FCC PART 15.247
TEST REPORT

For

Jiangsu SEUIC Technology Co.,Ltd

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

FCC ID: 2AC68-CRUISE1

Report Type:	**Product Type:**
Original Report	Portable Data Collection Terminal

Test Engineer:	Chris Wang
Report Number:	RKS160913001-00E
Report Date:	2016-12-02
Reviewed By:	Jesse Huang EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Manufacturer	Jiangsu SEUIC Technology Co.,Ltd.
Model	CRUISE 1
Series Model	CRUISE 1-HC
Product	Portable Data Collection Terminal
Dimension	152mm(H)×75.9mm(W)×12.8mm(T)
Power input	DC 3.8V From rechargeable battery or DC 5V Adapter

Adapter 1 Information:
Model: SW-3530
INPUT: 100-240V~50/60Hz 0.7A
OUTPUT: 5V, 2.5A

Adapter 2 Information:
Model:FJ-SW1260502000UB
INPUT: 100-240V~50/60Hz 0.4A Max
OUTPUT: 5V, 2000mA

*Note: * The difference between tested model and series model was explained in the declaration letter.*

**All measurement and test data in this report was gathered from production sample serial number: 20160909001 (Assigned by BACL, Kunshan). The EUT was received on 2016-09-09.*

Objective

This test 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 Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15B JBP, Part 15.247 DTS, Part 15.407 NII, Part 15.225 DXX and Part 22H24E27 PCE submissions with FCC ID: 2AC68-CRUISE1.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and DA 00-705 March 30, 2000.

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		±3.26 dB
RF conducted test with spectrum		±0.9dB
RF Output Power with Power meter		±0.5dB
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB
Occupied Bandwidth		±0.5kHz
Temperature		±1.0℃
Humidity		±6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode which was controlled by the software.

EUT Exercise Software

Bluetool

GFSK :Power level 1
π/4-DQPSK :Power level 0
8DPSK :Power level 0

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

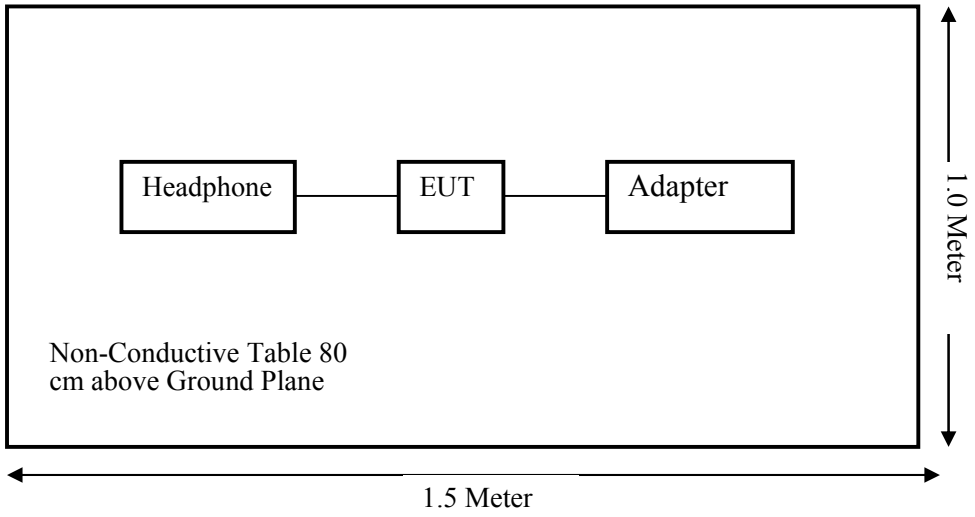
Manufacturer	Description	Model	Serial Number
SEUIC	Headphone	/	/

External I/O Cable

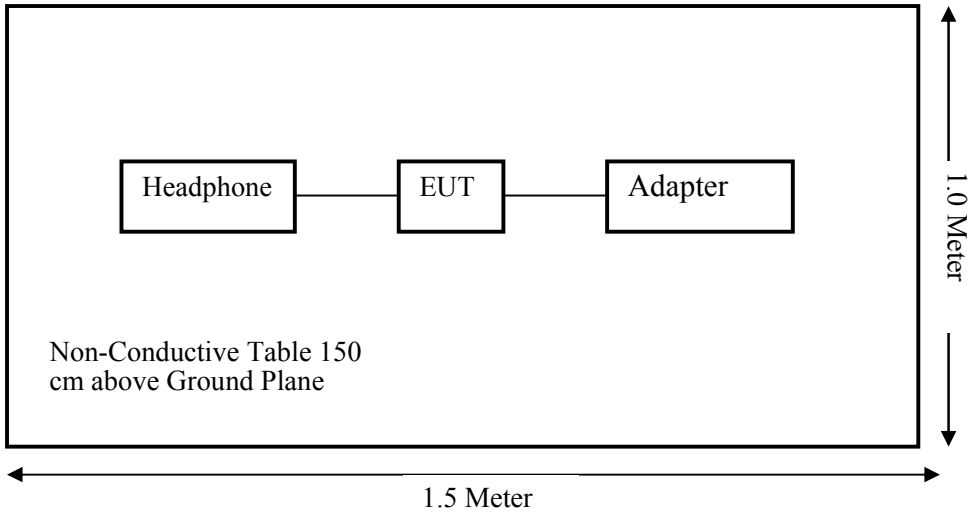
Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un- Shielding	0.8	EUT	Adapter

Block Diagram of Test Setup

For Radiated Emissions (Below 1 GHz):



For Radiated Emissions (Above 1 GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i) §1.1310& §2.1093	RF EXPOSURE	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliance
§15.247(a)(1)	20 dB Emission Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band edges	Compliance

FCC§15.247 (i), §1.1310& §2.1093 –RF EXPOSURE

Applicable Standard

According to§15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Test Result

Compliance, please refer to the SAR report: RKS160905050-20.

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 a internal integration antenna arrangement for Bluetooth, which the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

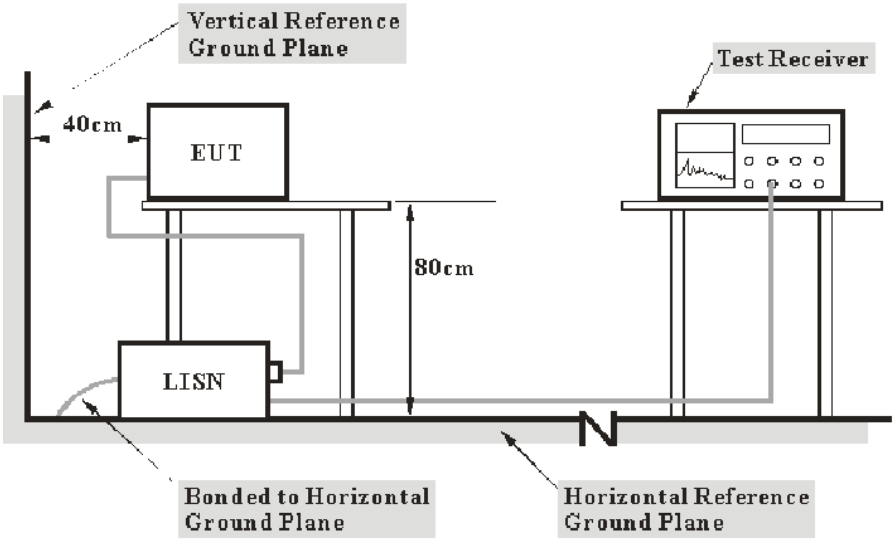
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

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 measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-10
HP	Current probe	11967A	636	2016-07-04	2017-07-03
FCC	ISN	FCC-TLISN-T8-02	20376	2016-07-04	2017-07-03
Haojintech	Coaxial Cable	HMR400UF	NN11600	2016-09-08	2017-09-08
Rohde & Schwarz	CE Test software	EMC32	V 09.10.0	/	/

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

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB 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 Part 15.207

Refer to CISPR16-4-2and CISPR 16-4-1, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

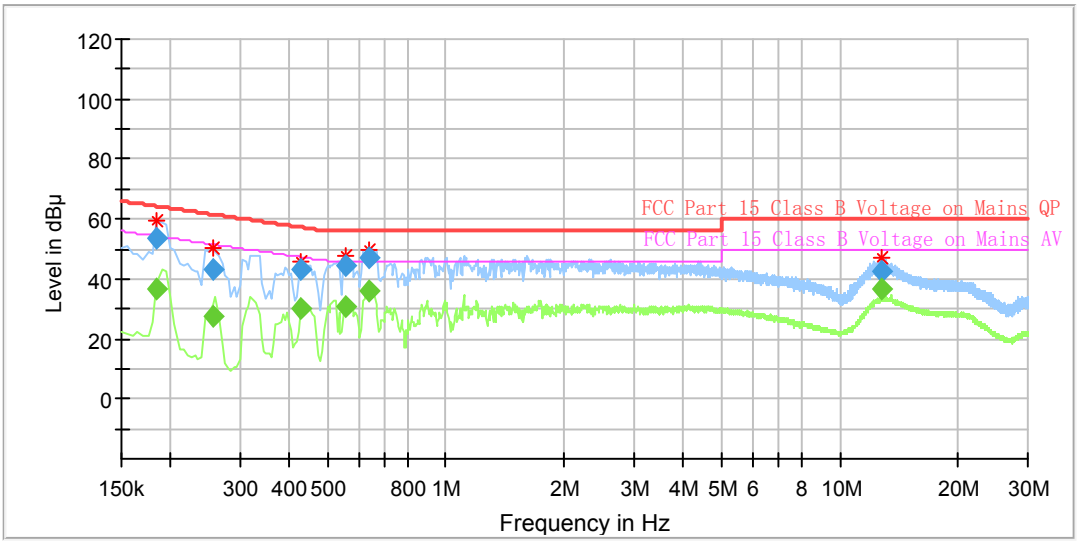
Temperature:	24℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-10-17

EUT operation mode: Transmitting

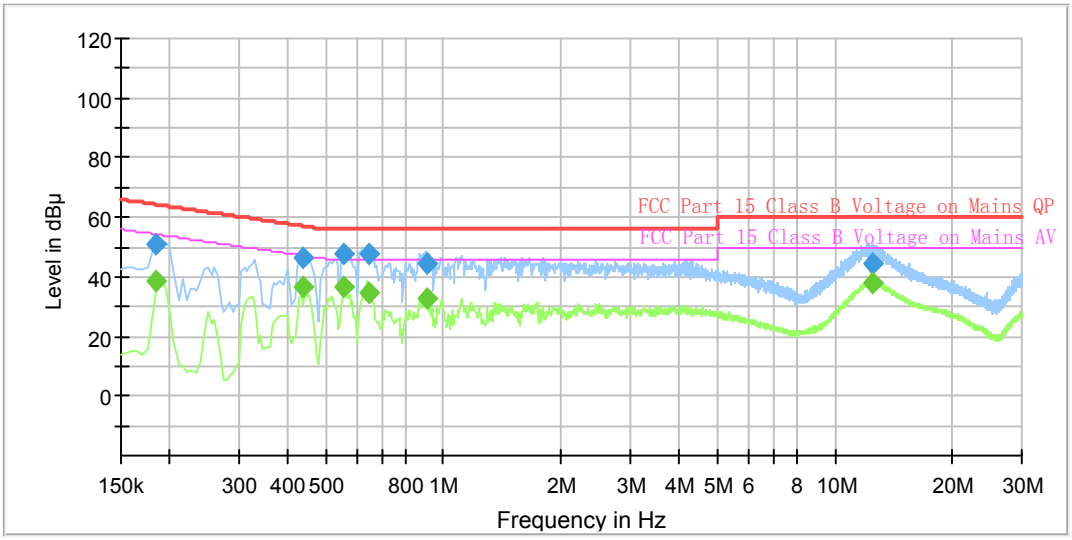
We have tested the couducted emissions with adapter 1 and adapter 2, the worst case (adapter1) was recorded.

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.185000	---	36.64	9.000	L1	11.0	17.62	54.26	Compliance
0.185000	53.29	---	9.000	L1	11.0	10.97	64.26	Compliance
0.255000	---	27.27	9.000	L1	11.0	24.32	51.59	Compliance
0.255000	43.06	---	9.000	L1	11.0	18.53	61.59	Compliance
0.430000	---	29.83	9.000	L1	11.0	17.42	47.25	Compliance
0.430000	43.33	---	9.000	L1	11.0	13.92	57.25	Compliance
0.555000	---	31.07	9.000	L1	11.1	14.93	46.00	Compliance
0.555000	44.47	---	9.000	L1	11.1	11.53	56.00	Compliance
0.640000	---	35.69	9.000	L1	11.1	10.31	46.00	Compliance
0.640000	47.26	---	9.000	L1	11.1	8.74	56.00	Compliance
12.800000	---	36.39	9.000	L1	11.3	13.61	50.00	Compliance
12.800000	42.34	---	9.000	L1	11.3	17.66	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.185000	---	38.29	9.000	N	11.0	15.97	54.26	Compliance
0.185000	50.76	---	9.000	N	11.0	13.50	64.26	Compliance
0.440000	---	36.89	9.000	N	11.0	10.17	47.06	Compliance
0.440000	46.23	---	9.000	N	11.0	10.83	57.06	Compliance
0.555000	---	36.91	9.000	N	11.0	9.09	46.00	Compliance
0.555000	47.90	---	9.000	N	11.0	8.10	56.00	Compliance
0.645000	---	34.83	9.000	N	11.1	11.17	46.00	Compliance
0.645000	47.65	---	9.000	N	11.1	8.35	56.00	Compliance
0.910000	---	32.68	9.000	N	11.1	13.32	46.00	Compliance
0.910000	44.41	---	9.000	N	11.1	11.59	56.00	Compliance
12.500000	---	38.21	9.000	N	11.4	11.79	50.00	Compliance
12.500000	44.27	---	9.000	N	11.4	15.73	60.00	Compliance

Note:
1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
2) Corrected Amplitude = Reading + Corr.
3) Margin = Limit –Corrected Amplitude

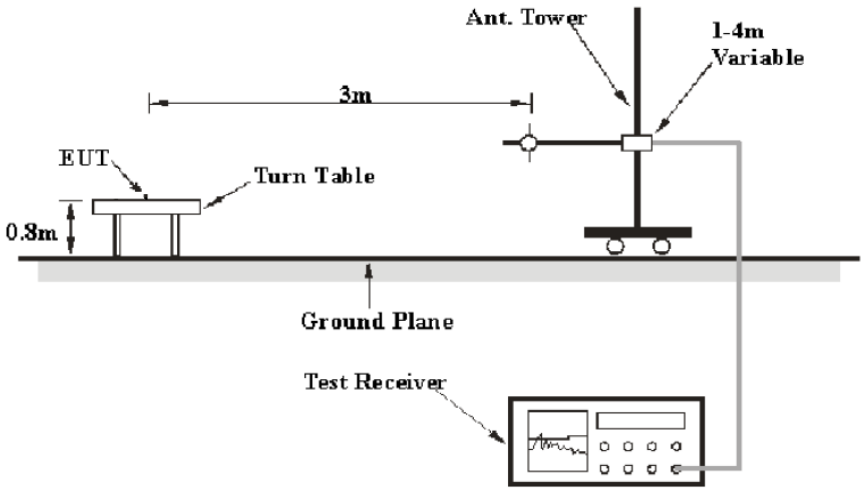
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

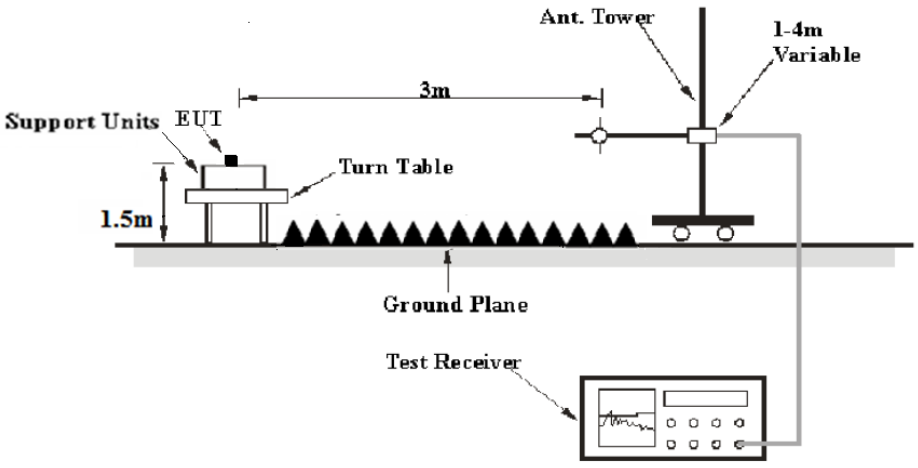
FCC §15.205; §15.209; §15.247(d)

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 limits.

