

FCC TEST REPORT

REPORT NO. : RF980817L15

MODEL NO. : FHA-3511

RECEIVED : Sep. 16, 2009

TESTED : Sep. 24 ~ Sep. 25, 2009

ISSUED : Sep. 30, 2009

APPLICANT : CHENG UEI PRECISION INDUSTRY CO., LTD.

ADDRESS : No. 18, Chung Shan Rd., Tu-Cheng Industry Park
Tu Cheng City, Taipei Hsien, Taiwan, R.O.C.

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

LAB ADDRESS : No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou
Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

TEST LOCATION : No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1. CERTIFICATION

PRODUCT: HP 2.4GHz Wireless Laser Mobile Mouse

MODEL NO.: FHA-3511

BRAND: HP

APPLICANT: CHENG UEI PRECISION INDUSTRY CO., LTD.

TESTED: Sep. 24 ~ Sep. 25, 2009

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: **FCC Part 15, Subpart C (Section 15.249)**

ANSI C63.4-2003

The above equipment (model: FHA-3511) have 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 : Polly Chien , **DATE** : Sep. 30, 2009
Polly Chien / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE** : Sep. 30, 2009
Responsible for RF Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE** : Sep. 30, 2009
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.249)			
STANDARD PARAGRAPH	TEST TYPE	RESULT	REMARK
15.207	Conducted Emission Test	NA	Power supply is 1.5Vdc from battery.
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 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -7.64dB at 2398.00MHz.

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:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~ 1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	HP 2.4GHz Wireless Laser Mobile Mouse
MODEL NO.	FHA-3511
FCC ID	M6E-FHA3511
POWER SUPPLY	1.5Vdc from battery
MODULATION TYPE	GFSK
DATA RATE	1Mbps
OPERATING FREQUENCY	2403~2477MHz
NUMBER OF CHANNEL	38
ANTENNA TYPE	PCB antenna
DATA CABLE	NA
I/O PORT	NA
ACCESSORY DEVICES	NA

NOTE:

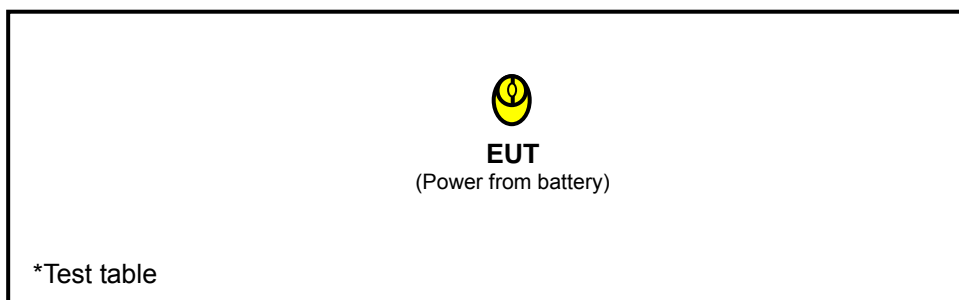
1. The EUT is a HP 2.4GHz Wireless Laser Mobile Mouse with transmitter and receiver functions.
2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

38 channels are provided to this EUT:

FREQUENCY GROUP 1		FREQUENCY GROUP 2	
FREQ. (MHz)		FREQ. (MHz)	
2403	2443	2405	2445
2407	2447	2409	2449
2411	2451	2413	2453
2415	2455	2417	2457
2419	2459	2421	2461
2423	2463	2425	2465
2427	2467	2429	2469
2431	2471	2433	2473
2435	2475	2437	2477
2439		2441	

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **PLC**: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

BM: Bandedge Measurement

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

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.

OPERATING FREQUENCY RANGE (MHz)	TEST FREQUENCY (MHz)	MODULATION TYPE
2403 ~ 2477	2403, 2441, 2477	GFSK

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.

OPERATING FREQUENCY RANGE (MHz)	TEST FREQUENCY (MHz)	MODULATION TYPE
2403 ~ 2477	2441	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.

