


# RF TEST REPORT



Report No.: 14070726-FCC-R1

Supersede Report No.: N/A

Applicant	SHENZHEN KINGSUN ENTERPRISES Co.,Ltd	
Product Name	Bluetooth Speaker	
Model No.	DC-0555	
Test Standard	FCC Part 15.247: 2014, ANSI C63.10: 2009	
Test Date	December 26, 2014 to January 14, 2015	
Issue Date	January 14, 2015	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification <input checked="" type="checkbox"/>		
Equipment did not comply with the specification <input type="checkbox"/>		
		
Dustin Wang 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**

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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
14070726-FCC-R1	NONE	Original	January 14, 2015

## 2. Customer information

Applicant Name	SHENZHEN KINGSUN ENTERPRISES Co.,Ltd
Applicant Add	25/F, CEC Information Building, Xinwen Rd., Shenzhen, Guangdong, China
Manufacturer	Shenzhen E-Ran Technology Co.,Ltd.
Manufacturer Add	6 Floor, Block A Xiangjiang Industrial Park, Songbai Road, Shiyan Town, Baoan District, Shenzhen

## 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:	Bluetooth Speaker
Main Model:	DC-0555
Serial Model:	N/A
Date EUT received:	December 24, 2014
Test Date(s):	December 26, 2014 to January 14, 2015
Equipment Category :	DSS
Antenna Gain:	Bluetooth: 0.9 dBi
Type of Modulation:	Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK
RF Operating Frequency (ies):	Bluetooth: 2402-2480 MHz
Output Power:	Bluetooth: 4.075 dBm
Number of Channels:	Bluetooth: 79CH
Port:	USB Port
Input Power:	Battery: Model: BL-5C Spec: 3.7V 400mAh Limit Charging Voltage: 4.2V
Trade Name :	N/A
GPRS/EGPRS Multi-slot class	N/A
FCC ID:	2AAPKDC-0555

## 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 one antenna:

A PIFA antenna for Bluetooth, the gain is 0.9 dBi.

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

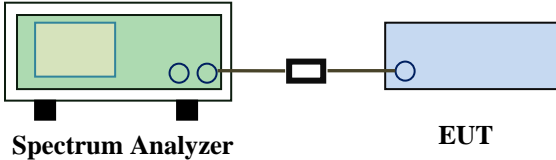
**Result:** Compliance.



## 6.2 Channel Separation

Temperature	21°C
Relative Humidity	60%
Atmospheric Pressure	1010mbar
Test date :	December 29, 2014
Tested By :	Dustin Wang

### Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Channel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> <li>- The EUT must have its hopping function enabled</li> <li>- Span = wide enough to capture the peaks of two adjacent channels</li> <li>- Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span</li> <li>- Video (or Average) Bandwidth (VBW) ≥ RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.</li> </ul>		

Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

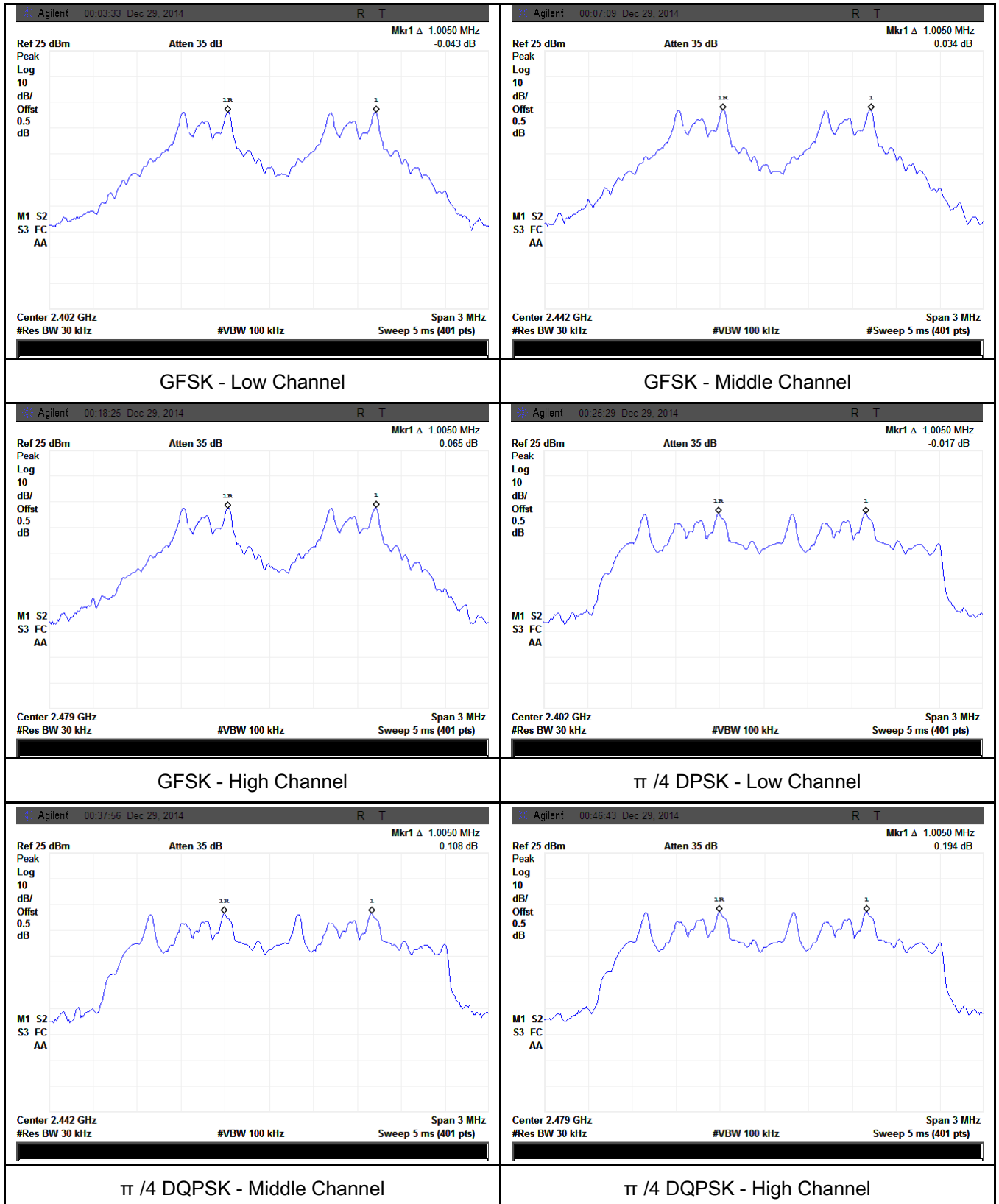
Test Plot ☒ Yes (See below) ☐ N/A

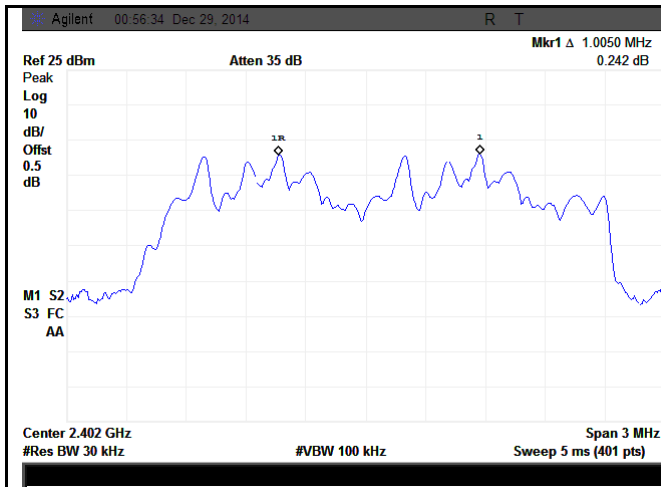
### Channel Separation measurement result

Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.757	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.764	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.763	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.828	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.827	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.828	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.820	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.820	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.821	Pass
	Adjacency Channel	2479			

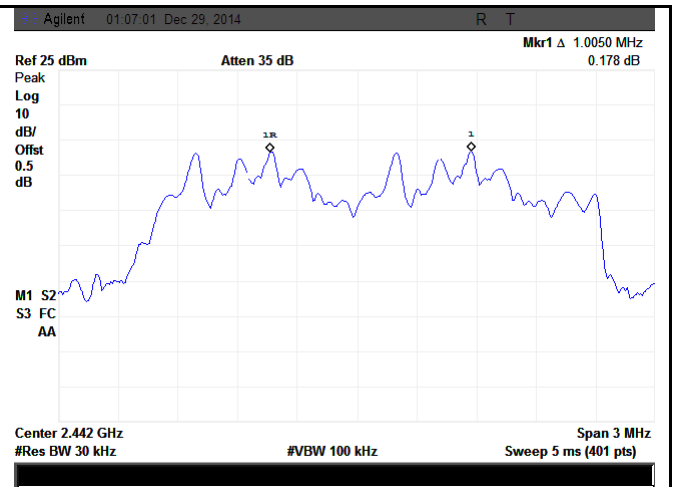
## Test Plots

### Channel Separation measurement result

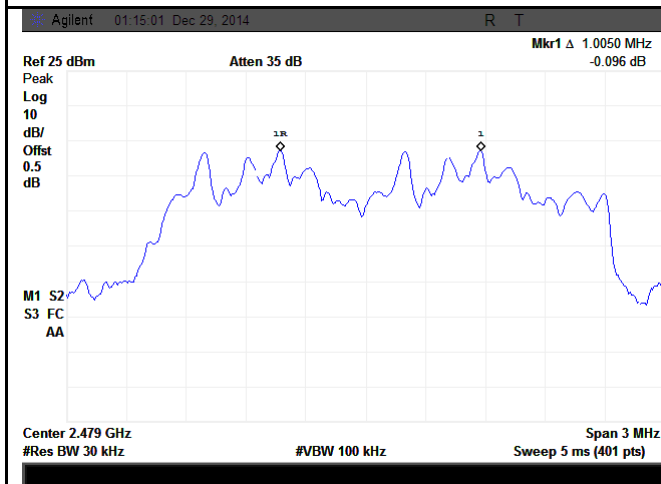




8DPSK - Low Channel



8DPSK - Middle Channel

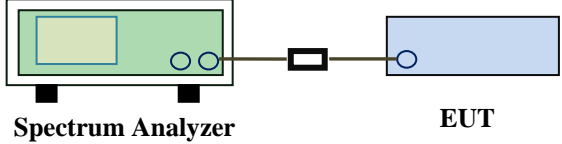


8DPSK - High Channel

### 6.3 20dB Bandwidth

Temperature	21°C
Relative Humidity	60%
Atmospheric Pressure	1010mbar
Test date :	December 29, 2014
Tested By :	Dustin Wang

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> <li>- Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW <math>\geq</math> 1% of the 20 dB bandwidth</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold.</li> <li>- The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference</li> </ul>		

