

# RF TEST REPORT



Report No.: 15070313-FCC-R2

Supersede Report No.: N/A

Applicant	Verykool USA Inc	
Product Name	Mobile Phone	
Model No.	s5518	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2014, ANSI C63.10: 2013	
Test Date	April 30 to May 19 06, 2015	
Issue Date	May 20, 2015	
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"/>	
<i>Winnie Zhang</i>	<i>Chris You</i>	
Winnie Zhang Test Engineer	Chris You 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**

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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
15070313-FCC-R2	NONE	Original	May 20, 2015

## 2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA
Manufacturer	Zechin Communications Co.,Ltd.
Manufacturer Add	Unit804,8th Floor Desay Tech Building Gaoxin, Road South, Nanshan District Shenzhen,China

## 3. Test site information

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.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

## 4. Equipment under Test (EUT) Information

Description of EUT:	Mobile Phone
Main Model:	s5518
Serial Model:	N/A
Date EUT received:	April 29, 2015
Test Date(s):	April 30 to May 19 06, 2015
Equipment Category :	DSS
Antenna Gain:	<p>GSM850: 1.6dBi  PCS1900: 3.8dBi  UMTS-FDD Band V:1.7 dBi  UMTS-FDD Band IV:3.7 dBi  UMTS-FDD Band II: 1.75 dBi  Bluetooth/BLE: 3 dBi  WIFI: 2.9 dBi  GPS: 1.6 dBi</p>
Type of Modulation:	<p>GSM / GPRS: GMSK  EGPRS: GMSK, 8PSK  UMTS-FDD: QPSK, 16QAM  802.11b/g/n: DSSS, OFDM  Bluetooth: GFSK, <math>\pi</math> /4DQPSK, 8DPSK  BLE: GFSK</p>
RF Operating Frequency (ies):	<p>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 IV TX:1712.4 ~ 1752.6 MHz;  RX : 2112.4 ~ 2152.6 MHz  UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz;  RX: 1932.4 ~ 1987.6 MHz  WIFI:802.11b/g/n(20M): 2412-2462 MHz  WIFI:802.11n(40M): 2422-2452 MHz</p>

Bluetooth& BLE: 2402-2480 MHz

Max. Output Power: GFSK:5.156 dBm

Number of Channels: GSM 850: 124CH  
PCS1900: 299CH  
UMTS-FDD Band V : 102CH  
UMTS-FDD Band IV: 202CH  
UMTS-FDD Band II : 277CH  
WIFI :802.11b/g/n(20M): 11CH  
WIFI :802.11n(40M): 7CH  
Bluetooth: 79CH  
BLE: 40CH

Port: Power Port, Earphone Port, USB Port

Input Power: Battery:  
Model: 345197P  
Spec: 3.8V 2600mAh 9.88Wh  
Limited charger voltag:4.35V  
Adapter:  
Model: S0500100-US  
Input: AC 100-240V; 50/60Hz 0.4A Max  
Output: DC 5.0V; 1A

Trade Name : verykool

GPRS/EGPRS Multi-slot class 8/10/12

FCC ID: WA6S5518

## 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	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance

### Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	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 PIFA antenna for Bluetooth/BLE/WIFI, the gain is 3 dBi for Bluetooth/BLE, 2.9 dBi for WIFI

A permanently attached PIFA antenna for GSM and UMTS, the gain is 1.6 dBi for GSM850, 1.75 dBi for UMTS-FDD Band V, 3.7 dBi for UMTS-FDD Band IV, 3.8 dBi for PCS1900, 3.7 dBi for UMTS-FDD Band II ,

A permanently attached PIFA antenna for GPS, the gain is 1.6 dBi for GPS

**The antenna meets up with the ANTENNA REQUIREMENT.**

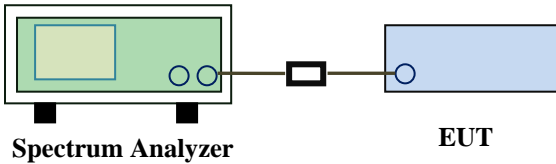
**Result:** Compliance.

## 6.2 Channel Separation

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1004mbar
Test date :	May 04 ,2015
Tested By :	Winnie Zhang

### 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>
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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"> <li>- The EUT must have its hopping function enabled</li> <li>- Span = wide enough to capture the peaks of two adjacent channels</li> <li>- Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span</li> <li>- Video (or Average) Bandwidth (VBW) ≥ RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- 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.</li> </ul>
----------------	--

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 Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.966	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.964	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.964	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.859	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.873	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.857	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.859	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.867	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.862	Pass
	Adjacency Channel	2479			

## Test Plots

### Channel Separation measurement result





8DPSK - Low Channel



8DPSK - Middle Channel



8DPSK - High Channel

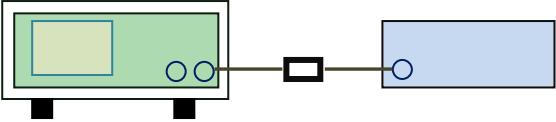


### 6.3 20dB Bandwidth

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1004mbar
Test date :	May 04, 2015
Tested By :	Winnie Zhang

**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	 <b>Spectrum Analyzer</b> <b>EUT</b>
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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"> <li>- Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW ≥ 1% of the 20 dB bandwidth</li> <li>- VBW ≥ RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold.</li> <li>- 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</li> </ul>
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	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 Freq (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	0.966	0.899
	Mid	2441	0.964	0.898
	High	2480	0.964	0.899
$\pi/4$ DQPSK	Low	2402	1.288	1.1696
	Mid	2441	1.309	1.1724
	High	2480	1.286	1.1712
8-DPSK	Low	2402	1.288	1.1786
	Mid	2441	1.301	1.1825
	High	2480	1.293	1.1804

## Test Plots

### 20dB Bandwidth measurement result



GFSK - Low Channel



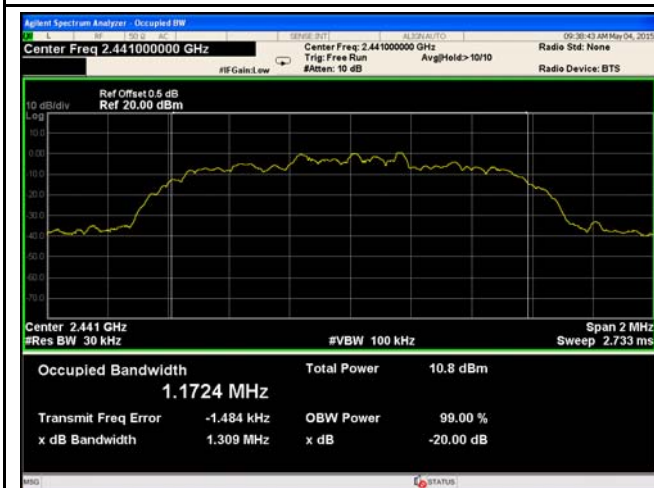
GFSK - Middle Channel



GFSK - High Channel



$\pi/4$  DPSK - Low Channel

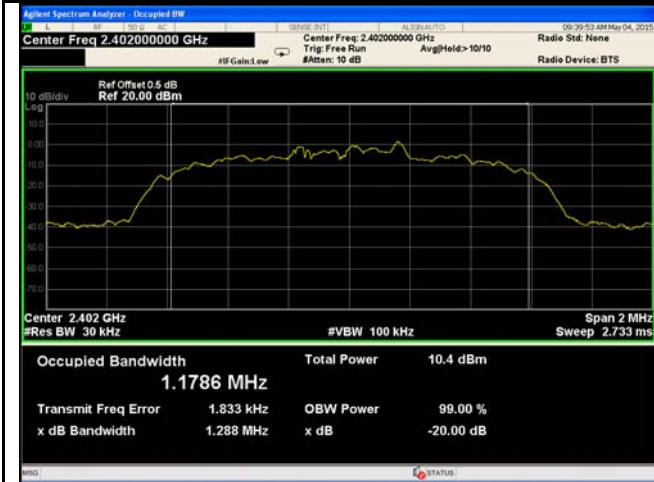


$\pi/4$  DQPSK - Middle Channel



$\pi/4$  DQPSK - High Channel

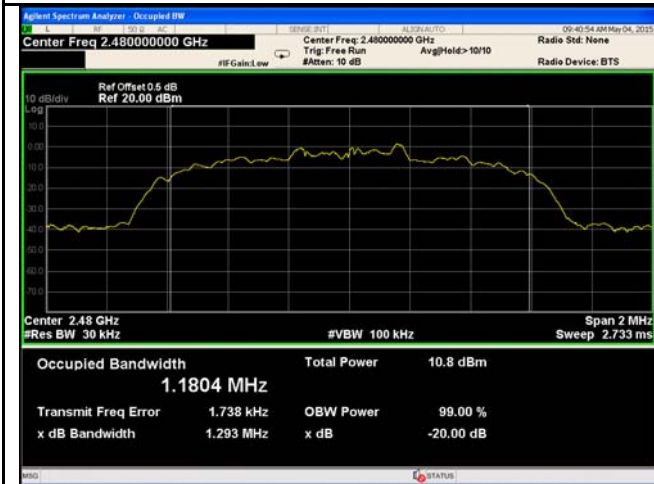




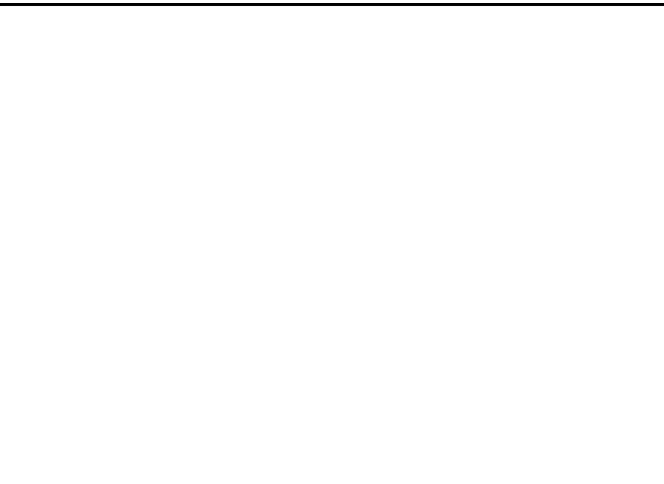
8DPSK - Low Channel



8DPSK - Middle Channel



8DPSK - High Channel

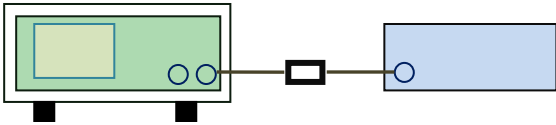


## 6.4 Peak Output Power

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1004mbar
Test date :	May 04, 2015
Tested By :	Winnie Zhang

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2)	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)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: $\leq 1$ Watt	<input type="checkbox"/>

Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
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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"> <li>- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW <math>&gt;</math> the 20 dB bandwidth of the emission being measured</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> </ul>
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	<ul style="list-style-type: none"> <li>- Allow the trace to stabilize.</li> <li>- 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.</li> </ul>
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	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	4.941	1000	Pass
		Mid	2441	5.035	1000	Pass
		High	2480	5.152	1000	Pass
	$\pi/4$ DQPSK	Low	2402	4.828	125	Pass
		Mid	2441	4.900	125	Pass
		High	2480	4.988	125	Pass
	8-DPSK	Low	2402	4.930	125	Pass
		Mid	2441	5.068	125	Pass
		High	2480	5.156	125	Pass

