RF TEST REPORT

Report No.: 17020307-FCC-R1
Supersede Report No.: N/A

Applicant	CHAMPION POWER EQUIPMENT, INC
Product Name	Bluetooth module
Main Model	LY02
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013
Test Date	March 30 to April 14, 2017
Issue Date	April 18, 2017
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Deon Dai	Miro Bao	
Deon Dai **Test Engineer**	**Miro Bao** **Checked By**	

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

Issued by:
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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
17020307-FCC-R1	NONE	Original	April 18, 2017

2. Customer information

Applicant Name	CHAMPION POWER EQUIPMENT, INC
Applicant Add	12039 Smith Avenue,Santa Fe Springs,CA90670,USA
Manufacturer	SHAOXING SIYUAN TECHNOLOGY CO., LTD
Manufacturer Add	Changfeng Industial Zone, Pingshui new city, Keqiao District, Shaoxing, Zhejiang, China

3. Test site information

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.	986914
IC Test Site No.	4842B-1
Test Software	EZ_EMC (Ver.ICP-03A1)

4. Equipment under Test (EUT) Information

Description of EUT:	Bluetooth module
Main Model:	LY02
Serial Model:	N/A
Date EUT received:	March 24, 2017
Test Date(s):	March 30 to April 14, 2017
Output Max power	10.179 dBm
Antenna Gain:	2.5 dBi
Type of Modulation:	BLE: GFSK
RF Operating Frequency (ies):	BLE: 2402-2480 MHz
Number of Channels:	BLE: 40CH
Port:	N/A
Input Power:	DC 12V
Trade Name :	CHAMPION
FCC ID:	YA3LY02

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
§15.247 (i), §2.1093	RF Exposure	Compliance
§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 Non-Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Test Item	Description	Uncertainty
Radiated Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	3.952dB

6. Measurements, Examination And Derived Results

6.1 RF Exposure

The EUT is a mobile device, thus requires RF exposure evaluation;
Please refer to SIEMIC RF Exposure Report: 17020307-FCC-H1.

6.2 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.

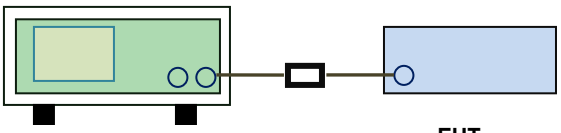
Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount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

Antenna Connector Construction

The EUT has 1 antenna:
It use a unique type of connector to attach to the EUT, the gain is 2.5 dBi.
Result: Compliance.

6.3 DTS (6 dB) Channel Bandwidth

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	April 13, 2017
Tested By :	Deon Dai

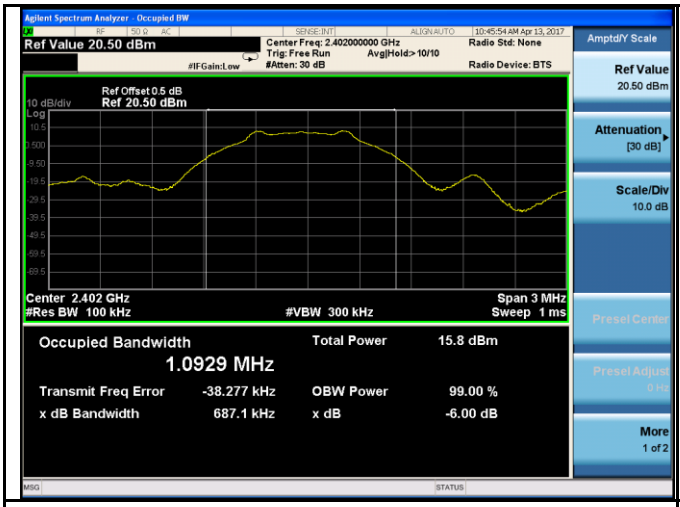
Spec	Item	Requirement	Applicable
§ 15.247(a)(2) RSSGen (4.6.1)	a)	6dB BW≥500kHz;	☑
	b)	20dB BW: For FCC reference only; required by IC.	☑
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v04, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 x 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.		
Remark			
Result	☑ Pass	☐ Fail	
Test Data	☑ Yes	☐ N/A	
Test Plot	☑ Yes (See below)	☐ N/A	

6dB Bandwidth measurement result

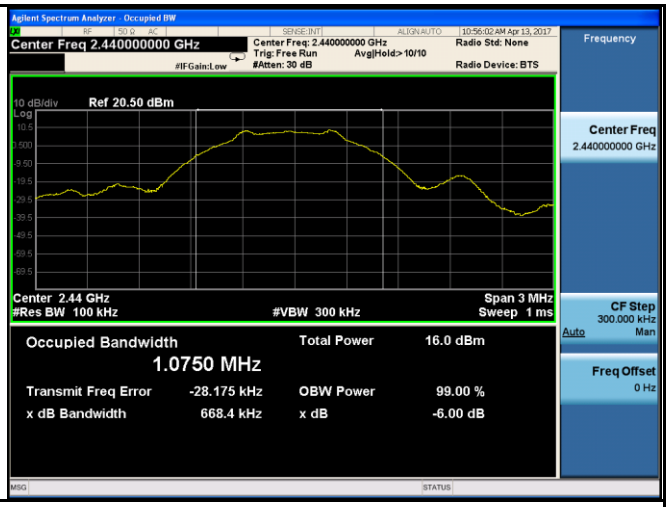
Type	Test mode	CH	Freq (MHz)	Result (MHz)	Limit (MHz)	Result
6dB BW	BLE	Low	2402	0.6871	≥0.5	Pass
		Mid	2440	0.6684	≥0.5	Pass
		High	2480	0.6754	≥0.5	Pass

Test Plots

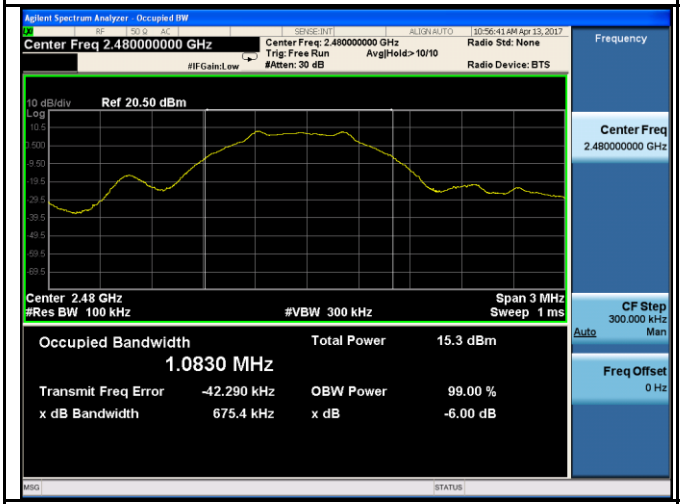
6dB Bandwidth measurement result



6dB Bandwidth - Low CH 2402



6dB Bandwidth - Mid CH 2440

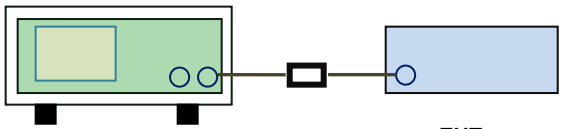


6dB Bandwidth - High CH 2480

6.4 Maximum Output Power

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	April 13, 2017
Tested By :	Deon Dai

Requirement(s):

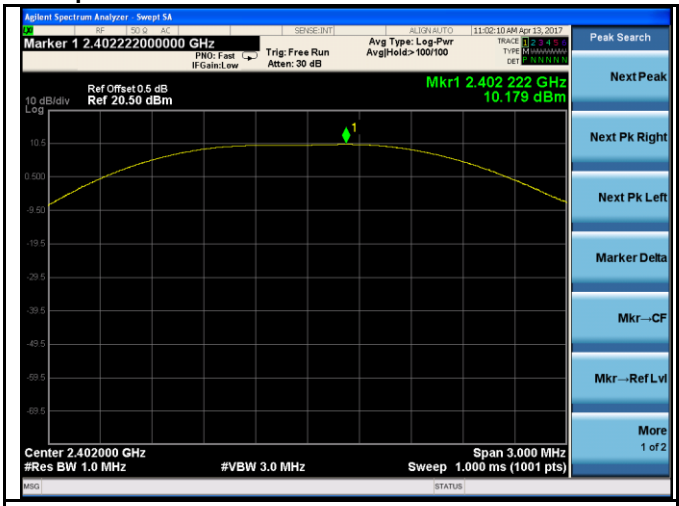
Spec	Item	Requirement	Applicable
§15.247(b)(2),RSS210 (A8.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤1 Watt	☑
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	558074 D01 DTS Meas Guidance v4, 9.1.1 Integrated band power method Maximum output power measurement procedure a) Set the RBW ≥ DTS bandwidth. b) Set VBW ≥ 3 × RBW. c) Set span ≥ 3 x 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.		
Remark			
Result	☑ Pass	☐ Fail	
Test Data	☑ Yes	☐ N/A	
Test Plot	☑ Yes (See below)	☐ N/A	

Output Power measurement result

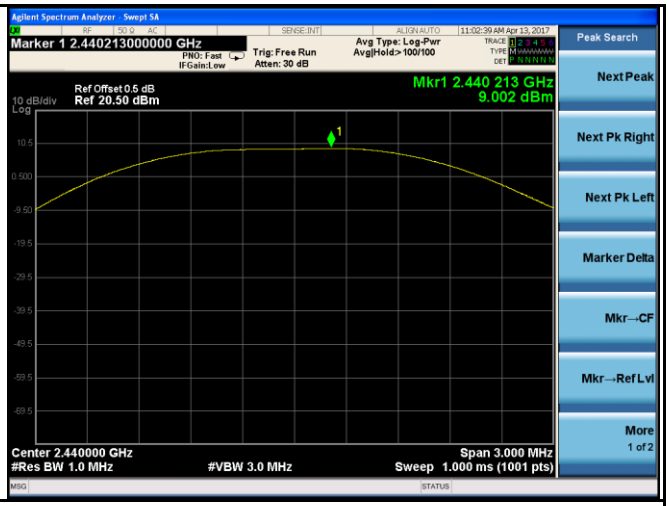
Type	Test mode	CH	Freq (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	BLE	Low	2402	10.179	30	Pass
		Mid	2440	9.002	30	Pass
		High	2480	8.791	30	Pass

Test Plots

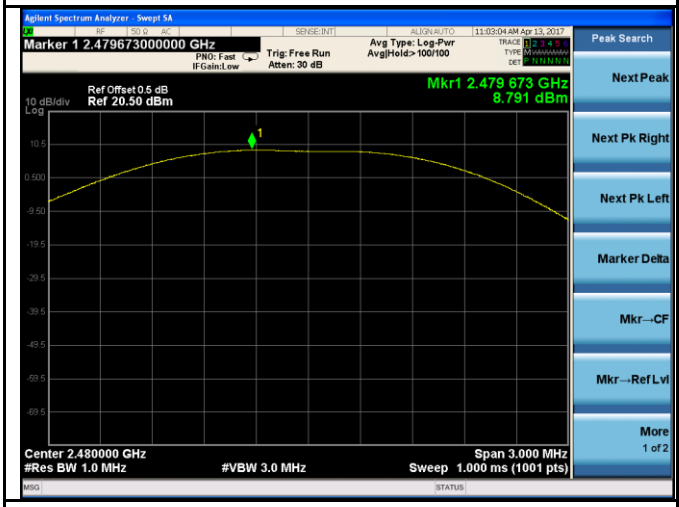
Output Power measurement result



Output power - Low CH 2402



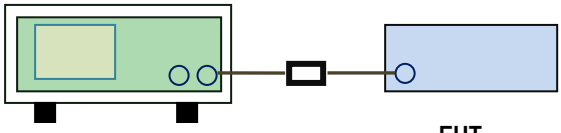
Output power - Mid CH 2440



Output power - High CH 2480

6.5 Power Spectral Density

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	April 13, 2017
Tested By :	Deon Dai

