

RF TEST REPORT



Report No.: 16070460-FCC-R2

Supersede Report No.: N/A

Applicant	Verykool USA Inc	
Product Name	Tablet	
Model No.	TL8010	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2015, ANSI C63.10: 2013	
Test Date	April 25 to May 25, 2016	
Issue Date	May 25, 2016	
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"/>	
<i>Winnie Zhang</i>	<i>David Huang</i>	
Winnie Zhang 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

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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
16070460-FCC-R2	NONE	Original	May 25, 2016

2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA
Manufacturer	Topwise
Manufacturer Add	5th floor,A8Music Building,No.1002,Keyuan Road,Hi-Tcach Park,NanShan Districtt,Shenzhen

3. Test site information

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

4. Equipment under Test (EUT) Information

Description of EUT: Tablet

Main Model: TL8010

Serial Model: N/A

Date EUT received: April 25, 2016

Test Date(s): April 25 to May 25, 2016

Equipment Category : DSS

Antenna Gain:

GSM850: 0.61 dBi
 PCS1900: 0.85 dBi
 UMTS-FDD Band 5: 0.61 dBi
 UMTS-FDD Band 2: 0.85 dBi
 UMTS-FDD Band 4: -0.84 dBi
 LTE Band 2: 0.85 dBi
 LTE Band 4: -0.84 dBi
 LTE Band 5: 0.61 dBi
 LTE Band 7: 1.11 dBi
 LTE Band 17: -4.77 dBi
 Bluetooth/BLE/WIFI: 2.16 dBi
 GPS: 1.74 dBi

Type of Modulation:

GSM / GPRS: GMSK
 EGPRS: GMSK, 8PSK
 UMTS-FDD: QPSK
 LTE Band: QPSK, 16QAM
 802.11b/g/n: DSSS, OFDM
 Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK
 BLE: GFSK
 GPS: BPSK

RF Operating Frequency (ies):

GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz
 PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz
 UMTS-FDD Band 5 TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz
 UMTS-FDD Band 2 TX: 1852.4 ~ 1907.6 MHz;

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RX: 1932.4 ~ 1987.6 MHz

UMTS-FDD Band 4 TX :1712.4 ~ 1752.6 MHz;

RX : 2112.4 ~ 2152.6 MHz

LTE Band 2 TX: 1852.5 ~ 1907.5 MHz; RX : 1932.5 ~ 1987.5 MHz

LTE Band 4 TX: 1712.5 ~ 1752.5 MHz; RX : 2112.5 ~ 2152.5 MHz

LTE Band 5 TX: 826.5 ~ 846.5 MHz; RX : 871.5 ~ 891.5 MHz

LTE Band 7 TX: 2502.5 ~ 2567.5 MHz; RX : 2622.5 ~ 2687.5 MHz

LTE Band 17 TX: 706.5 ~ 713.5 MHz; RX : 736.5 ~ 743.5 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

Max. Output Power: 5.03 dBm

GSM 850: 124CH

PCS1900: 299CH

UMTS-FDD Band 5: 102CH

UMTS-FDD Band 4: 202CH

UMTS-FDD Band 2: 277CH

Number of Channels:

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

WIFI :802.11n(40M): 7CH

Bluetooth: 79CH

BLE: 40CH

GPS:1CH

Port: Power Port, Earphone Port, USB Port

Adapter:

Model: JML050200A

Input: AC 100-240V; 50/60Hz;0.3A

Input Power:

Output: DC 5.0V,2.0A

Battery:

Capacity: 2030mAh

Voltage: 3.8V

Trade Name : verykool

GPRS/EGPRS Multi-slot class 8/10/12

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FCC ID:

WA6TL8010

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

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

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

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

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

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

Antenna Connector Construction

The EUT has 3 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIFI/GPS, the gain is 2.16dBi for Bluetooth/BLE/WIFI, the gain is 1.74dBi for GPS.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is 0.61dBi for GSM850, 0.85dBi for PCS1900, 0.61dBi for UMTS-FDD Band V, 0.85dBi for UMTS-FDD Band II, -0.84dBi for UMTS-FDD Band IV.

A permanently attached PIFA antenna for LTE Band 2/Band 4/ Band 5/Band 7/Band 17, 0.85dBi for LTE Band 2, -0.84dBi for Band 4, 0.61dBi for Band 5, 1.11dBi for Band 7, -4.77dBi for Band 17.


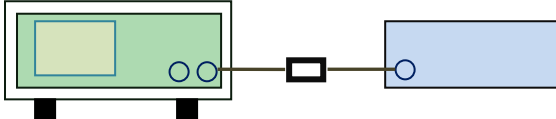
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	24°C
Relative Humidity	56%
Atmospheric Pressure	1023mbar
Test date :	May 13, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	
Test Setup			
Test Procedure	<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

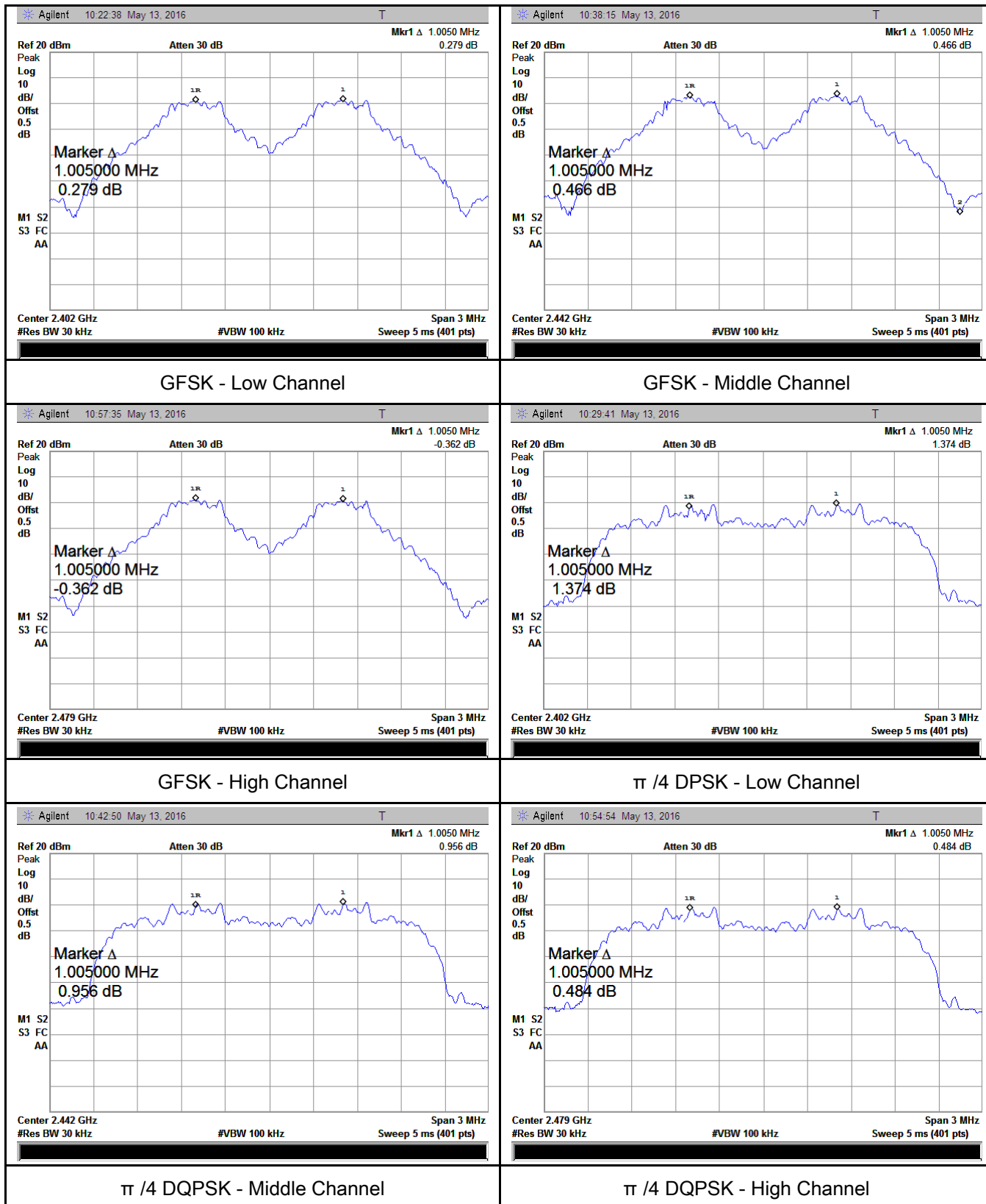
Test Plot ☒ Yes (See below) ☐ N/A

Channel Separation measurement result

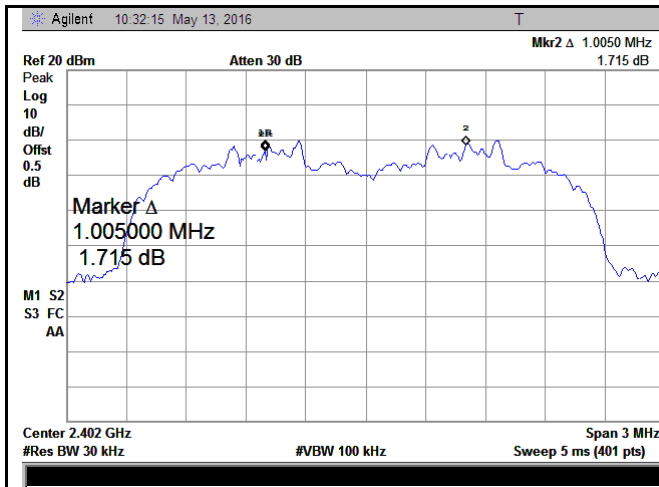
Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.964	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.679	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.685	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.867	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.864	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.873	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.869	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.867	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.873	Pass
	Adjacency Channel	2479			

Test Plots

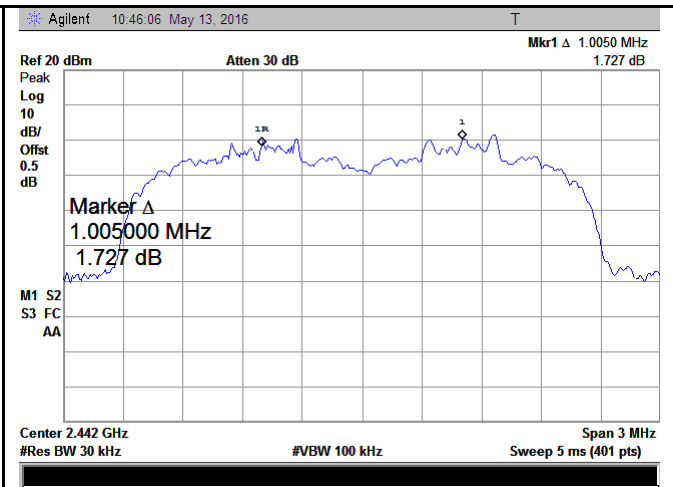
Channel Separation measurement result



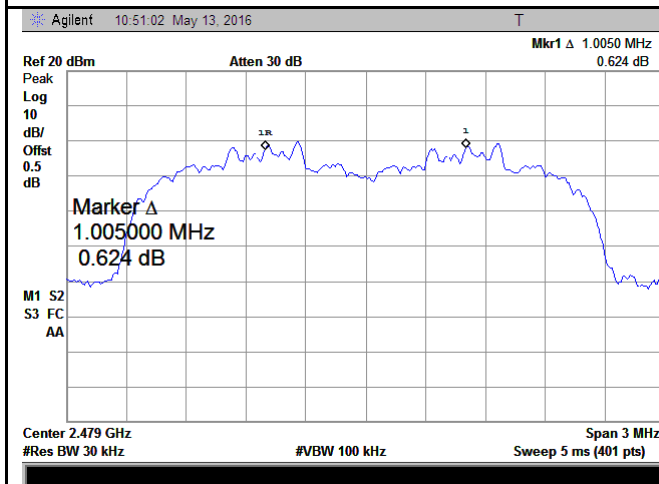
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8DPSK - Low Channel



8DPSK - Middle Channel

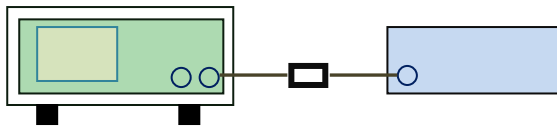


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	24°C
Relative Humidity	56%
Atmospheric Pressure	1023mbar
Test date :	Feb 23, 2016
Tested By :	Winnie Zhang

Requirement(s):

