

RF TEST REPORT



Report No.: 17070659-FCC-R3

Supersede Report No.: N/A

Applicant	TECNO MOBILE LIMITED	
Product Name	Mobile phone	
Model No.	AX8	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	July 29 to September 14, 2017	
Issue Date	September 15, 2017	
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"/>		
Loren Luo	David Huang	
Loren Luo 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

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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.



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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
17070659-FCC-R3	NONE	Original	September 15, 2017

2. Customer information

Applicant Name	TECNO MOBILE LIMITED
Applicant Add	ROOMS 05-15, 13A/F., SOUTH TOWER, WORLD FINANCE CENTRE, HARBOUR CITY, 17 CANTON ROAD, TSIM SHA TSUI, KOWLOON, HONG KONG
Manufacturer	SHENZHEN TECNO TECHNOLOGY CO.,LTD.
Manufacturer Add	1-4th Floor,3rd Building,Pacific Industrial Park,No.2088,Shenyan Road,Yantian District,Shenzhen,Guangdong,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:	Mobile phone
Main Model:	AX8
Serial Model:	N/A
Date EUT received:	July 28, 2017
Test Date(s):	July 29 to September 14, 2017
Equipment Category :	DSS
Antenna Gain:	<p>GSM850: -2.53dBi</p> <p>PCS1900: -1.31dBi</p> <p>UMTS-FDD Band V: -2dBi</p> <p>UMTS-FDD Band II: -1.74dBi</p> <p>LTE Band II: -1.31dBi</p> <p>LTE Band IV: -2.64dBi</p> <p>LTE Band V: -2.14dBi</p> <p>LTE Band VII: -0.27dBi</p> <p>WIFI(2.4G): -0.87 dBi</p> <p>WIFI(5150-5250MHz): -5.3 dBi</p> <p>WIFI(5250-5350MHz): -5.3 dBi</p> <p>WIFI(5725-5850MHz): -5.3 dBi</p> <p>Bluetooth/BLE: -0.87dBi</p> <p>GPS: -1.47dBi</p>
Antenna Type:	<p>IFA antenna</p> <p>GSM / GPRS: GMSK</p> <p>EGPRS: GMSK,8PSK</p> <p>UMTS-FDD: QPSK</p> <p>LTE Band: QPSK, 16QAM</p>
Type of Modulation:	<p>802.11b/g/n: DSSS, OFDM</p> <p>Bluetooth: GFSK, π /4DQPSK, 8DPSK</p> <p>BLE: GFSK</p> <p>GPS:BPSK</p>

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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;
 RX: 1932.4 ~ 1987.6 MHz

LTE Band II TX: 1850.7 ~ 1909.3 MHz; RX: 1930.7 ~ 1989.3 MHz

LTE Band IV TX: 1710.7 ~ 1754.3 MHz; RX: 2110.7 ~ 2154.3 MHz

LTE Band V TX: 824.7 ~ 848.3 MHz; RX: 869.7 ~ 893.3 MHz

RF Operating Frequency (ies):
 LTE Band VII TX: 2502.5 ~ 2567.5 MHz; RX: 2622.5 ~ 2687.5 MHz
 802.11b/g: 2412-2462 MHz (TX/RX)
 802.11n20: 2412-2462 MHz; 5180-5240 MHz; 5260-5320 MHz; 5745-5825 MHz; (TX/RX)
 802.11n40: 2422-2452 MHz (TX/RX); 5190-5230 MHz; 5270-5310 MHz; 5755-5795 MHz; (TX/RX)
 802.11 a: 5180-5240 MHz; 5260-5320 MHz; 5745-5825 MHz (TX/RX)
 Bluetooth & BLE: 2402-2480 MHz
 GPS: 1575.42 MHz

Max. Output Power: 2.645dBm

GSM 850: 124CH
 PCS1900: 299CH
 UMTS-FDD Band V: 102CH
 UMTS-FDD Band II: 277CH
 WIFI: 802.11b/g: 11CH

Number of Channels:
 WIFI: 802.11a: 24CH
 WIFI: 802.11n20: 11CH(2.4GHz); 24CH(5GHz)
 WIFI: 802.11n40: 7CH(2.4GHz); 12CH(5GHz)
 Bluetooth: 79CH
 BLE: 40CH
 GPS: 1CH

Port: USB Port, Earphone Port

Adapter:

Model: CQ-18KX

Input: AC100-240V~50/60Hz,400mA

Output: DC 5V-9V,2A

DC9V-12V,1.5A

Input Power:

Battery:

Model: BL-35AT

Rating: 3.85V, 3500mAh/3600mAh(min/typ)

13.47Wh/13.86Wh(min/typ)

Limited charge voltage: 4.4V

Trade Name : TECNO

FCC ID: 2ADYY-AX8

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 3 antennas:

A permanently attached IFA antenna for Bluetooth/BLE/2.4G WIFI/5G WIFI/GPS, the gain is -0.87dBi for Bluetooth/BLE, the gain is -0.87dBi for 2.4G WIFI, the gain is -5.3dBi for 5150-5250MHz/5250-5350MHz/5725-2850MHz MHz 5G WIFI, the gain is -1.47dBi for GPS.

A permanently attached IFA antenna for GSM/PCS/UMTS, the gain is -2.53dBi for GSM850, -1.31dBi for PCS1900, -2dBi for UMTS-FDD Band V, -1.74dBi for UMTS-FDD Band II.

A permanently attached IFA antenna for LTE Band II/IV/V/VII, the gain is -1.31dBi for LTE Band II, the gain is -2.64dBi for LTE Band IV, the gain is -2.14dBi for LTE Band V, the gain is -0.27dBi for LTE Band VII.

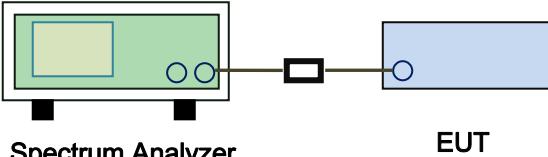
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	25°C
Relative Humidity	53%
Atmospheric Pressure	1010mbar
Test date :	September 12, 2017
Tested By :	Loren Luo

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		 Spectrum Analyzer EUT	
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"> - The EUT must have its hopping function enabled - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) \geq 1% of the span - Video (or Average) Bandwidth (VBW) \geq RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot. 	

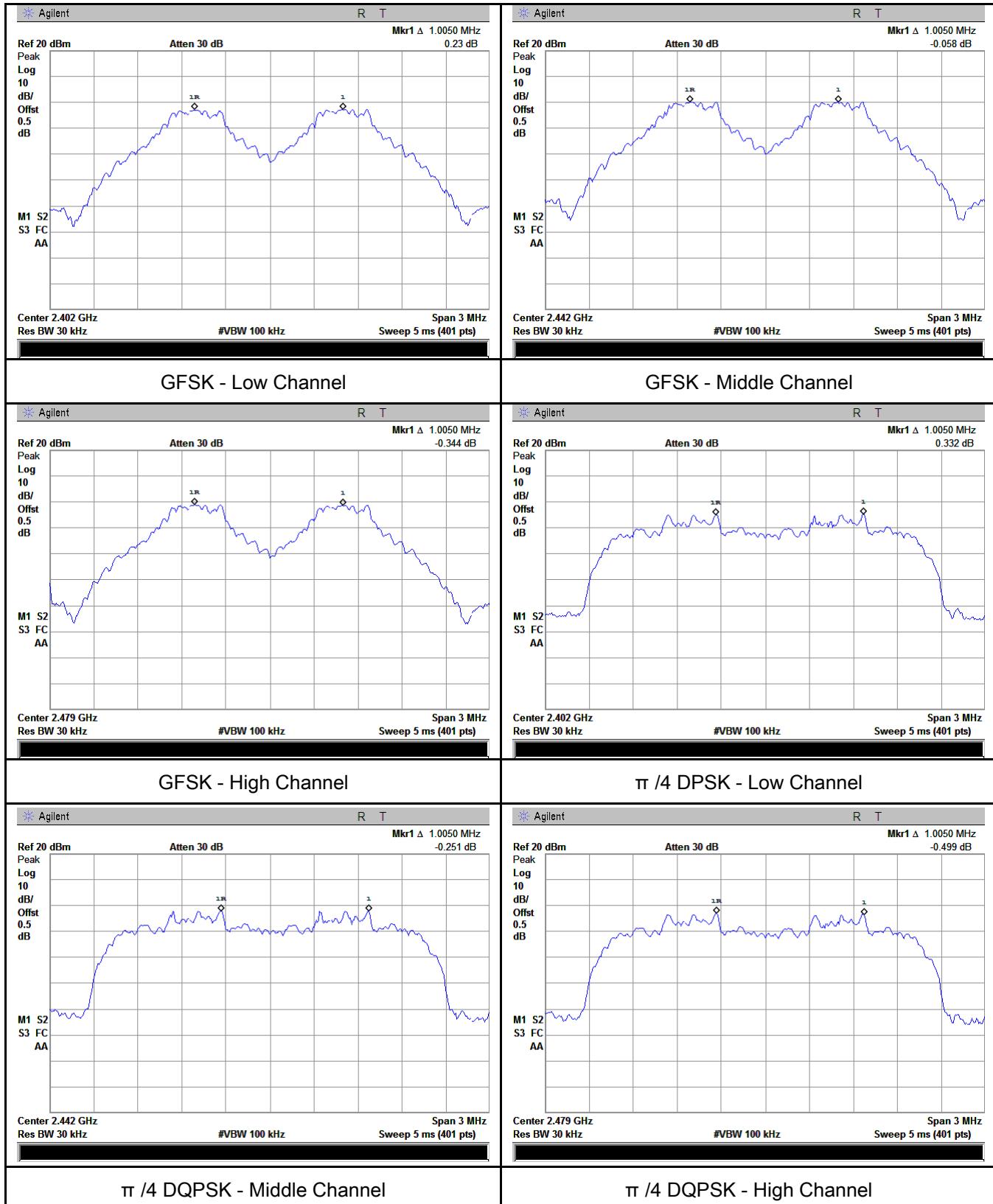
Remark		
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
Test Data	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> N/A
Test Plot	<input checked="" type="checkbox"/> Yes (See below)	<input type="checkbox"/> N/A

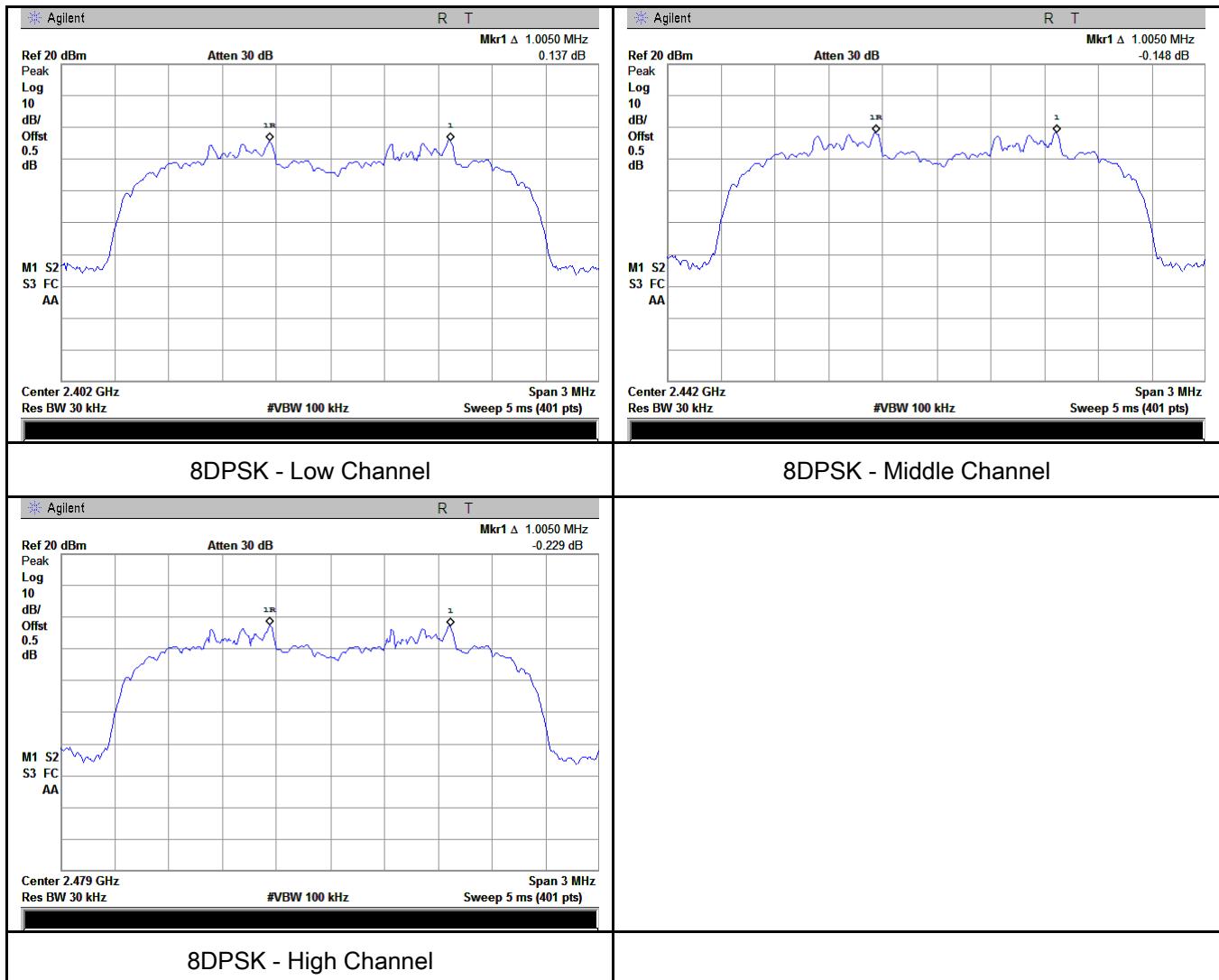
Channel Separation measurement result

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			
	Adjacency Channel	2441	1.005	0.684	Pass
	High Channel	2480			
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.864	Pass
	Adjacency Channel	2403			
	Mid Channel	2440			
	Adjacency Channel	2441	1.005	0.869	Pass
	High Channel	2480			
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.867	Pass
	Adjacency Channel	2403			
	Mid Channel	2440			
	Adjacency Channel	2441	1.005	0.865	Pass
	High Channel	2480			
	Adjacency Channel	2479			

Test Plots

Channel Separation measurement result

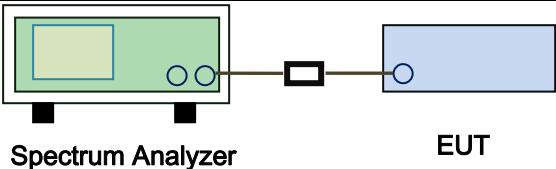




6.3 20dB Bandwidth

Temperature	25°C
Relative Humidity	53%
Atmospheric Pressure	1010mbar
Test date :	September 12, 2017
Tested By :	Loren Luo

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			
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 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