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

Test Data ☒ Yes ☐ N/A

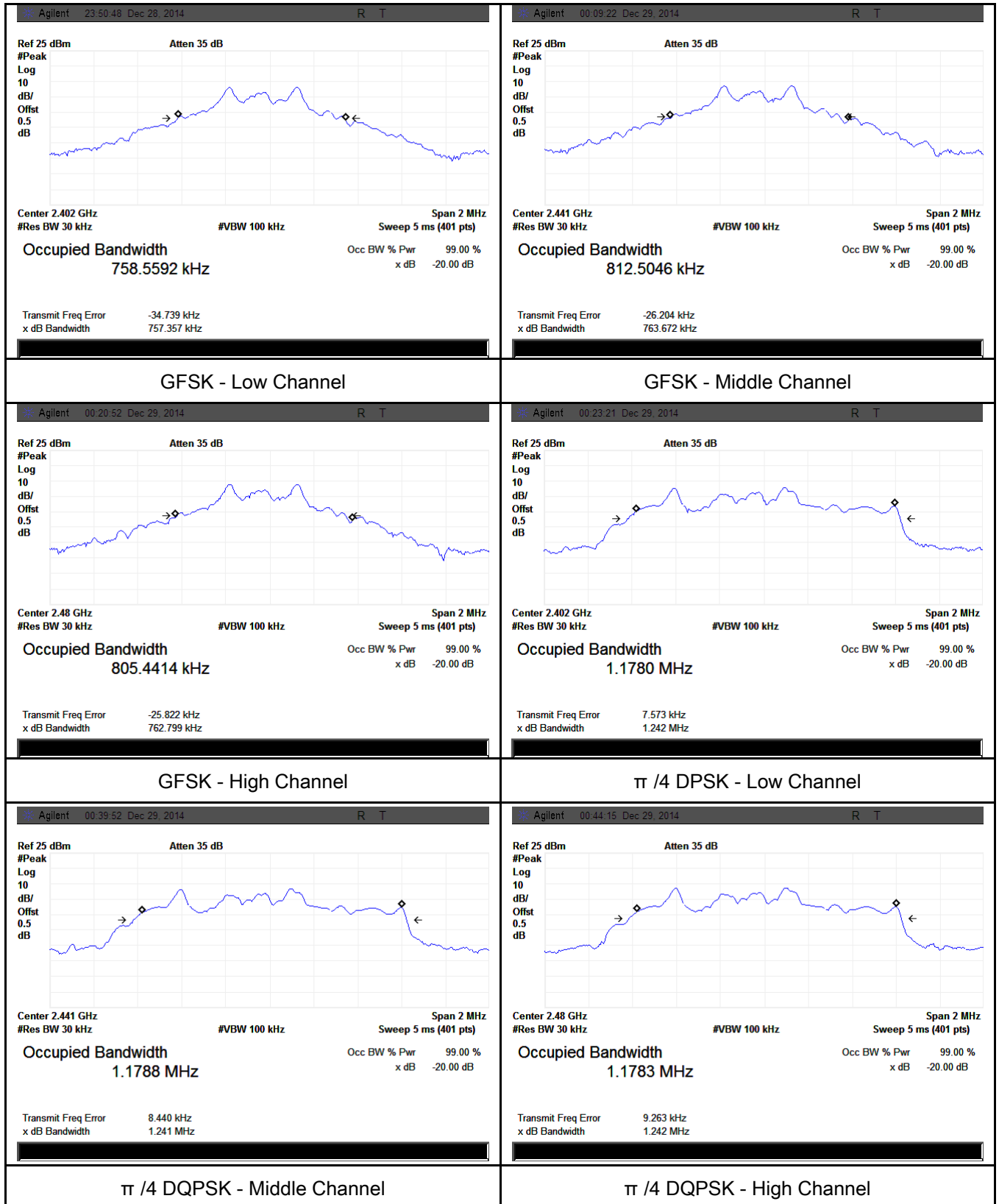
Test Plot ☒ Yes (See below) ☐ N/A

#### 20dB Bandwidth measurement result

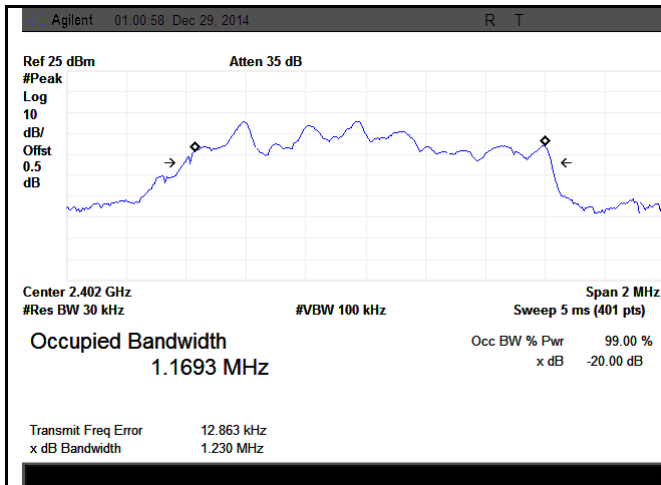
Type	Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)
20dB BW	GFSK	Low	2402	0.757
		Mid	2441	0.764
		High	2480	0.763
	$\pi$ / 4 DQPSK	Low	2402	1.242
		Mid	2441	1.241
		High	2480	1.242
	8-DPSK	Low	2402	1.230
		Mid	2441	1.230
		High	2480	1.232

## Test Plots

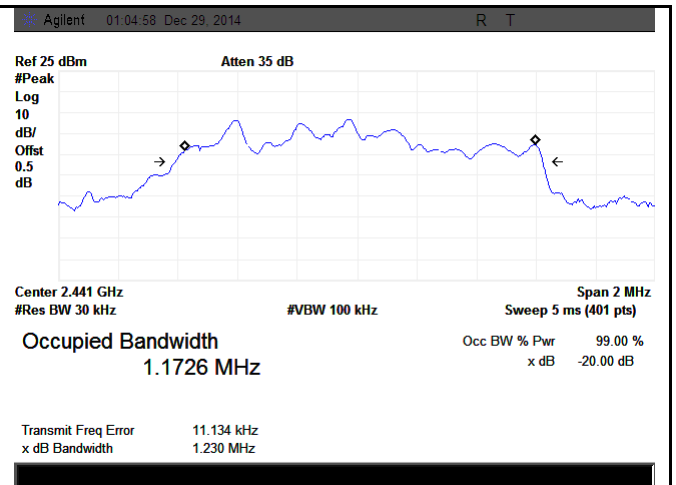
### 20dB Bandwidth measurement result



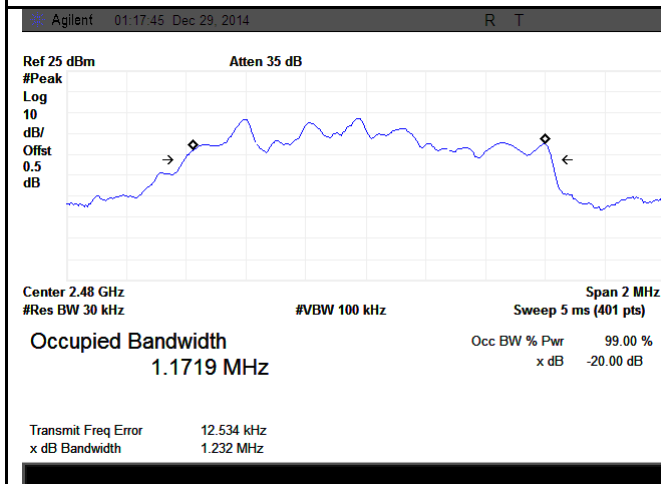
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8DPSK - Low Channel



8DPSK - Middle Channel



8DPSK - High Channel

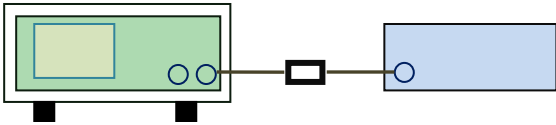


## 6.4 Peak Output Power

Temperature	21°C
Relative Humidity	60%
Atmospheric Pressure	1010mbar
Test date :	December 29, 2014
Tested By :	Dustin Wang

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2)	a)	FHSS in 2400-2483.5MHz with $\geq 75$ channels: $\leq 1$ Watt	<input checked="" type="checkbox"/>
	b)	FHSS in 5725-5850MHz: $\leq 1$ Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: $\leq 0.125$ Watt.	<input checked="" type="checkbox"/>
	d)	FHSS in 902-928MHz with $\geq 50$ channels: $\leq 1$ Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with $\geq 25$ & $< 50$ channels: $\leq 0.25$ Watt	<input type="checkbox"/>
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: $\leq 1$ Watt	<input type="checkbox"/>

Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
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Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> <li>- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW <math>&gt;</math> the 20 dB bandwidth of the emission being measured</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> </ul>
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	<ul style="list-style-type: none"> <li>- Allow the trace to stabilize.</li> <li>- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

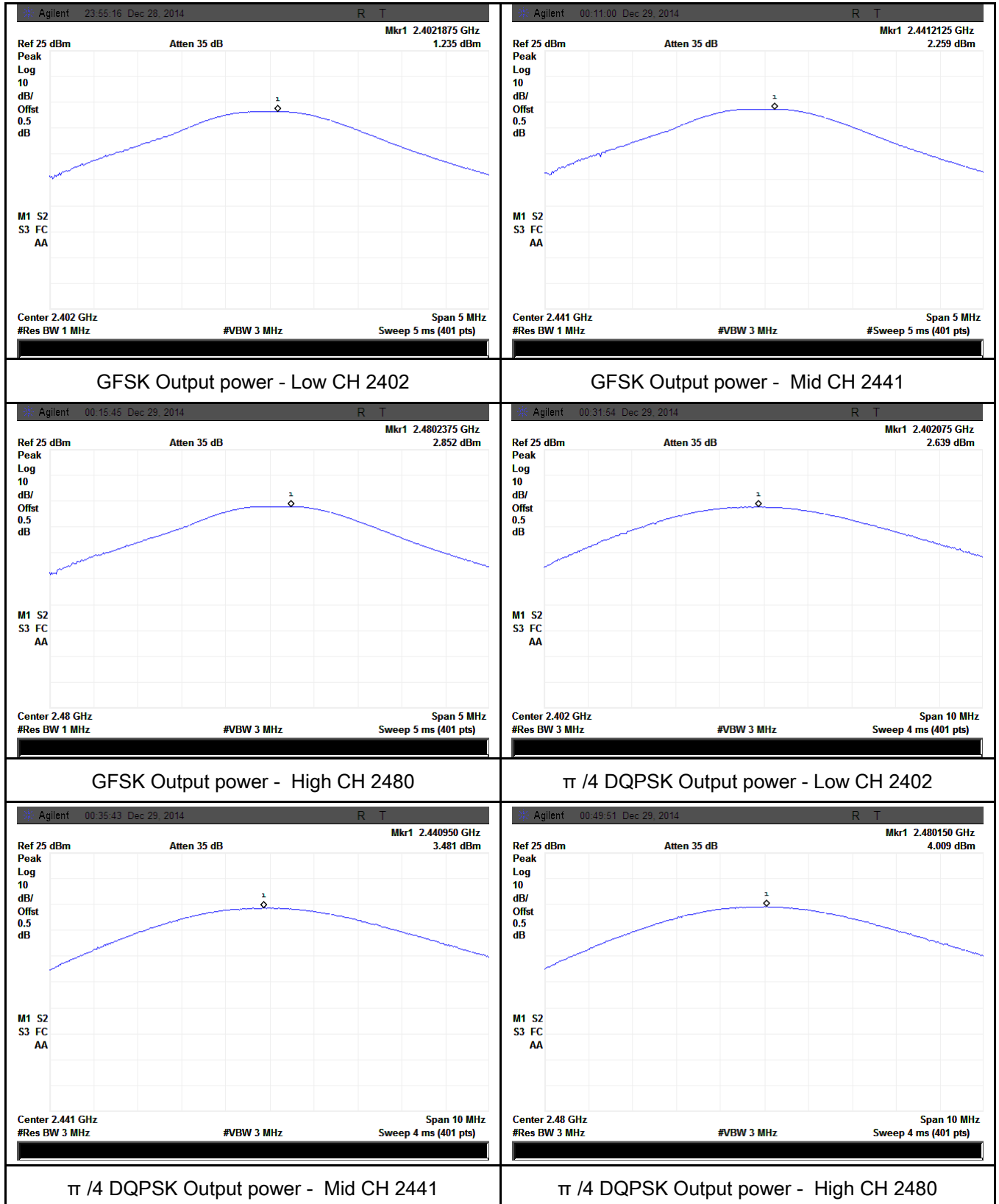
Test Data ☒ Yes ☐ N/A  
 Test Plot ☒ Yes (See below) ☐ N/A