OPERATING FREQUENCY RANGE (MHz)	TEST FREQUENCY (MHz)	MODULATION TYPE
2403 ~ 2477	2403, 2477	GFSK

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

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	May 25, 2009	May 24, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 30, 2009	Apr. 29, 2010
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Aug. 10, 2009	Aug. 09, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009	Jan. 05, 2010
Preamplifier Agilent	8449B	3008A01960	Nov. 03, 2008	Nov. 02, 2009
Preamplifier Agilent	8447D	2944A10638	Dec. 26, 2008	Dec. 25, 2009
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218190/4 231241/4	May 13, 2009	May 12, 2010
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 17, 2009	Aug. 16, 2010
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	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 HwaYa Chamber 9.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 460141.
 5. The IC Site Registration No. is IC 7450F-4.

4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

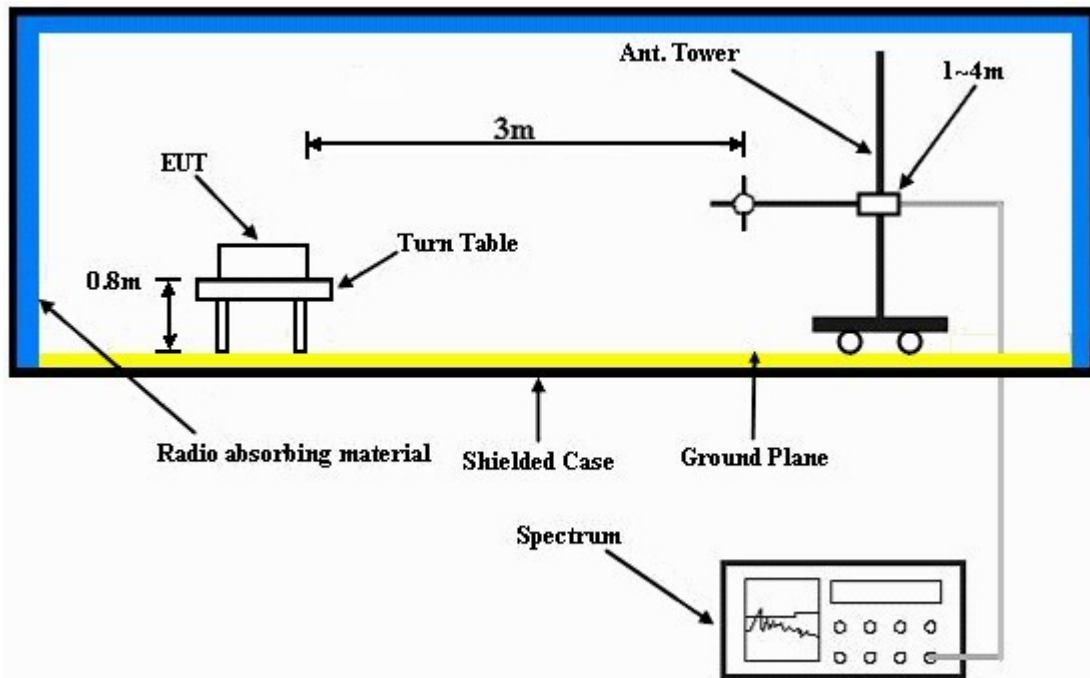
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection 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. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmitting condition.

4.1.7 TEST RESULTS

ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
TEST FREQUENCY	2403MHz	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao

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	58.45 PK	74.00	-15.55	1.34 H	190	26.23	32.22
2	2390.00	44.70 AV	54.00	-9.30	1.34 H	190	12.47	32.22
3	2398.00	66.36 PK	74.00	-7.64	1.34 H	190	34.11	32.25
4	2398.00	42.53 AV	54.00	-11.47	1.34 H	190	10.28	32.25
5	2400.00	53.04 PK	74.00	-20.96	1.34 H	190	20.78	32.26
6	2400.00	39.28 AV	54.00	-14.72	1.34 H	190	7.02	32.26
7	*2403.00	95.60 PK	114.00	-18.40	1.34 H	190	63.33	32.27
8	*2403.00	81.84 AV	94.00	-12.16	1.34 H	190	49.57	32.27
9	4806.00	52.00 PK	74.00	-22.00	1.11 H	347	13.70	38.30
10	4806.00	38.24 AV	54.00	-15.76	1.11 H	347	-0.06	38.30
11	7209.00	52.49 PK	74.00	-21.51	1.16 H	343	8.11	44.38
12	7209.00	38.73 AV	54.00	-15.27	1.16 H	343	-5.65	44.38

- 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:
 $20 \log (\text{Duty cycle}) = 20 \log (20.503 \text{ ms} / 100 \text{ ms}) = -13.76 \text{ dB}$
 Please see page 18 for plotted duty.



