

RF TEST REPORT



Report No.: 17070084-FCC-R1 V1

Supersede Report No.: N/A

Applicant	Global Regency Ltd.	
Product Name	Tablet PC	
Model No.	QA863	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	February 14 to March 09, 2017	
Issue Date	March 16, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
Loren Luo Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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Laboratories Introduction

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



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
17070084-FCC-R1	NONE	Original	March 10, 2017
17070084-FCC-R1 V1	V1	Adjust photos	March 16, 2017

2. Customer information

Applicant Name	Global Regency Ltd.
Applicant Add	20F, Tower A, Wenjin Plaza, Tianbei Rd1, Luohu Dist., Shenzhen, China
Manufacturer	Global Regency Ltd.
Manufacturer Add	20F, Tower A, Wenjin Plaza, Tianbei Rd1, Luohu Dist., Shenzhen, China

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Tablet PC
Main Model:	QA863
Serial Model:	N/A
Date EUT received:	February 13, 2017
Test Date(s):	February 14 to March 09, 2017
Equipment Category :	DSS
Antenna Gain:	Bluetooth/WIFI/BLE: 2.67dBi
Antenna Type:	PIFA antenna
Type of Modulation:	802.11b/g/n: DSSS, OFDM Bluetooth: GFSK, π /4DQPSK, 8DPSK BLE: GFSK
RF Operating Frequency (ies):	WIFI: 802.11b/g/n(20M): 2412-2462 MHz WIFI: 802.11n(40M): 2422-2452 MHz Bluetooth& BLE: 2402-2480 MHz
Max. Output Power:	4.419dBm
Number of Channels:	WIFI :802.11b/g/n(20M): 11CH WIFI :802.11n(40M): 7CH Bluetooth: 79CH BLE: 40CH
Port:	USB Port, Earphone Port

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Adapter:
Model: JML-0500200-LW
Input: AC100-240V~50/60Hz,MAX 0.3A
Output: DC 5.0V-2.0A
Battery:
Spec: 3.8V,5300mAh,20.14Wh

Input Power:

Trade Name : Smart Communications

FCC ID: 2AK5R-QA836

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)	20 dB Bandwidth	Compliance
§15.247(b)(1)	Peak Output Power	Compliance
§15.247(a)(1)(iii)	Number of Hopping Channel	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(d)	Band Edge& Restricted Band	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions& Restricted Band	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge& Restricted Band and Radiated Emissions& Restricted Band	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

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

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

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 1 antenna:

A permanently attached PIFA antenna for Bluetooth/WIFI/BLE, the gain is 2.67dBi for Bluetooth/WIFI/BLE.

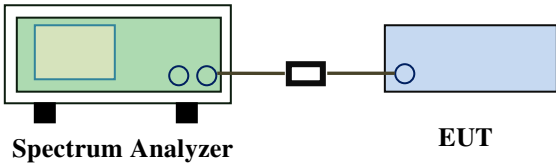
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	25°C
Relative Humidity	52%
Atmospheric Pressure	1015mbar
Test date :	February 21, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	<input checked="" type="checkbox"/>
Test Setup	 <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"> - 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

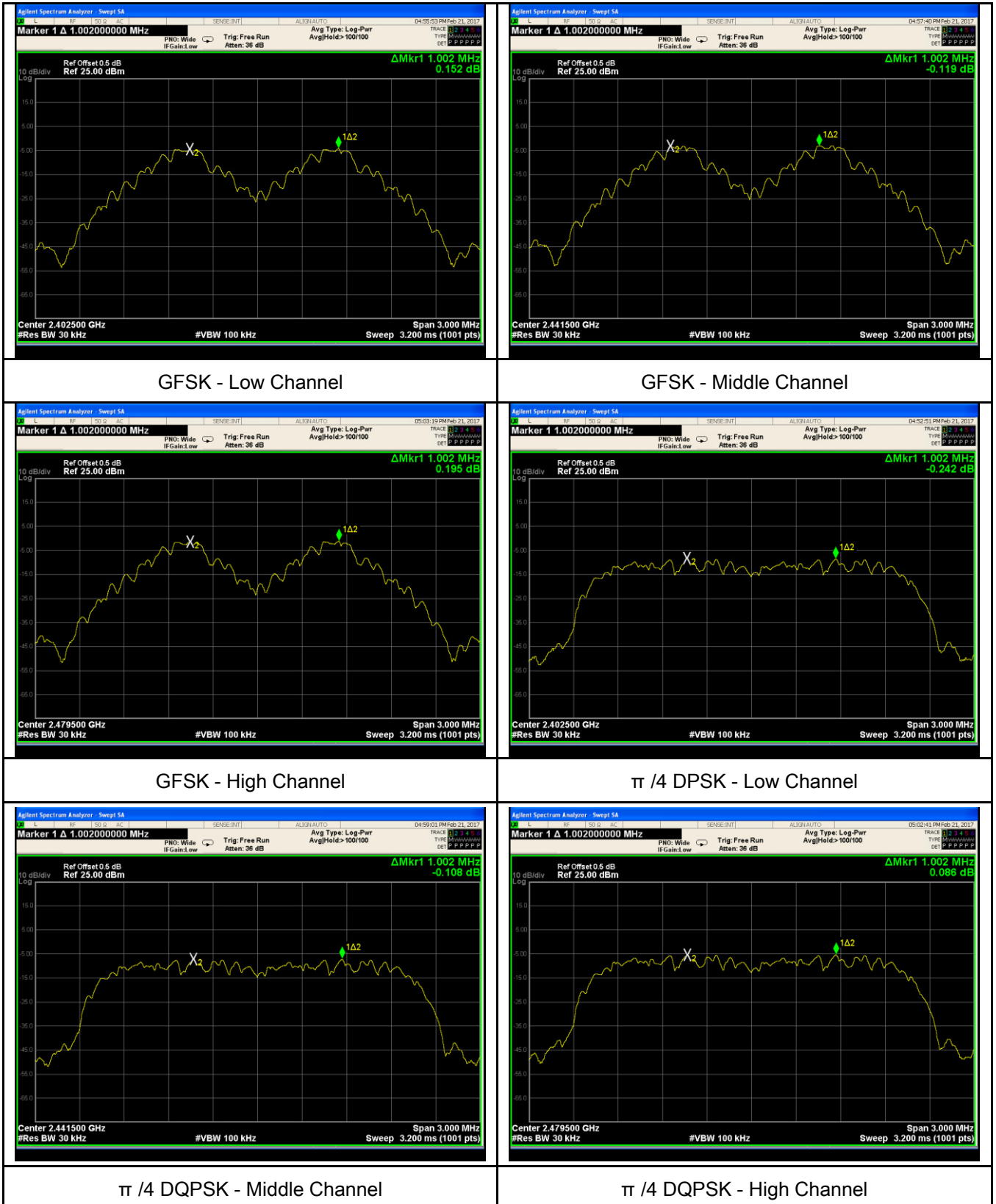
Test Plot Yes (See below) N/A

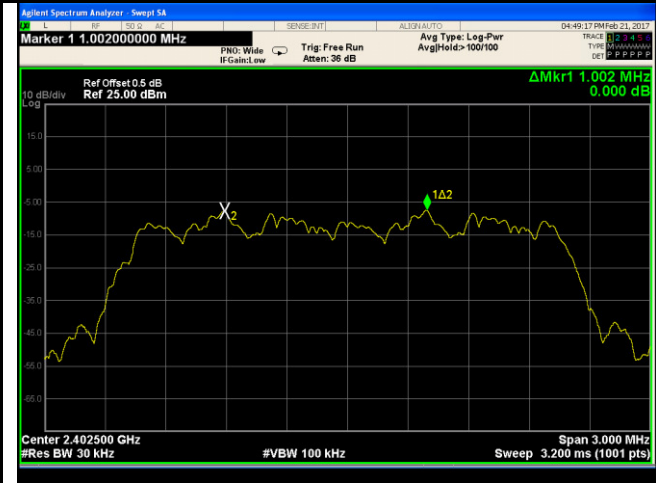
Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.002	0.689	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.002	0.687	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.002	0.687	Pass
	Adjacency Channel	2479			
CH Separation π / 4 DQPSK	Low Channel	2402	1.002	0.896	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.002	0.895	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.002	0.896	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.002	0.859	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.002	0.860	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.002	0.860	Pass
	Adjacency Channel	2479			

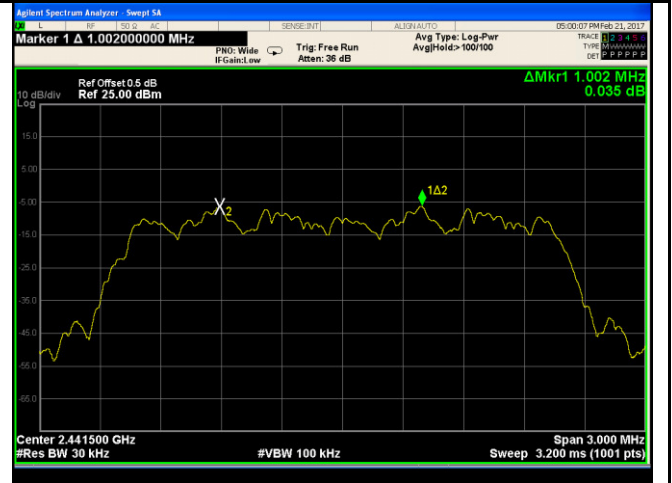
Test Plots

Channel Separation measurement result





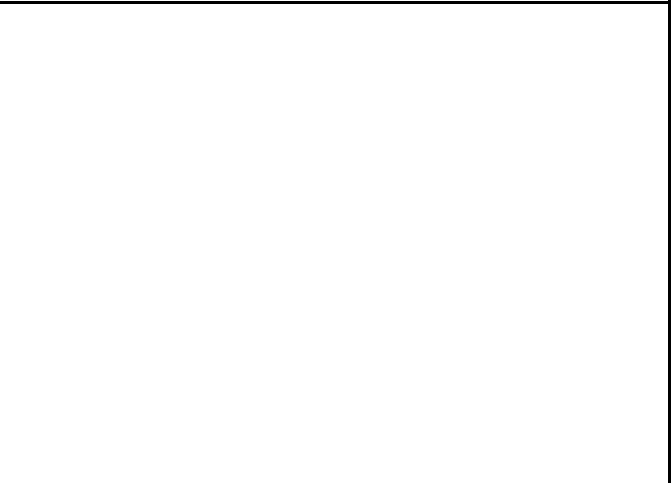
8DPSK - Low Channel



8DPSK - Middle Channel



8DPSK - High Channel

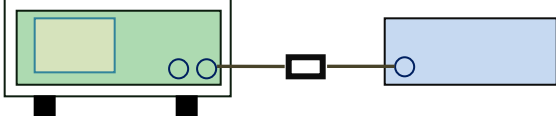


6.3 20dB Bandwidth

Temperature	25°C
Relative Humidity	52%
Atmospheric Pressure	1015mbar
Test date :	February 21, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	<input checked="" type="checkbox"/>

Test Setup	 Spectrum Analyzer EUT
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Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.</p> <p><u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> - Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel - RBW \geq 1% of the 20 dB bandwidth - VBW \geq RBW - Sweep = auto - Detector function = peak - Trace = max hold. - The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference
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	marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

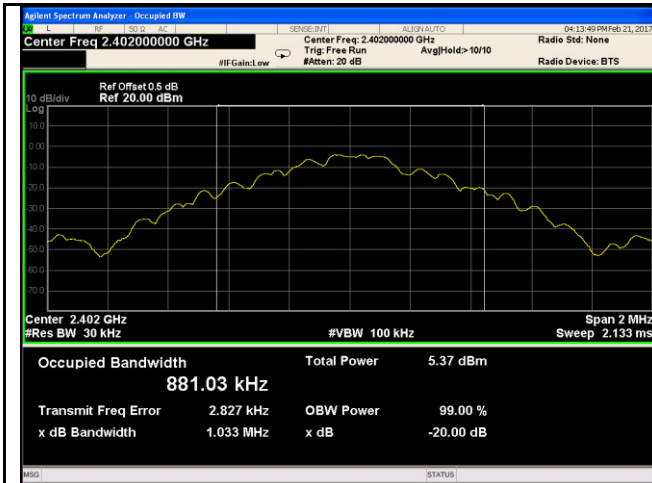
Test Plot Yes (See below) N/A

Measurement result

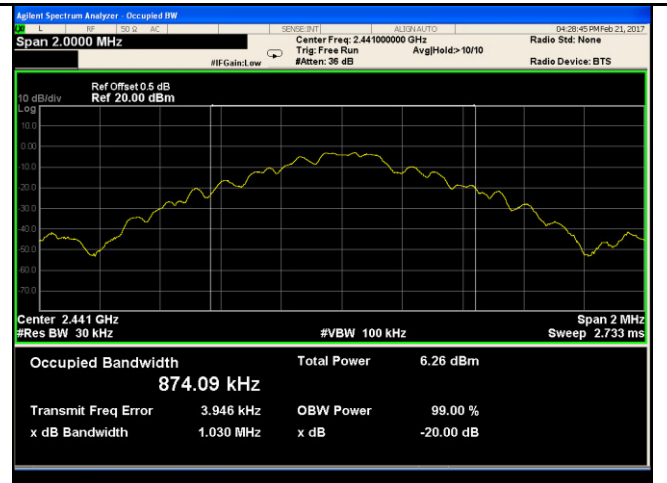
Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.033	0.8810
	Mid	2441	1.030	0.8741
	High	2480	1.030	0.8746
$\pi/4$ DQPSK	Low	2402	1.344	1.1847
	Mid	2441	1.342	1.1847
	High	2480	1.344	1.1863
8-DPSK	Low	2402	1.289	1.1531
	Mid	2441	1.290	1.1544
	High	2480	1.290	1.1556