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

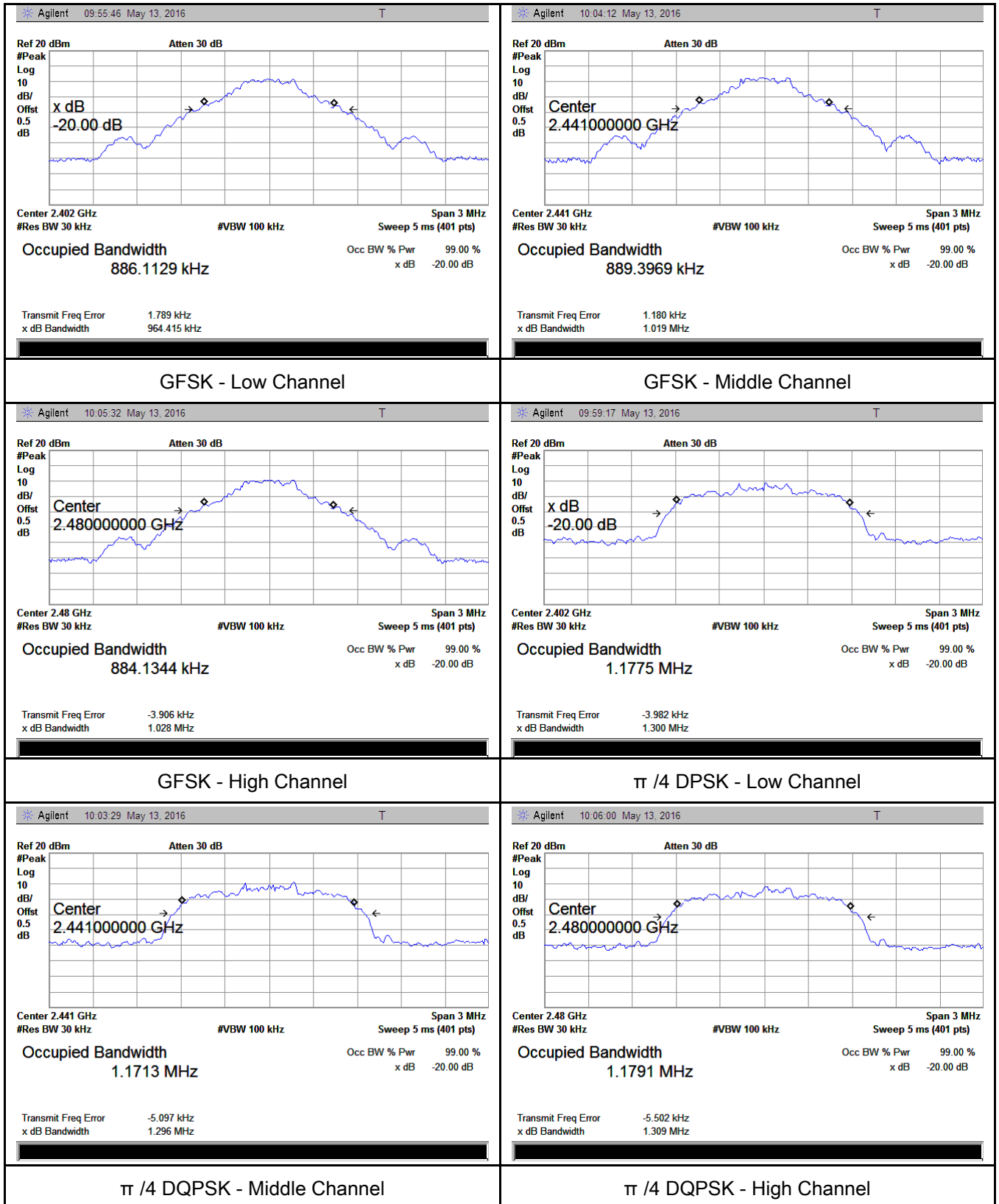
Test Plot ☒ Yes (See below) ☐ N/A

Measurement result

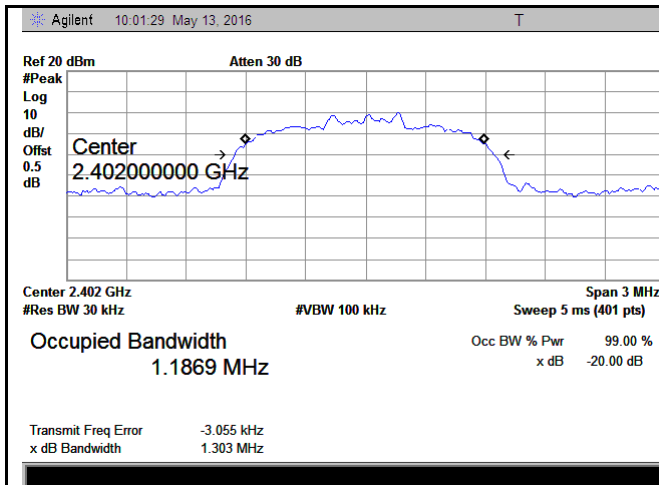
Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	0.964	0.8861
	Mid	2441	1.019	0.8894
	High	2480	1.028	0.8841
$\pi/4$ DQPSK	Low	2402	1.300	1.1775
	Mid	2441	1.296	1.1713
	High	2480	1.309	1.1791
8-DPSK	Low	2402	1.303	1.1869
	Mid	2441	1.301	1.1849
	High	2480	1.310	1.1948

Test Plots

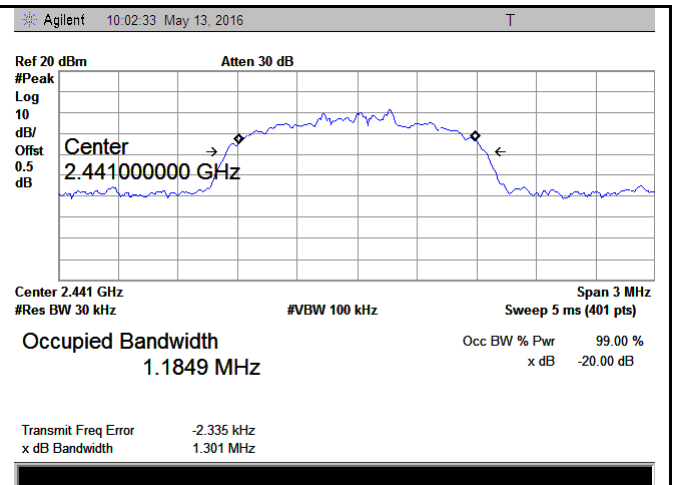
20dB Bandwidth measurement result



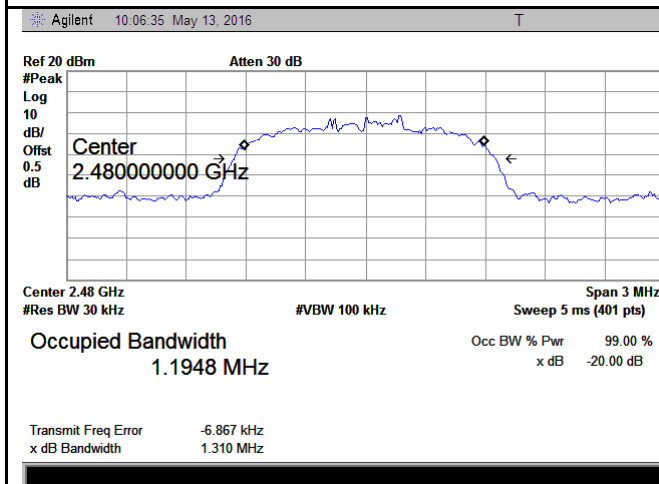
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8DPSK - Low Channel



8DPSK - Middle Channel

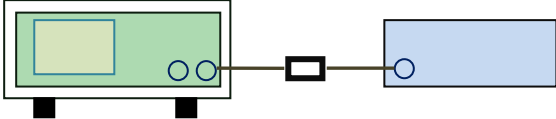


8DPSK - High Channel

6.4 Peak Output Power

Temperature	24°C
Relative Humidity	56%
Atmospheric Pressure	1023mbar
Test date :	Feb 23, 2016
Tested By :	Winnie Zhang

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

Test Data ☒ Yes ☐ N/A

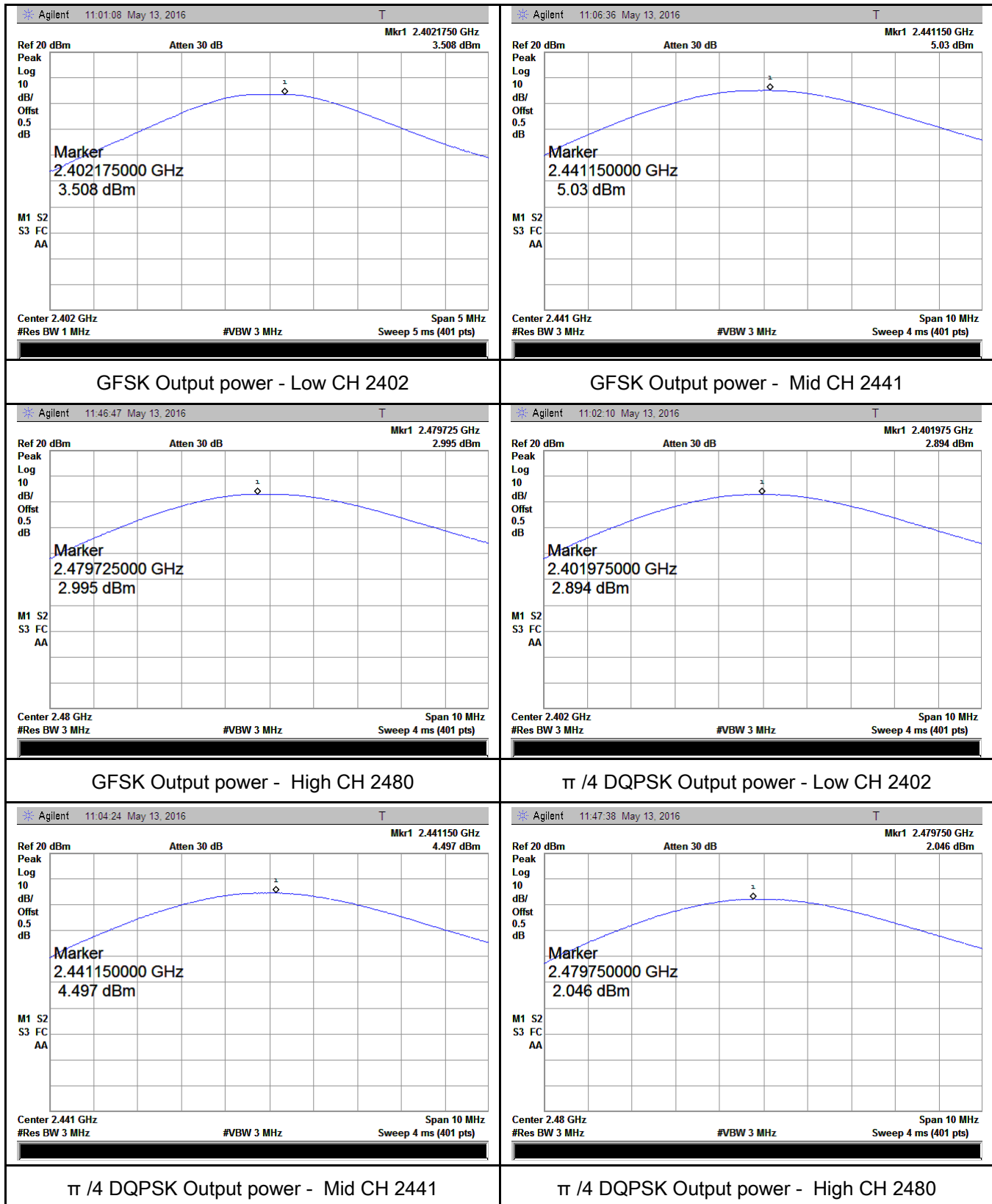
Test Plot ☒ Yes (See below) ☐ N/A

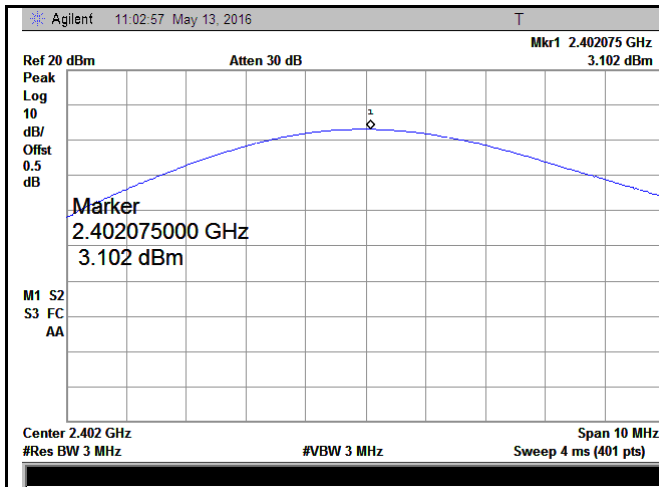
Peak Output Power measurement result

Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	3.508	1000	Pass
		Mid	2441	5.03	125	Pass
		High	2480	2.995	125	Pass
	$\pi/4$ DQPSK	Low	2402	2.894	125	Pass
		Mid	2441	4.497	125	Pass
		High	2480	2.046	125	Pass
	8-DPSK	Low	2402	3.102	125	Pass
		Mid	2441	4.569	125	Pass
		High	2480	2.272	125	Pass

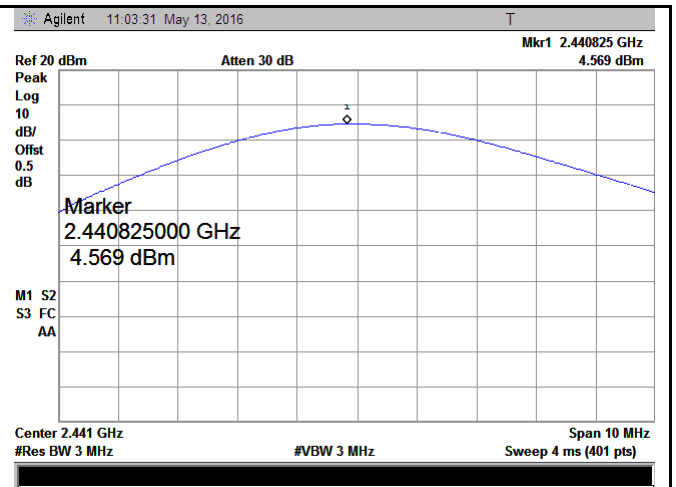
Test Plots

Output Power measurement result

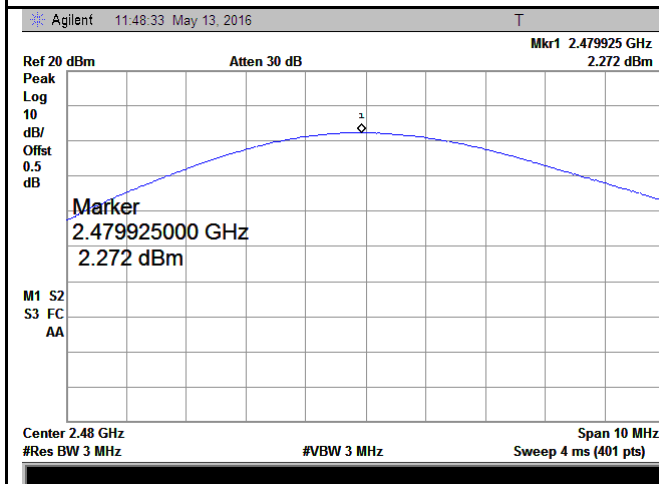




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

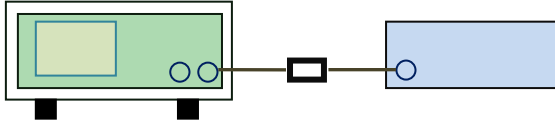


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	24°C
Relative Humidity	56%
Atmospheric Pressure	1023mbar
Test date :	May 12, 2016
Tested By :	Winnie Zhang

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			
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		

