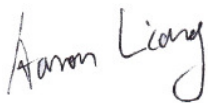
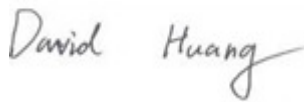


RF TEST REPORT



Report No.: 17071411-FCC-R1

Supersede Report No.: N/A

Applicant	Kygo Life AS	
Product Name	Bluetooth Headset	
Model No.	A6-500	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2017, ANSI C63.10: 2013	
Test Date	December 13, 2017 to February 01, 2018	
Issue Date	February 02, 2018	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification	☒	
Equipment did not comply with the specification	☐	
		
Aaron Liang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

Test Report	17071411-FCC-R1
Page	3 of 61

This page has been left blank intentionally.

CONTENTS

1. REPORT REVISION HISTORY	5
2. CUSTOMER INFORMATION.....	5
3. TEST SITE INFORMATION	5
4. EQUIPMENT UNDER TEST (EUT) INFORMATION	6
5. TEST SUMMARY	7
6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS.....	8
6.1 ANTENNA REQUIREMENT	8
6.2 CHANNEL SEPARATION.....	9
6.3 20DB BANDWIDTH	13
6.4 PEAK OUTPUT POWER	17
6.5 NUMBER OF HOPPING CHANNEL	21
6.6 TIME OF OCCUPANCY (DWELL TIME).....	23
6.7 BAND EDGE & RESTRICTED BAND	27
6.8 AC POWER LINE CONDUCTED EMISSIONS.....	32
6.9 RADIATED EMISSIONS & RESTRICTED BAND.....	38
ANNEX A. TEST INSTRUMENT	45
ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS.....	46
ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT.....	56
ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST	60
ANNEX E. DECLARATION OF SIMILARITY	61

1. Report Revision History

Report No.	Report Version	Description	Issue Date
17071411-FCC-R1	NONE	Original	February 02, 2018

2. Customer information

Applicant Name	Kygo Life AS
Applicant Add	Sjoyst Plass 3, 0278 Oslo ,Norway
Manufacturer	ASKA Electronics Co., Ltd.
Manufacturer Add	3F,building 19#,Road Da Ling Bian, Shahu Community,Tangxia Town,Dongguan, China

3. Test site information

Test Lab A:

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMG(ver.lcp-03A1)

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

4. Equipment under Test (EUT) Information

Description of EUT:	Bluetooth Headset
Main Model:	A6-500
Serial Model:	N/A
Date EUT received:	December 13, 2017
Test Date(s):	December 13, 2017 to February 01, 2018
Equipment Category :	DSS
Antenna Gain:	Bluetooth/BLE: 2.0dBi
Antenna Type:	PCB antenna
Type of Modulation:	Bluetooth: GFSK, π /4DQPSK, 8DPSK BLE: GFSK
RF Operating Frequency (ies):	Bluetooth& BLE: 2402-2480 MHz
Max. Output Power:	8.362dBm
Number of Channels:	Bluetooth: 79CH BLE: 40CH
Port:	Please refer to user manual
Input Power:	Battery Spec: 3.7V, 200mAh
Trade Name :	KYGO
FCC ID:	2ANOX A6

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)	20 dB Bandwidth	Compliance
§15.247(b)(1)	Peak Output Power	Compliance
§15.247(a)(1)(iii)	Number of Hopping Channel	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(d)	Band Edge& Restricted Band	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions& Restricted Band	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge& Restricted Band and Radiated Emissions& Restricted Band	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 1 antenna:

A permanently attached monopole antenna for Bluetooth/BLE, the gain is 2.0dBi for Bluetooth/BLE.

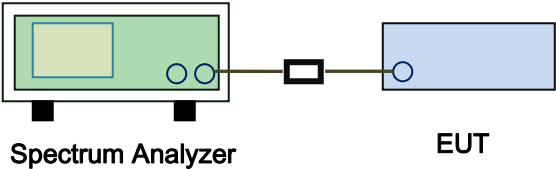
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	25 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	January 23, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> - The EUT must have its hopping function enabled - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span - Video (or Average) Bandwidth (VBW) $\geq$ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot. 		

Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

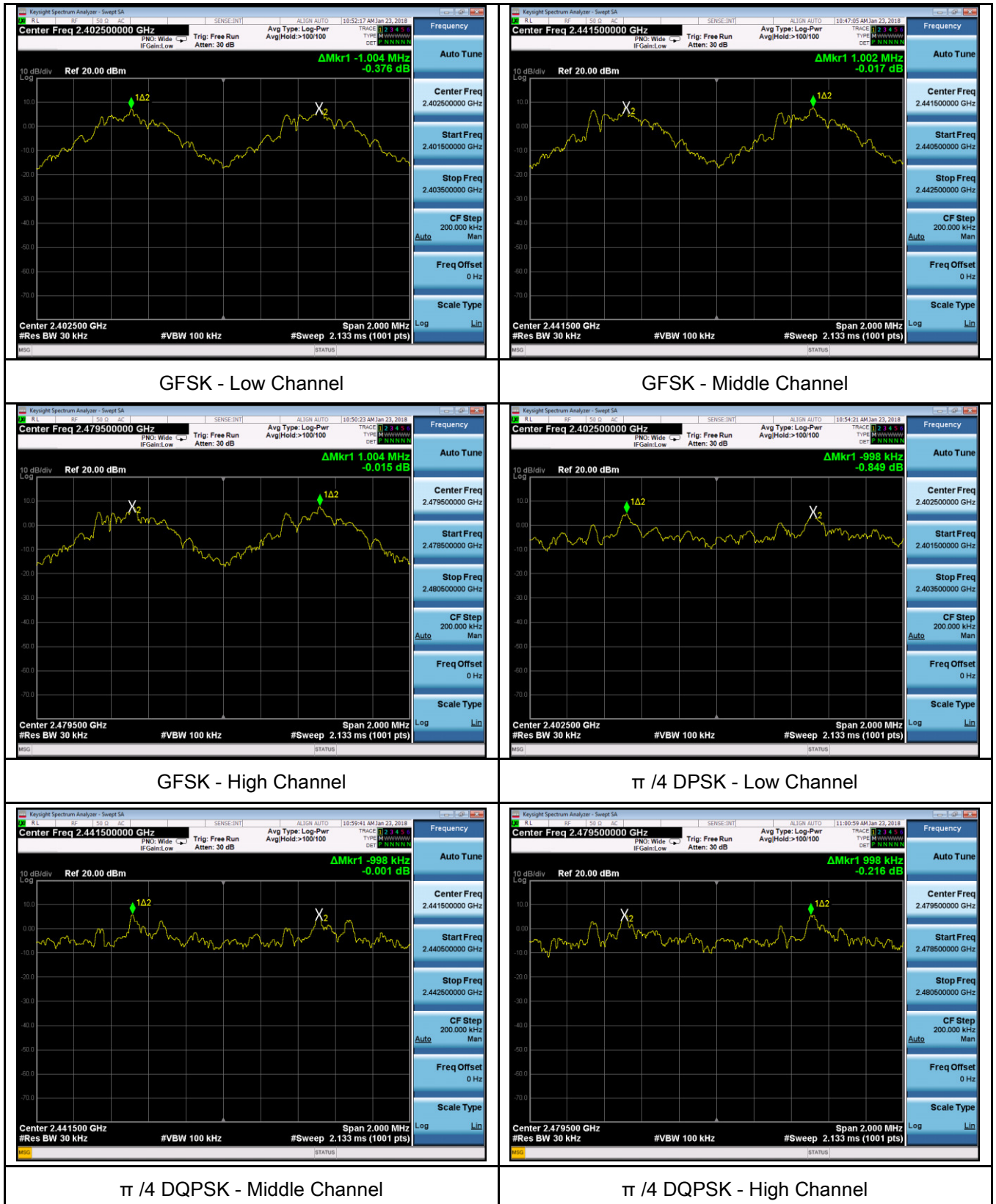
Test Plot ☒ Yes (See below) ☐ N/A

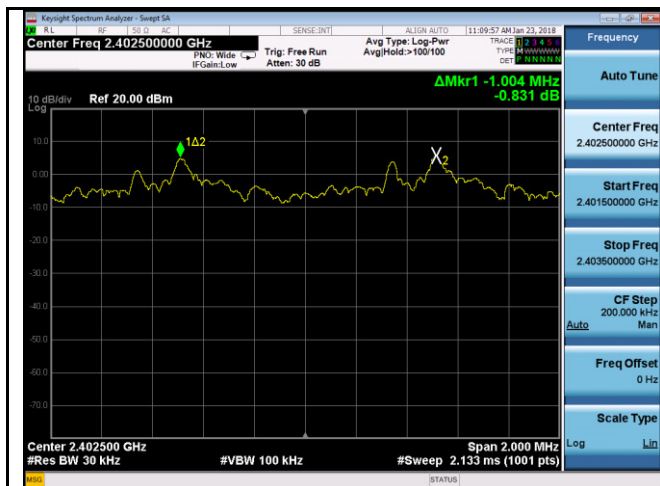
Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.004	0.864	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.002	0.866	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.004	0.861	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	0.998	0.873	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	0.998	0.884	Pass
	Adjacency Channel	2441			
	High Channel	2480	0.998	0.887	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.004	0.838	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.010	0.857	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.004	0.865	Pass
	Adjacency Channel	2479			

