

FCC PART 15.247

TEST REPORT

For

Jiangsu SEUIC Technology Co., Ltd

No23, Wenzhu Road, Yuhuatai District, Nanjing, Jiangsu, China.

FCC ID: 2AC68-AUTOID6

Report Type: Original Report	Product Type: AUTOID6
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Jiangsu SEUIC Technology Co.,Ltd's product, model number: *AUTOID6* (FCC ID: 2AC68-AUTOID6) or ("EUT") in this report is a *AUTOID6*, rated input voltage: DC 5V from adapter or DC 3.7V from lithium battery.

The measurement please refer below:

Description	Serial Number	Length (cm)	Width (cm)	High (cm)
RFID antenna on the back side	140814050-1	15.6	8.1	5.6
RFID antenna on the top side	140814050-2	19.7	8.4	5.6

Adapter information:

Model: FJ-SW0503000U

Input: AC 100-240V, 50/60Hz, 0.6A max

Output: DC 5V, 3000mA

**Two type of RFID antenna employed for this product, please refer to the EUT photos, the antenna type don't effected the test results,all measurement and test data in this report was gathered from production sample serial number: 140814050-1 .The EUT was received on 2014-08-21*

Objective

This report is prepared on behalf of Jiangsu SEUIC Technology 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 Part15C DTS submissions with FCC ID: 2AC68-AUTOID6.

FCC Part15C DSS submissions with FCC ID: 2AC68-AUTOID6.

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, Puxihu 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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode.

EUT Exercise Software

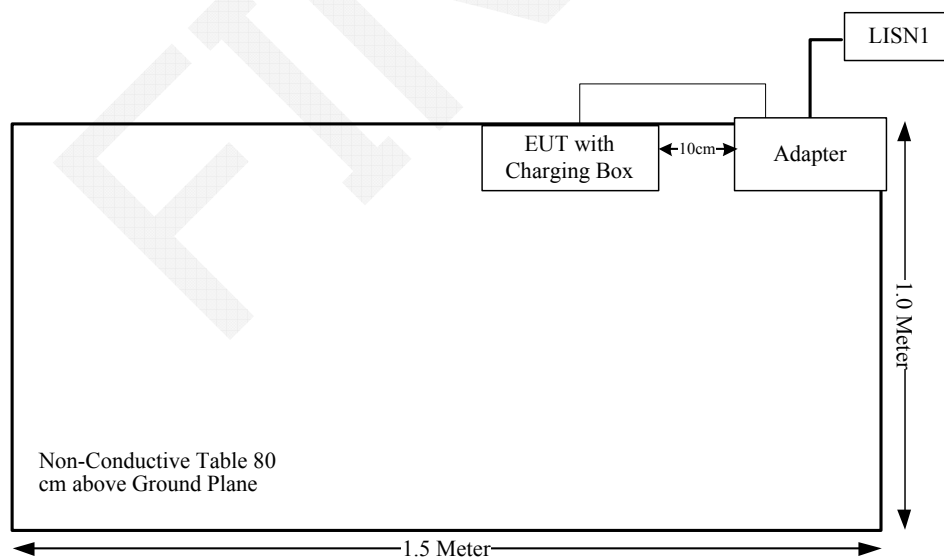
The software “Broadcom Bluetool” embedded in the EUT was used, which was provided by manufacturer. The maximum power was set by default configuration.

Test Software Version		Broadcom Bluetool		
Test Frequency		2402MHz	2441MHz	2480MHz
Power Level Setting	GFSK	0	0	0
	$\pi/4$ DQPSK	0	0	0
	8DPSK	0	0	0

Equipment Modifications

No modification was made to the EUT.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1) & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§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) & §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:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ 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 = -2.66 dBm (0.54 mW) at 2480MHz
 $[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 $= 0.54/5 \cdot (\sqrt{2.480}) = 0.17 < 7.5$

So the stand-alone SAR evaluation is not necessary for extremity (hands) use.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has one integral antenna arrangement for BT, and the antenna gain is 1 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSIONS

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_{cisp} 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_{cisp} of Table 1, then:

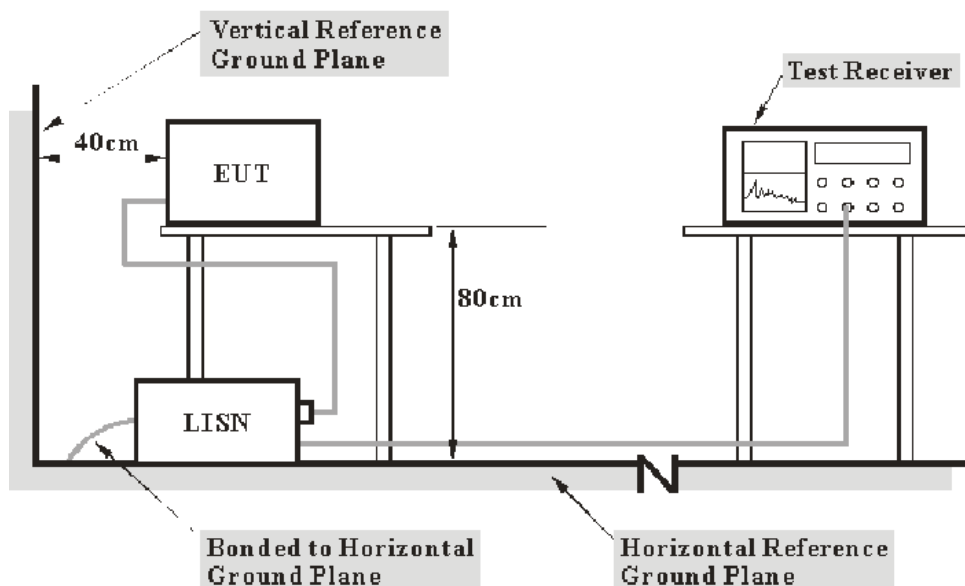
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

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_{cisp}

Measurement	U_{cisp}
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 Class B limits.

The spacing between the peripherals was 10 cm.

The adapter of EUT 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

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:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

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:

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

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	2014-11-20
R&S	L.I.S.N	ESH3-Z5	843331/015	N/A	N/A
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-01-22	2015-01-22
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

* **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 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:

18.6 dB at 0.186006 MHz in the **Neutral** conducted mode

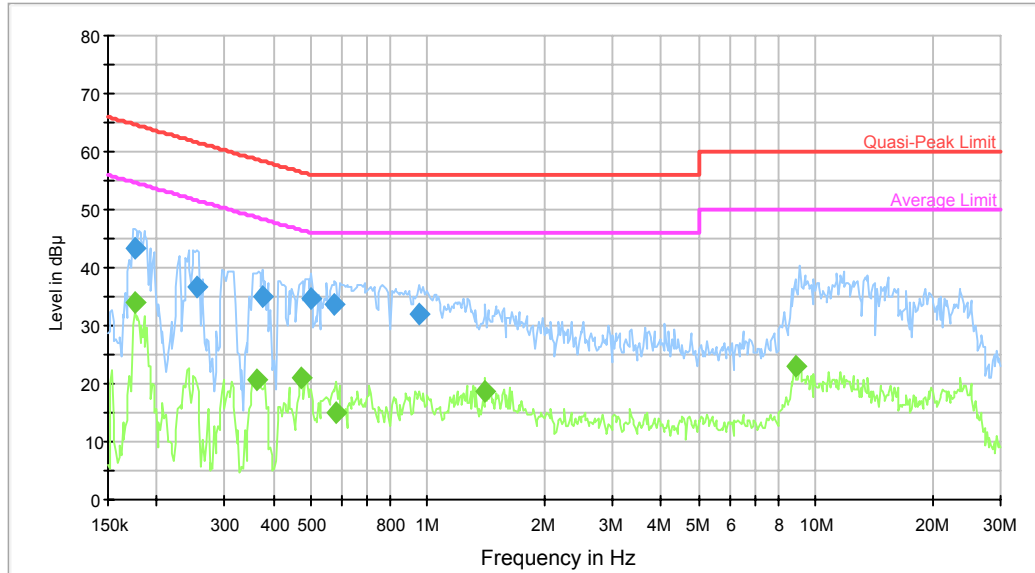
Test Data**Environmental Conditions**

Temperature:	28.3 °C
Relative Humidity:	49 %
ATM Pressure:	100.5 kPa

The testing was performed by Sevin Li on 2014-08-25.

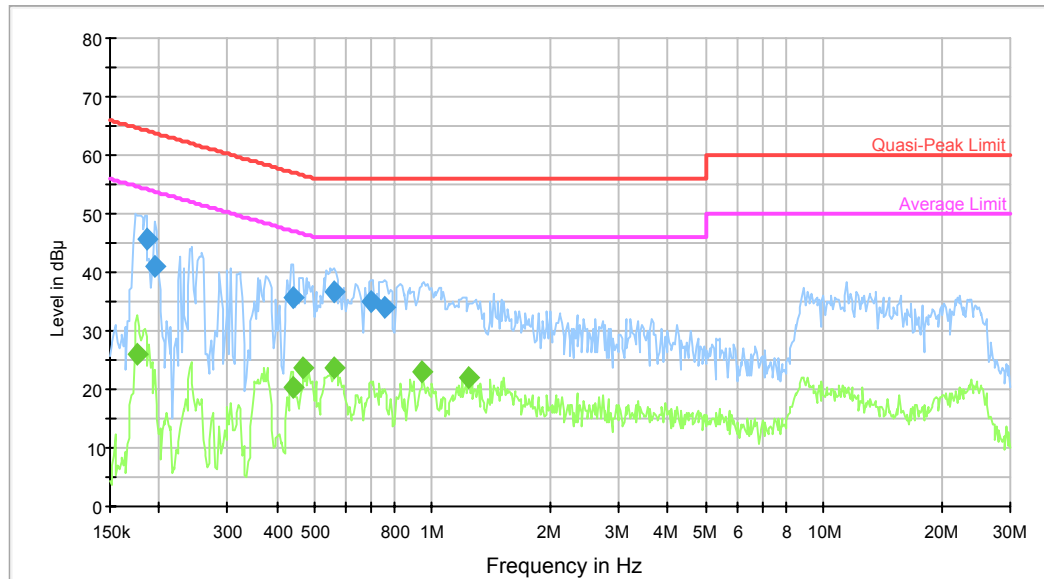
Test mode: Charging&Bluetooth Operating

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.175915	43.3	9.000	L1	10.4	21.4	64.7	Compliance
0.253797	36.7	9.000	L1	10.7	24.9	61.6	Compliance
0.375019	35.2	9.000	L1	10.6	23.2	58.4	Compliance
0.499611	34.7	9.000	L1	10.4	21.3	56.0	Compliance
0.576662	33.6	9.000	L1	10.4	22.4	56.0	Compliance
0.952654	32.1	9.000	L1	10.4	23.9	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.175915	34.0	9.000	L1	10.4	20.7	54.7	Compliance
0.363254	20.8	9.000	L1	10.7	27.9	48.7	Compliance
0.472507	21.0	9.000	L1	10.4	25.5	46.5	Compliance
0.581275	15.2	9.000	L1	10.4	30.8	46.0	Compliance
1.407671	18.5	9.000	L1	10.4	27.5	46.0	Compliance
8.869191	22.9	9.000	L1	10.7	27.1	50.0	Compliance

AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.186006	45.6	9.000	N	11.0	18.6	64.2	Compliance
0.195114	40.9	9.000	N	11.2	22.9	63.8	Compliance
0.443327	35.5	9.000	N	10.6	21.5	57.0	Compliance
0.563041	36.7	9.000	N	10.4	19.3	56.0	Compliance
0.698191	35.1	9.000	N	10.6	20.9	56.0	Compliance
0.756101	34.0	9.000	N	10.6	22.0	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.175915	26.1	9.000	N	10.8	28.6	54.7	Compliance
0.439808	20.4	9.000	N	10.6	26.7	47.1	Compliance
0.468757	23.6	9.000	N	10.5	22.9	46.5	Compliance
0.563041	23.7	9.000	N	10.4	22.3	46.0	Compliance
0.945093	23.0	9.000	N	10.5	23.0	46.0	Compliance
1.239175	22.0	9.000	N	10.5	24.0	46.0	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_{cisp} 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_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, 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

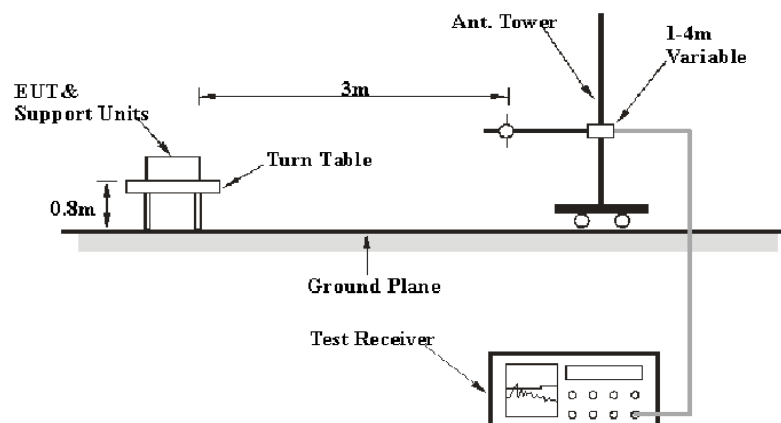
6G~18GHz: 5.23 dB

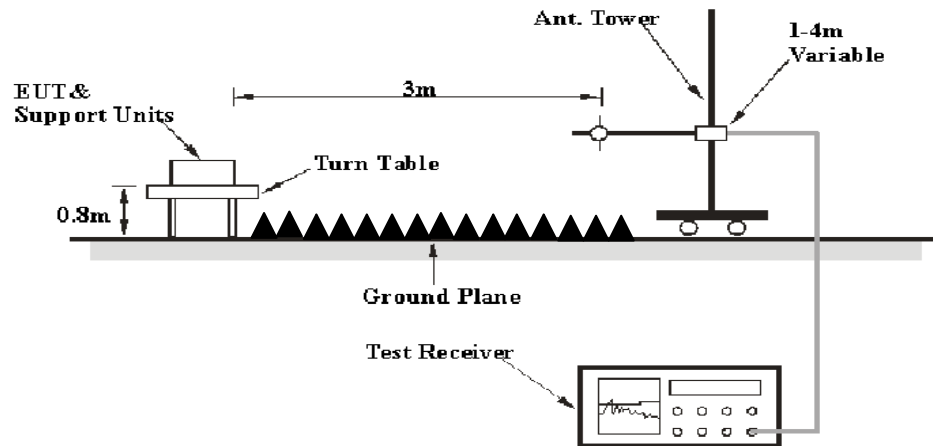
Table 1 – Values of U_{cisp}

Measurement	U_{cisp}
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 of EUT 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
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	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technologies	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:

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

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

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

Test Results Summary

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

12.12 dB at 42.2 MHz in the Vertical polarization of EDR Mode (8DPSK)

Test Data**Environmental Conditions**

Temperature:	26.7 °C-
Relative Humidity:	52 %
ATM Pressure:	100.5 kPa

The testing was performed by Sevin Li on 2014-10-08

Mode: Transmitting

BDR Mode (GFSK):

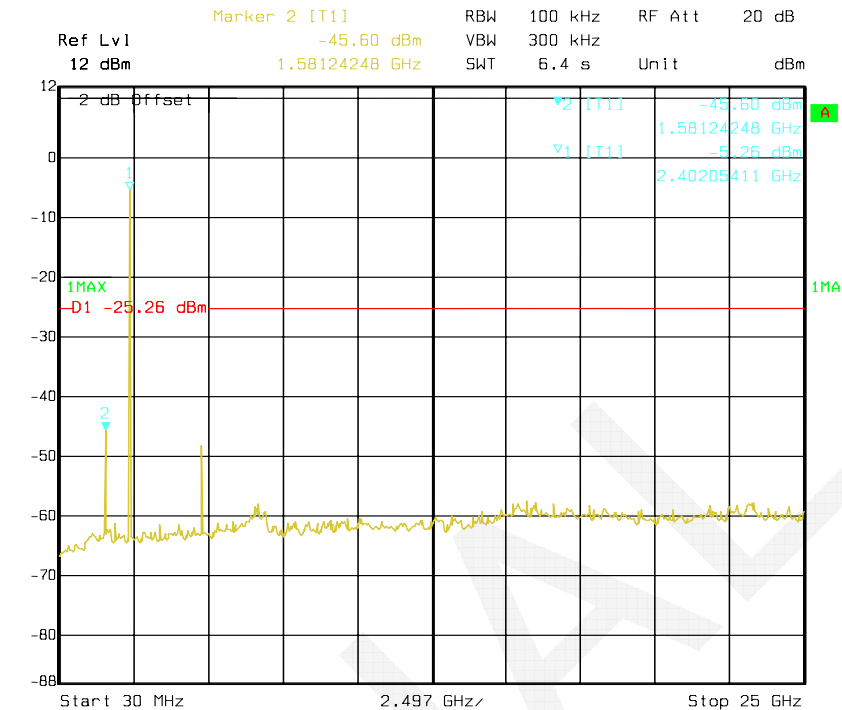
Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2402 MHz									
2402	91.04	PK	H	25.65	4.42	27.32	93.79	N/A	N/A
2402	73.4	AV	H	25.65	4.42	27.32	76.15	N/A	N/A
2402	88.77	PK	V	25.65	4.42	27.32	91.52	N/A	N/A
2402	70.36	AV	V	25.65	4.42	27.32	73.11	N/A	N/A
2390	39.62	PK	H	25.61	4.39	27.32	42.30	74.00	31.70
2390	21.89	AV	H	25.61	4.39	27.32	24.57	54.00	29.43
4804	38.21	PK	H	30.59	5.98	27.41	47.37	74.00	26.63
4804	22.59	AV	H	30.59	5.98	27.41	31.75	54.00	22.25
7206	30.67	PK	H	34.09	7.45	25.91	46.30	74.00	27.70
7206	19.36	AV	H	34.09	7.45	25.91	34.99	54.00	19.01
9608	29.47	PK	H	35.96	8.80	27.55	46.68	74.00	27.32
9608	18.24	AV	H	35.96	8.80	27.55	35.45	54.00	18.55
1595	47.15	PK	H	23.79	3.23	27.79	46.38	74.00	27.62
1595	26.43	AV	H	23.79	3.23	27.79	25.66	54.00	28.34
42.2	35.04	QP	V	12.84	0.83	21.42	27.29	40.00	12.71
Middle Channel: 2441 MHz									
2441	90.36	PK	H	25.75	4.40	27.34	93.17	N/A	N/A
2441	72.17	AV	H	25.75	4.40	27.34	74.98	N/A	N/A
2441	88.21	PK	V	25.75	4.40	27.34	91.02	N/A	N/A
2441	71.06	AV	V	25.75	4.40	27.34	73.87	N/A	N/A
4882	38.69	PK	H	30.79	6.08	27.42	48.14	74.00	25.86
4882	23.89	AV	H	30.79	6.08	27.42	33.34	54.00	20.66
7323	31.25	PK	H	34.38	7.51	25.88	47.26	74.00	26.74
7323	20.06	AV	H	34.38	7.51	25.88	36.07	54.00	17.93
9764	29.45	PK	H	36.33	8.83	27.20	47.41	74.00	26.59
9764	18.67	AV	H	36.33	8.83	27.20	36.63	54.00	17.37
1595	46.3	PK	H	23.79	3.23	27.79	45.53	74.00	28.47
1595	26.84	AV	H	23.79	3.23	27.79	26.07	54.00	27.93
42.2	34.26	QP	V	12.84	0.83	21.42	26.51	40.00	13.49
High Channel: 2480 MHz									
2480	90.41	PK	H	25.85	4.48	27.36	93.38	N/A	N/A
2480	72.78	AV	H	25.85	4.48	27.36	75.75	N/A	N/A
2480	88.67	PK	V	25.85	4.48	27.36	91.64	N/A	N/A
2480	70.88	AV	V	25.85	4.48	27.36	73.85	N/A	N/A
4960	40.07	PK	H	31.00	5.90	27.43	49.54	74.00	24.46
4960	24.59	AV	H	31.00	5.90	27.43	34.06	54.00	19.94
7440	31.66	PK	H	34.66	7.58	25.97	47.93	74.00	26.07
7440	20.36	AV	H	34.66	7.58	25.97	36.63	54.00	17.37
9920	29.47	PK	H	36.71	8.87	26.66	48.39	74.00	25.61
9920	18.62	AV	H	36.71	8.87	26.66	37.54	54.00	16.46
2483.5	38.29	PK	H	25.86	4.49	27.36	41.28	74.00	32.72
2483.5	21.74	AV	H	25.86	4.49	27.36	24.73	54.00	29.27
1653	46.32	PK	H	23.91	3.41	27.74	45.90	74.00	28.10
1653	32.21	AV	H	23.91	3.41	27.74	31.79	54.00	22.21
42.2	35.33	QP	V	12.84	0.83	21.42	27.58	40.00	12.42

