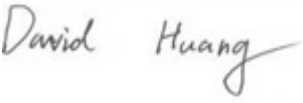


RF TEST REPORT



Report No.: 17070204-FCC-R3

Supersede Report No.: N/A

Applicant	BLU Products, Inc.	
Product Name	Mobile Phone	
Model No.	STUDIO J2	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	March 30 to April 21, 2017	
Issue Date	April 22, 2017	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification	☒	
Equipment did not comply with the specification	☐	
		
Loren Lou 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

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

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

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

Laboratories Introduction

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



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

Accreditations for Conformity Assessment

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

Test Report	17070204-FCC-R3
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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070204-FCC-R3	NONE	Original	April 22, 2017

2. Customer information

Applicant Name	BLU Products, Inc.
Applicant Add	10814 NW 33rd St # 100 Doral, FL 33172
Manufacturer	BLU Products, Inc.
Manufacturer Add	10814 NW 33rd St # 100 Doral, FL 33172

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 of Radiated Emission	Radiated Emission Program-To Shenzhen v2.0
Test Software of Conducted Emission	EZ-EMC(ver.lcp-03A1)

4. Equipment under Test (EUT) Information

Description of EUT: Mobile Phone

Main Model: STUDIO J2

Serial Model: N/A

Date EUT received: March 29, 2017

Test Date(s): March 30 to April 21, 2017

Equipment Category : DSS

Antenna Gain:

- GSM850: -3.8dBi
- PCS1900: -2.5dBi
- UMTS-FDD Band V: -3.8dBi
- UMTS-FDD Band IV: -2.3dBi
- UMTS-FDD Band II: -2.7dBi
- WIFI: -3.6dBi
- Bluetooth/BLE: -3.3dBi
- GPS: -2.5dBi

Antenna Type: PIFA antenna

Type of Modulation:

- GSM / GPRS: GMSK
- EGPRS: GMSK
- UMTS-FDD: QPSK
- 802.11b/g/n: DSSS, OFDM
- Bluetooth: GFSK, π /4DQPSK, 8DPSK
- BLE: GFSK
- GPS: BPSK

Max. Output Power: 5.769dBm

RF Operating Frequency (ies):

- GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz
- PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz
- UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz
- UMTS-FDD Band IV TX: 1712.4 ~ 1752.6 MHz;

RX : 2112.4 ~ 2152.6 MHz

UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz;

RX: 1932.4 ~ 1987.6 MHz

WIFI: 802.11b/g/n(20M): 2412-2462 MHz

WIFI: 802.11n(40M): 2422-2452 MHz

Bluetooth& BLE: 2402-2480 MHz

GPS: 1575.42 MHz

GSM 850: 124CH

PCS1900: 299CH

UMTS-FDD Band V: 102CH

UMTS-FDD Band IV: 202CH

UMTS-FDD Band II: 277CH

Number of Channels:

WIFI :802.11b/g/n(20M): 11CH

WIFI :802.11n(40M): 7CH

Bluetooth: 79CH

BLE: 40CH

GPS:1CH

Port:

USB Port, Earphone Port

Adapter:

Model:TPA-46B050070UU

Input: AC100-240V~50/60Hz,0.2A

Input Power:

Output: DC 5.0V,0.7A

Battery:

Model:C745244200L

Spec:3.8V,7.60Wh,2000mAh

Trade Name :

BLU

FCC ID:

YHLBLUSTUDIOJ2

GPRS/EGPRS Multi-slot class

8/10/12

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 & Unwanted Emissions into Restricted Frequency Bands and Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

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

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

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

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

Antenna Connector Construction

The EUT has 2 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIFI, the gain is -3.3Bi for Bluetooth and BLE, -3.6dBi for WIFI, -2.5dBi for GPS.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is -3.8dBi for GSM850, -2.5Bi for PCS1900, -3.8dBi for UMTS-FDD Band V, -2.3dBi for UMTS-FDD Band IV,-2.7dBi for UMTS-FDD Band II.

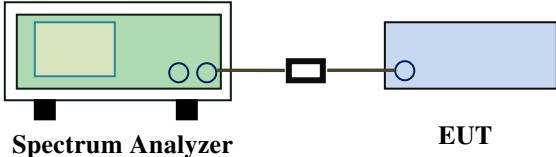
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

Requirement(s):

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

Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

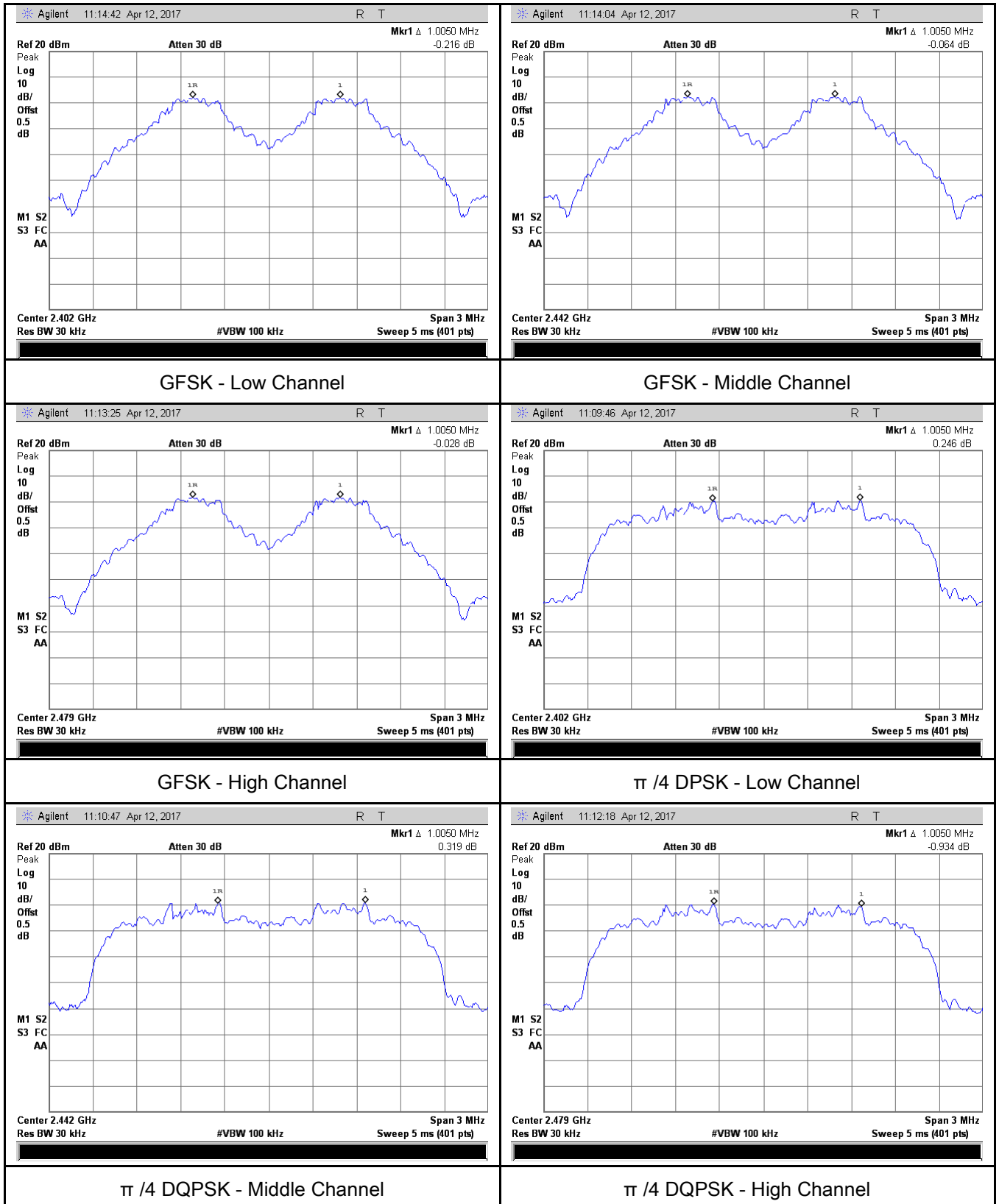
Test Plot ☒ Yes (See below) ☐ N/A

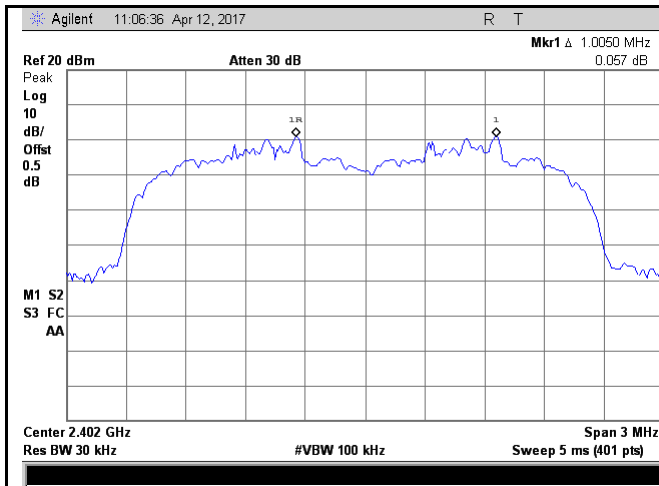
Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.693	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.689	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.691	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.865	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.869	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.872	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.864	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.870	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.865	Pass
	Adjacency Channel	2479			

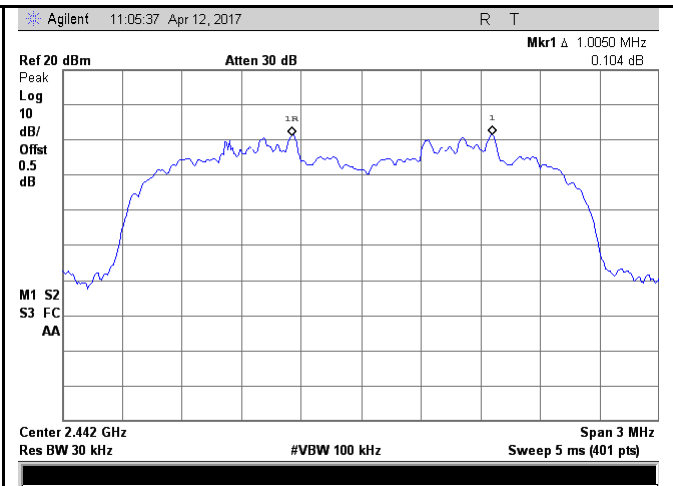
Test Plots

Channel Separation measurement result

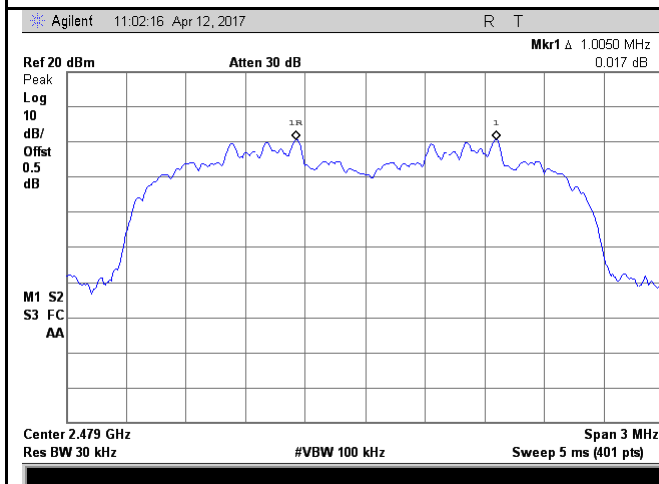




8DPSK - Low Channel



8DPSK - Middle Channel

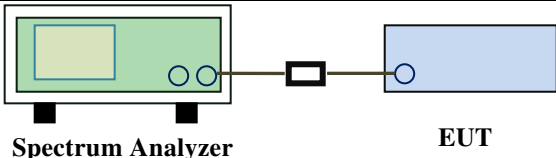


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel - RBW $\geq$ 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		

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

Test Data ☒ Yes ☐ N/A

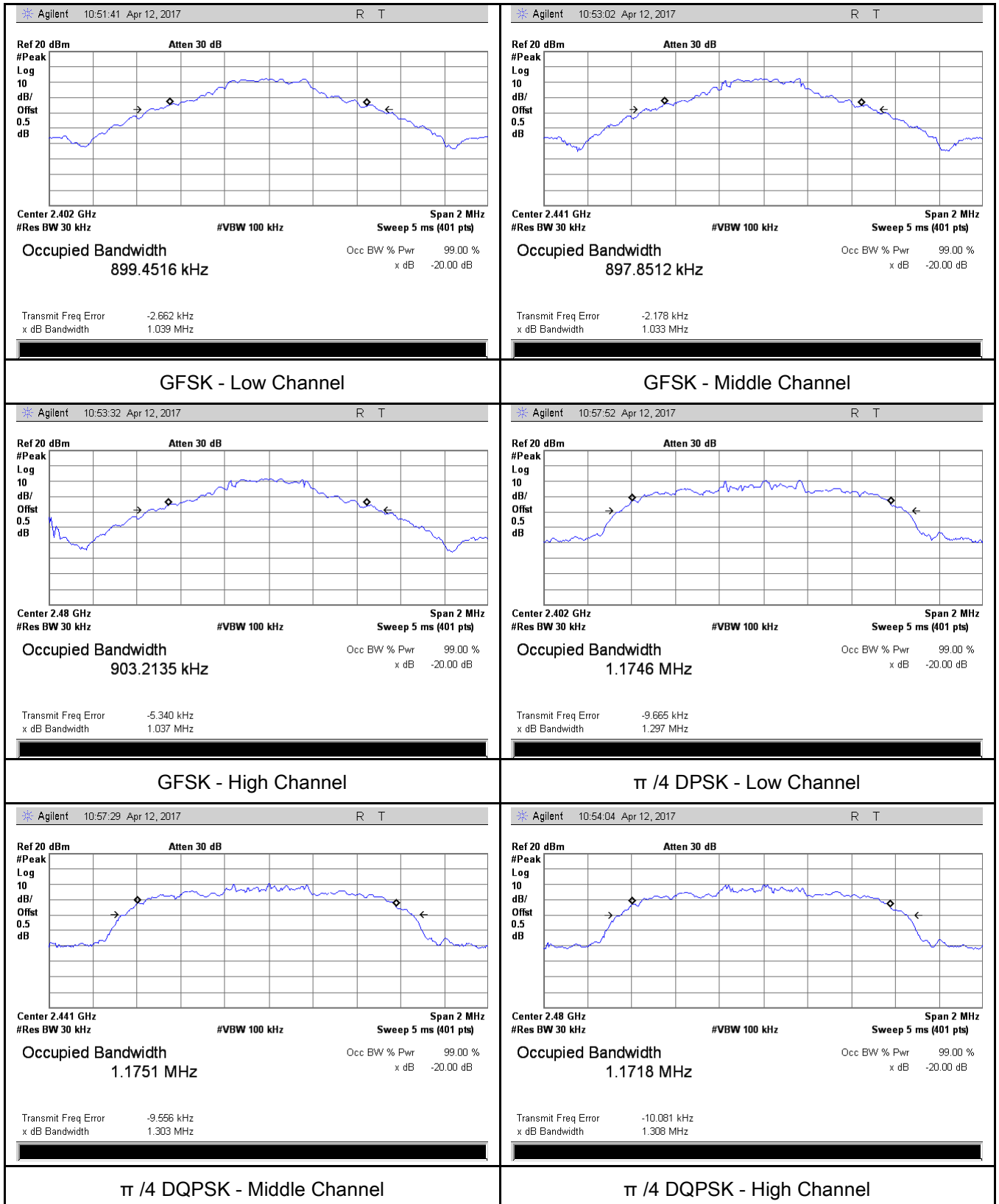
Test Plot ☒ Yes (See below) ☐ N/A

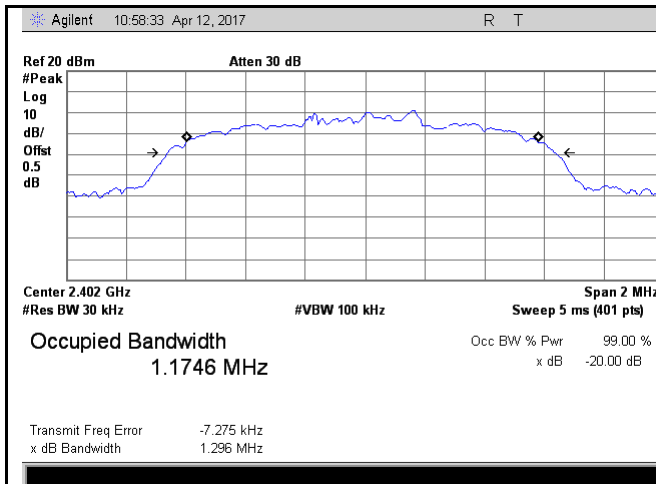
Measurement result

Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.039	0.8995
	Mid	2441	1.033	0.8979
	High	2480	1.037	0.9032
$\pi/4$ DQPSK	Low	2402	1.297	1.1746
	Mid	2441	1.303	1.1751
	High	2480	1.308	1.1718
8-DPSK	Low	2402	1.296	1.1746
	Mid	2441	1.305	1.1702
	High	2480	1.297	1.1711

