



# FCC TEST REPORT

**REPORT NO.:** RF111017E03

**MODEL NO.:** M-R0026

**FCC ID:** JNZMR0026

**RECEIVED:** Oct. 17, 2011

**TESTED:** Oct. 19 to 24, 2011

**ISSUED:** Oct. 26, 2011

**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

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

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Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF111017E03	Original release	Oct. 26, 2011

## 1 CERTIFICATION

**PRODUCT :** 2.4GHz Cordless Mouse  
**BRAND NAME :** Logitech  
**MODEL NO. :** M-R0026  
**TEST SAMPLE :** ENGINEERING SAMPLE  
**APPLICANT :** LOGITECH FAR EAST LTD.  
**TESTED :** Oct. 19 to 24, 2011  
**STANDARDS :** FCC Part 15, Subpart C (Section 15.249)  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (Model: M-R0026) 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 :** Midoli Peng, **DATE:** Oct. 26, 2011  
( Midoli Peng, Specialist )

**APPROVED BY :** May Chen, **DATE:** Oct. 26, 2011  
( 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	Power supply is DC 3.7 V from battery
15.249	Radiated Emission Test	PASS	Minimum passing margin is -12.3dB at 2400.00MHz
15.249	Conducted - Out Band Measurement	PASS	Meet the requirement of limit
15.203	Antenna Requirement	PASS	No antenna connector is used.

### 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)	3.89 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.56 dB

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	2.4GHz Cordless Mouse
<b>MODEL NO.</b>	M-R0026
<b>FCC ID</b>	JNZMR0026
<b>POWER SUPPLY</b>	DC 3.3V to 4.2V from battery or DC 5V from host equipment
<b>MODULATION TYPE</b>	GFSK
<b>CARRIER FREQUENCY OF EACH CHANNEL</b>	2405MHz ~ 2474MHz
<b>NUMBER OF CHANNEL</b>	12
<b>ANTENNA TYPE</b>	SMD PIFA antenna with 2.5dBi antenna gain
<b>DATA CABLE</b>	USB Cable(Shielded, 0.13m)
<b>I/O PORTS</b>	USB Port (power only)
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

1. The EUT operates in the 2.4GHz frequency spectrum and complies with GFSK techniques.
2. When USB port is connected to Host unit, the EUT wireless function will be disabled. Therefore there is no conducted emission measurement result in the report.
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

Twelve channels are provided in 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

### 3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE <sup>≥</sup> 1G	OB	
-	-	√	√	√	-

Where **PLC**: Power Line Conducted Emission

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

**RE <sup>≥</sup> 1G**: Radiated Emission above 1GHz

**OB**: 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	12	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 < 1G	23deg. C, 70%RH	DC 3.7V	Frank Liu
RE <sup>3</sup> 1G	24deg. C, 71%RH	DC 3.7V	Frank Liu
OB	24deg. C, 71%RH	DC 3.7V	Frank Liu





### **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 15.249)**

**ANSI C63.4: 2003**

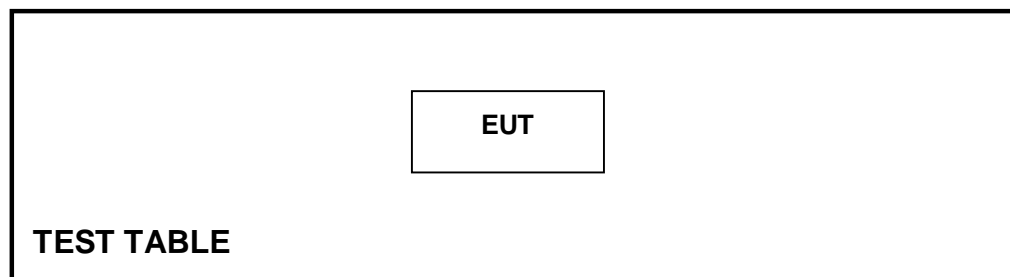
**ANSI C63.10: 2009**

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

### 3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

### 3.6 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

**NOTE:**

- 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.
- Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.

