



TEST REPORT

Report No. : **CHTEW19110205** Report Verification: 

Project No. : **SHT1911051301EW**

FCC ID : **2ALCFXO-9768-1**

Applicant's name : **Dongguan Xing Yue Electronic co., Ltd**

Address : **#98 LiWu Swan Industrial District, Qiao Tou Town, Dong Guan City, Guang Dong, China**

Manufacturer : **Dongguan Xing Yue Electronic co., Ltd**

Address : **#98 LiWu Swan Industrial District, Qiao Tou Town, Dong Guan City, Guang Dong, China**

Test item description : **Tango Light-Up Wireless Speaker**

Trade Mark : **-**

Model/Type reference : **XO-9768-1**

Listed Model(s) : **-**

Standard : **FCC CFR Title 47 Part 15 Subpart C Section 15.247**

Date of receipt of test sample : **Nov.20,2019**

Date of testing : **Nov.20,2019 ~ Nov.27,2019**

Date of issue : **Nov.28,2019**

Result : **PASS**

Compiled by
(Position+Printed name+Signature): File administrator Yueming Li

Yueming Li

Supervised by
(Position+Printed name+Signature): Project Engineer Edward Pan

Edward Pan

Approved by
(Position+Printed name+Signature): RF Manager Hans Hu

Hans Hu

Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address : **1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China**

Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

The test report merely correspond to the test sample.

Contents

<u>1.</u>	<u>TEST STANDARDS AND REPORT VERSION</u>	<u>3</u>
1.1.	Test Standards	3
1.2.	Report version	3
<u>2.</u>	<u>TEST DESCRIPTION</u>	<u>4</u>
<u>3.</u>	<u>SUMMARY</u>	<u>5</u>
3.1.	Client Information	5
3.2.	Product Description	5
3.3.	Radio Specification Description	5
3.4.	Testing Laboratory Information	6
<u>4.</u>	<u>TEST CONFIGURATION</u>	<u>7</u>
4.1.	Test frequency list	7
4.2.	Descriptions of Test mode	7
4.3.	Test mode	7
4.4.	Support unit used in test configuration and system	8
4.5.	Testing environmental condition	8
4.6.	Measurement uncertainty	8
4.7.	Equipment Used during the Test	9
<u>5.</u>	<u>TEST CONDITIONS AND RESULTS</u>	<u>11</u>
5.1.	Antenna Requirement	11
5.2.	AC Conducted Emission	12
5.3.	Peak Output Power	15
5.4.	20 dB Bandwidth	16
5.5.	99% Occupied Bandwidth	17
5.6.	Carrier Frequencies Separation	18
5.7.	Hopping Channel Number	19
5.8.	Dwell Time	20
5.9.	Duty Cycle Correction Factor (DCCF)	21
5.10.	Pseudorandom Frequency Hopping Sequence	22
5.11.	Conducted Band edge and Spurious Emission	23
5.12.	Radiated Band edge Emission	25
5.13.	Radiated Spurious Emission	30
<u>6.</u>	<u>TEST SETUP PHOTOS</u>	<u>35</u>
<u>7.</u>	<u>EXTERANAL AND INTERNAL PHOTOS</u>	<u>37</u>
<u>8.</u>	<u>APPENDIX REPORT</u>	<u>41</u>

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

- [FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
- [ANSI C63.10:2013](#): American National Standard for Testing Unlicensed Wireless Devices
- [KDB 558074 D01 15.247 Meas Guidance v05r02](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2019-11-28	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result
5.1	Antenna Requirement	15.203/15.247 (c)	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	Peak Output Power	15.247 (b)(1)	PASS
5.4	20 dB Bandwidth	15.247 (a)(1)	PASS
5.5	99% Occupied Bandwidth	-	PASS ^{*1}
5.6	Carrier Frequency Separation	15.247 (a)(1)	PASS
5.7	Hopping Channel Number	15.247 (a)(1)	PASS
5.8	Dwell Time	15.247 (a)(1)	PASS
5.9	Duty Cycle Correction Factor	-	PASS ^{*1}
5.10	Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	PASS
5.11	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS
5.12	Radiated Band Edge Emission	15.205/15.209	PASS
5.13	Radiated Spurious Emission	15.247(d)/15.205/15.209	PASS

Note:

- The measurement uncertainty is not included in the test result.
- ^{*1}: No requirement on standard, only report these test data.

3. SUMMARY

3.1. Client Information

Applicant:	Dongguan Xing Yue Electronic co., Ltd
Address:	#98 LiWu Swan Industrial District, Qiao Tou Town, Dong Guan City, Guang Dong, China
Manufacturer:	Dongguan Xing Yue Electronic co., Ltd
Address:	#98 LiWu Swan Industrial District, Qiao Tou Town, Dong Guan City, Guang Dong, China

3.2. Product Description

Name of EUT:	Tango Light-Up Wireless Speaker
Trade Mark:	-
Model No.:	XO-9768-1
Listed Model(s):	-
Power supply:	DC 5V
Hardware version:	VER1.0
Software version:	VER1.0

3.3. Radio Specification Description

Bluetooth version:	V5.0
Support function ^{*2} :	EDR
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB
Antenna gain:	-0.58dBi

Note:

*2: only show the RF function associated with this report.

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Qualifications	Type	Accreditation Number
	CNAS	L1225
	A2LA	3902.01
	FCC	762235
	Canada	5377A

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

Channel	Frequency (MHz)
00	2402
01	2403
⋮	⋮
39	2441
⋮	⋮
77	2479
78	2480

4.2. Descriptions of Test mode

Preliminary tests were performed in different data rates and recorded the RF output power in the following table:

Channel	RF output Power (dBm)		
	GFSK 1Mbps	π /4DQPSK 2Mbps	8DPSK 3Mbps
CH00	5.46	4.84	4.92
CH39	5.79	5.21	5.34
CH78	5.25	4.62	4.73

Note:

- 1) The manufacturer declare that the maximum power value of the product is set as a default value in the enter test mode software.
- 2) All the test data for each data rate were verified, found GFSK Modulation which is worse case mode

4.3. Test mode

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmitting.

Test Item	Modulation / Data Rate		
	GFSK 1Mbps	π /4DQPSK 2Mbps	8DPSK 3Mbps
Conducted test item	✓	✓	✓
Radiated test item	-	-	✓

Remark:

- For radiated test item, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests.
- The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?					
✓ No					
Item	Equipement	Trade Name	Model No.	FCC ID	Power cord
1	AC Adapter	Panasonic	SAE00120	FCC SDoC	N/A

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Measurement uncertainty

Test Item	Measurement Uncertainty
AC Conducted Emission (150kHz~30MHz)	3.02 dB
Radiated Emission (30MHz~1000MHz)	4.90 dB
Radiated Emissions (1GHz~25GHz)	4.96 dB
Peak Output Power	0.51 dB
Power Spectral Density	0.51 dB
Conducted Spurious Emission	0.51 dB
6dB Bandwidth	70 Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Equipment Used during the Test

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE X_142	EF-NM-BNCM-2M	2019/10/23	2020/10/22
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-6th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2019/08/21	2020/08/20
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX 104	501184/4	2019/05/27	2020/05/26
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-7th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2021/09/26
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2017/04/01	2020/03/31
●	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	25841	2017/03/27	2020/03/26
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2019/10/11	2020/10/10
●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

● RF Conducted Method						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2019/10/26	2020/10/25
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2019/10/26	2020/10/25
○	Radio communication tester	R&S	CMW500	137688-Lv	2019/10/26	2020/10/25

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 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, 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.

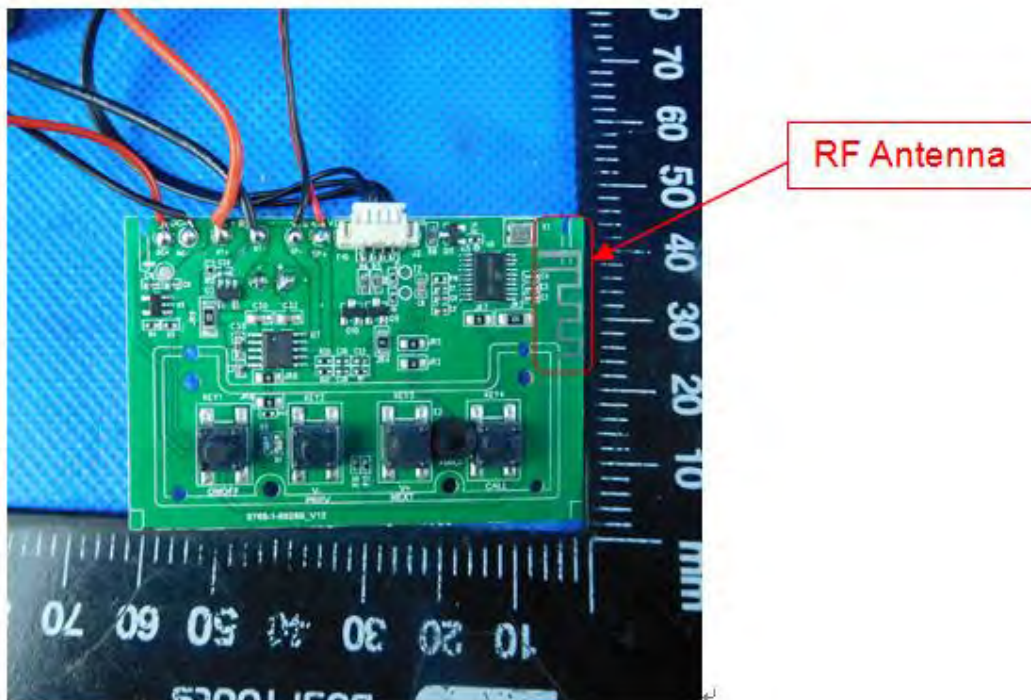
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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 6 dBi 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 6 dBi.

TEST RESULT

☒ Passed ☐ Not Applicable

The antenna type is a PCB antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. AC Conducted Emission

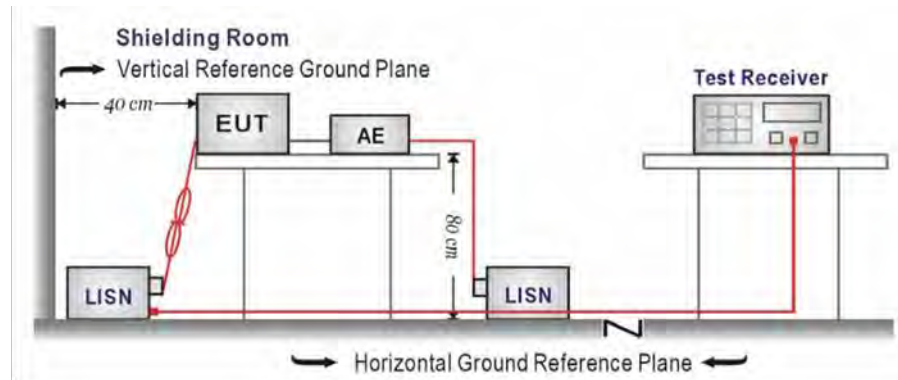
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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 CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

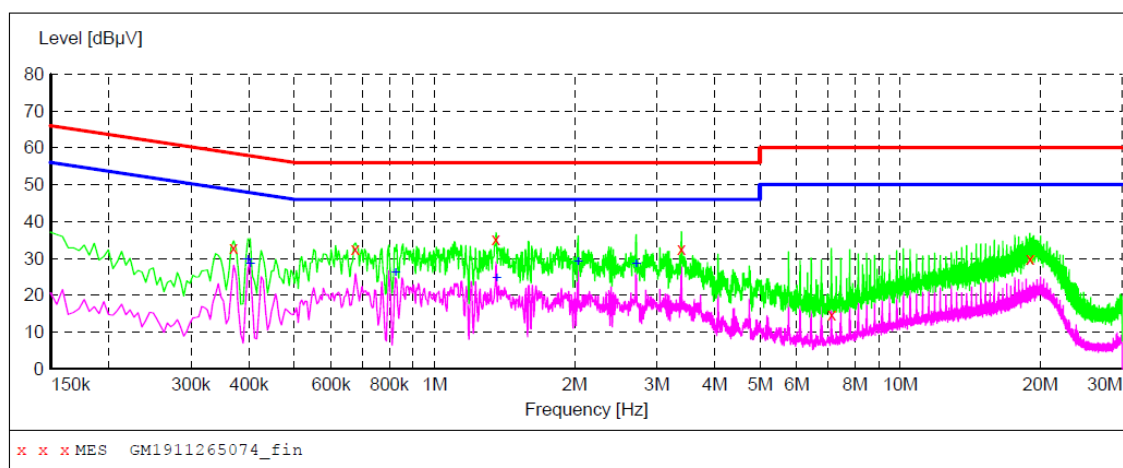
Please refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

Test Line:

L

**MEASUREMENT RESULT: "GM1911265074_fin"**

11/26/2019 7:08PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370500	33.00	10.1	59	25.5	QP	L1	GND
0.676500	32.70	10.1	56	23.3	QP	L1	GND
1.356000	35.20	10.1	56	20.8	QP	L1	GND
3.394500	32.50	10.1	56	23.5	QP	L1	GND
7.134000	14.70	10.2	60	45.3	QP	L1	GND
19.014000	30.00	10.2	60	30.0	QP	L1	GND

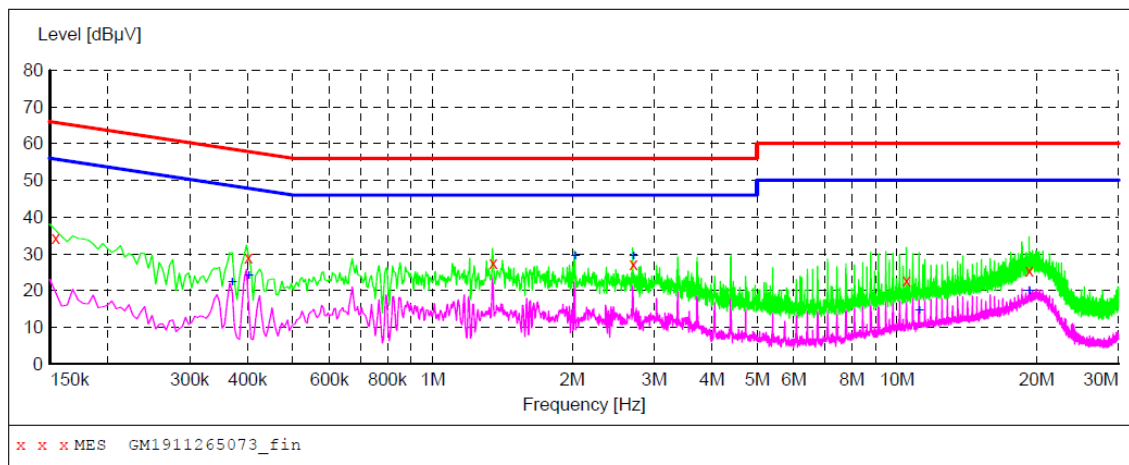
MEASUREMENT RESULT: "GM1911265074_fin2"

11/26/2019 7:08PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.397500	29.50	10.1	48	18.4	AV	L1	GND
0.402000	28.50	10.1	48	19.3	AV	L1	GND
0.825000	26.00	10.1	46	20.0	AV	L1	GND
1.360500	24.60	10.1	46	21.4	AV	L1	GND
2.035500	29.10	10.1	46	16.9	AV	L1	GND
2.715000	28.30	10.1	46	17.7	AV	L1	GND

Test Line:

N

**MEASUREMENT RESULT: "GM1911265073_fin"**

11/26/2019 7:05PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154500	34.30	10.1	66	31.5	QP	N	GND
0.402000	29.10	10.1	58	28.7	QP	N	GND
1.351500	27.40	10.1	56	28.6	QP	N	GND
2.710500	27.20	10.1	56	28.8	QP	N	GND
10.491000	22.90	10.2	60	37.1	QP	N	GND
19.288500	25.50	10.2	60	34.5	QP	N	GND

MEASUREMENT RESULT: "GM1911265073_fin2"

11/26/2019 7:05PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370500	22.20	10.1	49	26.3	AV	N	GND
0.402000	24.10	10.1	48	23.7	AV	N	GND
2.031000	29.20	10.1	46	16.8	AV	N	GND
2.710500	29.20	10.1	46	16.8	AV	N	GND
11.175000	14.60	10.2	50	35.4	AV	N	GND
19.297500	19.90	10.2	50	30.1	AV	N	GND

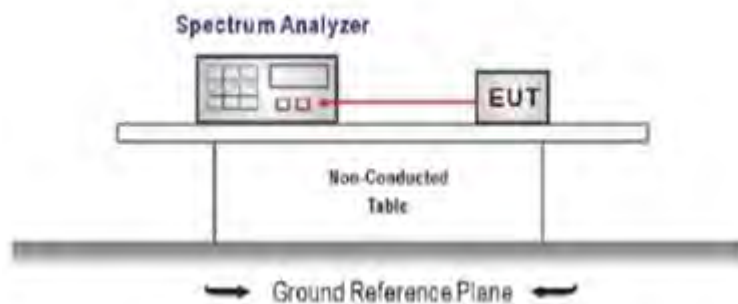
5.3. Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 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 CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ the 20 dB bandwidth of the emission being measured, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

TEST Data

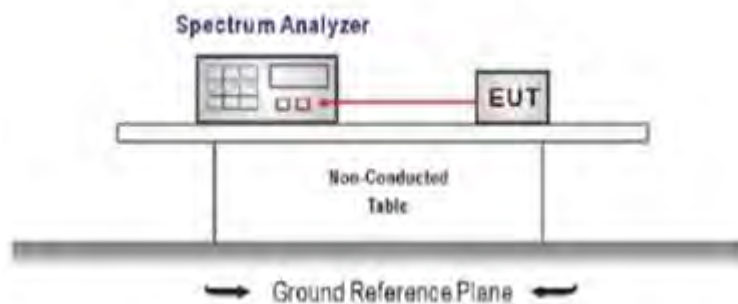
Please refer to appendix A on the appendix report

5.4. 20 dB Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

TEST Data

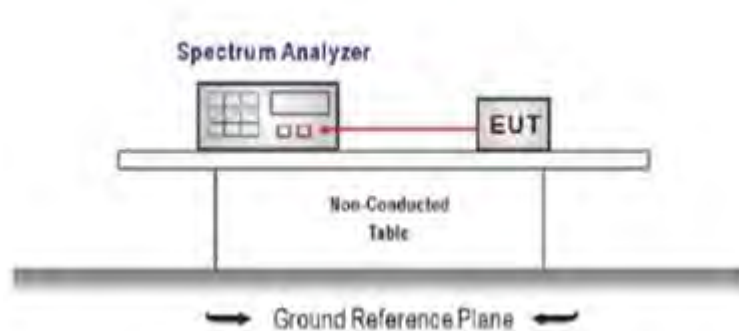
Please refer to appendix B on the appendix report

5.5. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = channel center frequency
Span $\geq 1.5 \times \text{OBW}$
RBW = 1%~5%OBW
VBW $\geq 3 \times \text{RBW}$
Sweep time = auto couple
Detector = Peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

TEST Data

Please refer to appendix C on the appendix report

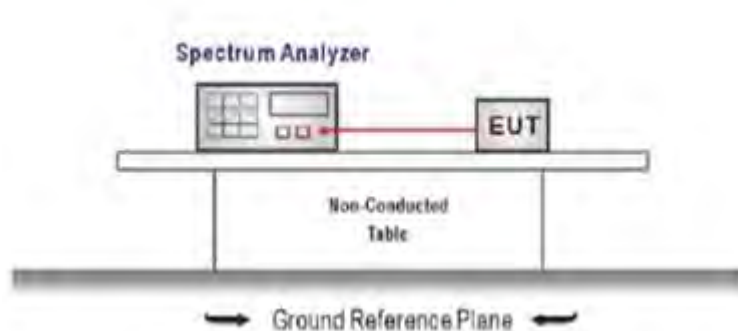
5.6. Carrier Frequencies Separation

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz 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.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
RBW $\geq$ 1% of the span, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.3

TEST RESULTS

☒ Passed ☐ Not Applicable

TEST Data

Please refer to appendix D on the appendix report

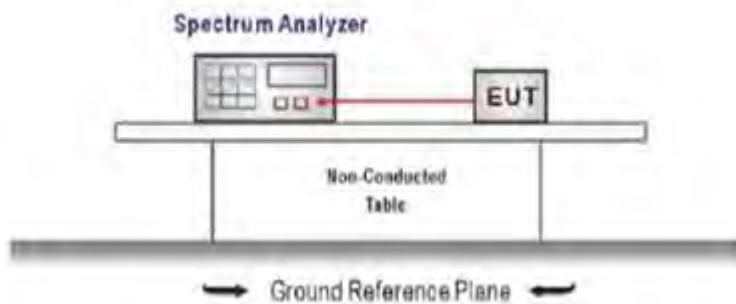
5.7. Hopping Channel Number

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least **15** channels.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW $\geq$ 1% of the span, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

TEST Data

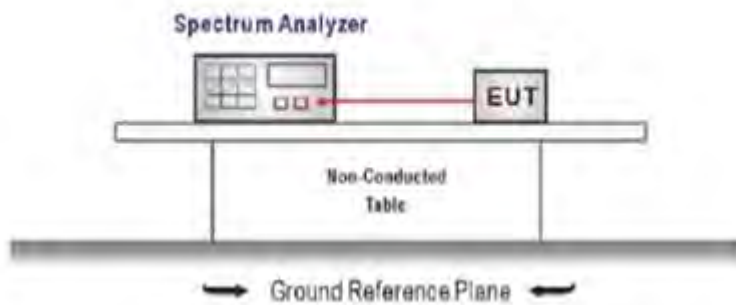
Please refer to appendix E on the appendix report

5.8. Dwell Time

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1): 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.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW $\geq$ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel,
Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.3

TEST RESULTS

☒ Passed ☐ Not Applicable

TEST Data

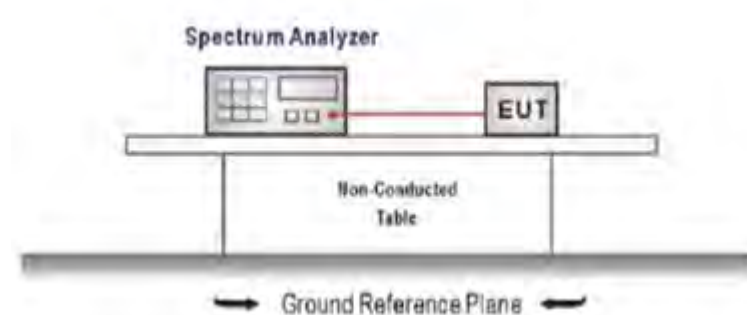
Please refer to appendix F on the appendix report

5.9. Duty Cycle Correction Factor (DCCF)

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW $\geq$ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel,
Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

TEST MODE:

Please refer to the clause 4.3

TEST Data

Please refer to appendix G on the appendix report

5.10. Pseudorandom Frequency Hopping Sequence

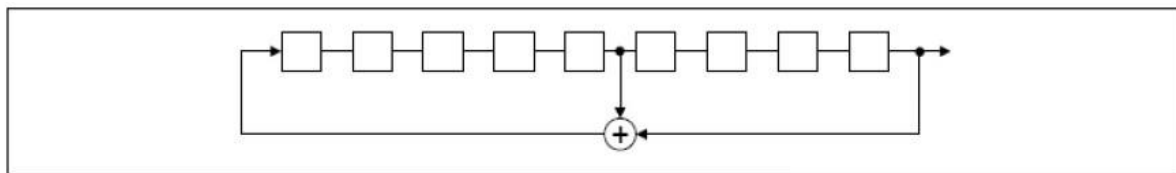
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1): 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 pseudo-randomly 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.

