

RF TEST REPORT



Report No.: 17070102-FCC-R2 V1

Supersede Report No.: N/A

Applicant	Verykool USA Inc	
Product Name	Mobile Phone	
Model No.	SL5565	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	May 06 to June 15, 2017	
Issue Date	June 23, 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"/>
Vera Zhang	David Huang	
Vera Zhang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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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
17070102-FCC-R2	NONE	Original	June 16, 2017
17070102-FCC-R2 V1	V1	Added the Radiated Emission test data (9kHz-30MHz)	June 23, 2017

2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, California 92122 United States
Manufacturer	TEM MOBILE LIMITED
Manufacturer Add	Room 1102, 11/F, Building B, TCL Plaza,GaoXin S. Rd. 1st, Hi-Tech industrial Park,Nanshan District, Shenzhen, 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.Icp-03A1)

4. Equipment under Test (EUT) Information

Description of EUT: Mobile Phone

Main Model: SL5565

Serial Model: N/A

Date EUT received: May 05, 2017

Test Date(s): May 06 to June 15, 2017

Equipment Category : DTS

GSM850: -2.1dBi
PCS1900: -1.2dBi
UMTS-FDD Band V: -2.1dBi
UMTS-FDD Band IV: -2.2dBi
UMTS-FDD Band II: -1.2dBi
LTE Band II: -1.2dBi
LTE Band IV: -2.2dBi
LTE Band V: -2.1dBi
LTE Band VII: 0.2dBi
LTE Band XII: -1.7dBi
LTE Band XVII: -1.8dBi
Bluetooth/BLE: -0.4dBi
WIFI: -0.4dBi
GPS: -1.02dBi

Antenna Gain:
Antenna Type: PIFA antenna

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Type of Modulation:

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

RF Operating Frequency (ies):

- GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz
- PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz
- UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz
- UMTS-FDD Band IV TX: 1712.4 ~ 1752.6 MHz;
RX : 2112.4 ~ 2152.6 MHz
- UMTS-FDD Band II TX: 1852.4 ~ 1907.6 MHz;
RX: 1932.4 ~ 1987.6 MHz
- LTE Band II TX: 1850.7 ~ 1909.3MHz; RX : 1930.7 ~ 1989.3 MHz
- LTE Band IV TX: 1710.7 ~ 1754.3 MHz; RX : 2110.7~ 2154.3 MHz
- LTE Band V TX: 824.7~ 848.3 MHz; RX : 869.7 ~ 893.3MHz
- LTE Band VII TX: 2502.5 ~ 2567.5 MHz; RX : 2622.5 ~ 2687.5 MHz
- LTE Band XII TX: 699.7 ~ 715.3 MHz; RX : 729.7~ 745.3MHz
- LTE Band XVII TX: 706.5 ~ 713.5 MHz; RX : 736.5 ~ 743.5 MHz
- WIFI: 802.11b/g/n(20M): 2412-2462 MHz
- WIFI: 802.11n(40M): 2422-2452 MHz
- Bluetooth& BLE: 2402-2480 MHz
- GPS: 1575.42 MHz

Max. Output Power:

- 802.11b: 15.78dBm
- 802.11g: 11.86dBm
- 802.11n(20M): 11.80dBm
- 802.11n(40M): 11.99dBm

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

Number of Channels:

Port: USB Port, Earphone Port

Adapter:

Model: TPA-46B050100UU

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

Output: DC 5.0V,1000mA

Battery:

Spec: 3.8V,2800mAh(10.64wh)

Trade Name : verykool

FCC ID: WA6SL5565

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

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

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

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

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

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

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

Antenna Connector Construction

The EUT has 3 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIFI/GPS, the gain is -0.4dBi for Bluetooth/BLE, the gain is -0.4dBi for WIFI, the gain is -1.02dBi for GPS.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is -2.1dBi for GSM850, -1.2dBi for PCS1900, -2.1dBi for UMTS-FDD Band V, -2.2dBi for UMTS-FDD Band IV, -1.2dBi for UMTS-FDD Band II.

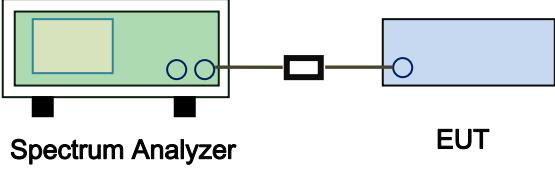
A permanently attached PIFA antenna for LTE Band II/ IV/V/VII/XII/XVII, the gain is -1.2dBi for LTE Band II, the gain is -2.2dBi for LTE Band IV, the gain is -2.1dBi for LTE Band V, the gain is 0.2dBi for LTE Band VII, the gain is -1.7dBi for LTE XII, the gain is -1.8dBi for LTE Band XVII.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	May 16, 2017
Tested By :	Vera Zhang

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW \geq 500kHz; 20dB BW \geq 500kHz;	<input checked="" type="checkbox"/>
RSS Gen(4.6.1)	b)	99% BW: For FCC reference only; required by IC.	<input checked="" type="checkbox"/>
Test Setup		 Spectrum Analyzer EUT	
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"> Set RBW = 100 kHz. Set the video bandwidth (VBW) \geq 3 \times RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize. 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. <p><u>20dB bandwidth</u></p> <p>C63.10 Occupied Bandwidth (OBW=20dB bandwidth)</p> <ol style="list-style-type: none"> Set RBW = 1%-5% OBW. Set the video bandwidth (VBW) \geq 3 x RBW. Set the span range between 2 times and 5 times of the OBW. Sweep time=Auto, Detector=PK, Trace=Max hold. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst- 	

	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

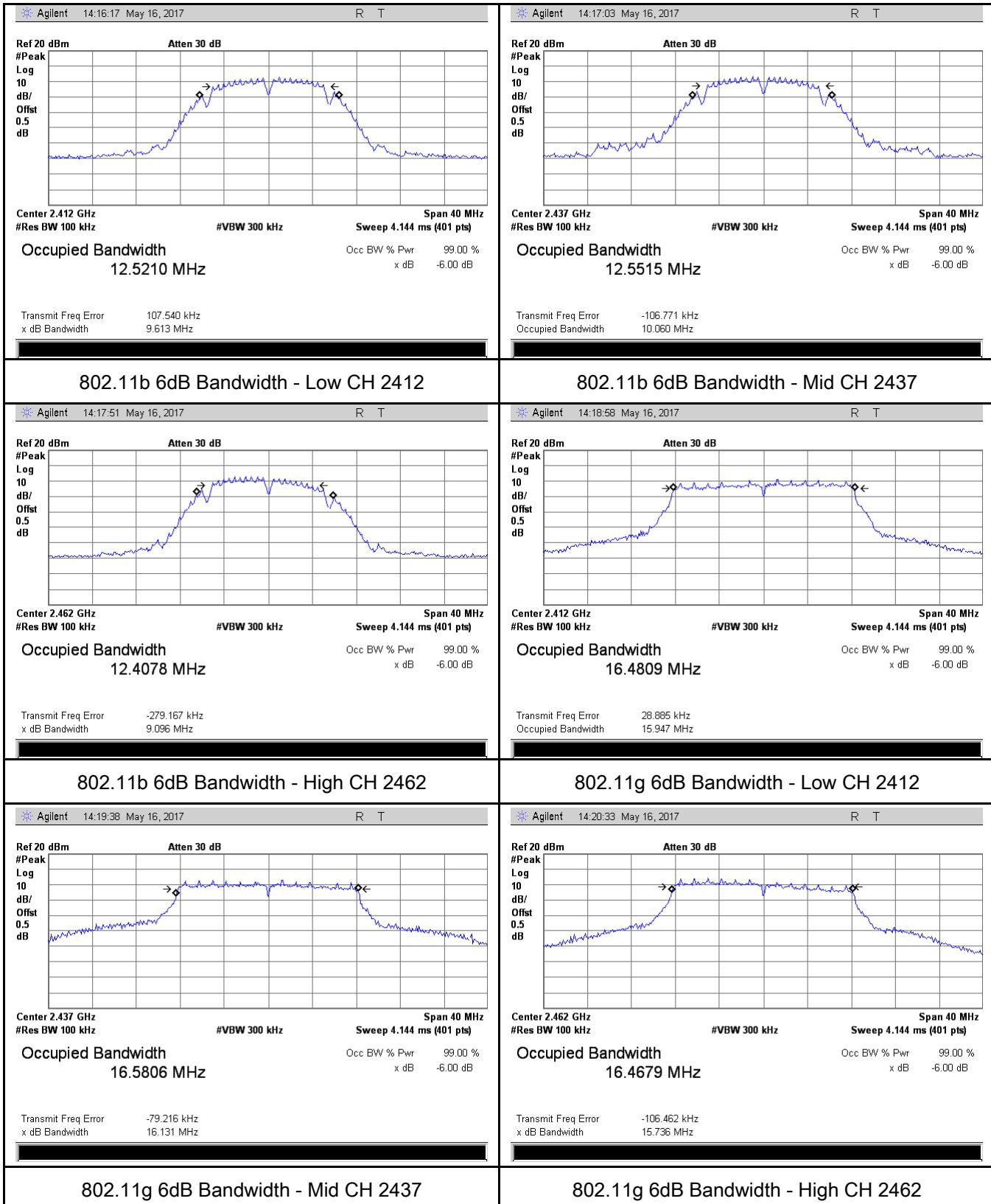
Test Plot Yes (See below) N/A

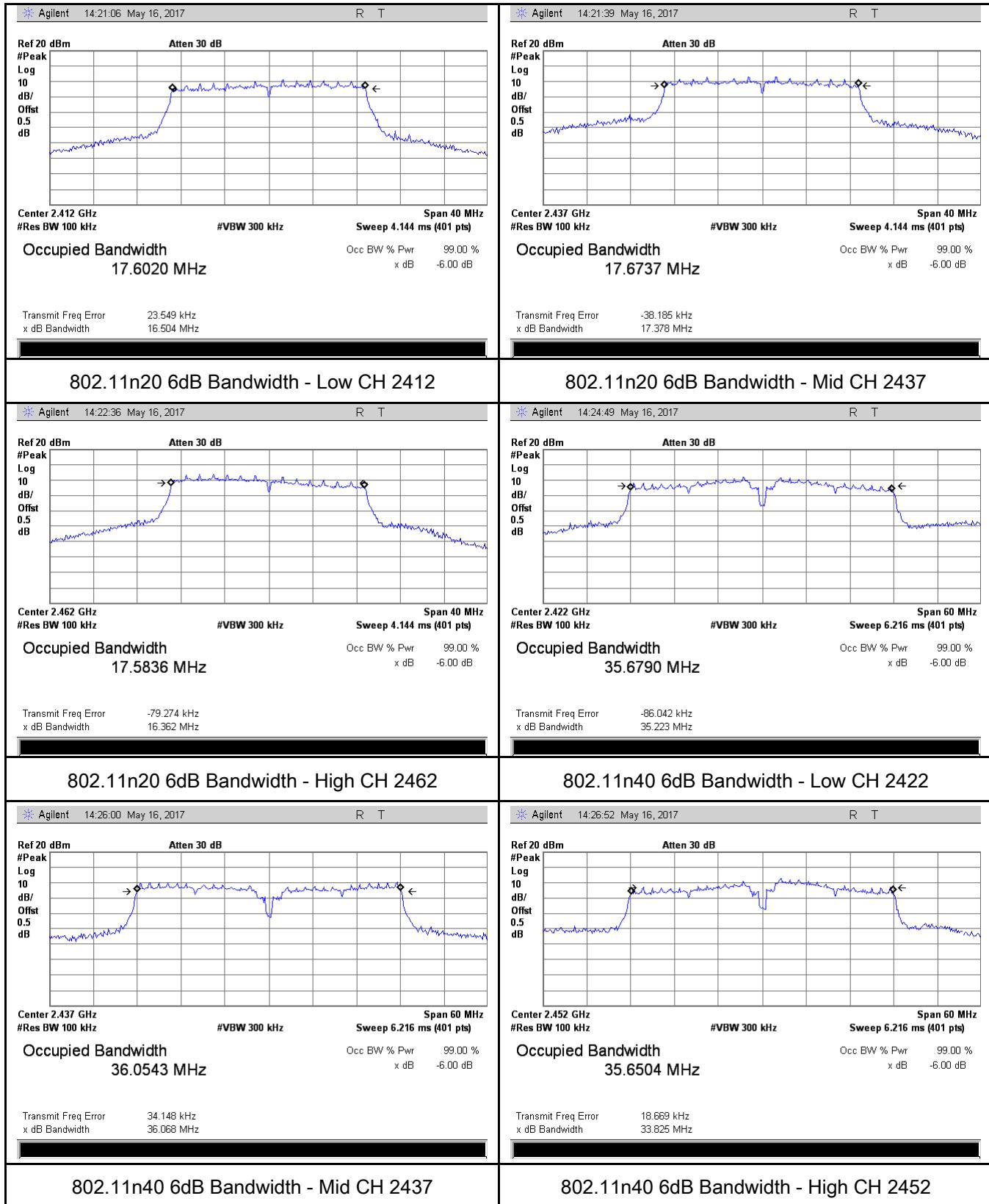
Measurement result

Test mode	CH	Freq (MHz)	6dB Bandwidth (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	9.613	14.784	≥ 0.5
	Mid	2437	10.060	14.883	≥ 0.5
	High	2462	9.096	14.781	≥ 0.5
802.11g	Low	2412	15.947	19.220	≥ 0.5
	Mid	2437	16.131	19.343	≥ 0.5
	High	2462	15.736	18.940	≥ 0.5
802.11n (20M)	Low	2412	16.504	19.475	≥ 0.5
	Mid	2437	17.378	19.739	≥ 0.5
	High	2462	16.362	19.483	≥ 0.5
802.11n (40M)	Low	2422	35.223	39.655	≥ 0.5
	Mid	2437	36.068	40.207	≥ 0.5
	High	2452	33.825	39.422	≥ 0.5

