

RF TEST REPORT



Report No.: 17070102-FCC-R4 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 Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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

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

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

Laboratories Introduction

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

Test Report No.	17070102-FCC-R4 V1
Page	3 of 52

This page has been left blank intentionally.

CONTENTS

1. REPORT REVISION HISTORY	5
2. CUSTOMER INFORMATION	5
3. TEST SITE INFORMATION	5
4. EQUIPMENT UNDER TEST (EUT) INFORMATION	6
5. TEST SUMMARY	9
6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS	10
6.1 ANTENNA REQUIREMENT	10
6.2 DTS (6 DB) CHANNEL BANDWIDTH	11
6.3 MAXIMUM OUTPUT POWER	13
6.4 POWER SPECTRAL DENSITY	15
6.5 BAND-EDGE & UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS	17
6.6 AC POWER LINE CONDUCTED EMISSIONS	20
6.7 RADIATED EMISSIONS & RESTRICTED BAND	26
ANNEX A. TEST INSTRUMENT	33
ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS	34
ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT	47
ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST	51
ANNEX E. DECLARATION OF SIMILARITY	52

1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070102-FCC-R4	NONE	Original	June 16, 2017
17070102-FCC-R4 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.lcp-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

Antenna Gain:

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 Type: PIFA antenna

Type of Modulation:	<p>GSM / GPRS: GMSK</p> <p>EGPRS: GMSK,8PSK</p> <p>UMTS-FDD: QPSK</p> <p>LTE Band: QPSK, 16QAM</p> <p>802.11b/g/n: DSSS, OFDM</p> <p>Bluetooth: GFSK, π /4DQPSK, 8DPSK</p> <p>BLE: GFSK</p> <p>GPS:BPSK</p>
RF Operating Frequency (ies):	<p>GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz</p> <p>PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz</p> <p>UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz</p> <p>UMTS-FDD Band IV TX:1712.4 ~ 1752.6 MHz;</p> <p style="padding-left: 100px;">RX : 2112.4 ~ 2152.6 MHz</p> <p>UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz;</p> <p style="padding-left: 100px;">RX: 1932.4 ~ 1987.6 MHz</p> <p>LTE Band II TX: 1850.7 ~ 1909.3MHz; RX : 1930.7 ~ 1989.3 MHz</p> <p>LTE Band IV TX: 1710.7 ~ 1754.3 MHz; RX : 2110.7~ 2154.3 MHz</p> <p>LTE Band V TX: 824.7~ 848.3 MHz; RX : 869.7 ~ 893.3MHz</p> <p>LTE Band VII TX: 2502.5 ~ 2567.5 MHz; RX : 2622.5 ~ 2687.5 MHz</p> <p>LTE Band XII TX:699.7 ~ 715.3 MHz; RX : 729.7~ 745.3MHz</p> <p>LTE Band XVII TX: 706.5 ~ 713.5 MHz; RX : 736.5 ~ 743.5 MHz</p> <p>WIFI: 802.11b/g/n(20M): 2412-2462 MHz</p> <p>WIFI: 802.11n(40M): 2422-2452 MHz</p> <p>Bluetooth& BLE: 2402-2480 MHz</p> <p>GPS: 1575.42 MHz</p>
Max. Output Power:	4.628dBm

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

Port: USB Port, Earphone Port

Trade Name : verykool

Input Power: Adapter:
Model: TPA-46B050100UU
Input: AC100-240V~50/60Hz,0.2A
Output: DC 5.0V,1000mA
Battery:
Spec: 3.8V,2800mAh(10.64wh)

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) 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:

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

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

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

Antenna Connector Construction

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.

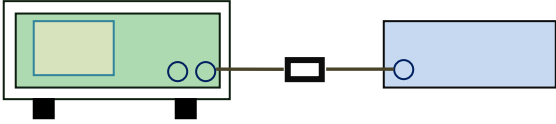
A permanently attached PIFA antenna for LTE Band II/ IV/V/VII/XII/XVII, the gain is -1.2dBi for LTE Band II, the gain is -2.2dBi for LTE Band IV, the gain is -2.1dBi for LTE Band V, the gain is 0.2dBi for LTE Band VII, the gain is -1.7dBi for LTE XII, the gain is -1.8dBi for LTE Band XVII.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB) 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 ≥ 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	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r03, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure</p> <ul style="list-style-type: none"> - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. <p>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>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data ☒ Yes ☐ N/A

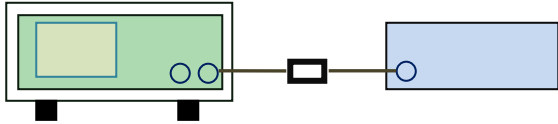
Test Plot ☒ Yes (See below) ☐ N/A

6dB Bandwidth - High CH 2480

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 ≥ 75 channels: ≤ 1 Watt	<input type="checkbox"/>
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	<input type="checkbox"/>
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤ 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 1 Watt	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r03, 9.1.2 Integrated band power method Maximum output power measurement procedure</p> <p>a) Set the RBW \geq DTS bandwidth. b) Set VBW $\geq 3 \times$ RBW. c) Set span $\geq 3 \times$ RBW d) Sweep time = auto couple. e) Detector = peak. f) Trace mode = max hold. g) Allow trace to fully stabilize. h) Use peak marker function to determine the peak amplitude level.</p>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data ☒ Yes ☐ N/A

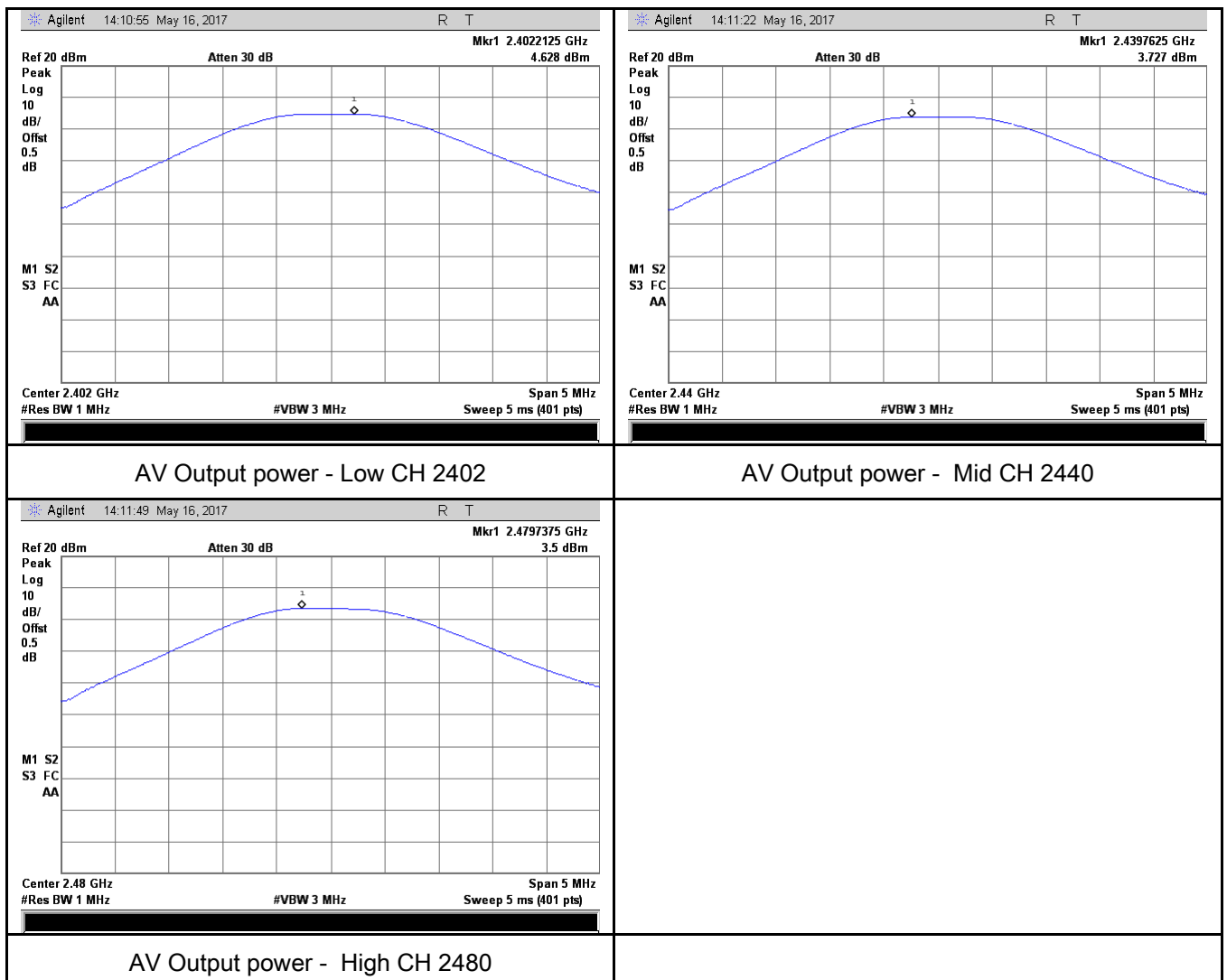
Test Plot ☒ Yes (See below) ☐ N/A

Output Power measurement result

Test Data

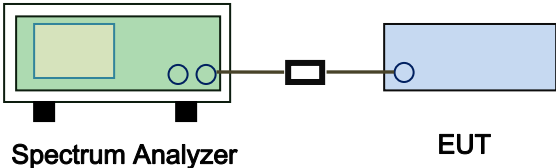
Type	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	Low	2402	4.628	30	Pass
	Mid	2440	3.727	30	Pass
	High	2480	3.500	30	Pass

