

## FCC Test Report

**Report No.:** RF150506C12

**FCC ID:** HLZ-APEN1

**Test Model:** Apen1

**Received Date:** May 06, 2015

**Test Date:** May 14 ~ May 15, 2015

**Issued Date:** May 21, 2015

**Applicant:** Acer Incorporated

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

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

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



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### Release Control Record

Issue No.	Description	Date Issued
RF150506C12	Original release.	May 21, 2015

## 1 Certificate of Conformity

**Product:** Active Stylus  
**Brand:** acer  
**Test Model:** Apen1  
**Sample Status:** Engineering sample  
**Applicant:** Acer Incorporated  
**Test Date:** May 14 ~ May 15, 2015  
**Standards:** FCC Part 15, Subpart C (Section 15.209)  
ANSI C63.10:2009

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 EMC characteristics under the conditions specified in this report.

**Prepared by :**  , **Date:** May 21, 2015  
Ivy Lin / Specialist

**Approved by :**  , **Date:** May 21, 2015  
Ken Liu / Senior Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C			
FCC Clause	Test Item	Result	Remarks
15.207	Conducted emission test	N/A	Without AC power port of the EUT
15.209	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -19.30dB at 37.68MHz.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.

Note: 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	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Active Stylus
Brand	acer
Test Model	Apen1
Status of EUT	Engineering sample
Power Supply Rating	1.5Vdc (Battery)
Modulation Type	FSK
Operating Frequency	82kHz, 112kHz
Number of Channel	2
Antenna Type	Internal Antenna
Antenna Connector	N/A
Accessory Device	N/A
Cable Supplied	N/A

Note:

The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

#### 3.2 Description of Test Modes

2 channels are provided to the EUT:

Channel	Frequency	Channel	Frequency
1	82kHz	2	112kHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE	PLC	EB	
-	√	N/A	√	

Where RE: Radiated Emission EB: 20dB Bandwidth measurement

**NOTE:**

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. N/A: Not Applicable

**RADIATED EMISSION TEST:**

- 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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	1 to 2	1, 2	FSK

**20dB BANDWIDTH:**

- 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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	1 to 2	1, 2	FSK

**TEST CONDITION:**

Applicable To	Environmental Conditions	Input Power	Tested By
RE<1G	18deg. C, 70%RH	1.5Vdc	Nick Hsu
EB	18deg. C, 70%RH	1.5Vdc	Nick Hsu

### 3.3 Description of Support Units

The EUT has been tested as an independent unit.

#### 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 (Section 15.209)**

ANSI C63.10-2009

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

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). Other emissions shall be at least 20dB below the highest level of the desired power.

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

As shown in 15.35(b), for frequencies above 1000MHz, 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.



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## 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Aug. 29, 2014	Aug. 28, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Loop Antenna R&S	HFH2-Z2	100070	Mar. 06, 2014	Mar. 05, 2016
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. The test was performed in HwaYa Chamber 3.
  4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  5. The FCC Site Registration No. is 988962.
  6. The IC Site Registration No. is IC 7450F-3.

#### 4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Note:**

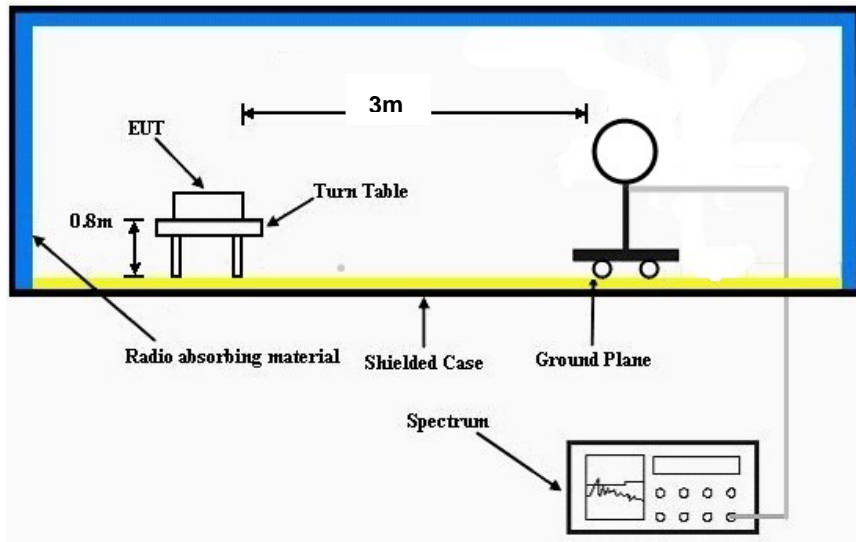
The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