Test Plots

Channel Separation measurement result





8DPSK - Low Channel



8DPSK - Middle Channel

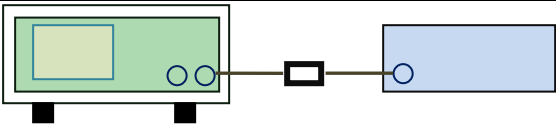


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	25 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	January 23&24, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	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.	
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> - 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. - The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference 		

	marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

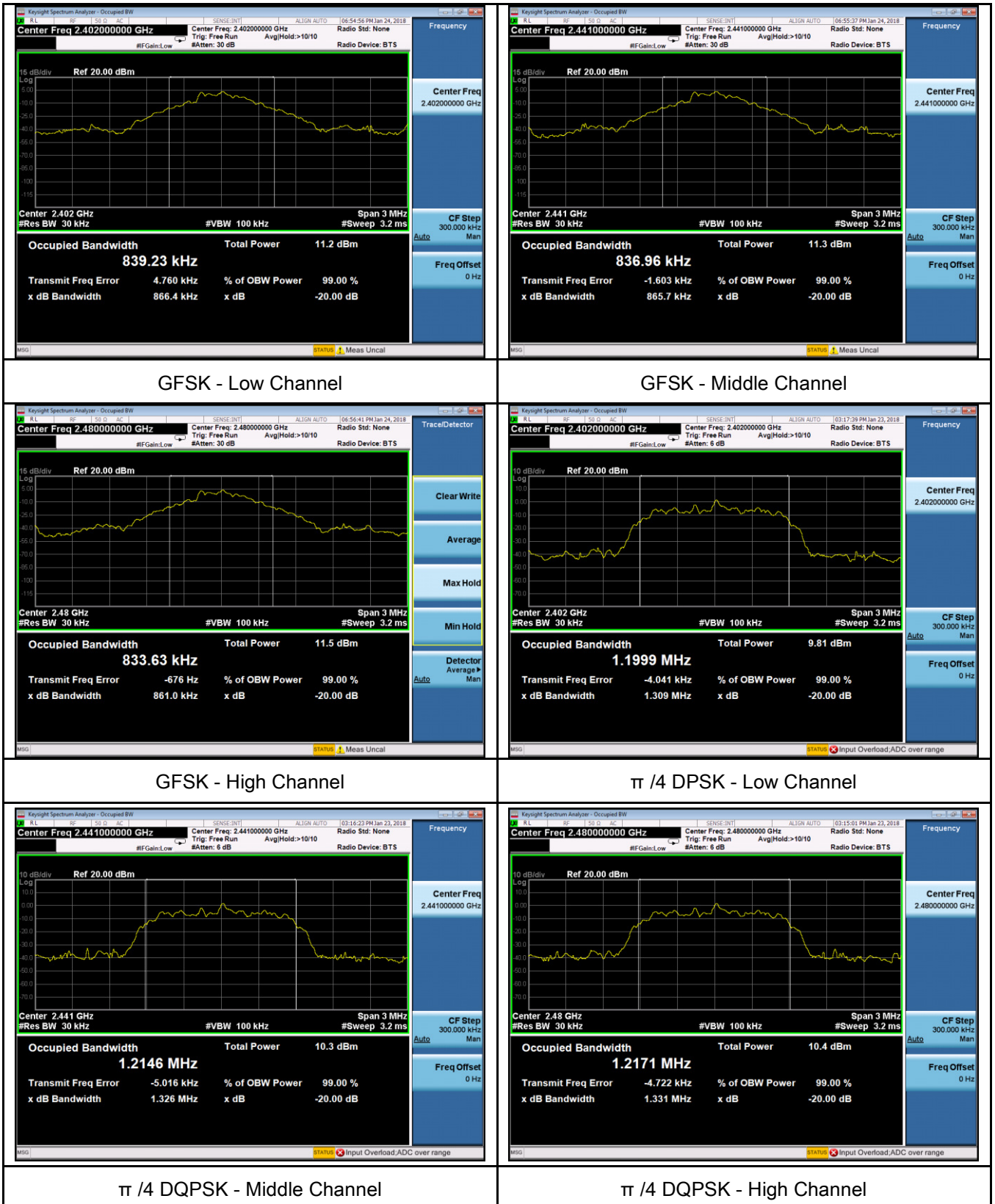
Test Plot ☒ Yes (See below) ☐ N/A

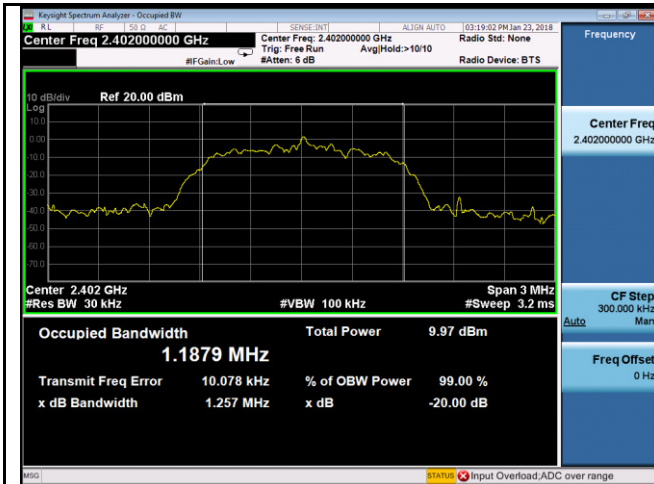
Measurement result

Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	0.8664	0.8392
	Mid	2441	0.8657	0.8369
	High	2480	0.8610	0.8336
$\pi/4$ DQPSK	Low	2402	1.309	1.1999
	Mid	2441	1.326	1.2146
	High	2480	1.331	1.2171
8-DPSK	Low	2402	1.257	1.1879
	Mid	2441	1.286	1.2017
	High	2480	1.298	1.2042

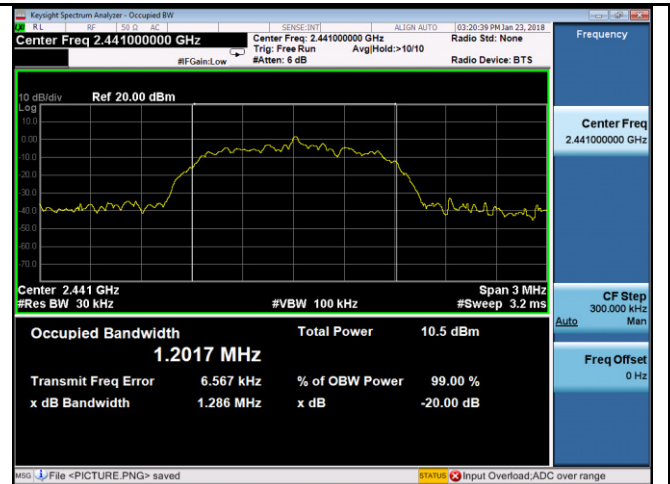
Test Plots

20dB Bandwidth measurement result

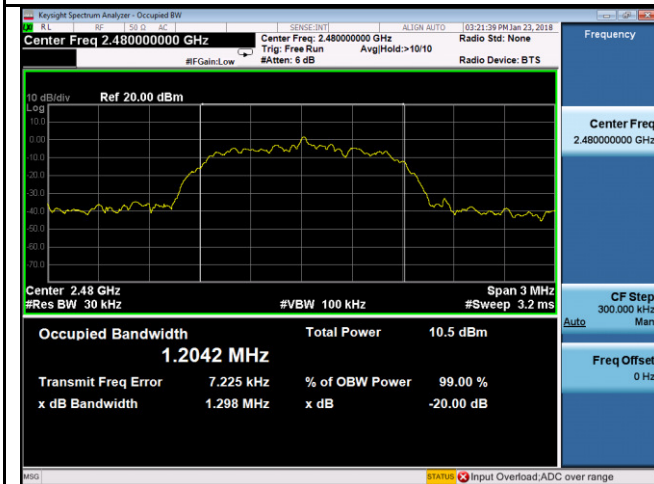




8DPSK - Low Channel



8DPSK - Middle Channel



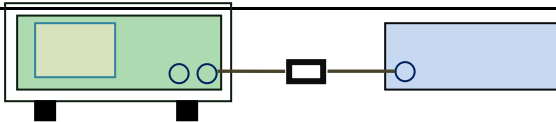
8DPSK - High Channel

6.4 Peak Output Power

Temperature	25 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	January 23, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☒
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	☒
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & < 50 channels: ≤ 0.25 Watt	☐
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 1 Watt	☐

Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>
------------	--

Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.</p> <p><u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel - RBW $>$ the 20 dB bandwidth of the emission being measured - VBW $\geq$ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize.
----------------	---

	<p>- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.</p>
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

