



# 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.



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Approved by: Eric Shih / Manager

***Sporton International (Shenzhen) Inc.***

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Guangdong Province 518055 China***



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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC832902	Rev. 01	Initial issue of report	May 21, 2018



## 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	
<b>Tx Frequency</b>	802.11b/g/n: 2412 MHz ~ 2462 MHz LoRa: 915MHz
<b>Rx Frequency</b>	802.11b/g/n: 2412 MHz ~ 2462 MHz LoRa: 915MHz
<b>Antenna Type</b>	WLAN : FPC Antenna LoRa : Rod Antenna
<b>Type of Modulation</b>	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

Sporton 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.

<b>Test Site</b>	Sporton International (Shenzhen) Inc.	
<b>Test Site Location</b>	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	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Test Firm Registration No.</b>
	CO01-SZ	251365

<b>Test Site</b>	Sporton International (Shenzhen) Inc.	
<b>Test Site Location</b>	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	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Test Firm Registration No.</b>
	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

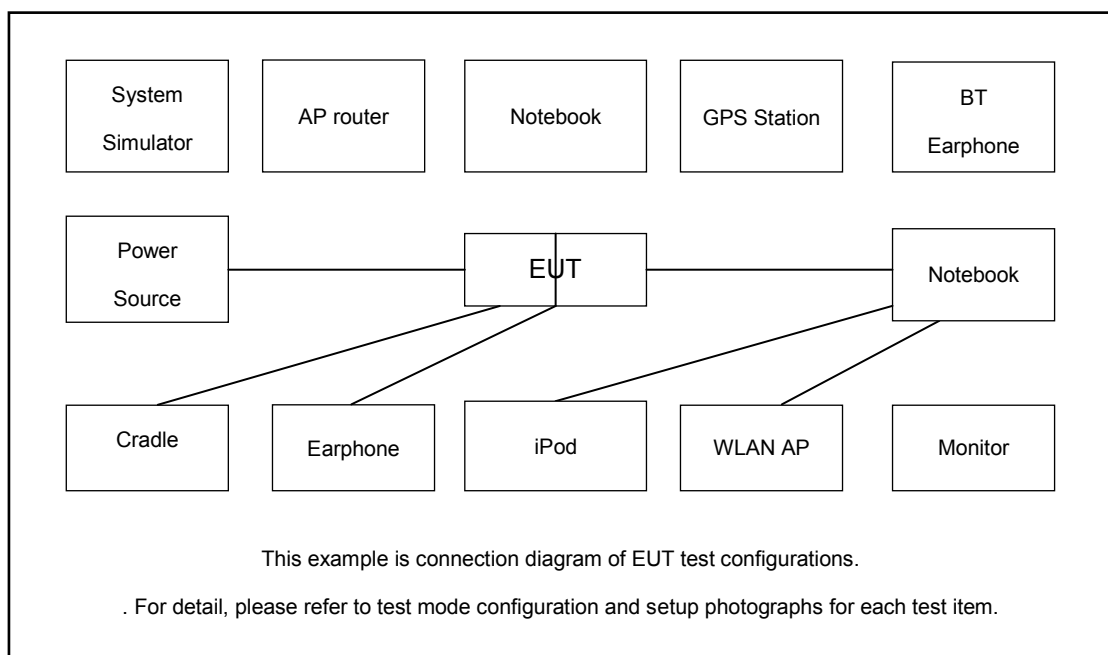
The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

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.