EUT TEST CONDITION		MEASUREMENT DETAIL	
TEST FREQUENCY	2403MHz	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao

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	52.35 PK	74.00	-21.65	1.21 V	216	20.12	32.22
2	2390.00	38.59 AV	54.00	-15.41	1.21 V	216	6.36	32.22
3	2398.00	62.64 PK	74.00	-11.36	1.21 V	216	30.39	32.25
4	2398.00	38.69 AV	54.00	-15.31	1.21 V	216	6.44	32.25
5	2400.00	48.43 PK	74.00	-25.57	1.21 V	216	16.17	32.26
6	2400.00	34.67 AV	54.00	-19.33	1.21 V	216	2.41	32.26
7	*2403.00	90.99 PK	114.00	-23.01	1.21 V	216	58.72	32.27
8	*2403.00	77.23 AV	94.00	-16.77	1.21 V	216	44.96	32.27
9	4806.00	53.81 PK	74.00	-20.19	1.52 V	110	15.51	38.30
10	4806.00	40.05 AV	54.00	-13.95	1.52 V	110	1.75	38.30
11	7209.00	54.42 PK	74.00	-19.58	1.20 V	133	10.04	44.38
12	7209.00	40.66 AV	54.00	-13.34	1.20 V	133	-3.72	44.38

- 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:
 $20 \log (\text{Duty cycle}) = 20 \log (20.503 \text{ ms} / 100 \text{ ms}) = -13.76 \text{ dB}$
 Please see page 18 for plotted duty.



EUT TEST CONDITION		MEASUREMENT DETAIL	
TEST FREQUENCY	2441MHz	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao

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	*2441.00	96.82 PK	114.00	-17.18	1.34 H	14	64.41	32.41
2	*2441.00	83.06 AV	94.00	-10.94	1.34 H	14	50.65	32.41
3	4882.00	55.22 PK	74.00	-18.78	1.00 H	340	16.80	38.42
4	4882.00	41.46 AV	54.00	-12.54	1.00 H	340	3.04	38.42
5	7323.00	49.85 PK	74.00	-24.15	1.38 H	345	5.18	44.67
6	7323.00	36.09 AV	54.00	-17.91	1.38 H	345	-8.58	44.67
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	*2441.00	92.35 PK	114.00	-21.65	1.18 V	220	59.94	32.41
2	*2441.00	78.59 AV	94.00	-15.41	1.18 V	220	46.18	32.41
3	4882.00	54.87 PK	74.00	-19.13	1.19 V	115	16.45	38.42
4	4882.00	41.11 AV	54.00	-12.89	1.19 V	115	2.69	38.42
5	7323.00	50.19 PK	74.00	-23.81	1.12 V	146	5.52	44.67
6	7323.00	36.43 AV	54.00	-17.57	1.12 V	146	-8.24	44.67

- 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.
 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:
 $20 \log (\text{Duty cycle}) = 20 \log (20.503 \text{ ms} / 100 \text{ ms}) = -13.76 \text{ dB}$
 Please see page 18 for plotted duty.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
TEST FREQUENCY	2477MHz	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao

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	*2477.00	96.16 PK	114.00	-17.84	1.31 H	62	63.62	32.54
2	*2477.00	82.40 AV	94.00	-11.60	1.31 H	62	49.86	32.54
3	2483.50	46.51 PK	74.00	-27.49	1.31 H	62	13.95	32.56
4	2483.50	32.75 AV	54.00	-21.25	1.31 H	62	0.19	32.56
5	2485.50	61.16 PK	74.00	-12.84	1.31 H	62	28.59	32.57
6	2485.50	42.32 AV	54.00	-11.68	1.31 H	62	9.75	32.57
7	4954.00	53.18 PK	74.00	-20.82	1.00 H	346	14.58	38.60
8	4954.00	39.42 AV	54.00	-14.58	1.00 H	346	0.82	38.60
9	7431.00	51.99 PK	74.00	-22.01	1.16 H	16	7.05	44.94
10	7431.00	38.23 AV	54.00	-15.77	1.16 H	16	-6.71	44.94

- 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:
 $20 \log (\text{Duty cycle}) = 20 \log (20.503 \text{ ms} / 100 \text{ ms}) = -13.76 \text{ dB}$
 Please see page 18 for plotted duty.



