FCC REPORT

(Bluetooth)

Applicant: LALTITUDE LLC

Address of Applicant: 17128 COLIMA RD. #209 HACIENDA HEIGHTS, CA 91745 USA

Equipment Under Test (EUT)

Product Name: SB340 USB ADAPTER

Model No.: SB340

Trade mark: SOUNDBOT

FCC ID: 2AKVO-SB340

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 05 Jan., 2017

Date of Test: 05 Jan., 2017 to 11 Jan., 2017

Date of report issued: 11 Jan., 2017

Test Result: PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*11 Jan., 2017*	*Original*

Tested by: Carey Chen ***Date:*** *11 Jan., 2017*

Test Engineer

Reviewed by: RYan.Lee ***Date:*** *11 Jan., 2017*

Project Engineer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

Pass: The EUT complies with the essential requirements in the standard.

Test according to ANSI C 63.4-2014 and ANSI C 63.10-2013

5 General Information

5.1 Client Information

Applicant:	LALTITUDE LLC
Address of Applicant:	17128 COLIMA RD. #209 HACIENDA HEIGHTS, CA 91745 USA
Manufacturer/Factory:	LALTITUDE LLC
Address of Manufacturer/Factory:	17128 COLIMA RD. #209 HACIENDA HEIGHTS, CA 91745 USA

5.2 General Description of E.U.T.

Product Name:	SB340 USB ADAPTER
Model No.:	SB340
Operation Frequency:	2402MHz~2480MHz
Transfer rate:	1/2/3 Mbits/s
Number of channel:	79
Modulation type:	GFSK, π/4-DQPSK, 8DPSK
Modulation technology:	FHSS
Antenna Type:	PCB Antenna
Antenna gain:	1.0 dBi
Power supply:	DC 5V powered by USB port

Operation Frequency each of channel for GFSK, π/4-DQPSK, 8DPSK							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
4	2406MHz	24	2426MHz	44	2446MHz	64	2466MHz
5	2407MHz	25	2427MHz	45	2447MHz	65	2467MHz
6	2408MHz	26	2428MHz	46	2448MHz	66	2468MHz
7	2409MHz	27	2429MHz	47	2449MHz	67	2469MHz
8	2410MHz	28	2430MHz	48	2450MHz	68	2470MHz
9	2411MHz	29	2431MHz	49	2451MHz	69	2471MHz
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
12	2414MHz	32	2434MHz	52	2454MHz	72	2474MHz
13	2415MHz	33	2435MHz	53	2455MHz	73	2475MHz
14	2416MHz	34	2436MHz	54	2456MHz	74	2476MHz
15	2417MHz	35	2437MHz	55	2457MHz	75	2477MHz
16	2418MHz	36	2438MHz	56	2458MHz	76	2478MHz
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		
Remark: Channel 0, 39 &78 selected for GFSK, π/4-DQPSK and 8DPSK.							

5.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with worst case data rate.
Remark	GFSK (1 Mbps) is the worst case mode.
The sample was placed 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground plane of 3m chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working with a fresh battery, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

5.4 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
DELL	PC	OPTIPLEX745	N/A	DoC
DELL	MONITOR	E178FPC	N/A	DoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in out files. Registration 817957, February 27, 2012.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

5.8 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-25-2016	03-25-2017
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-25-2016	03-25-2017
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2016	03-31-2017
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2016	03-31-2017
6	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	04-01-2016	03-31-2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2016	03-31-2017
8	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-28-2016	03-28-2017
9	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-28-2016	03-28-2017
10	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2016	03-31-2017
11	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
12	Coaxial Cable	N/A	N/A	CCIS0018	04-01-2016	03-31-2017
13	Coaxial Cable	N/A	N/A	CCIS0020	04-01-2016	03-31-2017

Conducted Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	08-23-2014	08-22-2017
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-24-2016	03-24-2017
3	LISN	CHASE	MN2050D	CCIS0074	03-26-2016	03-26-2017
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2016	03-31-2017
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

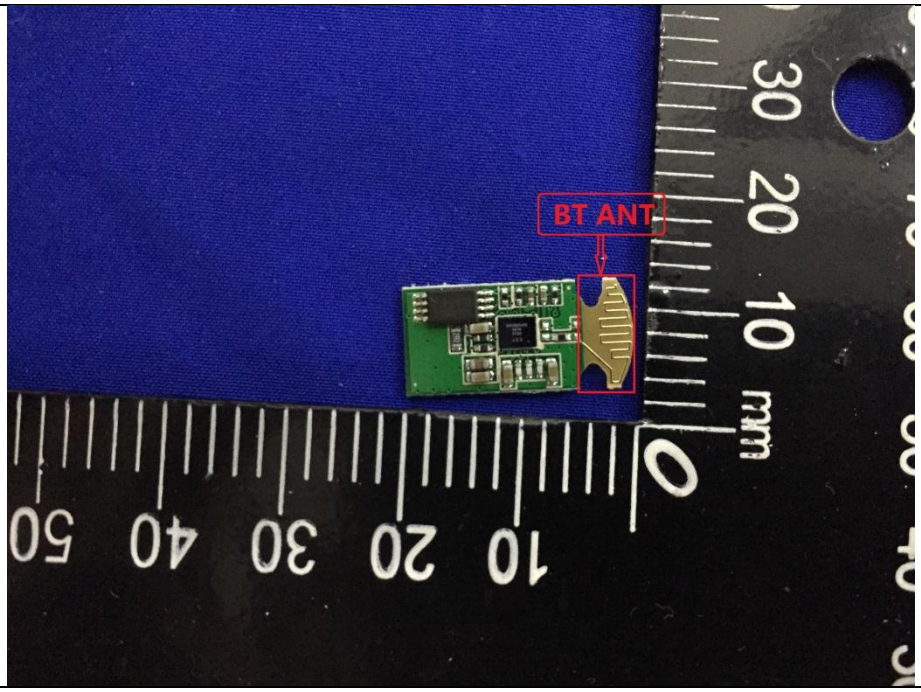
6.1 Antenna requirement

Standard requirement:	FCC Part 15 C Section 15.203 /247(c)

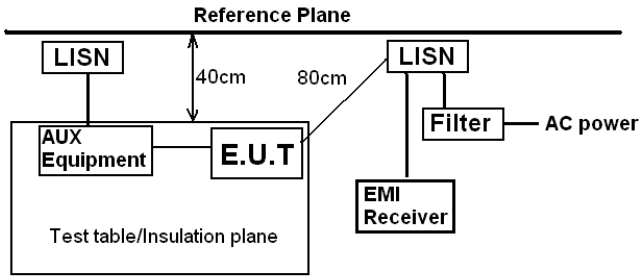
15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer 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.
15.247(c) (1)(i) requirement:
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:	

The Bluetooth antenna is an integral antenna which permanently attached, and the best case gain of the antenna is 1.0 dBi.