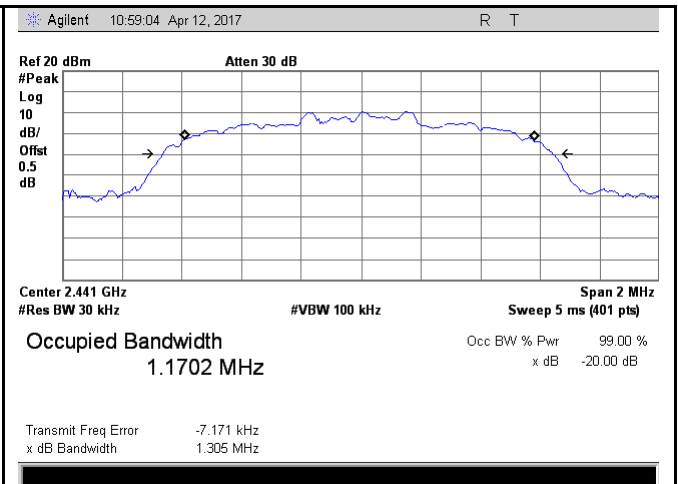
Test Plots

20dB Bandwidth measurement result

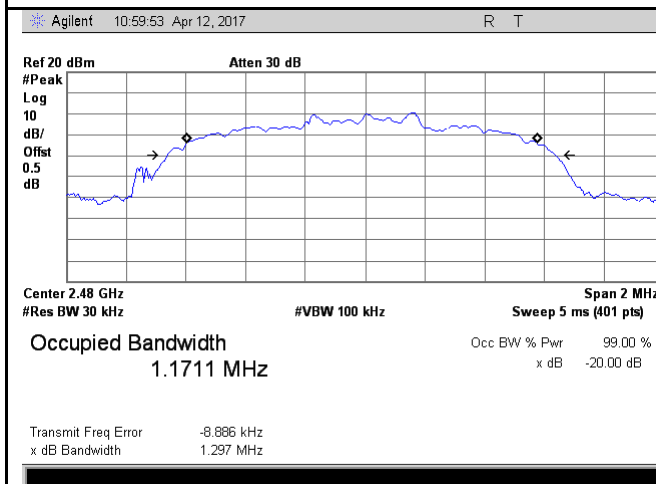




8DPSK - Low Channel



8DPSK - Middle Channel



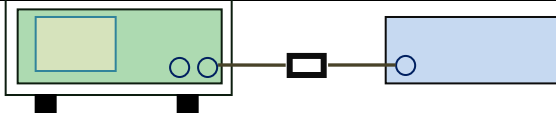
8DPSK - High Channel

6.4 Peak Output Power

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☒
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	☒
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & < 50 channels: ≤ 0.25 Watt	☐
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 1 Watt	☐

Test Setup	 Spectrum Analyzer EUT
------------	--

Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer settings:</u> - 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.
----------------	---

	- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.
Remark	
Result	☒ Pass ☐ Fail

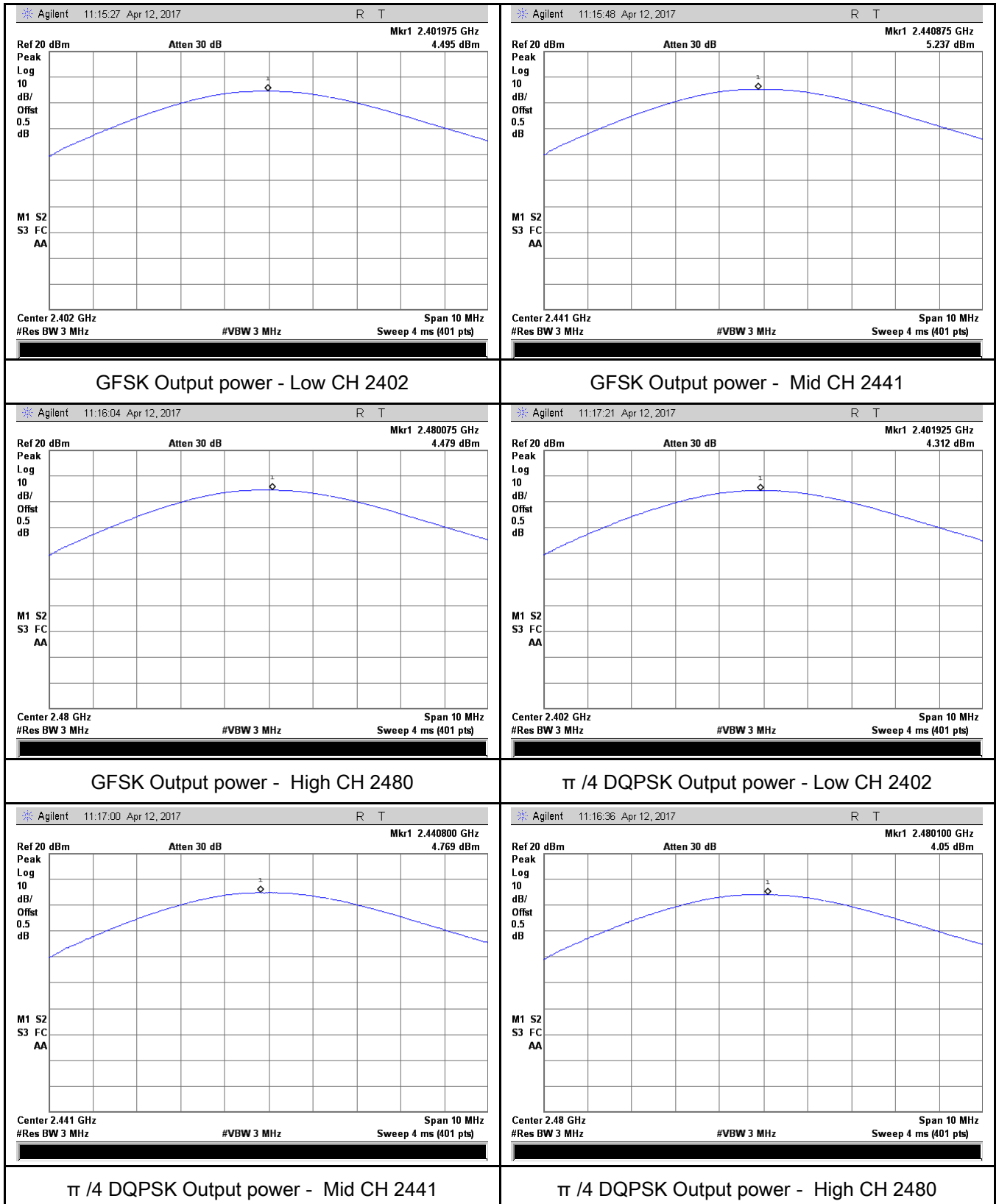
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

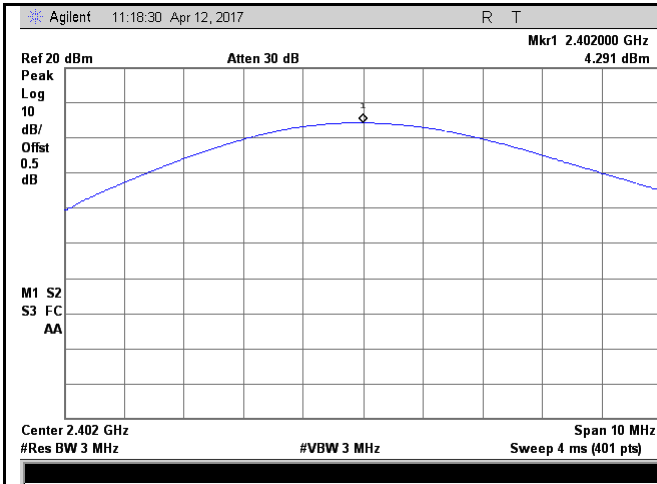
Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	4.495	125	Pass
		Mid	2441	5.237	125	Pass
		High	2480	4.479	125	Pass
	$\pi/4$ DQPSK	Low	2402	4.312	125	Pass
		Mid	2441	5.769	125	Pass
		High	2480	4.050	125	Pass
	8-DPSK	Low	2402	4.291	125	Pass
		Mid	2441	4.754	125	Pass
		High	2480	4.038	125	Pass

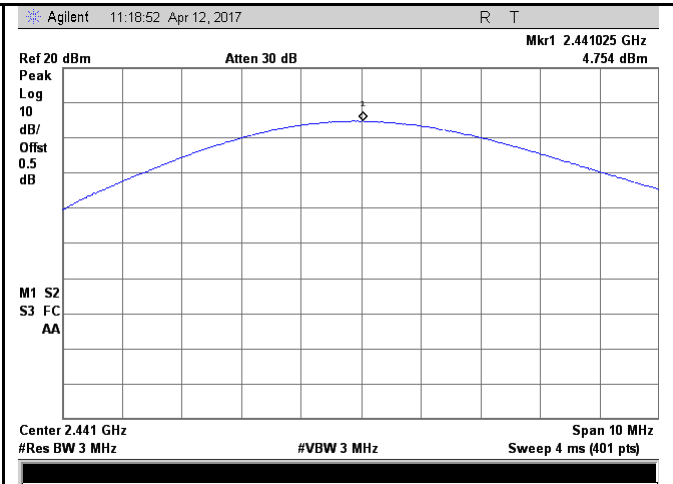
Test Plots

Output Power measurement result

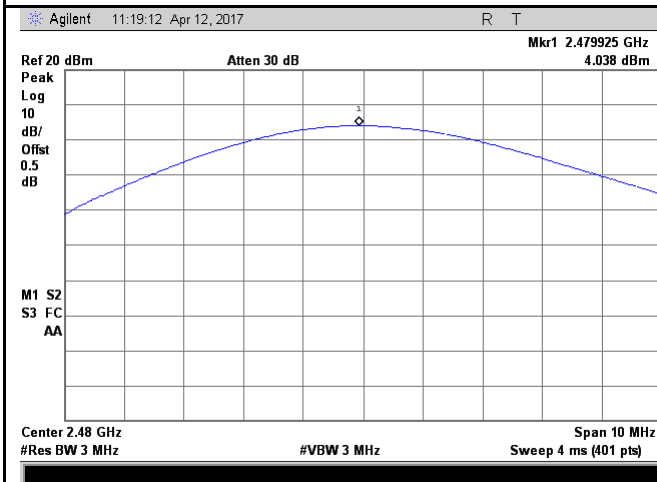




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

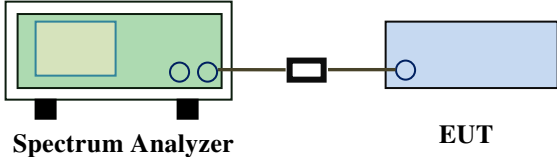


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz ≥ 15 channels	☒
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	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. - Span = the frequency band of operation - RBW ≥ 1% of the span - VBW ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow trace to fully stabilize. - It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).		
Remark			
Result	☒ Pass ☐ Fail		

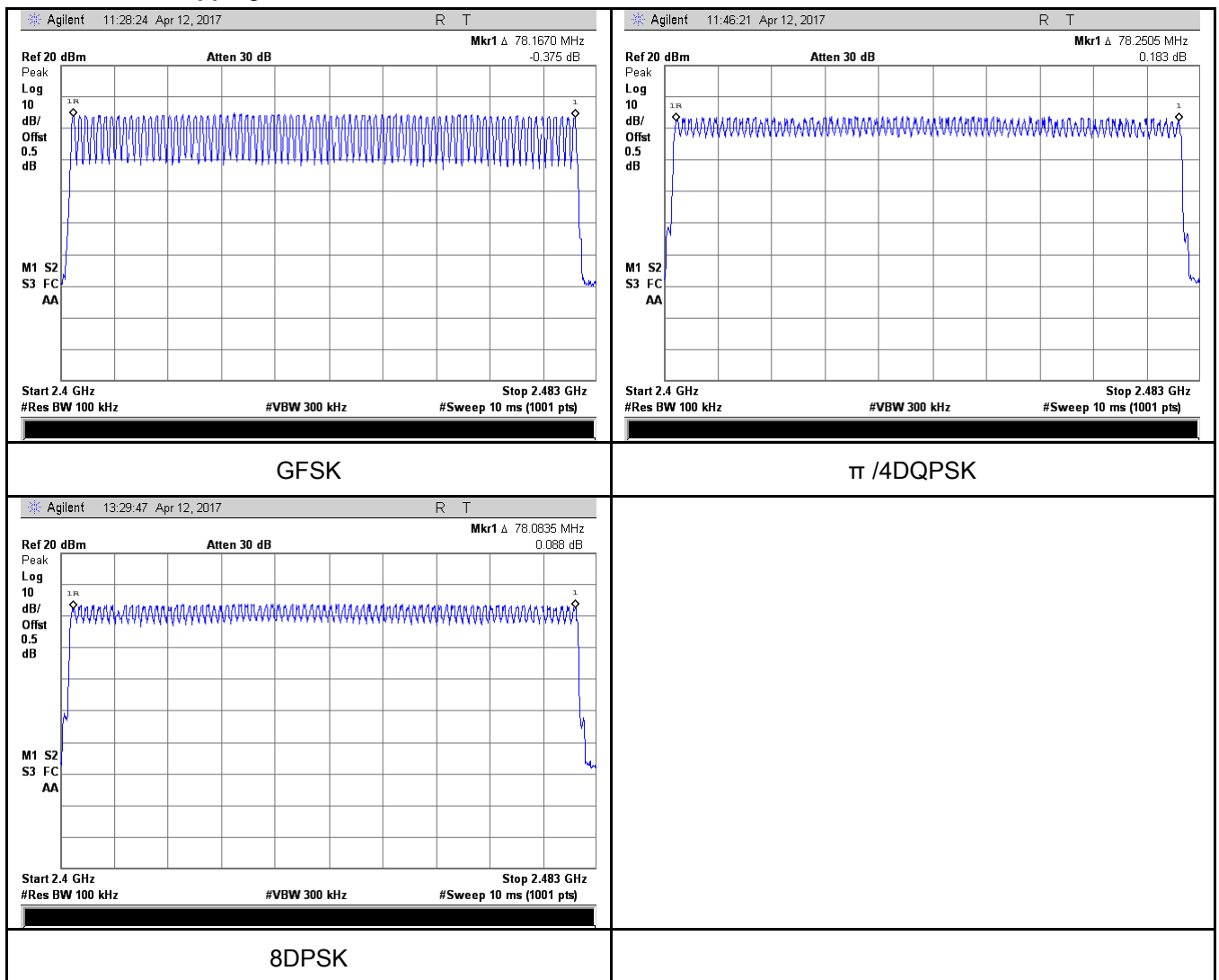
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

