



# FCC TEST REPORT

**REPORT NO. :** RF991116C19-1

**MODEL NO. :** HW0303W

**FCC ID:** YZM-HW0303W

**RECEIVED :** Nov. 16, 2010

**TESTED :** Nov. 18 ~ Nov. 19, 2010

**ISSUED :** Nov. 23, 2010

**APPLICANT :** Aibelive Co., Ltd

**ADDRESS :** 3F., No. 71, Jhou-zih St., Neu-hu District, Taipei  
City 114, Taiwan

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

**LAB ADDRESS :** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou  
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**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:** AIWI joystick 2nd generation

**MODEL NO.:** HW0303W

**BRAND:** AIWI

**APPLICANT:** Aibeline Co., Ltd

**TESTED:** Nov. 18 ~ Nov. 19, 2010

**TEST SAMPLE:** ENGINEERING SAMPLE

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

ANSI C63.4-2003

The above equipment (model: HW0303W) 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** : Andrea Hsia , DATE : Nov. 23, 2010  
Andrea Hsia / Specialist

**TECHNICAL  
ACCEPTANCE** : Long Chen , DATE : Nov. 23, 2010  
Responsible for RF Long Chen / Senior Engineer

**APPROVED BY** : Gary Chang , DATE : Nov. 23, 2010  
Gary Chang / Assistant Manager



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## 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	PASS	Meet the requirement of limit. Minimum passing margin is -8.98dB at 0.150MHz.
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 -7.8dB at 799.84MHz.

### 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
Conducted emissions	150kHz~30MHz	2.44dB
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.



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

EUT	AIWI joystick 2nd generation
MODEL NO.	HW0303W
FCC ID	YZM-HW0303W
POWER SUPPLY	5Vdc
MODULATION TYPE	GFSK
OPERATING FREQUENCY	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
ANTENNA TYPE	PCB antenna
DATA CABLE	NA
I/O PORT	USB
ACCESSORY DEVICES	NA

**NOTE:**

1. A set of the EUT include joystick and dongle. This report covers dongle only. The joystick is covered in another test report which report no.: RF991116C19.

MODEL	FCC ID	REPORT NO.	DESCRIPTION
HW0302W	YZM-HW0302W	RF991116C19	For Joystick
HW0303W	YZM-HW0303W	RF991116C19-1	For Dongle

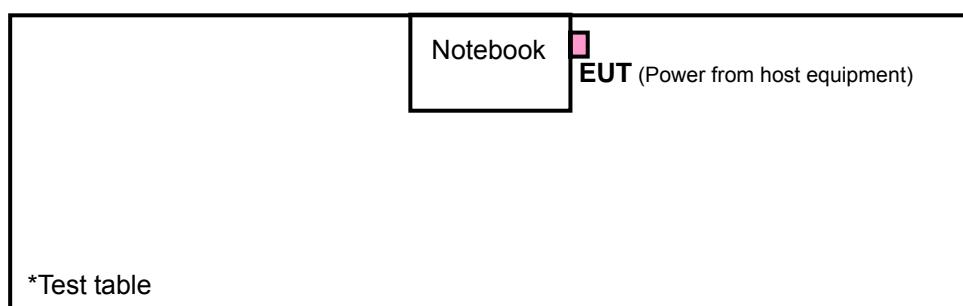
2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2402	28	2429	55	2456
2	2403	29	2430	56	2457
3	2404	30	2431	57	2458
4	2405	31	2432	58	2459
5	2406	32	2433	59	2460
6	2407	33	2434	60	2461
7	2408	34	2435	61	2462
8	2409	35	2436	62	2463
9	2410	36	2437	63	2464
10	2411	37	2438	64	2465
11	2412	38	2439	65	2466
12	2413	39	2440	66	2467
13	2414	40	2441	67	2468
14	2415	41	2442	68	2469
15	2416	42	2443	69	2470
16	2417	43	2444	70	2471
17	2418	44	2445	71	2472
18	2419	45	2446	72	2473
19	2420	46	2447	73	2474
20	2421	47	2448	74	2475
21	2422	48	2449	75	2476
22	2423	49	2450	76	2477
23	2424	50	2451	77	2478
24	2425	51	2452	78	2479
25	2426	52	2453	79	2480
26	2427	53	2454		
27	2428	54	2455		

#### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





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### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where PLC: Power Line Conducted Emission

RE&lt;1G: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

BM: Bandedge Measurement

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

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 79	1, 40, 79	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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 79	1	GFSK