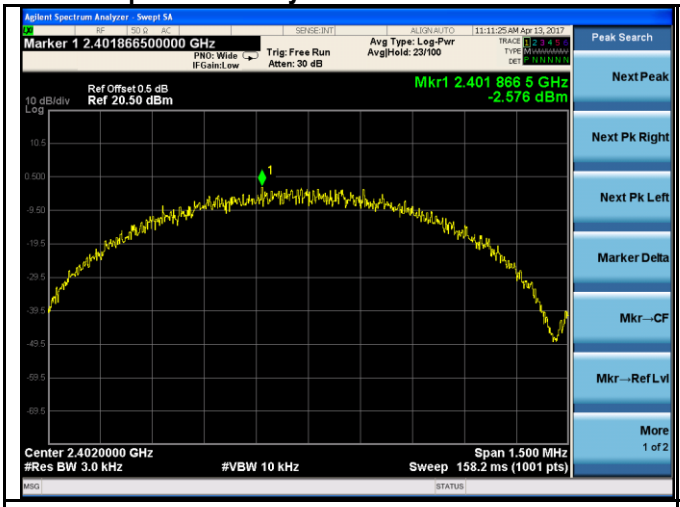
Spec	Item	Requirement	Applicable
§15.247(e)	a)	The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v04, 10.2 power spectral density method power spectral density measurement procedure 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 kHz ≤ RBW ≤ 100 kHz. d) Set the VBW ≥ 3 × 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	☑ Pass ☐ Fail		
Result	☑ Pass ☐ Fail		
Test Data	☑ Yes ☐ N/A		

Power Spectral Density measurement result

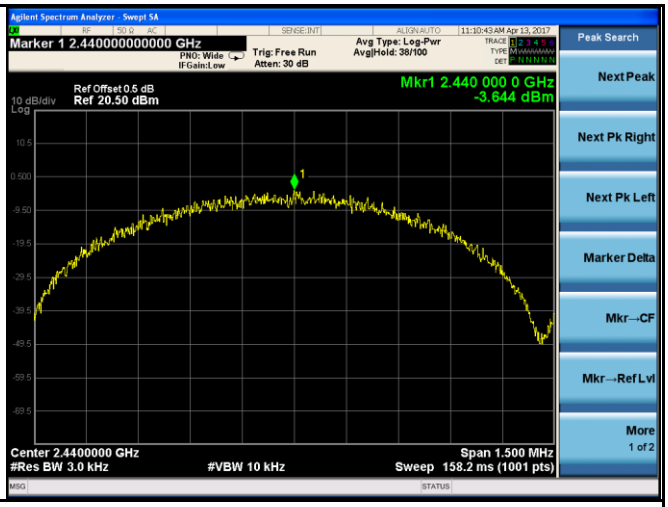
Type	Test mode	CH	Freq (MHz)	PSD (dBm)	Limit (dBm)	Result
PSD	BLE	Low	2402	-2.576	8	Pass
		Mid	2440	-3.644	8	Pass
		High	2480	-3.968	8	Pass

Test Plots

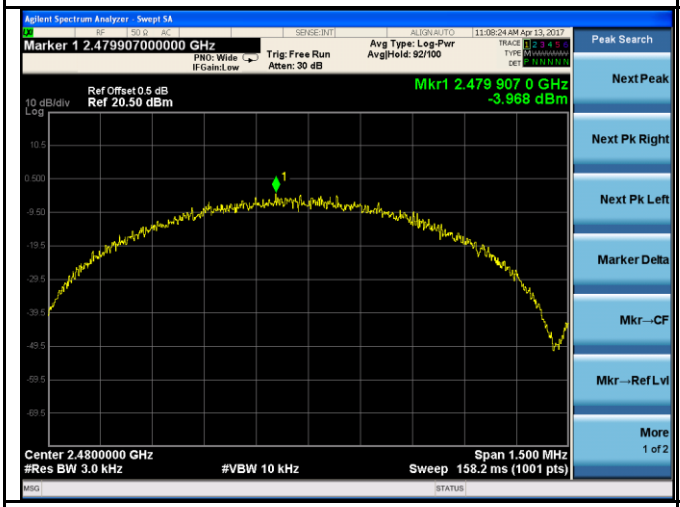
Power Spectral Density measurement result



PSD - Low CH 2402



PSD - Mid CH 2440



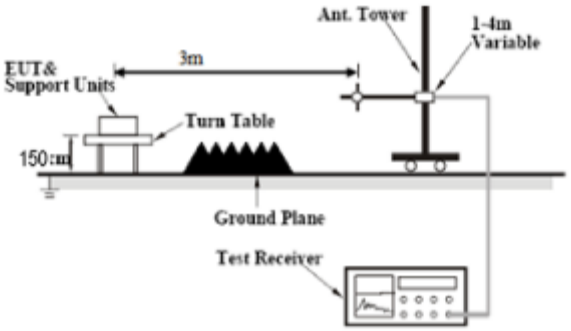
PSD - High CH 2480

6.6 Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	April 14, 2017
Tested By :	Deon Dai

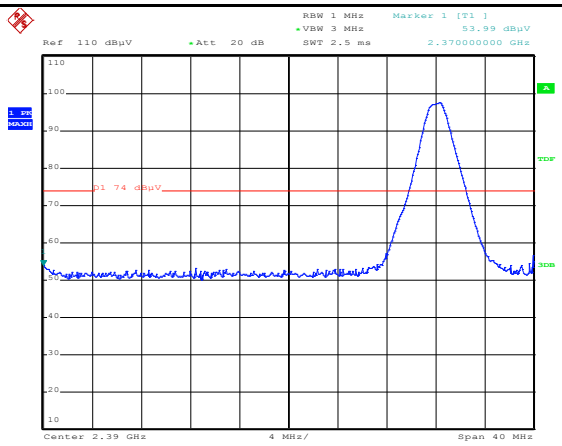
Requirement(s):

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.	☑

Test Setup	
Test Procedure	Radiated Method Only - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth for Average detection (AV) as below at frequency above 1GHz. ■ 1/T kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☑ Pass ☐ Fail
Test Data	☐ Yes ☑ N/A
Test Plot	☑ Yes (See below) ☐ N/A

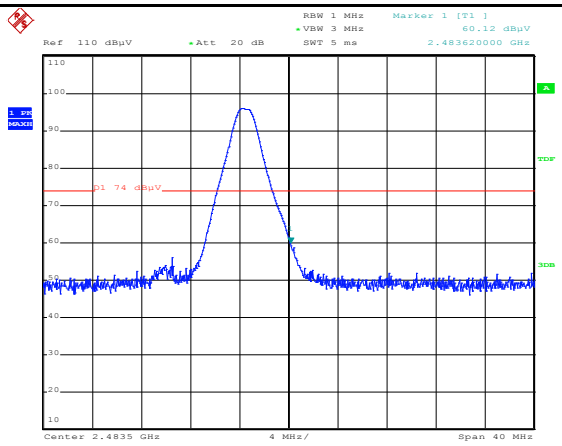
Test Plots

Band Edge measurement result



Date: 14.APR.2017 10:54:36

Band Edge, Left Side (Peak- Horizontal)



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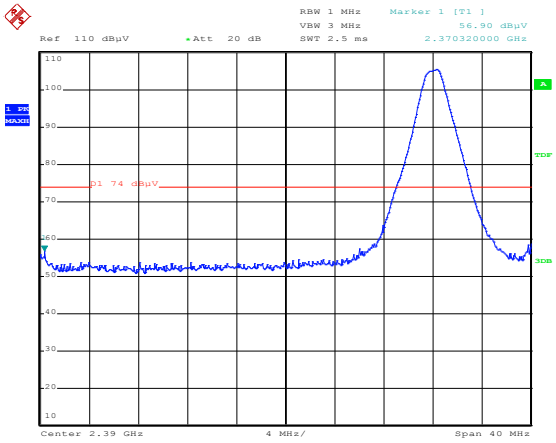
Band Edge, Right Side (Peak- Horizontal)



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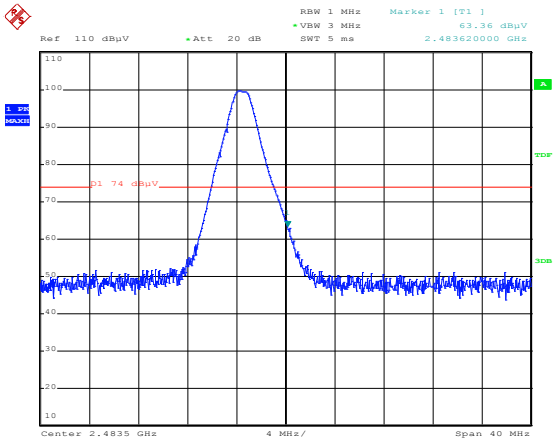
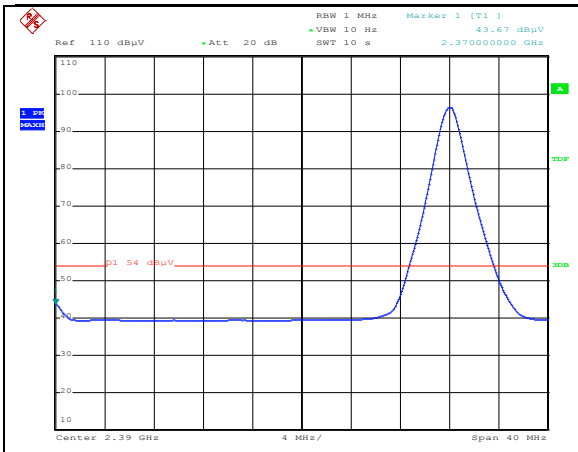
Band Edge, Left Side (Peak - Vertical)

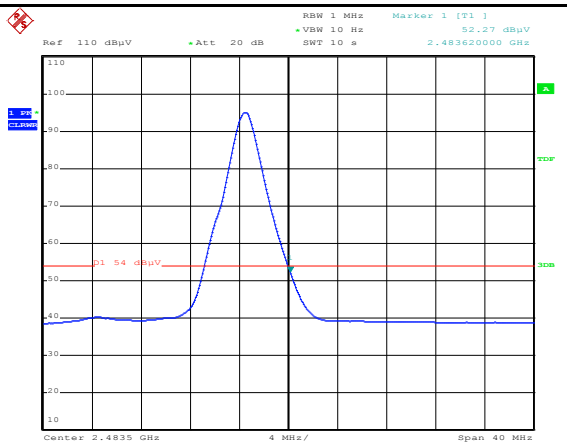


Date: 14.APR.2017 11:22:22

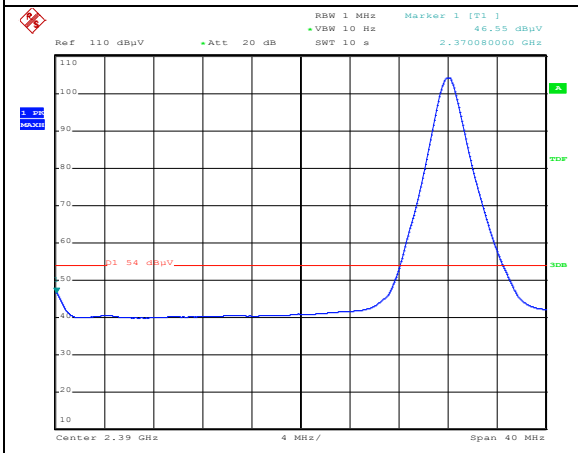
Band Edge, Right Side (Average -Vertical)



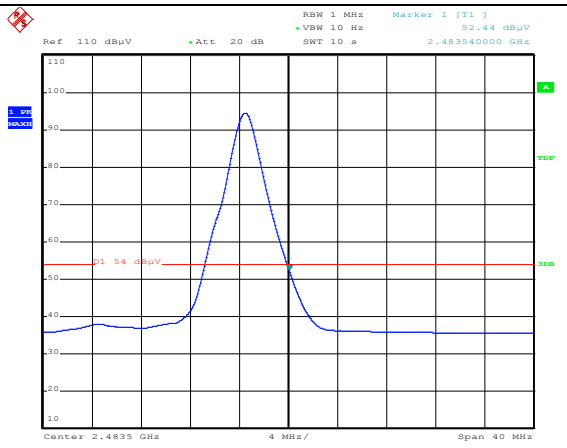
Band Edge, Left Side (Average - Horizontal)



Band Edge, Right Side (Average - Horizontal)



Band Edge, Left Side (Average - Vertical)



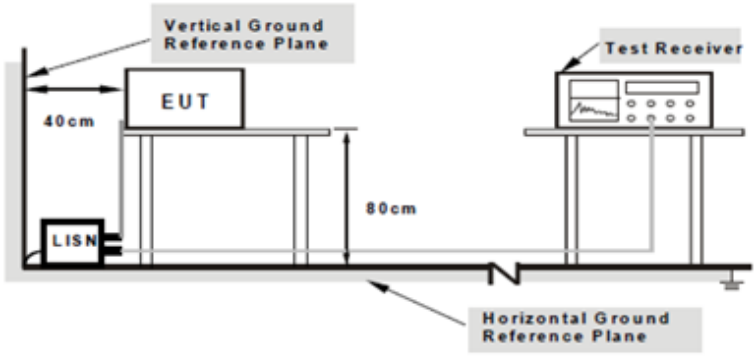
Band Edge, Right Side (Average - Vertical)

6.7 AC Power Line Conducted Emissions

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	April 14, 2017
Tested By :	Deon Dai

Requirement(s):

<table>
<tr><th>Spec</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR §15.107</td><td>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.

