
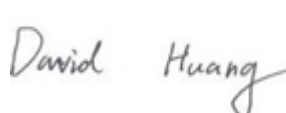



RF TEST REPORT



Report No.: Q181101S008-FCC-R2

Supersede Report No.: N/A

Applicant	Cedar Kingdom Corporation Limited	
Product Name	Mobile Phone	
Model No.	V501C	
Serial No.	N/A	
Test Standard	FCC Part 15.247, ANSI C63.10: 2013	
Test Date	November 06 to 25, 2018	
Issue Date	December 03, 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	
<p>This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only</p>		

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
Q181101S008-FCC-R2	NONE	Original	December 03, 2018

2. Customer information

Applicant Name	Cedar Kingdom Corporation Limited
Applicant Add	11/F, AXA Centre 151 Gloucester Road, Wanchai, Hong Kong
Manufacturer	Cedar Kingdom Corporation Limited
Manufacturer Add	11/F, AXA Centre 151 Gloucester Road, Wanchai, Hong Kong

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	Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch Laboratories
Lab Address	No. 34, Chenwulu Section, Guantai Rd., Houjie Town, Dongguan City, Guangdong 523942, China
FCC Test Site No.	749762
IC Test Site No.	5936A-1
Test Software	ADT_Radiated_V7.6.15.9.2

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

4. Equipment under Test (EUT) Information

Description of EUT:	Mobile Phone
Main Model:	V501C
Serial Model:	N/A
Date EUT received:	November 11, 2018
Test Date(s):	November 06 to 25, 2018
Equipment Category :	DSS
Antenna Gain:	GSM850: -1.12dBi PCS1900: -1.45dBi UMTS-FDD Band V: -1.12dBi UMTS-FDD Band II: -1.45dBi WIFI: -2.03dBi Bluetooth/BLE: -2.06dBi GPS: -1.56dBi
Antenna Type:	PIFA antenna
Type of Modulation:	GSM / GPRS: GMSK EGPRS: GMSK UMTS-FDD: QPSK 802.11b/g/n: DSSS, OFDM Bluetooth: GFSK, π /4DQPSK, 8DPSK BLE: GFSK GPS: BPSK

GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz
 PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz
 UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz
 UMTS-FDD Band II TX: 1852.4 ~ 1907.6 MHz;
 RF Operating Frequency (ies): RX: 1932.4 ~ 1987.6 MHz
 WIFI: 802.11b/g/n(20M): 2412-2462 MHz
 WIFI: 802.11n(40M): 2422-2452 MHz
 Bluetooth& BLE: 2402-2480 MHz
 GPS: 1575.42 MHz

Max. Output Power: 2.421dBm

Number of Channels:

 GSM 850: 124CH

 PCS1900: 299CH

 UMTS-FDD Band V: 102CH

 UMTS-FDD Band II: 277CH

 WIFI :802.11b/g/n(20M): 11CH

 WIFI :802.11n(40M): 7CH

 Bluetooth: 79CH

 BLE: 40CH

 GPS:1CH

Port: Please refer to the user' s manual

Input Power:

 Adapter :

 Model: V-501C

 Input: AC100-240V~50/60Hz,150mA

 Output: DC 5.0V, 1A

 Battery :

 Model: V-501C

 Spec: 3.8V, 2200mAh/8.36Wh

 Limited charge voltage: 4.35

Trade Name : VIRZO

FCC ID: 2AKQUVZCKV501C

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 -2.06dBi for Bluetooth/BLE, the gain is -2.03dBi for WIFI, the gain is -1.56dBi for GPS.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is -1.12dBi for GSM850, -1.45dBi for PCS1900, -1.12dBi for UMTS-FDD Band V, -1.45dBi for UMTS-FDD Band II.

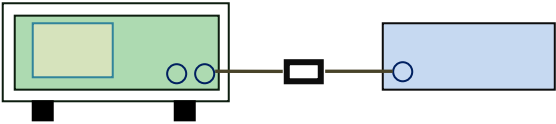
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	November 24, 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	<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. 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

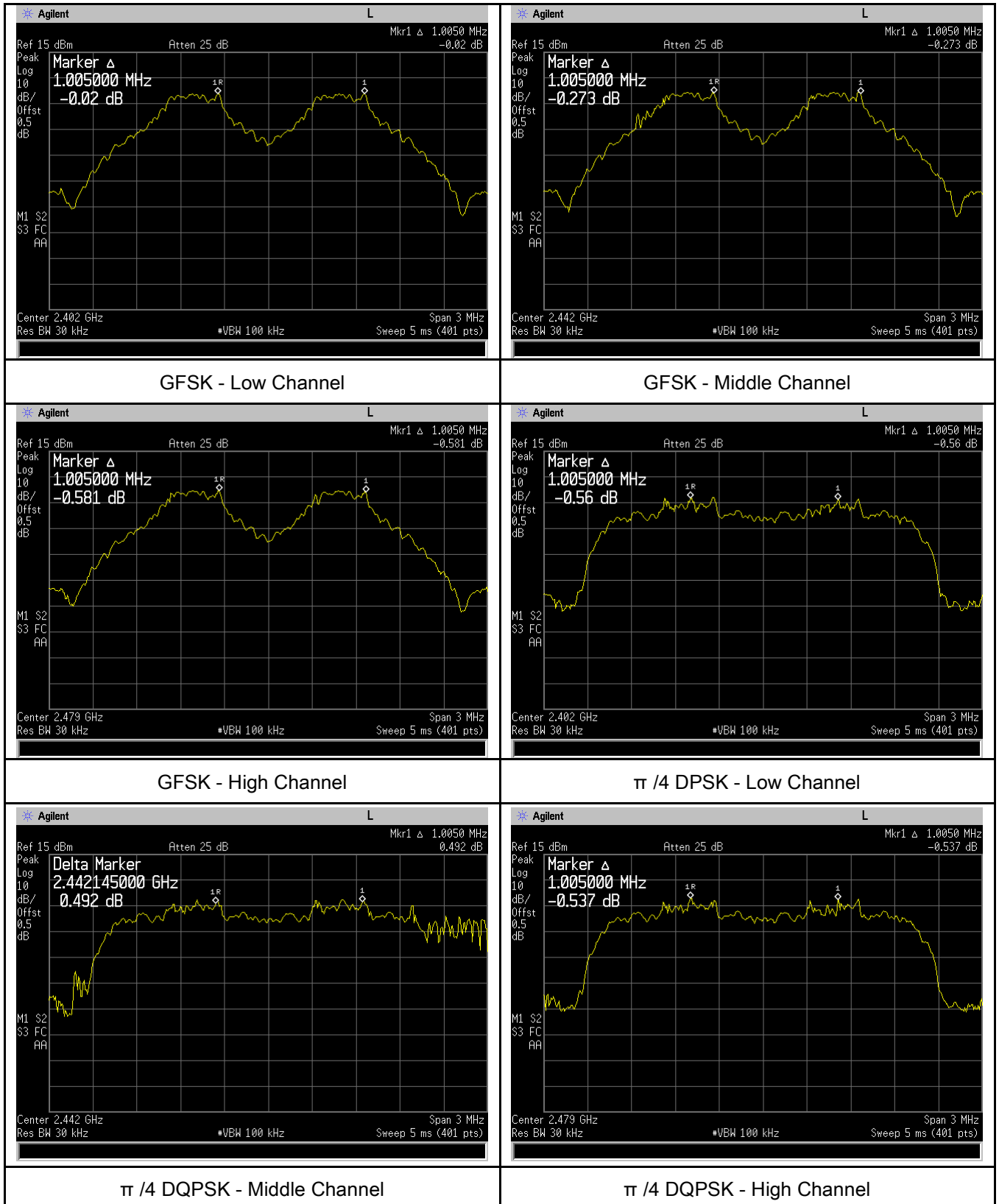
Test Plot Yes (See below) N/A

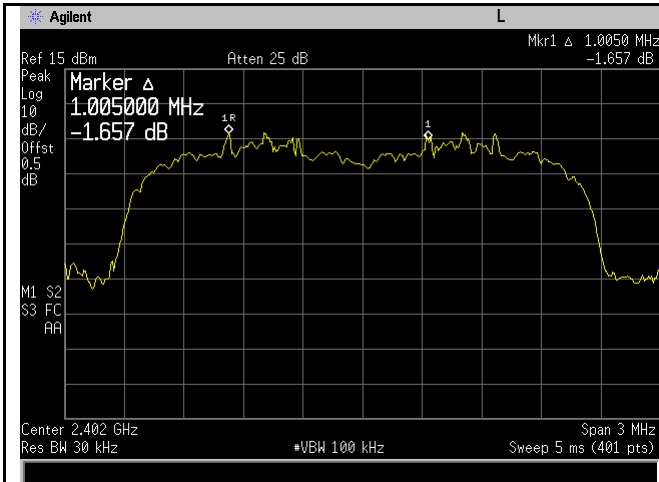
Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.686	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.685	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.679	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.865	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.877	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.855	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.875	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.867	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.849	Pass
	Adjacency Channel	2479			

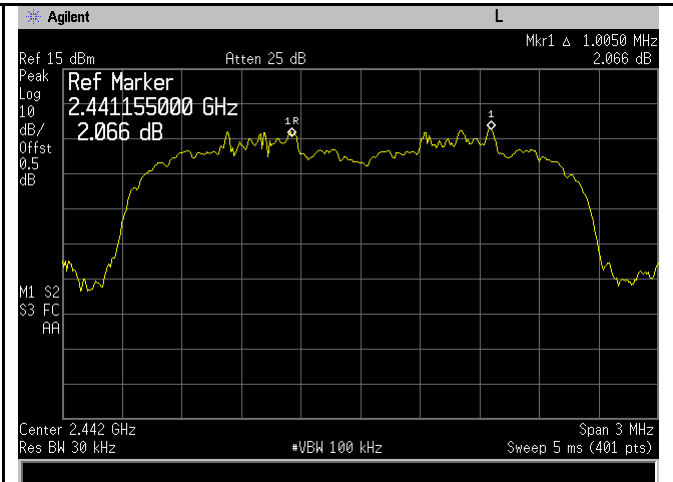
Test Plots

Channel Separation measurement result

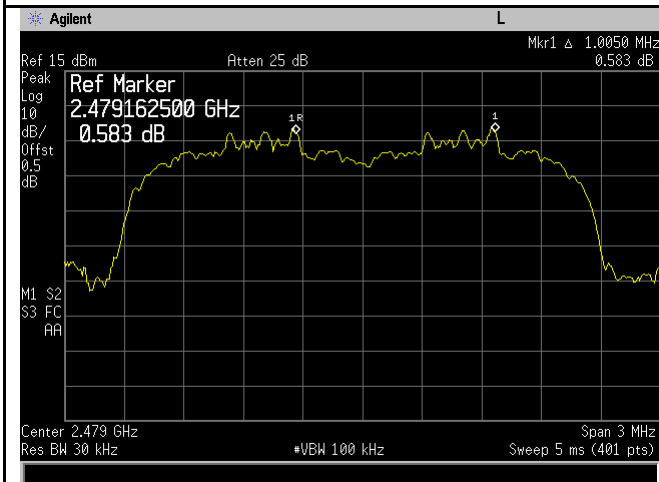




8DPSK - Low Channel



8DPSK - Middle Channel



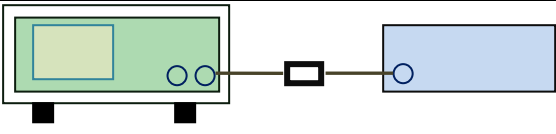
8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	November 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.	<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. 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

