RF TEST REPORT

Report No.: 15071187-FCC-R2

Supersede Report No.: N/A

Applicant	Quality One Wireless LLC
Product Name	3G Mobile Phone
Model No.	Z219
Serial No.	N/A
Test Standard	FCC Part 15.247: 2014, ANSI C63.10: 2013
Test Date	October 22 to December 09, 2015
Issue Date	December 21, 2015
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Winnie Zhang	David Huang	
Winnie Zhang Test Engineer	David Huang Checked By	

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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

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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.

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

Accreditations for Conformity Assessment

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

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
15071187-FCC-R2	NONE	Original	December 09,2015
15071187-FCC-R2	V1	Change EUT Photoes	December 19, 2015
15071187-FCC-R2	V2	Adding note on page 46	December 21, 2015

2. Customer information

Applicant Name	Quality One Wireless LLC
Applicant Add	1500 Tradeport Drive Orlando, FL 32824
Manufacturer	Shenzhen Haierhea Telecom Co.,Ltd.
Manufacturer Add	Room 418,Block M-3,Middle of Hi-Tech Park,Nanshan,Shenzhen,China 518057

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:	3G Mobile Phone
Main Model:	Z219
Serial Model:	N/A
Date EUT received:	October 21, 2015
Test Date(s):	October 22 to December 09, 2015
Equipment Category：	DSS
Antenna Gain:	GSM850: -3dBi PCS1900: -3 dBi UMTS-FDD Band V: -3 dBi UMTS-FDD Band IV: -3 dBi UMTS-FDD Band II: -3 dBi Bluetooth: -1 dBi GPS:-1 dBi
Type of Modulation:	GSM / GPRS: GMSK UMTS-FDD: QPSK, 16QAM Bluetooth: GFSK, π /4DQPSK, 8DPSK GPS:BPSK
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 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 Bluetooth: 2402-2480 MHz GPS RX:1575.42 MHz
Max. Output Power:	5.439dBm

Number of Channels:	GSM 850: 124CH PCS1900: 299CH UMTS-FDD Band V : 102CH UMTS-FDD Band IV: 202CH UMTS-FDD Band II : 277CH Bluetooth: 79CH GPS:1CH
Port:	Power Port, Earphone Port, USB Port
Input Power:	Adapter: Model: JT-H050050 Input: AC 100-240V; 50/60Hz;150mA Output: DC 5.0V,500mA Battery: Model: Z219 Spec:3.7Vcc,800mAh,2.96Wh
Trade Name :	N/A
GPRS Multi-slot class	8/10/12
FCC ID:	2AGP4Z219

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 2 antennas:
A permanently attached PCB antenna for Bluetooth/GPS, the gain is -1dBi for Bluetooth, the gain is -1dBi for GPS.
A permanently attached PIFA antenna for GSM/PCS/ UMTS, the gain is -3dBi for GSM850, -3dBi for PCS1900, -3dBi for UMTS-FDD Band V, -3dBi for UMTS-FDD Band IV, -3dBi for UMTS-FDD Band II,

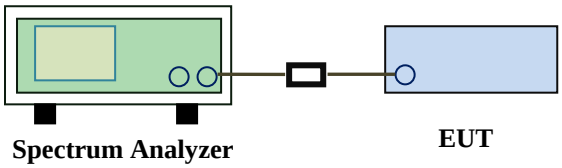
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 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	☑
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

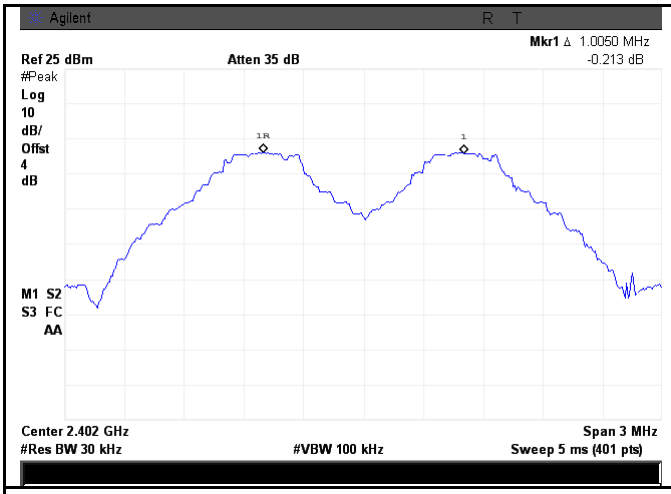
Test Plot ☑ Yes (See below) ☐ N/A

Channel Separation measurement result

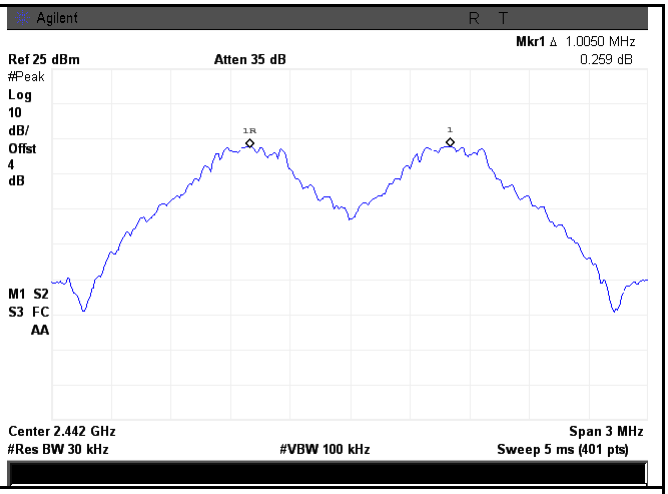
Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.962	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.681	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.671	Pass
	Adjacency Channel	2479			
CH Separation π /4 DQPSK	Low Channel	2402	1.005	0.890	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.889	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.889	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.887	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.897	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.899	Pass
	Adjacency Channel	2479			

Test Plots

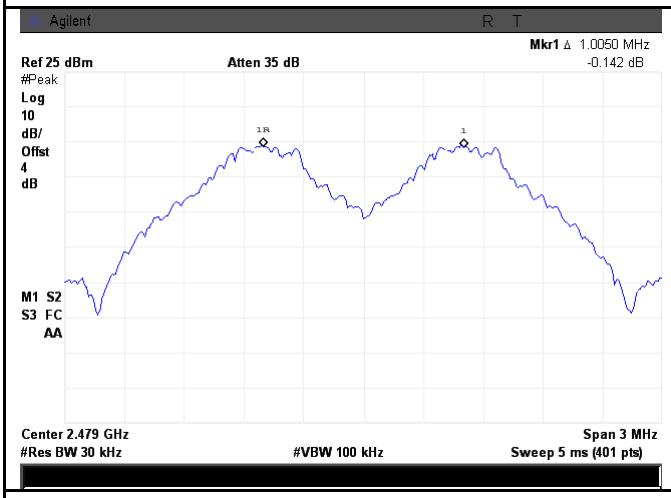
Channel Separation measurement result



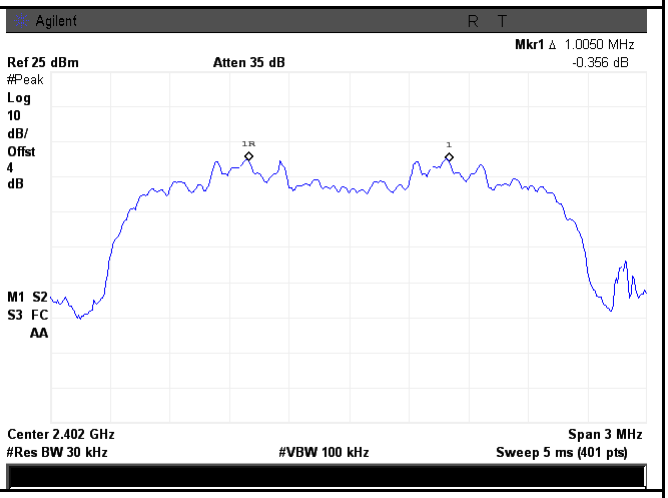
GFSK - Low Channel



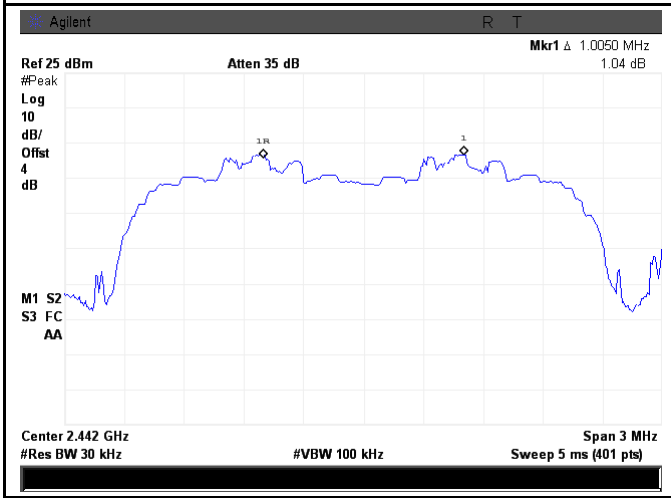
GFSK - Middle Channel



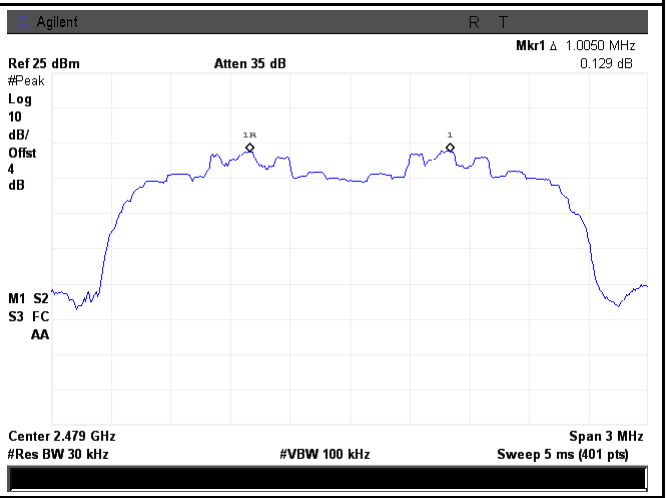
GFSK - High Channel



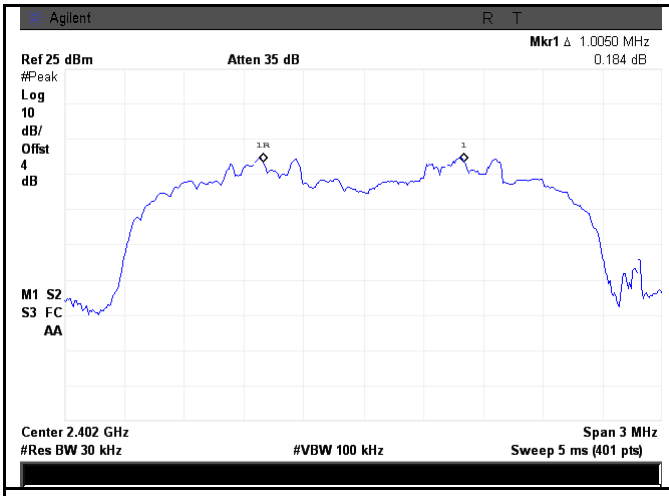
π /4 DPSK - Low Channel



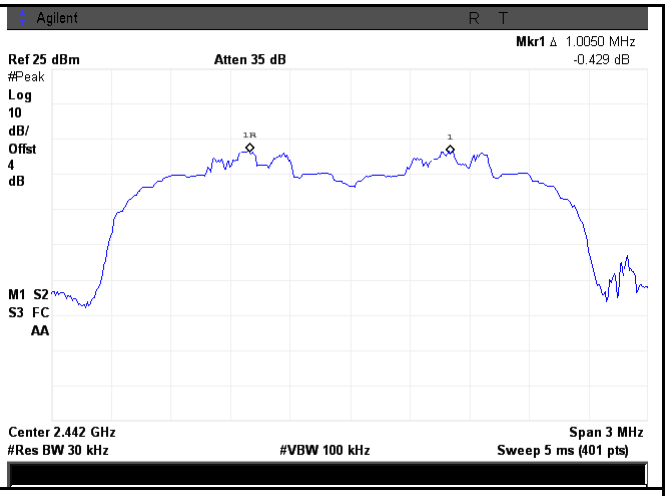
π /4 DQPSK - Middle Channel



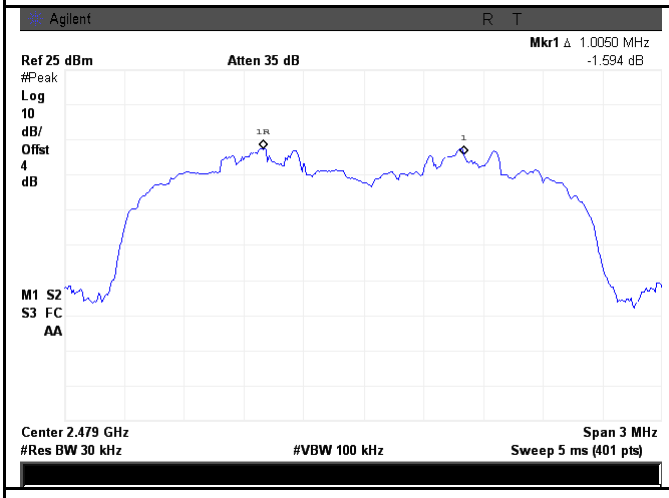
π /4 DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel

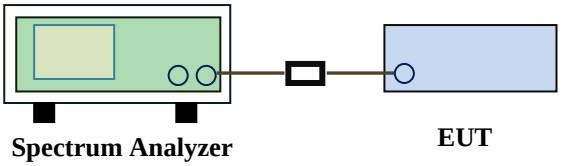


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 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.	☑
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

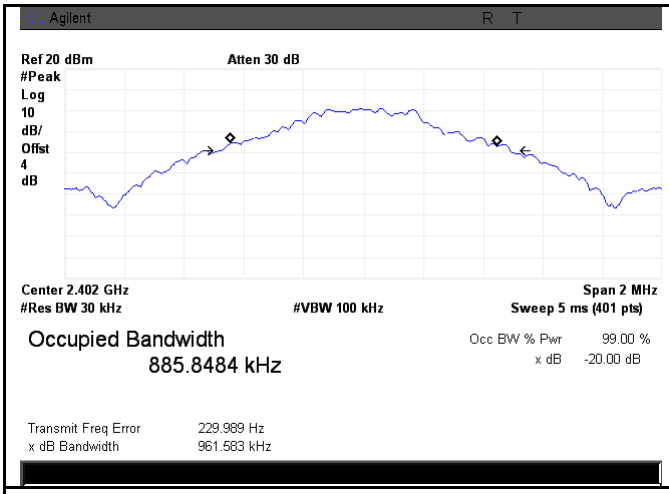
Test Plot ☑ Yes (See below) ☐ N/A

Measurement result

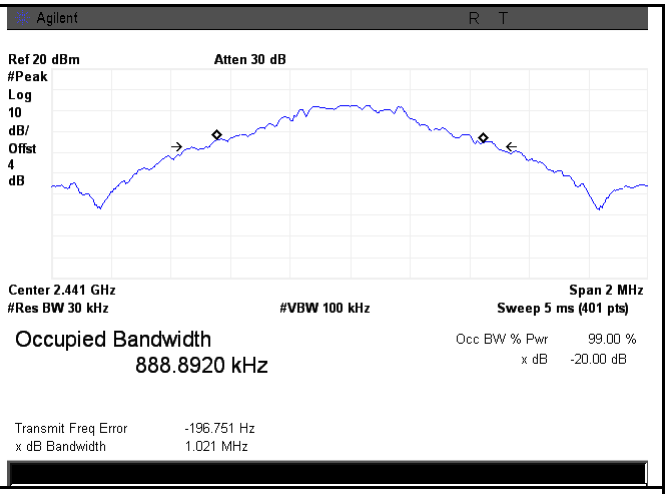
Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	0.962	0.8858
	Mid	2441	1.021	0.8889
	High	2480	1.007	0.9050
π /4 DQPSK	Low	2402	1.335	1.1900
	Mid	2441	1.333	1.1951
	High	2480	1.334	1.1923
8-DPSK	Low	2402	1.330	1.1918
	Mid	2441	1.345	1.2049
	High	2480	1.349	1.1996

