
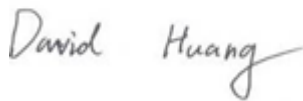



RF TEST REPORT



Report No.: Q181023S005-FCC-R2

Supersede Report No.: N/A

Applicant	TP-LINK Technologies Co., Ltd.	
Product Name	C5 Plus smartphone	
Model No.	TP7031C	
Serial No.	TP7031CXYZZ	
Test Standard	FCC Part 15.247, ANSI C63.10: 2013	
Test Date	Nov. 06 to Nov. 20, 2018	
Issue Date	Nov. 22, 2018	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification <input checked="" type="checkbox"/>		
Equipment did not comply with the specification <input type="checkbox"/>		
		
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

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
Q181023S005-FCC-R2	NONE	Original	Nov. 22, 2018

2. Customer information

Applicant Name	TP-LINK Technologies Co., Ltd.
Applicant Add	Building 24-1F/3F/4F/5F, 28-1F/2F/3F/4F Science and Technology Park, Shennan Road, Nanshan District, Shenzhen City, Guangdong Province, P.R. China
Manufacturer	TP-LINK Technologies Co.,Ltd
Manufacturer Add	Building 24-1F/3F/4F/5F, 28-1F/2F/3F/4F Science and Technology Park, Shennan Road, Nanshan District, Shenzhen City, Guangdong Province, P.R. 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_EMC(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:	C5 Plus smartphone
Main Model:	TP7031C
	TP7031CXYZZ
	(Model Difference
	Description of Model Name Differentiation:
	X=2 , indicates Grey ; X=4 , indicates Gold ; X=7 , indicates Blue ;
Serial Model:	X=8 , indicates Red ;
	Y=0 , indicates the memory is 512MB RAM + 8GB Flash; Y=1 , indicates the memory is 1GB RAM + 8GB Flash; Y=2 , indicates the memory is 1GB RAM + 16GB Flash;
	Z=' A' to ' Z' , ZZ indicates different regions or customers.All models are same with electrical parameters and internal circuit structure.)
Date EUT received:	Nov. 05, 2018
Test Date(s):	Nov. 06 to Nov. 20, 2018
Equipment Category :	DSS
Antenna Gain:	Bluetooth: -0.5dBi
Antenna Type:	PIFA antenna
Type of Modulation:	Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK
RF Operating Frequency (ies):	Bluetooth: 2402-2480 MHz
Max. Output Power:	6.370 dBm

Number of Channels: Bluetooth: 79CH

Port: Please refer to the user' s manual

Adapter :

Model: A8-501000

Input: AC100-240V~50/60Hz,0.2A Max

Output: DC 5.0V, 1.0A

Battery :

Input Power:

Model: NBL-40A2150

Spec: 3.8V, 2150mAh from Li-ion

Limited charge voltage: 4.35V

Rating:3.8V/2150mAh/8.17Wh

Typical3.8V/2200mAh/8.36Wh

Trade Name : neffos

FCC ID: TE7C5PLUSV1

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 2 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIF/GPS, the gain is -0.5dBi for Bluetooth/BLE, the gain is -0.5dBi for WIFI, the gain is -0.5dBi for GPS.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is 0dBi for GSM850, 0dBi for PCS1900, 0dBi for UMTS-FDD Band V, -0.5dBi for UMTS-FDD Band II.


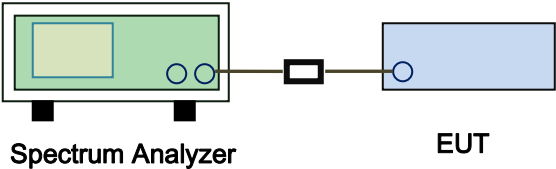
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	22 °C
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	Nov. 21, 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) ≥ 1% of the span - Video (or Average) Bandwidth (VBW) ≥ 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

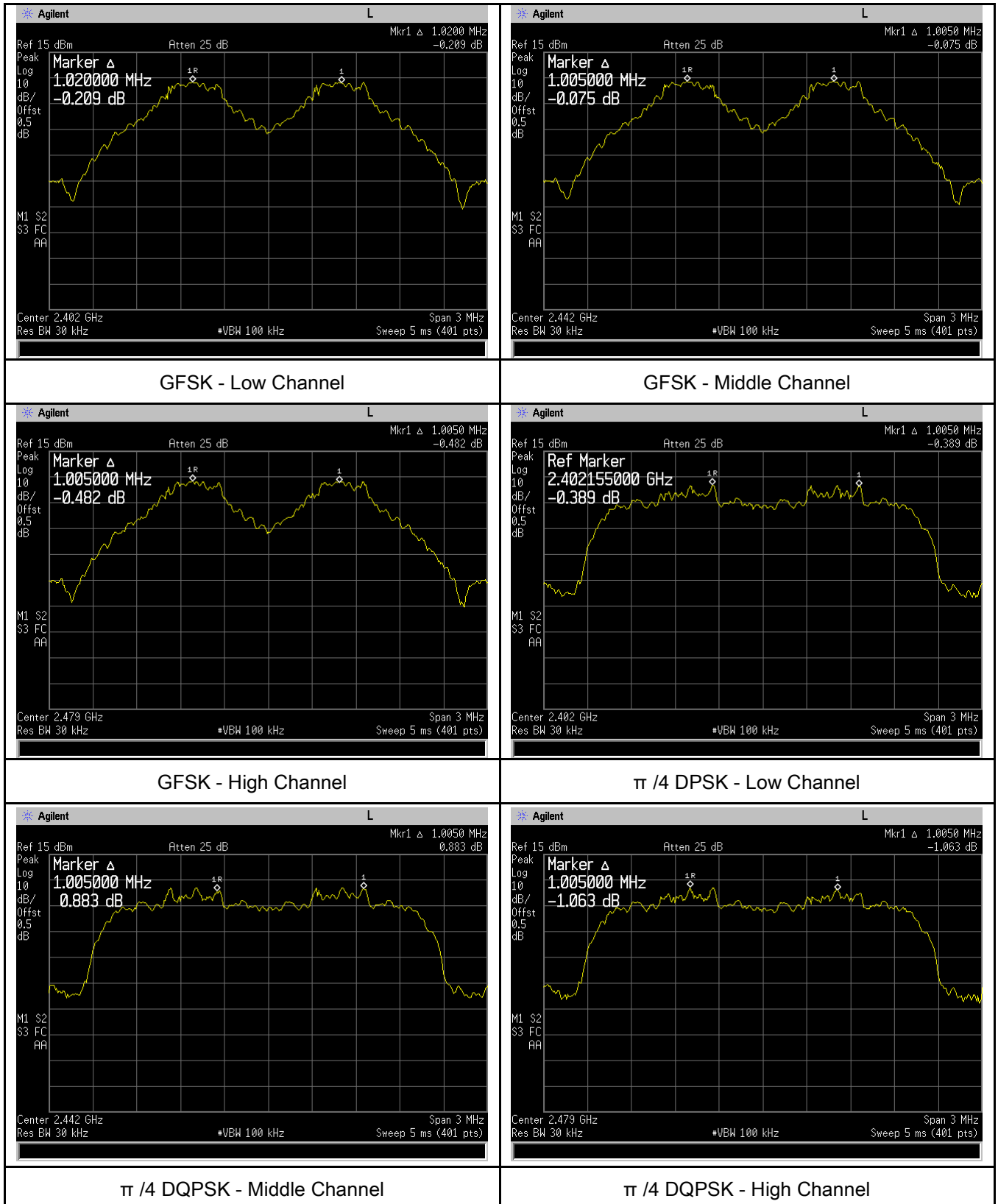
Test Plot ☒ Yes (See below) ☐ N/A

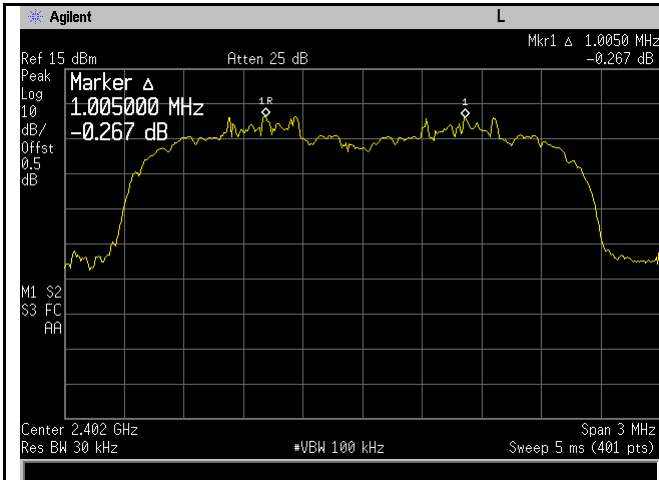
Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.020	0.692	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.687	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.685	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.863	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.865	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.861	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.862	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.877	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.863	Pass
	Adjacency Channel	2479			

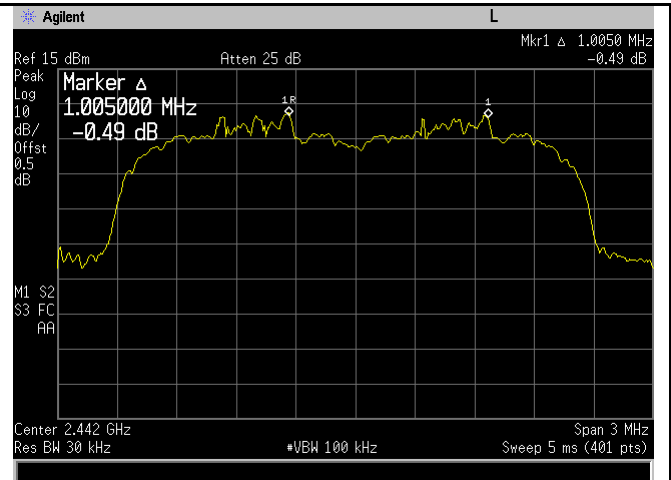
Test Plots

Channel Separation measurement result

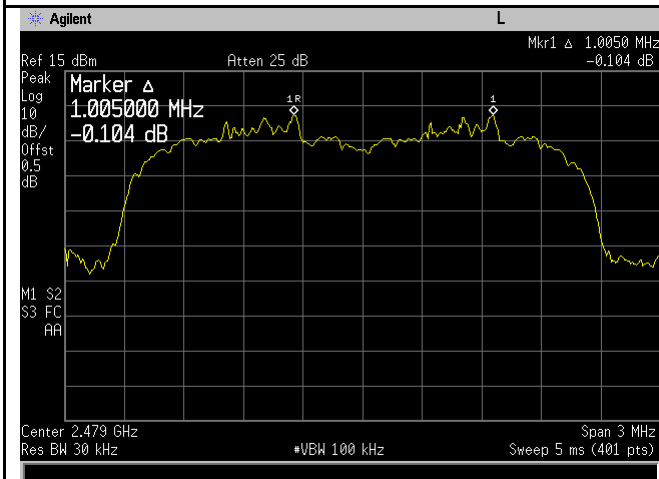




8DPSK - Low Channel



8DPSK - Middle Channel


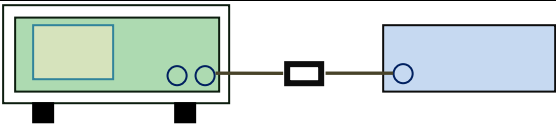


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	Nov. 08, 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