#### 4.1.2 TEST INSTRUMENTS

For Below 1GHz <Test date: Oct. 19, 2011>

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Agilent Pre-Selector	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Agilent Signal Generator	N5181A	MY49060347	July 25, 2011	July 24, 2012
LIG NEX1 Test Receiver	ER-265	L09068005	Oct. 25, 2010	Oct. 24, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-04	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02465	Feb. 28, 2011	Feb. 27, 2012
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	Nov. 16, 2010	Nov. 15, 2011
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-361	Apr. 14, 2011	Apr. 13, 2012
AISI Horn_Antenna	AIH.8018	0000220091110	Nov. 22, 2010	Nov. 21, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF CABLE	NA	RF104-205 RF104-207 RF104-202	Dec. 28, 2010	Dec. 27, 2011
RF Cable	NA	CHHCAB_001	Oct. 08, 2011	Oct. 07, 2012
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. H.  
 4. The FCC Site Registration No. is 797305.  
 5. The CANADA Site Registration No. is IC 7450H-3.



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**For Above 1GHz<Test date: Oct. 24, 2011>**

<b>DESCRIPTION &amp; MANUFACTURER</b>	<b>MODEL NO.</b>	<b>SERIAL NO.</b>	<b>CALIBRATED DATE</b>	<b>CALIBRATED UNTIL</b>
Agilent Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012
Agilent Pre-Selector	N9039A	MY46520311	July 12, 2011	July 11, 2012
Agilent Signal Generator	N5181A	MY49060517	July 12, 2011	July 11, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 04, 2011	July 03, 2012
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	Nov. 16, 2010	Nov. 15, 2011
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 14, 2011	Apr. 13, 2012
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
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.

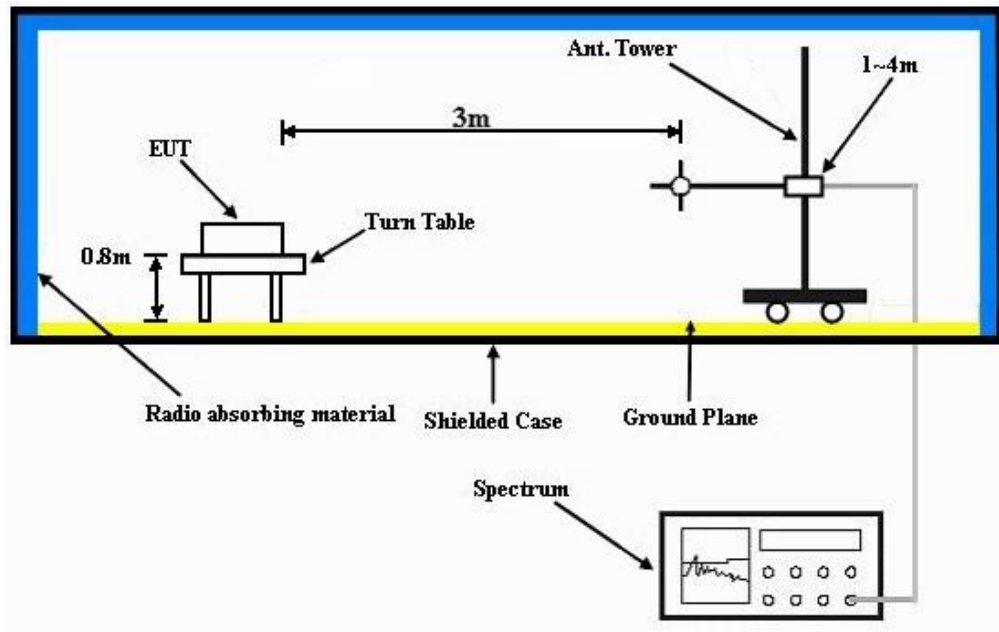
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for 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 12	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3.7V from battery	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	TESTED BY	Frank Liu

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	176.37	15.4 QP	43.5	-28.1	2.00 H	156	2.06	13.30
2	257.73	16.5 QP	46.0	-29.5	1.50 H	360	2.89	13.59
3	314.92	17.0 QP	46.0	-29.0	1.50 H	360	1.26	15.73
4	815.38	23.7 QP	46.0	-22.3	1.50 H	360	-2.04	25.77
5	882.88	24.2 QP	46.0	-21.8	2.00 H	38	-2.48	26.70
6	974.89	26.7 QP	54.0	-27.3	1.50 H	258	-1.33	27.99
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	37.58	18.6 QP	40.0	-21.4	1.50 V	0	4.77	13.80
2	297.04	18.1 QP	46.0	-27.9	2.00 V	282	2.84	15.28
3	329.96	19.3 QP	46.0	-26.7	1.00 V	255	3.27	16.07
4	363.00	18.3 QP	46.0	-27.8	1.00 V	16	1.43	16.82
5	389.18	19.2 QP	46.0	-26.8	1.00 V	31	1.78	17.44
6	957.01	28.2 QP	46.0	-17.8	2.00 V	93	0.47	27.76

