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# FCC TEST REPORT

**REPORT NO.:** RF990604E02

**MODEL NO.:** Y-R0011

**RECEIVED:** June 04, 2010

**TESTED:** June 04 to 08, 2010

**ISSUED:** June 14, 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

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## 1 CERTIFICATION

**PRODUCT :** 2.4GHz Cordless Keyboard  
**BRAND NAME :** Logitech  
**MODEL NO. :** Y-R0011  
**TESTED :** June 04 to 08, 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: Y-R0011) 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:** June 14, 2010  
( Midoli Peng, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** June 14, 2010  
( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** June 14, 2010  
( May Chen, Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: 47 CFR Part 15, Subpart C</b>			
<b>Standard Paragraph</b>	<b>Test Type</b>	<b>Result</b>	<b>Remark</b>
15.207	Conducted Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -4.91dB at 0.150MHz
15.249	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -9.6dB 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  $k=2$ .

<b>Measurement</b>	<b>Value</b>
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	4 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	2.4GHz Cordless Keyboard
<b>MODEL NO.</b>	Y-R0011
<b>FCC ID</b>	JNZYR0011
<b>POWER SUPPLY</b>	DC 5V from host equipment, DC 3V from battery, DC 5.15V from power adapter
<b>MODULATION TYPE</b>	GFSK
<b>OPERATING FREQUENCY</b>	2405MHz ~ 2474MHz
<b>NUMBER OF CHANNEL</b>	12
<b>ANTENNA TYPE</b>	Custom inverted F PCB printed antenna, with 4.49dBi antenna gain
<b>DATA CABLE</b>	USB Cable(Shielded, 1.85m / Brand :JEM)
<b>I/O PORTS</b>	USB Port x1
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

1. The EUT could be supplied with power adapter as the following below table.(Only for test, not for sale)

Brand	Model No.	Spec.
Logitech	AD6310C	AC I/P: 100-240V, 50/60Hz, 0.13A DC O/P: 5.15V, 1A

2. For radiated test , The EUT was pre-tested under the following modes:

Test Mode	Data rate
Mode A	EUT + Adapter
<b>Mode B</b>	<b>EUT + USB cable + NB</b>
Mode C	EUT + Battery

From the above modes, the worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this 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 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	APCM	
1	√	-	-	-	EUT + Adapter
2	√	√	√	-	EUT + USB cable + NB

Where **PLC**: Power Line Conducted Emission

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

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

**APCM**: Antenna Port Conducted Measurement

#### POWER LINE CONDUCTED 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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	EUT CONFIGURE MODE
1 to 12	12	GFSK	1, 2

#### 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	EUT CONFIGURE MODE
1 to 12	12	GFSK	2



**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	EUT CONFIGURE MODE
1 to 12	1, 8, 12	GFSK	2

**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	EUT CONFIGURE MODE
1 to 12	1, 12	GFSK	2

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 66%RH, 1015 hPa	120Vac, 60Hz	Wen Yu
RE<1G	25deg. C, 64%RH, 1015 hPa	120Vac, 60Hz	Andy Ho
PLC	26deg. C, 63%RH, 1015 hPa	120Vac, 60Hz	Anderson Chen



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### 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.

**NOTE:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.





### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

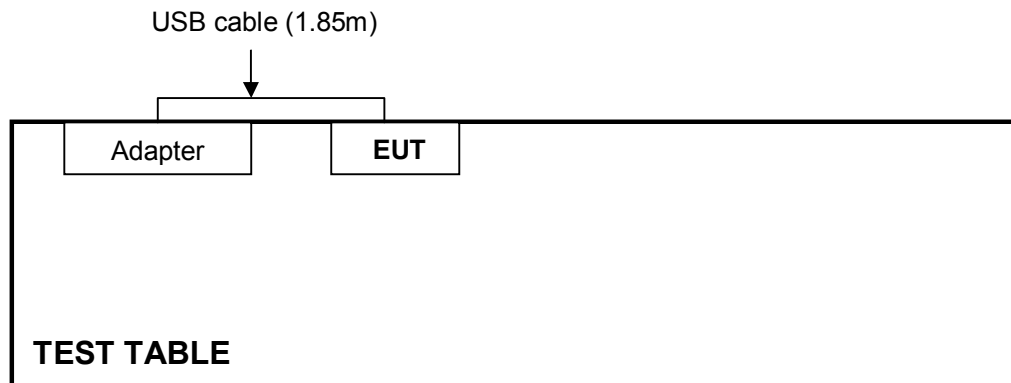
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	Notebook Computer	DELL	PP32LA	DSL32S	FCC DoC
2	iPod nano	Apple	A1137	6U6078FMUPR	FCC DoC

No.	Signal cable description
1	USB cable (shielded, 1.85m)
2	USB cable (shielded, 1m)

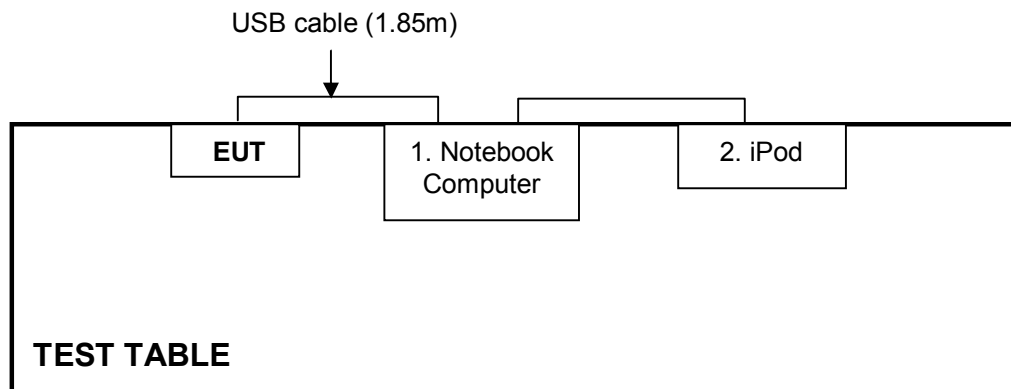
Note: 1. All power cords of the above support units are unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST

