

# FCC TEST REPORT

**REPORT NO.:** RF110921E06 R1

**MODEL NO.:** R4020A, ZR301F

**FCC ID:** Z28-R4020A

**RECEIVED:** Sep. 21, 2011

**TESTED:** Sep. 27 to Oct. 04, 2011

**ISSUED:** Oct. 14, 2011

**APPLICANT:** ZUNIDATA SYSTEMS, INC.

**ADDRESS:** 4F-7, No.65, Gaotia 7th Rd, Zhubei City, Hsinchu county 302, Taiwan

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

**LAB ADDRESS :** No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

**TEST LOCATION (1):** No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

**TEST LOCATION (2):** No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

This test report consists of 77 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.





A D T

## Table of Contents

RELEASE CONTROL RECORD .....	4
1. CERTIFICATION .....	5
2. SUMMARY OF TEST RESULTS .....	6
2.1 MEASUREMENT UNCERTAINTY .....	7
3. GENERAL INFORMATION .....	8
3.1 GENERAL DESCRIPTION OF EUT .....	8
3.2 DESCRIPTION OF TEST MODES .....	10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	11
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	14
3.4 DESCRIPTION OF SUPPORT UNITS .....	15
3.5 CONFIGURATION OF SYSTEM UNDER TEST .....	16
4. TEST TYPES AND RESULTS .....	17
4.1 CONDUCTED EMISSION MEASUREMENT .....	17
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	17
4.1.2 TEST INSTRUMENTS .....	17
4.1.3 TEST PROCEDURES .....	18
4.1.4 DEVIATION FROM TEST STANDARD .....	18
4.1.5 TEST SETUP .....	19
4.1.6 EUT OPERATING CONDITIONS .....	19
4.1.7 TEST RESULTS .....	20
4.2 RADIATED EMISSION MEASUREMENT .....	22
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....	22
4.2.2 TEST INSTRUMENTS .....	23
4.2.3 TEST PROCEDURES .....	24
4.2.4 DEVIATION FROM TEST STANDARD .....	24
4.2.5 TEST SETUP .....	25
4.2.6 EUT OPERATING CONDITIONS .....	25
4.2.7 TEST RESULTS .....	26
4.3 6dB BANDWIDTH MEASUREMENT .....	55
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	55
4.3.2 TEST INSTRUMENTS .....	55
4.3.3 TEST PROCEDURE .....	55
4.3.4 DEVIATION FROM TEST STANDARD .....	55
4.3.5 TEST SETUP .....	55
4.3.6 EUT OPERATING CONDITIONS .....	55
4.3.7 TEST RESULTS .....	56
4.4 MAXIMUM PEAK OUTPUT POWER .....	60
4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT .....	60
4.4.2 INSTRUMENTS .....	60
4.4.3 TEST PROCEDURES .....	60



A D T

4.4.4	DEVIATION FROM TEST STANDARD .....	60
4.4.5	TEST SETUP .....	60
4.4.6	EUT OPERATING CONDITIONS .....	60
4.4.7	TEST RESULTS .....	61
4.5	POWER SPECTRAL DENSITY MEASUREMENT .....	62
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	62
4.5.2	TEST INSTRUMENTS.....	62
4.5.3	TEST PROCEDURE.....	62
4.5.4	DEVIATION FROM TEST STANDARD .....	62
4.5.5	TEST SETUP .....	62
4.5.6	EUT OPERATING CONDITION.....	62
4.5.7	TEST RESULTS .....	63
4.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT .....	67
4.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	67
4.6.2	TEST INSTRUMENTS.....	67
4.6.3	TEST PROCEDURE.....	67
4.6.4	DEVIATION FROM TEST STANDARD .....	67
4.6.5	EUT OPERATING CONDITION .....	67
4.6.6	TEST RESULTS .....	67
5.	INFORMATION ON THE TESTING LABORATORIES .....	76
6.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	77



## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110921E06	Original release	Oct. 07, 2011
RF110921E06 R1	Modified the transfer rate.	Oct. 14, 2011



A D T

## 1. CERTIFICATION

**PRODUCT:** Wireless IEEE802.11b/g/n 300Mbps Tiny Router  
**BRAND NAME:** North Link, Zuni Data, Zuni Digital, Zuni Connect, ZUNI  
**MODEL NO.:** R4020A, ZR301F  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Sep. 27 to Oct. 04, 2011  
**APPLICANT:** ZUNIDATA SYSTEMS, INC.  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (Model: R4020A) 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** : Lori Chung , **DATE:** Oct. 14, 2011  
( Lori Chung, Specialist )

**APPROVED BY** : May Chen , **DATE:** Oct. 14, 2011  
( 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 -4.60dB at 17.70MHz
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 -0.6dB at 4874.00MHz & 4924.00MHz.
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.



A D T

## 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)	3.81dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.56 dB



A D T

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless IEEE802.11b/g/n 300Mbps Tiny Router
<b>MODEL NO.</b>	R4020A, ZR301F
<b>FCC ID</b>	Z28-R4020A
<b>POWER SUPPLY</b>	DC 5V 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: up to 11Mbps 802.11g: up to 54Mbps 802.11n (20MHz, 800ns GI): up to 130Mbps 802.11n (40MHz, 800ns GI): up to 270Mbps 802.11n (20MHz, 400ns GI): up to 144.4Mbps 802.11n (40MHz, 400ns GI): up to 300Mbps
<b>FREQUENCY OPERATING</b>	2412MHz ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
<b>MAXIMUM OUTPUT POWER</b>	802.11b: 40.7mW 802.11g: 162.2mW 802.11n (20MHz): 205.5mW 802.11n (40MHz): 172.5mW
<b>ANTENNA TYPE</b>	Please see NOTE
<b>DATA CABLE</b>	micro USB cable (Shielded, 0.9m)
<b>I/O PORTS</b>	LAN port × 1 WAN port × 1 USB port × 1 (power only)
<b>ASSOCIATED DEVICES</b>	NA



**NOTE:**

1. The EUT have two model names, which are identical to each other in all aspects except for the following table:

Model No.	Brand	Difference
R4020A	North Link	For marketing requirement
	Zuni Data	
	Zuni Digital	
	Zuni Connect	
ZR301F	ZUNI	

From the above models, model: R4020A was selected as representative model for the test and its data was recorded in this report.

2. There are two antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Gain(dBi)	Antenna Type	Connector Type
Chain(0)	4.03	Printed	NA
Chain(1)	3.69	Printed	NA

3. The EUT is 2 \* 2 spatial MIMO (2Tx & 2Rx) without beam forming function. The 11b/g legacy mode is limited to single transmitter only.
4. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
5. 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, 802.11n (20MHz):

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		

Seven channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz  
**RE ≥ 1G**: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement  
**OB**: Conducted Out-Band Emission Measurement

#### ANTENNA COMBINATION MODE:

COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
A	802.11 b	√	-
B	802.11 g	√	-
C	802.11n (20MHz)	√	-
D	802.11n (20MHz)	√	√
E	802.11n (40MHz)	√	-
F	802.11n (40MHz)	√	√

Note:

- The above information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
- Mode A, B, D, F the worst modes, was selected as representative mode for the report.

#### 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)	COMBINATION MODE
802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	D

#### **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)	COMBINATION MODE
802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	D

#### **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)	COMBINATION MODE
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	B
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	D
802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5	F

#### **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)	COMBINATION MODE
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	B
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	D
802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5	F

# **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)	COMBINATION MODE
802.11b	1 to 11	1, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 11	OFDM	BPSK	6	B
802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	6.5	D
802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	13.5	F

## **※ TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C, 68%RH,	120Vac, 60Hz	Andy Ho
RE <sup>3</sup> 1G	26deg. C, 66%RH	120Vac, 60Hz	Frank Liu
RE<1G	26deg. C, 74%RH	120Vac, 60Hz	Nelson Teng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang
OB	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang

### 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**

**ANSI C63.10-2009**

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.

**A D T**

### 3.4 DESCRIPTION OF SUPPORT UNITS

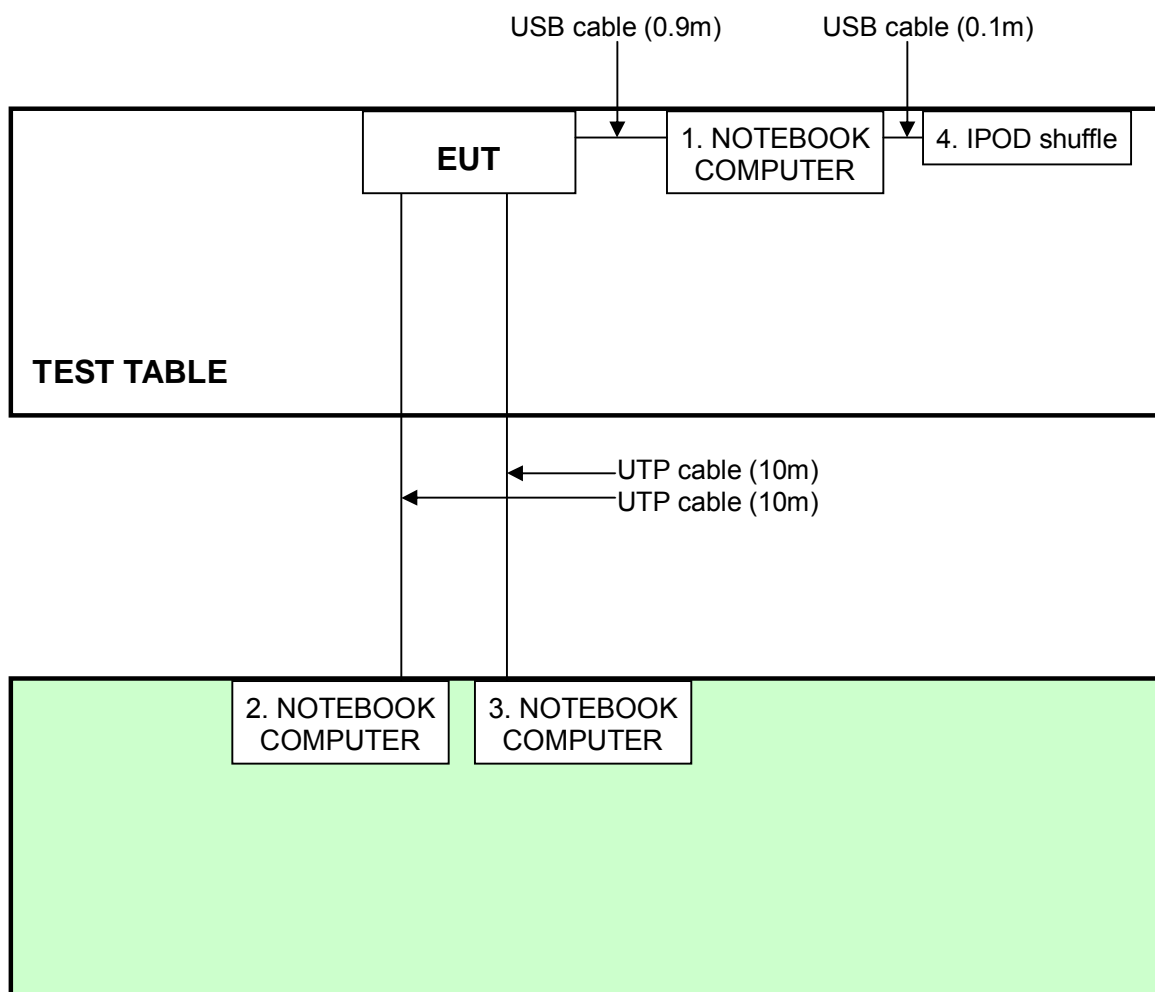
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
3	NOTEBOOK COMPUTER	DELL	PP27L	6YLB32S	FCC DoC
4	IPOD shuffle	Apple	MC749TA/A	CC4DMFJUDFDM	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Cable (0.9m)
2	UTP Cable (10m)
3	UTP Cable (10m)
4	USB cable (0.1m)