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

Frequency Range	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	1MHz	3 MHz	Any	PK
	1MHz	10 Hz	>98%	Ave.
	1MHz	1/T	<98%	

Test Procedure

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

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

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrunent	Amplifier	330	171377	2016-10-21	2017-10-21
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2015-10-18	2018-10-18
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
R&S	Auto test Software	EMC32	V 09.10.0	/	/
Haojintech	Coaxial Cable	HMR400UF	NN11600	2016-09-08	2017-09-08
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that 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 Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Refer to CISPR16-4-2 and CISPR 16-4-1, the measured level complies with the limit if

$$L_m ++ U_{(Lm)} \leq L_{lim} ++ U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than + U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

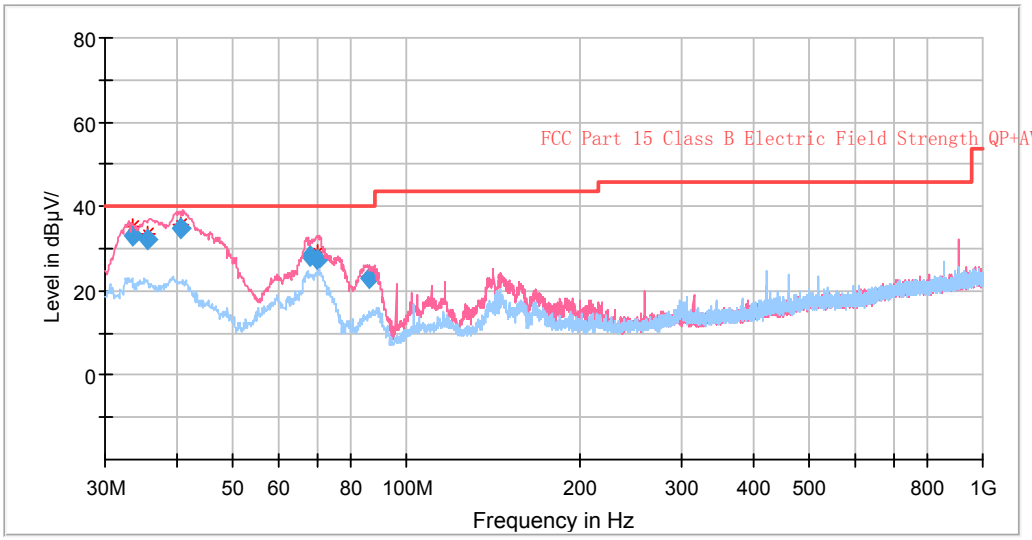
Temperature:	24 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-10-27.

EUT operation mode: Normal operation

We have tested the radiated emissions with adapter 1 and adapter 2, the worst case (adapter1) was recorded.

30MHz-1GHz:



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
33.470000	40.10	QP	157.0	101.0	V	-7.0	33.10	40.00	6.90
35.423750	40.38	QP	0.0	101.0	V	-8.0	32.38	40.00	7.62
40.668750	45.77	QP	185.0	101.0	V	-10.8	34.97	40.00	5.03
68.020000	45.51	QP	195.0	101.0	V	-17.1	28.41	40.00	11.59
70.171250	44.59	QP	110.0	199.0	V	-17.1	27.49	40.00	12.51
86.133750	39.99	QP	40.0	101.0	V	-17.0	22.99	40.00	17.01

EUT operation mode: Transmitting

1GHz -25 GHz: (*Scan with GFSK, π/4-DQPSK, 8-DPSK mode, the worst case is BDR Mode (GFSK)*)

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
2402.00	96.85	PK	52	232	V	-3.04	93.81	/	/
2402.00	92.12	Ave	52	232	V	-3.04	89.08	/	/
2402.00	91.03	PK	23	242	H	-3.04	87.99	/	/
2402.00	86.92	Ave	23	242	H	-3.04	83.88	/	/
2390.00	45.26	PK	292	119	V	-3.05	42.21	74.00	31.79
2390.00	32.22	Ave	292	119	V	-3.05	29.17	54.00	24.83
2400.00	46.29	PK	244	113	V	-3.00	43.29	74.00	30.71
2400.00	34.16	Ave	244	113	V	-3.00	31.16	54.00	22.84
1613.70	55.16	PK	57	124	H	-6.01	49.15	74.00	24.85
1613.70	50.64	Ave	57	124	H	-6.01	44.63	54.00	9.37
4804.00	47.28	PK	95	173	V	7.16	54.44	74.00	19.56
4804.00	36.21	Ave	95	173	V	7.16	43.37	54.00	10.63
7236.00	40.56	PK	326	113	H	16.00	56.56	74.00	17.44
7236.00	31.12	Ave	326	113	H	16.00	47.12	54.00	6.88
Middle Channel (2441MHz)									
2441.00	98.52	PK	63	211	V	-3.02	95.50	/	/
2441.00	94.23	Ave	63	211	V	-3.02	91.21	/	/
2441.00	94.67	PK	67	193	H	-3.02	91.65	/	/
2441.00	90.36	Ave	67	193	H	-3.02	87.34	/	/
1477.00	43.71	PK	257	134	V	-6.98	36.73	74.00	37.27
1477.00	32.12	Ave	257	134	V	-6.98	25.14	54.00	28.86
1696.00	42.73	PK	36	131	H	-5.43	37.30	74.00	36.70
1696.00	36.79	Ave	36	131	H	-5.43	31.36	54.00	22.64
4882.00	51.10	PK	290	224	V	7.28	58.38	74.00	15.62
4882.00	42.50	Ave	290	224	V	7.28	49.78	54.00	4.22
6677.00	39.47	PK	304	239	H	13.79	53.26	74.00	20.74
6677.00	32.72	Ave	304	239	H	13.79	46.51	54.00	7.49
7323.00	41.73	PK	42	109	H	16.38	58.11	74.00	15.89
7323.00	31.51	Ave	42	109	H	16.38	47.89	54.00	6.11

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
High Channel (2480 MHz)									
2480.00	94.96	PK	79	137	V	-2.99	91.97	/	/
2480.00	90.55	Ave	79	137	V	-2.99	87.56	/	/
2480.00	89.42	PK	57	204	H	-2.99	86.43	/	/
2480.00	84.56	Ave	57	204	H	-2.99	81.57	/	/
2483.50	43.55	PK	300	206	V	-2.99	40.56	74.00	33.44
2483.50	30.28	Ave	300	206	V	-2.99	27.29	54.00	26.71
2563.00	43.11	PK	9	201	V	-2.58	40.53	74.00	33.47
2563.00	34.16	Ave	9	201	V	-2.58	31.58	54.00	22.42
4960.00	51.32	PK	226	180	H	7.40	58.72	74.00	15.28
4960.00	41.15	Ave	226	180	H	7.40	48.55	54.00	5.45
6681.00	23.72	PK	2	119	H	13.80	37.52	74.00	36.48
6681.00	16.02	Ave	2	119	H	13.80	29.82	54.00	24.18
7440.00	43.38	PK	146	211	H	16.89	60.27	74.00	13.73
7440.00	31.77	Ave	146	211	H	16.89	48.66	54.00	5.34

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude

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 20 dB bandwidth of the hopping channel, whichever is greater. 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. Set the EUT in transmitting mode, maxhold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace.
3. Measure the channel separation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

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

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-09-14.

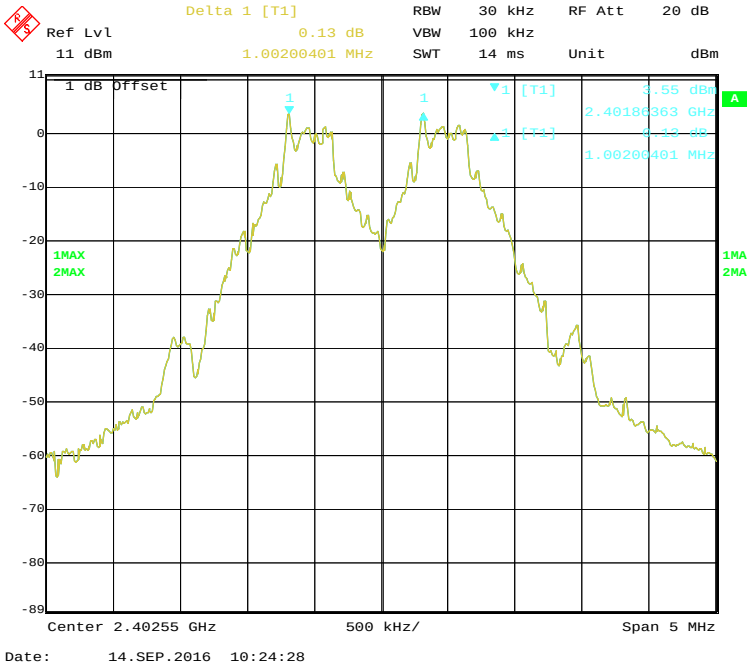
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to following tables and plots

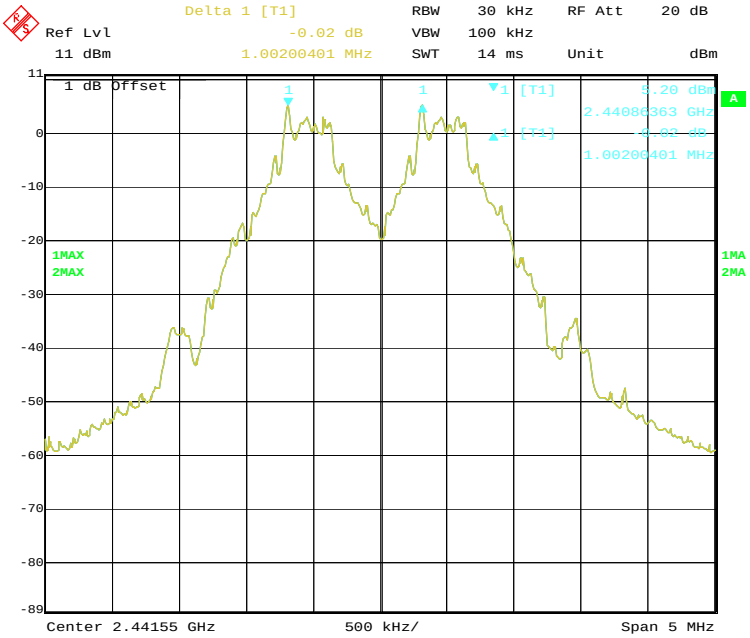
Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	≥Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.002	0.866	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.866	Pass
	Adjacent	2442			
	High	2480	1.002	0.848	Pass
	Adjacent	2479			
EDR (π/4-DQPSK)	Low	2402	1.012	0.862	Pass
	Adjacent	2403			
	Middle	2441	1.142	0.838	Pass
	Adjacent	2442			
	High	2480	1.152	0.870	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.172	0.934	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.943	Pass
	Adjacent	2442			
	High	2480	1.002	0.942	Pass
	Adjacent	2479			

Note: For GFSK: Limit = 20 dB bandwidth; For π/4-DQPSK and 8DPSK: Limit = 20 dB bandwidth *2/3