Test Plots

Output Power measurement result



GFSK Output power - Low CH 2402



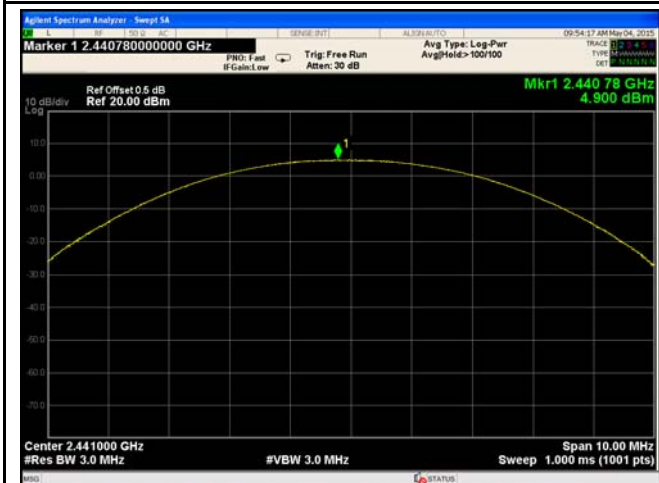
GFSK Output power - Mid CH 2441



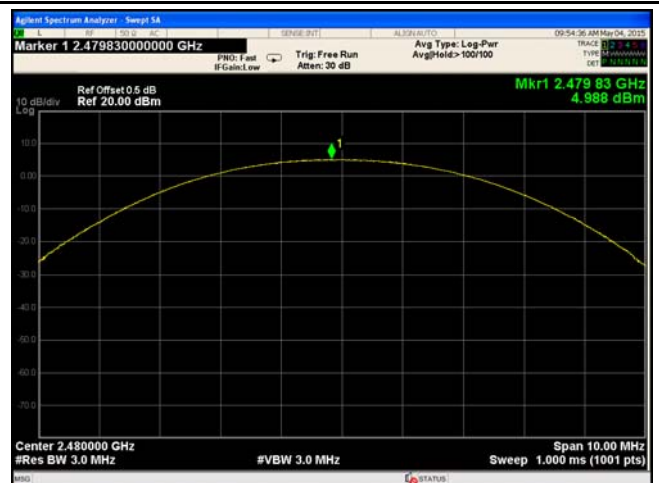
GFSK Output power - High CH 2480



$\pi/4$  DQPSK Output power - Low CH 2402



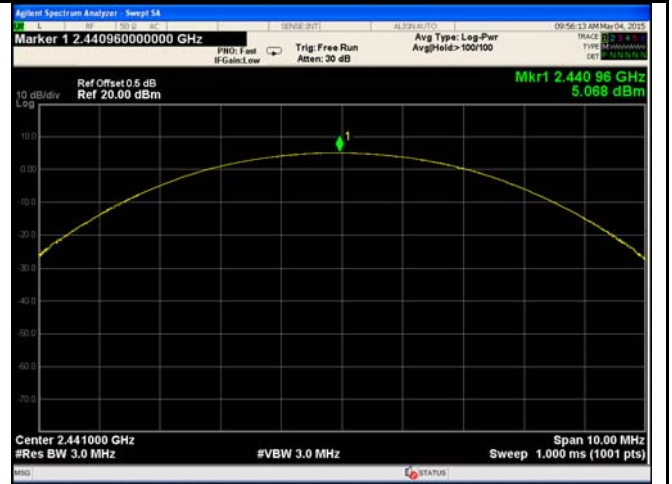
$\pi/4$  DQPSK Output power - Mid CH 2441



$\pi/4$  DQPSK Output power - High CH 2480



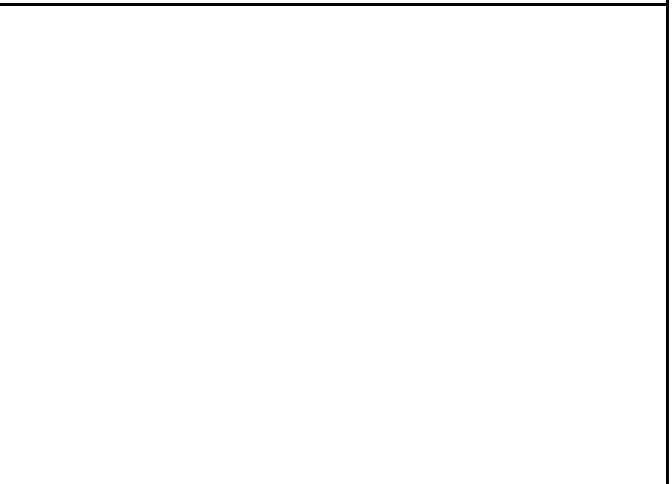
8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441



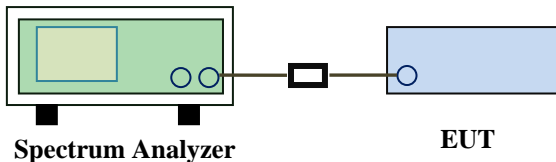
8DPSK Output power - High CH 2480



### 6.5 Number of Hopping Channel

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1004mbar
Test date :	May 04, 2015
Tested By :	Winnie Zhang

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz $\geq$ 15 channels	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.  <u>Use the following spectrum analyzer settings:</u>            The EUT must have its hopping function enabled.</p> <ul style="list-style-type: none"> <li>- Span = the frequency band of operation</li> <li>- RBW <math>\geq</math> 1% of the span</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow trace to fully stabilize.</li> <li>- 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).</li> </ul>		
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**

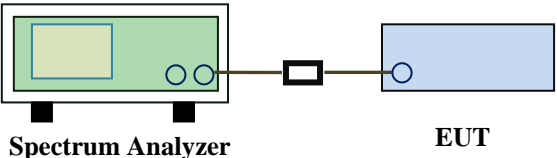
**Number of Hopping Channels measurement result**



### 6.6 Time of Occupancy (Dwell Time)

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1004mbar
Test date :	May 05, 2015
Tested By :	Winnie Zhang

**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"> <li>- Span = zero span, centered on a hopping channel</li> <li>- RBW = 1 MHz</li> <li>- VBW ≥ RBW</li> <li>- Sweep = as necessary to capture the entire dwell time per hopping channel</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- use the marker-delta function to determine the dwell time</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

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



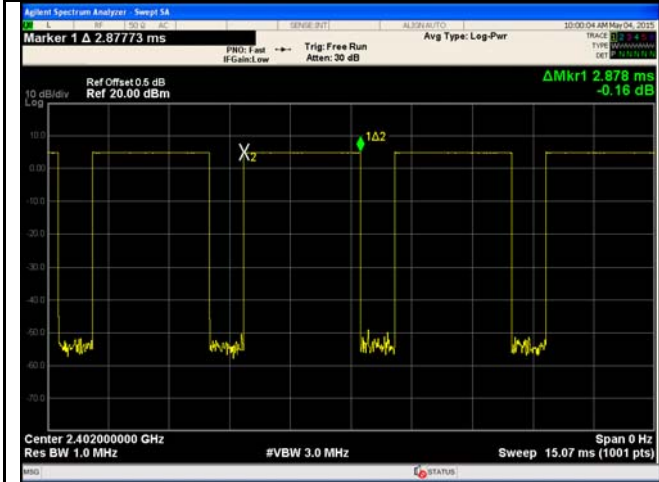
**Dwell Time measurement result**

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.878	306.987	400	Pass
		Mid	2.878	306.987	400	Pass
		High	2.878	306.987	400	Pass
	π /4 DQPSK	Low	2.878	306.987	400	Pass
		Mid	2.878	306.987	400	Pass
		High	2.878	306.987	400	Pass
	8-DPSK	Low	2.878	306.987	400	Pass
		Mid	2.878	306.987	400	Pass
		High	2.878	306.987	400	Pass

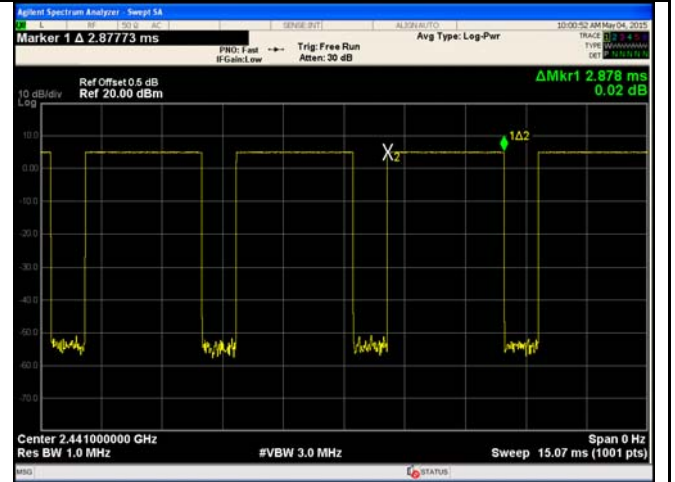
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6