Test Plots



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

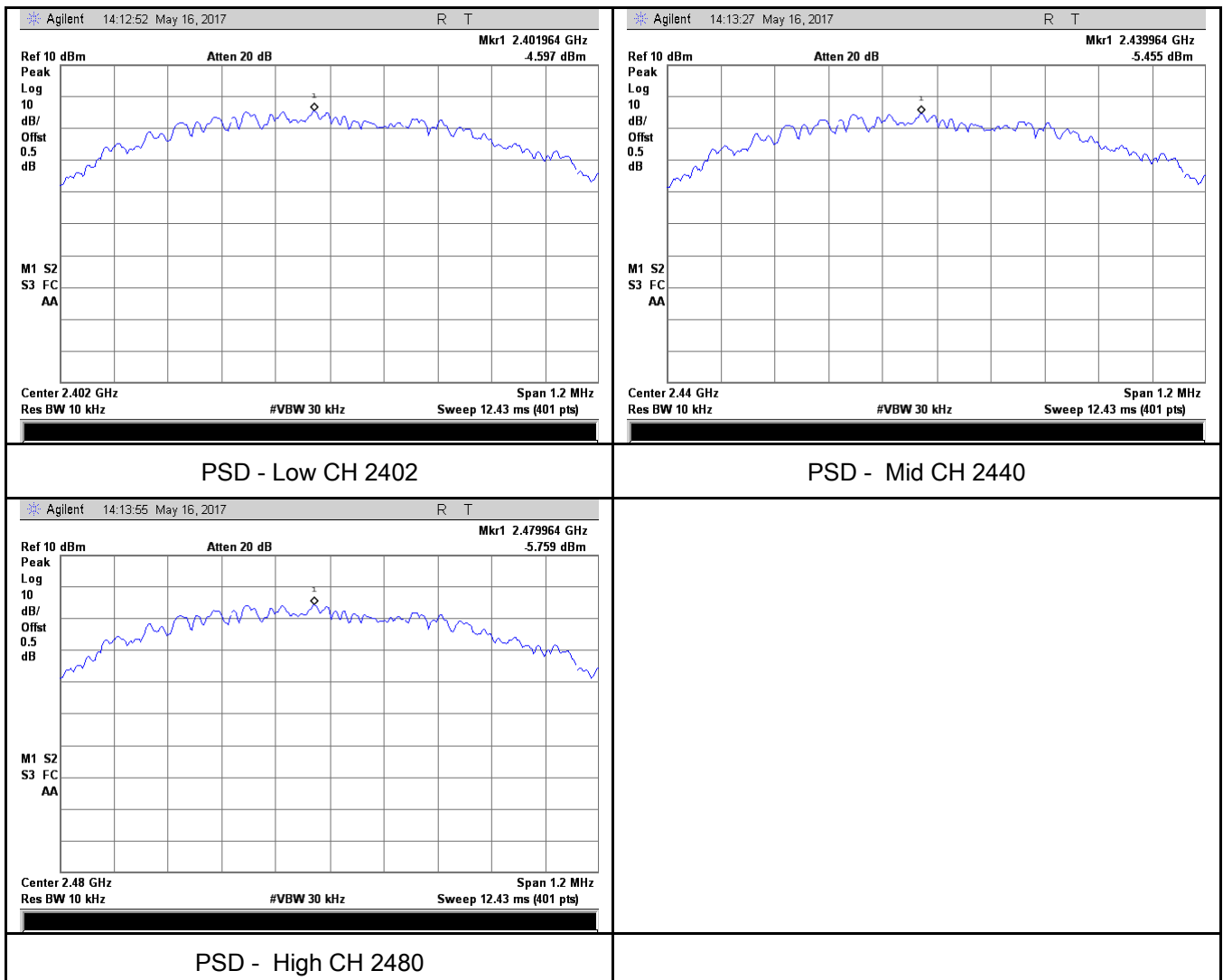
Power Spectral Density measurement result

Test Data

Type	CH	Freq (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Result
PSD	Low	2402	-4.597	-5.23	-15.726	8	Pass
	Mid	2440	-5.455	-5.23	-16.513	8	Pass
	High	2480	-5.759	-5.23	-19.036	8	Pass

Note: factor=10log(3/10)=-5.23

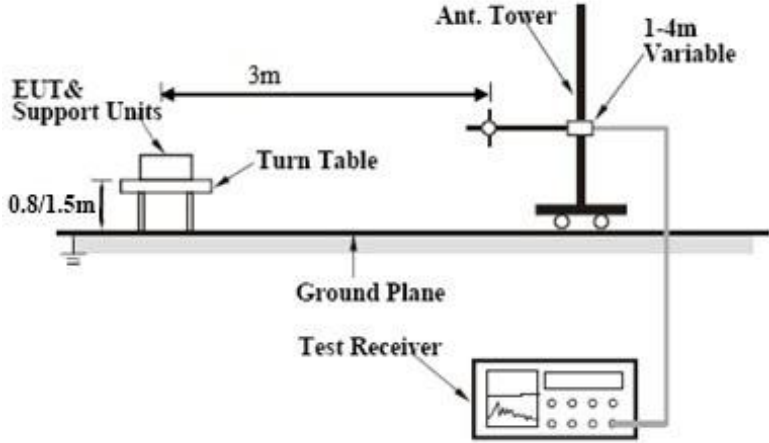
Test Plots



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):

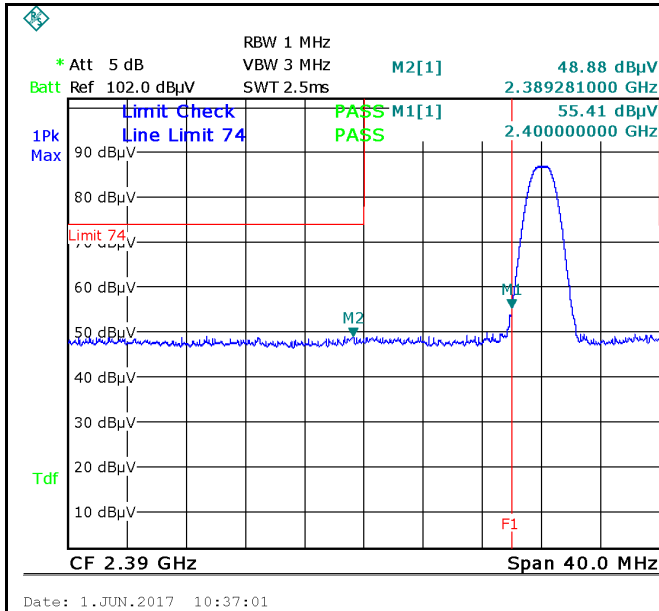
Spec	Item	Requirement	Applicable
§15.247(d)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100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

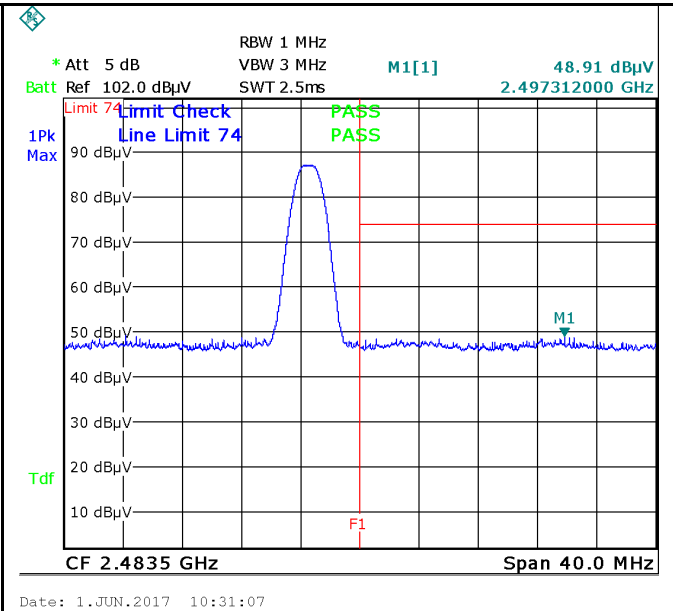
Test Plots

Band Edge measurement result



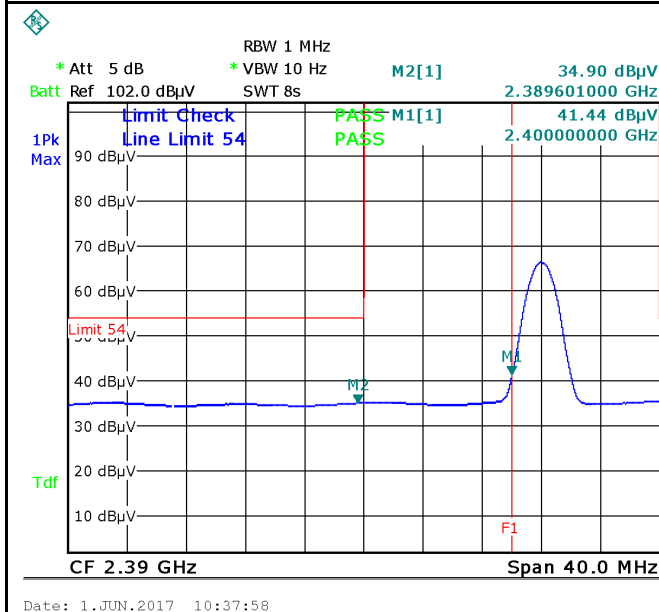
Band Edge, Left Side (Peak)

Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz



Band Edge, Right Side (Peak)

Note: F1 is frequency 2483.5MHz



Band Edge, Left Side-AV

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

Band Edge, Right Side-AV

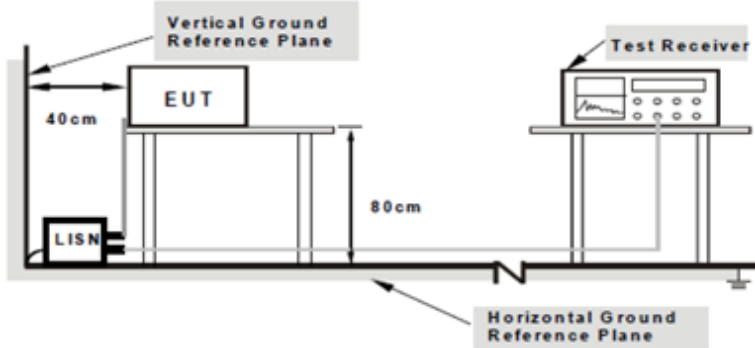
Note: Both Horizontal and vertical polarities were investigated.

