

RF TEST REPORT



Report No.: 16070896-FCC-R2

Supersede Report No.: N/A

Applicant	Verykool USA Inc	
Product Name	Mobile phone	
Model No.	SL5050	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2015, ANSI C63.10: 2013	
Test Date	July 21 to August 30	
Issue Date	August 31, 2016	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification	☒	
Equipment did not comply with the specification	☐	
		
Loren Luo Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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Laboratories Introduction

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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

Test Report	16070896-FCC-R2
Page	3 of 61

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CONTENTS

1. REPORT REVISION HISTORY	5
2. CUSTOMER INFORMATION	5
3. TEST SITE INFORMATION	5
4. EQUIPMENT UNDER TEST (EUT) INFORMATION	6
5. TEST SUMMARY	9
6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS	10
6.1 ANTENNA REQUIREMENT	10
6.2 CHANNEL SEPARATION	11
6.3 20DB BANDWIDTH	15
6.4 PEAK OUTPUT POWER	19
6.5 NUMBER OF HOPPING CHANNEL	23
6.6 TIME OF OCCUPANCY (DWEEL TIME)	25
6.7 BAND EDGE & RESTRICTED BAND	29
6.8 AC POWER LINE CONDUCTED EMISSIONS	37
6.9 RADIATED SPURIOUS EMISSIONS & RESTRICTED BAND	43
ANNEX A. TEST INSTRUMENT	49
ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS	50
ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT	56
ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST	60
ANNEX E. DECLARATION OF SIMILARITY	61

1. Report Revision History

Report No.	Report Version	Description	Issue Date
16070896-FCC-R2	NONE	Original	August 31, 2016

2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, California 92122 United States
Manufacturer	Kozen Mobile Co.,Ltd
Manufacturer Add	Floor 3rd, Building 29, No.368 Zhangjiang Road, Pudong District, Shanghai, China 201203

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: Mobile phone

Main Model: SL5050

Serial Model: N/A

Date EUT received: July 20, 2016

Test Date(s): July 21 to August 30

Equipment Category : DSS

Antenna Gain:

- GSM850: -2.2dBi
- PCS1900: -1.21dBi
- UMTS-FDD Band V: -2.62dBi
- UMTS-FDD Band IV: -1.42dBi
- UMTS-FDD Band II: -1.42dBi
- LTE Band 2: -1.5dBi
- LTE Band 4: -1.4dBi
- LTE Band 5: -2.2dBi
- LTE Band 7: -0.8dBi
- LTE Band 12: -2.4dBi
- LTE Band 17: -2.4dBi
- Bluetooth/BLE/WIFI : 0dBi
- GPS:0dBi

Antenna Type: PIFA antenna

Input Power:

- Adapter:
- Model: TPA-46B050100UU
- Input: AC 100-240V,50/60Hz;0.2A
- Output: DC 5.0V,1A
- Battery:
- Model:FHPK275875L
- Spec: 3.8V,2500mAh(9.5Wh)
- Charge limited voltage: 4.35V

Max. Output Power: 6.503dBm

Type of Modulation:

GSM / GPRS: GMSK
EGPRS: GMSK,8PSK
UMTS-FDD: QPSK
LTE Band: QPSK, 16QAM
802.11b/g/n: DSSS, OFDM
Bluetooth: GFSK, π /4DQPSK, 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 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
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 12 TX:699.7 ~ 715.3 MHz; RX : 729.7~ 745.3MHz
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

Number of Channels:

GSM 850: 124CH
PCS1900: 299CH
UMTS-FDD Band V: 102CH
UMTS-FDD Band IV: 202CH
UMTS-FDD Band II: 277CH
WIFI :802.11b/g/n(20M): 11CH
WIFI :802.11n(40M): 7CH
Bluetooth: 79CH
BLE: 40CH
GPS:1CH

Test Report	16070896-FCC-R2
Page	8 of 61

Port: Earphone Port, USB Port

Trade Name : verykool

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

FCC ID: WA6SL5050

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:

- Antenna must be permanently attached to the unit.
- 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

A permanently attached PIFA antenna for Bluetooth/BLE/WIFI/GPS, the gain is 0dBi.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is -2.2dBi for GSM850, -1.21dBi for PCS1900, -2.62dBi for UMTS-FDD Band V, -1.42dBi for UMTS-FDD Band IV, 1.42dBi for UMTS-FDD Band II.

A permanently attached PIFA antenna for LTE Band 2/4/5/7/12/17, the gain is -1.5dBi for LTE Band 2, the gain is -1.4dBi for LTE Band 4, the gain is -2.2dBi for LTE Band 5, the gain is -0.8dBi for LTE Band 7, the gain is -2.4dBi for LTE Band 12, the gain is -2.4dBi for LTE Band 17.

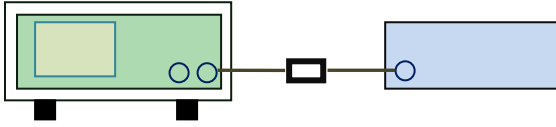
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	August 08, 2016
Tested By :	Loren Luo

Requirement(s):

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

Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

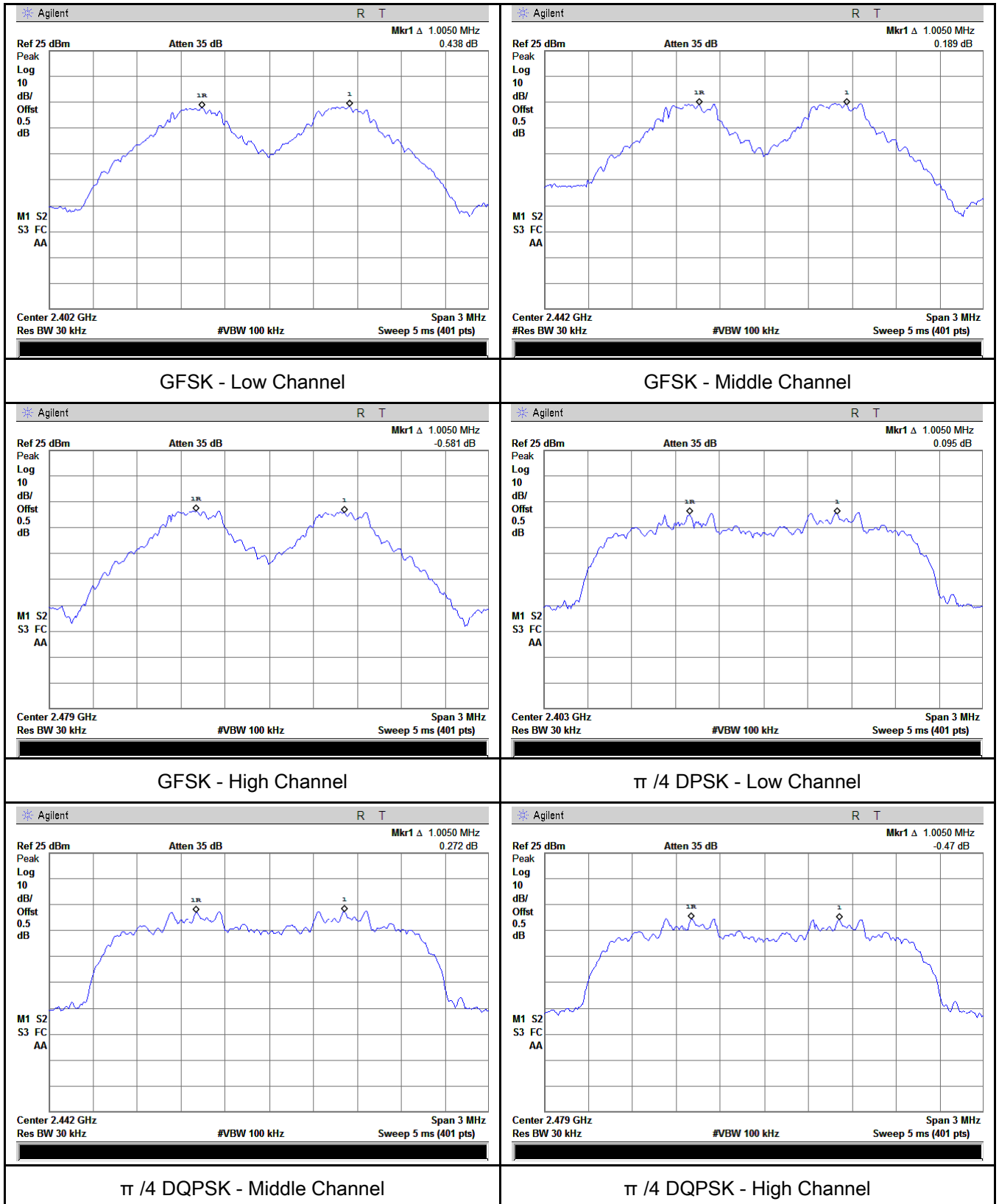
Test Plot ☒ Yes (See below) ☐ N/A

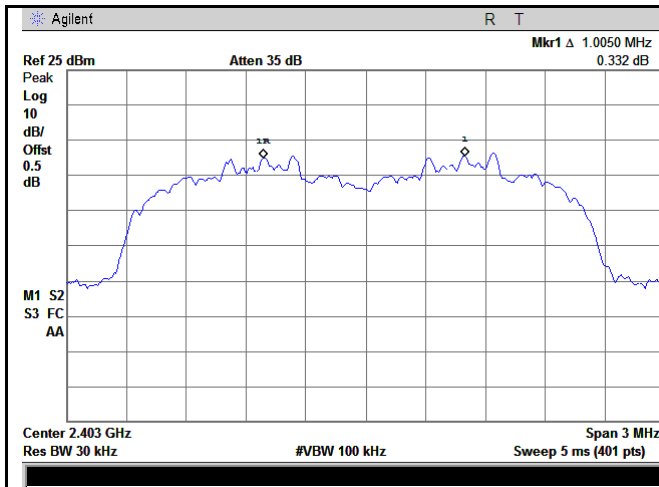
Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.687	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.685	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.684	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ DQPSK	Low Channel	2402	1.005	0.881	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.871	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.877	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.871	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.869	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.873	Pass
	Adjacency Channel	2479			

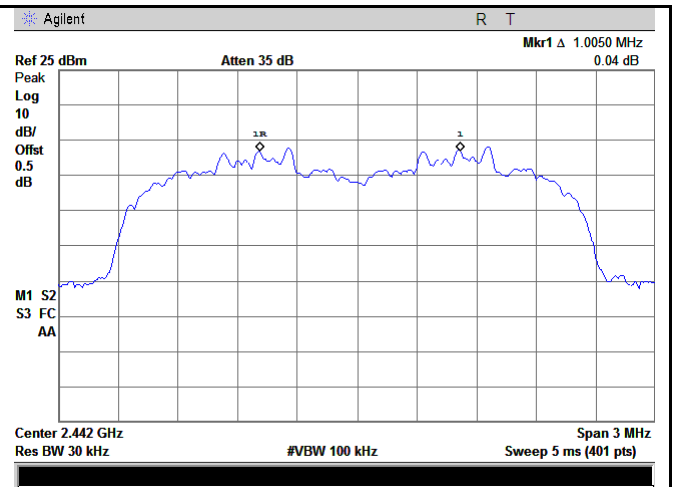
Test Plots

Channel Separation measurement result

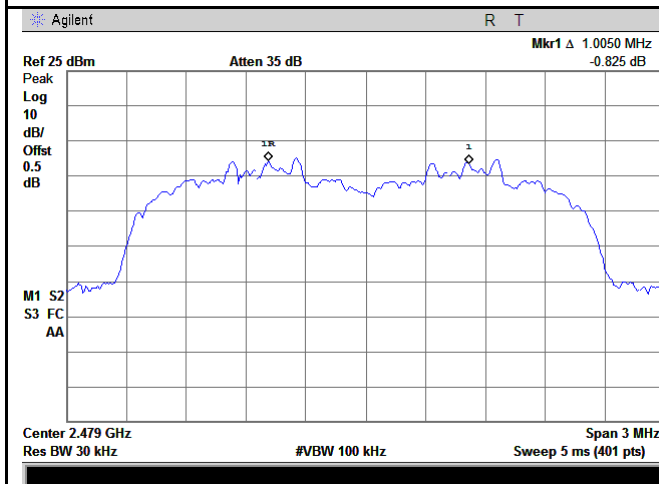




8DPSK - Low Channel



8DPSK - Middle Channel

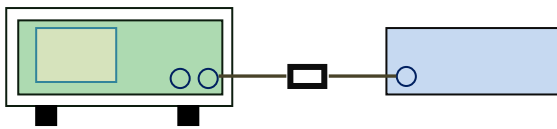


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	23°C
Relative Humidity	58%
Atmospheric Pressure	1006mbar
Test date :	August 06, 2016
Tested By :	Loren Luo

Requirement(s):