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

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST





## 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

Test date: Oct. 04, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 02, 2011	Mar. 01, 2012
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 20, 2011	Sep. 19, 2012
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 10, 2011	June 09, 2012
RF Cable (JYBAO)	5DFB	CONCAB-003	Aug. 05, 2011	Aug. 04, 2012
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

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

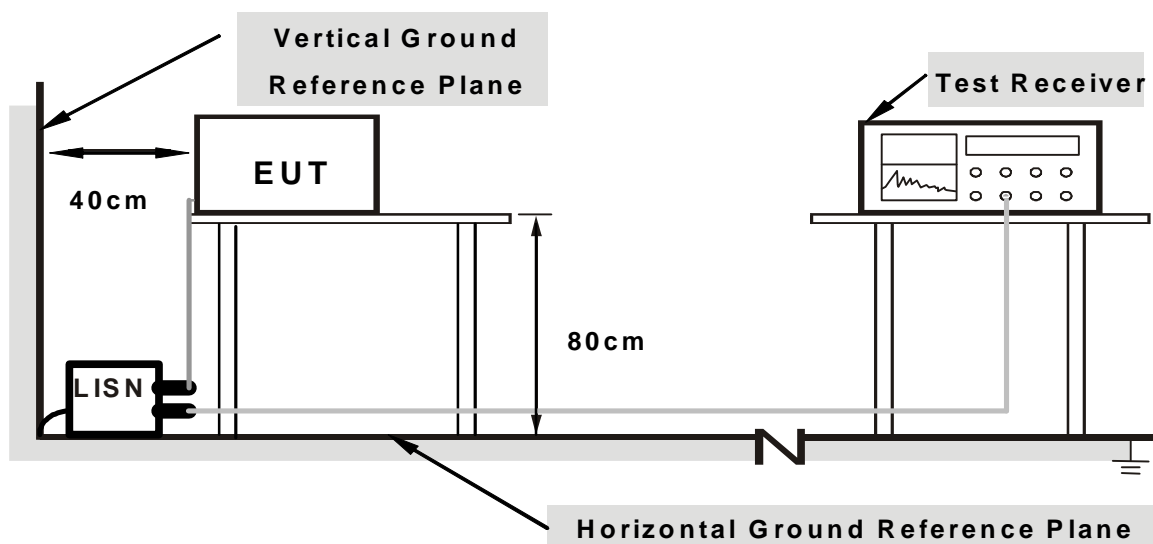
#### 4.1.3 TEST PROCEDURES

- a. The EUT 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) were 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

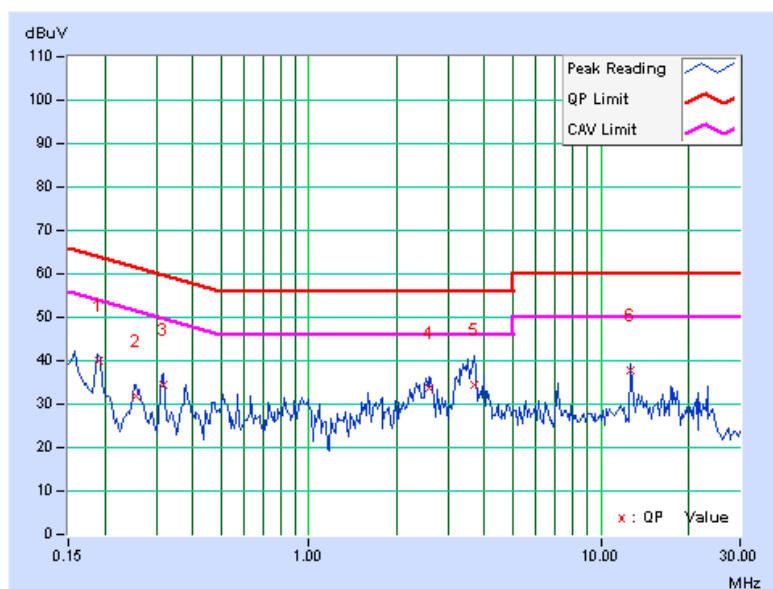
1. Placed the EUT on testing table.
2. Prepared other computer systems (support units 1~2) to act as communication partners and placed them on the test table and outside of testing area.
3. The communication partners ran test program “MP\_TEST.exe” to enable EUT under transmission/receiving condition continuously via UTP cables.

#### 4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
-------	----------	---------------	-------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.190	9.64	30.48	30.16	40.12	39.80	64.02	54.02	-23.90	-14.22
2	0.255	9.64	22.25	20.45	31.89	30.09	61.58	51.58	-29.68	-21.48
3	0.318	9.65	24.78	23.58	34.43	33.23	59.76	49.76	-25.33	-16.53
4	2.590	9.73	23.98	16.59	33.71	26.32	56.00	46.00	-22.29	-19.68
5	3.681	9.76	24.64	13.27	34.40	23.03	56.00	46.00	-21.60	-22.97
6	12.629	9.89	27.97	26.22	37.86	36.11	60.00	50.00	-22.14	-13.89

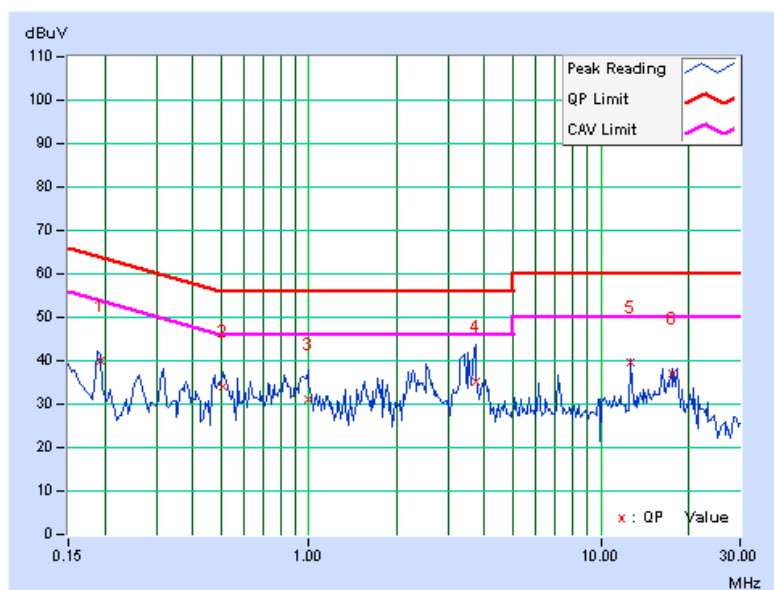
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.  
2. The emission levels of other frequencies were very low against the limit.  
3. Margin value = Emission level - Limit value  
4. Correction factor = Insertion loss + Cable loss  
5. Emission Level = Correction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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
-------	-------------	---------------	-------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.192	9.68	30.45	29.98	40.13	39.66	63.93	53.93	-23.80	-14.27
2	0.507	9.69	24.46	19.22	34.15	28.91	56.00	46.00	-21.85	-17.09
3	0.994	9.70	21.52	15.64	31.22	25.34	56.00	46.00	-24.78	-20.66
4	3.711	9.81	25.37	15.37	35.18	25.18	56.00	46.00	-20.82	-20.82
5	12.629	10.04	29.68	27.86	39.72	37.90	60.00	50.00	-20.28	-12.10
6	17.695	10.18	26.87	18.76	37.05	28.94	60.00	50.00	-22.95	-21.06

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. The emission levels of other frequencies were very low against the limit.
  3. Margin value = Emission level - Limit value
  4. Correction factor = Insertion loss + Cable loss
  5. 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.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.

## 4.2.2 TEST INSTRUMENTS

**Test date: Sep. 27, 2011**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012
Agilent Pre-Selector	N9039A	MY46520311	July 12, 2011	July 11, 2012
Agilent Signal Generator	N5181A	MY49060517	July 12, 2011	July 11, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 04, 2011	July 03, 2012
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	Nov. 16, 2010	Nov. 15, 2011
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 14, 2011	Apr. 13, 2012
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. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	Oct. 12, 2010	Oct. 11, 2011
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.

#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. 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. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**NOTE:**

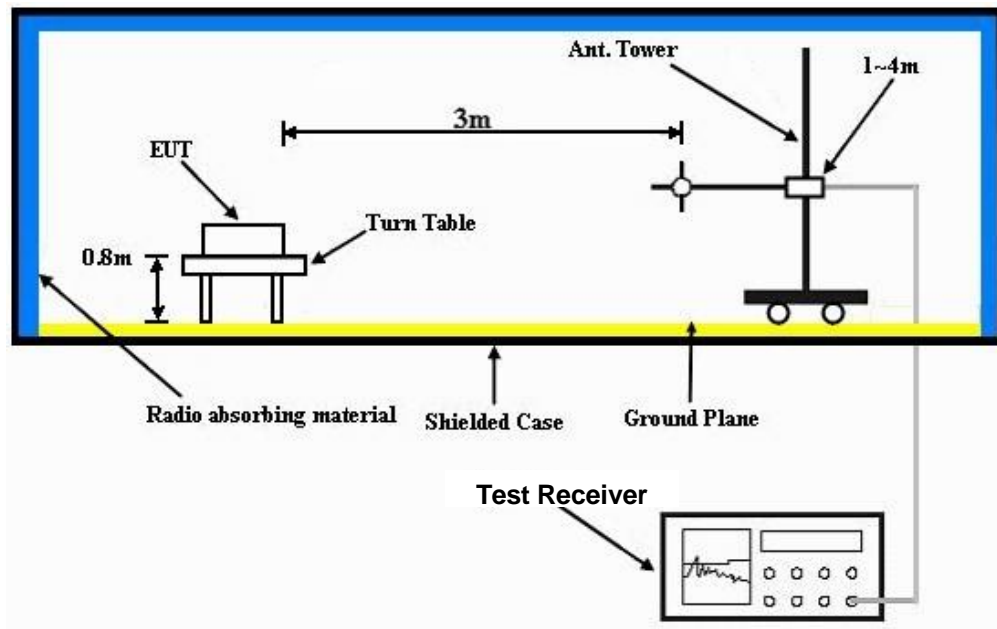
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution 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 4.1.6

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA : 802.11n (20MHz) 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	26deg. C, 74%RH	TESTED BY	Nelson Teng

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	106.74	39.4 QP	43.5	-4.1	1.75 H	34	28.83	10.54
2	156.24	38.6 QP	43.5	-4.9	1.75 H	78	23.92	14.69
3	312.56	42.7 QP	46.0	-3.3	1.00 H	167	27.18	15.49
4	468.76	41.0 QP	46.0	-5.1	1.75 H	31	21.74	19.21
5	729.17	36.3 QP	46.0	-9.8	1.25 H	53	12.92	23.33
6	898.87	35.3 QP	46.0	-10.7	1.00 H	350	8.79	26.48
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	68.96	31.3 QP	40.0	-8.7	1.00 V	232	18.74	12.58
2	160.62	33.0 QP	43.5	-10.5	1.00 V	316	18.36	14.62
3	312.56	34.6 QP	46.0	-11.4	1.25 V	123	19.08	15.49
4	468.76	38.5 QP	46.0	-7.5	1.75 V	89	19.32	19.21
5	572.97	31.5 QP	46.0	-14.5	1.00 V	122	9.93	21.54
6	885.49	36.2 QP	46.0	-9.9	1.50 V	167	9.84	26.31

- 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 WORST-CASE DATA

## 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	26deg. C, 66%RH	TESTED BY	Frank Liu

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	2370.27	57.7 PK	74.0	-16.3	1.20 H	350	26.01	31.69
2	2370.27	46.4 AV	54.0	-7.6	1.20 H	350	14.71	31.69
3	*2412.00	101.8 PK			1.23 H	350	69.98	31.82
4	*2412.00	99.1 AV			1.23 H	350	67.28	31.82
5	4824.00	55.6 PK	74.0	-18.4	1.24 H	292	16.24	39.36
6	4824.00	53.2 AV	54.0	-0.8	1.24 H	292	13.84	39.36
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	56.9 PK	74.0	-17.1	1.00 V	228	25.15	31.75
2	2390.00	44.2 AV	54.0	-9.8	1.00 V	228	12.45	31.75
3	*2412.00	95.6 PK			1.09 V	20	63.78	31.82
4	*2412.00	93.4 AV			1.09 V	20	61.58	31.82
5	4824.00	55.5 PK	74.0	-18.5	1.06 V	33	16.14	39.36
6	4824.00	53.1 AV	54.0	-0.9	1.06 V	33	13.74	39.36

- 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.