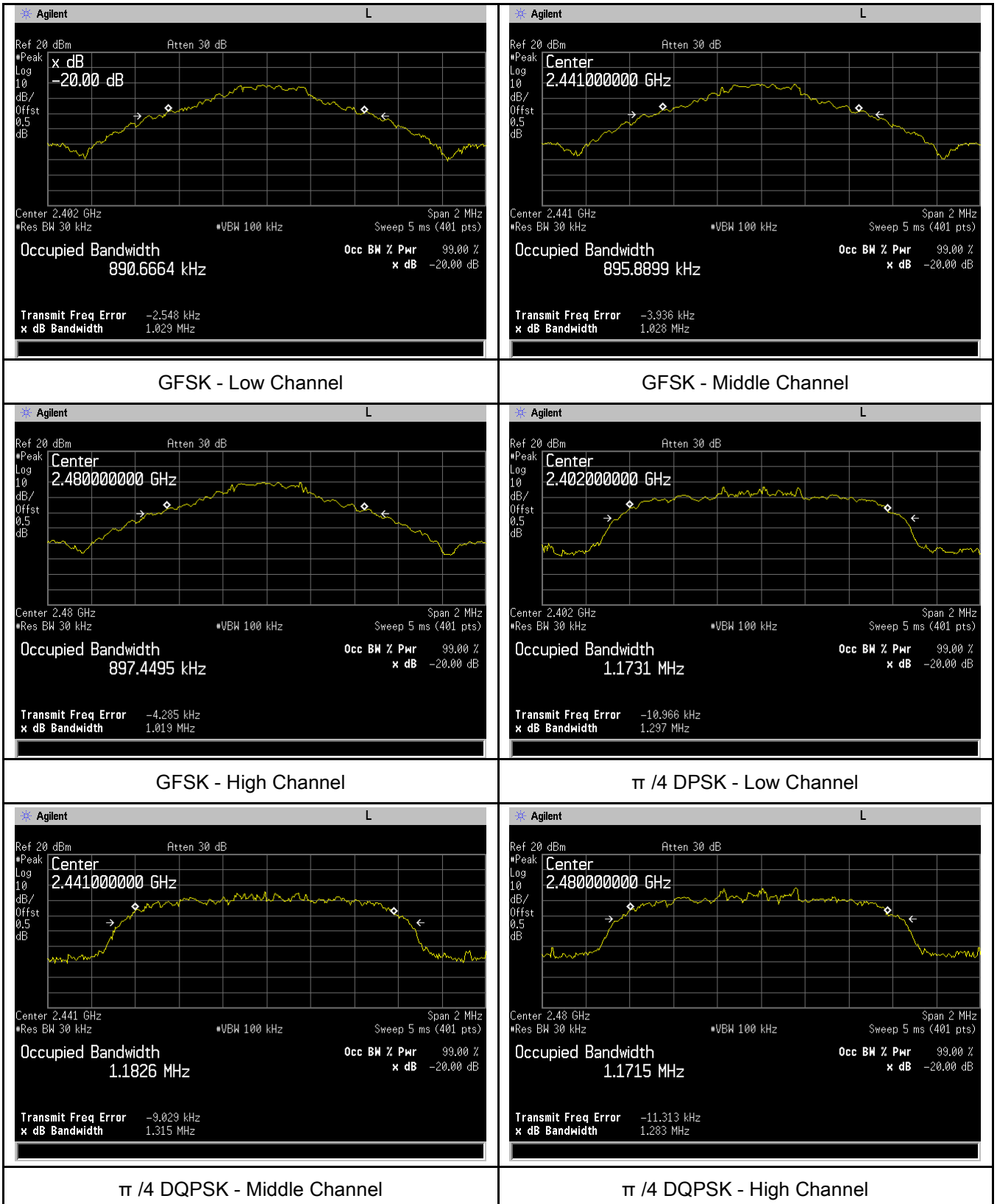
Test Plot Yes (See below) N/A

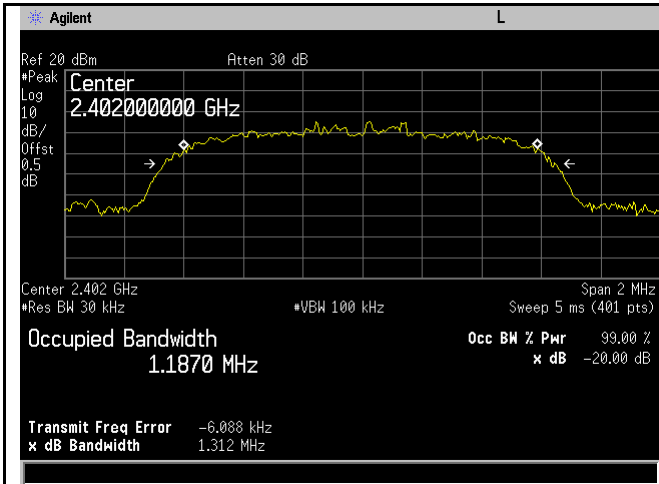
Measurement result

Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.029	0.891
	Mid	2441	1.028	0.896
	High	2480	1.019	0.897
π /4 DQPSK	Low	2402	1.297	1.1731
	Mid	2441	1.315	1.1826
	High	2480	1.283	1.1715
8-DPSK	Low	2402	1.312	1.1870
	Mid	2441	1.300	1.1865
	High	2480	1.274	1.1785

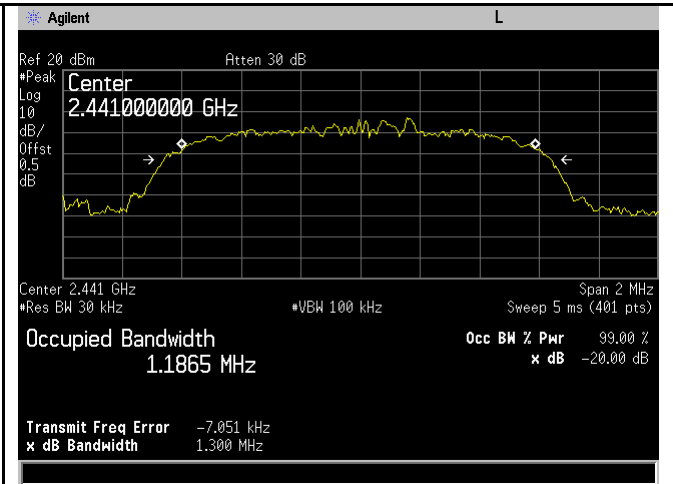
Test Plots

20dB Bandwidth measurement result

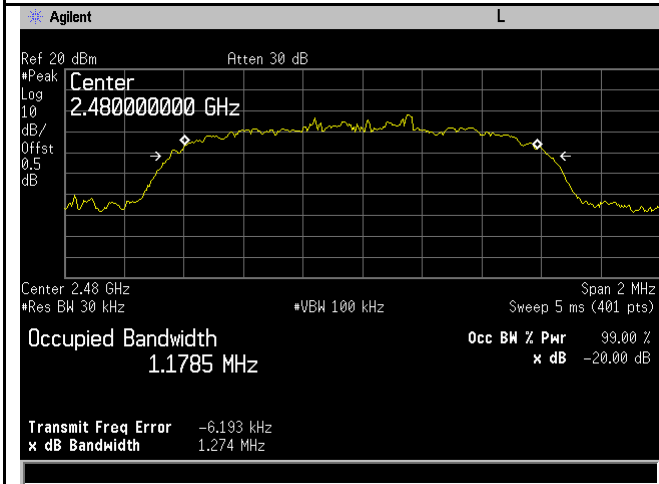




8DPSK - Low Channel



8DPSK - Middle Channel



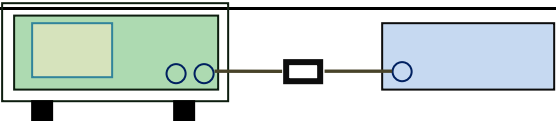
8DPSK - High Channel

6.4 Peak Output Power

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	November 24, 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.
----------------	--

	<ul style="list-style-type: none"> - 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.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

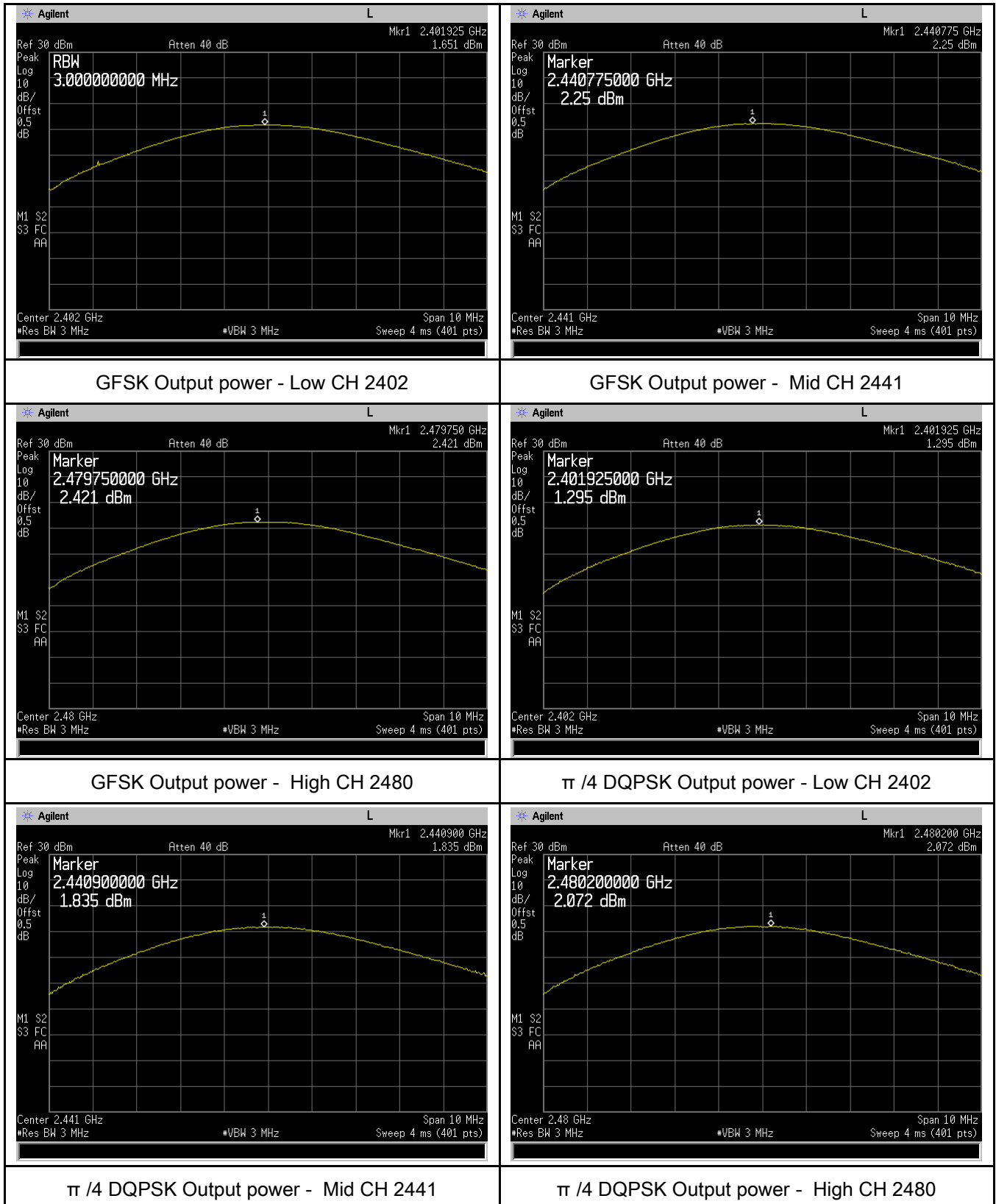
Test Plot Yes (See below) N/A

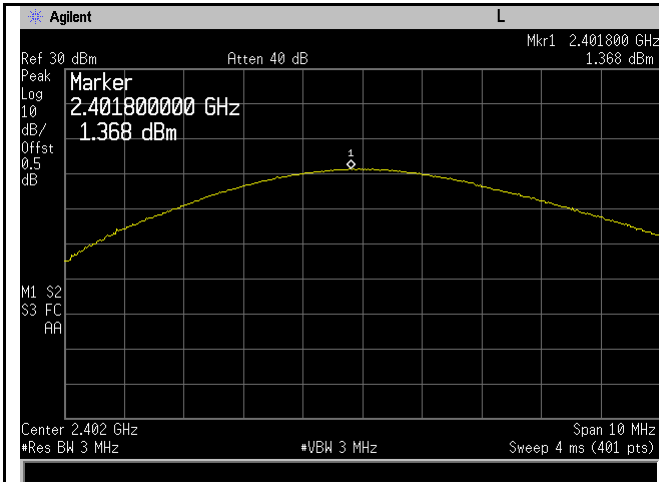
Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	1.651	125	Pass
		Mid	2441	2.250	125	Pass
		High	2480	2.421	125	Pass
	$\pi/4$ DQPSK	Low	2402	1.295	125	Pass
		Mid	2441	1.835	125	Pass
		High	2480	2.072	125	Pass
	8-DPSK	Low	2402	1.368	125	Pass
		Mid	2441	1.934	125	Pass
		High	2480	2.187	125	Pass

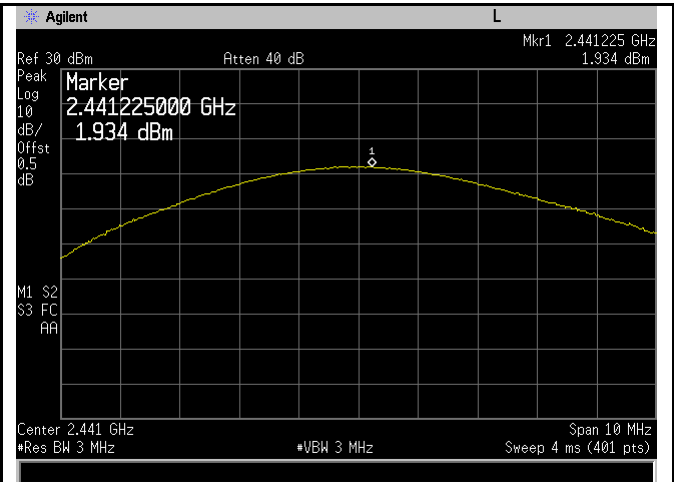
Test Plots

Output Power measurement result

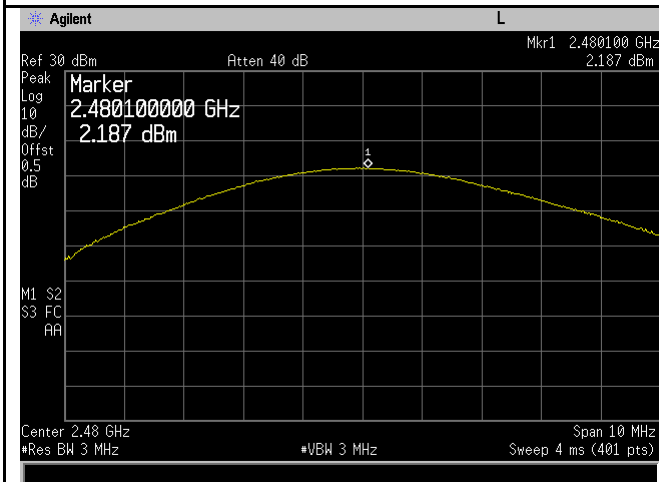




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

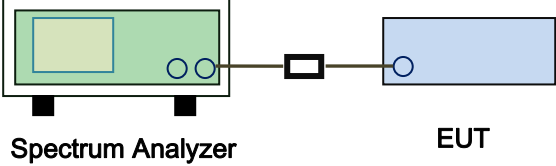


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	November 24, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz ≥ 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 ≥ 1% of the span - VBW ≥ 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	2400-2483.5	79	15
	$\pi/4$ DQPSK	2400-2483.5	79	15
	8-DPSK	2400-2483.5	79	15