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)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu] H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	<div><input checked="" type="checkbox"/></div>		
		Frequency ranges (MHz)		Limit (dBµV)	
				QP	Average
		0.15 ~ 0.5		66 – 56	56 – 46
		0.5 ~ 5		56	46
5 ~ 30	60	50			

Test Setup	 <p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>
------------	---

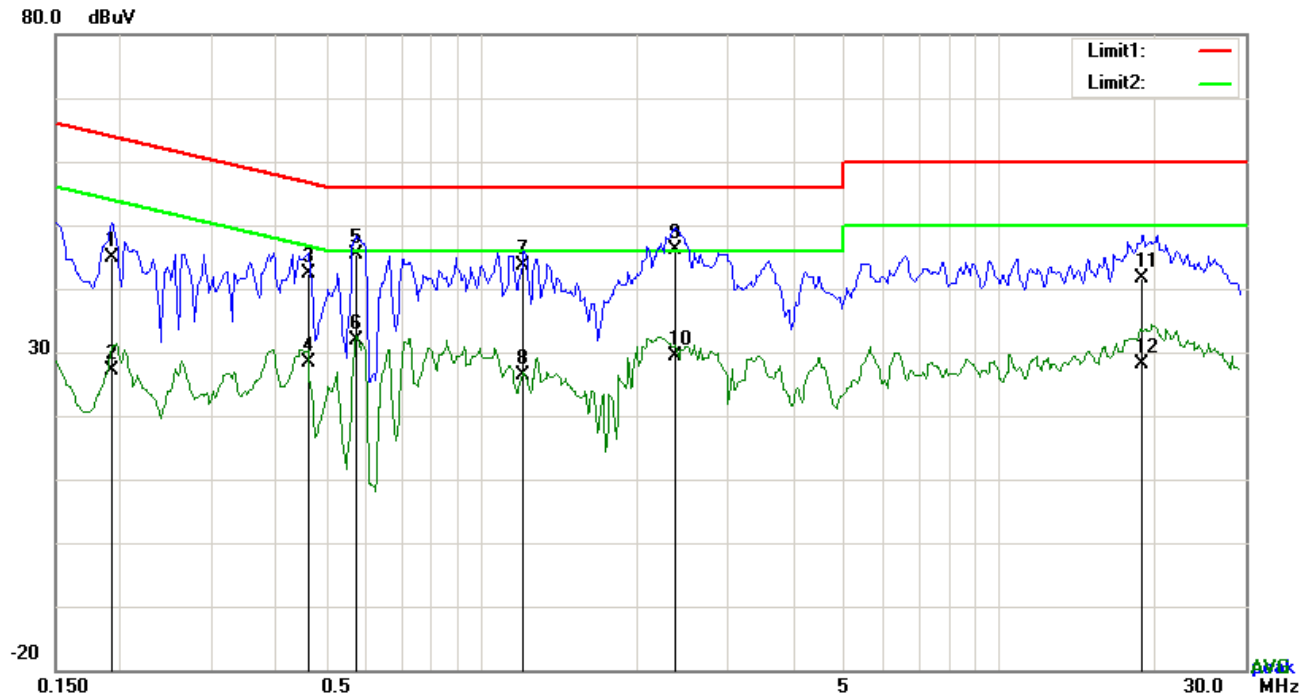
Procedure	<ol style="list-style-type: none"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss
-----------	---

	<p>coaxial cable.</p> <ol style="list-style-type: none"> 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver. 7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. 8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Mode: Transmitting Mode

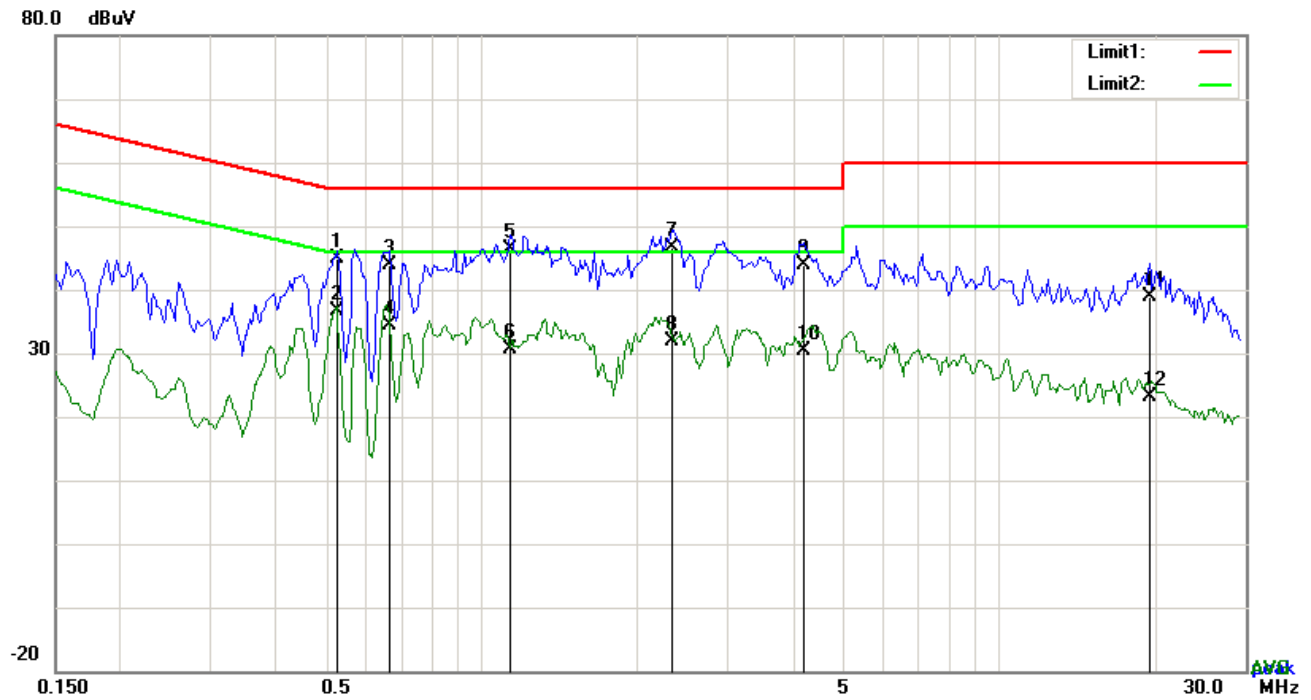


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	L1	0.1929	34.87	QP	10.03	44.90	63.91	-19.01
2	L1	0.1929	17.05	AVG	10.03	27.08	53.91	-26.83
3	L1	0.4620	32.25	QP	10.03	42.28	56.66	-14.38
4	L1	0.4620	18.40	AVG	10.03	28.43	46.66	-18.23
5	L1	0.5751	35.26	QP	10.03	45.29	56.00	-10.71
6	L1	0.5751	21.78	AVG	10.03	31.81	46.00	-14.19
7	L1	1.2069	33.66	QP	10.03	43.69	56.00	-12.31
8	L1	1.2069	16.42	AVG	10.03	26.45	46.00	-19.55
9	L1	2.3691	36.18	QP	10.05	46.23	56.00	-9.77
10	L1	2.3691	19.31	AVG	10.05	29.36	46.00	-16.64
11	L1	19.0173	31.30	QP	10.29	41.59	60.00	-18.41
12	L1	19.0173	17.88	AVG	10.29	28.17	50.00	-21.83

Test Mode: Transmitting Mode

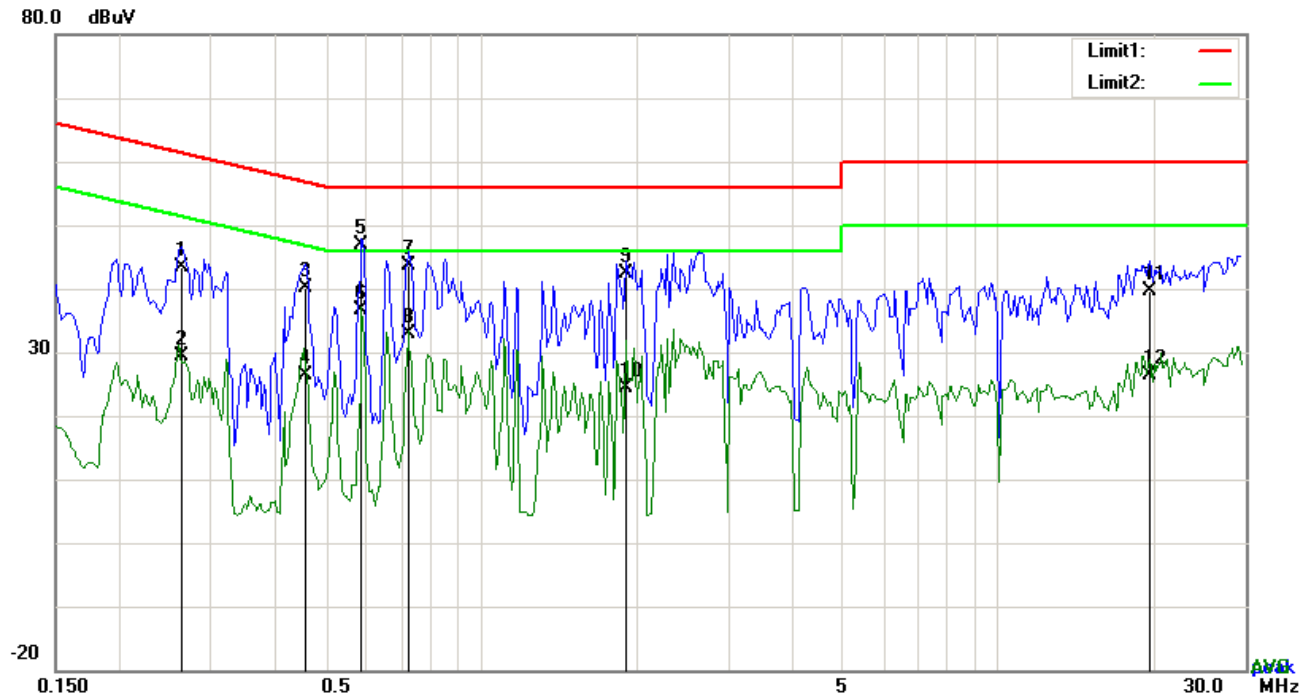


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	N	0.5244	34.87	QP	10.02	44.89	56.00	-11.11
2	N	0.5244	26.66	AVG	10.02	36.68	46.00	-9.32
3	N	0.6648	33.74	QP	10.02	43.76	56.00	-12.24
4	N	0.6648	24.40	AVG	10.02	34.42	46.00	-11.58
5	N	1.1367	36.23	QP	10.03	46.26	56.00	-9.74
6	N	1.1367	20.53	AVG	10.03	30.56	46.00	-15.44
7	N	2.3418	36.56	QP	10.04	46.60	56.00	-9.40
8	N	2.3418	21.74	AVG	10.04	31.78	46.00	-14.22
9	N	4.2012	33.88	QP	10.06	43.94	56.00	-12.06
10	N	4.2012	20.27	AVG	10.06	30.33	46.00	-15.67
11	N	19.5555	28.73	QP	10.25	38.98	60.00	-21.02
12	N	19.5555	12.90	AVG	10.25	23.15	50.00	-26.85