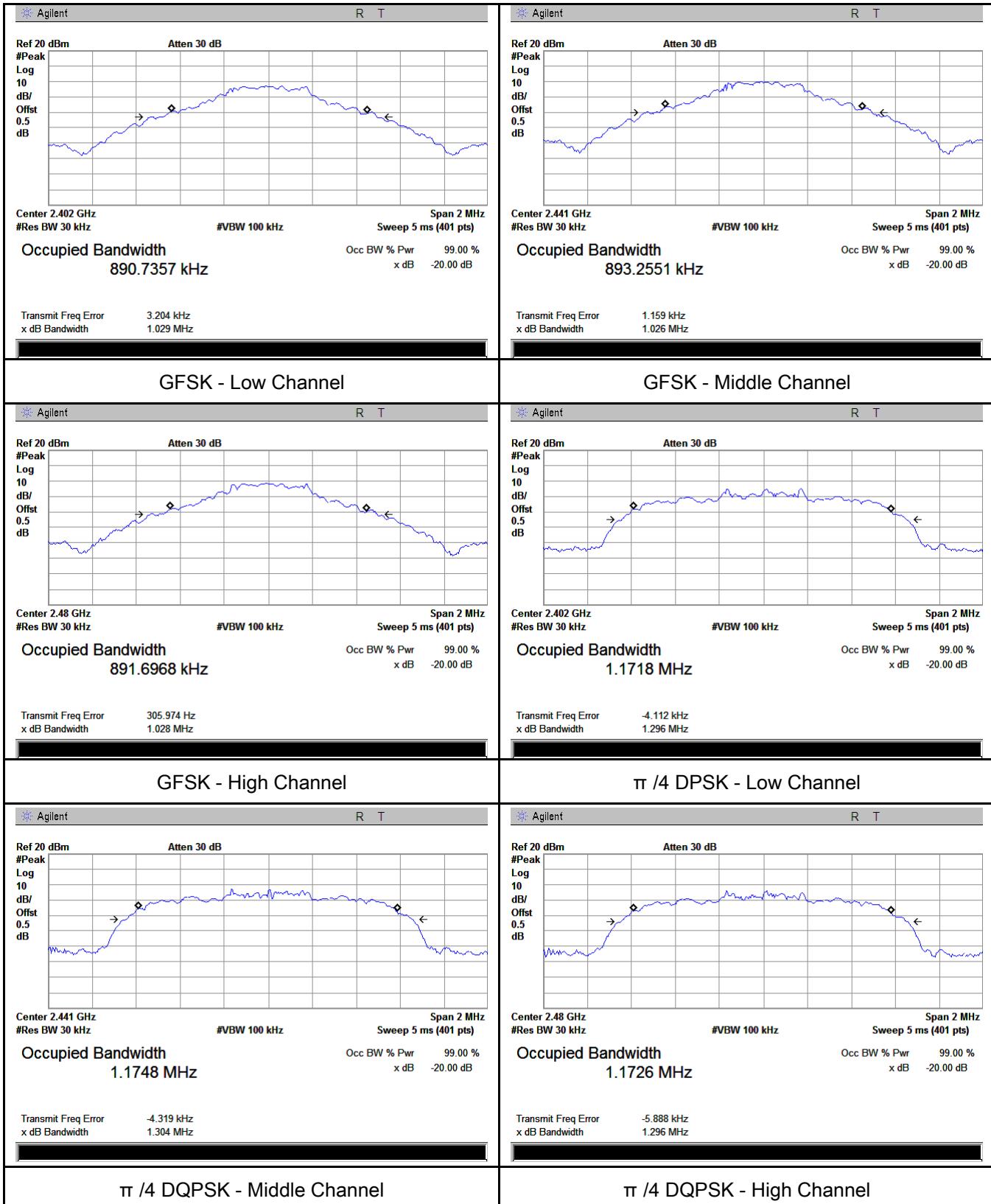
Test Plot Yes (See below) N/A

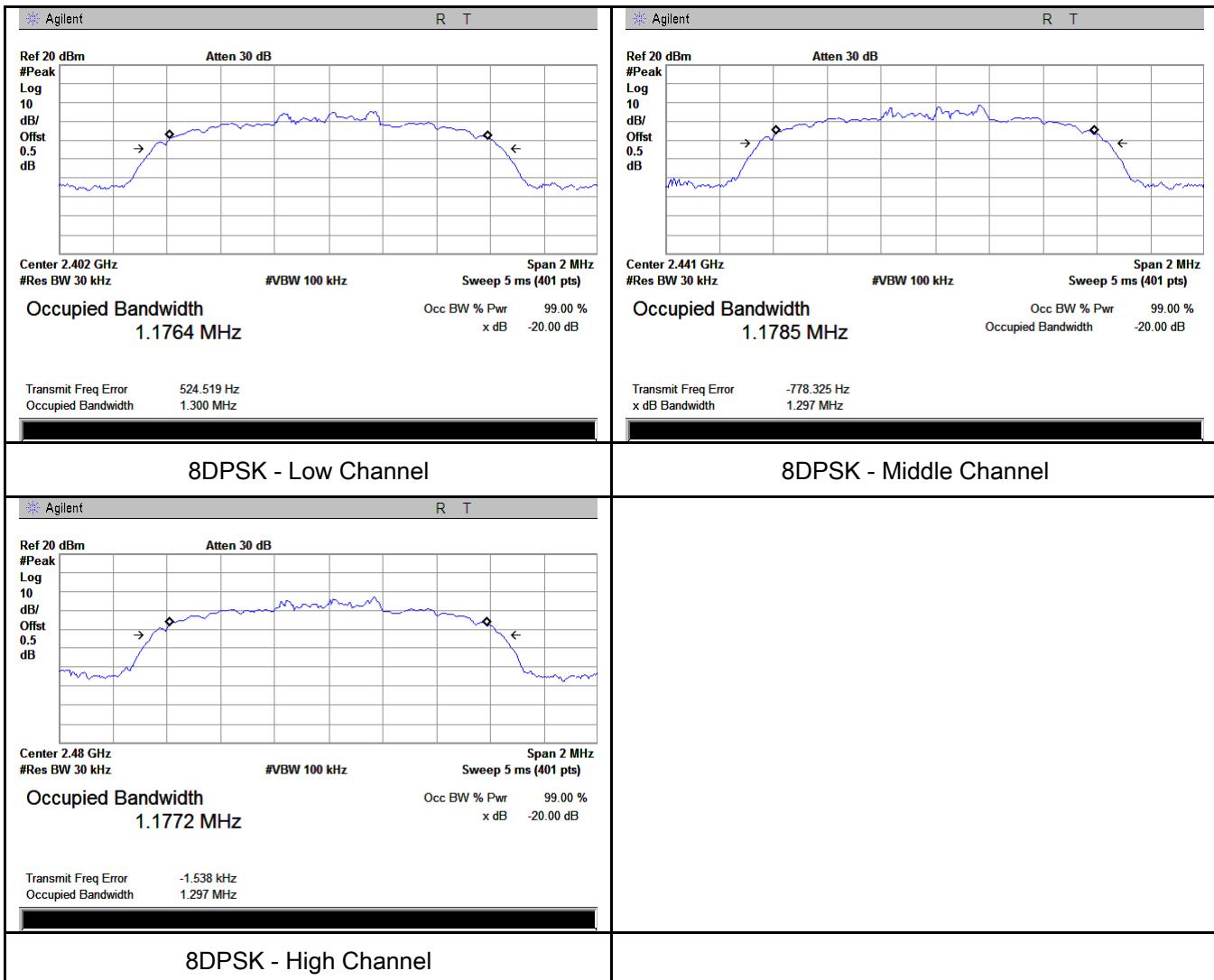
Measurement result

Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.029	0.8907
	Mid	2441	1.026	0.8933
	High	2480	1.028	0.8917
$\pi/4$ DQPSK	Low	2402	1.296	1.1718
	Mid	2441	1.304	1.1748
	High	2480	1.296	1.1726
8-DPSK	Low	2402	1.300	1.1764
	Mid	2441	1.297	1.1785
	High	2480	1.297	1.1772

Test Plots

20dB Bandwidth measurement result

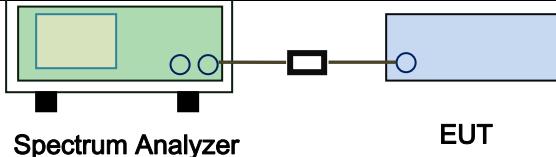




6.4 Peak Output Power

Temperature	25°C
Relative Humidity	53%
Atmospheric Pressure	1010mbar
Test date :	September 12, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3)	a)	FHSS in 2400-2483.5MHz with \geq 75 channels: \leq 1 Watt	<input checked="" type="checkbox"/>
	b)	FHSS in 5725-5850MHz: \leq 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: \leq 0.125 Watt.	<input checked="" type="checkbox"/>
	d)	FHSS in 902-928MHz with \geq 50 channels: \leq 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with \geq 25 & $<$ 50 channels: \leq 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: \leq 1 Watt	<input type="checkbox"/>
Test Setup		 Spectrum Analyzer EUT	
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

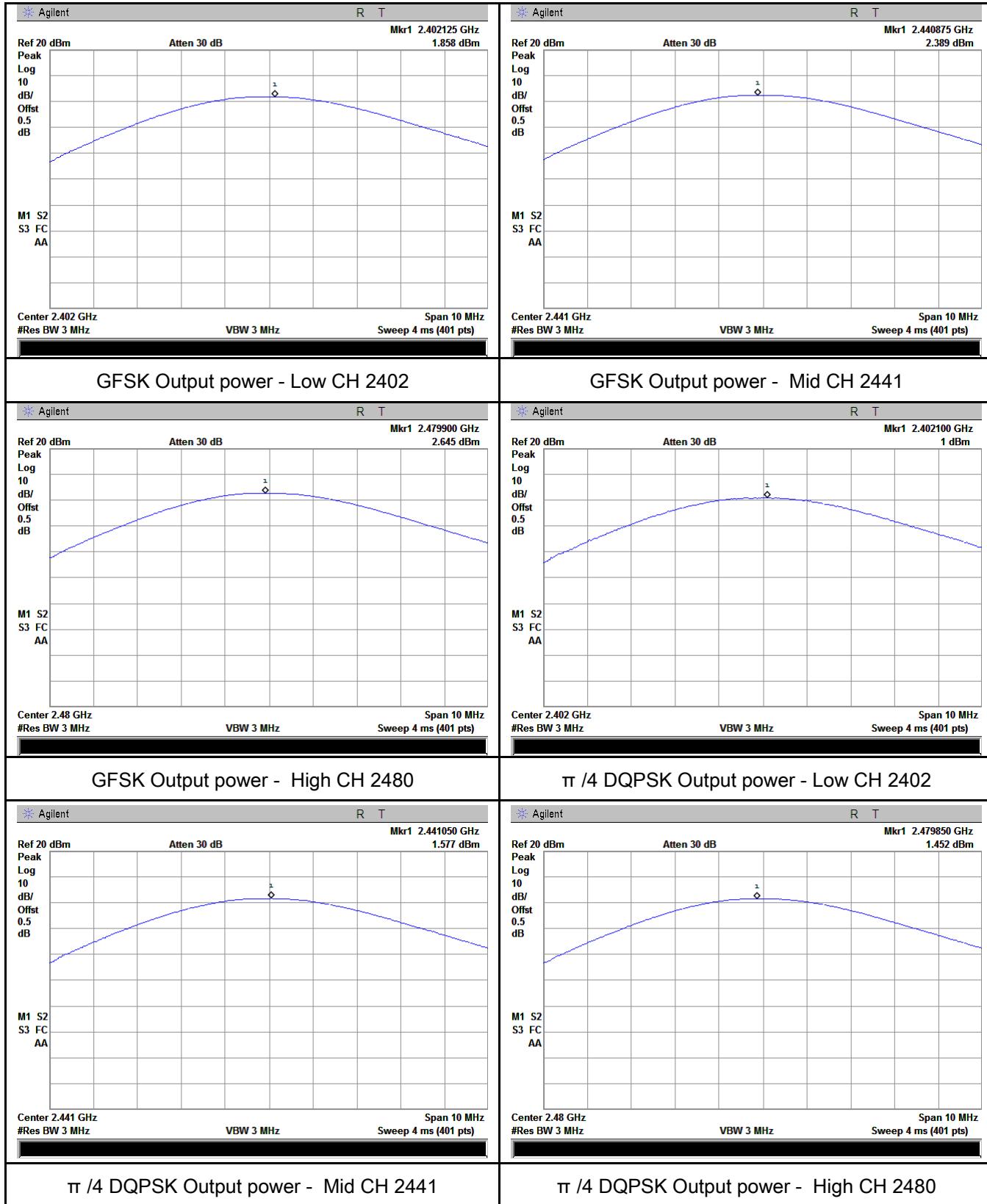
Test Plot Yes (See below) N/A

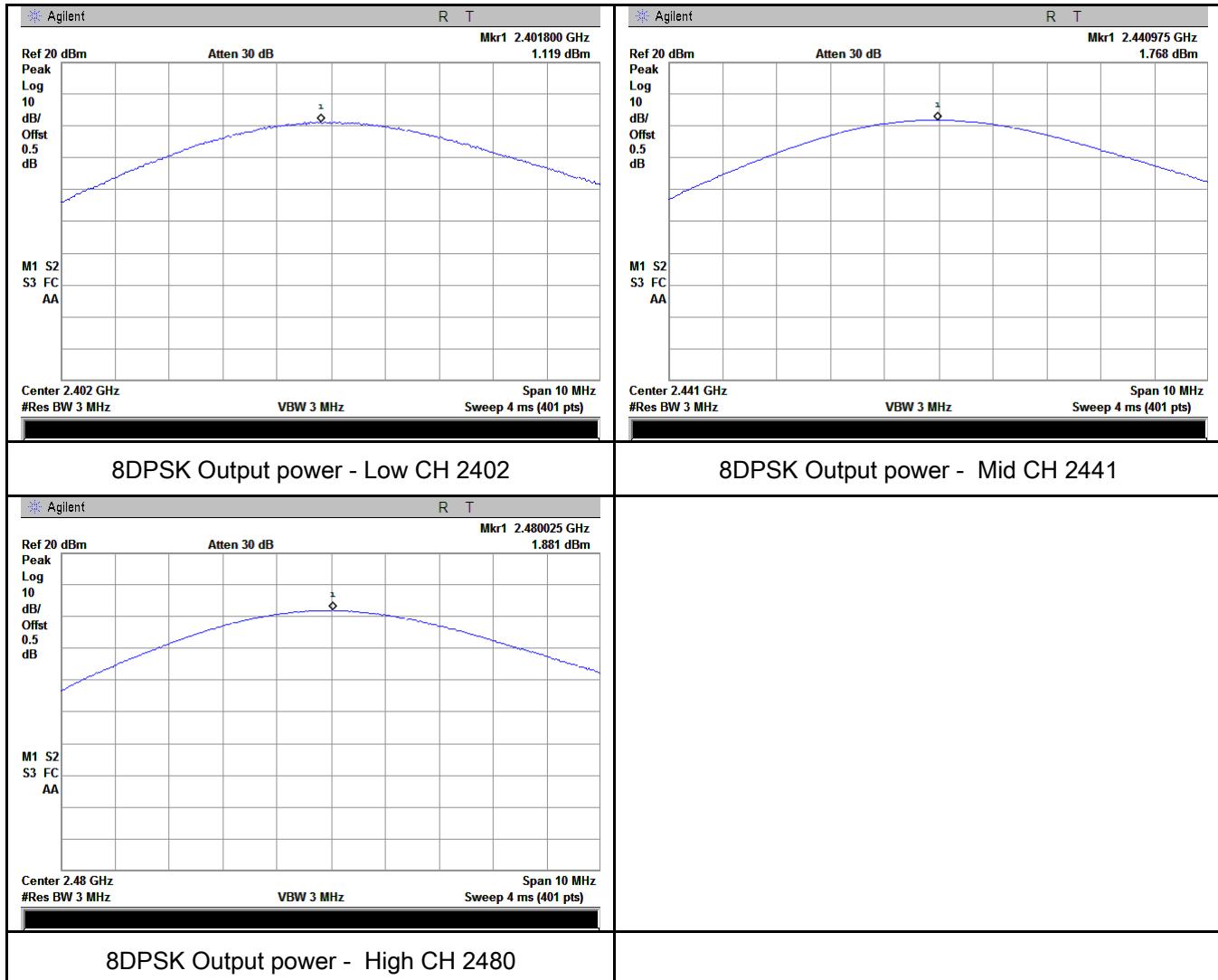
Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	1.858	125	Pass
		Mid	2441	2.389	125	Pass
		High	2480	2.645	125	Pass
	$\pi/4$ DQPSK	Low	2402	1.000	125	Pass
		Mid	2441	1.577	125	Pass
		High	2480	1.452	125	Pass
	8-DPSK	Low	2402	1.119	125	Pass
		Mid	2441	1.768	125	Pass
		High	2480	1.881	125	Pass

Test Plots

Output Power measurement result

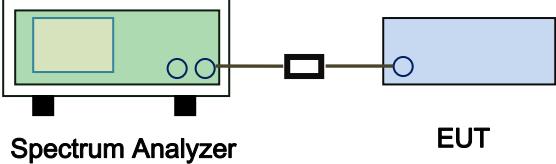




6.5 Number of Hopping Channel

Temperature	25°C
Relative Humidity	53%
Atmospheric Pressure	1010mbar
Test date :	September 12, 2017
Tested By :	Loren Luo

Requirement(s):

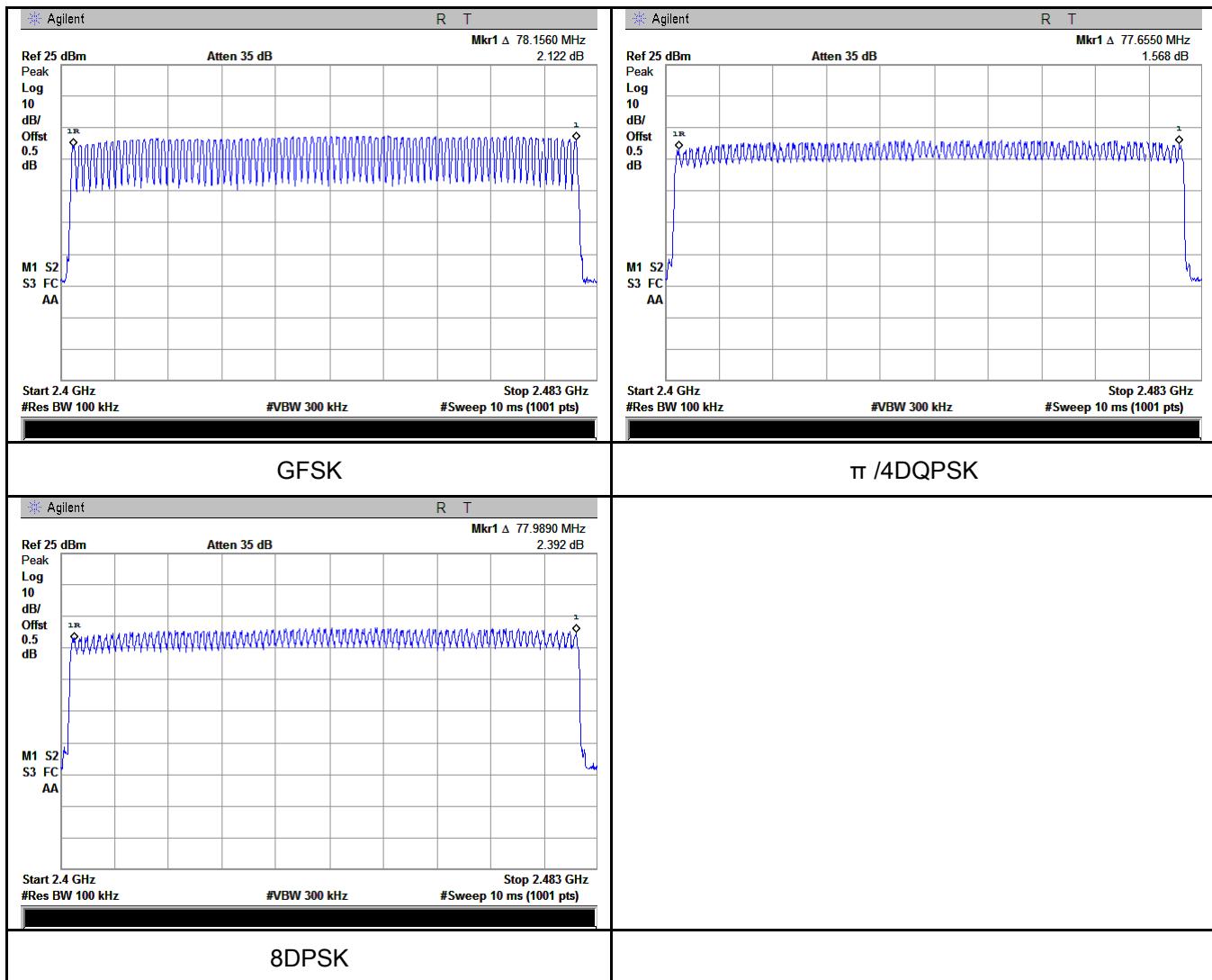
Spec	Item	Requirement	Applicable	
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz \geq 15 channels	<input checked="" type="checkbox"/>	
Test Setup				
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.</p> <p><u>Use the following spectrum analyzer settings:</u></p> <p>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	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	N/A
Test Plot	<input checked="" type="checkbox"/>	Yes (See below)	<input type="checkbox"/>	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	53%
Atmospheric Pressure	1010mbar
Test date :	September 12, 2017
Tested By :	Loren Luo