For EUT + Adapter:



For EUT + USB cable + NB:





## 4 TEST PROCEDURES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 23,2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec. 14, 2009	Dec. 13, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

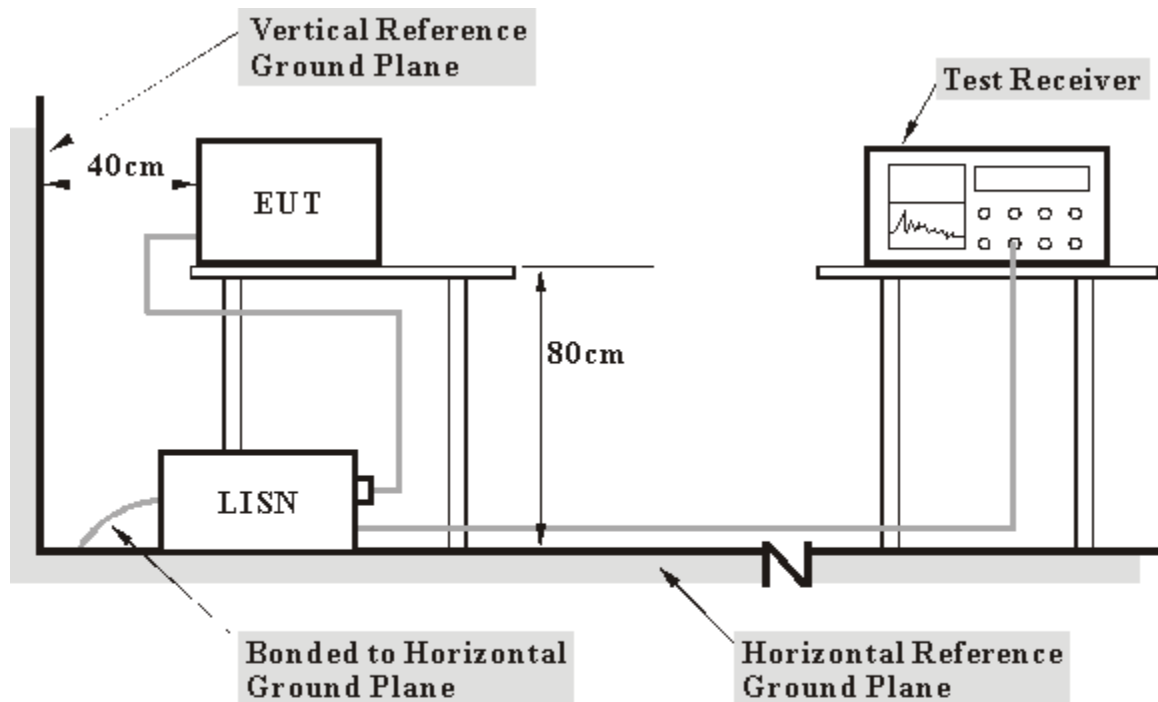
**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
- 3 The VCCI Con A Registration No. is C-817.

#### 4.1.3 TEST PROCEDURES

- a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

#### 4.1.4 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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

#### 4.1.5 EUT OPERATING CONDITIONS

**For EUT + Adapter:**

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

**For EUT + USB cable + NB:**

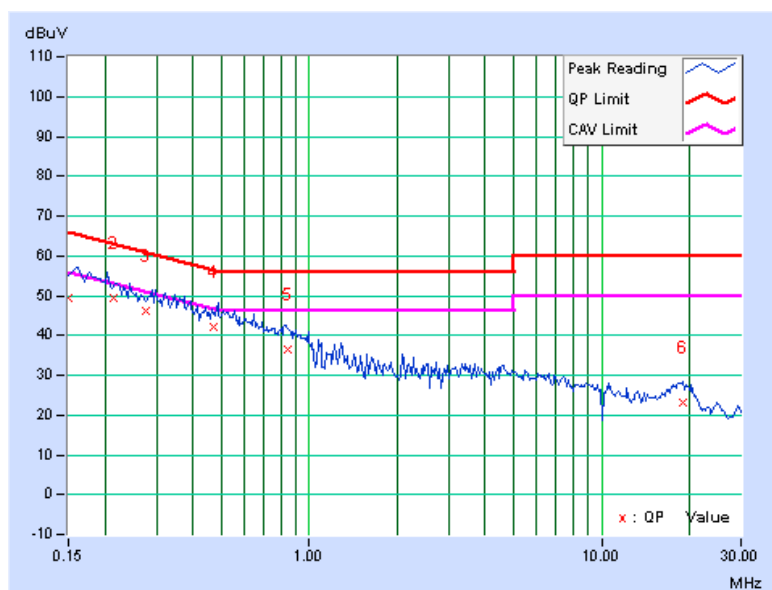
1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program "Button Control" to enable EUT under transmission/receiving condition continuously at specific channel frequency.

