FCC PART 15.247

TEST REPORT

For

MAXWEST INTERNATIONAL LIMITED.

No.1,Longgang Road,Buji, Longgang,Shenzhen,China

FCC ID: 2AEN3GRAVITY55GO

Report Type:	Product Name:
Original Report	Mobile Phone

Report Number:	RDG181210002-00C
Report Date:	2018-12-29
Reviewed By:	Jerry Zhang EMC Manager *(signed: Jerry Zhang)*
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	Mobile Phone	
EUT Model:	Gravity 55 GO	
Rated Input Voltage:	DC3.7V from Battery or DC5V from adapter	
Adapter Information	**Model:**	XCM23-U05100XYF
	Input:	AC 100-240V, 50/60Hz, 0.3A
	Output:	DC5V, 1A
External Dimension:	151mm(L)*71.7mm(W)*8.9mm(H)	
Serial Number:	181210002	
EUT Received Date:	2018-12-12	

Objective

This report is prepared on behalf of ***MAXWEST INTERNATIONAL LIMITED.*** in accordance with Part 2, Subpart J, Part 15, Subparts A 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 Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 22H, 24E,27 PCE submissions with FCC ID: 2AEN3GRAVITY55GO.
FCC Part 15C DTS submissions with FCC ID: 2AEN3GRAVITY55GO.

Test Methodology

All measurements detailed in this test report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

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

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

EUT Exercise Software

The Engineering Mode configured the maximum power level as default setting.

Equipment Modifications

No modification was made to the EUT.

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
USB Cable	Yes	No	1.03	Adapter	EUT
Earphone Cable	No	No	1.2	EUT	Earphone

Block Diagram of Test Setup
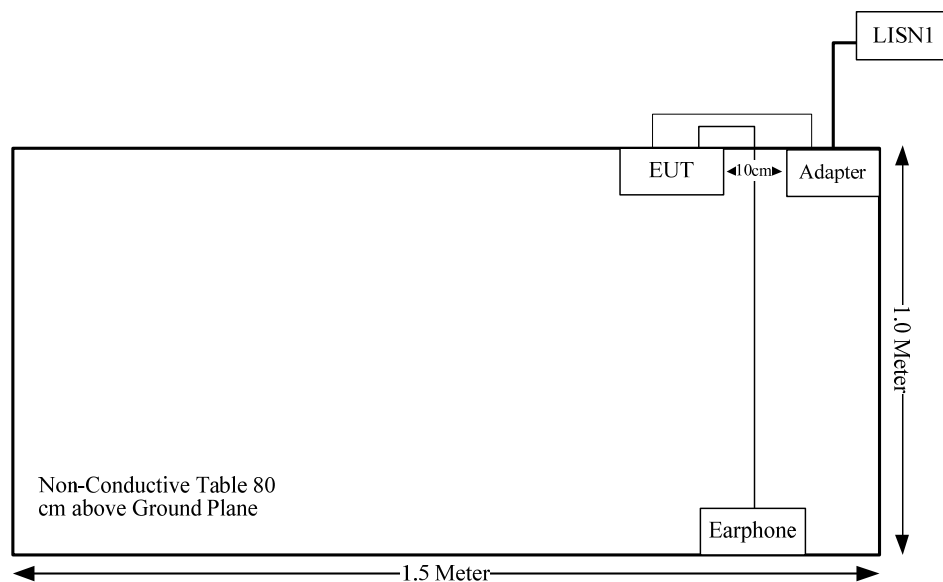
SUMMARY OF TEST RESULTS

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

Bay Area Compliance Laboratories Corp. (Dongguan)   Report No.: RDG181210002-00C

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.

Measurement Result

Please refer to the SAR report: RDG181210002-20A.

Result: Compliance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has one internal antenna arrangement for BT, and the antenna gain is 1.69 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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main LISN with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

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

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

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

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the 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	2018-12-10	2019-12-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2018-12-10	2019-12-10

* 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:	26.0 °C
Relative Humidity:	56 %
ATM Pressure:	99.8 kPa

The testing was performed by Lily Xie on 2018-12-20.

Test Mode: Transmitting

AC120V, 60 Hz, Line:
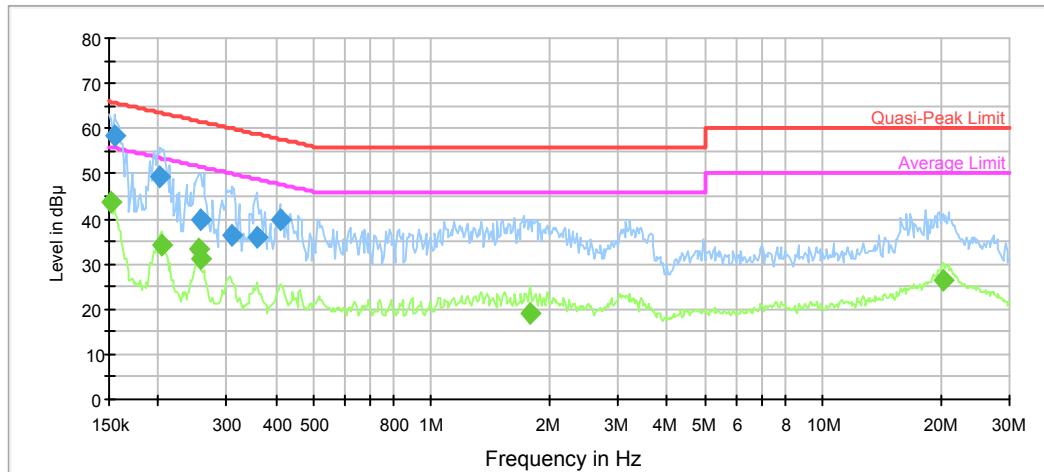
Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154858	58.3	9.000	L1	11.1	7.4	65.7
0.203045	49.1	9.000	L1	10.6	14.4	63.5
0.257874	39.9	9.000	L1	10.3	21.6	61.5
0.309742	36.3	9.000	L1	10.1	23.7	60.0
0.357511	36.0	9.000	L1	10.0	22.8	58.8
0.409372	39.8	9.000	L1	10.0	17.9	57.7

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152410	43.8	9.000	L1	11.1	12.1	55.9
0.204669	34.3	9.000	L1	10.6	19.1	53.4
0.253797	33.1	9.000	L1	10.3	18.5	51.6
0.255827	31.3	9.000	L1	10.3	20.3	51.6
1.787792	19.0	9.000	L1	9.7	27.0	46.0
20.313246	26.2	9.000	L1	10.1	23.8	50.0

AC120V, 60 Hz, Neutral:
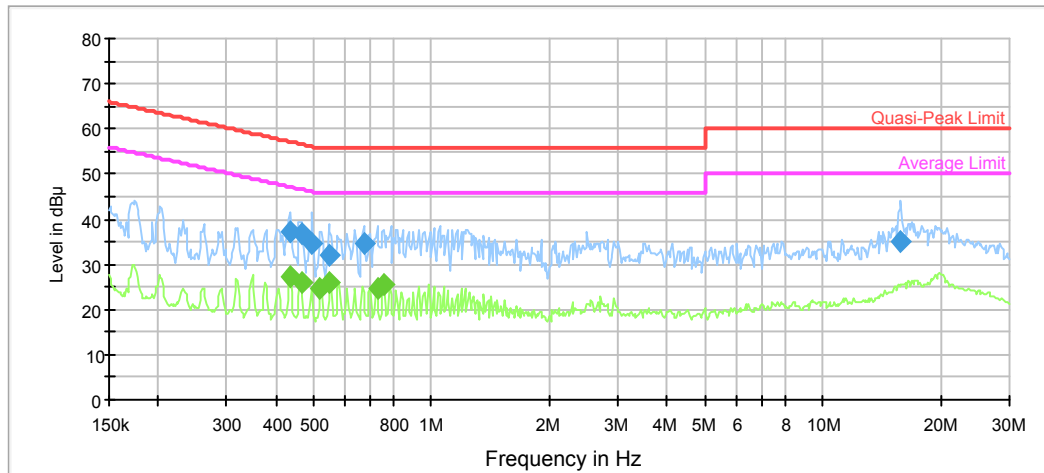
Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.436318	37.2	9.000	N	9.9	19.9	57.1
0.465037	36.8	9.000	N	9.9	19.8	56.6
0.495646	34.6	9.000	N	9.9	21.5	56.1
0.545378	32.2	9.000	N	9.8	23.8	56.0
0.670921	34.5	9.000	N	9.8	21.5	56.0
15.867293	34.9	9.000	N	9.9	25.1	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.436318	27.4	9.000	N	9.9	19.7	47.1
0.465037	26.1	9.000	N	9.9	20.5	46.6
0.519918	24.8	9.000	N	9.9	21.2	46.0
0.549741	26.0	9.000	N	9.8	20.0	46.0
0.726569	24.7	9.000	N	9.8	21.3	46.0
0.756101	25.5	9.000	N	9.8	20.5	46.0

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

Applicable Standard

 FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:

Above 1GHz:
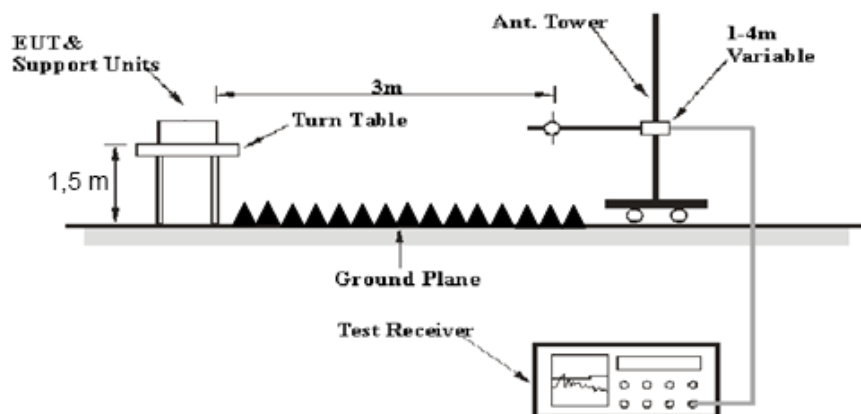
The radiated emission below 1GHz tests were performed in the 10 meters chamber, above 1GHz tests were performed in the 3 meters chamber test site A, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

According to FCC public notice: DA-00-705, 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	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

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.

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
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Sonoma	Amplifier	310N	185914	2018-10-13	2019-10-13
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2018-02-24	2019-02-28
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-09-05	2019-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2018-06-16	2019-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2018-06-16	2019-06-16

* 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:	22.6~24.8°C
Relative Humidity:	45~49 %
ATM Pressure:	100.8 kPa

* The testing was performed by Neil Liao, Sunny Cen on 2018-12-21.

Test Mode: Transmitting

1) 30MHz-1GHz(8DPSK High channel was the worst)

Horizontal:
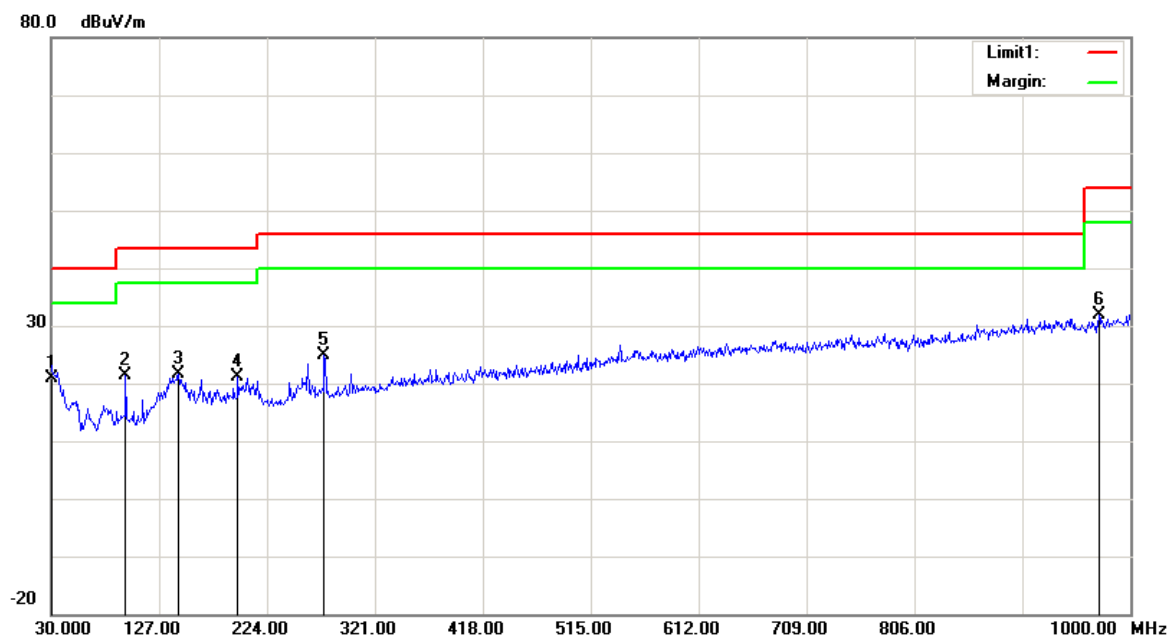
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	25.13	peak	-4.33	20.80	40.00	19.20
96.9300	35.75	peak	-14.45	21.30	43.50	22.20
144.4600	30.89	peak	-9.34	21.55	43.50	21.95
197.8100	30.52	peak	-9.50	21.02	43.50	22.48
275.4100	33.54	peak	-8.67	24.87	46.00	21.13
971.8700	26.91	peak	5.04	31.95	54.00	22.05

Vertical:
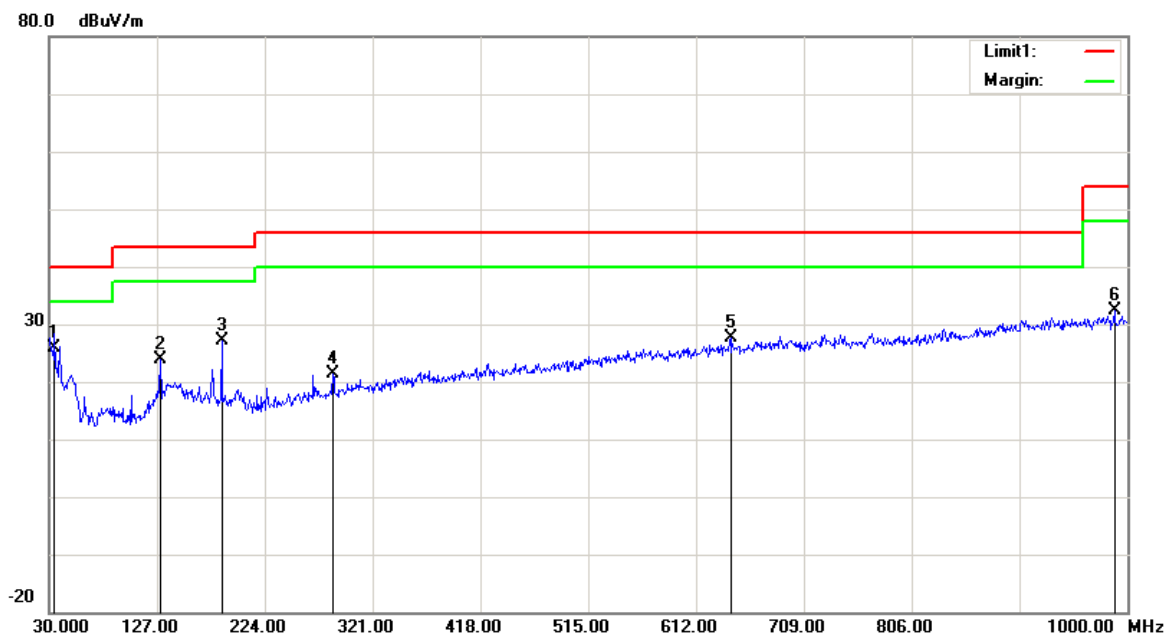
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
34.8500	32.65	peak	-6.85	25.80	40.00	14.20
129.9100	33.77	peak	-9.81	23.96	43.50	19.54
185.2000	37.33	peak	-10.12	27.21	43.50	16.29
285.1100	29.85	peak	-8.41	21.44	46.00	24.56
643.0400	28.02	peak	-0.49	27.53	46.00	18.47
988.3600	26.88	peak	5.45	32.33	54.00	21.67

2) 1GHz-25GHz:

3EDR Mode (8DPSK) was worst

| Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2402 MHz									
2402.00	66.97	PK	H	24.82	3.34	0.00	95.13	N/A	N/A
2402.00	53.83	AV	H	24.82	3.34	0.00	81.99	N/A	N/A
2402.00	67.17	PK	V	24.82	3.34	0.00	95.33	N/A	N/A
2402.00	54.04	AV	V	24.82	3.34	0.00	82.20	N/A	N/A
2390.00	24.91	PK	V	24.80	3.33	0.00	53.04	74.00	20.96
2390.00	13.02	AV	V	24.80	3.33	0.00	41.15	54.00	12.85
4804.00	38.42	PK	V	29.71	4.58	27.36	45.35	74.00	28.65
4804.00	24.80	AV	V	29.71	4.58	27.36	31.73	54.00	22.27
7206.00	38.43	PK	V	33.93	5.59	27.19	50.76	74.00	23.24
7206.00	25.01	AV	V	33.93	5.59	27.19	37.34	54.00	16.66
Middle Channel: 2441 MHz									
2441.00	68.65	PK	H	24.89	3.36	0.00	96.90	N/A	N/A
2441.00	55.10	AV	H	24.89	3.36	0.00	83.35	N/A	N/A
2441.00	70.77	PK	V	24.89	3.36	0.00	99.02	N/A	N/A
2441.00	57.96	AV	V	24.89	3.36	0.00	86.21	N/A	N/A
4882.00	38.63	PK	V	29.86	4.56	27.56	45.49	74.00	28.51
4882.00	24.17	AV	V	29.86	4.56	27.56	31.03	54.00	22.97
7323.00	38.72	PK	V	34.12	5.69	27.26	51.27	74.00	22.73
7323.00	24.61	AV	V	34.12	5.69	27.26	37.16	54.00	16.84
High Channel: 2480 MHz									
2480.00	69.21	PK	H	24.96	3.38	0.00	97.55	N/A	N/A
2480.00	56.36	AV	H	24.96	3.38	0.00	84.70	N/A	N/A
2480.00	71.19	PK	V	24.96	3.38	0.00	99.53	N/A	N/A
2480.00	58.40	AV	V	24.96	3.38	0.00	86.74	N/A	N/A
2483.50	28.61	PK	V	24.97	3.38	0.00	56.96	74.00	17.04
2483.50	15.43	AV	V	24.97	3.38	0.00	43.78	54.00	10.22
4960.00	38.40	PK	V	30.02	4.58	27.37	45.63	74.00	28.37
4960.00	24.47	AV	V	30.02	4.58	27.37	31.70	54.00	22.30
7440.00	38.44	PK	V	34.30	5.79	27.22	51.31	74.00	22.69
7440.00	25.59	AV	V	34.30	5.79	27.22	38.46	54.00	15.54

Worst plots (*8DPSK highchannel*)
Horizontal

Fundamental
Test with Band
Rejection Filter
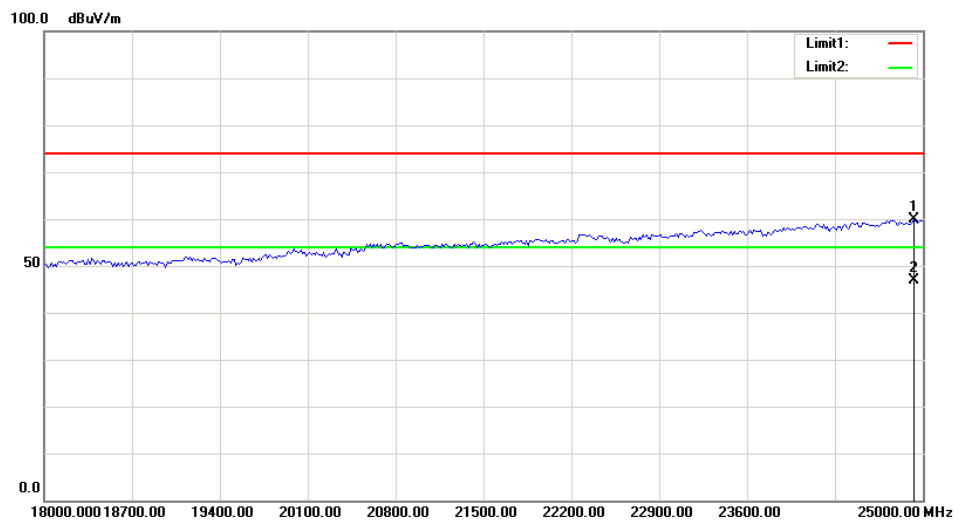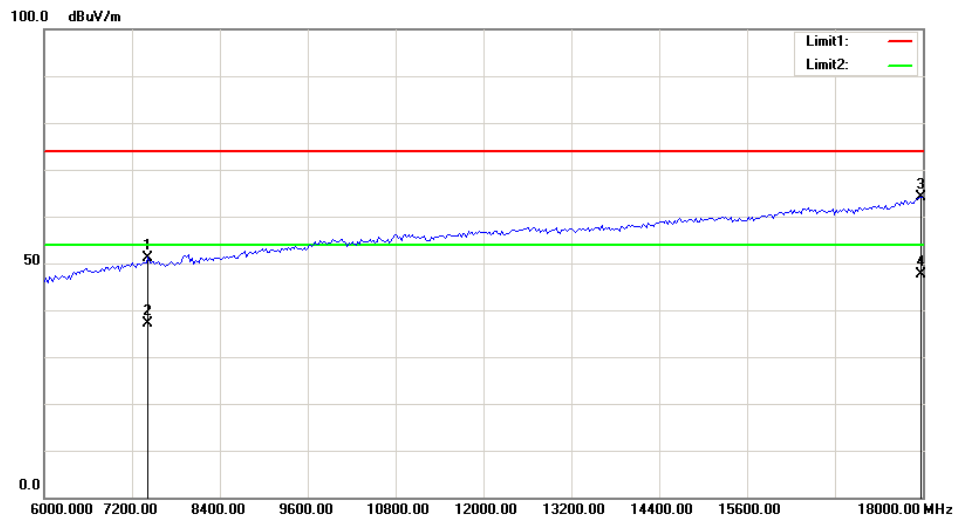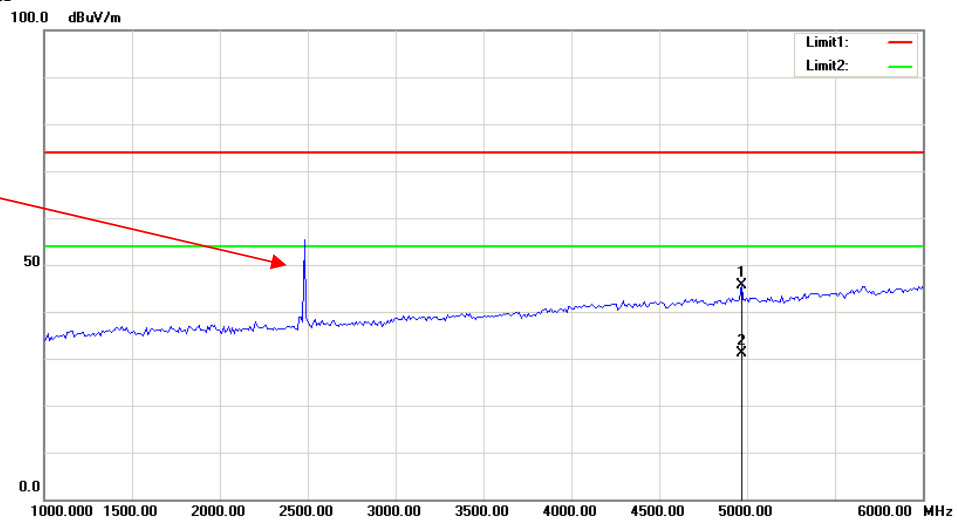
Vertical

Fundamental Test with Band Rejection Filter
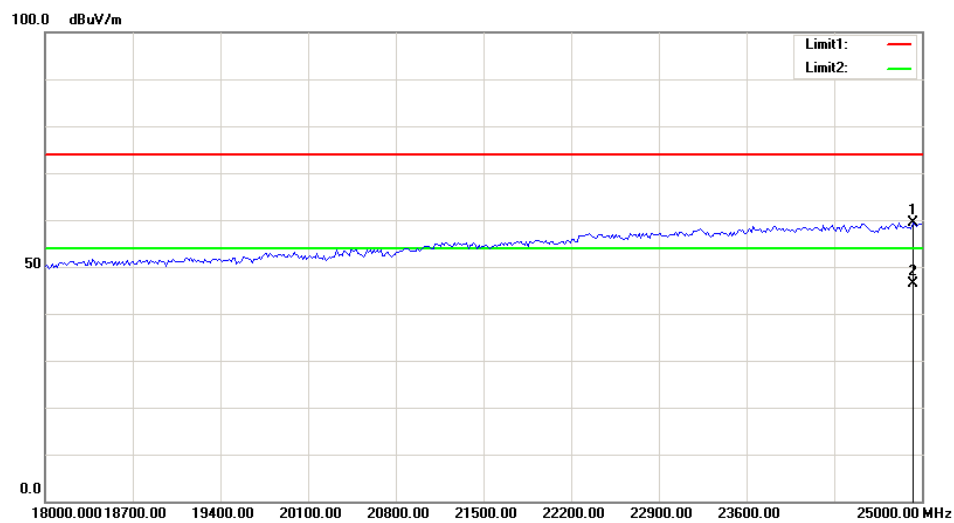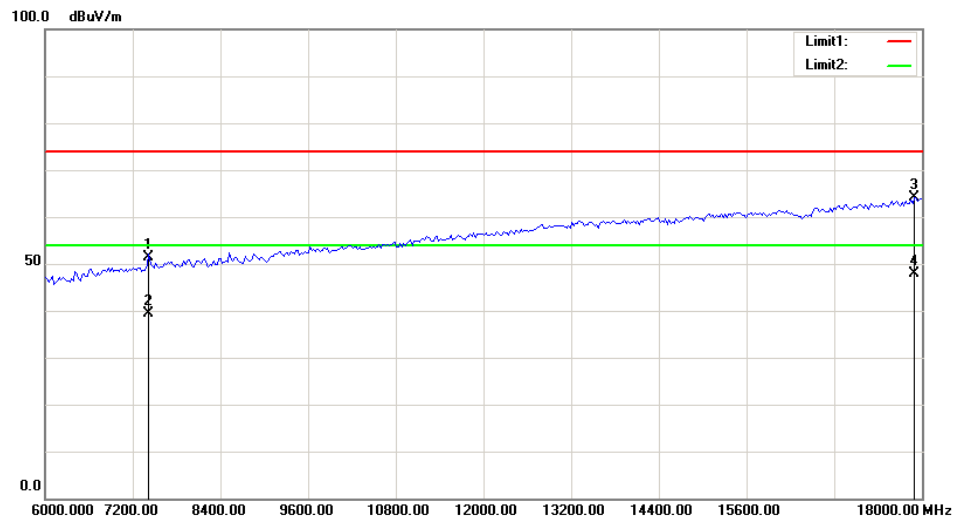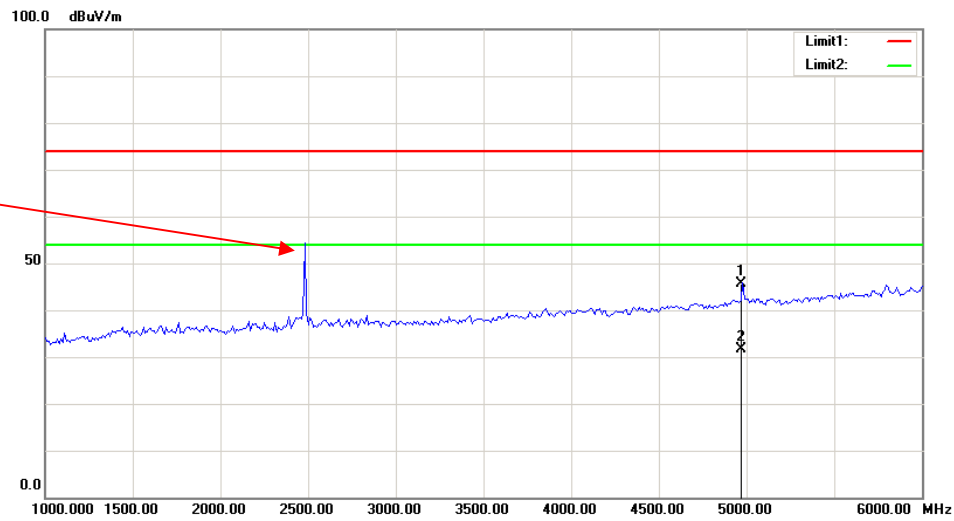
FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

Applicable Standard

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Procedure

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

Test Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	42 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang on 2018-12-16.

 Test Result: Compliance.

  Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
BDR (GFSK)	Low	2402	1.000	0.59
	Middle	2441	1.004	0.59
	High	2480	1.000	0.59
EDR (π/4-DQPSK)	Low	2402	1.000	0.86
	Middle	2441	1.004	0.87
	High	2480	1.004	0.87
EDR (8-DPSK)	Low	2402	1.000	0.84
	Middle	2441	1.000	0.84
	High	2480	1.004	0.84

Note: Limit= (2/3) × 20dB bandwidth

BDR Mode (GFSK):
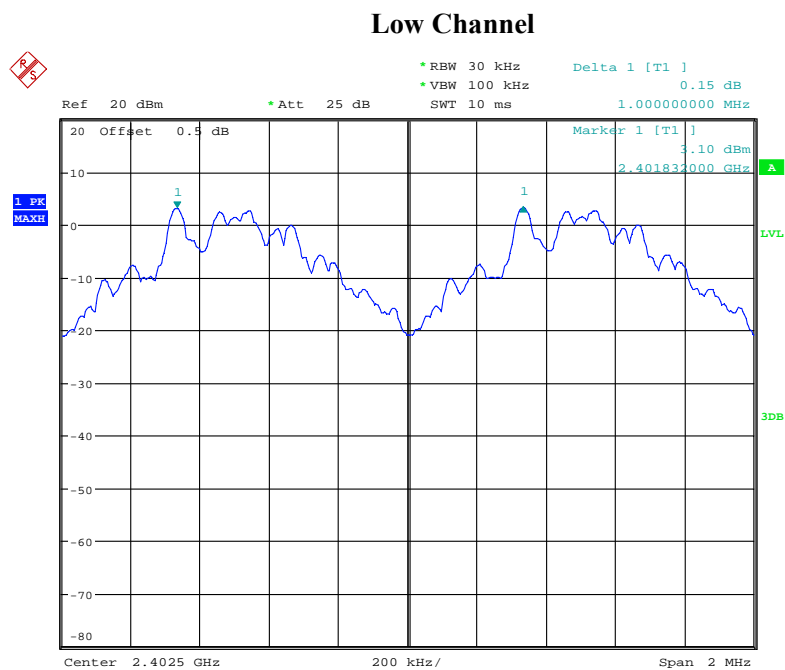
Low Channel

Date: 16.DEC.2018 13:17:35

Middle Channel


```
                                    *RBW  30 kHz        Delta 1 [T1 ]
                                    *VBW  100 kHz                1.00 dB
        Ref  20 dBm        *Att  25 dB    SWT  10 ms     1.004000000 MHz
        20  Offset   0.5 dB                      Marker 1 [T1 ]
                                                          3.15 dBm
      10                                          2.440832000 GHz   A

1 PK                                                                LVL
MAXH
      0

     -10

     -20

     -30

     -40                                                            3DB

     -50

     -60

     -70

     -80
        Center  2.4415 GHz          200 kHz/            Span  2 MHz
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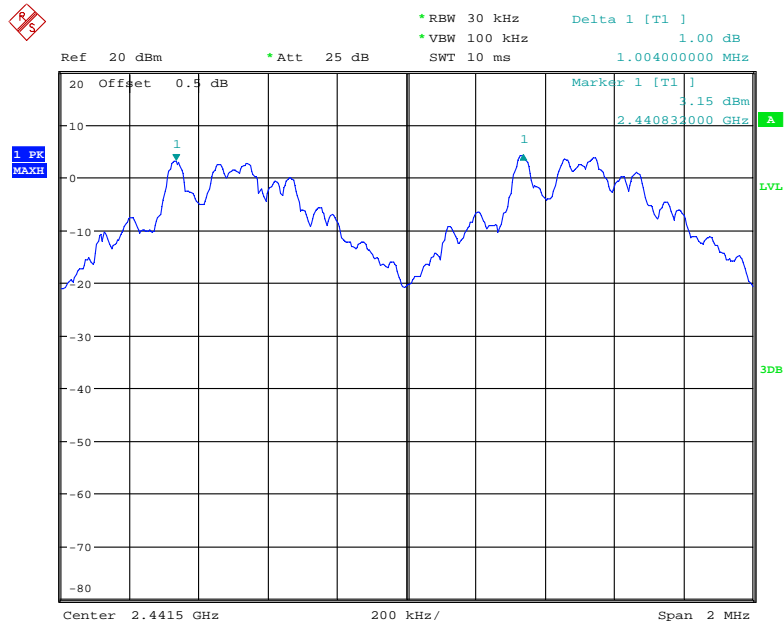
Date: 16.DEC.2018 13:18:52

High Channel


```
                                    *RBW  30 kHz        Delta 1 [T1 ]
                                    *VBW  100 kHz               -0.11 dB
        Ref  20 dBm        *Att  25 dB    SWT  10 ms     1.000000000 MHz
        20  Offset   0.5 dB                      Marker 1 [T1 ]
                                                          3.13 dBm
      10                                          2.478832000 GHz   A