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

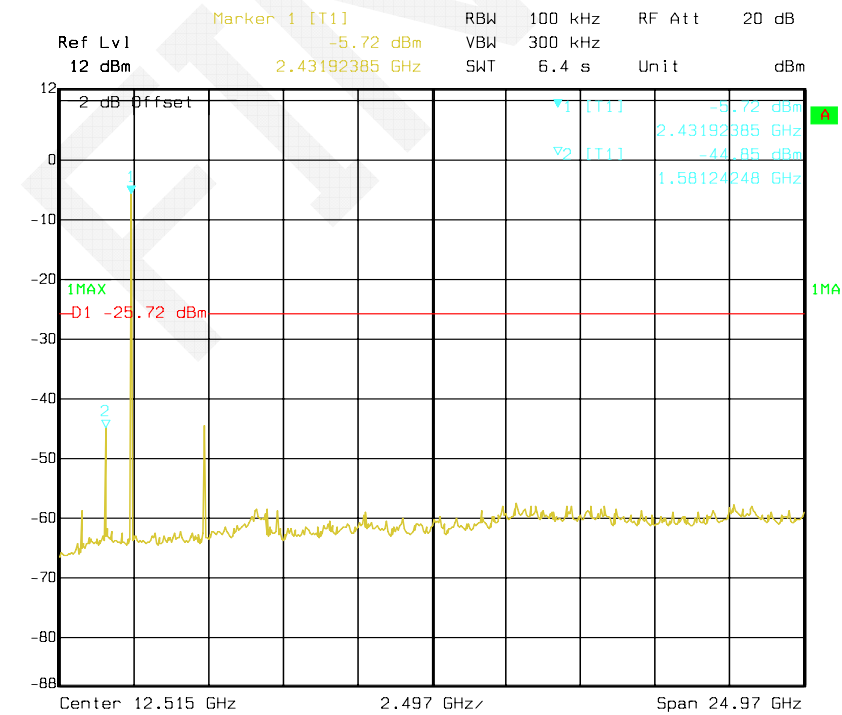
Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2402 MHz									
2402	89.36	PK	H	25.65	4.42	27.32	92.11	N/A	N/A
2402	70.99	AV	H	25.65	4.42	27.32	73.74	N/A	N/A
2402	87.62	PK	V	25.65	4.42	27.32	90.37	N/A	N/A
2402	70.08	AV	V	25.65	4.42	27.32	72.83	N/A	N/A
2390	36.14	PK	H	25.61	4.39	27.32	38.82	74.00	35.18
2390	22.03	AV	H	25.61	4.39	27.32	24.71	54.00	29.29
4804	35.02	PK	H	30.59	5.98	27.41	44.18	74.00	29.82
4804	21.74	AV	H	30.59	5.98	27.41	30.90	54.00	23.10
7206	30.52	PK	H	34.09	7.45	25.91	46.15	74.00	27.85
7206	19.48	AV	H	34.09	7.45	25.91	35.11	54.00	18.89
9608	29.54	PK	H	35.96	8.80	27.55	46.75	74.00	27.25
9608	18.37	AV	H	35.96	8.80	27.55	35.58	54.00	18.42
1595	45.01	PK	H	23.79	3.23	27.79	44.24	74.00	29.76
1595	25.74	AV	H	23.79	3.23	27.79	24.97	54.00	29.03
42.2	35.23	QP	V	12.84	0.83	21.42	27.48	40.00	12.52
Middle Channel: 2441 MHz									
2480	89.74	PK	H	25.85	4.48	27.36	92.71	N/A	N/A
2480	72.31	AV	H	25.85	4.48	27.36	75.28	N/A	N/A
2480	87.94	PK	V	25.85	4.48	27.36	90.91	N/A	N/A
2480	70.88	AV	V	25.85	4.48	27.36	73.85	N/A	N/A
4960	36.21	PK	H	31.00	5.90	27.43	45.68	74.00	28.32
4960	22.32	AV	H	31.00	5.90	27.43	31.79	54.00	22.21
7440	31.28	PK	V	34.66	7.58	25.97	47.55	74.00	26.45
7440	20.34	AV	H	34.66	7.58	25.97	36.61	54.00	17.39
9920	29.45	PK	H	36.71	8.87	26.66	48.37	74.00	25.63
9920	18.22	AV	H	36.71	8.87	26.66	37.14	54.00	16.86
2483.5	40.02	PK	H	25.86	4.49	27.36	43.01	74.00	30.99
2483.5	23.51	AV	H	25.86	4.49	27.36	26.50	54.00	27.50
2635	42.75	PK	H	26.25	4.77	27.44	46.33	74.00	27.67
High Channel: 2480 MHz									
2480	89.67	PK	H	25.85	4.48	27.36	92.64	N/A	N/A
2480	72.31	AV	H	25.85	4.48	27.36	75.28	N/A	N/A
2480	88.29	PK	V	25.85	4.48	27.36	91.26	N/A	N/A
2480	71.24	AV	V	25.85	4.48	27.36	74.21	N/A	N/A
4960	37.02	PK	H	31.00	5.90	27.43	46.49	74.00	27.51
4960	23.14	AV	H	31.00	5.90	27.43	32.61	54.00	21.39
7440	31.22	PK	H	34.66	7.58	25.97	47.49	74.00	26.51
7440	20.41	AV	H	34.66	7.58	25.97	36.68	54.00	17.32
9920	29.64	PK	H	36.71	8.87	26.66	48.56	74.00	25.44
9920	18.42	AV	H	36.71	8.87	26.66	37.34	54.00	16.66
2483.5	41.75	PK	H	25.86	4.49	27.36	44.74	74.00	29.26
2483.5	23.84	AV	H	25.86	4.49	27.36	26.83	54.00	27.17
1632	36.12	PK	H	23.86	3.35	27.77	35.56	74.00	38.44
1632	22.11	AV	H	23.86	3.35	27.77	21.55	54.00	32.45
385.6	35.61	QP	V	15.83	2.38	21.73	32.09	46.00	13.91

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	89.75	PK	H	25.65	4.42	27.32	92.50	N/A	N/A
2402	71.23	AV	H	25.65	4.42	27.32	73.98	N/A	N/A
2402	87.01	PK	V	25.65	4.42	27.32	89.76	N/A	N/A
2402	70.75	AV	V	25.65	4.42	27.32	73.50	N/A	N/A
2390	35.69	PK	H	25.61	4.39	27.32	38.37	74.00	35.63
2390	21.52	AV	H	25.61	4.39	27.32	24.20	54.00	29.80
4804	34.62	PK	H	30.59	5.98	27.41	43.78	74.00	30.22
4804	21.68	AV	H	30.59	5.98	27.41	30.84	54.00	23.16
7206	30.96	PK	H	34.09	7.45	25.91	46.59	74.00	27.41
7206	19.32	AV	H	34.09	7.45	25.91	34.95	54.00	19.05
9608	29.31	PK	H	35.96	8.80	27.55	46.52	74.00	27.48
9608	18.36	AV	H	35.96	8.80	27.55	35.57	54.00	18.43
1595	44.03	PK	H	23.79	3.23	27.79	43.26	74.00	30.74
1595	26.17	AV	H	23.79	3.23	27.79	25.40	54.00	28.60
42.2	35.26	QP	V	12.84	0.83	21.42	27.51	40.00	12.49
Middle Channel: 2441 MHz									
2441	89.17	PK	H	25.75	4.40	27.34	91.98	N/A	N/A
2441	71.02	AV	H	25.75	4.40	27.34	73.83	N/A	N/A
2441	87.99	PK	V	25.75	4.40	27.34	90.80	N/A	N/A
2441	70.24	AV	V	25.75	4.40	27.34	73.05	N/A	N/A
4882	35.26	PK	H	30.79	6.08	27.42	44.71	74.00	29.29
4882	22.24	AV	H	30.79	6.08	27.42	31.69	54.00	22.31
7323	30.68	PK	H	34.38	7.51	25.88	46.69	74.00	27.31
7323	19.67	AV	H	34.38	7.51	25.88	35.68	54.00	18.32
9764	29.33	PK	H	36.33	8.83	27.20	47.29	74.00	26.71
9764	18.67	AV	H	36.33	8.83	27.20	36.63	54.00	17.37
1595	44.62	PK	H	23.79	3.23	27.79	43.85	74.00	30.15
1595	25.84	AV	H	23.79	3.23	27.79	25.07	54.00	28.93
42.2	34.98	QP	V	12.84	0.83	21.42	27.23	40.00	12.77
High Channel: 2480 MHz									
2480	89.62	PK	H	25.85	4.48	27.36	92.59	N/A	N/A
2480	71.28	AV	H	25.85	4.48	27.36	74.25	N/A	N/A
2480	88.14	PK	V	25.85	4.48	27.36	91.11	N/A	N/A
2480	70.37	AV	V	25.85	4.48	27.36	73.34	N/A	N/A
4960	35.21	PK	H	31.00	5.90	27.43	44.68	74.00	29.32
4960	22.06	AV	H	31.00	5.90	27.43	31.53	54.00	22.47
7440	30.99	PK	H	34.66	7.58	25.97	47.26	74.00	26.74
7440	20.17	AV	H	34.66	7.58	25.97	36.44	54.00	17.56
9920	29.37	PK	H	36.71	8.87	26.66	48.29	74.00	25.71
9920	18.42	AV	H	36.71	8.87	26.66	37.34	54.00	16.66
2483.5	39.32	PK	H	25.86	4.49	27.36	42.31	74.00	31.69
2483.5	22.14	AV	H	25.86	4.49	27.36	25.13	54.00	28.87
1828	43.96	PK	H	24.26	3.65	27.52	44.35	74.00	29.65
1828	25.74	AV	H	24.26	3.65	27.52	26.13	54.00	27.87
42.2	35.63	QP	V	12.84	0.83	21.42	27.88	40.00	12.12

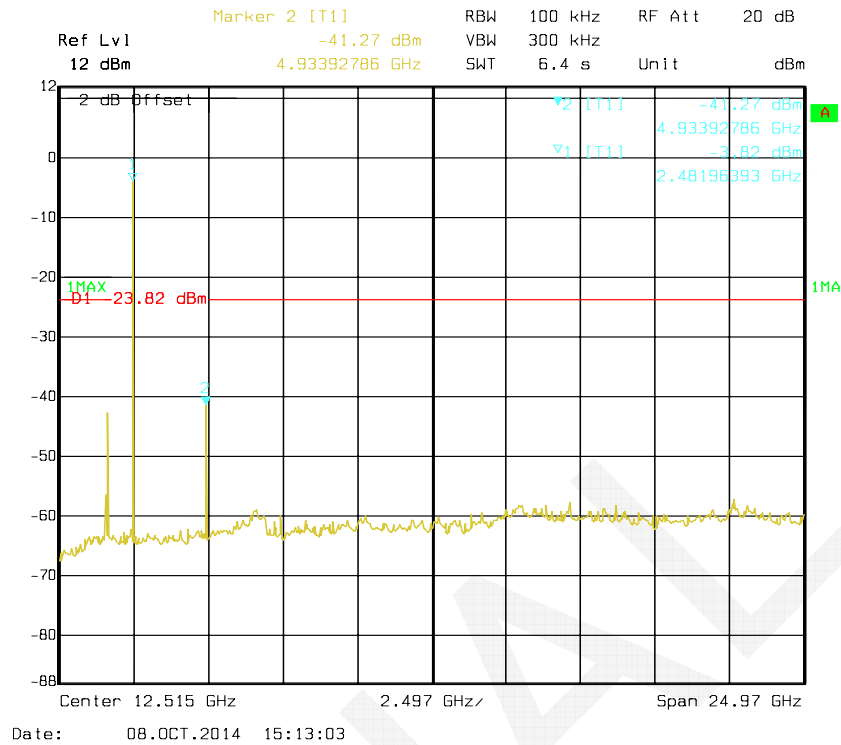
Conducted Spurious Emissions at Antenna Port*BDR Mode (GFSK):***Low Channel**

Date: 08.OCT.2014 15:10:36

Middle Channel

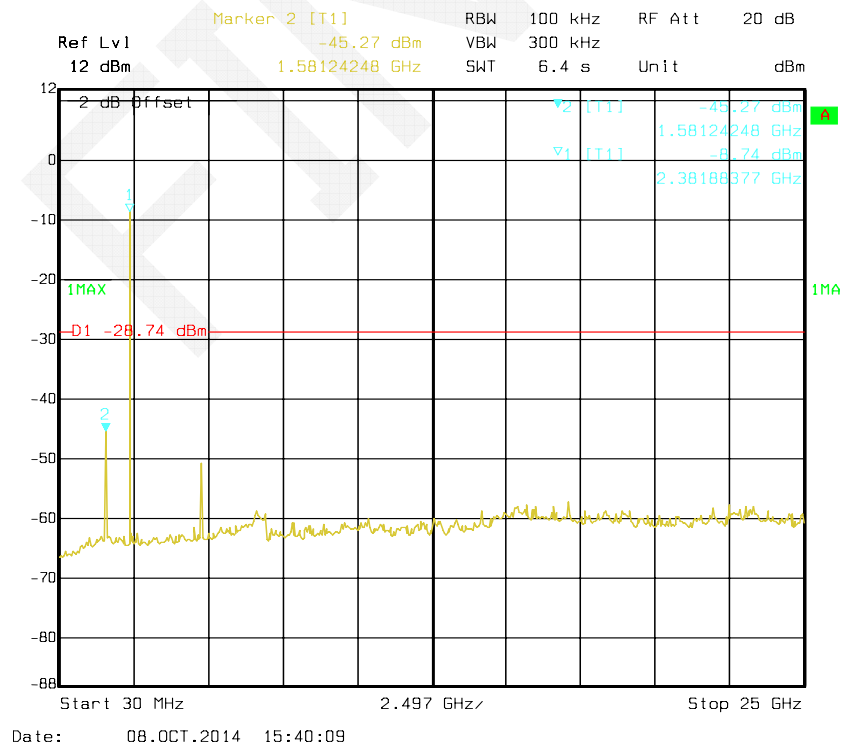
Date: 08.OCT.2014 15:12:00

High Channel

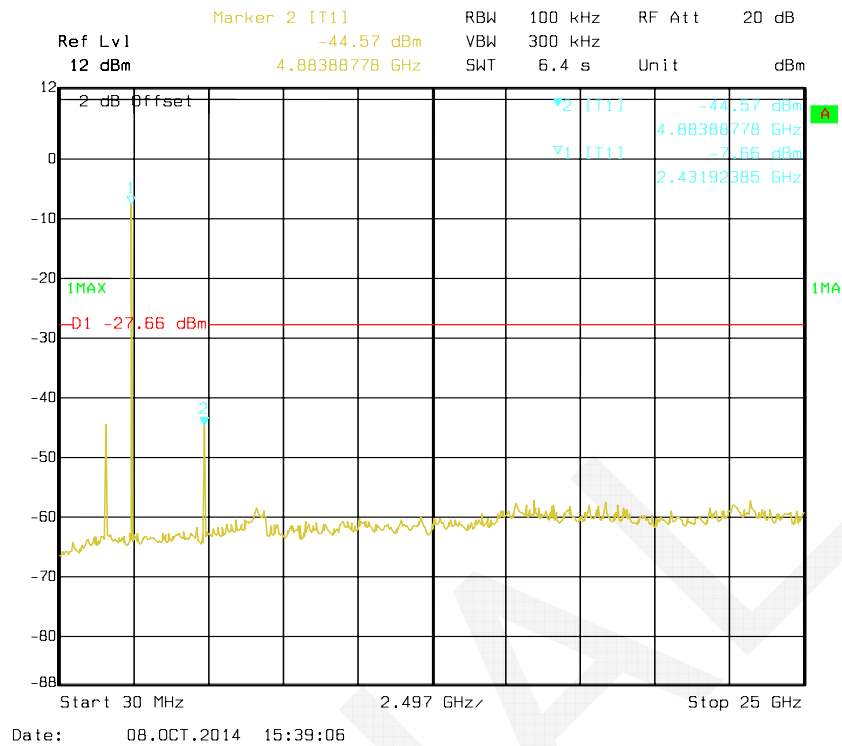


EDR Mode (($\pi/4$ -DQPSK):

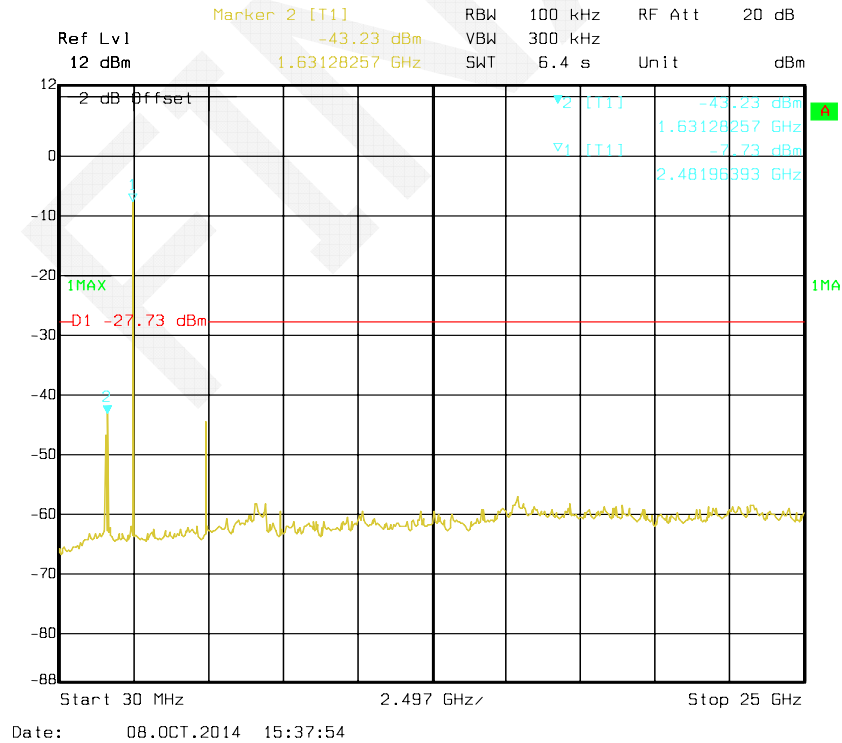
Low Channel



Middle Channel

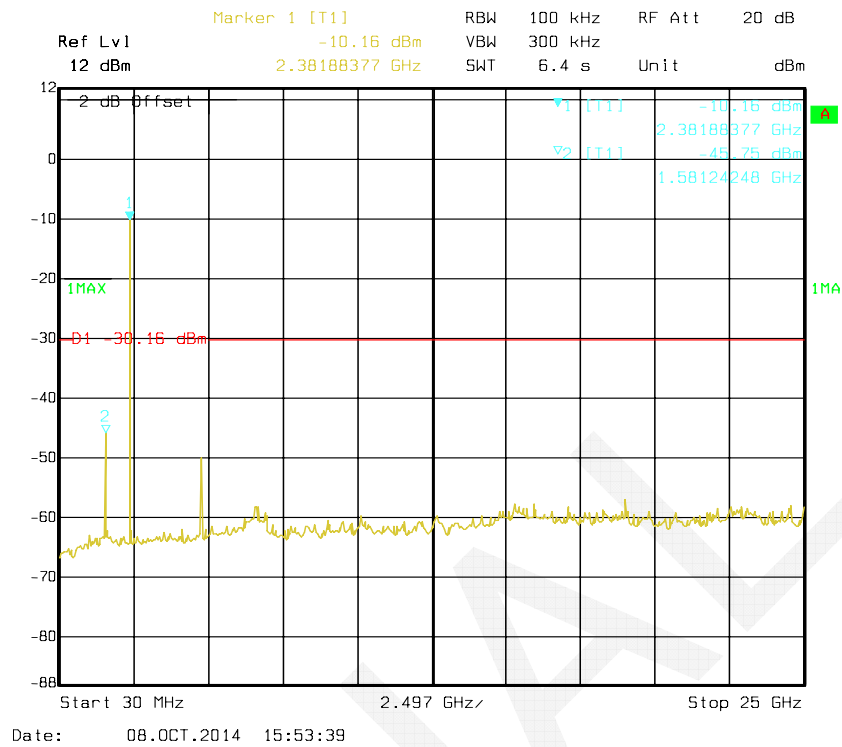


High Channel

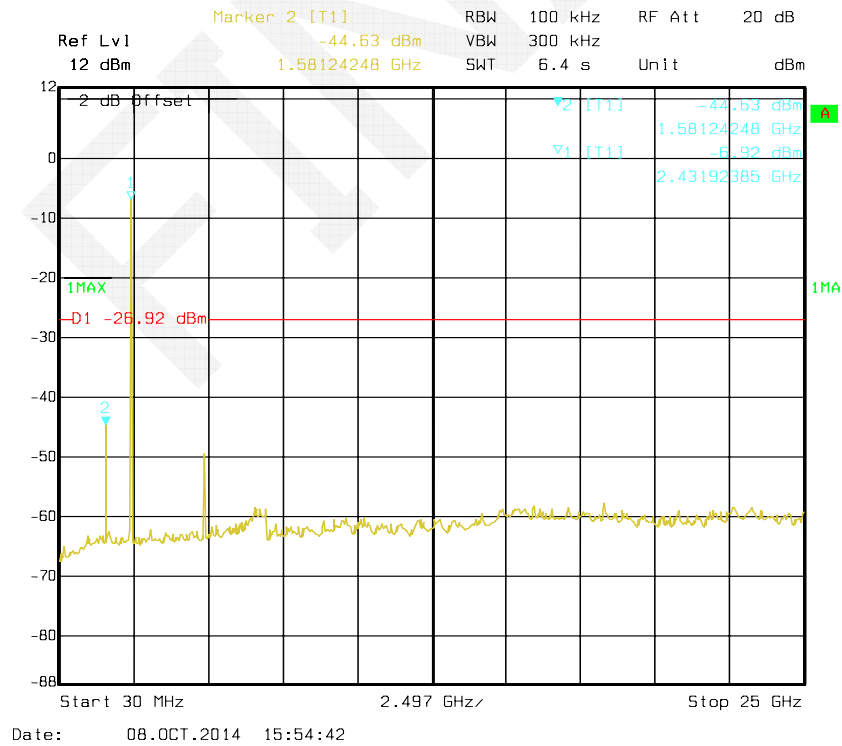


EDR Mode (8DPSK):

