RF TEST REPORT

GLOBAL TESTING & CERTIFICATIONS
YOUR CHOICE FOR- TCB FCB CB NB CAB RCB

Report No.: 14070579-FCC-R2

Supersede Report No.: N/A

Applicant	Verykool USA Inc
Product Name	Mobile phone
Model No.	s5511
Test Standard	FCC Part 15.247: 2013, ANSI C63.10: 2009
Test Date	October 20 to October 28, 2014
Issue Date	October 30, 2014
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Herith shi	Alex.Liu	
Herith Shi **Test Engineer**	**Alex Liu** **Checked By**	

This test report may be reproduced in full only

Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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

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

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

Laboratories Introduction

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

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

Accreditations for Conformity Assessment

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

This page has been left blank intentionally.

CONTENTS

1. REPORT REVISION HISTORY 5

2. CUSTOMER INFORMATION 5

3. TEST SITE INFORMATION 5

4. EQUIPMENT UNDER TEST (EUT) INFORMATION 6

5. TEST SUMMARY 8

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 9

6.1 RF EXPOSURE 9

6.2 ANTENNA REQUIREMENT 10

6.3 CHANNEL SEPARATION 11

6.4 20DB BANDWIDTH 15

6.5 PEAK OUTPUT POWER 19

6.6 NUMBER OF HOPPING CHANNEL 23

6.7 TIME OF OCCUPANCY (DWELL TIME) 25

6.8 BAND EDGE 29

6.9 AC POWER LINE CONDUCTED EMISSIONS 37

6.10 RADIATED SPURIOUS EMISSIONS 41

ANNEX A. TEST INSTRUMENT 45

ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS 46

ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT 51

ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST 54

ANNEX E. DECLARATION OF SIMILARITY 55

1. Report Revision History

Report No.	Report Version	Description	Issue Date
14070579-FCC-R2	NONE	Original	October 30, 2014

2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA
Manufacturer	HONGKONG IPRO TECHNOLOGY CO., LIMITED
Manufacturer Add	FLAT/RM A3 9/F SILVERCORP INT TOWER 707-713 NATHAN RD MONGKOK KL HONGKONG

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	Labview of SIEMIC version 2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Mobile phone
Main Model:	s5511
Serial Model:	N/A
Date EUT received:	October 17, 2014
Test Date(s):	October 20 to October 28, 2014
Equipment Category：	DSS
Antenna Gain:	UMTS-FDD Band V/GSM850: 2.7 dBi UMTS-FDD Band II /PCS1900: 2.4 dBi Bluetooth/BLE: 1.5 dBi WIFI: 1.5 dBi
Type of Modulation:	GSM / GPRS: GMSK EGPRS: GMSK UMTS-FDD: QPSK 802.11b/g/n: DSSS, OFDM Bluetooth: GFSK, π /4DQPSK, 8DPSK BLE: GFSK
RF Operating Frequency (ies):	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 WIFI:802.11b/g/n(20M): 2412-2462 MHz WIFI:802.11n(40M): 2422-2452 MHz Bluetooth& BLE: 2402-2480 MHz
ERP/EIRP:	Bluetooth: 4.938 dBm

Number of Channels:	GSM 850: 124CH PCS1900: 299CH 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: GLORY II Spec: 3.7V 2300mAh Limited charger voltage: 4.2V Adapter: Model: SC050100-US Input: AC 100-240V; 50/60Hz 0.4A Output: DC 5.0V; 1000mA
Trade Name :	verykool
GPRS/EGPRS Multi-slot class	8/10/12
FCC ID:	WA6S5511

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
§15.247 (i), §2.1093	RF Exposure	Compliance
§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 RF Exposure

Standard Requirement:

According to §15.247 (i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission' s guidelines.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,[16] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[17]
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

Two antennas are available for the EUT (GSM antenna, Bluetooth/WIFI/BLE antenna).
The maximum average output power(turn-up power) in low channel of Bluetooth is 5.5 dBm=3.55 mW
The calculation results= $3.55/5*\sqrt{2.402}$ = 1.10< 3

The maximum average output power(turn-up power) in middle channel of Bluetooth is 5.5 dBm=3.55 mW
The calculation results= $3.55/5*\sqrt{2.441}$ = 1.11< 3

The maximum average output power(turn-up power) in high channel of Bluetooth is 5.5 dBm=3.55 mW
The calculation results= $3.55/5*\sqrt{2.480}$ = 1.12< 3

According to KDB 447498, no stand-alone required for Bluetooth antenna, and no simultaneous SAR measurement is required , please refer to SAR report.

Test Result: Pass

6.2 Antenna Requirement

Applicable Standard

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

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

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 2 antennas:
A PIFA antenna for Bluetooth/BLE/WIFI, the gain is 1.5 dBi for Bluetooth/BLE/WIFI.
A PIFA antenna for GSM and UMTS, the gain is 2.7 dBi for UMTS-FDD Band V/ GSM850, 2.4 dBi for UMTS-FDD Band II /PCS1900

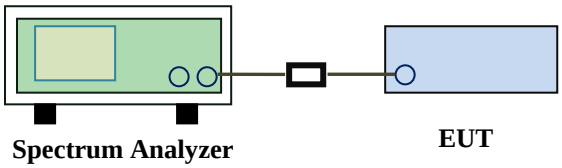
The antenna is up to ANTENNA REQUIREMENT.

Result: Compliance.

6.3 Channel Separation

Temperature	22°C
Relative Humidity	55%
Atmospheric Pressure	1005mbar
Test date :	October 24, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	☑
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - The EUT must have its hopping function enabled - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span - Video (or Average) Bandwidth (VBW) ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.		

Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

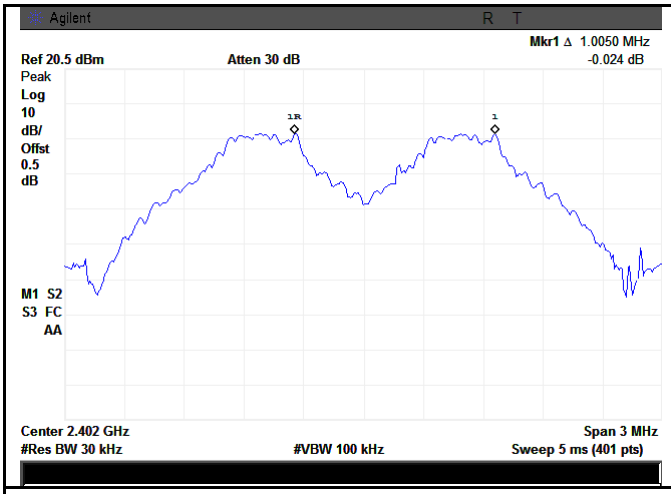
Test Plot ☑ Yes (See below) ☐ N/A

Channel Separation measurement result

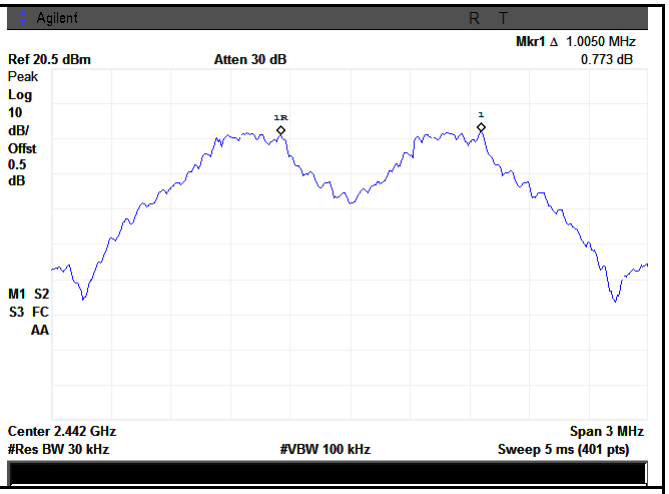
Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.685	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.684	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.684	Pass
	Adjacency Channel	2479			
CH Separation π /4 DQPSK	Low Channel	2402	1.005	0.869	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.867	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.866	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.869	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.867	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.868	Pass
	Adjacency Channel	2479			

Test Plots

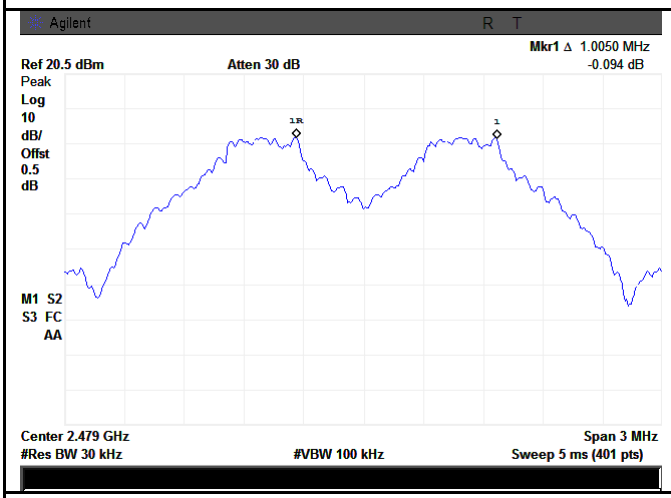
Channel Separation measurement result



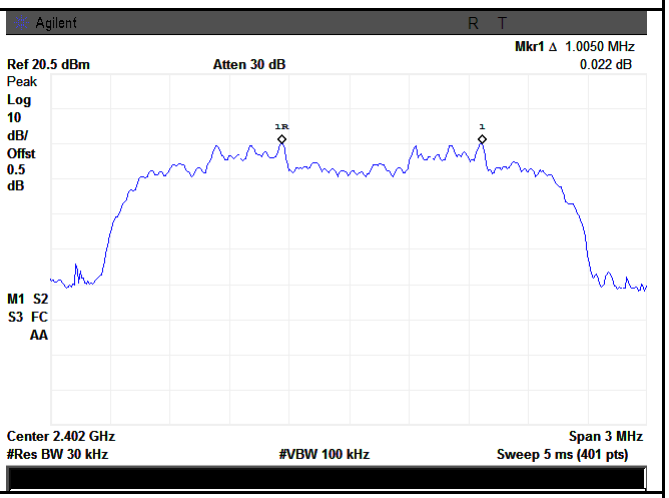
GFSK - Low Channel



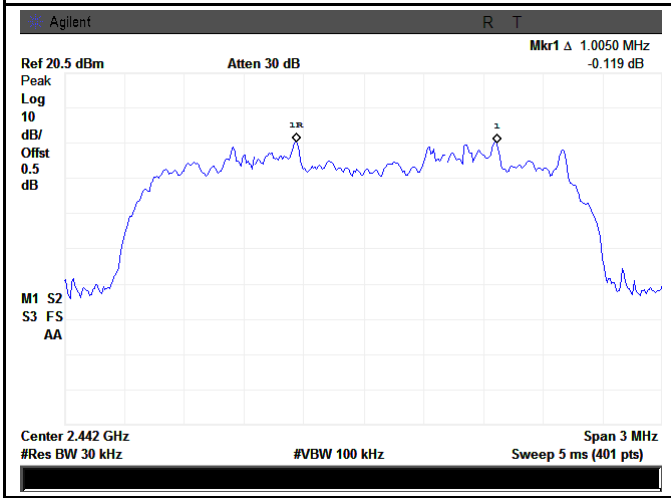
GFSK - Middle Channel



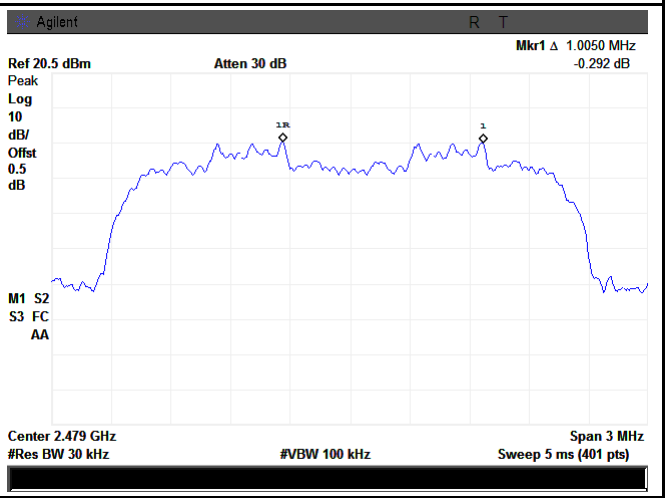
GFSK - High Channel



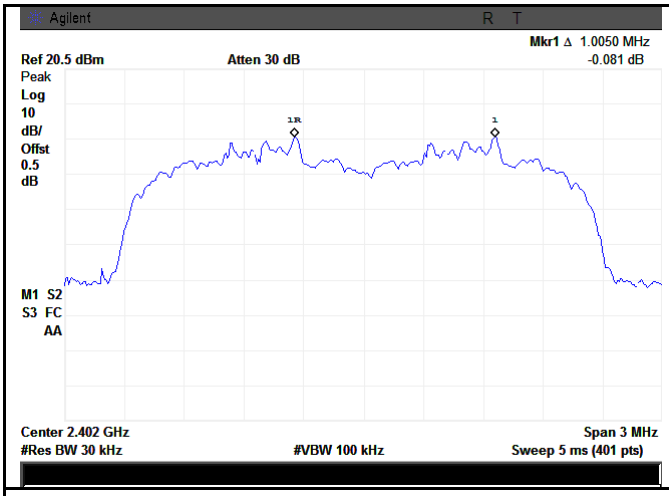
π /4 DPSK - Low Channel



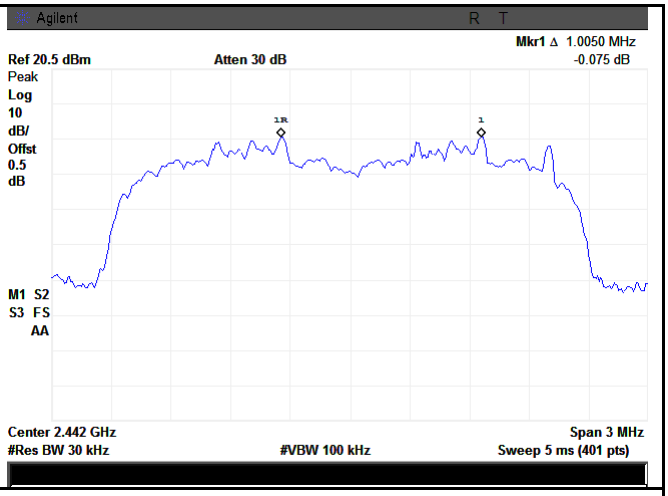
π /4 DQPSK - Middle Channel



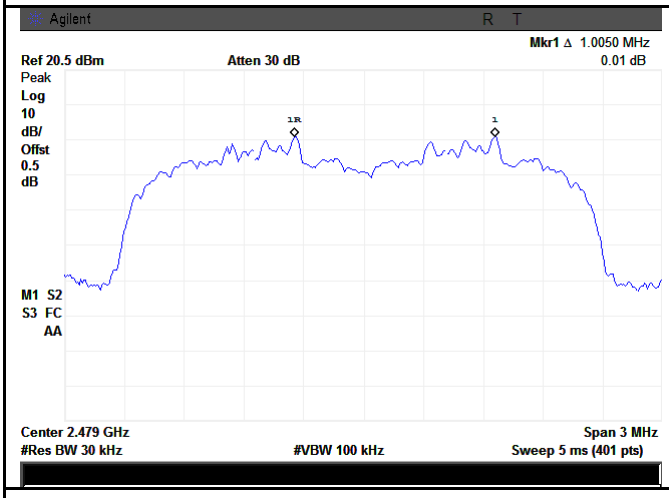
π /4 DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel

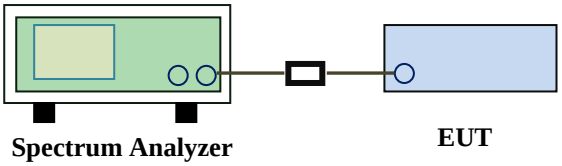


8DPSK - High Channel

6.4 20dB Bandwidth

Temperature	22°C
Relative Humidity	55%
Atmospheric Pressure	1005mbar
Test date :	October 24, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	☑
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel - RBW ≥ 1% of the 20 dB bandwidth - VBW ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold. - The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference		

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

Test Data ☑ Yes ☐ N/A

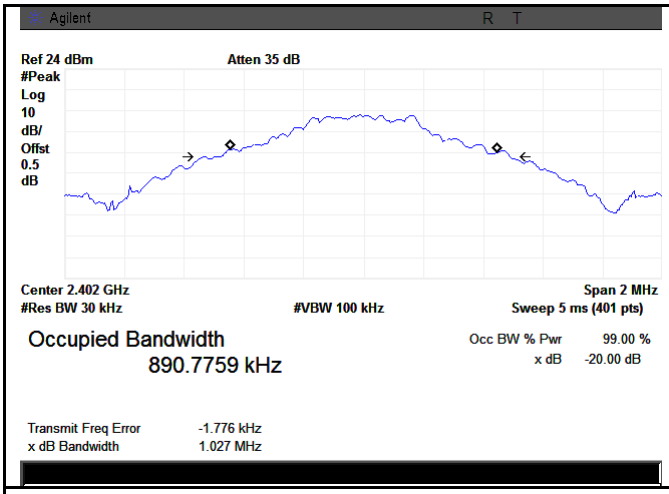
Test Plot ☑ Yes (See below) ☐ N/A

20dB Bandwidth measurement result

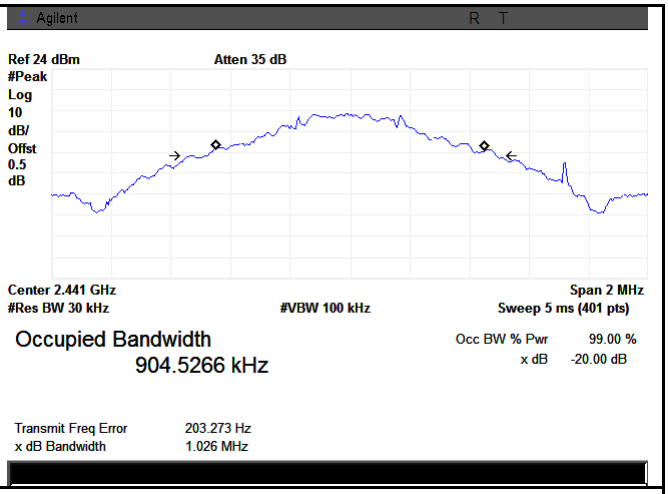
Type	Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)
20dB BW	GFSK	Low	2402	1.027
		Mid	2441	1.026
		High	2480	1.026
	π /4 DQPSK	Low	2402	1.303
		Mid	2441	1.300
		High	2480	1.299
	8-DPSK	Low	2402	1.303
		Mid	2441	1.300
		High	2480	1.302

Test Plots

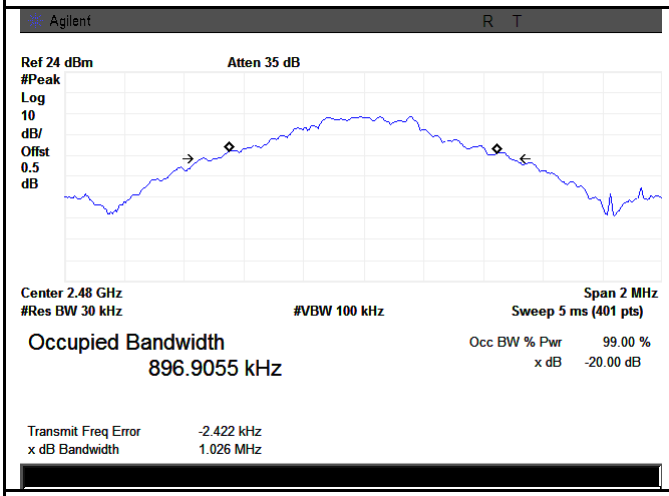
20dB Bandwidth measurement result



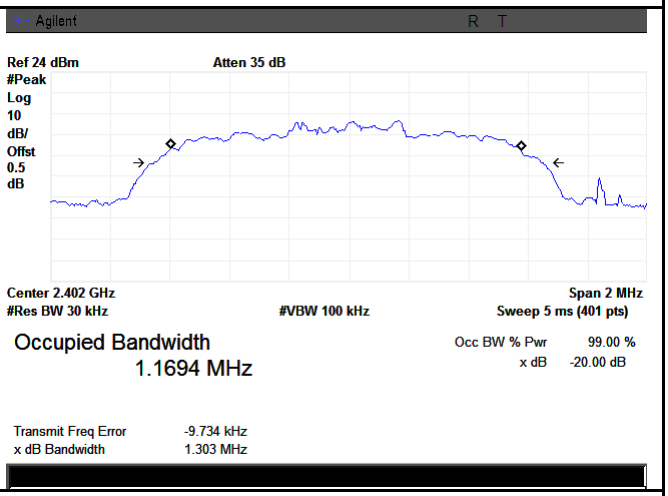
GFSK - Low Channel



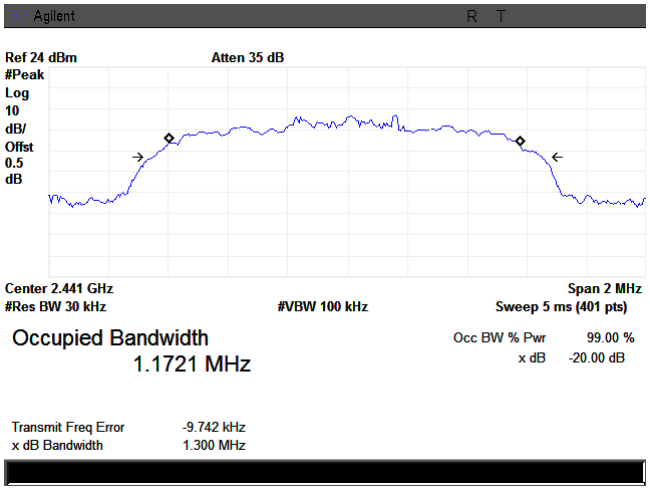
GFSK - Middle Channel



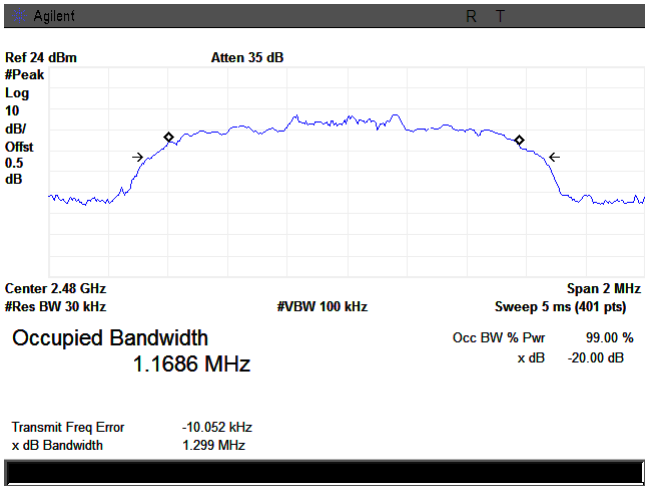
GFSK - High Channel



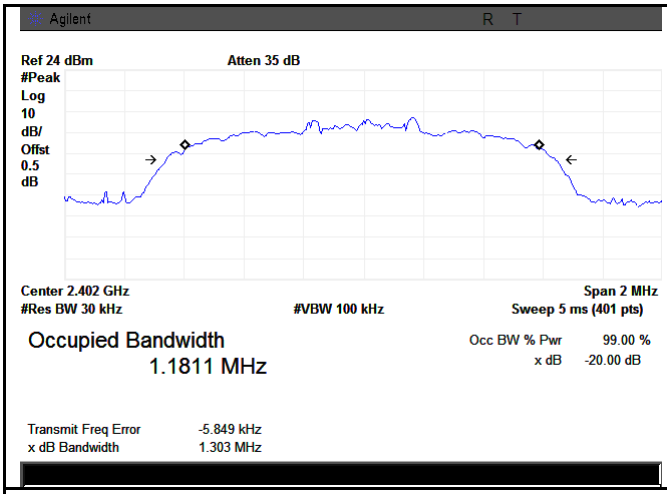
π /4 DPSK - Low Channel



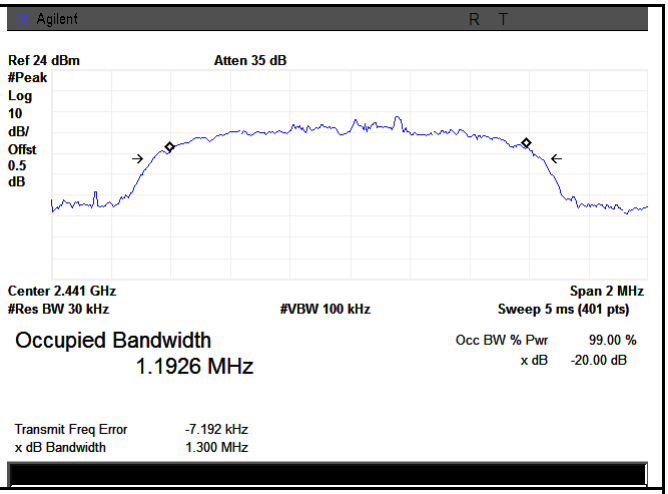
π /4 DQPSK - Middle Channel



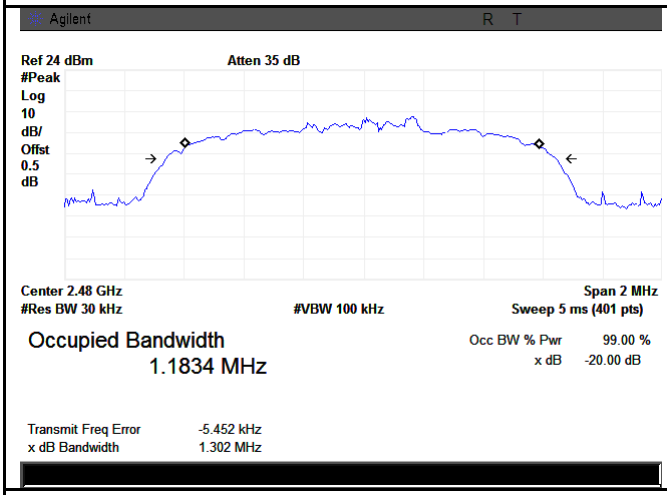
π /4 DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel

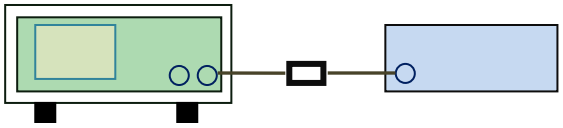


8DPSK - High Channel

6.5 Peak Output Power

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1006mbar
Test date :	October 25, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☑
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	☑
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤ 0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤ 1 Watt	☐
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel - RBW > the 20 dB bandwidth of the emission being measured - VBW ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold		

	- Allow the trace to stabilize. - 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	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

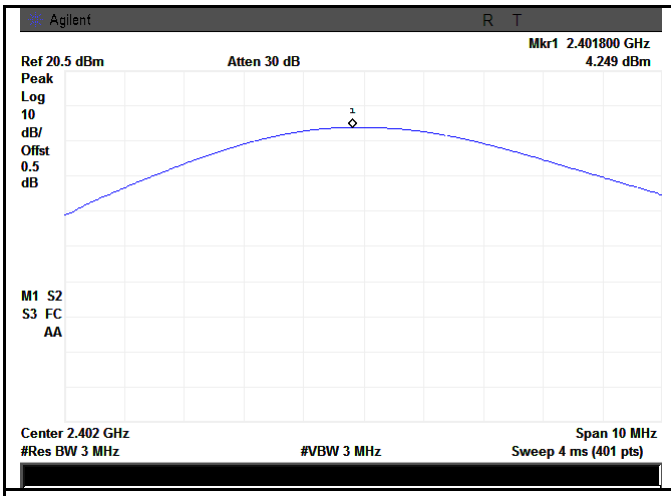
Test Plot ☑ Yes (See below) ☐ N/A

Peak Output Power measurement result

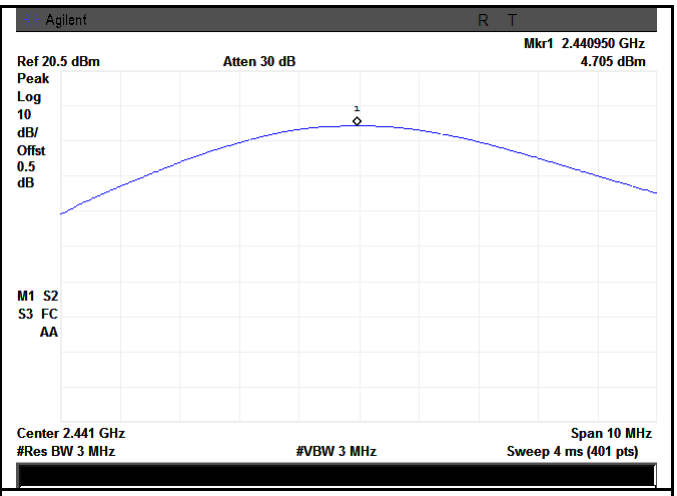
Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	**4.249**	125	Pass
		Mid	2441	**4.705**	125	Pass
		High	2480	**4.938**	125	Pass
	π /4 DQPSK	Low	2402	3.981	125	Pass
		Mid	2441	4.494	125	Pass
		High	2480	4.645	125	Pass
	8-DPSK	Low	2402	4.108	125	Pass
		Mid	2441	4.581	125	Pass
		High	2480	4.831	125	Pass