A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

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	105.4 PK			1.00 H	104	73.48	31.92
2	*2437.00	103.5 AV			1.00 H	104	71.58	31.92
3	4874.00	55.8 PK	74.0	-18.2	1.23 H	292	16.30	39.50
4	4874.00	53.4 AV	54.0	-0.6	1.23 H	292	13.90	39.50
5	7311.00	54.6 PK	74.0	-19.4	1.20 H	231	7.72	46.88
6	7311.00	42.3 AV	54.0	-11.7	1.20 H	231	-4.58	46.88
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	98.7 PK			1.00 V	230	66.78	31.92
2	*2437.00	96.2 AV			1.00 V	230	64.28	31.92
3	4874.00	56.4 PK	74.0	-17.6	1.06 V	34	16.90	39.50
4	4874.00	52.4 AV	54.0	-1.6	1.06 V	34	12.90	39.50
5	7311.00	53.7 PK	74.0	-20.3	1.00 V	66	6.82	46.88
6	7311.00	41.7 AV	54.0	-12.3	1.00 V	66	-5.18	46.88

**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.



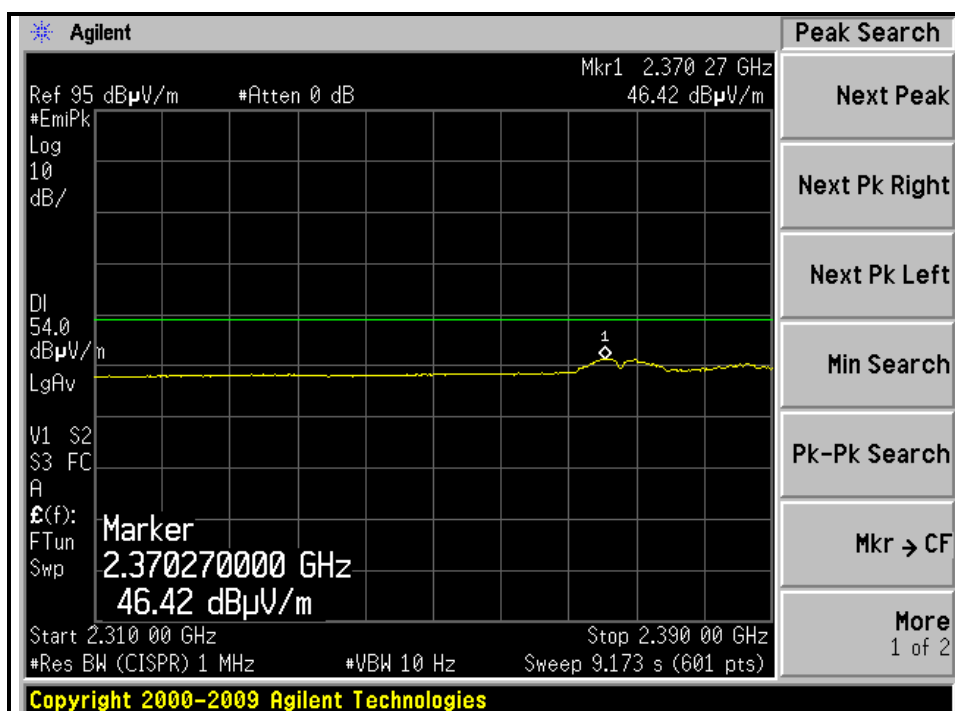
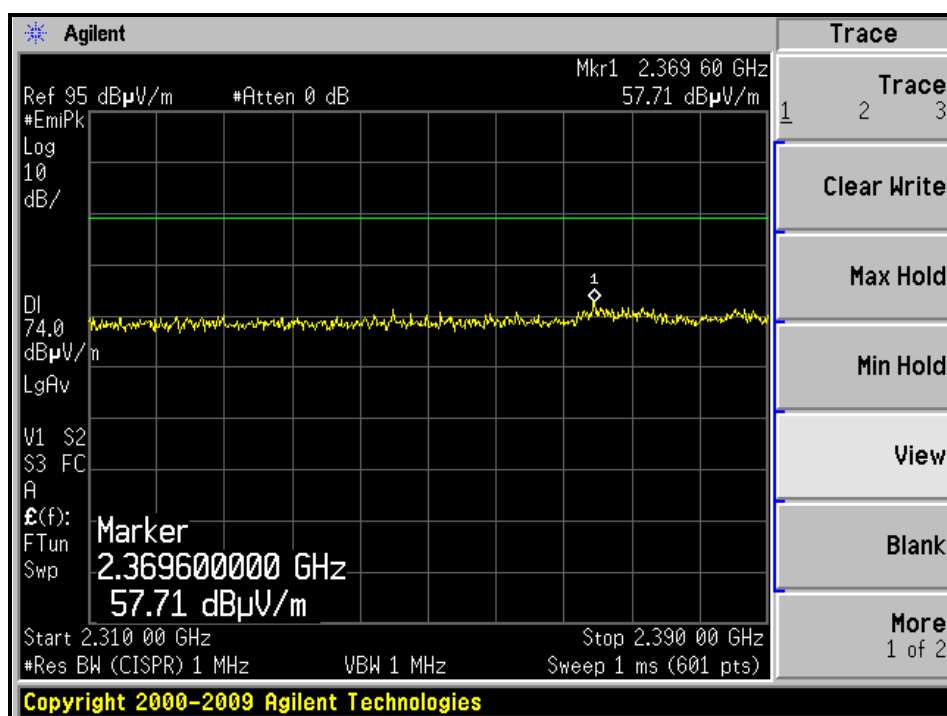
A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

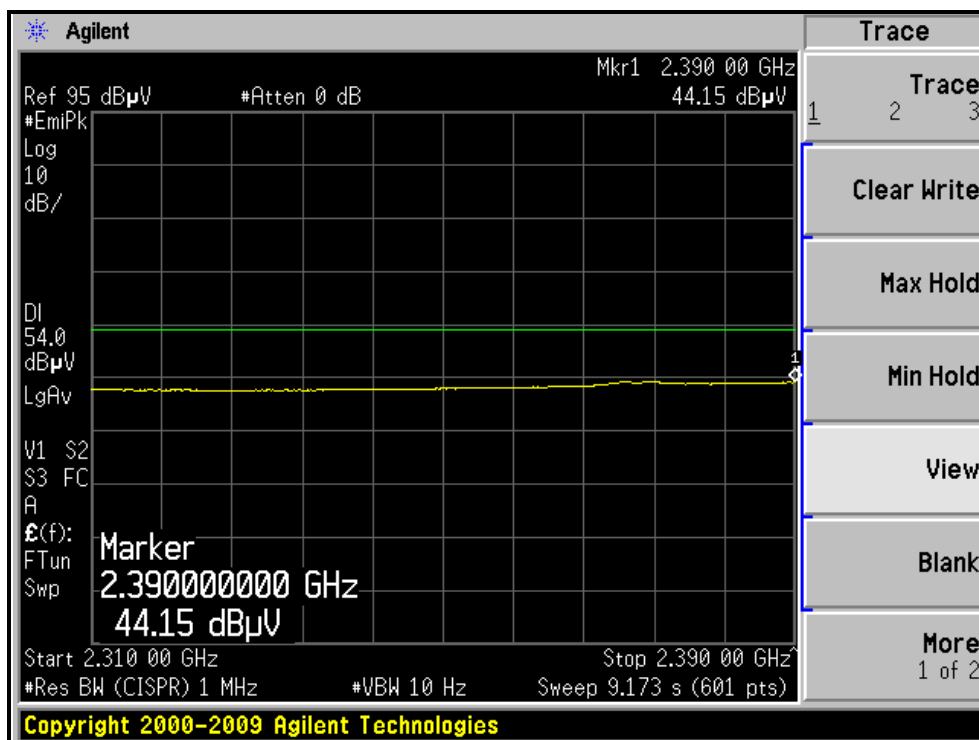
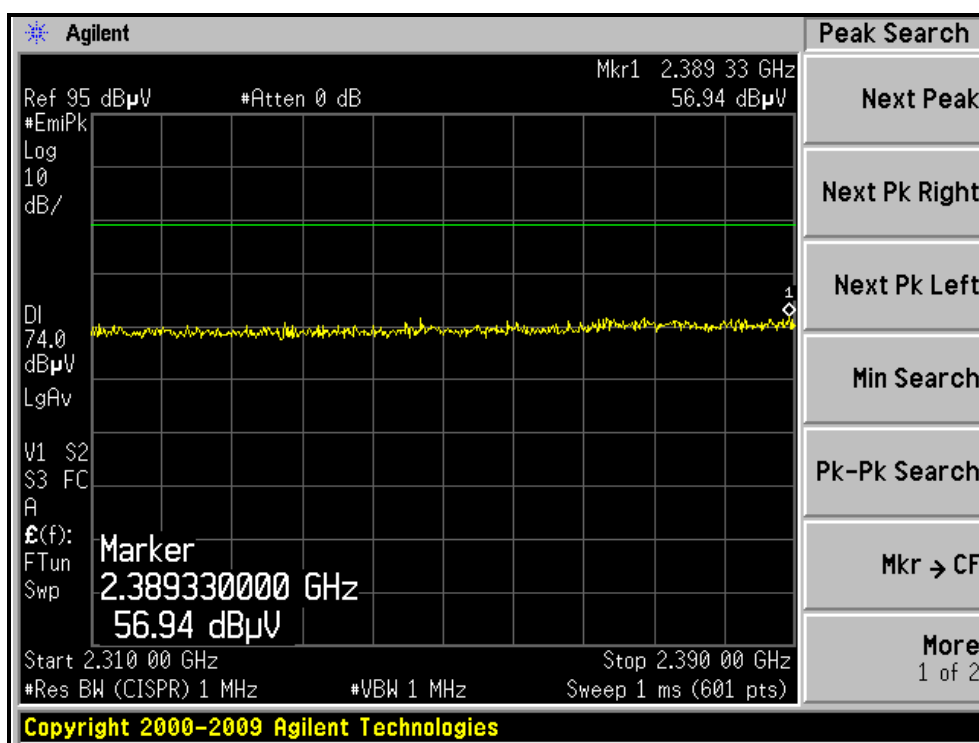
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.8 PK			1.19 H	348	74.79	32.01
2	*2462.00	103.9 AV			1.19 H	348	71.89	32.01
3	2500.00	57.3 PK	74.0	-16.7	1.19 H	352	25.15	32.15
4	2500.00	48.0 AV	54.0	-6.0	1.19 H	352	15.85	32.15
5	4924.00	55.9 PK	74.0	-18.1	1.21 H	291	16.23	39.67
6	4924.00	53.4 AV	54.0	-0.6	1.21 H	291	13.73	39.67
7	7386.00	54.6 PK	74.0	-19.4	1.21 H	266	7.80	46.80
8	7386.00	42.6 AV	54.0	-11.4	1.21 H	266	-4.20	46.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.3 PK			1.00 V	232	67.29	32.01
2	*2462.00	97.0 AV			1.00 V	232	64.99	32.01
3	2500.00	57.8 PK	74.0	-16.2	1.00 V	232	25.65	32.15
4	2500.00	45.2 AV	54.0	-8.8	1.00 V	232	13.05	32.15
5	4924.00	55.6 PK	74.0	-18.4	1.03 V	33	15.93	39.67
6	4924.00	50.3 AV	54.0	-3.7	1.03 V	33	10.63	39.67
7	7386.00	54.7 PK	74.0	-19.3	1.00 V	68	7.90	46.80
8	7386.00	42.5 AV	54.0	-11.5	1.00 V	68	-4.30	46.80