Class A Limit
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBµV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>79</td><td>66</td></tr>
<tr><td>0.5 ~ 30</td><td>73</td><td>60</td></tr>
</table>
Class B Limit
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBµV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<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>
</table></td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="2"> 

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.</td></tr>
<tr><td>Procedure</td><td colspan="2">1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50 [mu]H/50 EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz.
8. Steps 6-7 were repeated for the LIVE line (for AC mains) or DC line (for DC power).</td></tr>
<tr><td>Remark</td><td colspan="2"></td></tr>
</table>

Result	☒ Pass	☐ Fail
Test Data	☒Yes	☐ N/A
Test Plot	☒Yes	☐ N/A

Data sample

No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV) = Receiver Reading Value

Detector=Quasi Peak Detector or Average Detector

Lisn/ISN= Insertion loss of LISN

Ps_Lmt= Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

Cab_L= cable loss

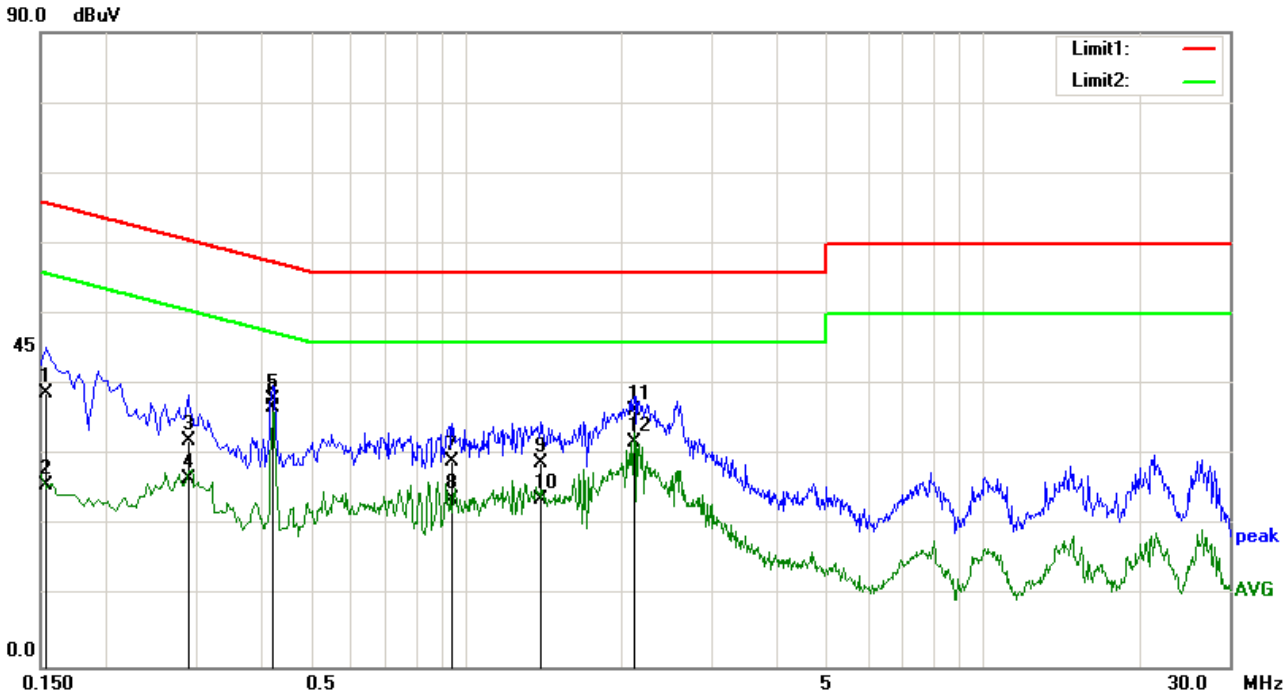
Result (dBμV) = Reading Value + Corrected Value

Limit (dBμV) = Limit stated in standard

Calculation Formula:

Margin (dB) = Result (dBμV) – limit (dBμV)

Test Mode :	Normal Working Mode

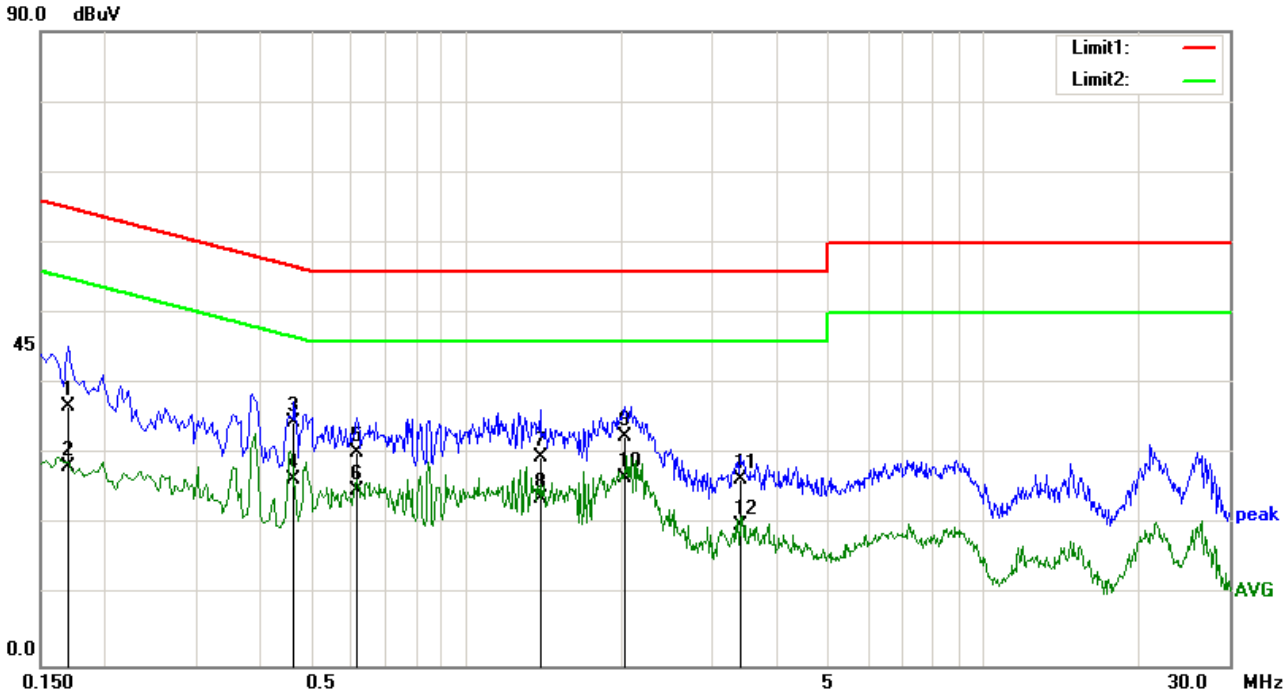


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1540	28.34	QP	0.10	-10.00	0.35	38.79	65.78	-26.99
2	0.1540	15.30	AVG	0.10	-10.00	0.35	25.75	55.78	-30.03
3	0.2900	21.86	QP	0.11	-10.00	0.20	32.17	60.52	-28.35
4	0.2900	16.35	AVG	0.11	-10.00	0.20	26.66	50.52	-23.86
5	0.4220	27.68	QP	0.11	-10.00	0.21	38.00	57.41	-19.41
6	0.4220	26.52	AVG	0.11	-10.00	0.21	36.84	47.41	-10.57
7	0.9420	18.88	QP	0.14	-10.00	0.19	29.21	56.00	-26.79
8	0.9420	13.39	AVG	0.14	-10.00	0.19	23.72	46.00	-22.28
9	1.3980	18.64	QP	0.15	-10.00	0.20	28.99	56.00	-27.01
10	1.3980	13.39	AVG	0.15	-10.00	0.20	23.74	46.00	-22.26
11	2.1180	26.05	QP	0.16	-10.00	0.20	36.41	56.00	-19.59
12	2.1180	21.42	AVG	0.16	-10.00	0.20	31.78	46.00	-14.22

Test Mode :	Normal Working Mode

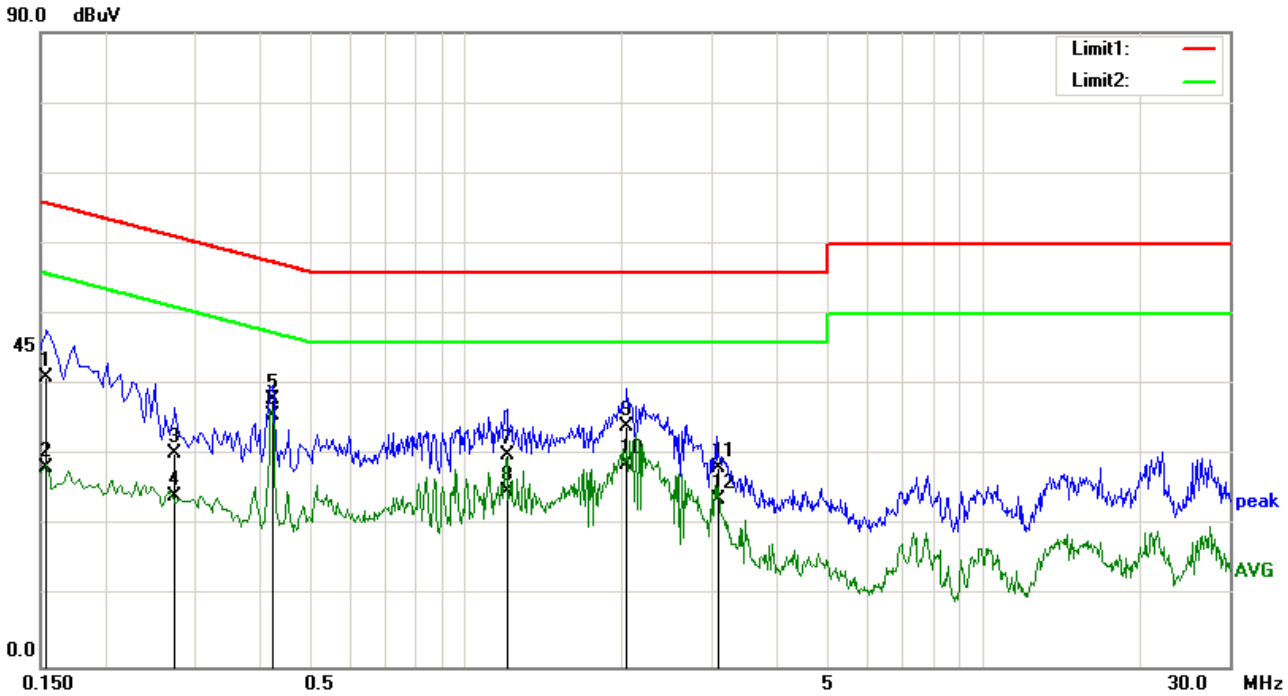


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1700	26.31	QP	0.11	-10.00	0.33	36.75	64.96	-28.21
2	0.1700	17.75	AVG	0.11	-10.00	0.33	28.19	54.96	-26.77
3	0.4660	24.24	QP	0.11	-10.00	0.21	34.56	56.58	-22.02
4	0.4660	16.13	AVG	0.11	-10.00	0.21	26.45	46.58	-20.13
5	0.6140	19.88	QP	0.12	-10.00	0.21	30.21	56.00	-25.79
6	0.6140	14.59	AVG	0.12	-10.00	0.21	24.92	46.00	-21.08
7	1.3940	19.18	QP	0.15	-10.00	0.20	29.53	56.00	-26.47
8	1.3940	13.30	AVG	0.15	-10.00	0.20	23.65	46.00	-22.35
9	2.0260	22.08	QP	0.17	-10.00	0.18	32.43	56.00	-23.57
10	2.0260	16.38	AVG	0.17	-10.00	0.18	26.73	46.00	-19.27
11	3.3940	15.94	QP	0.22	-10.00	0.25	26.41	56.00	-29.59
12	3.3940	9.43	AVG	0.22	-10.00	0.25	19.90	46.00	-26.10

