TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.247

TEST REPORT

For

AKUVOX (XIAMEN) NETWORKS CO., LTD.

10/F, No.56, Software Park II , Xiamen, China

FCC ID: 2AHCR-C317X

Report Type:	**Product Type:**
Original Report	Indoor Monitor

Report Number:	RXM190510053-00B
Report Date:	2019-07-08
Reviewed By:	Jerry Zhang EMC Manager
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:	Indoor Monitor
EUT Model:	C317A
Multiple Models:	C317W
Operation Frequency:	2402-2480 MHz
Maximum Output Power (Conducted):	5.17dBm
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Rated Input Voltage:	DC12V from DC port or DC48V from POE port
External Dimension:	251 mm(L)*182.5mm(W)*22.6mm(H)
Serial Number:	190510053
EUT Received Date:	2019/5/14

Note: The series product model C317W *is electrically identical with model C317A, we selected C317A for fully testing, the differences details was explained in the declaration letter.*

Objective

This report is prepared on behalf of *AKUVOX (XIAMEN) NETWORKS 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)

FCC Part 15C DTS submissions with FCC ID: 2AHCR-C317X

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
Power Spectral Density, conducted	±0.61 dB
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.

Test Mode	M1	Adapter supply & Transmitting
	M2	PoE supply & Transmitting

EUT Exercise Software

The software:' RFTestTool ' was used during test, which was provided by manufacturer. The maximum power level was configured by the software as below table:

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

Equipment Modifications

No modification was made to the EUT.

Local Support Equipment List and Details

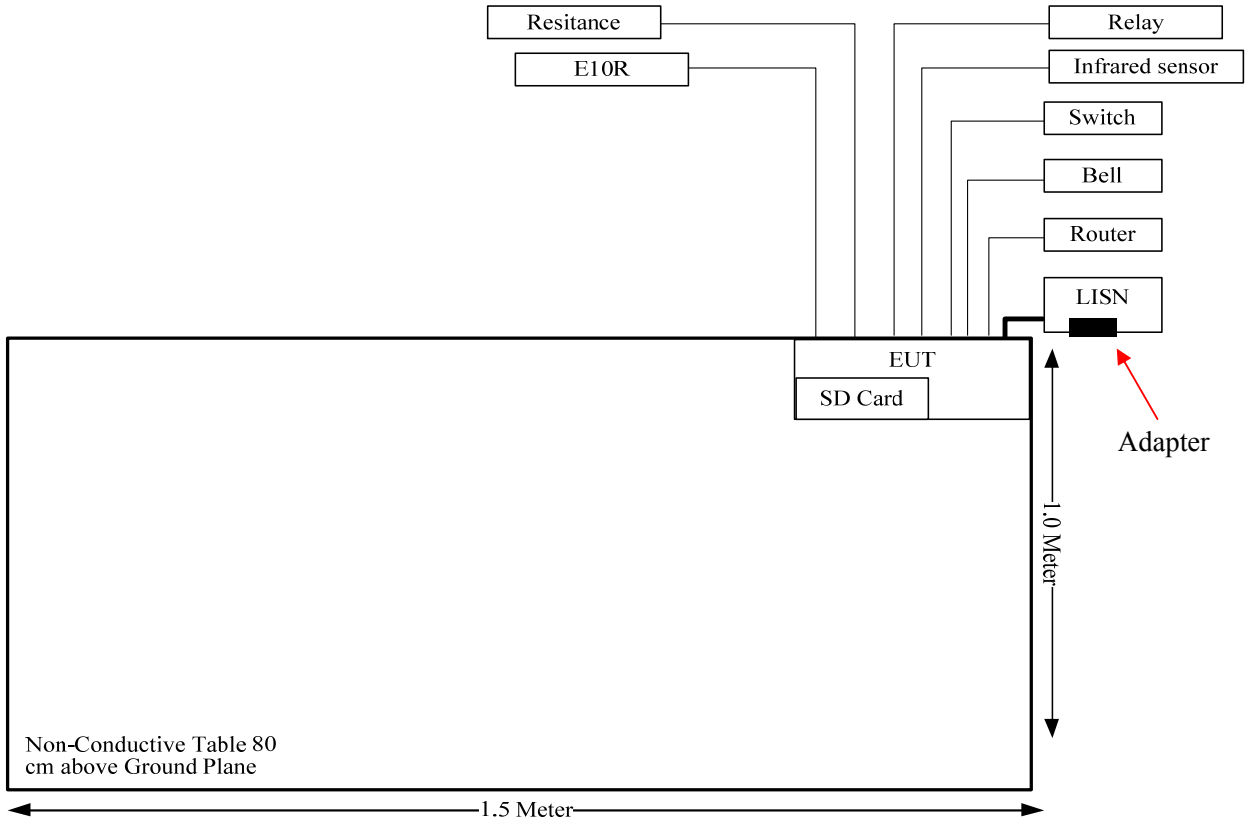
Manufacturer	Description	Model	Serial Number
Channel Well Technology	Adapter	2ABB018F EU	N/A
HUAWEI	SWITCHING POWER ADAPTER	PoE35-54A	N/A
Kingston	SD card	N/A	N/A
SIEMENS	Bell	5TD0102-1CC1	N/A
SALENS	Infrared sensor	RE200B	N/A
Schneider	Relay	RXM2LB2BD	N/A
AKUVOX	Doorbell	E10R	P1M40WMJ00299
TP-LINK	Switch	TL-SF1008P	114A297001782
xinsheng	Resistance	BX8-13	N/A
URSALINK	Router	UR75	621273906928

Support Cable List and Details

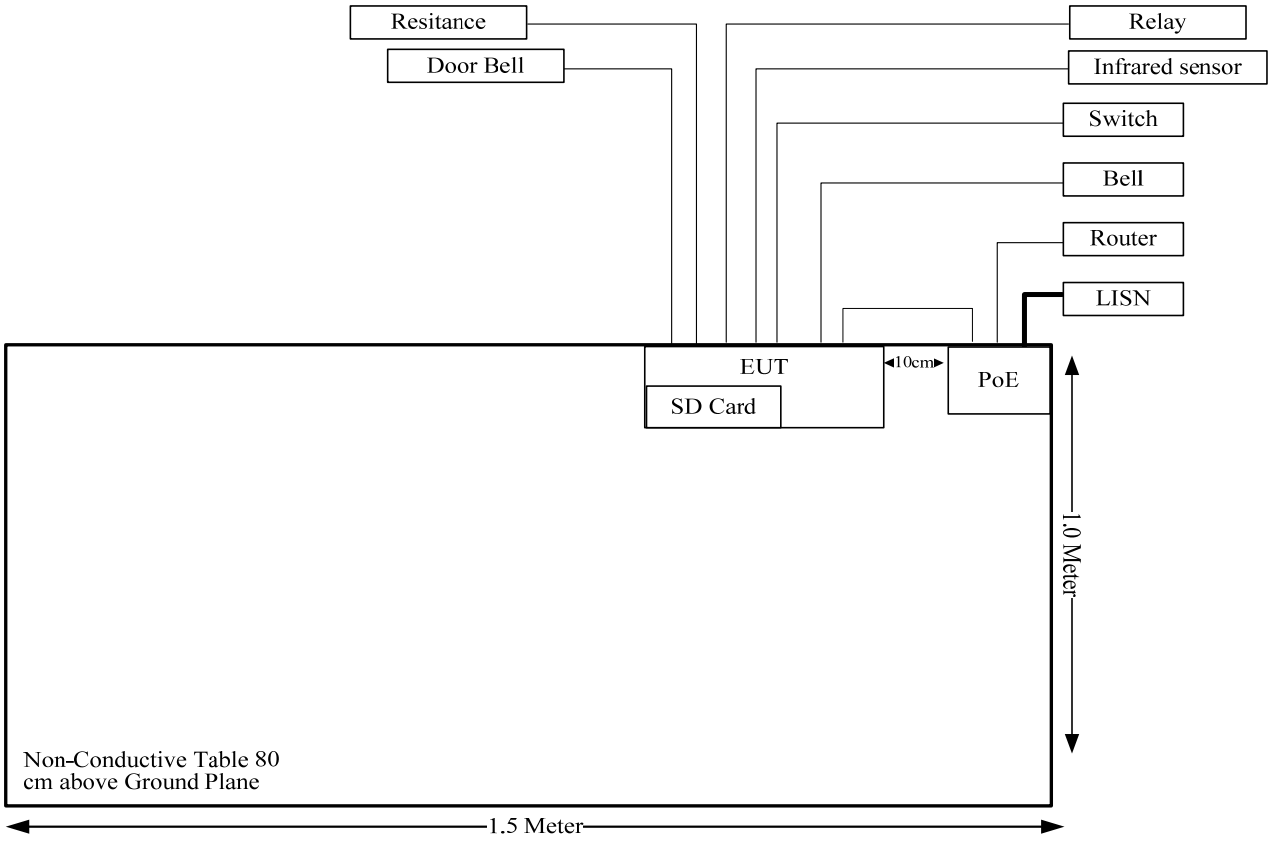
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	No	No	5	RJ45 Port of EUT	Doorbell
Signal Cable*8	No	No	5	IO Port of EUT	Infrared sensor
Signal Cable	No	No	5	BELL Port of EUT	Bell
Signal Cable	No	No	5	RS485 Port of EUT	Switch
Signal Cable	No	No	5	Relay Port of EUT	Relay
Signal Cable	No	No	5	12V_OUT Port of EUT	Resistance
RJ45 Cable	No	No	5	POE Port of EUT	Router
Adapter Cable	No	No	1.3	Adapter	EUT
RJ45 Cable	No	No	1	POE Port of EUT	SWITCHING POWER ADAPTER

Block Diagram of Test Setup

M1



M2


Resitance
Door Bell
Relay
Infrared sensor
Switch
Bell
Router
LISN
EUT
SD Card
10cm
PoE
1.0 Meter
Non-Conductive Table 80 cm above Ground Plane
1.5 Meter

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissable Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
FCC §15.207(a)	AC line 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 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency (MHz)	**Antenna Gain**		**Conducted output power including Tune-up Tolerance**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
	(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
2402-2480	2.6	1.82	5.5	3.55	20.00	0.001	1.0

Result: The device meet FCC MPE at 20 cm distance

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, fulfill the requirement of this section. Please refer to below information and the EUT photos:

Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
FPC	50	2.6 dBi/2.4~2.5GHz

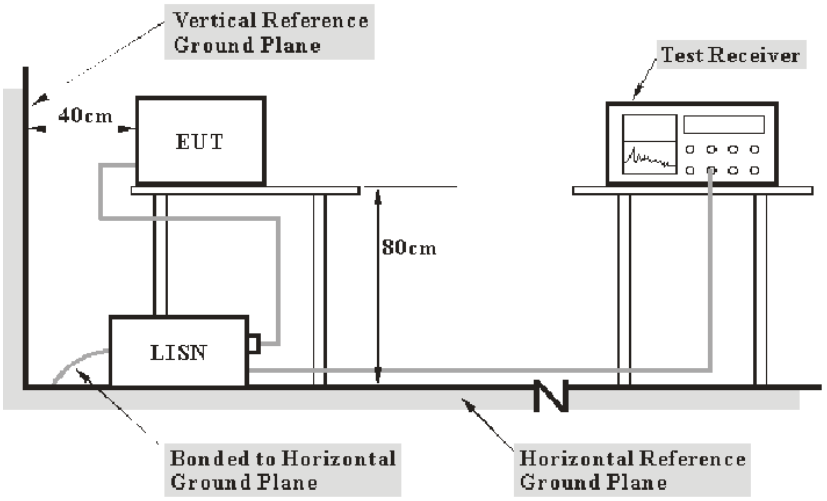
Result: Compliance.

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.

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	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

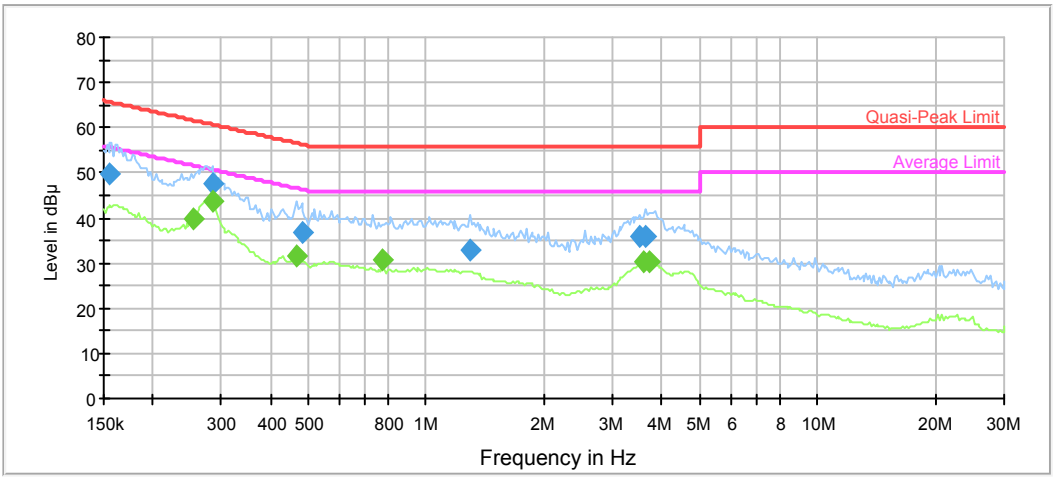
Temperature:	27.1 °C
Relative Humidity:	60 %
ATM Pressure:	100.5 kPa

The testing was performed by Lily Xie on 2019-05-18.

Test Result: Compliance

Pre-scan two models, C317A was the worst case.
Test Mode: M1 (GFSK low channel was the worst case)

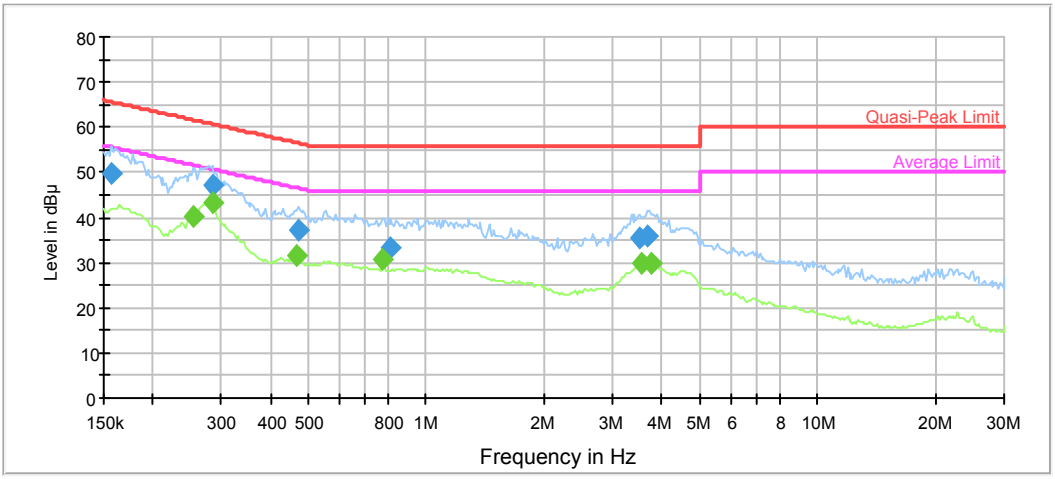
AC120V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156091	49.9	9.000	L1	11.1	15.8	65.7
0.283569	47.5	9.000	L1	10.2	13.2	60.7
0.480499	36.6	9.000	L1	9.9	19.7	56.3
1.299660	32.8	9.000	L1	9.8	23.2	56.0
3.515338	35.8	9.000	L1	9.8	20.2	56.0
3.621856	35.7	9.000	L1	9.8	20.3	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.254170	40.0	9.000	L1	10.3	11.6	51.6
0.283569	43.9	9.000	L1	10.2	6.8	50.7
0.466367	31.7	9.000	L1	9.9	14.9	46.6
0.774673	30.9	9.000	L1	9.8	15.1	46.0
3.585996	30.1	9.000	L1	9.8	15.9	46.0
3.731602	30.2	9.000	L1	9.8	15.8	46.0

AC120V, 60 Hz, Neutral:

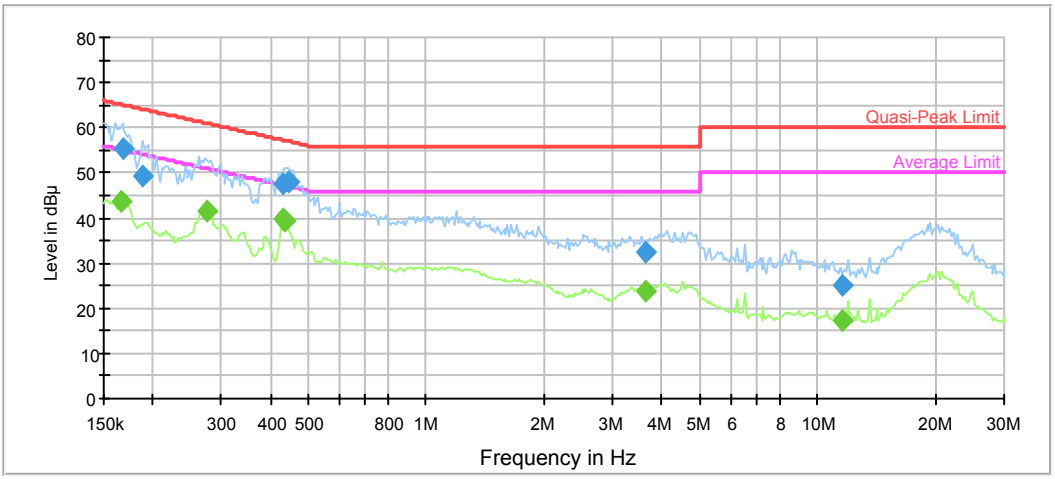


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.157652	49.8	9.000	N	11.1	15.8	65.6
0.283569	47.2	9.000	N	10.2	13.5	60.7
0.471031	37.0	9.000	N	9.9	19.5	56.5
0.814189	33.4	9.000	N	9.8	22.6	56.0
3.515338	35.4	9.000	N	9.8	20.6	56.0
3.694655	35.9	9.000	N	9.8	20.2	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.254170	40.0	9.000	N	10.3	11.6	51.6
0.283569	43.2	9.000	N	10.2	7.5	50.7
0.466367	31.7	9.000	N	9.9	14.9	46.6
0.774673	30.9	9.000	N	9.8	15.1	46.0
3.550491	29.6	9.000	N	9.8	16.4	46.0
3.768918	29.8	9.000	N	9.8	16.2	46.0