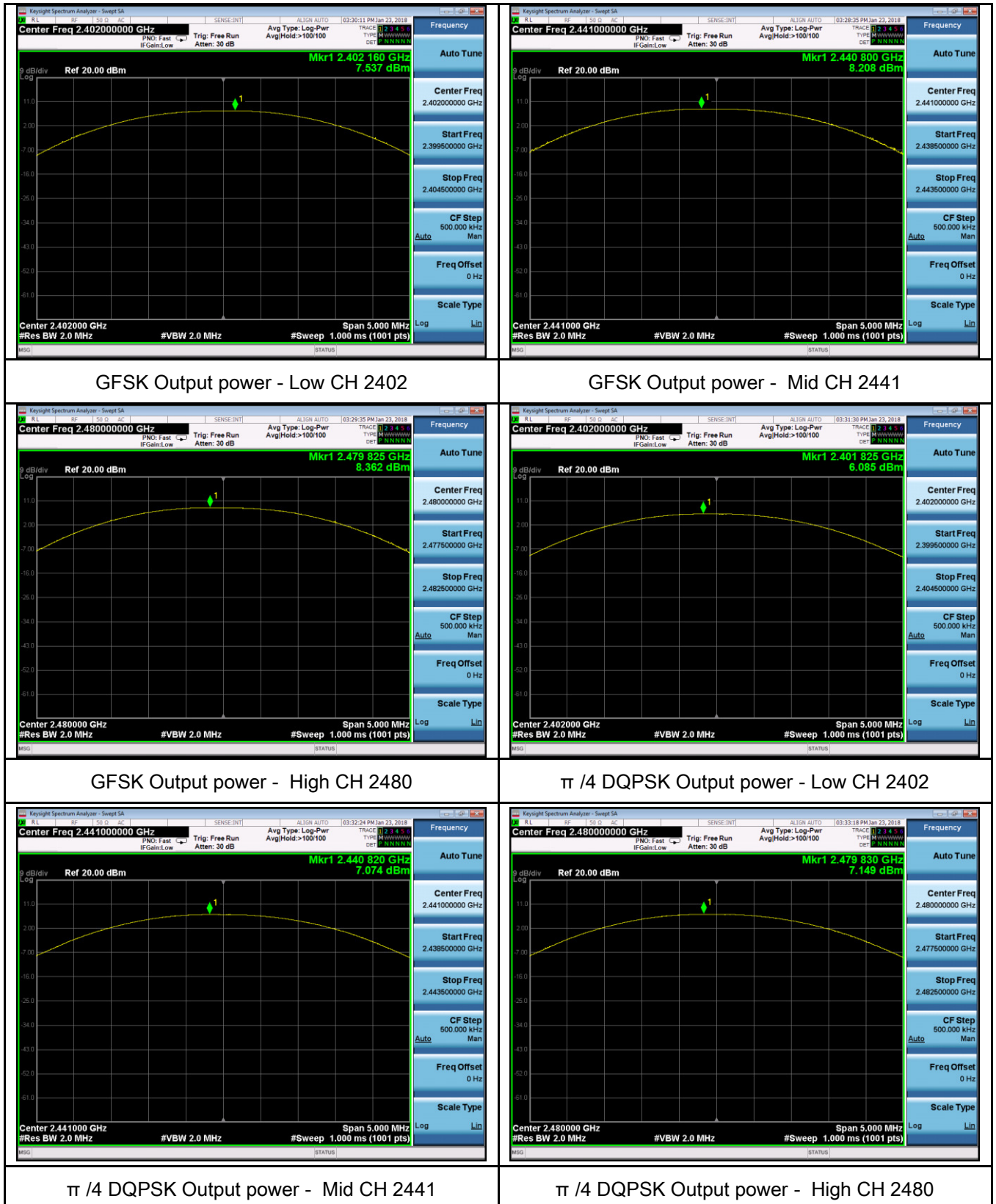
Test Plot ☒ Yes (See below) ☐ N/A

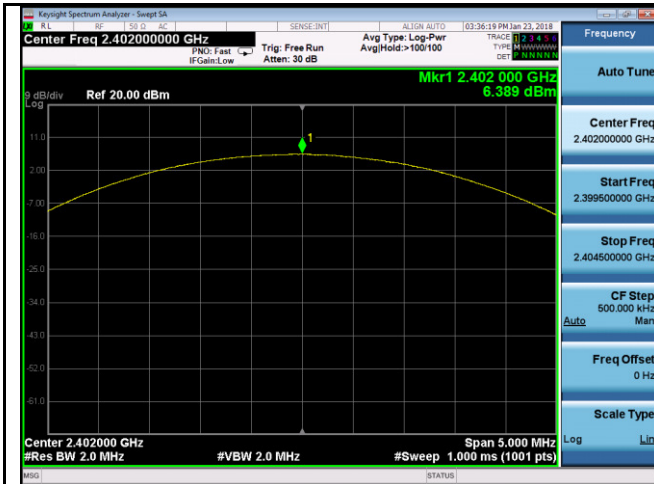
Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	7.537	1000	Pass
		Mid	2441	8.208	1000	Pass
		High	2480	8.362	1000	Pass
	$\pi/4$ DQPSK	Low	2402	6.085	125	Pass
		Mid	2441	7.074	125	Pass
		High	2480	7.149	125	Pass
	8-DPSK	Low	2402	6.389	125	Pass
		Mid	2441	7.362	125	Pass
		High	2480	7.466	125	Pass

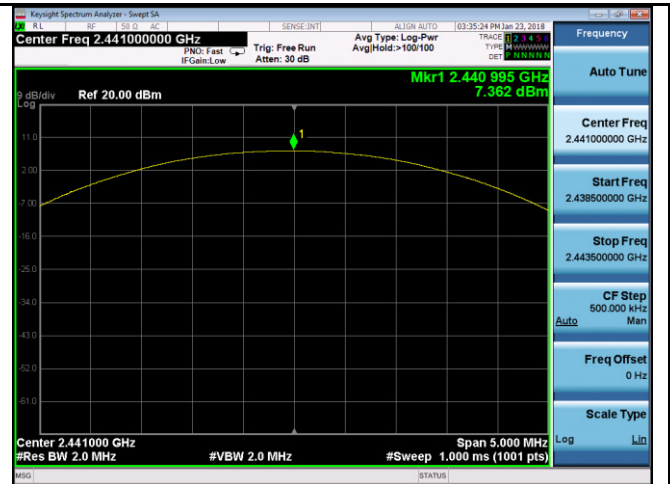
Test Plots

Output Power measurement result

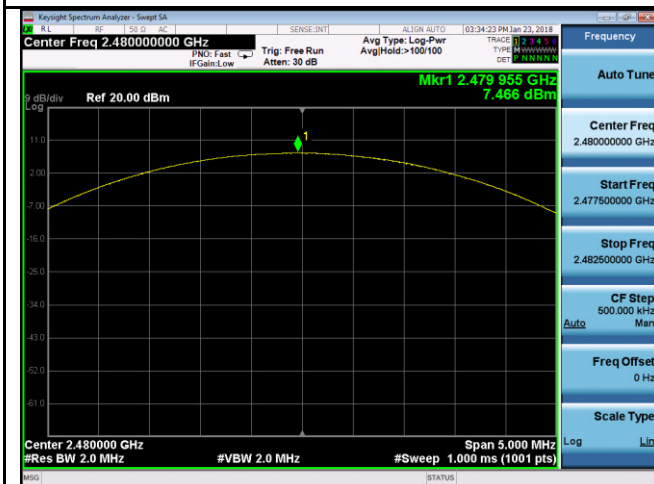




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

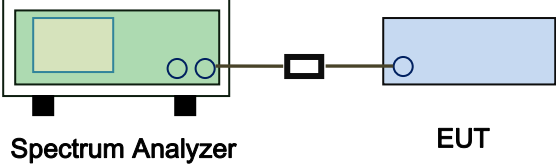


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	25 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	January 23, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz $\geq$ 15 channels	☒
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer settings:</u> The EUT must have its hopping function enabled.</p> <ul style="list-style-type: none"> - Span = the frequency band of operation - RBW $\geq$ 1% of the span - VBW $\geq$ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow trace to fully stabilize. - It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). 		
Remark			
Result	☒ Pass ☐ Fail		