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

Test Report	16070896-FCC-R2
Page	16 of 61

	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

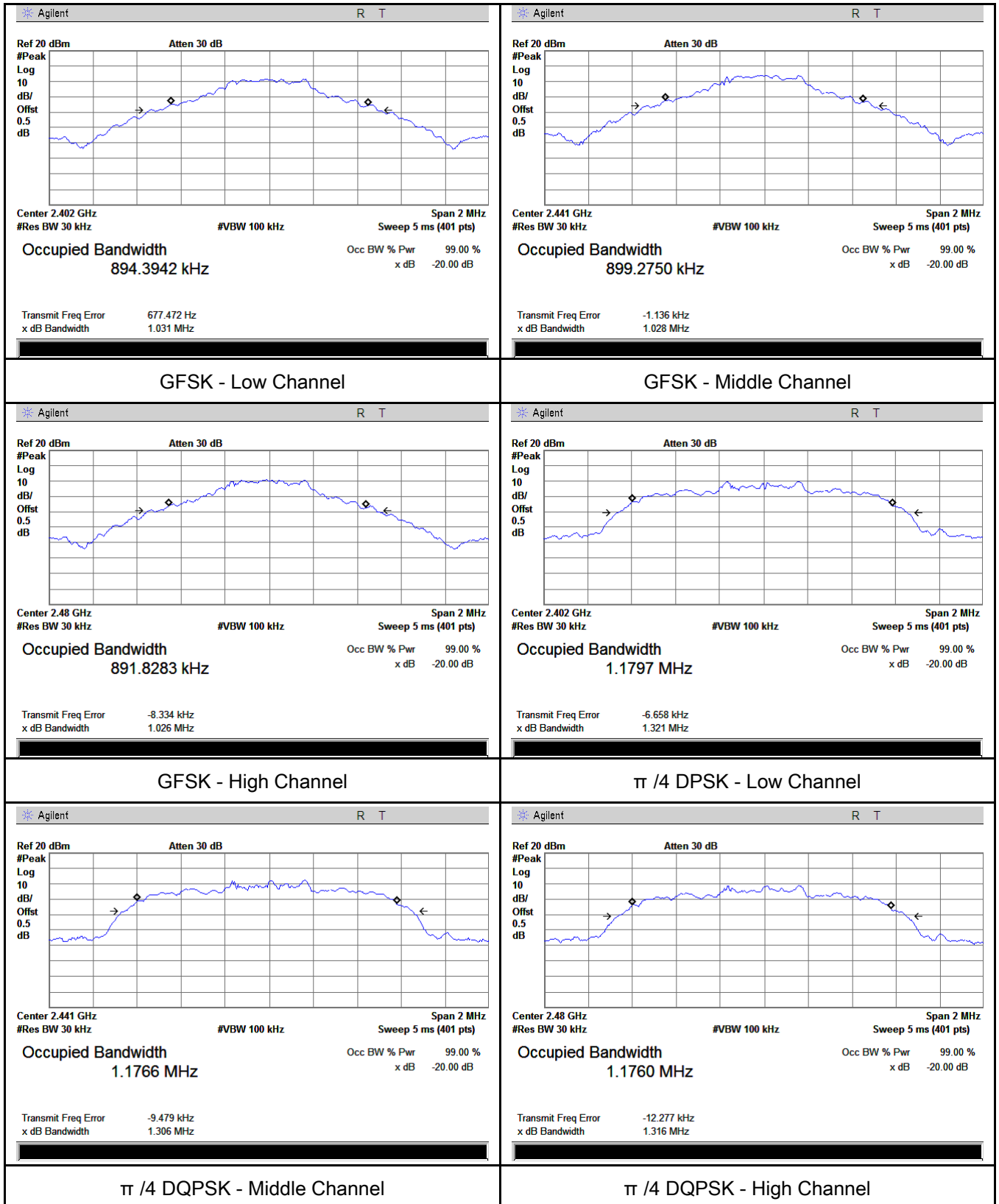
Test Plot ☒ Yes (See below) ☐ N/A

Measurement result

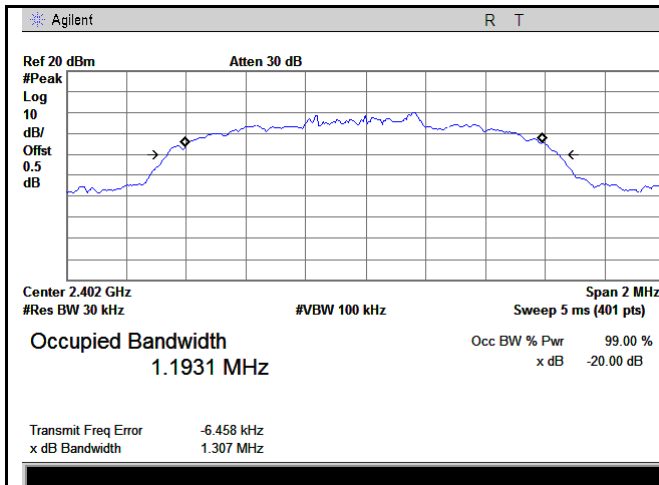
Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.031	0.8944
	Mid	2441	1.028	0.8993
	High	2480	1.026	0.8918
$\pi/4$ DQPSK	Low	2402	1.321	1.1797
	Mid	2441	1.306	1.1766
	High	2480	1.316	1.1760
8-DPSK	Low	2402	1.307	1.1931
	Mid	2441	1.304	1.1830
	High	2480	1.309	1.1921

Test Plots

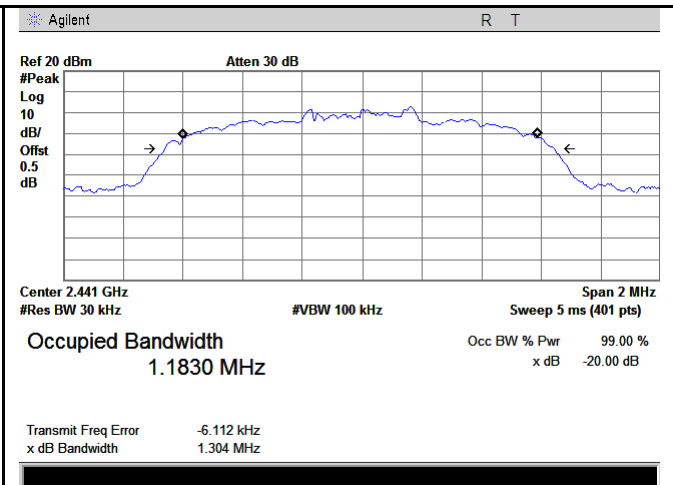
20dB Bandwidth measurement result



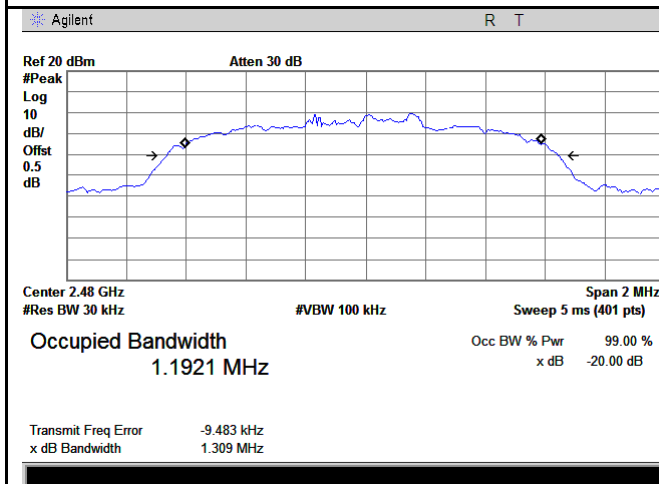
Test Report	16070896-FCC-R2
Page	18 of 61



8DPSK - Low Channel



8DPSK - Middle Channel

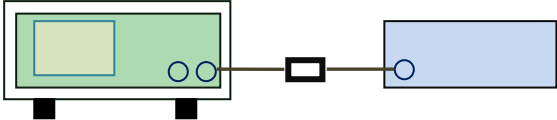


8DPSK - High Channel

6.4 Peak Output Power

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	August 08, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☒
	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			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel - RBW $>$ the 20 dB bandwidth of the emission being measured - VBW $\geq$ 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

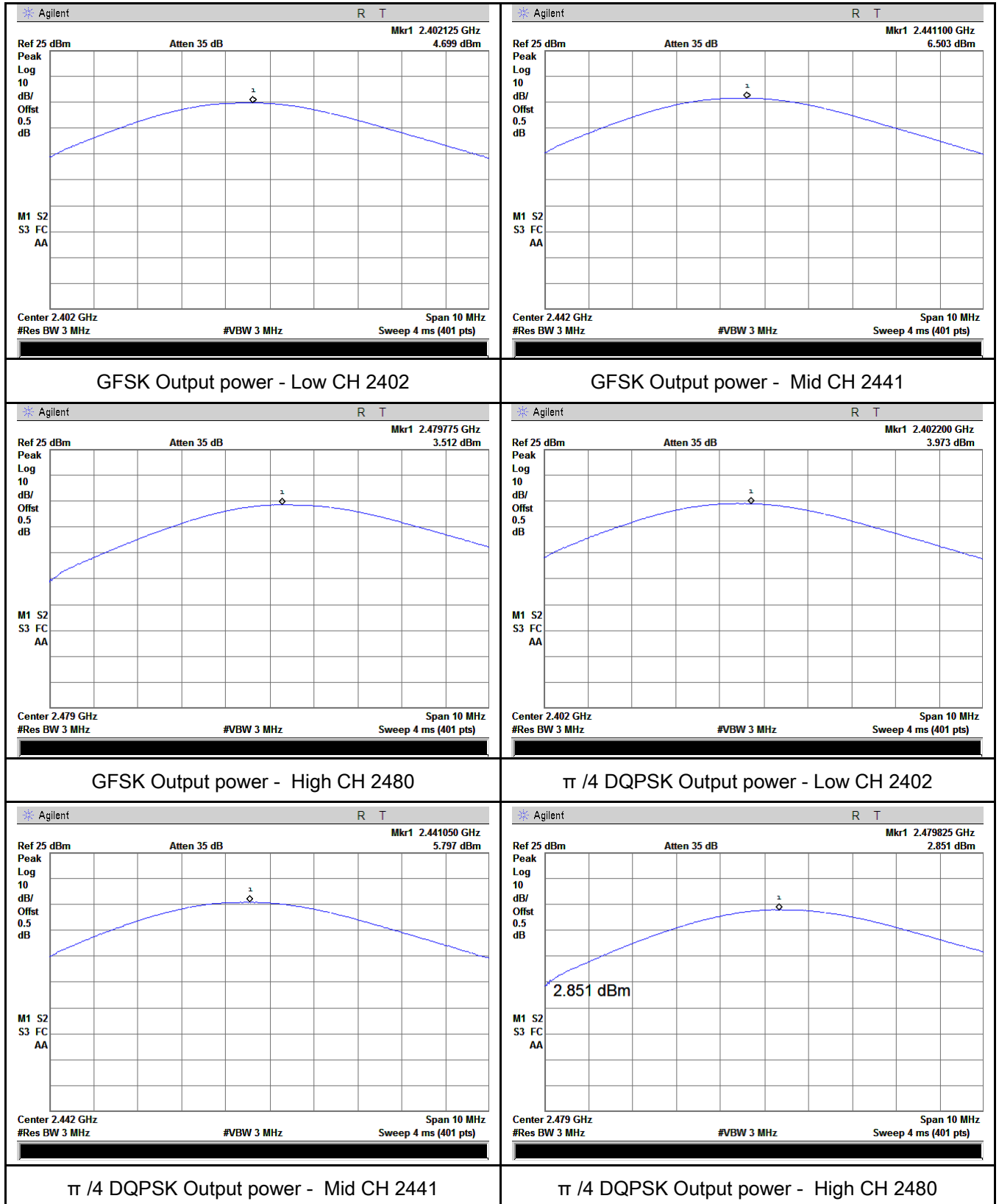
Test Plot ☒ Yes (See below) ☐ N/A

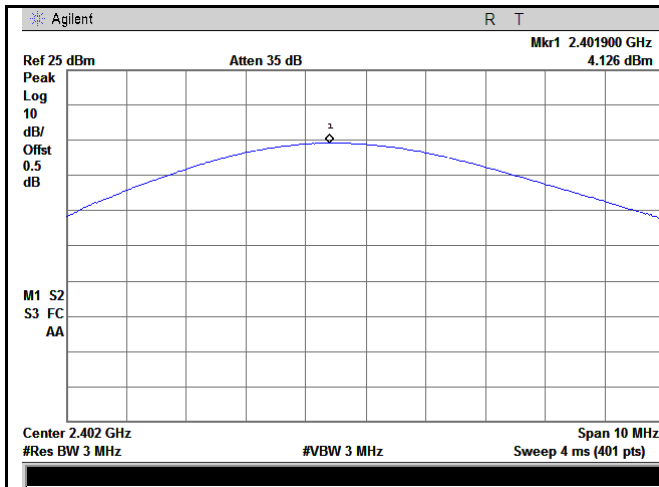
Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	4.699	125	Pass
		Mid	2441	6.503	125	Pass
		High	2480	3.512	125	Pass
	$\pi/4$ DQPSK	Low	2402	3.973	125	Pass
		Mid	2441	5.797	125	Pass
		High	2480	2.851	125	Pass
	8-DPSK	Low	2402	4.126	125	Pass
		Mid	2441	5.914	125	Pass
		High	2480	3.005	125	Pass

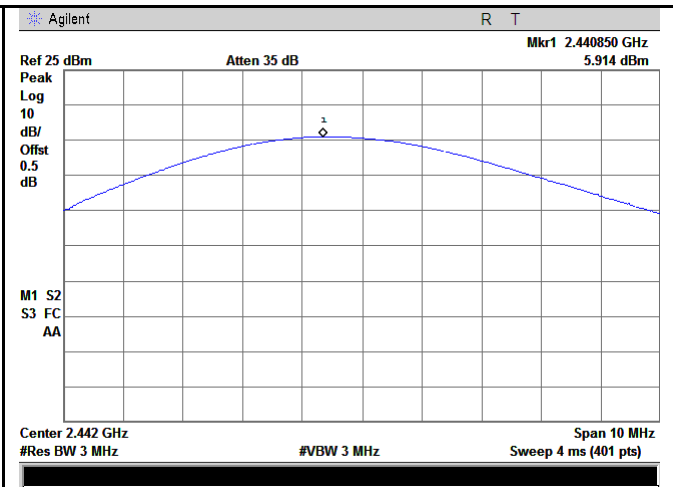
Test Plots

Output Power measurement result

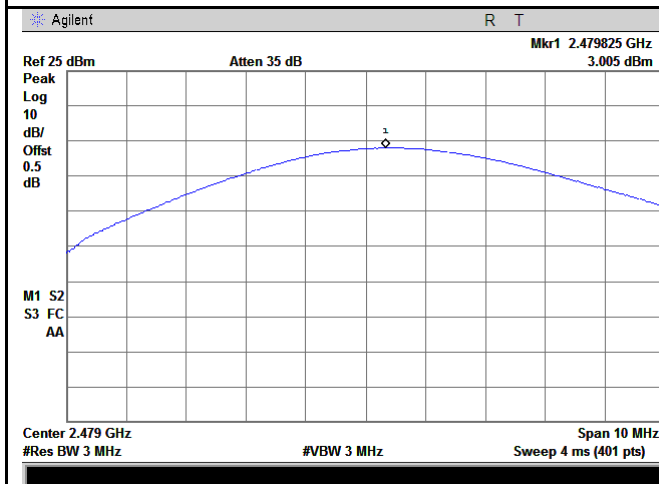




8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

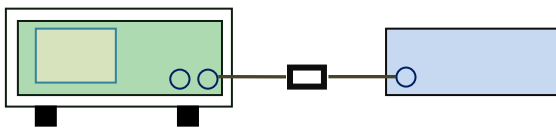


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	August 08, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz ≥ 15 channels	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <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