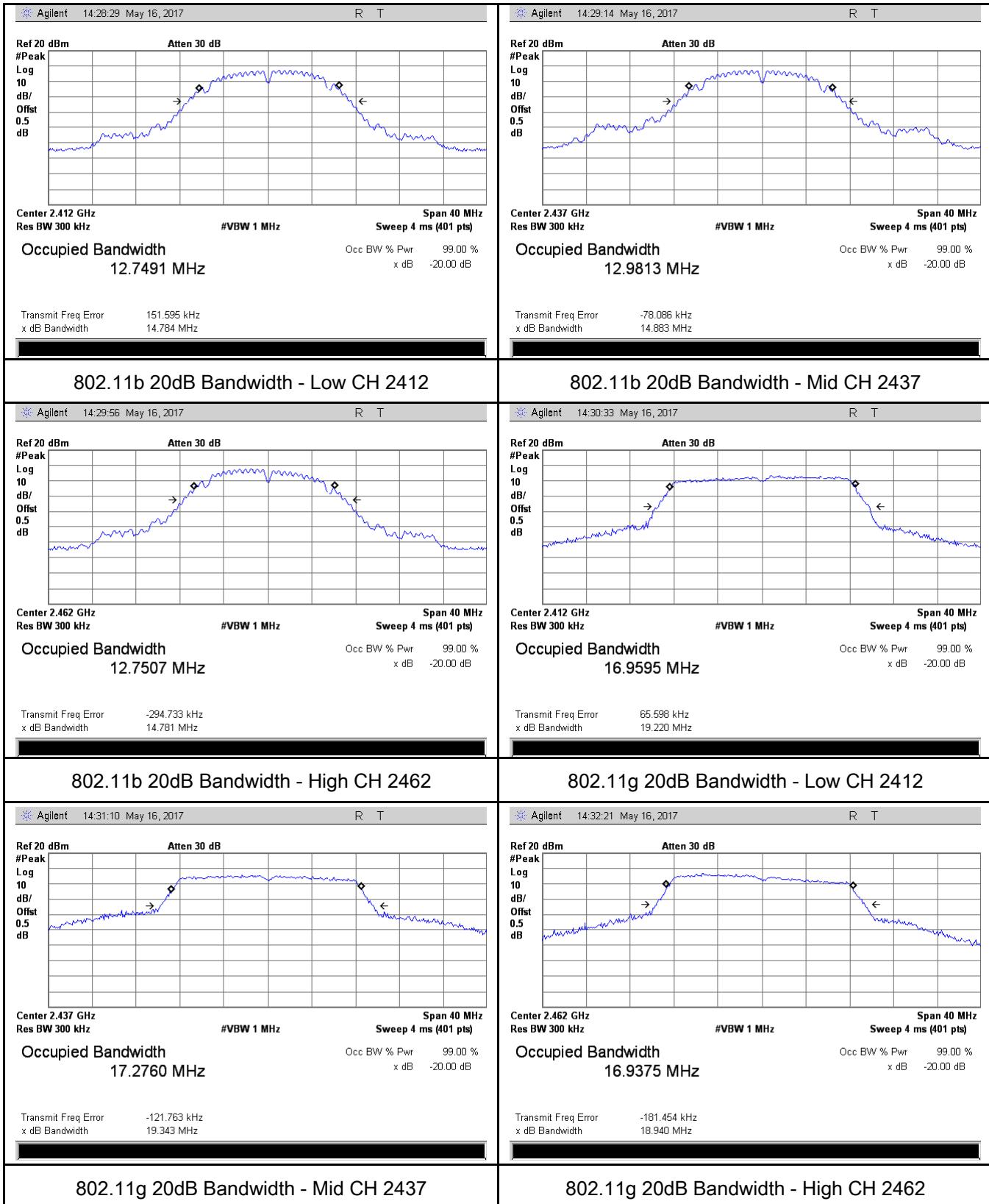
Test Plots

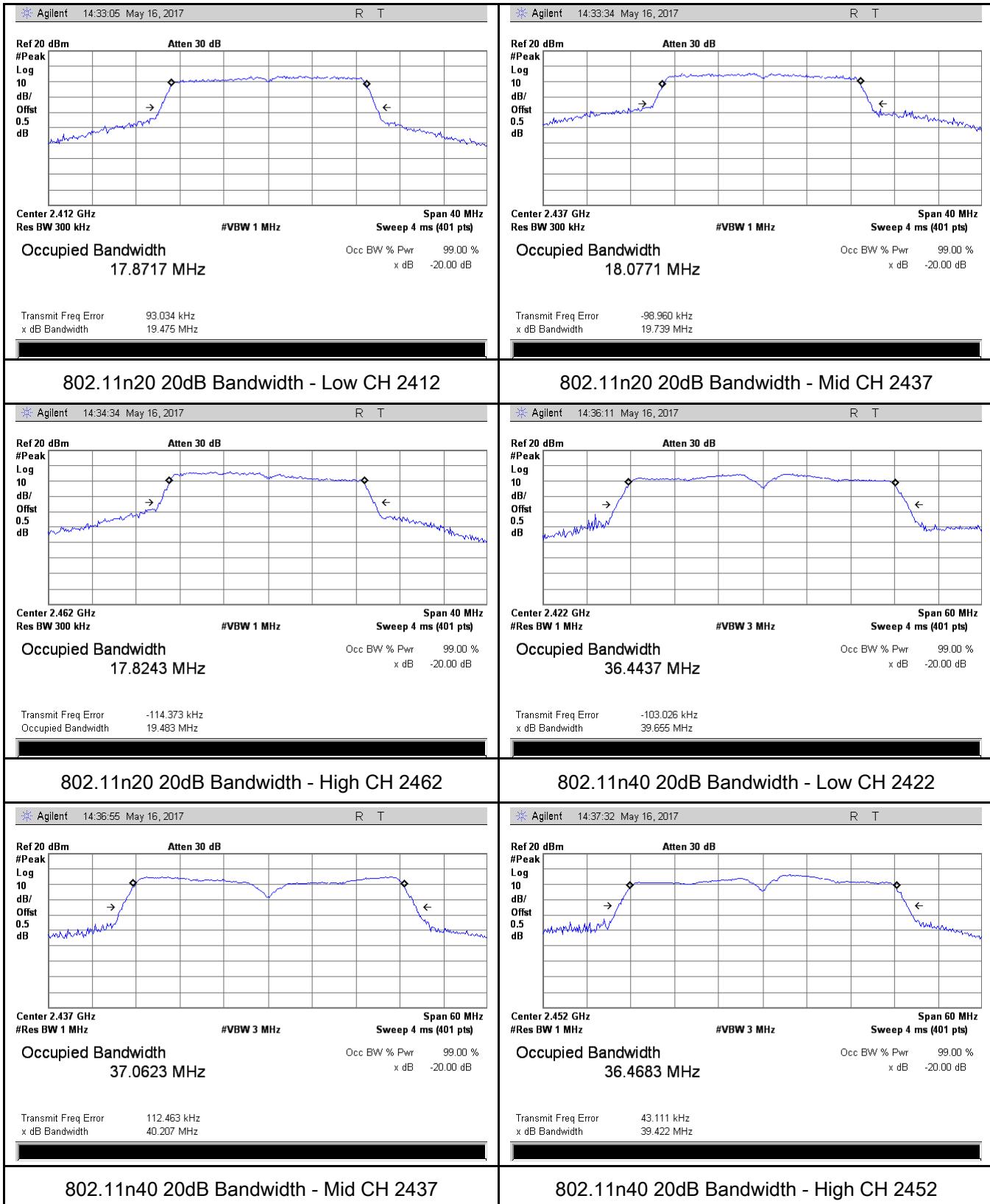
6dB Bandwidth measurement result





20 dB Bandwidth measurement result

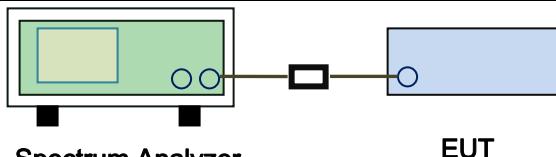




6.3 Maximum Output Power

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	May 16, 2017
Tested By :	Vera Zhang

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		 Spectrum Analyzer EUT	
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"> - a) Set span to at least 1.5 times the OBW. - b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz. - c) Set VBW \geq 3 x RBW. - d) Number of points in sweep \geq 2 \times span / RBW. (This gives bin-to-bin spacing \leq RBW/2, so that narrowband signals are not lost between frequency bins.) - e) Sweep time = auto. - f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. - g) If transmit duty cycle $<$ 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum 	

	<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 $\geq 98\%$, 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"> - h) Trace average at least 100 traces in power averaging (i.e., RMS) mode. - 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.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

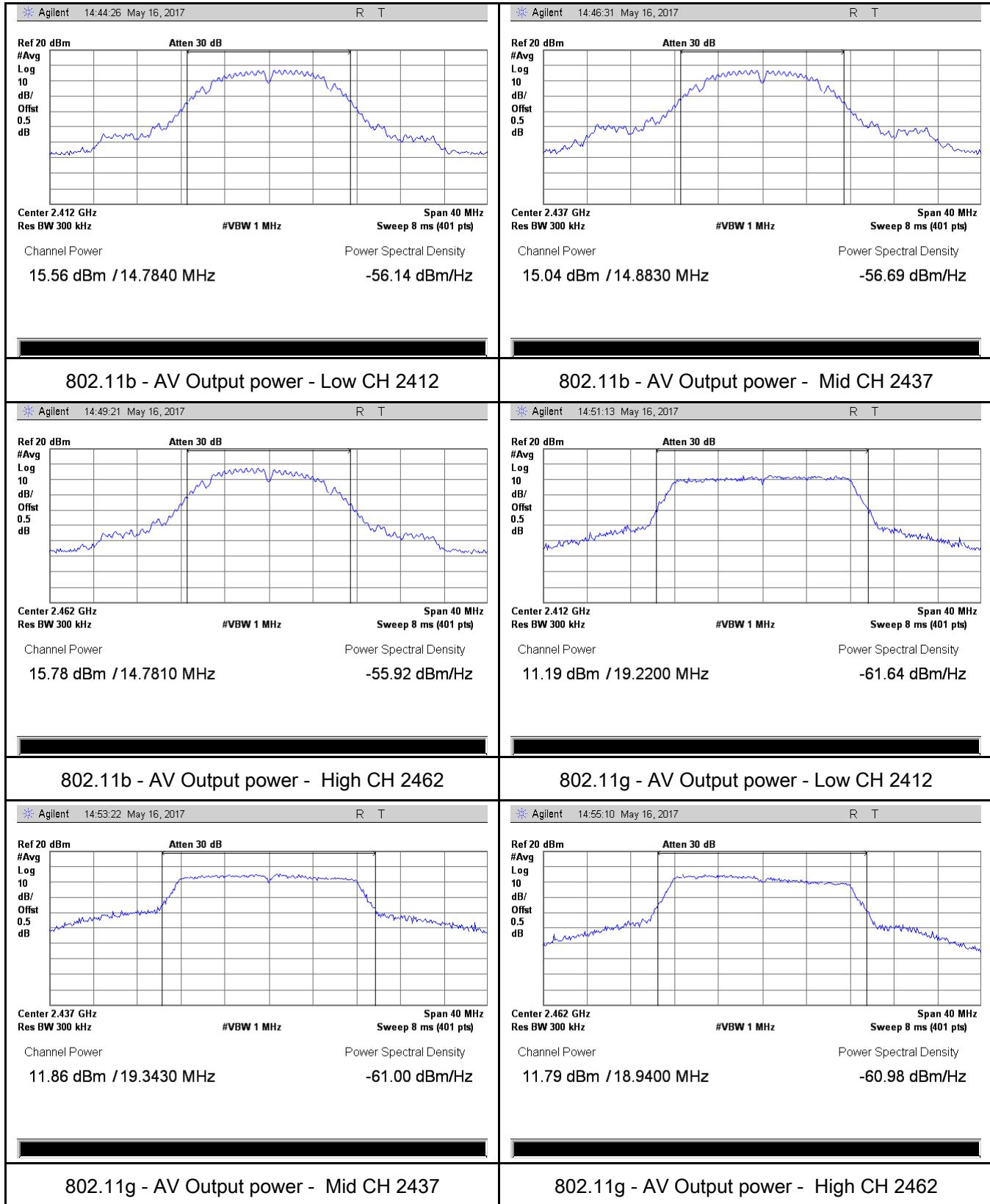
Test Plot Yes (See below) N/A

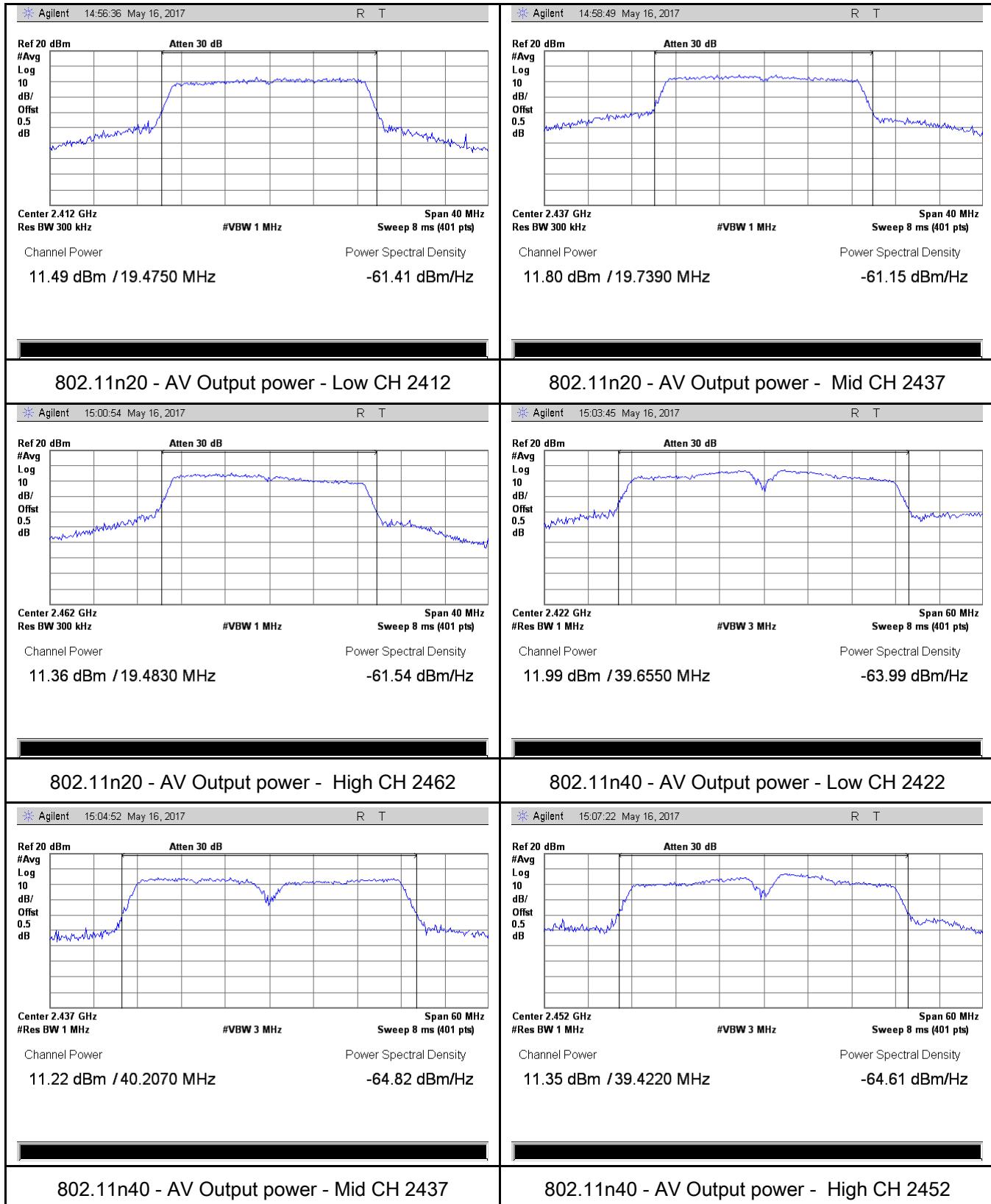
Output Power measurement result

Type	Test mode	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	Low	2412	15.56	30	Pass
		Mid	2437	15.04	30	Pass
		High	2462	15.78	30	Pass
	802.11g	Low	2412	11.19	30	Pass
		Mid	2437	11.86	30	Pass
		High	2462	11.79	30	Pass
	802.11n (20M)	Low	2412	11.49	30	Pass
		Mid	2437	11.80	30	Pass
		High	2462	11.36	30	Pass
	802.11n (40M)	Low	2422	11.99	30	Pass
		Mid	2437	11.22	30	Pass
		High	2452	11.35	30	Pass

Test Plots

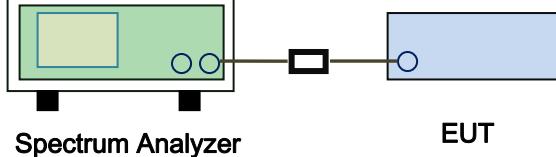
The Average Power





6.4 Power Spectral Density

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	May 16, 2017
Tested By :	Vera Zhang

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"> - a) Set analyzer center frequency to DTS channel center frequency. - b) Set the span to 1.5 times the DTS bandwidth. - c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. - d) Set the VBW $\geq 3 \times \text{RBW}$. - e) Detector = peak. - f) Sweep time = auto couple. - g) Trace mode = max hold. - h) Allow trace to fully stabilize. - i) Use the peak marker function to determine the maximum amplitude level within the RBW. - j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat. 	
Remark			
Result		<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