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

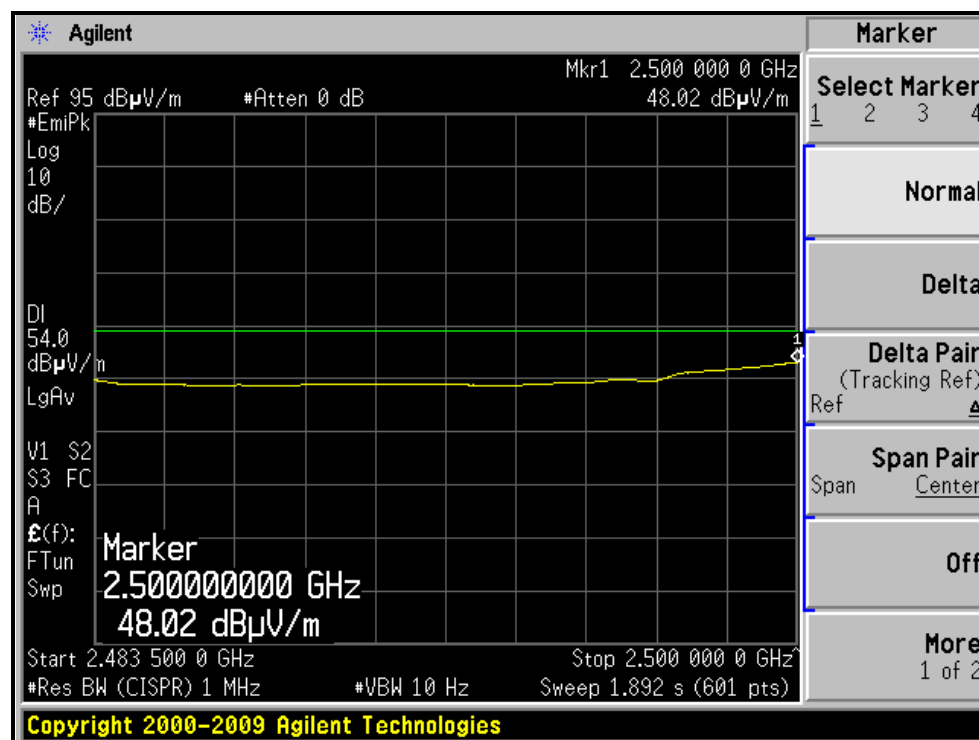
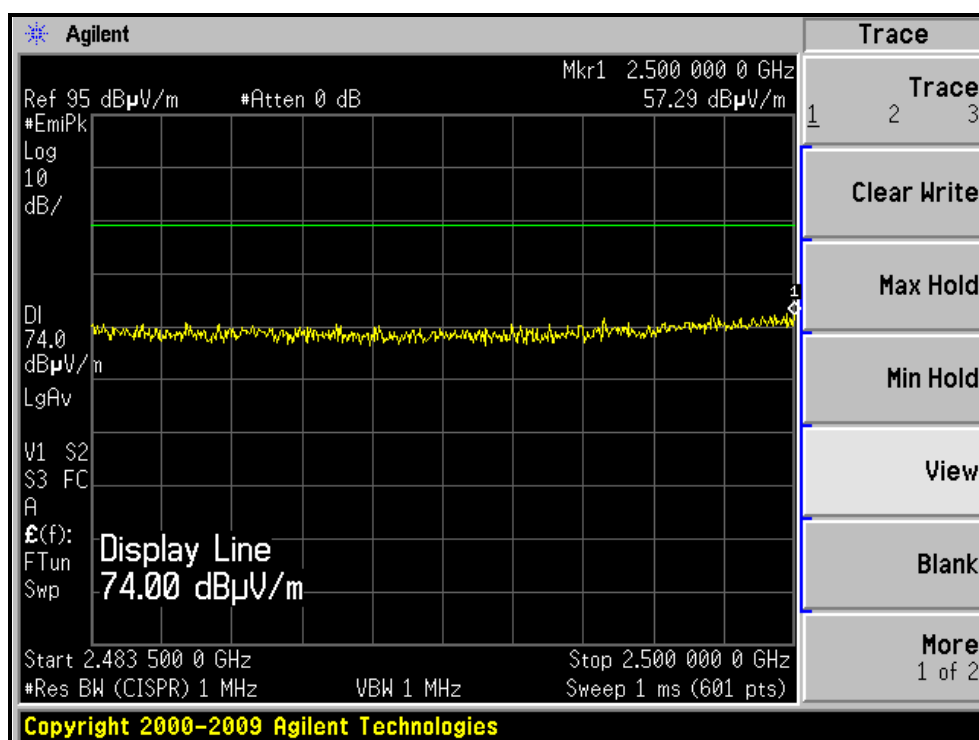
# RESTRICTED BANDEDGE (802.11b MODE, CH1, HORIZONTAL)



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

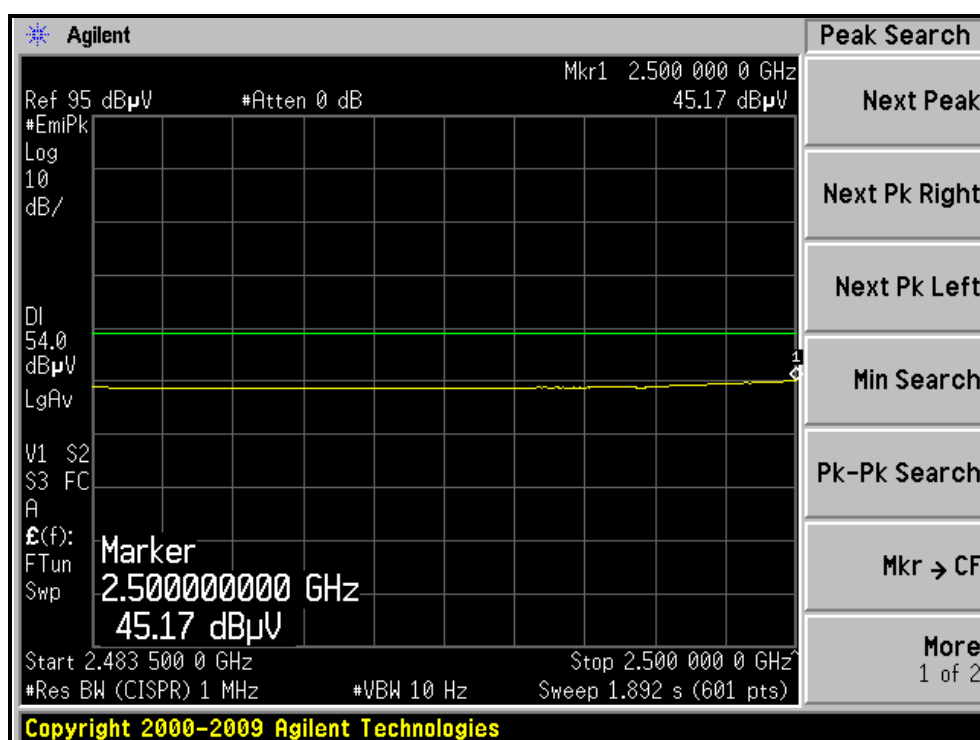
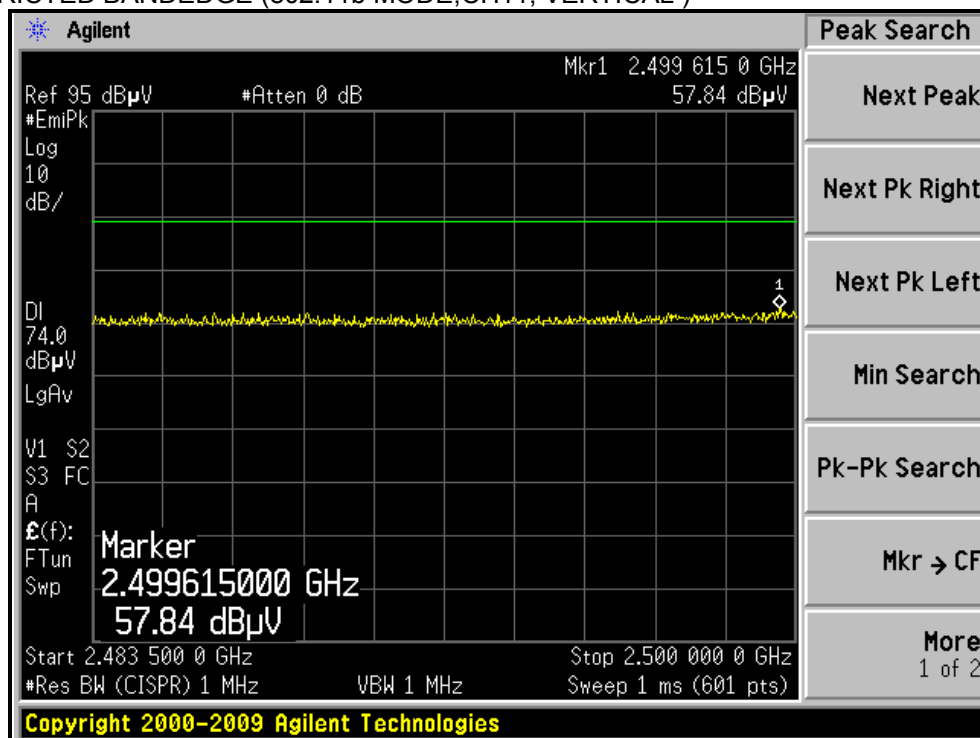


RESTRICTED BANDEDGE (802.11b MODE,CH11, HORIZONTAL )





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



## 802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 66%RH	TESTED BY	Frank Liu

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	2378.40	56.1 PK	74.0	-17.9	1.21 H	350	24.39	31.71
2	2378.40	45.2 AV	54.0	-8.8	1.21 H	350	13.49	31.71
3	*2412.00	104.5 PK			1.21 H	351	72.68	31.82
4	*2412.00	95.5 AV			1.21 H	351	63.68	31.82
5	4824.00	47.3 PK	74.0	-26.7	1.34 H	313	7.94	39.36
6	4824.00	35.9 AV	54.0	-18.1	1.34 H	313	-3.46	39.36
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	57.8 PK	74.0	-16.2	1.00 V	230	26.05	31.75
2	2390.00	44.6 AV	54.0	-9.4	1.00 V	230	12.85	31.75
3	*2412.00	100.0 PK			1.00 V	229	68.18	31.82
4	*2412.00	91.4 AV			1.00 V	229	59.58	31.82
5	4824.00	50.0 PK	74.0	-24.0	1.00 V	65	10.64	39.36
6	4824.00	39.9 AV	54.0	-14.1	1.00 V	65	0.54	39.36

**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.



A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

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	2389.88	59.4 PK	74.0	-14.6	1.00 H	98	27.65	31.75
2	2389.88	47.5 AV	54.0	-6.5	1.00 H	98	15.75	31.75
3	*2437.00	107.0 PK			1.00 H	112	75.08	31.92
4	*2437.00	98.4 AV			1.00 H	112	66.48	31.92
5	2484.29	60.2 PK	74.0	-13.8	1.00 H	110	28.11	32.09
6	2484.29	47.3 AV	54.0	-6.7	1.00 H	110	15.21	32.09
7	4874.00	47.5 PK	74.0	-26.5	1.29 H	301	8.00	39.50
8	4874.00	36.3 AV	54.0	-17.7	1.29 H	301	-3.20	39.50
9	7311.00	54.3 PK	74.0	-19.7	1.29 H	308	7.42	46.88
10	7311.00	41.1 AV	54.0	-12.9	1.29 H	308	-5.78	46.88
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	99.8 PK			1.00 V	231	67.88	31.92
2	*2437.00	90.9 AV			1.00 V	231	58.98	31.92
3	4874.00	49.5 PK	74.0	-24.5	1.00 V	63	10.00	39.50
4	4874.00	39.4 AV	54.0	-14.6	1.00 V	63	-0.10	39.50
5	7311.00	53.8 PK	74.0	-20.2	1.03 V	44	6.92	46.88
6	7311.00	41.4 AV	54.0	-12.6	1.03 V	44	-5.48	46.88