#### 4.1.4 Deviation from Test Standard

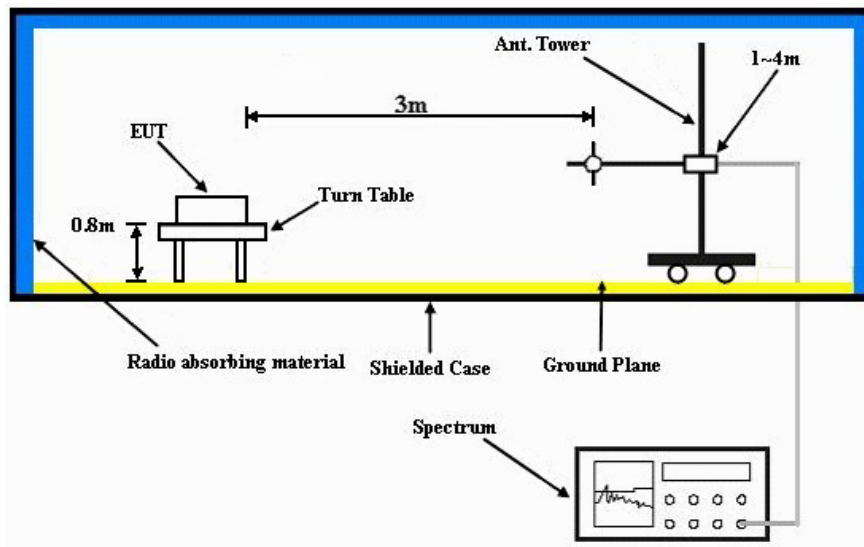
No deviation.

#### 4.1.5 Test Set Up

Frequency range 9k~30MHz:



Frequency range 30~1000MHz:



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

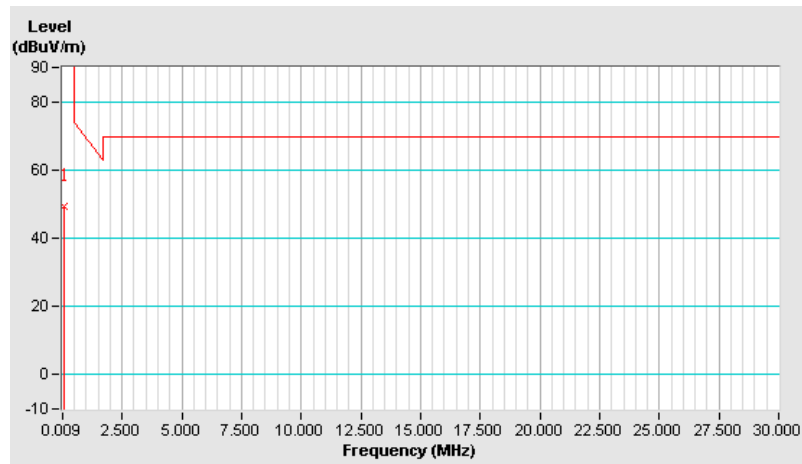
**WORST-CASE DATA:**

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	0.009~30MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.082	49.37	109.32	-59.95	1.00	19	29.37	20.00

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. Above limits have been translated by the formula