Test Plots

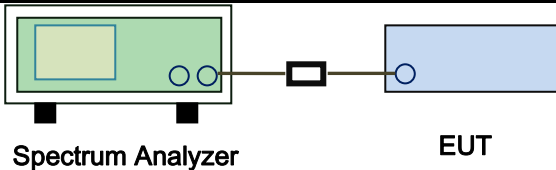
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	November 24, 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		

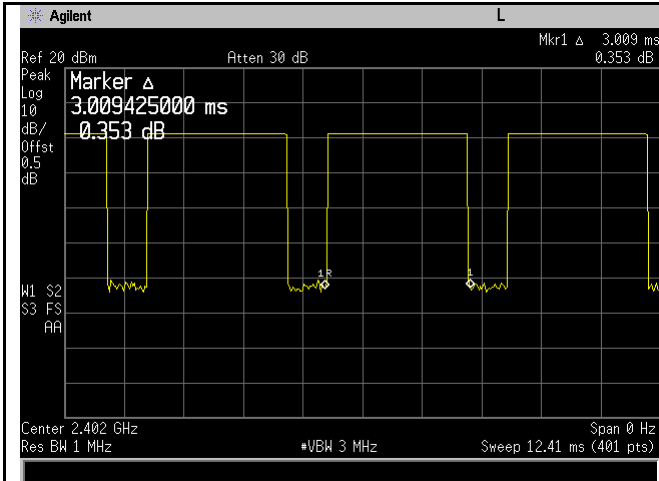
Test Data Yes N/A
 Test Plot Yes (See below) N/A

Dwell Time measurement result

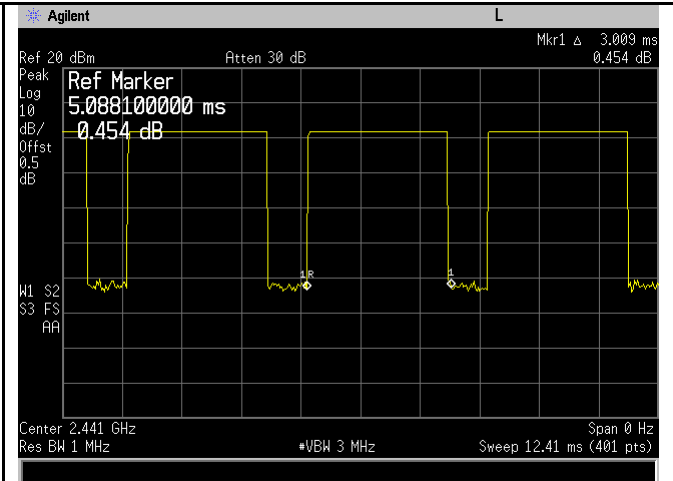
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	3.009	320.960	400	Pass
		Mid	3.009	320.960	400	Pass
		High	2.978	317.653	400	Pass
	π /4 DQPSK	Low	2.978	317.653	400	Pass
		Mid	3.009	320.960	400	Pass
		High	2.947	314.347	400	Pass
	8-DPSK	Low	2.978	317.653	400	Pass
		Mid	3.040	324.267	400	Pass
		High	2.978	317.653	400	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6						

Test Plots

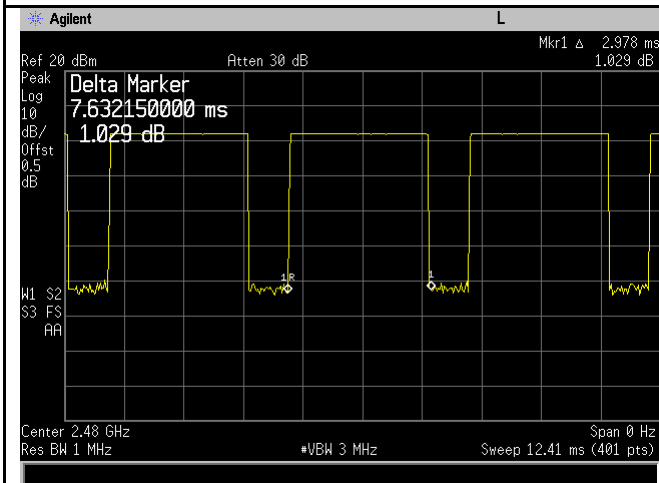
Dwell Time measurement result



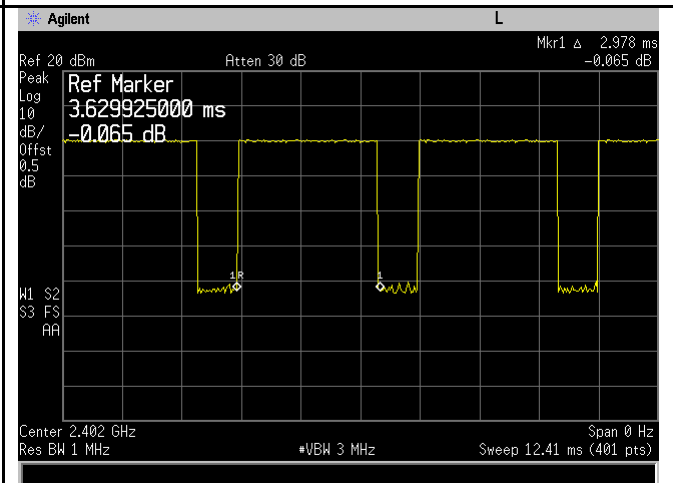
GFSK - Low CH 2402



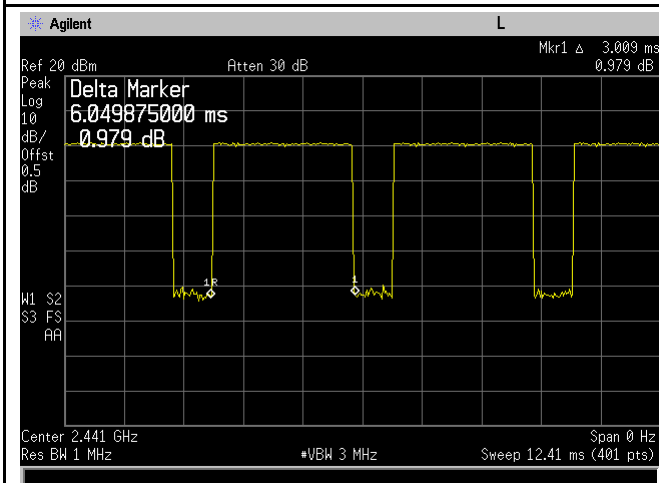
GFSK - Mid CH 2441



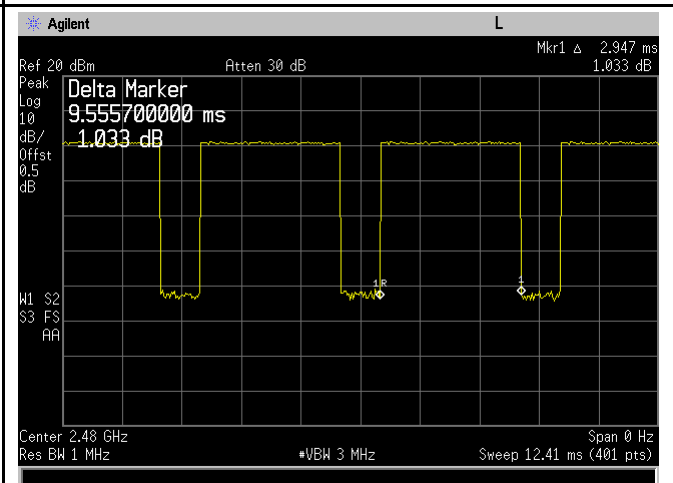
GFDK - High CH 2480



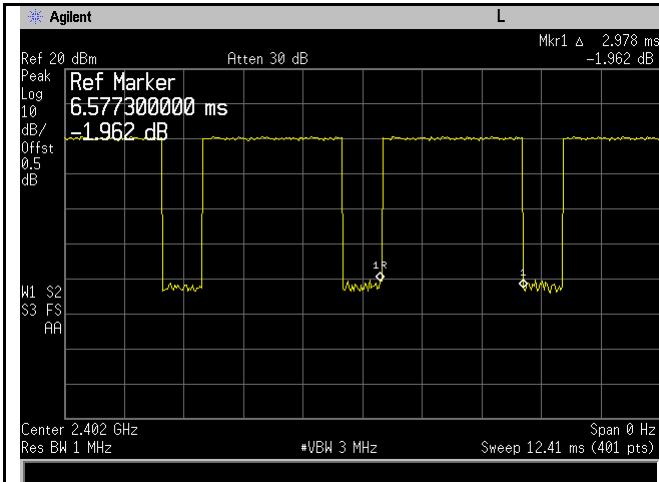
$\pi/4$ DQPSK - Low CH 2402



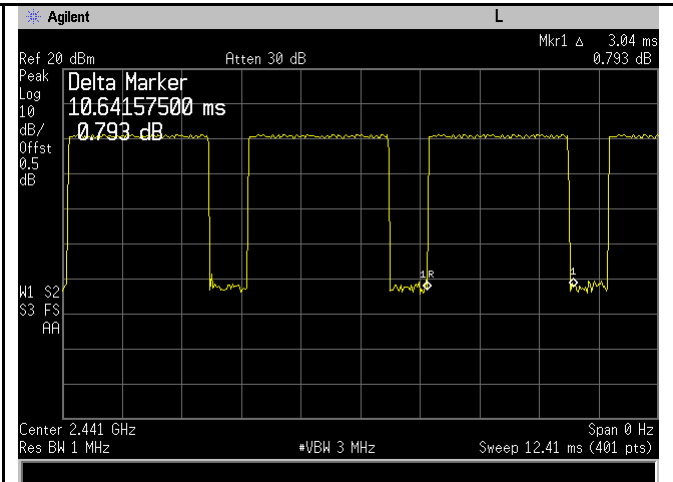
$\pi/4$ DQPSK - Mid CH 2441



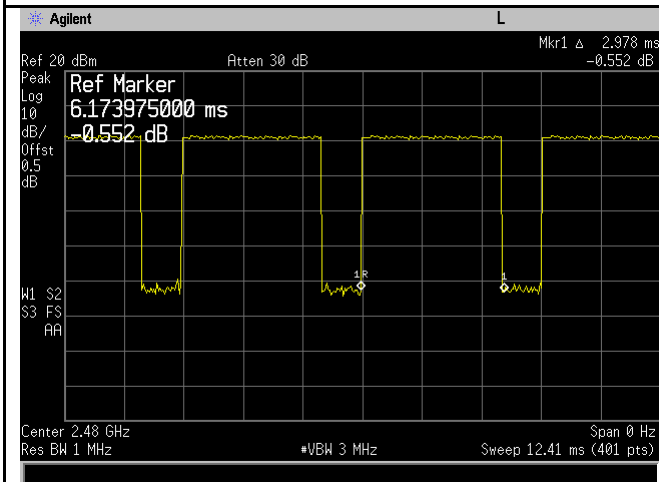
$\pi/4$ DQPSK - High CH 2480



8DPSK - Low CH 2402



8DPSK - Mid CH 2441



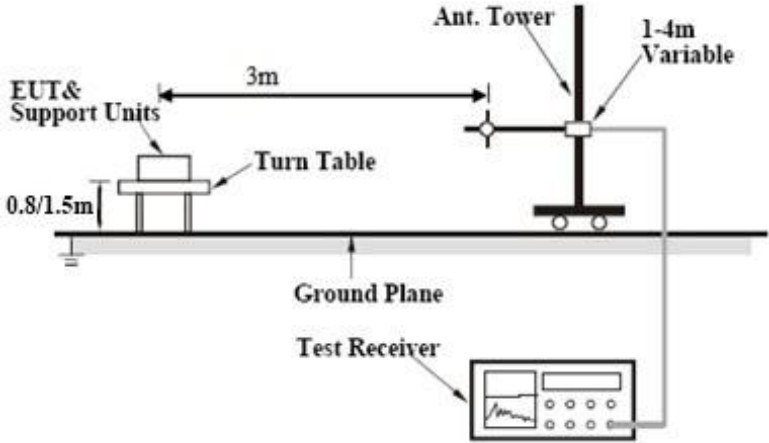
8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	26°C
Relative Humidity	55%
Atmospheric Pressure	1010mbar
Test date :	November 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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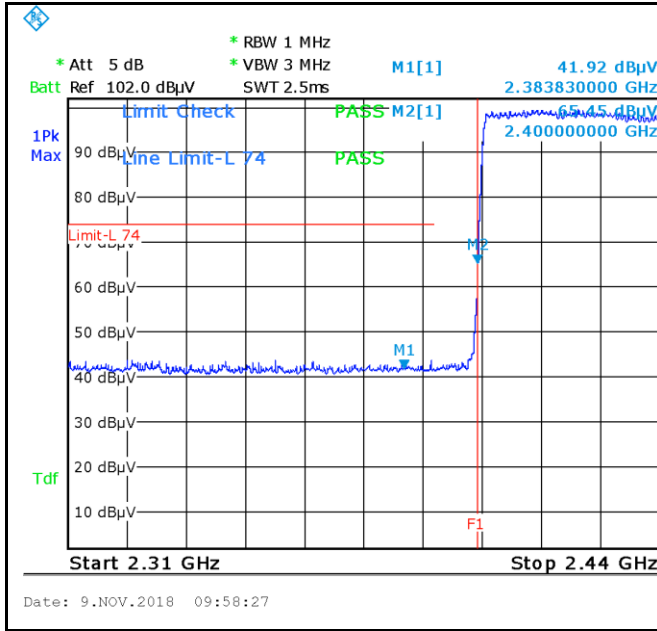
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only</p> <ul style="list-style-type: none"> - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 2. Position the 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