**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.



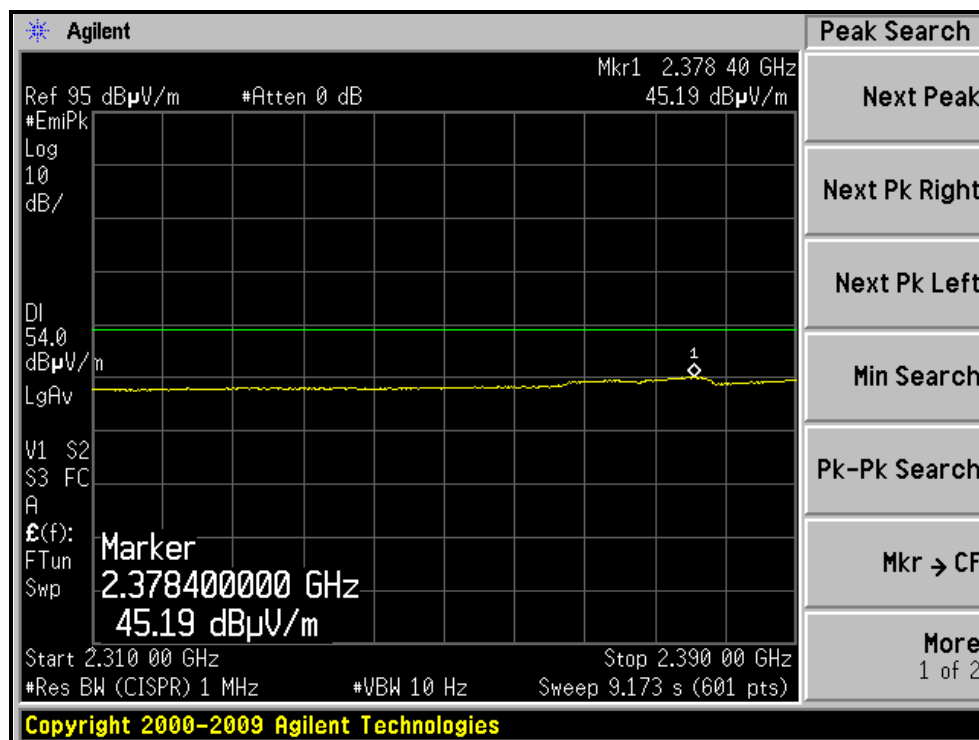
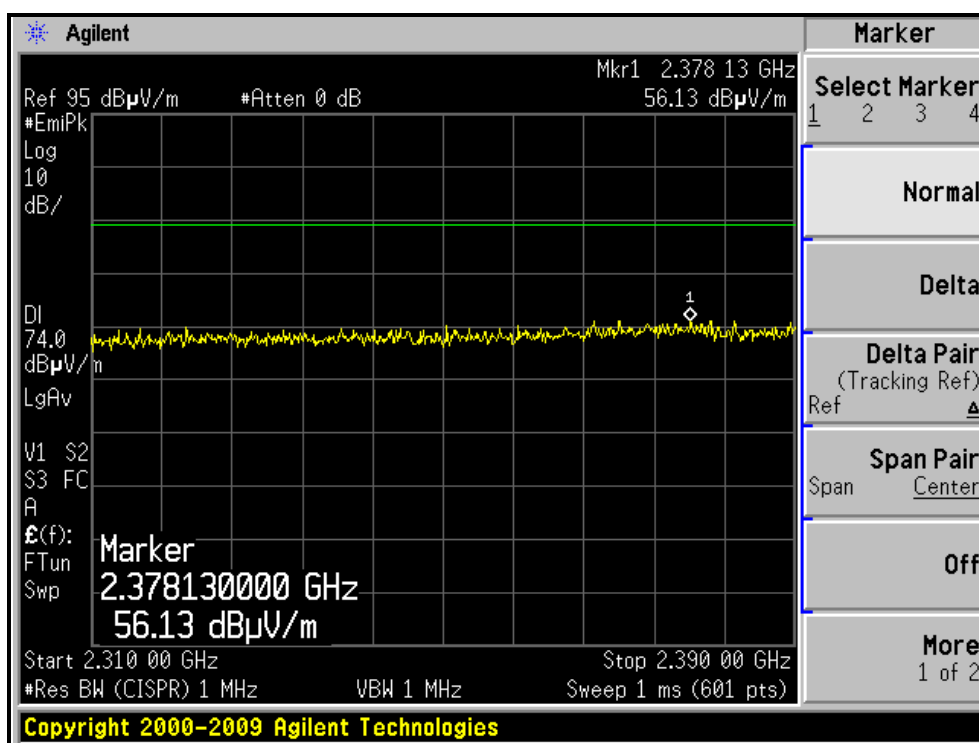
A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

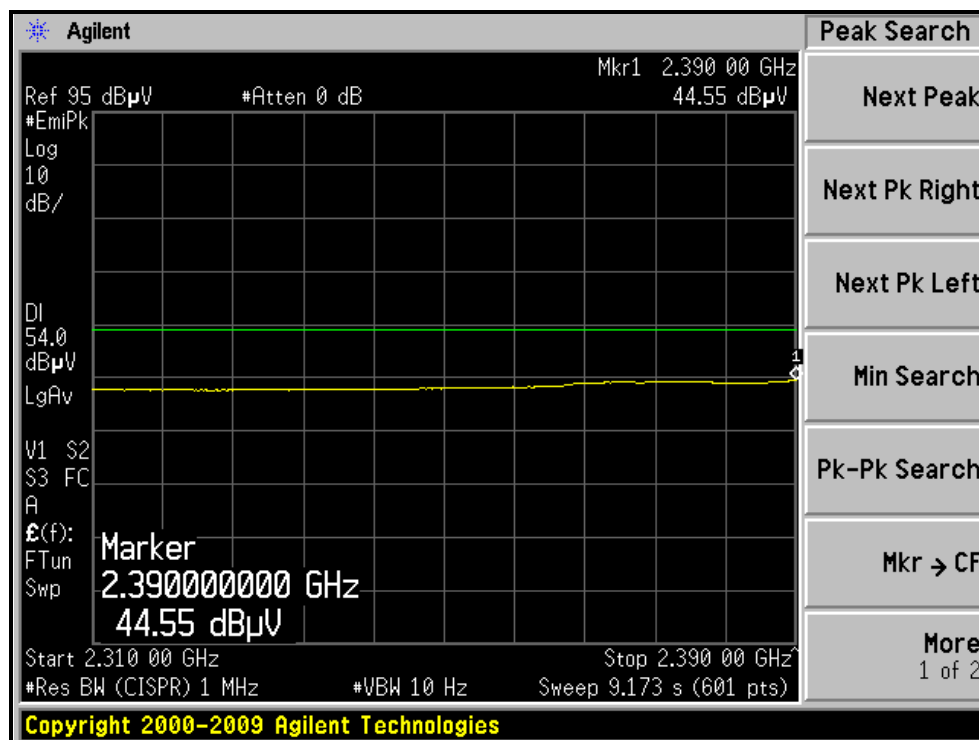
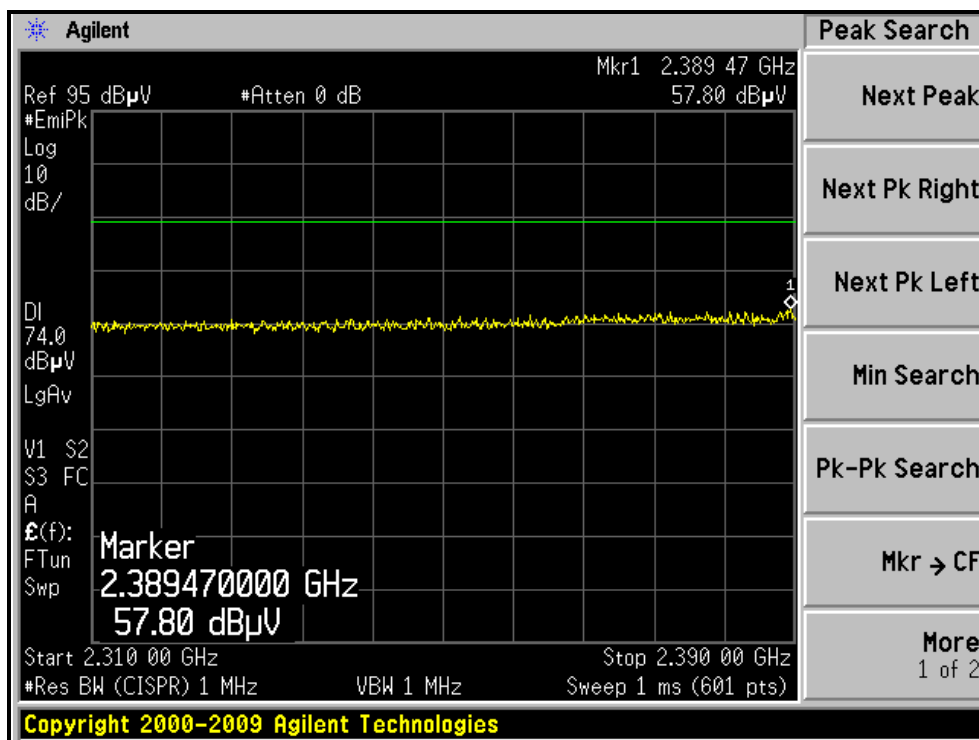
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.7 PK			1.19 H	349	73.69	32.01
2	*2462.00	96.8 AV			1.19 H	349	64.79	32.01
3	2483.50	59.1 PK	74.0	-14.9	1.19 H	349	27.01	32.09
4	2483.50	46.7 AV	54.0	-7.3	1.19 H	349	14.61	32.09
5	4924.00	47.7 PK	74.0	-26.3	1.29 H	308	8.03	39.67
6	4924.00	36.4 AV	54.0	-17.6	1.29 H	308	-3.27	39.67
7	7386.00	54.4 PK	74.0	-19.6	1.32 H	312	7.60	46.80
8	7386.00	41.1 AV	54.0	-12.9	1.32 H	312	-5.70	46.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.1 PK			1.00 V	218	67.09	32.01
2	*2462.00	90.4 AV			1.00 V	218	58.39	32.01
3	2495.82	57.4 PK	74.0	-16.6	1.03 V	222	25.27	32.13
4	2495.82	44.7 AV	54.0	-9.3	1.03 V	222	12.57	32.13
5	4924.00	49.9 PK	74.0	-24.1	1.04 V	44	10.23	39.67
6	4924.00	40.5 AV	54.0	-13.5	1.04 V	44	0.83	39.67
7	7386.00	53.7 PK	74.0	-20.3	1.03 V	27	6.90	46.80
8	7386.00	41.2 AV	54.0	-12.8	1.03 V	27	-5.60	46.80