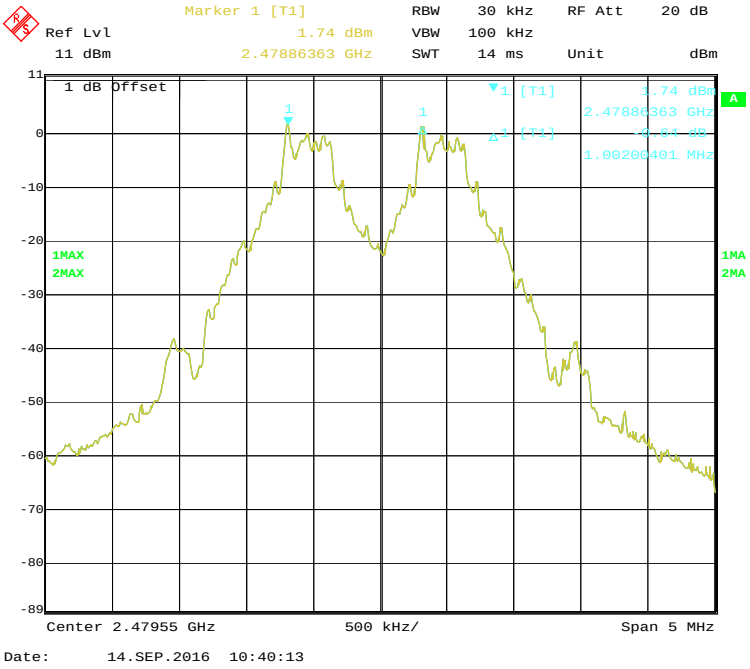
BDR (GFSK): Low Channel



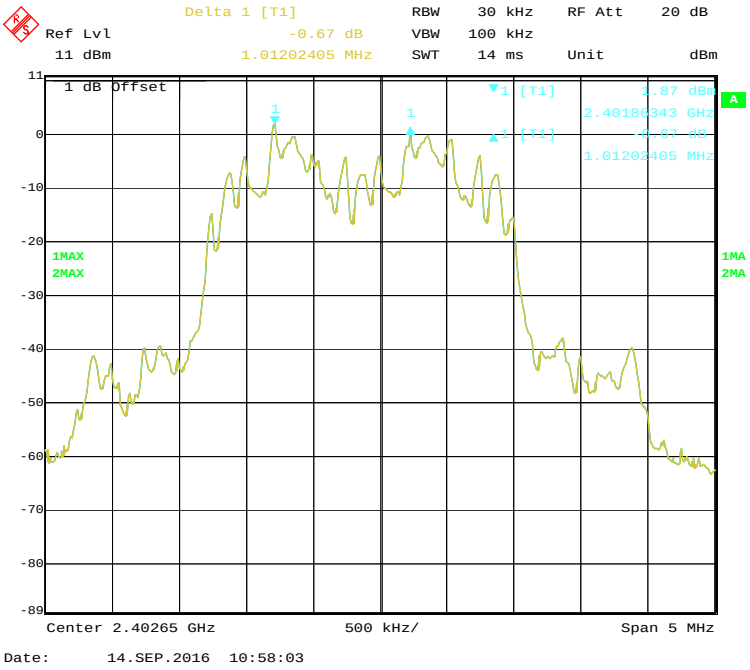
BDR (GFSK): Middle Channel



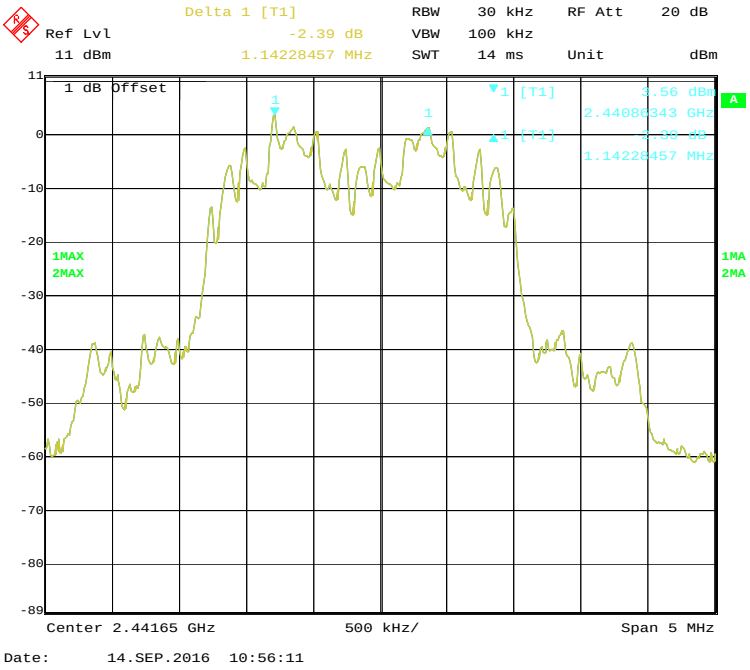
BDR (GFSK): High Channel



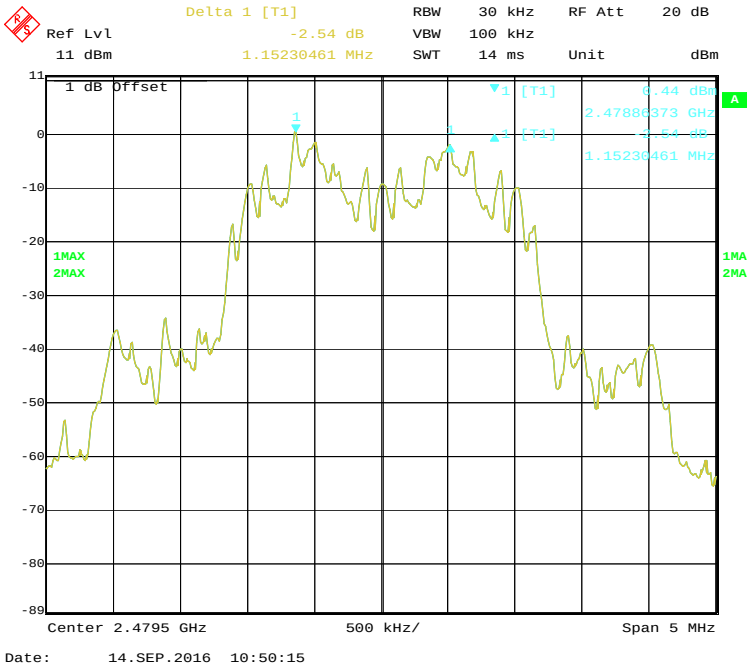
EDR (π/4-DQPSK): Low Channel



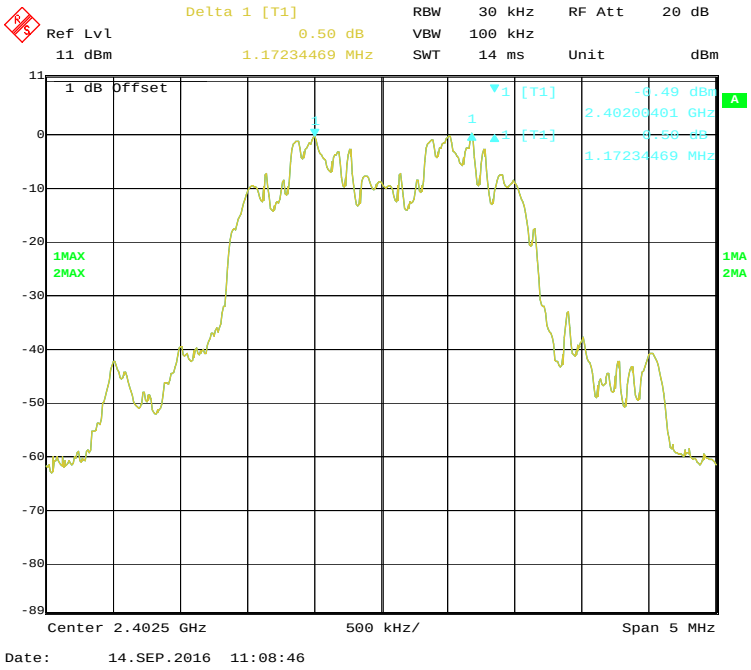
EDR (π/4-DQPSK): Middle Channel



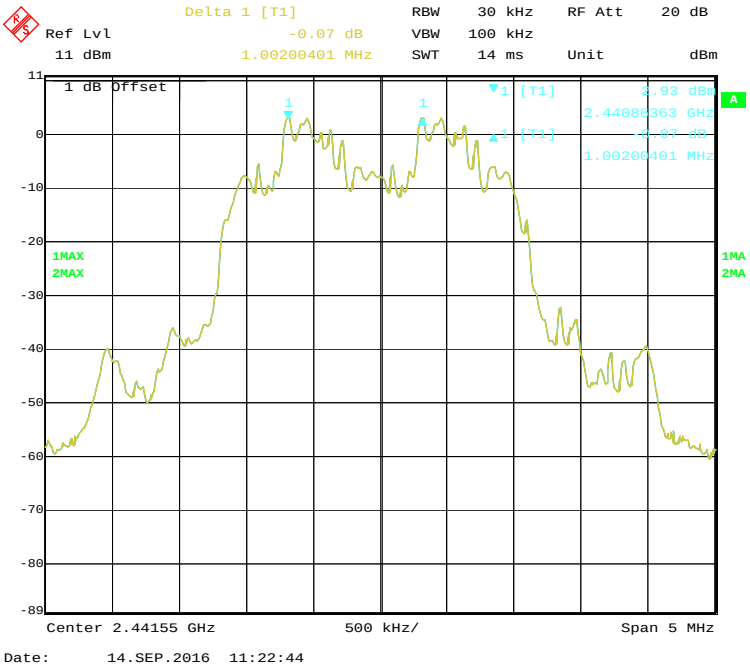
EDR (π/4-DQPSK): High Channel



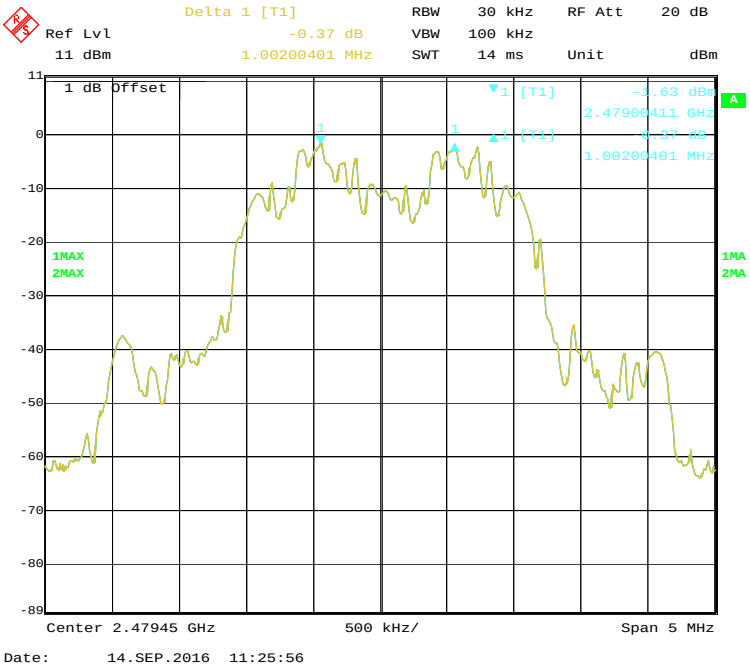
EDR (8DPSK): Low Channel



EDR (8DPSK): Middle Channel



EDR (8DPSK): High Channel



FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

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 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

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

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

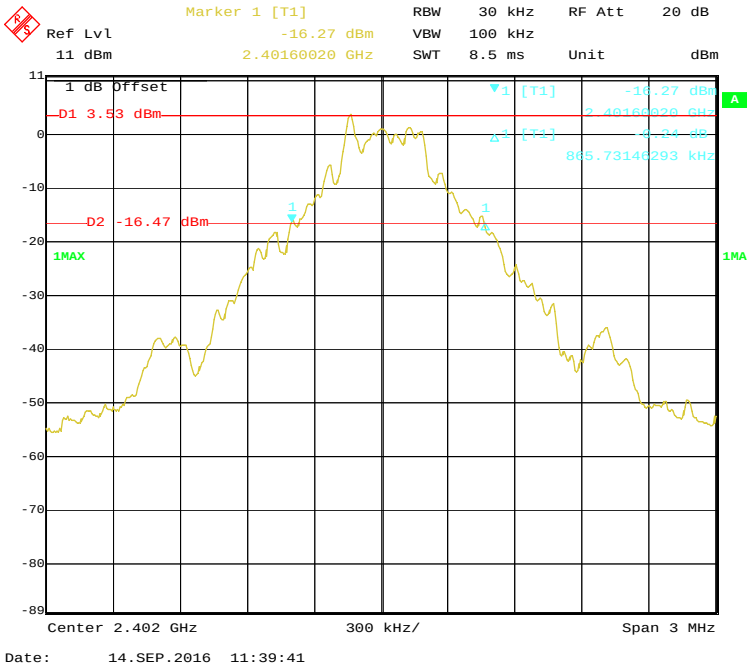
The testing was performed by Chris Wang on 2016-09-14.

EUT operation mode: Transmitting

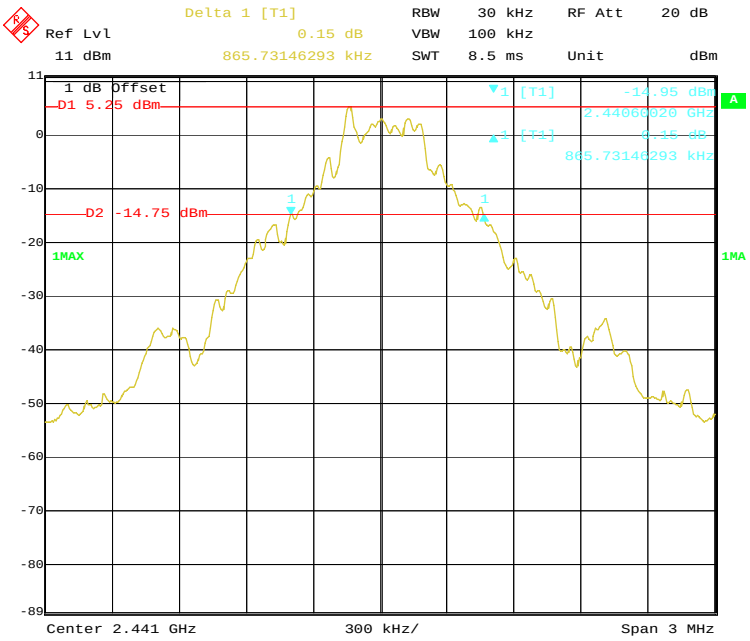
Test Result: Compliance. Please refer to following tables and plots

Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.866
	Middle	2441	0.866
	High	2480	0.848
EDR (π/4-DQPSK)	Low	2402	1.293
	Middle	2441	1.257
	High	2480	1.305
EDR (8DPSK)	Low	2402	1.401
	Middle	2441	1.415
	High	2480	1.413