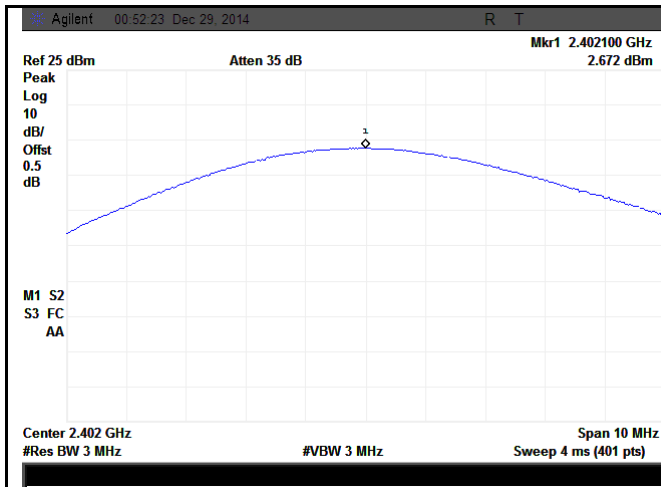
**Peak Output Power measurement result**

Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	1.235	1000	Pass
		Mid	2441	2.259	1000	Pass
		High	2480	2.852	1000	Pass
	$\pi/4$ DQPSK	Low	2402	2.639	125	Pass
		Mid	2441	3.481	125	Pass
		High	2480	4.009	125	Pass
	8-DPSK	Low	2402	<b>2.672</b>	125	Pass
		Mid	2441	<b>3.497</b>	125	Pass
		High	2480	<b>4.075</b>	125	Pass

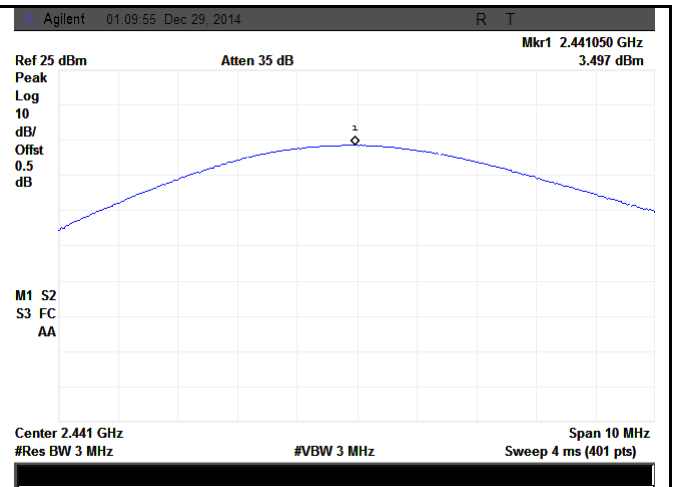
## Test Plots

### Output Power measurement result

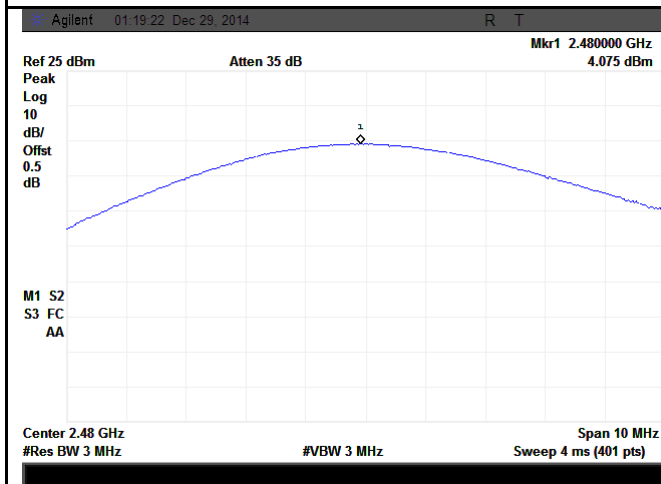




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

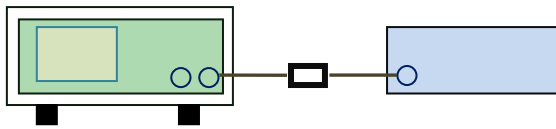


8DPSK Output power - High CH 2480

## 6.5 Number of Hopping Channel

Temperature	21°C
Relative Humidity	60%
Atmospheric Pressure	1010mbar
Test date :	December 29, 2014
Tested By :	Dustin Wang

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz $\geq$ 15 channels	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.  <u>Use the following spectrum analyzer settings:</u>          The EUT must have its hopping function enabled.</p> <ul style="list-style-type: none"> <li>- Span = the frequency band of operation</li> <li>- RBW <math>\geq</math> 1% of the span</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow trace to fully stabilize.</li> <li>- It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

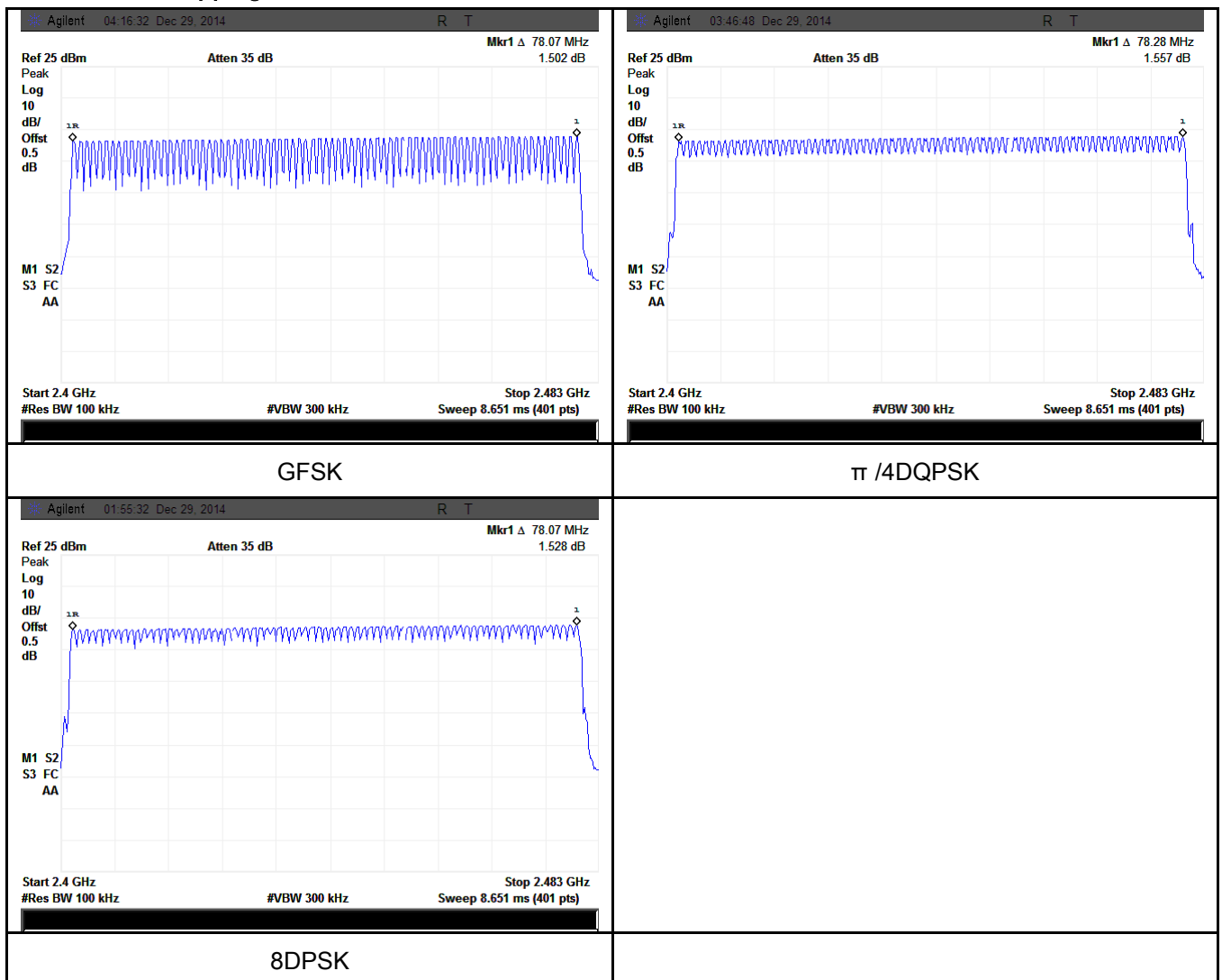
Test Data ☒ Yes                      ☐ N/A  
 Test Plot ☒ Yes (See below)                      ☐ N/A

### Number of Hopping Channel measurement result

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

### Test Plots

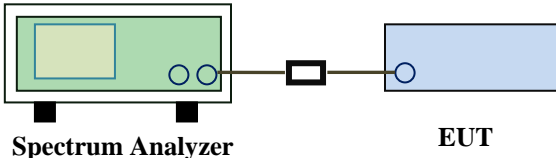
#### Number of Hopping Channels measurement result



## 6.6 Time of Occupancy (Dwell Time)

Temperature	21°C
Relative Humidity	60%
Atmospheric Pressure	1010mbar
Test date :	December 29, 2014
Tested By :	Dustin Wang

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer</u></p> <ul style="list-style-type: none"> <li>- Span = zero span, centered on a hopping channel</li> <li>- RBW = 1 MHz</li> <li>- VBW ≥ RBW</li> <li>- Sweep = as necessary to capture the entire dwell time per hopping channel</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- use the marker-delta function to determine the dwell time</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data    ☒ Yes                      ☐ N/A