- 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	3.7V from battery	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	24deg. C, 71%RH	TESTED BY	Frank Liu

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	61.7 PK	74.0	-12.3	1.18 H	145	29.92	31.78
2	2400.00	28.5 AV	54.0	-25.5	1.18 H	145	-3.28	31.78
3	*2405.00	93.4 PK	114.0	-20.6	1.18 H	145	61.60	31.80
4	*2405.00	60.2 AV	94.0	-33.8	1.18 H	145	28.40	31.80
5	4810.00	52.6 PK	74.0	-21.4	1.22 H	67	13.28	39.32
6	4810.00	19.4 AV	54.0	-34.6	1.22 H	67	-19.92	39.32
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	2400.00	55.5 PK	74.0	-18.5	1.00 V	119	23.72	31.78
2	2400.00	22.3 AV	54.0	-31.7	1.00 V	119	-9.48	31.78
3	*2405.00	84.1 PK	114.0	-29.9	1.00 V	119	52.30	31.80
4	*2405.00	50.9 AV	94.0	-43.1	1.00 V	119	19.10	31.80
5	4810.00	53.0 PK	74.0	-21.0	1.14 V	103	13.68	39.32
6	4810.00	19.8 AV	54.0	-34.2	1.14 V	103	-19.52	39.32

**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.  
 6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.012 \text{ ms} / 0.55 \text{ ms}) = -33.2 \text{ dB}$   
 Please see page 20 for plotted duty.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 8	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3.7V from battery	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	24deg. C, 71%RH	TESTED BY	Frank Liu

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	94.3 PK	114.0	-19.7	1.17 H	143	62.36	31.94
2	*2444.00	61.1 AV	94.0	-32.9	1.17 H	143	29.16	31.94
3	4888.00	53.4 PK	74.0	-20.6	1.22 H	73	13.85	39.55
4	4888.00	20.2 AV	54.0	-33.8	1.22 H	73	-19.35	39.55
5	7332.00	56.3 PK	74.0	-17.7	1.00 H	63	9.45	46.85
6	7332.00	23.1 AV	54.0	-30.9	1.00 H	63	-23.75	46.85

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	84.7 PK	114.0	-29.3	1.00 V	113	52.76	31.94
2	*2444.00	51.5 AV	94.0	-42.5	1.00 V	113	19.56	31.94
3	4888.00	53.0 PK	74.0	-21.0	1.15 V	107	13.45	39.55
4	4888.00	19.8 AV	54.0	-34.2	1.15 V	107	-19.75	39.55
5	7332.00	57.2 PK	74.0	-16.8	1.18 V	119	10.35	46.85
6	7332.00	24.0 AV	54.0	-30.0	1.18 V	119	-22.85	46.85

**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:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.012 \text{ ms} / 0.55 \text{ ms}) = -33.2 \text{ dB}$   
 Please see page 20 for plotted duty.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	3.7V from battery	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	24deg. C, 71%RH	TESTED BY	Frank Liu

