

# FCC TEST REPORT

**REPORT NO.:** RF980401H11A

**MODEL NO.:** WM5204Z

**RECEIVED:** Apr. 16, 2010

**TESTED:** Apr. 27 to 29, 2010

**ISSUED:** May 07, 2010

**APPLICANT:** ZyXEL Communications Corporation

**ADDRESS:** No. 6, Innovation Road II, Science-Park, Hsin-Chu,  
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**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
Ltd., Taoyuan Branch Hsin Chu Laboratory

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## 1. CERTIFICATION

**PRODUCT :** Wireless LAN USB 2.0 Adapter

**BRAND :** ZyXEL

**MODEL NO.:** WM5204Z

**APPLICANT :** ZyXEL Communications Corporation

**TESTED :** Apr. 27 to 29, 2010

**TEST SAMPLE :** MASS-PRODUCTION

**STANDARDS :** FCC Part 15, Subpart C (Section 15.247),  
ANSI C63.4-2003

The above equipment (Model: WM5204Z2) 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 :** Carol Liao , **DATE:** May 07, 2010  
( Carol Liao, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** May 07, 2010  
( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** May 07, 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			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -8.66dB at 2.609MHz
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -4.5dB at 2487.79MHz.
15.203	Antenna Requirement	PASS	Antenna connector is I-PEX not a standard connector.

**NOTE:** This report is prepared for FCC class II permissive change. Only conducted emission, radiated emission and maximum peak output power were presented in this test report.

### 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)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless LAN USB 2.0 Adapter
<b>MODEL NO.</b>	WM5204Z
<b>FCC ID</b>	I88WM5204Z
<b>POWER SUPPLY</b>	DC 3.3 $\pm$ 5% V from host equipment
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11b: 11 / 5.5 / 2 / 1Mbps 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps
<b>FREQUENCY RANGE</b>	2412MHz ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11
<b>MAXIMUM OUTPUT POWER</b>	802.11b: 134.9mW 802.11g: 275.4mW
<b>ANTENNA TYPE</b>	Please see note 1
<b>DATA CABLE</b>	NA

**NOTE:**

1. This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF980401H11 design is as the following information:

- U Modify the RF rejection filter for second source
- U Add one capacitor and one resistor in non RF path for better circuit stability
- U Modify antenna cable as below table:

Original							
Manufacture		Model No.		Antenna Type		Gain (dBi)	Antenna Connector
ZyXEL		N/A		PIFA		1.60126	I-PEX
Newly							
Antenna Type	Antenna Connector	Antenna Gain (dBi)	Cable loss(dB)	Net Gain (dBi)	Cable Length (cm)	Frequency range (MHz)	Diversity Function
PIFA	I-PEX	1.6	0.5	1.1	15	2400~2483	N/A



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2. The EUT, operates in the 2.4GHz frequency range, lets you connect IEEE 802.11g or IEEE 802.11b devices to the network. With its high-speed data transmissions of up to 54Mbps.
3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided for 802.11b, 802.11g:

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

Where **PLC**: Power Line Conducted Emission

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

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

**APCM**: Antenna Port Conducted Measurement

#### **POWER LINE CONDUCTED EMISSION TEST:**

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

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

#### **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

# **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 (SYSTEM)	TESTED BY
RE <sup>3</sup> 1G	19deg. C, 67%RH, 1015 hPa	120Vac, 60Hz	Wen Yu
RE<1G	19deg. C, 67%RH, 1015 hPa	120Vac, 60Hz	Wen Yu
PLC	25deg. C, 58%RH, 1015 hPa	120Vac, 60Hz	Wen Yu
APCM	25deg. C, 60%RH, 1015 hPa	120Vac, 60Hz	Kent Liu



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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.

### 3.4 DESCRIPTION OF SUPPORT UNITS

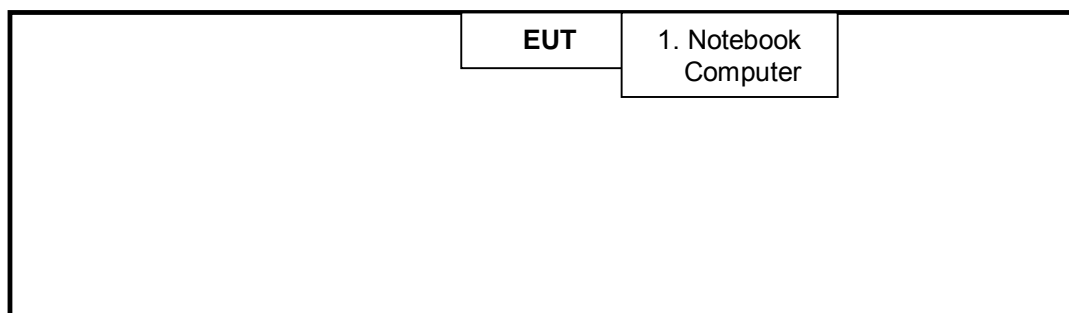
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	DSL32S	FCC DoC

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).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST



**Note:** Use one USB connector to test between notebook computer and EUT.

## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. 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.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec. 14, 2009	Dec. 13, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
Software	BV ADT_ Cond_V7.3.7	NA	NA	NA

**Note:**

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

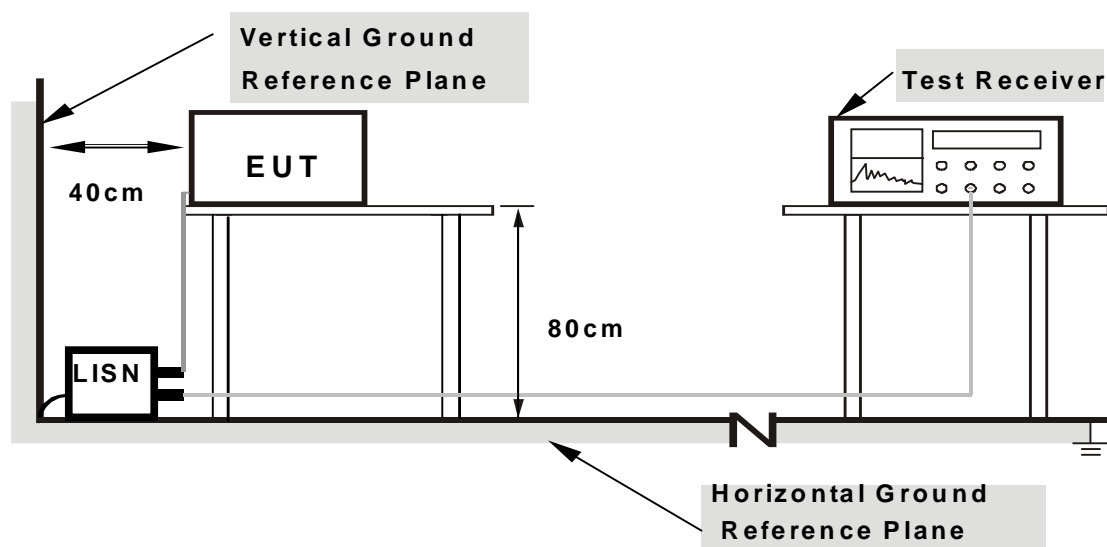
#### 4.1.3 TEST PROCEDURES

- 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.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 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 from other units and other metal planes**