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

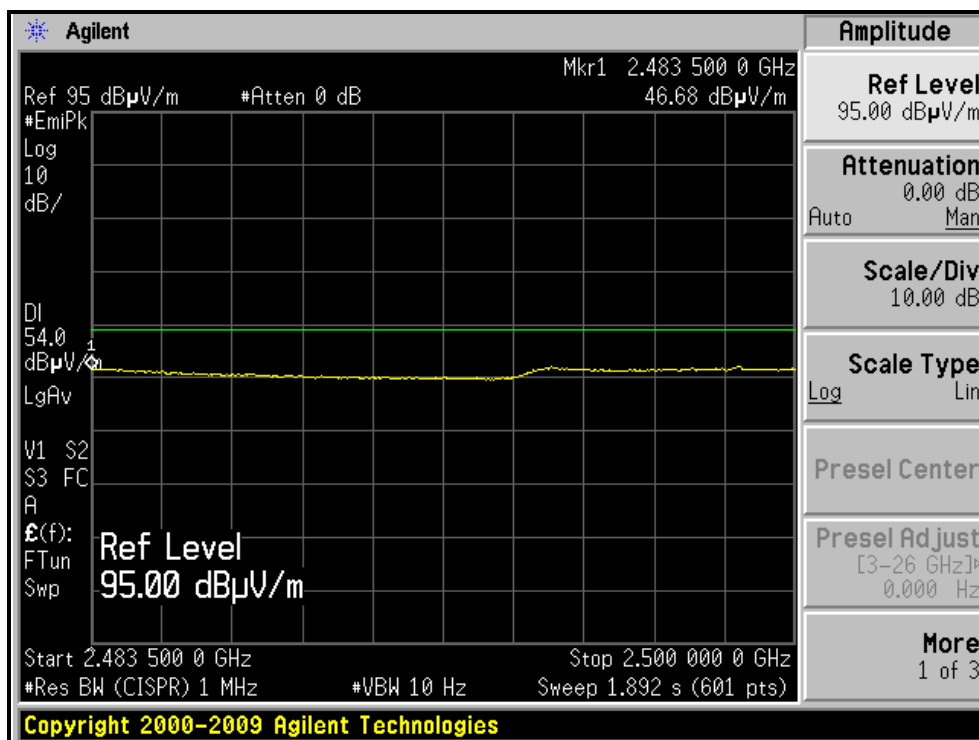
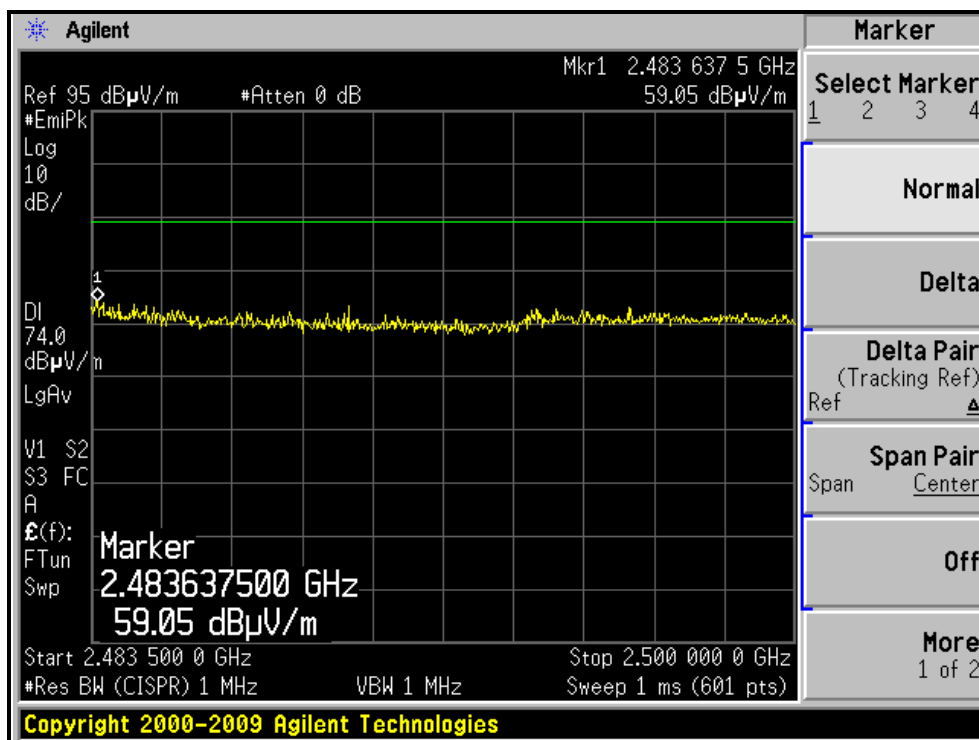
# RESTRICTED BANDEDGE (802.11g MODE, CH1, HORIZONTAL )



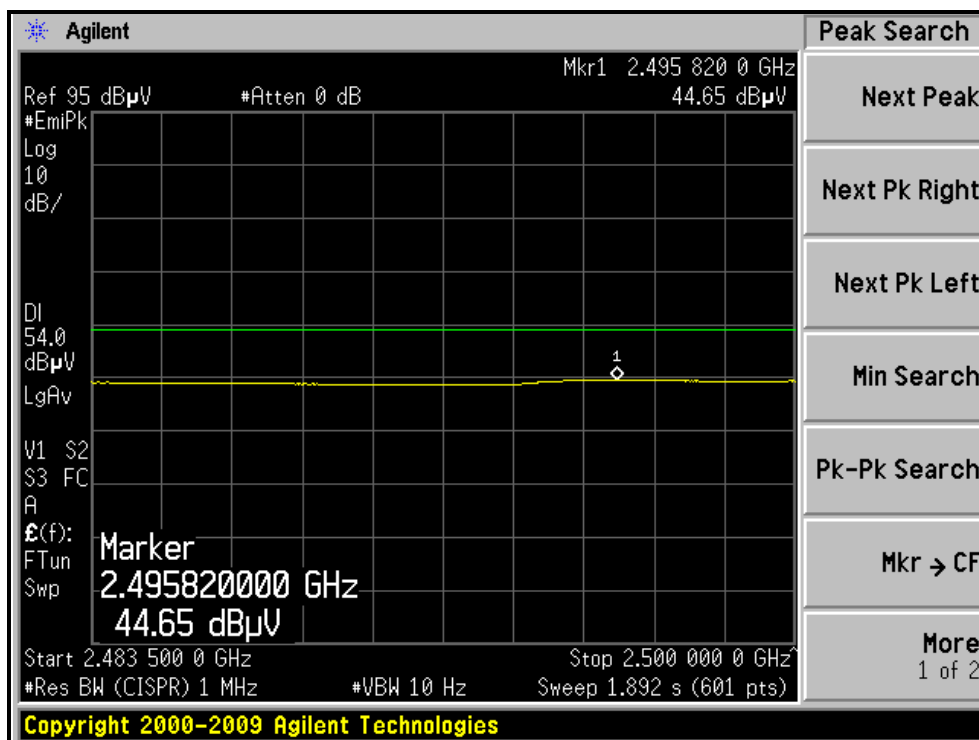
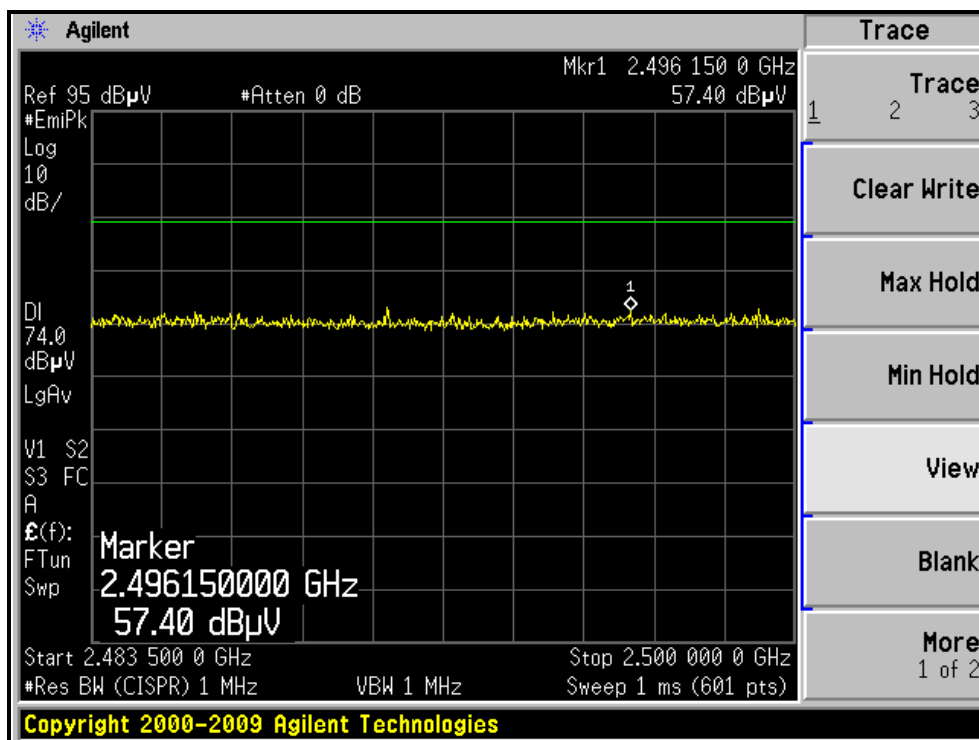
# RESTRICTED BANDEDGE (802.11g MODE,CH1, VERTICAL )



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



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





# 802.11n (20MHz) 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	26deg. C, 66%RH	TESTED BY	Frank Liu

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	2378.67	59.3 PK	74.0	-14.7	1.22 H	344	27.59	31.71
2	2378.67	47.9 AV	54.0	-6.1	1.22 H	344	16.19	31.71
3	*2412.00	103.6 PK			1.22 H	348	71.78	31.82
4	*2412.00	93.3 AV			1.22 H	348	61.48	31.82
5	4824.00	48.3 PK	74.0	-25.7	1.24 H	301	8.94	39.36
6	4824.00	35.1 AV	54.0	-18.9	1.24 H	301	-4.26	39.36
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	2380.27	58.0 PK	74.0	-16.0	1.00 V	231	26.28	31.72
2	2380.27	44.6 AV	54.0	-9.4	1.00 V	231	12.88	31.72
3	*2412.00	97.3 PK			1.00 V	231	65.48	31.82
4	*2412.00	87.8 AV			1.00 V	231	55.98	31.82
5	4824.00	49.1 PK	74.0	-24.9	1.15 V	39	9.74	39.36
6	4824.00	39.5 AV	54.0	-14.5	1.15 V	39	0.14	39.36

- 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.



A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

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	2389.92	62.8 PK	74.0	-11.2	1.00 H	84	31.05	31.75
2	2389.92	51.6 AV	54.0	-2.4	1.00 H	84	19.85	31.75
3	*2437.00	107.6 PK			1.00 H	96	75.68	31.92
4	*2437.00	97.3 AV			1.00 H	96	65.33	31.92
5	2484.23	59.2 PK	74.0	-14.8	1.00 H	111	27.11	32.09
6	2484.23	46.7 AV	54.0	-7.3	1.00 H	111	14.61	32.09
7	4874.00	48.2 PK	74.0	-25.8	1.00 H	313	8.70	39.50
8	4874.00	35.9 AV	54.0	-18.1	1.00 H	313	-3.60	39.50
9	7311.00	54.0 PK	74.0	-20.0	1.28 H	358	7.12	46.88
10	7311.00	41.1 AV	54.0	-12.9	1.28 H	358	-5.78	46.88
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	98.0 PK			1.00 V	91	66.08	31.92
2	*2437.00	87.9 AV			1.00 V	91	55.98	31.92
3	4874.00	48.9 PK	74.0	-25.1	1.19 V	43	9.40	39.50
4	4874.00	39.3 AV	54.0	-14.7	1.19 V	43	-0.20	39.50
5	7311.00	54.7 PK	74.0	-19.3	1.01 V	215	7.82	46.88
6	7311.00	41.1 AV	54.0	-12.9	1.01 V	215	-5.78	46.88