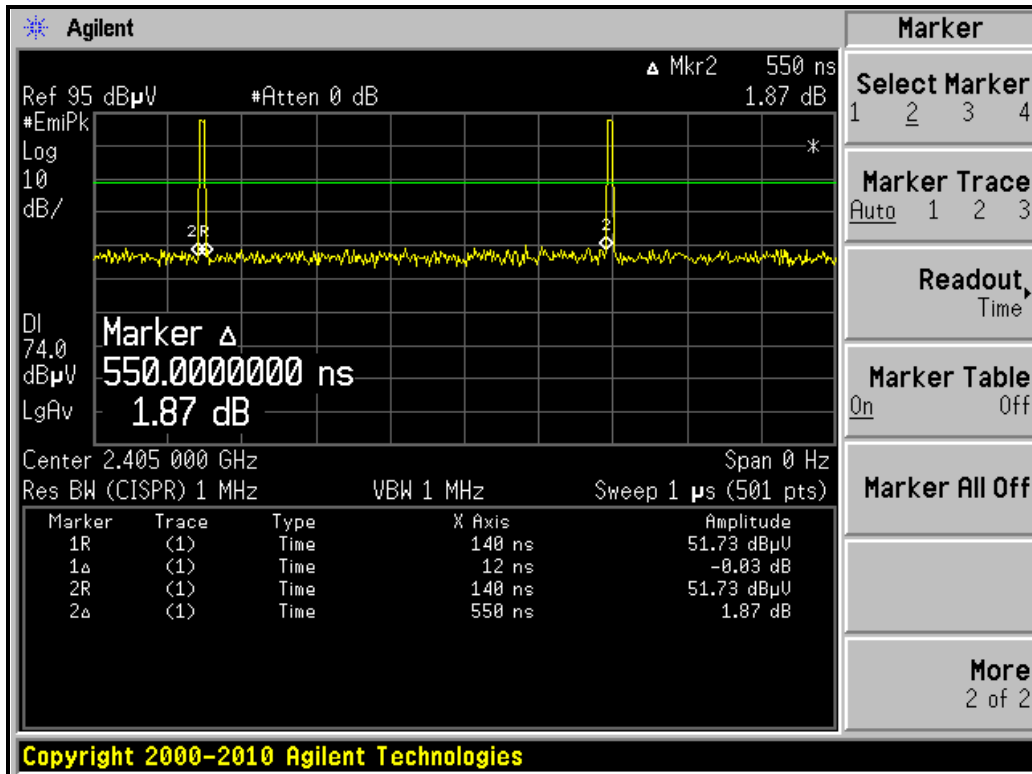
**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

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	96.6 PK	114.0	-17.4	1.15 H	166	64.55	32.05
2	*2474.00	63.4 AV	94.0	-30.6	1.15 H	166	31.35	32.05
3	2483.50	58.2 PK	74.0	-15.8	1.21 H	156	26.11	32.09
4	2483.50	25.0 AV	54.0	-29.0	1.21 H	156	-7.09	32.09
5	4948.00	53.9 PK	74.0	-20.1	1.23 H	61	14.13	39.77
6	4948.00	20.7 AV	54.0	-33.3	1.23 H	61	-19.07	39.77
7	7422.00	57.8 PK	74.0	-16.2	1.10 H	65	11.04	46.76
8	7422.00	24.6 AV	54.0	-29.4	1.10 H	65	-22.16	46.76

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

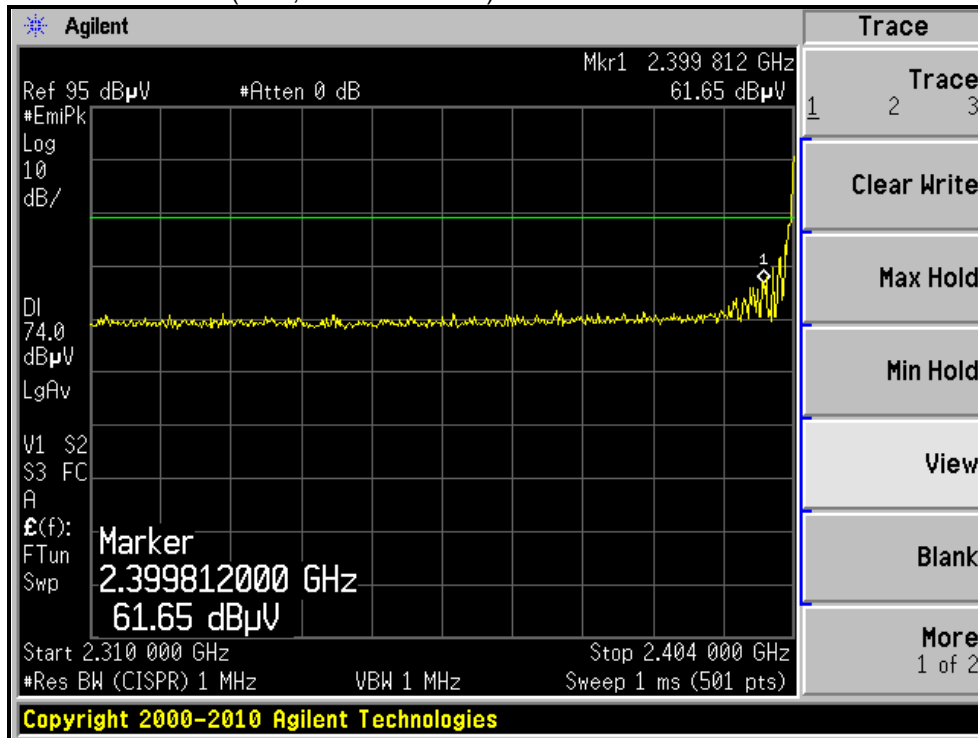
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2474.00	85.3 PK	114.0	-28.7	1.00 V	109	53.25	32.05
2	*2474.00	52.1 AV	94.0	-41.9	1.00 V	109	20.05	32.05
3	2483.50	54.1 PK	74.0	-19.9	1.00 V	109	22.01	32.09
4	2483.50	20.9 AV	54.0	-33.1	1.00 V	109	-11.19	32.09
5	4948.00	53.1 PK	74.0	-20.9	1.11 V	116	13.33	39.77
6	4948.00	19.9 AV	54.0	-34.1	1.11 V	116	-19.87	39.77
7	7422.00	61.3 PK	74.0	-12.7	1.00 V	113	14.54	46.76
8	7422.00	28.1 AV	54.0	-25.9	1.00 V	113	-18.66	46.76