Test Plots

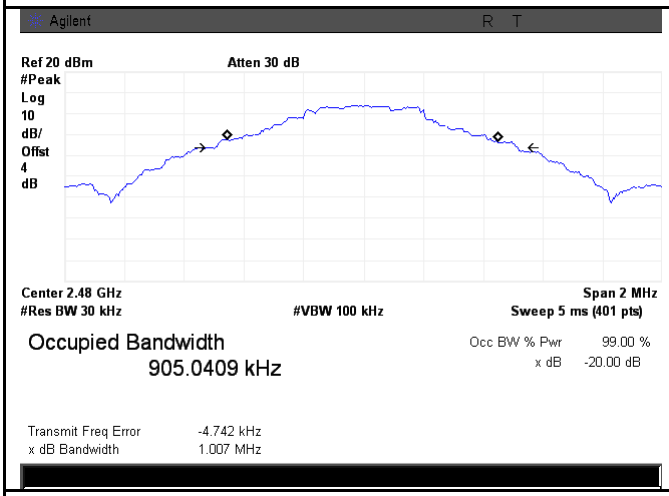
20dB Bandwidth measurement result



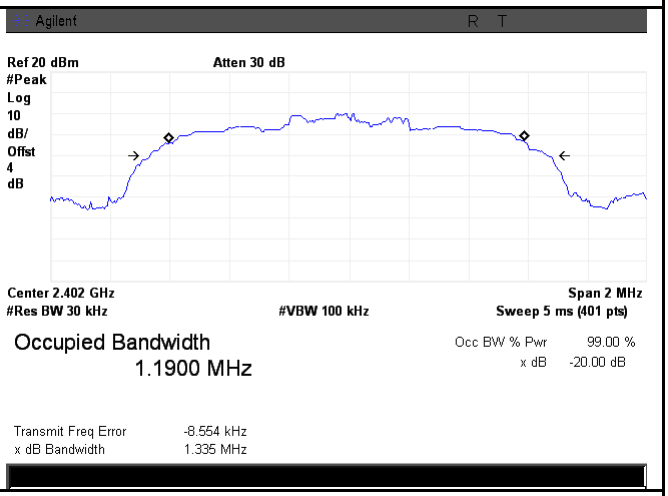
GFSK - Low Channel



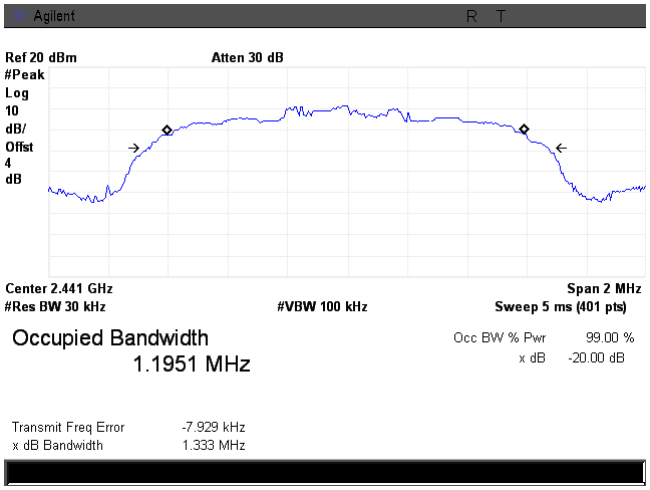
GFSK - Middle Channel



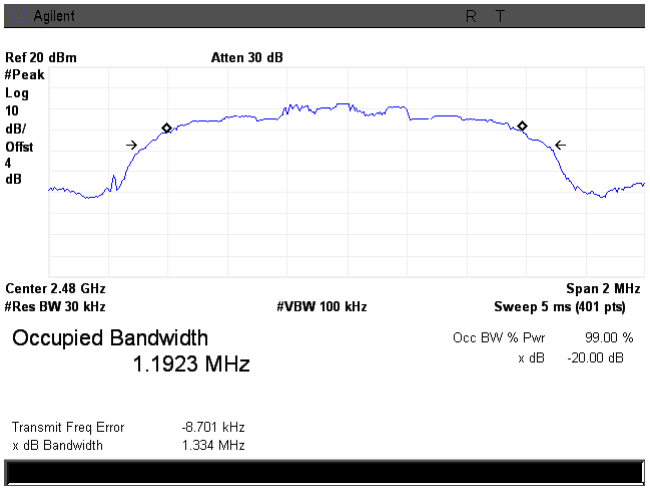
GFSK - High Channel



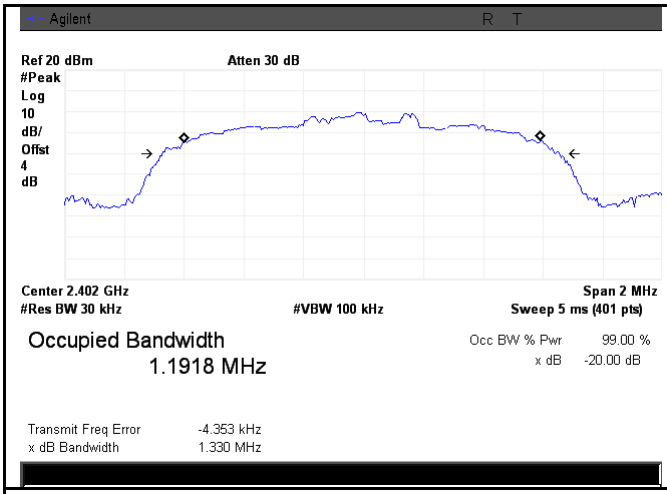
π /4 DPSK - Low Channel



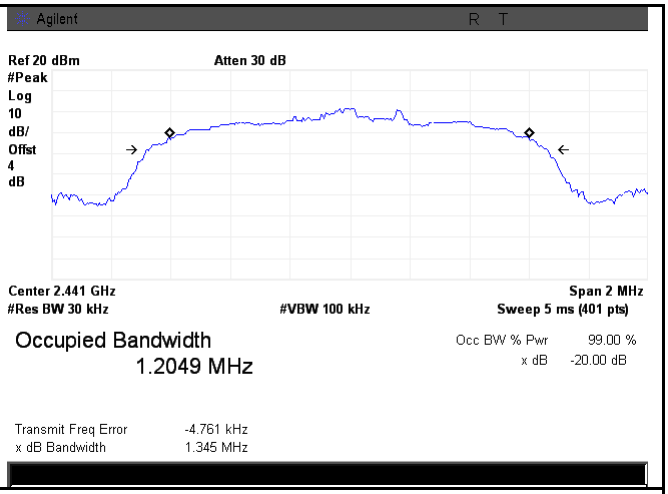
π /4 DQPSK - Middle Channel



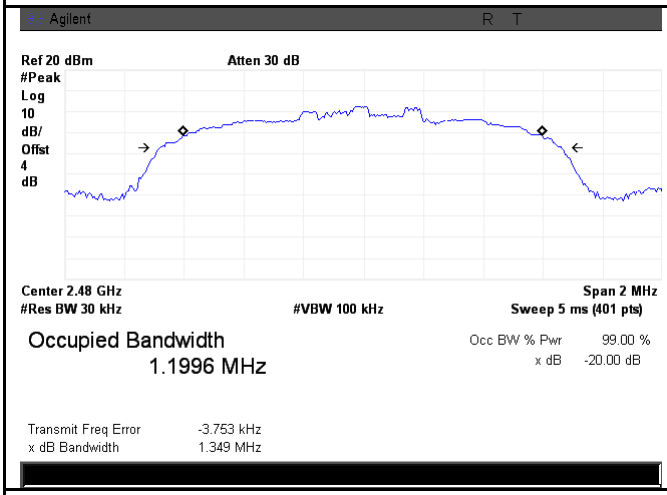
π /4 DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel

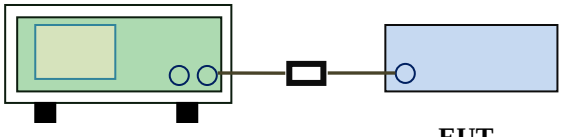


8DPSK - High Channel

6.4 Peak Output Power

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 2015
Tested By :	Winnie Zhang

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

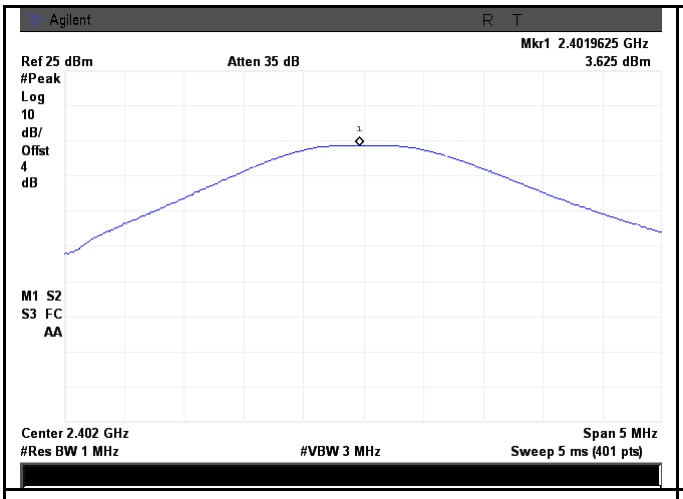
Test Plot ☑ Yes (See below) ☐ N/A

Peak Output Power measurement result

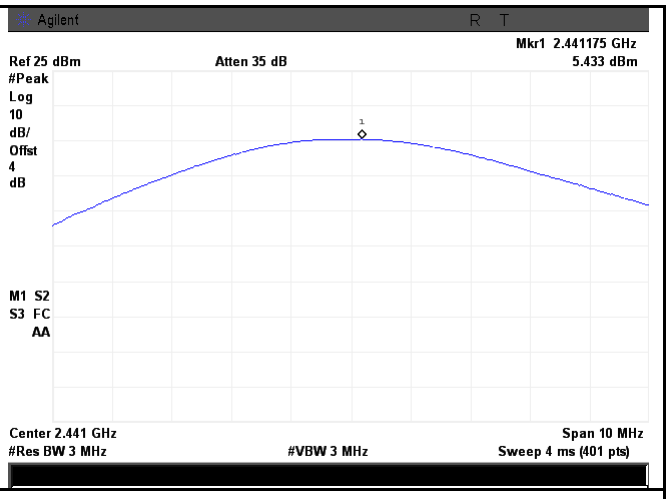
Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	3.625	1000	Pass
		Mid	2441	5.433	125	Pass
		High	2480	**5.439**	125	Pass
	π /4 DQPSK	Low	2402	3.400	125	Pass
		Mid	2441	5.118	125	Pass
		High	2480	5.141	125	Pass
	8-DPSK	Low	2402	3.713	125	Pass
		Mid	2441	5.336	125	Pass
		High	2480	5.425	125	Pass