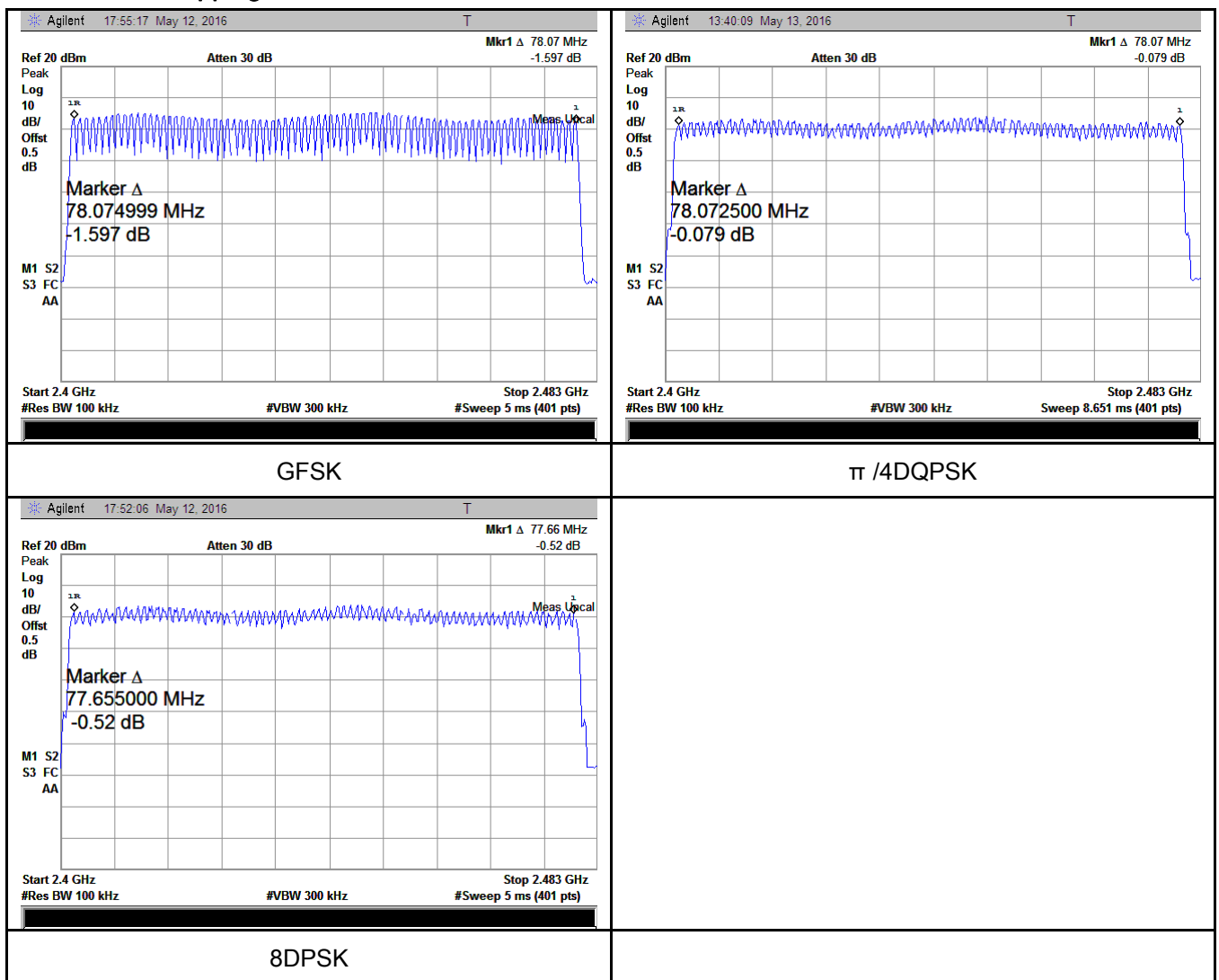
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

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
	π /4 DQPSK	2400-2483.5	79	15
	8-DPSK	2400-2483.5	79	15

Test Plots

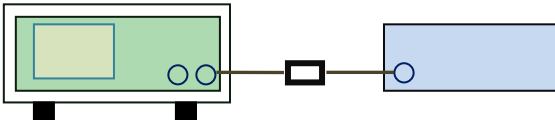
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	24°C
Relative Humidity	56%
Atmospheric Pressure	1023mbar
Test date :	Feb 23, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	<input checked="" type="checkbox"/>
Test Setup			
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		

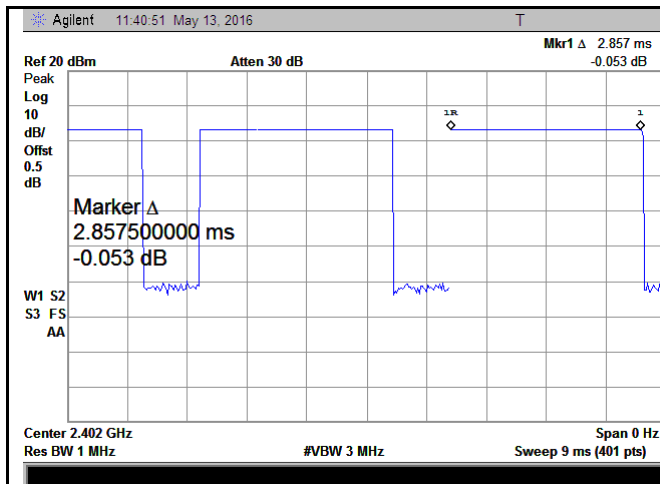
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

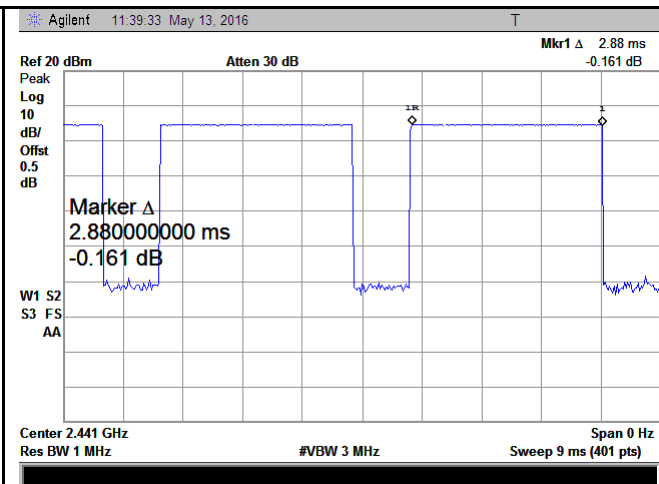
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.857	304.747	400	Pass
		Mid	2.88	307.200	400	Pass
		High	2.857	304.747	400	Pass
	$\pi/4$ DQPSK	Low	2.857	304.747	400	Pass
		Mid	2.857	304.747	400	Pass
		High	2.79	297.600	400	Pass
	8-DPSK	Low	2.88	307.200	400	Pass
		Mid	2.812	299.947	400	Pass
		High	2.835	302.400	400	Pass
Note: Dwell time=Pulse Time (ms) \times (1600 \div 6 \div 79) \times 31.6						