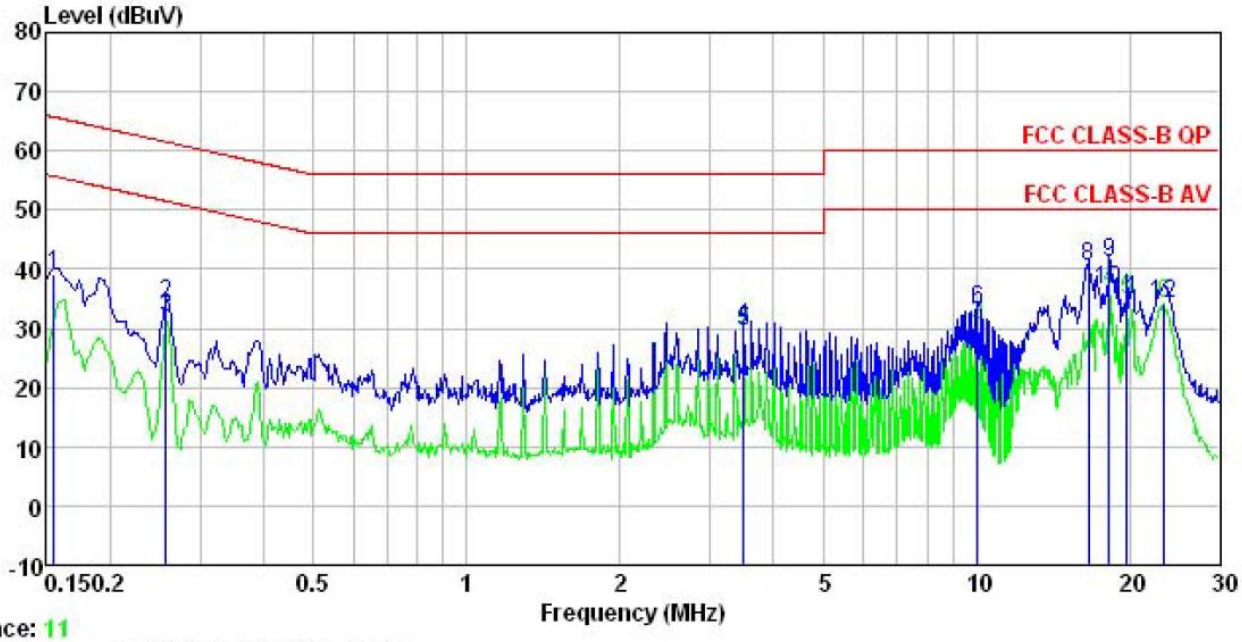


6.2 Conducted Emissions

Test Requirement:	FCC Part 15 C Section 15.207		
Test Method:	ANSI C63.4:2014		
Test Frequency Range:	150 kHz to 30 MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*		
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.		
Test Instruments:	Refer to section 5.7 for details		
Test mode:	Bluetooth (Continuous transmitting) mode		
Test results:	Pass		

Measurement Data:

Line:



Trace: 11

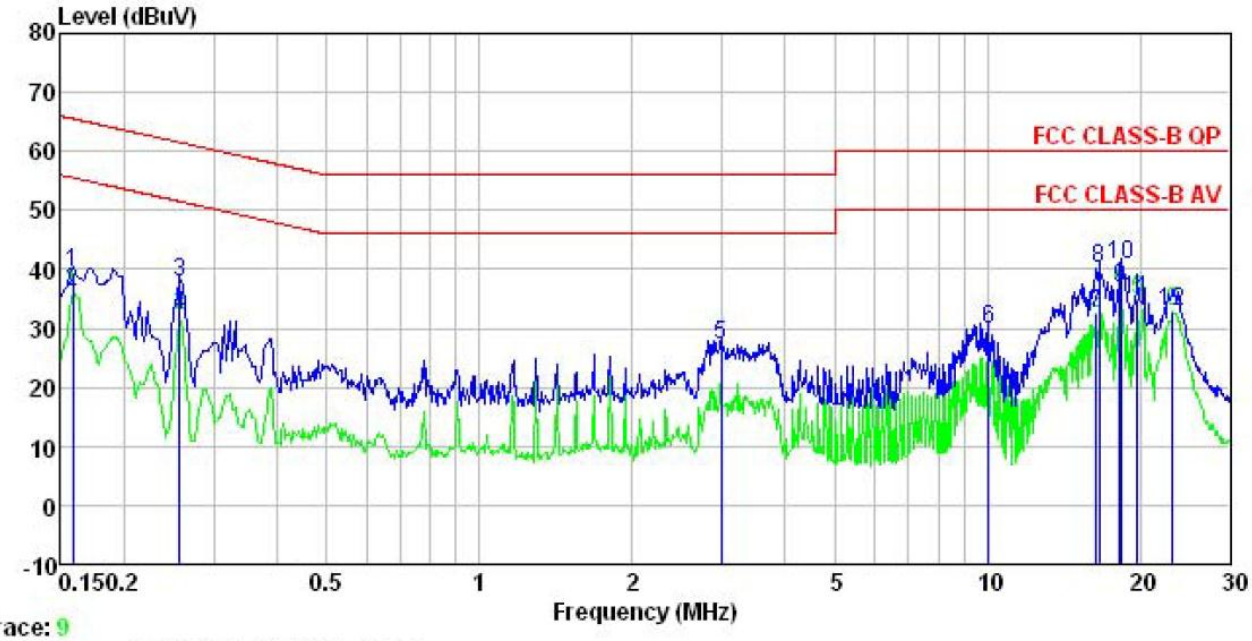
Site : CCIS Shielding Room
Condition : FCC CLASS-B QP LISN LINE
EUT : SB340 USB ADAPTER
Model : SB340
Test Mode : BT Mode
Power Rating : AC 120/60Hz
Environment : Temp: 23 ℃ Huni:56% Atmos:101KPa
Test Engineer: Carey
Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.155	28.20	0.14	10.78	39.12	65.74	-26.62	QP
2	0.258	23.35	0.16	10.75	34.26	61.51	-27.25	QP
3	0.258	20.86	0.16	10.75	31.77	51.51	-19.74	Average
4	3.491	19.02	0.34	10.90	30.26	56.00	-25.74	QP
5	3.491	18.17	0.34	10.90	29.41	46.00	-16.59	Average
6	10.072	21.83	0.30	10.94	33.07	60.00	-26.93	QP
7	10.072	19.39	0.30	10.94	30.63	50.00	-19.37	Average
8	16.573	29.24	0.28	10.91	40.43	60.00	-19.57	QP
9	18.232	29.95	0.31	10.91	41.17	60.00	-18.83	QP
10	18.232	25.18	0.31	10.91	36.40	50.00	-13.60	Average
11	19.740	23.46	0.33	10.93	34.72	50.00	-15.28	Average
12	23.387	22.81	0.35	10.89	34.05	50.00	-15.95	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

Neutral:



Trace: 9

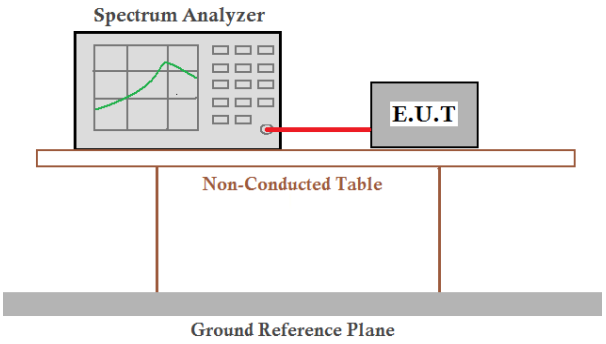
Site : CCIS Shielding Room
Condition : FCC CLASS-B QP LISN NEUTRAL
EUT : SB340 USB ADAPTER
Model : SB340
Test Mode : BT Mode
Power Rating : AC 120/60Hz
Environment : Temp: 23 ℃ Huni:56% Atmos:101KPa
Test Engineer: Carey
Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.158	28.51	0.13	10.78	39.42	65.56	-26.14	QP
2	0.158	25.31	0.13	10.78	36.22	55.56	-19.34	Average
3	0.258	26.80	0.17	10.75	37.72	61.51	-23.79	QP
4	0.258	21.14	0.17	10.75	32.06	51.51	-19.45	Average
5	2.993	15.85	0.31	10.92	27.08	56.00	-28.92	QP
6	10.072	18.55	0.24	10.94	29.73	60.00	-30.27	QP
7	16.398	21.41	0.27	10.91	32.59	50.00	-17.41	Average
8	16.573	29.04	0.27	10.91	40.22	60.00	-19.78	QP
9	18.232	25.75	0.27	10.91	36.93	50.00	-13.07	Average
10	18.328	29.79	0.27	10.91	40.97	60.00	-19.03	QP
11	19.740	23.76	0.28	10.93	34.97	50.00	-15.03	Average
12	23.140	21.64	0.25	10.89	32.78	50.00	-17.22	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

6.3 Conducted Output Power

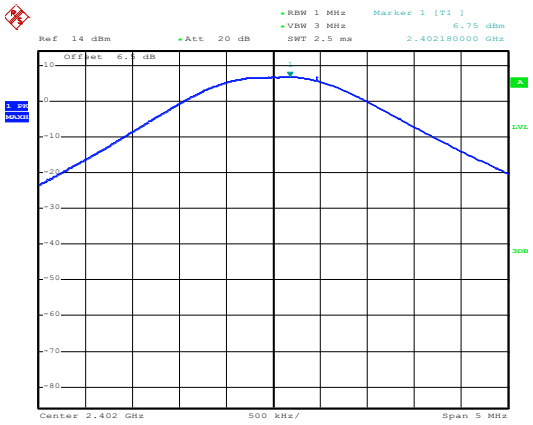
Test Requirement:	FCC Part 15 C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz) RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz)
Limit:	125 mW(21 dBm)
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

Measurement Data:

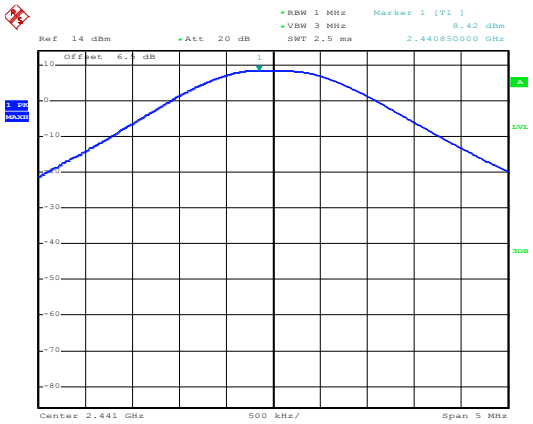
GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	6.75	21.00	Pass
Middle	8.42	21.00	Pass
Highest	8.79	21.00	Pass
π/4-DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	4.87	21.00	Pass
Middle	6.92	21.00	Pass
Highest	7.26	21.00	Pass
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	5.24	21.00	Pass
Middle	7.19	21.00	Pass
Highest	7.74	21.00	Pass

Test plot as follows:

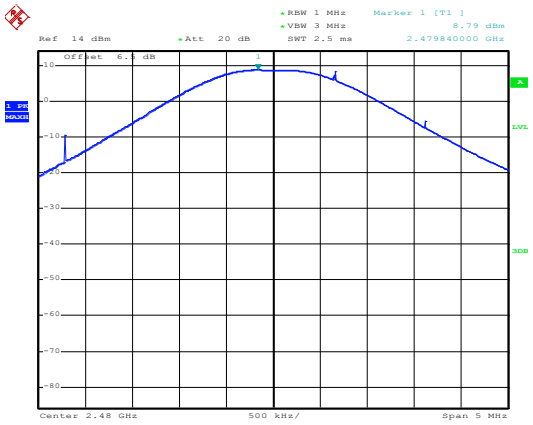
Modulation mode: GFSK



Lowest channel

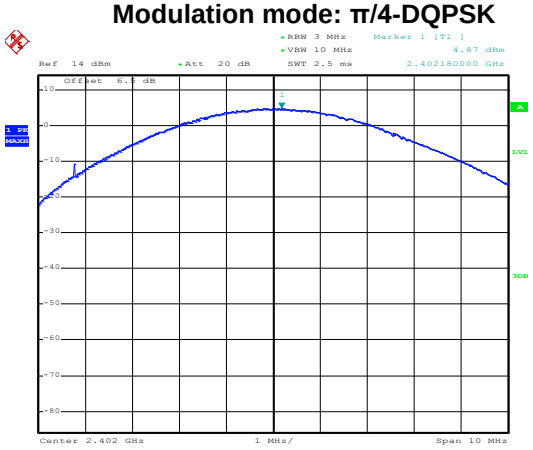


Middle channel



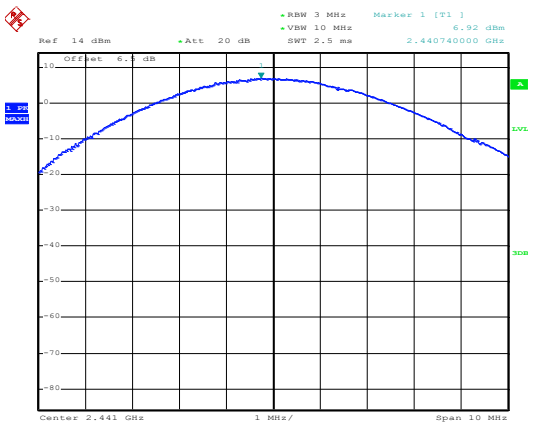
Highest channel

Modulation mode: π/4-DQPSK



Date: 4.JAN.2017 10:16:41

Lowest channel



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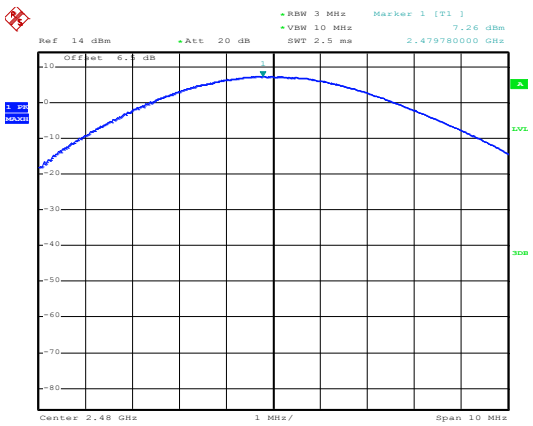
Middle channel