1 PK                                                                LVL
MAXH
      0

     -10

     -20

     -30

     -40                                                            3DB

     -50

     -60

     -70

     -80
        Center  2.4795 GHz          200 kHz/            Span  2 MHz
```

Date: 16.DEC.2018 13:19:31

EDR Mode (π/4-DQPSK):

Low Channel
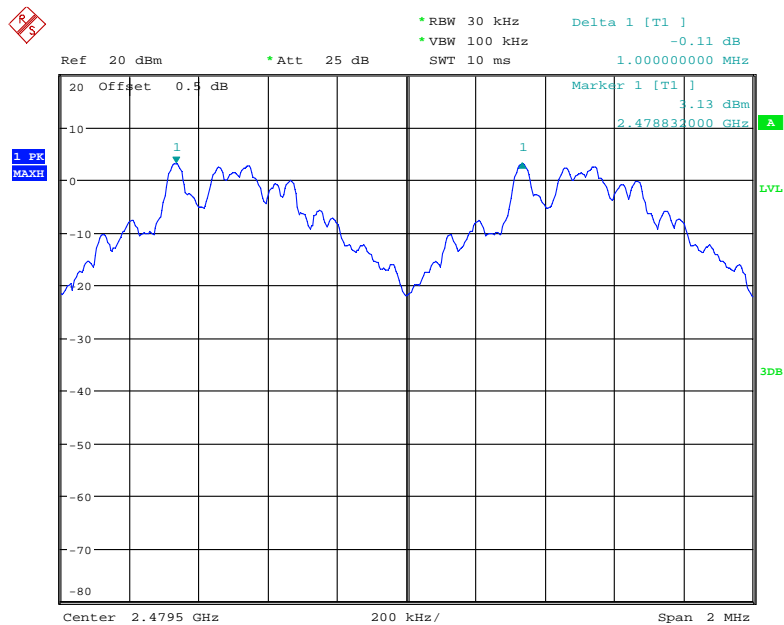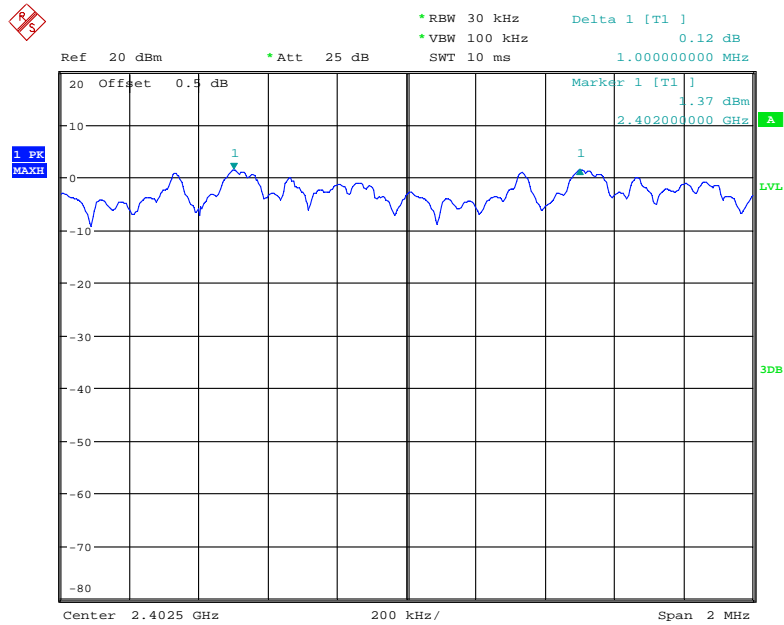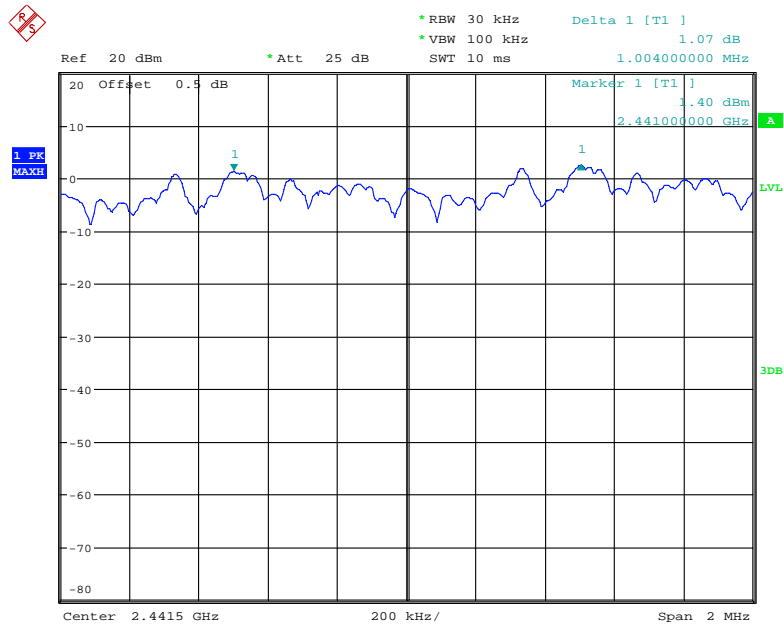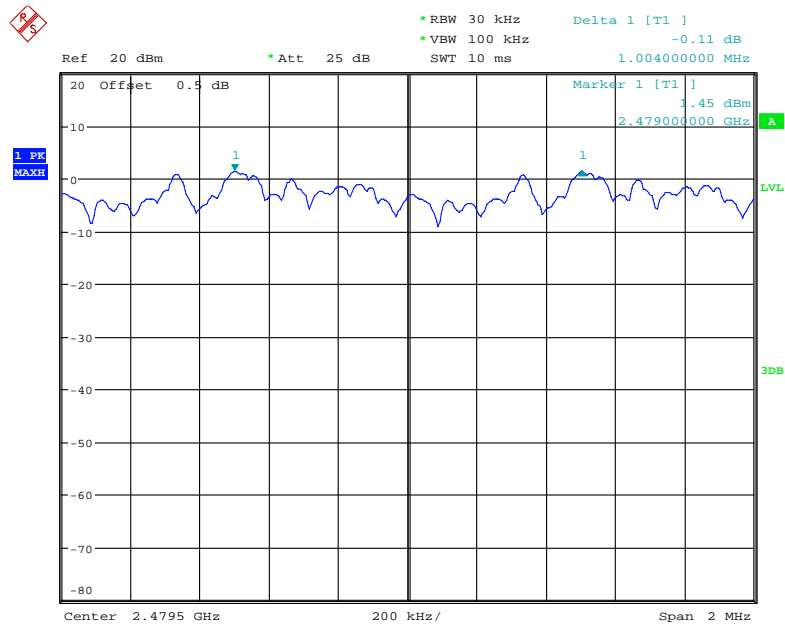

Date: 16.DEC.2018 13:22:18

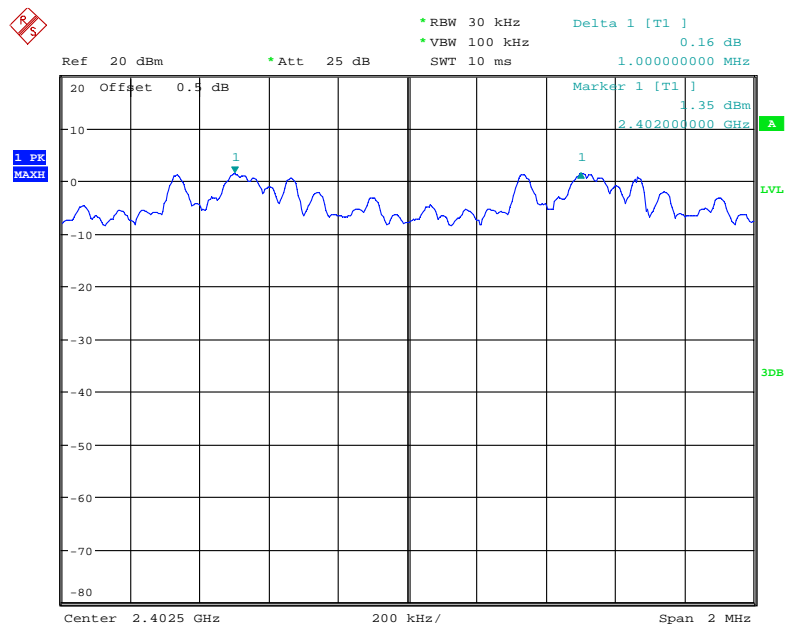## Middle Channel

Date: 16.DEC.2018 13:21:35

High Channel

Date: 16.DEC.2018 13:20:43

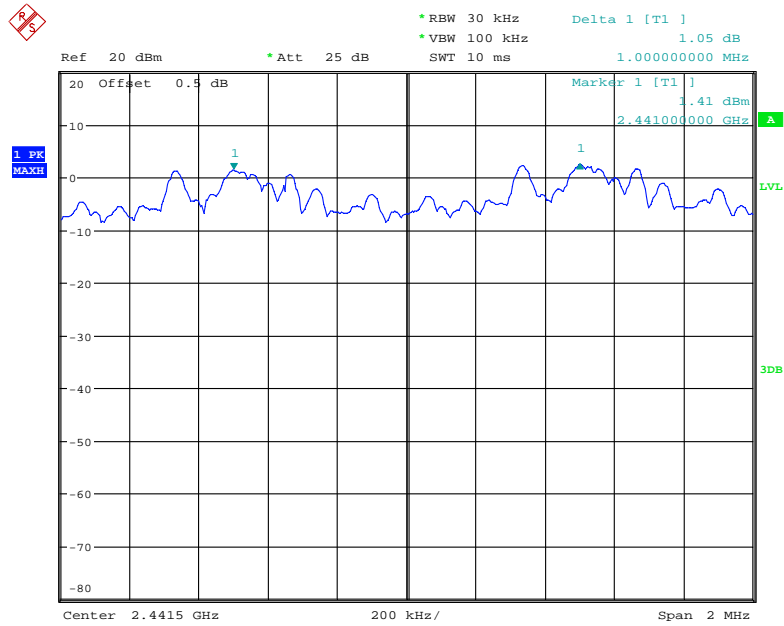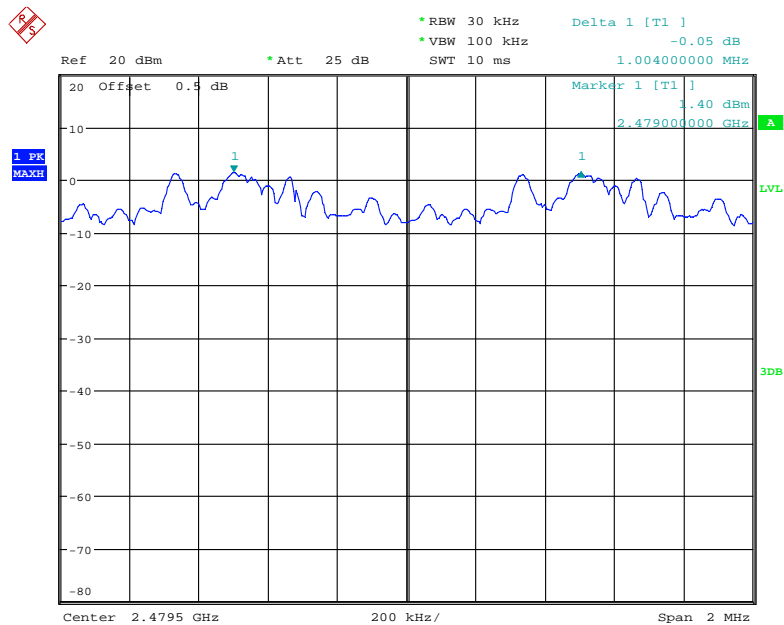*EDR Mode (8-DPSK):*

Low Channel

Date: 16.DEC.2018 13:23:21

Middle Channel

Date: 16.DEC.2018 13:24:14

High Channel

Date: 16.DEC.2018 13:24:55

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	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	42 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang on 2018-12-16.
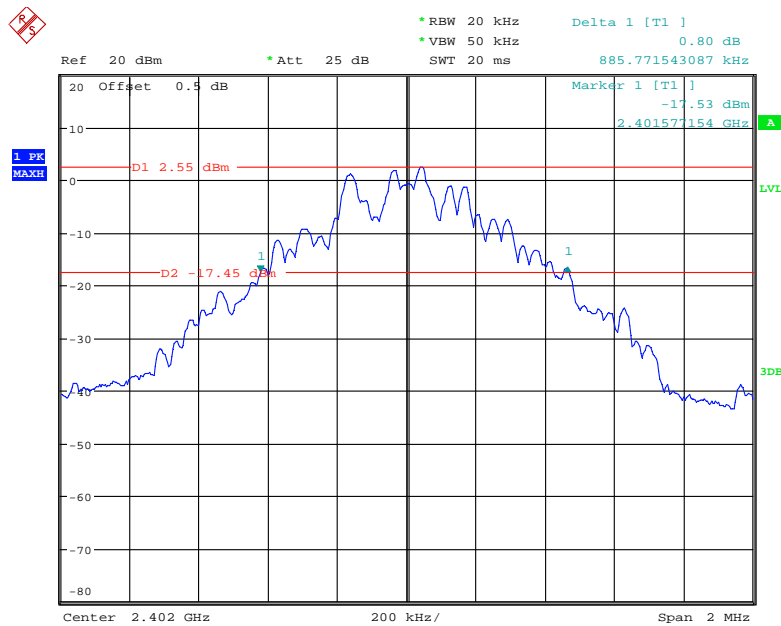
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	0.886
	Middle	2441	0.886
	High	2480	0.878
EDR Mode (π/4-DQPSK)	Low	2402	1.295
	Middle	2441	1.299
	High	2480	1.299
EDR Mode (8-DPSK)	Low	2402	1.259
	Middle	2441	1.259
	High	2480	1.259

BDR Mode (GFSK):

Low Channel

Middle Channel


```
* RBW 20 kHz      Delta 1 [T1 ]
* VBW 50 kHz            0.46 dB
Ref  20 dBm      * Att  25 dB   SWT 20 ms      885.771543087 kHz
20  Offset  0.5 dB                       Marker 1 [T1 ]
                                              -17.18 dBm
                                          2.440577154 GHz   A
D1 2.59 dBm
                                                          LVL
D2 -17.41 dBm
                                                          3DB
Center  2.441 GHz        200 kHz/         Span  2 MHz
```

Date: 16.DEC.2018 11:16:06

High Channel