Test Plots

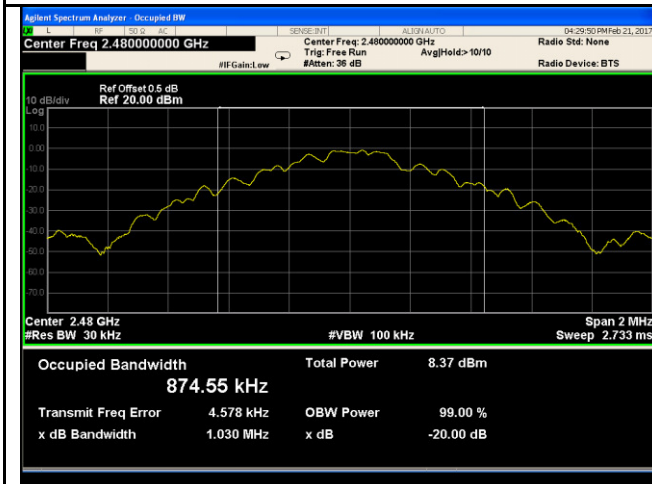
20dB Bandwidth measurement result



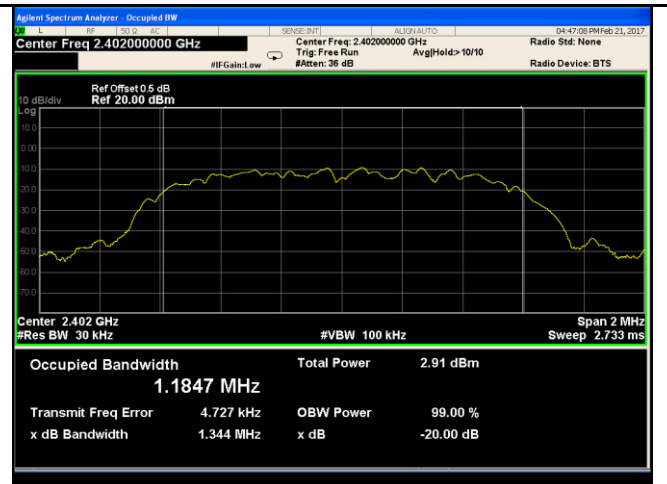
GFSK - Low Channel



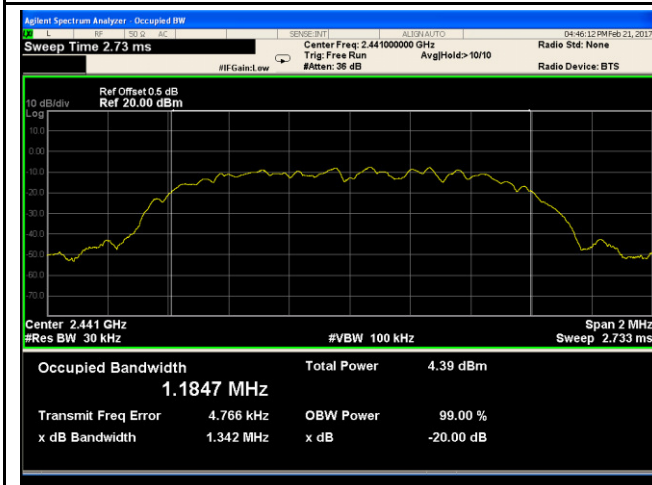
GFSK - Middle Channel



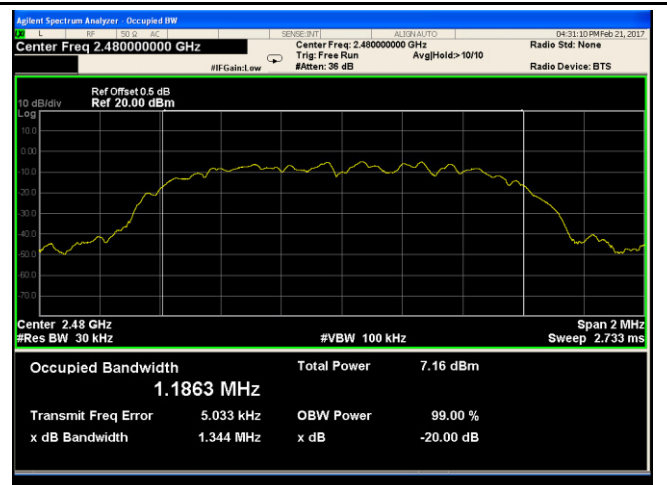
GFSK - High Channel



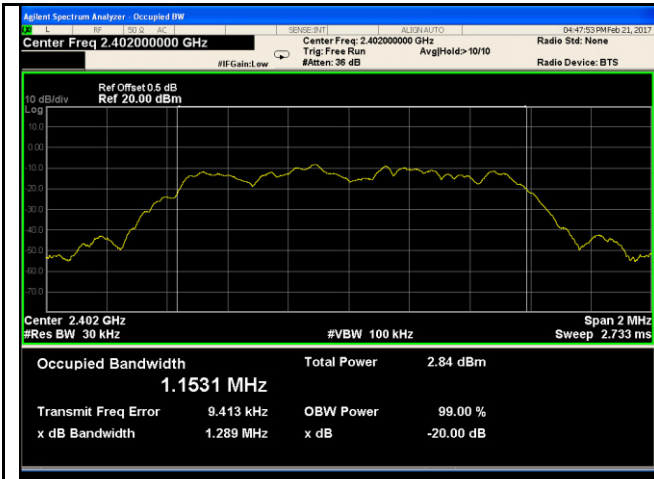
$\pi/4$ DPSK - Low Channel



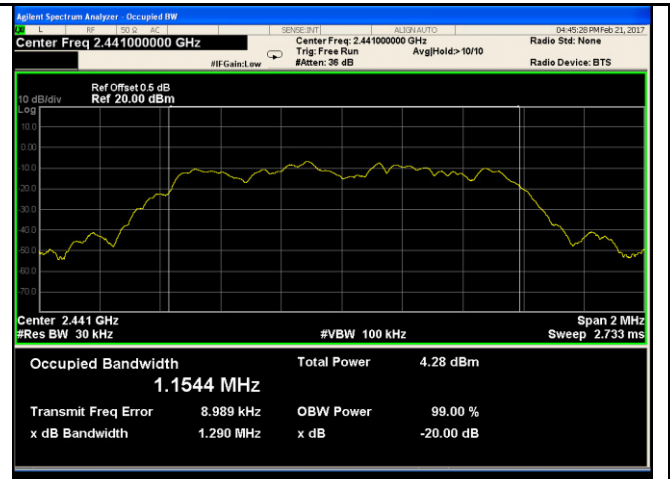
$\pi/4$ DQPSK - Middle Channel



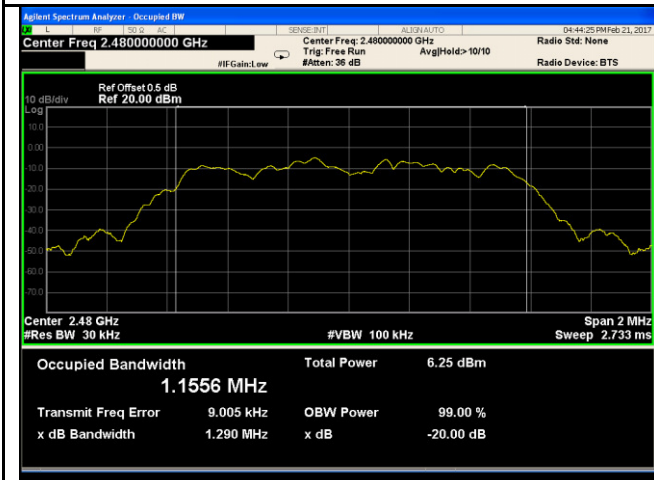
$\pi/4$ DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel



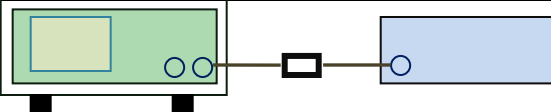
8DPSK - High Channel

6.4 Peak Output Power

Temperature	25°C
Relative Humidity	52%
Atmospheric Pressure	1015mbar
Test date :	February 21, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	<input checked="" type="checkbox"/>
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	<input checked="" type="checkbox"/>
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with ≥ 25 & < 50 channels: ≤ 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 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.</p> <p><u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel - RBW $>$ the 20 dB bandwidth of the emission being measured - VBW \geq RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize.
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	- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

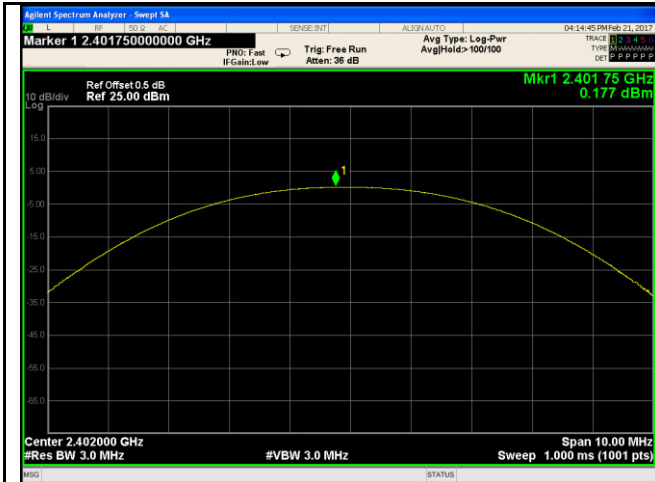
Test Plot Yes (See below) N/A

Peak Output Power measurement result

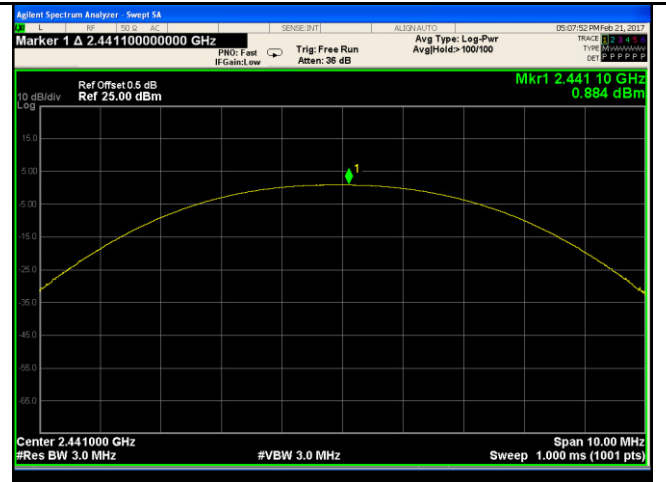
Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	0.177	125	Pass
		Mid	2441	0.884	125	Pass
		High	2480	2.765	125	Pass
	$\pi/4$ DQPSK	Low	2402	0.851	125	Pass
		Mid	2441	2.080	125	Pass
		High	2480	4.187	125	Pass
	8-DPSK	Low	2402	1.145	125	Pass
		Mid	2441	2.630	125	Pass
		High	2480	4.419	125	Pass

Test Plots

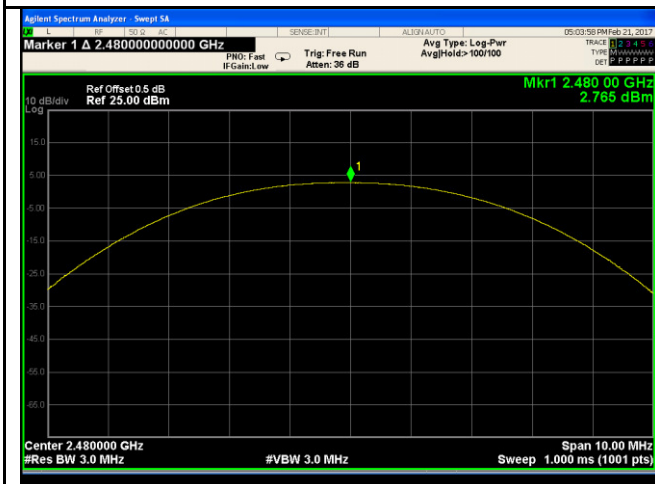
Output Power measurement result



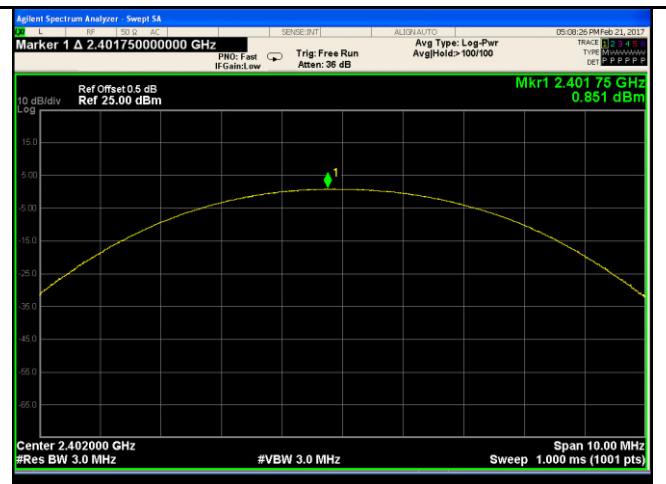
GFSK Output power - Low CH 2402



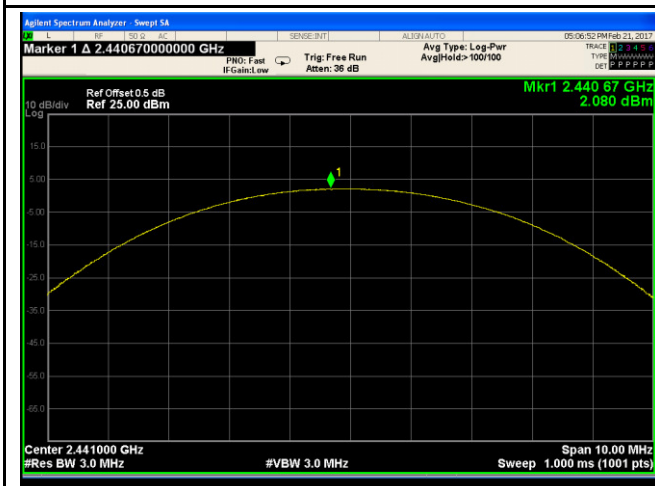
GFSK Output power - Mid CH 2441



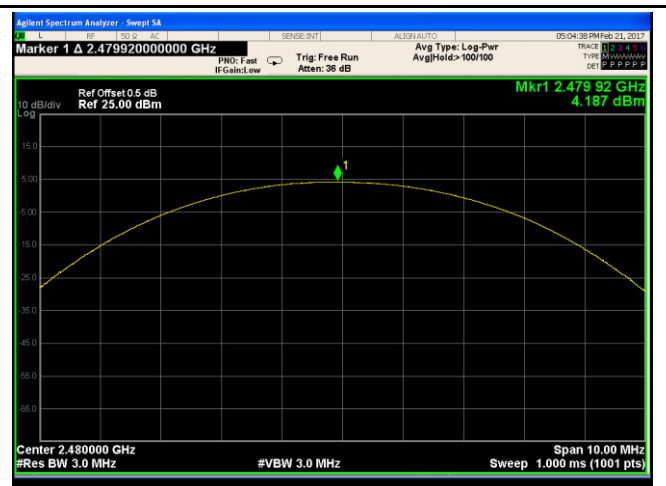
GFSK Output power - High CH 2480



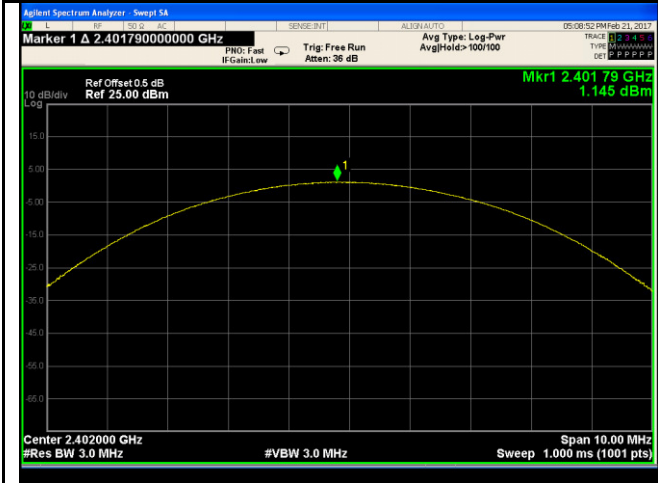
$\pi/4$ DQPSK Output power - Low CH 2402



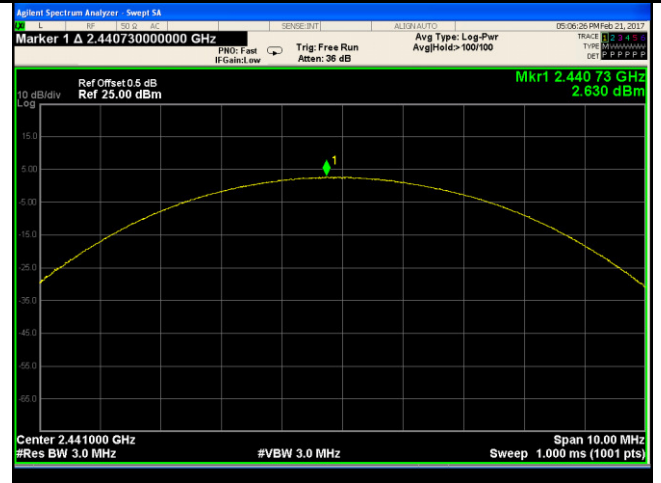
$\pi/4$ DQPSK Output power - Mid CH 2441



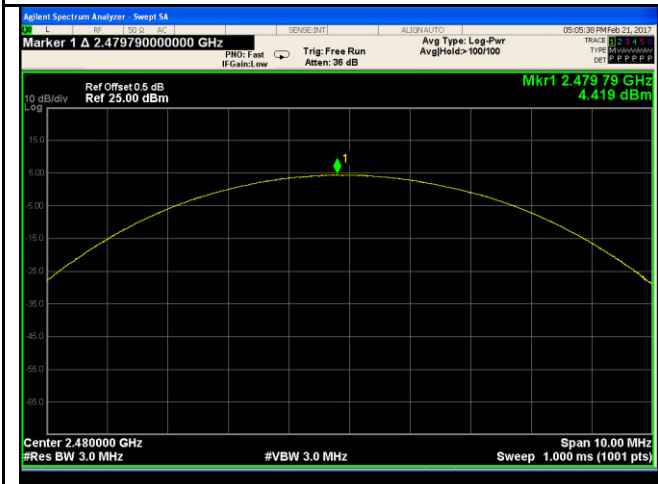
$\pi/4$ DQPSK Output power - High CH 2480



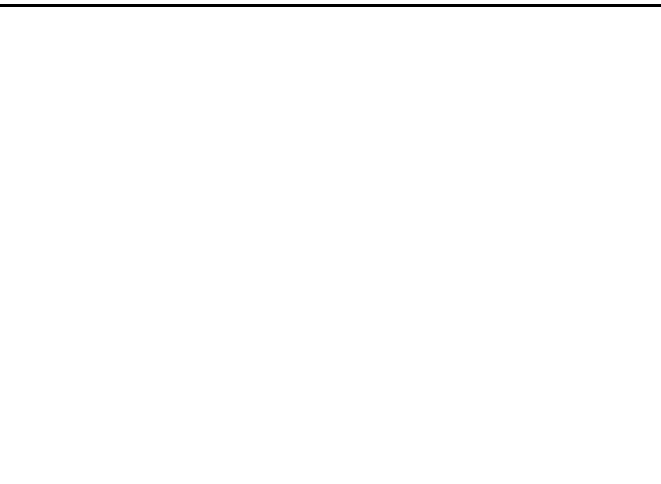
8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441



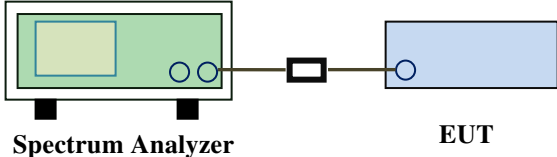
8DPSK Output power - High CH 2480



6.5 Number of Hopping Channel

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1012mbar
Test date :	March 09, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz ≥ 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"> - 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