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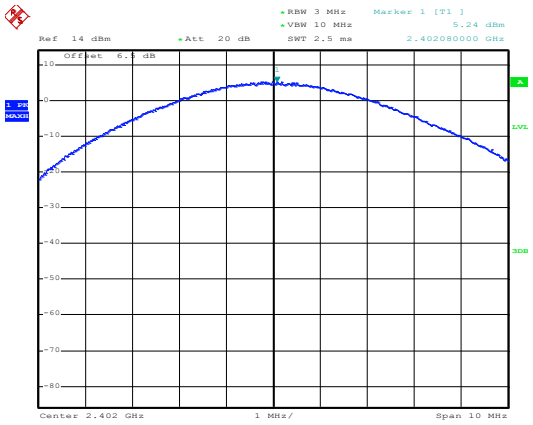
Highest channel

Modulation mode: 8DPSK



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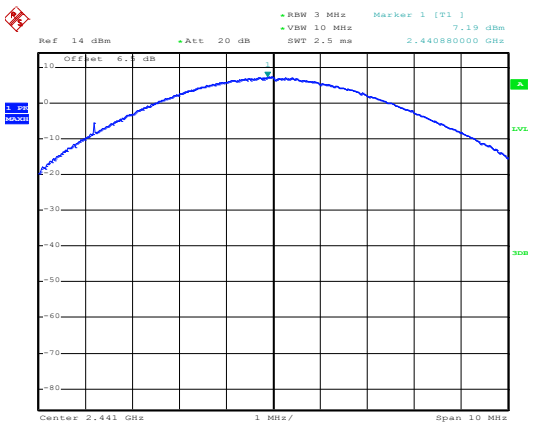
Lowest channel



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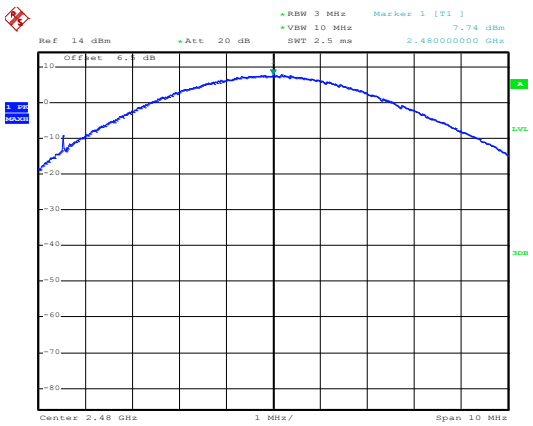
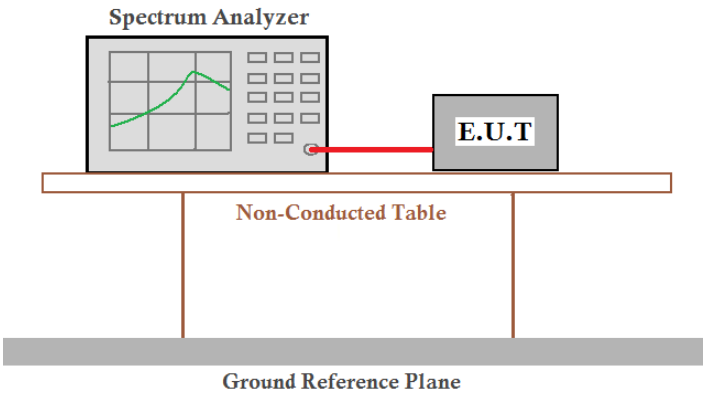
Middle channel



Date: 4.JAN.2017 10:18:06

Highest channel

6.4 20dB Occupy Bandwidth

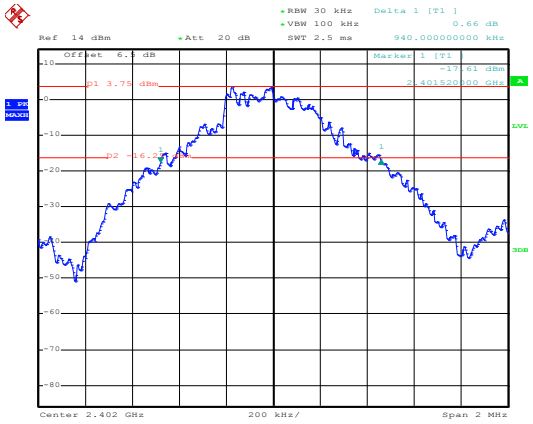
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak
Limit:	NA
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

Measurement Data:

Test channel	20dB Occupy Bandwidth (kHz)		
	GFSK	π/4-DQPSK	8DPSK
Lowest	940	1256	1232
Middle	888	1264	1252
Highest	924	1276	1252

Test plot as follows:

Modulation mode: GFSK



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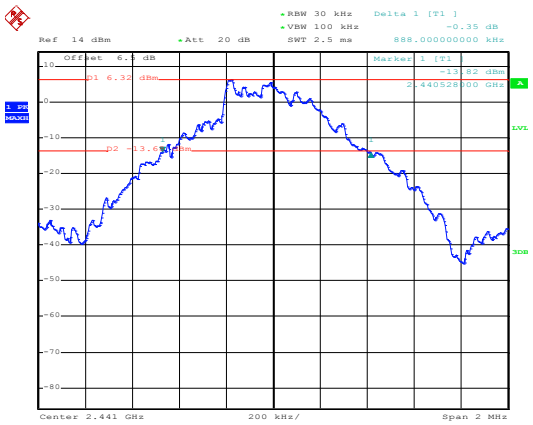
Lowest channel



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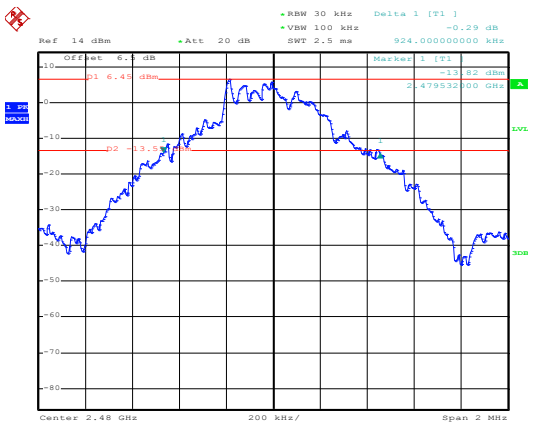
Middle channel