Test Plots

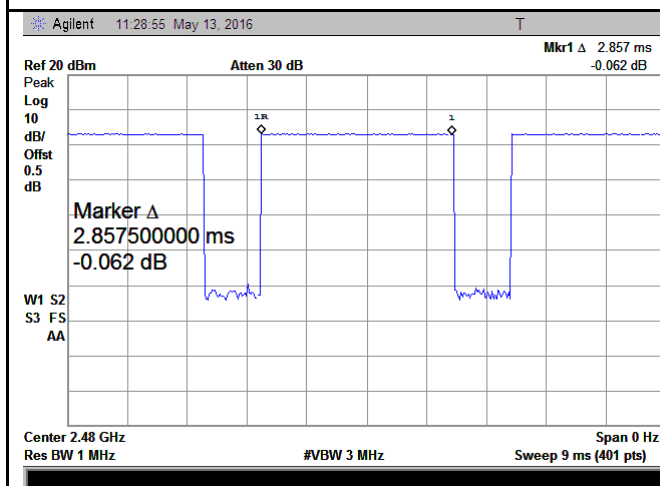
Dwell Time measurement result



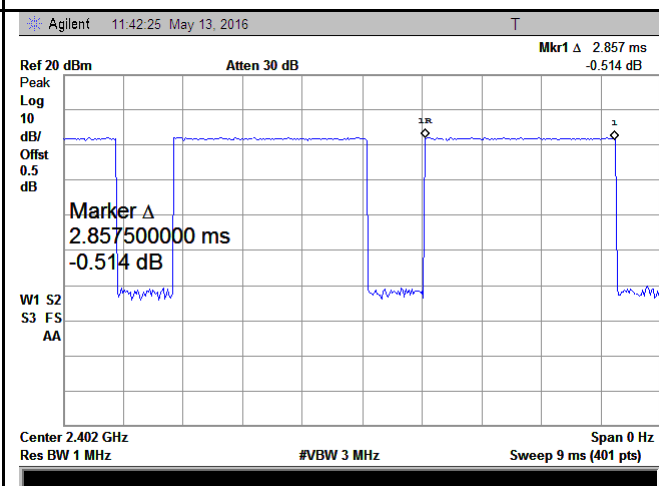
GFSK - Low CH 2402



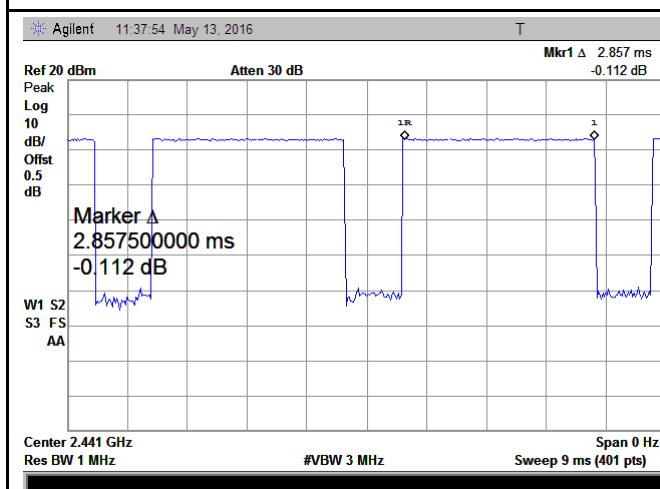
GFSK - Mid CH 2441



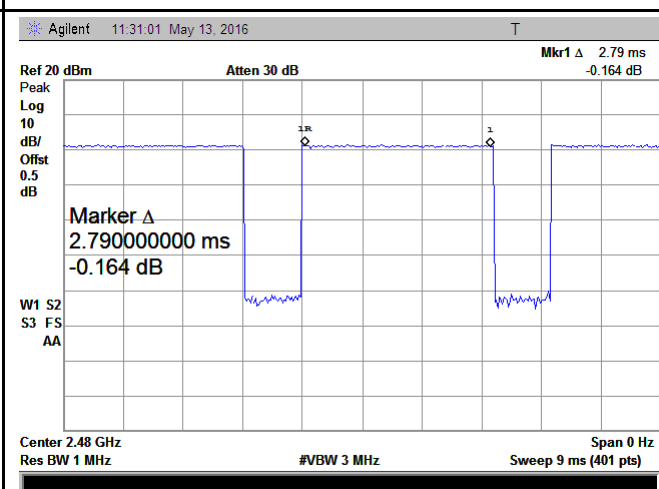
GFSK - High CH 2480



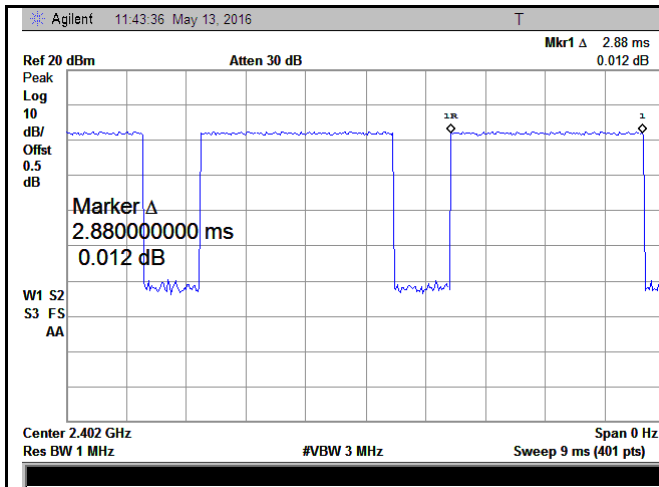
$\pi/4$ DQPSK - Low CH 2402



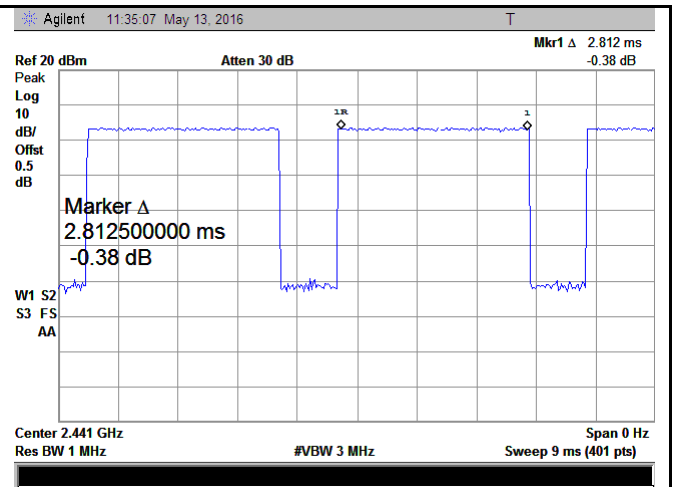
$\pi/4$ DQPSK - Mid CH 2441



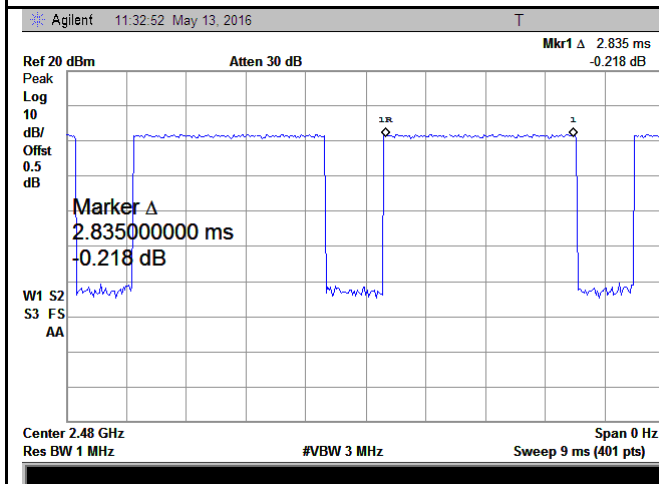
$\pi/4$ DQPSK - High CH 2480



8DPSK - Low CH 2402



8DPSK - Mid CH 2441

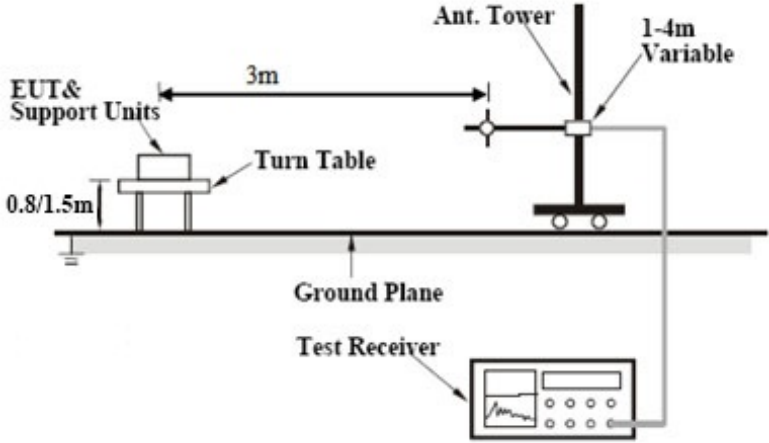


8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	May 10, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	<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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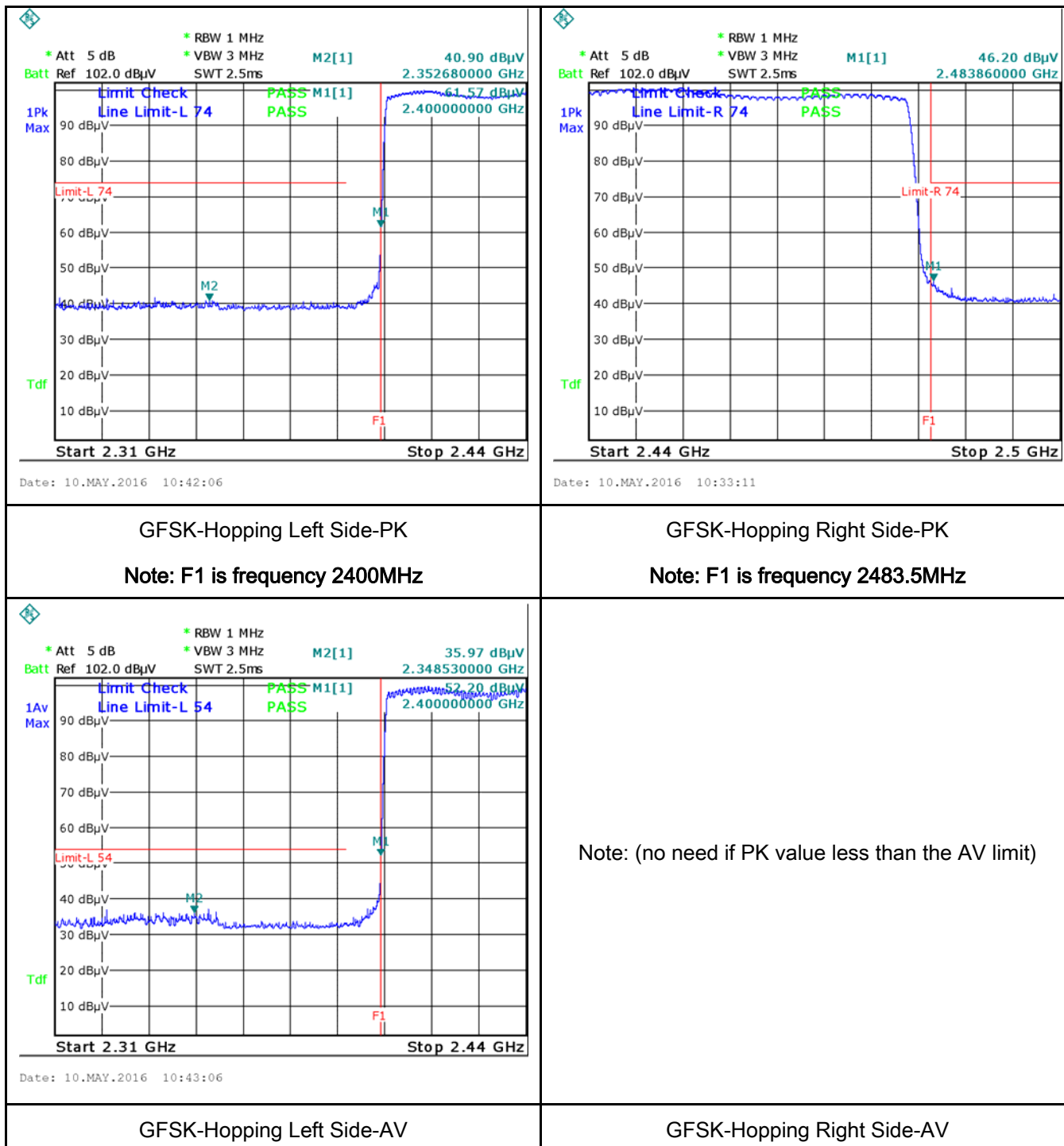
	<p>and make sure the instrument is operated in its linear range.</p> <ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer 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

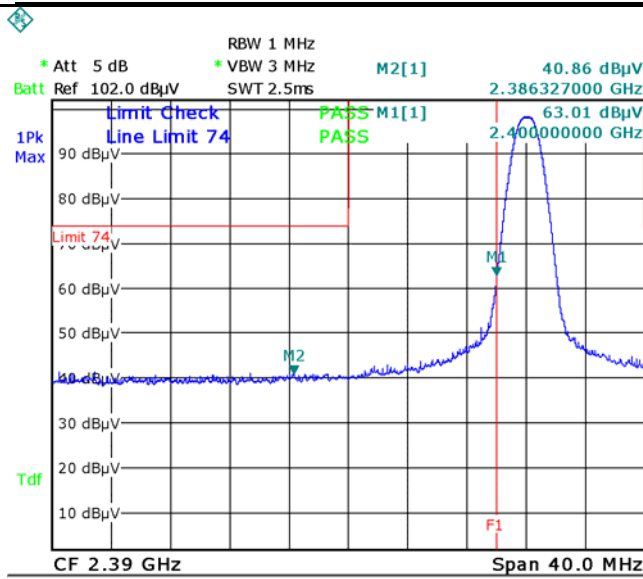
Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Plots

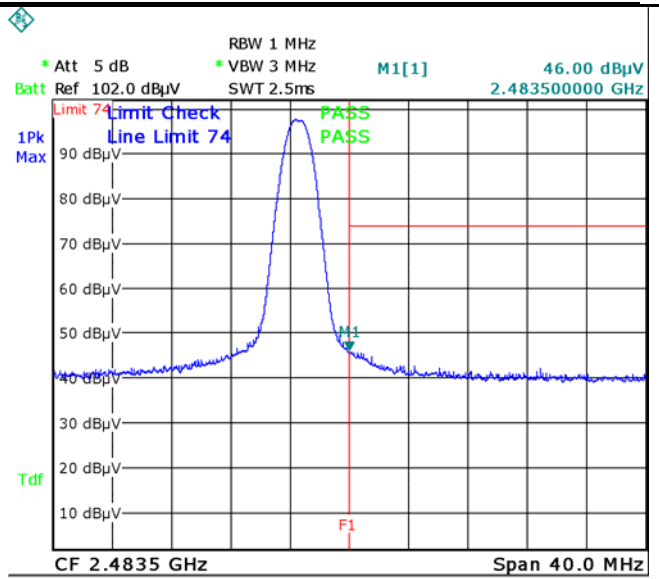
GFSK Mode:





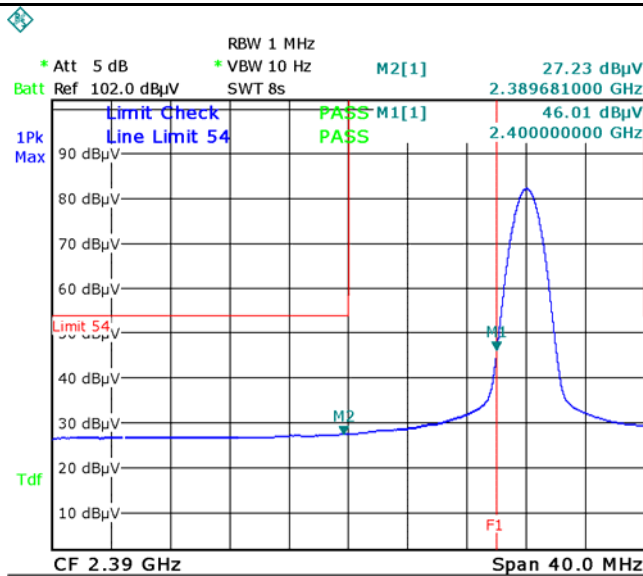
GFSK-Left Side-PK

Note: F1 is frequency 2400MHz



GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

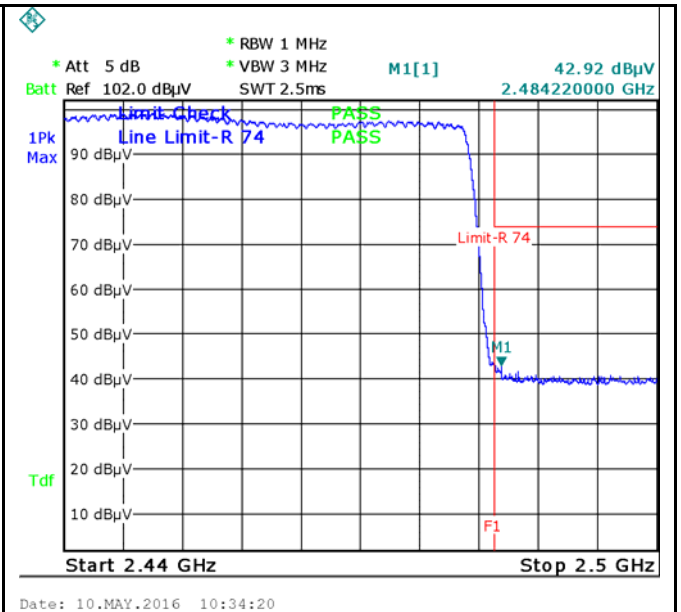
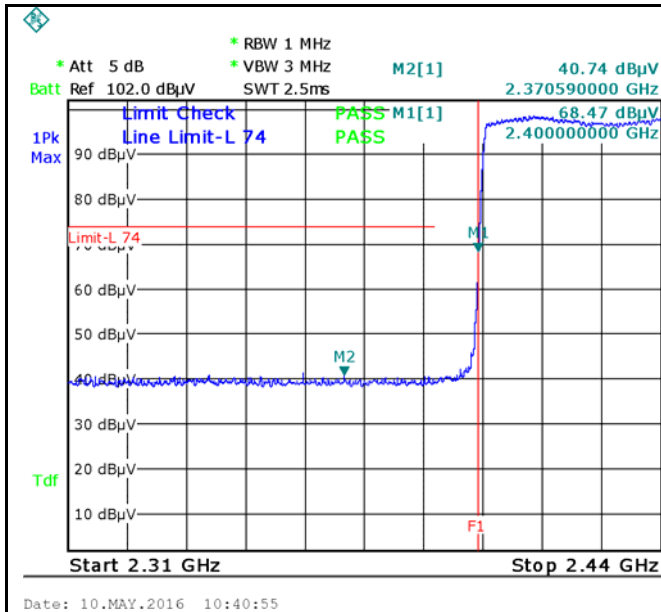


GFSK-Left Side-AV

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

GFSK-Right Side-AV

$\pi/4$ DQPSK Mode:

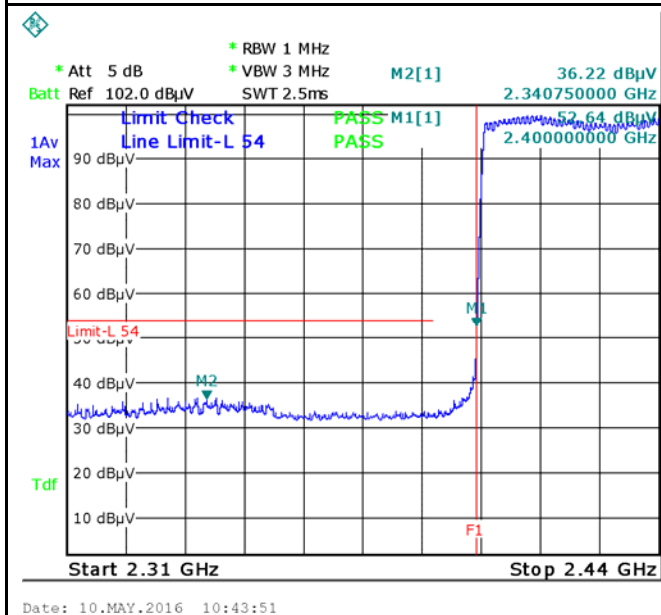


$\pi/4$ DQPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz

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

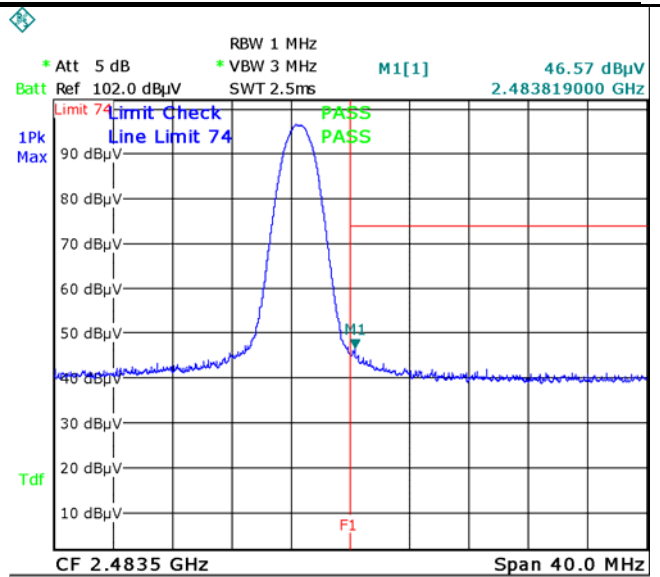
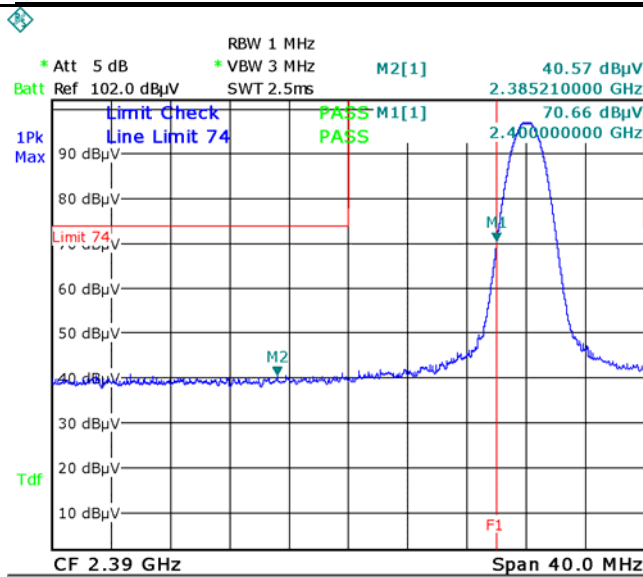
Note: F1 is frequency 2483.5MHz