**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.



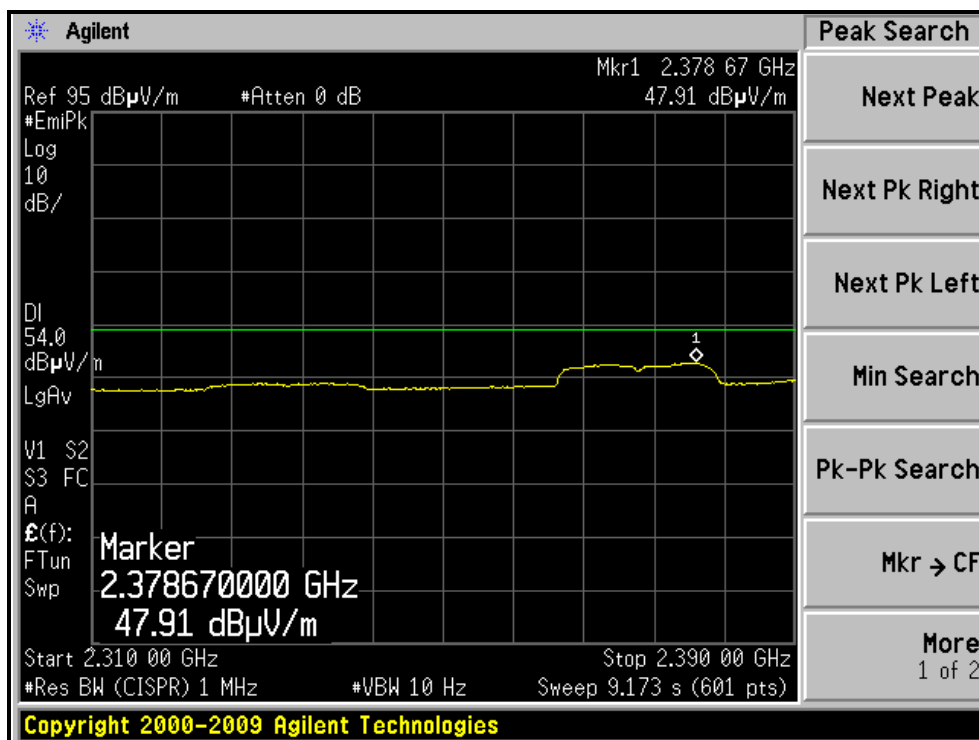
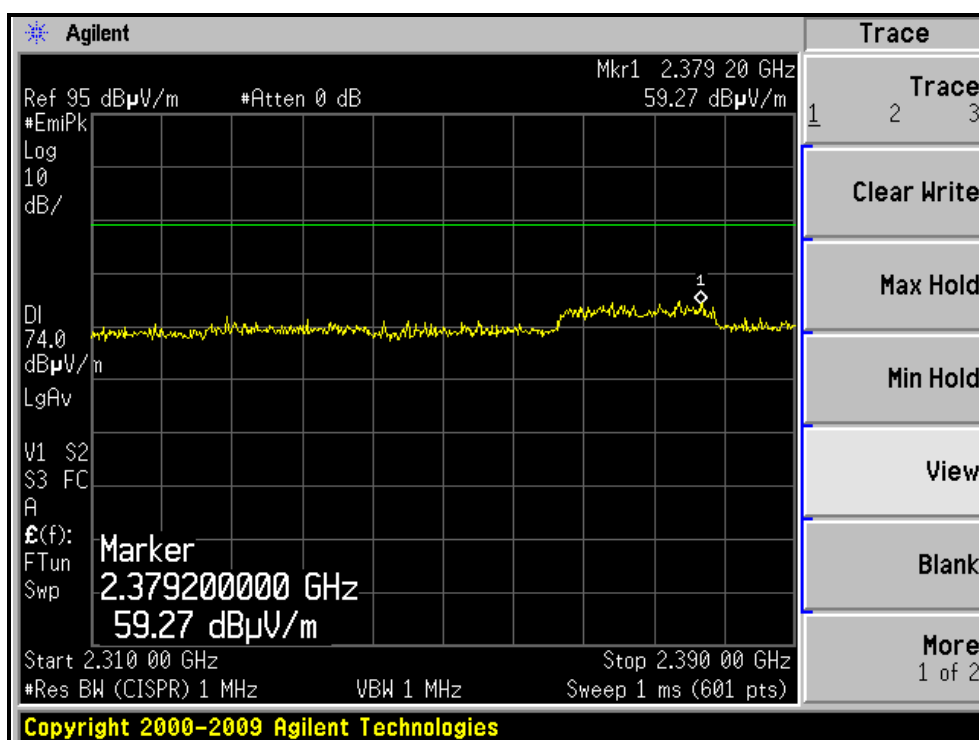
A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

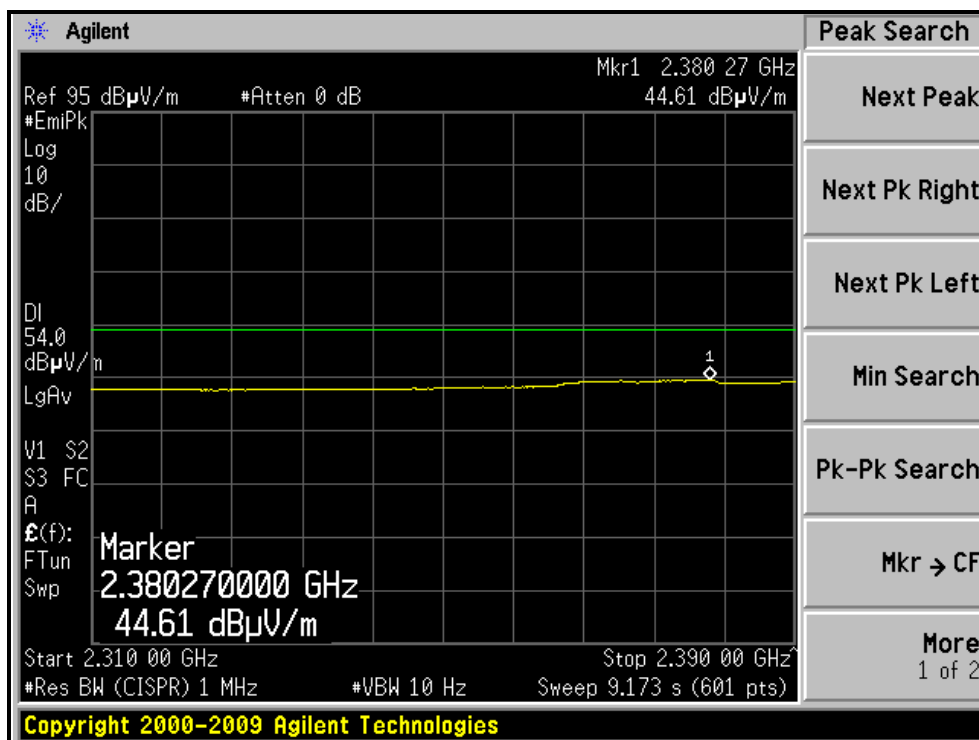
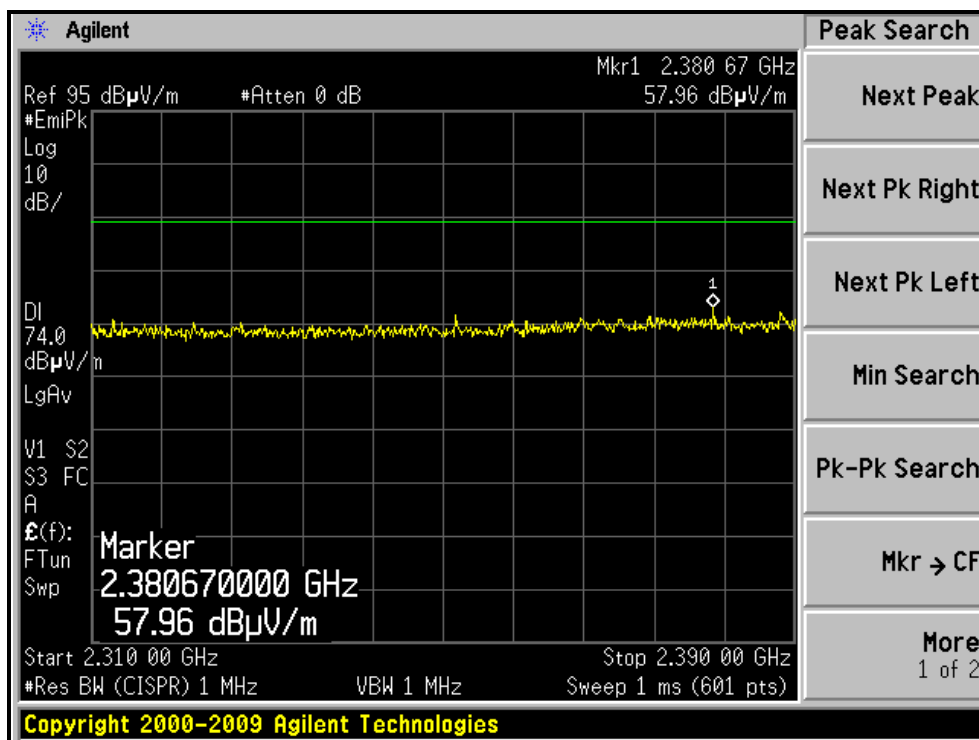
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.6 PK			1.20 H	349	71.59	32.01
2	*2462.00	93.7 AV			1.20 H	349	61.69	32.01
3	2494.14	56.5 PK	74.0	-17.5	1.20 H	349	24.37	32.13
4	2494.14	46.0 AV	54.0	-8.0	1.20 H	349	13.87	32.13
5	4924.00	48.6 PK	74.0	-25.4	1.04 H	308	8.93	39.67
6	4924.00	36.1 AV	54.0	-17.9	1.04 H	308	-3.57	39.67
7	7386.00	53.6 PK	74.0	-20.4	1.33 H	349	6.80	46.80
8	7386.00	41.0 AV	54.0	-13.0	1.33 H	349	-5.80	46.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	98.2 PK			1.00 V	45	66.19	32.01
2	*2462.00	88.7 AV			1.00 V	45	56.69	32.01
3	2495.98	57.1 PK	74.0	-16.9	1.00 V	88	24.96	32.14
4	2495.98	44.4 AV	54.0	-9.6	1.00 V	88	12.26	32.14
5	4924.00	49.3 PK	74.0	-24.7	1.19 V	46	9.63	39.67
6	4924.00	39.7 AV	54.0	-14.3	1.19 V	46	0.03	39.67
7	7386.00	54.4 PK	74.0	-19.6	1.00 V	220	7.60	46.80
8	7386.00	40.9 AV	54.0	-13.1	1.00 V	220	-5.90	46.80

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

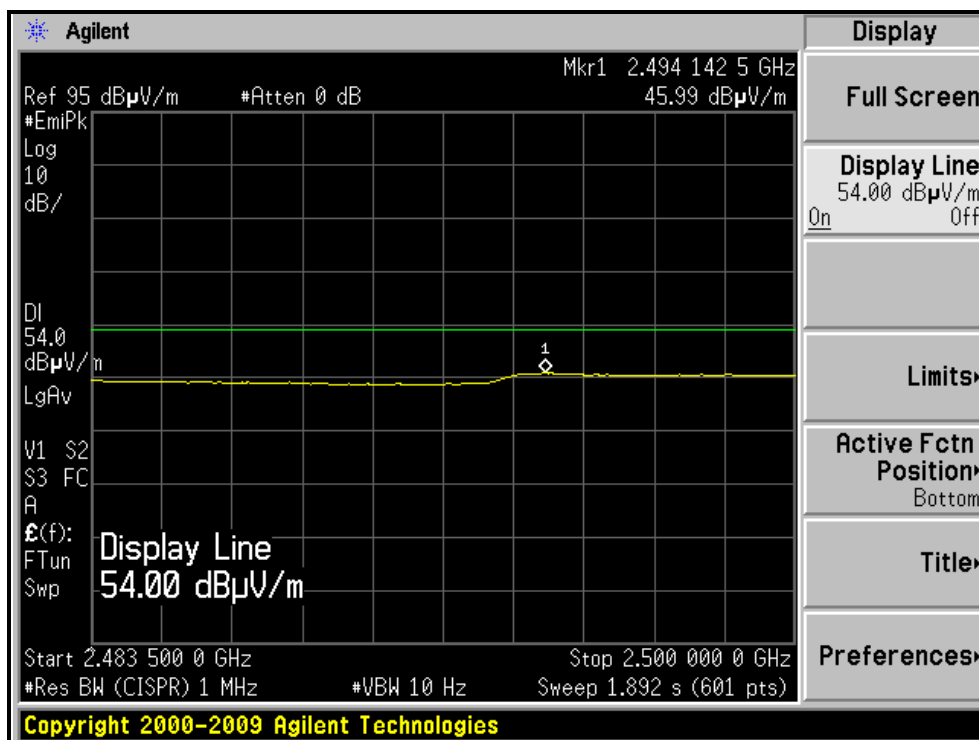
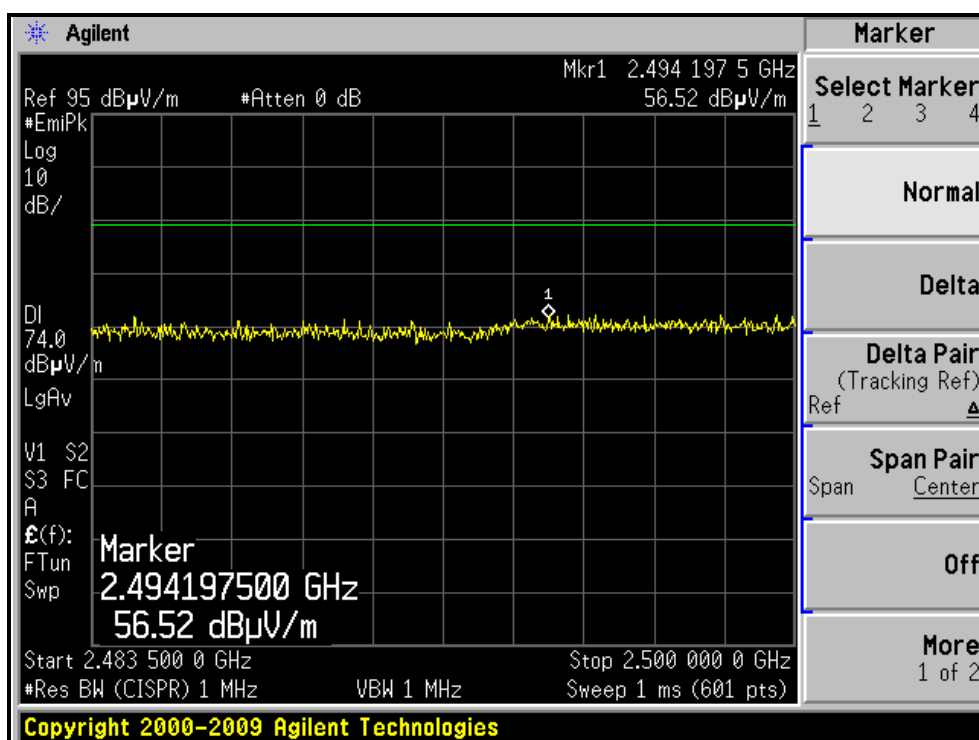
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, HORIZONTAL )