TEST RESULTS

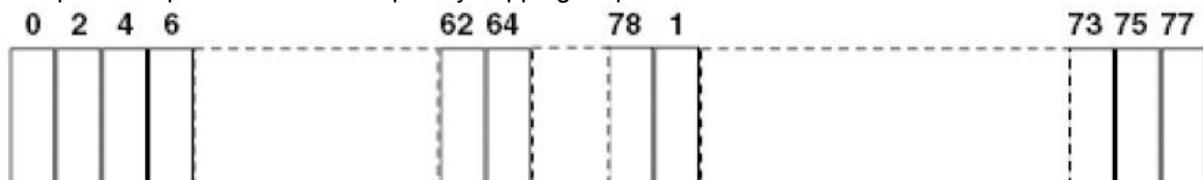
The pseudorandom frequency hopping sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: 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 follows:



Each frequency used equally on the average by each transmitter.

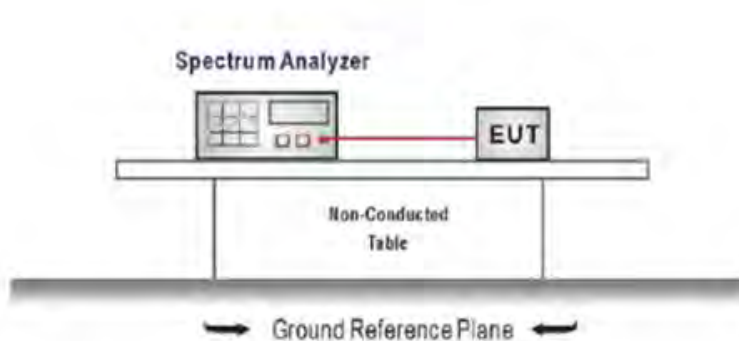
The system receiver has input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shifts frequencies in synchronization with the transmitted signals.

5.11. Conducted Band edge and Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d): 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 CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Establish a reference level by using the following procedure
Center frequency=DTS channel center frequency
The span = 1.5 times the DTS bandwidth.
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

3. Emission level measurement
Set the center frequency and span to encompass frequency range to be measured
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum amplitude level.
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
5. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST Data

Please refer to appendix H on the appendix report

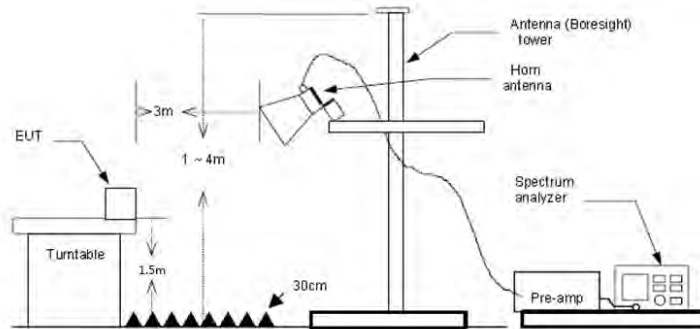
5.12. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)
 Averager level = Peak level + DCCF

TEST MODE:

Please refer to the clause 4.3

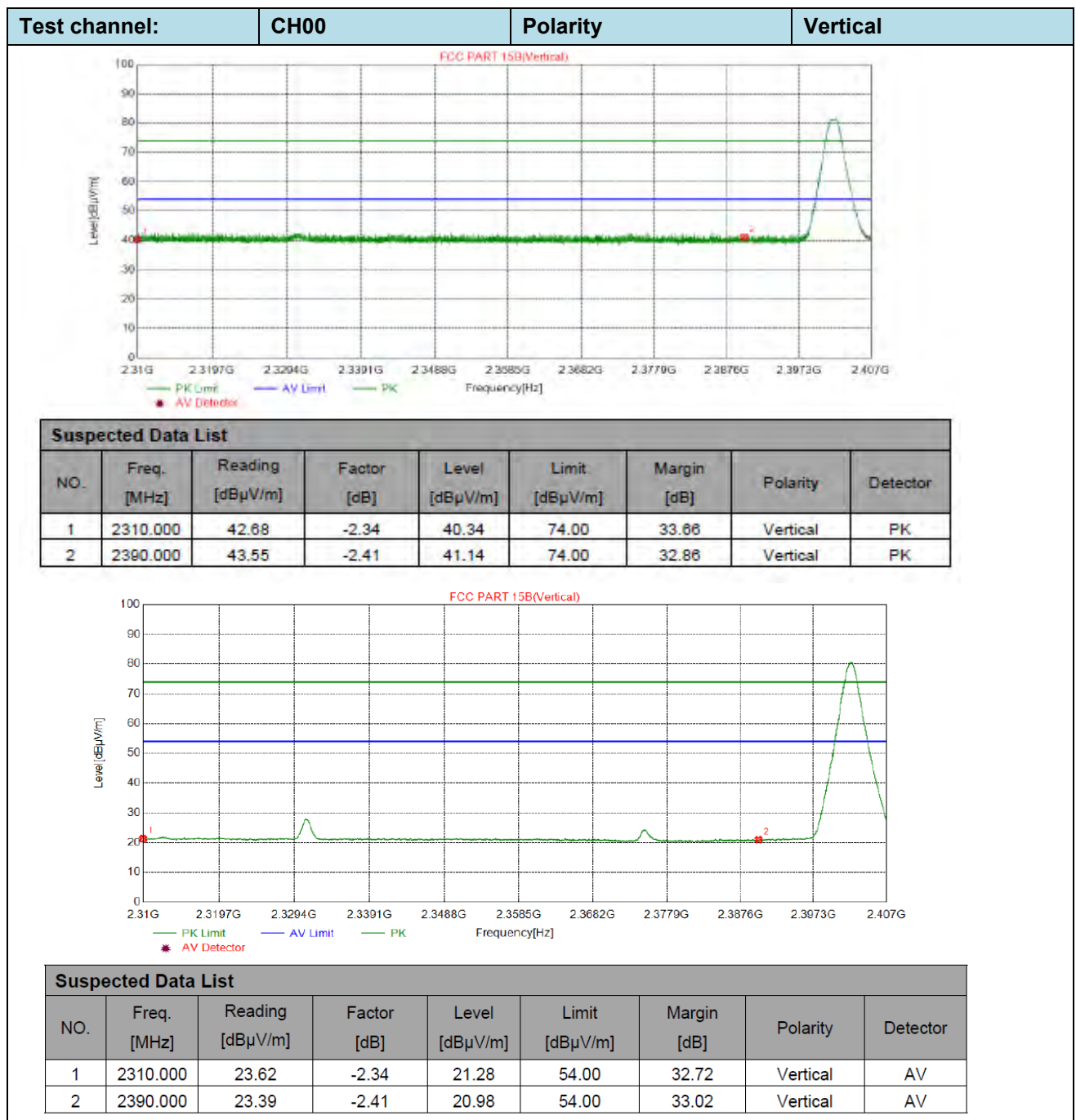
TEST RESULT

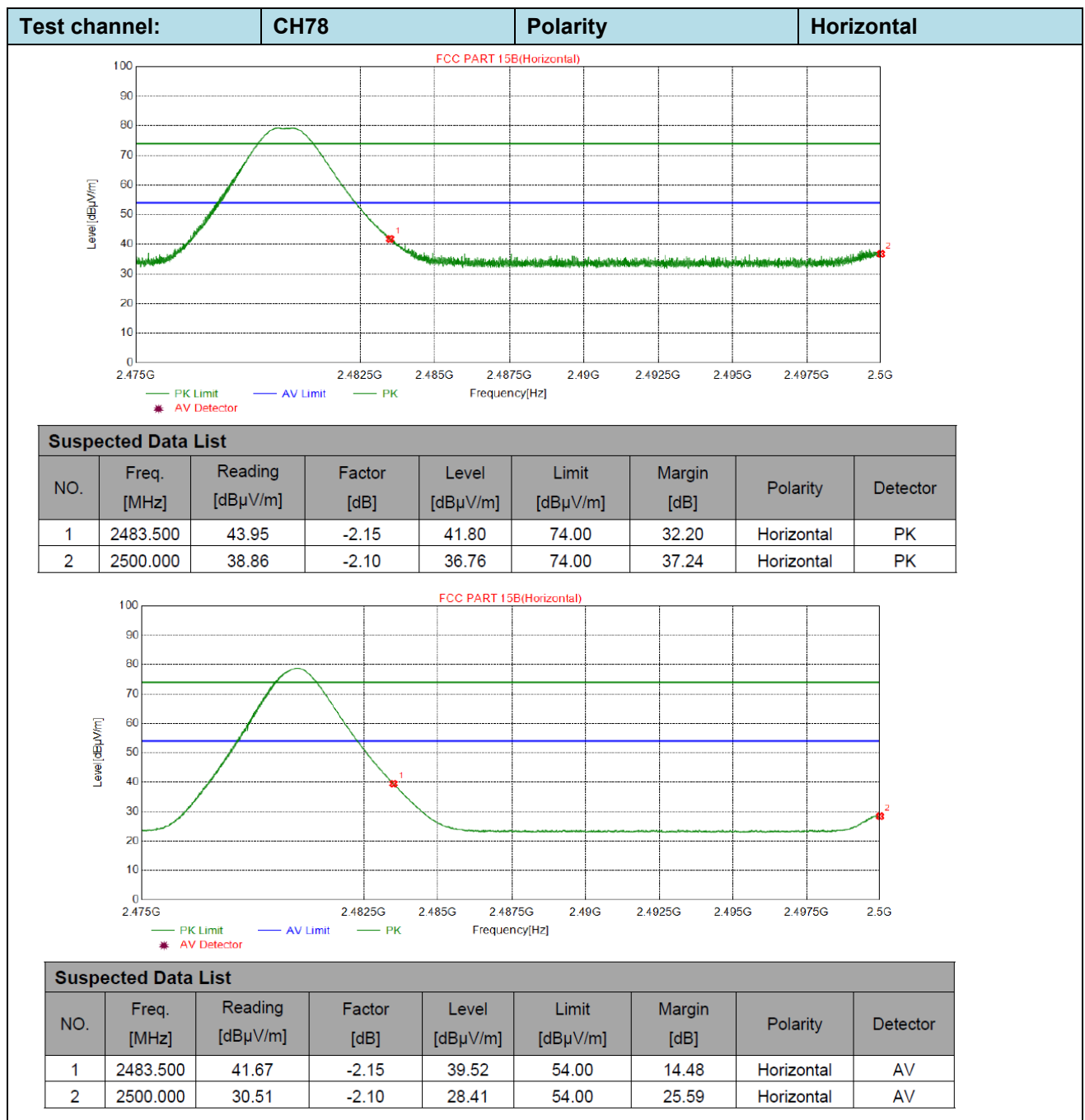
☒ Passed ☐ Not Applicable

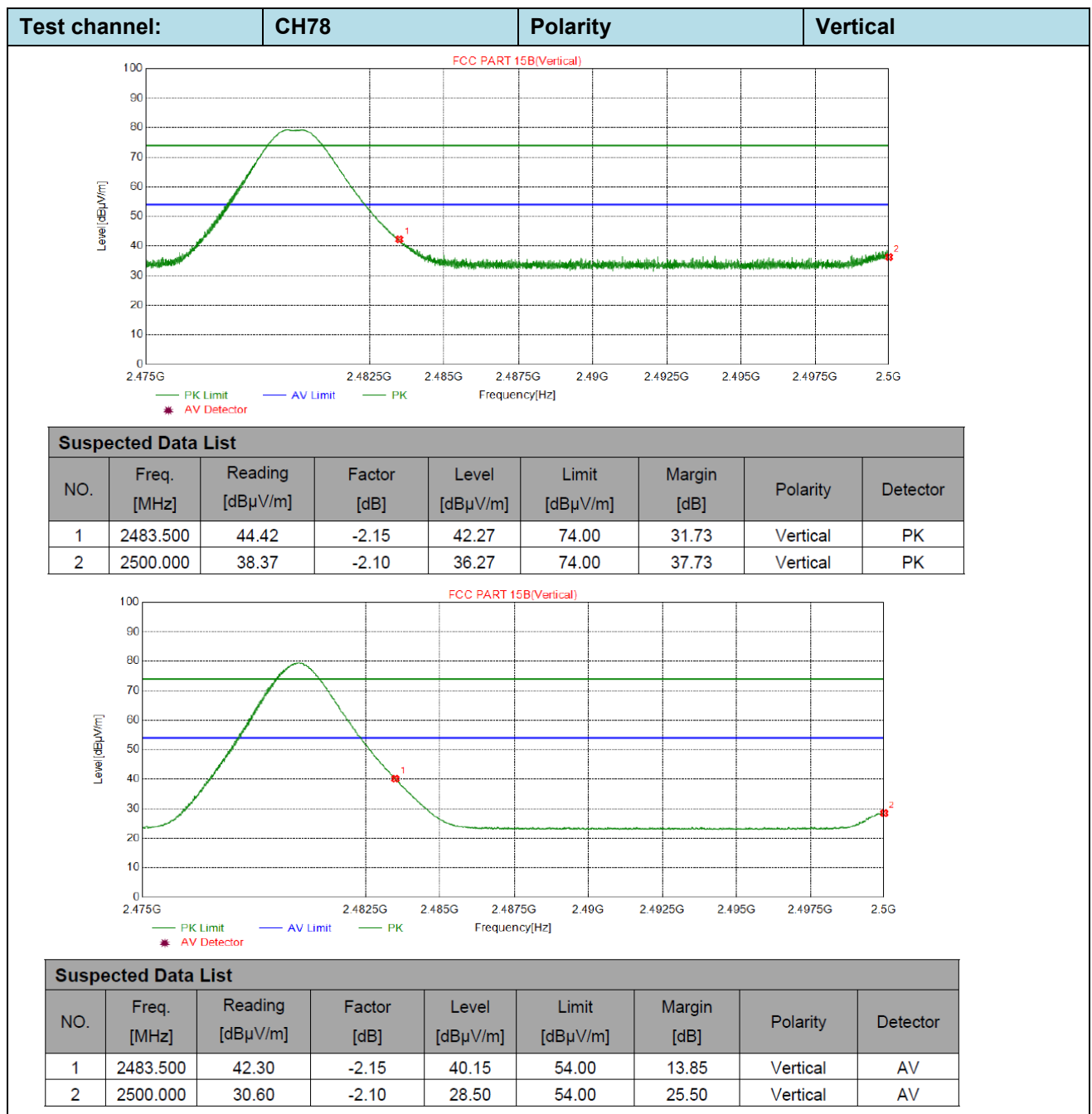
Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).









5.13. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

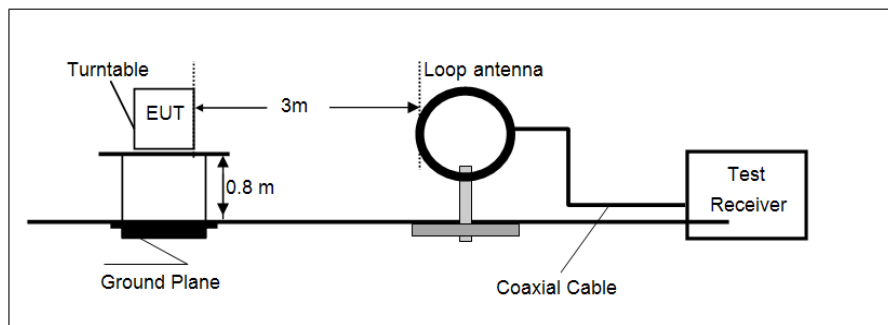
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

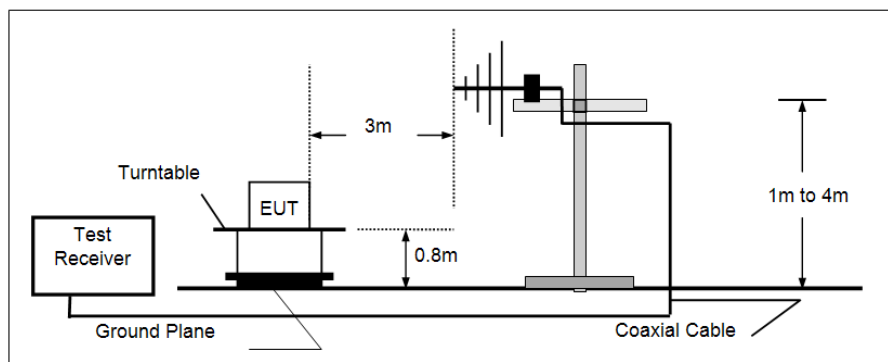
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

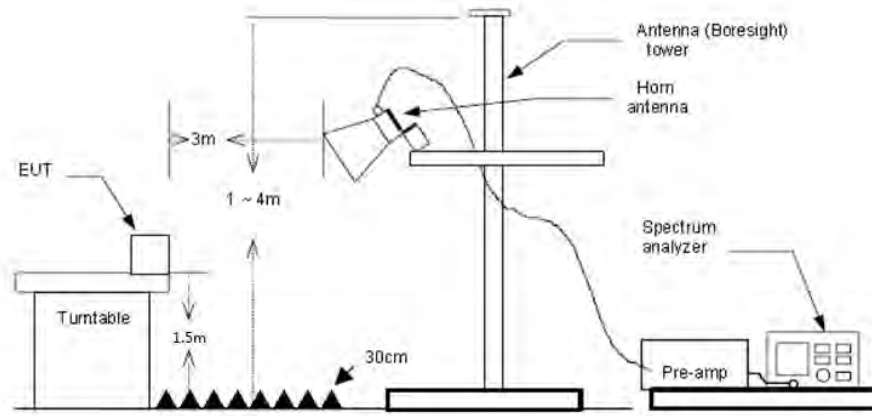
➤ 9 kHz ~ 30 MHz



➤ 30 MHz ~ 1 GHz



➤ Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)

Averager level = Peak level + DCCF

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

TEST DATA FOR 9 kHz ~ 30 MHz

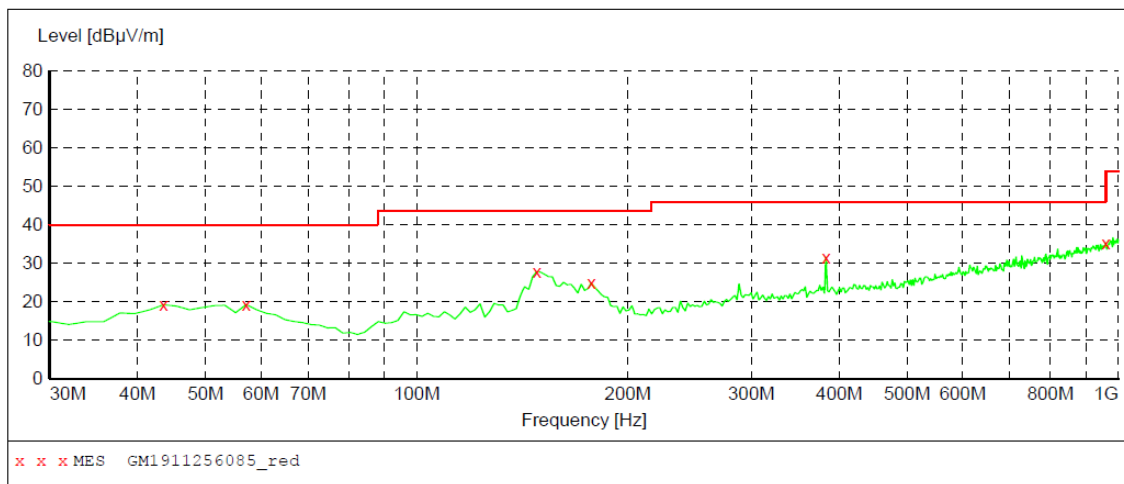
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

TEST DATA FOR 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH39 which it was worst case, so only show the worst case's data on this report.