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

#### 4.1.6 EUT OPERATING CONDITIONS

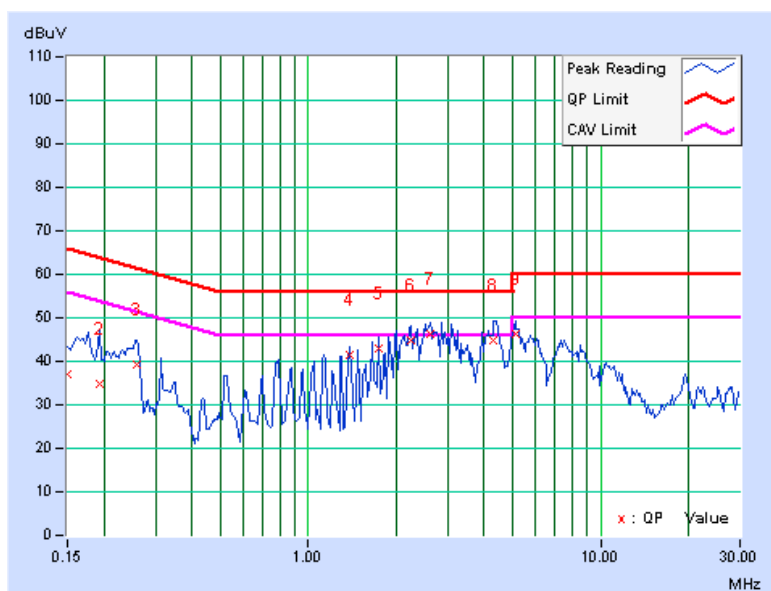
- a. Plug the EUT into the support unit 1 (Notebook computer) which is placed on a testing table.
- b. Support unit 1 (Notebook computer) runs test program “QA RT3x7x V1.5.2.0” to enable EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	Q.P. [dB (uV)]	AV. [dB (uV)]	Q.P. [dB (uV)]	AV. [dB (uV)]	Q.P. [dB (uV)]	AV. [dB (uV)]	Q.P. (dB)	AV. (dB)
1	0.150	0.04	37.05	-	37.09	-	66.00	56.00	-28.91	-
2	0.193	0.04	34.78	-	34.82	-	63.91	53.91	-29.09	-
3	0.259	0.05	39.12	-	39.17	-	61.45	51.45	-22.29	-
4	1.387	0.10	41.34	-	41.44	-	56.00	46.00	-14.56	-
5	1.734	0.11	42.73	-	42.84	-	56.00	46.00	-13.16	-
6	2.258	0.13	44.75	-	44.88	-	56.00	46.00	-11.12	-
7	<b>2.609</b>	<b>0.14</b>	<b>46.05</b>	<b>37.20</b>	<b>46.19</b>	<b>37.34</b>	<b>56.00</b>	<b>46.00</b>	<b>-9.81</b>	<b>-8.66</b>
8	4.301	0.21	44.60	-	44.81	-	56.00	46.00	-11.19	-
9	5.152	0.23	46.02	-	46.25	-	60.00	50.00	-13.75	-

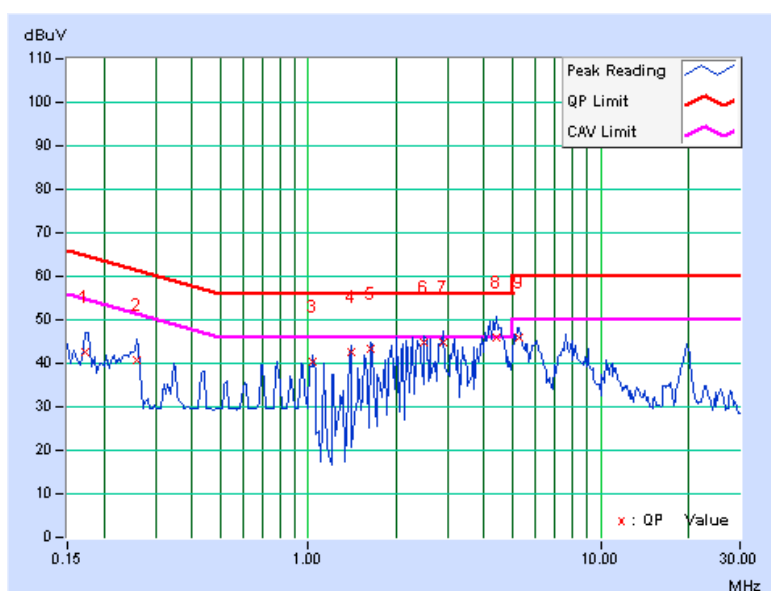
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.05	42.54	-	42.59	-	64.79	54.79	-22.20	-
2	0.259	0.06	40.61	-	40.67	-	61.45	51.45	-20.79	-
3	1.039	0.10	40.22	-	40.32	-	56.00	46.00	-15.68	-
4	1.402	0.11	42.48	-	42.59	-	56.00	46.00	-13.41	-
5	1.637	0.12	43.05	-	43.17	-	56.00	46.00	-12.83	-
6	2.500	0.15	44.74	-	44.89	-	56.00	46.00	-11.11	-
7	2.891	0.17	44.68	-	44.85	-	56.00	46.00	-11.15	-
8	4.414	0.23	45.80	37.02	46.03	37.25	56.00	46.00	-9.97	-8.75
9	5.246	0.25	45.75	-	46.00	-	60.00	50.00	-14.00	-

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



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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.



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## 4.2.2 TEST INSTRUMENTS

Test date: Apr. 27, 2010

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

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The horn antenna, preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.  
3. The test was performed in Open Site No. C.  
4. The FCC Site Registration No. is 656396.  
5. The VCCI Site Registration No. is R-1626.  
6. The CANADA Site Registration No. is IC 7450G-3.

#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 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.

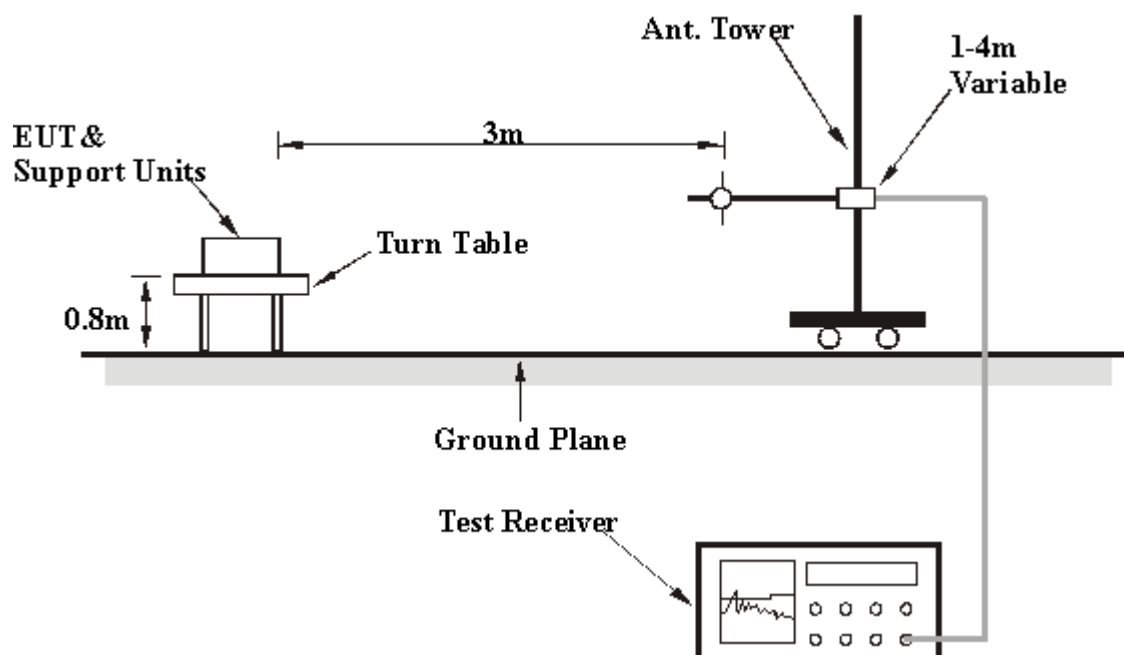
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.2.5 TEST SETUP



