FCC TEST REPORT

Application No:	HR/2019/40008
Applicant:	Huawei Technologies Co., Ltd.
Address of Applicant	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer:	Huawei Technologies Co., Ltd.
Address of Manufacturer	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
EUT Description:	Mobile Phone
Model No.:	YAL-L21
Trade Mark:	Honor
FCC ID:	QISYAL-L21
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C
Test Method	KDB558074 D01 15.247 Meas Guidance v05 ANSI C63.10 (2013)
Date of Receipt:	2019/4/10
Date of Test:	2019/4/10 to 2019/4/24
Date of Issue:	2019/4/25
Test Result:	**PASS ***

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

Authorized Signature:

Derek Yang
Wireless Laboratory Manager

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1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2019/4/25		Original

Authorized for issue by:				
Tested By		Mike Hu **(Mike Hu) /Project Engineer**		2019/4/25 **Date**
Checked By		David Chen **(David Chen) /Reviewer**		2019/4/25 **Date**

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2 Test Summary

Test Item	Test Requirement	Test method	Test Result	Result
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Clause 4.2	PASS
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013	Clause 4.3	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013	Clause 4.4	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013	Clause 4.5	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.6	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.7	PASS
Radiated Spurious Emissions	15.205/15.209	ANSI C63.10 2013	Clause 4.8	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.205/15.209	ANSI C63.10 2013	Clause 4.9	PASS

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3 General Information

3.1 Client Information

Applicant:	Huawei Technologies Co., Ltd.
Address of Applicant:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer:	Huawei Technologies Co., Ltd.
Address of Manufacturer:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
E-mail:	ee.shenzhen@sgs.com

3.3 Test Facility

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

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

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3.4 General Description of EUT

EUT Description::	Mobile Phone
Model No.:	YAL-L21
Trade Mark:	Honor
Hardware Version:	HL2YALEM01
Software Version:	9.1.0.101 (SP1C900E101R1P2)
Operation Frequency:	2400MHz~2483.5MHz fc = 2402 MHz + N * 2 MHz, where: -fc = “Operating Frequency” in MHz, -N = “Channel Number” with the range from 0 to 39.
Bluetooth Version:	Bluetooth V4.0 LE
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	☒ Portable Device, ☐Module
Antenna Type:	☐ External, ☒ Integrated
Antenna Gain:	-1.5dBi
Power Supply	☒ AC/DC Adapter; ☐ Battery;☐ PoE:; ☐ Other:
Accsessories	Model：HW-050450E01 Manufacturer：Huawei Technologies Co.,Ltd. Input Voltage：100-240V ~50/60Hz 0.75A Output Voltage：5V ⎓ 2A OR 4.5V ⎓ 5A OR 5V ⎓ 4.5A Model：HW-050450A01 Manufacturer：Huawei Technologies Co.,Ltd. Input Voltage：100-240V ~50/60Hz 0.75A Output Voltage：5V ⎓ 2A OR 4.5V ⎓ 5A OR 5V ⎓ 4.5A Model：HW-050450E00 Manufacturer：Huawei Technologies Co.,Ltd. Input Voltage：100-240V ~50/60Hz 0.75A Output Voltage：5V ⎓ 2A OR 4.5V ⎓ 5A OR 5V ⎓ 4.5A Model：HW-050450A00 Manufacturer：Huawei Technologies Co.,Ltd. Input Voltage：100-240V ~50/60Hz 0.75A Output Voltage：5V ⎓ 2A OR 4.5V ⎓ 5A OR 5V ⎓ 4.5A Model：HW-050450B00 Manufacturer：Huawei Technologies Co.,Ltd. Input Voltage：100-240V ~50/60Hz 0.75A Output Voltage：5V ⎓ 2A OR 4.5V ⎓ 5A OR 5V ⎓ 4.5A Model：HW-050450U00 Manufacturer：Huawei Technologies Co.,Ltd.

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	Input Voltage：100-240V ~50/60Hz 0.75A Output Voltage：5V ⎓ 2A OR 4.5V ⎓ 5A OR 5V ⎓ 4.5A

Operation Frequency of each channel							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel (CH0)	2402MHz
The middle channel (CH19)	2440MHz
The highest channel (CH39)	2480MHz

3.5 Test Environment

Operating Environment	
Temperature:	25.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	101.32 KPa

3.6 Description of Support Units

The EUT has been tested independent unit.

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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C 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(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -1.5dBi.	

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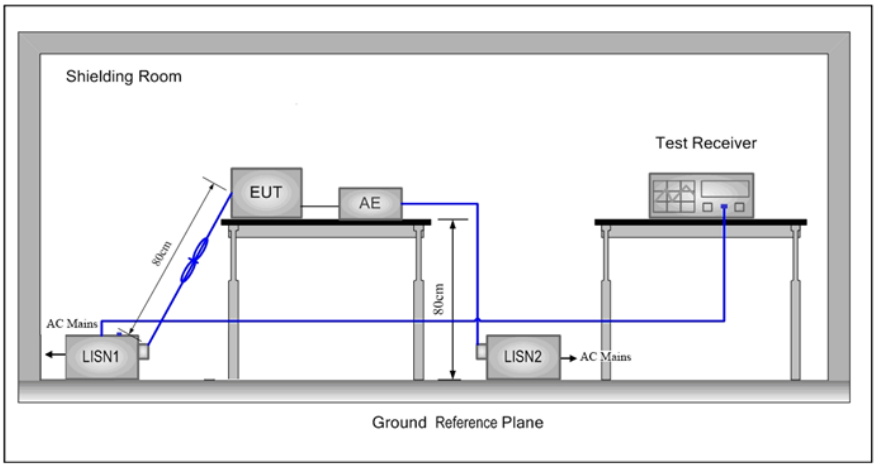
4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
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 Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane. 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.		
Test Setup:			

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Test Mode:	Transmitting with GFSK modulation. Charge +Transmitting mode.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

