

# RF TEST REPORT



Report No.: 17070225-FCC-R2

Supersede Report No.: N/A

Applicant	Shenzhen Konka Telecommunications Technology Co., Ltd.	
Product Name	Smart Phone	
Model No.	ADR9	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	March 29 to April 16, 2017	
Issue Date	April 17, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification		<input checked="" type="checkbox"/>
Equipment did not comply with the specification		<input type="checkbox"/>
Loren Luo	David Huang	
Loren Luo Test Engineer	David Huang Checked By	
This test report may be reproduced in full only		
Test result presented in this test report is applicable to the tested sample only		

Issued by:

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

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## Laboratories Introduction

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



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

### Accreditations for Conformity Assessment

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



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## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070225-FCC-R2	NONE	Original	April 17, 2017

## 2. Customer information

Applicant Name	Shenzhen Konka Telecommunications Technology Co., Ltd.
Applicant Add	No.9008 Shennan Road,Overseas Chinese Town, ShenZhen, Guangdong,China
Manufacturer	Shenzhen Konka Telecommunications Technology Co., Ltd.
Manufacturer Add	No.9008 Shennan Road,Overseas Chinese Town, ShenZhen, Guangdong,China

## 3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software of Radiated Emission	Radiated Emission Program-To Shenzhen v2.0
Test Software of Conducted Emission	EZ-EMC(ver.lcp-03A1)

## 4. Equipment under Test (EUT) Information

Description of EUT:	Smart Phone
Main Model:	ADR9
Serial Model:	N/A
Date EUT received:	March 28, 2017
Test Date(s):	March 29 to April 16, 2017
Equipment Category :	DTS
Antenna Gain:	GSM850: -0.43dBi PCS1900: 0.79dBi UMTS-FDD Band V: -0.43dBi UMTS-FDD Band II: 0.79dBi LTE Band IV: 0.89 dBi Bluetooth/BLE/WiFi: -0.56dBi GPS: 0.79dBi
Antenna Type:	PIFA antenna  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 II TX: 1852.4 ~ 1907.6 MHz; RX: 1932.4 ~ 1987.6 MHz LTE Band IV TX: 1710.7 ~ 1754.3 MHz; RX : 2110.7 ~ 2154.3 MHz WIFI: 802.11b/g/n(20M): 2412-2462 MHz

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

Bluetooth& BLE: 2402-2480 MHz

GPS: 1575.42 MHz

802.11b: 8.78 dBm

Max. Output Power:

802.11g: 8.79 dBm

802.11n(20M): 8.73 dBm

802.11n(40M): 8.67 dBm

GSM 850: 124CH

PCS1900: 299CH

UMTS-FDD Band V: 102CH

UMTS-FDD Band II: 277CH

Number of Channels:

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

WIFI :802.11n(40M): 7CH

Bluetooth: 79CH

BLE: 40CH

GPS:1CH

Port:

USB Port, Earphone Port

Adapter:

Model: HJ-050100-AR

Input: AC100-240V~50/60Hz,0.15A

Output: DC 5.0V,1.0A

Input Power:

Battery:

Model: KLB250P373

Spec : 3.8V,2500mAh,9.5Wh

Maximum chargeable voltage: 4.35V

Trade Name :

ADMIRAL

FCC ID:

UT3ADR9

## 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)(2)	DTS (6 dB&20 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge & Unwanted Emissions into Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

## Measurement Uncertainty

Parameter	Uncertainty
AC Power Line Conducted Emissions (150kHz~30MHz)	±3.71dB
Radiated Emission(30MHz~1GHz)	±5.12dB
Radiated Emission(1GHz~6GHz)	±5.34dB

## 6. Measurements, Examination And Derived Results

### 6.1 Antenna Requirement

#### Applicable Standard

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

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

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

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

#### Antenna Connector Construction

The EUT has 3 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIFI, the gain is -0.56dBi for Bluetooth/BLE/WIFI.

A permanently attached PIFA antenna for GSM/PCS/ UMTS-FDD Band V/ UMTS-FDD Band II, the gain is -0.43dBi for GSM850/ UMTS-FDD Band V, 0.79dBi for PCS1900/ UMTS-FDD Band II.

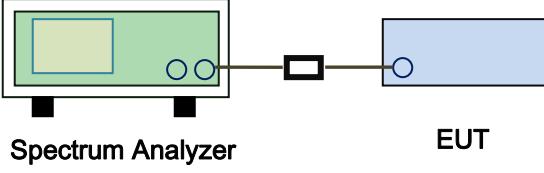
A permanently attached PIFA antenna for LTE Band IV, the gain is 0.89dBi for LTE Band IV.

**The antenna meets up with the ANTENNA REQUIREMENT.**

**Result:** Compliance.

## 6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	22 °C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 13, 2017
Tested By :	Loren Luo

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW ≥ 500kHz; 20dB BW ≥ 500kHz;	<input checked="" type="checkbox"/>
	b)	99% BW: For FCC reference only; required by IC.	<input checked="" type="checkbox"/>
Test Setup	 <b>Spectrum Analyzer</b> <b>EUT</b>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r03, 8.1 DTS bandwidth</p> <p><u>6dB bandwidth</u></p> <ol style="list-style-type: none"> <li>Set RBW = 100 kHz.</li> <li>Set the video bandwidth (VBW) ≥ 3 × RBW.</li> <li>Detector = Peak.</li> <li>Trace mode = max hold.</li> <li>Sweep = auto couple.</li> <li>Allow the trace to stabilize.</li> <li>Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.</li> </ol> <p><u>20dB bandwidth</u></p> <p>C63.10 Occupied Bandwidth (OBW=20dB bandwidth)</p> <ol style="list-style-type: none"> <li>Set RBW = 1%-5% OBW.</li> <li>Set the video bandwidth (VBW) ≥ 3 x RBW.</li> <li>Set the span range between 2 times and 5 times of the OBW.</li> <li>Sweep time=Auto, Detector=PK, Trace=Max hold.</li> <li>Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst-</li> </ol>		

	case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the 20 dB levels with respect to the reference level.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

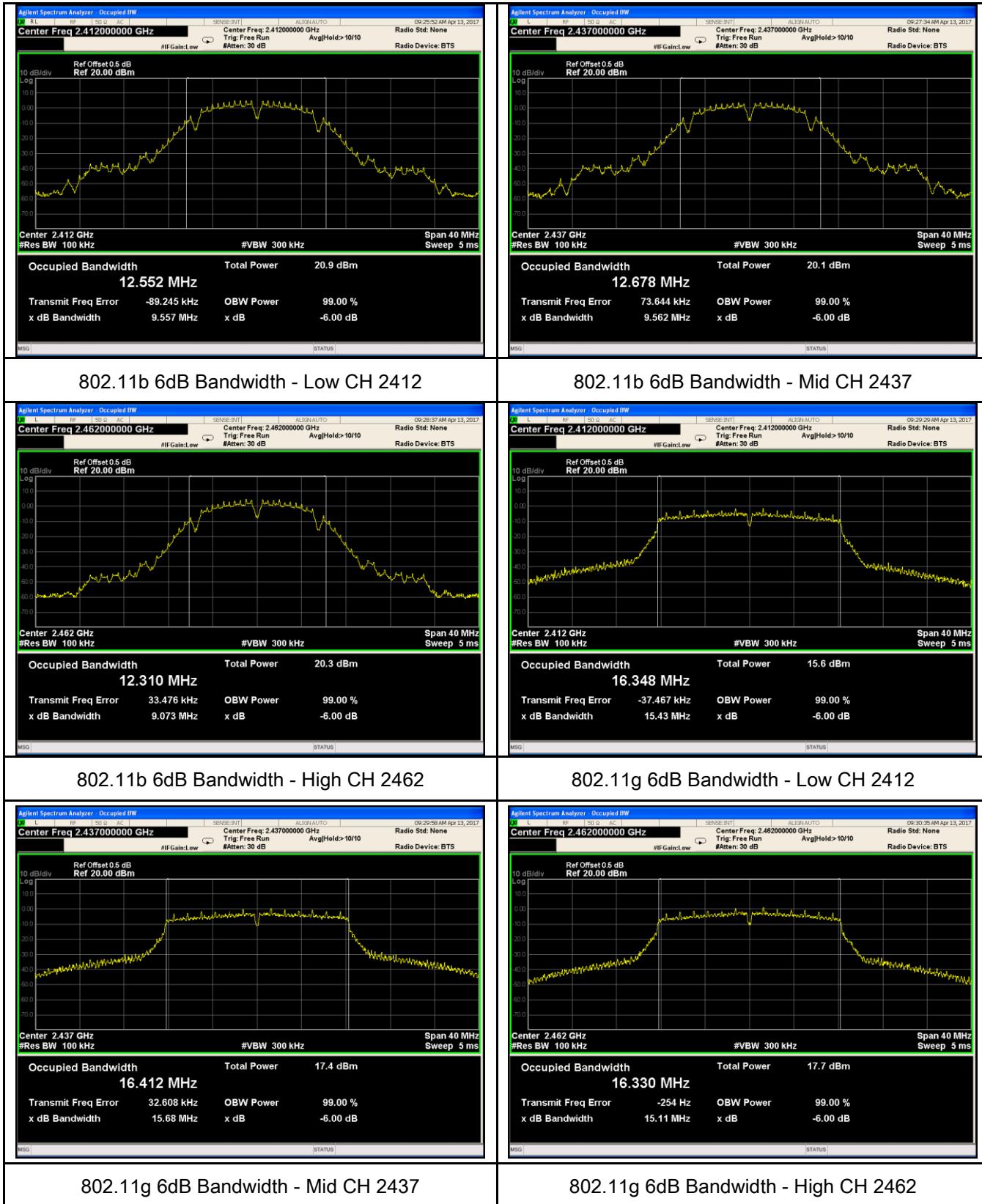
Test Plot  Yes (See below)  N/A

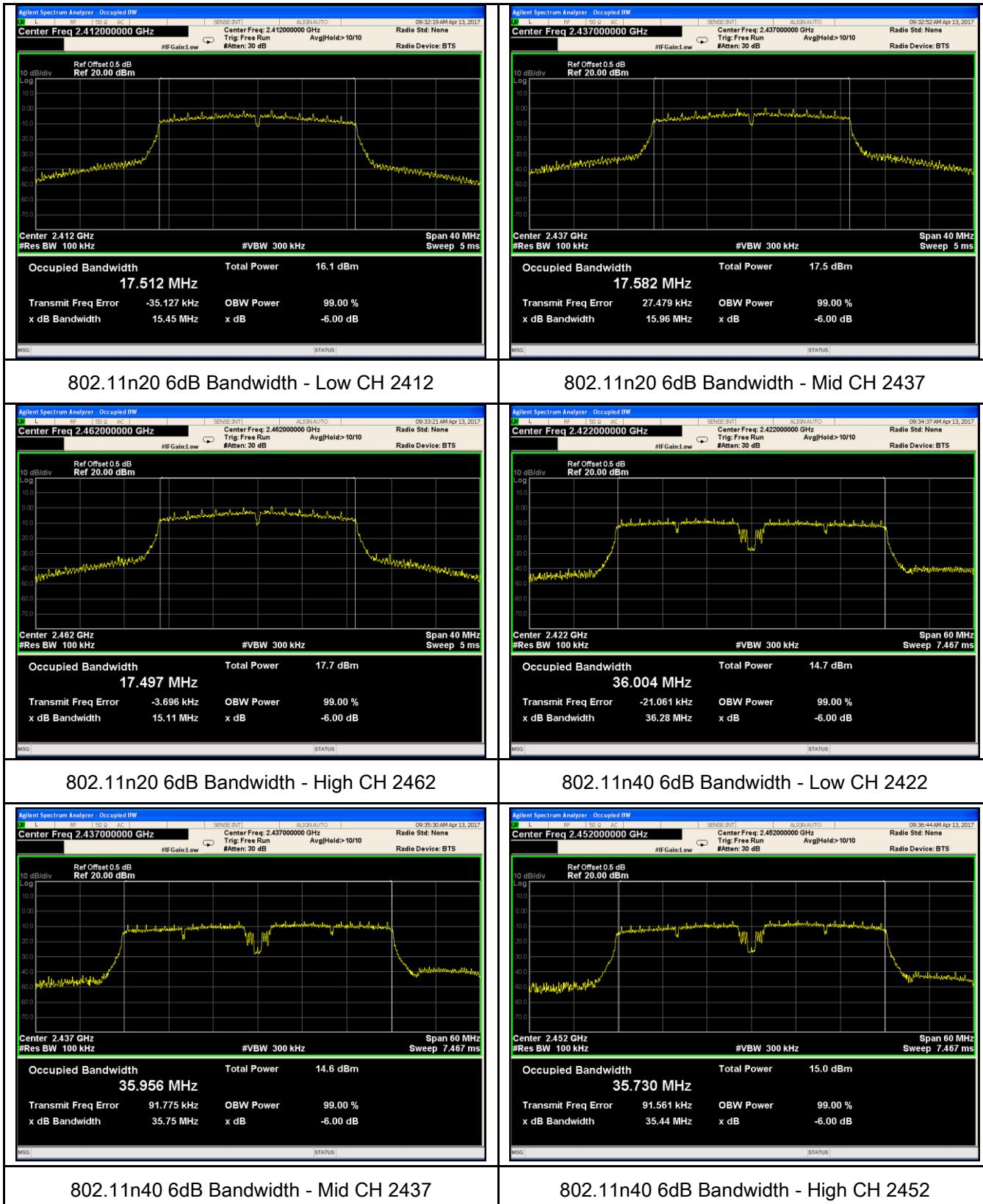
#### Measurement result

Test mode	CH	Freq (MHz)	6dB Bandwidth (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	9.557	14.30	$\geq 0.5$
	Mid	2437	9.562	14.32	$\geq 0.5$
	High	2462	9.073	14.23	$\geq 0.5$
802.11g	Low	2412	15.43	18.49	$\geq 0.5$
	Mid	2437	15.88	18.86	$\geq 0.5$
	High	2462	15.11	18.59	$\geq 0.5$
802.11n (20M)	Low	2412	15.45	19.11	$\geq 0.5$
	Mid	2437	15.96	19.25	$\geq 0.5$
	High	2462	15.11	19.11	$\geq 0.5$
802.11n (40M)	Low	2422	36.28	39.57	$\geq 0.5$
	Mid	2437	35.75	39.62	$\geq 0.5$
	High	2452	35.44	39.34	$\geq 0.5$