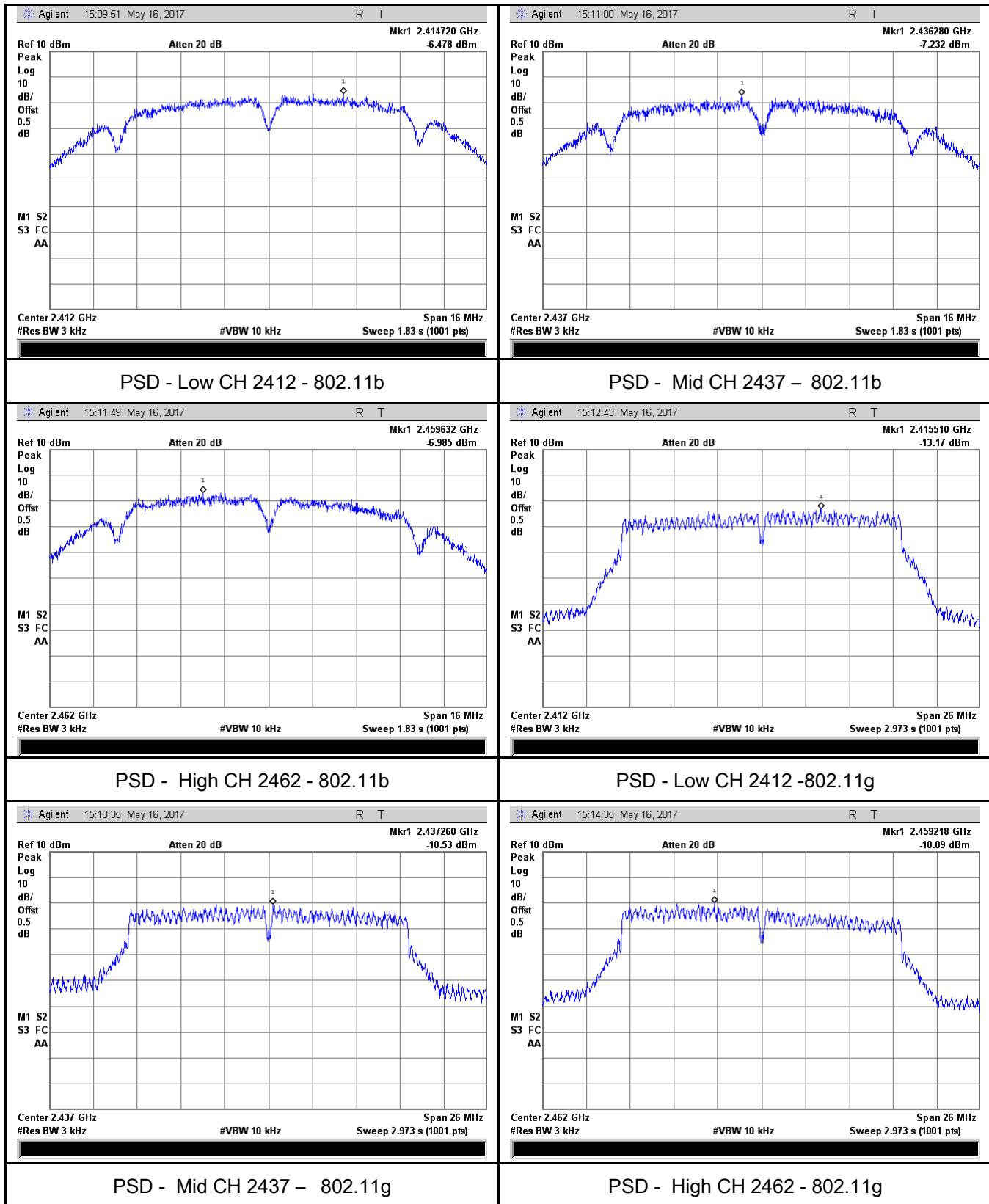
Test Data Yes N/A
Test Plot Yes (See below) N/A

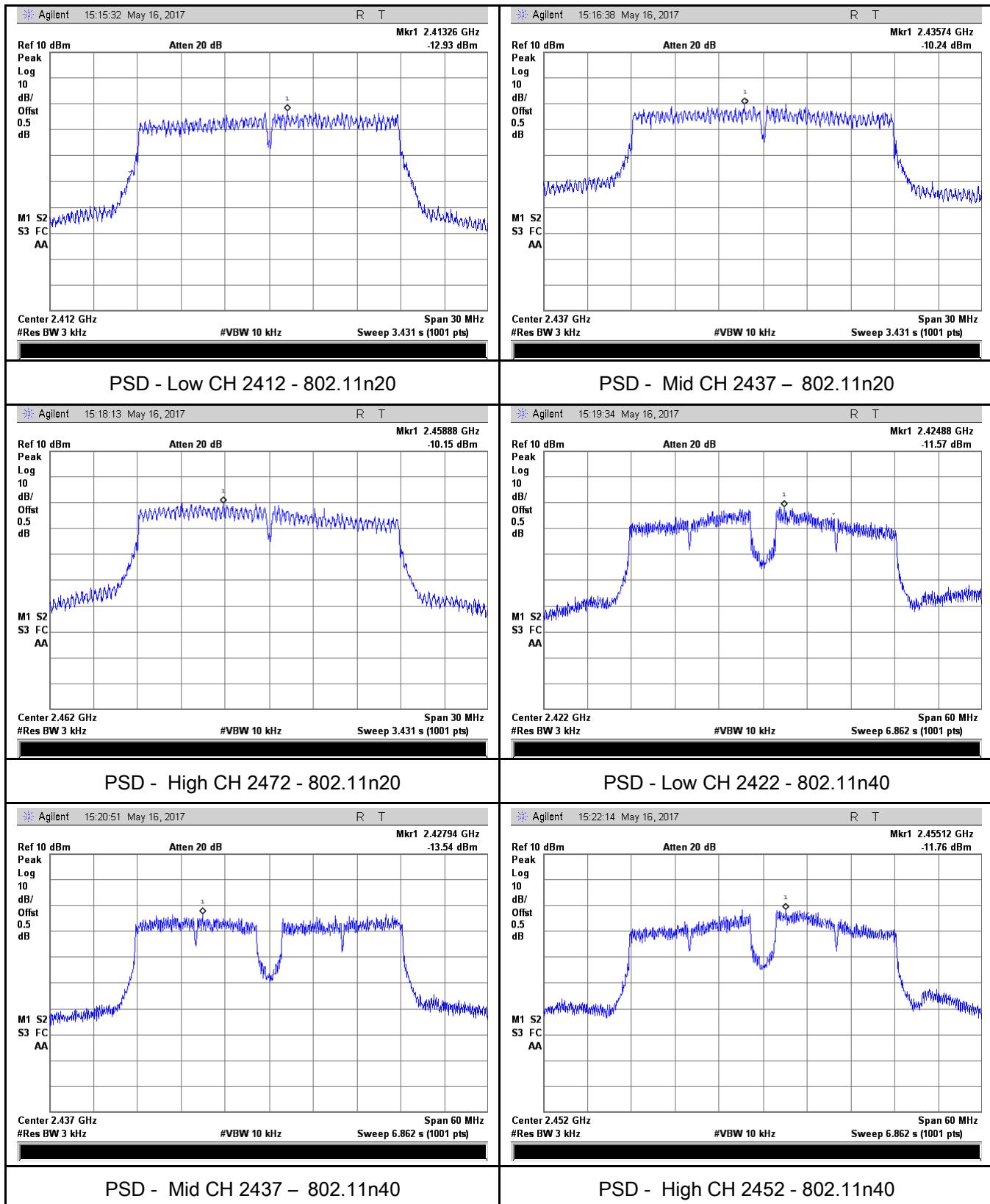
Power Spectral Density measurement result

Type	Test mode	CH	Freq (MHz)	PSD	Limit (dBm)	Result
				(dBm)		
PSD	802.11b	Low	2412	-6.478	8	Pass
		Mid	2437	-7.232	8	Pass
		High	2462	-6.985	8	Pass
	802.11g	Low	2412	-13.17	8	Pass
		Mid	2437	-10.53	8	Pass
		High	2462	-10.09	8	Pass
	802.11n (20M)	Low	2412	-12.93	8	Pass
		Mid	2437	-10.24	8	Pass
		High	2462	-10.15	8	Pass
	802.11n (40M)	Low	2422	-11.57	8	Pass
		Mid	2437	-13.54	8	Pass
		High	2452	-11.76	8	Pass

Test Plots

Power Spectral Density measurement result

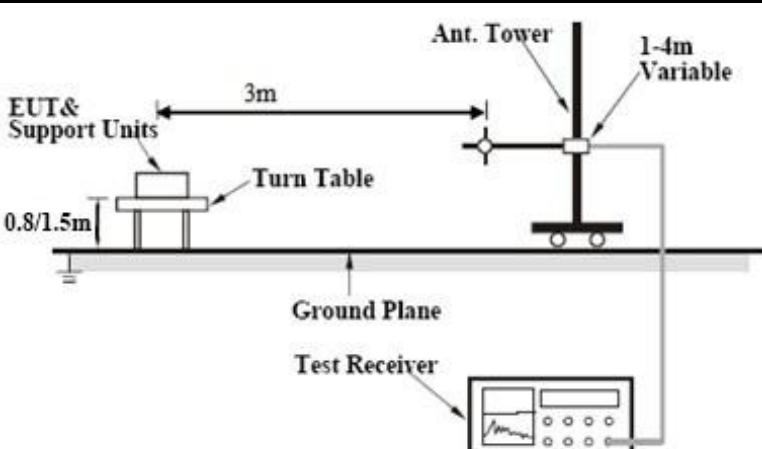




6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1002mbar
Test date :	June 01, 2017
Tested By :	Vera Zhang

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"> - 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. 		

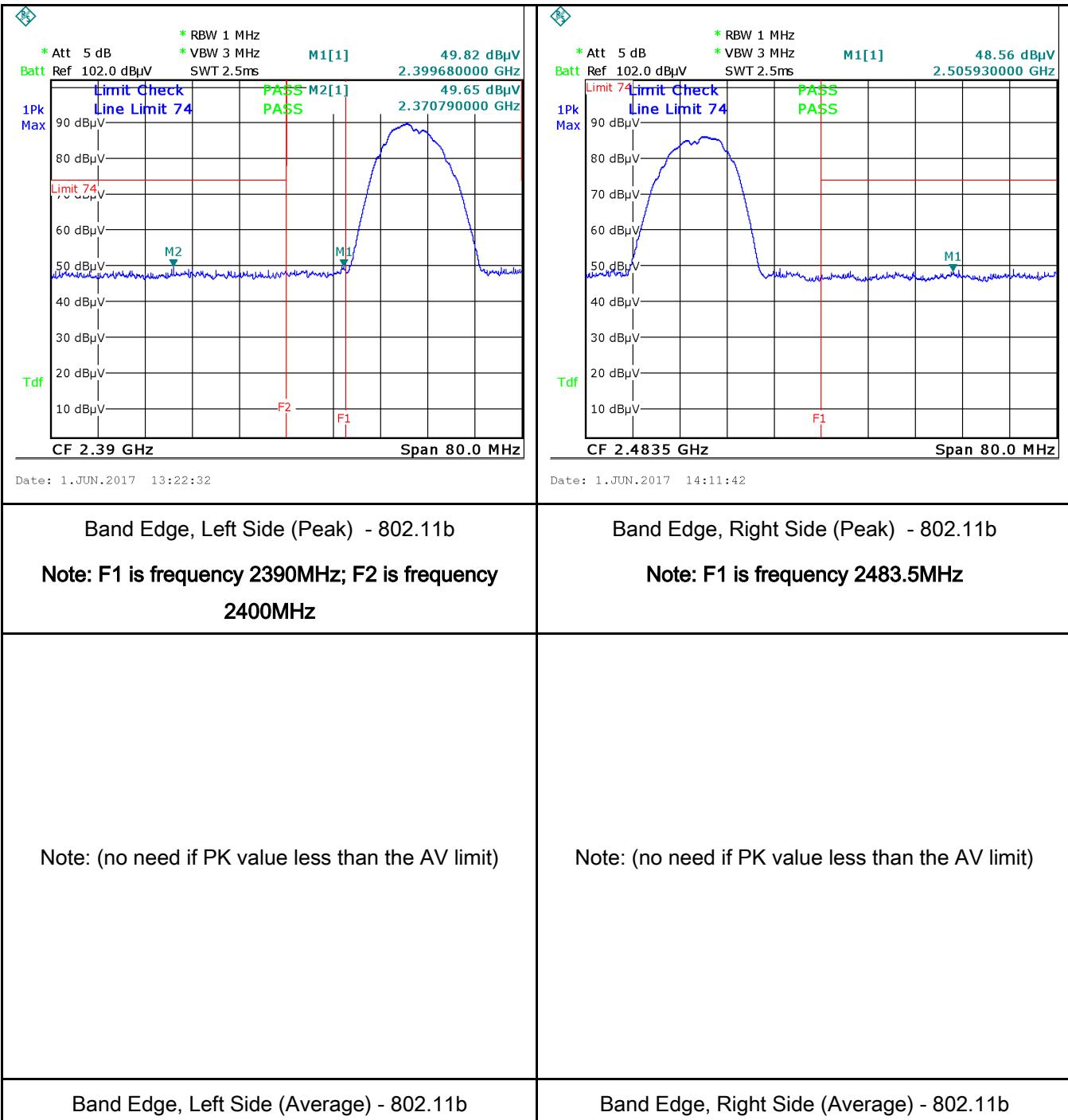
	<ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

