RF TEST REPORT

Report No.: 15070379-FCC-R2

Applicant	Verykool USA Inc
Product Name	Mobile phone
Model No.	R28
Serial No.	N/A
Test Standard	FCC Part 15.247: 2014, ANSI C63.10: 2013
Test Date	May 25 to June 15, 2015
Issue Date	June 15, 2015
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Winnie Zhang	Chris You	
Winnie Zhang **Test Engineer**	**Chris You** **Checked By**	

This test report may be reproduced in full only

Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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

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

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

Laboratories Introduction

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

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

Accreditations for Conformity Assessment

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

This page has been left blank intentionally.

CONTENTS

1. Report Revision History

Report No.	Report Version	Description	Issue Date
15070379-FCC-R2	NONE	Original	June 15, 2015

2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA
Manufacturer	MOBIWIRE MOBILES (NINGBO) CO.,LTD
Manufacturer Add	No.999,Dacheng East Road,Fenghua City,Zhejiang

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:	R28
Serial Model:	N/A
Date EUT received:	May 25, 2015
Test Date(s):	May 25 to June 15, 2015
Equipment Category：	DSS
Antenna Gain:	GSM850: 2.5dBi PCS1900: 1.0dBi UMTS-FDD Band V: 2.5dBi UMTS-FDD Band II: 1.0dBi UMTS-FDD Band IV: 2.0dBi Bluetooth: 2.0dBi
Type of Modulation:	GSM / GPRS: GMSK EGPRS: GMSK, 8PSK UMTS-FDD: QPSK, 16QAM Bluetooth: GFSK, π /4DQPSK, 8DPSK
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 II TX:1852.4 ~ 1907.6 MHz; RX: 1932.4 ~ 1987.6 MHz UMTS-FDD Band IV TX :1712.4 ~ 1752.6 MHz; RX : 2112.4 ~ 2152.6 MHz Bluetooth: 2402-2480 MHz
Max. Output Power:	π /4 DQPSK: 4.486dBm

Number of Channels:	GSM 850: 124CH PCS1900: 299CH UMTS-FDD Band V : 102CH UMTS-FDD Band II : 277CH UMTS-FDD Band IV: 202CH Bluetooth: 79CH
Port:	Power Port, Earphone Port, USB Port
Input Power:	Battery: Model: 178088746 Spec: 3.7V 1400mAh 5.18Wh Adapter: Model: A31-500550 Input: 100-240V~ 50/60Hz 0.2A Output: 5.0V 550mA
Trade Name :	Verykool
GPRS/EGPRS Multi-slot class	8/10/12
FCC ID:	WA6R28

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

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

Measurement Uncertainty

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

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

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

a. Antenna must be permanently attached to the unit.

b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 2 antennas:
A permanently attached PIFA antenna for Bluetooth, the gain is 2.0 dBi for Bluetooth,
A permanently attached PIFA antenna for GSM and UMTS, the gain is 2.5 dBi for GSM850, 1.0 dBi for PCS1900, 1.0 dBi for UMTS-FDD Band II , 2.5 dBi for UMTS-FDD Band V ,2.0 dBi for UMTS-FDD Band IV.

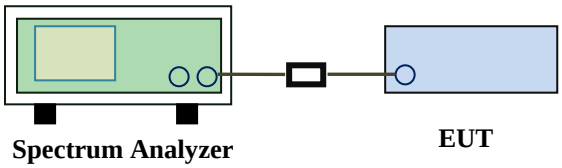
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
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	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

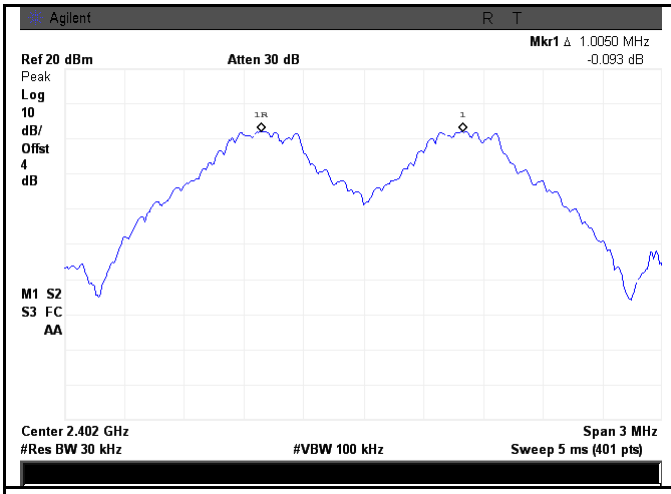
Test Plot ☑ Yes (See below) ☐ N/A

Channel Separation measurement result

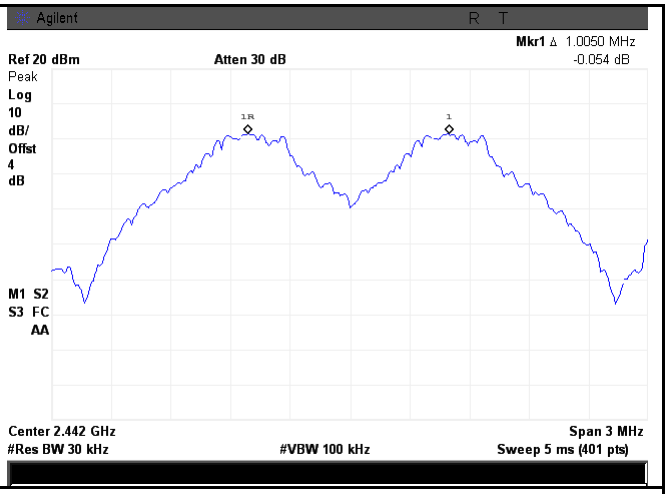
Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.005	0.686	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.681	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.683	Pass
	Adjacency Channel	2479			
CH Separation π /4 DQPSK	Low Channel	2402	1.005	0.856	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.857	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.859	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.005	0.865	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.005	0.867	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.005	0.867	Pass
	Adjacency Channel	2479			

Test Plots

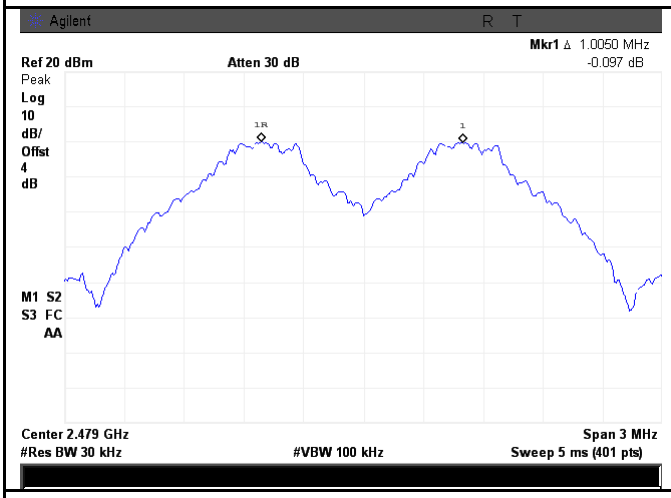
Channel Separation measurement result



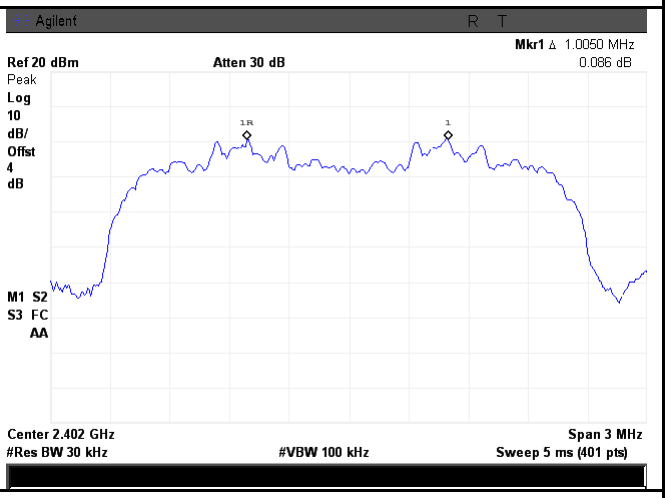
GFSK - Low Channel



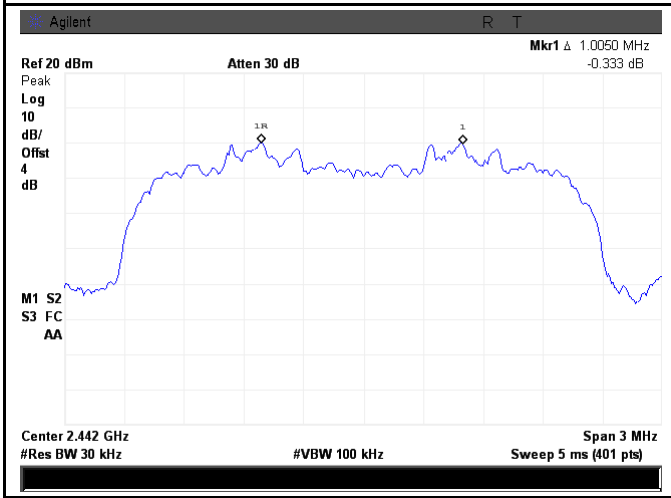
GFSK - Middle Channel



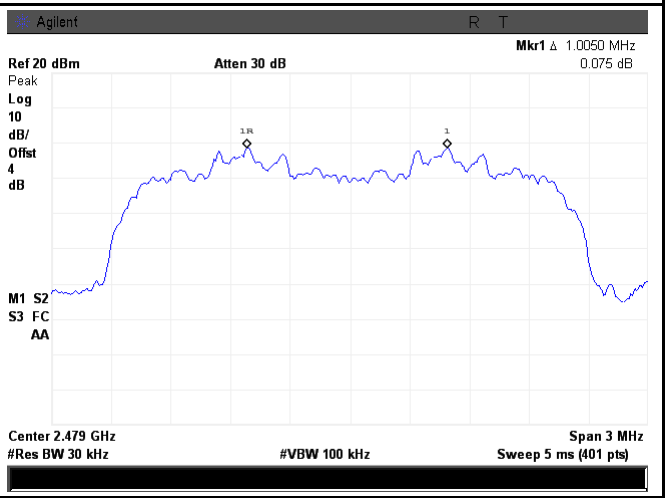
GFSK - High Channel



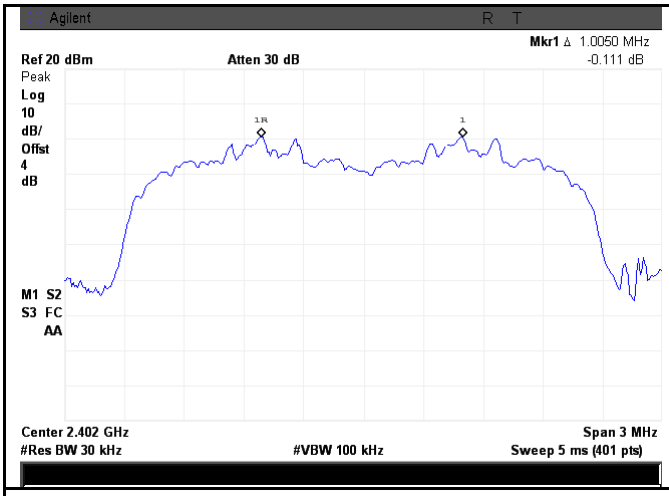
π /4 DPSK - Low Channel



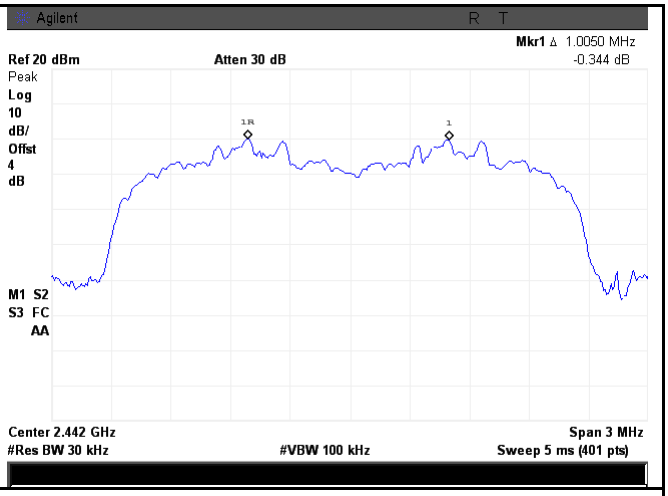
π /4 DQPSK - Middle Channel



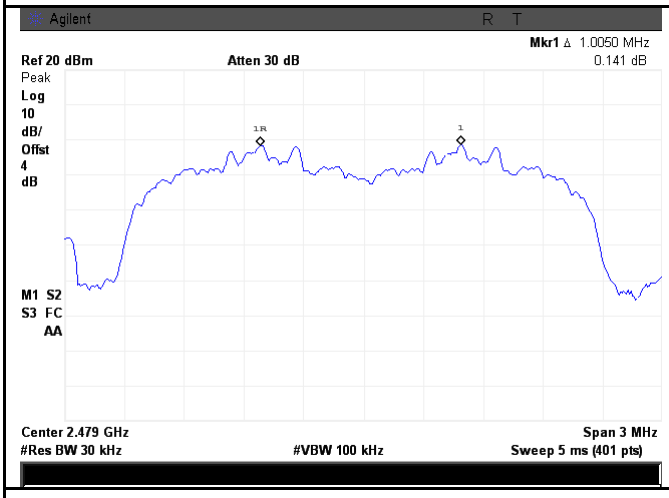
π /4 DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel

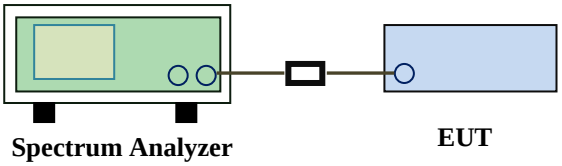


8DPSK - High Channel

6.3 20dB Bandwidth

Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
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.	☑
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 ≥ 1% of the 20 dB bandwidth - VBW ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold. - The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference		