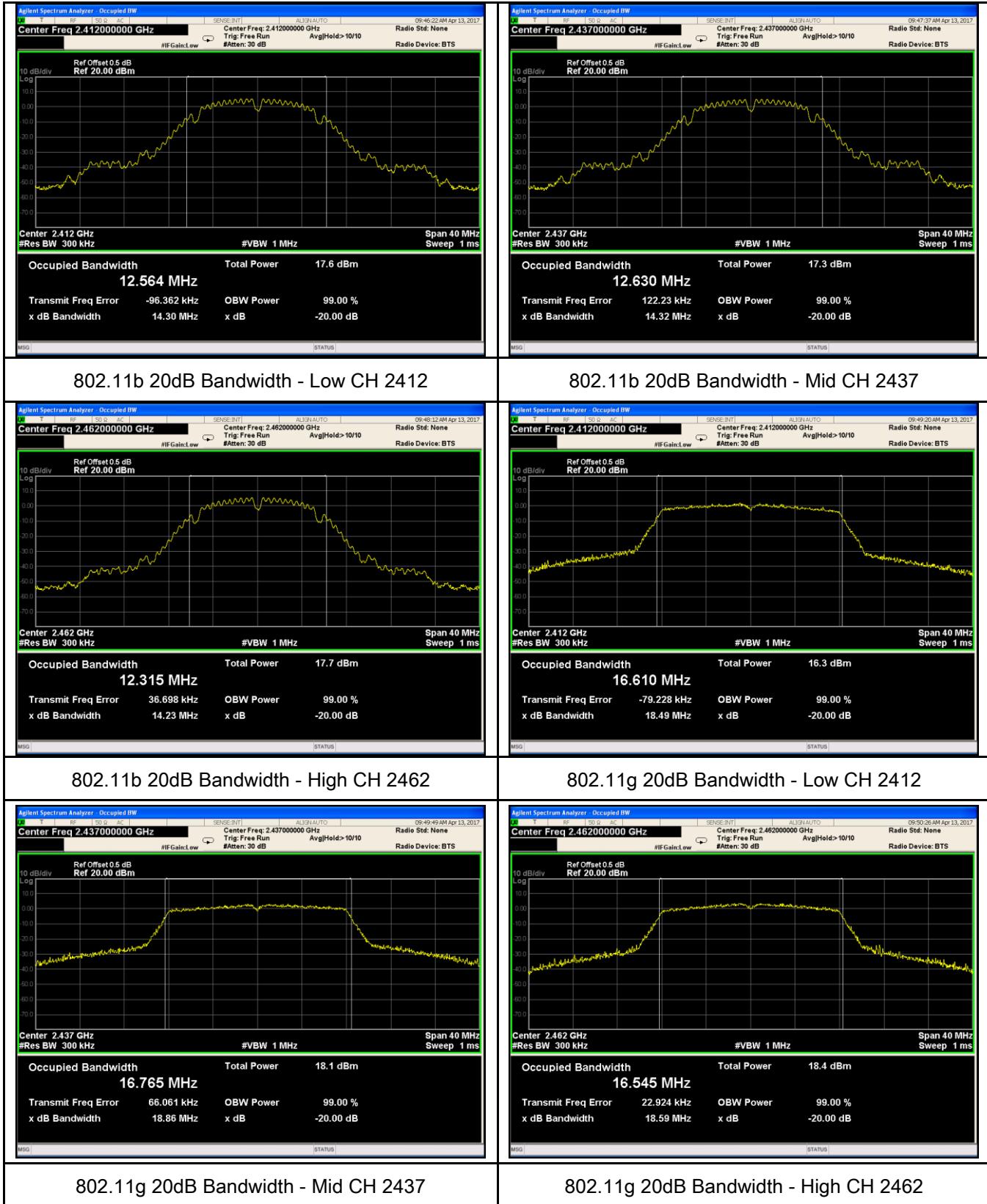
## Test Plots

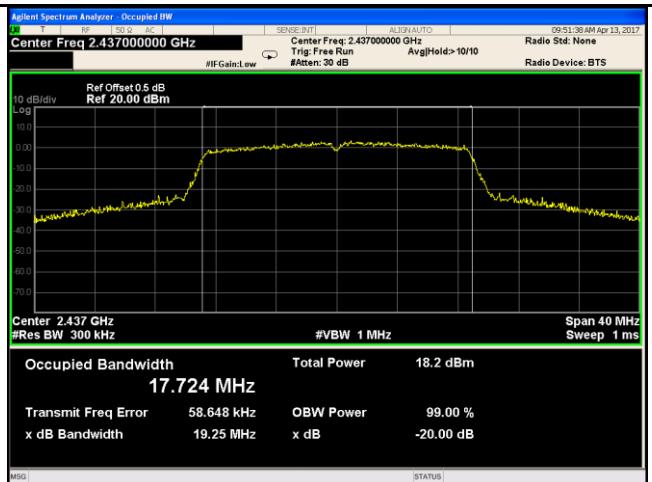
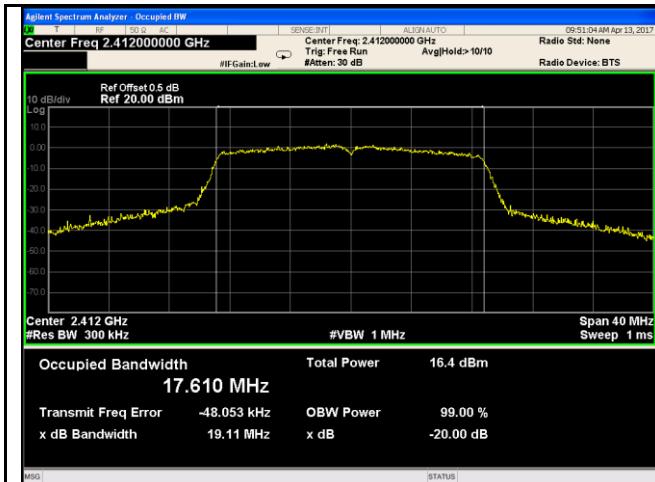
### 6dB Bandwidth measurement result



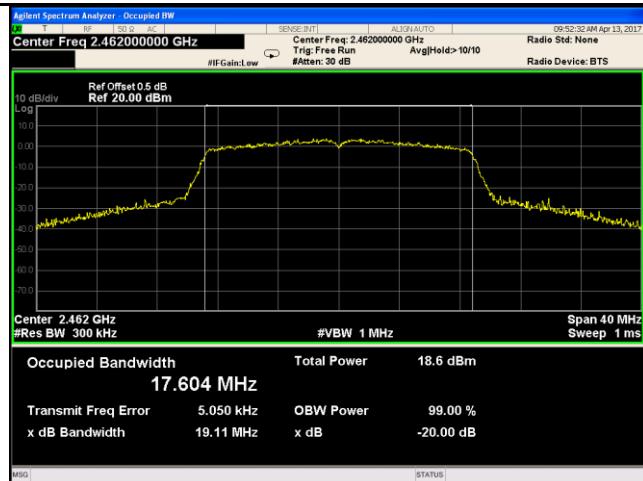


## 20 dB Bandwidth measurement result





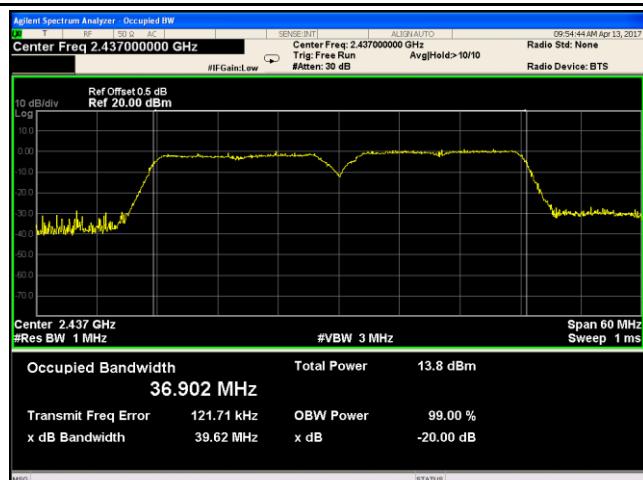
### 802.11n20 20dB Bandwidth - Low CH 2412



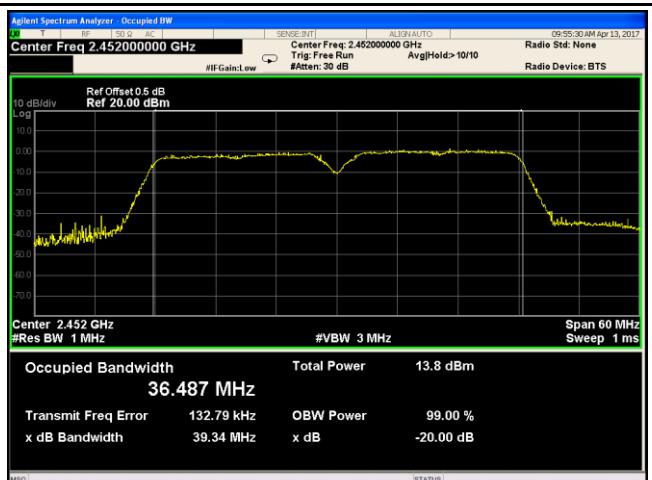
### 802.11n20 20dB Bandwidth - Mid CH 2437



### 802.11n20 20dB Bandwidth - High CH 2462



### 802.11n40 20dB Bandwidth - Low CH 2422



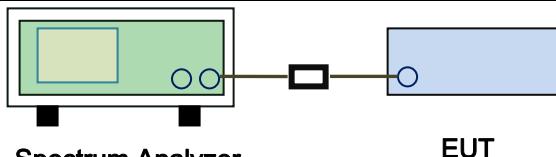
### 802.11n40 20dB Bandwidth - Mid CH 2437

### 802.11n40 20dB Bandwidth - High CH 2452

### 6.3 Maximum Output Power

Temperature	22 °C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 13, 2017
Tested By :	Loren Luo

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3), RSS210 (A8.4)	a)	FHSS in 2400-2483.5MHz with $\geq$ 75 channels: $\leq$ 1 Watt	<input type="checkbox"/>
	b)	FHSS in 5725-5850MHz: $\leq$ 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: $\leq$ 0.125 Watt.	<input type="checkbox"/>
	d)	FHSS in 902-928MHz with $\geq$ 50 channels: $\leq$ 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with $\geq$ 25 & $<$ 50 channels: $\leq$ 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: $\leq$ 1 Watt	<input checked="" type="checkbox"/>
Test Setup		 <b>Spectrum Analyzer</b> <b>EUT</b>	
Test Procedure		<p>558074 D01 DTS MEAS Guidance v03r03, 9.1.2 Integrated band power method</p> <p>Maximum output power measurement procedure</p> <ul style="list-style-type: none"> <li>- a) Set span to at least 1.5 times the OBW.</li> <li>- b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.</li> <li>- c) Set VBW <math>\geq</math> 3 x RBW.</li> <li>- d) Number of points in sweep <math>\geq</math> 2 <math>\times</math> span / RBW. (This gives bin-to-bin spacing <math>\leq</math> RBW/2, so that narrowband signals are not lost between frequency bins.)</li> <li>- e) Sweep time = auto.</li> <li>- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.</li> <li>- g) If transmit duty cycle <math>&lt;</math> 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum</li> </ul>	

	<p>power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle <math>\geq 98\%</math>, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “ free run” .</p> <ul style="list-style-type: none"> <li>- h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.</li> <li>- i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’ s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