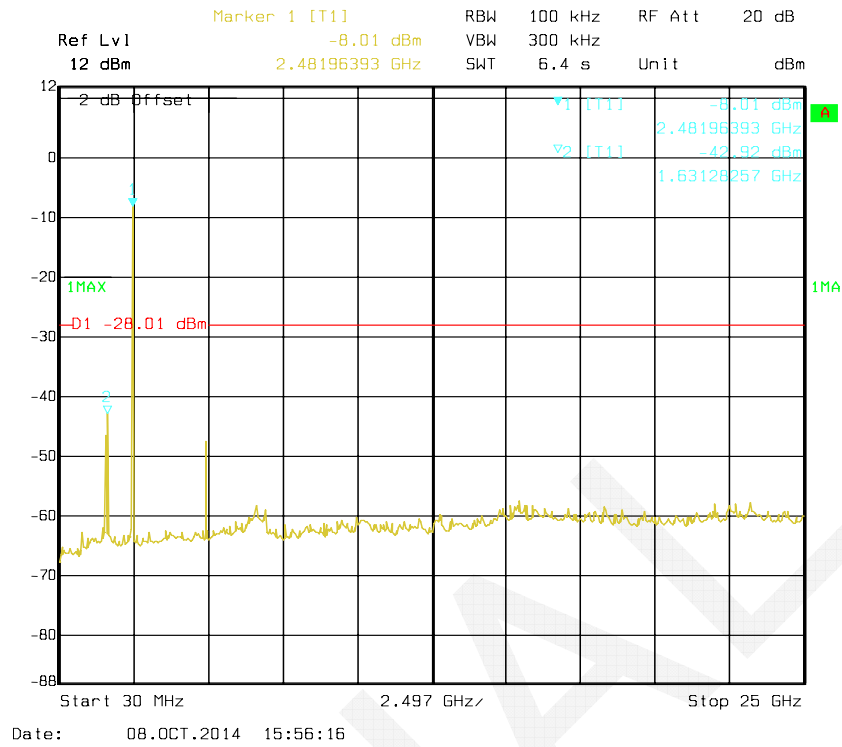
Low Channel



Middle Channel



High Channel



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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	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:	26.9 °C
Relative Humidity:	6 %
ATM Pressure:	100.5 kPa

The testing was performed by Sevin Li on 2014-10-08

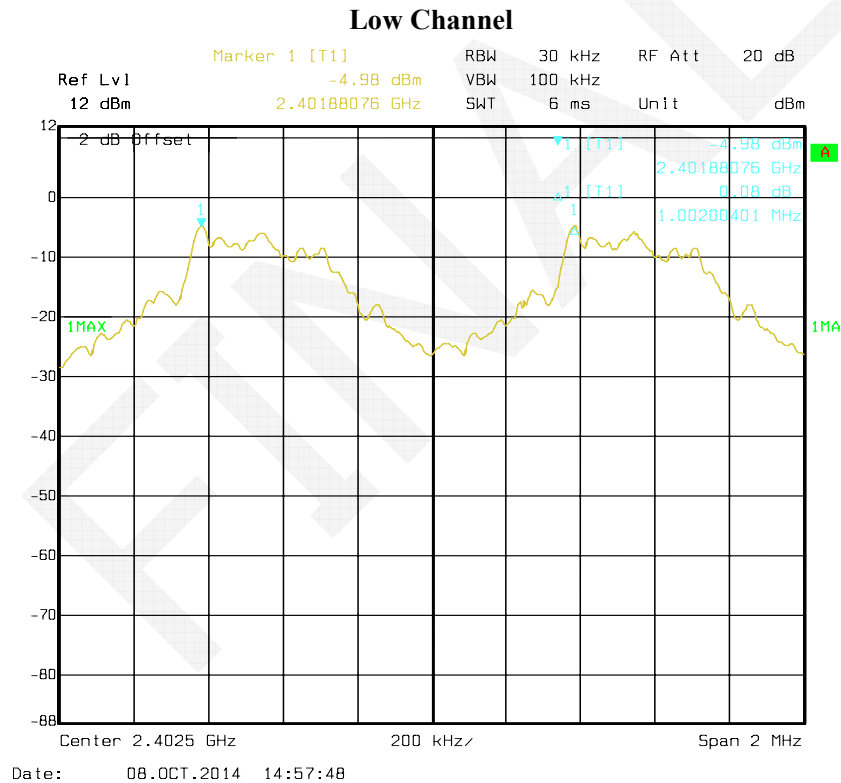
Test Result: Compliance.

Please refer to following tables and plots

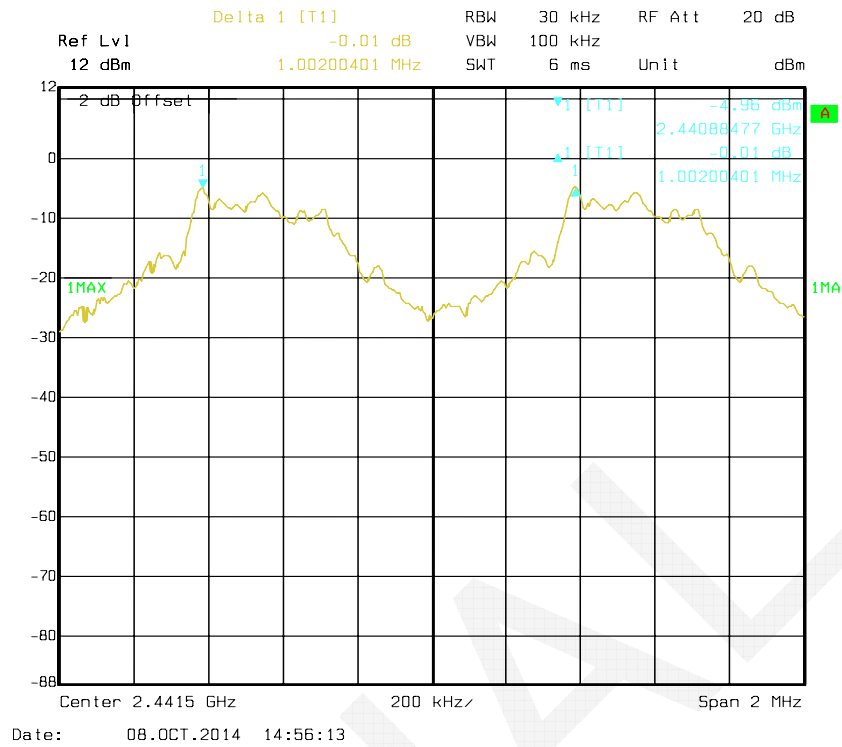
Test Mode: Transmitting

Mode	Channel	Frequency(MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	Low Channel	2402	1.002	0.659
	Middel Channel	2441	1.002	0.667
	High Channel	2480	1.002	0.669
$\pi / 4$ DQPSK	Low Channel	2402	1.002	0.848
	Middel Channel	2441	1.002	0.860
	High Channel	2480	1.006	0.860
8DPSK	Low Channel	2402	1.002	0.768
	Middel Channel	2441	1.002	0.768
	High Channel	2480	1.002	0.768

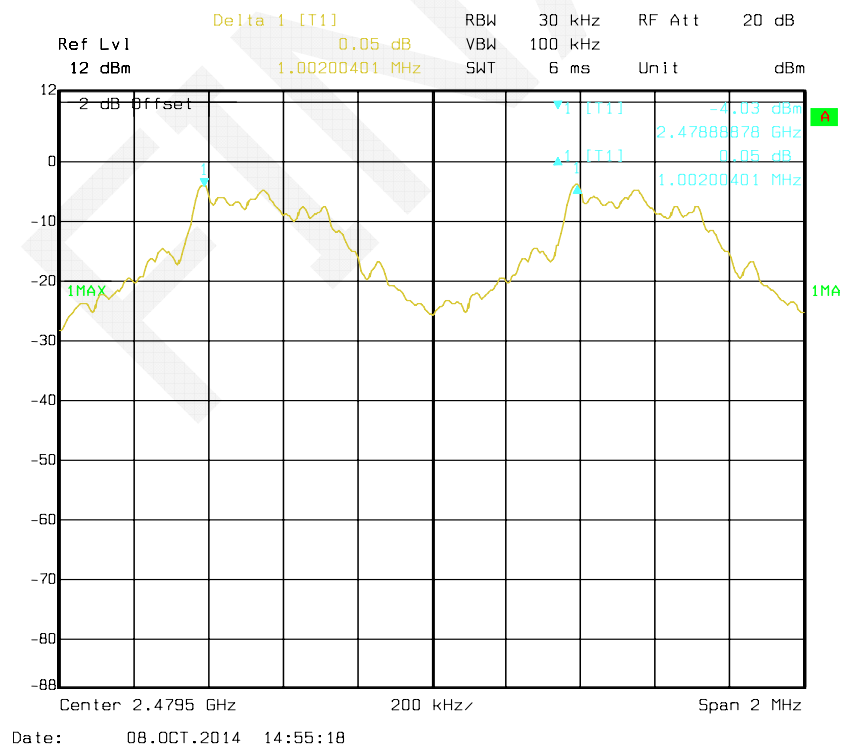
BDR Mode (GFSK):

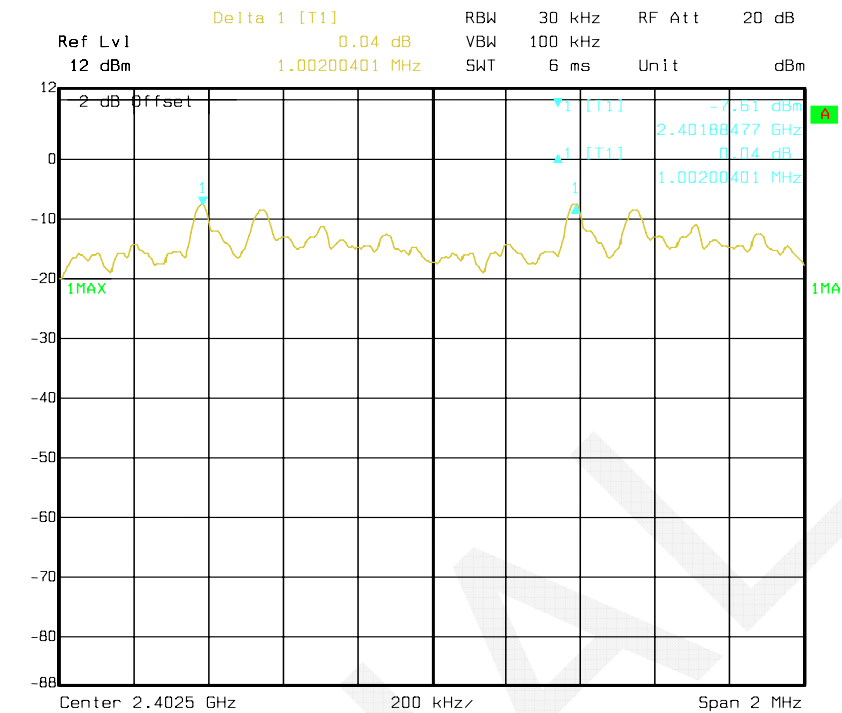
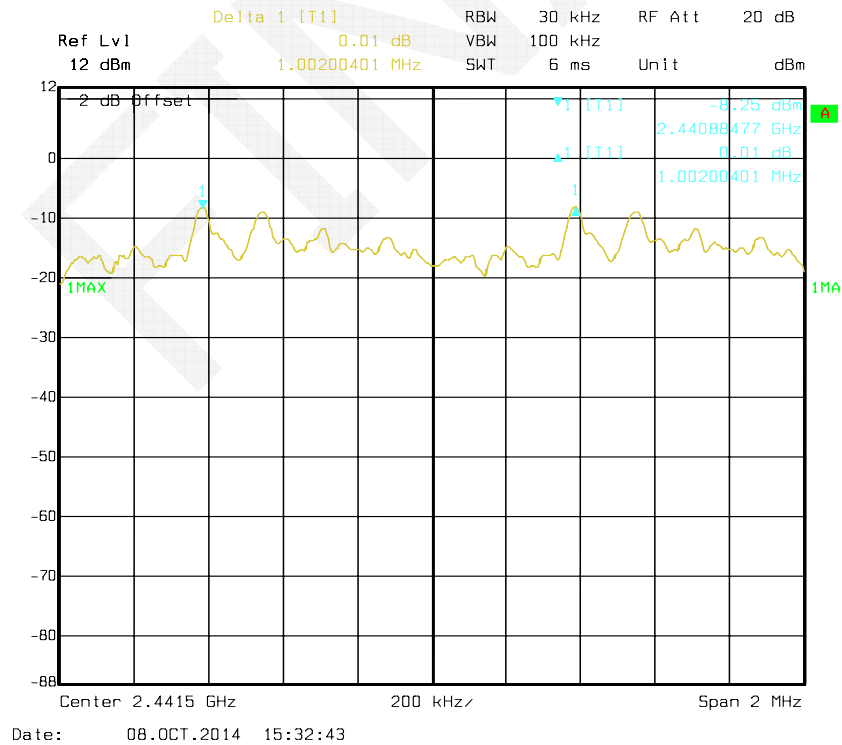


Middle Channel

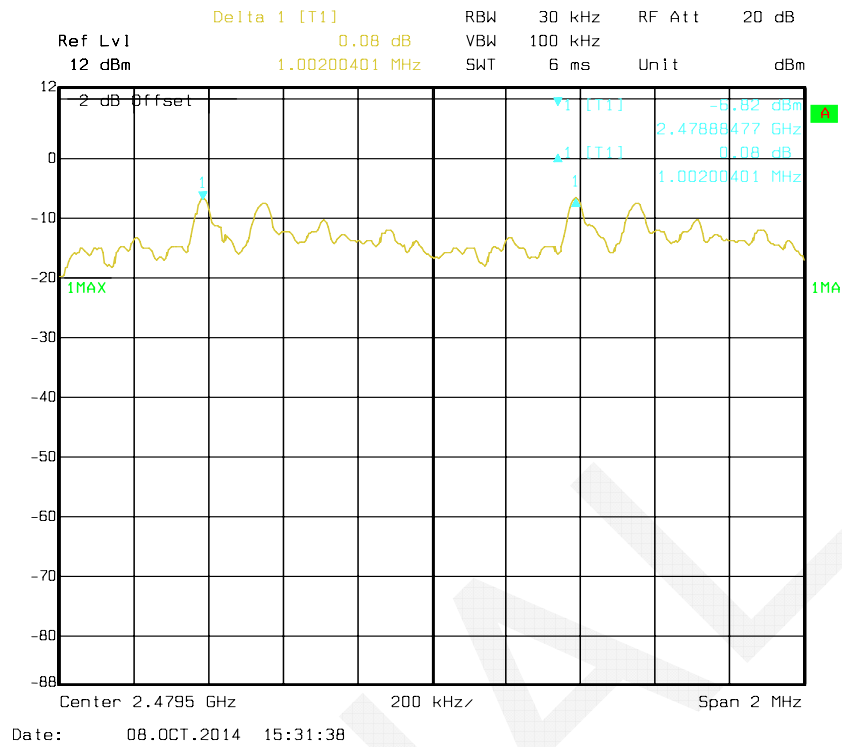


High Channel



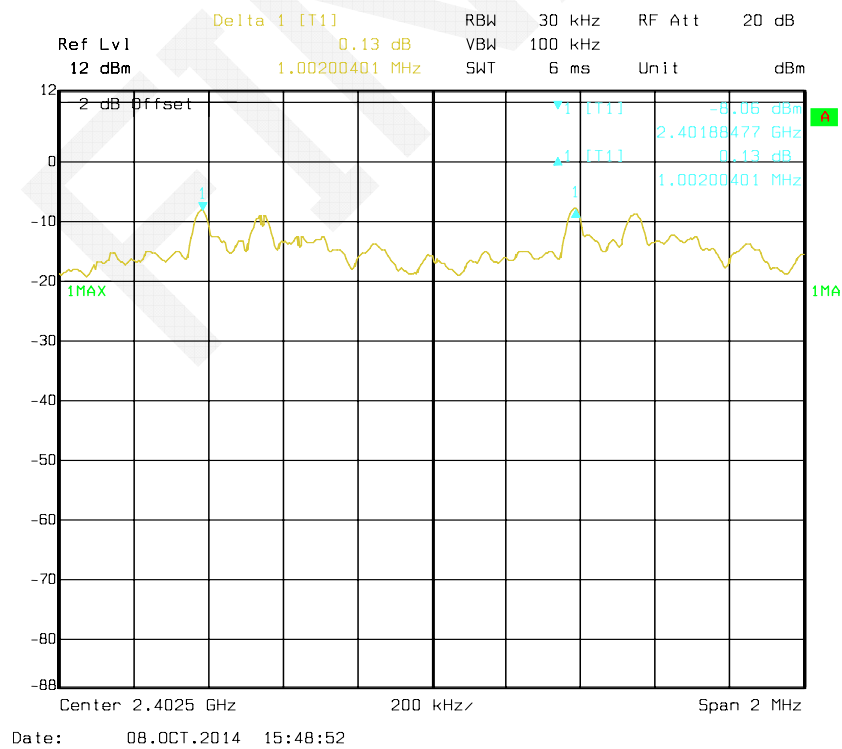
*EDR Mode ($\pi/4$ -DQPSK):***Low Channel****Middle Channel**

High Channel

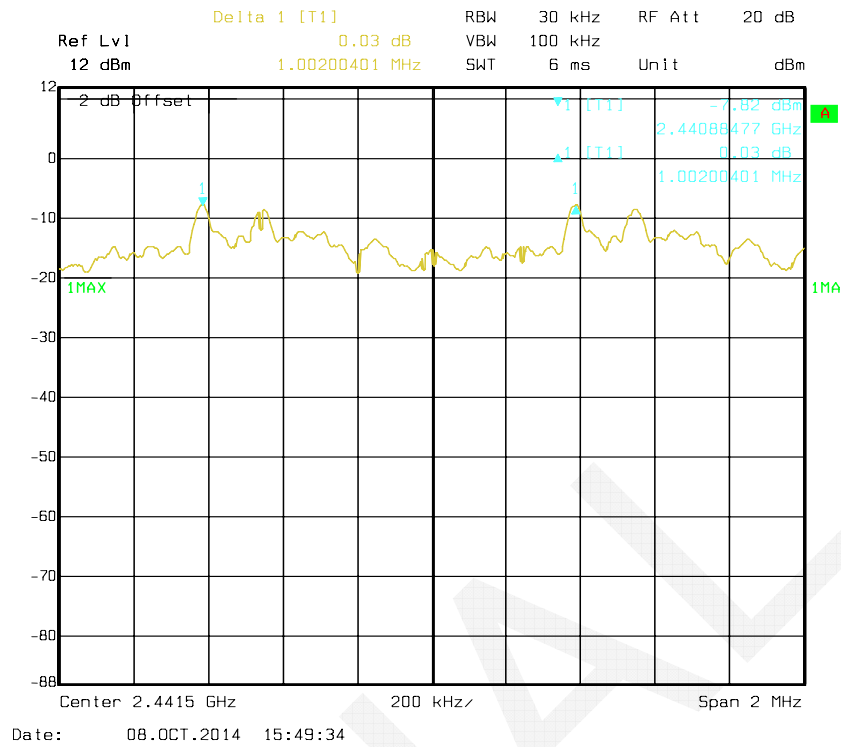


EDR Mode (8DPSK):

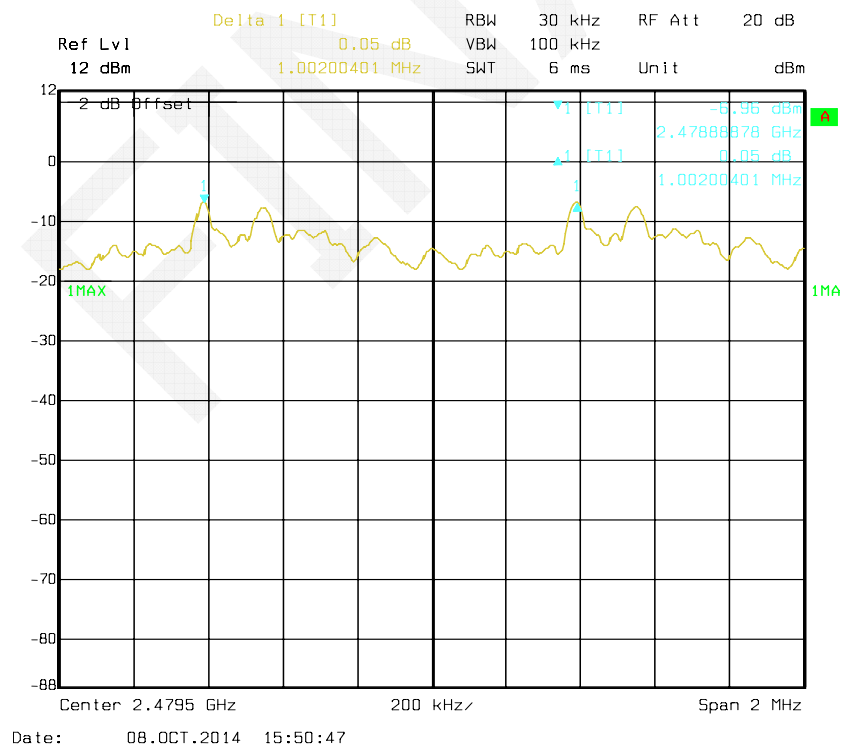
Low Channel



Middle Channel



High Channel



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	FSEM	DE31388	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:	28.9 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa

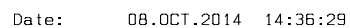
The testing was performed by Sevin Li on 2014-10-08.