Test Plots

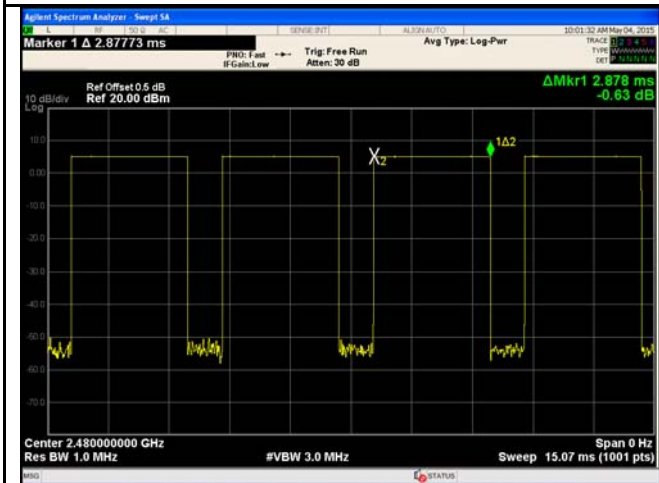
Dwell Time measurement result



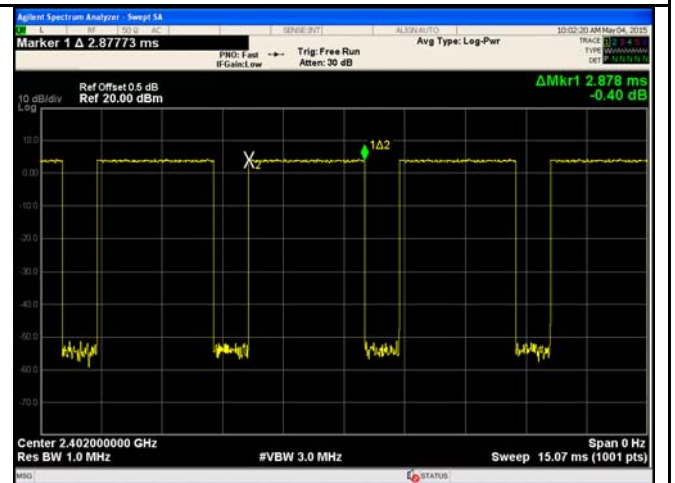
GFSK - Low CH 2402



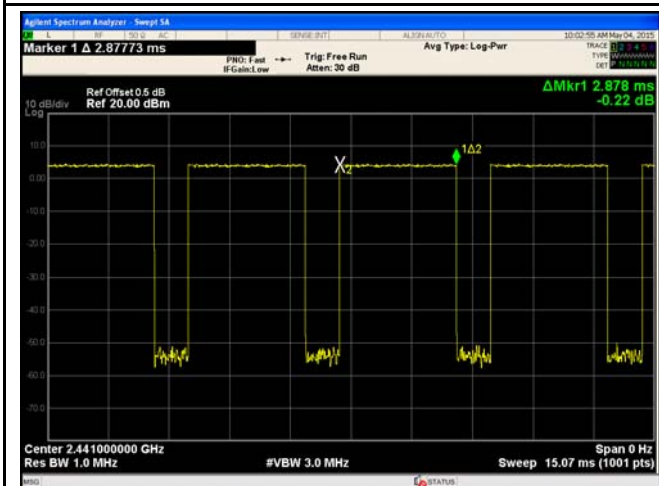
GFSK - Mid CH 2441



GFDK - High CH 2480



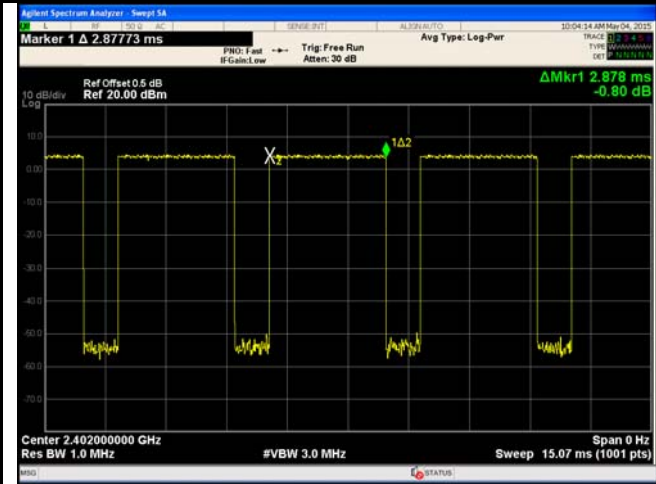
$\pi/4$  DQPSK - Low CH 2402



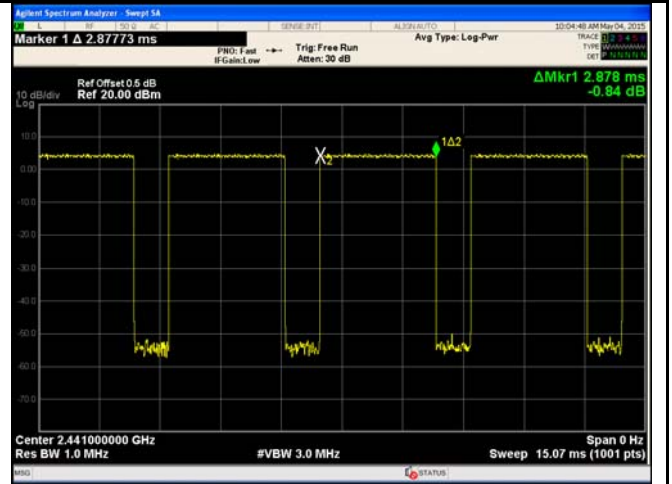
$\pi/4$  DQPSK - Mid CH 2441



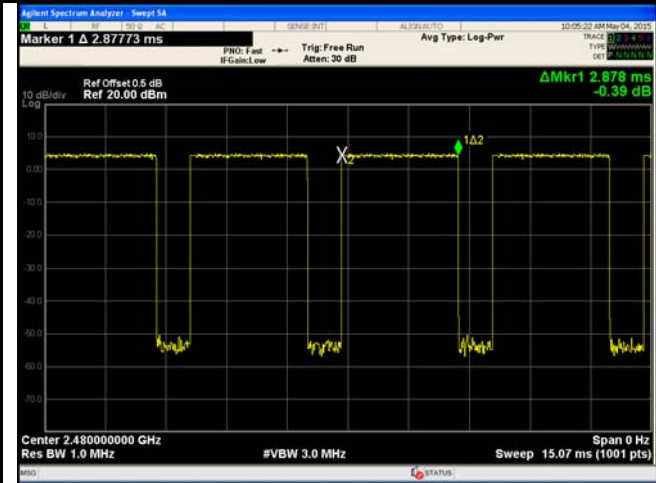
$\pi/4$  DQPSK - High CH 2480



8DPSK - Low CH 2402



8DPSK - Mid CH 2441



8DPSK - High CH 2480



## 6.7 Band Edge

Temperature	20°C
Relative Humidity	54%
Atmospheric Pressure	1012mbar
Test date :	May 12, 2015
Tested By :	Winnie Zhang

### 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"> <li>- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- 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,</li> </ul>
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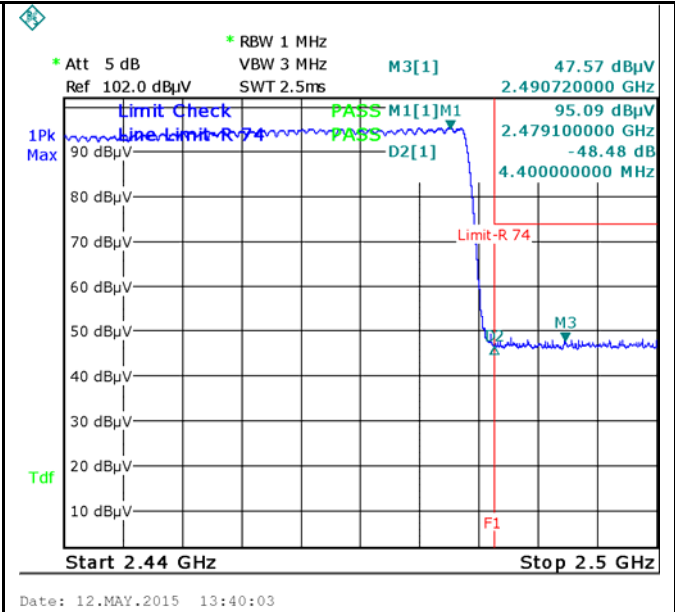
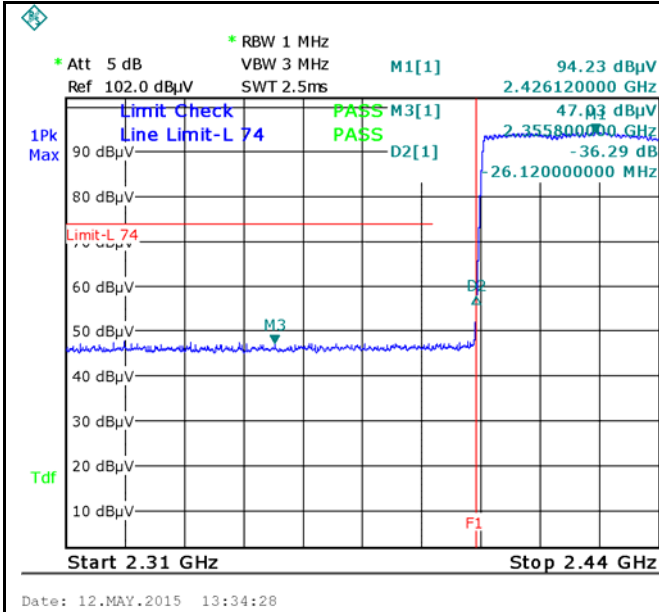
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	<p>and make sure the instrument is operated in its linear range.</p> <ul style="list-style-type: none"> <li>- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:           <ul style="list-style-type: none"> <li>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</li> <li>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.</li> <li>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.</li> </ul> </li> <li>- 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.</li> <li>- 5. Repeat above procedures until all measured frequencies were complete.</li> </ul>
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

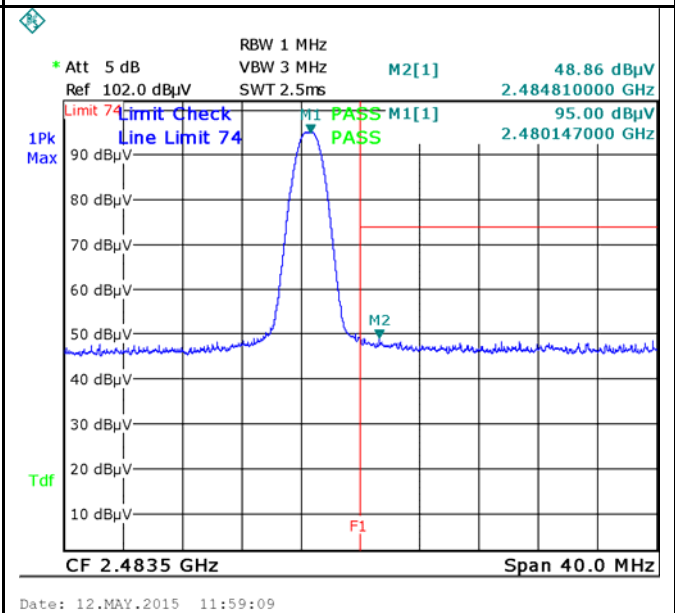
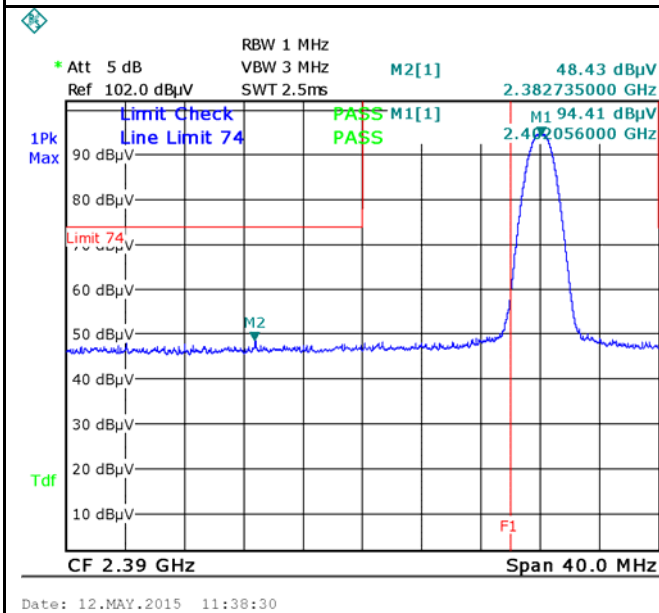
Note: F1 is frequency 2483.5MHz