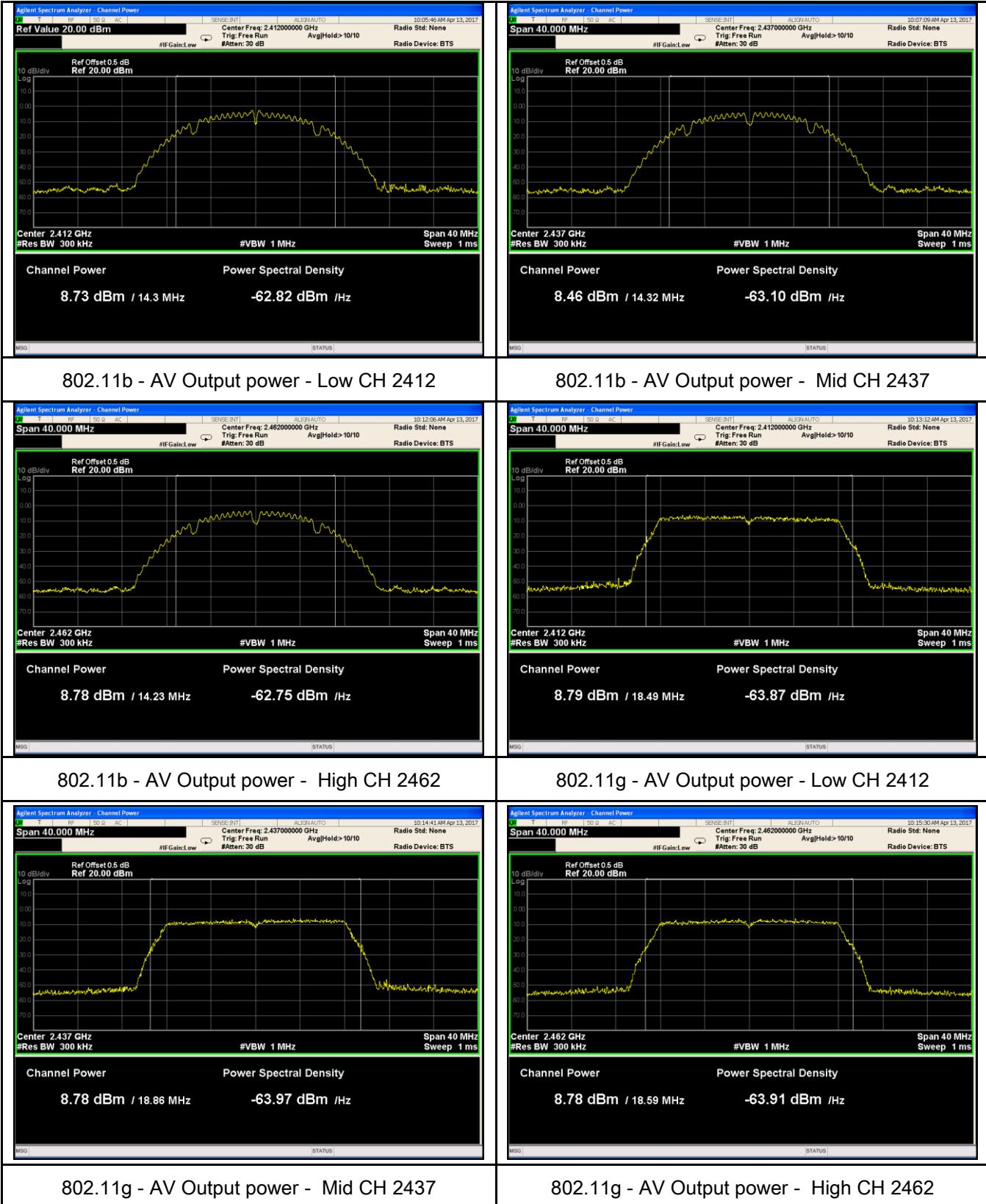
Test Plot  Yes (See below)  N/A

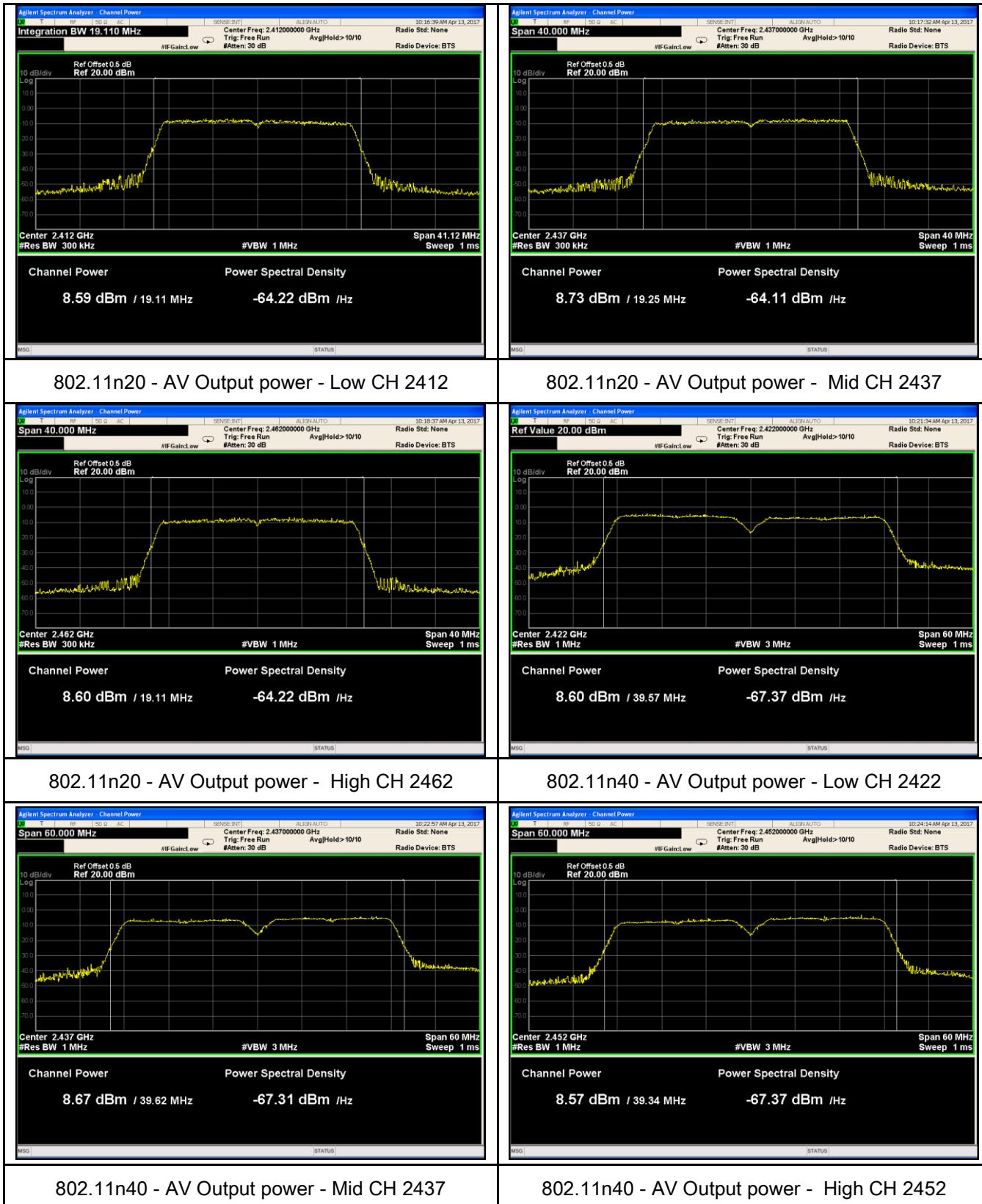
#### Output Power measurement result

Type	Test mode	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	Low	2412	8.73	30	Pass
		Mid	2437	8.46	30	Pass
		High	2462	<b>8.78</b>	30	Pass
	802.11g	Low	2412	<b>8.79</b>	30	Pass
		Mid	2437	8.78	30	Pass
		High	2462	8.78	30	Pass
	802.11n (20M)	Low	2412	8.59	30	Pass
		Mid	2437	<b>8.73</b>	30	Pass
		High	2462	8.60	30	Pass
	802.11n (40M)	Low	2422	8.60	30	Pass
		Mid	2437	<b>8.67</b>	30	Pass
		High	2452	8.57	30	Pass

## Test Plots

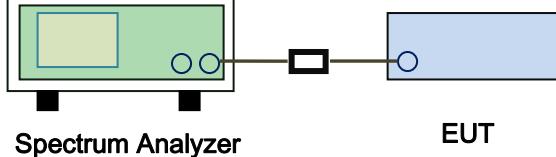
### The Average Power





## 6.4 Power Spectral Density

Temperature	22 °C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	April 13, 2017
Tested By :	Loren Luo

Spec	Item	Requirement	Applicable
§15.247(e)	a)	The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	<input checked="" type="checkbox"/>
Test Setup		 <p style="text-align: center;">Spectrum Analyzer                                  EUT</p>	
Test Procedure		<p>558074 D01 DTS MEAS Guidance v03r03, 10.2 power spectral density method power spectral density measurement procedure</p> <ul style="list-style-type: none"> <li>- a) Set analyzer center frequency to DTS channel center frequency.</li> <li>- b) Set the span to 1.5 times the DTS bandwidth.</li> <li>- c) Set the RBW to: <math>3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}</math>.</li> <li>- d) Set the VBW <math>\geq 3 \times \text{RBW}</math>.</li> <li>- e) Detector = peak.</li> <li>- f) Sweep time = auto couple.</li> <li>- g) Trace mode = max hold.</li> <li>- h) Allow trace to fully stabilize.</li> <li>- i) Use the peak marker function to determine the maximum amplitude level within the RBW.</li> <li>- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.</li> </ul>	
Remark			
Result		<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

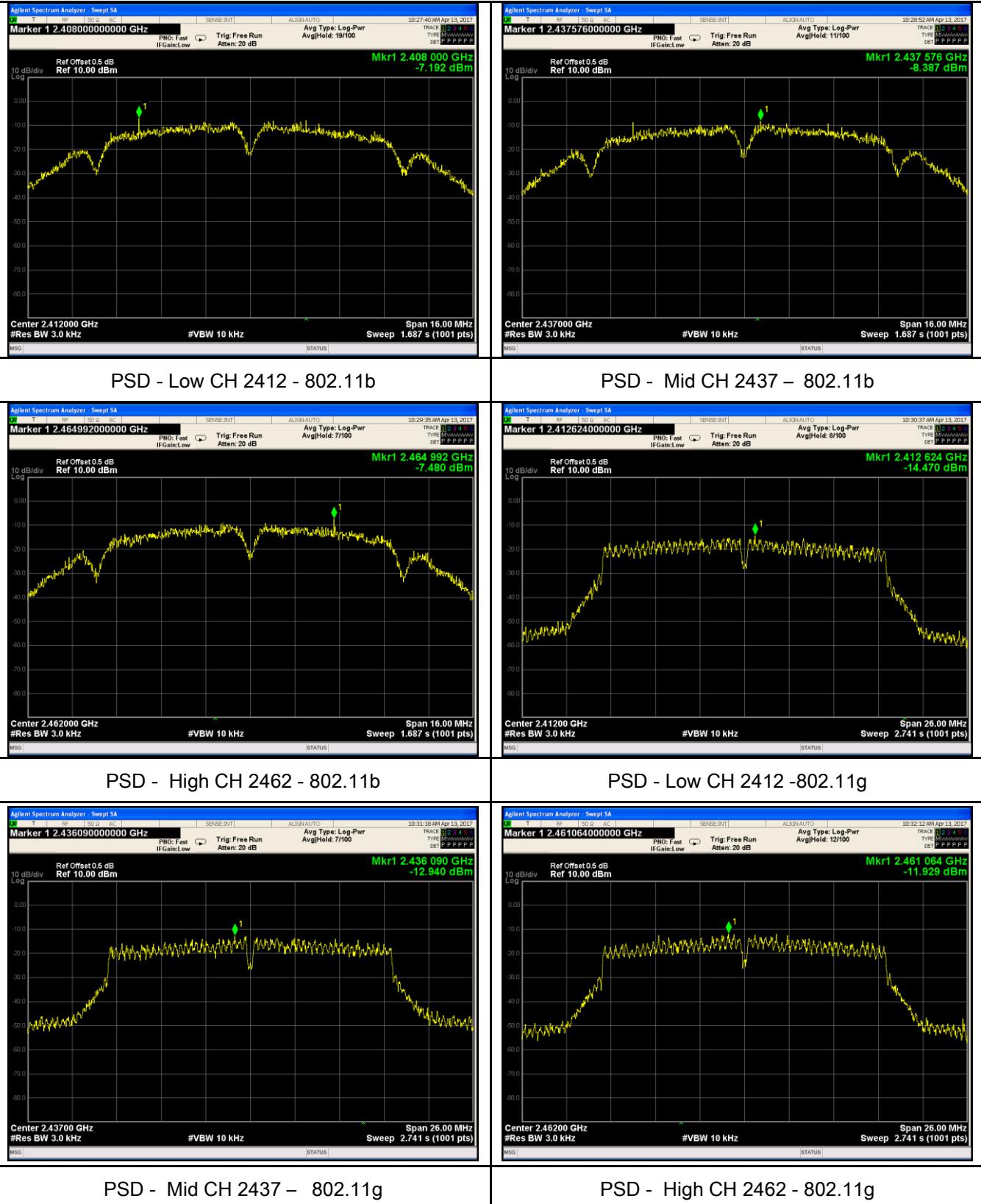
Test Data     Yes     N/A  
 Test Plot     Yes (See below)     N/A

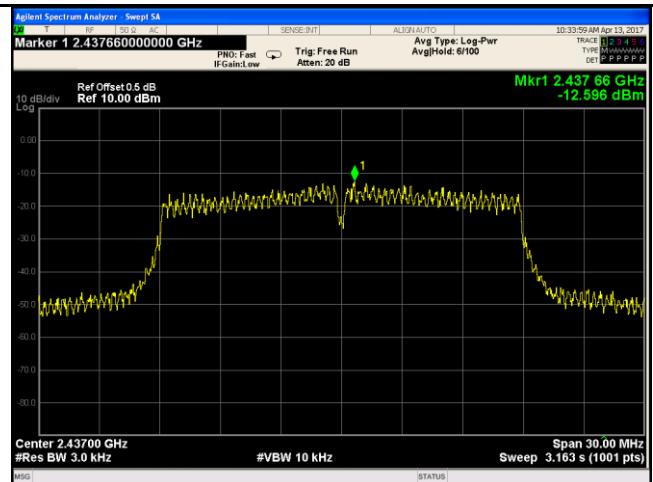
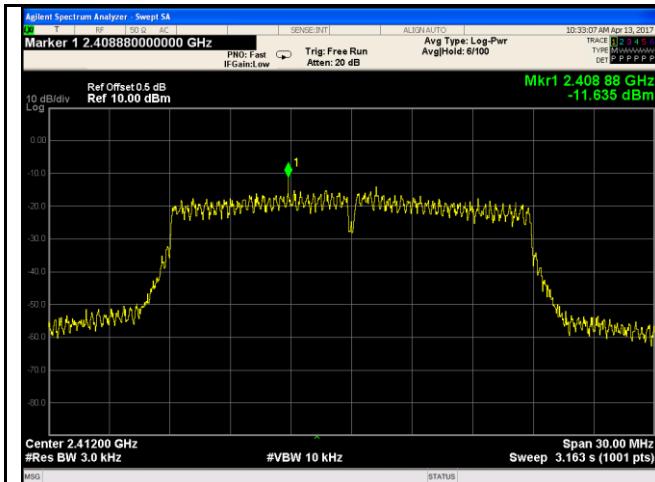
### Power Spectral Density measurement result

Type	Test mode	CH	Freq (MHz)	PSD	Limit (dBm)	Result
				(dBm)		
PSD	802.11b	Low	2412	-7.192	8	Pass
		Mid	2437	-8.387	8	Pass
		High	2462	-7.480	8	Pass
	802.11g	Low	2412	-14.470	8	Pass
		Mid	2437	-12.940	8	Pass
		High	2462	-11.929	8	Pass
	802.11n (20M)	Low	2412	-11.635	8	Pass
		Mid	2437	-12.596	8	Pass
		High	2462	-11.703	8	Pass
	802.11n (40M)	Low	2422	-19.273	8	Pass
		Mid	2437	-19.100	8	Pass
		High	2452	-18.920	8	Pass

## Test Plots

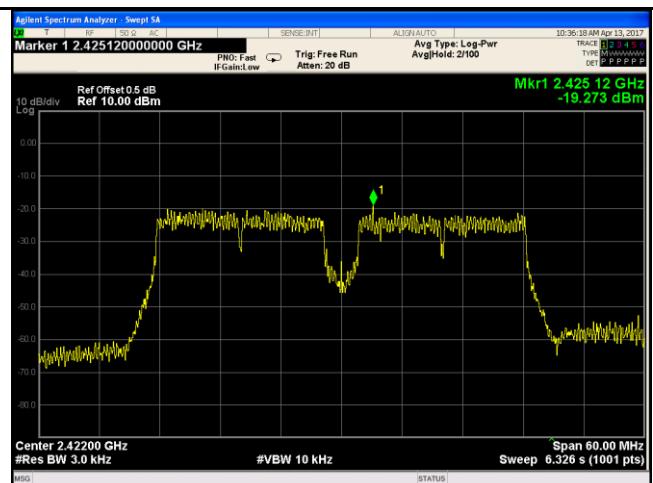
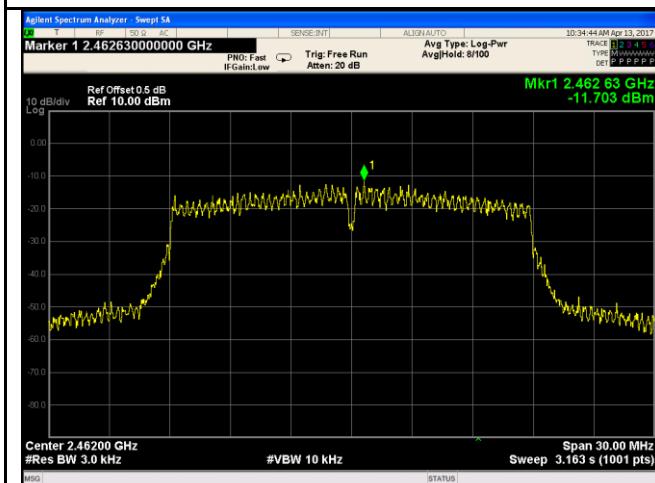
### Power Spectral Density measurement result





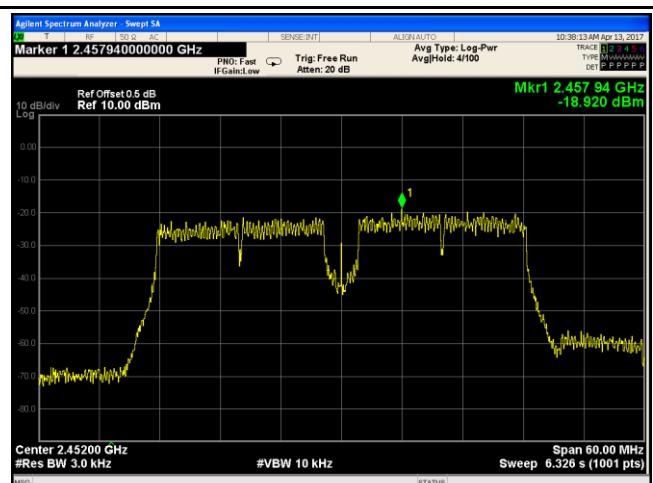
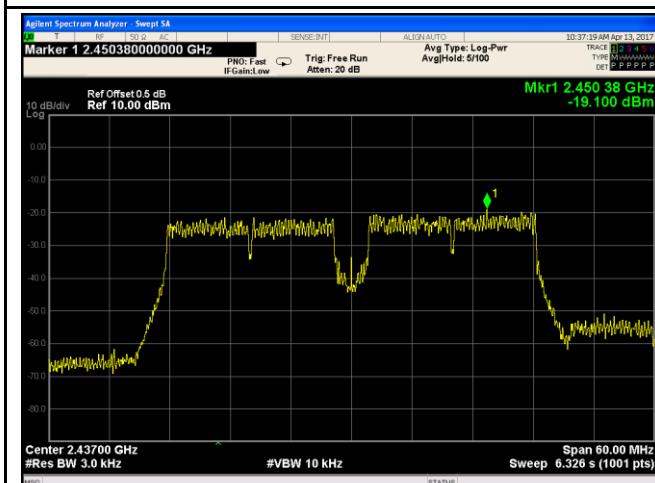
PSD - Low CH 2412 - 802.11n20