Test Mode :	Normal Working Mode

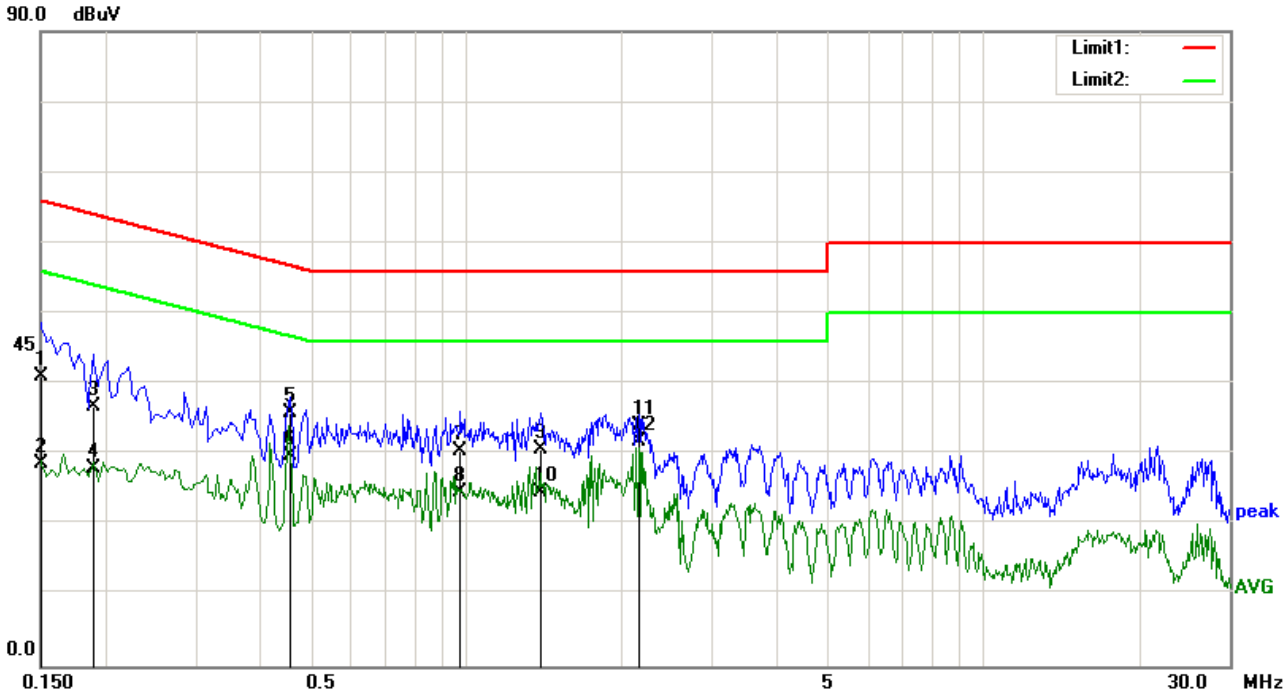


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1540	30.55	QP	0.10	-10.00	0.35	41.00	65.78	-24.78
2	0.1540	17.68	AVG	0.10	-10.00	0.35	28.13	55.78	-27.65
3	0.2740	19.96	QP	0.10	-10.00	0.20	30.26	61.00	-30.74
4	0.2740	13.88	AVG	0.10	-10.00	0.20	24.18	51.00	-26.82
5	0.4220	27.54	QP	0.11	-10.00	0.21	37.86	57.41	-19.55
6	0.4220	25.41	AVG	0.11	-10.00	0.21	35.73	47.41	-11.68
7	1.1980	19.78	QP	0.14	-10.00	0.21	30.13	56.00	-25.87
8	1.1980	14.60	AVG	0.14	-10.00	0.21	24.95	46.00	-21.05
9	2.0460	23.73	QP	0.16	-10.00	0.19	34.08	56.00	-21.92
10	2.0460	18.39	AVG	0.16	-10.00	0.19	28.74	46.00	-17.26
11	3.0740	17.79	QP	0.20	-10.00	0.25	28.24	56.00	-27.76
12	3.0740	13.21	AVG	0.20	-10.00	0.25	23.66	46.00	-22.34

Test Mode :	Normal Working Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1500	30.53	QP	0.11	-10.00	0.36	41.00	66.00	-25.00
2	0.1500	18.15	AVG	0.11	-10.00	0.36	28.62	56.00	-27.38
3	0.1900	26.41	QP	0.10	-10.00	0.30	36.81	64.04	-27.23
4	0.1900	17.56	AVG	0.10	-10.00	0.30	27.96	54.04	-26.08
5	0.4580	25.62	QP	0.11	-10.00	0.21	35.94	56.73	-20.79
6	0.4580	19.48	AVG	0.11	-10.00	0.21	29.80	46.73	-16.93
7	0.9740	20.06	QP	0.13	-10.00	0.19	30.38	56.00	-25.62
8	0.9740	14.35	AVG	0.13	-10.00	0.19	24.67	46.00	-21.33
9	1.3980	20.37	QP	0.15	-10.00	0.20	30.72	56.00	-25.28
10	1.3980	14.34	AVG	0.15	-10.00	0.20	24.69	46.00	-21.31
11	2.1660	23.75	QP	0.18	-10.00	0.21	34.14	56.00	-21.86
12	2.1660	21.40	AVG	0.18	-10.00	0.21	31.79	46.00	-14.21

6.8 Radiated Spurious Emissions

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	March 30 to March 31, 2017
Tested By :	Deon Dai

Requirement(s):

Spec	Requirement	Applicable
47CFR §15.109	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	☒

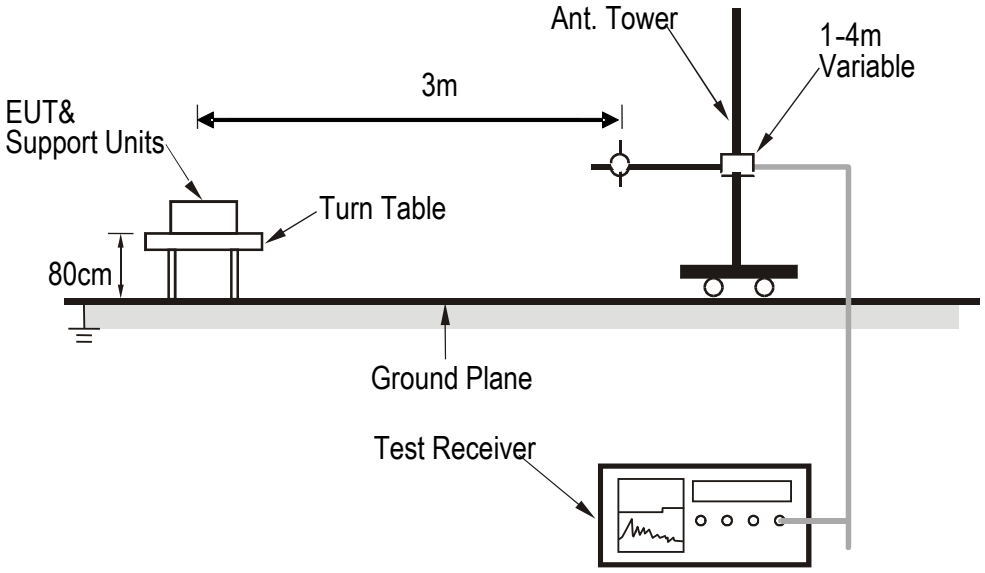
Class A Limit

Frequency range (MHz)	Field Strength (μV/m)
30 – 88	90
88 – 216	150
216 – 960	210
Above 960	300

Class B Limit

Frequency range (MHz)	Field Strength (μV/m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

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 characterisation. 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 polarisation (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. For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured.
4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

Remark		
Result	☒ Pass	☐ Fail
Test Data	☒Yes	☐N/A
Test Plot	☒Yes	☐N/A

Data sample

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBμV/m)		(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV/m) = Receiver Reading Value

Detector= Peak Detector or Quasi Peak Detector

Ant_F=Antenna Factor

PA_G=Pre-Amplifier Gain

Cab_L=Cable Loss

Result (dBμV/m) = Read ing Value + Corrected Value

Limit (dBμV/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

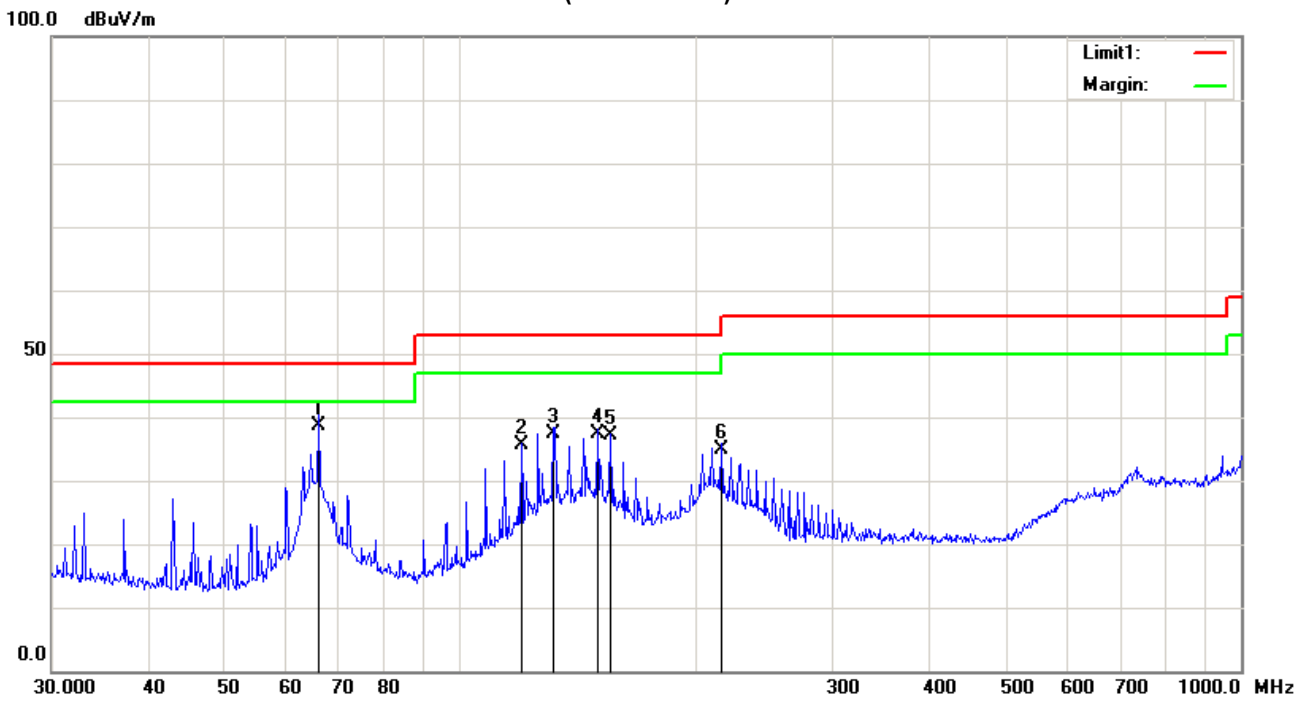
Degree = Turn table degree

Calculation Formula:

Margin (dB) = Result (dBμV/m) – limit (dBμV/m)

Test Mode:	Normal Working Mode

(Below 1GHz)



Test Data

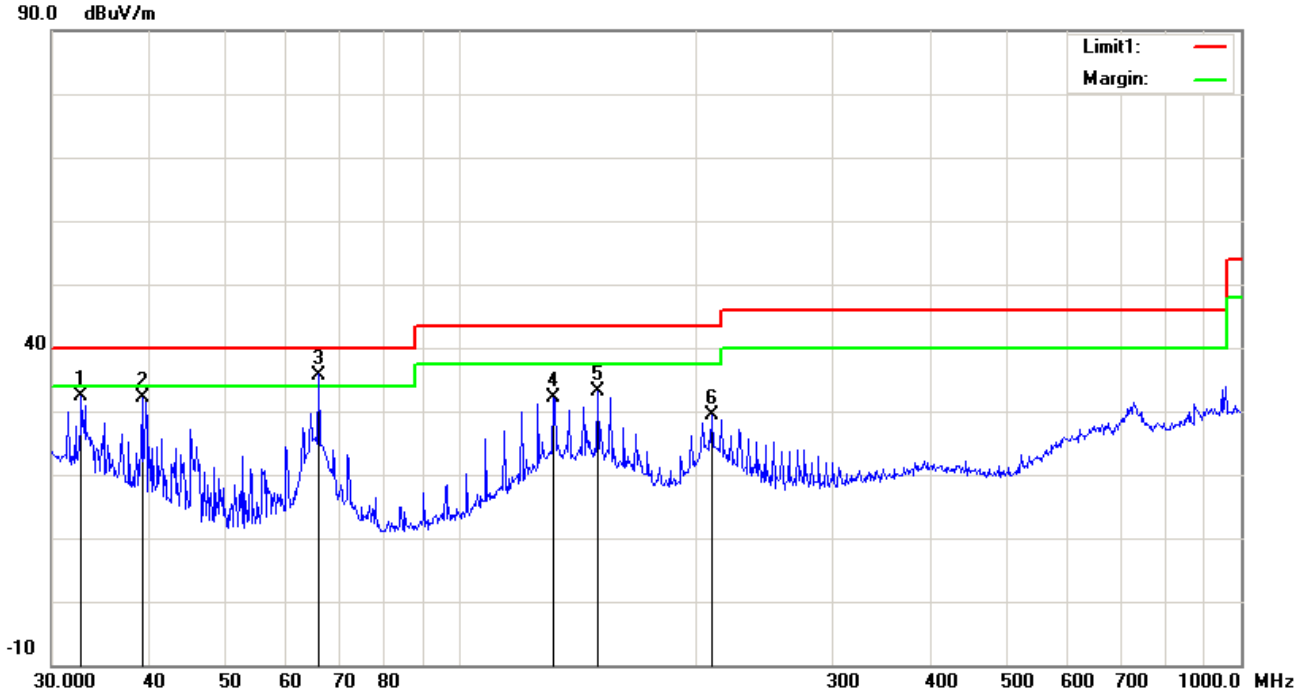
Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	66.0342	74.80	QP	10.23	47.69	1.38	38.72	48.50	-9.78	300	160
2	119.8556	64.35	QP	16.03	46.56	1.78	35.60	53.00	-17.40	300	143
3	131.7577	68.22	QP	14.71	47.42	1.88	37.39	53.00	-15.61	199	167
4	150.0108	70.26	QP	13.00	47.99	2.10	37.37	53.00	-15.63	200	278
5	155.9101	69.84	QP	12.70	47.57	2.08	37.05	53.00	-15.95	200	293
6	216.0240	66.22	QP	13.95	47.72	2.34	34.79	55.90	-21.11	200	291

Note:low channel only show the worst case.