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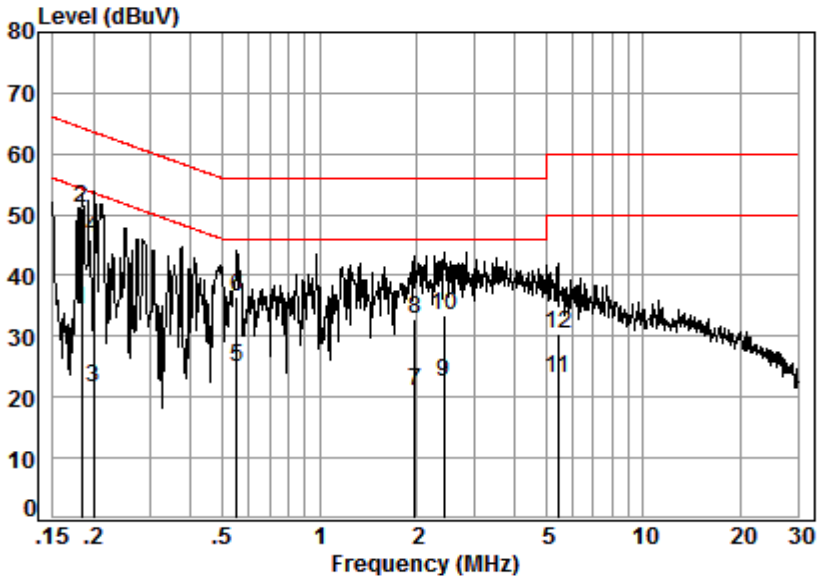
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



Site : Shielding Room
Condition: Line
Job No. : 12626CR
Test mode: c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.18	0.02	9.66	24.56	34.24	54.28	-20.04	Average
2	0.18	0.02	9.66	41.38	51.06	64.28	-13.22	QP
3	0.20	0.02	9.66	11.98	21.66	53.58	-31.92	Average
4	0.20	0.02	9.66	36.49	46.17	63.58	-17.41	QP
5	0.56	0.06	9.67	15.18	24.91	46.00	-21.09	Average
6	0.56	0.06	9.67	26.85	36.58	56.00	-19.42	QP
7	1.97	0.16	9.72	11.19	21.07	46.00	-24.93	Average
8	1.97	0.16	9.72	22.86	32.74	56.00	-23.26	QP
9	2.42	0.16	9.71	12.76	22.63	46.00	-23.37	Average
10	2.42	0.16	9.71	23.73	33.60	56.00	-22.40	QP
11	5.45	0.17	9.75	13.24	23.16	50.00	-26.84	Average
12	5.45	0.17	9.75	20.38	30.30	60.00	-29.70	QP

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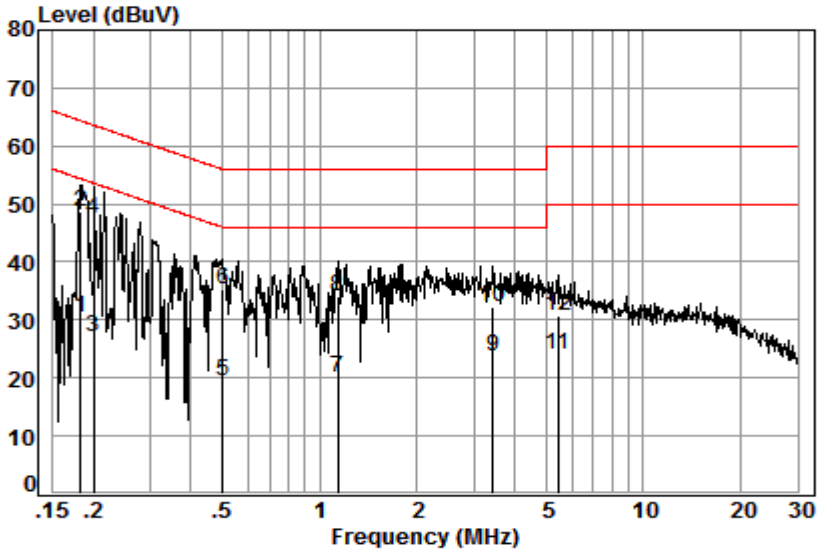
Neutral line:



Site : Shielding Room
Condition: Neutral
Job No. : 12626CR
Test mode: c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.18	0.02	9.64	20.75	30.41	54.37	-23.96	Average
2	0.18	0.02	9.64	38.96	48.62	64.37	-15.75	QP
3	0.20	0.02	9.64	17.56	27.22	53.58	-26.36	Average
4	0.20	0.02	9.64	37.81	47.47	63.58	-16.11	QP
5	0.50	0.06	9.64	9.90	19.60	46.00	-26.40	Average
6	0.50	0.06	9.64	25.46	35.16	56.00	-20.84	QP
7	1.14	0.10	9.70	10.15	19.95	46.00	-26.05	Average
8	1.14	0.10	9.70	24.15	33.95	56.00	-22.05	QP
9	3.44	0.16	9.68	13.99	23.83	46.00	-22.17	Average
10	3.44	0.16	9.68	22.32	32.16	56.00	-23.84	QP
11	5.45	0.17	9.72	14.15	24.04	50.00	-25.96	Average
12	5.45	0.17	9.72	20.71	30.60	60.00	-29.40	QP