Test Plots

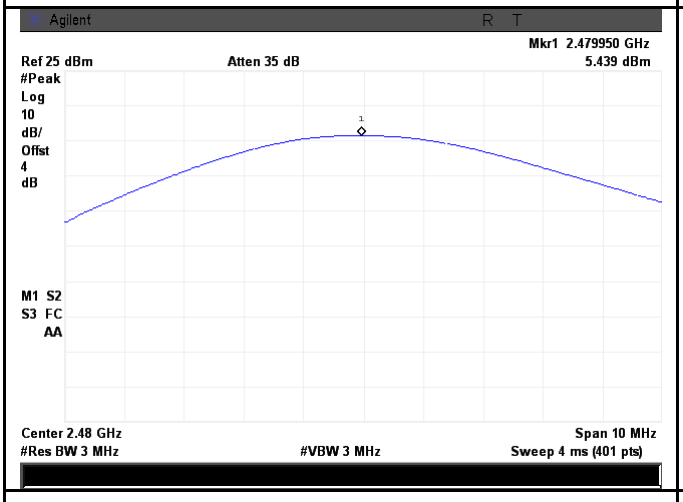
Output Power measurement result



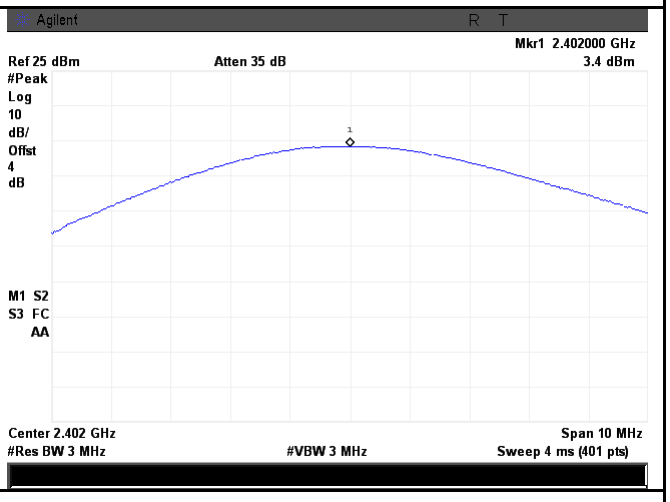
GFSK Output power - Low CH 2402



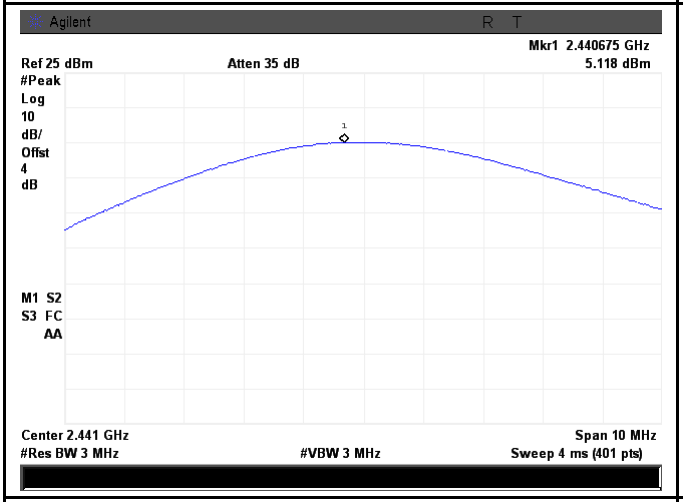
GFSK Output power - Mid CH 2441



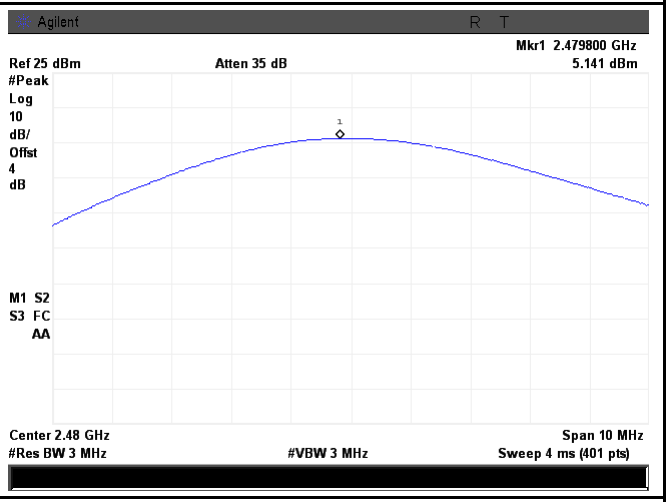
GFSK Output power - High CH 2480



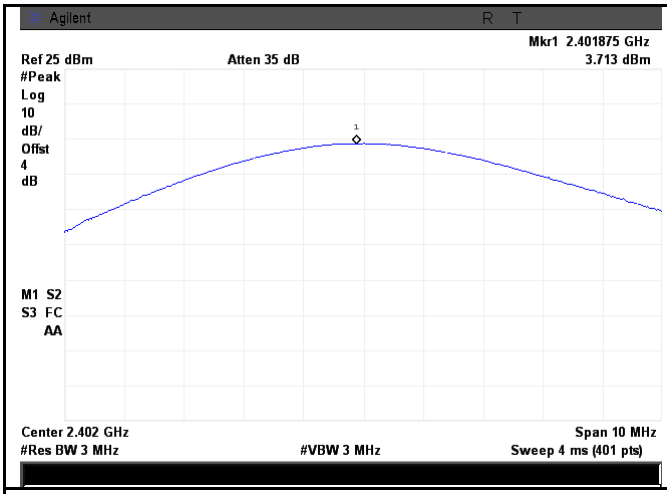
π /4 DQPSK Output power - Low CH 2402



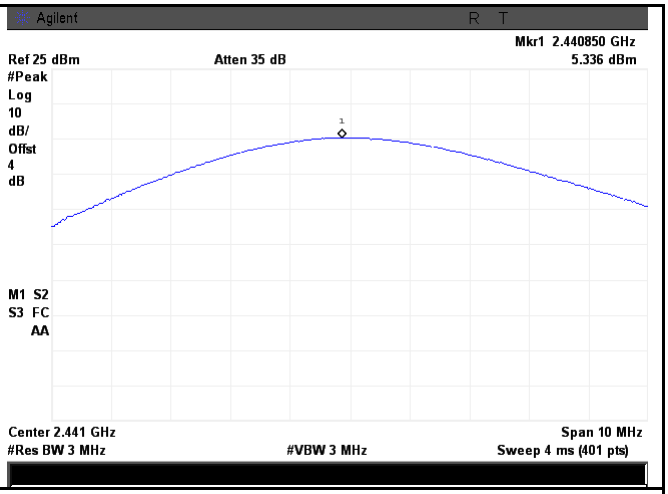
π /4 DQPSK Output power - Mid CH 2441



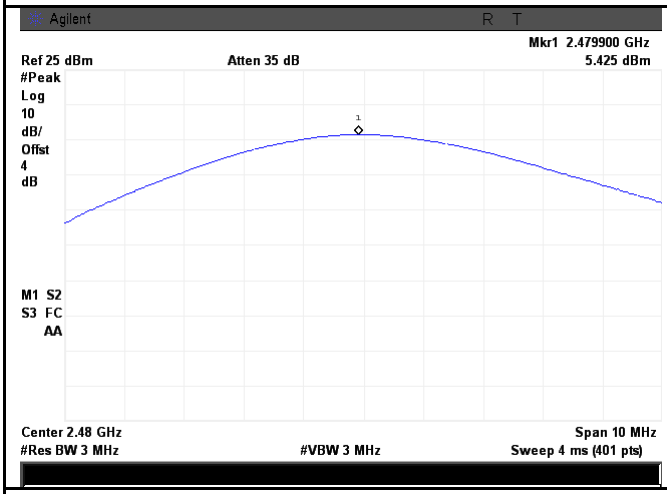
π /4 DQPSK Output power - High CH 2480



8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

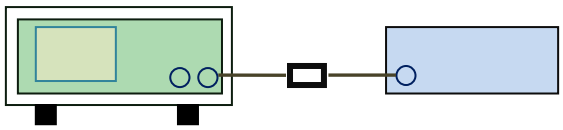


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 2015
Tested By :	Winnie Zhang

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

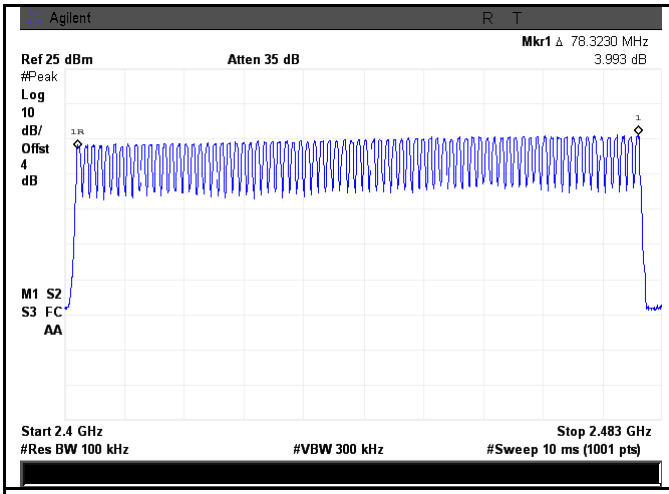
Test Plot ☑ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

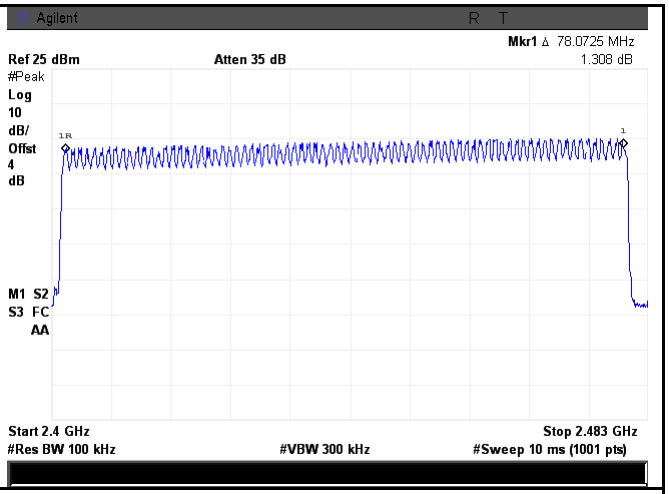
Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483.5	79	15
	π /4 DQPSK	2400-2483.5	79	15
	8-DPSK	2400-2483.5	79	15

Test Plots

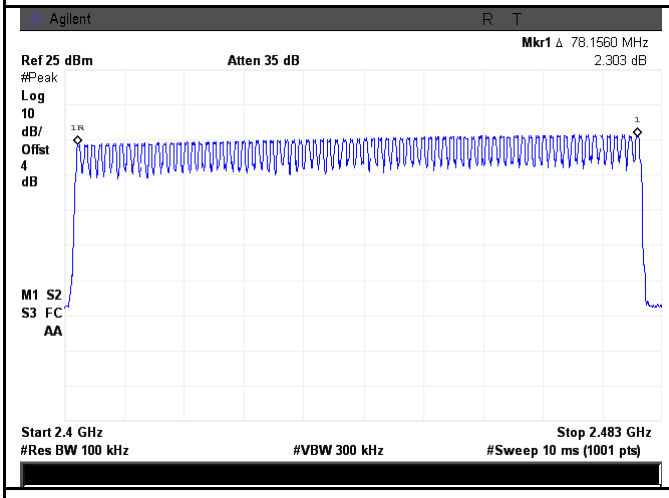
Number of Hopping Channels measurement result



GFSK



π /4DQPSK

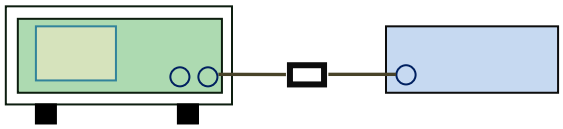


8DPSK

6.6 Time of Occupancy (Dwell Time)

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 2015
Tested By :	Winnie Zhang

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

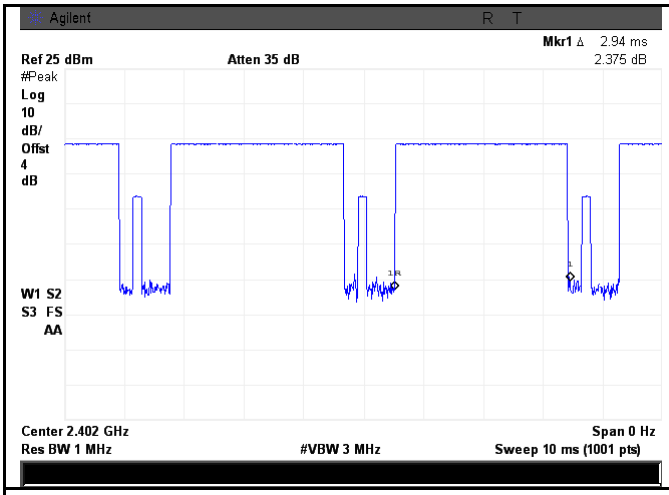
Test Plot ☑ Yes (See below) ☐ N/A

Dwell Time measurement result

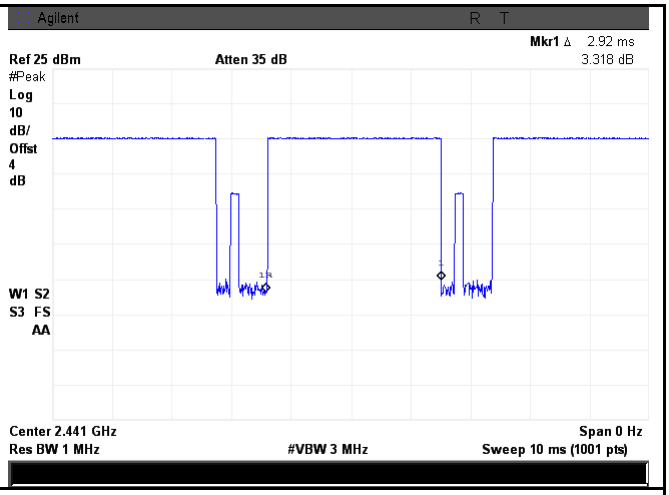
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.94	313.600	400	Pass
		Mid	2.92	311.467	400	Pass
		High	2.92	311.467	400	Pass
	π /4 DQPSK	Low	2.92	311.467	400	Pass
		Mid	2.93	312.533	400	Pass
		High	2.91	310.400	400	Pass
	8-DPSK	Low	2.92	311.467	400	Pass
		Mid	2.91	310.400	400	Pass
		High	2.93	312.533	400	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6						