Test Mode: Transmitting Mode

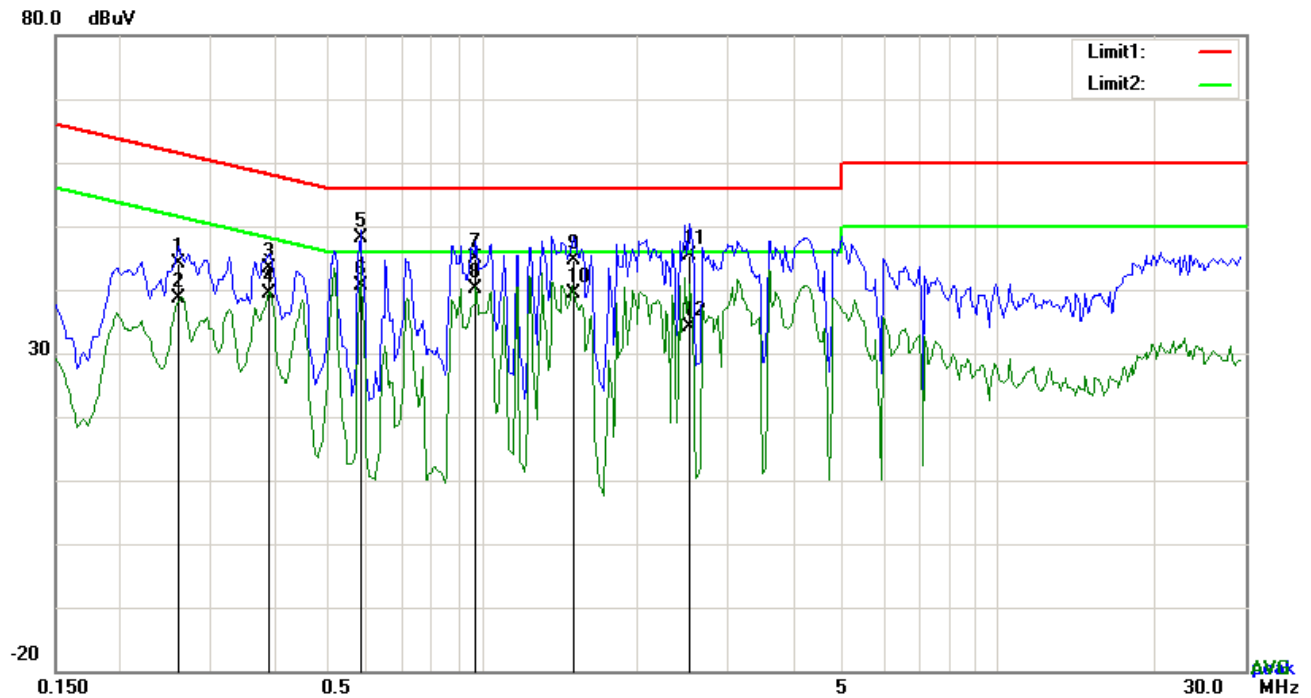


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	L1	0.2631	33.30	QP	10.03	43.33	61.33	-18.00
2	L1	0.2631	19.41	AVG	10.03	29.44	51.33	-21.89
3	L1	0.4581	30.11	QP	10.03	40.14	56.73	-16.59
4	L1	0.4581	16.32	AVG	10.03	26.35	46.73	-20.38
5	L1	0.5868	36.85	QP	10.03	46.88	56.00	-9.12
6	L1	0.5868	26.60	AVG	10.03	36.63	46.00	-9.37
7	L1	0.7233	33.71	QP	10.03	43.74	56.00	-12.26
8	L1	0.7233	22.74	AVG	10.03	32.77	46.00	-13.23
9	L1	1.9050	32.23	QP	10.04	42.27	56.00	-13.73
10	L1	1.9050	14.32	AVG	10.04	24.36	46.00	-21.64
11	L1	19.5399	29.39	QP	10.29	39.68	60.00	-20.32
12	L1	19.5399	16.00	AVG	10.29	26.29	50.00	-23.71

Test Mode: Transmitting Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	N	0.2592	34.15	QP	10.02	44.17	61.46	-17.29
2	N	0.2592	28.57	AVG	10.02	38.59	51.46	-12.87
3	N	0.3879	33.24	QP	10.02	43.26	58.11	-14.85
4	N	0.3879	29.32	AVG	10.02	39.34	48.11	-8.77
5	N	0.5829	38.21	QP	10.02	48.23	56.00	-7.77
6	N	0.5829	30.58	AVG	10.02	40.60	46.00	-5.40
7	N	0.9768	34.87	QP	10.03	44.90	56.00	-11.10
8	N	0.9768	30.22	AVG	10.03	40.25	46.00	-5.75
9	N	1.5033	34.49	QP	10.04	44.53	56.00	-11.47
10	N	1.5033	29.24	AVG	10.04	39.28	46.00	-6.72
11	N	2.5329	35.25	QP	10.05	45.30	56.00	-10.70
12	N	2.5329	24.09	AVG	10.05	34.14	46.00	-11.86

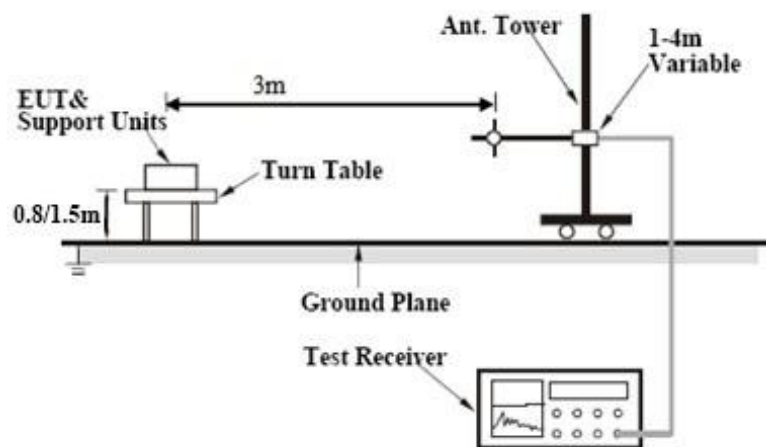
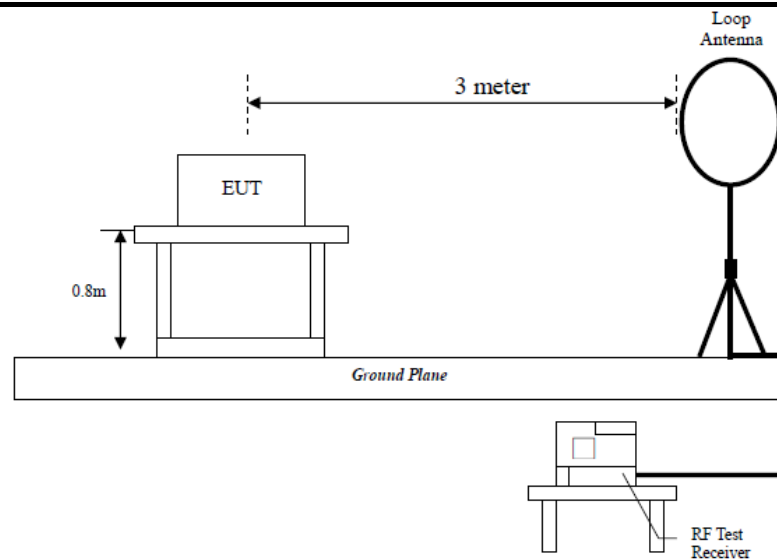
6.7 Radiated Emissions & Restricted Band

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)	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	<input checked="" type="checkbox"/>																
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (µV/m)</th></tr><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></table>		Frequency range (MHz)	Field Strength (µV/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
		Frequency range (MHz)		Field Strength (µV/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)	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	<input checked="" type="checkbox"/>																	
	<input checked="" type="checkbox"/> 20 dB down <input type="checkbox"/> 30 dB down																		
c)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	<input checked="" type="checkbox"/>																	

Test Setup



Procedure

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:
 - 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 Quasi 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:

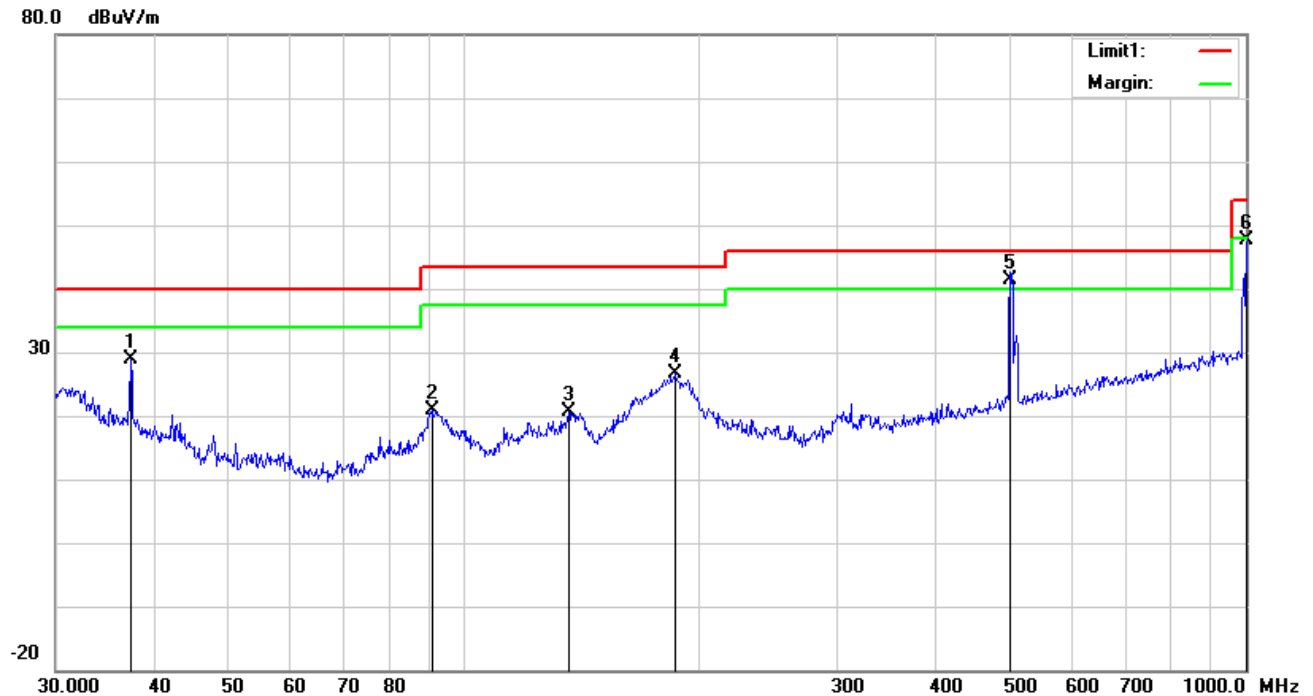
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