### 4.1.6 TEST RESULTS (MODE 1)

<b>PHASE</b>	Line (L)	<b>6DB BANDWIDTH</b>	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.03	49.19	-	49.22	-	66.00	56.00	-16.78	-
2	0.214	0.04	49.49	-	49.53	-	63.05	53.05	-13.52	-
3	0.276	0.04	45.92	-	45.96	-	60.93	50.93	-14.97	-
4	0.468	0.07	42.22	-	42.29	-	56.55	46.55	-14.27	-
5	0.850	0.17	36.14	-	36.31	-	56.00	46.00	-19.69	-
6	19.073	0.57	22.41	-	22.98	-	60.00	50.00	-37.02	-

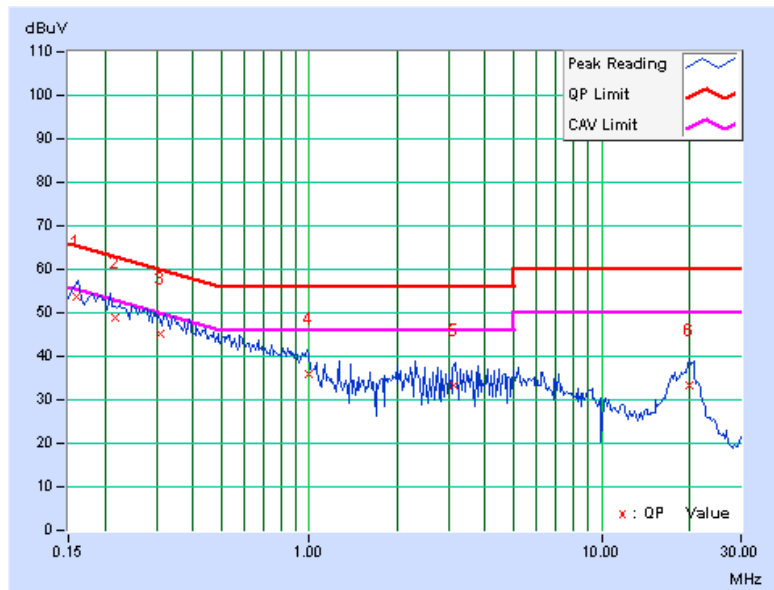
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>PHASE</b>	Neutral (N)	<b>6DB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.161	0.05	53.73	-	53.78	-	65.42	55.42	-11.64	-
2	0.216	0.05	48.80	-	48.85	-	62.96	52.96	-14.11	-
3	0.308	0.06	45.00	-	45.06	-	60.01	50.01	-14.96	-
4	0.995	0.22	35.61	-	35.83	-	56.00	46.00	-20.17	-
5	3.141	0.22	33.21	-	33.43	-	56.00	46.00	-22.57	-
6	20.095	0.62	32.81	-	33.43	-	60.00	50.00	-26.57	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

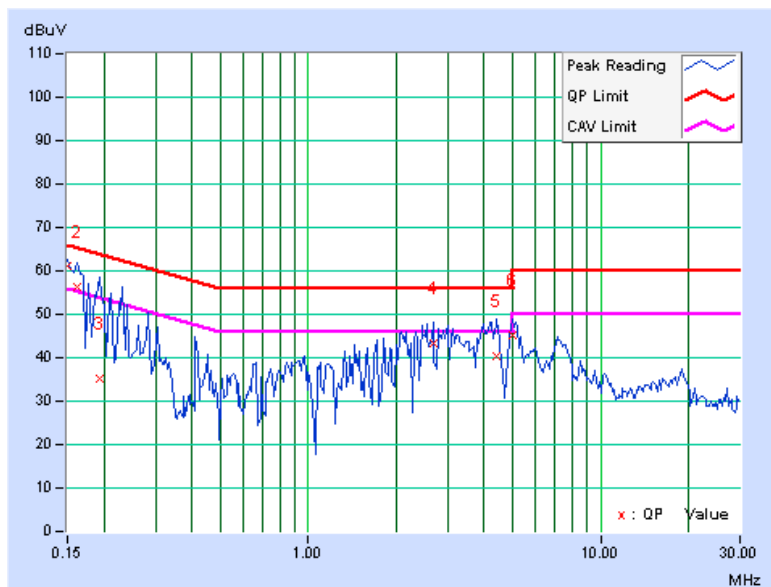


### 4.1.7 TEST RESULTS (MODE 2)

<b>PHASE</b>	Line (L)	<b>6DB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.03	61.06	50.38	61.09	50.41	66.00	56.00	-4.91	-5.59
2	0.162	0.04	56.14	20.82	56.18	20.86	65.38	55.38	-9.20	-34.52
3	0.193	0.04	35.10	-	35.14	-	63.91	53.91	-28.77	-
4	2.684	0.22	43.08	-	43.30	-	56.00	46.00	-12.70	-
5	4.415	0.22	40.25	-	40.47	-	56.00	46.00	-15.53	-
6	4.972	0.25	44.82	-	45.07	-	56.00	46.00	-10.93	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

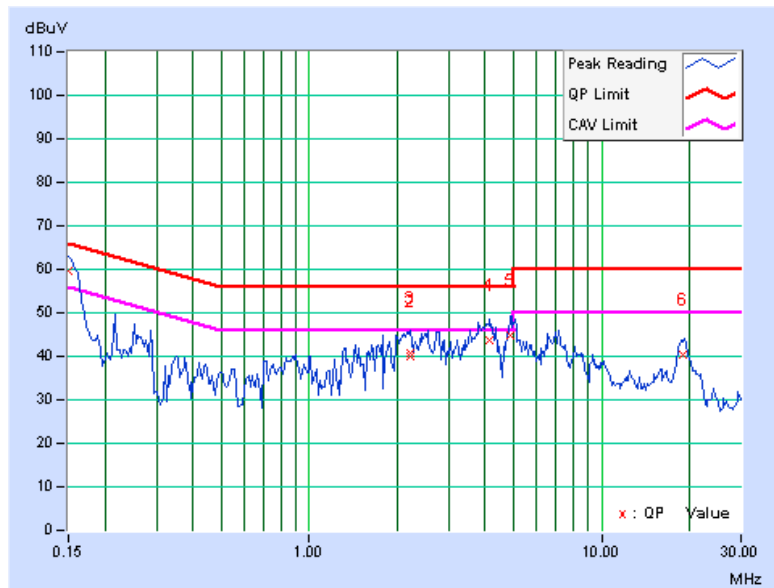




<b>PHASE</b>	Neutral (N)	<b>6DB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.03	59.56	48.98	59.59	49.01	66.00	56.00	-6.41	-6.99
2	2.213	0.23	39.88	-	40.11	-	56.00	46.00	-15.89	-
3	2.231	0.23	40.59	-	40.82	-	56.00	46.00	-15.18	-
4	4.124	0.20	43.60	-	43.80	-	56.00	46.00	-12.20	-
5	4.888	0.25	44.52	-	44.77	-	56.00	46.00	-11.23	-
6	19.014	0.57	39.91	-	40.48	-	60.00	50.00	-19.52	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 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.