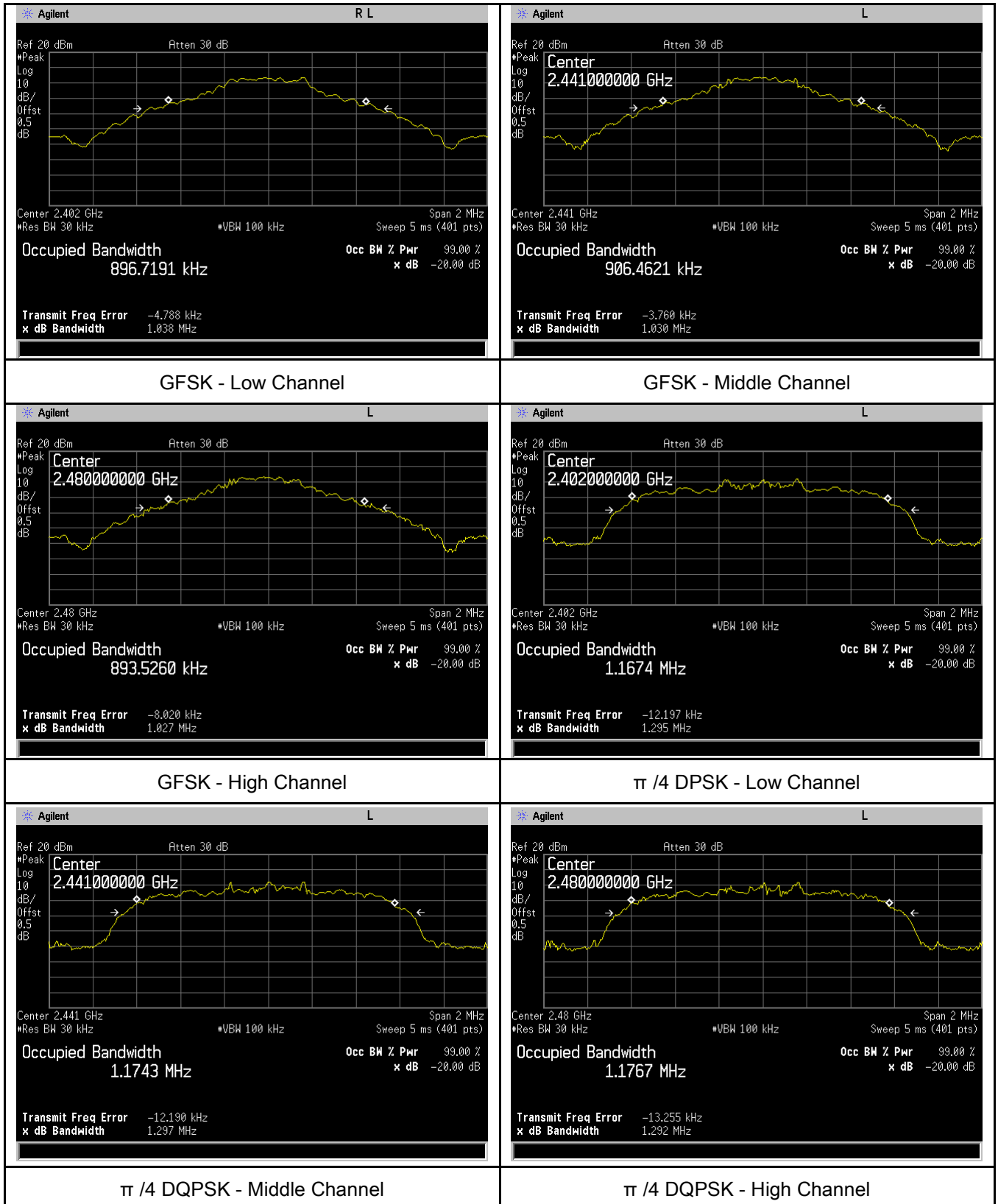
Test Plot ☒ Yes (See below) ☐ N/A

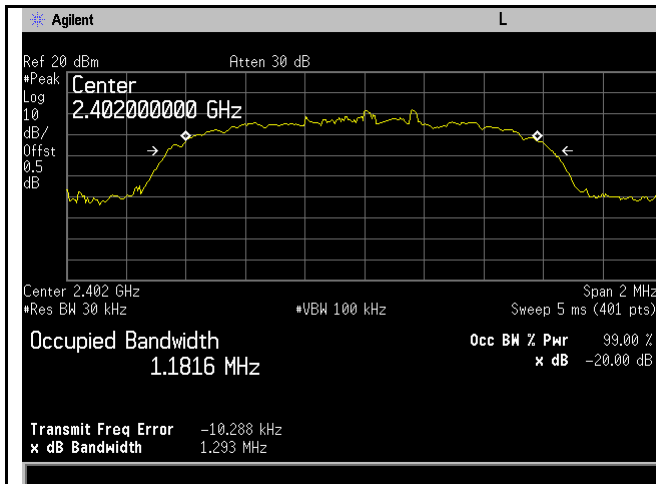
Measurement result

Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.038	0.896
	Mid	2441	1.030	0.906
	High	2480	1.027	0.894
$\pi/4$ DQPSK	Low	2402	1.295	1.1674
	Mid	2441	1.297	1.1743
	High	2480	1.292	1.1667
8-DPSK	Low	2402	1.293	1.1816
	Mid	2441	1.316	1.1866
	High	2480	1.295	1.1665

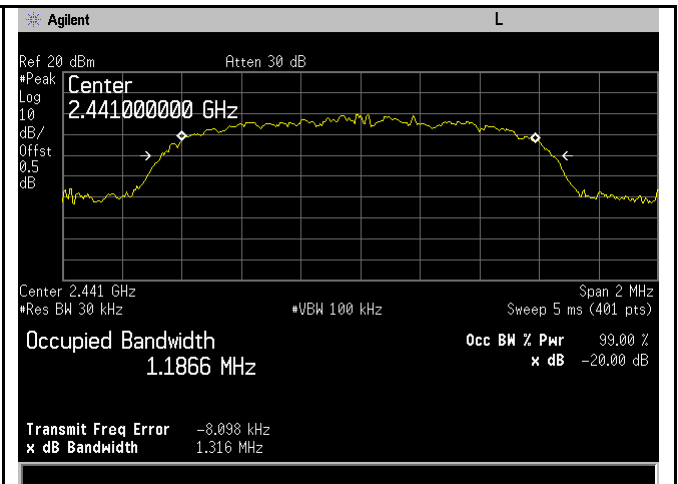
Test Plots

20dB Bandwidth measurement result

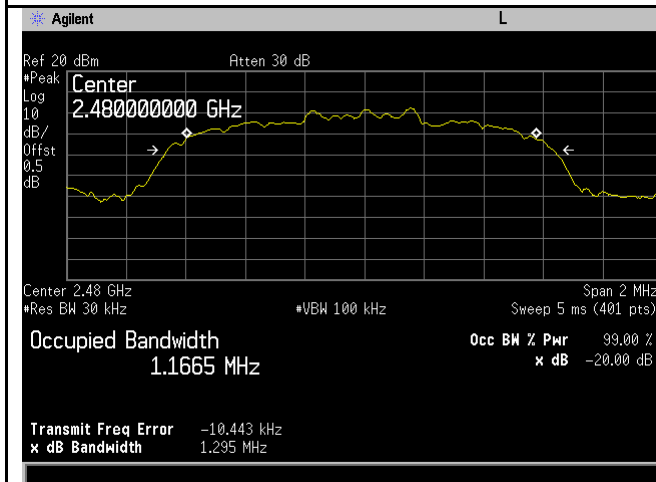




8DPSK - Low Channel



8DPSK - Middle Channel



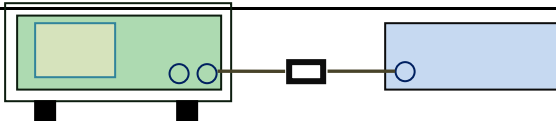
8DPSK - High Channel

6.4 Peak Output Power

Temperature	22 °C
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	Nov. 21, 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	<input checked="" type="checkbox"/>
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	<input checked="" type="checkbox"/>
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤ 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 1 Watt	<input type="checkbox"/>

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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

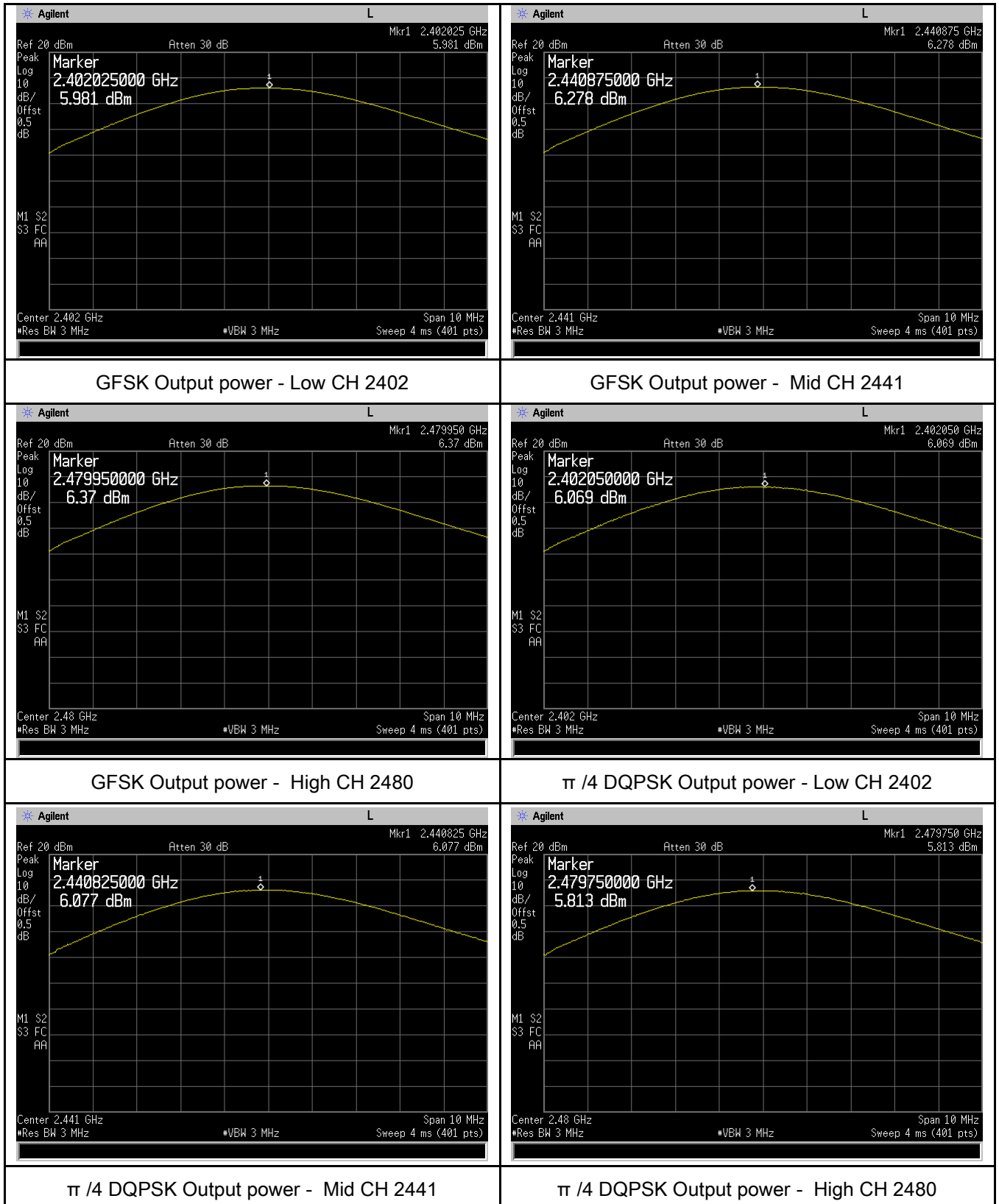
Test Plot ☒ Yes (See below) ☐ N/A

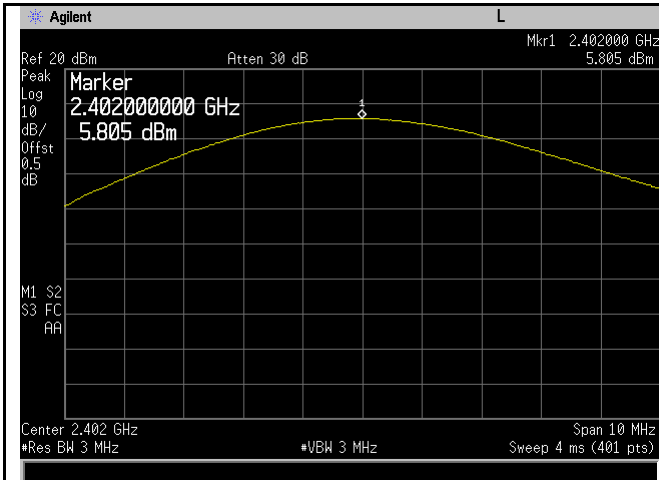
Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	5.981	125	Pass
		Mid	2441	6.278	125	Pass
		High	2480	6.370	125	Pass
	$\pi/4$ DQPSK	Low	2402	6.069	125	Pass
		Mid	2441	6.077	125	Pass
		High	2480	5.813	125	Pass
	8-DPSK	Low	2402	5.805	125	Pass
		Mid	2441	6.099	125	Pass
		High	2480	5.912	125	Pass

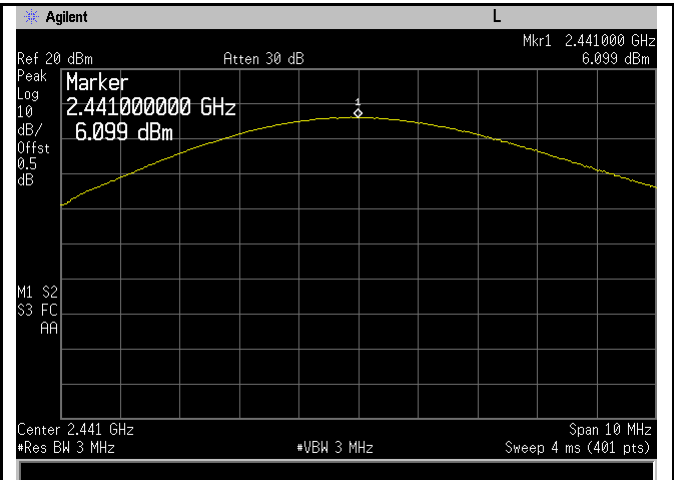
Test Plots

Output Power measurement result

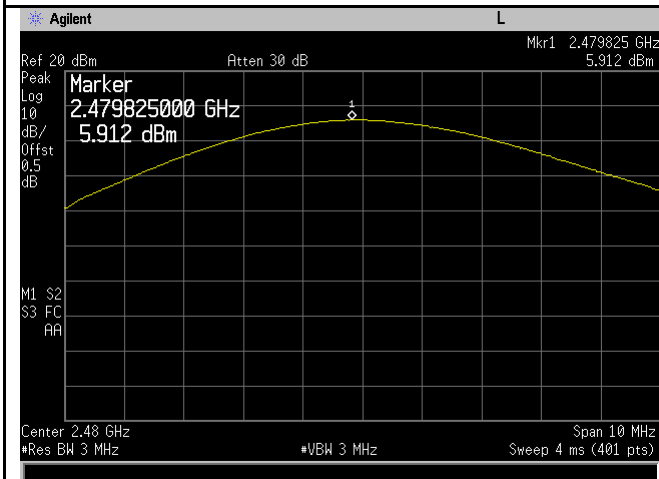




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

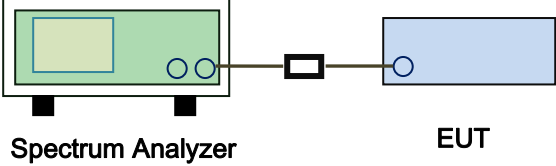


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	Nov. 08, 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	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

