

## FCC Test Report

**Report No.:** RF180904C01-1

**FCC ID:** L6AIRC100-1

**Test Model:** ITC100-1

**Received Date:** Sep. 04, 2018

**Test Date:** Sep. 27, 2018

**Issued Date:** Oct. 16, 2018

**Applicant:** BlackBerry Limited

**Address:** 2200 University Avenue East Waterloo, Ontario N2K 0A7 Canada

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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( R.O.C )

**Test Location:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City  
33383, Taiwan (R.O.C)

**FCC Registration /  
Designation Number:** 788550 / TW0003



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## Table of Contents

<b>Release Control Record .....</b>	<b>3</b>
<b>1 Certificate of Conformity .....</b>	<b>4</b>
<b>2 Summary of Test Results .....</b>	<b>5</b>
2.1 Measurement Uncertainty .....	5
2.2 Modification Record.....	5
<b>3 General Information .....</b>	<b>6</b>
3.1 General Description of EUT .....	6
3.2 Description of Test Modes .....	7
3.2.1 Test Mode Applicability and Tested Channel Detail .....	8
3.3 Description of Support Units.....	9
3.3.1 Configuration of System under Test.....	9
3.4 General Description of Applied Standards .....	9
<b>4 Test Types and Results .....</b>	<b>10</b>
4.1 Radiated Emission and Bandedge Measurement .....	10
4.1.1 Limits of Radiated Emission and Bandedge Measurement.....	10
4.1.2 Test Instruments .....	11
4.1.3 Test Procedures.....	12
4.1.4 Deviation from Test Standard.....	12
4.1.5 Test Set Up .....	13
4.1.6 EUT Operating Conditions .....	14
4.1.7 Test Results .....	15
4.2 20 dB Bandwidth Measurement.....	30
4.2.1 Limits of 20 dB Bandwidth Measurement.....	30
4.2.2 Test Setup.....	30
4.2.3 Test Instruments .....	30
4.2.4 Test Procedure .....	30
4.2.5 Deviation fromTest Standard.....	30
4.2.6 EUT Operating Conditions .....	30
4.2.7 Test Result .....	31
<b>5 Pictures of Test Arrangements.....</b>	<b>32</b>
<b>Appendix – Information on the Testing Laboratories .....</b>	<b>33</b>

### Release Control Record

Issue No.	Description	Date Issued
RF180904C01-1	Original Release	Oct. 16, 2018

## 1 Certificate of Conformity

**Product:** Asset Tracker

**Brand:** BlackBerry

**Test Model:** ITC100-1

**Sample Status:** Identical Prototype

**Applicant:** BlackBerry Limited

**Test Date:** Sep. 27, 2018

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.249)  
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

**Prepared by :** Rona Chen, **Date:** Oct. 16, 2018  
Rona Chen / Specialist

**Approved by :** Dylan Chiou, **Date:** Oct. 16, 2018  
Dylan Chiou / Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	N/A	Without AC Power port of the EUT.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50 dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.12 dB at 904 MHz.
15.203	Antenna Requirement	PASS	No antenna connector is used.

N/A: Not Applicable

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	Asset Tracker
<b>Brand</b>	BlackBerry
<b>Test Model</b>	ITC100-1
<b>Status of EUT</b>	Identical Prototype
<b>Power Supply Rating</b>	7.2 Vdc (Battery)
<b>Modulation Type</b>	2GFSK, 4GFSK
<b>Transfer Rate</b>	0.6 kbps, 50 kbps, 100 kbps, 400 kbps
<b>Operating Frequency</b>	902 ~ 928 MHz
<b>Number of Channel</b>	24
<b>Antenna Type</b>	Monopole Antenna with -5.4 dBi gain (Main SRD) -4.7 dBi gain (Secondary SRD)
<b>Antenna Connector</b>	N/A
<b>Accessory Device</b>	Refer to Note as below
<b>Data Cable Supplied</b>	Refer to Note as below

Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Battery 1	BlackBerry	BAT-63320-001	7.2 Vdc, 38 Ah, Non-rechargeable Manufacturer: EVE Energy Co., Ltd.
Battery 2	BlackBerry	BAT-63318-001	7.2 Vdc, 19 Ah, Non-rechargeable Manufacturer: EVE Energy Co., Ltd.

- Above batteries had been pre-tested, and the worst case was found when EUT with Battery 1. Therefore, only this configuration was as a representative for final test.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

### 3.2 Description of Test Modes

24 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	904	9	912	17	920
2	905	10	913	18	921
3	906	11	914	19	922
4	907	12	915	20	923
5	908	13	916	21	924
6	909	14	917	22	925
7	910	15	918	23	926
8	911	16	919	24	927

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	-	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz  
**PLC**: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

**Note:** 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.  
2. "-" means no effect.

#### Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (kbps)
-	1 to 24	1, 12, 24	2GFSK	400

#### Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (kbps)
-	1 to 24	1, 12, 24	2GFSK	400

#### Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (kbps)
-	1 to 24	1, 12, 24	2GFSK	400