## 4.2.2 TEST INSTRUMENTS

### Below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	160200410	July 17, 2009	July 16, 2010
ADVANTEST Spectrum Analyzer	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESVS 30	841977/002	Nov. 28, 2009	Nov. 27, 2010
SCHAFFNER(CHASE) Broadband Antenna	CBL6112B	2798	Apr. 29, 2010	Apr. 28, 2011
Schwarzbeck Horn_Antenna	BBHA9120-D1	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	9170-424	Sep. 30, 2009	Sep. 29, 2010
RF Switches	MP59B	6100175593	Sep. 01, 2009	Aug. 31, 2010
RF Cable	8DFB	STBCAB-001	Sep. 01, 2009	Aug. 31, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA
CORCOM AC Filter	MRI2030	024/019	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) and Spectrum Analyzer (model: U3772) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. B.

4. The VCCI Site Registration No. is R-847.

5. The FCC Site Registration No. is 92753.

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

**Above 1GHz test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2010	Apr. 23 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 27, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 29, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
Software	ADT_Radiated_V7.6.15.9.2	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) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. C.

4. The FCC Site Registration No. is 656396.

5. The VCCI Site Registration No. is R-1626.

6. The CANADA Site Registration No. is IC 7450G-3.

#### 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 10 meter open area test site. 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 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

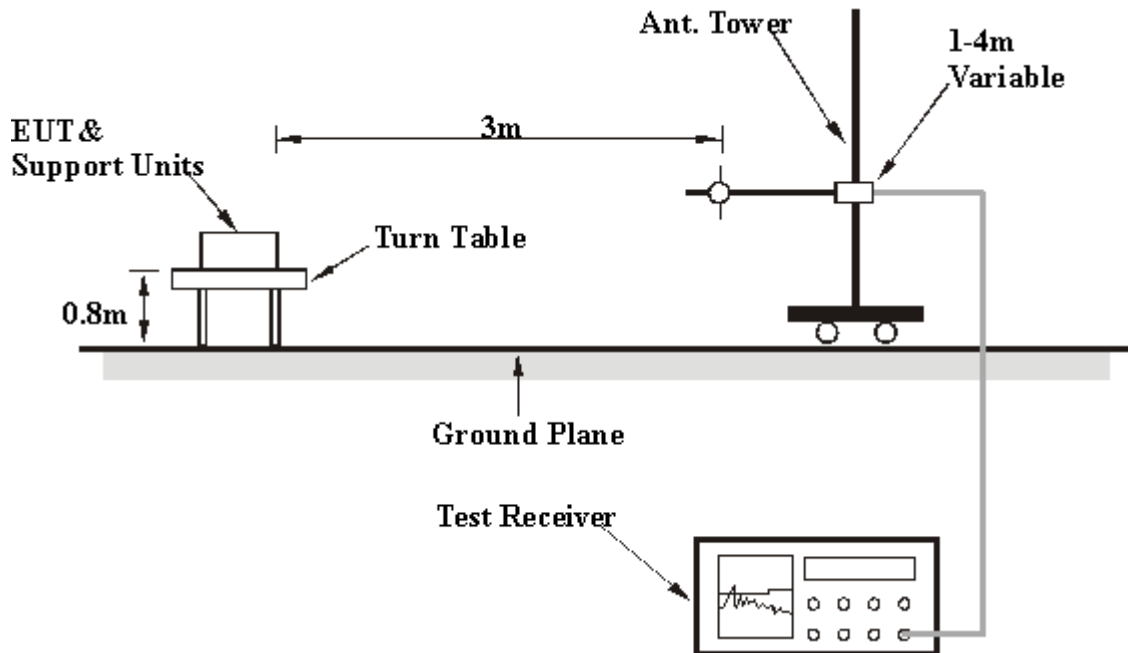
**NOTE:**

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 is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 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 / receiver condition continuously at specific channel frequency.



## 4.2.7 TEST RESULTS

## BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 64%RH 1015 hPa	TESTED BY	Andy Ho

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	120.00	31.9 QP	43.5	-11.6	1.00 H	173	18.38	13.50
2	240.00	30.5 QP	46.0	-15.5	1.09 H	175	17.00	13.54
3	360.00	35.3 QP	46.0	-10.7	1.14 H	20	18.03	17.26
4	480.00	33.6 QP	46.0	-12.4	1.00 H	355	13.18	20.42
5	600.00	32.3 QP	46.0	-13.7	1.18 H	328	10.03	22.27
6	960.00	30.8 QP	46.0	-15.2	1.04 H	267	5.18	25.60
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	120.00	30.3 QP	43.5	-13.2	1.00 V	66	16.76	13.50
2	240.00	30.6 QP	46.0	-15.4	1.00 V	169	17.02	13.54
3	360.00	30.2 QP	46.0	-15.8	1.00 V	337	12.92	17.26
4	480.00	33.6 QP	46.0	-12.4	1.16 V	0	13.19	20.42
5	600.01	28.6 QP	46.0	-17.4	1.00 V	6	6.30	22.27
6	960.00	25.8 QP	46.0	-20.2	1.00 V	277	0.18	25.60

