



A D T

# FCC TEST REPORT

**REPORT NO.:** RF990917E03

**MODEL NO.:** M-R0022

**FCC ID:** JNZMR0022

**RECEIVED:** Oct. 04, 2010

**TESTED:** Oct. 05 to 07, 2010

**ISSUED:** Oct. 11, 2010

**APPLICANT:** LOGITECH FAR EAST LTD.

**ADDRESS:** #2 Creation Rd. 4, Science-Based Ind. Park  
Hsinchu Taiwan, R.O.C.

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

**LAB ADDRESS :** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,  
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

**TEST LOCATION (1):** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,  
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

**TEST LOCATION (2):** No. 49, Ln. 206, Wende Rd., Shangshan Tsuen,  
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

This test report consists of 25 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 certification, approval, or endorsement by any government agencies. The test results in the report only apply to the tested sample.

## Table of Contents

1	CERTIFICATION.....	3
2	SUMMARY OF TEST RESULTS.....	4
2.1	MEASUREMENT UNCERTAINTY .....	4
3	GENERAL INFORMATION.....	5
3.1	GENERAL DESCRIPTION OF EUT .....	5
3.2	DESCRIPTION OF TEST MODES.....	6
3.2.1	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	6
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS .....	8
3.4	DESCRIPTION OF SUPPORT UNITS.....	9
3.5	CONFIGURATION OF SYSTEM UNDER TEST .....	9
4	TEST PROCEDURES AND RESULTS.....	10
4.1	RADIATED EMISSION MEASUREMENT.....	10
4.1.1	LIMITS OF RADIATED EMISSION 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 SETUP .....	13
4.1.6	EUT OPERATING CONDITIONS.....	13
4.1.7	TEST RESULTS.....	14
4.2	CONDUCTED - OUT BAND MEASUREMENT .....	21
4.2.1	LIMITS OF CONDUCTED - OUT BAND MEASUREMENT .....	21
4.2.2	TEST INSTRUMENTS.....	21
4.2.3	TEST PROCEDURE .....	21
4.2.4	DEVIATION FROM TEST STANDARD.....	21
4.2.5	EUT OPERATING CONDITION .....	21
4.2.6	TEST RESULTS.....	22
5	INFORMATION ON THE TESTING LABORATORIES.....	24
6	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	25



A D T

## 1 CERTIFICATION

**PRODUCT :** 2.4GHz Cordless Mouse  
**BRAND NAME :** Logitech  
**MODEL NO. :** M-R0022  
**TESTED :** Oct. 05 to 07, 2010  
**TEST SAMPLE :** ENGINEERING SAMPLE  
**APPLICANT :** LOGITECH FAR EAST LTD.  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.249)  
ANSI C63.4-2003

The above equipment (Model: M-R0022) 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 :** Carol Liao , **DATE:** Oct. 11, 2010  
( Carol Liao, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** Oct. 11, 2010  
( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** Oct. 11, 2010  
( May Chen, Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Paragraph	Test Type	Result	Remark
15.207	Conducted Emission Test	NA	Not Applicable
15.249	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -7.4dB at 2400.00MHz
15.249	Conducted - Out Band Measurement	PASS	Meet the requirement of limit

### 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.

Measurement	Value
Radiated emissions (30MHz-1GHz)	3.3 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	2.4GHz Cordless Mouse
<b>MODEL NO.</b>	M-R0022
<b>FCC ID</b>	JNZMR0022
<b>POWER SUPPLY</b>	DC 1.5V from battery
<b>MODULATION TYPE</b>	GFSK
<b>OPERATING FREQUENCY</b>	2405MHz ~ 2474MHz
<b>NUMBER OF CHANNEL</b>	12
<b>ANTENNA TYPE</b>	PCB printed antenna, quarter-wave with -2.57dBi antenna gain
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

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

## 3.2 DESCRIPTION OF TEST MODES

Twelve channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2405	4	2417	7	2441	10	2465
2	2408	5	2432	8	2444	11	2471
3	2414	6	2435	9	2462	12	2474

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	BE	
-	-	√	√	√	-

Where **PLC**: Power Line Conducted Emission

**RE < 1G**: Radiated Emission below 1GHz

**RE ≥ 1G**: Radiated Emission above 1GHz

**BE**: Conducted Out-Band Emission Measurement

#### 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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 12	1	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, 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	MODULATION TYPE
1 to 12	1, 8, 12	GFSK

