



# FCC TEST REPORT

**REPORT NO.:** RF991213D02

**MODEL NO.:** 1477

**FCC ID:** C3K1477

**RECEIVED:** Dec. 13, 2010

**TESTED:** Dec. 13 ~ 15, 2010

**ISSUED:** Dec. 29, 2010

**APPLICANT:** Microsoft Corporation

**ADDRESS:** One Microsoft Way Redmond, WA 98052-6399

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

**LAB LOCATION:** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang,  
Taipei Hsien, 244 Taiwan

This test report consists of 37 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.



## Table of Contents

RELEASE CONTROL RECORD.....	3
1. CERTIFICATION.....	4
2. SUMMARY OF TEST RESULTS.....	5
2.1 MEASUREMENT UNCERTAINTY.....	5
3. GENERAL INFORMATION .....	6
3.1 GENERAL DESCRIPTION OF EUT .....	6
3.2 DESCRIPTION OF TEST MODES.....	7
3.2.1 CONFIGURATION OF SYSTEM UNDER TEST .....	7
3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL: .....	8
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	9
3.4 DESCRIPTION OF SUPPORT UNITS .....	9
4. TEST TYPES AND RESULTS.....	10
4.1 CONDUCTED EMISSION MEASUREMENT .....	10
4.2 RADIATED EMISSION MEASUREMENT .....	10
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT.....	10
4.2.2 TEST INSTRUMENTS .....	11
4.2.3 TEST PROCEDURES.....	12
4.2.4 DEVIATION FROM TEST STANDARD .....	12
4.2.5 TEST SETUP .....	13
4.2.6 EUT OPERATING CONDITIONS .....	13
4.2.7 TEST RESULTS.....	14
4.3 FREQUENCY TOLERANCE MEASUREMENT .....	30
4.3.1 LIMITS OF FREQUENCY TOLERANCE MEASUREMENT .....	30
4.3.2 TEST INSTRUMENTS .....	30
4.3.3 TEST PROCEDURE .....	30
4.3.4 DEVIATION FROM TEST STANDARD .....	30
4.3.5 EUT OPERATING CONDITION .....	30
4.3.6 TEST RESULTS.....	31
4.4 BAND EDGES MEASUREMENT .....	32
4.4.1 LIMITS OF BAND EDGES MEASUREMENT .....	32
4.4.2 TEST INSTRUMENTS .....	32
4.4.3 TEST PROCEDURE .....	32
4.4.4 DEVIATION FROM TEST STANDARD .....	32
4.4.5 EUT OPERATING CONDITION .....	32
4.4.6 TEST RESULTS.....	32
5. PHOTOGRAPHS OF THE TEST CONFIGURATION.....	35
6. INFORMATION ON THE TESTING LABORATORIES .....	36
7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	37



A D T

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Dec. 29, 2010



## 1. CERTIFICATION

**PRODUCT:** Microsoft Wireless Keyboard  
**BRAND NAME:** Microsoft®  
**MODEL NO.:** 1477  
**APPLICANT:** Microsoft Corporation  
**TESTED:** Dec. 13 ~ 15, 2010  
**TEST ITEM:** ENGINEERING SAMPLE  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.249)  
ANSI C63.4-2003  
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 :** Celia Chen , **DATE:** Dec. 29, 2010  
( Celia Chen / Senior Specialist )

**APPROVED BY :** Ken Liu , **DATE:** Dec. 29, 2010  
( Ken Liu / Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.249)</b>			
<b>STANDARD SECTION</b>	<b>TEST TYPE AND LIMIT</b>	<b>RESULT</b>	<b>REMARK</b>
15.207	Conducted Emission Test	N/A	Power supply is 3Vdc from batteries
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 12.209	PASS	Minimum passing margin is -5.3dB at 2390.00MHz

### 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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

<b>Measurement</b>	<b>Frequency</b>	<b>Uncertainty</b>
Radiated emissions	30MHz ~ 1GHz	3.67 dB
	Above 1GHz	2.89 dB

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	Microsoft Wireless Keyboard
<b>MODEL NO.</b>	1477
<b>FCC ID</b>	C3K1477
<b>POWER SUPPLY</b>	3Vdc from batteries
<b>MODULATION TYPE</b>	GFSK
<b>OPERATING FREQUENCY</b>	2403MHz ~ 2480MHz
<b>NUMBER OF CHANNEL</b>	24
<b>ANTENNA TYPE</b>	PCB Strip antenna with 1dBi gain
<b>ANTENNA CONNECTOR</b>	N/A
<b>DATA CABLE</b>	N/A
<b>I/O PORTS</b>	N/A
<b>ASSOCIATED DEVICES</b>	N/A

**NOTE:**

1. The EUT is a transceiver.
2. The EUT has serial samples, which are defined as their serial no. as follows:

<b>Product</b>	<b>Model No.</b>	<b>Serial no.</b>
Microsoft Wireless Keyboard	1477	EV1-012
		EV1-029
		EV1-032
		EV1-034