- REMARKS:**
- Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  - Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  - The other emission levels were very low against the limit.
  - Margin value = Emission level – Limit value.
  - “ \* ” : Fundamental frequency
  - The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.012 \text{ ms} / 0.55 \text{ ms}) = -33.2 \text{ dB}$   
 Please see page 20 for plotted duty.

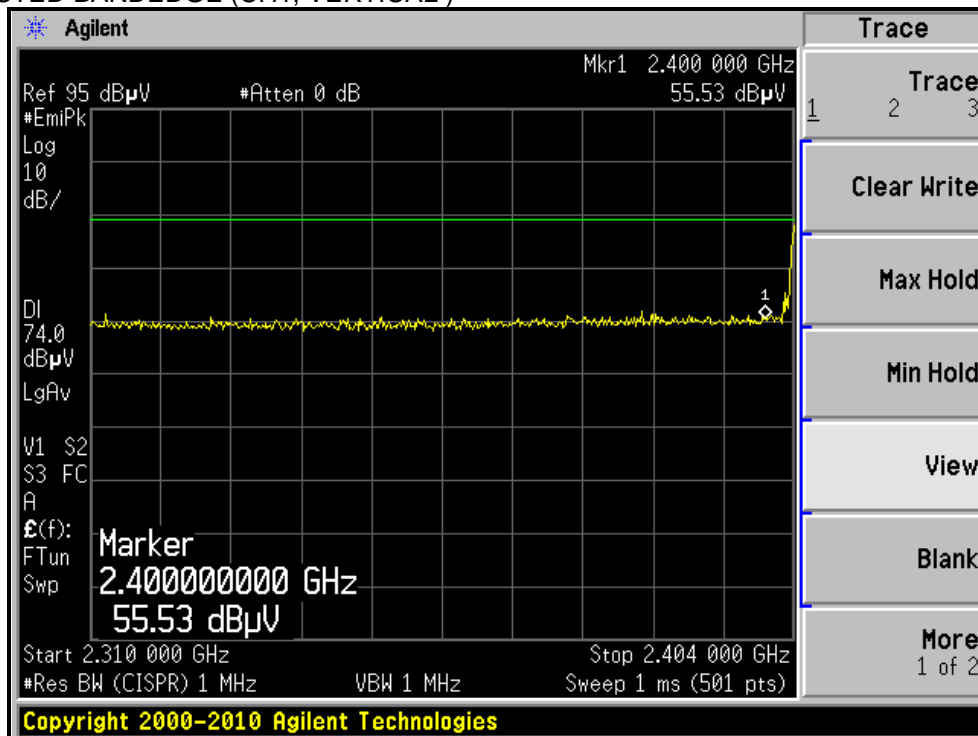


$$20 \log (\text{Duty cycle}) = 20 \log (0.012 \text{ ms} / 0.55 \text{ ms}) = -33.2 \text{ dB}$$

RESTRICTED BANDEDGE (CH1, HORIZONTAL)