### CONDUCTED OUT-BAND EMISSION MEASUREMENT:

- ☒ 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	MODULATION TYPE
1 to 12	1, 12	GFSK

### TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE <sup>3</sup> 1G	25deg. C, 52%RH, 1015 hPa	DC 1.5V from battery	Eric Lee
RE<1G	25deg. C, 52%RH, 1015 hPa	DC 1.5V from battery	Eric Lee

### **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:

**47 CFR Part 15, Subpart C (Section 15.249)**  
**ANSI C63.4: 2003**

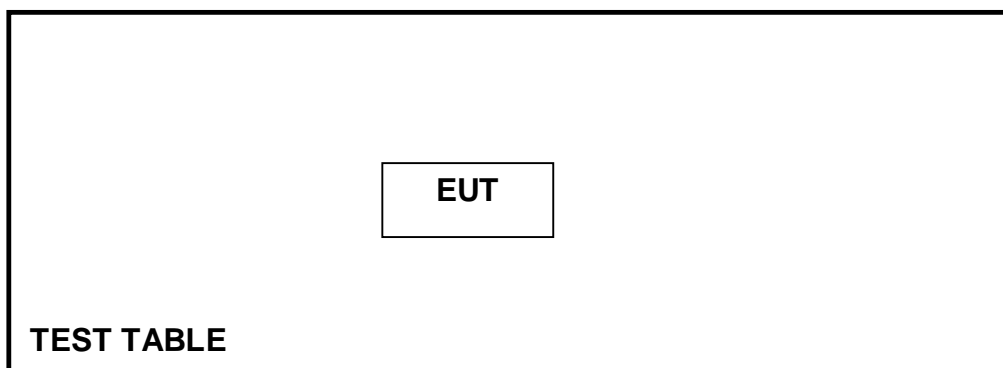
All tests have been performed and recorded as per the above standards.



### **3.4 DESCRIPTION OF SUPPORT UNITS**

The EUT has been tested as an independent unit.

### **3.5 CONFIGURATION OF SYSTEM UNDER TEST**



## 4 TEST PROCEDURES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.249 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
2400 ~ 2483.5	114	94
	Field Strength of Harmonics (dBuV/m)	
	74	54

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 in Section 15.209, whichever is the lesser attenuation.

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

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.



#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 13, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 29, 2010	Sep. 28, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.

#### 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 meters 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. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

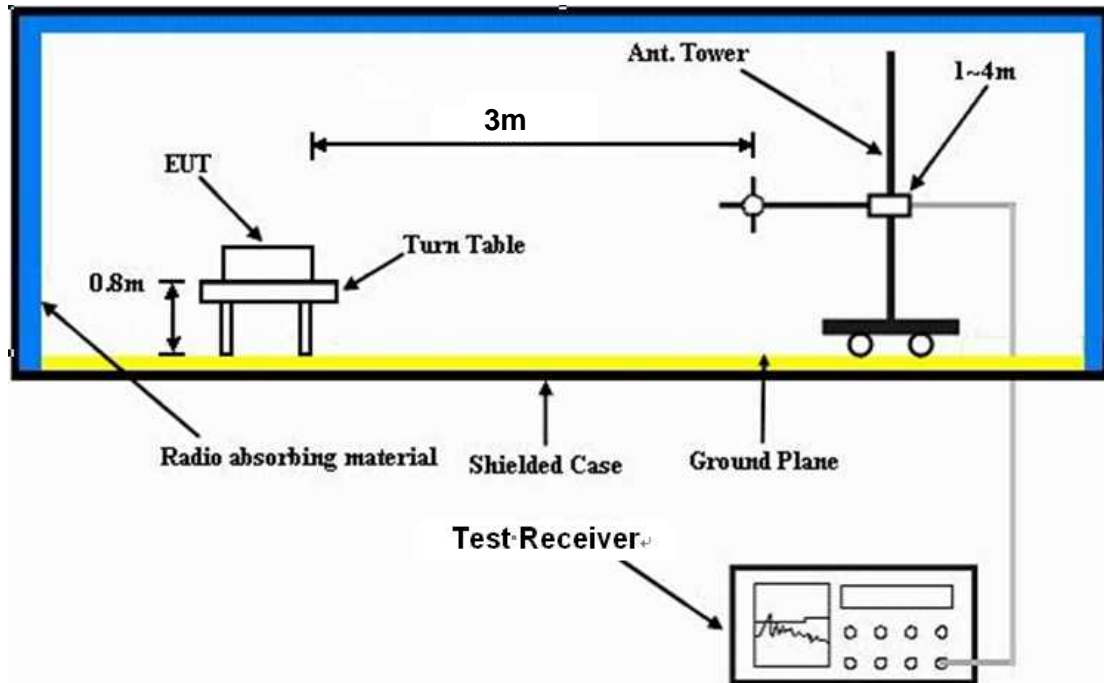
**NOTE:**

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 is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