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

Test Data ☑ Yes ☐ N/A

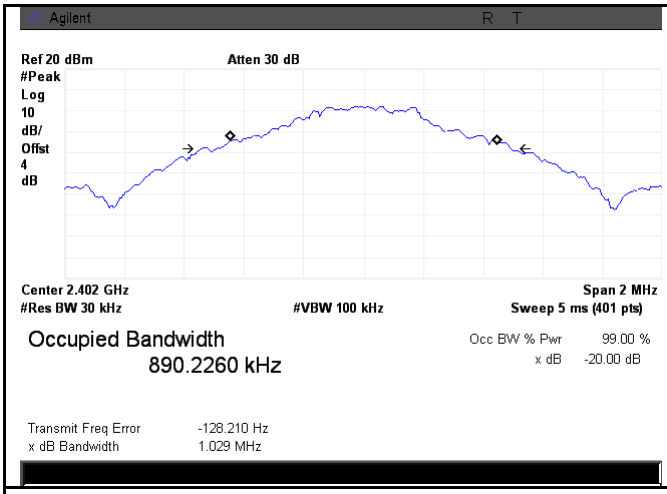
Test Plot ☑ Yes (See below) ☐ N/A

Measurement result

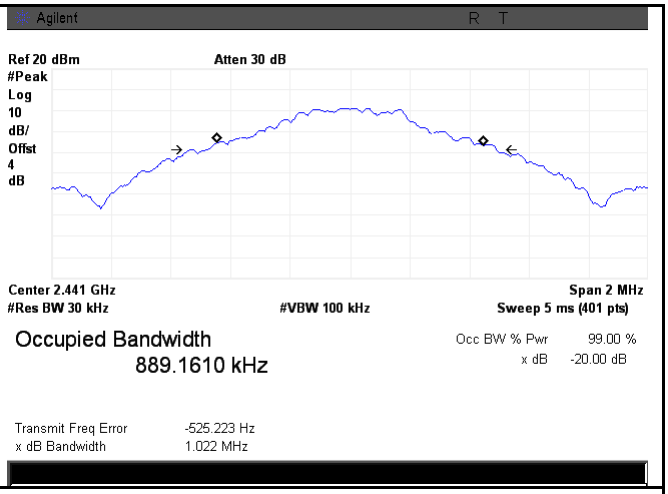
Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)
GFSK	Low	2402	1.029
	Mid	2441	1.022
	High	2480	1.024
π /4 DQPSK	Low	2402	1.284
	Mid	2441	1.286
	High	2480	1.288
8-DPSK	Low	2402	1.298
	Mid	2441	1.301
	High	2480	1.300

Test Plots

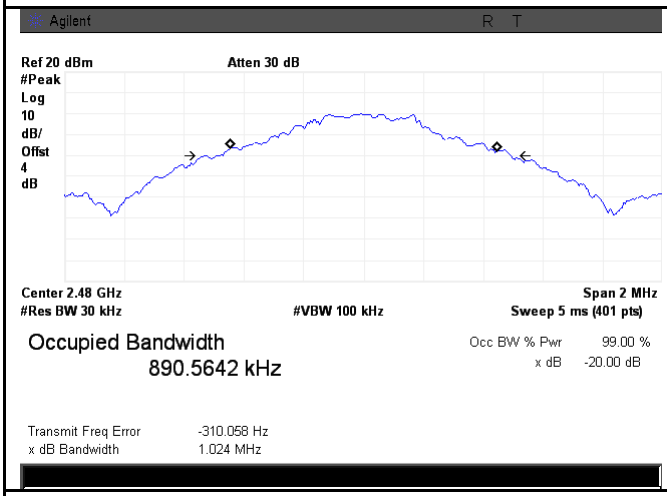
20dB Bandwidth measurement result



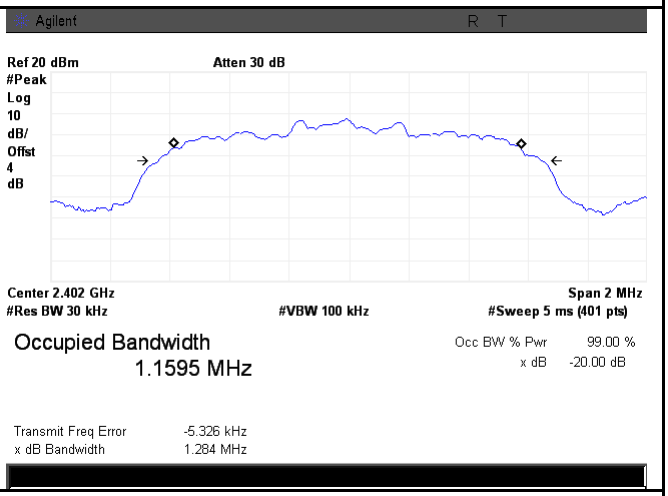
GFSK - Low Channel



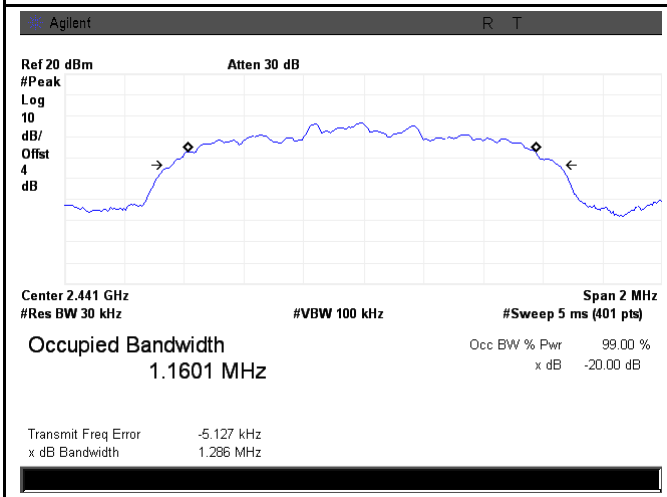
GFSK - Middle Channel



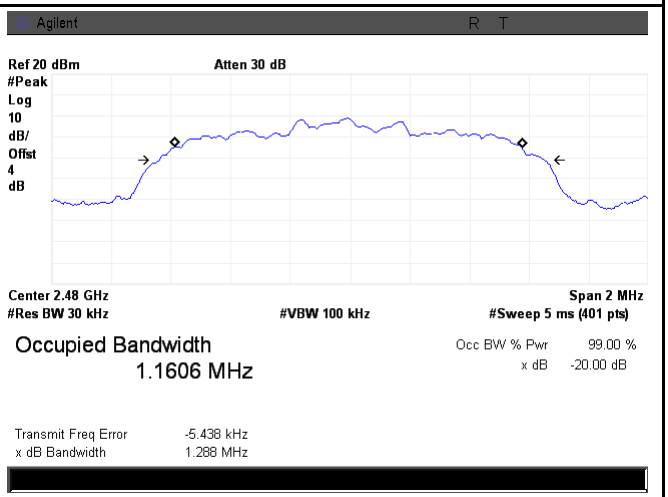
GFSK - High Channel



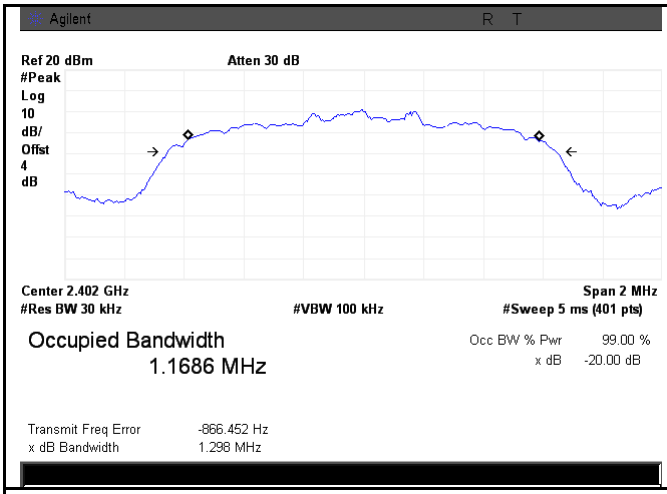
π /4 DPSK - Low Channel



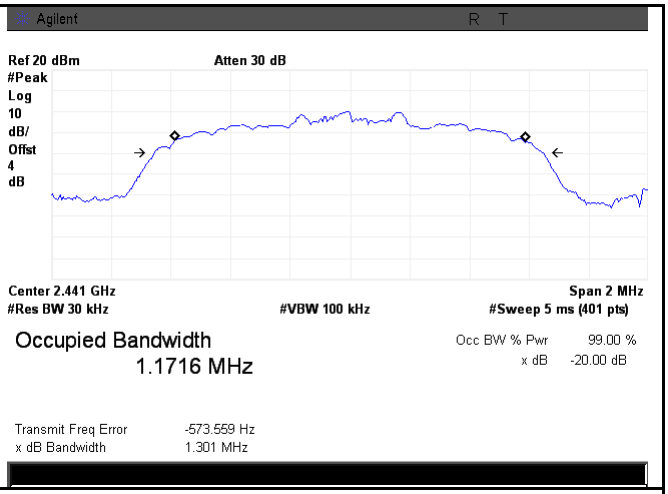
π /4 DQPSK - Middle Channel



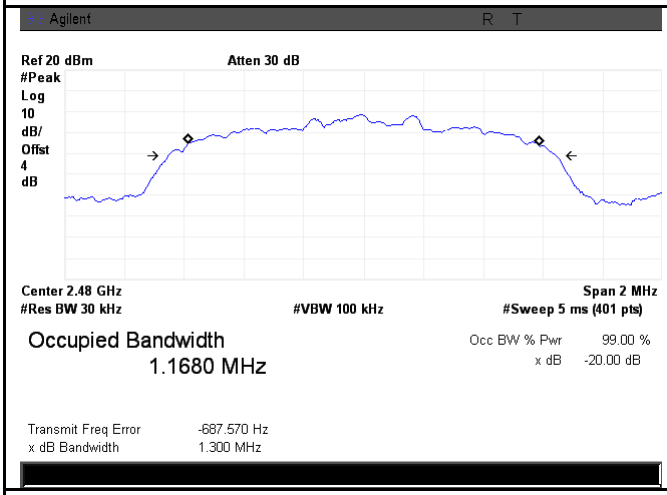
π /4 DQPSK - High Channel



8DPSK - Low Channel



8DPSK - Middle Channel

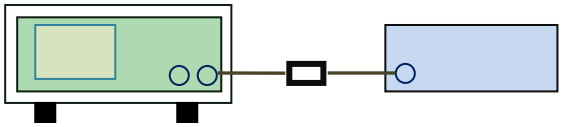


8DPSK - High Channel

6.4 Peak Output Power

Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
Tested By :	Winnie Zhang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2)	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)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤ 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 ≥ 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

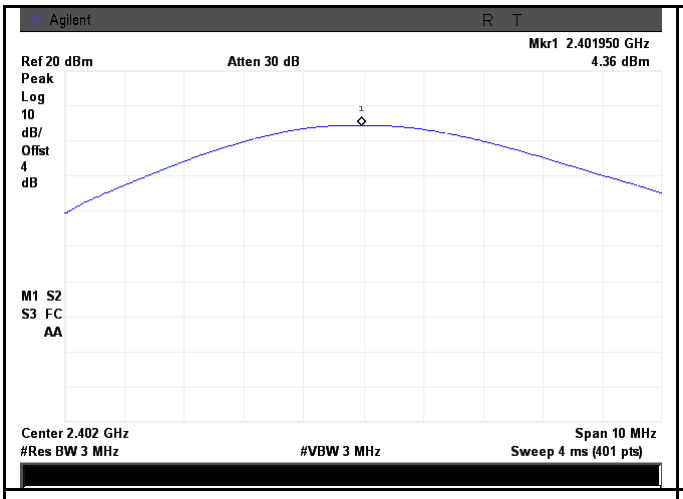
Test Plot ☑ Yes (See below) ☐ N/A

Peak Output Power measurement result

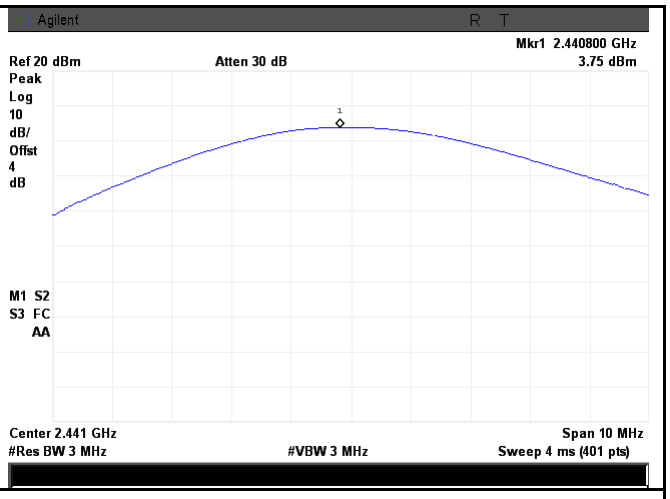
Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	4.36	125	Pass
		Mid	2441	3.75	125	Pass
		High	2480	2.117	125	Pass
	π /4 DQPSK	Low	2402	**4.486**	125	Pass
		Mid	2441	3.647	125	Pass
		High	2480	1.932	125	Pass
	8-DPSK	Low	2402	4.704	125	Pass
		Mid	2441	3.924	125	Pass
		High	2480	2.072	125	Pass