Test Mode:	Normal Working Mode

(Below 1GHz)



Test Data

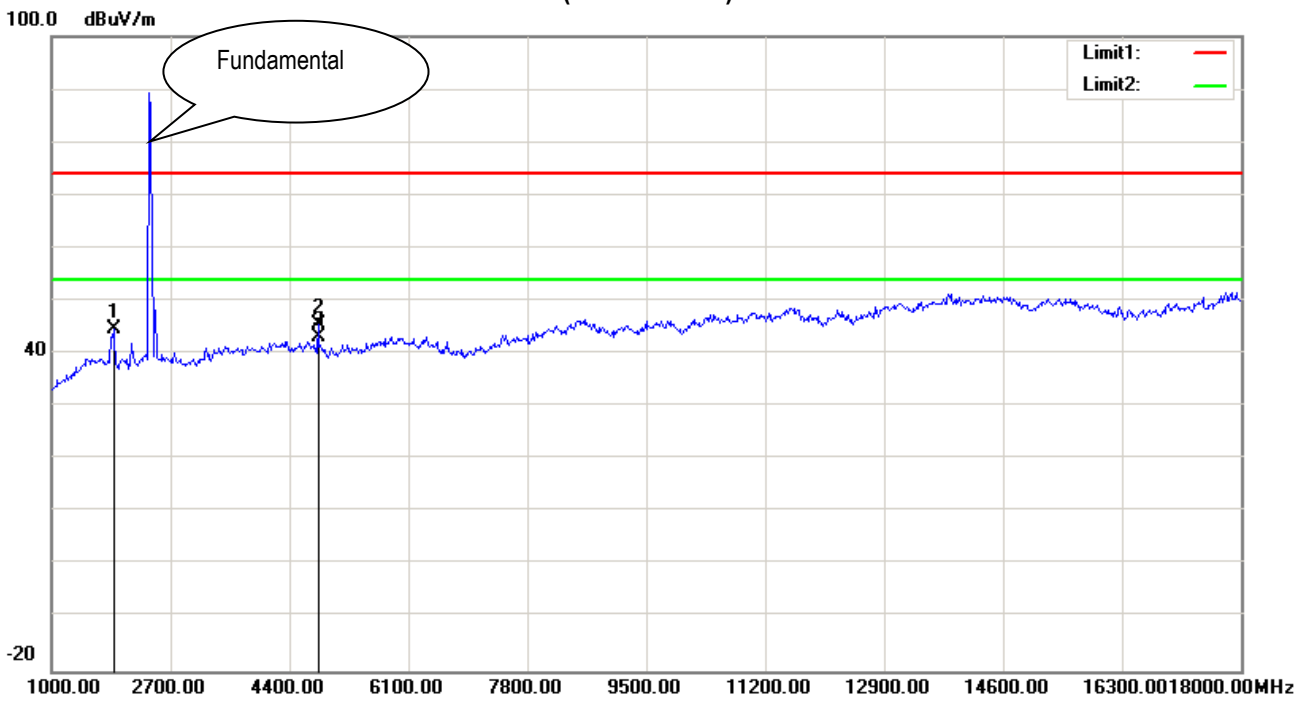
Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	32.7486	57.20	peak	20.00	45.66	0.92	32.46	40.00	-7.54	200	187
2	39.1616	60.64	peak	16.27	45.69	1.03	32.25	40.00	-7.75	200	215
3	66.0342	72.41	QP	9.41	47.69	1.38	35.51	40.00	-4.49	99	227
4	131.7577	61.99	peak	15.68	47.42	1.88	32.13	43.50	-11.37	200	194
5	150.0108	64.91	peak	13.99	47.99	2.10	33.01	43.50	-10.49	200	188
6	210.0482	59.79	peak	14.86	47.58	2.31	29.38	43.50	-14.12	200	199

Note:low channel only show the worst case.

Test Mode:	Normal Working Mode (Low Channel)

(Above 1GHz)



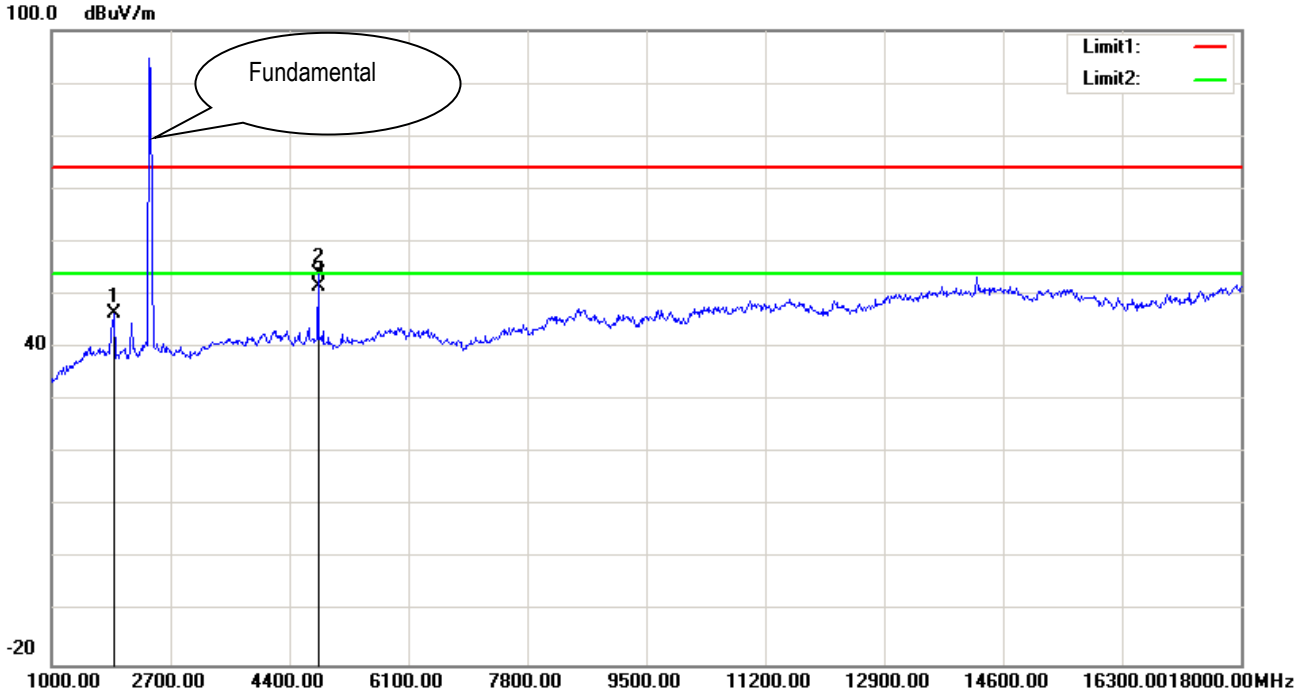
Test Data

Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1884.000	65.69	peak	26.61	51.69	3.99	44.60	74.00	-29.40	100	359
2	4808.000	59.72	peak	33.12	53.35	6.10	45.59	74.00	-28.41	200	136
3	4808.000	57.25	AVG	33.12	53.35	6.10	43.12	54.00	-10.88	200	136

Test Mode:	Normal Working Mode (Low Channel)

(Above 1GHz)



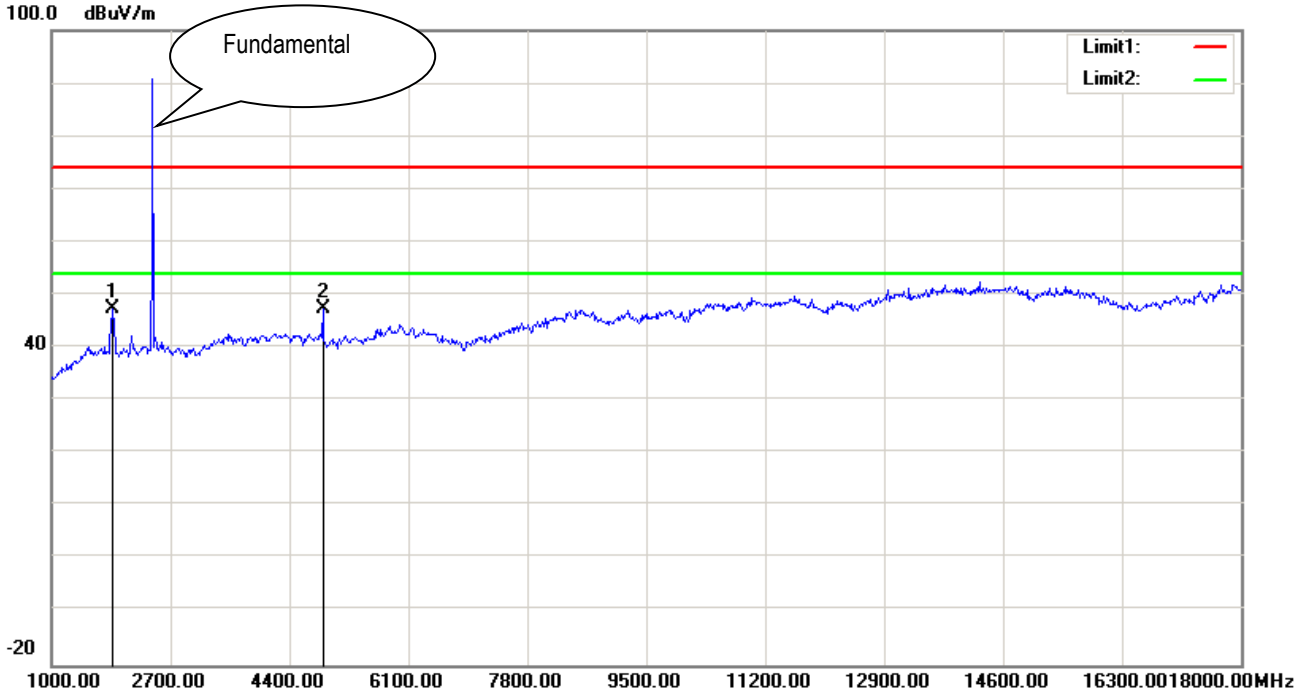
Test Data

Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1901.000	67.69	peak	26.68	51.77	3.98	46.58	74.00	-27.42	200	119
2	4808.000	68.07	peak	33.12	53.35	6.10	53.94	74.00	-20.06	200	295
3	4808.000	65.62	AVG	33.12	53.35	6.10	51.49	54.00	-2.51	200	295

Test Mode:	Normal Working Mode (Middle Channel)

(Above 1GHz)