Test Mode: M2(GFSK low channel was the worst case)

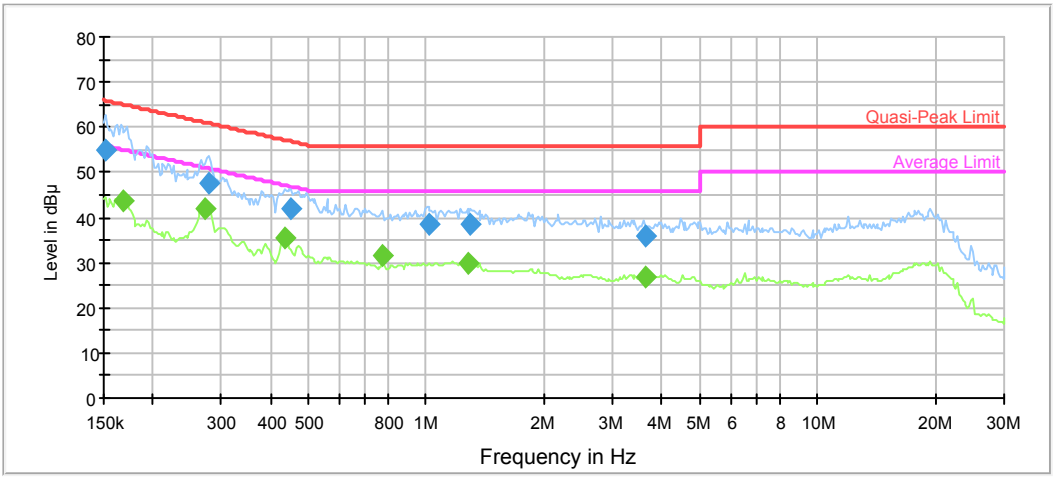
AC120V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.167350	55.3	9.000	L1	10.9	9.8	65.1
0.188575	49.5	9.000	L1	10.7	14.6	64.1
0.430682	47.6	9.000	L1	9.9	9.6	57.2
0.448170	48.0	9.000	L1	9.9	8.9	56.9
3.621856	32.5	9.000	L1	9.8	23.5	56.0
11.601974	25.2	9.000	L1	9.8	34.8	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.165693	43.8	9.000	L1	11.0	11.4	55.2
0.275230	41.6	9.000	L1	10.2	9.4	51.0
0.430682	39.8	9.000	L1	9.9	7.4	47.2
0.434989	39.3	9.000	L1	9.9	7.9	47.2
3.621856	24.0	9.000	L1	9.8	22.0	46.0
11.601974	17.2	9.000	L1	9.8	32.8	50.0

AC120V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.151500	54.9	9.000	N	11.1	11.0	65.9
0.277982	47.6	9.000	N	10.2	13.3	60.9
0.452652	41.9	9.000	N	9.9	14.9	56.8
1.013434	38.5	9.000	N	9.8	17.5	56.0
1.299660	38.6	9.000	N	9.8	17.4	56.0
3.621856	35.8	9.000	N	9.8	20.2	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.169024	43.6	9.000	N	10.9	11.4	55.0
0.272505	42.0	9.000	N	10.2	9.0	51.0
0.434989	35.3	9.000	N	9.9	11.9	47.2
0.774673	31.7	9.000	N	9.8	14.3	46.0
1.286792	29.9	9.000	N	9.8	16.1	46.0
3.621856	26.8	9.000	N	9.8	19.2	46.0

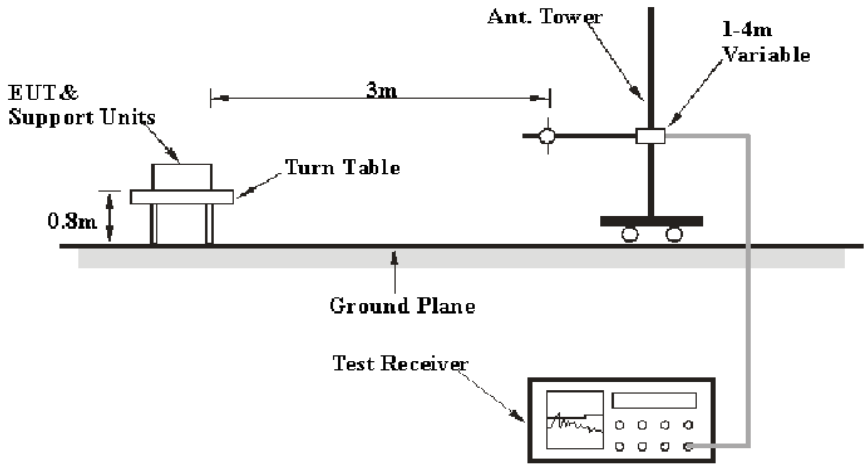
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

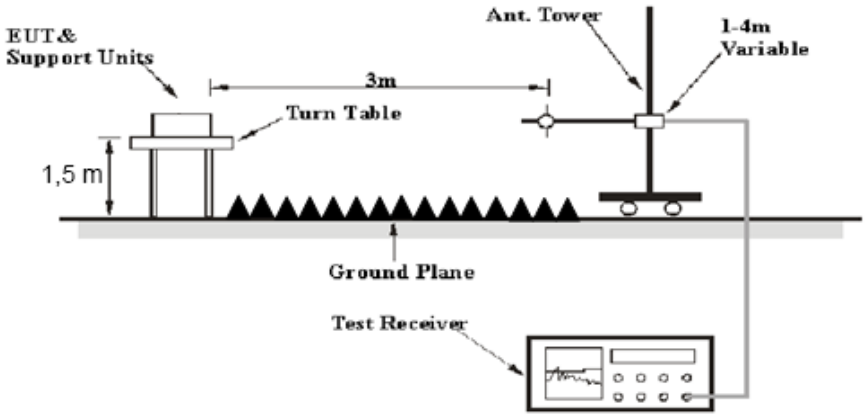
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission Below 1GHz tests were performed in the 3 meters chamber A, above 1GHz tests were performed in the 3 meters chamber 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
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	2018-10-12	2021-10-12
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	2019-02-24	2020-02-24
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).

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 Data

Environmental Conditions

Temperature:	24.2 °C
Relative Humidity:	61%
ATM Pressure:	100.7kPa

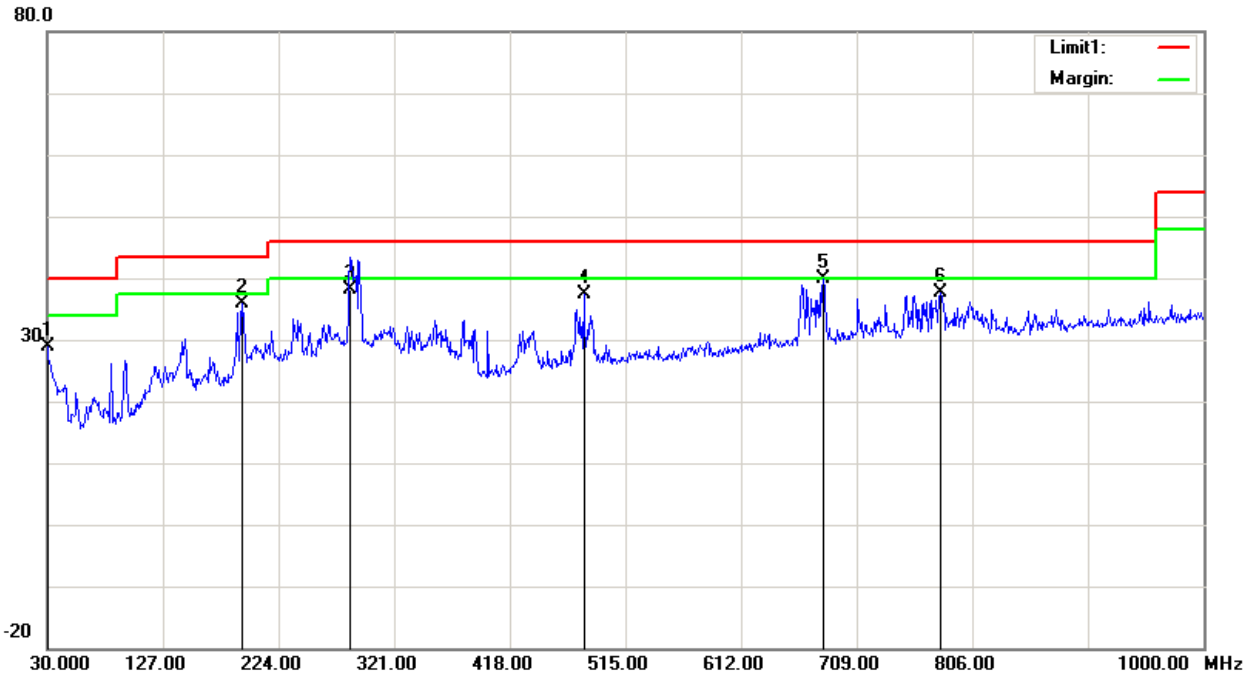
** The testing was performed by Tiger Pan and Neil Liao on 2019-05-20.*

Test Mode: Transmitting

Pre-scan two models and two test modes, C317A and M1 was the worst case.

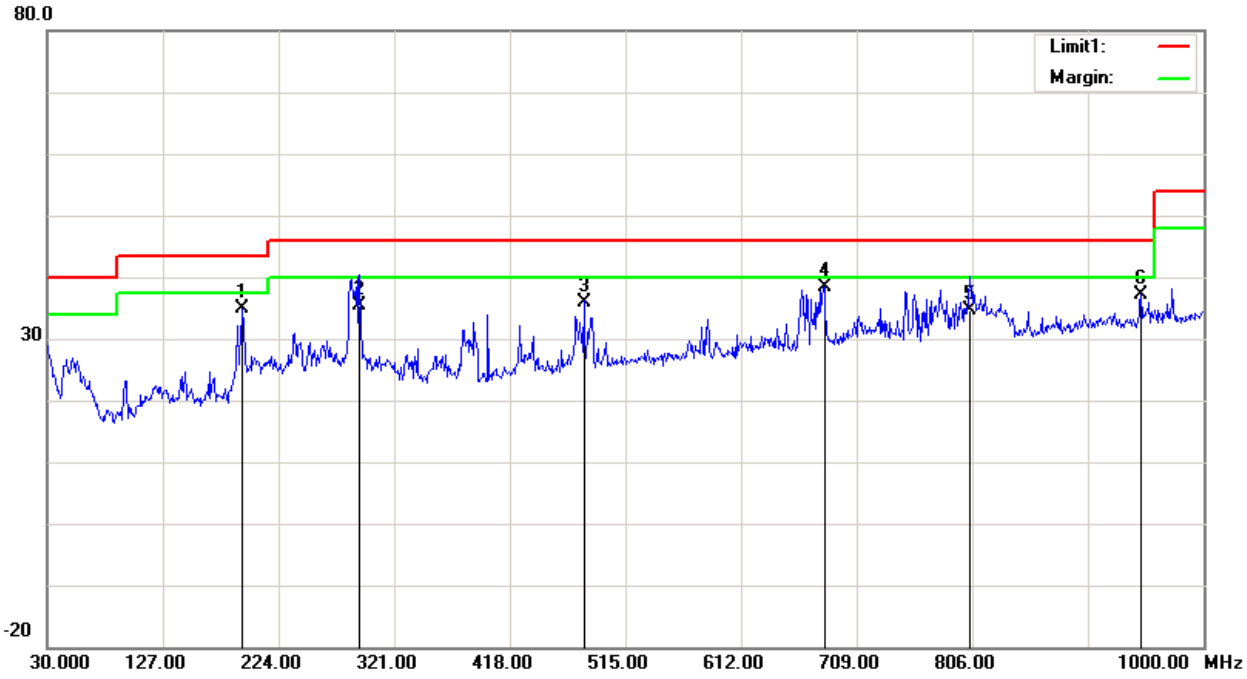
Please refer to following table and plots:

Condition:	FCC Part 15.247	**Polarization:**	Horizontal
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	M1(GFSK low channel-worat case)		
Note:			



No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	30.0000	27.18	peak	1.72	28.90	40.00	11.10
2	193.9300	42.79	peak	-6.80	35.99	43.50	7.51
3	284.1400	42.22	QP	-4.05	38.17	46.00	7.83
4	480.0800	37.68	peak	-0.27	37.41	46.00	8.59
5	680.8700	37.33	peak	2.67	40.00	46.00	6.00
6	779.8100	33.17	peak	4.37	37.54	46.00	8.46

Condition:	FCC Part 15.247	**Polarization:**	Vertical
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	M1(GFSK low channel-worat case)		
Note:			



No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	193.9300	41.77	peak	-6.80	34.97	43.50	8.53
2	291.9000	39.32	QP	-4.01	35.31	46.00	10.69
3	480.0800	36.27	peak	-0.27	36.00	46.00	10.00
4	681.8400	35.84	peak	2.66	38.50	46.00	7.50
5	804.0600	30.16	QP	4.53	34.69	46.00	11.31
6	947.6200	40.50	peak	-3.37	37.13	46.00	8.87

Please refer to following table:
BDR-worst case

BDR_low channel **Frequency 2402 MHz**

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dB
2402.00	70.64	PK	H	28.10	1.80	0.00	100.54	N/A	N/A
2402.00	60.39	AV	H	28.10	1.80	0.00	90.29	N/A	N/A
2402.00	67.87	PK	V	28.10	1.80	0.00	97.77	N/A	N/A
2402.00	57.17	AV	V	28.10	1.80	0.00	87.07	N/A	N/A
2390.00	26.13	PK	H	28.08	1.80	0.00	56.01	74.00	17.99
2390.00	13.42	AV	H	28.08	1.80	0.00	43.30	54.00	10.70
4804.00	48.61	PK	H	32.91	3.17	37.20	47.49	74.00	26.51
4804.00	37.80	AV	H	32.91	3.17	37.20	36.68	54.00	17.32
7206.00	46.36	PK	H	35.74	4.82	37.23	49.69	74.00	24.31
7206.00	32.54	AV	H	35.74	4.82	37.23	35.87	54.00	18.13
1066.00	66.83	PK	H	23.72	1.54	35.71	56.38	74.00	17.62
1066.00	59.63	AV	H	23.72	1.54	35.71	49.18	54.00	4.82

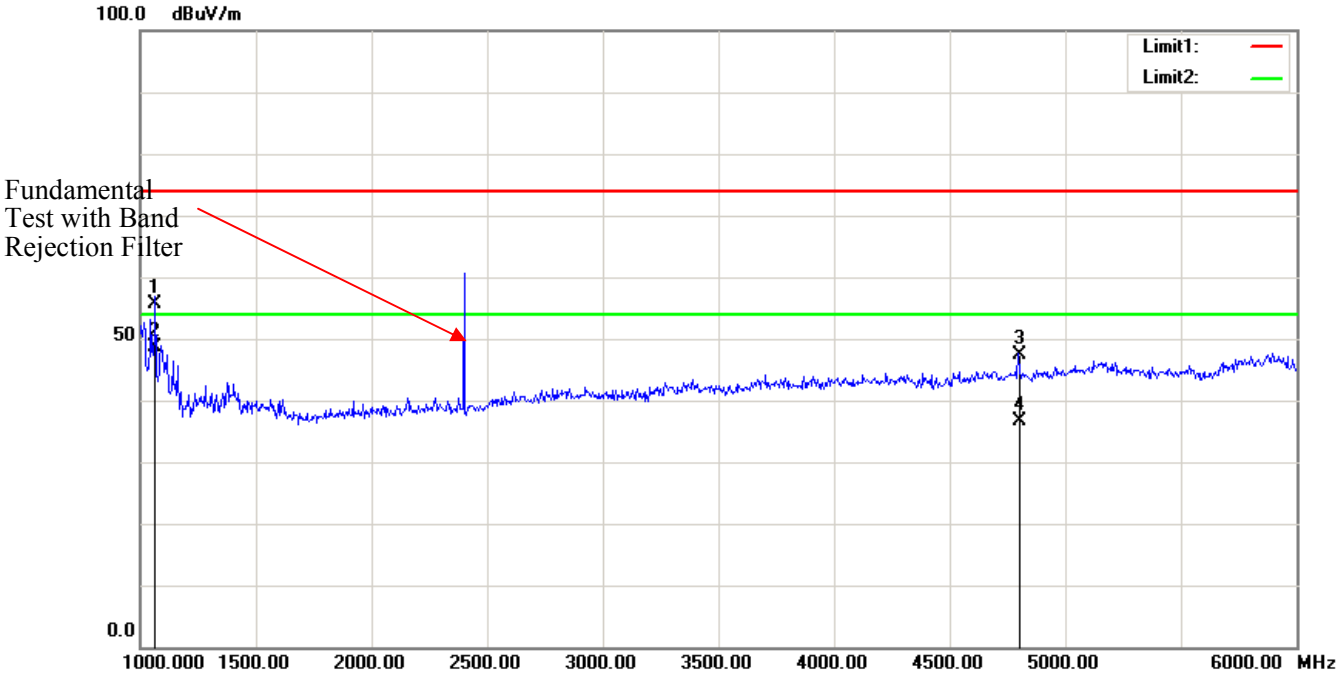
BDR_middle channel **Frequency 2441 MHz**