Test Mode: Transmitting Mode

30MHz -1GHz

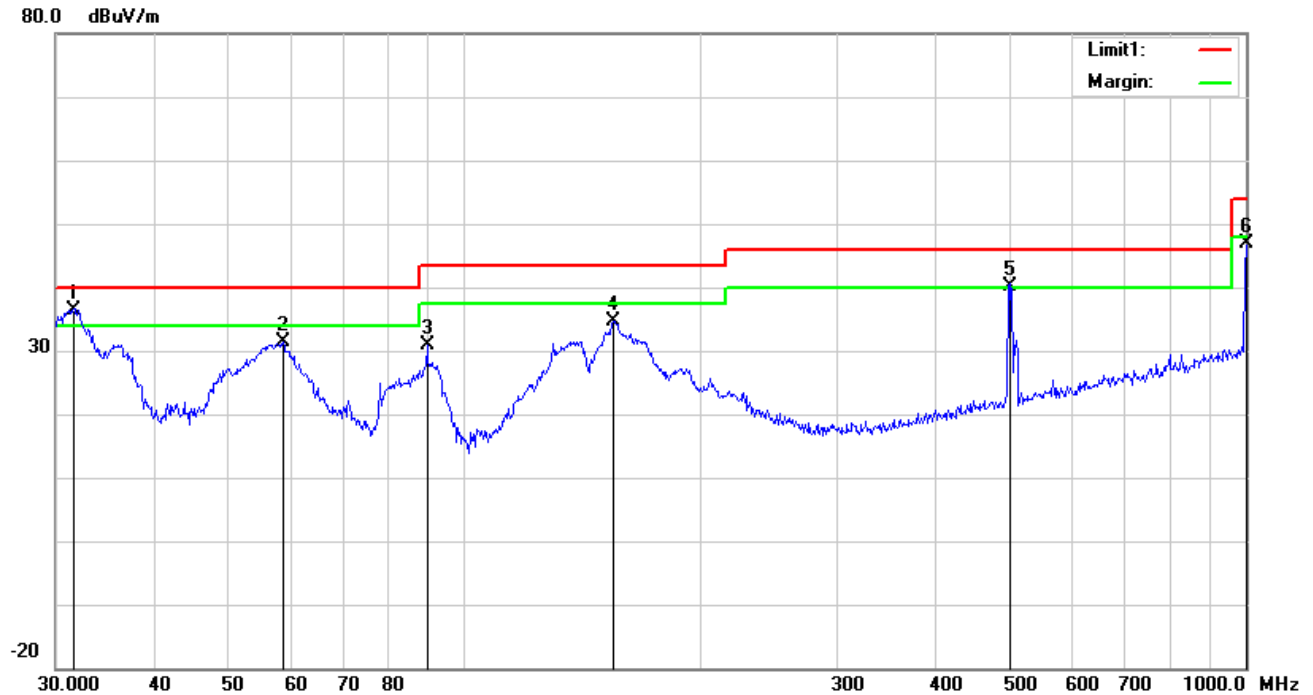


Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	37.4165	34.58	peak	15.79	22.26	0.77	28.88	40.00	-11.12	100	303
2	H	91.1746	33.90	peak	8.28	22.32	0.96	20.82	43.50	-22.68	100	104
3	H	135.9822	28.85	peak	12.86	22.40	1.24	20.55	43.50	-22.95	100	39
4	H	186.4409	36.19	peak	11.35	22.29	1.48	26.73	43.50	-16.77	100	127
5	H	499.4247	43.00	QP	17.69	21.81	2.42	41.30	46.00	-4.70	100	95
6	H	999.4680	41.85	QP	23.00	20.69	3.47	47.63	54.00	-6.37	100	227

30MHz -1GHz



Test Data

Horizontal Polarity Plot @3m

N o.	P/ L	Frequency (MHz)	Reading (dBuV/m)	Detect or	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degr ee ()
1	V	31.6202	37.75	QP	20.15	22.27	0.67	36.30	40.00	-3.70	100	119
2	V	58.6126	45.51	peak	7.45	22.41	0.76	31.31	40.00	-8.69	100	303
3	V	89.5900	44.28	peak	7.98	22.32	0.96	30.90	43.50	-12.60	100	13
4	V	154.8205	43.04	peak	12.60	22.31	1.36	34.69	43.50	-8.81	200	134
5	V	499.4247	41.90	QP	17.69	21.81	2.42	40.20	46.00	-5.80	100	116
6	V	1000.0000	41.20	peak	23.00	20.69	3.47	46.98	54.00	-7.02	100	252

Above 1GHz

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

Low Channel (2402 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	39.29	AV	V	33.83	6.86	31.72	48.26	54	-5.74
4804	38.05	AV	H	33.83	6.86	31.72	47.02	54	-6.98
4804	48.79	PK	V	33.83	6.86	31.72	57.76	74	-16.24
4804	47.7	PK	H	33.83	6.86	31.72	56.67	74	-17.33
17791	24.22	AV	V	45.03	11.21	32.38	48.08	54	-5.92
17791	23.67	AV	H	45.03	11.21	32.38	47.53	54	-6.47
17791	40.98	PK	V	45.03	11.21	32.38	64.84	74	-9.16
17791	40.66	PK	H	45.03	11.21	32.38	64.52	74	-9.48

Middle Channel (2440 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4880	39.51	AV	V	33.86	6.82	31.82	48.37	54	-5.63
4880	38.46	AV	H	33.86	6.82	31.82	47.32	54	-6.68
4880	48.29	PK	V	33.86	6.82	31.82	57.15	74	-16.85
4880	47.94	PK	H	33.86	6.82	31.82	56.8	74	-17.2
17807	24.29	AV	V	45.15	11.18	32.41	48.21	54	-5.79
17807	24.25	AV	H	45.15	11.18	32.41	48.17	54	-5.83
17807	41.39	PK	V	45.15	11.18	32.41	65.31	74	-8.69
17807	40.35	PK	H	45.15	11.18	32.41	64.27	74	-9.73

High Channel (2480 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	39.21	AV	V	33.9	6.76	31.92	47.95	54	-6.05
4960	38.13	AV	H	33.9	6.76	31.92	46.87	54	-7.13
4960	47.97	PK	V	33.9	6.76	31.92	56.71	74	-17.29
4960	47.35	PK	H	33.9	6.76	31.92	56.09	74	-17.91
17798	24.41	AV	V	45.22	11.35	32.38	48.6	54	-5.4
17798	24.33	AV	H	45.22	11.35	32.38	48.52	54	-5.48
17798	41.62	PK	V	45.22	11.35	32.38	65.81	74	-8.19
17798	41.07	PK	H	45.22	11.35	32.38	65.26	74	-8.74

Note:

1, The testing has been conformed to $10 \times 2480 \text{ MHz} = 24,800 \text{ MHz}$

2, All other emissions more than 30 dB below the limit

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

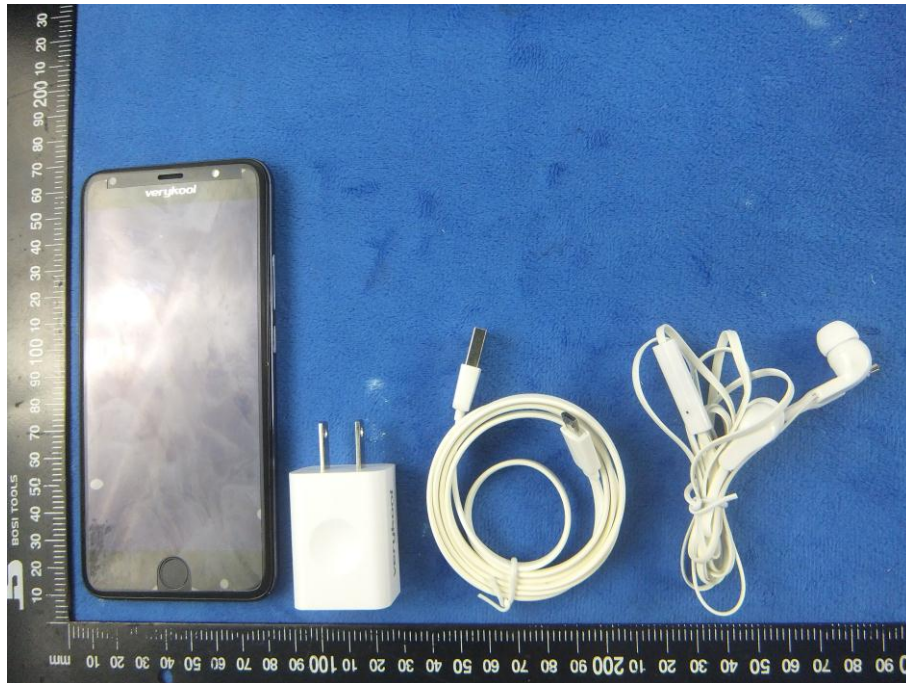
Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/16/2016	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 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 - Label 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