#### 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
1 to 79	1	GFSK

#### BANDEDGE MEASUREMENT:

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 to 79	1, 79	GFSK



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#### **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	25deg. C, 66%RH, 1008 hPa	5Vdc	Frank Wang
RE<1G	25deg. C, 65%RH, 1008 hPa	5Vdc	Frank Wang
PLC	25deg. C, 65%RH, 1008 hPa	5Vdc	Frank Wang
BM	25deg. C, 65%RH, 1008 hPa	5Vdc	Frank Wang

### **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.

### **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	DELL	PP05L	25191592336	E2K24CLNS

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

**NOTE:** All power cords of the above support units are non-shielded (1.8m).



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## 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	100188	Dec. 21, 2009	Dec. 20, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Jul. 09, 2010	Jul. 08, 2011
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 30, 2010	Apr. 29, 2011
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Aug. 02, 2010	Aug. 01, 2011
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Dec. 25, 2009	Dec. 24, 2010
Preamplifier Agilent	8449B	3008A01910	Sep. 09, 2010	Sep. 08, 2011
Preamplifier Agilent	8447D	2944A10638	Dec. 21, 2009	Dec. 20, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218190/4 231241/4	May 14, 2010	May 13, 2011
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 20, 2010	Aug. 19, 2011
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.

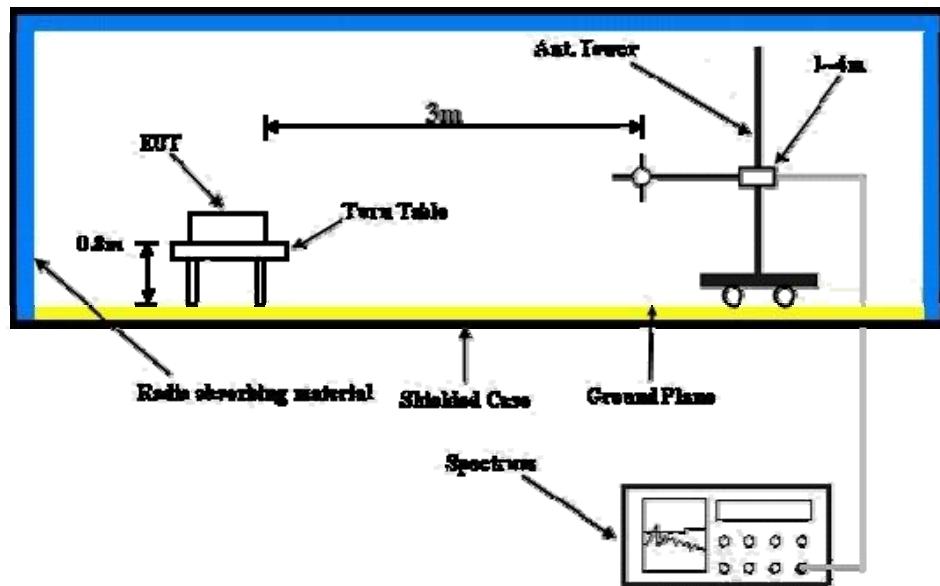
#### NOTE:

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 1MHz 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

- Plugged the EUT to notebook and placed on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.



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#### 4.1.7 TEST RESULTS

##### ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 1		FREQUENCY RANGE 1 ~ 25GHz
INPUT POWER (SYSTEM)		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		26deg. C, 65%RH 1008 hPa		TESTED BY Frank Wang

##### 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	52.4 PK	74.0	-21.6	1.08 H	72	21.90	30.50
2	2390.00	23.9 AV	54.0	-30.1	1.08 H	72	-6.60	30.50
3	2398.00	60.8 PK	74.0	-13.2	1.08 H	72	30.20	30.60
4	2398.00	23.7 AV	54.0	-30.3	1.08 H	72	-6.90	30.60
5	2400.00	57.2 PK	74.0	-16.8	1.08 H	72	26.60	30.60
6	2400.00	5.2 AV	54.0	-48.8	1.08 H	72	-25.40	30.60
7	*2402.00	91.4 PK	114.0	-22.6	1.08 H	72	60.80	30.60
8	*2402.00	39.4 AV	94.0	-54.6	1.08 H	72	8.80	30.60
9	4804.00	53.9 PK	74.0	-20.1	1.32 H	198	17.40	36.50
10	4804.00	1.9 AV	54.0	-52.1	1.32 H	198	-34.60	36.50