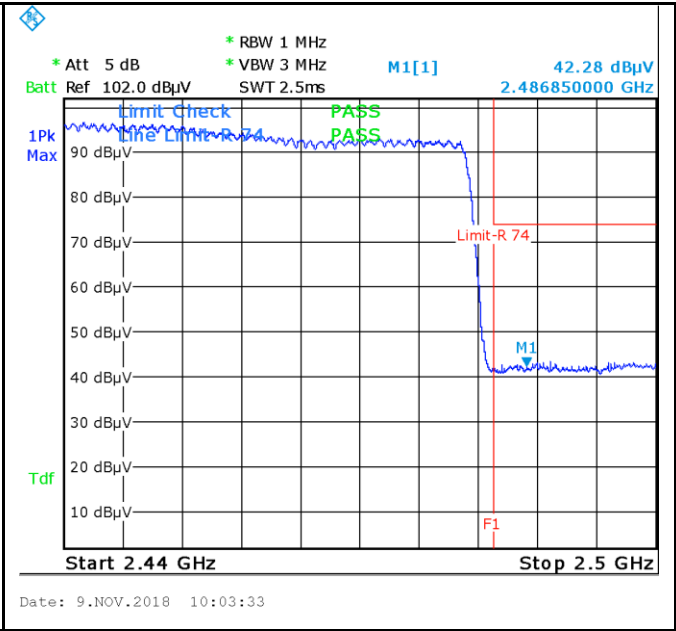
Test Plots

GFSK Mode:



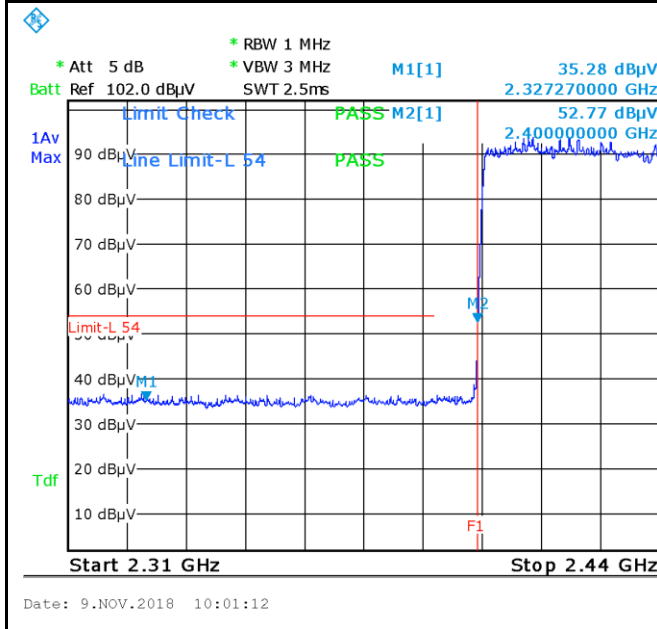
GFSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



GFSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

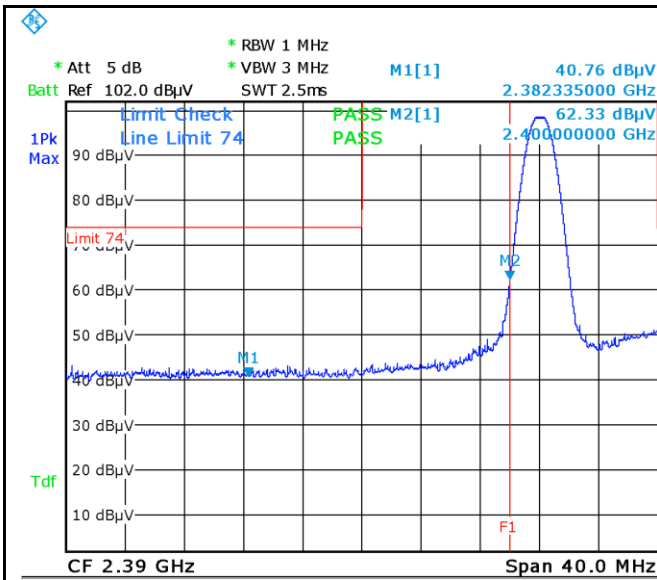


GFSK-Hopping Left Side-AV

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

GFSK-Hopping Right Side-AV

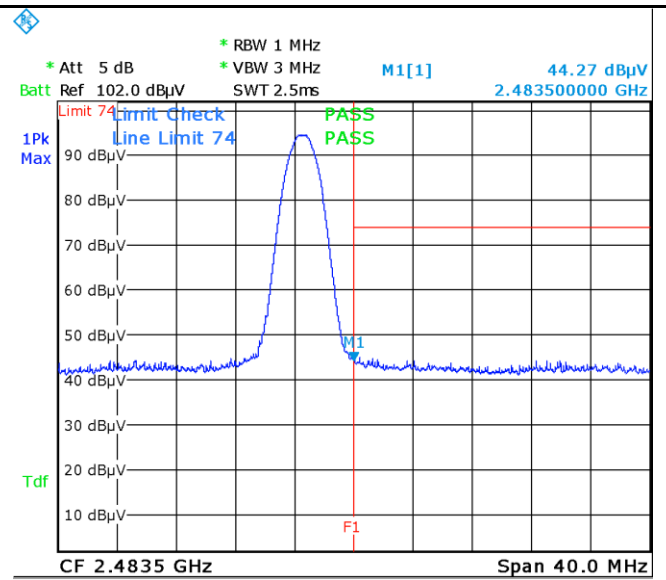
Note: Both Horizontal and vertical polarities were investigated.



Date: 9.NOV.2018 09:49:04

GFSK-Left Side-PK

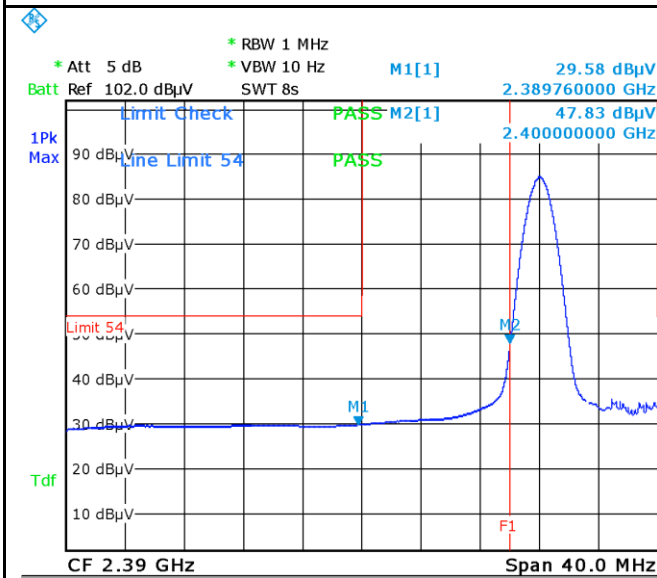
Note: F1 is frequency 2400MHz



Date: 9.NOV.2018 09:52:52

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 9.NOV.2018 09:50:08

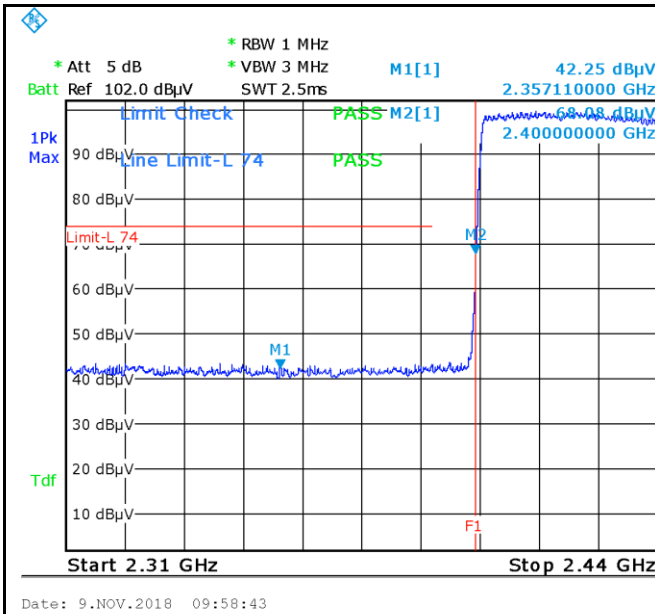
GFSK-Left Side-AV

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

GFSK-Right Side-AV

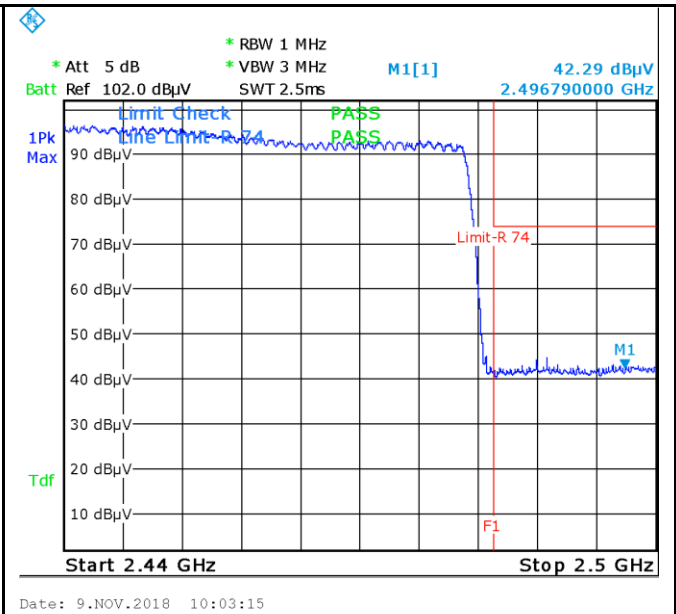
Note: Both Horizontal and vertical polarities were investigated.

π / 4 DQPSK Mode:



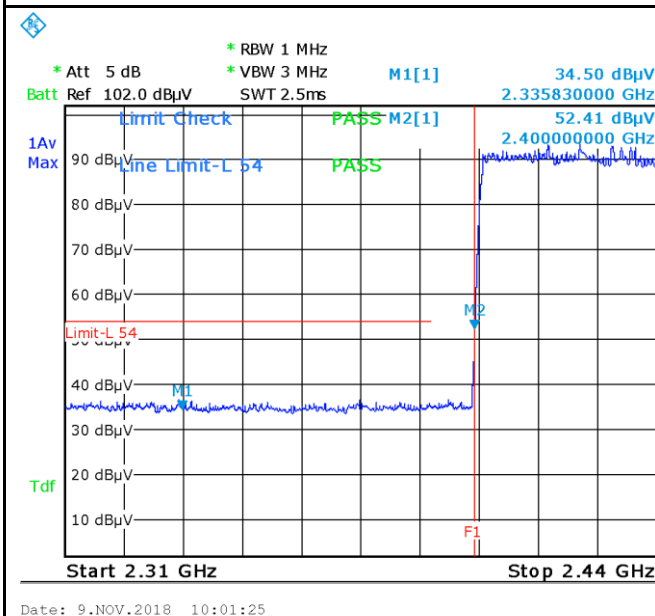
π / 4 DQPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



π / 4 DQPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

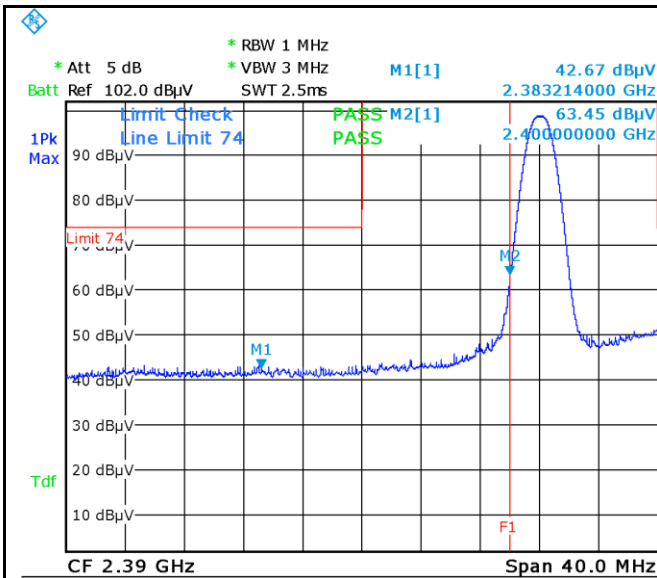


π / 4 DQPSK-Hopping Left-AV

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

π / 4 DQPSK-Hopping Right-AV

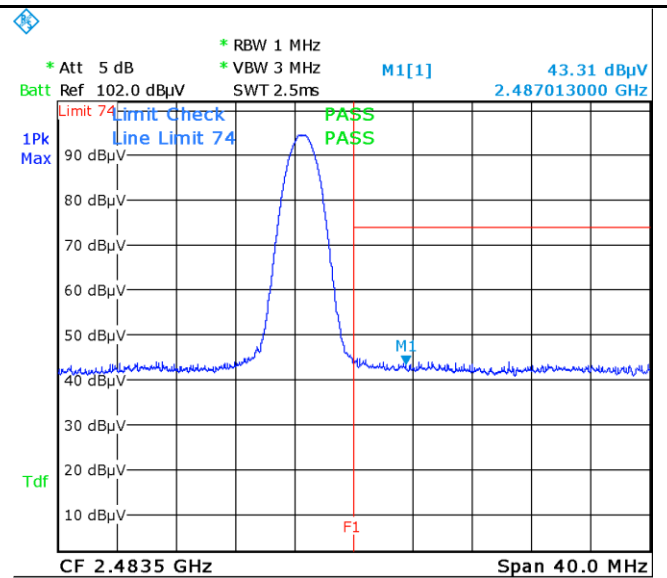
Note: Both Horizontal and vertical polarities were investigated.