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>	
The test follows FCC Public Notice DA 00-705 Measurement Guidelines.			
<u>Use the following spectrum analyzer</u> <ul style="list-style-type: none"> - Span = zero span, centered on a hopping channel - RBW = 1 MHz - VBW \geq RBW - Sweep = as necessary to capture the entire dwell time per hopping channel - Detector function = peak - Trace = max hold - use the marker-delta function to determine the dwell time 			
Test Procedure			
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes

N/A

Test Plot Yes (See below)

NA

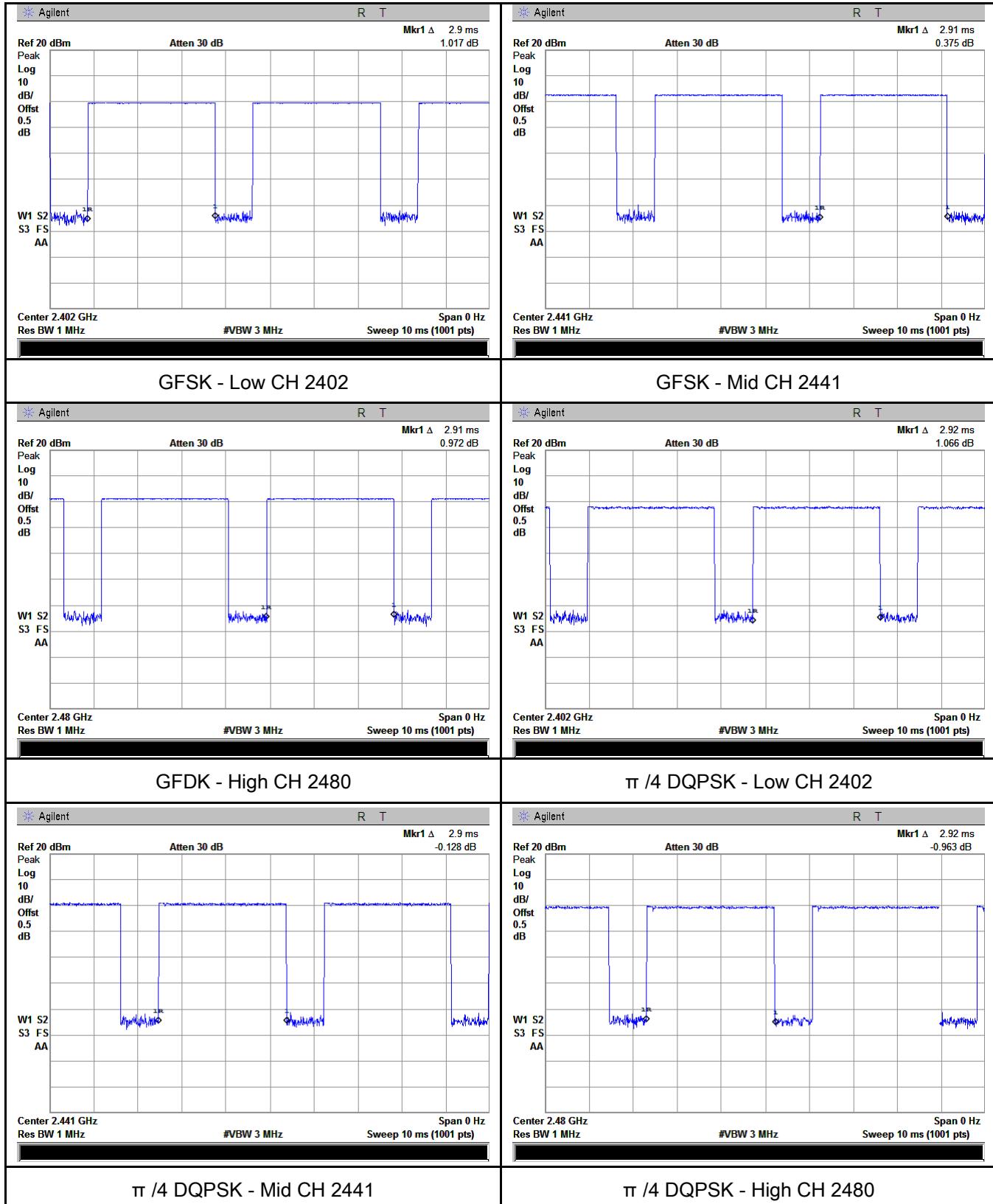
Dwell Time measurement result

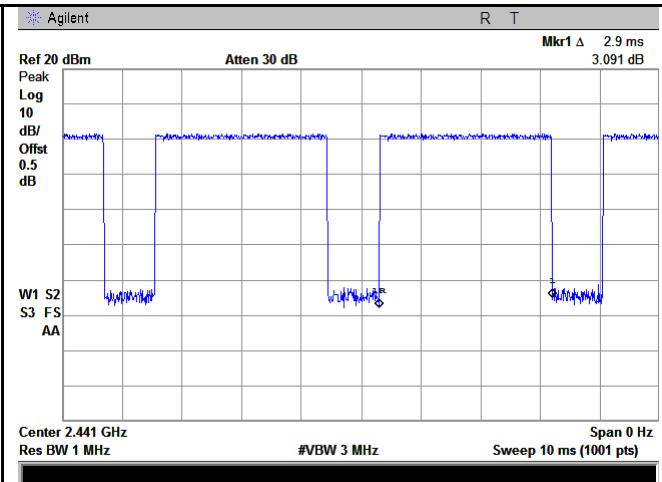
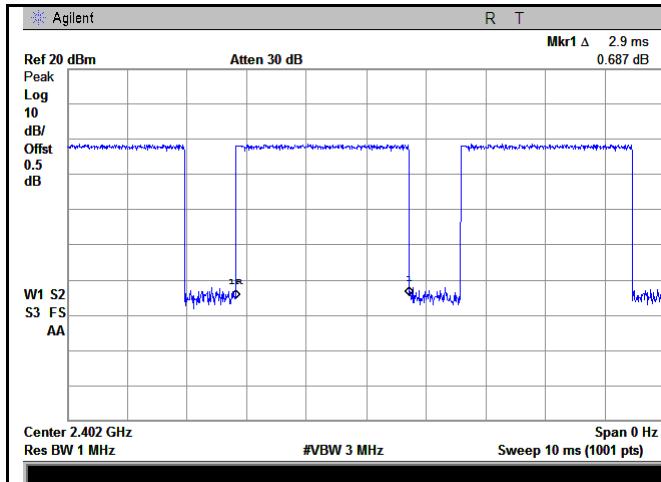
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.90	309.333	400	Pass
		Mid	2.91	310.400	400	Pass
		High	2.91	310.400	400	Pass
	$\pi/4$ DQPSK	Low	2.92	311.467	400	Pass
		Mid	2.90	309.333	400	Pass
		High	2.92	311.467	400	Pass
	8-DPSK	Low	2.90	309.333	400	Pass
		Mid	2.90	309.333	400	Pass
		High	2.92	311.467	400	Pass

Note: Dwell time=Pulse Time (ms) $\times (1600 \div 6 \div 79) \times 31.6$

Test Plots

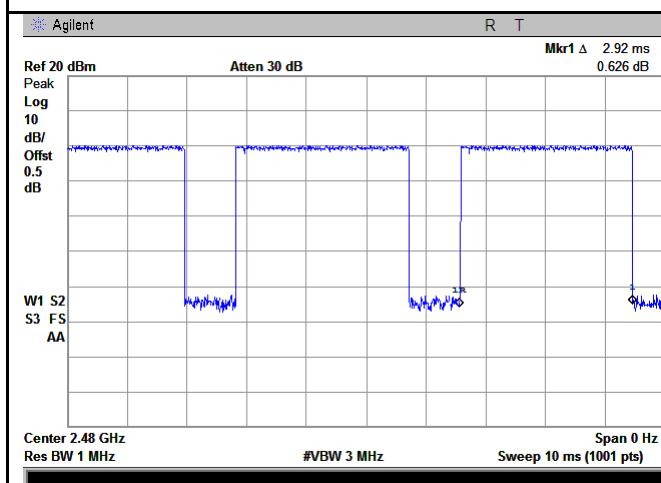
Dwell Time measurement result





8DPSK - Low CH 2402

8DPSK - Mid CH 2441

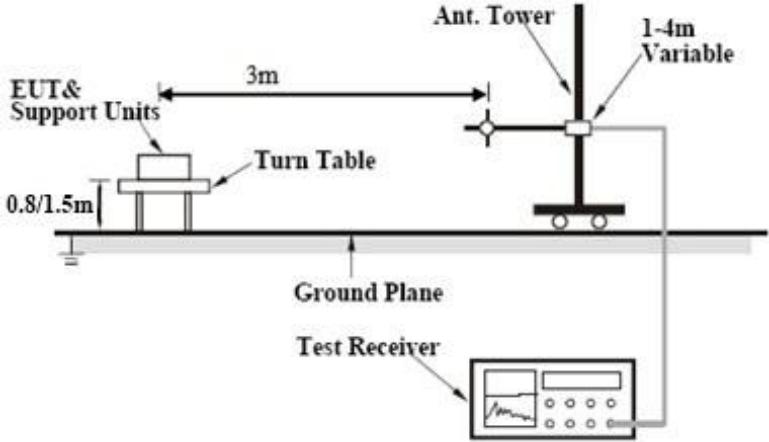


8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1015mbar
Test date :	August 07, 2017
Tested By :	Evans He

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	 <p>The diagram illustrates the test setup. An EUT & Support Units is positioned on a Turn Table, which is placed on a Ground Plane. The Turn Table is at a height of 0.8/1.5m. A vertical Ant. Tower is connected to the EUT via a cable. The distance between the EUT and the Ant. Tower is 3m. The Ant. Tower is connected to a Test Receiver, which is shown as a device with a screen and buttons. The height of the Ant. Tower is adjustable, indicated as 1-4m Variable.</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only</p> <ul style="list-style-type: none"> - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, 		

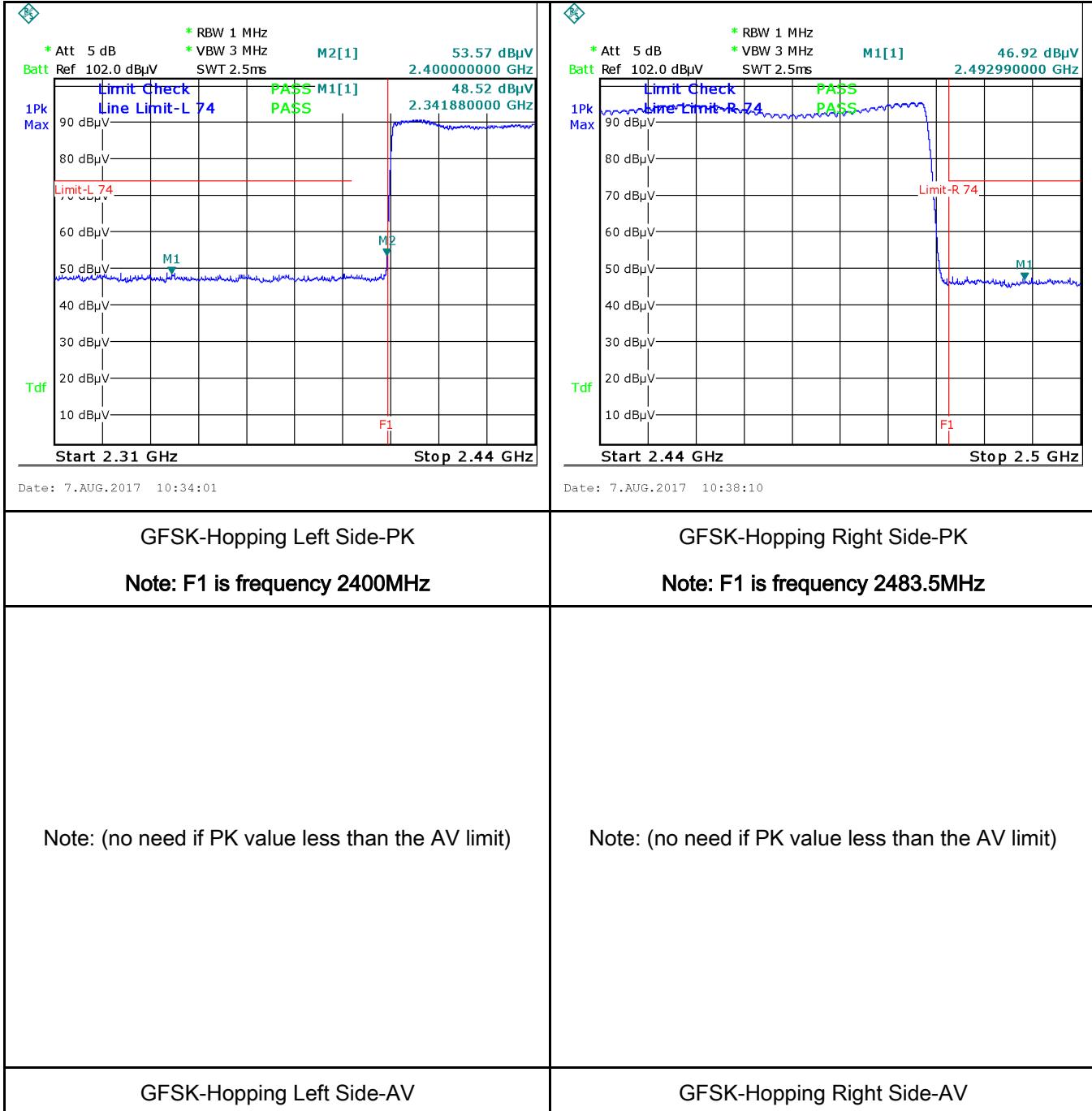
	<p>and make sure the instrument is operated in its linear range.</p> <ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer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

Test Data Yes N/A

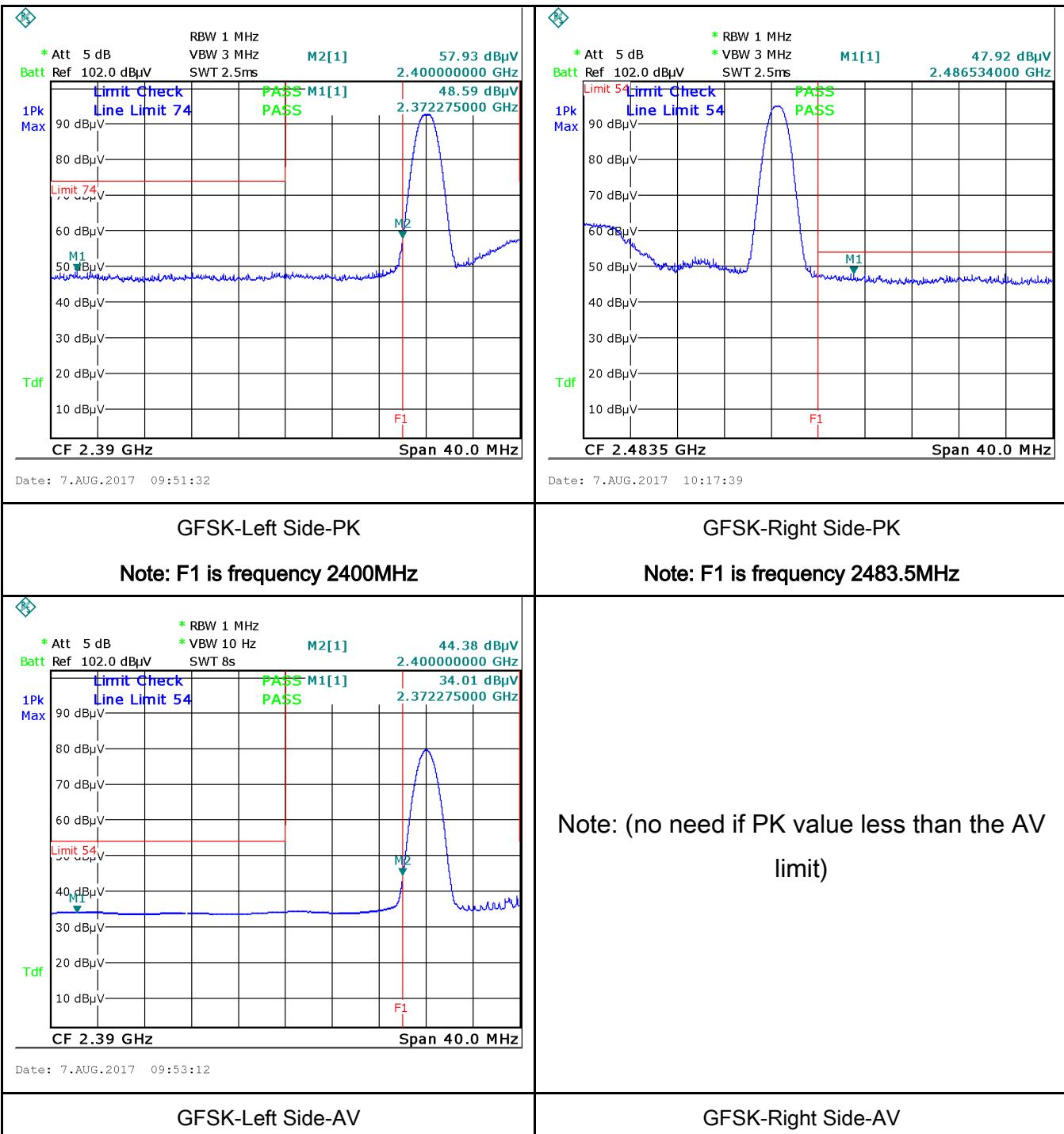
Test Plot Yes (See below) N/A

Test Plots

GFSK Mode:

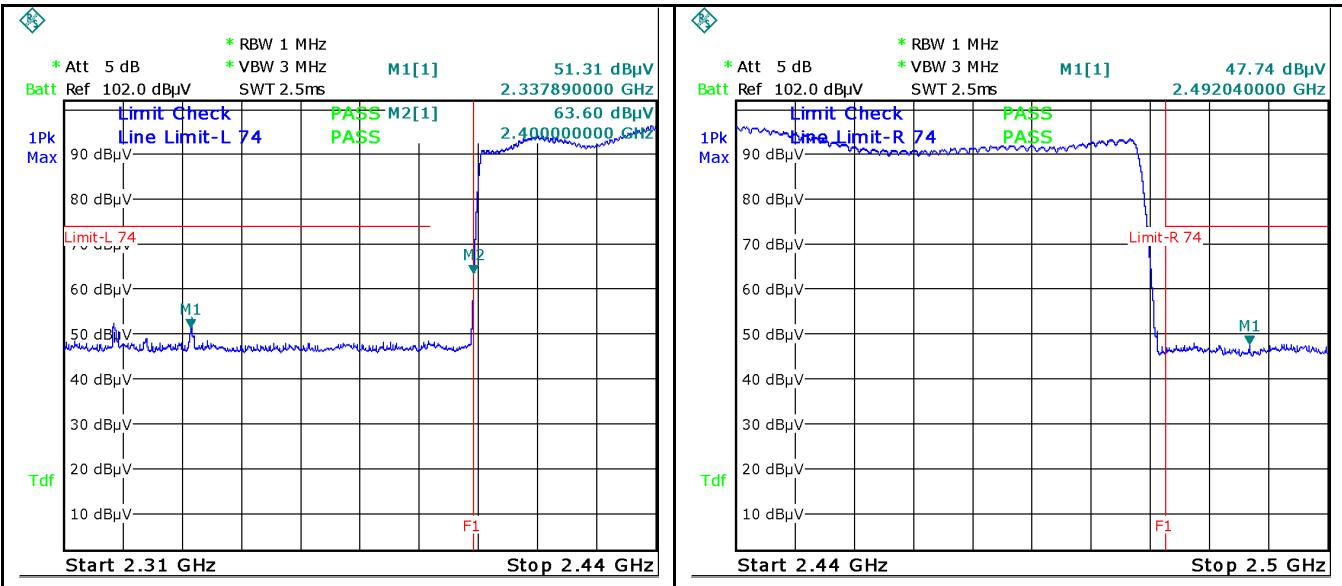


Note: Both Horizontal and vertical polarities were investigated.



Note: Both Horizontal and vertical polarities were investigated.

$\pi/4$ DQPSK Mode:



Date: 7.AUG.2017 10:53:22

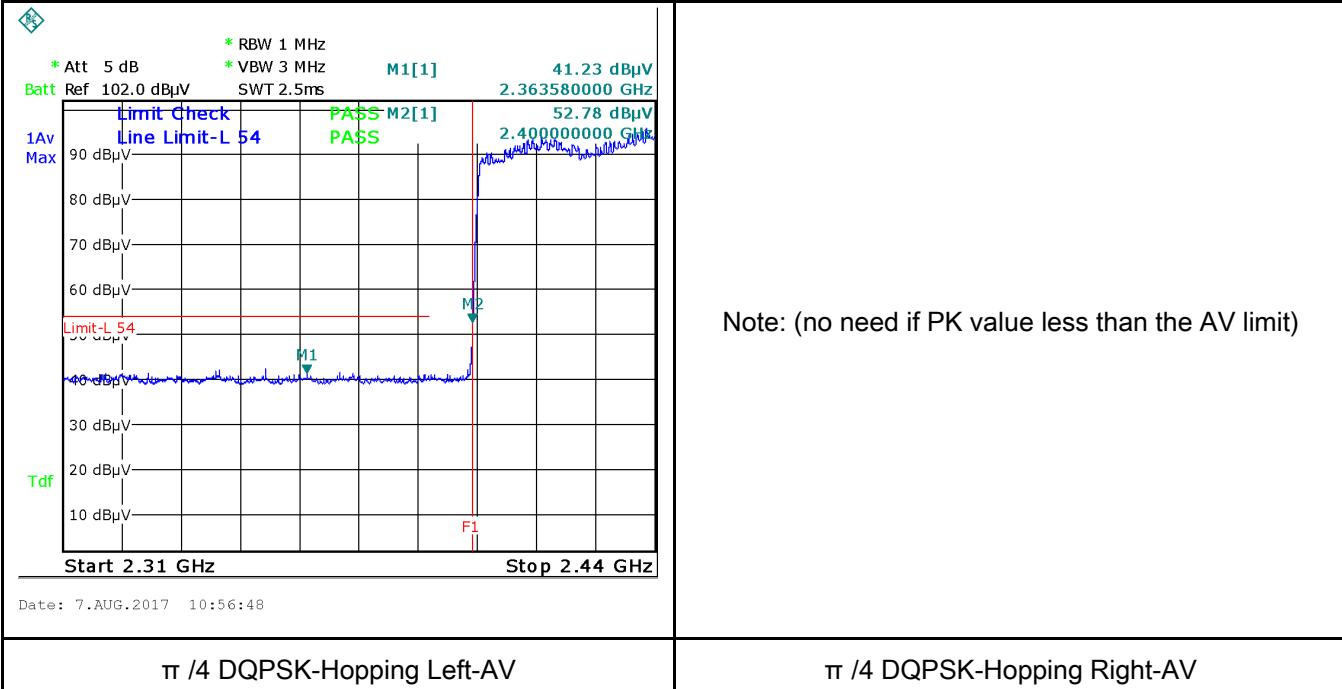
Date: 7.AUG.2017 10:48:20

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

Note: F1 is frequency 2400MHz

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

Note: F1 is frequency 2483.5MHz

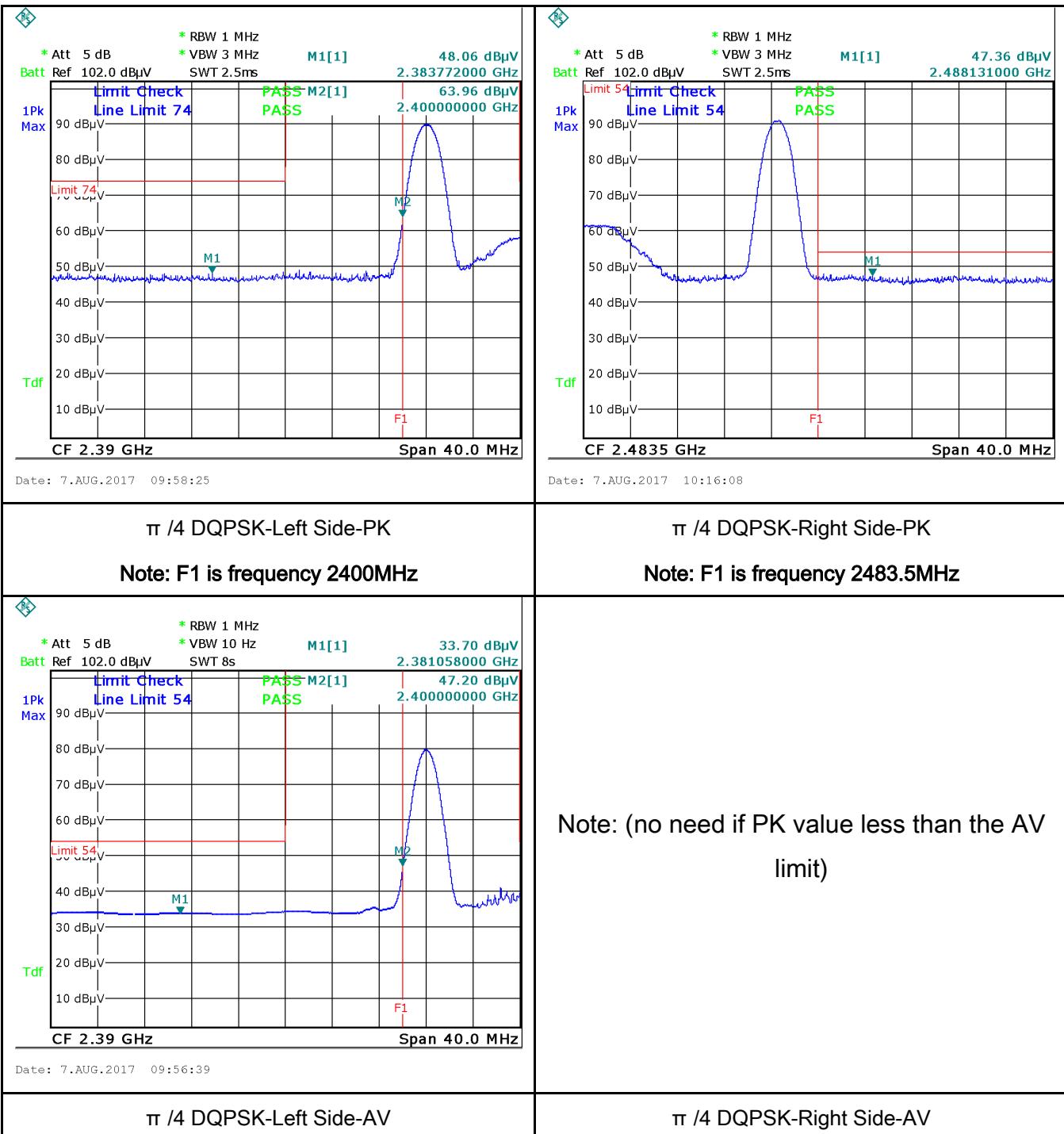


Date: 7.AUG.2017 10:56:48

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

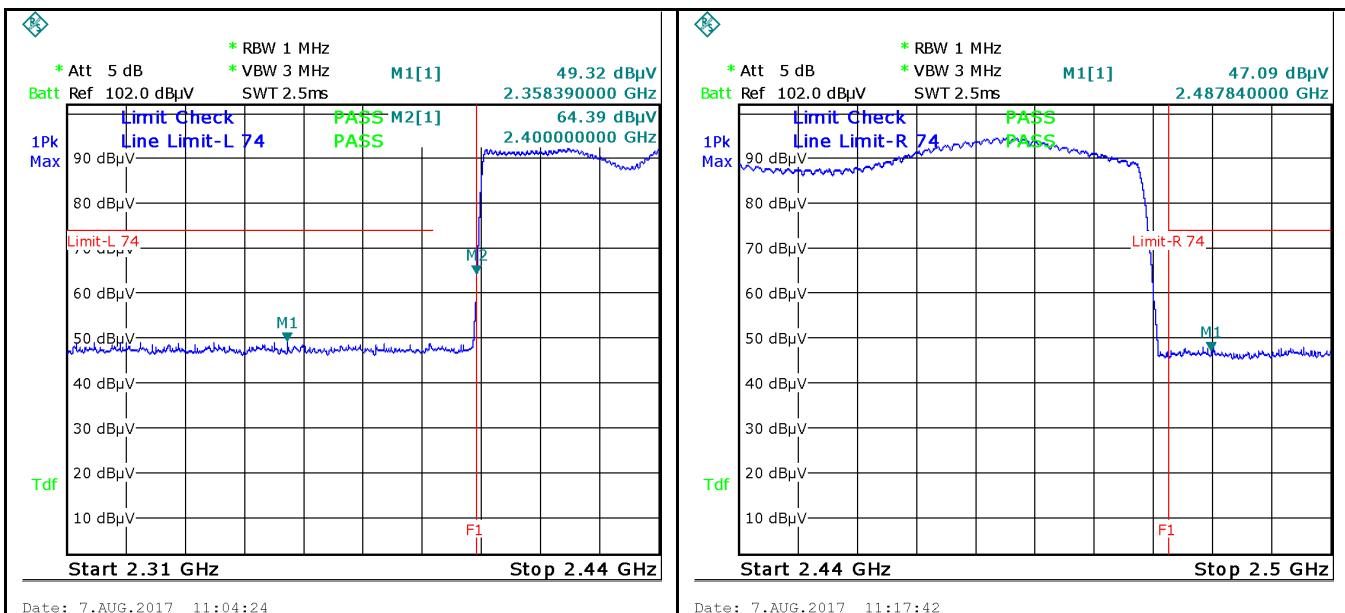
$\pi/4$ DQPSK-Hopping Right-AV

Note: Both Horizontal and vertical polarities were investigated.



Note: Both Horizontal and vertical polarities were investigated.

8-DPSK Mode:



Date: 7.AUG.2017 11:04:24

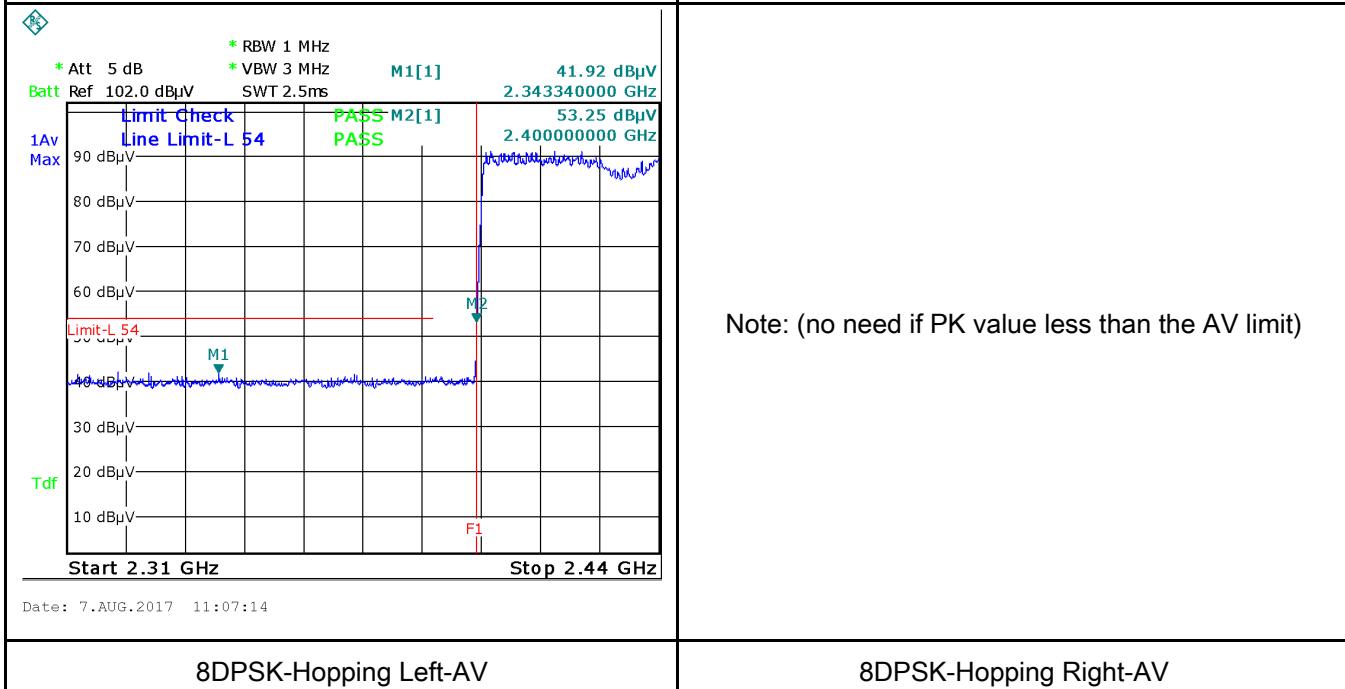
Date: 7.AUG.2017 11:17:42

8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 7.AUG.2017 11:07:14

8DPSK-Hopping Left-AV

8DPSK-Hopping Right-AV

Note: Both Horizontal and vertical polarities were investigated.