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

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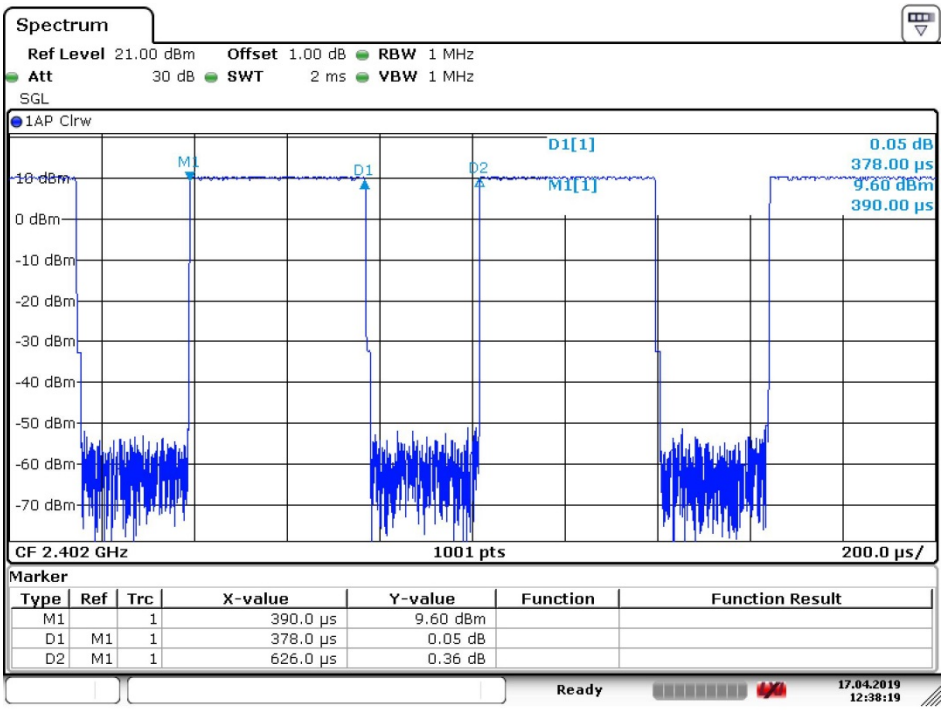
4.3 Duty Cycle

4.3.1 Test Results

Test Mode	TX Freq. [MHz]	Duty cycle [%]
BLE	CH0	60.38

4.3.1 Test Plots

4.3.1.1 BLE



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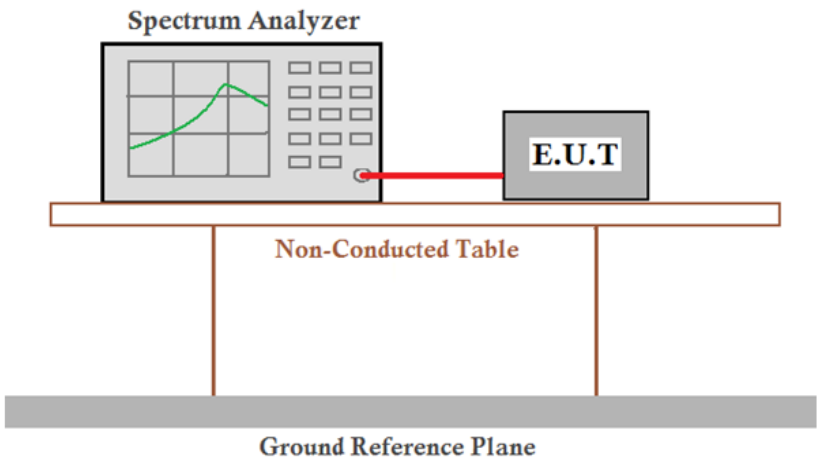
4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10 :2013 Section 11.9.1.1
Test Setup:	
Limit:	30dBm
Test Mode:	Transmitting with GFSK modulation.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

4.4.1 Test Results

Measurement Data of Average Power

GFSK mode		
Test channel	Average Output Power (dBm)	Result
Lowest	4.57	Report purpose only
Middle	4.78	Report purpose only
Highest	5.54	Report purpose only

Measurement Data of Peak Power :

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	10.67	30.00	Pass
Middle	10.26	30.00	Pass
Highest	7.85	30.00	Pass

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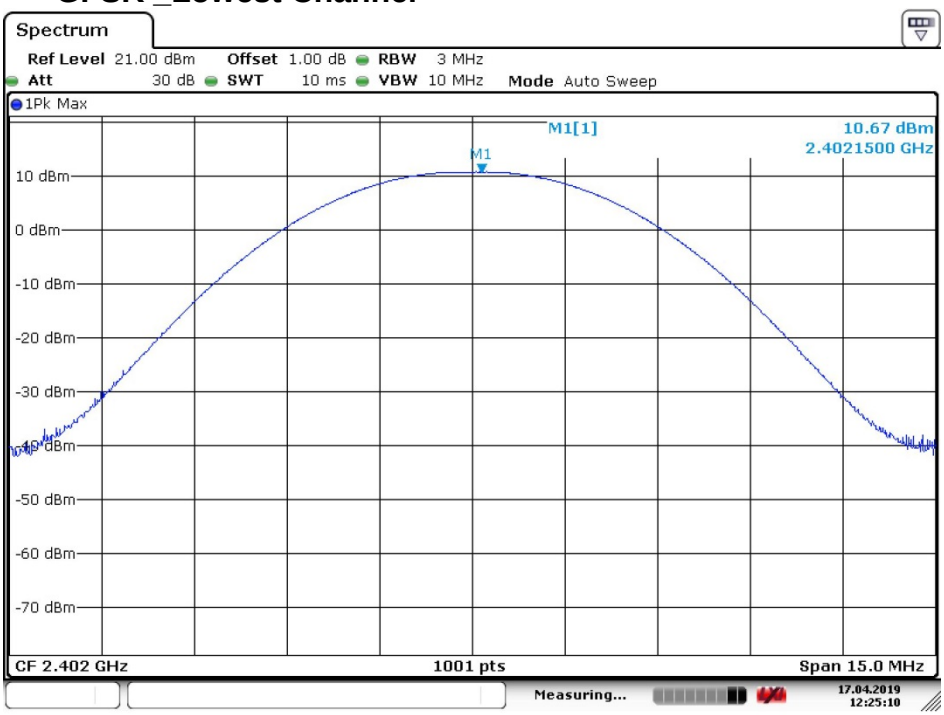
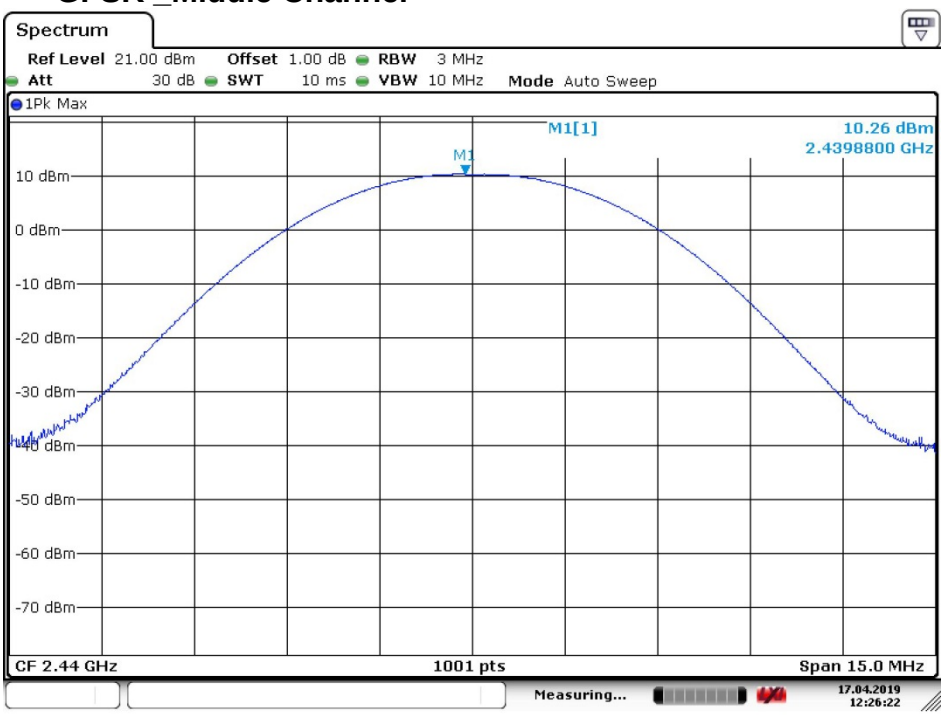
4.4.2 Test plots:

4.4.2.1 GFSK _Lowest Channel



Date: 17.APR.2019 12:25:10

4.4.2.2 GFSK _Middle Channel



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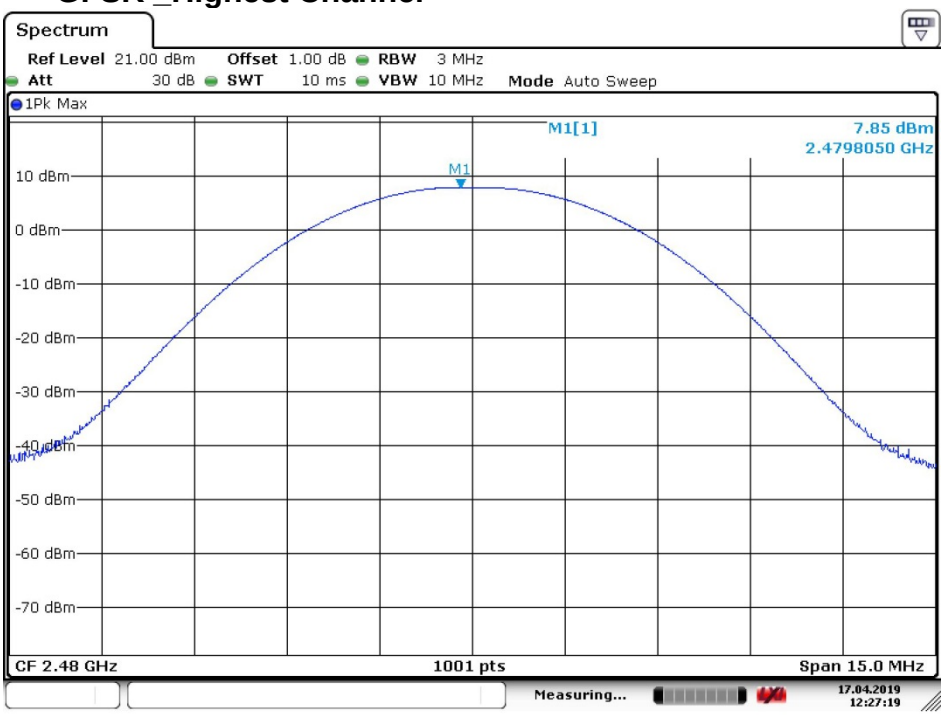
4.4.2.3 GFSK _Highest Channel



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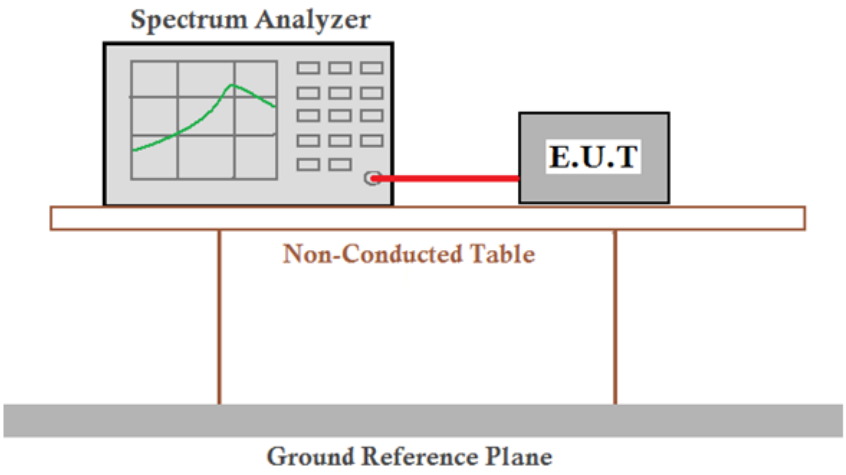
4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013 Section 11.8 Option 2
Test Setup:	
Limit:	≥ 500 kHz
Test Mode:	Transmitting with GFSK modulation.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

4.5.1 Test Results

Mode	Test Channel	99% Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
GFSK	Lowest	1.03	0.71	≥500	Pass
	Middle	1.02	0.70	≥500	Pass
	Highest	1.02	0.70	≥500	Pass