Test Plots

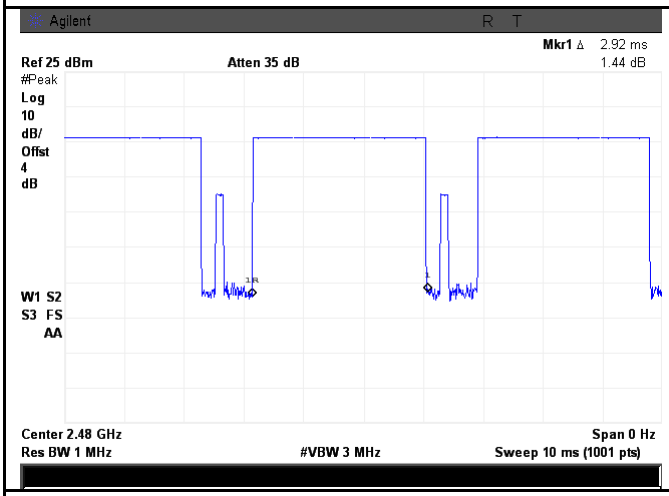
Dwell Time measurement result



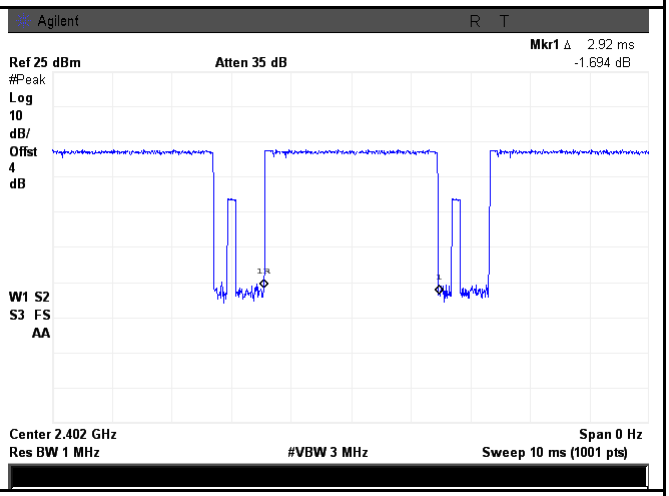
GFSK - Low CH 2402



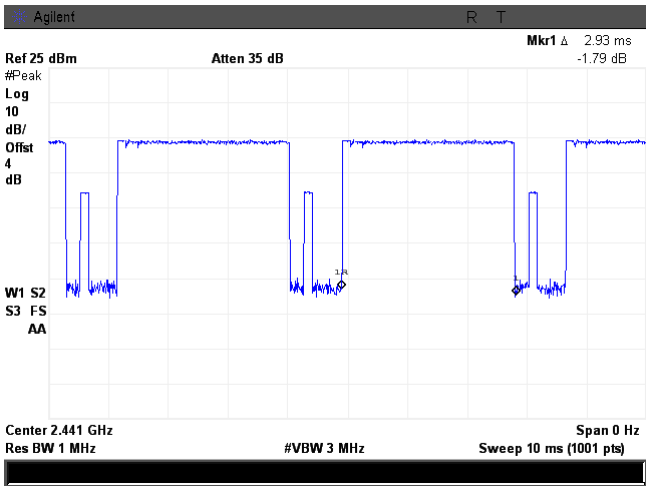
GFSK - Mid CH 2441



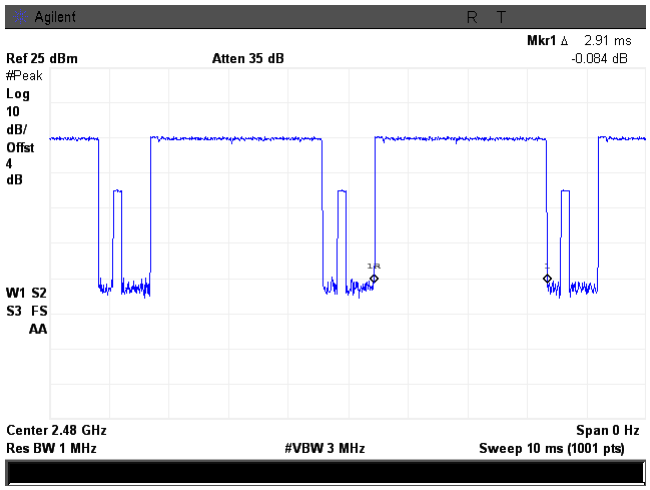
GFDK - High CH 2480



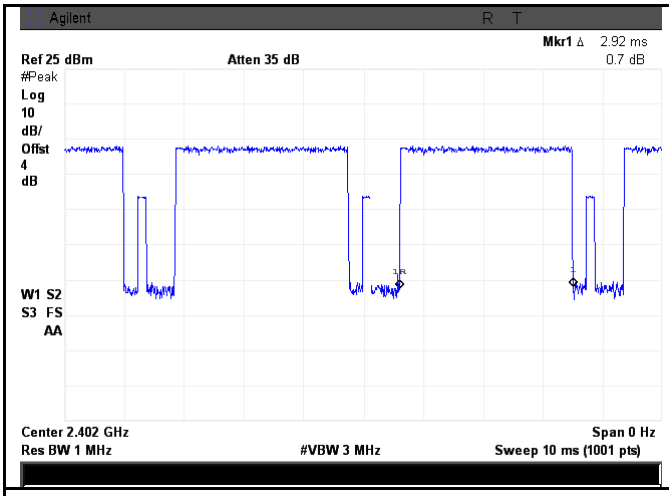
π /4 DQPSK - Low CH 2402



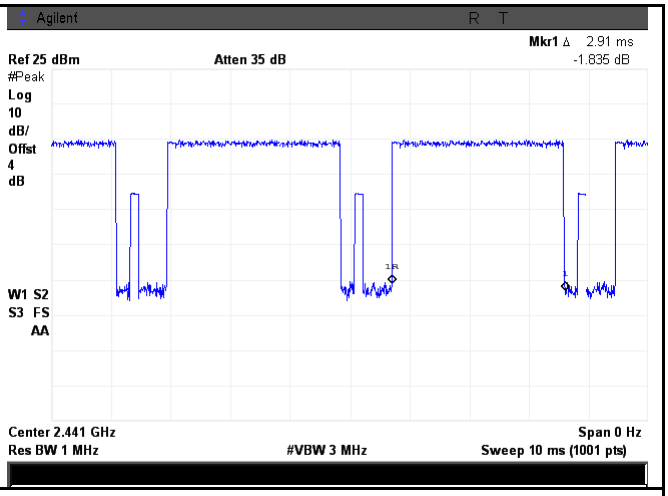
π /4 DQPSK - Mid CH 2441



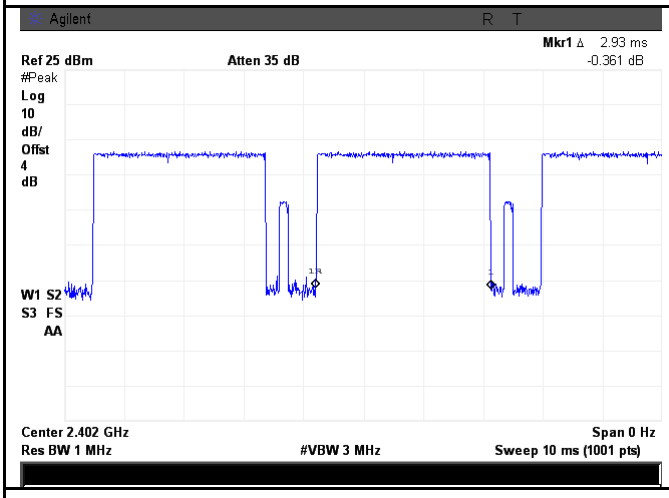
π /4 DQPSK - High CH 2480



8DPSK - Low CH 2402



8DPSK - Mid CH 2441

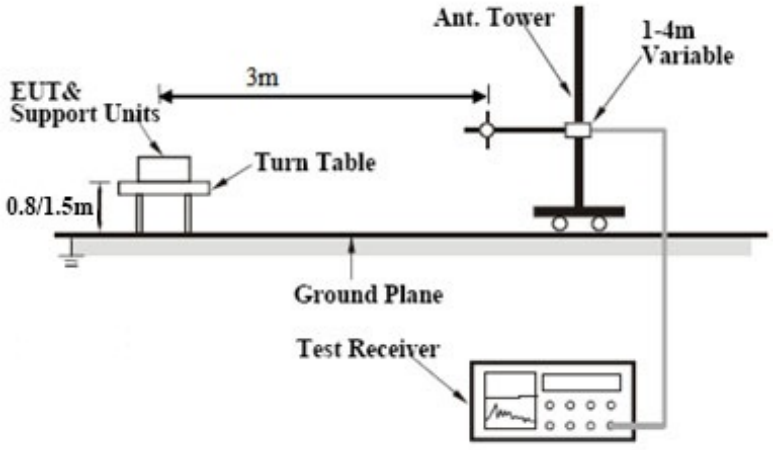


8DPSK - High CH 2480

6.7 Band Edge

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 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.	☑
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,		

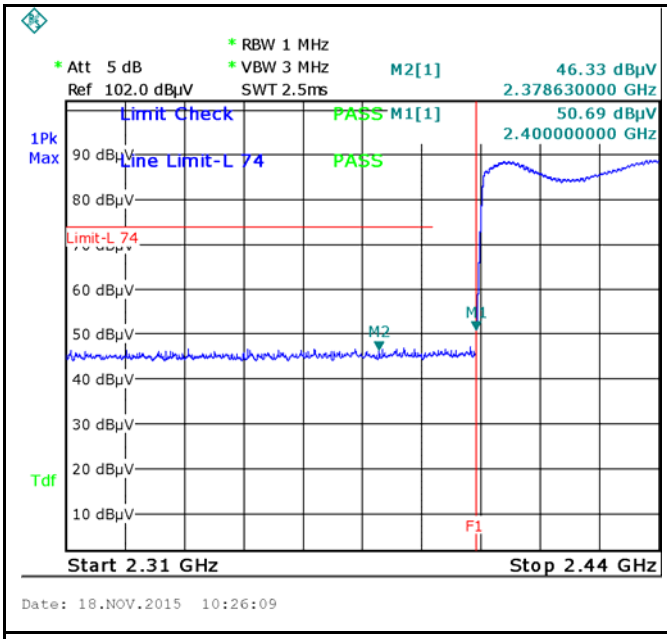
	and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth 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 is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☐ Yes ☑ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Plots

GFSK Mode:

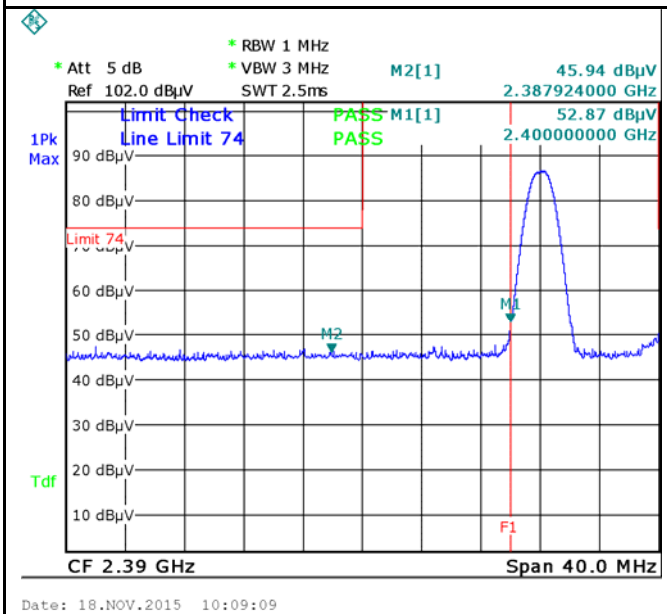


GFSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz

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

GFSK-Hopping Left Side-AV

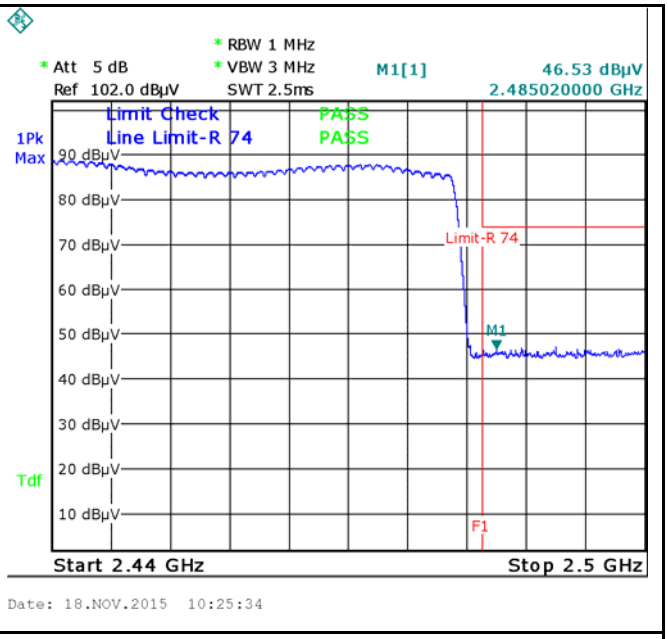


GFSK-Left Side-PK

Note: F1 is frequency 2400MHz

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

GFSK-Left Side-AV

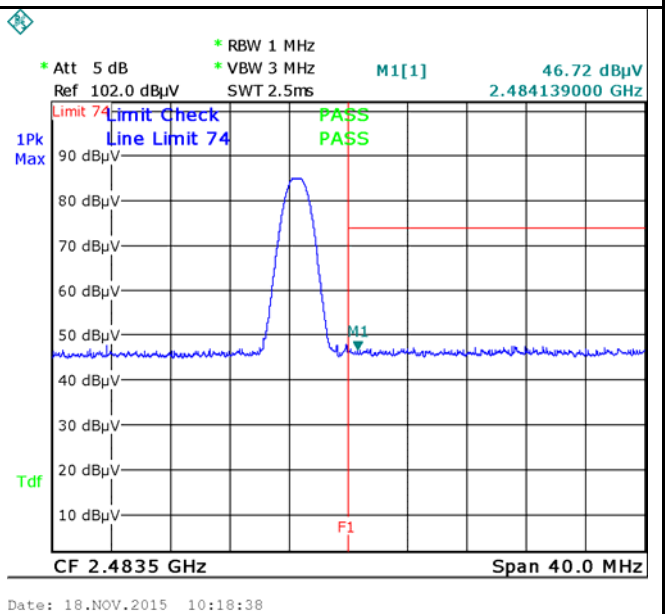


GFSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

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

GFSK-Hopping Right Side-AV



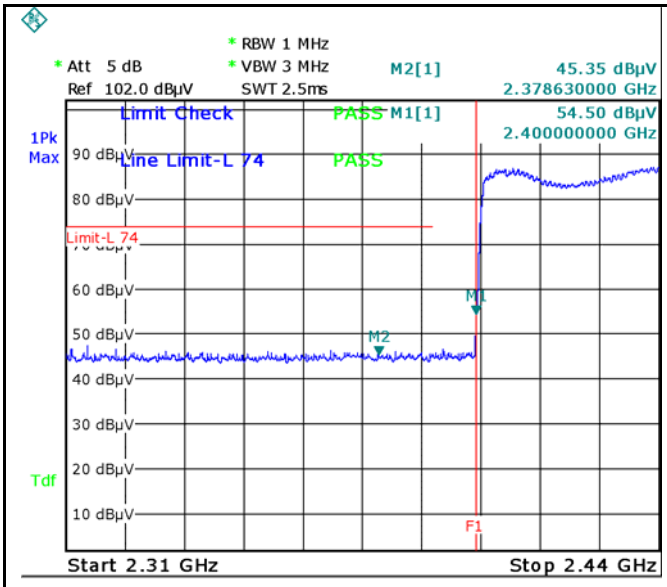
GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

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

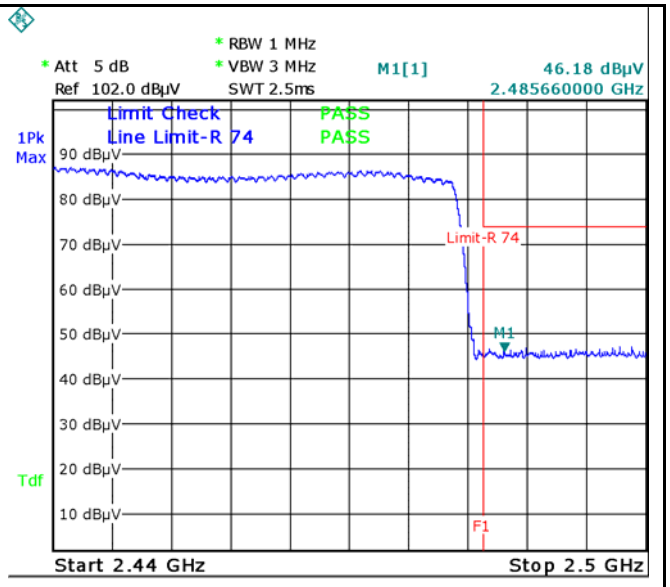
GFSK-Right Side-AV

π /4 DQPSK Mode:



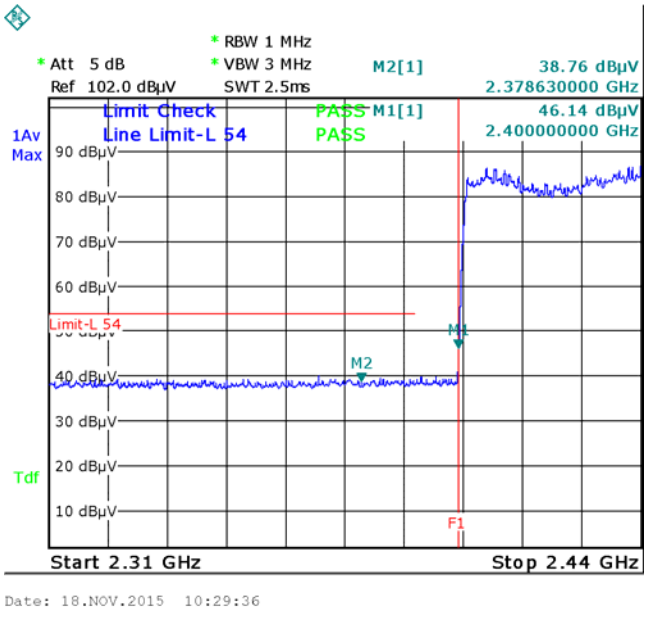
π /4 DQPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



π /4 DQPSK-Hopping Right Side-PK

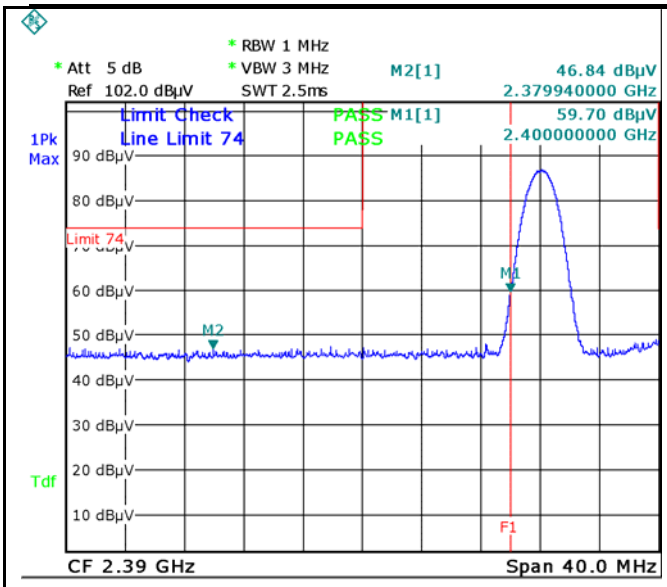
Note: F1 is frequency 2483.5MHz



π /4 DQPSK-Hopping Left-AV

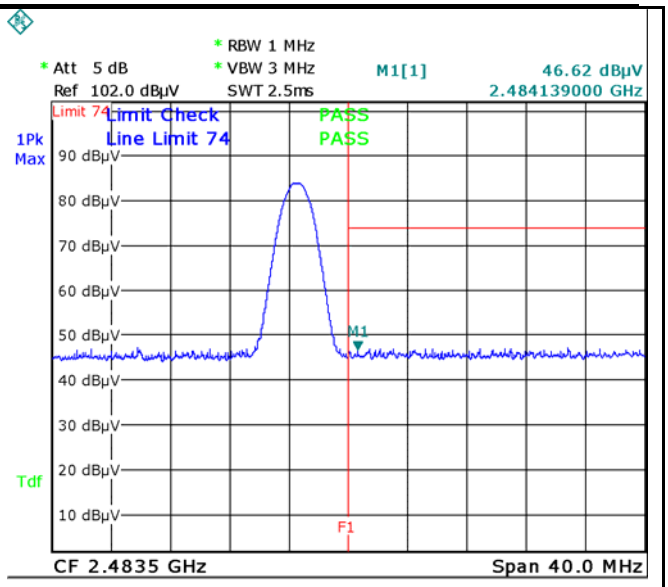
Note: (no need if PK value less than the AV limit)