#### Test Condition:

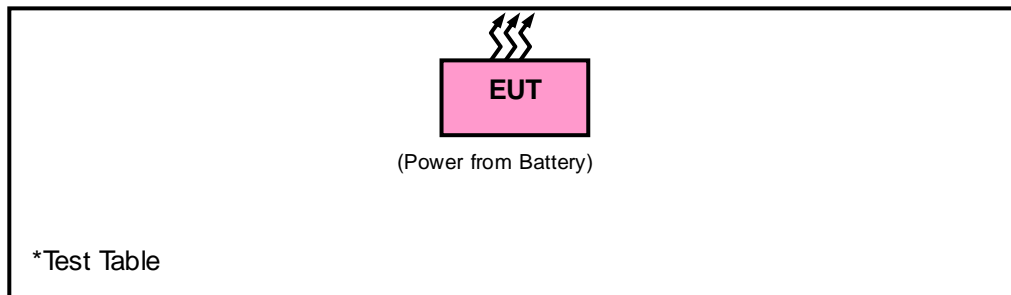
Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	7.2 Vdc	Thomas Wei
RE<1G	25 deg. C, 65 % RH	7.2 Vdc	Thomas Wei
APCM	25 deg. C, 65 % RH	7.2 Vdc	Leo Tsai



### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

#### 3.3.1 Configuration of System under Test



### 3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

#### **FCC Part 15, Subpart C (15.249)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

#### NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
Fixed Attenuator	BW-N4W5+	1301	Aug. 13, 2018	Aug. 12, 2019
Loop Antenna	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
Power Meter Anritsu	ML2495A	1012010	Sep. 05, 2018	Sep. 04, 2019
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2018	Sep. 05, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 20, 2017	Oct. 19, 2018
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.

3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1GHz if tested.

4. The IC Site Registration No. is IC7450F-10.

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

##### **For Radiated emission above 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

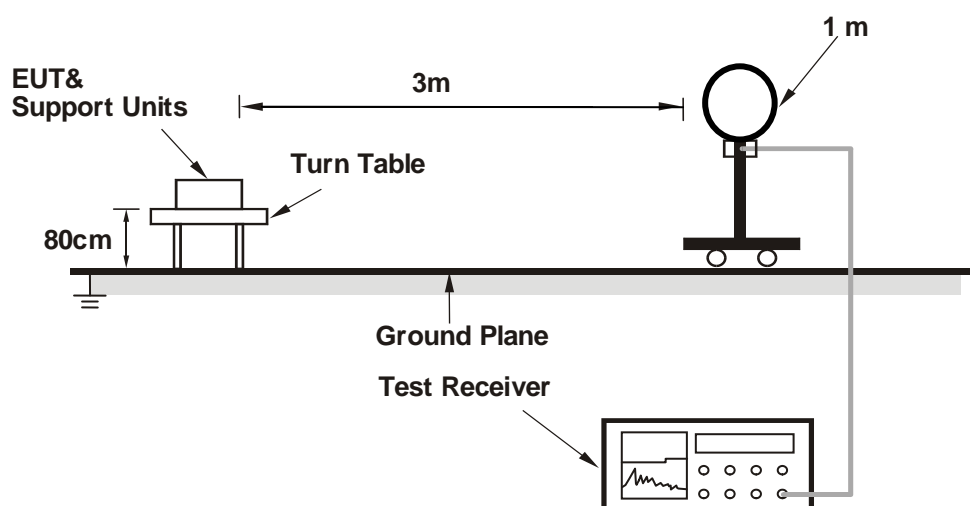
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98 %) or 10 Hz (Duty cycle  $\geq$  98 %) for Average detection (AV) at frequency above 1 GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

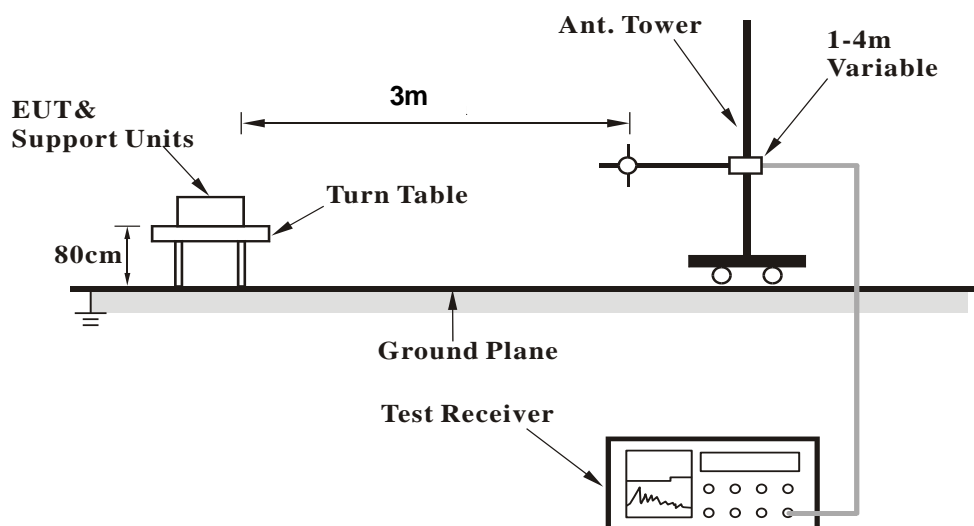
No deviation.

