67	N/A	N/A
2441	94.85	PK	V	25.75	3.76	27.34	97.02	N/A	N/A
2441	84.04	AV	V	25.75	3.76	27.34	86.21	N/A	N/A
4882	36.89	PK	V	30.79	5.19	27.42	45.45	74.00	28.55
4882	23.69	AV	V	30.79	5.19	27.42	32.25	54.00	21.75
7323	33.03	PK	V	34.38	6.75	25.88	48.28	74.00	25.72
7323	19.73	AV	V	34.38	6.75	25.88	34.98	54.00	19.02
9764	31.25	PK	V	36.33	8.62	27.20	49.00	74.00	25.00
9764	18.34	AV	V	36.33	8.62	27.20	36.09	54.00	17.91
2133	36.5	PK	V	24.95	3.20	27.35	37.30	74.00	36.70
2133	22.25	AV	V	24.95	3.20	27.35	23.05	54.00	30.95
3187	35.26	PK	V	27.80	6.31	27.38	41.99	74.00	32.01
3187	21.45	AV	V	27.80	6.31	27.38	28.18	54.00	25.82
251	28.1	QP	V	12.15	1.91	21.49	20.67	46.00	25.33
High Channel: 2480 MHz									
2480	91.12	PK	H	25.85	3.68	27.36	93.29	N/A	N/A
2480	80.51	AV	H	25.85	3.68	27.36	82.68	N/A	N/A
2480	95.08	PK	V	25.85	3.68	27.36	97.25	N/A	N/A
2480	85.02	AV	V	25.85	3.68	27.36	87.19	N/A	N/A
2483.5	42.89	PK	V	25.86	3.67	27.36	45.06	74.00	28.94
2483.5	28.85	AV	V	25.86	3.67	27.36	31.02	54.00	22.98
4960	37.26	PK	V	31.00	5.34	27.43	46.17	74.00	27.83
4960	24.12	AV	V	31.00	5.34	27.43	33.03	54.00	20.97
7440	33.36	PK	V	34.66	6.89	25.97	48.94	74.00	25.06
7440	20.13	AV	V	34.66	6.89	25.97	35.71	54.00	18.29
9920	31.47	PK	V	36.71	8.71	26.66	50.23	74.00	23.77
9920	18.62	AV	V	36.71	8.71	26.66	37.38	54.00	16.62
2133	36.84	PK	V	24.95	3.20	27.35	37.64	74.00	36.36
2133	22.47	AV	V	24.95	3.20	27.35	23.27	54.00	30.73
251	27.9	QP	V	12.15	1.91	21.49	20.47	46.00	25.53

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	87.78	PK	H	25.65	3.66	27.32	89.77	N/A	N/A
2402	76.07	AV	H	25.65	3.66	27.32	78.06	N/A	N/A
2402	94.22	PK	V	25.65	3.66	27.32	96.21	N/A	N/A
2402	82.71	AV	V	25.65	3.66	27.32	84.70	N/A	N/A
2390	37.26	PK	V	25.61	3.63	27.32	39.18	74.00	34.82
2390	24.34	AV	V	25.61	3.63	27.32	26.26	54.00	27.74
4804	36.57	PK	V	30.59	5.06	27.41	44.81	74.00	29.19
4804	24.34	AV	V	30.59	5.06	27.41	32.58	54.00	21.42
7206	31.73	PK	V	34.09	6.61	25.91	46.52	74.00	27.48
7206	18.6	AV	V	34.09	6.61	25.91	33.39	54.00	20.61
9608	29.15	PK	V	35.96	8.53	27.55	46.09	74.00	27.91
9608	16.66	AV	V	35.96	8.53	27.55	33.60	54.00	20.40
2925	34.52	PK	V	27.01	6.26	27.54	40.25	74.00	33.75
2925	20.98	AV	V	27.01	6.26	27.54	26.71	54.00	27.29
251	27.9	QP	V	12.15	1.91	21.49	20.47	46.00	25.53
Middle Channel: 2441 MHz									
2441	87.75	PK	H	25.75	3.76	27.34	89.92	N/A	N/A
2441	76.74	AV	H	25.75	3.76	27.34	78.91	N/A	N/A
2441	94.64	PK	V	25.75	3.76	27.34	96.81	N/A	N/A
2441	83.13	AV	V	25.75	3.76	27.34	85.30	N/A	N/A
4882	36.77	PK	V	30.79	5.19	27.42	45.33	74.00	28.67
4882	24.57	AV	V	30.79	5.19	27.42	33.13	54.00	20.87
7323	32.17	PK	V	34.38	6.75	25.88	47.42	74.00	26.58
7323	19.06	AV	V	34.38	6.75	25.88	34.31	54.00	19.69
9764	29.54	PK	V	36.33	8.62	27.20	47.29	74.00	26.71
9764	17.14	AV	V	36.33	8.62	27.20	34.89	54.00	19.11
2925	35.01	PK	V	27.01	6.26	27.54	40.74	74.00	33.26
2925	21.35	AV	V	27.01	6.26	27.54	27.08	54.00	26.92
3187	34.12	PK	V	27.80	6.31	27.38	40.85	74.00	33.15
3187	22.28	AV	V	27.80	6.31	27.38	29.01	54.00	24.99
251	28	QP	V	12.15	1.91	21.49	20.57	46.00	25.43
High Channel: 2480 MHz									
2480	88.26	PK	H	25.85	3.68	27.36	90.43	N/A	N/A
2480	77.39	AV	H	25.85	3.68	27.36	79.56	N/A	N/A
2480	95.23	PK	V	25.85	3.68	27.36	97.40	N/A	N/A
2480	83.69	AV	V	25.85	3.68	27.36	85.86	N/A	N/A
2483.5	45.29	PK	V	25.86	3.67	27.36	47.46	74.00	26.54
2483.5	28.34	AV	V	25.86	3.67	27.36	30.51	54.00	23.49
4960	37.16	PK	V	31.00	5.34	27.43	46.07	74.00	27.93
4960	25.01	AV	V	31.00	5.34	27.43	33.92	54.00	20.08
7440	32.39	PK	V	34.66	6.89	25.97	47.97	74.00	26.03
7440	19.4	AV	V	34.66	6.89	25.97	34.98	54.00	19.02
9920	30	PK	V	36.71	8.71	26.66	48.76	74.00	25.24
9920	17.35	AV	V	36.71	8.71	26.66	36.11	54.00	17.89
2925	35.43	PK	V	27.01	6.26	27.54	41.16	74.00	32.84
2925	21.77	AV	V	27.01	6.26	27.54	27.50	54.00	26.50
251	27.8	QP	V	12.15	1.91	21.49	20.37	46.00	25.63

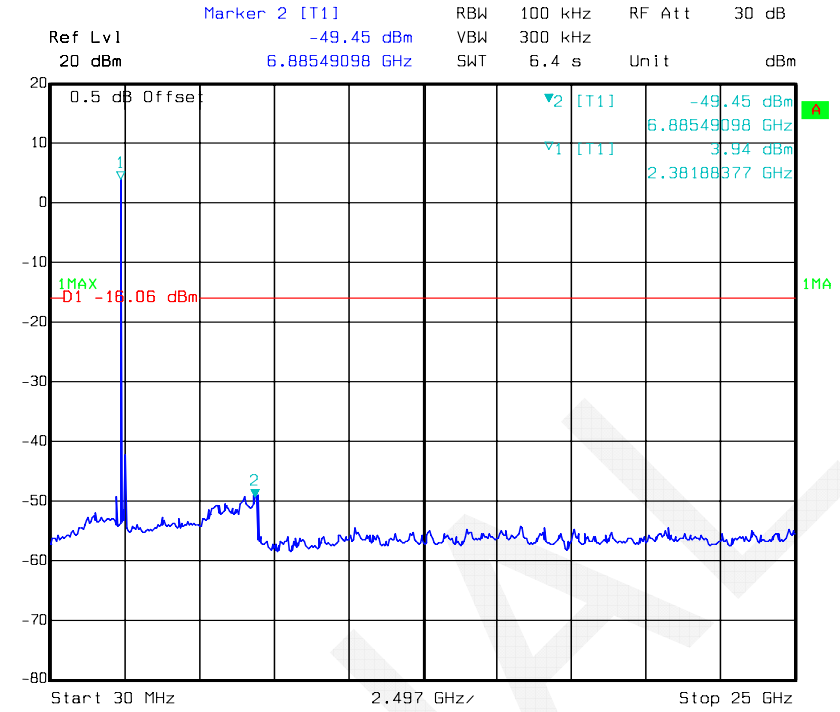
EDR Mode (8DPSK):

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	88.46	PK	H	25.65	3.66	27.32	90.45	N/A	N/A
2402	76.01	AV	H	25.65	3.66	27.32	78.00	N/A	N/A
2402	94.98	PK	V	25.65	3.66	27.32	96.97	N/A	N/A
2402	82.56	AV	V	25.65	3.66	27.32	84.55	N/A	N/A
2390	36.83	PK	V	25.61	3.63	27.32	38.75	74.00	35.25
2390	23.84	AV	V	25.61	3.63	27.32	25.76	54.00	28.24
4804	36.59	PK	V	30.59	5.06	27.41	44.83	74.00	29.17
4804	24.49	AV	V	30.59	5.06	27.41	32.73	54.00	21.27
7206	31.84	PK	V	34.09	6.61	25.91	46.63	74.00	27.37
7206	18.92	AV	V	34.09	6.61	25.91	33.71	54.00	20.29
9608	29.57	PK	V	35.96	8.53	27.55	46.51	74.00	27.49
9608	17.18	AV	V	35.96	8.53	27.55	34.12	54.00	19.88
3187	34.83	PK	V	27.80	6.31	27.38	41.56	74.00	32.44
3187	21.53	AV	V	27.80	6.31	27.38	28.26	54.00	25.74
251	27.9	QP	V	12.15	1.91	21.49	20.47	46.00	25.53
Middle Channel: 2441 MHz									
2441	88.66	PK	H	25.75	3.76	27.34	90.83	N/A	N/A
2441	76.94	AV	H	25.75	3.76	27.34	79.11	N/A	N/A
2441	95.45	PK	V	25.75	3.76	27.34	97.62	N/A	N/A
2441	83.06	AV	V	25.75	3.76	27.34	85.23	N/A	N/A
4882	37.04	PK	V	30.79	5.19	27.42	45.60	74.00	28.40
4882	24.82	AV	V	30.79	5.19	27.42	33.38	54.00	20.62
7323	32.26	PK	V	34.38	6.75	25.88	47.51	74.00	26.49
7323	19.39	AV	V	34.38	6.75	25.88	34.64	54.00	19.36
9764	30.03	PK	V	36.33	8.62	27.20	47.78	74.00	26.22
9764	17.42	AV	V	36.33	8.62	27.20	35.17	54.00	18.83
3187	35.32	PK	V	27.80	6.31	27.38	42.05	74.00	31.95
3187	21.93	AV	V	27.80	6.31	27.38	28.66	54.00	25.34
2925	34.58	PK	V	27.01	6.26	27.54	40.31	74.00	33.69
2925	21.75	AV	V	27.01	6.26	27.54	27.48	54.00	26.52
251	28	QP	V	12.15	1.91	21.49	20.57	46.00	25.43
High Channel: 2480 MHz									
2480	89.2	PK	H	25.85	3.68	27.36	91.37	N/A	N/A
2480	77.34	AV	H	25.85	3.68	27.36	79.51	N/A	N/A
2480	96.12	PK	V	25.85	3.68	27.36	98.29	N/A	N/A
2480	83.73	AV	V	25.85	3.68	27.36	85.90	N/A	N/A
2483.5	46.42	PK	V	25.86	3.67	27.36	48.59	74.00	25.41
2483.5	28.33	AV	V	25.86	3.67	27.36	30.50	54.00	23.50
4960	37.39	PK	V	31.00	5.34	27.43	46.30	74.00	27.70
4960	25.17	AV	V	31.00	5.34	27.43	34.08	54.00	19.92
7440	32.62	PK	V	34.66	6.89	25.97	48.20	74.00	25.80
7440	19.85	AV	V	34.66	6.89	25.97	35.43	54.00	18.57
9920	30.28	PK	V	36.71	8.71	26.66	49.04	74.00	24.96
9920	17.64	AV	V	36.71	8.71	26.66	36.40	54.00	17.60
3187	35.67	PK	V	27.80	6.31	27.38	42.40	74.00	31.60
3187	22.26	AV	V	27.80	6.31	27.38	28.99	54.00	25.01
251	28.1	QP	V	12.15	1.91	21.49	20.67	46.00	25.33

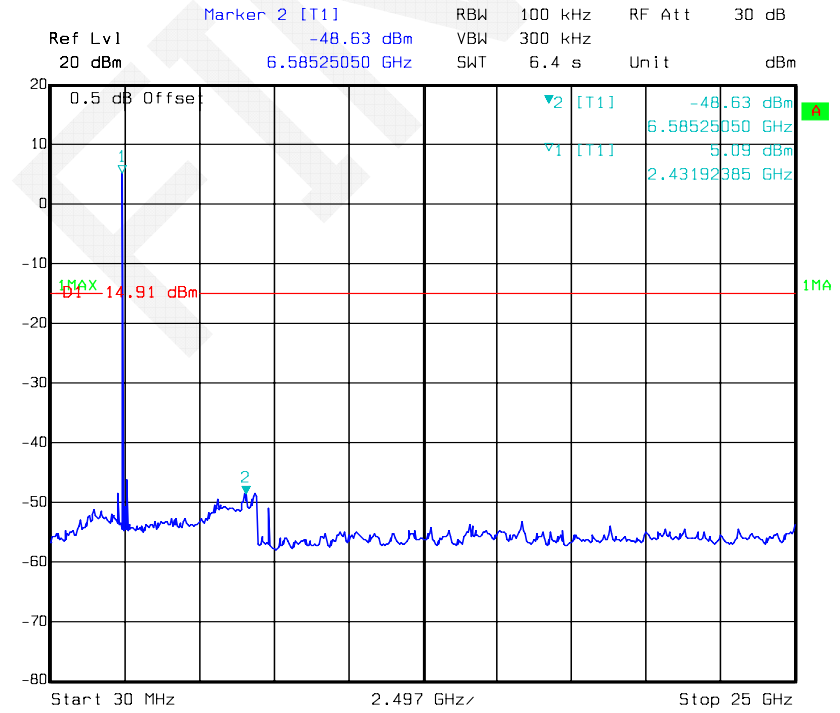
Conducted Spurious Emissions at Antenna Port

BDR Mode (GFSK):