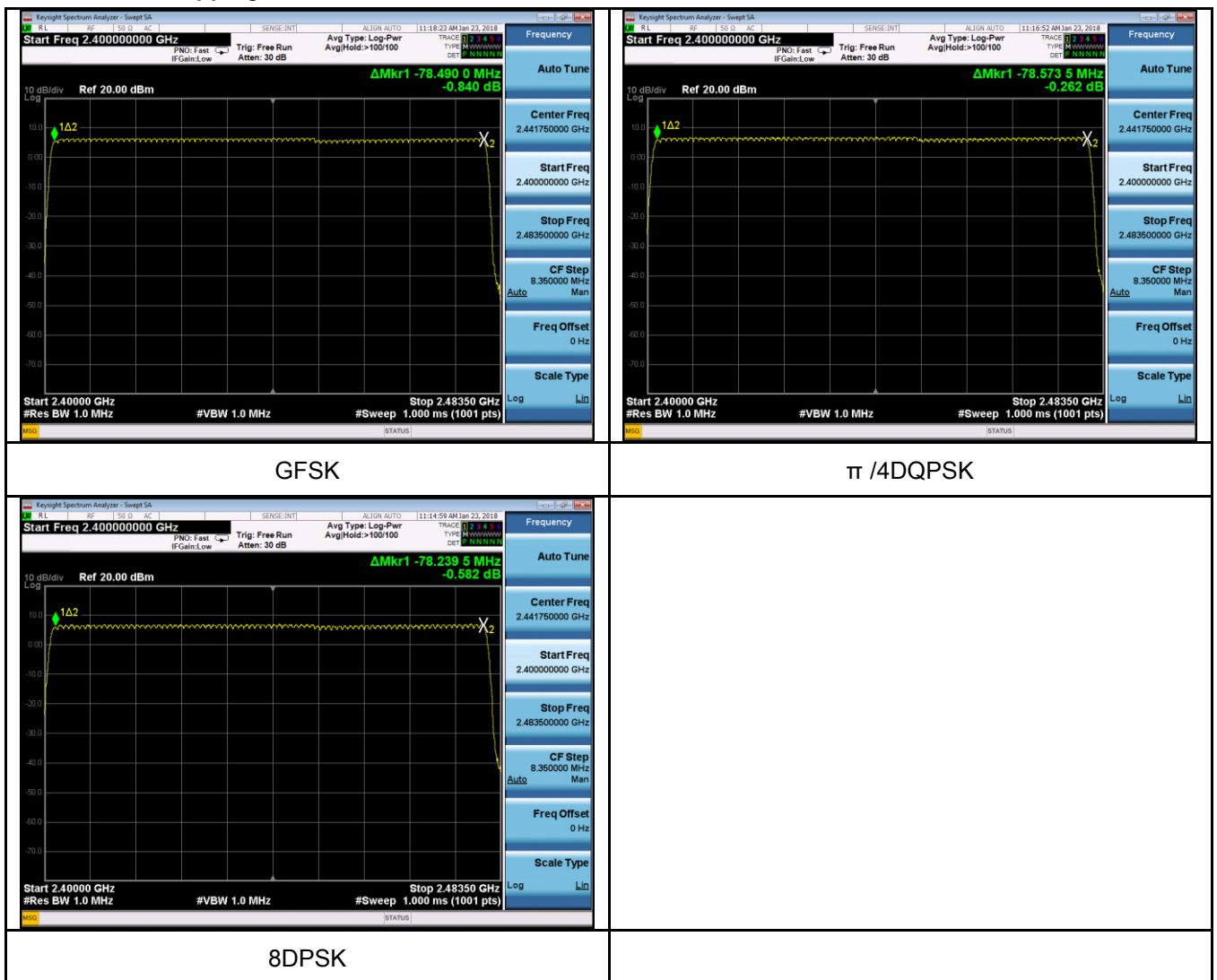
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483.5	79	15
	$\pi/4$ DQPSK	2400-2483.5	79	15
	8-DPSK	2400-2483.5	79	15

Test Plots

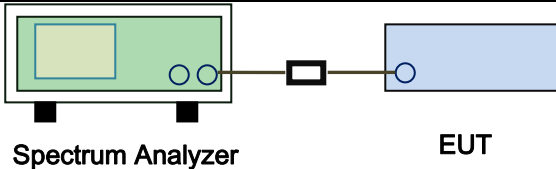
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	25 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	January 23, 2018
Tested By :	Aaron Liang

Requirement(s):

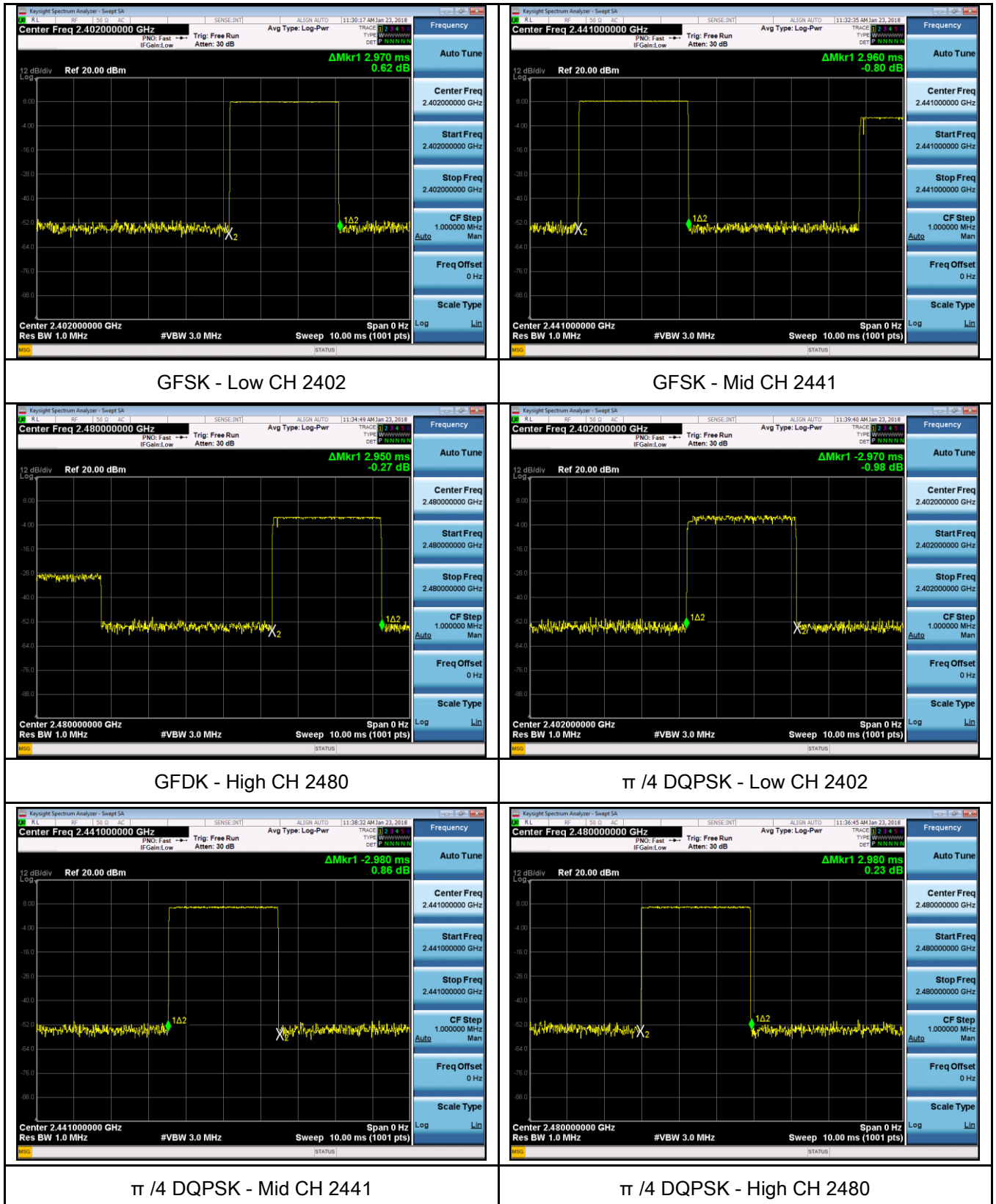
Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	☒
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer</u></p> <ul style="list-style-type: none"> - Span = zero span, centered on a hopping channel - RBW = 1 MHz - VBW ≥ RBW - Sweep = as necessary to capture the entire dwell time per hopping channel - Detector function = peak - Trace = max hold - use the marker-delta function to determine the dwell time 		
Remark			
Result	☒ Pass ☐ Fail		

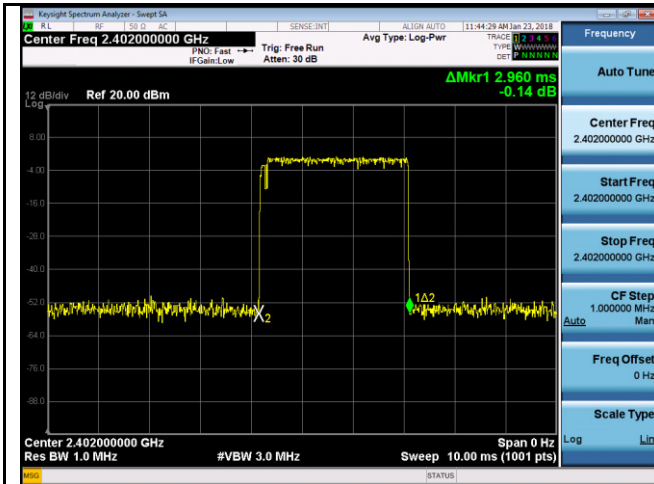
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.970	316.800	400	Pass
		Mid	2.960	315.733	400	Pass
		High	2.950	314.667	400	Pass
	π /4 DQPSK	Low	2.970	316.800	400	Pass
		Mid	2.980	317.867	400	Pass
		High	2.980	317.867	400	Pass
	8-DPSK	Low	2.960	315.733	400	Pass
		Mid	2.990	318.933	400	Pass
		High	2.970	316.800	400	Pass
Note: Dwell time=Pulse Time (ms) $\times$ (1600 $\div$ 6 $\div$ 79) $\times$ 31.6						