#### 4.1.5 Test Set Up

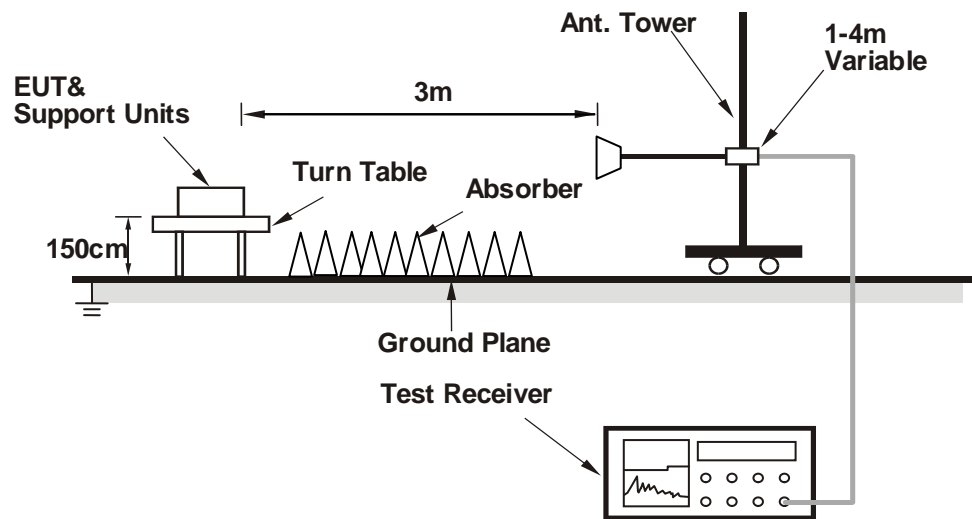
##### <Radiated Emission below 30 MHz>



##### <Radiated Emission 30 MHz to 1 GHz>



# <Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

## 4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

##### Above 1 GHz WORST-CASE DATA:

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 10 GHz
Input Power	7.2 Vdc	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2712	30.73	51.69	54	-23.27	27.95	5.14	54.05	134	211	Average
2712	39.82	60.78	74	-34.18	27.95	5.14	54.05	134	211	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2712	29.94	50.9	54	-24.06	27.95	5.14	54.05	157	103	Average
2712	39.36	60.32	74	-34.64	27.95	5.14	54.05	157	103	Peak

#### Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 904 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 10 GHz
Input Power	7.2 Vdc	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2745	31.64	52.49	54	-22.36	28.01	5.18	54.04	151	217	Average
2745	40	60.85	74	-34	28.01	5.18	54.04	151	217	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2745	31.09	51.94	54	-22.91	28.01	5.18	54.04	146	133	Average
2745	40.28	61.13	74	-33.72	28.01	5.18	54.04	146	133	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 915 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.



EUT Test Condition		Measurement Detail	
Channel	Channel 24	Frequency Range	1 GHz ~ 10 GHz
Input Power	7.2 Vdc	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2781	31.42	52.14	54	-22.58	28.06	5.23	54.01	127	236	Average
2781	39.64	60.36	74	-34.36	28.06	5.23	54.01	127	236	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2781	31.59	52.31	54	-22.41	28.06	5.23	54.01	148	195	Average
2781	39.86	60.58	74	-34.14	28.06	5.23	54.01	148	195	Peak

Remarks:

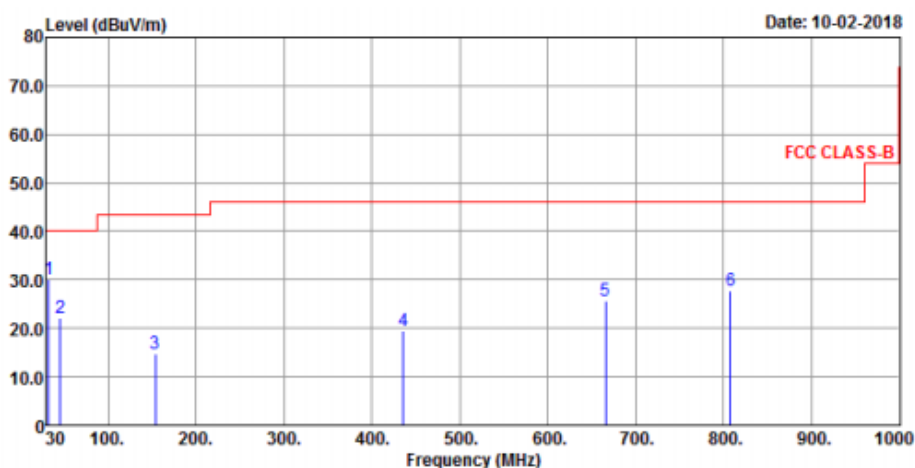
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 927 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