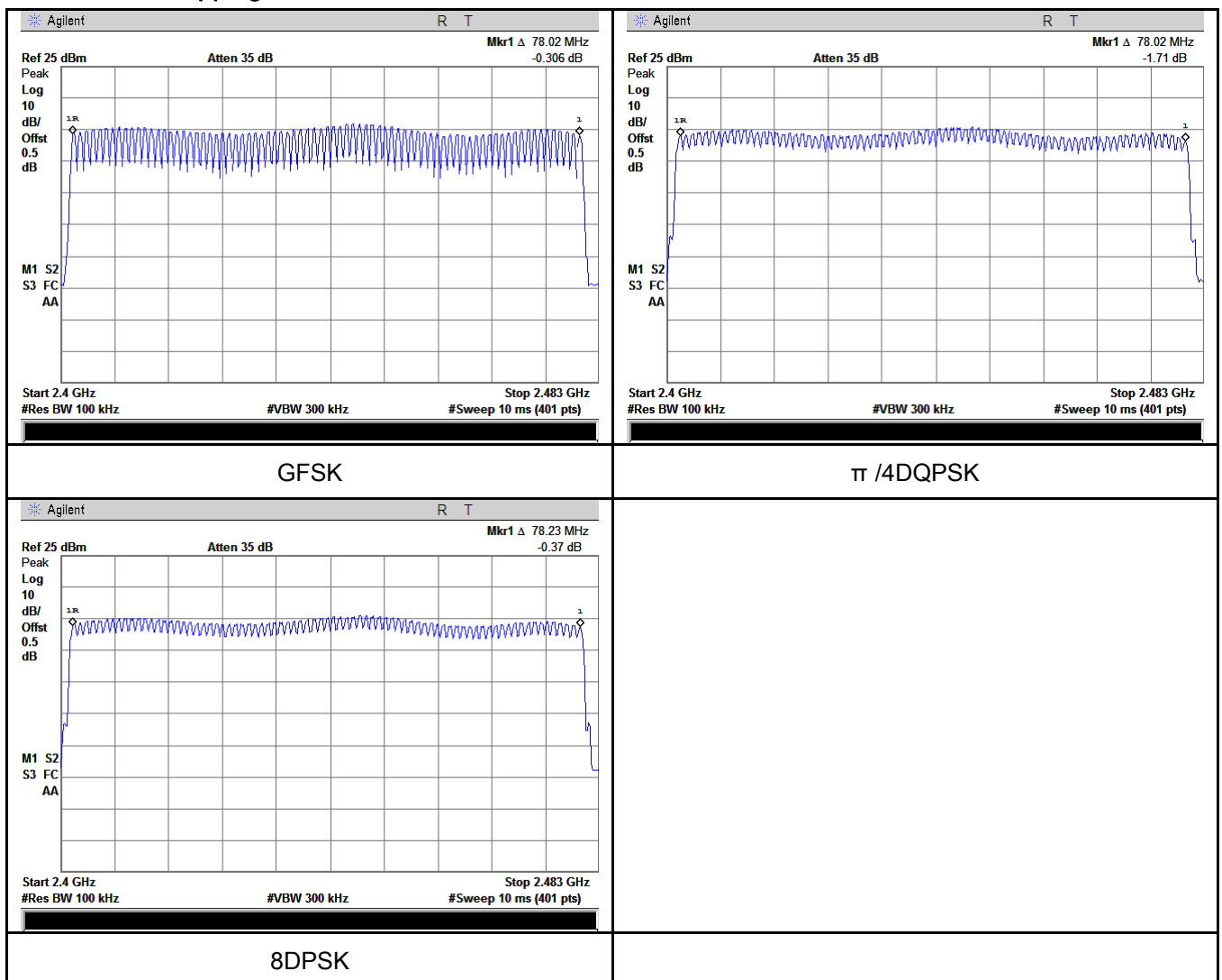
Test Plot ☒ Yes (See below) ☐ N/A

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

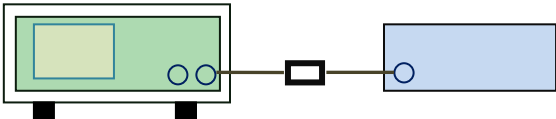
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	August 08, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <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		

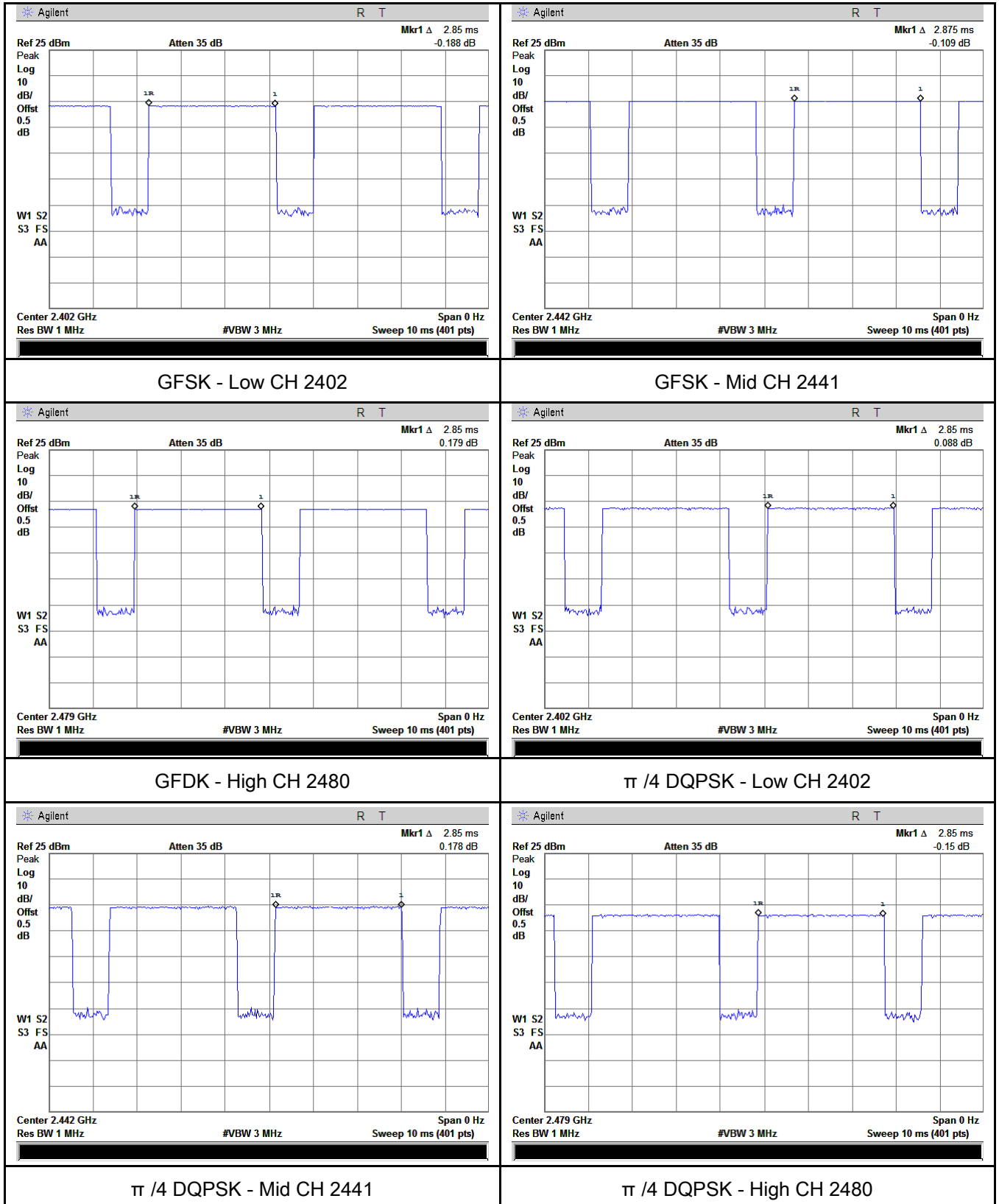
Test Data ☒ Yes ☐ N/A

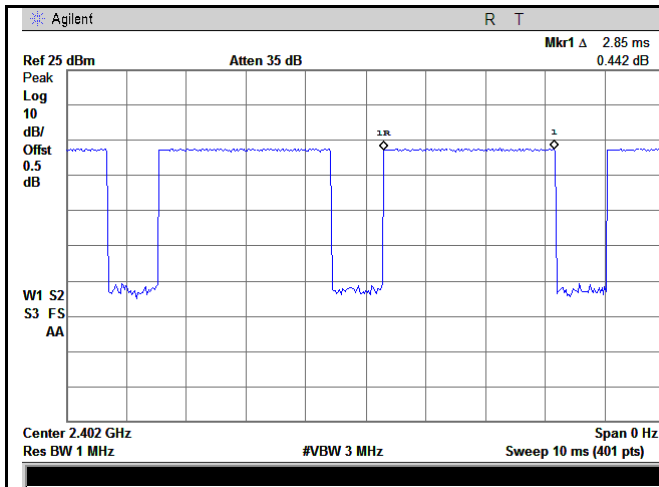
Test Plot ☒ Yes (See below) ☐ N/A

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.85	304.000	400	Pass
		Mid	2.88	307.200	400	Pass
		High	2.85	304.000	400	Pass
	$\pi/4$ DQPSK	Low	2.85	304.000	400	Pass
		Mid	2.85	304.000	400	Pass
		High	2.85	304.000	400	Pass
	8-DPSK	Low	2.85	304.000	400	Pass
		Mid	2.85	304.000	400	Pass
		High	2.85	304.000	400	Pass
Note: Dwell time=Pulse Time (ms) $\times$ (1600 $\div$ 6 $\div$ 79) $\times$ 31.6						

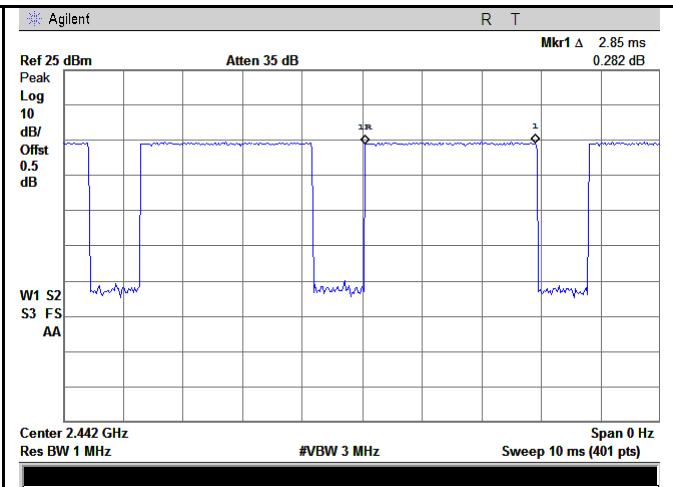
Test Plots

Dwell Time measurement result

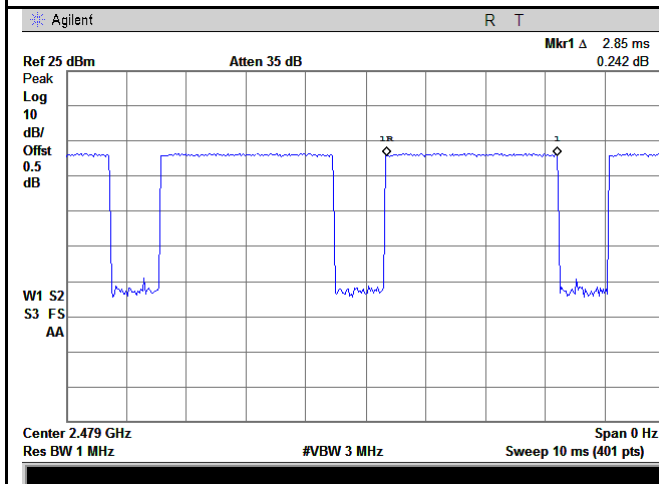




8DPSK - Low CH 2402



8DPSK - Mid CH 2441

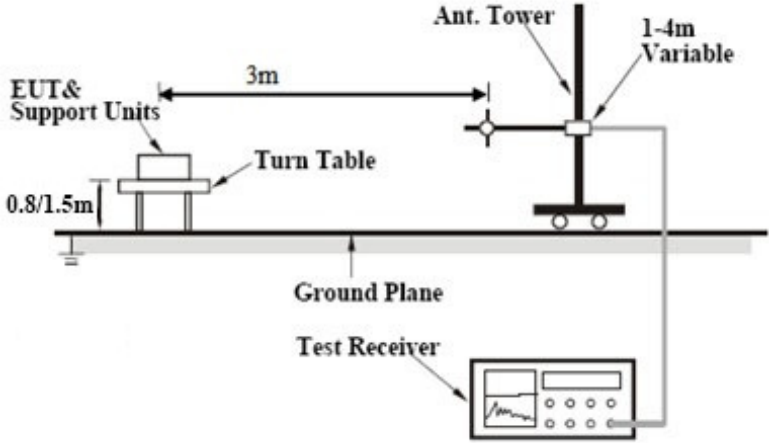


8DPSK - High CH 2480

6.7 Band Edge & Restricted Band

Temperature	25°C
Relative Humidity	54%
Atmospheric Pressure	1012mbar
Test date :	August 12, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	☒
Test Setup			
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range,		

Test Report	16070896-FCC-R2
Page	30 of 61

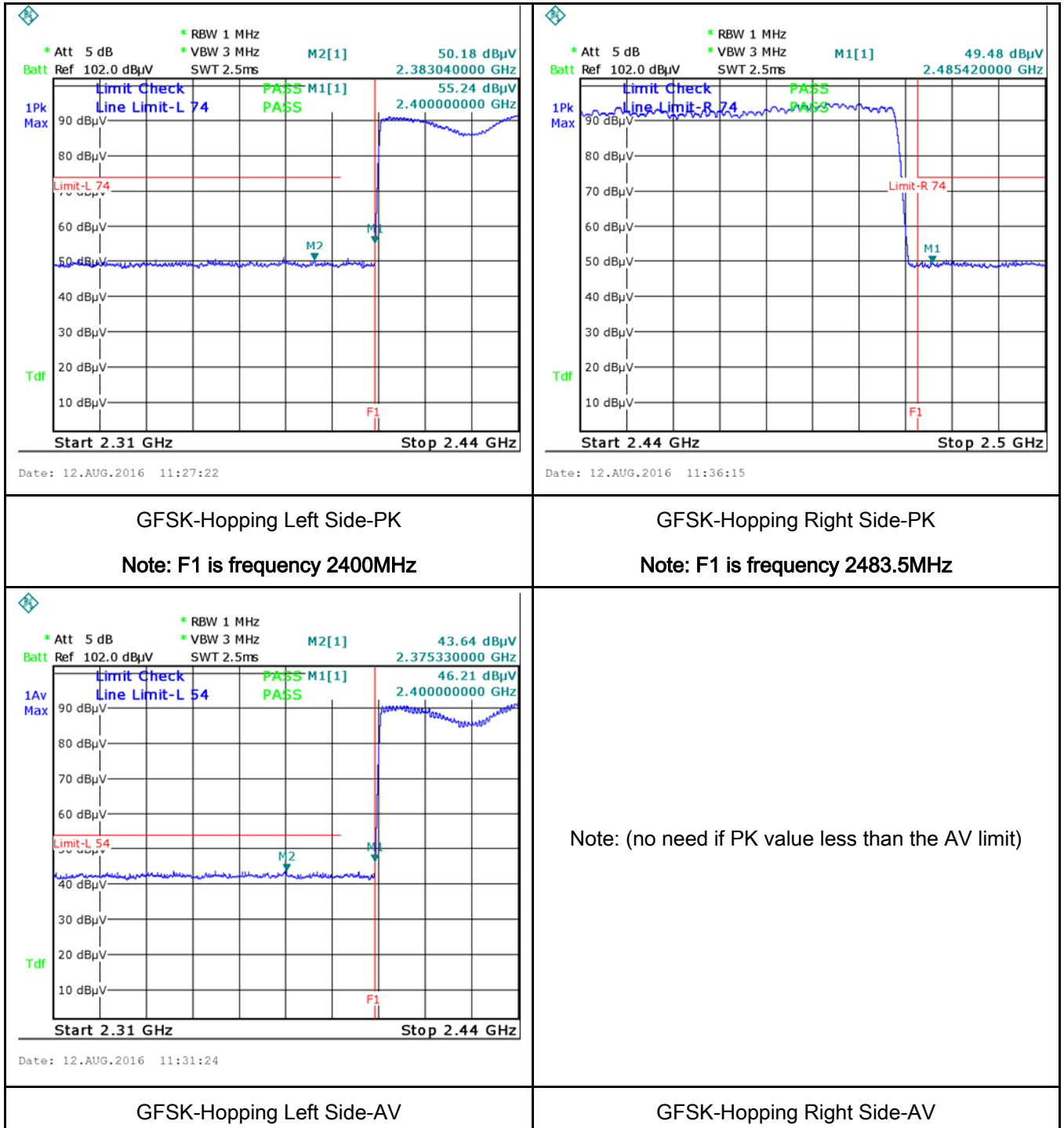
	and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☒ Pass ☐ Fail