Test Result: Compliance.

Please refer to following tables and plots

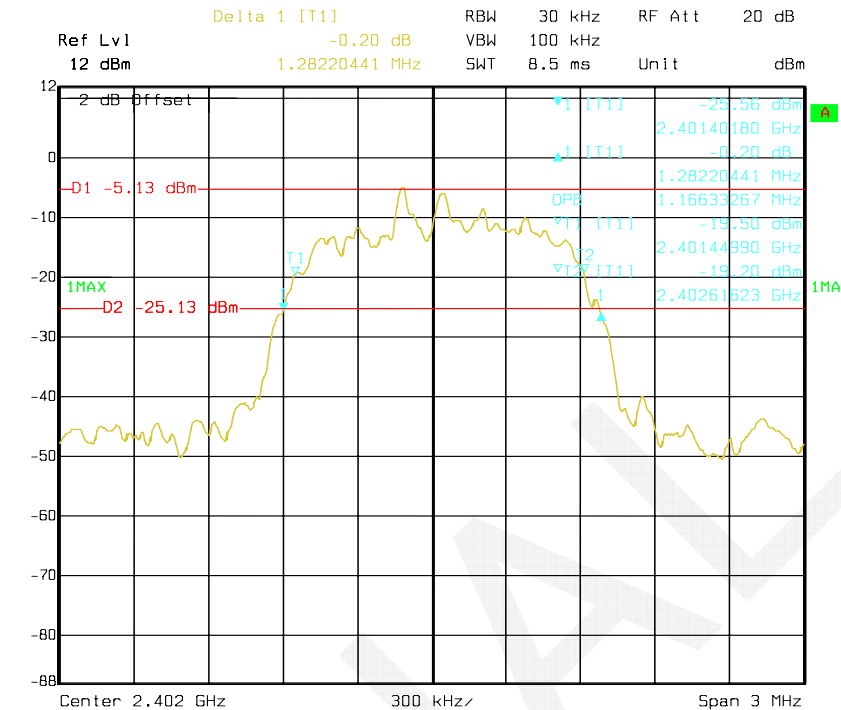
Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	1.006
	Middle	2441	0.998
	High	2480	1.002
EDR Mode ($\pi/4$ -DQPSK)	Low	2402	1.282
	Middle	2441	1.281
	High	2480	1.275
EDR Mode (8DPSK)	Low	2402	1.257
	Middle	2441	1.269
	High	2480	1.269

BDR Mode (GFSK):

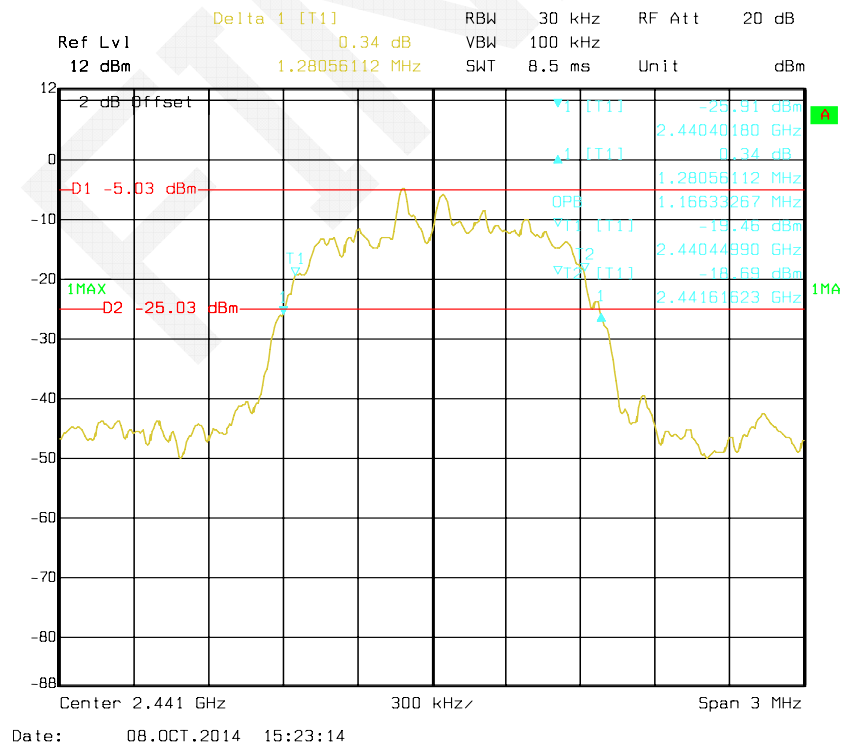


EDR Mode ($\pi/4$ -DQPSK):

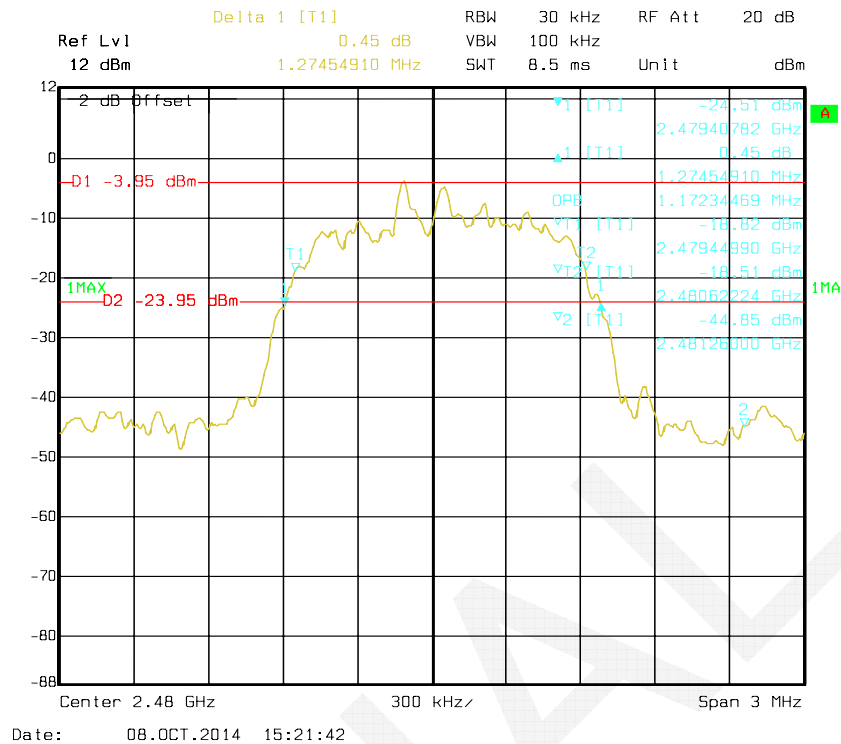
Low Channel



Middle Channel

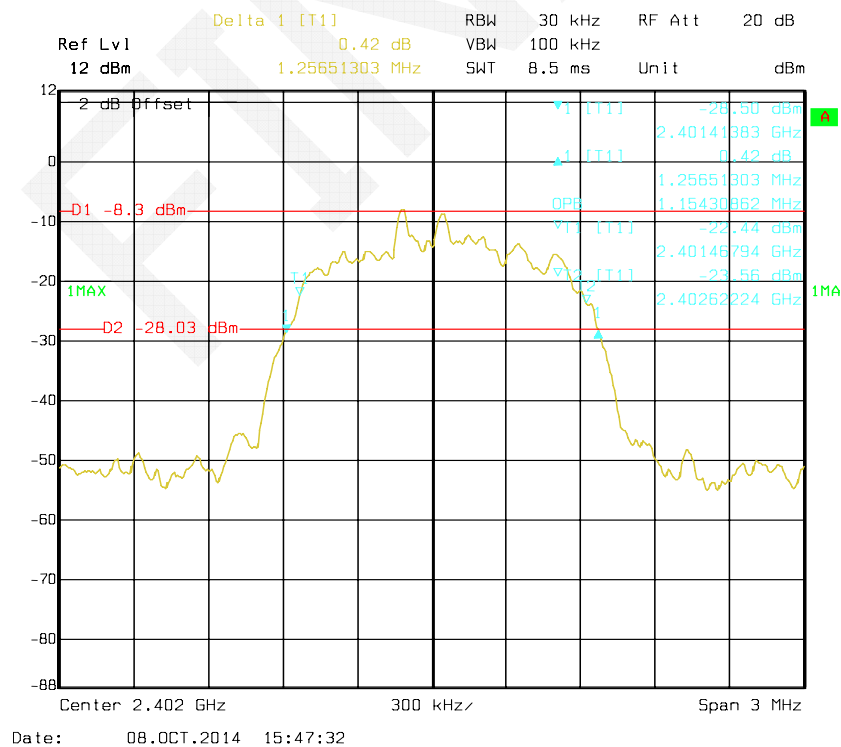


High Channel

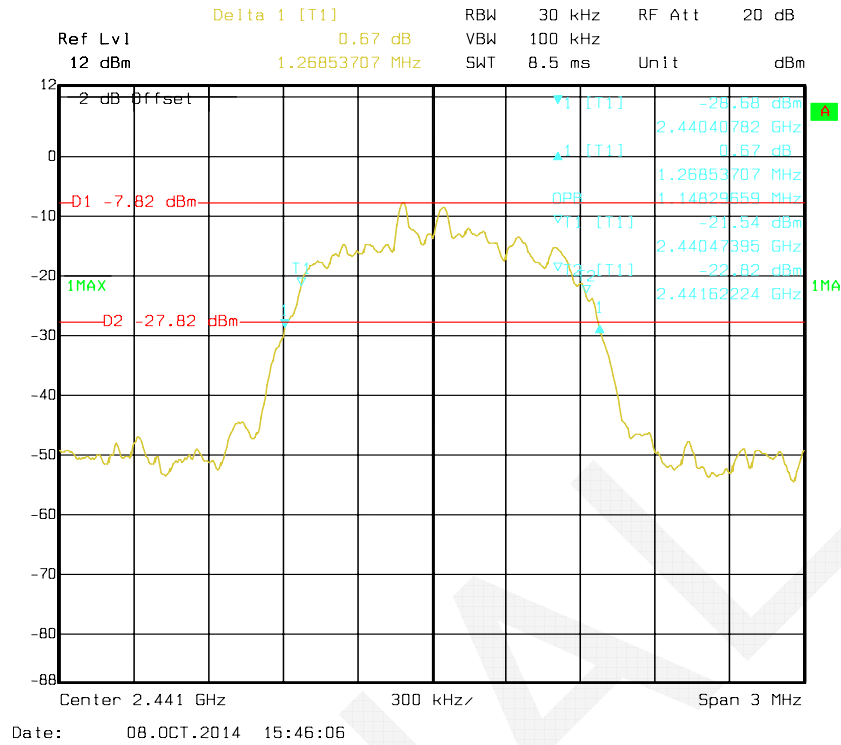


EDR Mode (8DPSK):

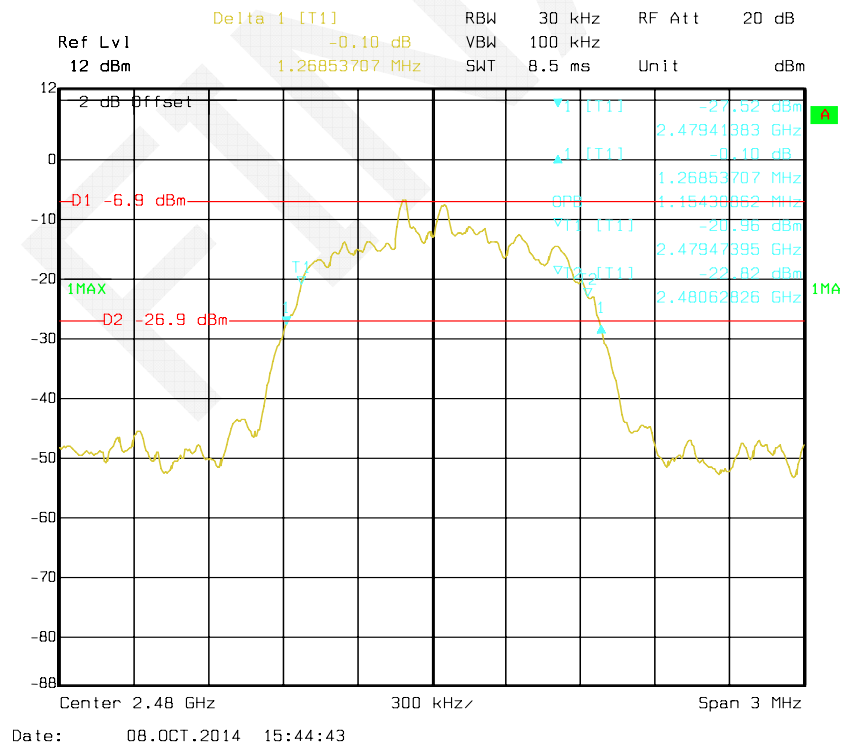
Low Channel



Middle Channel



High Channel



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	FSEM	DE31388	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:	28.9 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa

The testing was performed by Sevin Li on 2014-10-08.

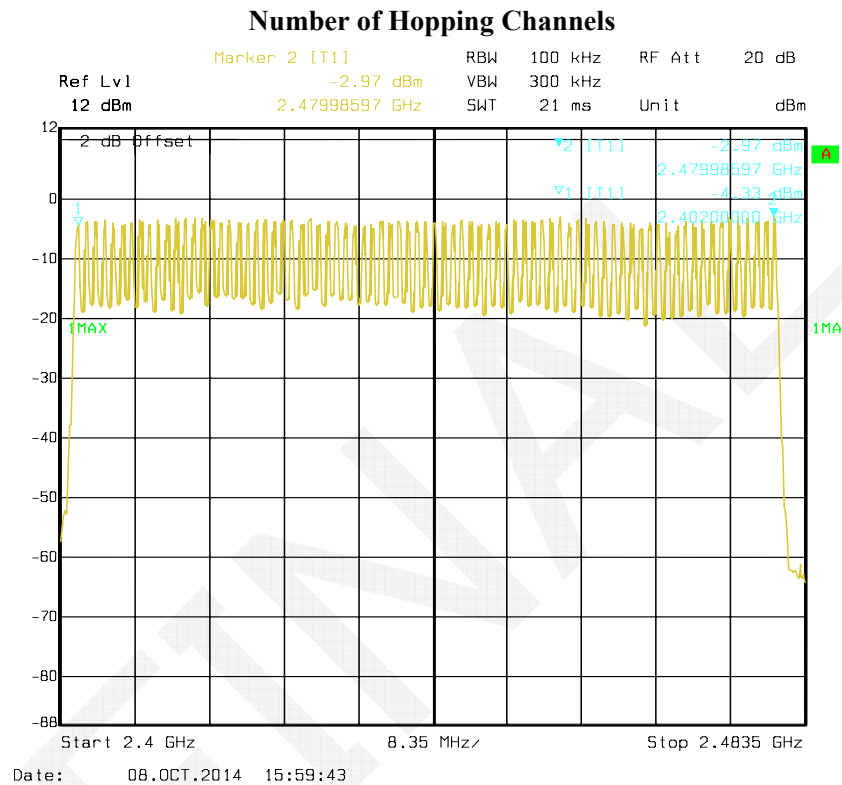
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

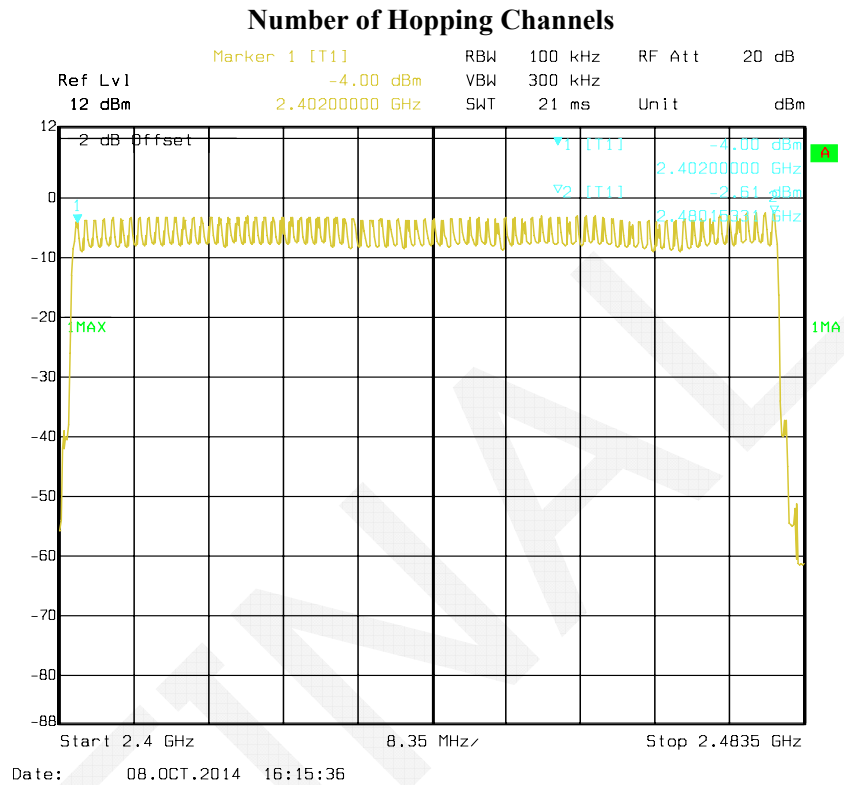
BDR Mode (GFSK):

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



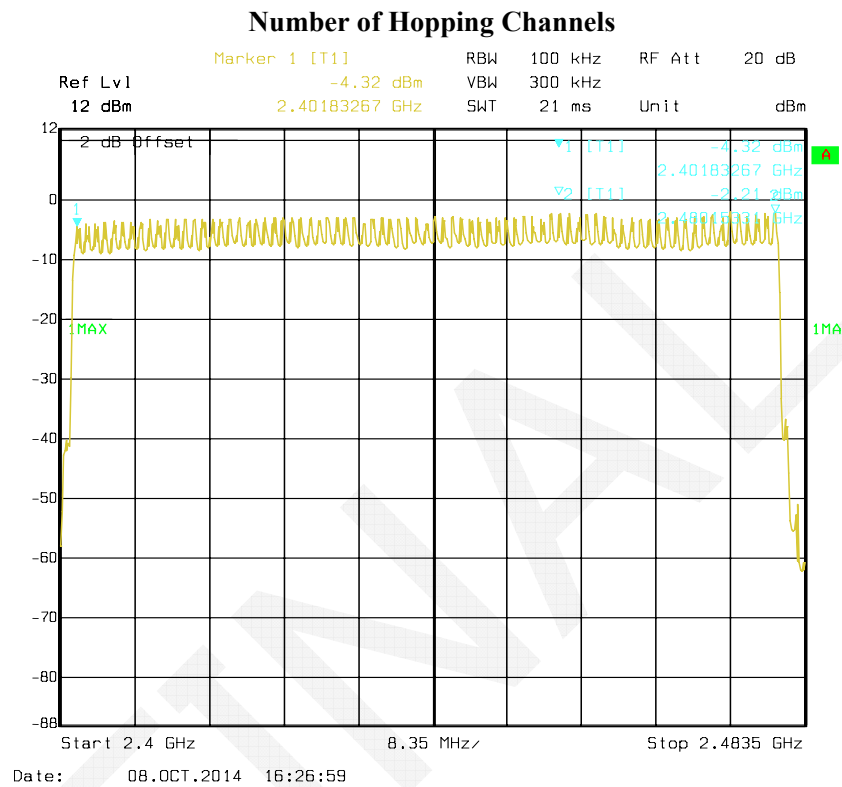
EDR Mode ($\pi/4$ -DQPSK):

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



EDR Mode (8DPSK):

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



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

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

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

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

Hop rate=1600/s

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	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:	28.9 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa

The testing was performed by Sevin Li on 2014-10-08.

Test Result: Compliance.