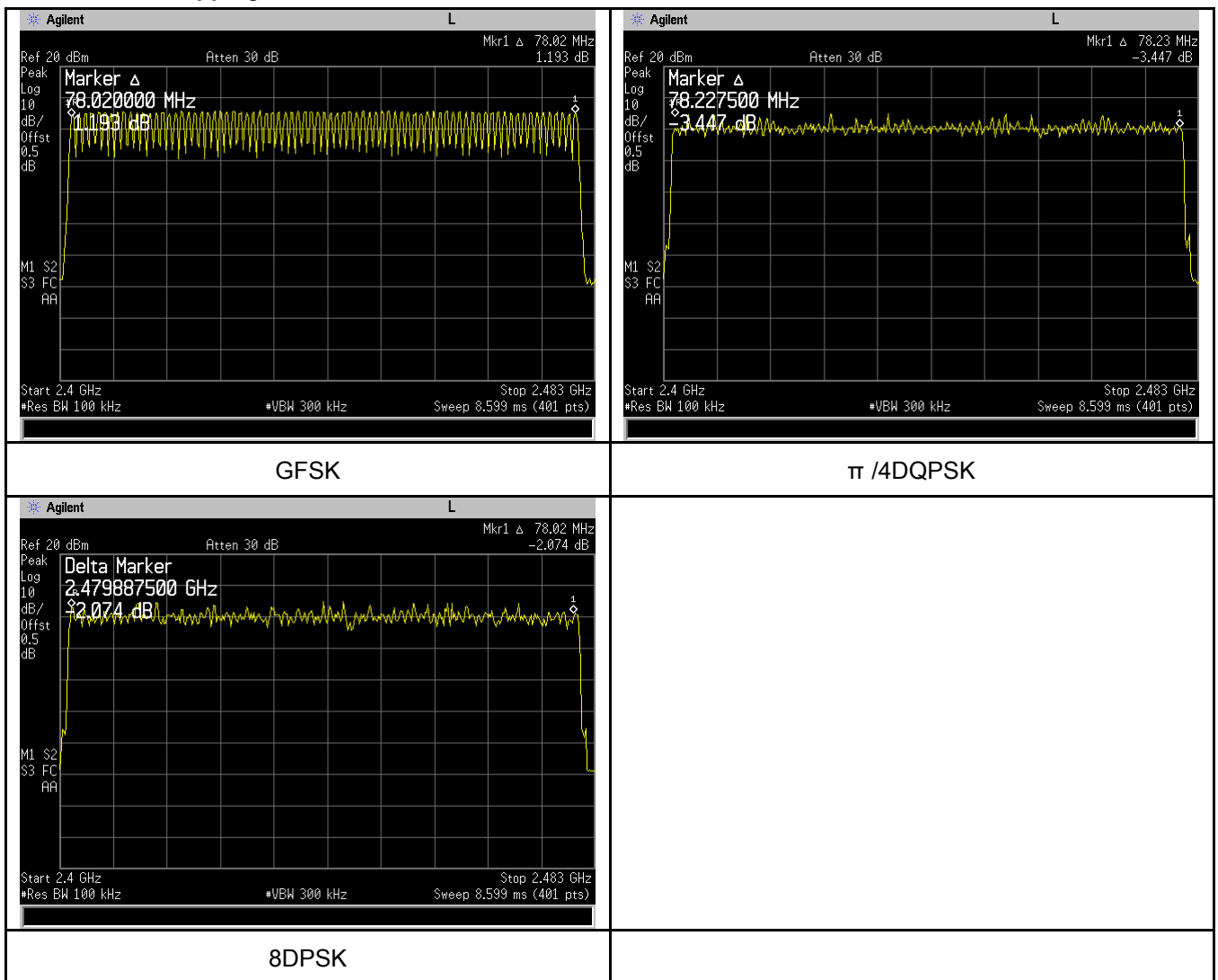
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483	79	15
	$\pi/4$ DQPSK	2400-2483	79	15
	8-DPSK	2400-2483	79	15

Test Plots

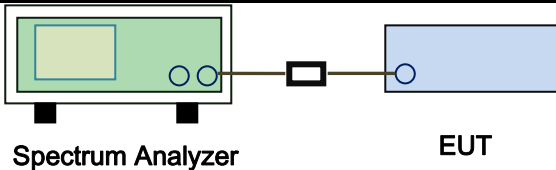
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	Nov. 08, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

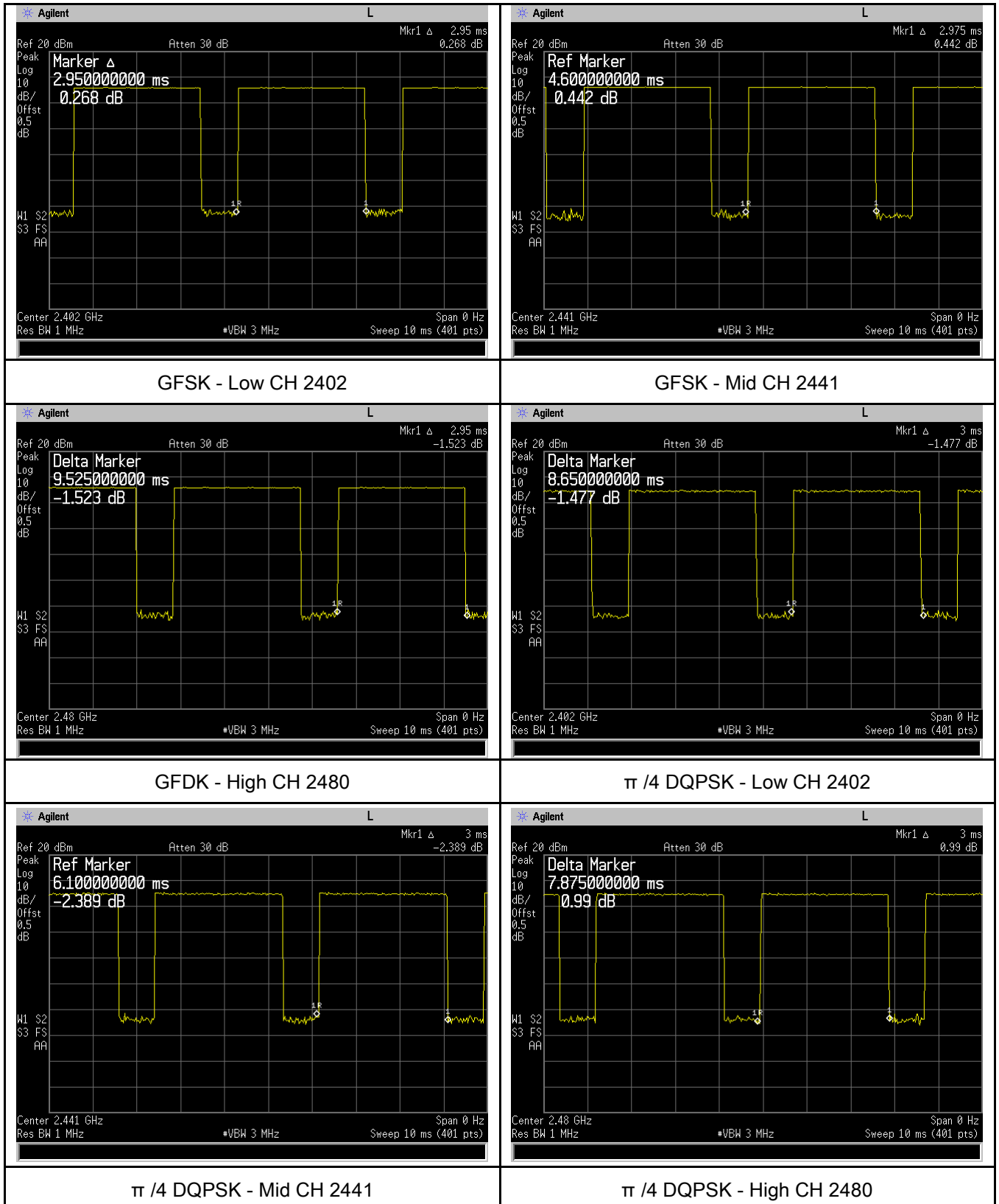
Test Data ☒ Yes ☐ N/A

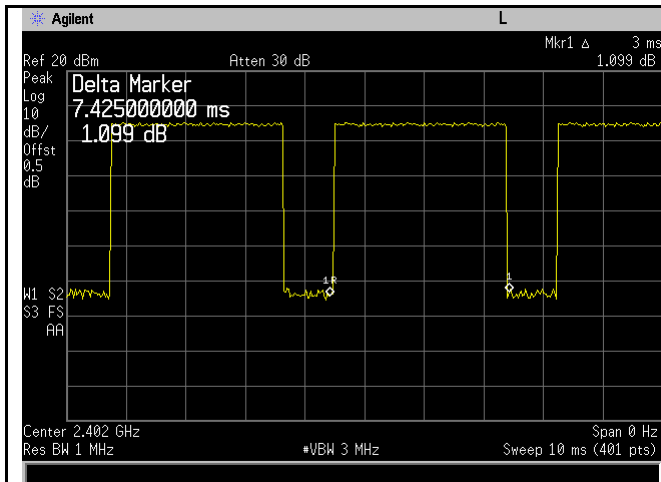
Test Plot ☒ Yes (See below) ☐ N/A

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.950	314.667	400	Pass
		Mid	2.975	317.333	400	Pass
		High	2.950	314.667	400	Pass
	π /4 DQPSK	Low	3.000	320.000	400	Pass
		Mid	3.000	320.000	400	Pass
		High	3.000	320.000	400	Pass
	8-DPSK	Low	3.000	320.000	400	Pass
		Mid	3.000	320.000	400	Pass
		High	3.000	320.000	400	Pass
Note: Dwell time=Pulse Time (ms) \times (1600 \div 6 \div 79) \times 31.6						

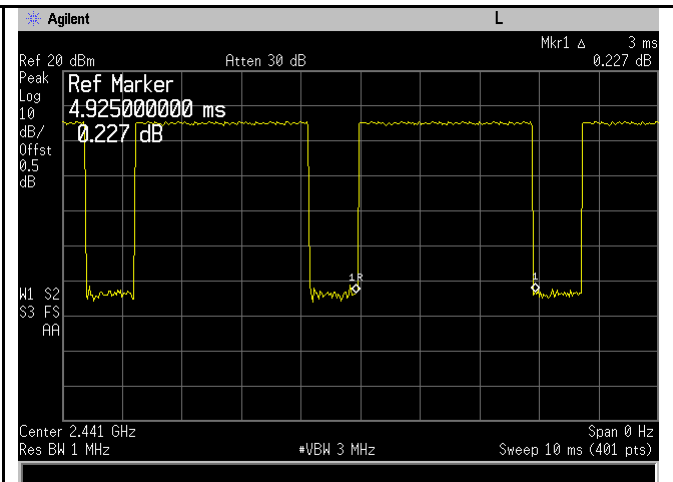
Test Plots

Dwell Time measurement result

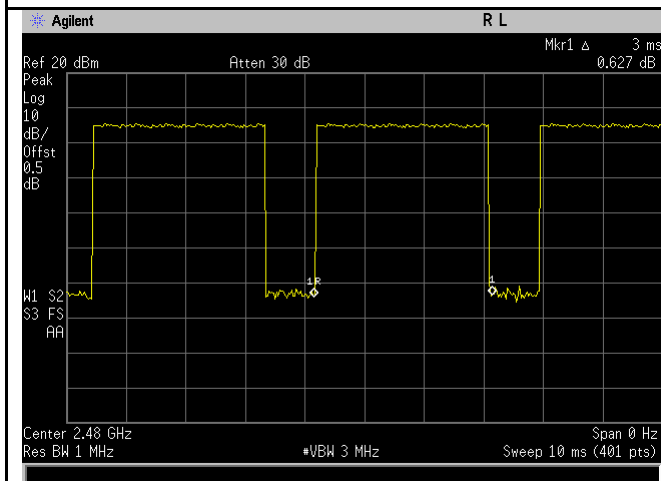




8DPSK - Low CH 2402



8DPSK - Mid CH 2441



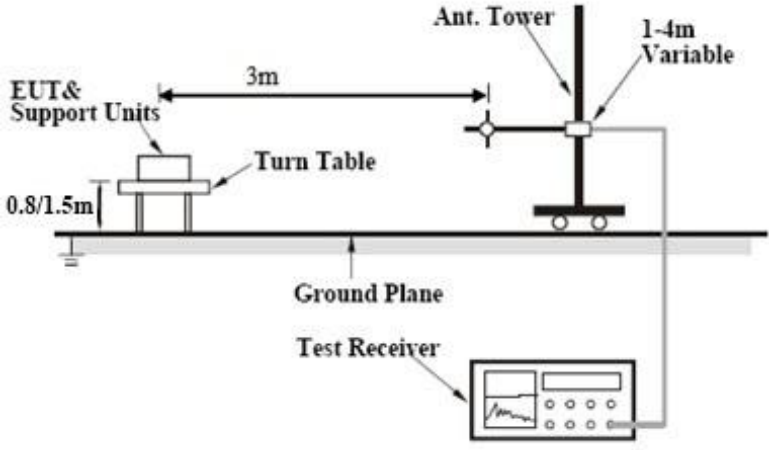
8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	21 °C
Relative Humidity	51%
Atmospheric Pressure	1009mbar
Test date :	Nov. 09, 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. □	<input checked="" type="checkbox"/>