##### 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	47.6 PK	74.0	-26.4	1.00 V	110	17.10	30.50
2	2390.00	24.0 AV	54.0	-30.0	1.00 V	110	-6.50	30.50
3	2398.00	57.1 PK	74.0	-16.9	1.00 V	110	26.50	30.60
4	2398.00	23.7 AV	54.0	-30.3	1.00 V	110	-6.90	30.60
5	2400.00	53.0 PK	74.0	-21.0	1.00 V	110	22.40	30.60
6	2400.00	1.0 AV	54.0	-53.0	1.00 V	110	-29.60	30.60
7	*2402.00	86.2 PK	114.0	-27.8	1.00 V	110	55.60	30.60
8	*2402.00	34.2 AV	94.0	-59.8	1.00 V	110	3.60	30.60
9	4804.00	53.5 PK	74.0	-20.5	1.00 V	358	17.00	36.50
10	4804.00	1.5 AV	54.0	-52.5	1.00 V	358	-35.00	36.50

**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:  

$$20 \log (\text{Duty cycle}) = 20 \log (0.25 \text{ ms} / 100 \text{ ms}) = -52.0 \text{ dB}$$
Please see page 16 for plotted duty.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 65%RH 1008 hPa	TESTED BY	Frank Wang

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	91.4 PK	114.0	-22.6	1.48 H	19	60.70	30.70
2	*2441.00	39.4 AV	94.0	-54.6	1.48 H	19	8.70	30.70
3	4882.00	54.0 PK	74.0	-20.0	1.35 H	215	17.30	36.70
4	4882.00	2.0 AV	54.0	-52.0	1.35 H	215	-34.70	36.70
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	88.1 PK	114.0	-25.9	1.10 V	341	57.40	30.70
2	*2441.00	36.1 AV	94.0	-57.9	1.10 V	341	5.40	30.70
3	4882.00	53.2 PK	74.0	-20.8	1.00 V	350	16.50	36.70
4	4882.00	1.2 AV	54.0	-52.8	1.00 V	350	-35.50	36.70

**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:  

$$20 \log (\text{Duty cycle}) = 20 \log (0.25 \text{ ms} / 100 \text{ ms}) = -52.0 \text{ dB}$$

Please see page 16 for plotted duty.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 79	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 65%RH 1008 hPa	TESTED BY	Frank Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	92.1 PK	114.0	-21.9	1.04 H	72	61.20	30.90
2	*2480.00	40.1 AV	94.0	-53.9	1.04 H	72	9.20	30.90
3	2483.50	56.5 PK	74.0	-17.5	1.04 H	72	25.60	30.90
4	2483.50	4.5 AV	54.0	-49.5	1.04 H	72	-26.40	30.90
5	2485.50	40.8 PK	74.0	-33.2	1.04 H	72	9.90	30.90
6	2485.50	17.3 AV	54.0	-36.7	1.04 H	72	-13.60	30.90
7	4960.00	53.6 PK	74.0	-20.4	1.00 H	352	16.70	36.90
8	4960.00	1.6 AV	54.0	-52.4	1.00 H	352	-35.30	36.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.1 PK	74.0	16.1	1.10 V	339	59.20	30.90
2	*2480.00	38.1 AV	54.0	-15.9	1.10 V	339	7.20	30.90
3	2483.50	53.3 PK	74.0	-20.7	1.09 V	339	22.40	30.90
4	2483.50	1.3 AV	54.0	-52.7	1.09 V	339	-29.60	30.90
5	2485.50	55.6 PK	74.0	-18.4	1.10 V	339	24.70	30.90
6	2485.50	23.7 AV	54.0	-30.3	1.10 V	339	-7.20	30.90
7	4960.00	53.2 PK	74.0	-20.8	1.38 V	203	16.30	36.90
8	4960.00	1.2 AV	54.0	-52.8	1.38 V	203	-35.70	36.90