Test Plots

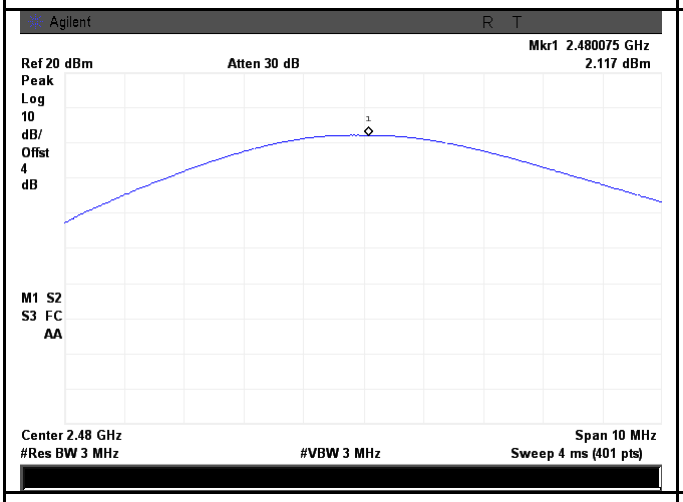
Output Power measurement result



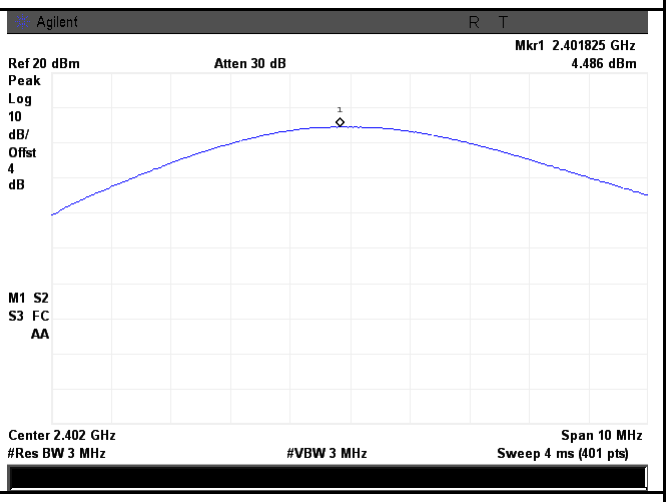
GFSK Output power - Low CH 2402



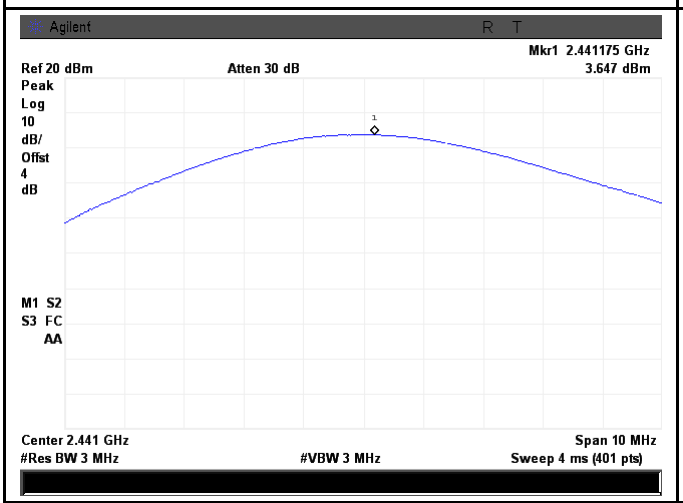
GFSK Output power - Mid CH 2441



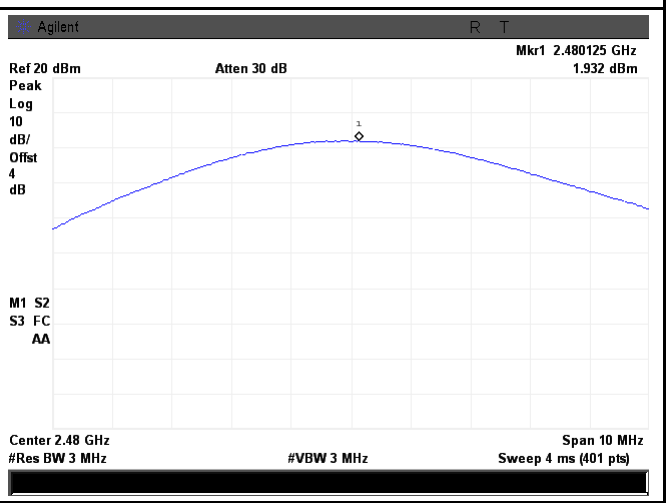
GFSK Output power - High CH 2480



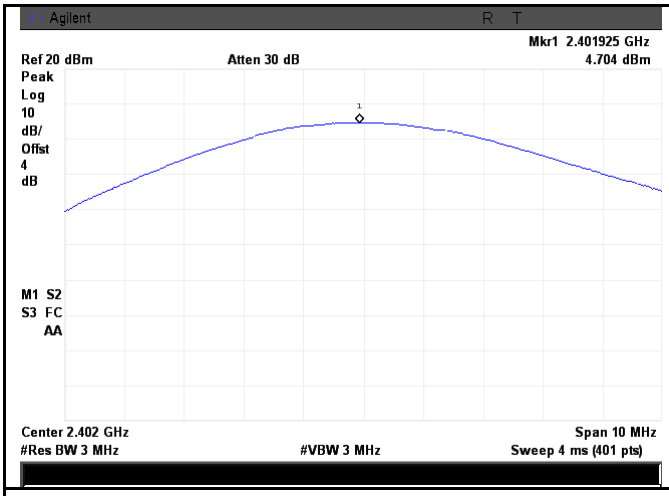
π /4 DQPSK Output power - Low CH 2402



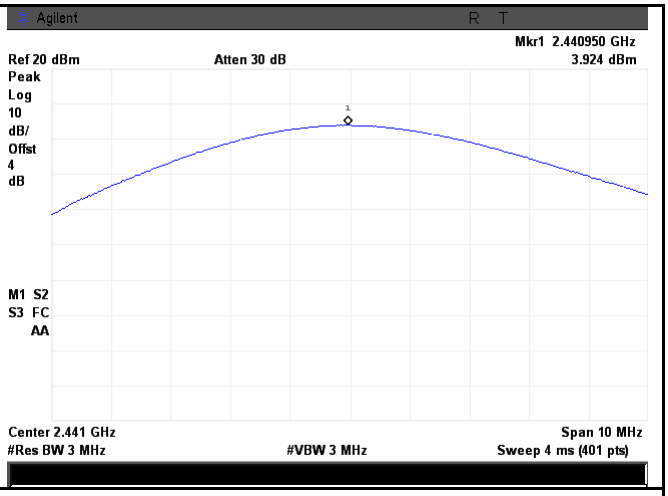
π /4 DQPSK Output power - Mid CH 2441



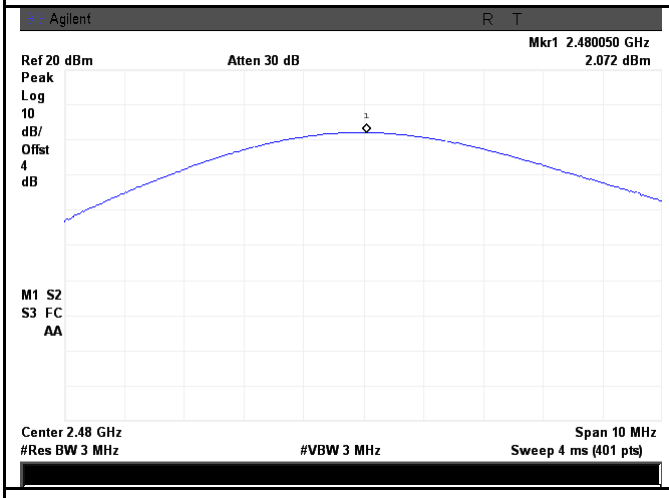
π /4 DQPSK Output power - High CH 2480



8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

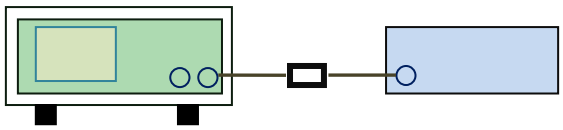


8DPSK Output power - High CH 2480

6.5 Number of Hopping Channel

Temperatur	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
Tested By :	Winnie Zhang

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. Use the following spectrum analyzer settings: 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

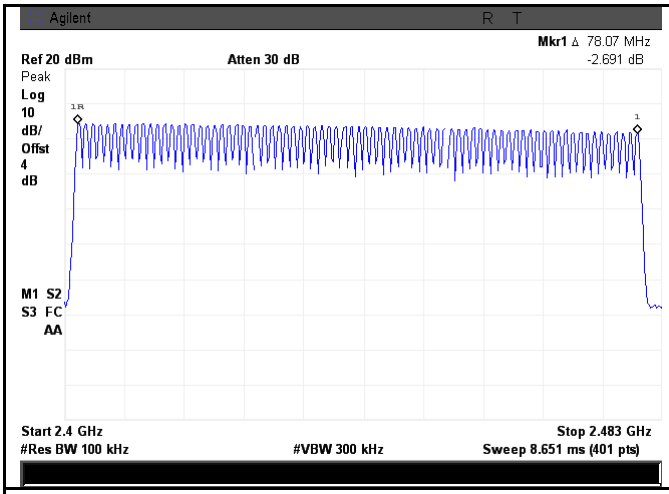
Test Plot ☑ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

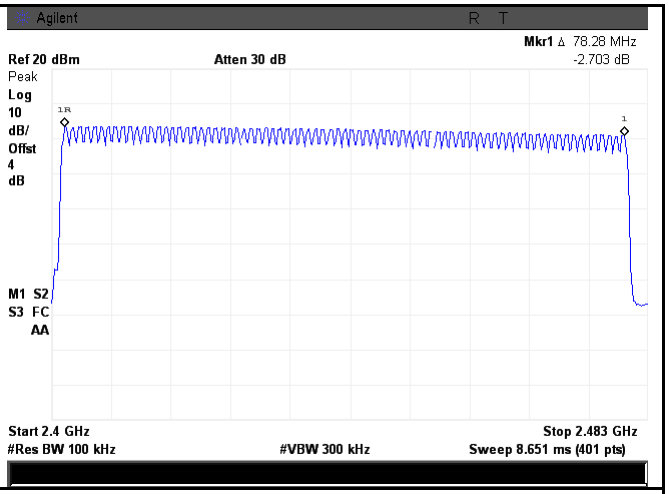
Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483.5	79	15
	π /4 DQPSK	2400-2483.5	79	15
	8-DPSK	2400-2483.5	79	15

Test Plots

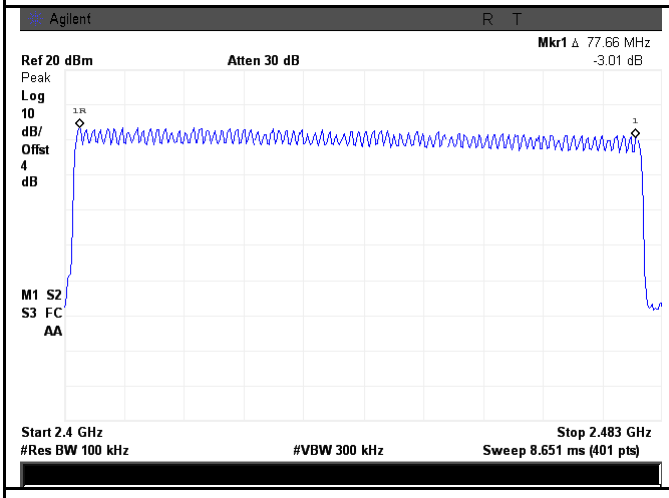
Number of Hopping Channels measurement result



GFSK



π /4DQPSK

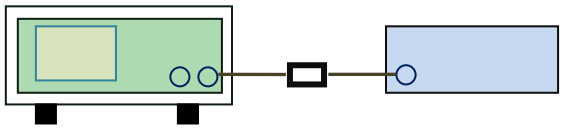


8DPSK

6.6 Time of Occupancy (Dwell Time)

Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
Tested By :	Winnie Zhang

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. Use the following spectrum analyzer - 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

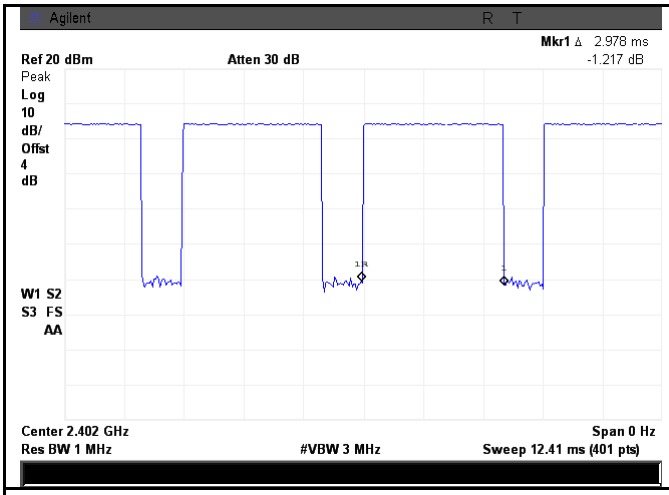
Test Plot ☑ Yes (See below) ☐ N/A

Dwell Time measurement result

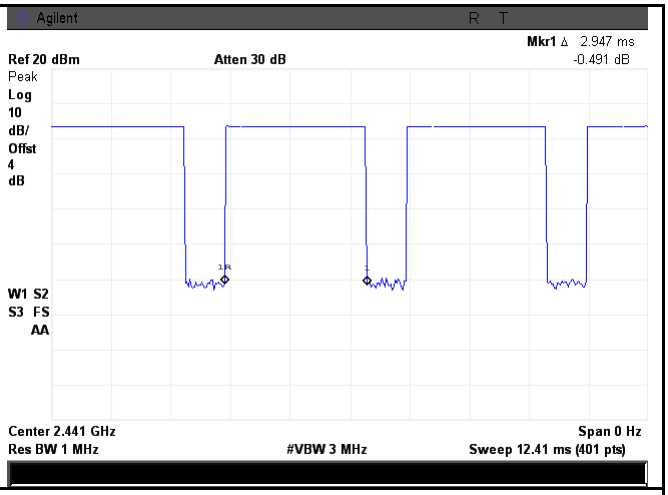
Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.978	317.653	400	Pass
		Mid	2.947	314.347	400	Pass
		High	2.978	317.653	400	Pass
	π /4 DQPSK	Low	2.978	317.653	400	Pass
		Mid	2.978	317.653	400	Pass
		High	2.978	317.653	400	Pass
	8-DPSK	Low	2.947	314.347	400	Pass
		Mid	2.978	317.653	400	Pass
		High	2.947	314.347	400	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6						