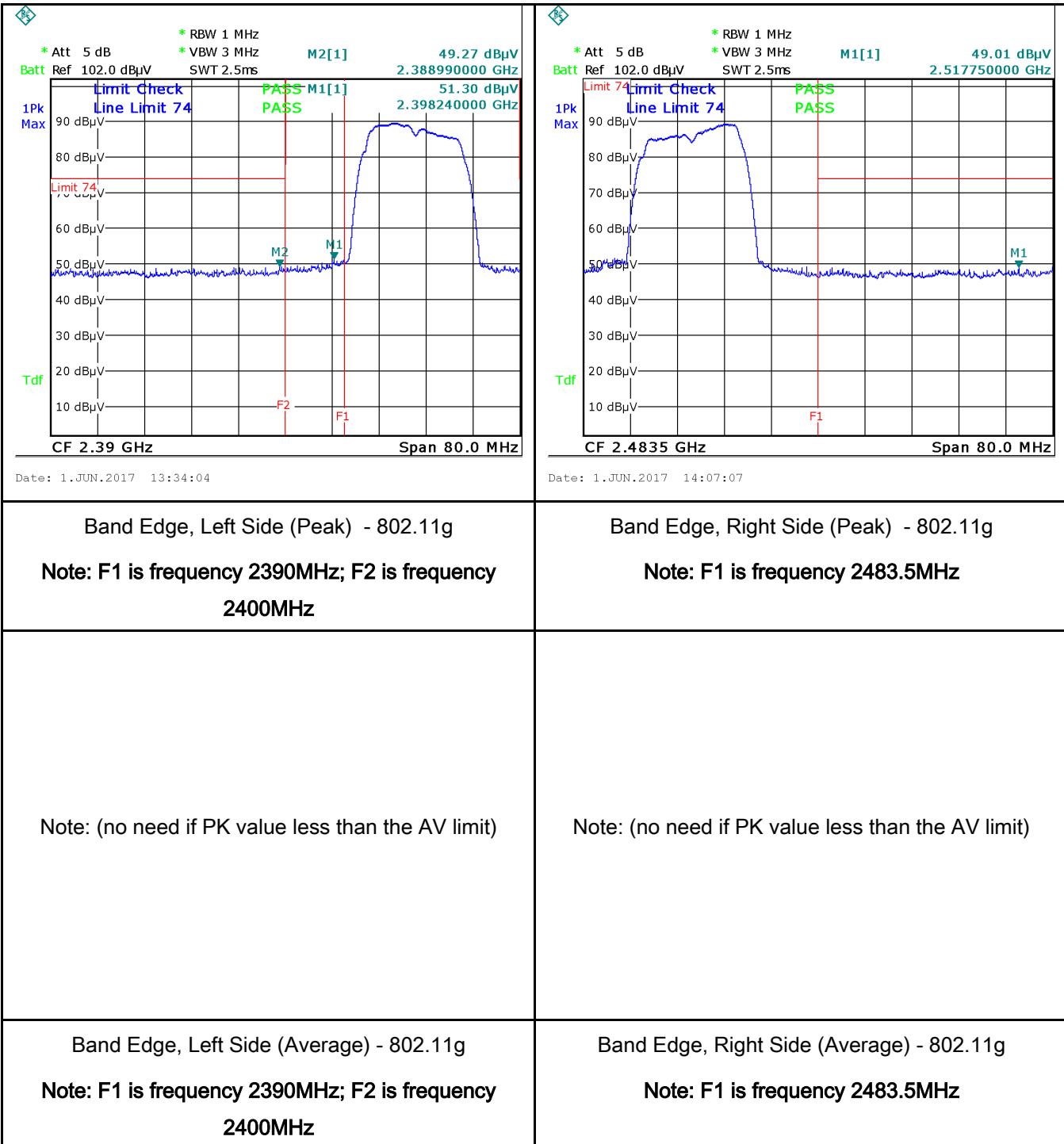
Test Plot Yes (See below) N/A

Test Plots

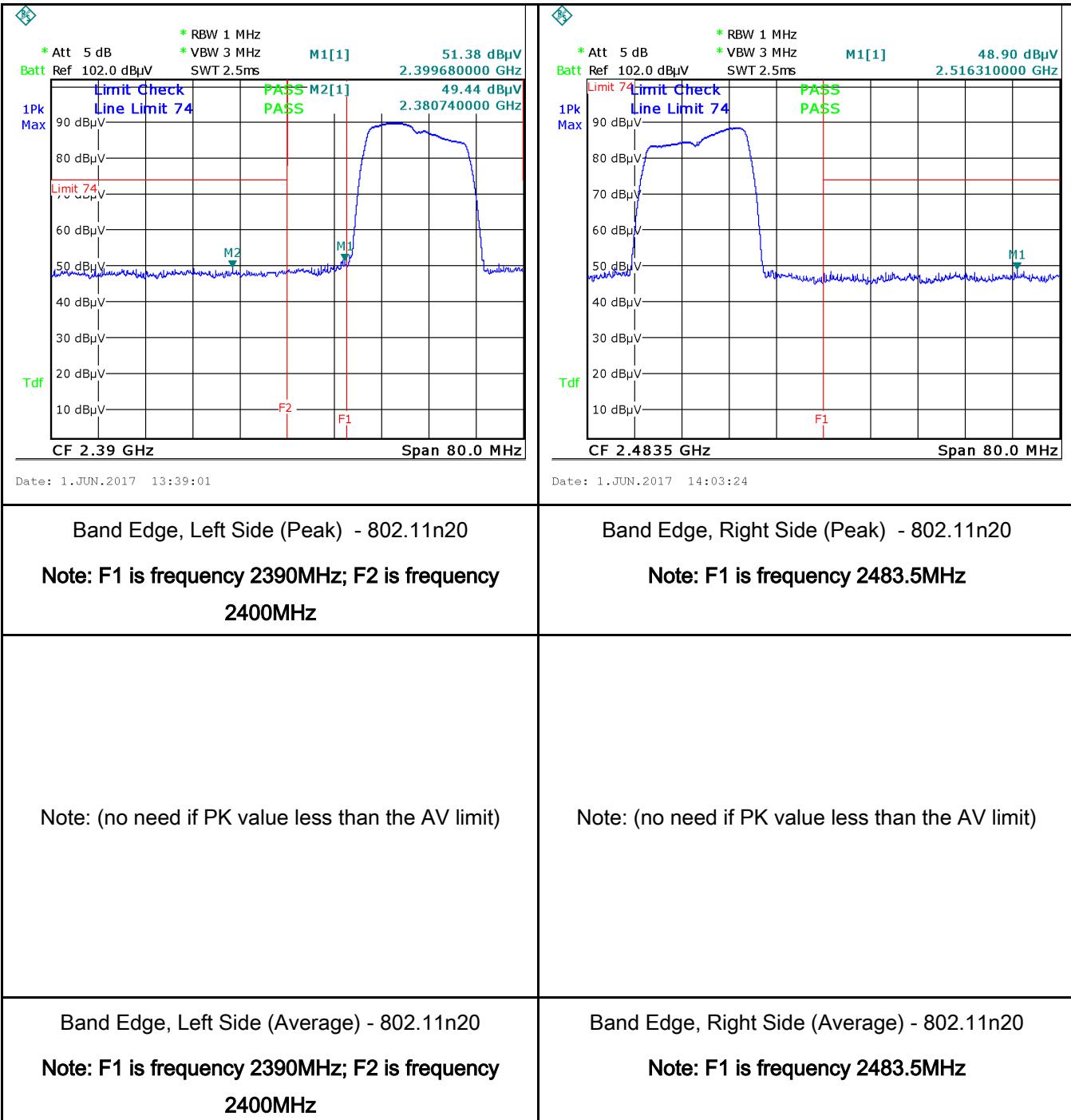
Band Edge measurement result



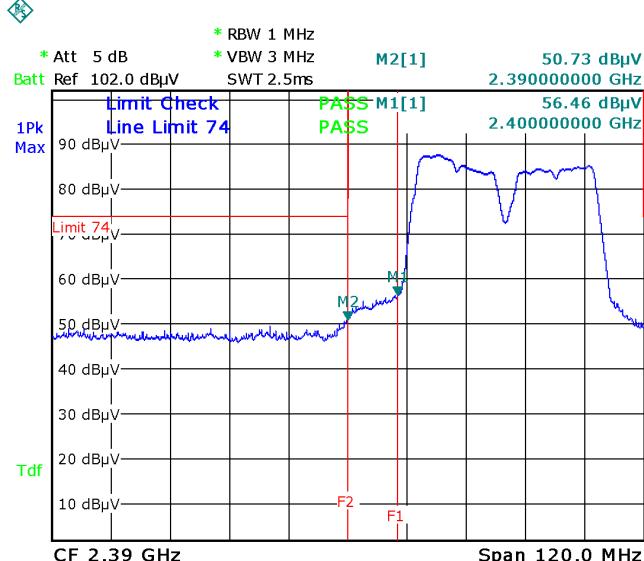
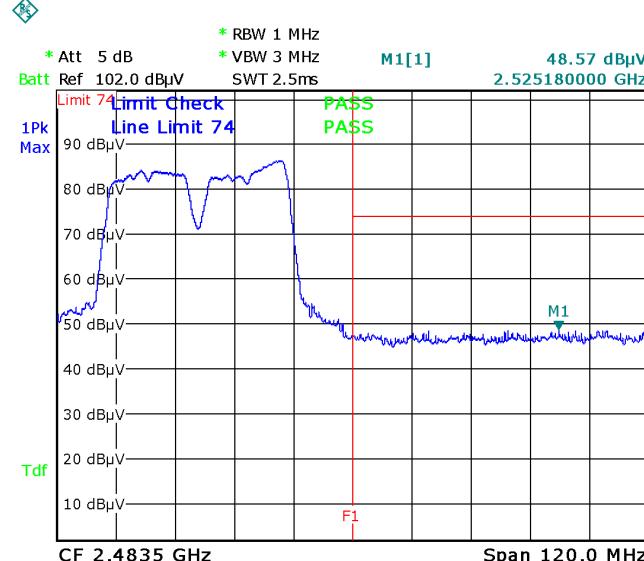
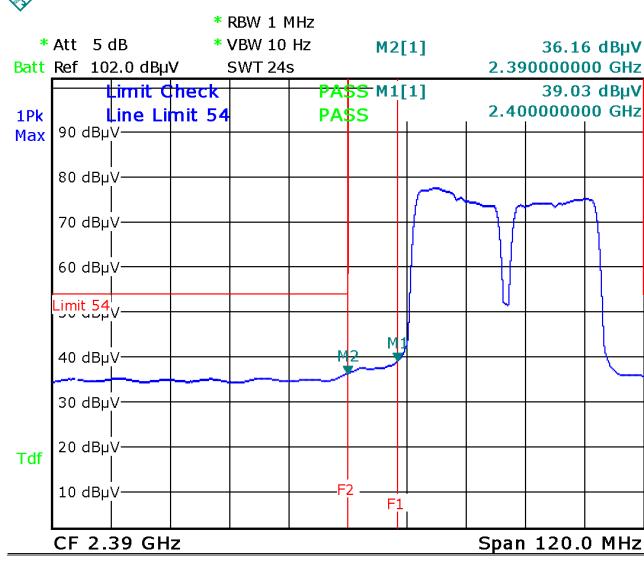
Note: Both Horizontal and vertical polarities were investigated



Note: Both Horizontal and vertical polarities were investigated



Note: Both Horizontal and vertical polarities were investigated

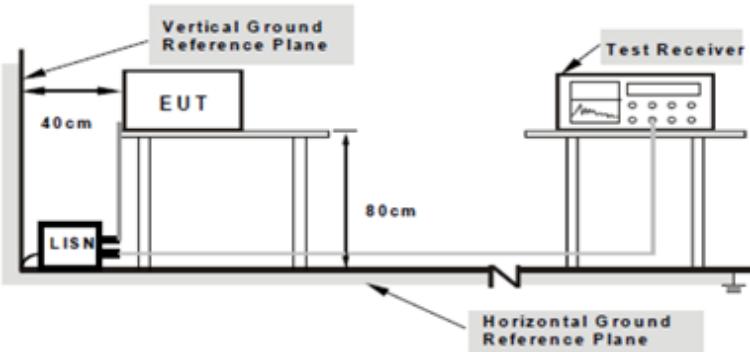
 <p>* RBW 1 MHz * Att 5 dB Batt Ref 102.0 dBμV SWT 2.5ms</p> <p>M2[1] 50.73 dBμV 2.390000000 GHz</p> <p>Limit Check Line Limit 74 1Pk Max 90 dBμV Tdf 20 dBμV</p> <p>PASS M1[1] PASS</p> <p>CF 2.39 GHz Span 120.0 MHz</p>	 <p>* RBW 1 MHz * Att 5 dB Batt Ref 102.0 dBμV SWT 2.5ms</p> <p>M1[1] 48.57 dBμV 2.525180000 GHz</p> <p>Limit 74 Limit Check Line Limit 74 1Pk Max 90 dBμV Tdf 20 dBμV</p> <p>PASS M1 PASS</p> <p>CF 2.4835 GHz Span 120.0 MHz</p>
<p>Date: 1.JUN.2017 13:44:34</p> <p>Band Edge, Left Side (Peak) - 802.11n40</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Date: 1.JUN.2017 13:51:33</p> <p>Band Edge, Right Side (Peak) - 802.11n40</p> <p>Note: F1 is frequency 2483.5MHz</p>
 <p>* RBW 1 MHz * Att 5 dB Batt Ref 102.0 dBμV SWT 24s</p> <p>M2[1] 36.16 dBμV 2.390000000 GHz</p> <p>Limit Check Line Limit 54 1Pk Max 90 dBμV Tdf 20 dBμV</p> <p>PASS M1[1] PASS</p> <p>CF 2.39 GHz Span 120.0 MHz</p>	<p>Note: (no need if PK value less than the AV limit)</p>
<p>Date: 1.JUN.2017 13:45:46</p> <p>Band Edge, Left Side (Average) - 802.11n40</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Band Edge, Right Side (Average) - 802.11n40</p> <p>Note: F1 is frequency 2483.5MHz</p>

Note: Both Horizontal and vertical polarities were investigated

6.6 AC Power Line Conducted Emissions

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1002mbar
Test date :	June 01, 2017
Tested By :	Vera Zhang

Requirement(s):

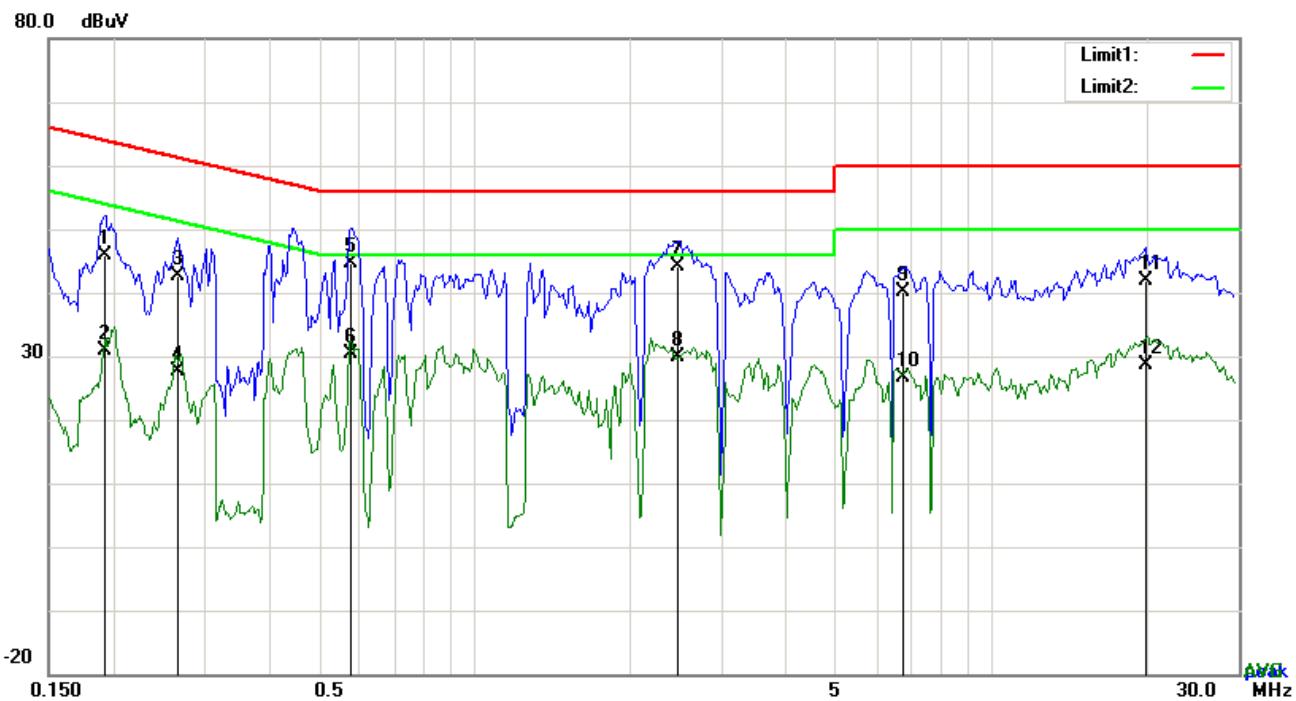
Spec	Item	Requirement	Applicable														
47CFR§15. 207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within 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"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss 																

	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	<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