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

## 4.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6



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## Below 1GHz Test Data

### 4.2.7 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA : 802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	44.31	28.8 QP	40.0	-11.2	1.00 H	0	14.44	14.35
2	120.00	24.8 QP	43.5	-18.7	1.00 H	143	12.85	11.95
3	325.00	32.0 QP	46.0	-14.0	1.00 H	253	15.38	16.64
4	600.00	37.1 QP	46.0	-8.9	1.30 H	197	13.20	23.87
5	750.00	34.1 QP	46.0	-11.9	1.00 H	42	8.37	25.71
6	960.01	32.9 QP	54.0	-21.1	1.00 H	36	4.19	28.68
7	1000.00	40.0 QP	54.0	-14.0	1.31 H	229	10.94	29.04
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	49.75	32.5 QP	40.0	-7.5	1.00 V	193	19.19	13.32
2	133.49	27.5 QP	43.5	-16.0	1.11 V	302	14.07	13.39
3	325.00	31.9 QP	46.0	-14.1	1.00 V	243	15.24	16.64
4	600.00	36.6 QP	46.0	-9.4	1.00 V	214	12.76	23.87
5	750.00	34.1 QP	46.0	-11.9	1.00 V	60	8.39	25.71
6	847.60	31.3 QP	46.0	-14.7	1.23 V	216	4.01	27.32
7	960.00	35.3 QP	46.0	-10.7	1.34 V	177	6.58	28.68
8	1000.00	40.1 QP	54.0	-13.9	1.34 V	5	11.09	29.04

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

## Above 1GHz Test Data

### 4.2.8 TEST RESULTS

#### 802.11b DSSS MODULATION

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	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2386.27	56.7 PK	74.0	-17.3	1.28 H	254	26.63	30.05
2	2386.27	46.6 AV	54.0	-7.4	1.28 H	254	16.52	30.05
3	*2412.00	106.3 PK			1.28 H	253	76.12	30.15
4	*2412.00	103.1 AV			1.28 H	253	72.90	30.15
5	4824.00	50.3 PK	74.0	-23.7	1.37 H	175	14.89	35.43
6	4824.00	47.6 AV	54.0	-6.4	1.37 H	175	12.16	35.43
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	2386.13	55.6 PK	74.0	-18.4	1.32 V	192	25.53	30.05
2	2386.13	43.6 AV	54.0	-10.5	1.32 V	192	13.50	30.05
3	*2412.00	100.5 PK			1.32 V	192	70.34	30.15
4	*2412.00	97.2 AV			1.32 V	192	67.07	30.15
5	4824.00	51.7 PK	74.0	-22.3	1.24 V	178	16.24	35.43
6	4824.00	49.0 AV	54.0	-5.0	1.24 V	178	13.60	35.43

- 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.



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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	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.3 PK			1.20 H	260	78.10	30.24
2	*2437.00	104.8 AV			1.20 H	260	74.55	30.24
3	4874.00	49.8 PK	74.0	-24.2	1.50 H	337	14.25	35.52
4	4874.00	46.6 AV	54.0	-7.4	1.50 H	337	11.08	35.52
5	7311.00	49.6 PK	74.0	-24.4	1.40 H	200	7.60	41.96
6	7311.00	41.1 AV	54.0	-12.9	1.40 H	200	-0.87	41.96
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	*2437.00	101.6 PK			1.06 V	183	71.39	30.24
2	*2437.00	97.8 AV			1.06 V	183	67.55	30.24
3	4874.00	52.0 PK	74.0	-22.0	1.24 V	177	16.49	35.52
4	4874.00	49.3 AV	54.0	-4.7	1.24 V	177	13.78	35.52
5	7311.00	50.0 PK	74.0	-24.0	1.40 V	172	8.07	41.96
6	7311.00	40.2 AV	54.0	-13.8	1.40 V	172	-1.76	41.96

**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.



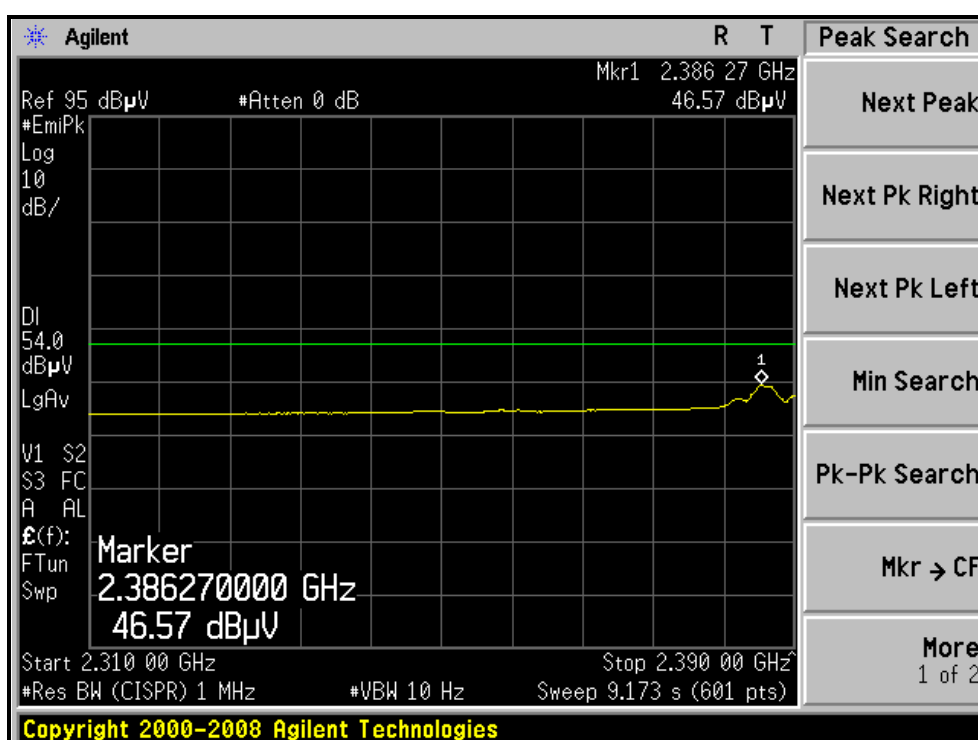
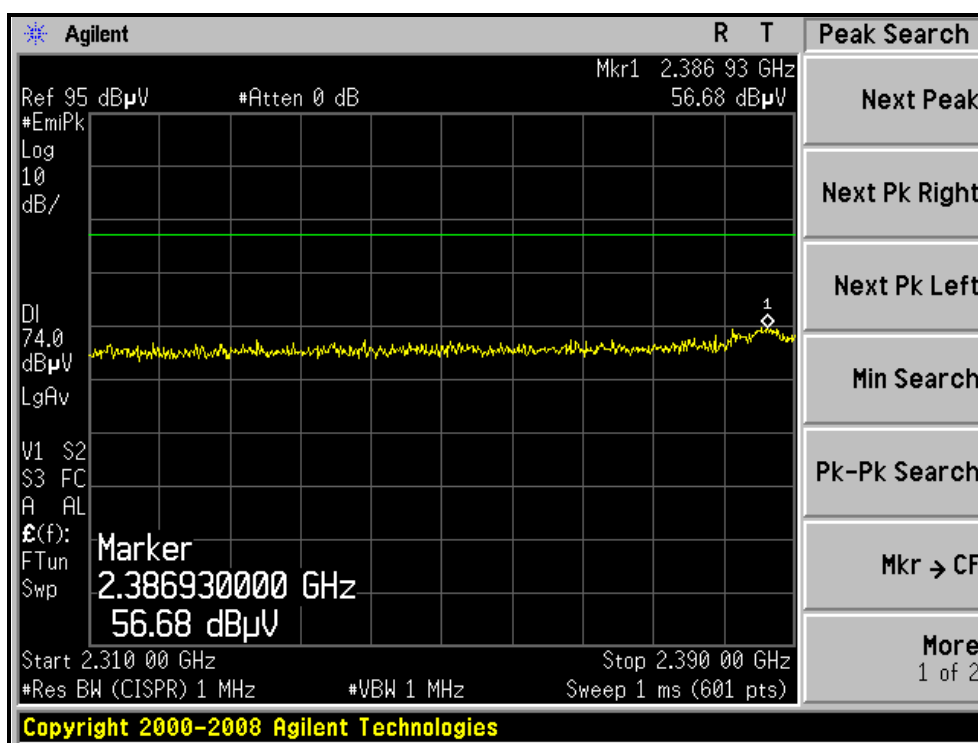
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