**REMARKS:**

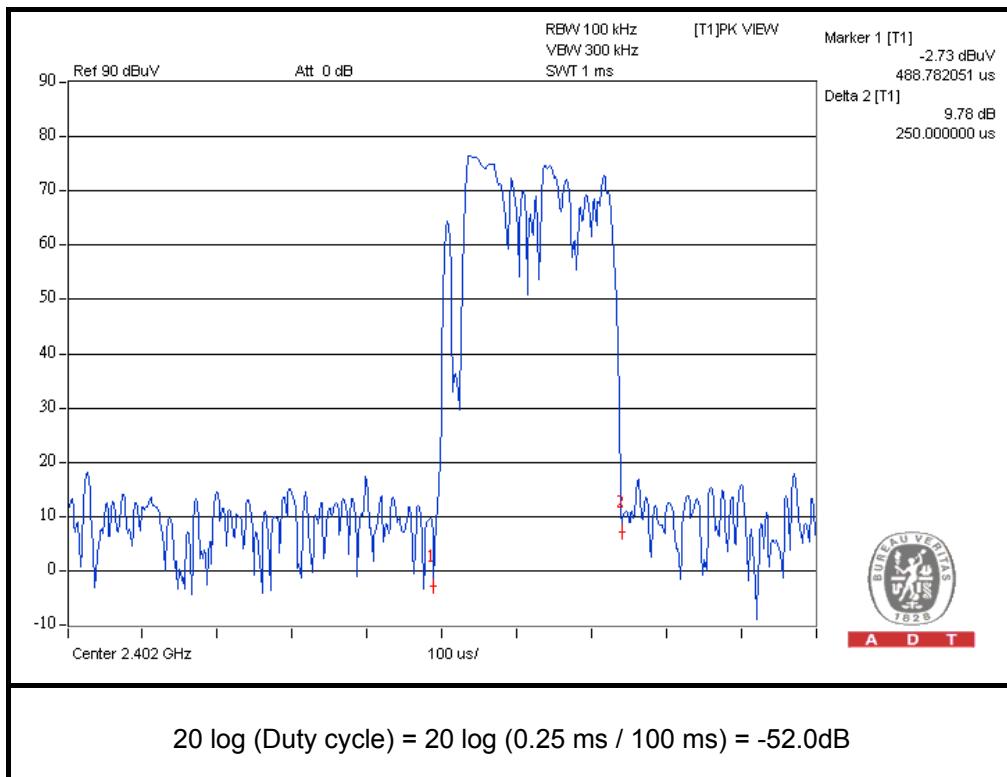
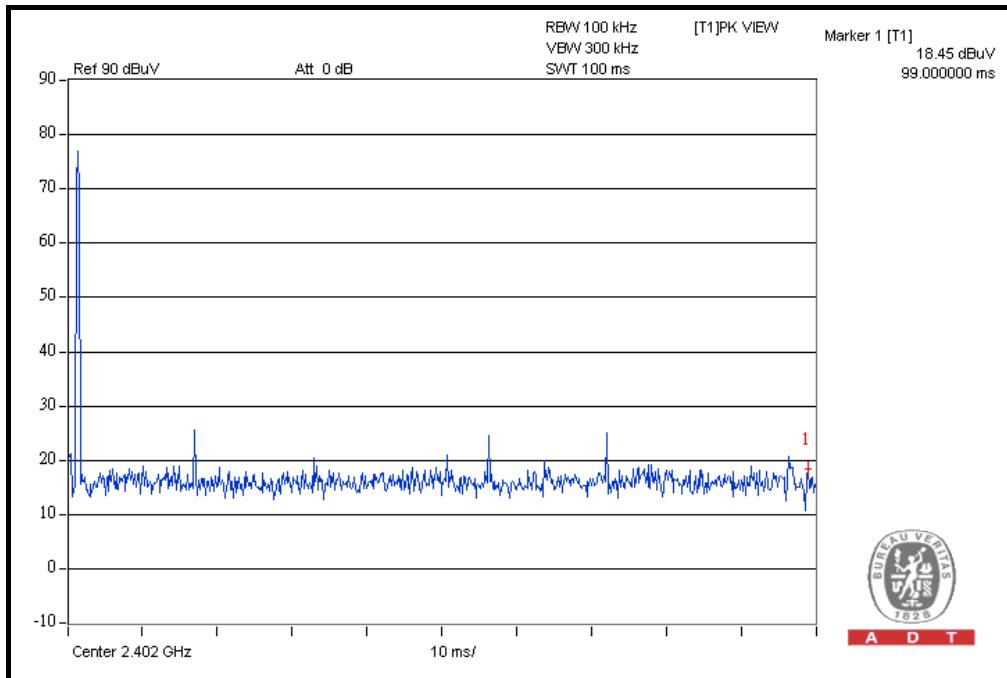
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “\*”: Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  

$$20 \log (\text{Duty cycle}) = 20 \log (0.25 \text{ ms} / 100 \text{ ms}) = -52.0 \text{ dB}$$

Please see page 16 for plotted duty.



