

RF TEST REPORT



Report No.: 17070925-FCC-R4

Supersede Report No.: N/A

Applicant	SMT TELECOMM HK LIMITED	
Product Name	Mobile Phone	
Model No.	X422A	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	September 20 to October 09, 2017	
Issue Date	October 10, 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
17070925-FCC-R4	NONE	Original	October 10, 2017

2. Customer information

Applicant Name	SMT TELECOMM HK LIMITED
Applicant Add	Unit C 8/F, CHARMHILL CTR 50 HILLWOOD RD TST KL
Manufacturer	SMT TELECOMM HK LIMITED
Manufacturer Add	Unit C 8/F, CHARMHILL CTR 50 HILLWOOD RD TST KL

3. Test site information

Test Lab A:

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.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMC(ver.lcp-03A1)

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

4. Equipment under Test (EUT) Information

Description of EUT: Mobile Phone

Main Model: X422A

Serial Model: N/A

Date EUT received: September 20, 2017

Test Date(s): September 20 to October 09, 2017

Equipment Category : DTS

GSM850: -1.86dBi

PCS1900: -0.09dBi

UMTS-FDD Band V: -1.86dBi

Antenna Gain: UMTS-FDD Band IV: -0.16dBi

UMTS-FDD Band II: -0.09dBi

WIFI: 0.37dBi

Bluetooth/BLE: 0.37dBi

Antenna Type: PIFA antenna

GSM / GPRS: GMSK

EGPRS: GMSK,8PSK

UMTS-FDD: QPSK

Type of Modulation: 802.11b/g/n: DSSS, OFDM

Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK

BLE: GFSK

GPS:BPSK

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
WIFI: 802.11b/g/n(20M): 2412-2462 MHz
WIFI: 802.11n(40M): 2422-2452 MHz
Bluetooth& BLE: 2402-2480 MHz

Max. Output Power: -3.884dBm

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

Number of Channels:	UMTS-FDD Band II: 277CH
	WIFI :802.11b/g/n(20M): 11CH
	WIFI :802.11n(40M): 7CH
	Bluetooth: 79CH
	BLE: 40CH

Port: USB Port, Earphone Port

Trade Name : N/A

Adapter:
Model: PCX422
Input: AC100-240V~50/60Hz,0.15A
Output: DC 5.0V~500mA
Battery:
Model: BPX422
Battery Capacity: 3.7V, 1300mAh
Battery Voltage Limit: 4.2V

Input Power:	Output: DC 5.0V~500mA
	Battery:
	Model: BPX422
	Battery Capacity: 3.7V, 1300mAh
	Battery Voltage Limit: 4.2V

FCC ID: 2A1MEX422A

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:

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

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

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

Antenna Connector Construction

The EUT has 2 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIFI, the gain is 0.37dBi for Bluetooth/BLE, the gain is 0.37dBi for WIFI.

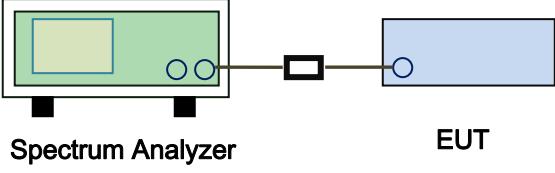
A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is -1.86dBi for GSM850, -0.09dBi for PCS1900, -1.86dBi for UMTS-FDD Band V, -0.09dBi for UMTS-FDD Band II, -0.16dBi for UMTS-FDD Band IV.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB) Channel Bandwidth

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1023mbar
Test date :	September 27, 2017
Tested By :	Loren Luo

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB 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 Emission bandwidth measurement procedure</u></p> <ul style="list-style-type: none"> - Set RBW = 100 kHz. - Set the video bandwidth (VBW) \geq 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

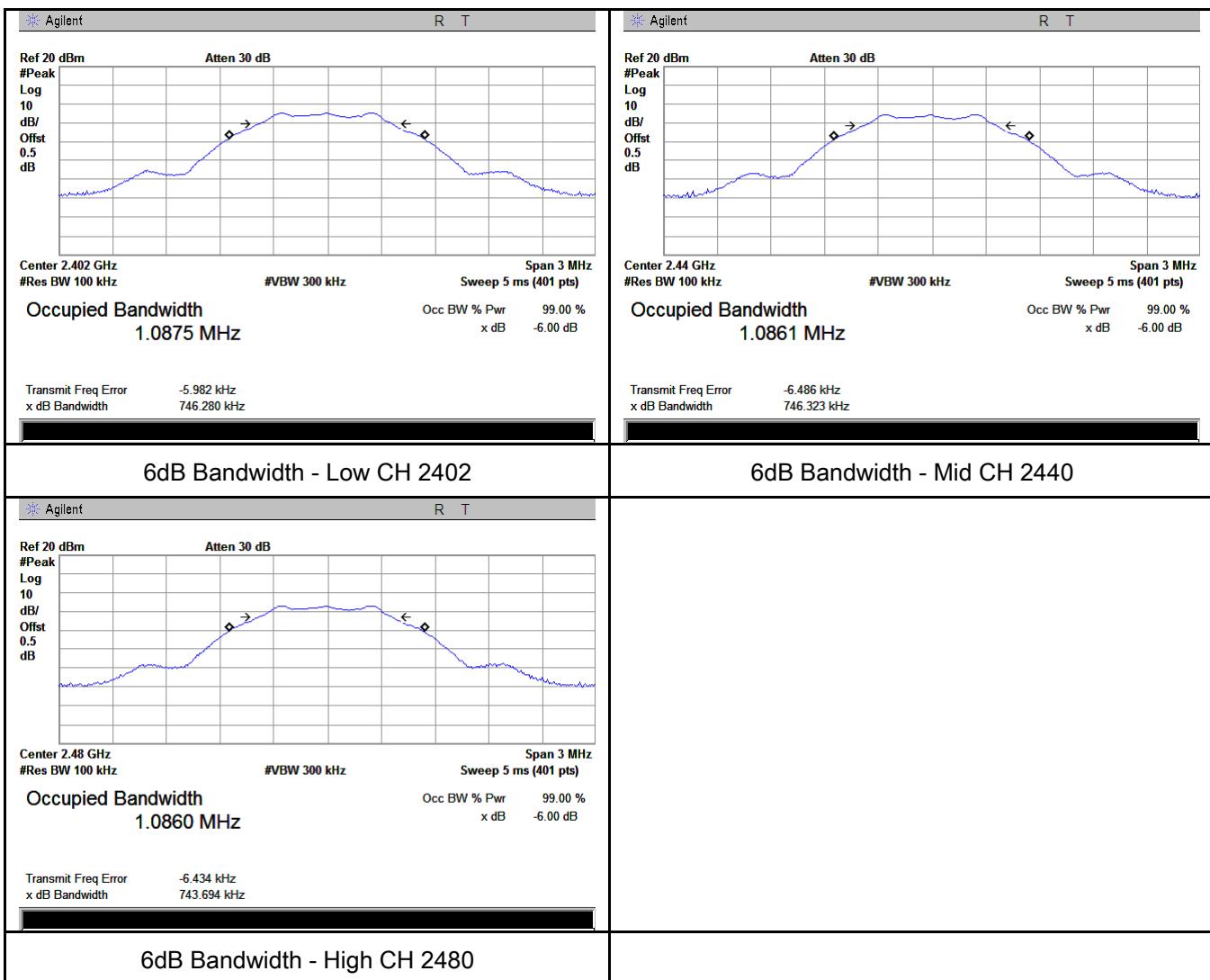
Test Plot Yes (See below) N/A

6dB Bandwidth measurement result

Test Data

CH	Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (MHz)
Low	2402	746.280	1.0875
Mid	2440	746.323	1.0861
High	2480	743.694	1.0860