Test Plot    ☒ Yes (See below)                      ☐ N/A

#### Dwell Time measurement result

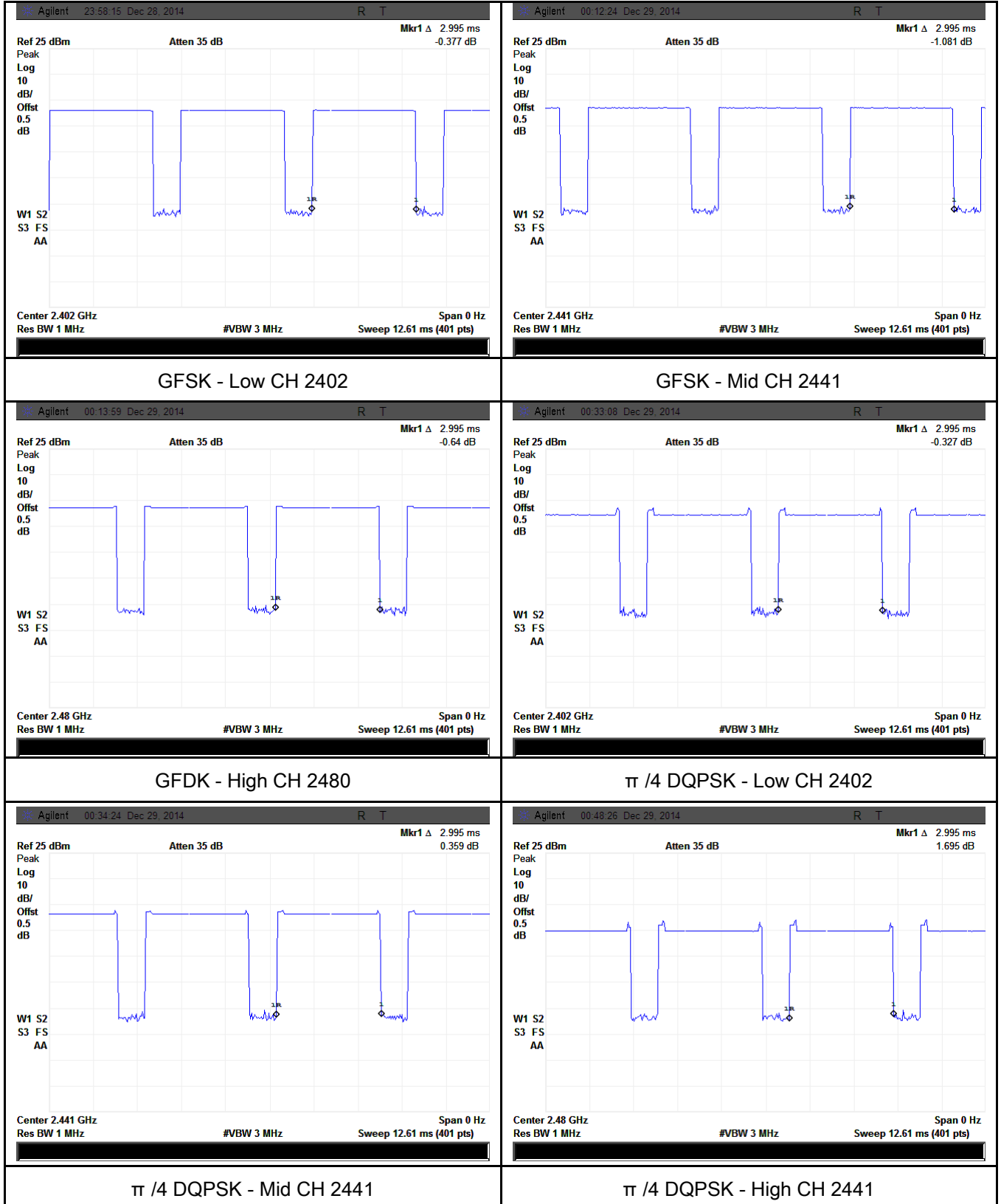
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Dwell Time	GFSK	Low	2.995	0.319	0.4	Pass
		Mid	2.995	0.319	0.4	Pass
		High	2.995	0.319	0.4	Pass
	$\pi$ /4 DQPSK	Low	2.995	0.319	0.4	Pass
		Mid	2.995	0.319	0.4	Pass
		High	2.995	0.319	0.4	Pass
	8-DPSK	Low	2.995	0.319	0.4	Pass
		Mid	2.995	0.319	0.4	Pass
		High	2.995	0.319	0.4	Pass

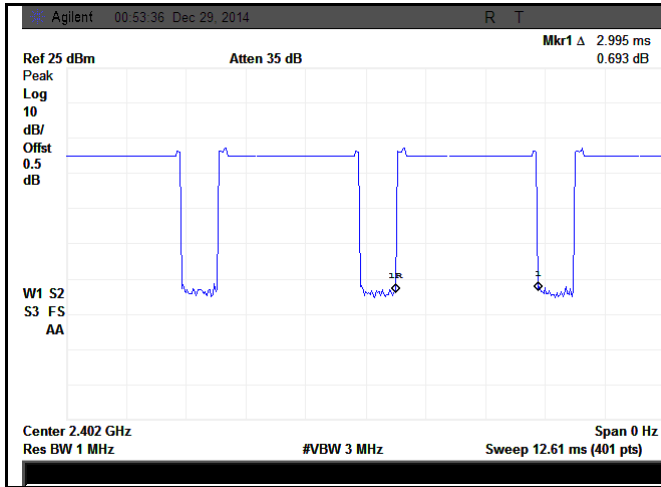
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  6  $\div$  79)  $\times$ 31.6 Second



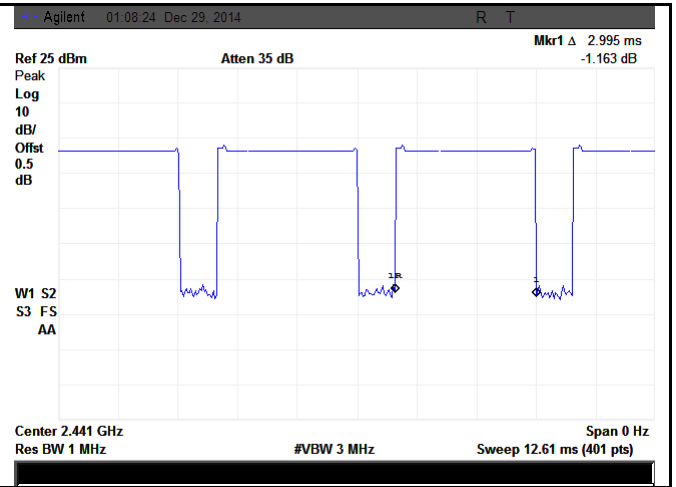
## Test Plots

### Dwell Time measurement result

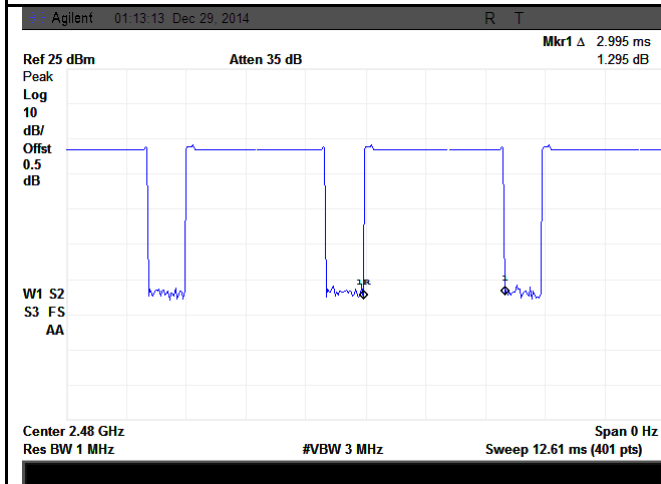




8DPSK - Low CH 2402



8DPSK - Mid CH 2441

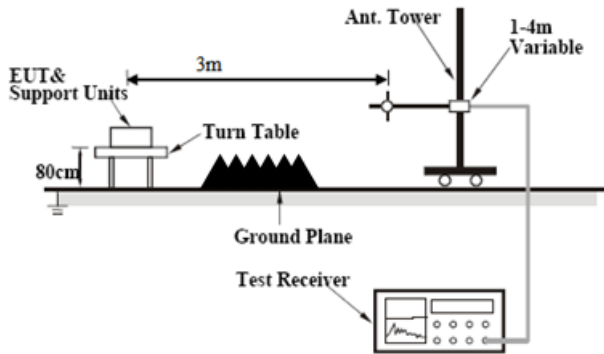


8DPSK - High CH 2480

## 6.7 Band Edge

Temperature	22°C
Relative Humidity	62%
Atmospheric Pressure	1008mbar
Test date :	January 04 to January 14, 2015
Tested By :	Dustin Wang

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only</p> <ul style="list-style-type: none"> <li>1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.</li> <li>3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a</li> </ul>		

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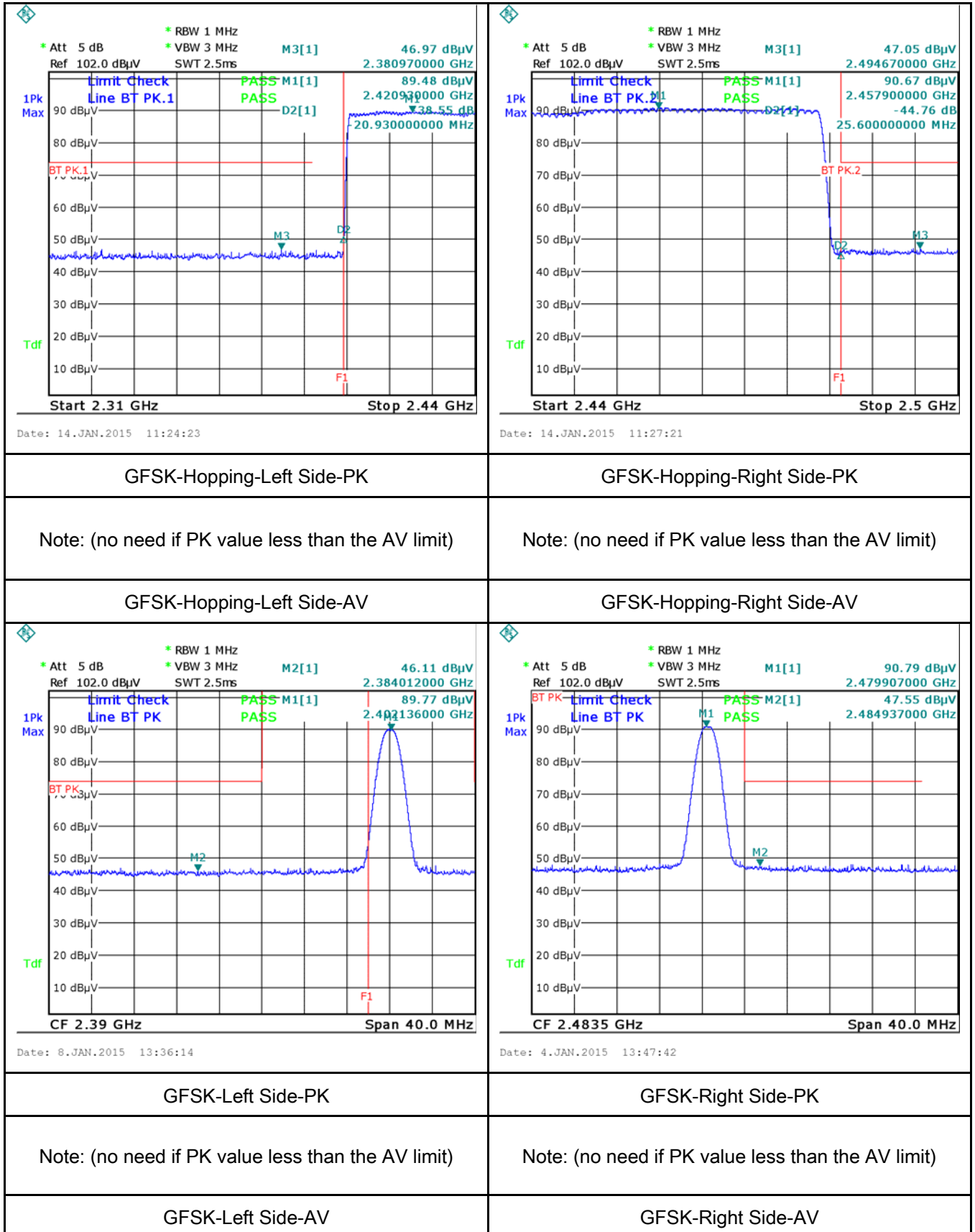
	<p>convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:</p> <p>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</p> <p>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.</p> <p>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.</p> <ul style="list-style-type: none"> <li>- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.</li> <li>- 5. Repeat above procedures until all measured frequencies were complete.</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☐ Yes ☒ N/A