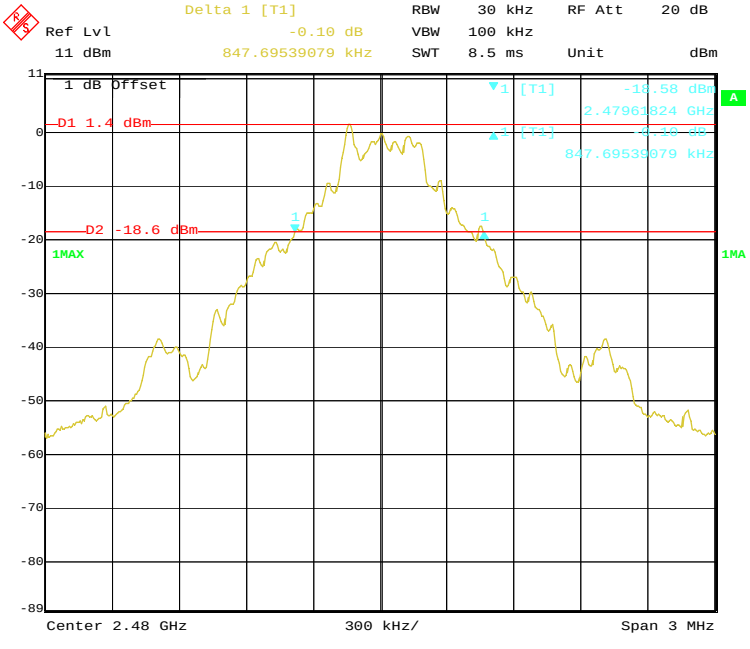
BDR (GFSK): Low Channel



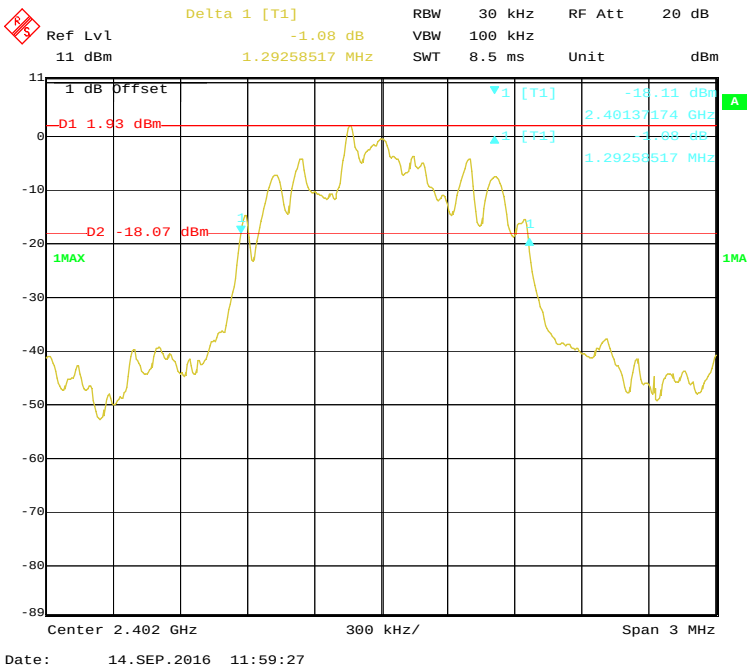
BDR (GFSK): Middle Channel



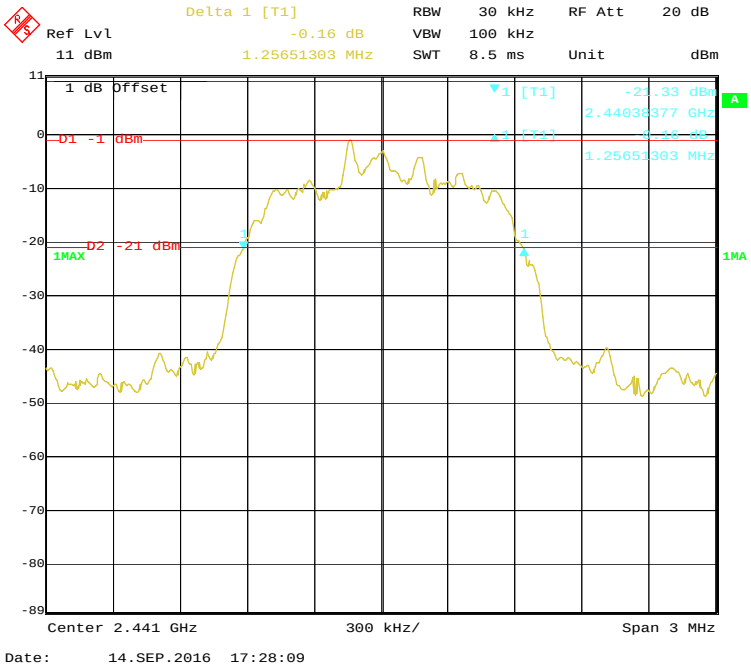
BDR (GFSK): High Channel



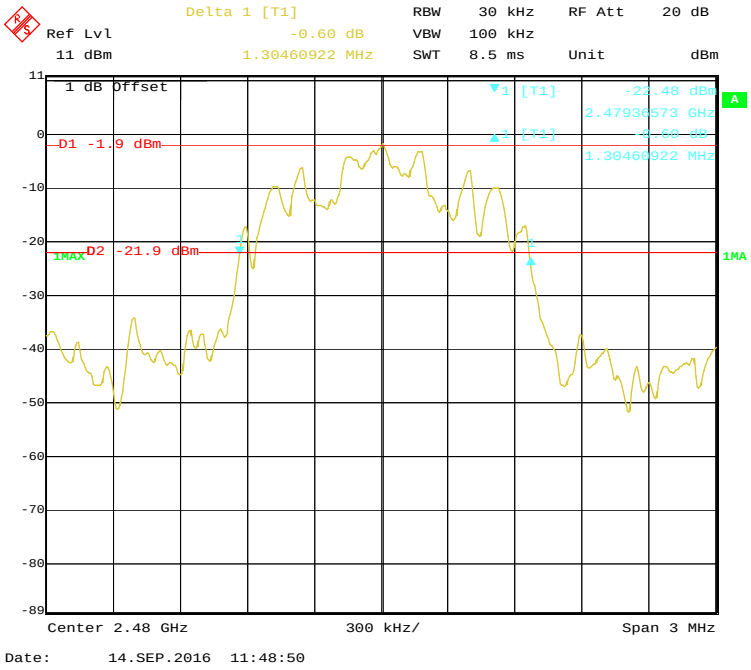
EDR (π/4-DQPSK): Low Channel



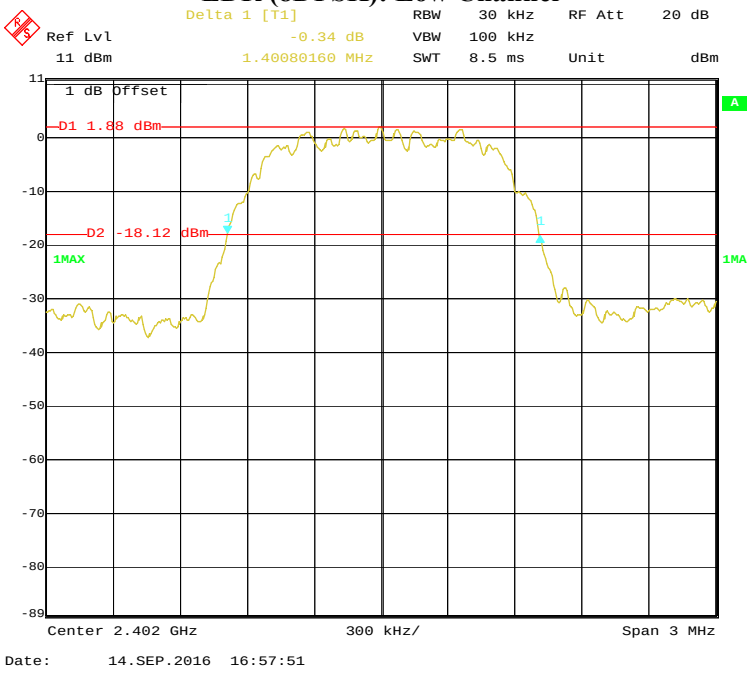
EDR(π/4-DQPSK): Middle Channel



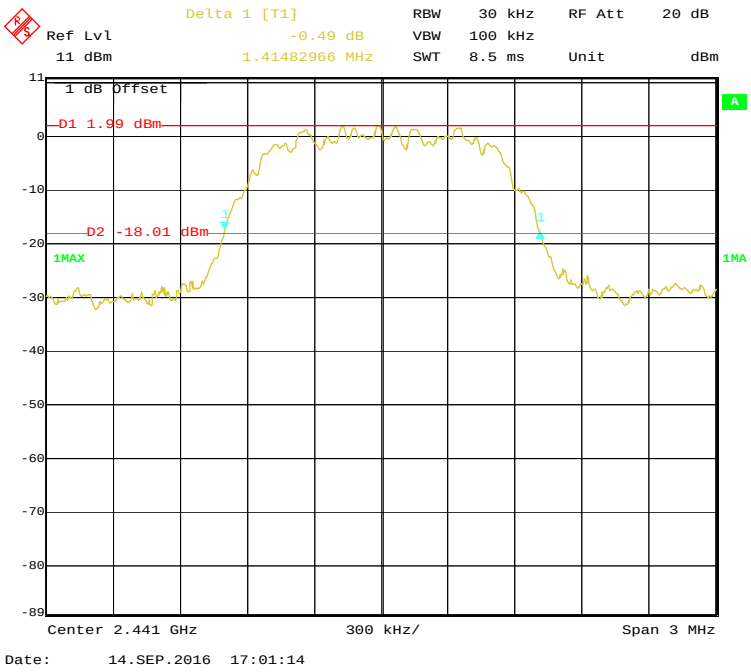
EDR (π/4-DQPSK): High Channel



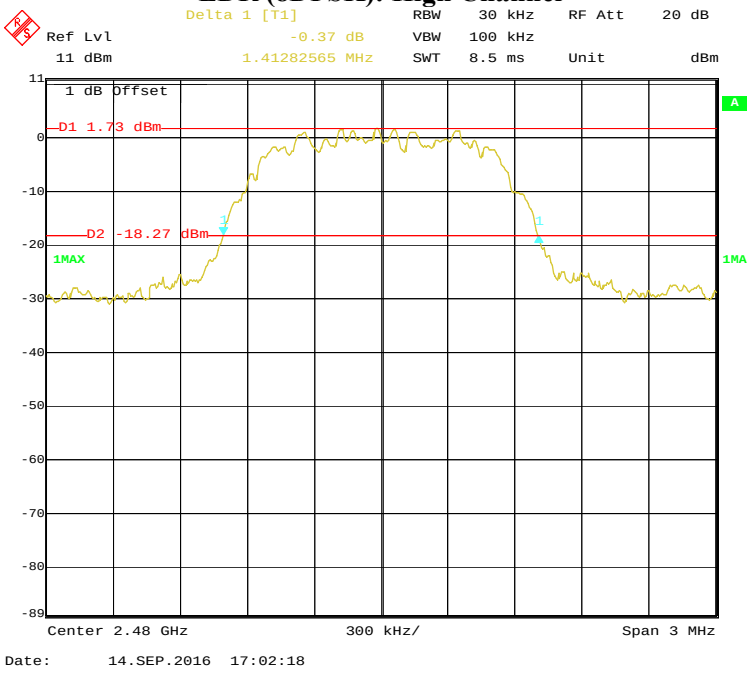
EDR (8DPSK): Low Channel



EDR (8DPSK): Middle Channel



EDR (8DPSK): 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

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

Test Data

Environmental Conditions

Temperature:	24℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

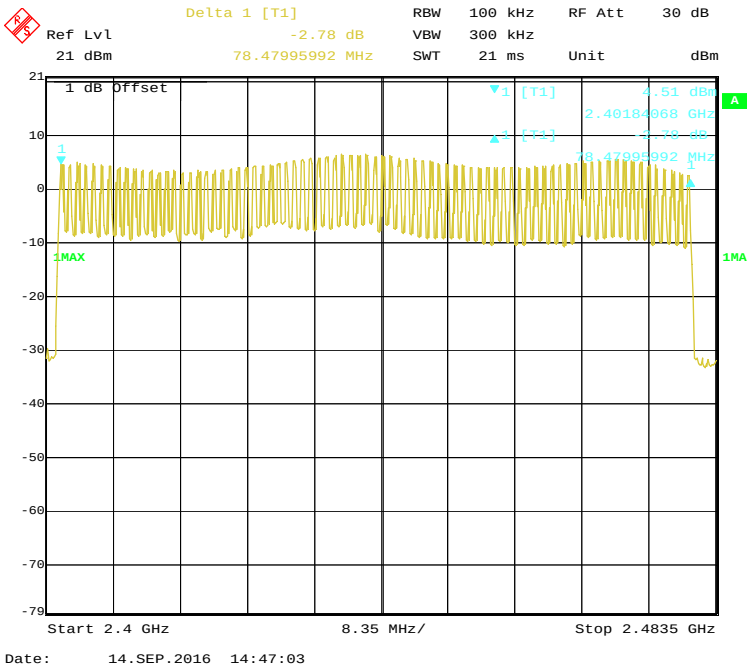
The testing was performed by Chris Wang on 2016-09-14.

EUT operation mode: Transmitting

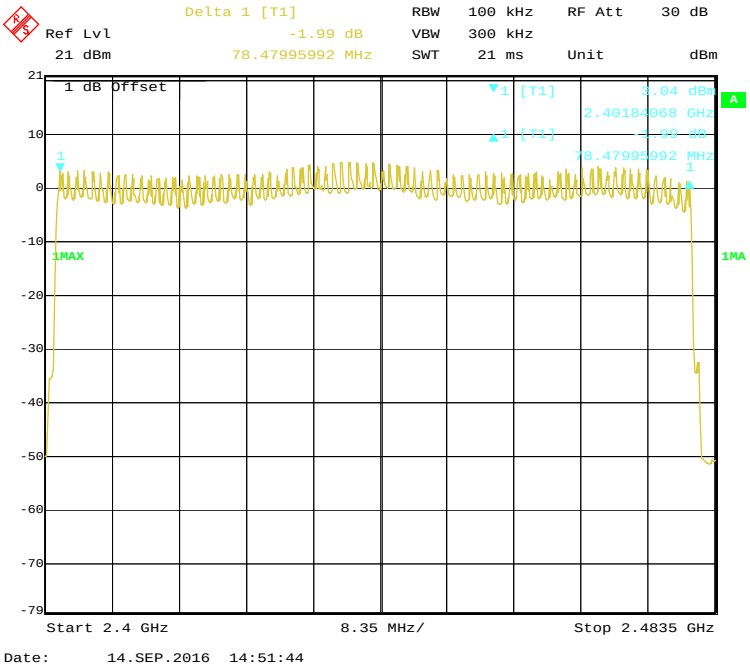
Test Result: Compliance. Please refer to following tables and plots

Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	⩾15
EDR (π/4-DQPSK)	2400-2483.5	79	⩾15
EDR (8DPSK)	2400-2483.5	79	⩾15

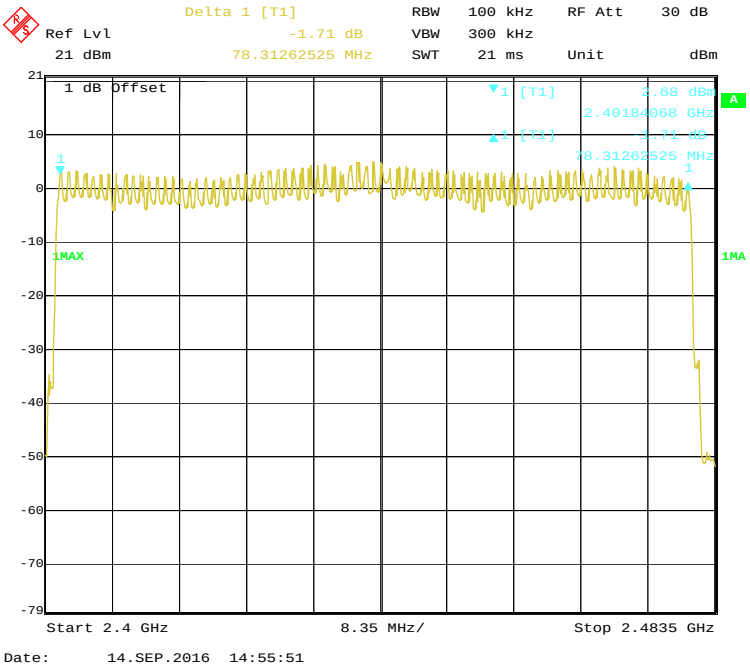
BDR (GFSK): Number of Hopping Channels



EDR (π/4-DQPSK): Number of Hopping Channels



EDR (8DPSK): Number of Hopping Channels



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 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

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

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-09-14&2016-09-17.

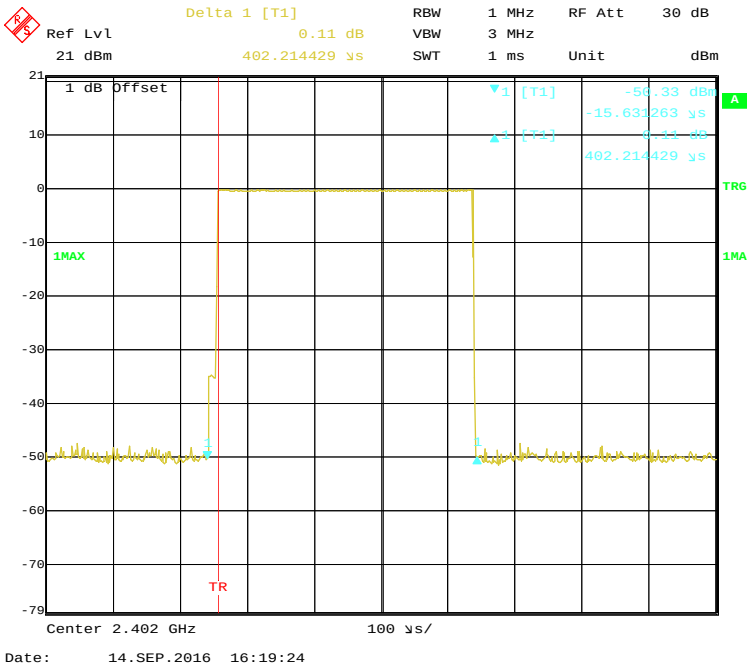
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to following tables and plots

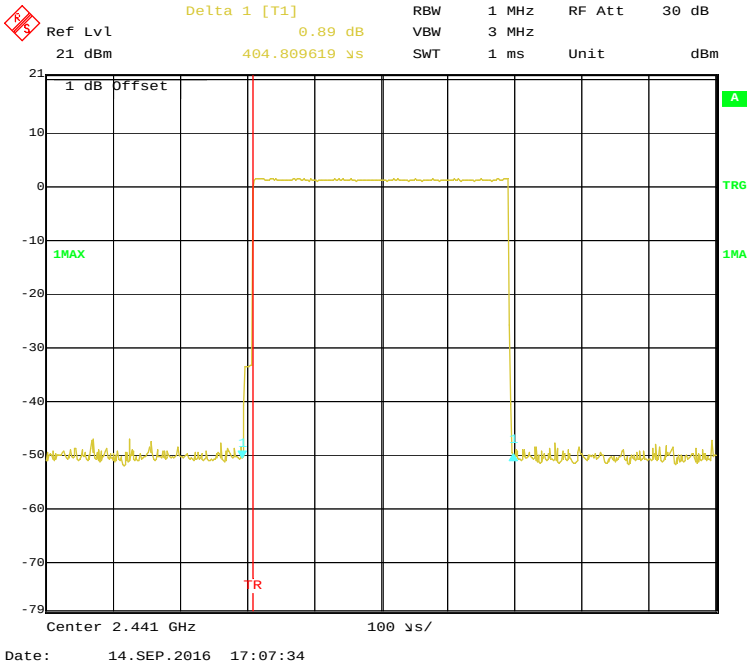
Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH1	Low	0.402	0.129	0.4	Pass
		Middle	0.405	0.130	0.4	Pass
		High	0.403	0.129	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH3	Low	1.668	0.265	0.4	Pass
		Middle	1.670	0.265	0.4	Pass
		High	1.670	0.265	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH5	Low	2.928	0.312	0.4	Pass
		Middle	2.920	0.311	0.4	Pass
		High	2.920	0.311	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (π/4-DQPSK)	2DH1	Low	0.413	0.132	0.4	Pass
		Middle	0.411	0.132	0.4	Pass
		High	0.411	0.132	0.4	Pass
		Note: 2DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	2DH3	Low	1.673	0.266	0.4	Pass
		Middle	1.673	0.266	0.4	Pass
		High	1.673	0.266	0.4	Pass
		Note: 2DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	2DH5	Low	2.932	0.313	0.4	Pass
		Middle	2.932	0.313	0.4	Pass
		High	2.932	0.313	0.4	Pass
		Note: 2DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	3DH1	Low	0.409	0.131	0.4	Pass
		Middle	0.409	0.131	0.4	Pass
		High	0.409	0.131	0.4	Pass
		Note: 3DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	3DH3	Low	1.671	0.265	0.4	Pass
		Middle	1.671	0.265	0.4	Pass
		High	1.671	0.265	0.4	Pass
		Note: 3DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	3DH5	Low	3.258	0.348	0.4	Pass
		Middle	2.938	0.313	0.4	Pass
		High	2.938	0.313	0.4	Pass
		Note: 3DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

BDR (GFSK):