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dB
2441.00	69.83	PK	H	28.18	1.82	0.00	99.83	N/A	N/A
2441.00	59.68	AV	H	28.18	1.82	0.00	89.68	N/A	N/A
2441.00	66.70	PK	V	28.18	1.82	0.00	96.70	N/A	N/A
2441.00	56.43	AV	V	28.18	1.82	0.00	86.43	N/A	N/A
4882.00	48.65	PK	H	33.06	3.27	37.21	47.77	74.00	26.23
4882.00	37.17	AV	H	33.06	3.27	37.21	36.29	54.00	17.71
7323.00	45.94	PK	H	36.04	4.62	37.38	49.22	74.00	24.78
7323.00	33.26	AV	H	36.04	4.62	37.38	36.54	54.00	17.46
1066.00	66.69	PK	H	23.72	1.54	35.71	56.24	74.00	17.76
1066.00	59.25	AV	H	23.72	1.54	35.71	48.80	54.00	5.20

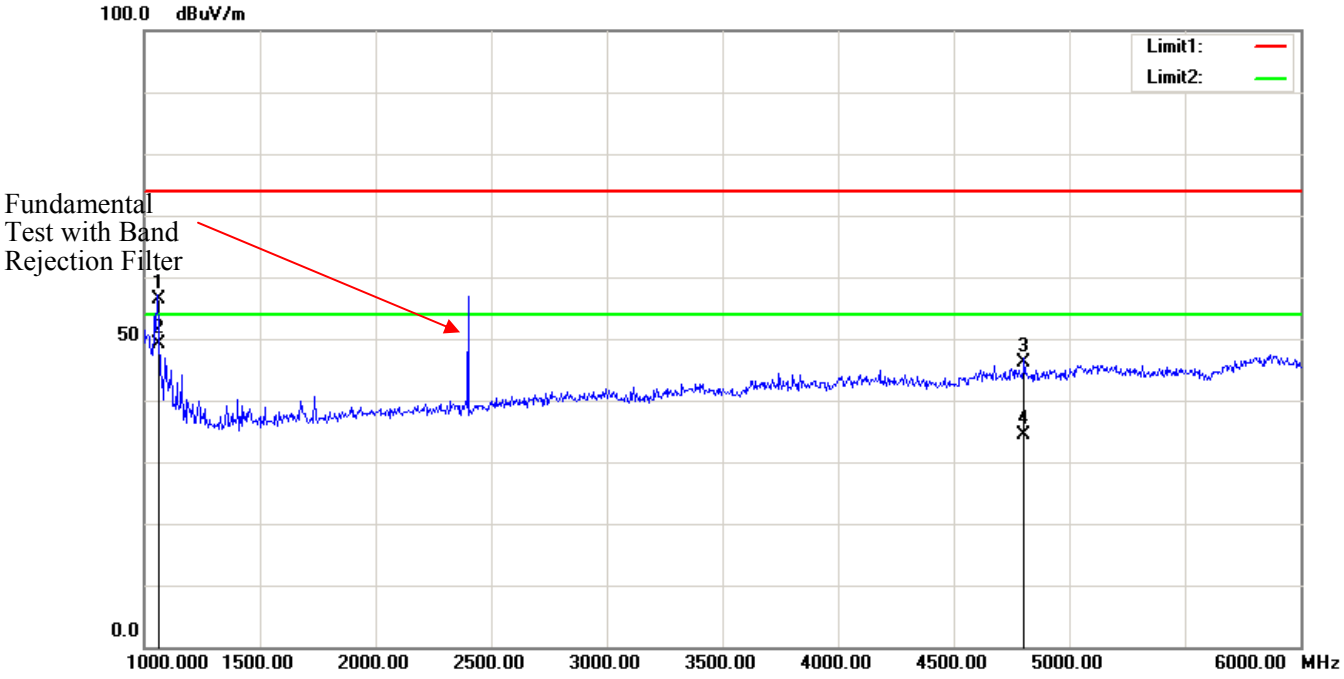
BDR_high channel **Frequency 2480 MHz**

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB/m	dB	dB	dBµV/m	dBµV/m	dB
2480.00	70.04	PK	H	28.26	1.84	0.00	100.14	N/A	N/A
2480.00	59.96	AV	H	28.26	1.84	0.00	90.06	N/A	N/A
2480.00	66.83	PK	V	28.26	1.84	0.00	96.93	N/A	N/A
2480.00	56.73	AV	V	28.26	1.84	0.00	86.83	N/A	N/A
2483.50	26.57	PK	H	28.27	1.84	0.00	56.68	74.00	17.32
2483.50	14.04	AV	H	28.27	1.84	0.00	44.15	54.00	9.85
4960.00	49.45	PK	H	33.22	3.23	37.25	48.65	74.00	25.35
4960.00	37.04	AV	H	33.22	3.23	37.25	36.24	54.00	17.76
7440.00	45.55	PK	H	36.34	4.41	37.52	48.78	74.00	25.22
7440.00	32.40	AV	H	36.34	4.41	37.52	35.63	54.00	18.37
1066.00	66.47	PK	H	23.72	1.54	35.71	56.02	74.00	17.98
1066.00	59.42	AV	H	23.72	1.54	35.71	48.97	54.00	5.03

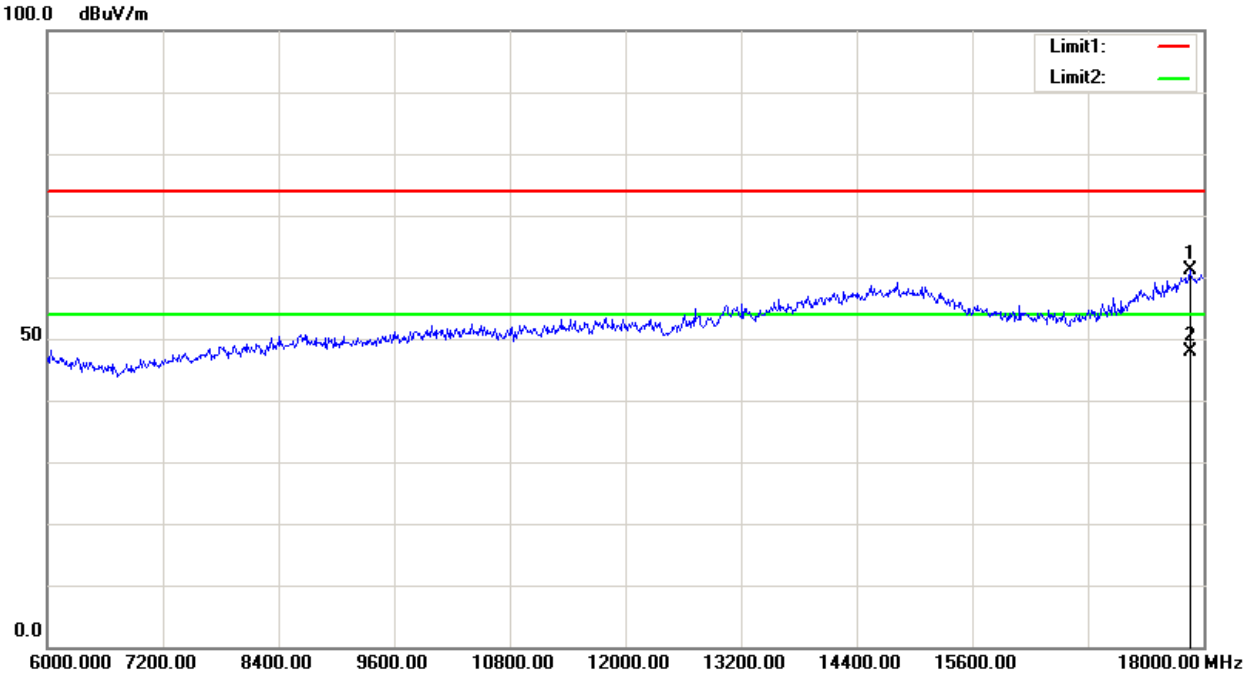
Condition:	FCC Part 15.247	**Polarization:**	Horizontal
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	BDR_low channel-worst		
Note:			



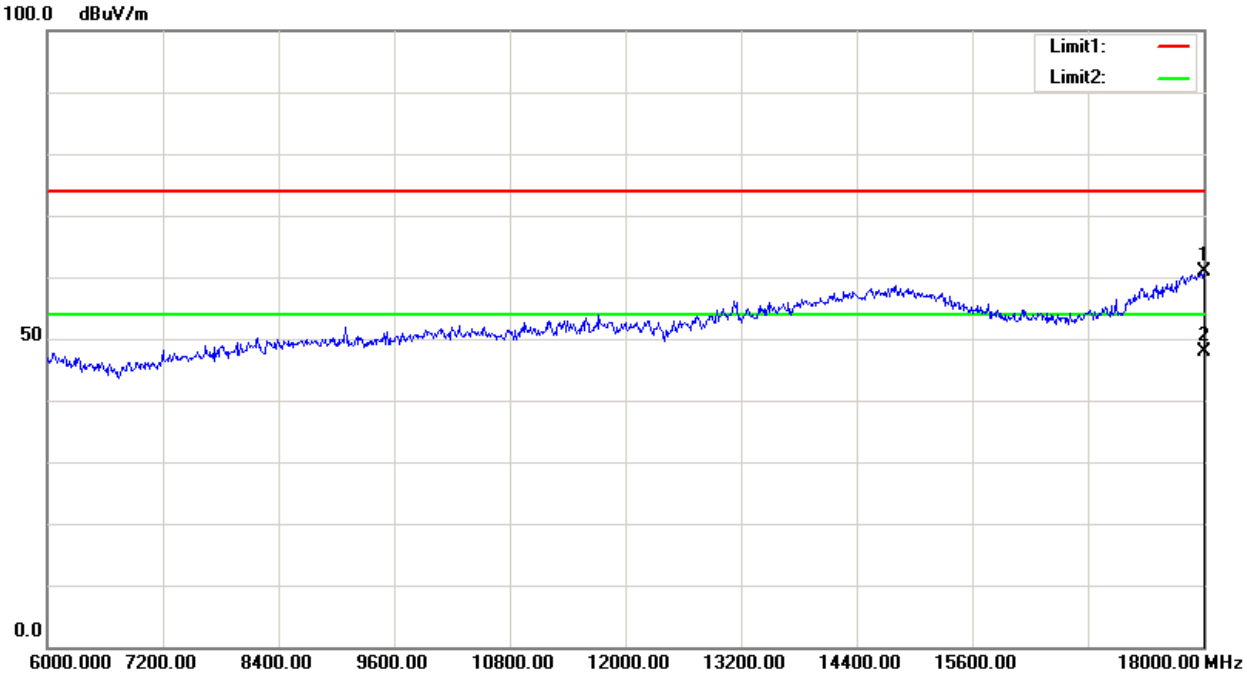
Condition:	FCC Part 15.247	**Polarization:**	Vertical
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	BDR_low channel-worst		
Note:			



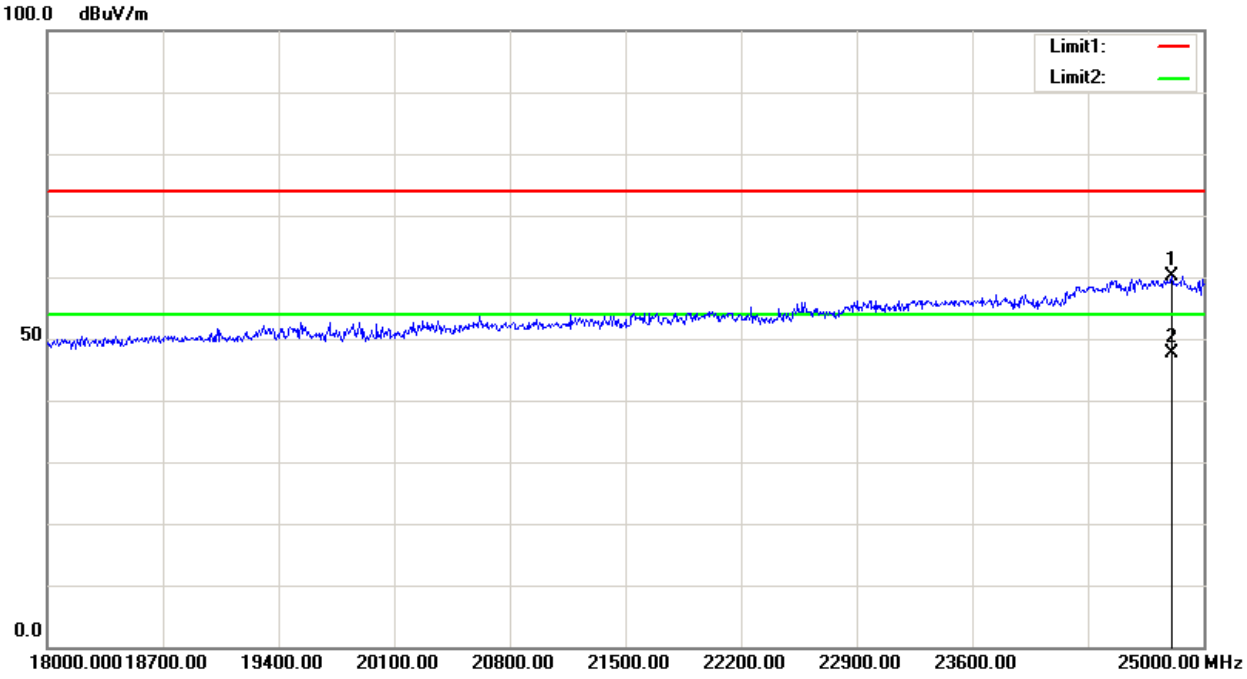
Condition:	FCC Part 15.247	**Polarization:**	Horizontal
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	BDR_low channel-worst		
Note:			



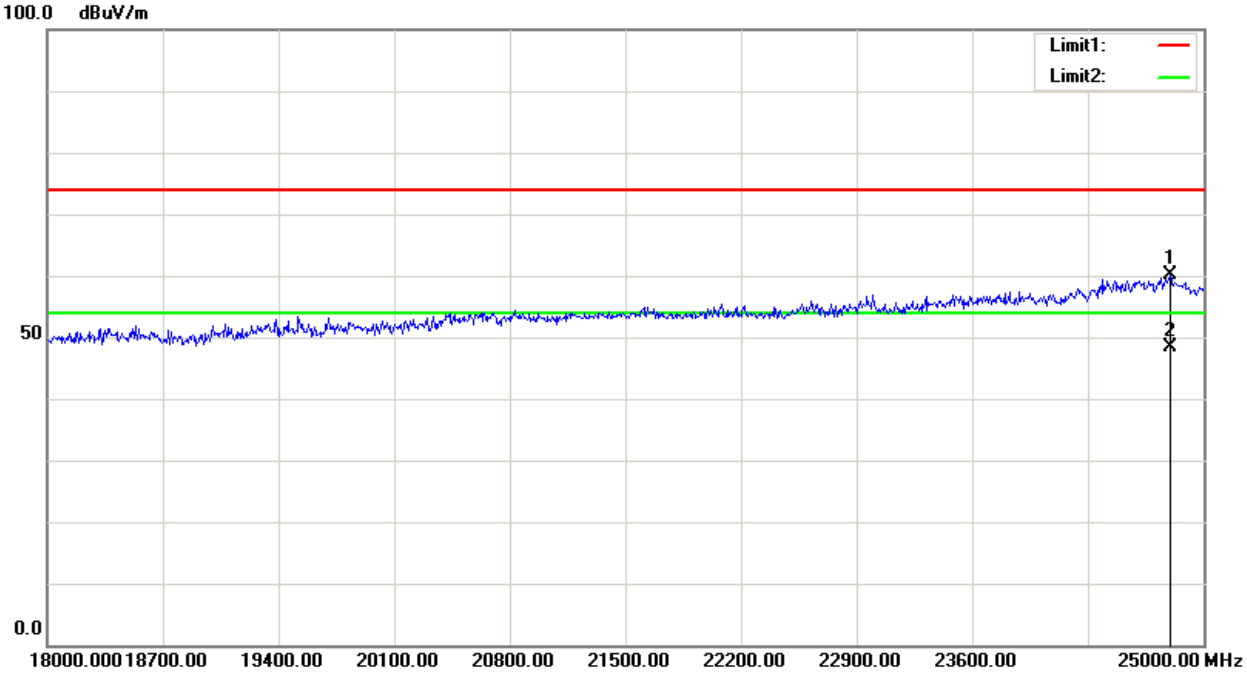
Condition:	FCC Part 15.247	**Polarization:**	Vertical
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	BDR_low channel-worst		
Note:			



Condition:	FCC Part 15.247	**Polarization:**	Horizontal
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	BDR_low channel-worst		
Note:			



Condition:	FCC Part 15.247	**Polarization:**	Vertical
EUT:	Indoor Monitor	**Power:**	AC 120V/60Hz
Model:	C317A	**Distance:**	3m
Test Mode:	BDR_low channel-worst		
Note:			



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	C0010/01	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:	26.4 °C
Relative Humidity:	54 %
ATM Pressure:	101.1 kPa

The testing was performed by Elena Lei on 2019-05-18.

