



FCC Test Report

APPLICANT : Hugreen Co Ltd
EQUIPMENT : Smart Agriculture Monitoring System
BRAND NAME : Rockabye
MODEL NAME : GWY-A09L
FCC ID : 2APLT-GWY-A09L
STANDARD : FCC CFR Title 47 Part 15 Subpart B
CLASSIFICATION : Certification

The product was received on Mar. 29, 2018 and testing was completed on Apr. 24, 2018. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.



Approved by: Eric Shih / Manager

Sportun International (Shenzhen) Inc.
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City
Guangdong Province 518055 China



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REVISION HISTORY



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	Under limit 18.30 dB at 0.670 MHz
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 10.94 dB at 852.560 MHz for peak



1. General Description

1.1. Applicant

Hugreen Co Ltd

12F., No.1-1, Sec. 5, Zhongxiao E. Rd., Xinyi Dist., Taipei City 110, Taiwan (R.O.C.)

1.2. Manufacturer

Hugreen Co Ltd

12F., No.1-1, Sec. 5, Zhongxiao E. Rd., Xinyi Dist., Taipei City 110, Taiwan (R.O.C.)

1.3. Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Agriculture Monitoring System
Brand Name	Rockabye
Model Name	GWY-A09L
FCC ID	2APLT-GWY-A09L
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40 LoRa
HW Version	V2.1
SW Version	V2.1
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



1.4. Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz LoRa: 915MHz
Rx Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz LoRa: 915MHz
Antenna Type	WLAN : FPC Antenna LoRa : Rod Antenna
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) LoRa: FSK

1.5. Modification of EUT

No modifications are made to the EUT during all test items.



1.6. Test Location

Sportun International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

Test Site	Sportun International (Shenzhen) Inc.	
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	Sportun Site No.	FCC Test Firm Registration No.
	CO01-SZ	251365
Test Site	Sportun International (Shenzhen) Inc.	
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398	
Test Site No.	Sportun Site No.	FCC Test Firm Registration No.
	03CH04-SZ	577730

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC CFR Title 47 Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



2. Test Configuration of Equipment Under Test

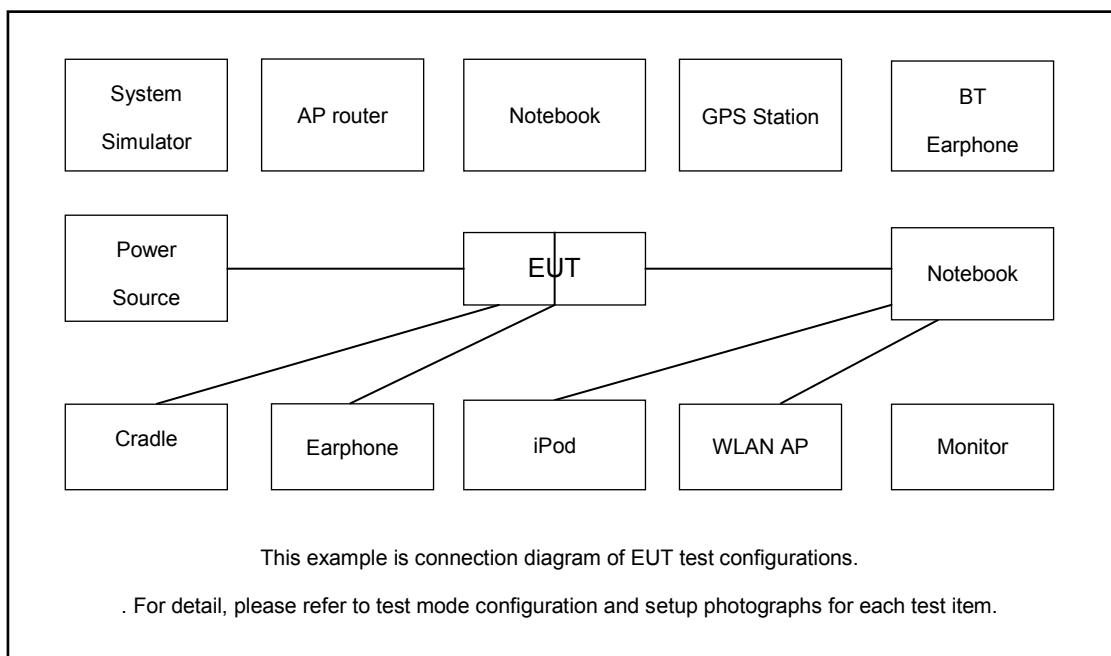
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
AC Conducted Emission	Mode 1: LoRa Tx(915MHz) + WLAN Idle(2.4G) + USB Cable (Charging from Adapter)
Radiated Emissions	Mode 1: LoRa Tx(915MHz) + WLAN Idle(2.4G) + USB Cable (Charging from Adapter)