Please refer to following tables and plots

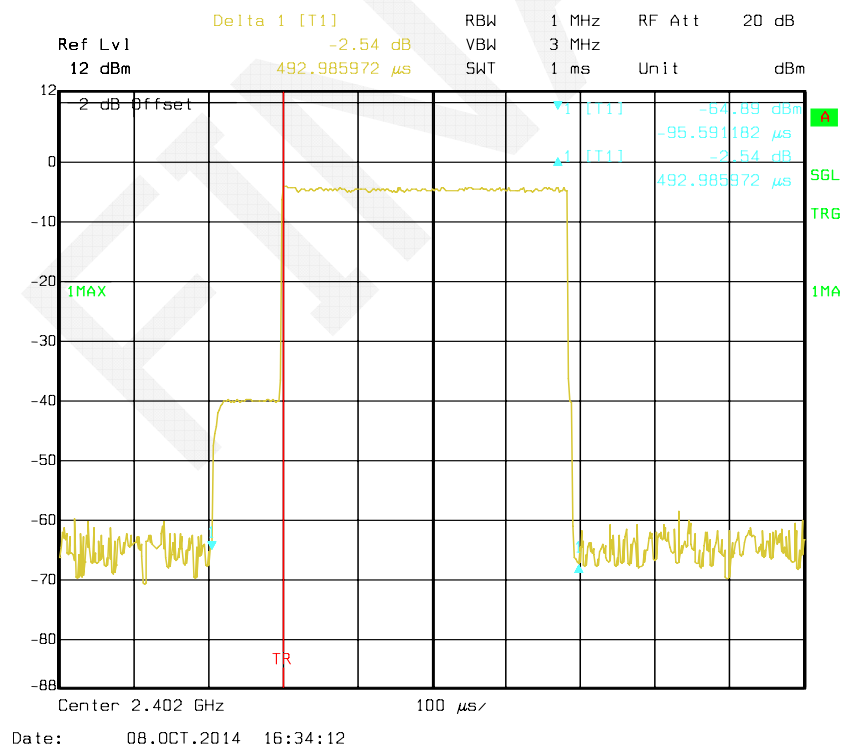
Test Mode: Transmitting

BDR Mode (GFSK):

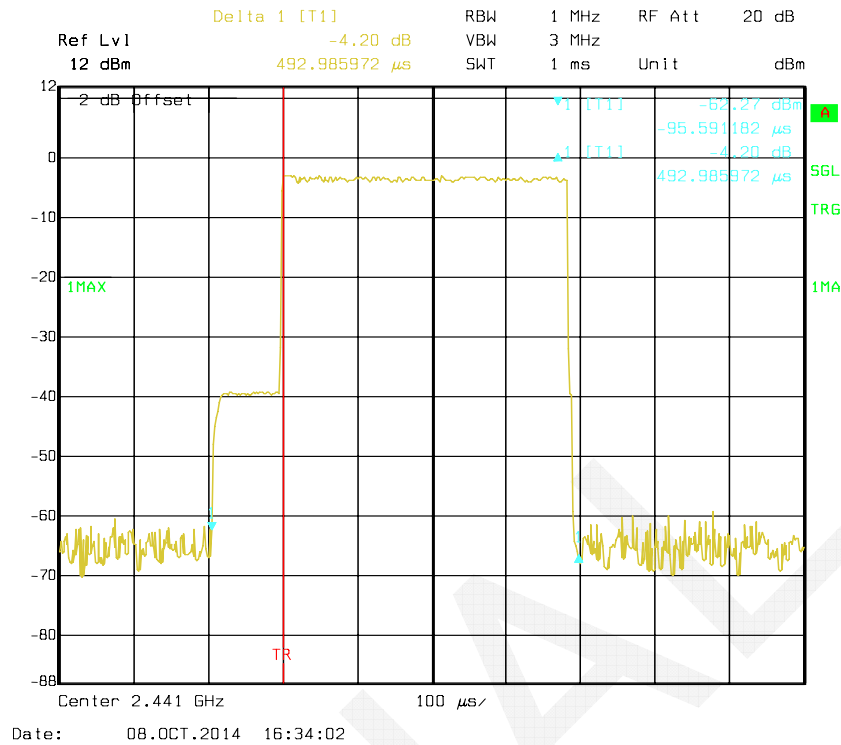
Mode	Channel	Frequency (MHz)	Packet Type	Pulse Width (ms)	Dwell time (s)	Limit (s)
GFSK	Low Channel	2402	DH1	0.493	0.155	0.4
			DH3	1.756	0.278	0.4
			DH5	3.027	0.320	0.4
	Middel Channel	2441	DH1	0.493	0.154	0.4
			DH3	1.756	0.278	0.4
			DH5	3.027	0.320	0.4
	High Channel	2480	DH1	0.493	0.155	0.4
			DH3	1.756	0.278	0.4
			DH5	3.017	0.320	0.4

DH1:Dwell time=Pulse time (ms) $\times$ (1600/2/79) $\times$ 31.6 s
 DH 3:Dwell time=Pulse time (ms) $\times$ (1600/4/79) $\times$ 31.6 s
 DH 5Dwell time=Pulse time (ms) $\times$ (1600/6/79) $\times$ 31.6 s

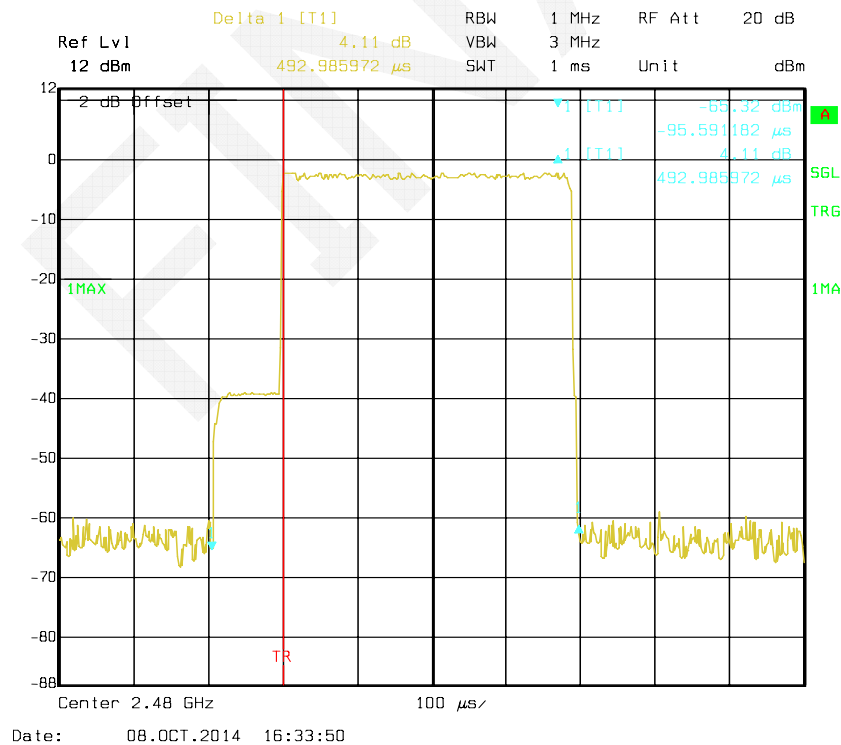
DH1: Low Channel



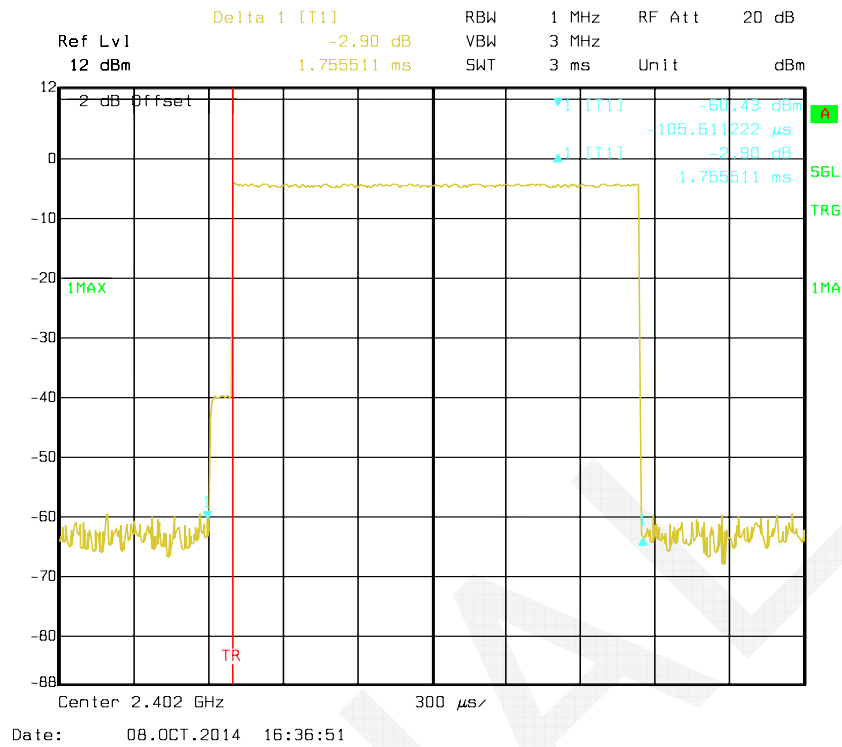
DH1: Middle Channel



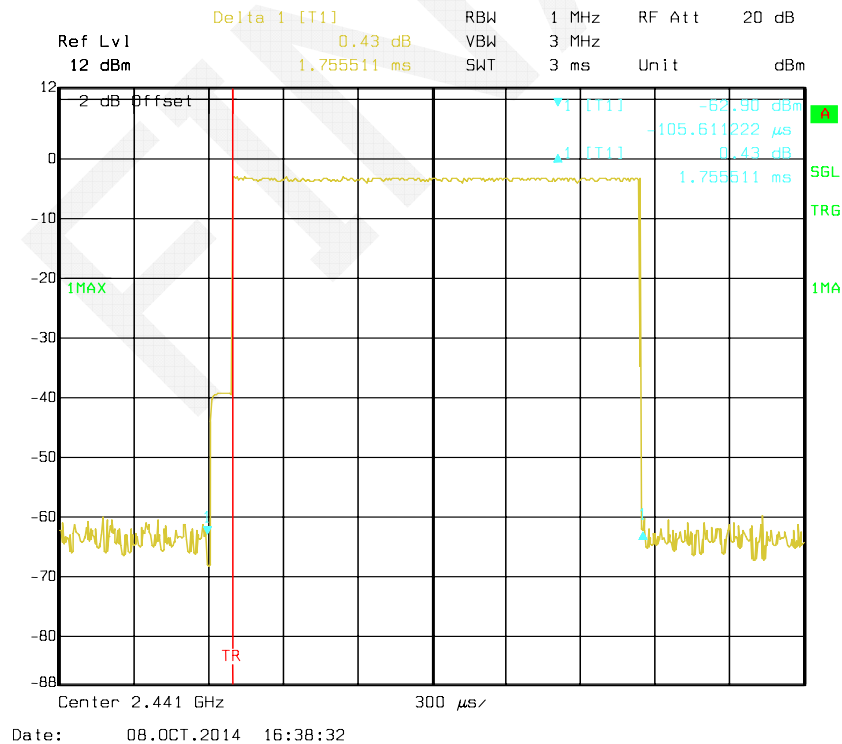
DH1: High Channel



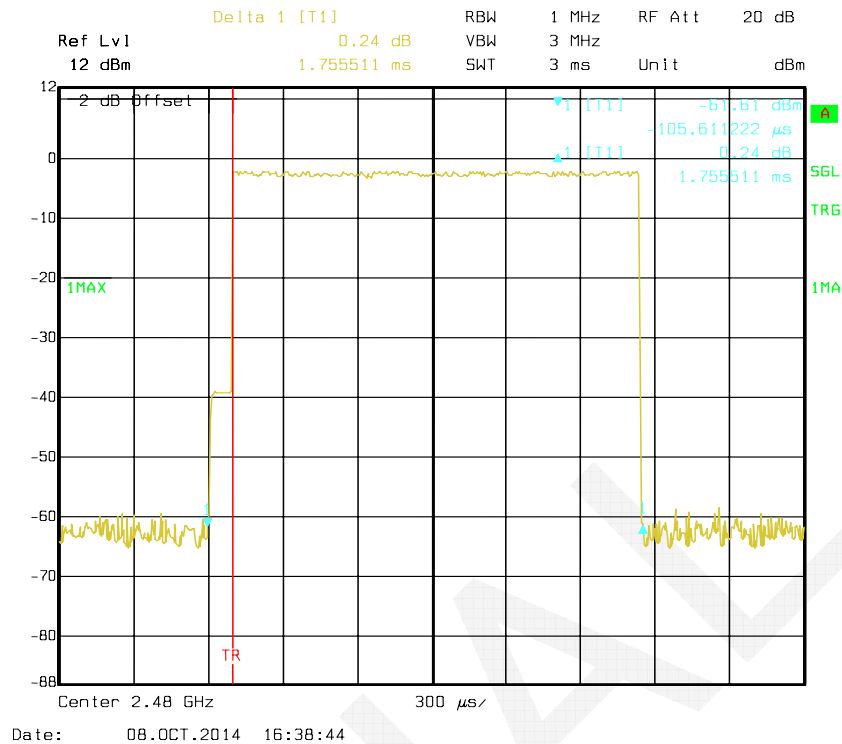
DH3: Low Channel



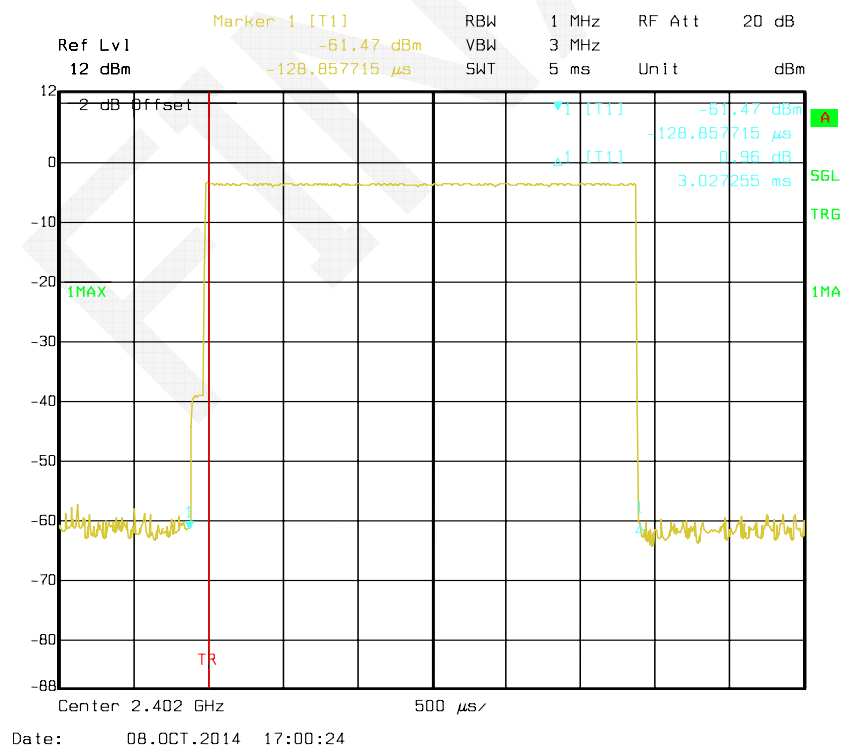
DH3: Middle Channel



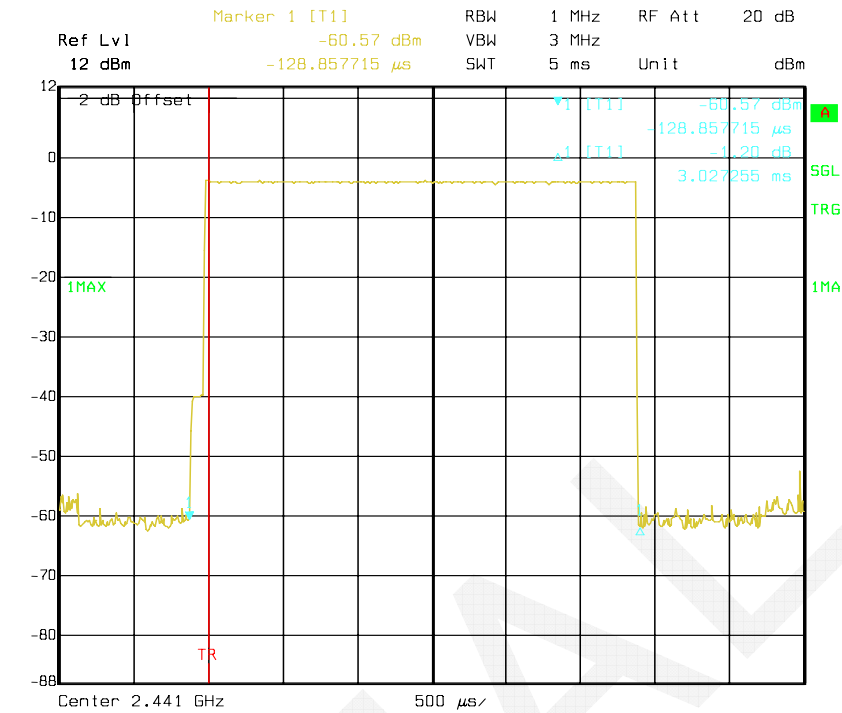
DH3: High Channel



DH5: Low Channel

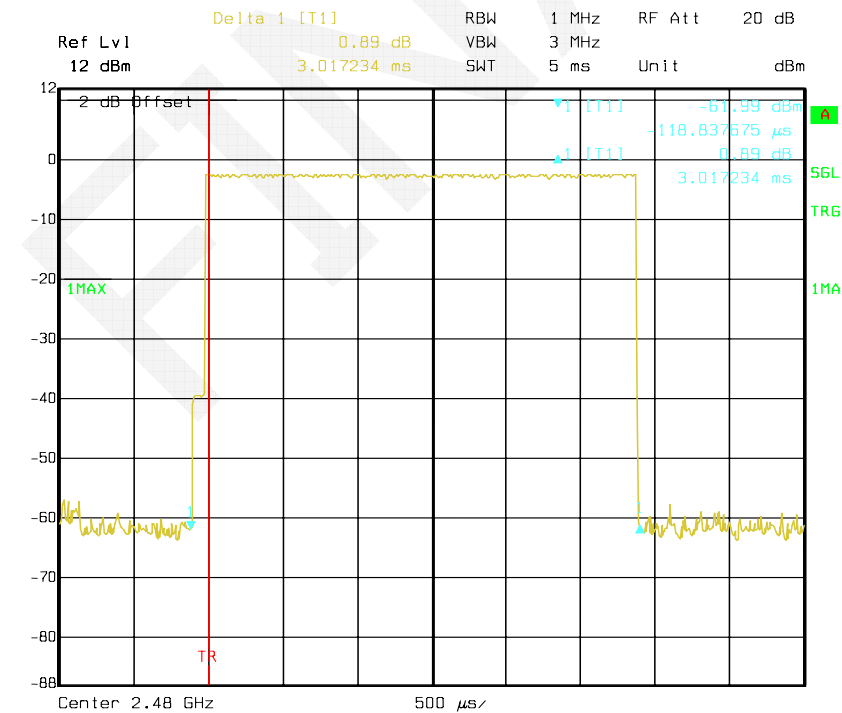


DH5: Middle Channel



Date: 08.OCT.2014 17:00:12

DH5: High Channel

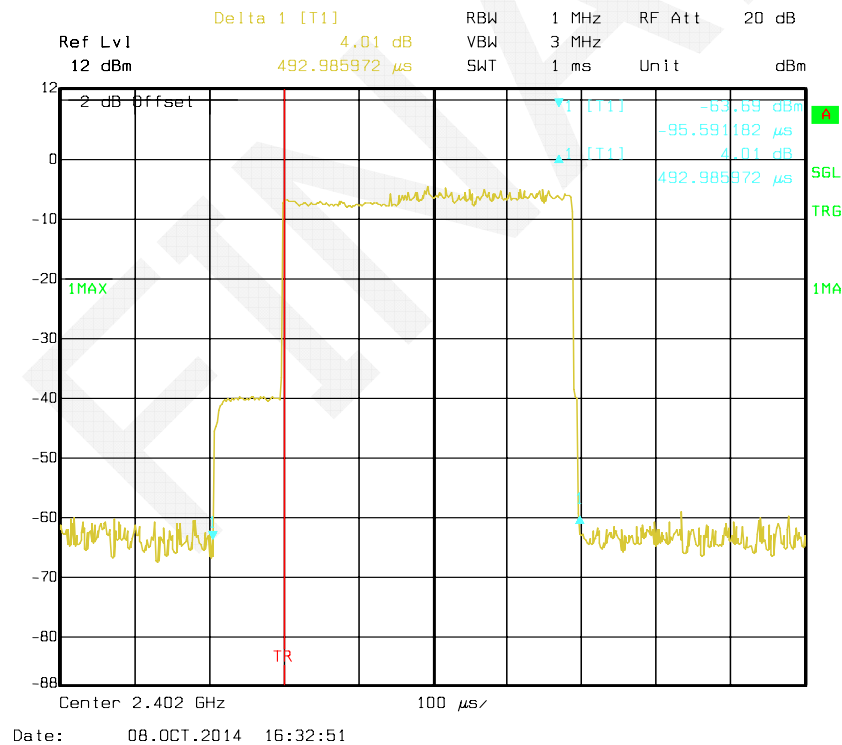


Date: 08.OCT.2014 16:58:32

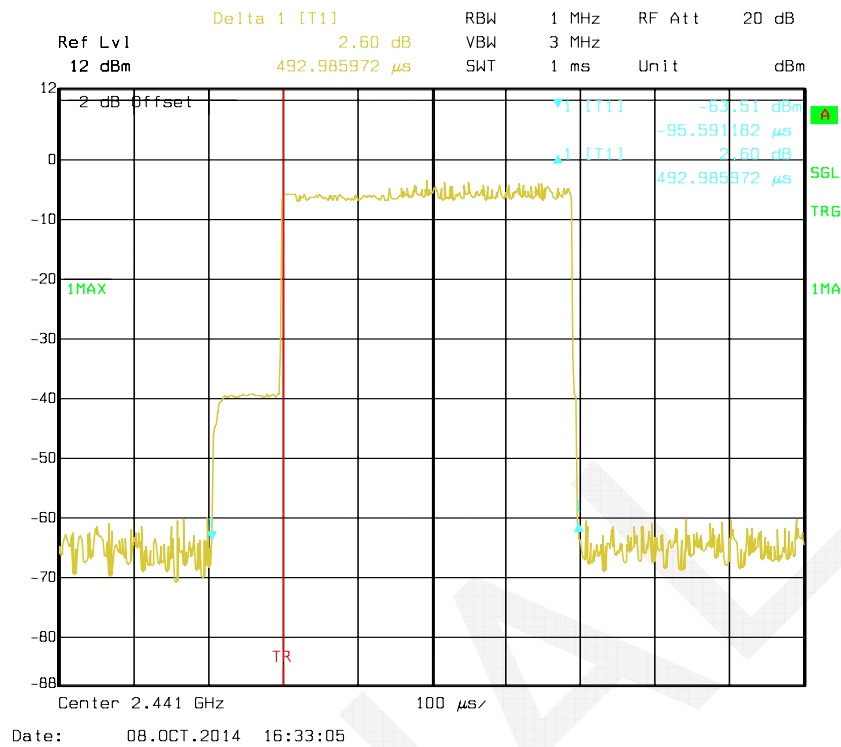
EDR Mode ($\pi/4$ -DQPSK):