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH 1015 hPa	TESTED BY	Wen Yu

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	63.7 PK	74.0	-10.3	1.31 H	184	33.60	30.10
2	2400.00	28.0 AV	54.0	-26.0	1.31 H	184	-2.10	30.10
3	*2405.00	93.8 PK	114.0	-20.2	1.31 H	184	63.70	30.10
4	*2405.00	58.1 AV	94.0	-35.9	1.31 H	184	28.00	30.10
5	4810.00	46.7 PK	74.0	-27.3	1.85 H	142	11.30	35.40
6	4810.00	11.0 AV	54.0	-43.0	1.85 H	142	-24.40	35.40
7	7215.00	50.0 PK	74.0	-24.0	1.17 H	150	8.20	41.80
8	7215.00	14.3 AV	54.0	-39.7	1.17 H	150	-27.50	41.80
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	2400.00	64.4 PK	74.0	-9.6	1.05 V	105	34.30	30.10
2	2400.00	28.7 AV	54.0	-25.3	1.05 V	105	-1.40	30.10
3	*2405.00	96.2 PK	114.0	-17.8	1.05 V	105	66.10	30.10
4	*2405.00	60.5 AV	94.0	-33.5	1.05 V	105	30.40	30.10
5	4810.00	48.1 PK	74.0	-25.9	1.38 V	168	12.70	35.40
6	4810.00	12.4 AV	54.0	-41.6	1.38 V	168	-23.00	35.40
7	7215.00	50.5 PK	74.0	-23.5	1.18 V	107	8.70	41.80
8	7215.00	14.8 AV	54.0	-39.2	1.18 V	107	-27.00	41.80

**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:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.2917 \text{ ms} / 17.88 \text{ ms}) = -35.7 \text{ dB}$   
 Please see page 27 for plotted duty.





EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 8	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH 1015 hPa	TESTED BY	Wen Yu

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	1.26 H	188	64.00	30.30
2	*2444.00	58.6 AV	94.0	-35.4	1.26 H	188	28.30	30.30
3	4888.00	45.6 PK	74.0	-28.4	1.87 H	155	10.10	35.50
4	4888.00	9.9 AV	54.0	-44.1	1.87 H	155	-25.60	35.50
5	7332.00	51.7 PK	74.0	-22.3	1.60 H	224	9.70	42.00
6	7332.00	16.0 AV	54.0	-38.0	1.60 H	224	-26.00	42.00
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	97.4 PK	114.0	-16.6	1.00 V	115	67.10	30.30
2	*2444.00	61.7 AV	94.0	-32.3	1.00 V	115	31.40	30.30
3	4888.00	47.6 PK	74.0	-26.4	1.48 V	204	12.10	35.50
4	4888.00	11.9 AV	54.0	-42.1	1.48 V	204	-23.60	35.50
5	7332.00	51.2 PK	74.0	-22.8	1.07 V	107	9.20	42.00
6	7332.00	15.5 AV	54.0	-38.5	1.07 V	107	-26.50	42.00

- 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).
  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:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.2917 \text{ ms} / 17.88 \text{ ms}) = -35.7 \text{ dB}$   
Please see page 27 for plotted duty.

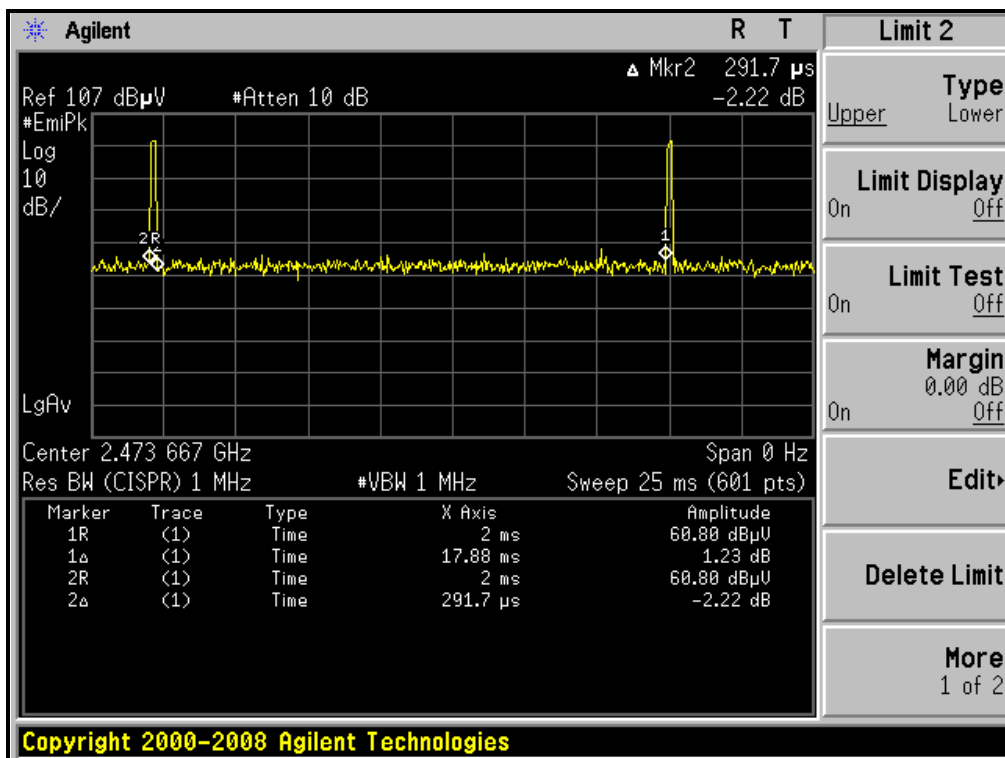


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 12	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH 1015 hPa	TESTED BY	Wen Yu

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	94.1 PK	114.0	-19.9	1.29 H	214	63.70	30.40
2	*2474.00	58.4 AV	94.0	-35.6	1.29 H	214	28.00	30.40
3	2483.70	58.4 PK	74.0	-15.6	1.29 H	214	28.00	30.40
4	2483.70	22.7 AV	54.0	-31.3	1.29 H	214	-7.70	30.40
5	4948.00	46.8 PK	74.0	-27.2	1.85 H	162	11.10	35.70
6	4948.00	11.1 AV	54.0	-42.9	1.85 H	162	-24.60	35.70
7	7422.00	52.8 PK	74.0	-21.2	1.69 H	238	10.60	42.20
8	7422.00	17.1 AV	54.0	-36.9	1.69 H	238	-25.10	42.20