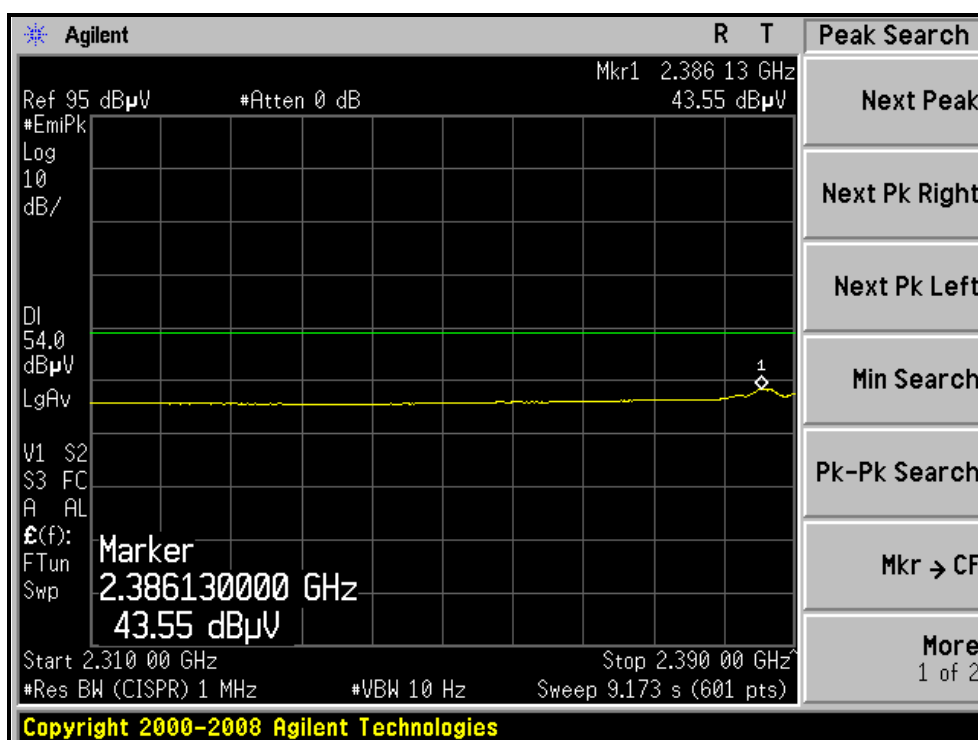
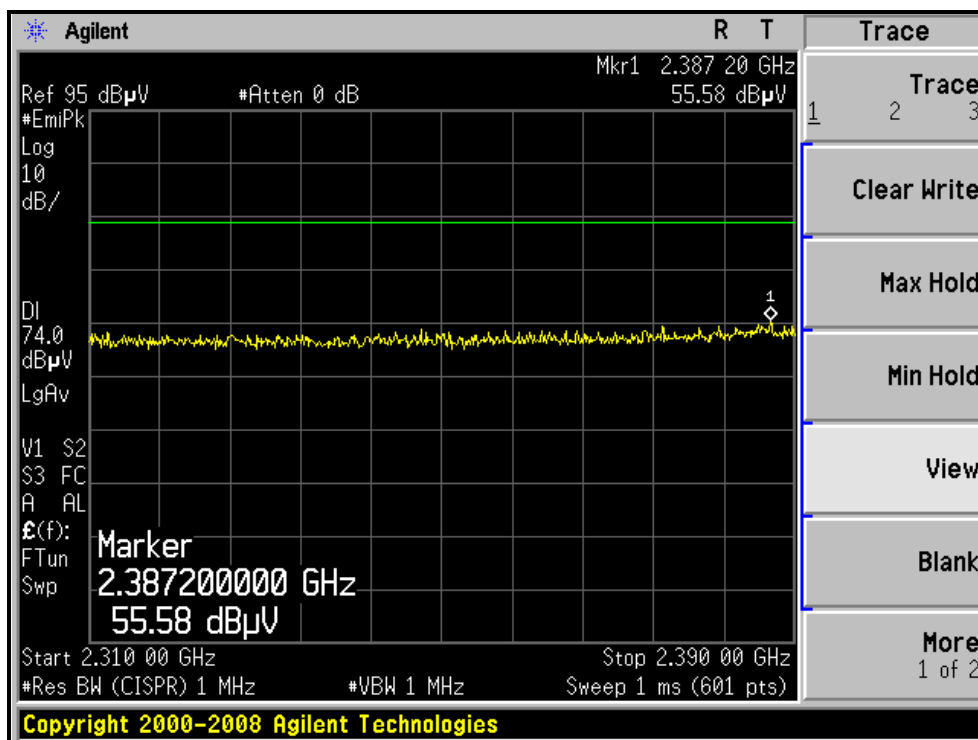
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.1 PK			1.52 H	279	76.78	30.34
2	*2462.00	103.8 AV			1.52 H	279	73.49	30.34
3	2487.79	58.2 PK	74.0	-15.8	1.52 H	279	27.76	30.44
4	2487.79	49.5 AV	54.0	-4.5	1.52 H	279	19.06	30.44
5	4924.00	50.1 PK	74.0	-23.9	1.47 H	317	14.45	35.62
6	4924.00	46.8 AV	54.0	-7.2	1.47 H	317	11.18	35.62
7	7386.00	49.3 PK	74.0	-24.7	1.40 H	320	7.23	42.10
8	7386.00	40.3 AV	54.0	-13.7	1.40 H	320	-1.79	42.10
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	*2462.00	99.8 PK			1.05 V	181	69.46	30.34
2	*2462.00	96.7 AV			1.05 V	181	66.34	30.34
3	2487.90	55.5 PK	74.0	-18.5	1.00 V	178	25.06	30.44
4	2487.90	43.7 AV	54.0	-10.3	1.00 V	178	13.23	30.44
5	4924.00	50.6 PK	74.0	-23.4	1.24 V	261	14.97	35.62
6	4924.00	47.1 AV	54.0	-6.9	1.24 V	261	11.51	35.62
7	7386.00	49.2 PK	74.0	-24.8	1.28 V	218	7.08	42.10
8	7386.00	39.5 AV	54.0	-14.5	1.28 V	218	-2.64	42.10

- 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.