Mode	Channel	Frequency (MHz)	Packet Type	Pulse Width (ms)	Dwell time (s)	Limit (s)
$\pi / 4$ DQPSK	Low Channel	2402	DH1	0.493	0.154	0.4
			DH3	1.756	0.254	0.4
			DH5	3.017	0.321	0.4
	Middel Channel	2441	DH1	0.493	0.156	0.4
			DH3	1.755	0.254	0.4
			DH5	3.017	0.320	0.4
	High Channel	2480	DH1	0.493	0.156	0.4
			DH3	1.755	0.254	0.4
			DH5	3.017	0.322	0.4
DH1:Dwell time=Pulse time (ms) $\times$ (1600/2/79) $\times$ 31.6 s DH 3:Dwell time=Pulse time (ms) $\times$ (1600/4/79) $\times$ 31.6 s DH 5Dwell time=Pulse time (ms) $\times$ (1600/6/79) $\times$ 31.6 s						

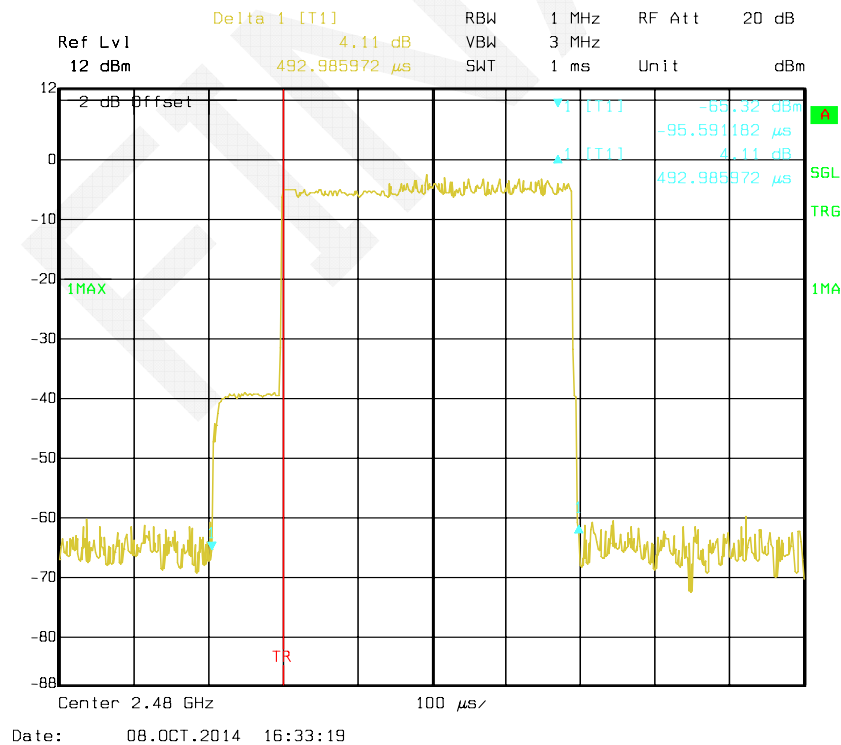
DH1: Low Channel



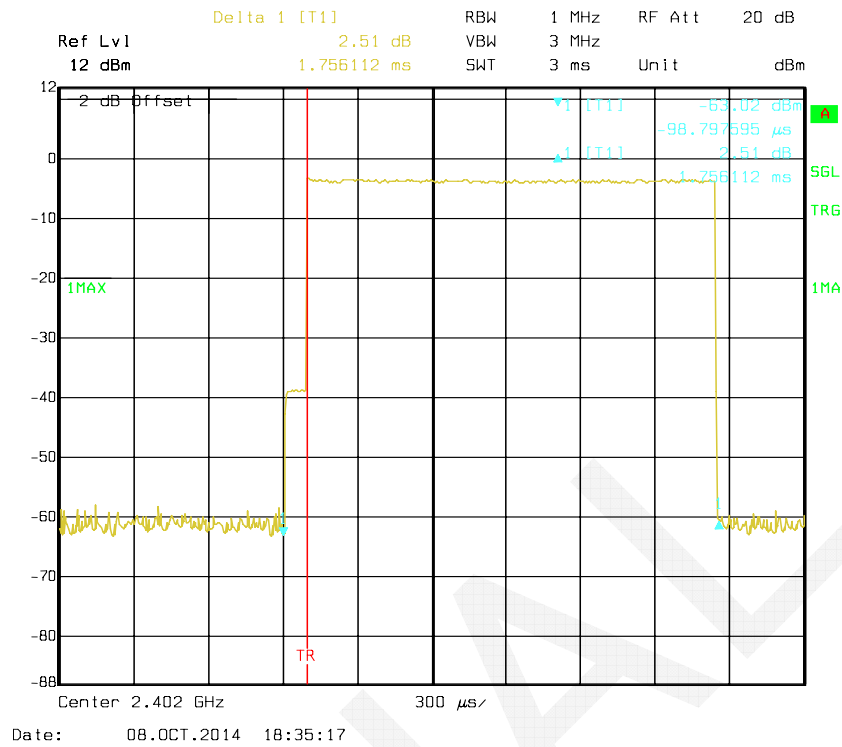
DH1: Middle Channel



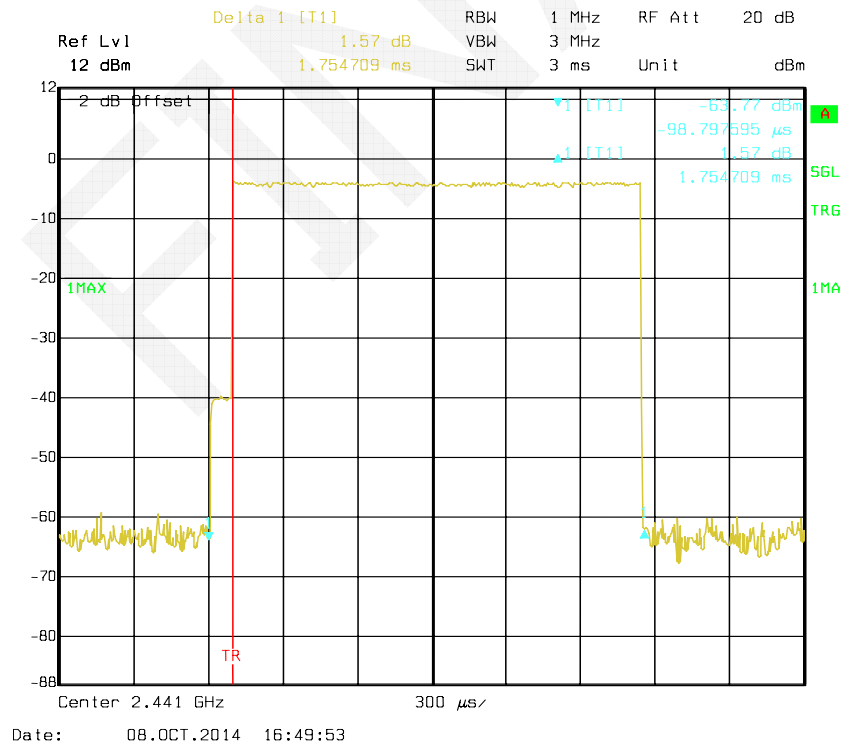
DH1: High Channel

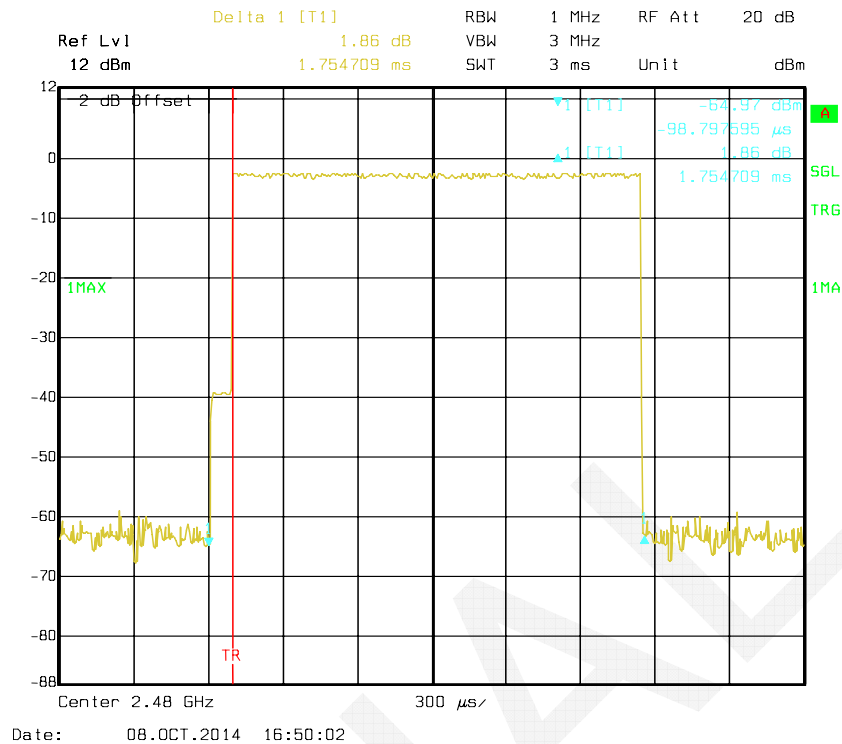
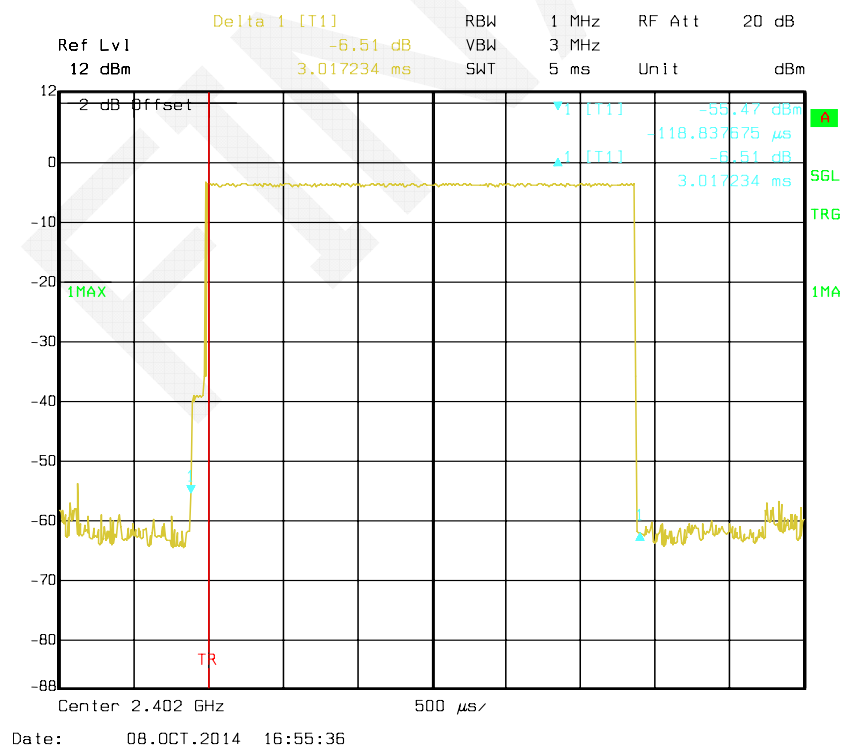


DH3: Low Channel

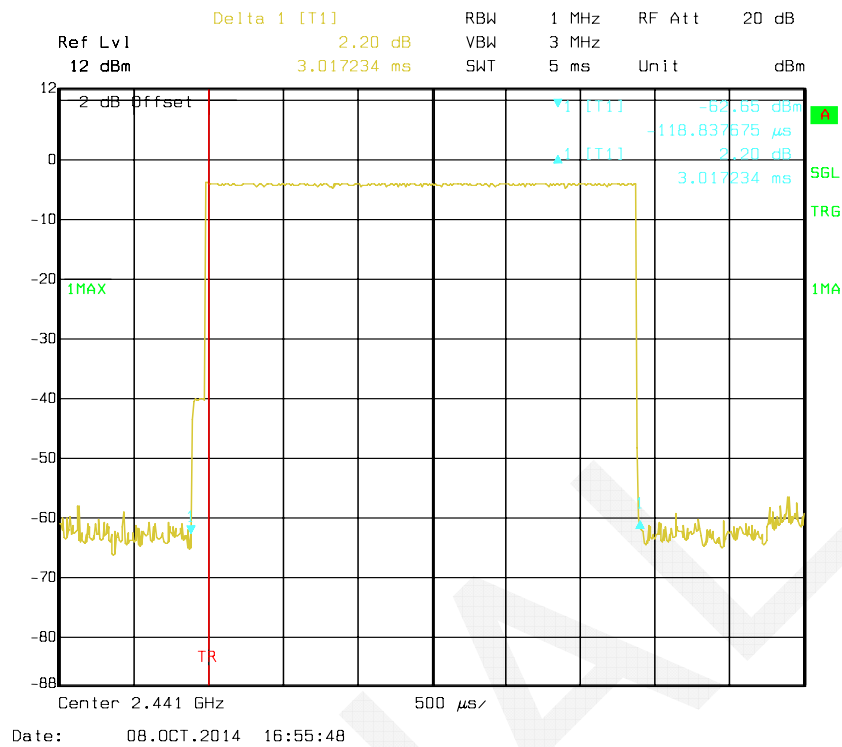


DH3: Middle Channel

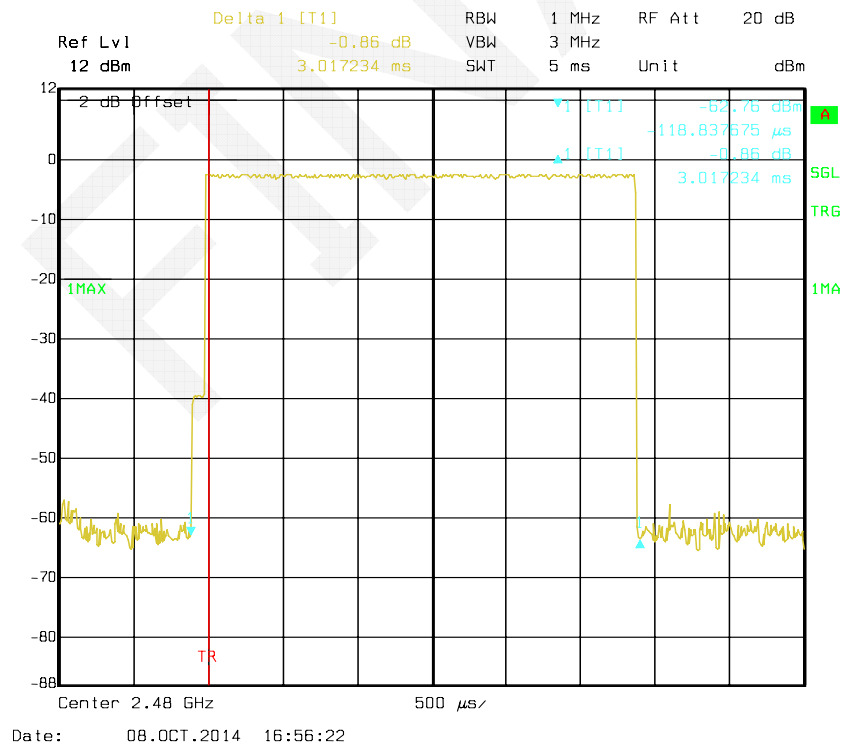


DH3: High Channel**DH5: Low Channel**

DH5: Middle Channel

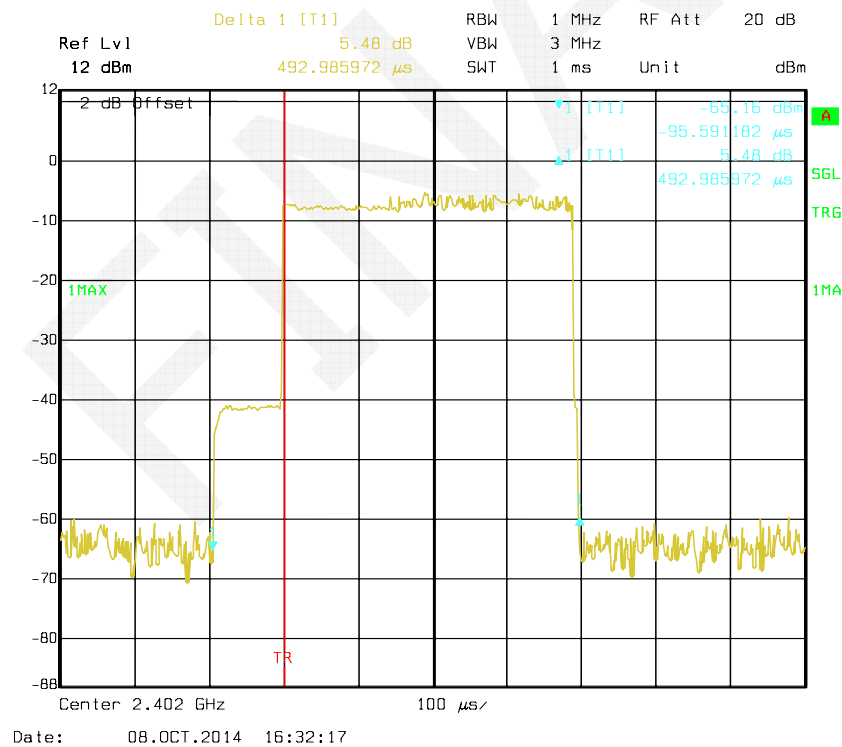


DH5: High Channel

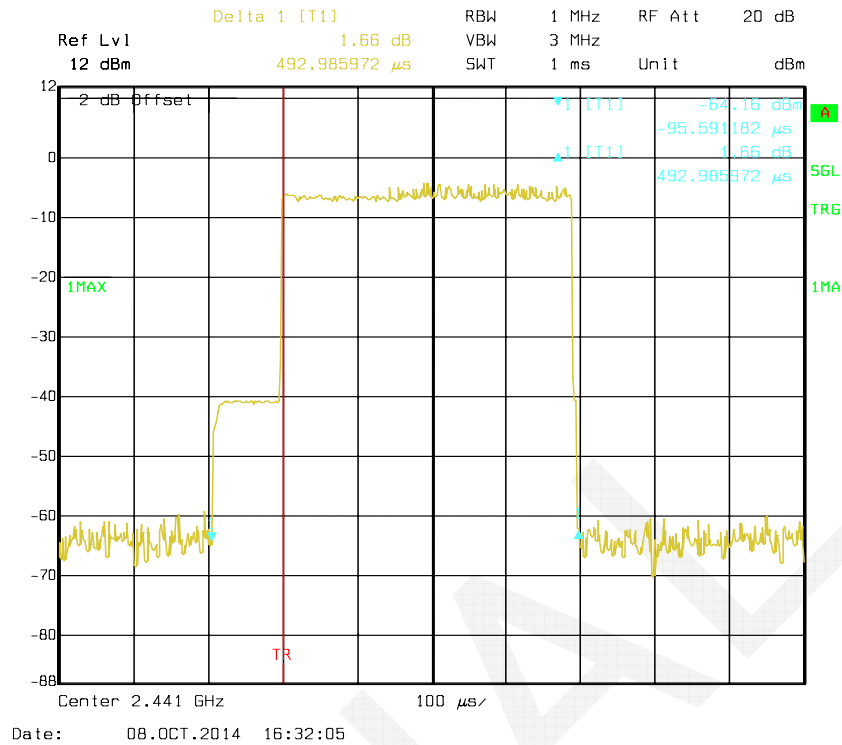


EDR Mode (8DPSK):