Test Setup	
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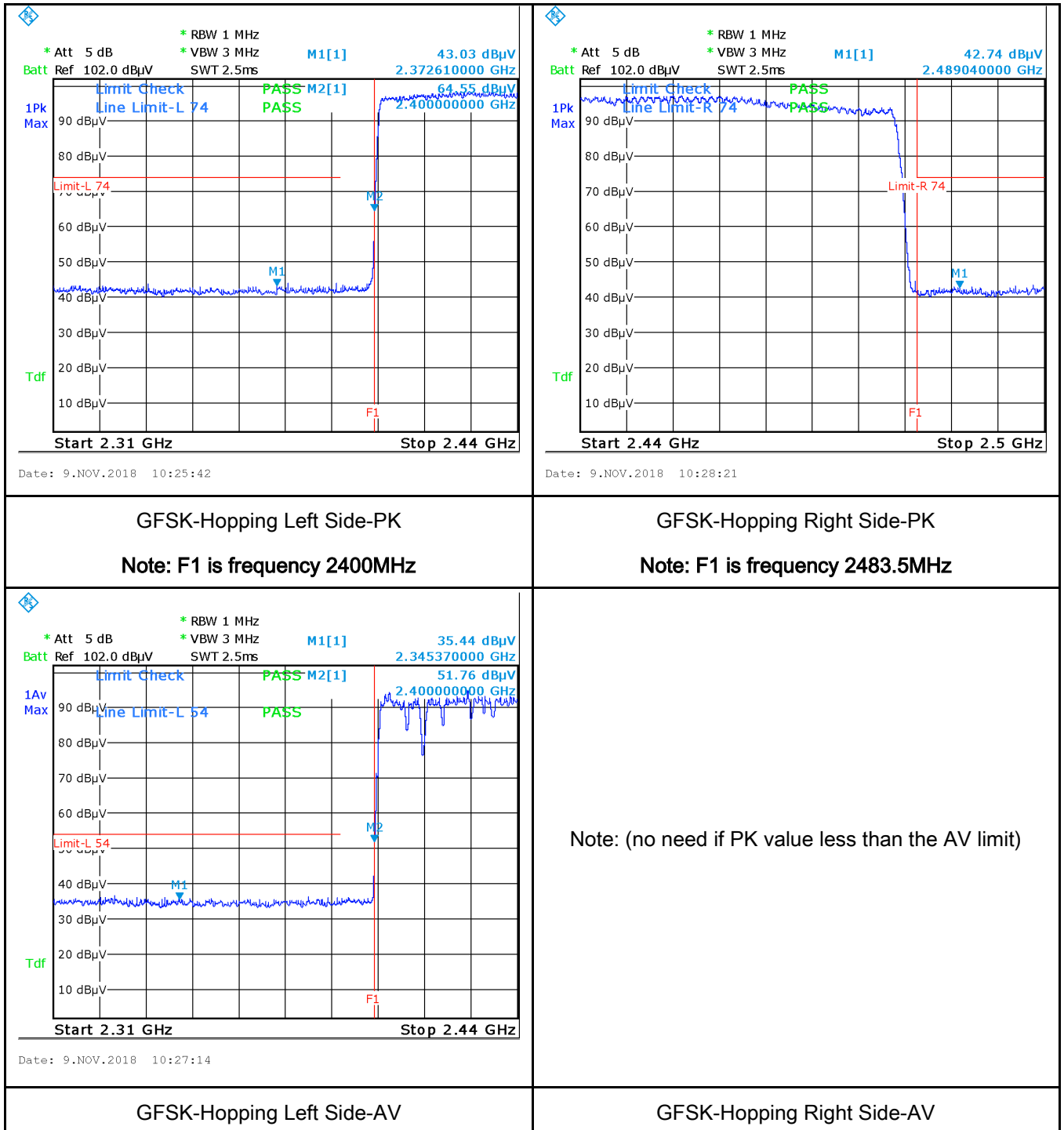
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only</p> <ul style="list-style-type: none"> 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. 2. Position the EUT 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,
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	<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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

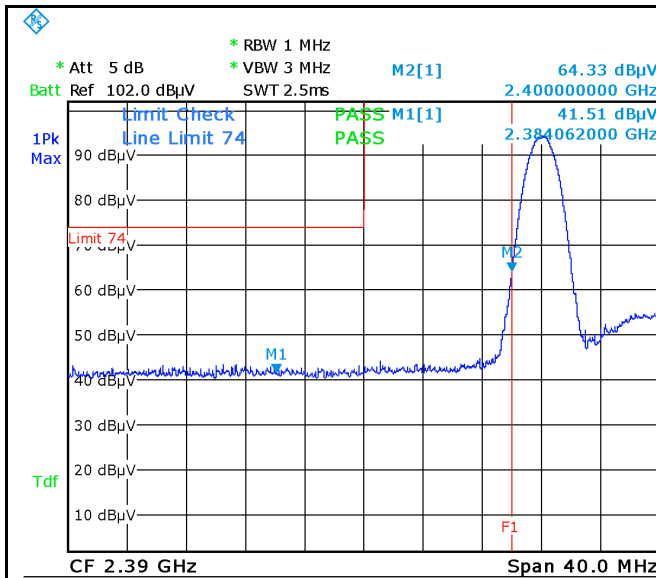
Test Data ☐ Yes ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test Plots

GFSK Mode:



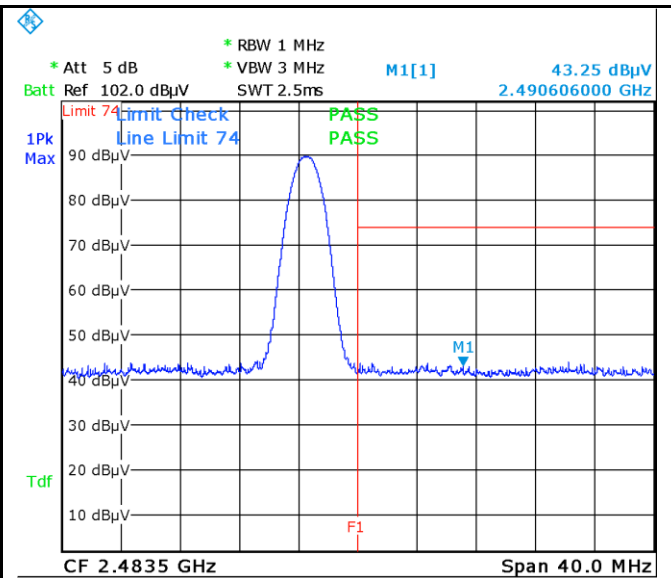
Note: Both Horizontal and vertical polarities were investigated.



Date: 9.NOV.2018 10:19:57

GFSK-Left Side-PK

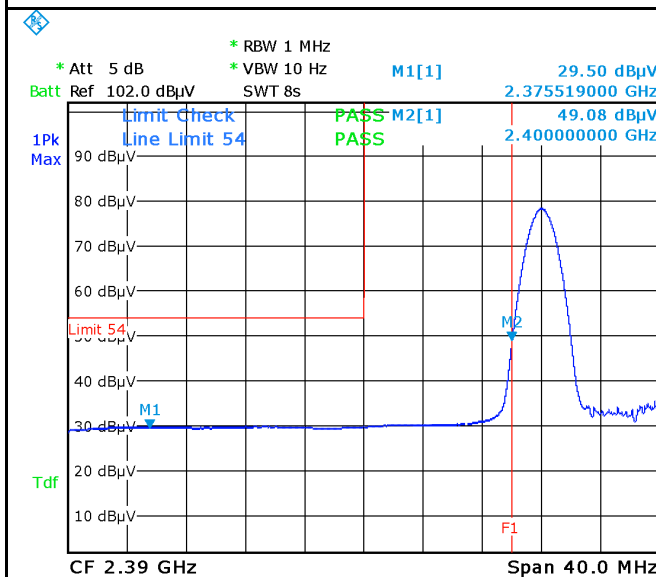
Note: F1 is frequency 2400MHz



Date: 9.NOV.2018 10:23:18

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 9.NOV.2018 10:21:00

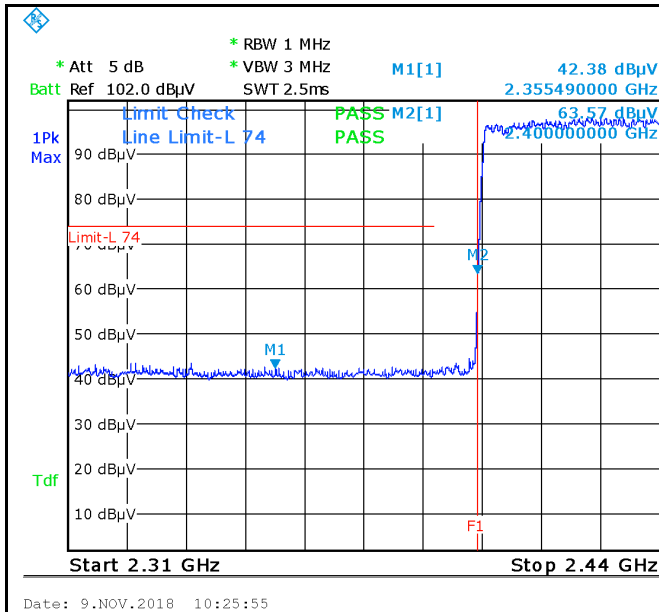
GFSK-Left Side-AV

Note: (no need if PK value less than the AV limit)

GFSK-Right Side-AV

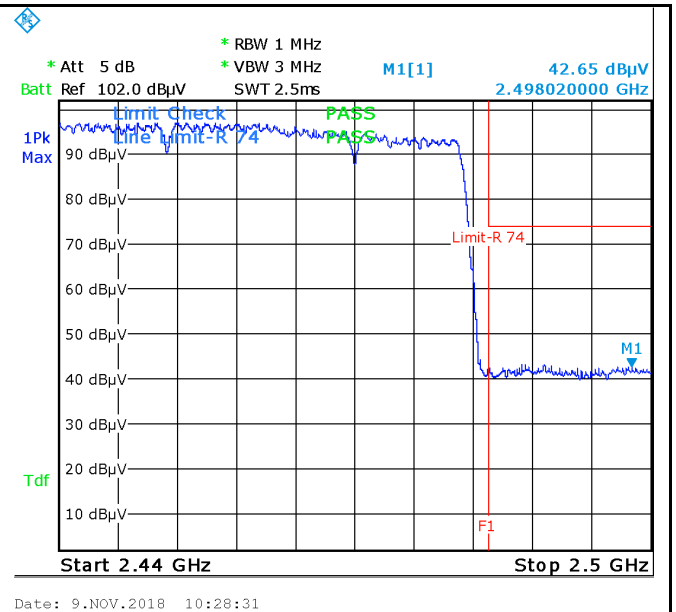
Note: Both Horizontal and vertical polarities were investigated.

$\pi/4$ DQPSK Mode:



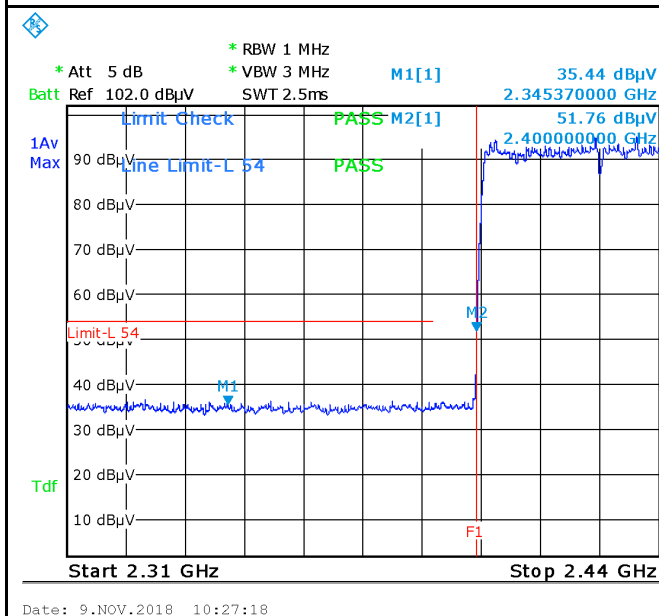
$\pi/4$ DQPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



$\pi/4$ DQPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

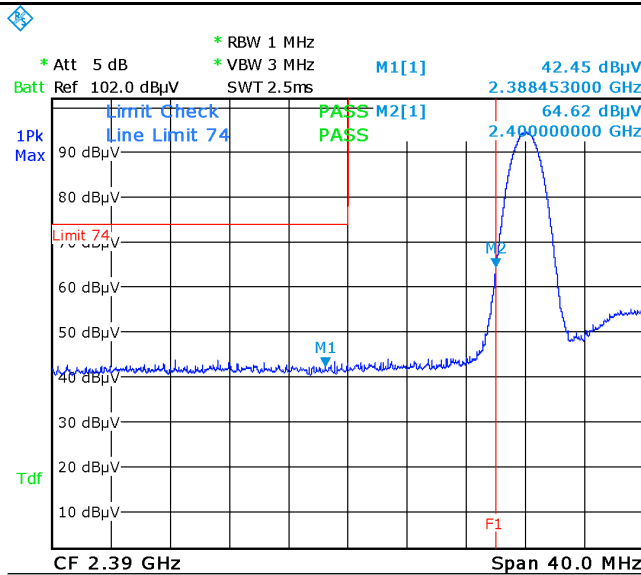


$\pi/4$ DQPSK-Hopping Left-AV

Note: (no need if PK value less than the AV limit)

$\pi/4$ DQPSK-Hopping Right-AV

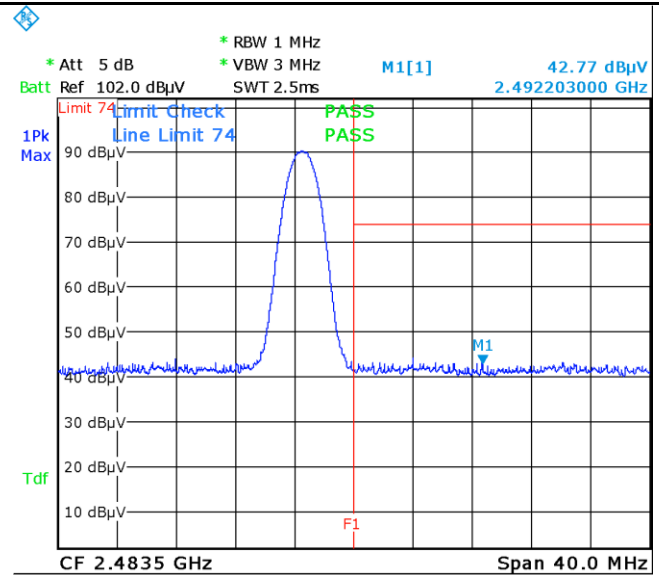
Note: Both Horizontal and vertical polarities were investigated.