Test Plots

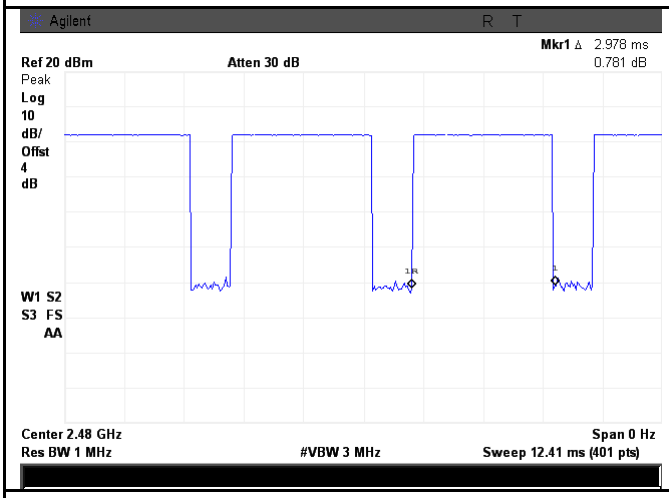
Dwell Time measurement result



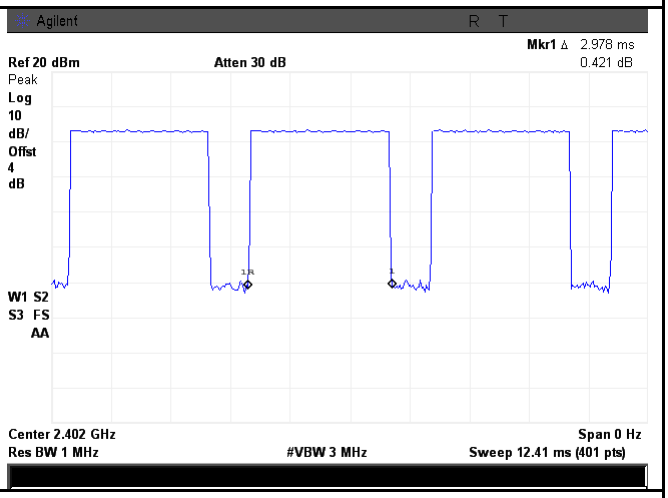
GFSK - Low CH 2402



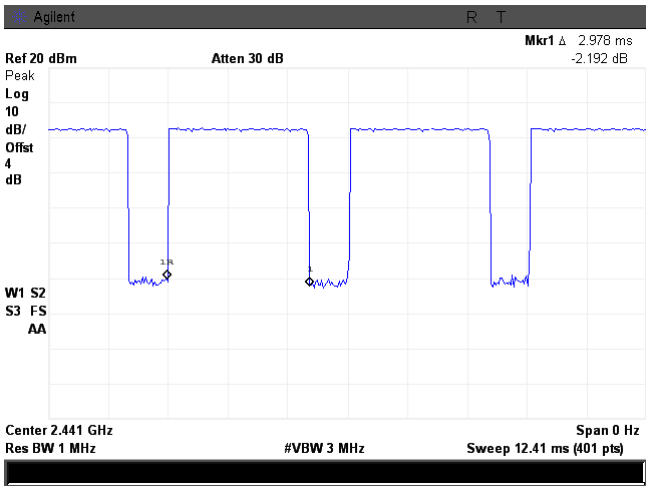
GFSK - Mid CH 2441



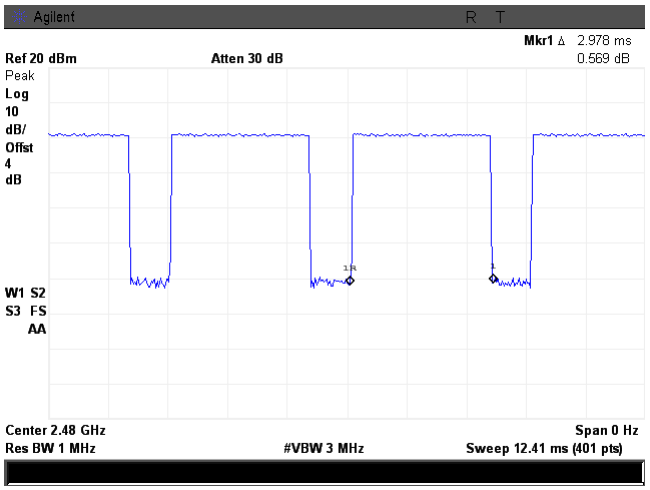
GFDK - High CH 2480



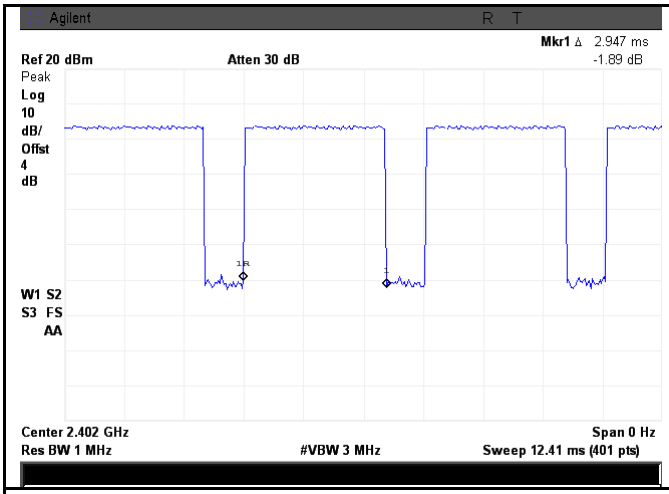
π /4 DQPSK - Low CH 2402



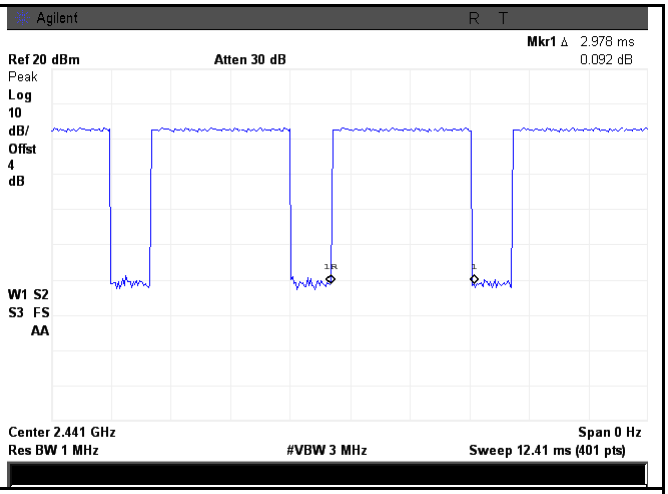
π /4 DQPSK - Mid CH 2441



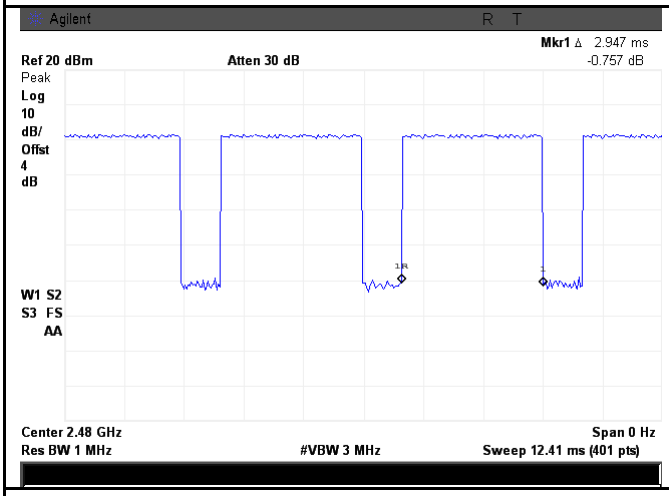
π /4 DQPSK - High CH 2441



8DPSK - Low CH 2402



8DPSK - Mid CH 2441

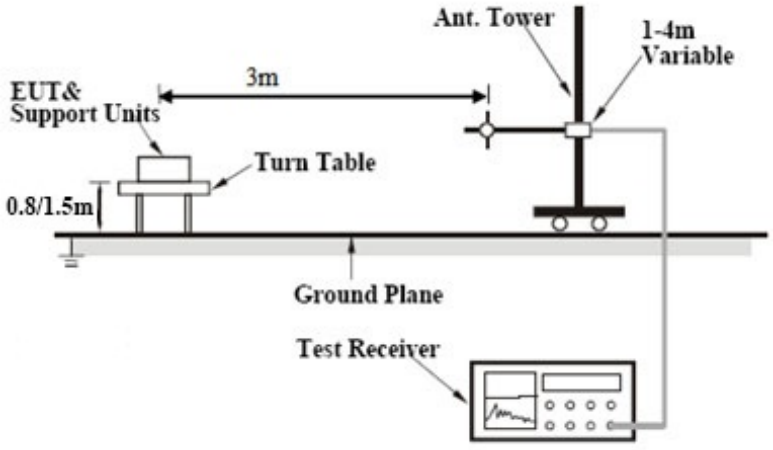


8DPSK - High CH 2480

6.7 Band Edge

Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
Tested By :	Winnie Zhang

Requirement(s):

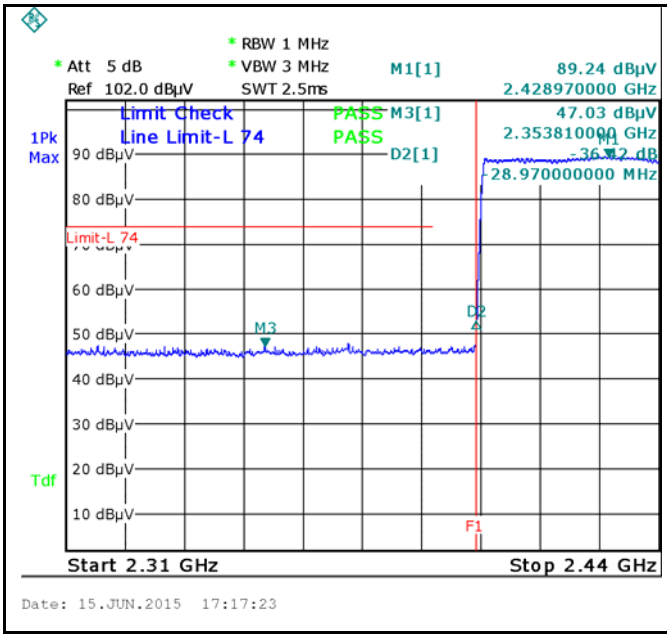
Spec	Item	Requirement	Applicable
§15.247(a)(1)(iii)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in 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.	☑
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,		

	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

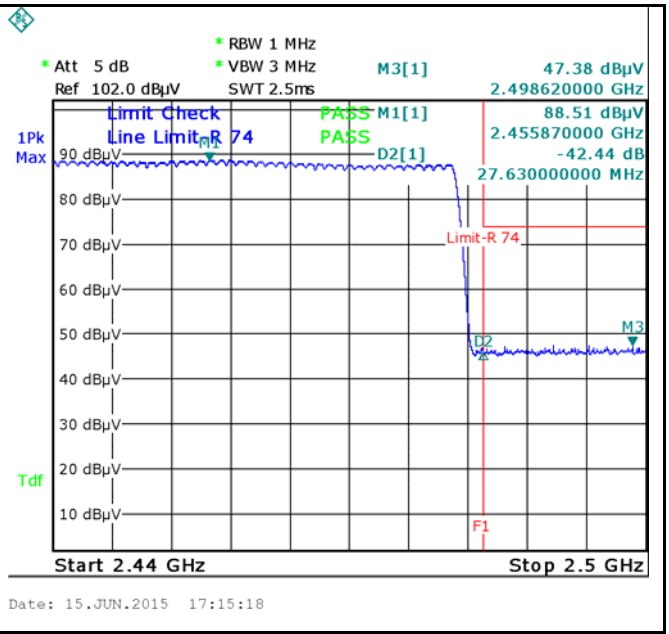
Test Plot ☑ Yes (See below) ☐ N/A

Test Plots GFS K Mode:



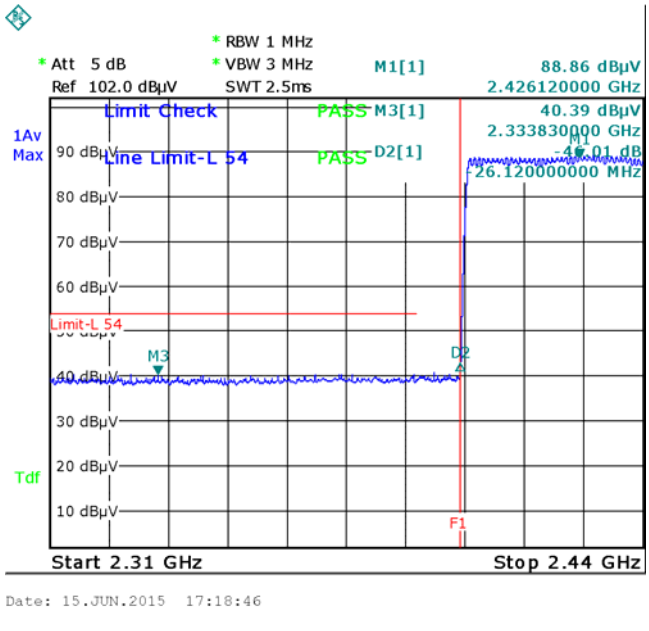
GFSK-Hopping Left Side-PK

Note: F1 is Frequency 2400MHz



GFSK-Hopping Right Side-PK

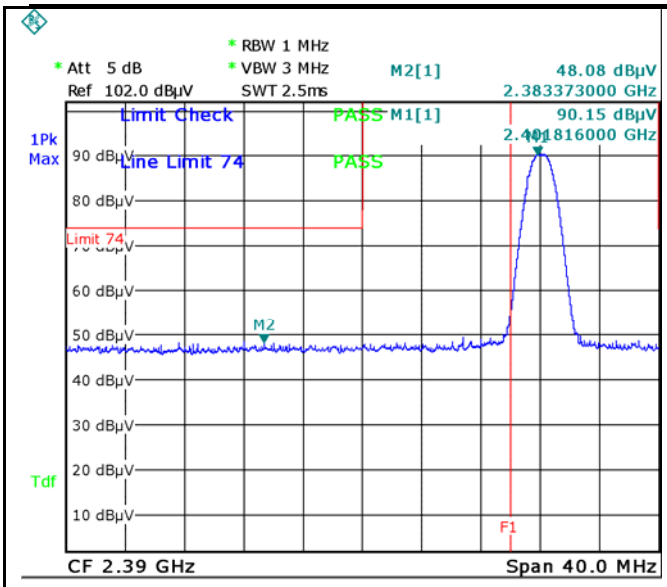
Note: F1 is Frequency 2483.5MHz



GFSK-Hopping Left Side-AV

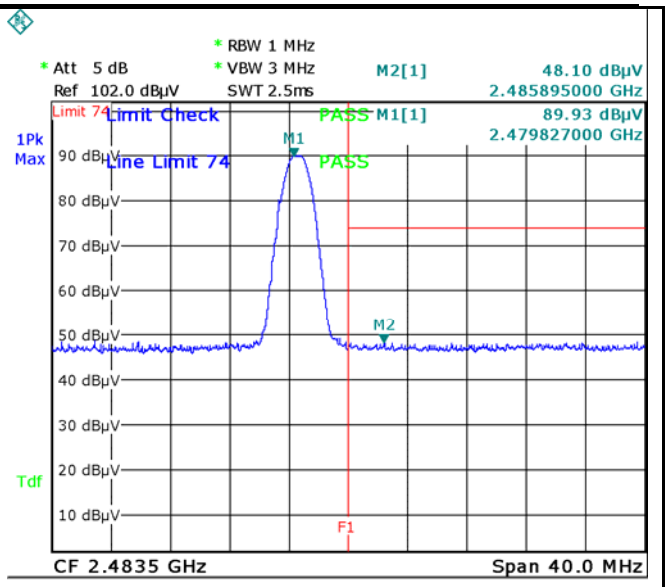
Note: (no need if PK value less than the AV limit)