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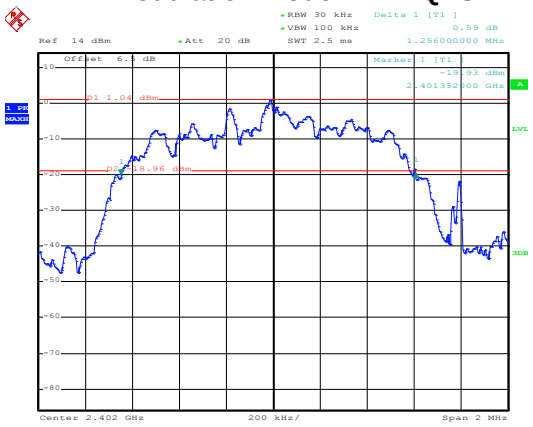
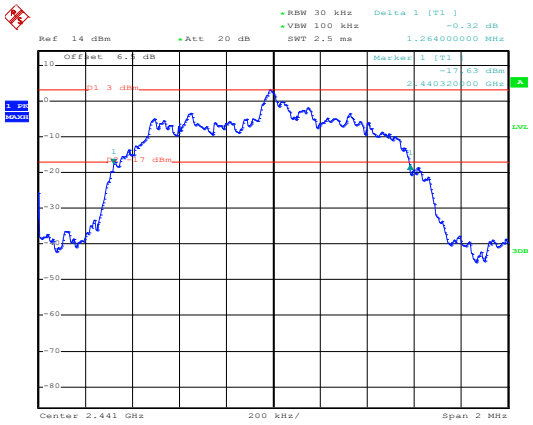
Highest channel

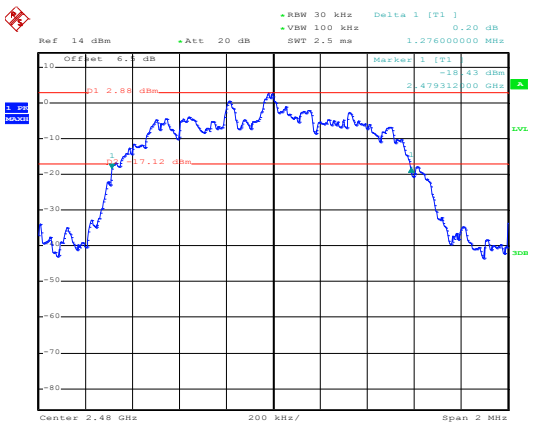
Modulation mode: π/4-DQPSK



Lowest channel

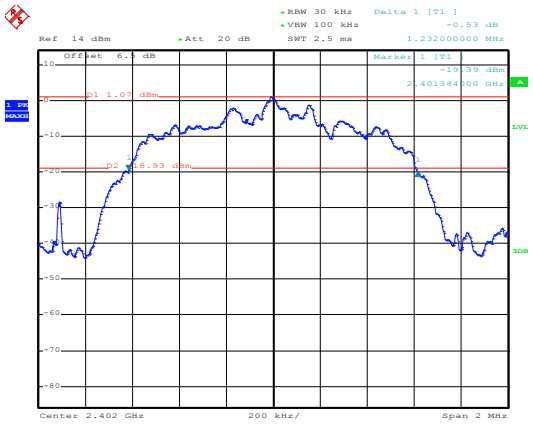


Middle channel



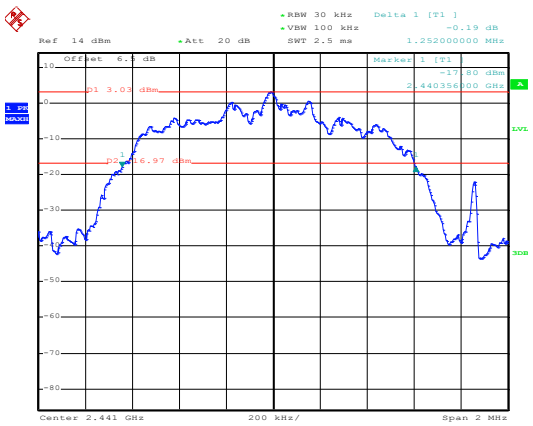
Highest channel

Modulation mode: 8DPSK



Date: 4.JAN.2017 10:21:54

Lowest channel



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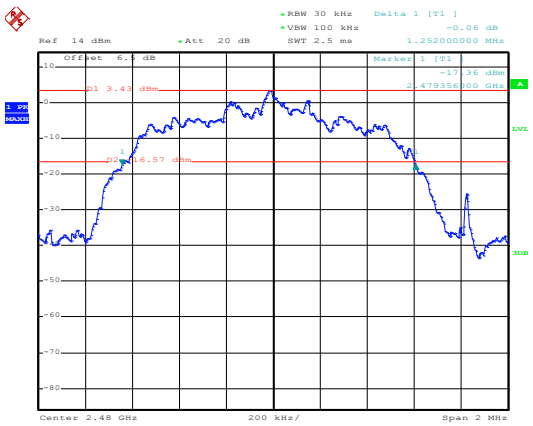
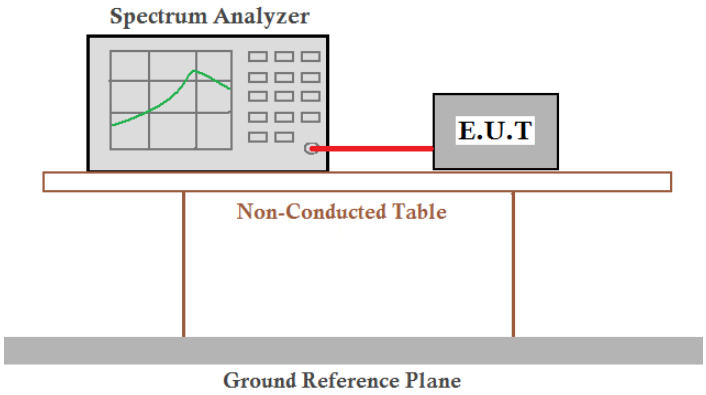
Middle channel



Date: 4.JAN.2017 10:20:10

Highest channel

6.5 Carrier Frequencies Separation

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

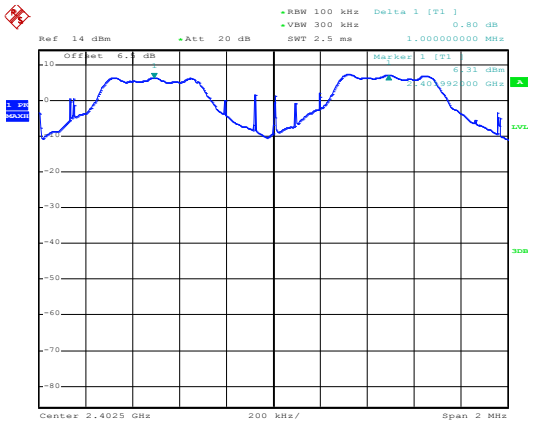
GFSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1000	562.67	Pass
Middle	1000	562.67	Pass
Highest	1000	562.67	Pass
π/4-DQPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1004	749.33	Pass
Middle	1004	749.33	Pass
Highest	1008	749.33	Pass
8DPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1000	781.33	Pass
Middle	1004	781.33	Pass
Highest	1000	781.33	Pass

Note: According to section 6.4

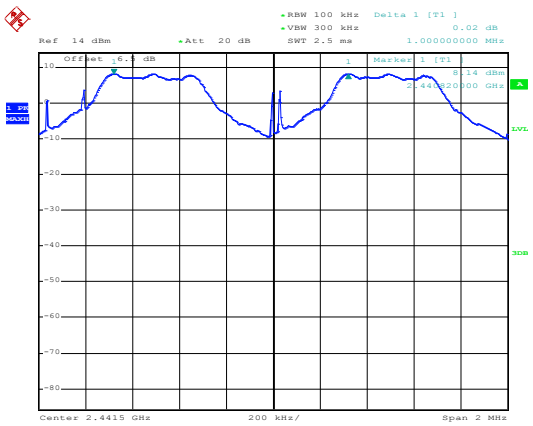
Mode	*20dB bandwidth (kHz) (worse case)*	*Limit (kHz) (Carrier Frequencies Separation)*
GFSK	*940*	*626.67*
π/4-DQPSK	*1276*	*850.67*
8DPSK	*1252*	*836.67*