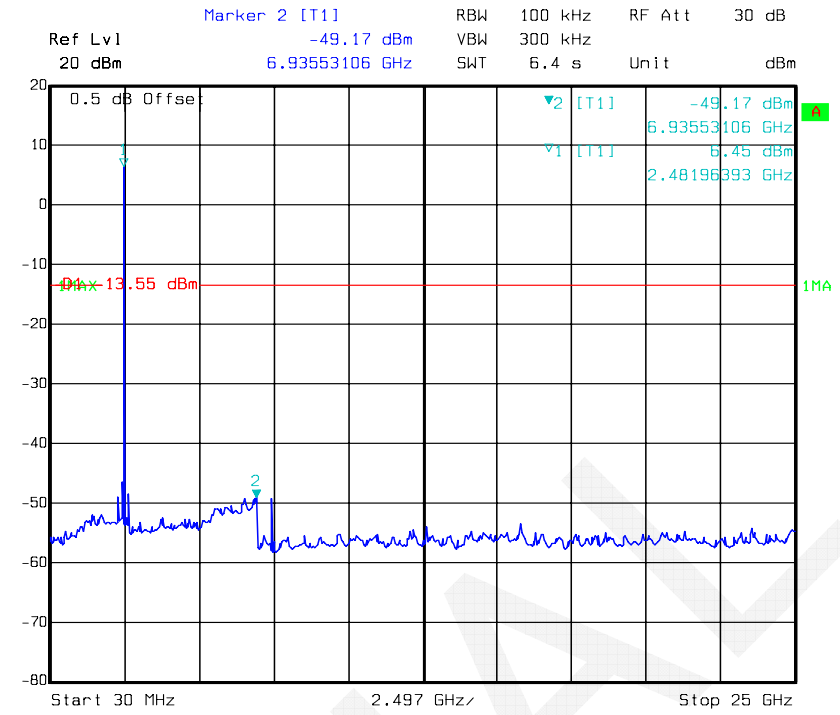
Low Channel



Middle Channel

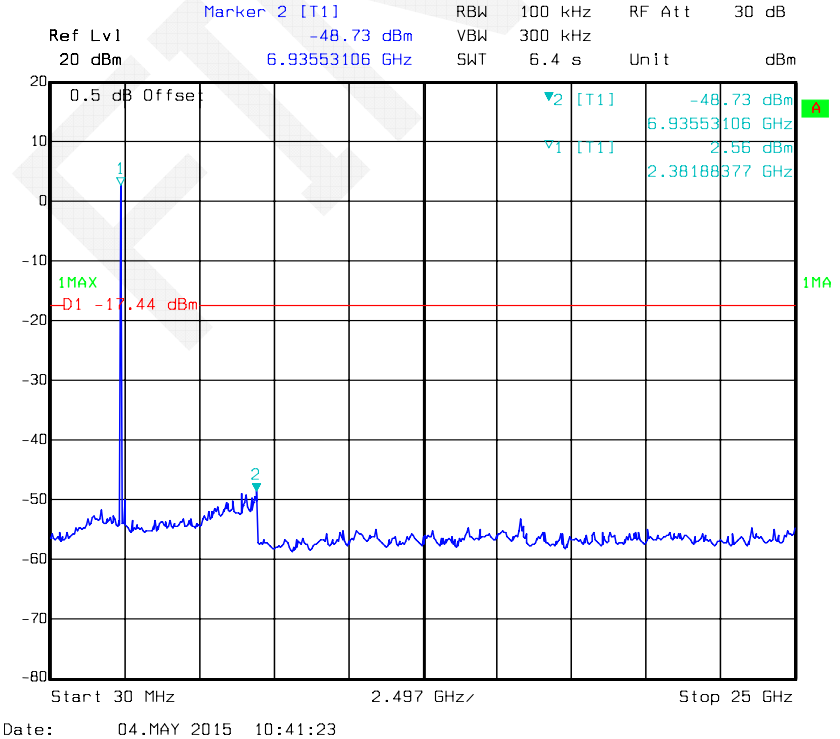


High Channel

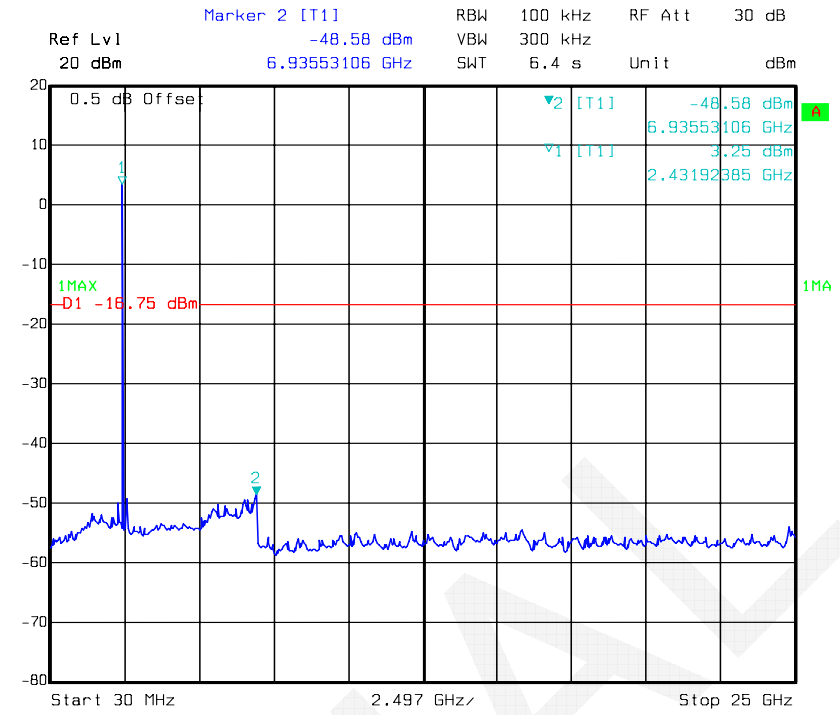


EDR Mode (π/4-DQPSK):

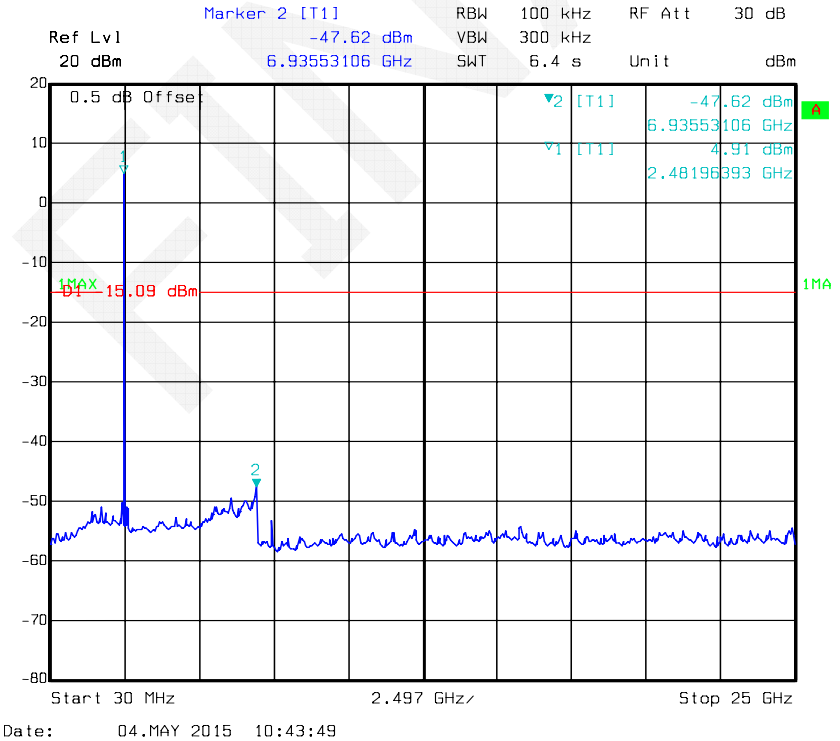
Low Channel



Middle Channel

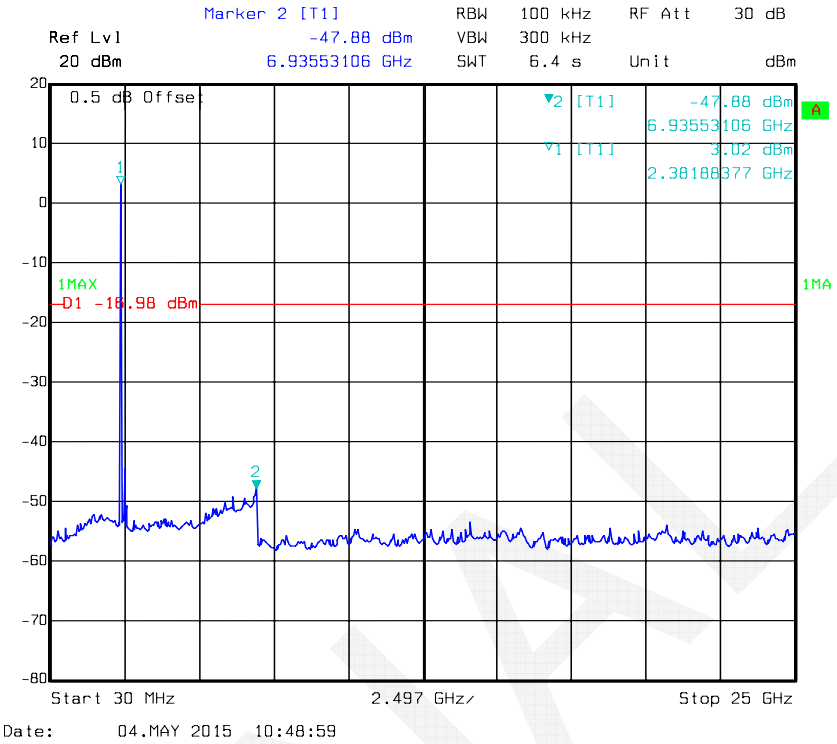


High Channel

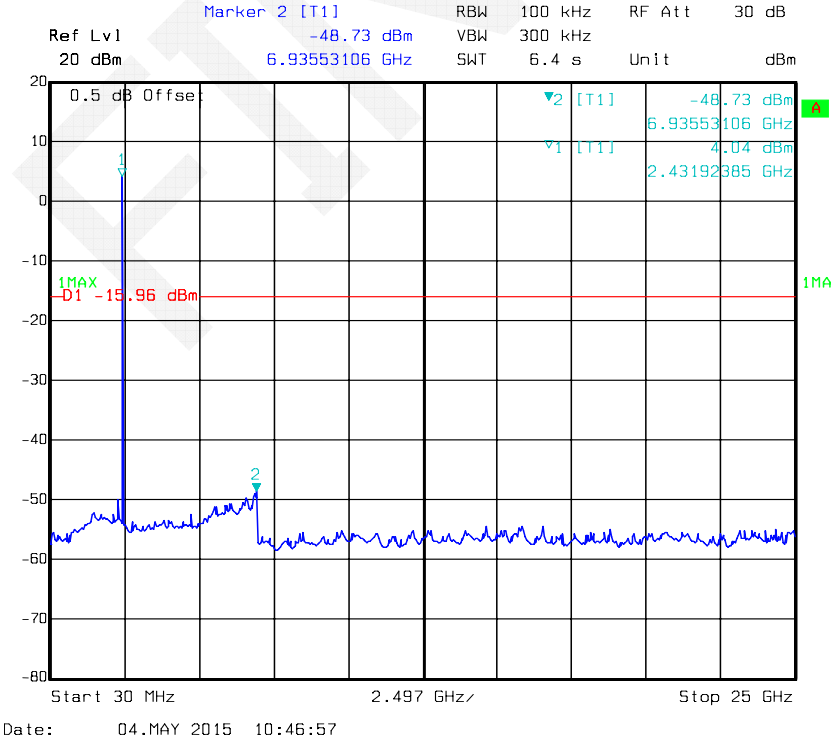


EDR Mode (8-DPSK):

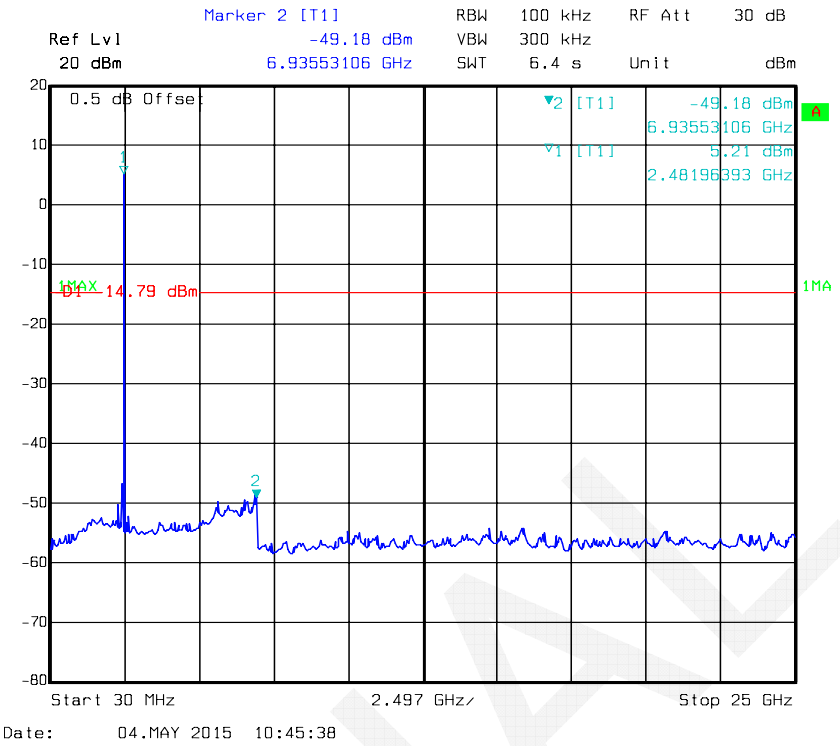
Low Channel



Middle Channel



High Channel



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	2014-05-09	2015-05-09

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, 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 30 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:	25.4°C
Relative Humidity:	58 %
ATM Pressure:	100.6 kPa

** The testing was performed by Dean Liu on 2015-04-30.*

Test Result: Compliance.

Please refer to following tables and plots

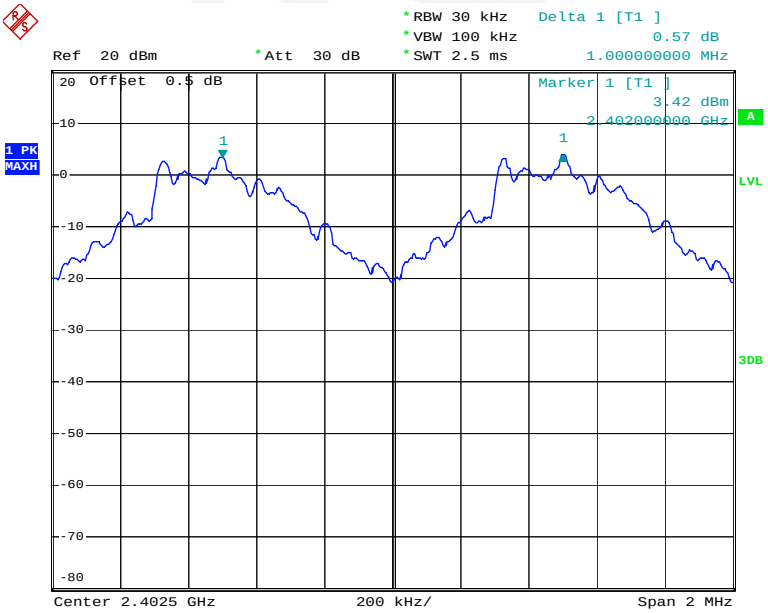
Test Mode: Transmitting

Mode	Channel	Frequency	Channel Seperation	Limit	Result
		MHz	MHz	MHz	
BDR (GFSK)	Low	2402	1	0.539	Pass
	Adjacent	2403			
	Middle	2441	1.004	0.539	Pass
	Adjacent	2442			
	High	2480	1	0.539	Pass
	Adjacent	2479			
EDR (π/4-DQPSK)	Low	2402	1.008	0.821	Pass
	Adjacent	2403			
	Middle	2441	1.004	0.821	Pass
	Adjacent	2442			
	High	2480	1.004	0.821	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.004	0.808	Pass
	Adjacent	2403			
	Middle	2441	1	0.808	Pass
	Adjacent	2442			
	High	2480	1.004	0.808	Pass
	Adjacent	2479			

*Note: Limit= (2/3)*20dB bandwidth*

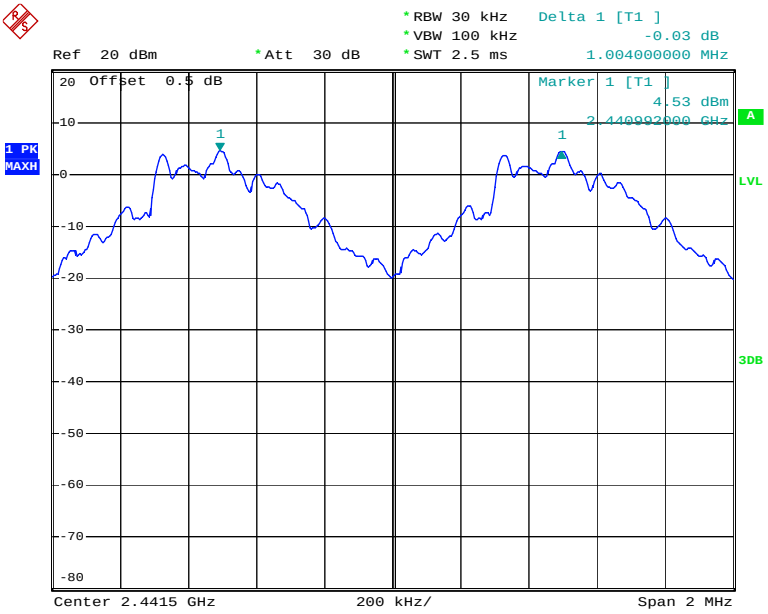
BDR Mode (GFSK):