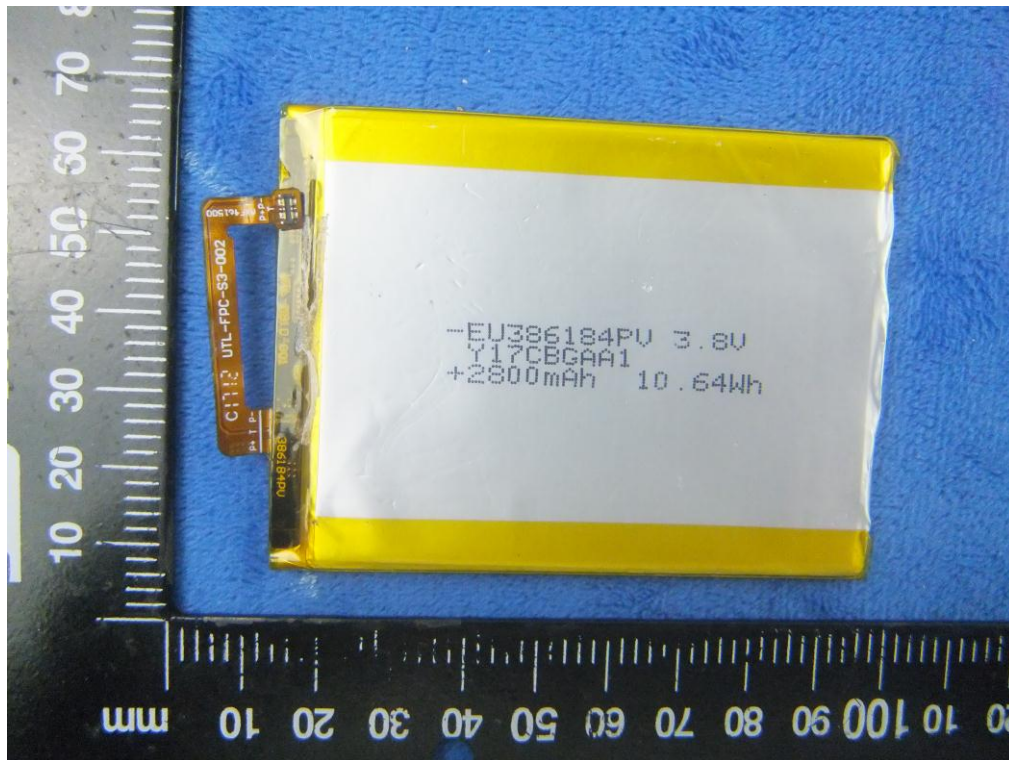
Cover Off - Top View 1



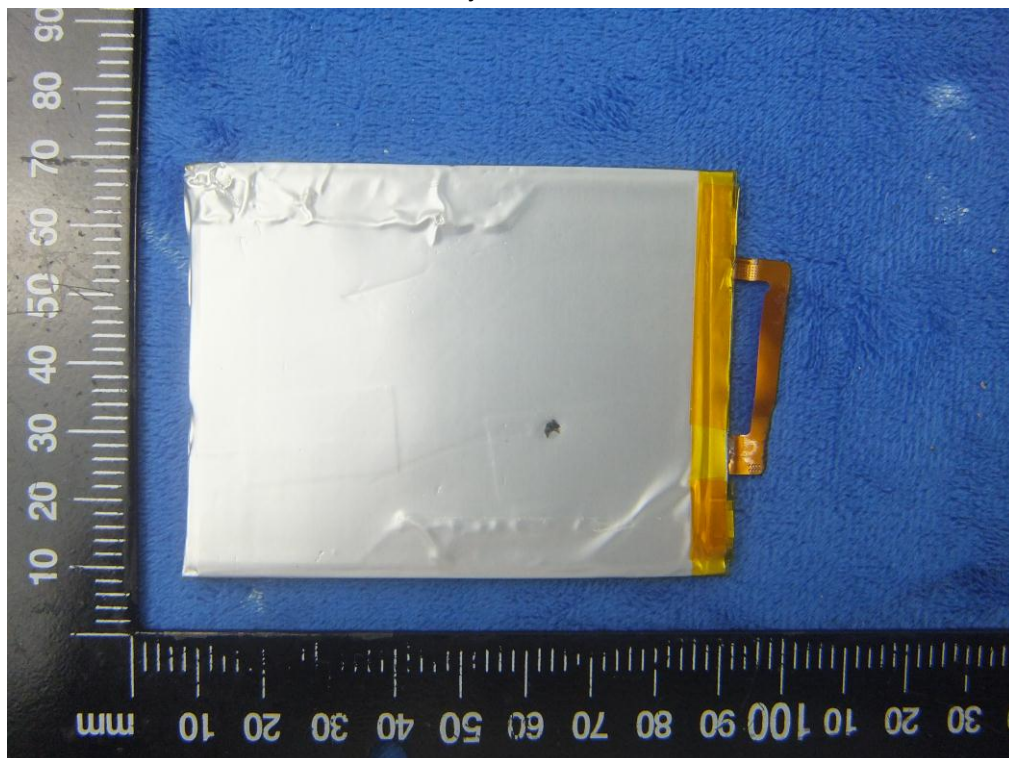
Cover Off - Top View 2



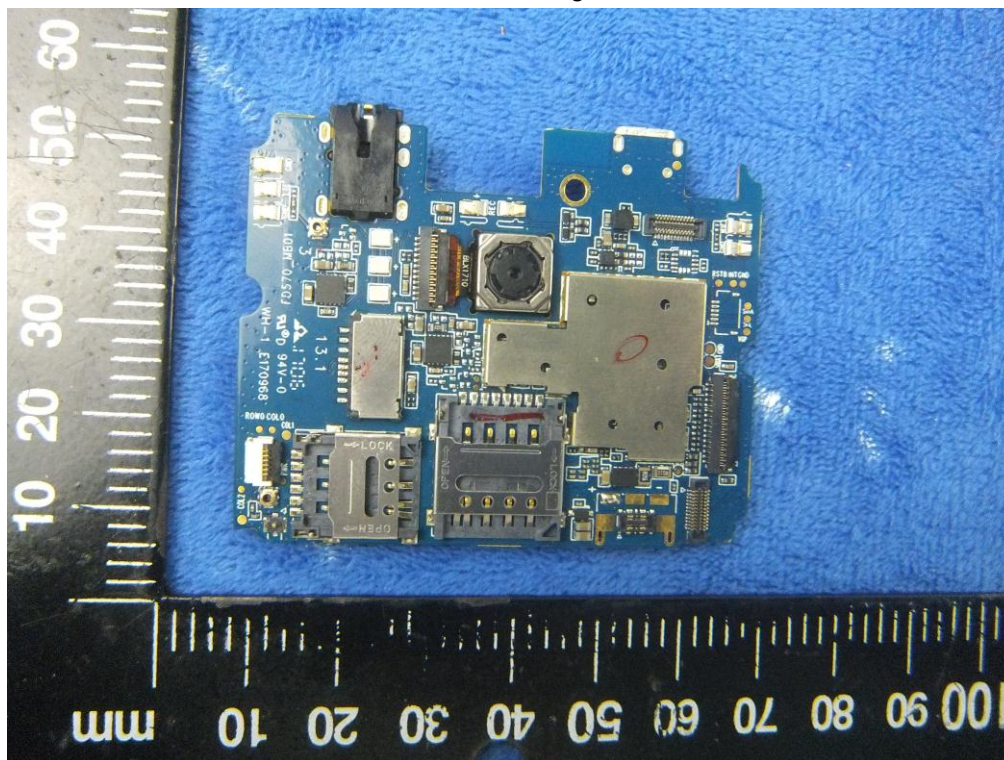
Battery - Front View



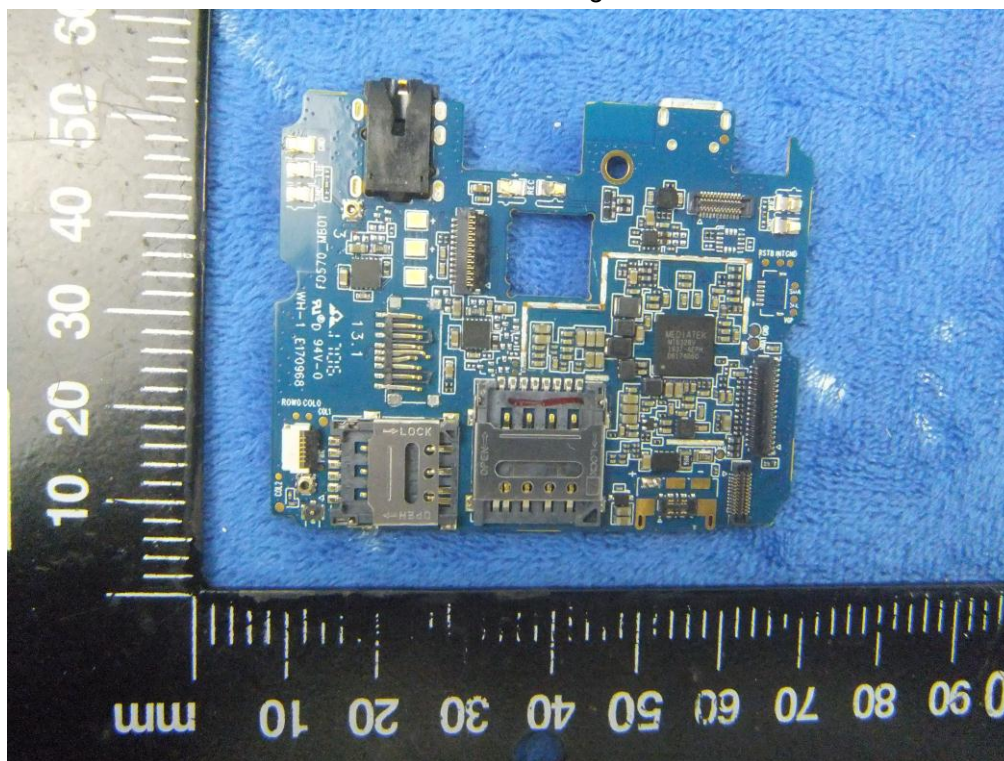
Battery - Rear View



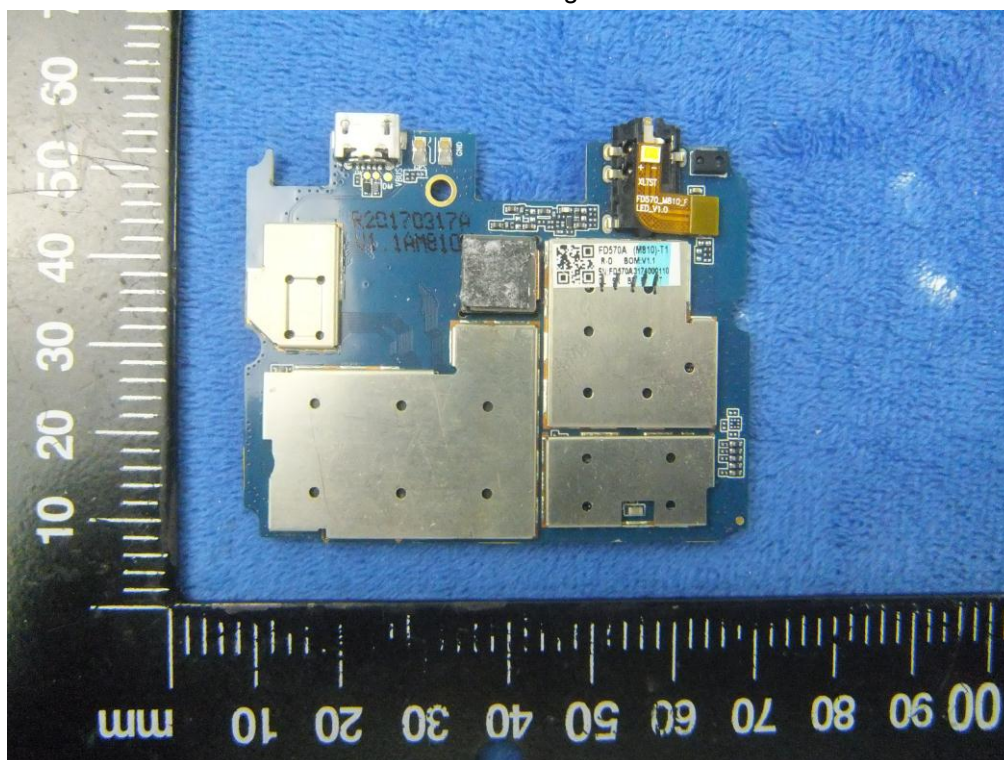
Mainboard with Shielding - Front View



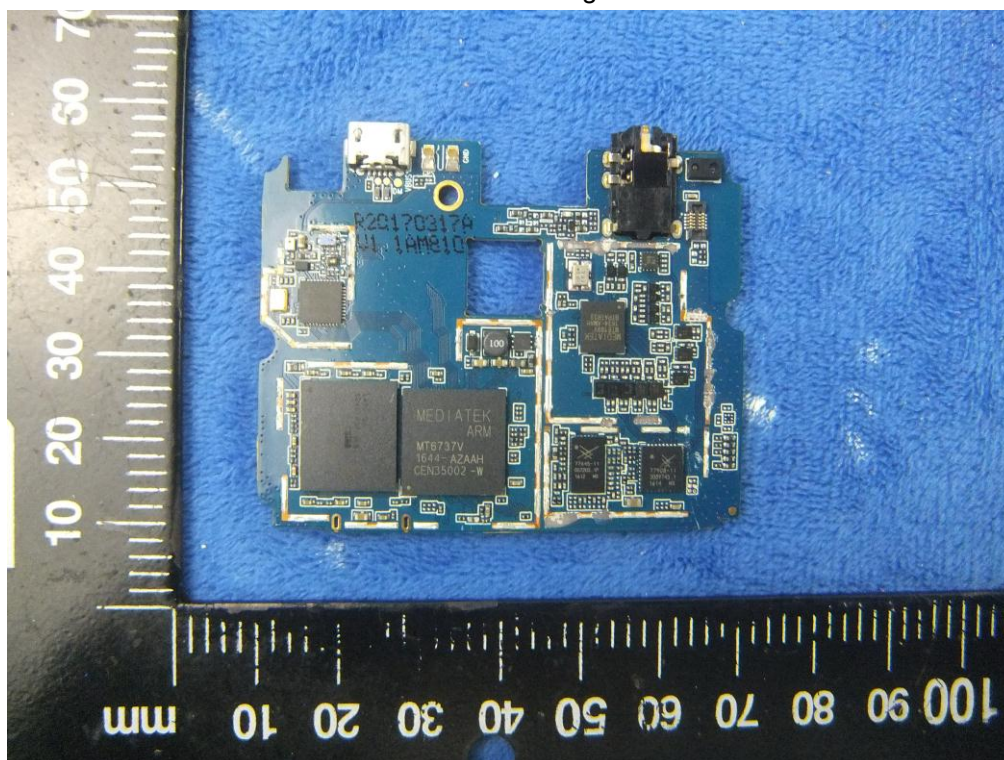
Mainboard without Shielding - Front View