## Below 1 GHz WORST-CASE DATA:

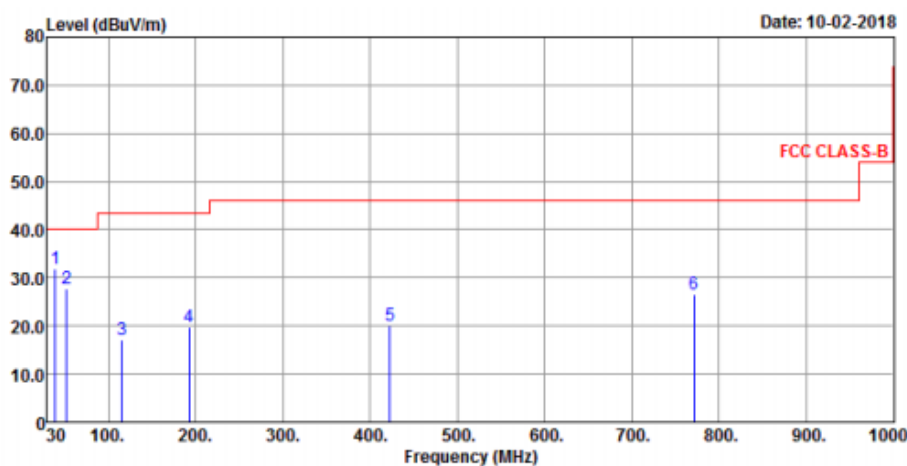
### <Spurious Emissions Measurement>

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	30 MHz ~ 1 GHz
Input Power	7.2 Vdc	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

### Horizontal



### Vertical



### Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
32.56	30.13	48.3	40	-9.87	12.47	0.45	31.09	288	326	Peak
45.52	22	39.16	40	-18	13.49	0.51	31.16	241	253	Peak
154.16	14.77	32.77	43.5	-28.73	12.72	1	31.72	216	189	Peak
435.46	19.54	33.29	46	-26.46	16.04	2.21	32	174	135	Peak
665.35	25.82	34.13	46	-20.18	20.4	3.16	31.87	153	102	Peak
807.94	27.79	33.21	46	-18.21	22.33	3.7	31.45	126	75	Peak

### Antenna Polarity & Test Distance: Vertical at 3 m

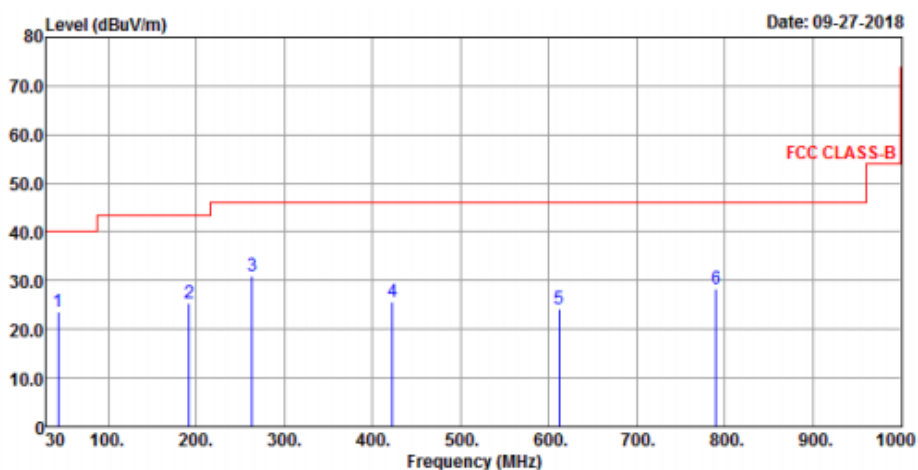
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
38.91	31.89	49.35	40	-8.11	13.09	0.48	31.03	131	306	Peak
52.57	27.82	45.63	40	-12.18	12.97	0.53	31.31	168	255	Peak
115.36	17.11	37.61	43.5	-26.39	10.55	0.82	31.87	209	211	Peak
192.58	19.69	40.09	43.5	-23.81	10.12	1.17	31.69	237	254	Peak
422.85	20.2	34.29	46	-25.8	15.79	2.16	32.04	261	158	Peak
771.08	26.71	32.62	46	-19.29	21.82	3.58	31.31	299	103	Peak

Remarks:

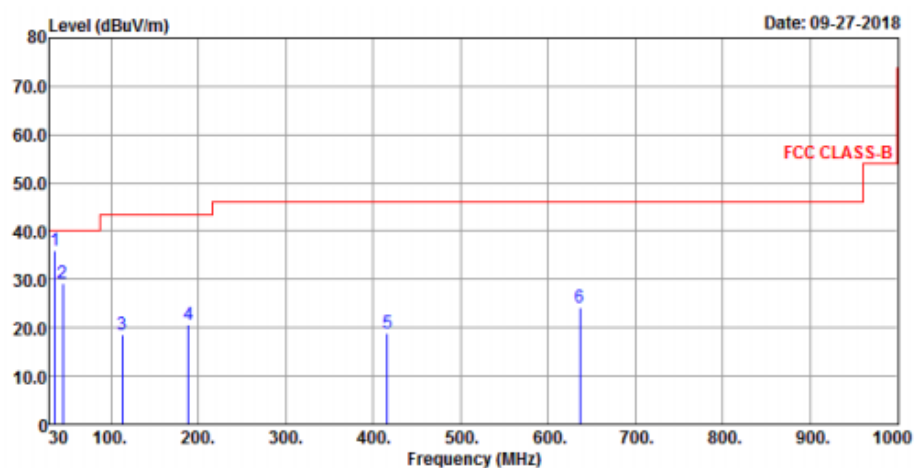
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	30 MHz ~ 1 GHz
Input Power	7.2 Vdc	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