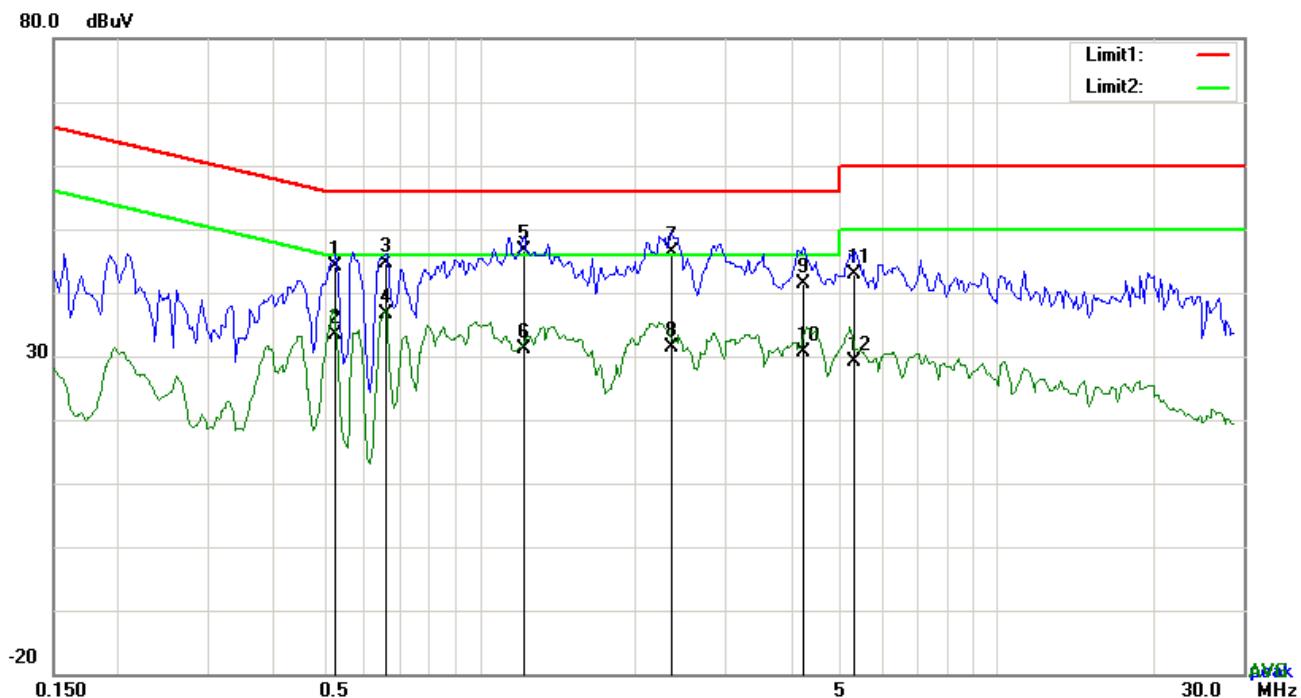


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	L1	0.1929	35.82	QP	10.03	45.85	63.91	-18.06
2	L1	0.1929	20.74	AVG	10.03	30.77	53.91	-23.14
3	L1	0.2670	32.64	QP	10.03	42.67	61.21	-18.54
4	L1	0.2670	17.58	AVG	10.03	27.61	51.21	-23.60
5	L1	0.5790	34.63	QP	10.03	44.66	56.00	-11.34
6	L1	0.5790	20.26	AVG	10.03	30.29	46.00	-15.71
7	L1	2.4861	34.17	QP	10.05	44.22	56.00	-11.78
8	L1	2.4861	19.72	AVG	10.05	29.77	46.00	-16.23
9	L1	6.7518	30.11	QP	10.10	40.21	60.00	-19.79
10	L1	6.7518	16.52	AVG	10.10	26.62	50.00	-23.38
11	L1	19.8675	31.49	QP	10.30	41.79	60.00	-18.21
12	L1	19.8675	18.23	AVG	10.30	28.53	50.00	-21.47

Test Mode: Transmitting Mode

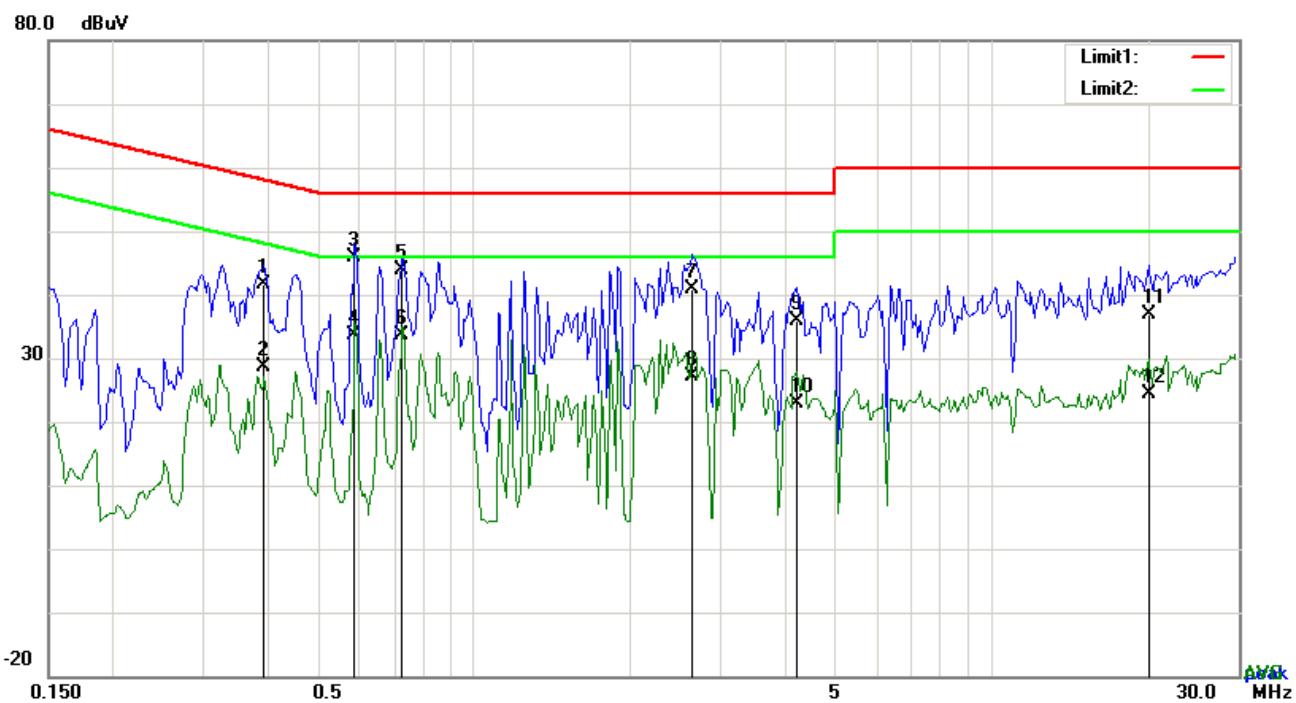


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	N	0.5283	34.02	QP	10.02	44.04	56.00	-11.96
2	N	0.5283	23.36	AVG	10.02	33.38	46.00	-12.62
3	N	0.6609	34.70	QP	10.02	44.72	56.00	-11.28
4	N	0.6609	26.71	AVG	10.02	36.73	46.00	-9.27
5	N	1.2186	36.54	QP	10.03	46.57	56.00	-9.43
6	N	1.2186	21.16	AVG	10.03	31.19	46.00	-14.81
7	N	2.3574	36.42	QP	10.04	46.46	56.00	-9.54
8	N	2.3574	21.26	AVG	10.04	31.30	46.00	-14.70
9	N	4.2402	31.33	QP	10.06	41.39	56.00	-14.61
10	N	4.2402	20.46	AVG	10.06	30.52	46.00	-15.48
11	N	5.3205	32.85	QP	10.07	42.92	60.00	-17.08
12	N	5.3205	19.18	AVG	10.07	29.25	50.00	-20.75

Test Mode: Transmitting Mode

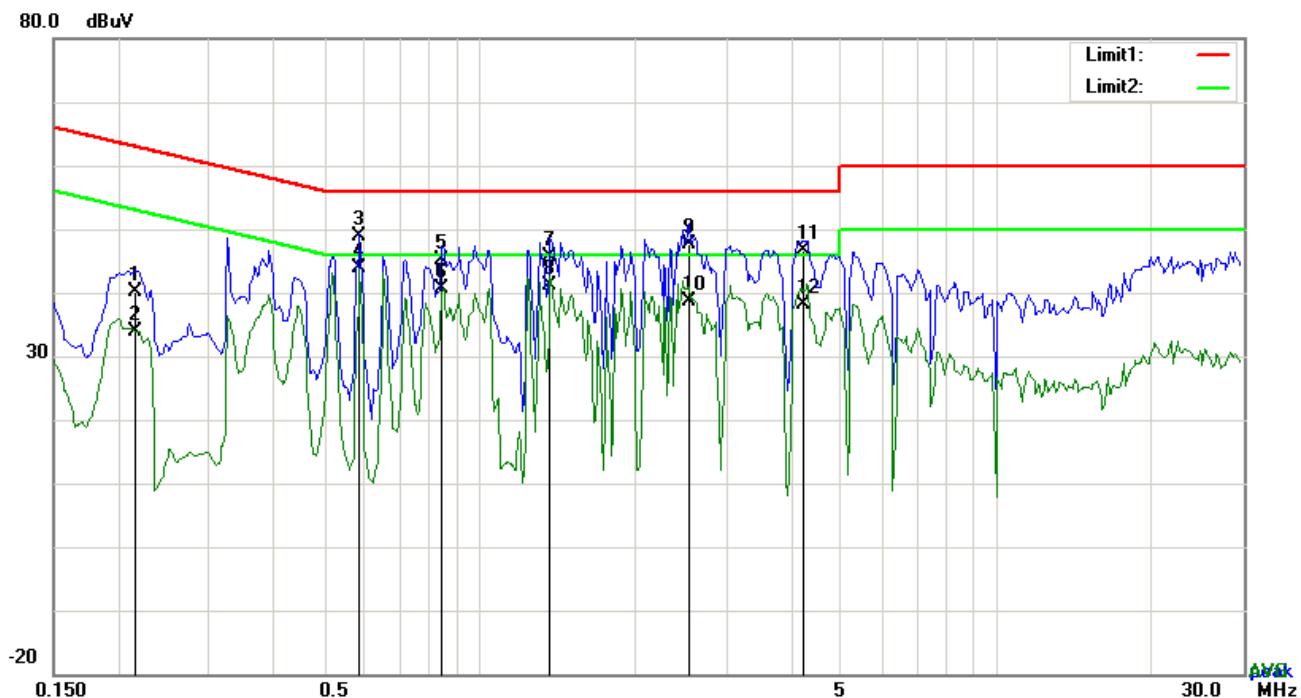


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	L1	0.3918	31.62	QP	10.03	41.65	58.03	-16.38
2	L1	0.3918	18.51	AVG	10.03	28.54	48.03	-19.49
3	L1	0.5868	35.74	QP	10.03	45.77	56.00	-10.23
4	L1	0.5868	23.66	AVG	10.03	33.69	46.00	-12.31
5	L1	0.7272	33.77	QP	10.03	43.80	56.00	-12.20
6	L1	0.7272	23.66	AVG	10.03	33.69	46.00	-12.31
7	L1	2.6226	30.85	QP	10.05	40.90	56.00	-15.10
8	L1	2.6226	17.17	AVG	10.05	27.22	46.00	-18.78
9	L1	4.1973	25.83	QP	10.07	35.90	56.00	-20.10
10	L1	4.1973	12.77	AVG	10.07	22.84	46.00	-23.16
11	L1	20.0625	26.57	QP	10.30	36.87	60.00	-23.13
12	L1	20.0625	14.09	AVG	10.30	24.39	50.00	-25.61

Test Mode: Transmitting Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

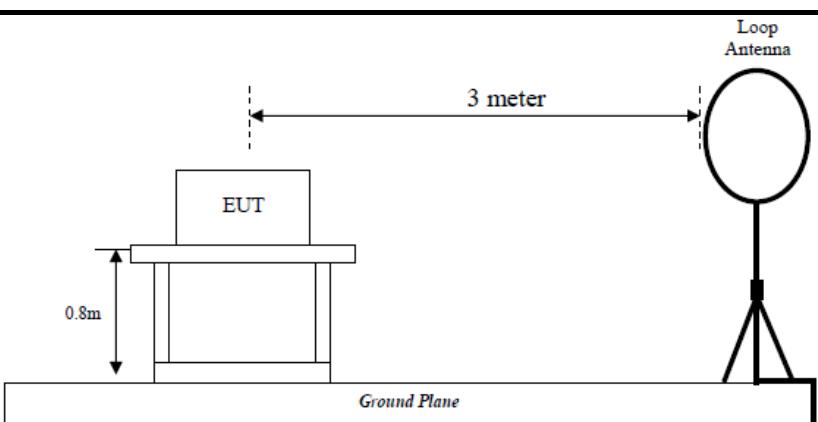
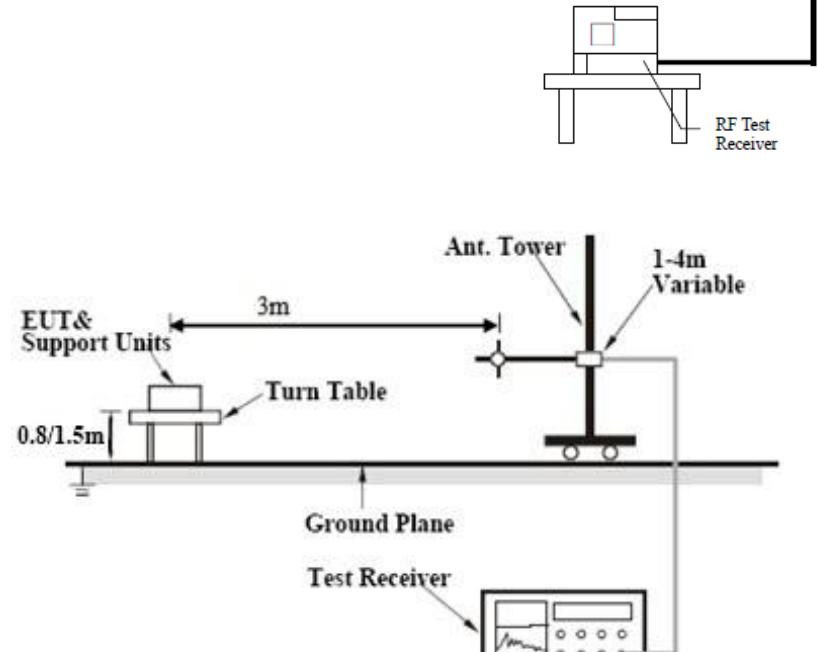
No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	N	0.2163	30.12	QP	10.02	40.14	62.96	-22.82
2	N	0.2163	23.82	AVG	10.02	33.84	52.96	-19.12
3	N	0.5868	38.94	QP	10.02	48.96	56.00	-7.04
4	N	0.5868	33.97	AVG	10.02	43.99	46.00	-2.01
5	N	0.8481	35.11	QP	10.03	45.14	56.00	-10.86
6	N	0.8481	30.56	AVG	10.03	40.59	46.00	-5.41
7	N	1.3707	35.65	QP	10.03	45.68	56.00	-10.32
8	N	1.3707	31.17	AVG	10.03	41.20	46.00	-4.80
9	N	2.5407	37.53	QP	10.05	47.58	56.00	-8.42
10	N	2.5407	28.65	AVG	10.05	38.70	46.00	-7.30
11	N	4.2441	36.52	QP	10.06	46.58	56.00	-9.42
12	N	4.2441	27.98	AVG	10.06	38.04	46.00	-7.96

6.7 Radiated Spurious Emissions & Restricted Band

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1002mbar
Test date :	June 01&21, 2017
Tested By :	Vera Zhang

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 (μV/m)</th> </tr> </thead> <tbody> <tr> <td>0.009~0.490</td> <td>2400/F(KHz)</td> </tr> <tr> <td>0.490~1.705</td> <td>24000/F(KHz)</td> </tr> <tr> <td>1.705~30.0</td> <td>30</td> </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> </tbody> </table>	Frequency range (MHz)	Field Strength (μ V/m)	0.009~0.490	2400/F(KHz)	0.490~1.705	24000/F(KHz)	1.705~30.0	30	30 – 88	100	88 – 216	150	216~960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (μ V/m)																		
0.009~0.490	2400/F(KHz)																		
0.490~1.705	24000/F(KHz)																		
1.705~30.0	30																		
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 shows a rectangular EUT (Equipment Under Test) mounted on a vertical support unit. The entire assembly sits on a Ground Plane. A Loop Antenna is positioned above the EUT, connected by a vertical cable. A horizontal dimension line indicates a distance of 3 meter between the center of the EUT and the center of the loop antenna. A vertical dimension line indicates a height of 0.8m from the ground plane to the top of the EUT.</p>  <p>The diagram shows a rectangular EUT & Support Units mounted on a vertical support unit, which is placed on a Turn Table. The entire setup rests on a Ground Plane. To the right, a tall Ant. Tower is connected to the turn table via a horizontal crossbar. The tower has a 1-4m Variable height adjustment mechanism. A Test Receiver is connected to the bottom of the turn table.</p>
Procedure	<ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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.