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

Test Plots

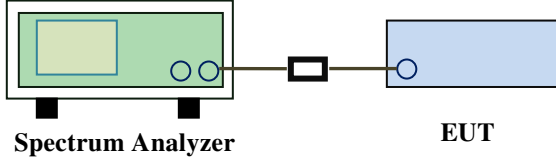
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

Requirement(s):

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

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.87	306.133	400	Pass
		Mid	2.86	305.067	400	Pass
		High	2.86	305.067	400	Pass
	π /4 DQPSK	Low	2.87	306.133	400	Pass
		Mid	2.87	306.133	400	Pass
		High	2.86	305.067	400	Pass
	8-DPSK	Low	2.87	306.133	400	Pass
		Mid	2.87	306.133	400	Pass
		High	2.86	305.067	400	Pass
Note: Dwell time=Pulse Time (ms) $\times$ (1600 $\div$ 6 $\div$ 79) $\times$ 31.6						

Test Plots

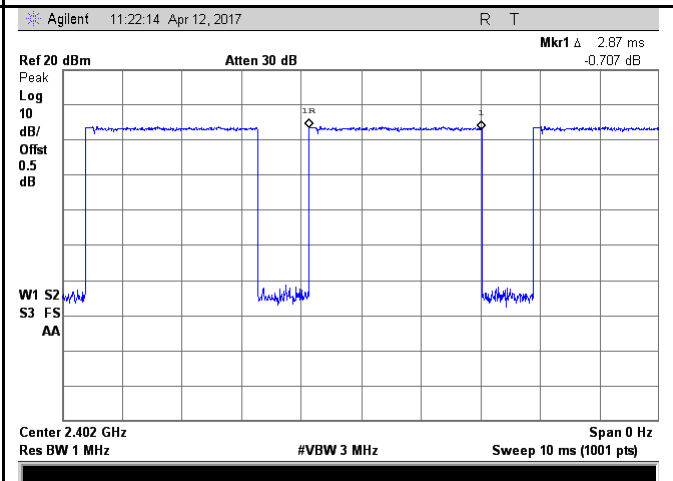
Dwell Time measurement result



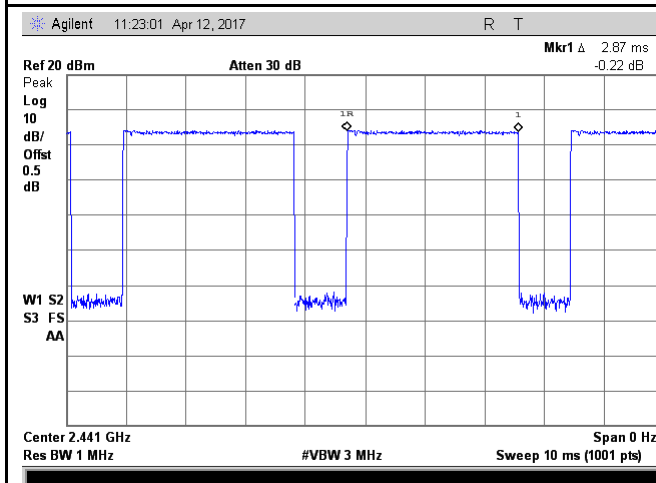
GFSK - Low CH 2402



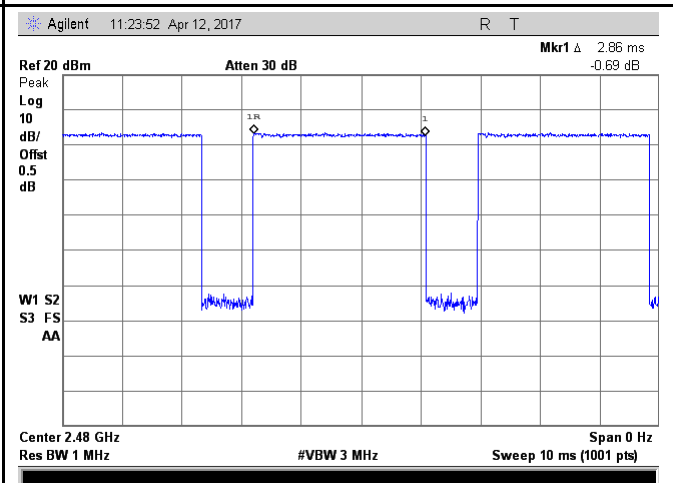
GFSK - Mid CH 2441



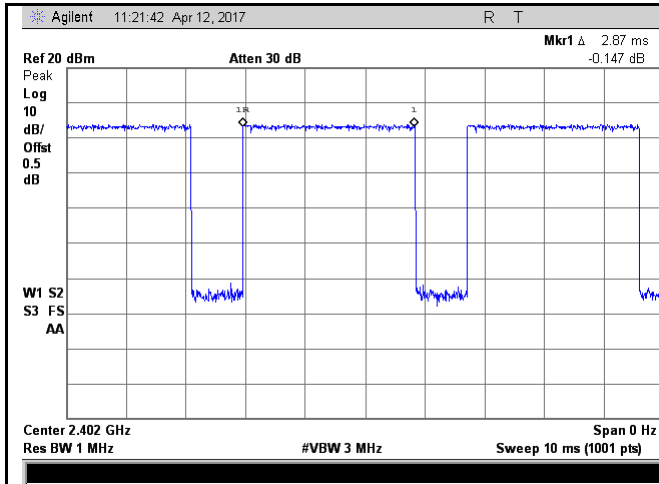
GFDK - High CH 2480



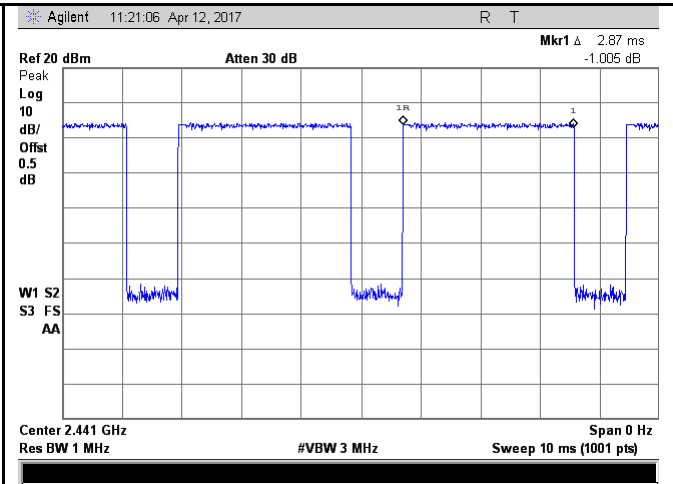
$\pi/4$ DQPSK - Mid CH 2441



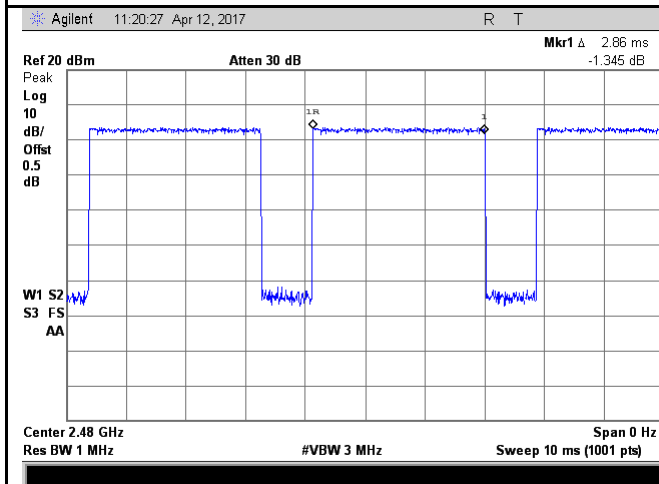
$\pi/4$ DQPSK - High CH 2480



8DPSK - Low CH 2402



8DPSK - Mid CH 2441



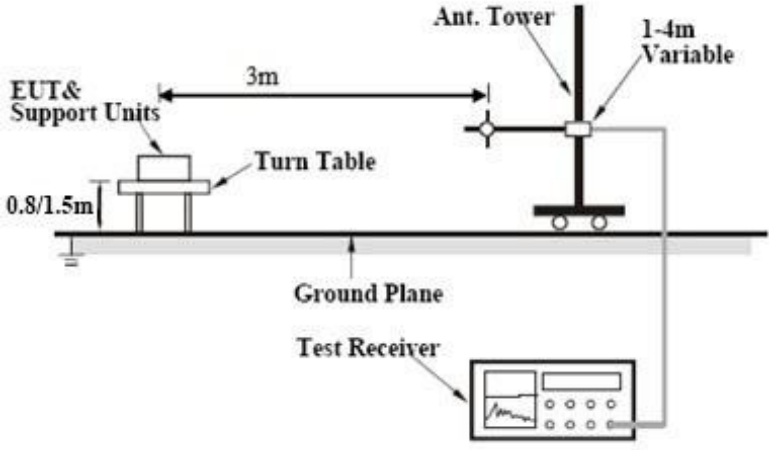
8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1005mbar
Test date :	April 07, 2017
Tested By :	Loren Lou

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. □	☒

Test Setup	
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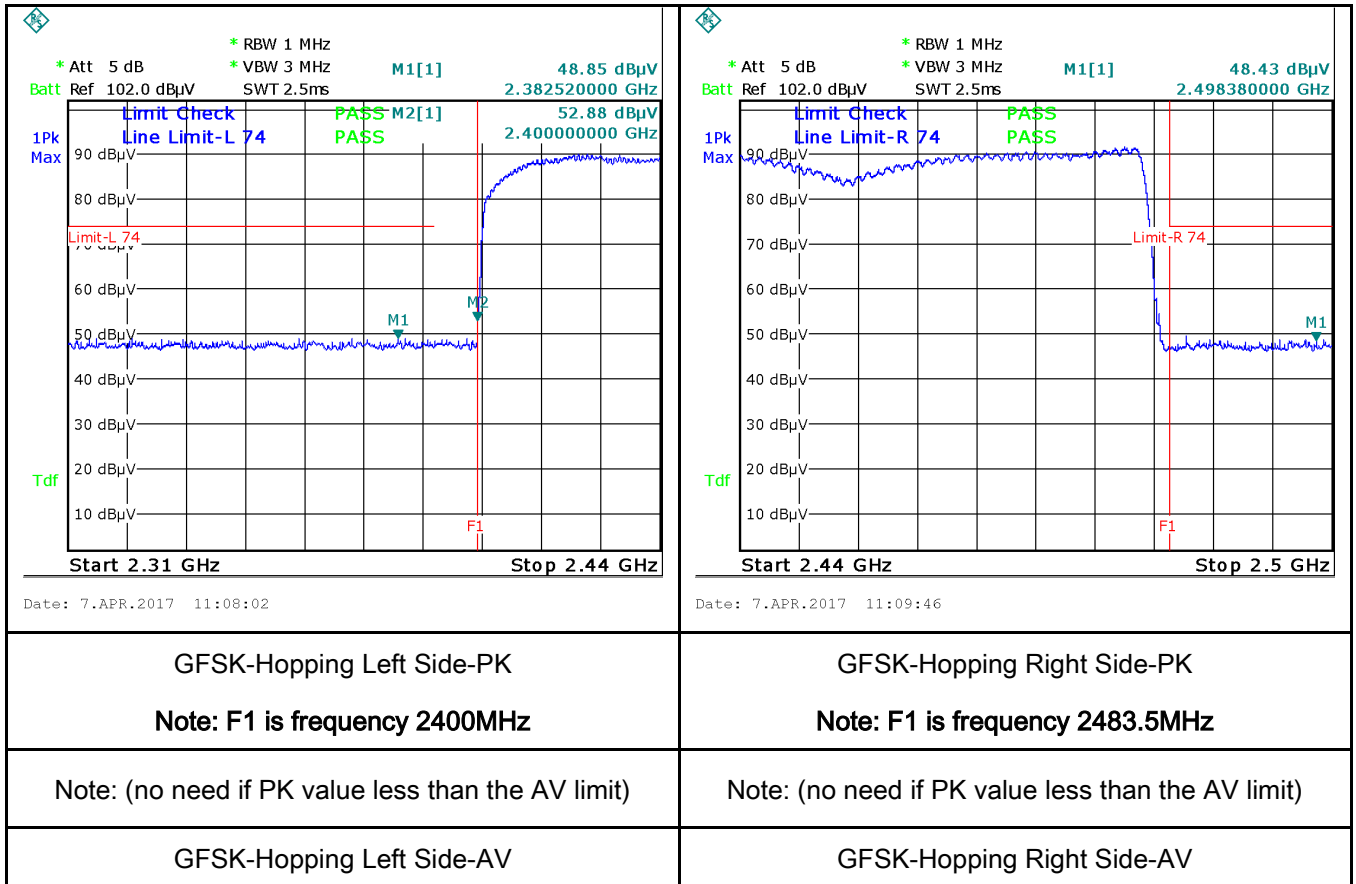
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range,
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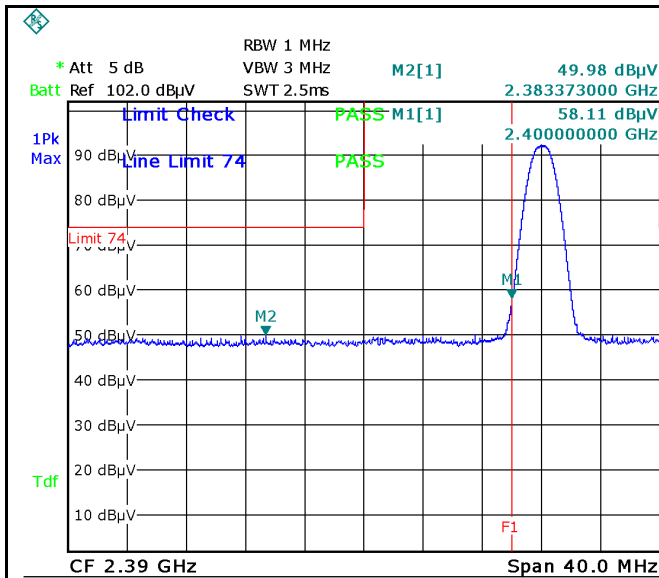
	and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☒ Pass ☐ Fail

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

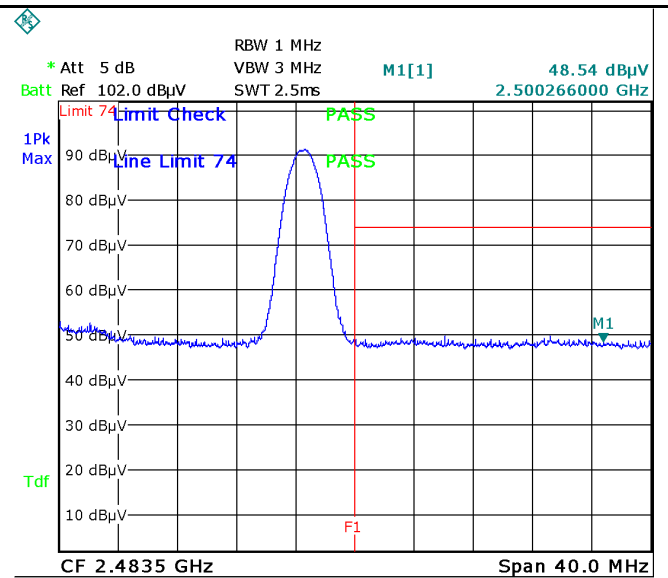
Test Plots

GFSK Mode:





Date: 7.APR.2017 10:44:34



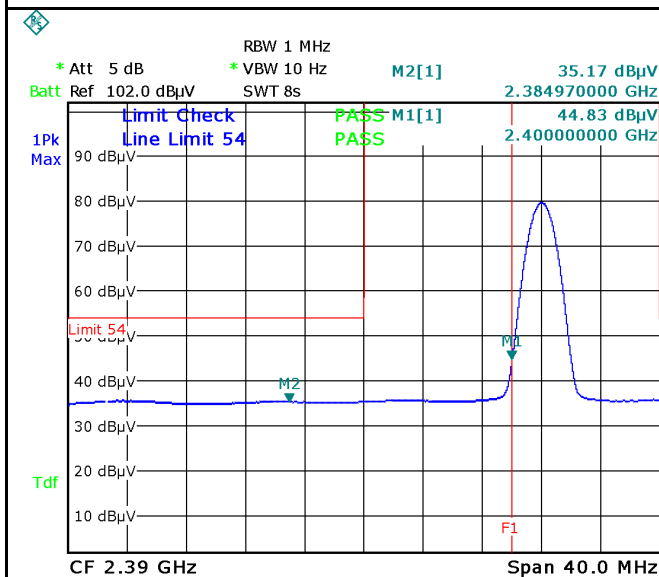
Date: 7.APR.2017 10:56:28

GFSK-Left Side-PK

Note: F1 is frequency 2400MHz

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



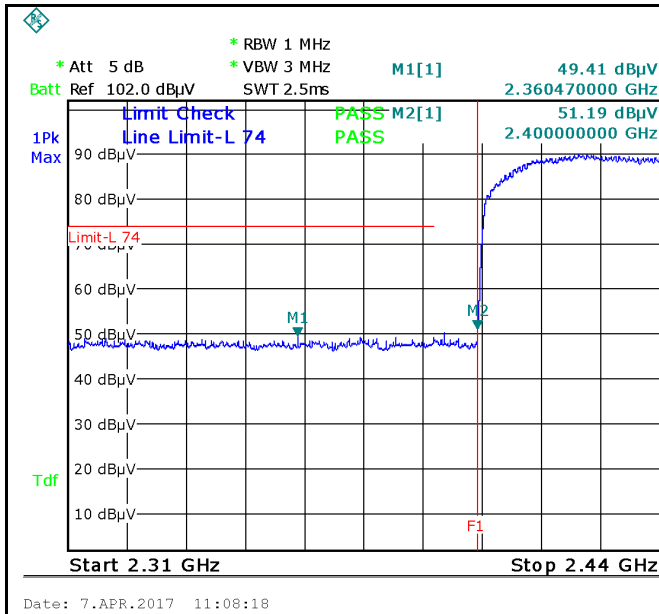
Date: 7.APR.2017 10:46:54

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

GFSK-Left Side-AV

GFSK-Right Side-AV

$\pi/4$ DQPSK Mode:

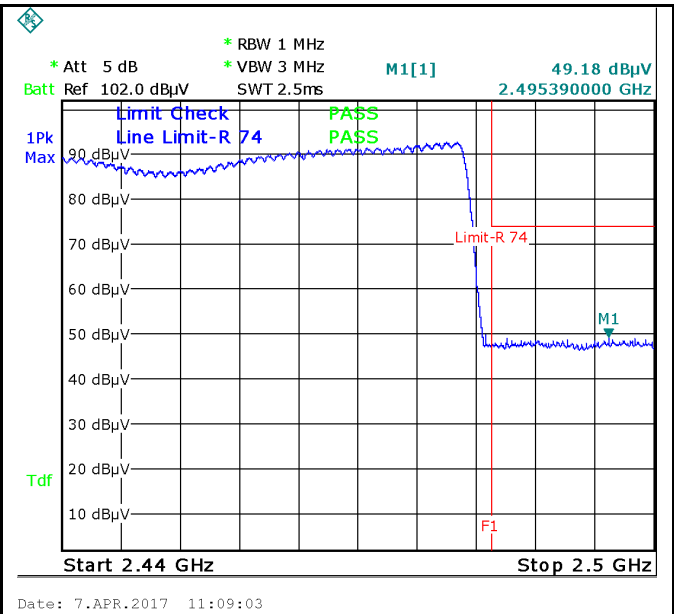


$\pi/4$ DQPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz

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

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

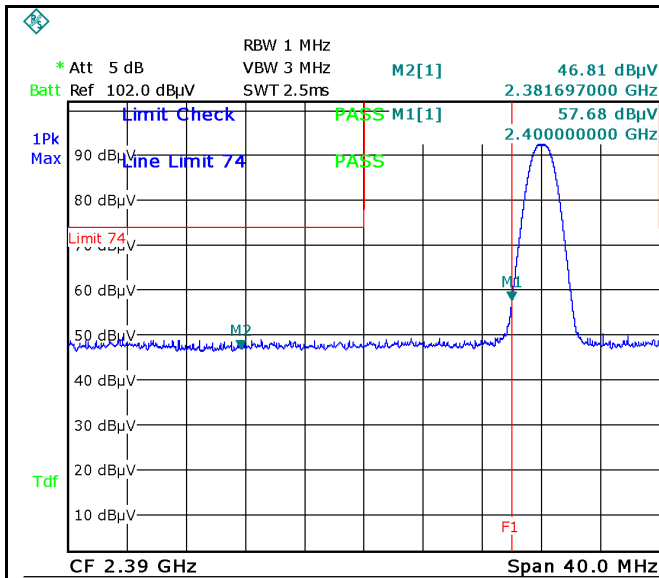


$\pi/4$ DQPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

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

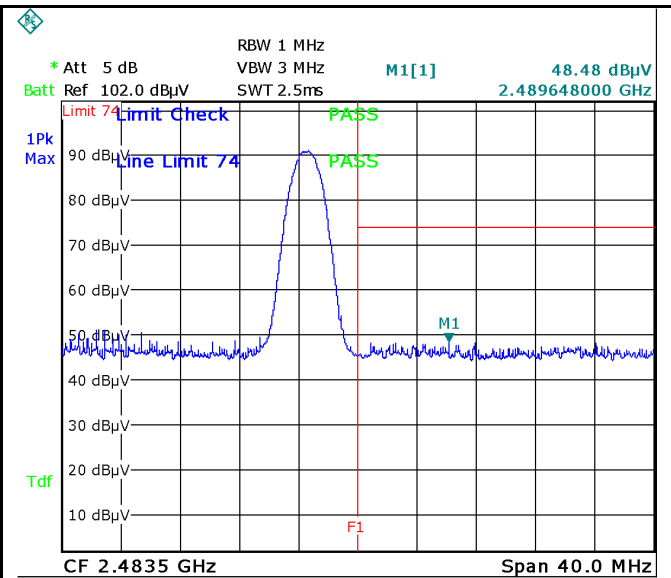
$\pi/4$ DQPSK-Hopping Right-AV



Date: 7.APR.2017 10:45:20

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

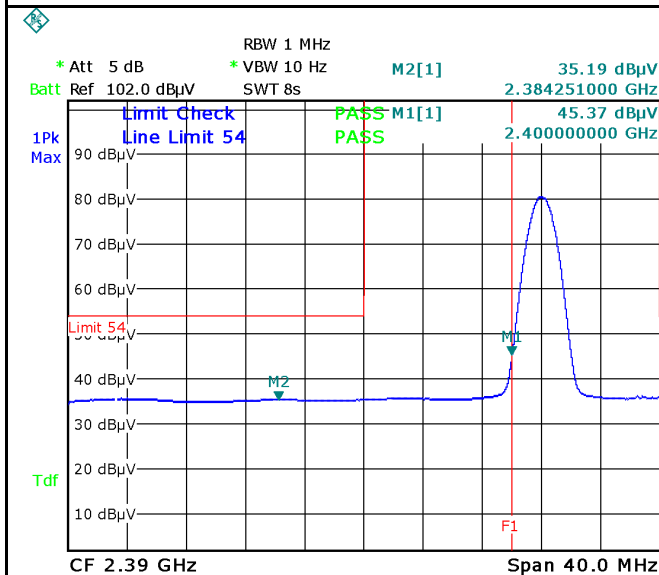
Note: F1 is frequency 2400MHz



Date: 7.APR.2017 10:57:09

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

Note: F1 is frequency 2483.5MHz



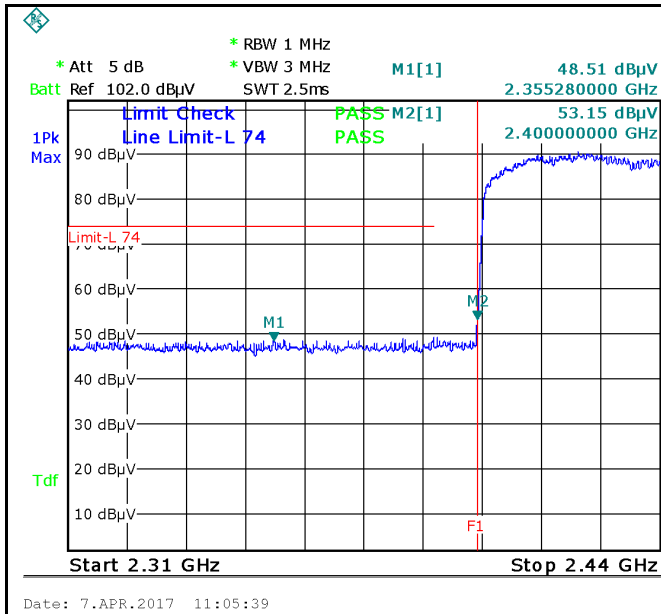
Date: 7.APR.2017 10:47:22

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

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

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

8-DPSK Mode:

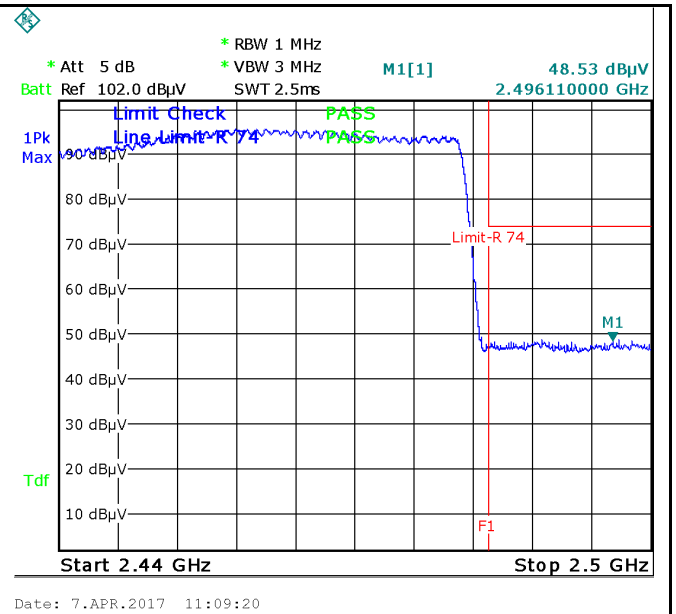


8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz

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

8DPSK-Hopping Left-AV

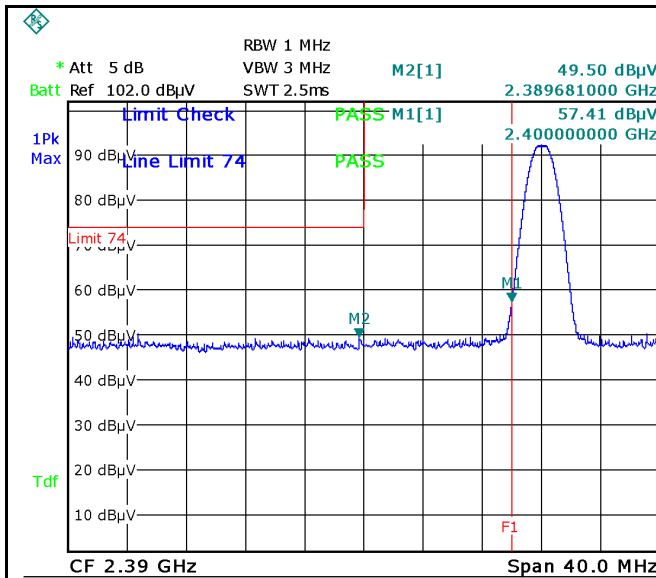


8DPSK-Hopping Right Side-PK

Note: F1 is frequency 2483.5MHz

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

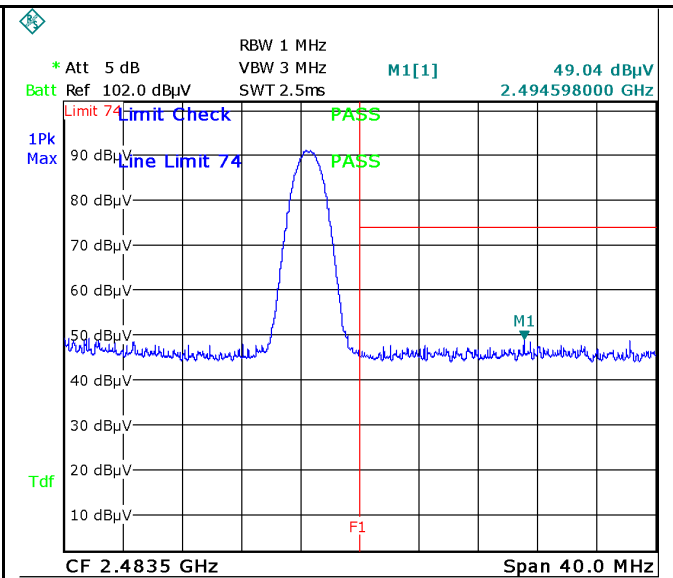
8DPSK-Hopping Right-AV



Date: 7.APR.2017 10:45:35

8DPSK-Left Side-PK

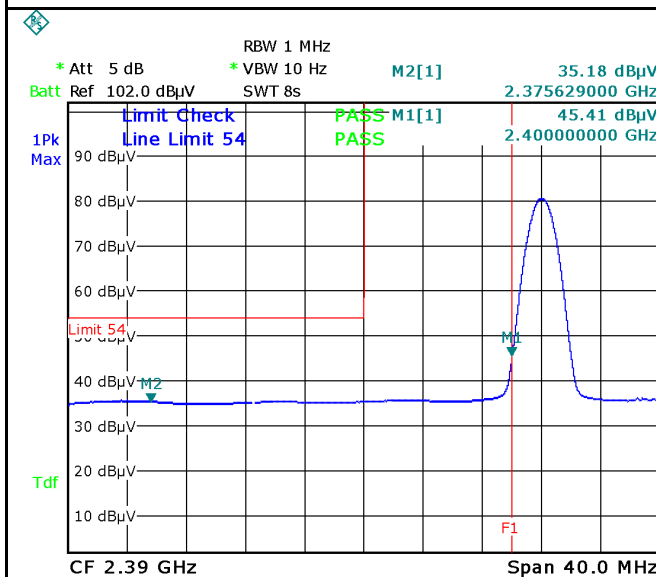
Note: F1 is frequency 2400MHz



Date: 7.APR.2017 10:57:39

8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 7.APR.2017 10:47:32

8DPSK-Left Side-AV

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

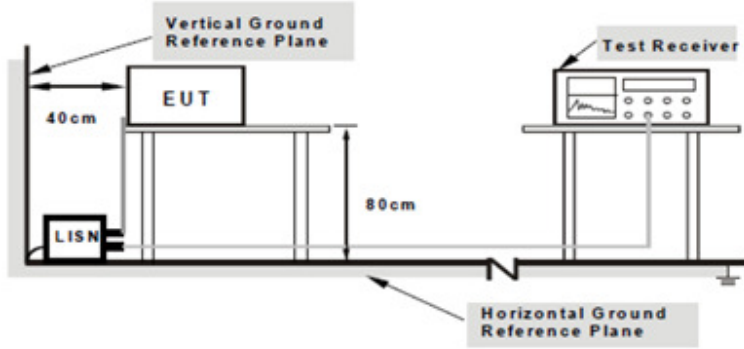
8DPSK-Right Side-AV

6.8 AC Power Line Conducted Emissions

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

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.	☒														
		<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	 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.
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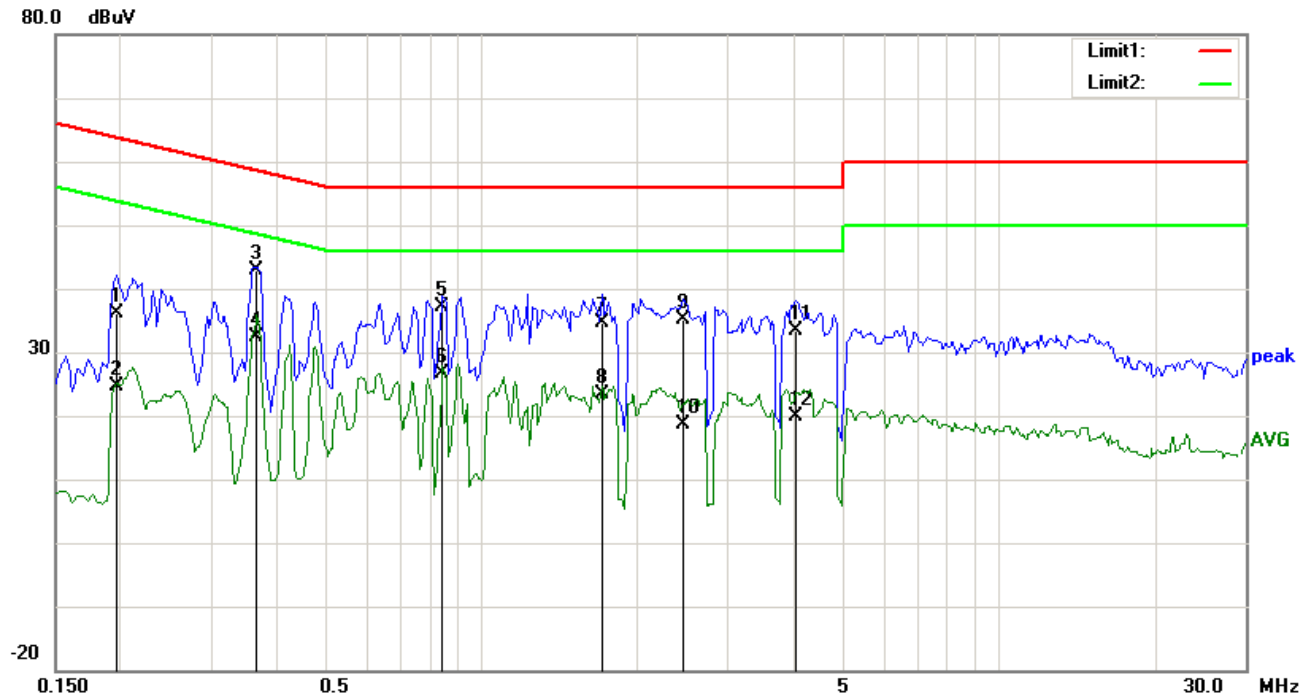
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. - The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss
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	coaxial cable. 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver. 7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. 8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).
Remark	
Result	☒ Pass ☐ Fail

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

Test Mode: Bluetooth Mode

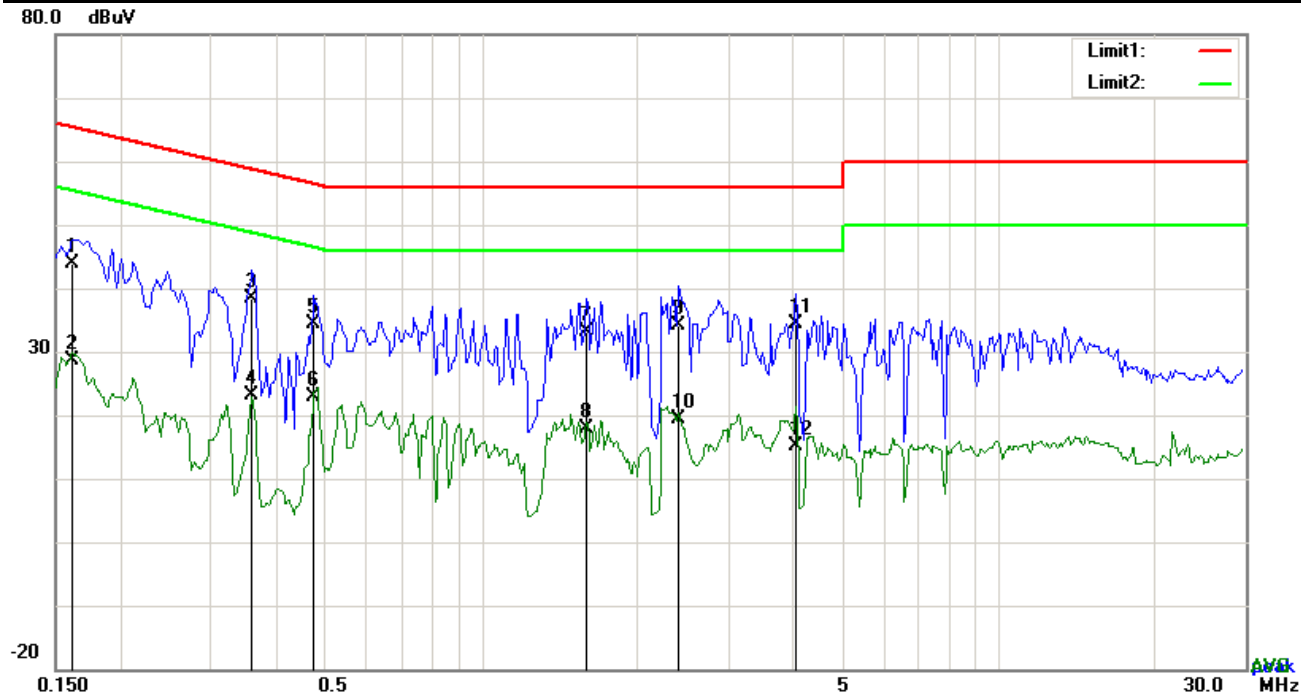


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.1968	26.09	QP	10.03	36.12	63.74	-27.62
2	L1	0.1968	14.50	AVG	10.03	24.53	53.74	-29.21
3	L1	0.3684	32.86	QP	10.03	42.89	58.54	-15.65
4	L1	0.3684	22.37	AVG	10.03	32.40	48.54	-16.14
5	L1	0.8403	27.20	QP	10.03	37.23	56.00	-18.77
6	L1	0.8403	16.56	AVG	10.03	26.59	46.00	-19.41
7	L1	1.7100	24.54	QP	10.04	34.58	56.00	-21.42
8	L1	1.7100	13.44	AVG	10.04	23.48	46.00	-22.52
9	L1	2.4549	25.04	QP	10.05	35.09	56.00	-20.91
10	L1	2.4549	8.51	AVG	10.05	18.56	46.00	-27.44
11	L1	4.0686	23.40	QP	10.07	33.47	56.00	-22.53
12	L1	4.0686	9.74	AVG	10.07	19.81	46.00	-26.19

Test Mode: Bluetooth Mode

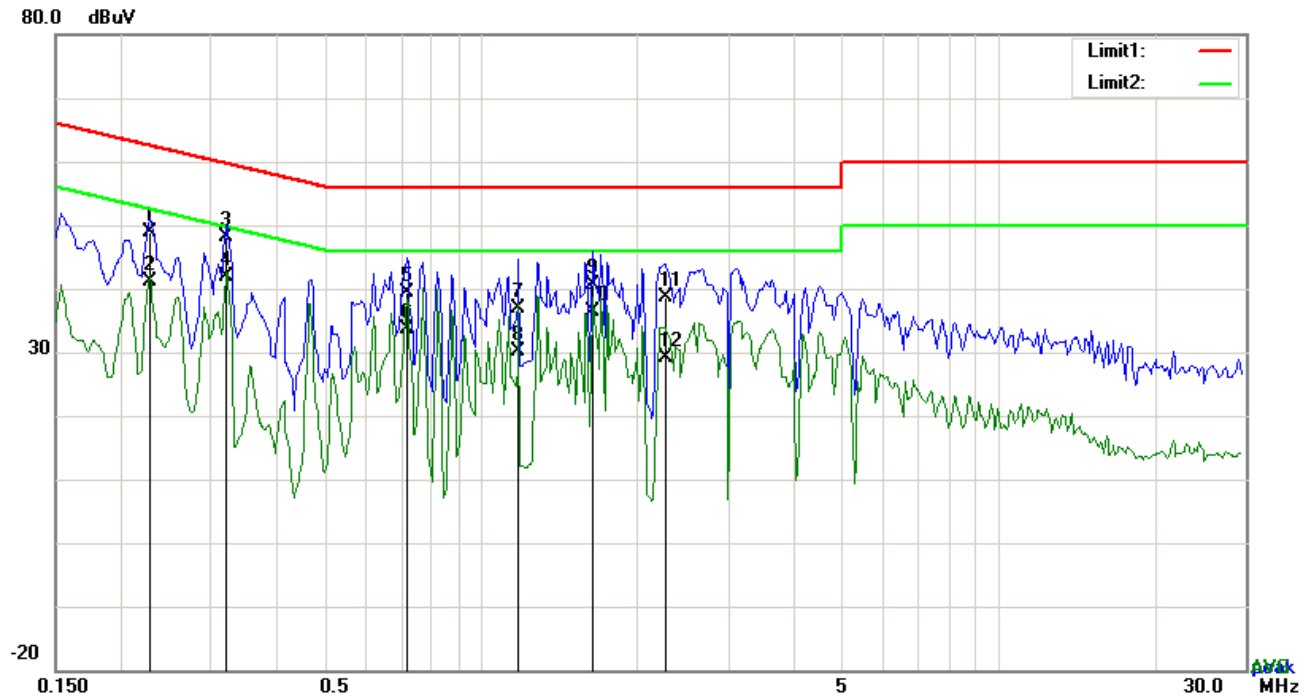


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1617	33.79	QP	10.02	43.81	65.38	-21.57
2	N	0.1617	18.66	AVG	10.02	28.68	55.38	-26.70
3	N	0.3606	28.29	QP	10.02	38.31	58.71	-20.40
4	N	0.3606	13.11	AVG	10.02	23.13	48.71	-25.58
5	N	0.4737	24.43	QP	10.02	34.45	56.45	-22.00
6	N	0.4737	12.88	AVG	10.02	22.90	46.45	-23.55
7	N	1.6008	22.97	QP	10.04	33.01	56.00	-22.99
8	N	1.6008	7.89	AVG	10.04	17.93	46.00	-28.07
9	N	2.3964	24.17	QP	10.04	34.21	56.00	-21.79
10	N	2.3964	9.42	AVG	10.04	19.46	46.00	-26.54
11	N	4.0608	24.20	QP	10.06	34.26	56.00	-21.74
12	N	4.0608	4.95	AVG	10.06	15.01	46.00	-30.99

Test Mode: Bluetooth Mode

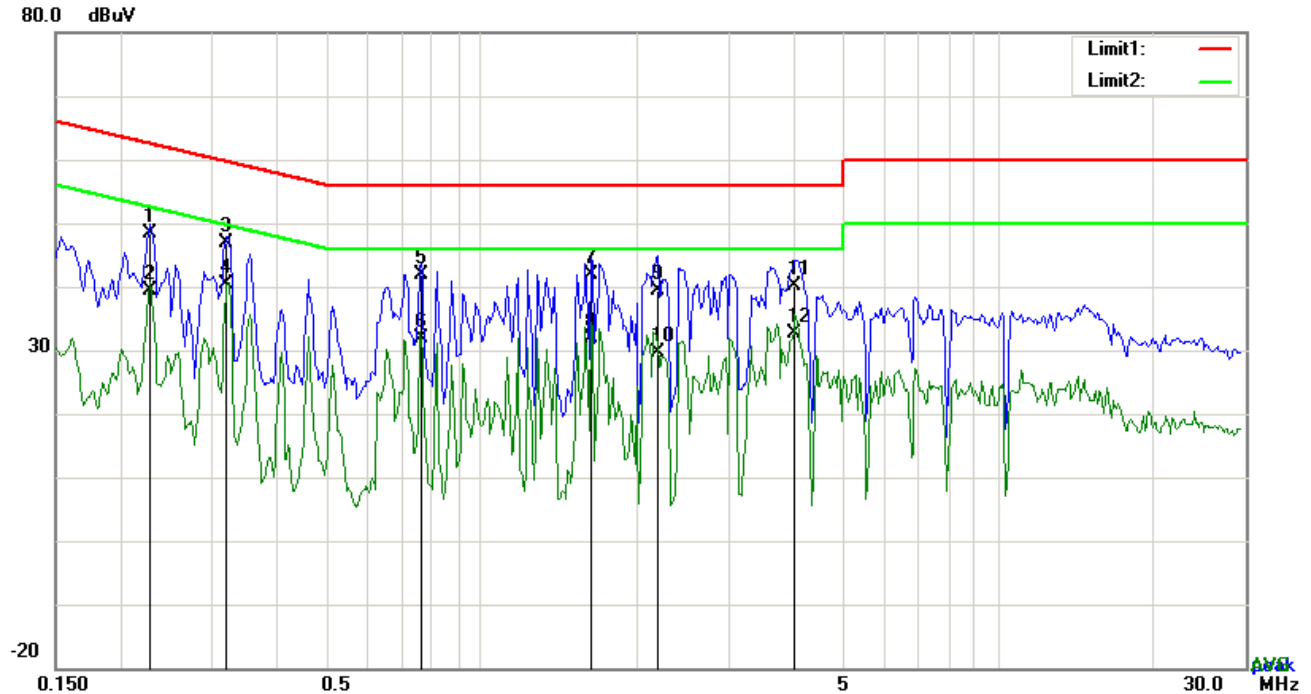


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2280	38.91	QP	10.03	48.94	62.52	-13.58
2	L1	0.2280	31.12	AVG	10.03	41.15	52.52	-11.37
3	L1	0.3216	38.03	QP	10.03	48.06	59.67	-11.61
4	L1	0.3216	31.91	AVG	10.03	41.94	49.67	-7.73
5	L1	0.7194	29.24	QP	10.03	39.27	56.00	-16.73
6	L1	0.7194	23.51	AVG	10.03	33.54	46.00	-12.46
7	L1	1.1835	26.96	QP	10.03	36.99	56.00	-19.01
8	L1	1.1835	20.14	AVG	10.03	30.17	46.00	-15.83
9	L1	1.6437	30.53	QP	10.04	40.57	56.00	-15.43
10	L1	1.6437	26.40	AVG	10.04	36.44	46.00	-9.56
11	L1	2.2677	28.59	QP	10.05	38.64	56.00	-17.36
12	L1	2.2677	19.09	AVG	10.05	29.14	46.00	-16.86