Low Channel



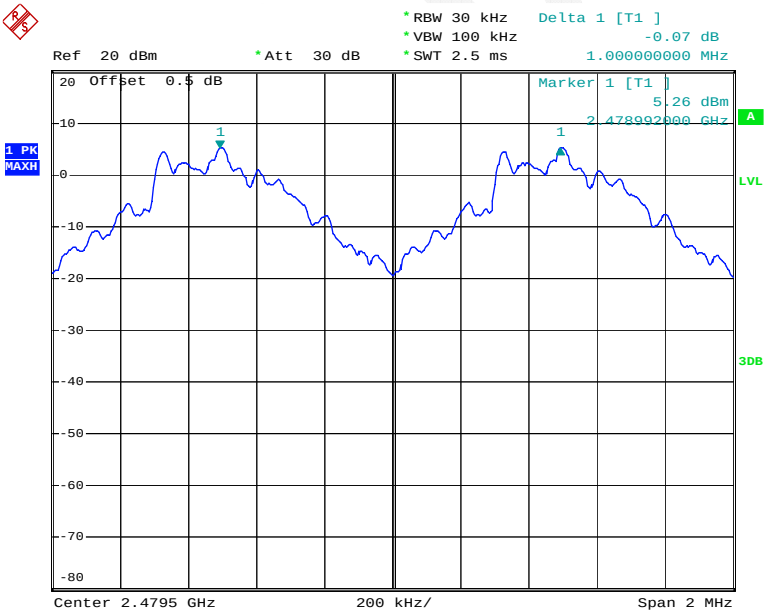
Date: 30.APR.2015 17:36:16

Middle Channel



Date: 30.APR.2015 17:37:10

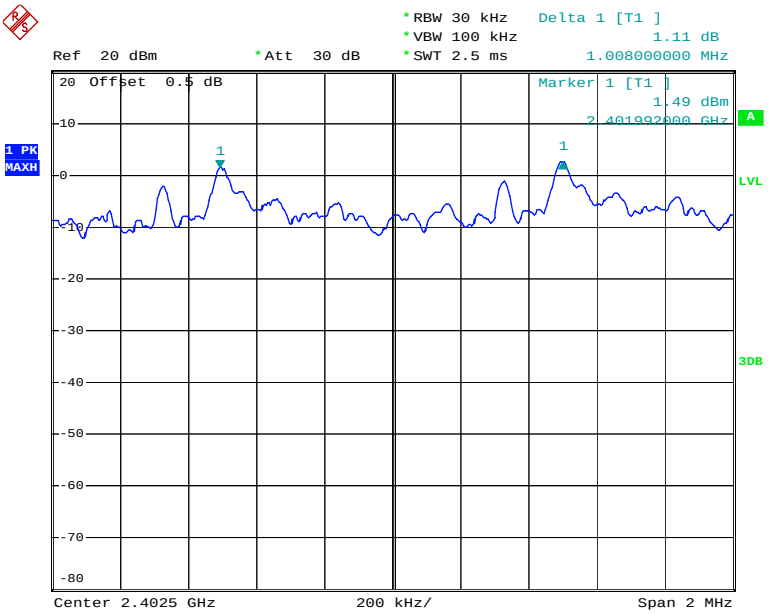
High Channel



Date: 30.APR.2015 17:37:49

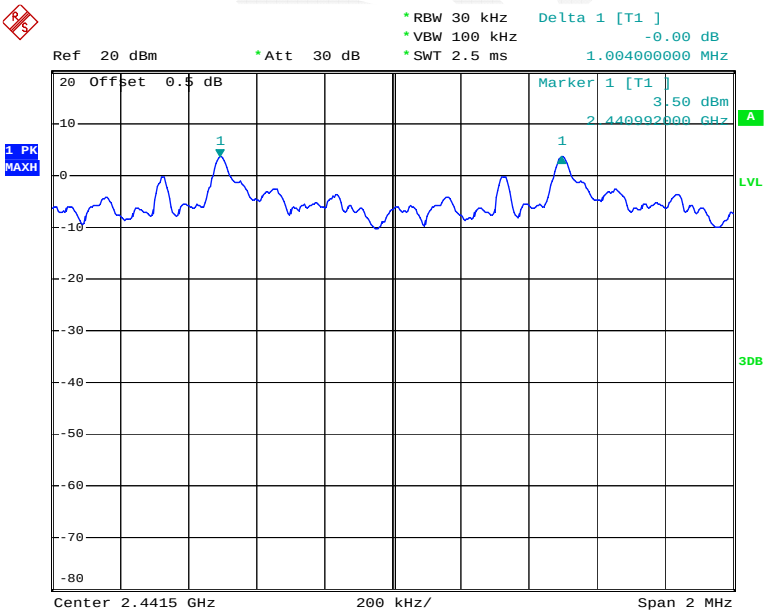
EDR Mode (π/4-DQPSK):

Low Channel



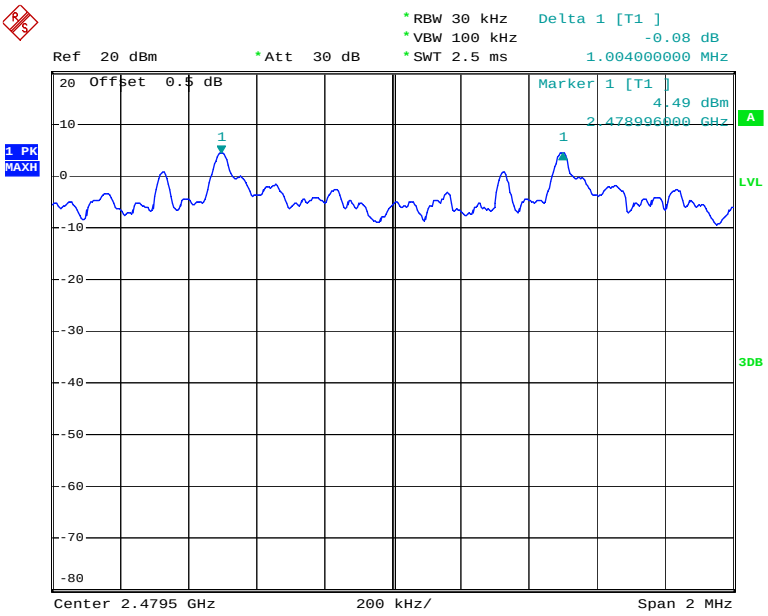
Date: 30.APR.2015 17:33:00

Middle Channel



Date: 30.APR.2015 17:33:57

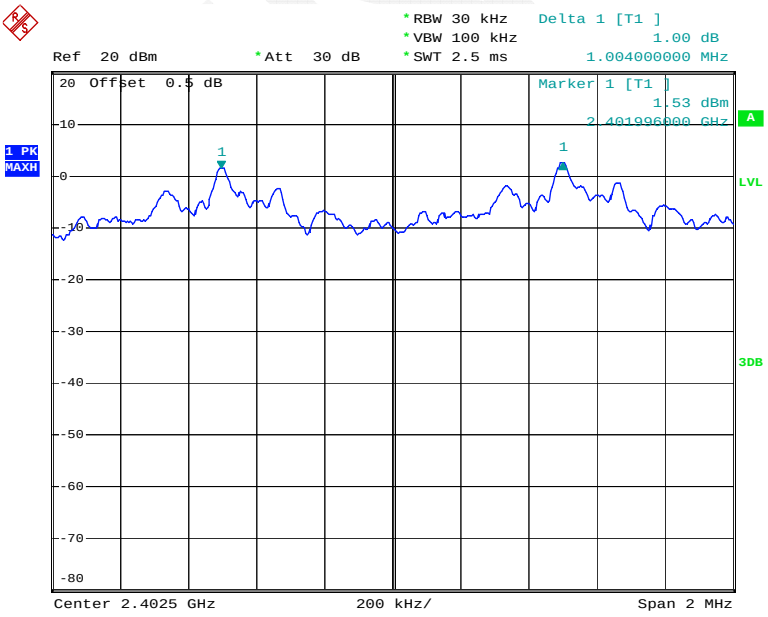
High Channel



Date: 30.APR.2015 17:34:50

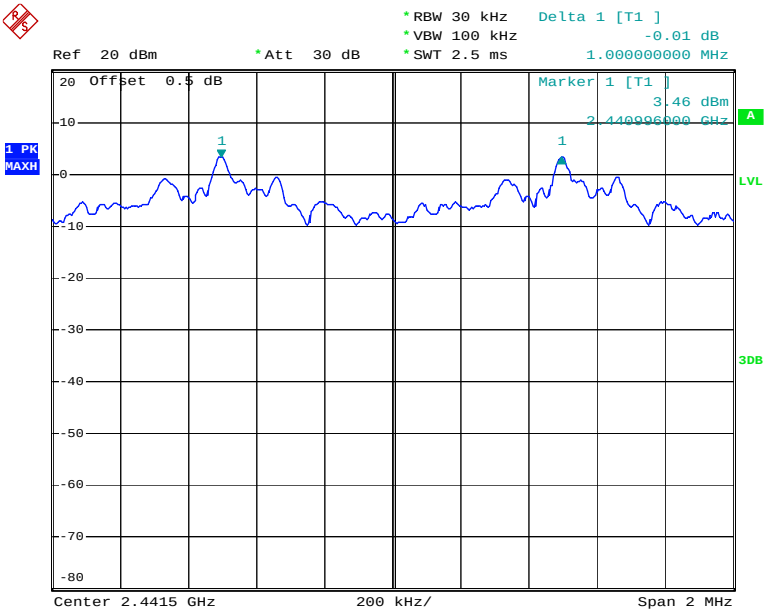
EDR Mode (8-DPSK):

Low Channel



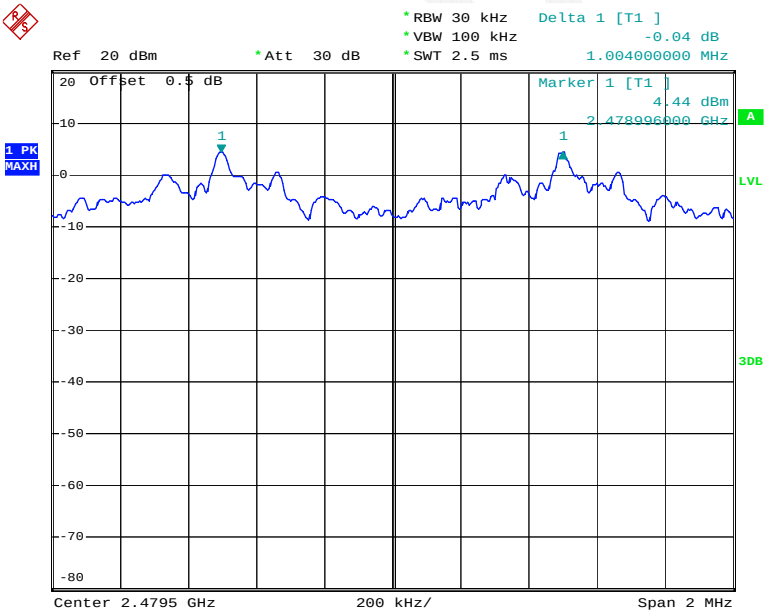
Date: 30.APR.2015 17:39:22

Middle Channel



Date: 30.APR.2015 17:39:55

High Channel



Date: 30.APR.2015 17:40:26

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	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	25.4°C
Relative Humidity:	58 %
ATM Pressure:	100.6 kPa

** The testing was performed by Dean Liu on 2015-04-30.*

Test Result: Compliance.

Please refer to following tables and plots

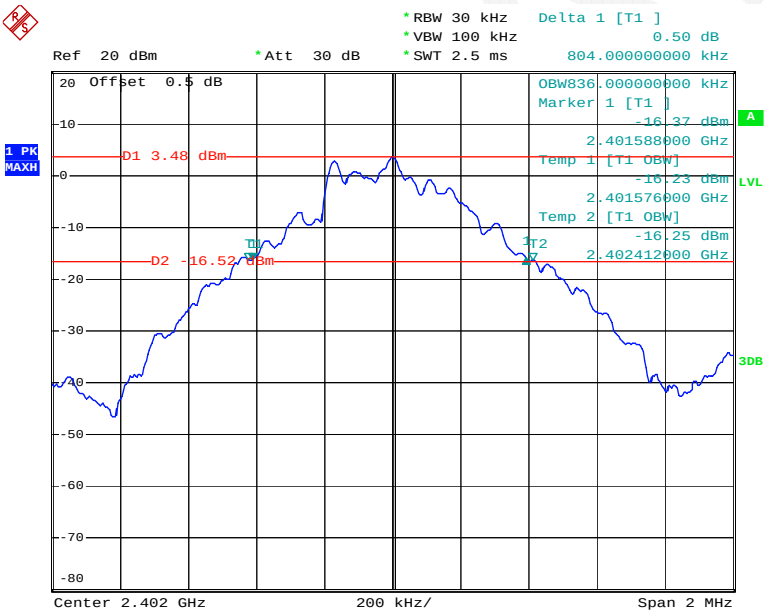
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	0.804
	Middle	2441	0.82
	High	2480	0.808
EDR Mode (π/4-DQPSK):	Low	2402	1.212
	Middle	2441	1.224
	High	2480	1.232
EDR Mode (8-DPSK):	Low	2402	1.208
	Middle	2441	1.208
	High	2480	1.212

Please refer to the following plots.

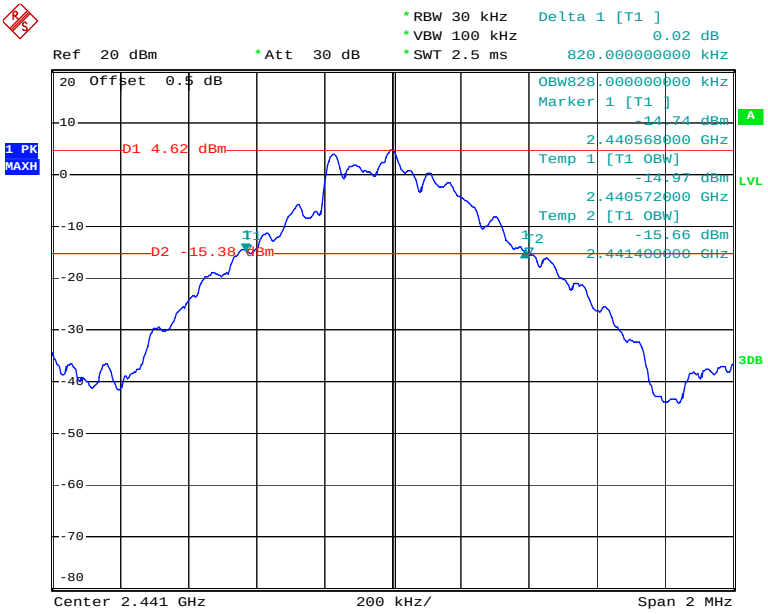
BDR Mode (GFSK):

Low Channel



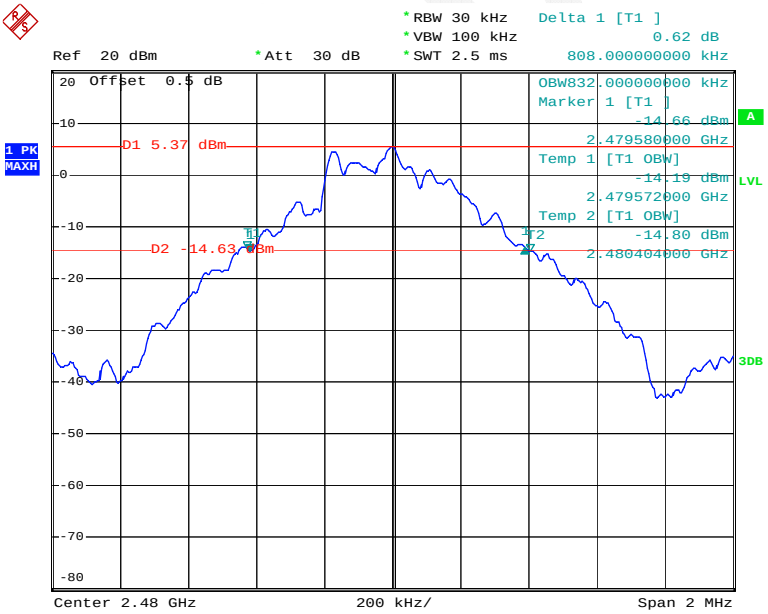
Date: 30.APR.2015 17:26:04

Middle Channel



Date: 30.APR.2015 17:24:44

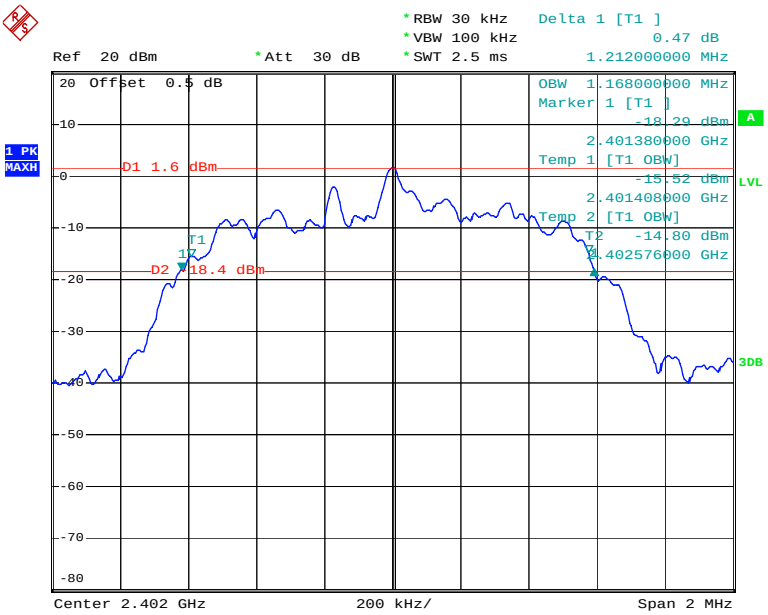
High Channel



Date: 30.APR.2015 17:23:18

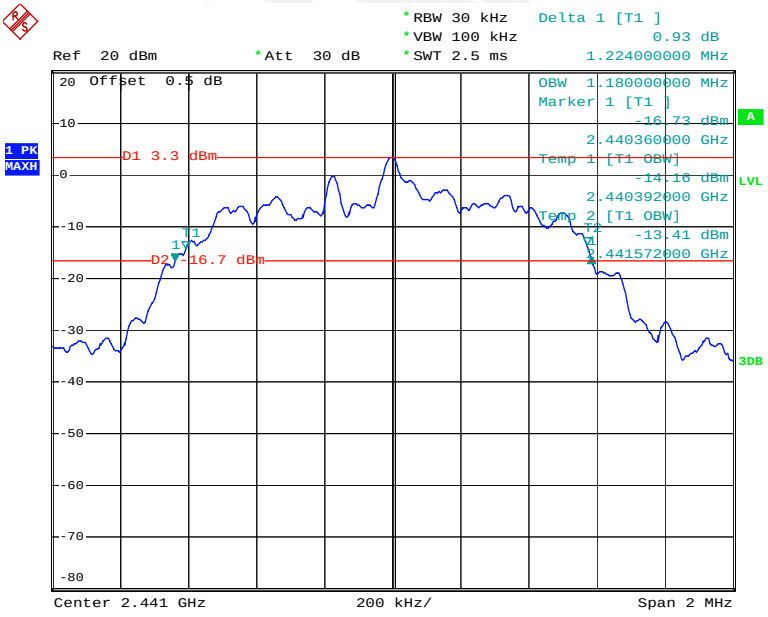
EDR Mode (π/4-DQPSK):