```
* RBW 20 kHz      Delta 1 [T1 ]
* VBW 50 kHz            0.01 dB
Ref  20 dBm      * Att  25 dB   SWT 20 ms      877.755511022 kHz
20  Offset  0.5 dB                       Marker 1 [T1 ]
                                              -17.32 dBm
                                          2.479577154 GHz   A
D1 2.41 dBm
                                                          LVL
D2 -17.59 dBm
                                                          3DB
Center  2.48 GHz         200 kHz/         Span  2 MHz
```
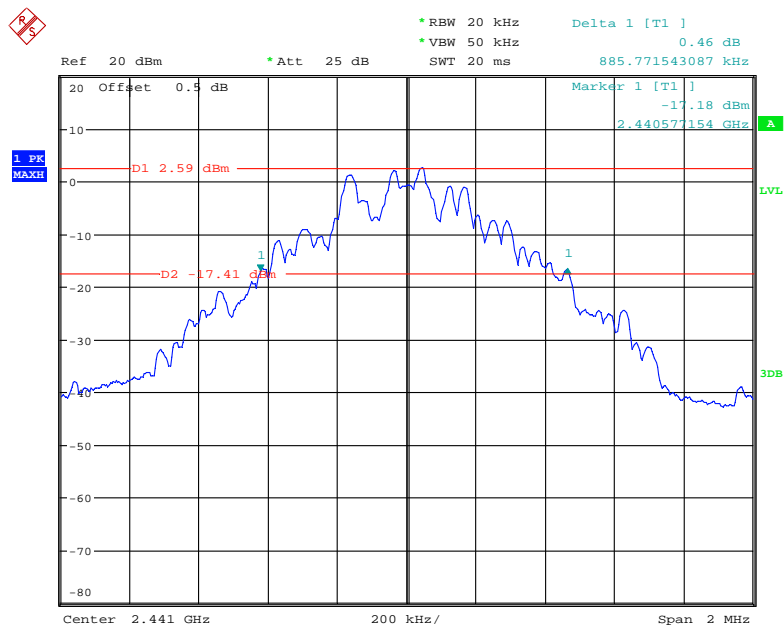
Date: 16.DEC.2018 11:17:30
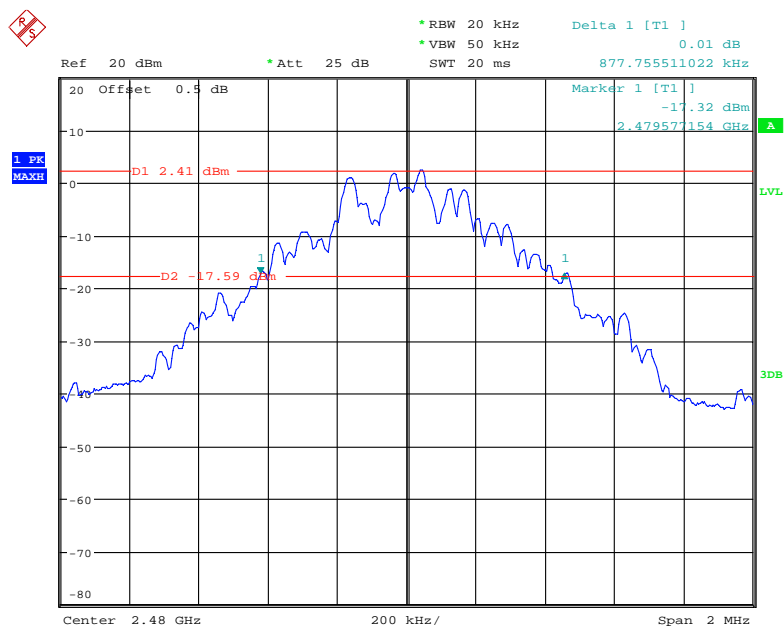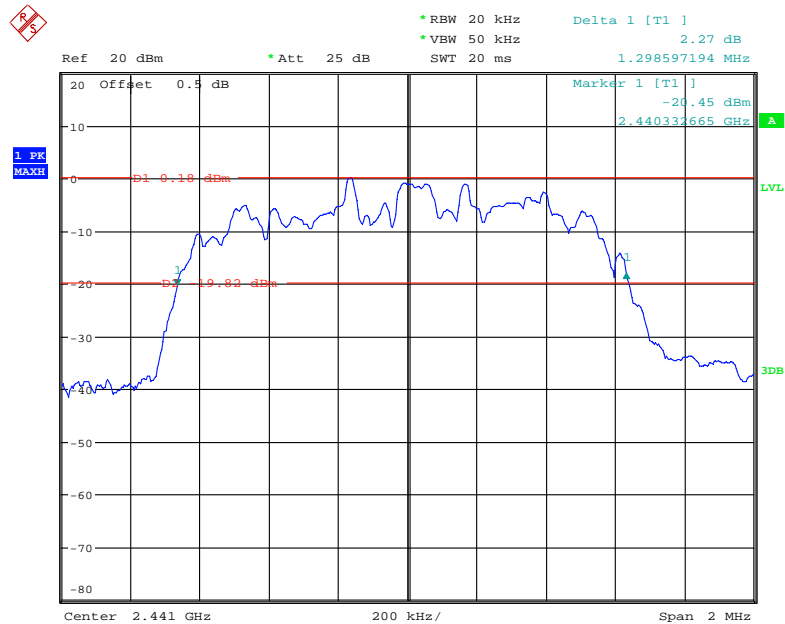
EDR Mode (π/4-DQPSK):
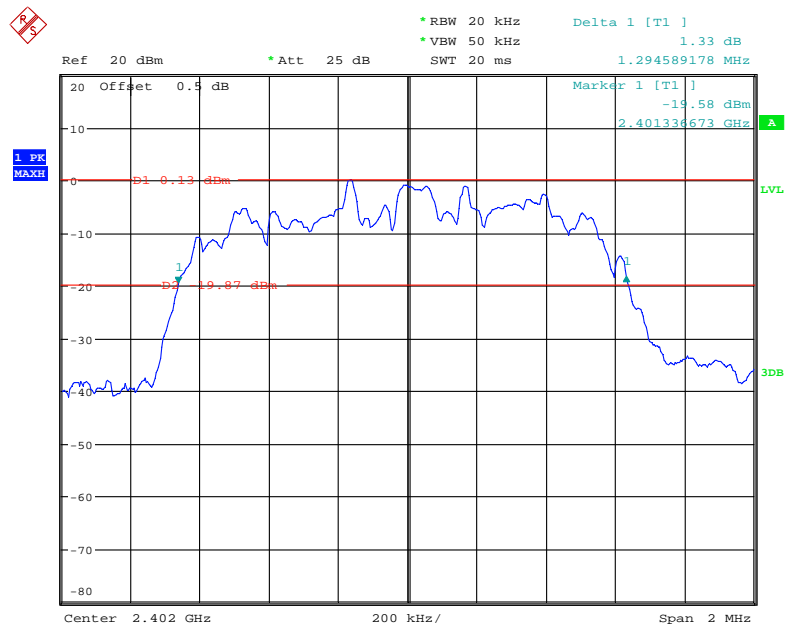
Low Channel

Date: 16.DEC.2018 11:22:07

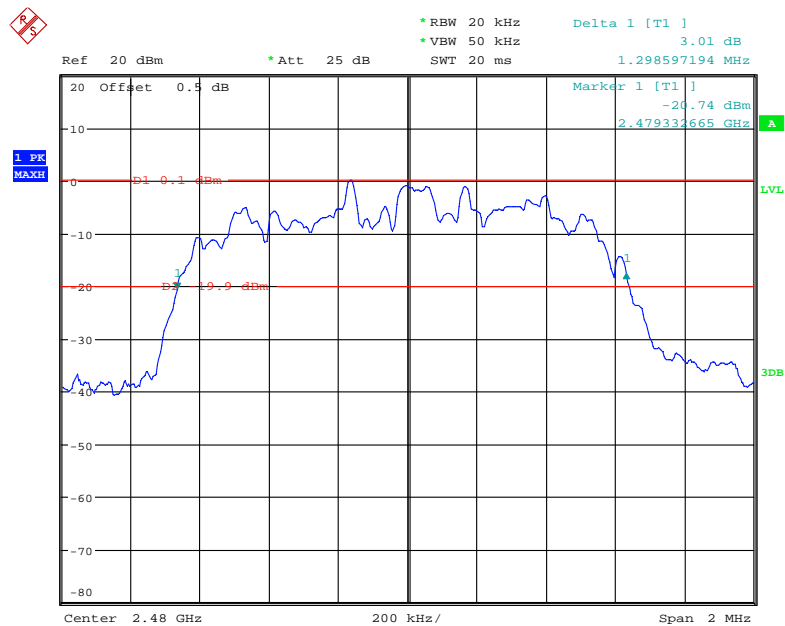## Middle Channel
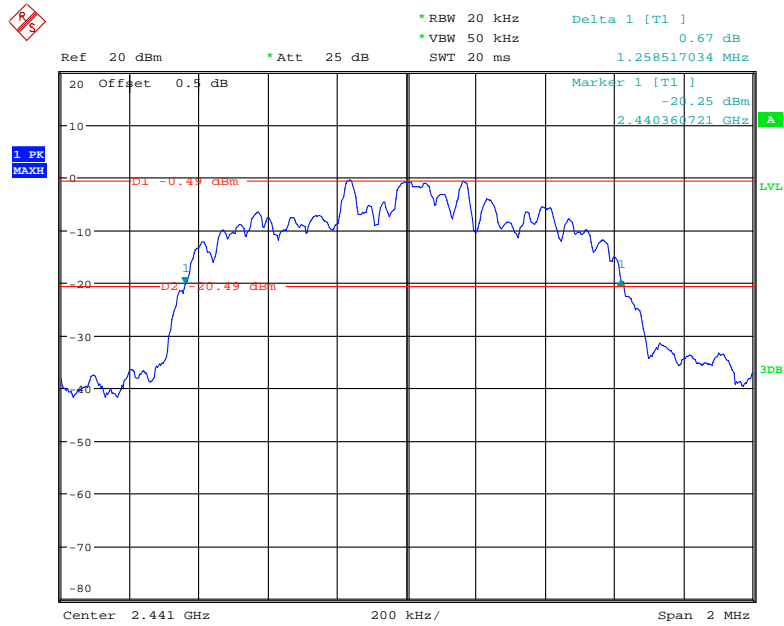

Date: 16.DEC.2018 11:21:01

High Channel


```
                                              * RBW 20 kHz      Delta 1 [T1 ]
                                              * VBW 50 kHz                    3.01 dB
          Ref   20 dBm         * Att   25 dB    SWT 20 ms       1.298597194 MHz
          20 Offset   0.5 dB                                 Marker 1 [T1 ]
                                                                    -20.74 dBm
      -10                                                    2.479332665 GHz   A
1 PK
MAXH              D1 0.1 dBm                                              LVL

      -10
      -20          D2 19.2 dBm
      -30
                                                                         3DB
      -40
      -50
      -60
      -70
      -80
          Center  2.48 GHz              200 kHz/              Span  2 MHz
```

Date: 16.DEC.2018 11:19:15

EDR Mode (8-DPSK):

Low Channel


```
                                              * RBW 20 kHz      Delta 1 [T1 ]
                                              * VBW 50 kHz                    1.05 dB
          Ref   20 dBm         * Att   25 dB    SWT 20 ms       1.258517034 MHz
          20 Offset   0.5 dB                                 Marker 1 [T1 ]
                                                                    -20.51 dBm
      -10                                                    2.401360721 GHz   A
1 PK
MAXH              D1 -0.55 dBm                                            LVL

      -10
      -20          D2 -20.55 dBm
      -30
                                                                         3DB
      -40
      -50
      -60
      -70
      -80
          Center  2.402 GHz             200 kHz/              Span  2 MHz
```
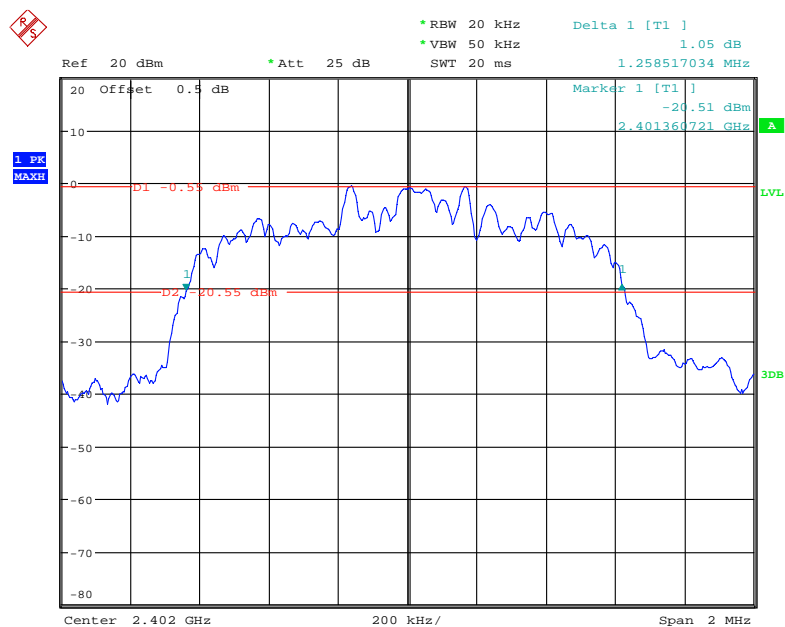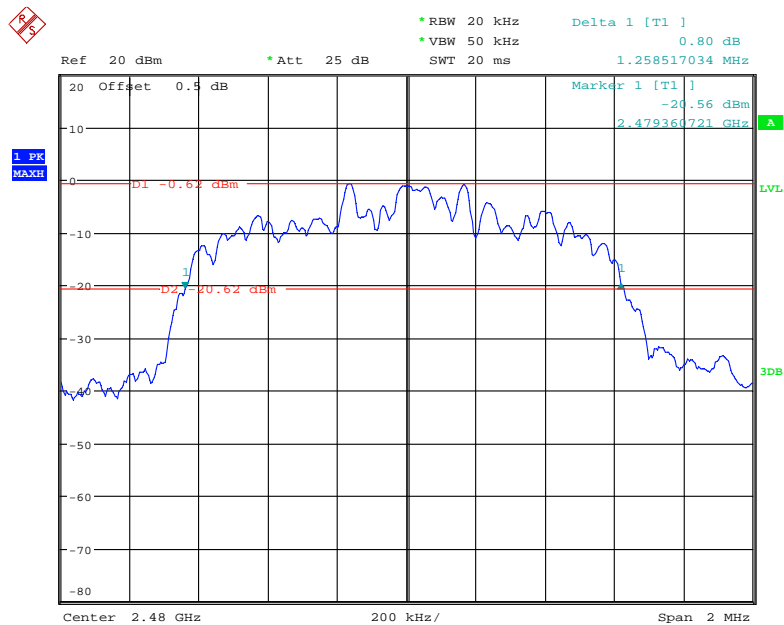
Date: 16.DEC.2018 11:23:42

Middle Channel

Date: 16.DEC.2018 11:25:36

High Channel

Date: 16.DEC.2018 11:26:40

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	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	42 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang on 2018-12-16.

Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

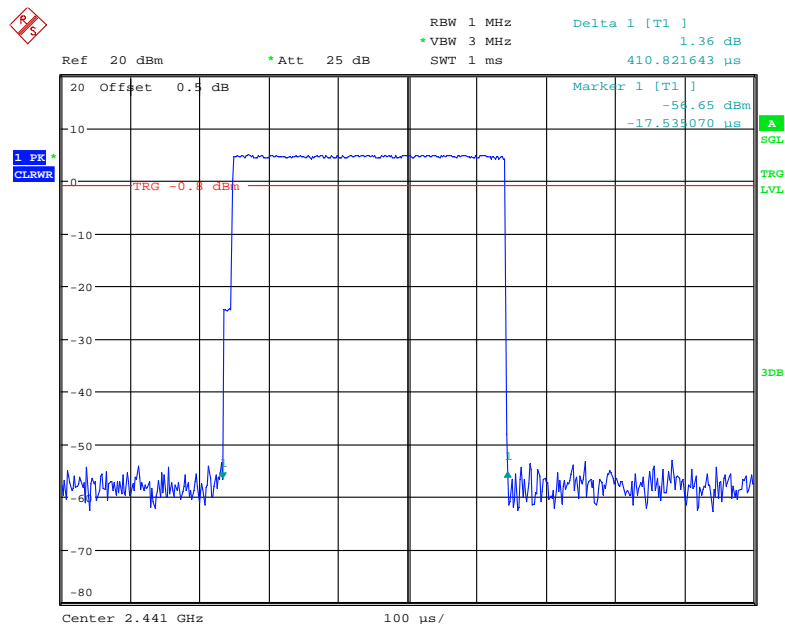| Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

Number of Hopping Channels


```
                                    *RBW  100 kHz      Delta 1 [T1 ]
                                    *VBW  300 kHz              0.04 dB
       Ref   20 dBm      *Att  25 dB   SWT  10 ms       78.156000000 MHz

       20 Offset   0.5 dB                        Marker 1 [T1 ]
                                                        4.39 dBm
      10                                          2.401837000 GHz   A
    1
                                                                1
       0                                                            LVL
     -10