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

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

GFSK-Hopping Left Side-AV

GFSK-Hopping Right Side-AV



GFSK-Left Side-PK

Note: F1 is frequency 2400MHz

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

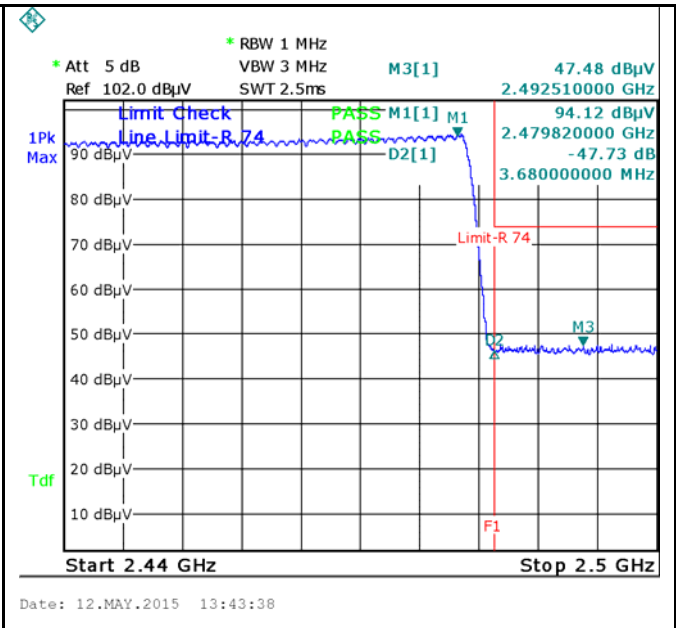
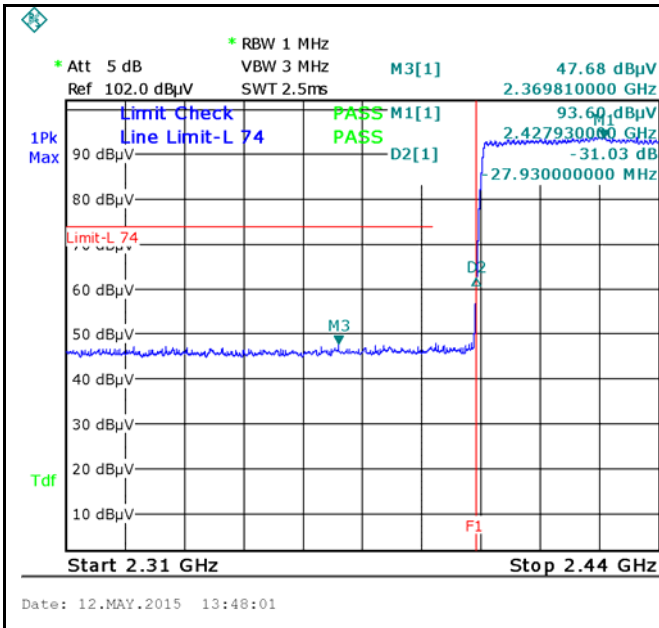
Note: (no need if PK value less than the AV limit)

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

GFSK-Left Side-AV

GFSK-Right Side-AV

**$\pi/4$  DQPSK Mode:**



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

**Note: F1 is frequency 2400MHz**

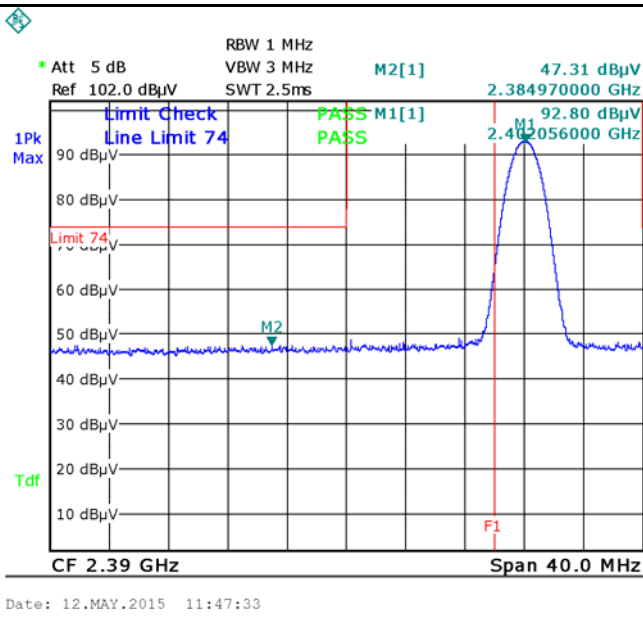
Note: (no need if PK value less than the AV limit)

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

**Note: F1 is frequency 2483.5MHz**

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

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

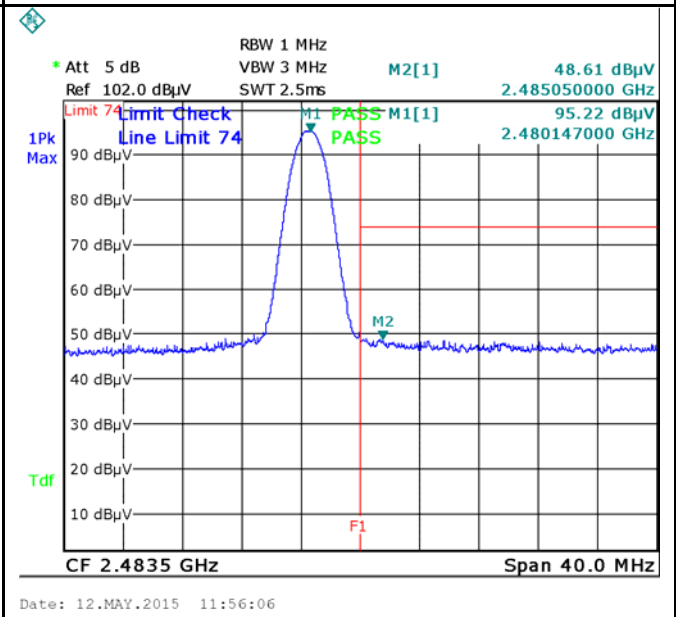


**$\pi/4$  DQPSK-Left Side-PK**

**Note: F1 is frequency 2400MHz**

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

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



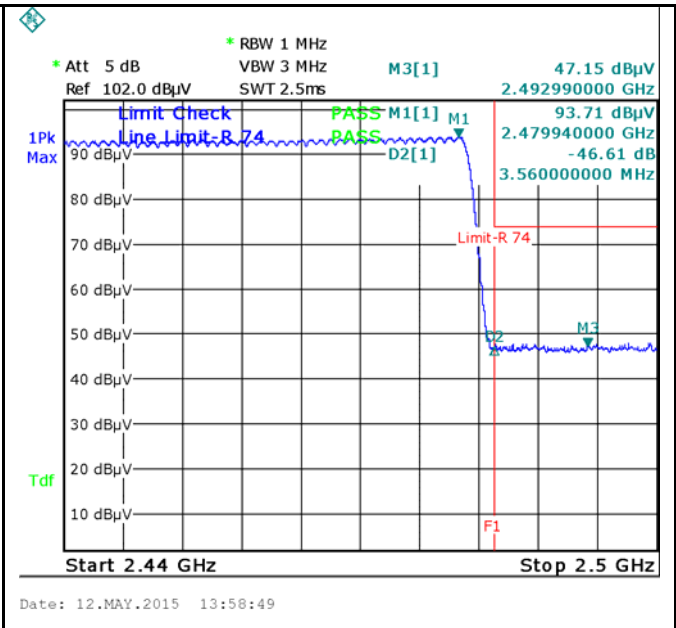
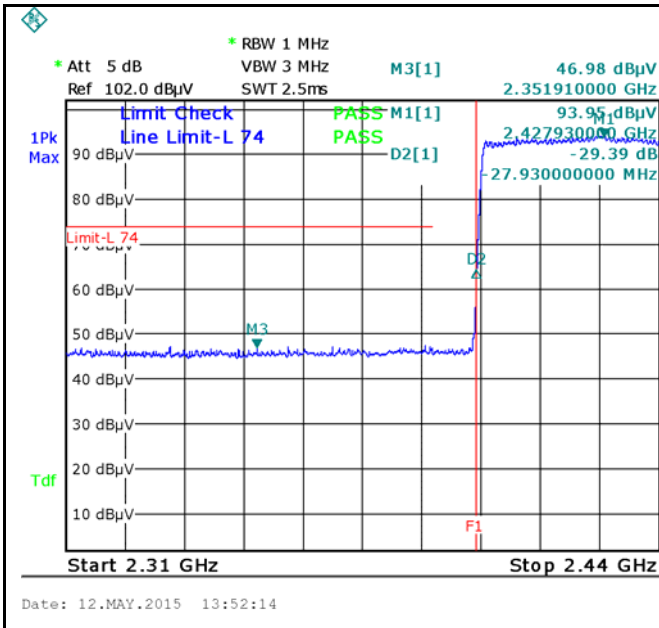
**$\pi/4$  DQPSK-Right Side-PK**

**Note: F1 is frequency 2483.5MHz**

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

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

**8-DPSK Mode:**



8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK-Hopping Right Side-PK

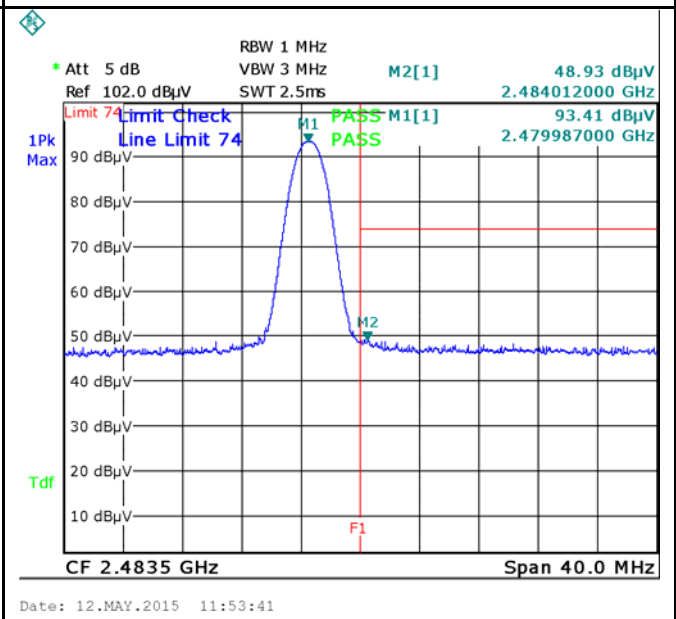
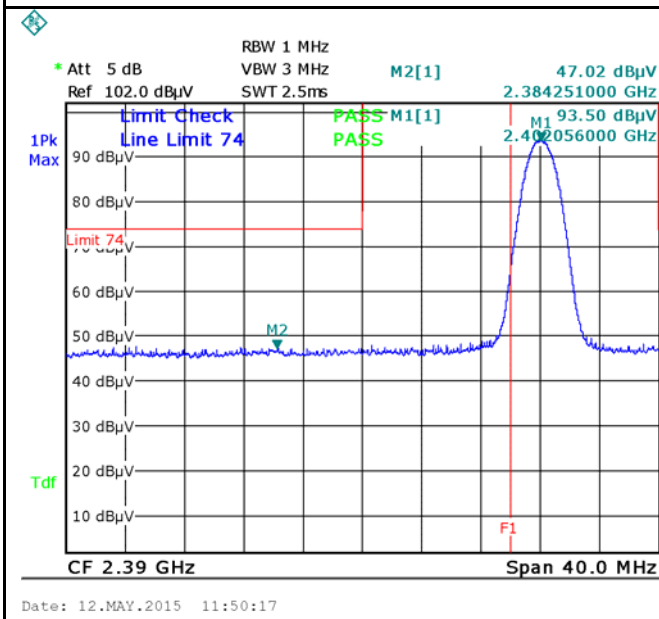
Note: F1 is frequency 2483.5MHz