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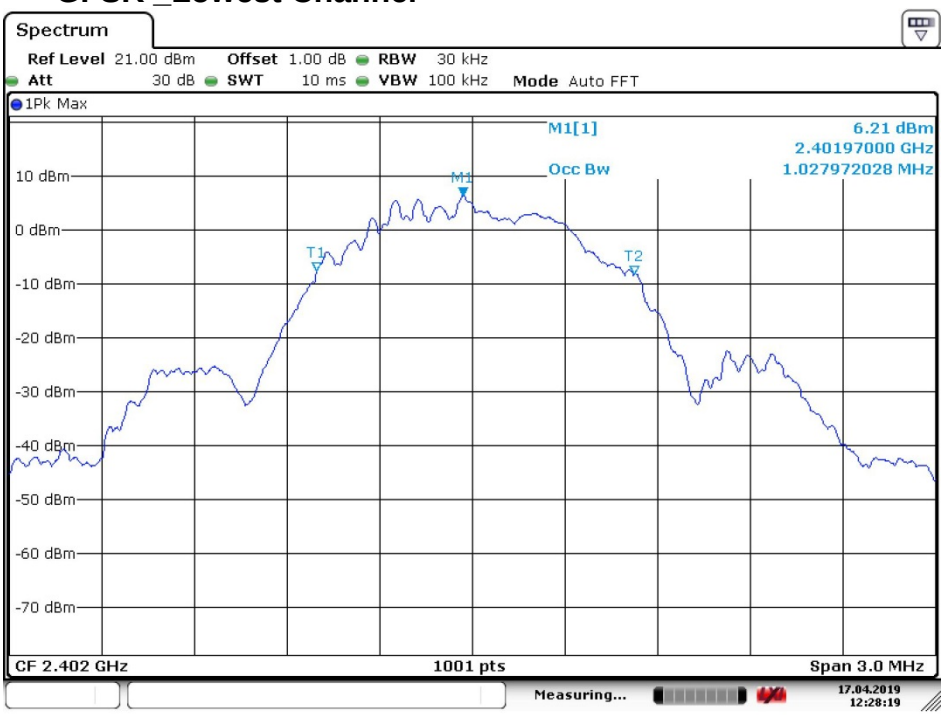
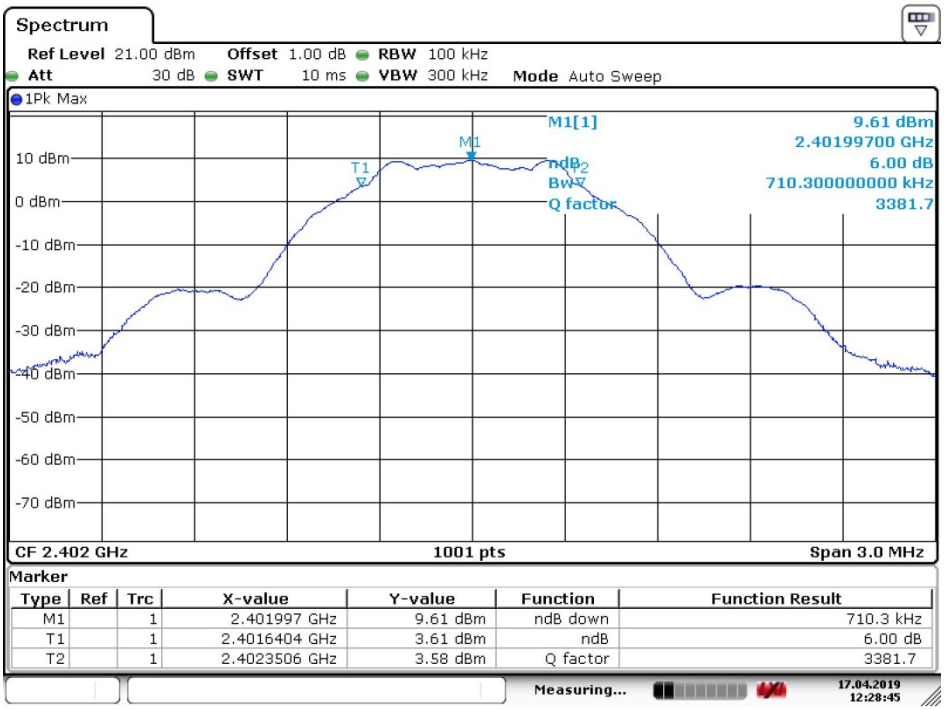
4.5.2 Test plots

4.5.2.1 GFSK _Lowest Channel



Date: 17.APR.2019 12:28:20



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.401997 GHz	9.61 dBm	ndB down	710.3 kHz
T1		1	2.4016404 GHz	3.61 dBm	ndB	6.00 dB
T2		1	2.4023506 GHz	3.58 dBm	Q factor	3381.7