Test plot as follows:

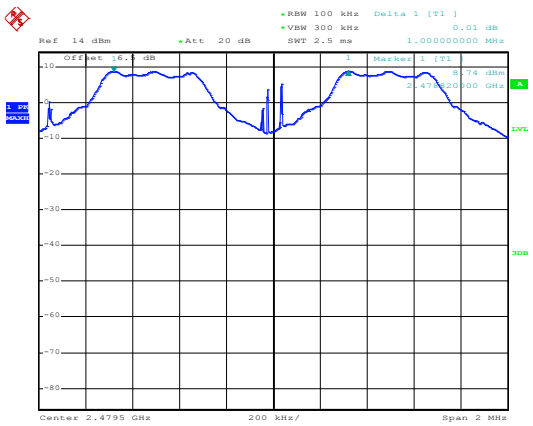
Modulation mode: GFSK



Lowest channel

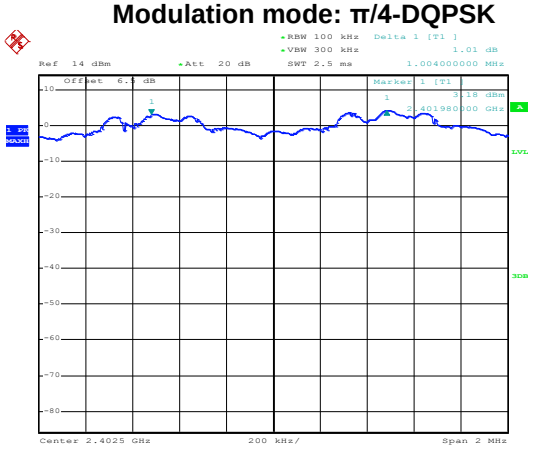


Middle channel

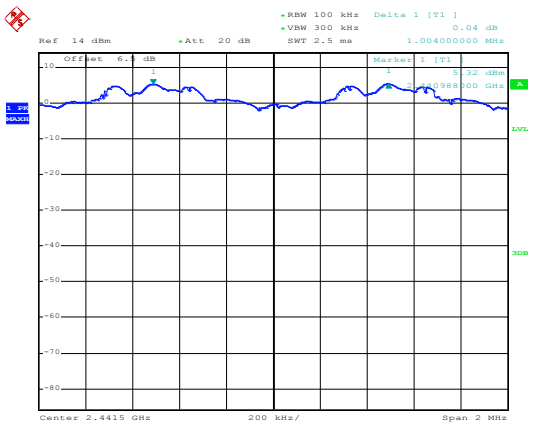


Highest channel

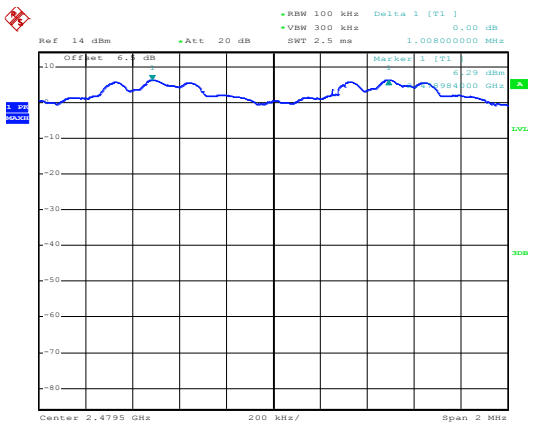
Modulation mode: π/4-DQPSK



Lowest channel

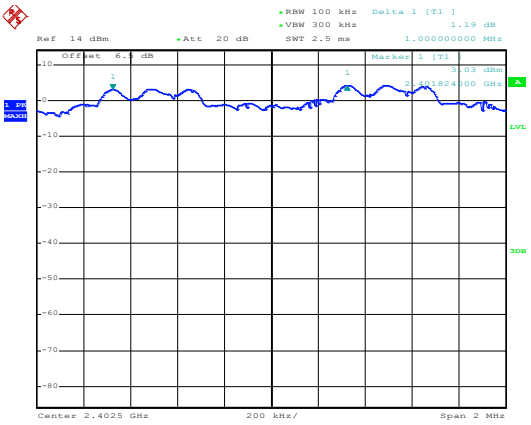


Middle channel

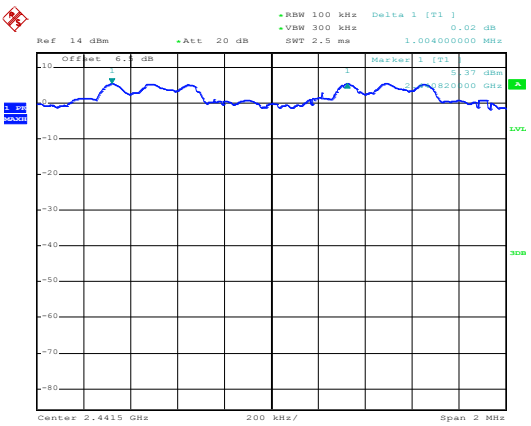


Highest channel

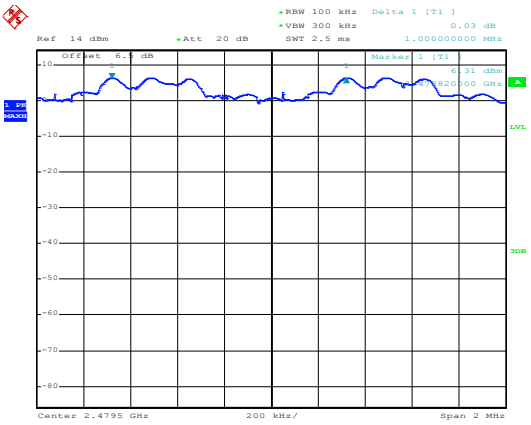
Modulation mode: 8DPSK



Lowest channel

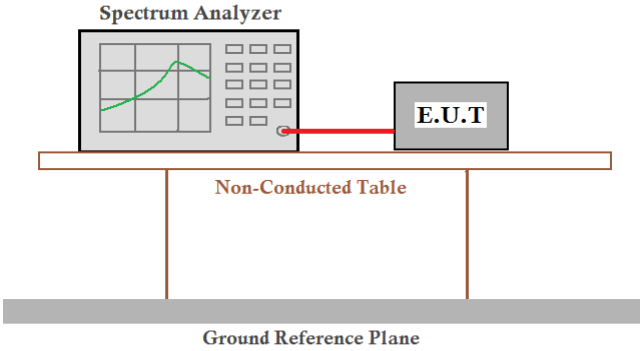


Middle channel



Highest channel

6.6 Hopping Channel Number

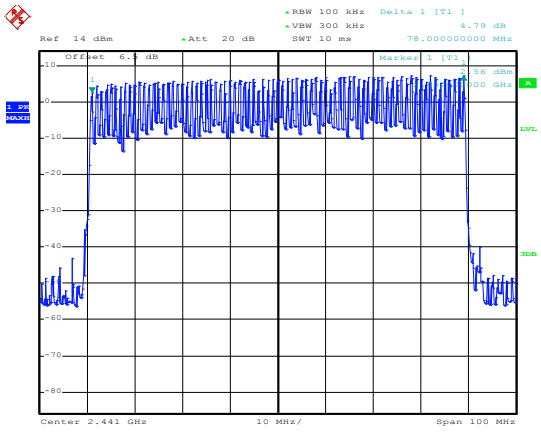
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK, π/4-DQPSK, 8DPSK	79	15	Pass

