TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.247

TEST REPORT

For

Xiamen Padmate Technology Co., LTD

RM 201,Huli Park No.37,Industrial Zone,Tong'an District,Xiamen,China

FCC ID:2AJEO-T6

Report Type:	**Product Name:**
Original Report	Bluetooth Earphones

Report Number:	RXM190520052-00B
Report Date:	2019-06-14
Reviewed By:	Jerry Zhang EMC Manager 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:	Bluetooth Earphones
EUT Model:	T6
Operation Frequency:	2402-2480 MHz
Output Power(Conducted):	3.89 dBm
Modulation Type:	GFSK, π/4-DQPSK, 8-DPSK
Rated Input Voltage:	DC 3.6V from battery and DC 5V from base
External Dimension:	72mm(L)*72mm(W)*38.4743mm(H)(base) 37.6601mm(L)*19.4857mm(W)*25.9166 mm(H)(headset)
Serial Number:	190520052
EUT Received Date:	2019.05.22

The Left and right earphone are electrically identical with the same PCB, antenna except the shell, the detailed information please refer to the declaration letter, left earphone was choose for fully testing.

Objective

This report is prepared on behalf of Xiamen Padmate Technology Co., LTD 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)

No related submittal.

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

Software and version Qualcomm BlueTest3.exe

Mode	Packet type	Channel	Frequency (MHz)	Packet length	Power Level
GFSK	DH1	Low	2402	27	251
		Middle	2441	27	251
		High	2480	27	251
	DH3	Low	2402	183	251
		Middle	2441	183	251
		High	2480	183	251
	DH5	Low	2402	339	251
		Middle	2441	339	251
		High	2480	339	251
π/4 DQPSK	2DH1	Low	2402	54	252
		Middle	2441	54	252
		High	2480	54	252
	2DH3	Low	2402	367	252
		Middle	2441	367	252
		High	2480	367	252
	2DH5	Low	2402	679	252
		Middle	2441	679	252
		High	2480	679	252
8DPSK	3DH1	Low	2402	83	252
		Middle	2441	83	252
		High	2480	83	252
	3DH3	Low	2402	552	252
		Middle	2441	552	252
		High	2480	552	252
	3DH5	Low	2402	1021	252
		Middle	2441	1021	252
		High	2480	1021	252

Equipment Modifications

No modification was made to the EUT.

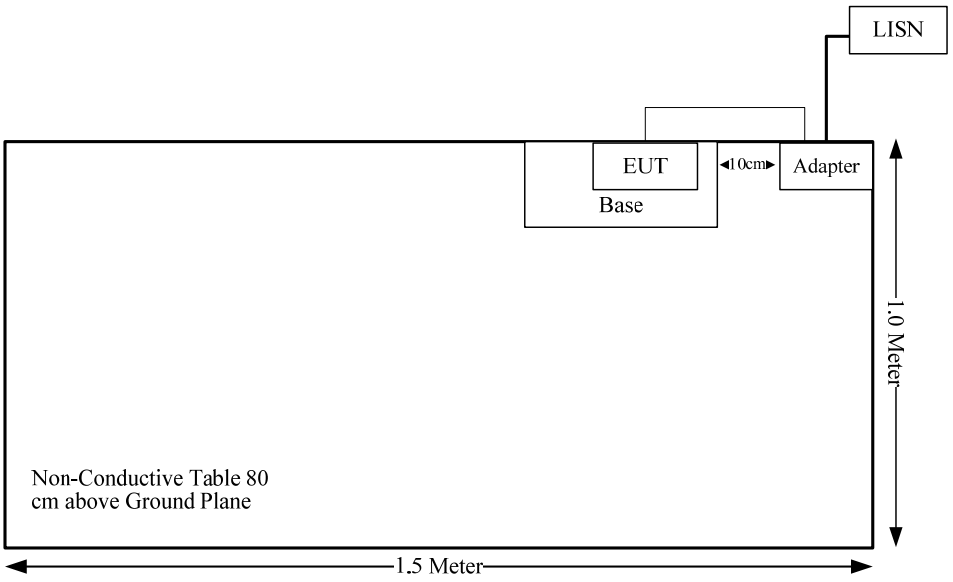
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
LEADER ELECTRONICS INC.	adapter	MU24-B480050-C5	N/A

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	yes	No	1.02	adapter	base

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

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

Applicable Standard

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

According to KDB447498 D01 General RF Exposure Guidance v06:

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

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

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

Measurement Result

The max conducted power including tune-up tolerance is 4.0 dBm (2.52 mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
=2.52/5*(√2.480) = 0.8< 3.0

So the stand-alone SAR evaluation is not necessary.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

Antenna Connector Construction

The EUT has one internal antenna arrangement for BT, and the antenna gain is -7.42 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

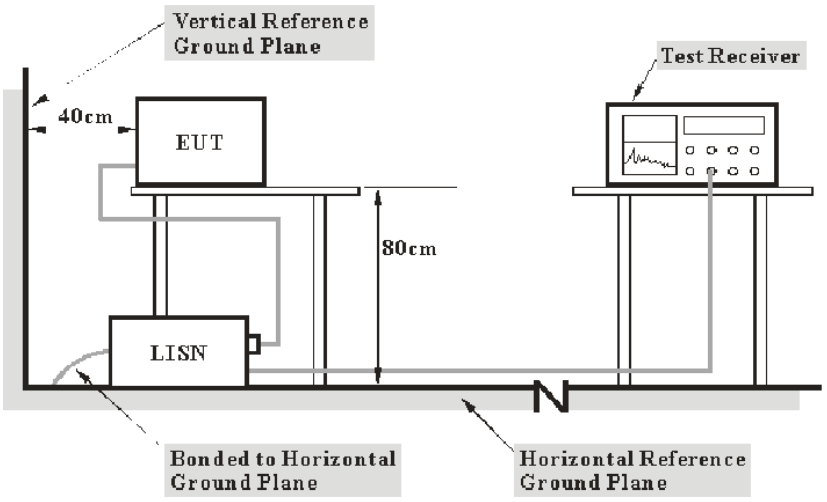
Result: Compliance.

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 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

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:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-05-09	2020-05-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	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

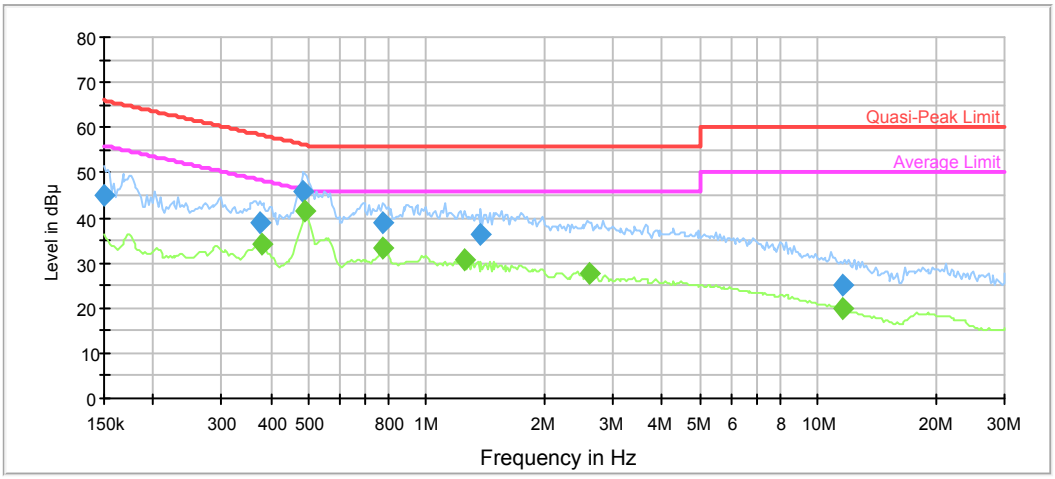
Environmental Conditions

Temperature:	28 °C
Relative Humidity:	57 %
ATM Pressure:	100.3 kPa

The testing was performed by Lily Xie on 2019-05-30

Test Mode: *Charging*

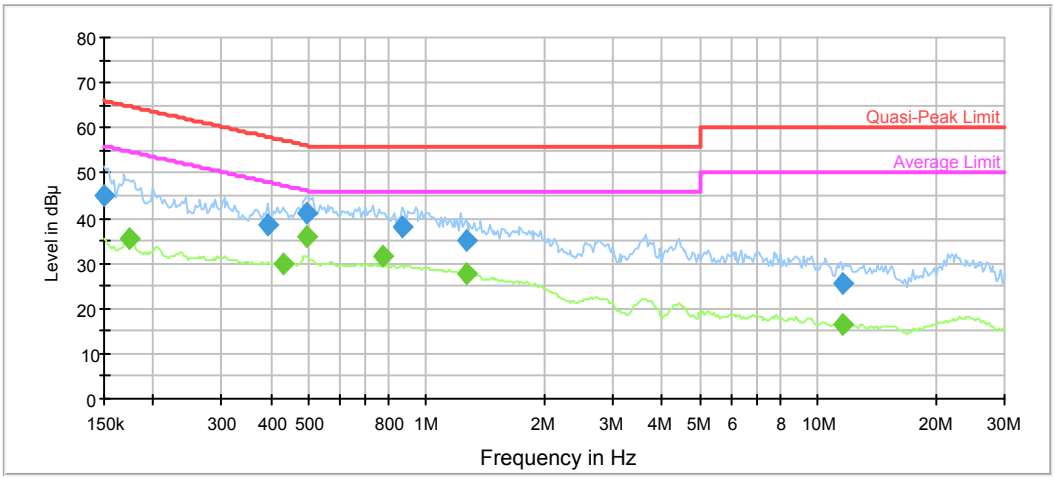
AC120V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.1	9.000	L1	11.2	20.9	66.0
0.374678	38.9	9.000	L1	10.0	19.5	58.4
0.485304	45.7	9.000	L1	9.9	10.5	56.2
0.774673	38.8	9.000	L1	9.8	17.2	56.0
1.379615	36.4	9.000	L1	9.8	19.6	56.0
11.601974	25.1	9.000	L1	9.8	34.9	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.378425	34.3	9.000	L1	10.0	14.0	48.3
0.490157	41.6	9.000	L1	9.9	4.6	46.2
0.774673	33.4	9.000	L1	9.8	12.6	46.0
1.248947	30.6	9.000	L1	9.8	15.4	46.0
2.608110	27.8	9.000	L1	9.8	18.2	46.0
11.601974	19.7	9.000	L1	9.8	30.3	50.0

AC120V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.1	9.000	N	11.2	20.9	66.0
0.393790	38.3	9.000	N	10.0	19.7	58.0
0.495058	41.1	9.000	N	9.9	12.0	56.1
0.864278	37.9	9.000	N	9.8	18.1	56.0
1.261437	35.2	9.000	N	9.8	22.8	56.0
11.601974	25.6	9.000	N	9.8	34.4	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174145	35.3	9.000	N	10.8	19.5	54.8
0.430682	29.8	9.000	N	9.9	17.4	47.2
0.495058	35.9	9.000	N	9.9	10.2	46.1
0.774673	31.6	9.000	N	9.8	14.4	46.0
1.261437	27.7	9.000	N	9.8	18.3	46.0
11.601974	16.3	9.000	N	9.8	33.7	50.0

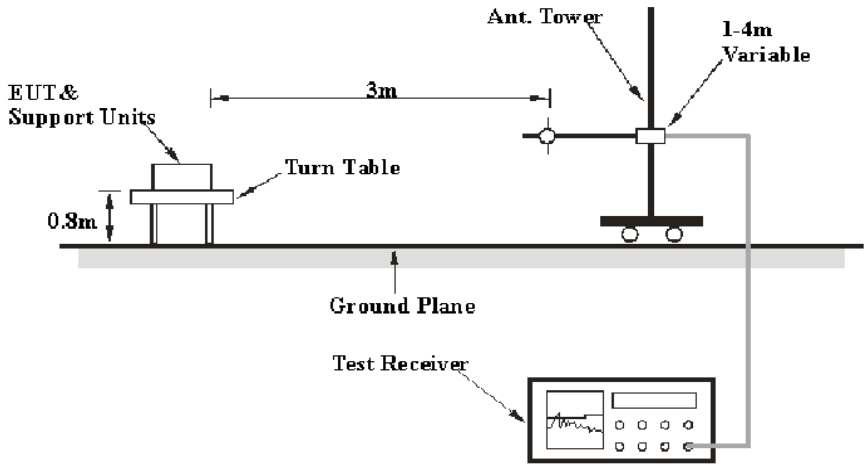
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

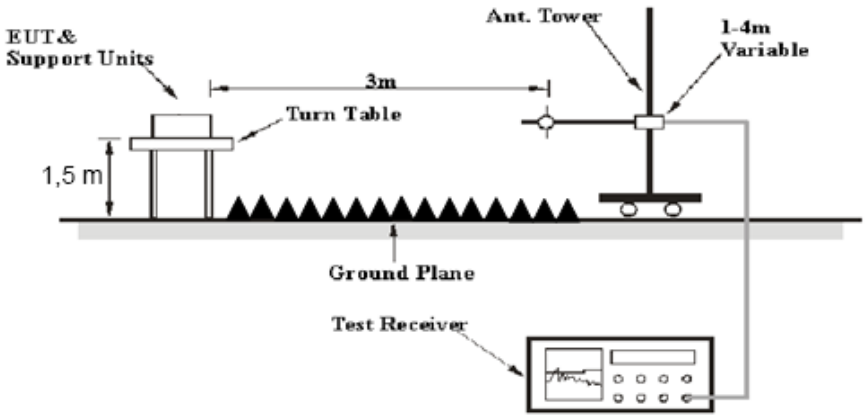
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, 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	ESR3	102453	2018-06-26	2019-06-26
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
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:	27.5~28.8°C
Relative Humidity:	52~64 %
ATM Pressure:	100.3~100.7kPa