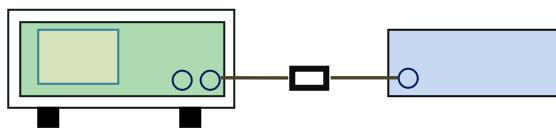
Test Plots



6.3 Maximum Output Power

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1023mbar
Test date :	September 27, 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		 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> <ol style="list-style-type: none"> Set the RBW \geq DTS bandwidth. Set VBW \geq $3 \times$ RBW. Set span \geq $3 \times$ RBW Sweep time = auto couple. Detector = peak. Trace mode = max hold. Allow trace to fully stabilize. Use peak marker function to determine the peak amplitude level. 	
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

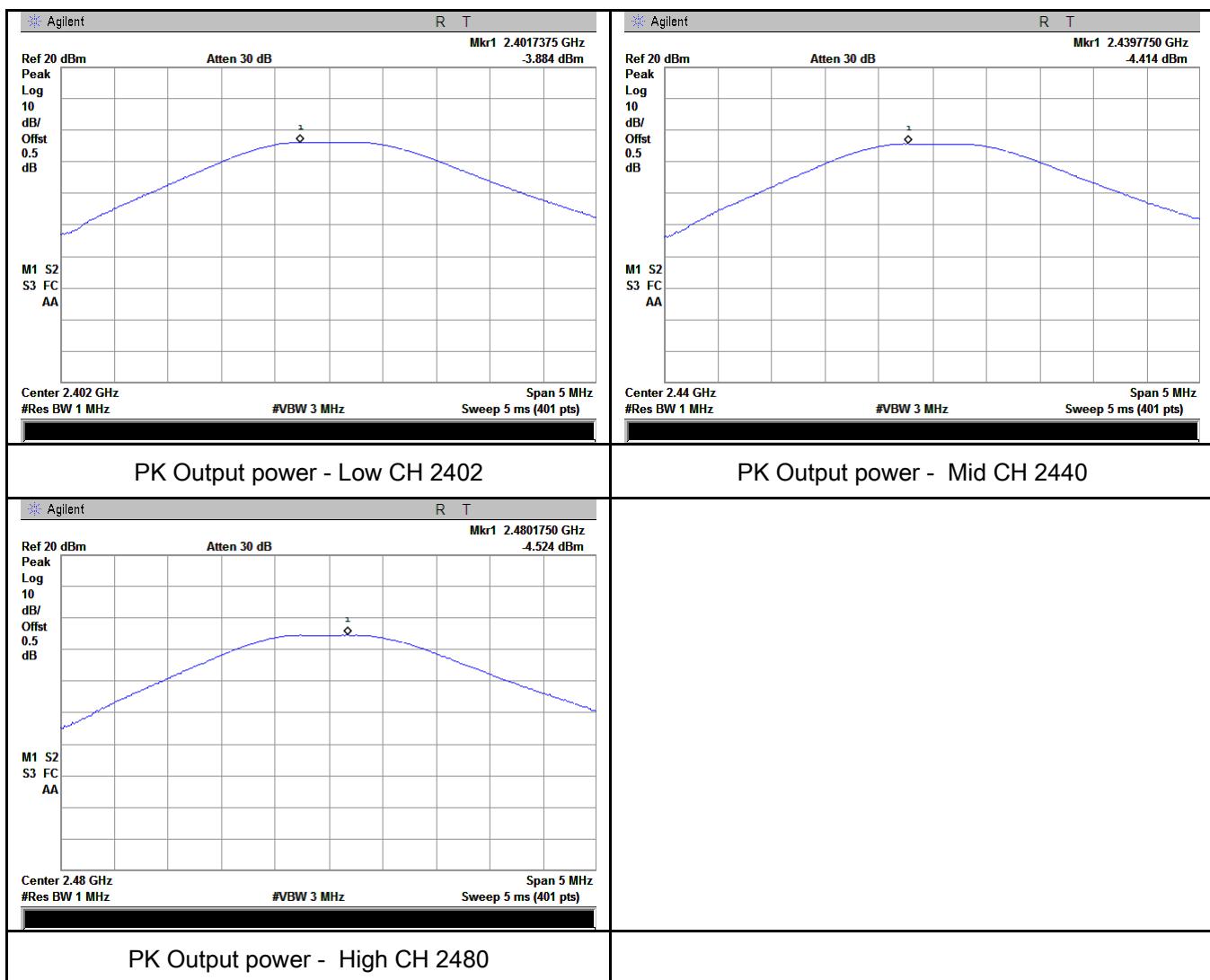
Test Plot Yes (See below) N/A

Output Power measurement result

Test Data

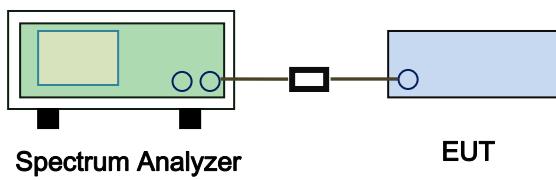
Type	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	Low	2402	-3.884	30	Pass
	Mid	2440	-4.414	30	Pass
	High	2480	-4.524	30	Pass

Test Plots



6.4 Power Spectral Density

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1023mbar
Test date :	September 27, 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		 Spectrum Analyzer EUT	
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

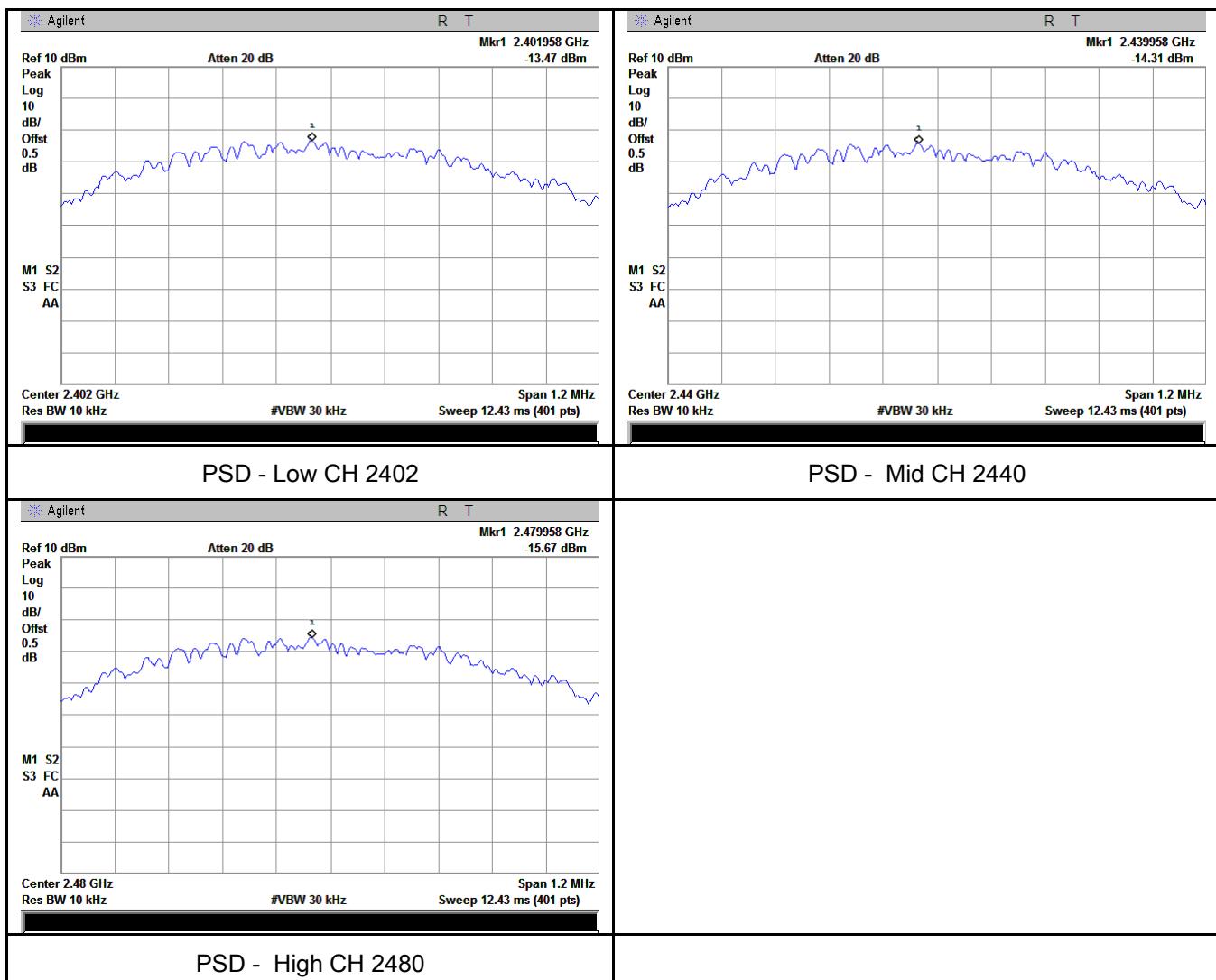
Power Spectral Density measurement result

