

# **FCC TEST REPORT**

**REPORT NO.**: RF991105E04

MODEL NO.: E50802, PocketBook511

FCC ID: NOIE50802

**RECEIVED:** Nov. 05, 2010

**TESTED:** Nov. 12 to 18, 2010

**ISSUED:** Dec. 08, 2010

APPLICANT: NETRONIX, INC.

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302, Taiwan, R.O.C.

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)

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# 1. CERTIFICATION

**PRODUCT:** 5"EBOOK READER DEVICE

BRAND NAME: Netronix, GreenBook, POCKETBOOK

MODEL NO.: E50802, PocketBook511

**TEST SAMPLE:** ENGINEERING SAMPLE

**TESTED DATE:** Nov. 12 to 18, 2010

**APPLICANT:** NETRONIX, INC.

**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)

ANSI C63.4-2003

The above equipment (Model: E50802) 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 : Complete Complete Dec. 08, 2010

(Claire Kuan, Specialist)

TECHNICAL

ACCEPTANCE:  $\int \int dx dx dx = \int \int dx dx = \int \partial dx$ 

(Hank Chung, Deputy Manager)

APPROVED BY : / , DATE: Dec. 08, 2010

(May Chen, Deputy Manager)



# 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)							
Standard Section	Test Type and Limit	Result	Remark				
15.207	AC Power Conducted Emission	NA	Not Applicable				
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.				
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.				
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -1.3dB at 2390.00MHz				
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.				
15.247(d)	Conducted Out-Band Emission Measurement Limit: 20dB less than the peak value of fundamental frequency	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
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.21 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB



# 3. GENERAL INFORMATION

# 3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	5"EBOOK READER DEVICE
MODEL NO.	E50802, PocketBook511
FCC ID	NOIE50802
POWER SUPPLY	DC 5V from host equipment or DC 3.7~4.2V from battery
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps
OPRTAING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11
MAXIMUM OUTPUT POWER	802.11b: 70.8mW 802.11g: 158.5mW
ANTENNA TYPE	Chip antenna (Gain : 2.5dBi)
DATA CABLE	USB cable (shielded, 1.3m)
I/O PORTS	USB port x 1(USB 2.0) Memory slot port x 1(SD)
ASSOCIATED DEVICES	Rechargeable Battery x 1

# NOTE:

1. The EUT has three brand names and two model names which are identical to each other in all aspects except for the following table:

Brand Name	Model No.	Description		
Netronix	E50802			
GreenBook	L30002	For marketing requirement		
POCKETBOOK	PocketBook511			

From the above models, model: **E50802** was selected as representative model for the test and its data was recorded in this report.



2. The EUT could be supplied with a rechargeable battery as the following table:

Brand	Model No.	Spec.
Psebattery	H503456	DC 3.7~4.2V, 1000mAh

3. The EUT was pre-tested under following test modes:

Pre-test	Description	Power Source
Mode A	X-Z plane	Battery
Mode B	X-Y plane	Battery
Mode C	Y-Z plane	Battery

The worst radiated emission was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

- 4. The EUT, operates in the 2.4GHz frequency range, lets you connect IEEE 802.11g and IEEE 802.11b technique devices to the network.
- 5. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided to this EUT.

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		



#### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT		APPLICA	ABLE TO		DECORIDEION
CONFIGURE MODE	PLC	RE < 1G	RE <sup>3</sup> 1G	APCM	DESCRIPTION
-	-	√	√	√	X-Y plane + Battery mode

Where PLC: Power Line Conducted Emission RE < 1G: Radiated Emission below 1GHz

RE <sup>3</sup> 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.

MODE	AVAILABLE TESTED CHANNEL CHANNEL		MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

### **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.

MODE	ODE AVAILABLE CHANNEL		MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

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#### **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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6

#### **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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 11	OFDM	BPSK	6

#### **ANTENNA PORT CONDUCTED MEASUREMENT:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6



# **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY	
<b>RE</b> 31G 24deg. C, 69%RH, 1012 hPa		DC 3.7V	Rex Huang	
RE<1G	24deg. C, 69%RH, 1012 hPa	DC 3.7V	Rex Huang	
APCM	25deg. C, 60%RH, 1012 hPa	DC 3.7V	Rex Huang	

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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:

FCC Part 15, Subpart C. (15.247) ANSI C63.4-2003

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

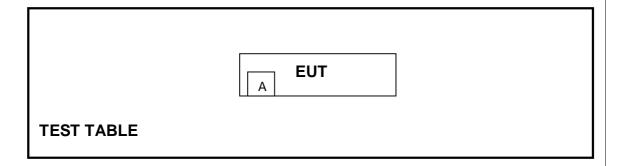
**NOTE**: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