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

#### 4.1.6 EUT OPERATING CONDITIONS

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

#### 4.1.7 TEST RESULTS

##### BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	DC 1.5V from battery	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 52%RH 1015 hPa	TESTED BY	Eric Lee

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	129.95	18.2 QP	43.5	-25.3	1.25 H	172	5.05	13.13
2	229.07	19.1 QP	46.0	-27.0	1.75 H	0	6.95	12.10
3	275.13	20.5 QP	46.0	-25.5	2.00 H	261	6.31	14.20
4	805.91	26.3 QP	46.0	-19.7	2.00 H	20	1.76	24.58
5	883.12	25.2 QP	46.0	-20.9	1.75 H	27	-0.80	25.95
6	956.54	26.2 QP	46.0	-19.8	2.00 H	294	-0.45	26.69
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	124.80	24.5 QP	43.5	-19.0	1.25 V	65	11.72	12.78
2	132.89	29.7 QP	43.5	-13.8	1.50 V	47	16.38	13.32
3	137.73	25.6 QP	43.5	-17.9	1.00 V	136	11.95	13.65
4	190.00	25.5 QP	43.5	-18.0	1.75 V	84	14.34	11.16
5	203.87	24.5 QP	43.5	-19.0	2.00 V	98	13.71	10.79
6	805.93	26.9 QP	46.0	-19.1	1.25 V	241	2.30	24.58

**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.

# ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 1.5V from battery	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 75%RH 1015 hPa	TESTED BY	Eric Lee

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	2400.00	66.6 PK	74.0	-7.4	1.00 H	357	34.91	31.69
2	2400.00	36.6 AV	54.0	-17.4	1.00 H	357	4.91	31.69
3	*2405.00	99.4 PK	114.0	-14.6	1.18 H	358	67.69	31.71
4	*2405.00	69.4 AV	94.0	-24.6	1.18 H	358	37.69	31.71
5	4810.00	49.3 PK	74.0	-24.7	1.02 H	232	10.38	38.92
6	4810.00	19.3 AV	54.0	-34.7	1.02 H	232	-19.62	38.92
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	2398.40	57.2 PK	74.0	-16.8	1.10 V	299	25.52	31.68
2	2398.40	27.2 AV	54.0	-26.8	1.10 V	299	-4.48	31.68
3	*2405.00	89.9 PK	114.0	-24.1	1.09 V	295	58.19	31.71
4	*2405.00	59.9 AV	94.0	-34.1	1.09 V	295	28.19	31.71
5	4810.00	47.1 PK	74.0	-26.9	1.21 V	42	8.18	38.92
6	4810.00	17.1 AV	54.0	-36.9	1.21 V	42	-21.82	38.92

**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).  
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 (Duty cycle) = 20 log (0.25 ms / 7.9 ms) = -30.0 dB  
Please see page 18 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 8	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 1.5V from battery	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 75%RH 1015 hPa	TESTED BY	Eric Lee

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	*2444.00	99.6 PK	114.0	-14.4	1.11 H	350	67.76	31.84
2	*2444.00	69.6 AV	94.0	-24.4	1.11 H	350	37.76	31.84
3	4888.00	49.3 PK	74.0	-24.7	1.54 H	25	10.11	39.19
4	4888.00	19.3 AV	54.0	-34.7	1.54 H	25	-19.89	39.19
5	7332.00	53.4 PK	74.0	-20.6	1.00 H	2	6.78	46.62
6	7332.00	23.4 AV	54.0	-30.6	1.00 H	2	-23.22	46.62
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	*2444.00	89.8 PK	114.0	-24.2	1.10 V	298	57.96	31.84
2	*2444.00	59.8 AV	94.0	-34.2	1.10 V	298	27.96	31.84
3	4888.00	47.1 PK	74.0	-26.9	1.02 V	247	7.91	39.19
4	4888.00	17.1 AV	54.0	-36.9	1.02 V	247	-22.09	39.19
5	7332.00	52.3 PK	74.0	-21.7	1.65 V	47	5.68	46.62
6	7332.00	22.3 AV	54.0	-31.7	1.65 V	47	-24.32	46.62