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile phone	Huawei	MATA9	QISEVA-L09	N/A	N/A

2.4. EUT Operation Test Setup

The following programs installed in the EUT were programmed during the test.

1. Turn on LoRa function.
2. Wifi keep registered with mobile phone



3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment 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.

<Class B Limit>

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

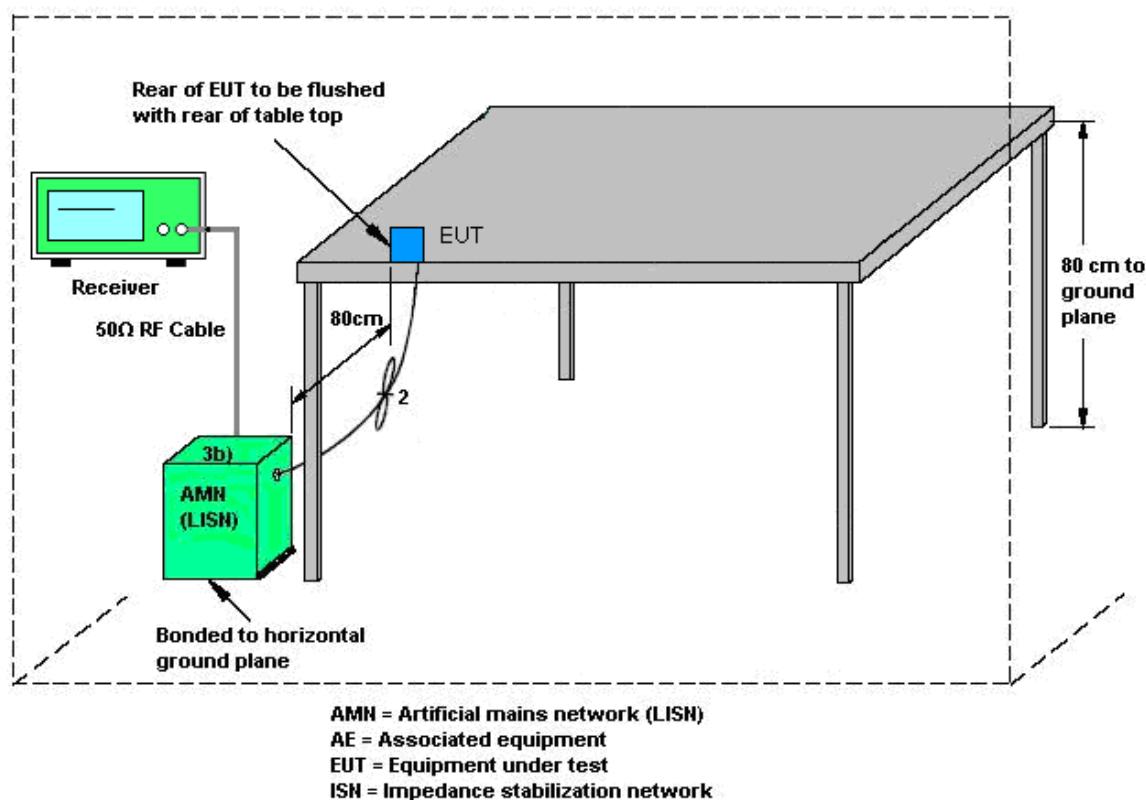
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