     -20

     -30

     -40                                                         3DB

     -50

     -60

     -70

     -80
       Start  2.4 GHz              8.35 MHz/            Stop  2.4835 GHz
```
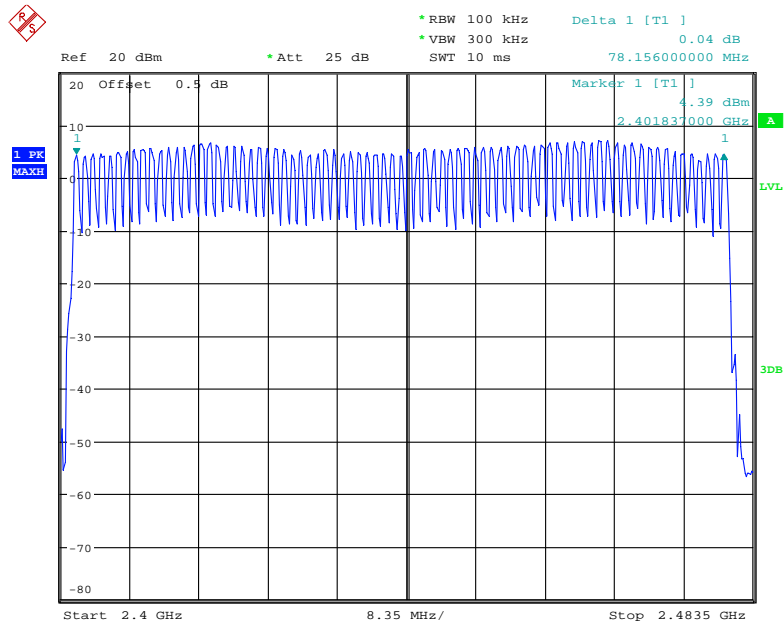
    Date: 16.DEC.2018 11:44:54

EDR Mode (π/4-DQPSK):

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

Number of Hopping Channels
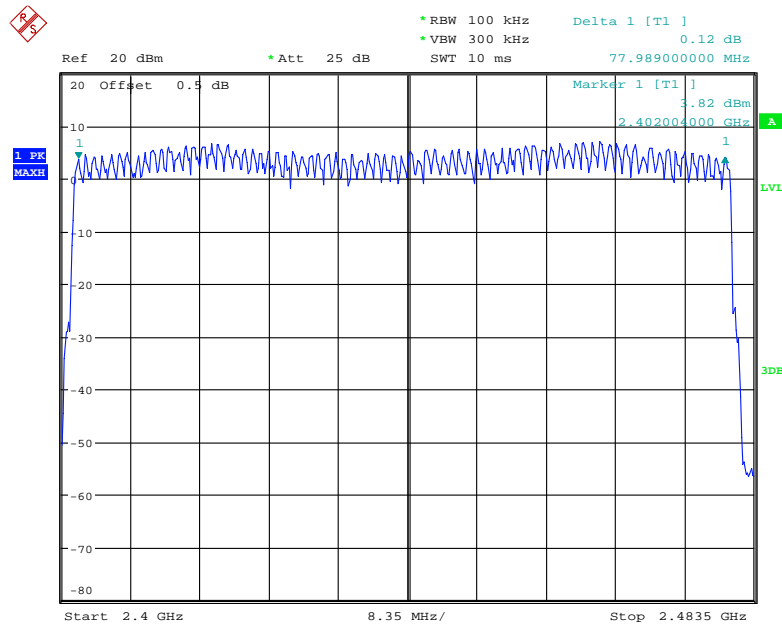
Date: 16.DEC.2018 11:49:00

EDR Mode (8-DPSK):

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

Number of Hopping Channels
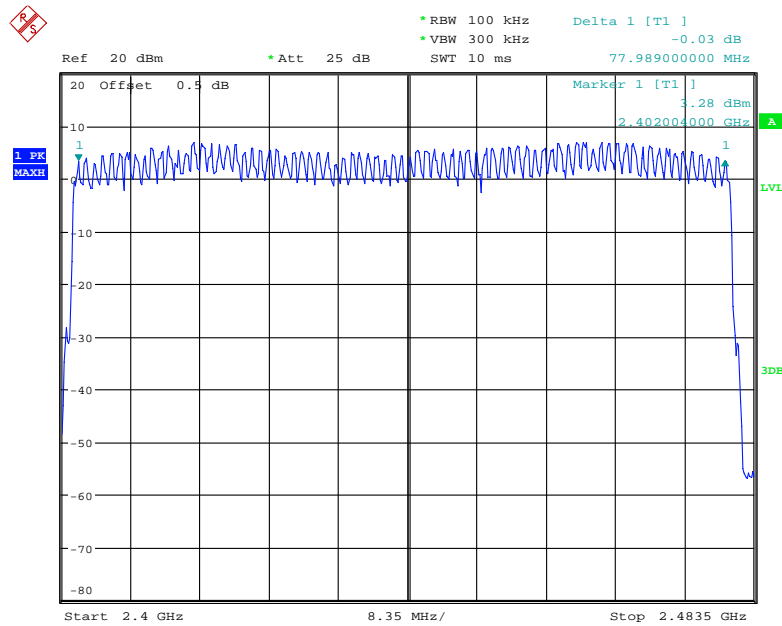
Date: 16.DEC.2018 11:52:44

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; the time of single pulses was tested.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	42 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang on 2018-12-16.

Test Result: Compliance.

 Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.411	0.132	0.4	Compliance
	Middle	0.411	0.132	0.4	Compliance
	High	0.411	0.132	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.683	0.269	0.4	Compliance
	Middle	1.683	0.269	0.4	Compliance
	High	1.683	0.269	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	2.946	0.314	0.4	Compliance
	Middle	2.936	0.313	0.4	Compliance
	High	2.946	0.314	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel
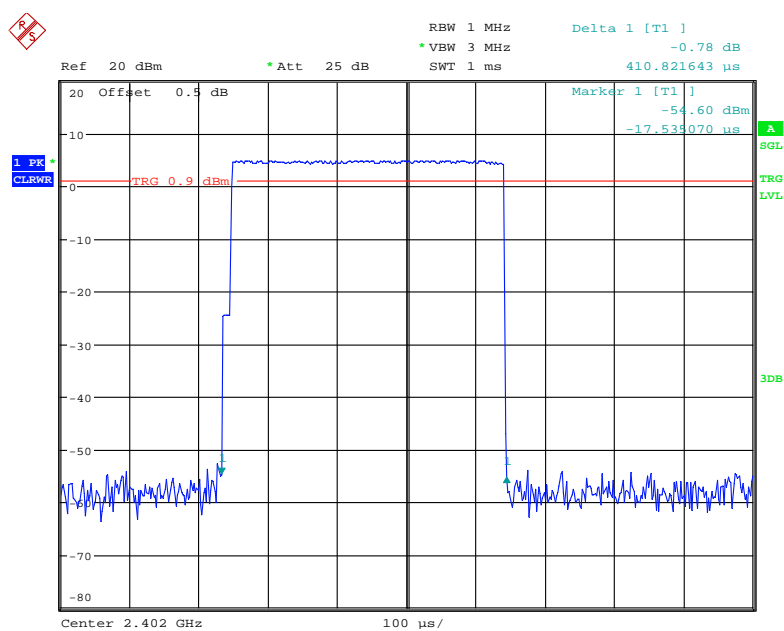
DH1: Middle Channel

Date: 16.DEC.2018 11:33:59

DH1: High Channel
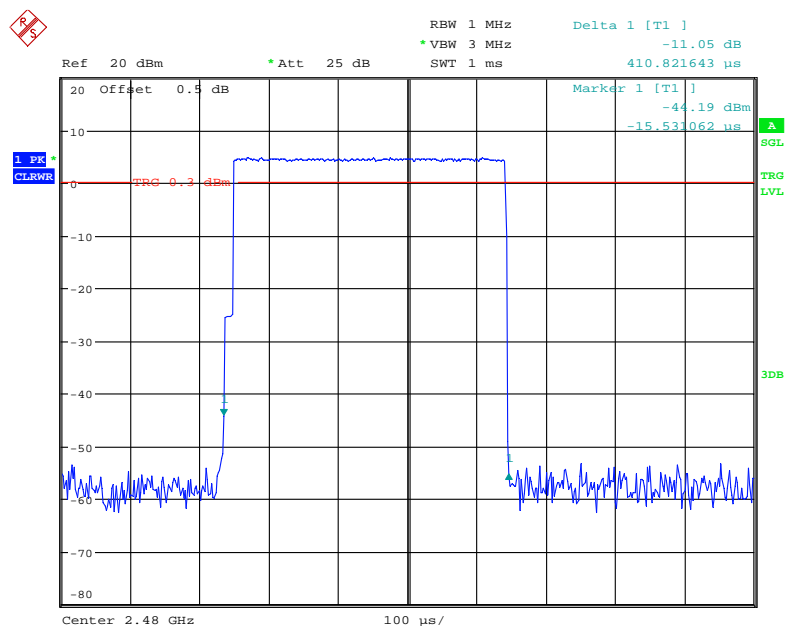
Date: 16.DEC.2018 11:34:03

DH3: Low Channel
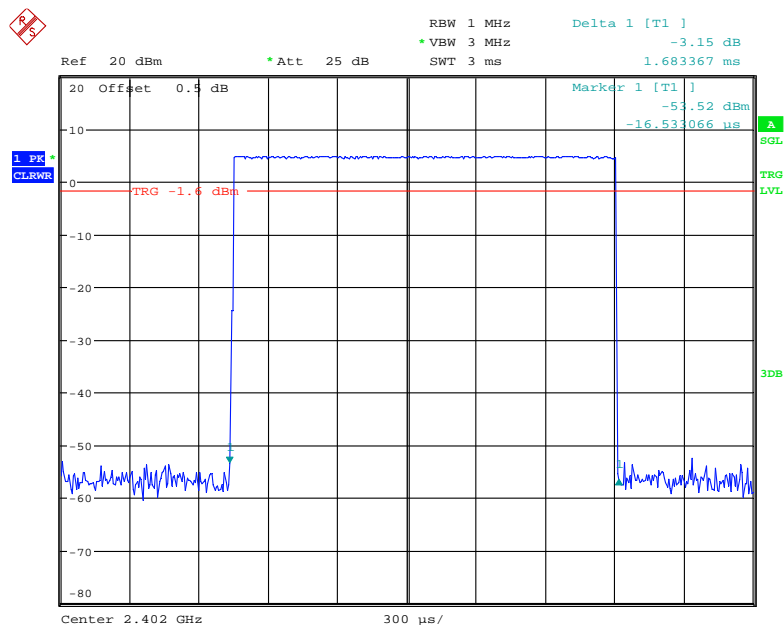
Date: 16.DEC.2018 11:34:42

DH3: Middle Channel
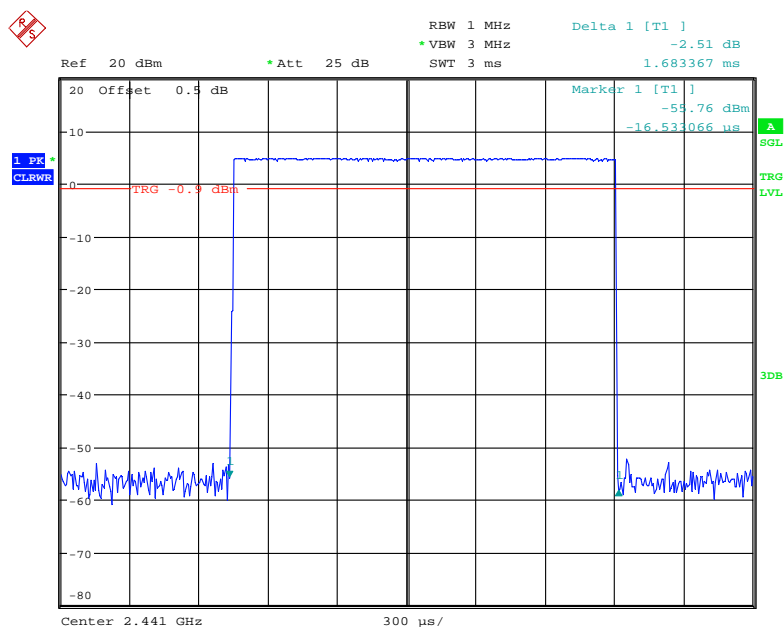
Date: 16.DEC.2018 11:34:47

DH3: High Channel
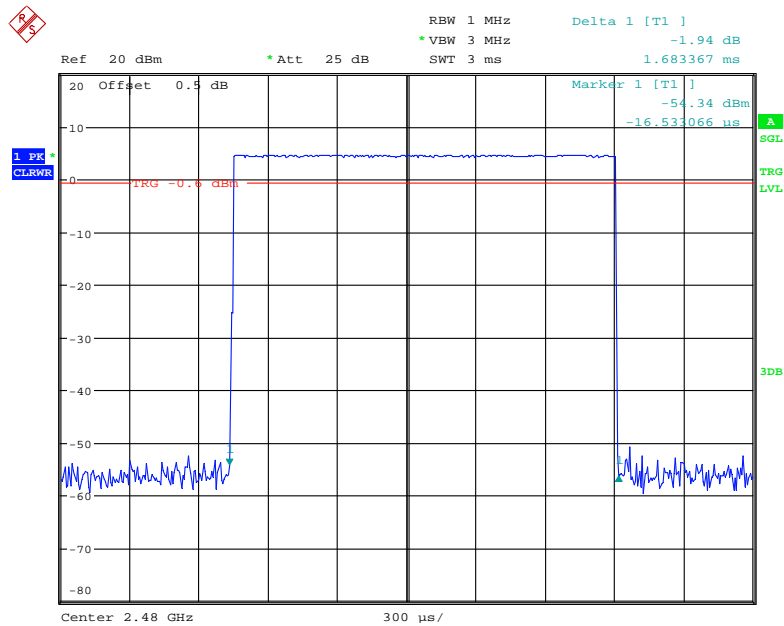
Date: 16.DEC.2018 11:34:51

DH5: Low Channel
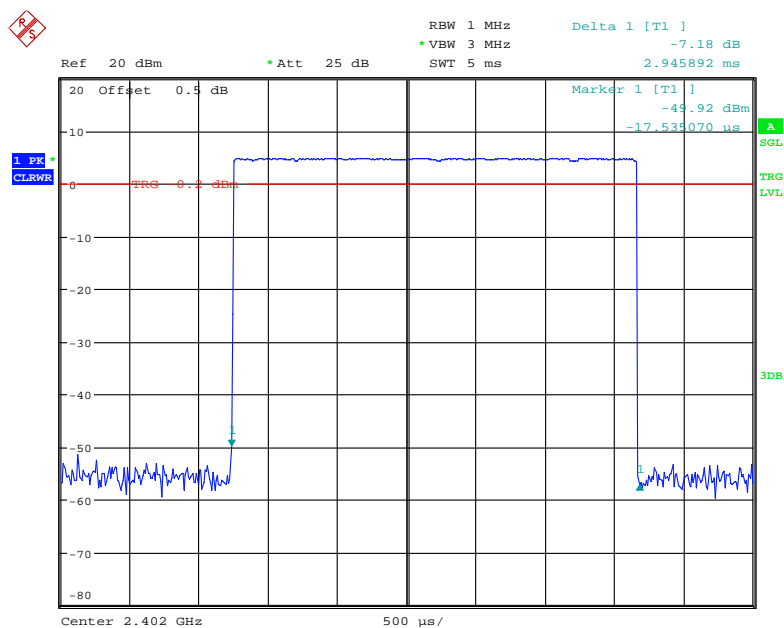
Date: 16.DEC.2018 11:35:25

DH5: Middle Channel
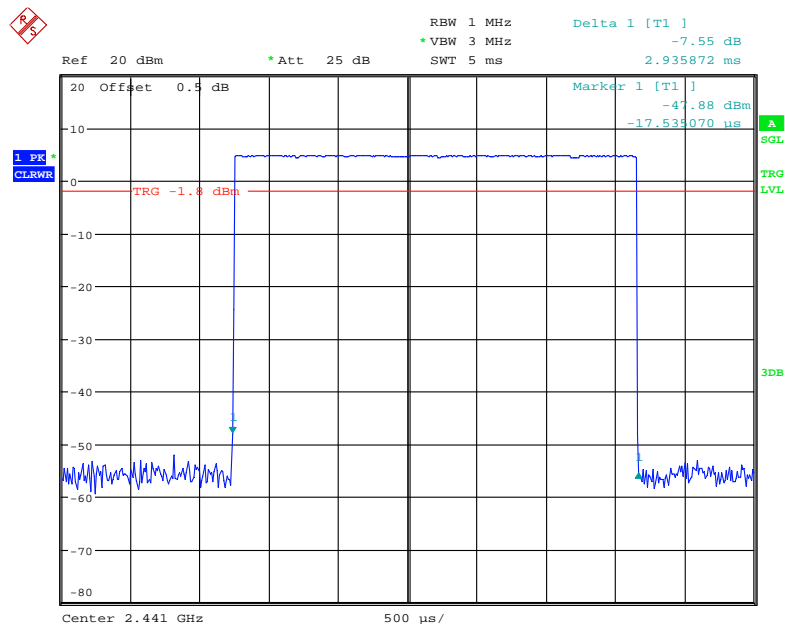
Date: 16.DEC.2018 11:35:29

DH5: High Channel
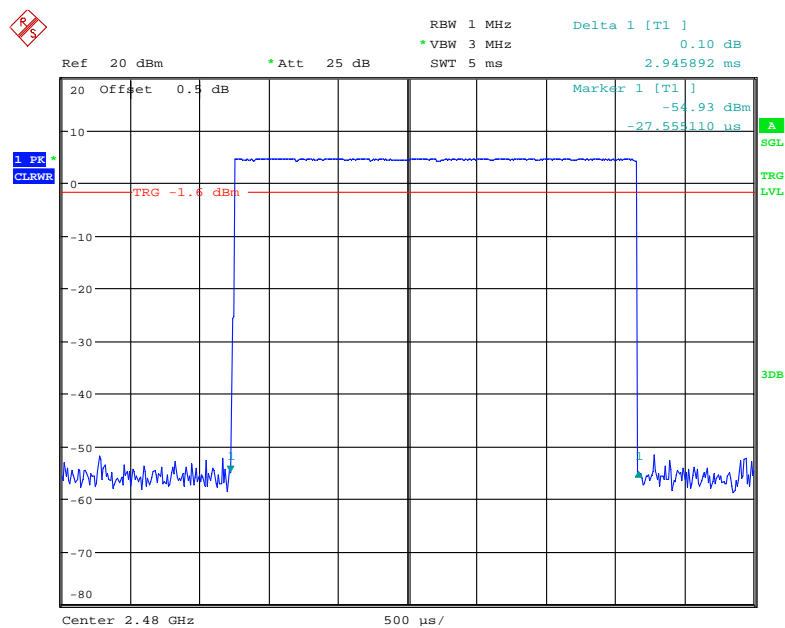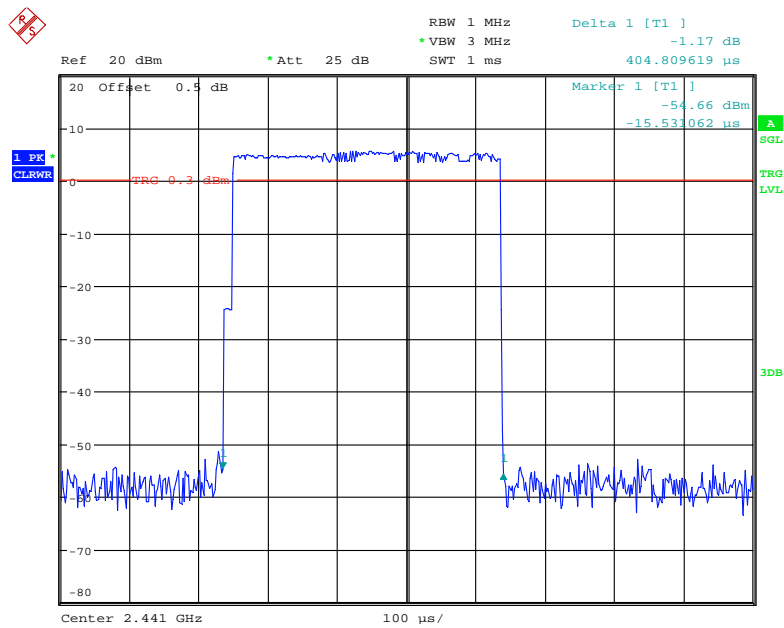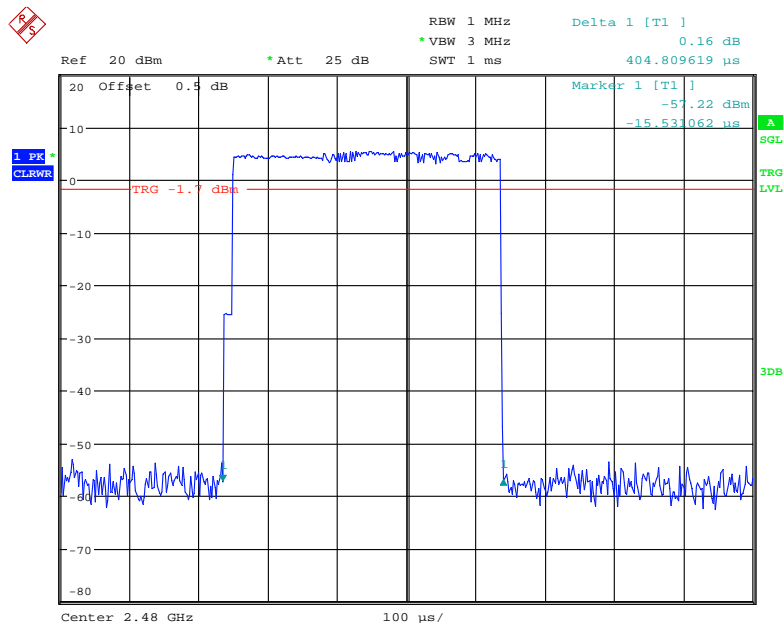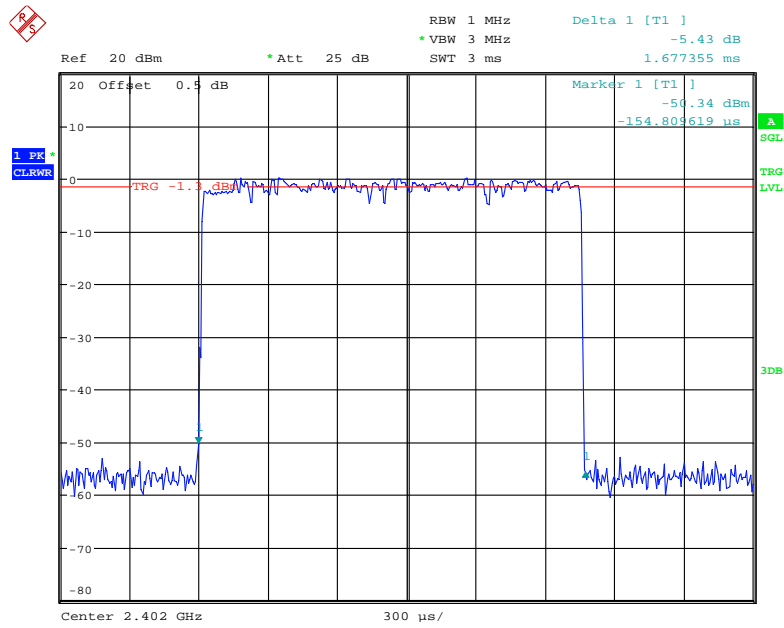

Date: 16.DEC.2018 11:35:33

EDR Mode (π/4-DQPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
2DH1	Low	0.407	0.130	0.4	Compliance