Date: 9.NOV.2018 09:49:18

π / 4 DQPSK-Left Side-PK

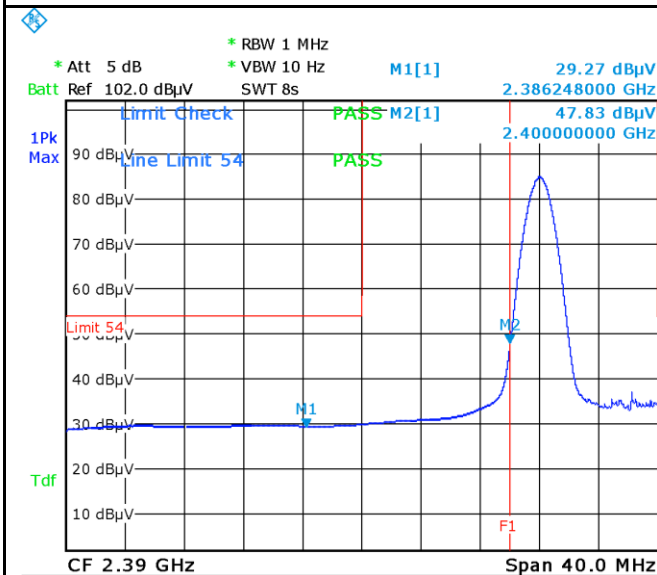
Note: F1 is frequency 2400MHz



Date: 9.NOV.2018 09:53:09

π / 4 DQPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 9.NOV.2018 09:50:35

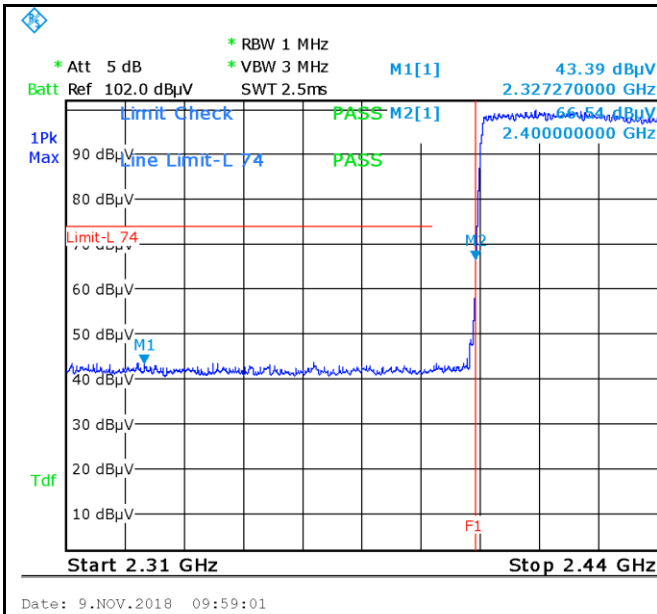
π / 4 DQPSK-Left Side-AV

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

π / 4 DQPSK-Right Side-AV

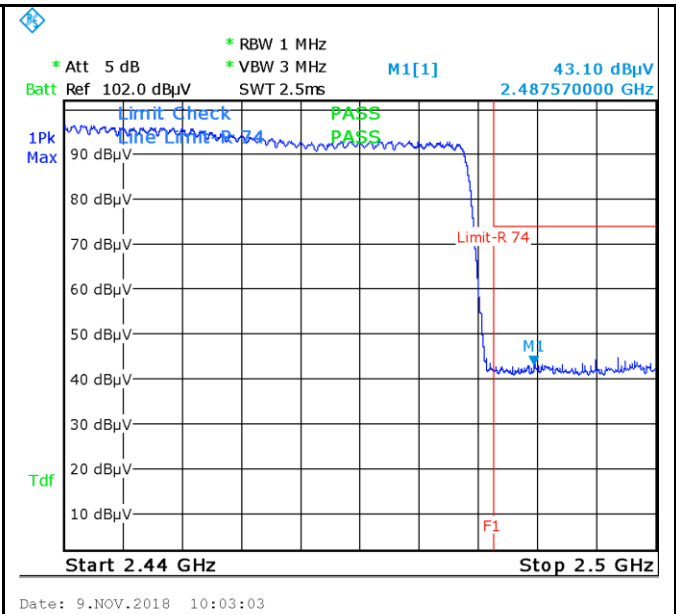
Note: Both Horizontal and vertical polarities were investigated.

8-DPSK Mode:



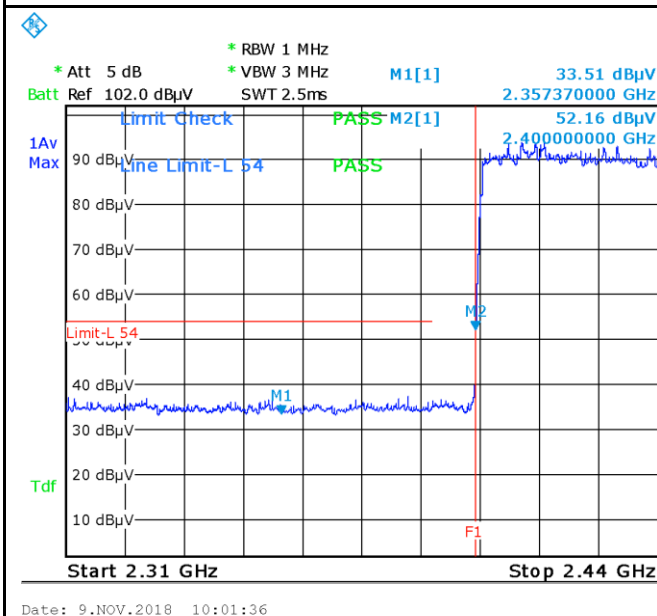
8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



8DPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

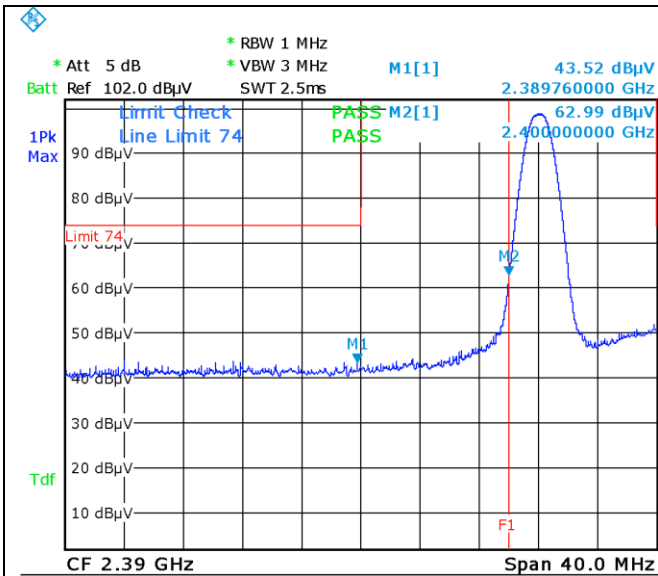


8DPSK-Hopping Left-AV

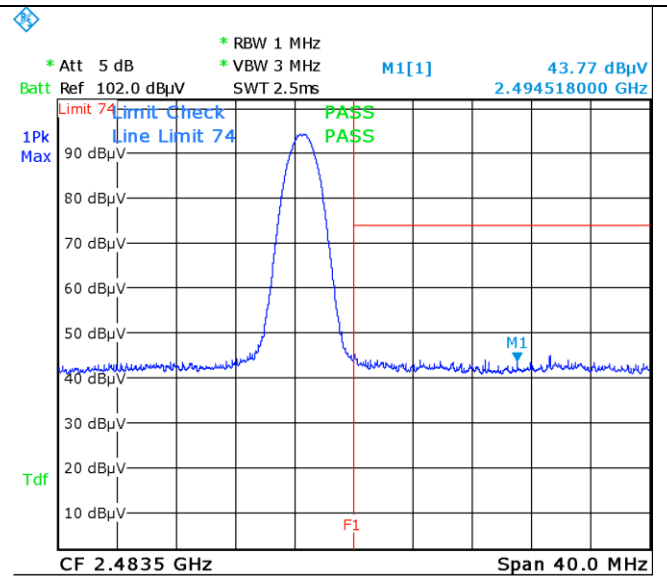
Note: (no need if PK value less than the AV limit)

8DPSK-Hopping Right-AV

Note: Both Horizontal and vertical polarities were investigated.



Date: 9.NOV.2018 09:49:37



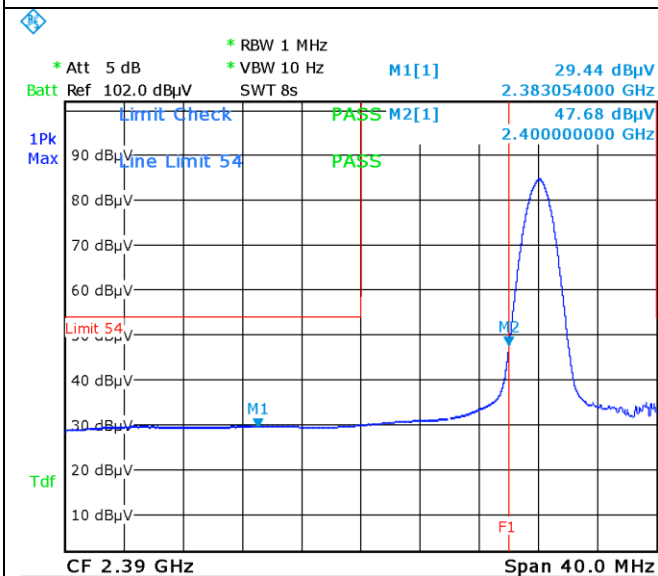
Date: 9.NOV.2018 09:53:28

8DPSK-Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 9.NOV.2018 09:50:54

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

8DPSK-Left Side-AV

8DPSK-Right Side-AV

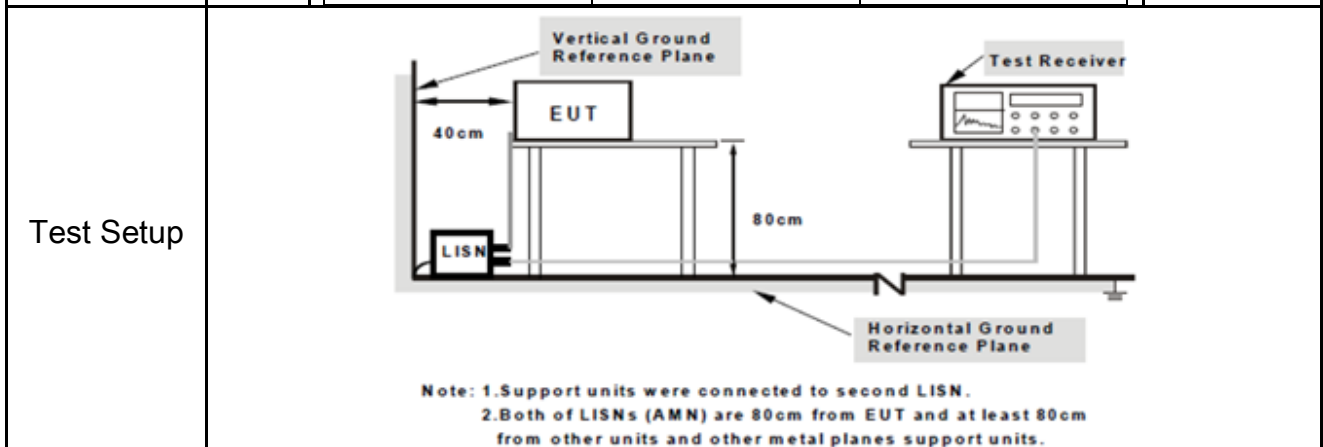
Note: Both Horizontal and vertical polarities were investigated.

6.8 AC Power Line Conducted Emissions

Temperature	26°C
Relative Humidity	55%
Atmospheric Pressure	1010mbar
Test date :	November 09, 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 μ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	<input checked="" type="checkbox"/>														
		<table border="1"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <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> </tbody> </table>		Frequency ranges (MHz)	Limit (dB μ V)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50
		Frequency ranges (MHz)			Limit (dB μ V)												
				QP	Average												
0.15 ~ 0.5	66 – 56	56 – 46															
0.5 ~ 5	56	46															
5 ~ 30	60	50															