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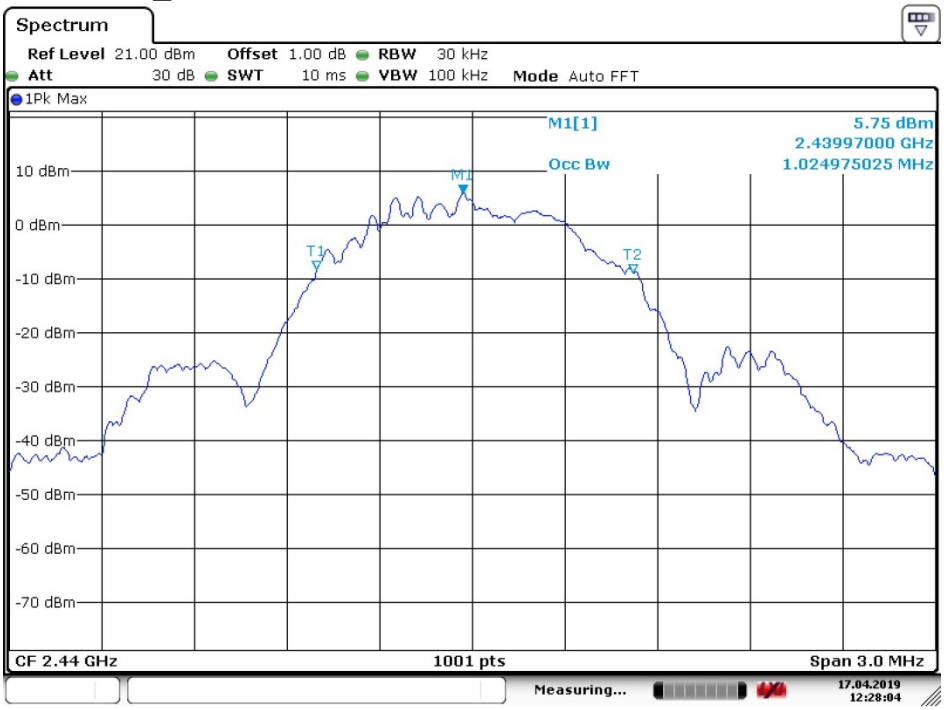
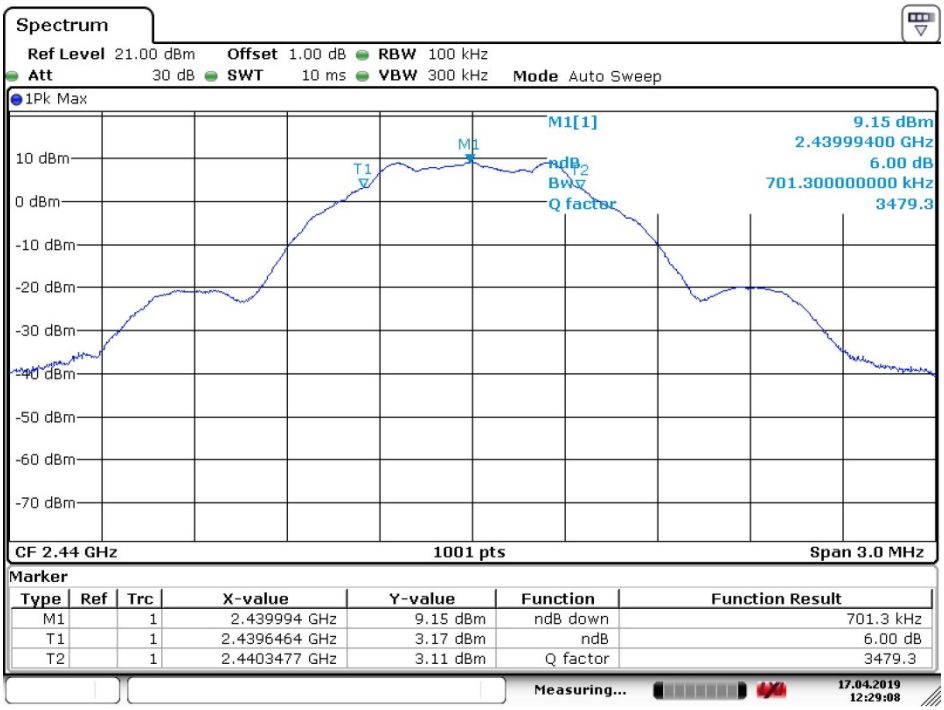
4.5.2.2 GFSK _Middle Channel



Date: 17.APR.2019 12:28:05



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.439994 GHz	9.15 dBm	ndB down	701.3 kHz
T1		1	2.4396464 GHz	3.17 dBm	ndB	6.00 dB
T2		1	2.4403477 GHz	3.11 dBm	Q factor	3479.3

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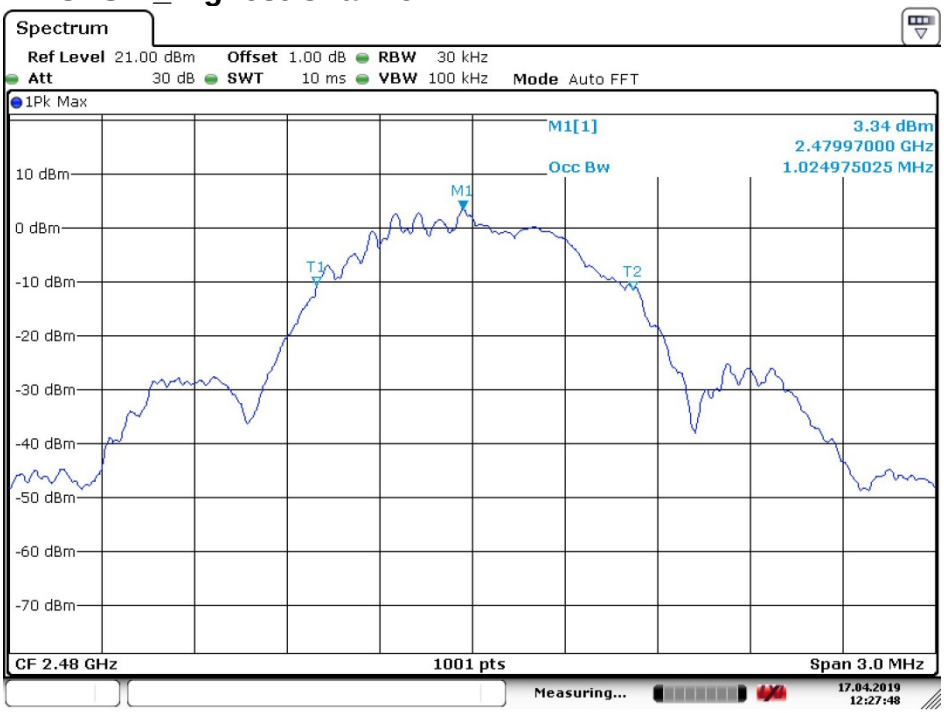
4.5.2.3 GFSK _Highest Channel