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

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

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

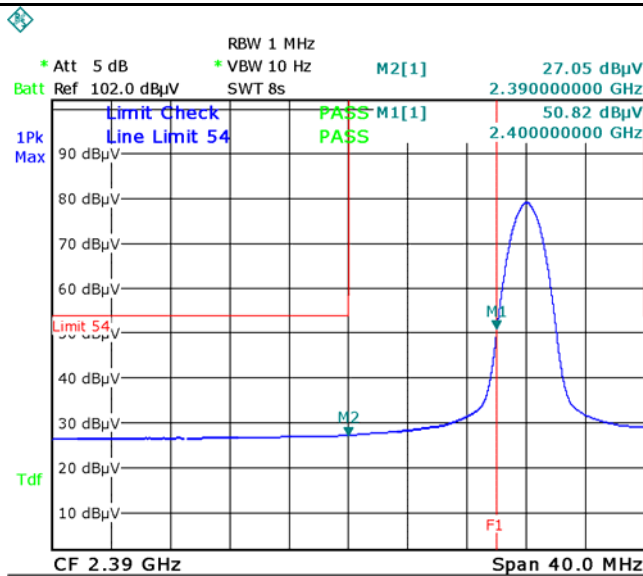


π /4 DQPSK-Left Side-PK

Note: F1 is frequency 2400MHz

π /4 DQPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

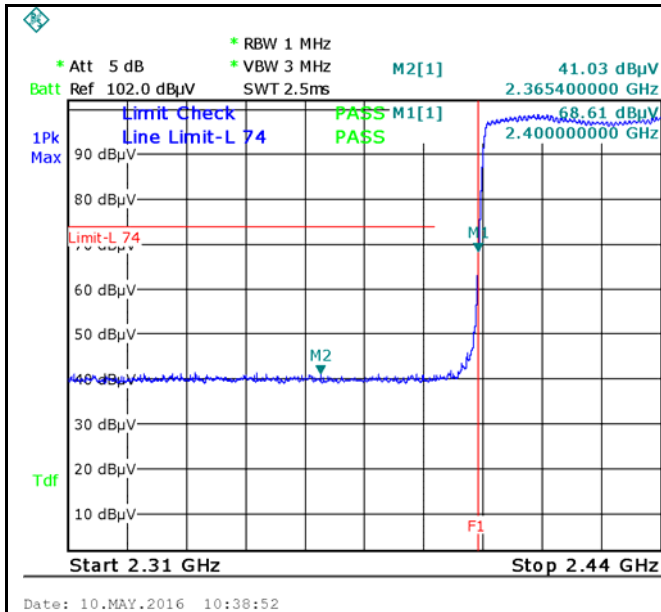


Note: (no need if PK value less than the AV limit)

π /4 DQPSK-Left Side-AV

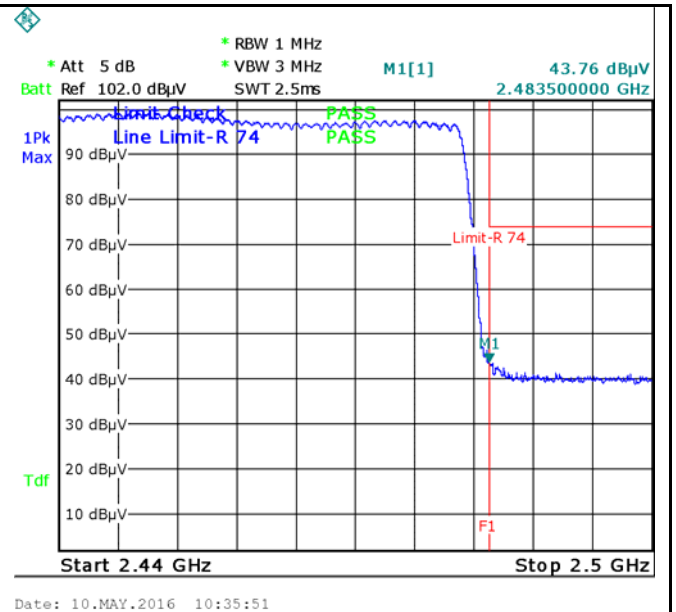
π /4 DQPSK-Right Side-AV

8-DPSK Mode:



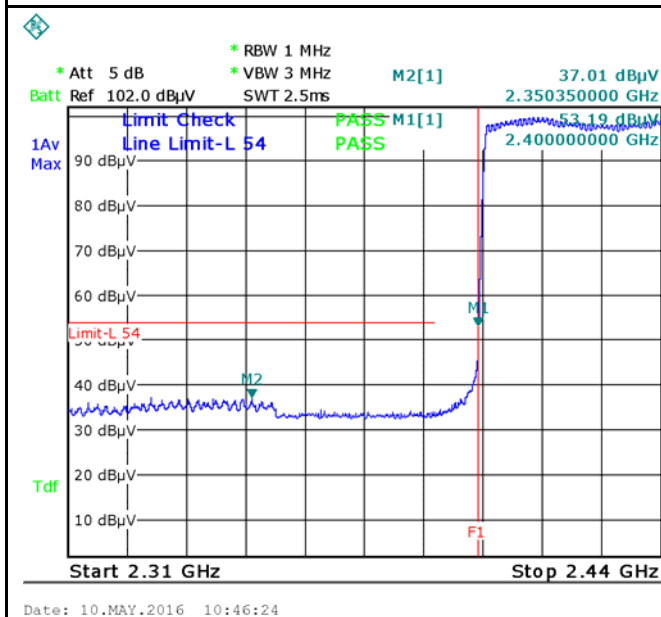
8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



8DPSK-Hopping Right Side-PK

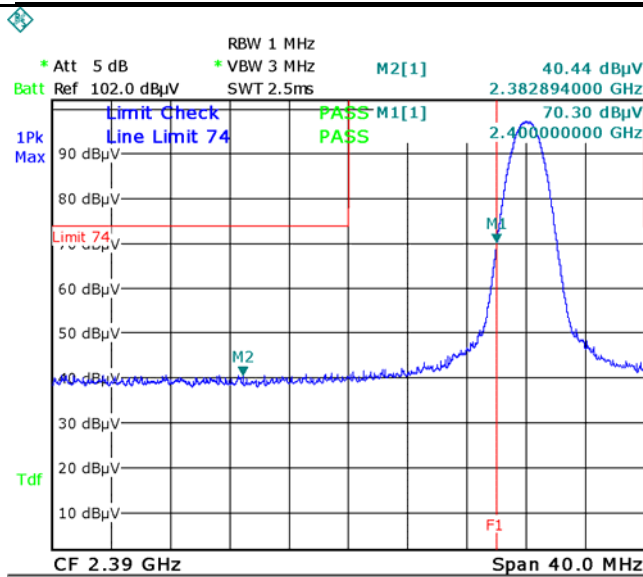
Note: F1 is frequency 2483.5MHz



8DPSK-Hopping Left-AV

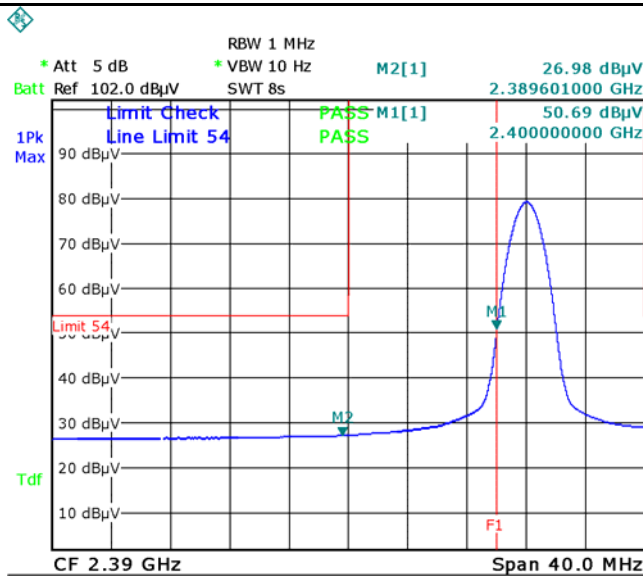
Note: (no need if PK value less than the AV limit)

8DPSK-Hopping Right-AV

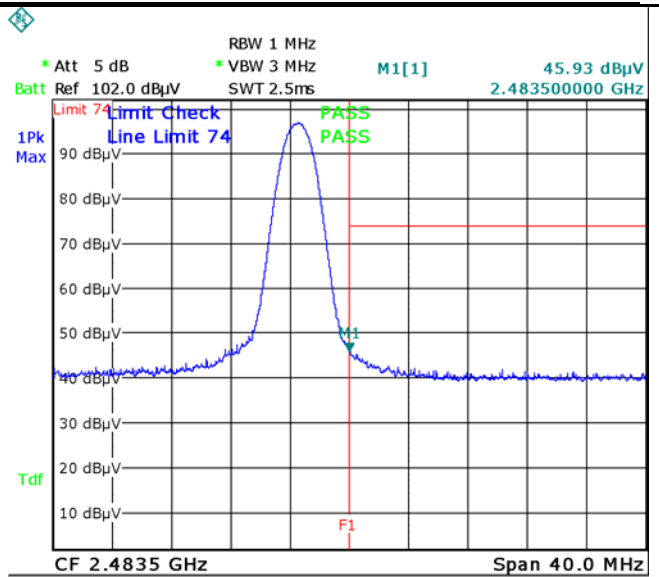


8DPSK-Left Side-PK

Note: F1 is frequency 2400MHz



8DPSK-Left Side-AV



8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

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

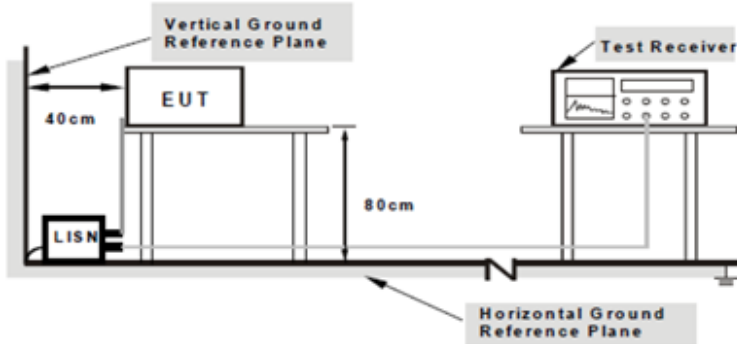
8DPSK-Right Side-AV

6.8 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	May 12, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable		
47CFR§15.207, RSS210 (A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	<div><input checked="" type="checkbox"/></div>		
		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	 <p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>
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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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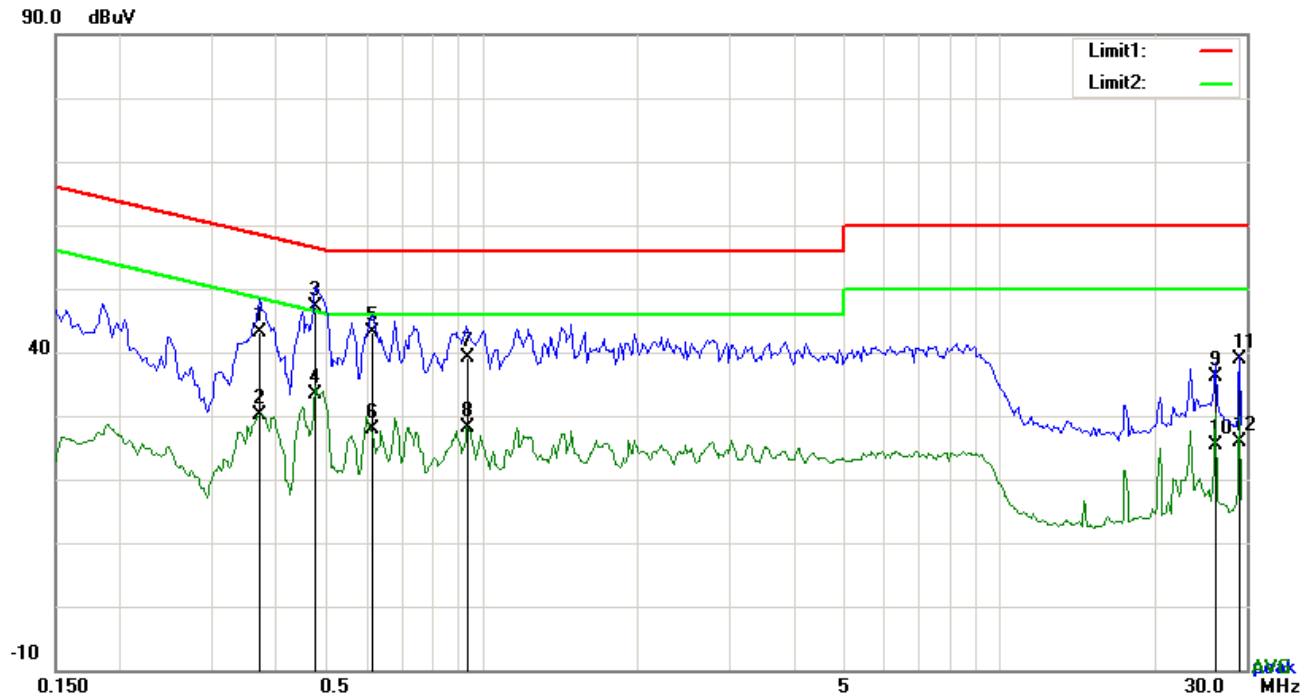
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	<p>coaxial cable.</p> <ol style="list-style-type: none"> 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 6. A scan was made on 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