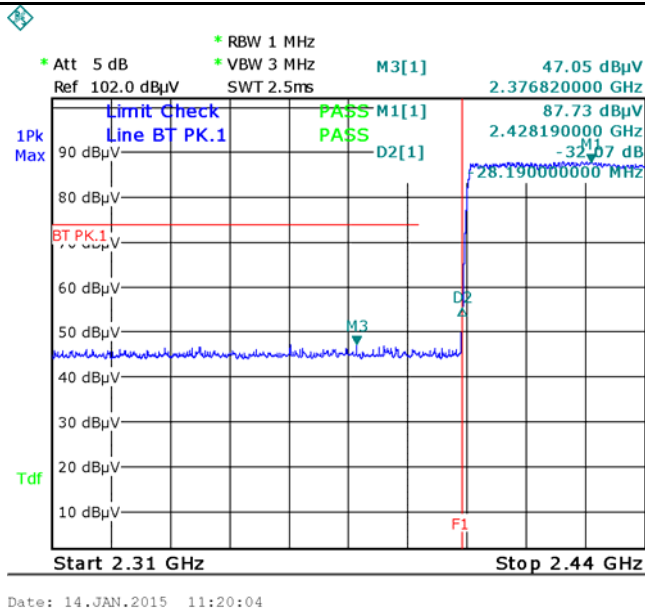
Test Plot ☒ Yes (See below) ☐ N/A

## Test Plots

### GFSK Mode:



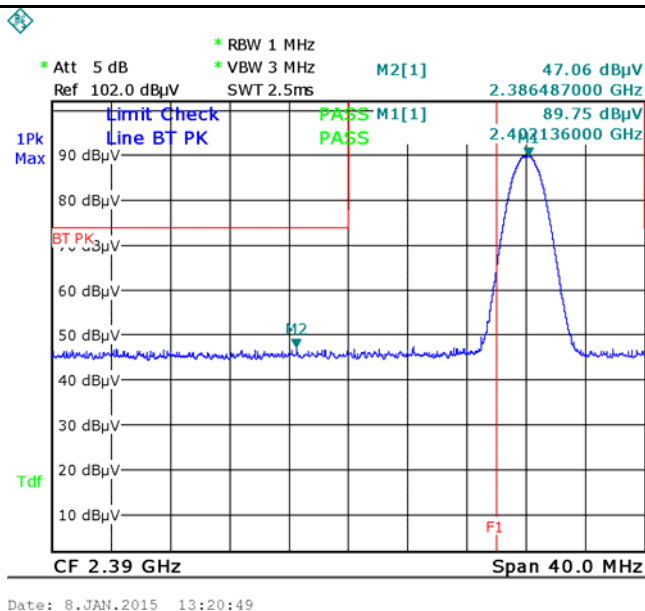
$\pi/4$  DQPSK Mode:



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

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

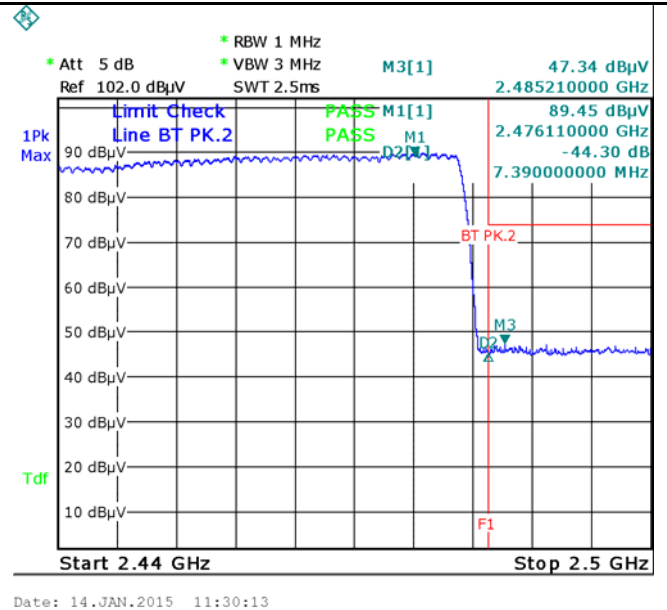
$\pi/4$  DQPSK-Hopping-Left Side-AV



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

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

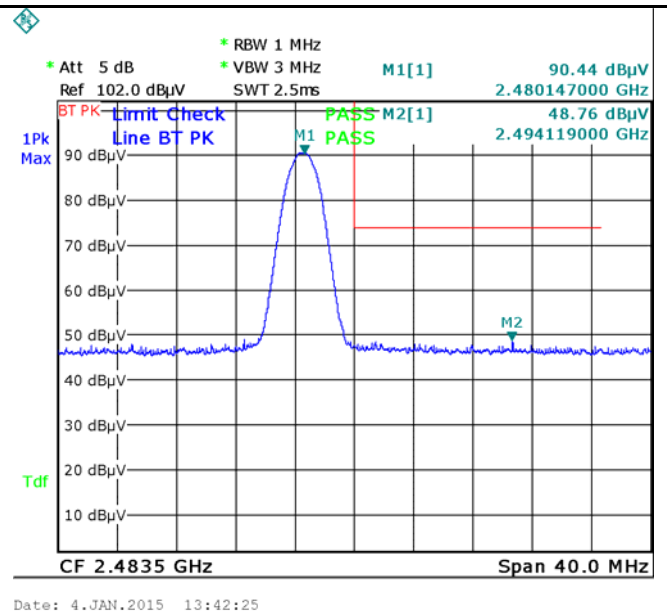
$\pi/4$  DQPSK-Left Side-AV



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

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

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

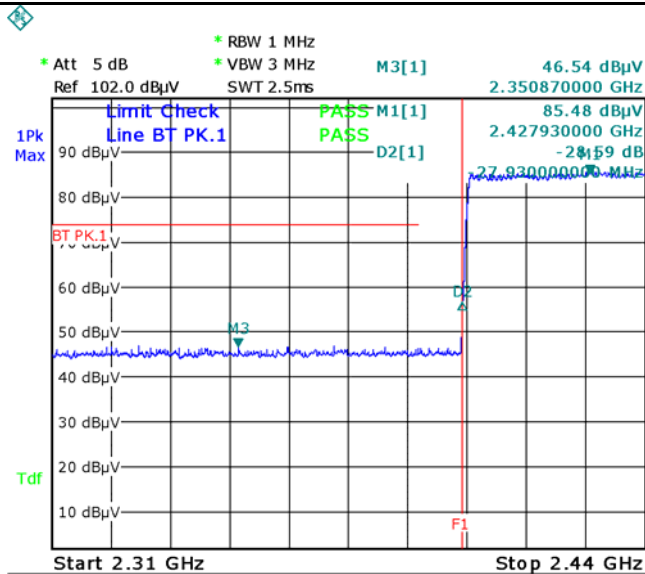


$\pi/4$  DQPSK-Right Side-PK

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

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

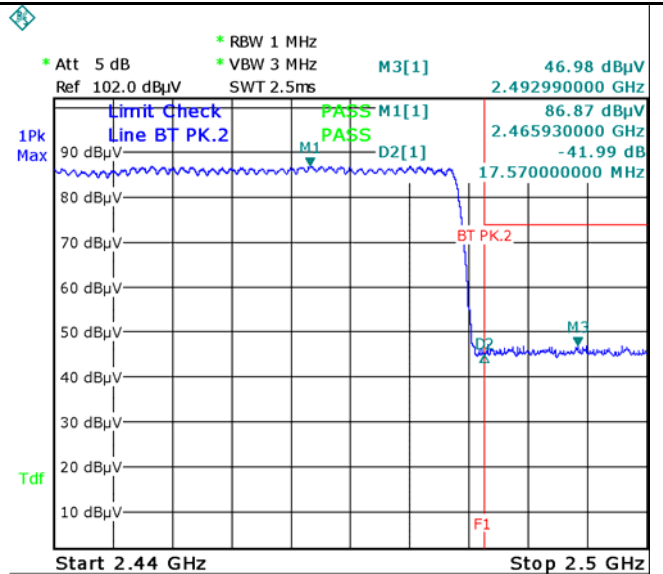
### 8-DPSK Mode:



Date: 14.JAN.2015 11:17:00

8DPSK-Hopping-Left Side-PK

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

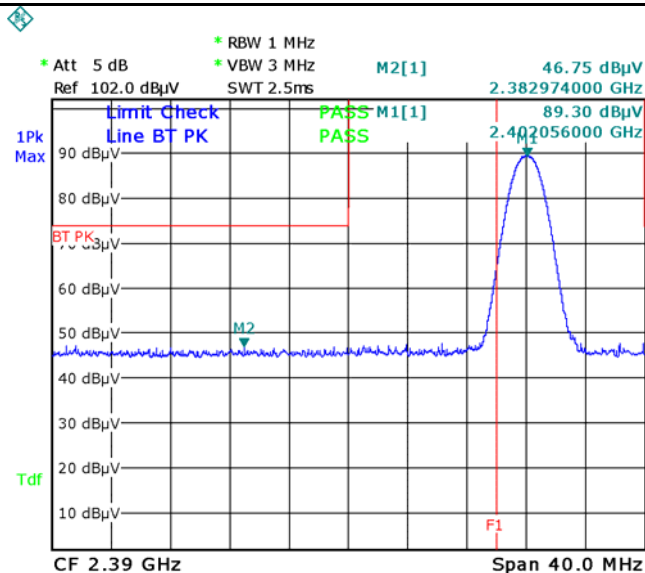


Date: 14.JAN.2015 11:33:33

8DPSK-Hopping-Right Side-PK

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

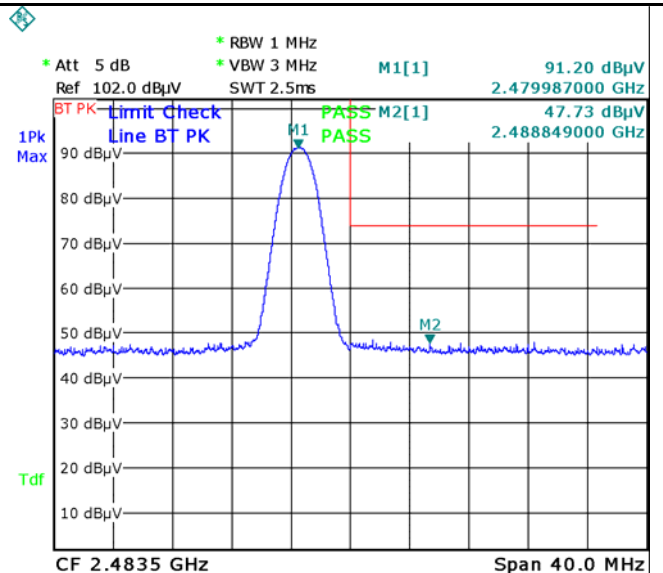
8DPSK-Hopping-Left Side-AV



Date: 8.JAN.2015 13:24:43

8DPSK-Left Side-PK

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



Date: 4.JAN.2015 13:31:59

8DPSK-Right Side-PK

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

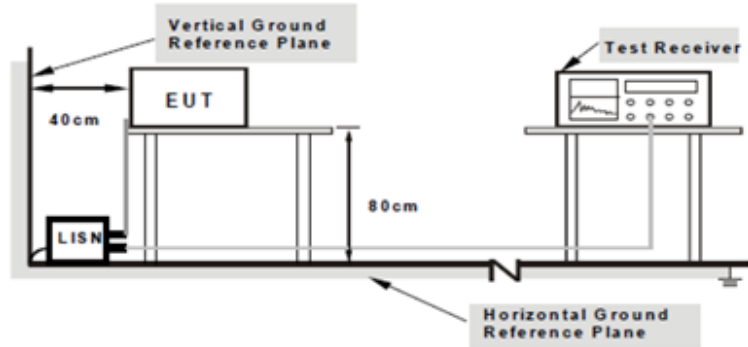
8DPSK-Left Side-AV

8DPSK-Right Side-AV

## 6.8 AC Power Line Conducted Emissions

Temperature	20°C
Relative Humidity	68%
Atmospheric Pressure	1011mbar
Test date :	December 30, 2014
Tested By :	Dustin Wang