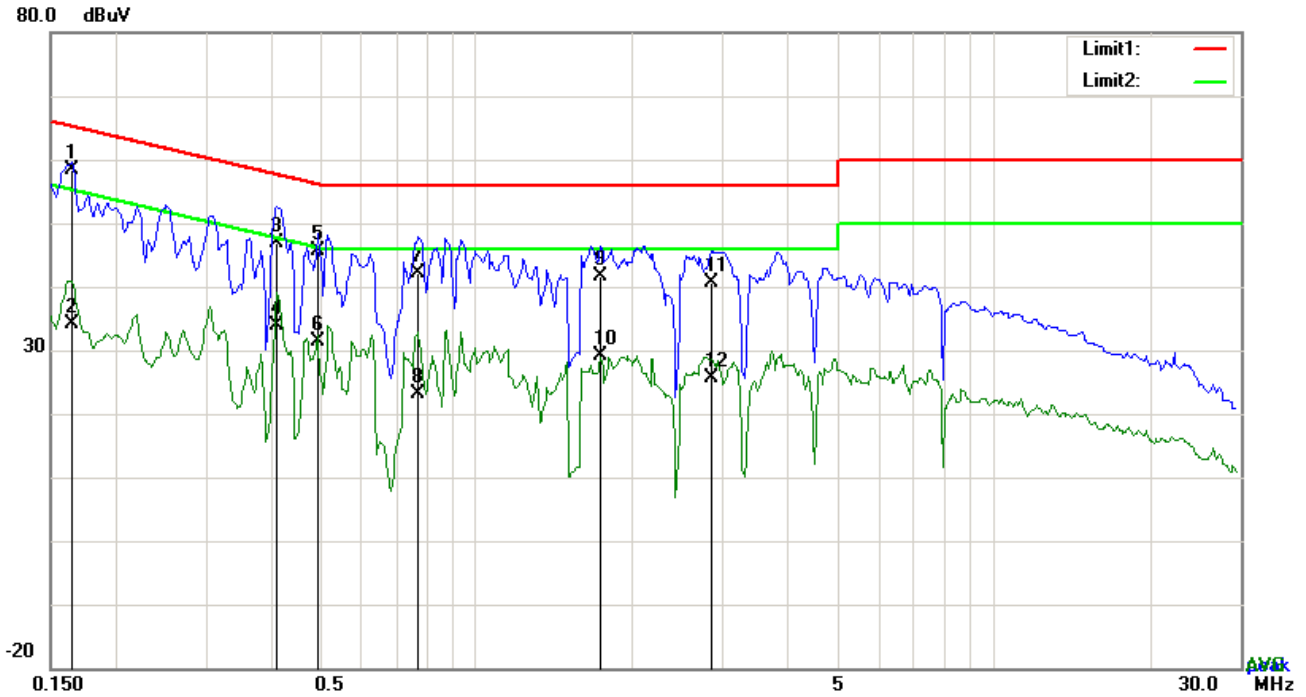
Procedure	<ol style="list-style-type: none"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT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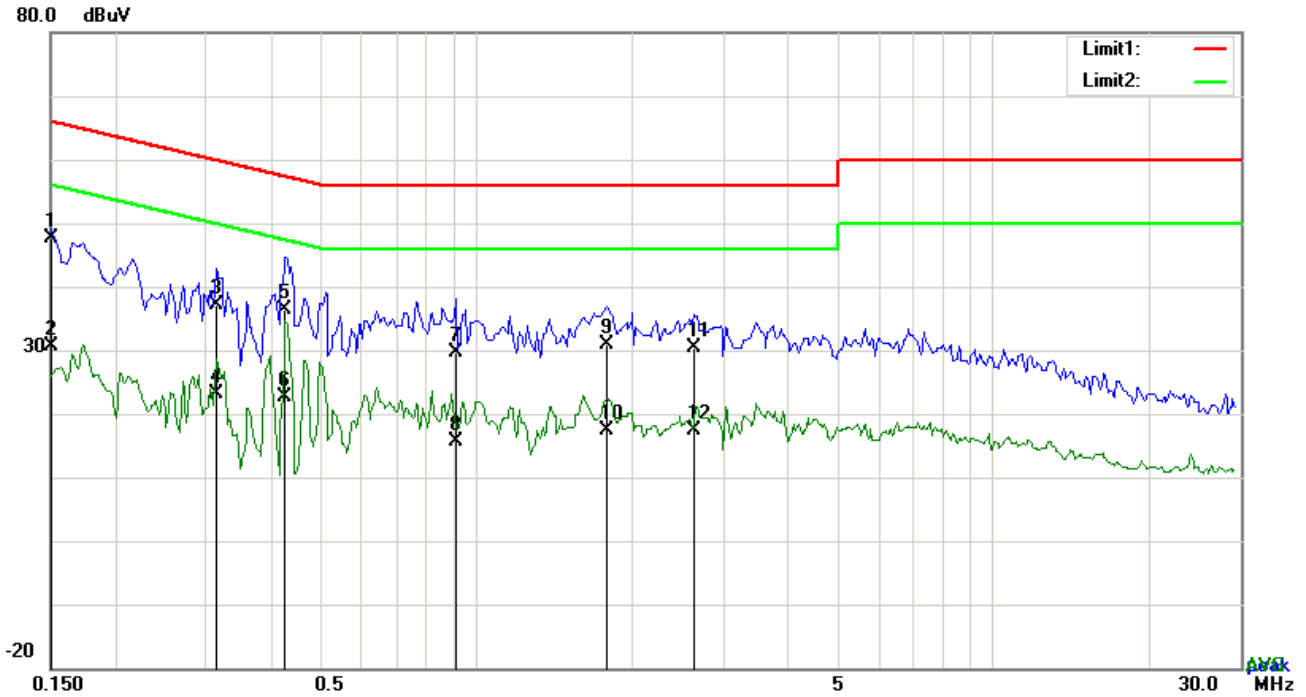


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.1656	48.37	QP	10.03	58.40	65.18	-6.78
2	L1	0.1656	24.04	AVG	10.03	34.07	55.18	-21.11
3	L1	0.4113	36.85	QP	10.03	46.88	57.62	-10.74
4	L1	0.4113	23.81	AVG	10.03	33.84	47.62	-13.78
5	L1	0.4932	35.61	QP	10.03	45.64	56.11	-10.47
6	L1	0.4932	21.42	AVG	10.03	31.45	46.11	-14.66
7	L1	0.7740	32.19	QP	10.03	42.22	56.00	-13.78
8	L1	0.7740	13.05	AVG	10.03	23.08	46.00	-22.92
9	L1	1.7412	31.71	QP	10.04	41.75	56.00	-14.25
10	L1	1.7412	19.21	AVG	10.04	29.25	46.00	-16.75
11	L1	2.8449	30.52	QP	10.05	40.57	56.00	-15.43
12	L1	2.8449	15.55	AVG	10.05	25.60	46.00	-20.40

Test Mode:	Bluetooth Mode
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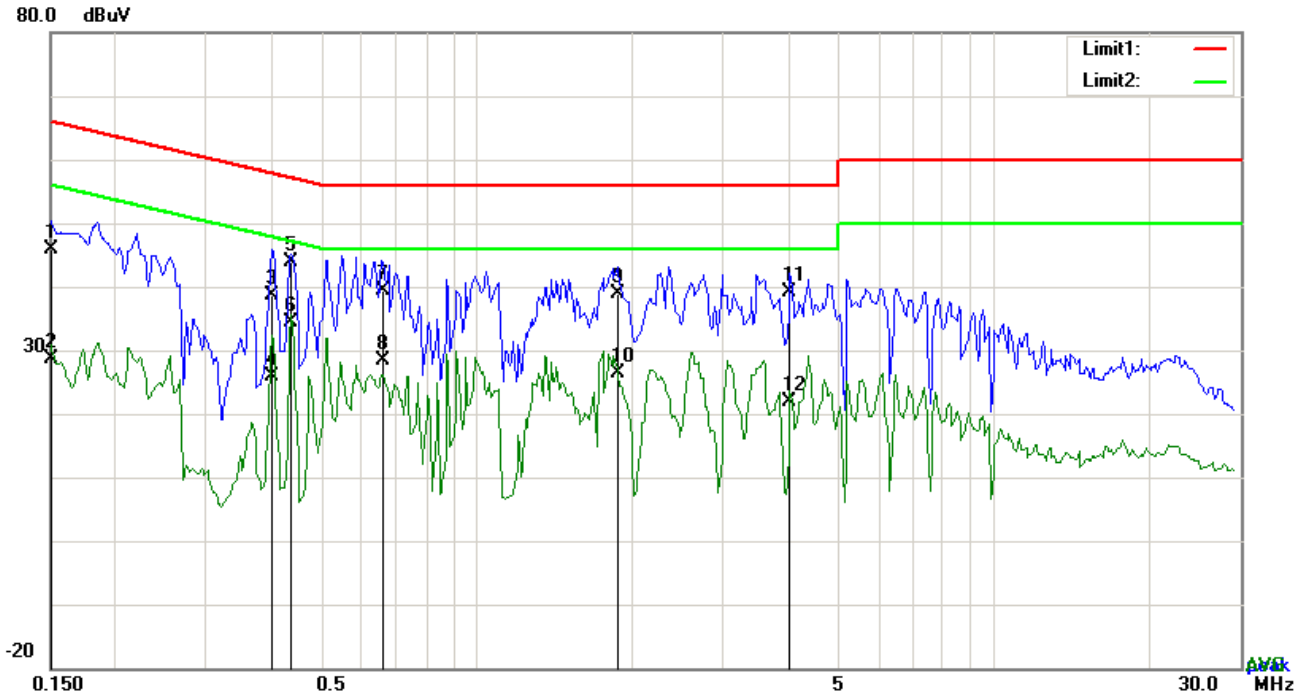


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1500	37.64	QP	10.02	47.66	66.00	-18.34
2	N	0.1500	20.49	AVG	10.02	30.51	56.00	-25.49
3	N	0.3138	27.22	QP	10.02	37.24	59.87	-22.63
4	N	0.3138	13.22	AVG	10.02	23.24	49.87	-26.63
5	N	0.4269	26.28	QP	10.02	36.30	57.31	-21.01
6	N	0.4269	12.65	AVG	10.02	22.67	47.31	-24.64
7	N	0.9105	19.51	QP	10.03	29.54	56.00	-26.46
8	N	0.9105	5.67	AVG	10.03	15.70	46.00	-30.30
9	N	1.7880	20.78	QP	10.04	30.82	56.00	-25.18
10	N	1.7880	7.40	AVG	10.04	17.44	46.00	-28.56
11	N	2.6265	20.23	QP	10.05	30.28	56.00	-25.72
12	N	2.6265	7.43	AVG	10.05	17.48	46.00	-28.52

Test Mode:	Bluetooth Mode
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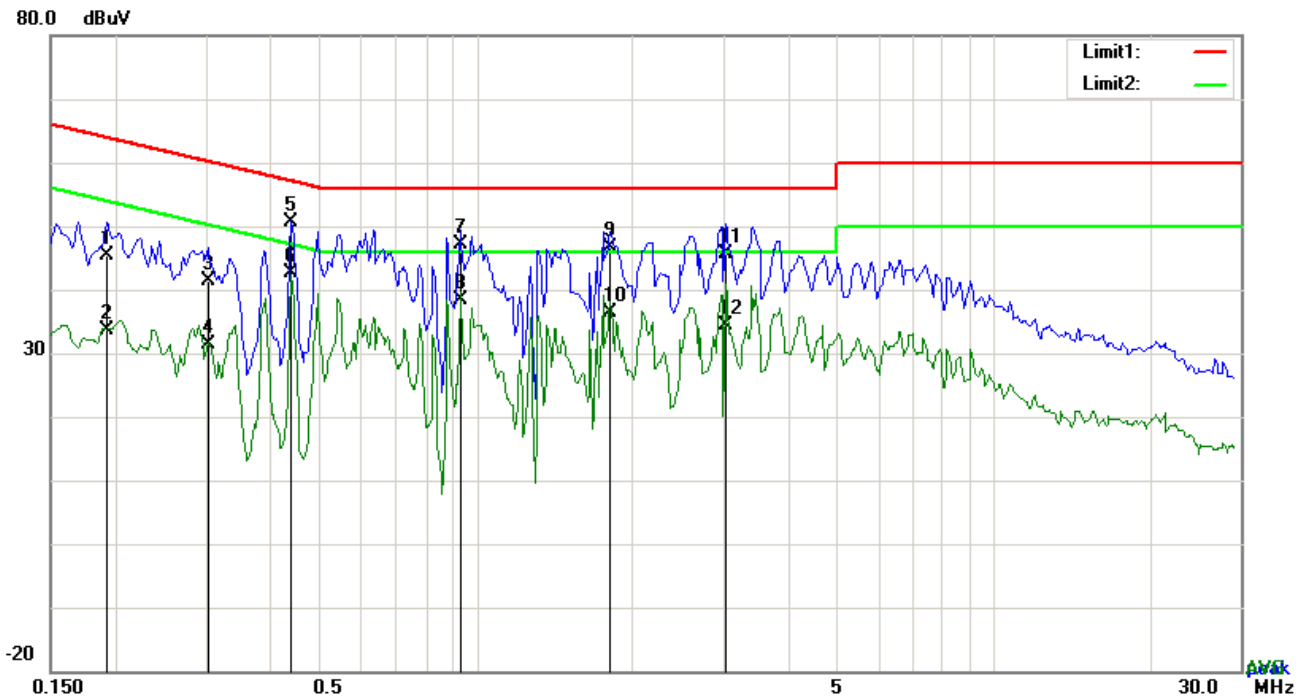


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.1500	35.81	QP	10.03	45.84	66.00	-20.16
2	L1	0.1500	18.57	AVG	10.03	28.60	56.00	-27.40
3	L1	0.4035	28.53	QP	10.03	38.56	57.78	-19.22
4	L1	0.4035	15.97	AVG	10.03	26.00	47.78	-21.78
5	L1	0.4386	33.87	QP	10.03	43.90	57.09	-13.19
6	L1	0.4386	24.23	AVG	10.03	34.26	47.09	-12.83
7	L1	0.6578	29.28	QP	10.03	39.31	56.00	-16.69
8	L1	0.6578	18.25	AVG	10.03	28.28	46.00	-17.72
9	L1	1.8699	28.94	QP	10.04	38.98	56.00	-17.02
10	L1	1.8699	16.27	AVG	10.04	26.31	46.00	-19.69
11	L1	4.0413	29.04	QP	10.07	39.11	56.00	-16.89
12	L1	4.0413	11.70	AVG	10.07	21.77	46.00	-24.23