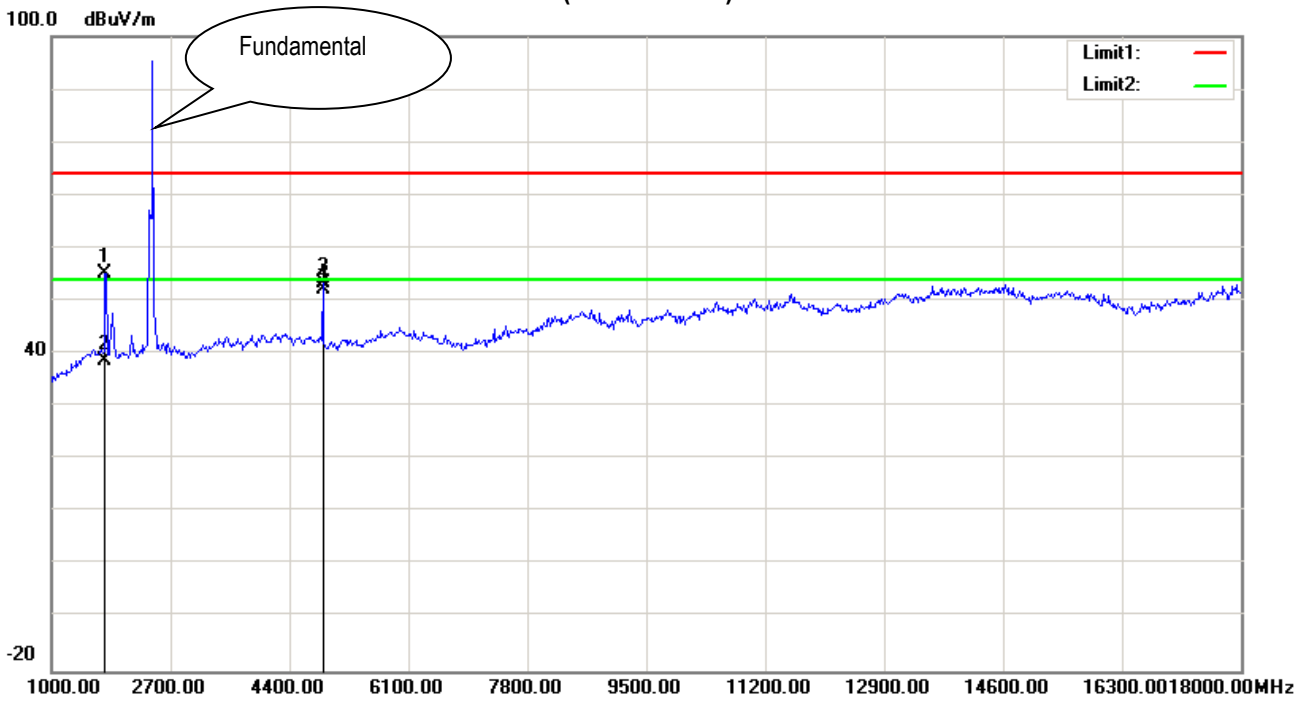
Test Data

Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	68.49	peak	26.54	51.61	3.99	47.41	74.00	-26.59	100	0
2	4876.000	61.69	peak	33.33	53.66	6.00	47.36	74.00	-26.64	200	125

Test Mode:	Normal Working Mode (Middle Channel)

(Above 1GHz)



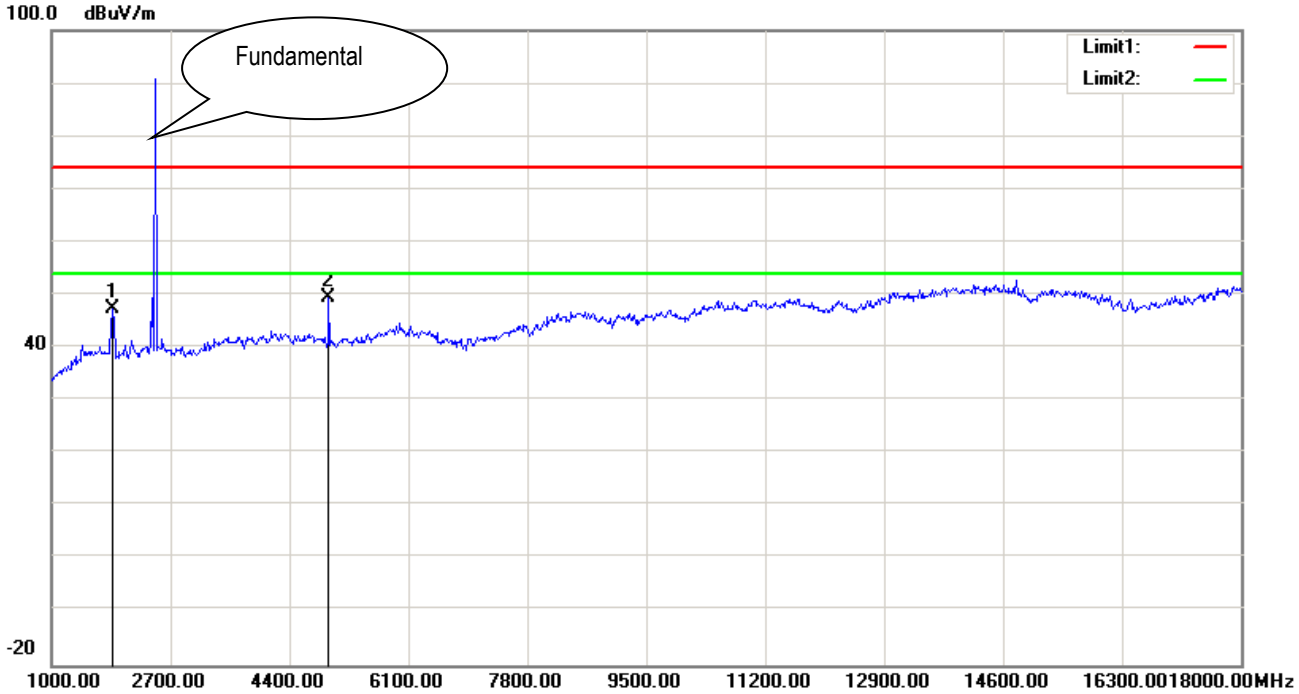
Test Data

Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1765.000	76.30	peak	26.11	51.12	4.01	55.30	74.00	-18.70	99	68
2	1765.000	59.68	AVG	26.11	51.12	4.01	38.68	54.00	-15.32	99	68
3	4876.000	67.81	peak	33.33	53.66	6.00	53.48	74.00	-20.52	200	149
4	4876.000	66.41	AVG	33.33	53.66	6.00	52.08	54.00	-1.92	200	149

Test Mode:	Normal Working Mode (High Channel)

(Above 1GHz)



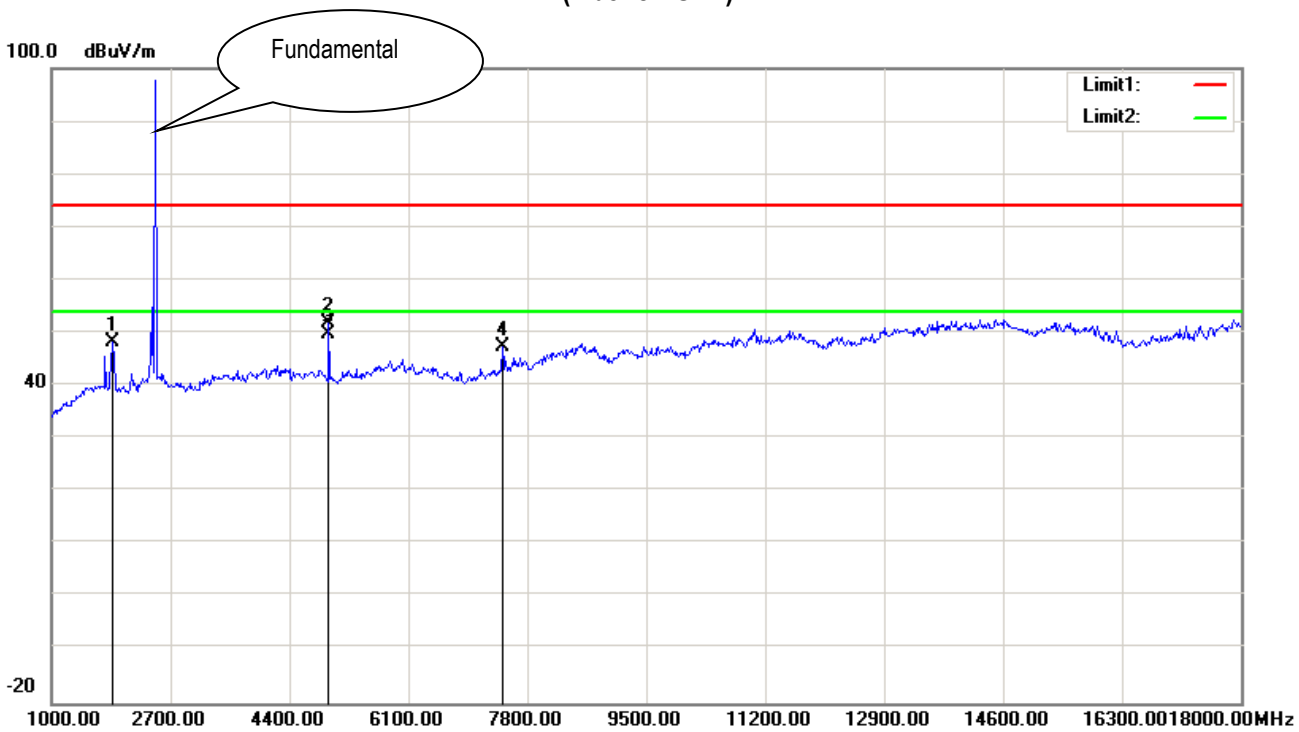
Test Data

Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	68.39	peak	26.54	51.61	3.99	47.31	74.00	-26.69	200	207
2	4961.000	63.93	peak	33.58	54.04	5.88	49.35	74.00	-24.65	200	120

Test Mode:	Normal Working Mode (High Channel)

(Above 1GHz)



Test Data

Vertical Polarity Plot @3m

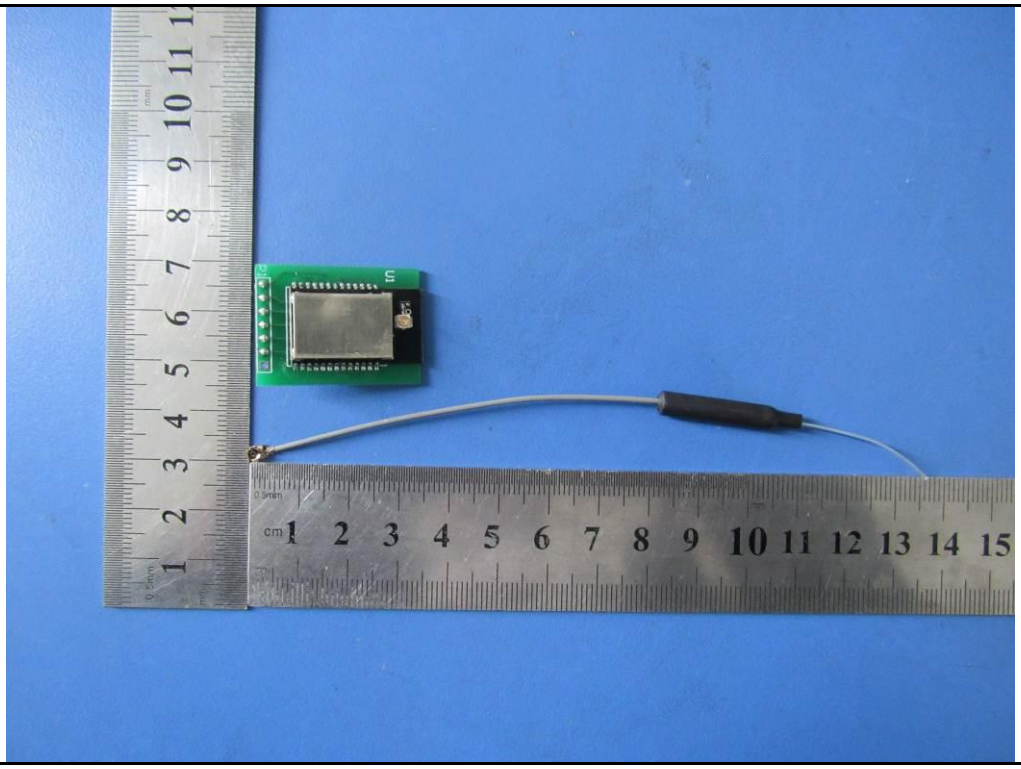
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	69.37	peak	26.54	51.61	3.99	48.29	74.00	-25.71	200	0
2	4961.000	66.56	peak	33.58	54.04	5.88	51.98	74.00	-22.02	200	173
3	4961.000	64.24	AVG	33.58	54.04	5.88	49.66	54.00	-4.34	200	173
4	7443.000	58.85	peak	35.91	54.87	7.33	47.22	74.00	-26.78	200	168