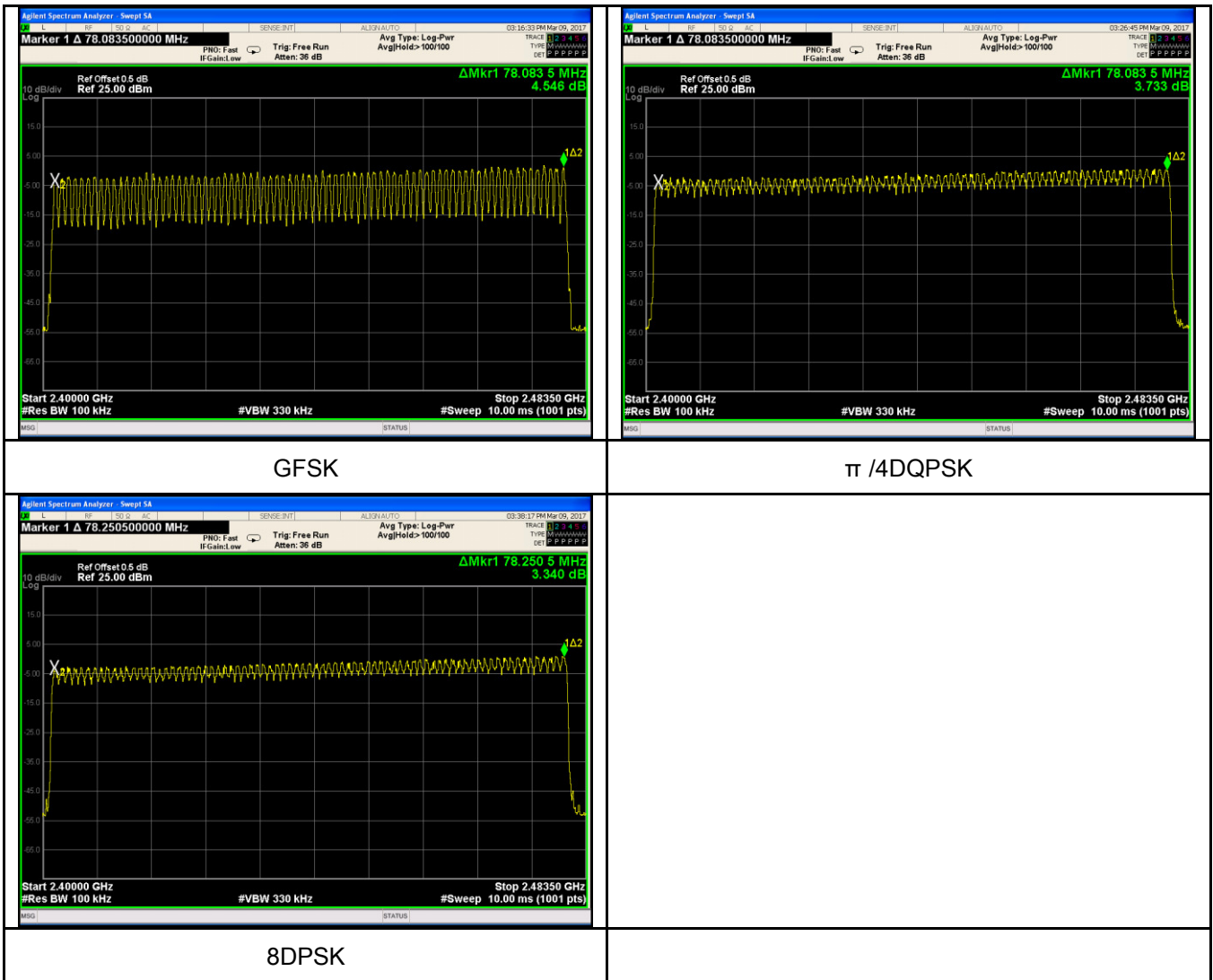
Test Data Yes N/A
 Test Plot Yes (See below) N/A

Number of Hopping Channel measurement result

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

Test Plots

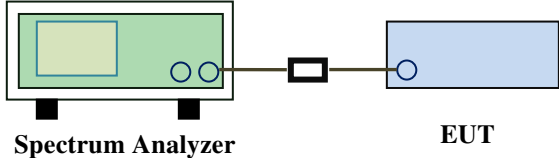
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	23°C
Relative Humidity	57%
Atmospheric Pressure	1020mbar
Test date :	February 23, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
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"> - 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

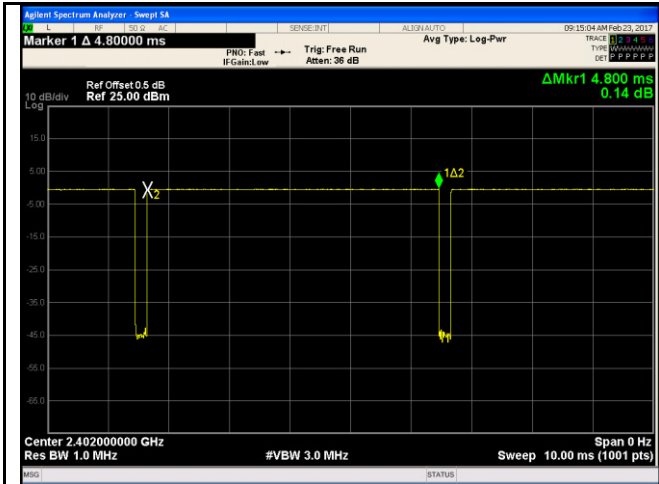
Test Data Yes N/A
 Test Plot Yes (See below) N/A

Dwell Time measurement result

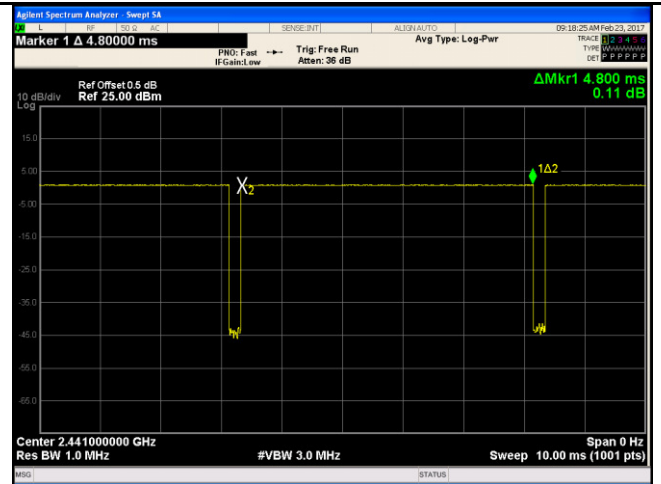
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	4.800	512.000	400	Pass
		Mid	4.800	512.000	400	Pass
		High	4.820	514.133	400	Pass
	π /4 DQPSK	Low	2.480	264.533	400	Pass
		Mid	2.480	264.533	400	Pass
		High	2.480	264.533	400	Pass
	8-DPSK	Low	1.710	182.400	400	Pass
		Mid	1.710	182.400	400	Pass
		High	1.710	182.400	400	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6						

Test Plots

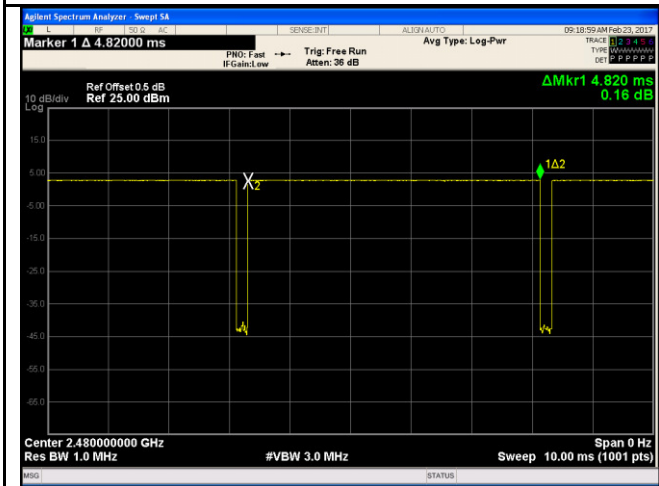
Dwell Time measurement result



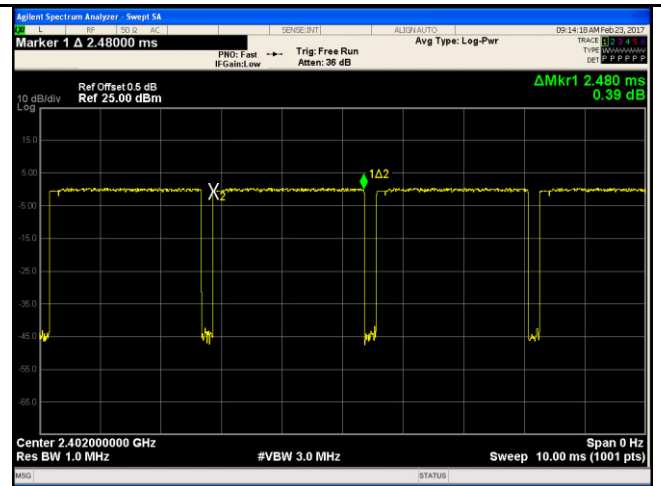
GFSK - Low CH 2402



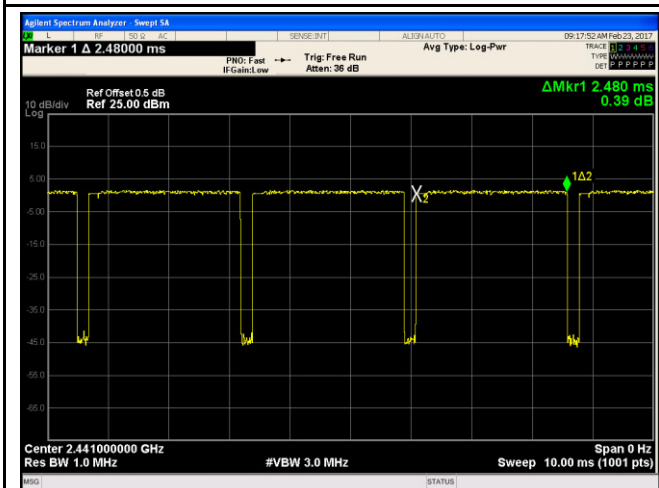
GFSK - Mid CH 2441



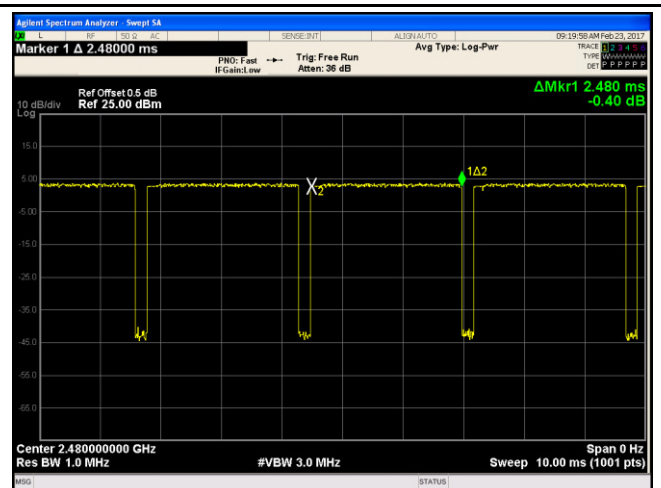
GFDK - High CH 2480



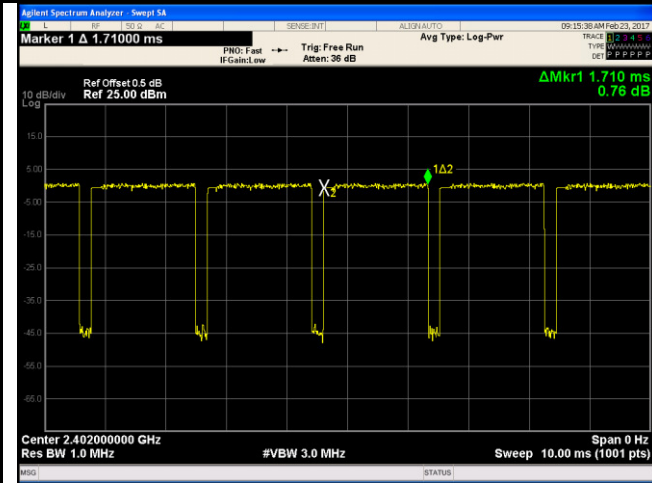
$\pi/4$ DQPSK - Low CH 2402



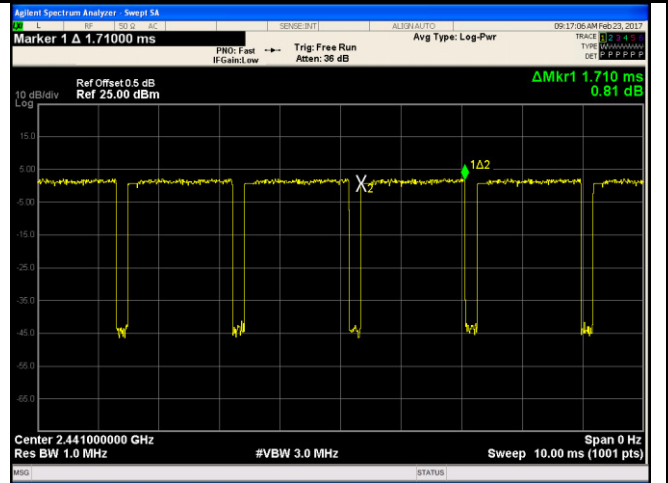
$\pi/4$ DQPSK - Mid CH 2441



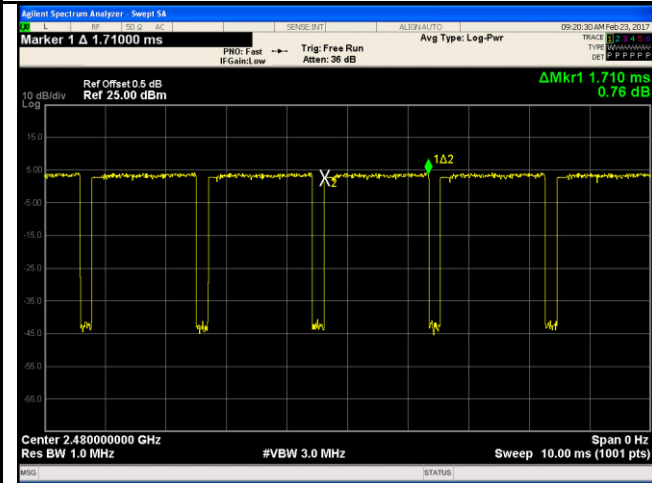
$\pi/4$ DQPSK - High CH 2480



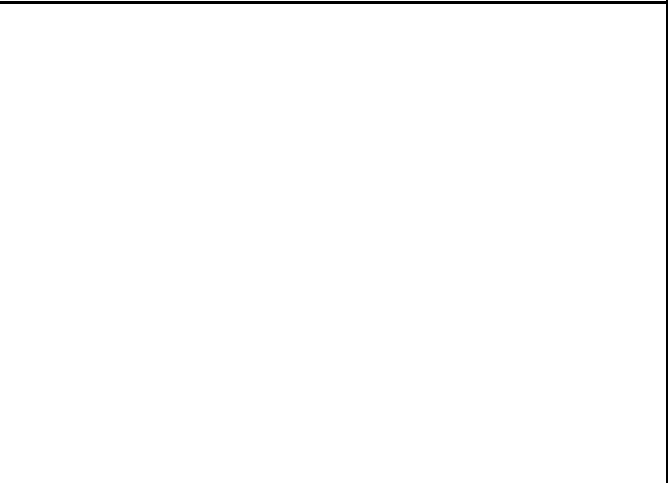
8DPSK - Low CH 2402



8DPSK - Mid CH 2441



8DPSK - High CH 2480



6.7 Band Edge & Restricted Band

Temperature	23°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	February 20 & March 09, 2017
Tested By :	Loren Luo

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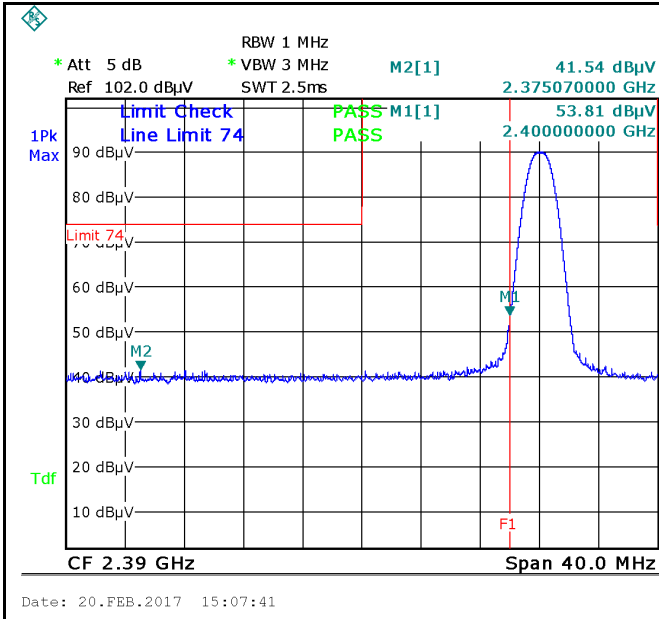
	<p>and make sure the instrument is operated in its linear range.</p> <ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer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

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

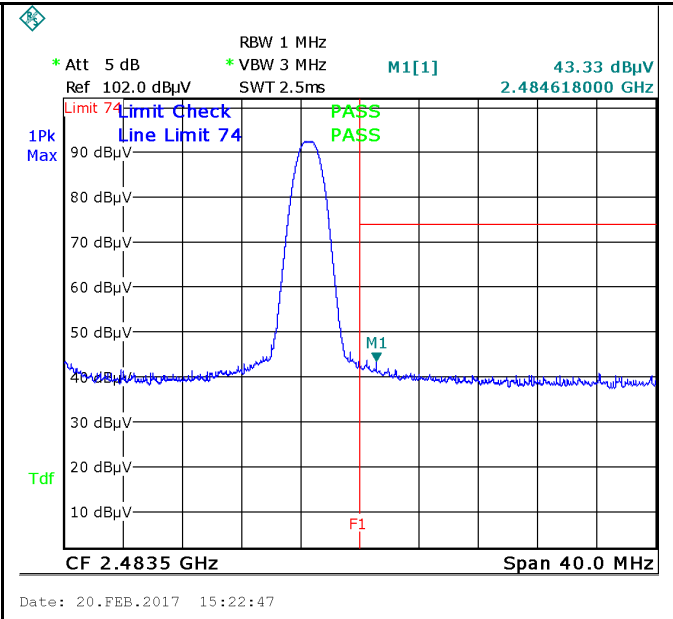
Test Plots

GFSK Mode:

<p>* RBW 1 MHz * Att 5 dB VBW 3 MHz Batt Ref 102.0 dBµV SWT 2.5ms</p> <p>Limit Check Line Limit-L 74 PASS M1[1] PASS</p> <p>1Pk Max 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 40 dBµV 30 dBµV 20 dBµV 10 dBµV</p> <p>M2 M1 F1</p> <p>Start 2.31 GHz Stop 2.44 GHz</p> <p>Date: 9.MAR.2017 14:02:17</p>	<p>* RBW 1 MHz * Att 5 dB VBW 3 MHz Batt Ref 102.0 dBµV SWT 2.5ms</p> <p>Limit Check Line Limit-R 74 PASS M1[1] PASS</p> <p>1Pk Max 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 40 dBµV 30 dBµV 20 dBµV 10 dBµV</p> <p>M1 F1</p> <p>Start 2.44 GHz Stop 2.5 GHz</p> <p>Date: 9.MAR.2017 14:03:33</p>
<p>GFSK-Hopping Left Side-PK Note: F1 is frequency 2400MHz</p>	<p>GFSK-Hopping Right Side-PK Note: F1 is frequency 2483.5MHz</p>
<p>Note: (no need if PK value less than the AV limit)</p>	<p>Note: (no need if PK value less than the AV limit)</p>
<p>GFSK-Hopping Left Side-AV</p>	<p>GFSK-Hopping Right Side-AV</p>



Date: 20.FEB.2017 15:07:41



Date: 20.FEB.2017 15:22:47

GFSK-Left Side-PK

Note: F1 is frequency 2400MHz

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

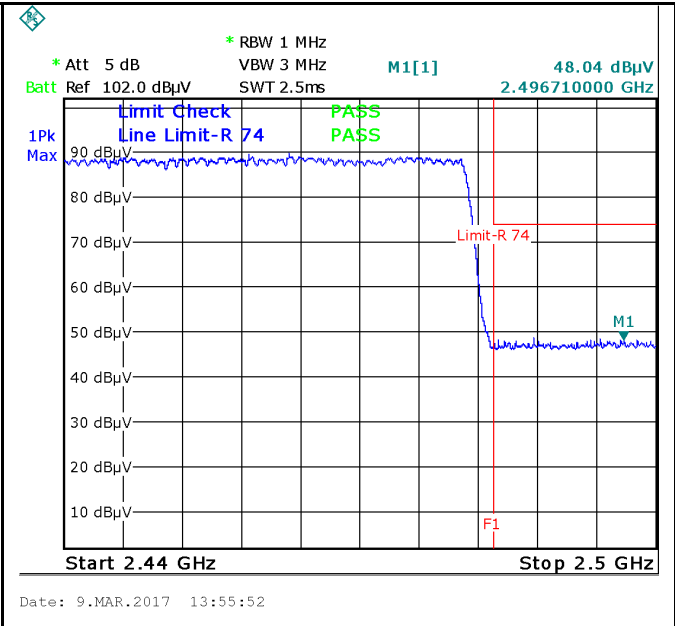
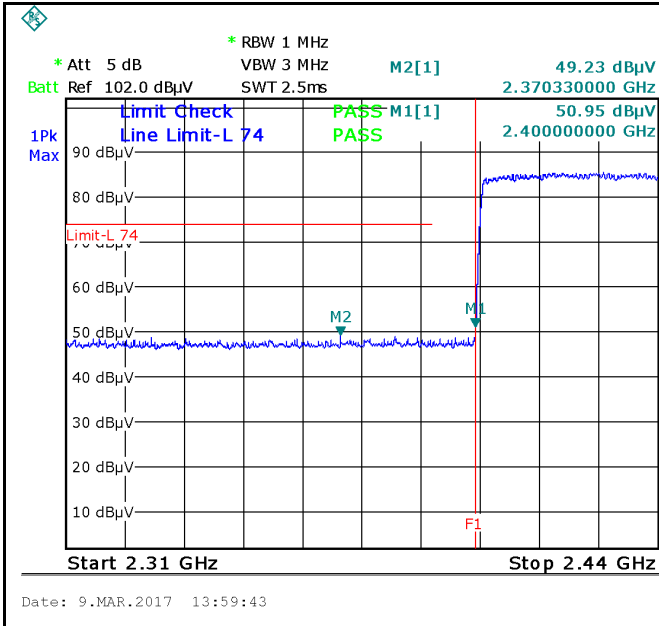
Note: (no need if PK value less than the AV

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

GFSK-Left Side-AV

GFSK-Right Side-AV

$\pi/4$ DQPSK Mode:



$\pi/4$ DQPSK-Hopping Left Side-PK
Note: F1 is frequency 2400MHz

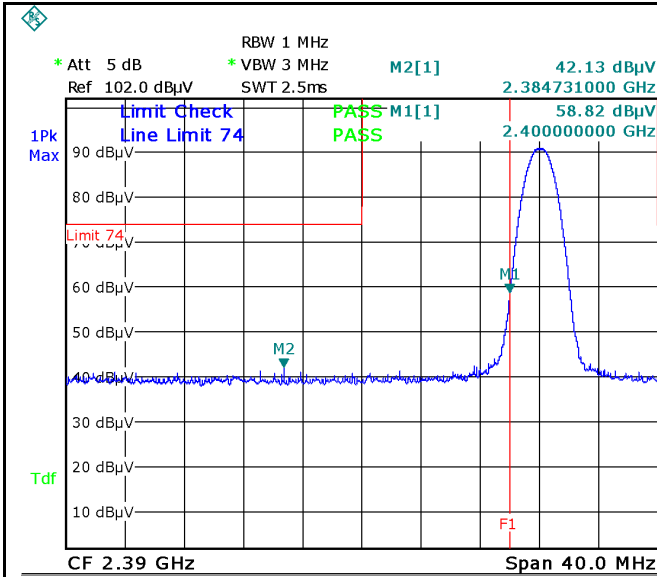
$\pi/4$ DQPSK-Hopping Right Side-PK
Note: F1 is frequency 2483.5MHz

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

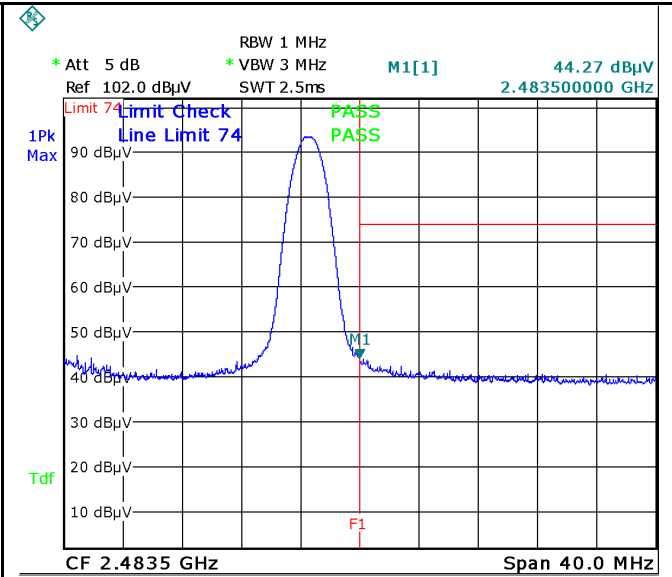
Note: (no need if PK value less than the AV limit)

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

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



Date: 20.FEB.2017 15:11:24



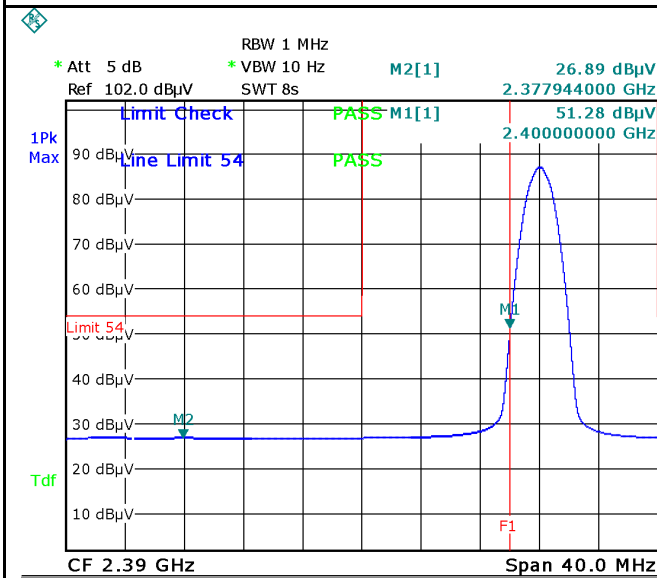
Date: 20.FEB.2017 15:25:54

π / 4 DQPSK-Left Side-PK

Note: F1 is frequency 2400MHz

π / 4 DQPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



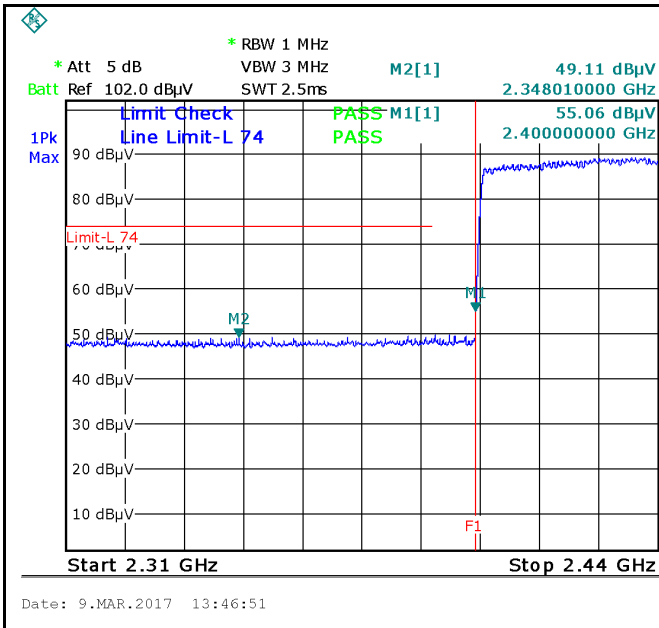
Date: 20.FEB.2017 15:12:49

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

π / 4 DQPSK-Left Side-AV

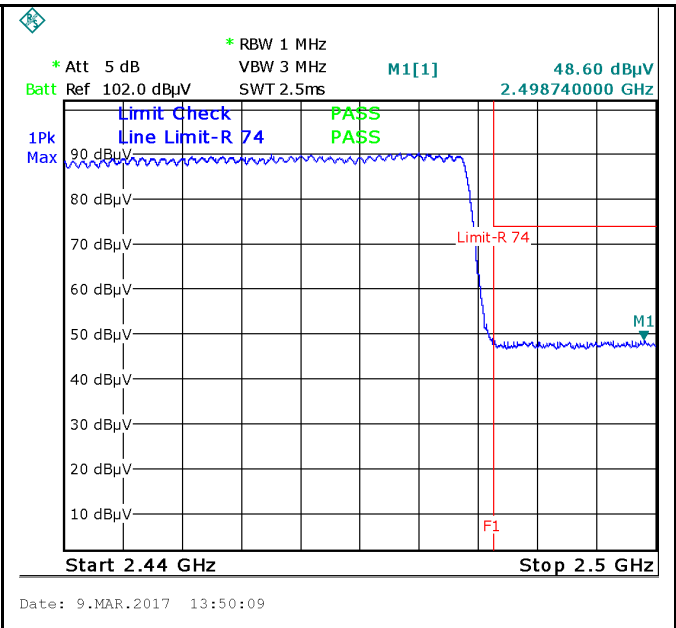
π / 4 DQPSK-Right Side-AV

8-DPSK Mode:



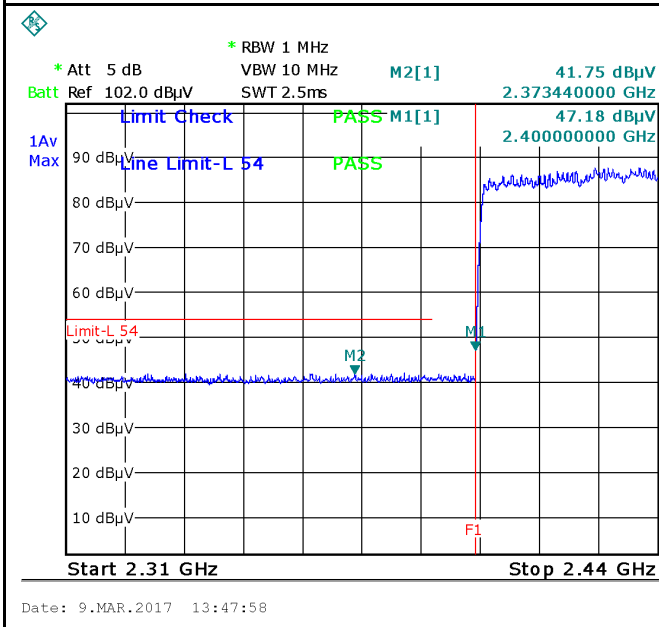
8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



8DPSK-Hopping Right Side-PK

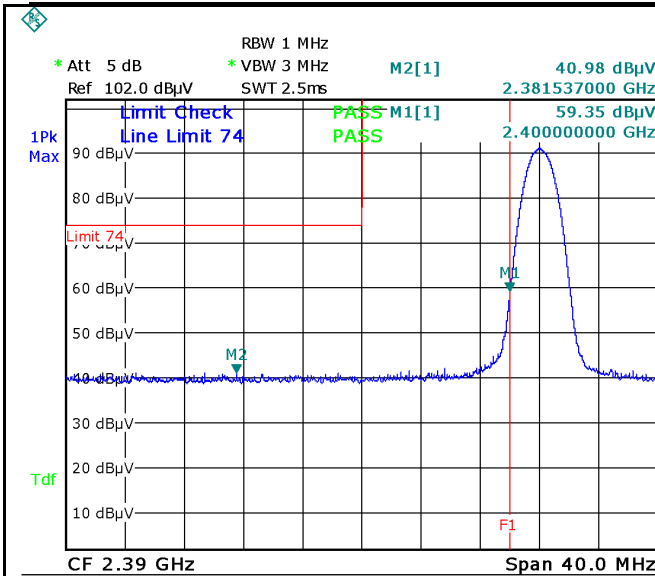
Note: F1 is frequency 2483.5MHz



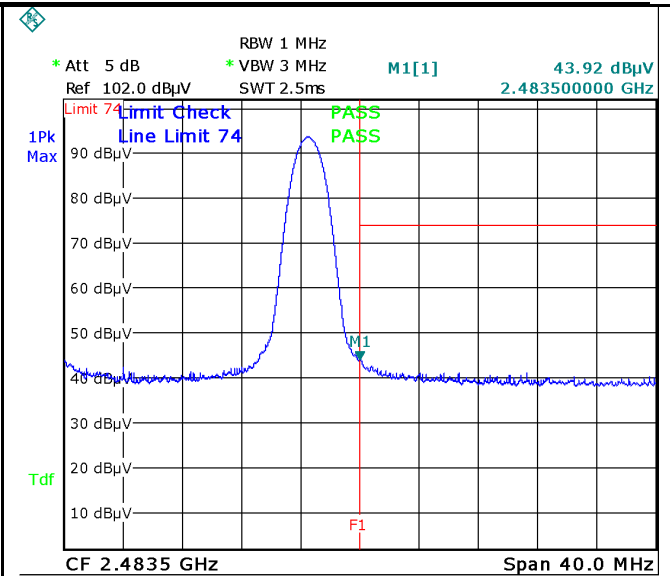
8DPSK-Hopping Left-AV

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

8DPSK-Hopping Right-AV



Date: 20.FEB.2017 15:15:54



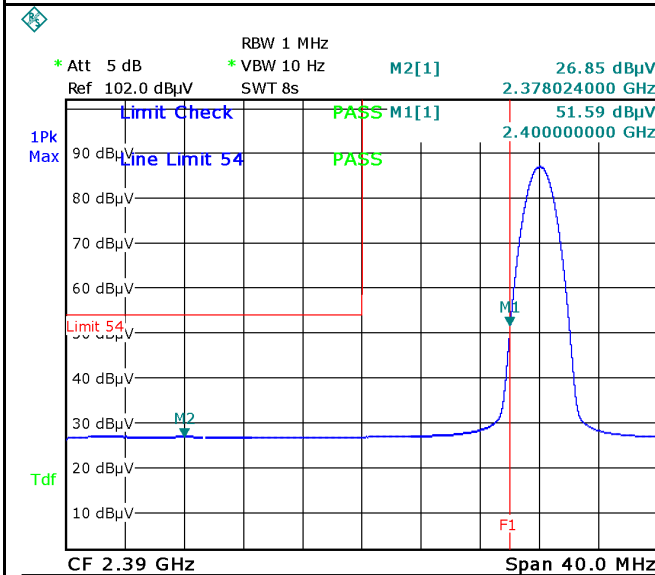
Date: 20.FEB.2017 15:28:13

8DPSK-Left Side-PK

Note: F1 is frequency 2400MHz

8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 20.FEB.2017 15:16:54

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

8DPSK-Left Side-AV

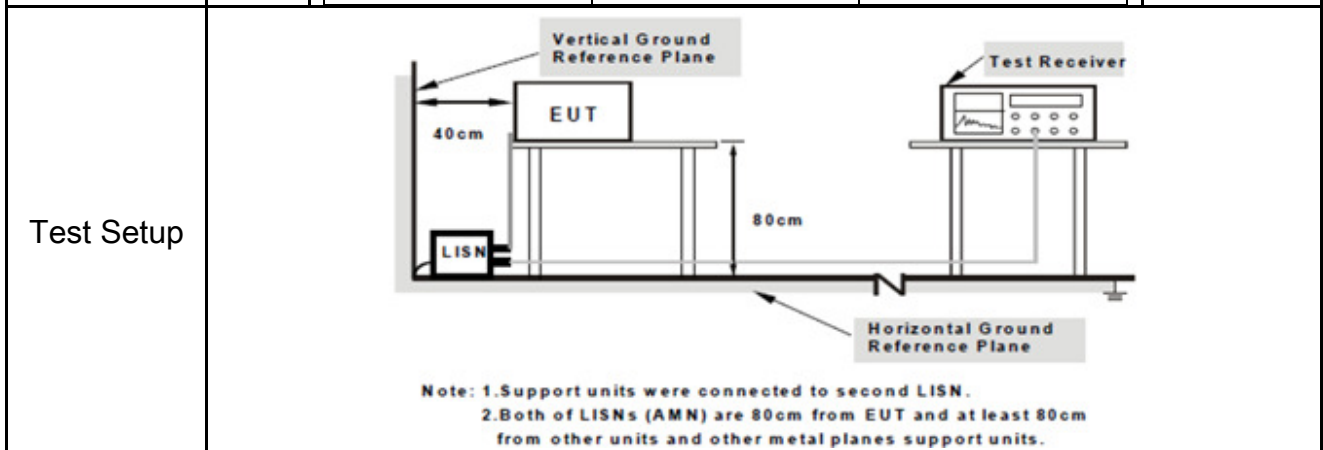
8DPSK-Right Side-AV

6.8 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	52%
Atmospheric Pressure	1015mbar
Test date :	February 21, 2017
Tested By :	Loren Luo