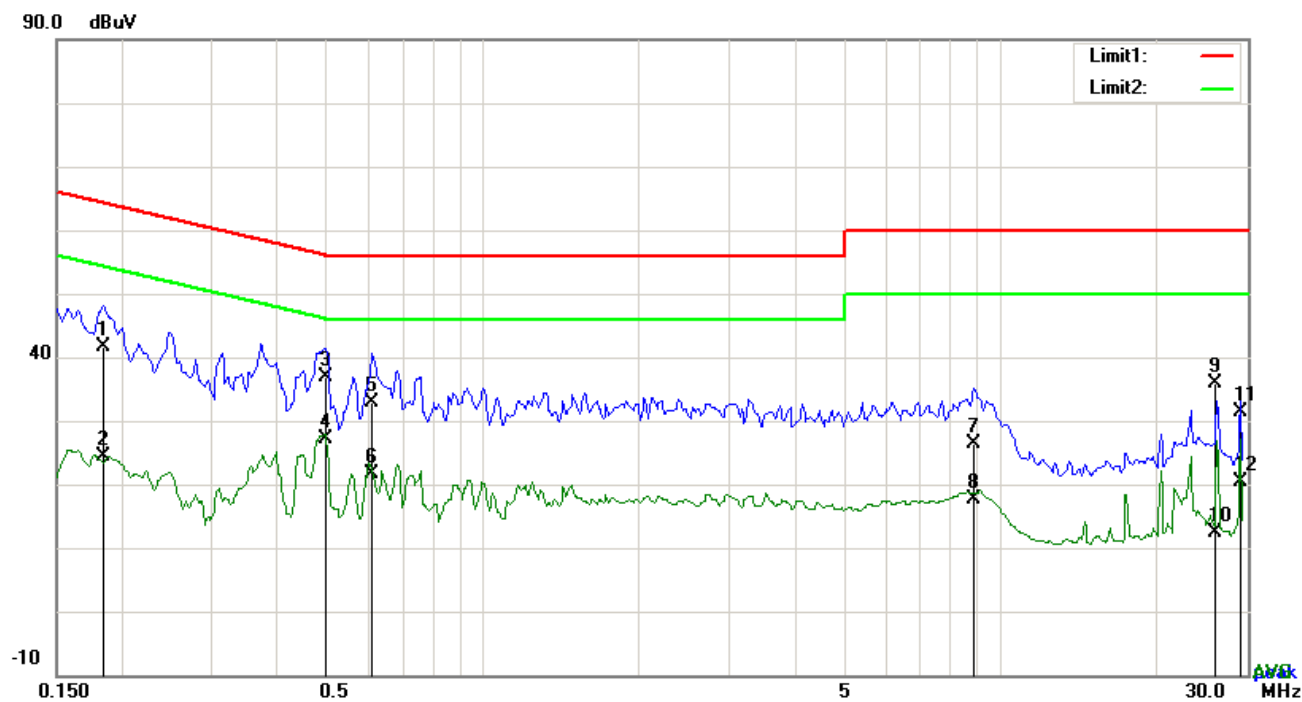


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.3723	32.99	QP	10.03	43.02	58.45	-15.43
2	L1	0.3723	20.10	AVG	10.03	30.13	48.45	-18.32
3	L1	0.4776	37.07	QP	10.03	47.10	56.38	-9.28
4	L1	0.4776	23.28	AVG	10.03	33.31	46.38	-13.07
5	L1	0.6141	33.06	QP	10.03	43.09	56.00	-12.91
6	L1	0.6141	17.81	AVG	10.03	27.84	46.00	-18.16
7	L1	0.9381	29.17	QP	10.03	39.20	56.00	-16.80
8	L1	0.9381	18.00	AVG	10.03	28.03	46.00	-17.97
9	L1	26.2011	25.72	QP	10.42	36.14	60.00	-23.86
10	L1	26.2011	15.07	AVG	10.42	25.49	50.00	-24.51
11	L1	29.1144	28.30	QP	10.47	38.77	60.00	-21.23
12	L1	29.1144	15.31	AVG	10.47	25.78	50.00	-24.22

Test Mode: Bluetooth Mode

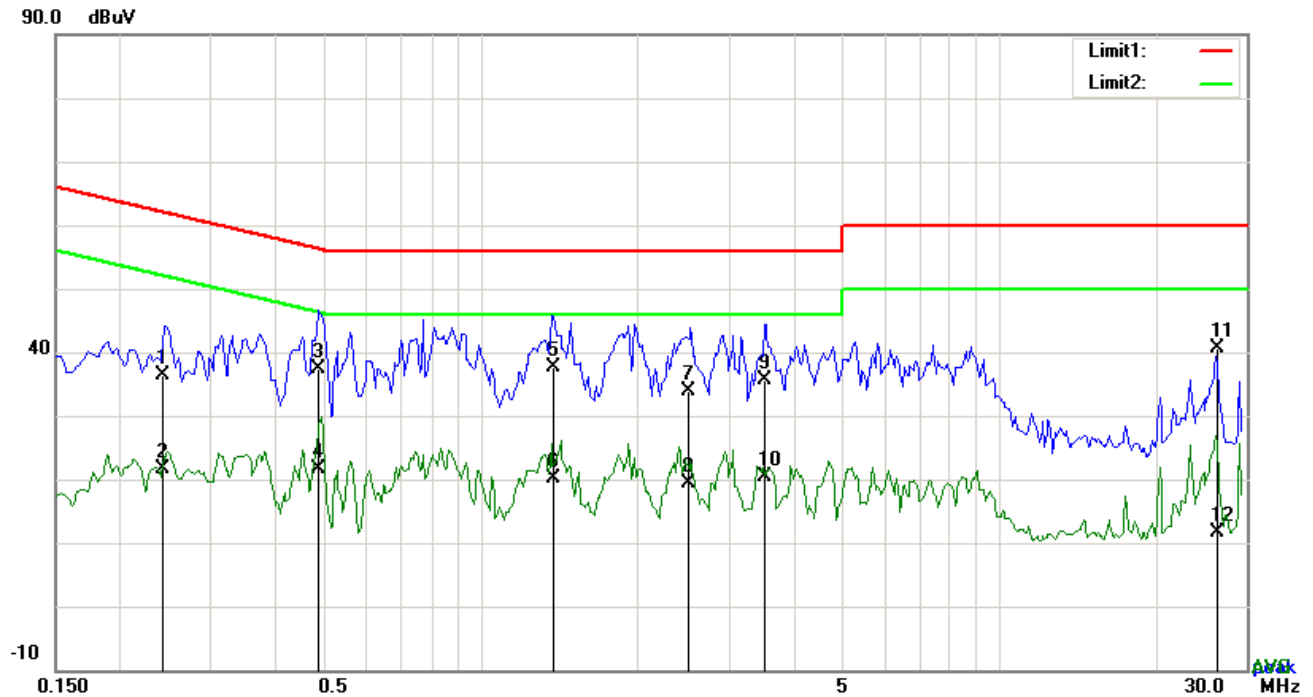


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1851	31.57	QP	10.02	41.59	64.25	-22.66
2	N	0.1851	14.47	AVG	10.02	24.49	54.25	-29.76
3	N	0.4971	26.96	QP	10.02	36.98	56.05	-19.07
4	N	0.4971	17.14	AVG	10.02	27.16	46.05	-18.89
5	N	0.6102	22.95	QP	10.02	32.97	56.00	-23.03
6	N	0.6102	11.49	AVG	10.02	21.51	46.00	-24.49
7	N	8.8695	16.27	QP	10.12	26.39	60.00	-33.61
8	N	8.8695	7.59	AVG	10.12	17.71	50.00	-32.29
9	N	26.0012	25.46	QP	10.36	35.82	60.00	-24.18
10	N	26.0012	2.14	AVG	10.36	12.50	50.00	-37.50
11	N	29.1222	20.89	QP	10.41	31.30	60.00	-28.70
12	N	29.1222	9.91	AVG	10.41	20.32	50.00	-29.68

Test Mode: Bluetooth Mode

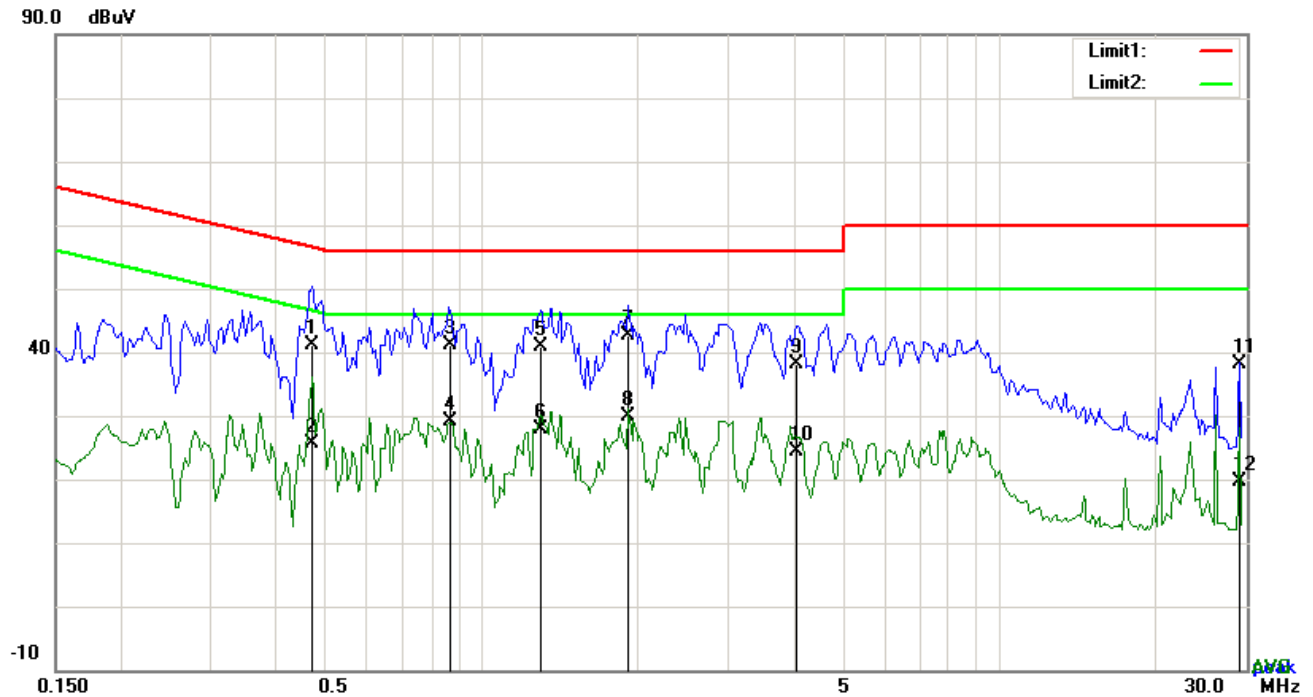


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2416	26.24	QP	10.03	36.27	62.04	-25.77
2	L1	0.2416	11.64	AVG	10.03	21.67	52.04	-30.37
3	L1	0.4837	27.32	QP	10.03	37.35	56.28	-18.93
4	L1	0.4837	11.69	AVG	10.03	21.72	46.28	-24.56
5	L1	1.3738	27.61	QP	10.03	37.64	56.00	-18.36
6	L1	1.3738	10.05	AVG	10.03	20.08	46.00	-25.92
7	L1	2.5000	23.71	QP	10.05	33.76	56.00	-22.24
8	L1	2.5000	9.32	AVG	10.05	19.37	46.00	-26.63
9	L1	3.5265	25.56	QP	10.06	35.62	56.00	-20.38
10	L1	3.5265	10.32	AVG	10.06	20.38	46.00	-25.62
11	L1	26.2782	30.22	QP	10.42	40.64	60.00	-19.36
12	L1	26.2782	1.19	AVG	10.42	11.61	50.00	-38.39

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	0.4698	31.11	QP	10.02	41.13	56.52	-15.39
2	N	0.4698	15.51	AVG	10.02	25.53	46.52	-20.99
3	N	0.8664	30.99	QP	10.03	41.02	56.00	-14.98
4	N	0.8664	18.98	AVG	10.03	29.01	46.00	-16.99
5	N	1.3005	30.78	QP	10.03	40.81	56.00	-15.19
6	N	1.3005	17.97	AVG	10.03	28.00	46.00	-18.00
7	N	1.9128	32.68	QP	10.04	42.72	56.00	-13.28
8	N	1.9128	19.95	AVG	10.04	29.99	46.00	-16.01
9	N	4.0686	28.02	QP	10.06	38.08	56.00	-17.92
10	N	4.0686	14.44	AVG	10.06	24.50	46.00	-21.50
11	N	29.1378	27.68	QP	10.41	38.09	60.00	-21.91
12	N	29.1378	9.21	AVG	10.41	19.62	50.00	-30.38

6.9 Radiated Spurious Emissions & Restricted Band

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	Feb 16, 2016
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable	
47CFR§15.205, §15.209, §15.247(d)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges		
		Frequency range (MHz)		Field Strength (µV/m)
		30 – 88		100
		88 – 216		150
		216 960		200
		Above 960		500

Test Setup	
------------	--

Procedure	<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

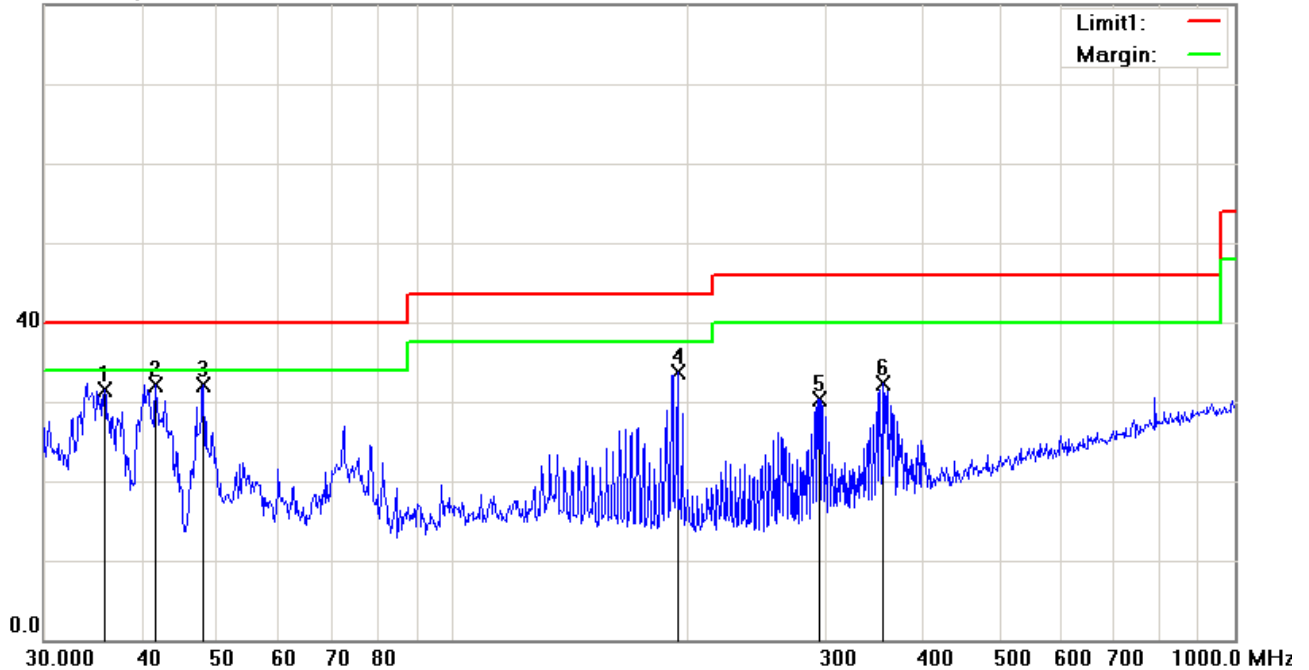
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Mode: Bluetooth Mode