### 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.	<div><input checked="" type="checkbox"/></div>														
		<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>		Frequency ranges (MHz)	Limit (dBµV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50
		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		<div><p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p></div>															
Procedure		<div>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.</div> <div>2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.</div> <div>3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss</div>															



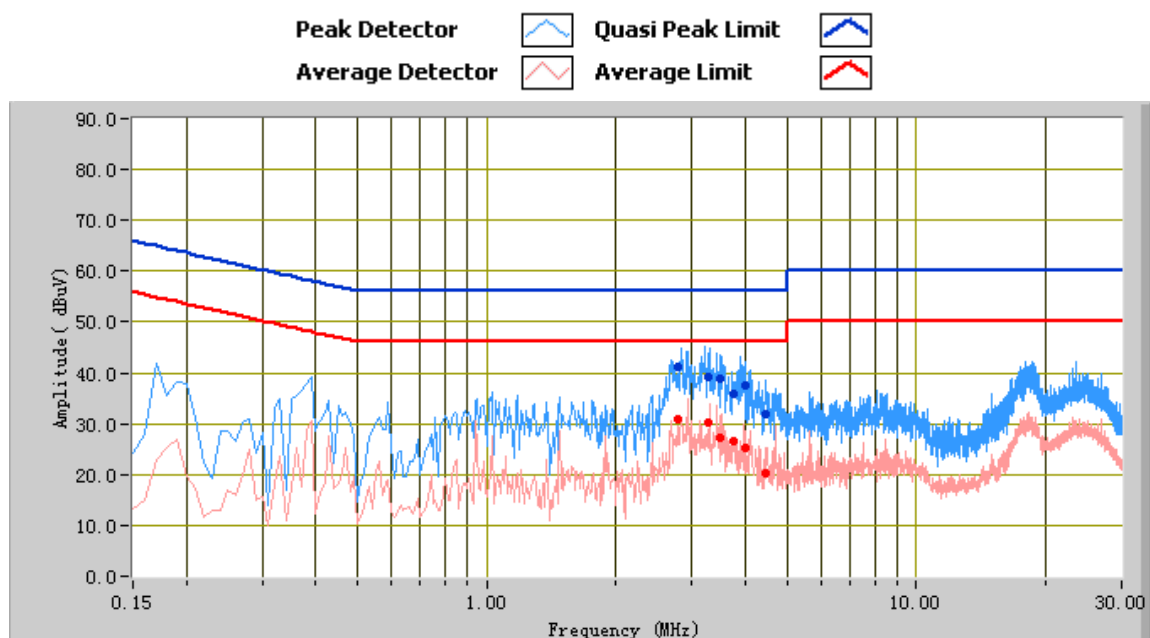
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	<p>coaxial cable.</p> <ol style="list-style-type: none"> <li>4. All other supporting equipment were powered separately from another main supply.</li> <li>5. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.</li> <li>7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.</li> <li>8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

**Test Mode:** Transmitting Mode

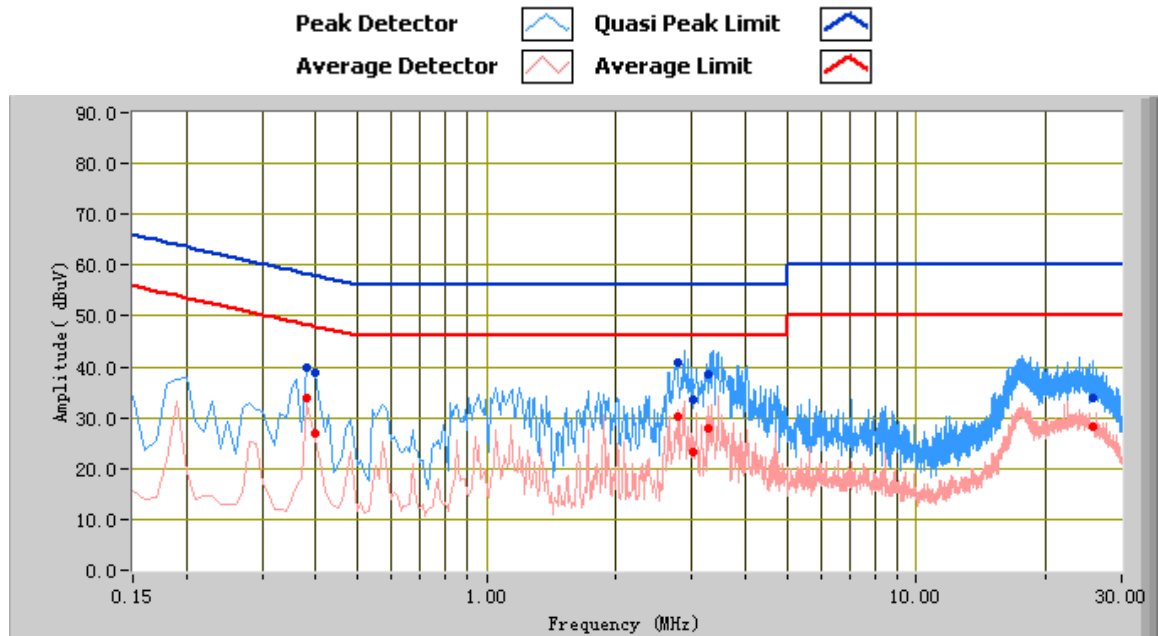


### Test Data

#### Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBμV)	Limit (dBμV)	Margin (dB)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Factors (dB)
3.98	37.46	56.00	-18.54	25.23	46.00	-20.77	10.81
3.26	39.31	56.00	-16.69	30.16	46.00	-15.84	10.67
3.50	38.85	56.00	-17.15	27.33	46.00	-18.67	10.71
2.78	41.12	56.00	-14.88	30.76	46.00	-15.24	10.58
4.46	31.93	56.00	-24.07	20.24	46.00	-25.76	10.90
3.74	35.85	56.00	-20.15	26.49	46.00	-19.51	10.76

**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)
2.78	40.90	56.00	-15.10	30.25	46.00	-15.75	10.58
3.26	38.39	56.00	-17.61	27.79	46.00	-18.21	10.67
0.38	39.75	58.28	-18.53	33.95	48.28	-14.33	11.08
3.02	33.43	56.00	-22.57	23.18	46.00	-22.82	10.63
25.82	33.79	60.00	-26.21	28.13	50.00	-21.87	15.73
0.40	38.96	57.85	-18.89	26.95	47.85	-20.90	10.98

## 6.9 Radiated Spurious Emissions

Temperature	21°C
Relative Humidity	59%
Atmospheric Pressure	1009mbar
Test date :	December 26, 2014
Tested By :	Dustin Wang

### 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												
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (µV/m)</th></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table>		Frequency range (MHz)	Field Strength (µV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	
		Frequency range (MHz)		Field Strength (µV/m)										
		30 – 88		100										
		88 – 216		150										
		216 960		200										
Above 960	500													

Test Setup	<p>The diagram illustrates the test setup. A Turn Table is placed on a Ground Plane, with EUT &amp; Support Units mounted on it. The distance between the Turn Table and the Ant. Tower is 3m. The Ant. Tower has a 1-4m Variable antenna. A Test Receiver is connected to the antenna. The height of the antenna is 80cm.</p>
------------	--

Procedure	<ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:</li> </ol>
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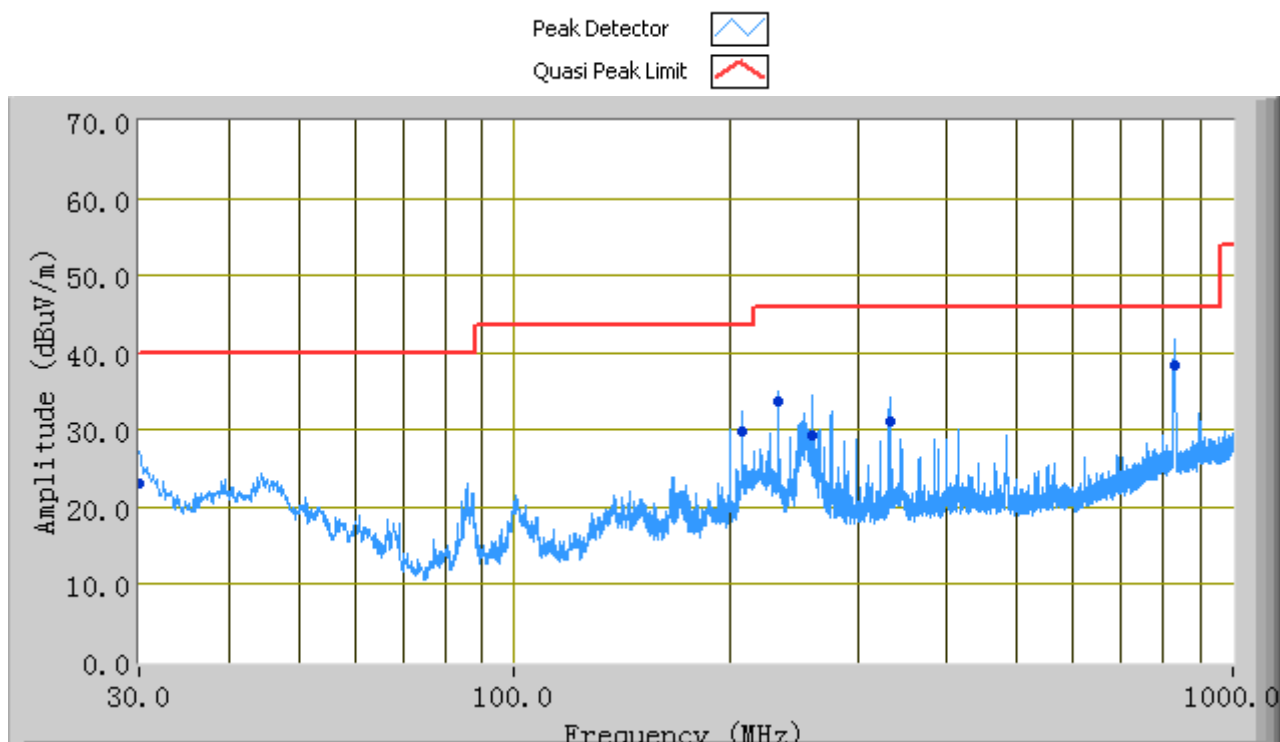
	<p>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</p> <p>b. The EUT was then rotated to the direction that gave the maximum emission.</p> <p>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</p> <p>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</p> <p>4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