PSD - Mid CH 2437 – 802.11n20



PSD - High CH 2472 - 802.11n20

PSD - Low CH 2422 - 802.11n40



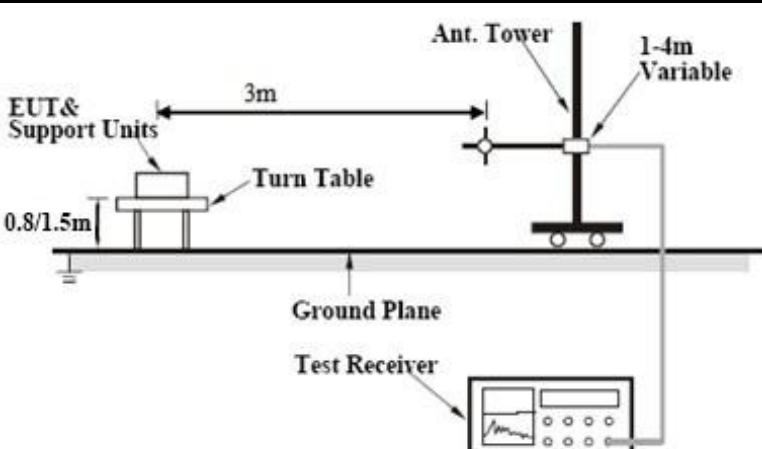
PSD - Mid CH 2437 – 802.11n40

PSD - High CH 2452 - 802.11n40

## 6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	23 °C
Relative Humidity	54%
Atmospheric Pressure	1030mbar
Test date :	March 30, 2017
Tested By :	Loren Luo

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(d)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>Radiated Method Only</p> <ul style="list-style-type: none"> <li>- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- 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.</li> </ul>		

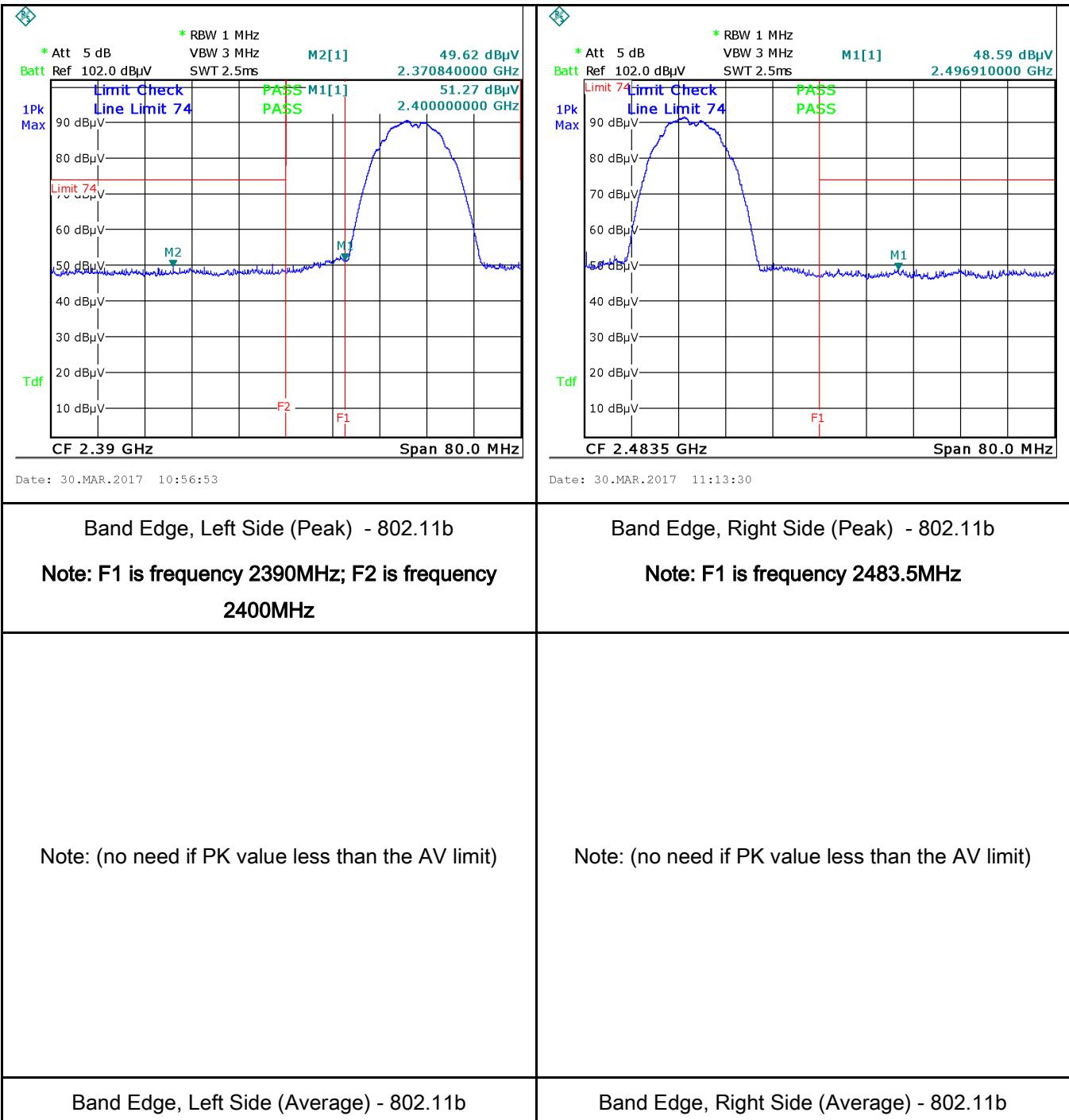
	<ul style="list-style-type: none"> <li>- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> <li>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</li> <li>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.</li> <li>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.</li> </ul> </li> <li>- 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.</li> <li>- 5. Repeat above procedures until all measured frequencies were complete.</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

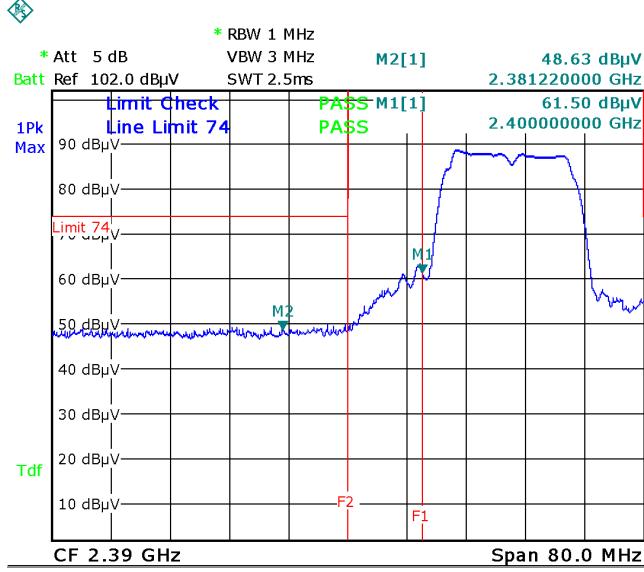
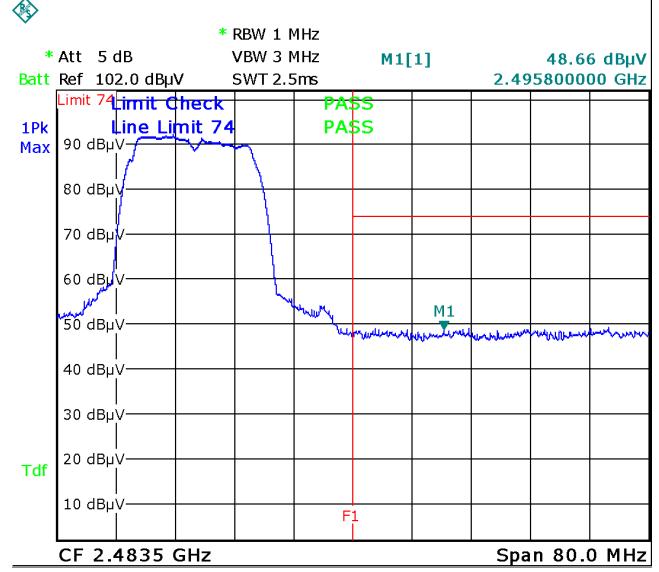
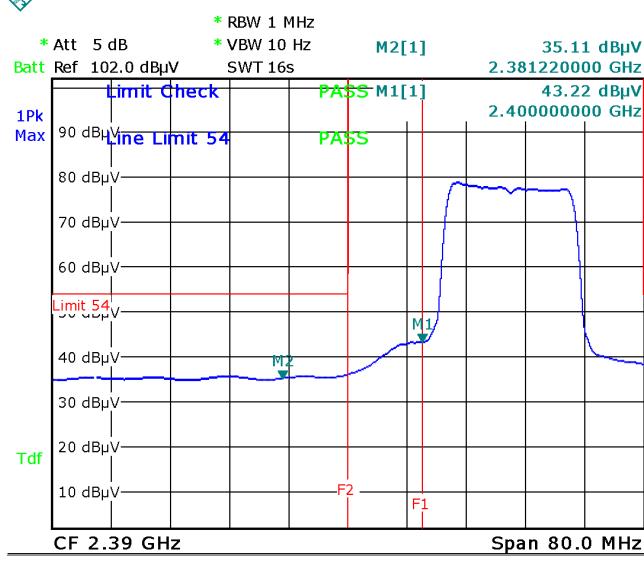
Test Data  Yes  N/A

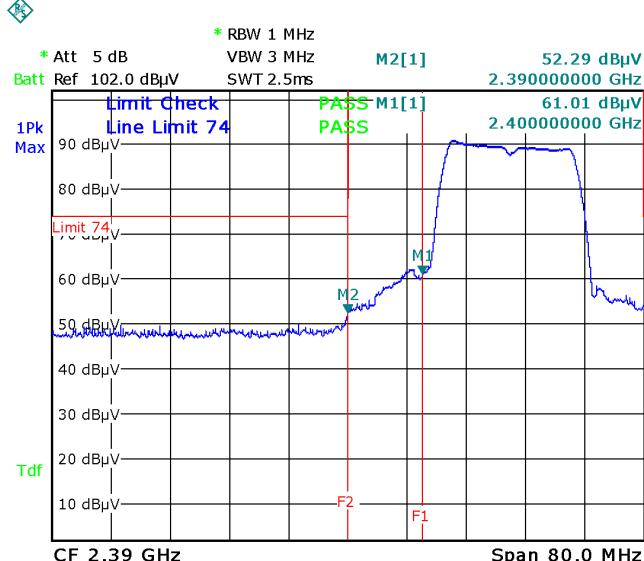
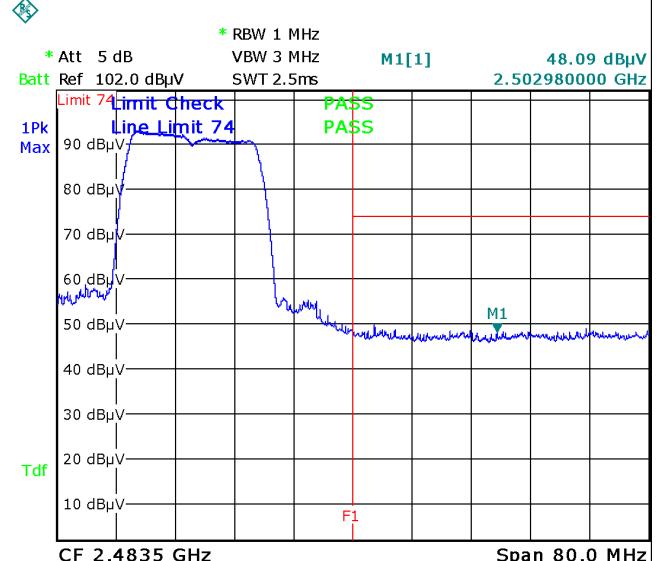
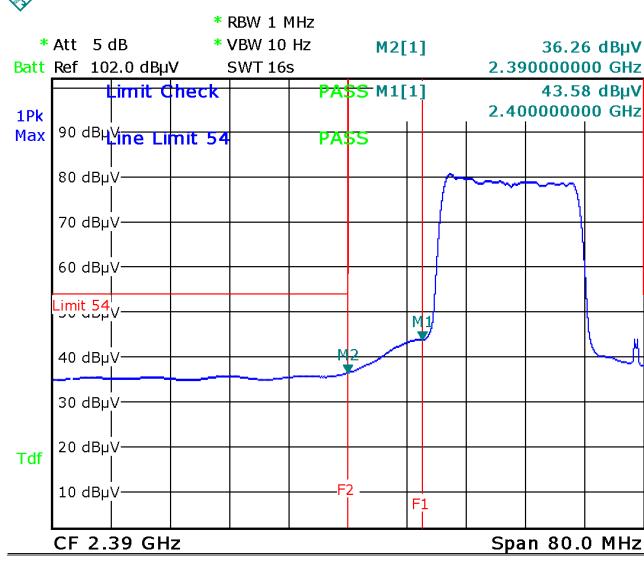
Test Plot  Yes (See below)  N/A

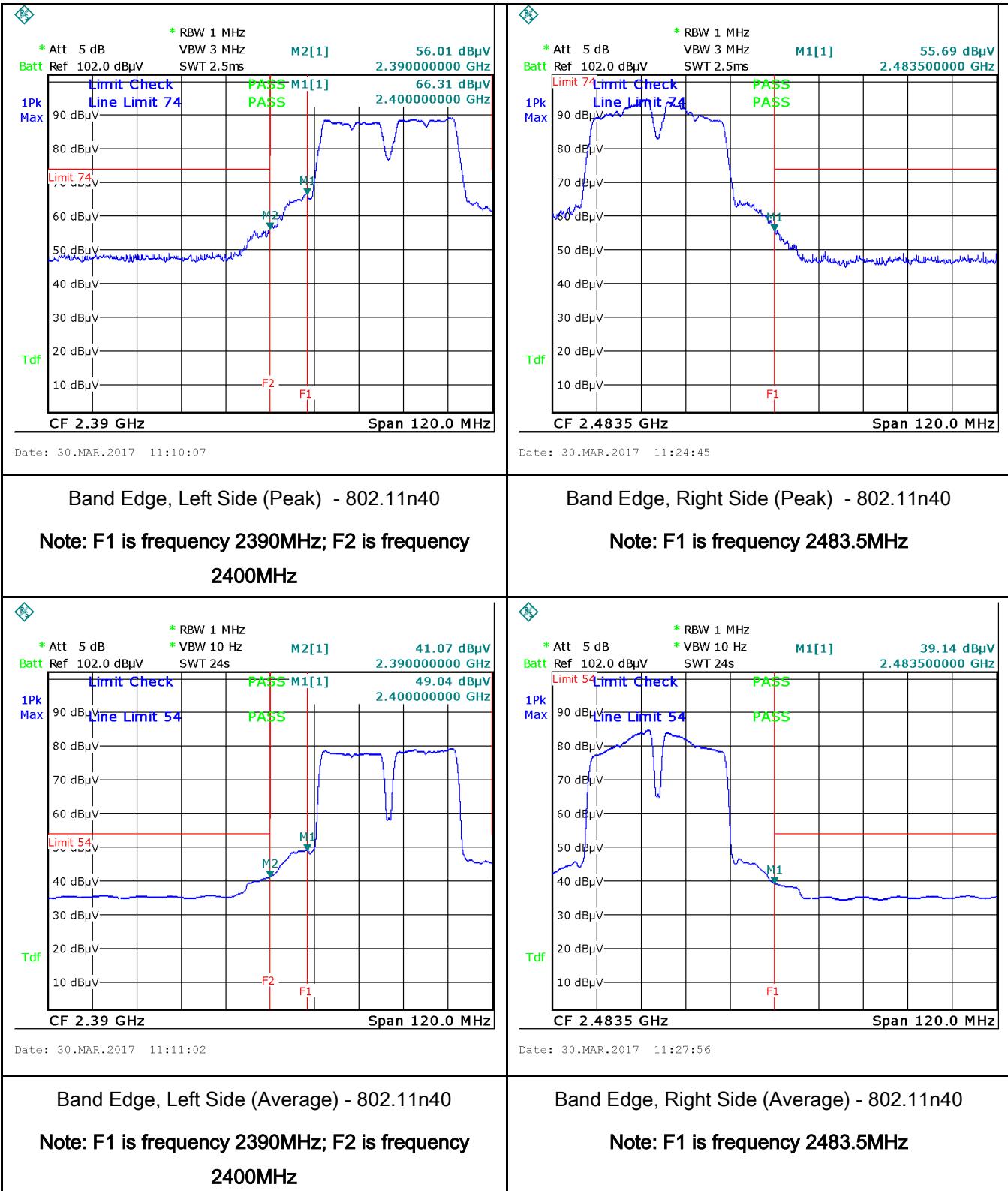
## Test Plots

### Band Edge measurement result



 <p>* RBW 1 MHz      * Att 5 dB      Batt Ref 102.0 dBµV      Line Limit 74      1Pk Max      Tdf</p> <p>M2[1] 48.63 dBµV      2.38122000 GHz      61.50 dBµV      2.40000000 GHz</p> <p>PASS M1[1]      PASS</p> <p>F2 F1</p> <p>CF 2.39 GHz Span 80.0 MHz</p>	 <p>* RBW 1 MHz      * Att 5 dB      Batt Ref 102.0 dBµV      Line Limit 74      1Pk Max      Tdf</p> <p>M1[1] 48.66 dBµV      2.49580000 GHz      61.50 dBµV      2.40000000 GHz</p> <p>PASS M1[1]      PASS</p> <p>F1</p> <p>CF 2.4835 GHz Span 80.0 MHz</p>
<p>Date: 30.MAR.2017 11:00:12</p> <p>Band Edge, Left Side (Peak) - 802.11g</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Date: 30.MAR.2017 11:15:25</p> <p>Band Edge, Right Side (Peak) - 802.11g</p> <p>Note: F1 is frequency 2483.5MHz</p>
 <p>* RBW 1 MHz      * Att 5 dB      Batt Ref 102.0 dBµV      Line Limit 54      1Pk Max      Tdf</p> <p>M2[1] 35.11 dBµV      2.38122000 GHz      43.22 dBµV      2.40000000 GHz</p> <p>PASS M1[1]      PASS</p> <p>F2 F1</p> <p>CF 2.39 GHz Span 80.0 MHz</p>	
<p>Date: 30.MAR.2017 11:01:15</p> <p>Band Edge, Left Side (Average) - 802.11g</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Band Edge, Right Side (Average) - 802.11g</p> <p>Note: F1 is frequency 2483.5MHz</p>