	<p>The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>
Remark	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 Result:

Test Mode:	Transmitting Mode
------------	-------------------

Frequency range: 9KHz - 30MHz

Freq. (MHz)	Detection value	Factor (dB/m)	Reading (dBuV/m)	Result (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)
--	--	--	--	--	--	>20
--	--	--	--	--	--	>20

Note:

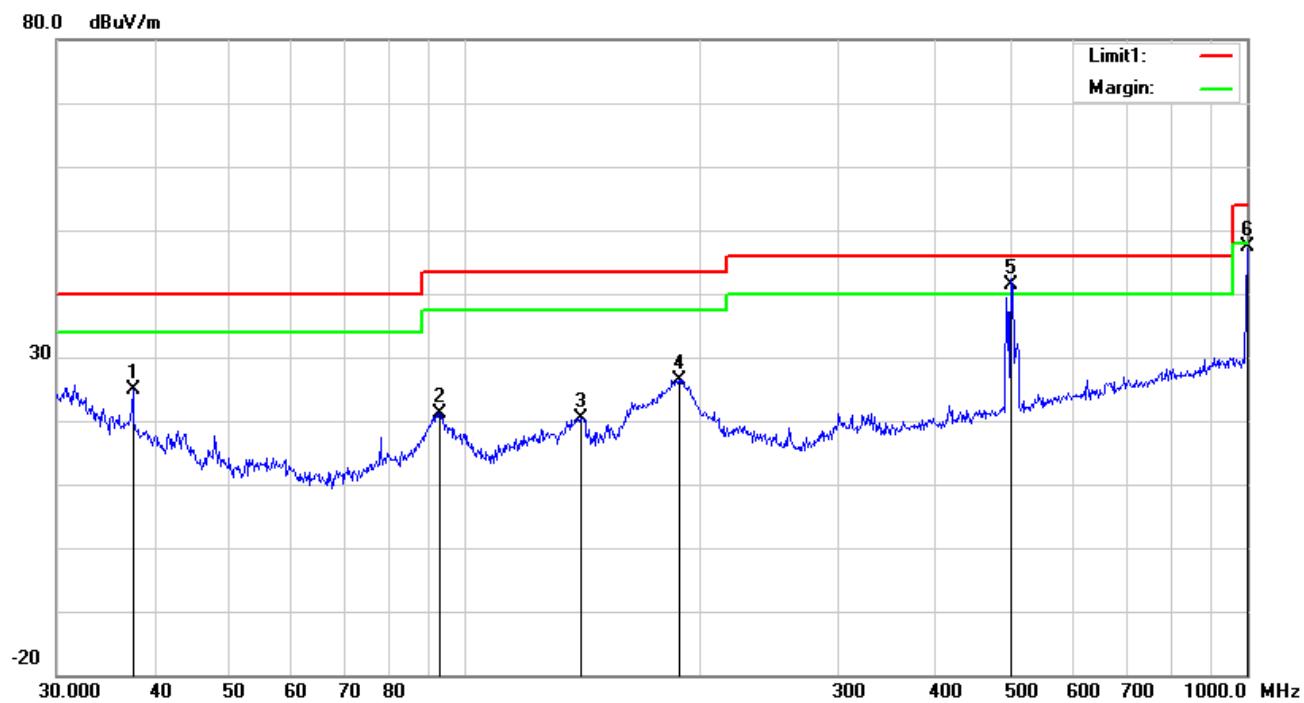
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})(\text{dB})$;

Limit line = specific limits(dBuv) + distance extrapolation factor.

Test Mode: Transmitting Mode

30MHz -1GHz

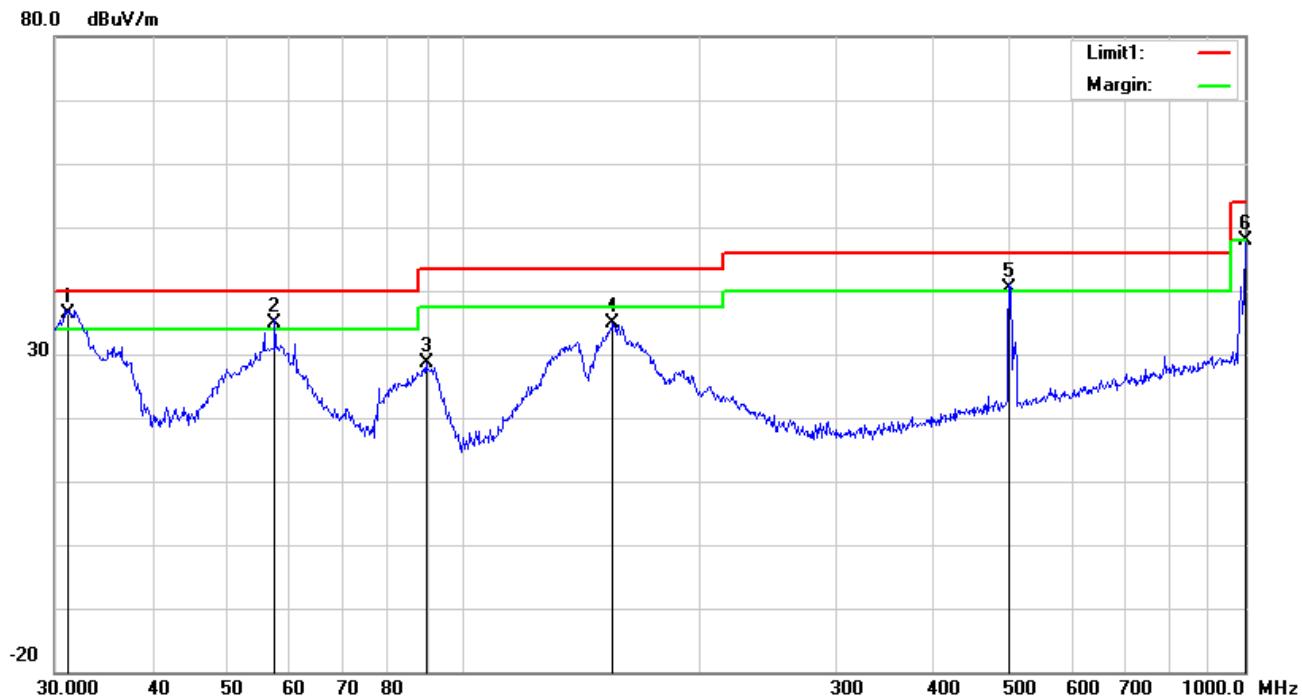


Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dB _{UV/m})		(dB/m)	(dB)	(dB)	(dB _{UV/m})	(dB _{UV/m})	(dB)	(cm)	()
1	H	37.5479	30.57	peak	15.69	22.27	0.78	24.77	40.00	-15.23	100	159
2	H	92.7872	33.87	peak	8.67	22.32	0.97	21.19	43.50	-22.31	200	284
3	H	140.3421	28.95	peak	12.60	22.41	1.27	20.41	43.50	-23.09	100	31
4	H	187.7530	35.86	peak	11.43	22.30	1.50	26.49	43.50	-17.01	100	131
5	H	499.4247	43.20	QP	17.69	21.81	2.42	41.50	46.00	-4.50	100	27
6	H	999.4681	41.53	QP	23.00	20.69	3.47	47.31	54.00	-6.69	100	234

30MHz -1GHz



Test Data

Horizontal Polarity Plot @3m

N o.	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	31.1798	37.63	QP	20.49	22.27	0.65	36.50	40.00	-3.50	200	128
2	V	57.3923	48.84	QP	7.59	22.40	0.77	34.80	40.00	-5.20	100	149
3	V	89.5900	42.07	peak	7.98	22.32	0.96	28.69	43.50	-14.81	100	71
4	V	155.3644	43.31	peak	12.60	22.30	1.37	34.98	43.50	-8.52	100	334
5	V	499.4247	42.10	QP	17.69	21.81	2.42	40.40	46.00	-5.60	100	129
6	V	1000.0000	42.22	QP	23.00	20.69	3.47	48.00	54.00	-6.00	100	345

Above 1GHz

Test Mode:	Transmitting Mode
------------	-------------------

Low Channel (2412 MHz) (b mode worst case)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4824	39.33	AV	V	33.8	6.86	32.69	47.3	54	-6.7
4824	38.67	AV	H	33.8	6.86	32.69	46.64	54	-7.36
4824	47.76	PK	V	33.8	6.86	32.69	55.73	74	-18.27
4824	47.84	PK	H	33.8	6.86	32.69	55.81	74	-18.19
17898	24.39	AV	V	45.12	11.57	32.11	48.97	54	-5.03
17898	22.43	AV	H	45.12	11.57	32.11	47.01	54	-6.99
17898	39.82	PK	V	45.12	11.57	32.11	64.4	74	-9.6
17898	38.98	PK	H	45.12	11.57	32.11	63.56	74	-10.44

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

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4874	38.96	AV	V	33.6	6.82	32.71	46.67	54	-7.33
4874	39.01	AV	H	33.6	6.82	32.71	46.72	54	-7.28
4874	48.05	PK	V	33.6	6.82	32.71	55.76	74	-18.24
4874	48.14	PK	H	33.6	6.82	32.71	55.85	74	-18.15
17931	24.52	AV	V	45.17	11.63	32.18	49.14	54	-4.86
17931	22.17	AV	H	45.17	11.63	32.18	46.79	54	-7.21
17931	39.71	PK	V	45.17	11.63	32.18	64.33	74	-9.67
17931	39.12	PK	H	45.17	11.63	32.18	63.74	74	-10.26

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

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4924	39.63	AV	V	33.83	6.95	32.79	47.62	54	-6.38
4924	38.49	AV	H	33.83	6.95	32.79	46.48	54	-7.52
4924	47.89	PK	V	33.83	6.95	32.79	55.88	74	-18.12
4924	47.93	PK	H	33.83	6.95	32.79	55.92	74	-18.08
17922	24.21	AV	V	45.19	11.61	32.24	48.77	54	-5.23
17922	23.08	AV	H	45.19	11.61	32.24	47.64	54	-6.36
17922	39.75	PK	V	45.19	11.61	32.24	64.31	74	-9.69
17922	38.92	PK	H	45.19	11.61	32.24	63.48	74	-10.52

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
AC Line Conducted					
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"/>
RF conducted test					
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"/>
Radiated Emissions					
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"/>
Active Antenna (9kHz-30MHz)	AL-130	121031	10/13/2016	10/12/2017	<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 - Lable View