Test Mode: Bluetooth Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

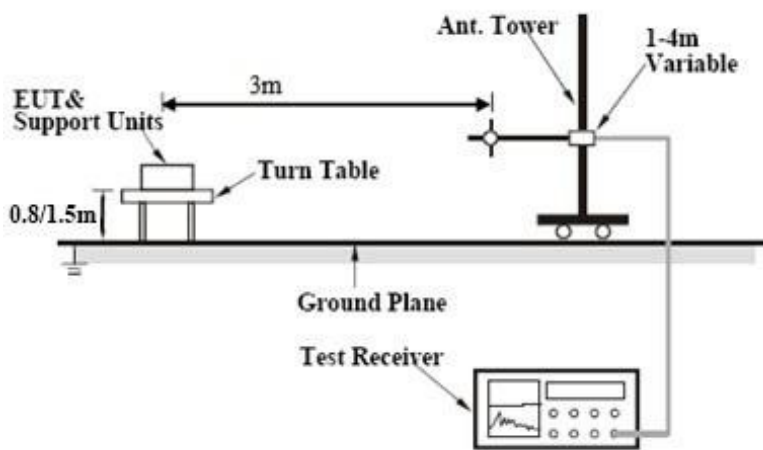
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	N	0.2280	38.37	QP	10.02	48.39	62.52	-14.13
2	N	0.2280	29.25	AVG	10.02	39.27	52.52	-13.25
3	N	0.3216	36.95	QP	10.02	46.97	59.67	-12.70
4	N	0.3216	30.32	AVG	10.02	40.34	49.67	-9.33
5	N	0.7662	31.80	QP	10.03	41.83	56.00	-14.17
6	N	0.7662	21.87	AVG	10.03	31.90	46.00	-14.10
7	N	1.6359	31.80	QP	10.04	41.84	56.00	-14.16
8	N	1.6359	21.80	AVG	10.04	31.84	46.00	-14.16
9	N	2.2014	29.30	QP	10.04	39.34	56.00	-16.66
10	N	2.2014	19.48	AVG	10.04	29.52	46.00	-16.48
11	N	4.0413	30.10	QP	10.06	40.16	56.00	-15.84
12	N	4.0413	22.50	AVG	10.06	32.56	46.00	-13.44

6.9 Radiated Emissions & Restricted Band

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 12, 2017
Tested By :	Loren Lou

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	
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Procedure	- 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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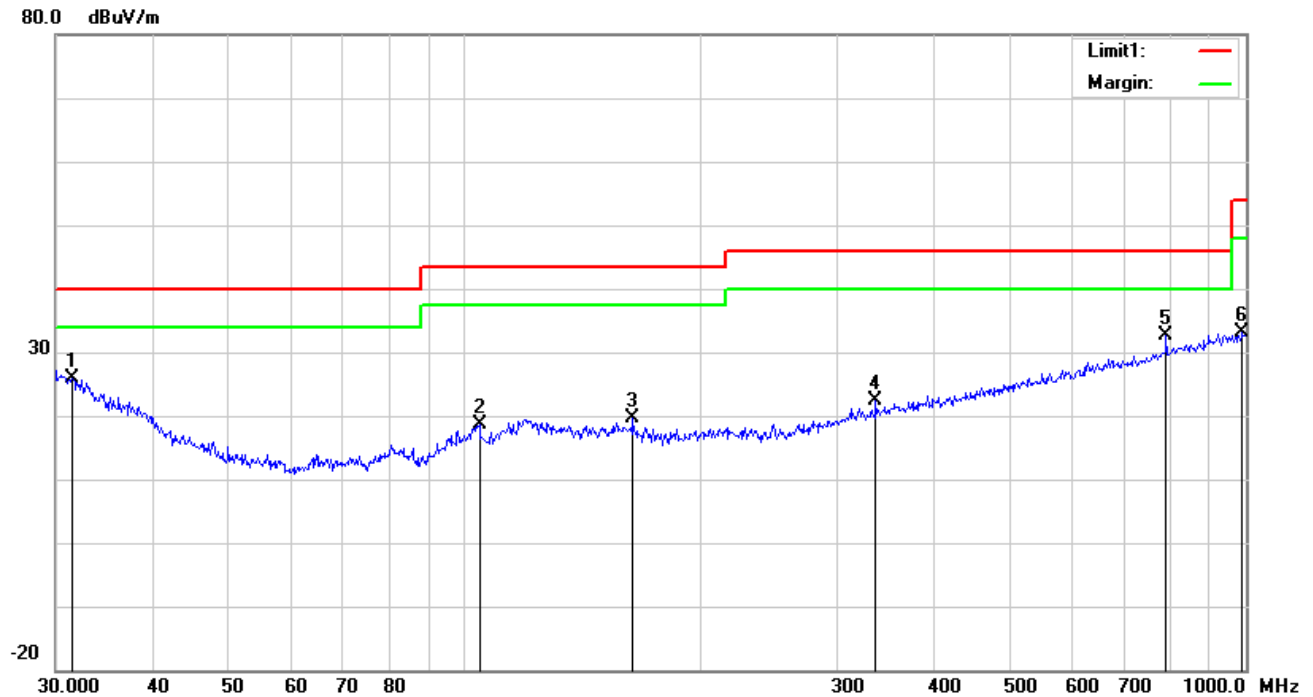
	a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. 4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. 5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Mode: Bluetooth Mode

Below 1GHz



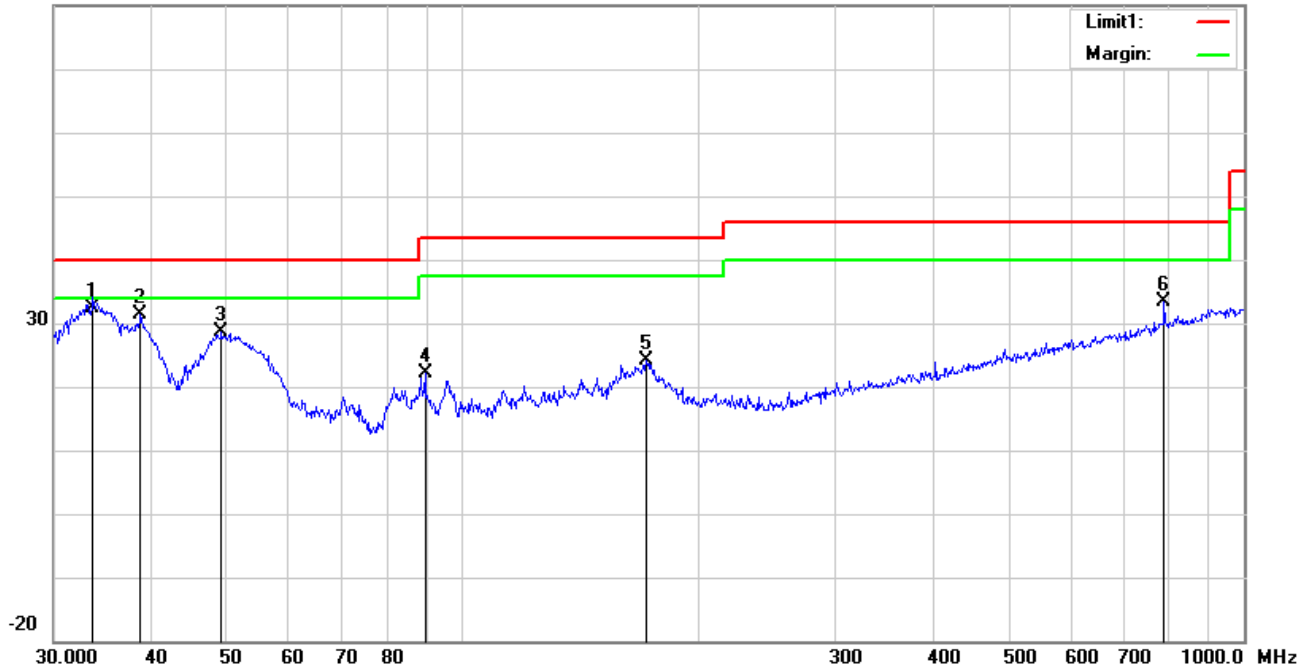
Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	31.5095	27.25	peak	20.24	22.27	0.66	25.88	40.00	-14.12	100	262
2	H	104.5361	28.61	peak	11.19	22.33	1.14	18.61	43.50	-24.89	100	215
3	H	164.3302	28.21	peak	12.25	22.27	1.38	19.57	43.50	-23.93	100	21
4	H	336.0352	28.16	peak	14.36	22.19	1.97	22.30	46.00	-23.70	200	272
5	H	790.6188	29.66	peak	21.29	21.17	2.94	32.72	46.00	-13.28	100	331
6	H	989.5355	27.50	peak	22.95	20.71	3.41	33.15	54.00	-20.85	100	137

Below 1GHz

80.0 dBuV/m



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	V	33.6803	35.47	QP	18.57	22.26	0.72	32.50	40.00	-7.50	100	148
2	V	38.7518	38.04	peak	14.81	22.27	0.78	31.36	40.00	-8.64	200	246
3	V	49.1866	41.40	peak	8.76	22.37	0.79	28.58	40.00	-11.42	100	259
4	V	89.5900	35.52	peak	7.98	22.32	0.96	22.14	43.50	-21.36	100	52
5	V	171.9946	33.29	peak	11.64	22.26	1.36	24.03	43.50	-19.47	100	326
6	V	790.6188	30.29	peak	21.29	21.17	2.94	33.35	46.00	-12.65	100	116

Above 1GHz

Test Mode:	Transmitting Mode
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Low Channel: $\pi/4$ DQPSK Mode (Worst Case) (2402 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4804	38.64	AV	V	33.67	6.86	32.66	46.51	54	-7.49
4804	37.74	AV	H	33.67	6.86	32.66	45.61	54	-8.39
4804	48.65	PK	V	33.67	6.86	32.66	56.52	74	-17.48
4804	46.63	PK	H	33.67	6.86	32.66	54.5	74	-19.5
17802	24.54	AV	V	45.03	11.21	32.38	48.4	54	-5.6
17802	24.31	AV	H	45.03	11.21	32.38	48.17	54	-5.83
17802	40.08	PK	V	45.03	11.21	32.38	63.94	74	-10.06
17802	39.49	PK	H	45.03	11.21	32.38	63.35	74	-10.65

Middle Channel: $\pi/4$ DQPSK Mode (Worst Case) (2441 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4882	38.87	AV	V	33.71	6.95	32.74	46.79	54	-7.21
4882	37.08	AV	H	33.71	6.95	32.74	45	54	-9
4882	49.24	PK	V	33.71	6.95	32.74	57.16	74	-16.84
4882	46.91	PK	H	33.71	6.95	32.74	54.83	74	-19.17
17812	25.34	AV	V	45.15	11.18	32.41	49.26	54	-4.74
17812	23.88	AV	H	45.15	11.18	32.41	47.8	54	-6.2
17812	41.55	PK	V	45.15	11.18	32.41	65.47	74	-8.53
17812	40.73	PK	H	45.15	11.18	32.41	64.65	74	-9.35

High Channel: $\pi/4$ DQPSK Mode (Worst Case) (2480 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4960	38.82	AV	V	33.9	6.76	32.74	46.74	54	-7.26
4960	38.1	AV	H	33.9	6.76	32.74	46.02	54	-7.98
4960	47.34	PK	V	33.9	6.76	32.74	55.26	74	-18.74
4960	46.59	PK	H	33.9	6.76	32.74	54.51	74	-19.49
17820	23.66	AV	V	45.22	11.35	32.38	47.85	54	-6.15
17820	23.6	AV	H	45.22	11.35	32.38	47.79	54	-6.21
17820	42.53	PK	V	45.22	11.35	32.38	66.72	74	-7.28
17820	40.88	PK	H	45.22	11.35	32.38	65.07	74	-8.93

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	☒
Line Impedance	LI-125A	191106	09/24/2016	09/23/2017	☒
Line Impedance	LI-125A	191107	09/24/2016	09/23/2017	☒
LISN	ISN T800	34373	09/24/2016	09/23/2017	☒
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	☒
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	☒
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/16/2016	09/15/2017	☒
Power Splitter	1#	1#	08/31/2016	08/30/2017	☒
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	☒
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	☒
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	☒
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	☒
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	☒
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	☒
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	☒
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	☒

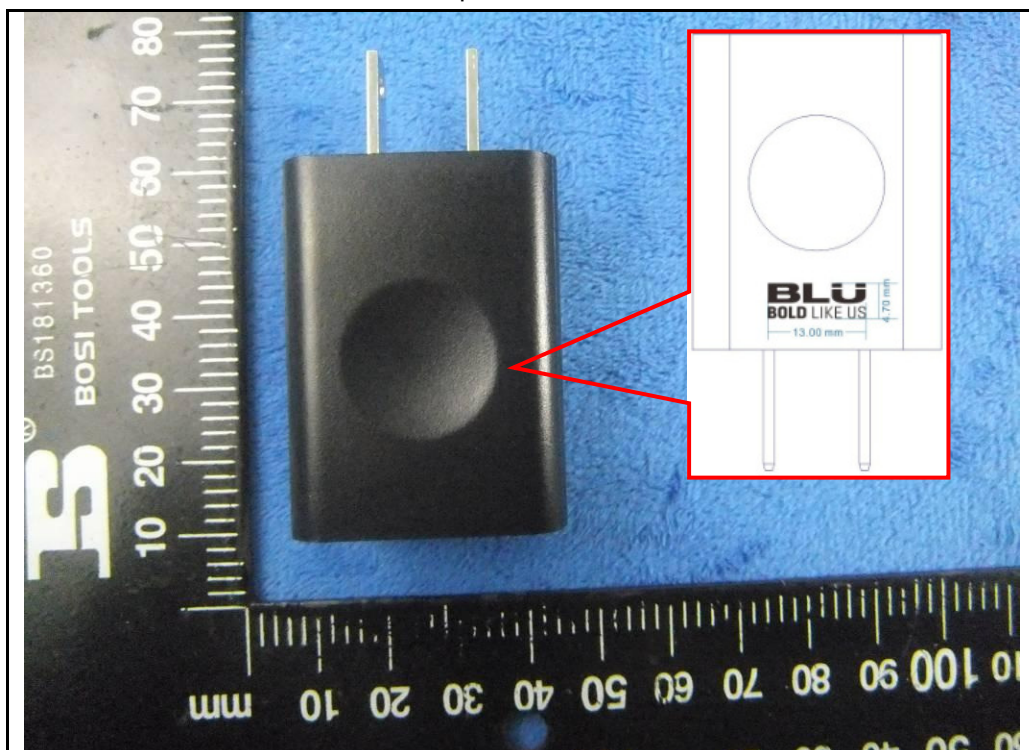
Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