# 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

# 3.5 CONFIGURATION OF SYSTEM UNDER TEST



NOTE: 1. Item A is the SD Card



# **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 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:

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



# 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_ V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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

2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

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

4. The FCC Site Registration No. is 966073.

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

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



#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter 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 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 and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

#### NOTE:

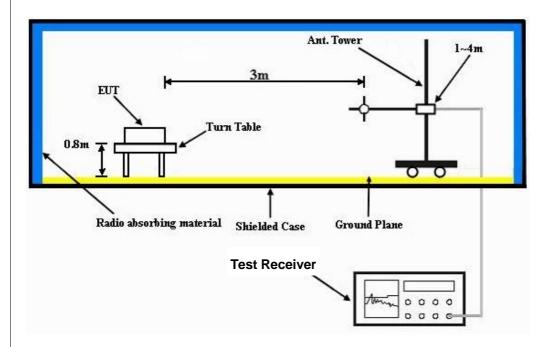
- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- 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.

#### 4.1.4 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: 802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

	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	133.98	22.5 QP	43.50	-21.0	2.25 H	360	9.10	13.40	
2	312.56	29.2 QP	46.00	-16.8	1.00 H	349	13.70	15.50	
3	525.01	33.0 QP	46.00	-13.0	1.75 H	201	12.70	20.30	
4	574.98	41.3 QP	46.00	-4.7	1.50 H	183	19.90	21.40	
5	624.96	41.7 QP	46.00	-4.3	1.50 H	0	19.50	22.20	
6	675.05	38.0 QP	46.00	-8.0	1.25 H	360	15.20	22.80	
7	937.59	30.3 QP	46.00	-15.7	1.50 H	72	3.80	26.50	
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	35.33	20.2 QP	40.00	-19.8	1.00 V	360	6.90	13.30	
2	151.86	17.5 QP	43.50	-26.0	1.75 V	122	3.60	13.90	
3	294.67	18.6 QP	46.00	-27.4	2.00 V	339	3.60	15.00	
4	574.98	30.9 QP	46.00	-15.1	1.50 V	291	9.50	21.40	
5	625.07	28.3 QP	46.00	-17.7	1.50 V	360	6.10	22.20	
6	693.05	28.3 QP	46.00	-17.7	1.50 V	42	5.20	23.10	
7	858.01	26.0 QP	46.00	-20.0	1.25 V	268	0.50	25.50	

- 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 WORST-CASE DATA**

# **802.11b DSSS MODULATION**

<b>EUT TEST CONDITION</b>		MEASUREMENT DETAIL		
CHANNEL Channel 1		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

	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	2336.88	62.1 PK	74.00	-11.9	1.00 H	242	30.60	31.50		
2	2336.88	51.9 AV	54.00	-2.1	1.00 H	242	20.40	31.50		
3	*2412.00	109.9 PK			1.00 H	246	78.20	31.70		
4	*2412.00	107.6 AV			1.00 H	246	75.90	31.70		
5	4824.00	46.1 PK	74.00	-27.9	1.77 H	353	7.10	39.00		
6	4824.00	35.2 AV	54.00	-18.8	1.77 H	353	-3.80	39.00		
		ANTENNA	A POLARIT	/ & TEST DI	STANCE: V	ERTICAL A	T 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	56.0 PK	74.00	-18.0	1.02 V	265	24.30	31.70		
2	2390.00	44.3 AV	54.00	-9.7	1.02 V	265	12.60	31.70		
3	*2412.00	101.2 PK			1.02 V	265	69.50	31.70		
4	*2412.00	99.0 AV			1.02 V	265	67.30	31.70		
5	4824.00	46.6 PK	74.00	-27.4	1.07 V	118	7.60	39.00		
6	4824 00	36.0 AV	54 00	-18.0	1 07 V	118	-3.00	39.00		

- 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.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Channel 6		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

	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	*2437.00	108.6 PK			1.00 H	248	76.80	31.80		
2	*2437.00	106.5 AV			1.00 H	248	74.70	31.80		
3	4874.00	46.4 PK	74.00	-27.6	1.00 H	250	7.30	39.10		
4	4874.00	34.5 AV	54.00	-19.5	1.00 H	250	-4.60	39.10		
5	7311.00	54.4 PK	74.00	-19.6	1.00 H	279	7.80	46.60		
6	7311.00	42.0 AV	54.00	-12.0	1.00 H	279	-4.60	46.60		
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*2437.00	101.3 PK			1.00 V	266	69.50	31.80		
2	*2437.00	99.0 AV			1.00 V	266	67.20	31.80		
3	4874.00	47.3 PK	74.00	-26.7	1.06 V	119	8.20	39.10		
4	4874.00	34.9 AV	54.00	-19.1	1.06 V	119	-4.20	39.10		
5	7311.00	53.9 PK	74.00	-20.1	1.00 V	216	7.30	46.60		
6	7311.00	41.8 AV	54.00	-12.2	1.00 V	216	-4.80	46.60		

- 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.