Polarization:

Horizontal

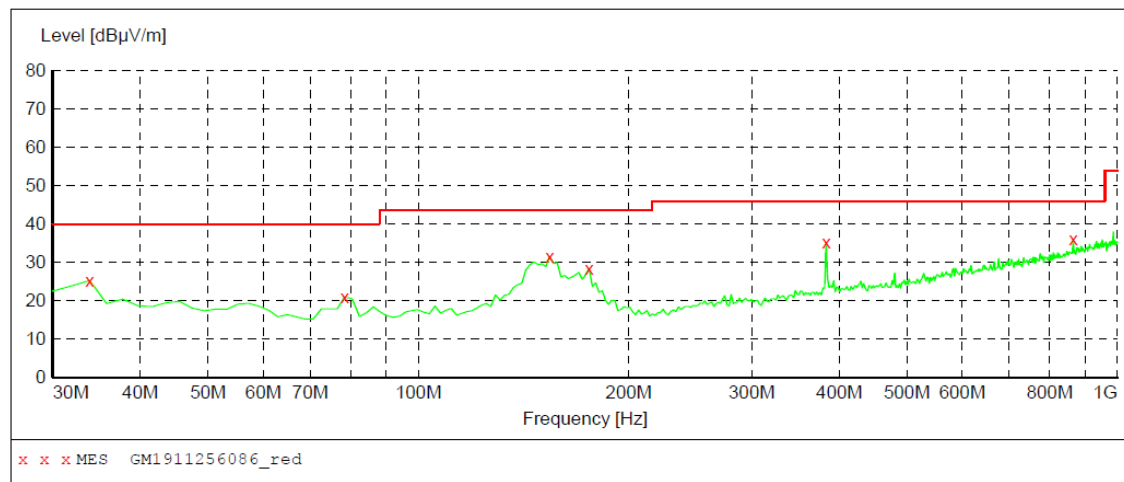
**MEASUREMENT RESULT: "GM1911256085_red"**

11/25/2019 7:29PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	19.20	-8.7	40.0	20.8	QP	300.0	228.00	HORIZONTAL
57.160000	19.30	-8.7	40.0	20.7	QP	100.0	239.00	HORIZONTAL
148.340000	27.80	-13.4	43.5	15.7	QP	100.0	189.00	HORIZONTAL
177.440000	24.90	-12.2	43.5	18.6	QP	100.0	0.00	HORIZONTAL
383.080000	31.60	-4.3	46.0	14.4	QP	100.0	239.00	HORIZONTAL
959.260000	35.30	8.4	46.0	10.7	QP	100.0	341.00	HORIZONTAL

Polarization:

Vertical

**MEASUREMENT RESULT: "GM1911256086_red"**

11/25/2019 7:31PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
33.880000	25.30	-12.1	40.0	14.7	QP	100.0	296.00	VERTICAL
78.500000	21.00	-15.1	40.0	19.0	QP	100.0	194.00	VERTICAL
154.160000	31.50	-13.1	43.5	12.0	QP	100.0	335.00	VERTICAL
175.500000	28.40	-12.3	43.5	15.1	QP	100.0	335.00	VERTICAL
383.080000	35.20	-4.3	46.0	10.8	QP	100.0	257.00	VERTICAL
864.200000	36.00	6.6	46.0	10.0	QP	100.0	245.00	VERTICAL

TEST DATA FOR 1 GHz ~ 25 GHz

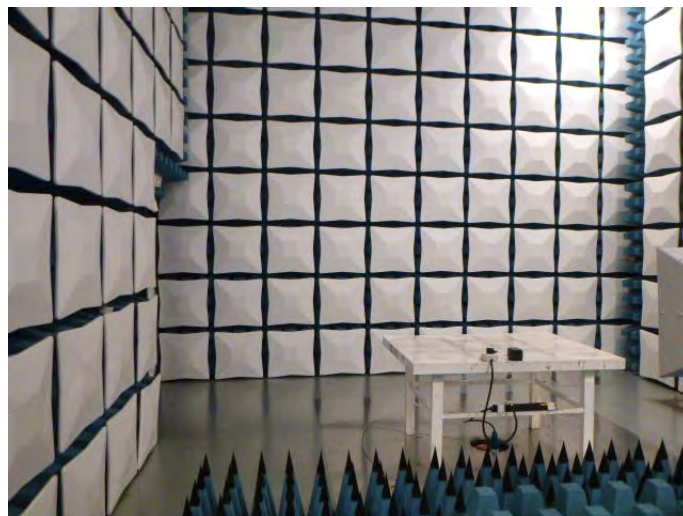
Test channel					CH00			
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	1229.125	36.20	-5.75	30.45	74.00	43.55	Horizontal	PK
2	3142.906	35.80	0.54	36.34	74.00	37.66	Horizontal	PK
3	4589.625	34.21	5.73	39.94	74.00	34.06	Horizontal	PK
4	6875.000	31.26	13.88	45.14	74.00	28.86	Horizontal	PK
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	1205.625	35.89	-5.82	30.07	74.00	43.93	Vertical	PK
2	3220.750	35.97	0.59	36.56	74.00	37.44	Vertical	PK
3	4921.562	33.06	7.32	40.38	74.00	33.62	Vertical	PK
4	6833.875	31.57	13.50	45.07	74.00	28.93	Vertical	PK

Test channel					CH19			
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	1279.062	35.98	-5.62	30.36	74.00	43.64	Horizontal	PK
2	3101.781	37.04	0.33	37.37	74.00	36.63	Horizontal	PK
3	4602.843	33.38	5.79	39.17	74.00	34.83	Horizontal	PK
4	6600.343	31.28	13.15	44.43	74.00	29.57	Horizontal	PK
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	1274.656	36.08	-5.64	30.44	74.00	43.56	Vertical	PK
2	3148.781	36.25	0.57	36.82	74.00	37.18	Vertical	PK
3	4498.562	34.41	5.34	39.75	74.00	34.25	Vertical	PK
4	6905.843	31.13	14.10	45.23	74.00	28.77	Vertical	PK

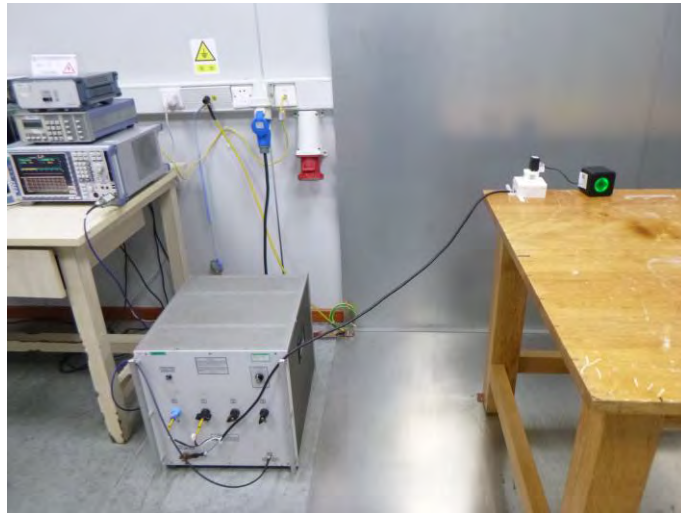
Test channel					CH39			
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	1217.375	36.47	-5.78	30.69	74.00	43.31	Horizontal	PK
2	3197.250	36.22	0.83	37.05	74.00	36.95	Horizontal	PK
3	4765.875	33.03	6.82	39.85	74.00	34.15	Horizontal	PK
4	6670.843	31.97	13.38	45.35	74.00	28.65	Horizontal	PK
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	1245.281	35.91	-5.71	30.20	74.00	43.80	Vertical	PK
2	3167.875	35.70	0.67	36.37	74.00	37.63	Vertical	PK
3	4511.781	34.06	5.40	39.46	74.00	34.54	Vertical	PK
4	6720.781	31.05	13.41	44.46	74.00	29.54	Vertical	PK

6. TEST SETUP PHOTOS

Radiated Emission



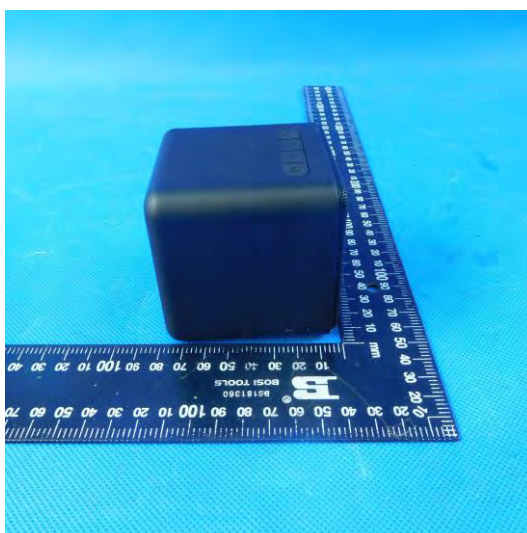
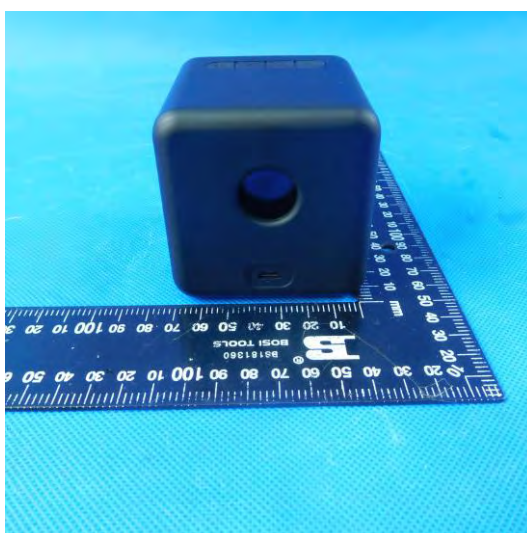
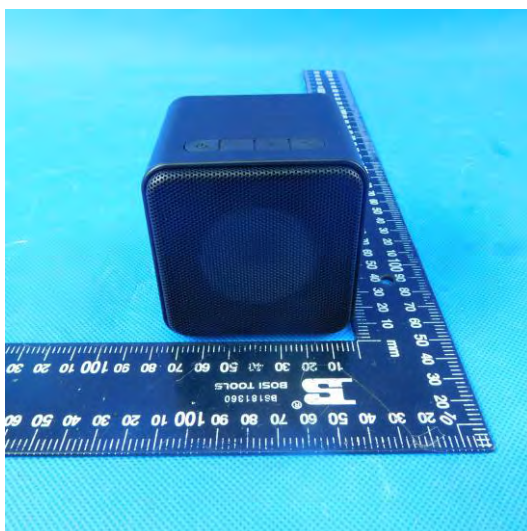
AC Conducted Emission

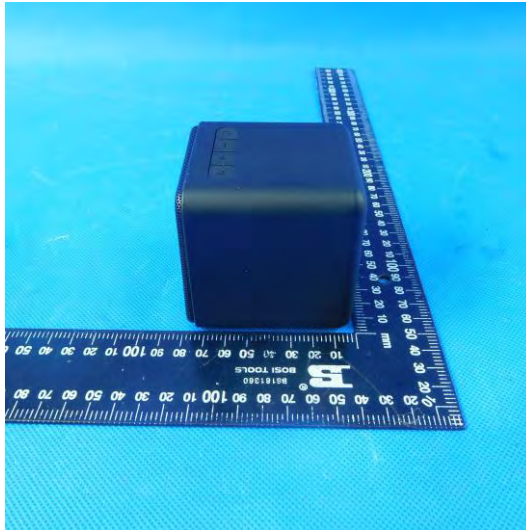


7. EXTERANAL AND INTERNAL PHOTOS

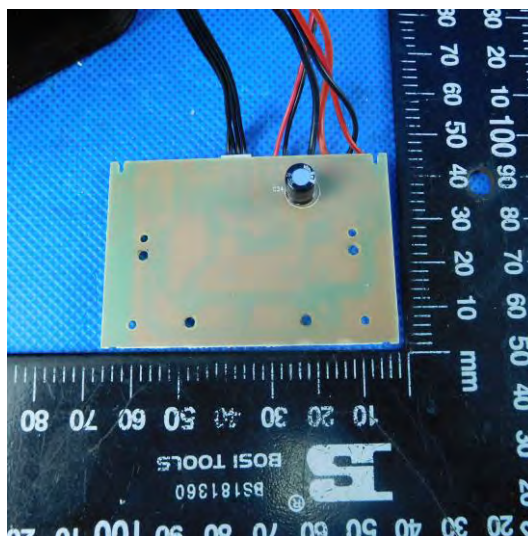
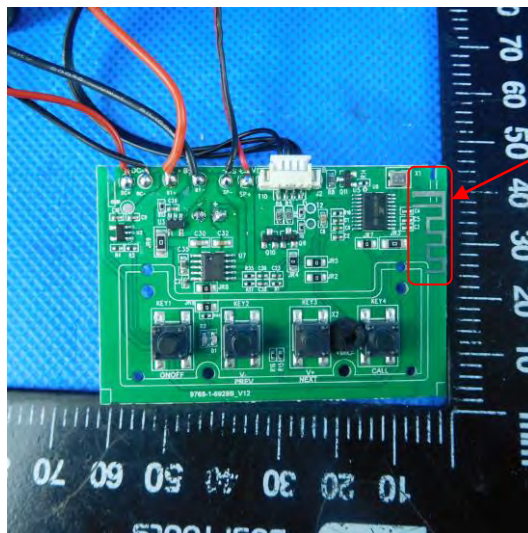
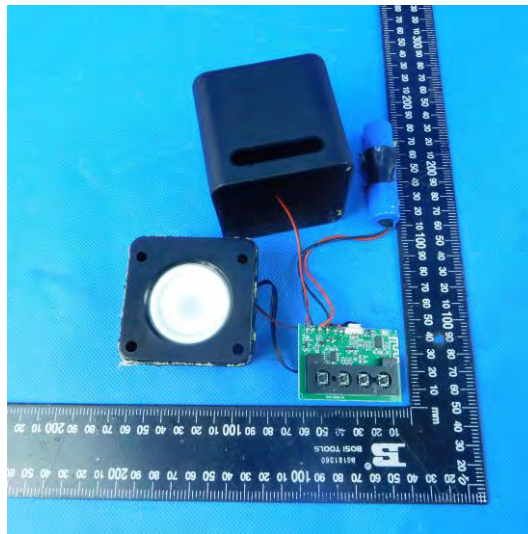
External Photo







Internal Photo

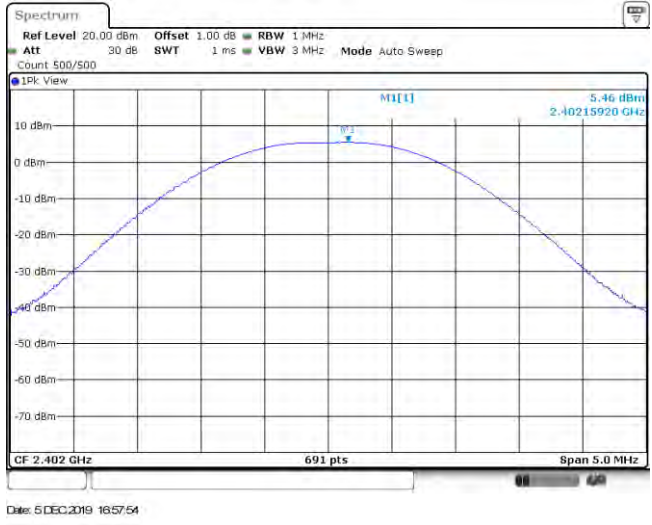
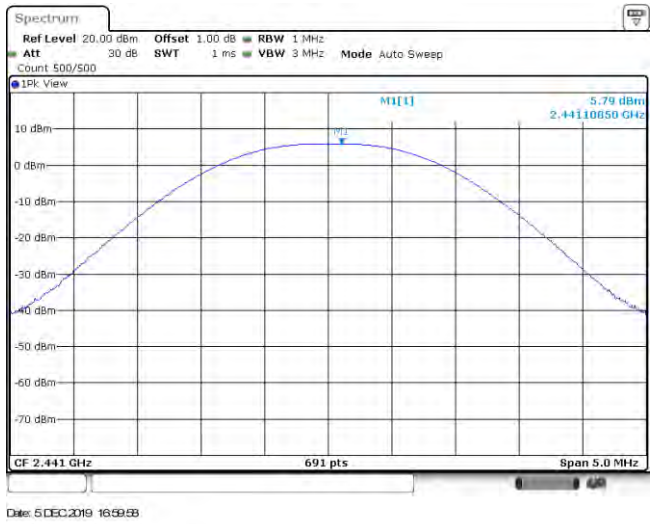
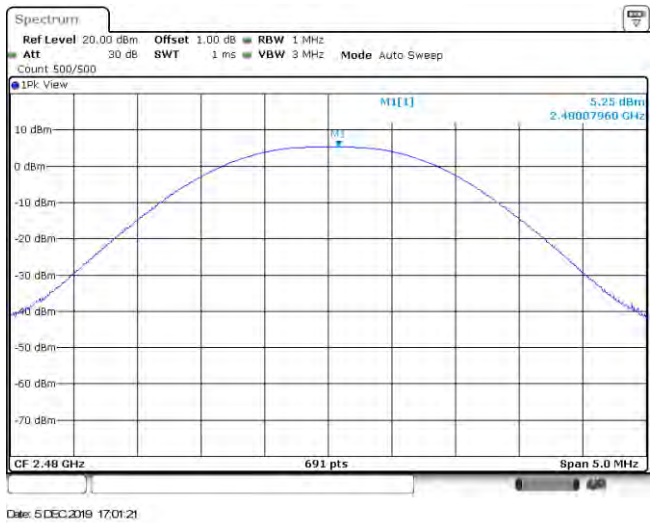




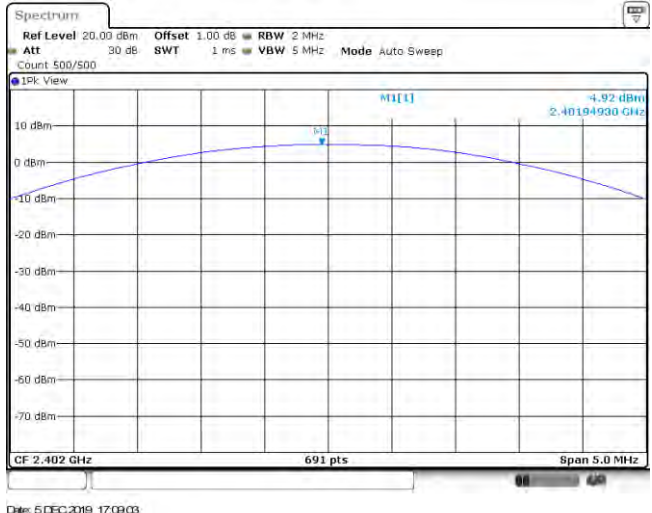
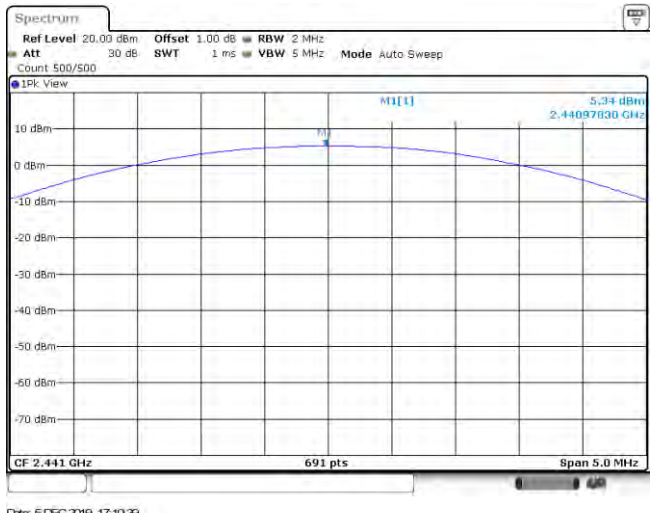
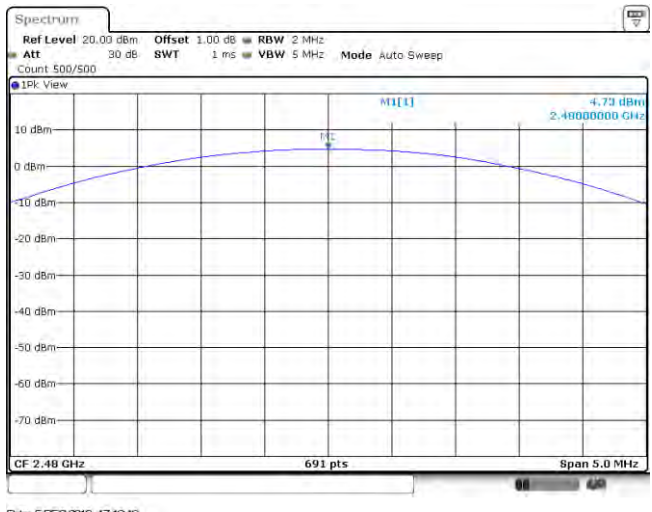
8. APPENDIX REPORT

Appendix A: Peak Output Power

Modulation type	Channel	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	5.46	5.31	≤ 30.00	Pass
	39	5.79	5.62		
	78	5.25	5.12		
$\pi/4$ DQPSK	00	4.84	4.02	≤ 21.00	Pass
	39	5.21	4.65		
	78	4.62	4.01		
8DPSK	00	4.92	4.23	≤ 21.00	Pass
	39	5.34	4.89		
	78	4.73	4.11		

Modulation Type:	GFSK
CH00	
CH39	
CH78	

Modulation Type: $\pi/4$ DQPSK	
CH00	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 4.84 dBm 2.40209410 GHz CF 2.402 GHz 691 pts Span 5.0 MHz Date: 5 DEC.2019 17:03:23
CH39	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 5.21 dBm 2.44110650 GHz CF 2.441 GHz 691 pts Span 5.0 MHz Date: 5 DEC.2019 17:05:49
CH78	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 4.62 dBm 2.48013020 GHz CF 2.48 GHz 691 pts Span 5.0 MHz Date: 5 DEC.2019 17:07:11

Modulation Type:	8DPSK
CH00	 Spectrum plot for CH00. The plot shows a peak at 2.40194930 GHz with a power level of -4.92 dBm. The plot includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 2 MHz, Count 500/500, Mode Auto Sweep. The x-axis is CF 2.402 GHz and the y-axis is power in dBm from -70 to 10.
CH39	 Spectrum plot for CH39. The plot shows a peak at 2.44097630 GHz with a power level of -5.34 dBm. The plot includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 2 MHz, Count 500/500, Mode Auto Sweep. The x-axis is CF 2.441 GHz and the y-axis is power in dBm from -70 to 10.
CH78	 Spectrum plot for CH78. The plot shows a peak at 2.48000000 GHz with a power level of -4.73 dBm. The plot includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 2 MHz, Count 500/500, Mode Auto Sweep. The x-axis is CF 2.48 GHz and the y-axis is power in dBm from -70 to 10.