Date: 9.NOV.2018 10:20:16

$\pi/4$ DQPSK-Left Side-PK

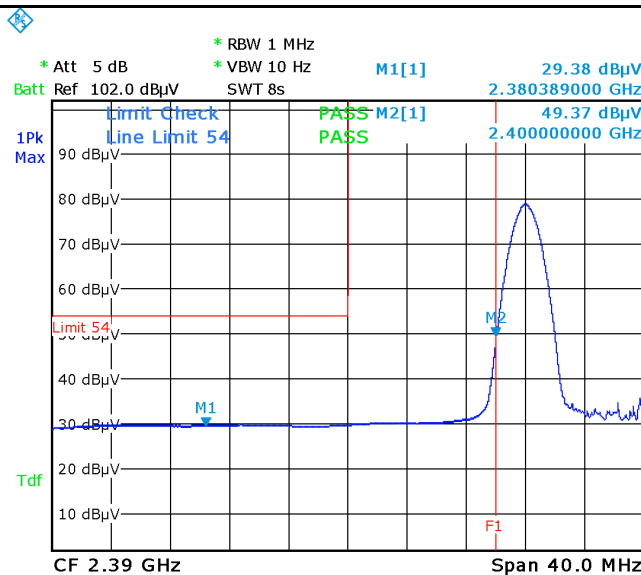
Note: F1 is frequency 2400MHz



Date: 9.NOV.2018 10:23:30

$\pi/4$ DQPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 9.NOV.2018 10:21:17

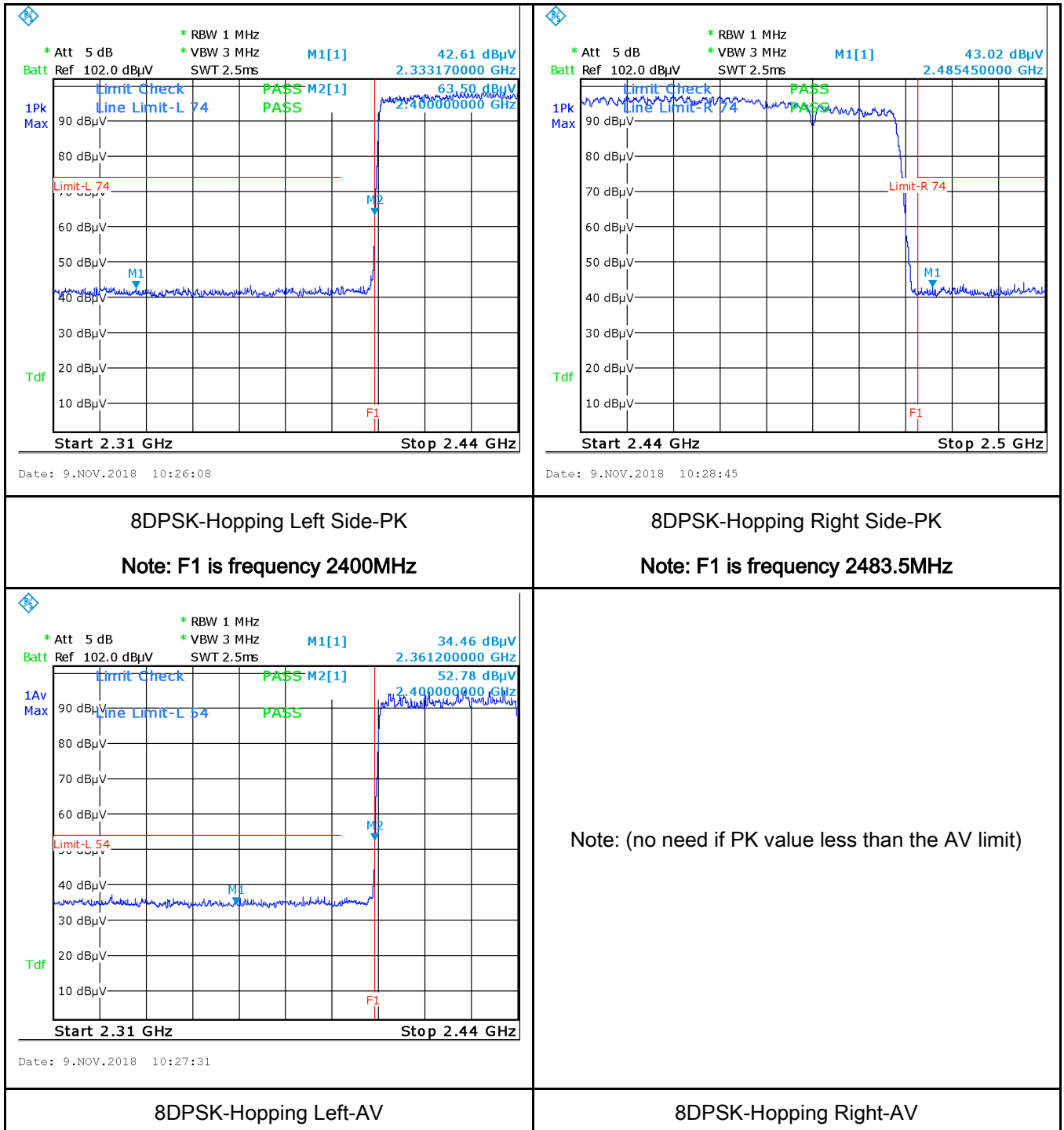
$\pi/4$ DQPSK-Left Side-AV

Note: (no need if PK value less than the AV limit)

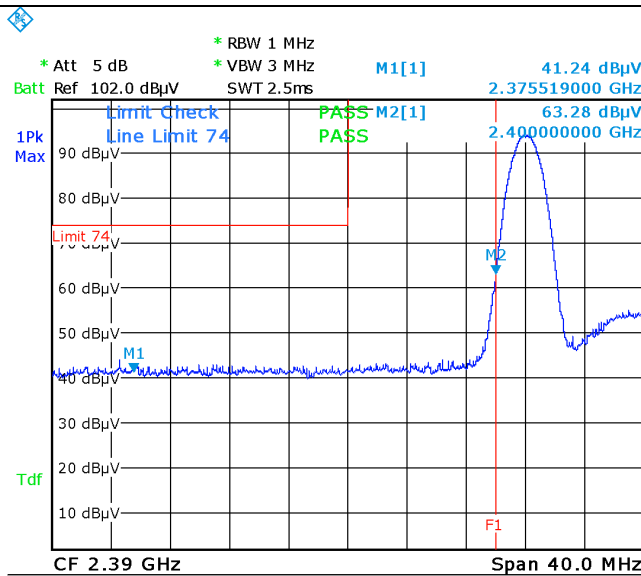
$\pi/4$ DQPSK-Right Side-AV

Note: Both Horizontal and vertical polarities were investigated.

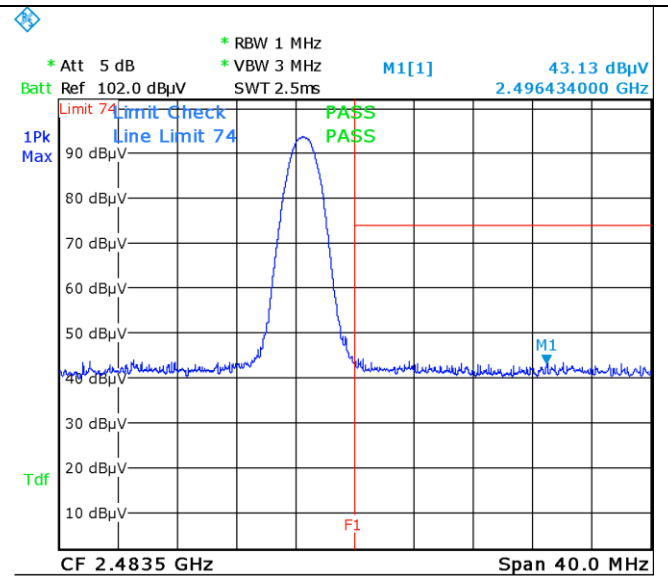
8-DPSK Mode:



Note: Both Horizontal and vertical polarities were investigated.



Date: 9.NOV.2018 10:20:32



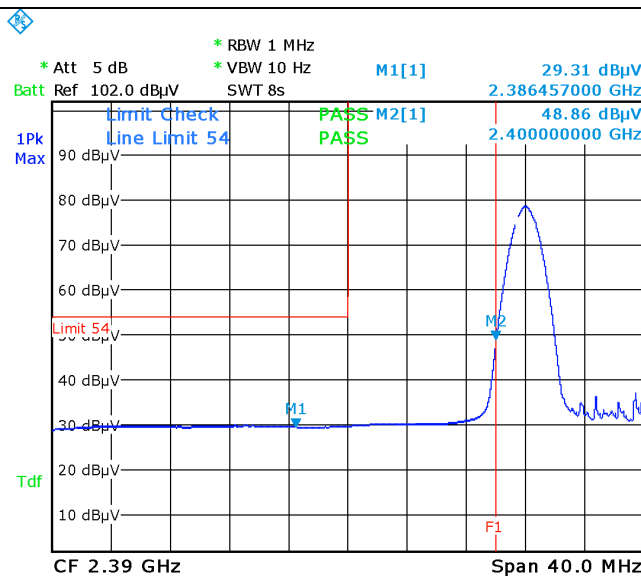
Date: 9.NOV.2018 10:23:59

8DPSK-Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 9.NOV.2018 10:21:37

Note: (no need if PK value less than the AV limit)

8DPSK-Left Side-AV

8DPSK-Right Side-AV

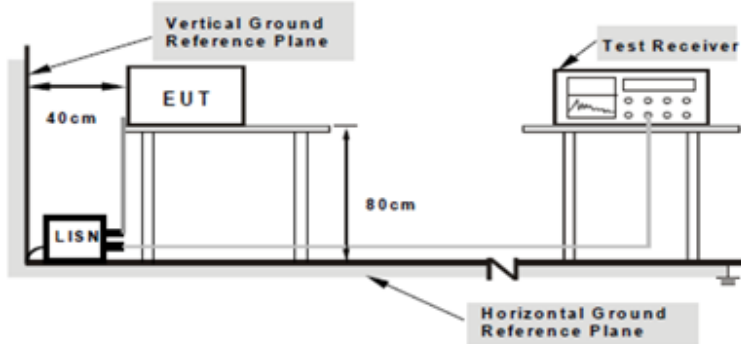
Note: Both Horizontal and vertical polarities were investigated.