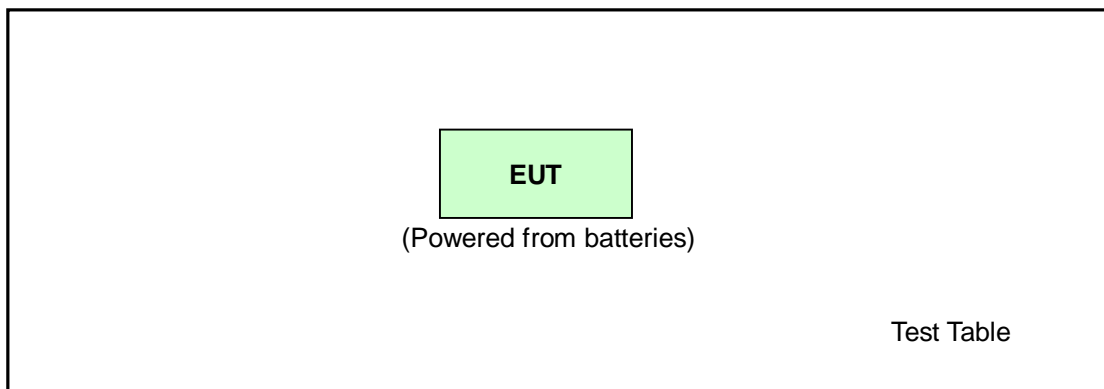
3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

24 channels are provided to this EUT:

Channel Group	Channel	Frequency (MHz)	Channel Group	Channel	Frequency (MHz)
Subset A	0	2403	Subset D	12	2405
	1	2419		13	2425
	2	2478		14	2444
	3	2468		15	2452
Subset B	4	2429	Subset E	16	2423
	5	2450		17	2446
	6	2470		18	2456
	7	2480		19	2474
Subset C	8	2421	Subset F	20	2417
	9	2431		21	2427
	10	2472		22	2448
	11	2454		23	2476

#### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to					Description
	PLC	RE<1G	RE <sup>≥</sup> 1G	FT	BM	
-	Note	√	√	√	√	-

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz  
 RE<sup>≥</sup>1G: Radiated Emission above 1GHz FT: Frequency Tolerance  
 BM: Bandedge Measurement

**Note:** No need to concern of Conducted Emission due to the EUT is powered by battery.

#### **RADIATED EMISSION TEST (BELOW 1 GHz):**

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

AVAILABLE CHANNEL	TESTED CHANNEL	SERIAL NO.	MODULATION TYPE
0 to 23	0	EV1-029, EV1-032, EV1-034	GFSK

#### **RADIATED EMISSION TEST (ABOVE 1 GHz):**

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

AVAILABLE CHANNEL	TESTED CHANNEL	SERIAL NO.	MODULATION TYPE
0 to 23	0, 17, 7	EV1-029, EV1-032, EV1-034	GFSK

#### **FREQUENCY TOLERANCE:**

- 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.

AVAILABLE CHANNEL	TESTED CHANNEL	SERIAL NO.	MODULATION TYPE
0 to 23	0, 17, 7	EV1-012	GFSK

#### **BANDEDGE MEASUREMENT:**

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

AVAILABLE CHANNEL	TESTED CHANNEL	SERIAL NO.	MODULATION TYPE
0 to 23	0, 7	EV1-012	GFSK



**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE <sup>3</sup> 1G	20deg. C, 76% RH, 1013hPa	3Vdc	Nick Chen
RE<1G	20deg. C, 76% RH, 1018hPa	3Vdc	Nick Chen
FT	16deg. C, 78% RH, 1018hPa	3Vdc	Jun Wu
BM	20deg. C, 76% RH, 1013hPa	3Vdc	Nick Chen

### 3.3 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 15.249)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

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

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any necessary accessory or support unit.

## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

N/A

### 4.2 RADIATED EMISSION MEASUREMENT

#### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, 15.249 as following:

15.209 Limit		
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
15.249 Limit		
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

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
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.



## 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 06, 2010	May 05, 2011
HP Preamplifier	8449B	3008A01924	Jul. 14, 2010	Jul. 13, 2011
HP Preamplifier	8449B	3008A01292	Jul. 14, 2010	Jul. 13, 2011
ROHDE & SCHWARZ TEST RECEIVER	ESU26	100005	Jun. 10, 2010	Jun. 09, 2011
Schwarzbeck Antenna	VULB 9168	137	Apr. 29, 2010	Apr. 28, 2011
Schwarzbeck Antenna	VHBA 9123	480	Apr. 29, 2010	Apr. 28, 2011
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 20, 2010	Aug. 19, 2011
EMCO Horn Antenna	3115	6714	Oct. 26, 2010	Oct. 25, 2011
EMCO Horn Antenna	3115	9312-4192	Apr. 23, 2010	Apr. 22, 2011
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

## 4.2.3 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 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. 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. 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 method or average method as specified and then reported in data sheet.