GFSK-Hopping Right Side-AV



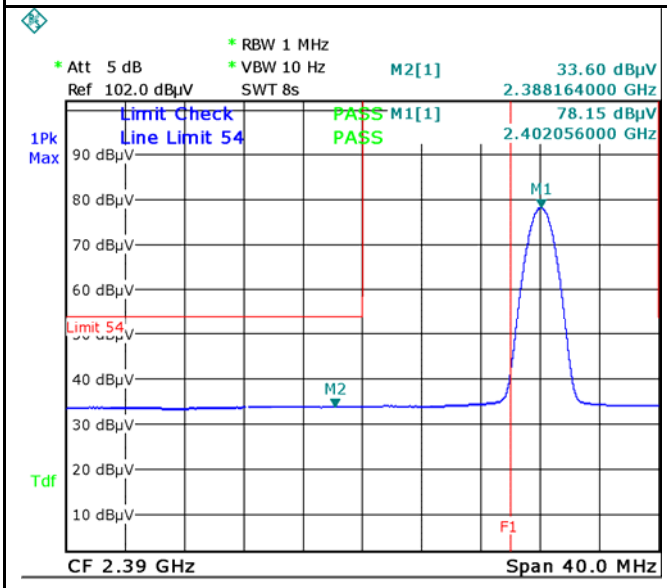
GFSK-Left Side-PK

Note: F1 is Frequency 2400MHz



GFSK-Right Side-PK

Note: F1 is Frequency 2483.5MHz

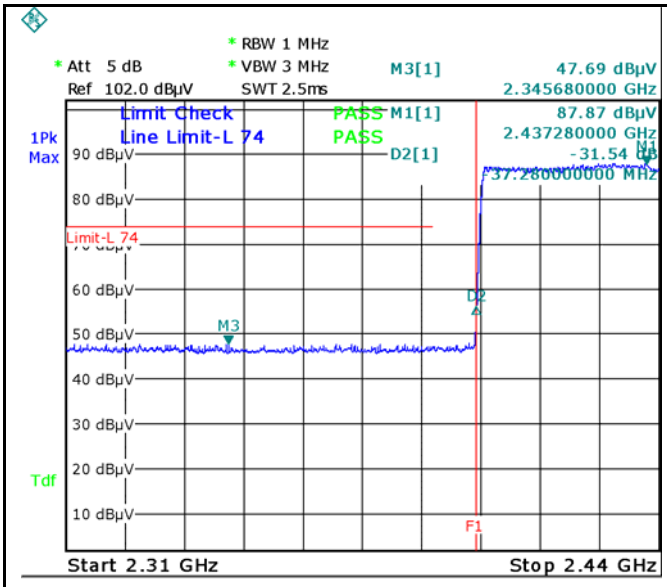


GFSK-Left Side-AV

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

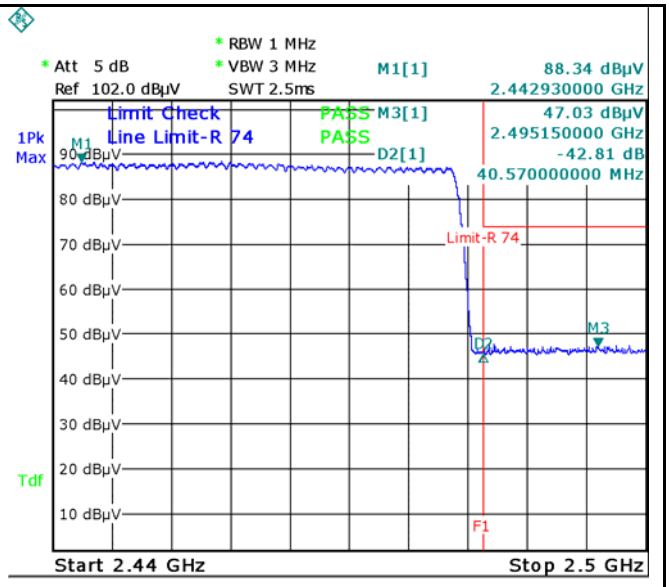
GFSK-Right Side-AV

π /4 DQPSK Mode:



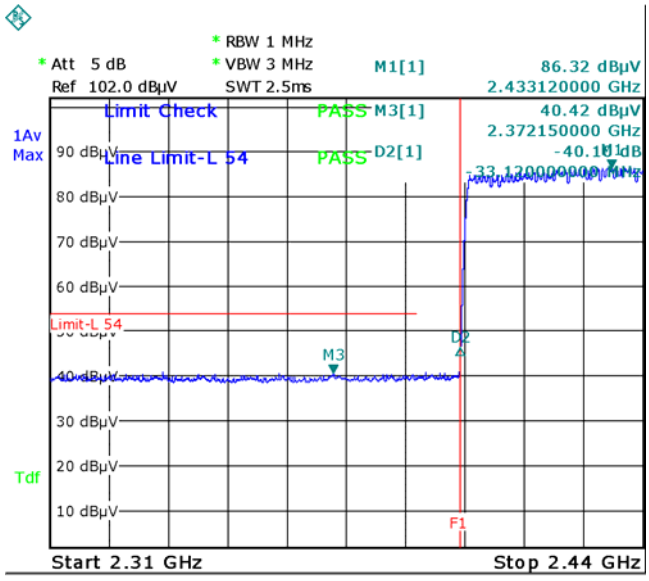
π /4 DQPSK-Hopping Left Side-PK

Note: F1 is Frequency 2400MHz



π /4 DQPSK-Hopping Right Side-PK

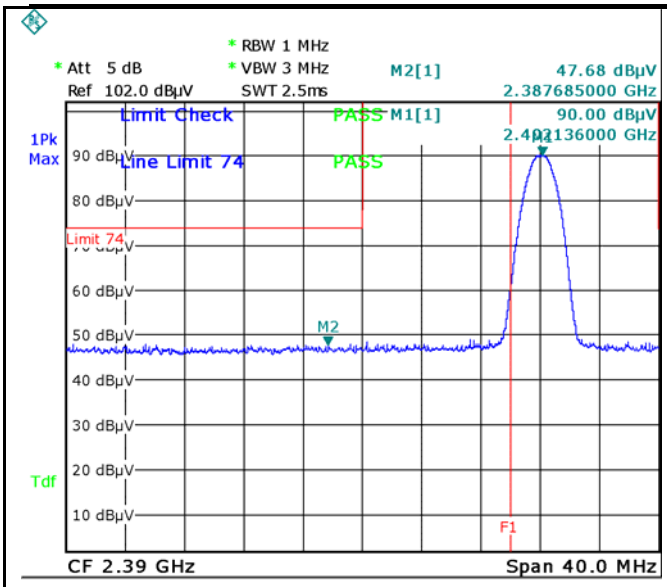
Note: F1 is Frequency 2483.5MHz



π /4 DQPSK-Hopping Left-AV

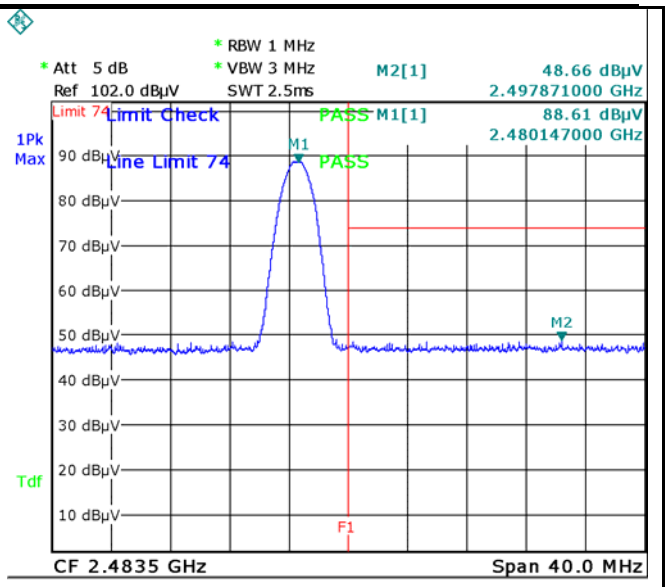
Note: (no need if PK value less than the AV limit)

π /4 DQPSK-Hopping Right-AV



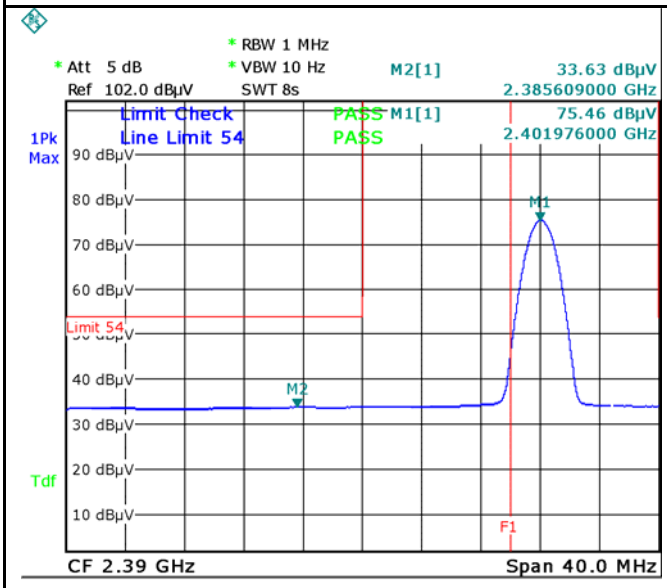
π /4 DQPSK-Left Side-PK

Note: F1 is Frequency 2400MHz



π /4 DQPSK-Right Side-PK

Note: F1 is Frequency 2483.5MHz

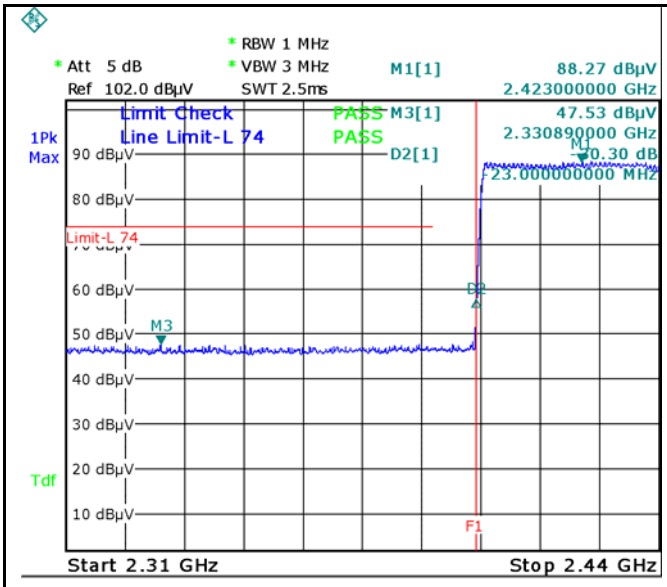


π /4 DQPSK-Left Side-AV

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

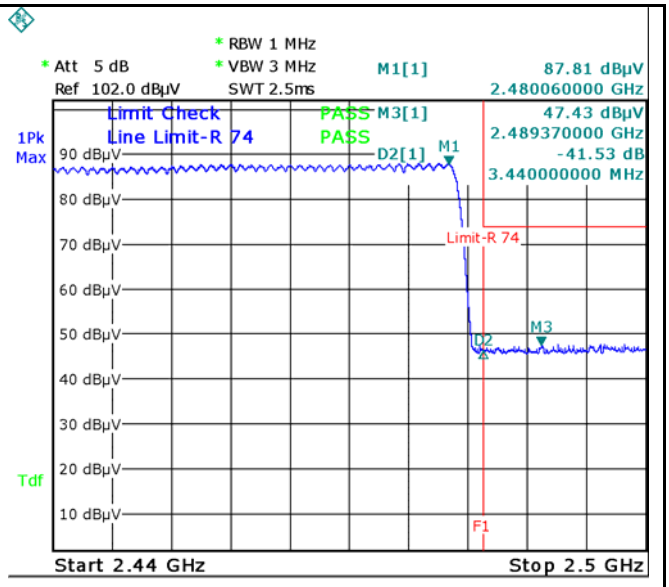
π /4 DQPSK-Right Side-AV

8-DPSK Mode:



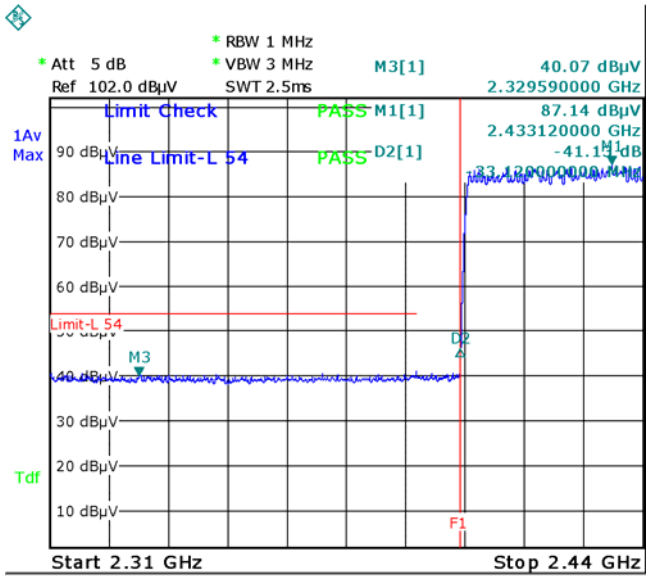
8DPSK-Hopping Left Side-PK

Note: F1 is Frequency 2400MHz



8DPSK-Hopping Right Side-PK

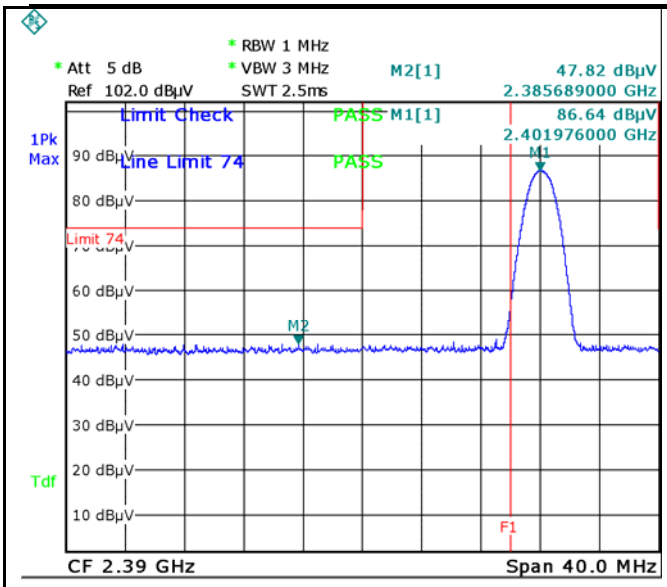
Note: F1 is Frequency 2483.5MHz



8DPSK-Hopping Left-AV

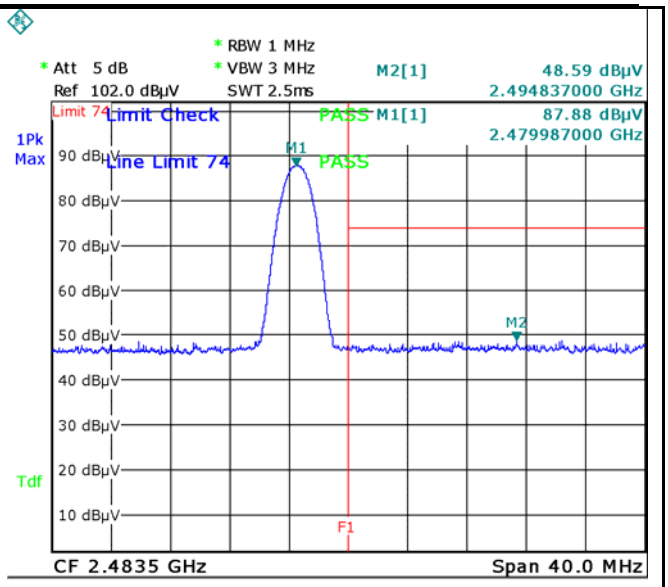
Note: (no need if PK value less than the AV limit)

8DPSK-Hopping Right-AV



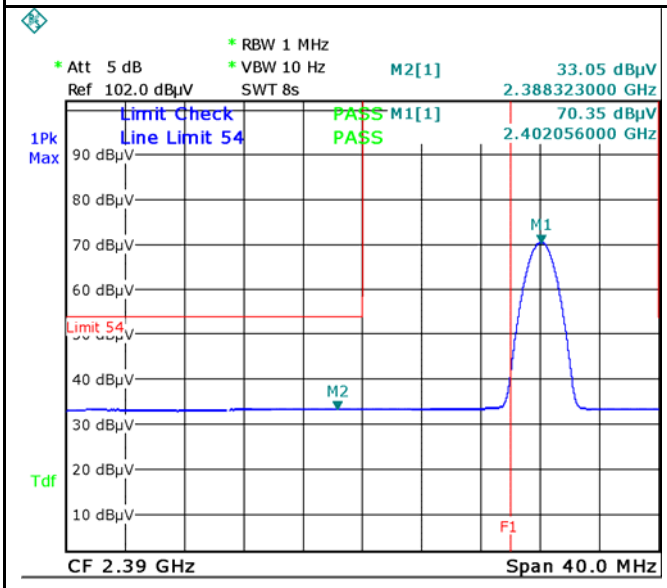
8DPSK-Left Side-PK

Note: F1 is Frequency 2400MHz



8DPSK-Right Side-PK

Note: F1 is Frequency 2483.5MHz



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

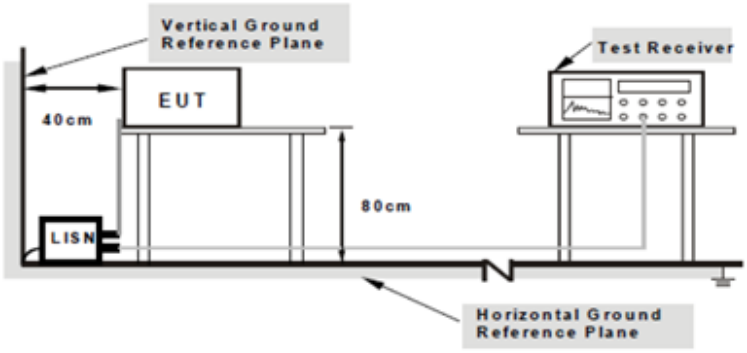
Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
Tested By :	Winnie Zhang

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.	☑

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.