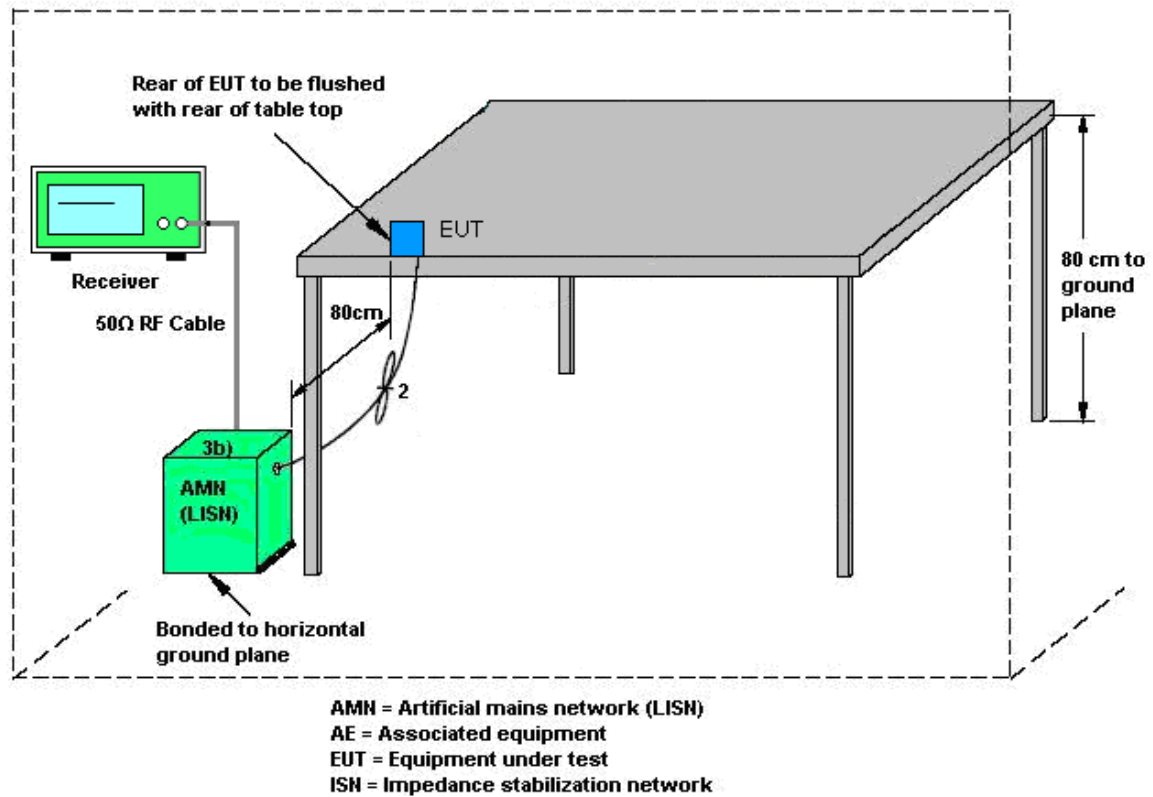
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedure

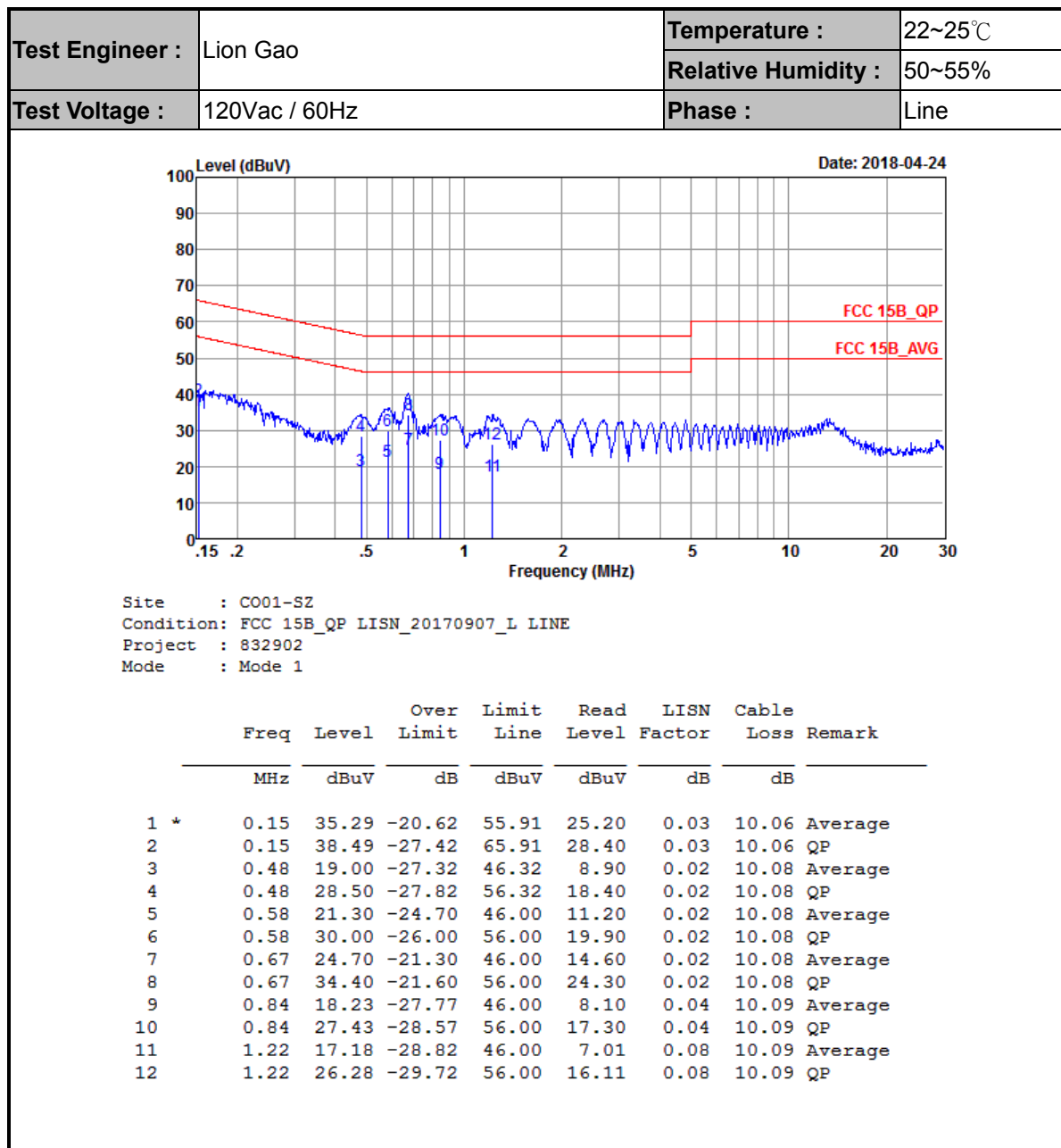
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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