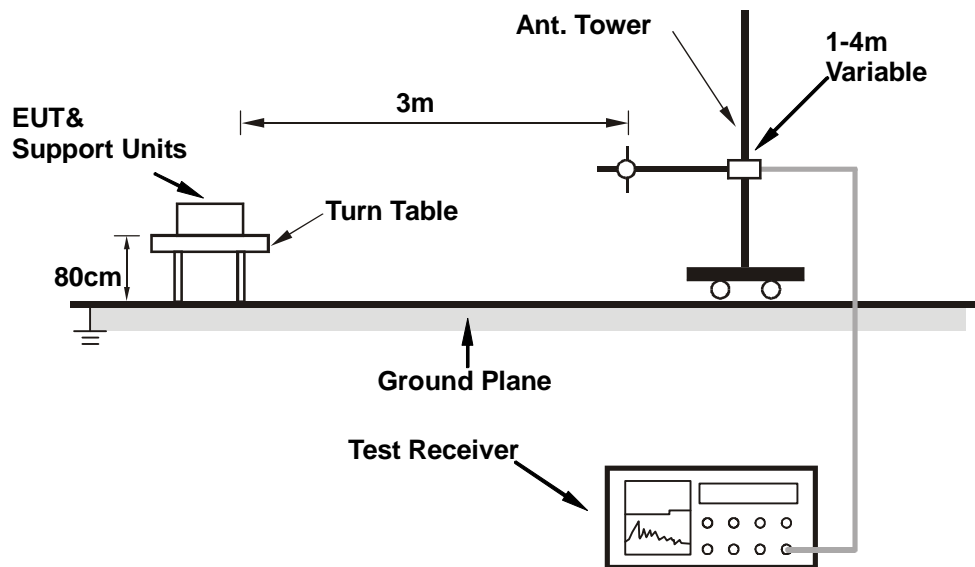
### NOTE:

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

## 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 4.2.6 EUT OPERATING CONDITIONS

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

## 4.2.7 TEST RESULTS

### ABOVE 1GHz DATA (For Fundamental, Harmonics)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

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	*2403.00	100.0 PK	114.0	-14.0	1.00 H	179	67.50	32.52
2	*2403.00	67.8 AV	94.0	-26.2	1.00 H	179	35.30	32.52
3	4806.00	53.2 PK	74.0	-20.8	1.32 H	84	13.30	39.86
4	4806.00	21.0 AV	54.0	-33.0	1.32 H	84	-18.90	39.86
5	7209.00	57.2 PK	74.0	-16.8	1.56 H	173	11.38	45.82
6	7209.00	25.0 AV	54.0	-29.0	1.56 H	173	-20.82	45.82
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	*2403.00	94.5 PK	114.0	-19.5	1.14 V	95	62.02	32.52
2	*2403.00	62.3 AV	94.0	-31.7	1.14 V	95	29.82	32.52
3	4806.00	53.0 PK	74.0	-21.0	1.34 V	160	13.18	39.86
4	4806.00	20.8 AV	54.0	-33.2	1.34 V	160	-19.02	39.86
5	7209.00	57.0 PK	74.0	-17.0	1.53 V	192	11.17	45.82
6	7209.00	24.8 AV	54.0	-29.2	1.53 V	192	-21.03	45.82

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* ” : Fundamental frequency
  6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.192 \text{ ms} / 7.82 \text{ ms}) = -32.2 \text{ dB}$   
 Please see page 17 for plotted duty.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 17	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

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	*2446.00	99.5 PK	114.0	-14.5	1.00 H	86	66.82	32.68
2	*2446.00	67.3 AV	94.0	-26.7	1.00 H	86	34.62	32.68
3	4892.00	53.3 PK	74.0	-20.7	1.16 H	85	13.13	40.14
4	4892.00	21.1 AV	54.0	-32.9	1.16 H	85	-19.07	40.14
5	7338.00	55.7 PK	74.0	-18.3	1.57 H	149	9.78	45.91
6	7338.00	23.5 AV	54.0	-30.5	1.57 H	149	-22.42	45.91
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	*2446.00	92.8 PK	114.0	-21.2	1.06 V	146	60.11	32.68
2	*2446.00	60.6 AV	94.0	-33.4	1.06 V	146	27.91	32.68
3	4892.00	54.4 PK	74.0	-19.6	1.40 V	192	14.23	40.14
4	4892.00	22.2 AV	54.0	-31.8	1.40 V	192	-17.97	40.14
5	7338.00	55.4 PK	74.0	-18.6	1.43 V	191	9.51	45.91
6	7338.00	23.2 AV	54.0	-30.8	1.43 V	191	-22.69	45.91

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* ” : Fundamental frequency
  6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.192 \text{ ms} / 7.82 \text{ ms}) = -32.2 \text{ dB}$   
 Please see page 17 for plotted duty.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