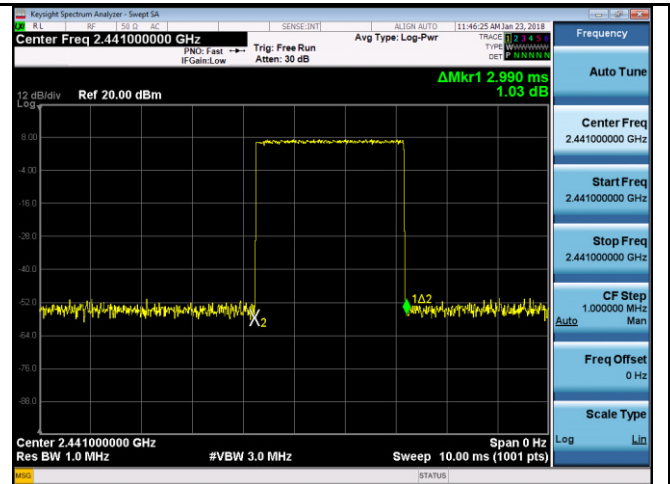
Test Plots

Dwell Time measurement result

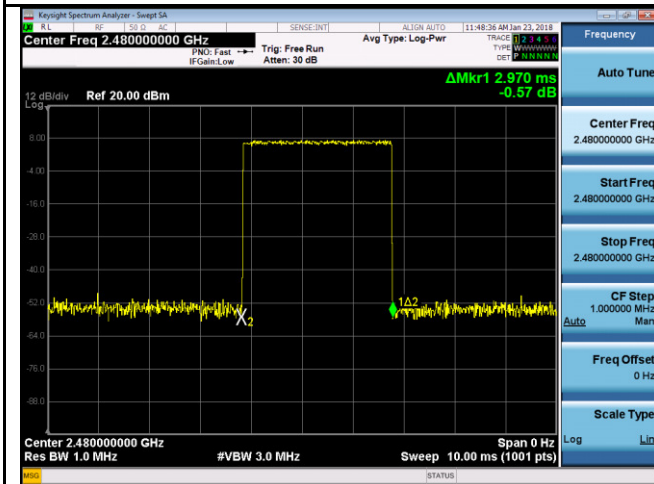




8DPSK - Low CH 2402



8DPSK - Mid CH 2441



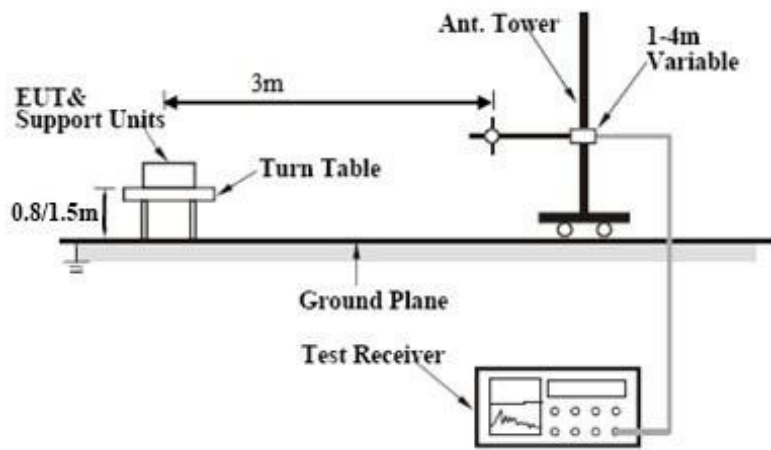
8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	25 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	January 23, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. □	☒

Test Setup	
------------	--

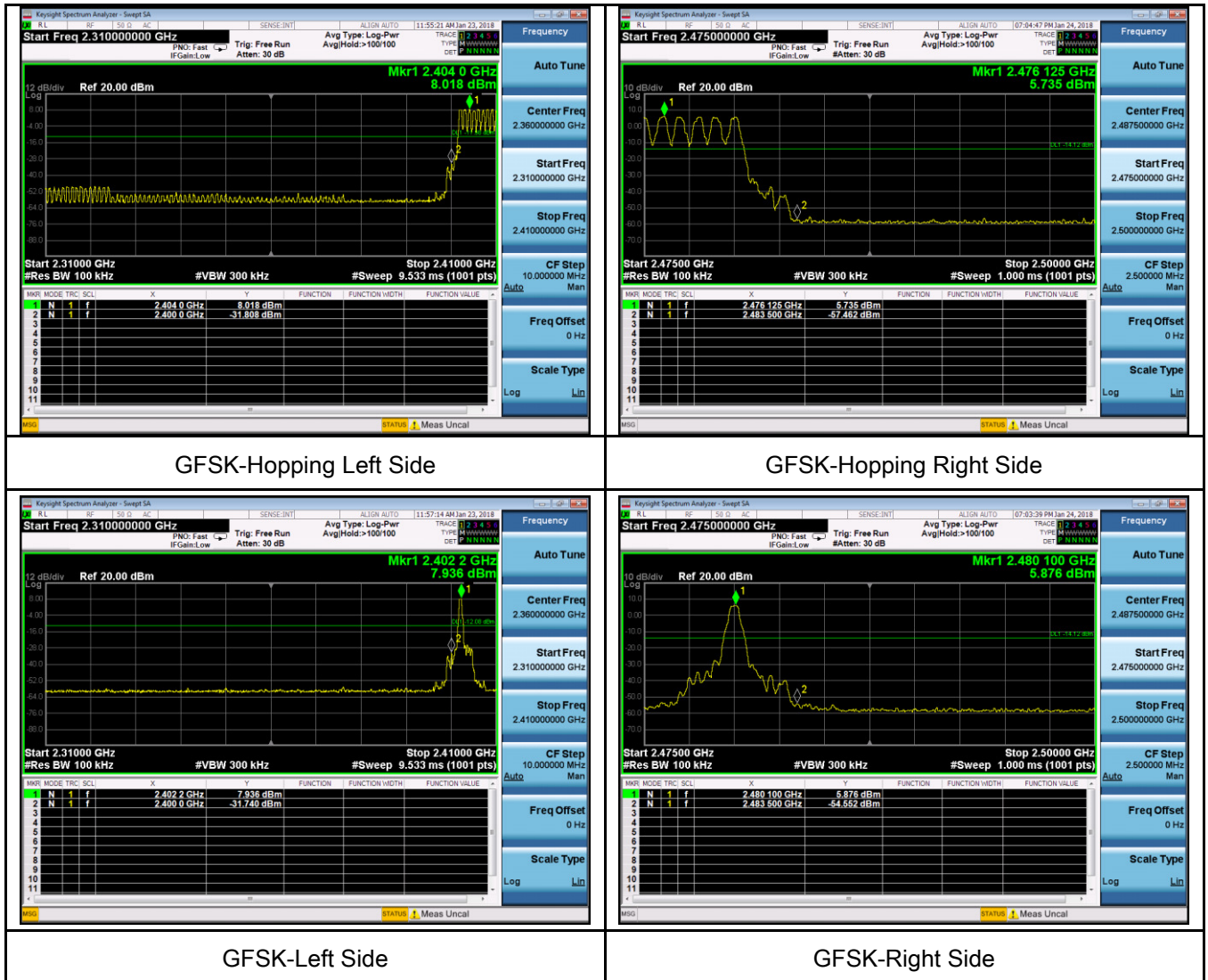
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only</p> <ul style="list-style-type: none"> 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range,
----------------	--

	<p>and make sure the instrument is operated in its linear range.</p> <ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☒ Pass ☐ Fail

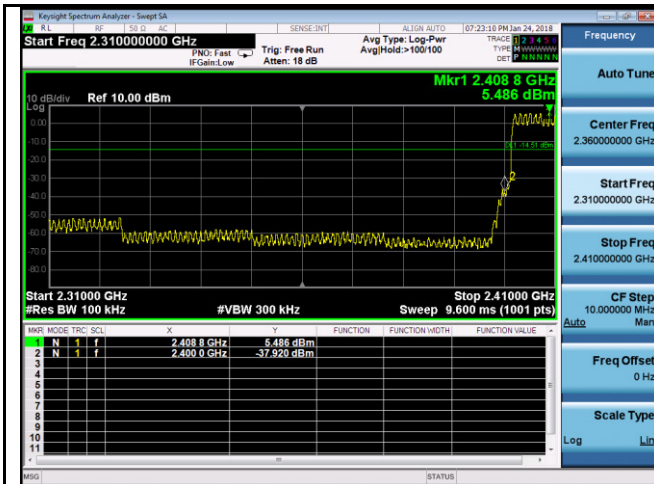
Test Data ☐ Yes ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test Plots

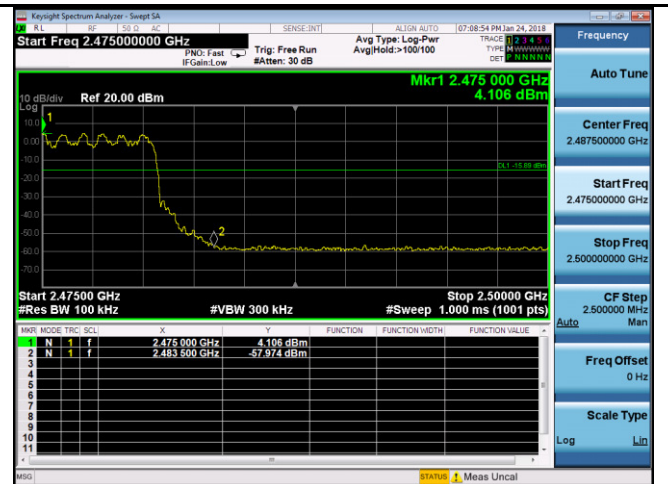
GFSK Mode:



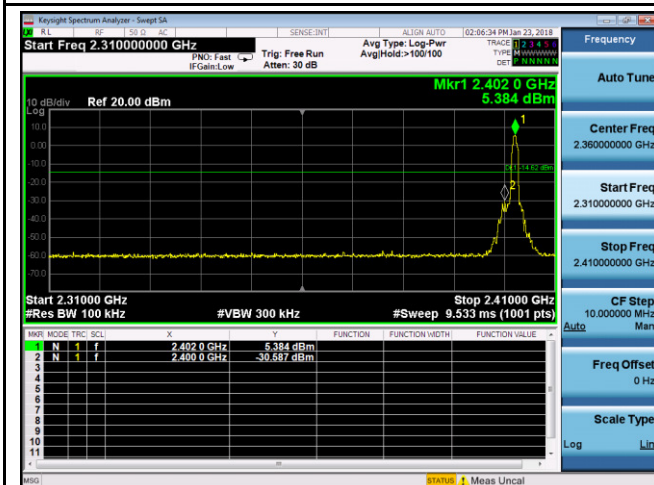
π /4 DQPSK Mode:



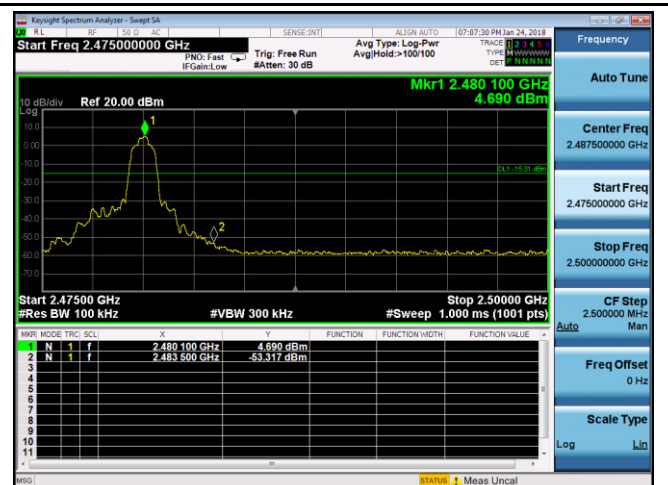
π /4 DQPSK-Hopping Left Side



π /4 DQPSK-Hopping Right Side



π /4 DQPSK-Left Side



π /4 DQPSK-Right Side

Agilent Spectrum Analyzer - Swept AC

Start Freq 2.31000000 GHz Stop Freq 2.41000000 GHz

Ref 20.00 dBm

Mkr1 2.410 0 GHz 6.088 dBm

Start 2.31000 GHz Stop 2.41000 GHz

#Res BW 100 kHz #VBW 300 kHz #Sweep 9.533 ms (1001 pts)

WVR	MODE	TRC	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.410 0 GHz	6.088 dBm			
2	N	1	f	2.400 0 GHz	-31.653 dBm			

KeySight FieldFox Analyzer - Sweep 1A

Page 1 of 20

Start Freq 2.475000000 GHz

Stop Freq 2.500000000 GHz

Center Freq 2.487500000 GHz

CF Step 2.500000 MHz

Auto Man

Frequency

Auto Tune

Center Freq 2.487500000 GHz

Start Freq 2.475000000 GHz

Stop Freq 2.500000000 GHz

CF Step 2.500000 MHz

Auto Man

10 dB/div Ref 20.00 dBm

Mkr1 2.480 025 GHz 6.069 dBm

Start 2.47500 GHz

Stop 2.50000 GHz

#Res BW 100 kHz

#VBW 300 kHz

#Sweep 9.533 ms (1001 pts)

Mkr	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.480 025 GHz	6.069 dBm			
2	N	1	f	2.483 500 GHz	-55.760 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSO File <PICTURE.PNG> saved

(STATUS)

Keysight Spectrum Analyzer - Sweep SA

Start Freq: 2.310000000 GHz

Stop Freq: 2.410000000 GHz

Ref: 20.00 dBm

PN1: Fast IF Gain: Low

Trig: Free Run

Attenu: 30 dB

Avg Type: Log-Pwr

Avg/Hold: >100/100

TRACE 0: 1, 2, 3, 4, 5

TYPE: M

UNIT: dBm

CF Stop: 10.000000 MHz

Auto

Frequency

Auto Tune

Center Freq: 2.360000000 GHz

Start Freq: 2.310000000 GHz

Stop Freq: 2.410000000 GHz

CF Stop: 10.000000 MHz

Auto

Freq Offset: 0 Hz

Scale Type: Log

Unit: dBm

Start 2.31000 GHz

Stop 2.41000 GHz

#Res BW 100 kHz

#VBW 300 kHz

#Sweep 9.533 ms (1001 pts)

Mkr1 2.4019 GHz

5.521 dBm

10 dB/div

0.00

10.00

20.00

30.00

40.00

50.00

60.00

70.00

80.00

90.00

100.00

2.31000 GHz

2.4019 GHz

2.41000 GHz

MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.4019 GHz	5.521 dBm			
2	N	1	f	2.4009 GHz	-39.671 dBm			

MSG

STATUS

Meas Uncal

Keysight Spectrum Analyzer - Sweep SA

Start Freq: 2.475000000 GHz

Stop Freq: 2.500000000 GHz

Resolution BW: 100 kHz

Video BW: 300 kHz

Sweep Time: 9.533 ms (1001 pts)

Marker 1: 2.475 850 GHz, 6.154 dBm

Marker 2: 2.483 500 GHz, -62.339 dBm

Mkr	Mode	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.475 850 GHz	6.154 dBm			
2	N	1	f	2.483 500 GHz	-62.339 dBm			

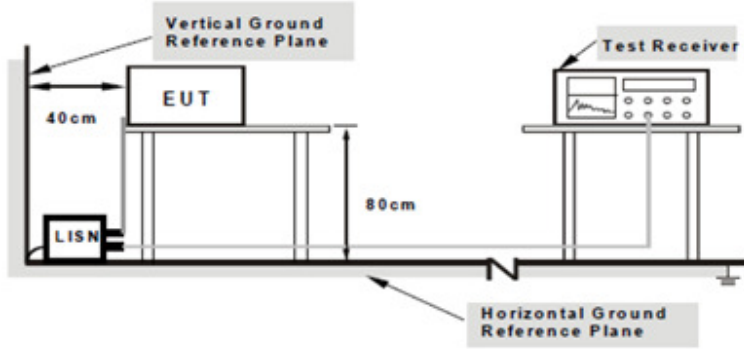
8DPSK-Right Side

6.8 AC Power Line Conducted Emissions

Temperature	24 °C
Relative Humidity	55%
Atmospheric Pressure	1008mbar
Test date :	December 13, 2017
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable														
47CFR§15.207, RSS210 (A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	<div>☒</div>														
		<table><tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBµV)</th></tr><tr><th>QP</th><th>Average</th></tr><tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr><tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr><tr><td>5 ~ 30</td><td>60</td><td>50</td></tr></table>		Frequency ranges (MHz)	Limit (dBµV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50
		Frequency ranges (MHz)			Limit (dBµV)												
				QP	Average												
		0.15 ~ 0.5		66 – 56	56 – 46												
		0.5 ~ 5		56	46												
5 ~ 30	60	50															

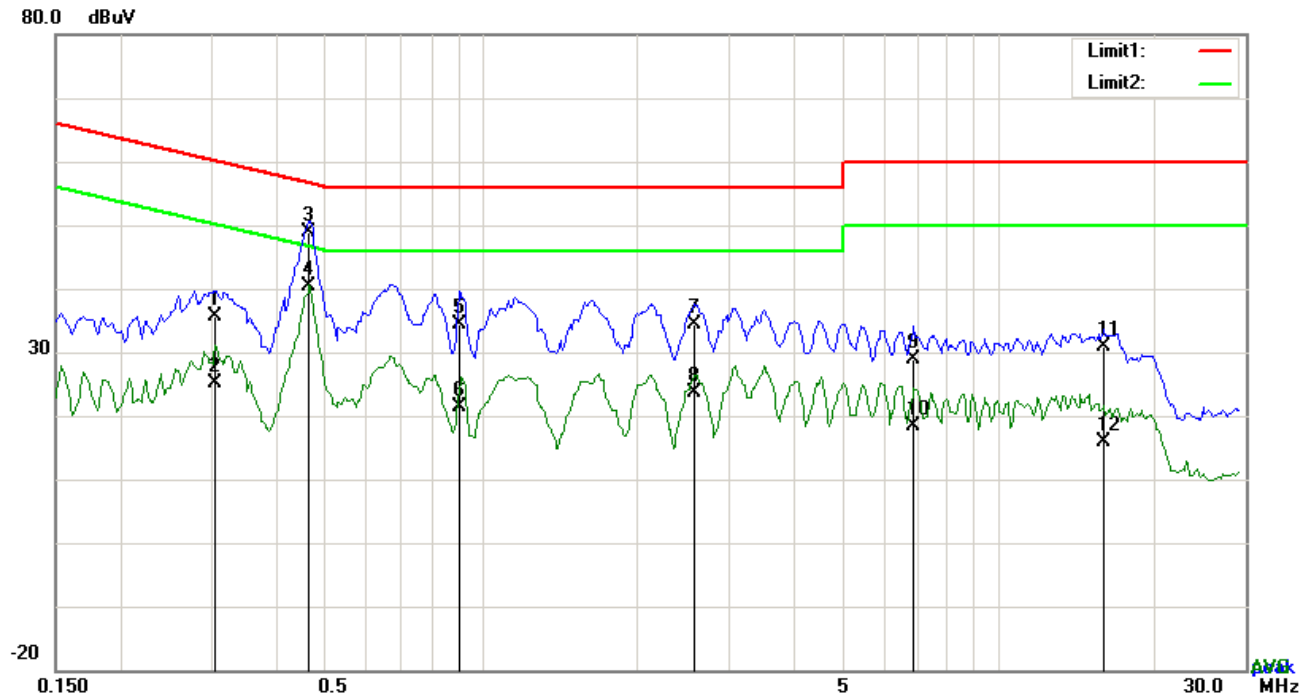
Test Setup	 <p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>
------------	---