Low Channel



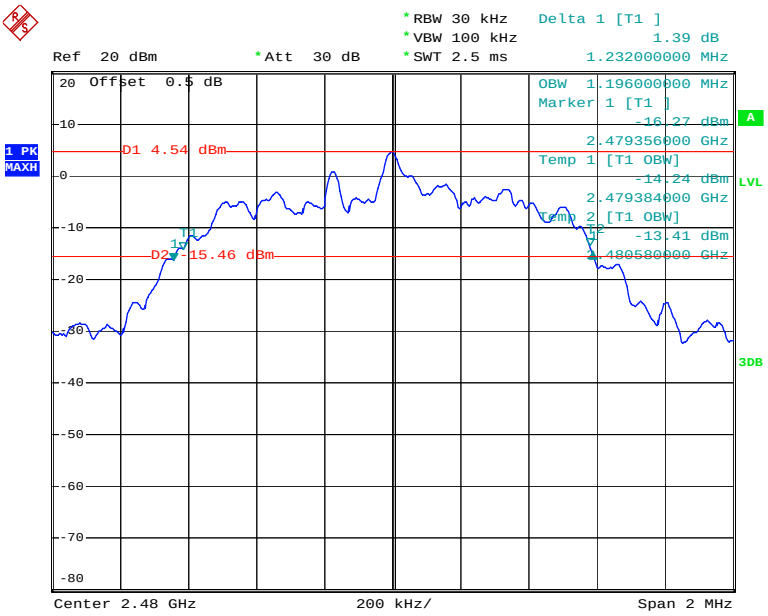
Date: 30.APR.2015 17:28:36

Middle Channel



Date: 30.APR.2015 17:29:39

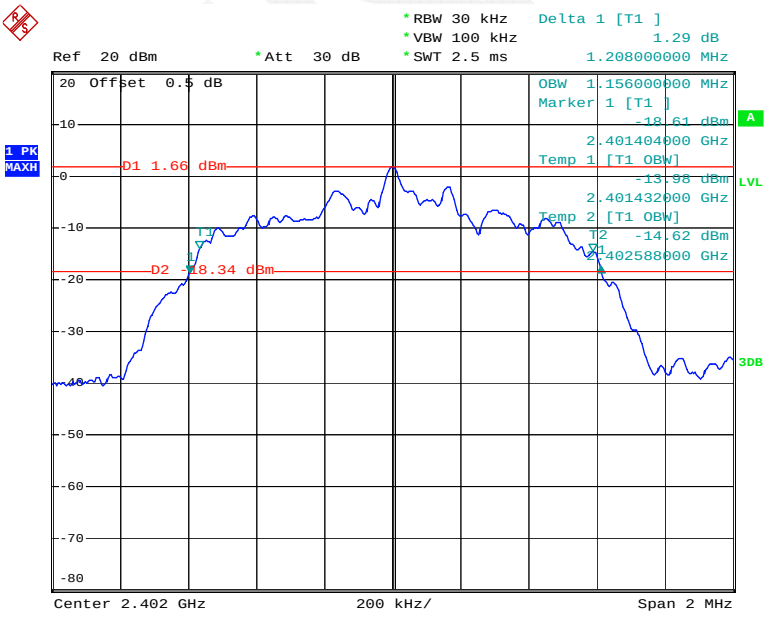
High Channel



Date: 30.APR.2015 17:30:42

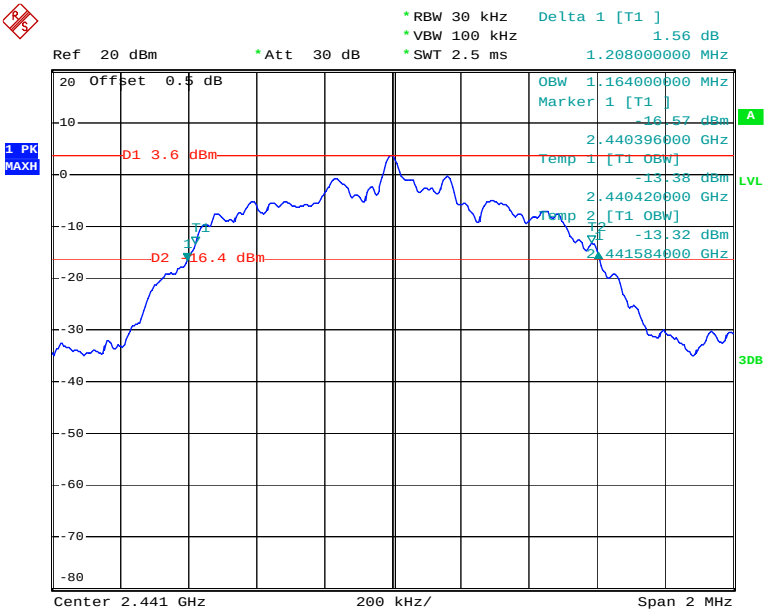
EDR Mode (8-DPSK):

Low Channel



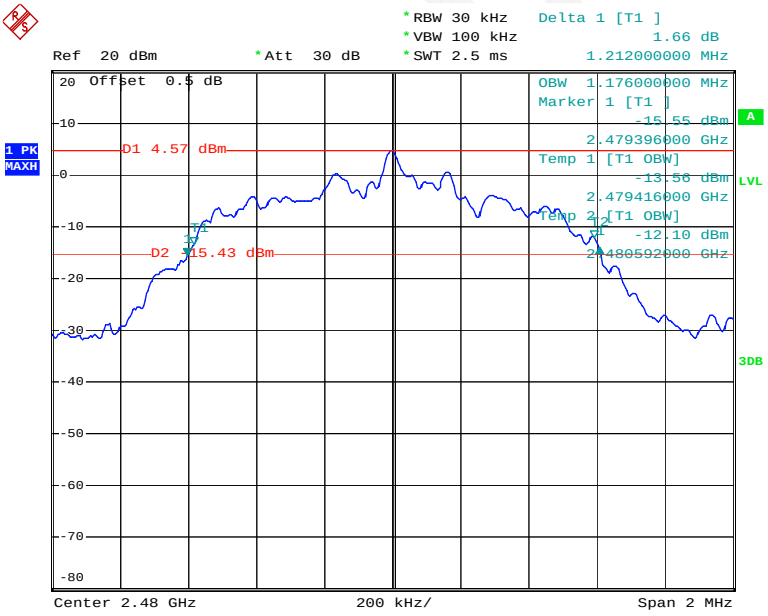
Date: 30.APR.2015 17:15:03

Middle Channel



Date: 30.APR.2015 17:16:50

High Channel



Date: 30.APR.2015 17:20:47

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	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	25.4°C
Relative Humidity:	58 %
ATM Pressure:	100.6 kPa

** The testing was performed by Dean Liu on 2015-04-30.*

Test Result: Compliance.

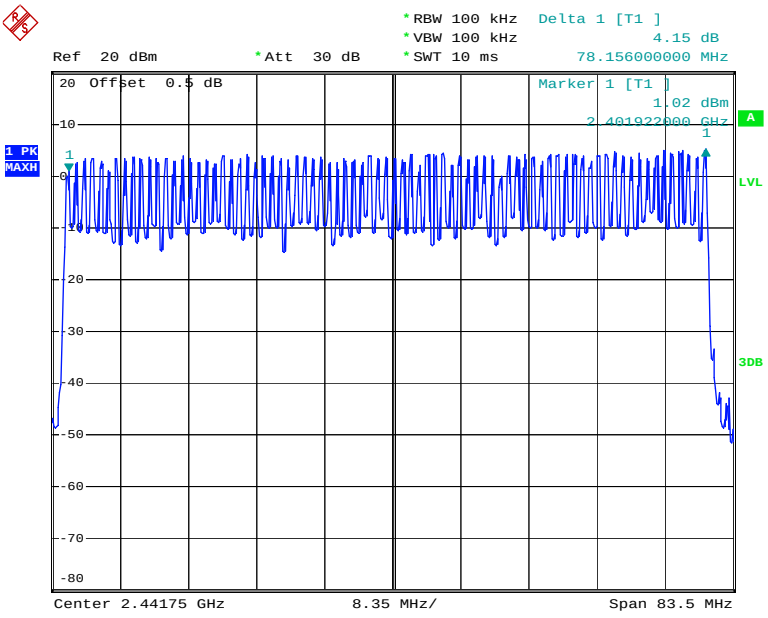
Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

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

Number of Hopping Channels

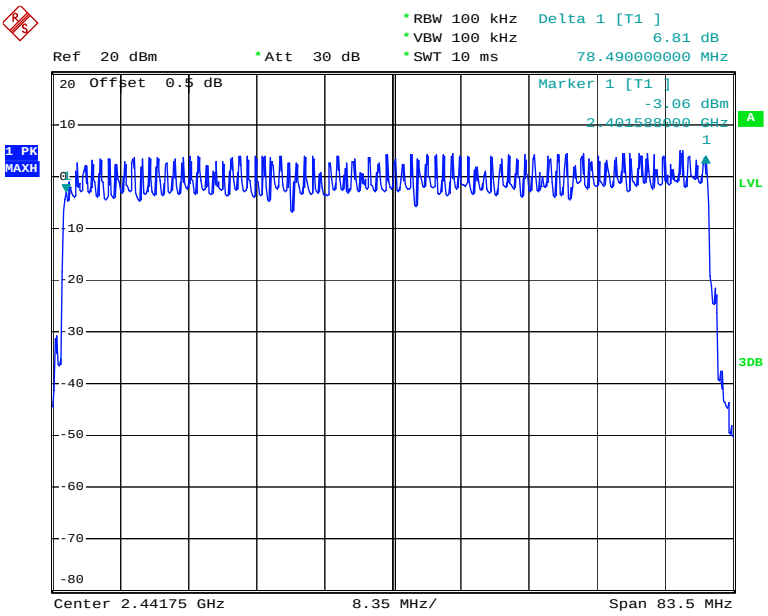


Date: 30.APR.2015 17:51:18

EDR Mode (π/4-DQPSK):

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

Number of Hopping Channels

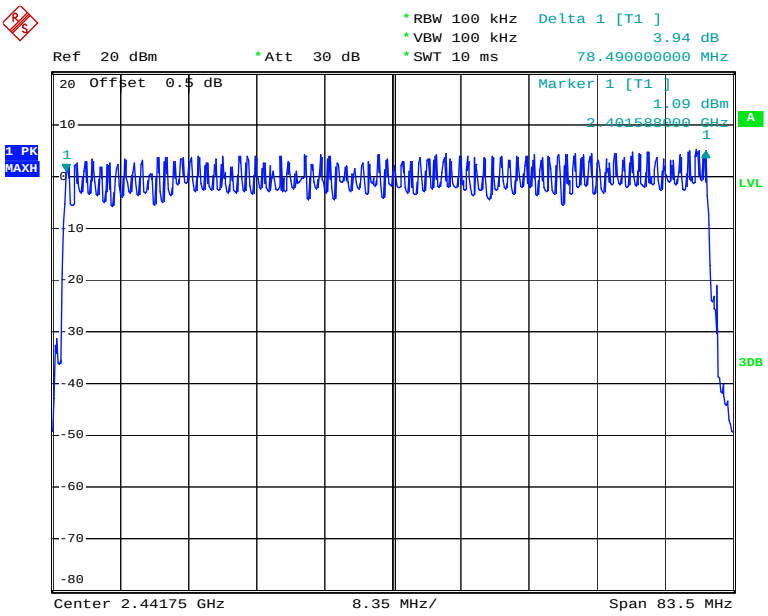


Date: 30.APR.2015 17:47:02

EDR Mode (8-DPSK):

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

Number of Hopping Channels



Date: 30.APR.2015 17:49:43

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	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	25.4°C
Relative Humidity:	58 %
ATM Pressure:	100.6 kPa

** The testing was performed by Dean Liu on 2015-04-30.*

Test Result: Compliance.

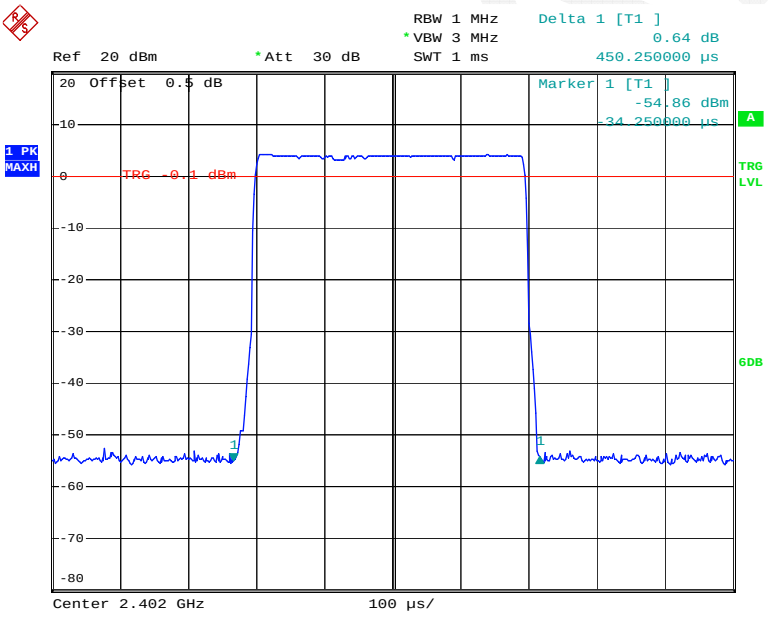
Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

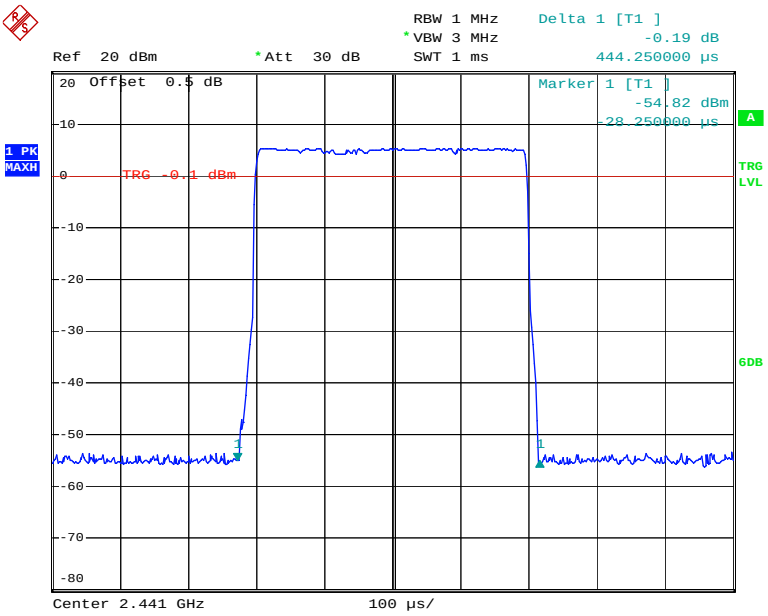
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.450	0.144	0.4	Pass
	Middle	0.444	0.142	0.4	Pass
	High	0.444	0.142	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.728	0.276	0.4	Pass
	Middle	1.716	0.275	0.4	Pass
	High	1.722	0.276	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	3.000	0.320	0.4	Pass
	Middle	3.000	0.320	0.4	Pass
	High	2.970	0.317	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel



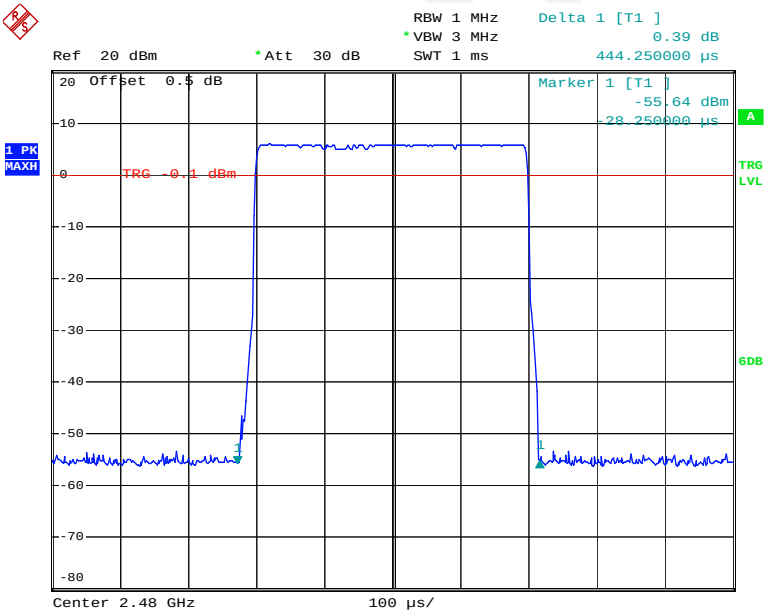
Date: 30.APR.2015 17:57:19

DH1: Middle Channel



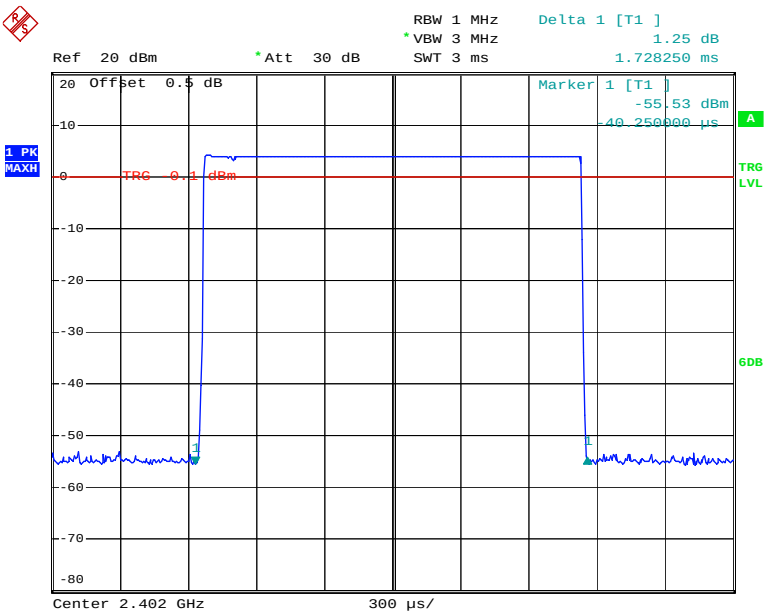
Date: 30.APR.2015 17:58:21

DH1: High Channel



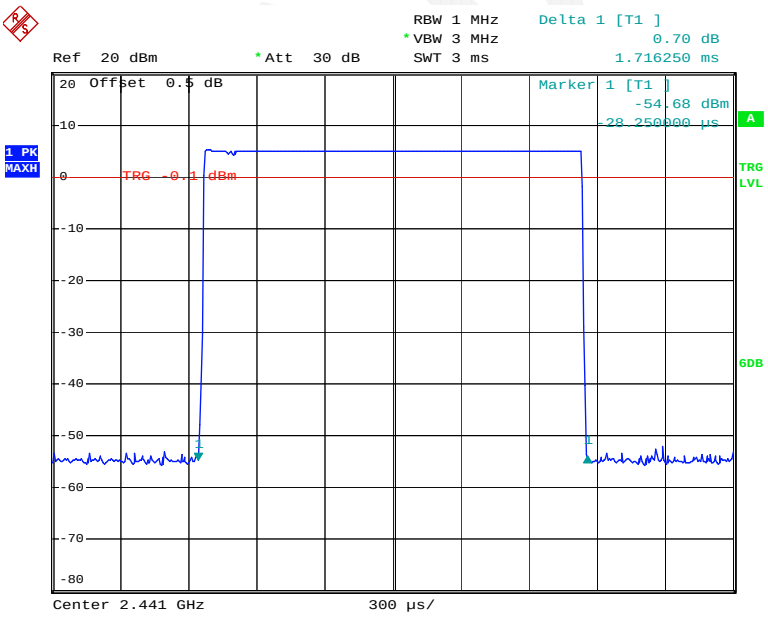
Date: 30.APR.2015 17:58:53

DH3: Low Channel



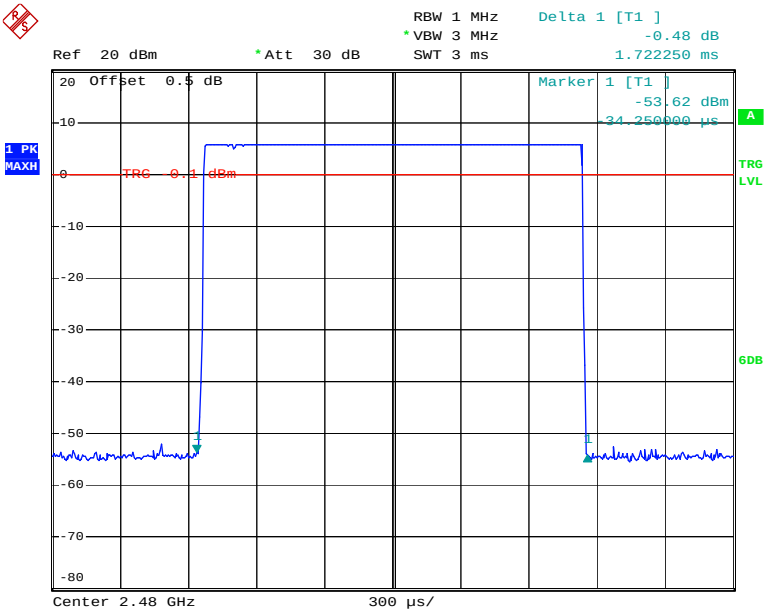
Date: 30.APR.2015 18:01:18

DH3: Middle Channel



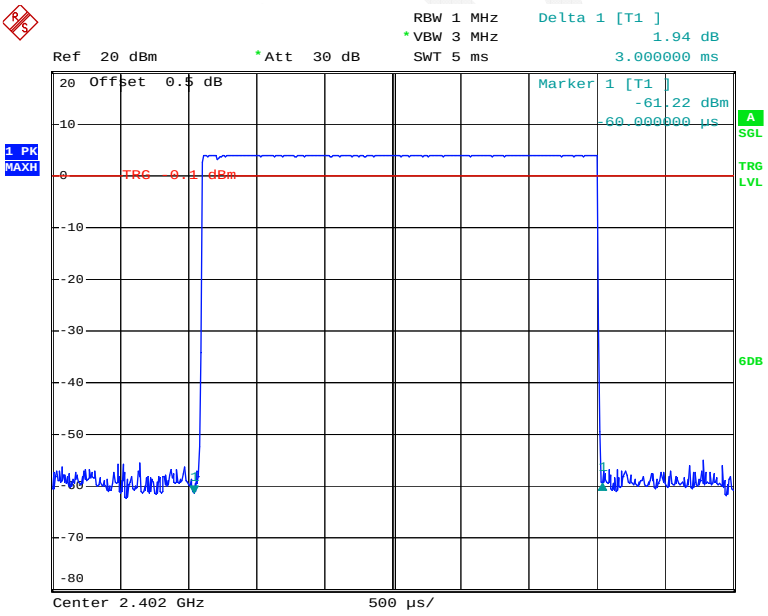
Date: 30.APR.2015 18:00:57

DH3: High Channel



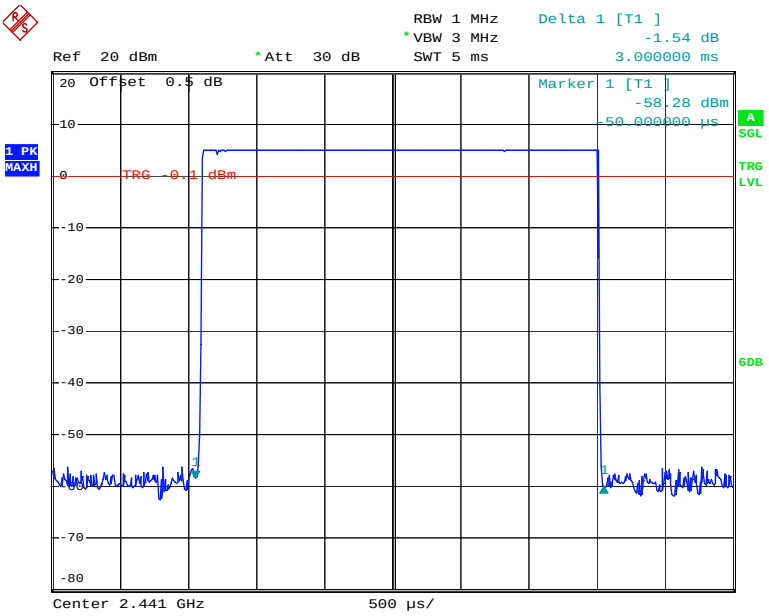
Date: 30.APR.2015 18:00:09

DH5: Low Channel



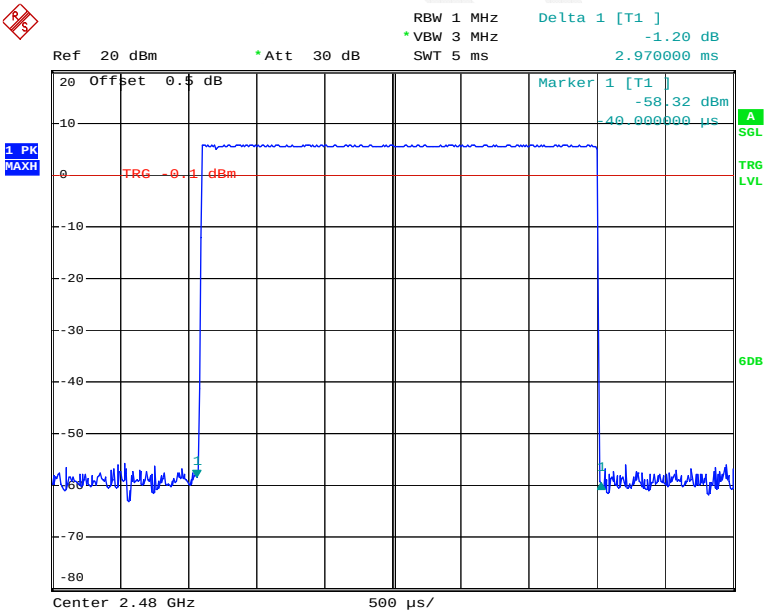
Date: 30.APR.2015 18:16:35

DH5: Middle Channel



Date: 30.APR.2015 18:16:54

DH5: High Channel

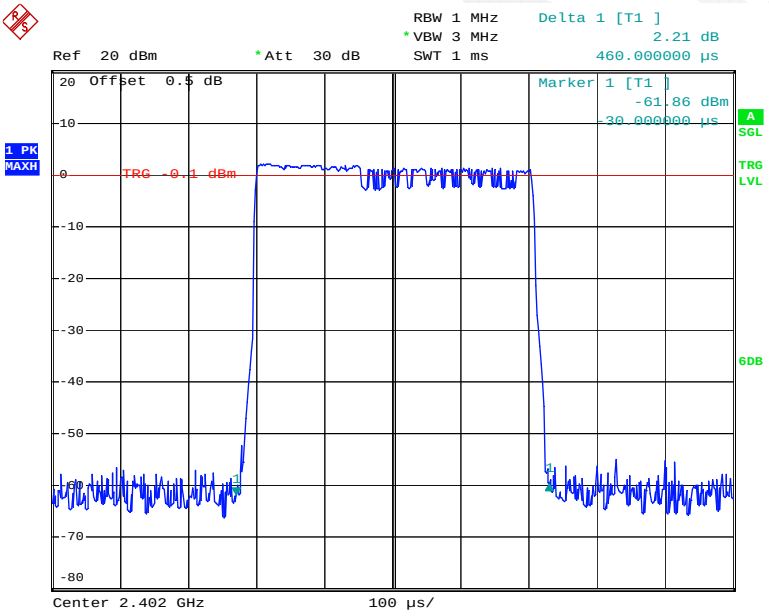


Date: 30.APR.2015 18:17:11

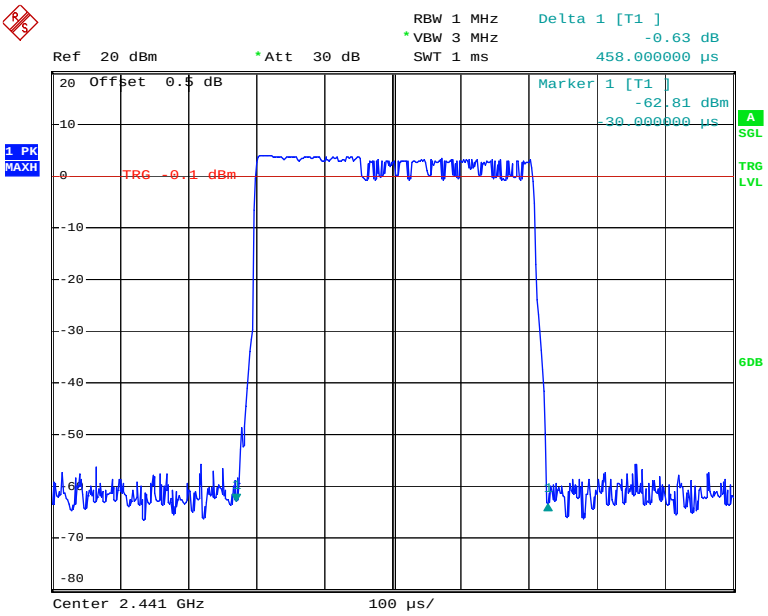
EDR Mode (π/4-DQPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.460	0.147	0.4	Pass
	Middle	0.458	0.147	0.4	Pass
	High	0.460	0.147	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.738	0.278	0.4	Pass
	Middle	1.726	0.276	0.4	Pass
	High	1.744	0.279	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	2.980	0.318	0.4	Pass
	Middle	3.010	0.321	0.4	Pass
	High	3.000	0.320	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel

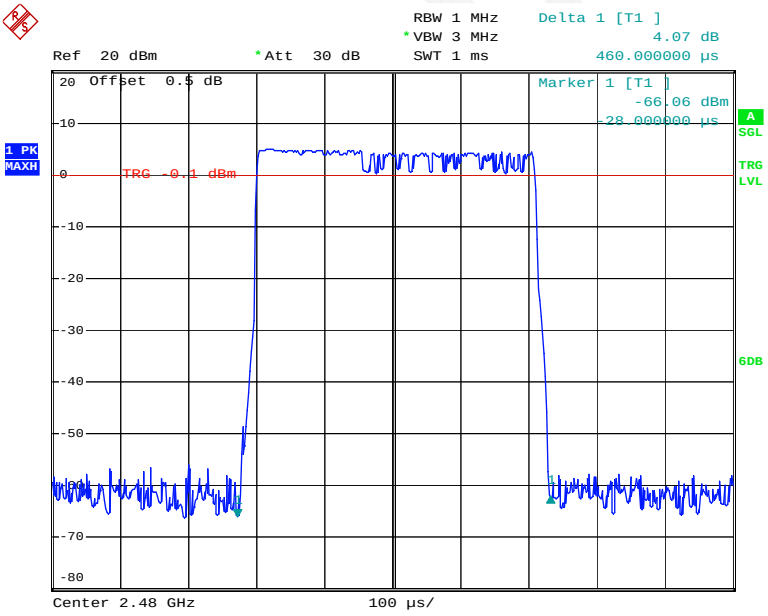


DH1: Middle Channel



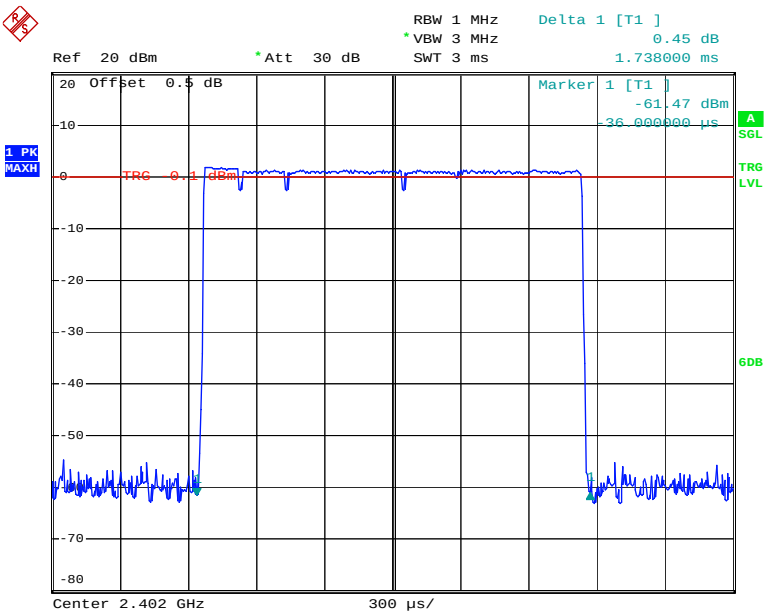
Date: 30.APR.2015 18:11:16

DH1: High Channel



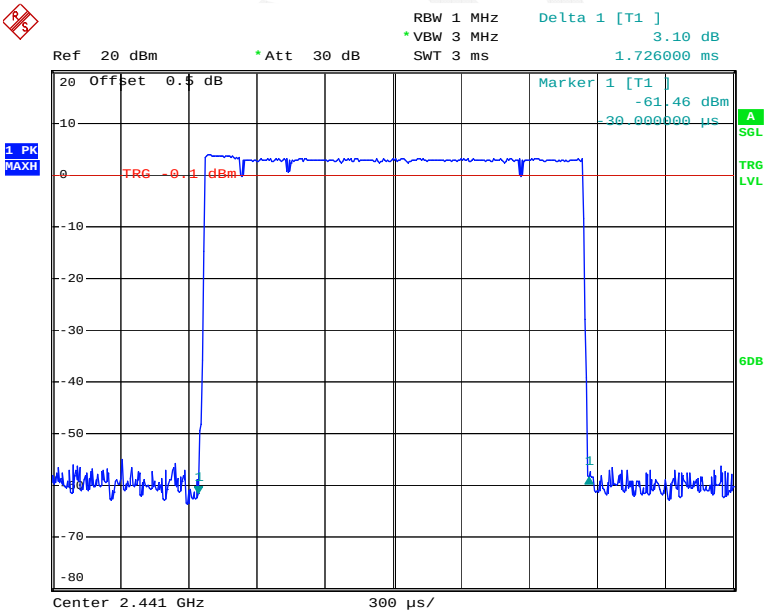
Date: 30.APR.2015 18:10:49

DH3: Low Channel



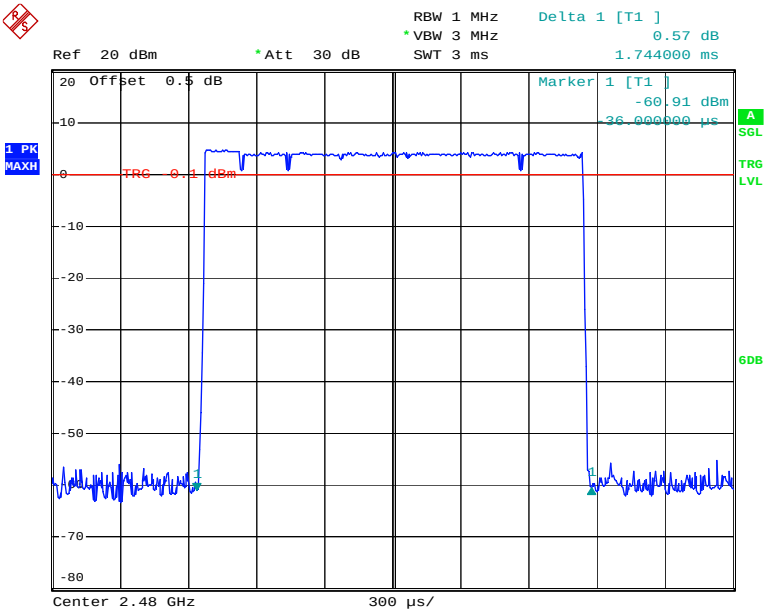
Date: 30.APR.2015 18:27:37

DH3: Middle Channel



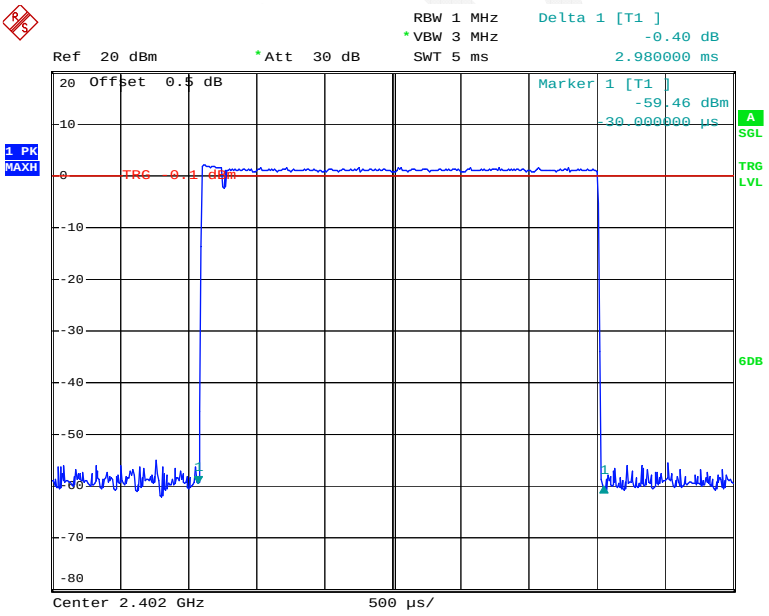
Date: 30.APR.2015 18:27:21

DH3: High Channel



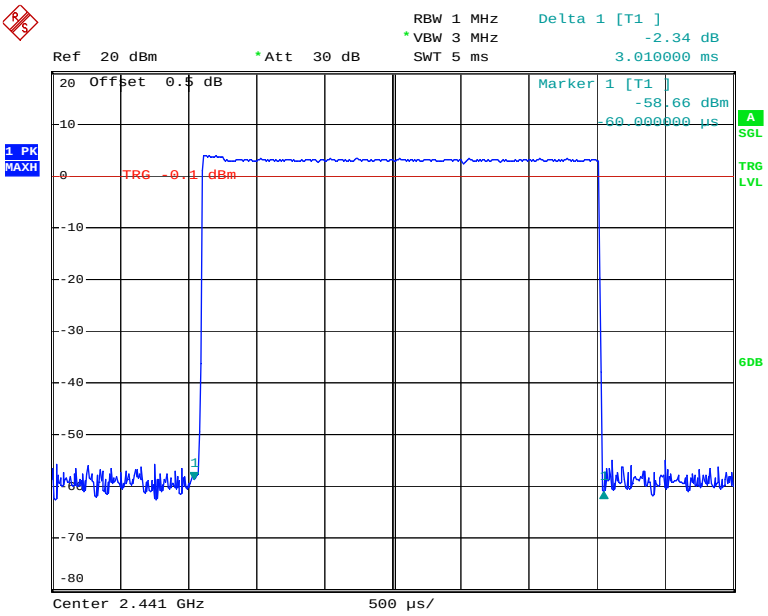
Date: 30.APR.2015 18:27:02

DH5: Low Channel



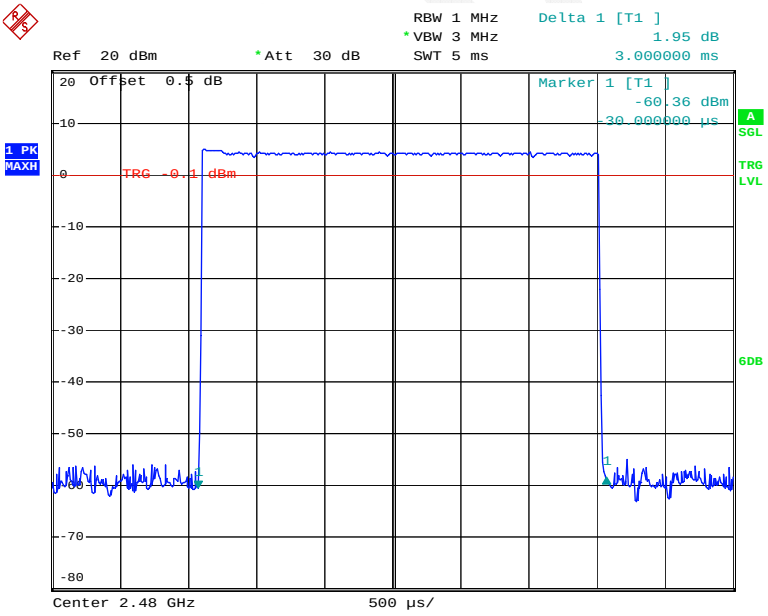
Date: 30.APR.2015 18:18:44

DH5: Middle Channel



Date: 30.APR.2015 18:18:28

DH5: High Channel

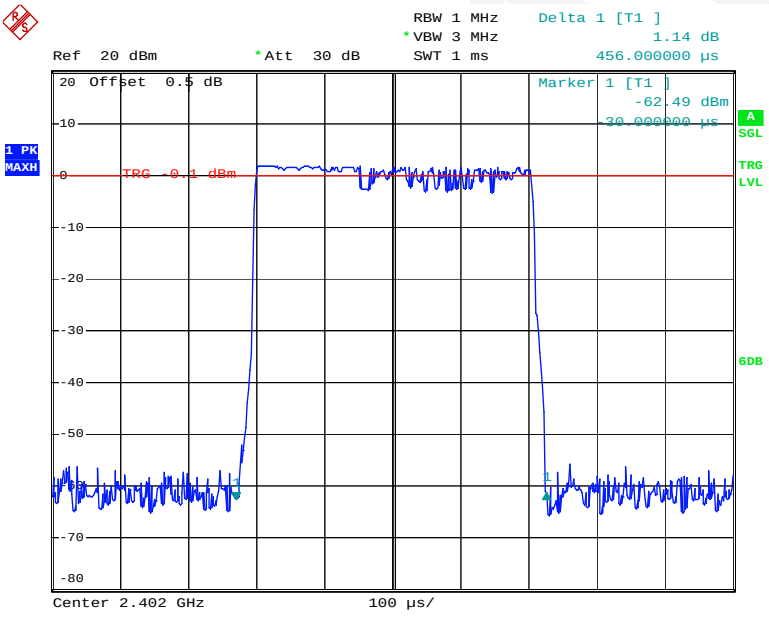


Date: 30.APR.2015 18:18:09

EDR Mode (8-DPSK):

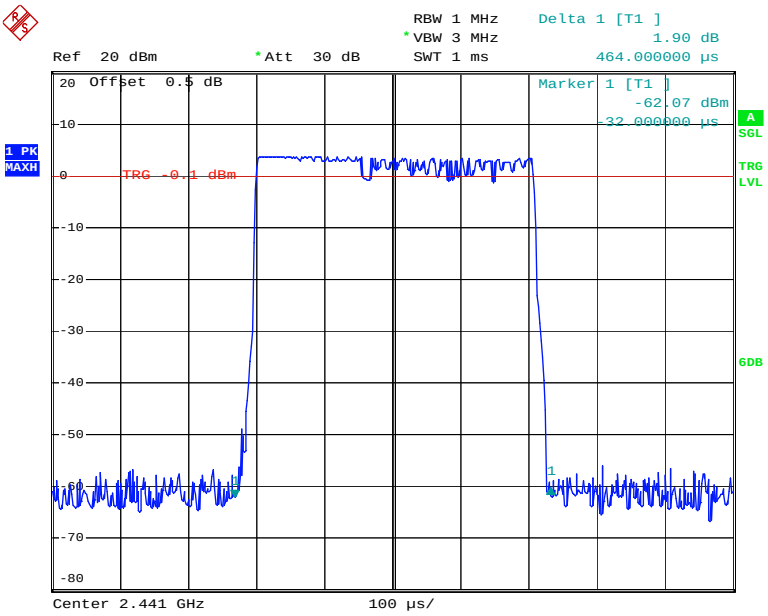
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.456	0.146	0.4	Pass
	Middle	0.464	0.148	0.4	Pass
	High	0.456	0.146	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.726	0.276	0.4	Pass
	Middle	1.726	0.276	0.4	Pass
	High	1.726	0.276	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	3.000	0.320	0.4	Pass
	Middle	2.990	0.319	0.4	Pass
	High	3.000	0.320	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel



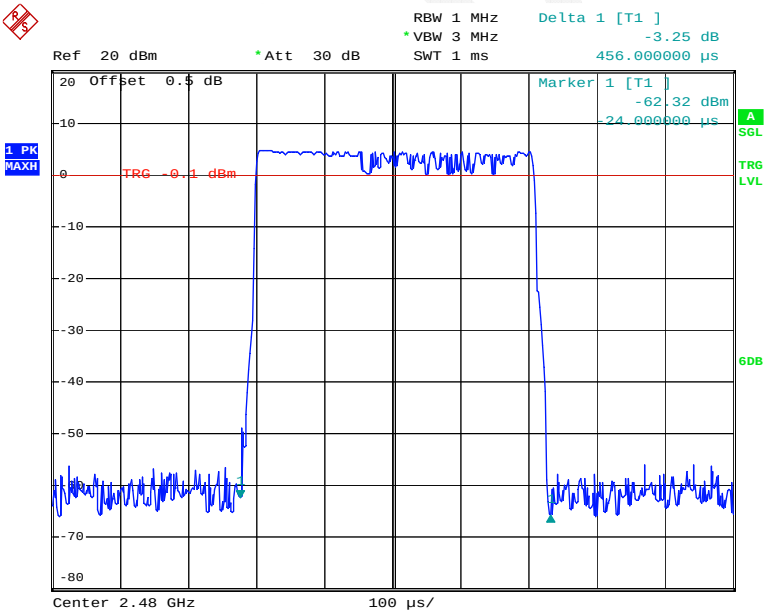
Date: 30.APR.2015 18:31:06

DH1: Middle Channel



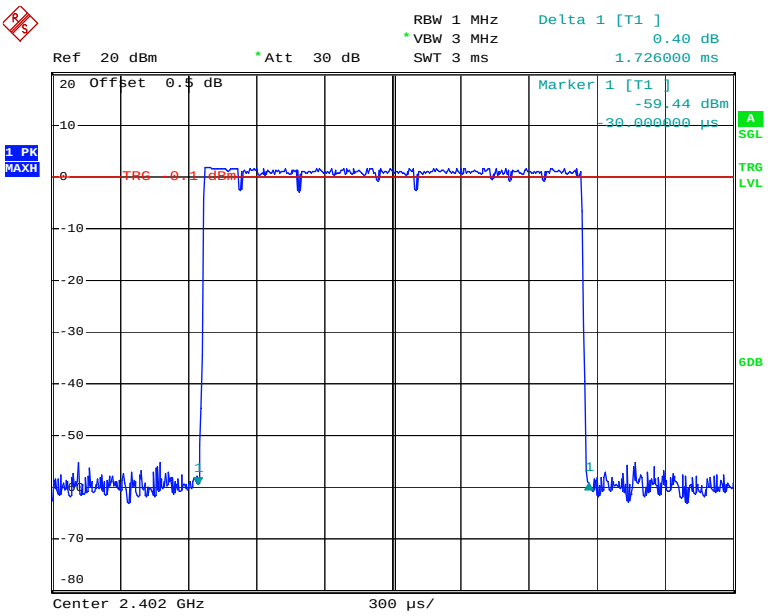
Date: 30.APR.2015 18:30:38

DH1: High Channel



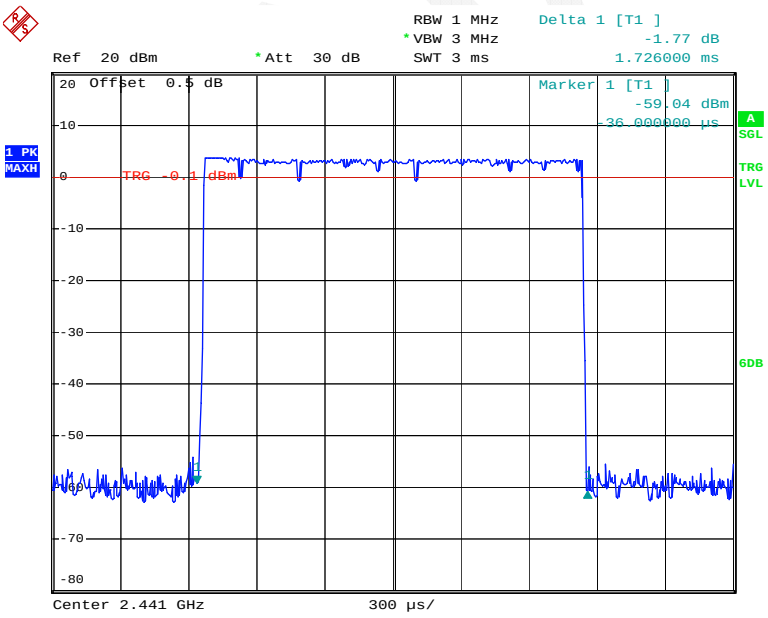
Date: 30.APR.2015 18:30:21

DH3: Low Channel



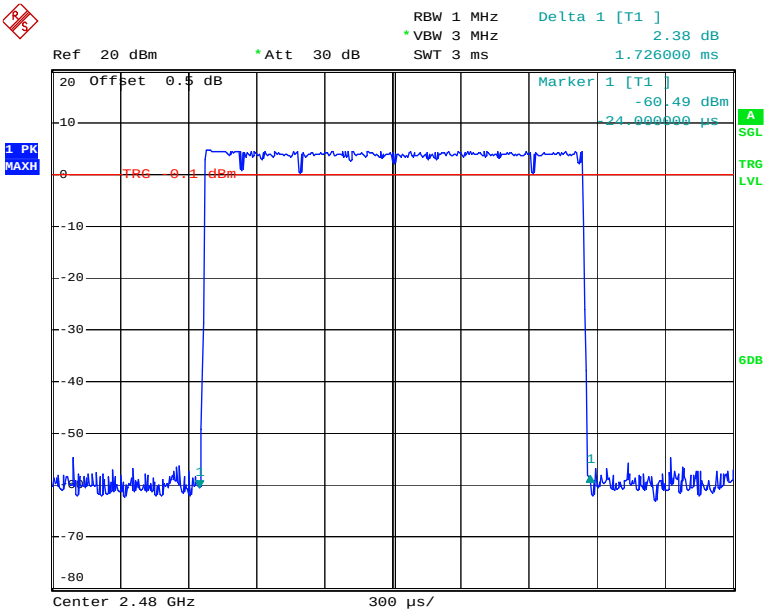
Date: 30.APR.2015 18:28:37

DH3: Middle Channel



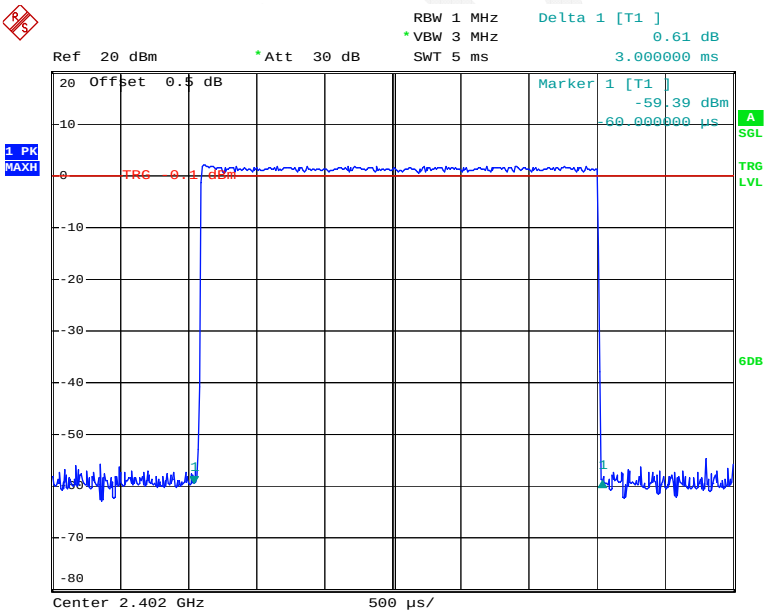
Date: 30.APR.2015 18:28:52

DH3: High Channel



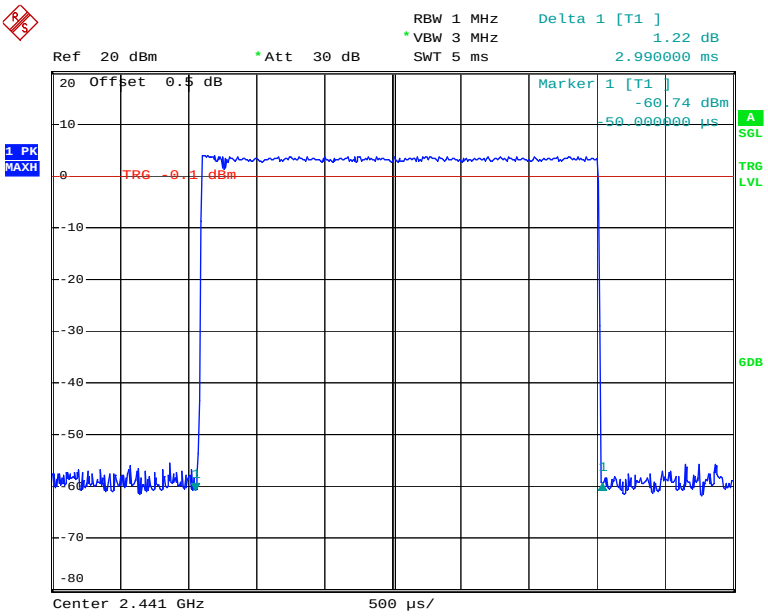
Date: 30.APR.2015 18:29:08

DH5: Low Channel



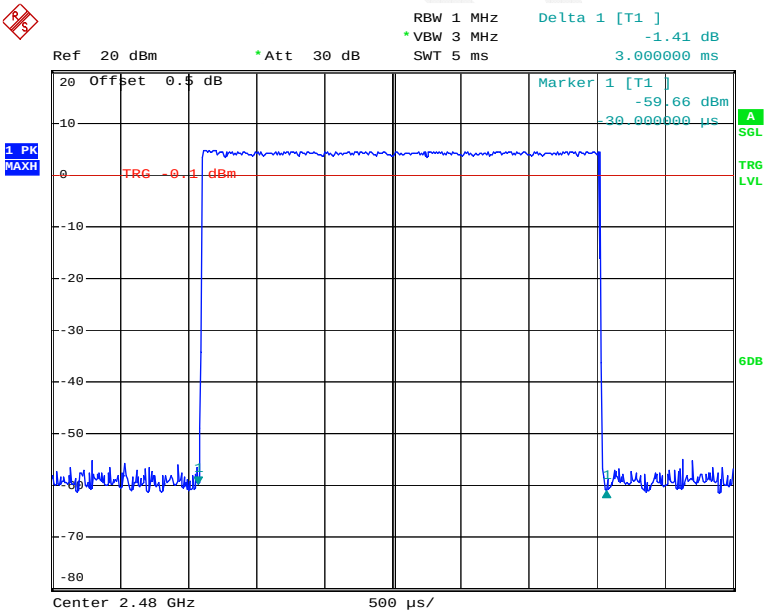
Date: 30.APR.2015 18:19:36

DH5: Middle Channel



Date: 30.APR.2015 18:19:51

DH5: High Channel



Date: 30.APR.2015 18:20:10

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 test equipment.
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	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

Temperature:	25.3 °C
Relative Humidity:	56 %
ATM Pressure:	100.4 kPa

** The testing was performed by Dean Liu on 2015-05-03.*

Test Result: Compliance.

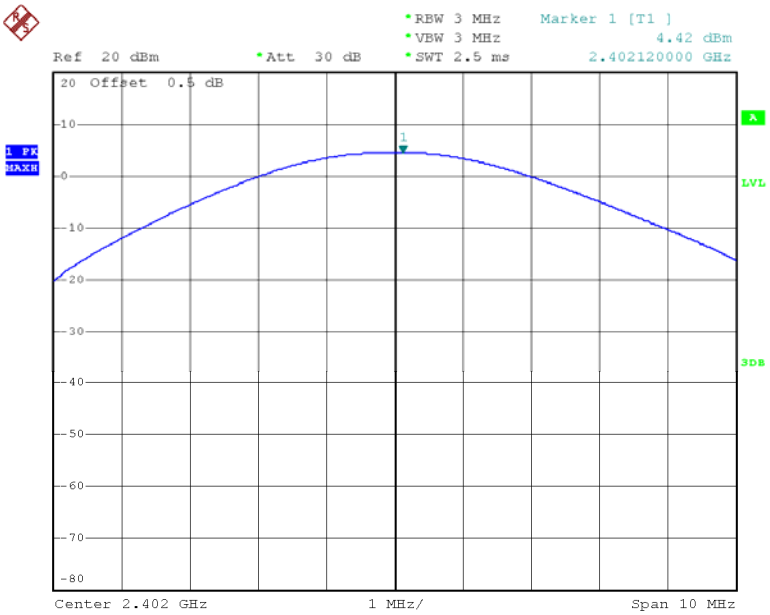
Test Mode: Transmitting

Mode	Frequency (MHz)	Output power (dBm)	Limit (dBm)
BDR Mode (GFSK)	2402	4.42	30
	2441	4.85	30
	2480	5.79	30
EDR Mode (π/4-DQPSK)	2402	3.33	30
	2441	4.27	30
	2480	5.29	30
EDR Mode (8-DPSK)	2402	3.59	30
	2441	4.39	30
	2480	5.36	30

Note: The data above was tested in conducted mode.

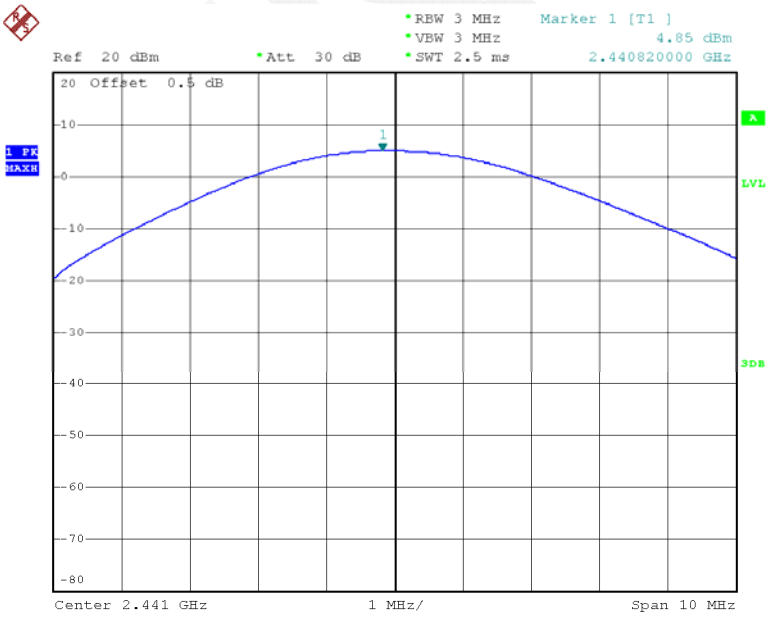
BDR Mode (GFSK):

Output Power, 2402 MHz



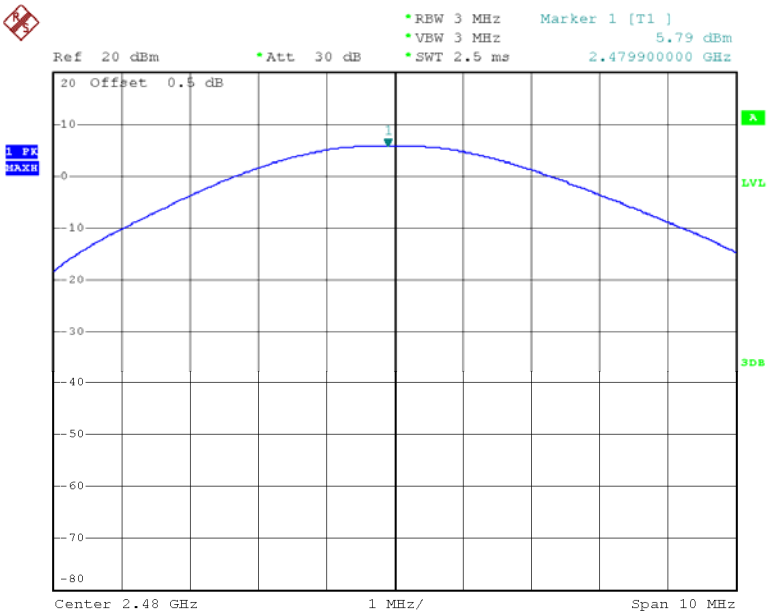
Date: 3.MAY.2015 16:21:43

Output Power, 2441 MHz



Date: 3.MAY.2015 16:21:54

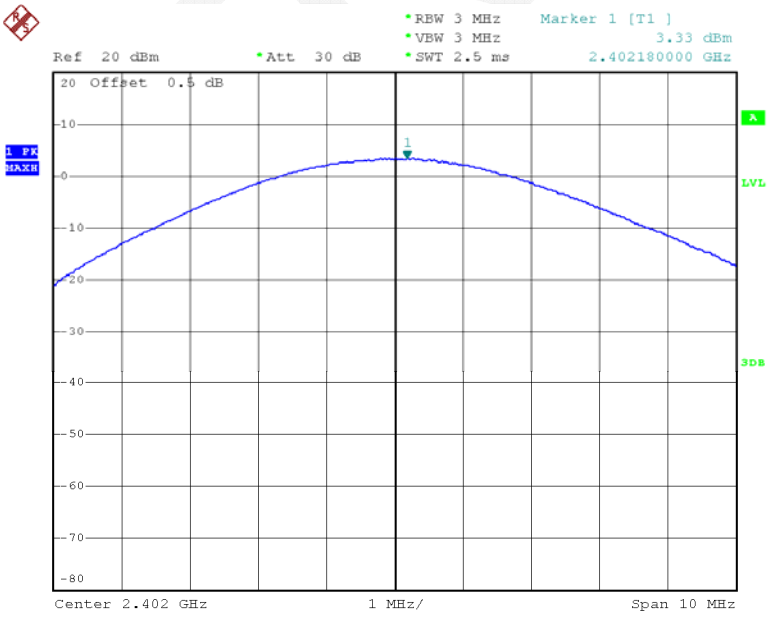
Output Power, 2480 MHz



Date: 3.MAY.2015 16:22:12

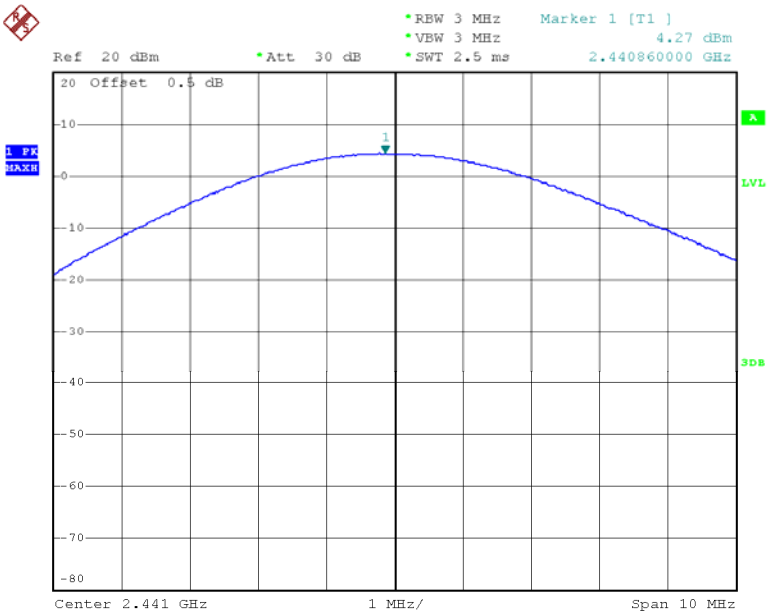
EDR Mode (π/4-DQPSK):