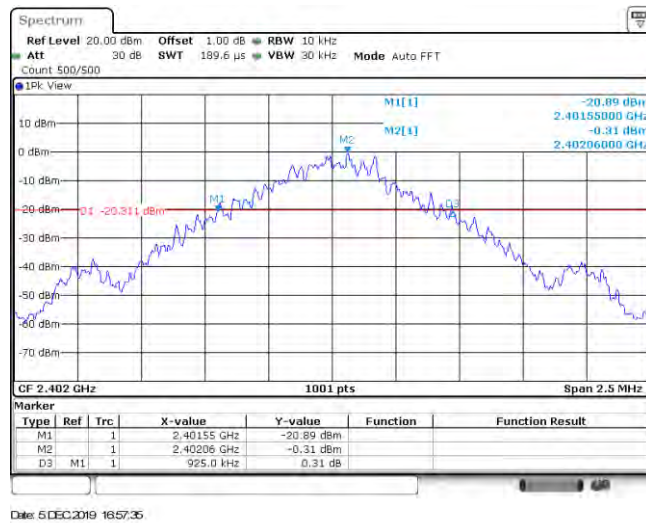
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	925.00	-	Pass
	39	925.00		
	78	925.00		
$\pi/4$ DQPSK	00	1285.00	-	Pass
	39	1295.00		
	78	1300.00		
8DPSK	00	1287.50	-	Pass
	39	1293.00		
	78	1290.00		

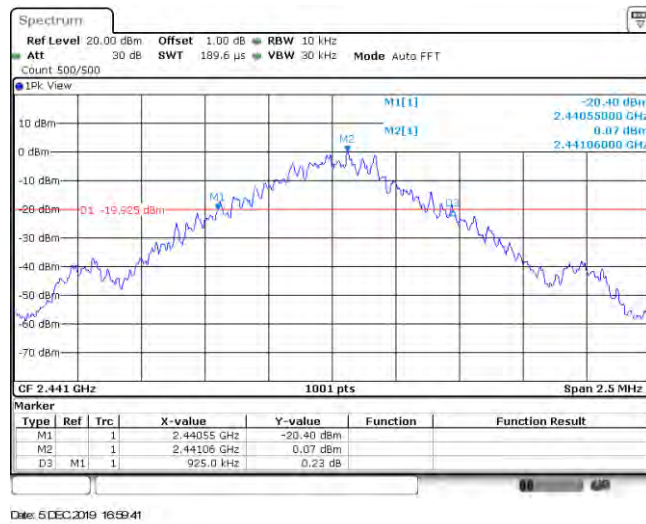
Modulation Type:

GFSK

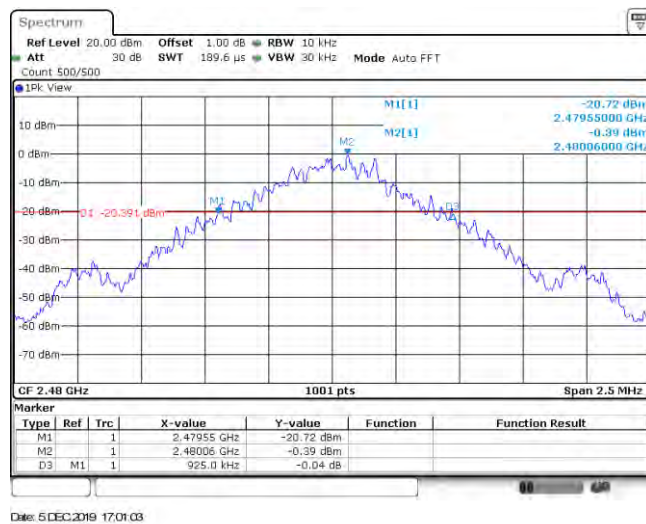
CH00

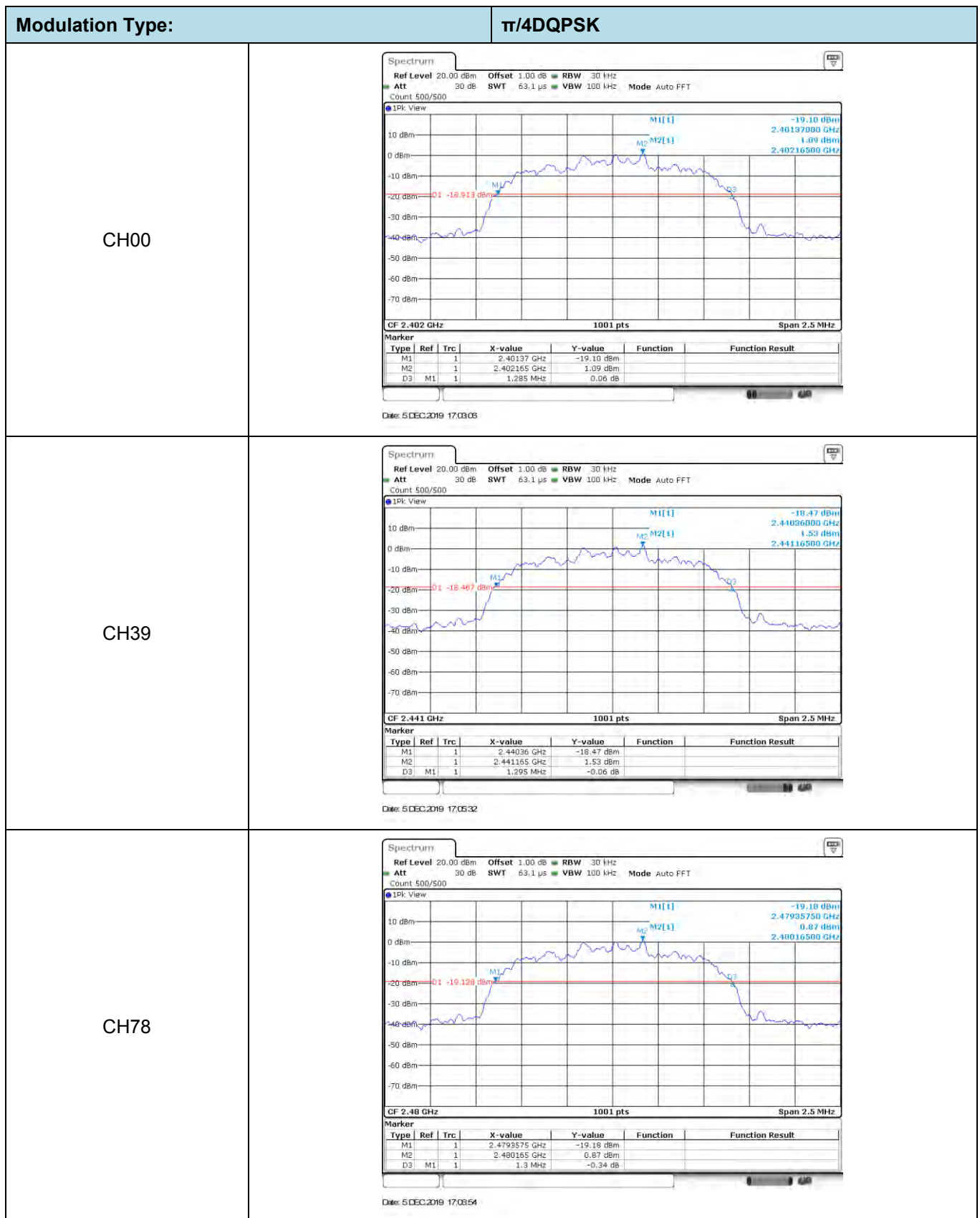


CH39



CH78

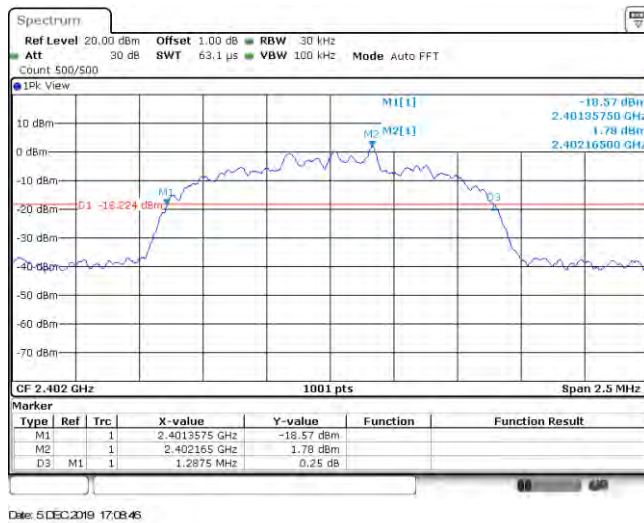




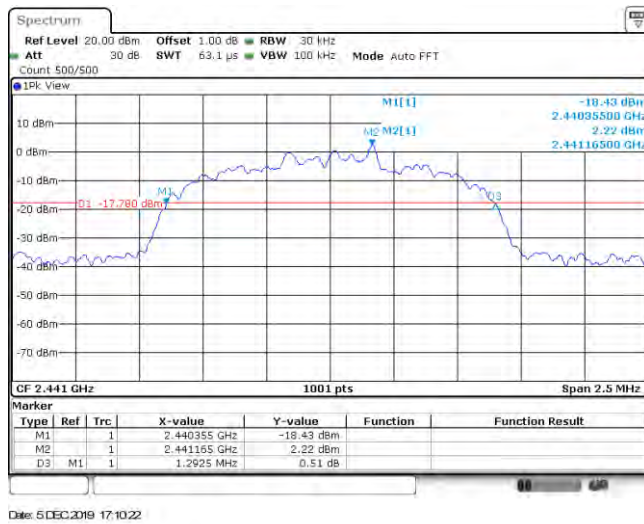
Modulation Type:

8DPSK

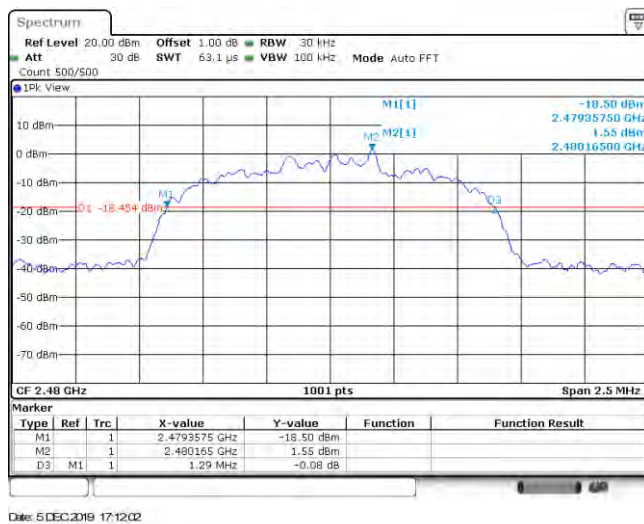
CH00



CH39



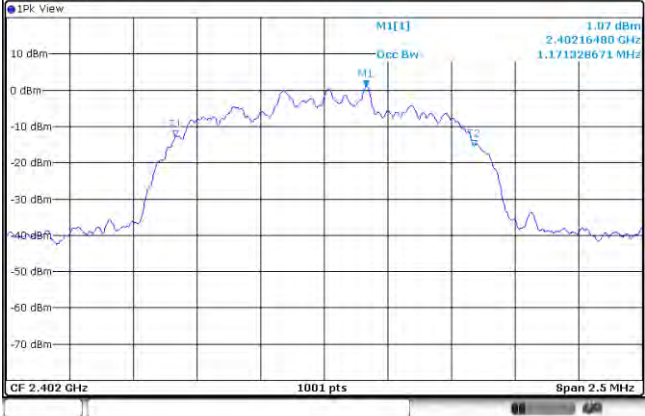
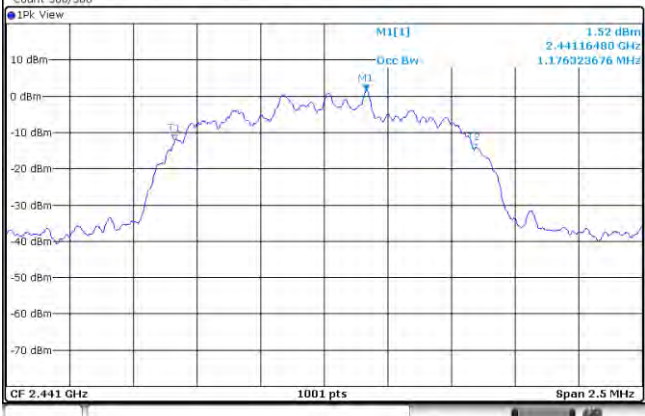
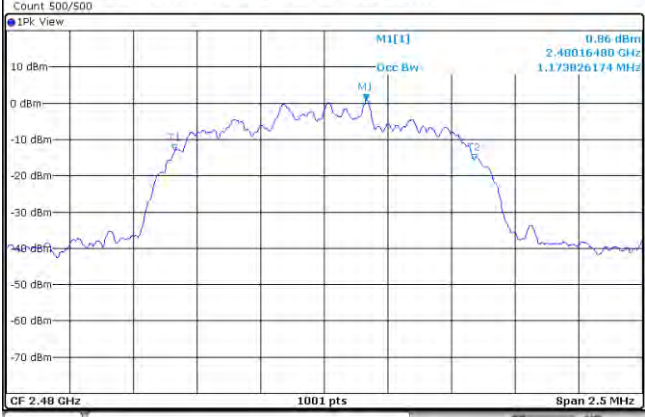
CH78

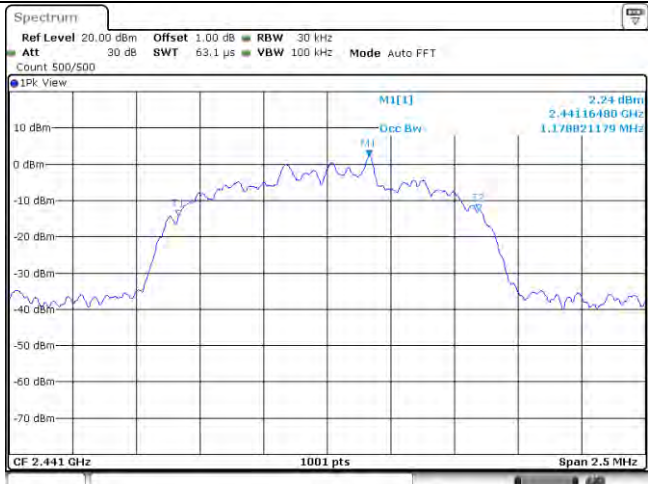
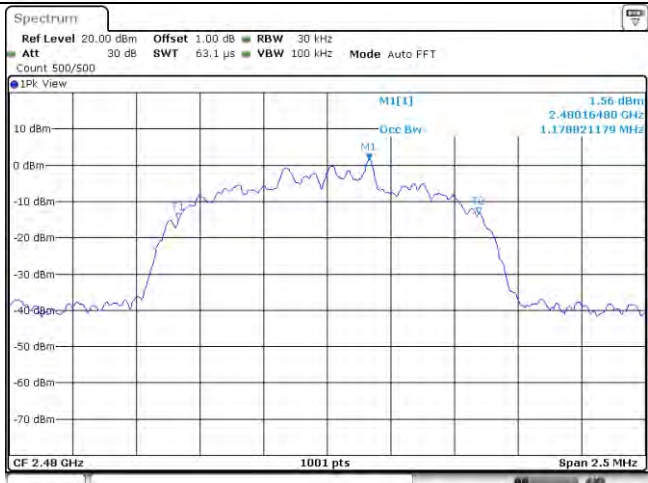


Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.90	-	Pass
	39	0.90		
	78	0.91		
$\pi/4$ DQPSK	00	1.17	-	Pass
	39	1.18		
	78	1.17		
8DPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		

Modulation Type: GFSK	
CH00	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1[1] 2.97 dBm 2.40216480 GHz 904.095904096 kHz CF 2.402 GHz 1001 pts Span 2.5 MHz Date: 5 DEC.2019 16:57:45
CH39	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1[1] 3.34 dBm 2.44116480 GHz 904.095904096 kHz CF 2.441 GHz 1001 pts Span 2.5 MHz Date: 5 DEC.2019 16:59:49
CH78	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1[1] 2.79 dBm 2.46016480 GHz 906.593406594 kHz CF 2.460 GHz 1001 pts Span 2.5 MHz Date: 5 DEC.2019 17:01:12

Modulation Type: $\pi/4$ DQPSK	
CH00	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1[1] 1.07 dBm 2.40216480 GHz 1.171328671 MHz M1 Occ Bw  CF 2.402 GHz1001 ptsSpan 2.5 MHz Date: 5 DEC.2019 17:03:14
CH39	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1[1] 1.52 dBm 2.44116480 GHz 1.176323676 MHz M1 Occ Bw  CF 2.441 GHz1001 ptsSpan 2.5 MHz Date: 5 DEC.2019 17:05:40
CH78	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1[1] 0.86 dBm 2.48016480 GHz 1.173826174 MHz M1 Occ Bw  CF 2.48 GHz1001 ptsSpan 2.5 MHz Date: 5 DEC.2019 17:07:03

Modulation Type: 8DPSK	
CH00	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1 1.76 dBm M11 2.40216480 GHz Occ Bw 1.176323676 MHz CF 2.402 GHz 1001 pts Span 2.5 MHz Date: 5 DEC.2019 17:08:54
CH39	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1 2.24 dBm M11 2.44116480 GHz Occ Bw 1.178821179 MHz CF 2.441 GHz 1001 pts Span 2.5 MHz Date: 5 DEC.2019 17:10:30
CH78	 Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View M1 1.56 dBm M11 2.48016480 GHz Occ Bw 1.178821179 MHz CF 2.48 GHz 1001 pts Span 2.5 MHz Date: 5 DEC.2019 17:12:10

Appendix D: Carrier Frequencies Separation

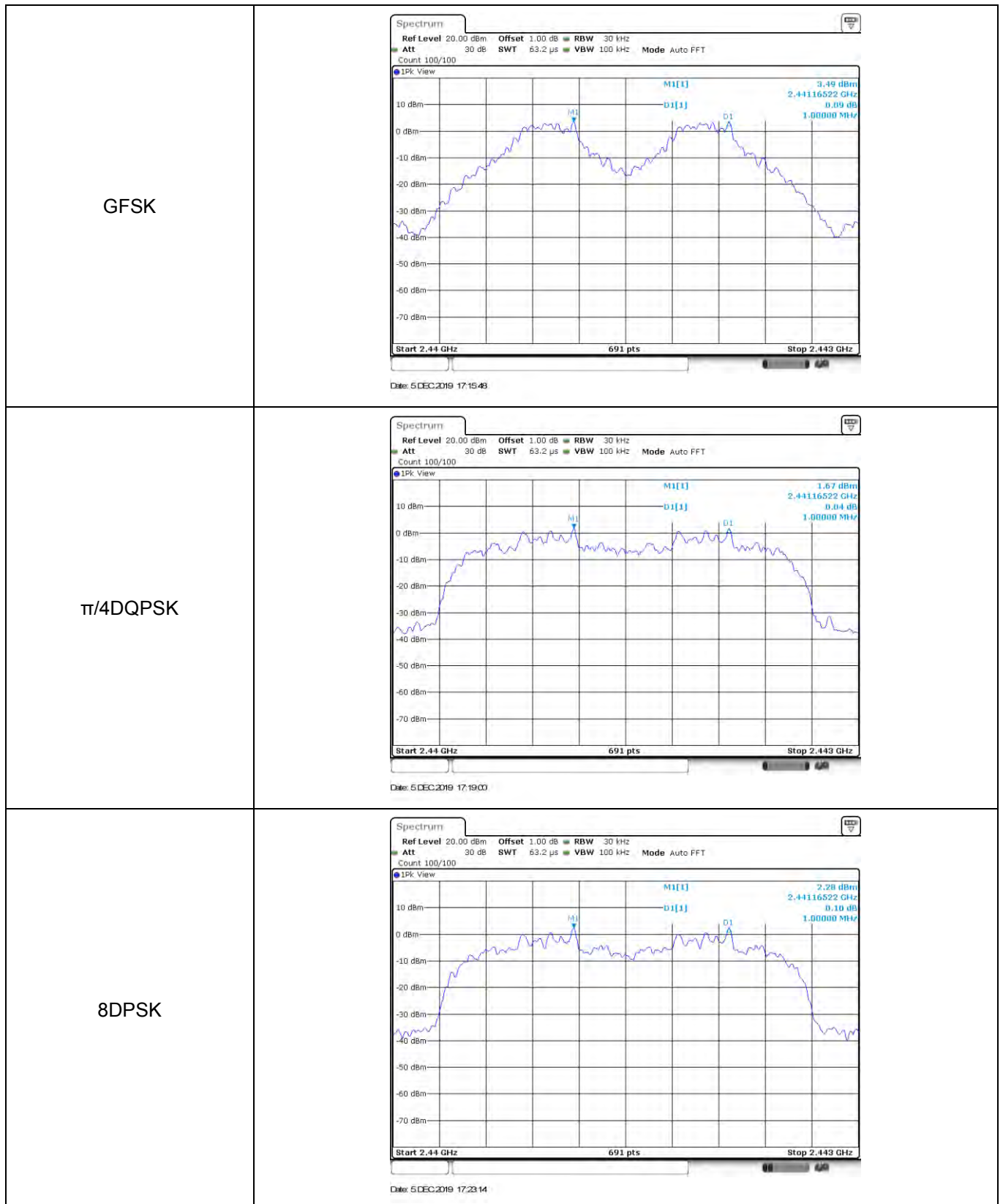
Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥925.00	Pass
π/4DQPSK	39	1.00	≥866.67	Pass
8DPSK	39	1.00	≥862.00	Pass

Note:

*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the appendix B.