	Middle	0.405	0.130	0.4	Compliance
	High	0.405	0.130	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
2DH3	Low	1.677	0.268	0.4	Compliance
	Middle	1.671	0.267	0.4	Compliance
	High	1.677	0.268	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
2DH5	Low	2.936	0.313	0.4	Compliance
	Middle	2.936	0.313	0.4	Compliance
	High	2.936	0.313	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

2DH1: Low Channel
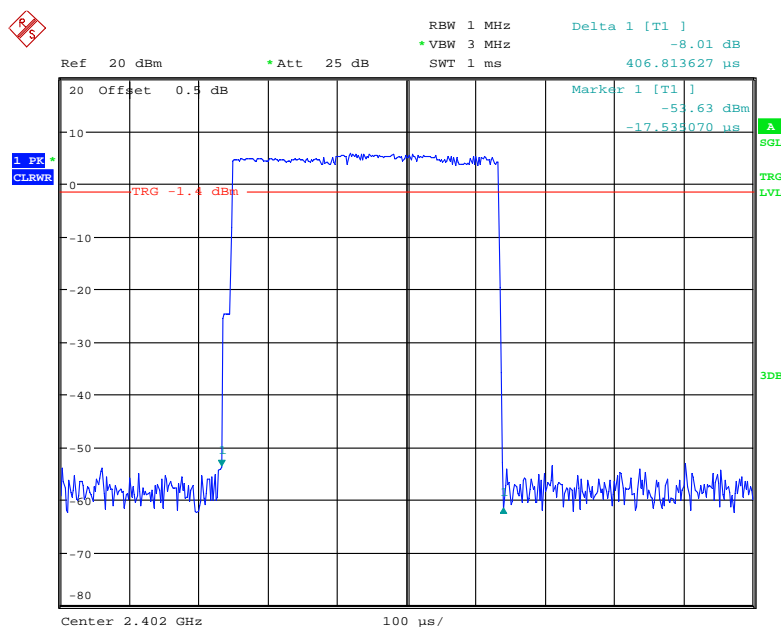
Date: 16.DEC.2018 11:36:02

2DH1: Middle Channel

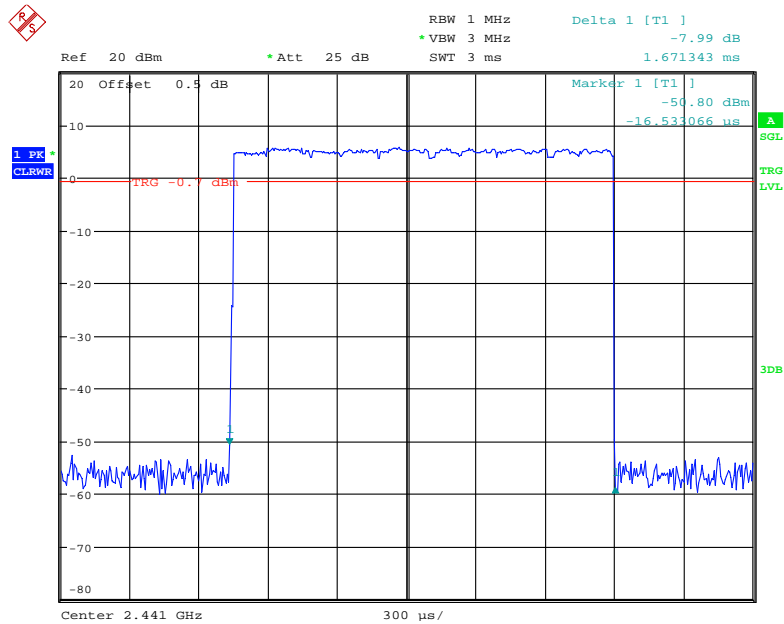Date: 16.DEC.2018 11:36:14

2DH1: High Channel

Date: 16.DEC.2018 11:36:18

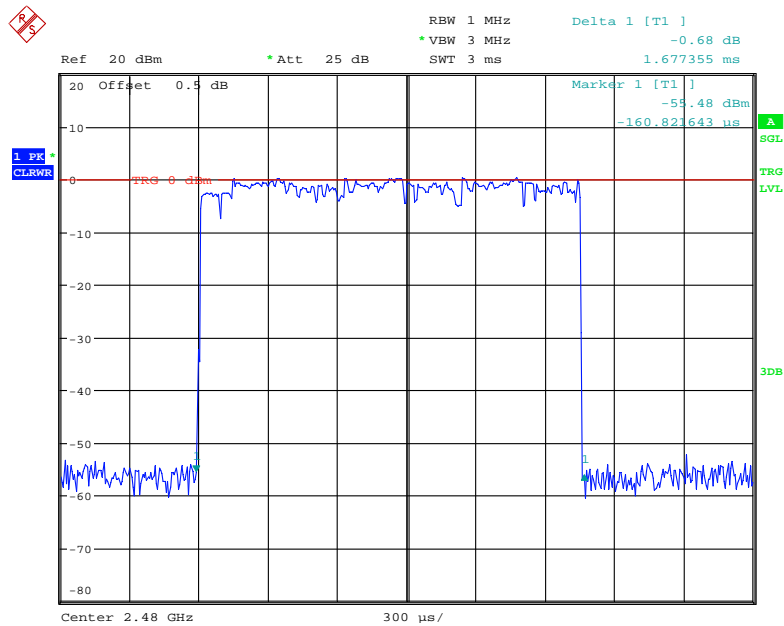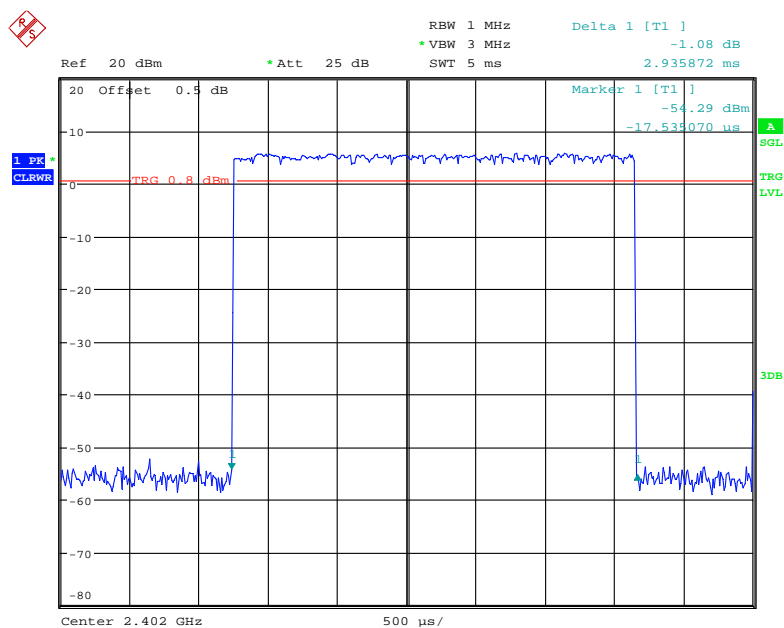## 2DH3: Low Channel

Date: 16.DEC.2018 11:36:51

2DH3: Middle Channel

Date: 16.DEC.2018 11:36:55

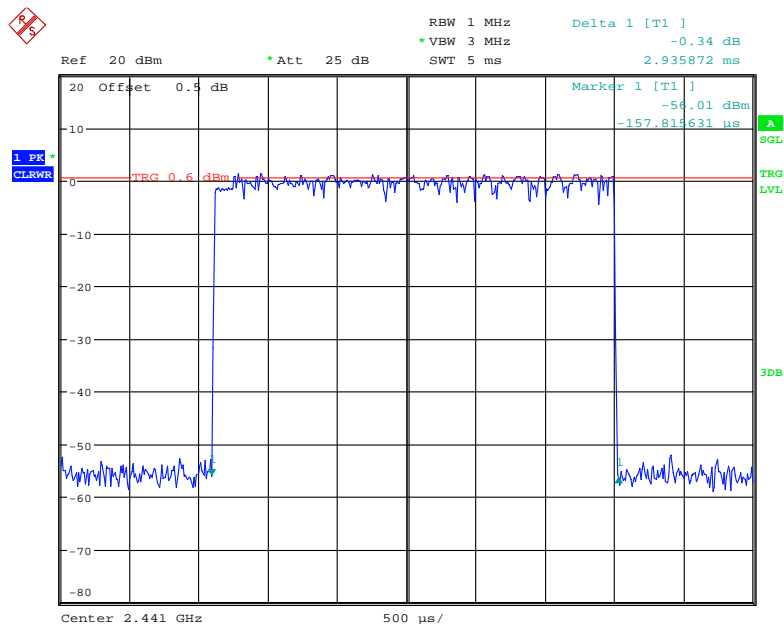## 2DH3: High Channel
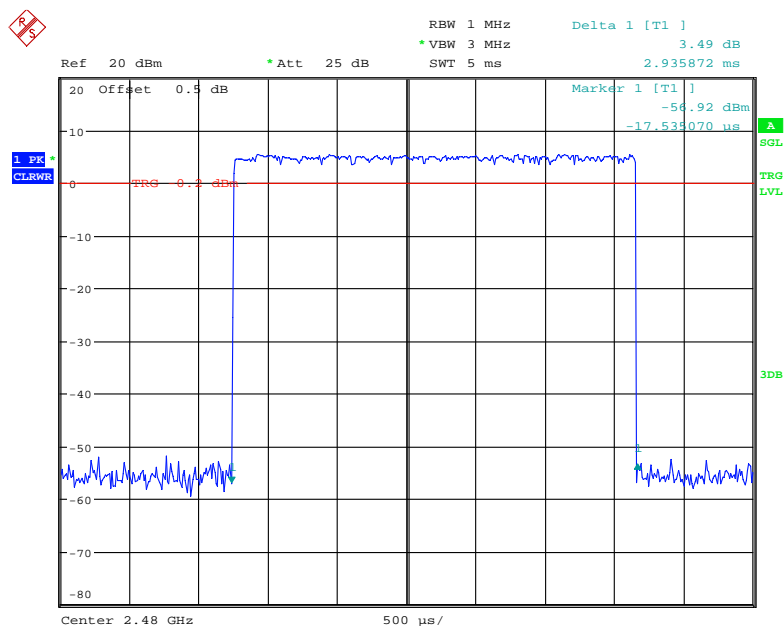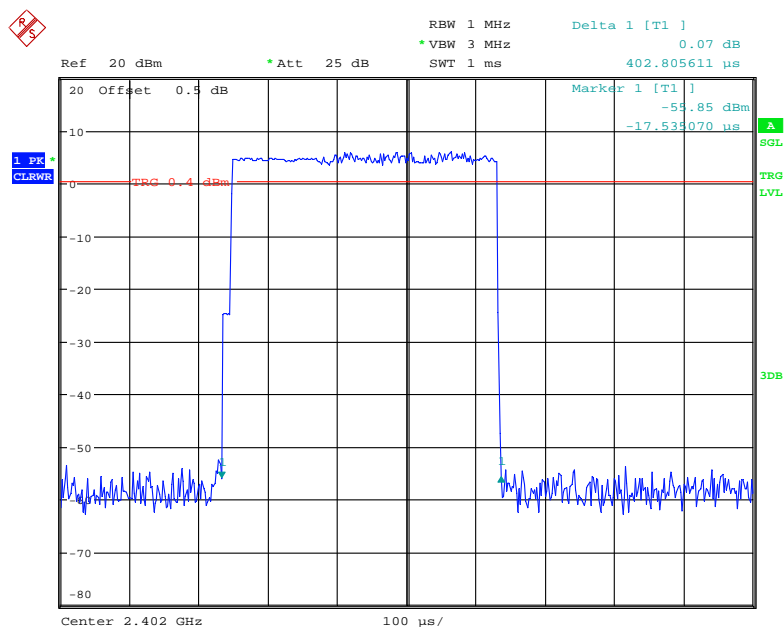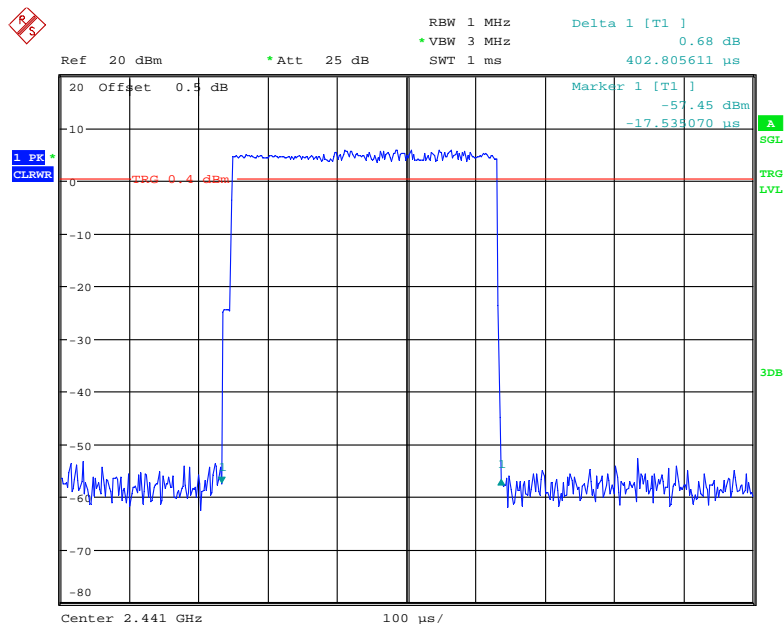

Date: 16.DEC.2018 11:36:59

2DH5: Low Channel

Date: 16.DEC.2018 11:37:31

2DH5: Middle Channel

		RBW 1 MHz	Delta 1 [T1]
		*VBW 3 MHz	-0.34 dB
Ref 20 dBm	*Att 25 dB	SWT 5 ms	2.935872 ms

Marker 1 [T1]
-56.01 dBm
-157.815631 µs

Center 2.441 GHz   500 µs/

Date: 16.DEC.2018 11:37:36

2DH5: High Channel

		RBW 1 MHz	Delta 1 [T1]
		*VBW 3 MHz	3.49 dB
Ref 20 dBm	*Att 25 dB	SWT 5 ms	2.935872 ms

Marker 1 [T1]
-56.92 dBm
-17.535070 us

Center 2.48 GHz   500 µs/

Date: 16.DEC.2018 11:37:40

EDR Mode (8-DPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
3DH1	Low	0.403	0.129	0.4	Compliance
	Middle	0.403	0.129	0.4	Compliance
	High	0.403	0.129	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
3DH3	Low	1.671	0.267	0.4	Compliance
	Middle	1.671	0.267	0.4	Compliance
	High	1.671	0.267	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
3DH5	Low	2.936	0.313	0.4	Compliance
	Middle	2.936	0.313	0.4	Compliance
	High	2.926	0.312	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

3DH1: Low Channel

3DH1: Middle Channel

Date: 16.DEC.2018 11:38:15

3DH1: High Channel

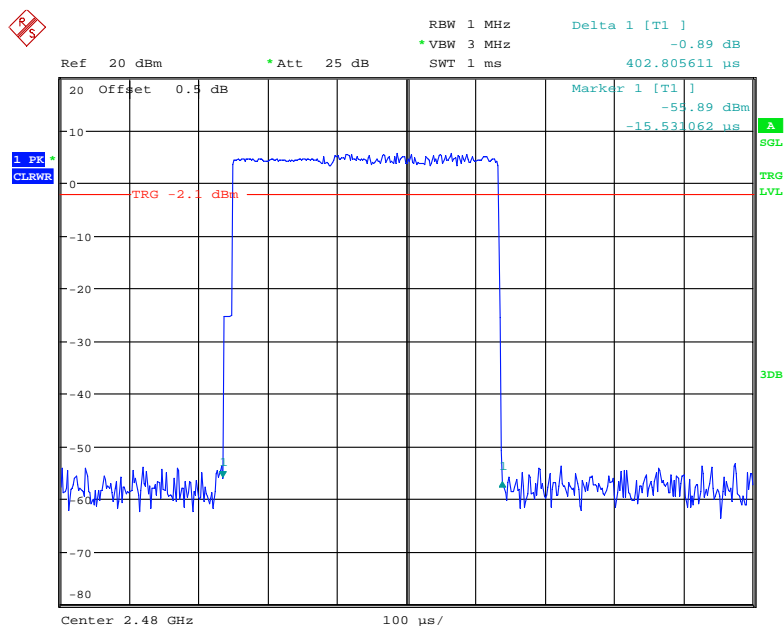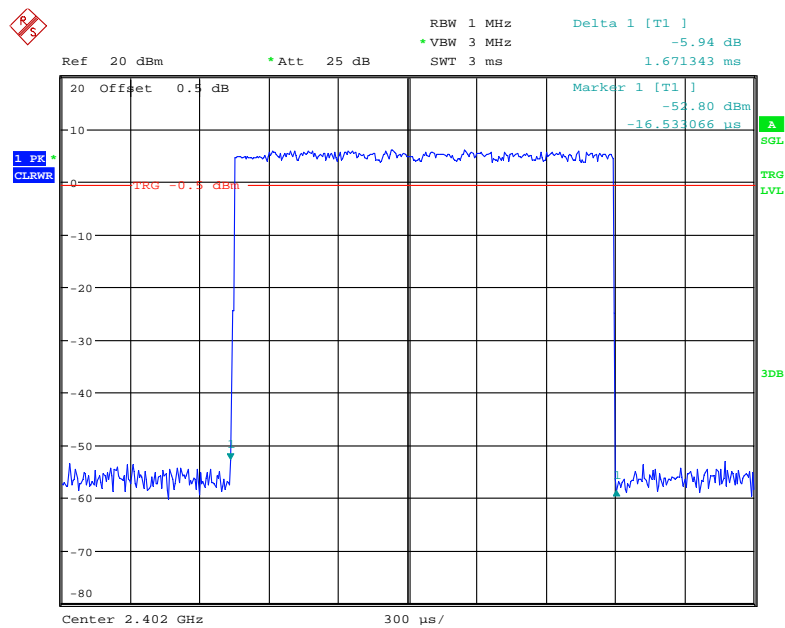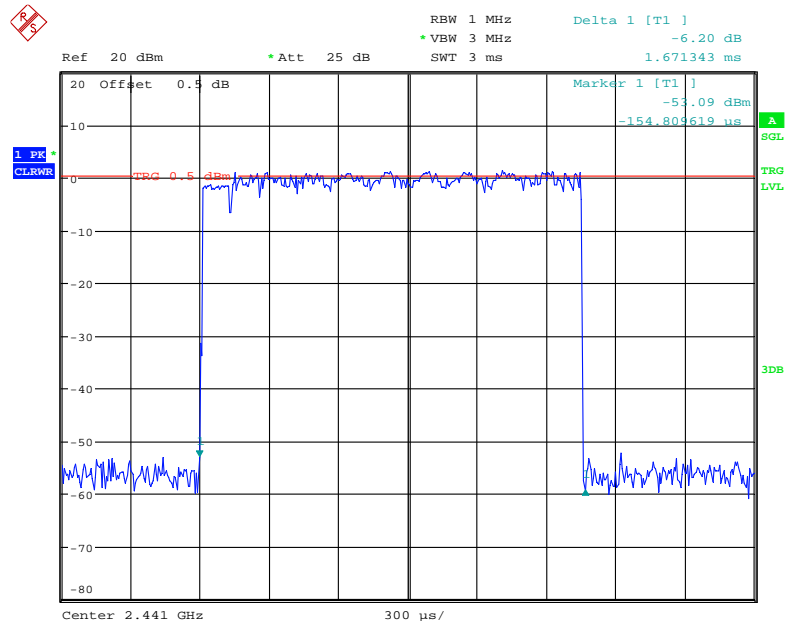Date: 16.DEC.2018 11:38:19

3DH3: Low Channel