Annex A. TEST INSTRUMENT

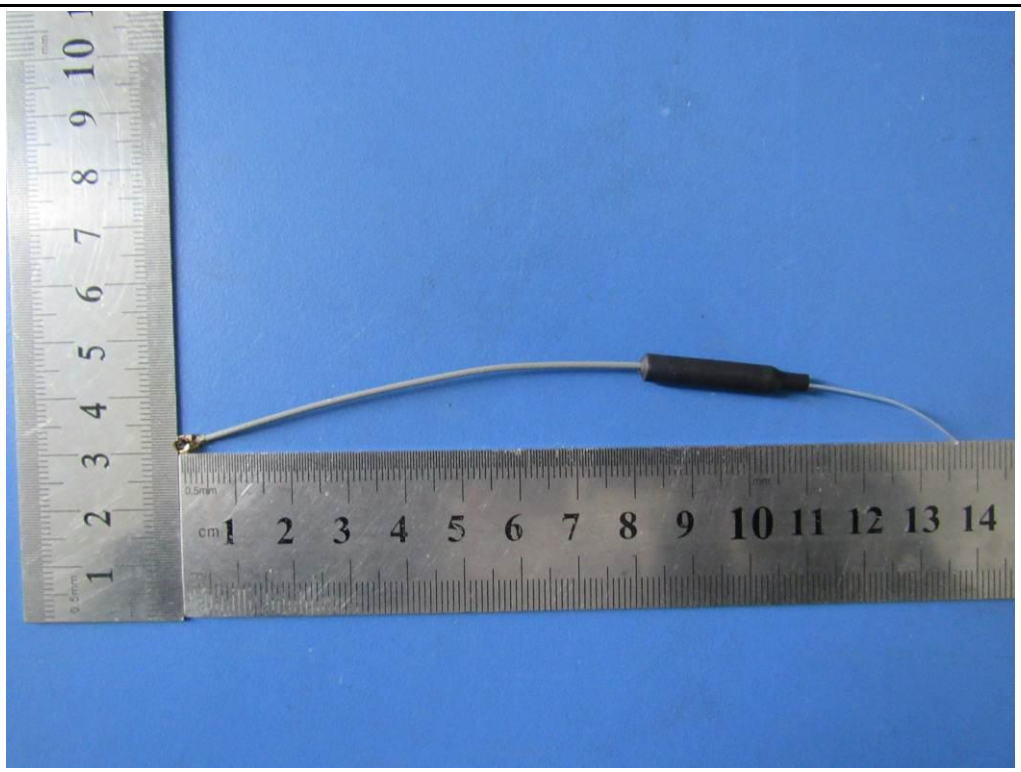
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	03/30/2017	03/31/2018	☑
V-LISN	ESH3-Z5	838979/005	03/30/2017	03/31/2018	☑
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	10/08/2016	10/07/2017	☑
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☑
RF conducted test					
R&S EMI Receiver	ESPI3	101216	03/30/2017	03/31/2018	☑
Power Splitter	1#	1#	02/02/2017	02/01/2018	☑
Spectrum Analyzer	N9010A	MY47191130	03/30/2017	03/31/2018	☑
Temperature/Humidity Chamber	1007H	N/A	01/07/2017	01/06/2018	☑
Radiated Emissions					
Spectrum Analyzer	N9010A	MY47191130	03/30/2017	03/31/2018	☑
R&S EMI Receiver	ESPI3	101216	03/30/2017	03/31/2018	☑
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2016	10/31/2017	☑
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	11/15/2016	11/14/2017	☑
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	10/09/2016	10/08/2017	☑
Horn Antenna (18~40GHz)	AH-840	101013	04/30/2016	04/29/2017	N/A
Microwave Pre-Amp (18~40GHz)	PA-840	181250	05/29/2016	05/28/2017	N/A
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/31/2016	10/30/2017	☑
MITEQ Pre-Amplifier (0.1 ~ 18GHz)	AMF-7D-00101800-	1451709	10/27/2016	10/26/2017	☑
SIEMIC Labview Radiated Emissions software	V1.0	N/A	N/A	N/A	☑

Annex B. EUT And Test Setup Photographs

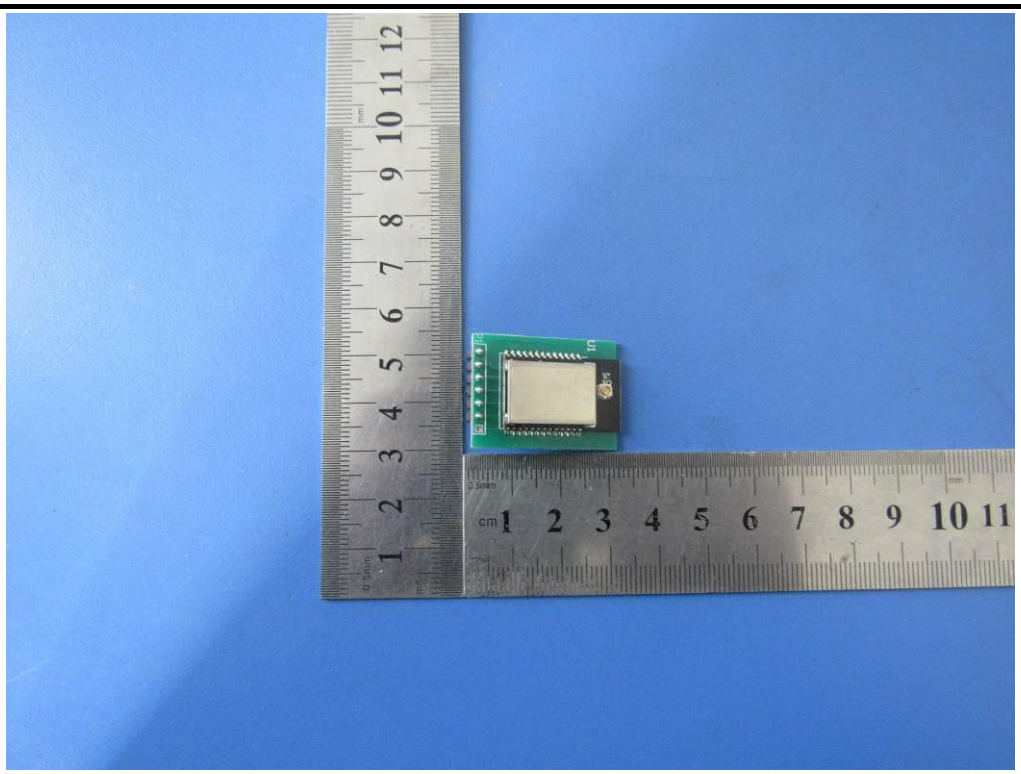
Annex B.i. Photograph: EUT External/ Internal Photo