**Test Mode:** 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)
829.31	38.39	49.00	V	144.00	3.86	46.00	-7.61
232.42	33.58	82.00	H	141.00	-7.65	46.00	-12.42
206.95	29.75	96.00	H	125.00	-8.01	43.52	-13.77
259.97	29.18	25.00	H	116.00	-7.25	46.00	-16.82
333.02	31.07	194.00	V	118.00	-5.47	46.00	-14.93
30.05	23.14	183.00	V	100.00	-1.71	40.00	-16.86

<b>Test Mode:</b>	<b>Transmitting Mode</b>
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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	38.57	AV	V	33.83	4.87	-3.93	24	49.34	54	-4.66
4804	39.05	AV	H	33.83	4.87	-3.93	24	49.82	54	-4.18
4804	43.26	PK	V	33.83	4.87	—	24	57.96	74	-16.04
4804	44.18	PK	H	33.83	4.87	—	24	58.88	74	-15.12

Duty cycle factor=20log(Dwell time/100ms)=20log(2.89\*23/100)=-3.93

**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)
4882	38.47	AV	V	33.86	4.87	-3.93	24	49.27	54	-4.73
4882	37.84	AV	H	33.86	4.87	-3.93	24	48.64	54	-5.36
4882	43.46	PK	V	33.86	4.87	—	24	58.19	74	-15.81
4882	44.27	PK	H	33.86	4.87	—	24	59	74	-15

Duty cycle factor=20log(Dwell time/100ms)=20log(2.89\*23/100)=-3.93

**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	38.44	AV	V	33.9	4.87	-3.93	24	49.28	54	-4.72
4960	38.78	AV	H	33.9	4.87	-3.93	24	49.62	54	-4.38
4960	43.57	PK	V	33.9	4.87	—	24	58.34	74	-15.66
4960	44.15	PK	H	33.9	4.87	—	24	58.92	74	-15.08

Duty cycle factor=20log(Dwell time/100ms)=20log(2.89\*23/100)=-3.93

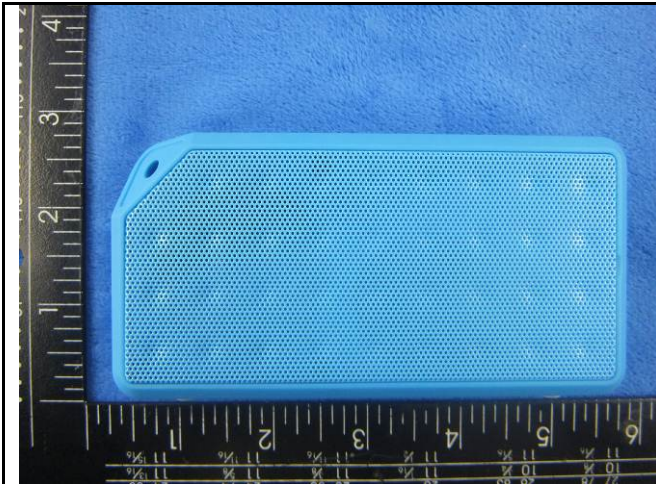
## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>AC Line Conducted</b>					
EMI test receiver	ESCS30	8471241027	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
LISN	ISN T800	34373	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
<b>RF conducted test</b>					
Agilent ESA-E SERIES	E4407B	MY45108319	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
EMI test receiver	ESL6	100262	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/20/2014	11/19/2015	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/22/2014	09/21/2015	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>



## Annex B. EUT And Test Setup Photographs

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



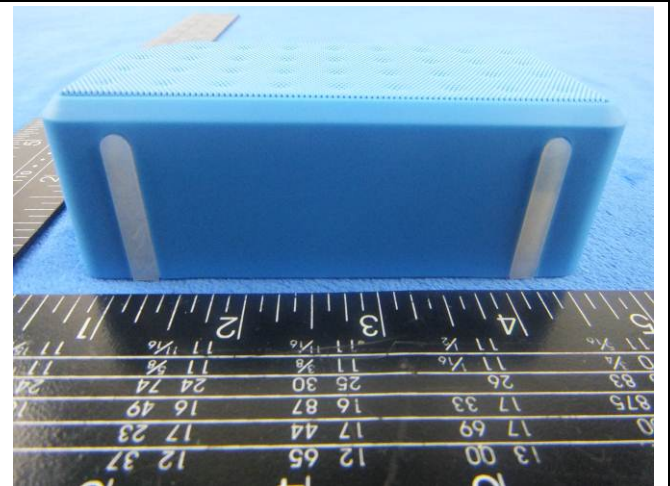
EUT - Front View



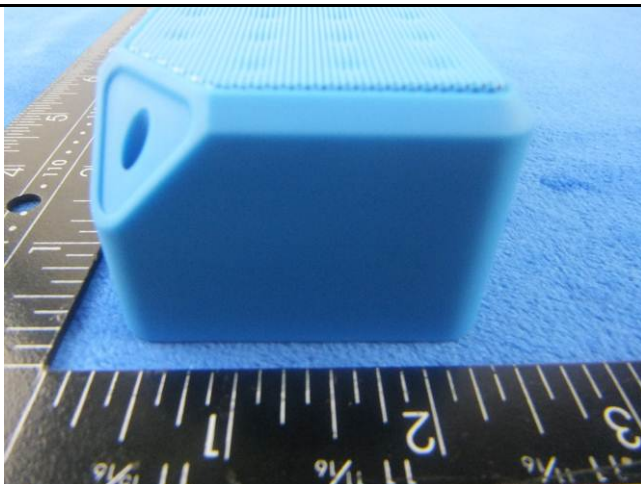
EUT - Rear View



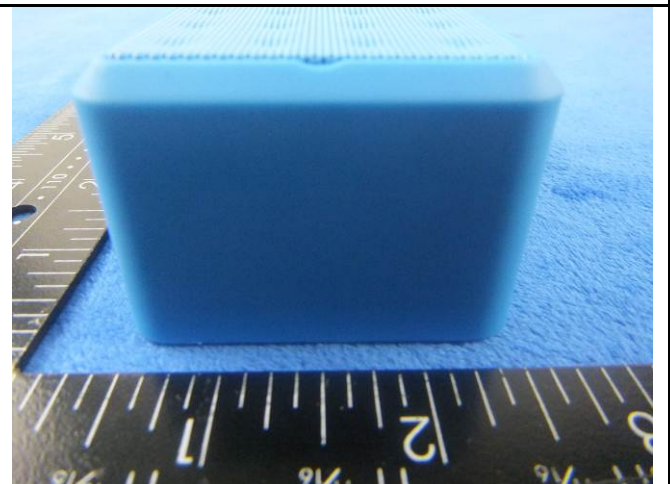
EUT - Top View



EUT - Bottom View



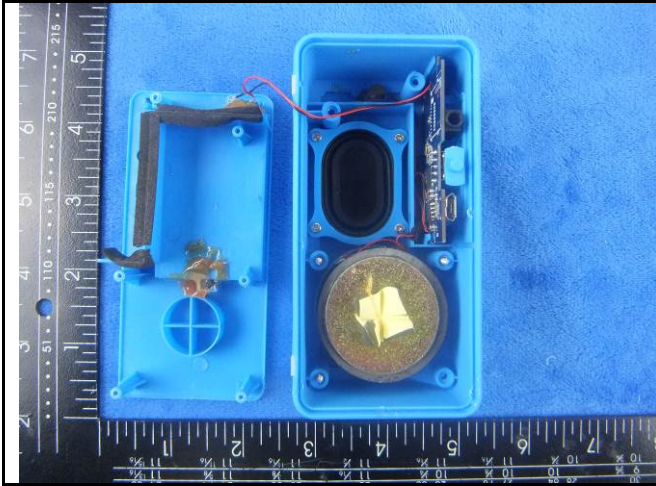
EUT - Left View



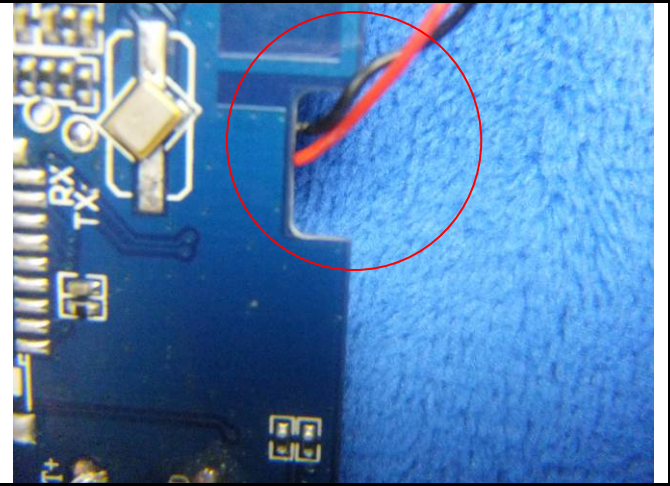
EUT - Right View



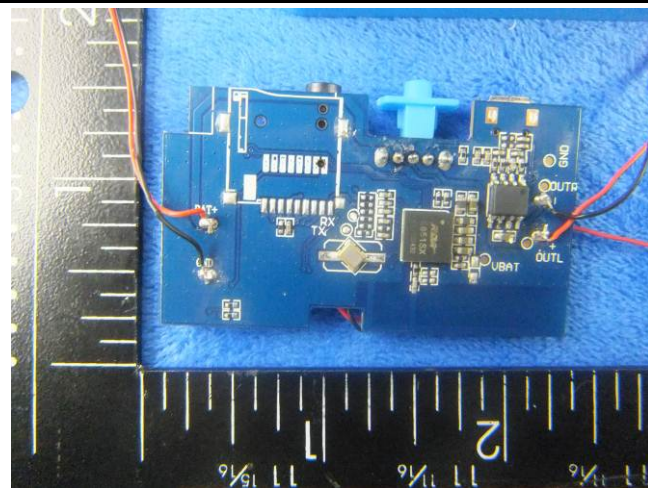
**Annex B.ii. Photograph: EUT Internal Photo**