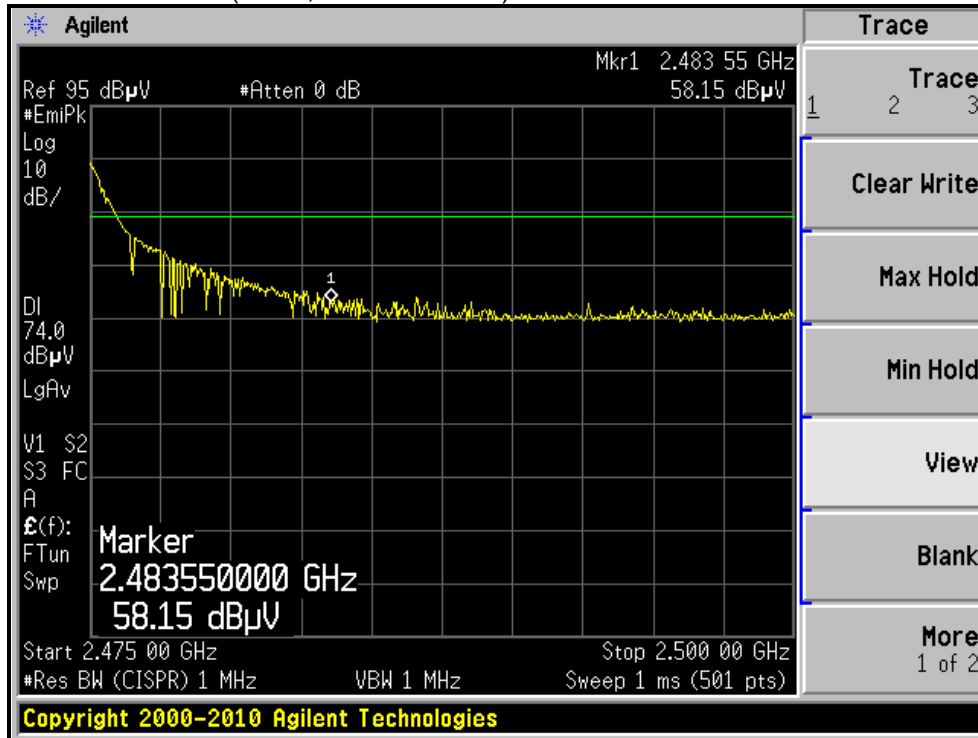


RESTRICTED BANDEDGE (CH1, VERTICAL)

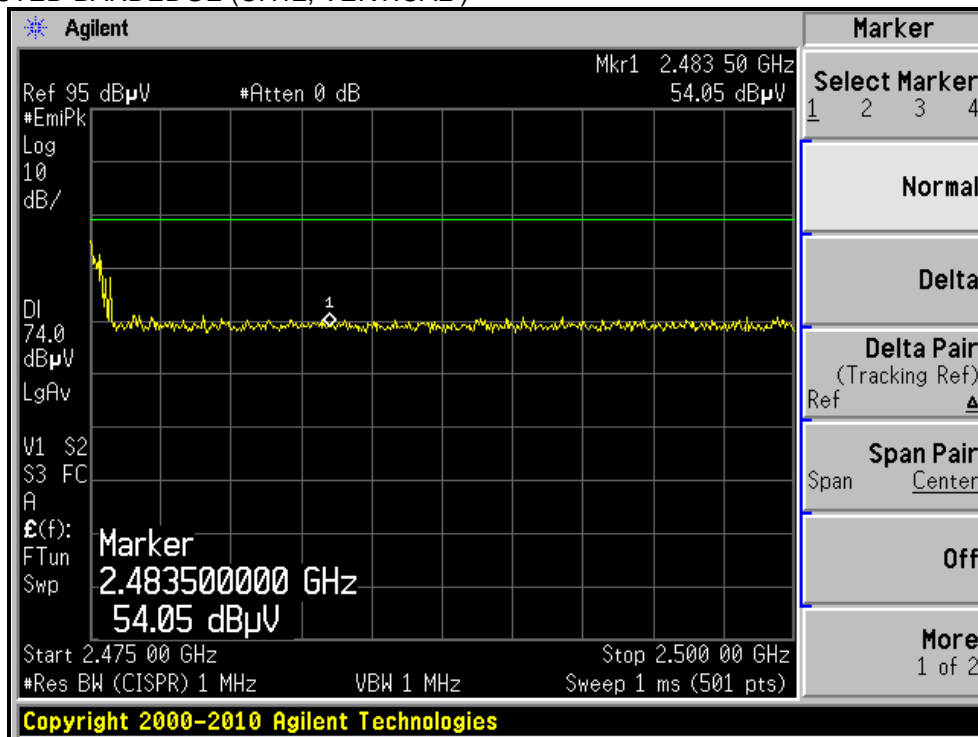


\* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle). And it meets the requirement of limit.