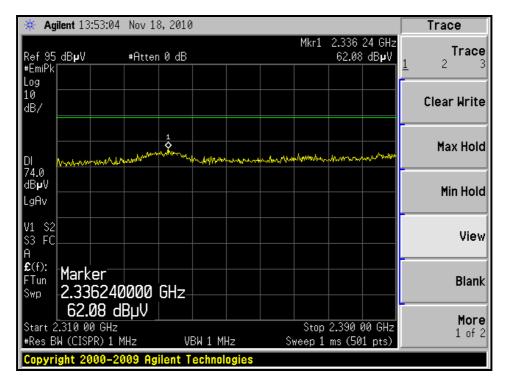
EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

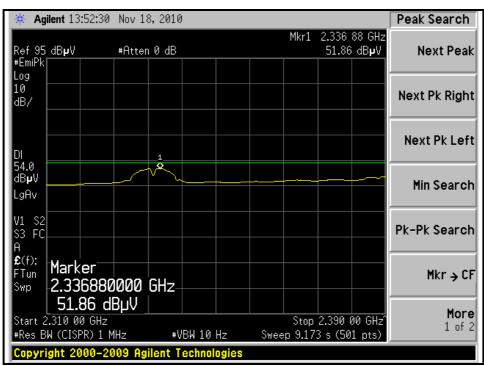
		ANTENNA I	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	AT 3 M	
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.9 PK			1.00 H	249	76.00	31.90
2	*2462.00	105.8 AV			1.00 H	249	73.90	31.90
3	2483.50	59.6 PK	74.00	-14.4	1.00 H	249	27.60	32.00
4	2483.50	47.1 AV	54.00	-6.9	1.00 H	249	15.10	32.00
5	4924.00	46.6 PK	74.00	-27.4	1.00 H	254	7.30	39.30
6	4924.00	34.6 AV	54.00	-19.4	1.00 H	254	-4.70	39.30
7	7386.00	54.1 PK	74.00	-19.9	1.00 H	3	7.50	46.60
8	7386.00	42.3 AV	54.00	-11.7	1.00 H	3	-4.30	46.60
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*2462.00	99.7 PK			1.00 V	266	67.80	31.90
2	*2462.00	97.3 AV			1.00 V	266	65.40	31.90
3	2483.50	56.2 PK	74.00	-17.8	1.00 V	266	24.20	32.00
4	2483.50	43.9 AV	54.00	-10.1	1.00 V	266	11.90	32.00
5	4924.00	47.6 PK	74.00	-26.4	1.08 V	114	8.30	39.30
6	4924.00	34.8 AV	54.00	-19.2	1.08 V	114	-4.50	39.30
7	7386.00	54.5 PK	74.00	-19.5	1.00 V	175	7.90	46.60
8	7386.00	42.4 AV	54.00	-11.6	1.00 V	175	-4.20	46.60

- 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.



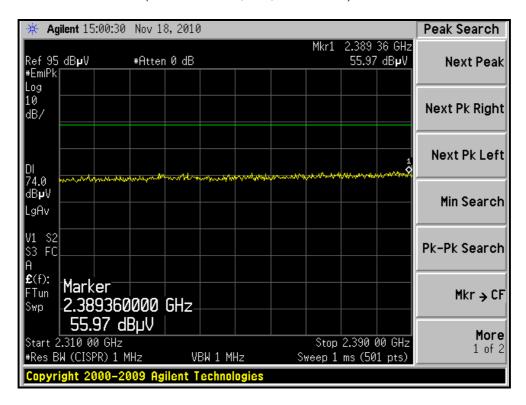
## RESTRICTED BANDEDGE (802.11b MODE, CH1, HORIZONTAL)