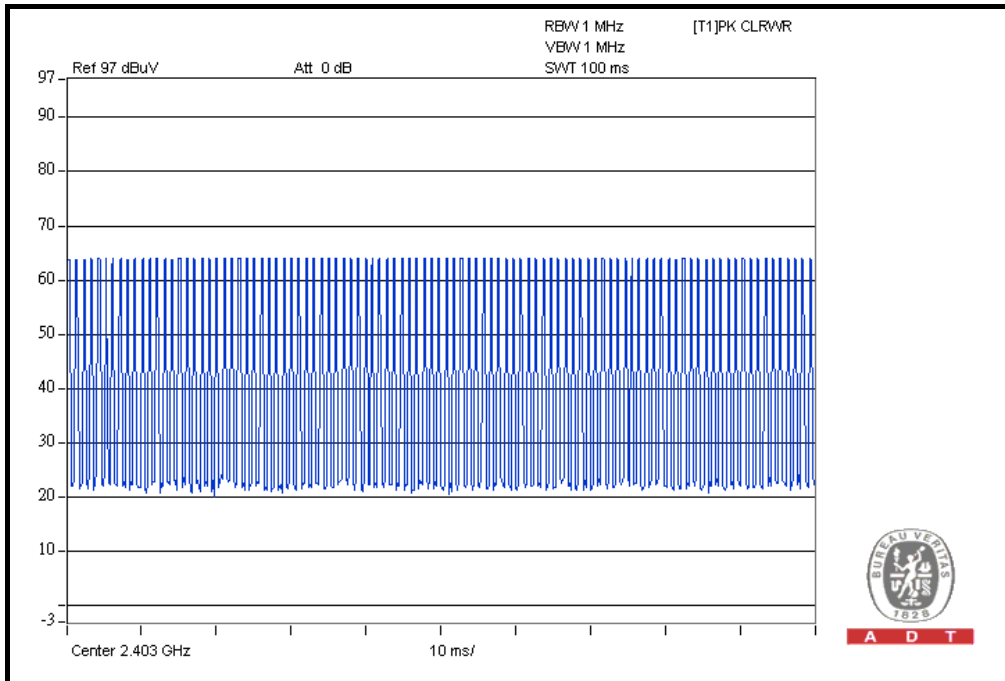
EUT TEST CONDITION		MEASUREMENT DETAIL	
TEST FREQUENCY	2477MHz	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao

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	*2477.00	92.13 PK	114.00	-21.87	1.19 V	171	59.59	32.54
2	*2477.00	78.37 AV	94.00	-15.63	1.19 V	171	45.83	32.54
3	2483.50	42.48 PK	74.00	-31.52	1.19 V	171	9.92	32.56
4	2483.50	28.72 AV	54.00	-25.28	1.19 V	171	-3.84	32.56
5	2485.50	58.43 PK	74.00	-15.57	1.19 V	171	25.86	32.57
6	2485.50	39.27 AV	54.00	-14.73	1.19 V	171	6.70	32.57
7	4954.00	54.77 PK	74.00	-19.23	1.17 V	118	16.17	38.60
8	4954.00	41.01 AV	54.00	-12.99	1.17 V	118	2.41	38.60
9	7431.00	52.76 PK	74.00	-21.24	1.30 V	135	7.82	44.94
10	7431.00	39.00 AV	54.00	-15.00	1.30 V	135	-5.94	44.94