π /4 DQPSK-Hopping Right-AV



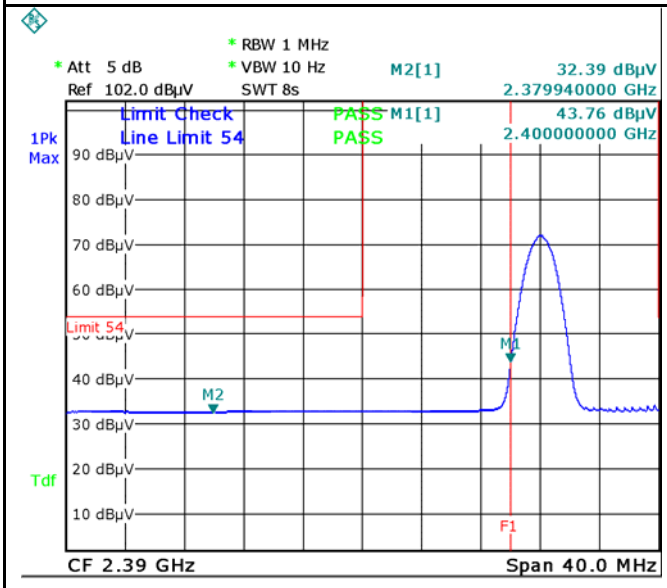
π /4 DQPSK-Left Side-PK

Note: F1 is frequency 2400MHz



π /4 DQPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

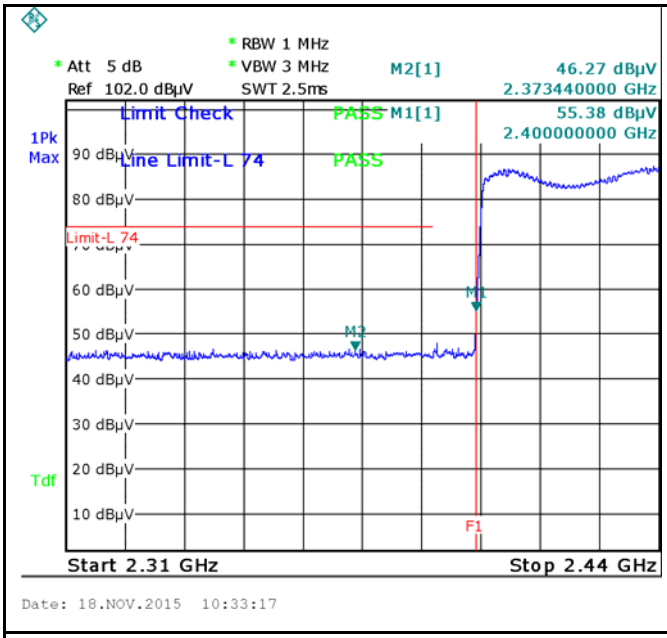


π /4 DQPSK-Left Side-AV

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

π /4 DQPSK-Right Side-AV

8-DPSK Mode:

<table>
<tr>
<td> 
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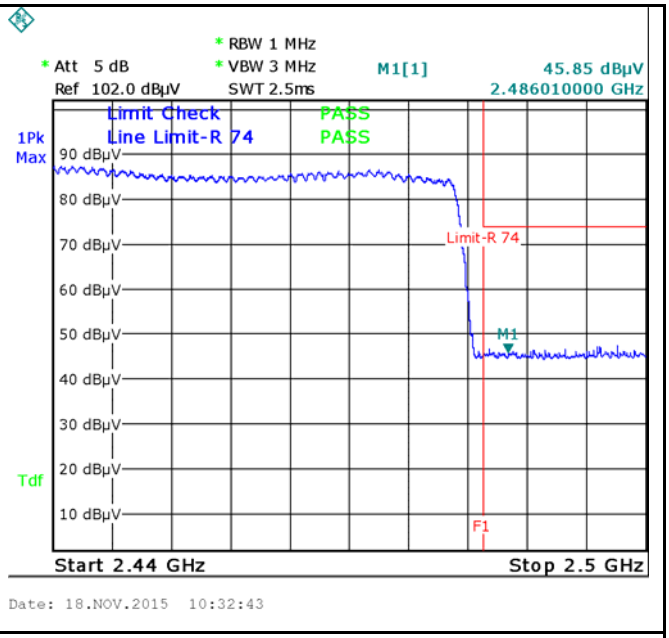
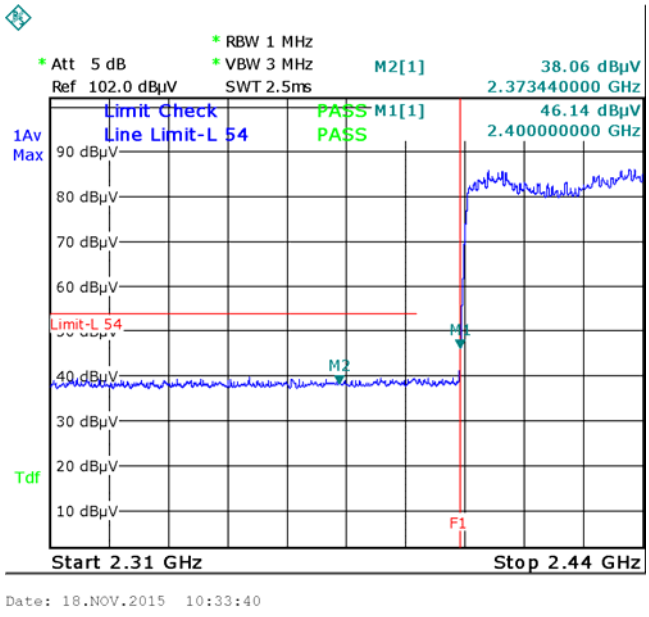
<td> 
</td>
</tr>
<tr>
<td>8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz</td>
<td>8DPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz</td>
</tr>
<tr>
<td> 
</td>
<td>Note: (no need if PK value less than the AV limit)</td>
</tr>
<tr>
<td>8DPSK-Hopping Left-AV</td>
<td>8DPSK-Hopping Right-AV</td>
</tr>
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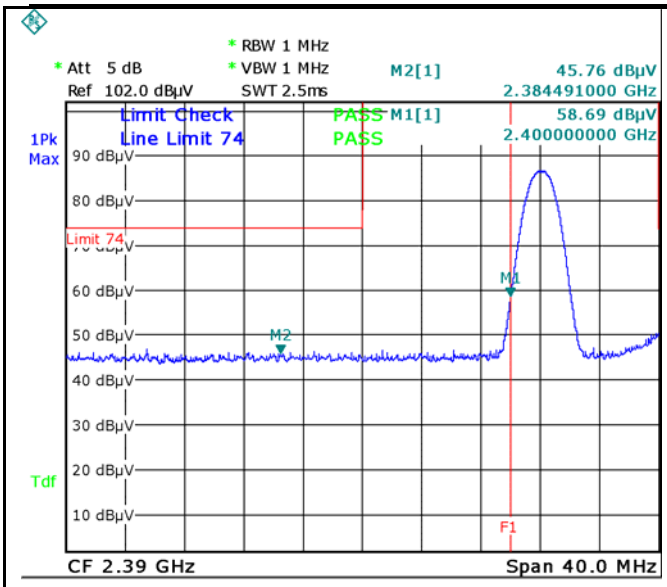
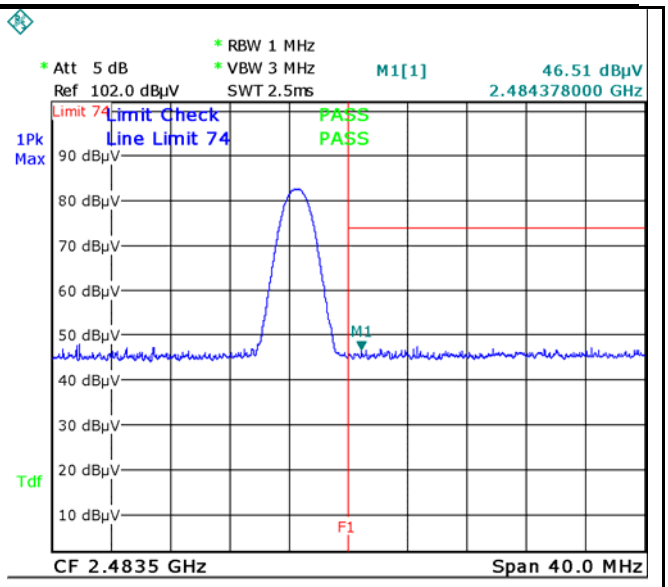


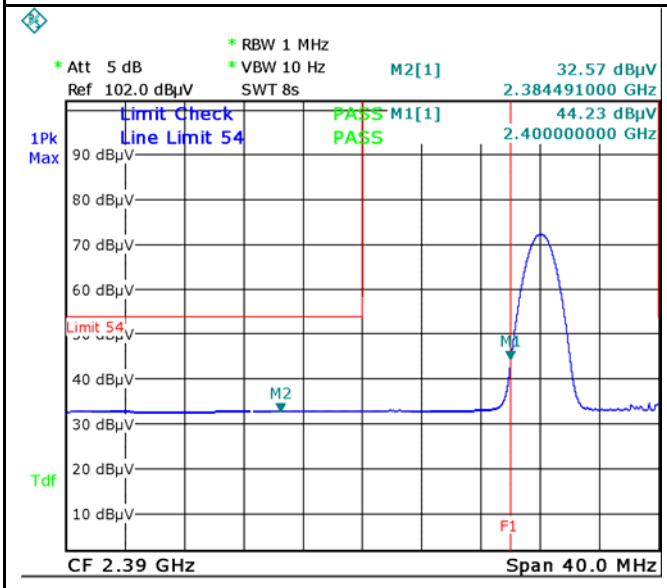
8DPSK-Left Side-PK

Note: F1 is frequency 2400MHz



8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



8DPSK-Left Side-AV

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

8DPSK-Right Side-AV

6.8 AC Power Line Conducted Emissions

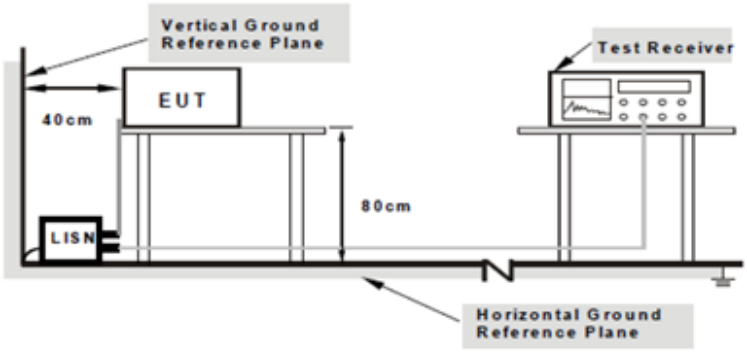
Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 2015
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.207, RSS210 (A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	☑

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



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.

Procedure

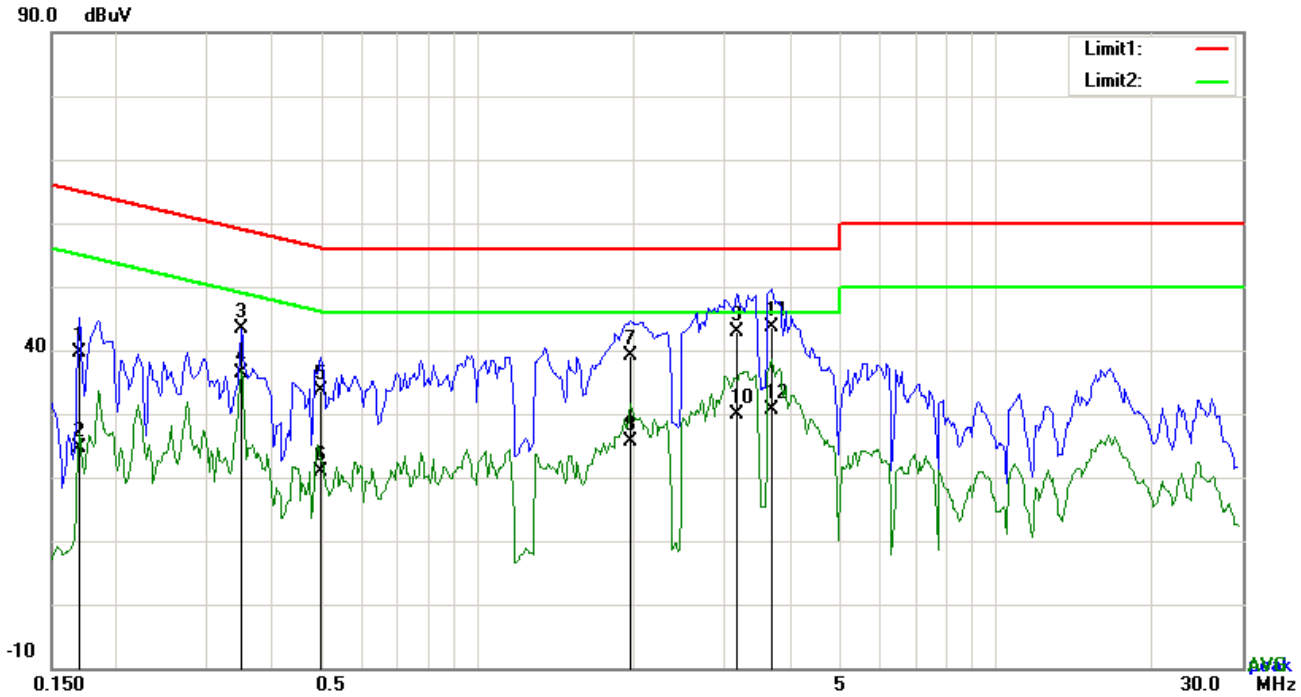
1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss

	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:	Bluetooth Mode

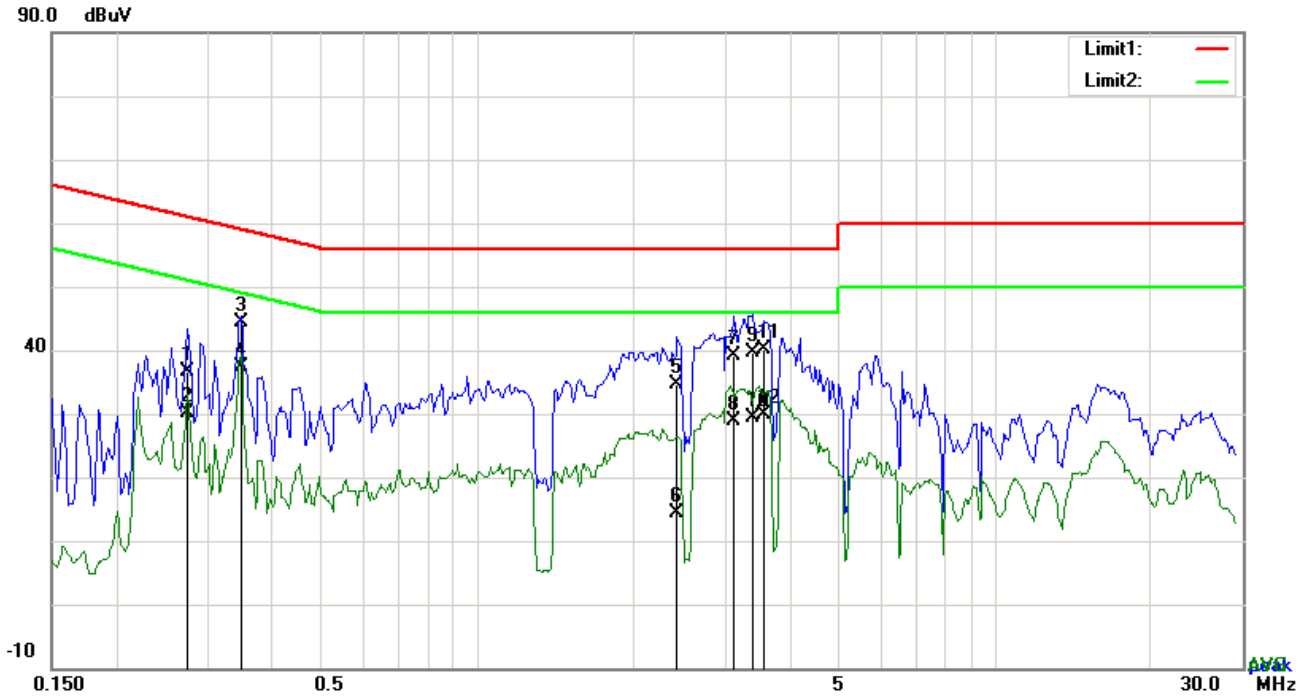


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	L1	0.1695	26.45	QP	13.13	39.58	64.98	-25.40
2	L1	0.1695	11.50	AVG	13.13	24.63	54.98	-30.35
3	L1	0.3489	30.82	QP	12.46	43.28	58.99	-15.71
4	L1	0.3489	23.93	AVG	12.46	36.39	48.99	-12.60
5	L1	0.4971	21.61	QP	11.91	33.52	56.05	-22.53
6	L1	0.4971	8.85	AVG	11.91	20.76	46.05	-25.29
7	L1	1.9791	27.69	QP	11.40	39.09	56.00	-16.91
8	L1	1.9791	14.31	AVG	11.40	25.71	46.00	-20.29
9	L1	3.1677	31.58	QP	11.40	42.98	56.00	-13.02
10	L1	3.1677	18.56	AVG	11.40	29.96	46.00	-16.04
11	L1	3.6942	32.18	QP	11.40	43.58	56.00	-12.42
12	L1	3.6942	19.23	AVG	11.40	30.63	46.00	-15.37

Test Mode:	Bluetooth Mode

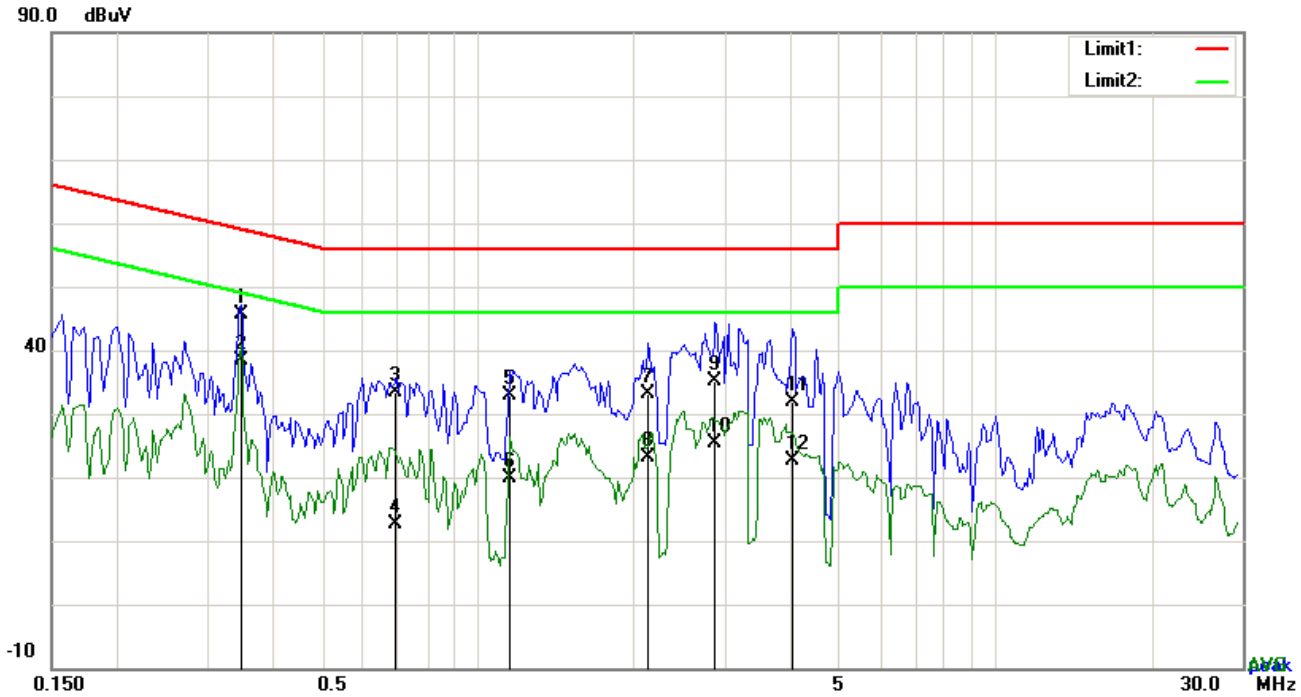


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	N	0.2748	23.95	QP	12.74	36.69	60.97	-24.28
2	N	0.2748	17.49	AVG	12.74	30.23	50.97	-20.74
3	N	0.3489	31.94	QP	12.46	44.40	58.99	-14.59
4	N	0.3489	24.98	AVG	12.46	37.44	48.99	-11.55
5	N	2.4237	23.07	QP	11.58	34.65	56.00	-21.35
6	N	2.4237	2.78	AVG	11.58	14.36	46.00	-31.64
7	N	3.1248	27.42	QP	11.67	39.09	56.00	-16.91
8	N	3.1248	17.22	AVG	11.67	28.89	46.00	-17.11
9	N	3.3822	27.94	QP	11.70	39.64	56.00	-16.36
10	N	3.3822	17.73	AVG	11.70	29.43	46.00	-16.57
11	N	3.5694	28.36	QP	11.72	40.08	56.00	-15.92
12	N	3.5694	18.18	AVG	11.72	29.90	46.00	-16.10

Test Mode:	Bluetooth Mode

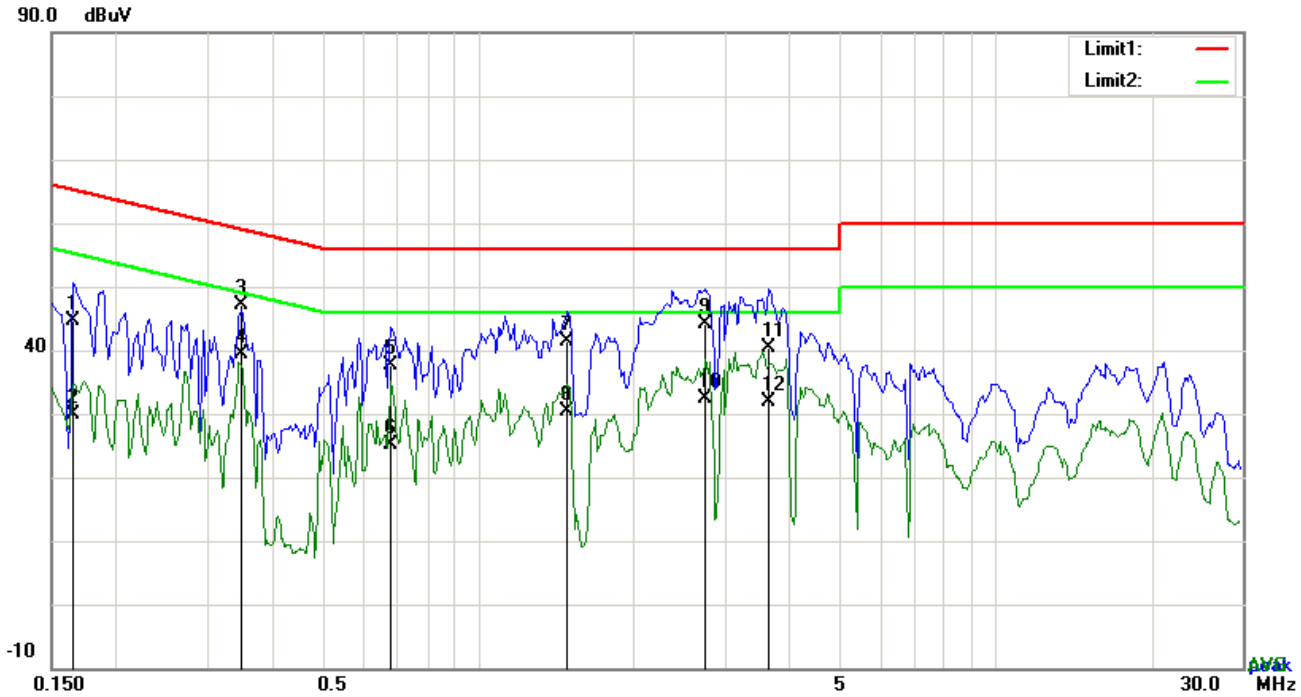


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	L1	0.3489	33.22	QP	12.46	45.68	58.99	-13.31
2	L1	0.3489	25.89	AVG	12.46	38.35	48.99	-10.64
3	L1	0.6960	21.79	QP	11.70	33.49	56.00	-22.51
4	L1	0.6960	0.81	AVG	11.70	12.51	46.00	-33.49
5	L1	1.1523	21.46	QP	11.40	32.86	56.00	-23.14
6	L1	1.1523	8.58	AVG	11.40	19.98	46.00	-26.02
7	L1	2.1351	21.75	QP	11.40	33.15	56.00	-22.85
8	L1	2.1351	11.74	AVG	11.40	23.14	46.00	-22.86
9	L1	2.8839	23.76	QP	11.40	35.16	56.00	-20.84
10	L1	2.8839	13.95	AVG	11.40	25.35	46.00	-20.65
11	L1	4.0569	20.37	QP	11.40	31.77	56.00	-24.23
12	L1	4.0569	11.14	AVG	11.40	22.54	46.00	-23.46

Test Mode:	Bluetooth Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	N	0.1656	31.43	QP	13.14	44.57	65.18	-20.61
2	N	0.1656	16.76	AVG	13.14	29.90	55.18	-25.28
3	N	0.3489	34.62	QP	12.46	47.08	58.99	-11.91
4	N	0.3489	27.02	AVG	12.46	39.48	48.99	-9.51
5	N	0.6804	25.80	QP	11.72	37.52	56.00	-18.48
6	N	0.6804	13.35	AVG	11.72	25.07	46.00	-20.93
7	N	1.4916	29.84	QP	11.46	41.30	56.00	-14.70
8	N	1.4916	18.86	AVG	11.46	30.32	46.00	-15.68
9	N	2.7552	32.58	QP	11.62	44.20	56.00	-11.80
10	N	2.7552	20.83	AVG	11.62	32.45	46.00	-13.55
11	N	3.6552	28.60	QP	11.73	40.33	56.00	-15.67
12	N	3.6552	20.19	AVG	11.73	31.92	46.00	-14.08

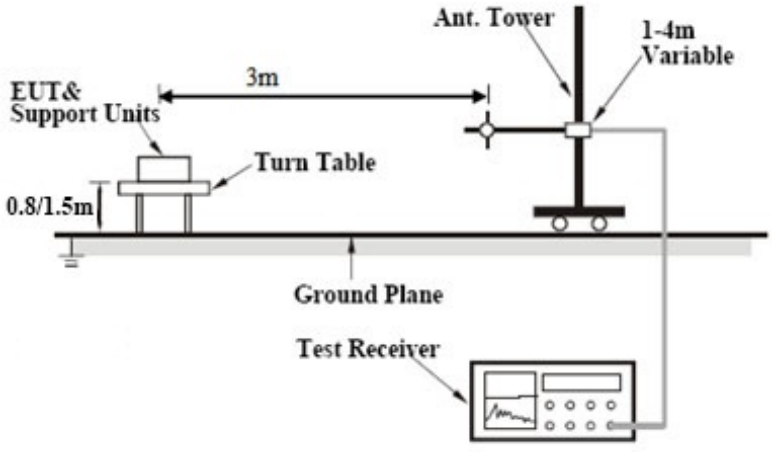
6.9 Radiated Emissions

Temperature	23℃
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 18, 2015
Tested By :	Winnie Zhang

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:

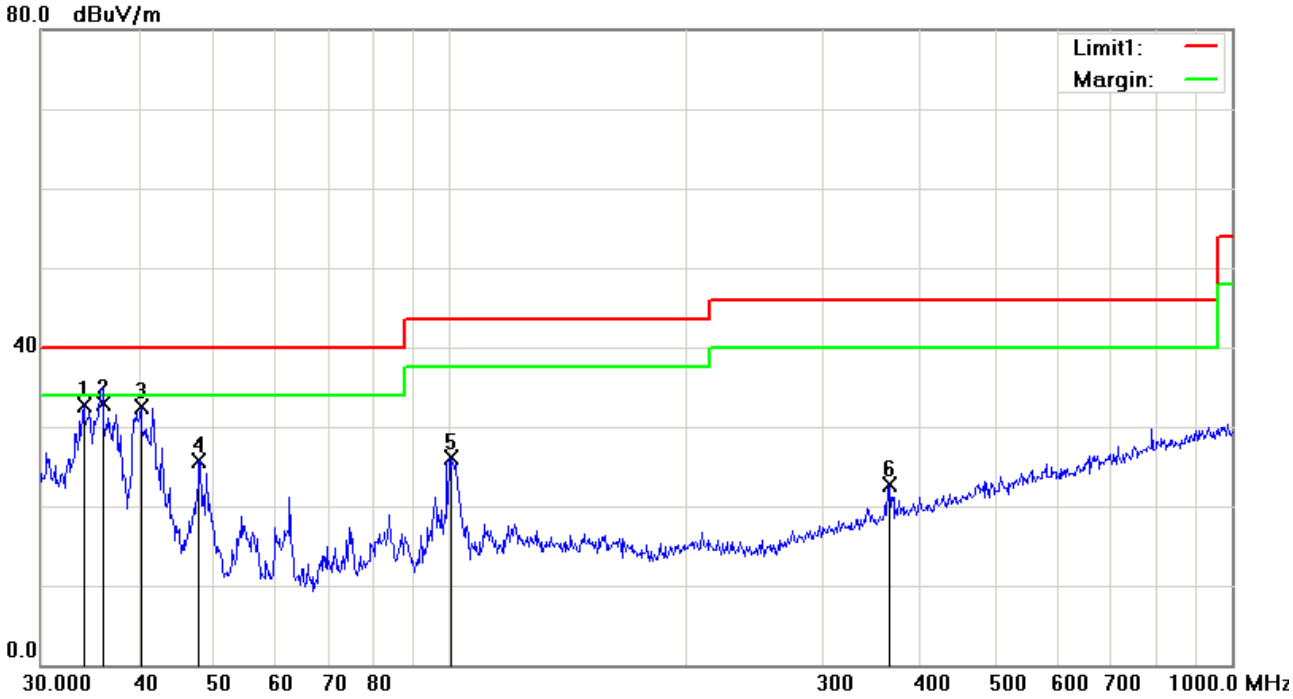
	a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution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