EUT - Front View



EUT - Rear View



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EUT - Top View



EUT - Bottom View



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EUT - Left View



EUT - Right View

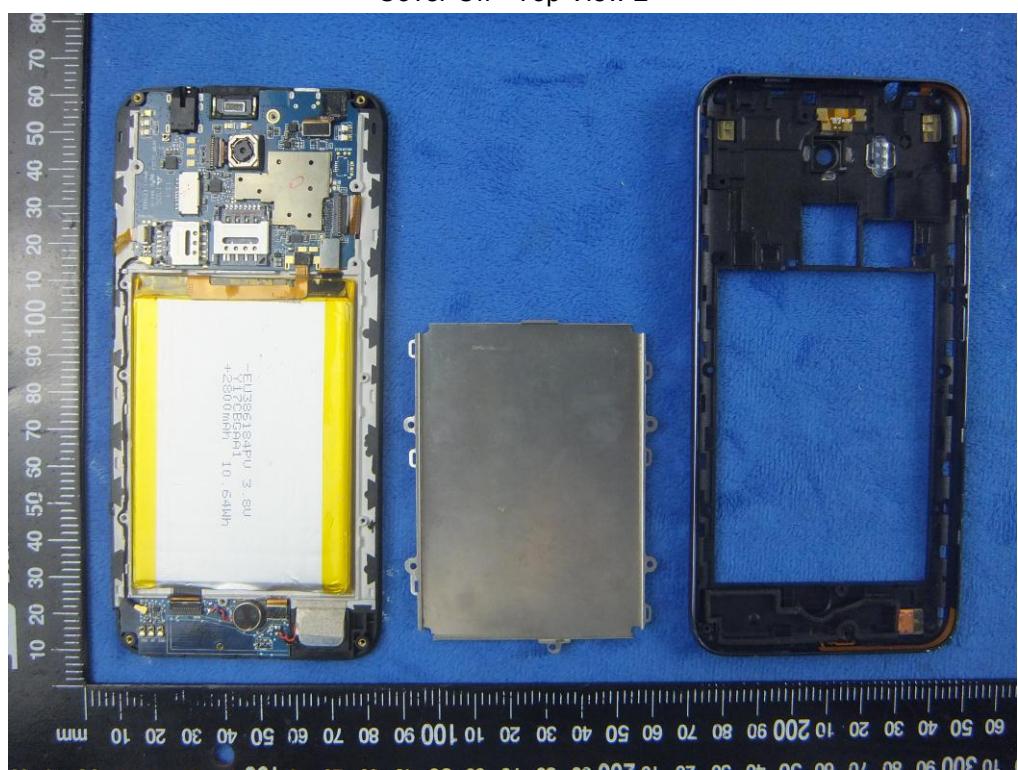


Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1



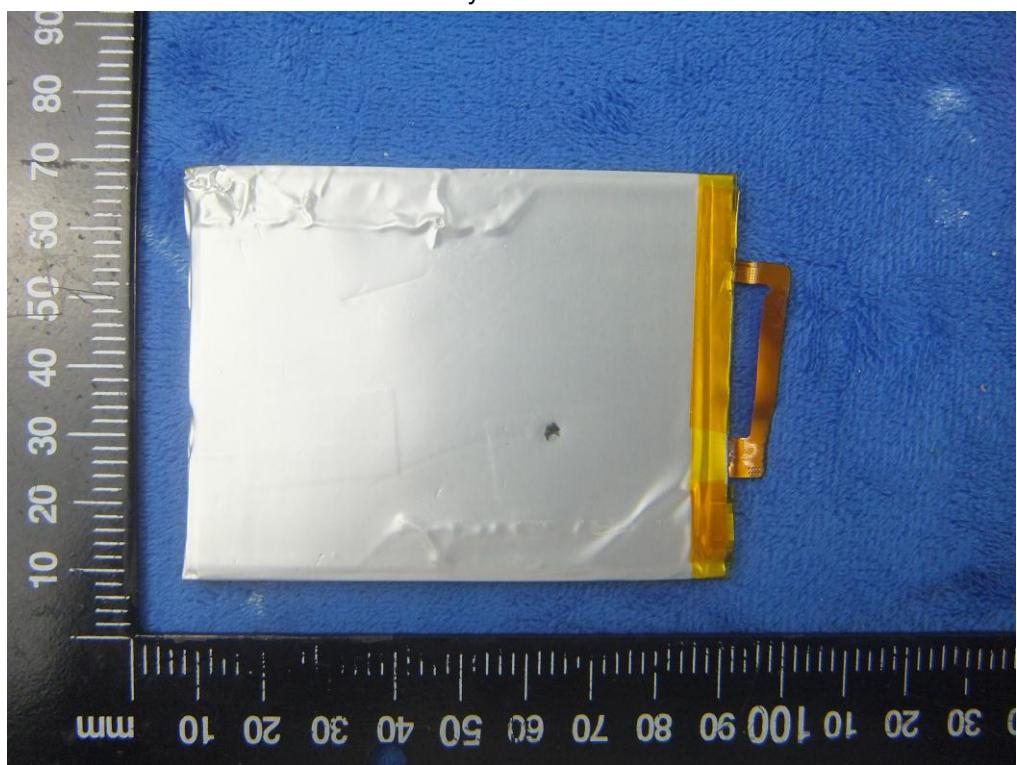
Cover Off - Top View 2



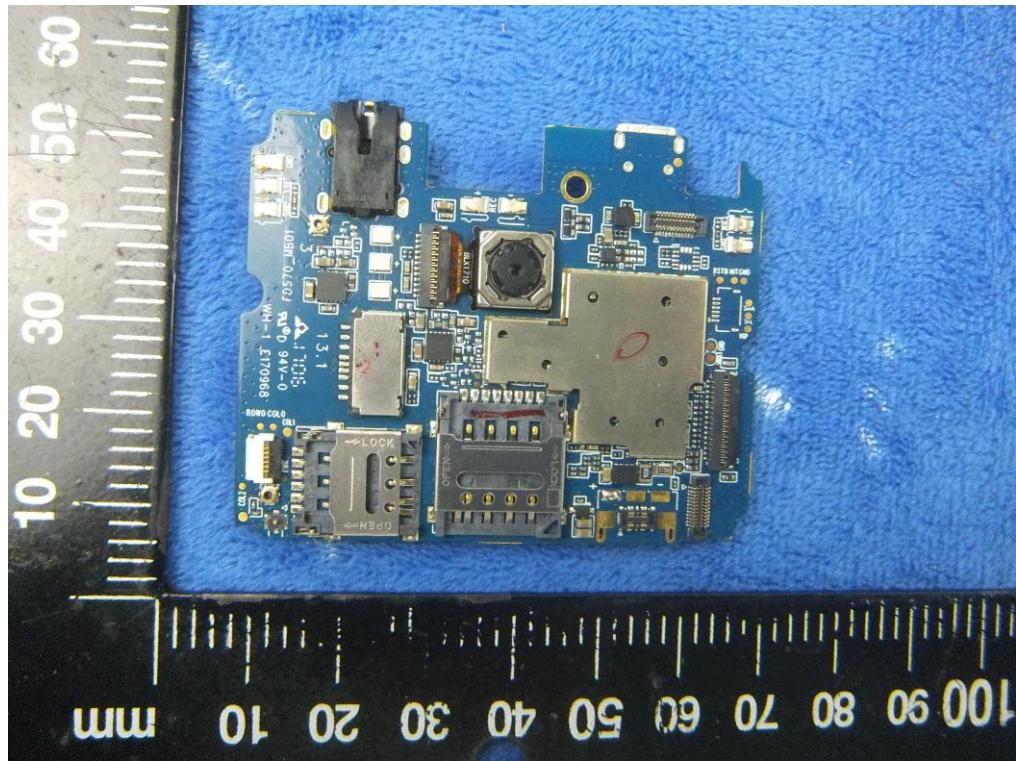
Battery - Front View



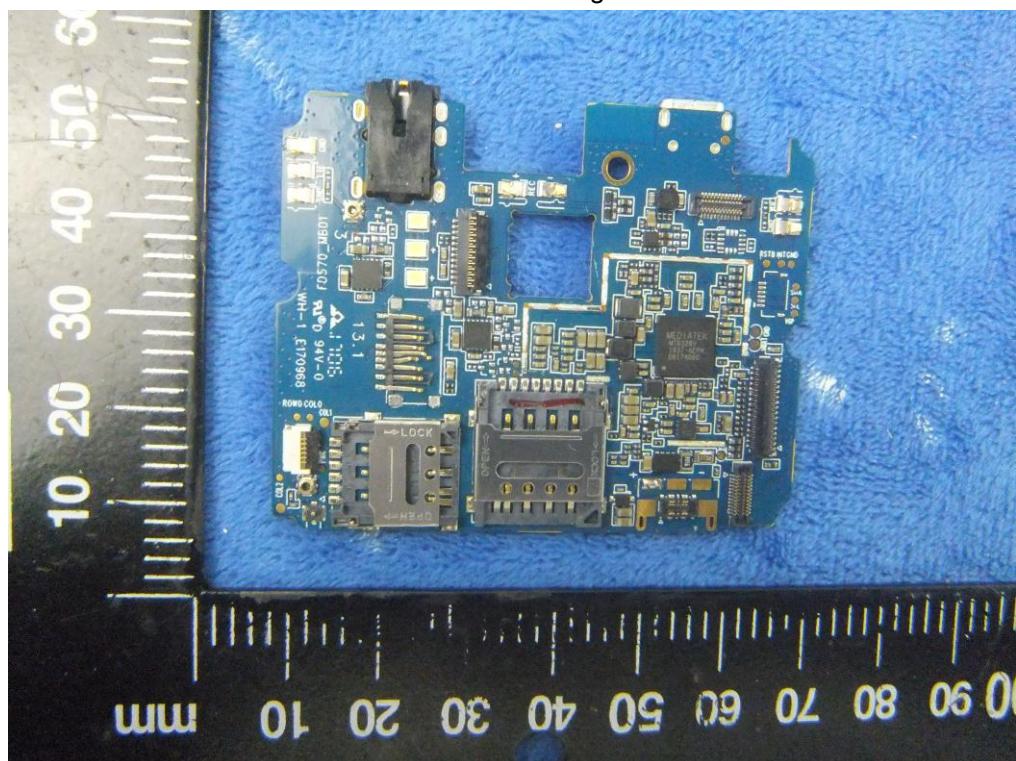
Battery - Rear View



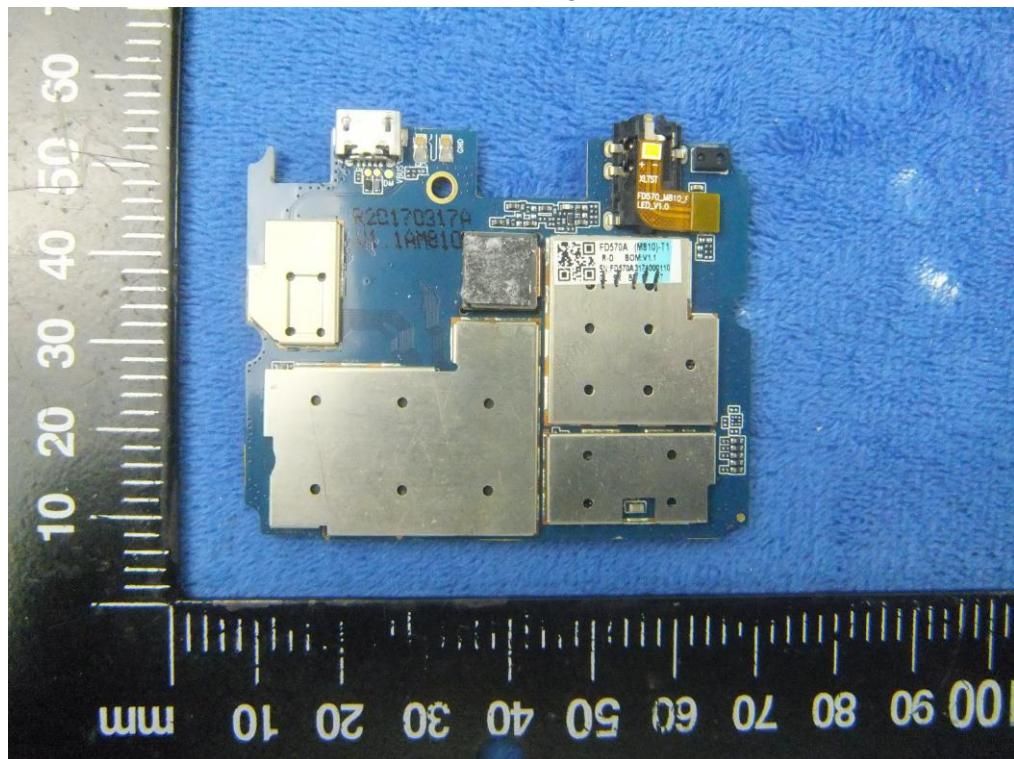
Mainboard with Shielding - Front View



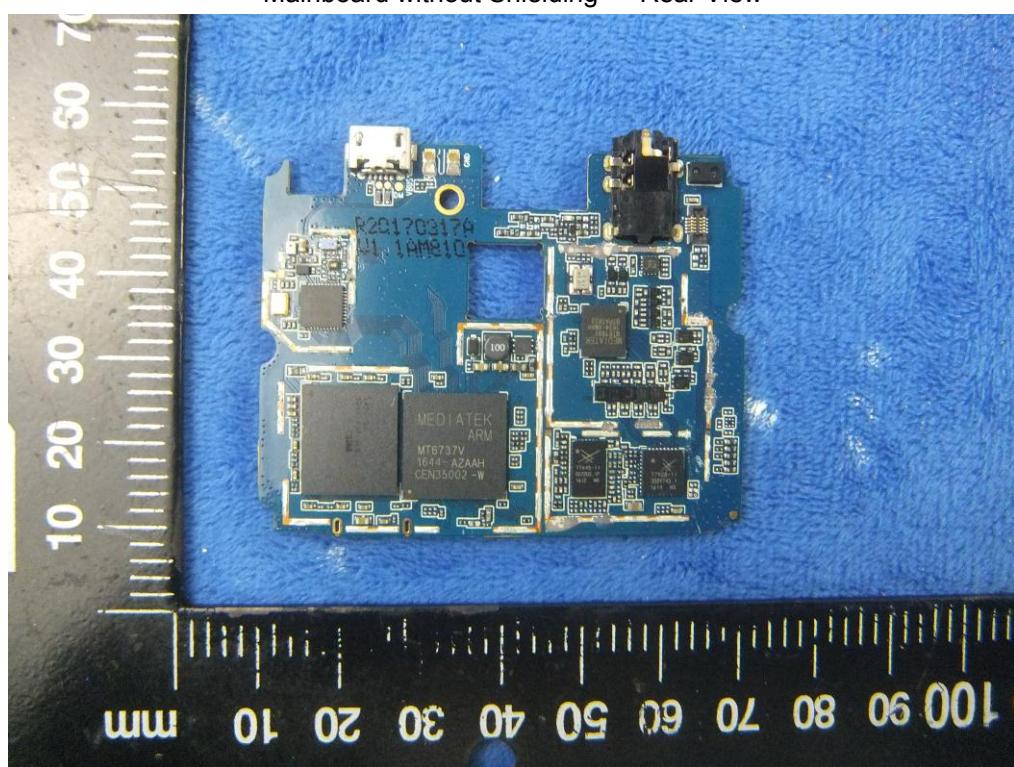
Mainboard without Shielding - Front View