Procedure	<ol style="list-style-type: none"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss
-----------	---

	coaxial cable. 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver. 7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. 8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

Test Mode: Bluetooth Mode

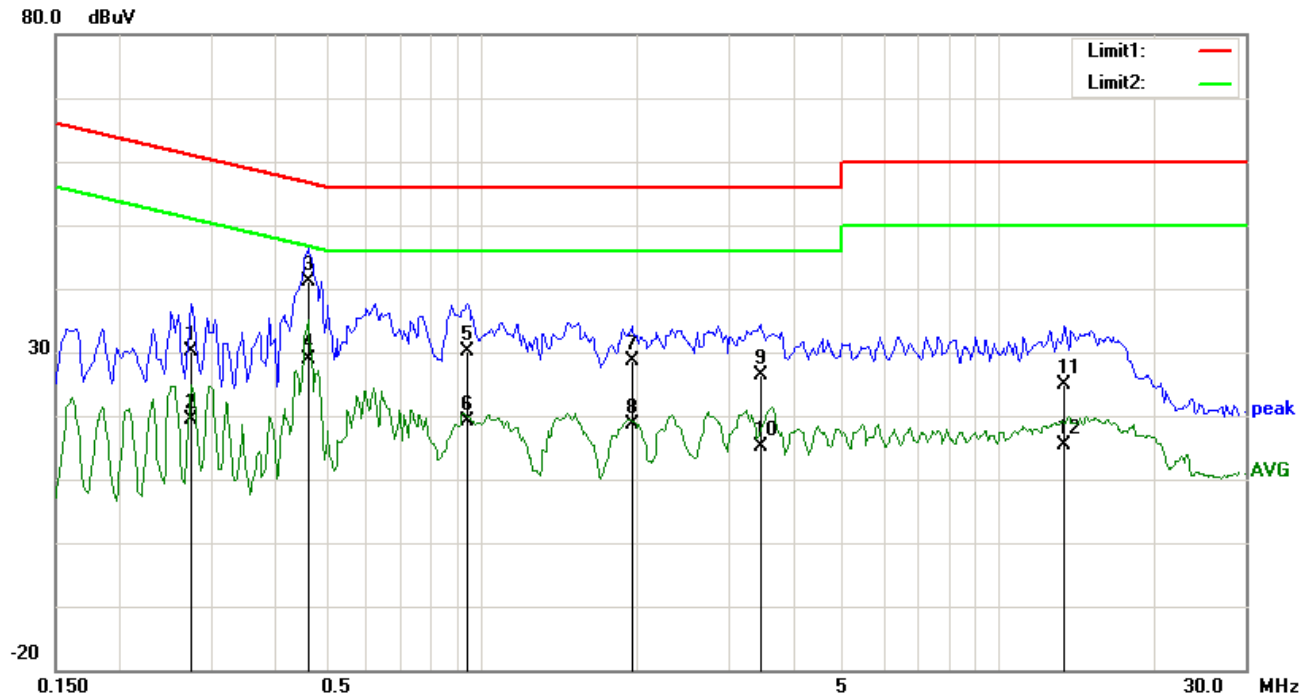


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.3060	25.55	QP	10.03	35.58	60.08	-24.50
2	L1	0.3060	15.16	AVG	10.03	25.19	50.08	-24.89
3	L1	0.4659	38.81	QP	10.03	48.84	56.59	-7.75
4	L1	0.4659	30.27	AVG	10.03	40.30	46.59	-6.29
5	L1	0.9066	24.42	QP	10.03	34.45	56.00	-21.55
6	L1	0.9066	11.25	AVG	10.03	21.28	46.00	-24.72
7	L1	2.5797	24.36	QP	10.05	34.41	56.00	-21.59
8	L1	2.5797	13.55	AVG	10.05	23.60	46.00	-22.40
9	L1	6.8454	18.80	QP	10.11	28.91	60.00	-31.09
10	L1	6.8454	8.32	AVG	10.11	18.43	50.00	-31.57
11	L1	15.9870	20.62	QP	10.24	30.86	60.00	-29.14
12	L1	15.9870	5.75	AVG	10.24	15.99	50.00	-34.01

Test Mode: Bluetooth Mode

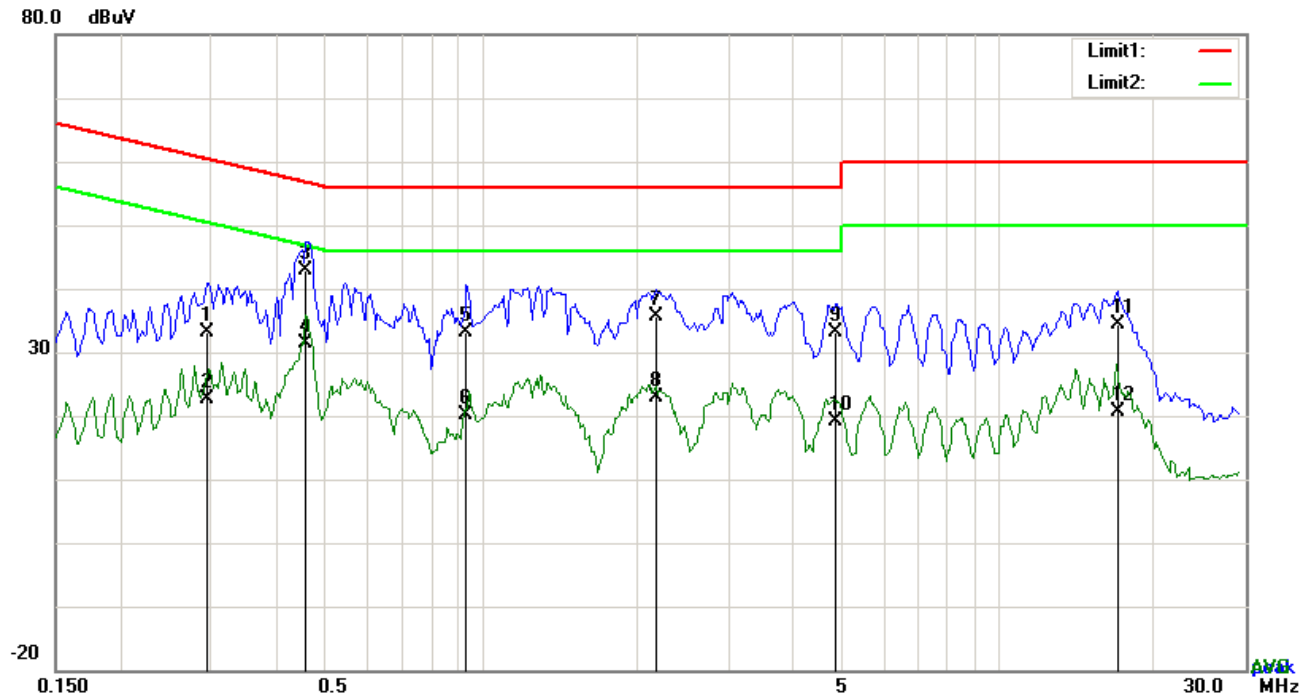


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2748	20.09	QP	10.02	30.11	60.97	-30.86
2	N	0.2748	9.42	AVG	10.02	19.44	50.97	-31.53
3	N	0.4620	31.16	QP	10.02	41.18	56.66	-15.48
4	N	0.4620	18.87	AVG	10.02	28.89	46.66	-17.77
5	N	0.9417	20.11	QP	10.03	30.14	56.00	-25.86
6	N	0.9417	9.07	AVG	10.03	19.10	46.00	-26.90
7	N	1.9557	18.70	QP	10.04	28.74	56.00	-27.26
8	N	1.9557	8.52	AVG	10.04	18.56	46.00	-27.44
9	N	3.4641	16.42	QP	10.05	26.47	56.00	-29.53
10	N	3.4641	5.12	AVG	10.05	15.17	46.00	-30.83
11	N	13.3935	14.81	QP	10.18	24.99	60.00	-35.01
12	N	13.3935	5.11	AVG	10.18	15.29	50.00	-34.71