Test Plots

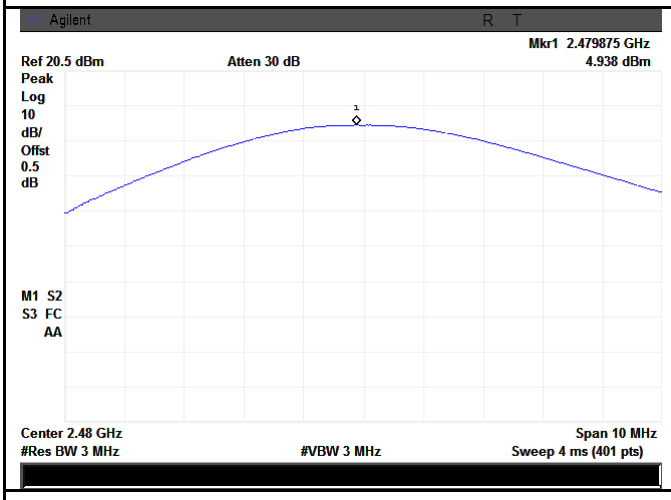
Output Power measurement result



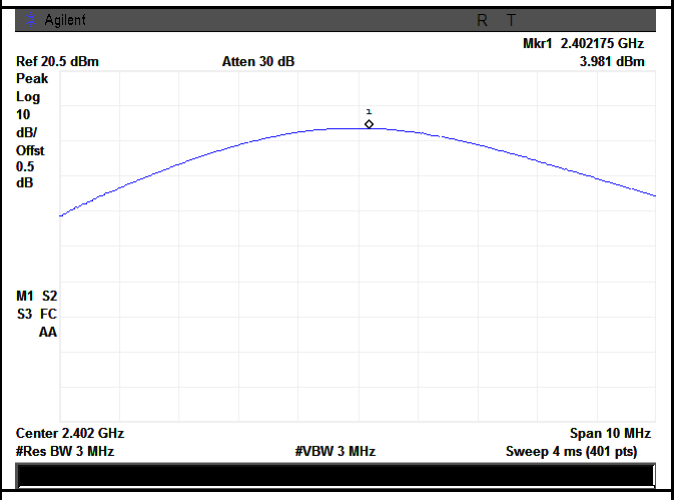
GFSK Output power - Low CH 2402



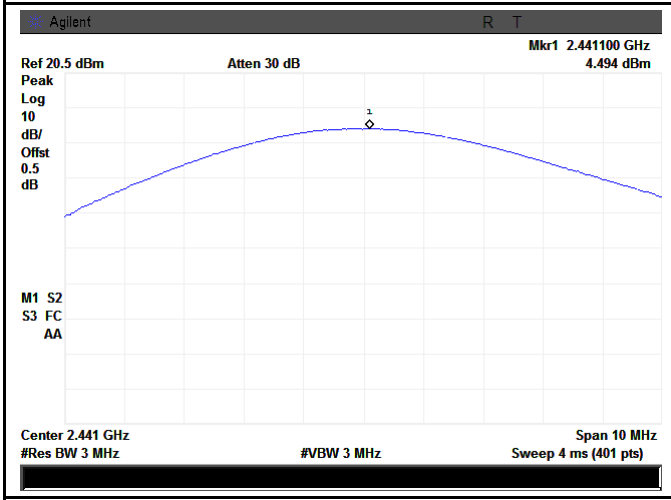
GFSK Output power - Mid CH 2441



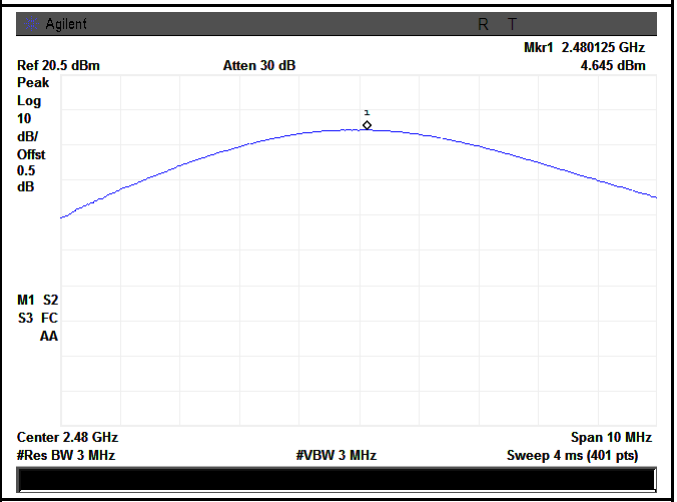
GFSK Output power - High CH 2480



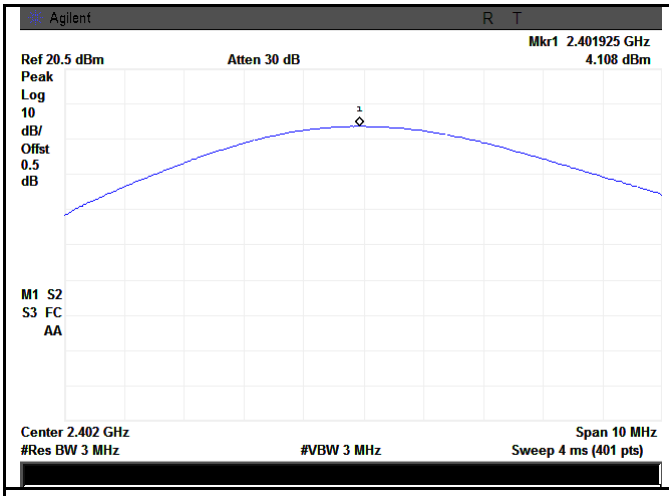
π /4 DQPSK Output power - Low CH 2402



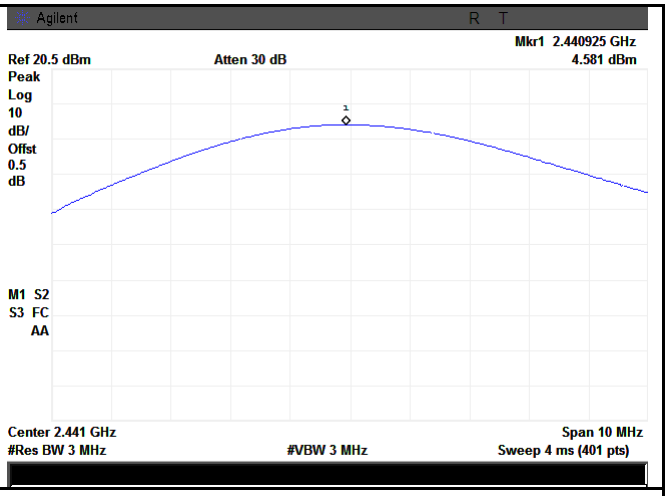
π /4 DQPSK Output power - Mid CH 2441



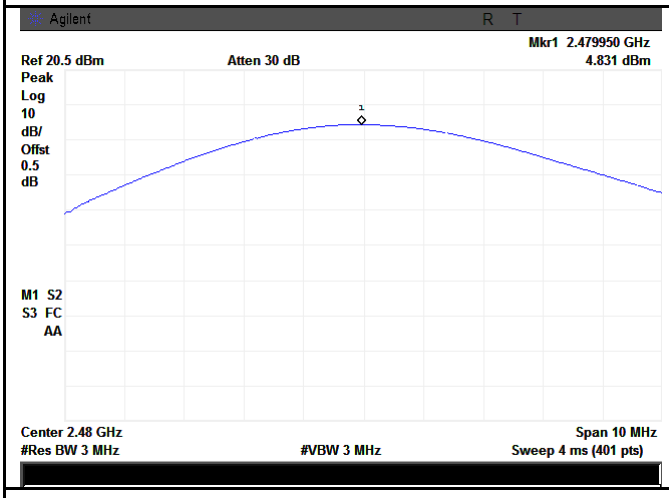
π /4 DQPSK Output power - High CH 2480



8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

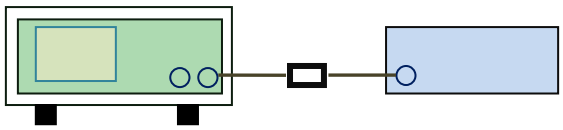


8DPSK Output power - High CH 2480

6.6 Number of Hopping Channel

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1006mbar
Test date :	October 25, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz ≥ 15 channels	☑
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: The EUT must have its hopping function enabled. - Span = the frequency band of operation - RBW ≥ 1% of the span - VBW ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow trace to fully stabilize. - It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).		
Remark			
Result	☑ Pass	☐ Fail	

Test Data ☑ Yes ☐ N/A

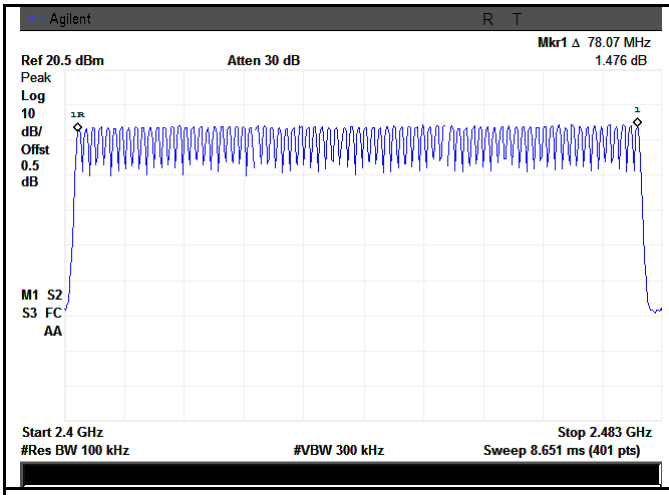
Test Plot ☑ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

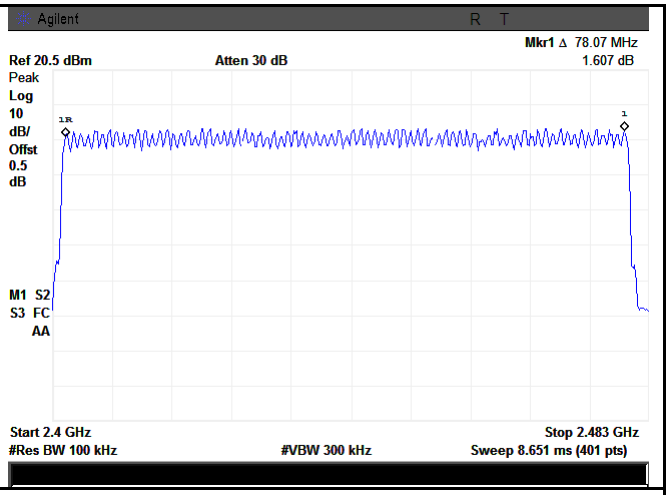
Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483.5	79	15
	π /4 DQPSK	2400-2483.5	79	15
	8-DPSK	2400-2483.5	79	15

Test Plots

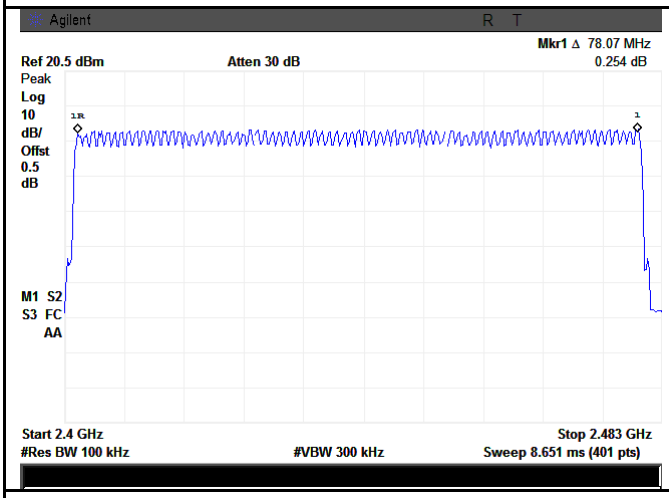
Number of Hopping Channels measurement result



GFSK



π /4DQPSK

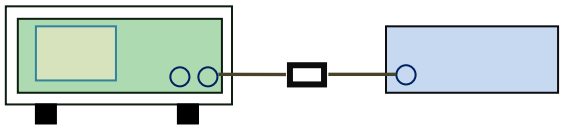


8DPSK

6.7 Time of Occupancy (Dwell Time)

Temperature	24°C
Relative Humidity	57%
Atmospheric Pressure	1007mbar
Test date :	October 26, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a)(1)(iii)	a)	Dwell Time < 0.4s	☑
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer - Span = zero span, centered on a hopping channel - RBW = 1 MHz - VBW ≥ RBW - Sweep = as necessary to capture the entire dwell time per hopping channel - Detector function = peak - Trace = max hold - use the marker-delta function to determine the dwell time		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

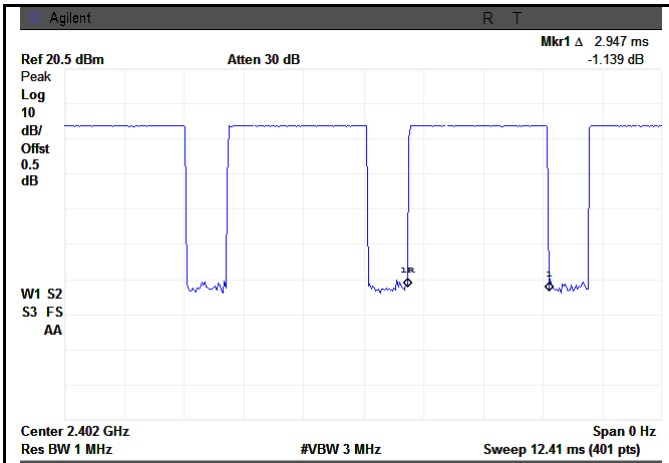
Test Plot ☑ Yes (See below) ☐ N/A

Dwell Time measurement result

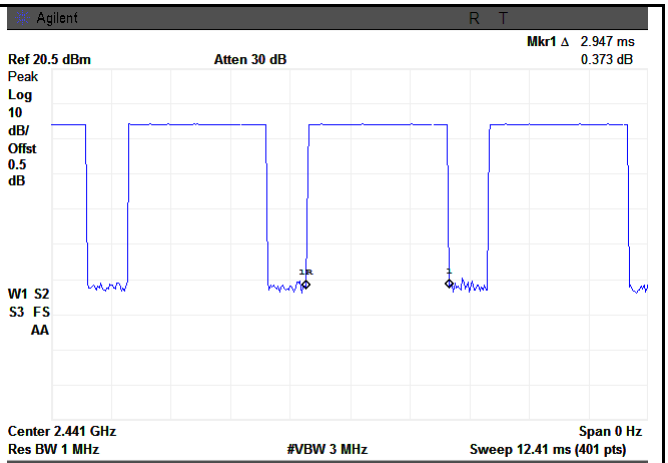
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Dwell Time	GFSK	Low	2.947	0.314	0.4	Pass
		Mid	2.947	0.314	0.4	Pass
		High	2.947	0.314	0.4	Pass
	π /4 DQPSK	Low	2.947	0.314	0.4	Pass
		Mid	2.947	0.314	0.4	Pass
		High	2.947	0.314	0.4	Pass
	8-DPSK	Low	2.947	0.314	0.4	Pass
		Mid	2.947	0.314	0.4	Pass
		High	2.947	0.314	0.4	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second						