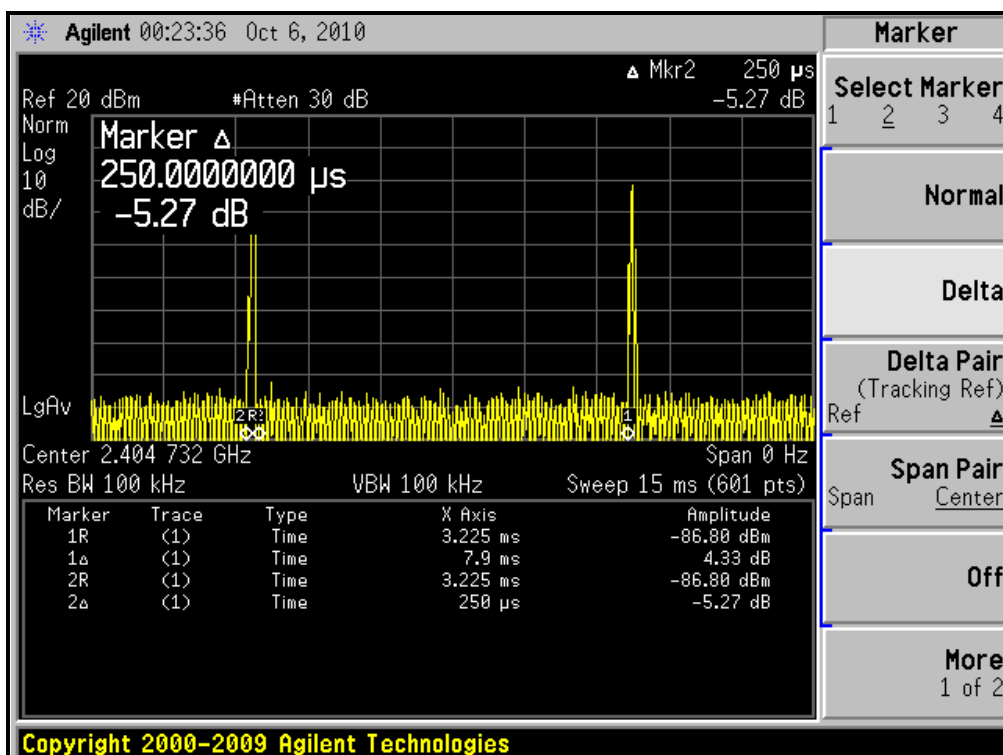
**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. The other emission levels were very low against the limit.  
4. Margin value = Emission level – Limit value.  
5. “ \* ” : Fundamental frequency  
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.25 \text{ ms} / 7.9 \text{ ms}) = -30.0 \text{ dB}$   
Please see page 18 for plotted duty.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 1.5V from battery	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	26deg. C, 75%RH 1015 hPa	TESTED BY	Eric Lee