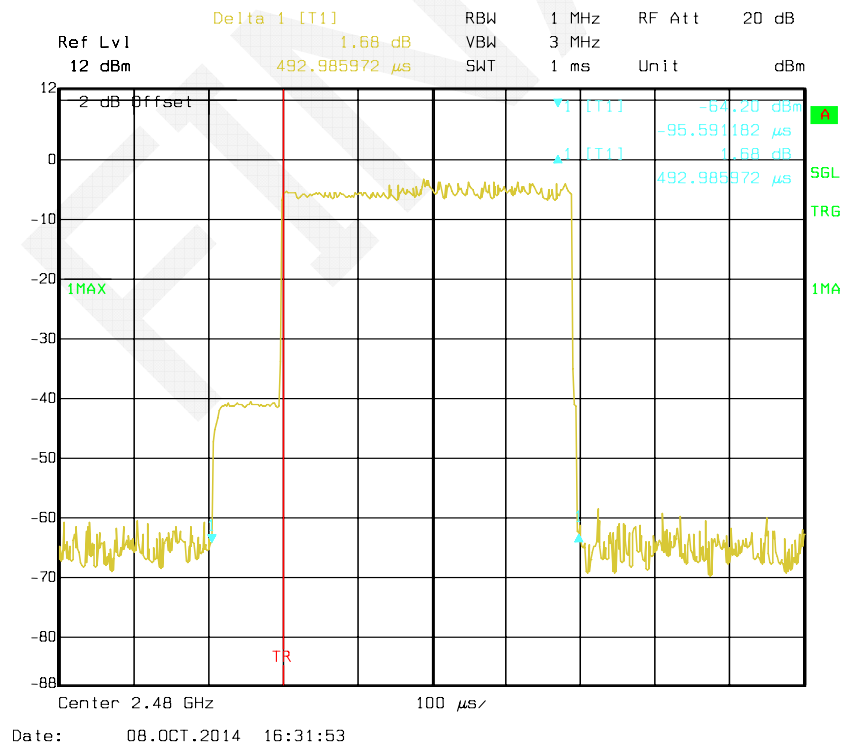
Mode	Channel	Frequency (MHz)	Packet Type	Pulse Width (ms)	Dwell time (s)	Limit (s)
8DPSK	Low Channel	2402	DH1	0.493	0.156	0.4
			DH3	1.755	0.278	0.4
			DH5	3.017	0.321	0.4
	Middel Channel	2441	DH1	0.493	0.156	0.4
			DH3	1.755	0.278	0.4
			DH5	3.017	0.321	0.4
	High Channel	2480	DH1	0.493	0.156	0.4
			DH3	1.755	0.278	0.4
			DH5	3.017	0.321	0.4
DH1:Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s DH 3:Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s DH 5Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s						

DH1: Low Channel

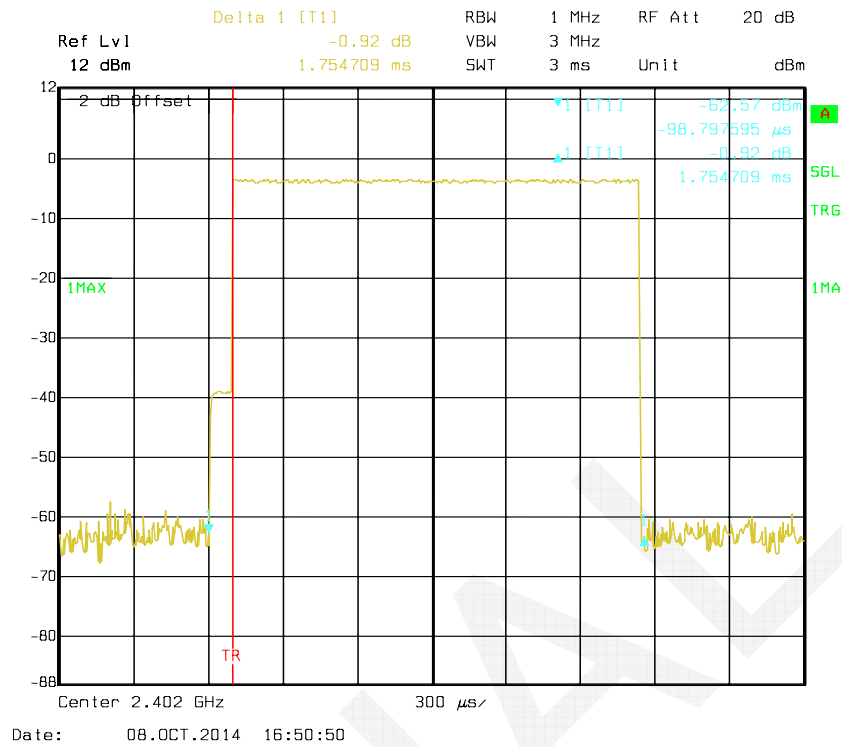
DH1: Middle Channel



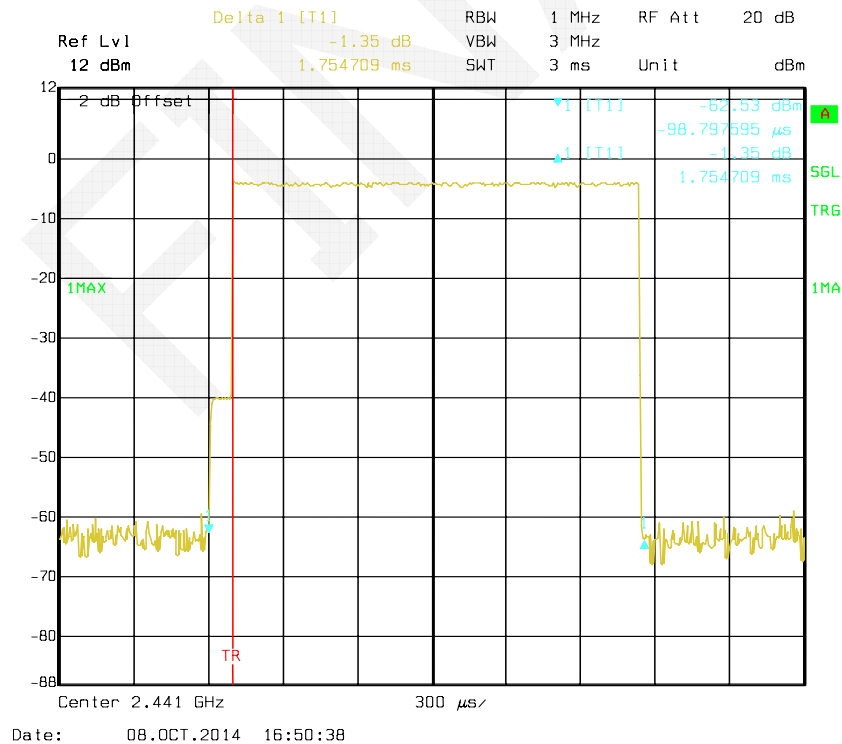
DH1: High Channel



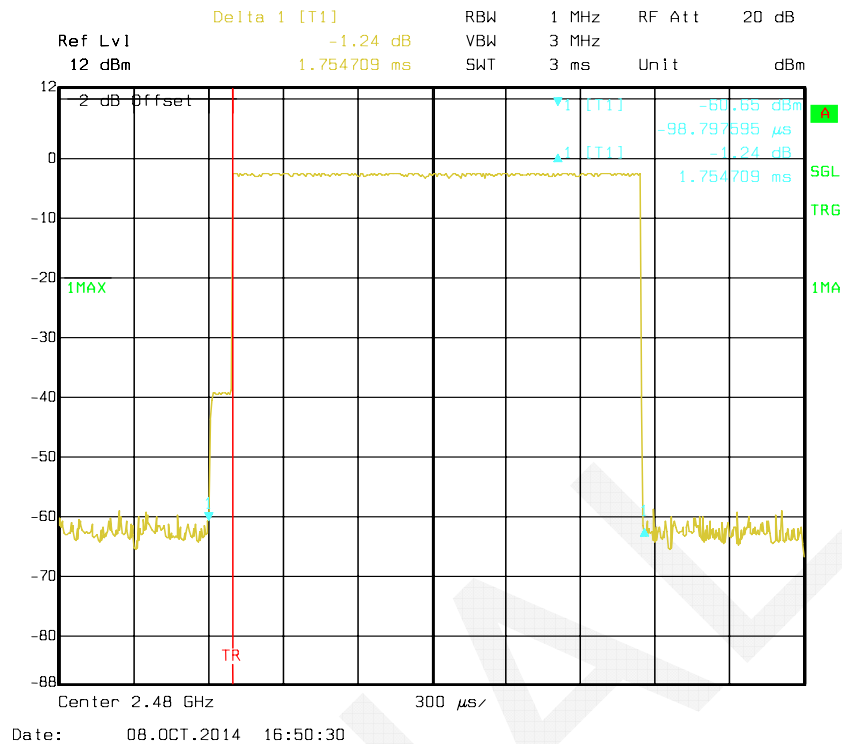
DH3: Low Channel



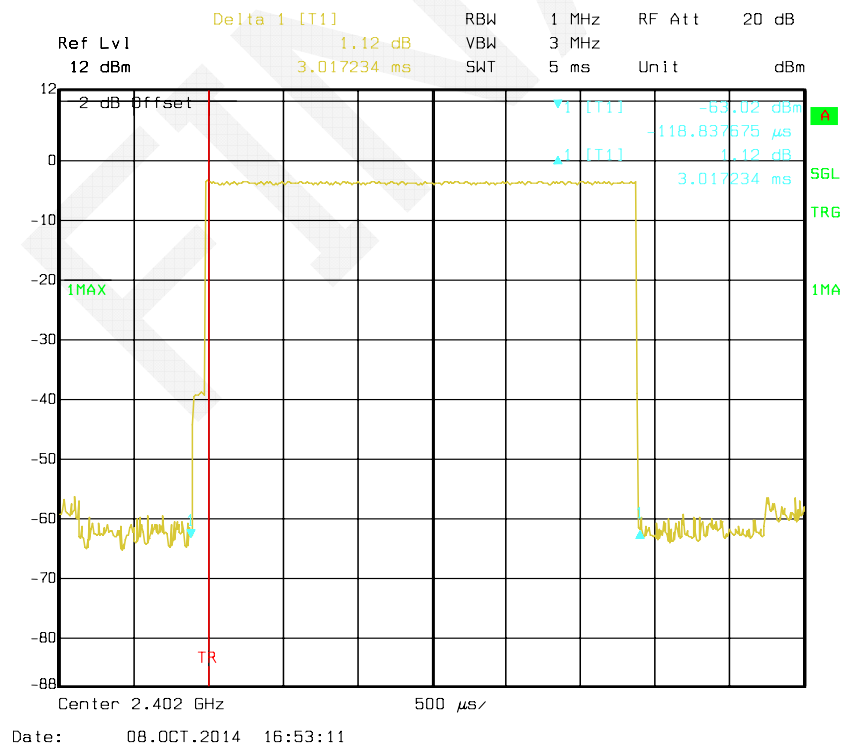
DH3: Middle Channel



DH3: High Channel



DH5: Low Channel



[illegible][illegible]

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 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	FSEM	DE31388	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:	28.9 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa

The testing was performed by Sevin Li on 2014-10-08.

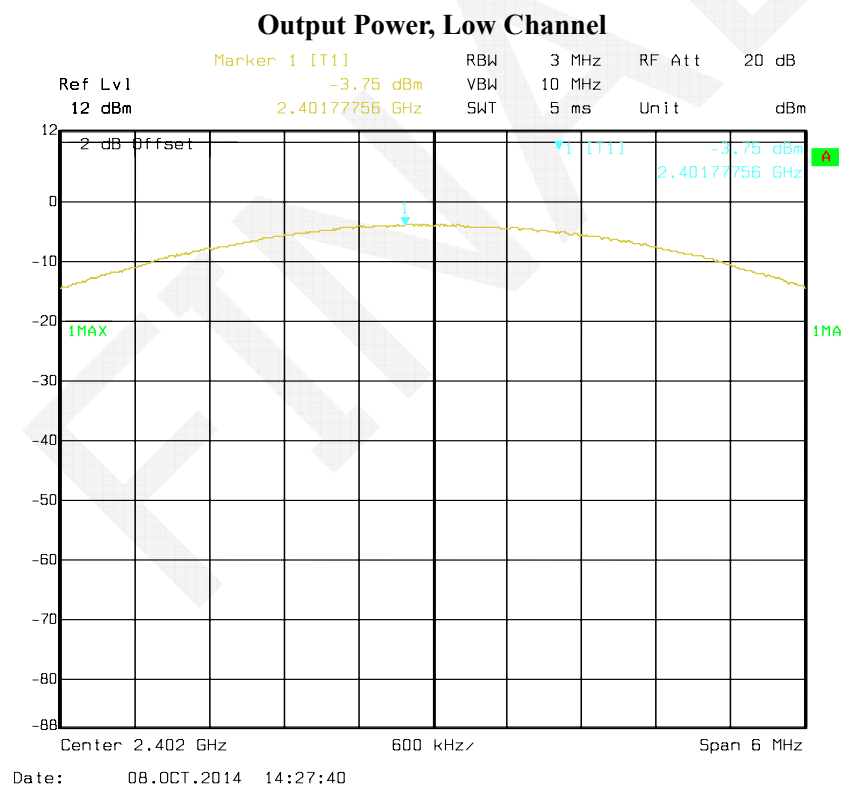
Test Result: Compliance.

Test Mode: Transmitting

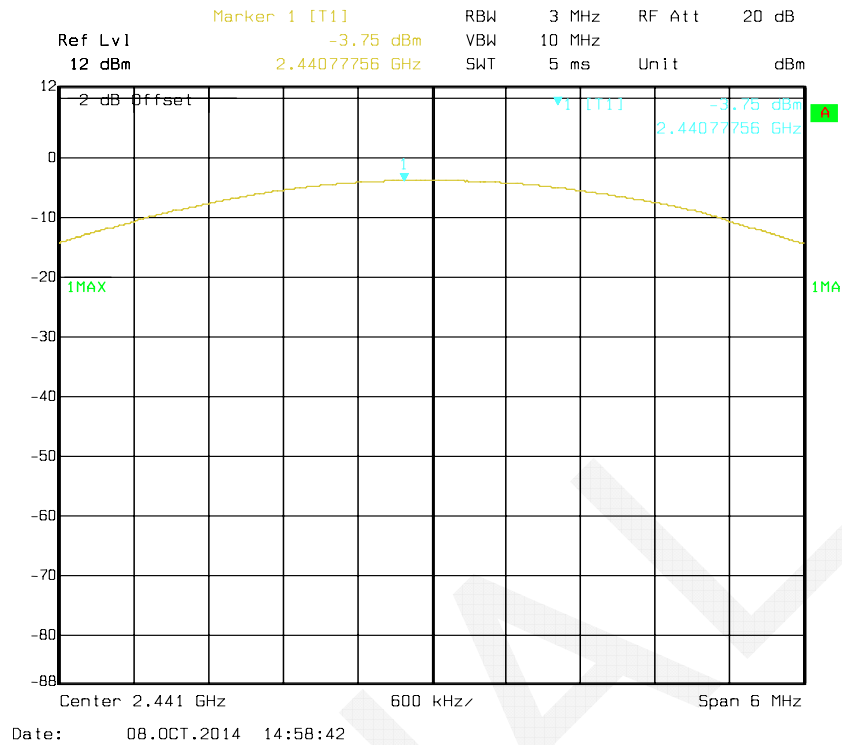
Mode	Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
BDR Mode (GFSK)	Low	2402	-3.75	30
	Middle	2441	-3.75	30
	High	2480	-2.90	30
EDR Mode ($\pi/4$ -DQPSK)	Low	2402	-4.00	30
	Middle	2441	-3.38	30
	High	2480	-2.79	30
EDR Mode (8DPSK)	Low	2402	-4.00	30
	Middle	2441	-3.63	30
	High	2480	-2.66	30

Note: The data above was tested in conducted mode.

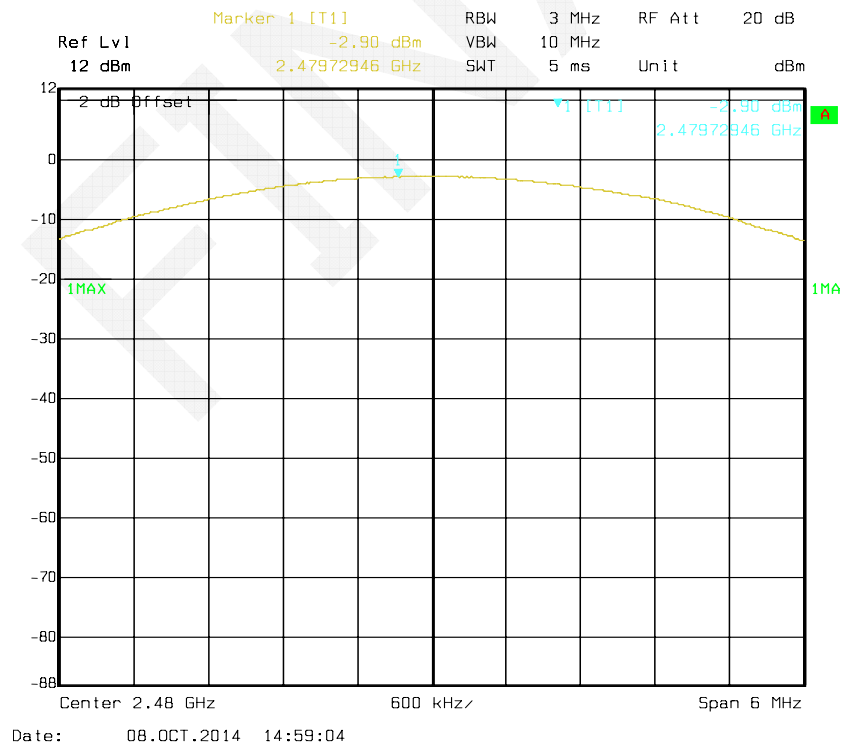
BDR Mode (GFSK):



Output Power, Middle Channel

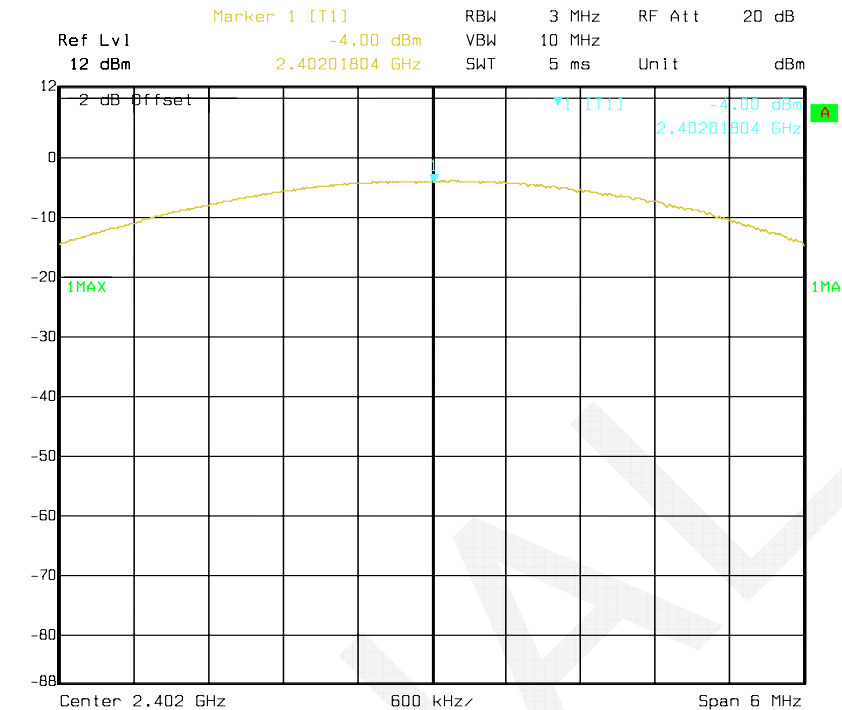


Output Power, High Channel



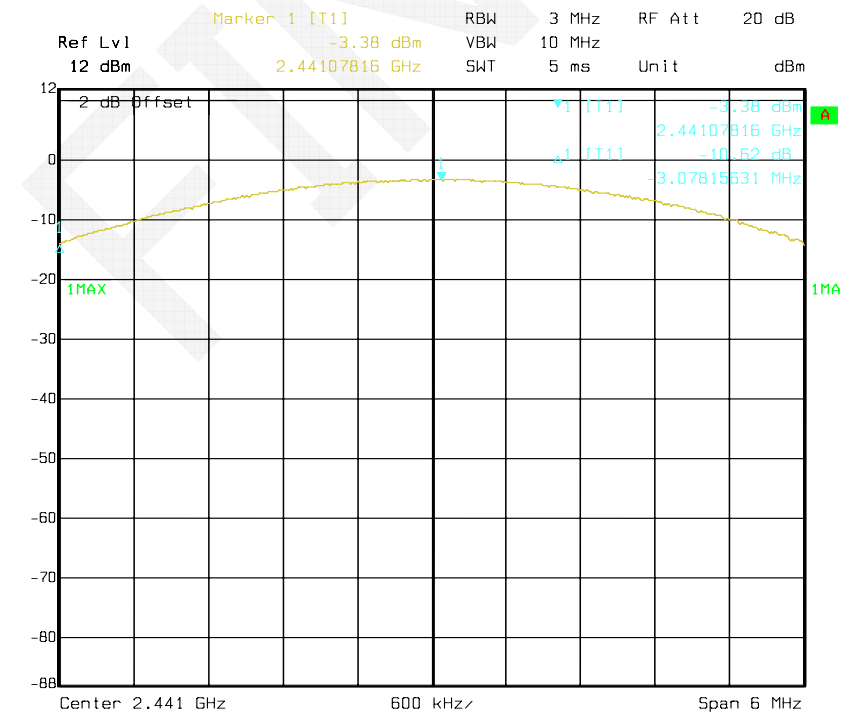
EDR Mode ($\pi/4$ -DQPSK):