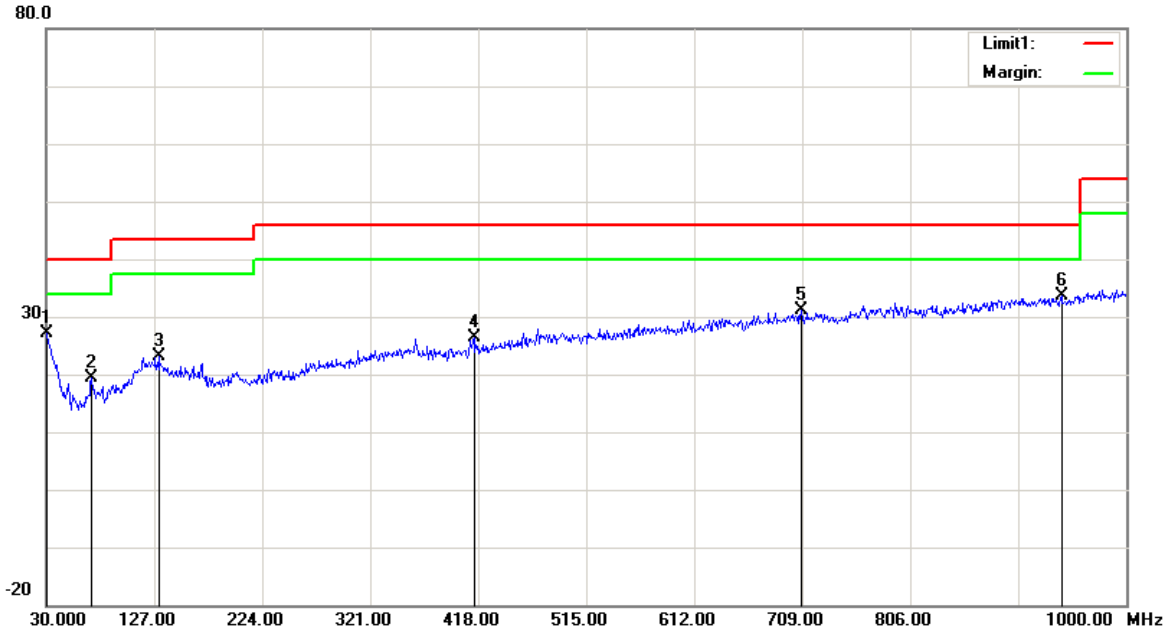
** The testing was performed by Tyler Pan&Neil Liao on 2019-06-02 and 2019-06-04*

Pre-scan left earphone and right earphone, left earphone was the worst case.

Test Mode: Transmitting

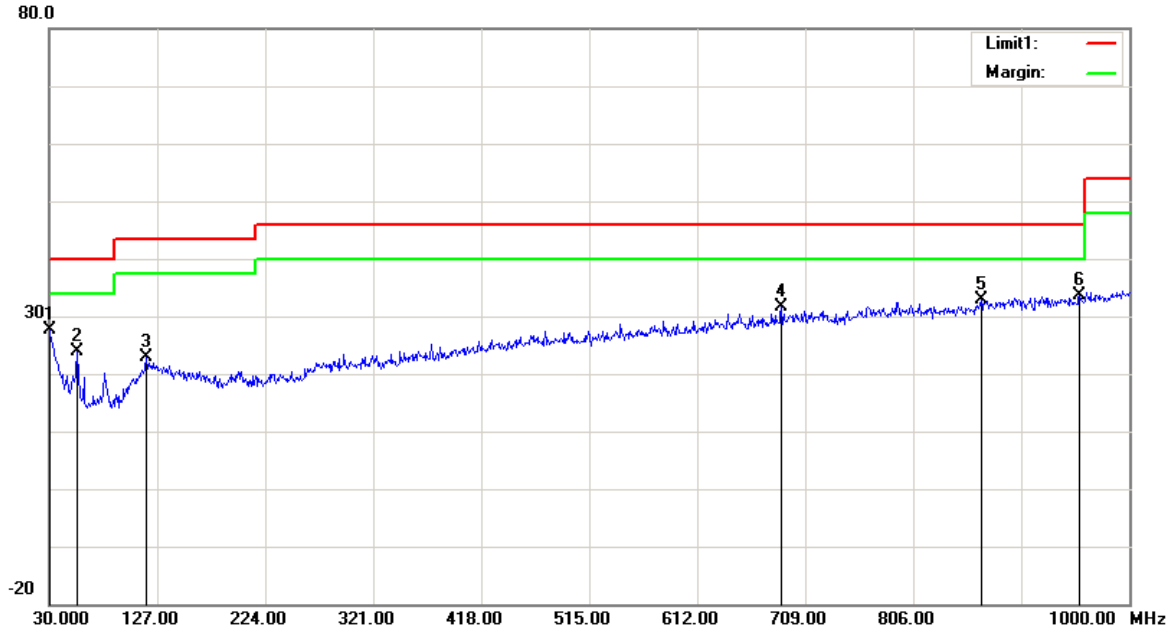
1) 30MHz-1GHz (8-DPSK middle channel was the worst)

Horizontal:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	25.29	peak	1.72	27.01	40.00	12.99
70.7400	30.42	peak	-11.12	19.30	40.00	20.70
130.8800	28.07	peak	-4.85	23.22	43.50	20.28
414.1200	28.21	peak	-1.75	26.46	46.00	19.54
708.0300	27.98	peak	3.15	31.13	46.00	14.87
941.8000	36.98	peak	-3.41	33.57	46.00	12.43

Vertical:



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	25.83	peak	1.72	27.55	40.00	12.45
55.2200	36.00	peak	-12.10	23.90	40.00	16.10
117.3000	27.75	peak	-4.95	22.80	43.50	20.70
687.6600	28.82	peak	2.69	31.51	46.00	14.49
867.1100	31.38	peak	1.57	32.95	46.00	13.05
955.3800	36.89	peak	-3.29	33.60	46.00	12.40

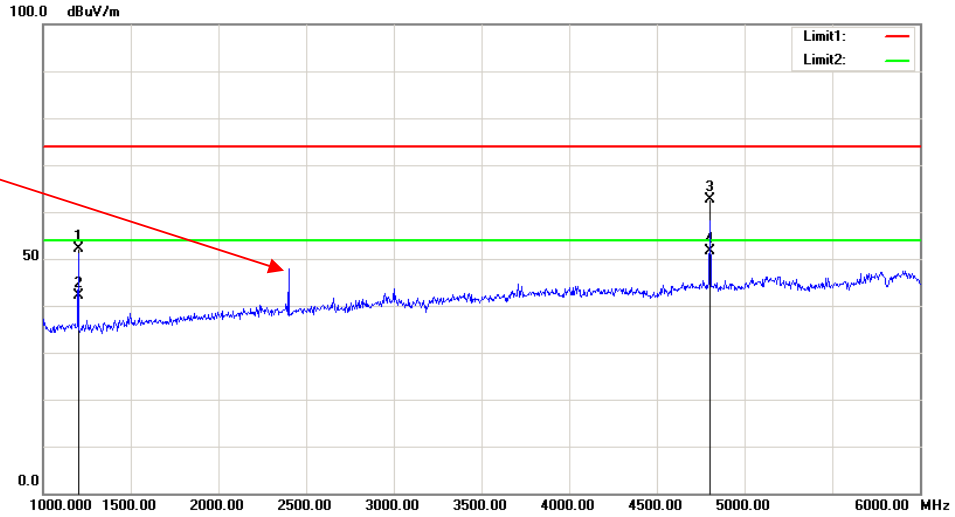
2) 1GHz-25GHz:

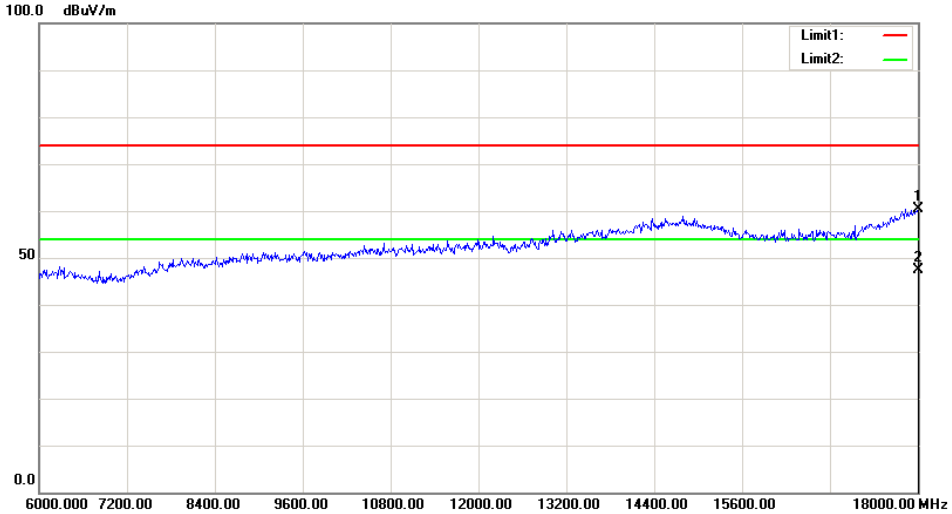
BDR Mode-worst case:

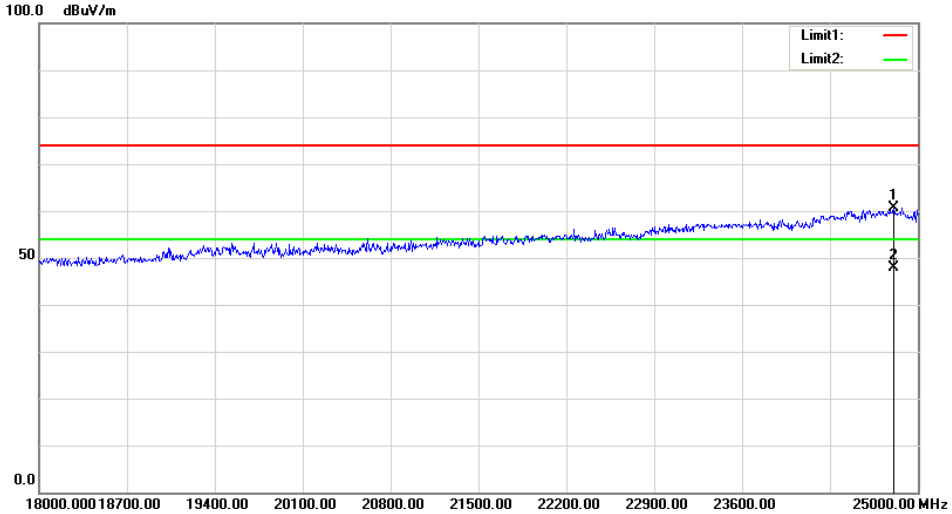
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2402 MHz									
2402.00	57.10	PK	H	28.10	1.80	0.00	87.00	N/A	N/A
2402.00	47.12	AV	H	28.10	1.80	0.00	77.02	N/A	N/A
2402.00	62.76	PK	V	28.10	1.80	0.00	92.66	N/A	N/A
2402.00	52.79	AV	V	28.10	1.80	0.00	82.69	N/A	N/A
2390.00	25.76	PK	V	28.08	1.80	0.00	55.64	74.00	18.36
2390.00	14.57	AV	V	28.08	1.80	0.00	44.45	54.00	9.55
4804.00	64.36	PK	V	32.91	3.17	37.20	63.24	74.00	10.76
4804.00	53.39	AV	V	32.91	3.17	37.20	52.27	54.00	1.73
7206.00	52.24	PK	V	35.74	4.82	37.23	55.57	74.00	18.43
7206.00	40.16	AV	V	35.74	4.82	37.23	43.49	54.00	10.51
1200.00	63.23	PK	V	24.18	1.47	35.61	53.27	74.00	20.73
1200.00	52.42	AV	V	24.18	1.47	35.61	42.46	54.00	11.54
Middle Channel: 2441 MHz									
2441.00	53.97	PK	H	28.18	1.82	0.00	83.97	N/A	N/A
2441.00	43.99	AV	H	28.18	1.82	0.00	73.99	N/A	N/A
2441.00	59.38	PK	V	28.18	1.82	0.00	89.38	N/A	N/A
2441.00	49.45	AV	V	28.18	1.82	0.00	79.45	N/A	N/A
4882.00	62.68	PK	V	33.06	3.27	37.21	61.80	74.00	12.20
4882.00	52.71	AV	V	33.06	3.27	37.21	51.83	54.00	2.17
7323.00	51.81	PK	V	36.04	4.62	37.38	55.09	74.00	18.91
7323.00	40.02	AV	V	36.04	4.62	37.38	43.30	54.00	10.70
1220.00	66.41	PK	V	24.25	1.49	35.68	56.47	74.00	17.53
1220.00	55.74	AV	V	24.25	1.49	35.68	45.80	54.00	8.20
High Channel: 2480 MHz									
2480.00	50.95	PK	H	28.26	1.84	0.00	81.05	N/A	N/A
2480.00	40.98	AV	H	28.26	1.84	0.00	71.08	N/A	N/A
2480.00	56.37	PK	V	28.26	1.84	0.00	86.47	N/A	N/A
2480.00	46.45	AV	V	28.26	1.84	0.00	76.55	N/A	N/A
2483.50	26.40	PK	V	28.27	1.84	0.00	56.51	74.00	17.49
2483.50	14.32	AV	V	28.27	1.84	0.00	44.43	54.00	9.57
4960.00	59.73	PK	V	33.22	3.23	37.25	58.93	74.00	15.07
4960.00	49.85	AV	V	33.22	3.23	37.25	49.05	54.00	4.95
7440.00	50.63	PK	V	36.34	4.41	37.52	53.86	74.00	20.14
7440.00	40.71	AV	V	36.34	4.41	37.52	43.94	54.00	10.06
1240.00	66.24	PK	V	24.32	1.51	35.75	56.32	74.00	17.68
1240.00	56.33	AV	V	24.32	1.51	35.75	46.41	54.00	7.59