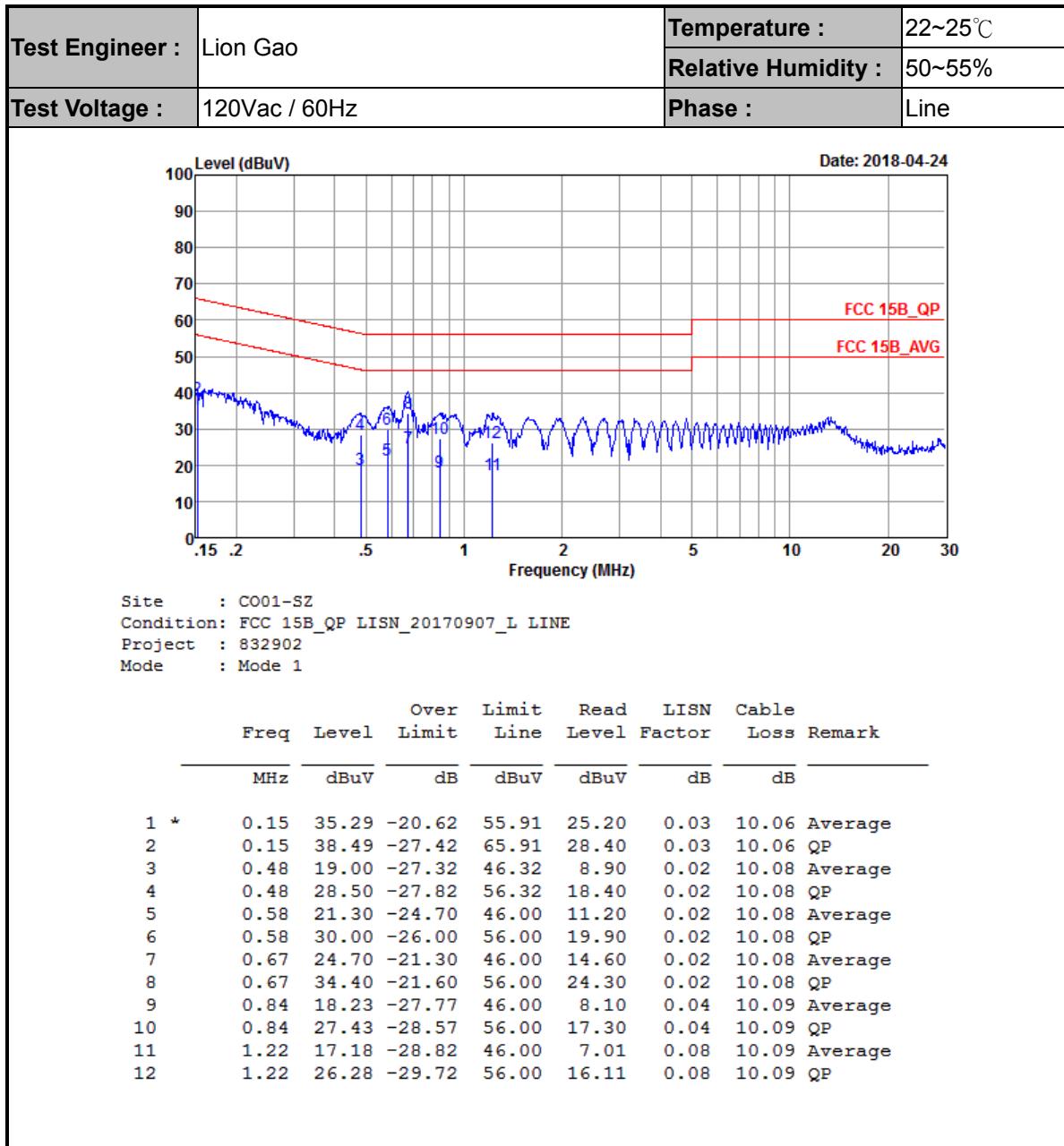
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