Output Power, Low Channel



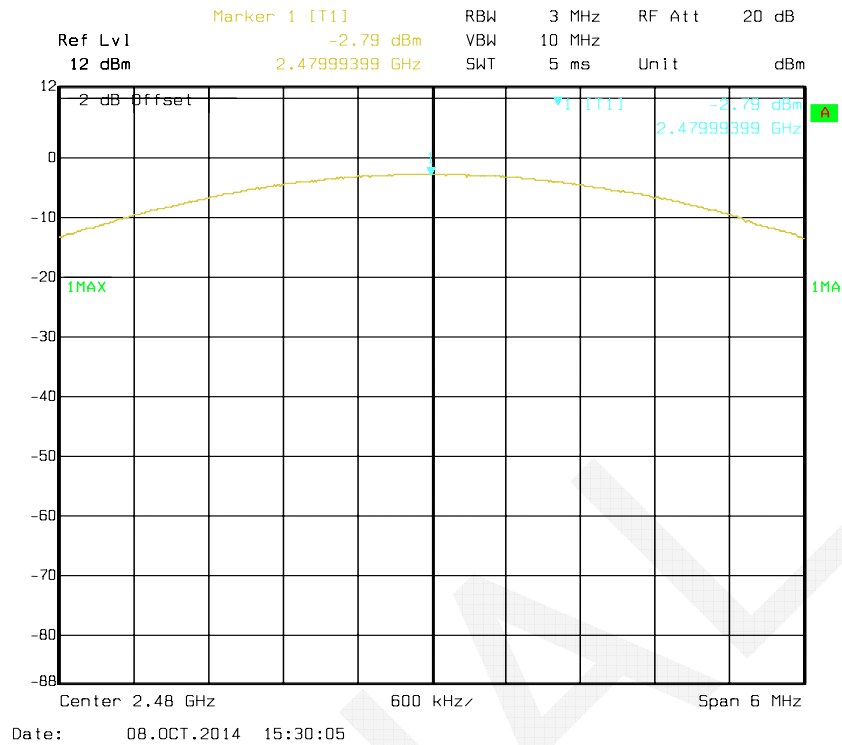
Date: 08.OCT.2014 15:28:32

Output Power, Middle Channel



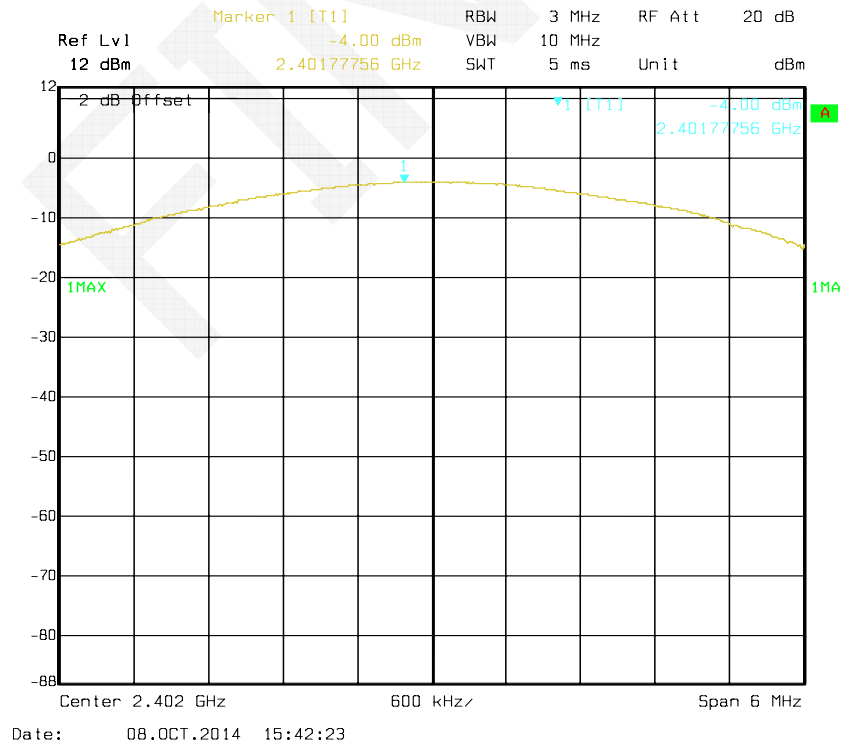
Date: 08.OCT.2014 18:40:07

Output Power, High Channel

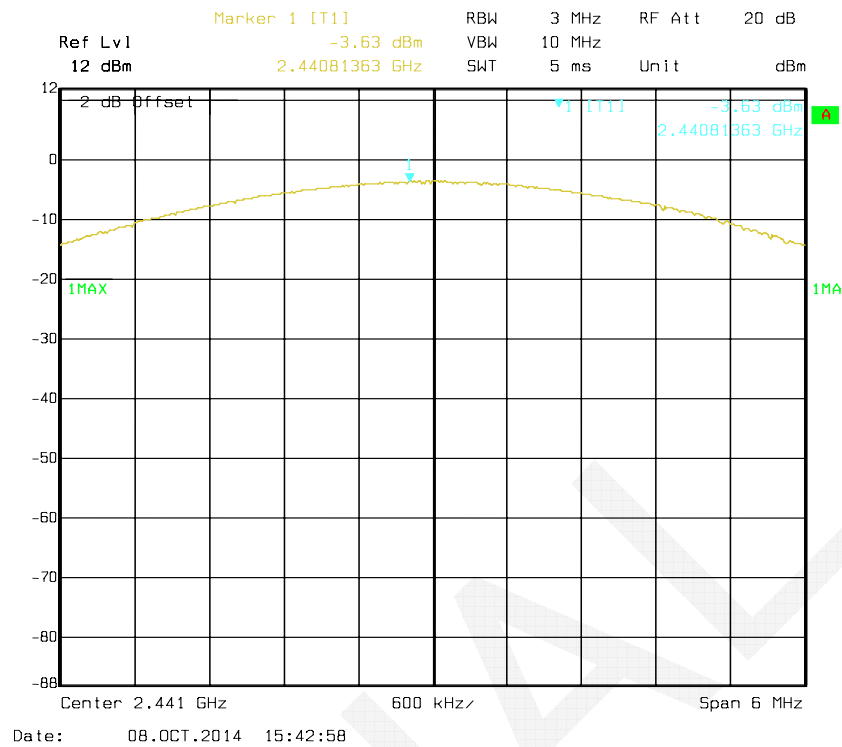


EDR Mode (8DPSK):

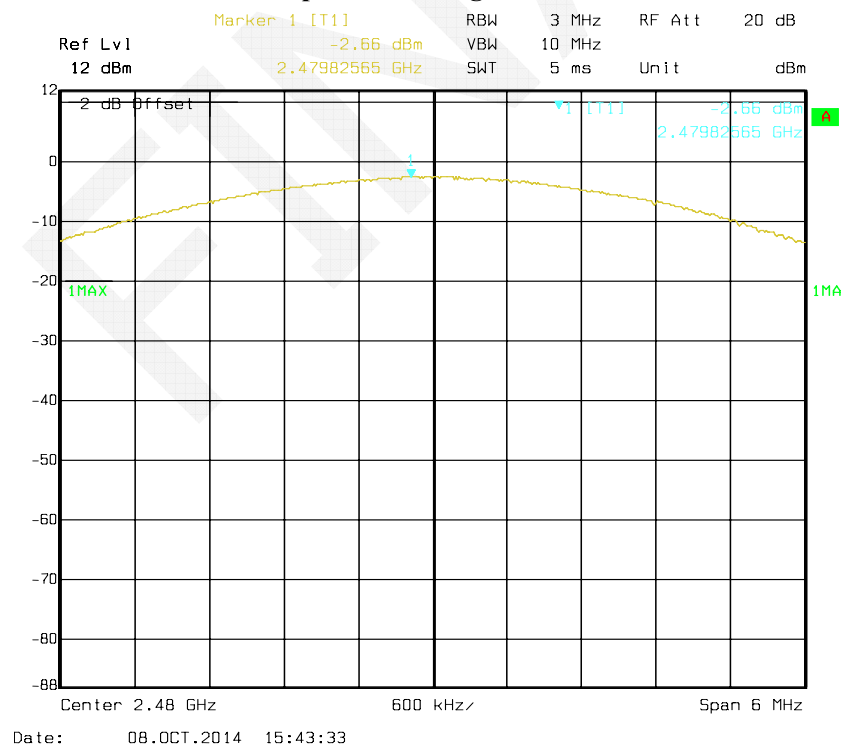
Output Power, Low Channel



Output Power, Middle Channel



Output Power, High Channel



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	FSEM	DE31388	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

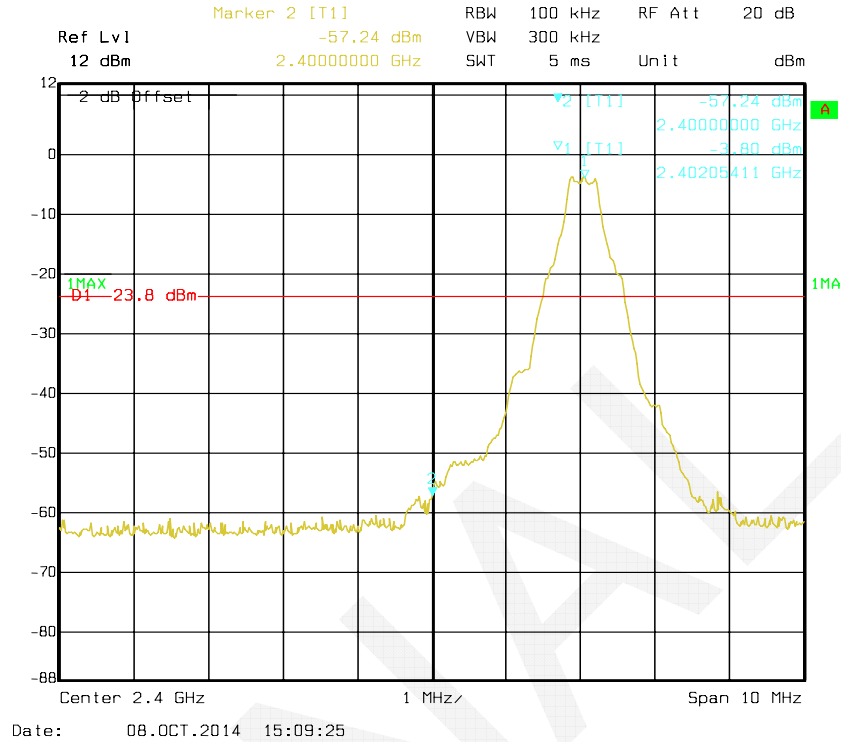
Temperature:	28.9 °C
Relative Humidity:	65 %
ATM Pressure:	100.6 kPa

The testing was performed by Sevin Li on 2014-10-08.

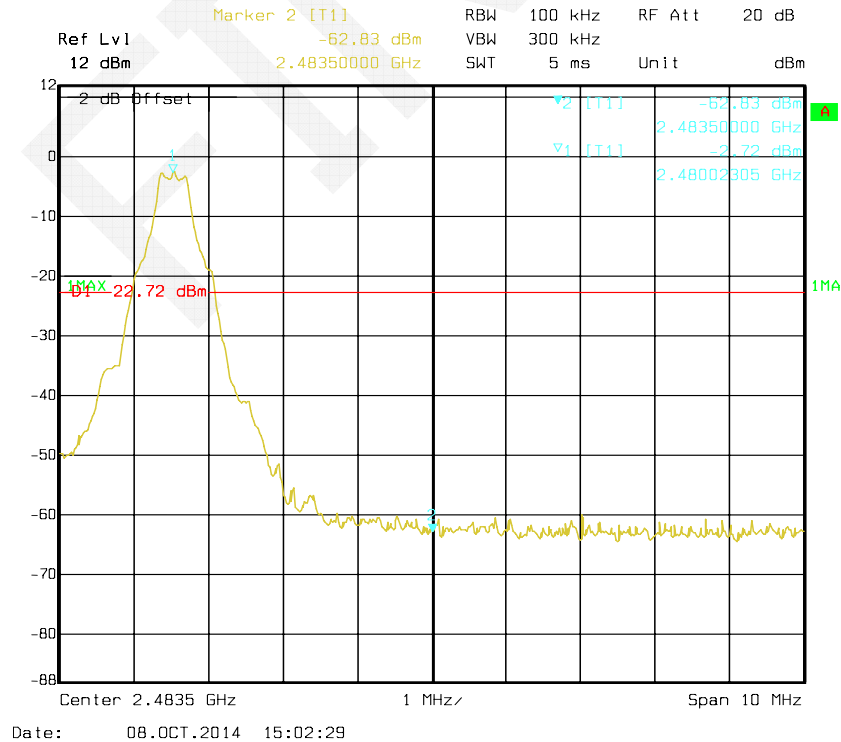
Test Result: Compliance

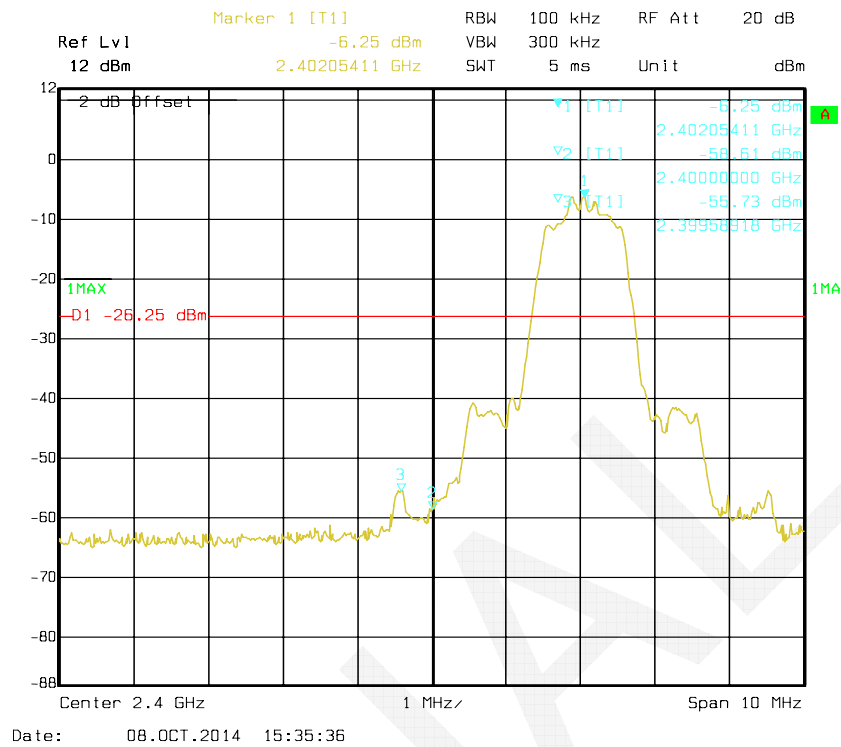
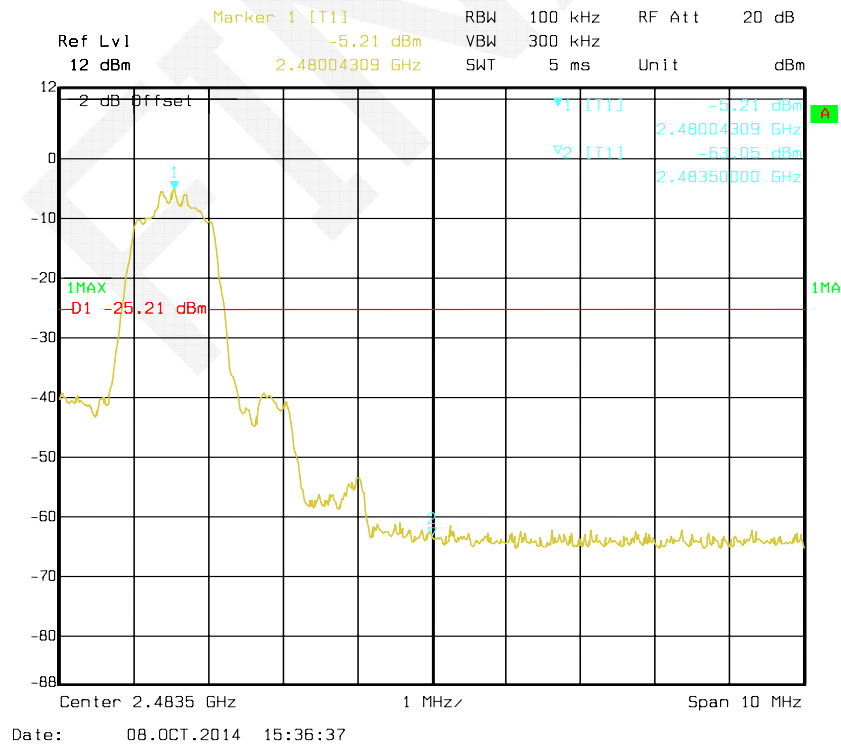
BDR Mode (GFSK):

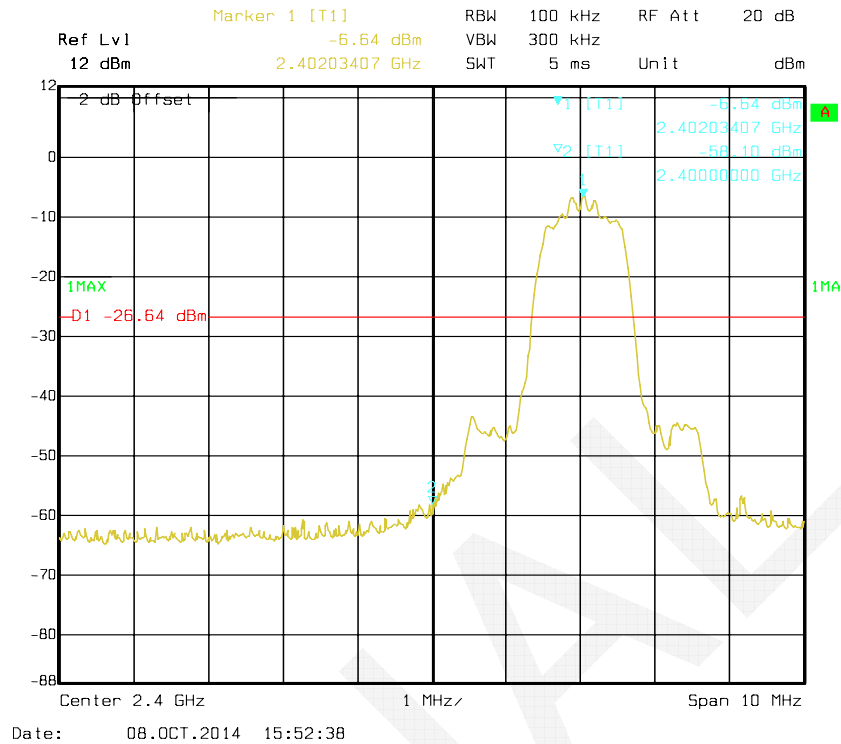
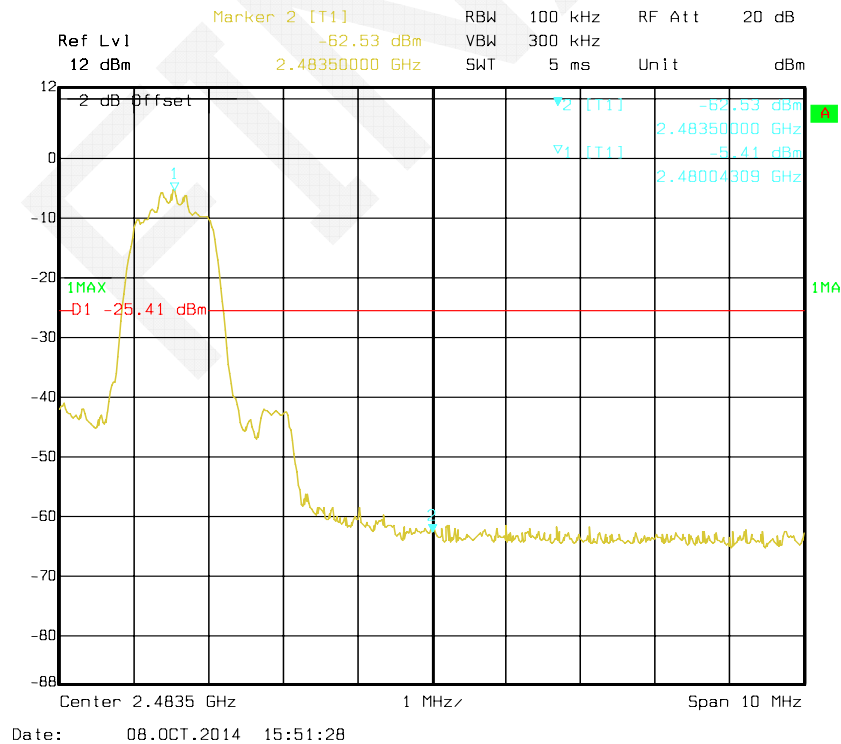
Band Edge, Left Side



Band Edge, Right Side



*EDR Mode (π 4-DQPSK):***Band Edge, Left Side****Band Edge, Right Side**

*EDR Mode (8DPSK):***Band Edge, Left Side****Band Edge, Right Side********* END OF REPORT *******