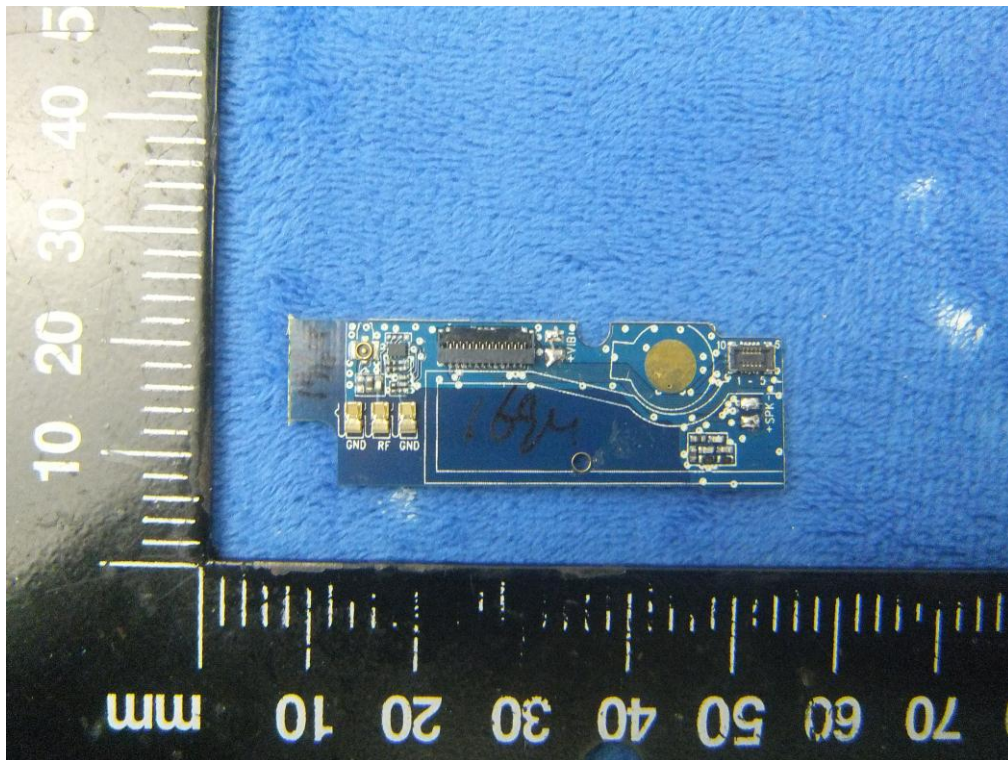
Mainboard with Shielding – Rear View



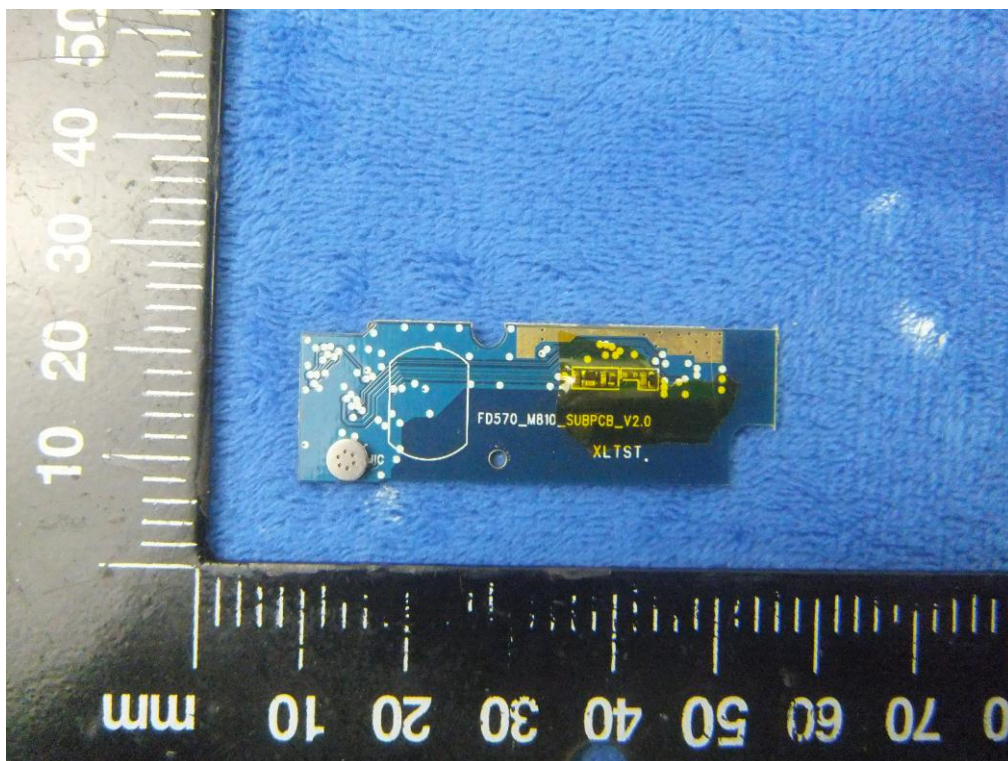
Mainboard without Shielding – Rear View



Smallboard – Front View



Smallboard – Rear View



LCD – Front View



LCD – Rear View



GSM/PCS/UMTS-FDD Antenna View



WIFI/BT/BLE - Antenna View



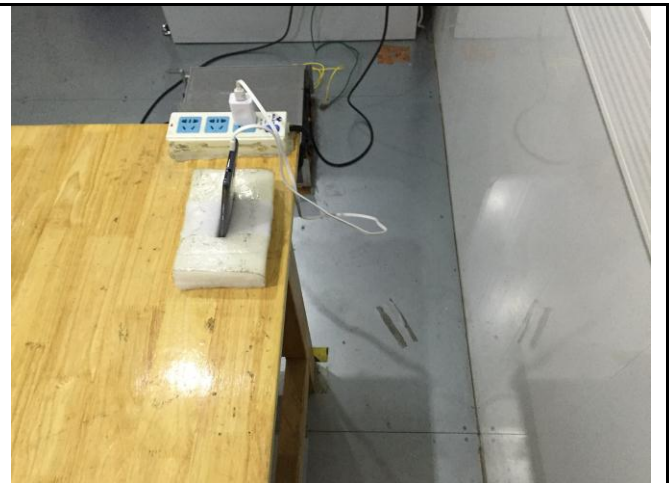
LTE - Antenna View



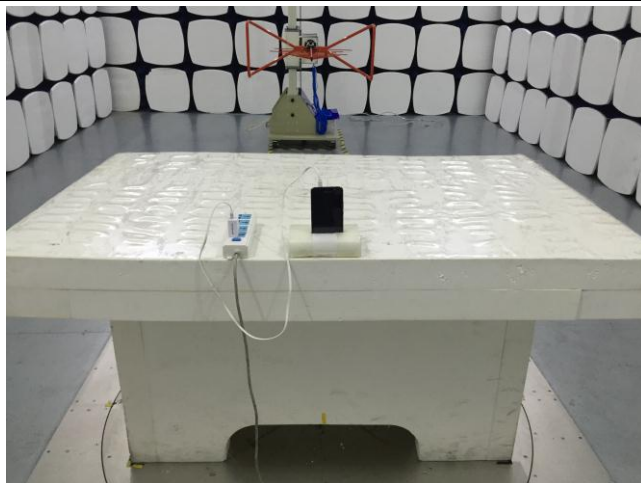
Annex B.iii. Photograph: Test Setup Photo



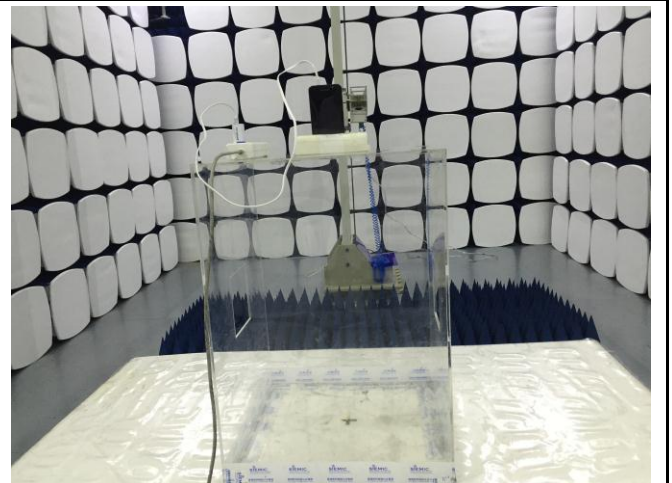
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