Below 1GHz

80.0 dBuV/m

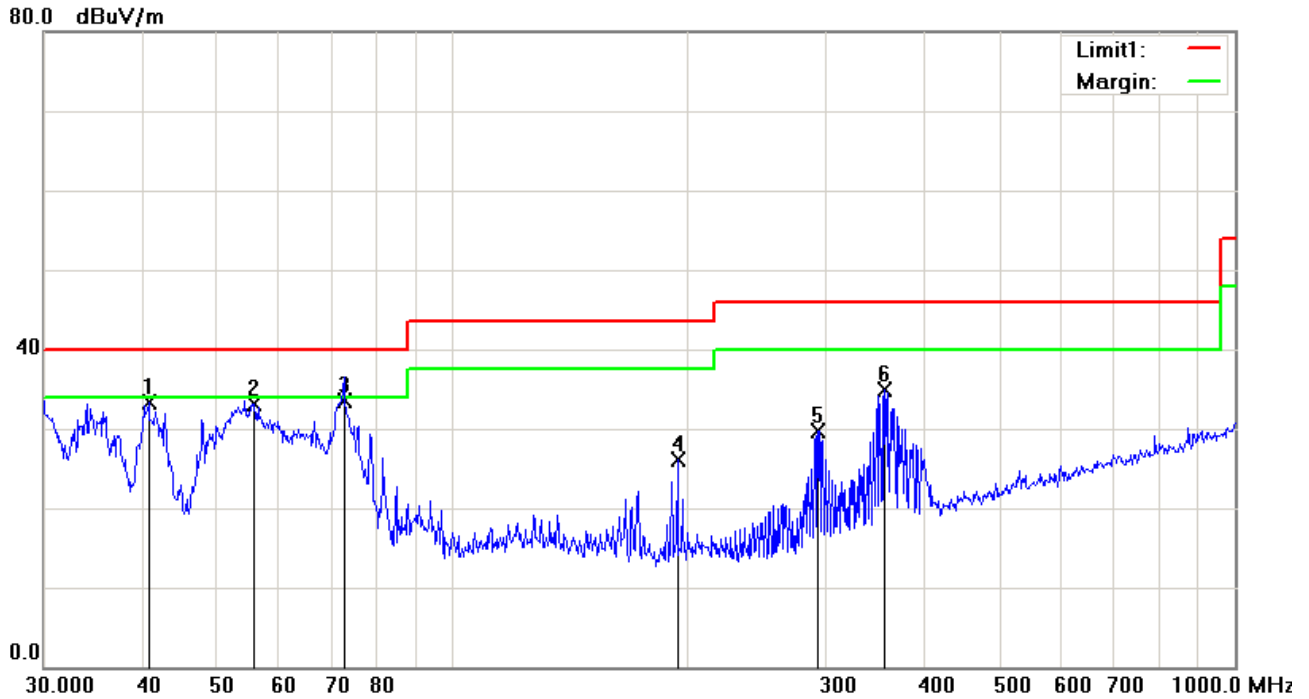


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	35.8747	36.11	peak	-4.58	31.53	40.00	-8.47	100	8
2	H	41.7130	40.91	peak	-8.73	32.18	40.00	-7.82	100	358
3	H	47.9940	44.47	peak	-12.28	32.19	40.00	-7.81	100	311
4	H	193.7728	42.66	peak	-9.04	33.62	43.50	-9.88	100	101
5	H	294.1137	37.41	peak	-7.17	30.24	46.00	-15.76	100	345
6	H	354.1831	37.57	peak	-5.36	32.21	46.00	-13.79	100	79

Below 1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	V	40.8446	41.46	peak	-8.16	33.30	40.00	-6.70	100	191
2	V	55.8047	47.00	peak	-13.86	33.14	40.00	-6.86	100	3
3	V	72.5917	47.17	QP	-13.67	33.50	40.00	-6.50	100	52
4	V	193.7728	35.14	peak	-9.04	26.10	43.50	-17.40	100	153
5	V	293.0842	36.99	peak	-7.21	29.78	46.00	-16.22	100	228
6	V	356.6758	40.13	peak	-5.30	34.83	46.00	-11.17	100	266

Above 1GHz

Test Mode:	Transmitting Mode
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Mode: GFSK (Worst Case)

Low Channel (2402 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	38.96	AV	V	33.83	6.86	31.72	47.93	54	-6.07
4804	38.41	AV	H	33.83	6.86	31.72	47.38	54	-6.62
4804	48.55	PK	V	33.83	6.86	31.72	57.52	74	-16.48
4804	47.92	PK	H	33.83	6.86	31.72	56.89	74	-17.11
17869	25.17	AV	V	44.68	11.55	32.11	49.29	54	-4.71
17869	24.84	AV	H	44.68	11.55	32.11	48.96	54	-5.04
17869	42.59	PK	V	44.68	11.55	32.11	66.71	74	-7.29
17869	42.13	PK	H	44.68	11.55	32.11	66.25	74	-7.75

Middle Channel (2441 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4882	39.16	AV	V	33.86	6.82	31.82	48.02	54	-5.98
4882	38.52	AV	H	33.86	6.82	31.82	47.38	54	-6.62
4882	49.17	PK	V	33.86	6.82	31.82	58.03	74	-15.97
4882	48.33	PK	H	33.86	6.82	31.82	57.19	74	-16.81
17865	25.18	AV	V	44.68	11.55	32.11	49.3	54	-4.7
17865	24.92	AV	H	44.68	11.55	32.11	49.04	54	-4.96
17865	42.37	PK	V	44.68	11.55	32.11	66.49	74	-7.51
17865	42.03	PK	H	44.68	11.55	32.11	66.15	74	-7.85

High Channel (2480 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	38.85	AV	V	33.9	6.76	31.92	47.59	54	-6.41
4960	38.39	AV	H	33.9	6.76	31.92	47.13	54	-6.87
4960	49.03	PK	V	33.9	6.76	31.92	57.77	74	-16.23
4960	48.67	PK	H	33.9	6.76	31.92	57.41	74	-16.59
17873	24.71	AV	V	44.68	11.55	32.11	48.83	54	-5.17
17873	24.59	AV	H	44.68	11.55	32.11	48.71	54	-5.29
17873	42.14	PK	V	44.68	11.55	32.11	66.26	74	-7.74
17873	42.58	PK	H	44.68	11.55	32.11	66.7	74	-7.3

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

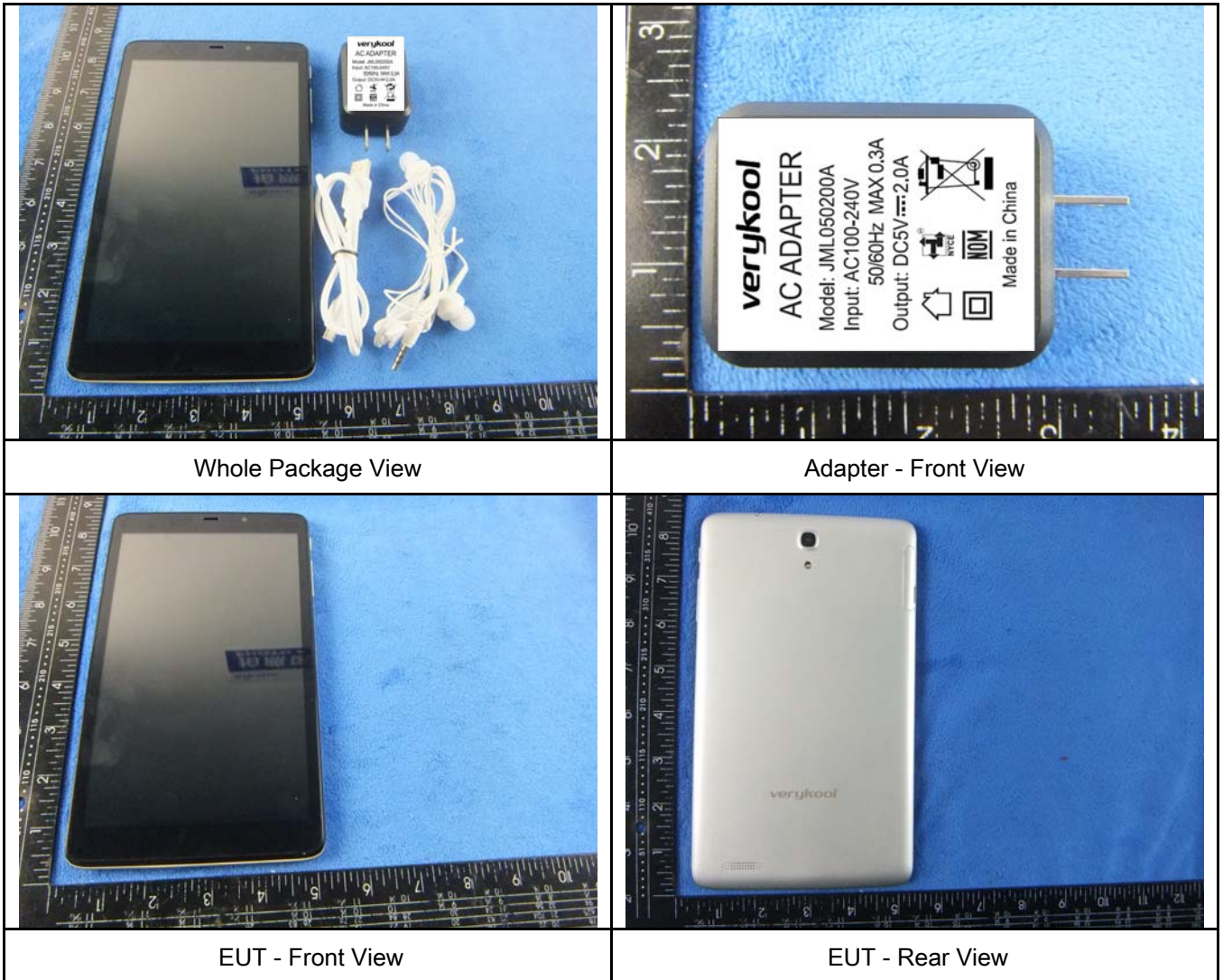
3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

Annex A. TEST INSTRUMENT

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

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo





EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View

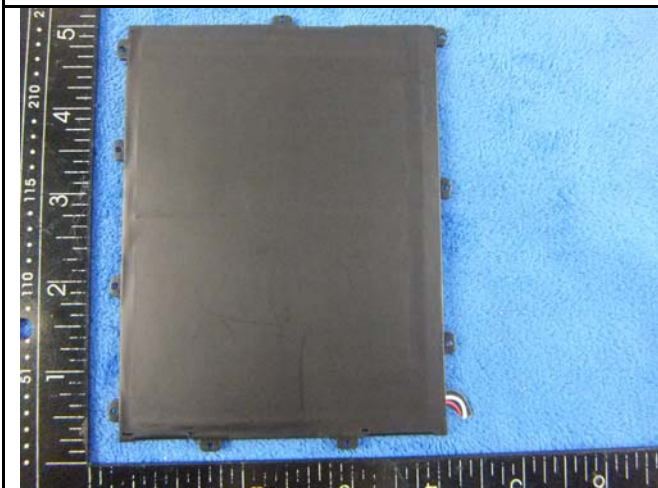
Annex B.ii. Photograph: EUT Internal Photo



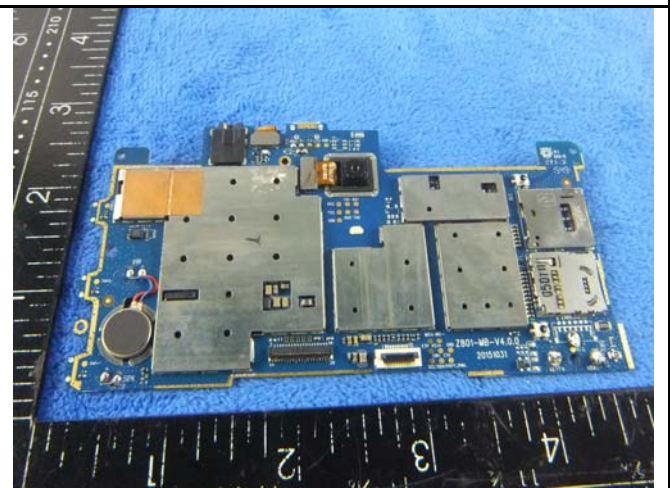
Cover Off - Top View 1



Battery - Front View



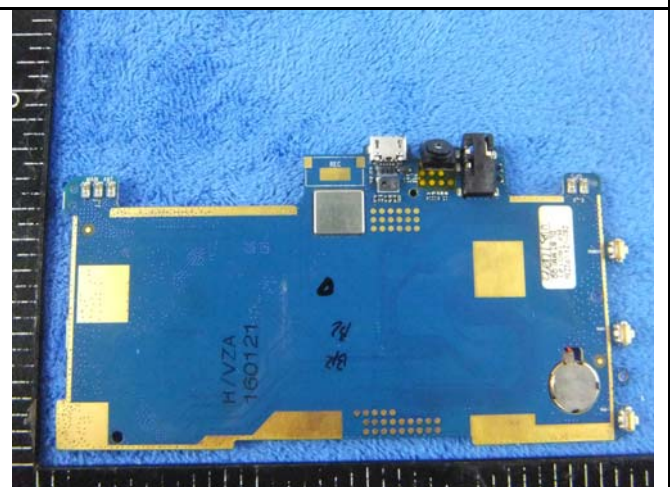
Battery - Rear View



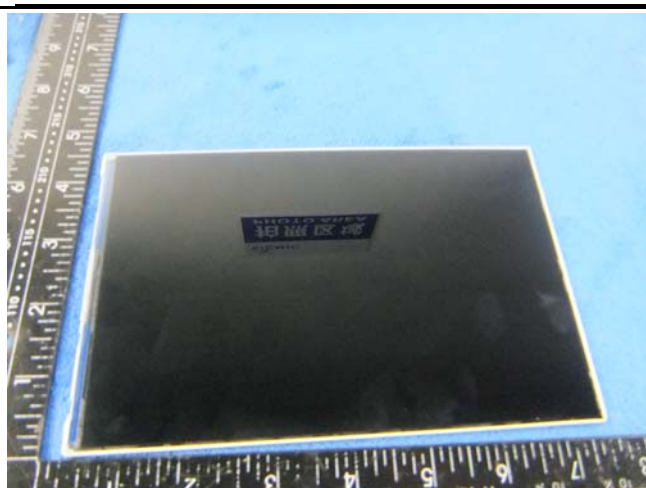
Mainboard with Shielding - Front View



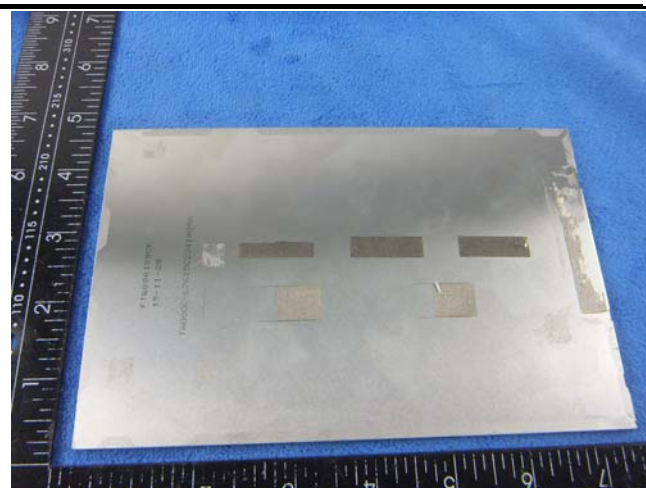
Mainboard without Shielding - Front View