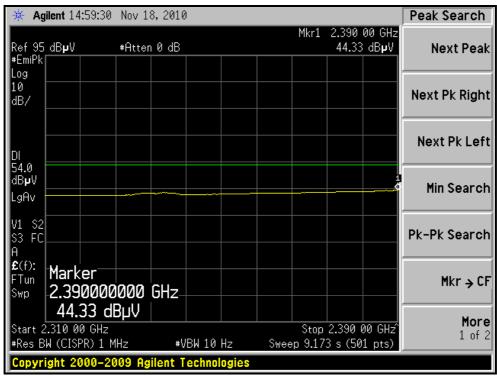






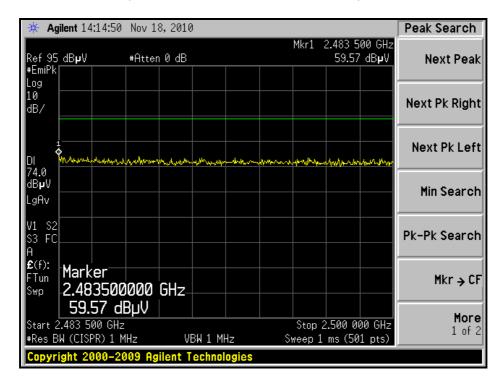
#### RESTRICTED BANDEDGE (802.11b MODE, CH1, VERTICAL)

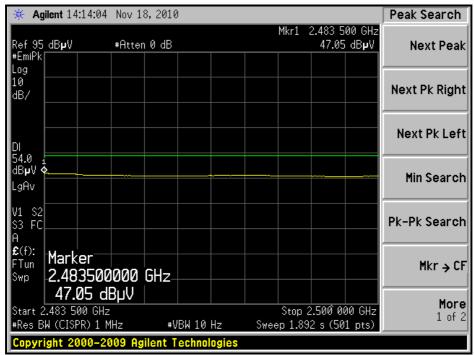






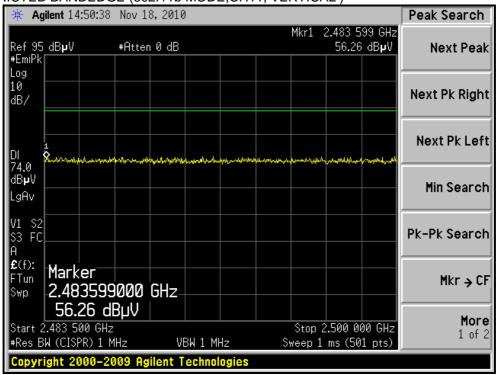
#### RESTRICTED BANDEDGE (802.11b MODE, CH11, HORIZONTAL)

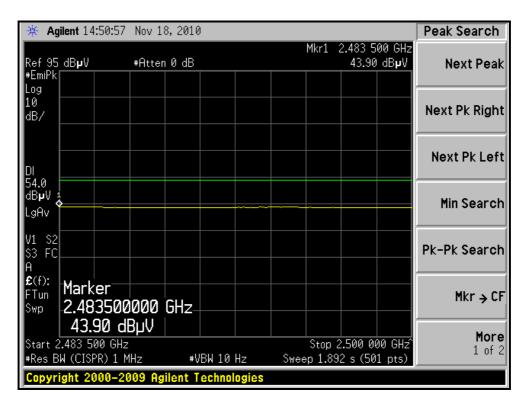






#### RESTRICTED BANDEDGE (802.11b MODE, CH11, VERTICAL)







# **802.11g OFDM MODULATION**

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	IANNEL Channel 1 FREQUENCY RANGE		1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

	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	67.1 PK	74.00	-6.9	1.00 H	249	35.40	31.70	
2	2390.00	52.7 AV	54.00	-1.3	1.00 H	249	21.00	31.70	
3	*2412.00	108.9 PK			1.00 H	249	77.20	31.70	
4	*2412.00	100.0 AV			1.00 H	249	68.30	31.70	
5	4824.00	45.6 PK	74.00	-28.4	1.00 H	351	6.60	39.00	
6	4824.00	33.8 AV	54.00	-20.2	1.00 H	351	-5.20	39.00	
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	59.6 PK	74.00	-14.4	1.03 V	265	27.90	31.70	
2	2390.00	46.1 AV	54.00	-7.9	1.03 V	265	14.40	31.70	
3	*2412.00	100.3 PK			1.03 V	265	68.60	31.70	
4	*2412.00	91.2 AV			1.03 V	265	59.50	31.70	
5	4824.00	45.9 PK	74.00	-28.1	1.07 V	113	6.90	39.00	
6	4824.00	33.9 AV	54.00	-20.1	1.07 V	113	-5.10	39.00	

- 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.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

	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	*2437.00	109.1 PK			1.00 H	249	77.30	31.80		
2	*2437.00	99.7 AV			1.00 H	249	67.90	31.80		
3	4874.00	46.2 PK	74.00	-27.8	1.00 H	254	7.10	39.10		
4	4874.00	34.1 AV	54.00	-19.9	1.00 H	254	-5.00	39.10		
5	7311.00	54.2 PK	74.00	-19.8	1.00 H	306	7.60	46.60		
6	7311.00	42.1 AV	54.00	-11.9	1.00 H	306	-4.50	46.60		
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*2437.00	100.9 PK			1.00 V	265	69.10	31.80		
2	*2437.00	91.5 AV			1.00 V	265	59.70	31.80		
3	4874.00	46.5 PK	74.00	-27.5	1.06 V	114	7.40	39.10		
4	4874.00	34.4 AV	54.00	-19.6	1.06 V	114	-4.70	39.10		
5	7311.00	54.3 PK	74.00	-19.7	1.00 V	242	7.70	46.60		
6	7311.00	41.9 AV	54.00	-12.1	1.00 V	242	-4.70	46.60		

- 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.