Worst plots (*GFSK low* channel)
Horizontal

Fundamental Test with Band Rejection Filter

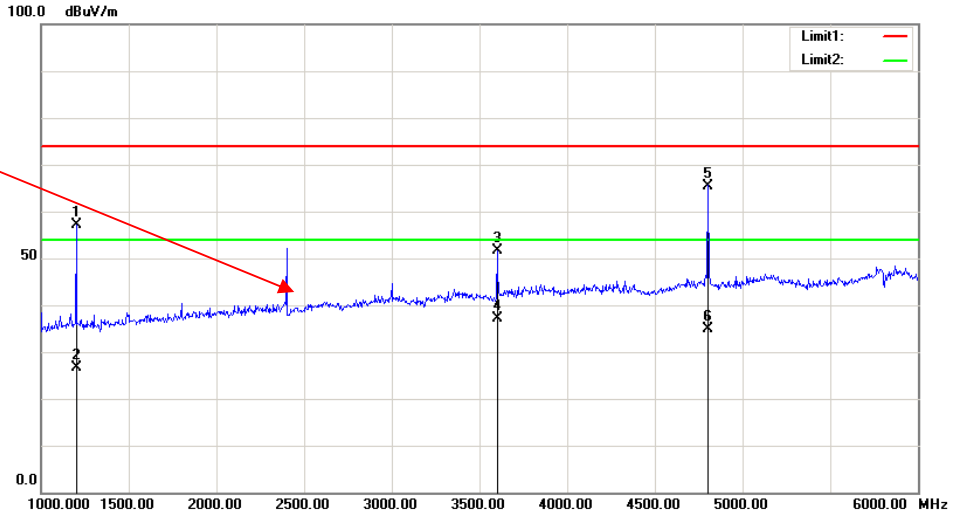


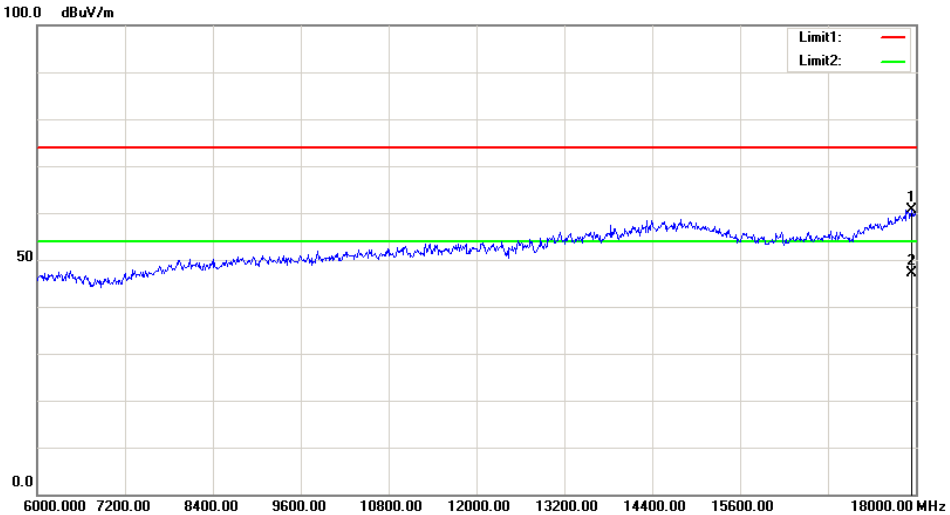


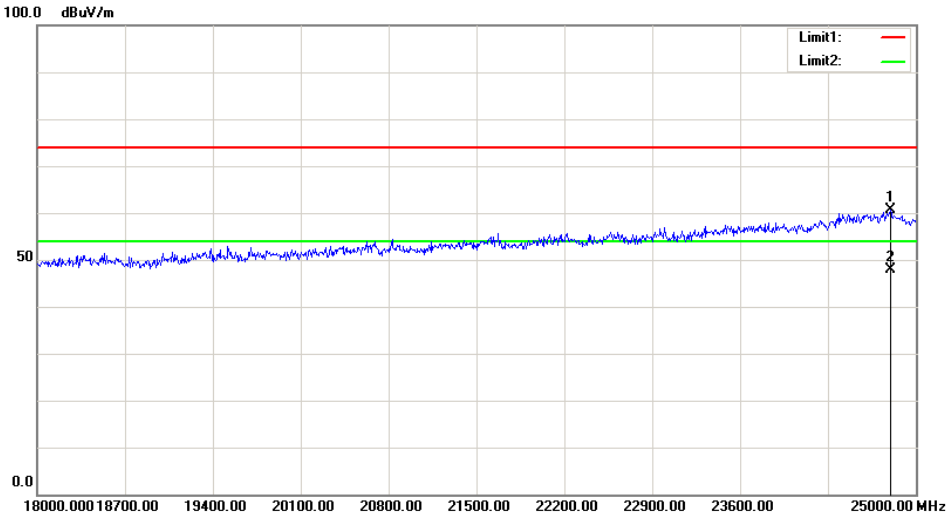


Vertical

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	2019-05-09	2020-05-09
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	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:	27.8 °C
Relative Humidity:	55 %
ATM Pressure:	100.3 kPa

** The testing was performed by Elena Lei on 2019-05-25.*

Test Result: Compliance.

Please refer to following tables and plots

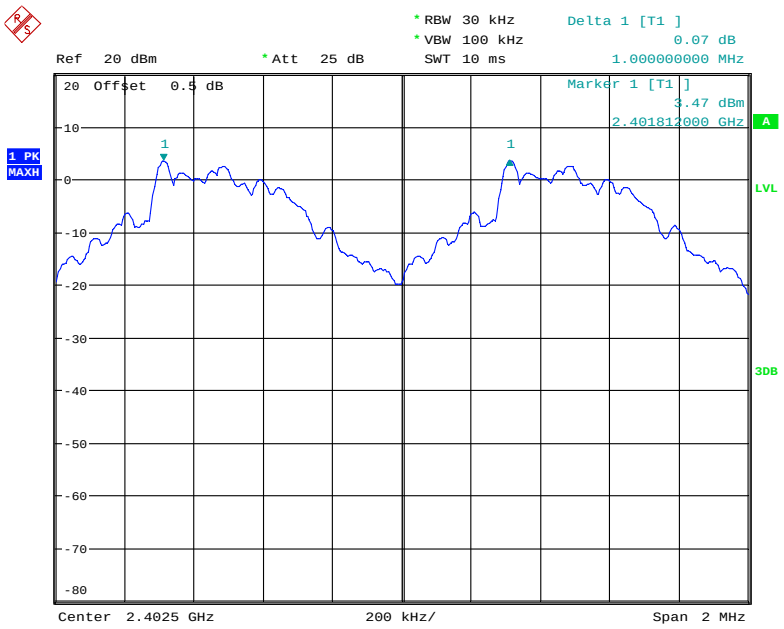
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
BDR (GFSK)	Low	2402-2403	1.000	0.61
	Middle	2441-2442	1.000	0.61
	High	2480-2479	1.004	0.62
EDR (π/4-DQPSK)	Low	2402-2403	1.004	0.88
	Middle	2441-2442	1.004	0.88
	High	2480-2479	1.004	0.88
EDR (8-DPSK)	Low	2402-2403	1.004	0.85
	Middle	2441-2442	1.004	0.85
	High	2480-2479	1.004	0.85

Note: Limit= (2/3) × 20dB bandwidth

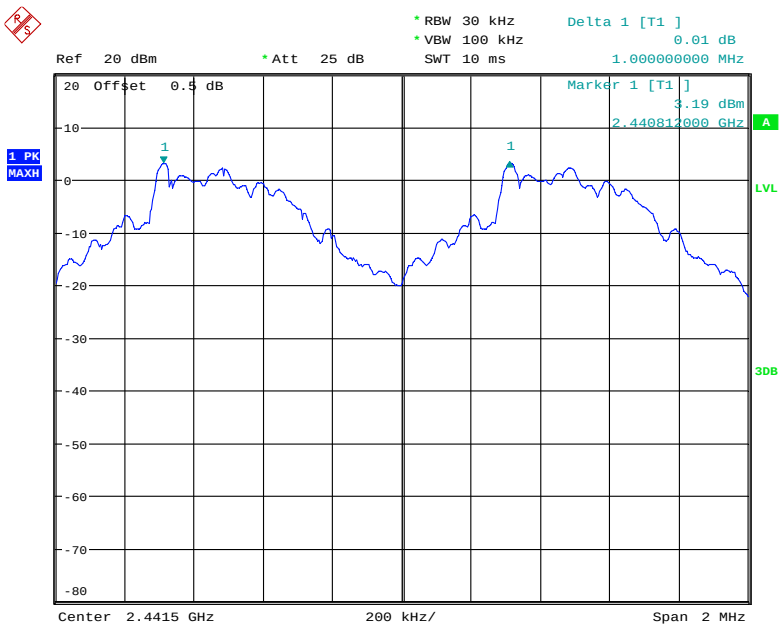
Please refer to following plots:

GFSK_Low



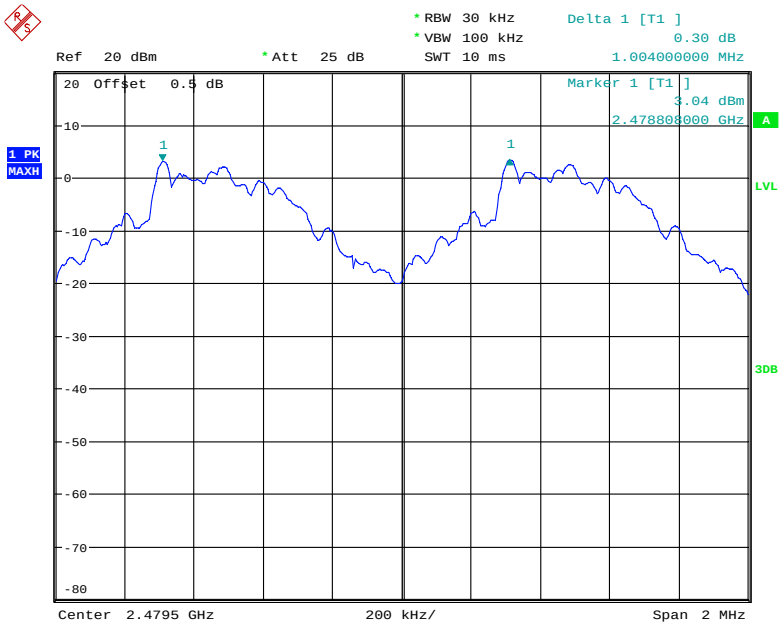
Date: 25.MAY.2019 16:48:07

GFSK_Middle



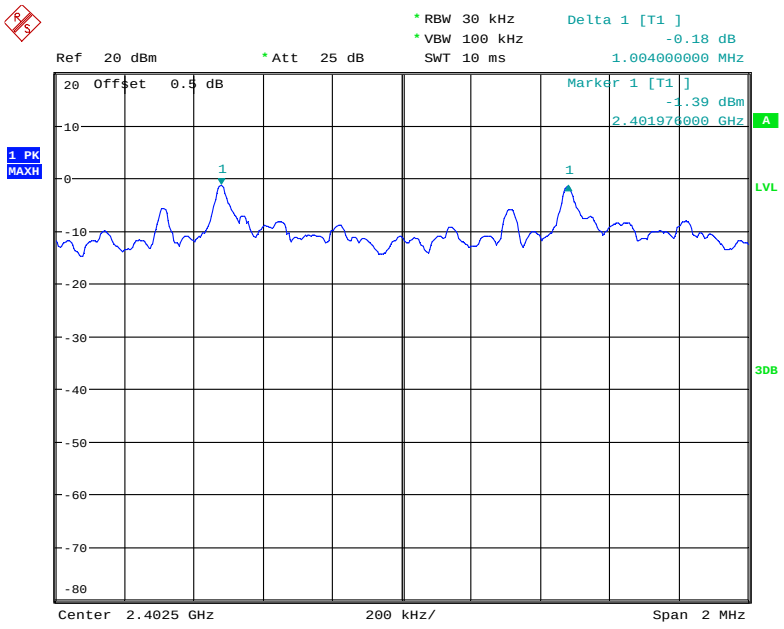
Date: 25.MAY.2019 16:48:36

GFSK_High



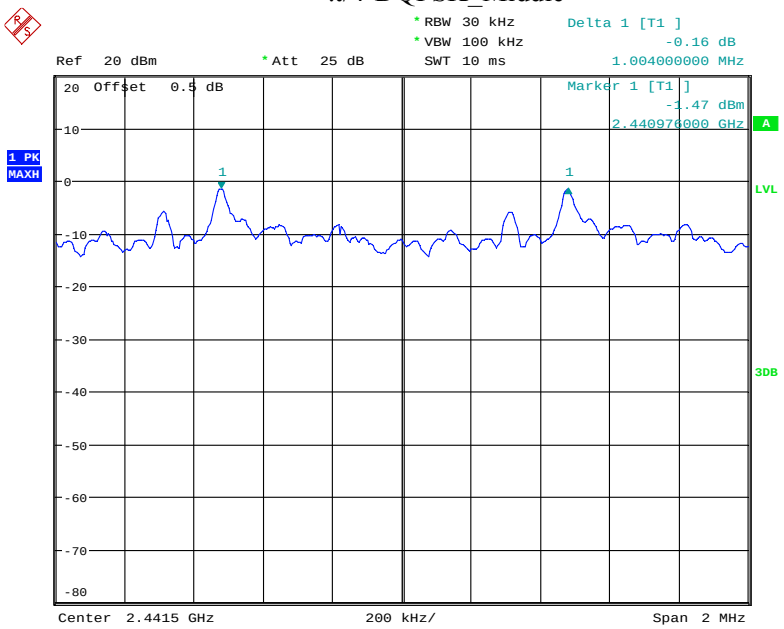
Date: 25.MAY.2019 16:49:14

π/4-DQPSK_Low



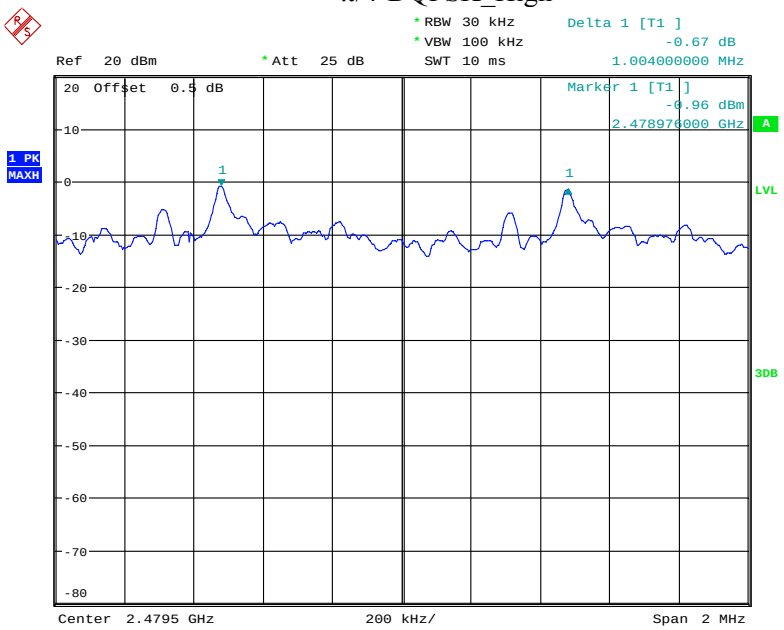
Date: 25.MAY.2019 16:50:28

π/4-DQPSK_Middle



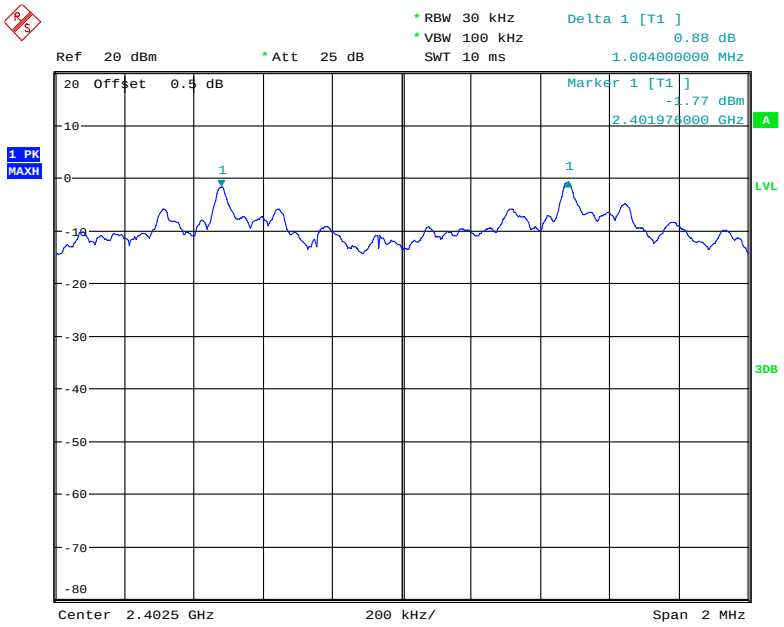
Date: 25.MAY.2019 16:51:11

π/4-DQPSK_High



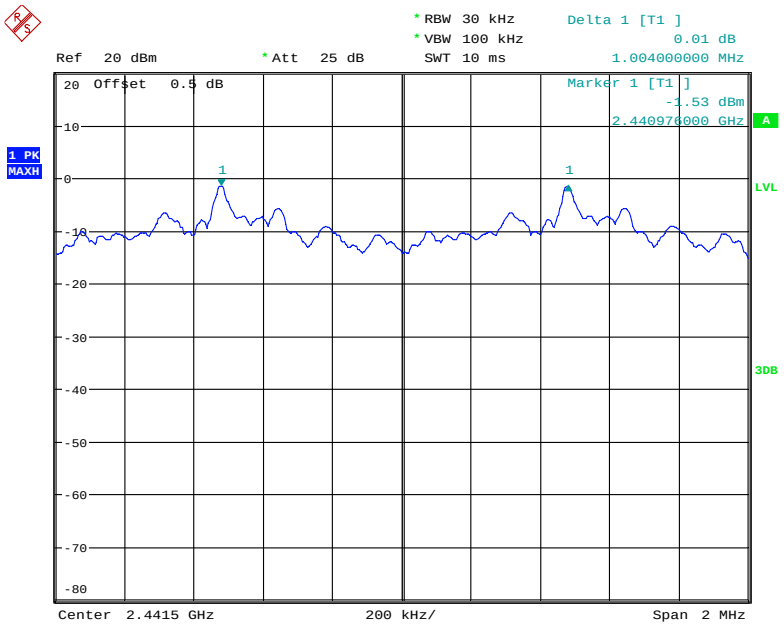
Date: 25.MAY.2019 16:51:48

8-DPSK_Low



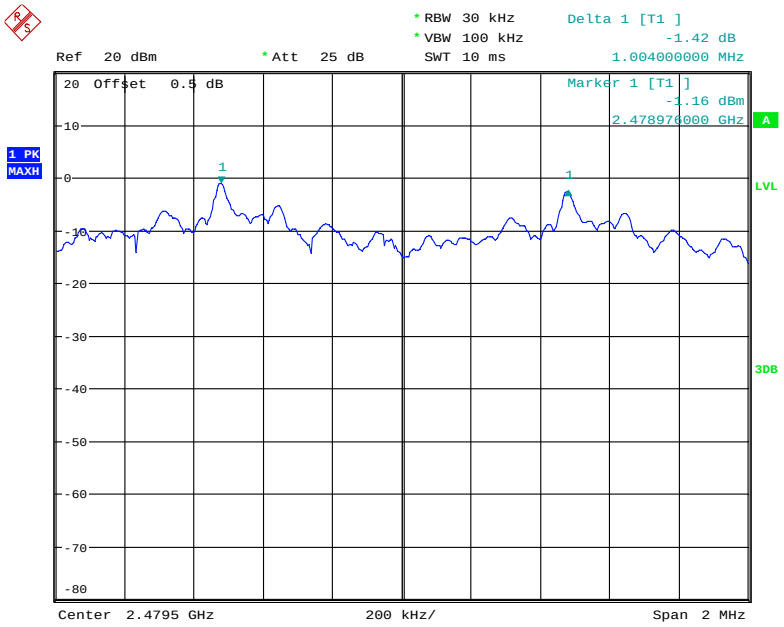
Date: 25.MAY.2019 16:52:37

8-DPSK_Middle



Date: 25.MAY.2019 16:53:15

8-DPSK_High


RBW 30 kHz
VBW 100 kHz
SWT 10 ms
Delta 1 [T1]
-1.42 dB
1.004000000 MHz
Ref 20 dBm
Att 25 dB
20 Offset 0.5 dB
Marker 1 [T1]
-1.16 dBm
2.478976000 GHz
1 PK
MAXH
A
LVL
3DB
Center 2.4795 GHz
200 kHz/
Span 2 MHz
Date: 25.MAY.2019 16:53:55

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	2019-05-09	2020-05-09
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:	25.8 °C
Relative Humidity:	65 %
ATM Pressure:	100.5 kPa

** The testing was performed by Elena Lei on 2019-05-25.*

Test Result: Compliance.

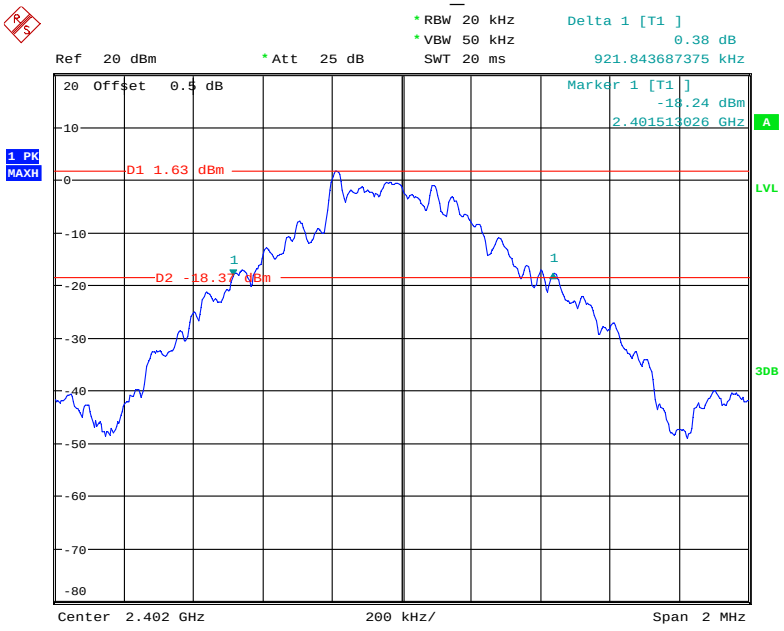
Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	0.922
	Middle	2441	0.922
	High	2480	0.926
EDR Mode (π/4-DQPSK)	Low	2402	1.323
	Middle	2441	1.323
	High	2480	1.323
EDR Mode (8-DPSK)	Low	2402	1.275
	Middle	2441	1.275
	High	2480	1.275

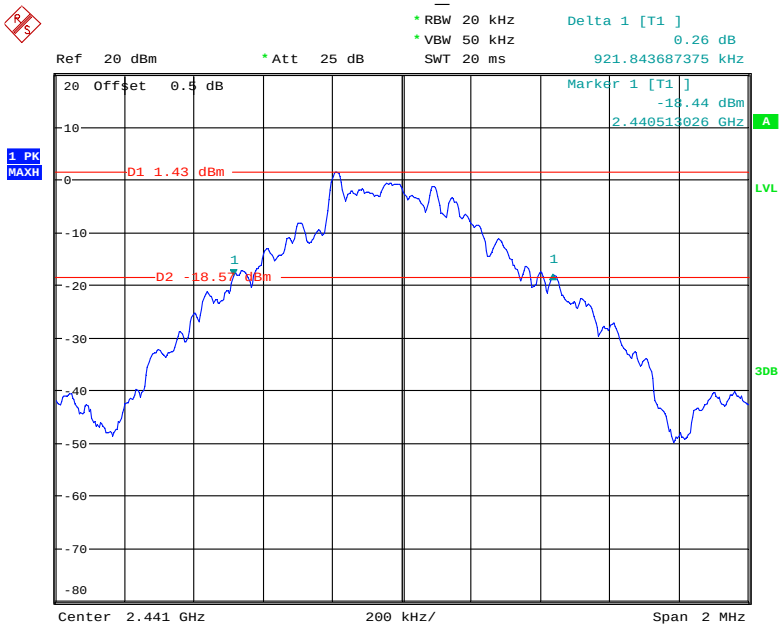
Please refer to following plots:

GFSK_Low



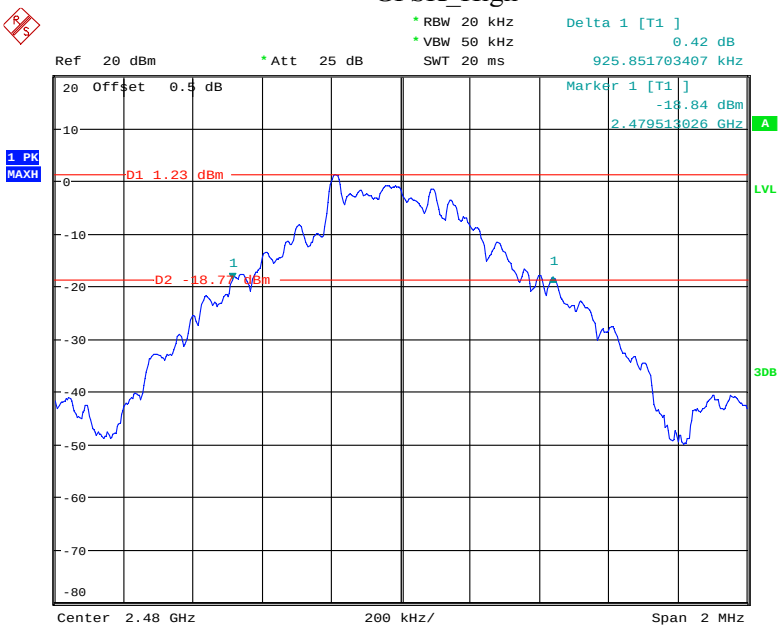
Date: 25.MAY.2019 13:50:19

GFSK_Middle



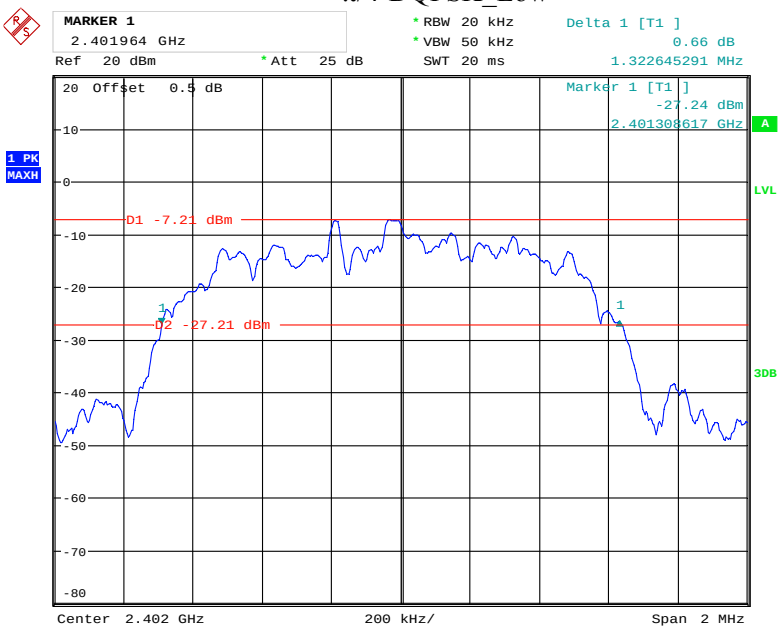
Date: 25.MAY.2019 13:52:06

GFSK_High



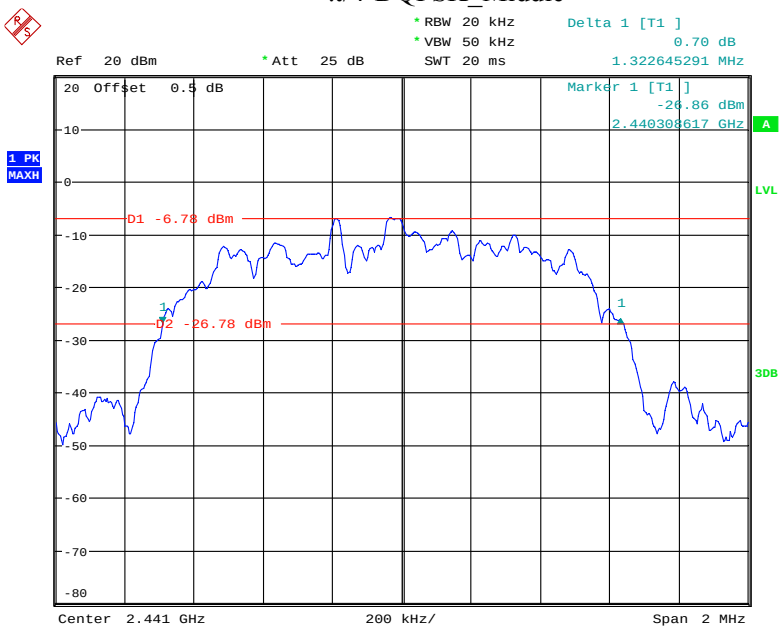
Date: 25.MAY.2019 13:53:16

π/4-DQPSK_Low



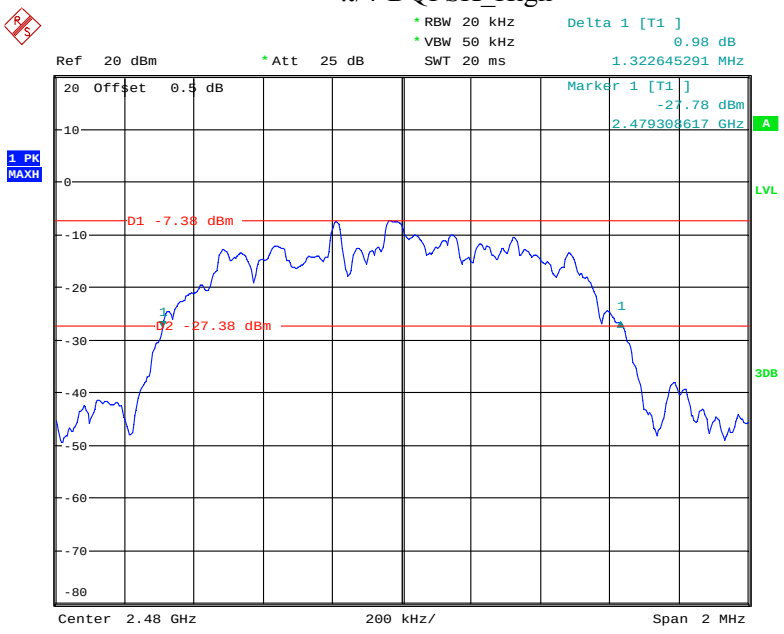
Date: 25.MAY.2019 14:13:29

π/4-DQPSK_Middle



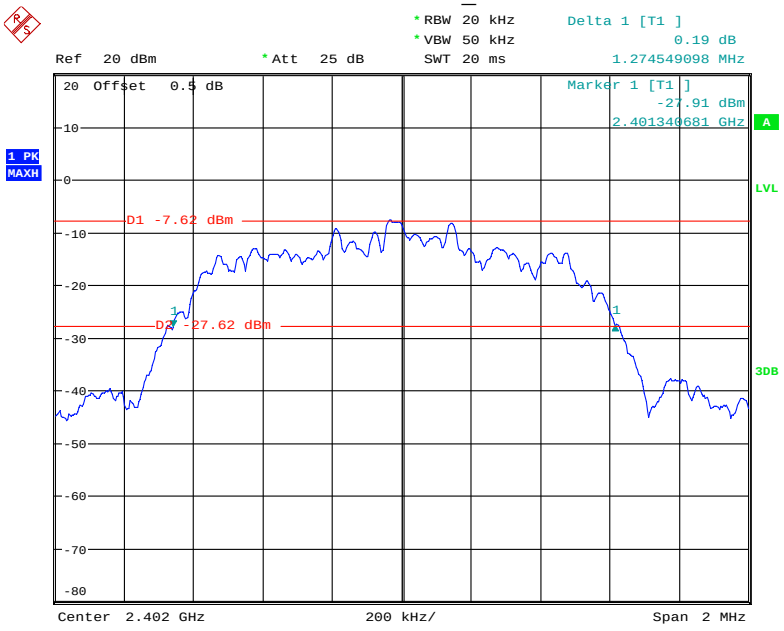
Date: 25.MAY.2019 14:15:06

π/4-DQPSK_High



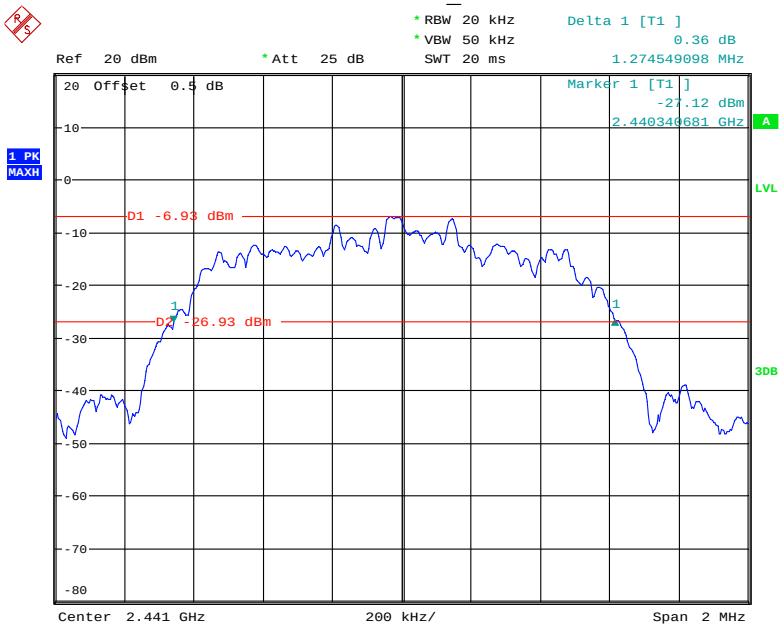
Date: 25.MAY.2019 14:18:06

8-DPSK_Low



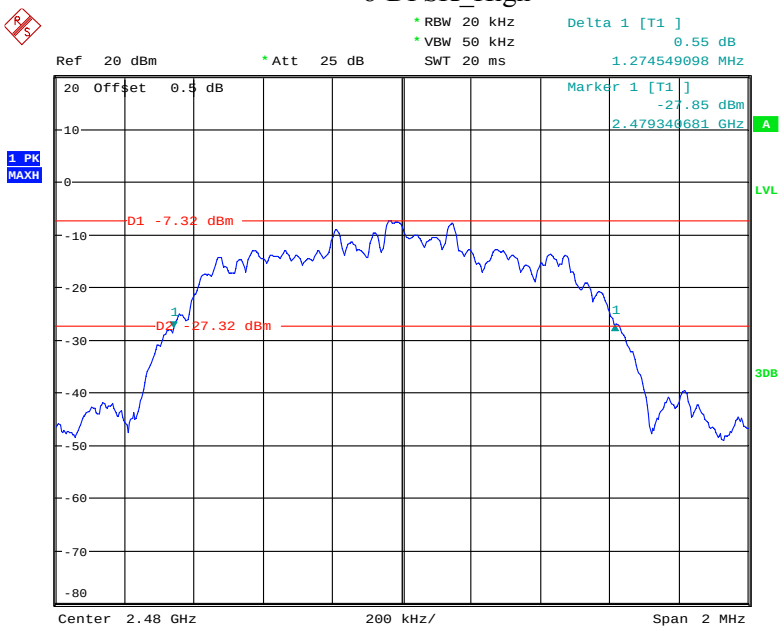
Date: 25.MAY.2019 14:11:24

8-DPSK_Middle



Date: 25.MAY.2019 14:09:56

8-DPSK_High



Date: 25.MAY.2019 14:08:11

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	2019-05-09	2020-05-09
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:	25.8 °C
Relative Humidity:	65 %
ATM Pressure:	100.5 kPa

** The testing was performed by Elena Lei on 2019-05-25.*

Test Result: Compliance.

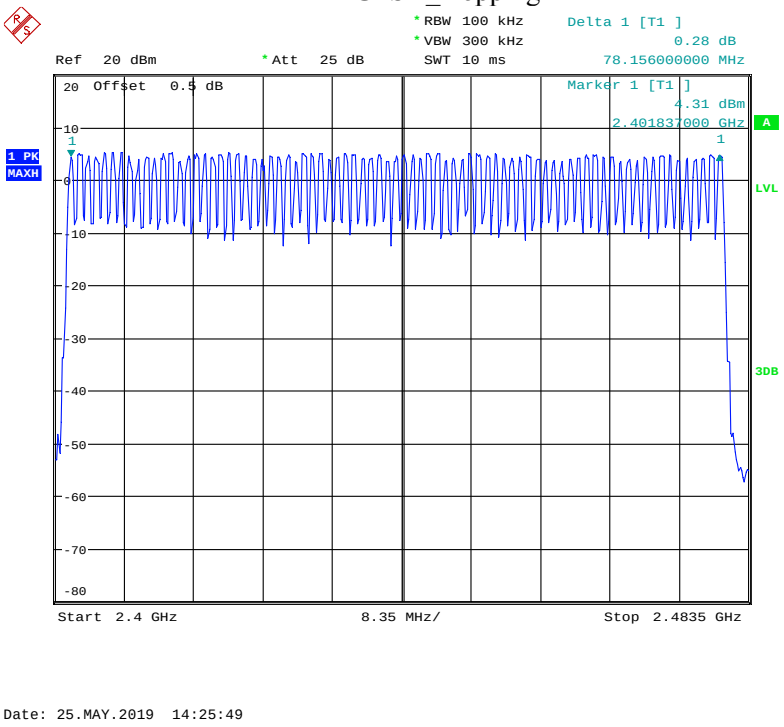
Please refer to following tables and plots