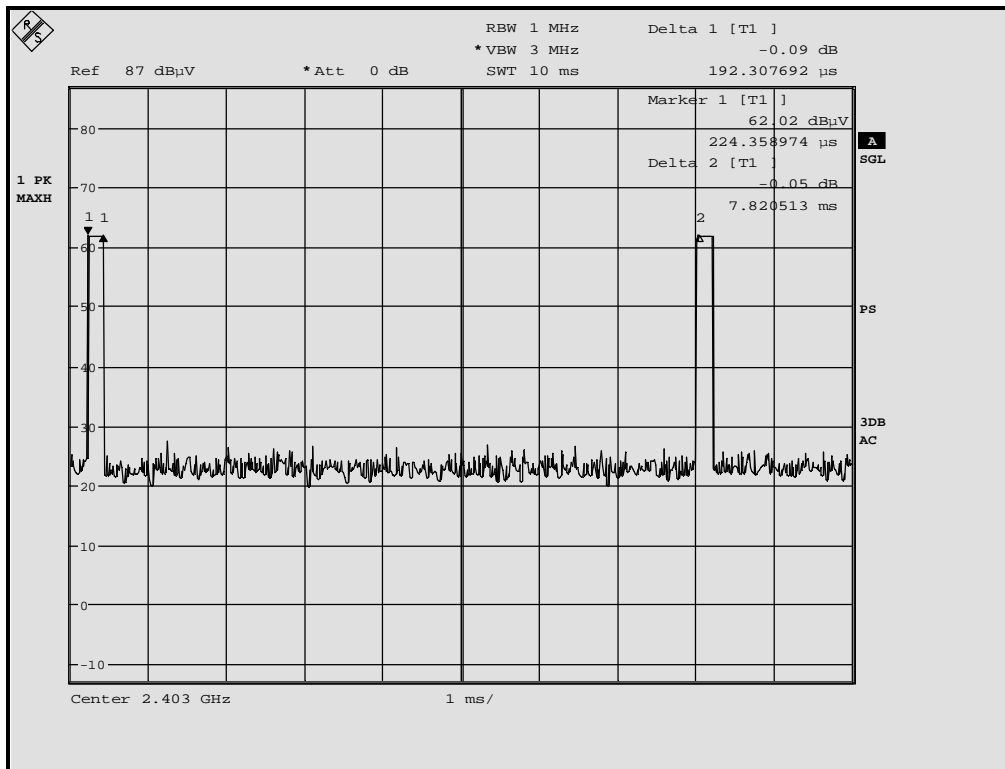
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	96.6 PK	114.0	-17.4	1.00 H	82	63.84	32.80
2	*2480.00	64.4 AV	94.0	-29.6	1.00 H	82	31.64	32.80
3	4960.00	52.3 PK	74.0	-21.8	1.51 H	82	11.90	40.34
4	4960.00	20.1 AV	54.0	-34.0	1.51 H	82	-20.30	40.34
5	7440.00	55.3 PK	74.0	-18.7	1.53 H	213	9.31	45.98
6	7440.00	23.1 AV	54.0	-30.9	1.53 H	213	-22.89	45.98
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	*2480.00	92.9 PK	114.0	-21.1	1.12 V	88	60.09	32.80
2	*2480.00	60.7 AV	94.0	-33.3	1.12 V	88	27.89	32.80
3	4960.00	53.4 PK	74.0	-20.7	1.00 V	193	13.00	40.34
4	4960.00	21.2 AV	54.0	-32.9	1.00 V	193	-19.20	40.34
5	7440.00	54.0 PK	74.0	-20.0	1.49 V	193	8.00	45.98
6	7440.00	21.8 AV	54.0	-32.2	1.49 V	193	-24.20	45.98

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* ” : Fundamental frequency
  6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.192 \text{ ms} / 7.82 \text{ ms}) = -32.2 \text{ dB}$   
 Please see page 17 for plotted duty.





A D T



$$20 \log (\text{Duty cycle}) = 20 \log (0.192 \text{ ms} / 7.82 \text{ ms}) = -32.2 \text{ dB}$$



A D T

**ABOVE 1GHz DATA (For Spurious Emission)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

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	2390.00	68.7 PK	74.0	-5.3	1.00 H	179	36.25	32.47
2	2390.00	47.4 AV	54.0	-6.6	1.00 H	179	14.96	32.47
3	2400.00	59.8 PK	74.0	-14.2	1.00 H	179	27.31	32.51
4	2400.00	27.6 AV	54.0	-26.4	1.00 H	179	-4.89	32.51
5	2748.00	44.5 PK	74.0	-29.5	1.04 H	82	10.46	34.02
6	2748.00	30.6 AV	54.0	-23.4	1.04 H	82	-3.39	34.02
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	2390.00	63.8 PK	74.0	-10.2	1.14 V	95	31.33	32.47
2	2390.00	47.3 AV	54.0	-6.7	1.14 V	95	14.81	32.47
3	2400.00	54.3 PK	74.0	-19.7	1.14 V	95	21.83	32.51
4	2400.00	22.1 AV	54.0	-31.9	1.14 V	95	-10.37	32.51
5	2748.00	43.7 PK	74.0	-30.3	1.05 V	213	9.64	34.02
6	2748.00	30.2 AV	54.0	-23.8	1.05 V	213	-3.86	34.02

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 17	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

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	2798.00	44.5 PK	74.0	-29.5	1.03 H	105	10.34	34.19
2	2798.00	30.5 AV	54.0	-23.5	1.03 H	105	-3.67	34.19
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	2798.00	43.7 PK	74.0	-30.3	1.00 V	195	9.53	34.19
2	2798.00	30.5 AV	54.0	-23.5	1.00 V	195	-3.65	34.19

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

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	2483.50	52.5 PK	74.0	-21.5	1.00 H	85	19.73	32.81
2	2483.50	20.3 AV	54.0	-33.7	1.00 H	85	-12.47	32.81
3	2836.00	44.6 PK	74.0	-29.4	1.01 H	114	10.28	34.31
4	2836.00	30.7 AV	54.0	-23.3	1.01 H	114	-3.59	34.31
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	2483.50	48.8 PK	74.0	-25.2	1.12 V	88	15.98	32.81
2	2483.50	16.6 AV	54.0	-37.4	1.12 V	88	-16.22	32.81
3	2836.00	43.8 PK	74.0	-30.2	1.02 V	184	9.51	34.31
4	2836.00	30.4 AV	54.0	-23.6	1.02 V	184	-3.90	34.31

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-032		

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	2748.00	44.9 PK	74.0	-29.1	1.01 H	66	10.86	34.02
2	2748.00	30.9 AV	54.0	-23.1	1.01 H	66	-3.08	34.02
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	2748.00	44.2 PK	74.0	-29.8	1.04 V	189	10.16	34.02
2	2748.00	30.6 AV	54.0	-23.4	1.04 V	189	-3.41	34.02