Test Mode: Bluetooth Mode

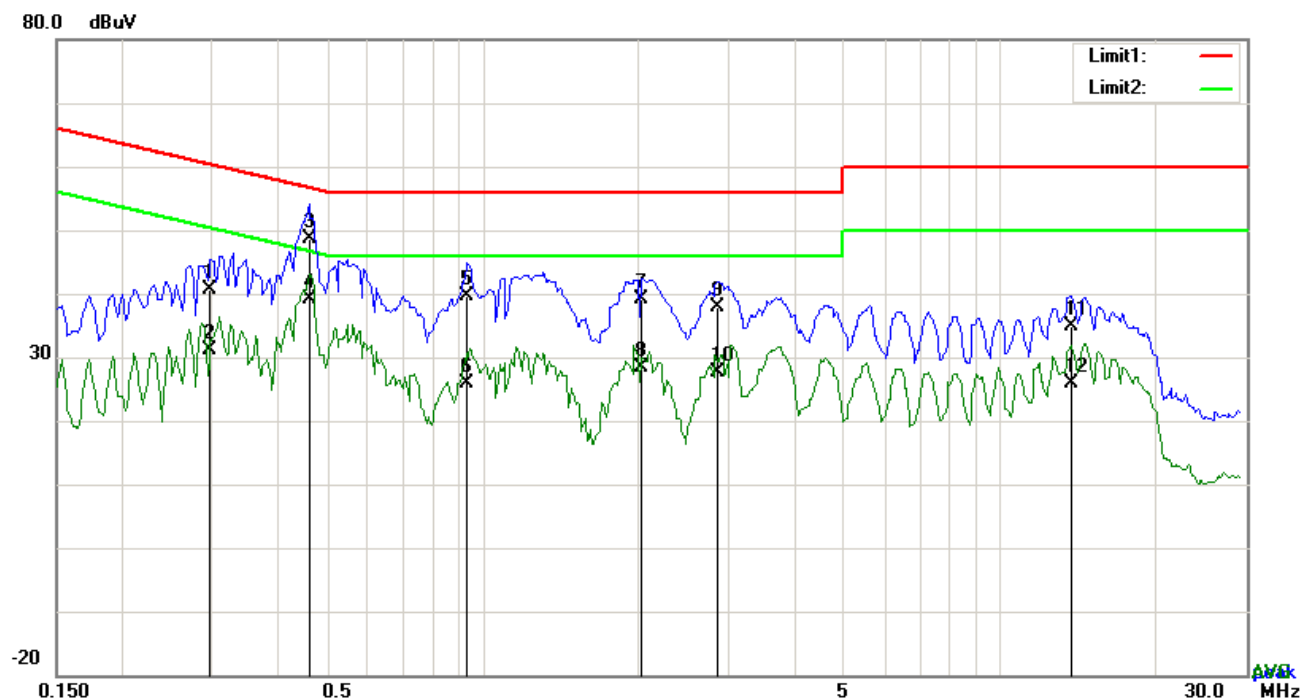


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2943	23.17	QP	10.02	33.19	60.40	-27.21
2	L1	0.2943	12.50	AVG	10.02	22.52	50.40	-27.88
3	L1	0.4581	32.93	QP	10.02	42.95	56.73	-13.78
4	L1	0.4581	21.45	AVG	10.02	31.47	46.73	-15.26
5	L1	0.9378	23.07	QP	10.03	33.10	56.00	-22.90
6	L1	0.9378	10.16	AVG	10.03	20.19	46.00	-25.81
7	L1	2.1741	25.56	QP	10.04	35.60	56.00	-20.40
8	L1	2.1741	12.74	AVG	10.04	22.78	46.00	-23.22
9	L1	4.8408	22.95	QP	10.07	33.02	56.00	-22.98
10	L1	4.8408	9.15	AVG	10.07	19.22	46.00	-26.78
11	L1	16.9893	24.19	QP	10.22	34.41	60.00	-25.59
12	L1	16.9893	10.49	AVG	10.22	20.71	50.00	-29.29

Test Mode:	Bluetooth Mode
-------------------	-----------------------



Test Data

Phase Neutral Plot at 240Vac, 60Hz

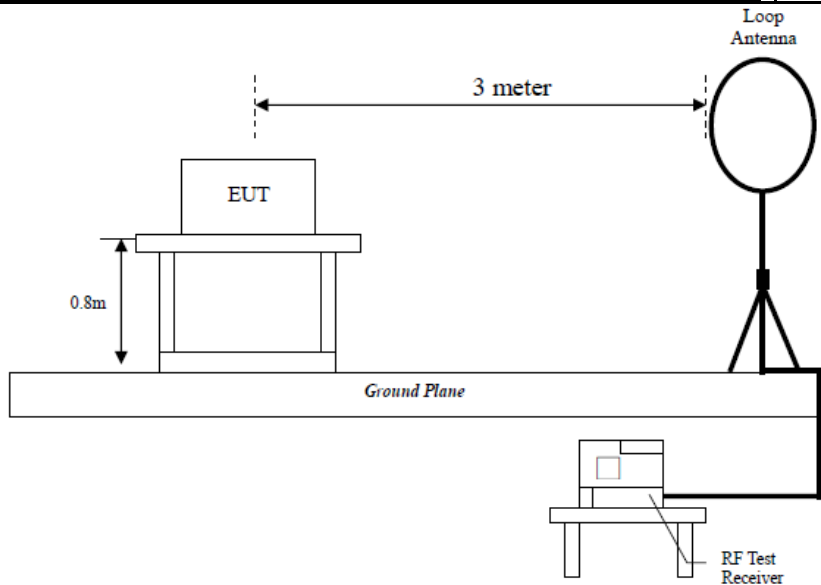
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2982	30.68	QP	10.02	40.70	60.29	-19.59
2	N	0.2982	21.04	AVG	10.02	31.06	50.29	-19.23
3	N	0.4620	38.61	QP	10.02	48.63	56.66	-8.03
4	N	0.4620	29.05	AVG	10.02	39.07	46.66	-7.59
5	N	0.9339	29.72	QP	10.03	39.75	56.00	-16.25
6	N	0.9339	15.89	AVG	10.03	25.92	46.00	-20.08
7	N	2.0298	29.03	QP	10.04	39.07	56.00	-16.93
8	N	2.0298	18.25	AVG	10.04	28.29	46.00	-17.71
9	N	2.8527	27.95	QP	10.05	38.00	56.00	-18.00
10	N	2.8527	17.56	AVG	10.05	27.61	46.00	-18.39
11	N	13.7016	24.79	QP	10.18	34.97	60.00	-25.03
12	N	13.7016	15.81	AVG	10.18	25.99	50.00	-24.01

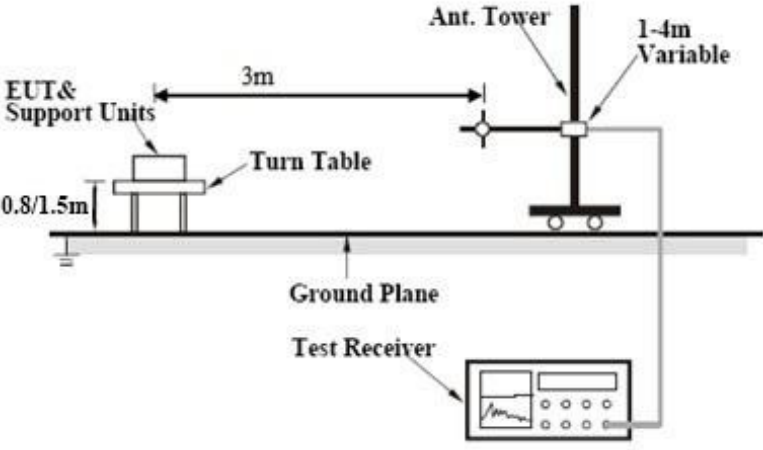
6.9 Radiated Emissions & Restricted Band

Temperature	24 °C
Relative Humidity	53%
Atmospheric Pressure	1010mbar
Test date :	December 15, 2017
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable																
47CFR§15.205, §15.209, §15.247(d)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges																	
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (µV/m)</th></tr><tr><td>0.009~0.490</td><td>2400/F(KHz)</td></tr><tr><td>0.490~1.705</td><td>24000/F(KHz)</td></tr><tr><td>1.705~30.0</td><td>30</td></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table>		Frequency range (MHz)	Field Strength (µV/m)	0.009~0.490	2400/F(KHz)	0.490~1.705	24000/F(KHz)	1.705~30.0	30	30 – 88	100	88 – 216	150	216 960	200	Above 960	500
		Frequency range (MHz)		Field Strength (µV/m)															
		0.009~0.490		2400/F(KHz)															
		0.490~1.705		24000/F(KHz)															
		1.705~30.0		30															
		30 – 88		100															
		88 – 216		150															
		216 960		200															
		Above 960		500															

Test Setup	 <p>The diagram illustrates the test setup for radiated emissions. It shows an Equipment Under Test (EUT) placed on a stand that is 0.8 meters high. A Loop Antenna is positioned 3 meters away from the EUT. The entire setup is on a Ground Plane. An RF Test Receiver is connected to the antenna.</p>
------------	---

	
Procedure	<ol style="list-style-type: none"> The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. The EUT was then rotated to the direction that gave the maximum emission. Finally, the antenna height was adjusted to the height that gave the maximum emission. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Result:

Test Mode:	Transmitting Mode
------------	-------------------

Frequency range: 9KHz - 30MHz

Freq.	Detection	Factor	Reading	Result	Limit@3m	Margin
(MHz)	value	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
--	--	--	--	--	--	>20
--	--	--	--	--	--	>20

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.