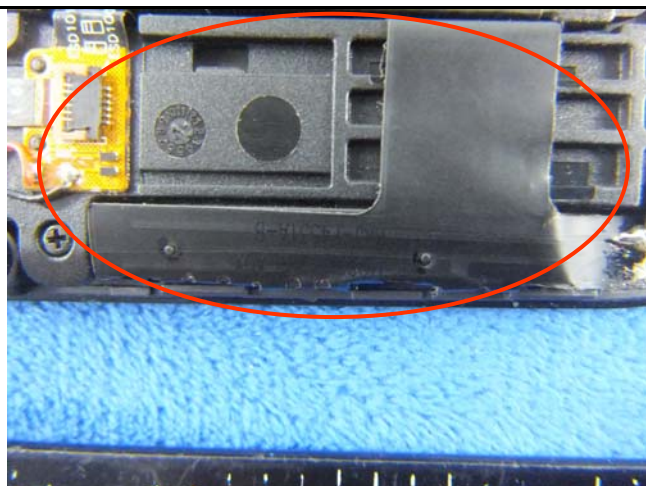
Mainboard - Rear View



LCD – Front View



LCD – Rear View



GSM/PCS/UMTS-FDD Antenna View



LTE - Antenna View



WIFI/BT/BLE/GPS - Antenna View

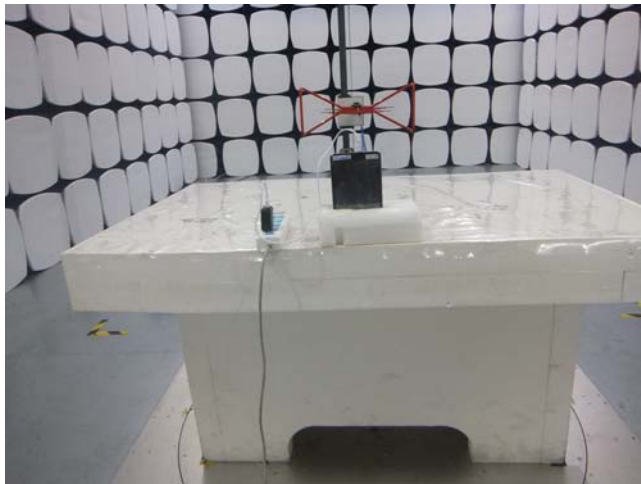
Annex B.iii. Photograph: Test Setup Photo



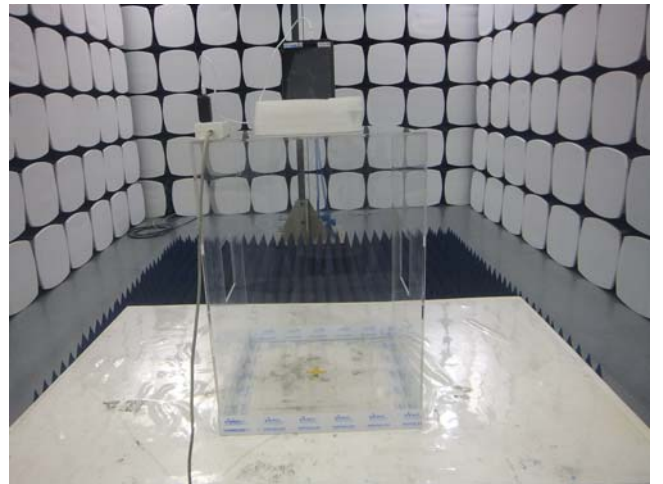
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

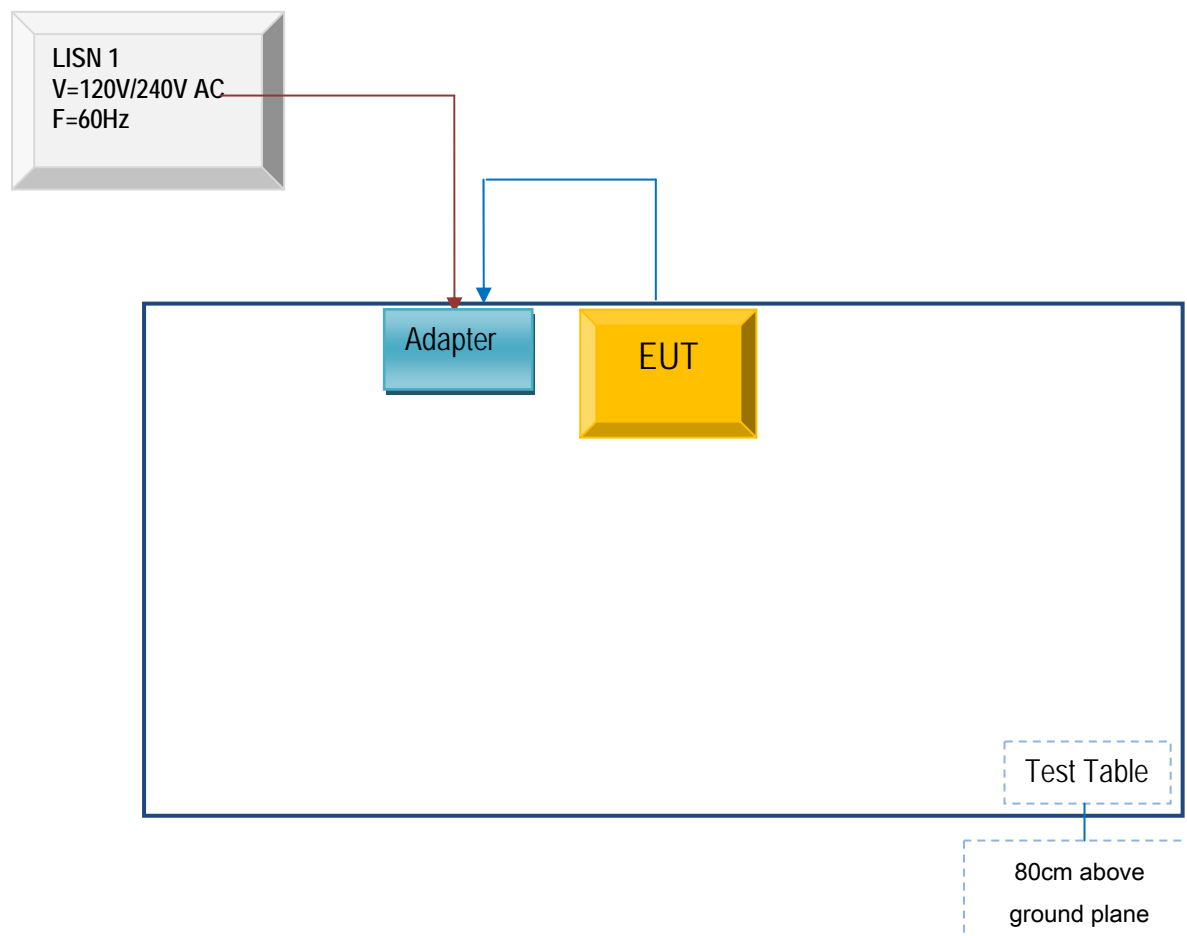


Radiated Spurious Emissions Test Setup Above
1GHz

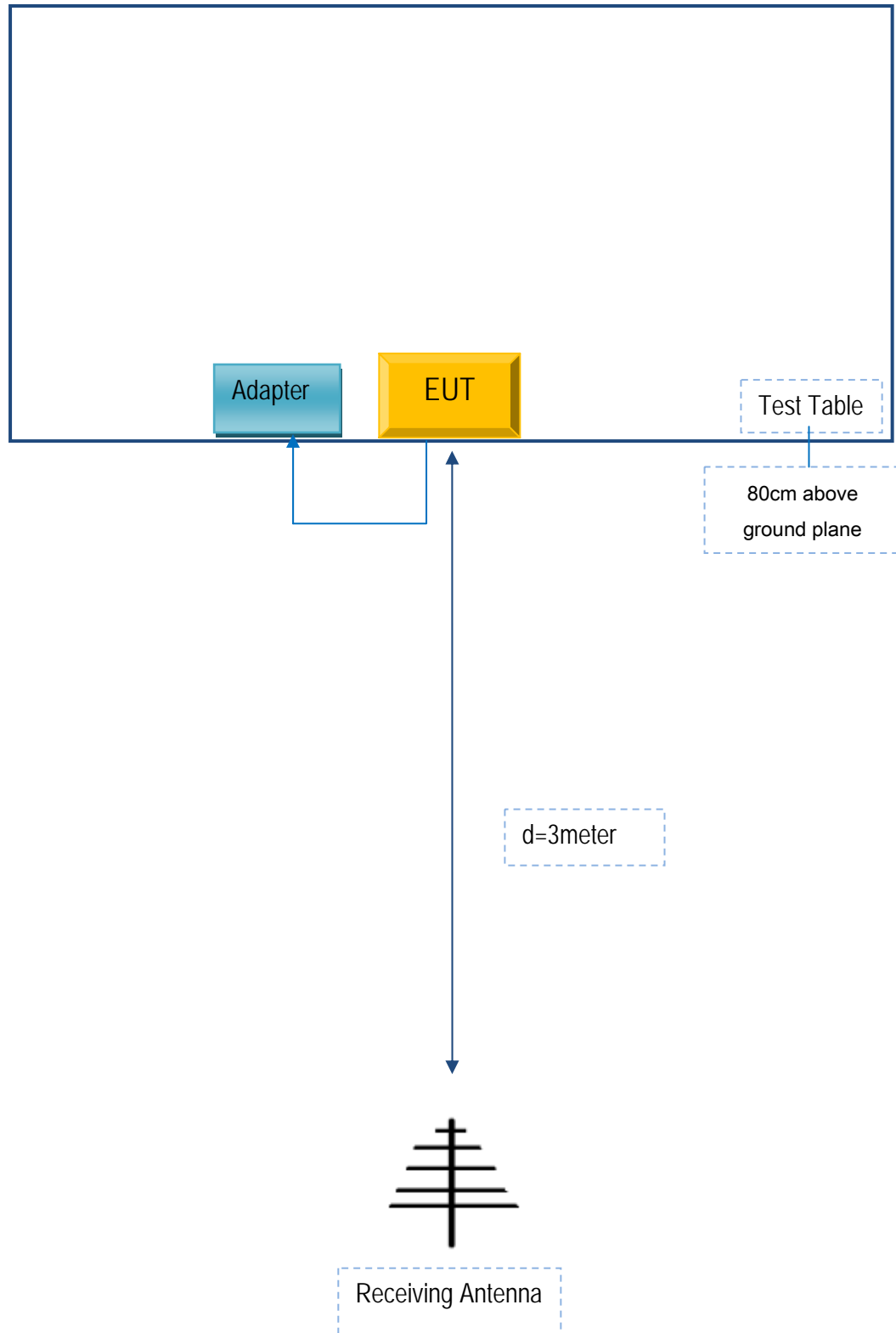
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

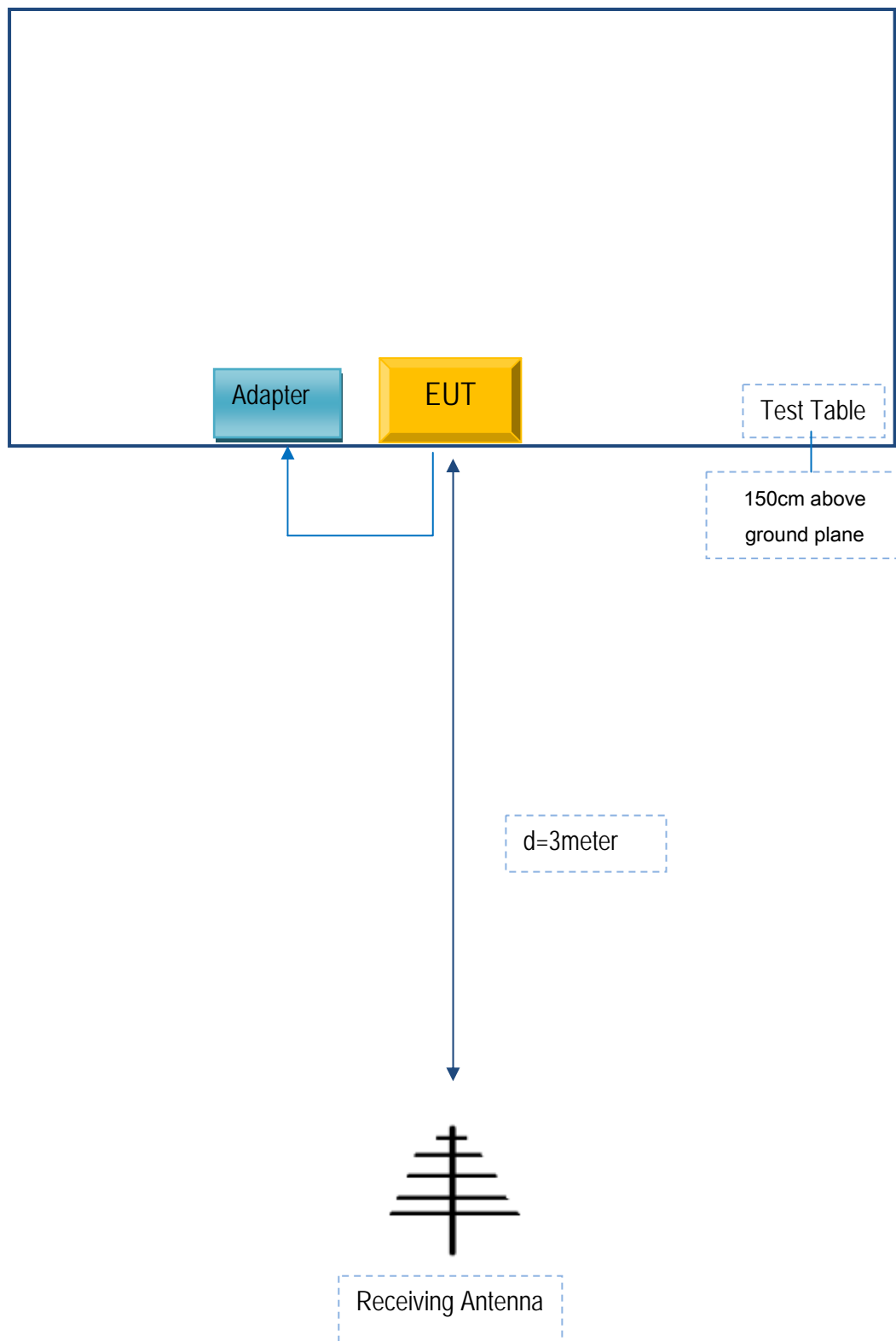
Block Configuration Diagram for AC Line Conducted Emissions



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
Verykool USA Inc	Adapter	JML050200A	Y11243578

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	ST22100

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

N/A

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Annex E. DECLARATION OF SIMILARITY

N/A