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

**Test date: Oct. 19, 2011**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011

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

### 4.2.3 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

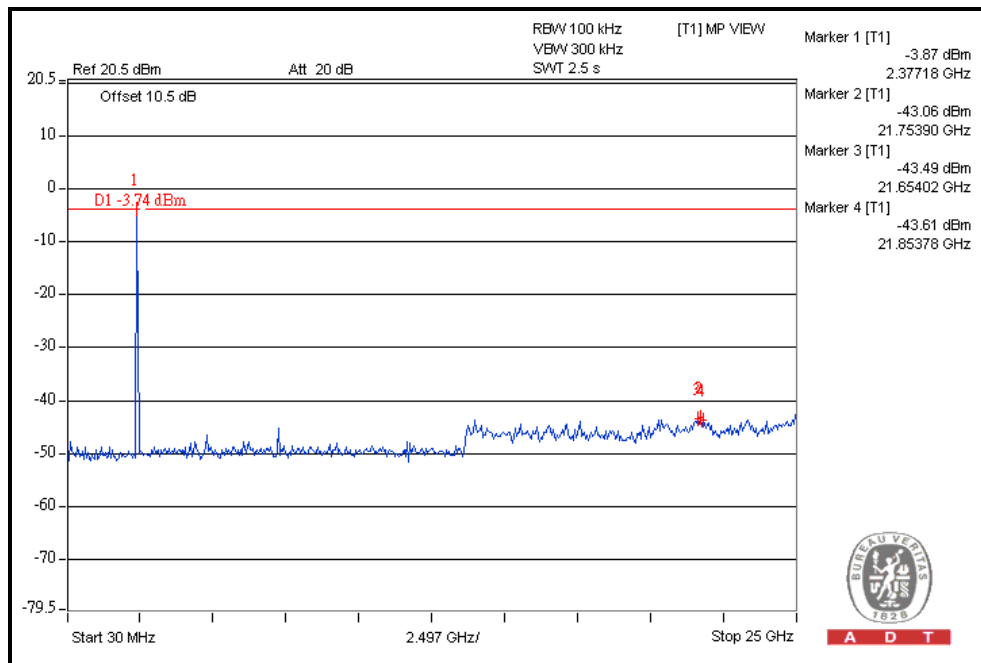
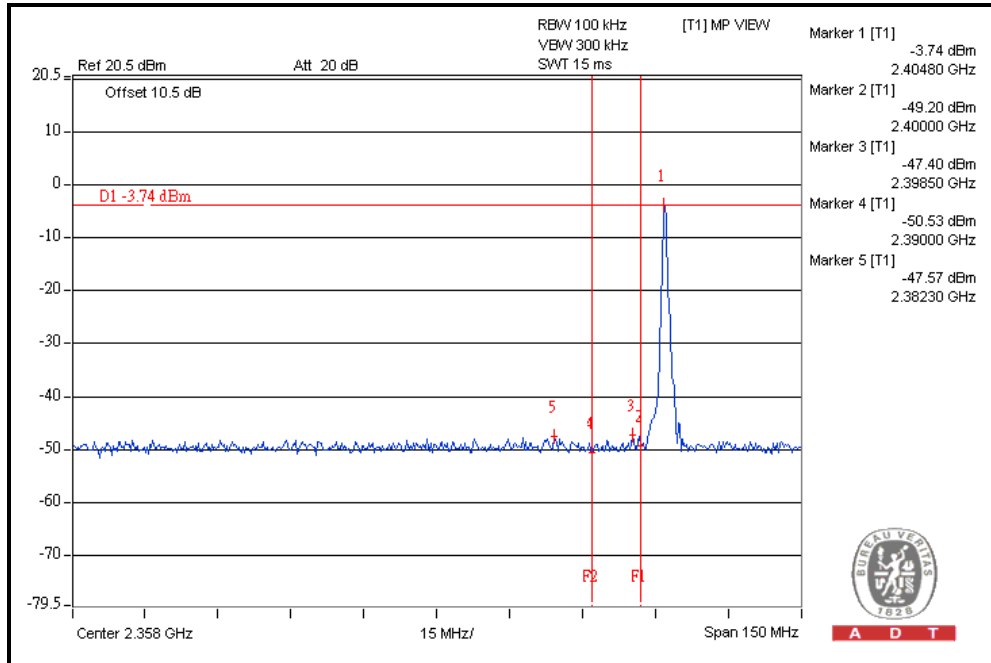
### 4.2.5 EUT OPERATING CONDITION