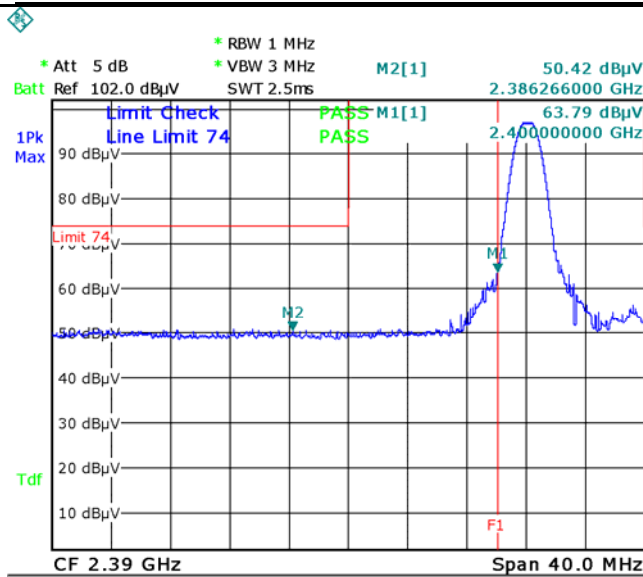
Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Plots

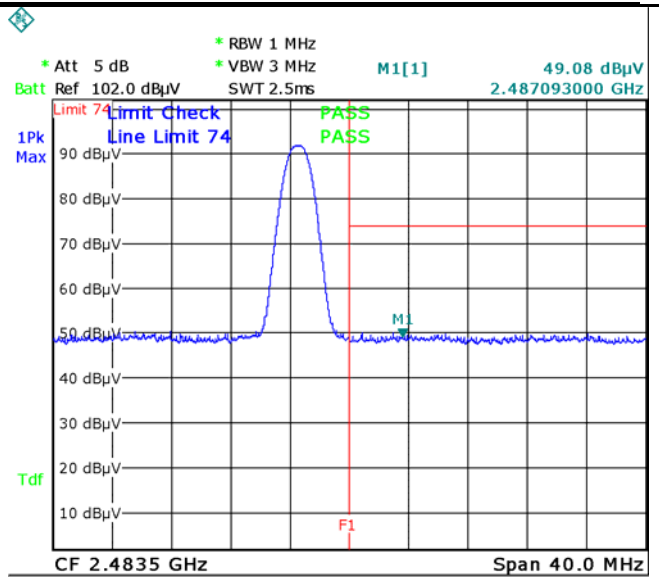
GFSK Mode:





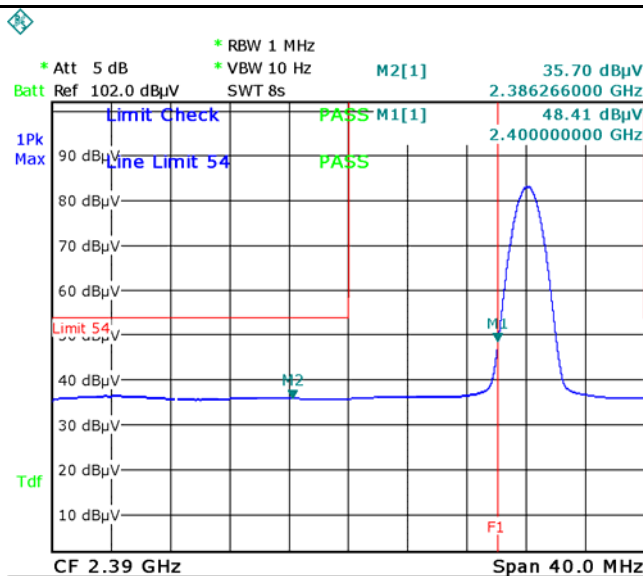
GFSK-Left Side-PK

Note: F1 is frequency 2400MHz



GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz

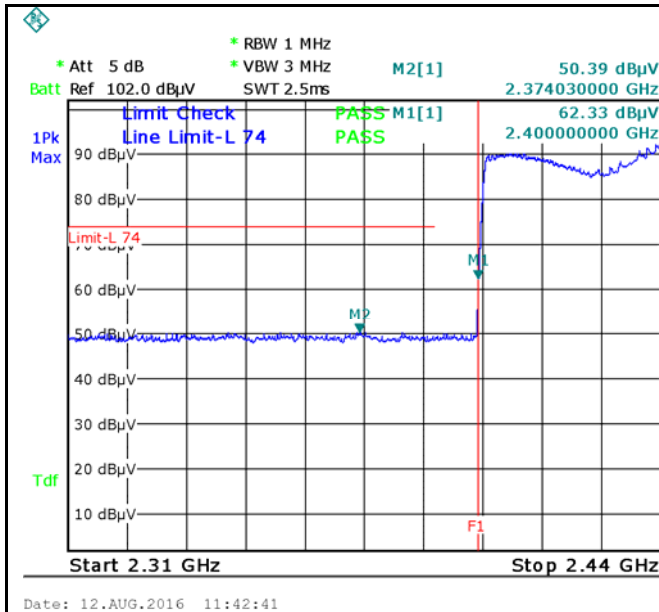


GFSK-Left Side-AV

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

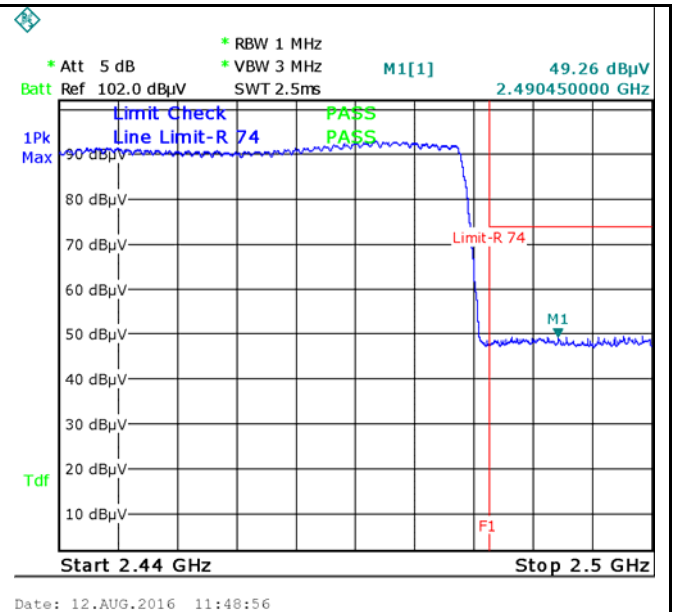
GFSK-Right Side-AV

$\pi/4$ DQPSK Mode:



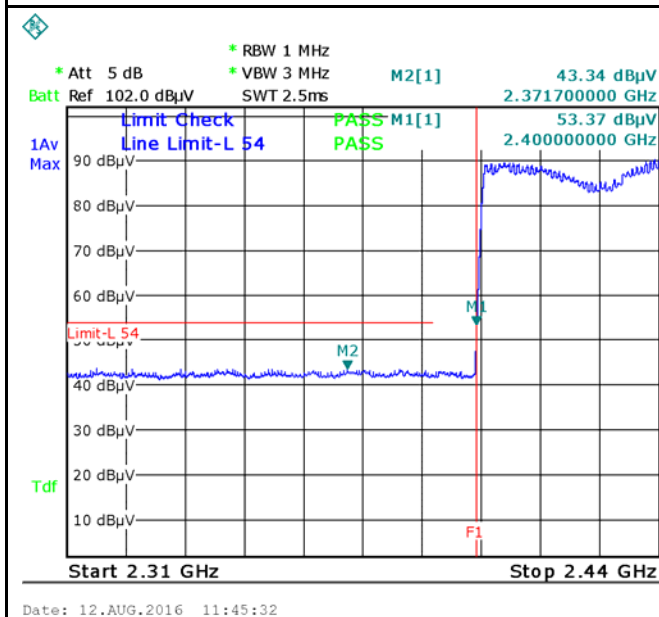
$\pi/4$ DQPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



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

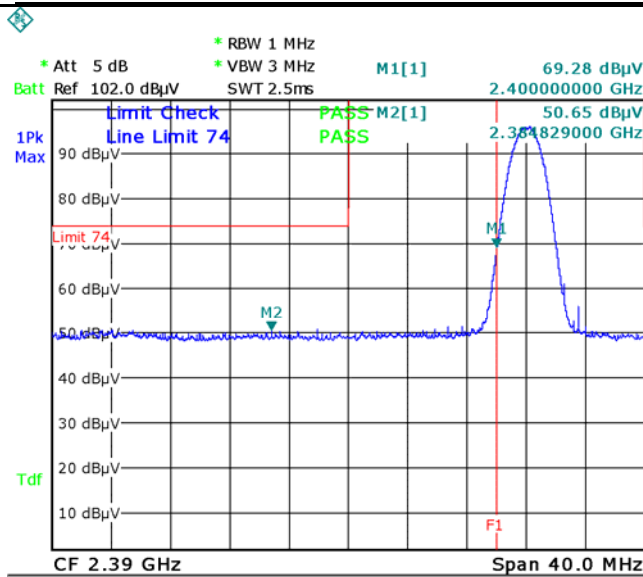
Note: F1 is frequency 2483.5MHz



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

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

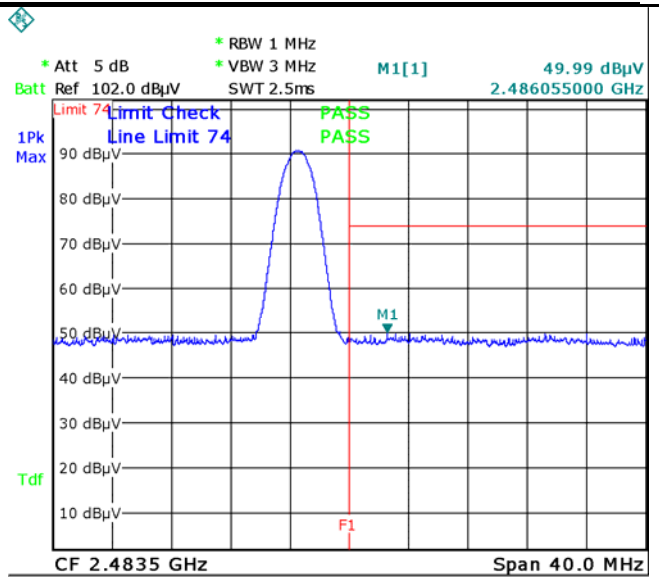
$\pi/4$ DQPSK-Hopping Right-AV



Date: 12.AUG.2016 10:45:27

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

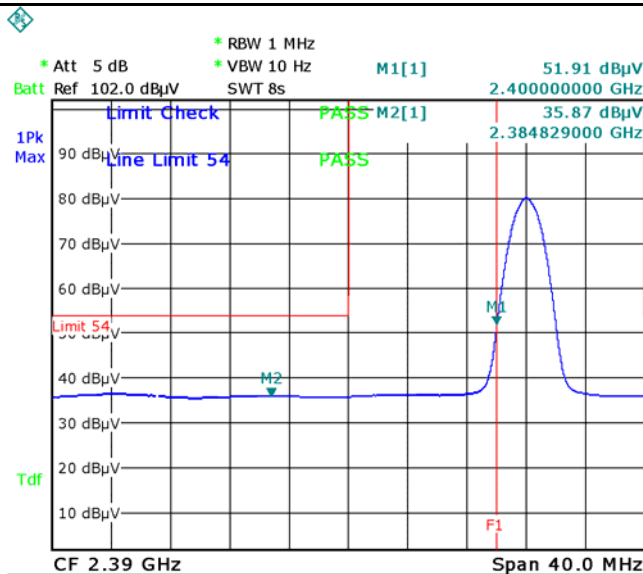
Note: F1 is frequency 2400MHz



Date: 12.AUG.2016 11:15:13

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

Note: F1 is frequency 2483.5MHz



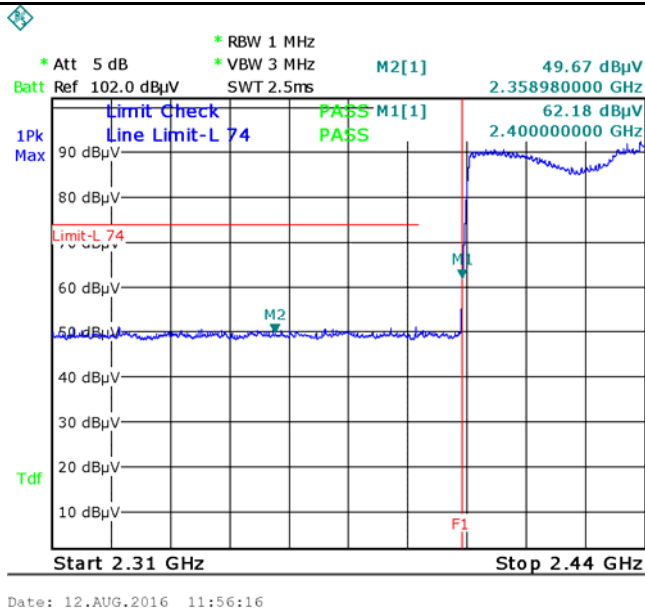
Date: 12.AUG.2016 10:47:49

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

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

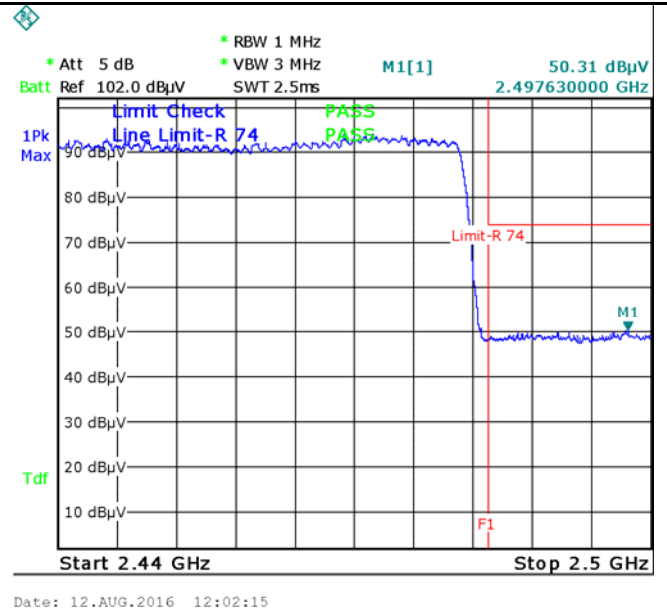
$\pi/4$ DQPSK-Right Side-AV

8-DPSK Mode:



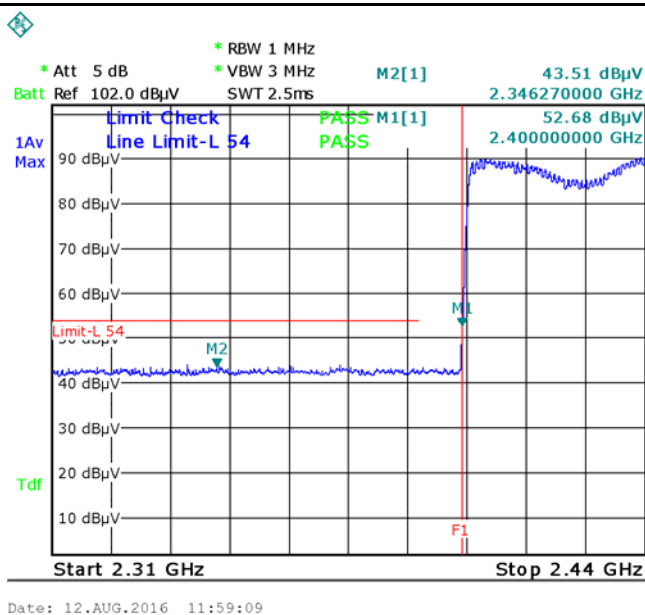
8DPSK-Hopping Left Side-PK

Note: F1 is frequency 2400MHz



8DPSK-Hopping Right Side-PK

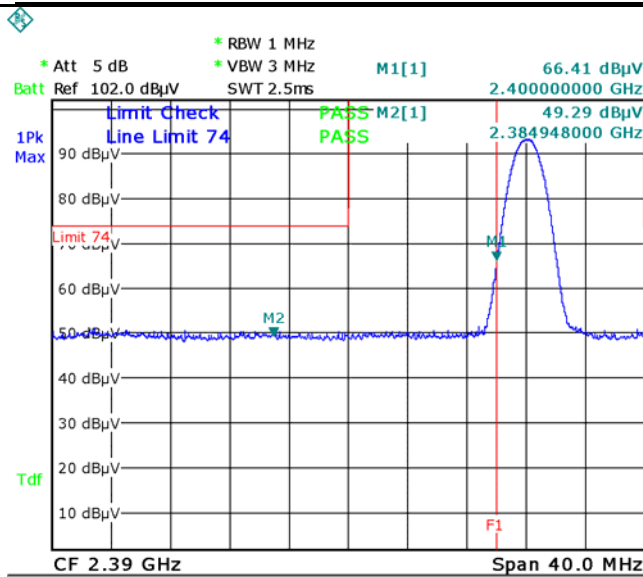
Note: F1 is frequency 2483.5MHz



8DPSK-Hopping Left-AV

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

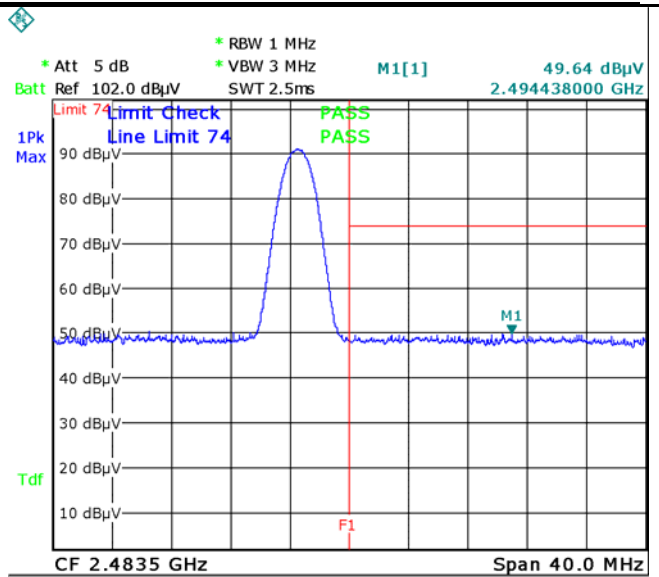
8DPSK-Hopping Right-AV



Date: 12.AUG.2016 10:59:58

8DPSK-Left Side-PK

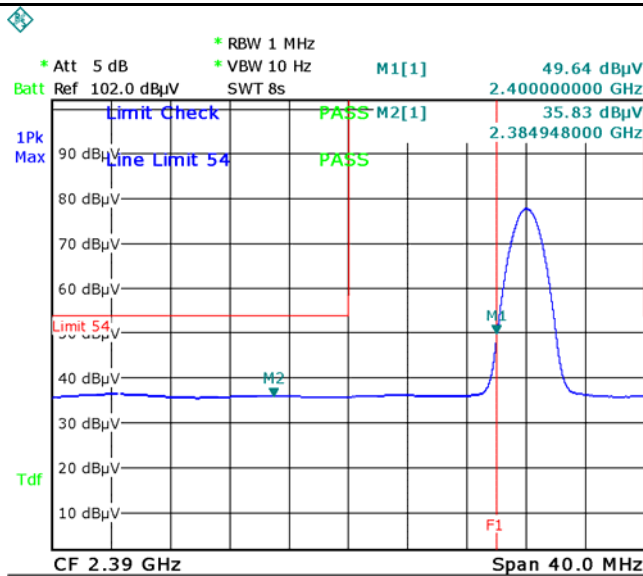
Note: F1 is frequency 2400MHz



Date: 12.AUG.2016 11:17:10

8DPSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 12.AUG.2016 11:02:12

8DPSK-Left Side-AV

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

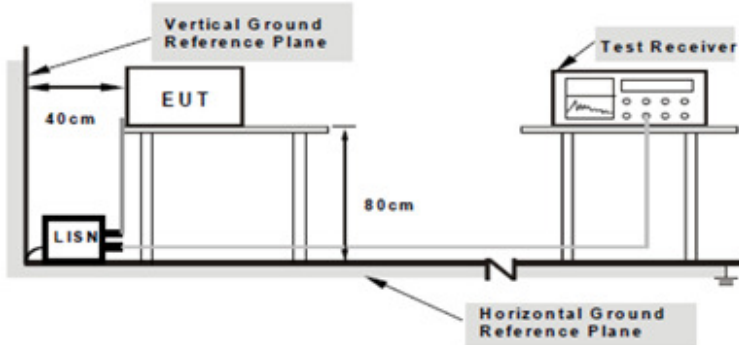
8DPSK-Right Side-AV

6.8 AC Power Line Conducted Emissions

Temperature	24°C
Relative Humidity	53%
Atmospheric Pressure	1001mbar
Test date :	August 01, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable		
47CFR§15.207, RSS210 (A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	☒		
		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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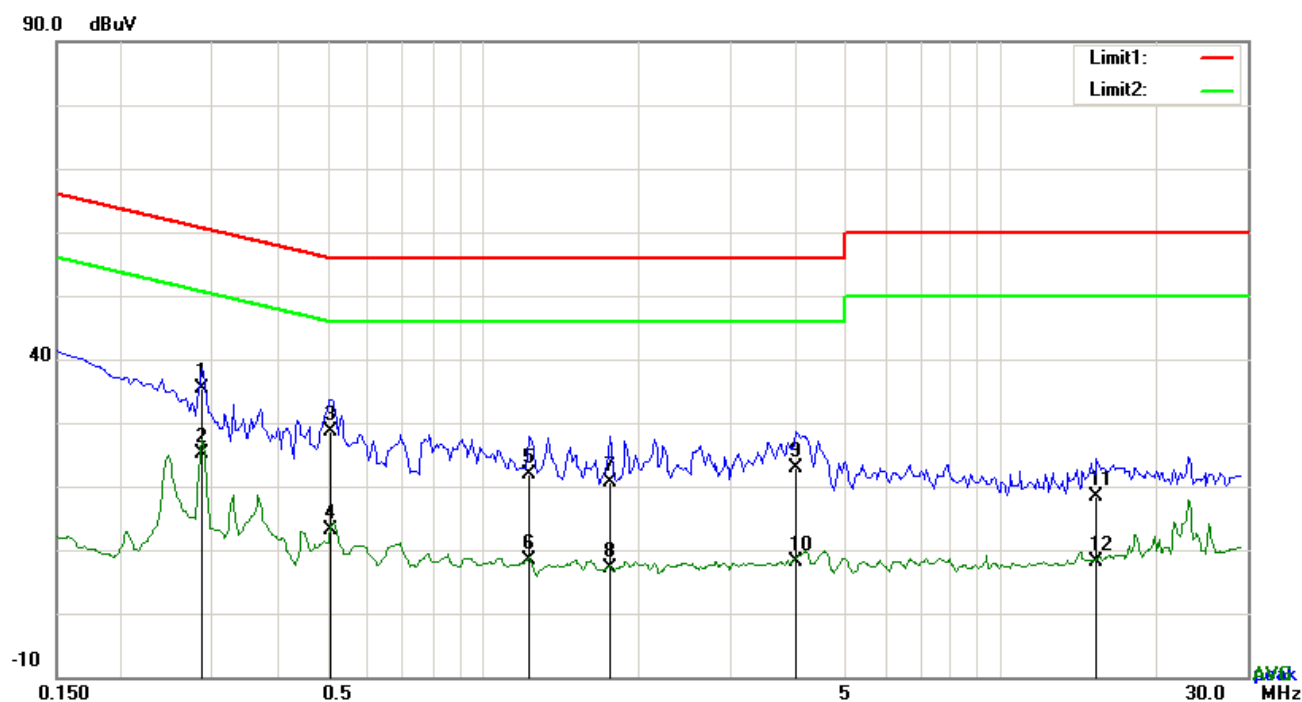
Test Report	16070896-FCC-R2
Page	38 of 61

	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

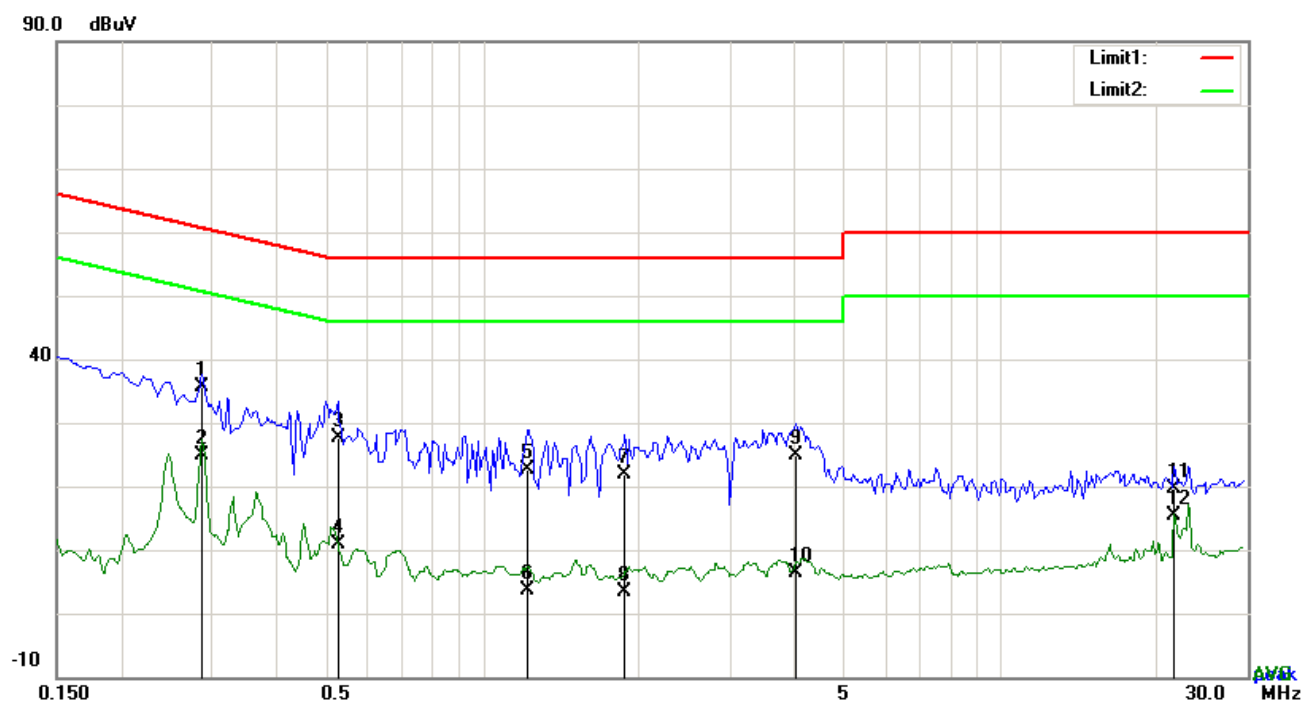


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2865	25.38	QP	10.03	35.41	60.63	-25.22
2	L1	0.2865	15.11	AVG	10.03	25.14	50.63	-25.49
3	L1	0.5088	18.64	QP	10.03	28.67	56.00	-27.33
4	L1	0.5088	3.02	AVG	10.03	13.05	46.00	-32.95
5	L1	1.2264	11.74	QP	10.03	21.77	56.00	-34.23
6	L1	1.2264	-1.69	AVG	10.03	8.34	46.00	-37.66
7	L1	1.7646	10.61	QP	10.04	20.65	56.00	-35.35
8	L1	1.7646	-2.83	AVG	10.04	7.21	46.00	-38.79
9	L1	4.0179	12.83	QP	10.07	22.90	56.00	-33.10
10	L1	4.0179	-1.87	AVG	10.07	8.20	46.00	-37.80
11	L1	15.3123	8.26	QP	10.23	18.49	60.00	-41.51
12	L1	15.3123	-2.02	AVG	10.23	8.21	50.00	-41.79