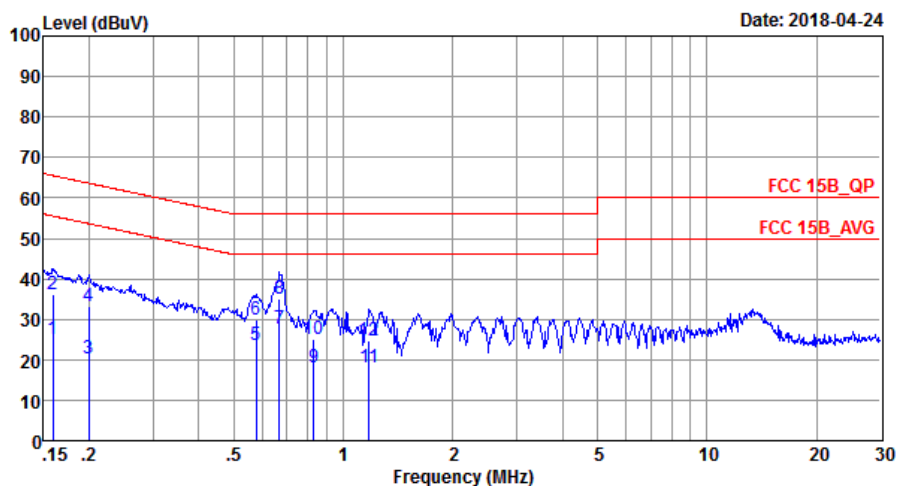


## 3.1.5 Test Result of AC Conducted Emission





Test Engineer :	Lion Gao	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : C001-SZ  
Condition: FCC 15B\_QP LISN\_20170907\_N NEUTRAL  
Project : 832902  
Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16	24.99	-30.53	55.52	14.90	0.03	10.06	Average
2	0.16	36.09	-29.43	65.52	26.00	0.03	10.06	QP
3	0.20	20.20	-33.42	53.62	10.10	0.03	10.07	Average
4	0.20	33.10	-30.52	63.62	23.00	0.03	10.07	QP
5	0.58	23.60	-22.40	46.00	13.50	0.02	10.08	Average
6	0.58	29.90	-26.10	56.00	19.80	0.02	10.08	QP
7 *	0.67	27.70	-18.30	46.00	17.60	0.02	10.08	Average
8	0.67	35.00	-21.00	56.00	24.90	0.02	10.08	QP
9	0.83	18.12	-27.88	46.00	8.00	0.03	10.09	Average
10	0.83	25.02	-30.98	56.00	14.90	0.03	10.09	QP
11	1.18	17.94	-28.06	46.00	7.80	0.05	10.09	Average
12	1.18	24.54	-31.46	56.00	14.40	0.05	10.09	QP

## 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

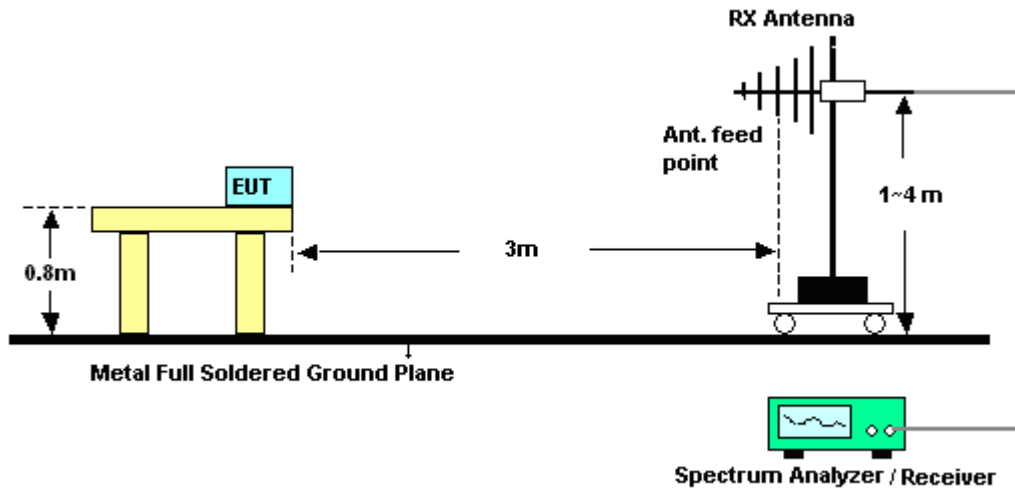
The measuring equipment is listed in the section 4 of this test report.