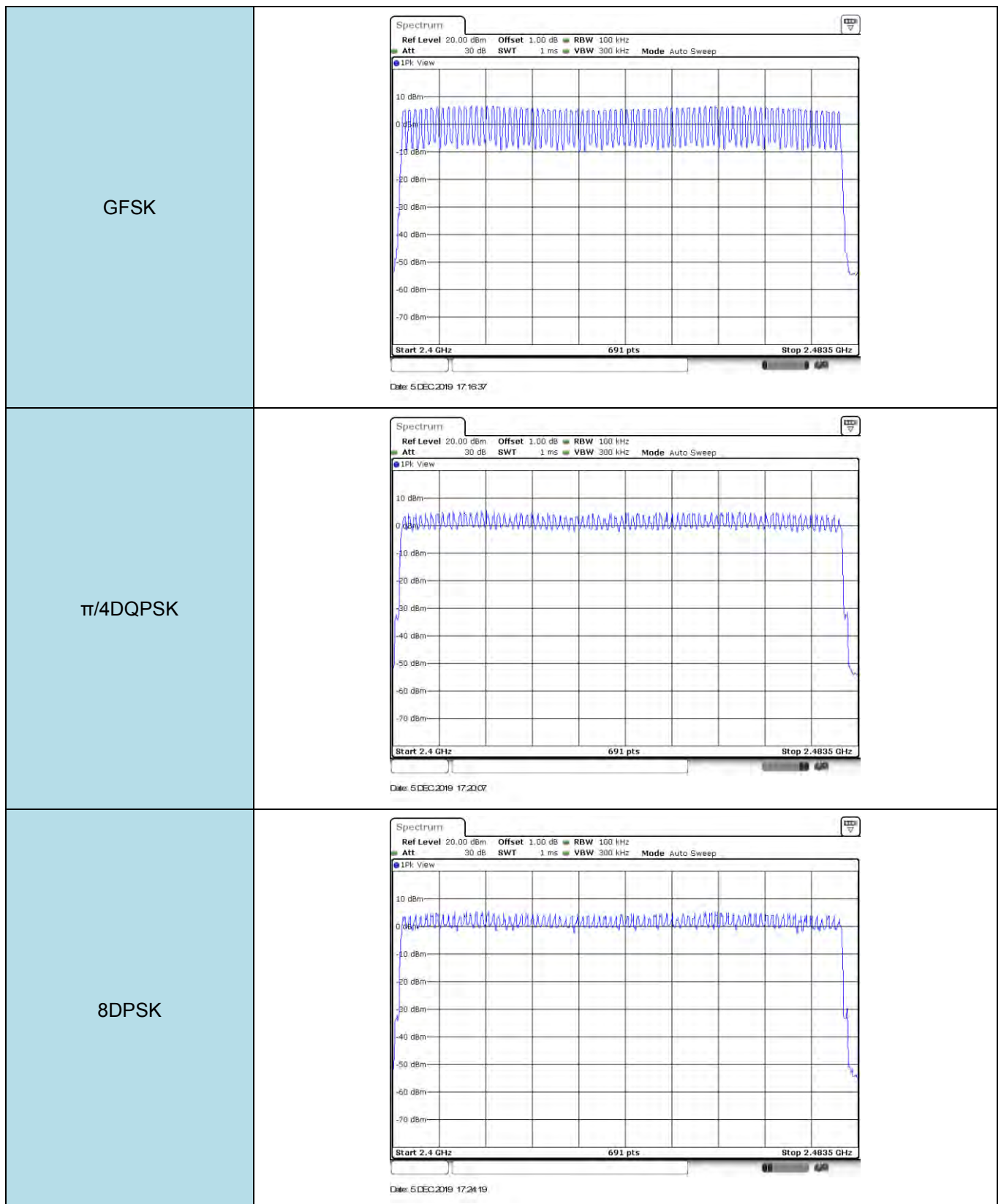
π/4DQPSK limit = 2/3 * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B



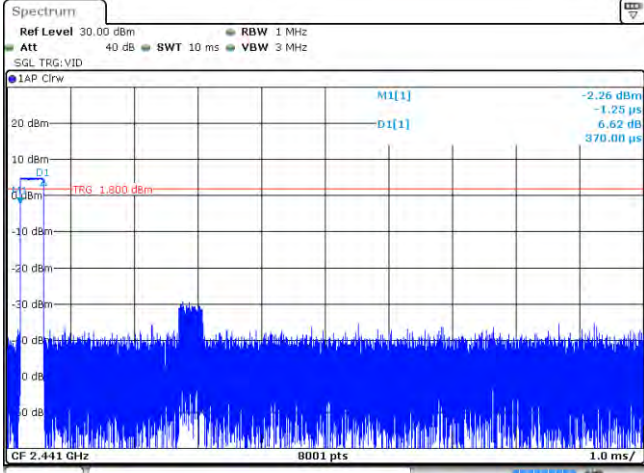
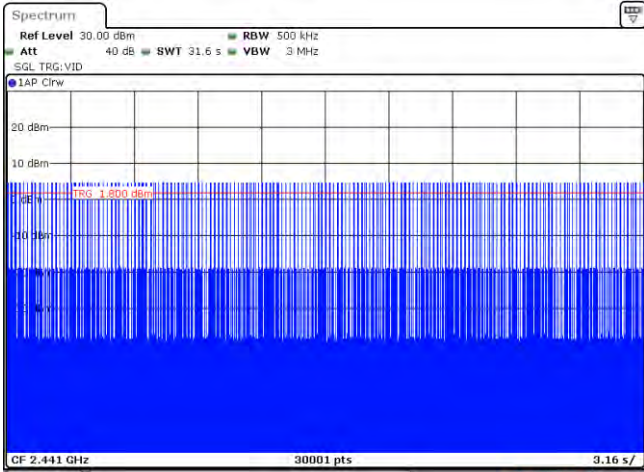
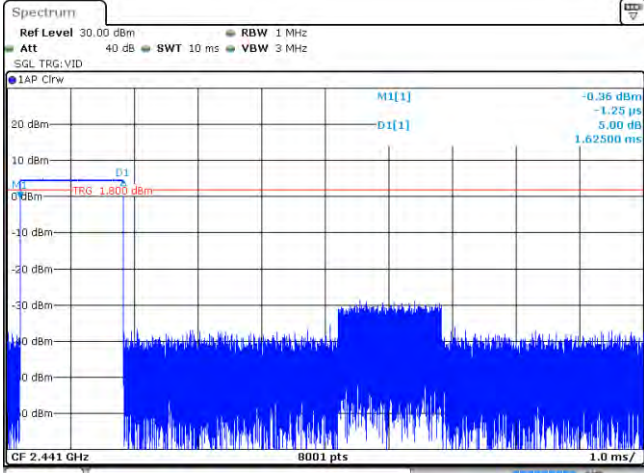
Appendix E: Hopping Channel Number

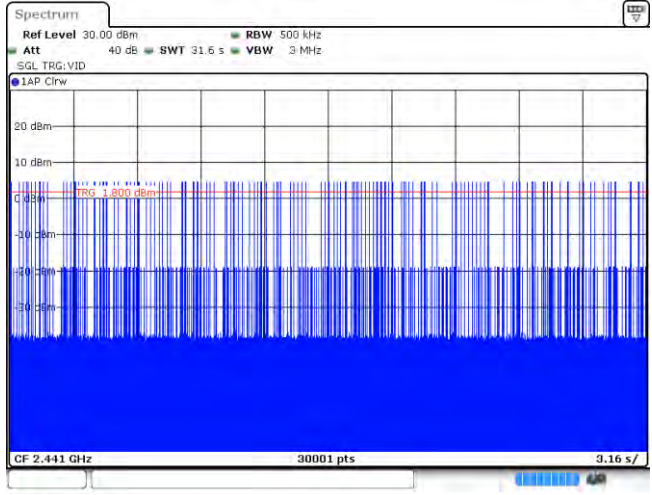
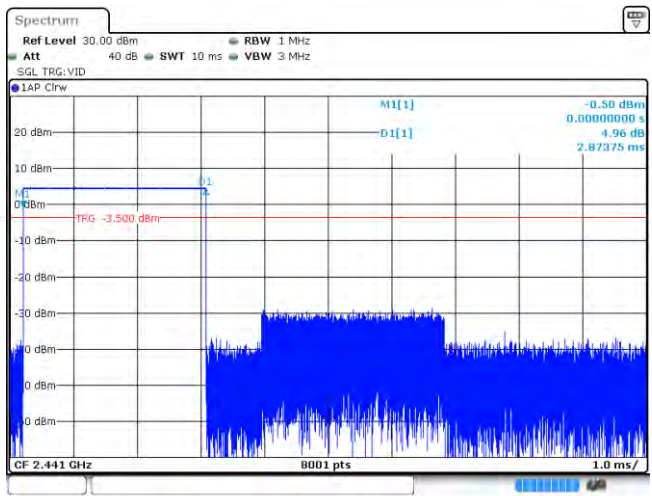
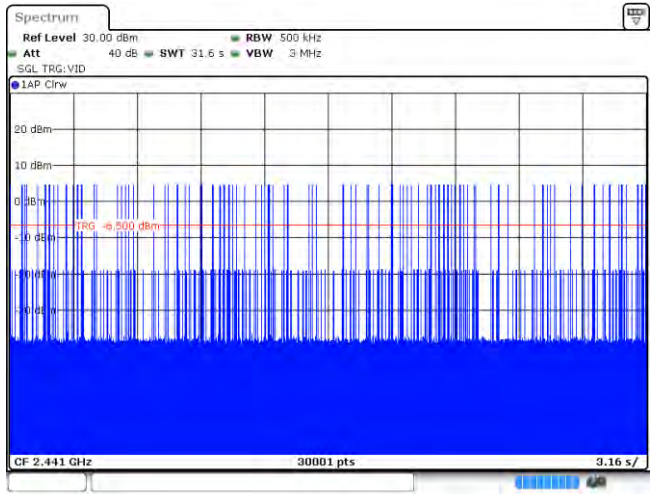
Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π/4DQPSK	79		
8DPSK	79		

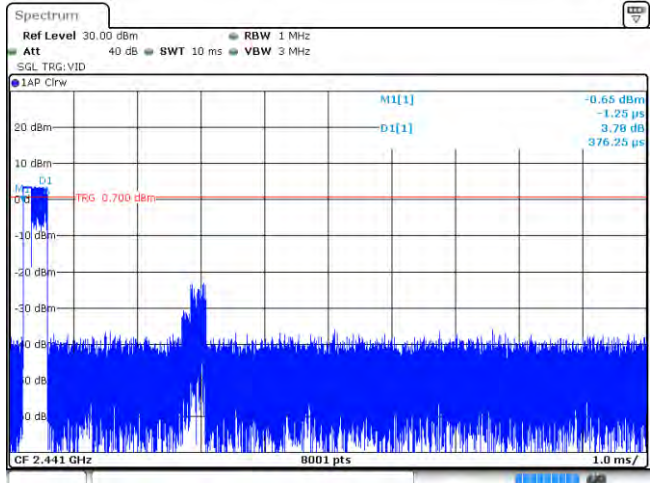
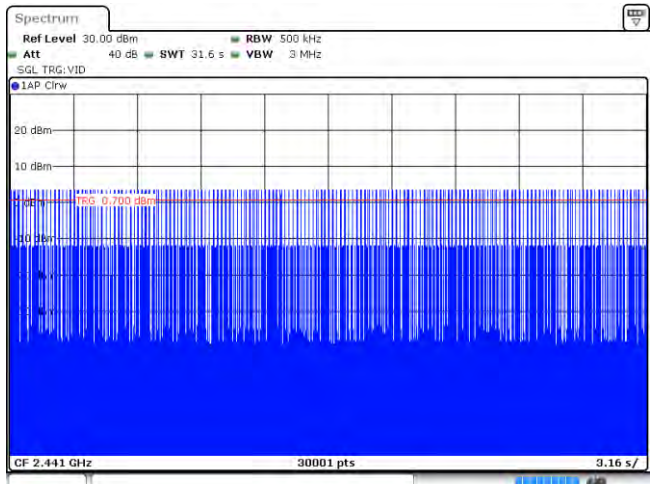
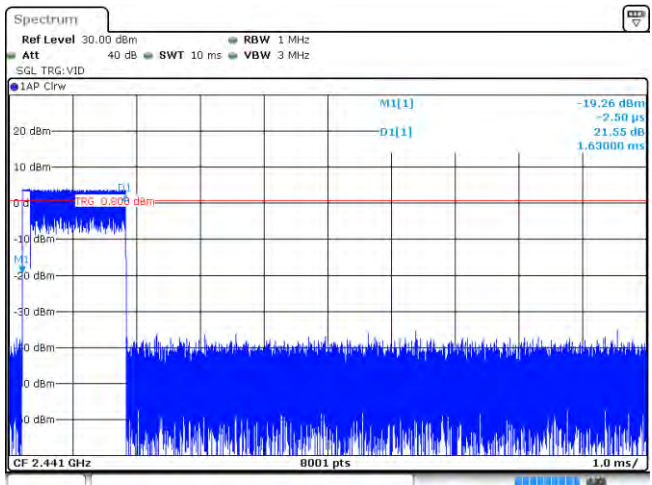


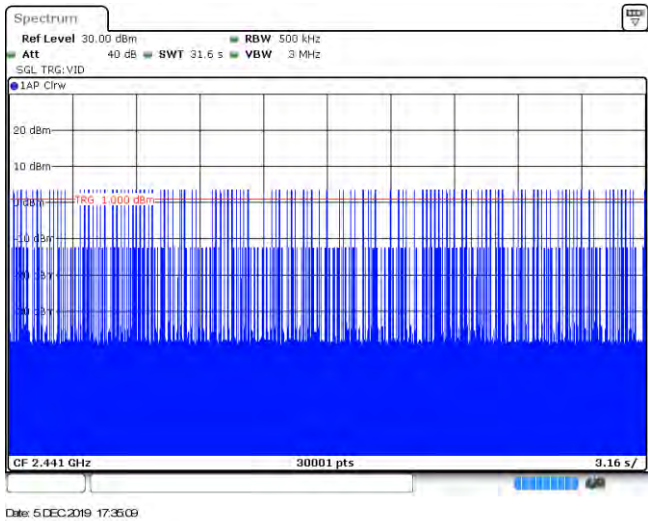
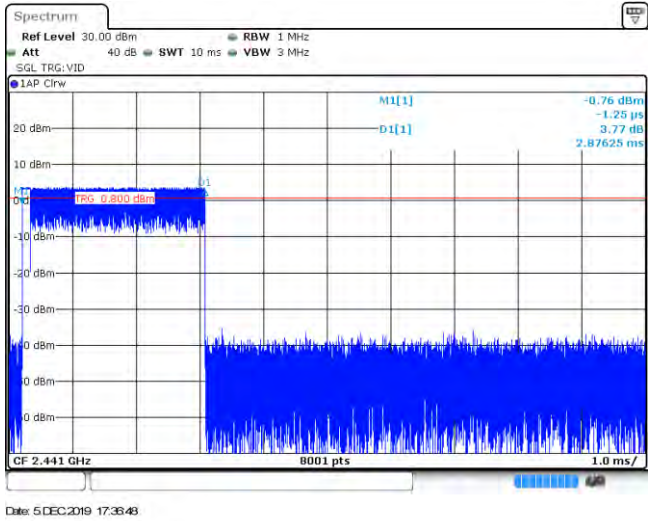
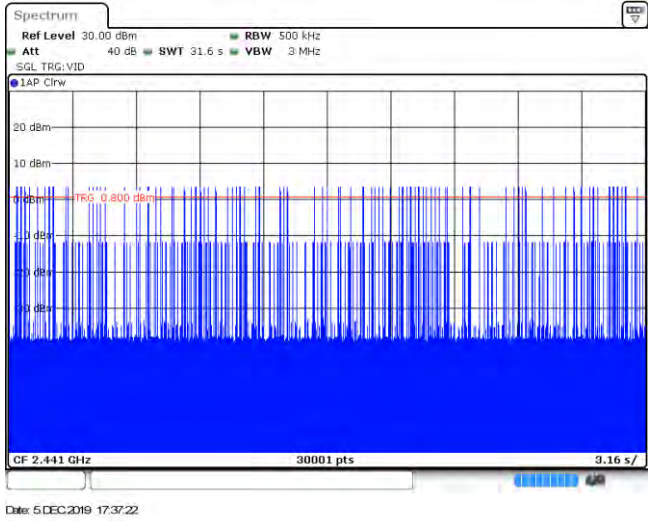
Appendix F: Dwell Time