Test Result: Compliance.

Please refer to following tables and plots

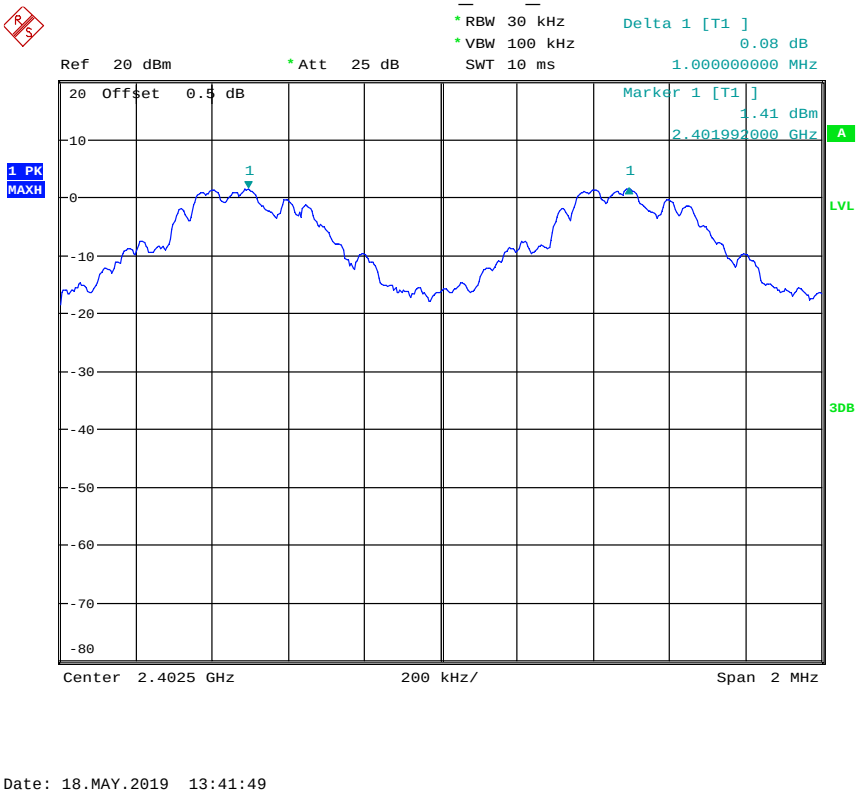
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	Low	2402-2403	1.000	0.711
	Middle	2441-2442	1.000	0.711
	High	2480-2479	1.004	0.711
π/4-DQPSK	Low	2402-2403	1.000	0.893
	Middle	2441-2442	1.000	0.893
	High	2480-2479	1.004	0.895
8-DPSK	Low	2402-2403	1.000	0.869
	Middle	2441-2442	1.004	0.869
	High	2480-2479	1.004	0.869

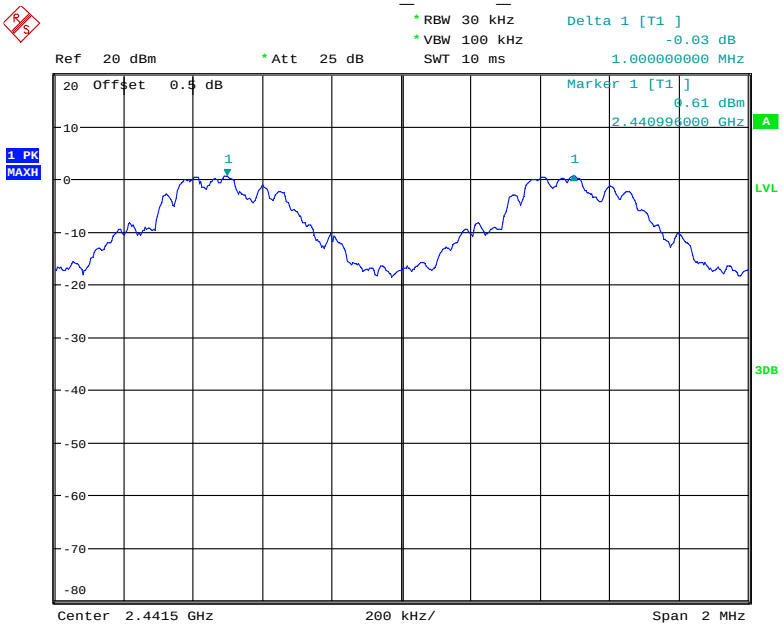
Note: Limit= (2/3) × 20dB bandwidth

Please refer to following plots:

GFSK_Low_DH1

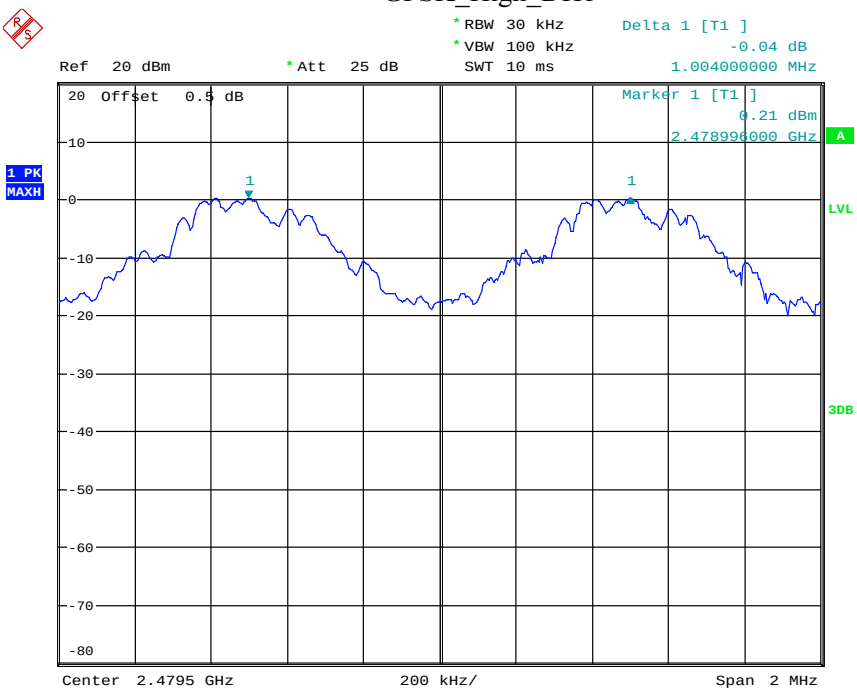


GFSK_Middle_DH1



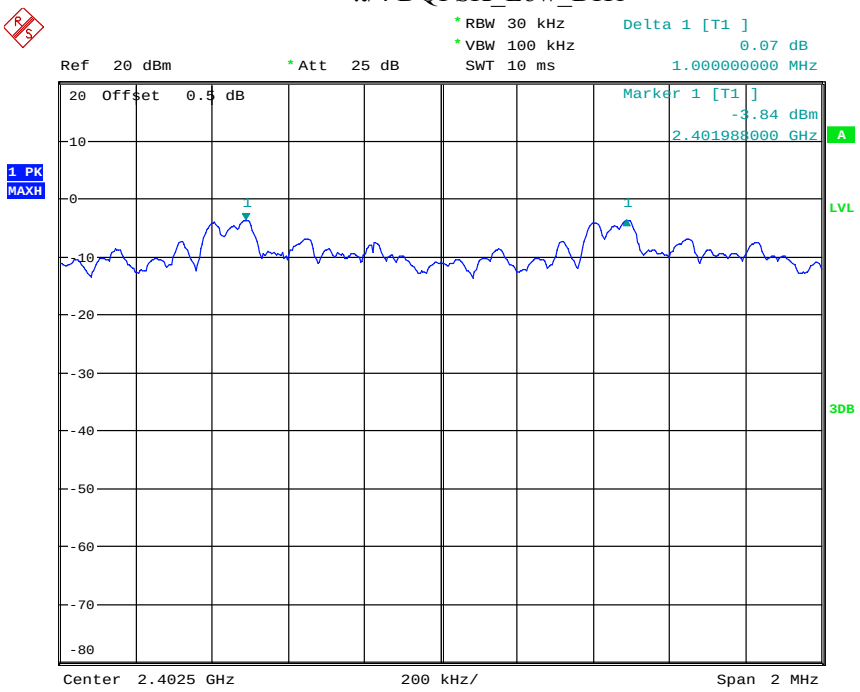
Date: 18.MAY.2019 13:42:34

GFSK_High_DH1



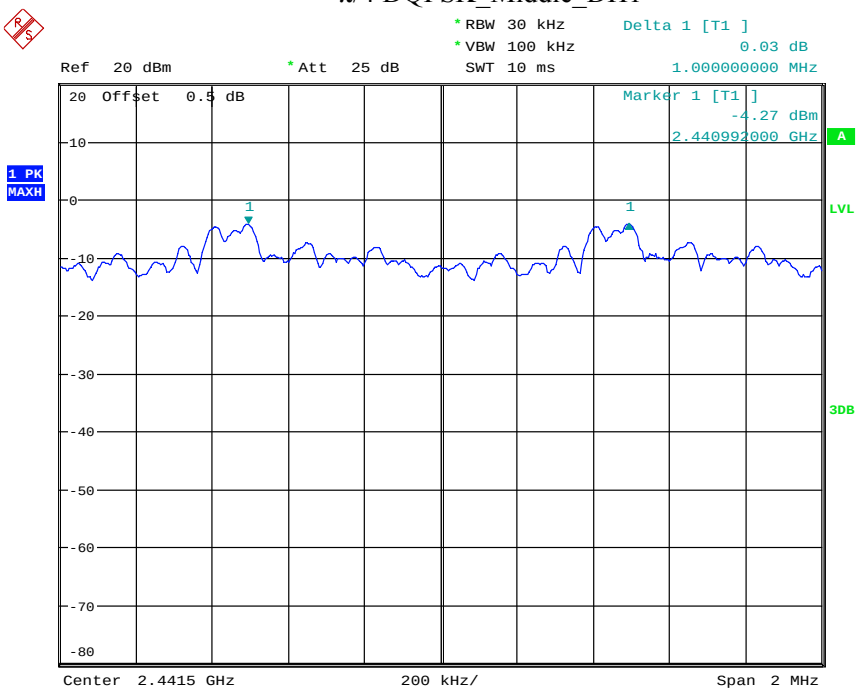
Date: 18.MAY.2019 13:43:23

π/4 DQPSK_Low_DH1



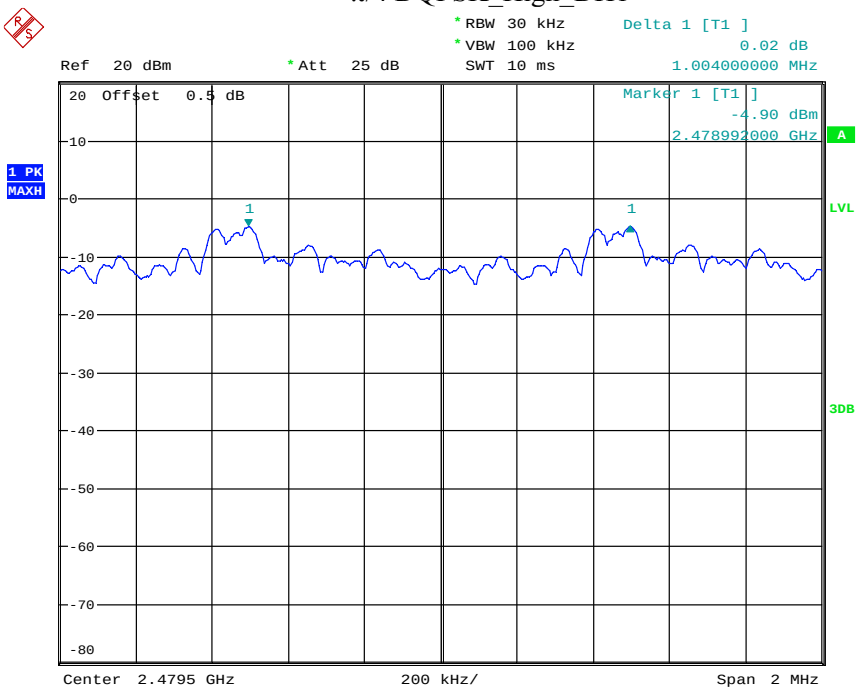
Date: 18.MAY.2019 13:39:05

π/4 DQPSK_Middle_DH1



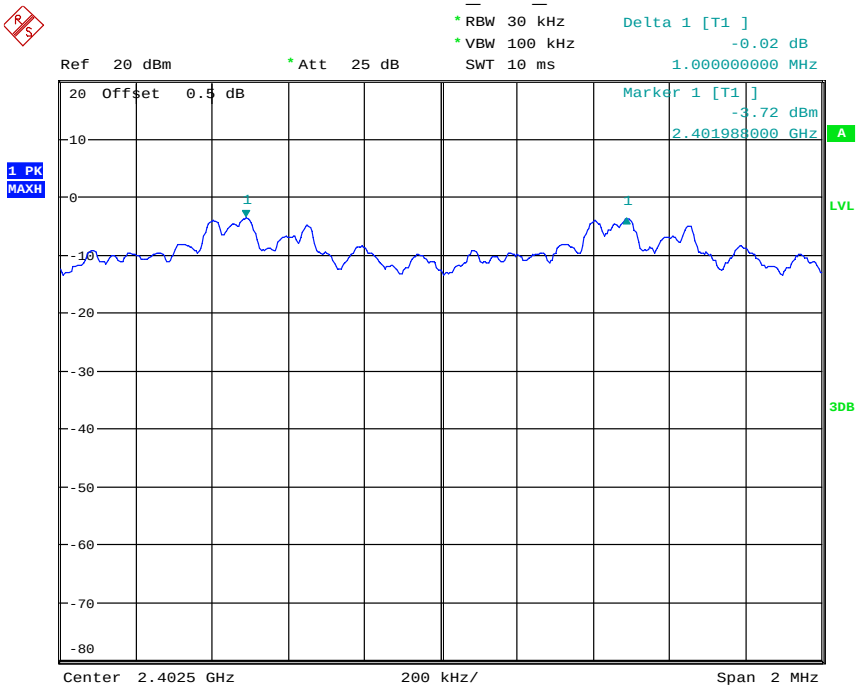
Date: 18.MAY.2019 13:39:55

π/4 DQPSK_High_DH1



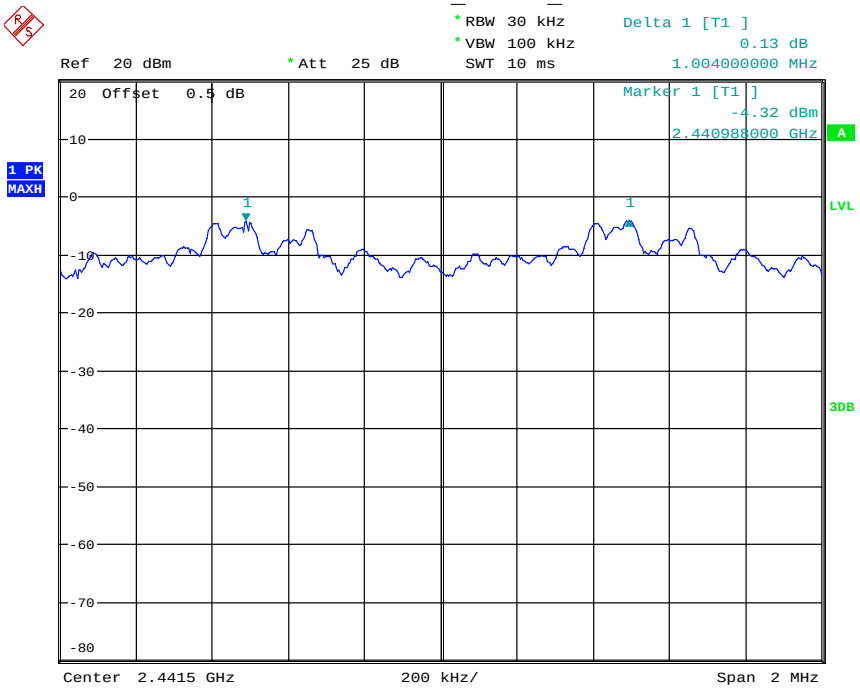
Date: 18.MAY.2019 13:40:47

8DPSK_Low_DH1



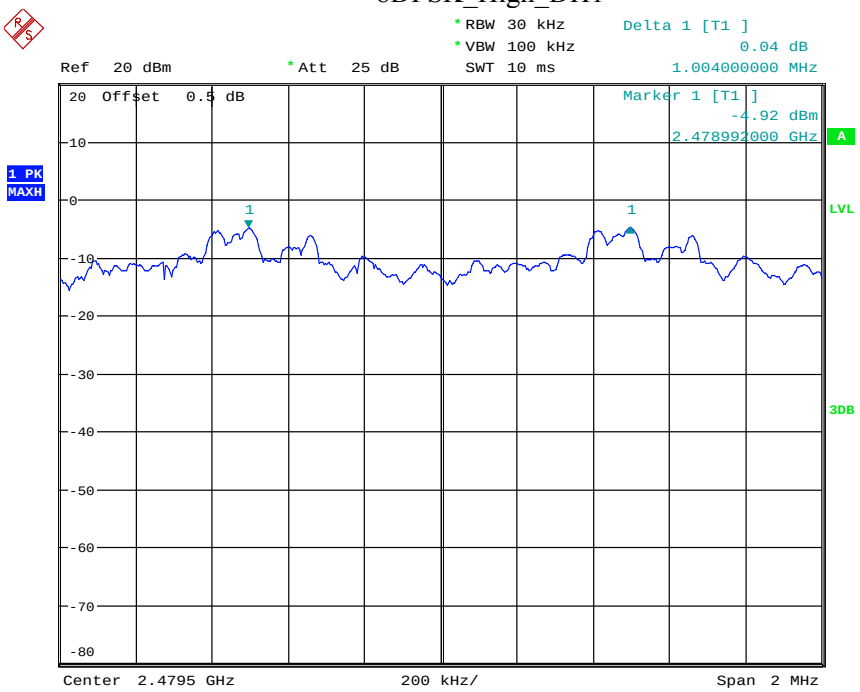
Date: 18.MAY.2019 13:36:51

8DPSK_Middle_DH1



Date: 18.MAY.2019 13:37:38

8DPSK_High_DH1



Date: 18.MAY.2019 13:38:15

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:	26.4 °C
Relative Humidity:	54 %
ATM Pressure:	101.1 kPa

The testing was performed by Elena Lei on 2019-05-18.