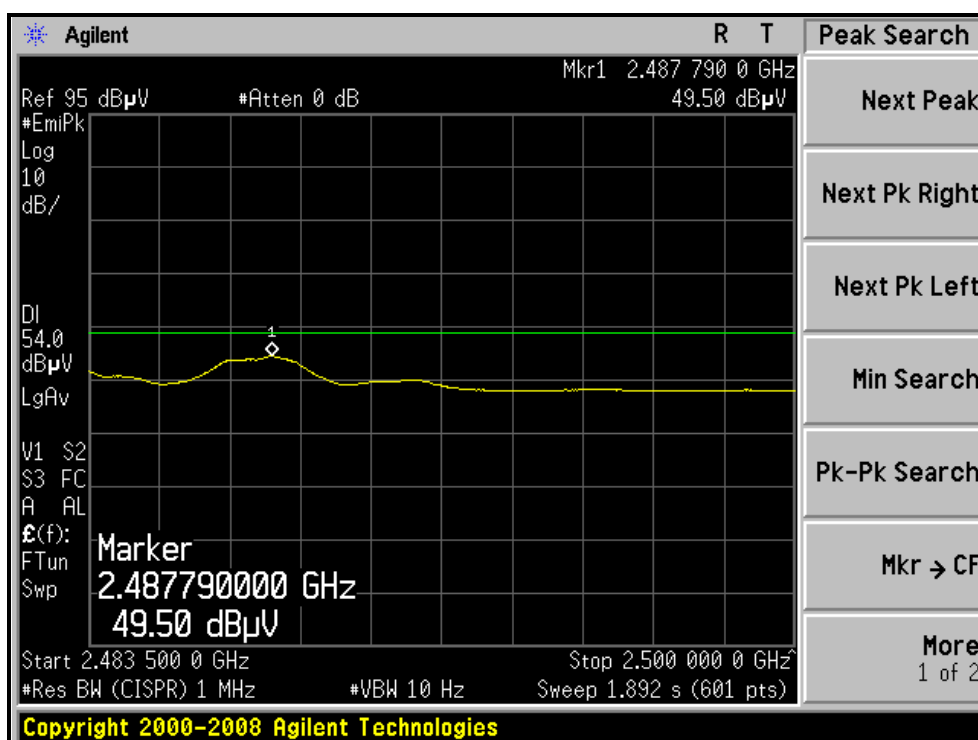
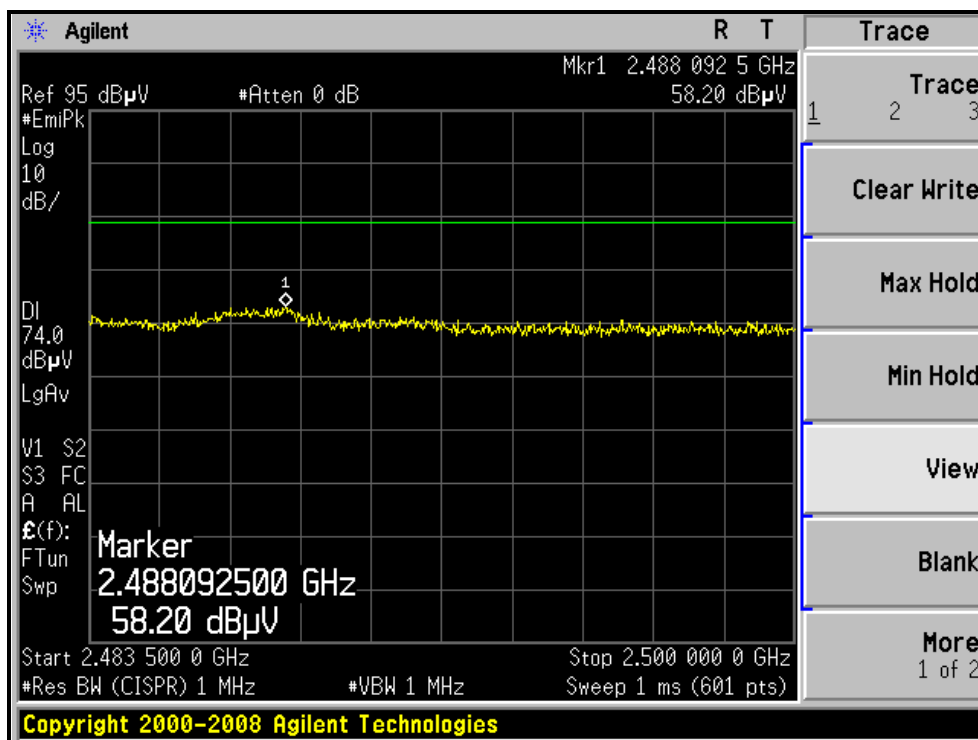
RESTRICTED BANDEDGE (802.11b MODE,CH1, HORIZONTAL )



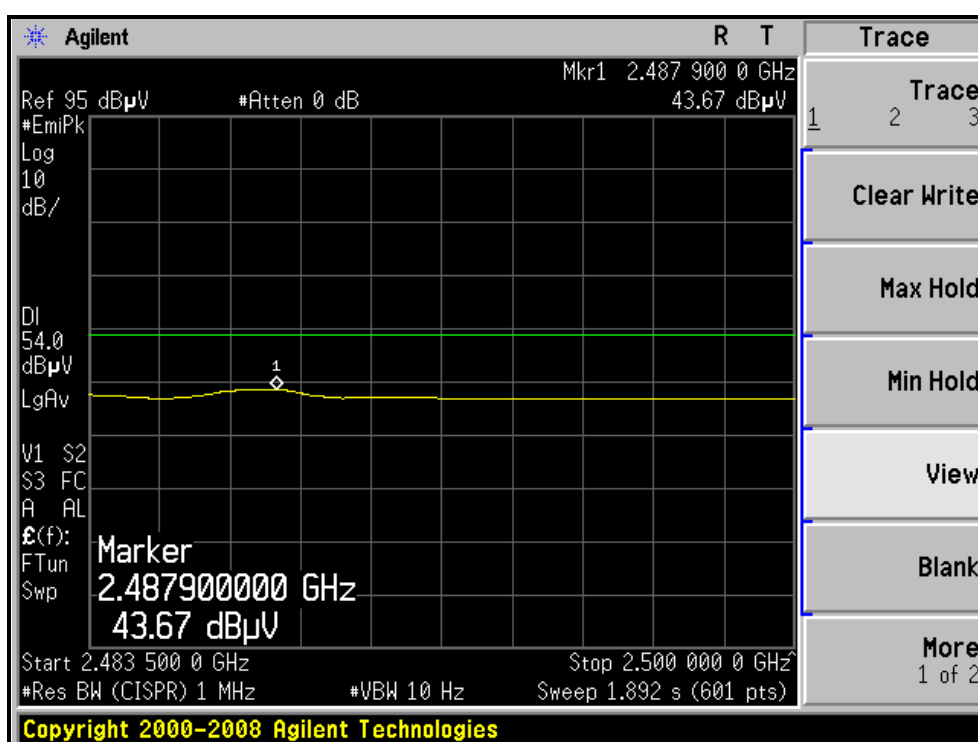
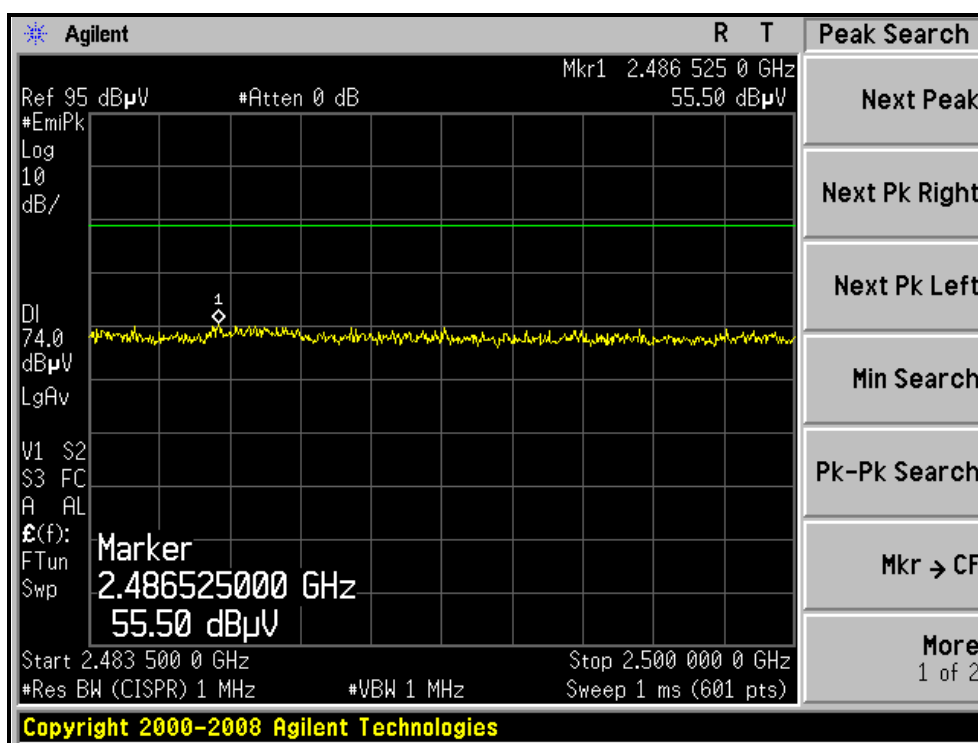
# RESTRICTED BANDEDGE (802.11b MODE,CH1, VERTICAL )



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



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





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## 802.11g OFDM MODULATION

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	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.2 PK	74.0	-15.8	1.29 H	248	28.16	30.06
2	2390.00	44.2 AV	54.0	-9.9	1.29 H	248	14.09	30.06
3	*2412.00	106.2 PK			1.29 H	248	76.02	30.15
4	*2412.00	91.1 AV			1.29 H	248	60.92	30.15
5	4824.00	43.4 PK	74.0	-30.6	1.31 H	349	7.97	35.43
6	4824.00	31.0 AV	54.0	-23.0	1.31 H	349	-4.43	35.43
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	57.9 PK	74.0	-16.1	1.03 V	192	27.87	30.06
2	2390.00	43.5 AV	54.0	-10.5	1.03 V	192	13.40	30.06
3	*2412.00	102.6 PK			1.03 V	192	72.49	30.15
4	*2412.00	86.1 AV			1.03 V	192	55.90	30.15
5	4824.00	46.7 PK	74.0	-27.3	1.37 V	173	11.28	35.43
6	4824.00	32.8 AV	54.0	-21.2	1.37 V	173	-2.59	35.43

- 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.