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.	<input checked="" type="checkbox"/>														
		<table border="1"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dBµV)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>66 – 56</td> <td>56 – 46</td> </tr> <tr> <td>0.5 ~ 5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 ~ 30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>		Frequency ranges (MHz)	Limit (dBµV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50
		Frequency ranges (MHz)			Limit (dBµV)												
				QP	Average												
0.15 ~ 0.5	66 – 56	56 – 46															
0.5 ~ 5	56	46															
5 ~ 30	60	50															



Procedure	<ol style="list-style-type: none"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss
-----------	---

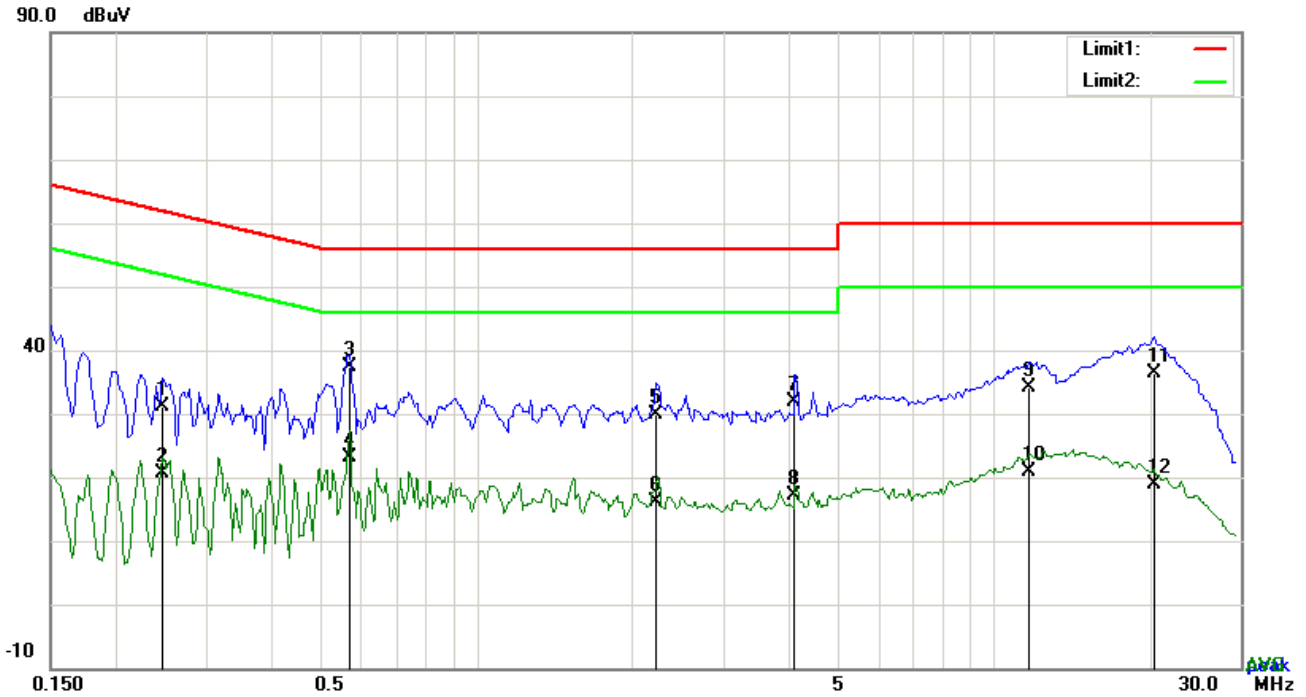
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	<p>coaxial cable.</p> <ol style="list-style-type: none"> 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 6. A scan was made on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

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test Mode:	Bluetooth Mode
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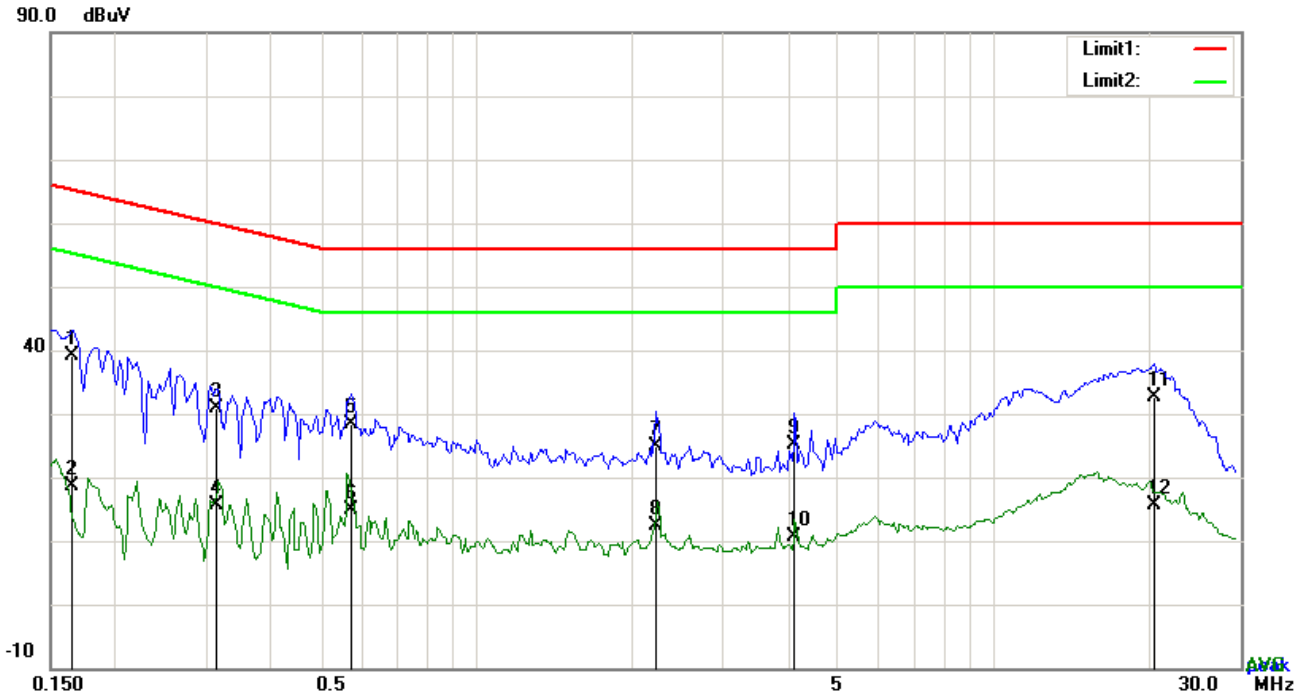


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2475	21.14	QP	10.03	31.17	61.84	-30.67
2	L1	0.2475	10.49	AVG	10.03	20.52	51.84	-31.32
3	L1	0.5673	27.39	QP	10.03	37.42	56.00	-18.58
4	L1	0.5673	13.18	AVG	10.03	23.21	46.00	-22.79
5	L1	2.2209	19.83	QP	10.05	29.88	56.00	-26.12
6	L1	2.2209	6.18	AVG	10.05	16.23	46.00	-29.77
7	L1	4.1349	21.89	QP	10.07	31.96	56.00	-24.04
8	L1	4.1349	7.04	AVG	10.07	17.11	46.00	-28.89
9	L1	11.7321	23.86	QP	10.18	34.04	60.00	-25.96
10	L1	11.7321	10.61	AVG	10.18	20.79	50.00	-29.21
11	L1	20.3823	25.97	QP	10.31	36.28	60.00	-23.72
12	L1	20.3823	8.51	AVG	10.31	18.82	50.00	-31.18

Test Mode:	Bluetooth Mode
-------------------	-----------------------

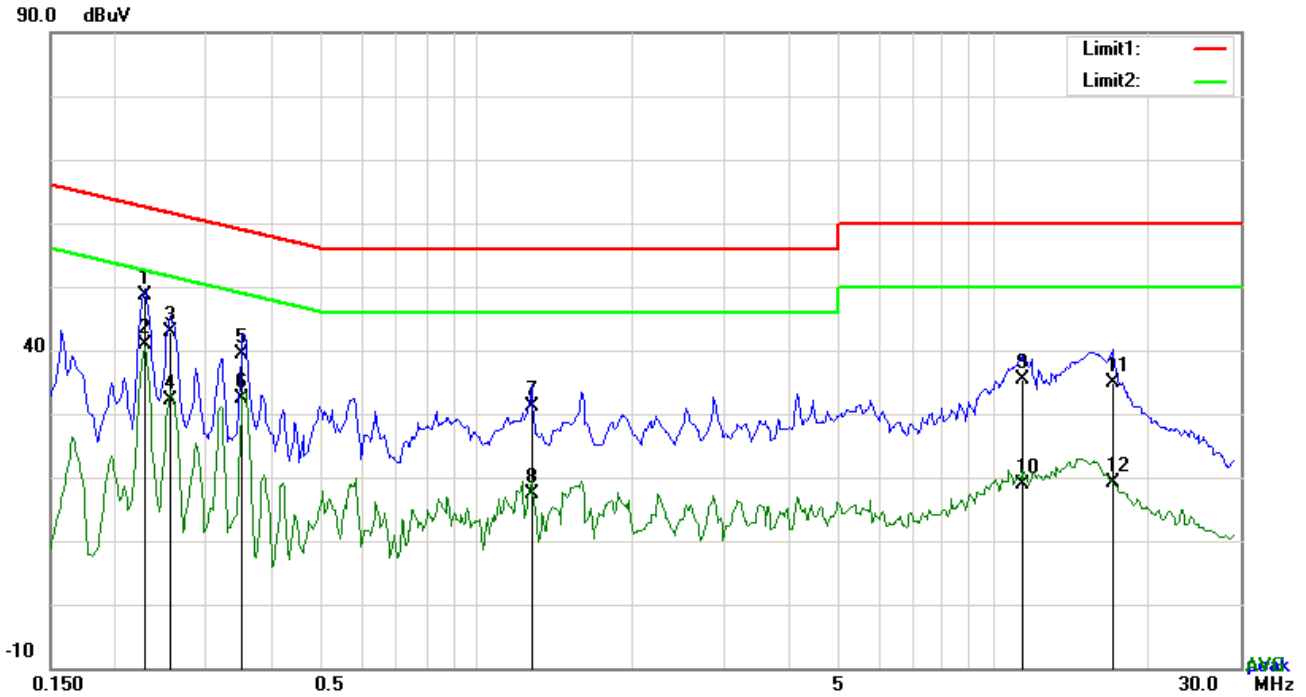


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1656	29.04	QP	10.02	39.06	65.18	-26.12
2	N	0.1656	8.56	AVG	10.02	18.58	55.18	-36.60
3	N	0.3138	20.78	QP	10.02	30.80	59.87	-29.07
4	N	0.3138	5.59	AVG	10.02	15.61	49.87	-34.26
5	N	0.5751	18.38	QP	10.02	28.40	56.00	-27.60
6	N	0.5751	4.77	AVG	10.02	14.79	46.00	-31.21
7	N	2.2209	14.82	QP	10.04	24.86	56.00	-31.14
8	N	2.2209	2.23	AVG	10.04	12.27	46.00	-33.73
9	N	4.1271	15.14	QP	10.06	25.20	56.00	-30.80
10	N	4.1271	0.54	AVG	10.06	10.60	46.00	-35.40
11	N	20.3823	22.44	QP	10.27	32.71	60.00	-27.29
12	N	20.3823	5.46	AVG	10.27	15.73	50.00	-34.27

Test Mode:	Bluetooth Mode
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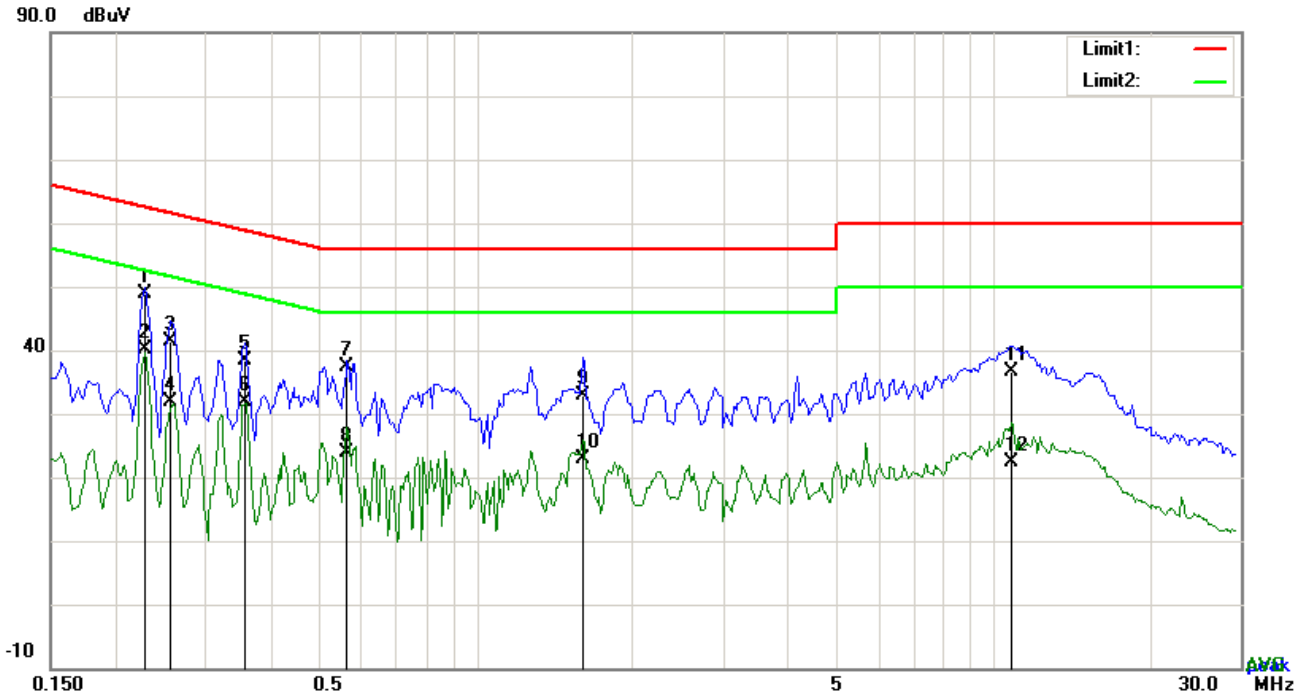


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2280	38.67	QP	10.03	48.70	62.52	-13.82
2	L1	0.2280	30.73	AVG	10.03	40.76	52.52	-11.76
3	L1	0.2553	32.81	QP	10.03	42.84	61.58	-18.74
4	L1	0.2553	22.09	AVG	10.03	32.12	51.58	-19.46
5	L1	0.3528	29.30	QP	10.03	39.33	58.90	-19.57
6	L1	0.3528	22.28	AVG	10.03	32.31	48.90	-16.59
7	L1	1.2771	21.12	QP	10.03	31.15	56.00	-24.85
8	L1	1.2771	7.42	AVG	10.03	17.45	46.00	-28.55
9	L1	11.3577	25.17	QP	10.17	35.34	60.00	-24.66
10	L1	11.3577	8.69	AVG	10.17	18.86	50.00	-31.14
11	L1	16.9737	24.63	QP	10.25	34.88	60.00	-25.12
12	L1	16.9737	8.84	AVG	10.25	19.09	50.00	-30.91