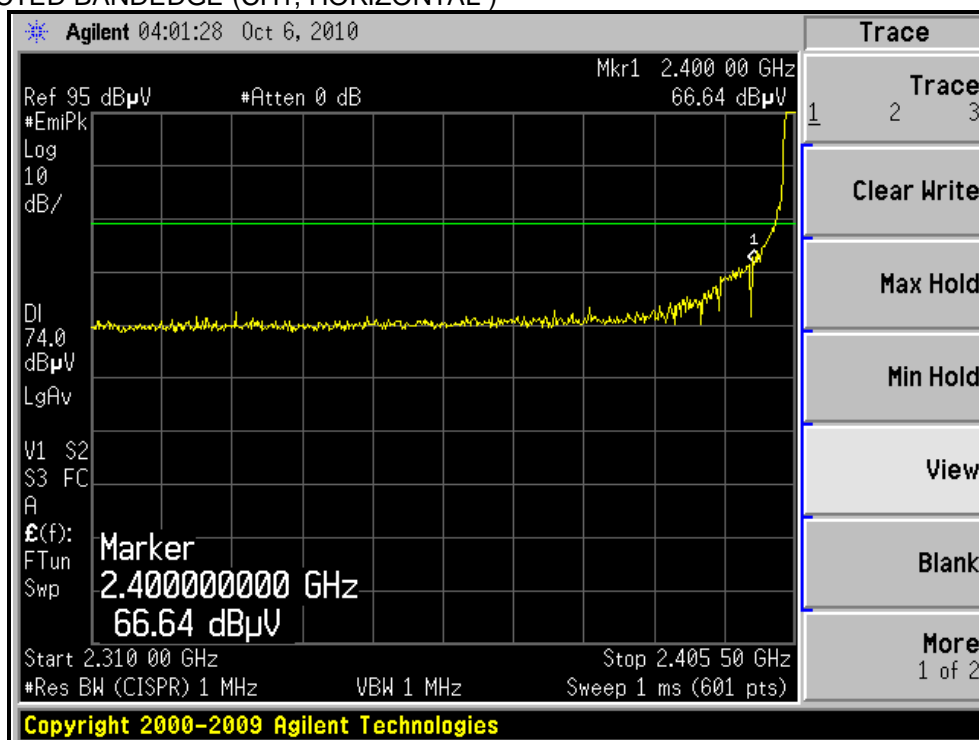
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2474.00	99.0 PK	114.0	-15.0	1.11 H	338	67.07	31.93
2	*2474.00	69.0 AV	94.0	-25.0	1.11 H	338	37.07	31.93
3	2483.50	62.4 PK	74.0	-11.6	1.16 H	340	30.43	31.97
4	2483.50	32.4 AV	54.0	-21.6	1.16 H	340	0.43	31.97
5	4948.00	49.2 PK	74.0	-24.8	1.10 H	308	9.82	39.38
6	4948.00	19.2 AV	54.0	-34.8	1.10 H	308	-20.18	39.38
7	7422.00	54.3 PK	74.0	-19.7	1.28 H	67	7.73	46.57
8	7422.00	24.3 AV	54.0	-29.7	1.28 H	67	-22.27	46.57
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	*2474.00	89.7 PK	114.0	-24.3	1.08 V	298	57.77	31.93
2	*2474.00	59.7 AV	94.0	-34.3	1.08 V	298	27.77	31.93
3	2483.60	55.1 PK	74.0	-18.9	1.10 V	300	23.13	31.97
4	2483.60	25.1 AV	54.0	-28.9	1.10 V	300	-6.87	31.97
5	4948.00	47.3 PK	74.0	-26.7	1.02 V	333	7.92	39.38
6	4948.00	17.3 AV	54.0	-36.7	1.02 V	333	-22.08	39.38
7	7422.00	51.7 PK	74.0	-22.3	1.11 V	48	5.13	46.57
8	7422.00	21.7 AV	54.0	-32.3	1.11 V	48	-24.87	46.57

**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 (Duty cycle) = 20 log (0.25 ms / 7.9 ms) = -30.0 dB  
Please see page 18 for plotted duty.