Output Power, 2402 MHz



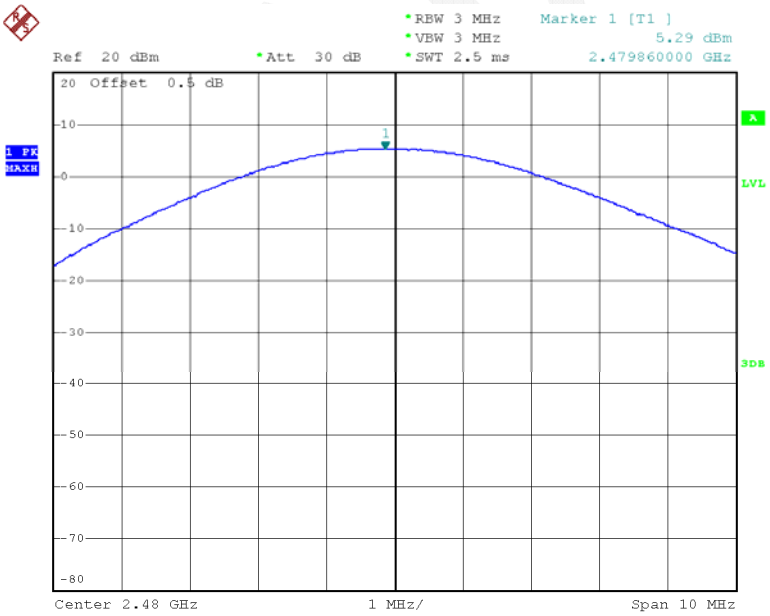
Date: 3.MAY.2015 16:24:39

Output Power, 2441 MHz



Date: 3.MAY.2015 16:24:56

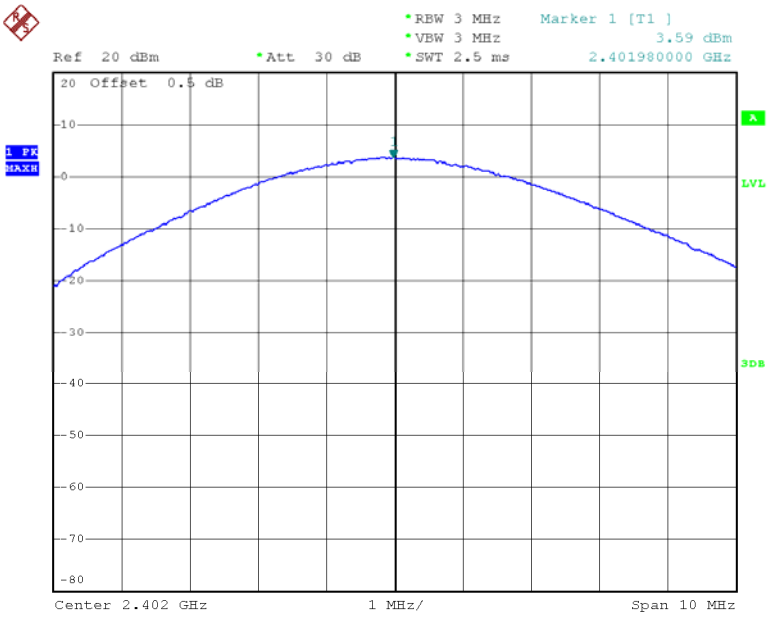
Output Power, 2480 MHz



Date: 3.MAY.2015 16:25:13

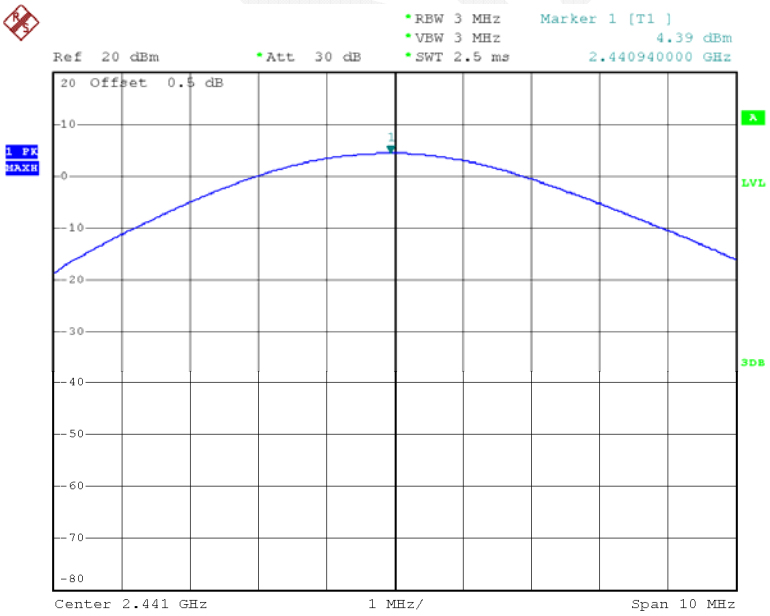
EDR Mode (8-DPSK):

Output Power, 2402 MHz



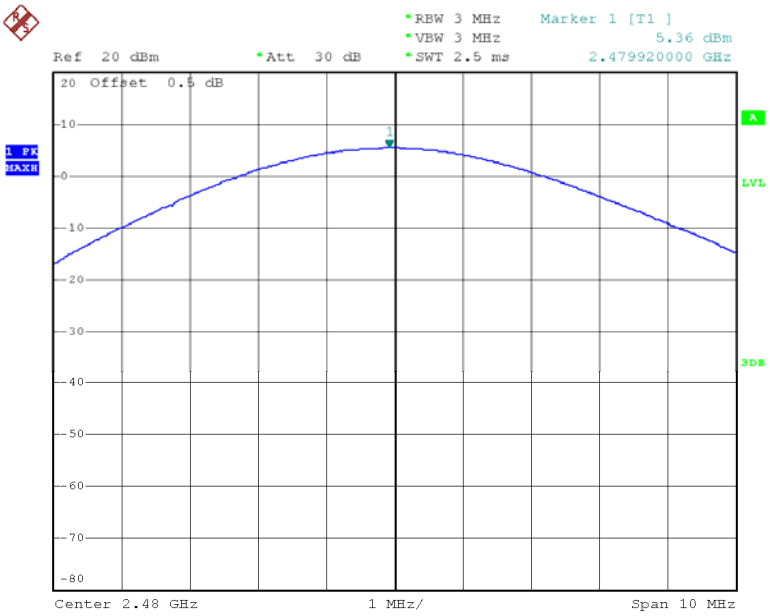
Date: 3.MAY.2015 16:22:52

Output Power, 2441 MHz



Date: 3.MAY.2015 16:23:44

Output Power, 2480 MHz



Date: 3.MAY.2015 16:24:09

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	2014-05-09	2015-05-09

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

Test Data

Environmental Conditions

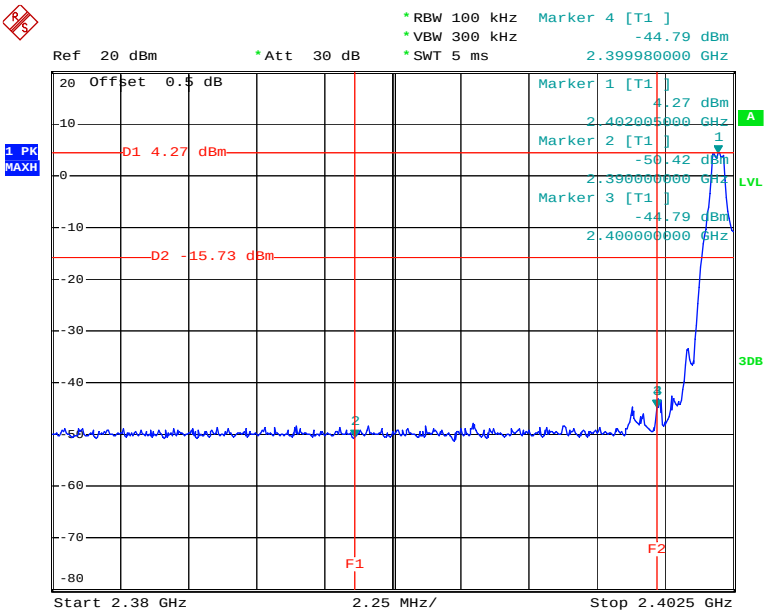
Temperature:	25.4°C
Relative Humidity:	58 %
ATM Pressure:	100.6 kPa

** The testing was performed by Dean Liu on 2015-04-30.*

Test Result: Compliance

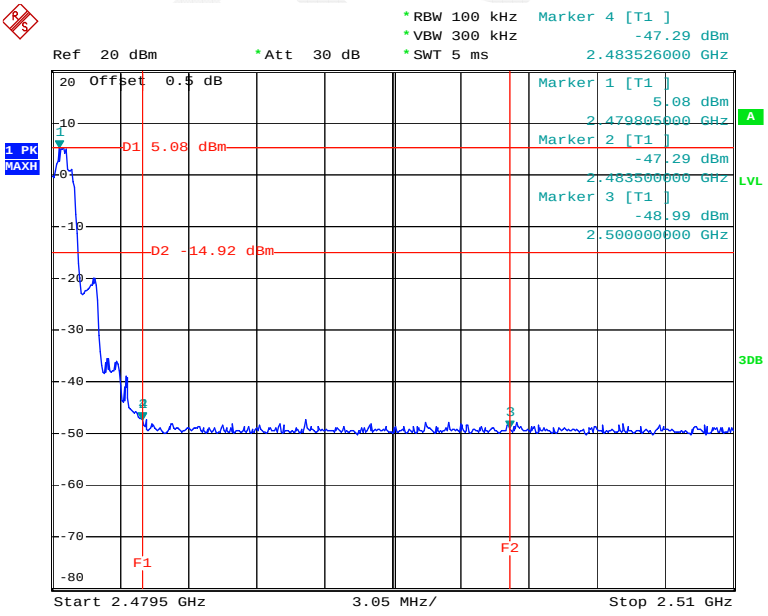
BDR Mode (GFSK):

Band Edge, Left Side



Date: 30.APR.2015 19:03:54

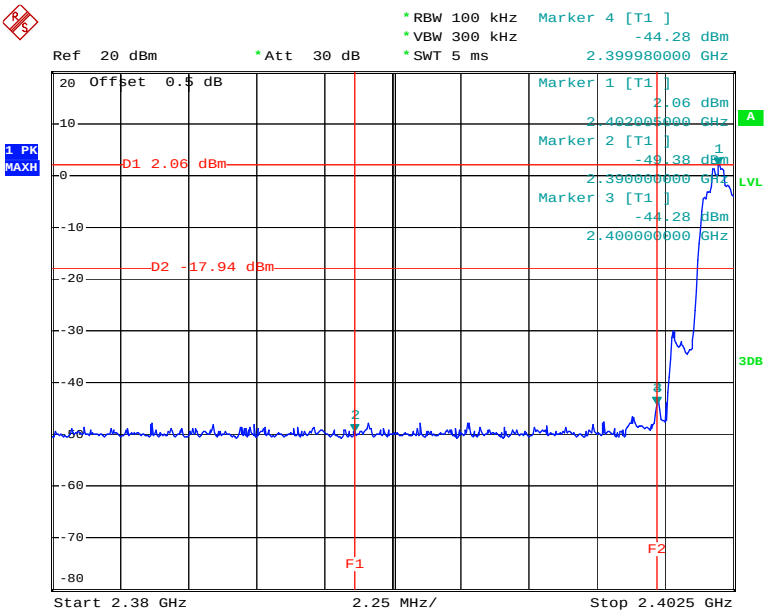
Band Edge, Right Side



Date: 30.APR.2015 18:48:56

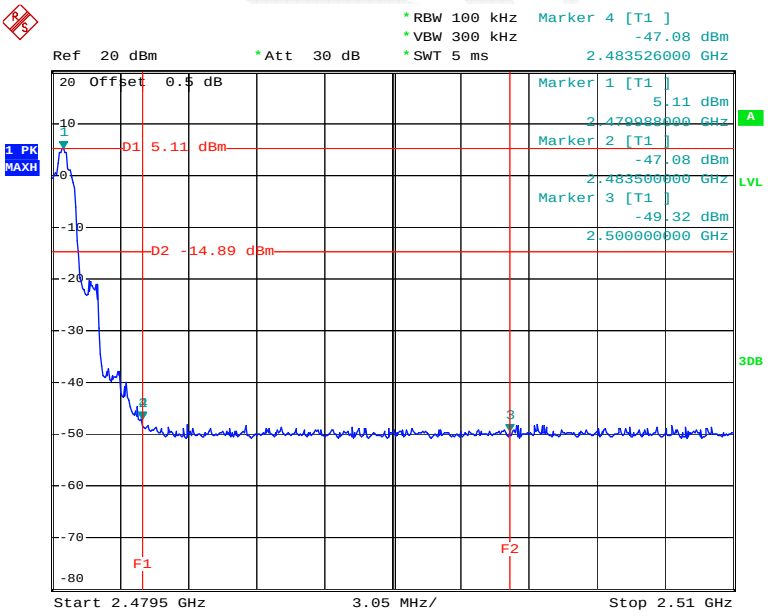
EDR Mode (π/4-DQPSK):

Band Edge, Left Side



Date: 30.APR.2015 19:06:49

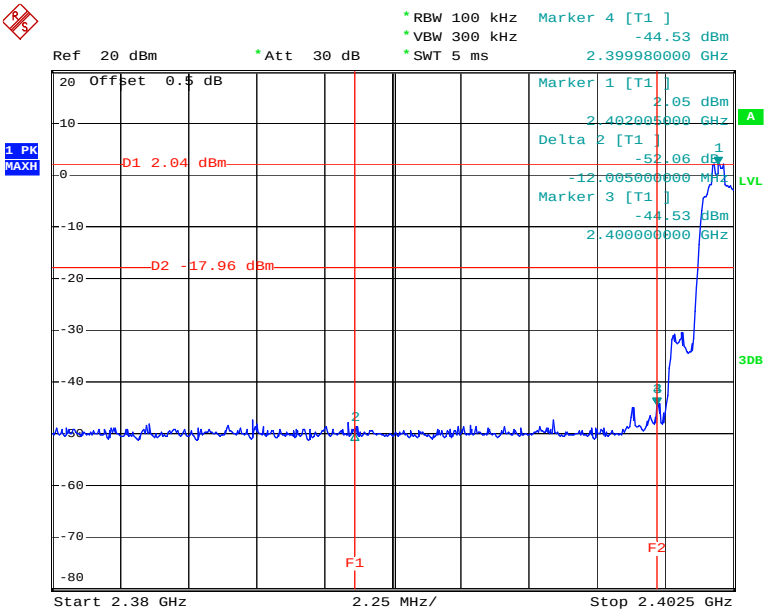
Band Edge, Right Side



Date: 30.APR.2015 19:00:52

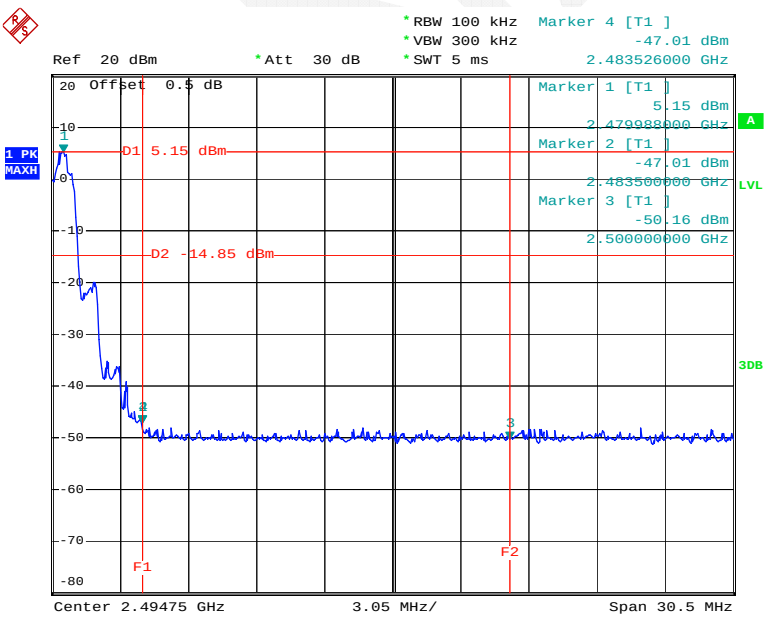
EDR Mode (8-DPSK):

Band Edge, Left Side



Date: 30.APR.2015 19:08:47

Band Edge, Right Side



Date: 30.APR.2015 18:57:46

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