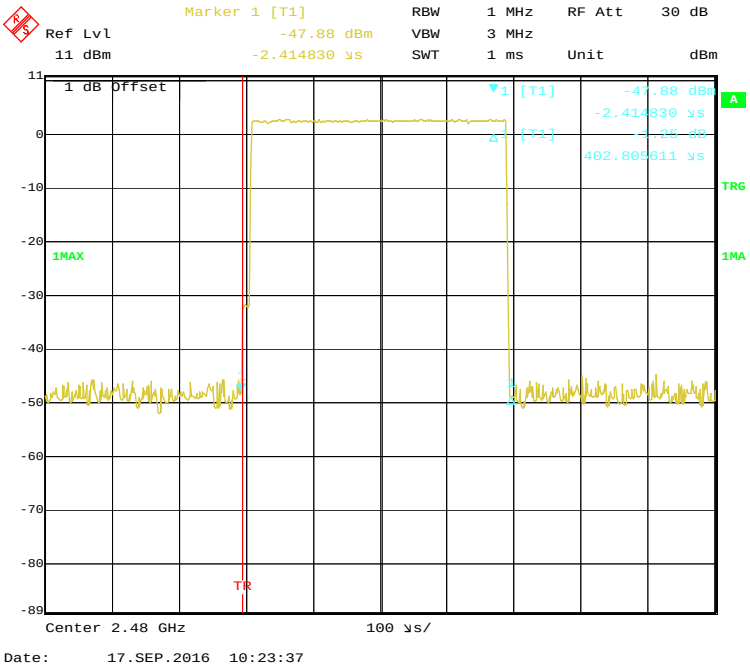
Pulse time, Low Channel, DH1



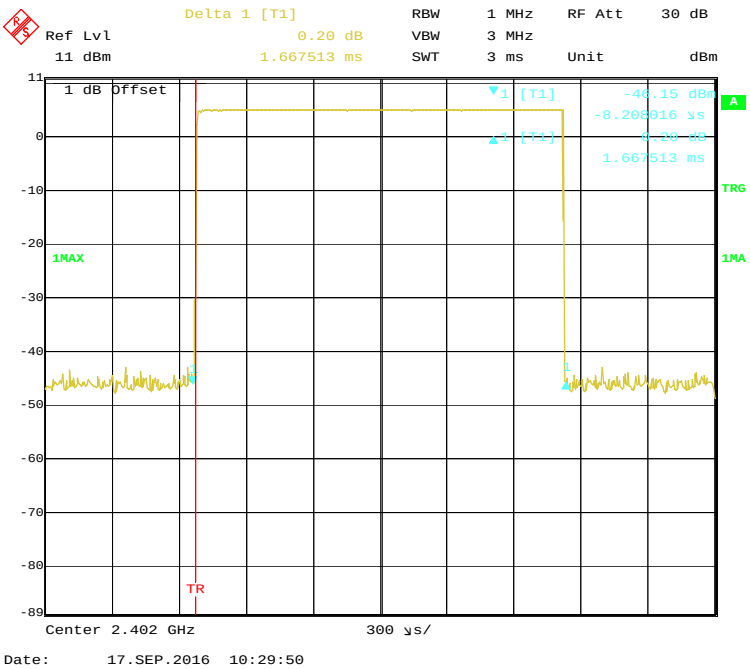
Pulse time, Middle Channel, DH1



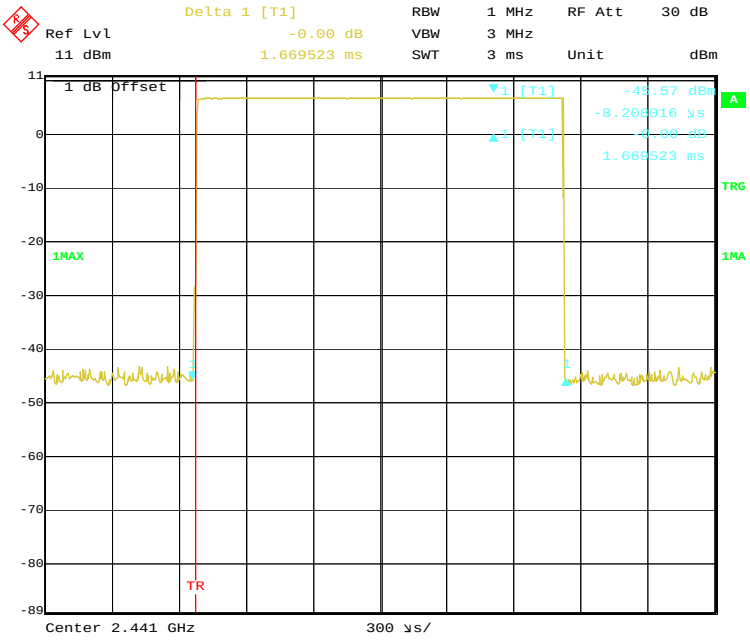
Pulse time, High Channel, DH1



Pulse time, Low Channel, DH3

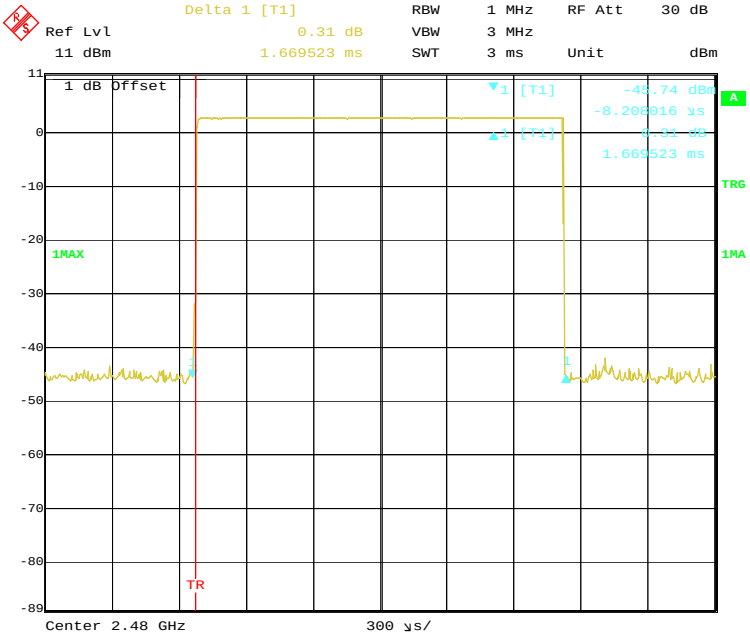


Pulse time, Middle Channel, DH3



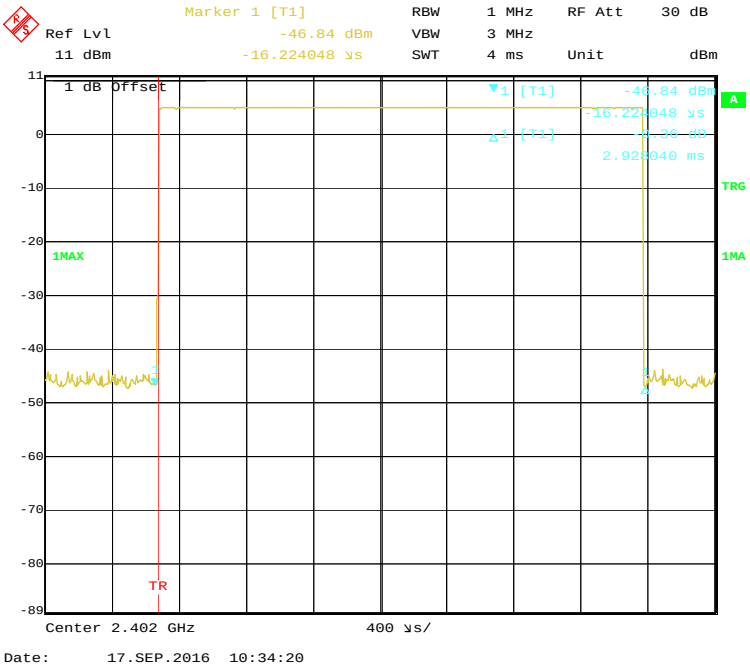
Date: 17.SEP.2016 10:31:14

Pulse time, High Channel, DH3

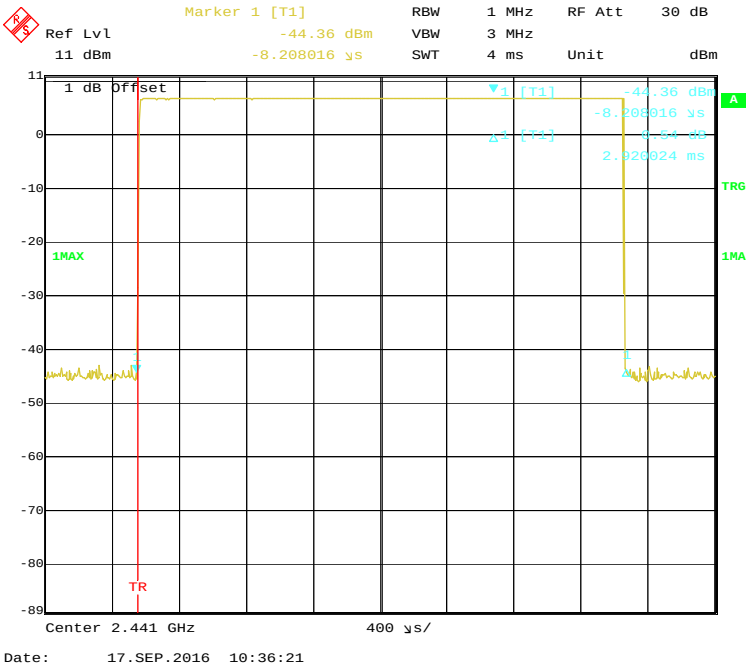


Date: 17.SEP.2016 10:32:08

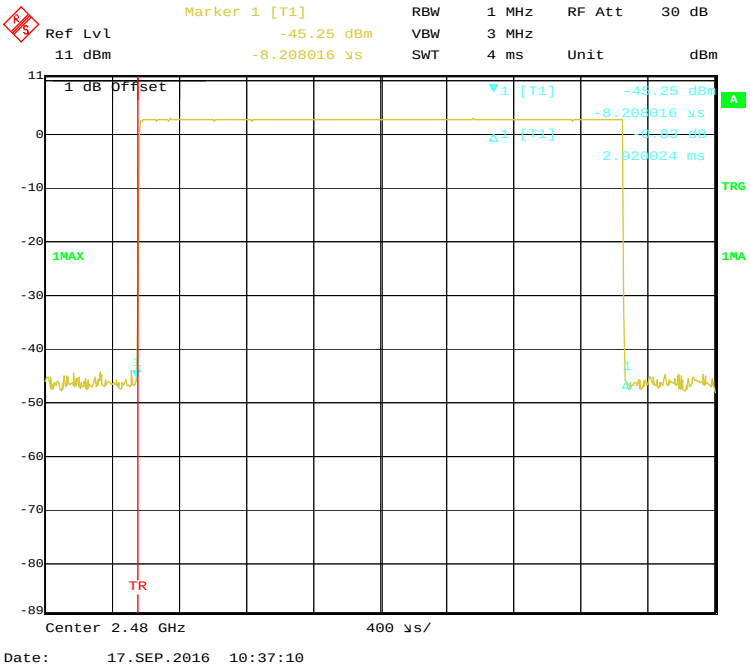
Pulse time, Low Channel, DH5



Pulse time, Middle Channel, DH5

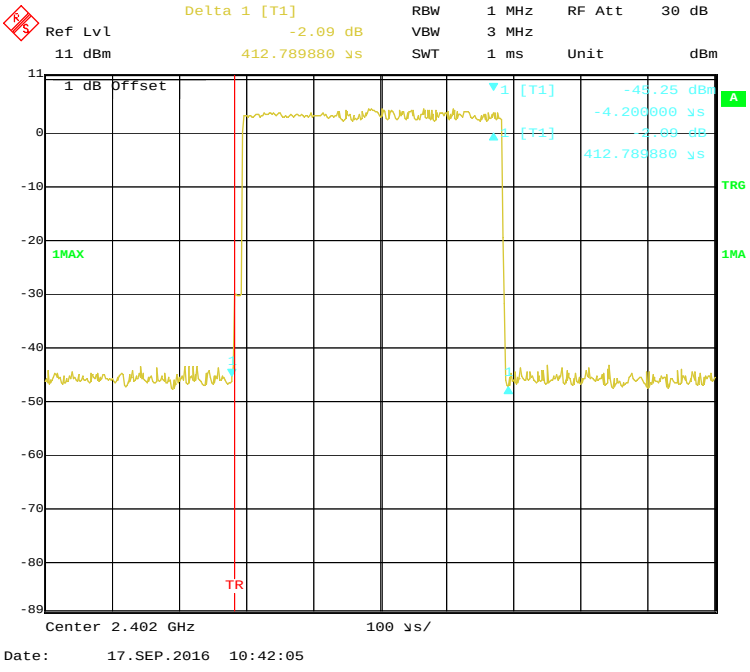


Pulse time, High Channel, DH5

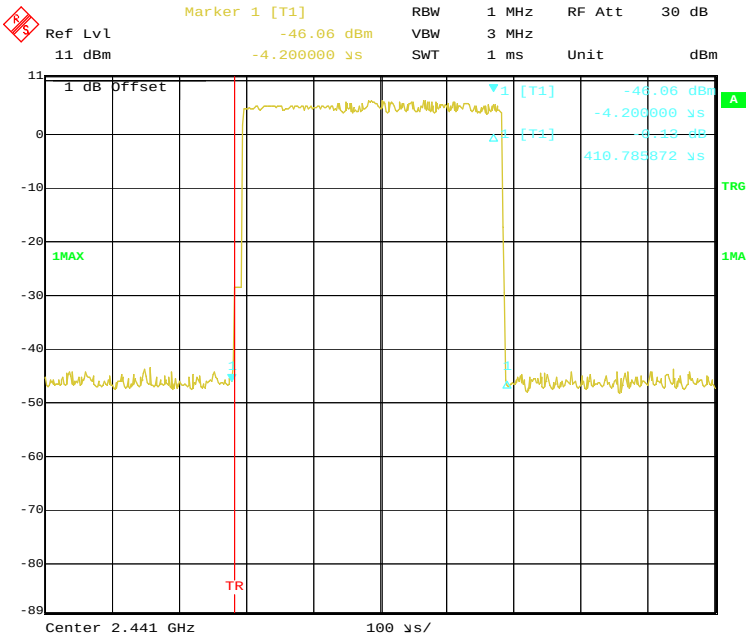


EDR (π/4-DQPSK):