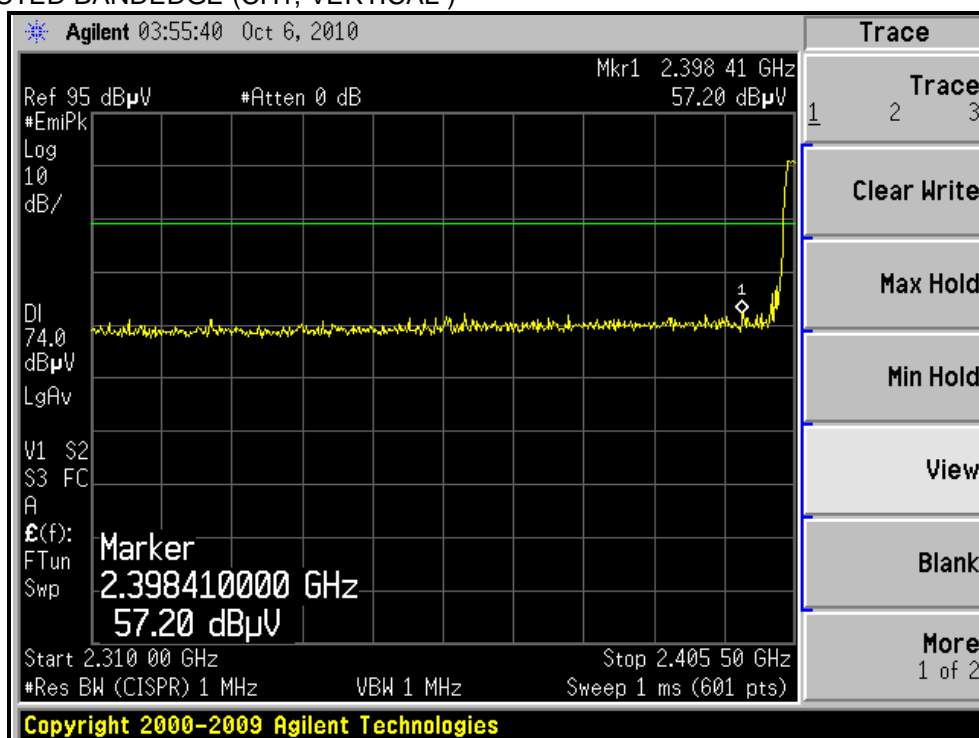


$$20 \log (\text{Duty cycle}) = 20 \log (0.25 \text{ ms} / 7.9 \text{ ms}) = -30.0 \text{ dB}$$