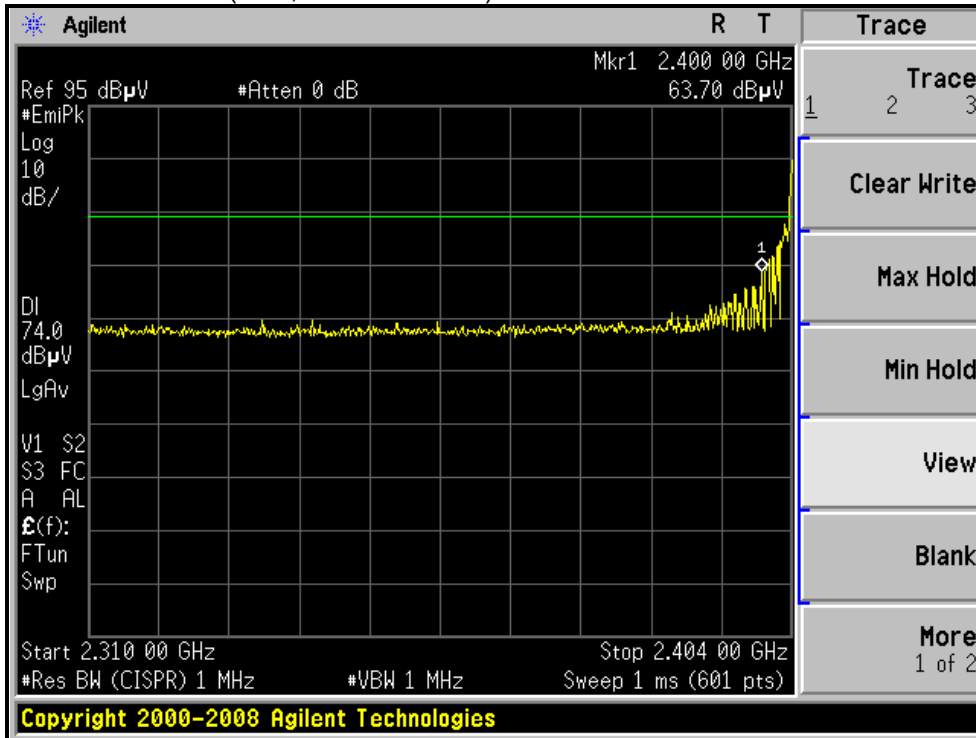
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2474.00	98.0 PK	114.0	-16.0	1.09 V	96	67.60	30.40
2	*2474.00	62.3 AV	94.0	-31.7	1.09 V	96	31.90	30.40
3	2483.60	61.9 PK	74.0	-12.1	1.09 V	95	31.50	30.40
4	2483.60	26.2 AV	54.0	-27.8	1.09 V	95	-4.20	30.40
5	4948.00	48.6 PK	74.0	-25.4	1.44 V	211	12.90	35.70
6	4948.00	12.9 AV	54.0	-41.1	1.44 V	211	-22.80	35.70
7	7422.00	52.4 PK	74.0	-21.6	1.09 V	183	10.20	42.20
8	7422.00	16.7 AV	54.0	-37.3	1.09 V	183	-25.50	42.20

- 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:  
 $20 \log (\text{Duty cycle}) = 20 \log (0.2917 \text{ ms} / 17.88 \text{ ms}) = -35.7 \text{ dB}$   
Please see page 27 for plotted duty.

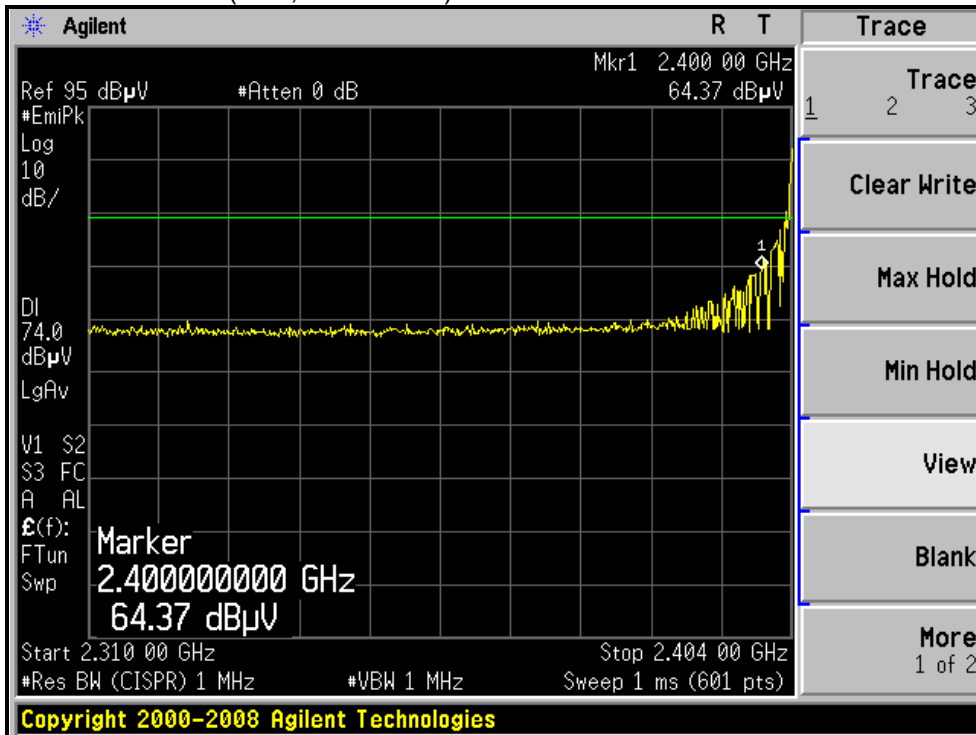


$$20 \log (\text{Duty cycle}) = 20 \log (0.2917 \text{ ms} / 17.88 \text{ ms}) = -35.7 \text{ dB}$$