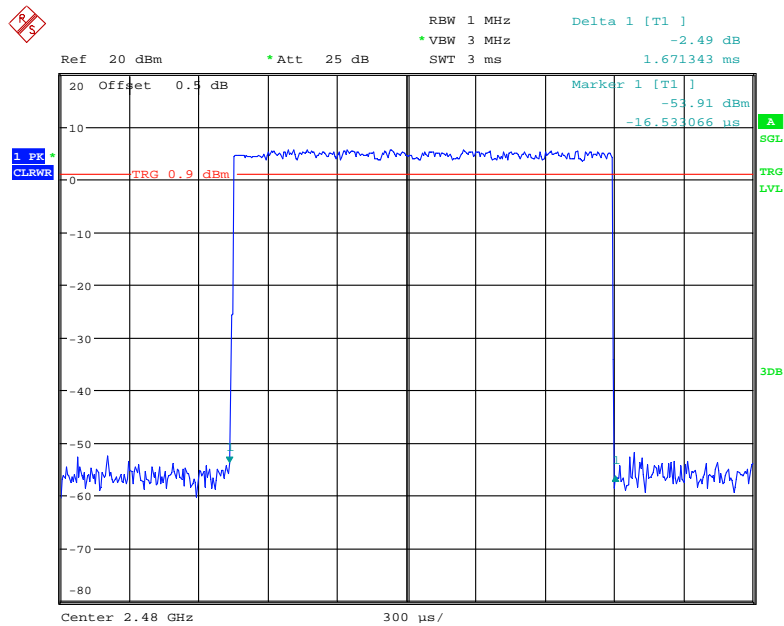

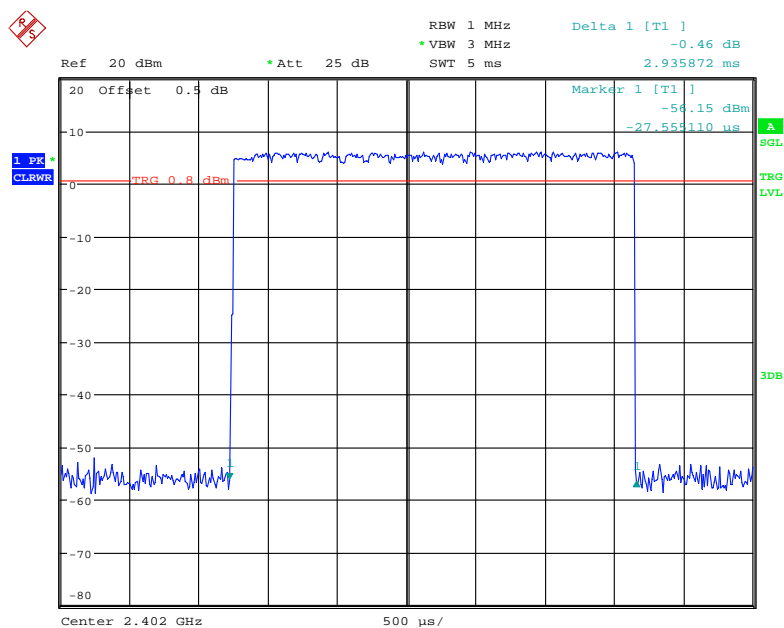Date: 16.DEC.2018 11:39:32

3DH3: Middle Channel

Date: 16.DEC.2018 11:39:36

3DH3: High Channel
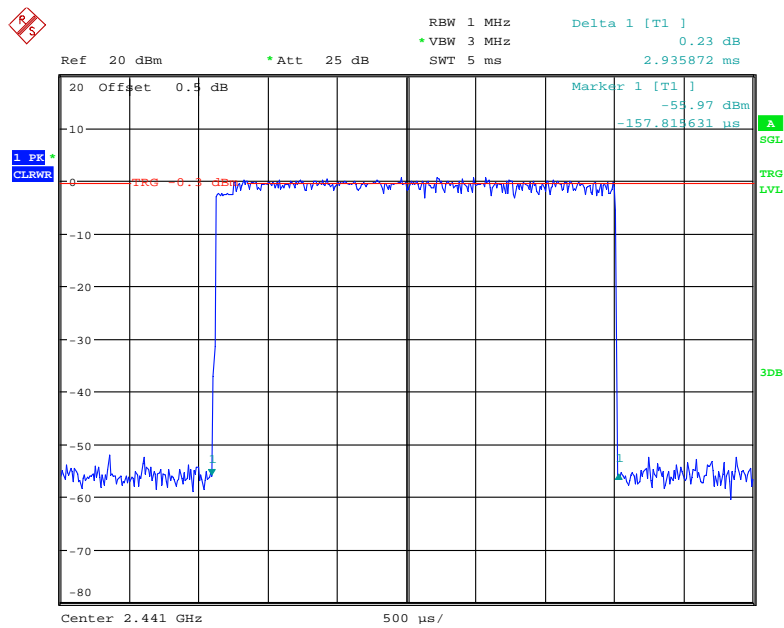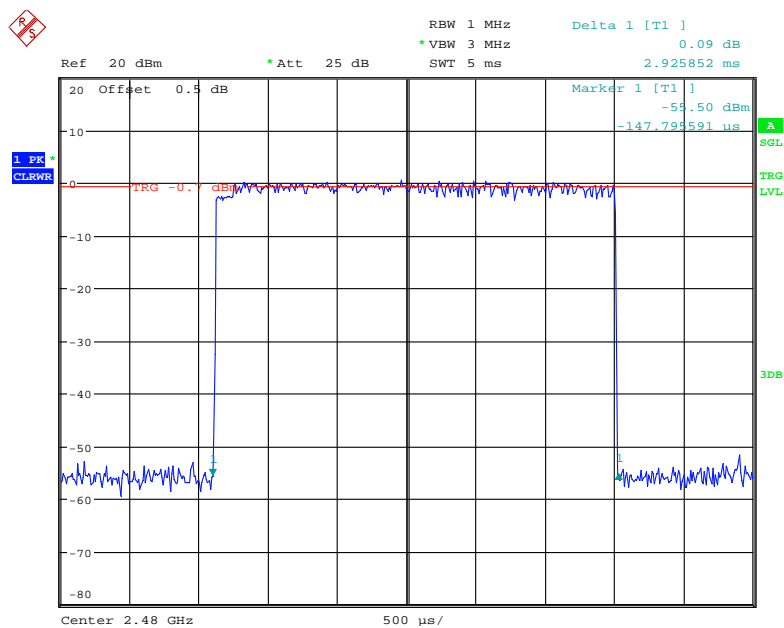

Date: 16.DEC.2018 11:39:40

3DH5: Low Channel

Date: 16.DEC.2018 11:40:43

3DH5: Middle Channel

Date: 16.DEC.2018 11:40:47

3DH5: High Channel

Date: 16.DEC.2018 11:40:51

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 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
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2018-12-10	2019-12-10
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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 Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	42 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang on 2018-12-16.

Test Result: Compliance.

Test Mode: Transmitting

Mode	Frequency (MHz)	Peak Conducted Output power (dBm)	Limit (dBm)
BDR Mode (GFSK)	2402	5.05	21
	2441	5.13	21
	2465	7.45	21
	2480	4.88	21
EDR Mode (π/4-DQPSK)	2402	6.31	21
	2441	6.30	21
	2465	8.84	21
	2480	6.01	21
EDR Mode (8-DPSK)	2402	6.54	21
	2441	6.46	21
	2465	9.04	21
	2480	6.14	21

Note: The data above was tested in conducted mode.

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/ VBW of spectrum analyzer to 100/300 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	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	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).
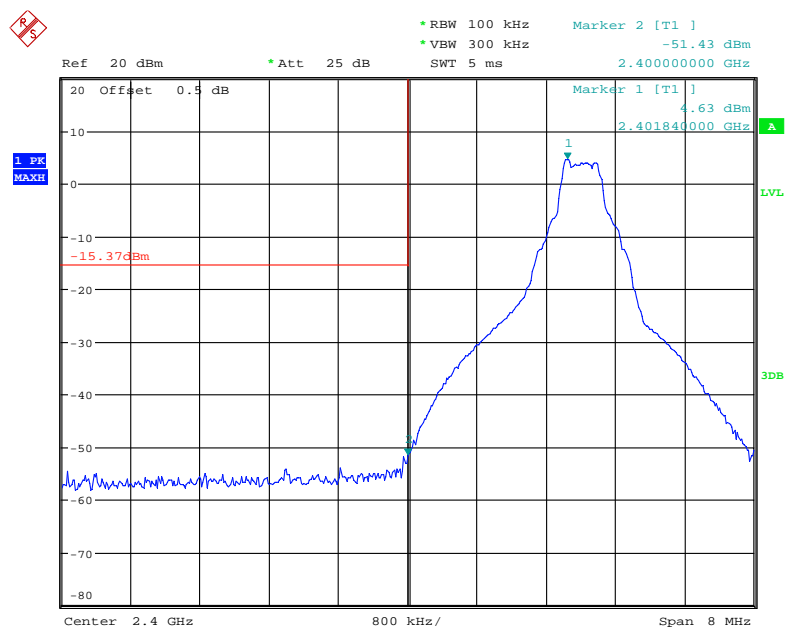
Test Data

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	42 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang on 2018-12-16.
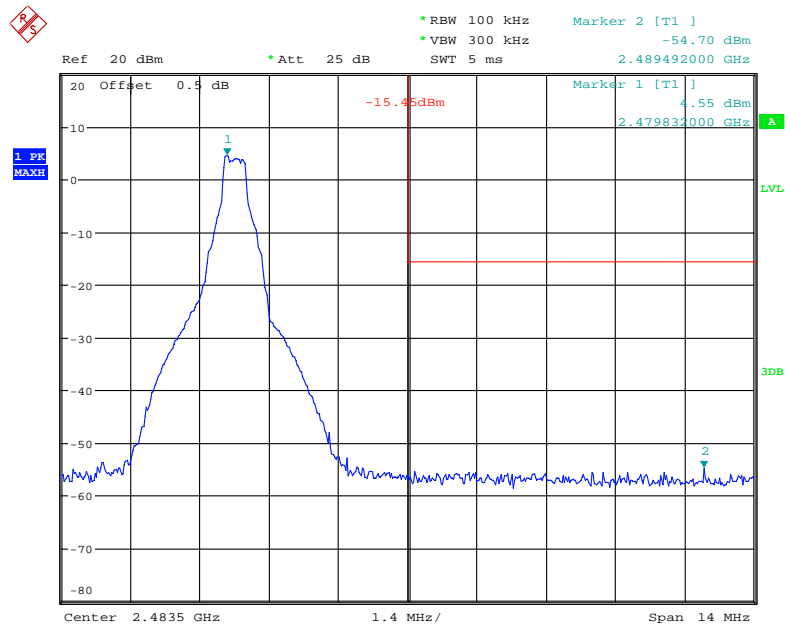
Test Result: Compliance

Single mode:
BDR Mode (GFSK):

Band Edge, Left Side
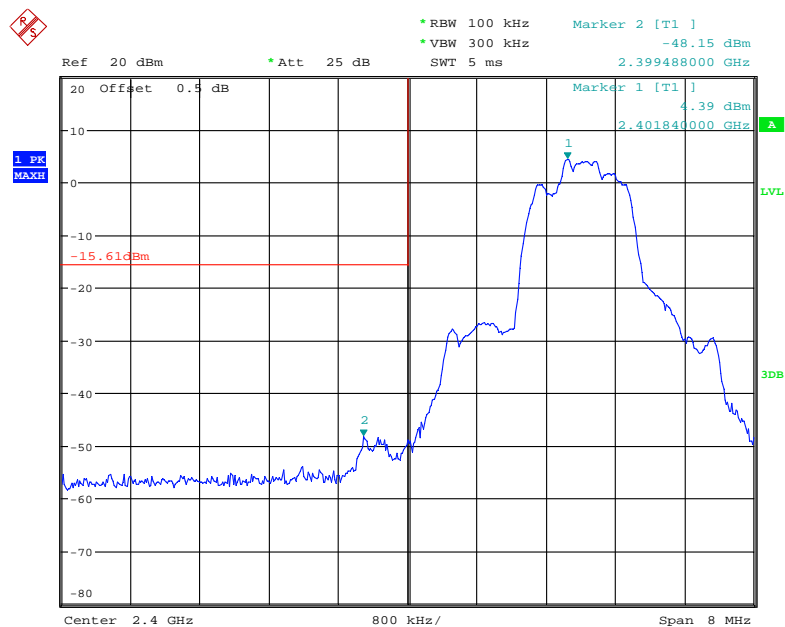

Date: 16.DEC.2018 11:14:22

Band Edge, Right Side
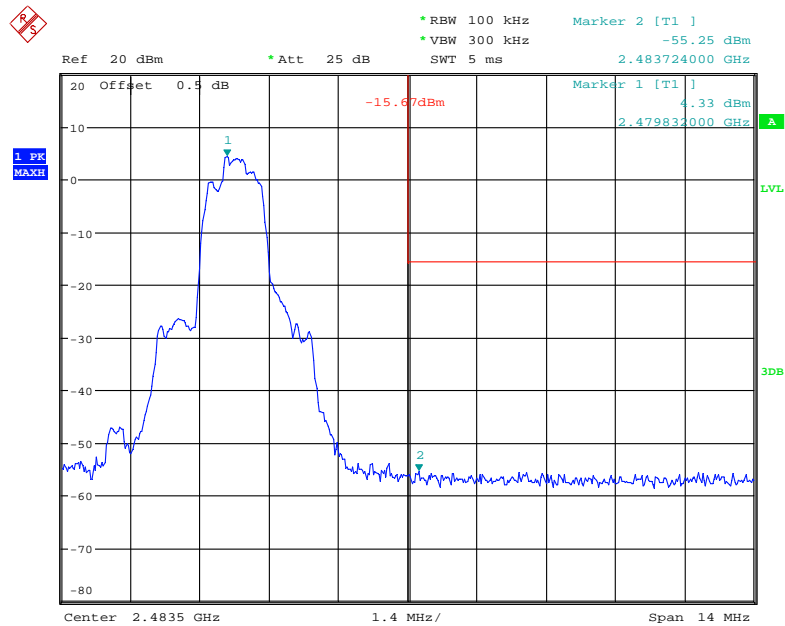

Date: 16.DEC.2018 11:18:35

EDR Mode (π/4-DQPSK):

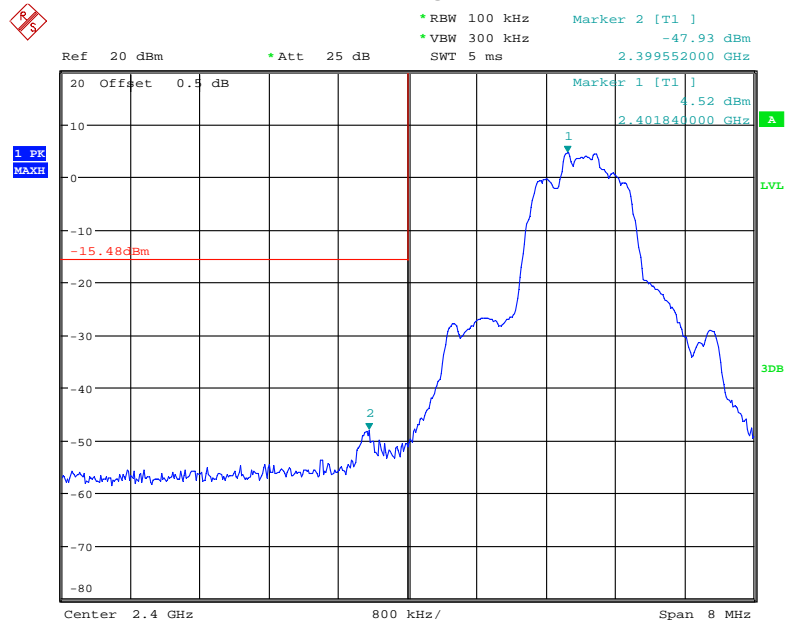## Band Edge, Left Side

Date: 16.DEC.2018 11:23:01

Band Edge, Right Side

Date: 16.DEC.2018 11:20:20

EDR Mode (8-DPSK):

Band Edge, Left Side

Date: 16.DEC.2018 11:24:43

Band Edge, Right Side