### 3.2.3. Test Procedures

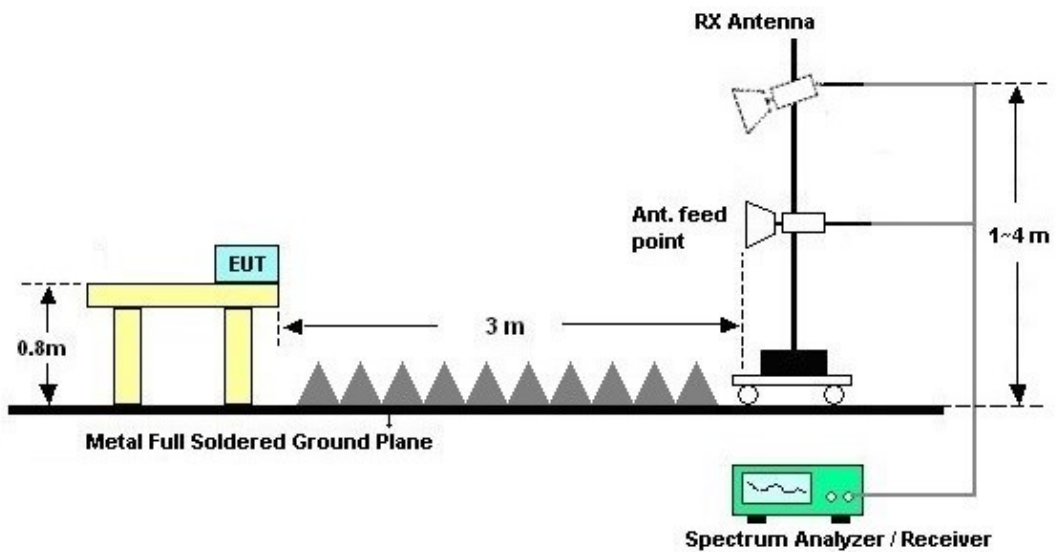
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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 (dBμV/m) = 20 log Emission level (μV/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

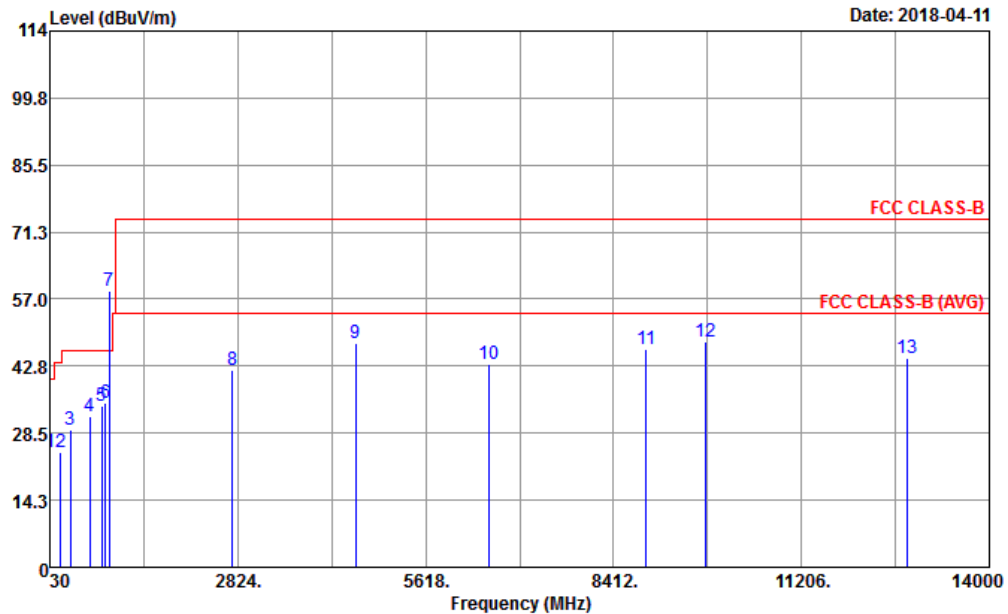






## 3.2.5. Test Result of Radiated Emission

Test Engineer :	Fuquan Wu	Temperature :	24~25°C
		Relative Humidity :	48~49%
Test Distance :	3m	Polarization :	Horizontal
Remark :	#7 is system simulator signal which can be ignored.		