## Horizontal



## Vertical



### Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	23.73	40.75	40	-16.27	13.59	0.5	31.11	134	319	Peak
191.99	25.48	46.08	43.5	-18.02	9.91	1.18	31.69	169	288	Peak
263.77	31.03	49.57	46	-14.97	11.88	1.5	31.92	189	234	Peak
422.85	25.6	39.69	46	-20.4	15.79	2.16	32.04	208	163	Peak
612	24.16	33.56	46	-21.84	19.75	2.95	32.1	255	100	Peak
790.48	28.46	34.14	46	-17.54	22.09	3.63	31.4	281	62	Peak

### Antenna Polarity & Test Distance: Vertical at 3 m

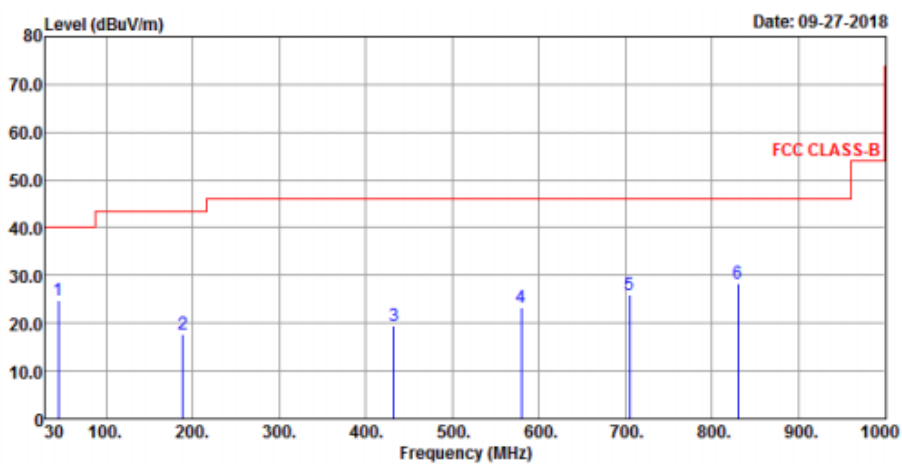
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
35.82	35.94	53.58	40	-4.06	12.94	0.47	31.05	277	309	Peak
44.55	29.3	46.33	40	-10.7	13.6	0.51	31.14	241	266	Peak
113.42	18.63	39.31	43.5	-24.87	10.37	0.81	31.86	226	201	Peak
189.08	20.81	41.21	43.5	-22.69	10.12	1.17	31.69	203	155	Peak
416.06	18.76	32.99	46	-27.24	15.66	2.14	32.03	149	113	Peak
636.25	24.09	33.11	46	-21.91	20.04	3.05	32.11	128	23	Peak

Remarks:

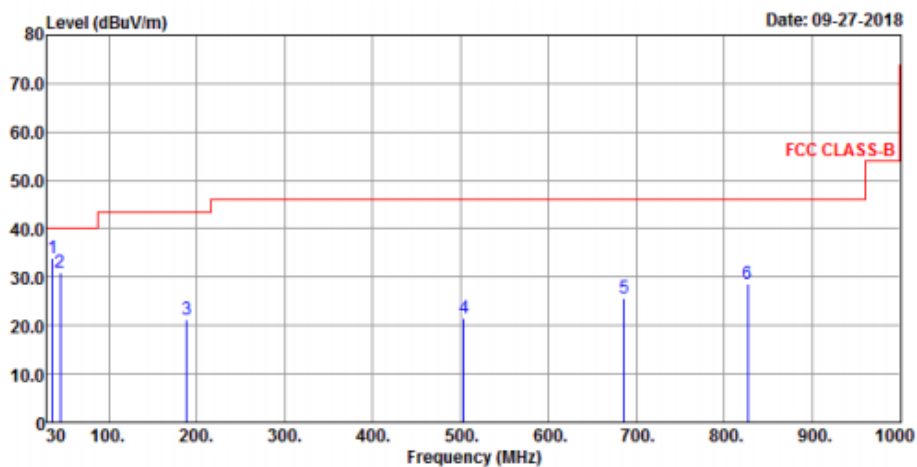
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 24	Frequency Range	30 MHz ~ 1 GHz
Input Power	7.2 Vdc	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

### Horizontal



### Vertical



### Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
44.55	24.9	41.93	40	-15.1	13.6	0.51	31.14	132	203	Peak
189.08	17.59	37.99	43.5	-25.91	10.12	1.17	31.69	158	113	Peak
432.55	19.42	33.25	46	-26.58	15.98	2.2	32.01	206	67	Peak
579.99	23.31	33.46	46	-22.69	19.15	2.82	32.12	258	147	Peak
705.12	25.96	33.5	46	-20.04	20.89	3.33	31.76	316	115	Peak
830.25	28.25	33.58	46	-17.75	22.62	3.77	31.72	204	78	Peak