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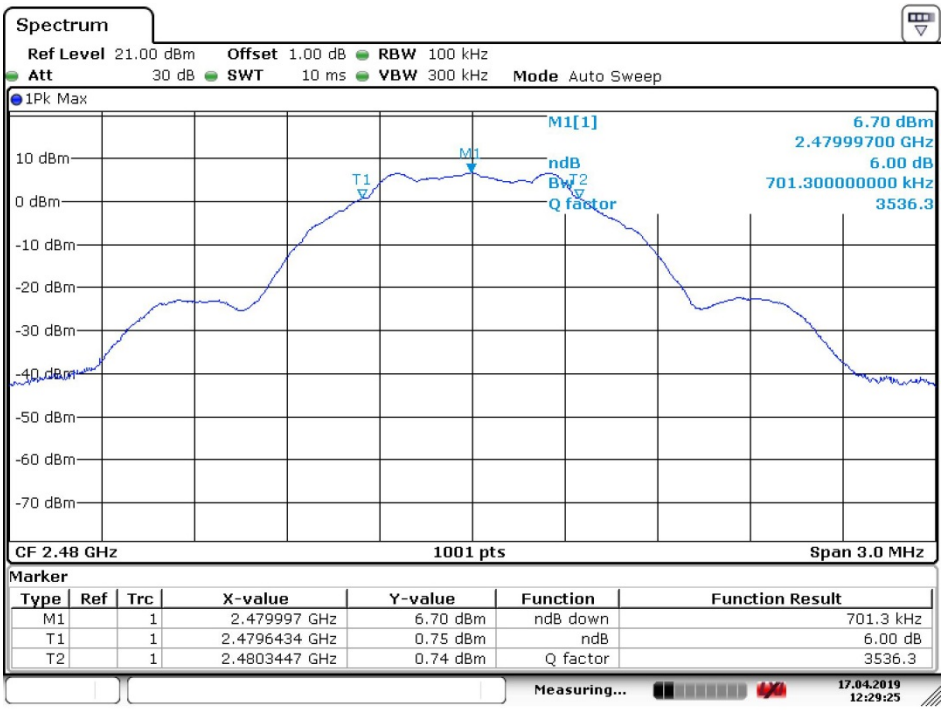

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.479997 GHz	6.70 dBm	ndB down	701.3 kHz
T1		1	2.4796434 GHz	0.75 dBm	ndB	6.00 dB
T2		1	2.4803447 GHz	0.74 dBm	Q factor	3536.3

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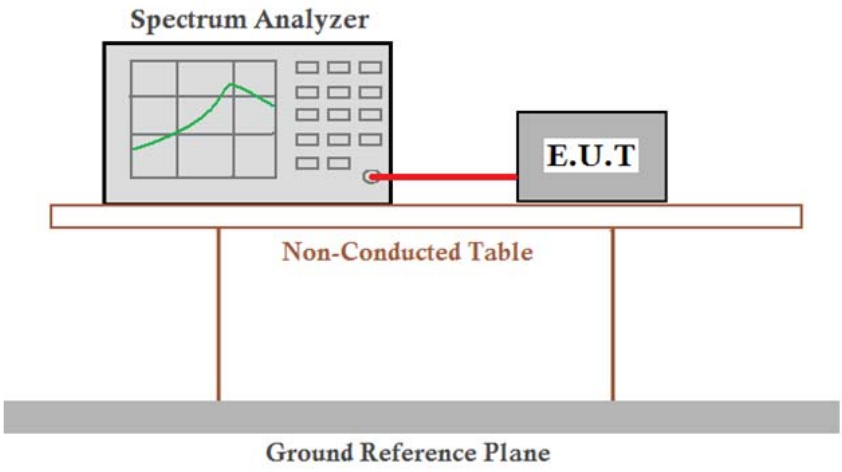
4.6 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10 :2013 Section 11.10.2
Test Setup:	
Limit:	≤8.00dBm/3kHz
Test Mode:	Transmitting with GFSK modulation.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

4.6.1 Test Results

Mode	Test Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
GFSK	Lowest	-5.08	≤8.00	Pass
	Middle	-5.51	≤8.00	Pass
	Highest	-7.97	≤8.00	Pass

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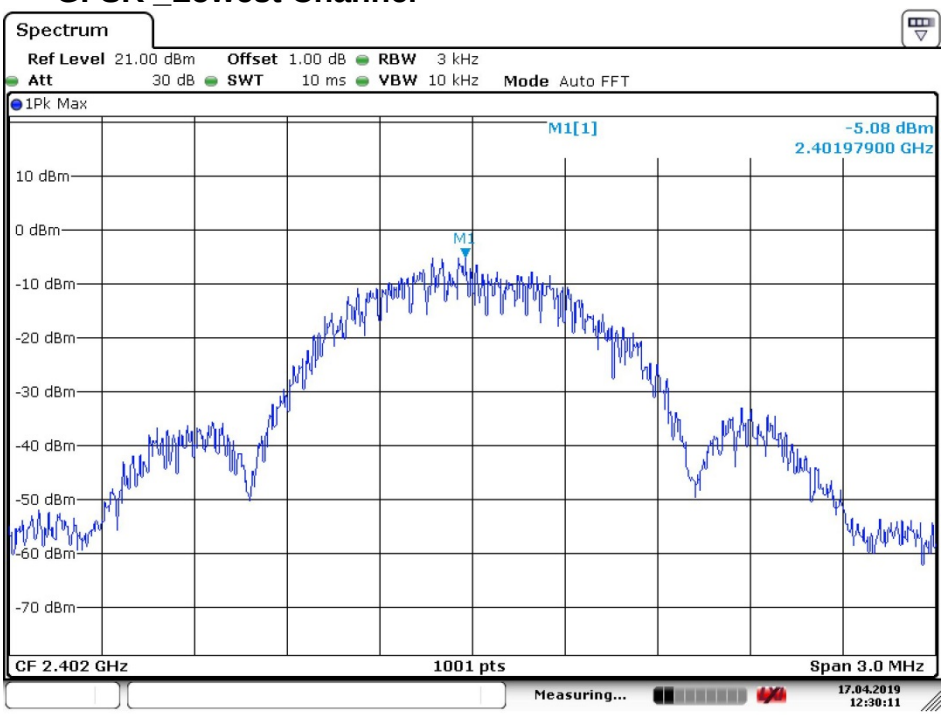
4.6.2 Test plots