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode:	Bluetooth Mode

Below 1GHz

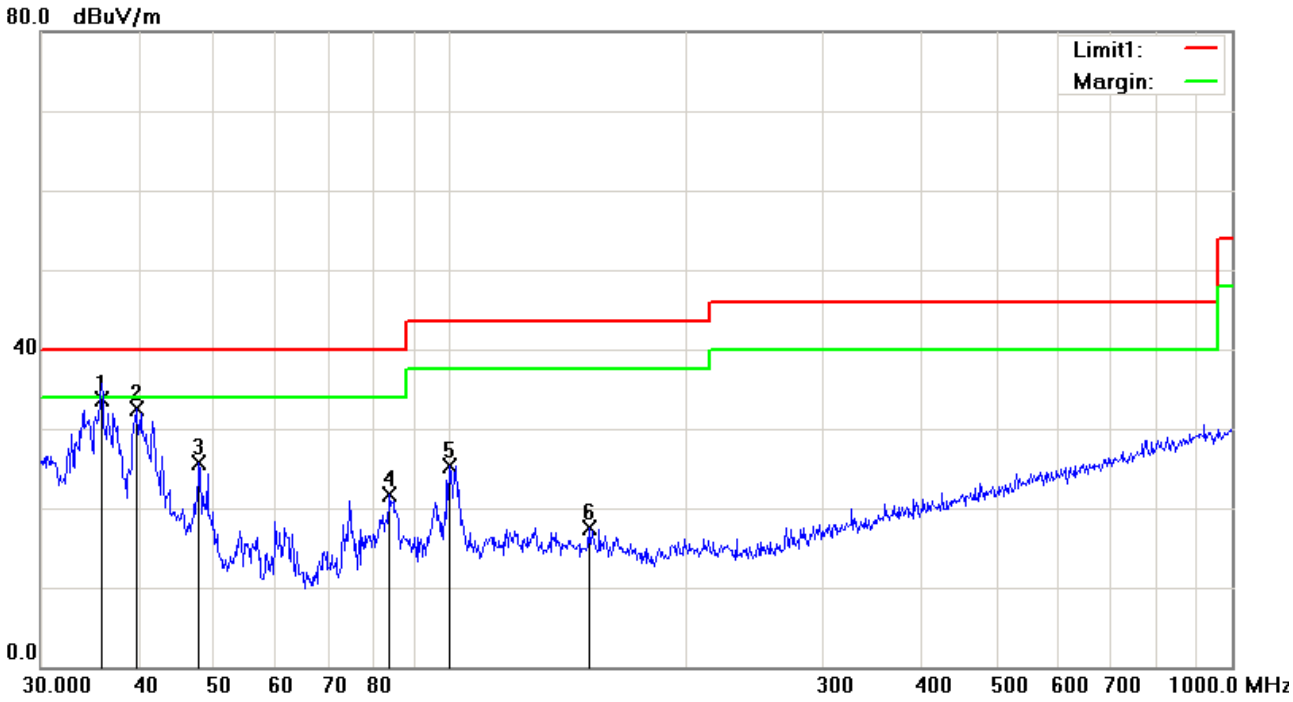


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( )
1	H	34.0365	35.85	peak	-3.24	32.61	40.00	-7.39	100	339
2	H	36.0007	37.56	QP	-4.67	32.89	40.00	-7.11	100	219
3	H	40.2757	40.23	peak	-7.77	32.46	40.00	-7.54	100	14
4	H	47.8260	37.95	peak	-12.20	25.75	40.00	-14.25	100	66
5	H	100.5806	36.73	peak	-10.70	26.03	43.50	-17.47	100	343
6	H	365.5391	27.71	peak	-5.10	22.61	46.00	-23.39	100	302

Below 1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( )
1	V	35.8747	38.21	QP	-4.58	33.63	40.00	-6.37	100	308
2	V	39.7147	39.95	peak	-7.38	32.57	40.00	-7.43	100	58
3	V	47.8260	37.81	peak	-12.20	25.61	40.00	-14.39	100	302
4	V	83.8156	35.33	peak	-13.56	21.77	40.00	-18.23	100	276
5	V	99.8777	36.20	peak	-10.83	25.37	43.50	-18.13	100	220
6	V	150.5378	25.86	peak	-8.40	17.46	43.50	-26.04	100	81

Above 1GHz

Test Mode:	Transmitting Mode

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	38.51	AV	V	33.83	6.86	31.72	47.48	54	-6.52
4804	37.69	AV	H	33.83	6.86	31.72	46.66	54	-7.34
4804	46.33	PK	V	33.83	6.86	31.72	55.30	74	-18.7
4804	45.75	PK	H	33.83	6.86	31.72	54.72	74	-19.28

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	38.47	AV	V	33.86	6.82	31.82	47.33	54	-6.67
4882	37.62	AV	H	33.86	6.82	31.82	46.48	54	-7.52
4882	46.28	PK	V	33.86	6.82	31.82	55.14	74	-18.86
4882	45.71	PK	H	33.86	6.82	31.82	54.57	74	-19.43

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	38.53	AV	V	33.9	6.76	31.92	47.27	54	-6.73
4960	37.56	AV	H	33.9	6.76	31.92	46.3	54	-7.70
4960	46.31	PK	V	33.9	6.76	31.92	55.05	74	-18.95
4960	45.77	PK	H	33.9	6.76	31.92	54.51	74	-19.49

Note:

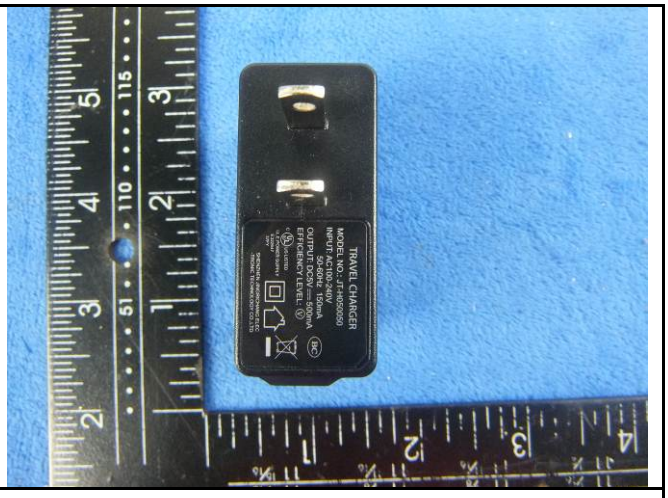
*1, The testing has been conformed to 10*2480MHz=24,800MHz*
2, All other emissions more than 30 dB below the limit

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/17/2015	09/16/2016	☑
Line Impedance	LI-125A	191106	09/25/2015	09/24/2016	☑
Line Impedance	LI-125A	191107	09/25/2015	09/24/2016	☑
LISN	ISN T800	34373	09/25/2015	09/24/2016	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	☑
Transient Limiter	LIT-153	531118	09/01/2015	08/31/2016	☑
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/17/2015	09/16/2016	☑
Power Splitter	1#	1#	09/01/2015	08/31/2016	☑
DC Power Supply	E3640A	MY40004013	09/17/2015	09/16/2016	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/17/2015	09/16/2016	☑
Positioning Controller	UC3000	MF780208282	11/20/2014	11/19/2015	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/01/2015	08/31/2016	☑
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/25/2015	03/24/2016	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/21/2015	09/20/2016	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	☑
Universal Radio Communication Tester	CMU200	121393	09/25/2015	09/23/2016	☑

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

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

EUT - Top View

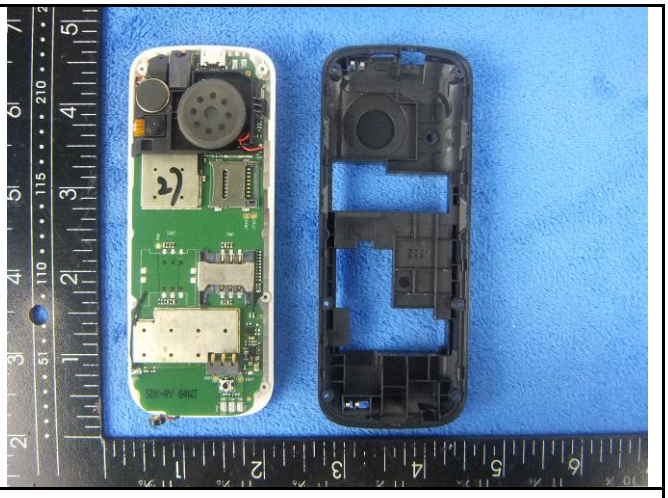
EUT - Bottom View

EUT - Left View

EUT - Right View

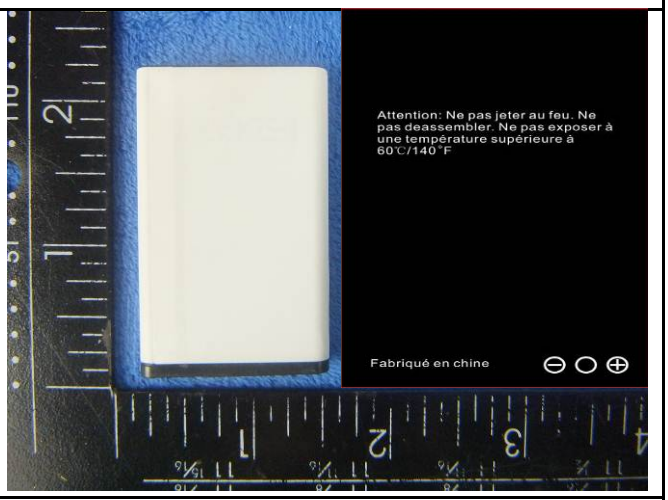
Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1