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## BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 1		FREQUENCY RANGE Below 1000MHz
INPUT POWER (SYSTEM)		120Vac, 60 Hz		DETECTOR FUNCTION Quasi-Peak
ENVIRONMENTAL CONDITIONS		26deg. C, 65%RH 1008 hPa		TESTED BY Frank Wang

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	189.33	24.1 QP	43.5	-19.4	1.75 H	136	12.60	11.50
2	329.32	24.4 QP	46.0	-21.6	1.00 H	274	10.00	14.40
3	399.31	24.4 QP	46.0	-21.6	1.25 H	292	8.30	16.10
4	543.19	27.5 QP	46.0	-18.5	1.00 H	10	6.90	20.60
5	698.74	32.8 QP	46.0	-13.2	1.50 H	223	10.00	22.80
6	799.84	38.2 QP	46.0	-7.8	1.00 H	271	12.80	25.40
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	31.84	32.1 QP	40.0	-7.9	1.00 V	103	19.80	12.30
2	156.28	24.1 QP	43.5	-19.4	1.00 V	55	10.30	13.80
3	399.31	31.0 QP	46.0	-15.0	1.75 V	298	14.90	16.10
4	698.74	30.5 QP	46.0	-15.5	1.00 V	286	7.70	22.80
5	797.89	41.5 QP	46.0	-4.5	1.25 V	349	16.20	25.30
6	947.60	34.3 QP	46.0	-11.7	1.00 V	118	7.80	26.50

**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 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
0.15 ~ 0.5 0.5 ~ 5 5 ~ 30	Quasi-peak	Average
	66 to 56	56 to 46
	56	46
	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 23, 2009	Nov. 22, 2010
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 31, 2009	Dec. 30, 2010
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Dec. 25, 2009	Dec. 24, 2010
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jul. 08, 2010	Jul. 07, 2011
V-LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jul. 12, 2010	Jul. 11, 2011
Software ADT	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 HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

#### 4.2.3 TEST PROCEDURES

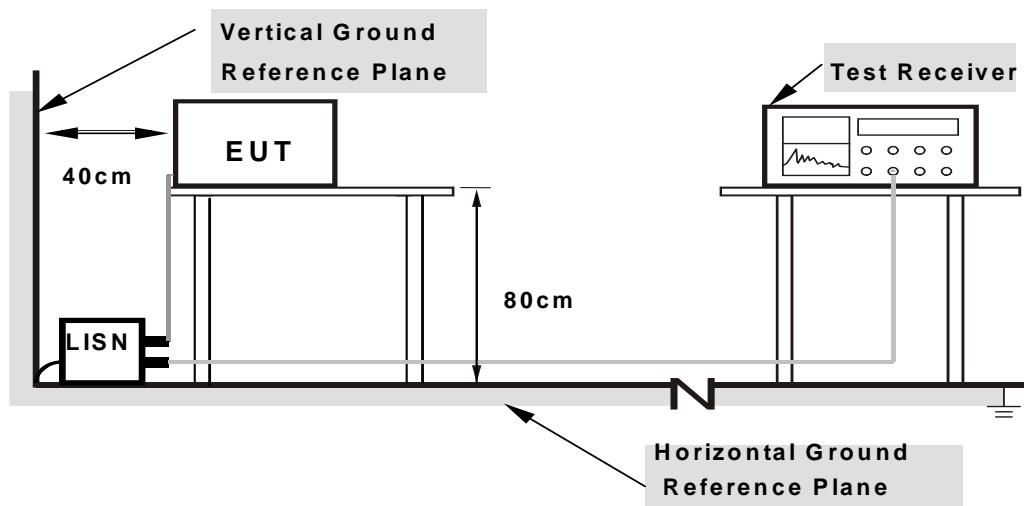
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