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 17	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-032		

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	2798.00	44.6 PK	74.0	-29.4	1.01 H	96	10.44	34.19
2	2798.00	30.8 AV	54.0	-23.2	1.01 H	96	-3.37	34.19
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	2798.00	43.8 PK	74.0	-30.2	1.01 V	187	9.62	34.19
2	2798.00	30.6 AV	54.0	-23.4	1.01 V	187	-3.60	34.19

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-032		

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	2836.00	44.8 PK	74.0	-29.2	1.02 H	69	10.50	34.31
2	2836.00	31.0 AV	54.0	-23.0	1.02 H	69	-3.29	34.31
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	2836.00	43.7 PK	74.0	-30.3	1.07 V	224	9.41	34.31
2	2836.00	30.5 AV	54.0	-23.5	1.07 V	224	-3.80	34.31

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-034		

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	2748.00	44.7 PK	74.0	-29.3	1.02 H	94	10.70	34.02
2	2748.00	30.8 AV	54.0	-23.2	1.02 H	94	-3.21	34.02
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	2748.00	43.8 PK	74.0	-30.2	1.00 V	200	9.80	34.02
2	2748.00	30.5 AV	54.0	-23.5	1.00 V	200	-3.51	34.02

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.





A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 17	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-034		

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	2798.00	44.6 PK	74.0	-29.4	1.00 H	86	10.44	34.19
2	2798.00	30.7 AV	54.0	-23.3	1.00 H	86	-3.47	34.19
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	2798.00	43.8 PK	74.0	-30.2	1.04 V	199	9.64	34.19
2	2798.00	31.3 AV	54.0	-22.7	1.04 V	199	-2.90	34.19

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1013 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-034		

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	2836.00	44.6 PK	74.0	-29.4	1.03 H	72	10.30	34.31
2	2836.00	31.1 AV	54.0	-22.9	1.03 H	72	-3.23	34.31
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	2836.00	44.1 PK	74.0	-29.9	1.01 V	186	9.75	34.31
2	2836.00	31.0 AV	54.0	-23.0	1.01 V	186	-3.33	34.31

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



## BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1018 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-029		

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	73.53	24.3 QP	40.0	-15.7	1.03 H	55	13.00	11.31
2	440.38	24.3 QP	46.0	-21.7	1.11 H	262	5.22	19.09
3	672.00	24.3 QP	46.0	-21.7	1.07 H	10	-0.15	24.42
4	703.09	25.7 QP	46.0	-20.3	1.28 H	112	0.78	24.88
5	773.04	24.1 QP	46.0	-21.9	1.22 H	310	-1.78	25.85
6	855.43	25.8 QP	46.0	-20.2	1.00 H	181	-1.41	27.23
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	59.54	26.7 QP	40.0	-13.3	1.11 V	10	13.13	13.55
2	131.04	21.8 QP	43.5	-21.7	1.07 V	157	8.31	13.49
3	769.94	24.0 QP	46.0	-22.0	1.08 V	52	-1.78	25.81
4	810.35	26.7 QP	46.0	-19.3	1.03 V	100	0.32	26.42
5	843.00	25.5 QP	46.0	-20.5	1.05 V	319	-1.53	27.02
6	870.98	27.4 QP	46.0	-18.6	1.22 V	169	-0.07	27.47
7	903.62	25.9 QP	46.0	-20.1	1.00 V	10	-2.08	27.96

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1018 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-032		

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	59.54	26.7 QP	40.0	-13.3	1.07 H	76	13.11	13.55
2	766.83	24.5 QP	46.0	-21.5	1.16 H	64	-1.26	25.77
3	793.25	24.2 QP	46.0	-21.9	1.08 H	10	-1.99	26.14
4	838.33	25.2 QP	46.0	-20.8	1.07 H	100	-1.76	26.93
5	853.88	27.3 QP	46.0	-18.7	1.32 H	205	0.10	27.20
6	892.74	27.0 QP	46.0	-19.0	1.05 H	10	-0.82	27.80
7	916.06	27.2 QP	46.0	-18.8	1.02 H	88	-0.93	28.13
8	956.47	26.8 QP	46.0	-19.2	1.13 H	172	-1.89	28.65
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	59.54	26.1 QP	40.0	-13.9	1.07 V	10	12.53	13.55
2	776.15	24.8 QP	46.0	-21.2	1.22 V	55	-1.09	25.90
3	801.03	24.4 QP	46.0	-21.6	1.09 V	10	-1.82	26.25
4	818.13	25.9 QP	46.0	-20.1	1.14 V	10	-0.67	26.56
5	867.87	26.9 QP	46.0	-19.1	1.08 V	151	-0.52	27.42
6	900.51	26.2 QP	46.0	-19.8	1.23 V	10	-1.73	27.92
7	940.93	26.9 QP	46.0	-19.2	1.00 V	10	-1.61	28.46

- 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).
  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 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 76%RH 1018 hPa	TESTED BY	Nick Chen
SERIAL NO.	EV1-034		

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	59.54	26.6 QP	40.0	-13.4	1.04 H	343	13.06	13.55
2	774.60	24.7 QP	46.0	-21.3	1.11 H	13	-1.20	25.87
3	791.70	24.1 QP	46.0	-21.9	1.06 H	172	-2.01	26.11
4	844.55	26.0 QP	46.0	-20.0	1.09 H	154	-1.02	27.05
5	872.53	26.1 QP	46.0	-19.9	1.07 H	58	-1.41	27.49
6	881.86	26.2 QP	46.0	-19.8	1.16 H	223	-1.39	27.63
7	933.16	27.1 QP	46.0	-18.9	1.02 H	352	-1.26	28.35