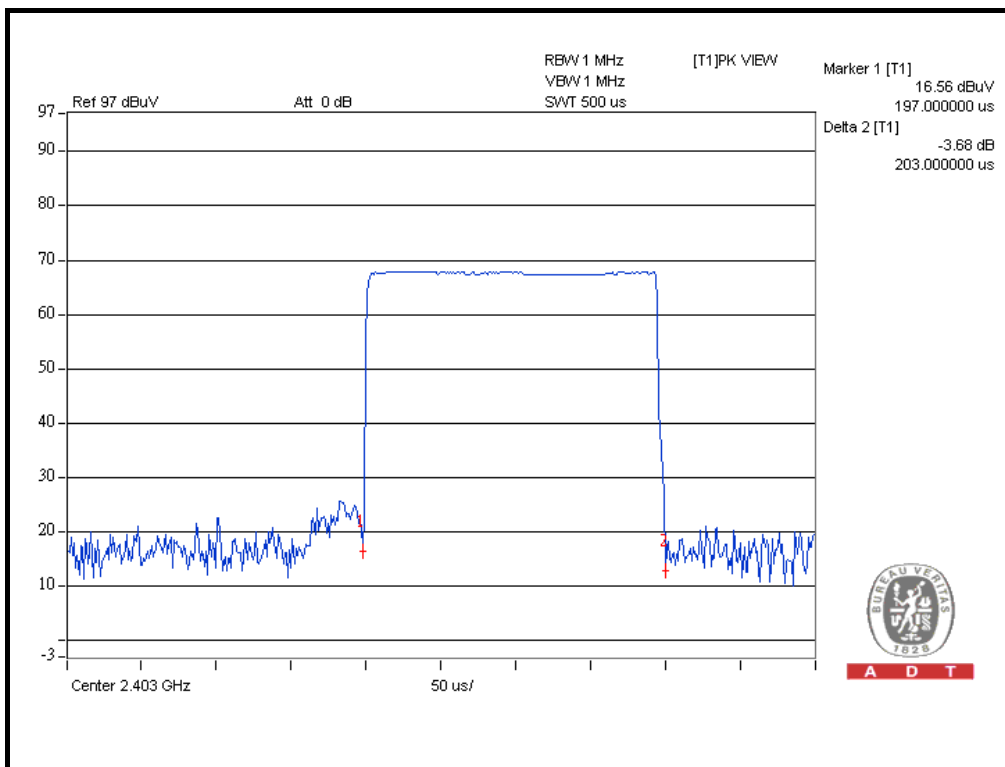
- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (20.503 \text{ ms} / 100 \text{ ms}) = -13.76 \text{ dB}$
 Please see page 18 for plotted duty.



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$$20 \log (\text{Duty cycle}) = 20 \log (101 \cdot 0.203 \text{ ms} / 100 \text{ ms}) = -13.76 \text{ dB}$$



BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
TEST FREQUENCY	2441MHz	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 999 hPa	TESTED BY	Mark Liao

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	30.00	19.88 QP	40.00	-20.12	2.00 H	187	7.60	12.28
2	144.61	20.86 QP	43.50	-22.64	1.00 H	4	7.70	13.16
3	409.04	15.63 QP	46.00	-30.37	1.50 H	355	-0.73	16.36
4	543.19	25.88 QP	46.00	-20.12	1.00 H	10	5.32	20.56
5	698.74	24.39 QP	46.00	-21.61	2.00 H	19	1.67	22.72
6	869.83	24.32 QP	46.00	-21.68	1.00 H	67	-1.50	25.82
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	30.00	21.55 QP	40.00	-18.45	2.00 V	19	9.27	12.28
2	99.89	16.98 QP	43.50	-26.52	1.25 V	46	7.66	9.33
3	187.39	21.00 QP	43.50	-22.50	1.25 V	340	9.40	11.61
4	514.03	17.89 QP	46.00	-28.11	1.25 V	48	-1.78	19.67
5	698.74	25.91 QP	46.00	-20.09	1.50 V	43	3.19	22.72
6	891.22	24.77 QP	46.00	-21.23	1.00 V	54	-1.26	26.03

- 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.

4.2 BAND EDGES MEASUREMENT

4.2.1 LIMITS OF BAND EDGES MEASUREMENT

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010

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 including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots are attached on the following pages.