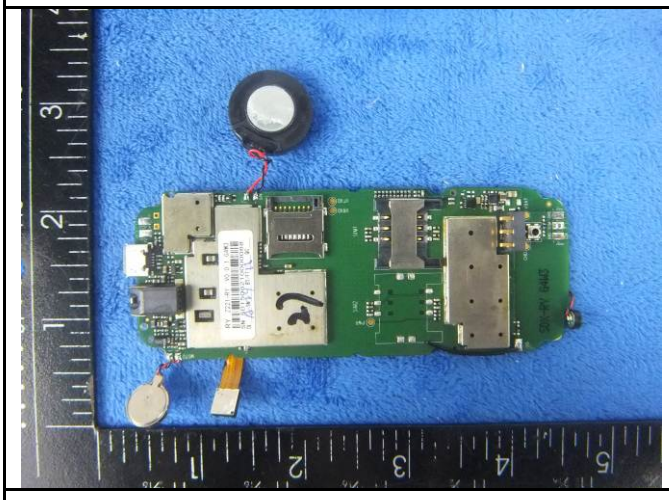


Cover Off - Top View 2

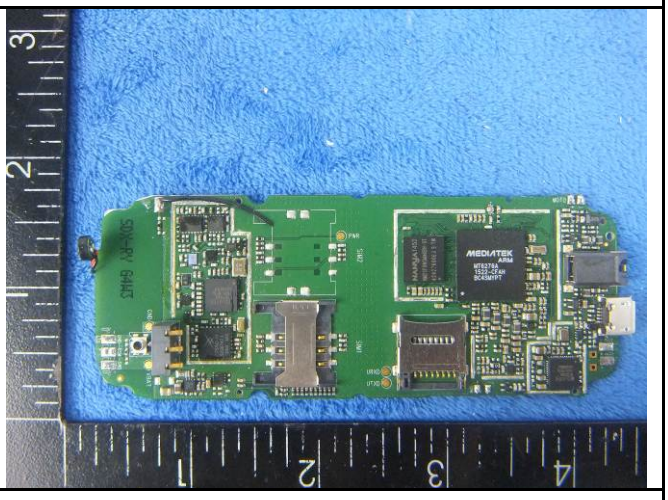
Battery - Front View



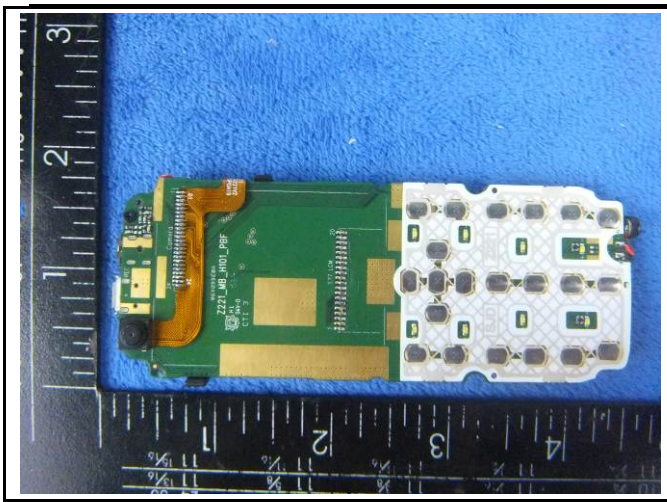
Battery - Rear View



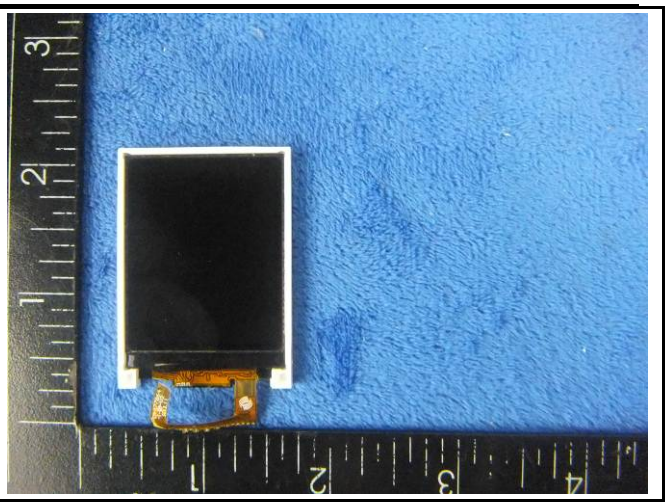
Mainbard with Shielding - Front View



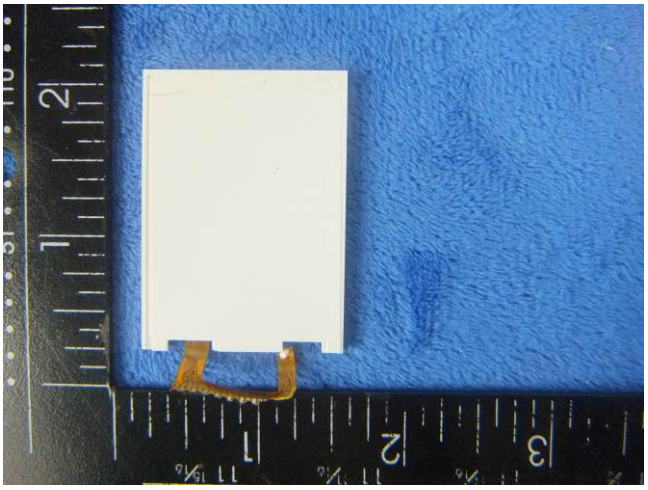
Mainbard without Shielding - Front View



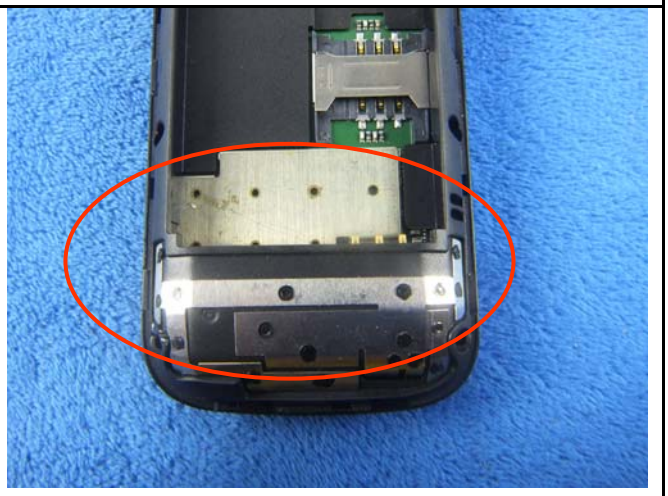
Mainbard – Rear View



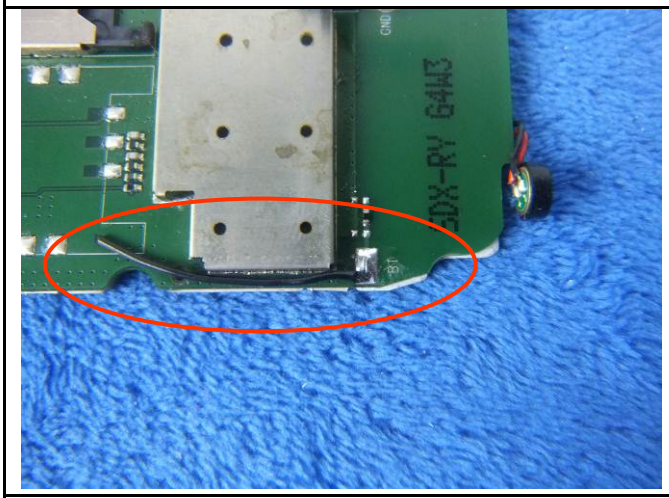
LCD – Front View



LCD – Rear View

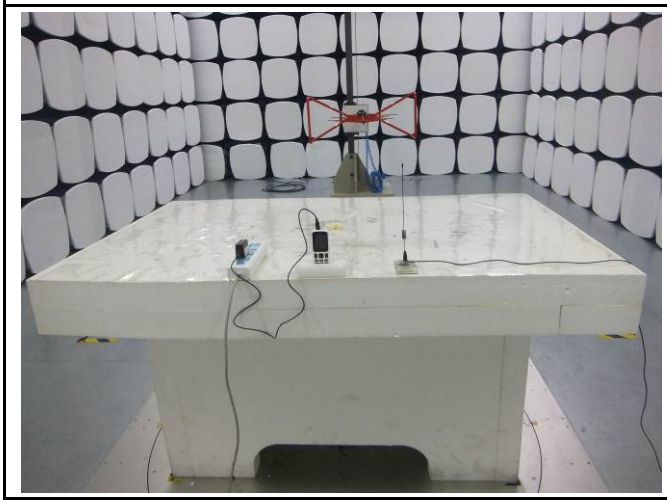
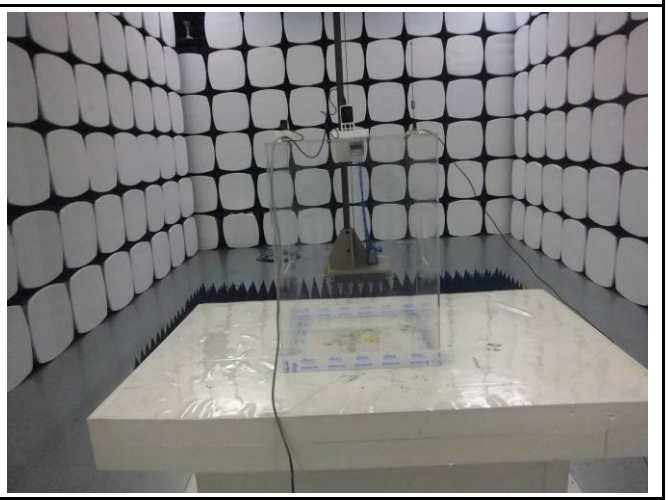


GSM/PCS/UMTS-FDD Antenna View



BT - Antenna View

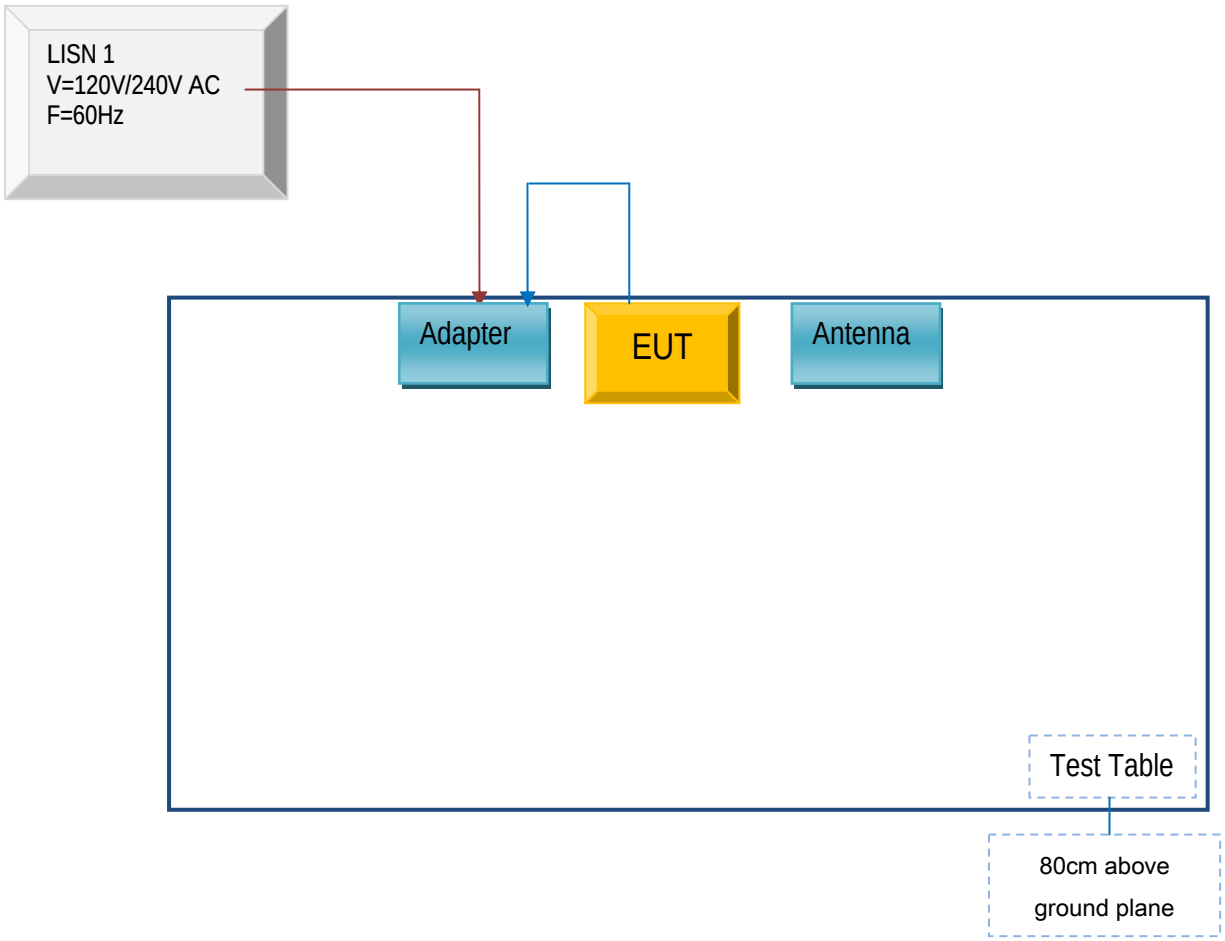
Annex B.iii. Photograph: Test Setup Photo

	
Conducted Emissions Test Setup Front View	Conducted Emissions Test Setup Side View
	
Radiated Emissions Test Setup Below 1GHz	Radiated Emissions Test Setup Above 1GHz

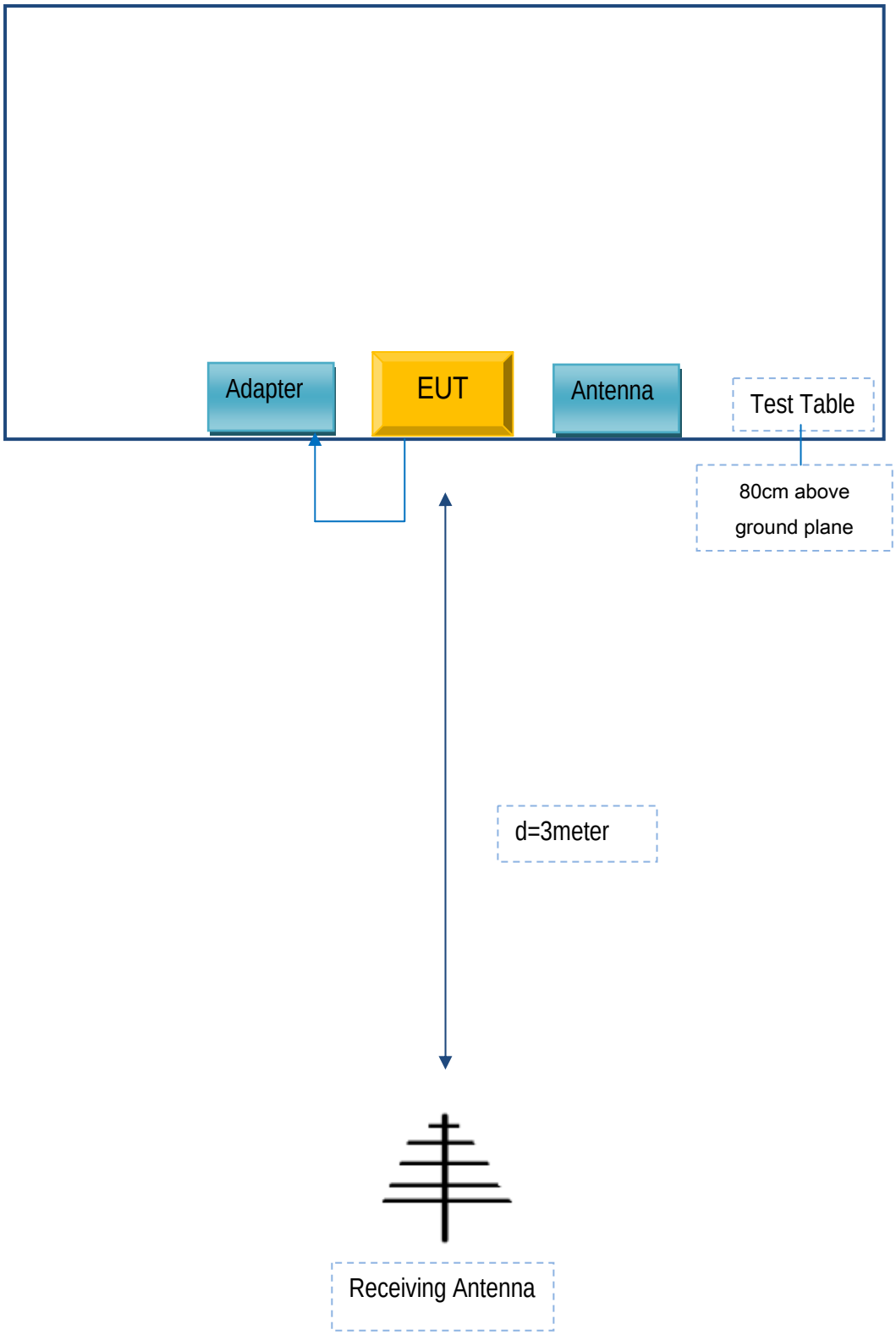
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

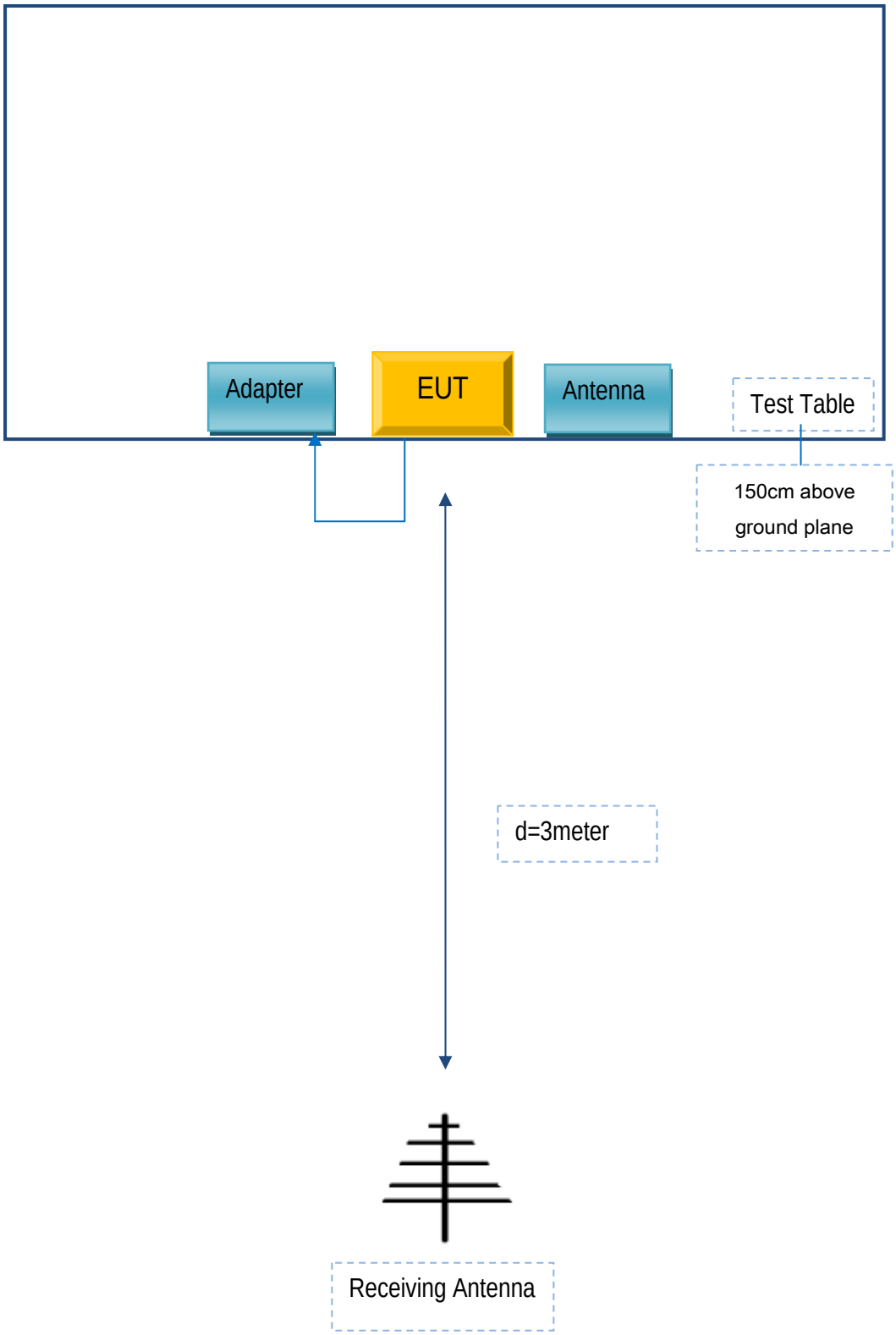
Block Configuration Diagram for AC Line Conducted Emissions



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



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



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

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

Manufacturer	Equipment Description	Model	Serial No	Calibration Date	Calibration Due Date
Quality One Wireless LLC	Adapter	JT-H050050	HM554451	N/A	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No	Calibration Date	Calibration Due Date
USB Cable	Un-shielding	No	0.8m	HM542214	N/A	N/A

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

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A