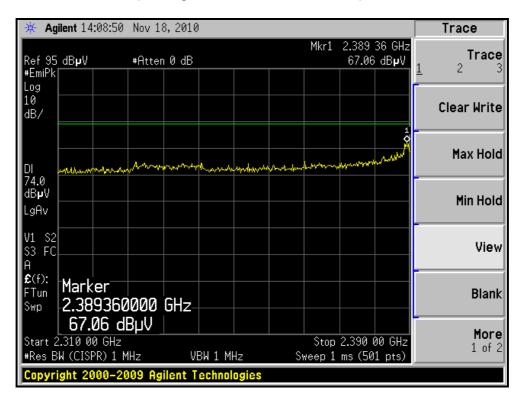
EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH 1012 hPa	TESTED BY	Rex Huang	

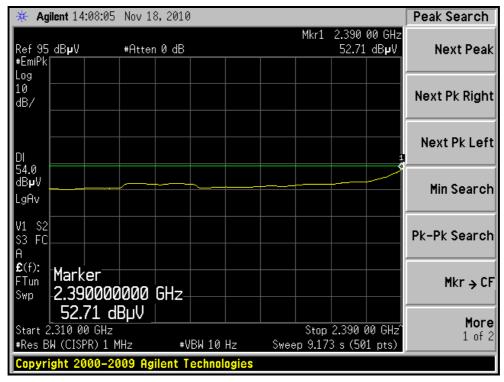
	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)	
1	*2462.00	107.8 PK			1.00 H	249	75.90	31.90	
2	*2462.00	98.7 AV			1.00 H	249	66.80	31.90	
3	2483.50	64.1 PK	74.00	-9.9	1.00 H	249	32.10	32.00	
4	2483.50	51.6 AV	54.00	-2.4	1.00 H	249	19.60	32.00	
5	4924.00	46.3 PK	74.00	-27.7	1.00 H	262	7.00	39.30	
6	4924.00	34.4 AV	54.00	-19.6	1.00 H	262	-4.90	39.30	
7	7386.00	54.2 PK	74.00	-19.8	1.00 H	19	7.60	46.60	
8	7386.00	42.1 AV	54.00	-11.9	1.00 H	19	-4.50	46.60	
		ANTENNA	A POLARIT	/ & TEST DI	STANCE: V	ERTICAL A	T 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	*2462.00	100.2 PK			1.00 V	265	68.30	31.90	
2	*2462.00	90.8 AV			1.00 V	265	58.90	31.90	
3	2483.50	58.7 PK	74.00	-15.3	1.00 V	265	26.70	32.00	
4	2483.50	45.8 AV	54.00	-8.2	1.00 V	265	13.80	32.00	
5	4924.00	47.1 PK	74.00	-26.9	1.10 V	112	7.80	39.30	
6	4924.00	34.6 AV	54.00	-19.4	1.10 V	112	-4.70	39.30	
7	7386.00	54.3 PK	74.00	-19.7	1.00 V	163	7.70	46.60	
8	7386.00	42.1 AV	54.00	-11.9	1.00 V	163	-4.50	46.60	

- 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.



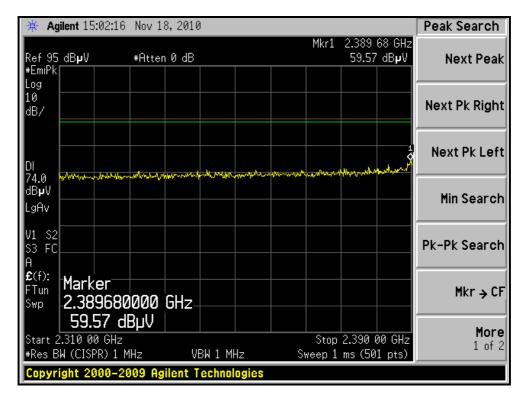
### RESTRICTED BANDEDGE (802.11g MODE, CH1, HORIZONTAL)