Test Data

Type	CH	Freq (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Result
PSD	Low	2402	-13.47	-5.23	-18.70	8	Pass
	Mid	2440	-14.31	-5.23	-19.54	8	Pass
	High	2480	-15.67	-5.23	-20.90	8	Pass

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

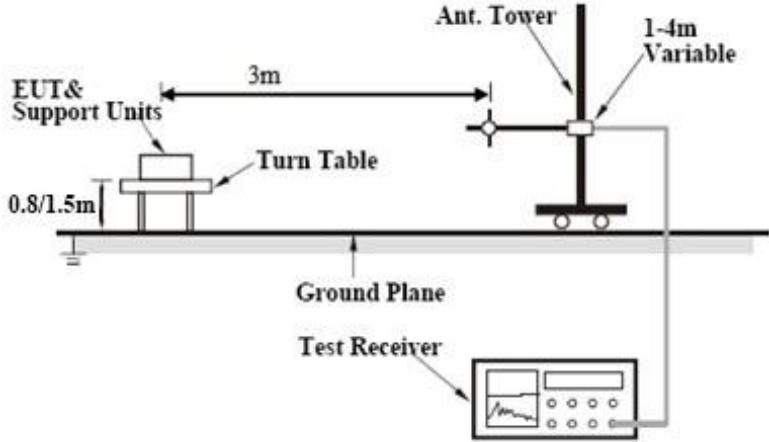
Test Plots



6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	25°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	September 23, 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	 <p>The diagram illustrates the test setup. A Turn Table is positioned on a Ground Plane. An EUT & Support Units is placed on the turn table. A vertical Ant. Tower is connected to the EUT and is mounted on a height variable stand. A Test Receiver is connected to the tower. The distance between the EUT and the tower is 3m. The height of the EUT is 0.8/1.5m.</p>		
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. 		

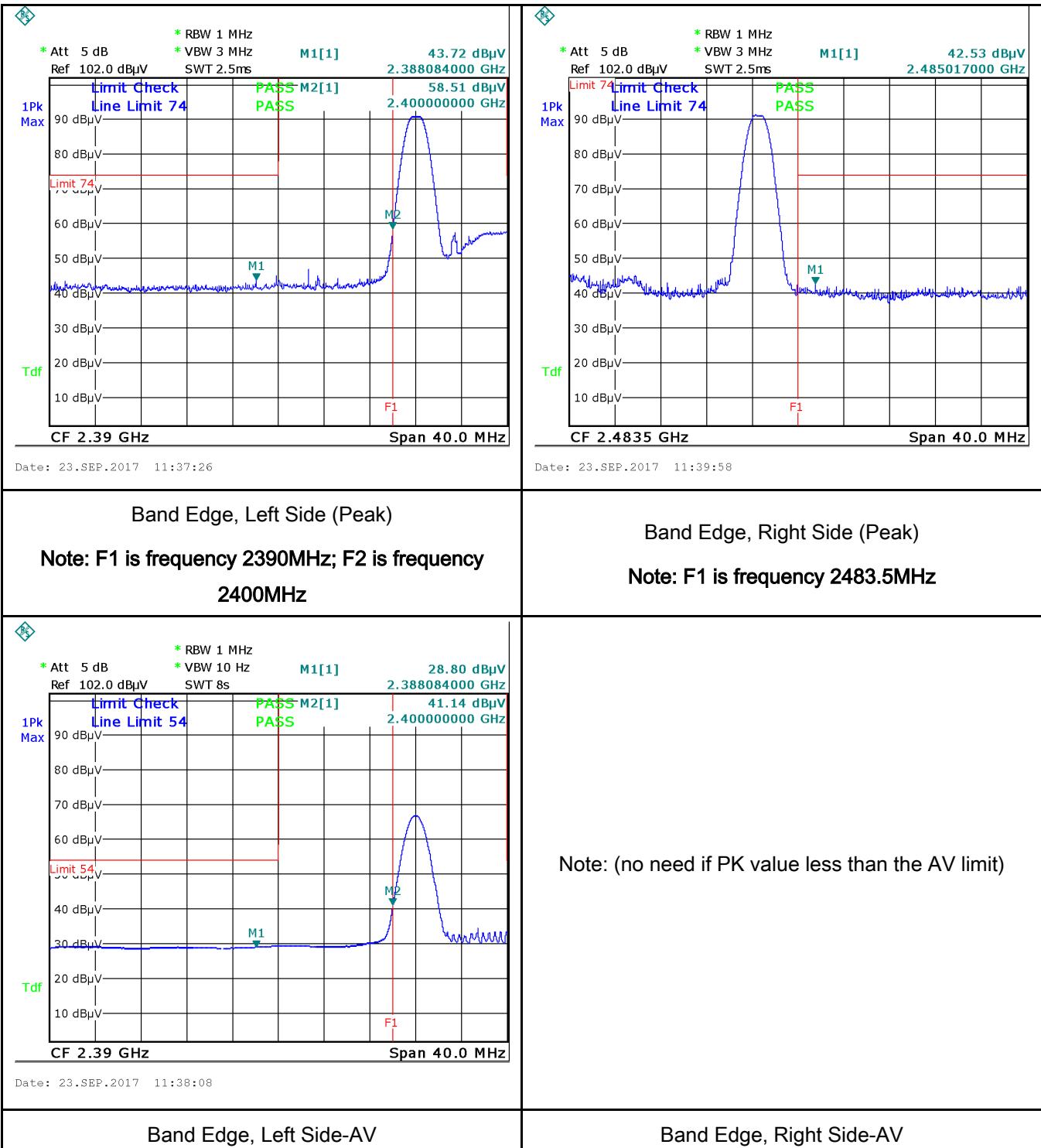
	<ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> a. The resolution 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.

6.6 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	September 23, 2017
Tested By :	Loren Luo

Requirement(s):