## 4.2.7 TEST RESULTS

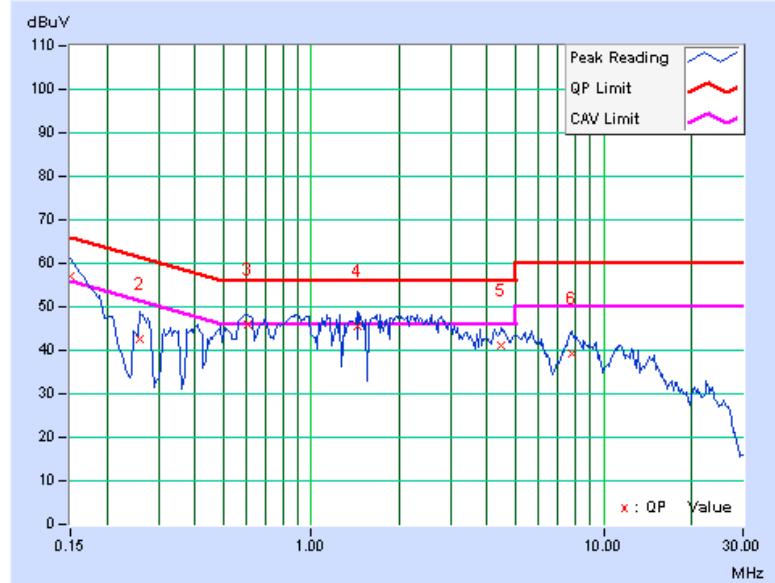
## CONDUCTED WORST-CASE DATA

PHASE	Line 1		6dB BANDWIDTH		9kHz	
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No	Freq. [MHz]	Corr. (dB)	Reading Value		Emission Level		Limit		Margin	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.16	56.72	37.58	56.88	37.74	66.00	56.00	-9.12	-18.26
2	0.259	0.17	42.44	-	42.61	-	61.45	51.45	-18.85	-
3	0.607	0.20	45.76	-	45.96	-	56.00	46.00	-10.04	-
4	1.438	0.26	45.43	-	45.69	-	56.00	46.00	-10.31	-
5	4.461	0.35	40.86	-	41.21	-	56.00	46.00	-14.79	-
6	7.754	0.35	38.73	-	39.08	-	60.00	50.00	-20.92	-

**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.

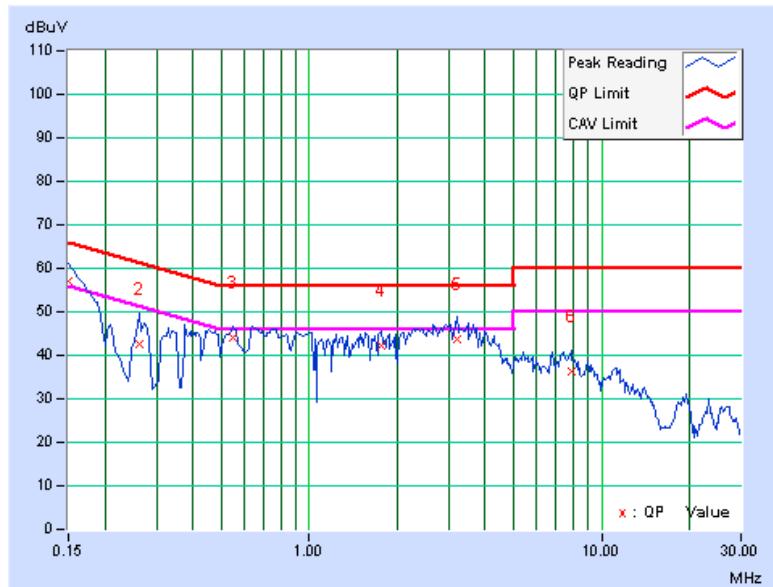


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.12	56.90	37.74	57.02	37.86	66.00	56.00	-8.98	-18.14
2	0.263	0.14	42.39	-	42.53	-	61.33	51.33	-18.80	-
3	0.548	0.17	43.88	-	44.05	-	56.00	46.00	-11.95	-
4	1.754	0.28	41.76	-	42.04	-	56.00	46.00	-13.96	-
5	3.191	0.34	43.23	-	43.57	-	56.00	46.00	-12.43	-
6	7.855	0.41	35.89	-	36.30	-	60.00	50.00	-23.70	-

**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.





### 4.3 BAND EDGES MEASUREMENT

#### 4.3.1 LIMITS OF BAND EDGES MEASUREMENT

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

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100040	Jul. 17, 2010	Jul. 16, 2011

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

#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss 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.