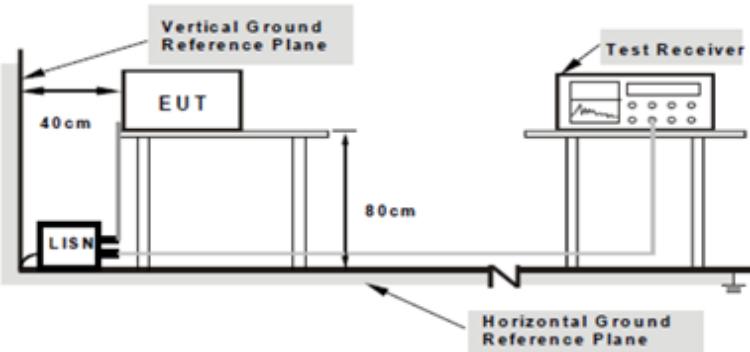
 <p>* RBW 1 MHz      * Att 5 dB      Batt Ref 102.0 dB<math>\mu</math>V      Limit Check Line Limit 74      1Pk Max 90 dB<math>\mu</math>V      Tdf 2.390000000 GHz      M2[1] 52.29 dB<math>\mu</math>V      2.390000000 GHz      M1[1] 61.01 dB<math>\mu</math>V      2.400000000 GHz      F2      F1</p>	 <p>* RBW 1 MHz      * Att 5 dB      Batt Ref 102.0 dB<math>\mu</math>V      Limit 74 Limit Check Line Limit 74      1Pk Max 90 dB<math>\mu</math>V      Tdf 2.4835 GHz      M1[1] 48.09 dB<math>\mu</math>V      2.502980000 GHz      M1      F1</p>
<p>Date: 30.MAR.2017 11:05:15</p> <p>Band Edge, Left Side (Peak) - 802.11n20</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Date: 30.MAR.2017 11:22:01</p> <p>Band Edge, Right Side (Peak) - 802.11n20</p> <p>Note: F1 is frequency 2483.5MHz</p>
 <p>* RBW 1 MHz      * Att 5 dB      Batt Ref 102.0 dB<math>\mu</math>V      * VBW 10 Hz      SWT 16s      Limit Check Line Limit 54      1Pk Max 90 dB<math>\mu</math>V      Tdf 2.390000000 GHz      M2[1] 36.26 dB<math>\mu</math>V      2.390000000 GHz      M1[1] 43.58 dB<math>\mu</math>V      2.400000000 GHz      F2      F1</p>	<p>Note: (no need if PK value less than the AV limit)</p>
<p>Date: 30.MAR.2017 11:06:23</p> <p>Band Edge, Left Side (Average) - 802.11n20</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Band Edge, Right Side (Average) - 802.11n20</p> <p>Note: F1 is frequency 2483.5MHz</p>



## 6.6 AC Power Line Conducted Emissions

Temperature	23 °C
Relative Humidity	54%
Atmospheric Pressure	1030mbar
Test date :	March 30, 2017
Tested By :	Loren Luo

### Requirement(s):

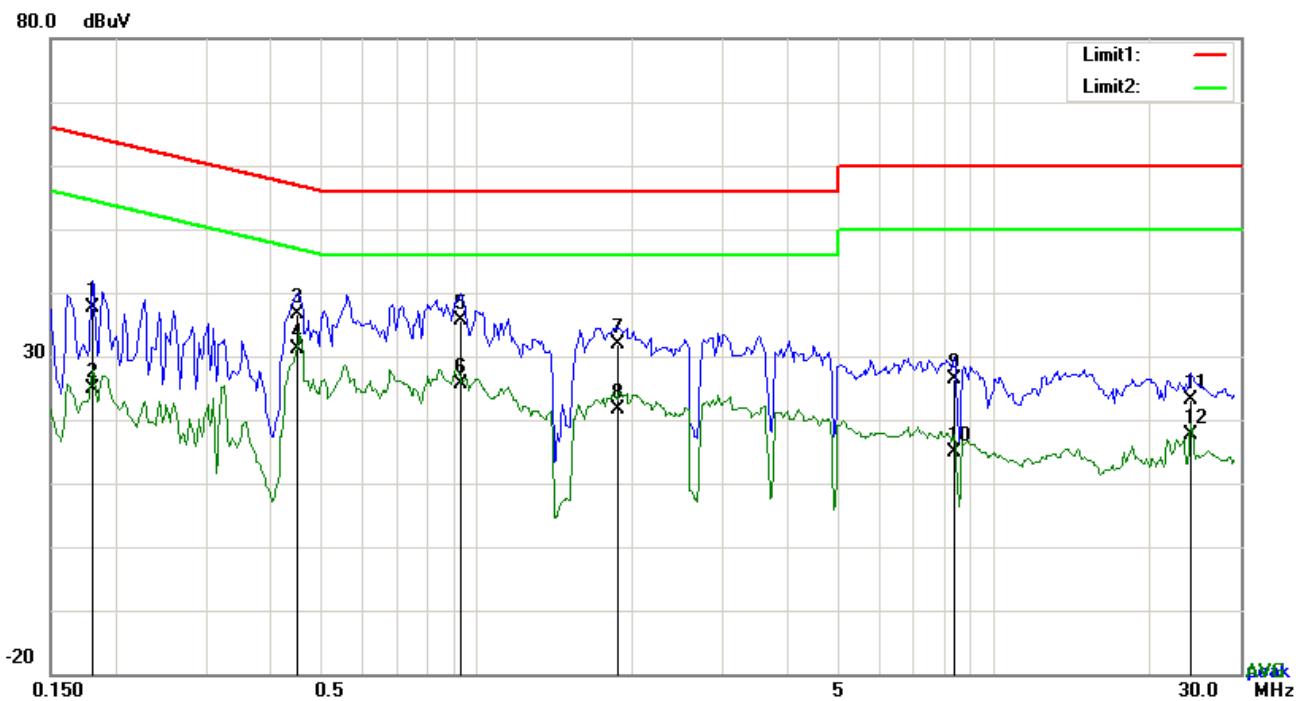
Spec	Item	Requirement	Applicable														
47CFR§15. 207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within 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.</p> <table border="1"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>66 – 56</td> <td>56 – 46</td> </tr> <tr> <td>0.5 ~ 5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 ~ 30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency ranges (MHz)	Limit (dBμV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50	<input checked="" type="checkbox"/>
Frequency ranges (MHz)	Limit (dBμV)																
	QP	Average															
0.15 ~ 0.5	66 – 56	56 – 46															
0.5 ~ 5	56	46															
5 ~ 30	60	50															
Test Setup	 <p>Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>																
Procedure	<ol style="list-style-type: none"> <li>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.</li> <li>The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.</li> <li>The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss</li> </ol>																

	<p>coaxial cable.</p> <ol style="list-style-type: none"> <li>4. All other supporting equipment were powered separately from another main supply.</li> <li>5. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>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.</li> <li>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.</li> <li>8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

**Test Mode:** Transmitting Mode

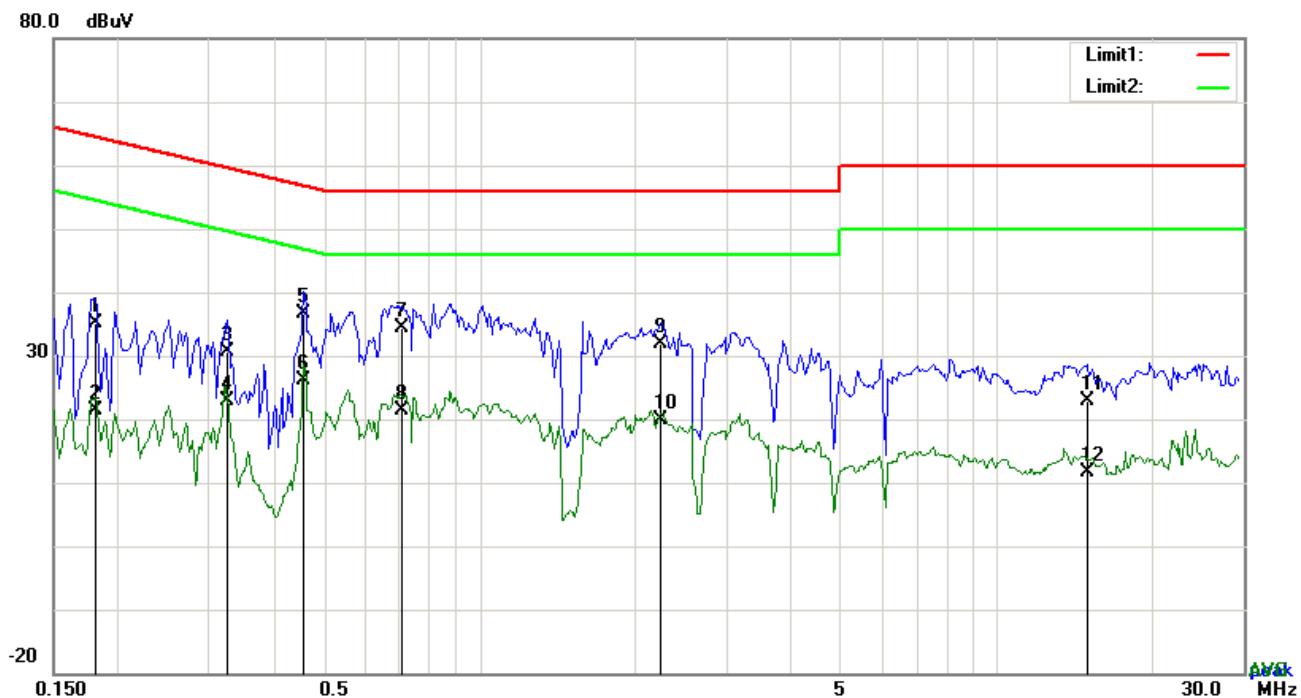


### *Test Data*

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	L1	0.1812	27.59	QP	10.03	37.62	64.43	-26.81
2	L1	0.1812	14.97	AVG	10.03	25.00	54.43	-29.43
3	L1	0.4503	26.66	QP	10.03	36.69	56.87	-20.18
4	L1	0.4503	21.06	AVG	10.03	31.09	46.87	-15.78
5	L1	0.9339	25.65	QP	10.03	35.68	56.00	-20.32
6	L1	0.9339	15.59	AVG	10.03	25.62	46.00	-20.38
7	L1	1.8738	21.84	QP	10.04	31.88	56.00	-24.12
8	L1	1.8738	11.68	AVG	10.04	21.72	46.00	-24.28
9	L1	8.4093	16.16	QP	10.13	26.29	60.00	-33.71
10	L1	8.4093	4.86	AVG	10.13	14.99	50.00	-35.01
11	L1	24.0210	12.71	QP	10.38	23.09	60.00	-36.91
12	L1	24.0210	7.19	AVG	10.38	17.57	50.00	-32.43