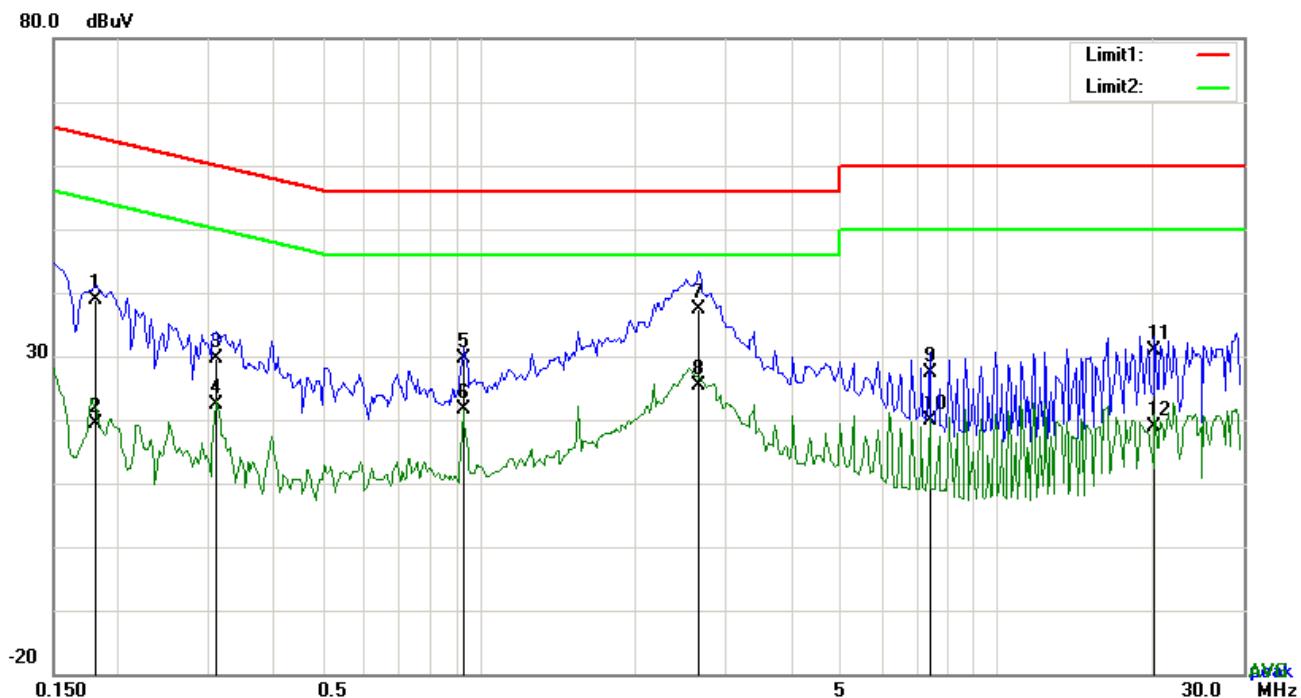
Spec	Item	Requirement	Applicable														
47CFR§15.207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within 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 (dB μ V)		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 (dB μ V)																
	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

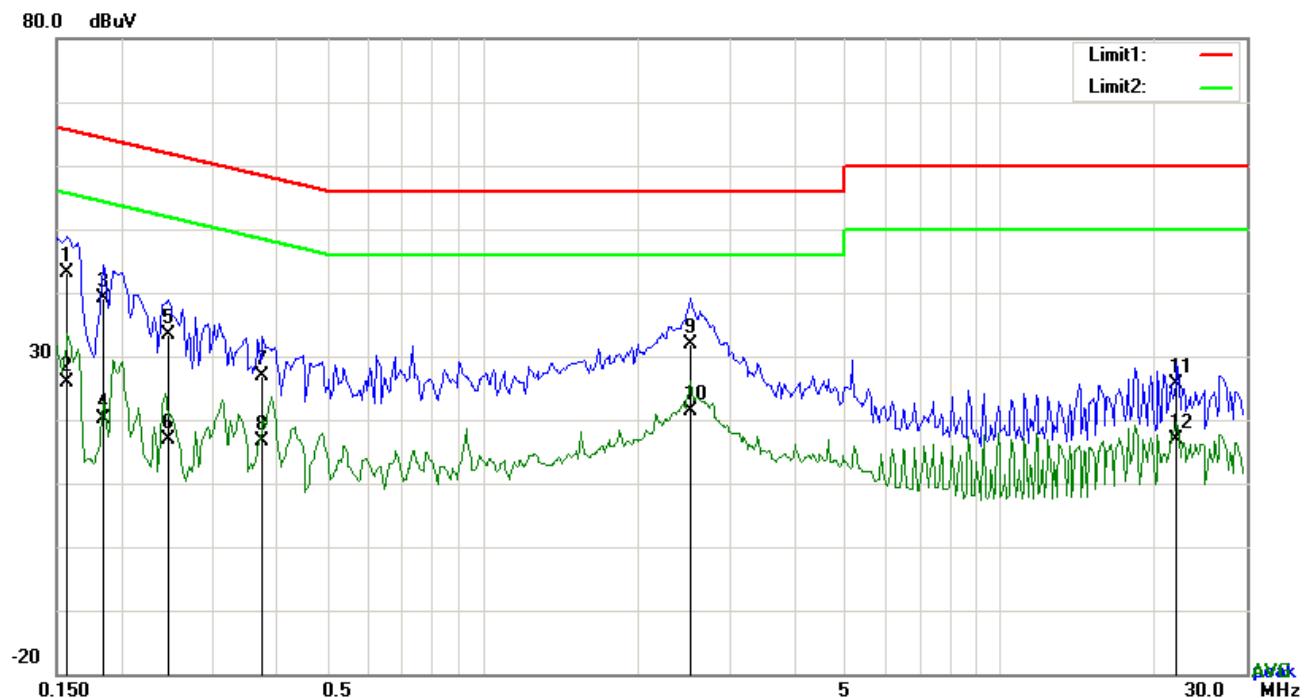


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	L1	0.1812	25.68	QP	13.08	38.76	64.43	-25.67
2	L1	0.1812	6.38	AVG	13.08	19.46	54.43	-34.97
3	L1	0.3099	17.01	QP	12.61	29.62	59.97	-30.35
4	L1	0.3099	9.65	AVG	12.61	22.26	49.97	-27.71
5	L1	0.9300	18.04	QP	11.47	29.51	56.00	-26.49
6	L1	0.9300	10.17	AVG	11.47	21.64	46.00	-24.36
7	L1	2.6616	25.89	QP	11.40	37.29	56.00	-18.71
8	L1	2.6616	13.86	AVG	11.40	25.26	46.00	-20.74
9	L1	7.4460	15.07	QP	12.28	27.35	60.00	-32.65
10	L1	7.4460	7.59	AVG	12.28	19.87	50.00	-30.13
11	L1	20.1717	15.87	QP	15.08	30.95	60.00	-29.05
12	L1	20.1717	3.81	AVG	15.08	18.89	50.00	-31.11