Test Result: Compliance.

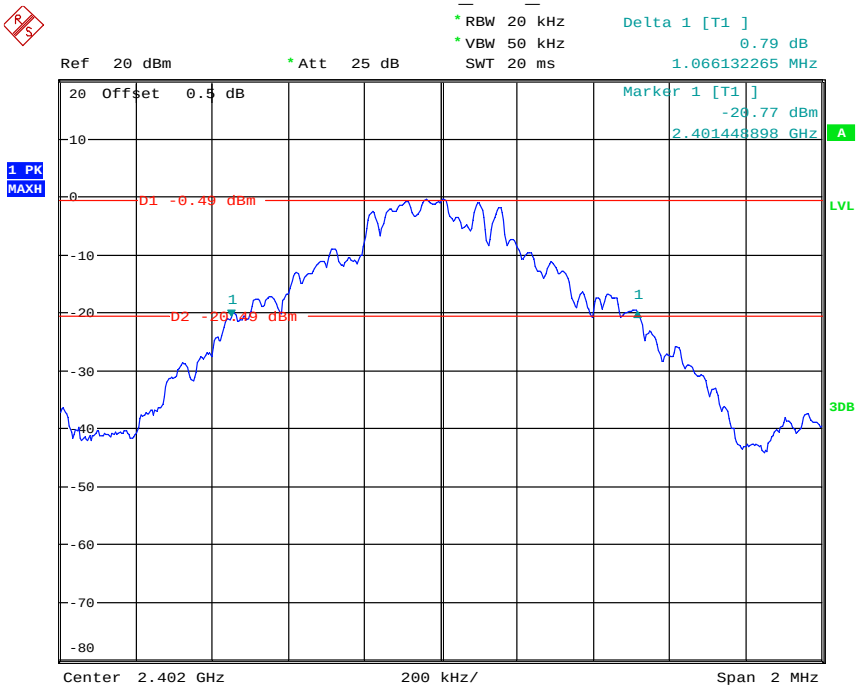
Please refer to following tables and plots

Test Mode: Transmitting
Please refer to following table:

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	Low	2402	1.066
	Middle	2441	1.066
	High	2480	1.066
π/4-DQPSK	Low	2402	1.339
	Middle	2441	1.339
	High	2480	1.343
8-DPSK	Low	2402	1.303
	Middle	2441	1.303
	High	2480	1.303

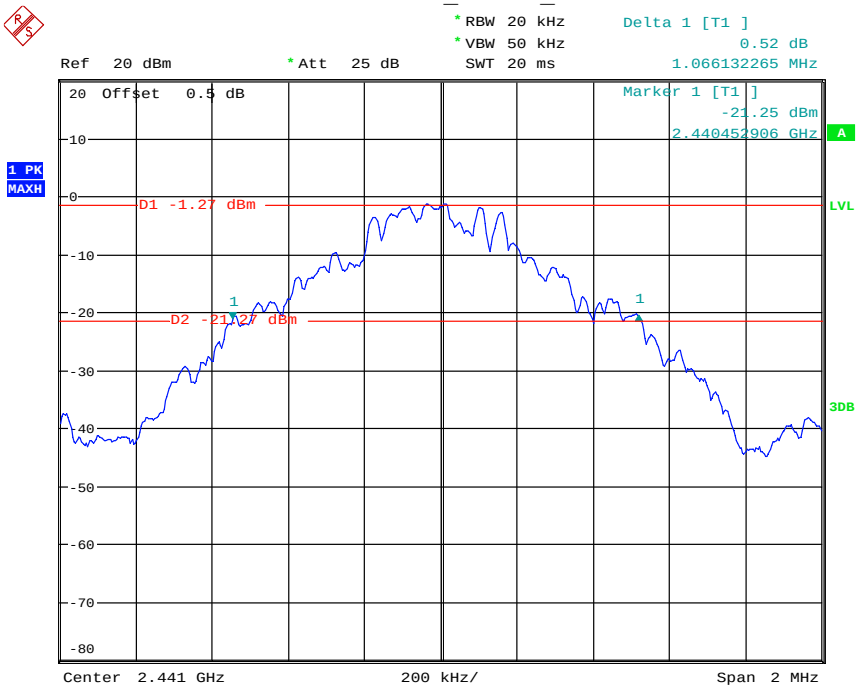
Please refer to following plots:

GFSK_Low_DH1



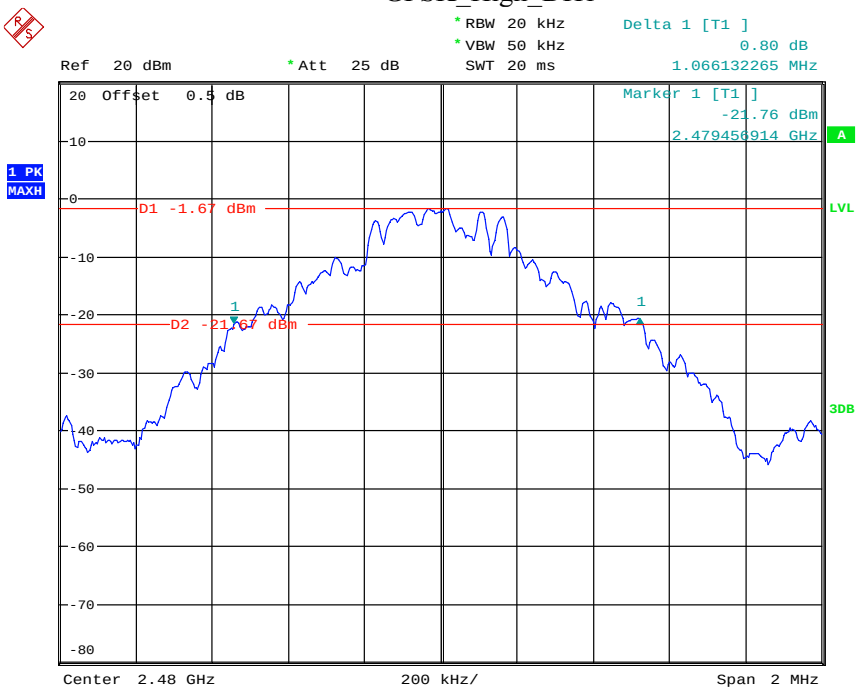
Date: 18.MAY.2019 13:22:42

GFSK_Middle_DH1



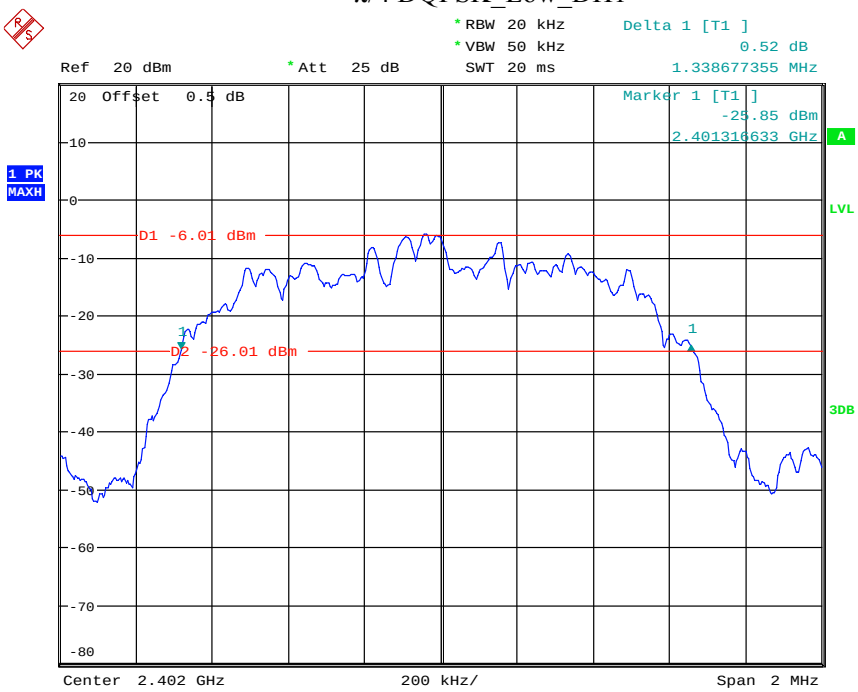
Date: 18.MAY.2019 13:24:31

GFSK_High_DH1



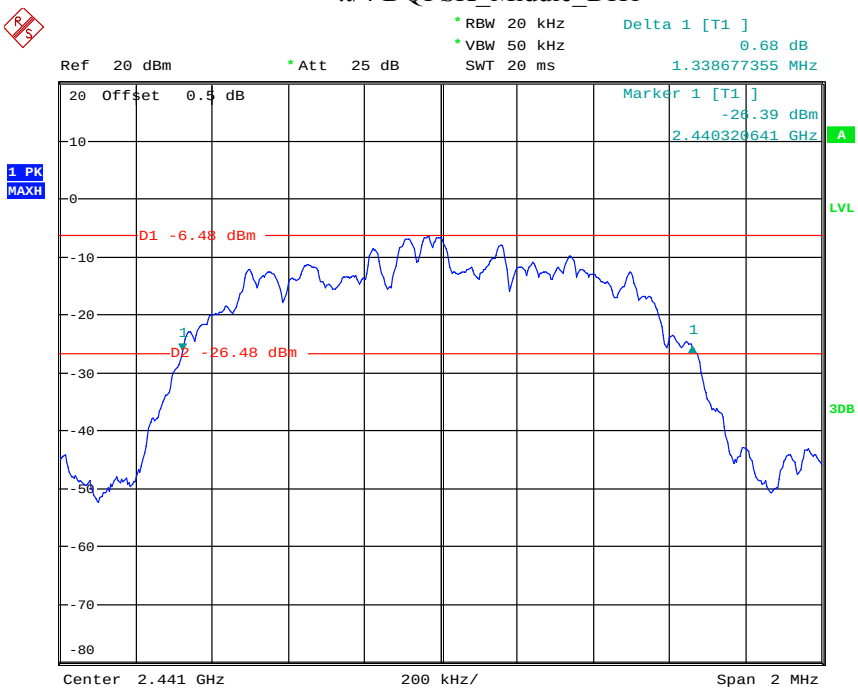
Date: 18.MAY.2019 13:25:33

π/4 DQPSK_Low_DH1



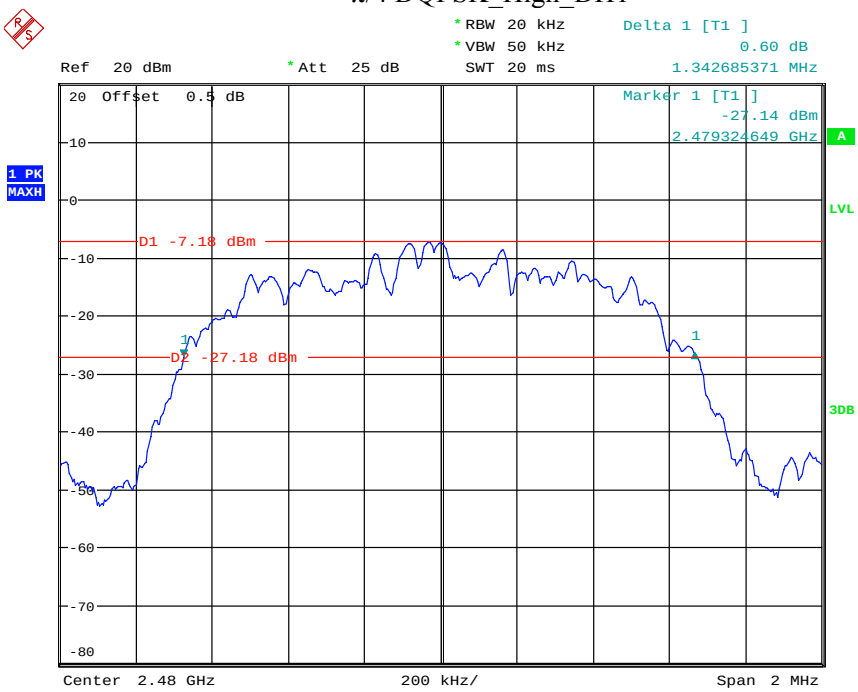
Date: 18.MAY.2019 13:29:03

π/4 DQPSK_Middle_DH1



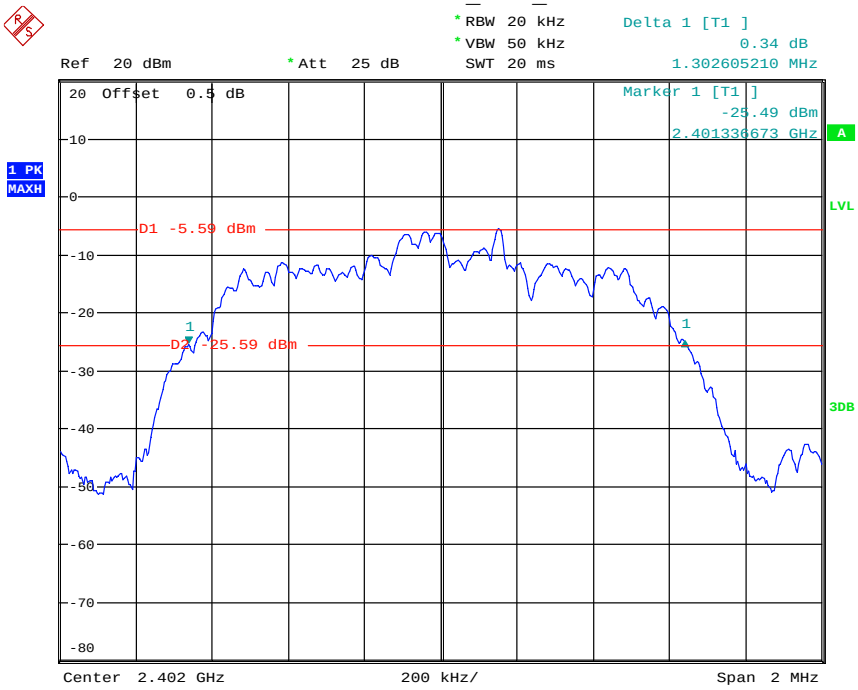
Date: 18.MAY.2019 13:30:43

π/4 DQPSK_High_DH1



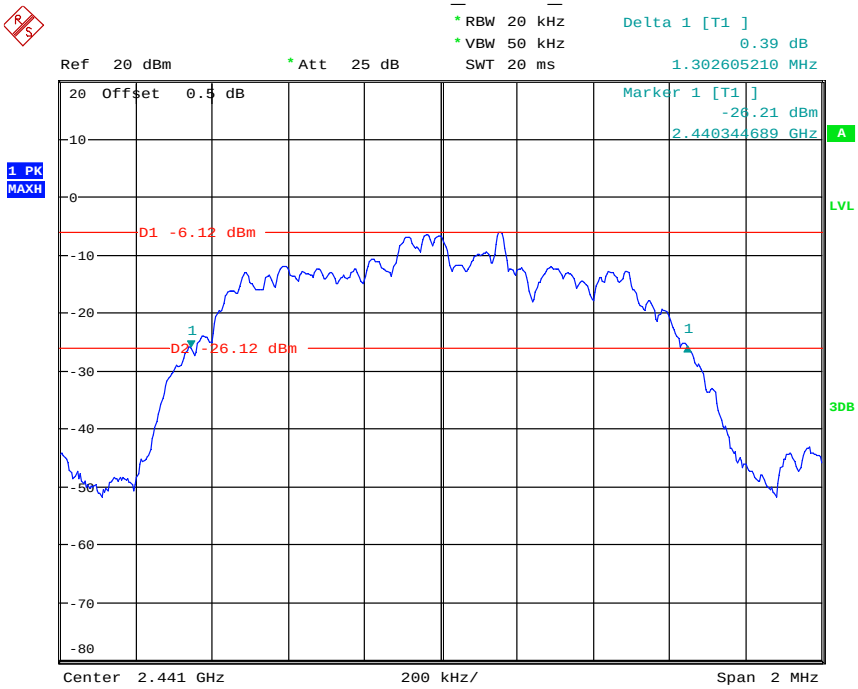
Date: 18.MAY.2019 13:27:18

8DPSK_Low_DH1



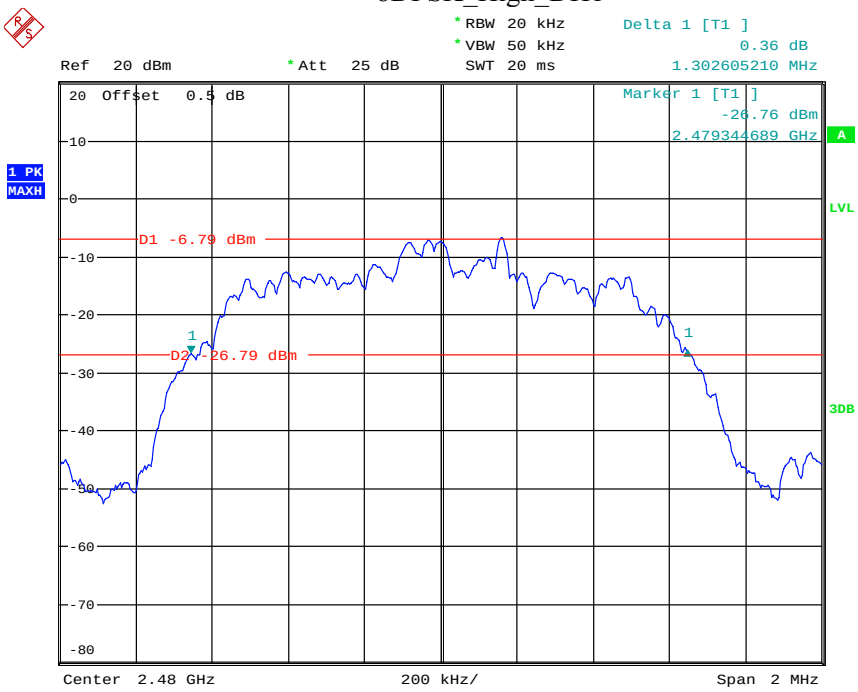
Date: 18.MAY.2019 13:33:04

8DPSK_Middle_DH1



Date: 18.MAY.2019 13:31:58

8DPSK_High_DH1



Date: 18.MAY.2019 13:34:38

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:	26.4 °C
Relative Humidity:	54 %
ATM Pressure:	101.1 kPa

The testing was performed by Elena Lei on 2019-05-18.