RESTRICTED BANDEDGE (CH1, HORIZONTAL)

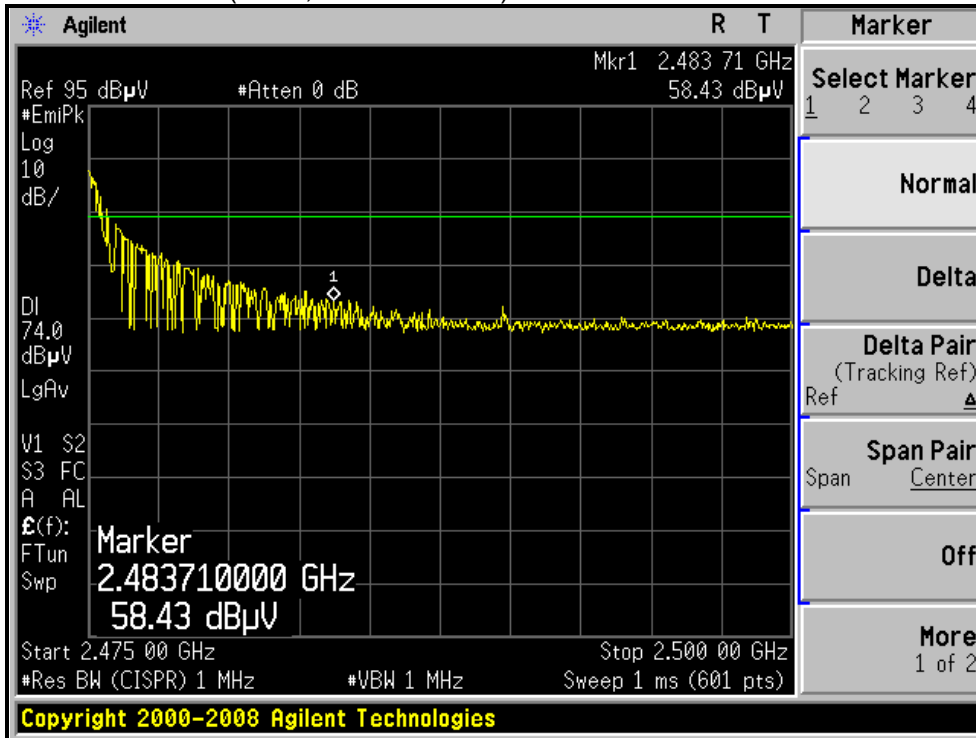


RESTRICTED BANDEDGE (CH1, VERTICAL)

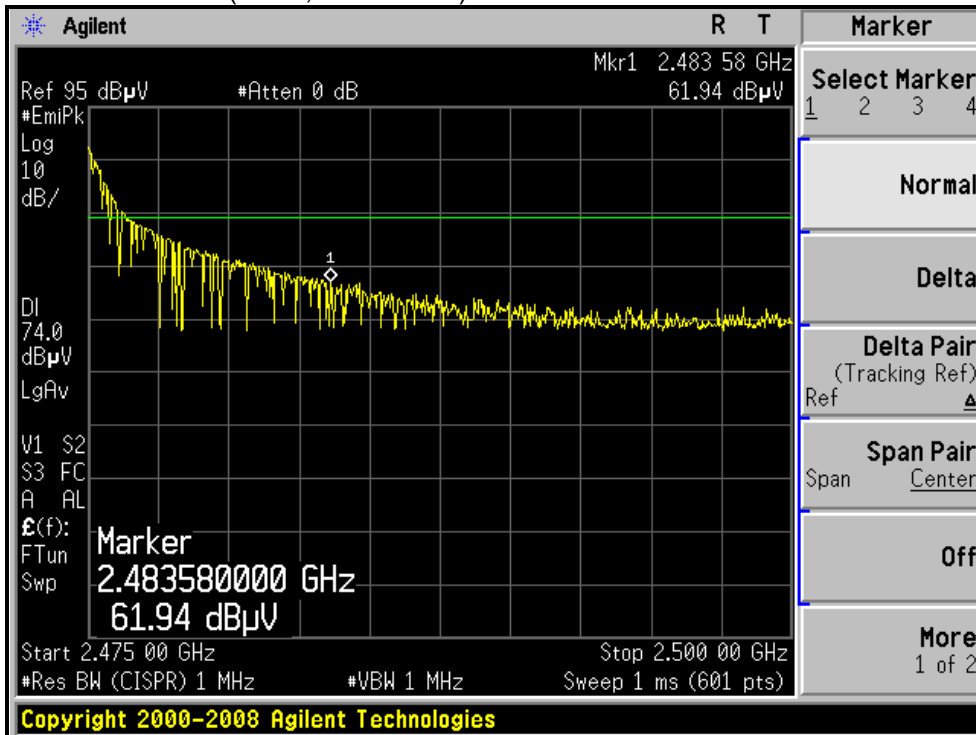


\* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle). And it meets the requirement of limit.

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.



### 4.3 CONDUCTED - OUT BAND MEASUREMENT

#### 4.3.1 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.

#### 4.3.2 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.

#### 4.3.3 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 with suitable frequency span including 300 MHz bandwidth from band edge. The band edges was measured and recorded.