6.8 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	Nov. 08, 2018
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><input checked="" type="checkbox"/></div>		
		Frequency ranges (MHz)		Limit (dBµV)	
				QP	Average
		0.15 ~ 0.5		66 – 56	56 – 46
		0.5 ~ 5		56	46
5 ~ 30	60	50			

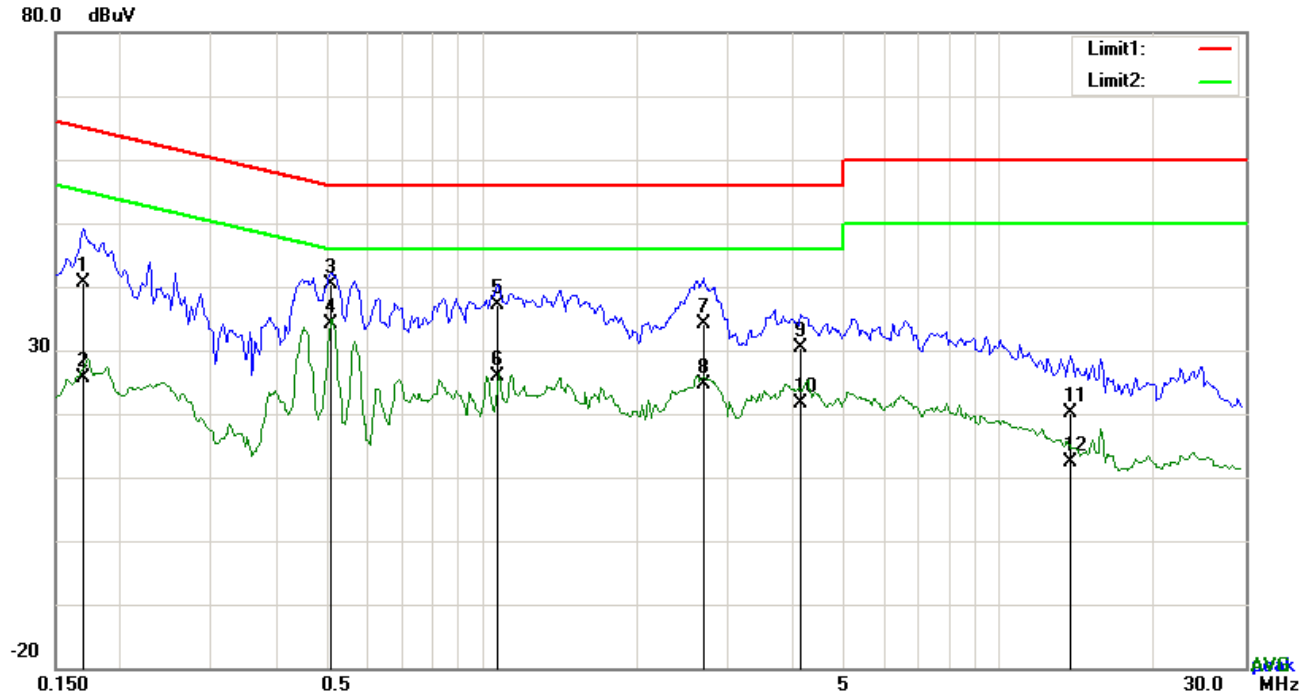
Test Setup	 <p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>
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Procedure	<ol style="list-style-type: none"> The EUT and supporting 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
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	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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

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

Test Mode: Bluetooth Mode

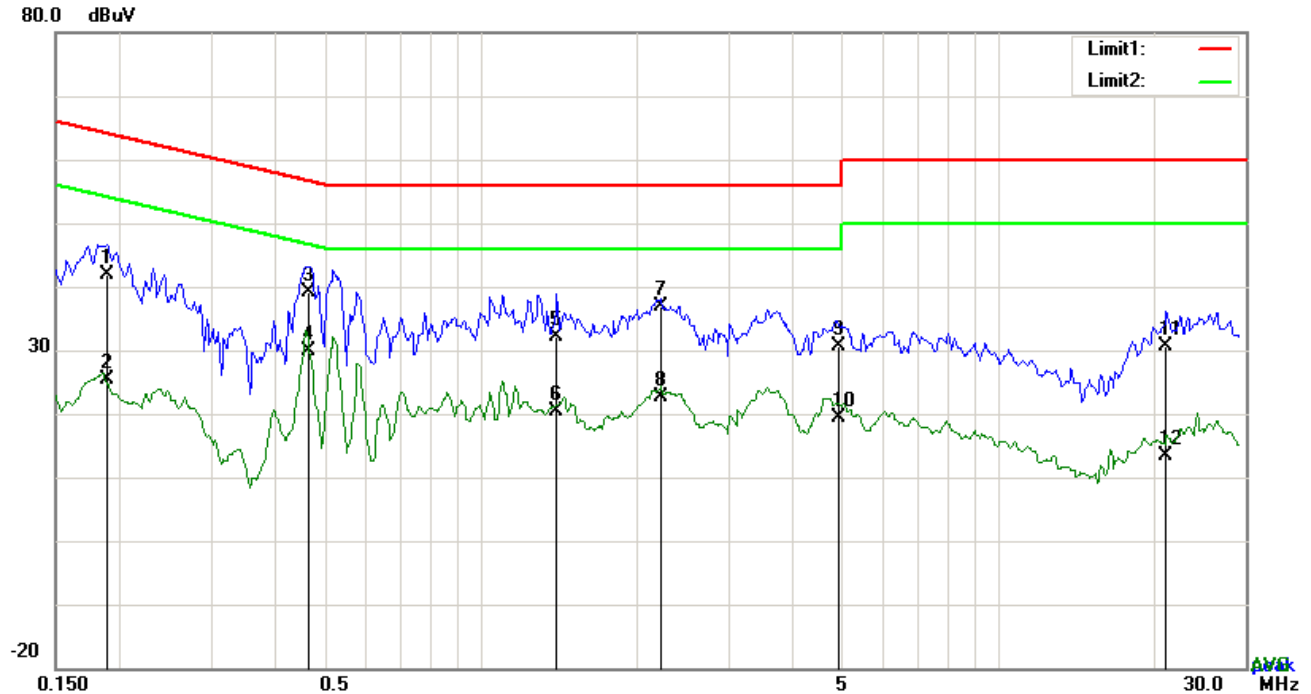


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.1695	30.69	QP	10.03	40.72	64.98	-24.26
2	L1	0.1695	15.69	AVG	10.03	25.72	54.98	-29.26
3	L1	0.5127	30.36	QP	10.03	40.39	56.00	-15.61
4	L1	0.5127	24.10	AVG	10.03	34.13	46.00	-11.87
5	L1	1.0743	27.06	QP	10.03	37.09	56.00	-18.91
6	L1	1.0743	15.78	AVG	10.03	25.81	46.00	-20.19
7	L1	2.6850	24.20	QP	10.05	34.25	56.00	-21.75
8	L1	2.6850	14.63	AVG	10.05	24.68	46.00	-21.32
9	L1	4.1466	20.35	QP	10.07	30.42	56.00	-25.58
10	L1	4.1466	11.65	AVG	10.07	21.72	46.00	-24.28
11	L1	13.8186	9.85	QP	10.21	20.06	60.00	-39.94
12	L1	13.8186	2.29	AVG	10.21	12.50	50.00	-37.50

Test Mode: Bluetooth Mode

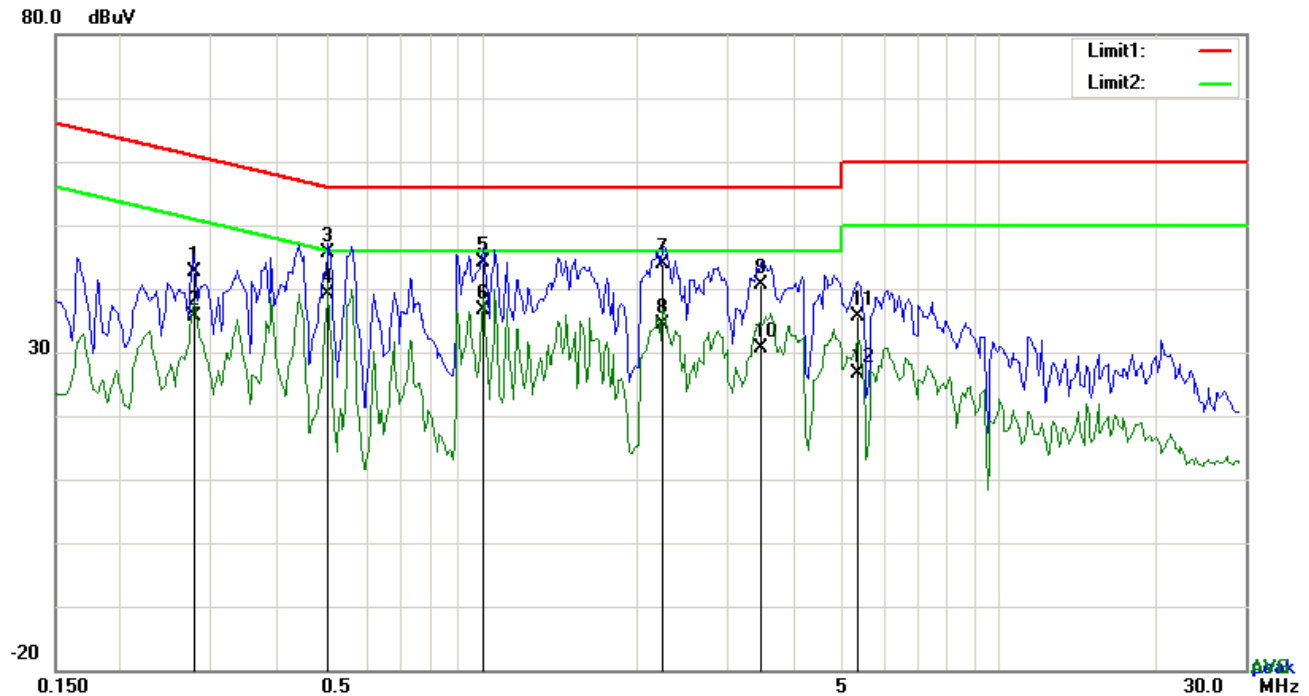


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1890	31.84	QP	10.02	41.86	64.08	-22.22
2	N	0.1890	15.43	AVG	10.02	25.45	54.08	-28.63
3	N	0.4659	28.99	QP	10.02	39.01	56.59	-17.58
4	N	0.4659	19.95	AVG	10.02	29.97	46.59	-16.62
5	N	1.3980	22.22	QP	10.03	32.25	56.00	-23.75
6	N	1.3980	10.31	AVG	10.03	20.34	46.00	-25.66
7	N	2.2326	26.93	QP	10.04	36.97	56.00	-19.03
8	N	2.2326	12.47	AVG	10.04	22.51	46.00	-23.49
9	N	4.8997	20.66	QP	10.07	30.73	56.00	-25.27
10	N	4.8997	9.40	AVG	10.07	19.47	46.00	-26.53
11	N	21.1116	20.46	QP	10.28	30.74	60.00	-29.26
12	N	21.1116	3.14	AVG	10.28	13.42	50.00	-36.58

Test Mode: Bluetooth Mode

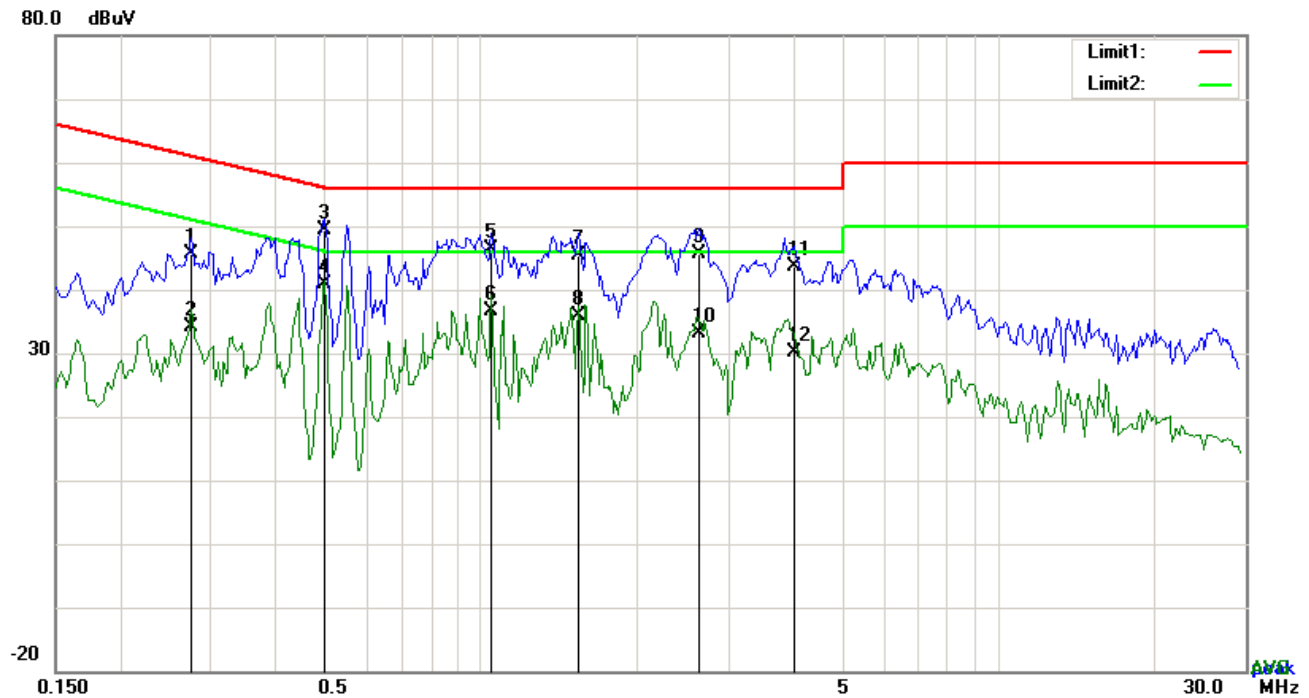


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2787	32.68	QP	10.03	42.71	60.85	-18.14
2	L1	0.2787	25.49	AVG	10.03	35.52	50.85	-15.33
3	L1	0.5049	35.60	QP	10.03	45.63	56.00	-10.37
4	L1	0.5049	29.00	AVG	10.03	39.03	46.00	-6.97
5	L1	1.0080	34.01	QP	10.03	44.04	56.00	-11.96
6	L1	1.0080	26.68	AVG	10.03	36.71	46.00	-9.29
7	L1	2.2404	33.82	QP	10.05	43.87	56.00	-12.13
8	L1	2.2404	24.29	AVG	10.05	34.34	46.00	-11.66
9	L1	3.4836	30.55	QP	10.06	40.61	56.00	-15.39
10	L1	3.4836	20.64	AVG	10.06	30.70	46.00	-15.30
11	L1	5.3439	25.48	QP	10.08	35.56	60.00	-24.44
12	L1	5.3439	16.47	AVG	10.08	26.55	50.00	-23.45