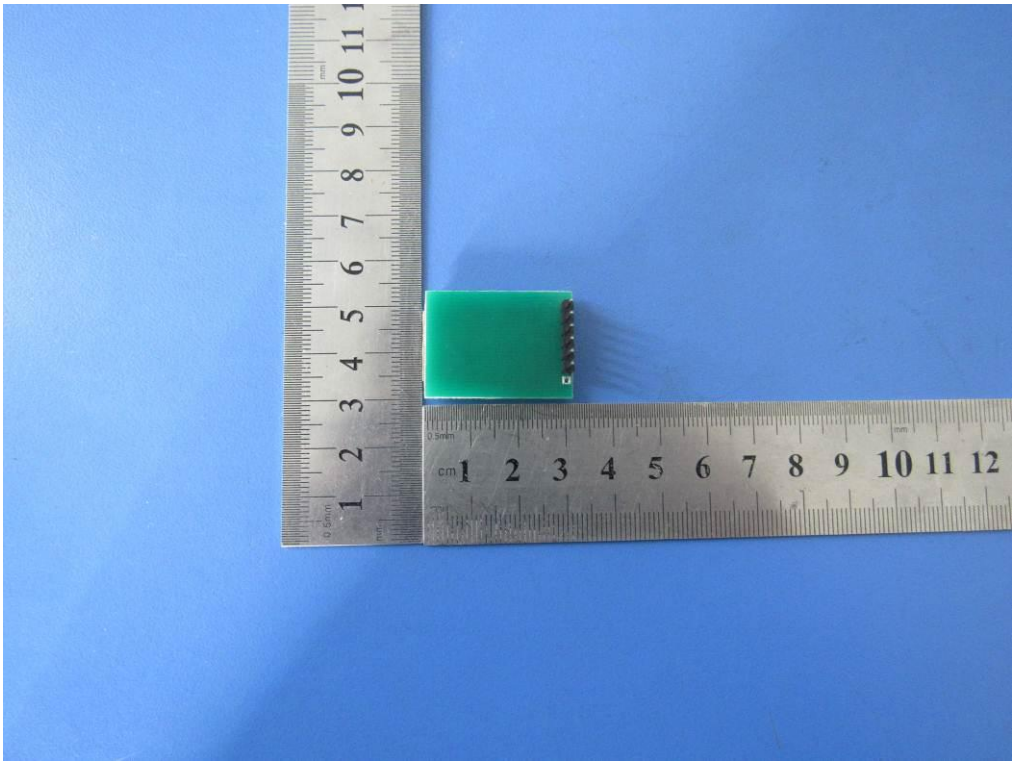
The Whole of EUT - Front View



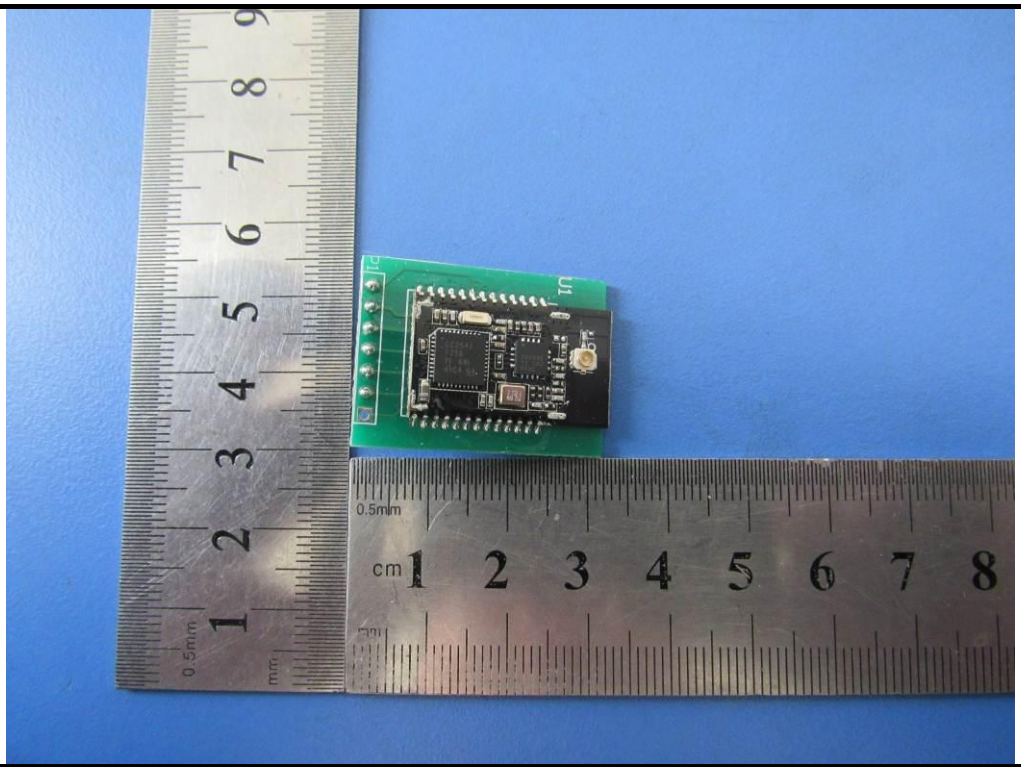
EUT Antenna - Front View



EUT - Top View

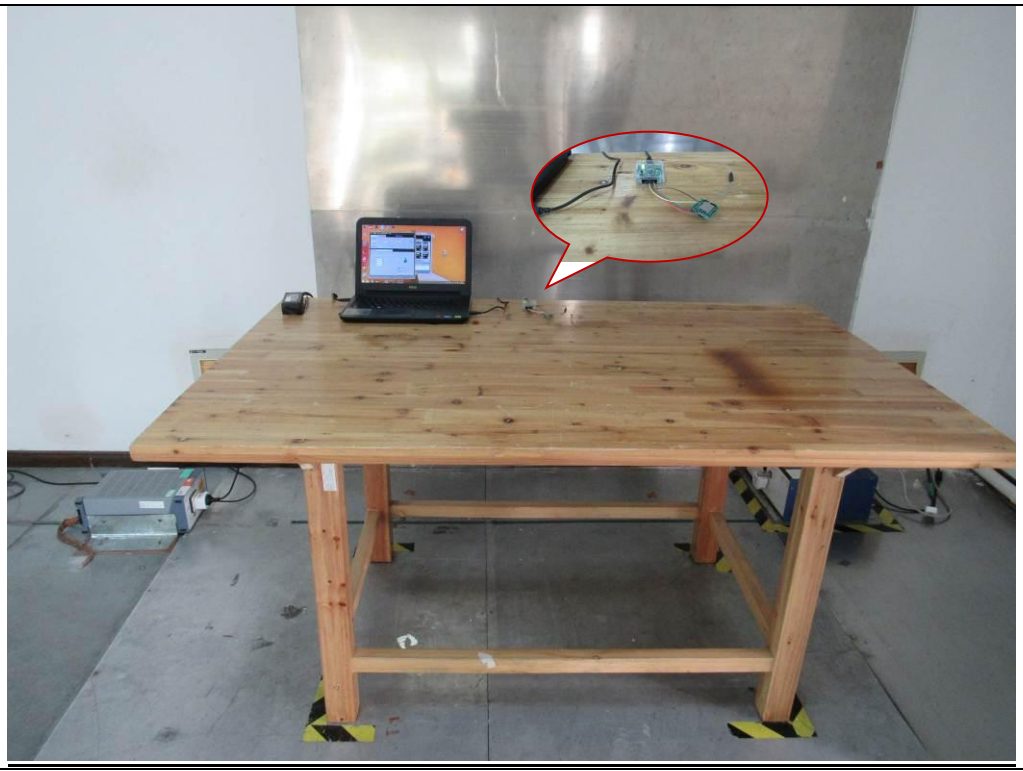


EUT - Bottom View



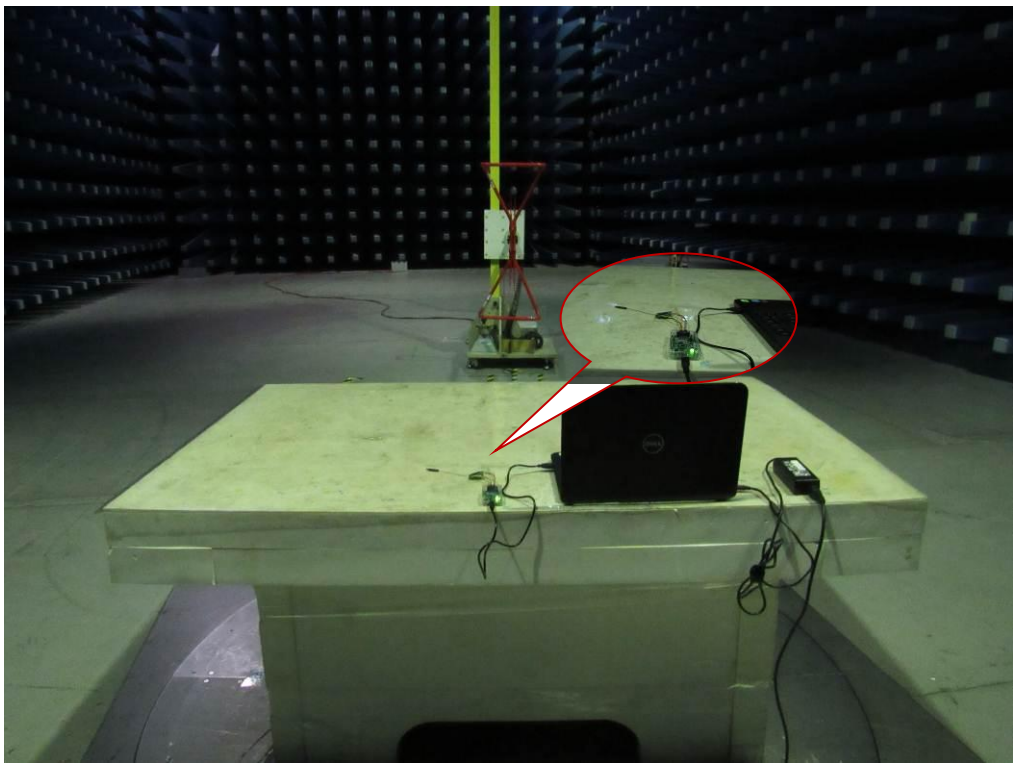
EUT – Front View(Without shield)

Annex B.ii. Photograph: Test Setup Photo

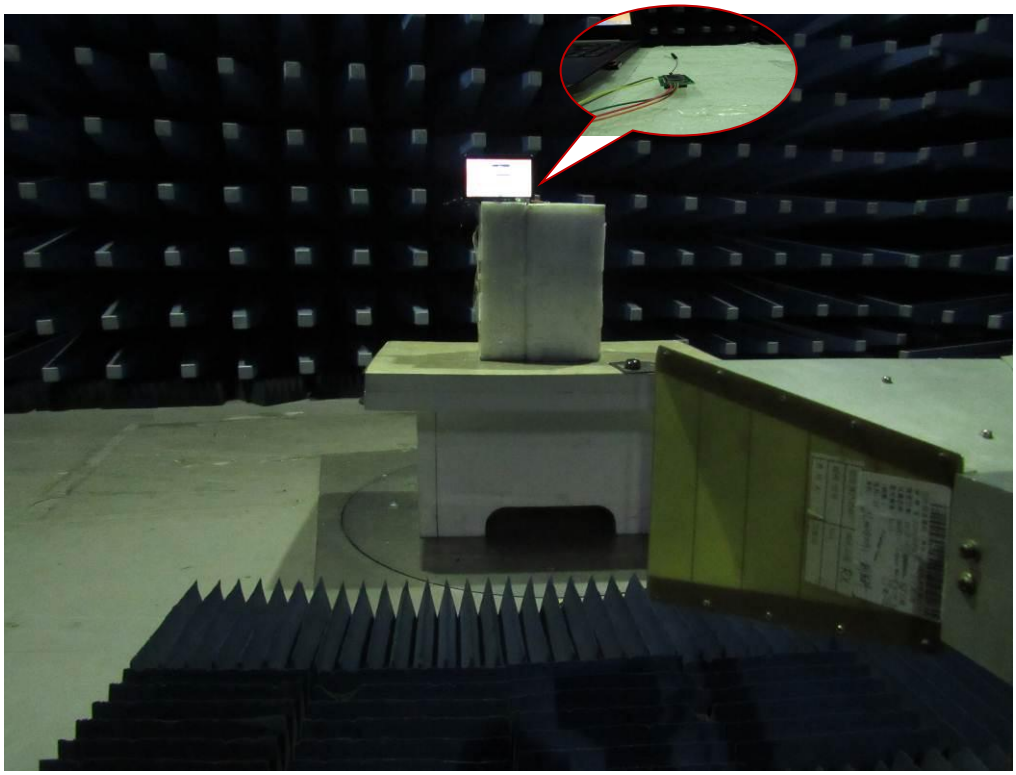


Conducted Emissions Setup Front View

Conducted Emissions Setup Side View



Radiated Emissions Setup Below 1GHz Front View

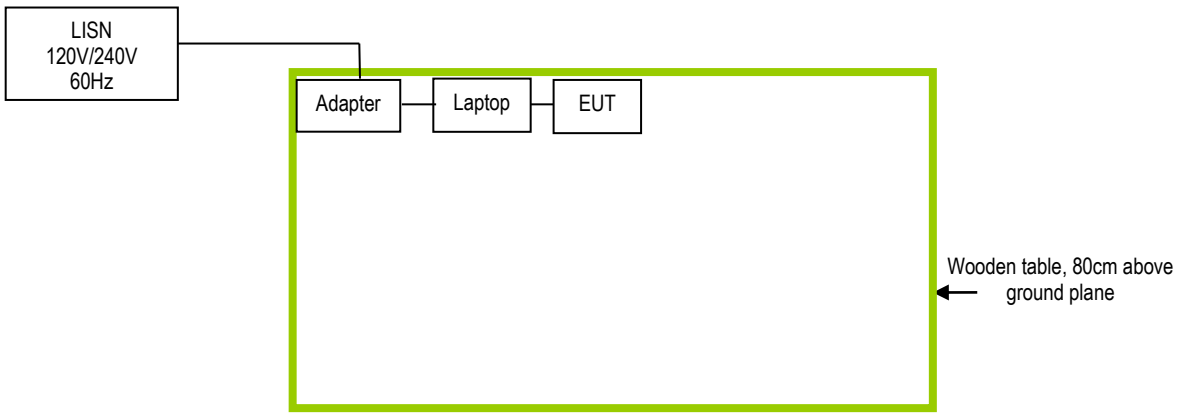


Radiated Spurious Emissions Test Setup Above 1GHz

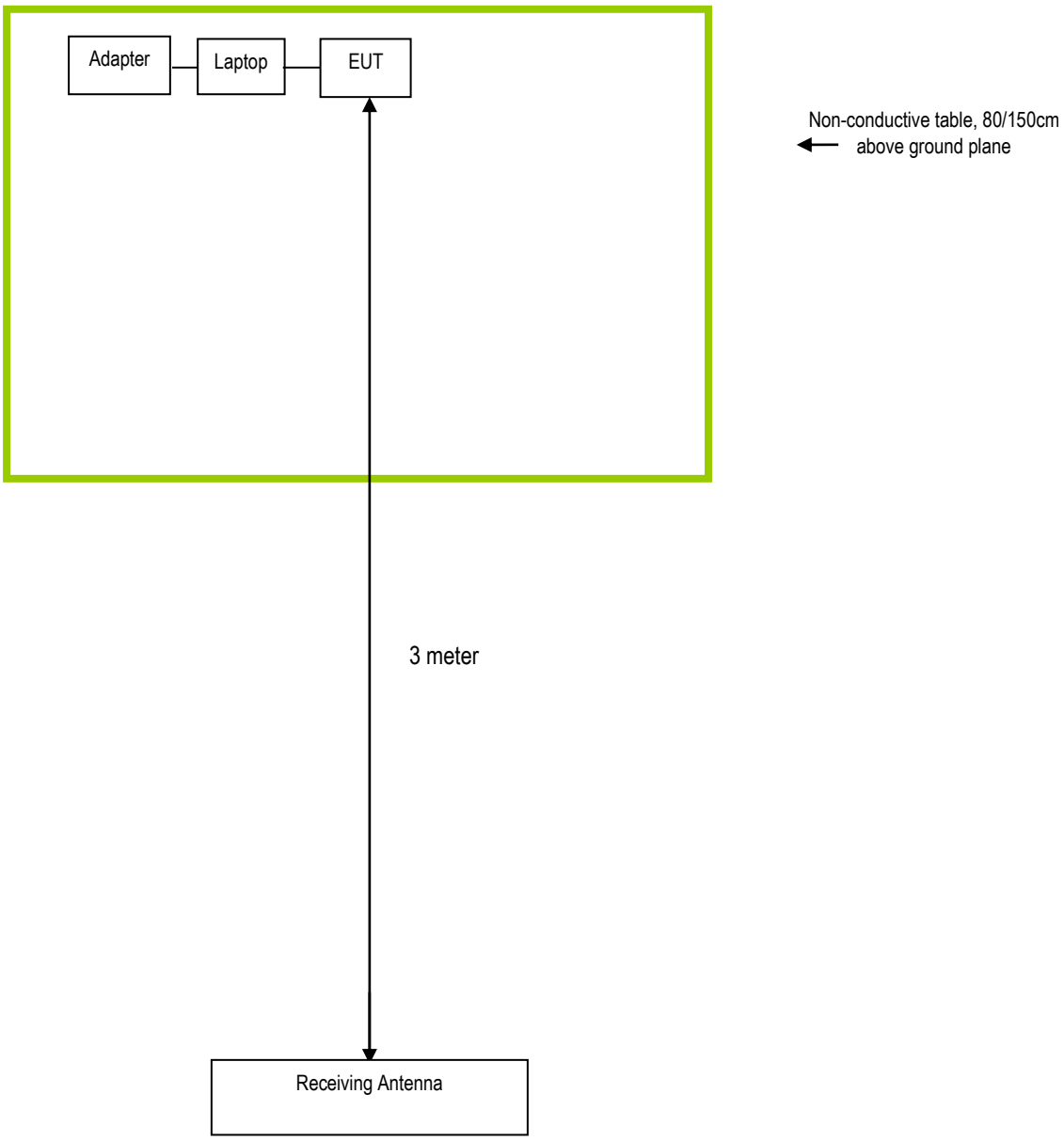
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

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

Manufacturer	Equipment Description	Model	Calibration Date
Dell	Laptop	DSCM	N/A

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

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A