4.2.4 DEVIATION FROM TEST STANDARD

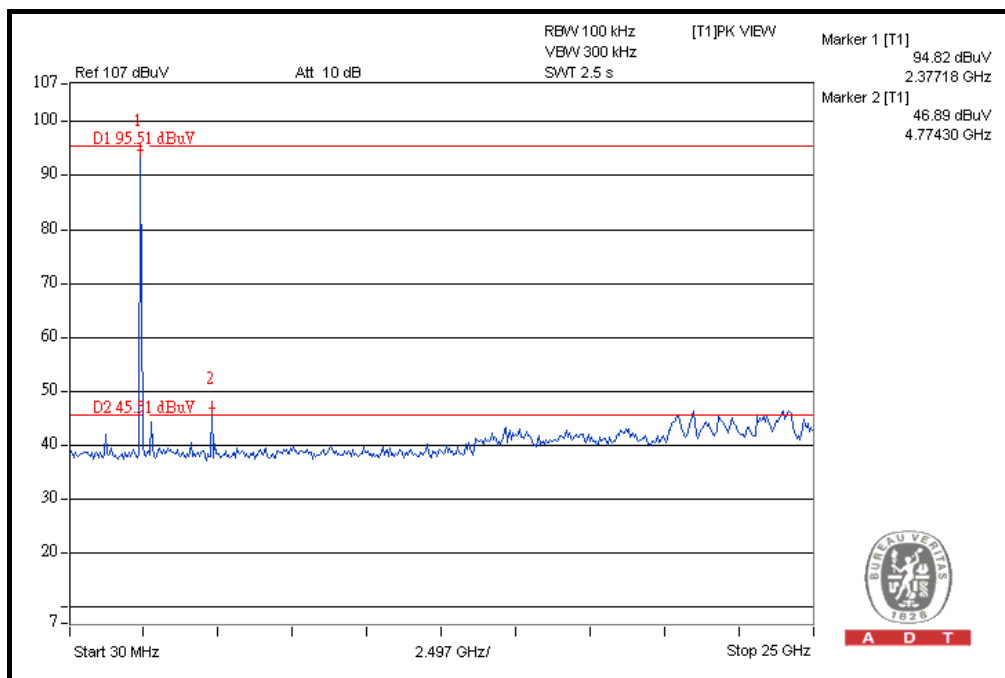
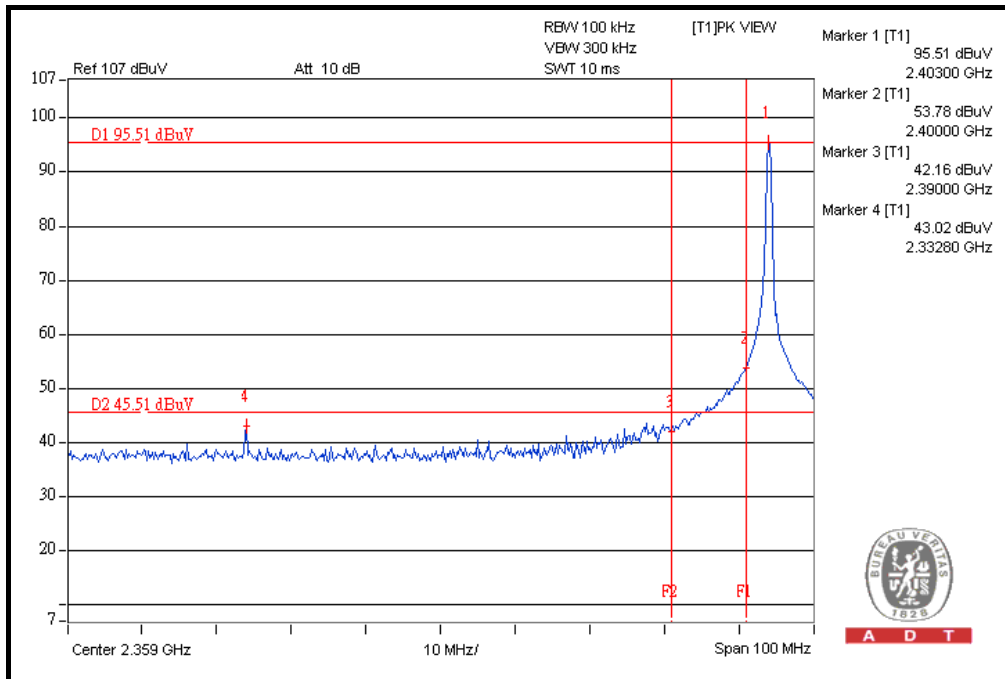
No deviation.