Test Mode: Bluetooth Mode

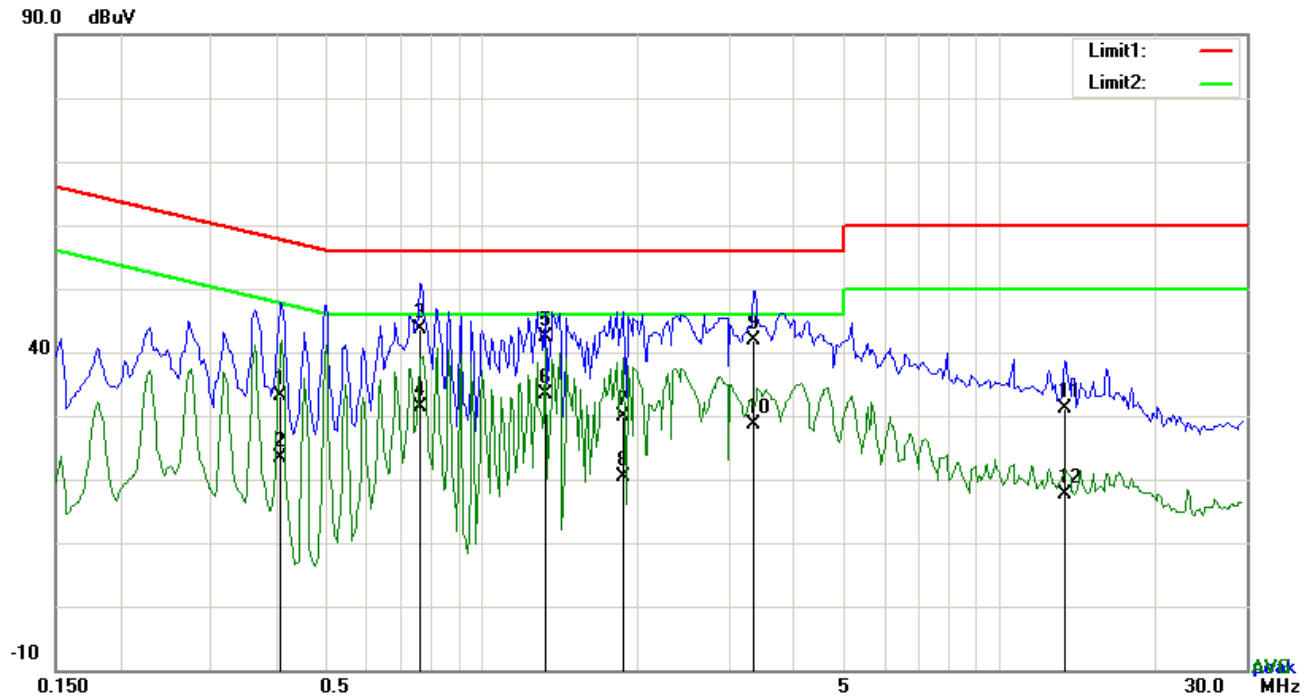


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2865	25.53	QP	10.02	35.55	60.63	-25.08
2	N	0.2865	14.75	AVG	10.02	24.77	50.63	-25.86
3	N	0.5244	17.58	QP	10.02	27.60	56.00	-28.40
4	N	0.5244	0.82	AVG	10.02	10.84	46.00	-35.16
5	N	1.2225	12.65	QP	10.03	22.68	56.00	-33.32
6	N	1.2225	-6.31	AVG	10.03	3.72	46.00	-42.28
7	N	1.8816	11.88	QP	10.04	21.92	56.00	-34.08
8	N	1.8816	-6.54	AVG	10.04	3.50	46.00	-42.50
9	N	4.0062	14.78	QP	10.06	24.84	56.00	-31.16
10	N	4.0062	-3.60	AVG	10.06	6.46	46.00	-39.54
11	N	21.6654	9.22	QP	10.29	19.51	60.00	-40.49
12	N	21.6654	5.08	AVG	10.29	15.37	50.00	-34.63

Test Mode: Bluetooth Mode

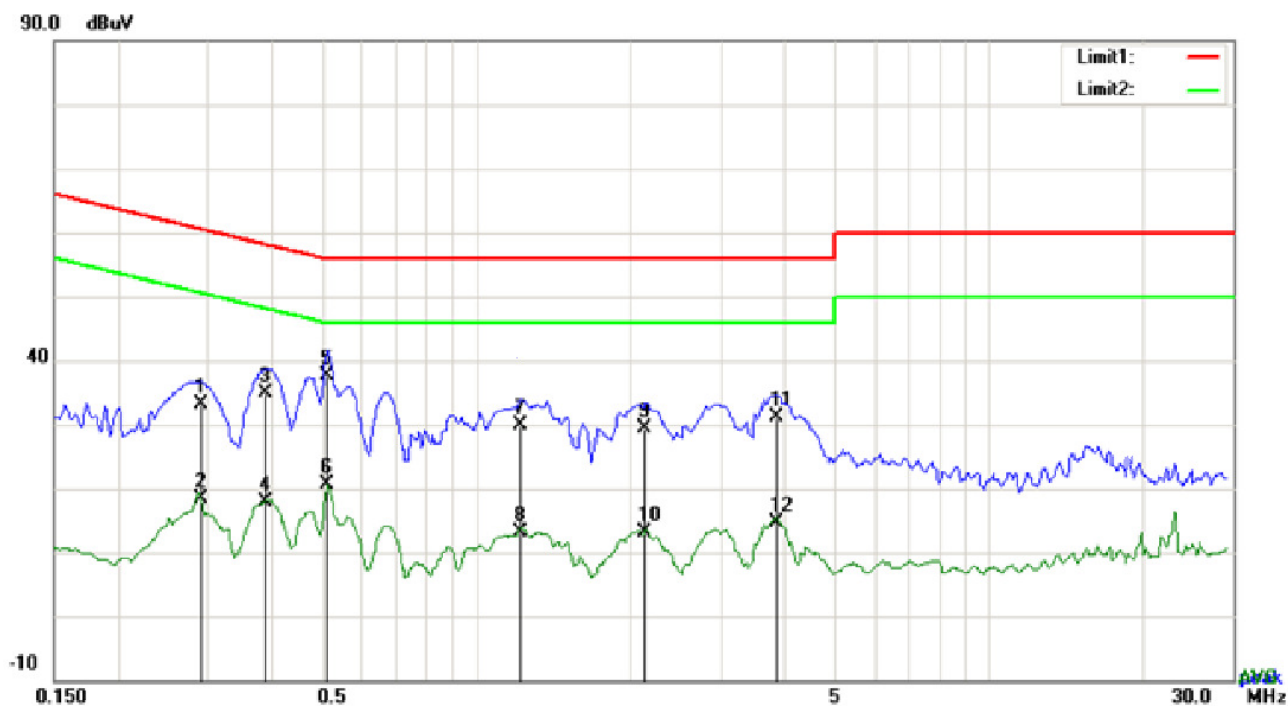


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.4074	23.11	QP	10.03	33.14	57.70	-24.56
2	L1	0.4074	13.45	AVG	10.03	23.48	47.70	-24.22
3	L1	0.7623	33.66	QP	10.03	43.69	56.00	-12.31
4	L1	0.7623	21.26	AVG	10.03	31.29	46.00	-14.71
5	L1	1.3239	32.27	QP	10.03	42.30	56.00	-13.70
6	L1	1.3239	23.31	AVG	10.03	33.34	46.00	-12.66
7	L1	1.8738	19.79	QP	10.04	29.83	56.00	-26.17
8	L1	1.8738	10.34	AVG	10.04	20.38	46.00	-25.62
9	L1	3.3627	31.85	QP	10.06	41.91	56.00	-14.09
10	L1	3.3627	18.54	AVG	10.06	28.60	46.00	-17.40
11	L1	13.3857	20.98	QP	10.20	31.18	60.00	-28.82
12	L1	13.3857	7.37	AVG	10.20	17.57	50.00	-32.43

Test Mode: Bluetooth Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

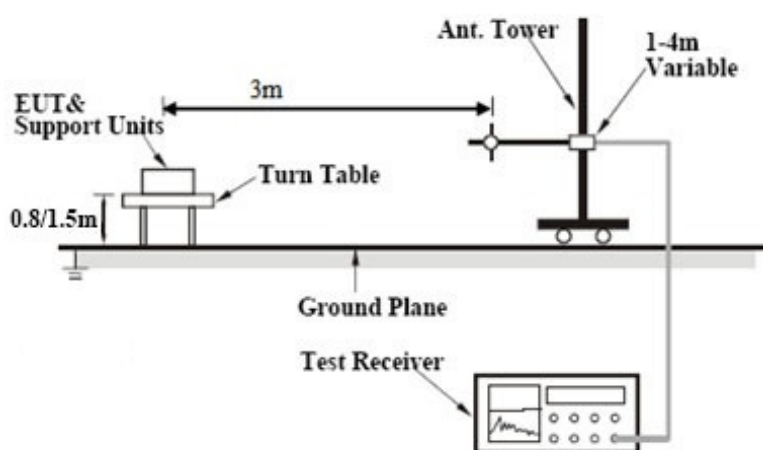
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2904	23.06	QP	10.02	33.08	60.51	-27.43
2	N	0.2904	8.32	AVG	10.02	18.34	50.51	-32.17
3	N	0.3879	24.85	QP	10.02	34.87	58.11	-23.24
4	N	0.3879	7.94	AVG	10.02	17.96	48.11	-30.15
5	N	0.5127	27.70	QP	10.02	37.72	56.00	-18.28
6	N	0.5127	10.68	AVG	10.02	20.70	46.00	-25.30
7	N	1.2225	19.80	QP	10.03	29.83	56.00	-26.17
8	N	1.2225	3.19	AVG	10.03	13.22	46.00	-32.78
9	N	2.1429	19.30	QP	10.04	29.34	56.00	-26.66
10	N	2.1429	3.03	AVG	10.04	13.07	46.00	-32.93
11	N	3.8603	21.05	QP	10.06	31.11	56.00	-24.89
12	N	3.8603	4.56	AVG	10.06	14.62	46.00	-31.38

6.9 Radiated Spurious Emissions & Restricted Band

Temperature	24°C
Relative Humidity	53%
Atmospheric Pressure	1001mbar
Test date :	August 01, 2016
Tested By :	Loren Luo

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	
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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
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Test Report	16070896-FCC-R2
Page	44 of 61

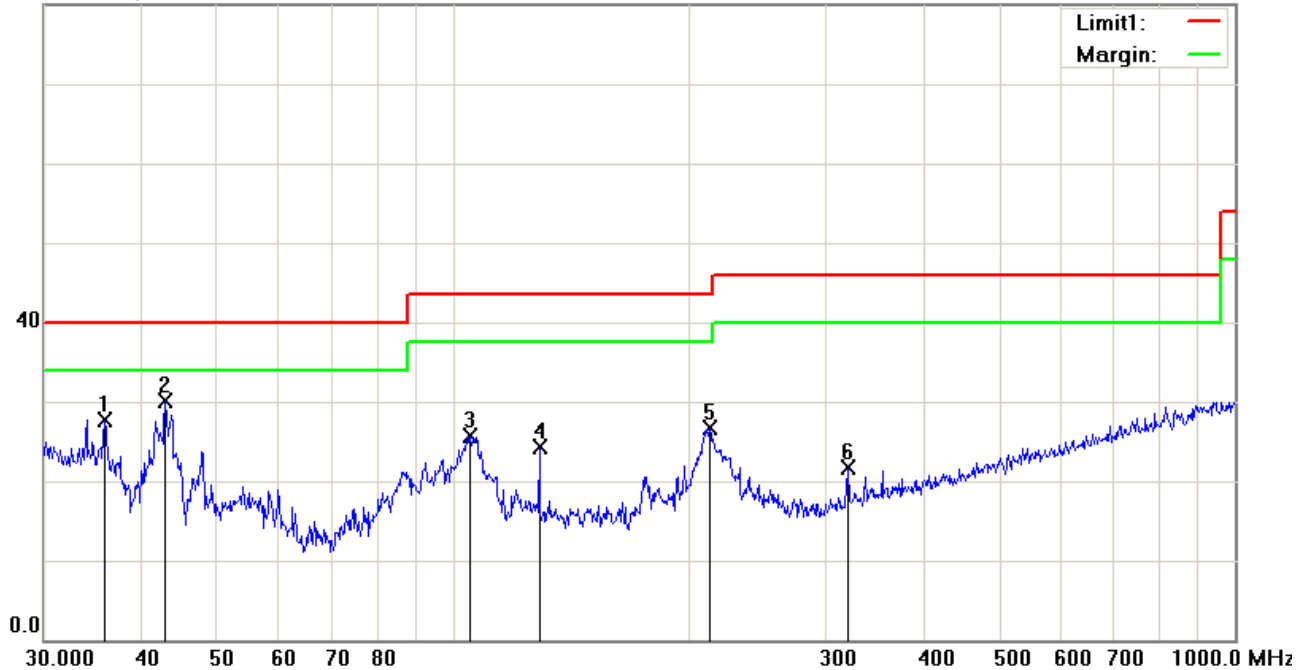
	following manner: - Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz. - 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. - 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