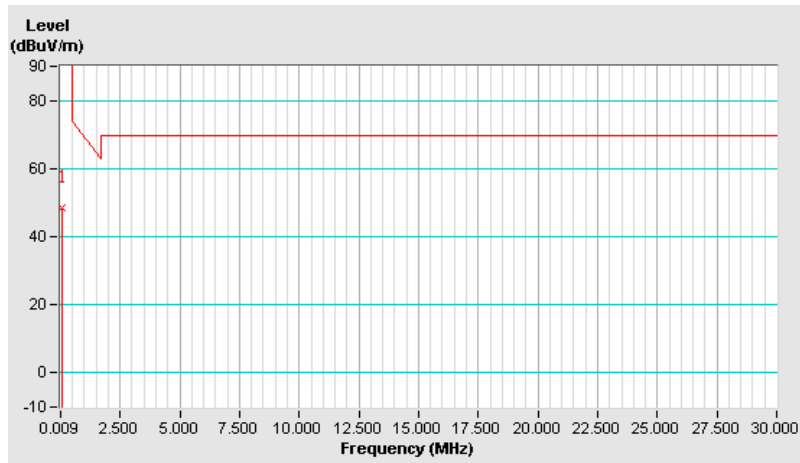


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	0.009~30MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.082	48.49	109.32	-60.83	1.00	0	28.49	20.00

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. Above limits have been translated by the formula

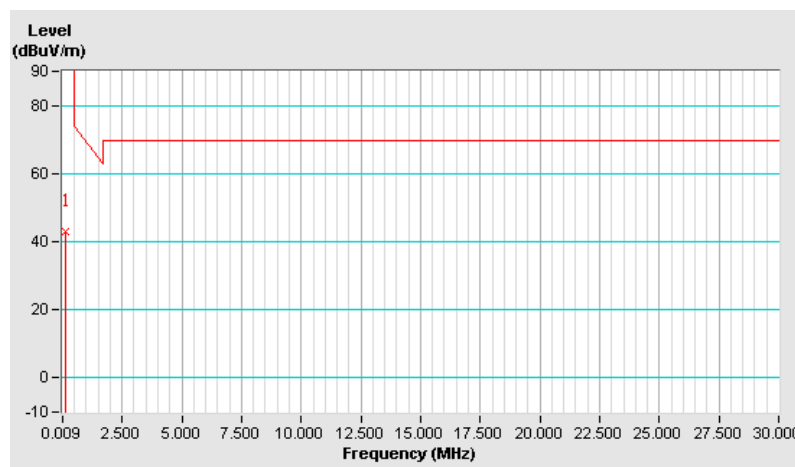


EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	0.009~30MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.112	42.76	106.61	-63.85	1.00	0	22.79	19.97

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. Above limits have been translated by the formula

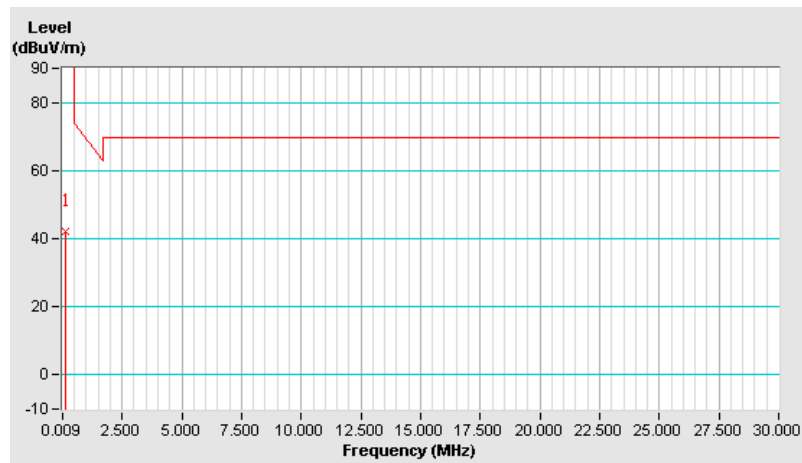


EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	0.009~30MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.112	41.91	106.61	-64.70	1.00	19	21.94	19.97

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. Above limits have been translated by the formula





EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	0.009~30MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.164	42.90	103.30	-60.40	1.00	0	23.00	19.90
Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.164	42.10	103.30	-61.20	1.00	19	22.20	19.90

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	0.009~30MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.224	39.88	100.58	-60.70	1.00	0	19.96	19.92
Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.224	39.11	100.58	-61.47	1.00	19	19.19	19.92