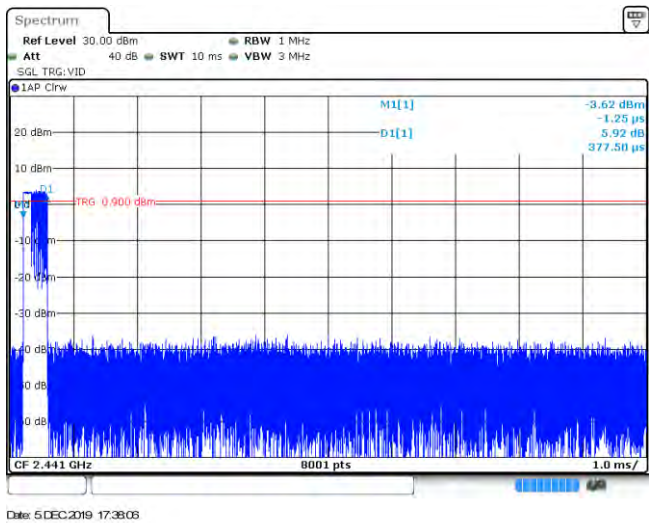
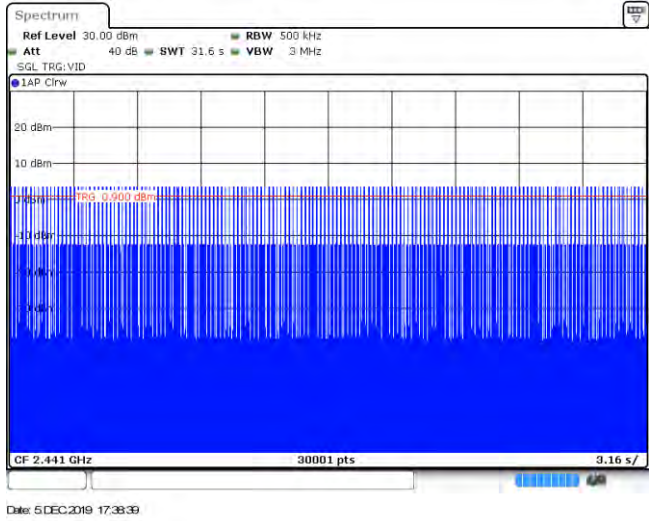
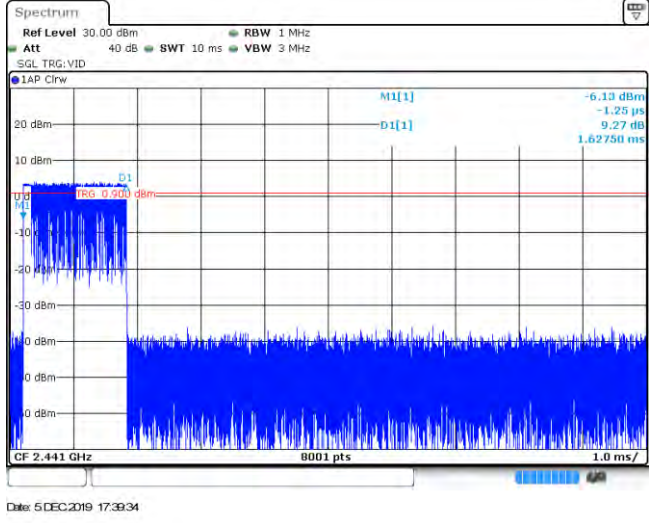
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.37	314.00	0.12	≤ 0.40	Pass
	DH3	1.63	158.00	0.26		
	DH5	2.87	112.00	0.32		
$\pi/4$ DQPSK	2DH1	0.38	314.00	0.12	≤ 0.40	Pass
	2DH3	1.63	158.00	0.26		
	2DH5	2.88	112.00	0.32		
8DPSK	3DH1	0.38	314.00	0.12	≤ 0.40	Pass
	3DH3	1.63	158.00	0.26		
	3DH5	2.88	106.00	0.31		

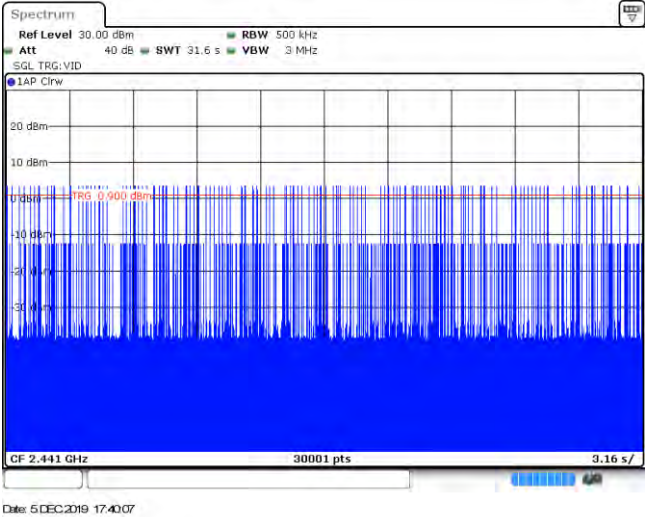
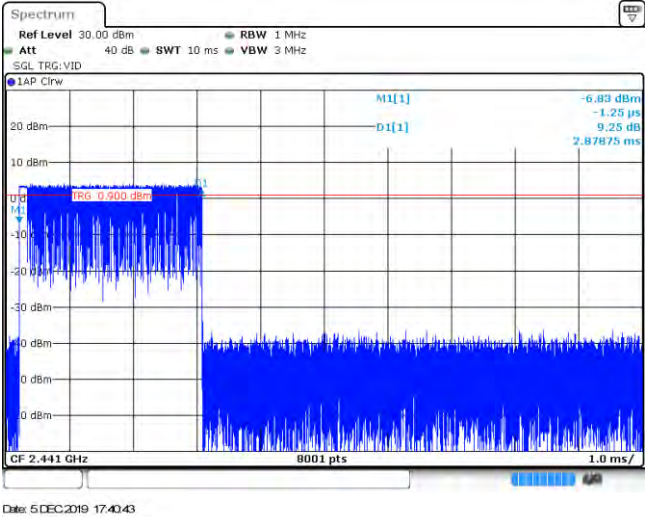
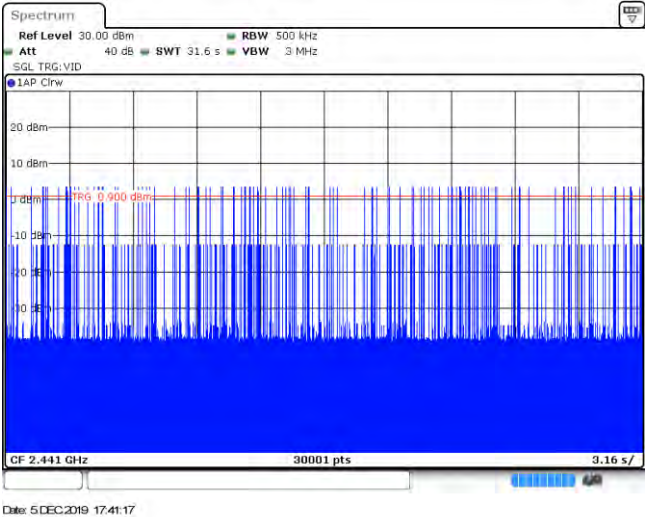
Modulation Type:	GFSK
DH1 Burst width	 Spectrum plot showing DH1 Burst width. The plot displays a signal burst at 2.441 GHz. The y-axis represents power in dBm, ranging from -40 dBm to 30 dBm. The x-axis represents time in ms, ranging from 0 to 1.0 ms. The signal is labeled M1[1] and D1[1]. The plot shows a burst of signal at approximately 0.5 ms, with a peak power of -2.26 dBm. The signal is triggered at 1.800 dBm. The plot includes a red trigger line at 1.800 dBm. The plot also shows the signal's duration and the time interval between the start and end of the burst. Ref Level 30.00 dBm Att 40 dB SWT 10 ms RBW 1 MHz VBW 3 MHz SGL TRG:VID IAP Clrw M1[1] -2.26 dBm D1[1] -1.25 μs 6.62 dB 370.00 μs CF 2.441 GHz 8001 pts 1.0 ms/ Date: 5 DEC 2019 17:28:51
DH1 Burst number	 Spectrum plot showing DH1 Burst number. The plot displays a signal burst at 2.441 GHz. The y-axis represents power in dBm, ranging from -40 dBm to 30 dBm. The x-axis represents time in s, ranging from 0 to 3.16 s. The signal is labeled M1[1] and D1[1]. The plot shows a burst of signal at approximately 1.5 s, with a peak power of -2.26 dBm. The signal is triggered at 1.800 dBm. The plot includes a red trigger line at 1.800 dBm. The plot also shows the signal's duration and the time interval between the start and end of the burst. Ref Level 30.00 dBm Att 40 dB SWT 31.6 s RBW 500 kHz VBW 3 MHz SGL TRG:VID IAP Clrw M1[1] -2.26 dBm D1[1] -1.25 μs 6.62 dB 370.00 μs CF 2.441 GHz 30001 pts 3.16 s/ Date: 5 DEC 2019 17:27:24
DH3 Burst width	 Spectrum plot showing DH3 Burst width. The plot displays a signal burst at 2.441 GHz. The y-axis represents power in dBm, ranging from -40 dBm to 30 dBm. The x-axis represents time in ms, ranging from 0 to 1.0 ms. The signal is labeled M1[1] and D1[1]. The plot shows a burst of signal at approximately 0.5 ms, with a peak power of -0.36 dBm. The signal is triggered at 1.800 dBm. The plot includes a red trigger line at 1.800 dBm. The plot also shows the signal's duration and the time interval between the start and end of the burst. Ref Level 30.00 dBm Att 40 dB SWT 10 ms RBW 1 MHz VBW 3 MHz SGL TRG:VID IAP Clrw M1[1] -0.36 dBm D1[1] -1.25 μs 5.00 dB 1.62500 ms CF 2.441 GHz 8001 pts 1.0 ms/ Date: 5 DEC 2019 17:29:42

DH3 Burst number	 The spectrum plot shows a dense burst of signal activity. The y-axis represents power in dBm, ranging from -30 to 20. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red trigger line is set at -3.500 dBm. The plot shows a burst of signal activity around 2.441 GHz, with a peak power of approximately 0 dBm. The burst duration is 3.16 s, and the resolution bandwidth (RBW) is 500 kHz.
DH5 Burst width	 The spectrum plot shows a burst of signal activity. The y-axis represents power in dBm, ranging from -30 to 20. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red trigger line is set at -3.500 dBm. The plot shows a burst of signal activity around 2.441 GHz, with a peak power of approximately 0 dBm. The burst duration is 1.0 ms, and the resolution bandwidth (RBW) is 1 MHz.
DH5 Burst number	 The spectrum plot shows a dense burst of signal activity. The y-axis represents power in dBm, ranging from -30 to 20. The x-axis represents frequency in GHz, centered at 2.441 GHz. A red trigger line is set at -3.500 dBm. The plot shows a burst of signal activity around 2.441 GHz, with a peak power of approximately 0 dBm. The burst duration is 3.16 s, and the resolution bandwidth (RBW) is 500 kHz.

Modulation Type:	$\pi/4$ DQPSK
2DH1 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -30 to 20. A red trigger line is set at -0.700 dBm. The plot shows a burst of signal at the beginning, followed by a period of low power. The date is 5 DEC 2019 17:50:43. Ref Level 30.00 dBm Att 40 dB SWT 10 ms RBW 1 MHz VBW 3 MHz SGL TRG:VID 1AP Clrw M1[1] -0.65 dBm D1[1] -1.25 μs 3.78 dB 376.25 μs CF 2.441 GHz 8001 pts 1.0 ms/ Date: 5 DEC 2019 17:50:43
2DH1 Burst number	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 30001 pts. The y-axis represents power in dBm, ranging from -30 to 20. A red trigger line is set at -0.700 dBm. The plot shows a burst of signal at the beginning, followed by a period of low power. The date is 5 DEC 2019 17:51:17. Ref Level 30.00 dBm Att 40 dB SWT 31.6 s RBW 500 kHz VBW 3 MHz SGL TRG:VID 1AP Clrw M1[1] -0.65 dBm D1[1] -1.25 μs 3.78 dB 376.25 μs CF 2.441 GHz 30001 pts 3.16 s/ Date: 5 DEC 2019 17:51:17
2DH3 Burst width	 The spectrum plot shows a signal at 2.441 GHz with a bandwidth of 8001 pts. The y-axis represents power in dBm, ranging from -30 to 20. A red trigger line is set at -0.609 dBm. The plot shows a burst of signal at the beginning, followed by a period of low power. The date is 5 DEC 2019 17:34:35. Ref Level 30.00 dBm Att 40 dB SWT 10 ms RBW 1 MHz VBW 3 MHz SGL TRG:VID 1AP Clrw M1[1] -19.26 dBm D1[1] -2.50 μs 21.55 dB 1.63000 ms CF 2.441 GHz 8001 pts 1.0 ms/ Date: 5 DEC 2019 17:34:35

2DH3 Burst number	
2DH5 Burst width	
2DH5 Burst number	

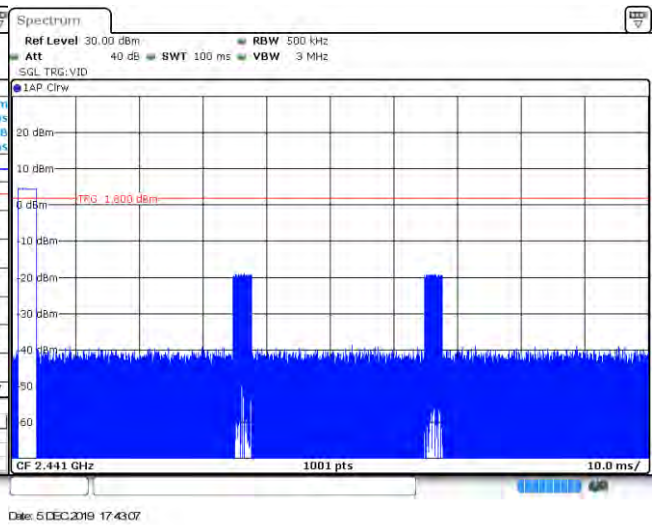
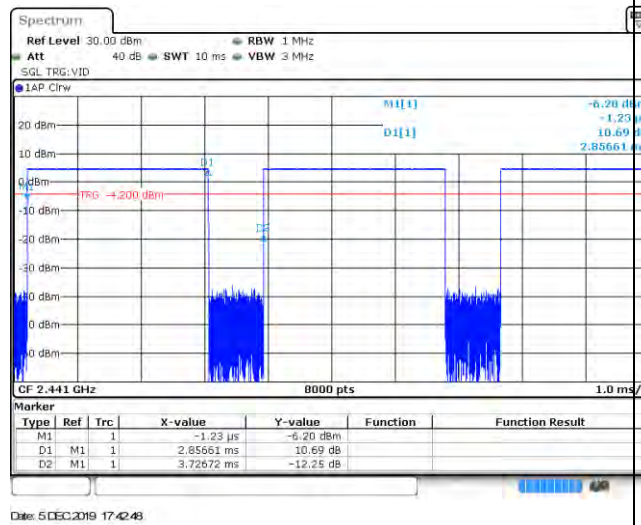
Modulation Type: 8DPSK	
3DH1 Burst width	
3DH1 Burst number	
3DH3 Burst width	

3DH3 Burst number	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -30 to 20. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. The signal is a burst of energy, with a peak power of approximately 0 dBm. The plot includes a trigger level at 0.900 dBm. The date and time are 5 DEC 2019 17:40:07.
3DH5 Burst width	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -30 to 20. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. The signal is a burst of energy, with a peak power of approximately 0 dBm. The plot includes a trigger level at 0.900 dBm. The date and time are 5 DEC 2019 17:40:43.
3DH5 Burst number	 The spectrum plot shows a signal centered at 2.441 GHz. The y-axis represents power in dBm, ranging from -30 to 20. The x-axis represents frequency in MHz, ranging from 2.435 to 2.447. The signal is a burst of energy, with a peak power of approximately 0 dBm. The plot includes a trigger level at 0.900 dBm. The date and time are 5 DEC 2019 17:41:17.

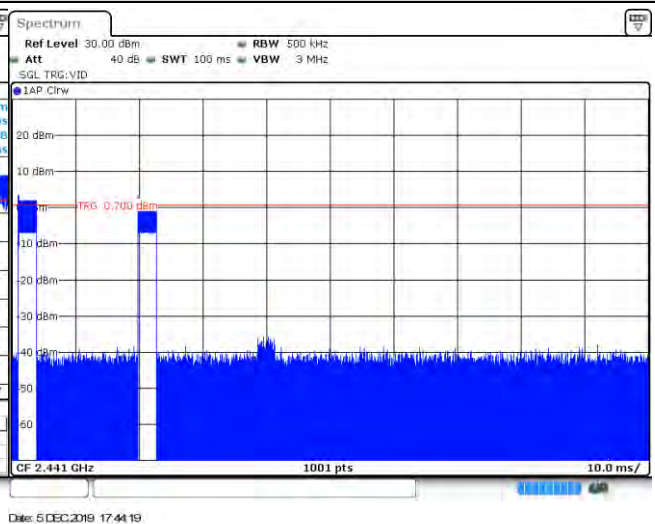
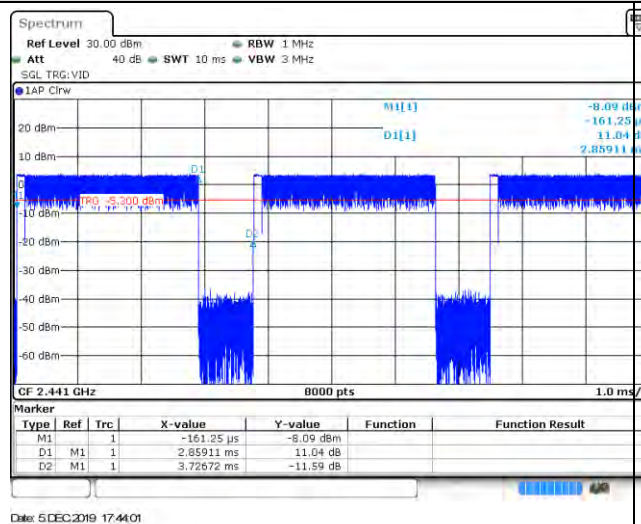
Appendix G: Duty Cycle Correction Factor (DCCF)

DCCF Calculate Formula					
$DCCF = 20 * \text{Log}(\text{duty cycle}) = 20 * \text{Log}(T_{\text{on time}} / T_{\text{period}})$					
Modulation type	Test Frequency (MHz)	$T_{\text{on time}}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.86	100	2	-24.85
$\pi/4$ DQPSK	2441	2.86	100	2	-24.85
8DPSK	2441	2.86	100	2	-24.85

GFSK

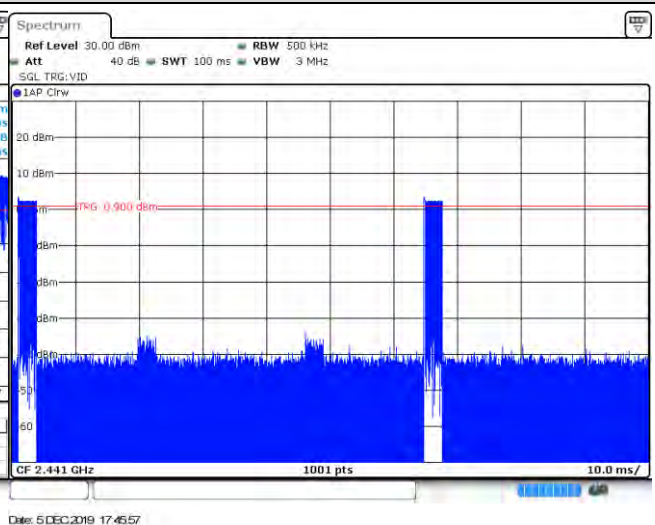
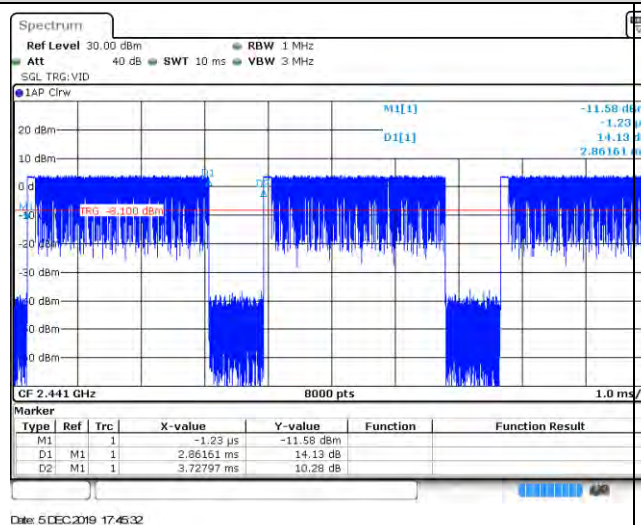
T_{on} time for single burst

Burst Quantity

 $\pi/4$ DQPSKT_{on} time for single burst

Burst Quantity

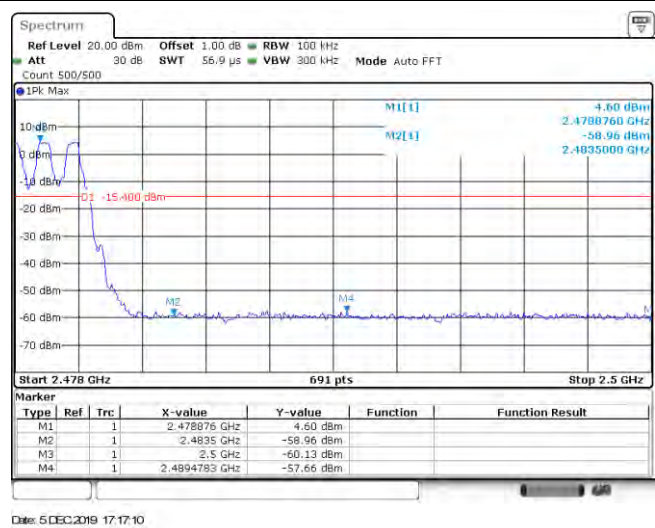
8DPSK

T_{on} time for single burst

Burst Quantity

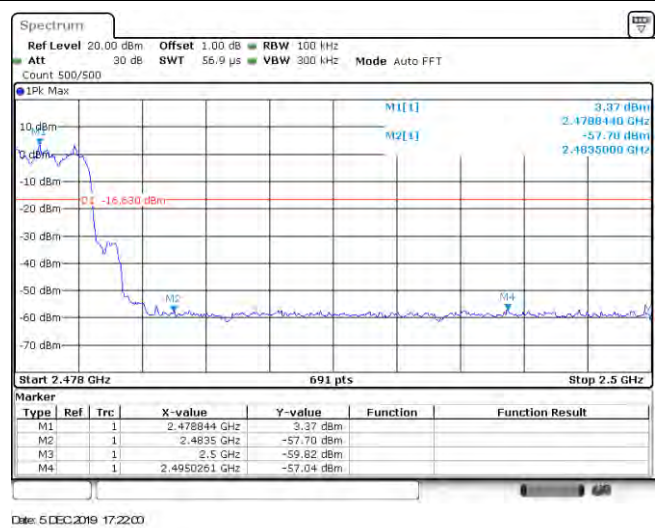
Test Item:	Band edge	Modulation type:	GFSK
CH00 No hopping mode			
CH00 Hopping mode			
CH78 No hopping mode			