### Antenna Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
35.82	34.03	51.67	40	-5.97	12.94	0.47	31.05	133	89	Peak
44.55	31.1	48.13	40	-8.9	13.6	0.51	31.14	158	104	Peak
189.08	21.34	41.74	43.5	-22.16	10.12	1.17	31.69	184	155	Peak
504.33	21.43	33.09	46	-24.57	17.42	2.53	31.61	203	191	Peak
685.72	25.65	33.61	46	-20.35	20.64	3.24	31.84	247	233	Peak
826.37	28.68	34.03	46	-17.32	22.57	3.76	31.68	266	300	Peak

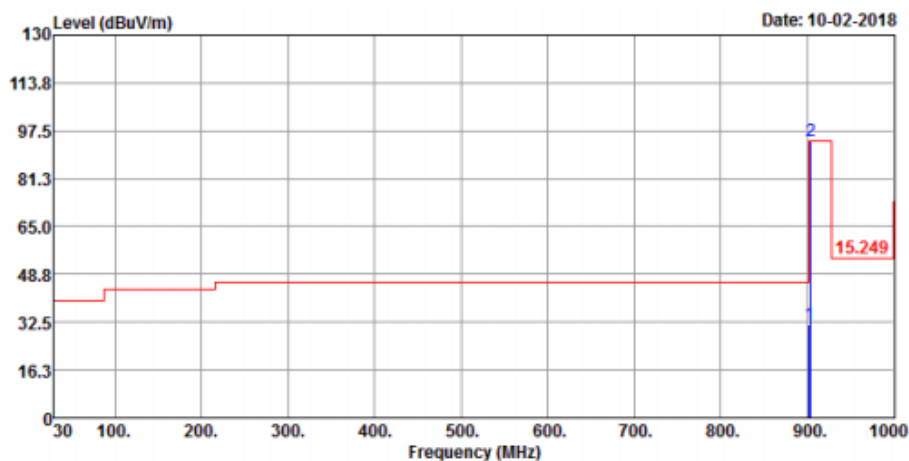
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

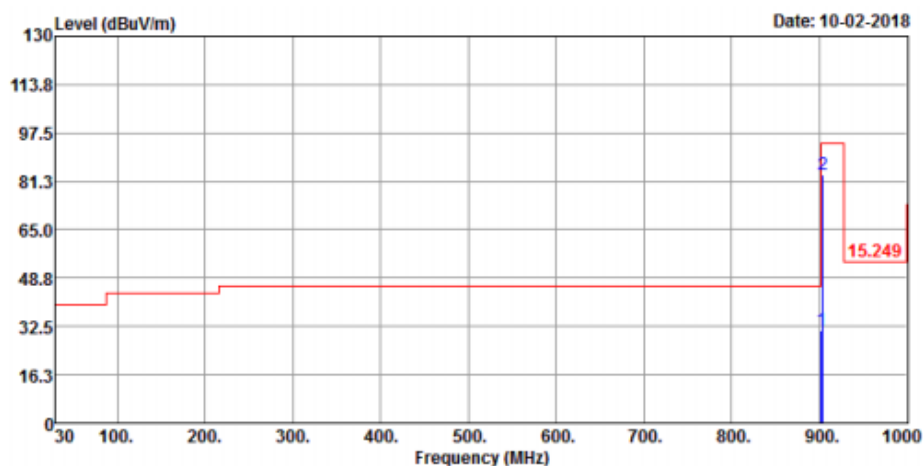
# <Band Edge Measurement>

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	30 MHz ~ 1 GHz
Input Power	7.2 Vdc	Detector Function	Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

## Horizontal



## Vertical





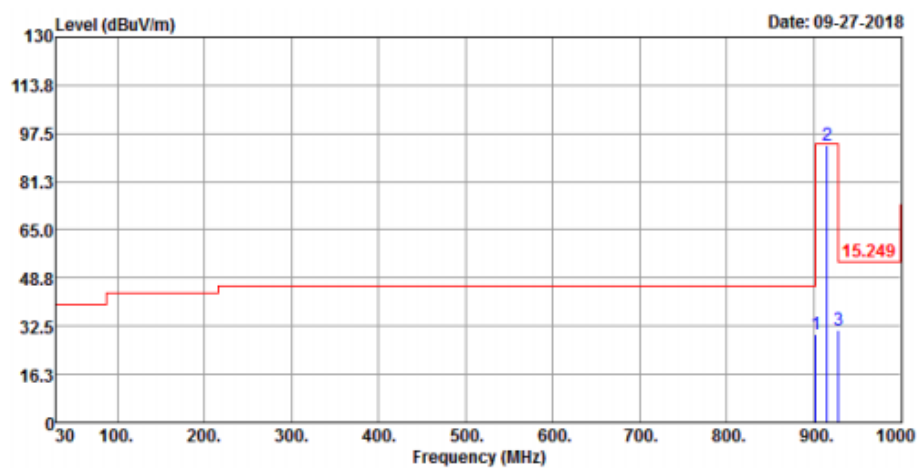
Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
902	31.48	35.93	46	-14.52	23.52	4.05	32.02	160	2	QP
904	93.88	98.33	94	-0.12	23.53	4.05	32.03	160	2	QP
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
902	31.28	35.73	46	-14.72	23.52	4.05	32.02	163	53	QP
904	83.62	88.07	94	-10.38	23.53	4.05	32.03	163	53	QP