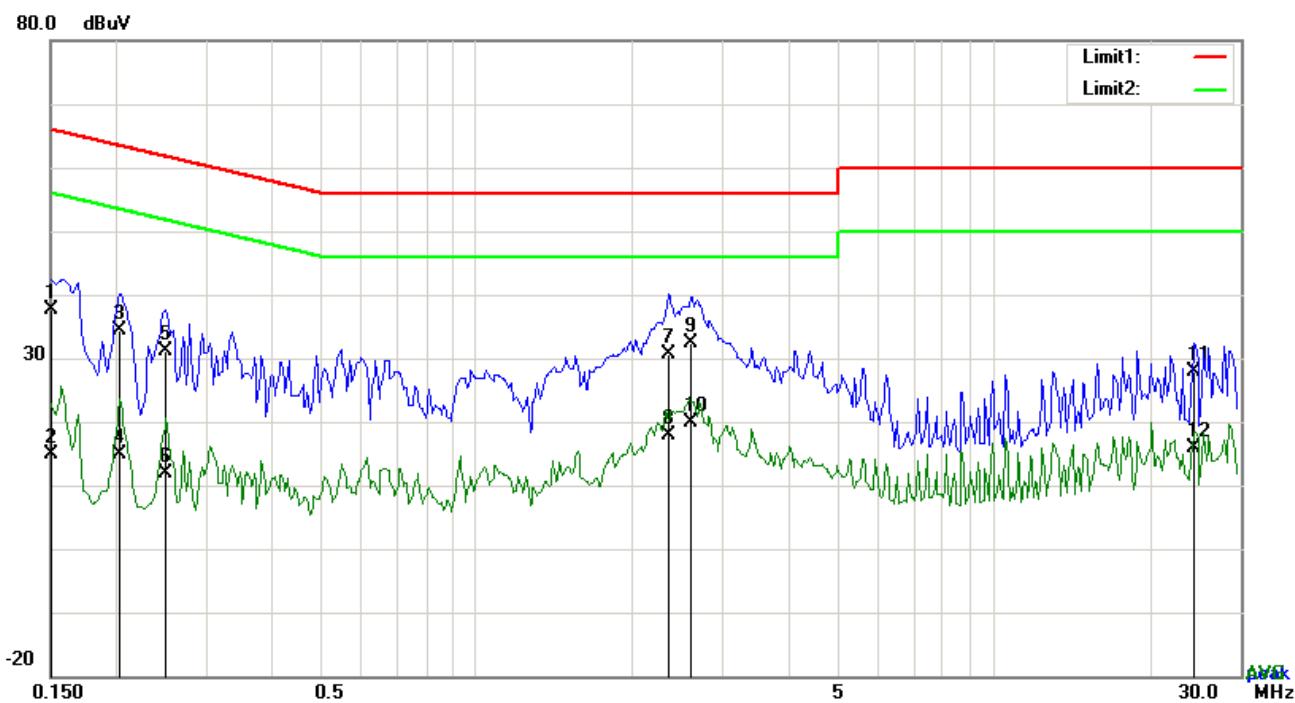
Test Mode: Transmitting Mode



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	0.1578	29.99	QP	13.17	43.16	65.58	-22.42
2	N	0.1578	12.83	AVG	13.17	26.00	55.58	-29.58
3	N	0.1851	26.12	QP	13.07	39.19	64.25	-25.06
4	N	0.1851	7.07	AVG	13.07	20.14	54.25	-34.11
5	N	0.2475	20.49	QP	12.84	33.33	61.84	-28.51
6	N	0.2475	4.02	AVG	12.84	16.86	51.84	-34.98
7	N	0.3762	14.49	QP	12.36	26.85	58.36	-31.51
8	N	0.3762	4.24	AVG	12.36	16.60	48.36	-31.76
9	N	2.5251	20.25	QP	11.59	31.84	56.00	-24.16
10	N	2.5251	9.67	AVG	11.59	21.26	46.00	-24.74
11	N	22.0320	9.74	QP	15.87	25.61	60.00	-34.39
12	N	22.0320	1.08	AVG	15.87	16.95	50.00	-33.05

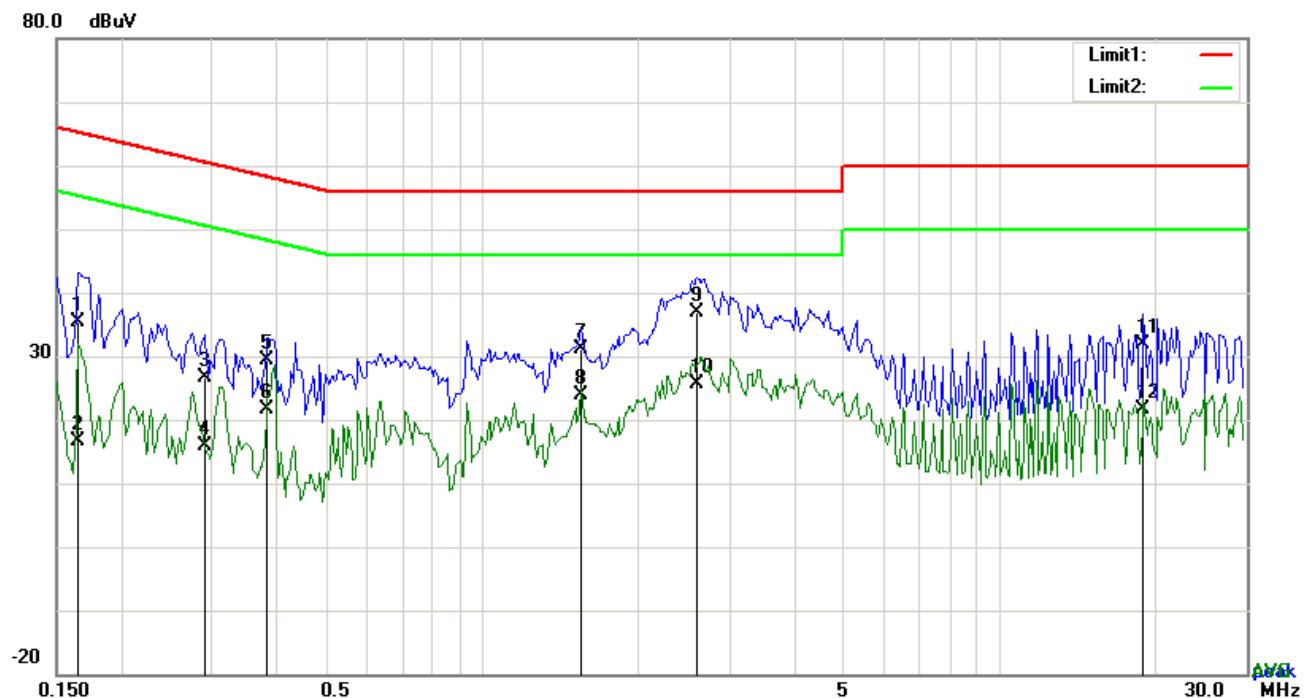
Test Mode: Transmitting Mode



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	0.1500	24.43	QP	13.20	37.63	66.00	-28.37
2	L1	0.1500	1.69	AVG	13.20	14.89	56.00	-41.11
3	L1	0.2046	21.39	QP	13.00	34.39	63.42	-29.03
4	L1	0.2046	1.82	AVG	13.00	14.82	53.42	-38.60
5	L1	0.2514	18.43	QP	12.82	31.25	61.71	-30.46
6	L1	0.2514	-0.99	AVG	12.82	11.83	51.71	-39.88
7	L1	2.3535	19.22	QP	11.40	30.62	56.00	-25.38
8	L1	2.3535	6.39	AVG	11.40	17.79	46.00	-28.21
9	L1	2.6070	20.98	QP	11.40	32.38	56.00	-23.62
10	L1	2.6070	8.50	AVG	11.40	19.90	46.00	-26.10
11	L1	24.5085	13.33	QP	14.51	27.84	60.00	-32.16
12	L1	24.5085	1.34	AVG	14.51	15.85	50.00	-34.15

Test Mode: Transmitting Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

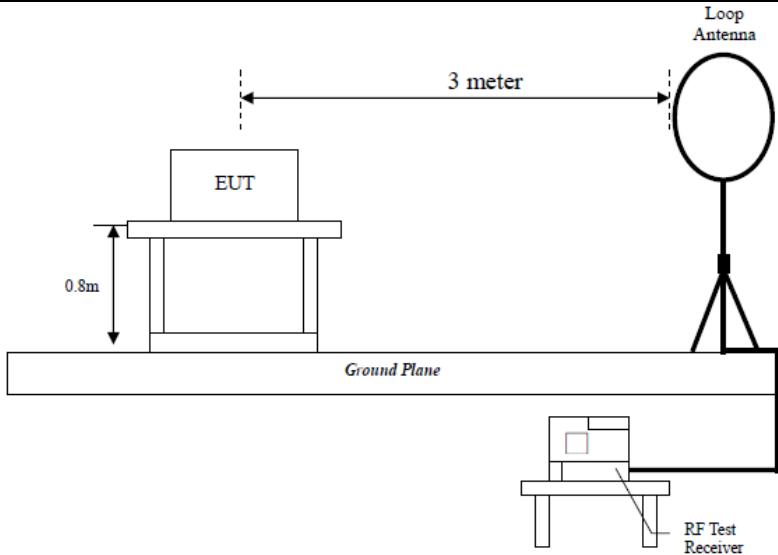
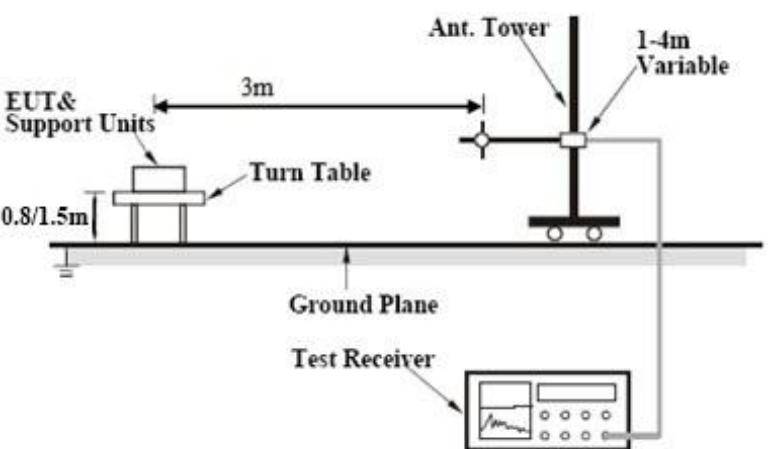
No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	N	0.1656	22.19	QP	13.14	35.33	65.18	-29.85
2	N	0.1656	3.49	AVG	13.14	16.63	55.18	-38.55
3	N	0.2904	14.03	QP	12.68	26.71	60.51	-33.80
4	N	0.2904	3.24	AVG	12.68	15.92	50.51	-34.59
5	N	0.3840	17.06	QP	12.33	29.39	58.19	-28.80
6	N	0.3840	9.34	AVG	12.33	21.67	48.19	-26.52
7	N	1.5501	19.70	QP	11.47	31.17	56.00	-24.83
8	N	1.5501	12.37	AVG	11.47	23.84	46.00	-22.16
9	N	2.5953	25.26	QP	11.60	36.86	56.00	-19.14
10	N	2.5953	13.96	AVG	11.60	25.56	46.00	-20.44
11	N	18.9276	16.92	QP	14.90	31.82	60.00	-28.18
12	N	18.9276	6.61	AVG	14.90	21.51	50.00	-28.49