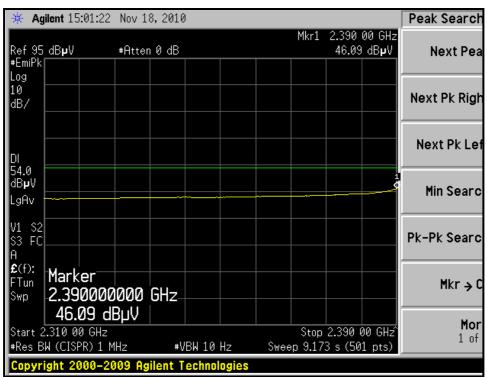






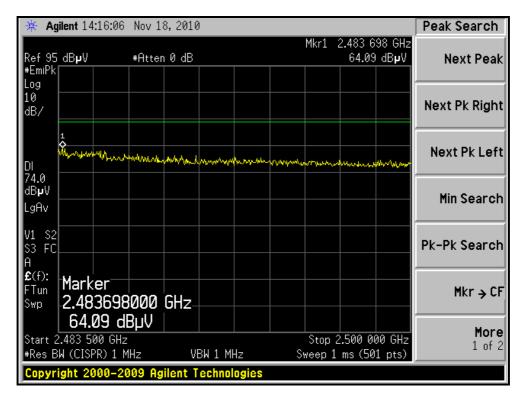
#### RESTRICTED BANDEDGE (802.11g MODE, CH1, VERTICAL)

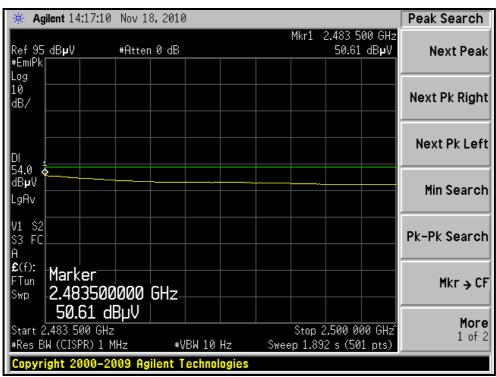






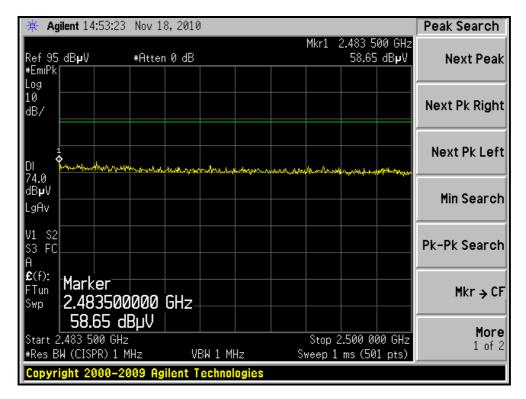
#### RESTRICTED BANDEDGE (802.11g MODE, CH11, HORIZONTAL)

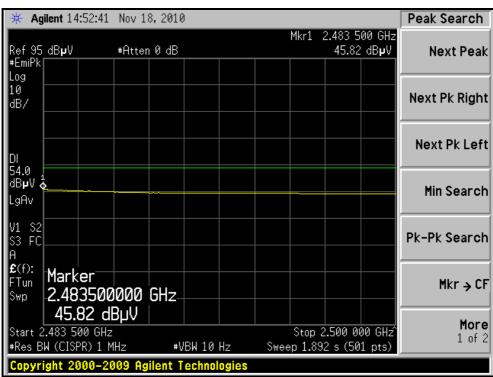






#### RESTRICTED BANDEDGE (802.11g MODE, CH11, VERTICAL)







# 4.2 6dB BANDWIDTH MEASUREMENT

# 4.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

# 4.2.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL CALIBRATED		CALIBRATED	
MANUFACTURER	WIODEL NO.	NO.	DATE	UNTIL	
Spectrum Analyzer	FSP 40	100036	Dec. 18, 2009	Dec. 17, 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 through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.2.5 TEST SETUP