Test Result: Compliance.

Please refer to following tables and plots

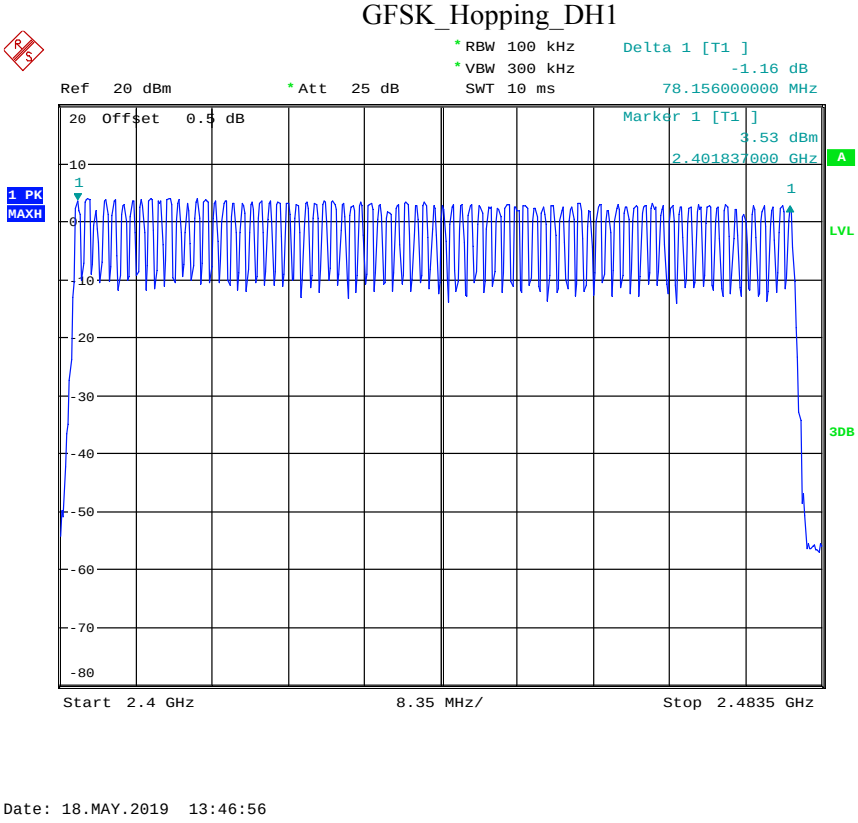
Test Mode: Transmitting

Please refer to following table:

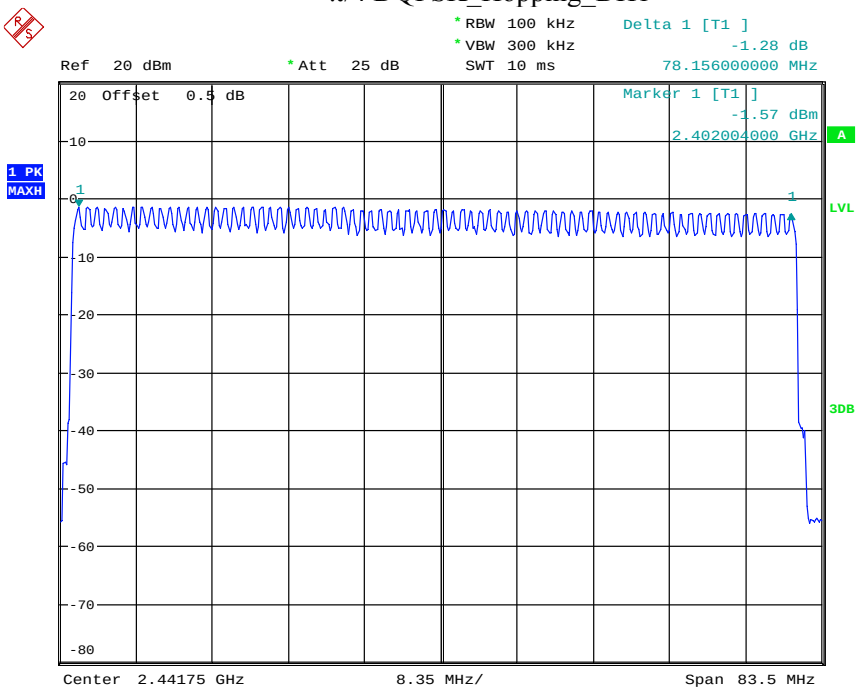
Mode	Frequency Range (MHz)	Number of Hopping Channel	Limit
GFSK	2400-2483.5	79	⩾15
π/4-DQPSK	2400-2483.5	79	
8-DPSK	2400-2483.5	79	

Please refer to following plots:

GFSK_Hopping_DH1

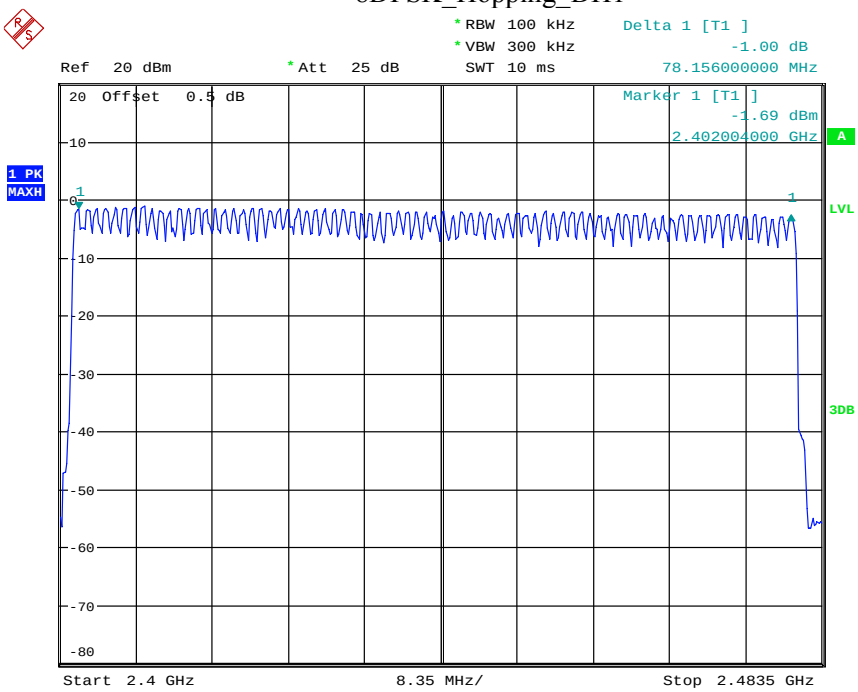


π/4 DQPSK_Hopping_DH1



Date: 18.MAY.2019 14:00:25

8DPSK_Hopping_DH1



Date: 18.MAY.2019 14:04:12

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	C0010/02	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 Data

Environmental Conditions

Temperature:	26.4 °C
Relative Humidity:	54 %
ATM Pressure:	101.1 kPa

The testing was performed by Elena Lei on 2019-05-18.

Test Result: Compliance.

Please refer to following tables and plots

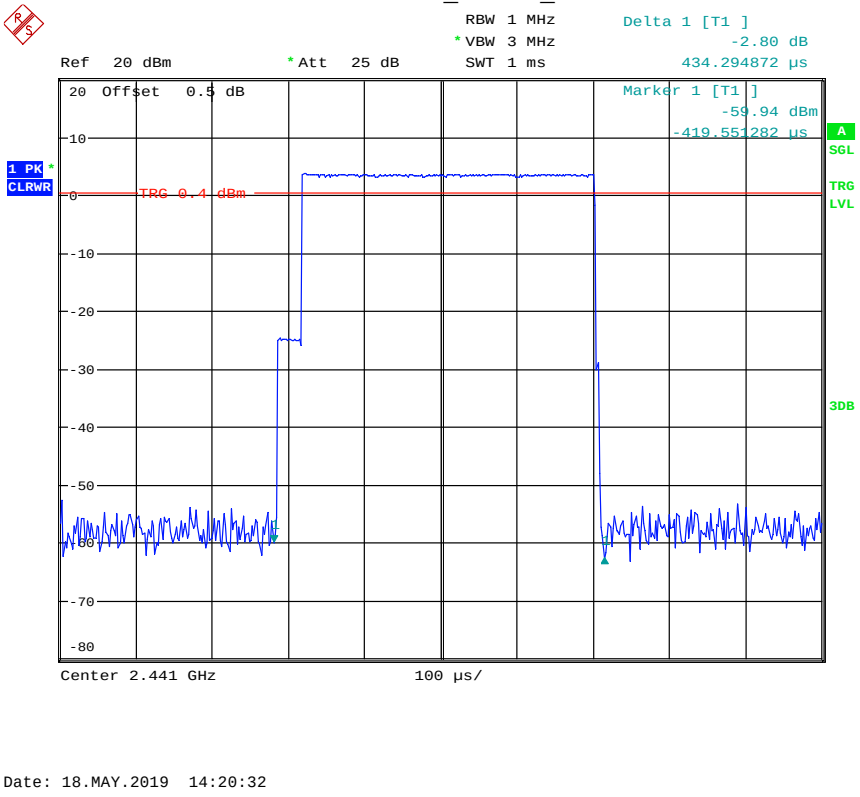
Test Mode: Transmitting

Mode	Packet Type	Channel	Frequency (MHz)	Pulse Width (ms)	Dwell Time (s)	Limit (s)
GFSK	DH1	Middle	2441	0.434	0.139	≤0.4
	DH3	Middle	2441	1.702	0.272	
	DH5	Middle	2441	2.992	0.319	
π/4-DQPSK	2DH1	Middle	2441	0.437	0.140	
	2DH3	Middle	2441	1.713	0.274	
	2DH5	Middle	2441	2.974	0.317	
8-DPSK	3DH1	Middle	2441	0.437	0.140	
	3DH3	Middle	2441	1.713	0.274	
	3DH5	Middle	2441	2.974	0.317	

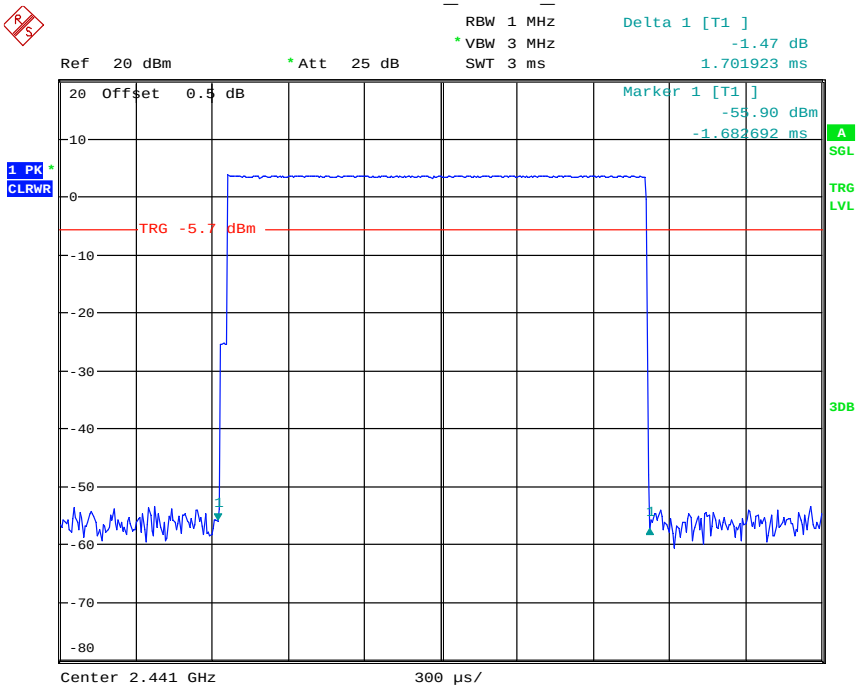
Note: DH1/2DH1/3DH1: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s
DH3/2DH3/3DH3: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s
DH5/2DH5/3DH5: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s

Please refer to following plots:

GFSK_Middle_DH1

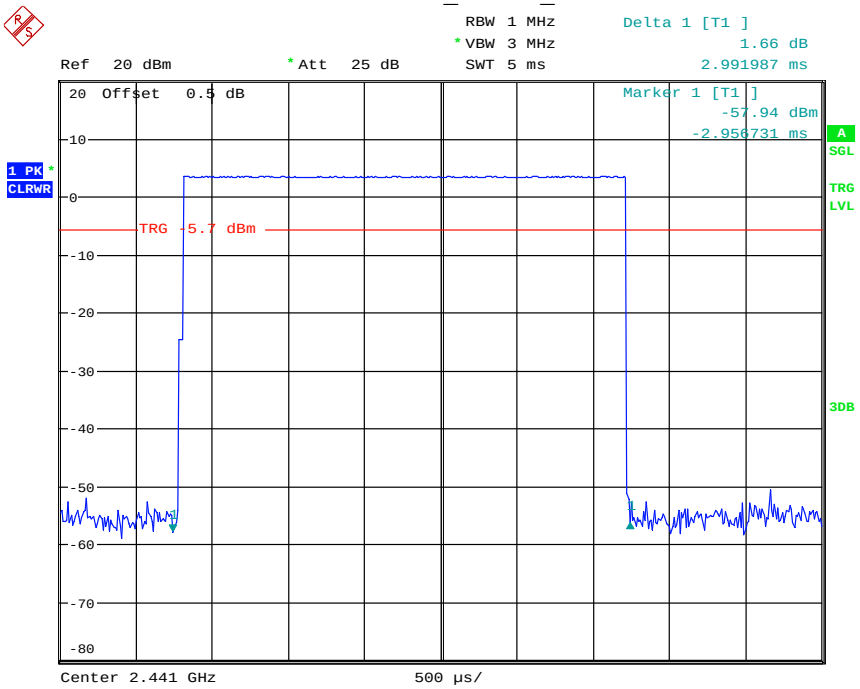


GFSK_Middle_DH3



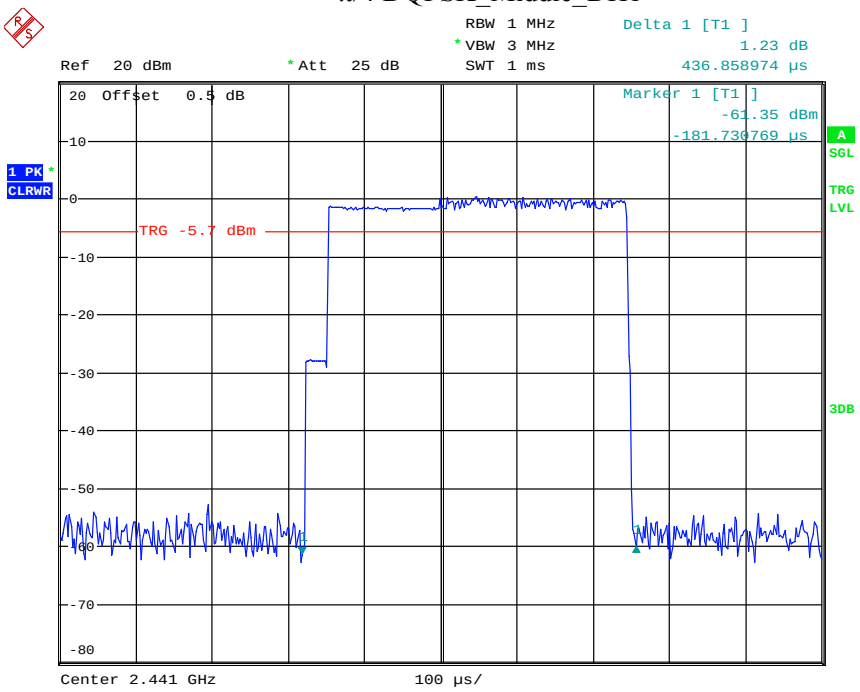
Date: 18.MAY.2019 14:27:22

GFSK_Middle_DH5



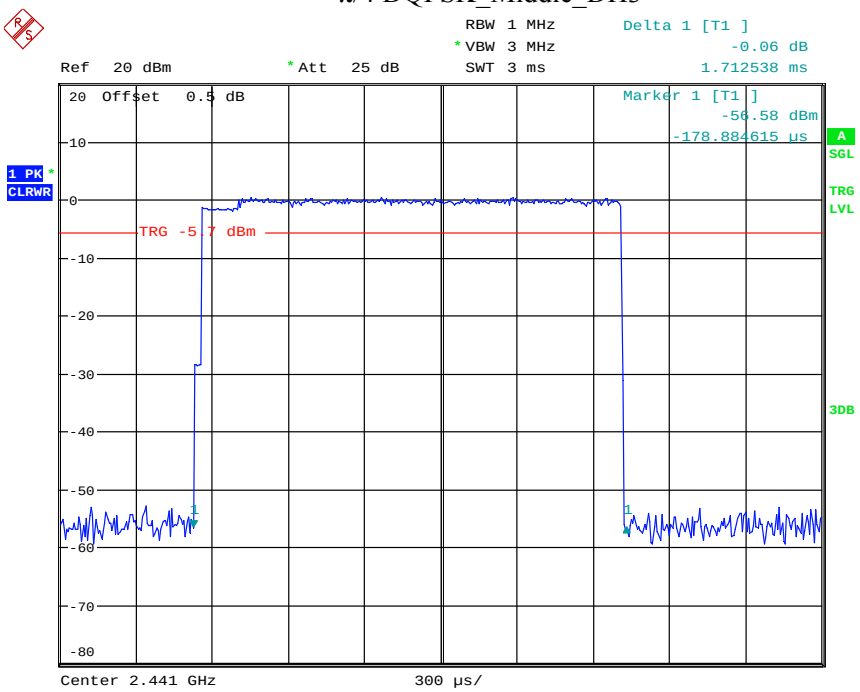
Date: 18.MAY.2019 14:28:26

π/4 DQPSK_Middle_DH1



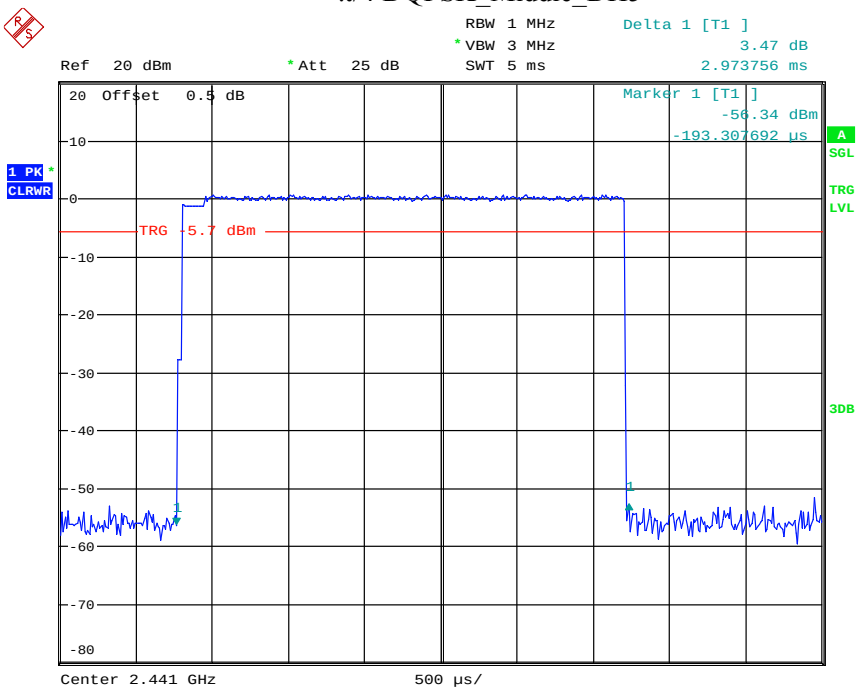
Date: 18.MAY.2019 14:21:54

π/4 DQPSK_Middle_DH3



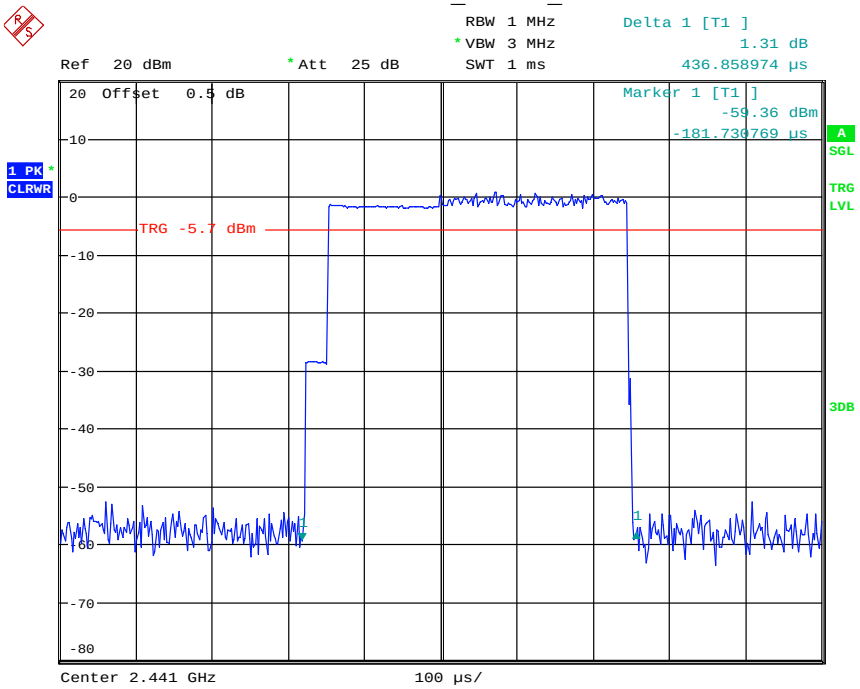
Date: 18.MAY.2019 14:24:37

π/4 DQPSK_Middle_DH5



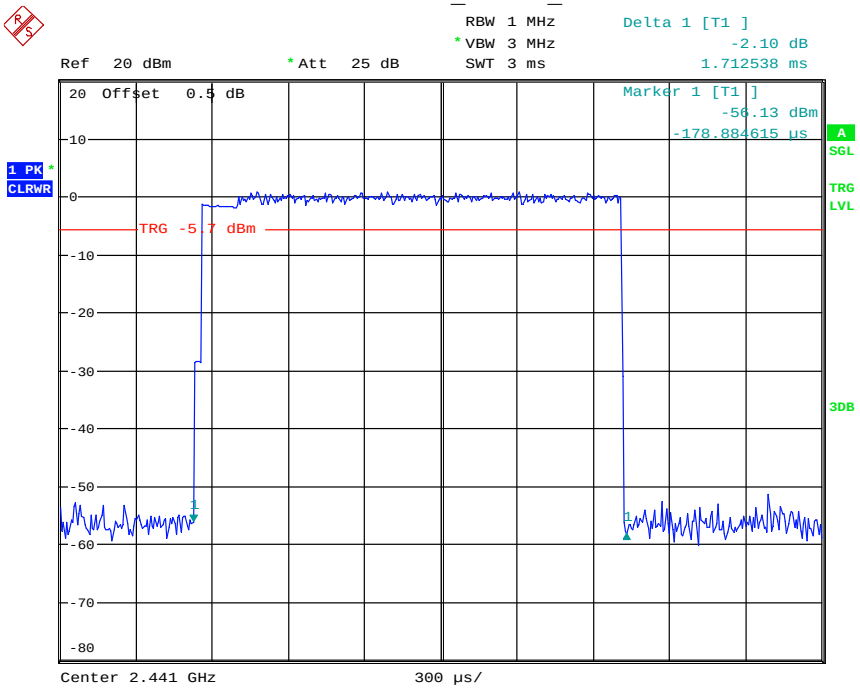
Date: 18.MAY.2019 14:31:35

8DPSK_Middle_DH1



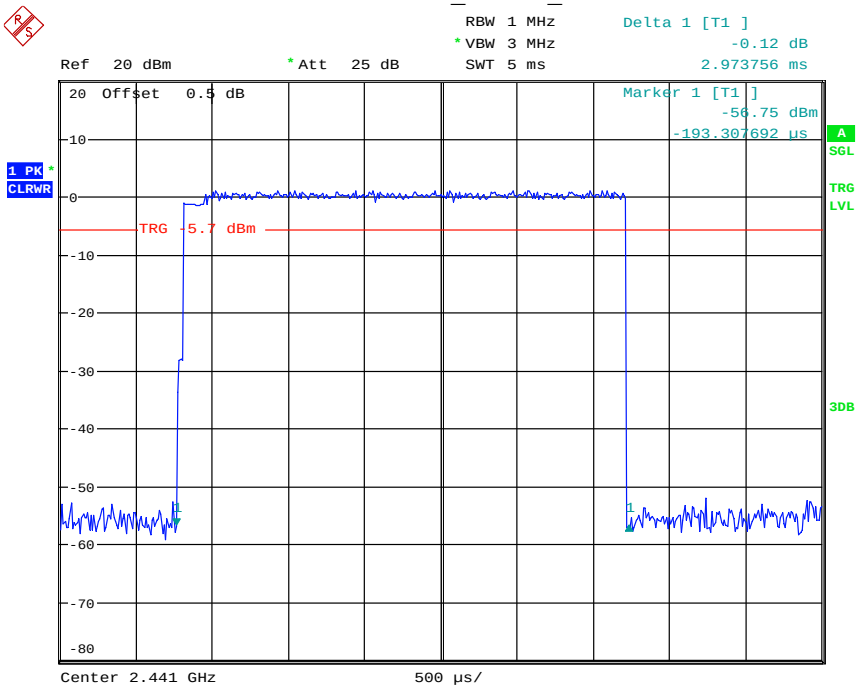
Date: 18.MAY.2019 14:22:49

8DPSK_Middle_DH3



Date: 18.MAY.2019 14:24:05

8DPSK_Middle_DH5



Date: 18.MAY.2019 14:30:36

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:	26.4 °C
Relative Humidity:	54 %
ATM Pressure:	101.1 kPa

The testing was performed by Elena Lei on 2019-05-18.

Test Result: Compliance.

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Peak Conducted Output power (dBm)	Limit (dBm)
GFSK	Low	2402	5.17	⩽21
	Middle	2441	4.46	
	High	2480	3.97	
π/4-DQPSK	Low	2402	2.05	
	Middle	2441	1.52	
	High	2480	0.78	
8-DPSK	Low	2402	2.52	
	Middle	2441	2.00	
	High	2480	1.30	

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

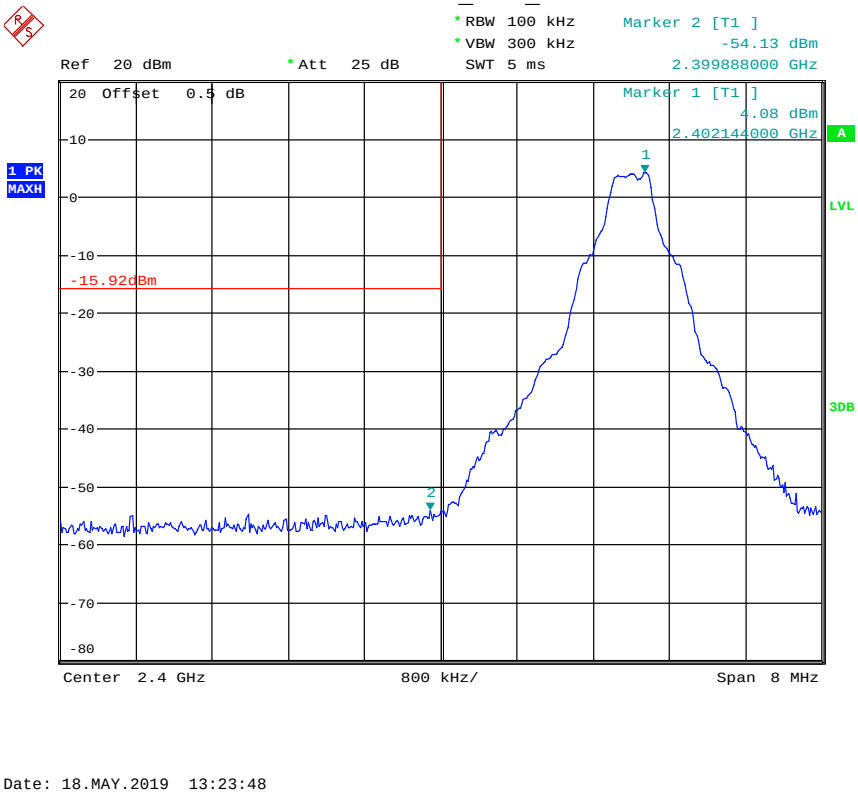
Environmental Conditions

Temperature:	26.4 °C
Relative Humidity:	54 %
ATM Pressure:	101.1 kPa

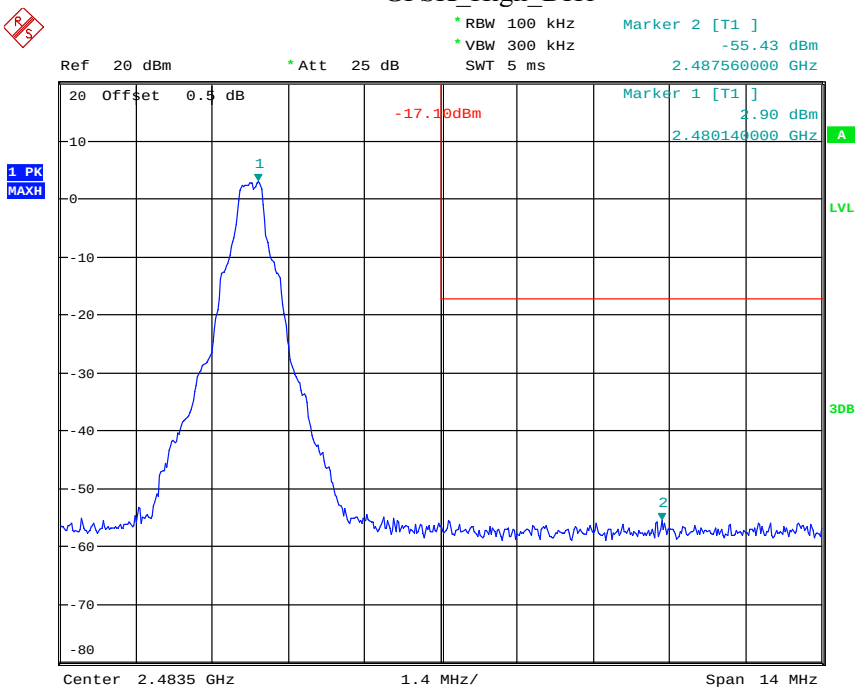
The testing was performed by Elena Lei on 2019-05-18.