Date: 16.DEC.2018 11:27:45

Hopping mode:
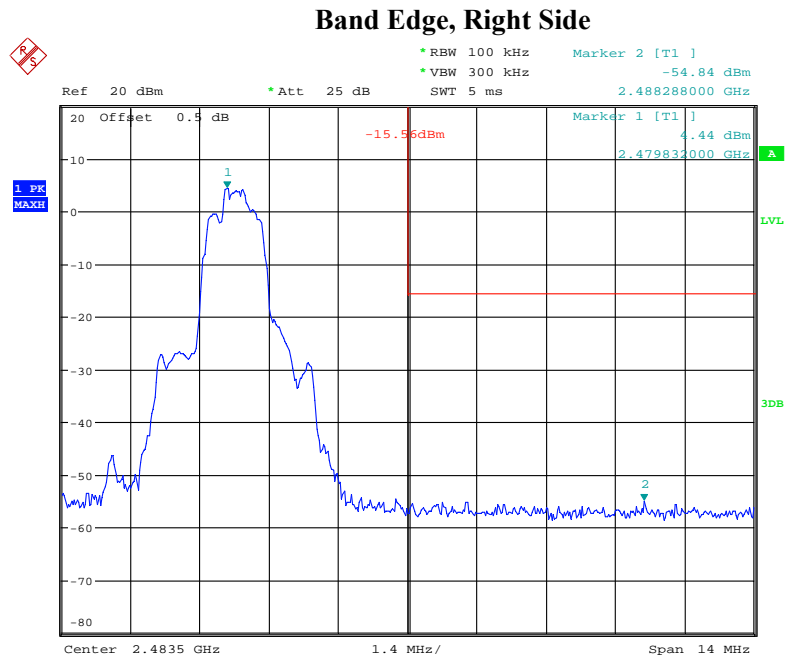*BDR Mode (GFSK):*

Band Edge, Left Side

Date: 16.DEC.2018 13:09:49

Band Edge, Right Side

Date: 16.DEC.2018 13:07:59

EDR Mode (π/4-DQPSK):

Band Edge, Left Side

Date: 16.DEC.2018 13:04:03

Band Edge, Right Side

Date: 16.DEC.2018 13:06:12
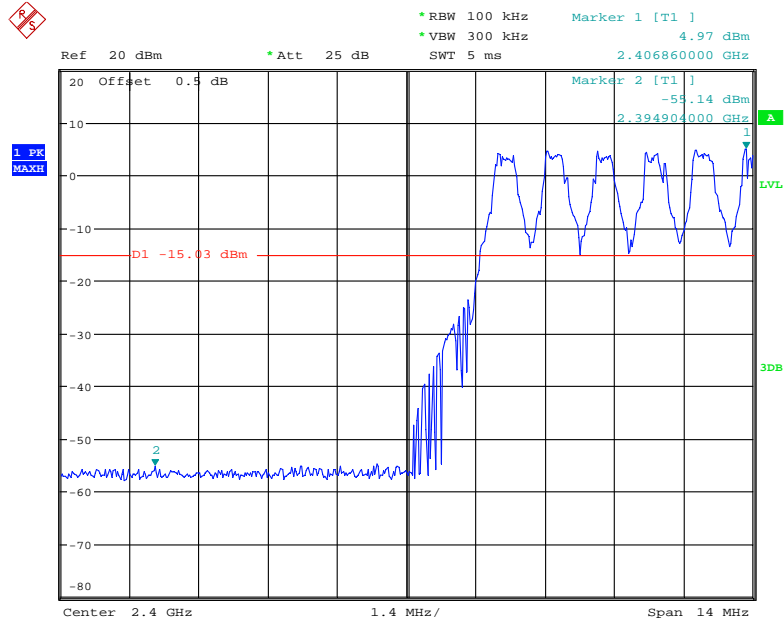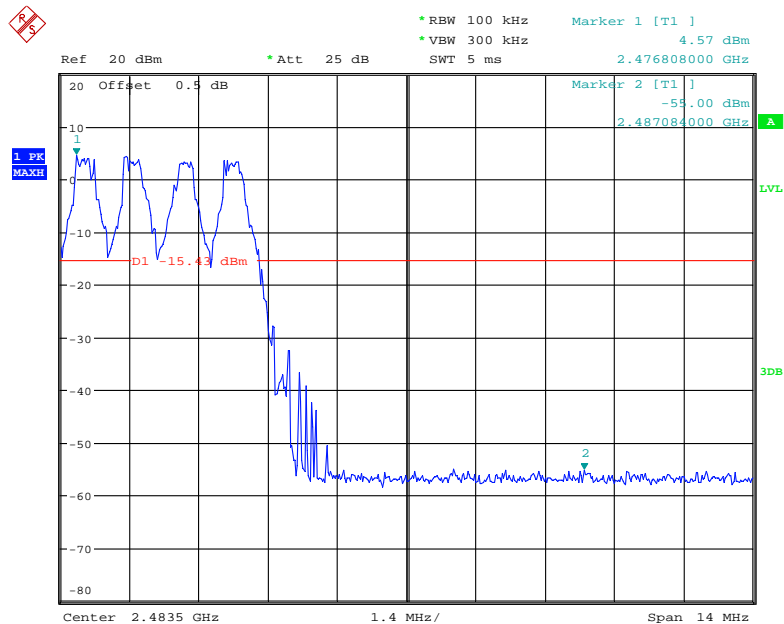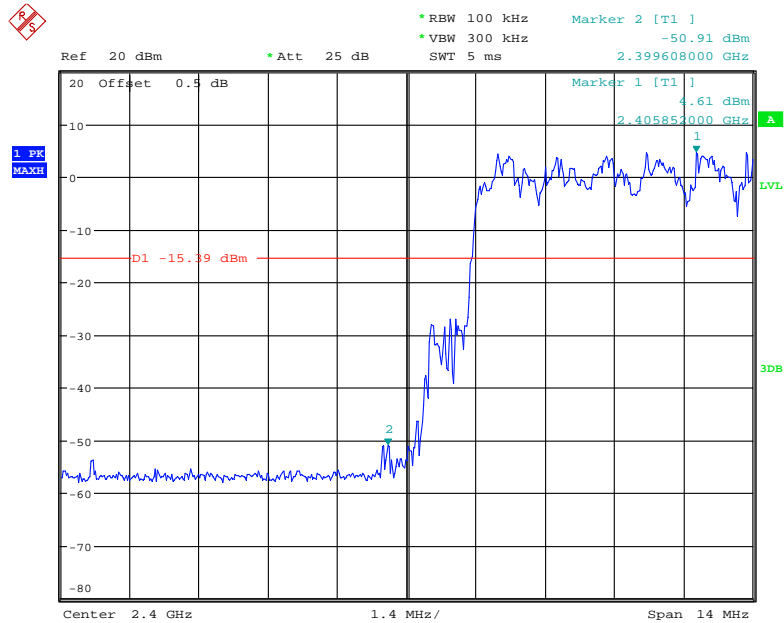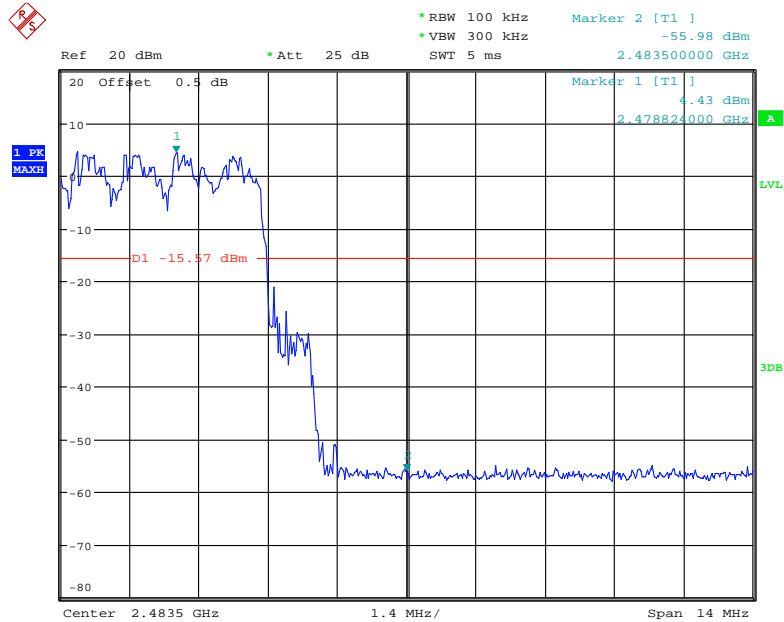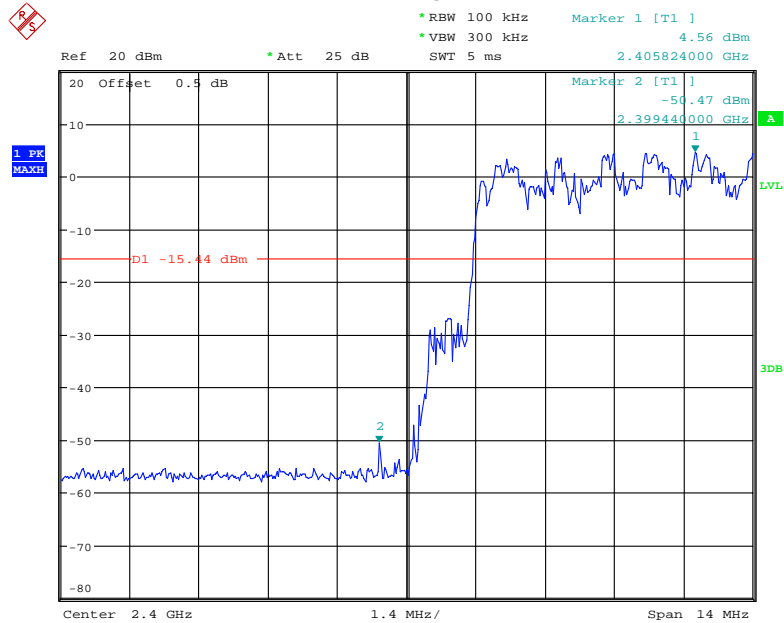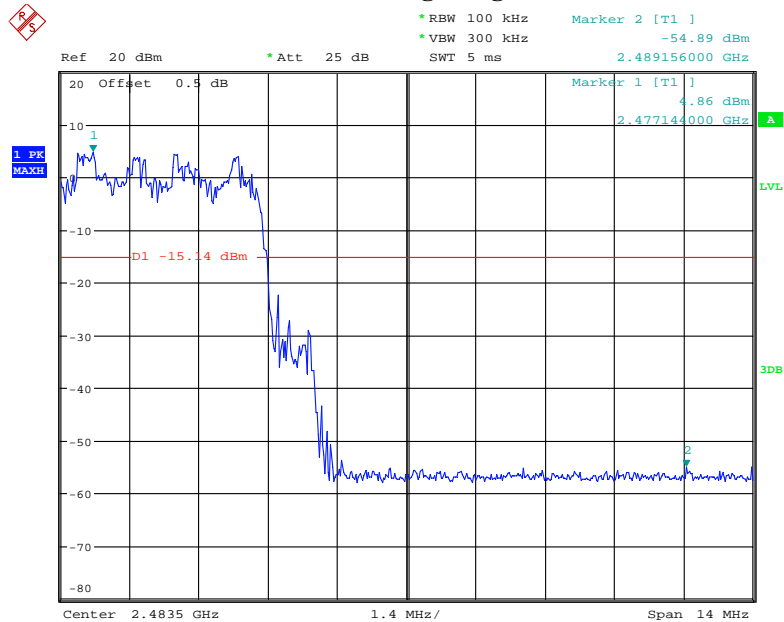
EDR Mode (8-DPSK):

Band Edge, Left Side

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz            4.56 dBm
         Ref  20 dBm        *Att  25 dB    SWT 5 ms     2.405824000 GHz

         20  Offset  0.5 dB                     Marker 2 [T1 ]
                                                       -50.47 dBm
        10                                        2.399440000 GHz    A
1 PK
MAXH     0                                                           LVL

       -10

               D1 -15.44 dBm
       -20
                                                                    3DB
       -30

       -40

       -50            2

       -60

       -70

       -80
         Center  2.4 GHz           1.4 MHz/         Span  14 MHz
```

Date: 16.DEC.2018 13:02:07

Band Edge, Right Side

```
                                    *RBW 100 kHz    Marker 2 [T1 ]
                                    *VBW 300 kHz           -54.89 dBm
         Ref  20 dBm        *Att  25 dB    SWT 5 ms     2.489156000 GHz

         20  Offset  0.5 dB                     Marker 1 [T1 ]
                                                        4.86 dBm
        10   1                                    2.477144000 GHz    A
1 PK
MAXH     0                                                           LVL

       -10
               D1 -15.14 dBm
       -20
                                                                    3DB
       -30

       -40

       -50                                                 2

       -60

       -70

       -80
         Center  2.4835 GHz        1.4 MHz/         Span  14 MHz
```

Date: 16.DEC.2018 13:00:33

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