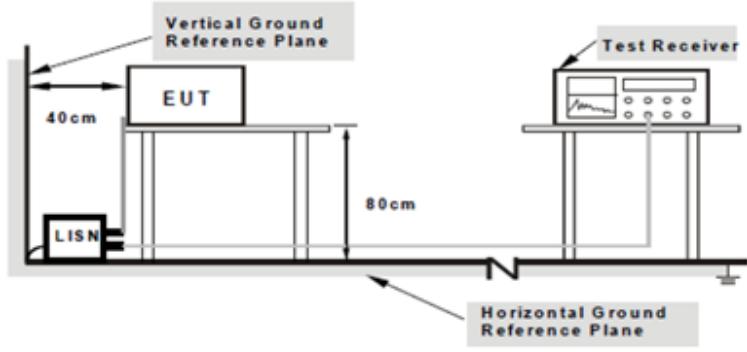


Note: Both Horizontal and vertical polarities were investigated.

6.8 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1015mbar
Test date :	August 07, 2017
Tested By :	Evans He

Requirement(s):

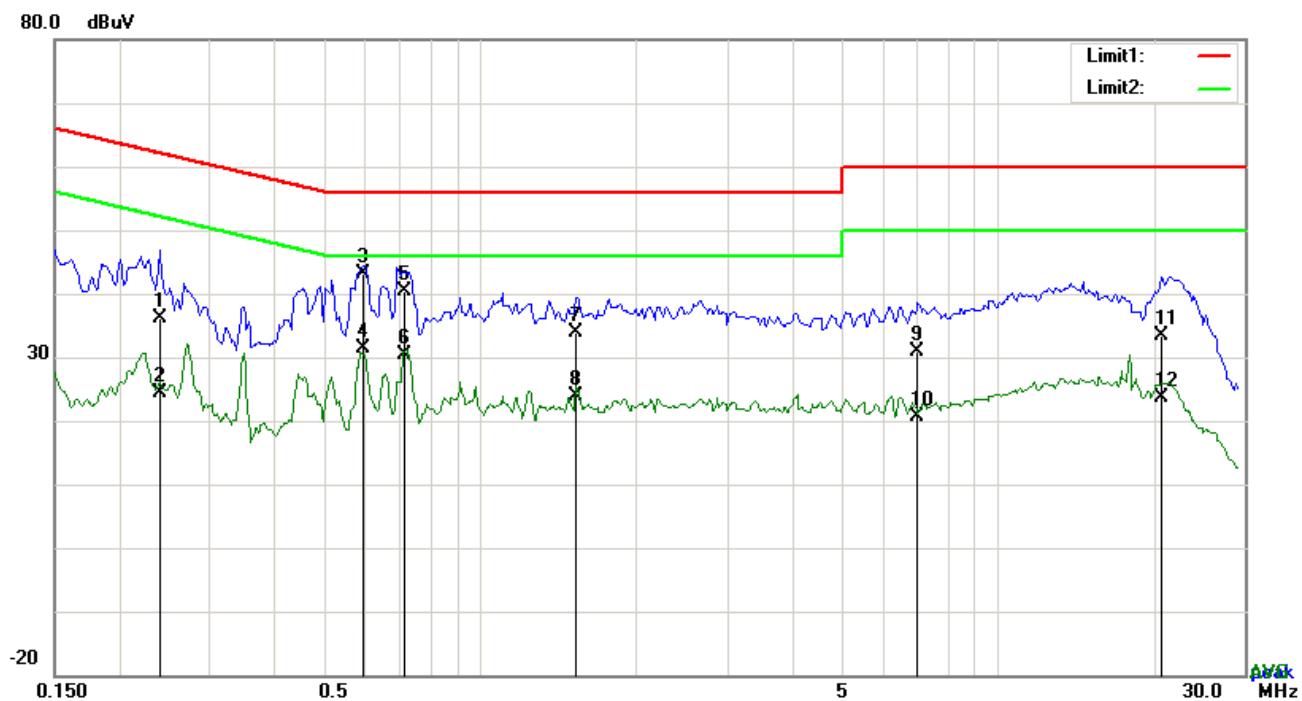
Spec	Item	Requirement	Applicable														
47CFR§15.207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within 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.</p> <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	<input checked="" type="checkbox"/>
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															
Test Setup	 <p>Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>																
Procedure	<ol style="list-style-type: none"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss 																

	<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

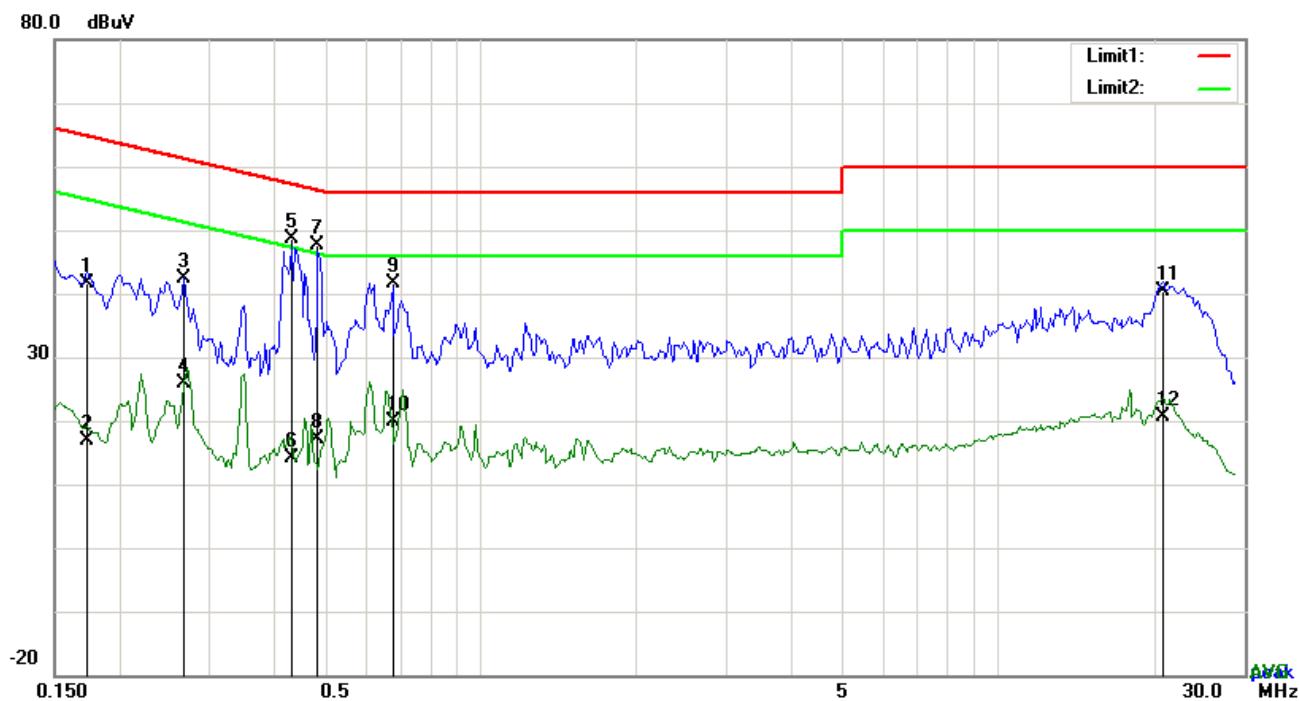


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	L1	0.2397	26.06	QP	10.03	36.09	62.11	-26.02
2	L1	0.2397	14.34	AVG	10.03	24.37	52.11	-27.74
3	L1	0.5946	33.17	QP	10.03	43.20	56.00	-12.80
4	L1	0.5946	21.46	AVG	10.03	31.49	46.00	-14.51
5	L1	0.7122	30.31	QP	10.03	40.34	56.00	-15.66
6	L1	0.7122	20.27	AVG	10.03	30.30	46.00	-15.70
7	L1	1.5345	23.81	QP	10.04	33.85	56.00	-22.15
8	L1	1.5345	13.89	AVG	10.04	23.93	46.00	-22.07
9	L1	7.0170	20.79	QP	10.11	30.90	60.00	-29.10
10	L1	7.0170	10.57	AVG	10.11	20.68	50.00	-29.32
11	L1	20.7333	23.01	QP	10.31	33.32	60.00	-26.68
12	L1	20.7333	13.37	AVG	10.31	23.68	50.00	-26.32

Test Mode: Bluetooth Mode

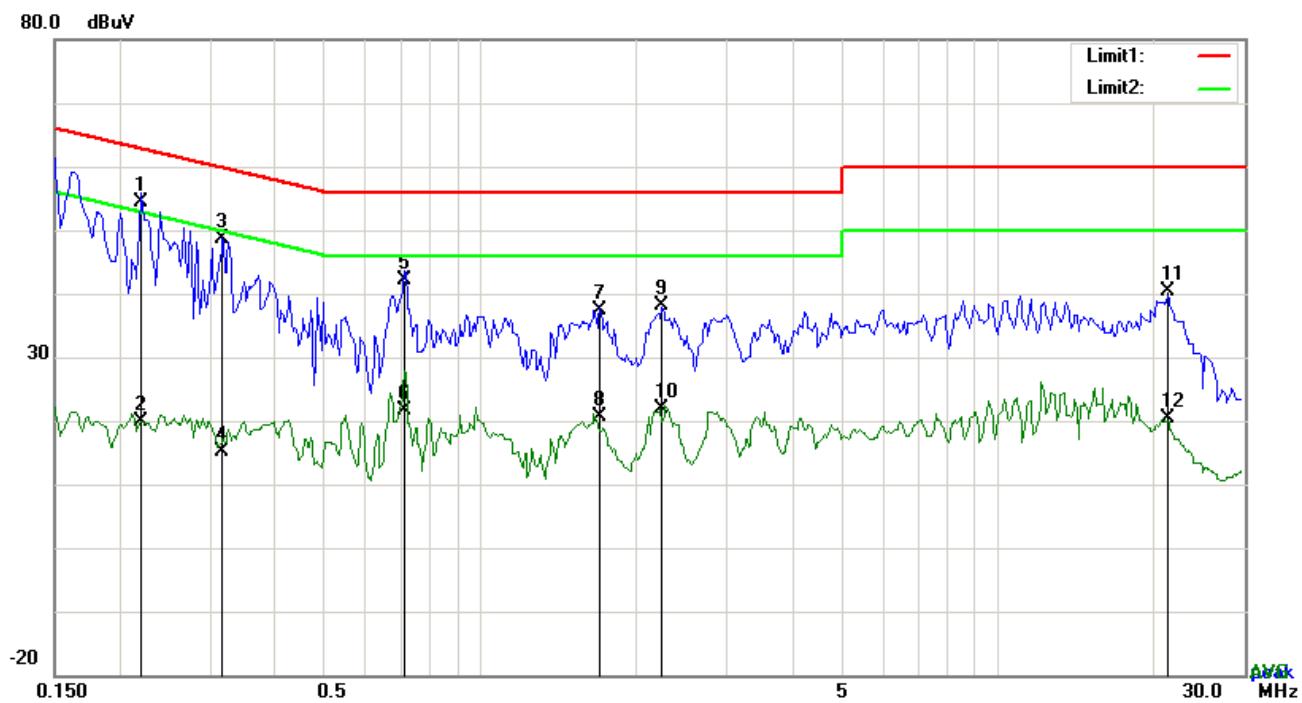


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	N	0.1734	31.56	QP	10.02	41.58	64.80	-23.22
2	N	0.1734	6.94	AVG	10.02	16.96	54.80	-37.84
3	N	0.2670	32.40	QP	10.02	42.42	61.21	-18.79
4	N	0.2670	15.78	AVG	10.02	25.80	51.21	-25.41
5	N	0.4308	38.59	QP	10.02	48.61	57.24	-8.63
6	N	0.4308	4.23	AVG	10.02	14.25	47.24	-32.99
7	N	0.4854	37.54	QP	10.02	47.56	56.25	-8.69
8	N	0.4854	7.23	AVG	10.02	17.25	46.25	-29.00
9	N	0.6765	31.73	QP	10.02	41.75	56.00	-14.25
10	N	0.6765	9.75	AVG	10.02	19.77	46.00	-26.23
11	N	20.8191	30.12	QP	10.27	40.39	60.00	-19.61
12	N	20.8191	10.48	AVG	10.27	20.75	50.00	-29.25

Test Mode: Bluetooth Mode

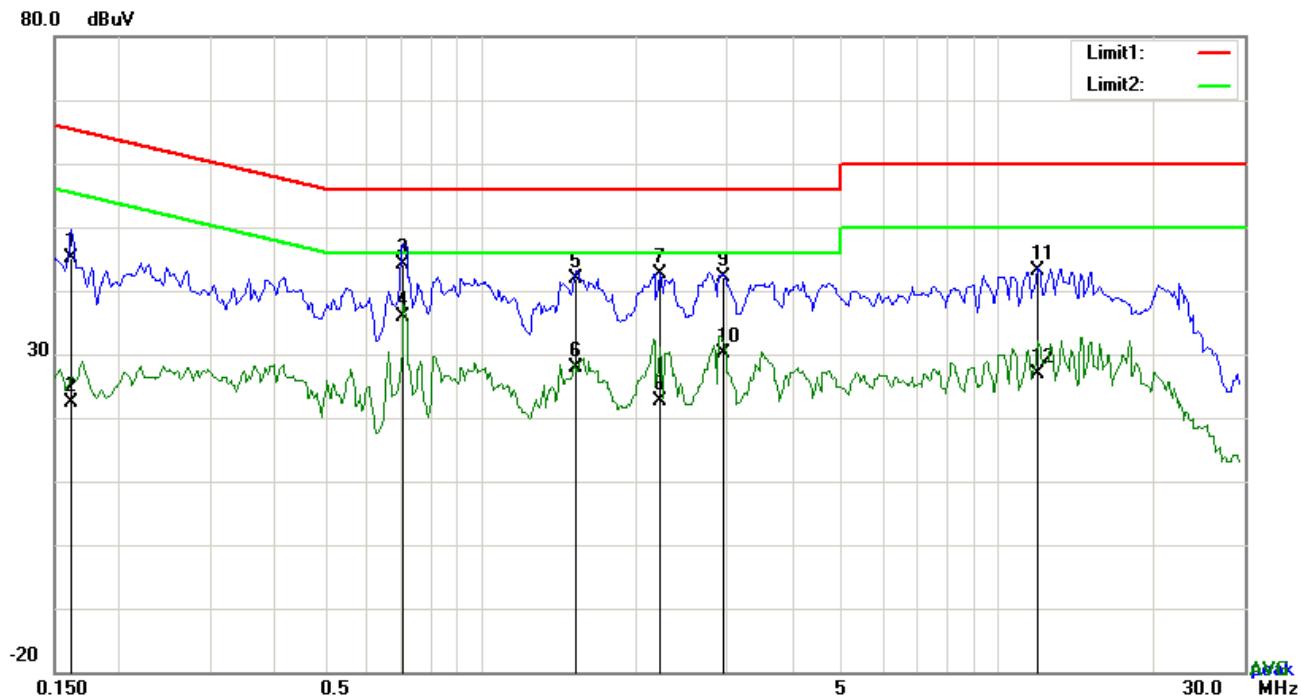


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	L1	0.2202	44.38	QP	10.03	54.41	62.81	-8.40
2	L1	0.2202	9.93	AVG	10.03	19.96	52.81	-32.85
3	L1	0.3177	38.72	QP	10.03	48.75	59.77	-11.02
4	L1	0.3177	5.13	AVG	10.03	15.16	49.77	-34.61
5	L1	0.7155	32.10	QP	10.03	42.13	56.00	-13.87
6	L1	0.7155	11.59	AVG	10.03	21.62	46.00	-24.38
7	L1	1.6983	27.32	QP	10.04	37.36	56.00	-18.64
8	L1	1.6983	10.53	AVG	10.04	20.57	46.00	-25.43
9	L1	2.2443	28.19	QP	10.05	38.24	56.00	-17.76
10	L1	2.2443	11.92	AVG	10.05	21.97	46.00	-24.03
11	L1	21.3417	29.95	QP	10.33	40.28	60.00	-19.72
12	L1	21.3417	10.12	AVG	10.33	20.45	50.00	-29.55

Test Mode: Bluetooth Mode



Phase Neutral Plot at 240Vac, 60Hz

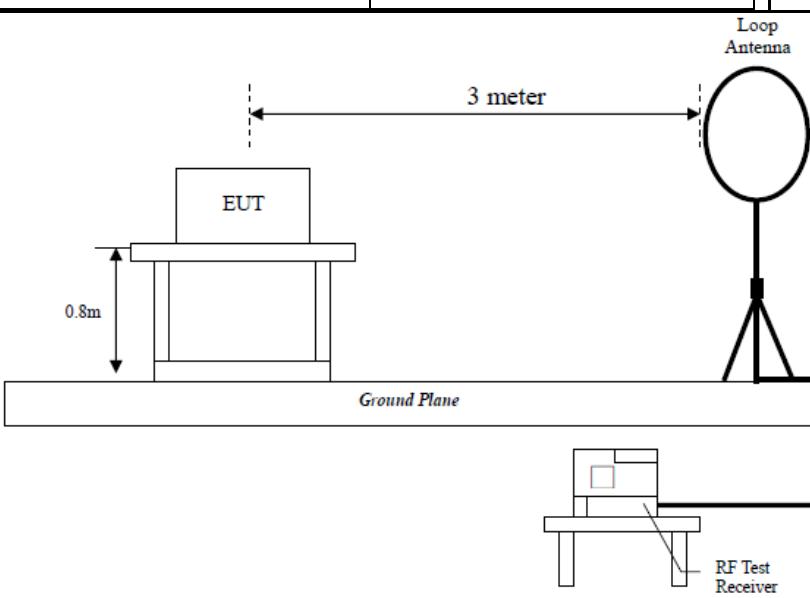
No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	N	0.1617	35.17	QP	10.02	45.19	65.38	-20.19
2	N	0.1617	12.30	AVG	10.02	22.32	55.38	-33.06
3	N	0.7116	34.10	QP	10.02	44.12	56.00	-11.88
4	N	0.7116	25.87	AVG	10.02	35.89	46.00	-10.11
5	N	1.5345	31.74	QP	10.04	41.78	56.00	-14.22
6	N	1.5345	17.82	AVG	10.04	27.86	46.00	-18.14
7	N	2.2248	32.50	QP	10.04	42.54	56.00	-13.46
8	N	2.2248	12.62	AVG	10.04	22.66	46.00	-23.34
9	N	2.9463	32.06	QP	10.05	42.11	56.00	-13.89
10	N	2.9463	20.08	AVG	10.05	30.13	46.00	-15.87
11	N	11.9505	33.06	QP	10.16	43.22	60.00	-16.78
12	N	11.9505	16.71	AVG	10.16	26.87	50.00	-23.13