Test Result: Compliance
Please refer to following plots:

GFSK_Low_DH1

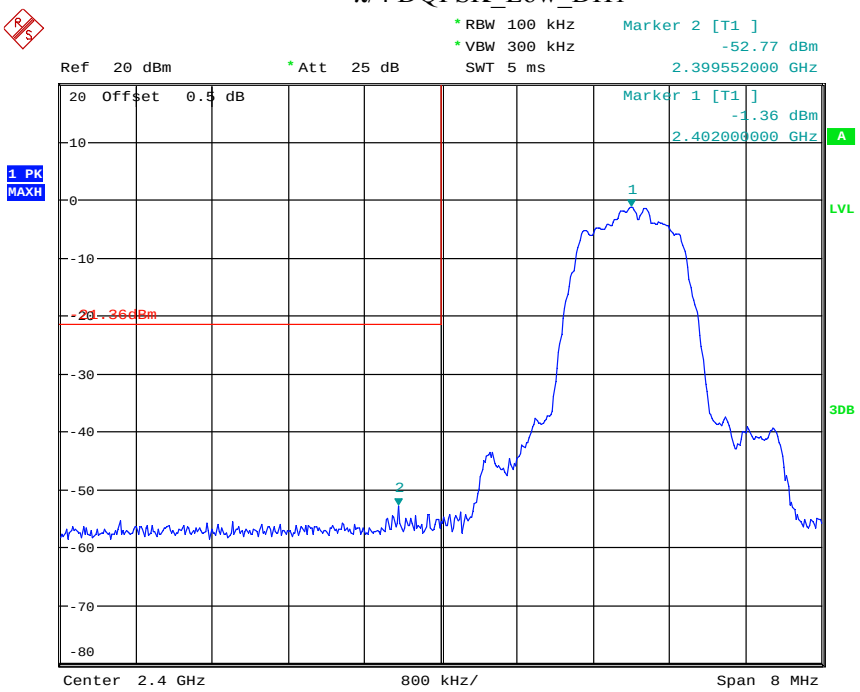


GFSK_High_DH1



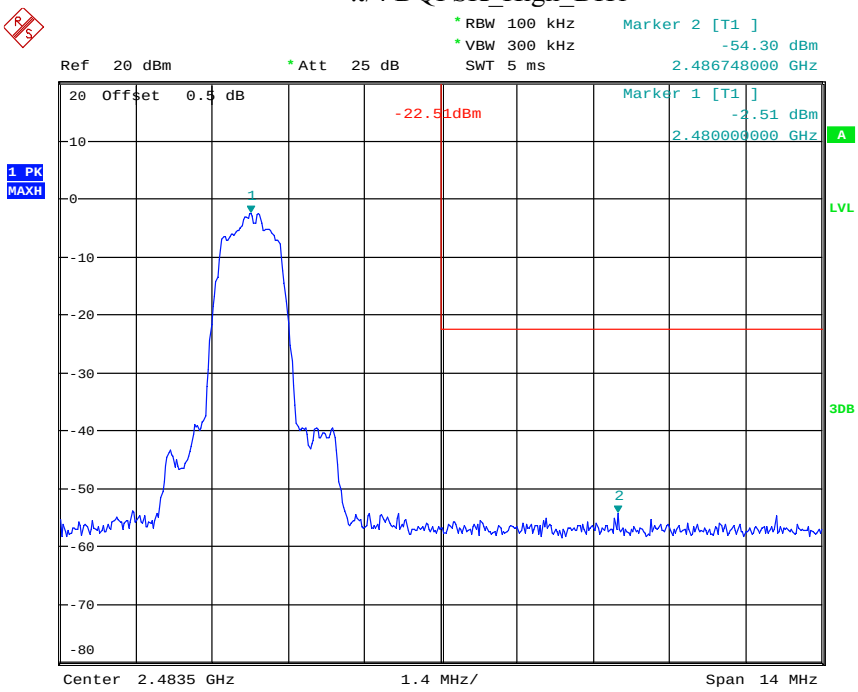
Date: 18.MAY.2019 13:26:28

π/4 DQPSK_Low_DH1



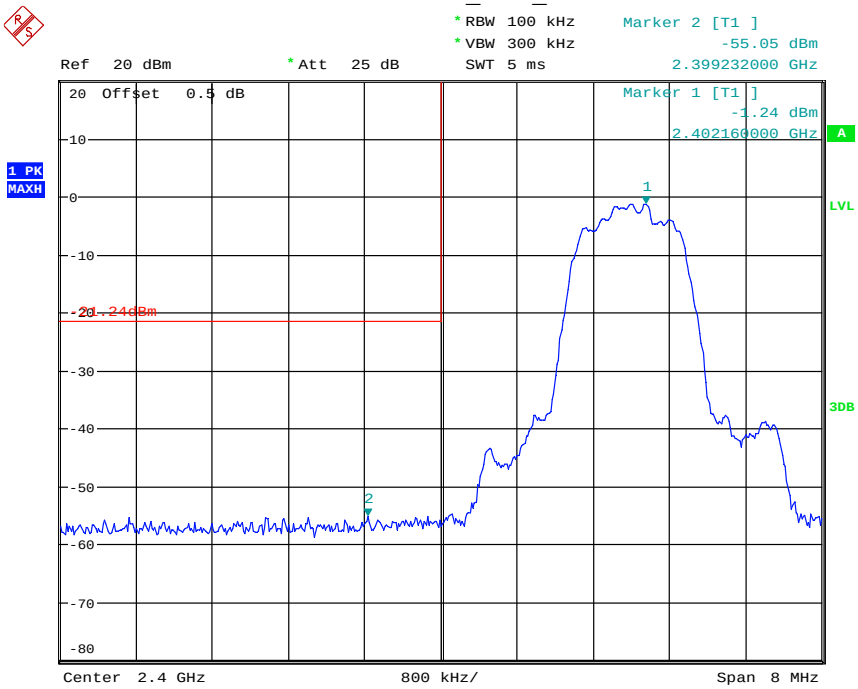
Date: 18.MAY.2019 13:30:05

π/4 DQPSK_High_DH1



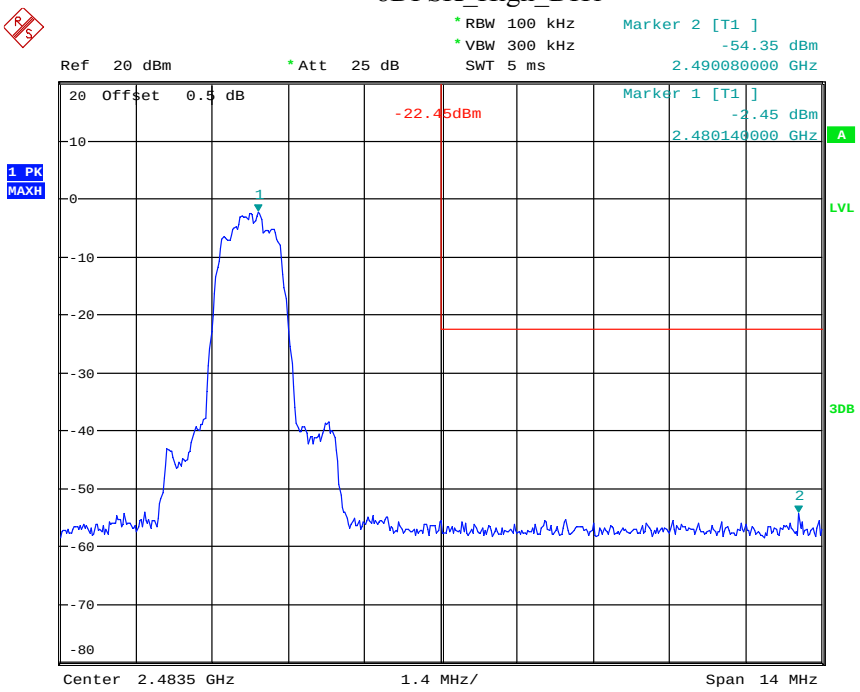
Date: 18.MAY.2019 13:28:30

8DPSK_Low_DH1



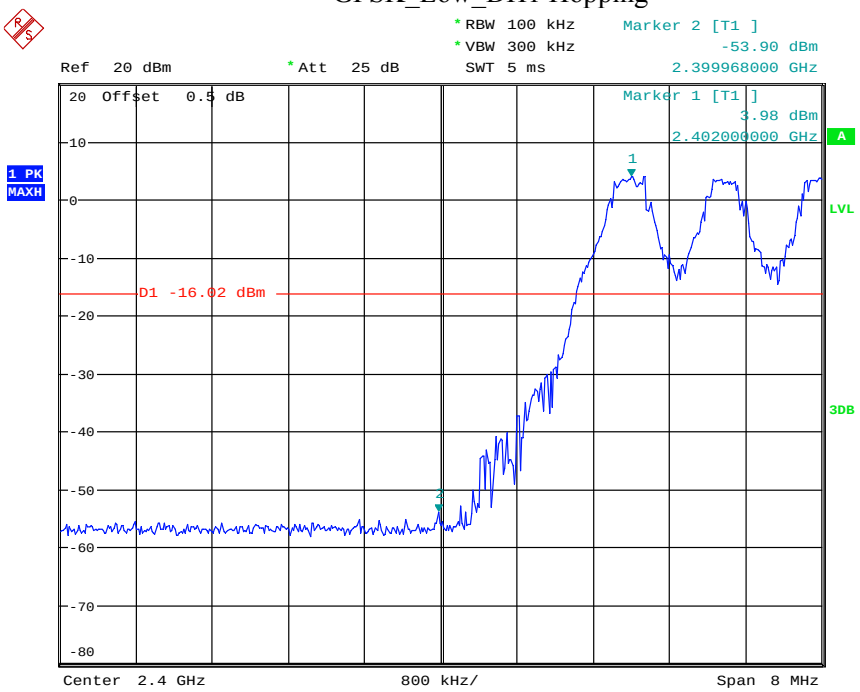
Date: 18.MAY.2019 13:34:05

8DPSK_High_DH1



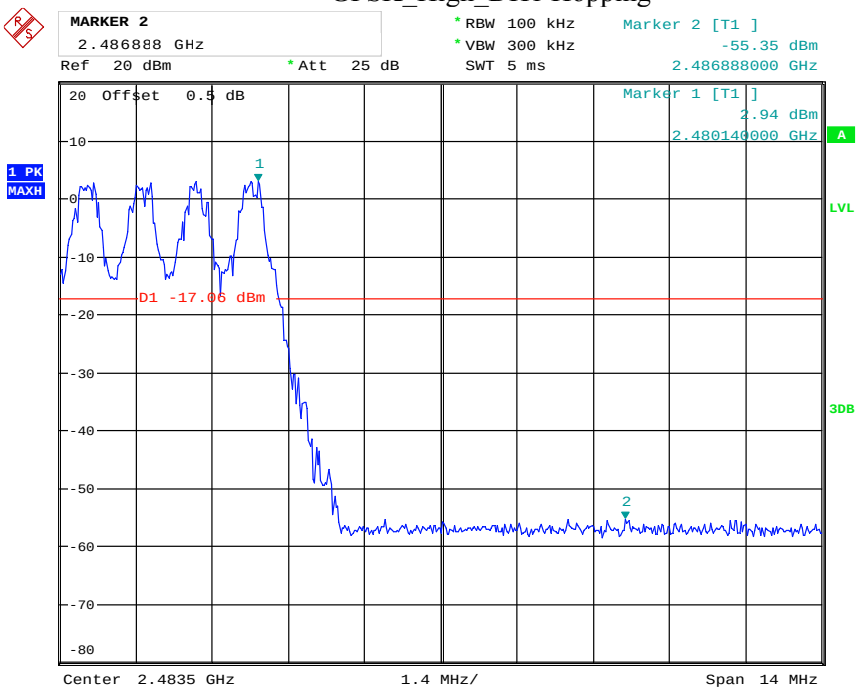
Date: 18.MAY.2019 13:35:47

GFSK_Low_DH1 Hopping



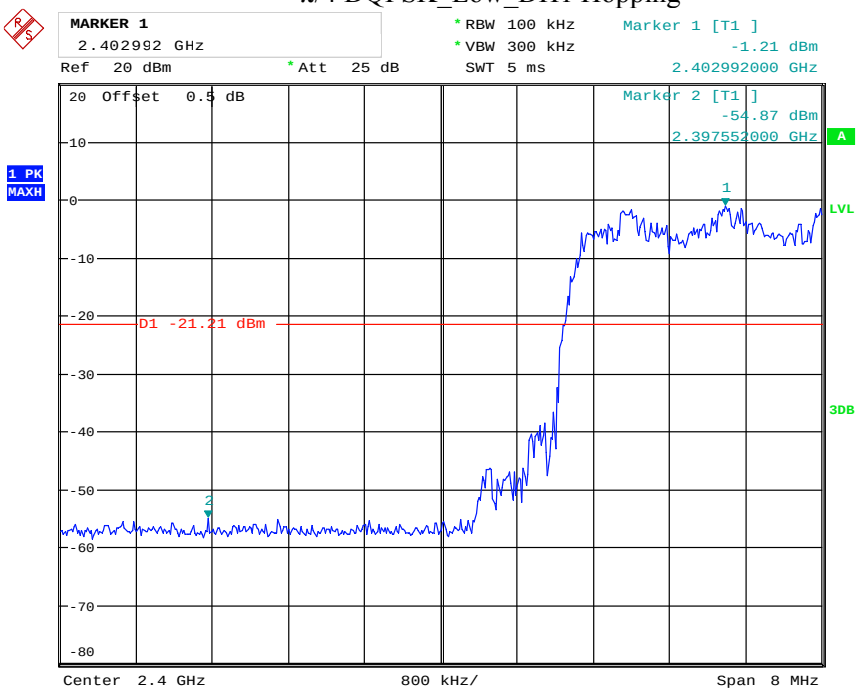
Date: 18.MAY.2019 14:49:21

GFSK_High_DH1 Hopping



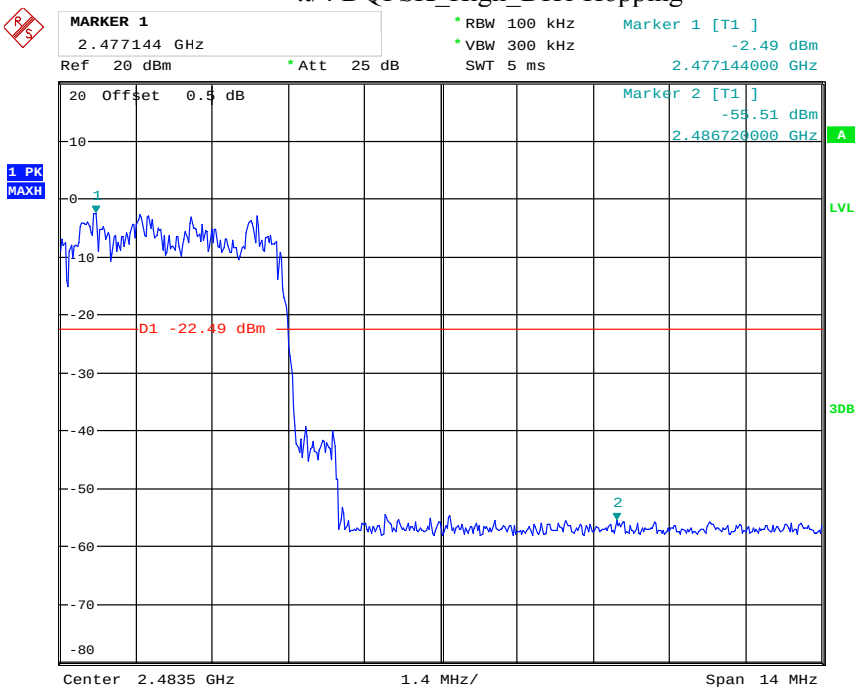
Date: 18.MAY.2019 14:51:48

π/4 DQPSK_Low_DH1 Hopping



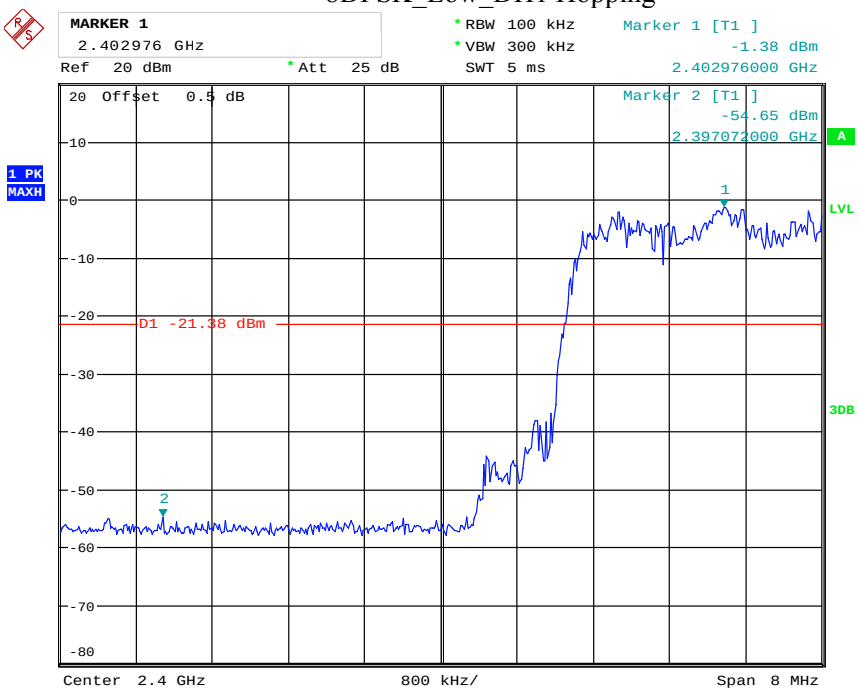
Date: 18.MAY.2019 14:54:19

π/4 DQPSK_High_DH1 Hopping



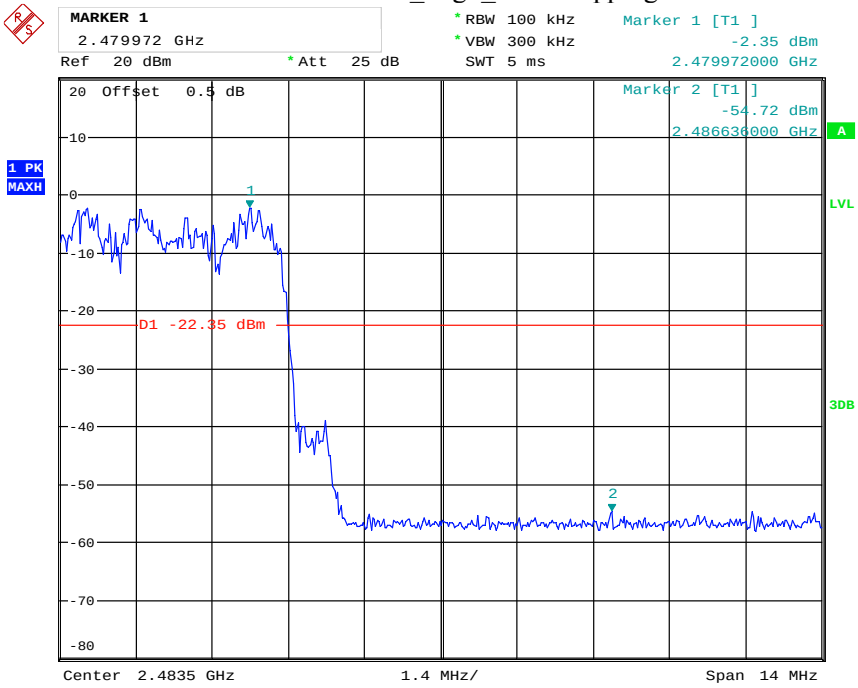
Date: 18.MAY.2019 14:53:25

8DPSK_Low_DH1 Hopping



Date: 18.MAY.2019 14:56:13

8DPSK_High_DH1 Hopping



Date: 18.MAY.2019 14:57:51

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