# 4.2.6 EUT OPERATING CONDITIONS

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

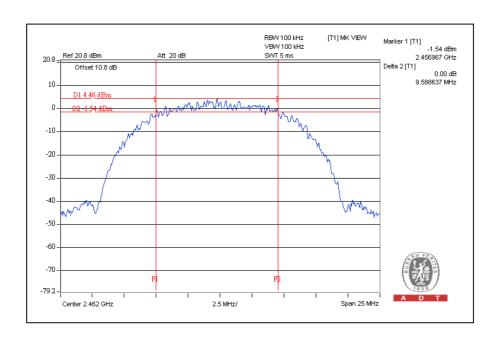


# 4.2.7 TEST RESULTS

# 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	9.56	0.5	PASS
6	2437	9.55	0.5	PASS
11	2462	9.58	0.5	PASS

# CH11

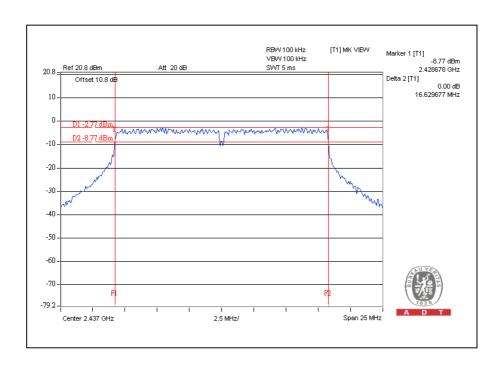




# 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.59	0.5	PASS
6	2437	16.62	0.5	PASS
11	2462	16.60	0.5	PASS

# CH6





#### 4.3 MAXIMUM PEAK OUTPUT POWER

#### 4.3.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

#### 4.3.2 INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL NO.	CALIBRATED	CALIBRATED
MANUFACTURER	model no	OLIVIAL IVOI	DATE	UNTIL
Anritsu Power Meter	ML2495A	0824006	May 04, 2010	May 03, 2011
Pulse Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

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

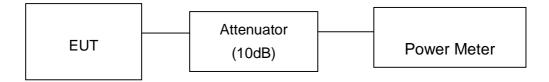
#### 4.3.3 TEST PROCEDURES

- 1. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.
- 2. Record the power level.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP





# 4.3.6 EUT OPERATING CONDITIONS

Same as Item 4.2.6



## 4.3.7 TEST RESULTS

#### 802.11b

CHAN	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (mW)	POWER OUTPUT (dBm)	POWER LIMIT (dBm)	PASS/FAIL
1	2412	66.1	18.2	30	PASS
6	2437	70.8	18.5	30	PASS
11	2462	58.9	17.7	30	PASS

# 802.11g

CHAN	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (mW)	POWER OUTPUT (dBm)	POWER LIMIT (dBm)	PASS/FAIL
1	2412	158.5	22.0	30	PASS
6	2437	147.9	21.7	30	PASS
11	2462	151.9	21.8	30	PASS



## 4.4 POWER SPECTRAL DENSITY MEASUREMENT

## 4.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

## 4.4.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER	WODEL NO.	NO.	DATE	UNTIL
Spectrum Analyzer	FSP 40	100036	Dec. 18, 2009	Dec. 17, 2010

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



#### 4.4.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP

EUT SPECTRUM ANALYZER

## 4.4.6 EUT OPERATING CONDITION

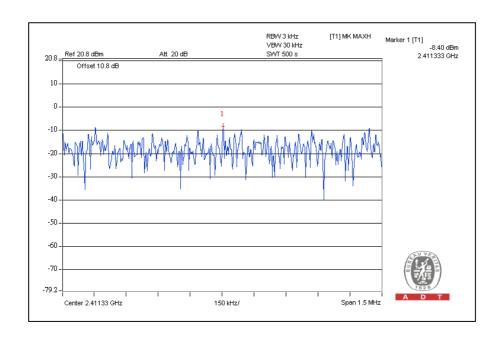
Same as Item 4.3.6



## 4.4.7 TEST RESULTS

#### 802.11b

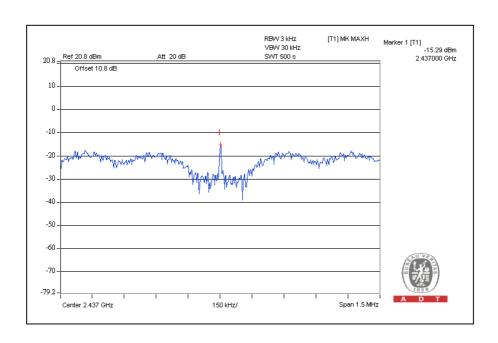
CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-8.4	8	PASS
6	2437	-9.5	8	PASS
11	2462	-9.3	8	PASS





# 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-15.6	8	PASS
6	2437	-15.3	8	PASS
11	2462	-15.4	8	PASS





#### 4.5 CONDUCTED OUT-BAND EMISSION MEASUREMENT

#### 4.5.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

#### 4.5.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER	WODEL NO.	NO.	DATE	UNTIL
Spectrum Analyzer	FSP 40	100036	Dec. 18, 2009	Dec. 17, 2010

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

#### 4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW of spectrum analyzer to 100kHz and VBW of spectrum analyzer to 300kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (RBW = 100kHz, VBW = 300kHz) are attached on the following pages.