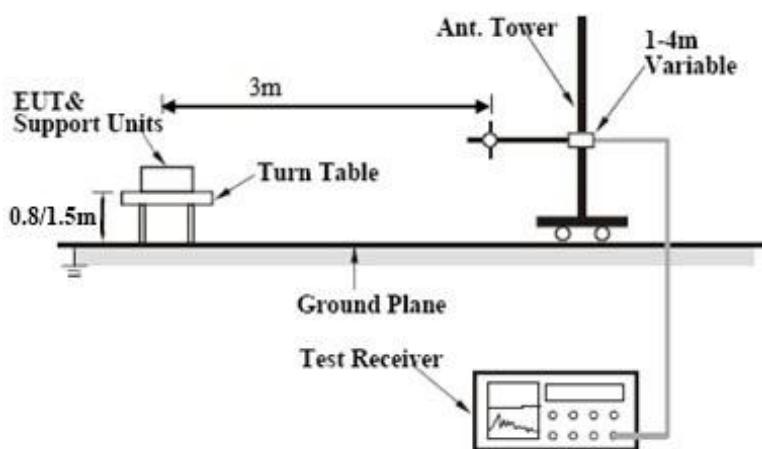
6.9 Radiated Emissions & Restricted Band

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1015mbar
Test date :	August 07, 2017
Tested By :	Evans He

Requirement(s):

Spec	Item	Requirement	Applicable																
47CFR§15. 205, §15.209, §15.247(d)	a)	<p>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</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (μV/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 (μ V/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	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (μ V/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. A Loop Antenna is positioned 3 meters horizontally from the EUT (Equipment Under Test), which is placed on a stand 0.8 meters above a Ground Plane. An RF Test Receiver is connected to the Loop Antenna via a cable.</p>
------------	--



Procedure	<ol style="list-style-type: none"> 1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. 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"> a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. 4. 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. 5. 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	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> N/A
Test Plot	<input checked="" type="checkbox"/> Yes (See below) <input type="checkbox"/> N/A

Test Result:

Test Mode:	Transmitting Mode
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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:

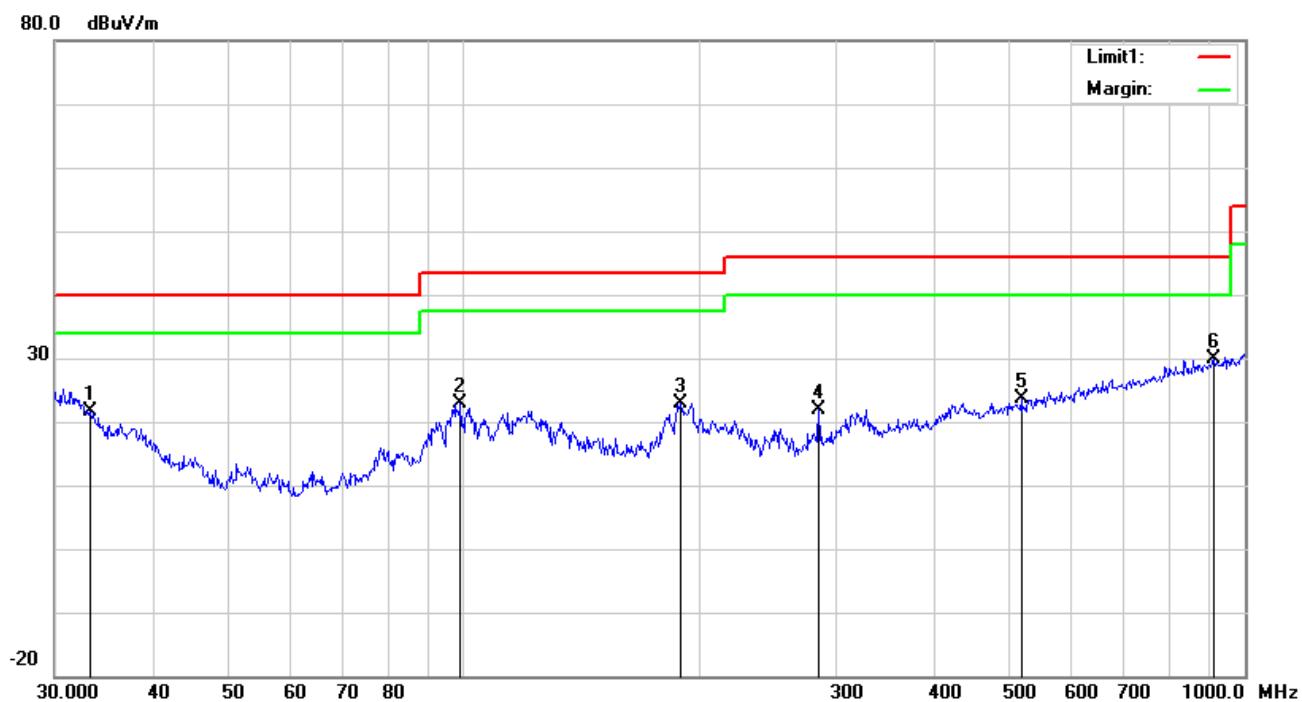
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

Test Mode: Bluetooth Mode

30MHz -1GHz

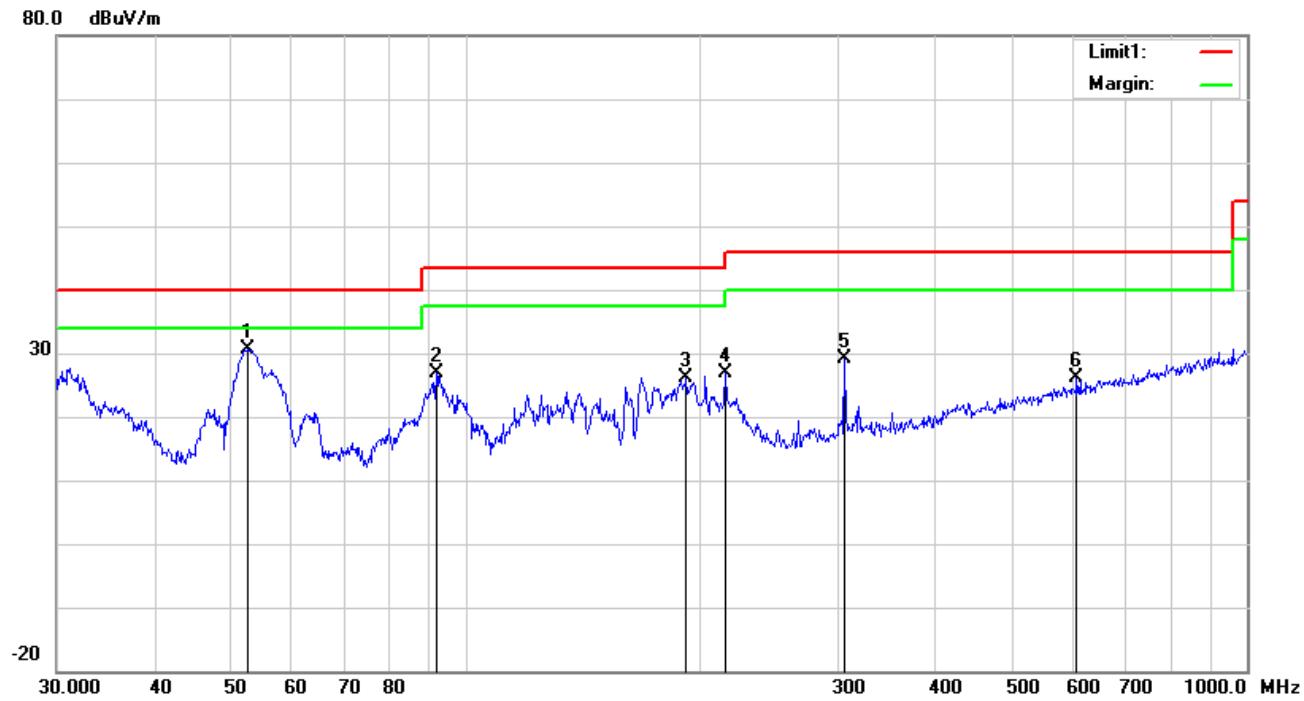


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	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	33.3279	24.42	peak	18.84	22.26	0.71	21.71	40.00	-18.29	100	48
2	H	99.1797	33.88	peak	10.20	22.32	1.10	22.86	43.50	-20.64	100	346
3	H	189.7385	32.19	peak	11.54	22.31	1.54	22.96	43.50	-20.54	100	97
4	H	284.9767	29.57	peak	12.94	22.29	1.76	21.98	46.00	-24.02	100	340
5	H	517.2480	25.12	peak	17.94	21.77	2.44	23.73	46.00	-22.27	100	32
6	H	912.8620	24.99	peak	22.56	20.86	3.10	29.79	46.00	-16.21	100	325

30MHz -1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	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	V	52.5753	44.04	peak	8.12	22.39	0.79	30.56	40.00	-9.44	100	219
2	V	91.8163	39.78	peak	8.44	22.32	0.96	26.86	43.50	-16.64	200	155
3	V	191.7450	35.26	peak	11.65	22.33	1.54	26.12	43.50	-17.38	100	52
4	V	215.2678	35.76	peak	11.89	22.35	1.59	26.89	43.50	-16.61	100	155
5	V	305.6800	35.88	peak	13.72	22.27	1.82	29.15	46.00	-16.85	100	57
6	V	605.6592	25.94	peak	19.16	21.57	2.51	26.04	46.00	-19.96	100	204

Above 1GHz

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

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	42.57	AV	V	33.39	7.22	48.46	34.72	54	-19.28
4804	41.06	AV	H	33.39	7.22	48.46	33.21	54	-20.79
4804	52.87	PK	V	33.39	7.22	48.46	45.02	74	-28.98
4804	50.37	PK	H	33.39	7.22	48.46	42.52	74	-31.48
4015	34.16	AV	V	31.76	6.6	49.36	23.16	54	-30.84
4015	33.26	AV	H	31.76	6.6	49.36	22.26	54	-31.74
4015	56.87	PK	V	31.76	6.6	49.36	45.87	74	-28.13
4015	54.26	PK	H	31.76	6.6	49.36	43.26	74	-30.74

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	46.82	AV	V	33.62	7.53	48.36	39.61	54	-14.39
4882	44.71	AV	H	33.62	7.53	48.36	37.5	54	-16.5
4882	56.3	PK	V	33.62	7.53	48.36	49.09	74	-24.91
4882	53.87	PK	H	33.62	7.53	48.36	46.66	74	-27.34
8523	28.74	AV	V	37.74	7.89	47.8	26.57	54	-27.43
8523	26.15	AV	H	37.74	7.89	47.8	23.98	54	-30.02
8523	43.11	PK	V	37.74	7.89	47.8	40.94	74	-33.06
8523	40.27	PK	H	37.74	7.89	47.8	38.1	74	-35.9

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	44.67	AV	V	33.89	7.86	48.31	38.11	54	-15.89
4960	41.69	AV	H	33.89	7.86	48.31	35.13	54	-18.87
4960	57.34	PK	V	33.89	7.86	48.31	50.78	74	-23.22
4960	54.29	PK	H	33.89	7.86	48.31	47.73	74	-26.27
17893	21.06	AV	V	43.21	19.44	44.4	39.31	54	-14.69
17893	20.11	AV	H	43.21	19.44	44.4	38.36	54	-15.64
17893	40.28	PK	V	43.21	19.44	44.4	58.53	74	-15.47
17893	38.57	PK	H	43.21	19.44	44.4	56.82	74	-17.18

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.

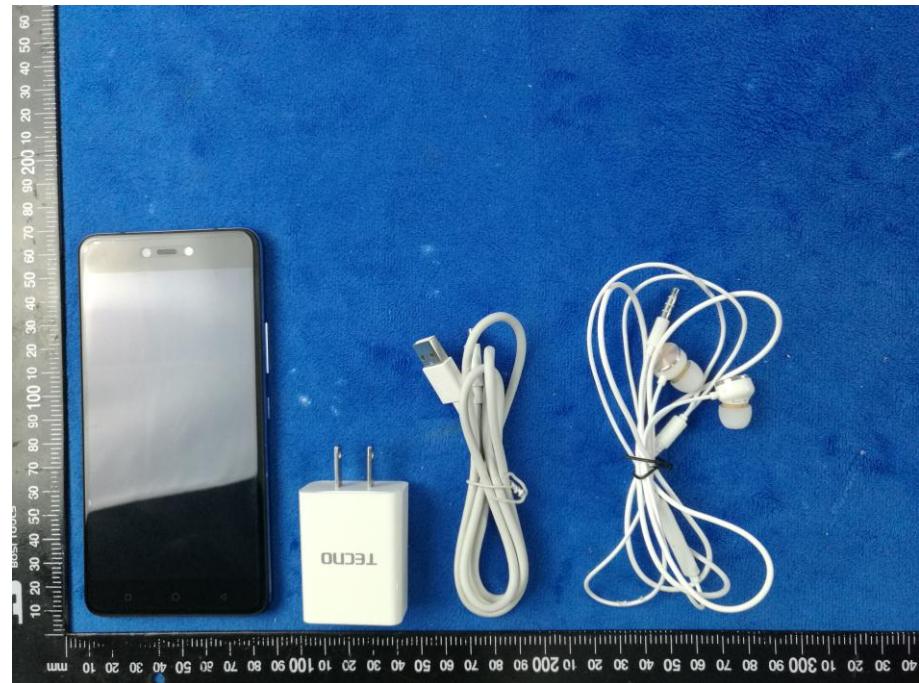
Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
ISN	ISN T800	34373	09/24/2016	09/23/2017	<input type="checkbox"/>
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Horn Antenna	BBHA9170	3145226D1	09/28/2016	09/27/2017	<input checked="" type="checkbox"/>
Active Antenna (9kHz-30MHz)	AL-130	121031	10/13/2016	10/12/2017	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