Test Mode:	Bluetooth Mode
-------------------	-----------------------



Test Data

Phase Neutral Plot at 240Vac, 60Hz

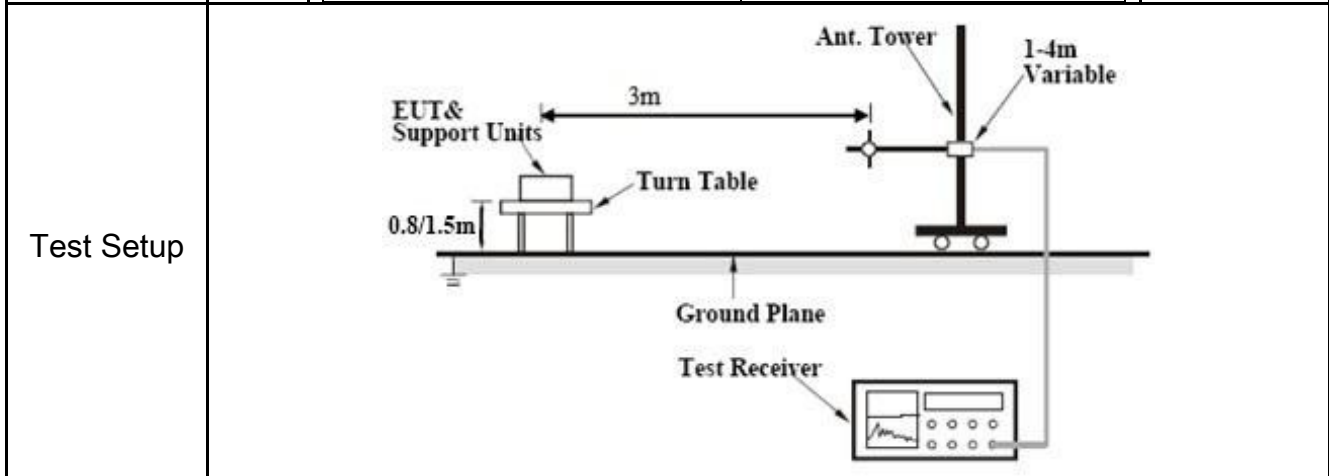
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2280	38.78	QP	10.02	48.80	62.52	-13.72
2	N	0.2280	30.02	AVG	10.02	40.04	52.52	-12.48
3	N	0.2553	31.46	QP	10.02	41.48	61.58	-20.10
4	N	0.2553	21.83	AVG	10.02	31.85	51.58	-19.73
5	N	0.3567	28.25	QP	10.02	38.27	58.80	-20.53
6	N	0.3567	21.93	AVG	10.02	31.95	48.80	-16.85
7	N	0.5634	27.38	QP	10.02	37.40	56.00	-18.60
8	N	0.5634	13.87	AVG	10.02	23.89	46.00	-22.11
9	N	1.6086	22.89	QP	10.04	32.93	56.00	-23.07
10	N	1.6086	12.87	AVG	10.04	22.91	46.00	-23.09
11	N	10.8312	26.47	QP	10.15	36.62	60.00	-23.38
12	N	10.8312	12.20	AVG	10.15	22.35	50.00	-27.65

6.9 Radiated Emissions & Restricted Band

Temperature	25°C
Relative Humidity	52%
Atmospheric Pressure	1015mbar
Test date :	February 21, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable										
47CFR§15.205, §15.209, §15.247(d)	a)	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength ($\mu\text{V/m}$)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>100</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 - 960</td> <td>200</td> </tr> <tr> <td>Above 960</td> <td>500</td> </tr> </tbody> </table>	Frequency range (MHz)	Field Strength ($\mu\text{V/m}$)	30 – 88	100	88 – 216	150	216 - 960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength ($\mu\text{V/m}$)												
30 – 88	100												
88 – 216	150												
216 - 960	200												
Above 960	500												



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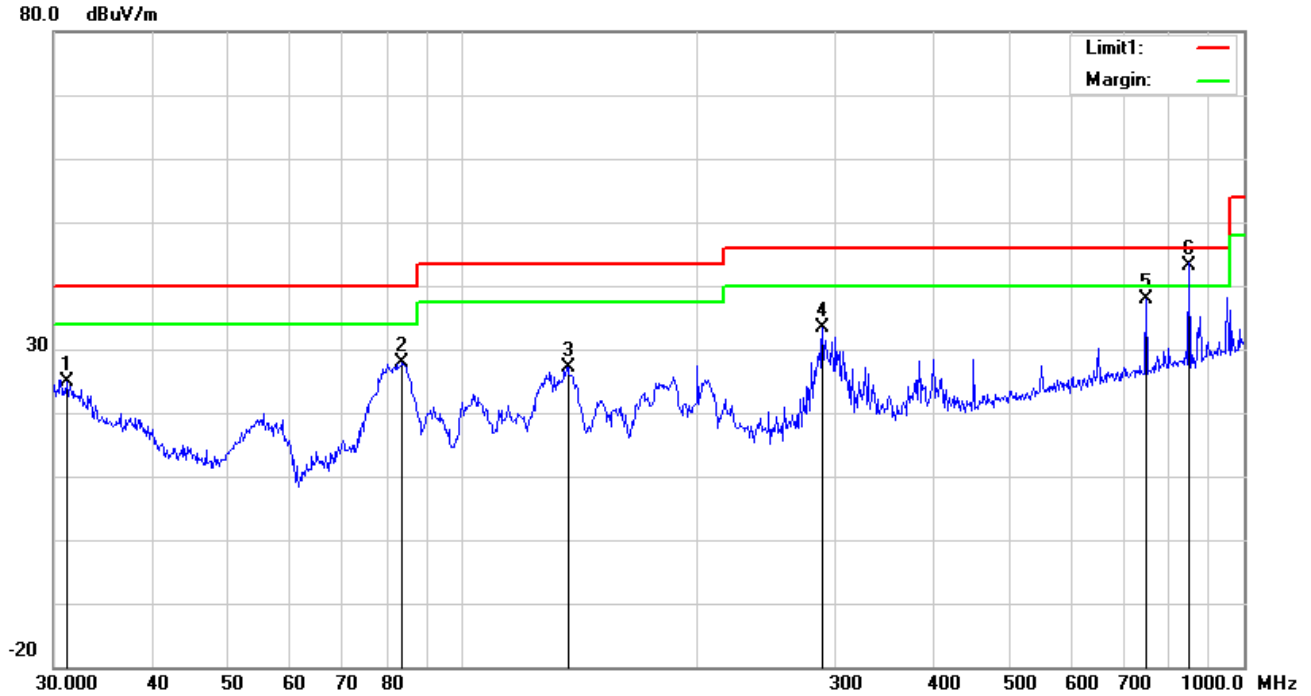
	<p>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</p> <p>b. The EUT was then rotated to the direction that gave the maximum emission.</p> <p>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.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

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test Mode: Bluetooth Mode

Below 1GHz



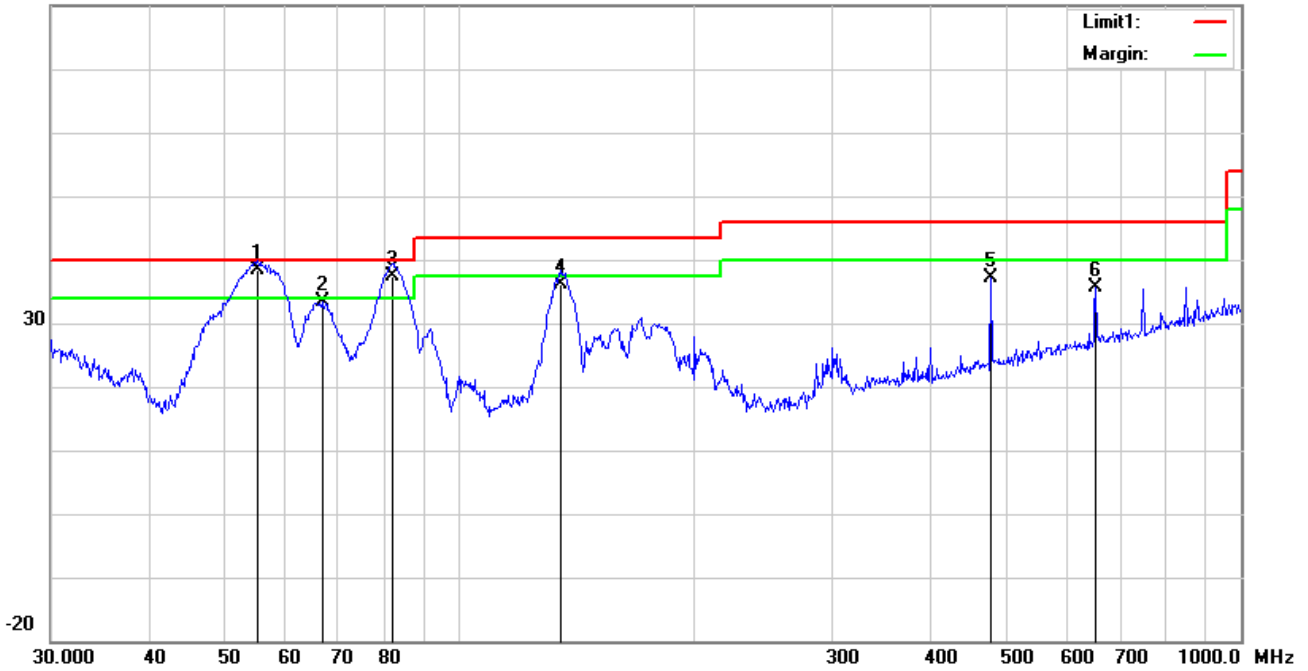
Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detect or	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degr ee (°)
1	H	31.1798	25.97	peak	20.49	22.27	0.65	24.84	40.00	-15.16	200	338
2	H	83.8156	41.55	peak	7.75	22.38	1.07	27.99	40.00	-12.01	100	273
3	H	136.4598	35.54	peak	12.83	22.40	1.25	27.22	43.50	-16.28	200	300
4	H	289.0021	40.86	peak	13.12	22.29	1.77	33.46	46.00	-12.54	200	145
5	H	750.1083	35.52	peak	20.80	21.25	2.87	37.94	46.00	-8.06	300	216
6	H	851.0353	39.29	QP	21.96	21.01	2.87	43.11	46.00	-2.89	200	131

Below 1GHz

80.0 dBuV/m



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detect or	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degr ee (°)
1	V	55.2207	52.29	QP	7.83	22.40	0.78	38.50	40.00	-1.50	200	150
2	V	66.7325	47.27	peak	7.64	22.39	0.91	33.43	40.00	-6.57	300	54
3	V	82.0706	50.96	QP	7.68	22.40	1.06	37.30	40.00	-2.70	100	269
4	V	135.0319	44.34	QP	12.92	22.40	1.24	36.10	43.50	-7.40	100	121
5	V	478.8456	39.28	peak	17.28	21.85	2.30	37.01	46.00	-8.99	300	336
6	V	651.9417	34.77	peak	19.67	21.47	2.63	35.60	46.00	-10.40	100	7

Above 1GHz

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

Low Channel: 8-DFSK Mode (Worst Case) (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	38.43	AV	V	33.67	6.86	32.66	46.3	54	-7.7
4804	38.12	AV	H	33.67	6.86	32.66	45.99	54	-8.01
4804	49.57	PK	V	33.67	6.86	32.66	57.44	74	-16.56
4804	48.61	PK	H	33.67	6.86	32.66	56.48	74	-17.52
17811	24.58	AV	V	45.03	11.21	32.38	48.44	54	-5.56
17811	23.41	AV	H	45.03	11.21	32.38	47.27	54	-6.73
17811	40.69	PK	V	45.03	11.21	32.38	64.55	74	-9.45
17811	39.73	PK	H	45.03	11.21	32.38	63.59	74	-10.41

Middle Channel: 8-DFSK Mode (Worst Case) (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	39.06	AV	V	33.71	6.95	32.74	46.98	54	-7.02
4882	38.45	AV	H	33.71	6.95	32.74	46.37	54	-7.63
4882	48.67	PK	V	33.71	6.95	32.74	56.59	74	-17.41
4882	47.53	PK	H	33.71	6.95	32.74	55.45	74	-18.55
17819	25.07	AV	V	45.15	11.18	32.41	48.99	54	-5.01
17819	24.16	AV	H	45.15	11.18	32.41	48.08	54	-5.92
17819	40.36	PK	V	45.15	11.18	32.41	64.28	74	-9.72
17819	40.09	PK	H	45.15	11.18	32.41	64.01	74	-9.99

High Channel: 8-DFSK Mode (Worst Case) (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	38.47	AV	V	33.9	6.76	32.74	46.39	54	-7.61
4960	37.19	AV	H	33.9	6.76	32.74	45.11	54	-8.89
4960	48.36	PK	V	33.9	6.76	32.74	56.28	74	-17.72
4960	47.59	PK	H	33.9	6.76	32.74	55.51	74	-18.49
17827	24.16	AV	V	45.22	11.35	32.38	48.35	54	-5.65
17827	23.87	AV	H	45.22	11.35	32.38	48.06	54	-5.94
17827	41.25	PK	V	45.22	11.35	32.38	65.44	74	-8.56
17827	40.91	PK	H	45.22	11.35	32.38	65.1	74	-8.9

Note:

- 1, The testing has been conformed to $10 \times 2480 \text{ MHz} = 24,800 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

Annex A. TEST INSTRUMENT

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

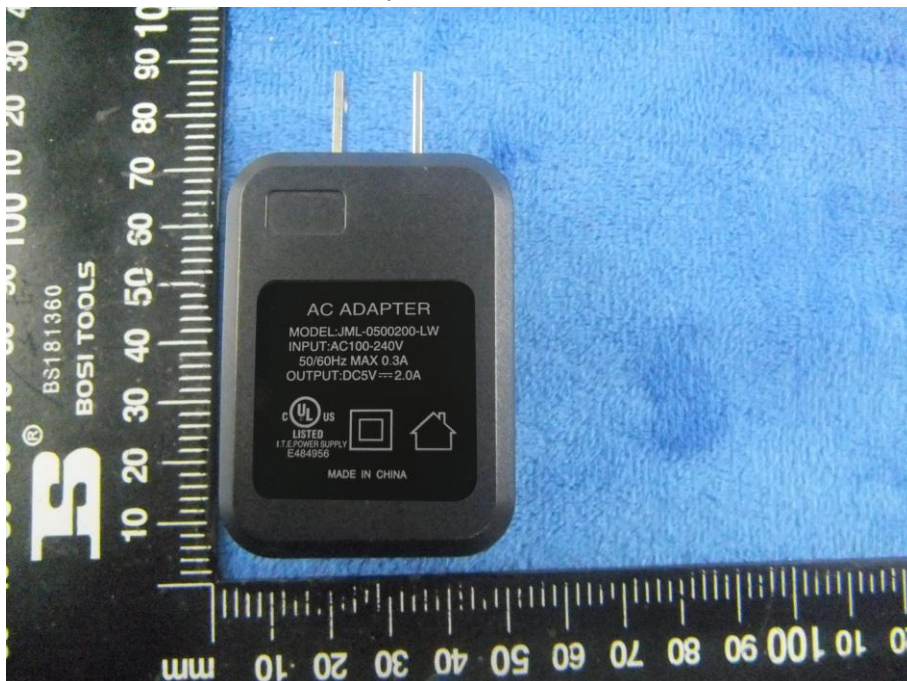
Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