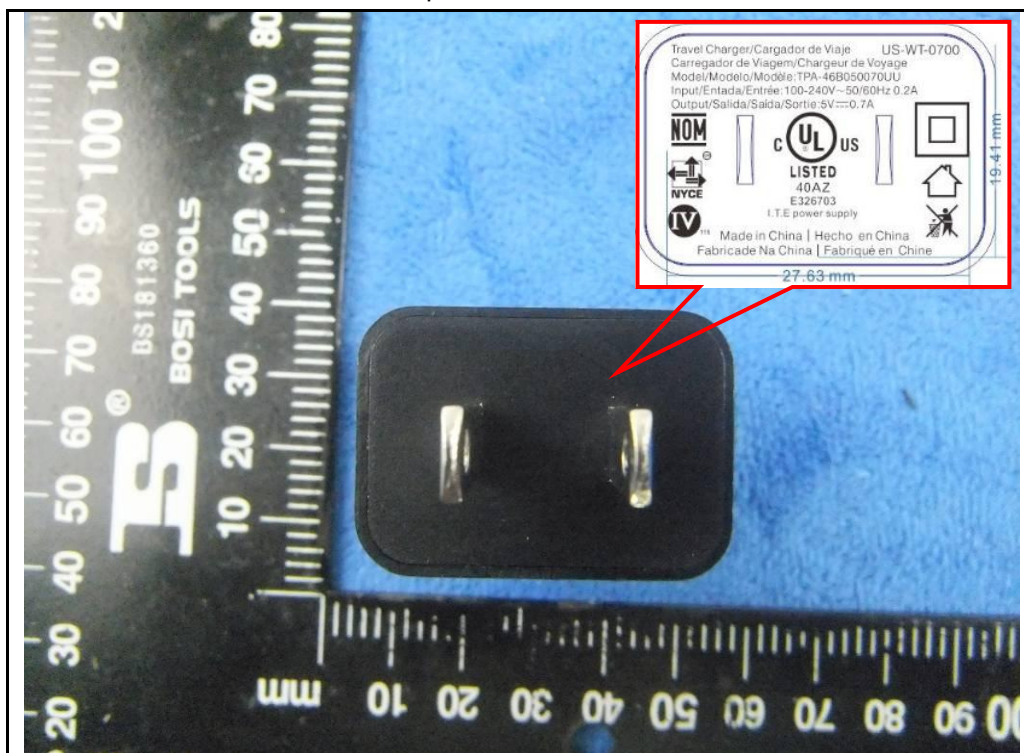
Whole Package View



Adapter - Label View



Adapter - Front View



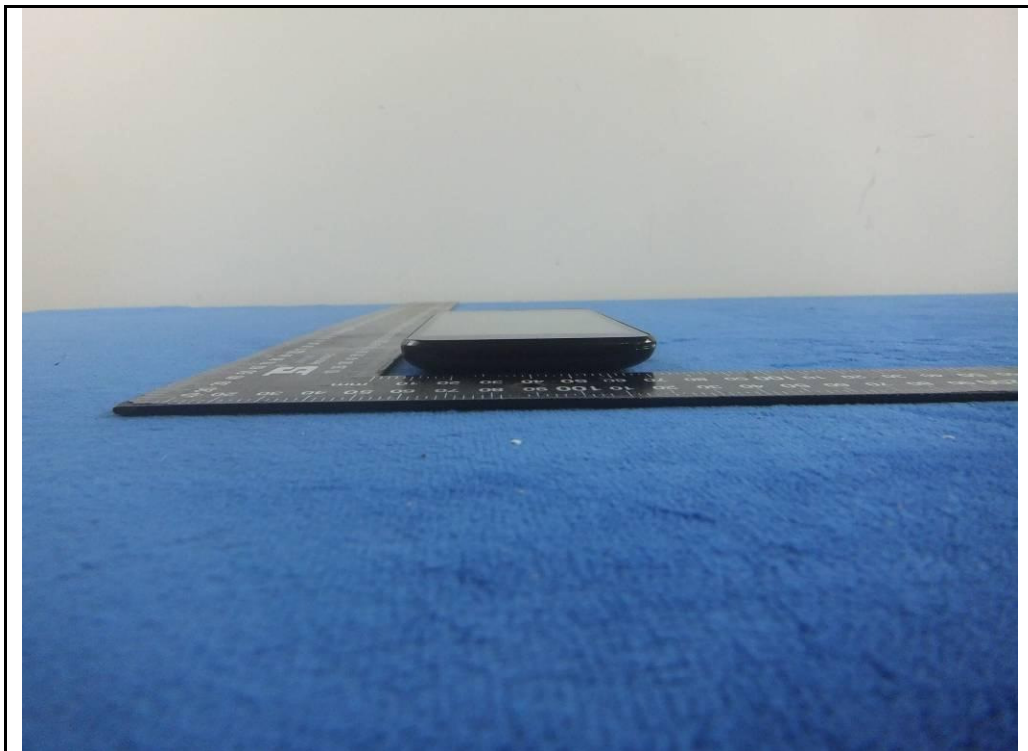
EUT - Front View



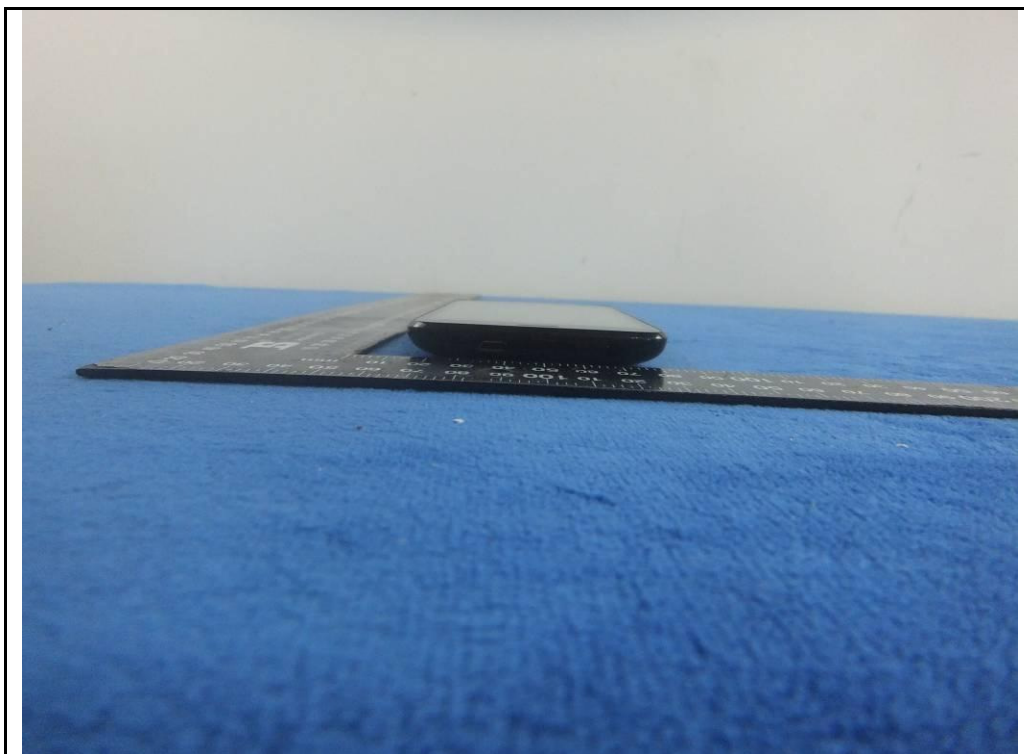
EUT - Rear View



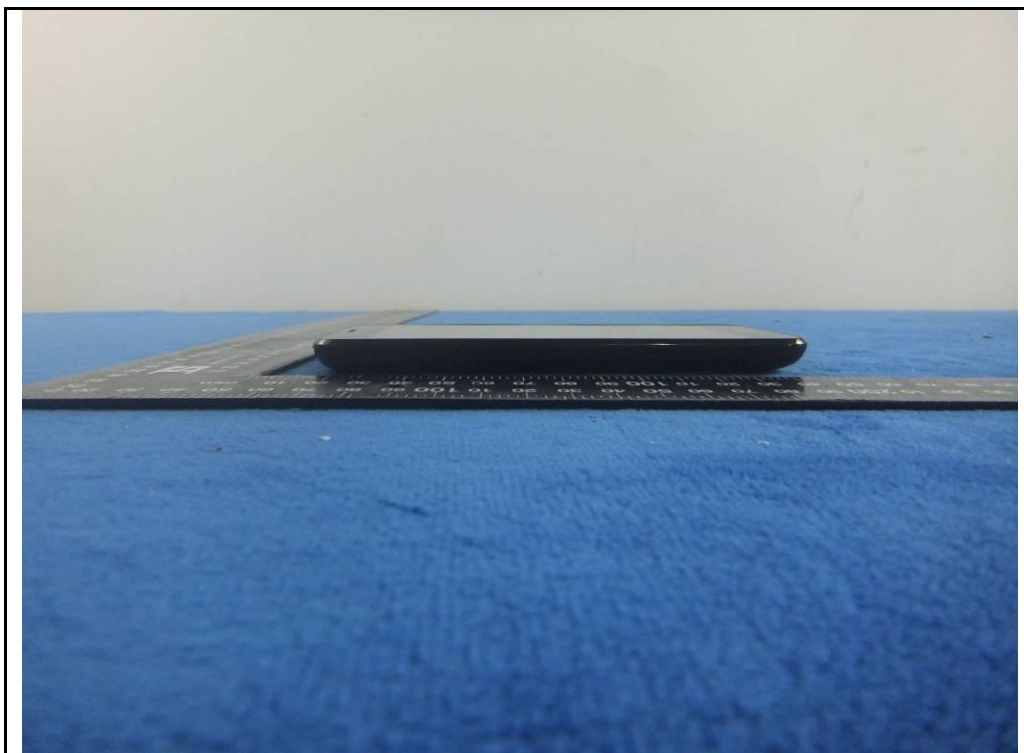
EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View