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



Test Data

Phase Neutral Plot at 240Vac, 60Hz

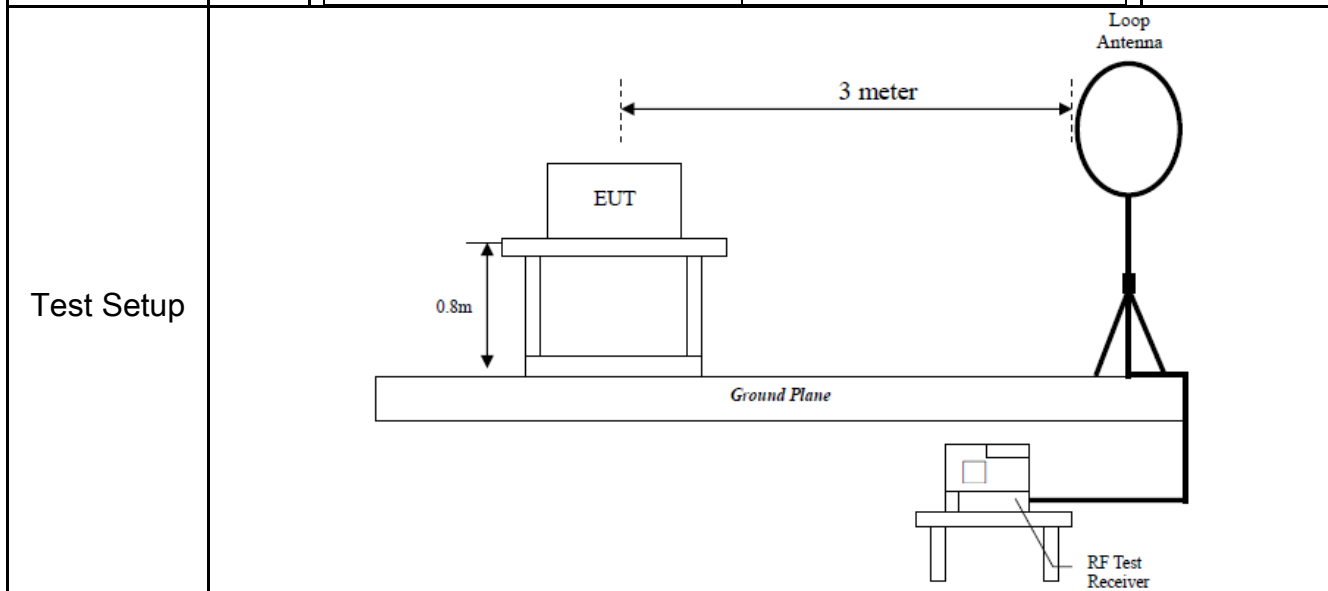
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1929	35.45	QP	10.02	45.47	63.91	-18.44
2	N	0.1929	23.67	AVG	10.02	33.69	53.91	-20.22
3	N	0.3021	31.35	QP	10.02	41.37	60.18	-18.81
4	N	0.3021	21.33	AVG	10.02	31.35	50.18	-18.83
5	N	0.4386	40.71	QP	10.02	50.73	57.09	-6.36
6	N	0.4386	32.54	AVG	10.02	42.56	47.09	-4.53
7	N	0.9300	37.02	QP	10.03	47.05	56.00	-8.95
8	N	0.9300	28.30	AVG	10.03	38.33	46.00	-7.67
9	N	1.8114	36.51	QP	10.04	46.55	56.00	-9.45
10	N	1.8114	26.43	AVG	10.04	36.47	46.00	-9.53
11	N	3.0312	35.59	QP	10.05	45.64	56.00	-10.36
12	N	3.0312	24.31	AVG	10.05	34.36	46.00	-11.64

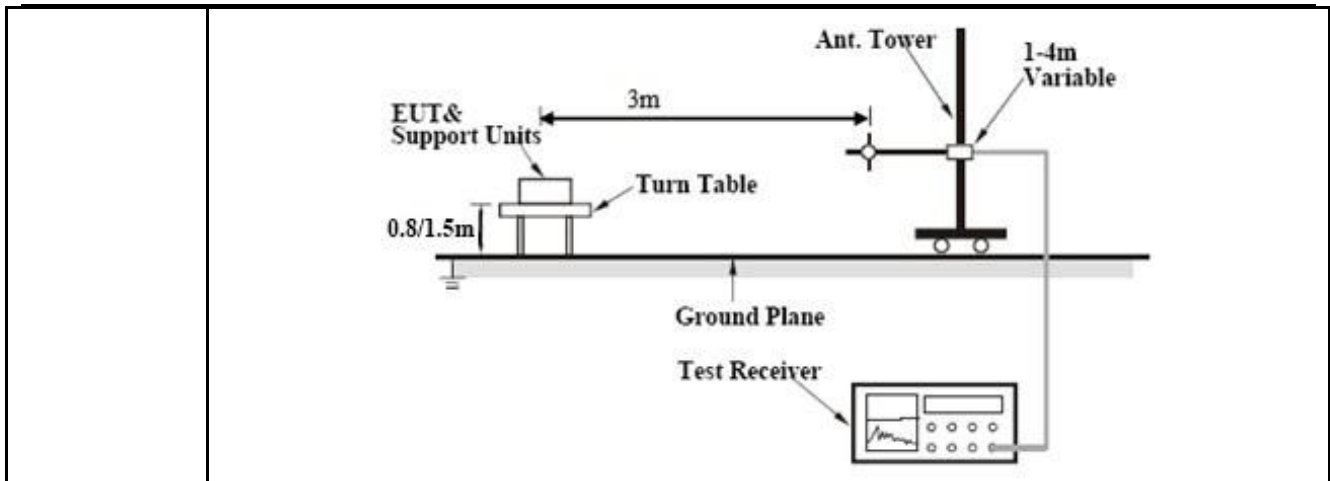
6.9 Radiated Emissions & Restricted Band

Temperature	26°C
Relative Humidity	55%
Atmospheric Pressure	1010mbar
Test date :	November 09, 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	<input checked="" type="checkbox"/>																
		<table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength ($\mu\text{V}/\text{m}$)</th> </tr> </thead> <tbody> <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> </tbody> </table>		Frequency range (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	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 ($\mu\text{V}/\text{m}$)															
		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																		





Procedure

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

Note:

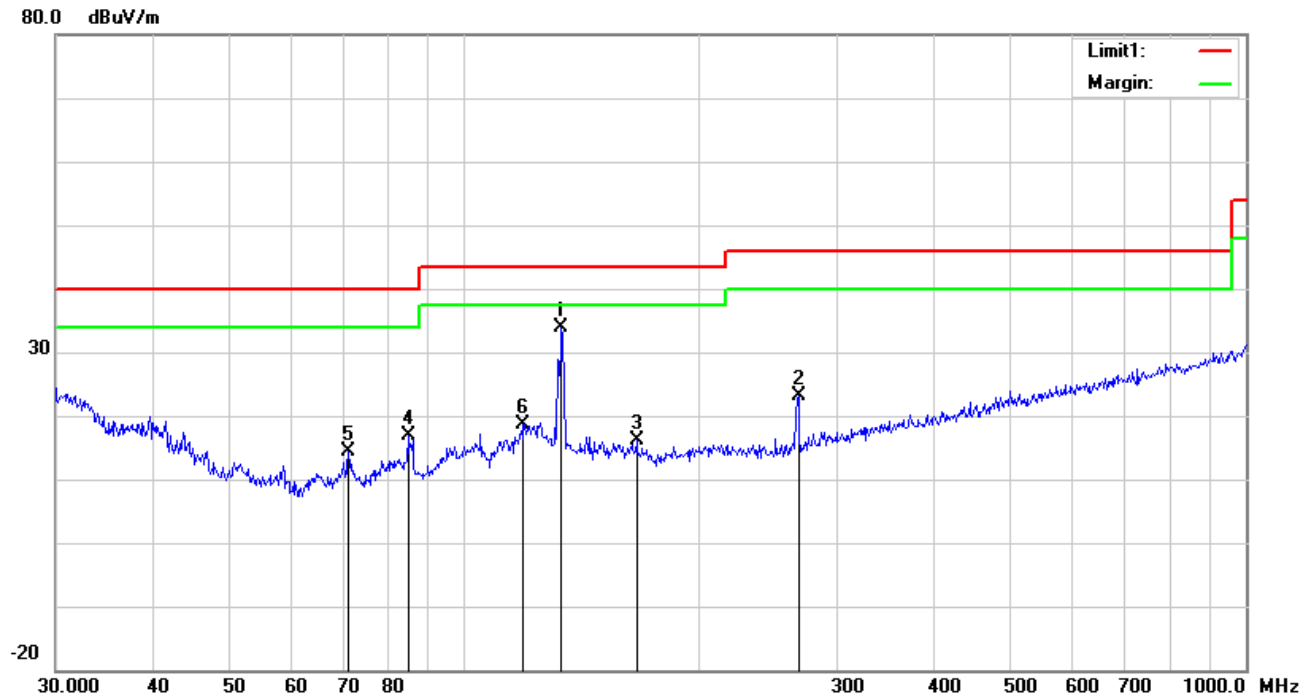
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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



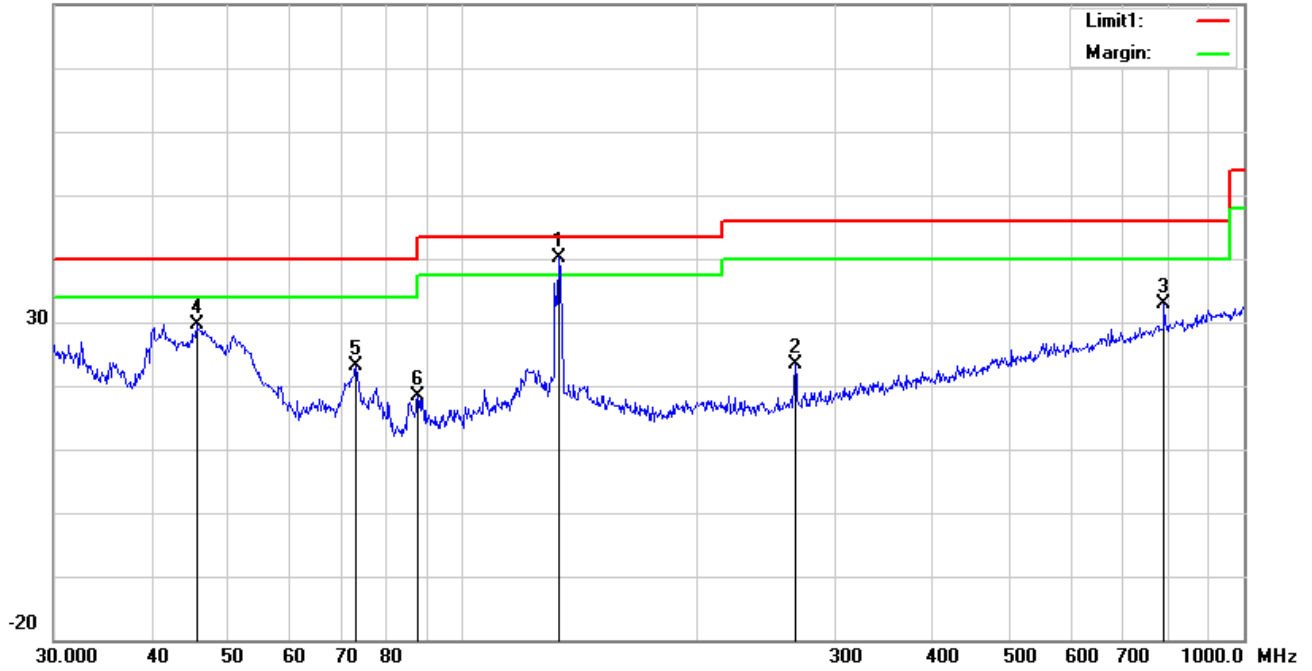
Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degr ee ()
1	H	133.1511	42.09	13.05	22.39	1.22	33.97	43.50	-9.53	100	173
2	H	267.5455	31.50	12.17	22.29	1.73	23.11	46.00	-22.89	100	252
3	H	166.0680	24.79	12.11	22.26	1.37	16.01	43.50	-27.49	100	6
4	H	84.7019	30.49	7.79	22.37	1.07	16.98	40.00	-23.02	100	90
5	H	71.0803	28.03	7.78	22.38	0.98	14.41	40.00	-25.59	100	282
6	H	119.0180	26.14	13.73	22.36	1.16	18.67	43.50	-24.83	100	256

30MHz -1GHz

80.0 dBuV/m



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degr ee ()
1	V	132.6850	48.12	13.08	22.39	1.22	40.03	43.50	-3.47	200	206
2	V	266.6089	31.87	12.13	22.29	1.73	23.44	46.00	-22.56	100	78
3	V	790.6188	29.93	21.29	21.17	2.94	32.99	46.00	-13.01	100	84
4	V	45.6948	40.90	10.29	22.30	0.76	29.65	40.00	-10.35	100	123
5	V	73.1025	36.73	7.74	22.39	0.97	23.05	40.00	-16.95	100	317
6	V	87.7248	31.87	7.91	22.34	1.00	18.44	40.00	-21.56	100	334

Above 1GHz

Test Mode:	Transmitting Mode
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Low Channel: GFSK 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	48.2	AV	V	33.39	7.22	48.46	40.35	54	-13.65
4804	45.58	AV	H	33.39	7.22	48.46	37.73	54	-16.27
4804	65.82	PK	V	33.39	7.22	48.46	57.97	74	-16.03
4804	62.71	PK	H	33.39	7.22	48.46	54.86	74	-19.14
8125	42.7	AV	V	37.36	9.65	48.85	40.86	54	-13.14
8125	37.51	AV	H	37.36	9.65	48.85	35.67	54	-18.33
8125	58.67	PK	V	37.36	9.65	48.85	56.83	74	-17.17
8125	60.92	PK	H	37.36	9.65	48.85	59.08	74	-14.92

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	43.65	AV	V	33.62	7.53	48.36	36.44	54	-17.56
4882	47.82	AV	H	33.62	7.53	48.36	40.61	54	-13.39
4882	70.9	PK	V	33.62	7.53	48.36	63.69	74	-10.31
4882	66.86	PK	H	33.62	7.53	48.36	59.65	74	-14.35
8524	38.94	AV	V	37.29	9.46	48.49	37.2	54	-16.8
8524	33.74	AV	H	37.29	9.46	48.49	32	54	-22
8524	61.92	PK	V	37.29	9.46	48.49	60.18	74	-13.82
8524	56.29	PK	H	37.29	9.46	48.49	54.55	74	-19.45

High Channel: GFSK Mode (Worst Case) (2480 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)
4960	42.82	AV	V	33.89	7.86	48.31	36.26	54	-17.74
4960	49	AV	H	33.89	7.86	48.31	42.44	54	-11.56
4960	67.03	PK	V	33.89	7.86	48.31	60.47	74	-13.53
4960	64.53	PK	H	33.89	7.86	48.31	57.97	74	-16.03
17948	5.66	AV	V	42.51	19.66	45.34	22.49	54	-31.51
17948	7.56	AV	H	42.51	19.66	45.34	24.39	54	-29.61
17948	29.45	PK	V	42.51	19.66	45.34	46.28	74	-27.72
17948	26.86	PK	H	42.51	19.66	45.34	43.69	74	-30.31

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 Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch Laboratories and found 30dB below the limit at least.