Whole Package View



Adapter - Front View



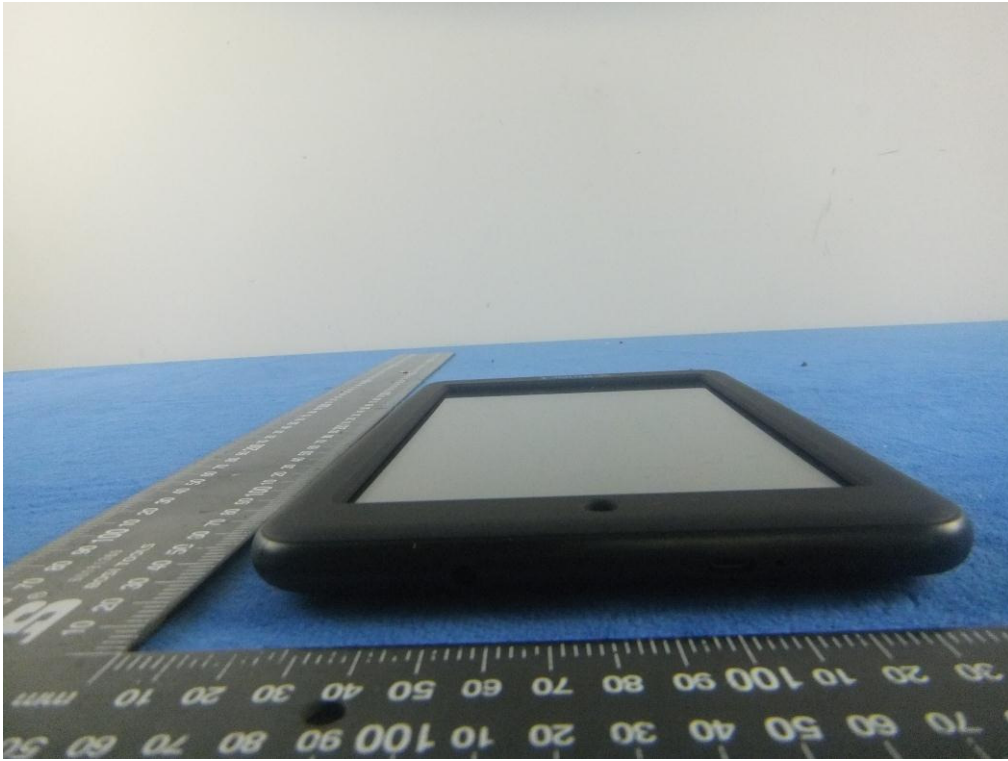
EUT - Front View



EUT - Rear View



EUT - Top View

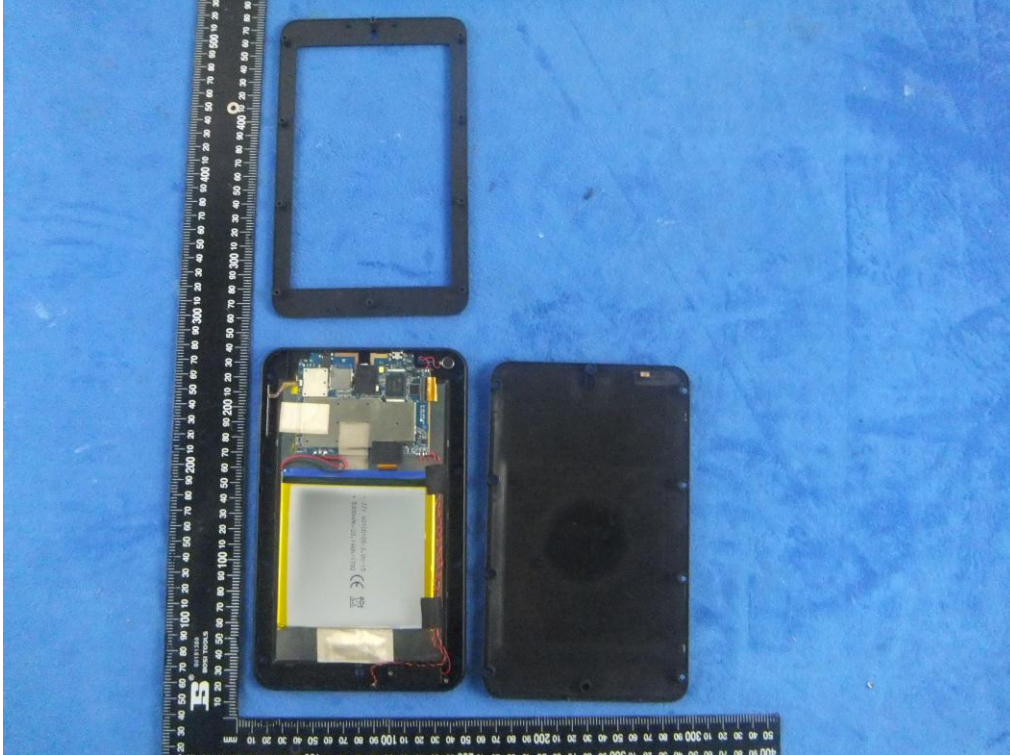


EUT - Bottom View



Annex B.ii. Photograph: EUT Internal Photo

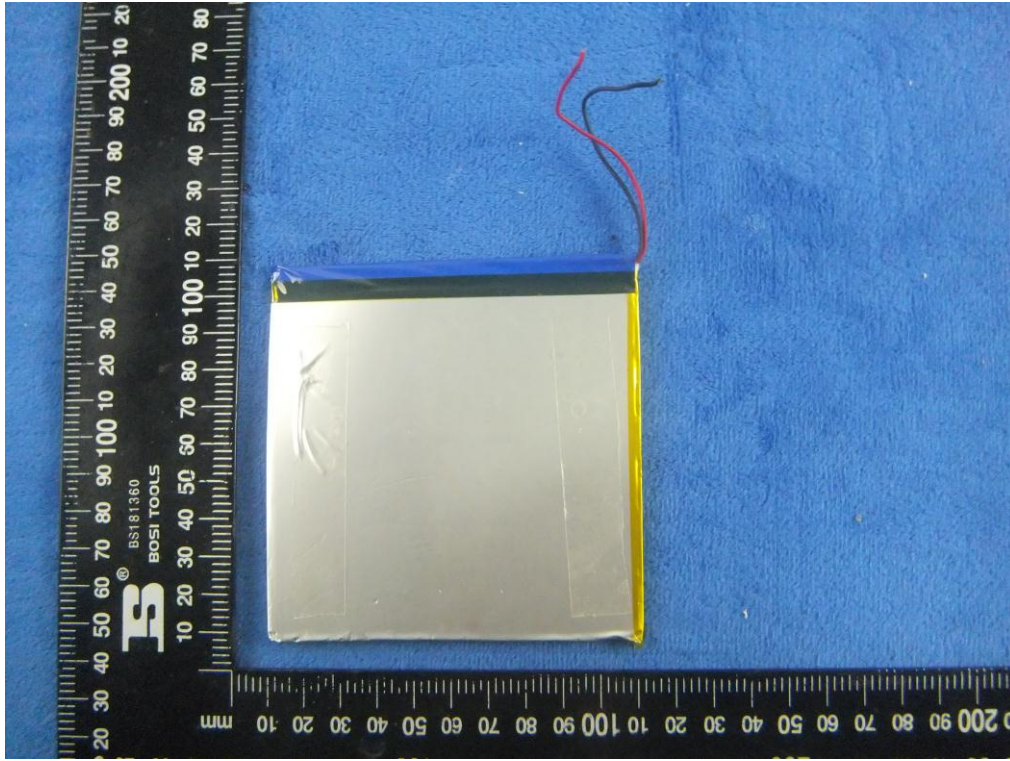
Cover Off - Top View 1



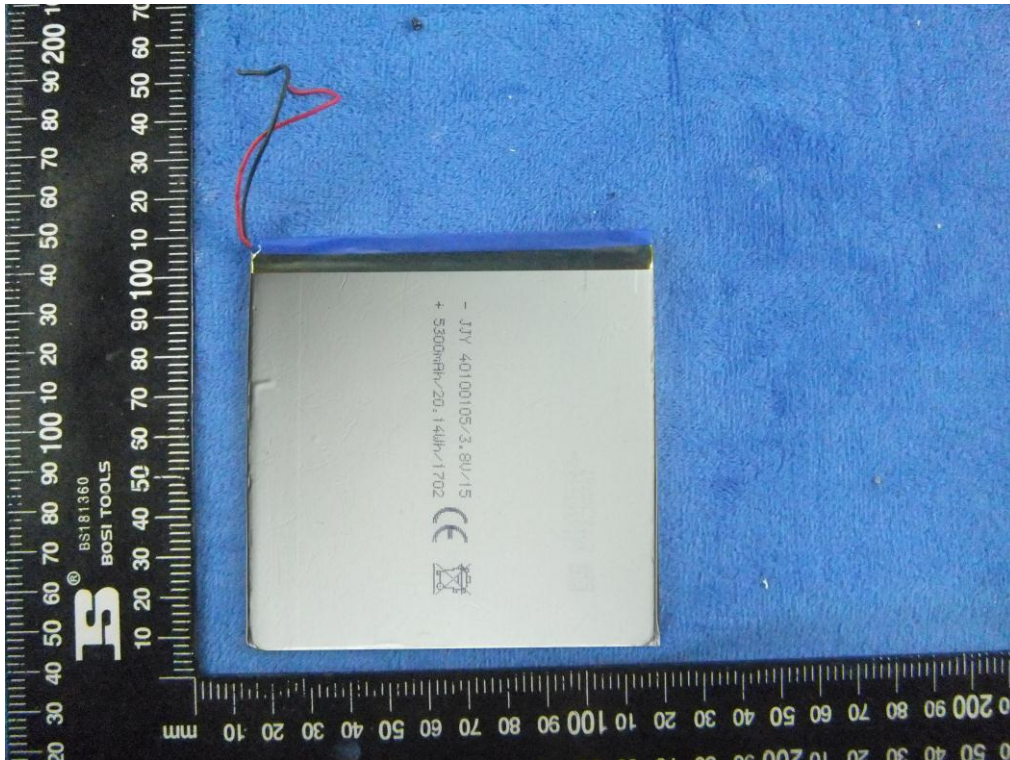
Cover Off - Top View 2



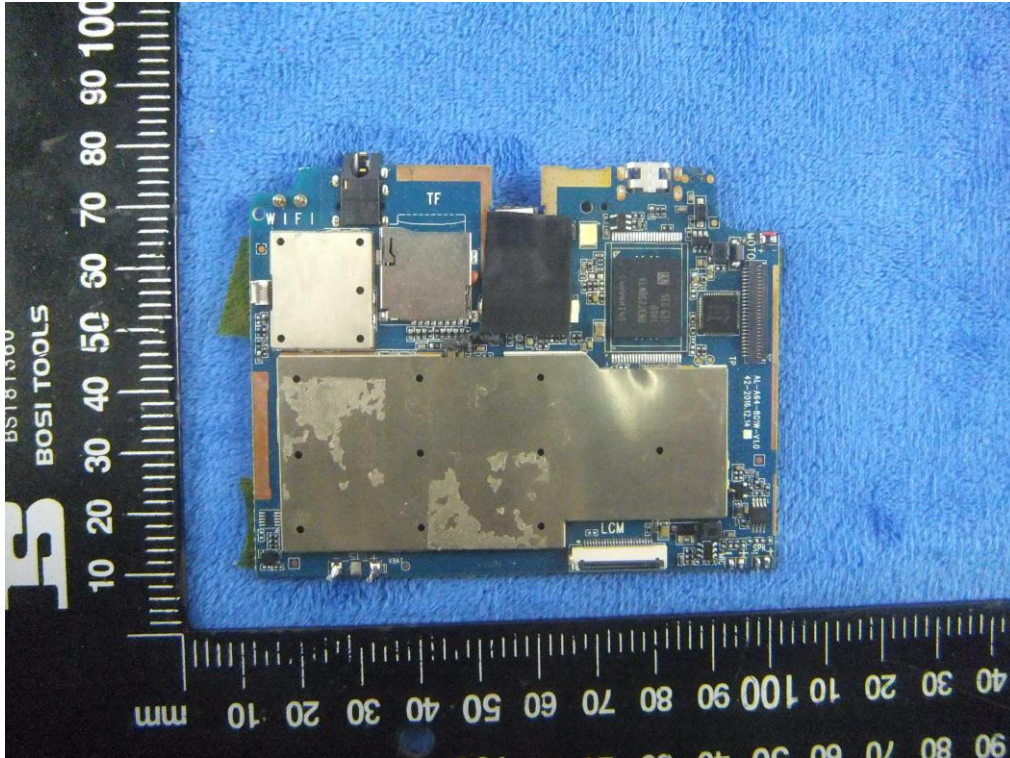
Battery - Front View



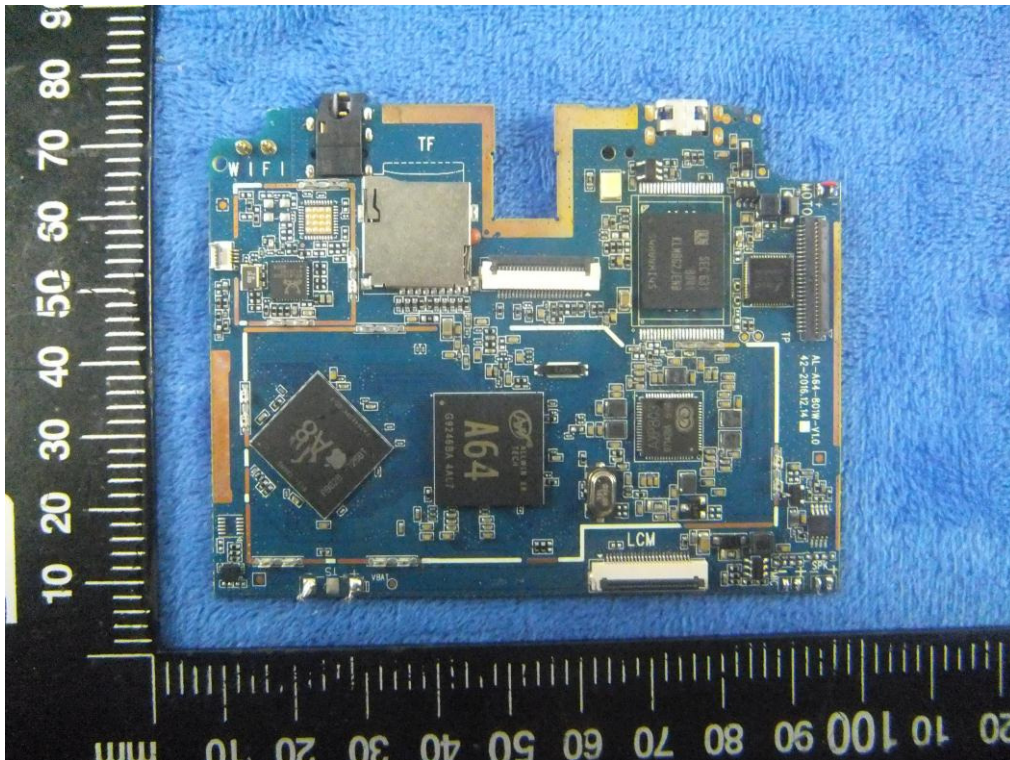
Battery - Rear View



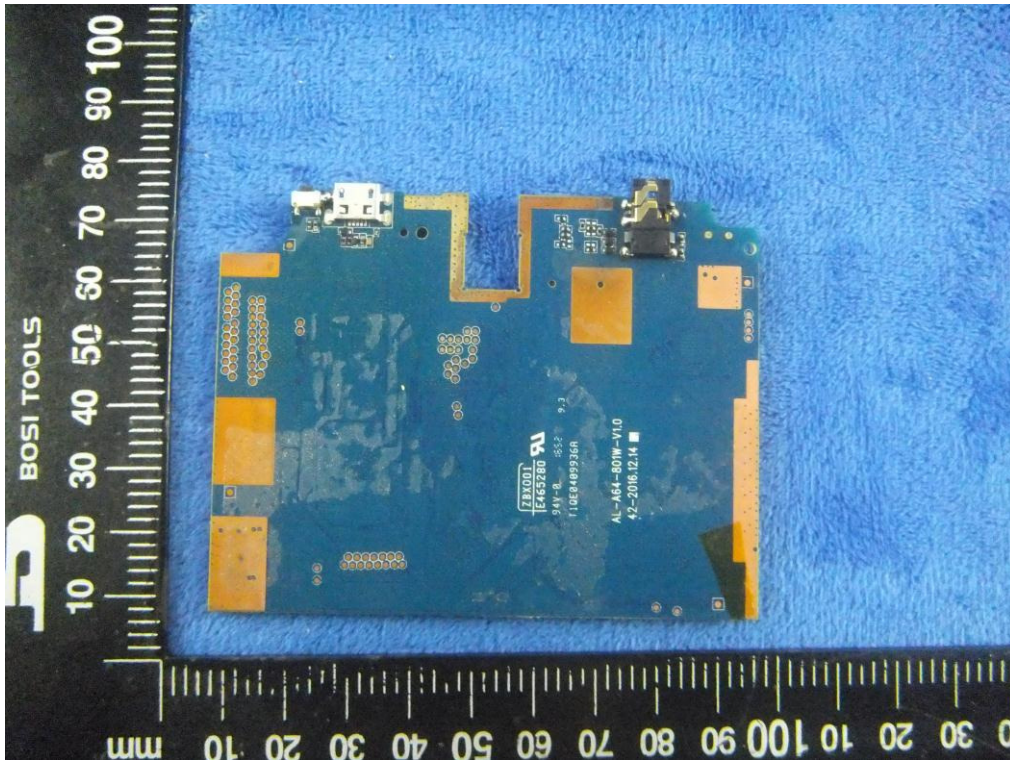
Mainboard with Shielding - Front View



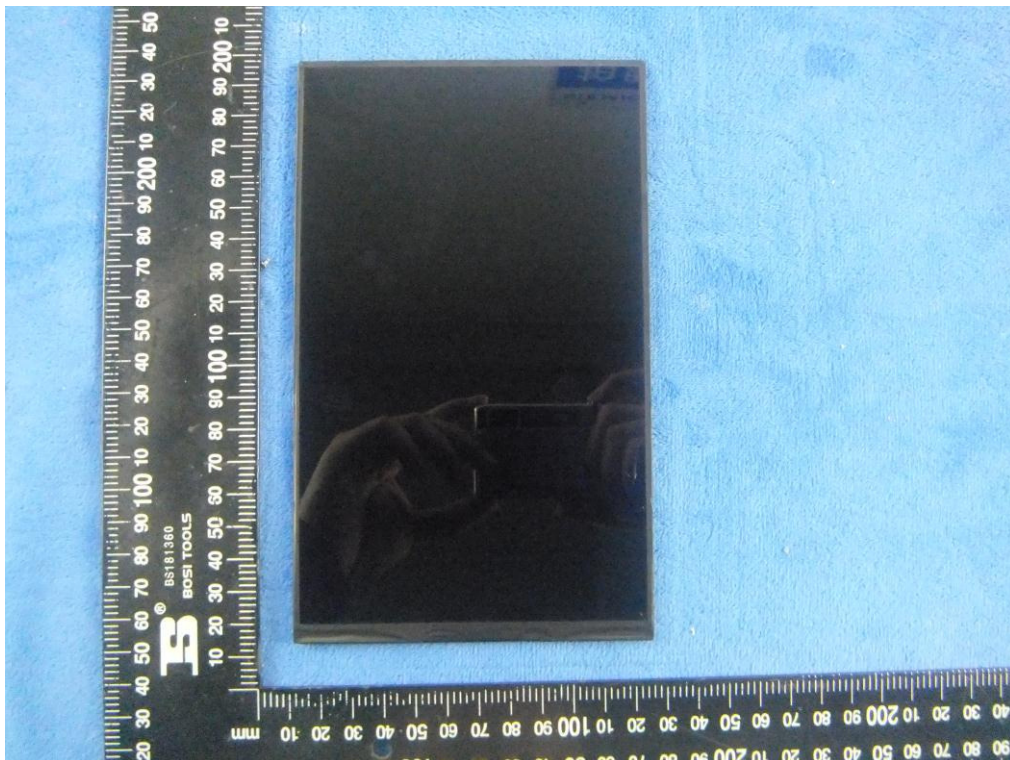
Mainboard without Shielding - Front View