## 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.5.5 EUT OPERATING CONDITION

Same as Item 4.3.6

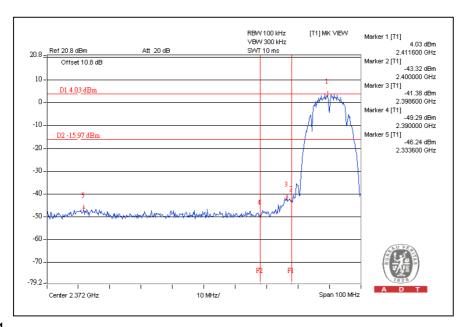
## 4.5.6 TEST RESULTS

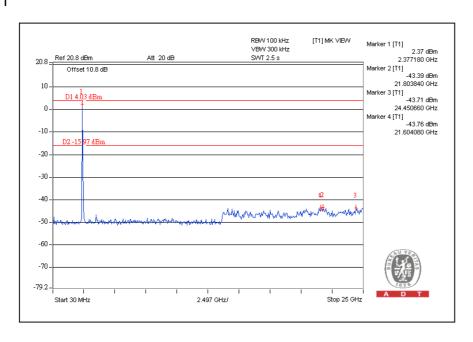
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).



#### 802.11b:

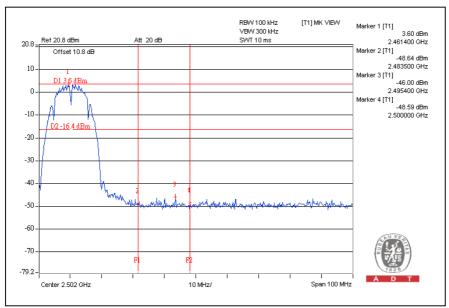
## CH1

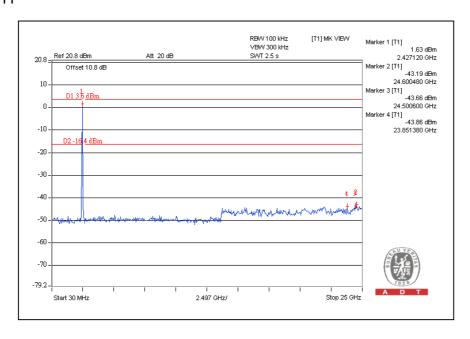






## **CH11**

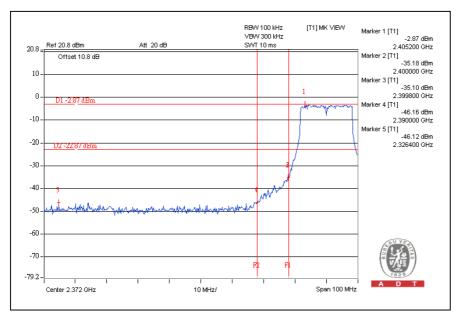


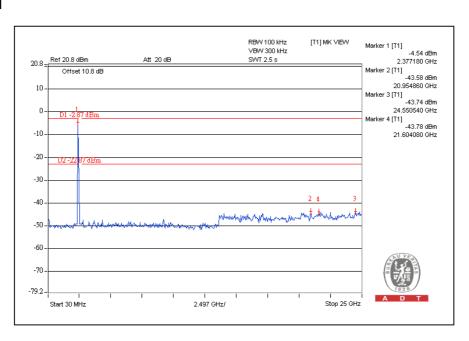




## 802.11g:

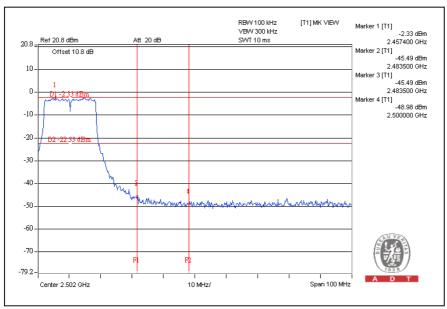
## CH1

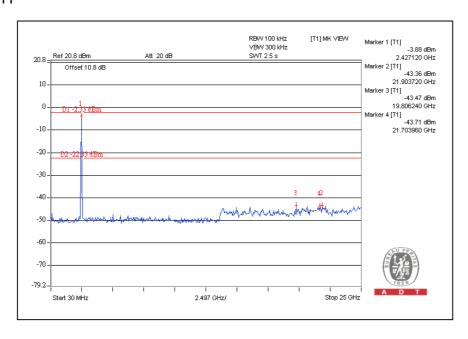






## **CH11**







## **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: <a href="https://www.adt.com.tw/index.5/phtml">www.adt.com.tw/index.5/phtml</a>. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:Hsin Chu EMC/RF Lab:Tel: 886-2-26052180Tel: 886-3-5935343Fax: 886-2-26052943Fax: 886-3-5935342

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

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



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

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