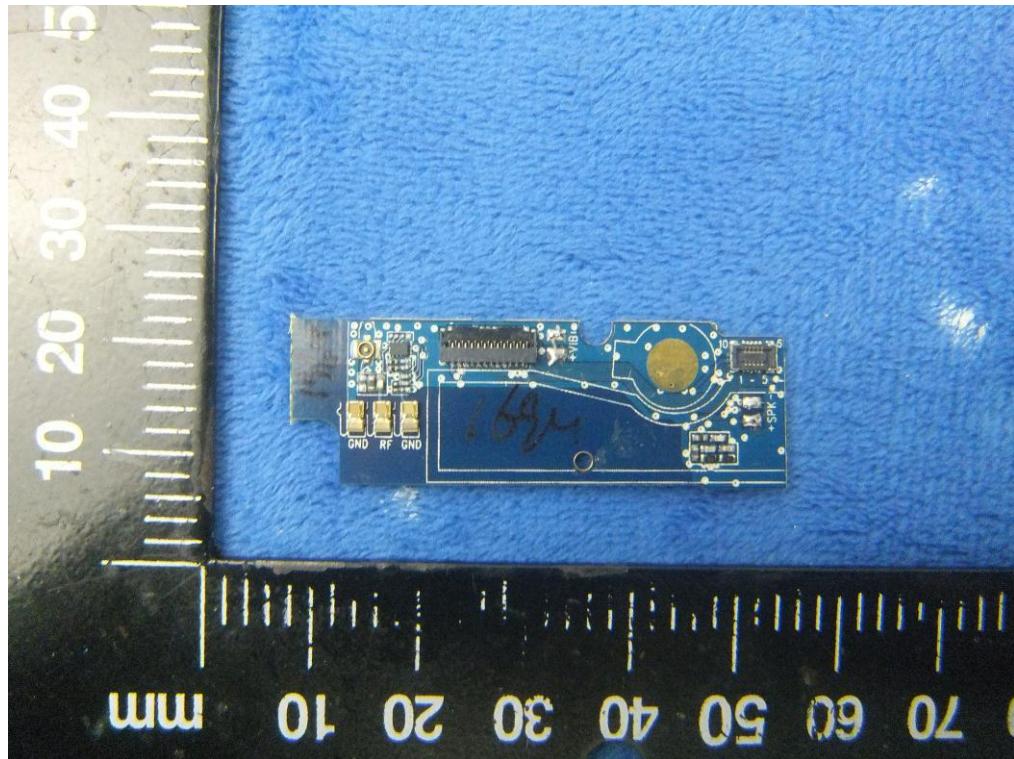
Mainboard with Shielding – Rear View



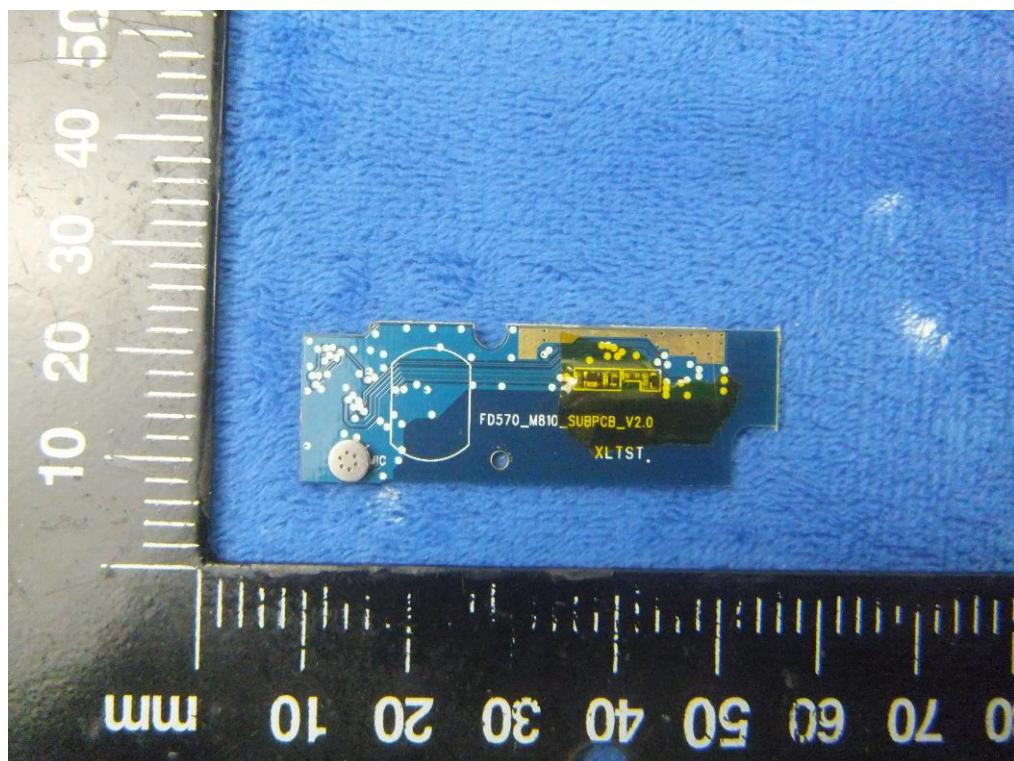
Mainboard without Shielding – Rear View



Smallboard – Front View



Smallboard – Rear View



LCD – Front View



LCD – Rear View



GSM/PCS/UMTS-FDD Antenna View



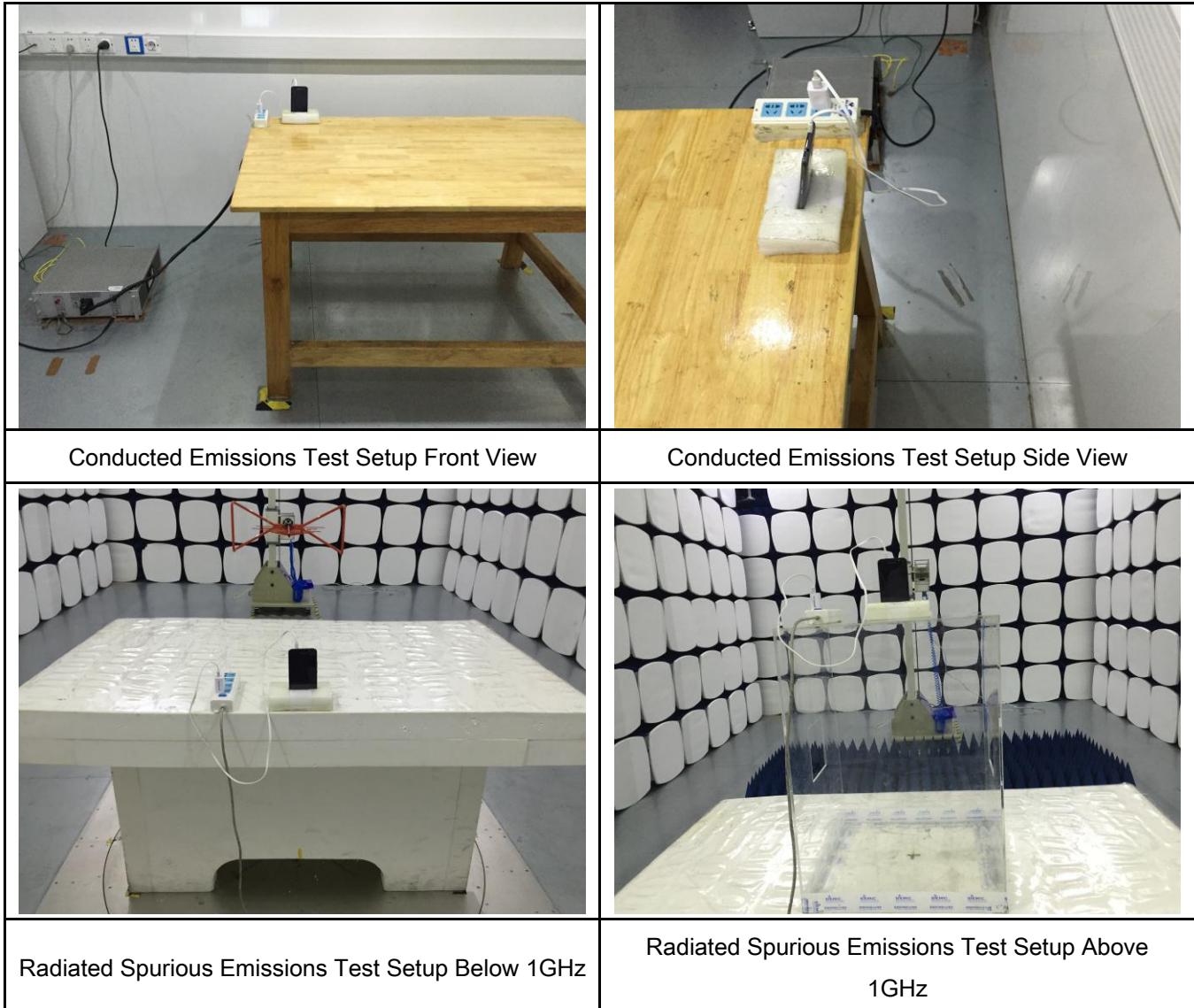
WIFI/BT/BLE - Antenna View



LTE - Antenna View



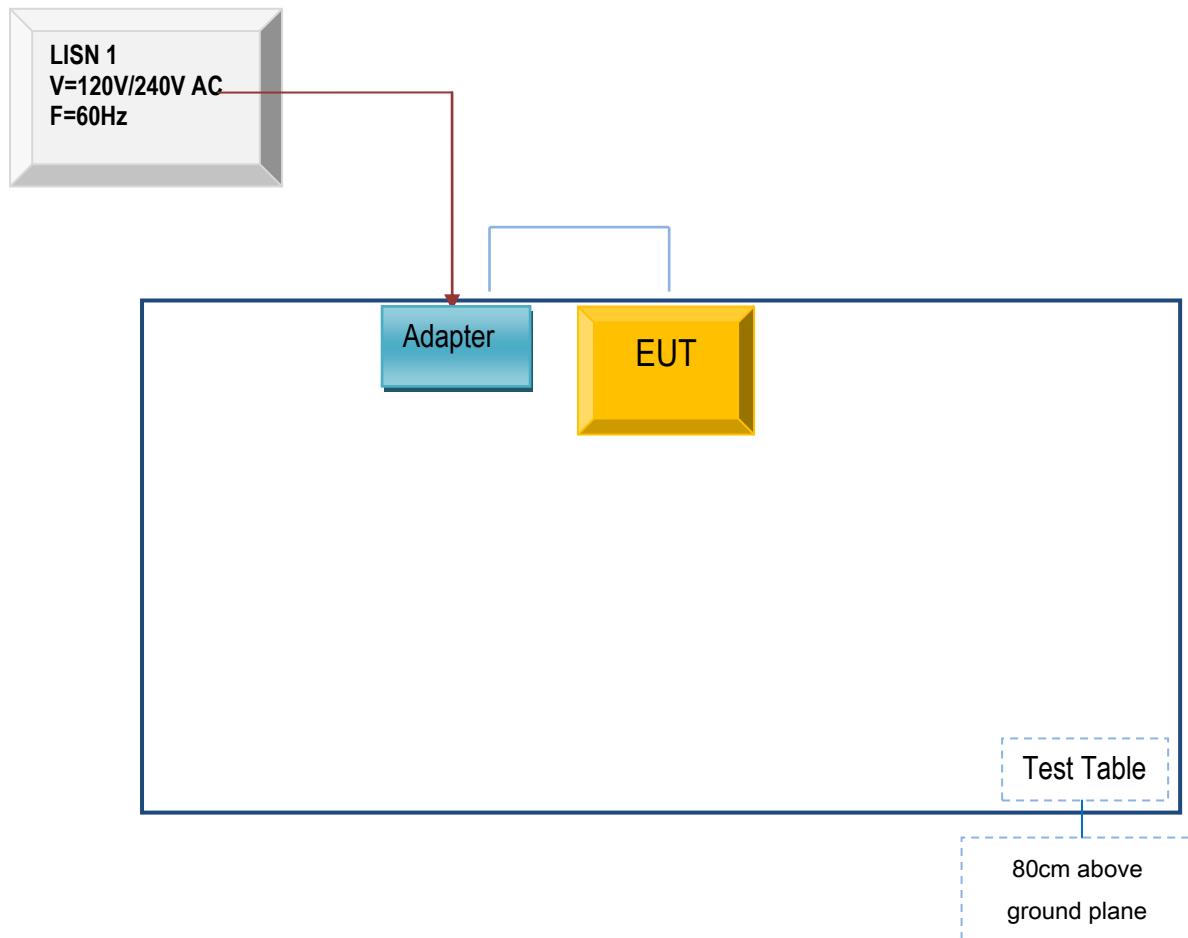
Annex B.iii. Photograph: Test Setup Photo



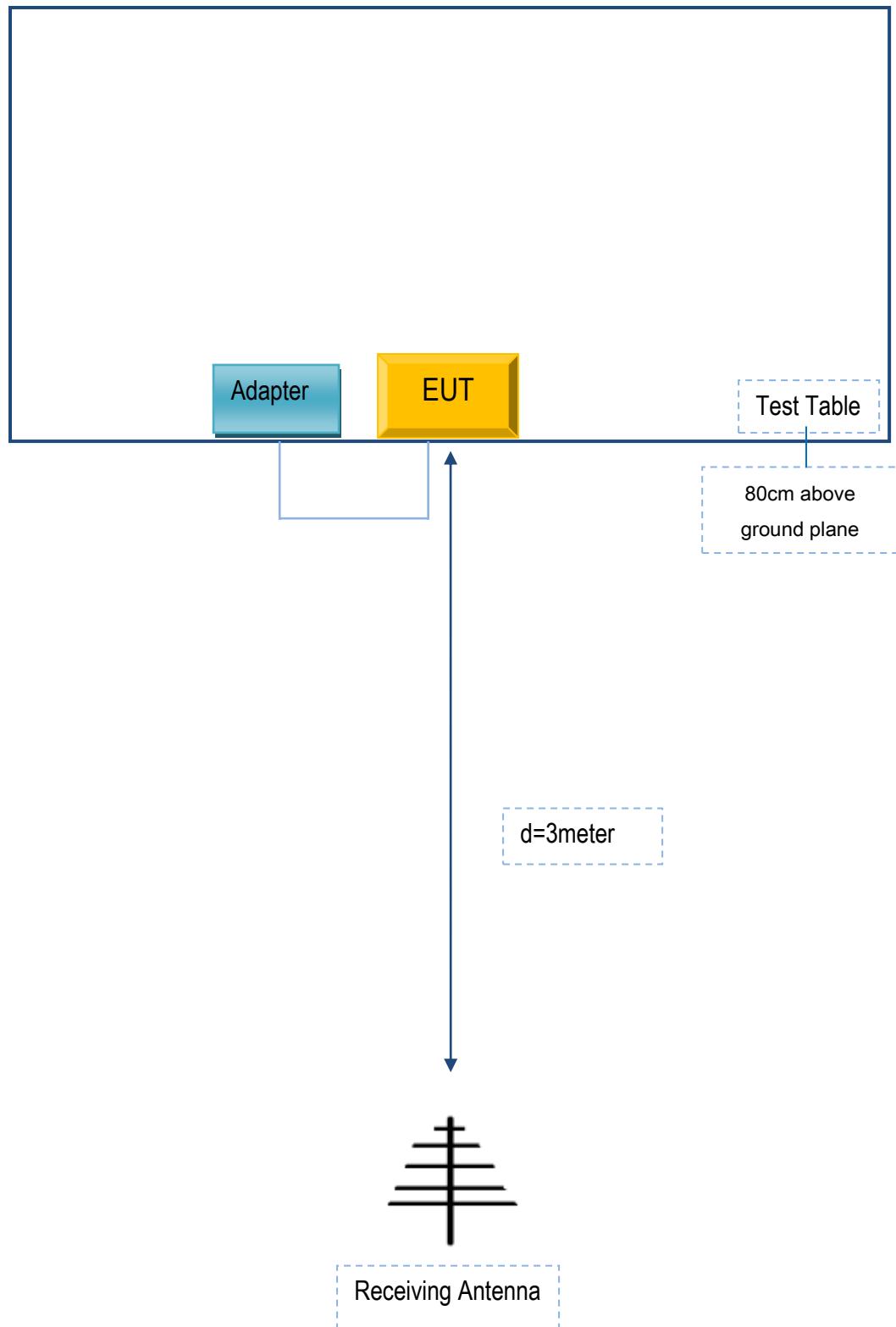
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

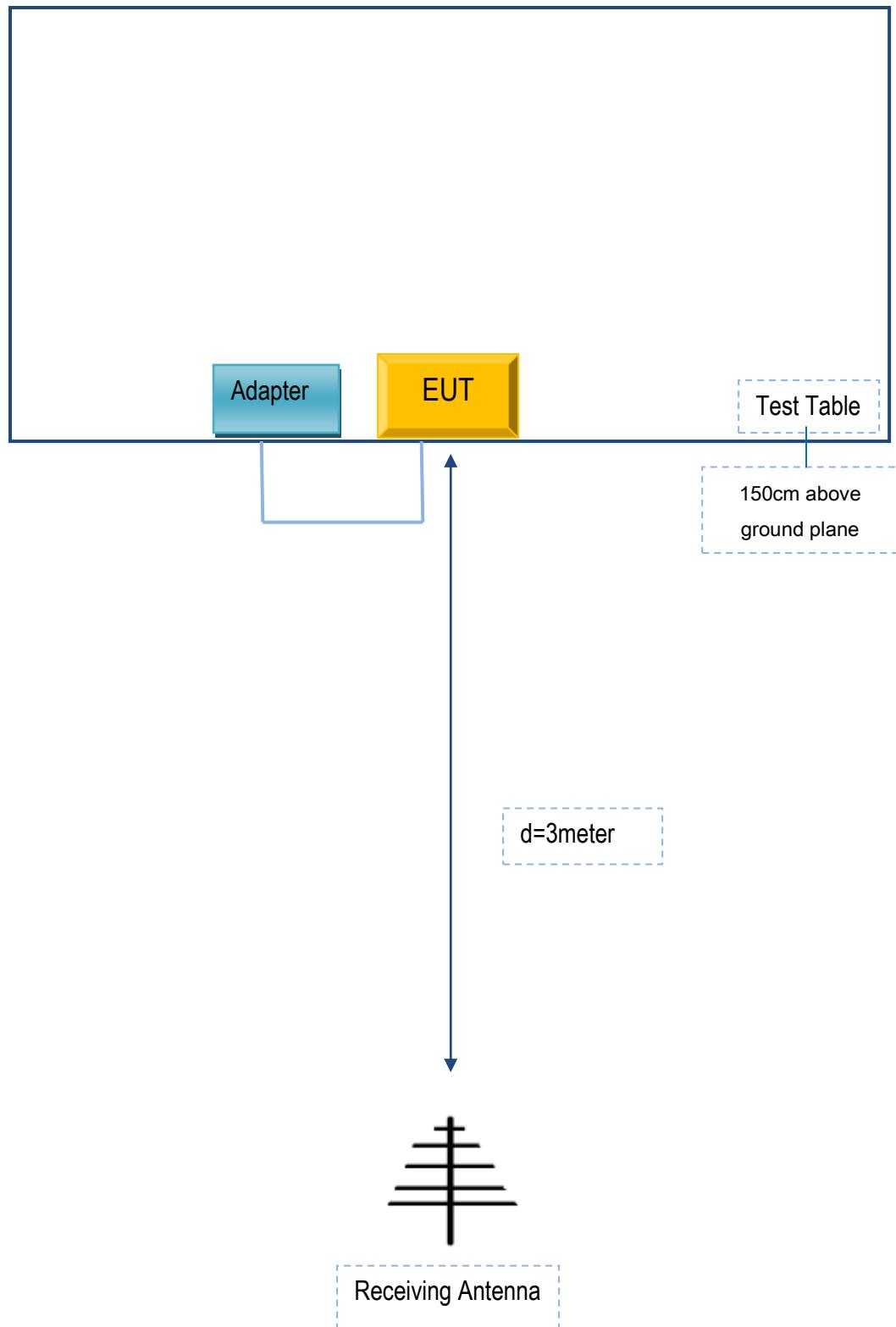
Block Configuration Diagram for AC Line Conducted Emissions



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
Verykool USA Inc	Adapter	TPA-46B050100UU	S20170127

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	S20170127

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A