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

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

8DPSK-Hopping Left-AV

8DPSK-Hopping Right-AV



8DPSK-Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

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

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

8DPSK-Left Side-AV

8DPSK-Right Side-AV

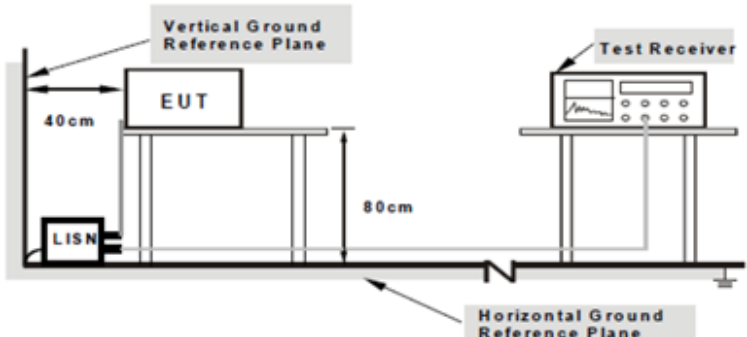


## 6.8 AC Power Line Conducted Emissions

Temperature	23°C
Relative Humidity	58%
Atmospheric Pressure	1004mbar
Test date :	May 04, 2015
Tested By :	Winnie Zhang

### Requirement(s):

Spec	Item	Requirement	Applicable														
47CFR§15.207,	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 [μ]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 (dBμV)		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 (dBμV)																
	QP	Average															
0.15 ~ 0.5	66 – 56	56 – 46															
0.5 ~ 5	56	46															
5 ~ 30	60	50															

Test Setup	 <p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>
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Procedure	<ol style="list-style-type: none"> <li>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.</li> <li>The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.</li> <li>The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss</li> </ol>
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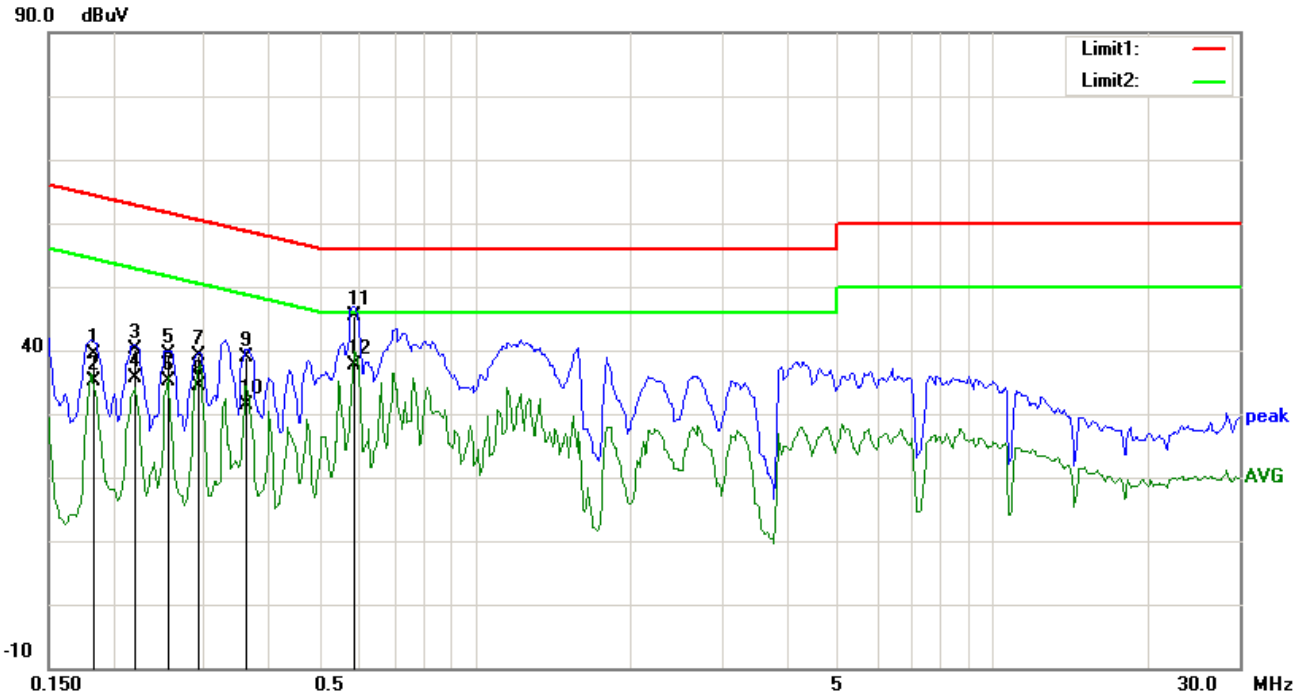
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	<p>coaxial cable.</p> <ol style="list-style-type: none"> <li>4. All other supporting equipment were powered separately from another main supply.</li> <li>5. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>6. 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.</li> <li>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.</li> <li>8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data     Yes                       N/A

Test Plot     Yes (See below)             N/A

<b>Test Mode:</b>	<b>Bluetooth Mode</b>
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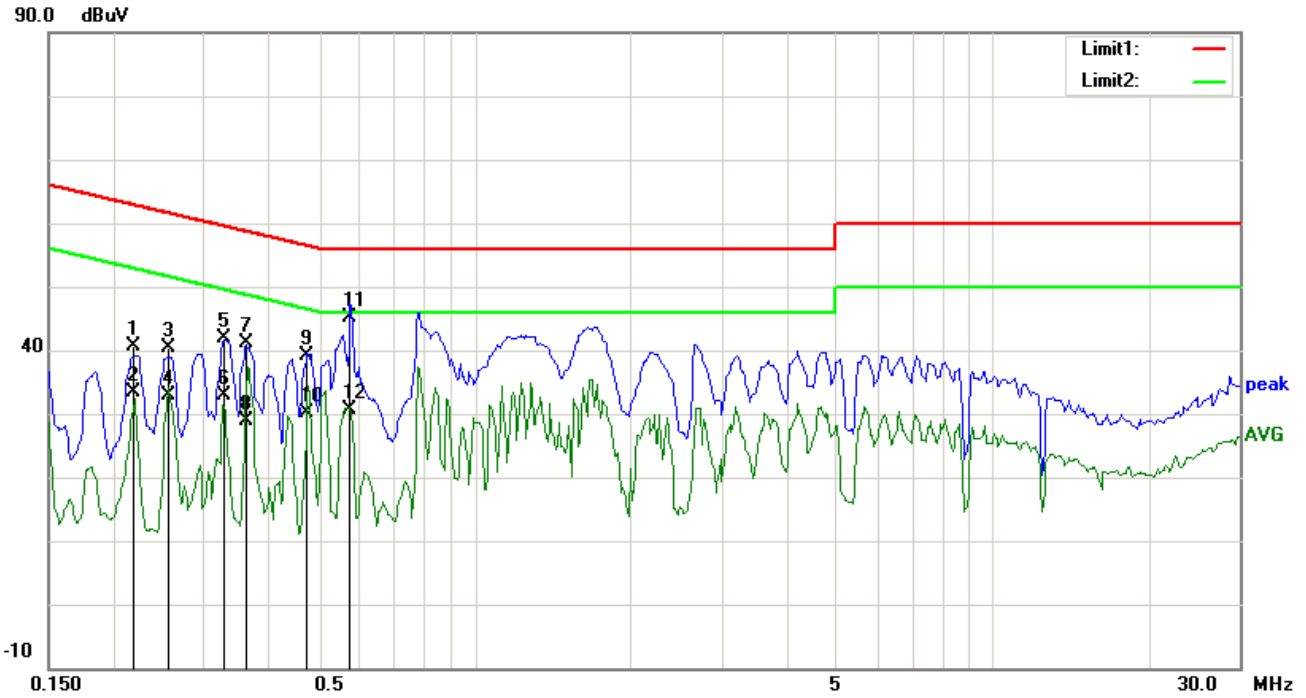


**Test Data**

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Comment
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)	
1	L1	0.1835	26.38	QP	13.08	39.46	64.33	-24.87	
2	L1	0.1835	21.95	AVG	13.08	35.03	54.33	-19.30	
3	L1	0.2208	27.15	QP	12.94	40.09	62.79	-22.70	
4	L1	0.2208	22.70	AVG	12.94	35.64	52.79	-17.15	
5	L1	0.2562	26.48	QP	12.81	39.29	61.55	-22.26	
6	L1	0.2562	22.33	AVG	12.81	35.14	51.55	-16.41	
7	L1	0.2924	26.45	QP	12.67	39.12	60.46	-21.34	
8	L1	0.2924	21.77	AVG	12.67	34.44	50.46	-16.02	
9	L1	0.3615	26.38	QP	12.41	38.79	58.69	-19.90	
10	L1	0.3615	18.85	AVG	12.41	31.26	48.69	-17.43	
11	L1	0.5875	33.54	QP	11.81	45.35	56.00	-10.65	
12	L1	0.5875	25.94	AVG	11.81	37.75	46.00	-8.25	

<b>Test Mode:</b>	<b>Bluetooth Mode</b>
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**Test Data**

**Phase Neutral Plot at 120Vac, 60Hz**

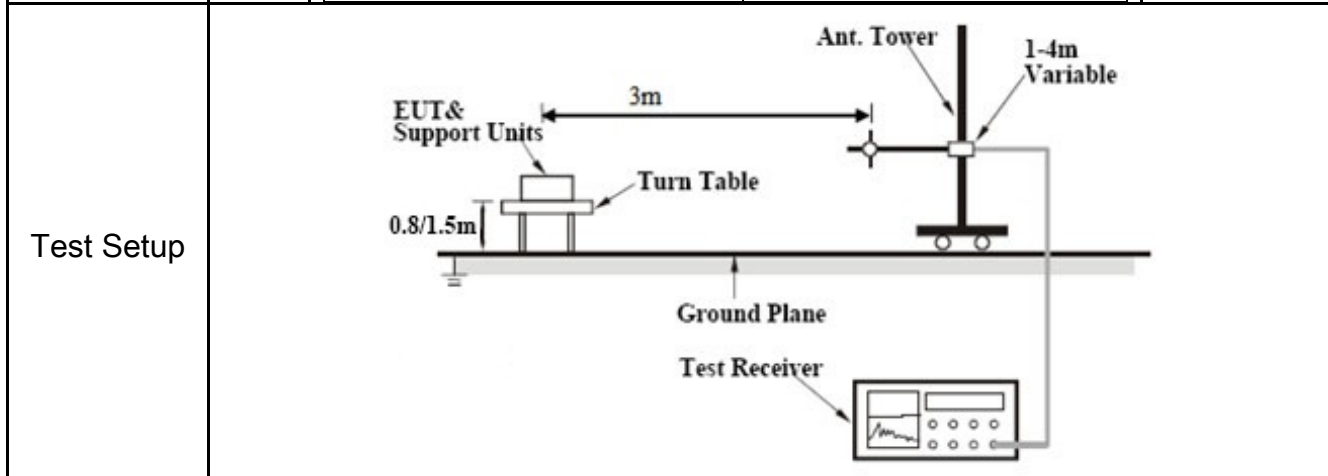
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Comment
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)	
1	N	0.2185	27.72	QP	12.95	40.67	62.88	-22.21	
2	N	0.2185	20.43	AVG	12.95	33.38	52.88	-19.50	
3	N	0.2562	27.48	QP	12.81	40.29	61.55	-21.26	
4	N	0.2562	20.01	AVG	12.81	32.82	51.55	-18.73	
5	N	0.3268	29.40	QP	12.54	41.94	59.53	-17.59	
6	N	0.3268	20.36	AVG	12.54	32.90	49.53	-16.63	
7	N	0.3648	28.65	QP	12.40	41.05	58.62	-17.57	
8	N	0.3648	16.36	AVG	12.40	28.76	48.62	-19.86	
9	N	0.4742	27.16	QP	12.00	39.16	56.44	-17.28	
10	N	0.4742	18.16	AVG	12.00	30.16	46.44	-16.28	
11	N	0.5758	33.23	QP	11.82	45.05	56.00	-10.95	
12	N	0.5758	18.91	AVG	11.82	30.73	46.00	-15.27	