Procedure

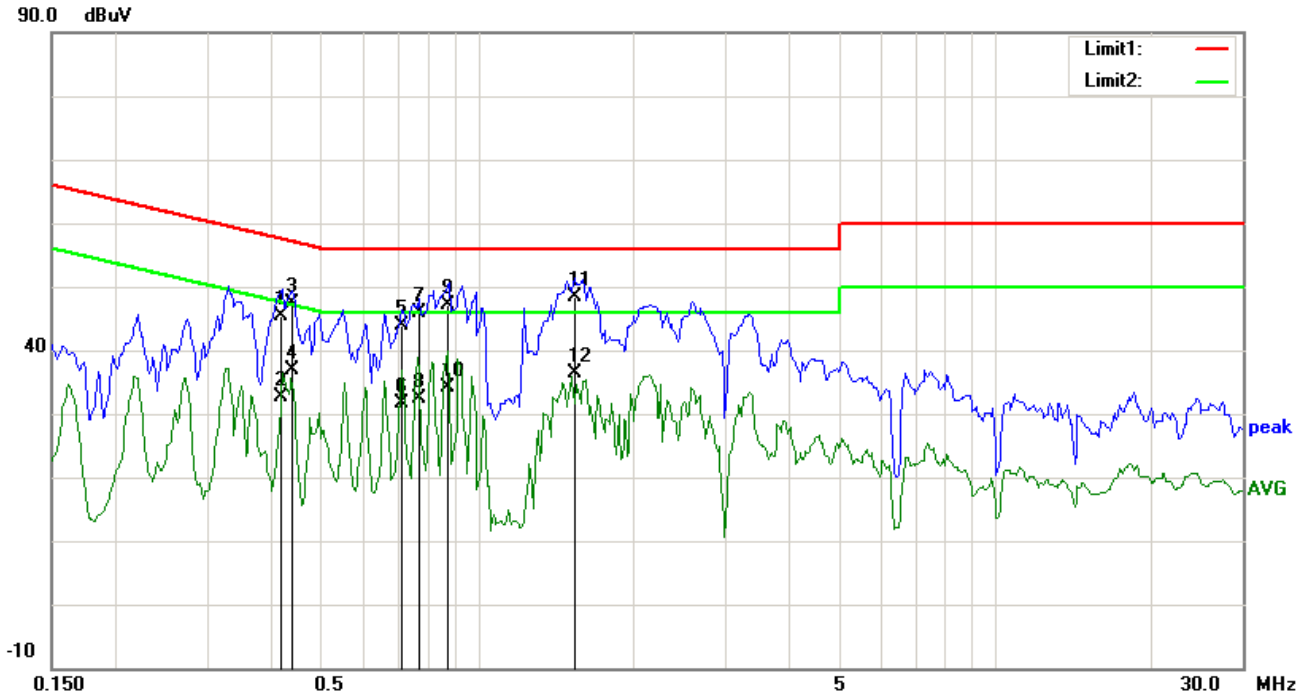
1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss

	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

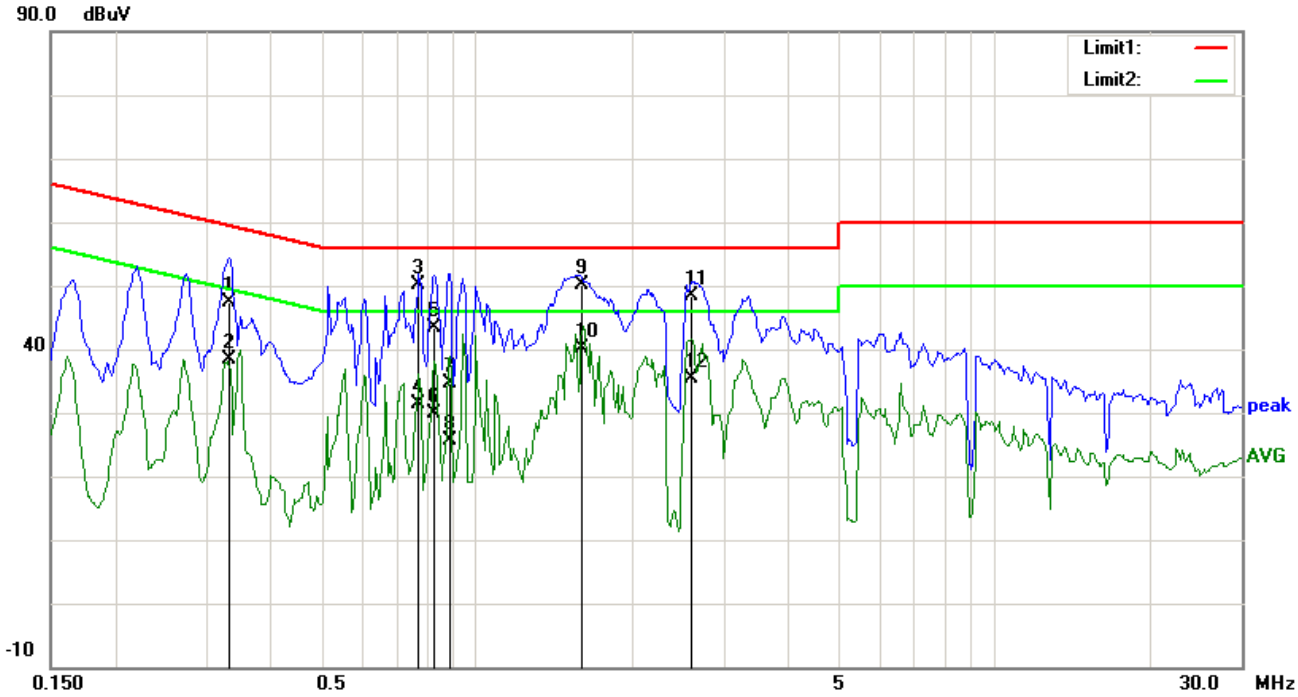
Test Mode:	Transmitting Mode



Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV/m)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	L1	0.4171	33.13	QP	12.21	45.34	57.51	-12.17
2	L1	0.4171	20.48	AVG	12.21	32.69	47.51	-14.82
3	L1	0.4391	35.31	QP	12.13	47.44	57.08	-9.64
4	L1	0.4391	24.84	AVG	12.13	36.97	47.08	-10.11
5	L1	0.7125	32.27	QP	11.69	43.96	56.00	-12.04
6	L1	0.7125	20.02	AVG	11.69	31.71	46.00	-14.29
7	L1	0.7711	34.21	QP	11.63	45.84	56.00	-10.16
8	L1	0.7711	20.78	AVG	11.63	32.41	46.00	-13.59
9	L1	0.8757	35.67	QP	11.52	47.19	56.00	-8.81
10	L1	0.8757	22.66	AVG	11.52	34.18	46.00	-11.82
11	L1	1.5406	37.03	QP	11.40	48.43	56.00	-7.57
12	L1	1.5406	24.96	AVG	11.40	36.36	46.00	-9.64

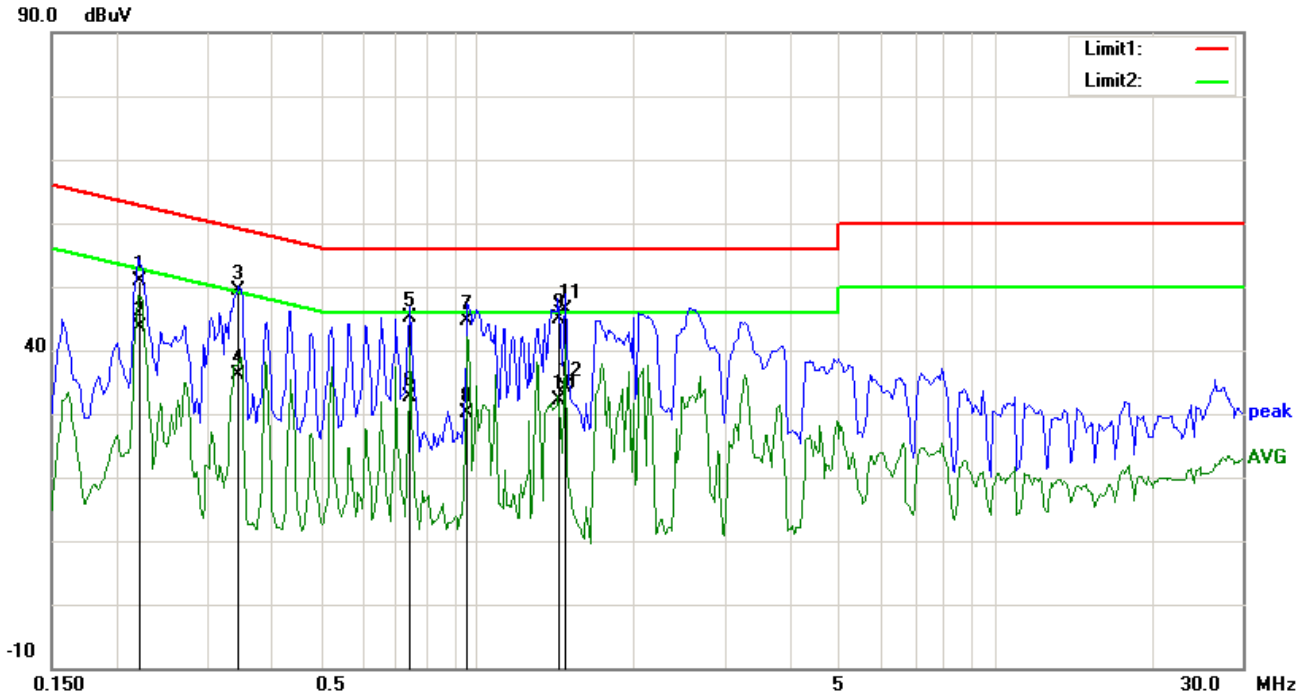


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV/m)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	N	0.3336	34.75	QP	12.52	47.27	59.36	-12.09
2	N	0.3336	25.94	AVG	12.52	38.46	49.36	-10.90
3	N	0.7750	38.49	QP	11.63	50.12	56.00	-5.88
4	N	0.7750	19.63	AVG	11.63	31.26	46.00	-14.74
5	N	0.8297	31.87	QP	11.57	43.44	56.00	-12.56
6	N	0.8297	18.21	AVG	11.57	29.78	46.00	-16.22
7	N	0.8844	23.07	QP	11.52	34.59	56.00	-21.41
8	N	0.8844	14.17	AVG	11.52	25.69	46.00	-20.31
9	N	1.6070	38.66	QP	11.48	50.14	56.00	-5.86
10	N	1.6070	28.77	AVG	11.48	40.25	46.00	-5.75
11	N	2.6070	36.75	QP	11.60	48.35	56.00	-7.65
12	N	2.6070	23.76	AVG	11.60	35.36	46.00	-10.64

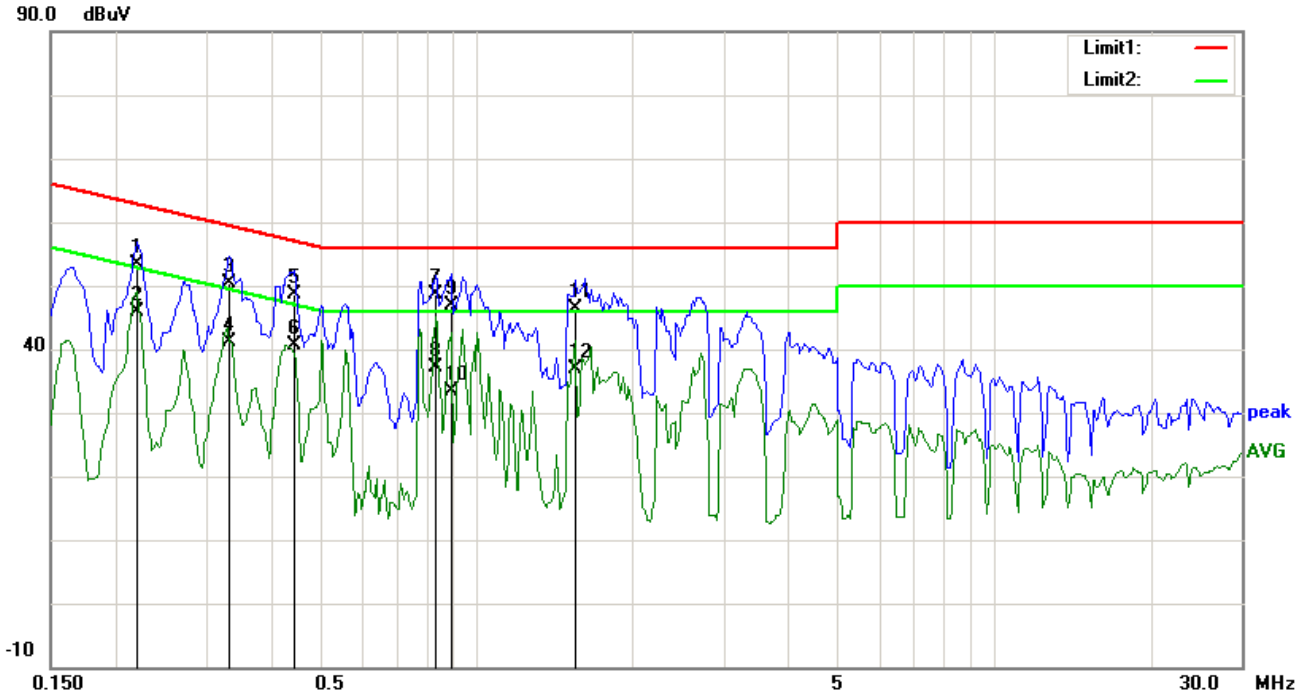
Test Mode:	Transmitting Mode



Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV/m)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	L1	0.2242	37.92	QP	12.92	50.84	62.66	-11.82
2	L1	0.2242	30.68	AVG	12.92	43.60	52.66	-9.06
3	L1	0.3453	36.79	QP	12.47	49.26	59.07	-9.81
4	L1	0.3453	23.74	AVG	12.47	36.21	49.07	-12.86
5	L1	0.7398	33.54	QP	11.66	45.20	56.00	-10.80
6	L1	0.7398	20.98	AVG	11.66	32.64	46.00	-13.36
7	L1	0.9547	33.25	QP	11.45	44.70	56.00	-11.30
8	L1	0.9547	18.62	AVG	11.45	30.07	46.00	-15.93
9	L1	1.4333	33.42	QP	11.40	44.82	56.00	-11.18
10	L1	1.4333	20.70	AVG	11.40	32.10	46.00	-13.90
11	L1	1.4781	35.05	QP	11.40	46.45	56.00	-9.55
12	L1	1.4781	22.65	AVG	11.40	34.05	46.00	-11.95