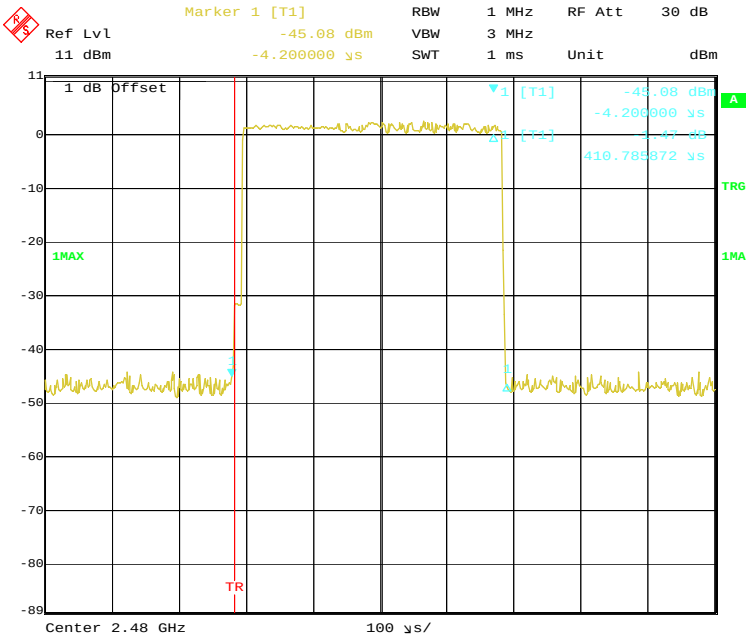
Pulse time, Low Channel, 2DH1



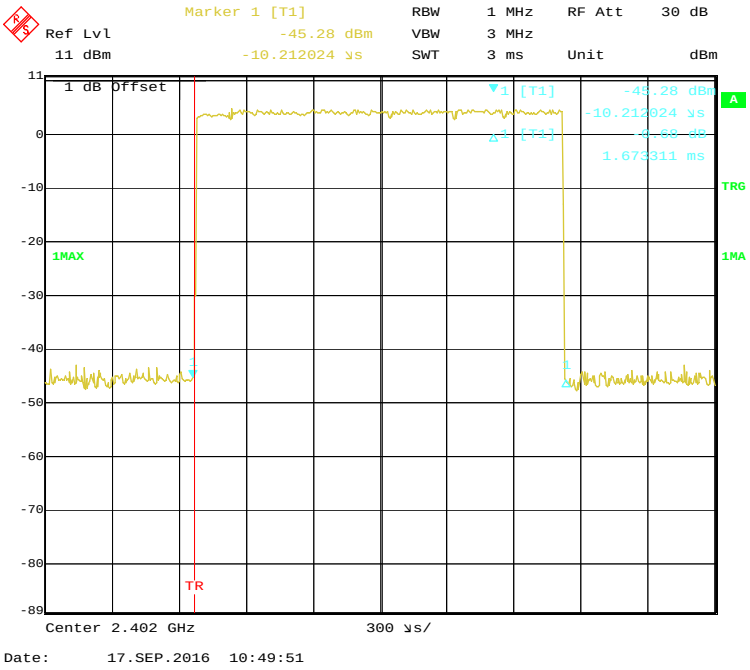
Pulse time, Middle Channel, 2DH1



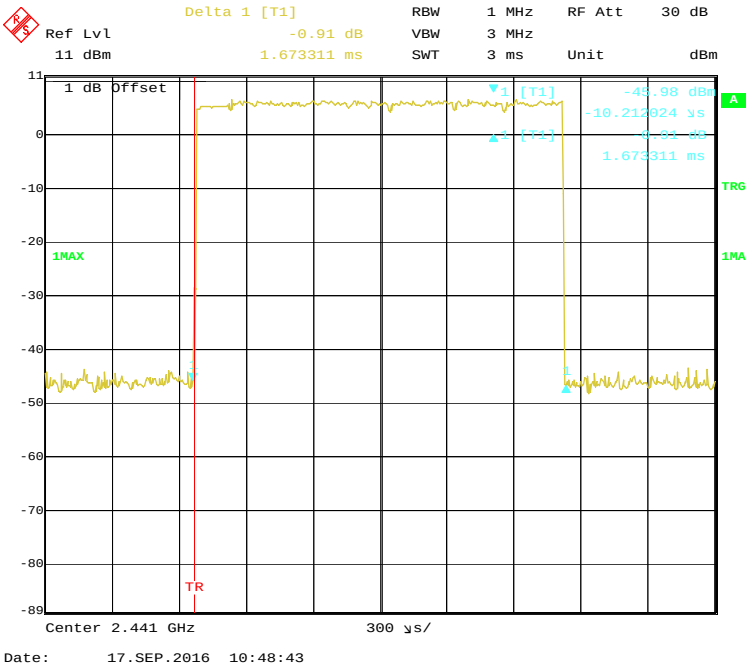
Pulse time, High Channel, 2DH1



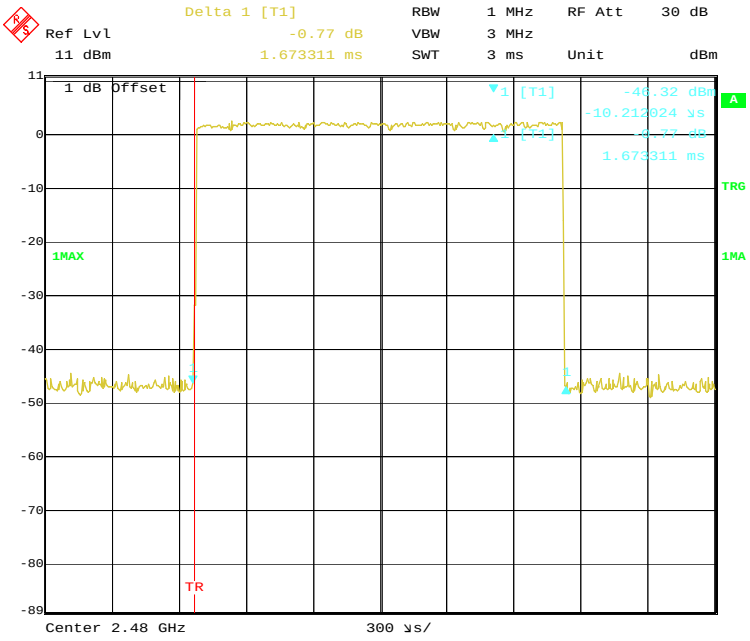
Pulse time, Low Channel, 2DH3



Pulse time, Middle Channel, 2DH3

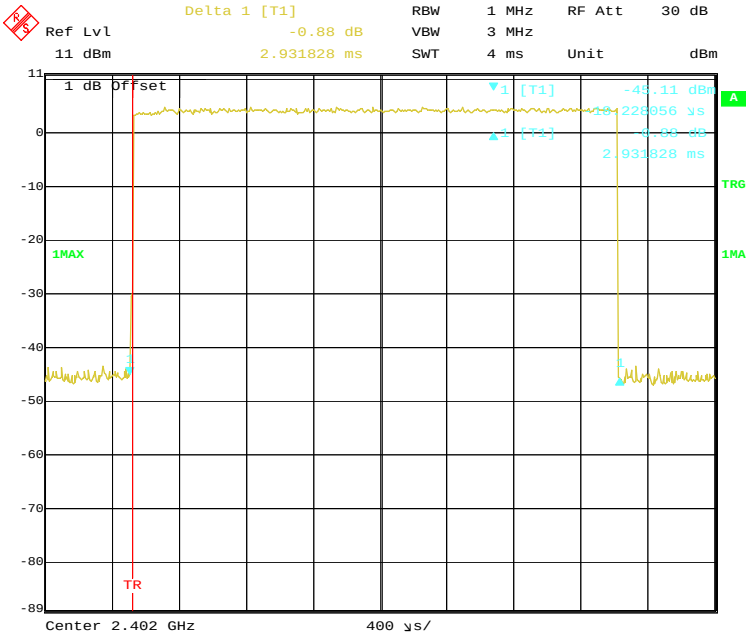


Pulse time, High Channel, 2DH3



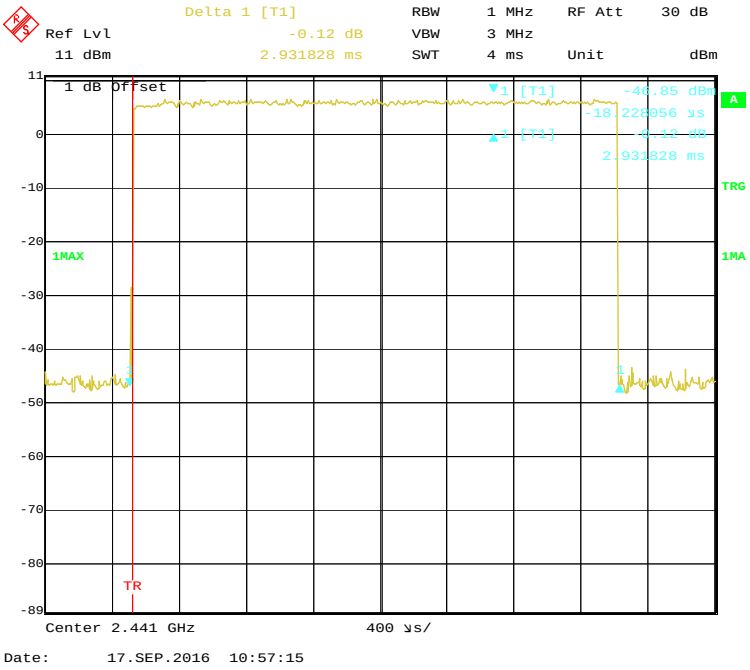
Date: 17.SEP.2016 10:46:51

Pulse time, Low Channel, 2DH5

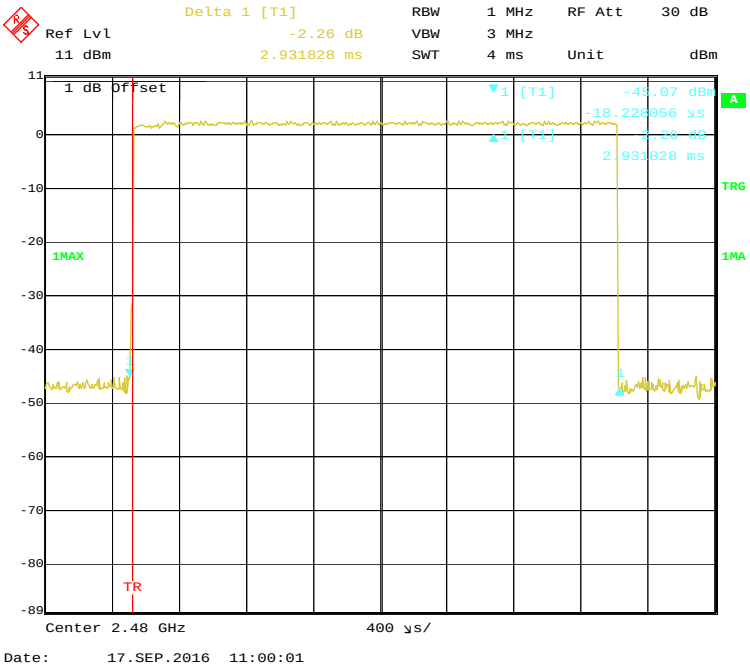


Date: 17.SEP.2016 10:54:25

Pulse time, Middle Channel, 2DH5

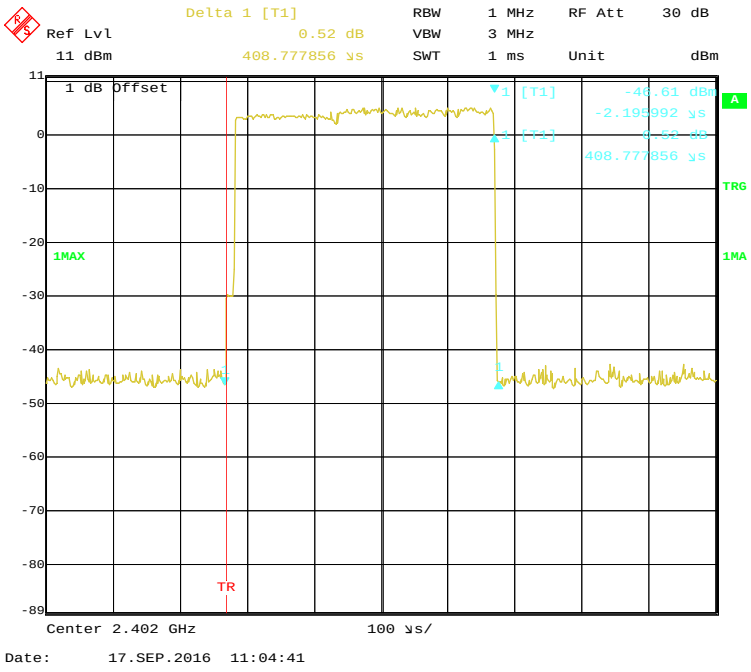


Pulse time, High Channel, 2DH5

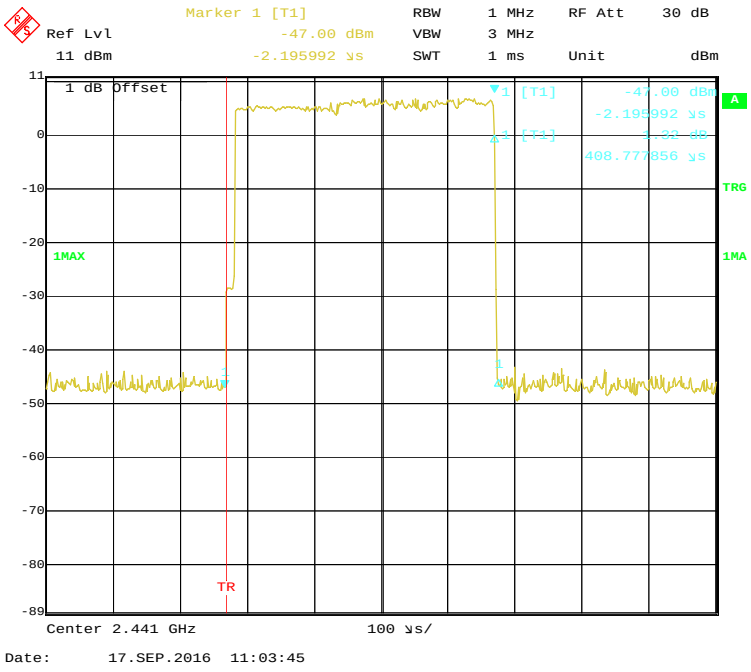


EDR (8DPSK):