Test Plots

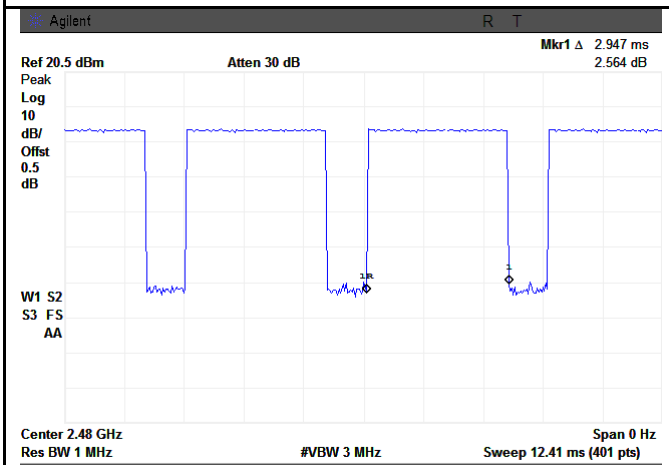
Dwell Time measurement result



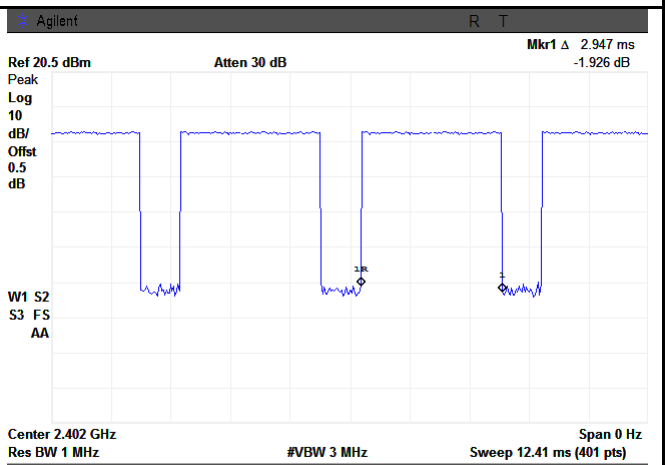
GFSK - Low CH 2402



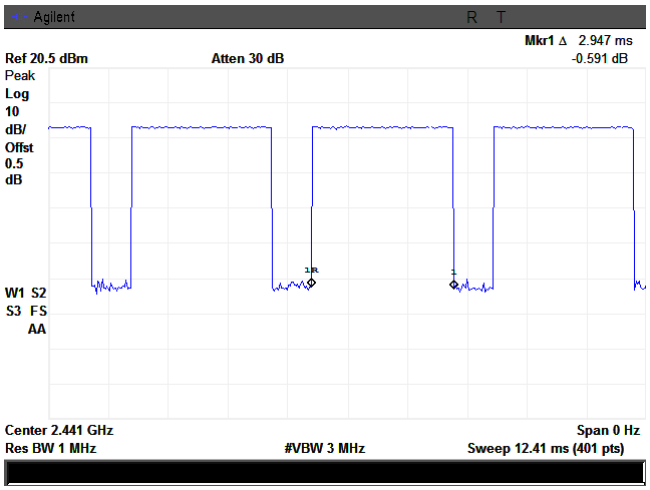
GFSK - Mid CH 2441



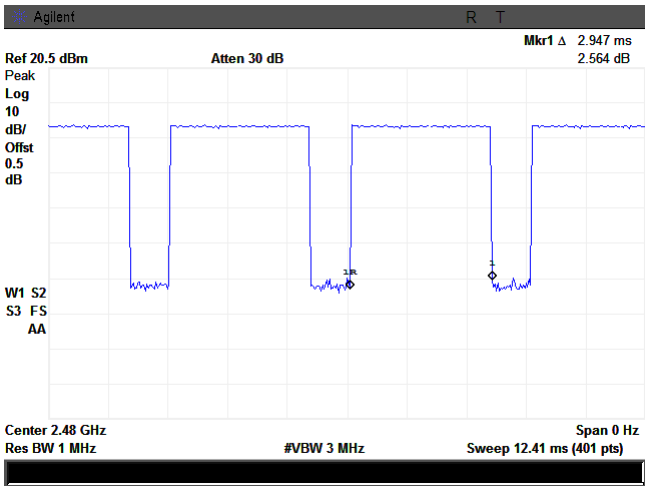
GFDK - High CH 2480



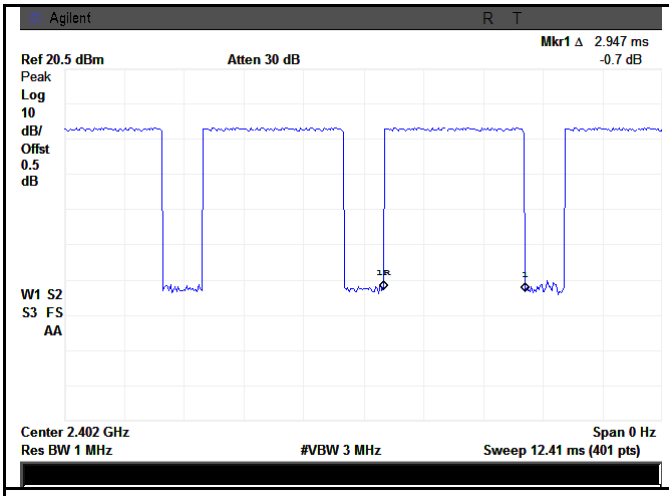
π /4 DQPSK - Low CH 2402



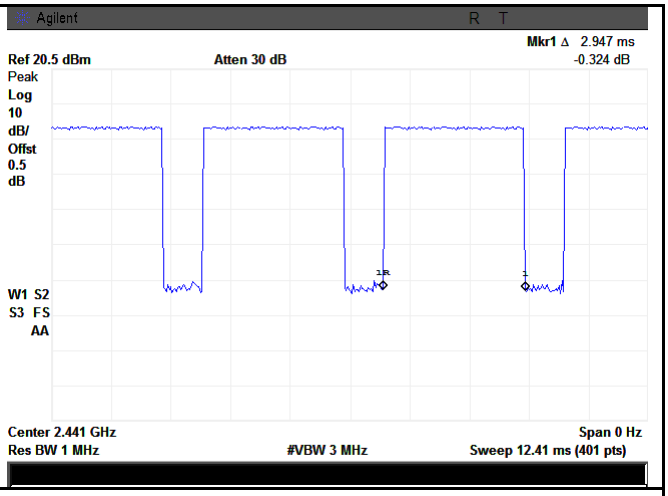
π /4 DQPSK - Mid CH 2441



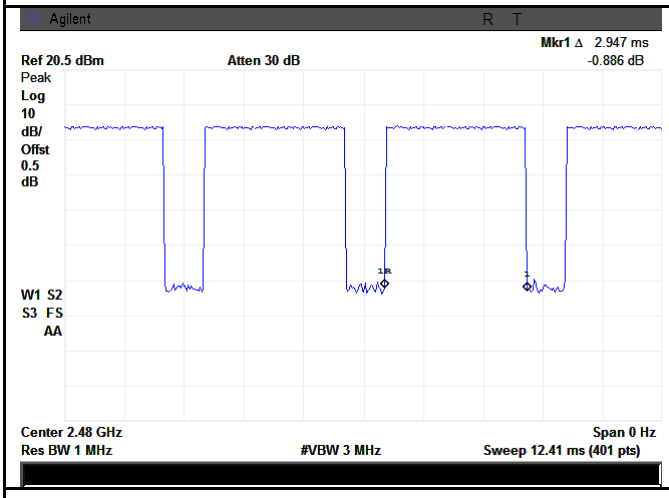
π /4 DQPSK - High CH 2441



8DPSK - Low CH 2402



8DPSK - Mid CH 2441

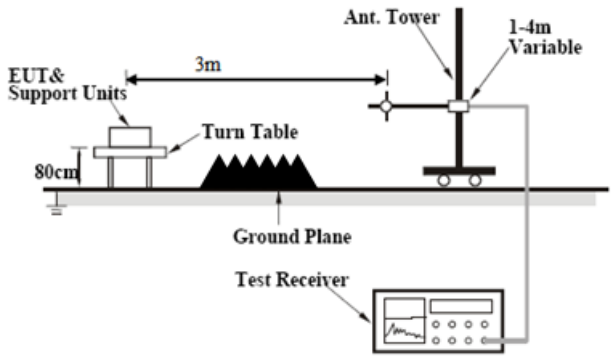


8DPSK - High CH 2480

6.8 Band Edge

Temperature	26°C
Relative Humidity	50%
Atmospheric Pressure	1009mbar
Test date :	October 27 to October 28, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a)(1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	☑
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only - 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, and make sure the instrument is operated in its linear range. - 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: 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 with Peak detection for Average Measurement as below at frequency above 1GHz. ■ 1 kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☑ Pass ☐ Fail

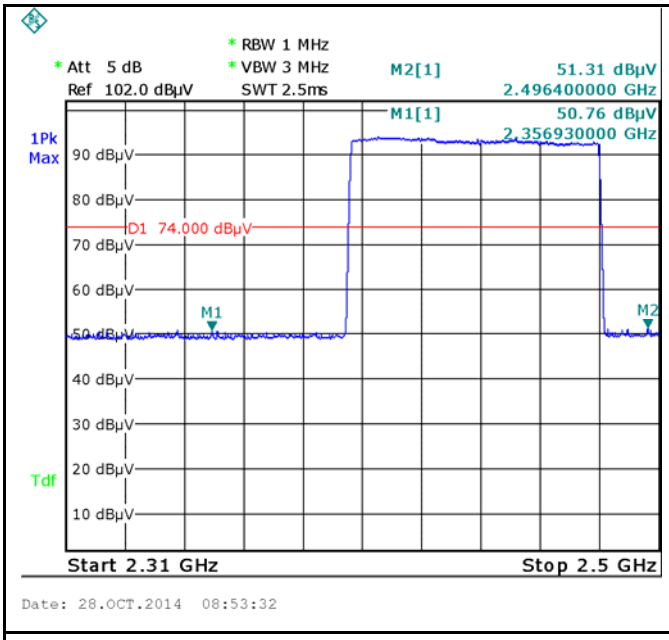
Test Data ☐ Yes ☑ N/A

Test Plot ☑ Yes (See below) ☐ N/A

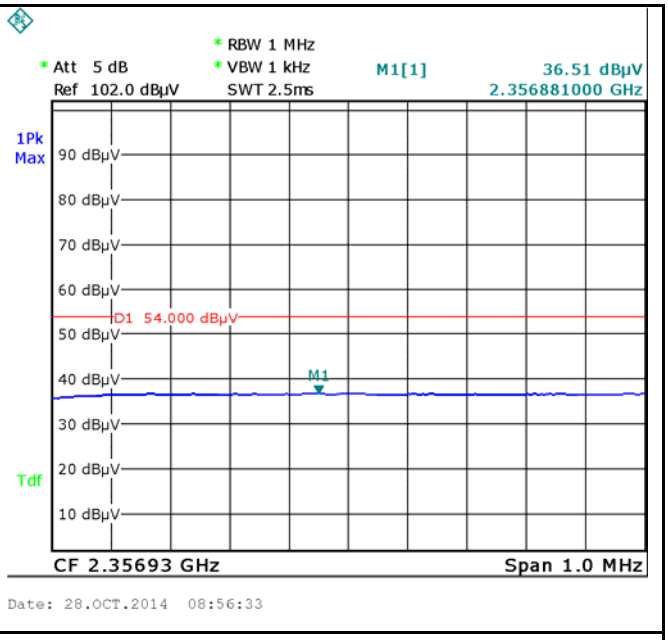
Test Plots

Band Edge measurement result

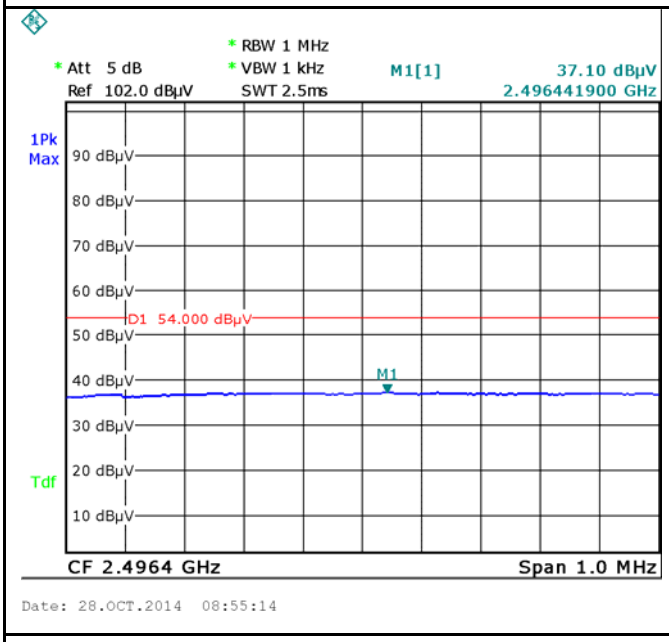
GFSK Mode:



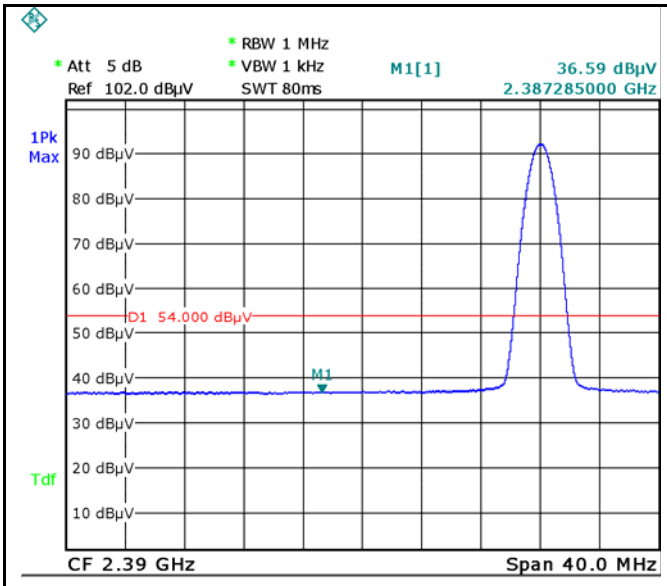
GFSK-Hopping-PK



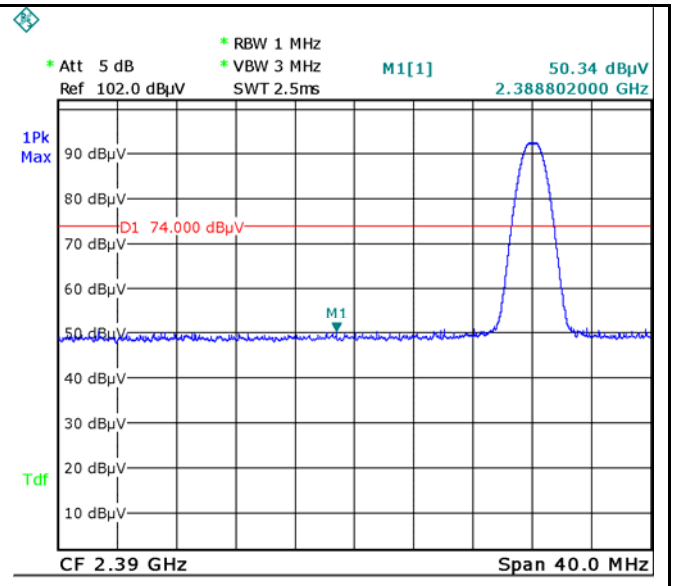
GFSK-Hopping-Ave-Left Side



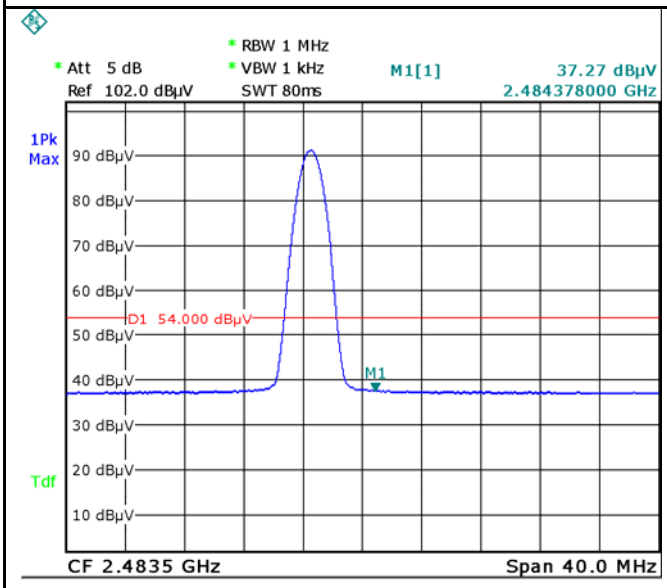
GFSK-Hopping-Ave-Right Side



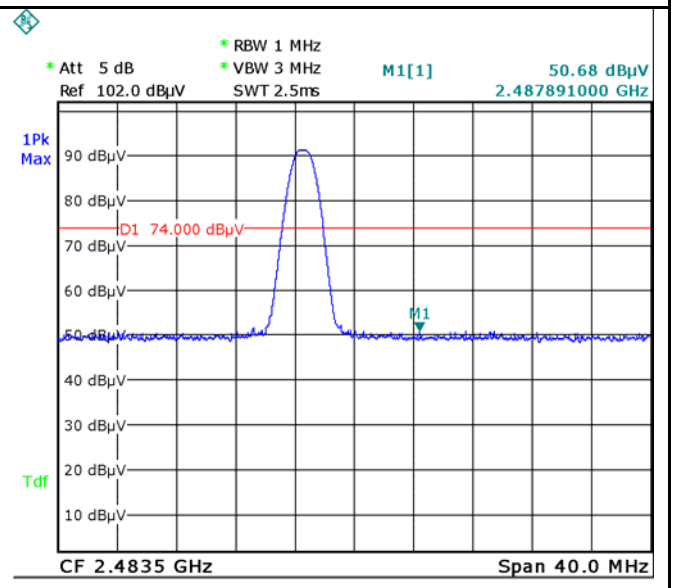
GFSK-Left Side-Ave



GFSK-Left Side-PK

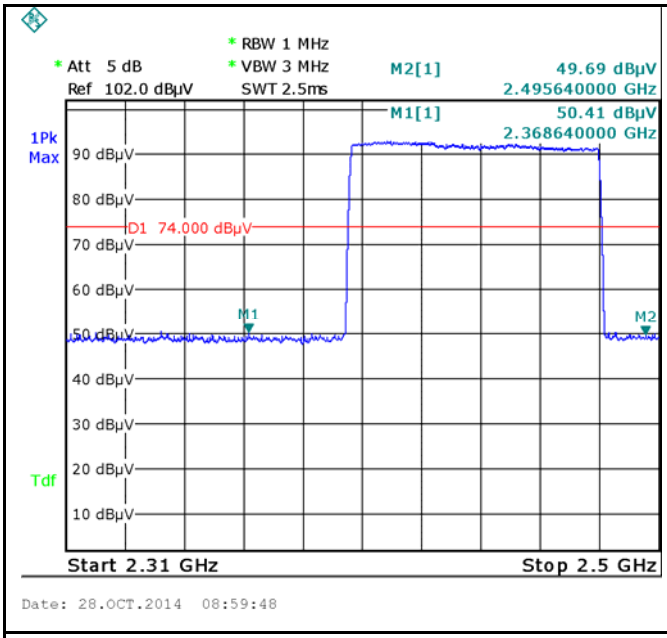


GFSK-Right Side-Ave

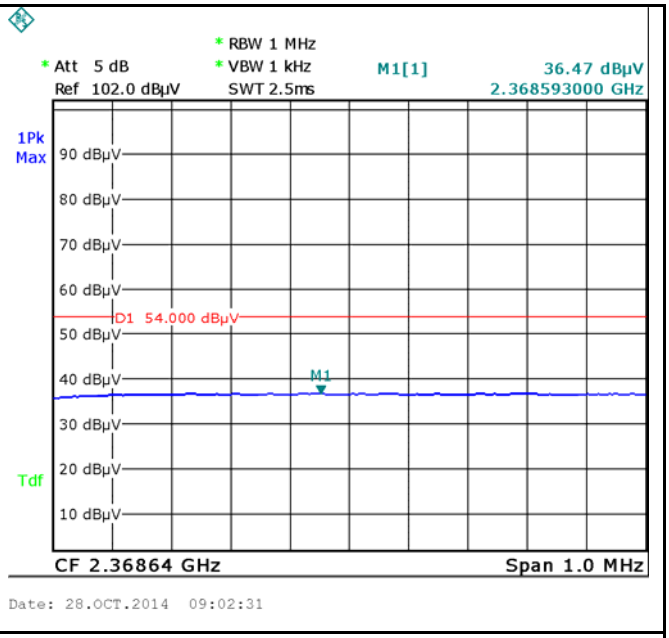


GFSK-Right Side-PK

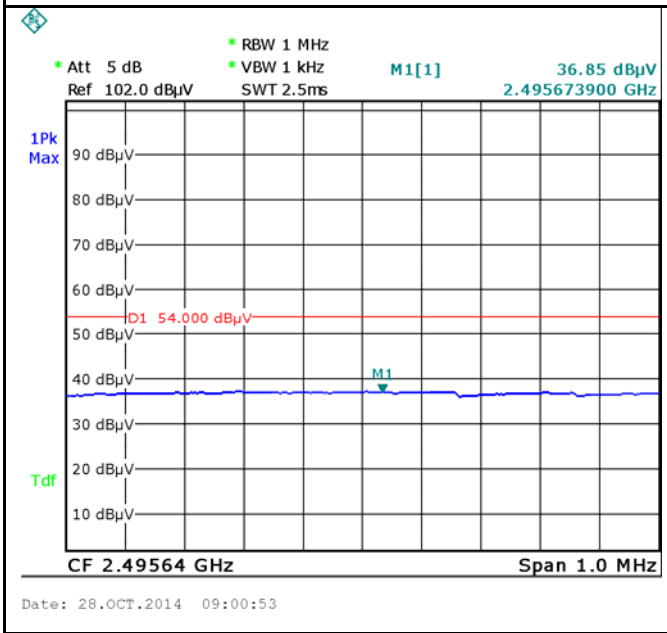
π /4 DQPSK Mode:



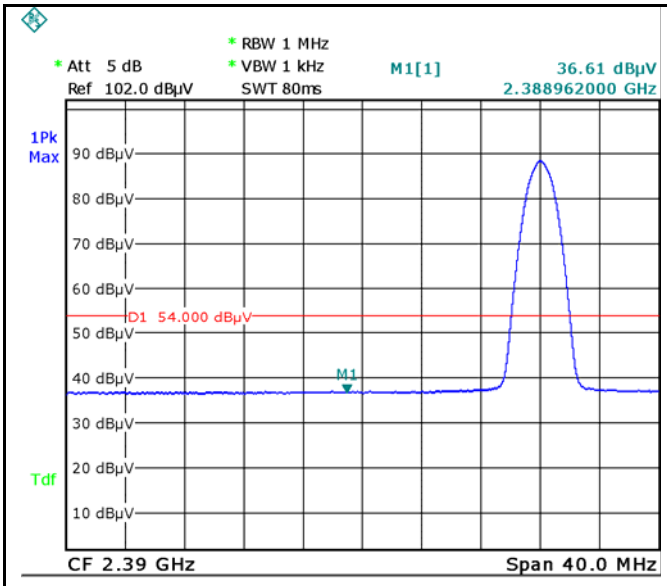
π /4 DQPSK-Hopping-PK



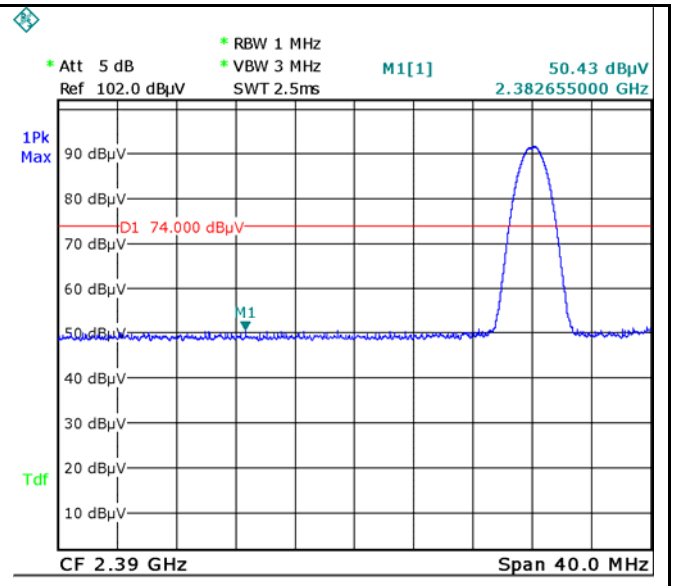
π /4 DQPSK-Hopping-Ave-Left Side



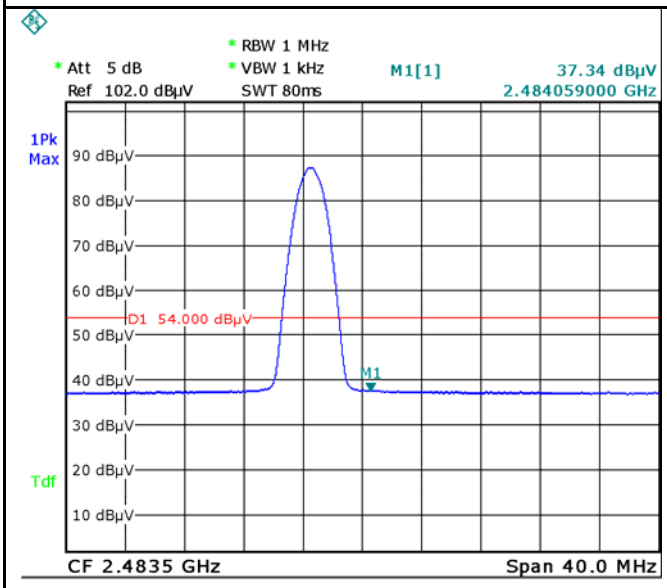
π /4 DQPSK-Hopping-Ave Right-Side



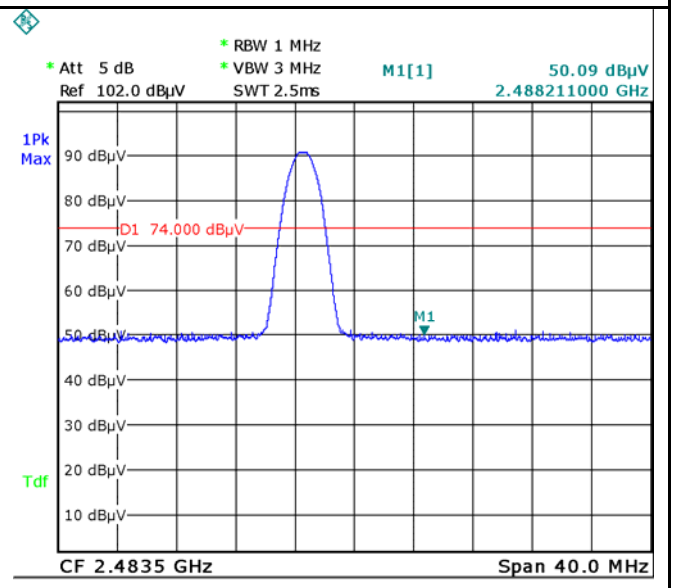
π /4 DQPSK-Left Side-Ave



π /4 DQPSK-Left Side-PK

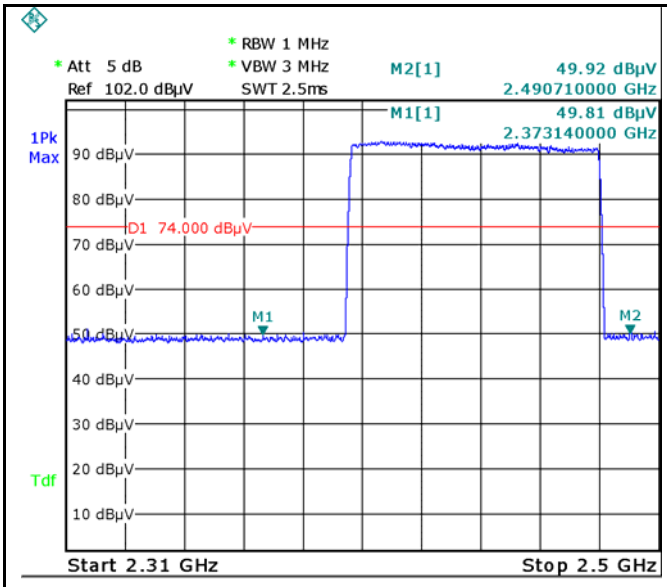


π /4 DQPSK-Right Side-Ave

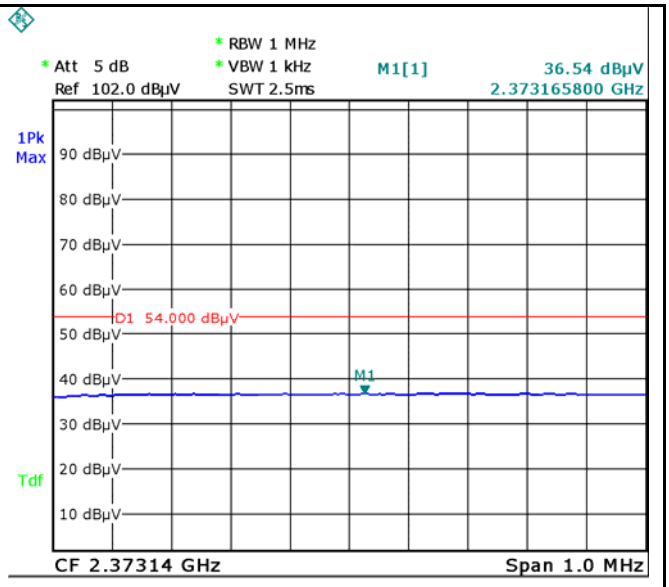


π /4 DQPSK-Right Side-PK

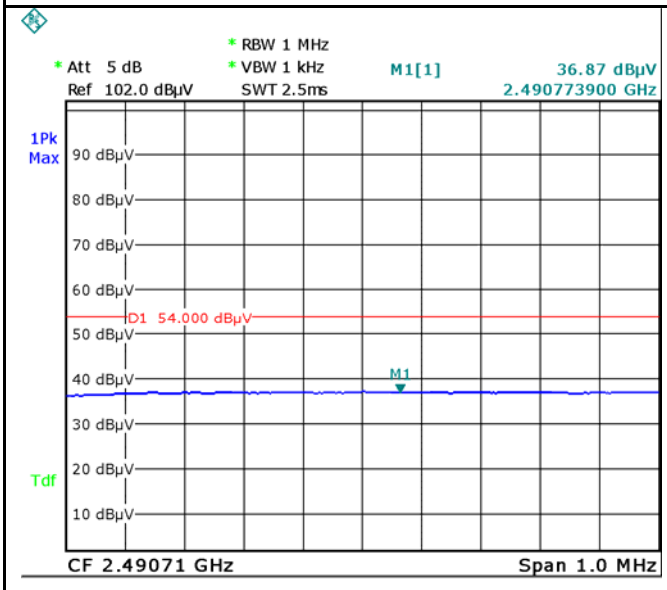
8-DPSK Mode:



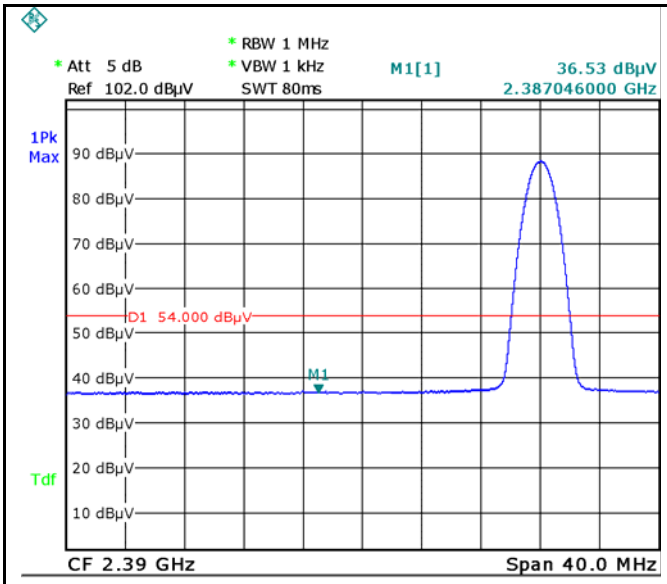
8DPSK-Hopping-PK



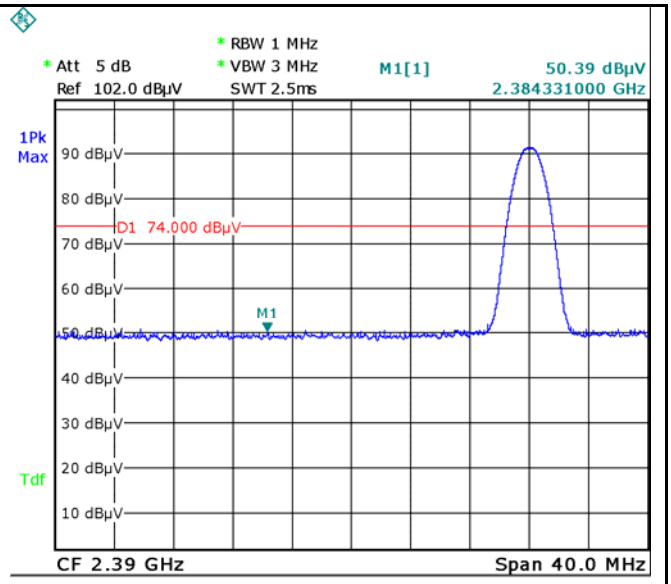
8DPSK-Hopping-Ave-Left Side



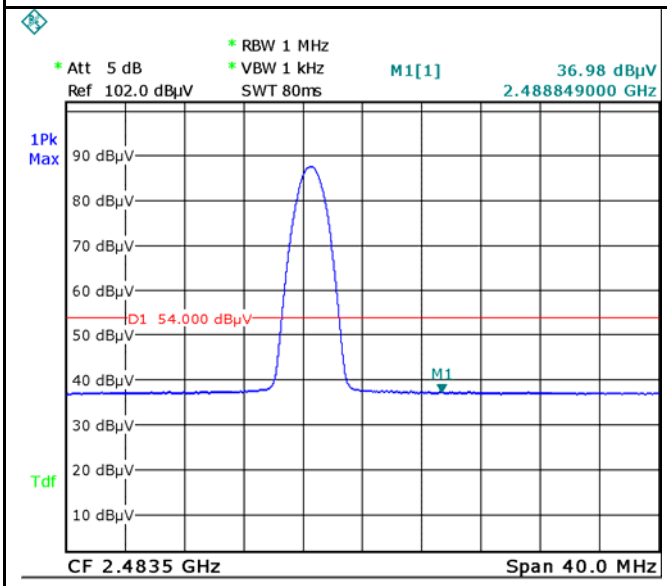
8DPSK-Hopping-Ave-Right Side



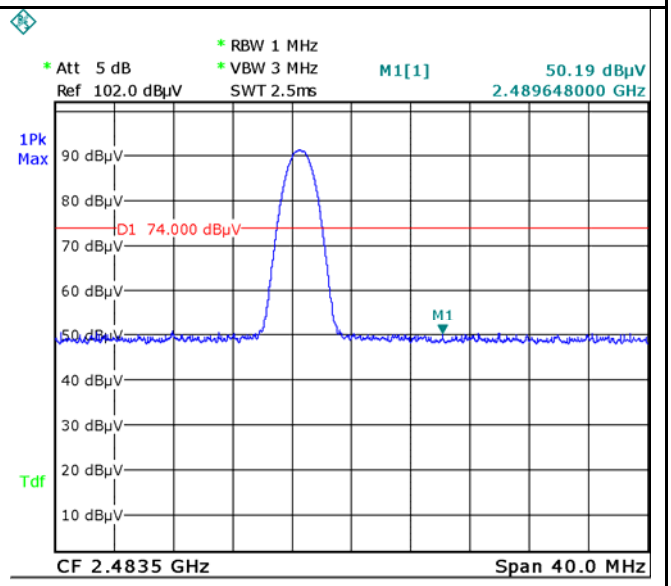
8DPSK-Left Side-Ave



8DPSK-Left Side-PK



8DPSK-Right Side-Ave

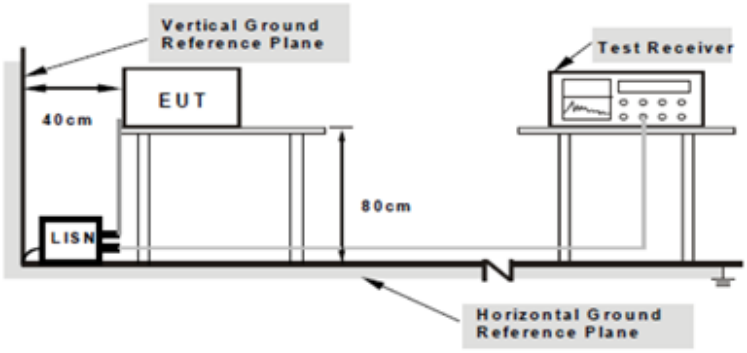


8DPSK-Right Side-PK

6.9 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	51%
Atmospheric Pressure	1001mbar
Test date :	October 20, 2014
Tested By :	Herith Shi

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.207, RSS210 (A8.1)</td><td>a)</td><td>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.
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr>
<tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr>
<tr><td>5 ~ 30</td><td>60</td><td>50</td></tr>
</table>
</td><td>☑</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 

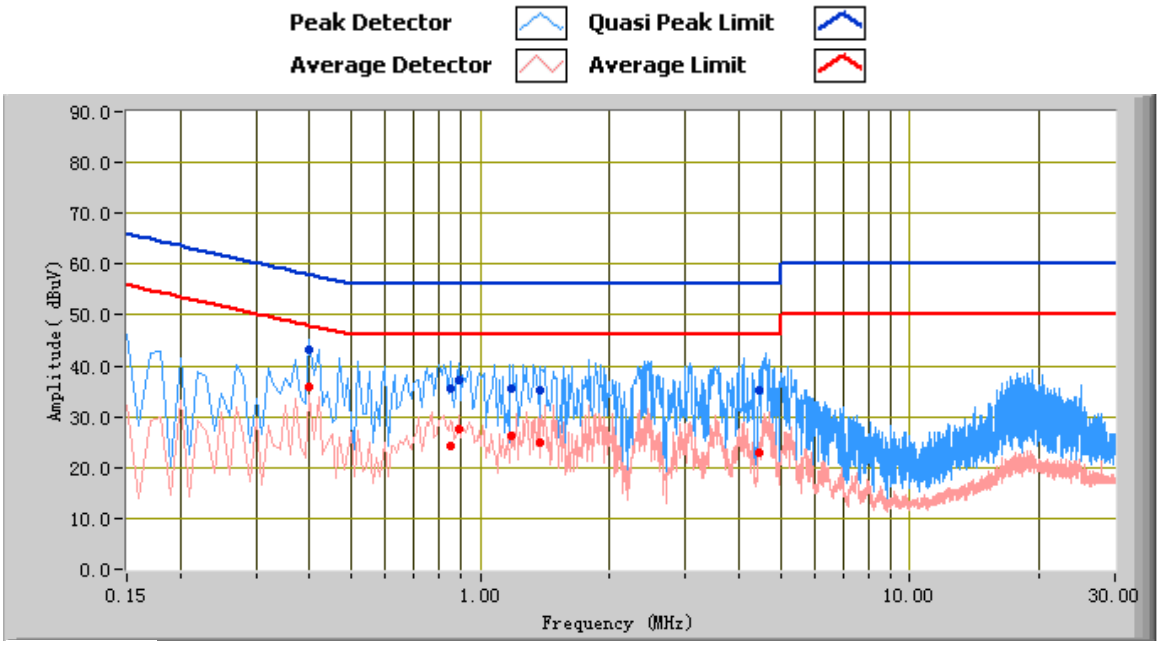
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss</td></tr>
</table>

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

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode:	Transmitting Mode

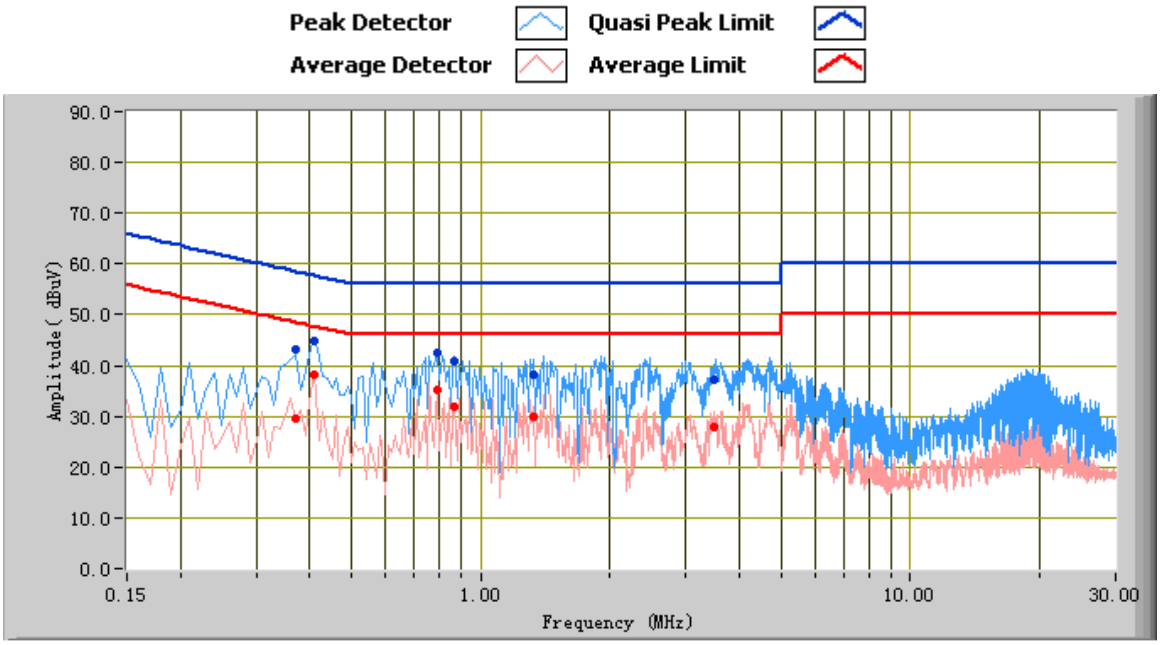


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
1.18	35.63	56.00	-20.37	26.12	46.00	-19.88	10.29
0.40	43.22	57.85	-14.63	35.86	47.85	-11.99	10.98
0.85	35.40	56.00	-20.60	24.21	46.00	-21.79	10.37
0.89	37.31	56.00	-18.69	27.40	46.00	-18.60	10.35
1.38	35.19	56.00	-20.81	24.77	46.00	-21.23	10.33
4.46	35.15	56.00	-20.85	23.00	46.00	-23.00	10.90