Test Data

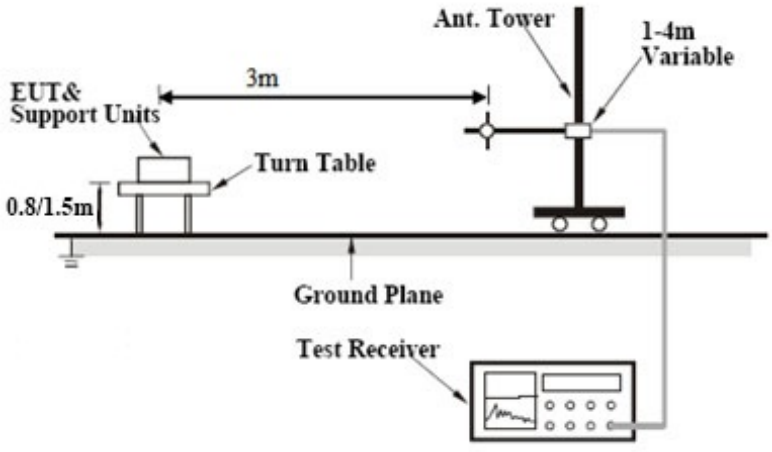
Phase Neutral Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV/m)	Detector	Corrected (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	N	0.2203	40.44	QP	12.94	53.38	62.81	-9.43
2	N	0.2203	32.84	AVG	12.94	45.78	52.81	-7.03
3	N	0.3336	37.88	QP	12.52	50.40	59.36	-8.96
4	N	0.3336	28.66	AVG	12.52	41.18	49.36	-8.18
5	N	0.4430	36.44	QP	12.11	48.55	57.01	-8.46
6	N	0.4430	28.55	AVG	12.11	40.66	47.01	-6.35
7	N	0.8336	37.03	QP	11.57	48.60	56.00	-7.40
8	N	0.8336	25.51	AVG	11.57	37.08	46.00	-8.92
9	N	0.8922	35.48	QP	11.51	46.99	56.00	-9.01
10	N	0.8922	21.90	AVG	11.51	33.41	46.00	-12.59
11	N	1.5518	34.87	QP	11.47	46.34	56.00	-9.66
12	N	1.5518	25.31	AVG	11.47	36.78	46.00	-9.22

6.9 Radiated Spurious Emissions

Temperature	22°C
Relative Humidity	57%
Atmospheric Pressure	1003mbar
Test date :	June 03, 2015
Tested By :	Winnie Zhang

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.205,
§15.209,
§15.247(d)</td><td>a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (μV/m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table></td><td>☑</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. 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:</td></tr>
</table>

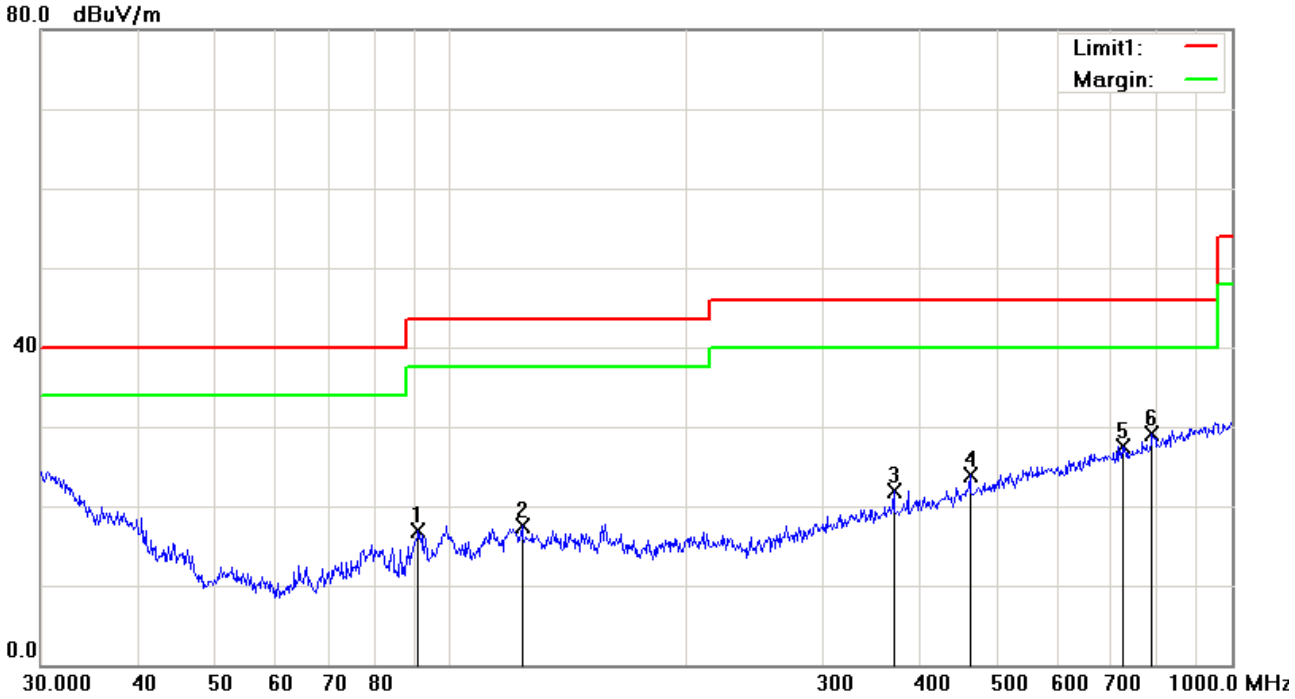
	a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution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

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode:	Transmitting Mode

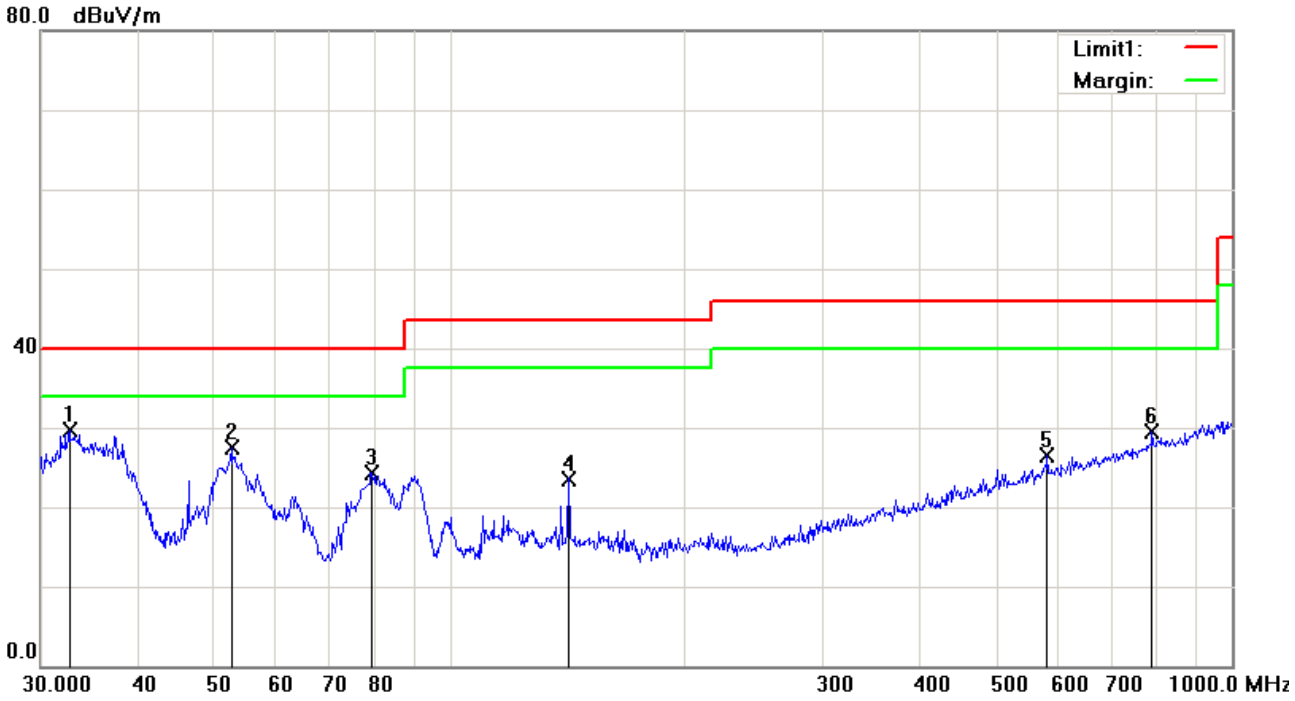
Below 1GHz



Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBμV/m)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)
1	H	91.1746	30.03	peak	-13.08	16.95	43.50	-26.55	200	162
2	H	123.6985	25.03	peak	-7.54	17.49	43.50	-26.01	100	328
3	H	369.4047	26.95	peak	-5.01	21.94	46.00	-24.06	200	359
4	H	462.3455	26.72	peak	-2.74	23.98	46.00	-22.02	101	360
5	H	724.2611	25.64	peak	1.88	27.52	46.00	-18.48	100	100
6	H	790.6188	26.12	peak	3.06	29.18	46.00	-16.82	200	359



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBμV/m)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)
1	V	32.6340	31.98	peak	-2.20	29.78	40.00	-10.22	100	195
2	V	52.5753	41.03	peak	-13.48	27.55	40.00	-12.45	100	195
3	V	79.5209	38.15	peak	-13.77	24.38	40.00	-15.62	100	139
4	V	141.8262	32.12	peak	-8.52	23.60	43.50	-19.90	109	360
5	V	580.7026	26.88	peak	-0.30	26.58	46.00	-19.42	100	94
6	V	790.6188	26.46	peak	3.06	29.52	46.00	-16.48	126	360

Test Mode:	Transmitting Mode

Note: Other modes were verified, only the result of worst case basic rate mode was presented.

Above 1GHz

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	35.18	AV	V	33.83	6.86	31.72	44.15	54	-9.85
4804	34.55	AV	H	33.83	6.86	31.72	43.52	54	-10.48
4804	45.71	PK	V	33.83	6.86	31.72	54.68	74	-19.32
4804	44.26	PK	H	33.83	6.86	31.72	53.23	74	-20.77

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	34.85	AV	V	33.86	6.82	31.82	43.71	54	-10.29
4882	34.62	AV	H	33.86	6.82	31.82	43.48	54	-10.52
4882	45.84	PK	V	33.86	6.82	31.82	54.7	74	-19.3
4882	44.35	PK	H	33.86	6.82	31.82	53.21	74	-20.79

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	34.82	AV	V	33.9	6.76	31.92	43.56	54	-10.44
4960	34.57	AV	H	33.9	6.76	31.92	43.31	54	-10.69
4960	45.69	PK	V	33.9	6.76	31.92	54.43	74	-19.57
4960	44.52	PK	H	33.9	6.76	31.92	53.26	74	-20.74

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/18/2014	09/17/2015	☑
Line Impedance	LI-125A	191106	09/26/2014	09/25/2015	☑
Line Impedance	LI-125A	191107	09/26/2014	09/25/2015	☑
LISN	ISN T800	34373	09/26/2014	09/25/2015	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	☑
Transient Limiter	LIT-153	531118	09/02/2014	09/01/2015	☑
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/18/2014	09/17/2015	☑
Power Splitter	1#	1#	09/02/2014	09/01/2015	☑
DC Power Supply	E3640A	MY40004013	09/18/2014	09/17/2015	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/18/2014	09/17/2015	☑
Positioning Controller	UC3000	MF780208282	11/20/2014	11/19/2015	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015	☑
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	10/04/2015	10/04/2016	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/22/2014	09/21/2015	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	☑
Universal Radio Communication Tester	CMU200	121393	09/26/2014	09/25/2015	☑

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Whole Package - Top View</td><td>Adapter - Front View</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>EUT - Front View</td><td>EUT - Rear View</td></tr>
</table>

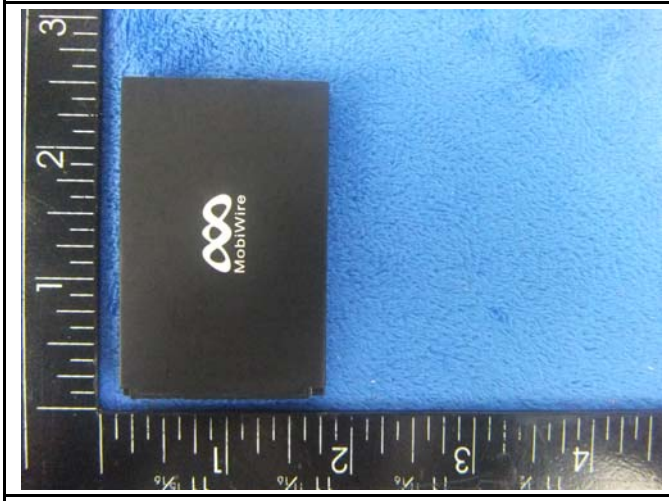
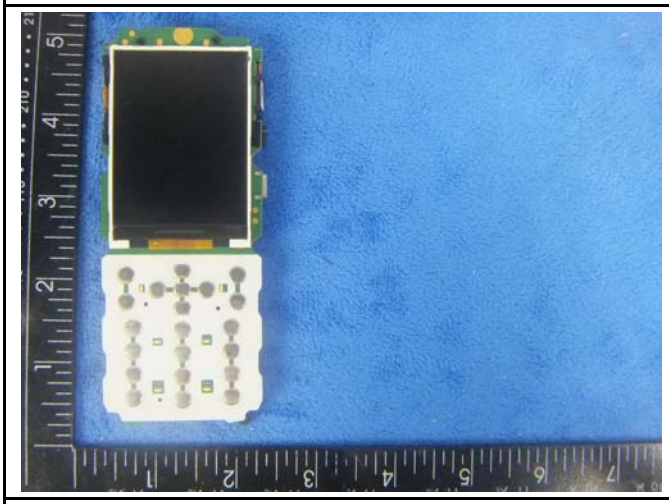
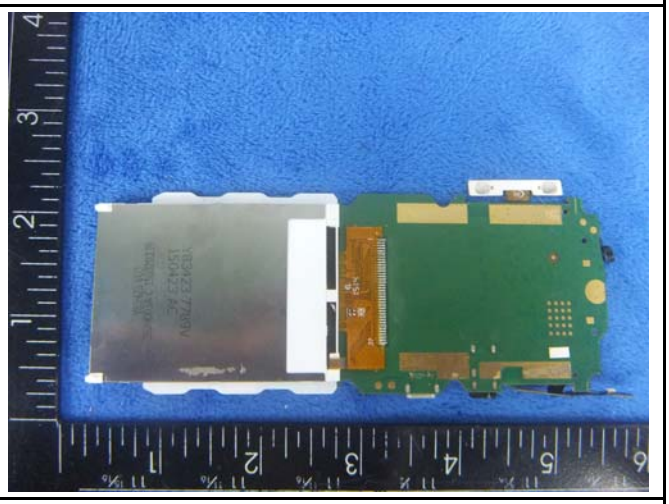
EUT - Top View