# RESTRICTED BANDEDGE (CH1, HORIZONTAL )

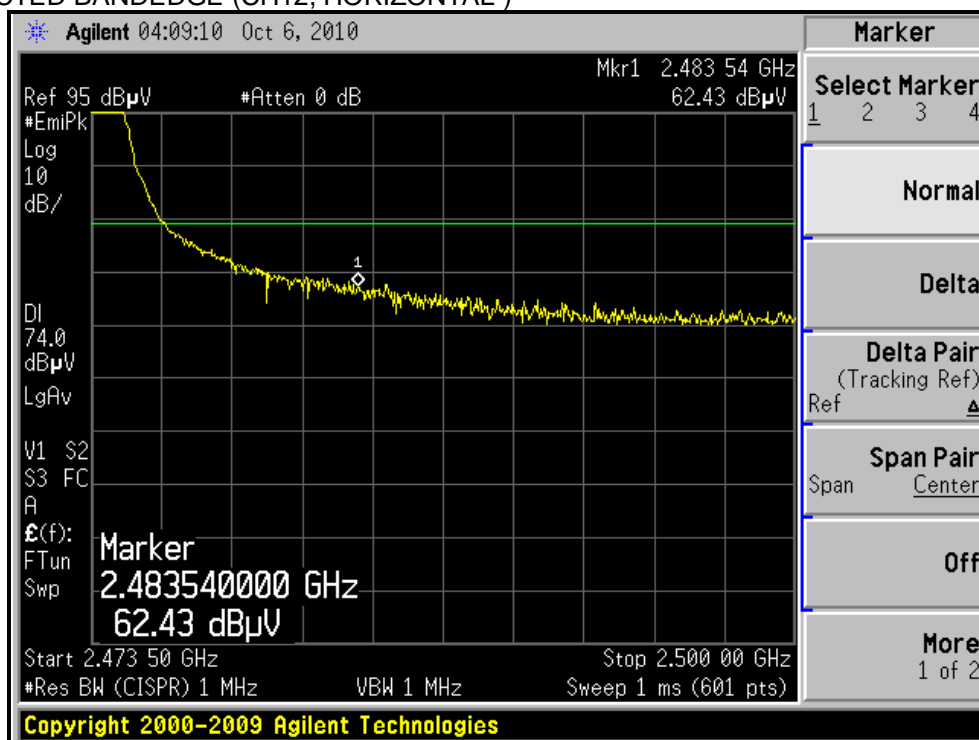


# RESTRICTED BANDEDGE (CH1, VERTICAL )

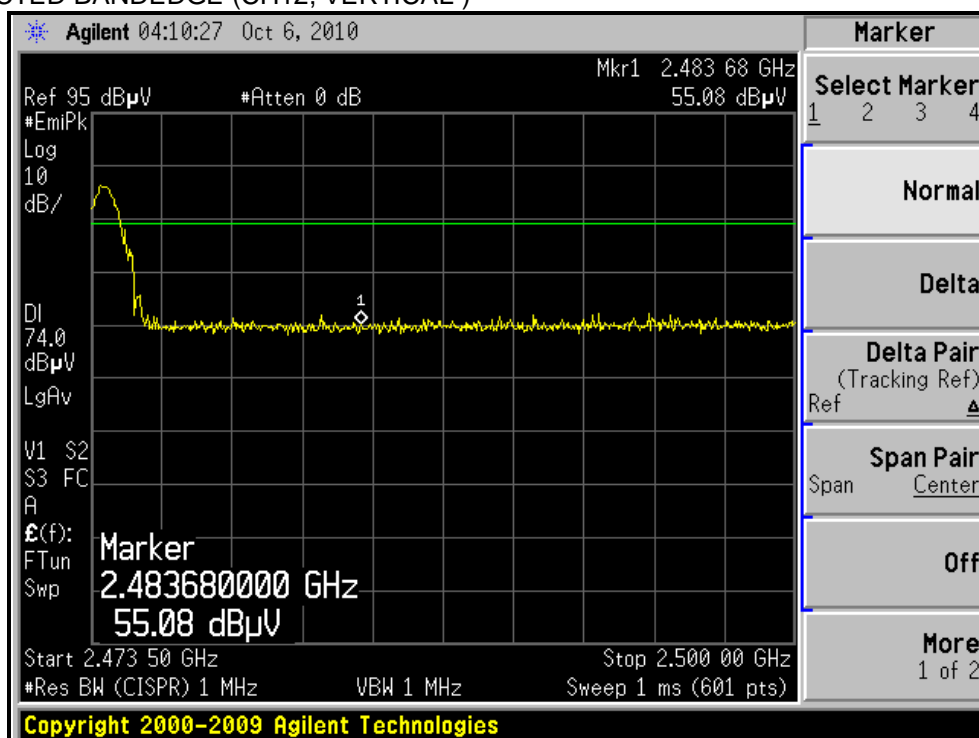


\* The average value of fundamental frequency is:  $\text{Average} = \text{Peak value} + 20\log(\text{Duty cycle})$ . And it meets the requirement of limit.

# RESTRICTED BANDEDGE (CH12, HORIZONTAL )



# RESTRICTED BANDEDGE (CH12, VERTICAL )



\* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle). And it meets the requirement of limit.

## 4.2 CONDUCTED - OUT BAND MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED - OUT BAND MEASUREMENT

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 in Section 15.209, whichever is the lesser attenuation.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

**NOTE:**

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

### 4.2.3 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 from band edge. The band edges was measured and recorded.

### 4.2.4 DEVIATION FROM TEST STANDARD

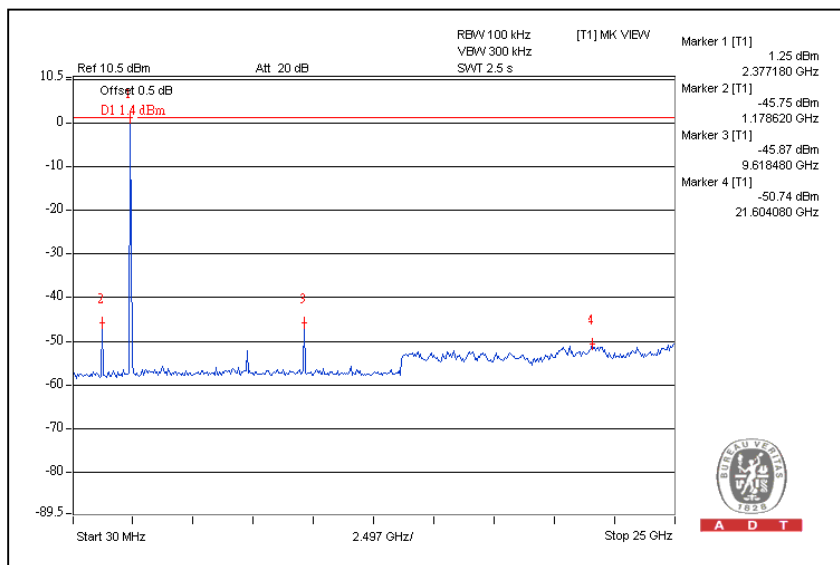
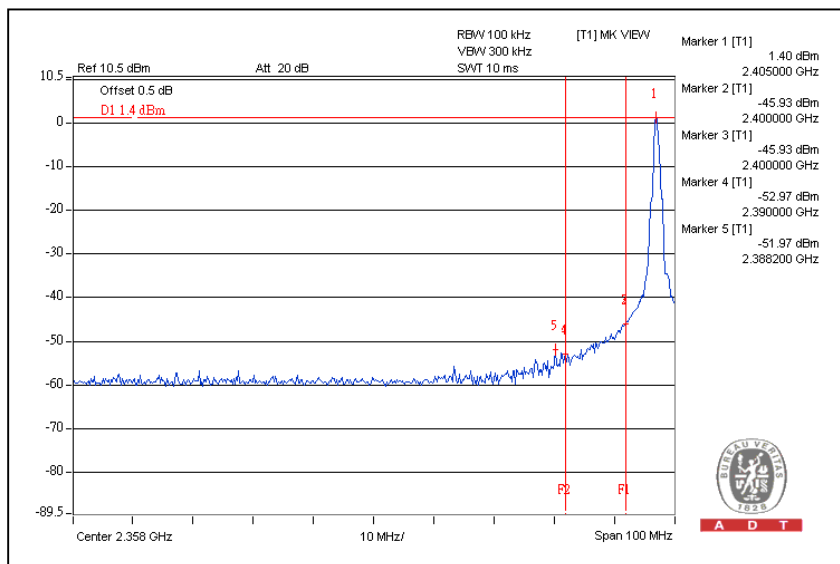
No deviation