CH78
Hopping mode



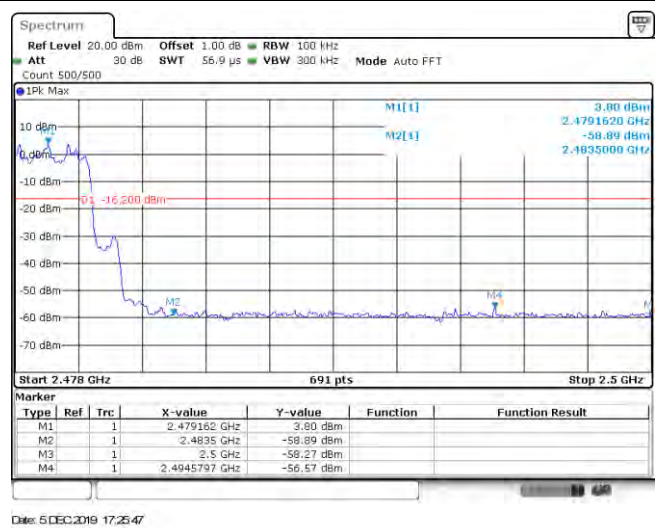
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK																																										
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -16.300 dBm M3 M4 M5 3.70 dBm 2.401910 GHz -51.96 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.40191 GHz</td><td>-3.70 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-51.96 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-56.18 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-55.49 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399906 GHz</td><td>-51.71 dBm</td><td></td><td></td></tr></table> Date: 5 DEC 2019 17:03:37			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40191 GHz	-3.70 dBm			M2	1		2.4 GHz	-51.96 dBm			M3	1		2.39 GHz	-56.18 dBm			M4	1		2.31 GHz	-55.49 dBm			M5	1		2.399906 GHz	-51.71 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40191 GHz	-3.70 dBm																																									
M2	1		2.4 GHz	-51.96 dBm																																									
M3	1		2.39 GHz	-56.18 dBm																																									
M4	1		2.31 GHz	-55.49 dBm																																									
M5	1		2.399906 GHz	-51.71 dBm																																									
CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -15.530 dBm M3 M4 M5 4.07 dBm 2.404240 GHz -54.38 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.40424 GHz</td><td>-4.07 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-54.38 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-55.55 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.90 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.31358 GHz</td><td>-53.13 dBm</td><td></td><td></td></tr></table> Date: 5 DEC 2019 17:20:47			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40424 GHz	-4.07 dBm			M2	1		2.4 GHz	-54.38 dBm			M3	1		2.39 GHz	-55.55 dBm			M4	1		2.31 GHz	-54.90 dBm			M5	1		2.31358 GHz	-53.13 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40424 GHz	-4.07 dBm																																									
M2	1		2.4 GHz	-54.38 dBm																																									
M3	1		2.39 GHz	-55.55 dBm																																									
M4	1		2.31 GHz	-54.90 dBm																																									
M5	1		2.31358 GHz	-53.13 dBm																																									
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 56.9 μs VBW 300 kHz Mode Auto FFT Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -16.170 dBm M3 M4 3.83 dBm 2.4798310 GHz -58.50 dBm 2.4835000 GHz Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.479831 GHz</td><td>-3.83 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-58.50 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-59.99 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.4837391 GHz</td><td>-56.83 dBm</td><td></td><td></td></tr></table> Date: 5 DEC 2019 17:07:25			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.479831 GHz	-3.83 dBm			M2	1		2.4835 GHz	-58.50 dBm			M3	1		2.5 GHz	-59.99 dBm			M4	1		2.4837391 GHz	-56.83 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.479831 GHz	-3.83 dBm																																									
M2	1		2.4835 GHz	-58.50 dBm																																									
M3	1		2.5 GHz	-59.99 dBm																																									
M4	1		2.4837391 GHz	-56.83 dBm																																									

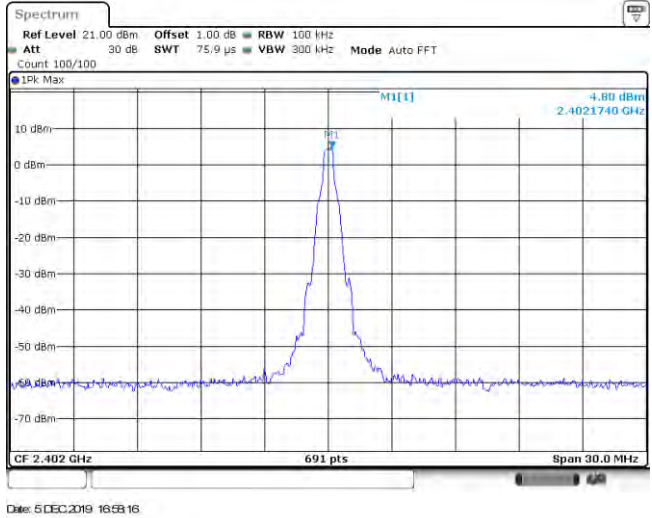
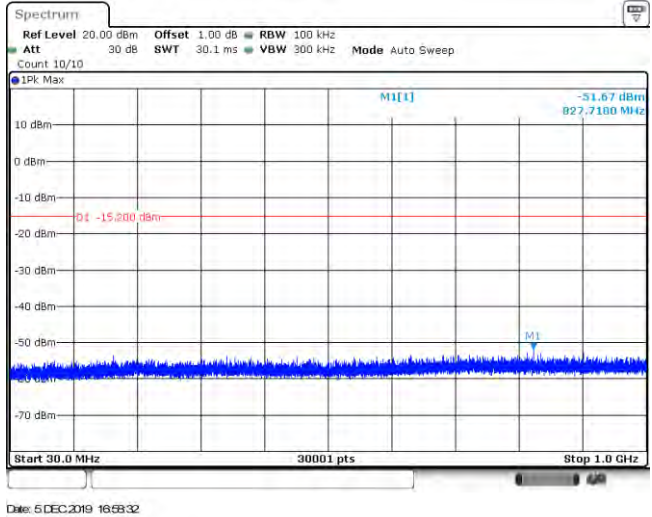
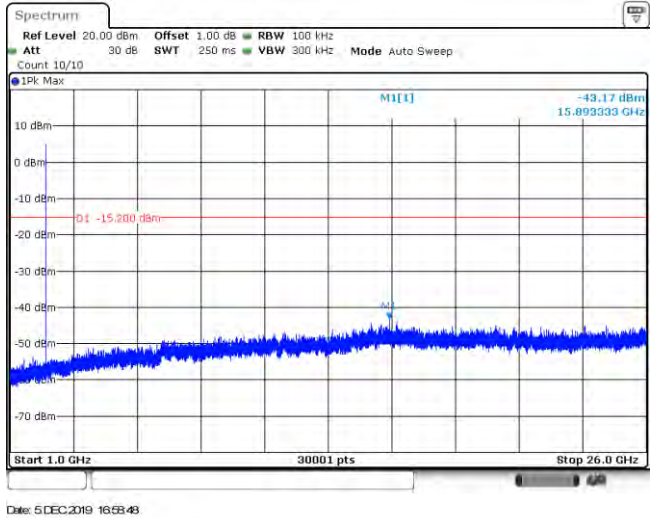
CH78
Hopping mode

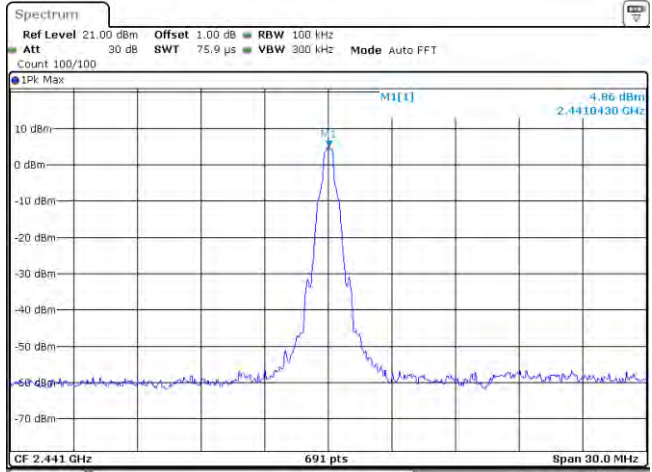
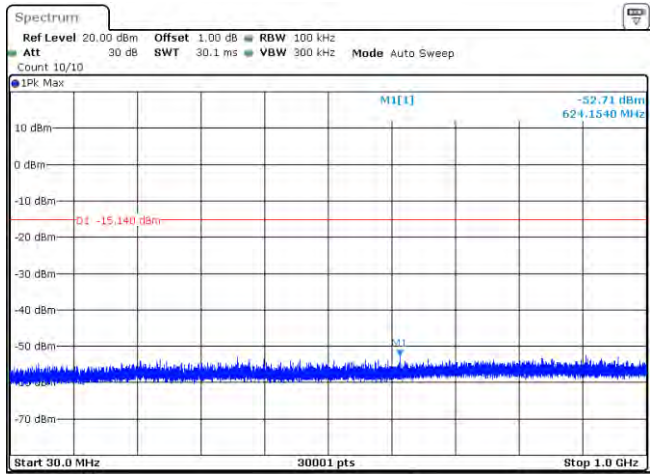
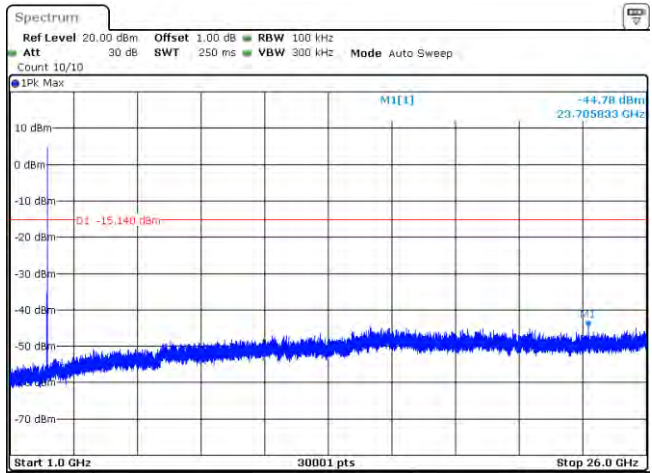


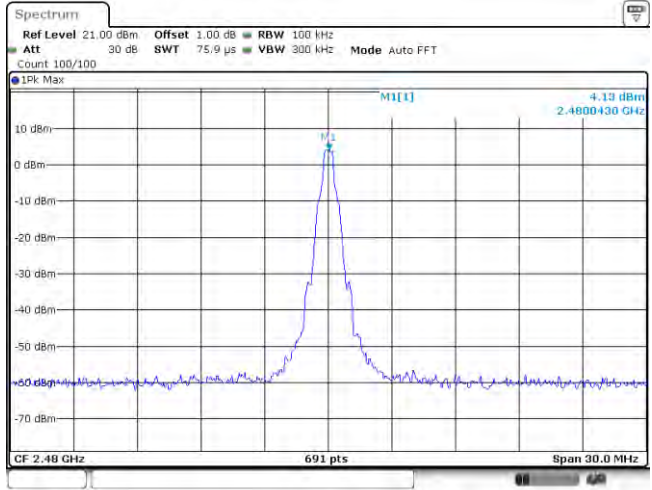
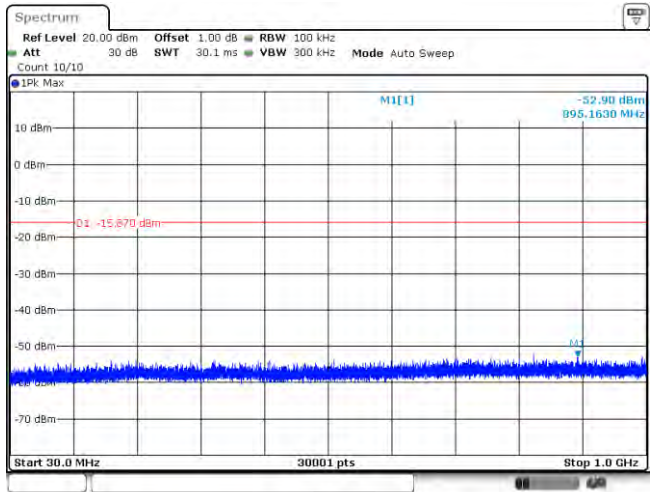
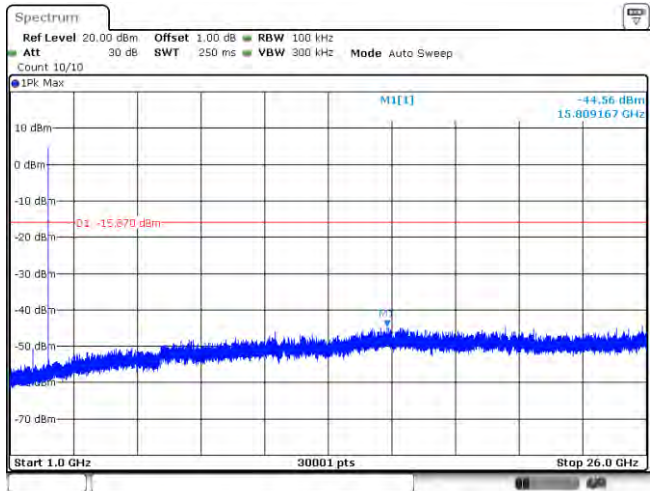
Test Item:	Band edge	Modulation type:	8DPSK																																									
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -16.190 dBm M3 M4 M5 3.81 dBm 2.402180 GHz -51.78 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td>1</td><td>2.40218 GHz</td><td>-3.81 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td>1</td><td>2.4 GHz</td><td>-51.78 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td>1</td><td>2.39 GHz</td><td>-55.65 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td>1</td><td>2.31 GHz</td><td>-55.73 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td>1</td><td>2.399768 GHz</td><td>-51.06 dBm</td><td></td><td></td></tr></table> Date: 5 DEC.2019 17:49:18	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1	1	2.40218 GHz	-3.81 dBm			M2	1	1	2.4 GHz	-51.78 dBm			M3	1	1	2.39 GHz	-55.65 dBm			M4	1	1	2.31 GHz	-55.73 dBm			M5	1	1	2.399768 GHz	-51.06 dBm			
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																						
M1	1	1	2.40218 GHz	-3.81 dBm																																								
M2	1	1	2.4 GHz	-51.78 dBm																																								
M3	1	1	2.39 GHz	-55.65 dBm																																								
M4	1	1	2.31 GHz	-55.73 dBm																																								
M5	1	1	2.399768 GHz	-51.06 dBm																																								
CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -16.370 dBm M3 M4 M5 3.63 dBm 2.404240 GHz -52.66 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td>1</td><td>2.40424 GHz</td><td>-3.63 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td>1</td><td>2.4 GHz</td><td>-52.66 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td>1</td><td>2.39 GHz</td><td>-55.95 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td>1</td><td>2.31 GHz</td><td>-54.10 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td>1</td><td>2.328036 GHz</td><td>-53.00 dBm</td><td></td><td></td></tr></table> Date: 5 DEC.2019 17:25:01	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1	1	2.40424 GHz	-3.63 dBm			M2	1	1	2.4 GHz	-52.66 dBm			M3	1	1	2.39 GHz	-55.95 dBm			M4	1	1	2.31 GHz	-54.10 dBm			M5	1	1	2.328036 GHz	-53.00 dBm			
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																						
M1	1	1	2.40424 GHz	-3.63 dBm																																								
M2	1	1	2.4 GHz	-52.66 dBm																																								
M3	1	1	2.39 GHz	-55.95 dBm																																								
M4	1	1	2.31 GHz	-54.10 dBm																																								
M5	1	1	2.328036 GHz	-53.00 dBm																																								
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 56.9 μs VBW 300 kHz Mode Auto FFT Count 500/500 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -16.150 dBm M3 M4 3.85 dBm 2.480149 GHz -57.31 dBm 2.4835000 GHz Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td>1</td><td>2.480149 GHz</td><td>-3.85 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td>1</td><td>2.4835 GHz</td><td>-57.31 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td>1</td><td>2.5 GHz</td><td>-58.79 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td>1</td><td>2.4838667 GHz</td><td>-56.30 dBm</td><td></td><td></td></tr></table> Date: 5 DEC.2019 17:12:32	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1	1	2.480149 GHz	-3.85 dBm			M2	1	1	2.4835 GHz	-57.31 dBm			M3	1	1	2.5 GHz	-58.79 dBm			M4	1	1	2.4838667 GHz	-56.30 dBm										
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																						
M1	1	1	2.480149 GHz	-3.85 dBm																																								
M2	1	1	2.4835 GHz	-57.31 dBm																																								
M3	1	1	2.5 GHz	-58.79 dBm																																								
M4	1	1	2.4838667 GHz	-56.30 dBm																																								

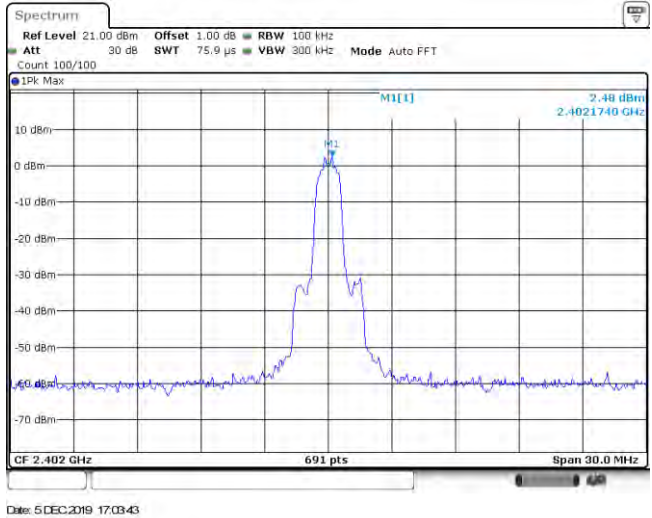
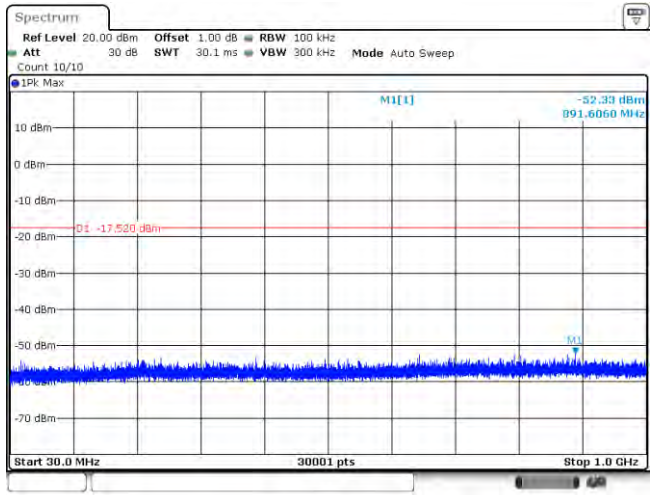
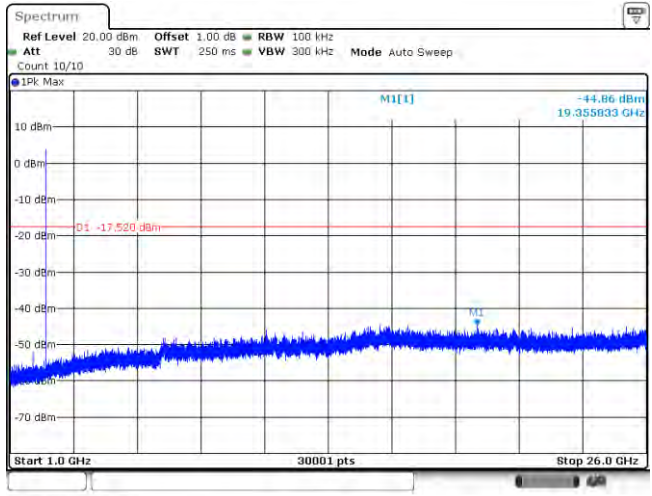
CH78
Hoppig mode