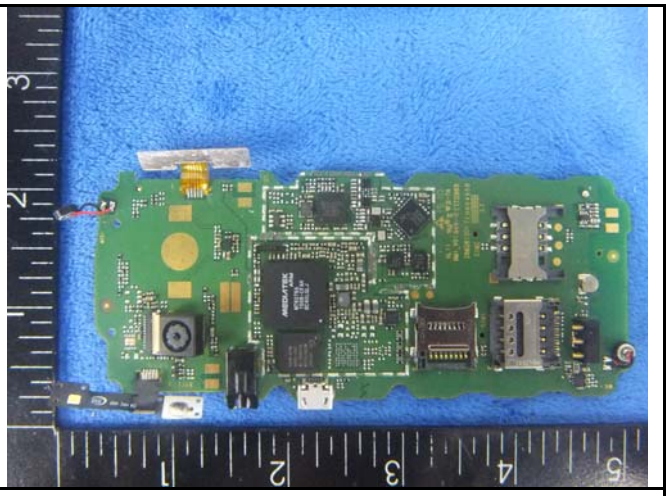
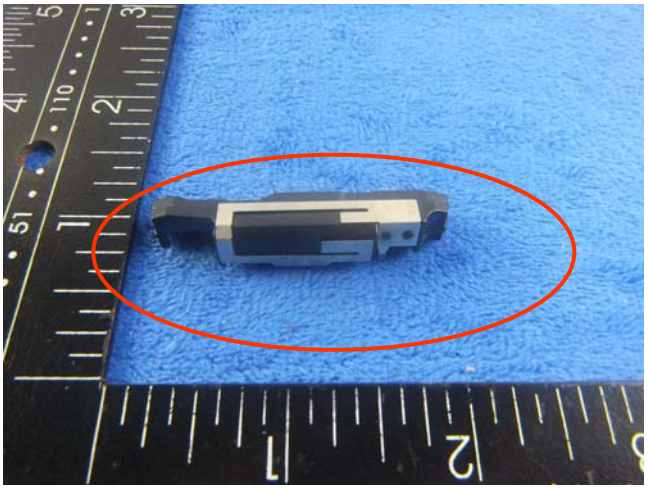
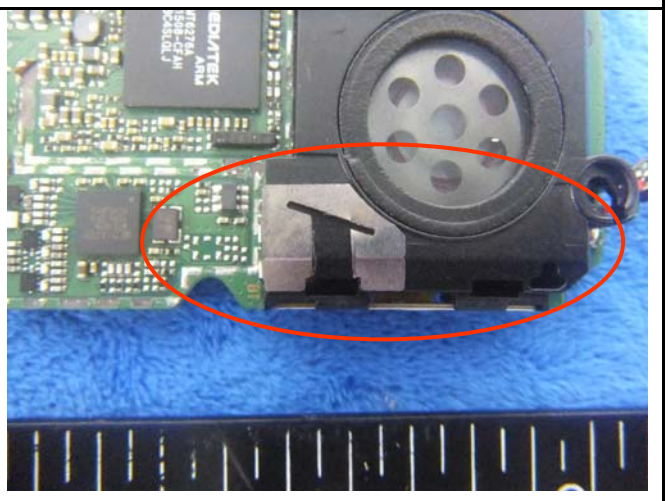
EUT - Bottom View

EUT - Left View

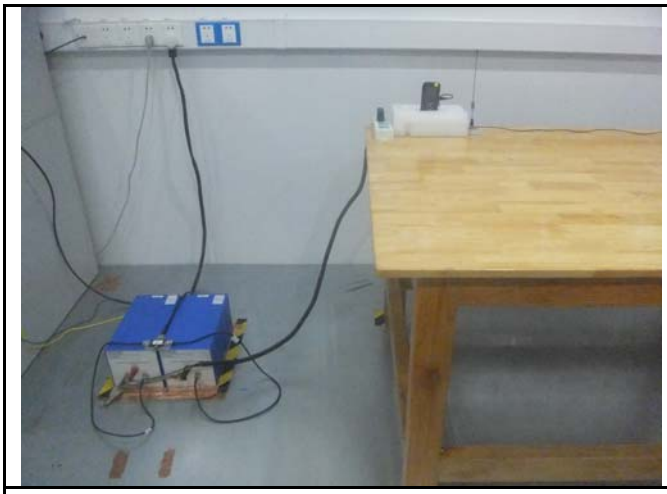
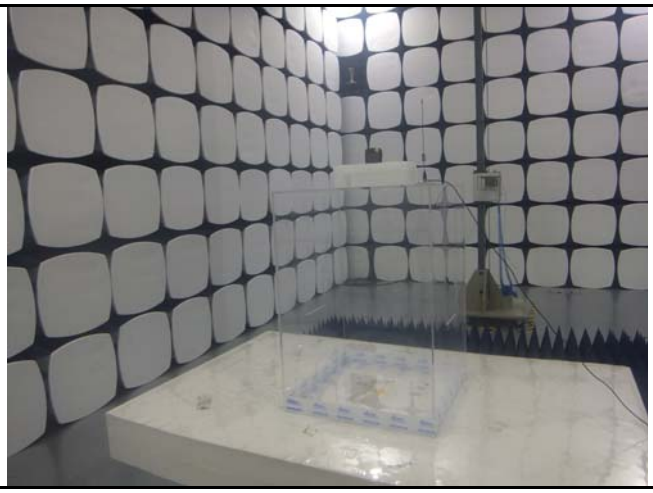
EUT - Right View

Annex B.ii. Photograph: EUT Internal Photo

	
Cover Off - Top View 1	Cover Off - Top View 2
	
Battery - Top View	Battery - Bottom View
	
LCD - Front View	LCD - Rear View

	
Mainborad With Shielding - Front View	Mainborad Without Shielding - Front View
	
GSM/PCS/UMTS-FDD Antenna View	BT Antenna View

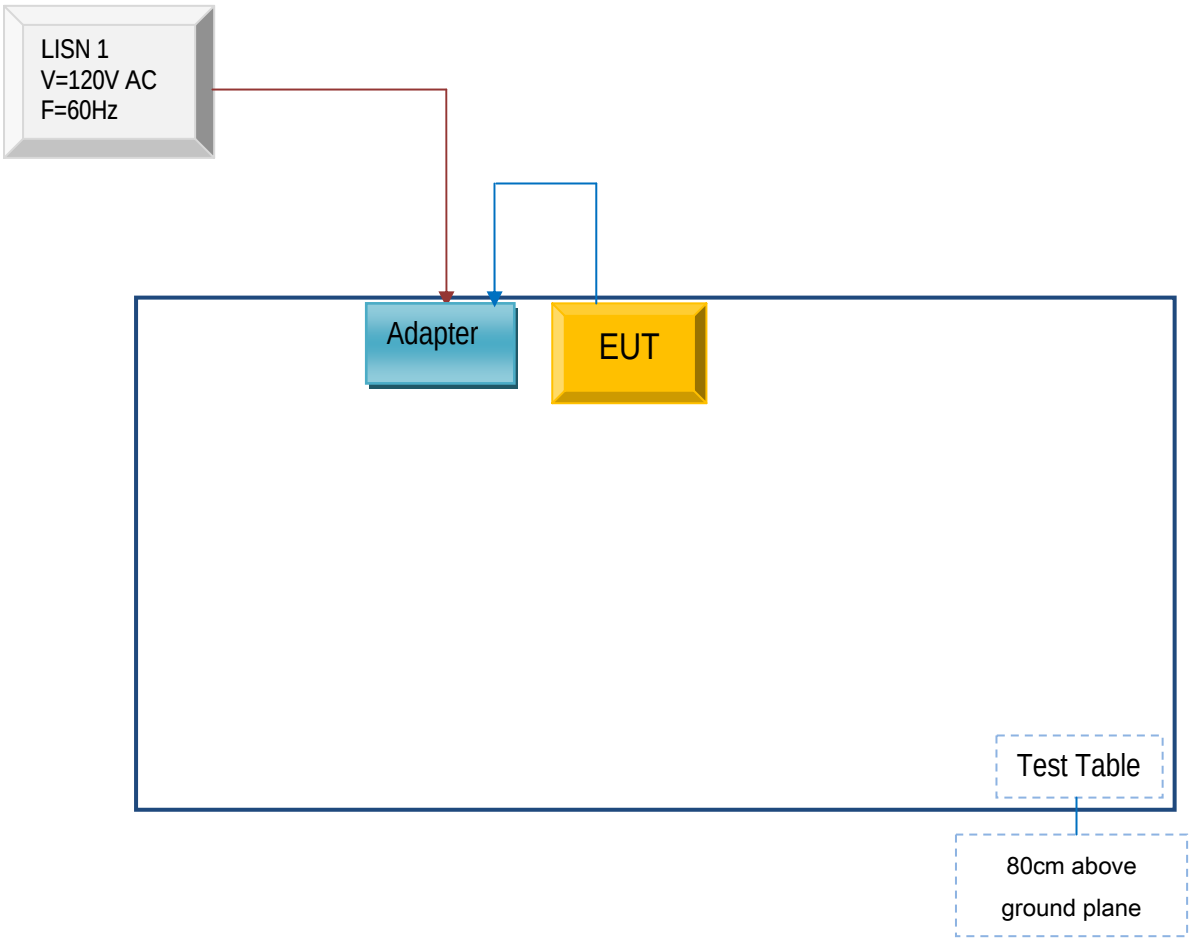
Annex B.iii. Photograph: Test Setup Photo

	
Conducted Emissions Test Setup Front View	Conducted Emissions Test Setup Side View
	
Radiated Spurious Emissions Test Setup Below 1GHz	Radiated Spurious Emissions Test Setup Above 1GHz

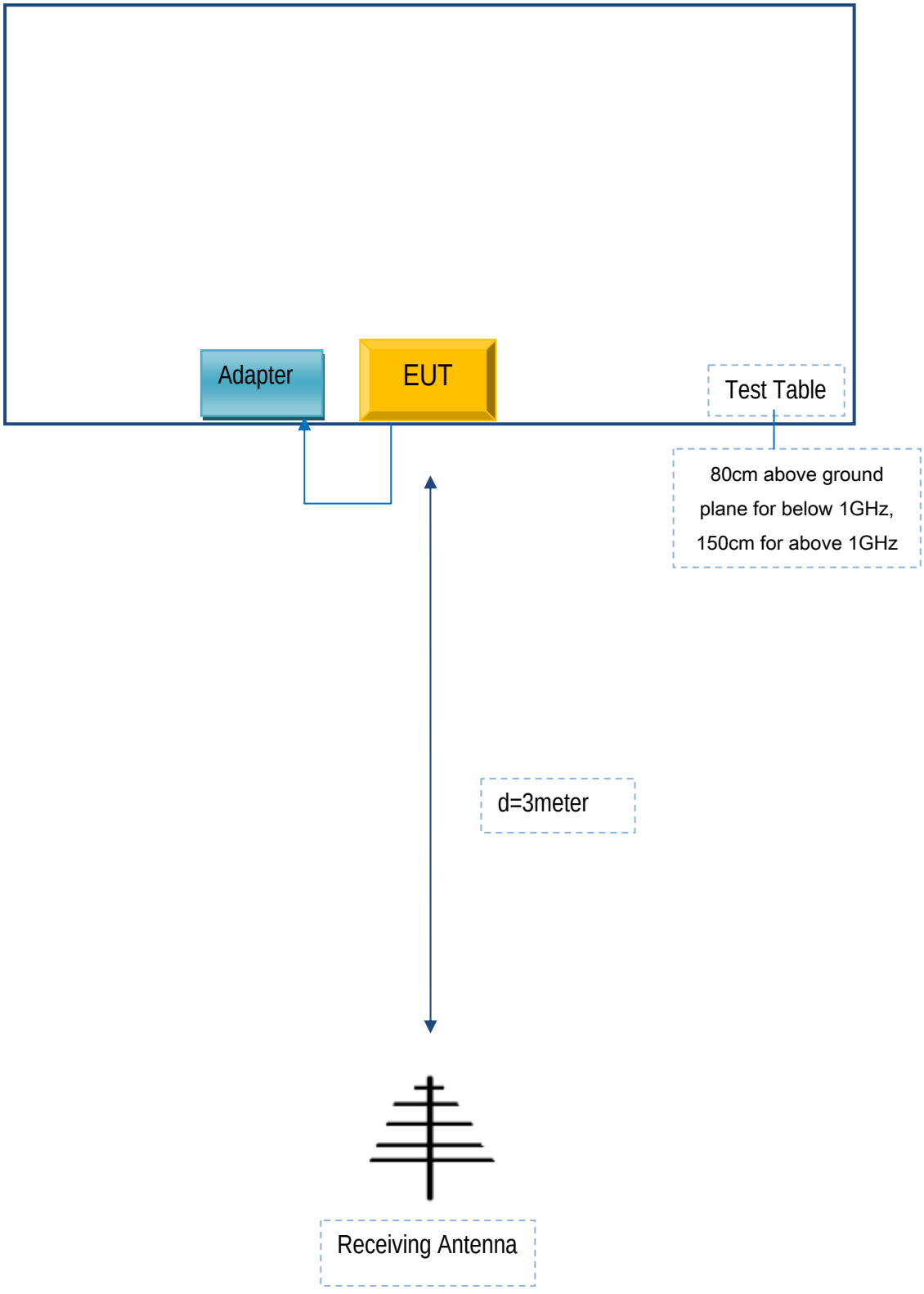
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

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

Manufacturer	Equipment Description	Model	Calibration Date	Calibration Due Date
N/A	N/A	N/A	N/A	N/A

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

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A