6.7 Radiated Emissions & Restricted Band

Temperature	25°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	September 23, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable																
47CFR§15. 247(d), RSS210	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																		
(A8.5)	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 the test setup. An EUT (Equipment Under Test) is placed on a turntable, which is positioned on a ground plane. A loop antenna is positioned 3 meters away from the EUT. An RF test receiver is connected to the loop antenna. The EUT is mounted on a vertical support unit, with a height of 0.8m indicated.</p>  <p>The diagram shows the antenna tower setup. The EUT and support units are on a turntable, 3 meters away from an antenna tower. The antenna tower has a height of 1-4m and is variable. The turntable is on a ground plane, and a test receiver is connected to the antenna tower.</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	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Test Data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> N/A
Test Plot	<input checked="" type="checkbox"/> Yes (See below) <input type="checkbox"/> N/A

Test Result:

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

Frequency range: 9KHz - 30MHz

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

Note:

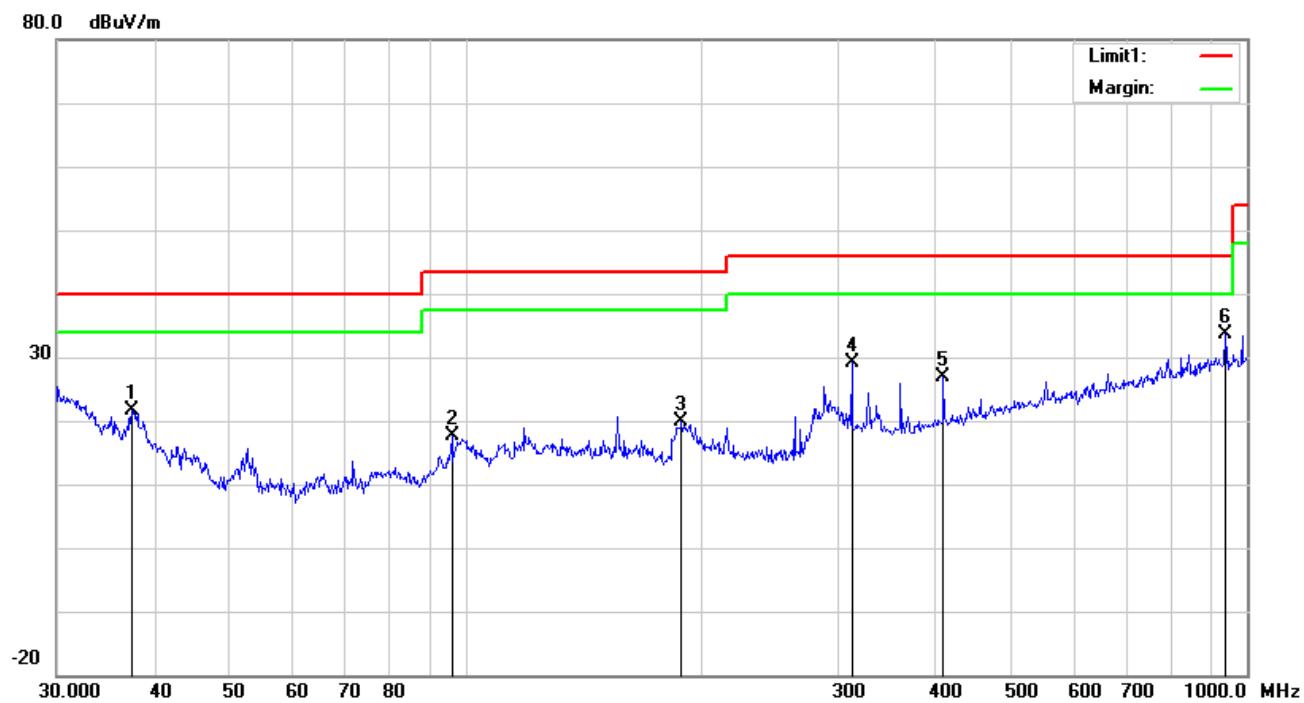
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

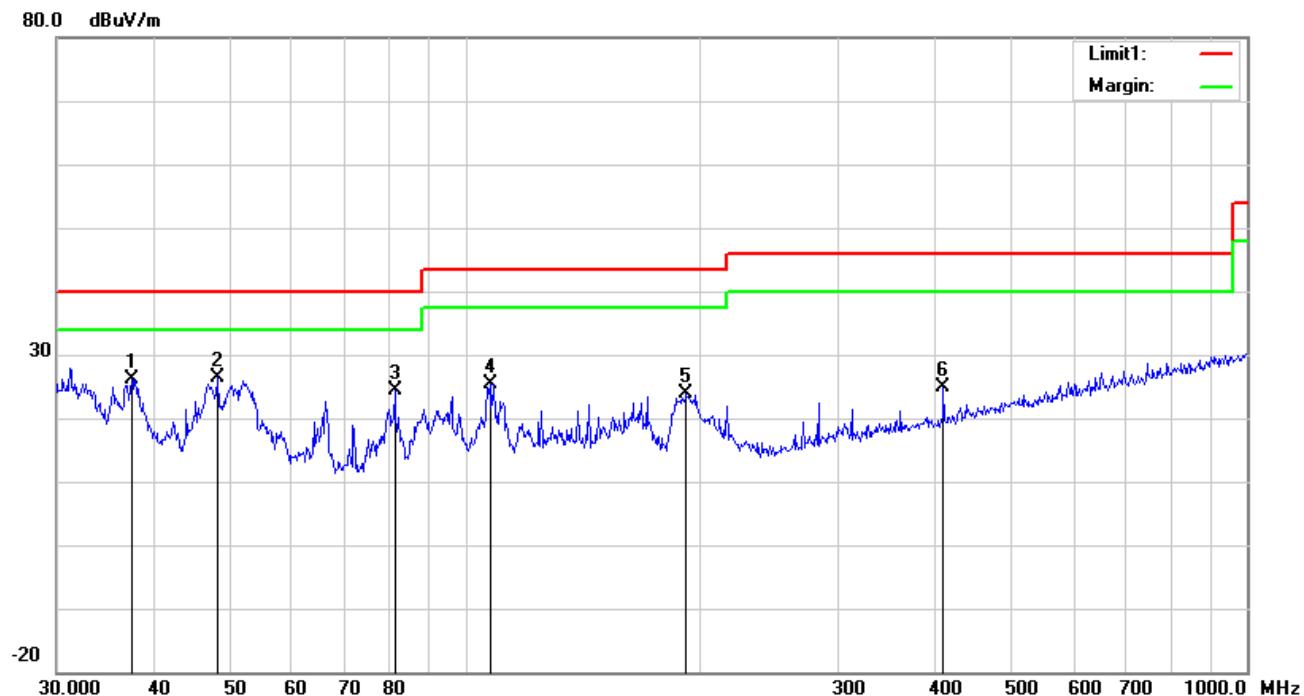


Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	37.4165	27.41	peak	15.79	22.26	0.77	21.71	40.00	-18.29	100	24
2	H	96.0986	29.44	peak	9.46	22.32	1.02	17.60	43.50	-25.90	100	292
3	H	189.0743	29.22	peak	11.50	22.31	1.52	19.93	43.50	-23.57	100	22
4	H	312.1794	35.60	peak	13.86	22.26	1.85	29.05	46.00	-16.95	100	234
5	H	408.9460	30.93	peak	15.88	21.99	2.03	26.85	46.00	-19.15	100	337
6	H	938.8326	28.69	peak	22.69	20.81	3.15	33.72	46.00	-12.28	100	264