#### 4.3.4 DEVIATION FROM TEST STANDARD

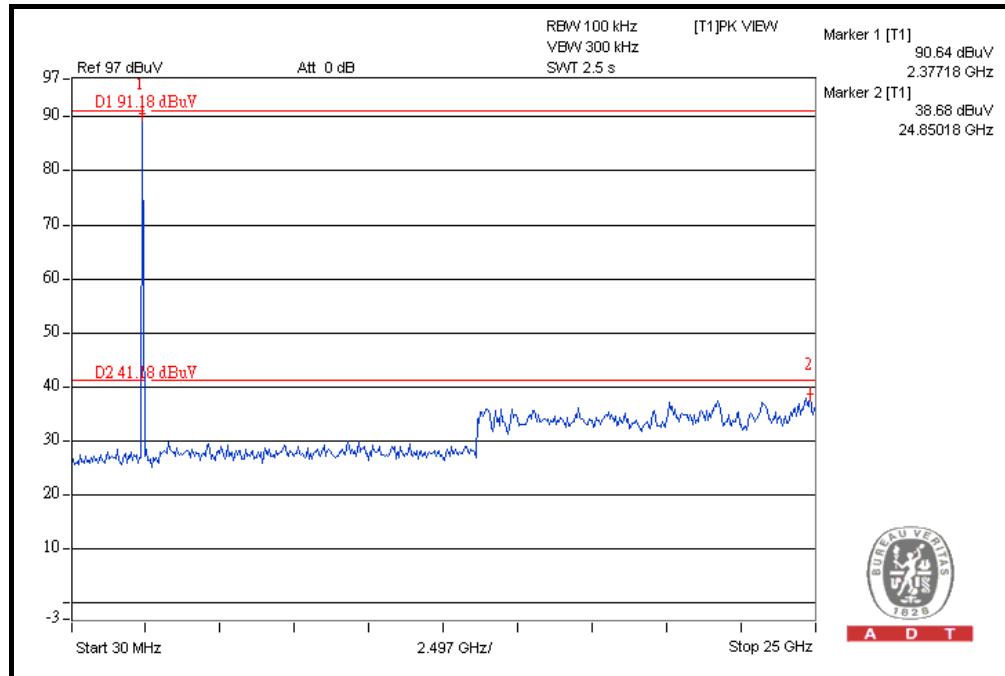
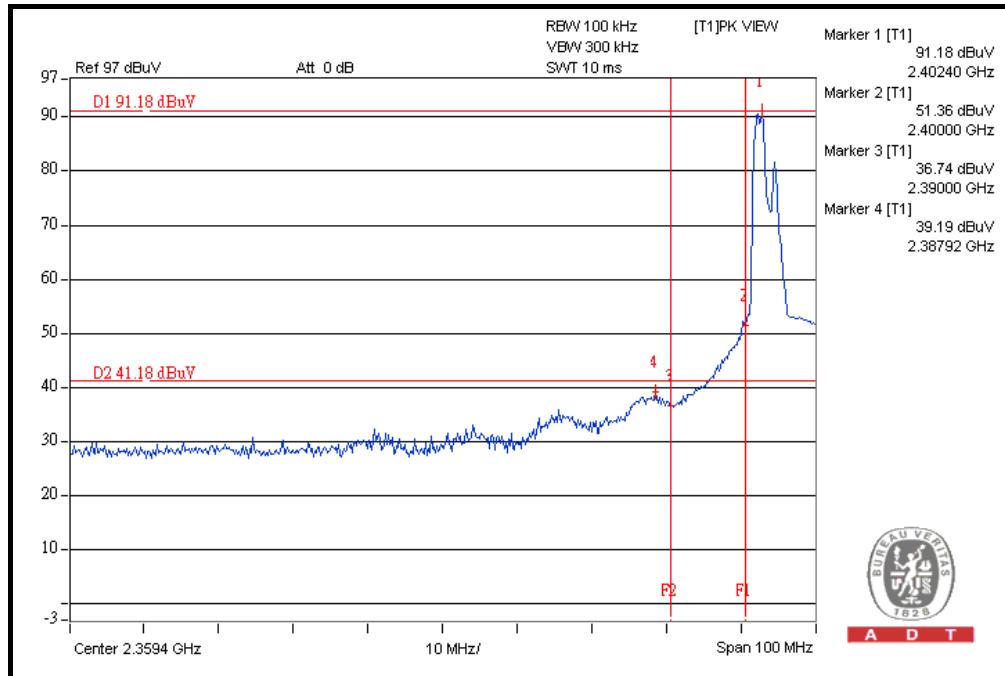
No deviation.