Remarks:

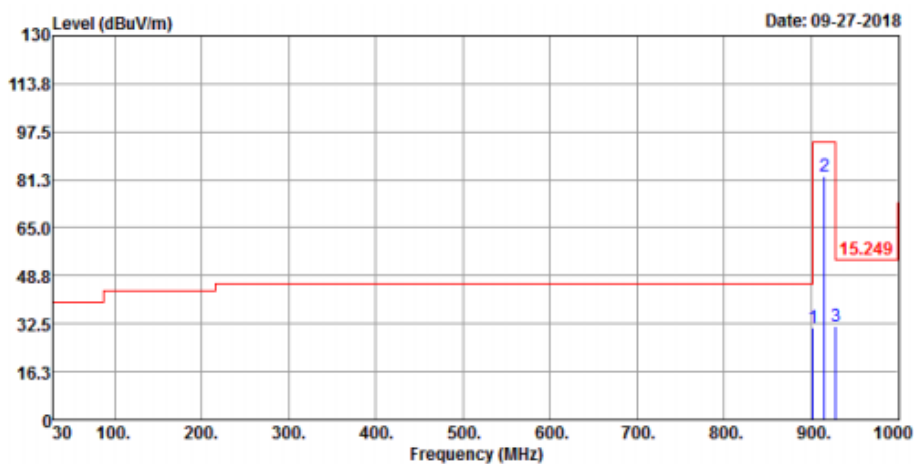
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	30 MHz ~ 1 GHz
Input Power	7.2 Vdc	Detector Function	Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

### Horizontal



### Vertical



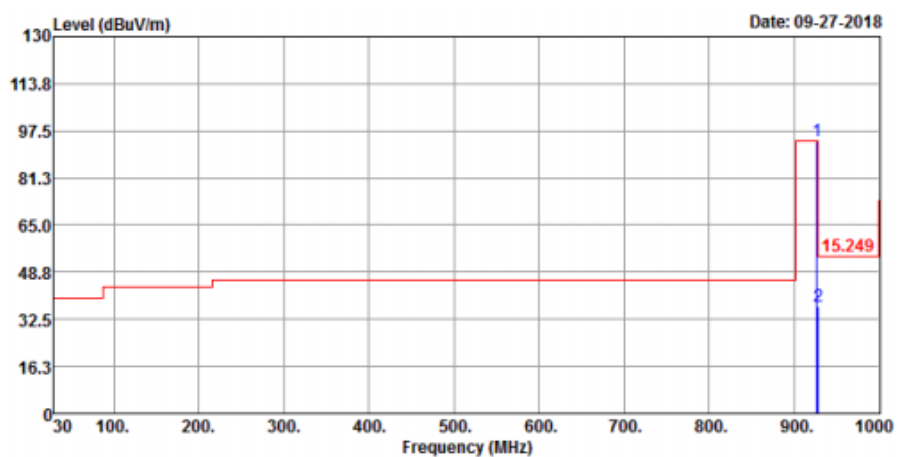
Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
902	29.53	33.98	46	-16.47	23.52	4.05	32.02	154	139	QP
915	93.41	97.74	94	-0.59	23.59	4.11	32.03	154	139	QP
928	31.3	35.46	54	-22.7	23.67	4.16	31.99	154	139	QP
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
902	31.42	35.87	46	-14.58	23.52	4.05	32.02	101	160	QP
915	82.43	86.76	94	-11.57	23.59	4.11	32.03	101	160	QP
928	31.74	35.9	54	-22.26	23.67	4.16	31.99	101	160	QP

Remarks:

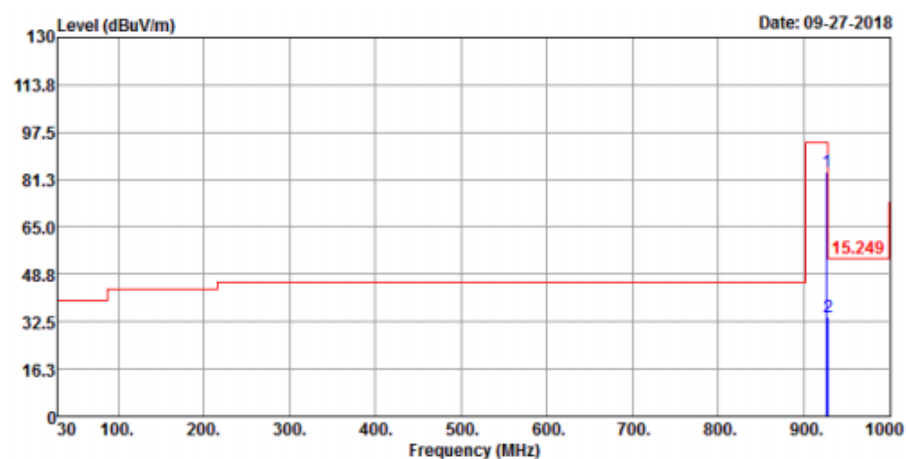
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 24	Frequency Range	30 MHz ~ 1 GHz
Input Power	7.2 Vdc	Detector Function	Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