Test Mode:	Transmitting Mode



Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.41	44.83	57.65	-12.82	38.18	47.65	-9.47	10.96
0.79	42.54	56.00	-13.46	35.14	46.00	-10.86	10.40
0.87	40.77	56.00	-15.23	31.87	46.00	-14.13	10.36
1.32	38.26	56.00	-17.74	29.77	46.00	-16.23	10.32
3.50	37.11	56.00	-18.89	28.00	46.00	-18.00	10.71
0.37	43.16	58.50	-15.34	29.42	48.50	-19.08	11.13

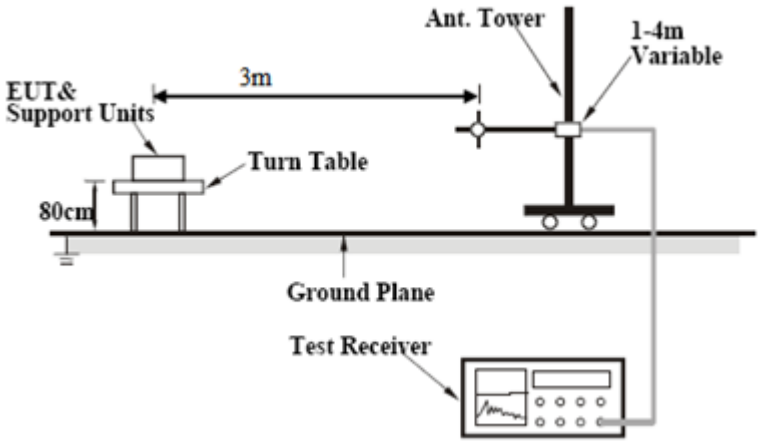
6.10 Radiated Spurious Emissions

Temperature	26°C
Relative Humidity	52%
Atmospheric Pressure	1002mbar
Test date :	October 21, 2014
Tested By :	Herith Shi

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.205, §15.209, §15.247(d)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☑

Frequency range (MHz)	Field Strength (μV/m)
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

Test Setup	
Procedure	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:

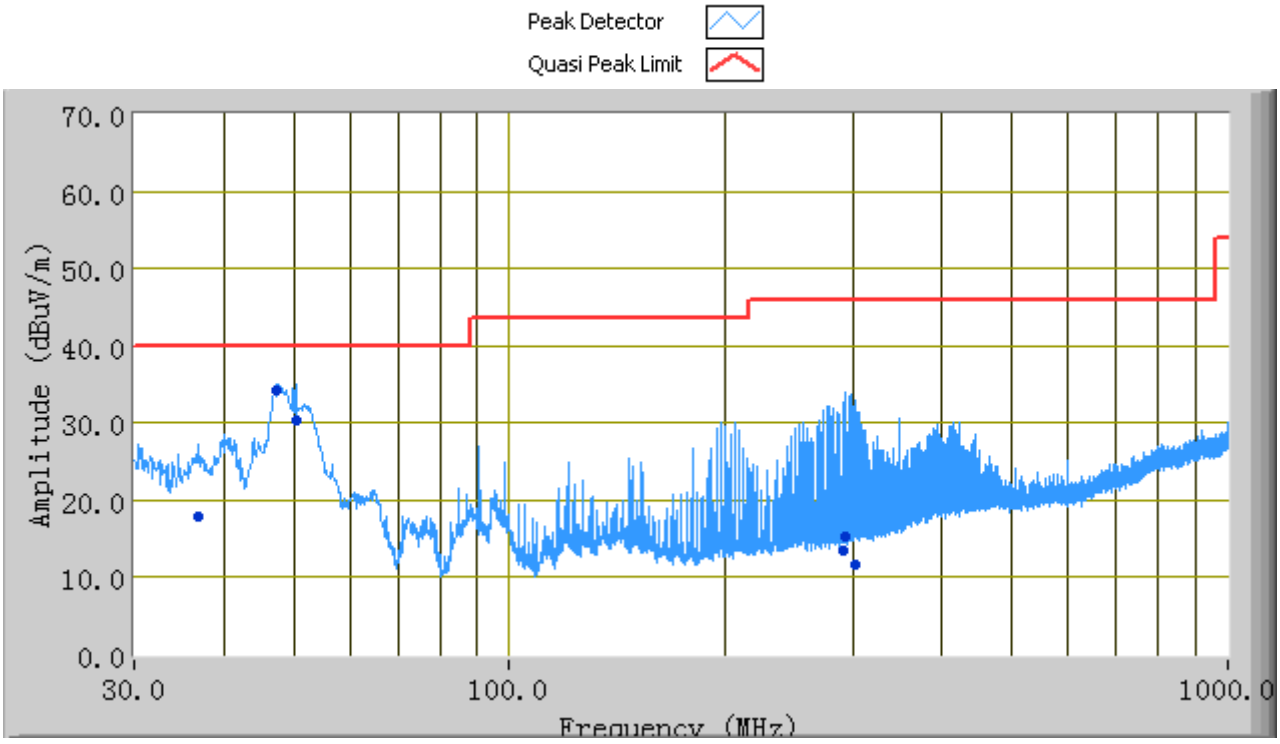
	a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution 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 with Peak detection for Average Measurement as below at frequency above 1GHz. ■ 1 kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) 5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode:	Transmitting Mode

(Below 1GHz)



Test Data

Vertical & Horizontal Polarity Plot @3m

Frequency (MHz)	Quasi Peak (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
50.60	30.28	0.00	V	116.00	-14.00	40.00	-9.72
47.47	34.17	206.00	V	136.00	-12.74	40.00	-5.83
293.87	15.41	181.00	V	134.00	-6.76	46.00	-30.59
36.84	17.99	296.00	V	158.00	-5.37	40.00	-22.01
302.76	11.70	19.00	V	136.00	-6.58	46.00	-34.30
290.94	13.38	181.00	V	163.00	-6.81	46.00	-32.62

Test Mode:	Transmitting Mode

Note: Other modes were verified, only the result of worst case basic rate mode was presented.

Mode: GFSK

Low Channel (2402 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Duty cycle Factor (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	38.22	AV	V	33.83	4.87	-3.12	24	49.80	54	-4.20
4804	38.73	AV	H	33.83	4.87	-3.12	24	50.31	54	-3.69
4804	41.76	PK	V	33.83	4.87	—	24	56.46	74	-17.54
4804	42.08	PK	H	33.83	4.87	—	24	56.78	74	-17.22

Duty cycle factor=20log(Dwell time/100ms)=20log(2.91*24/100)=-3.12

Middle Channel (2441 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Duty cycle Factor (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4880	38.62	AV	V	33.86	4.87	-3.12	24	50.23	54	-3.77
4880	38.44	AV	H	33.86	4.87	-3.12	24	50.05	54	-3.95
4880	42.06	PK	V	33.86	4.87	—	24	56.79	74	-17.21
4880	41.83	PK	H	33.86	4.87	—	24	56.56	74	-17.44

Duty cycle factor=20log(Dwell time/100ms)=20log(2.91*24/100)=-3.12

High Channel (2480 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Duty cycle Factor (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	38.75	AV	V	33.9	4.87	-3.12	24	50.40	54	-3.60
4960	38.46	AV	H	33.9	4.87	-3.12	24	50.11	54	-3.89
4960	41.86	PK	V	33.9	4.87	—	24	56.63	74	-17.37
4960	42.16	PK	H	33.9	4.87	—	24	56.93	74	-17.07

Duty cycle factor=20log(Dwell time/100ms)=20log(2.91*24/100)=-3.12

Annex A. TEST INSTRUMENT

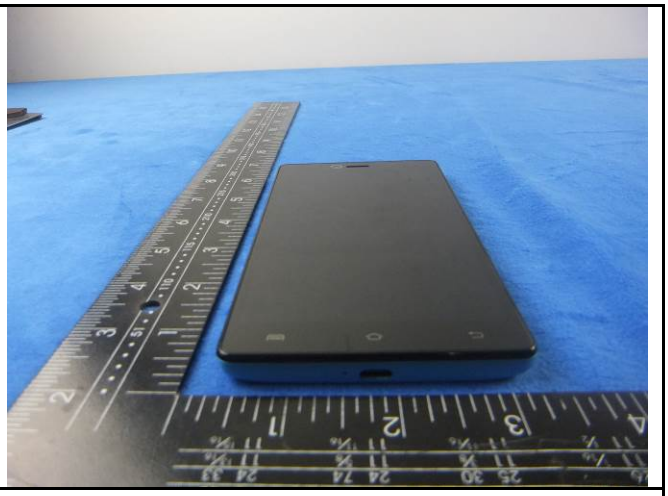
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/18/2014	09/17/2015	☑
Line Impedance	LI-125A	191106	09/26/2014	09/25/2015	☑
Line Impedance	LI-125A	191107	09/26/2014	09/25/2015	☑
LISN	ISN T800	34373	09/26/2014	09/25/2015	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	☑
Transient Limiter	LIT-153	531118	09/02/2014	09/01/2015	☑
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/18/2014	09/17/2015	☑
Power Splitter	1#	1#	09/02/2014	09/01/2015	☑
DC Power Supply	E3640A	MY40004013	09/18/2014	09/17/2015	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/18/2014	09/17/2015	☑
Positioning Controller	UC3000	MF780208282	11/20/2013	11/19/2014	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015	☑
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	09/02/2014	09/01/2015	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/22/2014	09/21/2015	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	☑

Annex B. EUT And Test Setup Photographs

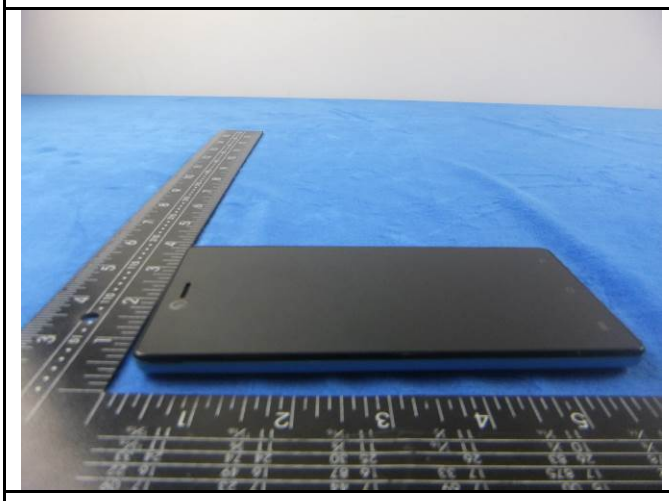
Annex B.i. Photograph: EUT External Photo