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	59.54	27.2 QP	40.0	-12.8	1.03 V	340	13.64	13.55
2	771.49	24.3 QP	46.0	-21.7	1.17 V	274	-1.51	25.83
3	796.36	24.0 QP	46.0	-22.0	1.25 V	157	-2.17	26.18
4	830.56	25.0 QP	46.0	-21.0	1.36 V	10	-1.81	26.79
5	863.21	26.5 QP	46.0	-19.5	1.14 V	277	-0.82	27.35
6	891.19	26.4 QP	46.0	-19.6	1.07 V	46	-1.42	27.78
7	958.03	27.2 QP	46.0	-18.8	1.13 V	235	-1.44	28.67

- 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).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



### 4.3 FREQUENCY TOLERANCE MEASUREMENT

#### 4.3.1 LIMITS OF FREQUENCY TOLERANCE MEASUREMENT

Limit :  $\pm 0.001\%$

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Apr. 27, 2010	Apr. 26, 2011

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

#### 4.3.3 TEST PROCEDURE

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.001\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 EUT OPERATING CONDITION

Same as Item 4.2.6



### 4.3.6 TEST RESULTS

<b>SERIAL NO.</b>	EV1-012		
<b>INPUT POWER</b>	3Vdc	<b>CHANNEL</b>	0, 17, 7

#### CH 0

TEST CONDITION			Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency error (%)
Tnom(°C)	20	Vnom(V)	2402.9794	0	0
Tmin(°C)	-20	Vmin(V)	2402.9808	1.40	0.00006
		Vmax(V)	2402.9814	2.00	0.00008
Tmax(°C)	55	Vmin(V)	2402.9780	-1.40	-0.00006
		Vmax(V)	2402.9774	-2.00	-0.00008
Limit : ±0.001%					

#### CH 17

TEST CONDITION			Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency error (%)
Tnom(°C)	20	Vnom(V)	2445.9786	0	0
Tmin(°C)	-20	Vmin(V)	2445.9800	1.40	0.00006
		Vmax(V)	2445.9813	2.70	0.00011
Tmax(°C)	55	Vmin(V)	2445.9778	-0.80	-0.00003
		Vmax(V)	2445.9771	-1.50	-0.00006
Limit : ±0.001%					

#### CH 7

TEST CONDITION			Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency error (%)
Tnom(°C)	20	Vnom(V)	2479.9795	0	0
Tmin(°C)	-20	Vmin(V)	2479.9788	-0.70	-0.00003
		Vmax(V)	2479.9781	-1.40	-0.00006
Tmax(°C)	55	Vmin(V)	2479.9777	-1.80	-0.00007
		Vmax(V)	2479.9775	-2.00	-0.00008
Limit : ±0.001%					

## 4.4 BAND EDGES MEASUREMENT

### 4.4.1 LIMITS OF BAND EDGES MEASUREMENT

Below -50dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100036	Apr. 27, 2010	Apr. 26, 2011

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

### 4.4.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots are attached on the following pages.

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.4.5 EUT OPERATING CONDITION