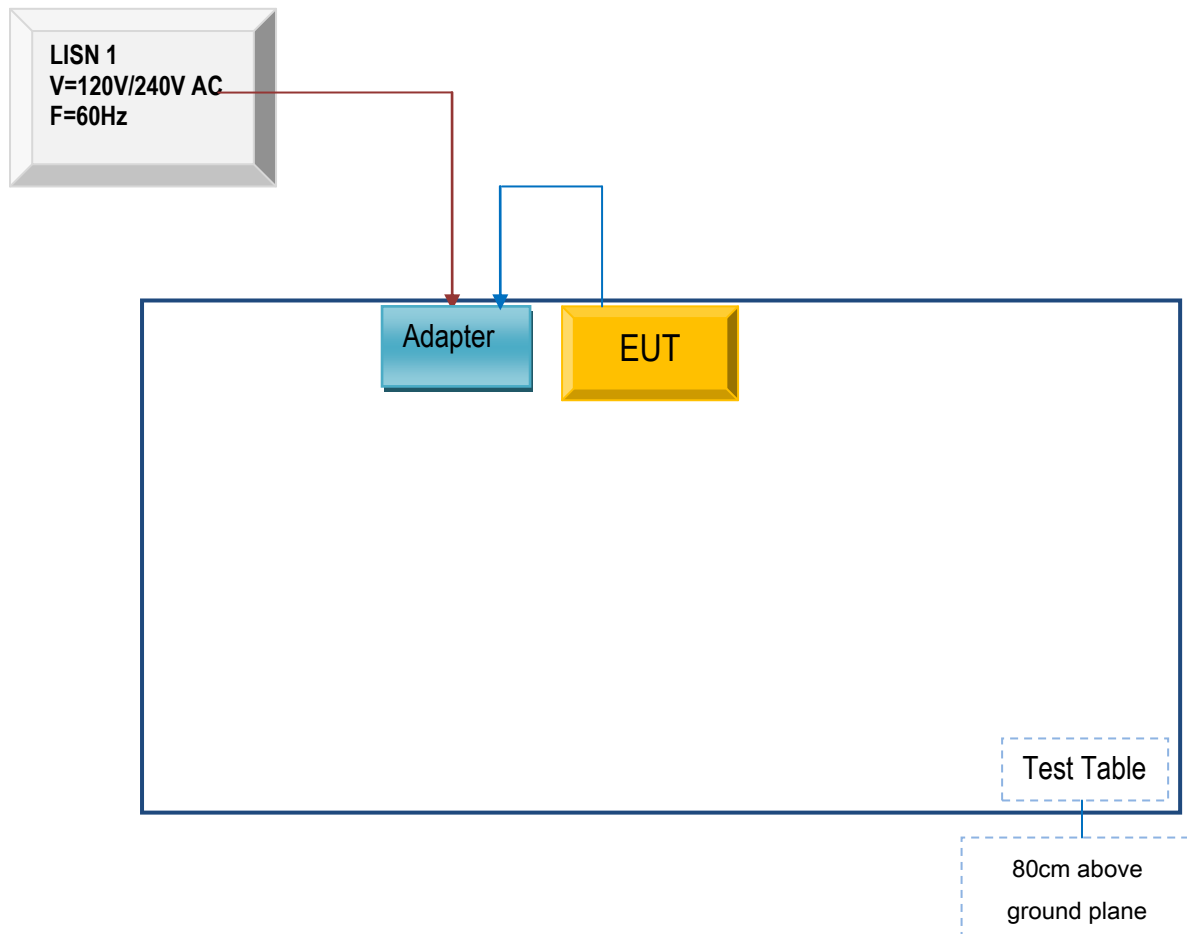


Radiated Spurious Emissions Test Setup Above
1GHz

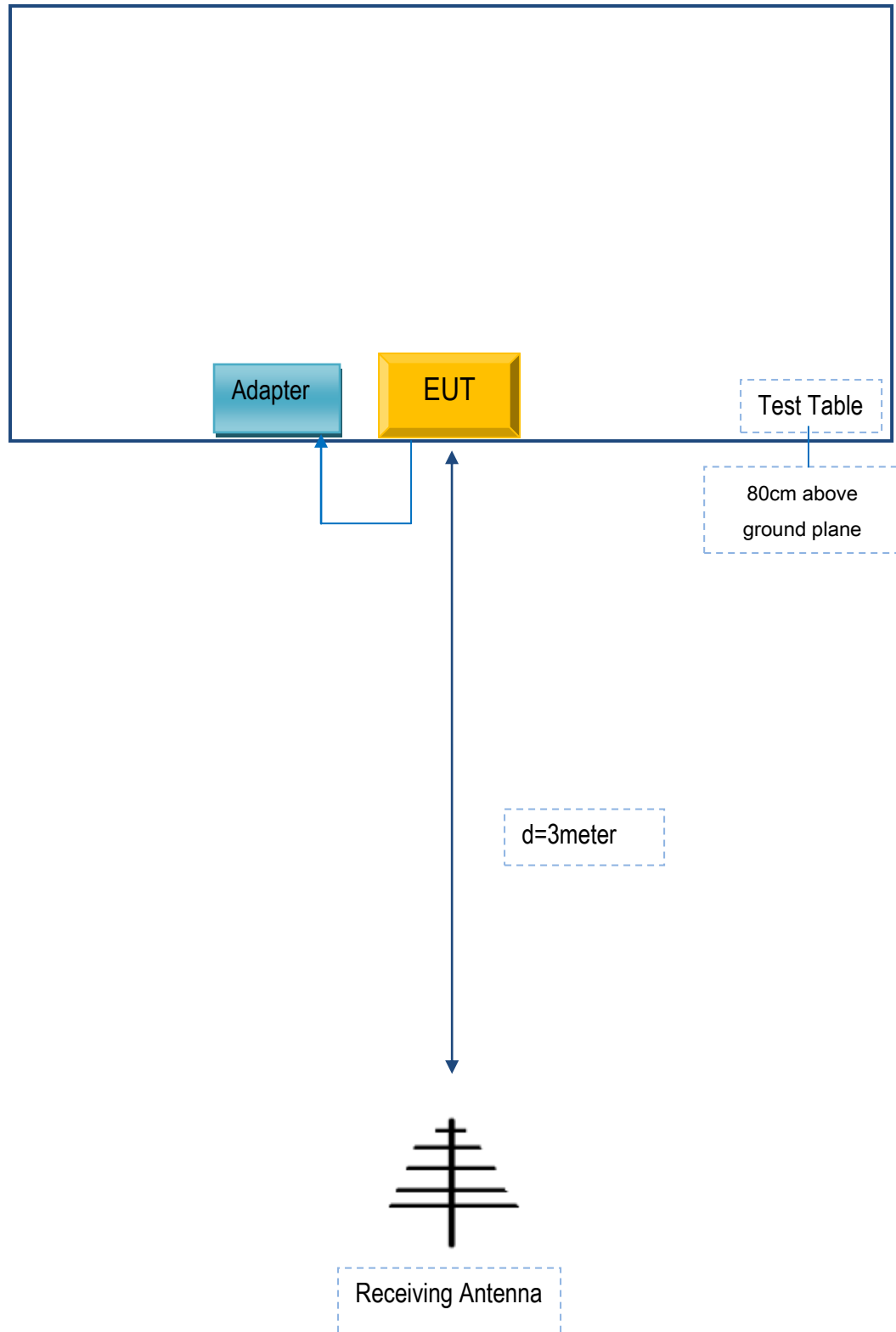
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

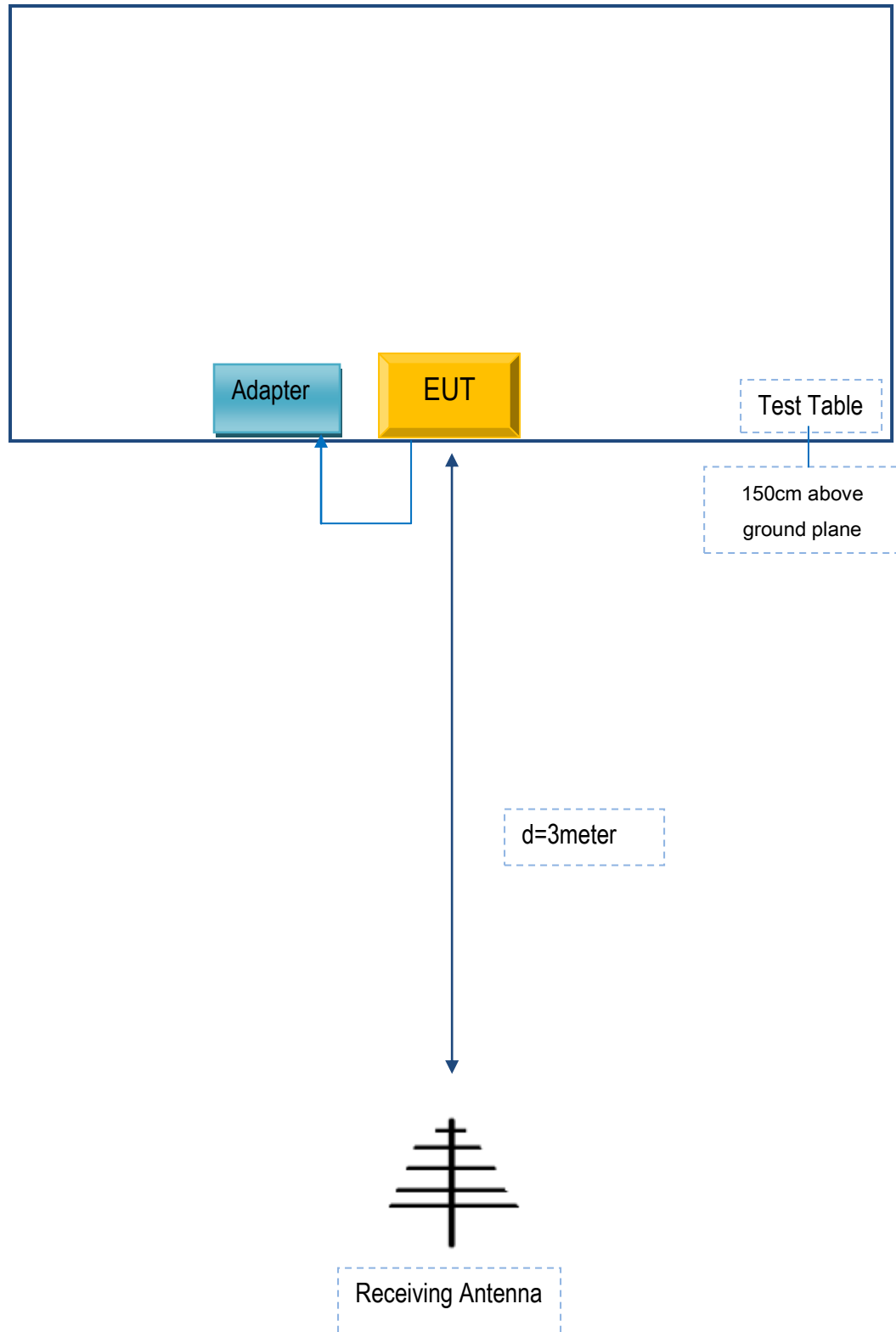
Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions (Below 1GHz) .



Block Configuration Diagram for Radiated Emissions (Above 1GHz) .



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

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

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Verykool USA Inc	Adapter	TPA-46B050100UU	S20170127

Supporting Cable:

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

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A