## 6.9 Radiated Spurious Emissions

Temperature	23°C
Relative Humidity	58%
Atmospheric Pressure	1004mbar
Test date :	May 04, 2015
Tested By :	Winnie Zhang

### 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>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 (µV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (µV/m)												
30 – 88	100												
88 – 216	150												
216 960	200												
Above 960	500												



Procedure	<ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>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:</li> </ol>
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	<p>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</p> <p>b. The EUT was then rotated to the direction that gave the maximum emission.</p> <p>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</p> <p>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</p> <p>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.</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

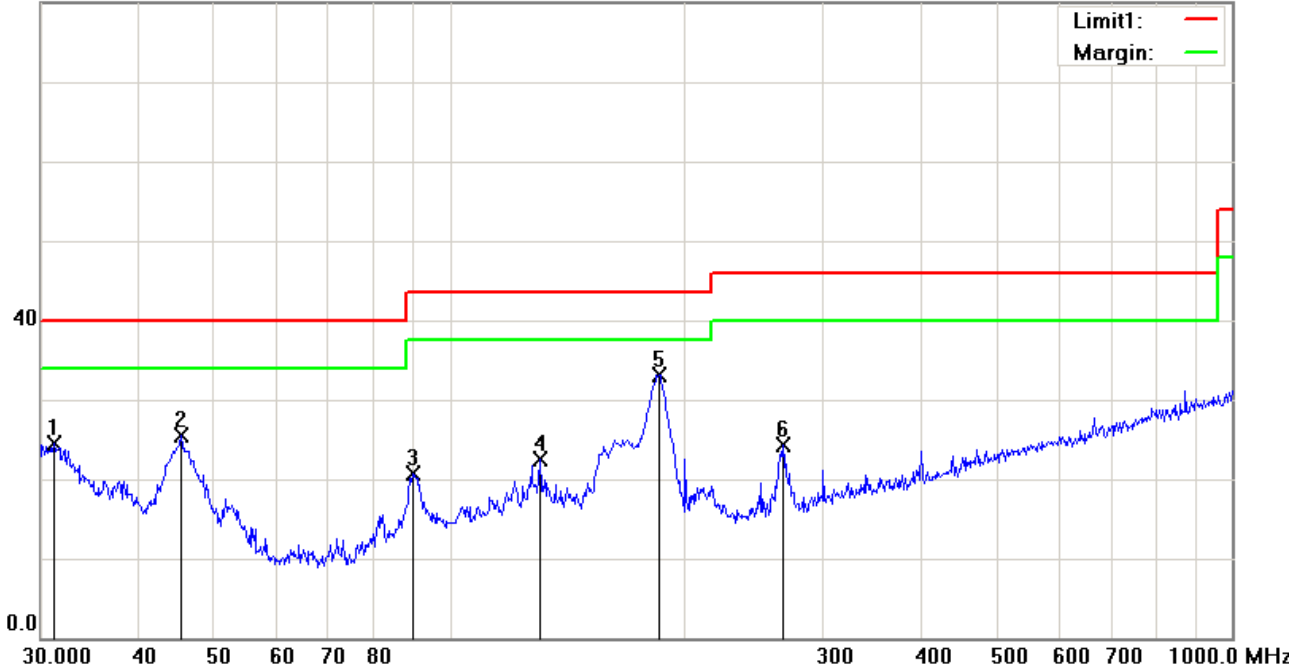
Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

**Test Mode:** Bluetooth Mode

**Below 1GHz**

80.0 dBuV/m



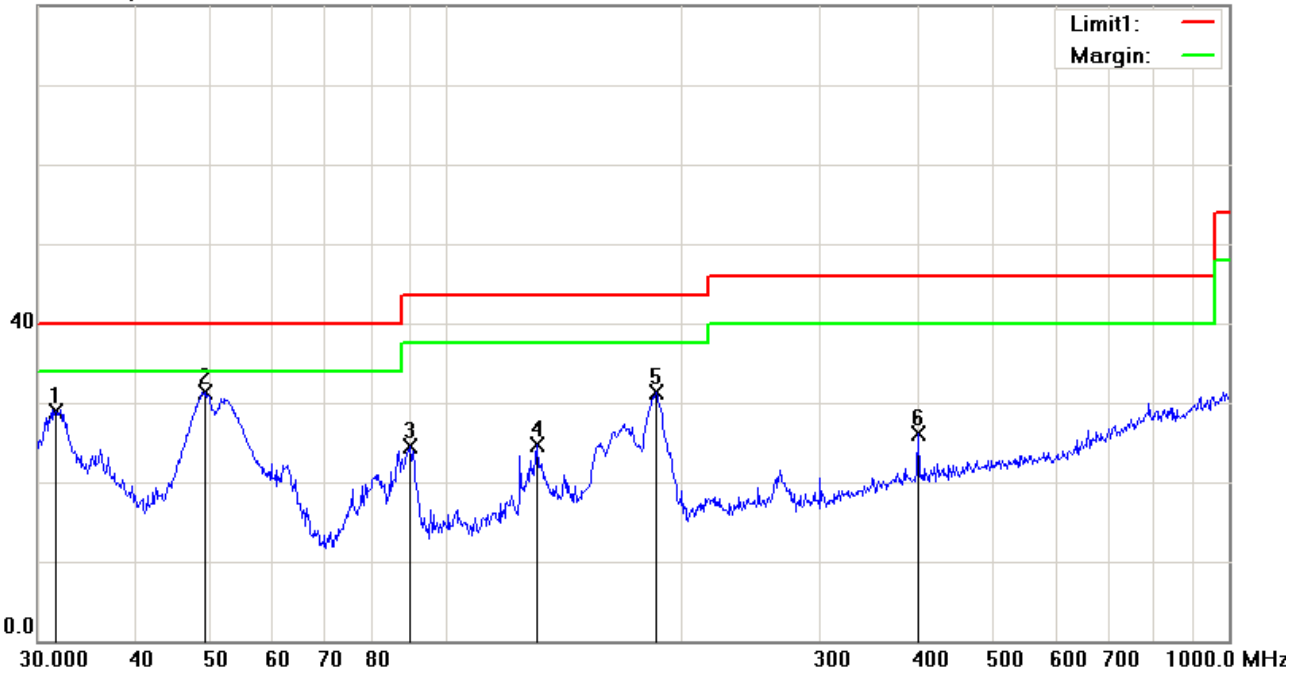
**Test Data**

**Horizontal Polarity Plot @3m**

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree ( )	Comment
1	H	31.1798	25.56	peak	-1.13	24.43	40.00	-15.57	100	360	
2	H	45.3755	26.80	peak	-1.31	25.49	40.00	-14.51	110	360	
3	H	89.5900	34.11	peak	-13.38	20.73	43.50	-22.77	200	199	
4	H	130.3789	30.42	peak	-7.96	22.46	43.50	-21.04	100	227	
5	H	185.1379	42.66	peak	-9.55	33.11	43.50	-10.39	100	115	
6	H	266.6089	32.68	peak	-8.43	24.25	46.00	-21.75	100	168	

**Below 1GHz**

80.0 dBuV/m



**Test Data**

**Vertical Polarity Plot @3m**

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree ( )	Comment
1	V	31.6202	31.30	peak	-2.41	28.89	40.00	-11.11	100	229	
2	V	49.1866	45.03	peak	-13.67	31.36	40.00	-8.64	100	172	
3	V	89.9047	38.43	peak	-13.87	24.56	43.50	-18.94	100	202	
4	V	130.3789	32.26	peak	-7.52	24.74	43.50	-18.76	100	229	
5	V	185.1379	39.98	peak	-8.65	31.33	43.50	-12.17	200	194	
6	V	400.4319	29.84	peak	-3.80	26.04	46.00	-19.96	100	221	



<b>Test Mode:</b>	<b>Transmitting Mode</b>
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Mode: GFSK (Worst Case)

**Low Channel (2402 MHz)**

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	38.46	AV	V	33.83	6.86	31.72	47.43	54	-6.57
4804	36.41	AV	H	33.83	6.86	31.72	45.38	54	-8.62
4804	47.92	PK	V	33.83	6.86	31.72	56.89	74	-17.11
4804	48.73	PK	H	33.83	6.86	31.72	57.70	74	-16.30

**Middle Channel (2441 MHz)**

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4882	37.55	AV	V	33.86	6.82	31.82	46.41	54	-7.59
4882	37.19	AV	H	33.86	6.82	31.82	46.05	54	-7.95
4882	48.62	PK	V	33.86	6.82	31.82	57.48	74	-16.52
4882	49.27	PK	H	33.86	6.82	31.82	58.13	74	-15.87

**High Channel (2480 MHz)**

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	36.52	AV	V	33.9	6.76	31.92	45.26	54	-8.74
4960	35.74	AV	H	33.9	6.76	31.92	44.48	54	-9.52
4960	49.12	PK	V	33.9	6.76	31.92	57.86	74	-16.14
4960	50.19	PK	H	33.9	6.76	31.92	58.93	74	-15.07

## Annex A. TEST INSTRUMENT

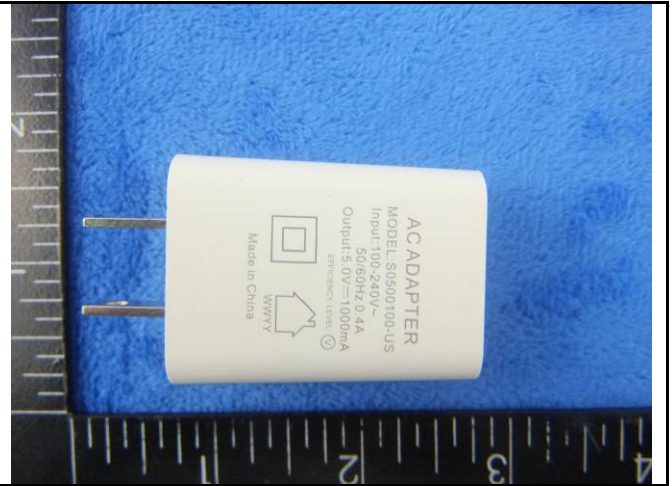
Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>AC Line Conducted</b>					
EMI test receiver	ESCS30	8471241027	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
LISN	ISN T800	34373	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
<b>RF conducted test</b>					
Agilent ESA-E SERIES	E4407B	MY45108319	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
EMI test receiver	ESL6	100262	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/20/2014	11/19/2015	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	10/04/2015	10/04/2016	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/22/2014	09/21/2015	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>