Test plot as follows:

GFSK



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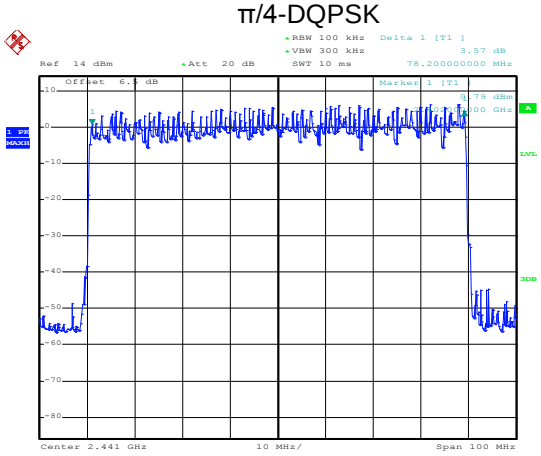
π/4-DQPSK



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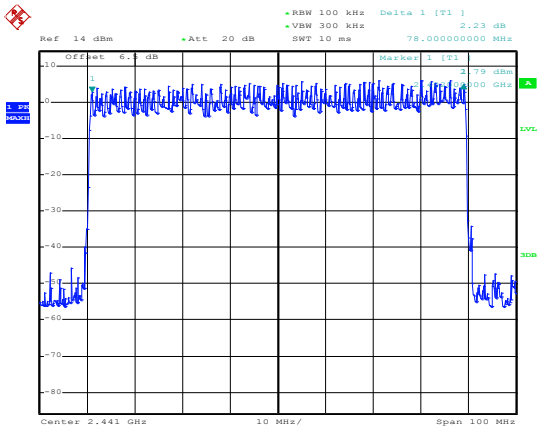
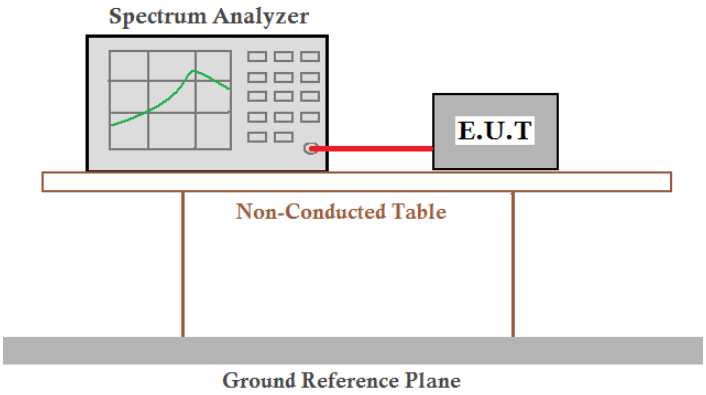
8DPSK



Date: 4.JAN.2017 10:35:11

6.7 Dwell Time

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 and KDB DA00-705
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data (Worse case):

Mode	Packet	Dwell time (second)	Limit (second)	Result
GFSK	DH1	0.13760	0.4	Pass
	DH3	0.27328		
	DH5	0.31531		
π/4-DQPSK	2-DH1	0.14208	0.4	Pass
	2-DH3	0.27456		
	2-DH5	0.31701		
8DPSK	3-DH1	0.14144	0.4	Pass
	3-DH3	0.27360		
	3-DH5	0.31872		

For GFSK, π/4-DQPSK and 8DPSK:

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

DH1 time slot=0.430*(1600/ (2*79))*31.6=137.60ms

DH3 time slot=1.708*(1600/ (4*79))*31.6=273.28ms

DH5 time slot=2.956*(1600/ (6*79))*31.6=315.31ms

2-DH1 time slot=0.444*(1600/ (2*79))*31.6=142.08ms

2-DH3 time slot=1.716*(1600/ (4*79))*31.6=274.56ms

2-DH5 time slot=2.972*(1600/ (6*79))*31.6=317.01ms

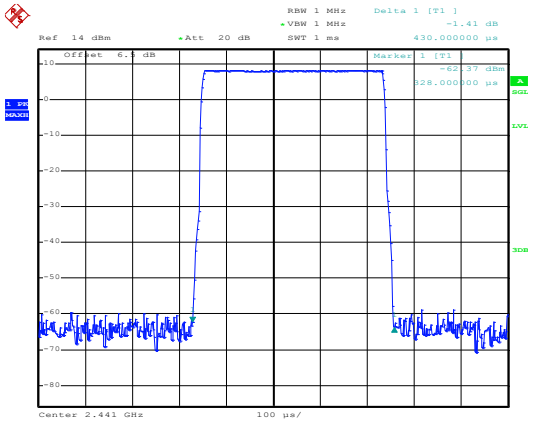
3-DH1 time slot=0.442*(1600/ (2*79))*31.6=141.44ms

3-DH3 time slot=1.710*(1600/ (4*79))*31.6=273.60ms

3-DH5 time slot=2.988*(1600/ (6*79))*31.6=318.72ms

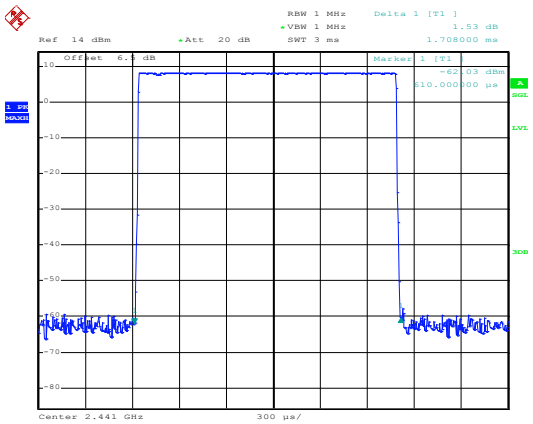
Test plot as follows:

Modulation mode: GFSK



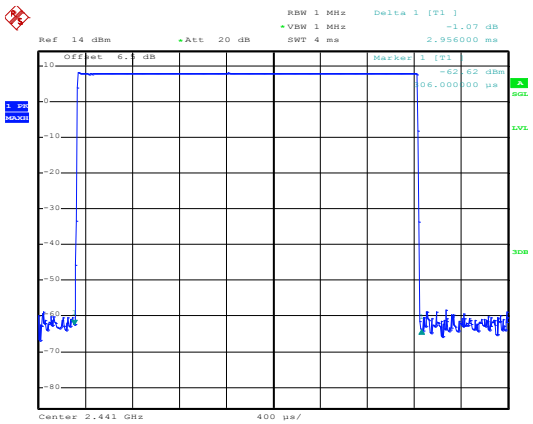
Date: 4.JAN.2017 10:43:03

DH1



Date: 4.JAN.2017 10:43:40

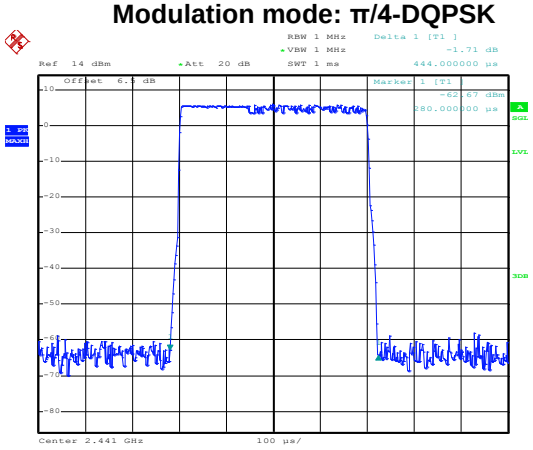
DH3



Date: 4.JAN.2017 10:44:26

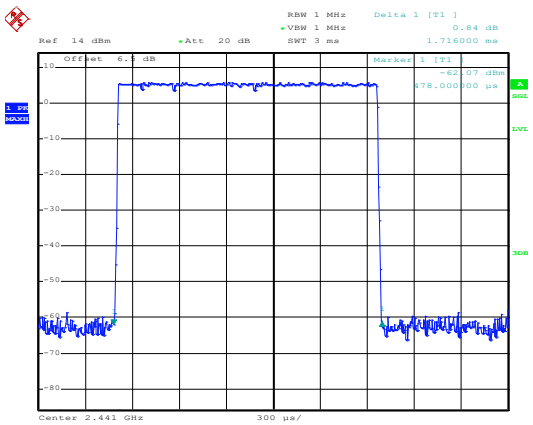
DH5

Modulation mode: π/4-DQPSK



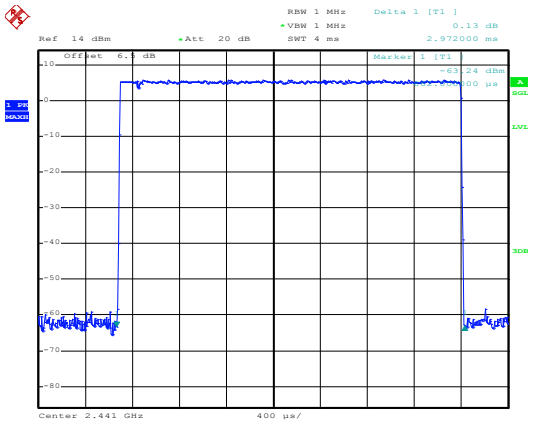
Date: 4.JAN.2017 10:38:46

2-DH1



Date: 4.JAN.2017 10:39:27

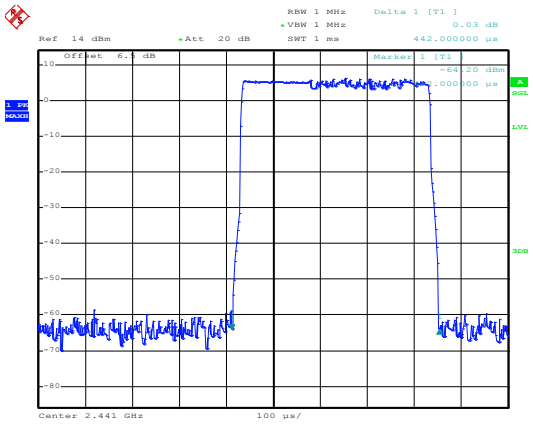
2-DH3



Date: 4.JAN.2017 10:40:06

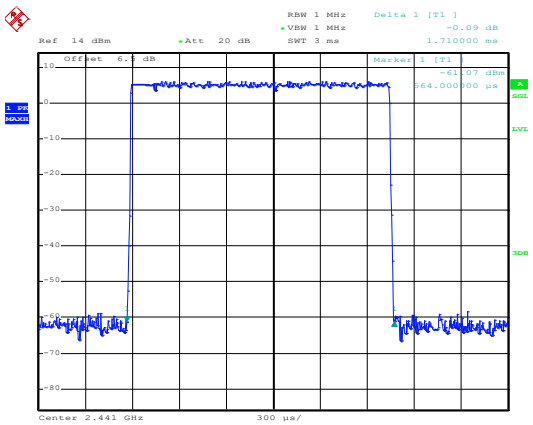
2-DH5

Modulation mode: 8DPSK



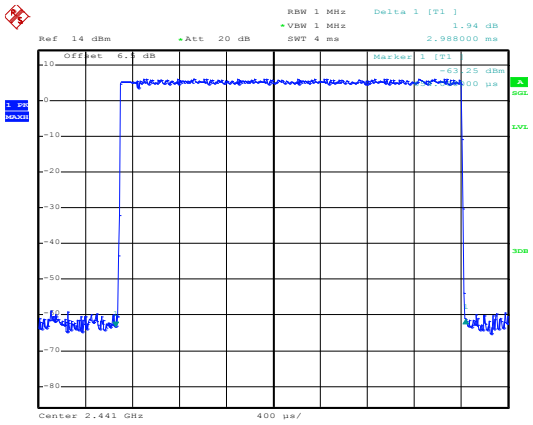
Date: 4.JAN.2017 10:42:26

3-DH1



Date: 4.JAN.2017 10:41:54

3-DH3



Date: 4.JAN.2017 10:41:16

3-DH5

6.8 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1) requirement:

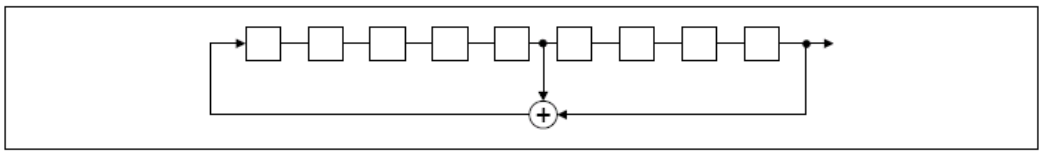
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

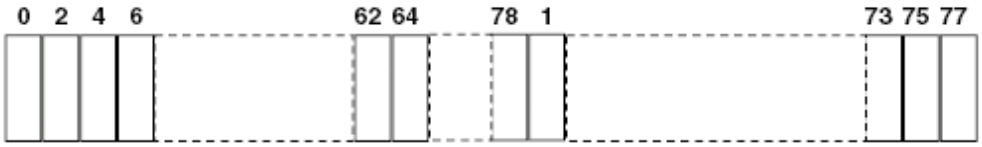
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- *Number of shift register stages: 9*
- *Length of pseudo-random sequence: 2^9 -1 = 511 bits*
- *Longest sequence of zeros: 8 (non-inverted signal)*



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.