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	37.4165	31.75	peak	15.79	22.26	0.77	26.05	40.00	-13.95	100	54
2	V	48.1626	38.68	peak	9.21	22.35	0.78	26.32	40.00	-13.68	100	261
3	V	81.2117	37.97	peak	7.65	22.41	1.05	24.26	40.00	-15.74	100	280
4	V	107.5101	34.90	peak	11.71	22.34	1.16	25.43	43.50	-18.07	200	169
5	V	191.7450	32.98	peak	11.65	22.33	1.54	23.84	43.50	-19.66	100	298
6	V	408.9460	29.07	peak	15.88	21.99	2.03	24.99	46.00	-21.01	100	329

Above 1GHz

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

Low Channel (2402 MHz)

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)
4804	39	AV	V	33.39	7.22	48.46	31.15	54	-22.85
4804	38.74	AV	H	33.39	7.22	48.46	30.89	54	-23.11
4804	47.42	PK	V	33.39	7.22	48.46	39.57	74	-34.43
4804	47.76	PK	H	33.39	7.22	48.46	39.91	74	-34.09
13529	23.59	AV	V	40.65	13.75	46.88	31.11	54	-22.89
13529	23.32	AV	H	40.65	13.75	46.88	30.84	54	-23.16
13529	41.07	PK	V	40.65	13.75	46.88	48.59	74	-25.41
13529	39.91	PK	H	40.65	13.75	46.88	47.43	74	-26.57

Middle Channel (2440 MHz)

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)
4880	39.18	AV	V	33.62	7.53	48.36	31.97	54	-22.03
4880	38.59	AV	H	33.62	7.53	48.36	31.38	54	-22.62
4880	49.08	PK	V	33.62	7.53	48.36	41.87	74	-32.13
4880	47.49	PK	H	33.62	7.53	48.36	40.28	74	-33.72
10136	25.06	AV	V	39.58	9.73	46.84	27.53	54	-26.47
10136	24.37	AV	H	39.58	9.73	46.84	26.84	54	-27.16
10136	40.53	PK	V	39.58	9.73	46.84	43	74	-31
10136	41.26	PK	H	39.58	9.73	46.84	43.73	74	-30.27

High Channel (2480 MHz)

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)
4960	39.15	AV	V	33.89	7.86	48.31	32.59	54	-21.41
4960	38.41	AV	H	33.89	7.86	48.31	31.85	54	-22.15
4960	49.12	PK	V	33.89	7.86	48.31	42.56	74	-31.44
4960	47.74	PK	H	33.89	7.86	48.31	41.18	74	-32.82
17875	24.71	AV	V	43.26	19.41	44.4	42.98	54	-11.02
17875	23.52	AV	H	43.26	19.41	44.4	41.79	54	-12.21
17875	41.74	PK	V	43.26	19.41	44.4	60.01	74	-13.99
17875	41.04	PK	H	43.26	19.41	44.4	59.31	74	-14.69

Note:

- 1, The testing has been conformed to $10*2480\text{MHz}=24,800\text{MHz}$
- 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.
- 4, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/15/2017	09/14/2018	<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"/>
ISN	ISN T800	34373	09/24/2016	09/23/2017	<input type="checkbox"/>
Transient Limiter	LIT-153	531118	08/30/2017	08/29/2018	<input type="checkbox"/>
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/15/2017	09/14/2018	<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	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Horn Antenna	BBHA9170	3145226D1	09/27/2017	09/26/2018	<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	09/19/2017	09/18/2018	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	<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

Annex B.ii. Photograph: EUT Internal Photo

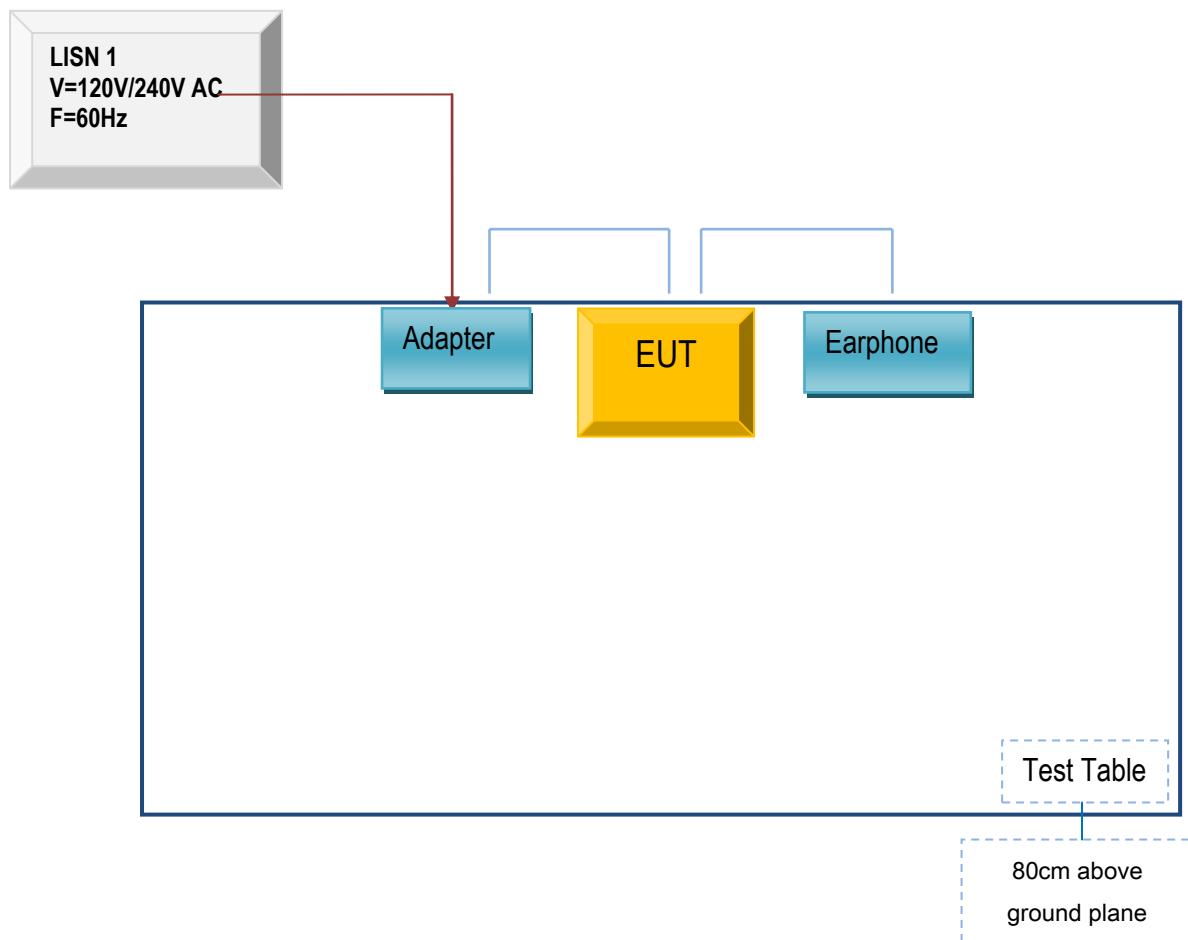
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Annex B.iii. Photograph: Test Setup Photo