4.2.5 EUT OPERATING CONDITION

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

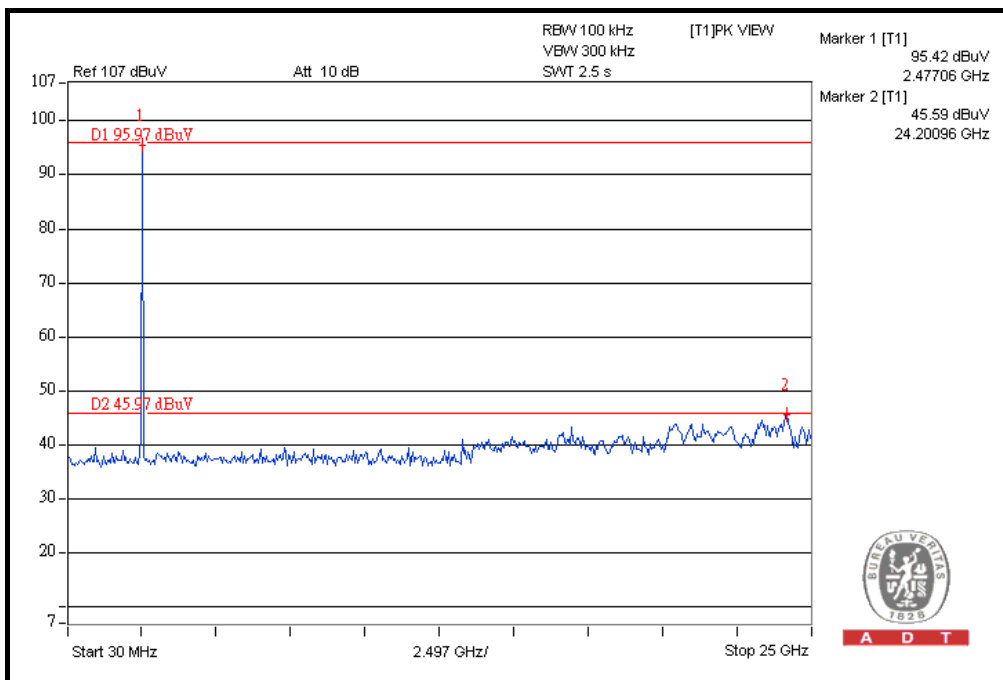
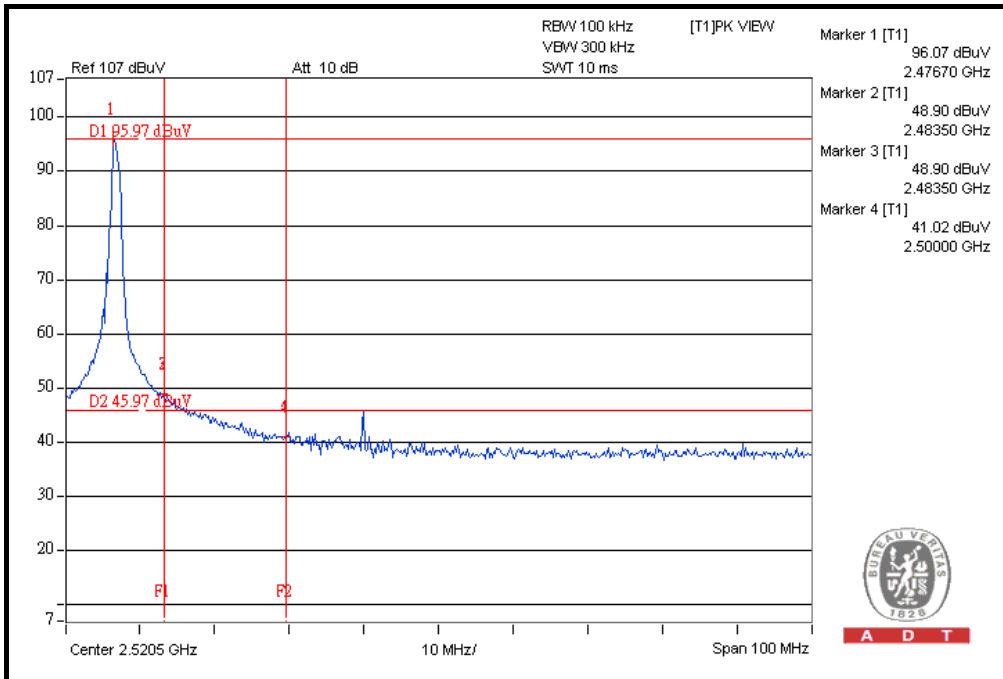
4.2.6 TEST RESULTS

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).





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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 by the following approval agencies according to ISO/IEC 17025.

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA(MOU)
Russia	CERTIS(MOU)

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. 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

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

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.

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