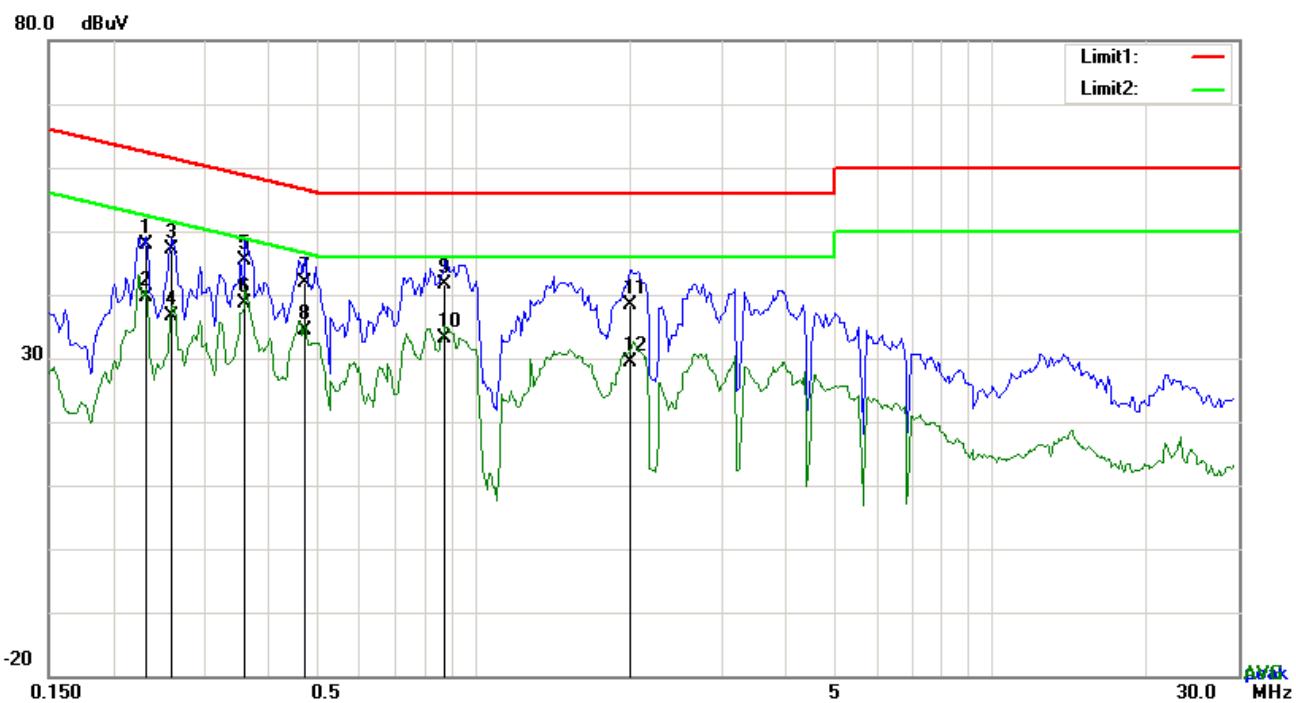
**Test Mode:** Transmitting Mode



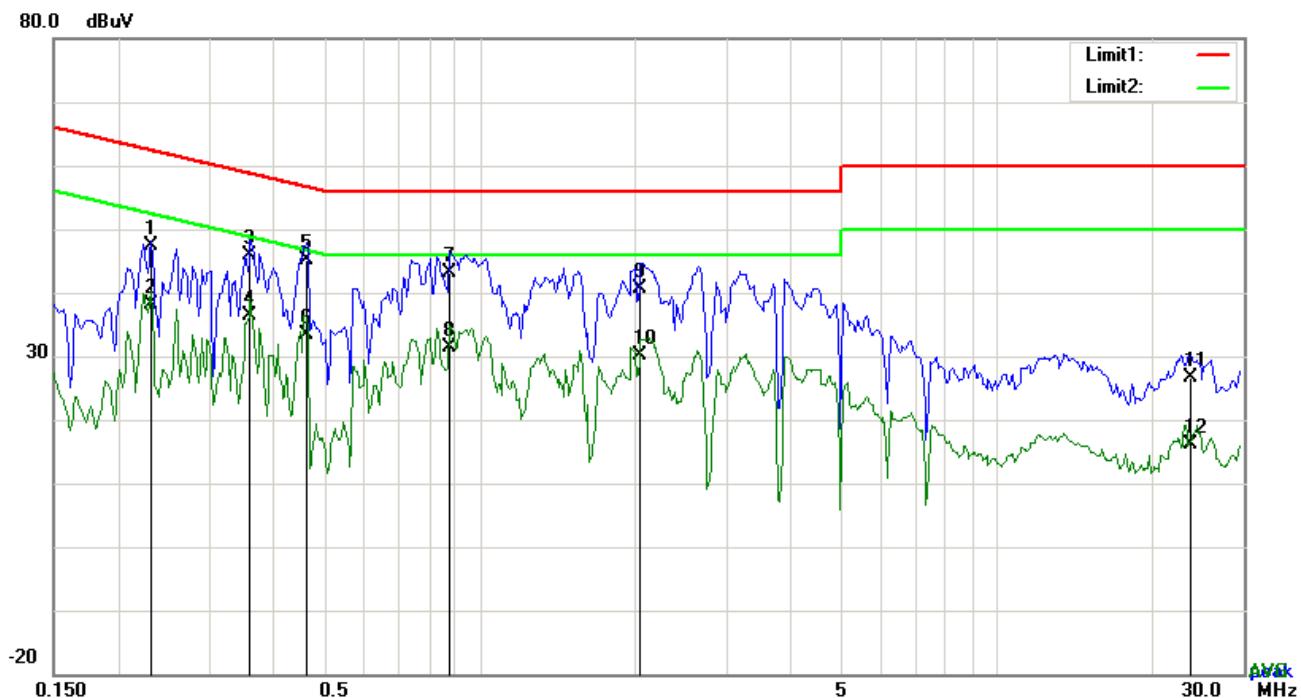
#### Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	N	0.1812	24.99	QP	10.02	35.01	64.43	-29.42
2	N	0.1812	11.34	AVG	10.02	21.36	54.43	-33.07
3	N	0.3255	20.66	QP	10.02	30.68	59.57	-28.89
4	N	0.3255	12.93	AVG	10.02	22.95	49.57	-26.62
5	N	0.4581	26.72	QP	10.02	36.74	56.73	-19.99
6	N	0.4581	16.11	AVG	10.02	26.13	46.73	-20.60
7	N	0.7077	24.45	QP	10.02	34.47	56.00	-21.53
8	N	0.7077	11.41	AVG	10.02	21.43	46.00	-24.57
9	N	2.2443	21.80	QP	10.04	31.84	56.00	-24.16
10	N	2.2443	9.91	AVG	10.04	19.95	46.00	-26.05
11	N	14.9457	12.68	QP	10.20	22.88	60.00	-37.12
12	N	14.9457	1.39	AVG	10.20	11.59	50.00	-38.41

**Test Mode:** Transmitting Mode



**Test Mode:** Transmitting Mode



### Test Data

Phase Neutral Plot at 240Vac, 60Hz

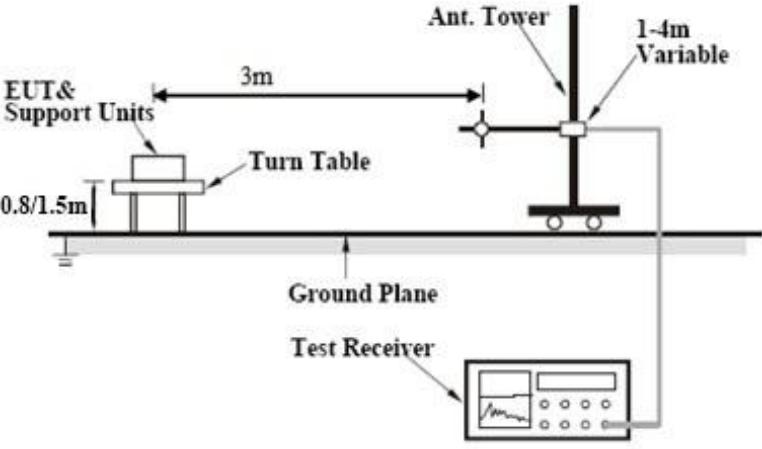
No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	N	0.2319	37.36	QP	10.02	47.38	62.38	-15.00
2	N	0.2319	28.09	AVG	10.02	38.11	52.38	-14.27
3	N	0.3606	35.79	QP	10.02	45.81	58.71	-12.90
4	N	0.3606	26.44	AVG	10.02	36.46	48.71	-12.25
5	N	0.4659	34.99	QP	10.02	45.01	56.59	-11.58
6	N	0.4659	23.37	AVG	10.02	33.39	46.59	-13.20
7	N	0.8754	33.09	QP	10.03	43.12	56.00	-12.88
8	N	0.8754	21.32	AVG	10.03	31.35	46.00	-14.65
9	N	2.0532	30.64	QP	10.04	40.68	56.00	-15.32
10	N	2.0532	20.19	AVG	10.04	30.23	46.00	-15.77
11	N	23.7129	16.32	QP	10.32	26.64	60.00	-33.36
12	N	23.7129	5.74	AVG	10.32	16.06	50.00	-33.94

## 6.7 Radiated Spurious Emissions & Restricted Band

Temperature	23 °C
Relative Humidity	54%
Atmospheric Pressure	1030mbar
Test date :	March 30, 2017
Tested By :	Loren Luo

### Requirement(s):

Spec	Item	Requirement	Applicable										
47CFR§15. 247(d), RSS210 (A8.5)	a)	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (<math>\mu</math>V/m)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>100</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 960</td> <td>200</td> </tr> <tr> <td>Above 960</td> <td>500</td> </tr> </tbody> </table>	Frequency range (MHz)	Field Strength ( $\mu$ V/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength ( $\mu$ V/m)												
30 – 88	100												
88 – 216	150												
216 960	200												
Above 960	500												
b)	<p>For non-restricted band, 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 or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required</p> <p><input checked="" type="checkbox"/> 20 dB down      <input type="checkbox"/> 30 dB down</p>	<input checked="" type="checkbox"/>											
c)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	<input checked="" type="checkbox"/>											

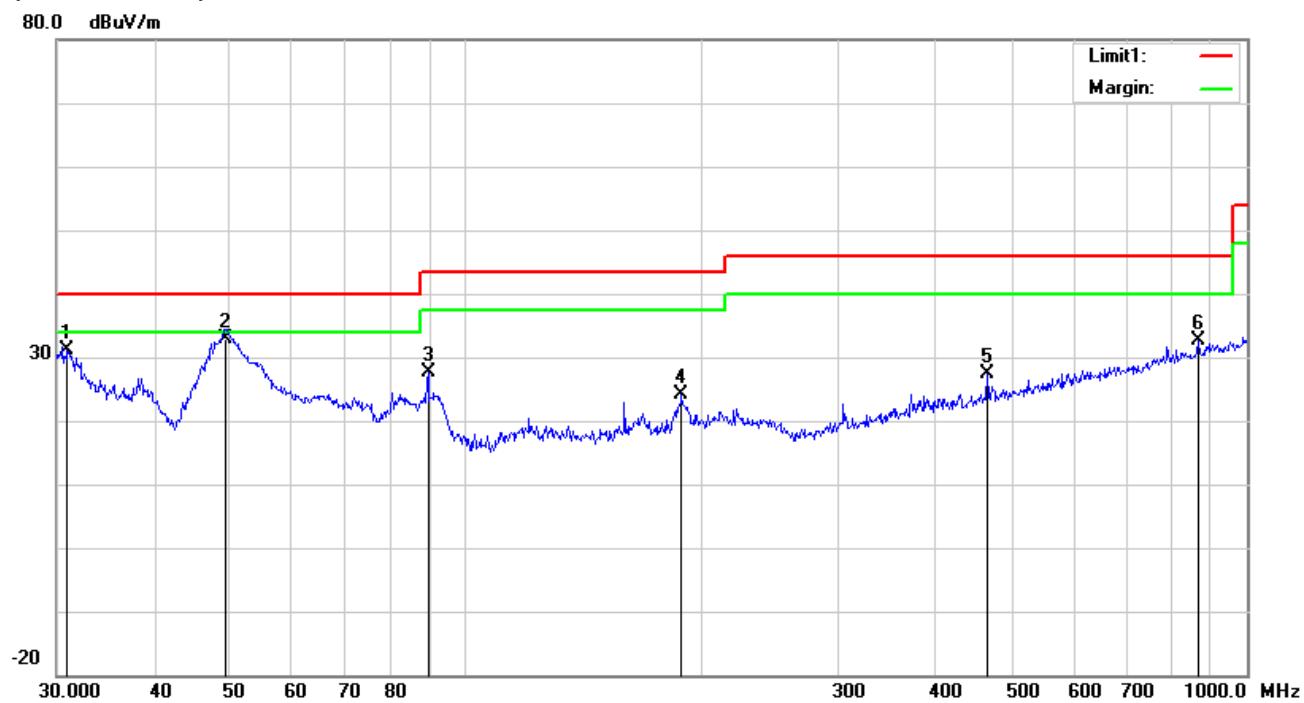
Test Setup	 <p>The diagram illustrates the test setup. An EUT &amp; Support Units assembly is mounted on a Turn Table, which is positioned on a Ground Plane. A vertical Ant. Tower is connected to the turn table via a horizontal crossbar. The distance between the EUT and the turn table is 3m. The height of the EUT is indicated as 0.8/1.5m. A 1-4m Variable antenna is attached to the top of the Ant. Tower. A Test Receiver is connected to the turn table assembly, likely for signal processing or measurement.</p>
Procedure	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>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: <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</li> <li>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.</li> <li>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol>
Remark	Different RF configuration has been evaluated but not much difference was found. The data presented here is the worst case data with EUT under 802.11n – HT20-2437MHz mode.
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data     Yes       N/A

Test Plot     Yes (See below)       N/A

**Test Mode:** Transmitting Mode

(Below 1GHz)

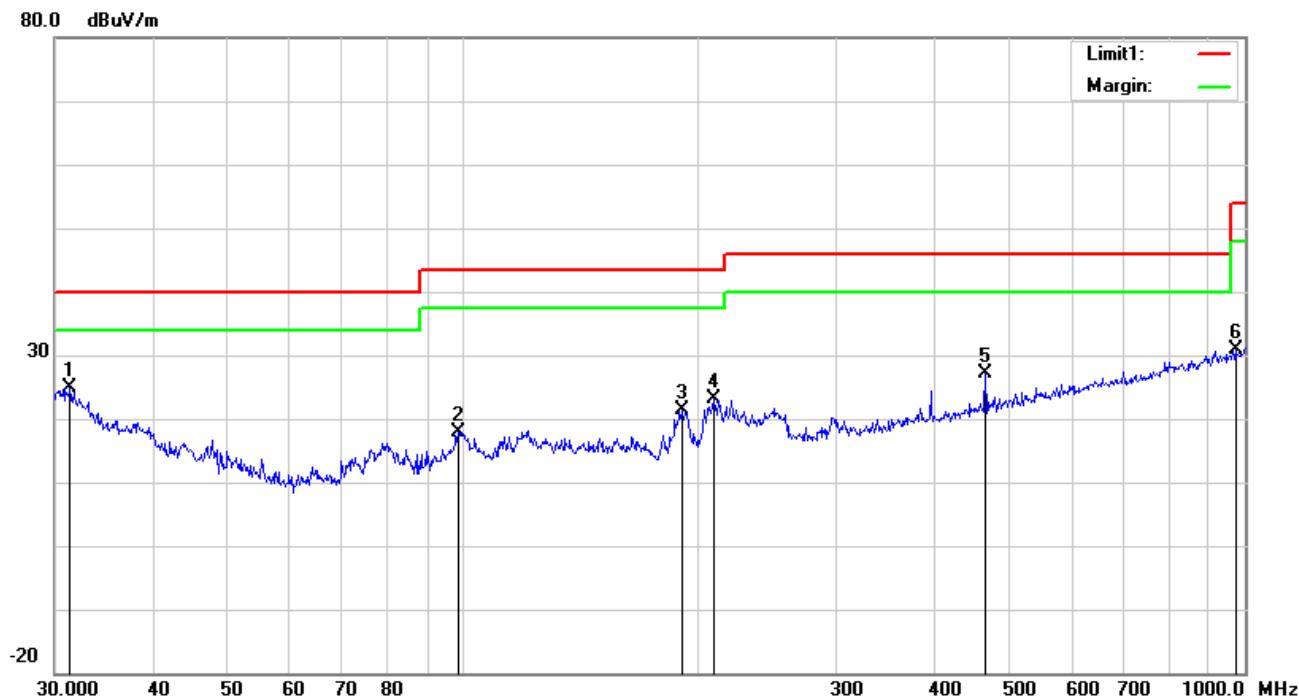


### Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( )
1	V	30.9619	32.12	peak	20.66	22.27	0.65	31.16	40.00	-8.84	100	71
2	V	49.3594	45.70	QP	8.68	22.37	0.79	32.80	40.00	-7.20	100	197
3	V	89.5900	41.10	peak	7.98	22.32	0.96	27.72	43.50	-15.78	100	349
4	V	189.0743	33.45	peak	11.50	22.31	1.52	24.16	43.50	-19.34	100	235
5	V	465.5994	30.03	peak	17.01	21.88	2.22	27.38	46.00	-18.62	200	4
6	V	866.0879	28.46	peak	22.13	20.97	2.93	32.55	46.00	-13.45	100	173

### (Below 1GHz)



### Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dB <sub>uV/m</sub> )	Detect or	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dB <sub>uV/m</sub> )	Limit (dB <sub>uV/m</sub> )	Margin (dB)	Height (cm)	Degr ee
1	H	31.3992	26.25	peak	20.32	22.27	0.66	24.96	40.00	-15.04	100	126
2	H	98.4866	29.10	peak	10.04	22.32	1.08	17.90	43.50	-25.60	100	273
3	H	190.4050	30.70	peak	11.57	22.32	1.54	21.49	43.50	-22.01	100	13
4	H	209.3129	31.86	peak	11.97	22.36	1.57	23.04	43.50	-20.46	100	306
5	H	465.5994	29.74	peak	17.01	21.88	2.22	27.09	46.00	-18.91	100	182
6	H	972.3374	25.40	peak	22.86	20.74	3.30	30.82	54.00	-23.18	100	246

### Above 1GHz

Test Mode:	Transmitting Mode
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Low Channel (2412 MHz) (g mode worst case)