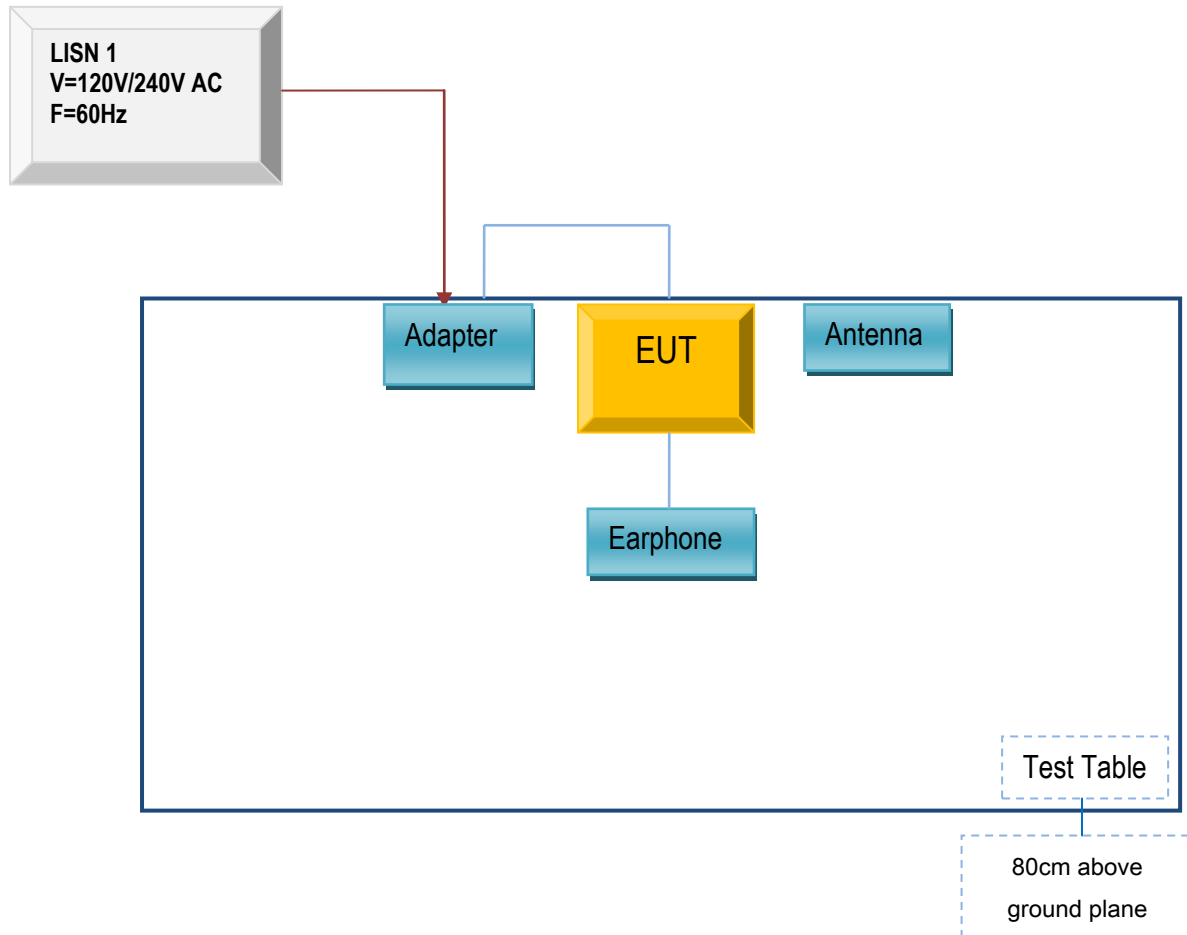
Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due
AC Line Conducted Emissions				
EMI test receiver	ESCS30	8471241027	01/05/2018	01/04/2019
Artificial Mains Network	8127	8127713	01/05/2018	01/04/2019
ISN	ISN T800	34373	01/05/2018	01/04/2019
Radiated Emissions				
EMI test receiver	ESL6	1300.5001K06-100262-eQ	01/05/2018	01/04/2019
Active Antenna	AL-130	121031	02/08/2018	02/07/2019
3m Semi-anechoic Chamber	9m*6m*6m	N/A	10/18/2018	10/17/2019
Signal Amplifier	8447E	443008	01/25/2018	01/24/2019
MXA signal analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
Horn Antenna	HAH-118	71259	01/26/2018	01/25/2019
Horn Antenna	HAH-118	71283	02/02/2018	02/01/2019
AMPLIFIER	EM01G26G	60613	01/25/2018	01/24/2019
AMPLIFIER	Emc012645	980077	01/05/2018	01/04/2019
Bilog Antenna (30MHz~6GHz)	JB6	A110712	02/08/2018	02/07/2019
RF Conducted				
DC Power Supply	E3640A	MY40004013	01/05/2018	01/04/2019
MXA Signal Analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
MXG Vector Signal Generator	N5182A	MY50140530	01/05/2018	01/04/2019
Series Signal Generator	E4421B	US40051152	05/12/2018	05/11/2019
RF control unit	JS0806-0806-2	188060112	04/25/2018	04/24/2019
Wireless Connectivity Tester	CMW270	1201.0002K75-101601-PE	04/25/2018	04/24/2019
Weinschel	1580-1	TL177	01/05/2018	01/04/2019
Universal Radio Communica	CMU200	121393	02/11/2018	02/10/2019

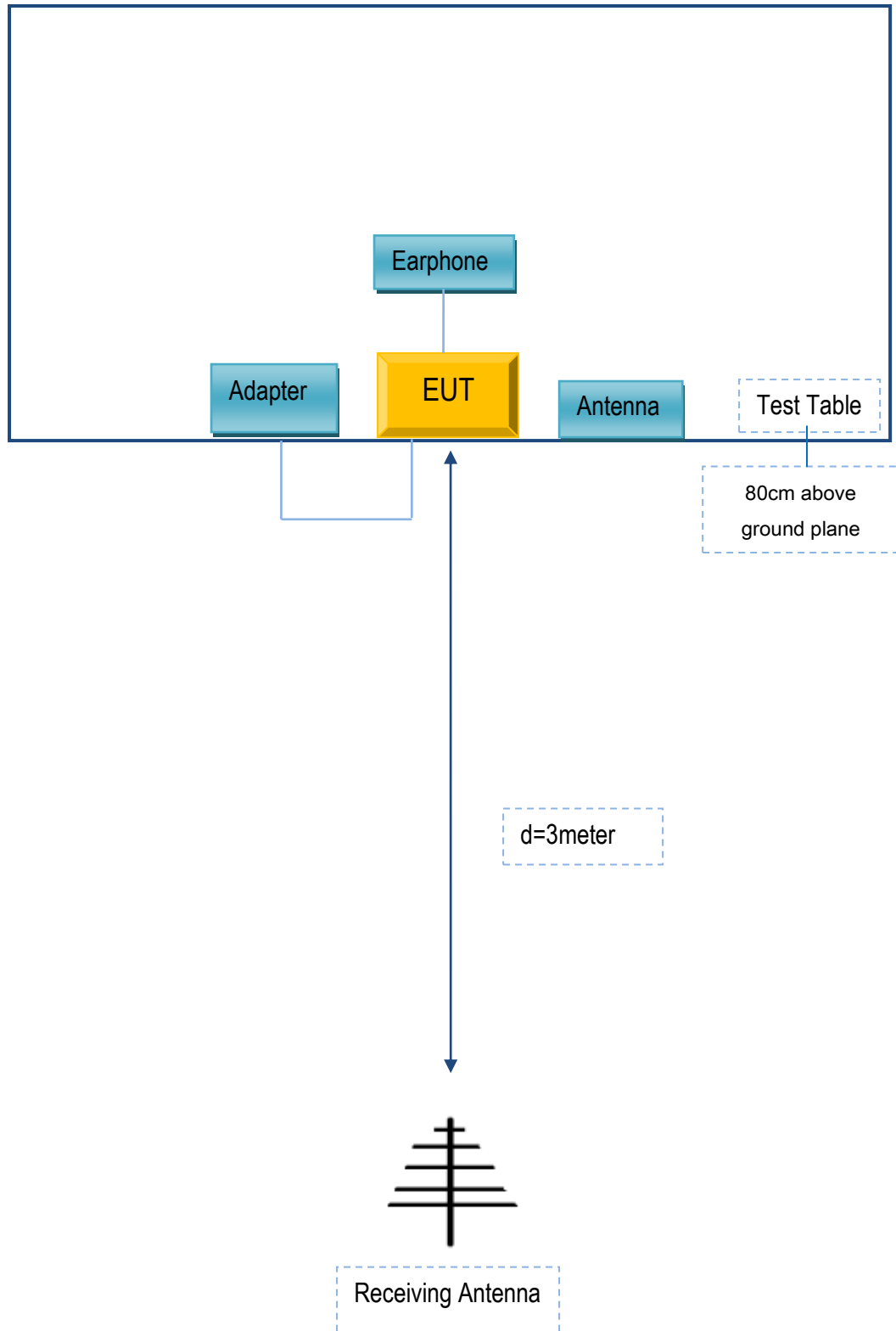
Annex B. TEST SETUP AND SUPPORTING EQUIPMENT

Annex B.i. TEST SET UP BLOCK

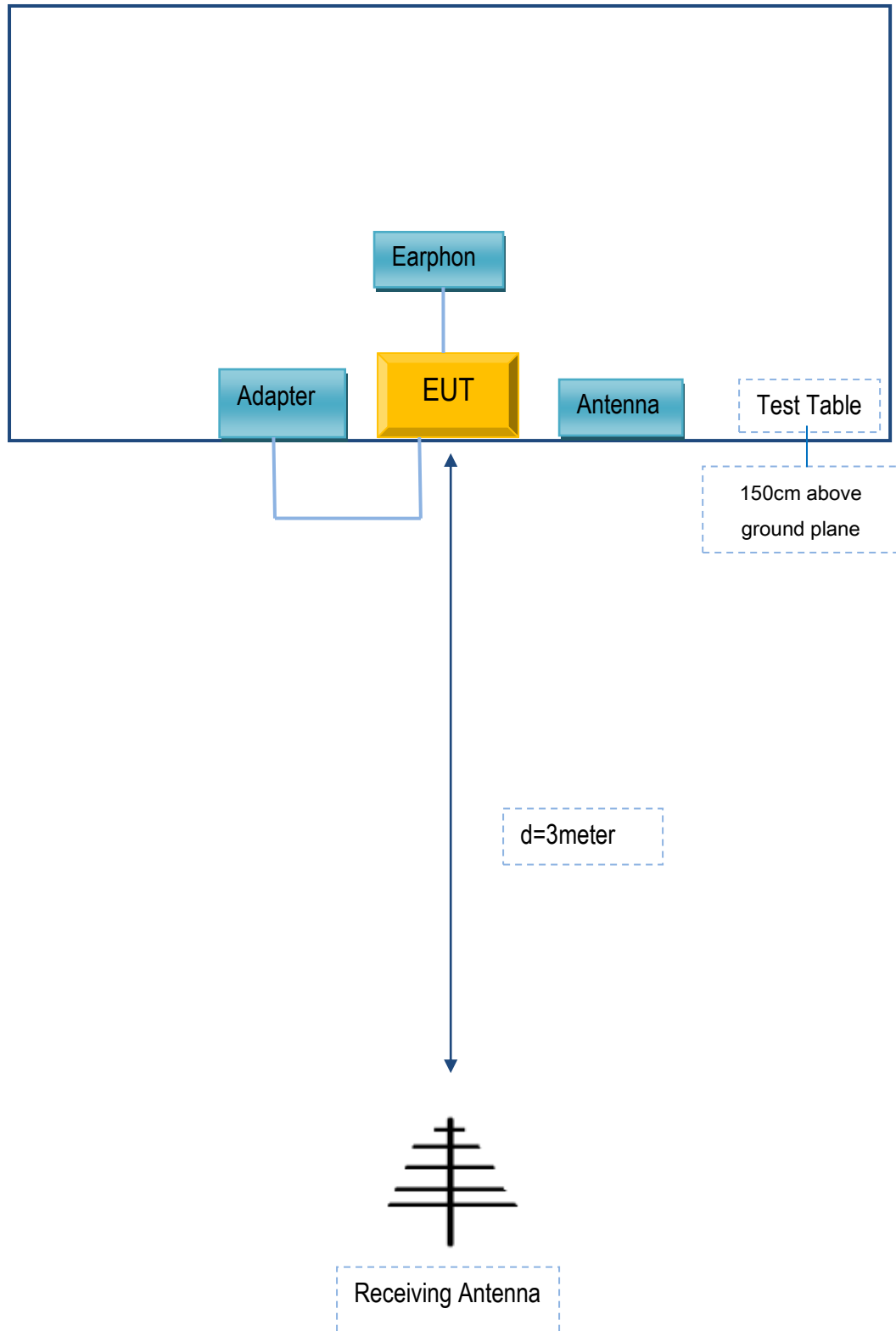
Block Configuration Diagram for AC Line Conducted Emissions



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
Cedar Kingdom Corporation Limited	Adapter	V-501C	N/A
Cedar Kingdom Corporation Limited	Earphone	V-501C	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	N/A

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

Please see the attachment