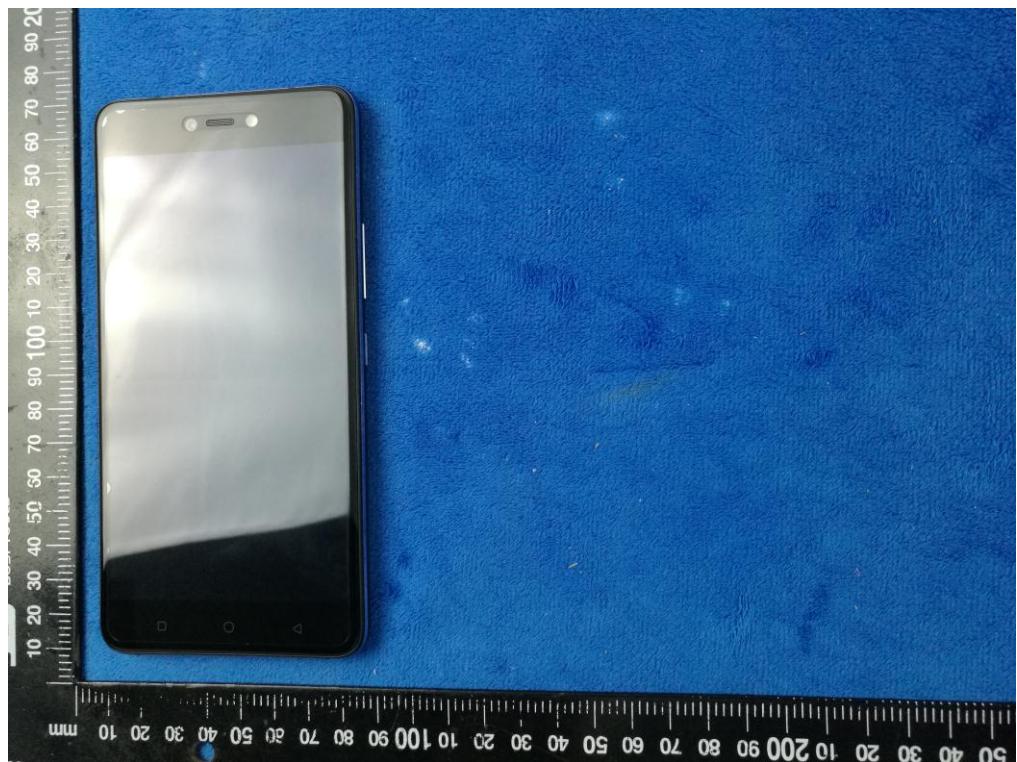
Whole Package View



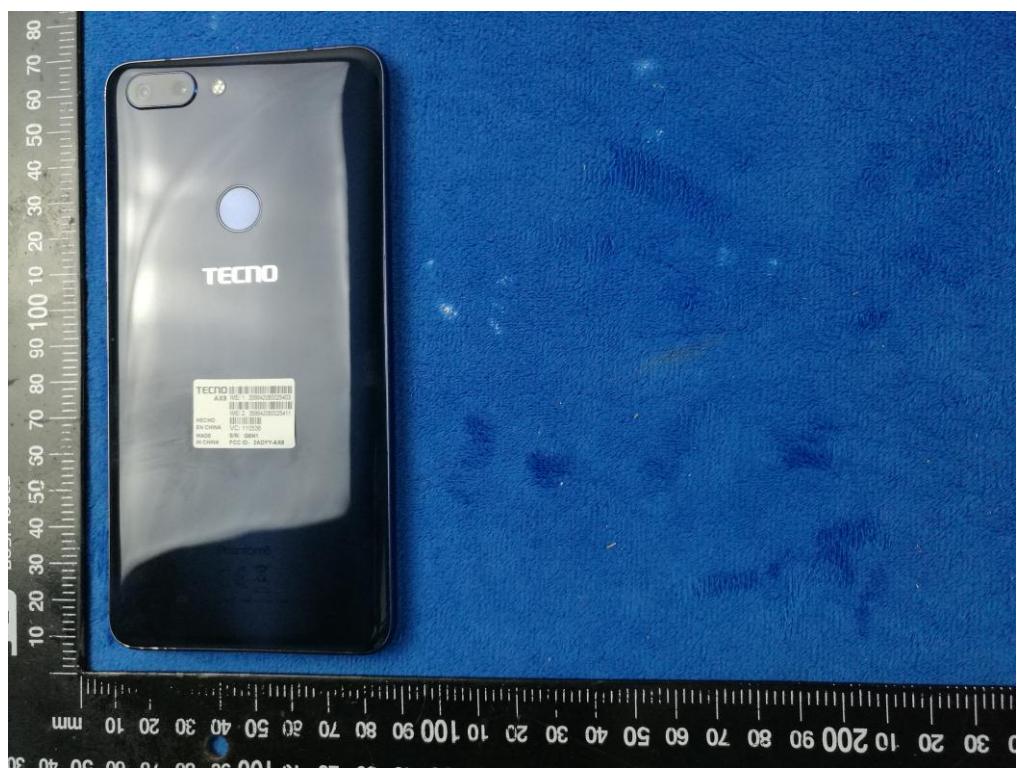
Adapter - Lable View



EUT - Front View



EUT - Rear View



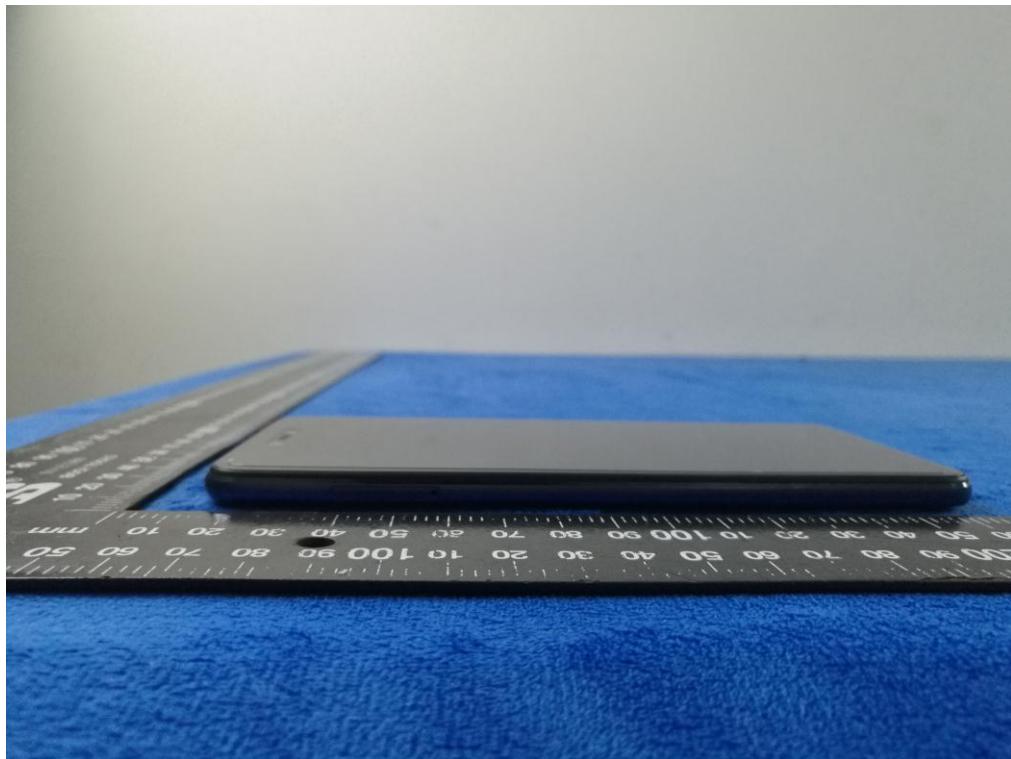
EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View



Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1



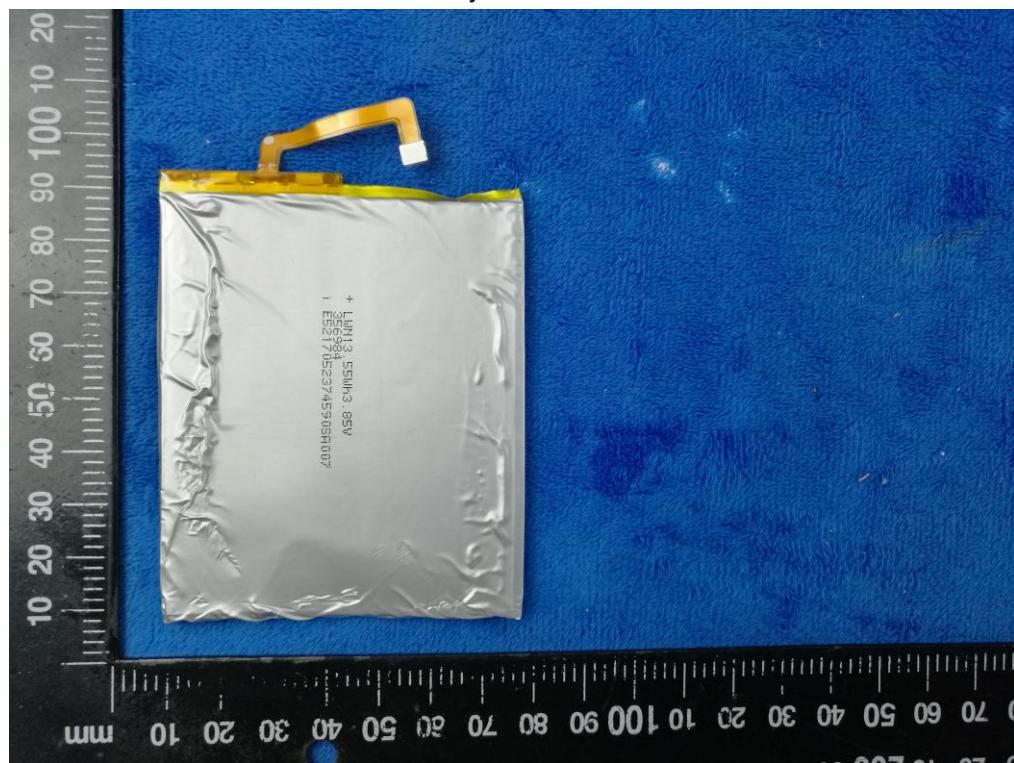
Cover Off - Top View 2



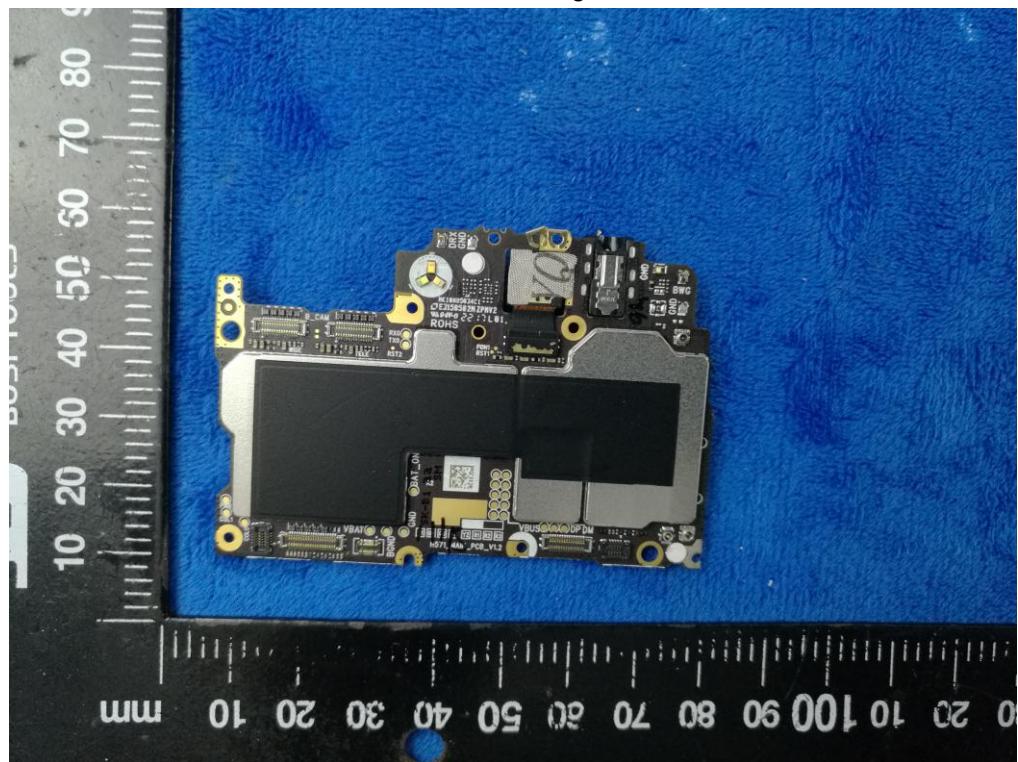
Battery - Front View



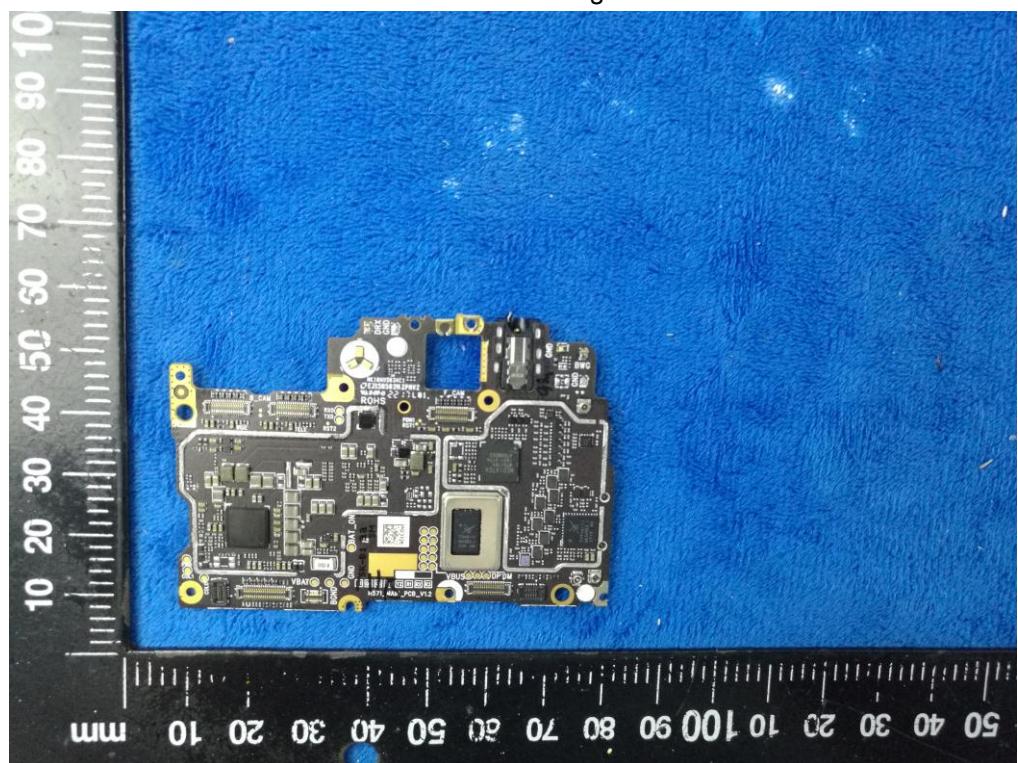
Battery - Rear View



Mainboard with Shielding - Front View



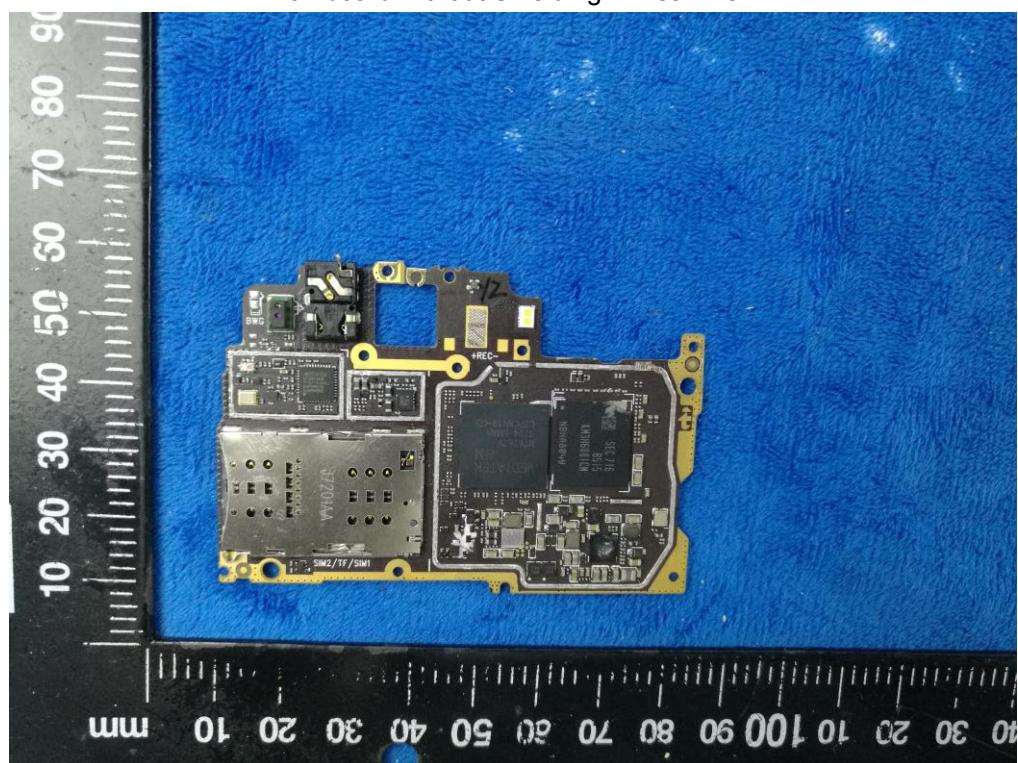
Mainboard without Shielding - Front View