Same as Item 4.2.6

### 4.4.6 TEST RESULTS

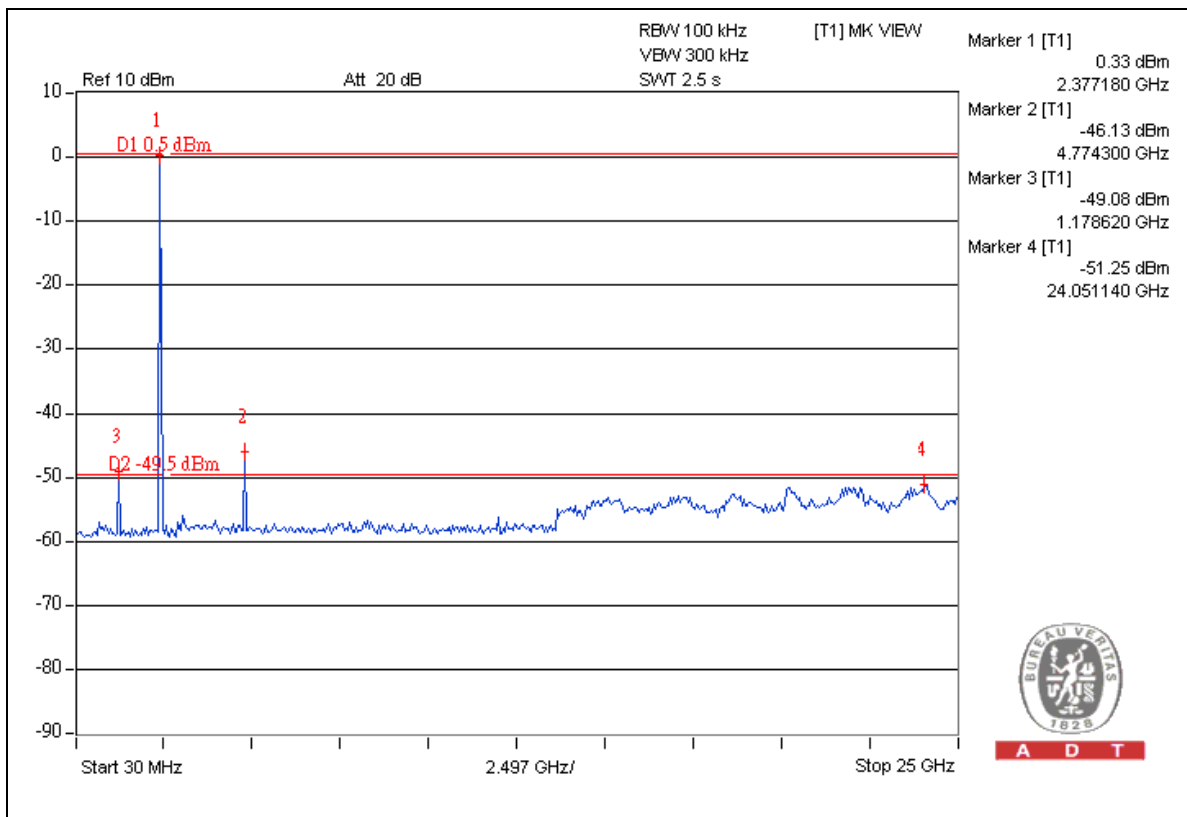
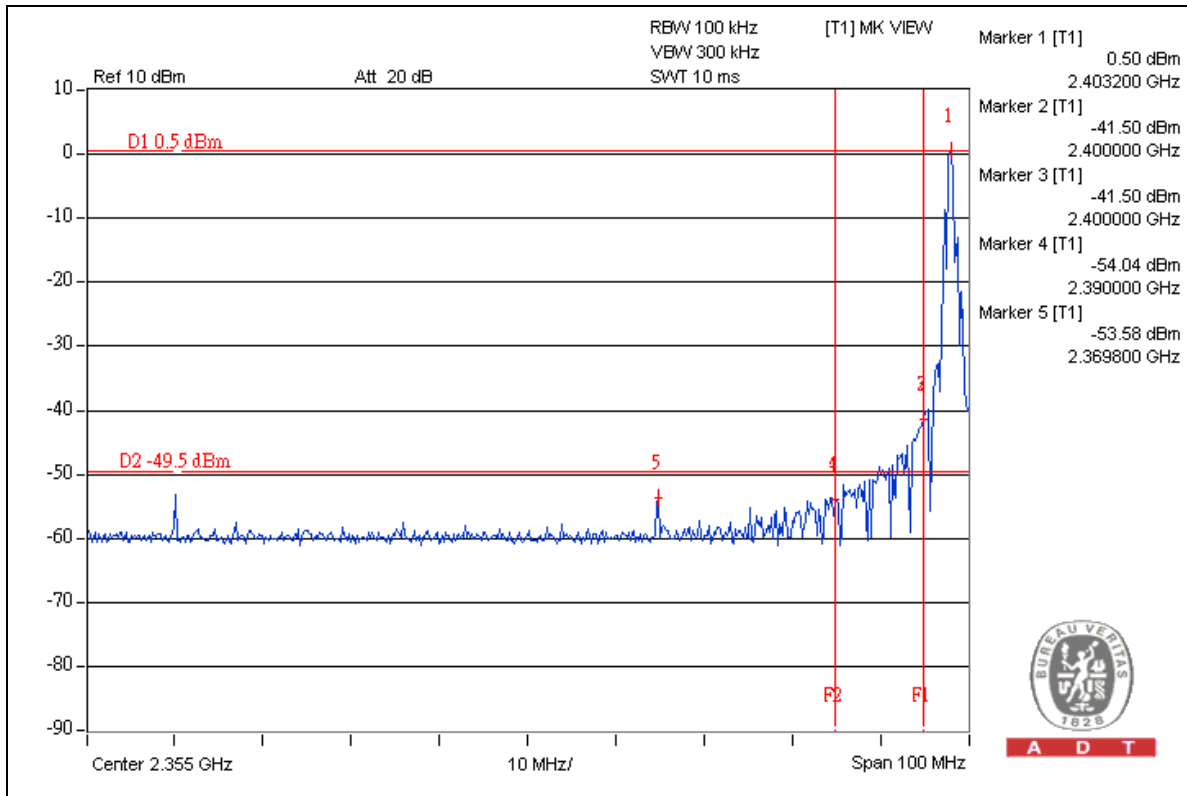
The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, and D2 line indicates the 50dB offset below D1. It shows compliance with the requirement in part 15.249(d).