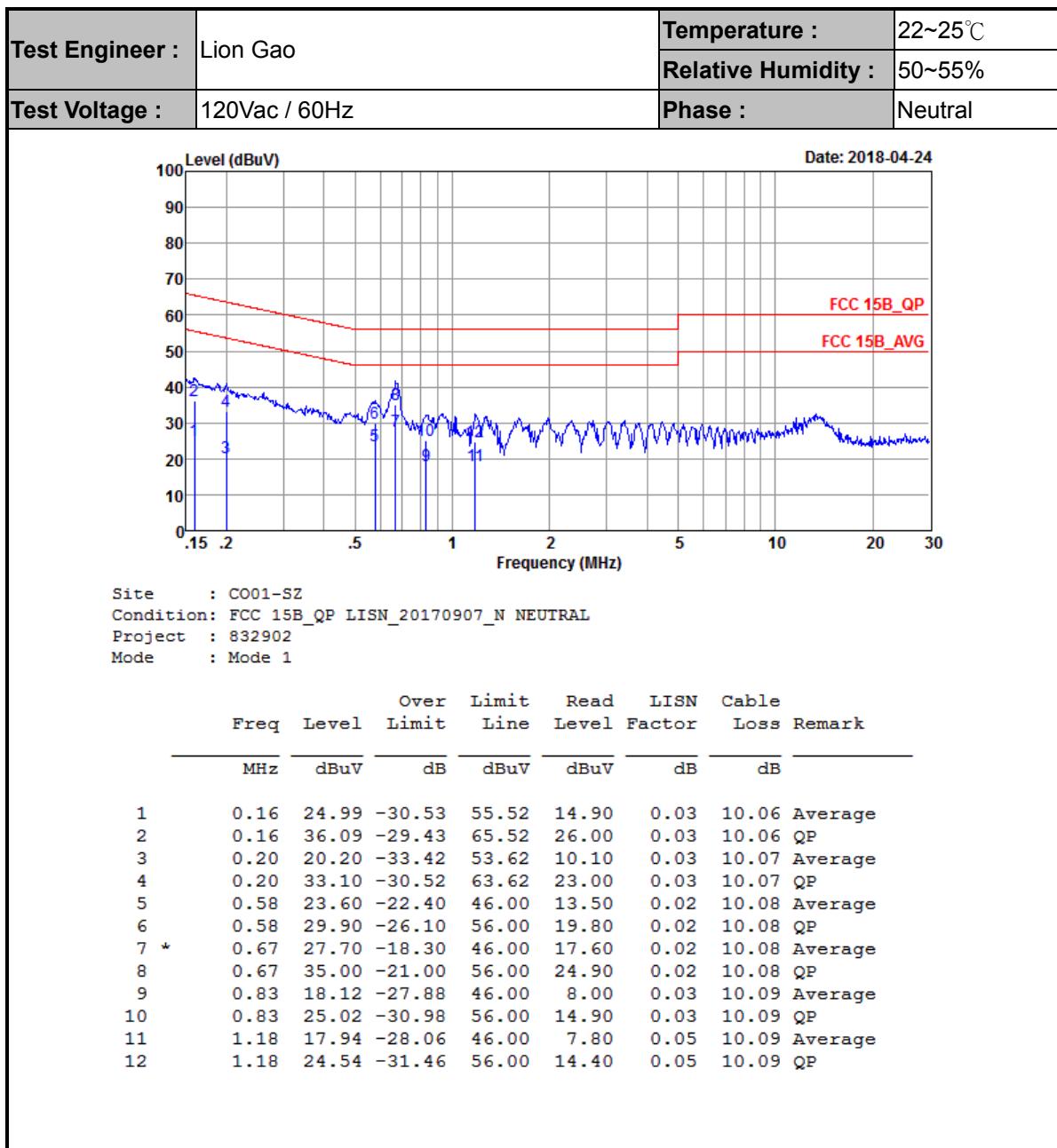
3.1.4 Test Setup





3.1.5 Test Result of AC Conducted Emission







3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B Limit>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