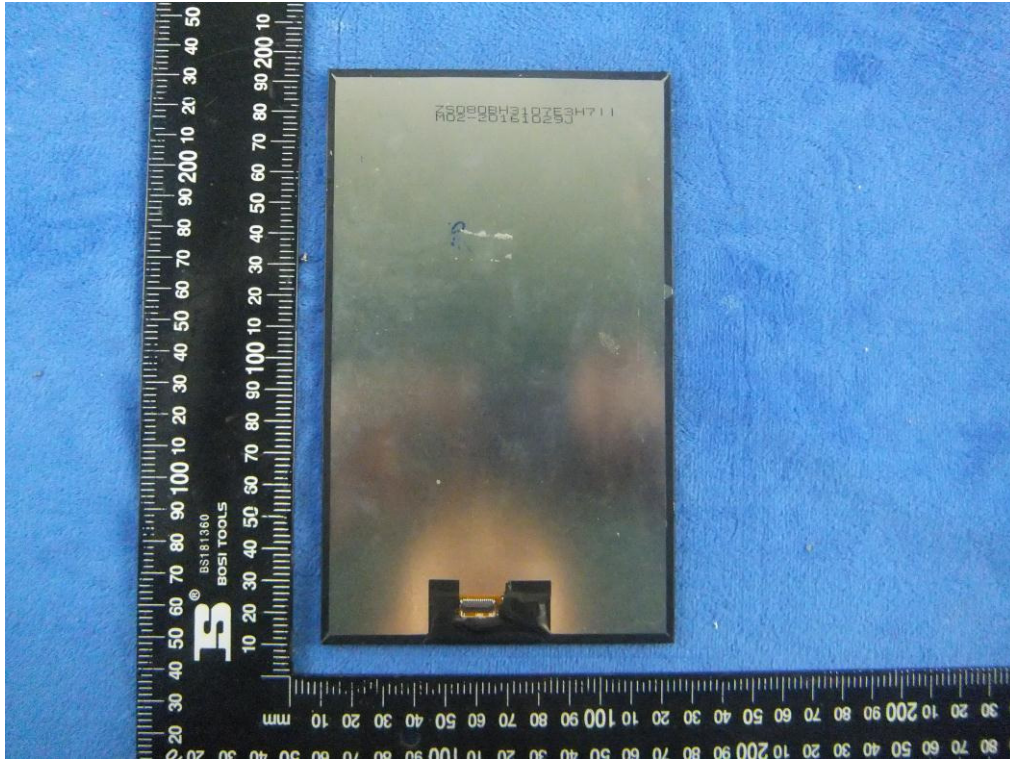
Mainboard - Rear View



LCD - Front View



LCD – Rear View



WIFI/BT - Antenna View



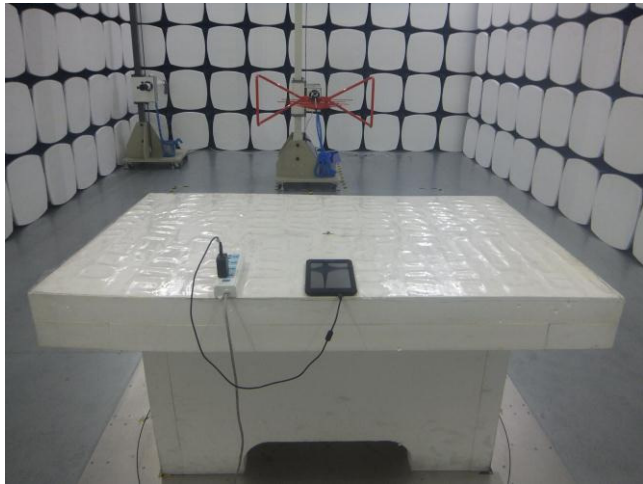
Annex B.iii. Photograph: Test Setup Photo



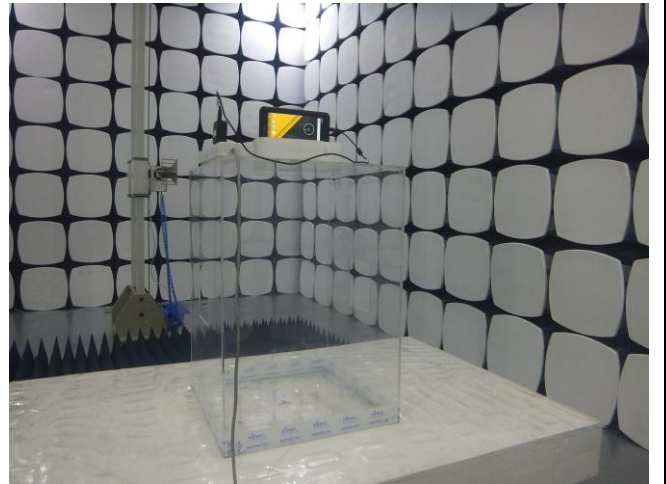
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

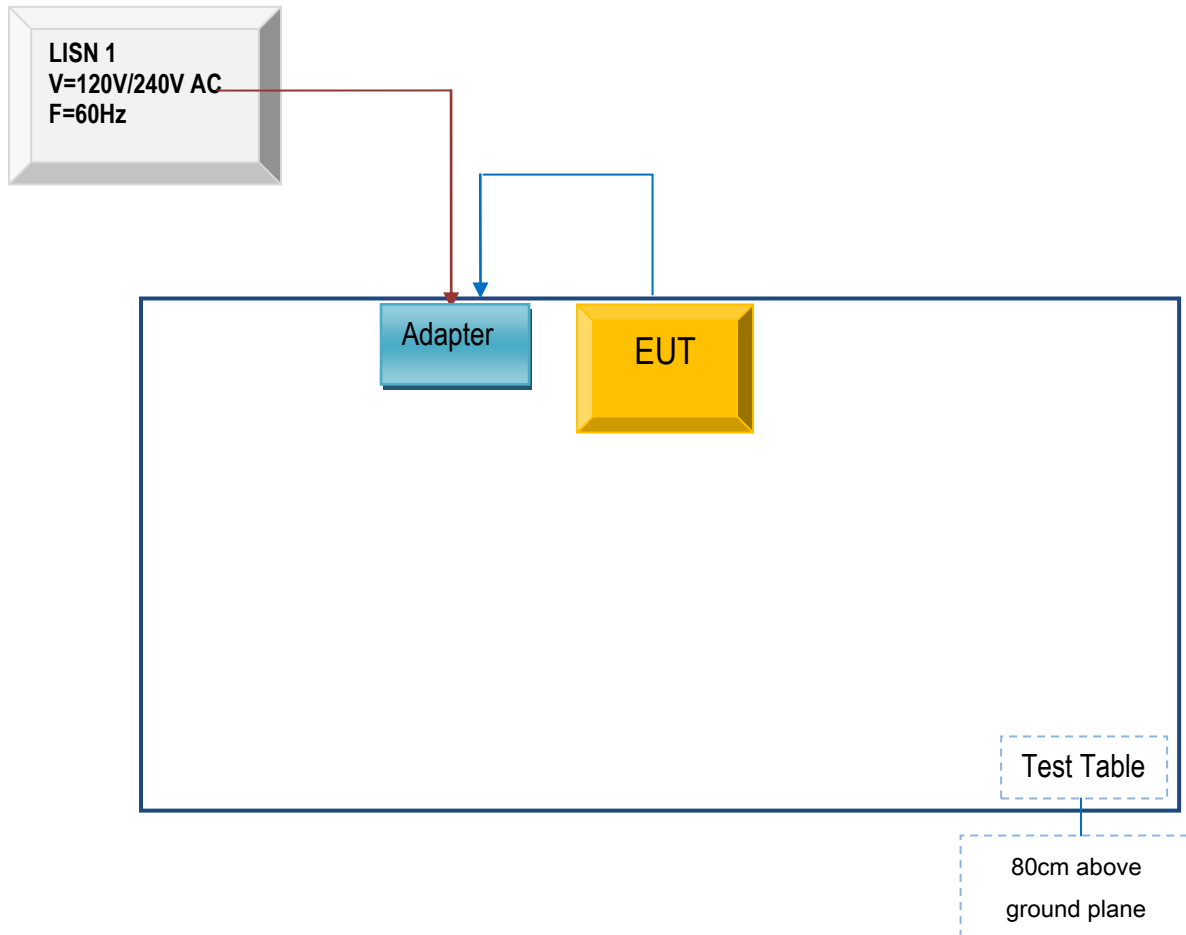


Radiated Spurious Emissions Test Setup Above 1GHz

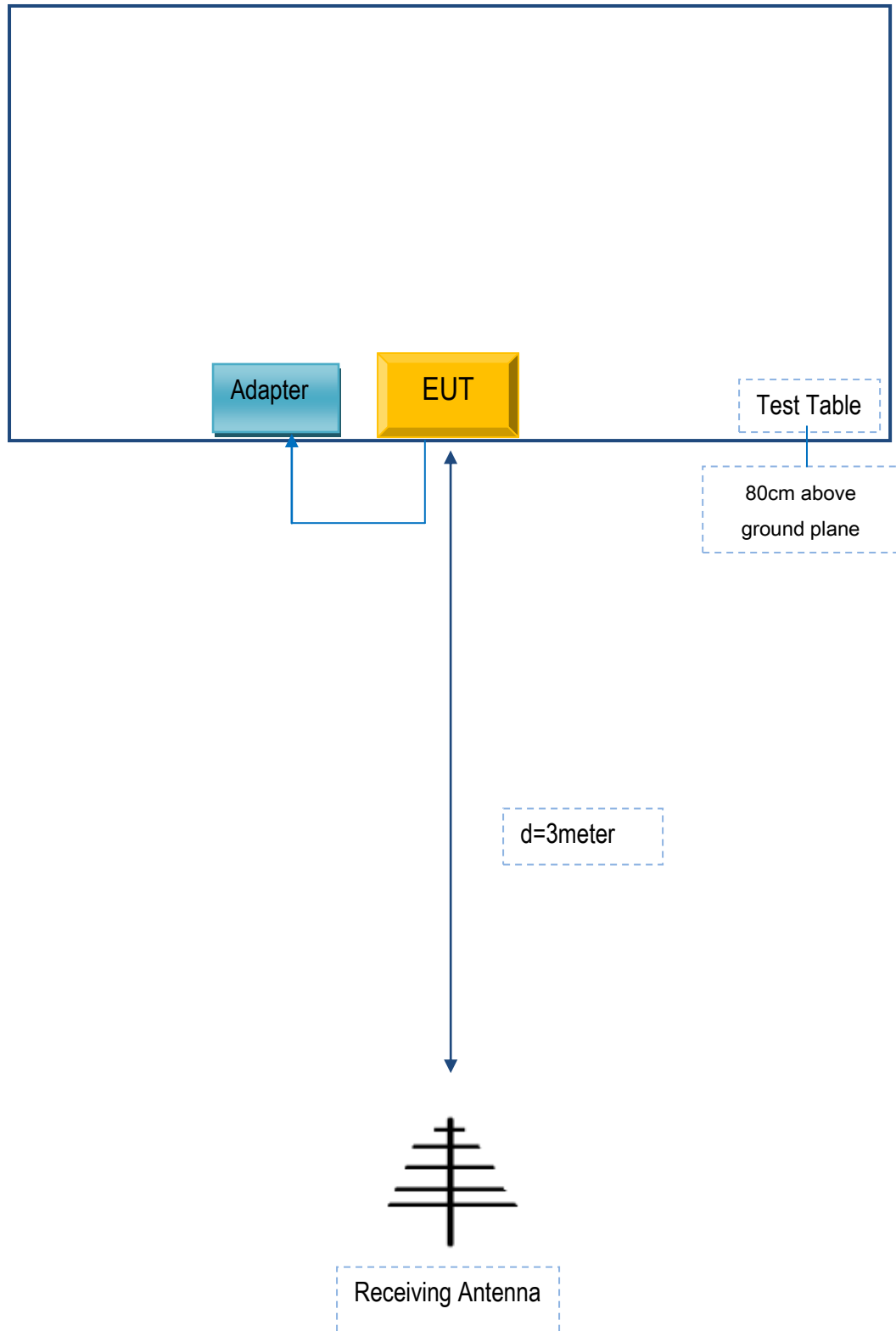
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

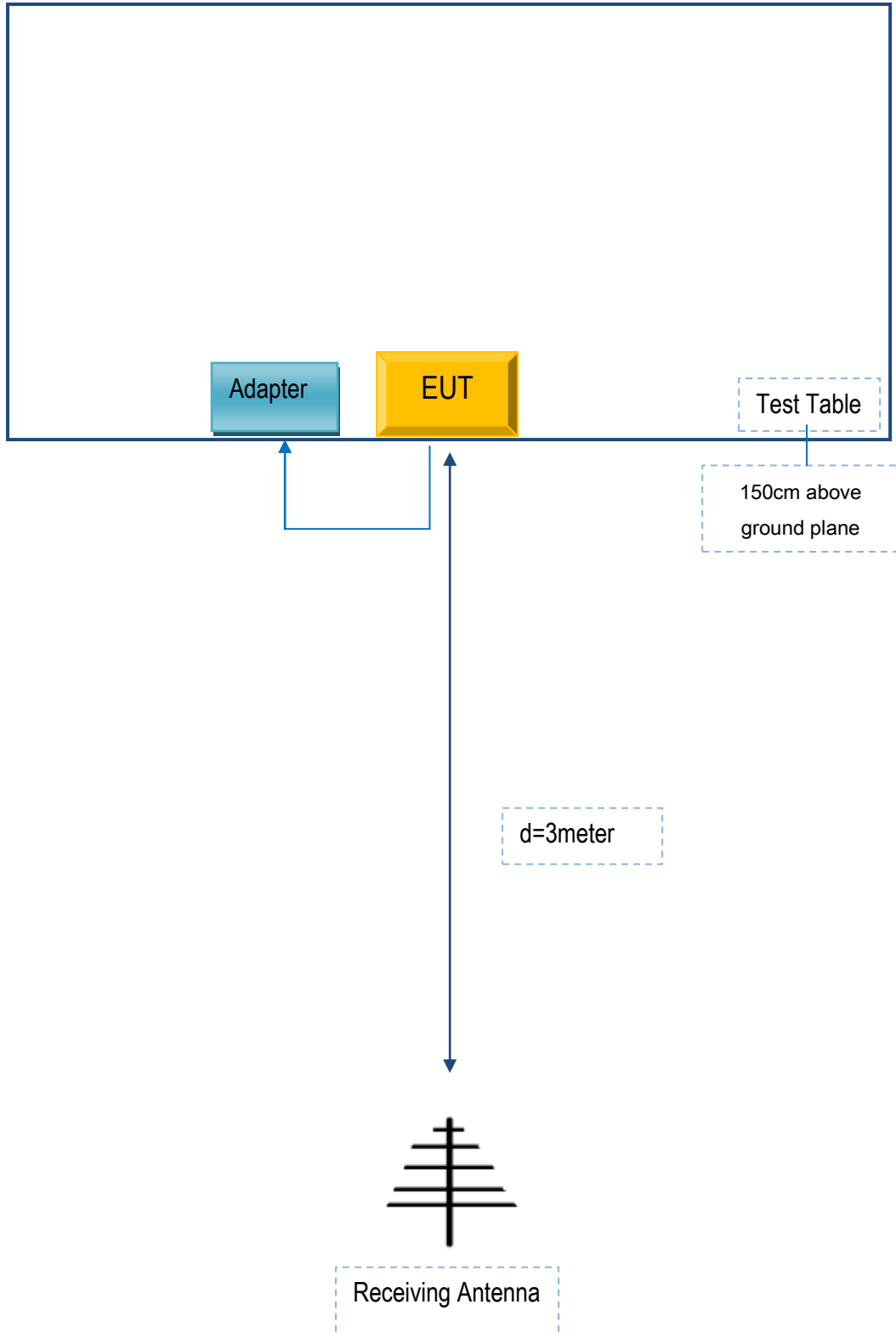
Block Configuration Diagram for AC Line Conducted Emissions



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



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



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

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

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Global Regency Ltd.	Adapter	JML-0500200-LW	C053146

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	C053146

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

Please see the attachment

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Annex E. DECLARATION OF SIMILARITY

N/A