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Horizontal at 3 m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.73	16.00 QP	40.00	-24.00	1.49 H	200	31.60	-15.60
2	107.67	13.40 QP	43.50	-30.10	2.00 H	46	31.20	-17.80
3	142.67	15.40 QP	43.50	-28.10	1.49 H	232	30.00	-14.60
4	171.83	15.20 QP	43.50	-28.30	1.49 H	284	29.60	-14.40
5	261.27	12.70 QP	46.00	-33.30	1.00 H	278	26.70	-14.00
6	298.21	15.10 QP	46.00	-30.90	2.00 H	178	27.60	-12.50
Antenna Polarity & Test Distance: Vertical at 3 m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
<b>1</b>	<b>37.68</b>	<b>20.70 QP</b>	<b>40.00</b>	<b>-19.30</b>	<b>1.01 V</b>	<b>146</b>	<b>36.00</b>	<b>-15.30</b>
2	70.73	13.90 QP	40.00	-26.10	1.01 V	346	30.10	-16.20
3	103.78	11.40 QP	43.50	-32.10	1.01 V	303	29.70	-18.30
4	140.72	12.70 QP	43.50	-30.80	1.01 V	70	27.50	-14.80
5	162.11	13.40 QP	43.50	-30.10	2.00 V	78	27.50	-14.10
6	282.66	14.90 QP	46.00	-31.10	2.00 V	206	27.80	-12.90

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	Below 1000MHz
Input Power	1.5Vdc	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu

Antenna Polarity & Test Distance: Horizontal at 3 m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	29.90	16.40 QP	40.00	-23.60	1.50 H	7	32.10	-15.70
2	113.50	12.50 QP	43.50	-31.00	1.50 H	275	29.60	-17.10
3	142.67	14.40 QP	43.50	-29.10	1.00 H	349	29.00	-14.60
4	171.83	14.50 QP	43.50	-29.00	1.50 H	96	28.90	-14.40
5	300.16	16.50 QP	46.00	-29.50	1.00 H	120	28.90	-12.40
6	329.32	17.10 QP	46.00	-28.90	1.00 H	30	28.90	-11.80
Antenna Polarity & Test Distance: Vertical at 3 m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	57.12	20.00 QP	40.00	-20.00	1.99 V	89	34.60	-14.60
2	136.84	12.50 QP	43.50	-31.00	1.50 V	213	27.60	-15.10
3	154.33	13.20 QP	43.50	-30.30	1.50 V	334	27.10	-13.90
4	282.66	13.90 QP	46.00	-32.10	1.00 V	8	26.80	-12.90
5	323.49	15.10 QP	46.00	-30.90	1.00 V	16	26.90	-11.80
6	436.26	17.90 QP	46.00	-28.10	1.50 V	5	27.40	-9.50

**REMARKS:**

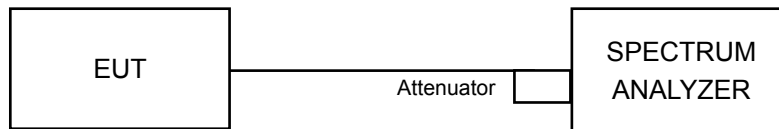
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 4.2 20dB Bandwidth Measurement

### 4.2.1 Limits of 20dB Bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
R&S SPECTRUM ANALYZER	FSP40	100039	Apr. 07, 2015	Apr. 06, 2016

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

### 4.2.4 Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### 4.2.5 Deviation from Test Standard

No deviation.