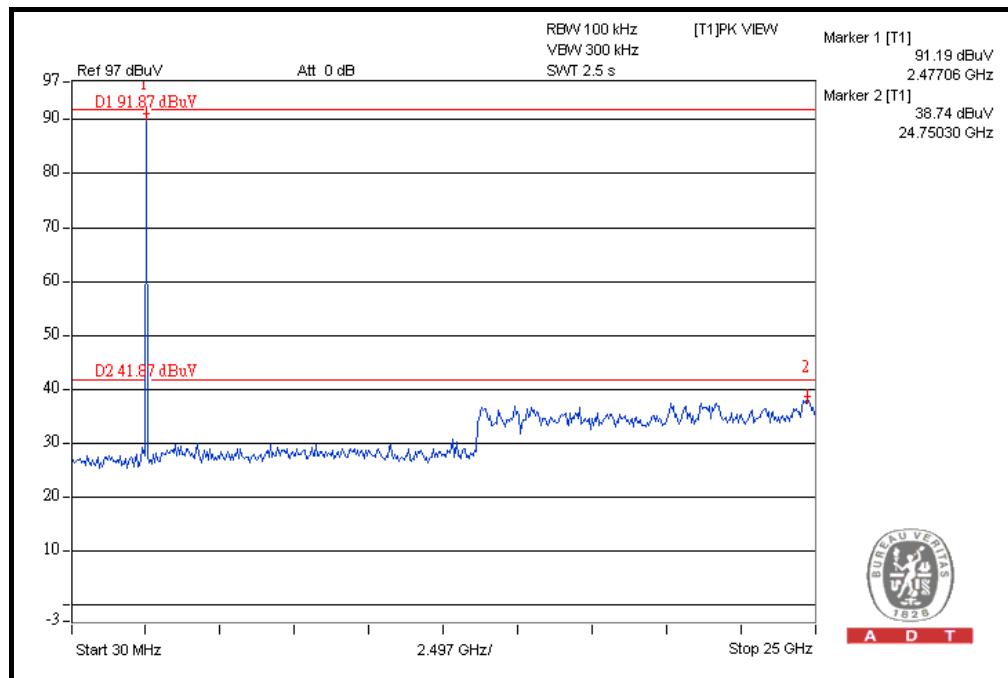
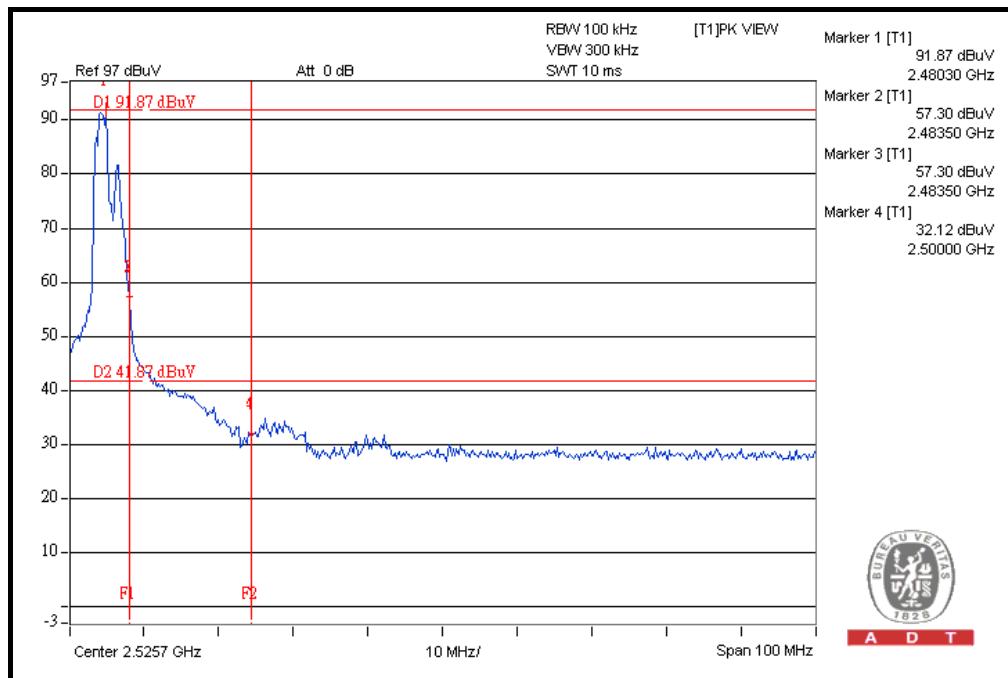
#### 4.3.5 EUT OPERATING CONDITION

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

#### 4.3.6 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 according to ISO/IEC 17025:

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

**Linko EMC/RF Lab**

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

**Hsin Chu EMC/RF Lab**

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

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

Tel: 886-3-3183232  
Fax: 886-3-3185050  
**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

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



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

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

**--- END ---**