Test Mode: Bluetooth Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

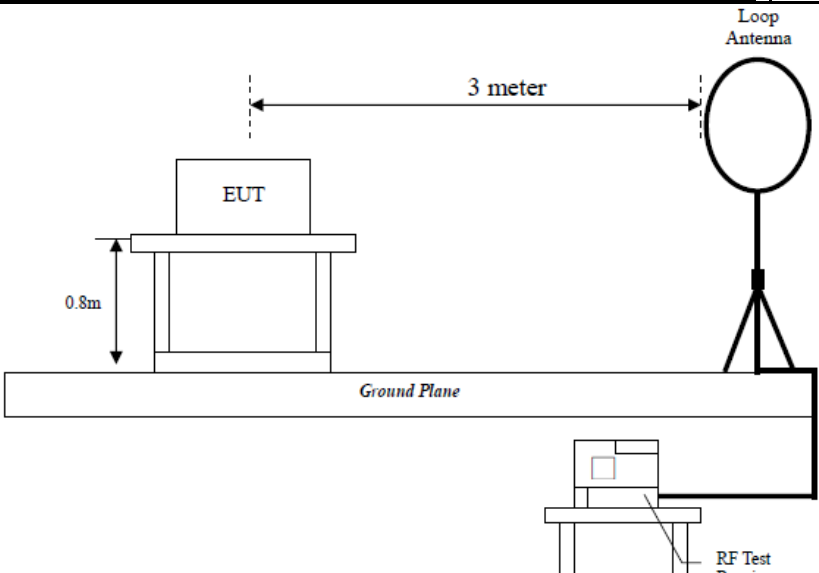
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2748	35.63	QP	10.02	45.65	60.97	-15.32
2	N	0.2748	24.17	AVG	10.02	34.19	50.97	-16.78
3	N	0.4971	39.29	QP	10.02	49.31	56.05	-6.74
4	N	0.4971	30.82	AVG	10.02	40.84	46.05	-5.21
5	N	1.0431	36.39	QP	10.03	46.42	56.00	-9.58
6	N	1.0431	26.63	AVG	10.03	36.66	46.00	-9.34
7	N	1.5384	35.37	QP	10.04	45.41	56.00	-10.59
8	N	1.5384	25.91	AVG	10.04	35.95	46.00	-10.05
9	N	2.6343	35.57	QP	10.05	45.62	56.00	-10.38
10	N	2.6343	23.09	AVG	10.05	33.14	46.00	-12.86
11	N	4.0179	33.57	QP	10.06	43.63	56.00	-12.37
12	N	4.0179	19.95	AVG	10.06	30.01	46.00	-15.99

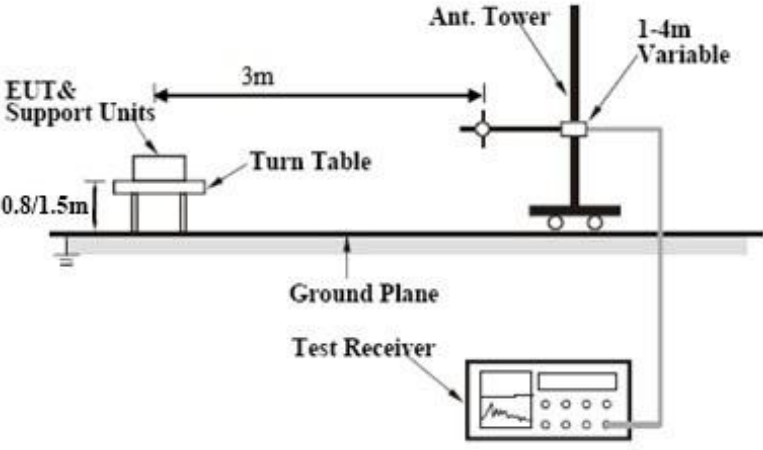
6.9 Radiated Emissions & Restricted Band

Temperature	22oC
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	Nov. 21, 2018
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	<div><input checked="" type="checkbox"/></div>																
		<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>
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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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Result:

Test Mode:	Transmitting Mode
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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:

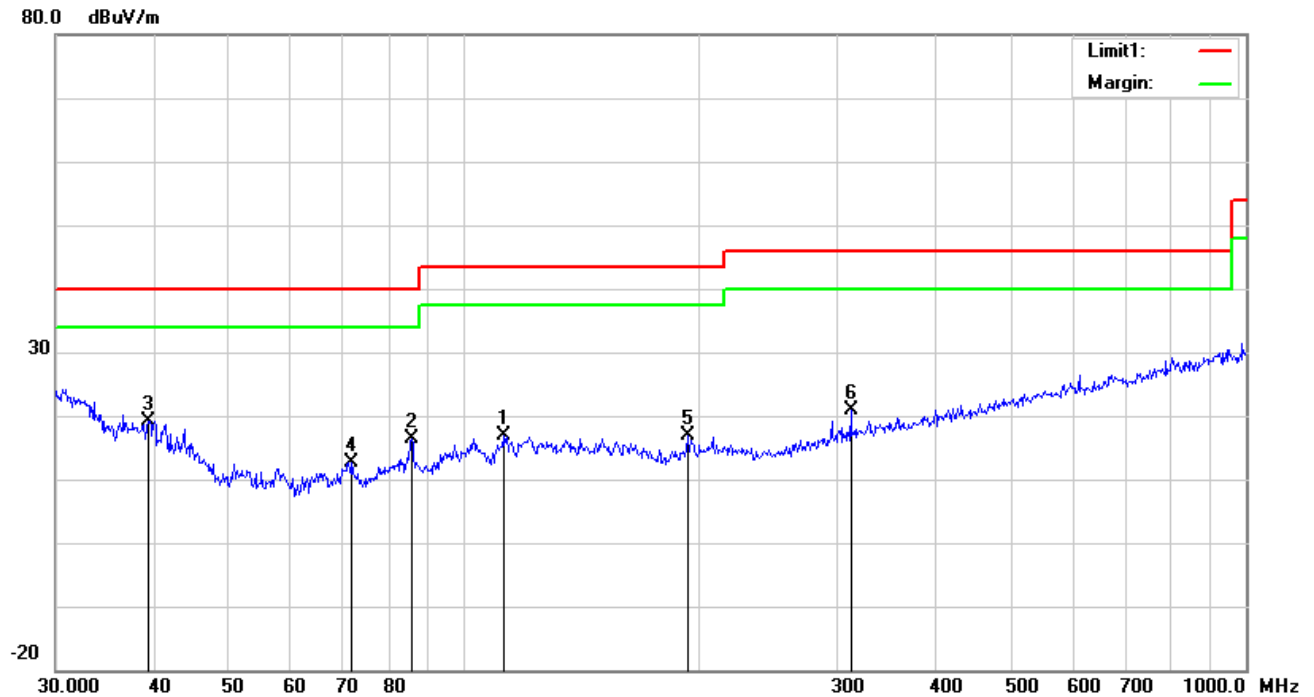
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

Test Mode: Bluetooth Mode

30MHz -1GHz



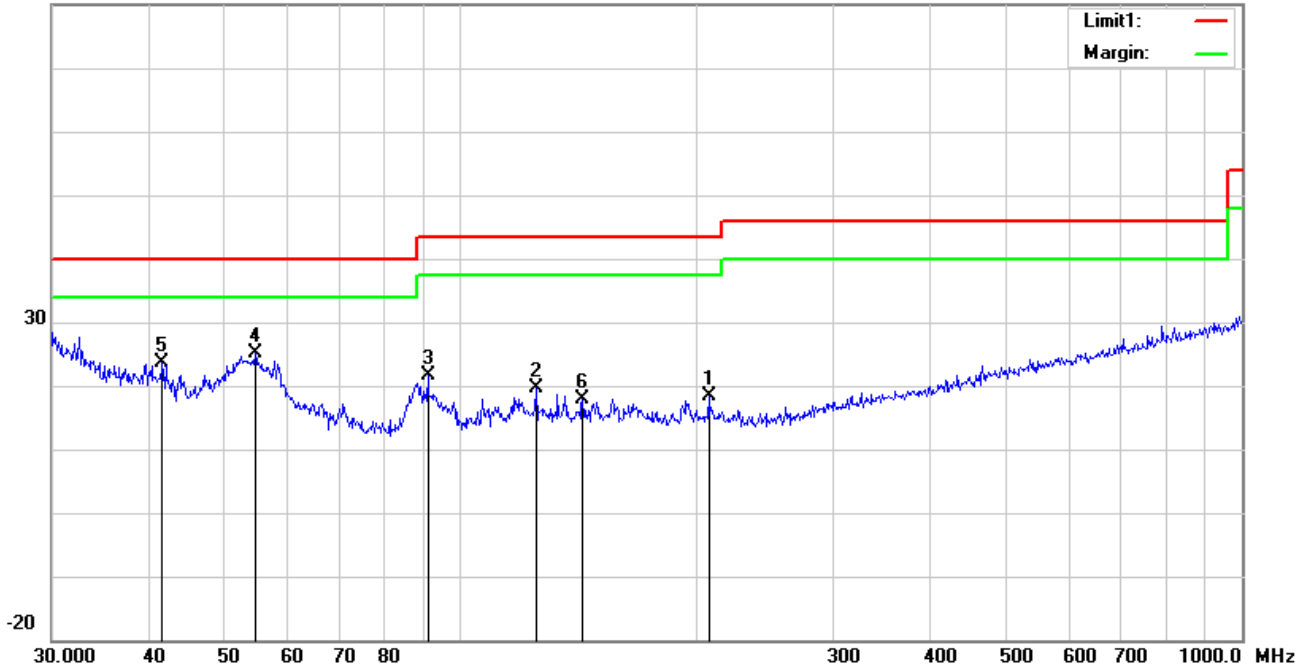
Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	()
1	H	112.1305	25.45	12.52	22.34	1.17	16.80	43.50	-26.70	100	221
2	H	85.5977	29.86	7.82	22.36	1.06	16.38	40.00	-23.62	100	95
3	H	39.4372	26.41	14.31	22.28	0.79	19.23	40.00	-20.77	100	279
4	H	71.8320	26.26	7.76	22.39	0.97	12.60	40.00	-27.40	100	112
5	H	193.0945	26.02	11.72	22.34	1.54	16.94	43.50	-26.56	100	245
6	H	312.1794	27.50	13.86	22.26	1.85	20.95	46.00	-25.05	100	109

30MHz -1GHz

80.0 dBuV/m



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	V	207.8501	27.26	11.99	22.37	1.57	18.45	43.50	-25.05	100	46
2	V	125.0066	27.14	13.57	22.37	1.18	19.52	43.50	-23.98	100	79
3	V	90.8554	34.78	8.21	22.32	0.96	21.63	43.50	-21.87	100	131
4	V	54.6429	38.75	7.89	22.39	0.78	25.03	40.00	-14.97	100	110
5	V	41.5670	32.31	12.87	22.28	0.78	23.68	40.00	-16.32	100	309
6	V	143.3261	26.30	12.60	22.39	1.29	17.80	43.50	-25.70	100	77

Above 1GHz

Test Mode:	Transmitting Mode
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Low Channel: π /4DQPSK Mode (Worst Case) (2402 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4804	45.6	AV	V	33.39	7.22	48.46	37.75	54	-16.25
4804	42.46	AV	H	33.39	7.22	48.46	34.61	54	-19.39
4804	69.88	PK	V	33.39	7.22	48.46	62.03	74	-11.97
4804	64.82	PK	H	33.39	7.22	48.46	56.97	74	-17.03
12421	29.27	AV	V	39.86	13.45	45.7	36.88	54	-17.12
12421	26.57	AV	H	39.86	13.45	45.7	34.18	54	-19.82
12421	45.42	PK	V	39.86	13.45	45.7	53.03	74	-20.97
12421	47.05	PK	H	39.86	13.45	45.7	54.66	74	-19.34

Middle Channel:GFSK Mode (Worst Case) (2441 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4882	49.57	AV	V	33.62	7.53	48.36	42.36	54	-11.64
4882	42.63	AV	H	33.62	7.53	48.36	35.42	54	-18.58
4882	70.01	PK	V	33.62	7.53	48.36	62.8	74	-11.2
4882	63.12	PK	H	33.62	7.53	48.36	55.91	74	-18.09
11081	29.31	AV	V	40.17	13.46	46.78	36.16	54	-17.84
11081	22.24	AV	H	40.17	13.46	46.78	29.09	54	-24.91
11081	38.46	PK	V	40.17	13.46	46.78	45.31	74	-28.69
11081	48.42	PK	H	40.17	13.46	46.78	55.27	74	-18.73

High Channel: GFSK Mode (Worst Case) (2480 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	46.23	AV	V	33.89	7.86	48.31	39.67	54	-14.33
4960	42.65	AV	H	33.89	7.86	48.31	36.09	54	-17.91
4960	68.6	PK	V	33.89	7.86	48.31	62.04	74	-11.96
4960	67.23	PK	H	33.89	7.86	48.31	60.67	74	-13.33
17806	6.51	AV	V	43.4	18.97	44.72	24.16	54	-29.84
17806	8.28	AV	H	43.4	18.97	44.72	25.93	54	-28.07
17806	33.85	PK	V	43.4	18.97	44.72	51.5	74	-22.5
17806	30.95	PK	H	43.4	18.97	44.72	48.6	74	-25.4

Note:

- 1, The testing has been conformed to $10 \times 2480 \text{ MHz} = 24,800 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 4, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

Annex A. TEST INSTRUMENT

The product was tested in accordance with the following specifications.