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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	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.2 PK			1.57 H	280	76.96	30.24
2	*2437.00	91.9 AV			1.57 H	280	61.62	30.24
3	4874.00	43.8 PK	74.0	-30.2	1.19 H	320	8.28	35.52
4	4874.00	31.2 AV	54.0	-22.8	1.19 H	320	-4.35	35.52
5	7311.00	48.1 PK	74.0	-25.9	1.03 H	124	6.14	41.96
6	7311.00	36.6 AV	54.0	-17.4	1.03 H	124	-5.36	41.96
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	*2437.00	102.3 PK			1.03 V	188	72.06	30.24
2	*2437.00	85.9 AV			1.03 V	188	55.66	30.24
3	4874.00	47.3 PK	74.0	-26.7	1.45 V	88	11.80	35.52
4	4874.00	33.6 AV	54.0	-20.4	1.45 V	88	-1.96	35.52
5	7311.00	47.3 PK	74.0	-26.7	1.31 V	203	5.34	41.96
6	7311.00	36.4 AV	54.0	-17.6	1.31 V	203	-5.56	41.96

- 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.



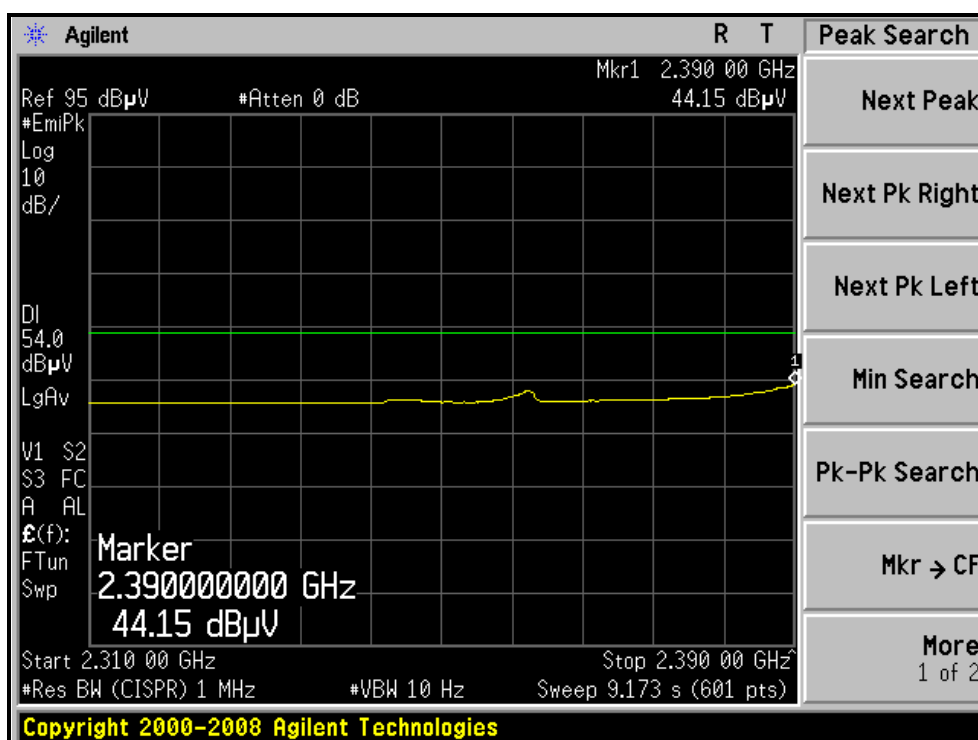
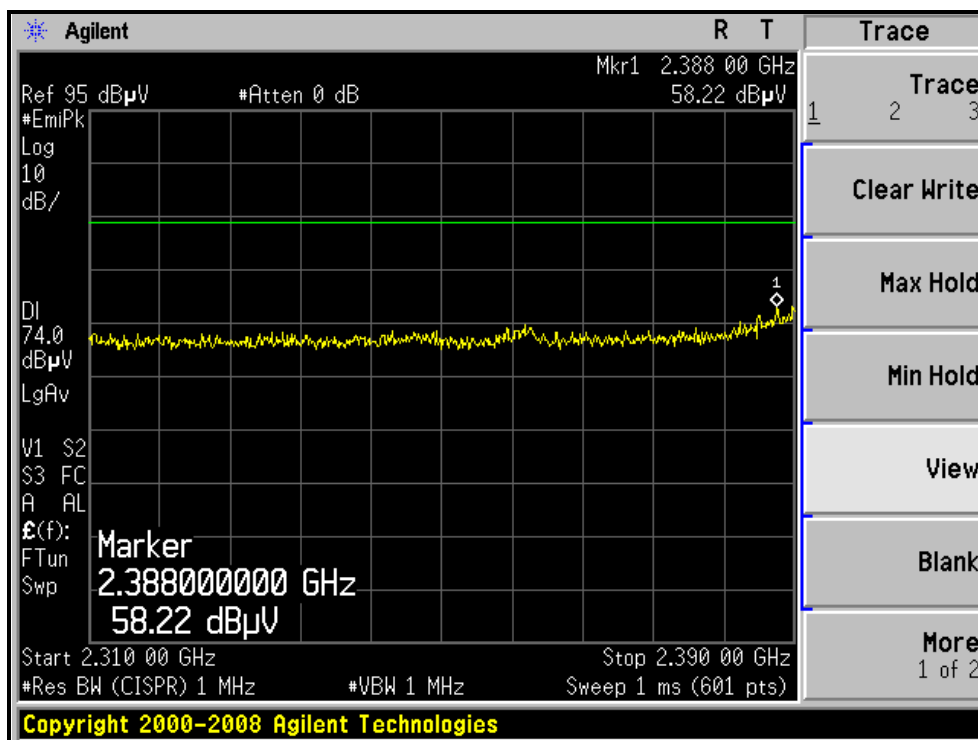
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	19deg. C, 67%RH 1015 hPa	TESTED BY	Wen Yu