### 4.2.5 EUT OPERATING CONDITION

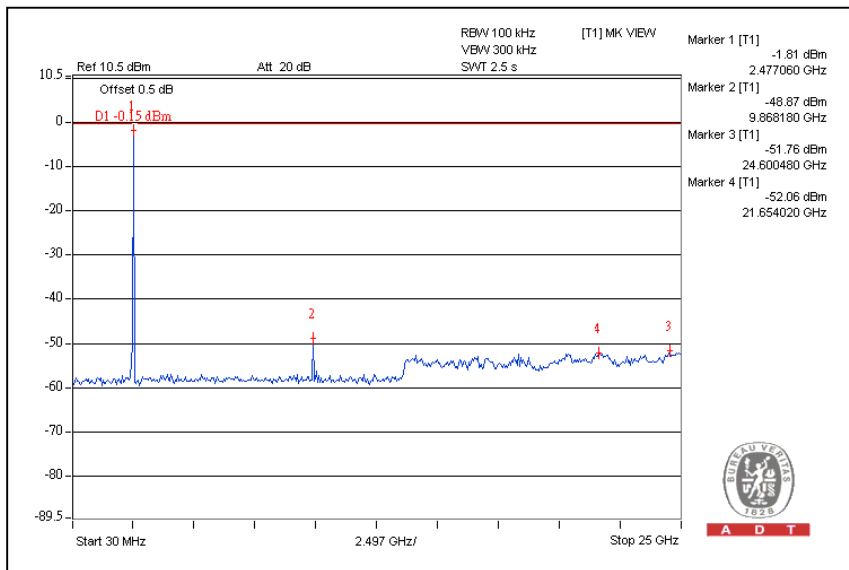
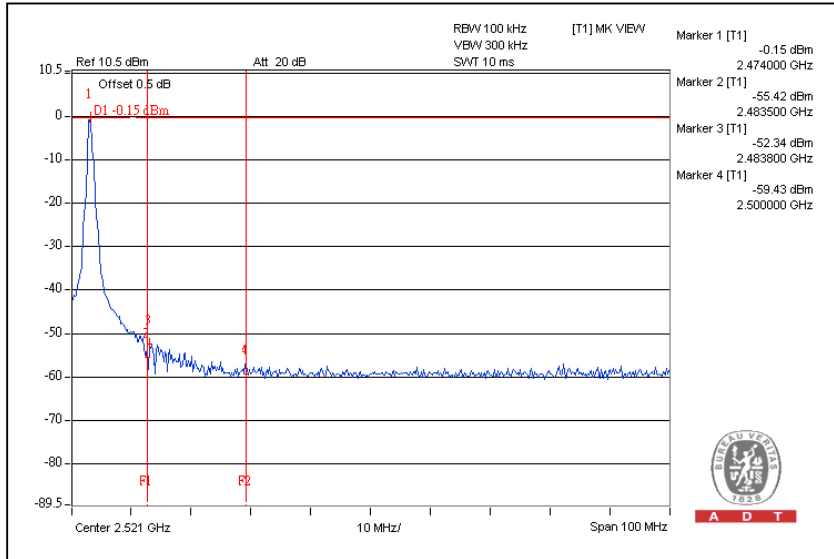
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

## 4.2.6 TEST RESULTS

Emissions radiated outside of the specified frequency bands, please refer following pages for met the requirement of the general radiated emission limits in § 15.209. CH1



# CH12





A D T

## 5 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: 886-2-26052943

**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

**Email:** [service@adt.com.tw](mailto:service@adt.com.tw)

**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.



## **6 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 ---**