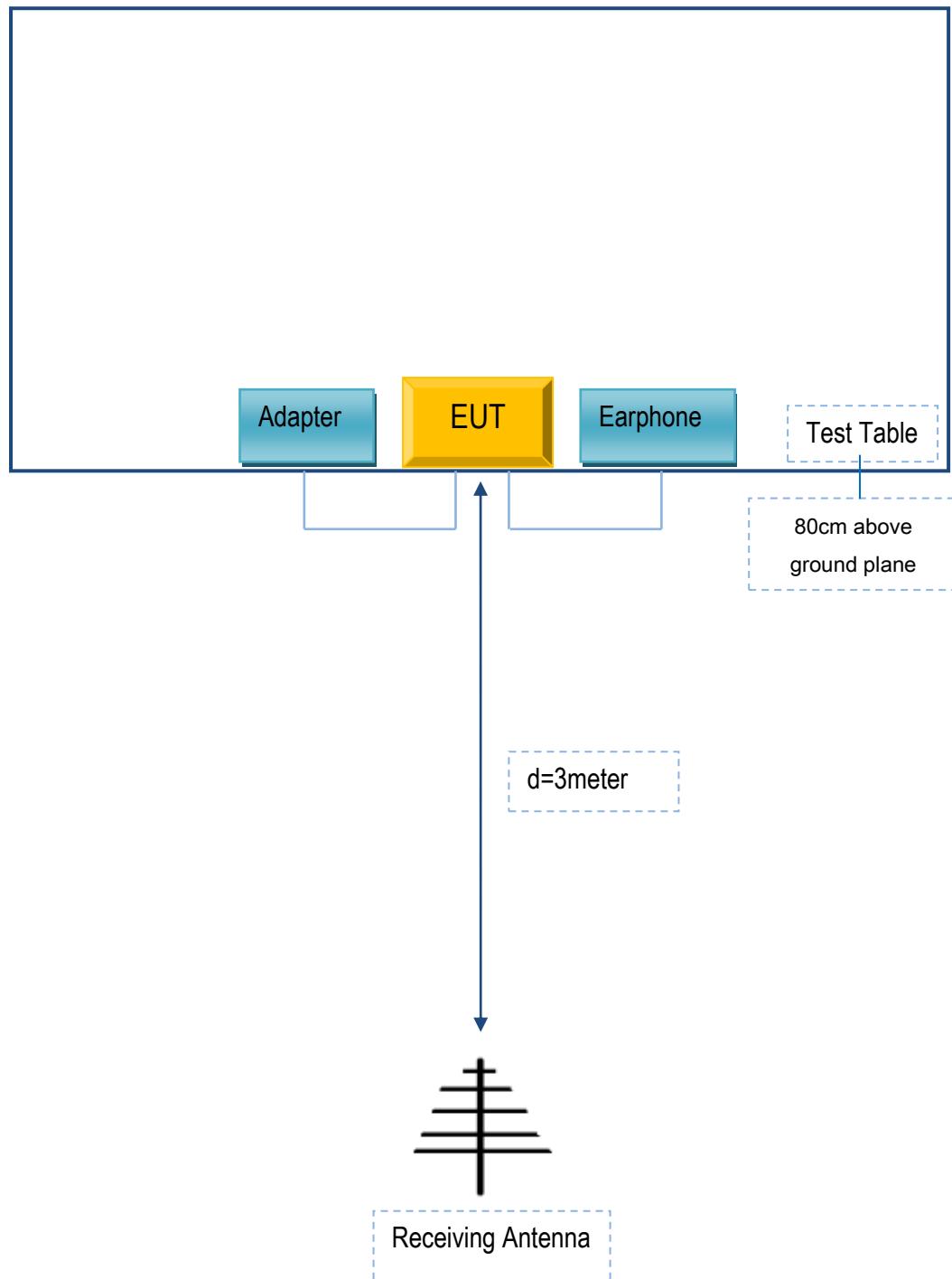
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

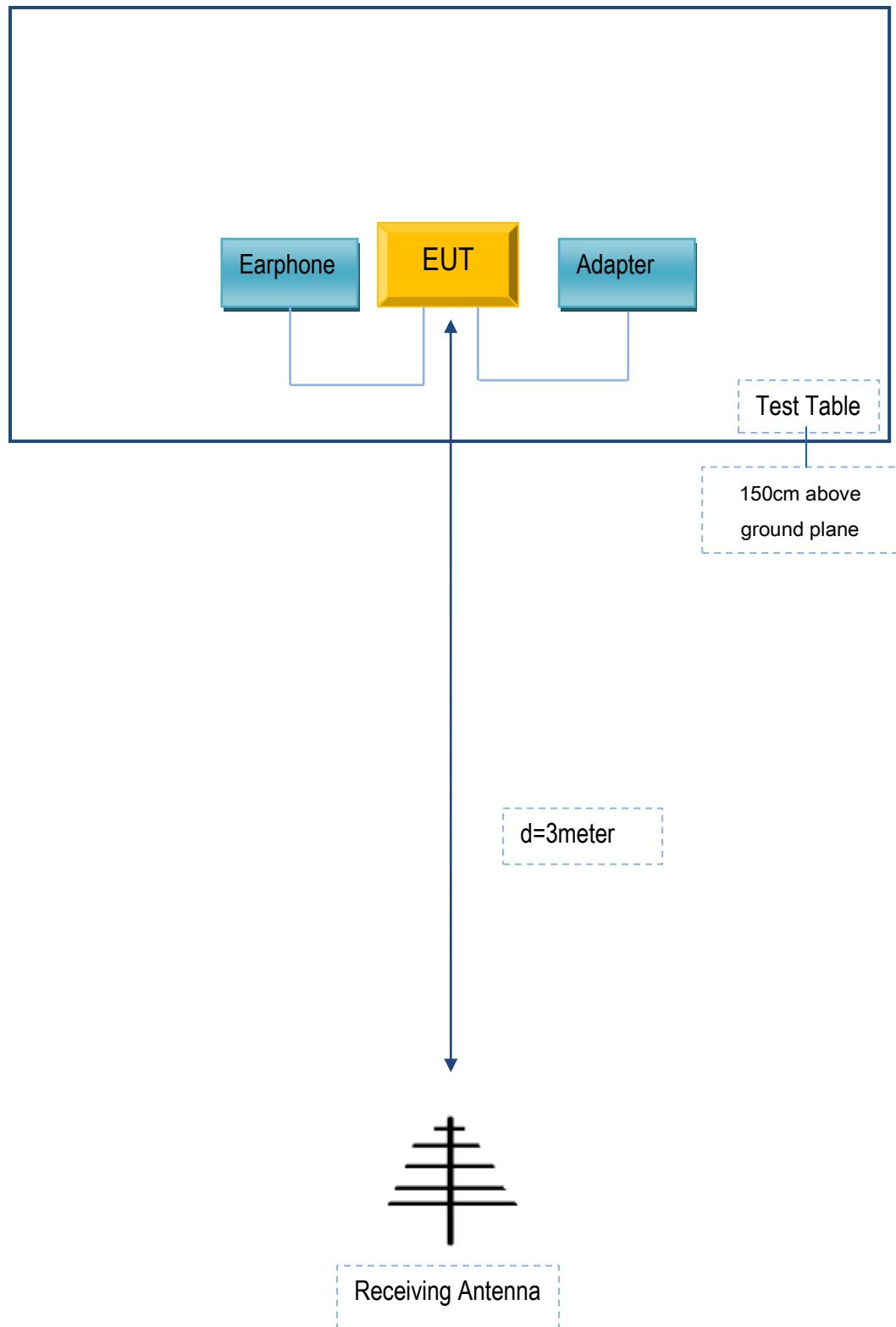
Block Configuration Diagram for AC Line Conducted Emissions



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
SMT TELECOMM HK LIMITED	Adapter	PCX422	N/A
SMT TELECOMM HK LIMITED	Earphone	X422A	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	N/A

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

Please see the attachment

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Annex E. DECLARATION OF SIMILARITY

N/A