80.0 dBuV/m

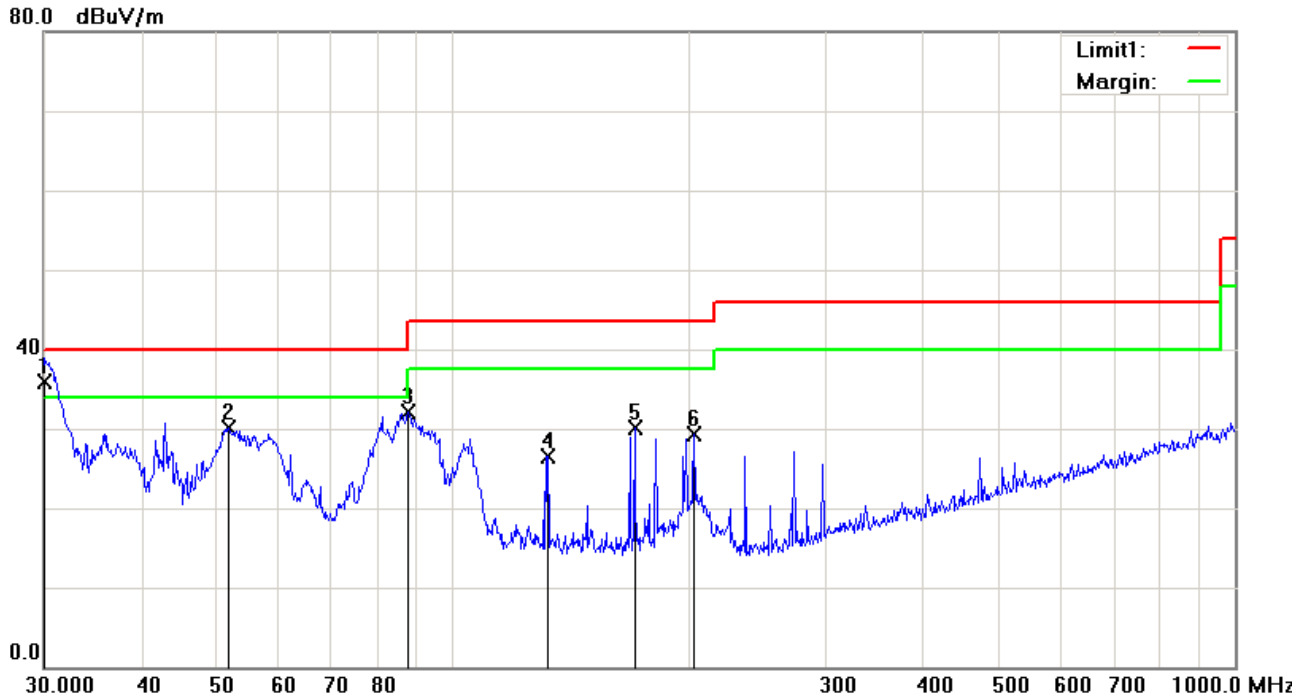


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	H	35.8747	32.31	peak	-4.58	27.73	40.00	-12.27	100	216
2	H	42.8998	39.70	peak	-9.53	30.17	40.00	-9.83	100	190
3	H	105.2718	35.60	peak	-9.86	25.74	43.50	-17.76	100	190
4	H	129.0146	32.19	peak	-7.87	24.32	43.50	-19.18	100	156
5	H	213.0151	35.62	peak	-8.86	26.76	43.50	-16.74	100	122
6	H	319.9370	28.04	peak	-6.32	21.72	46.00	-24.28	100	145

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	30.1054	36.25	QP	-0.34	35.91	40.00	-4.09	100	229
2	V	51.6616	43.48	peak	-13.37	30.11	40.00	-9.89	100	286
3	V	87.7248	45.63	peak	-13.43	32.20	40.00	-7.80	100	158
4	V	132.2206	34.63	peak	-8.06	26.57	43.50	-16.93	100	312
5	V	170.7926	39.35	peak	-9.16	30.19	43.50	-13.31	100	331
6	V	203.5228	38.17	peak	-8.77	29.40	43.50	-14.10	100	244

Above 1GHz

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

Low Channel (2402 MHz) (GFSK Worst Case)

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	39.11	AV	V	33.67	6.86	32.66	46.98	54	-7.02
4804	38.94	AV	H	33.67	6.86	32.66	46.81	54	-7.19
4804	48.26	PK	V	33.67	6.86	32.66	56.13	74	-17.87
4804	48.67	PK	H	33.67	6.86	32.66	56.54	74	-17.46
17854	25.32	AV	V	45.03	11.21	32.38	49.18	54	-4.82
17854	25.14	AV	H	45.03	11.21	32.38	49	54	-5
17854	41.25	PK	V	45.03	11.21	32.38	65.11	74	-8.89
17854	40.98	PK	H	45.03	11.21	32.38	64.84	74	-9.16

Middle Channel (2441 MHz) (GFSK Worst Case)

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	39.25	AV	V	33.71	6.95	32.74	47.17	54	-6.83
4882	38.78	AV	H	33.71	6.95	32.74	46.7	54	-7.3
4882	48.37	PK	V	33.71	6.95	32.74	56.29	74	-17.71
4882	48.57	PK	H	33.71	6.95	32.74	56.49	74	-17.51
17893	25.46	AV	V	45.15	11.18	32.41	49.38	54	-4.62
17893	24.99	AV	H	45.15	11.18	32.41	48.91	54	-5.09
17893	41.21	PK	V	45.15	11.18	32.41	65.13	74	-8.87
17893	41.02	PK	H	45.15	11.18	32.41	64.94	74	-9.06

High Channel (2480 MHz) (GFSK Worst Case)

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	39.48	AV	V	33.9	6.76	32.74	47.4	54	-6.6
4960	39.35	AV	H	33.9	6.76	32.74	47.27	54	-6.73
4960	48.05	PK	V	33.9	6.76	32.74	55.97	74	-18.03
4960	47.79	PK	H	33.9	6.76	32.74	55.71	74	-18.29
17906	24.78	AV	V	45.22	11.35	32.38	48.97	54	-5.03
17906	24.39	AV	H	45.22	11.35	32.38	48.58	54	-5.42
17906	41.48	PK	V	45.22	11.35	32.38	65.67	74	-8.33
17906	41.27	PK	H	45.22	11.35	32.38	65.46	74	-8.54

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

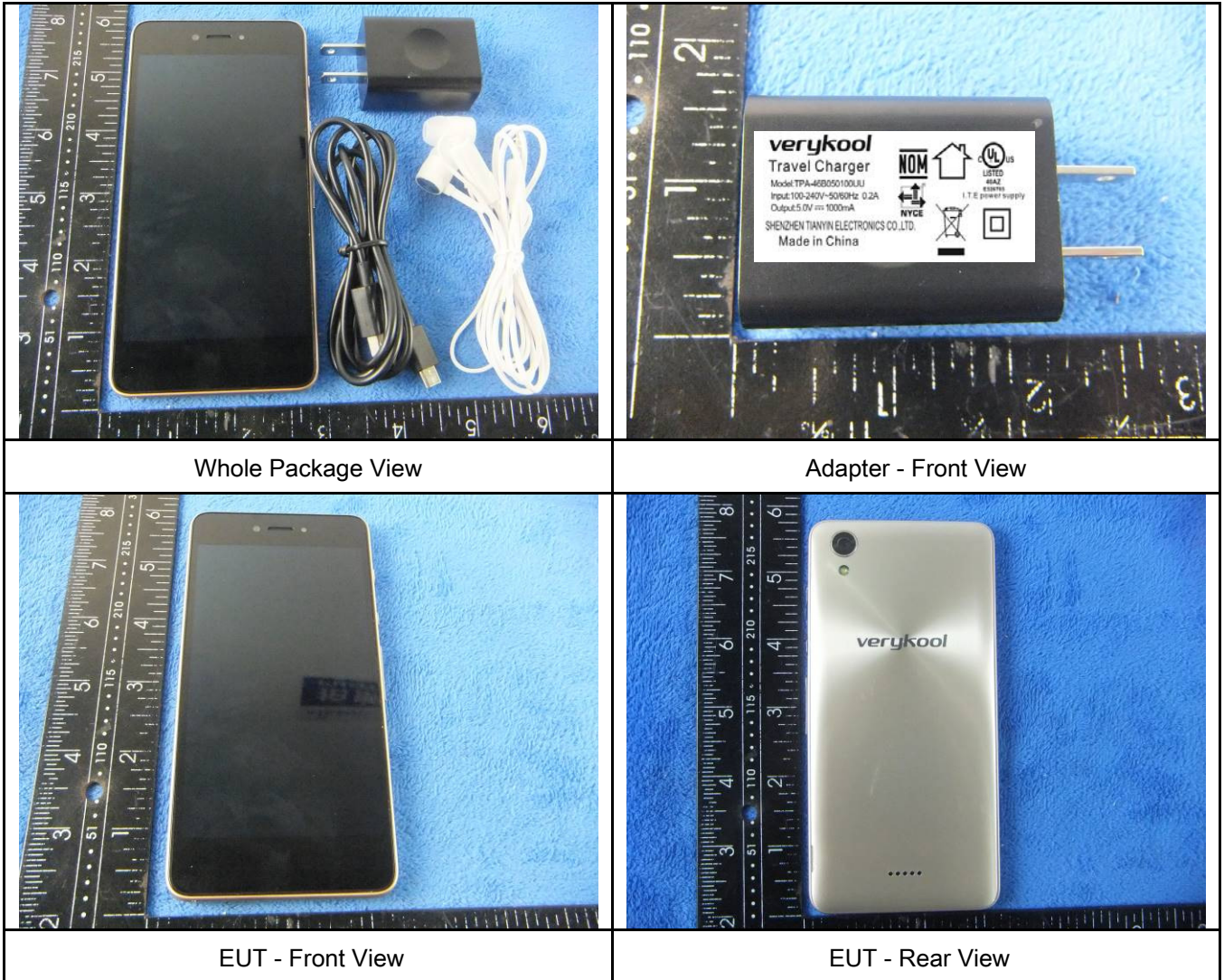
3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

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	☒
Line Impedance	LI-125A	191106	09/25/2015	09/24/2016	☒
Line Impedance	LI-125A	191107	09/25/2015	09/24/2016	☒
LISN	ISN T800	34373	09/25/2015	09/24/2016	☒
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	☒
Transient Limiter	LIT-153	531118	09/01/2015	08/31/2016	☒
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/17/2015	09/16/2016	☒
Power Splitter	1#	1#	09/01/2015	08/31/2016	☒
DC Power Supply	E3640A	MY40004013	09/17/2015	09/16/2016	☒
Radiated Emissions					
EMI test receiver	ESL6	100262	09/17/2015	09/16/2016	☒
Positioning Controller	UC3000	MF780208282	11/19/2015	11/18/2016	☒
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/01/2015	08/31/2016	☒
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/24/2016	03/23/2017	☒
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/21/2015	09/20/2016	☒
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	☒
Universal Radio Communication Tester	CMU200	121393	09/25/2015	09/24/2016	☒

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

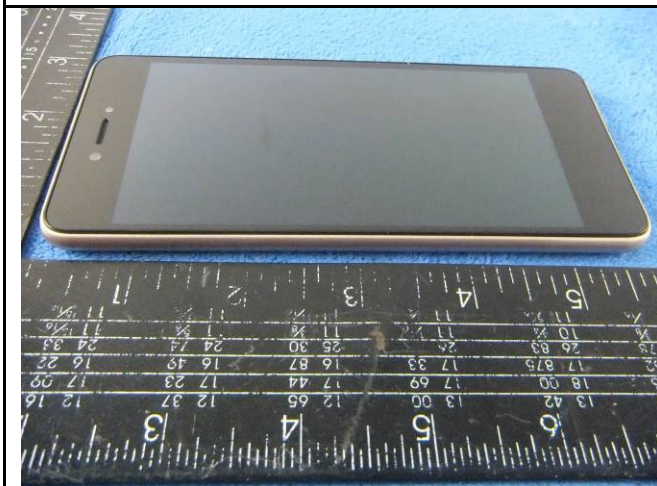




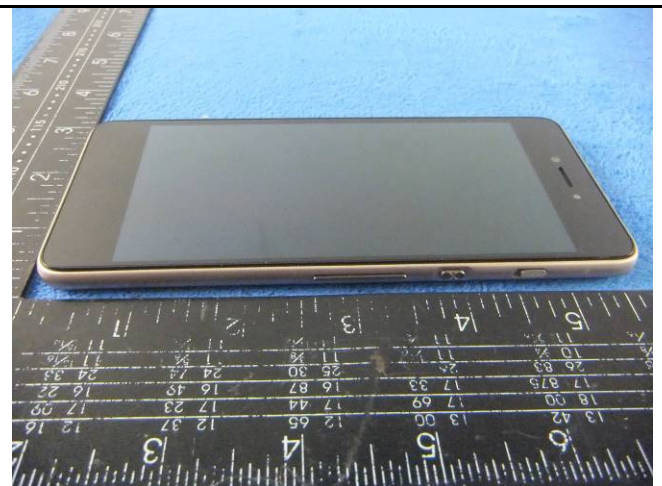
EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View

Annex B.ii. Photograph: EUT Internal Photo



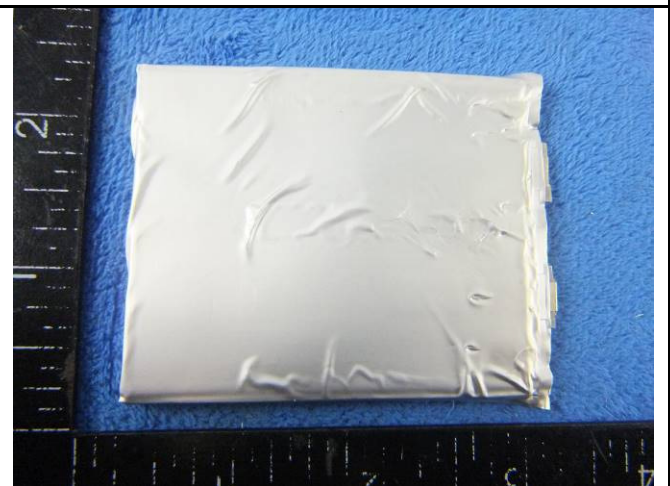
Cover Off - Top View 1



Cover Off - Top View 2



Battery - Front View



Battery - Rear View



Mainboard with Shielding - Front View



Mainboard without Shielding - Front View



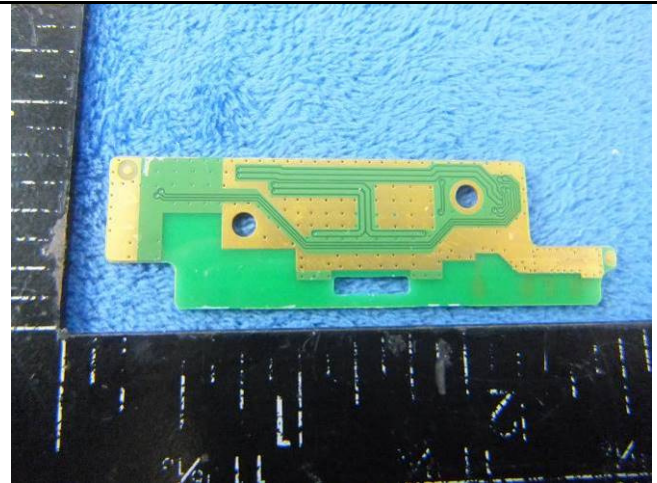
Mainboard with Shielding - Rear View



Mainboard without Shielding - Rear View



Small Board - Front View



Small Board - Rear View

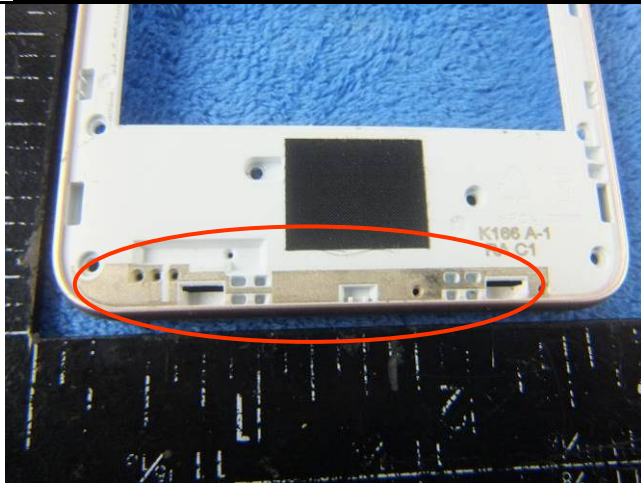


LCD - Front View



LCD - Rear View

Test Report	16070896-FCC-R2
Page	54 of 61



GSM/PCS/UMTS-FDD-Antenna View



WIFI/BT/BLE/GPS - Antenna View



LTE - Antenna View

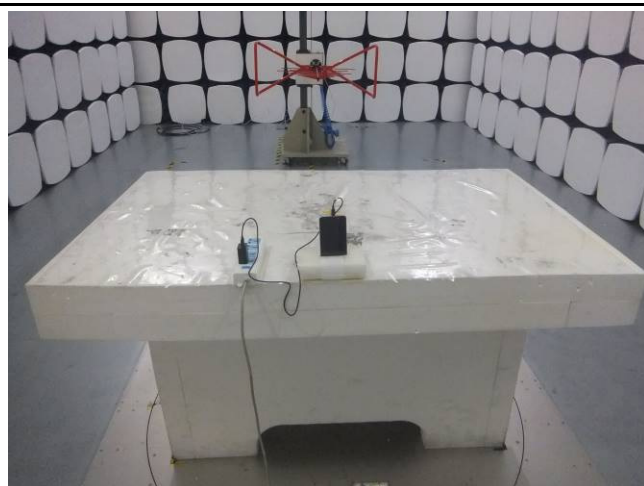
Annex B.iii. Photograph: Test Setup Photo