	
Whole Package - Top View	Adapter - Front View
	
EUT - Front View	EUT - Rear View

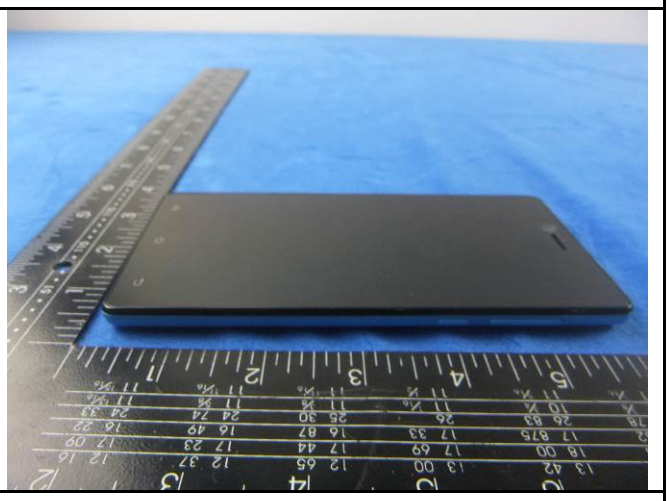
EUT - Top View



EUT - Bottom View



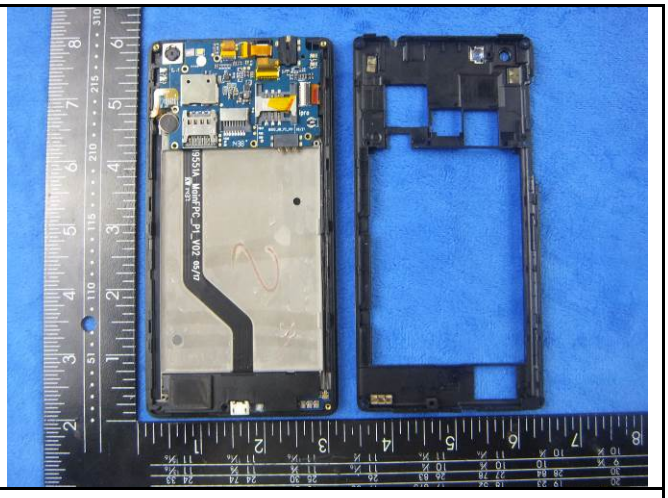
EUT - Left View



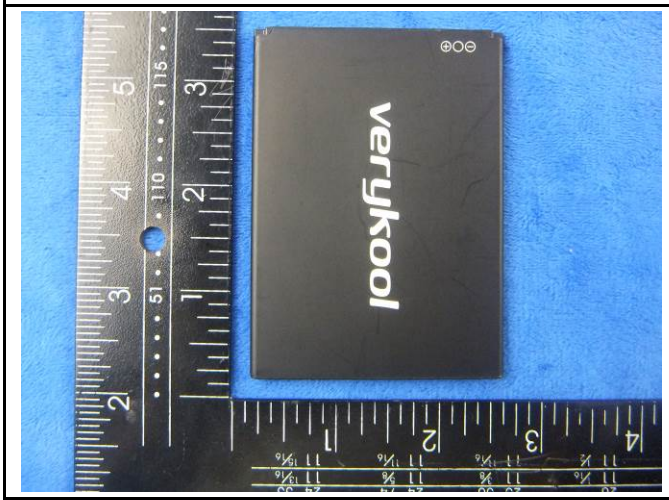
EUT - Right View

Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1

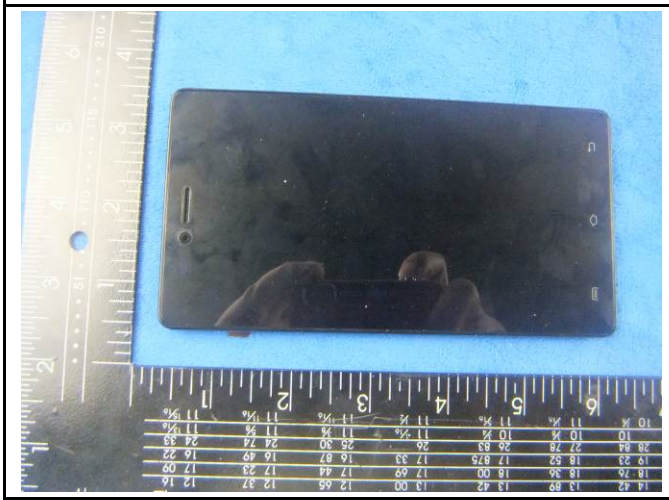


Cover Off - Top View 2



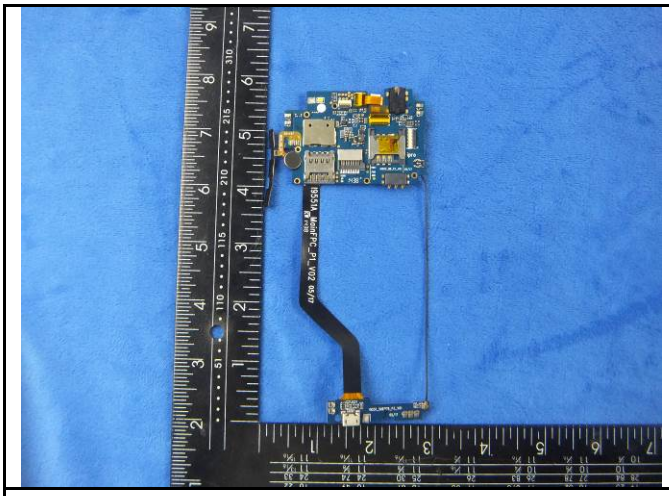
Battery - Top View

Battery - Bottom View

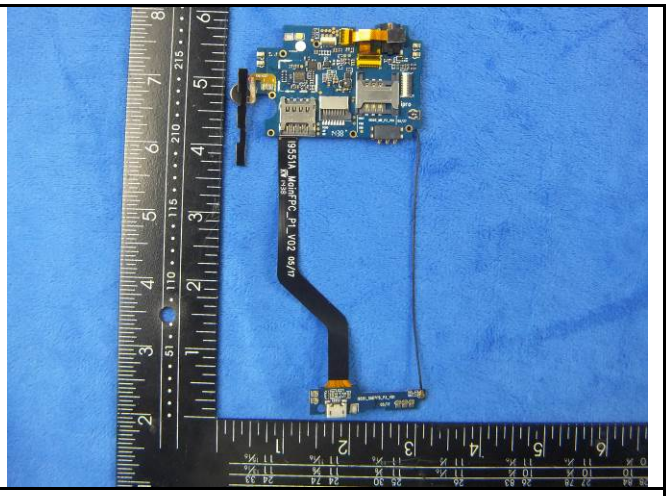


LCD - Front View

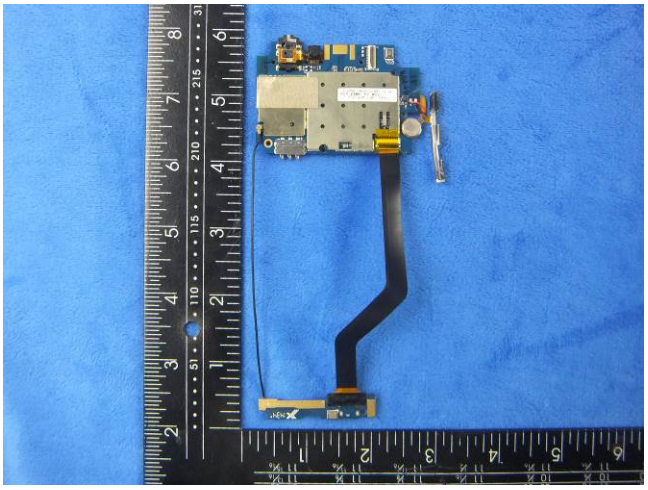
LCD - Rear View



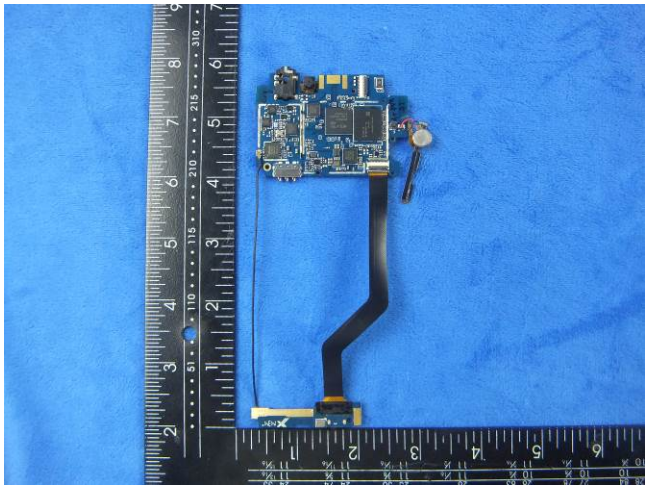
Mainborad With Shielding - Front View



Mainborad Without Shielding - Front View



Mainborad With Shielding - Front View



Mainborad Without Shielding - Rear View

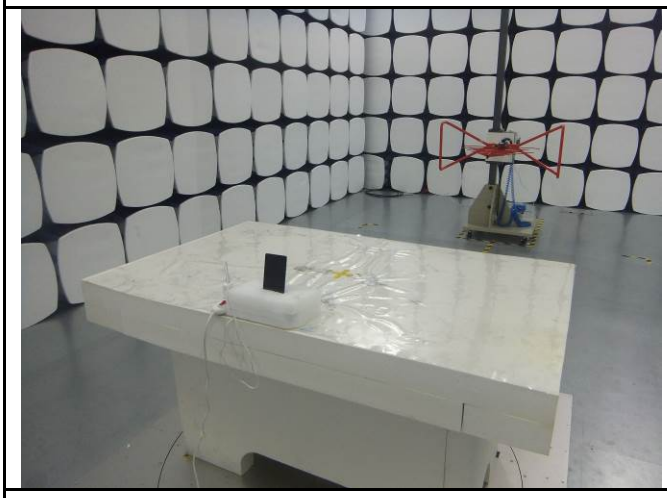
BT/BLE/WIFI Antenna View

GSM/PCS/UMTS-FDD Antenna View

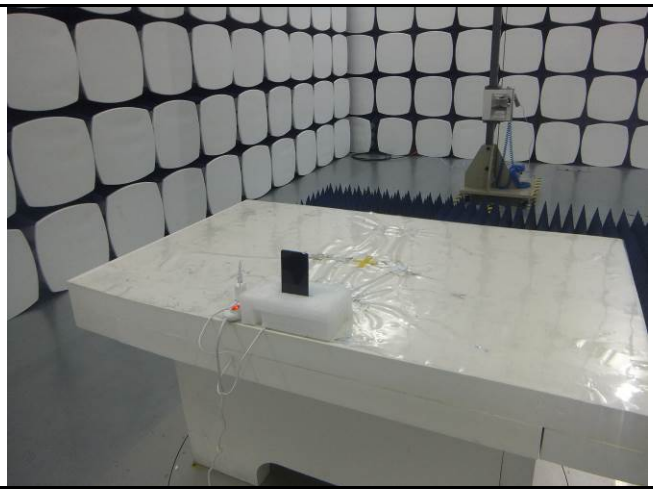
Annex B.iii. Photograph: Test Setup Photo

Conducted Emissions Test Setup Front View

Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

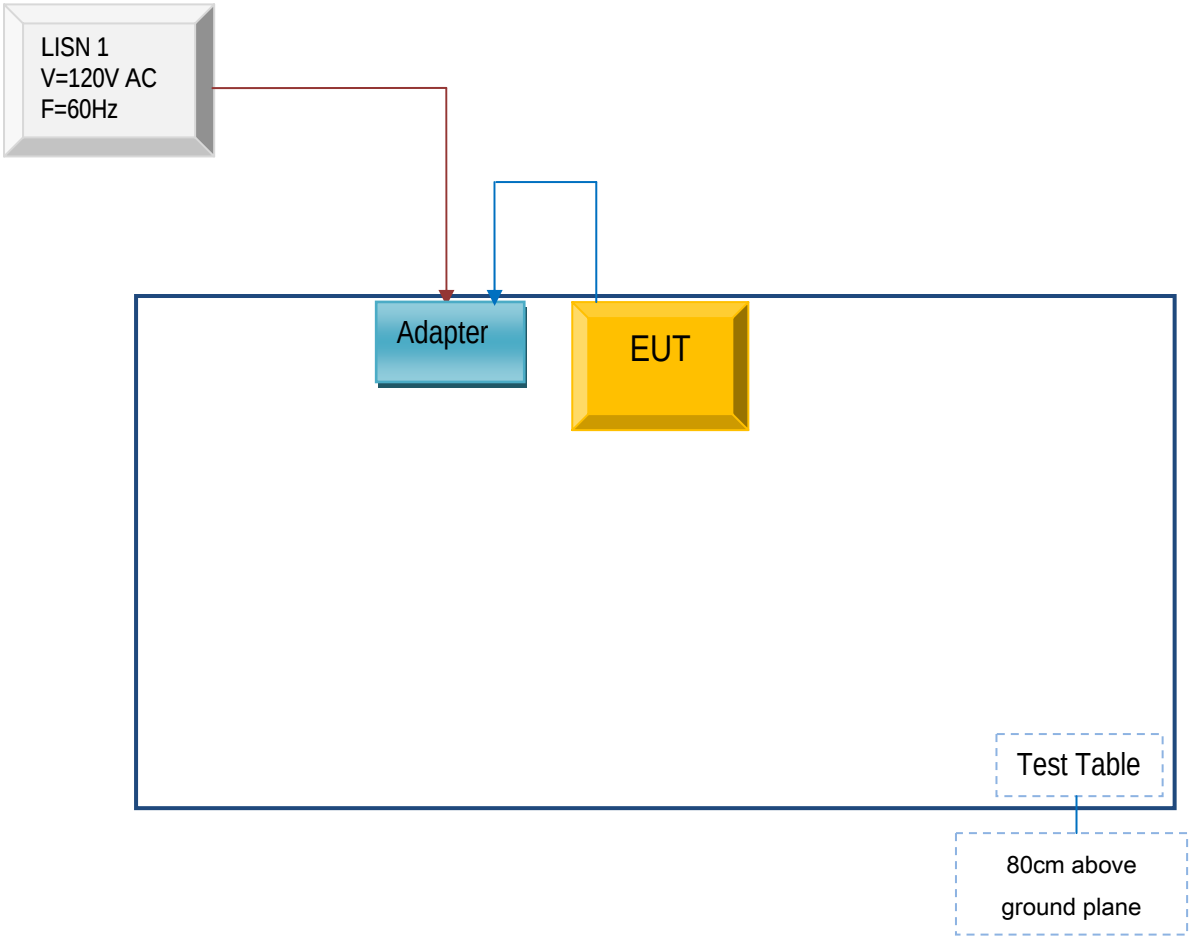


Radiated Spurious Emissions Test Setup Above 1GHz

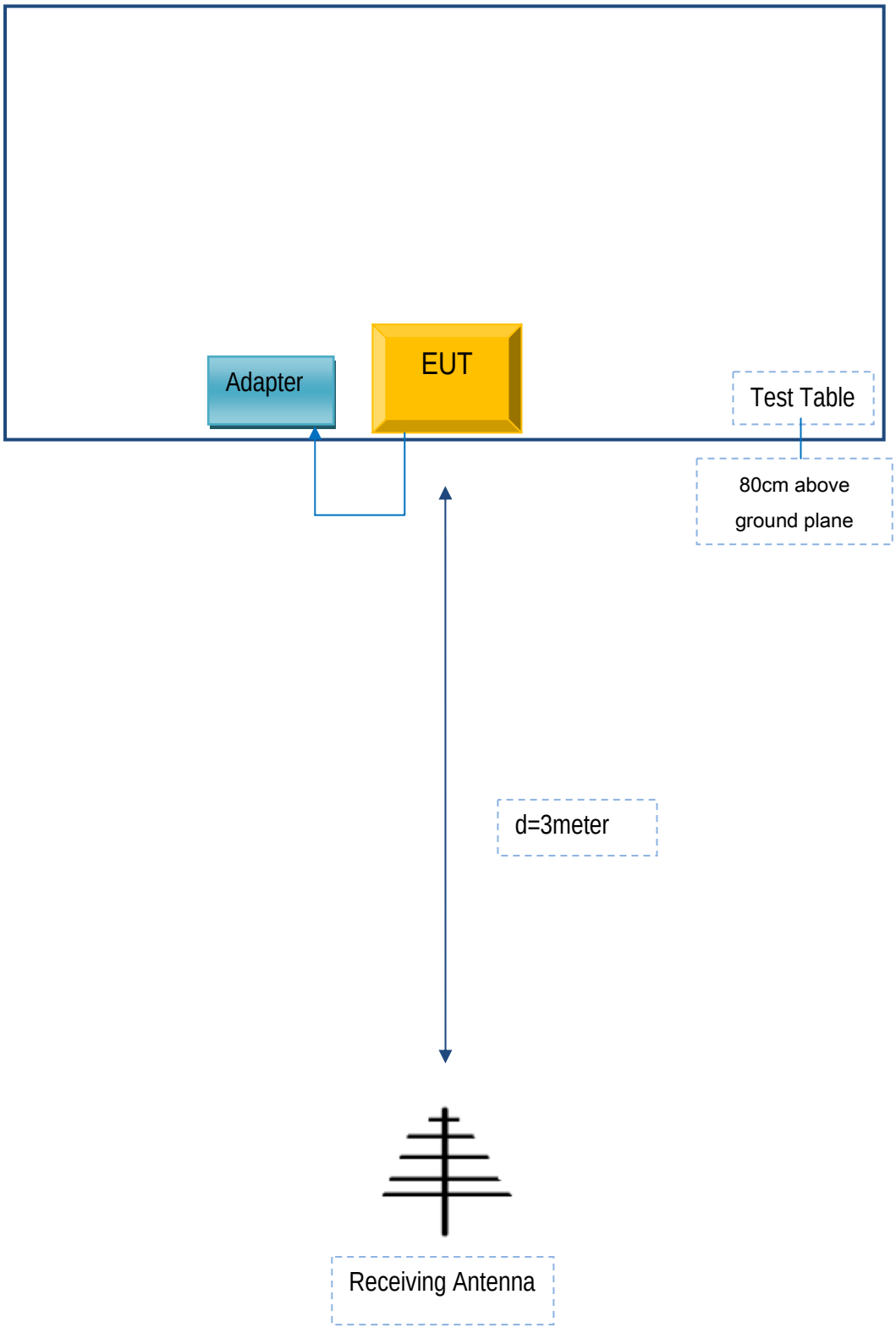
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. il. 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

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

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A