Annex B.ii. Photograph: EUT Internal Photo

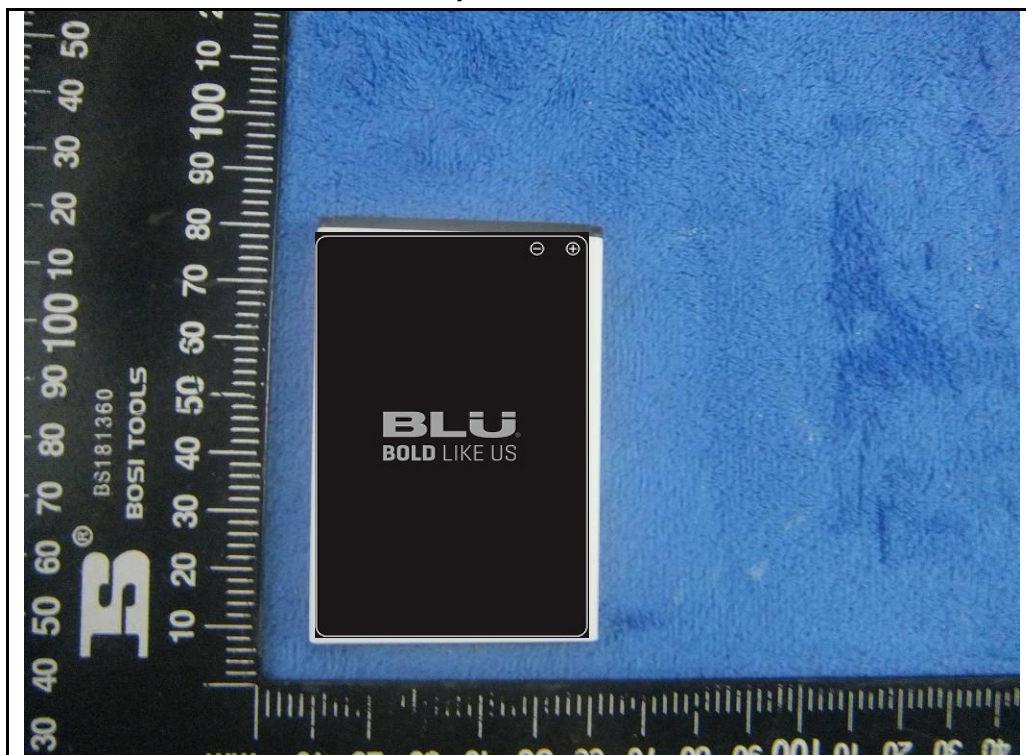
Cover Off - Top View 1



Cover Off - Top View 2



Battery - Front View



Battery - Rear View



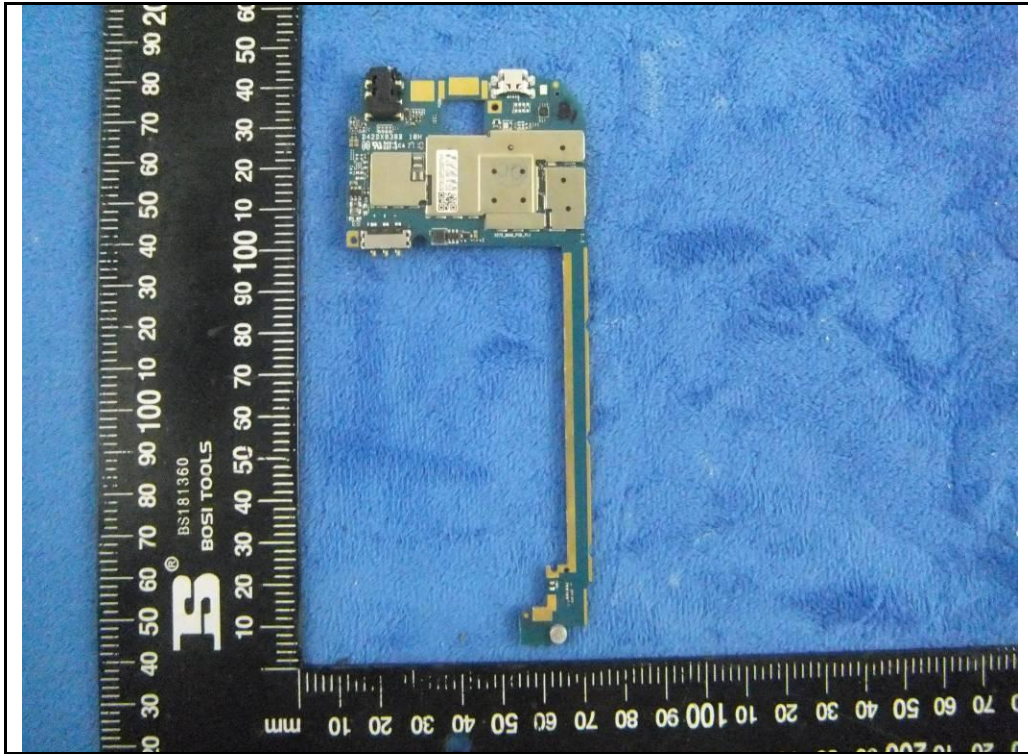
LCD - Front View



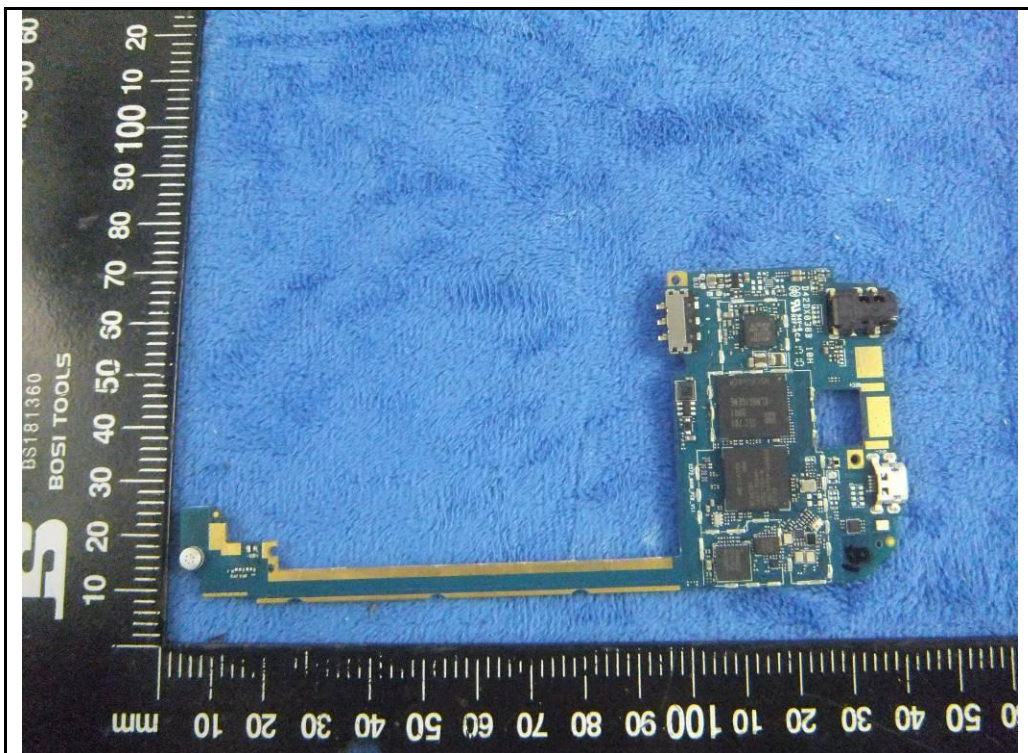
LCD - Rear View



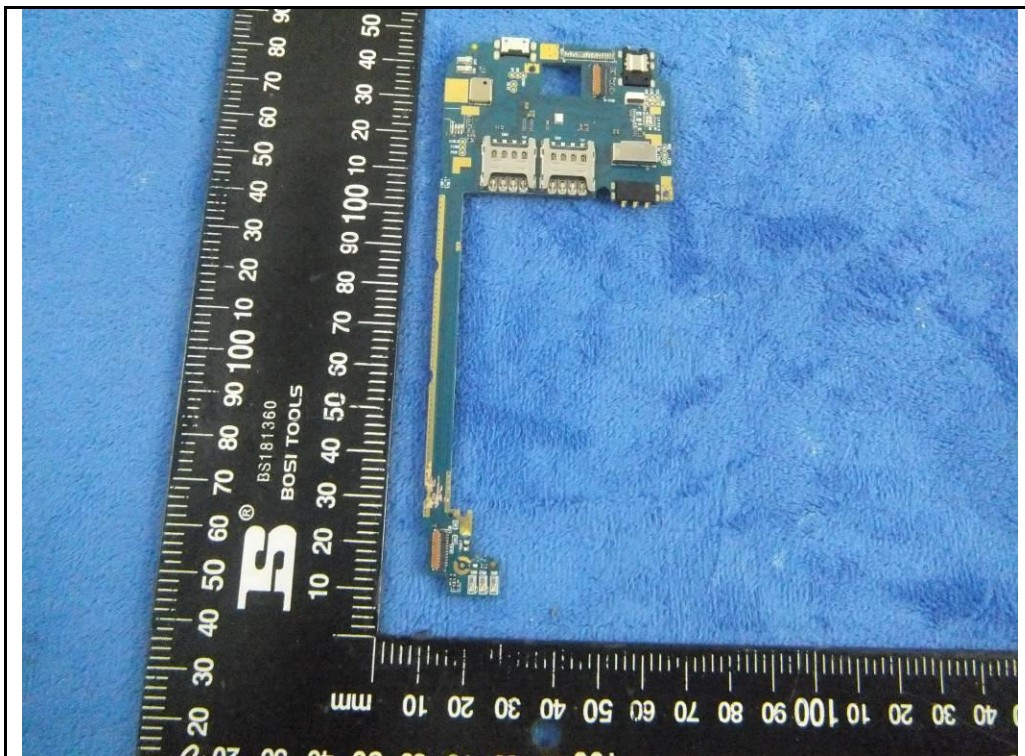
Mainboard with Shielding - Front View



Mainboard - Front View



Mainboard – Rear View



GSM/PCS/UMTS-FDD Antenna View



WIFI/BT/BLE/GPS - Antenna View



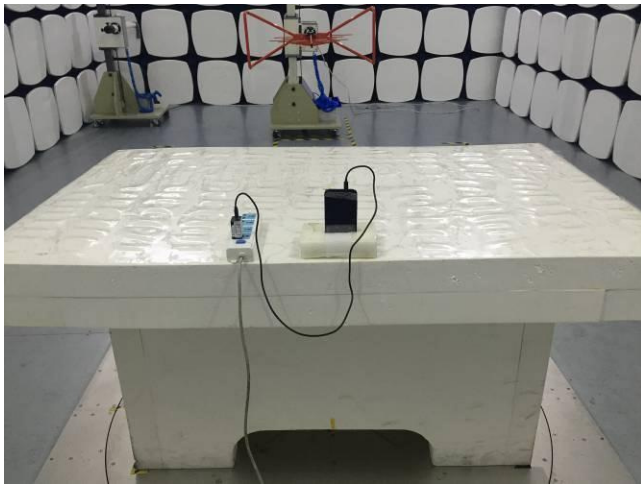
Annex B.iii. Photograph: Test Setup Photo



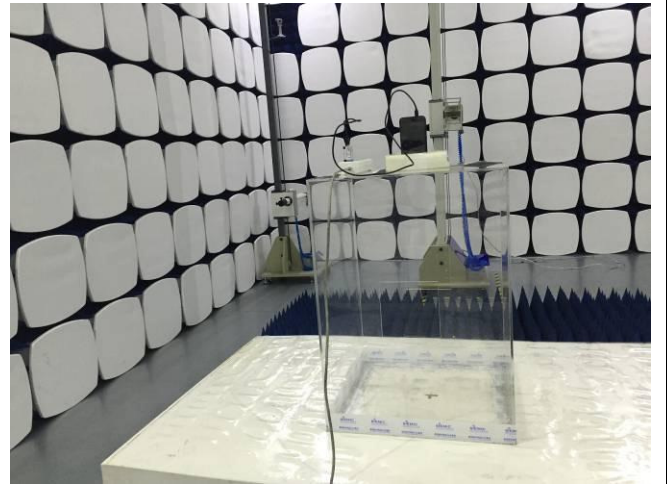
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

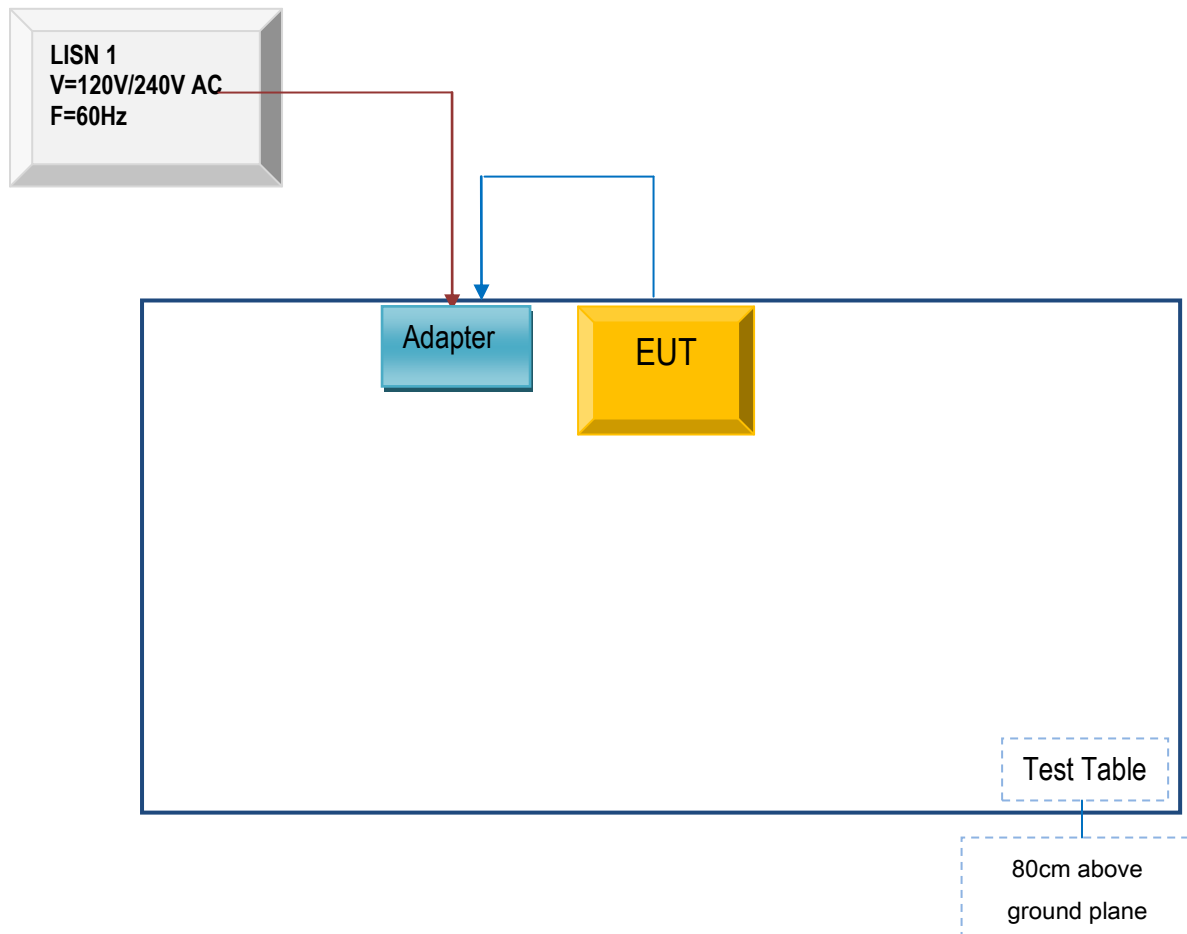


Radiated Spurious Emissions Test Setup Above 1GHz

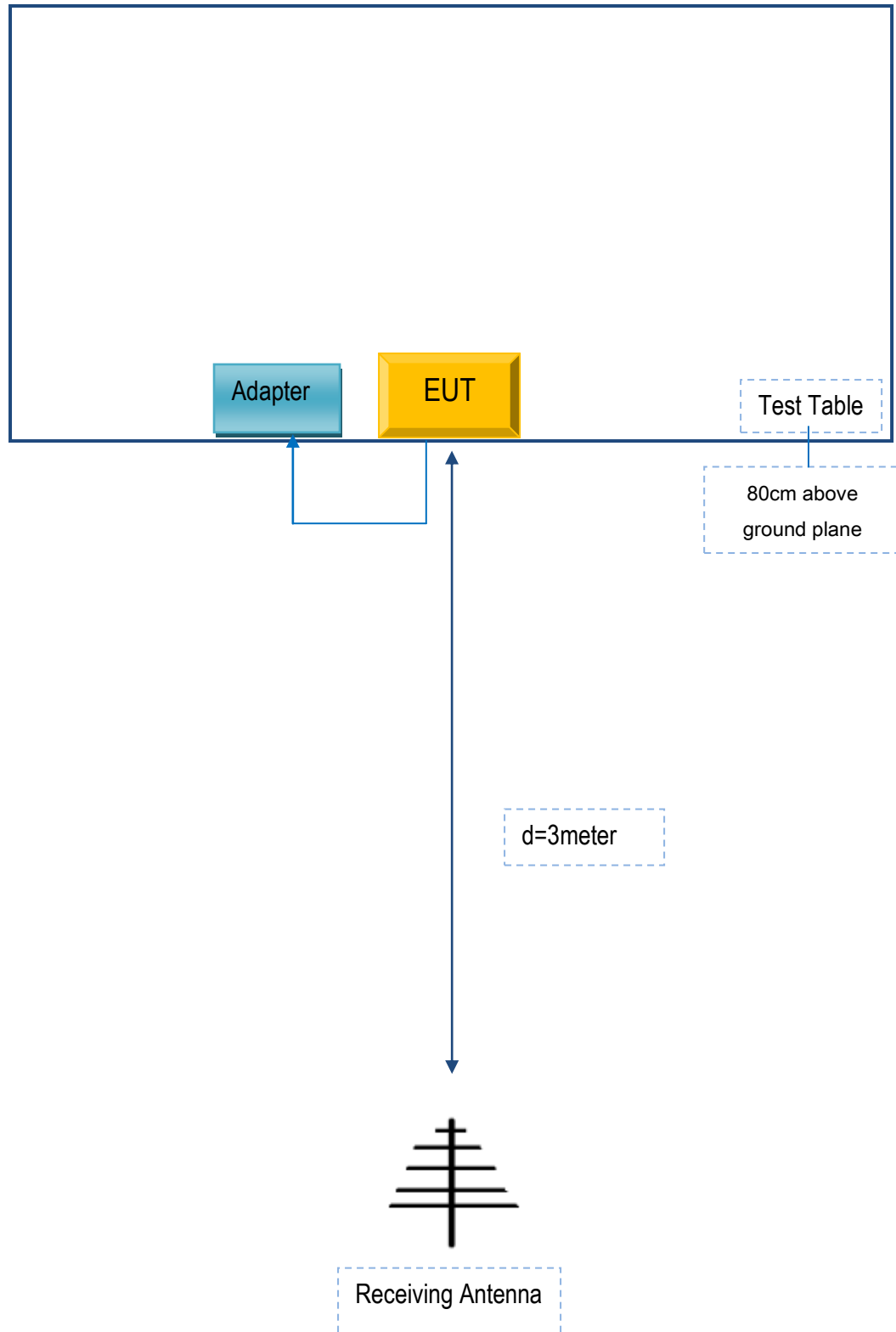
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

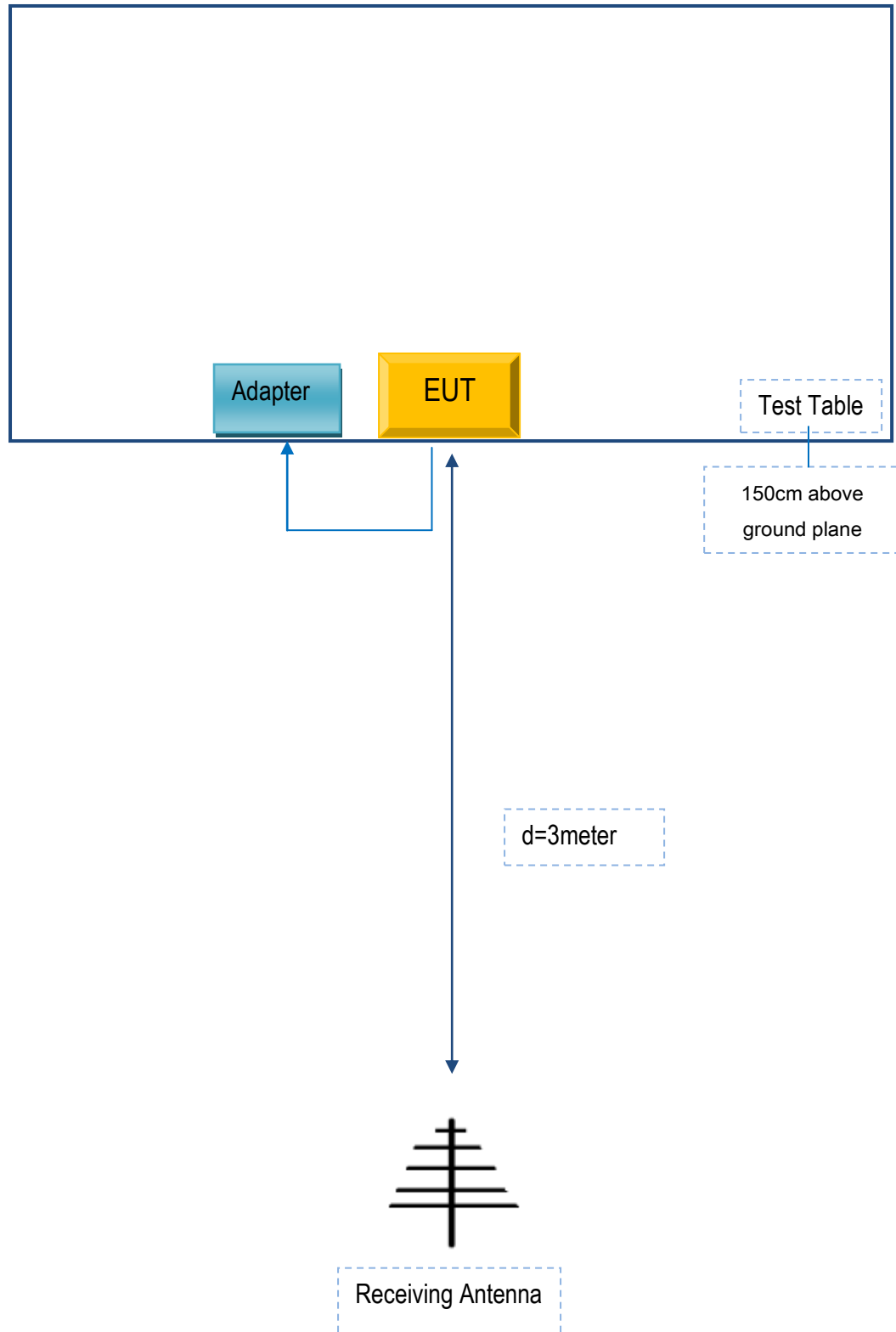
Block Configuration Diagram for AC Line Conducted Emissions



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



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



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

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

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
BLU Products, Inc.	Adapter	TPA-46B050070UU	070UU

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	070UU

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A