Test Mode: Transmitting

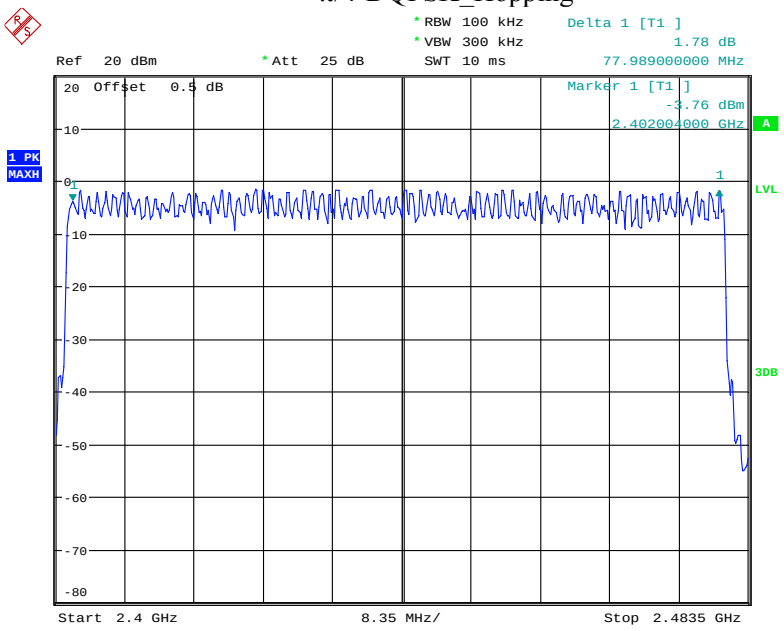
Mode	Frequency range (MHz)	Number of Hopping Channel	Limit
GFSK	2400-2483.5	79	≥15
π/4-DQPSK	2400-2483.5	79	
8-DPSK	2400-2483.5	79	

Please refer to following plots:

GFSK_Hopping

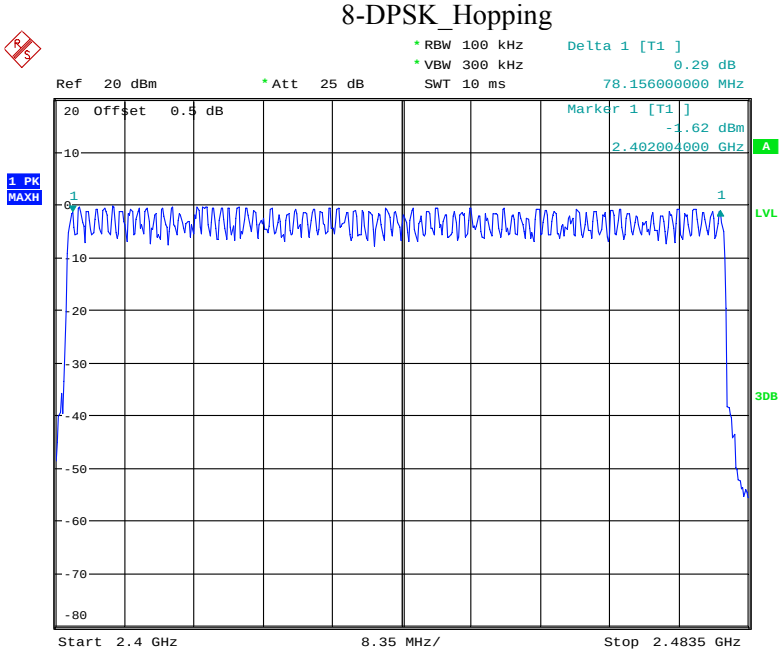


π/4-DQPSK_Hopping



Date: 25.MAY.2019 14:21:31

8-DPSK_Hopping



Date: 25.MAY.2019 14:24:05

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	2019-05-09	2020-05-09
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:	25.8 °C
Relative Humidity:	65 %
ATM Pressure:	100.5 kPa

** The testing was performed by Elena Lei on 2019-05-25.*

Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

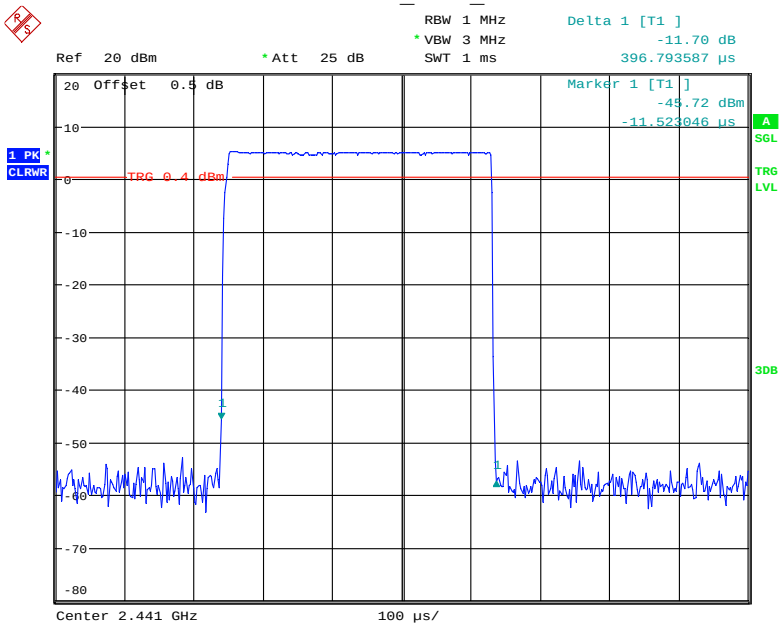
Mode	Packet type	Channel	Frequency (MHz)	Pulse width (ms)	Result (s)	Limit (s)
GFSK	DH1	Middle	2441	0.397	0.127	≤0.4
	DH3	Middle	2441	1.671	0.267	
	DH5	Middle	2441	2.926	0.312	
π/4-DQPSK	2DH1	Middle	2441	0.407	0.130	
	2DH3	Middle	2441	1.677	0.268	
	2DH5	Middle	2441	2.936	0.313	
8-DPSK	3DH1	Middle	2441	0.407	0.130	
	3DH3	Middle	2441	1.671	0.267	
	3DH5	Middle	2441	2.936	0.313	

Note:

DH1/2DH1/3DH1: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s
DH3/2DH3/3DH3: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s
DH5/2DH5/3DH5: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s

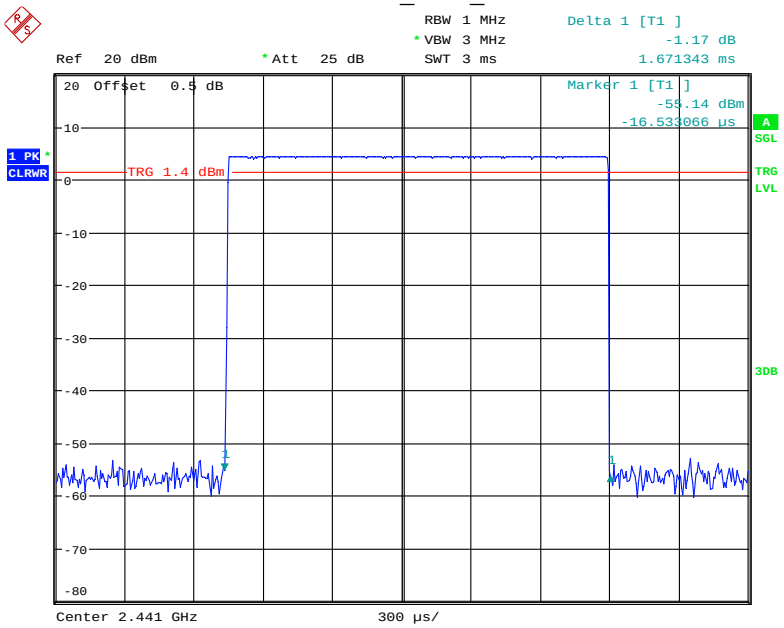
Please refer to following plots:

GFSK_DH1_Middle



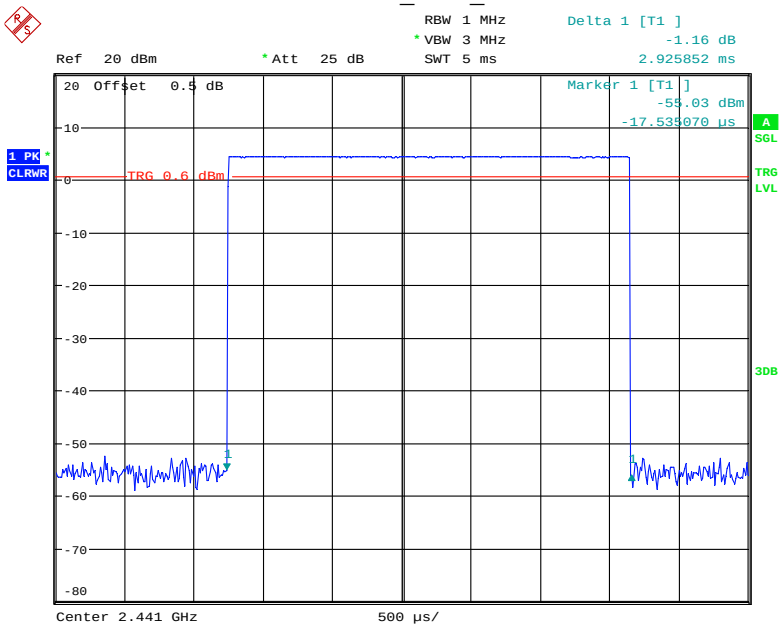
Date: 25.MAY.2019 14:26:17

GFSK_DH3_Middle



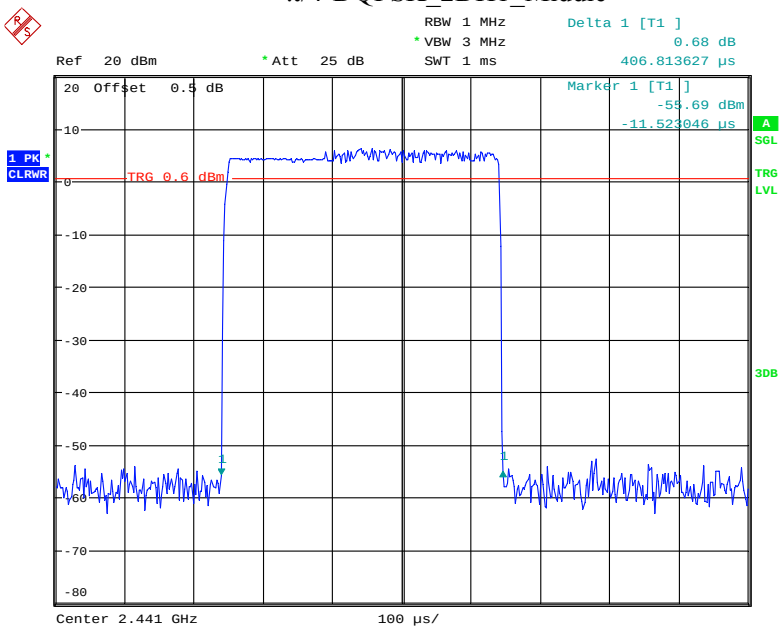
Date: 25.MAY.2019 14:27:28

GFSK_DH5_Middle



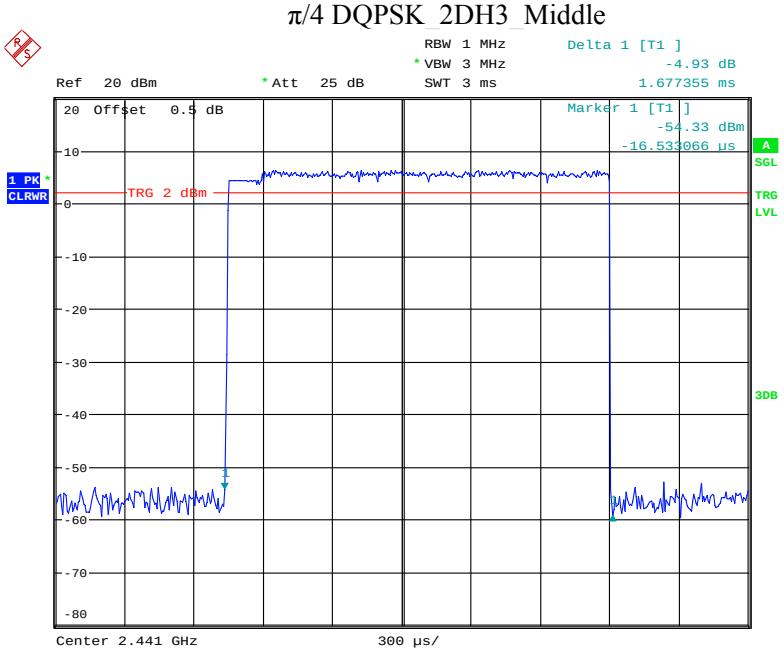
Date: 25.MAY.2019 14:28:05

π/4-DQPSK_2DH1_Middle



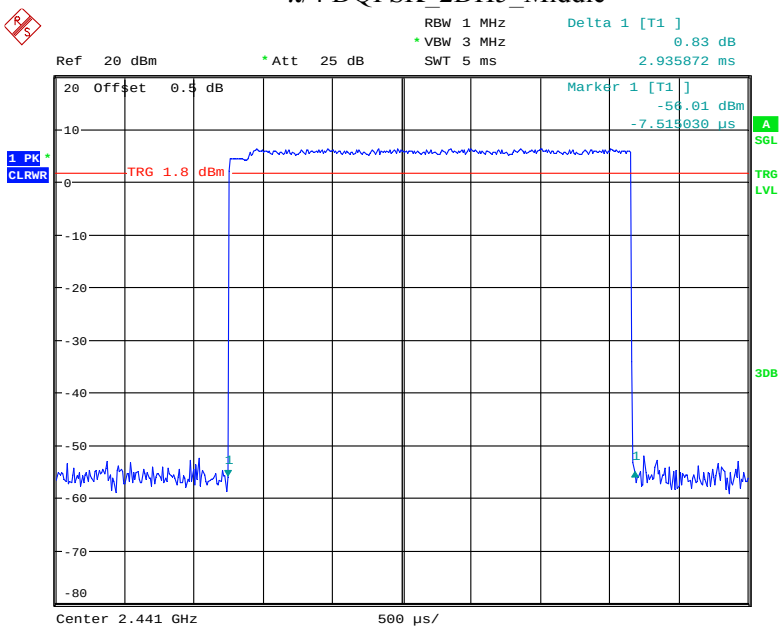
Date: 25.MAY.2019 14:28:39

π/4 DQPSK_2DH3_Middle



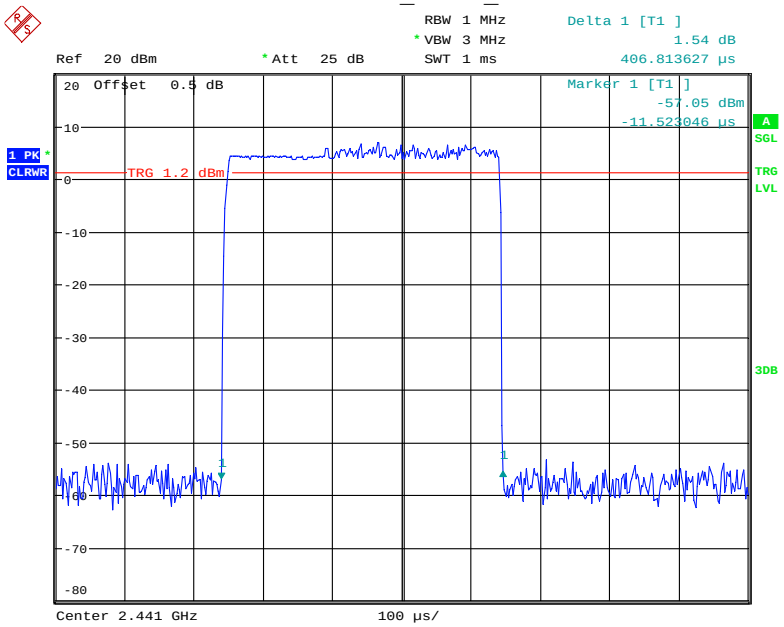
Date: 25.MAY.2019 14:30:07

π/4 DQPSK_2DH5_Middle



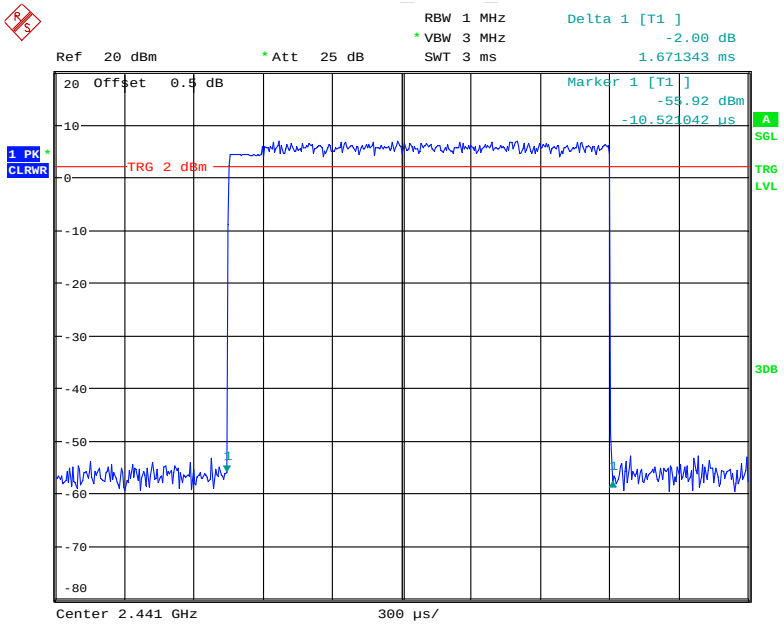
Date: 25.MAY.2019 14:30:51

8DPSK_3DH1_Middle



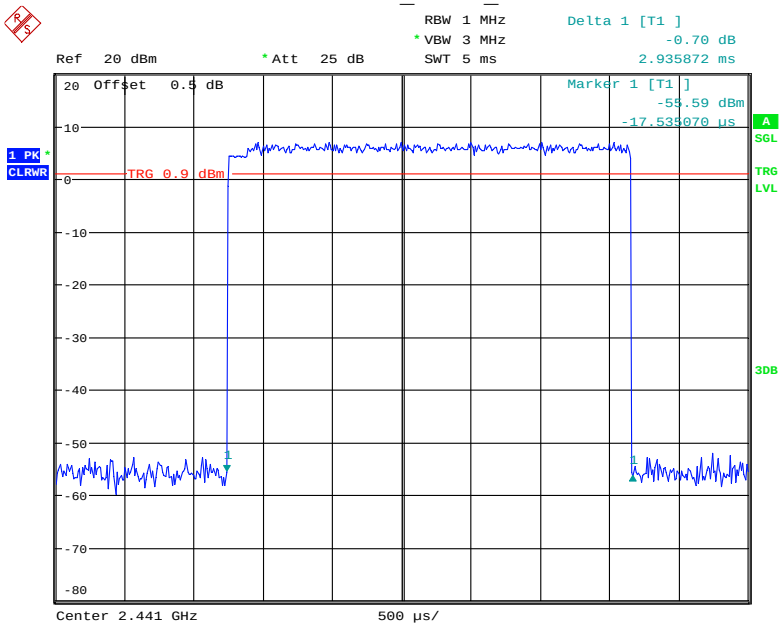
Date: 25.MAY.2019 14:31:34

8DPSK_3DH3_Middle



Date: 25.MAY.2019 14:32:12

8DPSK_3DH5_Middle



Date: 25.MAY.2019 14:32:54

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
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	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:	25.8 °C
Relative Humidity:	65 %
ATM Pressure:	100.5 kPa

** The testing was performed by Elena Lei on 2019-05-25.*

Test Result: Compliance.

Test Mode: Transmitting

Mode	Frequency (MHz)	Peak Conducted Output power (dBm)	Limit (dBm)
BDR Mode (GFSK)	2402	3.89	21
	2441	3.76	21
	2480	3.59	21
EDR Mode (π/4-DQPSK)	2402	0.77	21
	2441	1.13	21
	2480	0.67	21
EDR Mode (8-DPSK)	2402	1.36	21
	2441	1.67	21
	2480	1.01	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	2019-05-09	2020-05-09
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:	25.8 °C
Relative Humidity:	65 %
ATM Pressure:	100.5 kPa

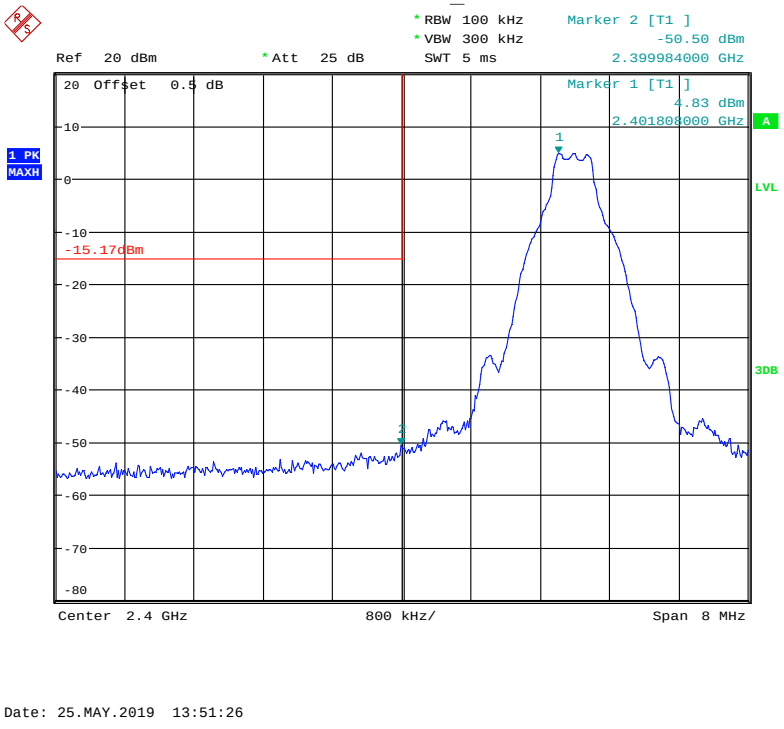
** The testing was performed by Elena Lei on 2019-05-25.*

Test Result: Compliance

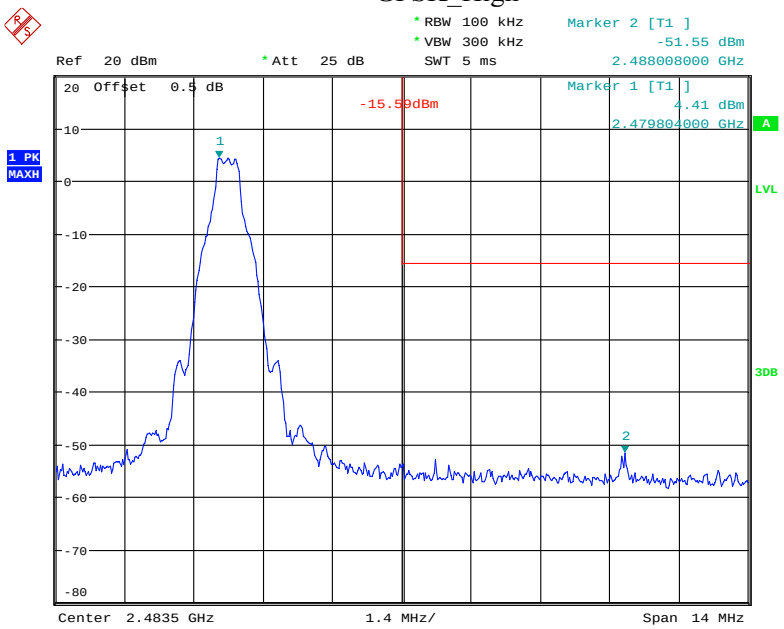
Please refer to following plots:

Single Channel:

GFSK_Low

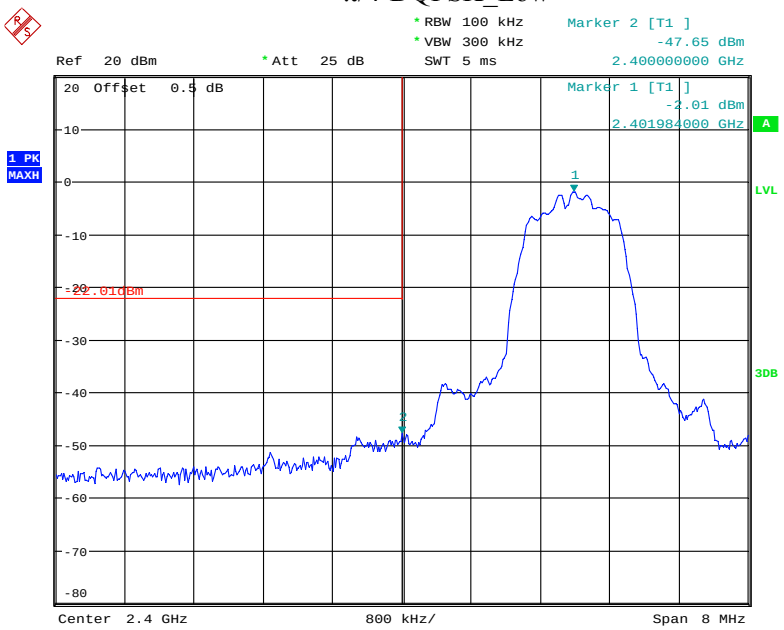


GFSK_High



Date: 25.MAY.2019 13:54:18

π/4-DQPSK_Low



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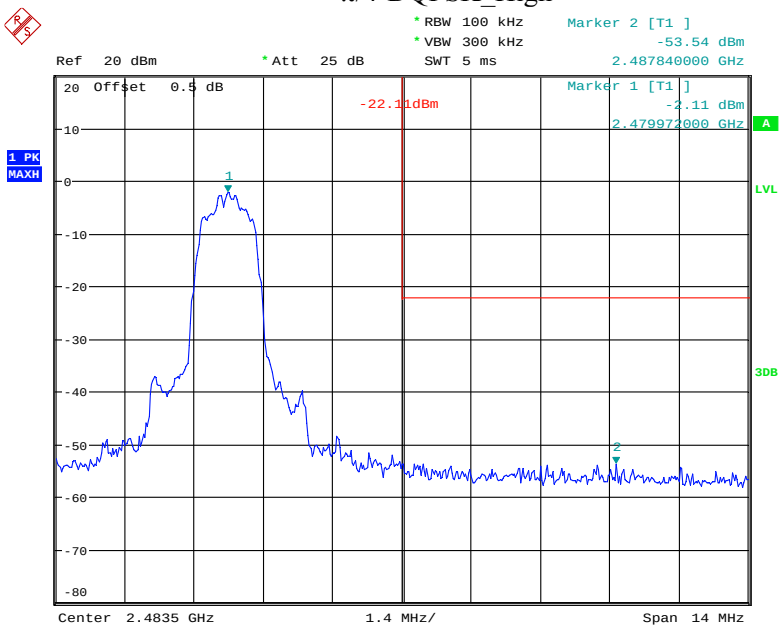
π/4-DQPSK_High