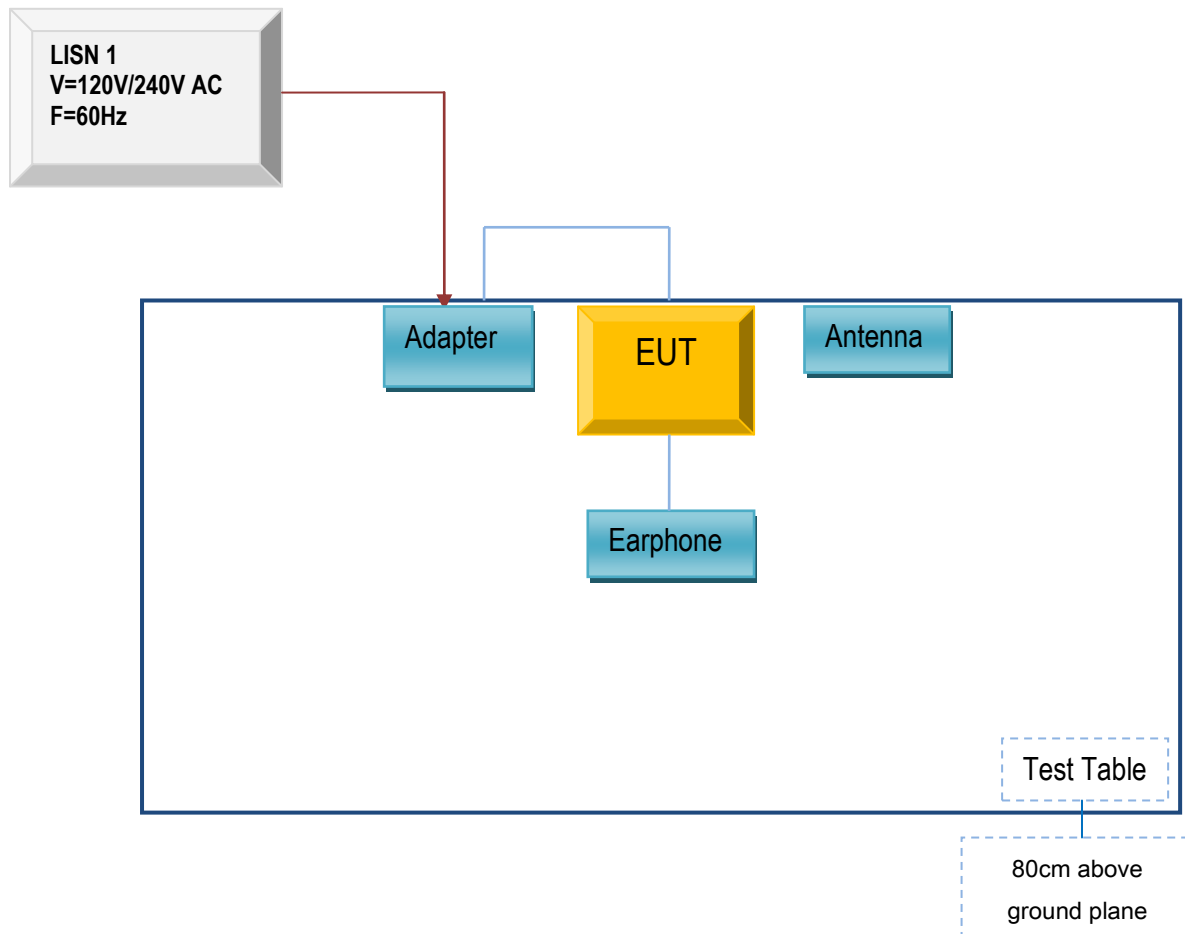
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Please refer to 17021127-FCC-R1
§15.247(a)(1)	Channel Separation	Please refer to 17021127-FCC-R1
§15.247(a)(1)	20 dB Bandwidth	Please refer to 17021127-FCC-R1
§15.247(b)(1)	Peak Output Power	Please refer to 17021127-FCC-R1
§15.247(a)(1)(iii)	Number of Hopping Channel	Please refer to 17021127-FCC-R1
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Please refer to 17021127-FCC-R1
§15.247(d)	Band Edge& Restricted Band	Please refer to 17021127-FCC-R1
§15.207(a)	AC Line Conducted Emissions	Please refer to 17021127-FCC-R1
§15.205, §15.209, §15.247(d)	Radiated Emissions& Restricted Band	Please refer to 17021127-FCC-R1

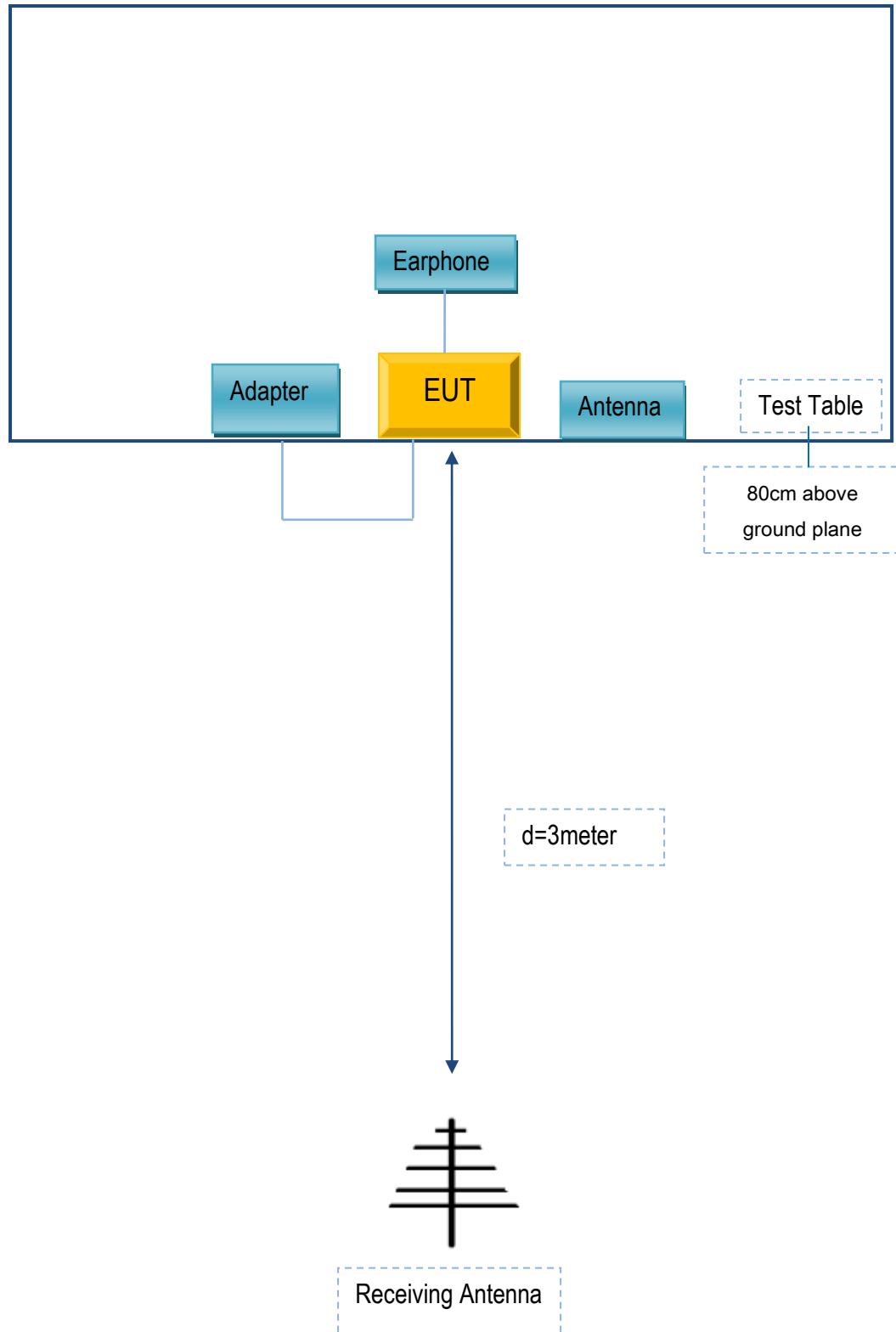
Annex B. TEST SETUP AND SUPPORTING EQUIPMENT

Annex B.i. TEST SET UP BLOCK

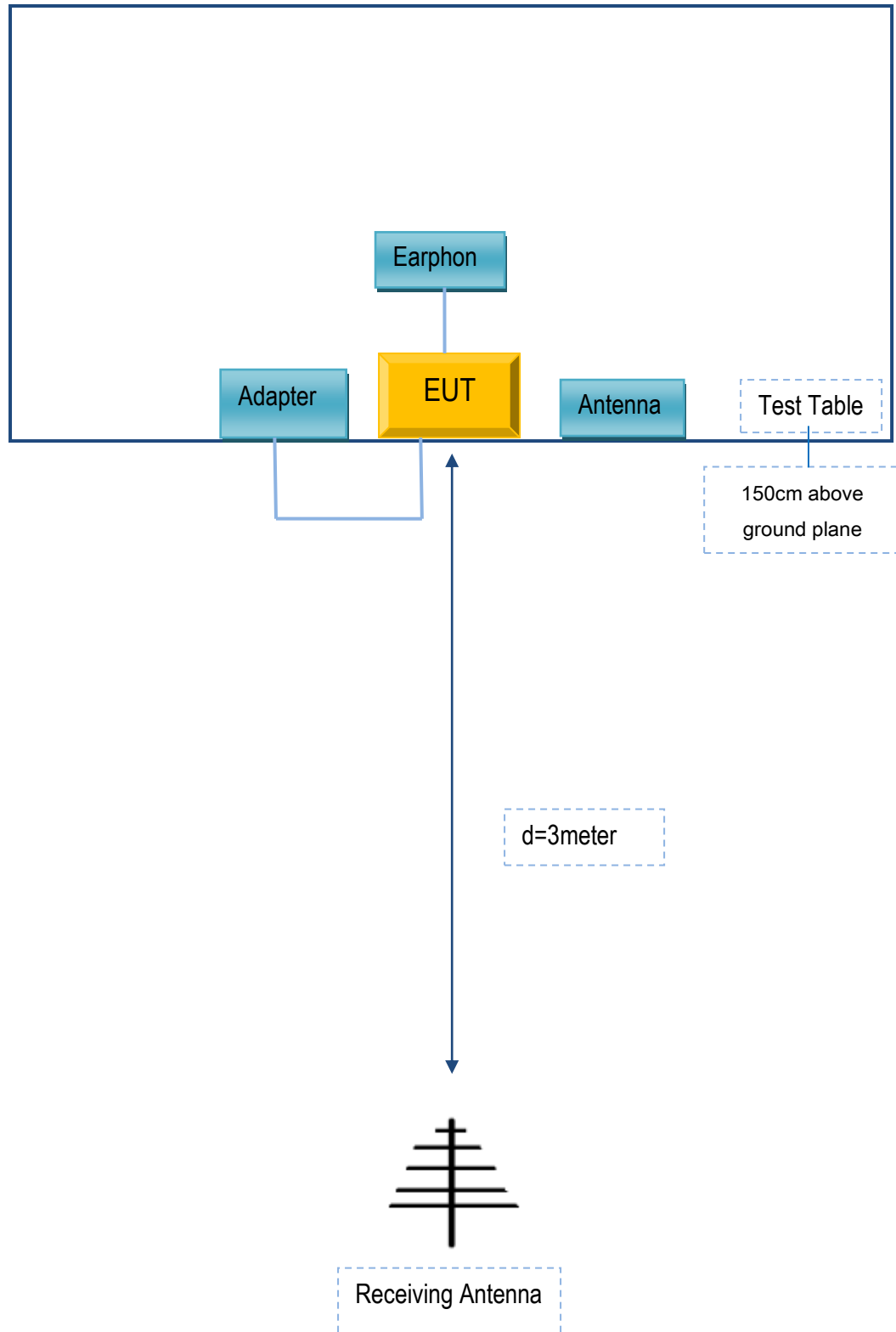
Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions (Below 1GHz) .



Block Configuration Diagram for Radiated Emissions (Above 1GHz) .



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Dongguan Aohai Power Technology Co.,Ltd.	Adapter	A8-501000	N/A
Dong guan Tenji Technology Industrial Co., Ltd.	Earphone	TJ101891E	N/A
Agilent	Wireless Connectivity Test Set	N4010A	N/A
OEM	omnidirectional antenna	AntSuck	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	1m	N/A

Annex C. User Manual / Block Diagram / Schematics / Partlist/ DECLARATION OF SIMILARITY

TP-LINK TECHNOLOGIES CO., LTD.

Building 24 (floors 1,3,4,5) and 28 (floors1-4)
Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

Product Change Description

We, TP-LINK TECHNOLOGIES CO., LTD. ,declare on our sole responsibility that the product,

[TP7031CXYZZ]

is the variant of the initial certified product,

[TP7031C]

Except the following changes on the latest MODEL: [TP7031CXYZZ]

Series Name TP7031CXYZZ

Model Difference

Description of Model Name Differentiation:

X=2, indicates Grey; X=4, indicates Gold; X=7, indicates Blue;

X=8, indicates Red;

Y=0, indicates the memory is 512MB RAM + 8GB Flash; Y=1, indicates

the memory is 1GB RAM + 8GB Flash; Y=2, indicates the memory is

1GB RAM + 16GB Flash;

Z='A' to 'Z', ZZ indicates different regions or customers.

All models are same with electrical parameters and internal circuit structure.

HARDWARE MODIFICATION:

Power Amplifier changes: NO

Antenna changes: NO

PCB Layout changes: NO

LCD changes: NO

Speaker changes: NO

Camera changes: NO

Vibrator changes: NO Bluetooth

changes: NO

FM changes: NO

Other changes: NO

MECHANICAL MODIFICATIONS:

Use new metal front/back cover or keypad: NO

Mechanical shell changes: NO

Other changes detailed: NO

Signature:



Name: Huang Jing

Designation: Regulatory Compliance Manager

Date: 2018-11-29