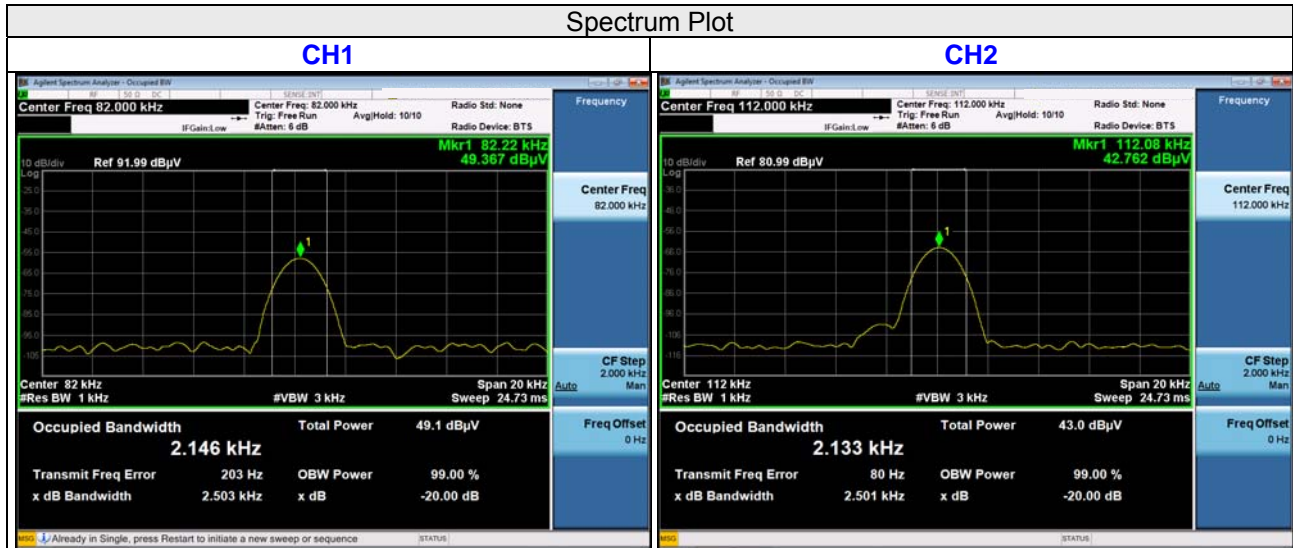
### 4.2.6 EUT Operating Conditions

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

### 4.2.7 Test Result

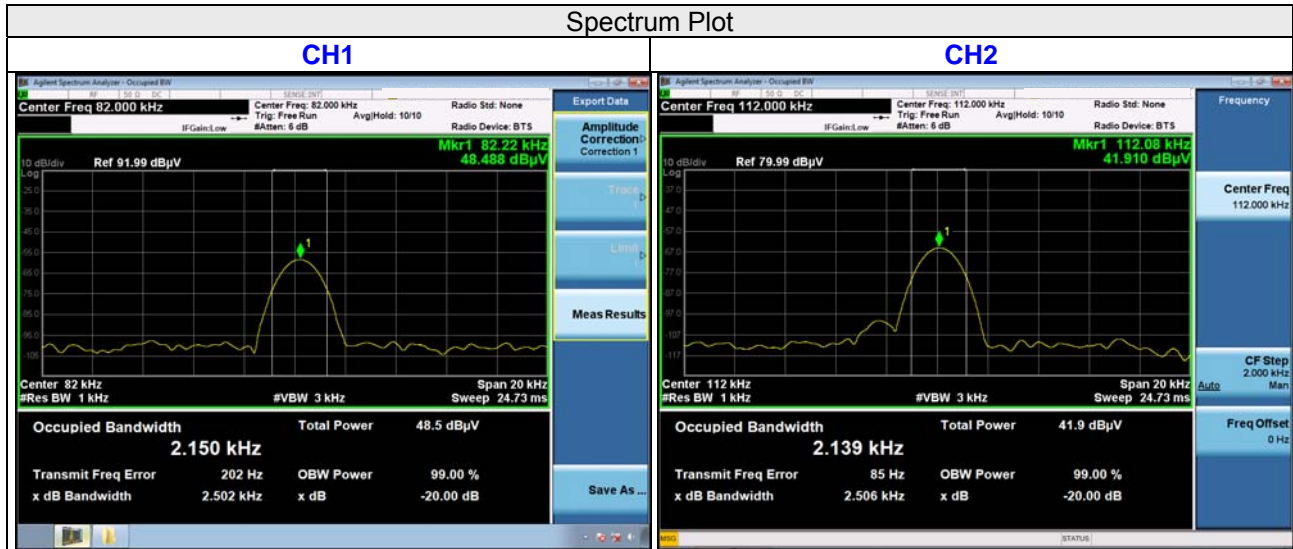
Loop antenna: Open

Channel	Frequency (kHz)	20dB Bandwidth (kHz)	Pass / Fail
1	82	2.503	PASS
2	112	2.501	PASS



Loop antenna: Close

Channel	Frequency (kHz)	20dB Bandwidth (kHz)	Pass / Fail
1	82	2.502	PASS
2	112	2.506	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 accredited and approved according to ISO/IEC 17025.

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

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

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