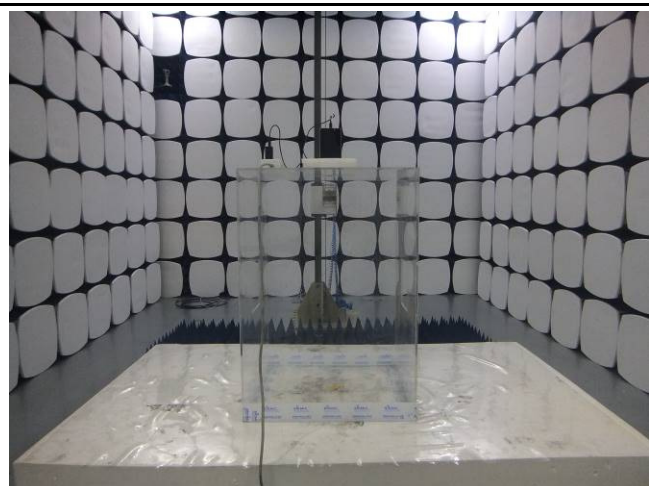
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

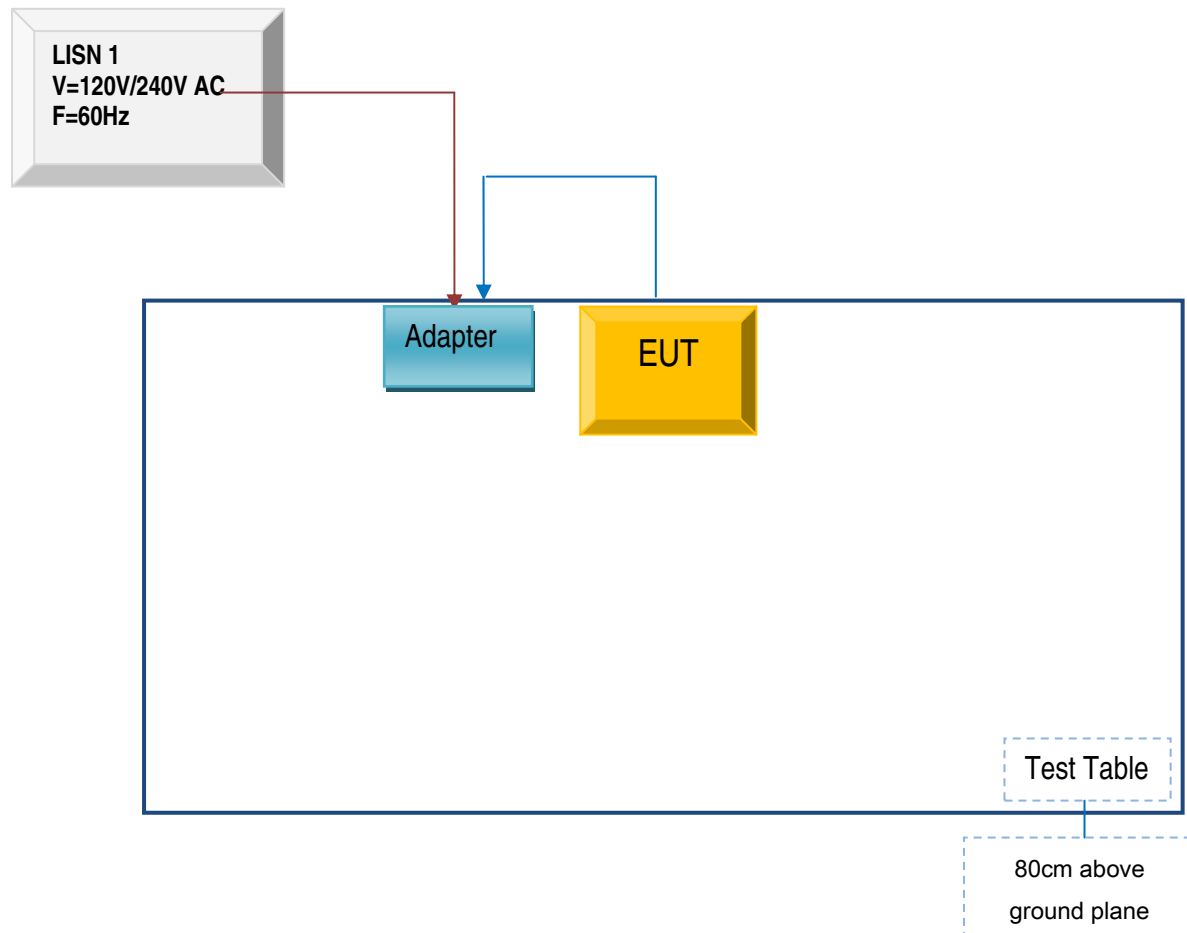


Radiated Spurious Emissions Test Setup Above 1GHz

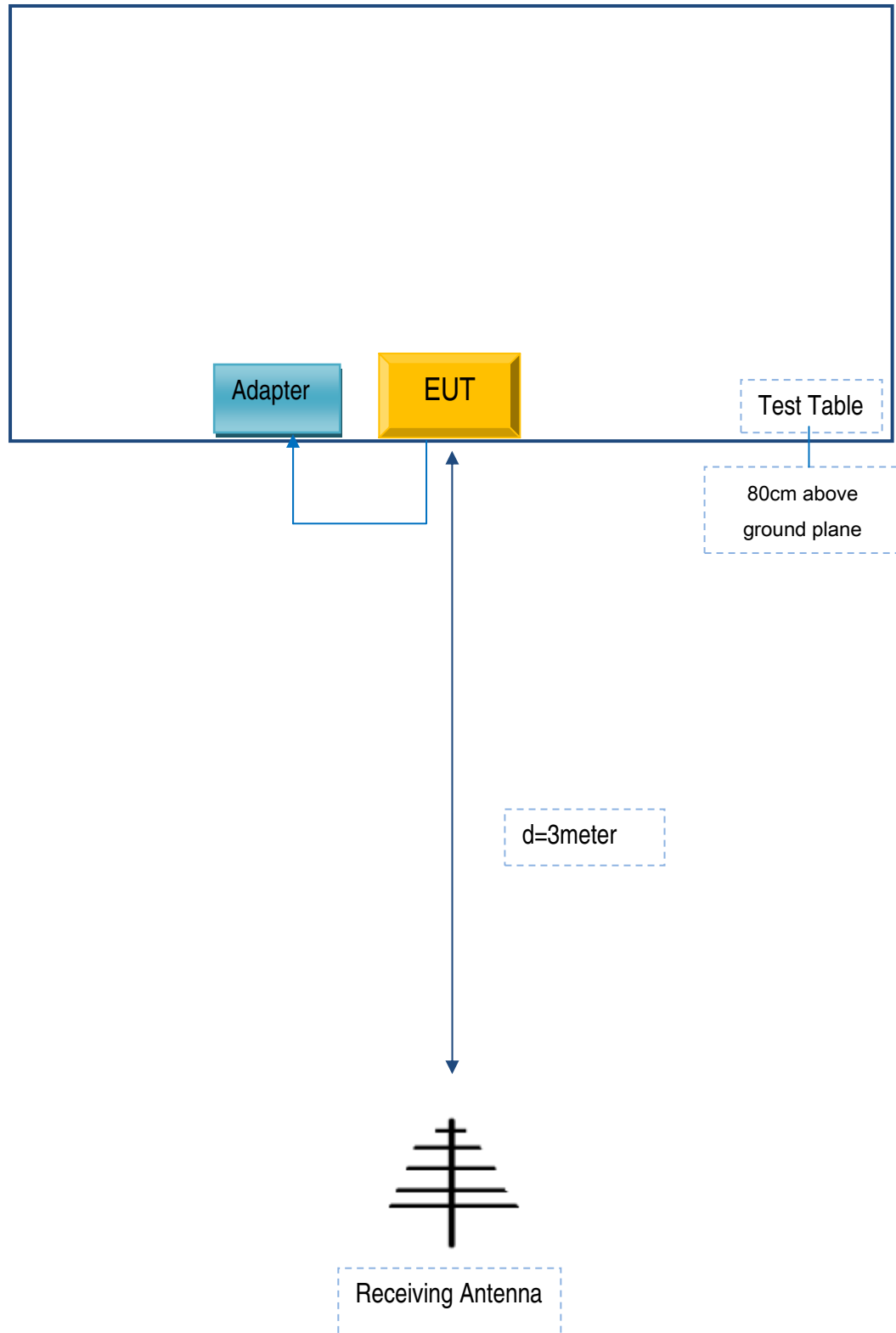
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

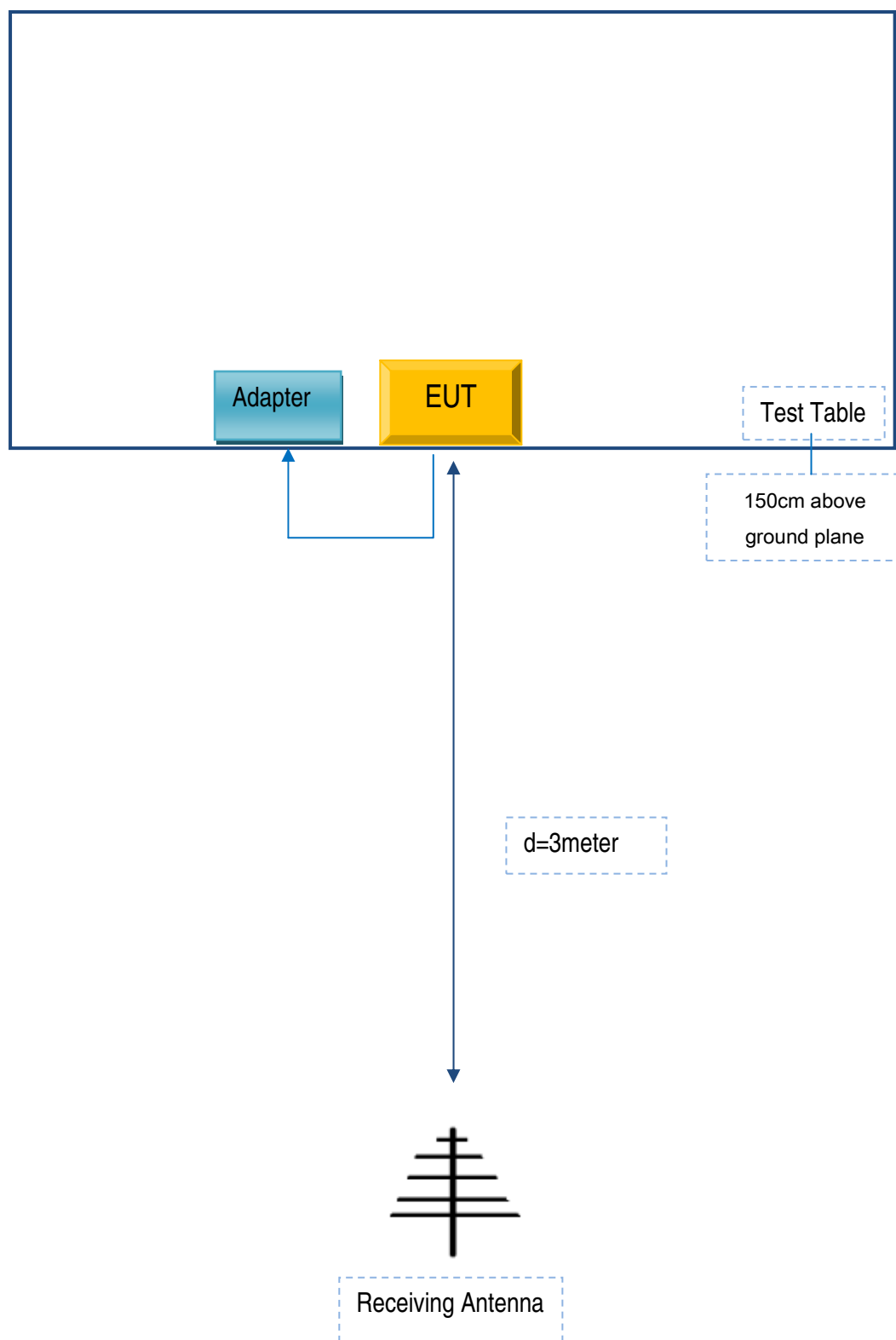
Block Configuration Diagram for AC Line Conducted Emissions



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	TPA-46B050100UU	SL-010

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	SL-010

Test Report	16070896-FCC-R2
Page	60 of 61

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

Please see attachment

Test Report	16070896-FCC-R2
Page	61 of 61

Annex E. DECLARATION OF SIMILARITY

N/A