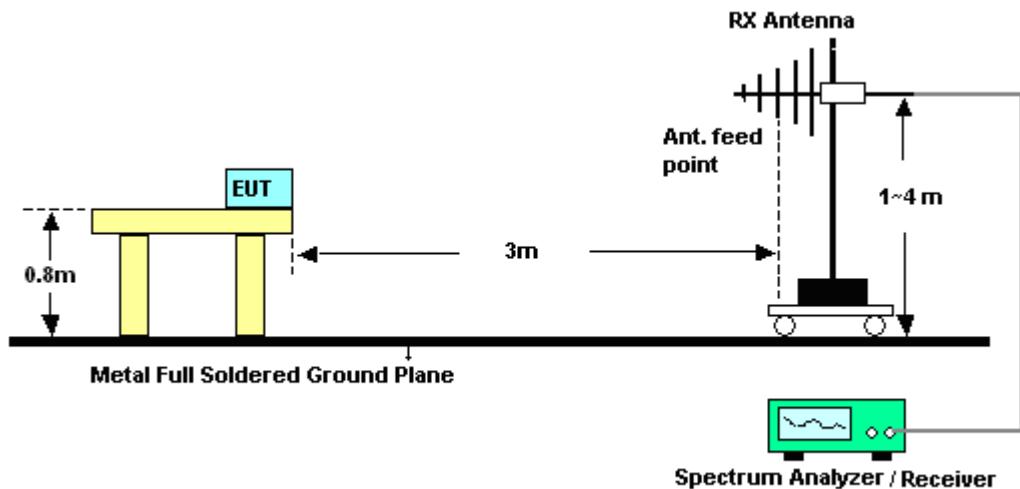


3.2.3. Test Procedures

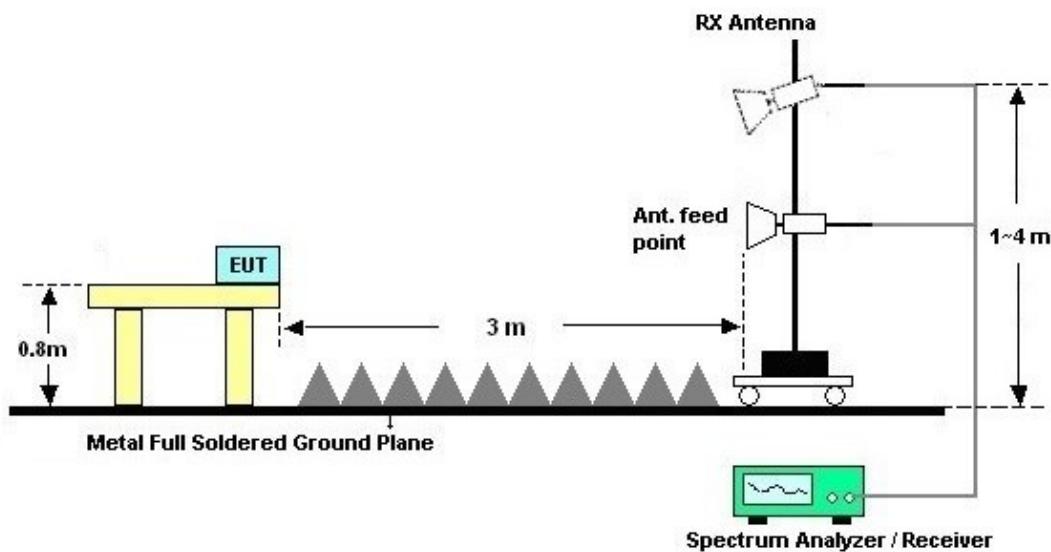
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dB μ V/m) = 20 log Emission level (μ V/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz

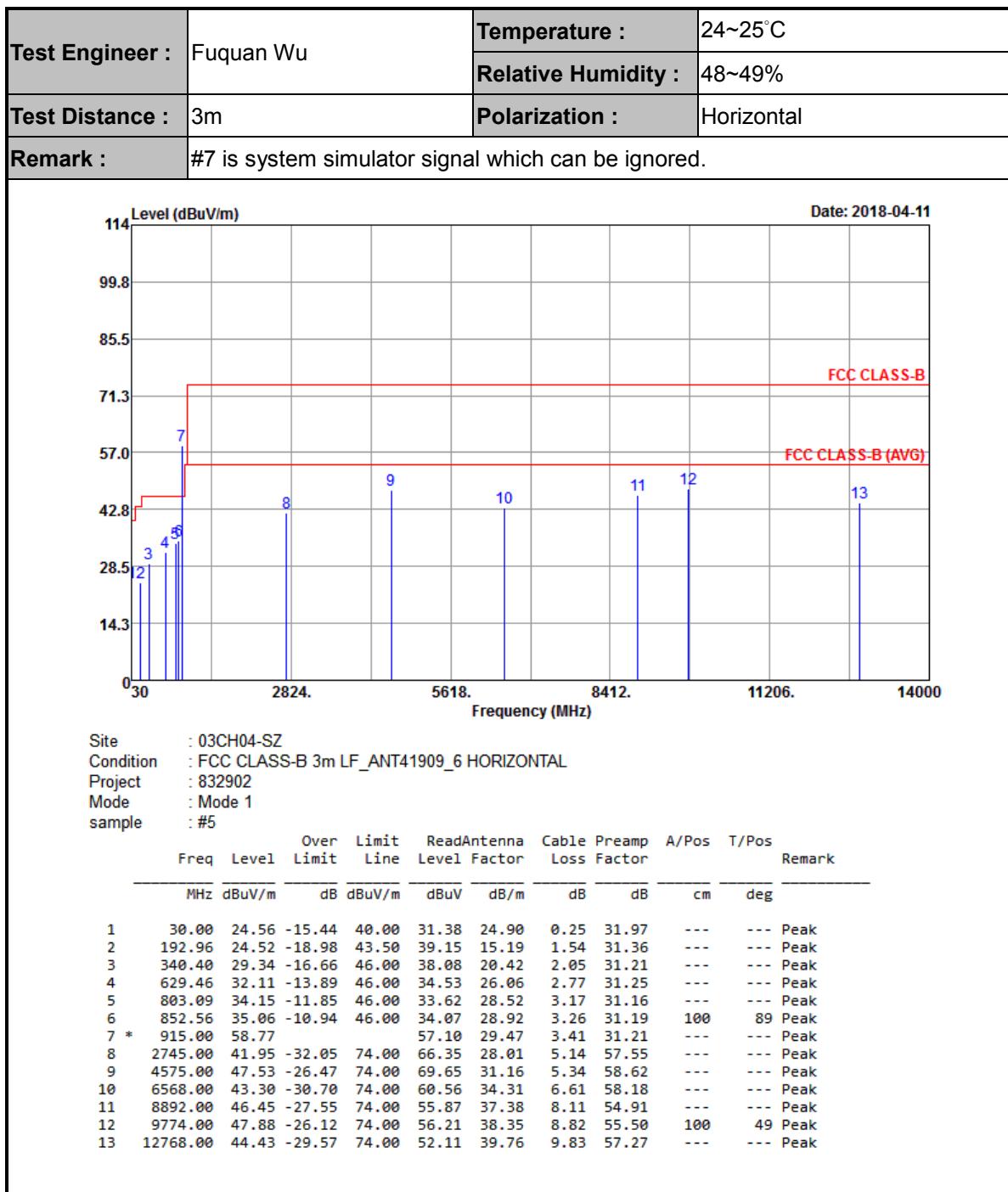


For radiated emissions above 1GHz

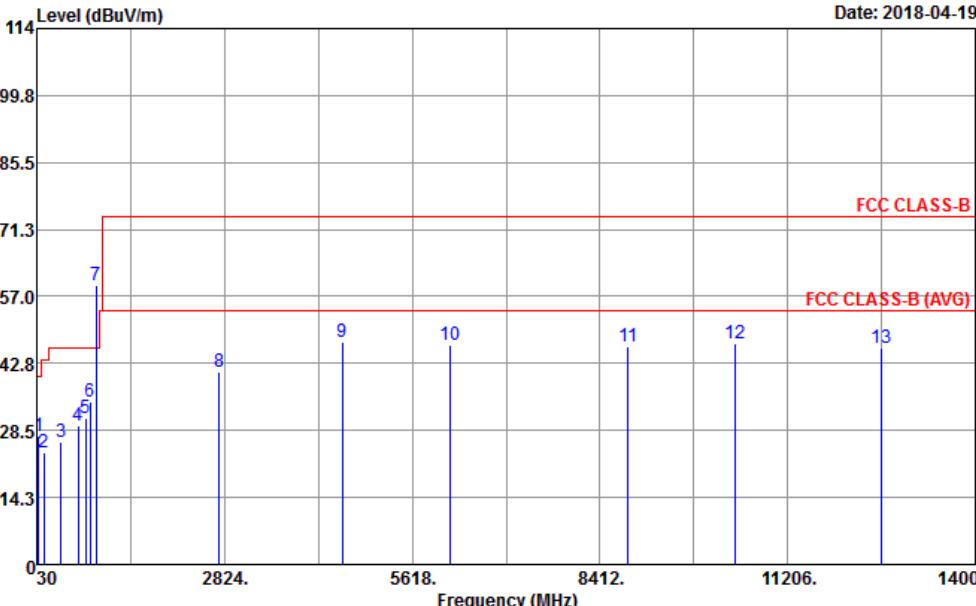




3.2.5. Test Result of Radiated Emission





Test Engineer :	Fuquan Wu	Temperature :	24~25°C																																																																																																																																																																																				
		Relative Humidity :	48~49%																																																																																																																																																																																				
Test Distance :	3m	Polarization :	Vertical																																																																																																																																																																																				
Remark :	#7 is system simulator signal which can be ignored.																																																																																																																																																																																						
 <p>Level (dBuV/m) Date: 2018-04-19</p> <p>Frequency (MHz)</p>																																																																																																																																																																																							
Site	: 03CH04-SZ																																																																																																																																																																																						
Condition	: FCC CLASS-B 3m LF_ANT41909_6 VERTICAL																																																																																																																																																																																						
Project	: 832902																																																																																																																																																																																						
Mode	: Mode 1																																																																																																																																																																																						