### Horizontal



### Vertical



**Antenna Polarity & Test Distance: Horizontal at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
927	93.85	98.03	94	-0.15	23.66	4.15	31.99	152	139	QP
928	37.1	41.26	46	-8.9	23.67	4.16	31.99	152	139	QP

**Antenna Polarity & Test Distance: Vertical at 3 m**

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
927	83.71	87.89	94	-10.29	23.66	4.15	31.99	160	305	QP
928	34.03	38.19	46	-11.97	23.67	4.16	31.99	160	305	QP

Remarks:

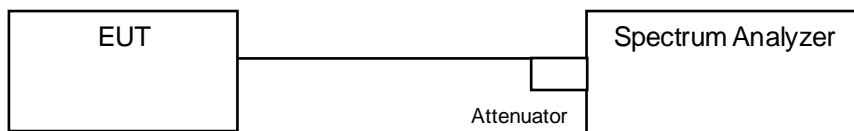
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

## 4.2 20 dB Bandwidth Measurement

### 4.2.1 Limits of 20 dB Bandwidth Measurement

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.2.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

### 4.2.5 Deviation from Test Standard

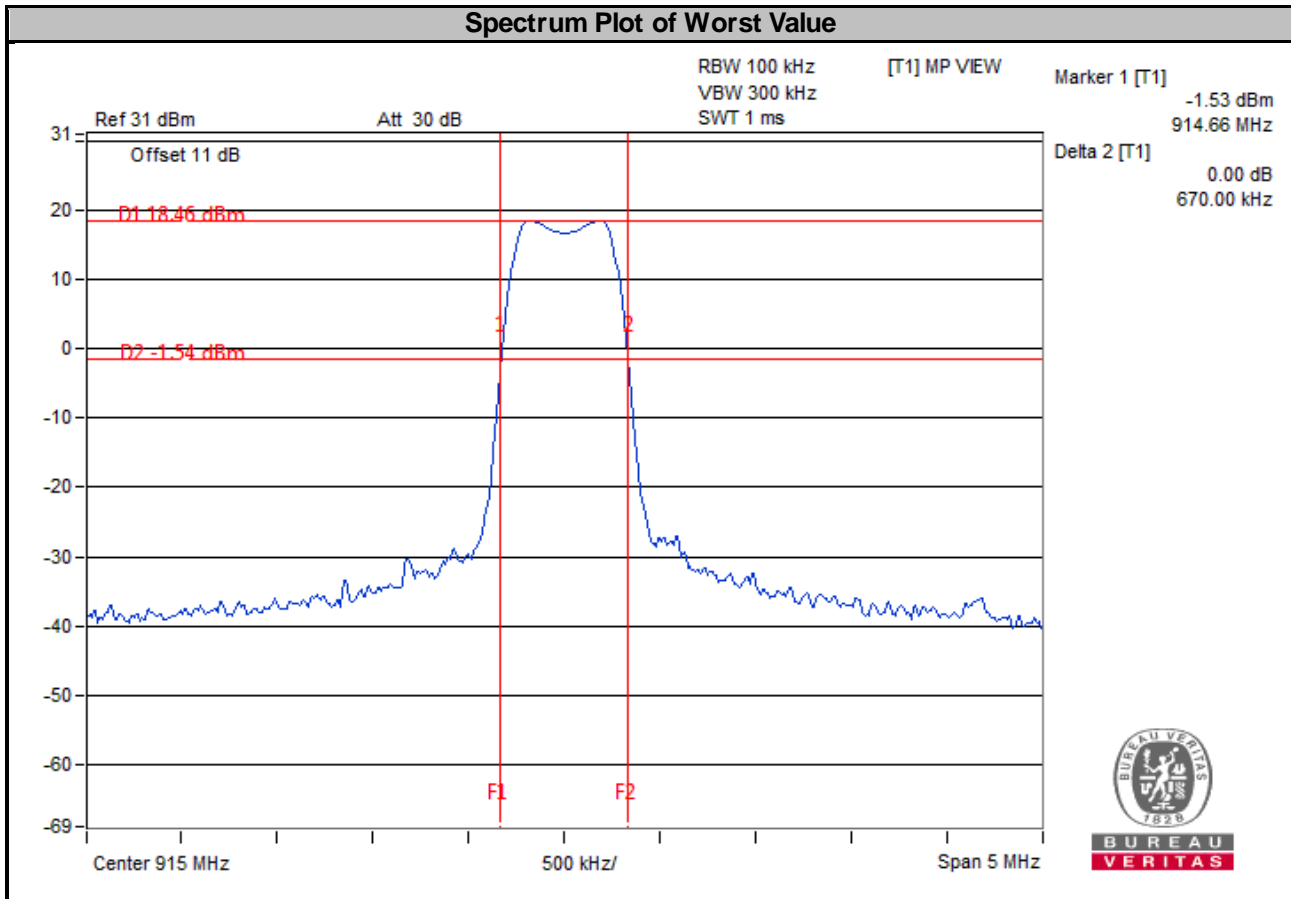
No deviation.

### 4.2.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at channel frequencies individually.

#### 4.2.7 Test Result

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Pass / Fail
1	904	0.66	Pass
12	915	0.67	Pass
24	927	0.66	Pass



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).



## Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.

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