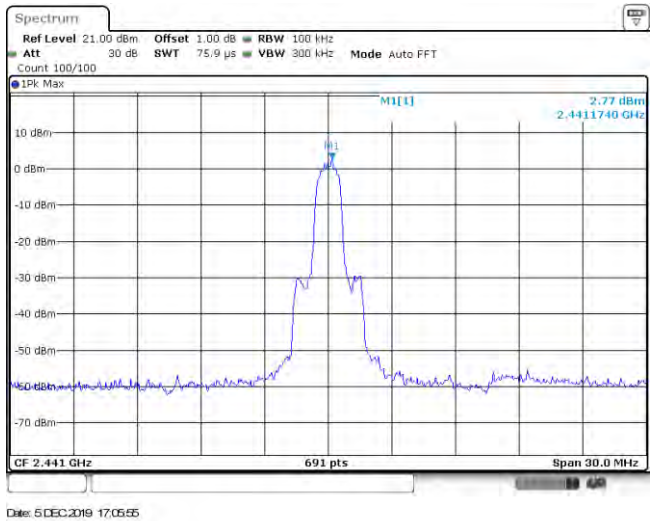
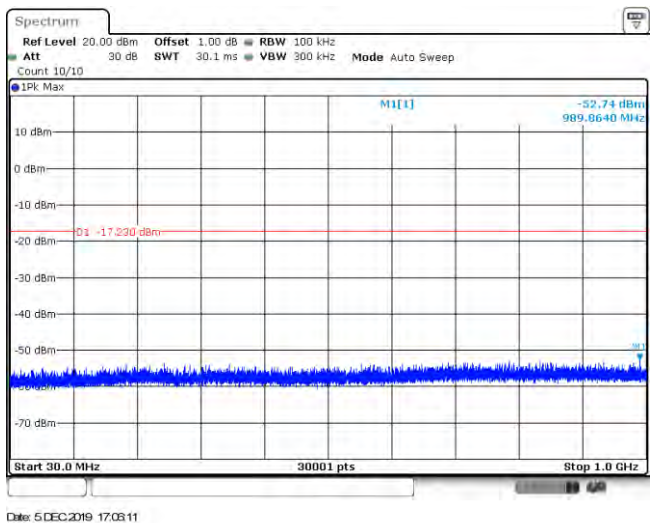
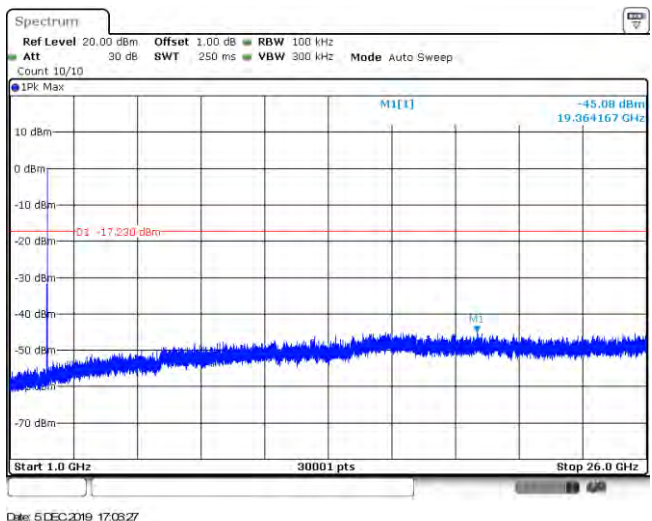


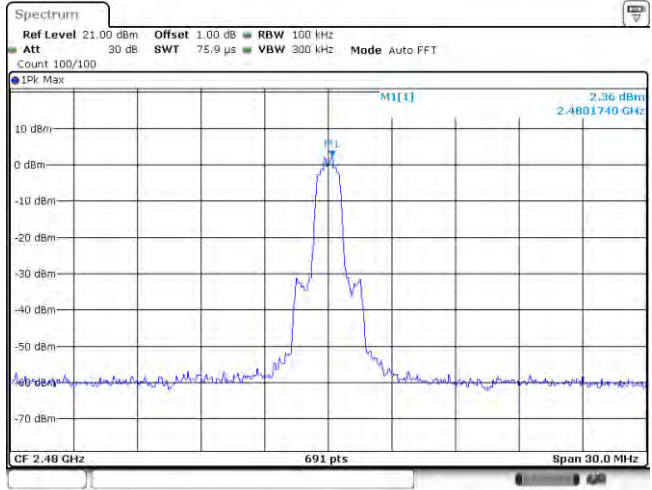
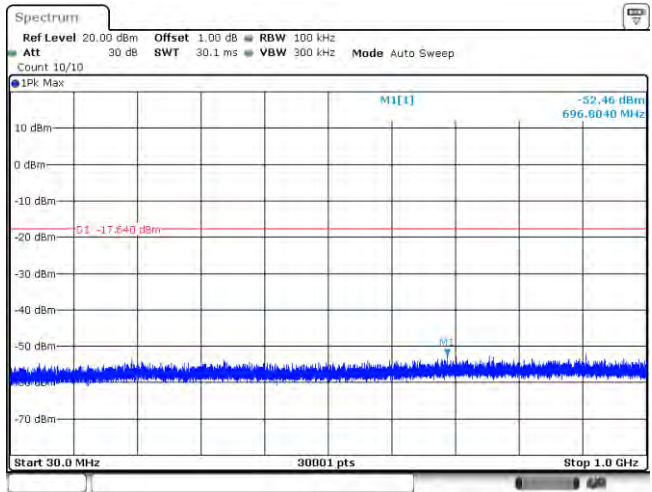
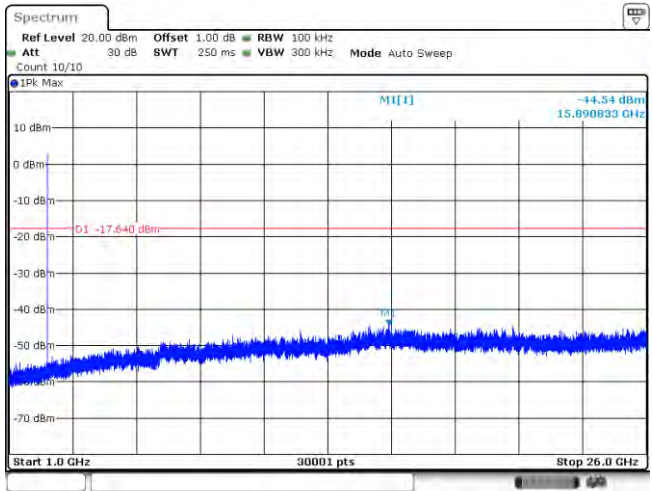
Test Item:	Spurious Emission	Modulation type:	GFSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

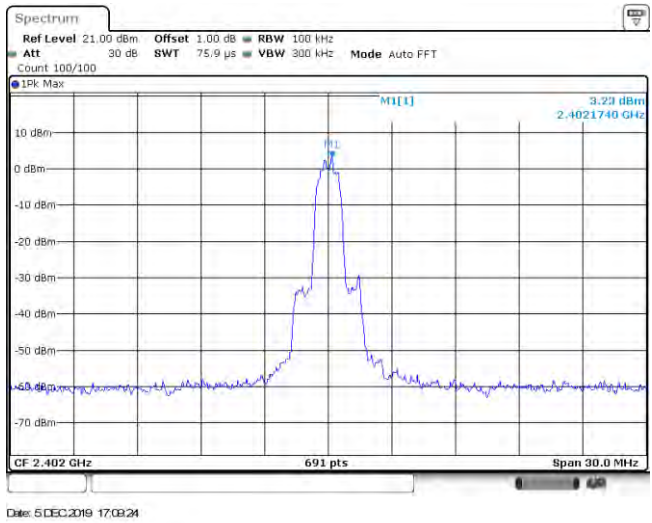
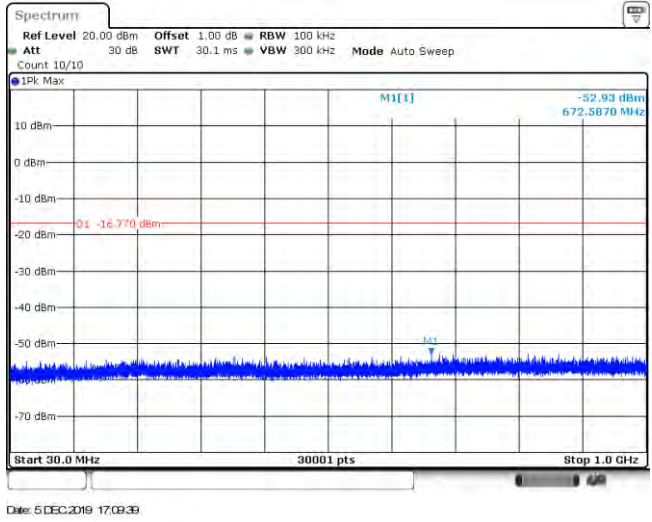
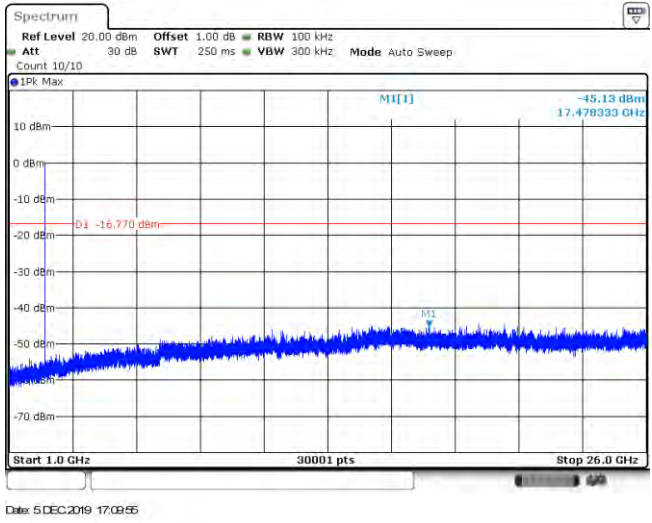
CH39 Reference level	 The spectrum plot shows a single sharp peak at 2.4410430 GHz. The y-axis represents power in dBm, ranging from -70 to 10. The peak is labeled with a value of -4.86 dBm. The plot includes settings: Ref Level 21.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 75.9 μs, VBW 300 kHz, Mode Auto FFT, Count 100/100. The x-axis is centered at CF 2.441 GHz with a span of 30.0 MHz and 691 points. Date: 5 DEC 2019 17:00:04
CH39 30MHz~1000MHz	 The spectrum plot shows a wideband signal from 30.0 MHz to 1.0 GHz. The y-axis ranges from -70 to 10 dBm. A red horizontal line is drawn at -15.140 dBm. The peak is labeled with a value of -52.71 dBm. The plot includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 30.1 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The x-axis starts at 30.0 MHz and stops at 1.0 GHz with 30001 points. Date: 5 DEC 2019 17:00:20
CH39 1GHz~26GHz	 The spectrum plot shows a wideband signal from 1.0 GHz to 26.0 GHz. The y-axis ranges from -70 to 10 dBm. A red horizontal line is drawn at -15.140 dBm. The peak is labeled with a value of -44.78 dBm. The plot includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 250 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The x-axis starts at 1.0 GHz and stops at 26.0 GHz with 30001 points. Date: 5 DEC 2019 17:00:36

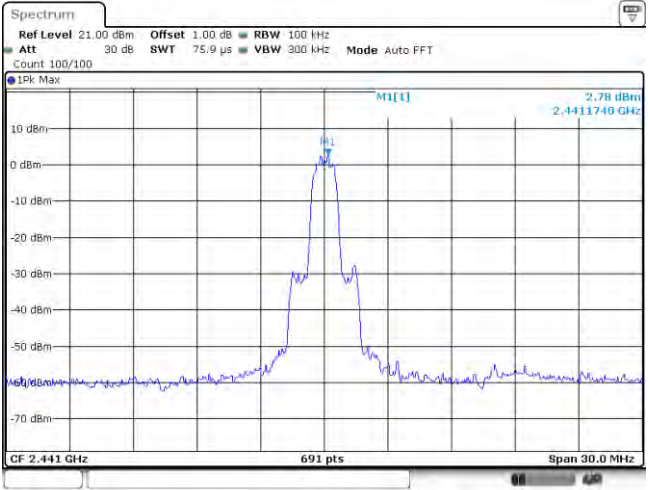
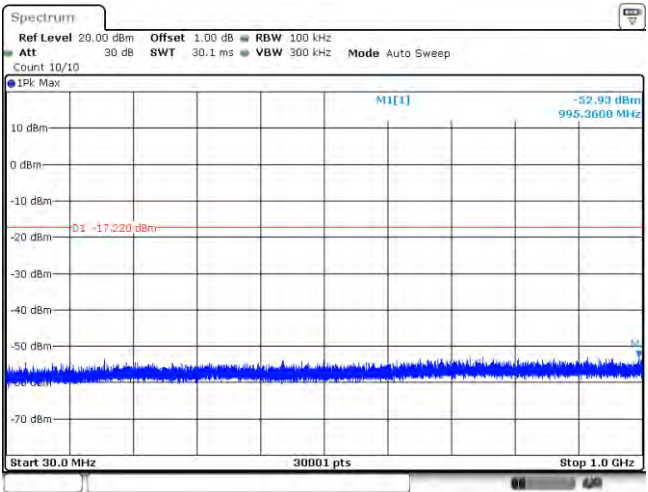
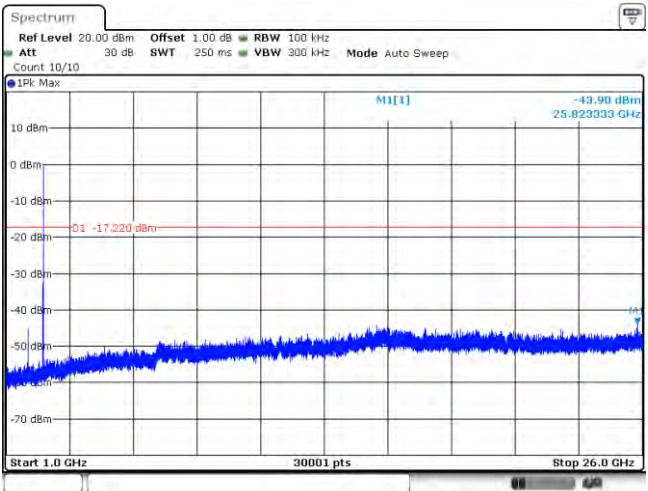
CH78 Reference level	 The spectrum plot shows a single sharp peak at 2.4800430 GHz with a power level of 4.13 dBm. The y-axis ranges from -70 dBm to 10 dBm, and the x-axis shows a span of 30.0 MHz. The plot is titled 'Spectrum' and includes settings: Ref Level 21.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 75.9 μs, VBW 300 kHz, Mode Auto FFT, Count 100/100. The peak is labeled 'M1[1]' and '1/1'. The date is 5 DEC 2019 17:01:40.
CH78 30MHz~1000MHz	 The spectrum plot shows a noise floor across the frequency range from 30.0 MHz to 1.0 GHz. The y-axis ranges from -70 dBm to 10 dBm. A red horizontal line is drawn at -15.670 dBm. The plot is titled 'Spectrum' and includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 30.1 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The peak is labeled 'M1[1]' and '-52.90 dBm'. The date is 5 DEC 2019 17:01:58.
CH78 1GHz~26GHz	 The spectrum plot shows a noise floor across the frequency range from 1.0 GHz to 26.0 GHz. The y-axis ranges from -70 dBm to 10 dBm. A red horizontal line is drawn at -15.670 dBm. The plot is titled 'Spectrum' and includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 250 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The peak is labeled 'M1[1]' and '-44.56 dBm'. The date is 5 DEC 2019 17:02:12.

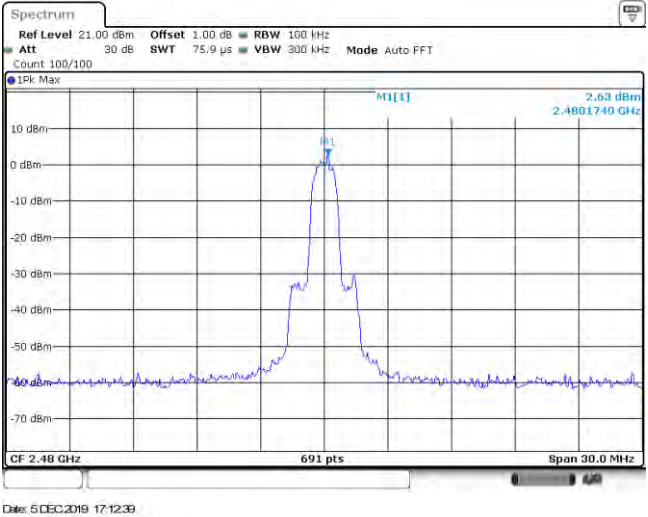
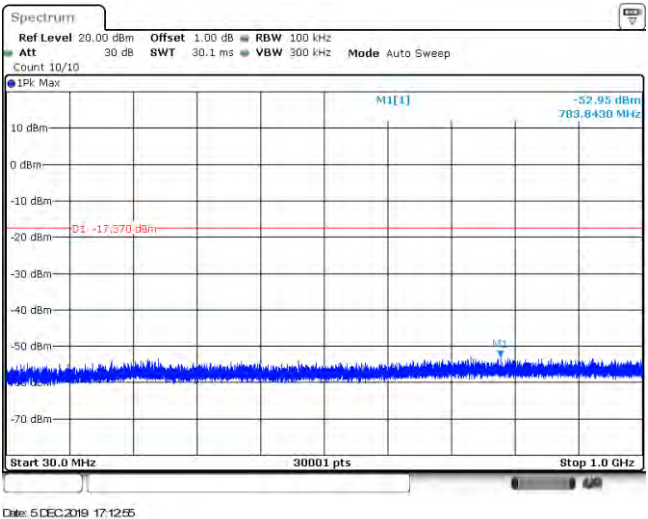
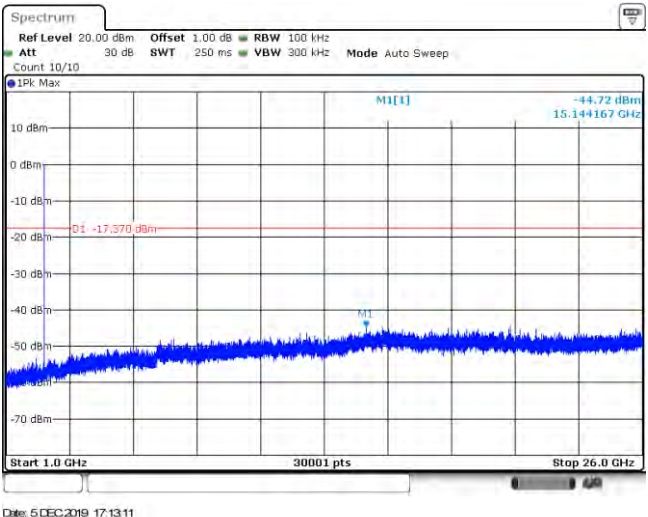
Test Item:	Spurious Emission	Modulation type:	$\pi/4$ DQPSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

CH39 Reference level	
CH39 30MHz~1000MHz	
CH39 1GHz~26GHz	

CH78 Reference level	 The spectrum plot shows a single peak at 2.4001740 GHz with a power level of 2.36 dBm. The y-axis ranges from -70 dBm to 10 dBm, and the x-axis ranges from 2.40 GHz to 2.401740 GHz. The plot is titled 'Spectrum' and includes settings: Ref Level 21.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 75.9 μs, VBW 300 kHz, Mode Auto FFT, Count 100/100. The peak is labeled 'M1[1]' and 'IPK Max'. The date is 5 DEC 2019 17:07:31.
CH78 30MHz~1000MHz	 The spectrum plot shows a noise floor at -52.46 dBm across the frequency range 30.0 MHz to 1.0 GHz. The y-axis ranges from -70 dBm to 10 dBm, and the x-axis ranges from 30.0 MHz to 1.0 GHz. The plot is titled 'Spectrum' and includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 30.1 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The noise floor is labeled 'M1[1]' and 'IPK Max'. The date is 5 DEC 2019 17:07:47.
CH78 1GHz~26GHz	 The spectrum plot shows a noise floor at -44.54 dBm across the frequency range 1.0 GHz to 26.0 GHz. The y-axis ranges from -70 dBm to 10 dBm, and the x-axis ranges from 1.0 GHz to 26.0 GHz. The plot is titled 'Spectrum' and includes settings: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 250 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The noise floor is labeled 'M1[1]' and 'IPK Max'. The date is 5 DEC 2019 17:08:03.

Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

CH39 Reference level	 The spectrum plot shows a single sharp peak at 2.4411740 GHz. The peak level is 2.78 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 21.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 75.9 μs, VBW 300 kHz, Mode Auto FFT, Count 100/100. The y-axis ranges from -70 dBm to 10 dBm. The x-axis is centered at 2.441 GHz with a span of 30.0 MHz. The date is 5 DEC 2019 17:10:45.
CH39 30MHz~1000MHz	 The spectrum plot shows a noisy baseline across the 30.0 MHz to 1.0 GHz range. The peak level is -52.93 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 30.1 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The y-axis ranges from -70 dBm to 10 dBm. The x-axis ranges from 30.0 MHz to 1.0 GHz with 30001 pts. A red line indicates a level of -17.220 dBm. The date is 5 DEC 2019 17:11:01.
CH39 1GHz~26GHz	 The spectrum plot shows a noisy baseline across the 1.0 GHz to 26.0 GHz range. The peak level is -49.90 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, Offset 1.00 dB, RBW 100 kHz, SWT 250 ms, VBW 300 kHz, Mode Auto Sweep, Count 10/10. The y-axis ranges from -70 dBm to 10 dBm. The x-axis ranges from 1.0 GHz to 26.0 GHz with 30001 pts. A red line indicates a level of -17.220 dBm. The date is 5 DEC 2019 17:11:17.

CH78 Reference level	
CH78 30MHz~1000MHz	
CH78 1GHz~26GHz	

-----End of Report-----