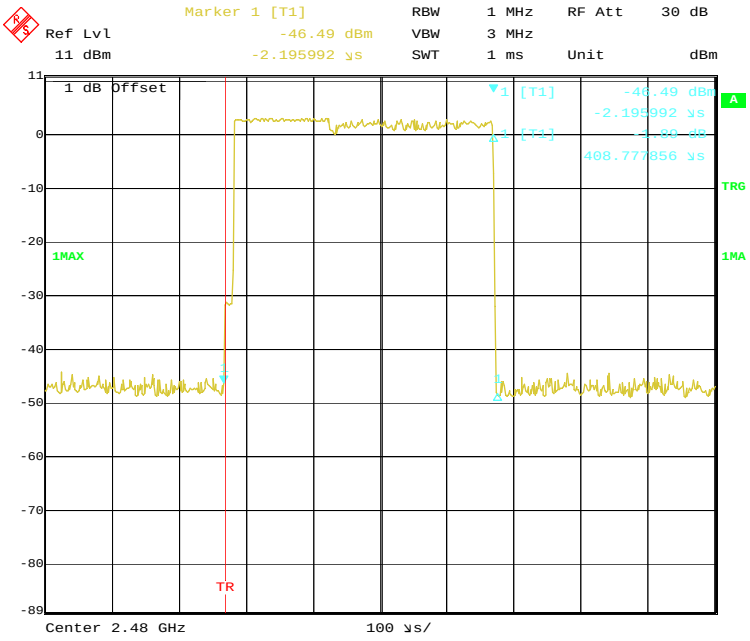
Pulse time, Low Channel, 3DH1



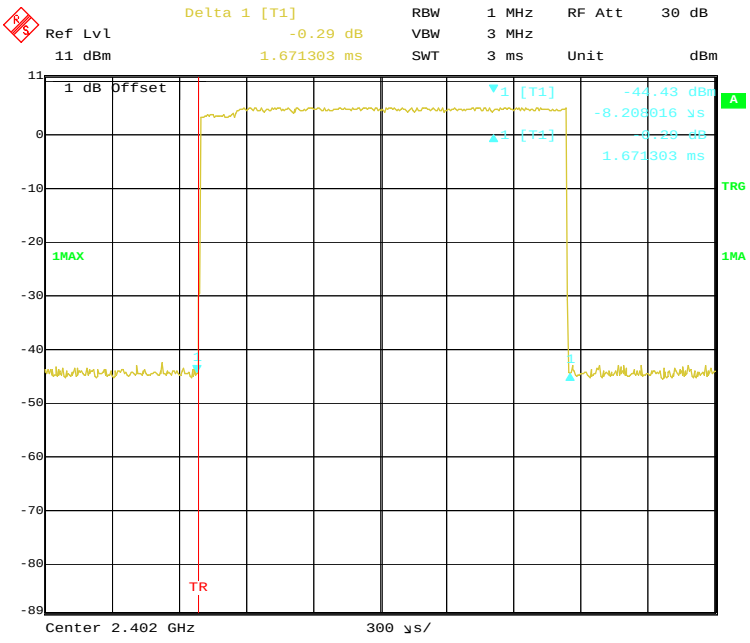
Pulse time, Middle Channel, 3DH1



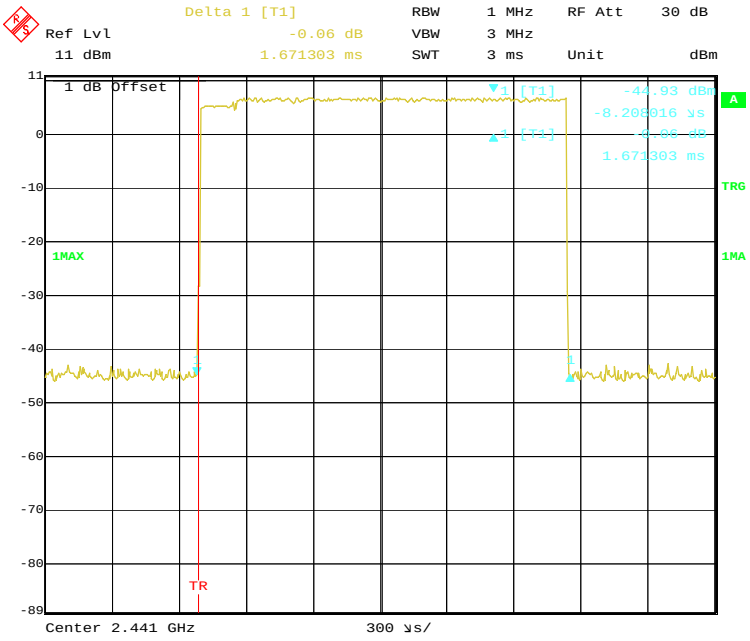
Pulse time, High Channel, 3DH1



Pulse time, Low Channel, 3DH3

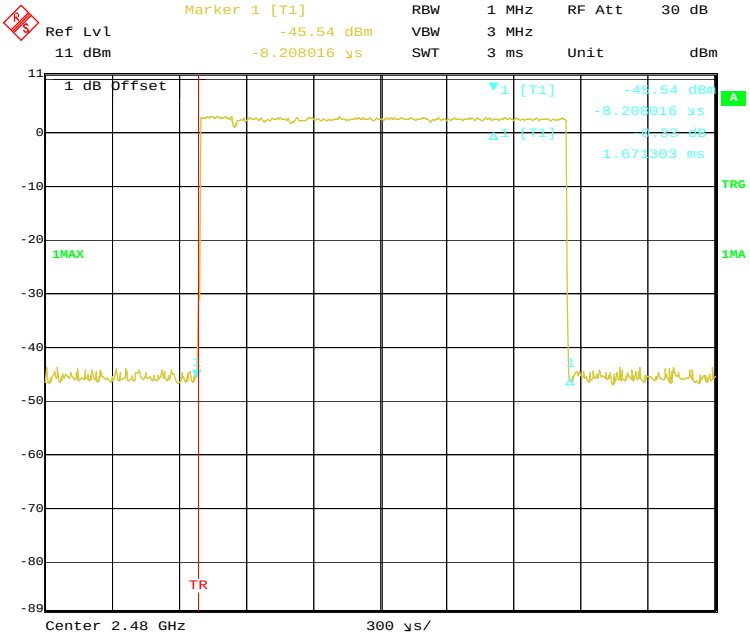


Pulse time, Middle Channel, 3DH3



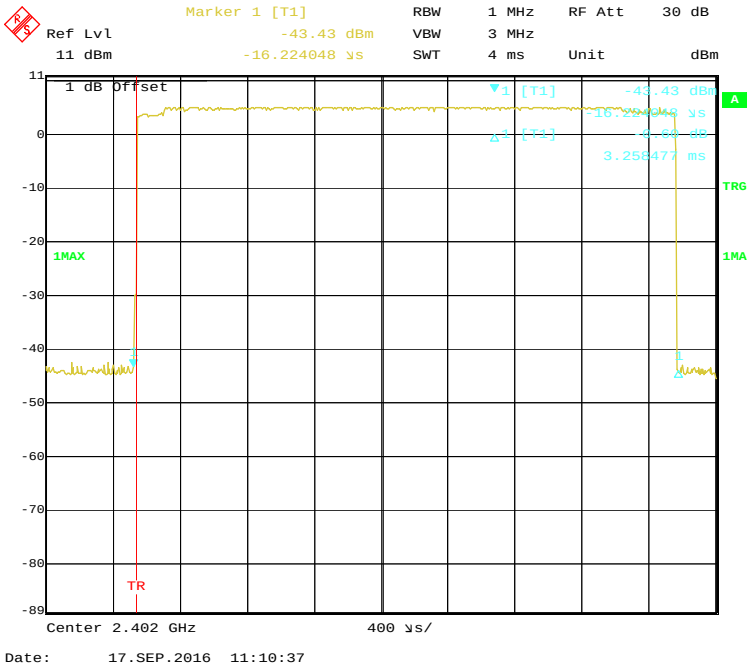
Date: 17.SEP.2016 11:06:26

Pulse time, High Channel, 3DH3

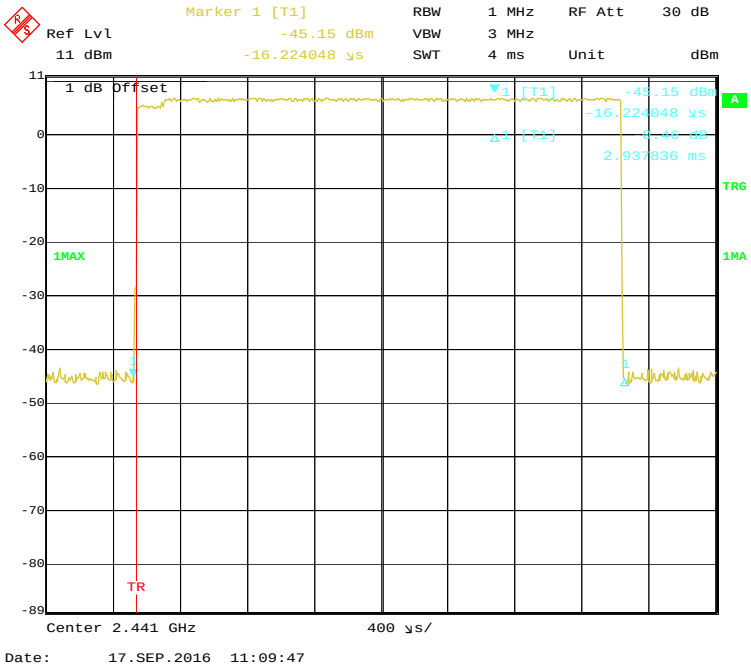


Date: 17.SEP.2016 11:07:38

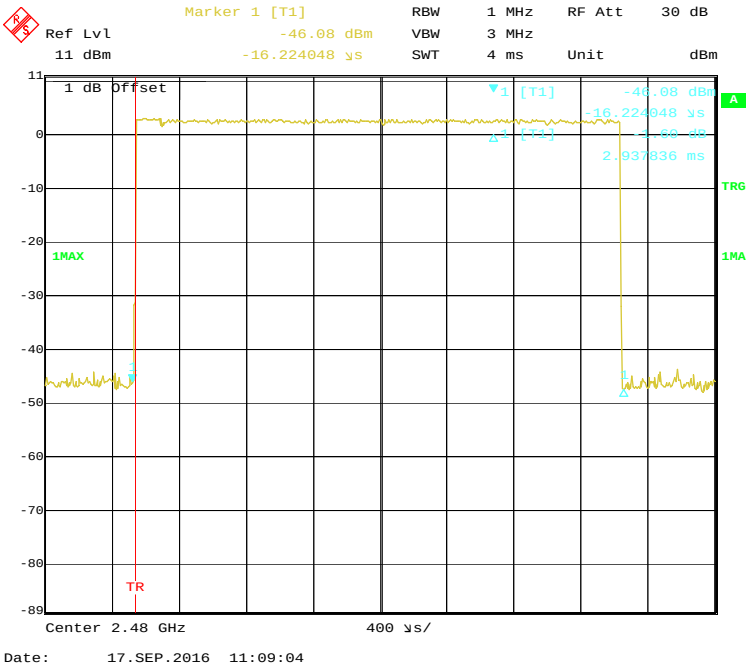
Pulse time, Low Channel, 3DH5



Pulse time, Middle Channel, 3DH5



Pulse time, High Channel, 3DH5



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. And 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 one 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

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

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

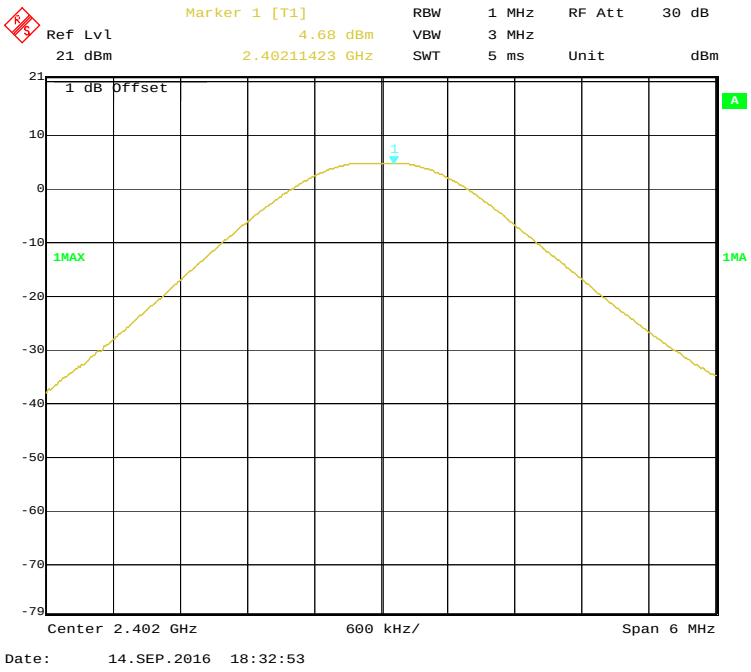
The testing was performed by Chris Wang on 2016-09-14.

EUT operation mode: Transmitting

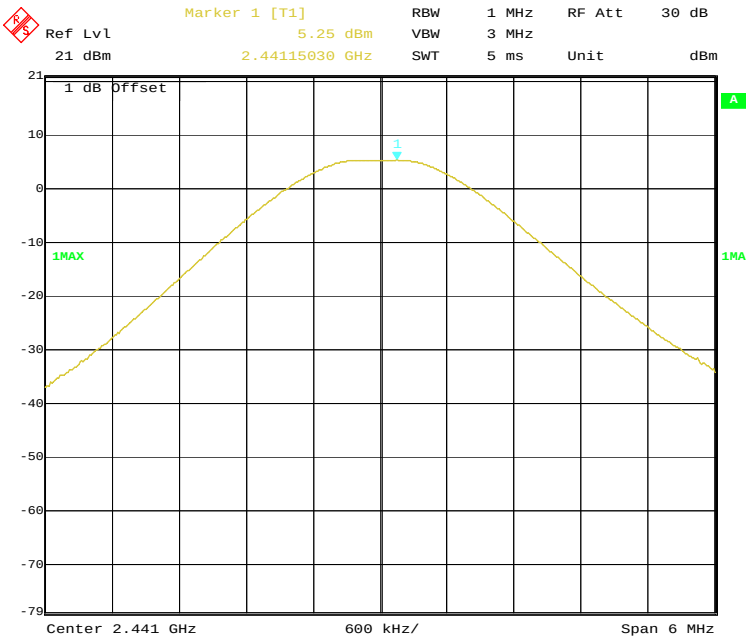
Test Result: Compliance. Please refer to following tables and plots

Mode	Channel	Frequency (MHz)	Output Power		Limit (mW)
			(dBm)	(mW)	
BDR (GFSK)	Low	2402	4.68	2.94	1000
	Middle	2441	5.25	3.35	1000
	High	2480	5.00	3.16	1000
EDR (π/4-DQPSK)	Low	2402	4.14	2.59	1000
	Middle	2441	4.40	2.75	1000
	High	2480	4.40	2.75	1000
EDR (8DPSK)	Low	2402	4.81	3.03	1000
	Middle	2441	4.94	3.12	1000
	High	2480	4.81	3.03	1000