#### 4.3.4 DEVIATION FROM TEST STANDARD

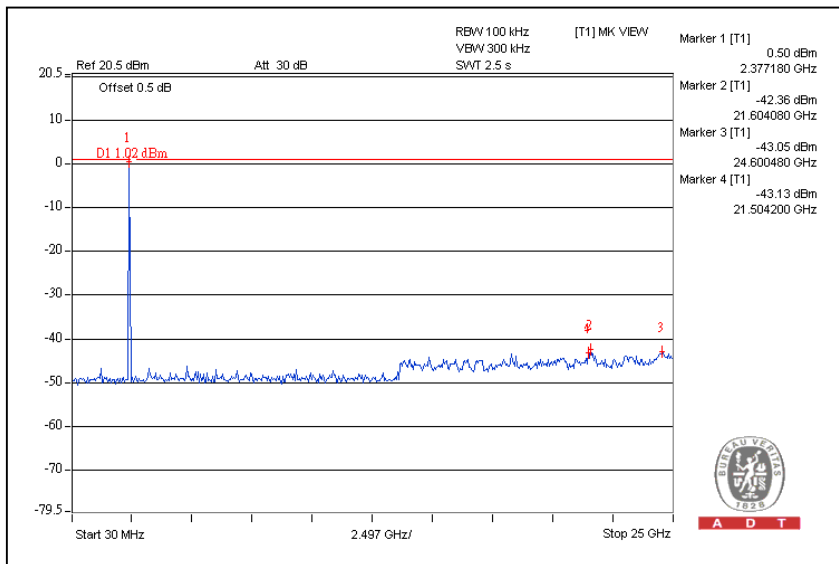
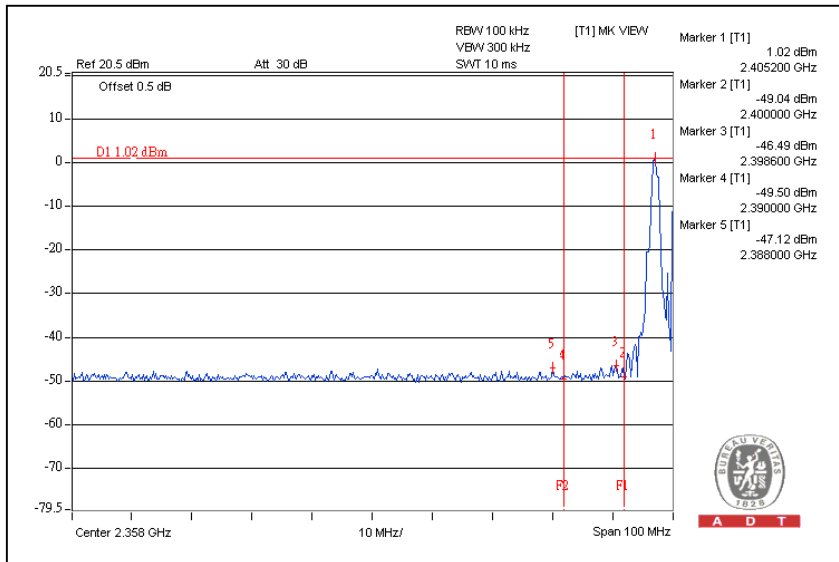
No deviation

#### 4.3.5 EUT OPERATING CONDITION

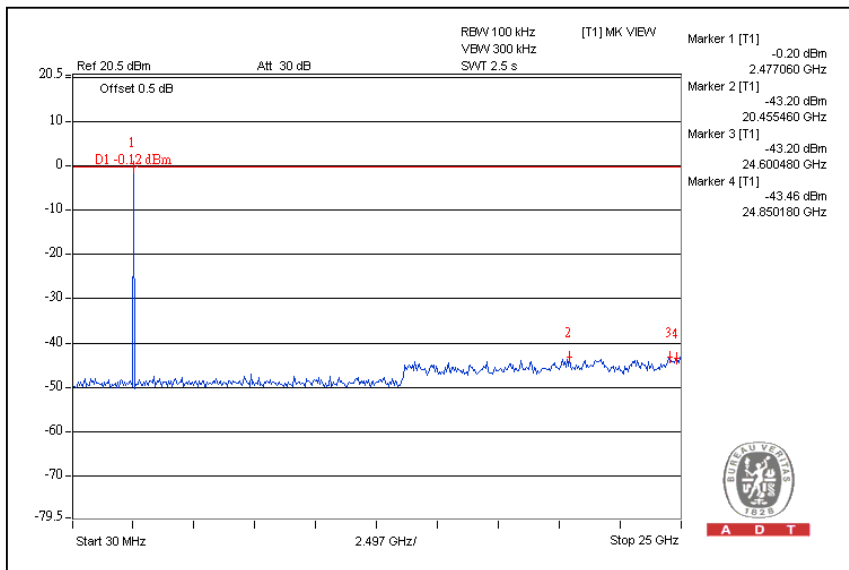
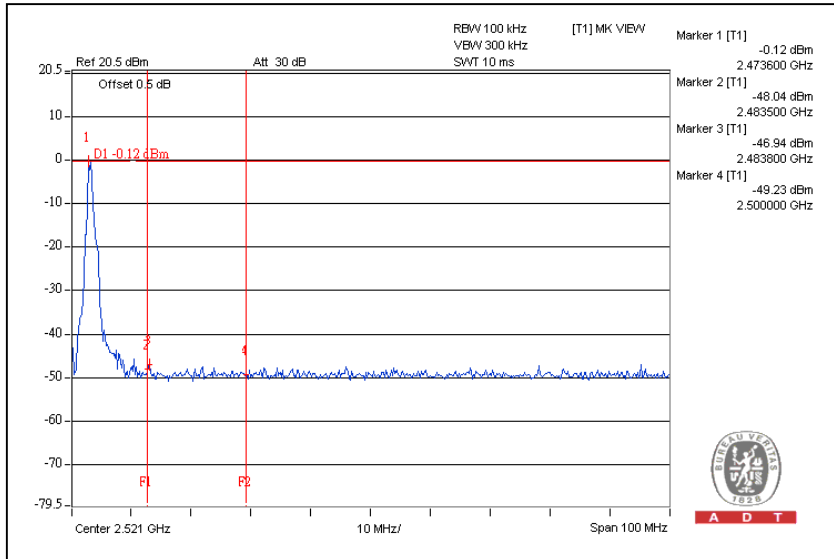
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

### 4.3.6 TEST RESULTS

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



# CH12







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## 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.



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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 ---**