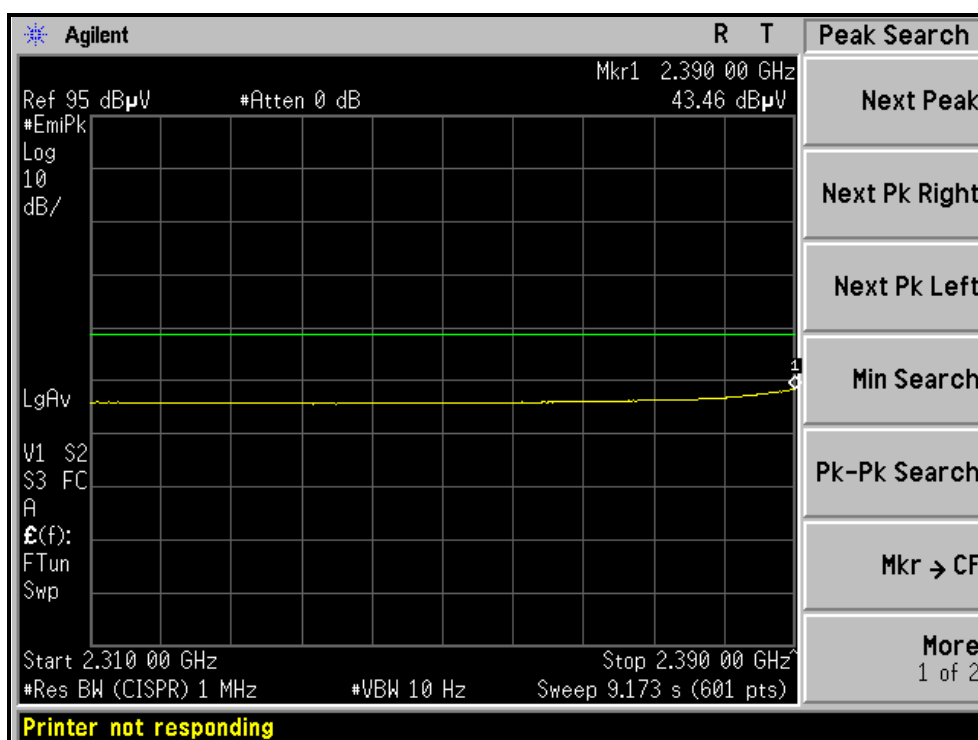
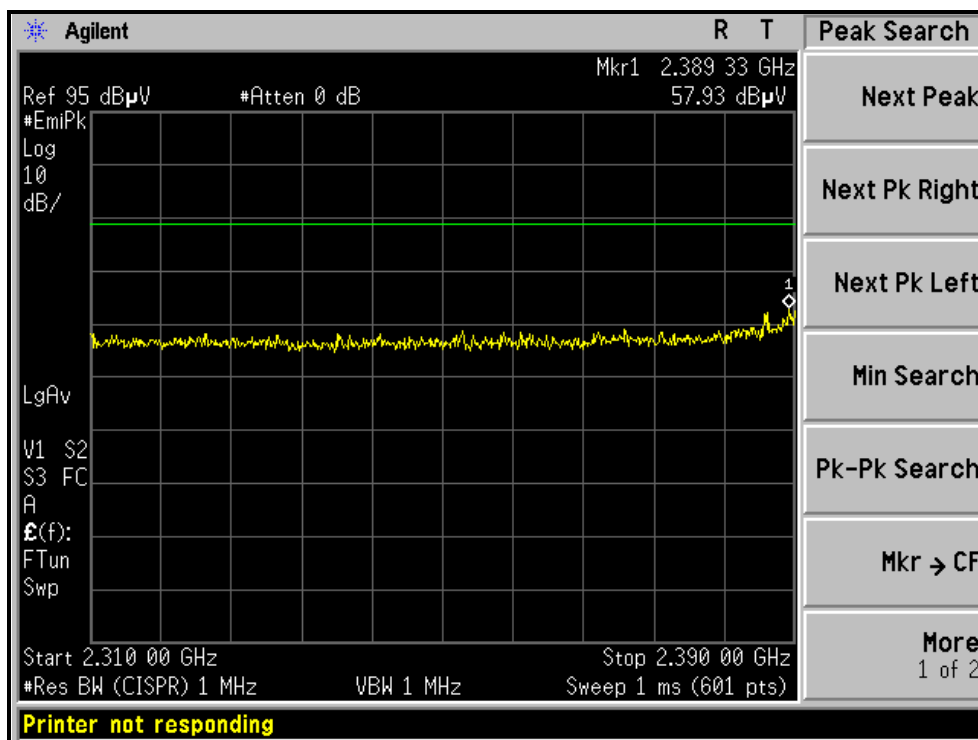
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.4 PK			1.57 H	274	77.01	30.34
2	*2462.00	91.9 AV			1.57 H	274	61.60	30.34
3	2483.50	65.5 PK	74.0	-8.5	1.57 H	274	35.05	30.43
4	2483.50	46.7 AV	54.0	-7.3	1.57 H	274	16.28	30.43
5	4924.00	44.6 PK	74.0	-29.4	1.23 H	331	9.02	35.62
6	4924.00	31.7 AV	54.0	-22.4	1.23 H	331	-3.97	35.62
7	7386.00	48.4 PK	74.0	-25.6	1.20 H	112	6.31	42.10
8	7386.00	36.9 AV	54.0	-17.1	1.20 H	112	-5.20	42.10
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	*2462.00	102.4 PK			1.03 V	181	72.07	30.34
2	*2462.00	85.9 AV			1.03 V	181	55.52	30.34
3	2483.50	64.4 PK	74.0	-9.6	1.01 V	179	33.97	30.43
4	2483.50	46.7 AV	54.0	-7.3	1.01 V	179	16.23	30.43
5	4924.00	46.5 PK	74.0	-27.5	1.24 V	260	10.89	35.62
6	4924.00	31.6 AV	54.0	-22.4	1.24 V	260	-4.04	35.62
7	7386.00	47.8 PK	74.0	-26.2	1.23 V	210	5.71	42.10
8	7386.00	37.1 AV	54.0	-16.9	1.23 V	210	-5.00	42.10

- 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.

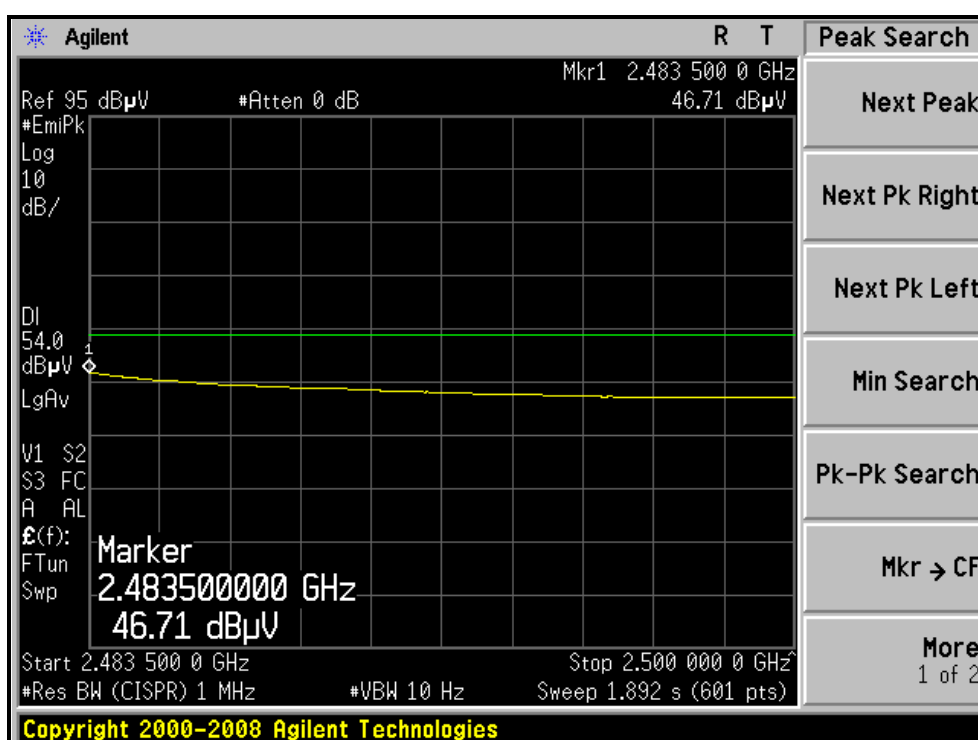
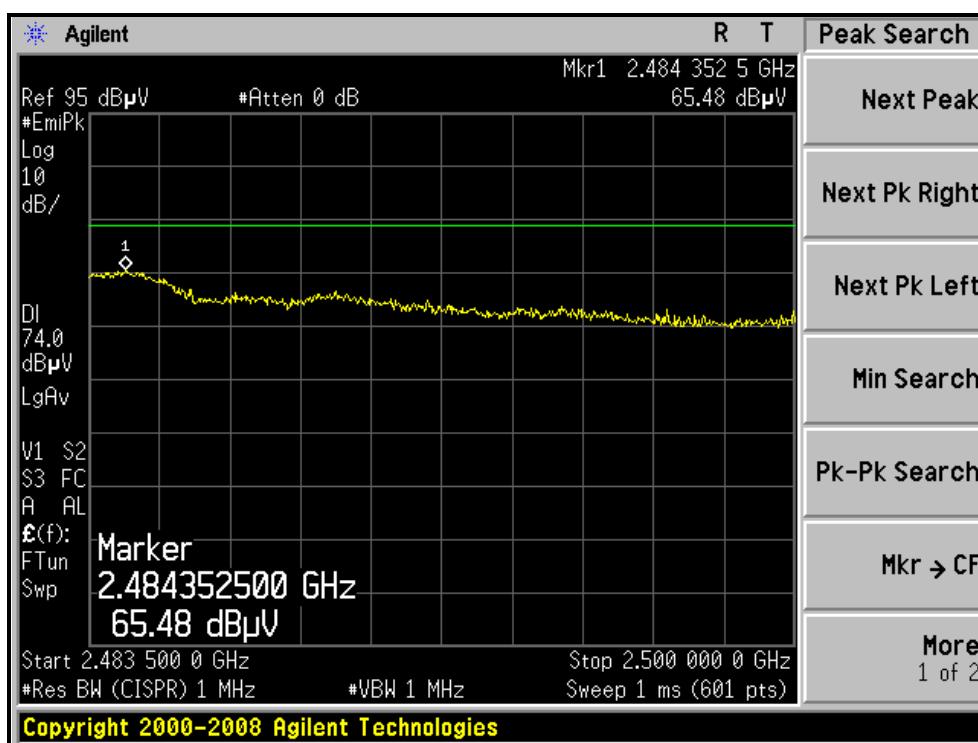
# RESTRICTED BANDEDGE (802.11g MODE, CH1, HORIZONTAL)