Frequency (MHz)	S.A. Reading (dB $\mu$ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
4824	39.33	AV	V	33.8	6.86	32.69	47.3	54	-6.7
4824	38.56	AV	H	33.8	6.86	32.69	46.53	54	-7.47
4824	48.31	PK	V	33.8	6.86	32.69	56.28	74	-17.72
4824	47.89	PK	H	33.8	6.86	32.69	55.86	74	-18.14
17899	24.01	AV	V	45.12	11.57	32.11	48.59	54	-5.41
17899	22.98	AV	H	45.12	11.57	32.11	47.56	54	-6.44
17899	40.27	PK	V	45.12	11.57	32.11	64.85	74	-9.15
17899	39.62	PK	H	45.12	11.57	32.11	64.2	74	-9.8

Middle Channel (2437 MHz) (g mode worst case)

Frequency (MHz)	S.A. Reading (dB $\mu$ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
4874	38.74	AV	V	33.6	6.82	32.71	46.45	54	-7.55
4874	38.99	AV	H	33.6	6.82	32.71	46.7	54	-7.3
4874	48.11	PK	V	33.6	6.82	32.71	55.82	74	-18.18
4874	48.06	PK	H	33.6	6.82	32.71	55.77	74	-18.23
17925	24.23	AV	V	45.17	11.63	32.18	48.85	54	-5.15
17925	22.75	AV	H	45.17	11.63	32.18	47.37	54	-6.63
17925	40.08	PK	V	45.17	11.63	32.18	64.7	74	-9.3
17925	39.83	PK	H	45.17	11.63	32.18	64.45	74	-9.55

### High Channel (2462 MHz) (b mode worst case)

Frequency (MHz)	S.A. Reading (dB $\mu$ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
4924	39.12	AV	V	33.83	6.95	32.79	47.11	54	-6.89
4924	39.04	AV	H	33.83	6.95	32.79	47.03	54	-6.97
4924	47.28	PK	V	33.83	6.95	32.79	55.27	74	-18.73
4924	48.03	PK	H	33.83	6.95	32.79	56.02	74	-17.98
17917	23.19	AV	V	45.19	11.61	32.24	47.75	54	-6.25
17917	23.57	AV	H	45.19	11.61	32.24	48.13	54	-5.87
17917	40.38	PK	V	45.19	11.61	32.24	64.94	74	-9.06
17917	39.51	PK	H	45.19	11.61	32.24	64.07	74	-9.93

**Note:**

- 1, The testing has been conformed to  $10 \times 2462\text{MHz} = 24,620\text{MHz}$
- 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
<b>AC Line Conducted</b>					
EMI test receiver	ESCS30	8471241027	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
LISN	ISN T800	34373	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
<b>RF conducted test</b>					
Agilent ESA-E SERIES	E4407B	MY45108319	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>