**Annex B. EUT And Test Setup Photographs**

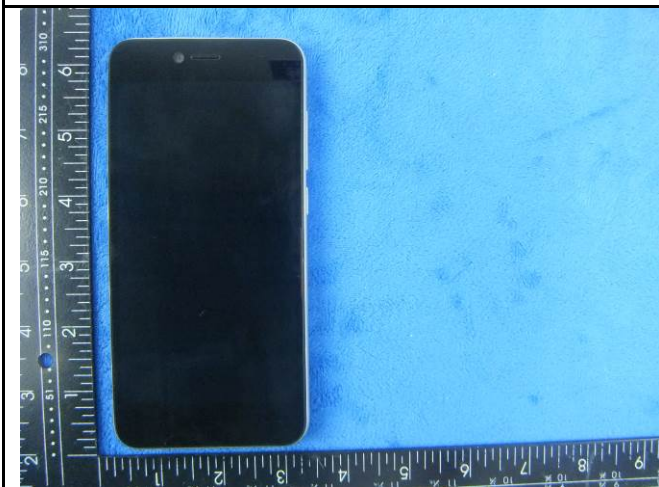
**Annex B.i. Photograph: EUT External Photo**



Whole Package - Top View



Adapter - Front View



EUT - Front View



EUT - Rear View



EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View



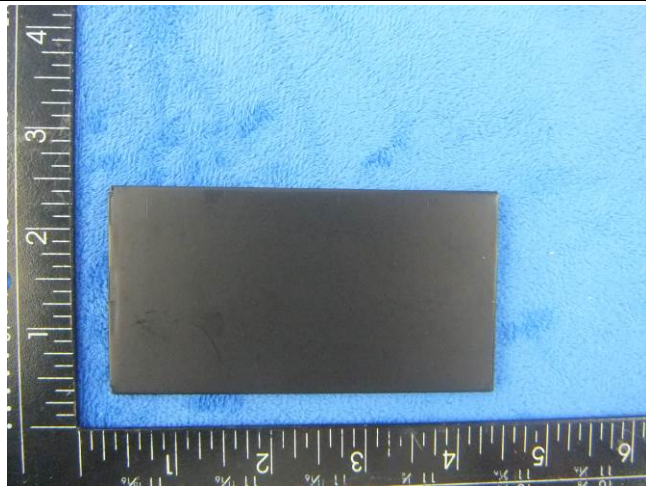
**Annex B.ii. Photograph: EUT Internal Photo**



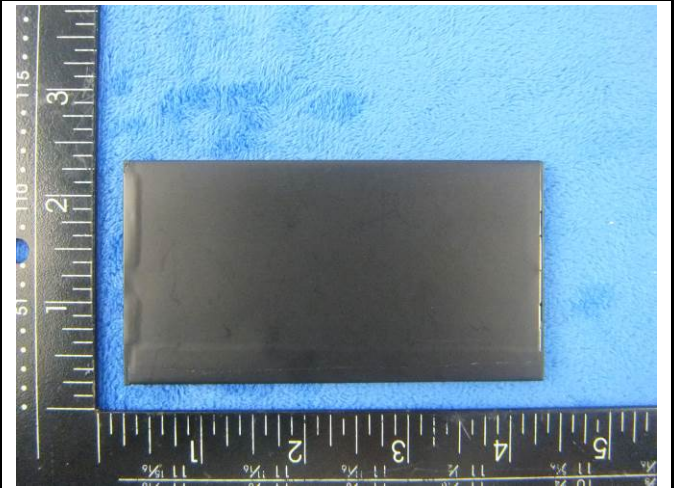
Cover Off - Top View 1



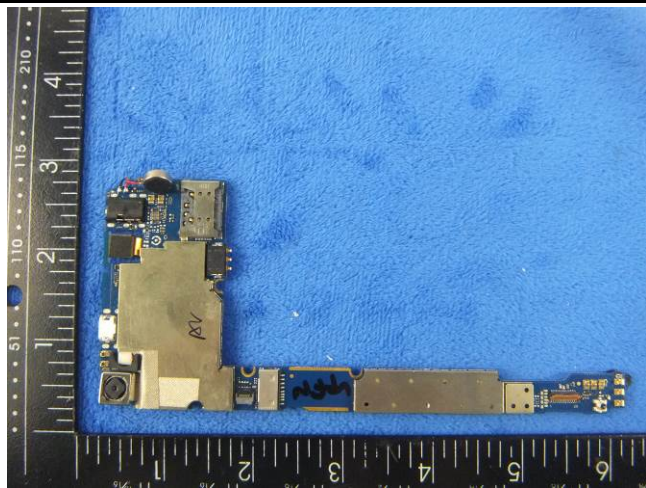
Cover Off - Top View 2



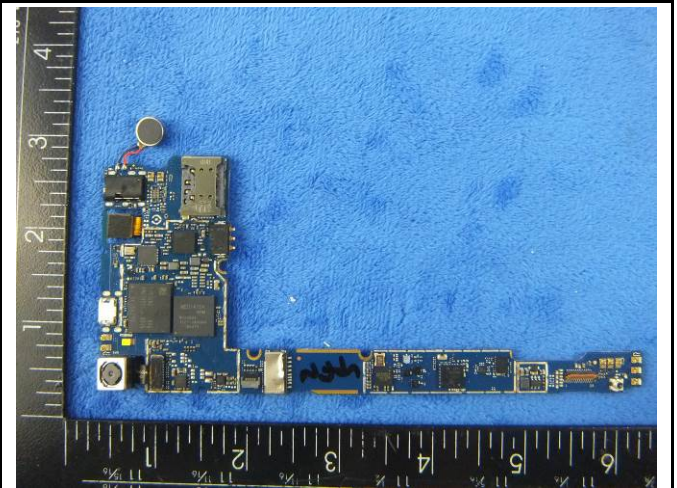
Battery - Top View



Battery - Bottom View

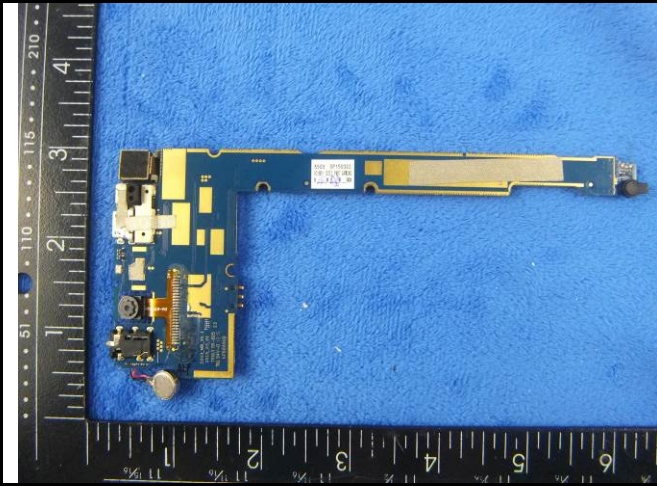


Mainboard With Shielding - Front View



Mainboard Without Shielding - Front View





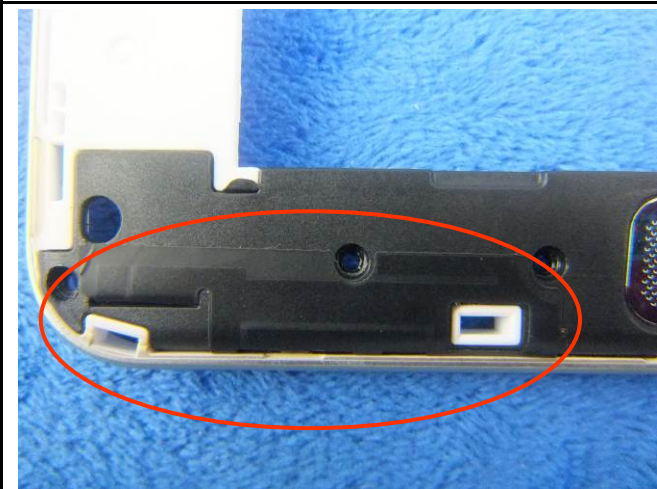
Mainboard - Rear View



LCD - Front View



LCD - Rear View



GSM/PCS/UMTS-FDD Antenna View



WIFI/BT/BLE - Antenna View



GPS - Antenna View



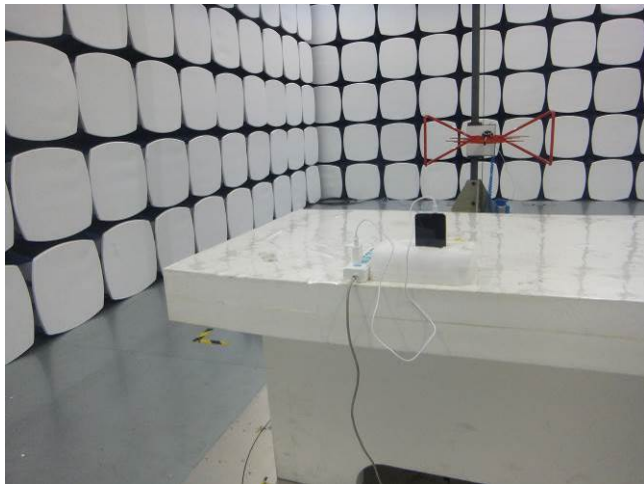
**Annex B.iii. Photograph: Test Setup Photo**



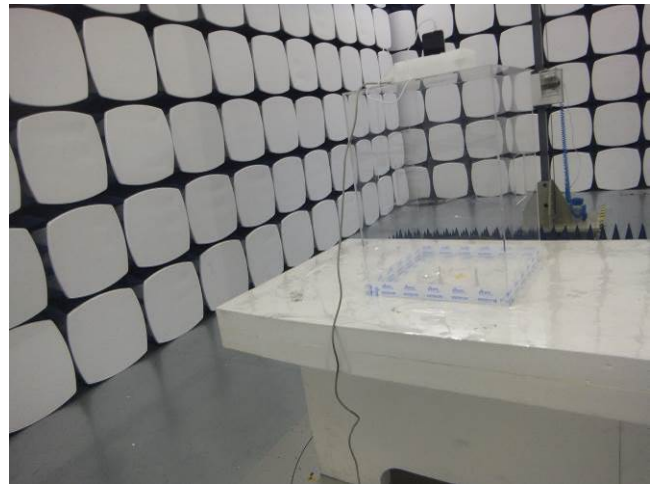
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz



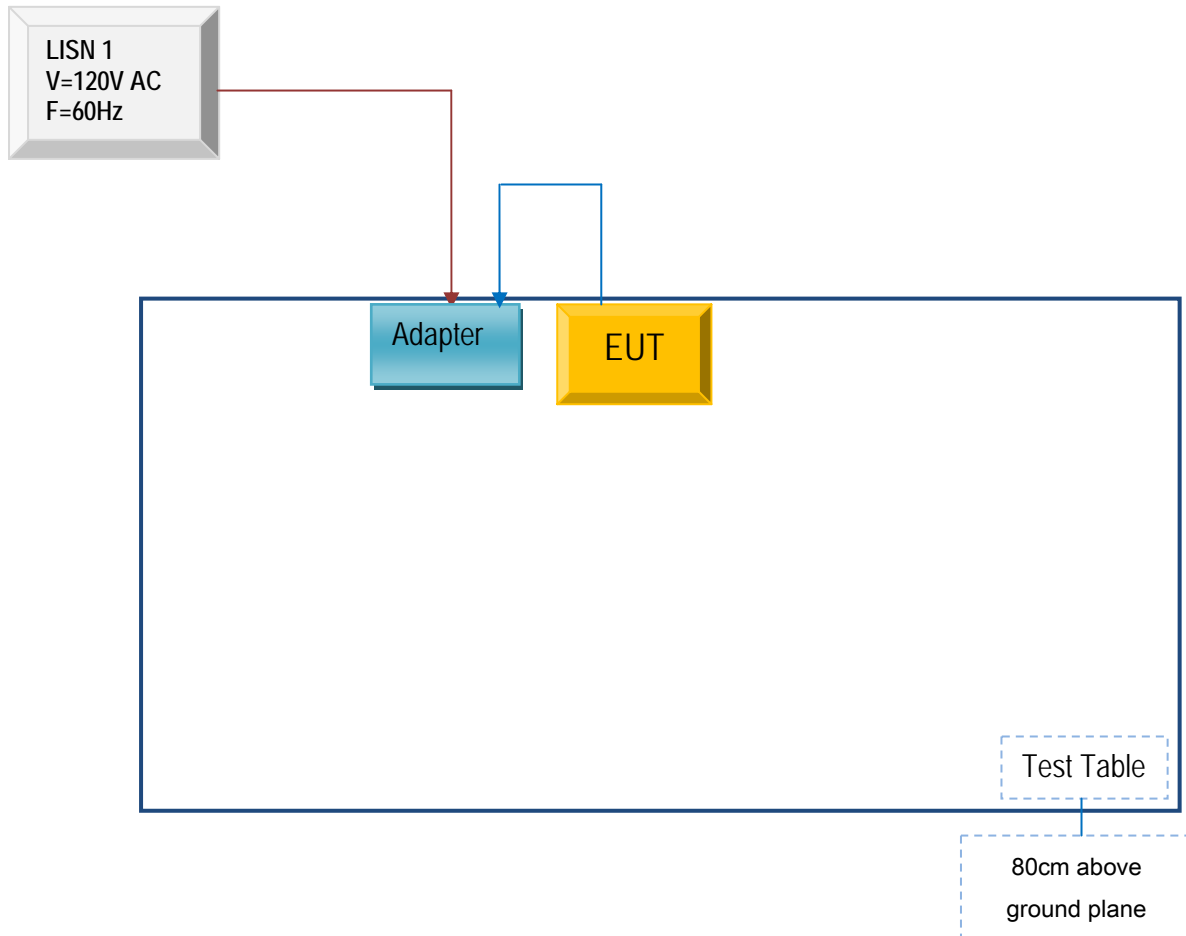
Radiated Spurious Emissions Test Setup Above 1GHz



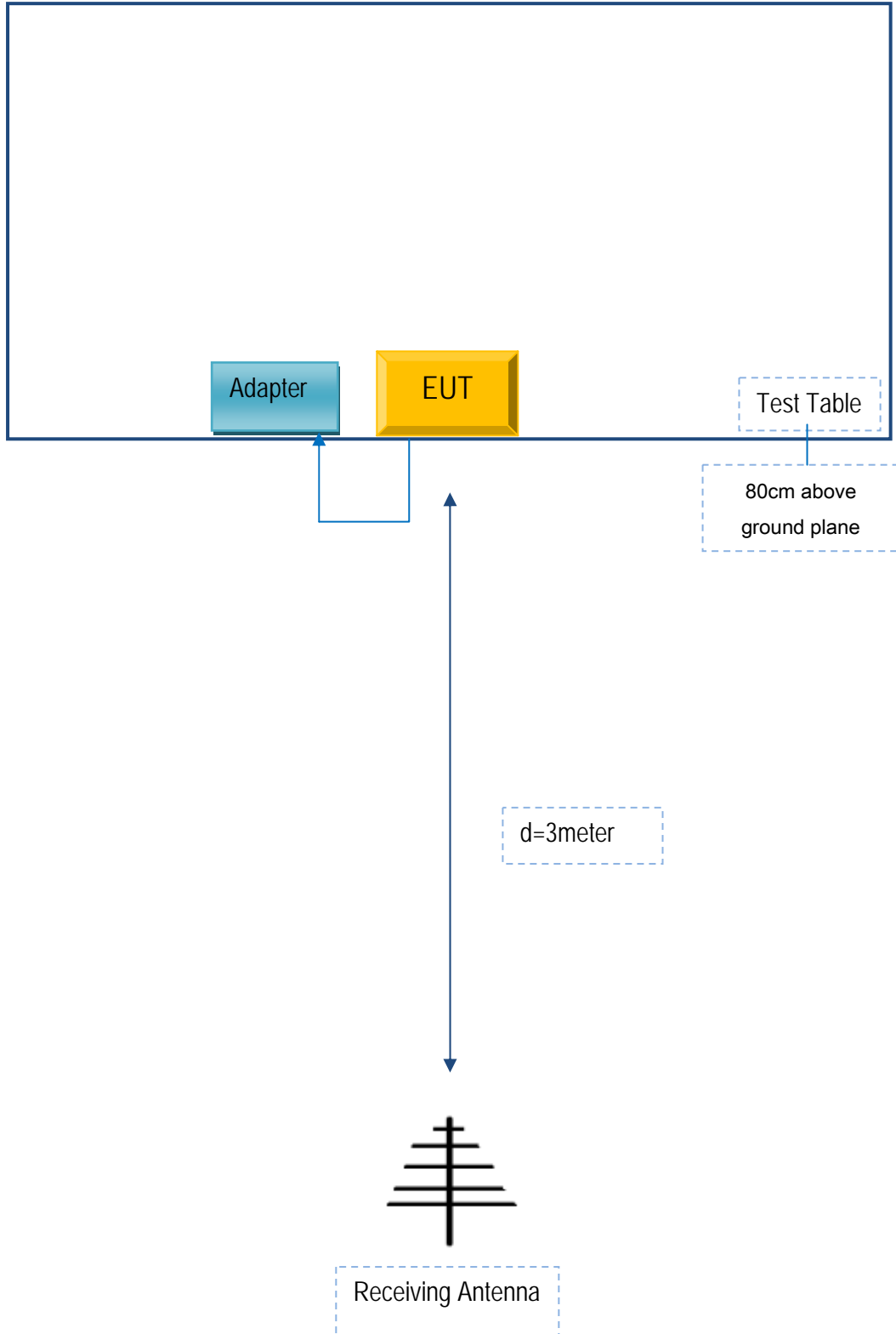
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

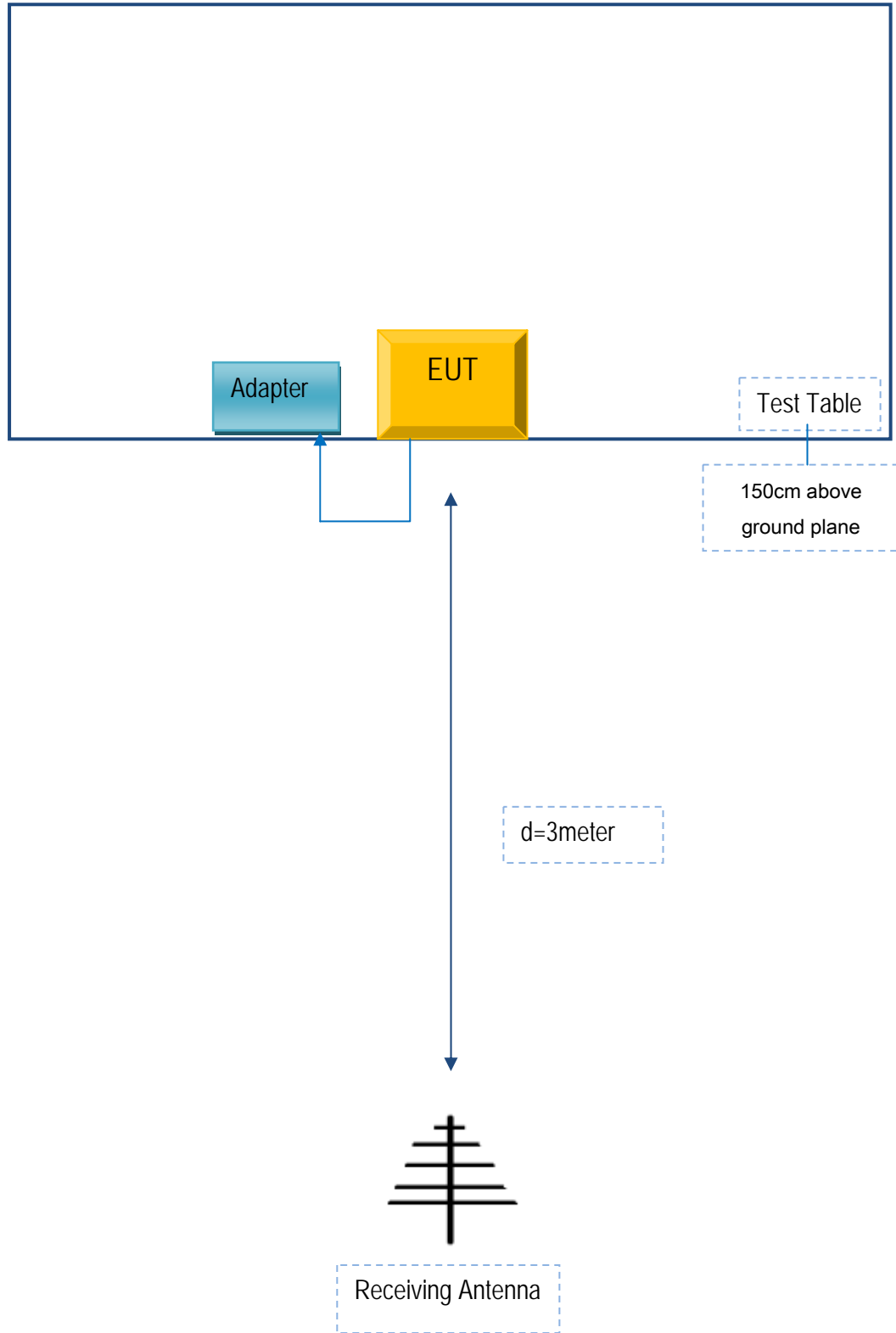
#### Block Configuration Diagram for AC Line Conducted Emissions



### 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.

Manufacturer	Equipment Description	Model	Calibration Date	Calibration Due Date
N/A	N/A	N/A	N/A	N/A

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

Please see attachment

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## Annex E. DECLARATION OF SIMILARITY

N/A