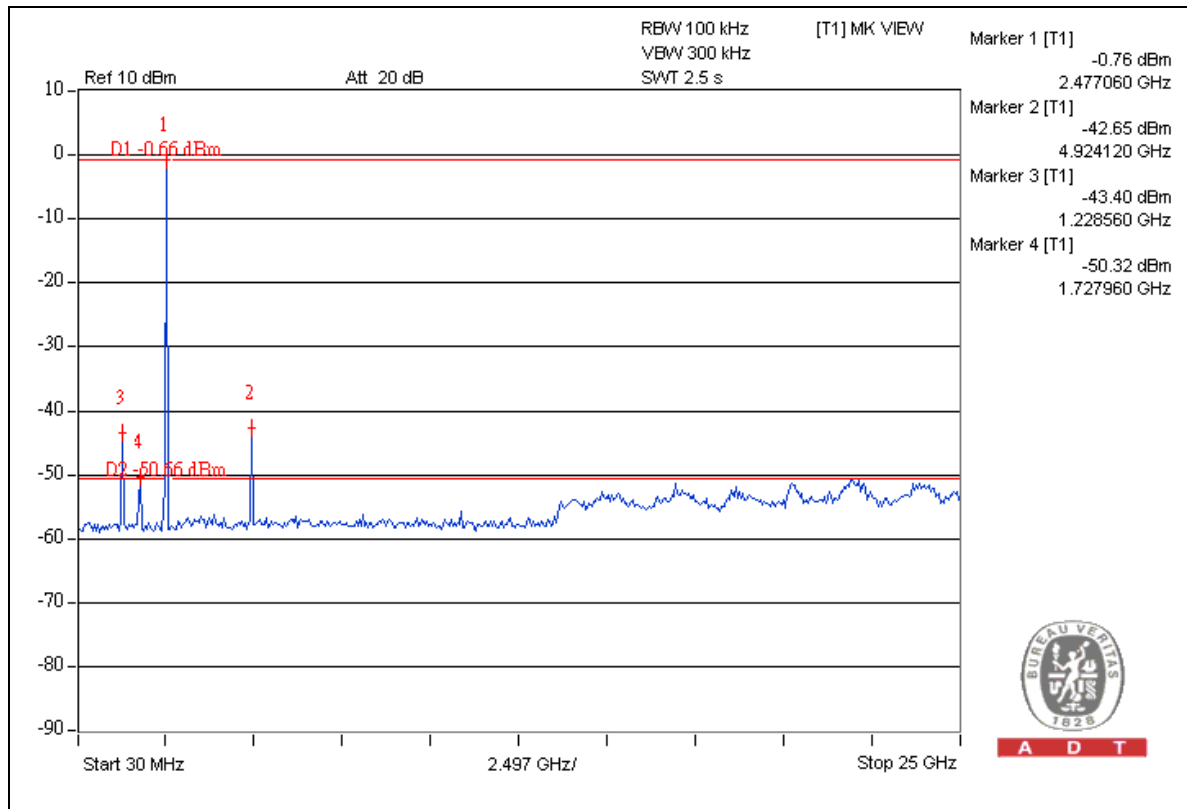
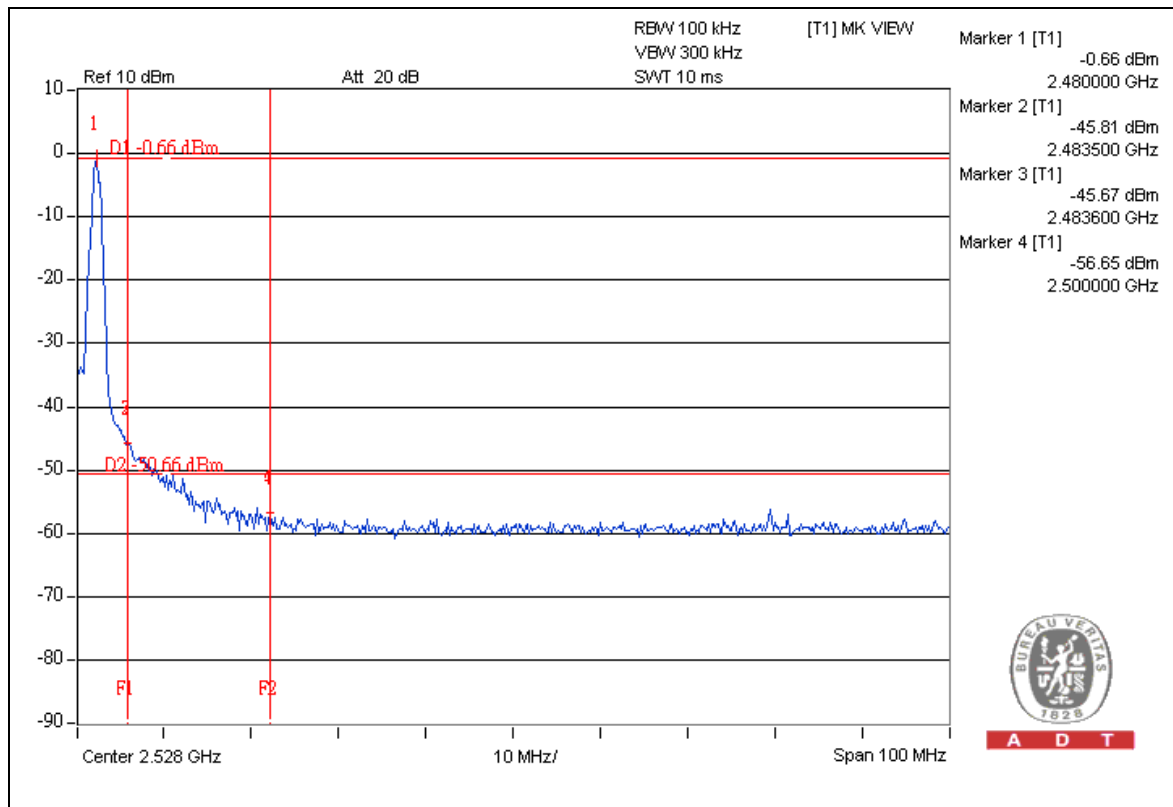
A D T

SERIAL NO.: EV1-012





A D T





A D T

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



## 6. 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.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180  
Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343  
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab:**

Tel: 886-3-3183232  
Fax: 886-3-3185050

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

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



A D T

## **7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**