## Annex B. EUT and Test Setup Photographs

### Annex B.i. Photograph: EUT External Photo

Whole Package View



Adapter - Front View



EUT - Front View



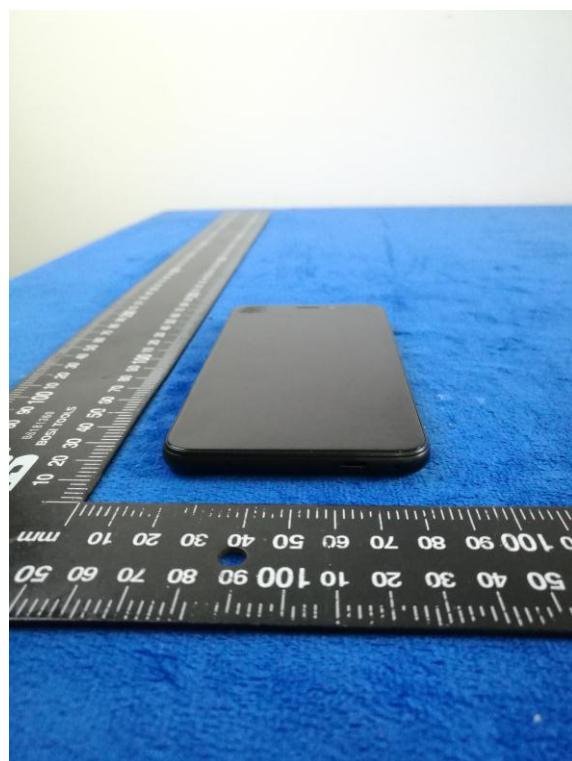
EUT - Rear View



EUT - Top View



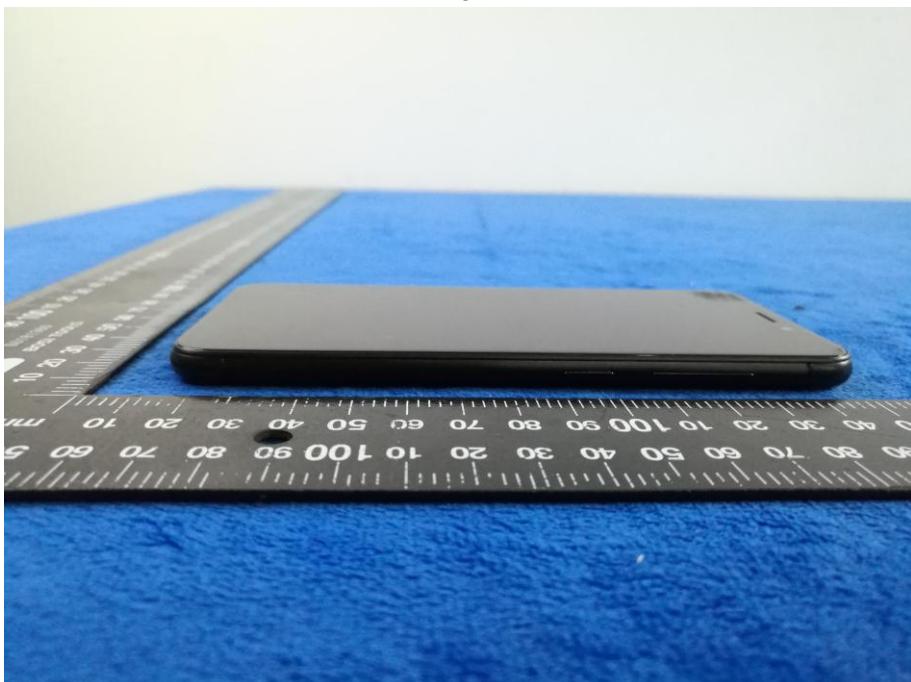
EUT - Bottom View



EUT - Left View



EUT - Right View



### Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1



Cover Off - Top View 2



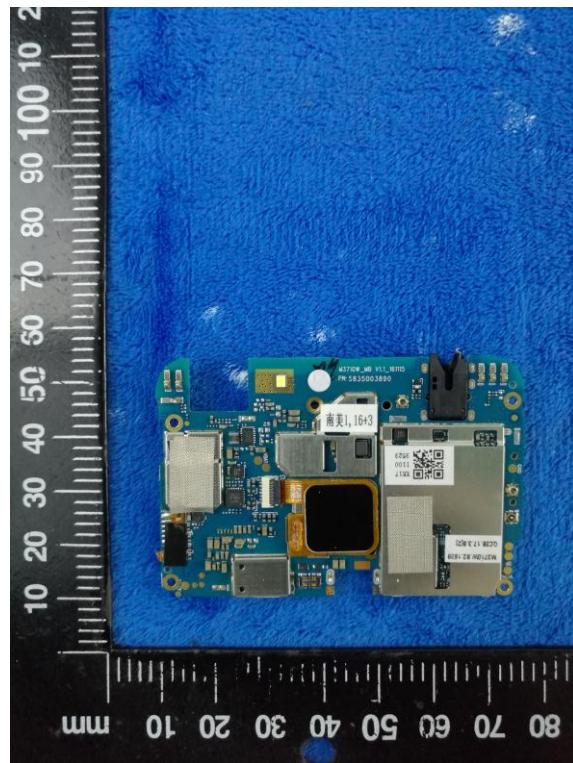
Battery - Front View



Battery - Rear View



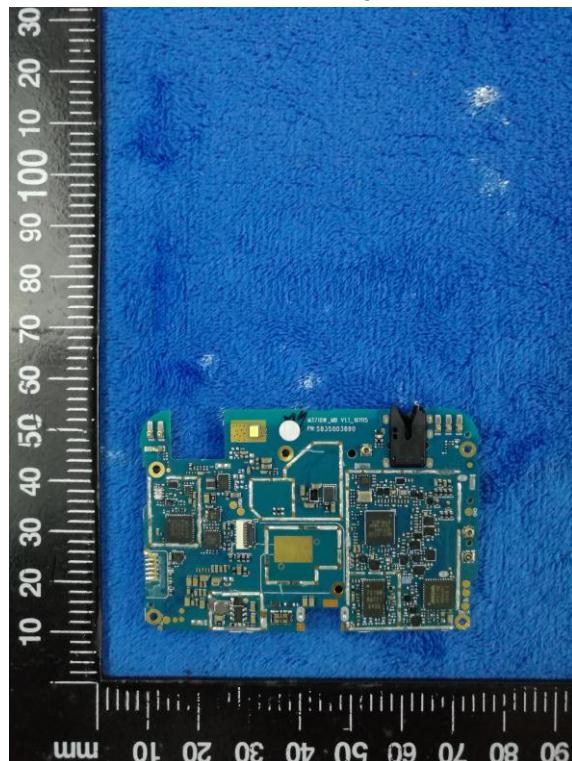
Mainboard with Shielding- Front View



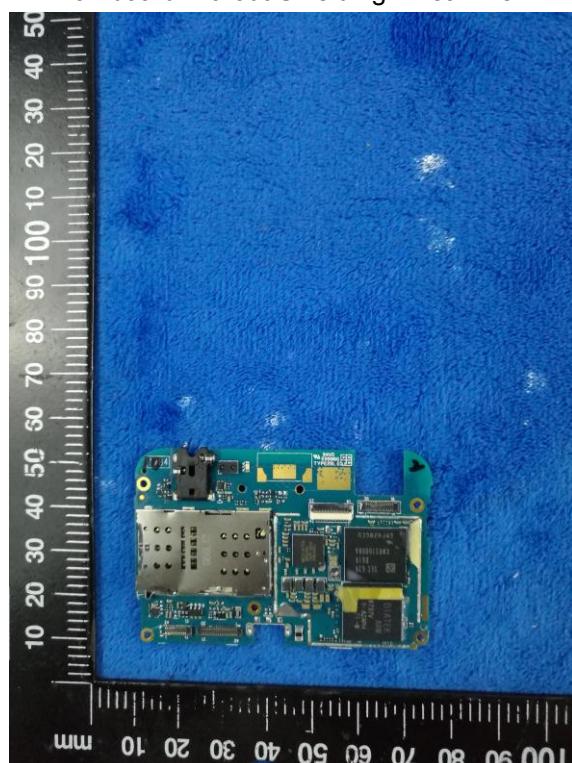
Mainboard with Shielding - Rear View



Mainboard without Shielding – Front View



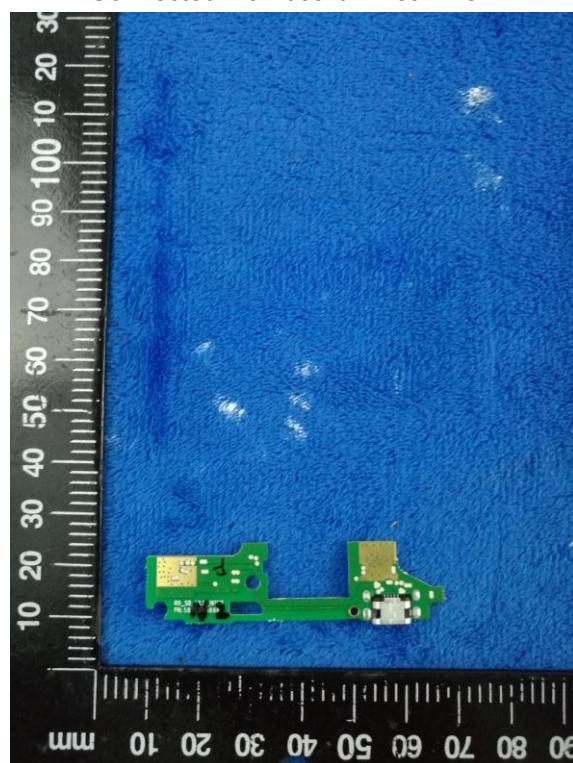
Mainboard without Shielding - Rear View



Connected Mainboard – Front View



Connected Mainboard - Rear View

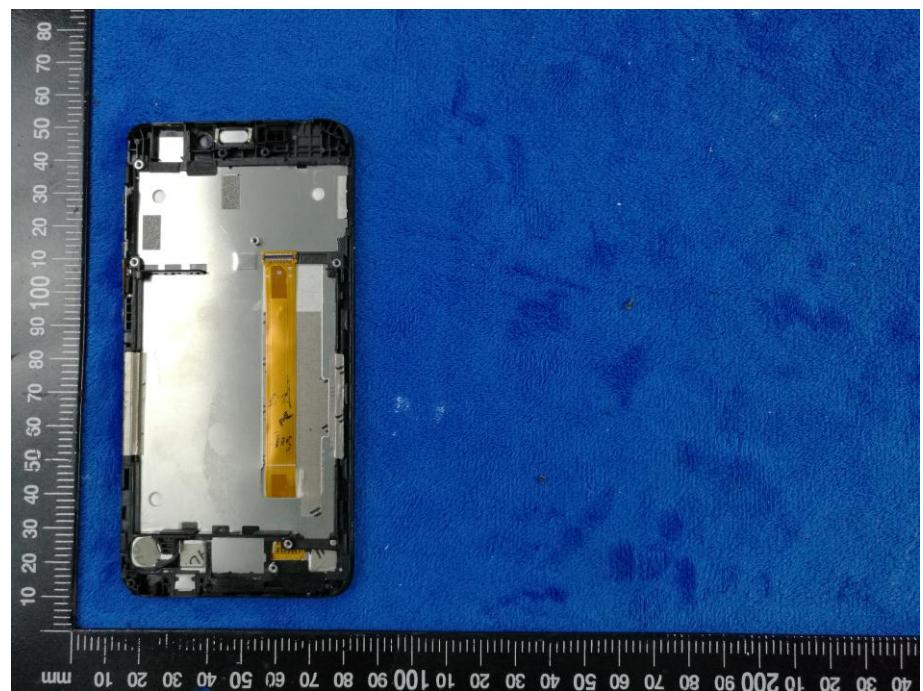


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LCD – Front View



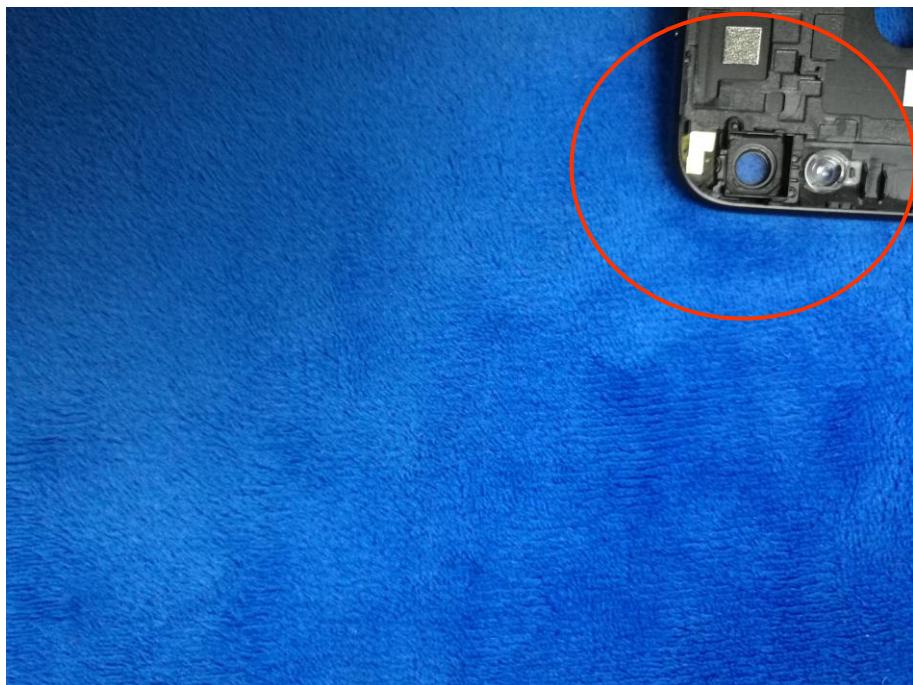
LCD – Rear View



GSM/PCS/UMTS - Antenna View



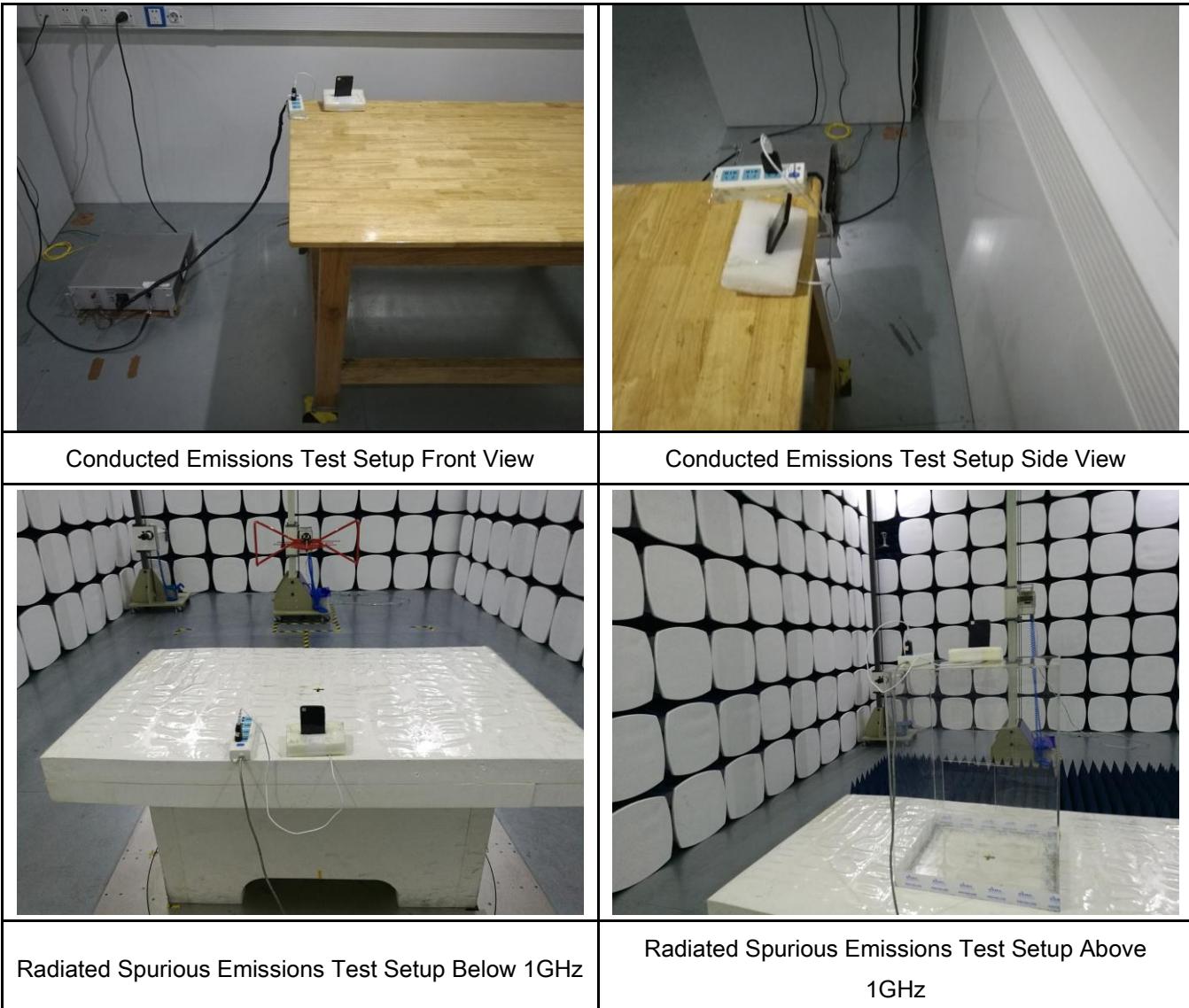
BT/WiFi/GPS - Antenna View



LTE - Antenna View



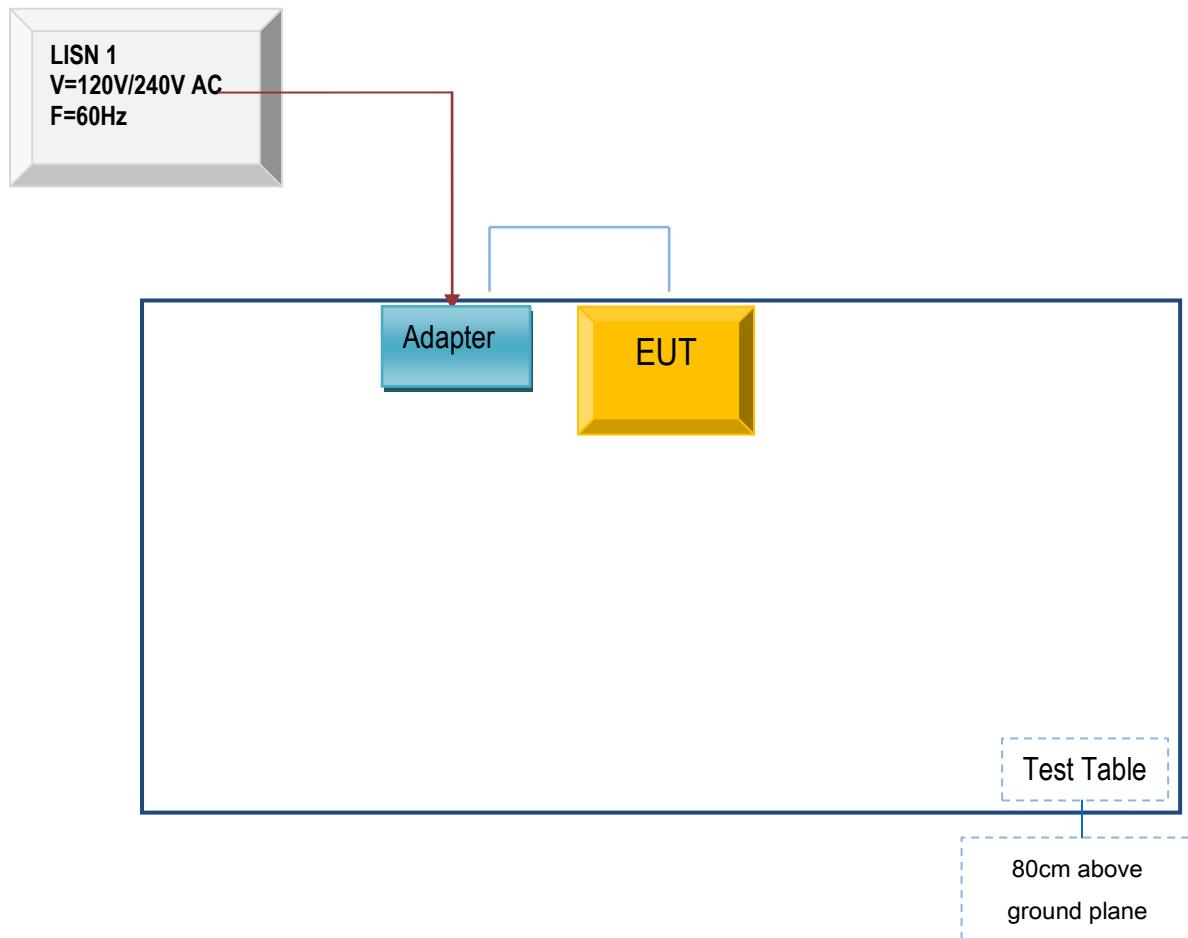
**Annex B.iii. Photograph: Test Setup Photo**



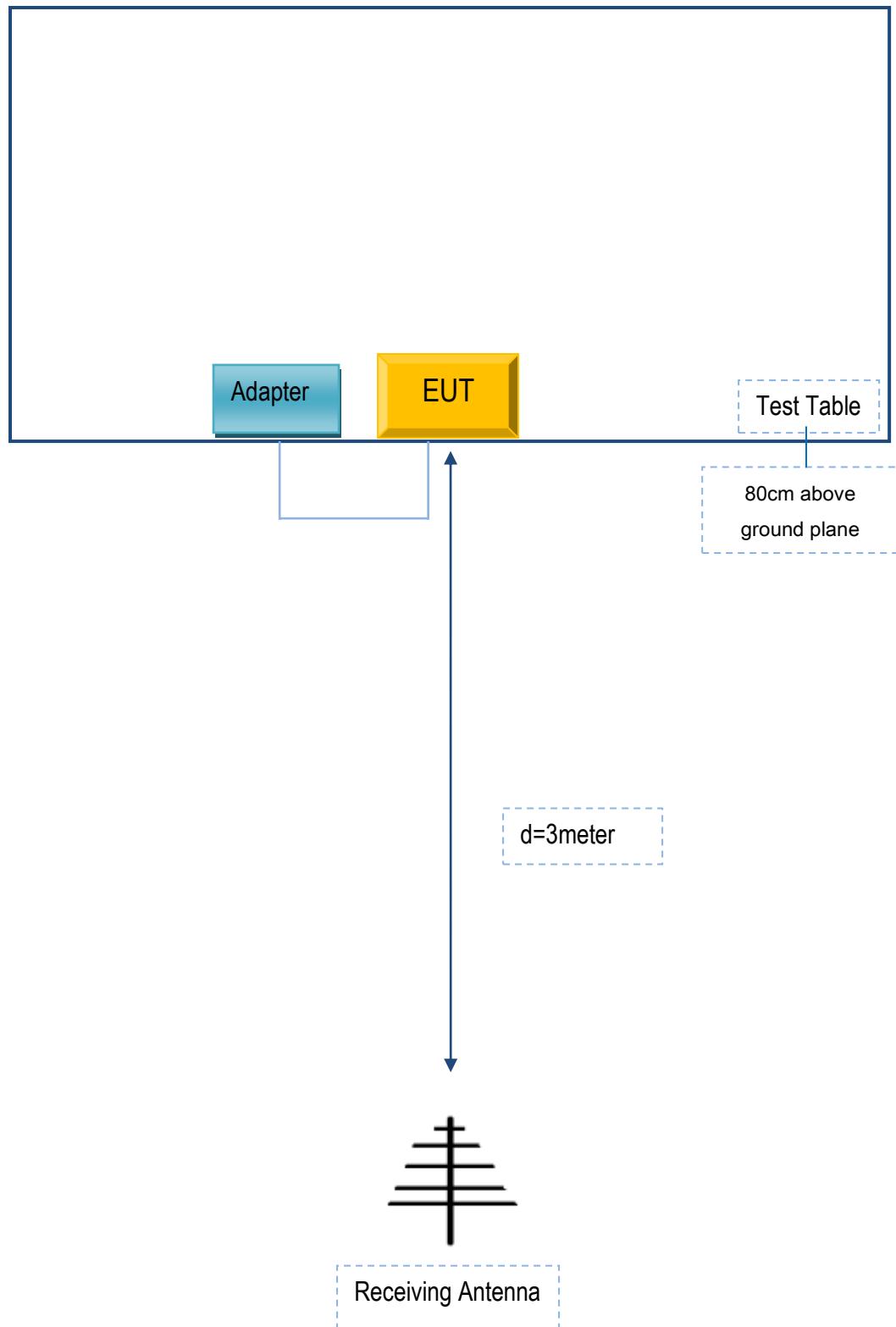
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

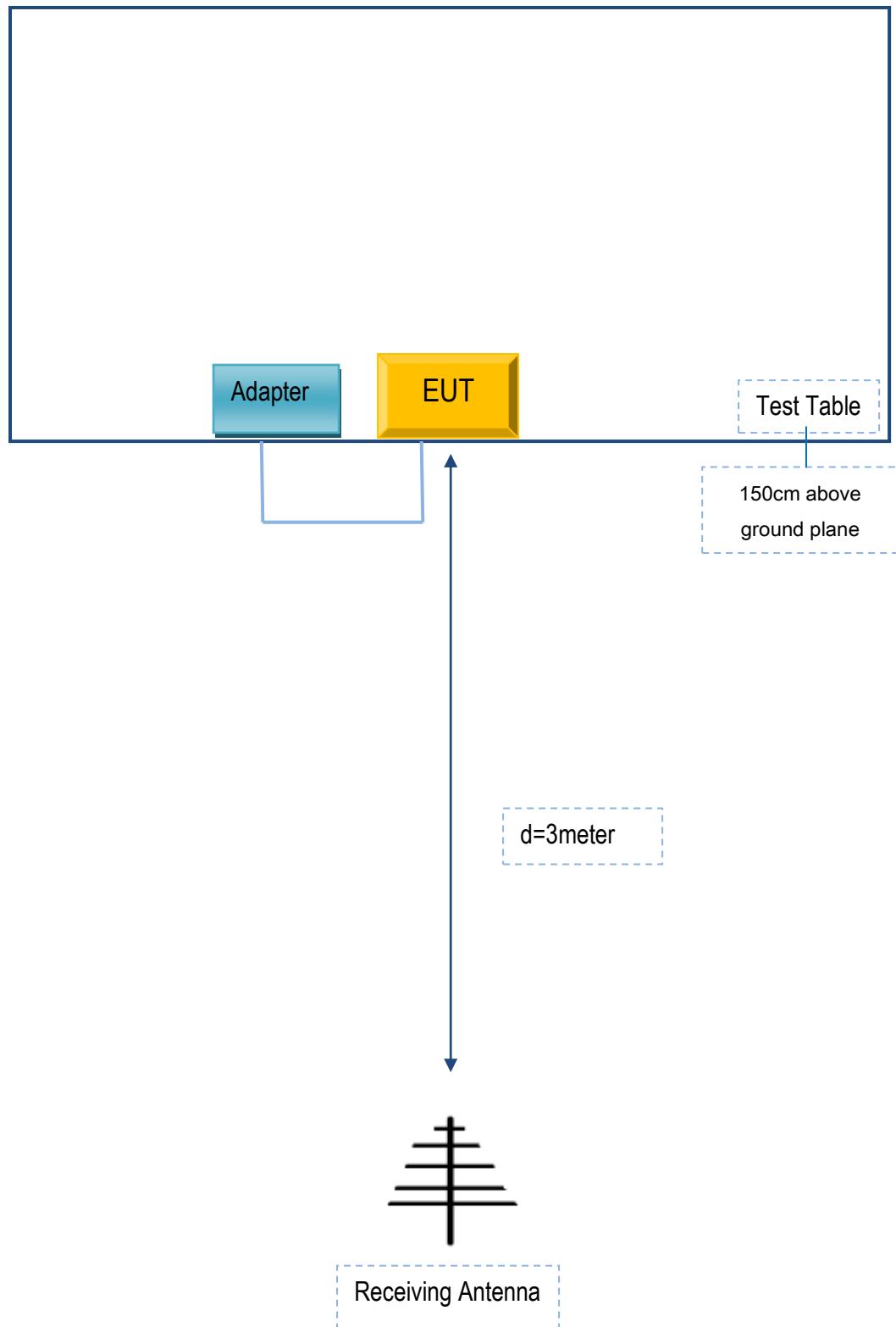
Block Configuration Diagram for AC Line Conducted Emissions



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
Shenzhen Konka Telecommunications Technology Co., Ltd.	Adapter	HJ-050100-AR	HAS020

### Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	HAS020

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

Please see the attachment

## Annex E. DECLARATION OF SIMILARITY

N/A