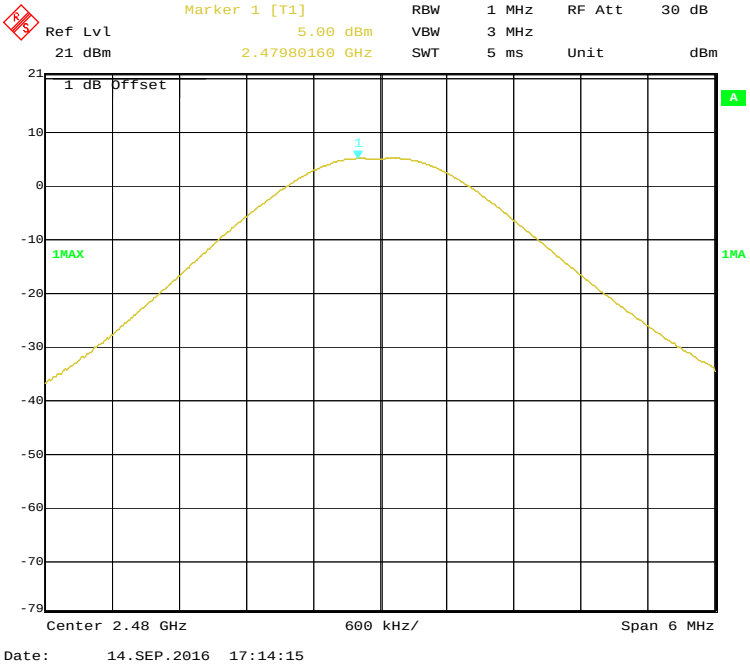
BDR (GFSK): Low Channel



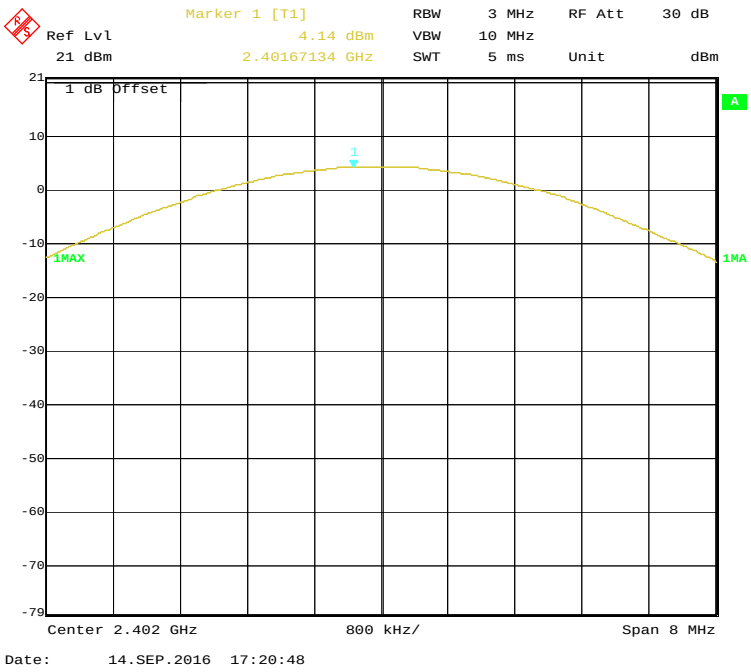
BDR (GFSK): Middle Channel



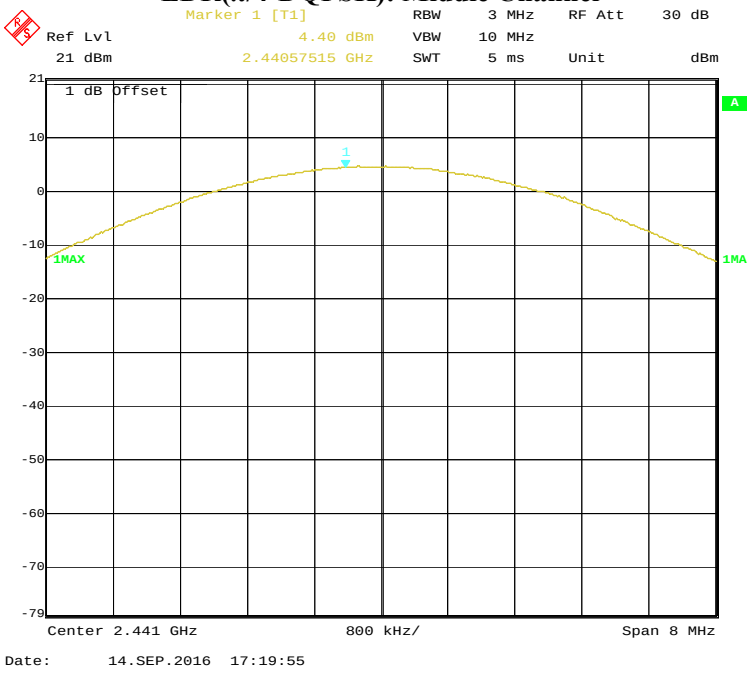
BDR (GFSK): High Channel



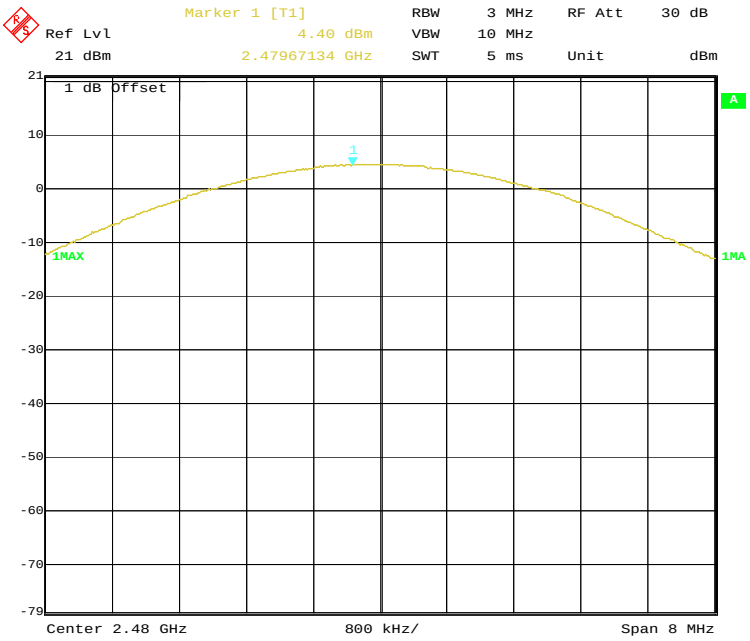
EDR(π/4-DQPSK): Low Channel



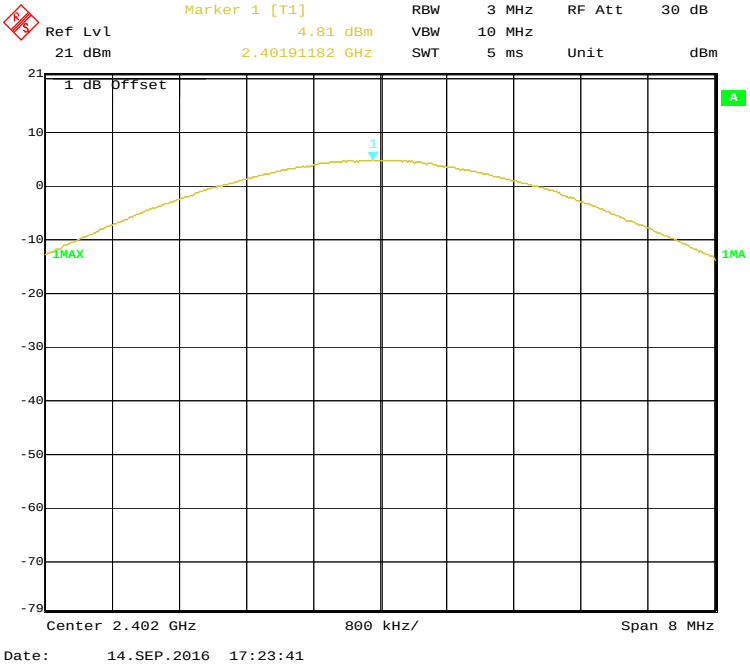
EDR(π/4-DQPSK): Middle Channel



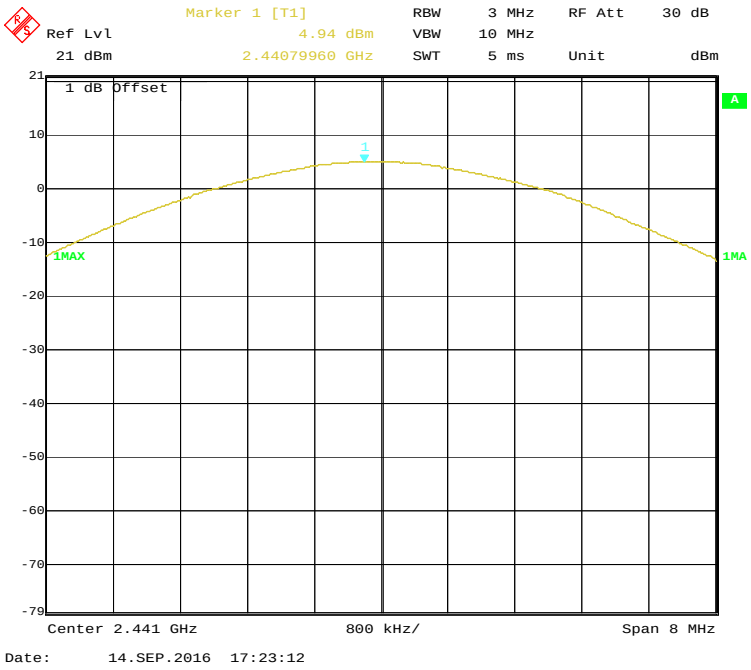
EDR(π/4-DQPSK): High Channel



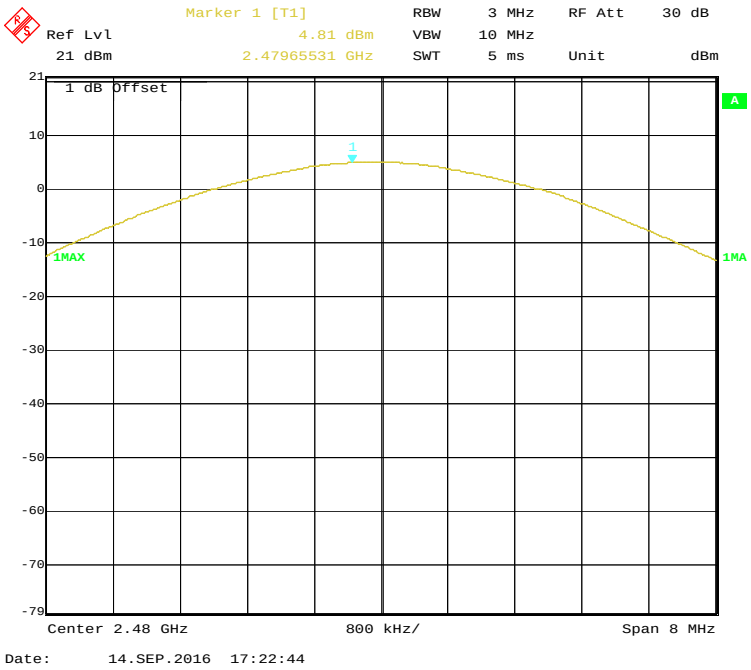
EDR(8DPSK): Low Channel



EDR(8DPSK): Middle Channel



EDR(8DPSK): 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 RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Haojintech	Coaxial Cable	SR	SS11800	2016-09-08	2017-09-08

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

Test Data

Environmental Conditions

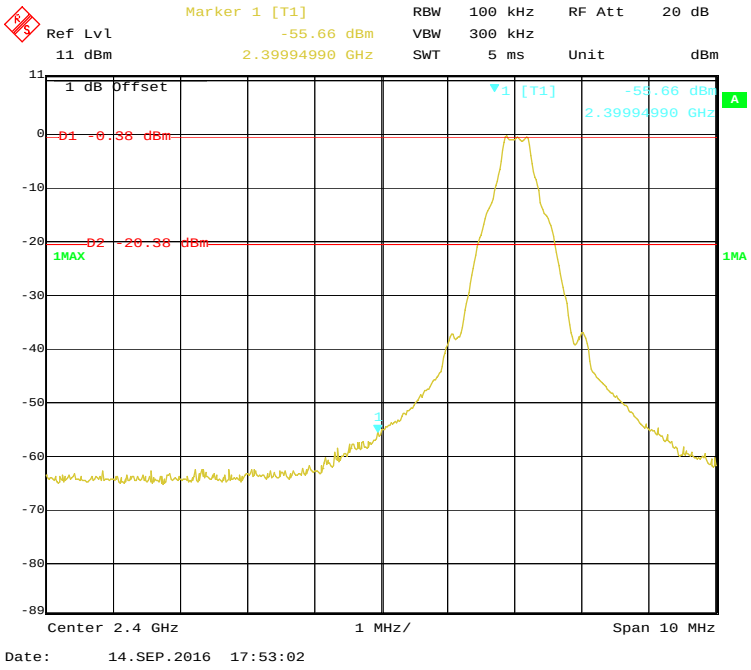
Temperature:	23 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-09-14.

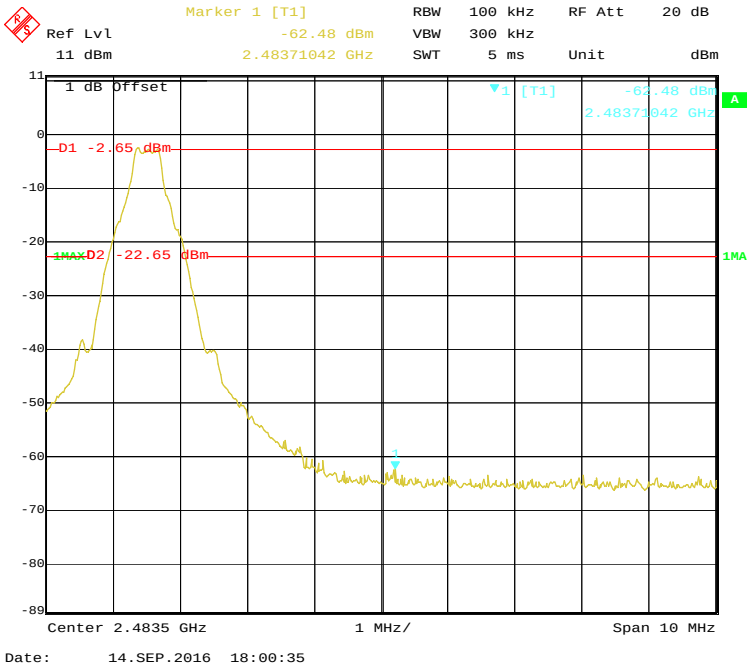
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to following plots.

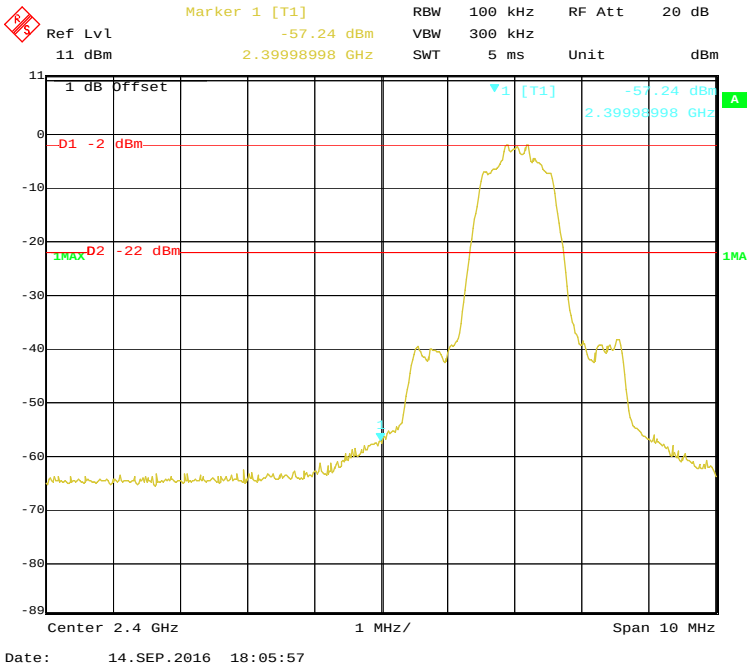
BDR (GFSK): Band Edge-Left Side



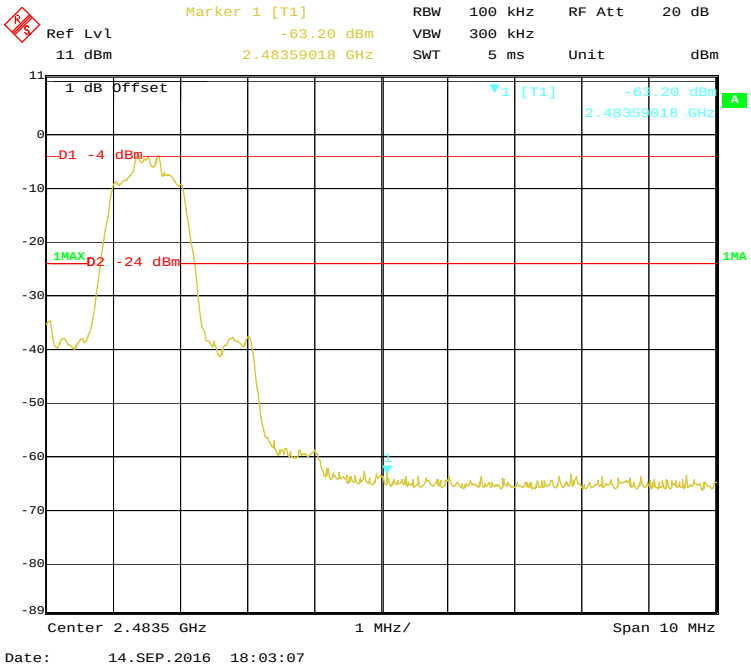
BDR (GFSK): Band Edge-Right Side



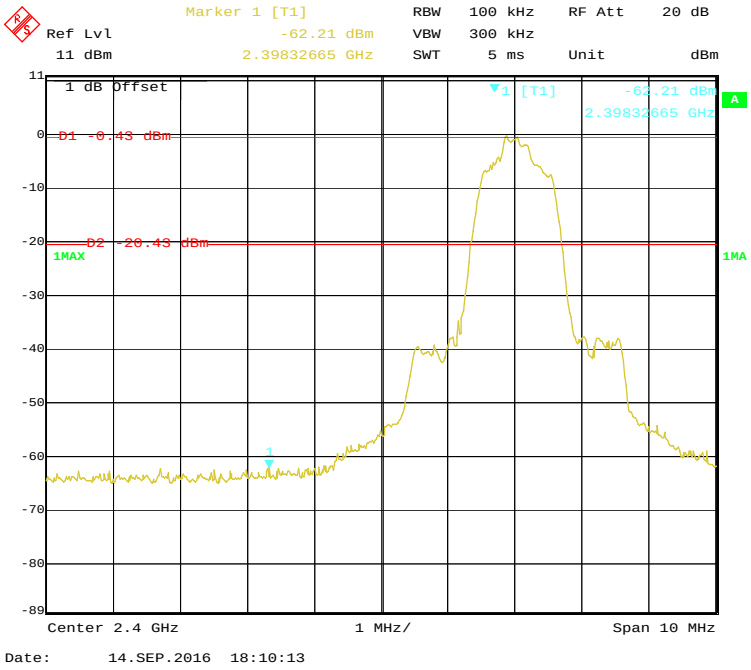
EDR (π/4-DQPSK): Band Edge-Left Side



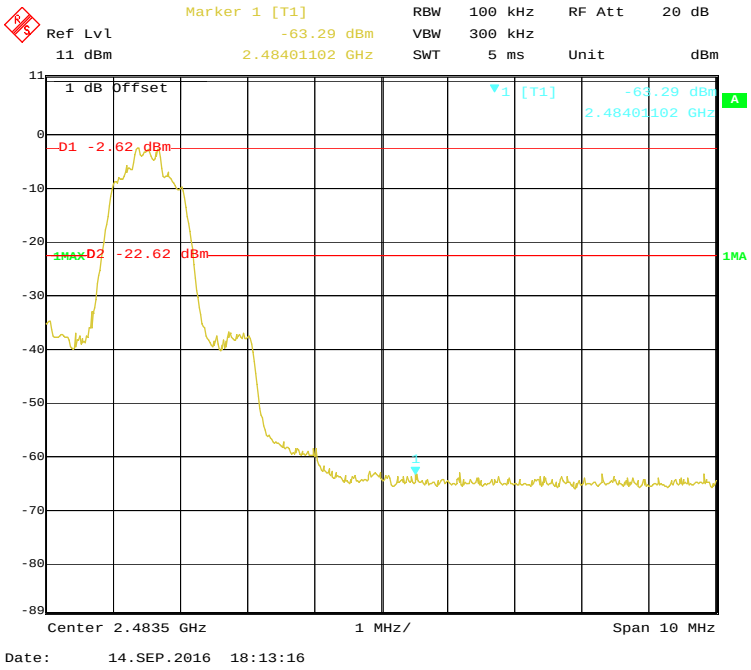
EDR (π/4-DQPSK): Band Edge-Right Side



EDR (8DPSK): Band Edge-Left Side



BDR (8DPSK): Band Edge-Right Side



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