4.6.2.1 GFSK _Lowest Channel



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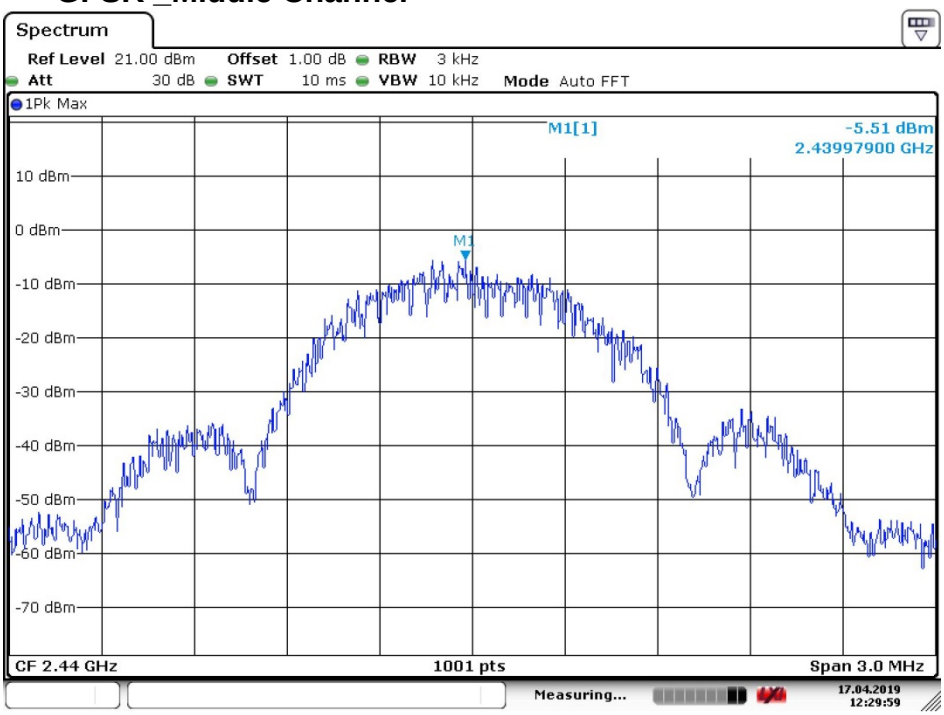
4.6.2.2 GFSK _Middle Channel



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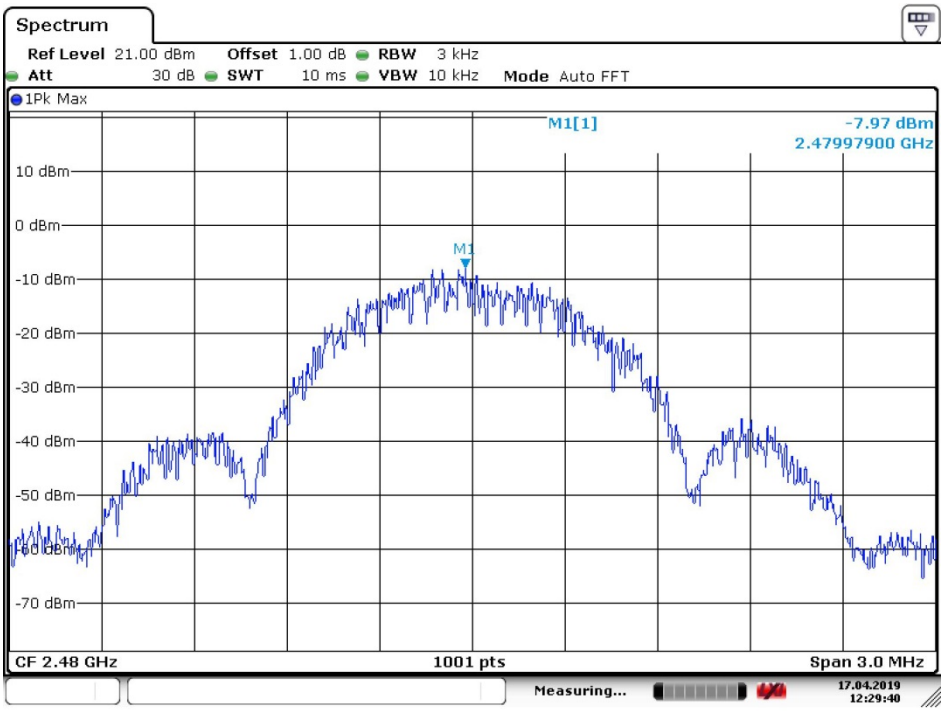
4.6.2.3 GFSK _Highest Channel



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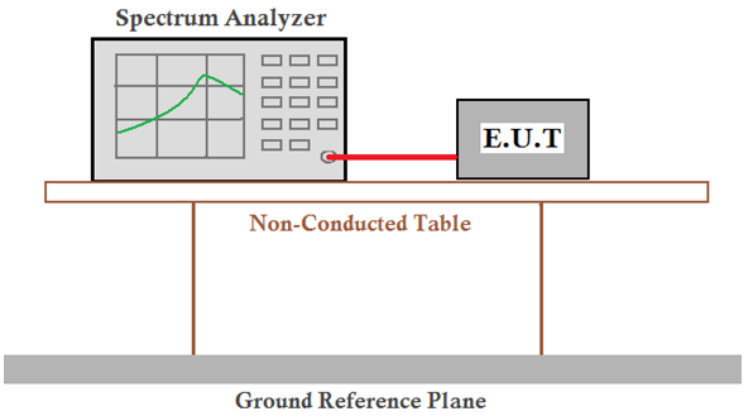
4.7 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.13
Test Setup:	
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Mode:	Transmitting with GFSK modulation.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

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