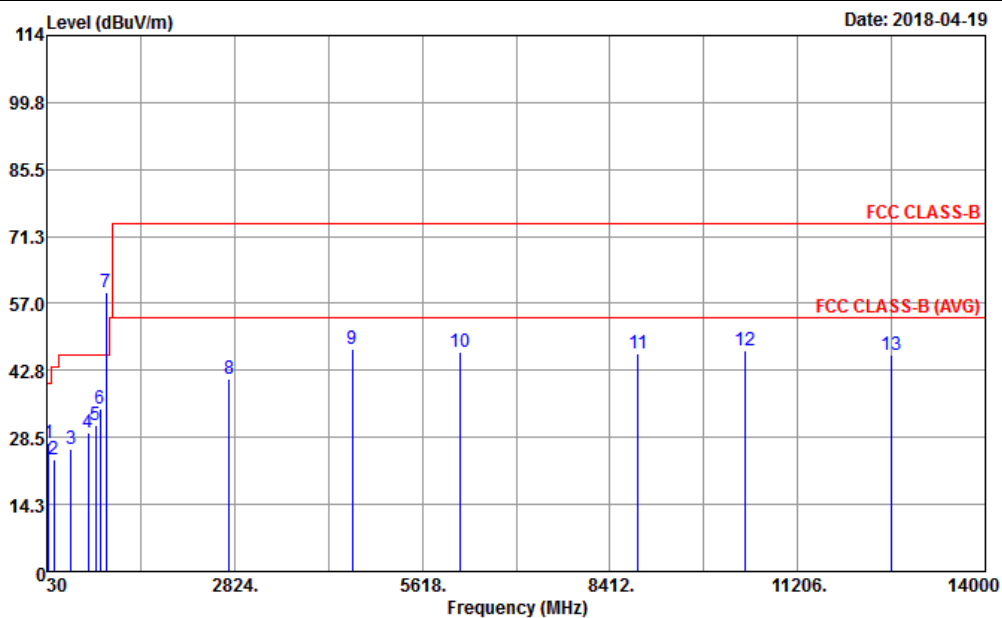


Site : 03CH04-SZ  
Condition : FCC CLASS-B 3m LF\_ANT41909\_6 HORIZONTAL  
Project : 832902  
Mode : Mode 1  
sample : #5

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.00	24.56	-15.44	40.00	31.38	24.90	0.25	31.97	---	---	Peak
2	192.96	24.52	-18.98	43.50	39.15	15.19	1.54	31.36	---	---	Peak
3	340.40	29.34	-16.66	46.00	38.08	20.42	2.05	31.21	---	---	Peak
4	629.46	32.11	-13.89	46.00	34.53	26.06	2.77	31.25	---	---	Peak
5	803.09	34.15	-11.85	46.00	33.62	28.52	3.17	31.16	---	---	Peak
6	852.56	35.06	-10.94	46.00	34.07	28.92	3.26	31.19	100	89	Peak
7 *	915.00	58.77			57.10	29.47	3.41	31.21	---	---	Peak
8	2745.00	41.95	-32.05	74.00	66.35	28.01	5.14	57.55	---	---	Peak
9	4575.00	47.53	-26.47	74.00	69.65	31.16	5.34	58.62	---	---	Peak
10	6568.00	43.30	-30.70	74.00	60.56	34.31	6.61	58.18	---	---	Peak
11	8892.00	46.45	-27.55	74.00	55.87	37.38	8.11	54.91	---	---	Peak
12	9774.00	47.88	-26.12	74.00	56.21	38.35	8.82	55.50	100	49	Peak
13	12768.00	44.43	-29.57	74.00	52.11	39.76	9.83	57.27	---	---	Peak



<b>Test Engineer :</b>	Fuquan Wu	<b>Temperature :</b>	24~25°C
		<b>Relative Humidity :</b>	48~49%
<b>Test Distance :</b>	3m	<b>Polarization :</b>	Vertical
<b>Remark :</b>	#7 is system simulator signal which can be ignored.		



Site : 03CH04-SZ  
Condition : FCC CLASS-B 3m LF\_ANT41909\_6 VERTICAL  
Project : 832902  
Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
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



## 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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