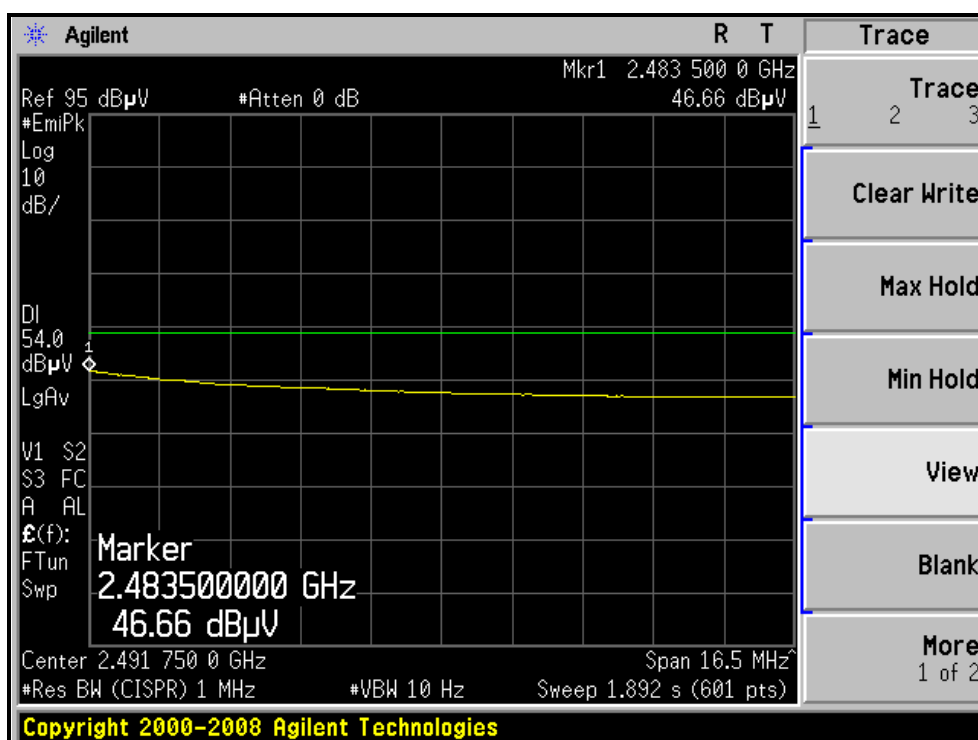
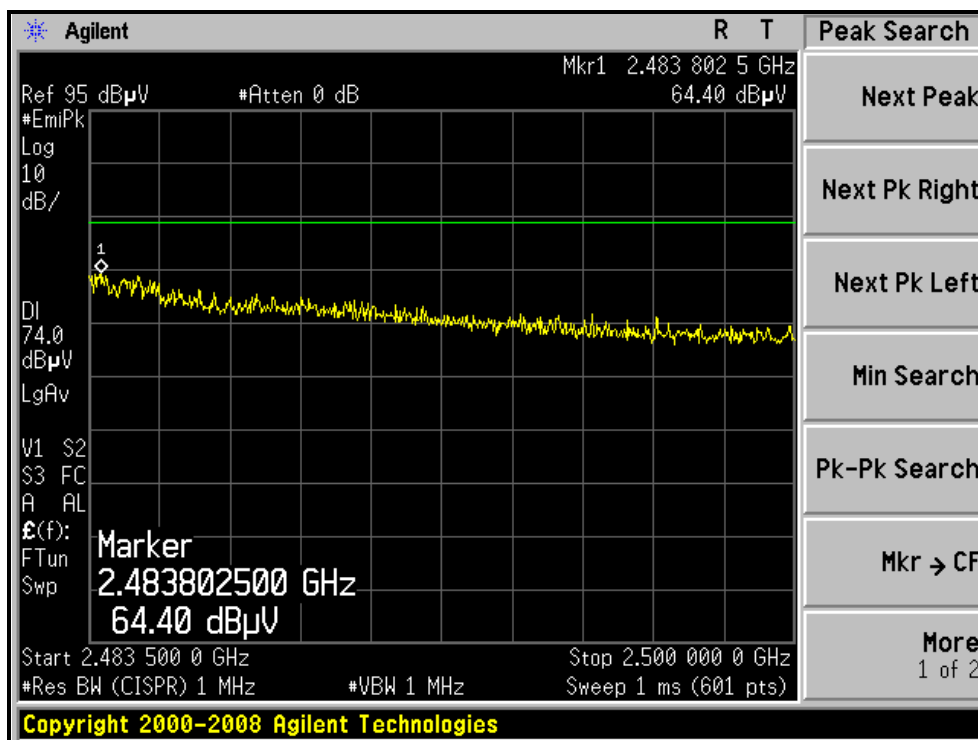
# RESTRICTED BANDEDGE (802.11g MODE, CH1, VERTICAL)



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



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



### 4.3 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 & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	April 24, 2010	April 23, 2011
Pulse Power Sensor	MA2411B	0738172	April 24, 2010	April 23, 2011

**NOTE:**

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

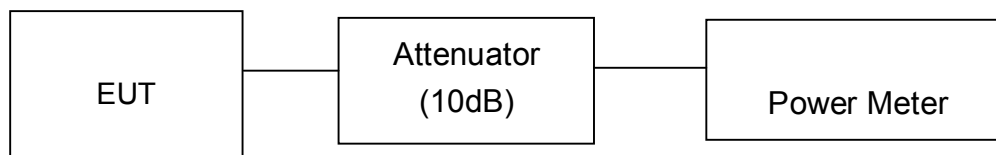
#### 4.4.3 TEST PROCEDURES

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.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

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

#### 4.4.7 TEST RESULTS

##### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	20.1	102.3	30	PASS
6	2437	21.3	134.9	30	PASS
11	2462	20.1	102.3	30	PASS

##### 802.11g OFDM modulation:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	24.1	257.0	30	PASS
6	2437	24.4	275.4	30	PASS
11	2462	24.2	263.0	30	PASS

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## 5. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025:

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

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



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

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

**--- END ---**