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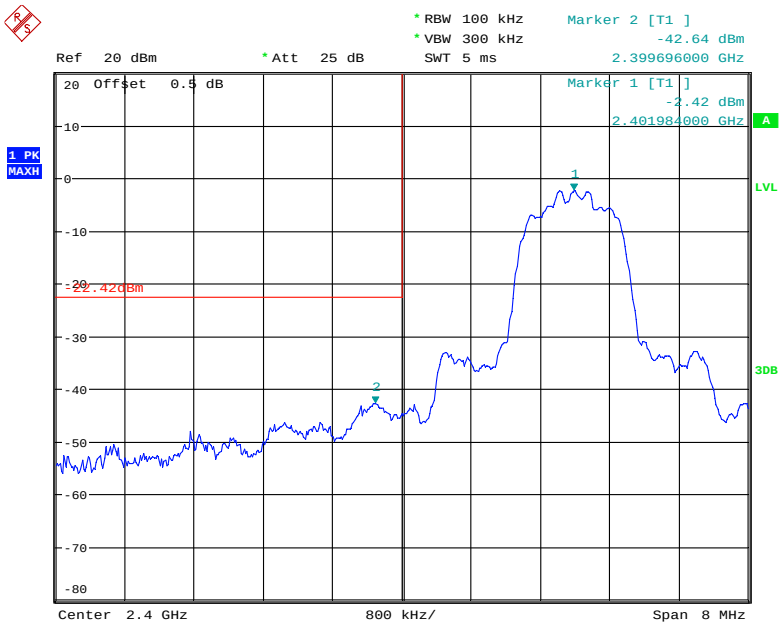
8-DPSK_Low



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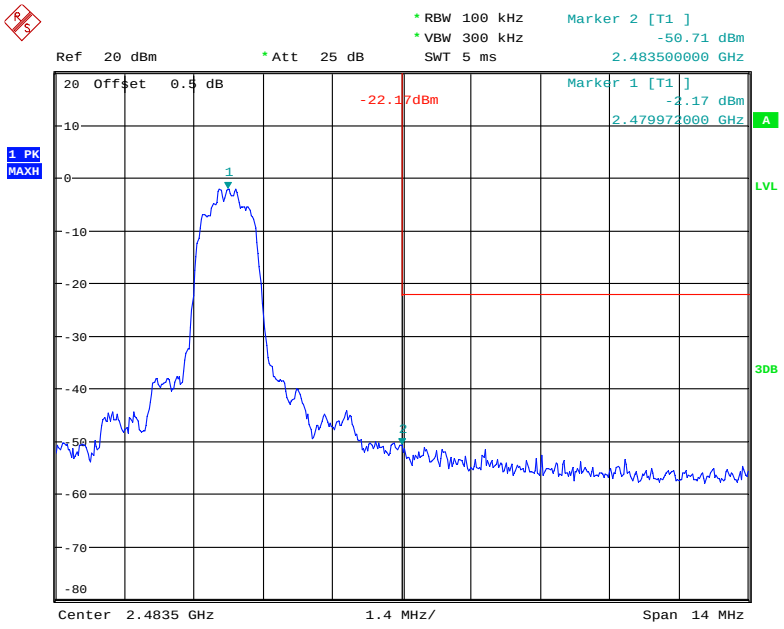
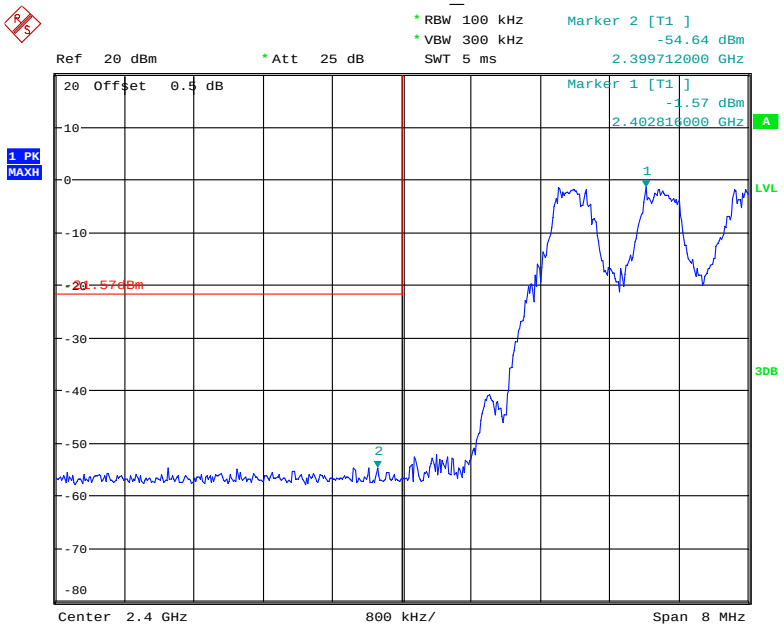
8-DPSK_High



Date: 25.MAY.2019 14:09:19

Hopping mode:

GFSK_Low



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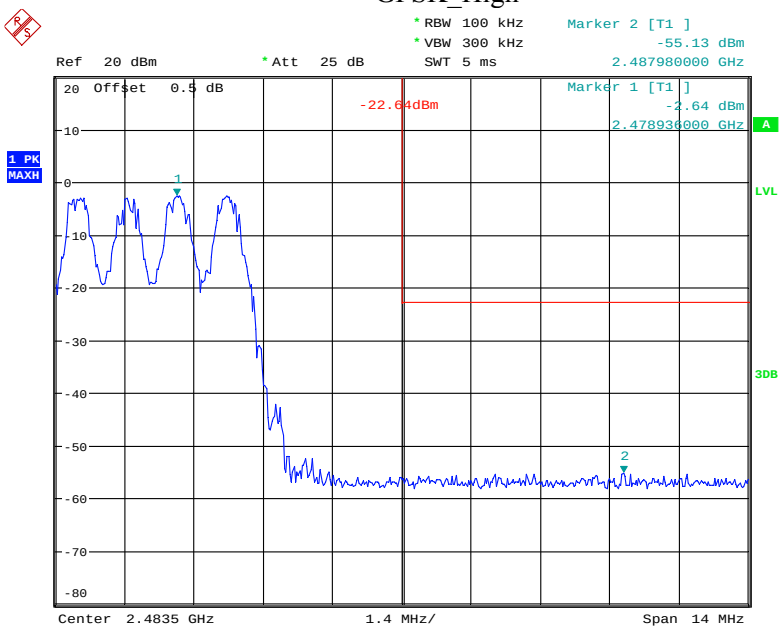
GFSK_High



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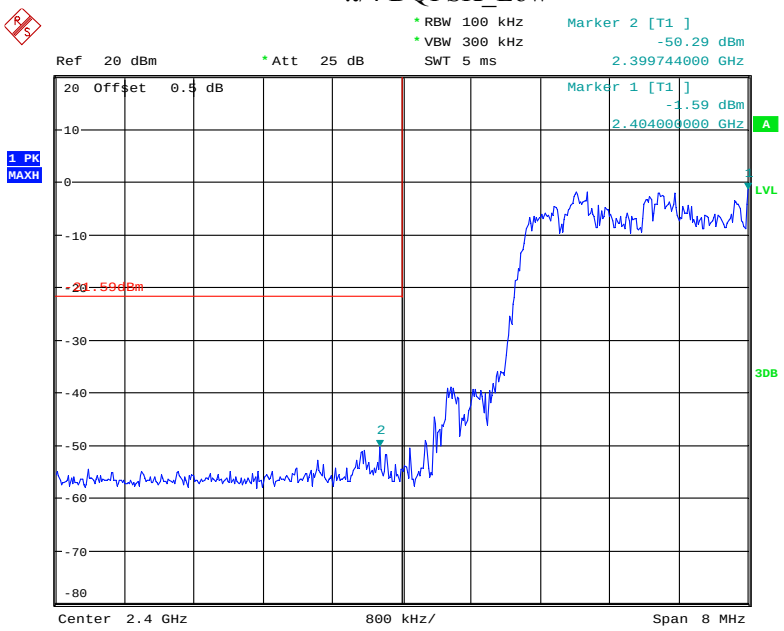
π/4 DQPSK_Low



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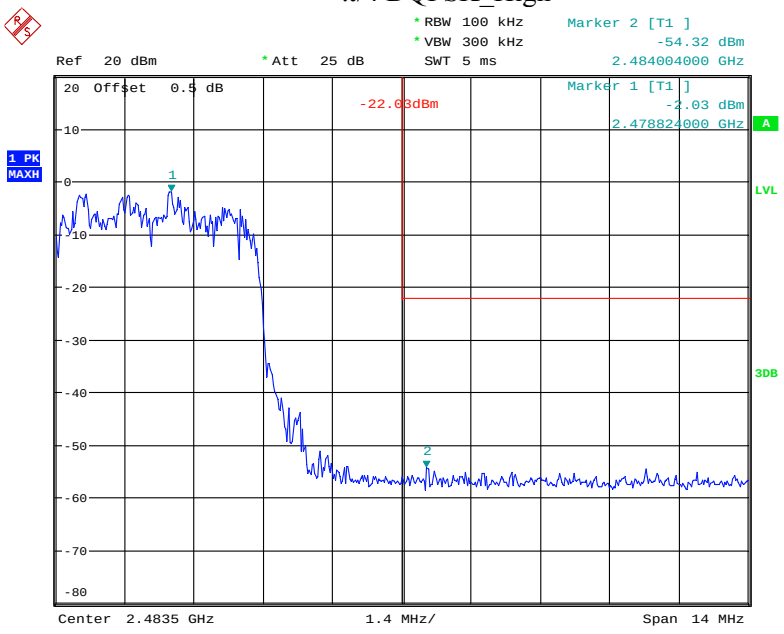
π/4 DQPSK_High



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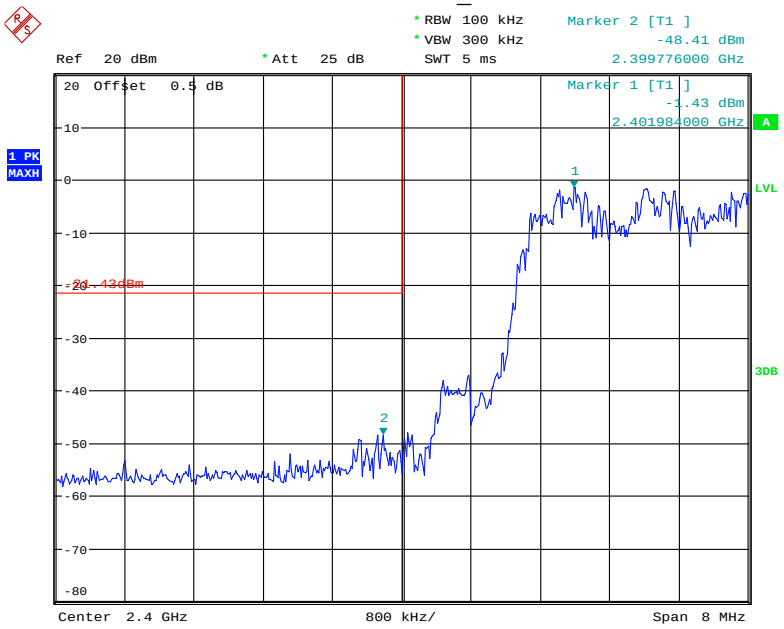
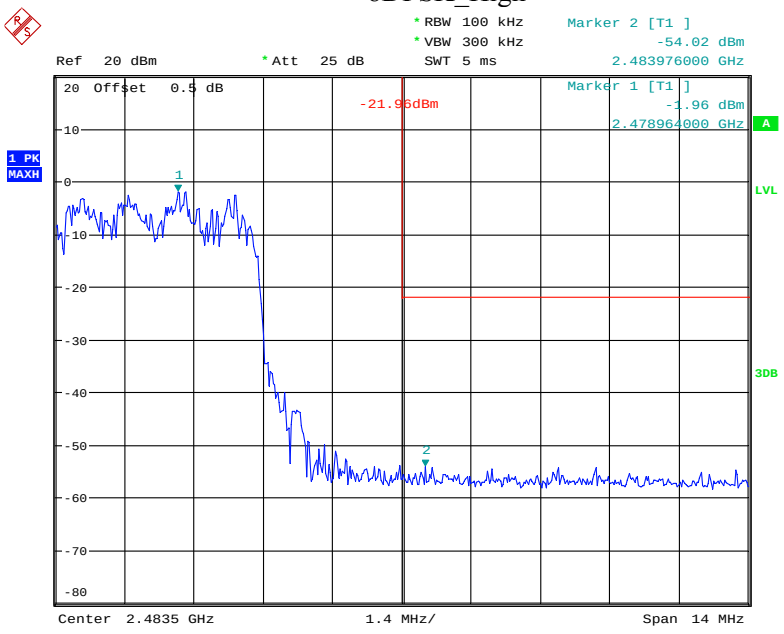
8DPSK_Low



Date: 25.MAY.2019 16:57:43

8DPSK_High



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