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

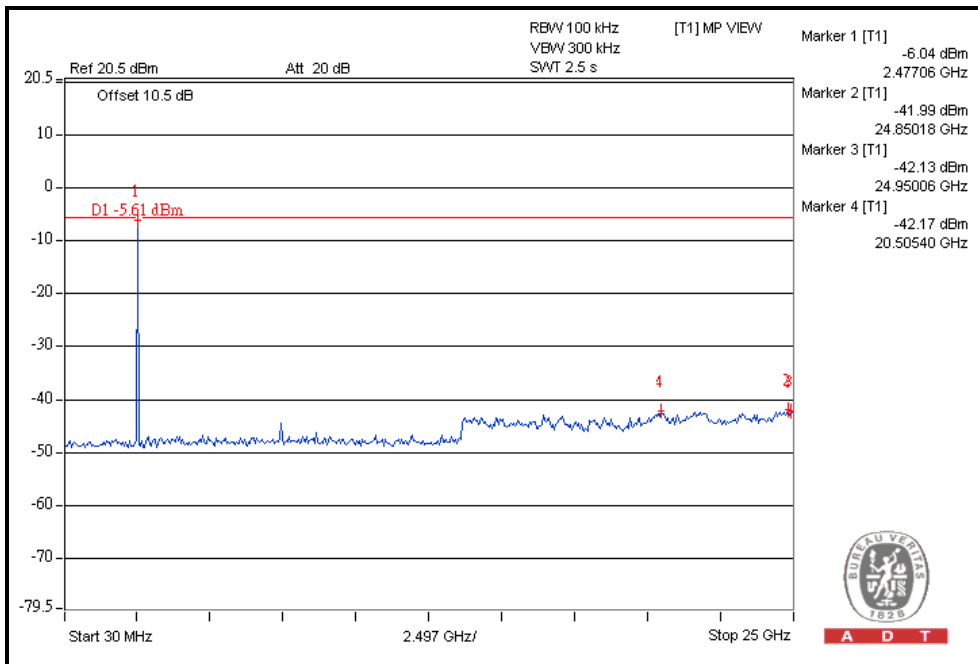
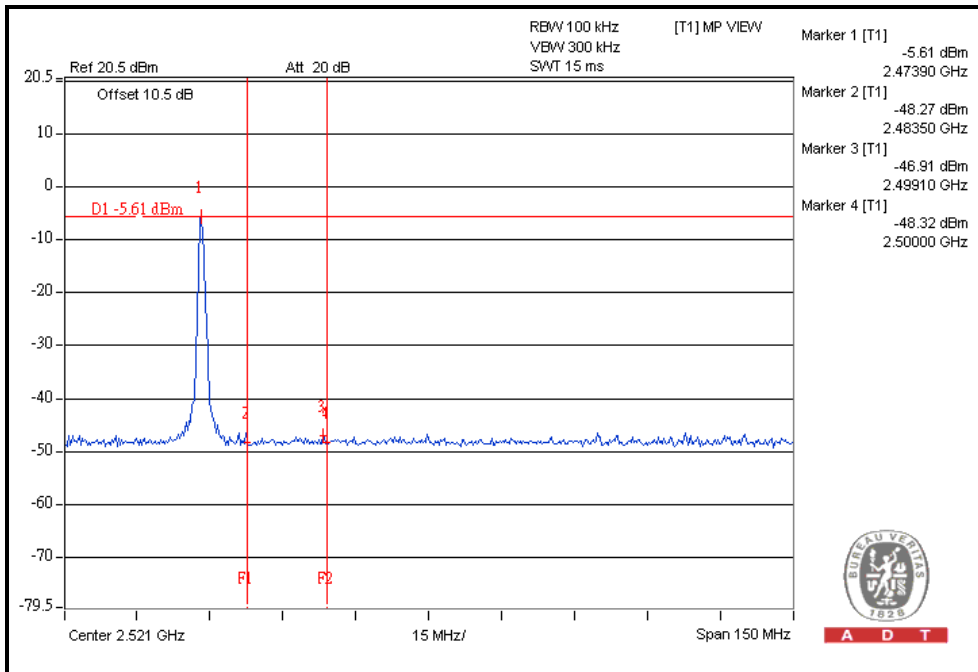






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# CH12





## 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 and authorization 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@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**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.



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## **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 ---**