Mainboard with Shielding— Rear View



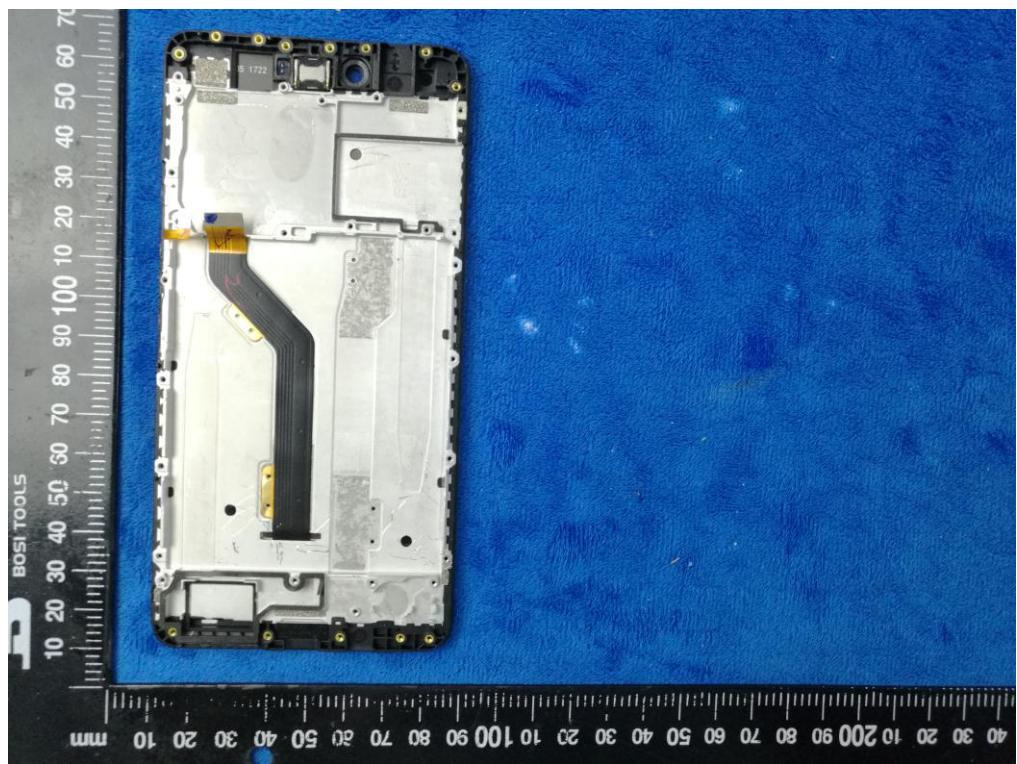
Mainboard without Shielding— Rear View



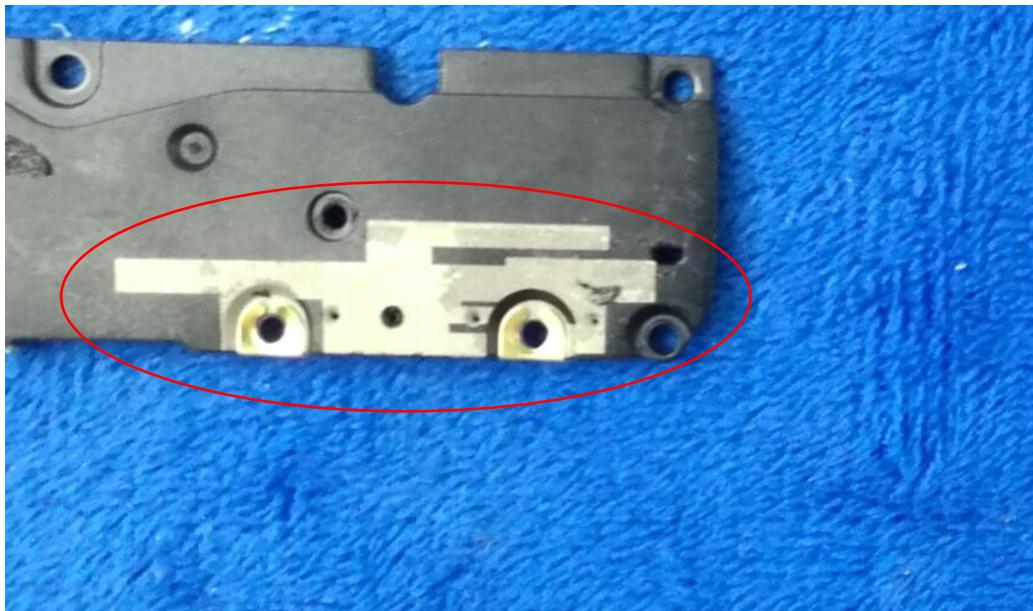
LCD – Front View



LCD – Rear View



GSM/PCS/UMTS-FDD Antenna View



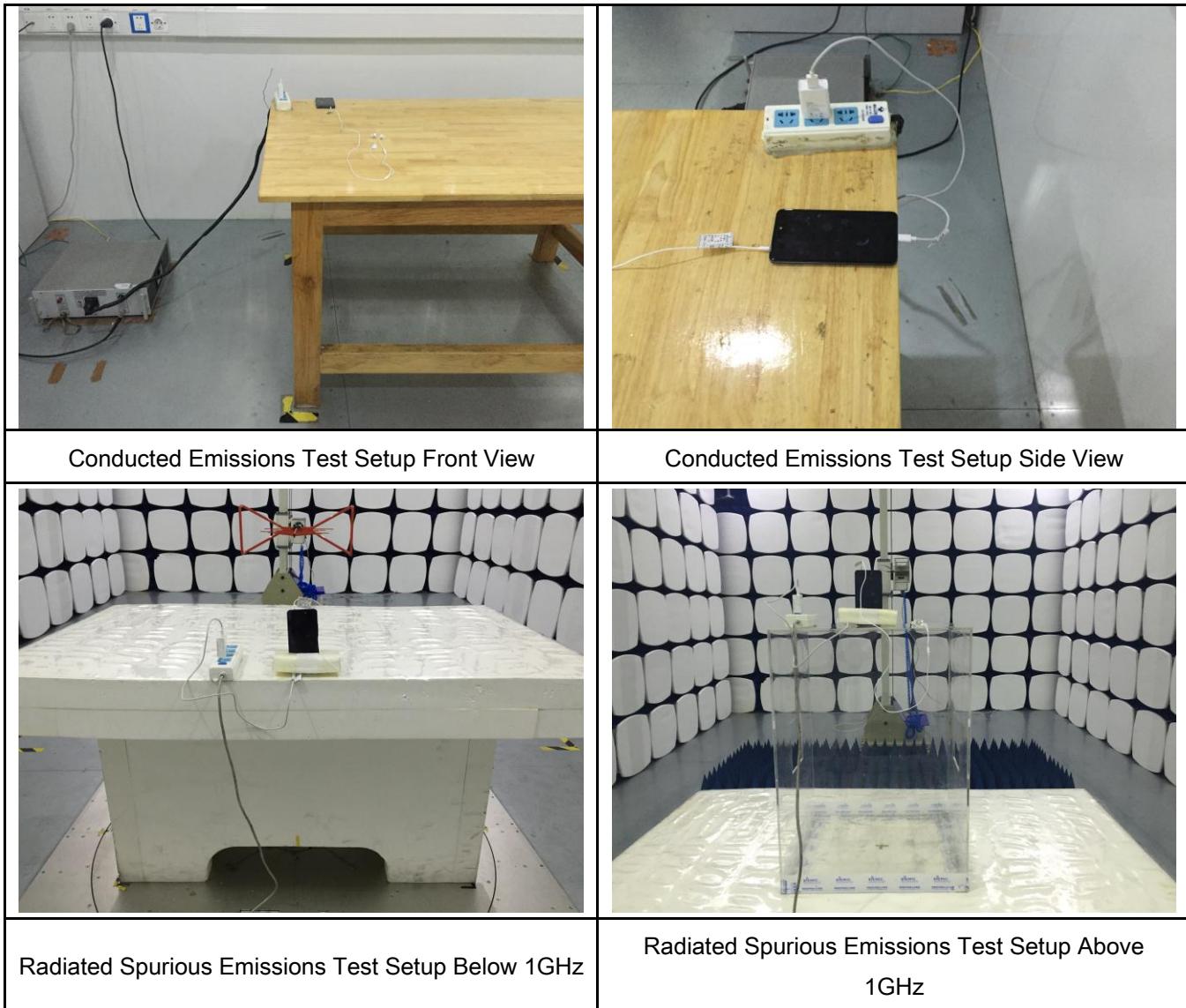
2.4WIFI/5G WIFI/BT/BLE/GPS - Antenna View



LTE - Antenna View



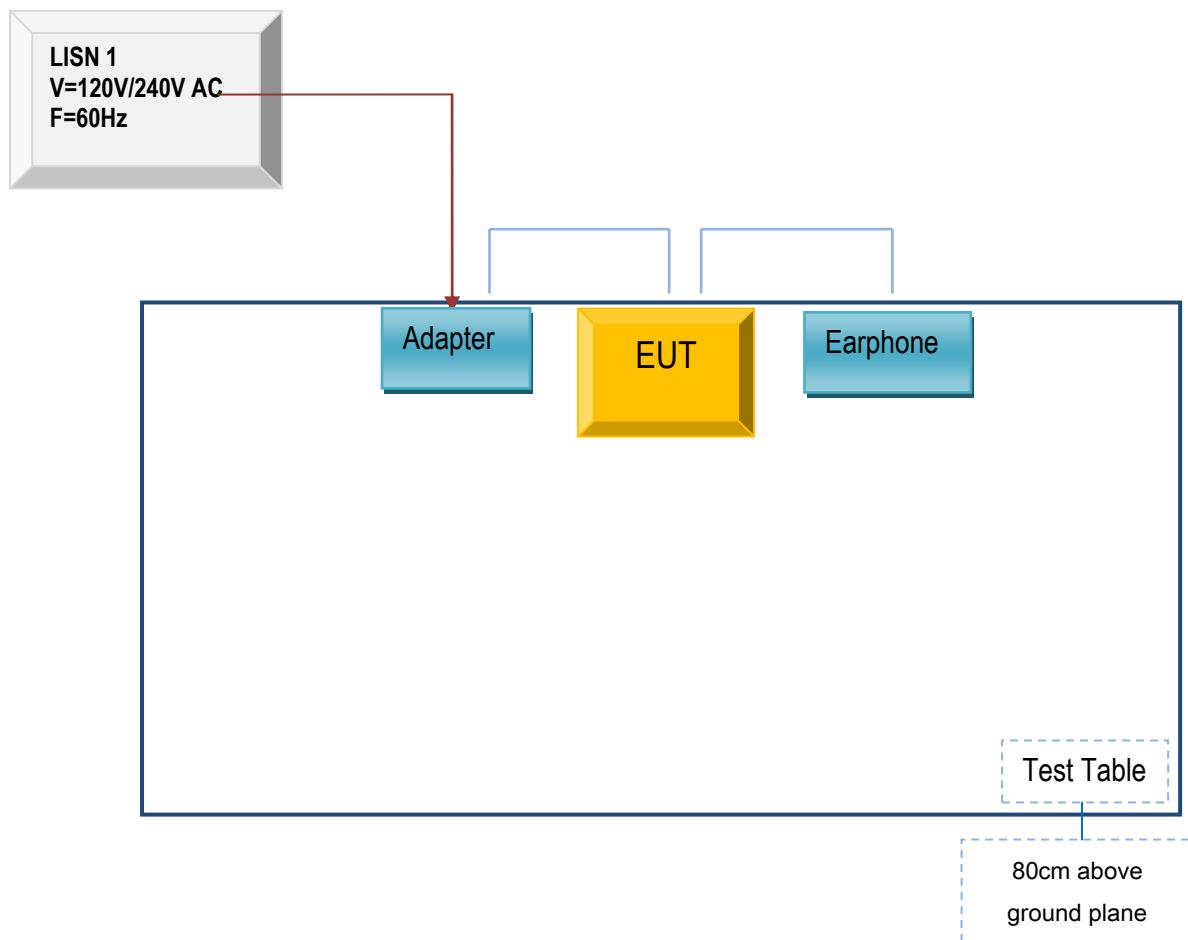
Annex B.iii. Photograph: Test Setup Photo



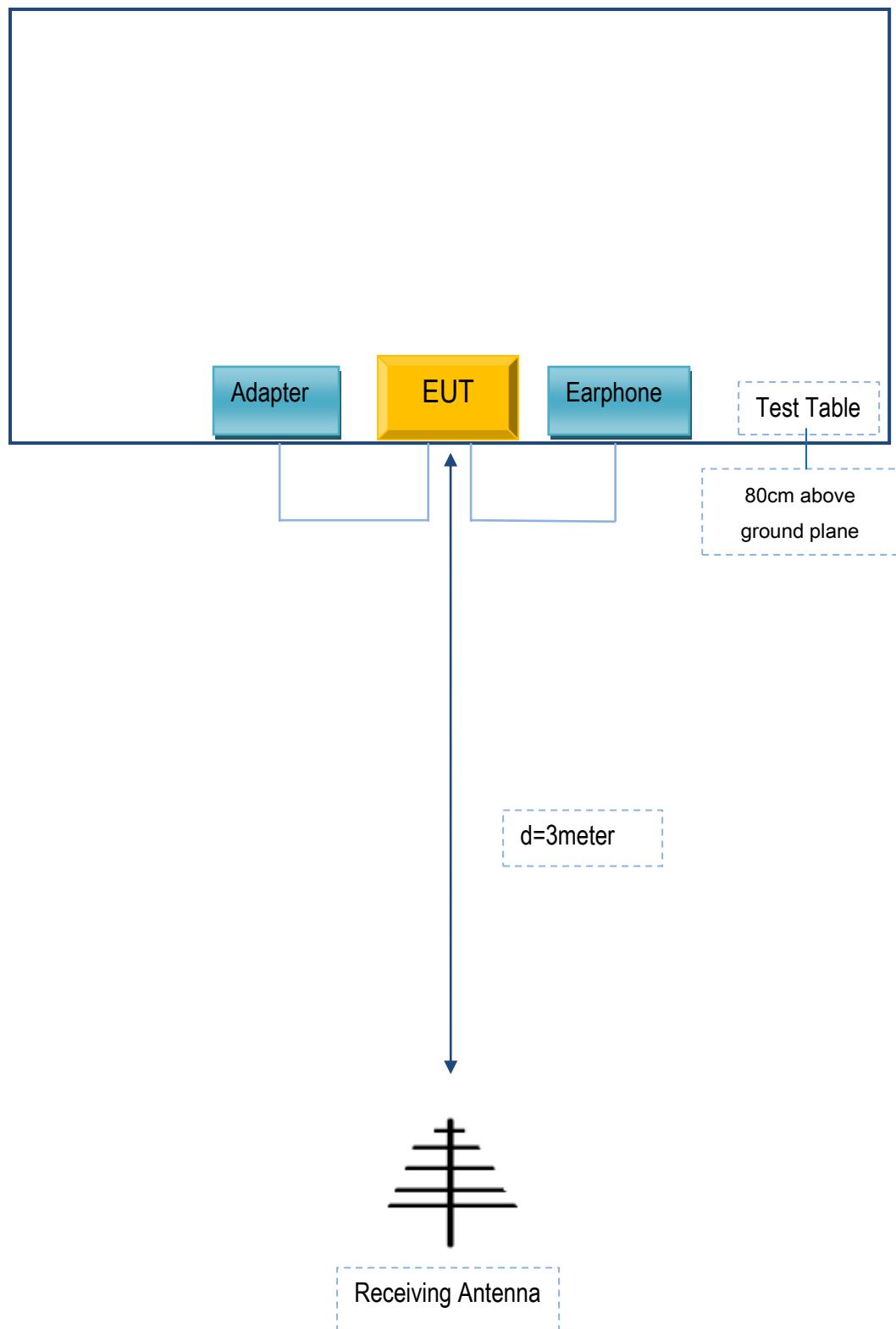
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

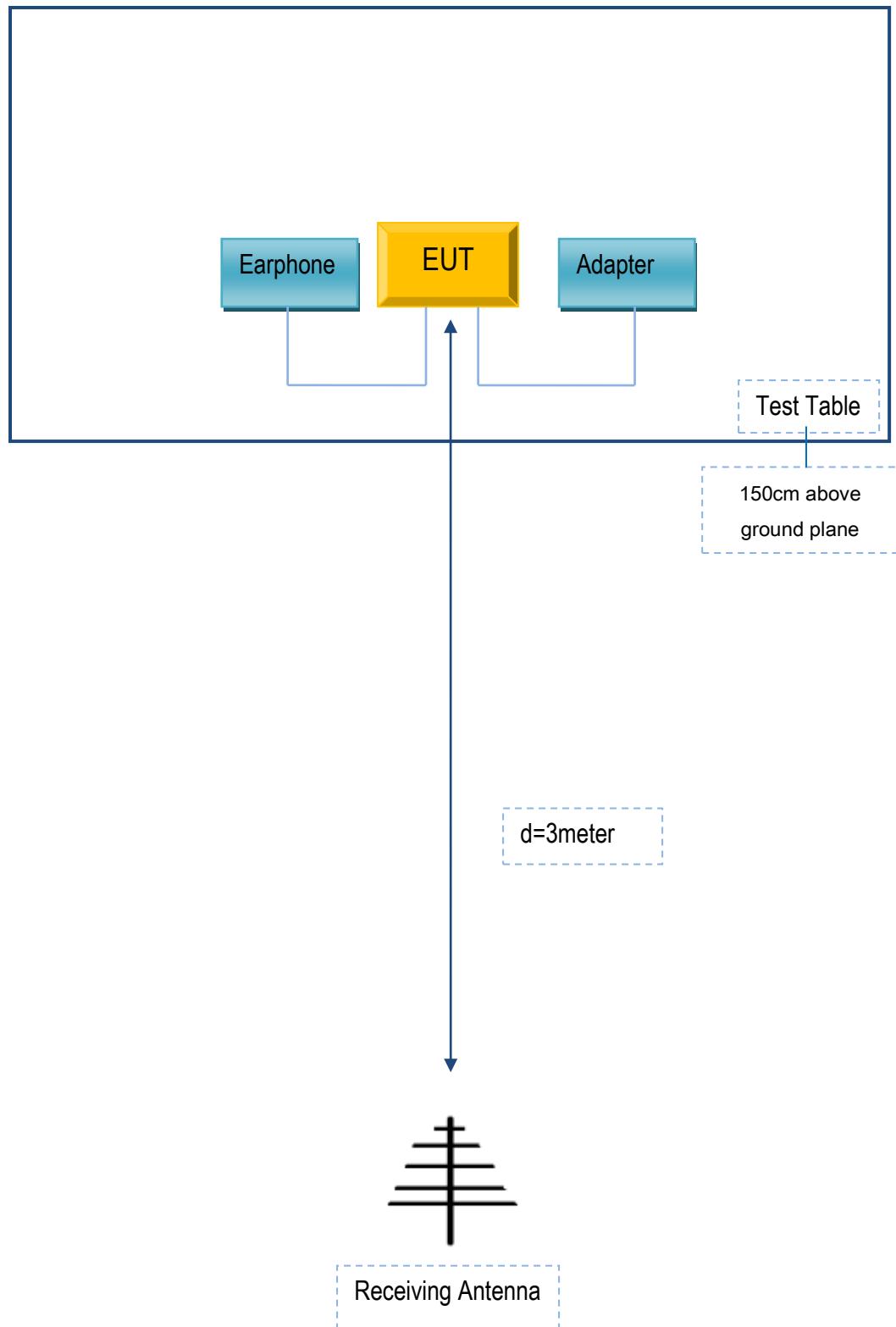
Block Configuration Diagram for AC Line Conducted Emissions



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
TECNO MOBILE LIMITED	Adapter	CQ-18KX	N/A
TECNO MOBILE LIMITED	Earphone	AX8	N/A

Supporting Cable:

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

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A