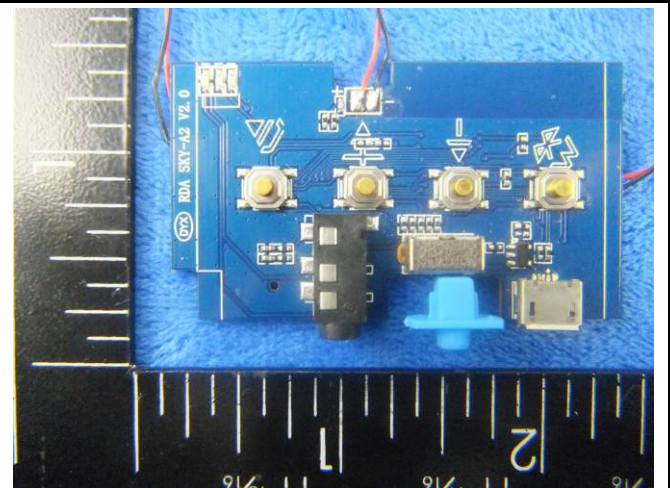
Cover Off - Top View



Antenna View



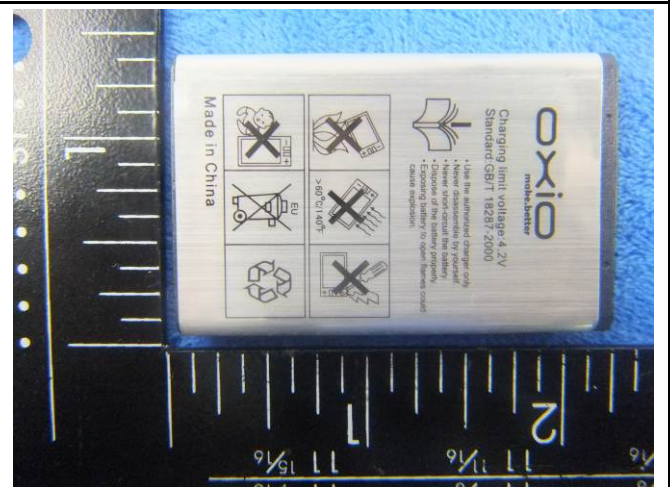
Mainboard - Front View



Mainboard - Rear View



Battery - Front View



Battery - Rear View

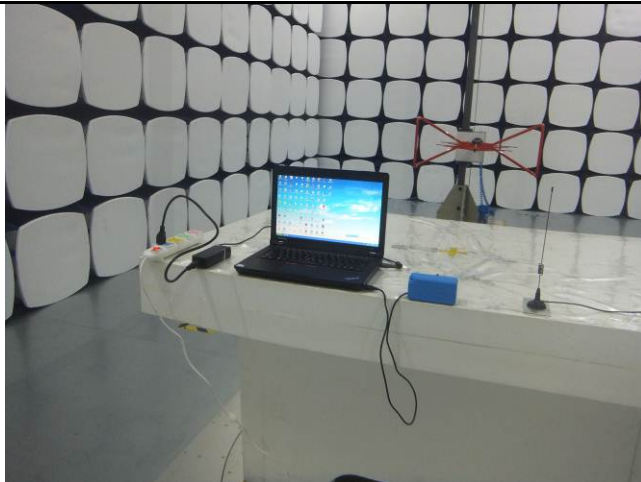
**Annex B.iii. Photograph: Test Setup Photo**



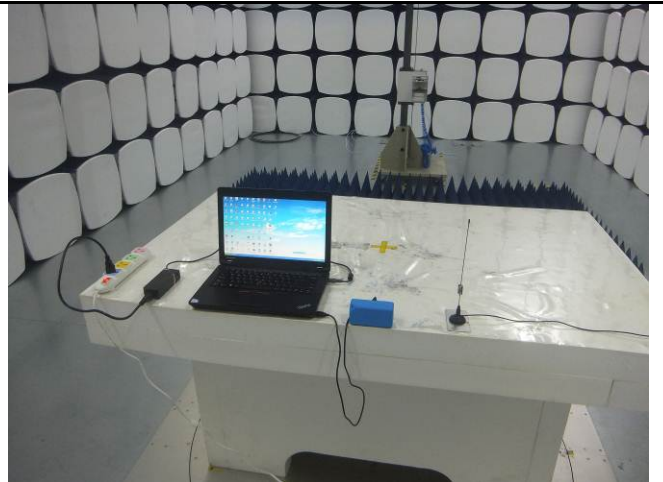
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz



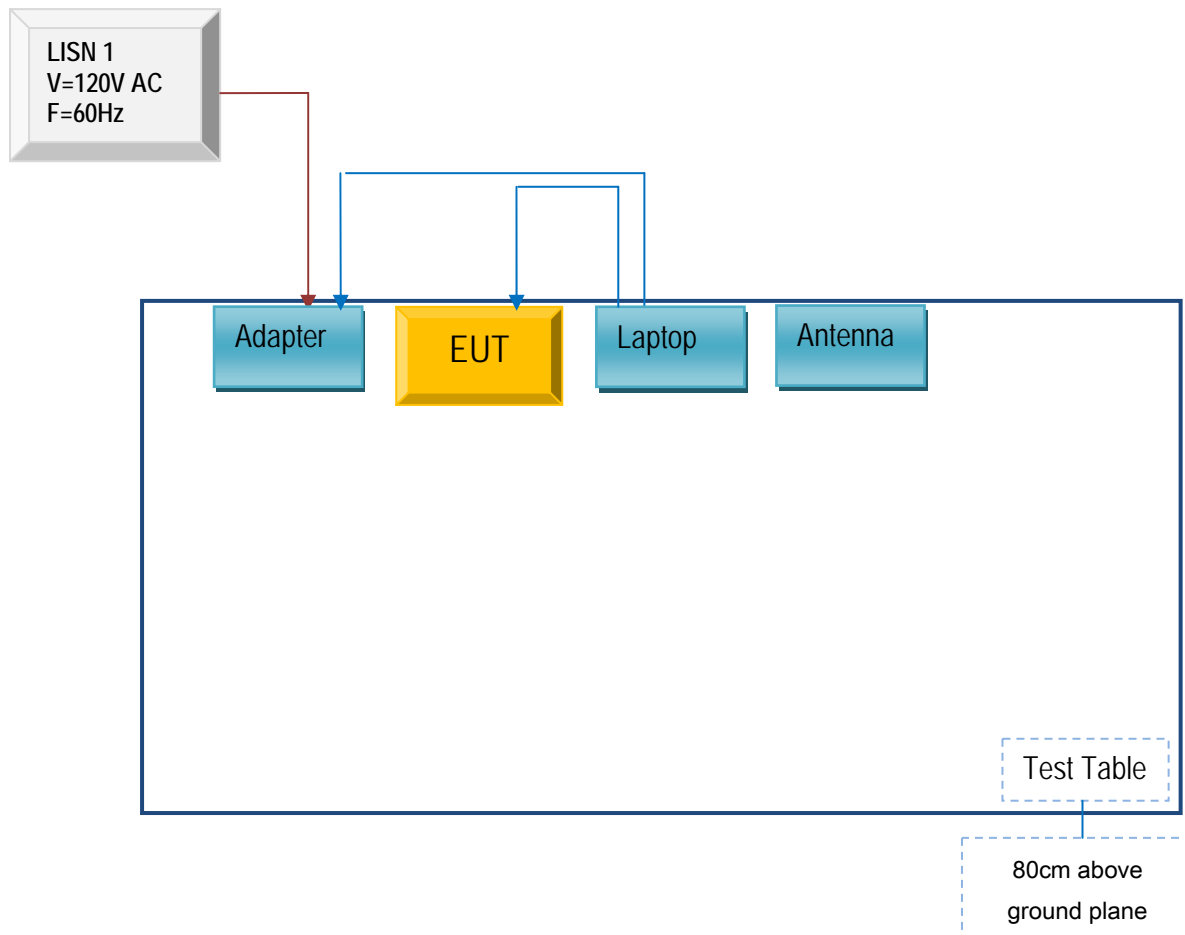
Radiated Spurious Emissions Test Setup Above  
1GHz



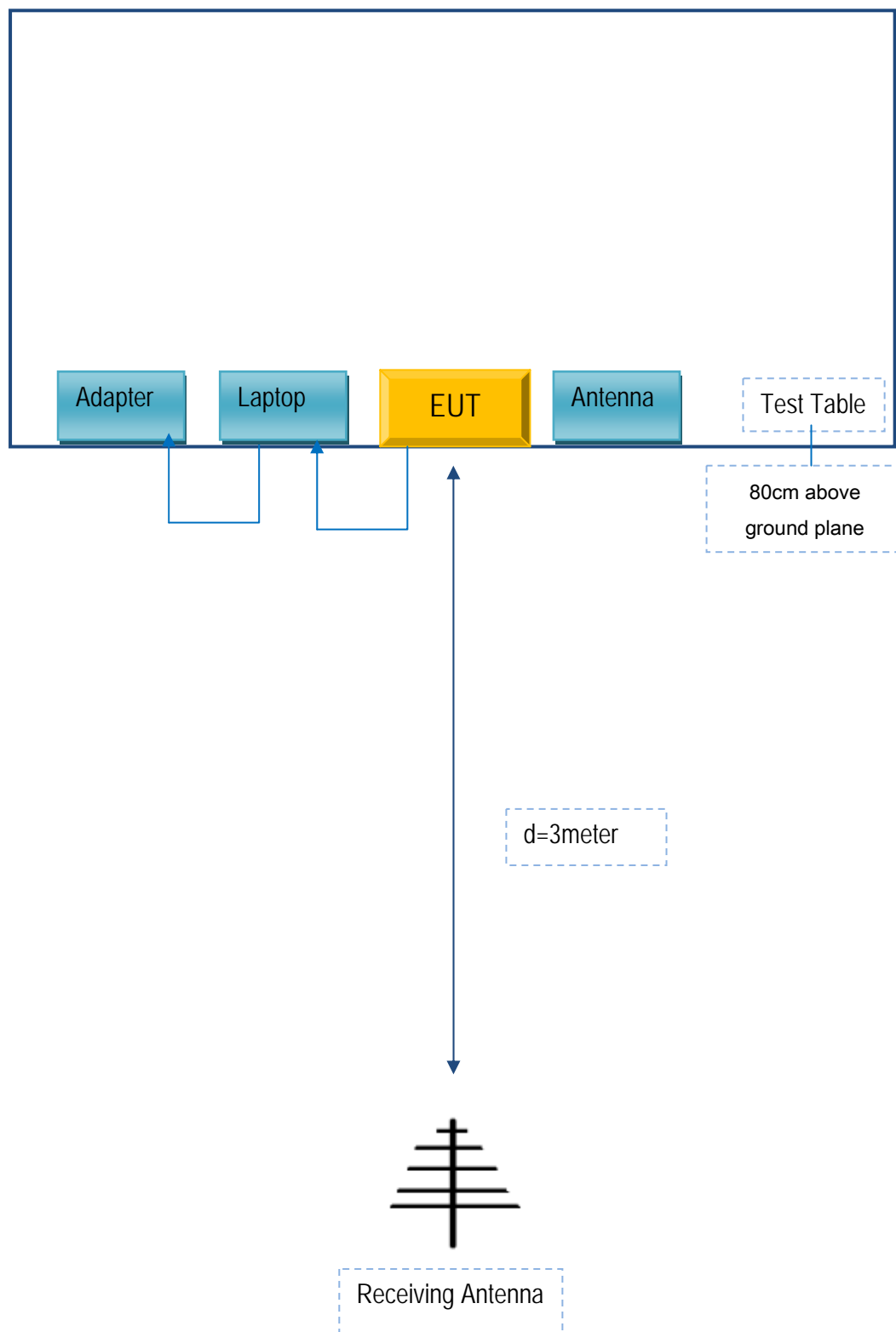
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

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

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



## Block Configuration Diagram for Radiated Emissions



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## **Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION**

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

Manufacturer	Equipment Description	Model	Calibration Date	Calibration Due Date
Lenovo	Lenovo Laptop	E40& 0579A52	N/A	N/A

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

Please see attachment

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## Annex E. DECLARATION OF SIMILARITY

N/A