<table border="1"> <thead> <tr> <th rowspan="2">Freq</th> <th rowspan="2">Level</th> <th>Over</th> <th>Limit</th> <th>Read</th> <th>Antenna</th> <th>Cable</th> <th>Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th>Remark</th> </tr> <tr> <th>Limit</th> <th>Line</th> <th>Level</th> <th>Factor</th> <th>Loss</th> <th>Factor</th> <th>cm</th> <th>deg</th> <th></th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV/m</th> <th>dBuV</th> <th>dB/m</th> <th>dB</th> <th>dB</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>52.31</td> <td>27.28</td> <td>-12.72</td> <td>40.00</td> <td>44.53</td> <td>13.98</td> <td>0.69</td> <td>31.92</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>2</td> <td>131.85</td> <td>23.92</td> <td>-19.58</td> <td>43.50</td> <td>36.78</td> <td>17.56</td> <td>1.19</td> <td>31.61</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>3</td> <td>388.90</td> <td>26.15</td> <td>-19.85</td> <td>46.00</td> <td>33.56</td> <td>21.63</td> <td>2.15</td> <td>31.19</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>4</td> <td>642.07</td> <td>29.51</td> <td>-16.49</td> <td>46.00</td> <td>31.77</td> <td>26.18</td> <td>2.80</td> <td>31.24</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>5</td> <td>755.56</td> <td>31.03</td> <td>-14.97</td> <td>46.00</td> <td>31.48</td> <td>27.70</td> <td>3.05</td> <td>31.20</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>6</td> <td>827.34</td> <td>34.55</td> <td>-11.45</td> <td>46.00</td> <td>33.80</td> <td>28.72</td> <td>3.21</td> <td>31.18</td> <td>100</td> <td>58 Peak</td> </tr> <tr> <td>7 *</td> <td>915.00</td> <td>59.53</td> <td></td> <td></td> <td>57.86</td> <td>29.47</td> <td>3.41</td> <td>31.21</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>8</td> <td>2745.00</td> <td>41.05</td> <td>-32.95</td> <td>74.00</td> <td>65.45</td> <td>28.01</td> <td>5.14</td> <td>57.55</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>9</td> <td>4575.00</td> <td>47.33</td> <td>-26.67</td> <td>74.00</td> <td>69.45</td> <td>31.16</td> <td>5.34</td> <td>58.62</td> <td>100</td> <td>87 Peak</td> </tr> <tr> <td>10</td> <td>6192.00</td> <td>46.64</td> <td>-27.36</td> <td>74.00</td> <td>64.34</td> <td>33.38</td> <td>6.44</td> <td>57.52</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>11</td> <td>8826.00</td> <td>46.28</td> <td>-27.72</td> <td>74.00</td> <td>55.84</td> <td>37.36</td> <td>8.05</td> <td>54.97</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>12</td> <td>10426.00</td> <td>46.89</td> <td>-27.11</td> <td>74.00</td> <td>55.22</td> <td>38.29</td> <td>9.25</td> <td>55.87</td> <td>---</td> <td>--- Peak</td> </tr> <tr> <td>13</td> <td>12608.00</td> <td>45.91</td> <td>-28.09</td> <td>74.00</td> <td>53.19</td> <td>39.67</td> <td>9.79</td> <td>56.74</td> <td>---</td> <td>--- Peak</td> </tr> </tbody> </table>											Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	A/Pos	T/Pos	Remark	Limit	Line	Level	Factor	Loss	Factor	cm	deg		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			1	52.31	27.28	-12.72	40.00	44.53	13.98	0.69	31.92	---	--- Peak	2	131.85	23.92	-19.58	43.50	36.78	17.56	1.19	31.61	---	--- Peak	3	388.90	26.15	-19.85	46.00	33.56	21.63	2.15	31.19	---	--- Peak	4	642.07	29.51	-16.49	46.00	31.77	26.18	2.80	31.24	---	--- Peak	5	755.56	31.03	-14.97	46.00	31.48	27.70	3.05	31.20	---	--- Peak	6	827.34	34.55	-11.45	46.00	33.80	28.72	3.21	31.18	100	58 Peak	7 *	915.00	59.53			57.86	29.47	3.41	31.21	---	--- Peak	8	2745.00	41.05	-32.95	74.00	65.45	28.01	5.14	57.55	---	--- Peak	9	4575.00	47.33	-26.67	74.00	69.45	31.16	5.34	58.62	100	87 Peak	10	6192.00	46.64	-27.36	74.00	64.34	33.38	6.44	57.52	---	--- Peak	11	8826.00	46.28	-27.72	74.00	55.84	37.36	8.05	54.97	---	--- Peak	12	10426.00	46.89	-27.11	74.00	55.22	38.29	9.25	55.87	---	--- Peak	13	12608.00	45.91	-28.09	74.00	53.19	39.67	9.79	56.74	---	--- Peak
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4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	Apr. 24, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	Apr. 24, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	Apr. 24, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	Apr. 24, 2018	Jul. 18, 2018	Conduction (CO01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 20, 2017	Apr. 11, 2018~Apr. 19, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 20, 2017	Apr. 11, 2018~Apr. 19, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 16, 2017	Apr. 11, 2018~Apr. 19, 2018	May 15, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Apr. 11, 2018~Apr. 19, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz~3000MHz	Oct. 19, 2017	Apr. 11, 2018~Apr. 19, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	Apr. 11, 2018~Apr. 19, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 20, 2017	Apr. 11, 2018~Apr. 19, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Apr. 11, 2018~Apr. 19, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Apr. 11, 2018~Apr. 19, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Apr. 11, 2018~Apr. 19, 2018	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required



5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2U _c (y))	2.6 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2U _c (y))	5.1 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2U _c (y))	4.8 dB
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