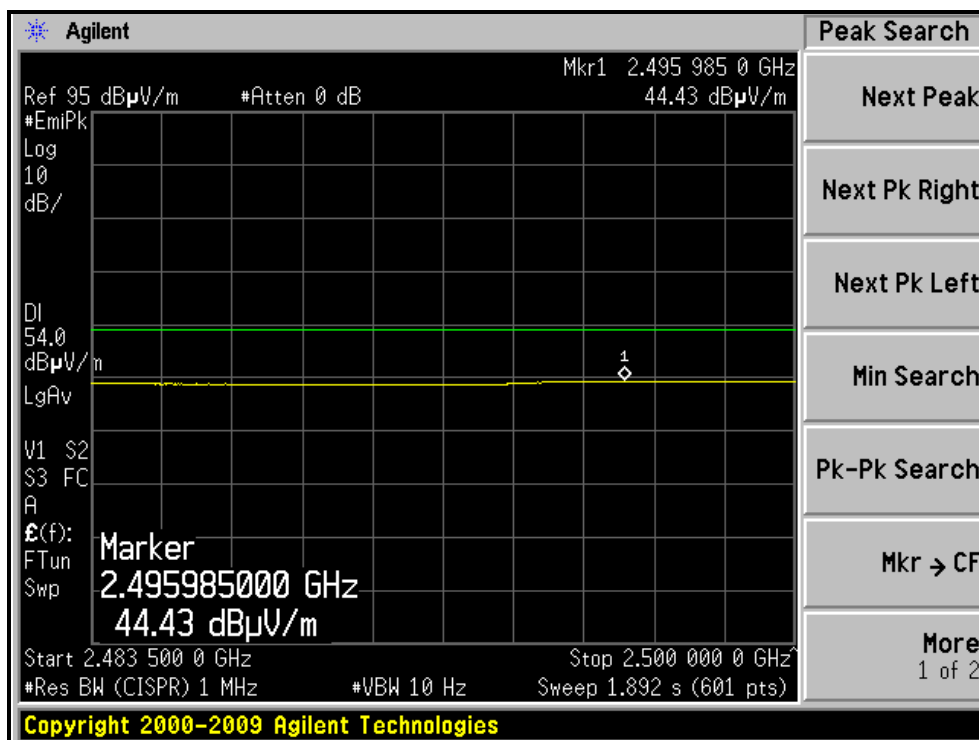
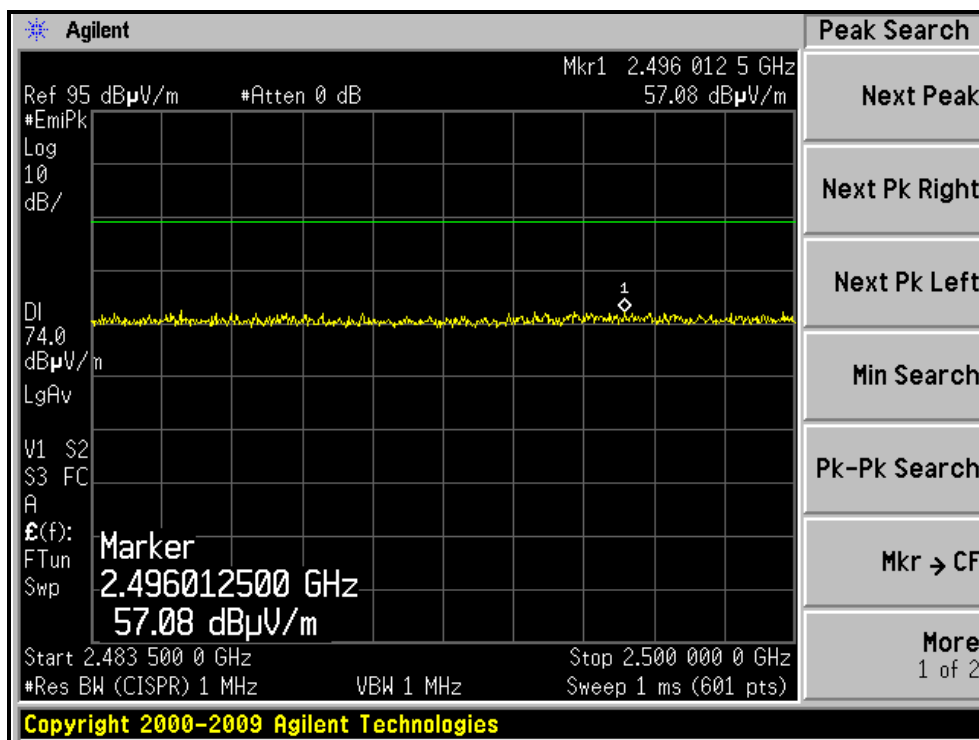
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, VERTICAL )



RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH11, HORIZONTAL )



# RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH11, VERTICAL )





A D T

## 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 66%RH	TESTED BY	Frank Liu

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	59.3 PK	74.0	-14.7	1.20 H	349	27.55	31.75
2	2390.00	47.5 AV	54.0	-6.5	1.20 H	349	15.75	31.75
3	*2422.00	102.6 PK			1.20 H	349	70.74	31.86
4	*2422.00	91.8 AV			1.20 H	349	59.94	31.86
5	4844.00	48.1 PK	74.0	-25.9	1.05 H	314	8.68	39.42
6	4844.00	34.7 AV	54.0	-19.3	1.05 H	314	-4.72	39.42
7	7266.00	53.4 PK	74.0	-20.6	1.07 H	322	6.49	46.91
8	7266.00	41.0 AV	54.0	-13.0	1.07 H	322	-5.91	46.91
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	57.5 PK	74.0	-16.5	1.00 V	233	25.75	31.75
2	2390.00	44.8 AV	54.0	-9.2	1.00 V	233	13.05	31.75
3	*2422.00	96.3 PK			1.00 V	233	64.44	31.86
4	*2422.00	86.0 AV			1.00 V	233	54.14	31.86
5	4844.00	49.2 PK	74.0	-24.8	1.17 V	35	9.78	39.42
6	4844.00	39.4 AV	54.0	-14.6	1.17 V	35	-0.02	39.42
7	7266.00	54.1 PK	74.0	-19.9	1.00 V	201	7.19	46.91
8	7266.00	41.0 AV	54.0	-13.0	1.00 V	201	-5.91	46.91

- 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.





A D T

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	26deg. C, 66%RH	TESTED BY	Frank Liu

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	2388.10	62.2 PK	74.0	-11.8	1.00 H	85	30.46	31.74
2	2388.10	50.5 AV	54.0	-3.5	1.00 H	85	18.76	31.74
3	*2437.00	104.3 PK			1.00 H	85	72.38	31.92
4	*2437.00	94.2 AV			1.00 H	85	62.28	31.92
5	2483.88	59.8 PK	74.0	-14.2	1.00 H	112	27.71	32.09
6	2483.88	46.8 AV	54.0	-7.2	1.00 H	112	14.71	32.09
7	4874.00	48.3 PK	74.0	-25.7	1.04 H	310	8.80	39.50
8	4874.00	34.8 AV	54.0	-19.2	1.04 H	310	-4.70	39.50
9	7311.00	54.1 PK	74.0	-19.9	1.08 H	324	7.22	46.88
10	7311.00	40.8 AV	54.0	-13.2	1.08 H	324	-6.08	46.88
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	96.1 PK			1.00 V	230	64.18	31.92
2	*2437.00	86.2 AV			1.00 V	230	54.28	31.92
3	4874.00	48.6 PK	74.0	-25.4	1.15 V	55	9.10	39.50
4	4874.00	39.1 AV	54.0	-14.9	1.15 V	55	-0.40	39.50
5	7311.00	54.2 PK	74.0	-19.8	1.03 V	214	7.32	46.88
6	7311.00	40.9 AV	54.0	-13.1	1.03 V	214	-5.98	46.88

- 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.



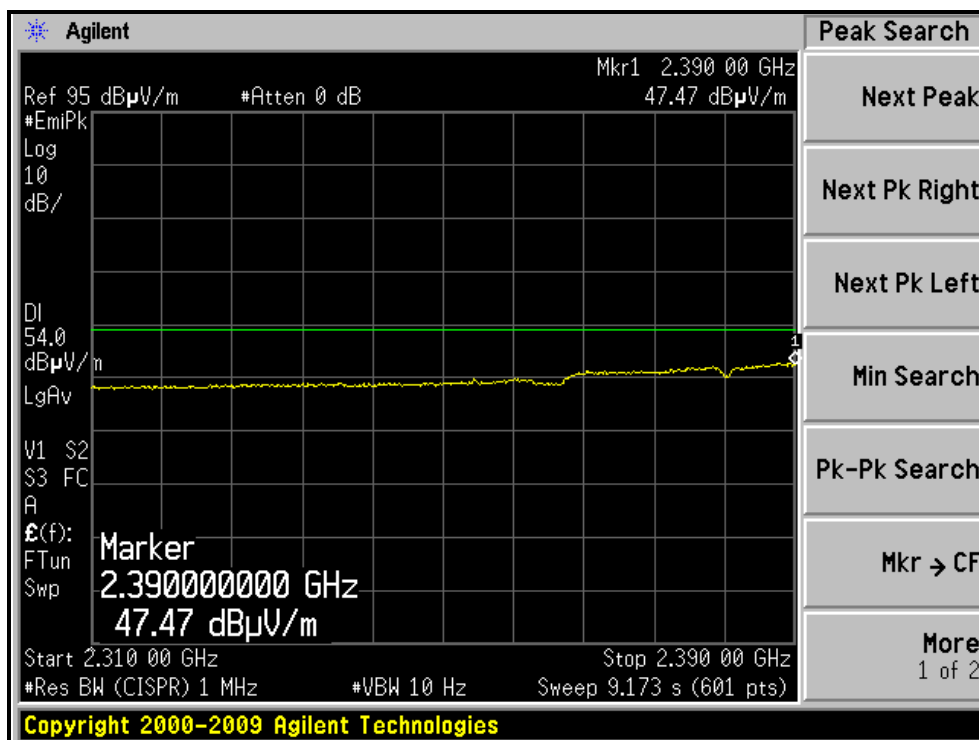
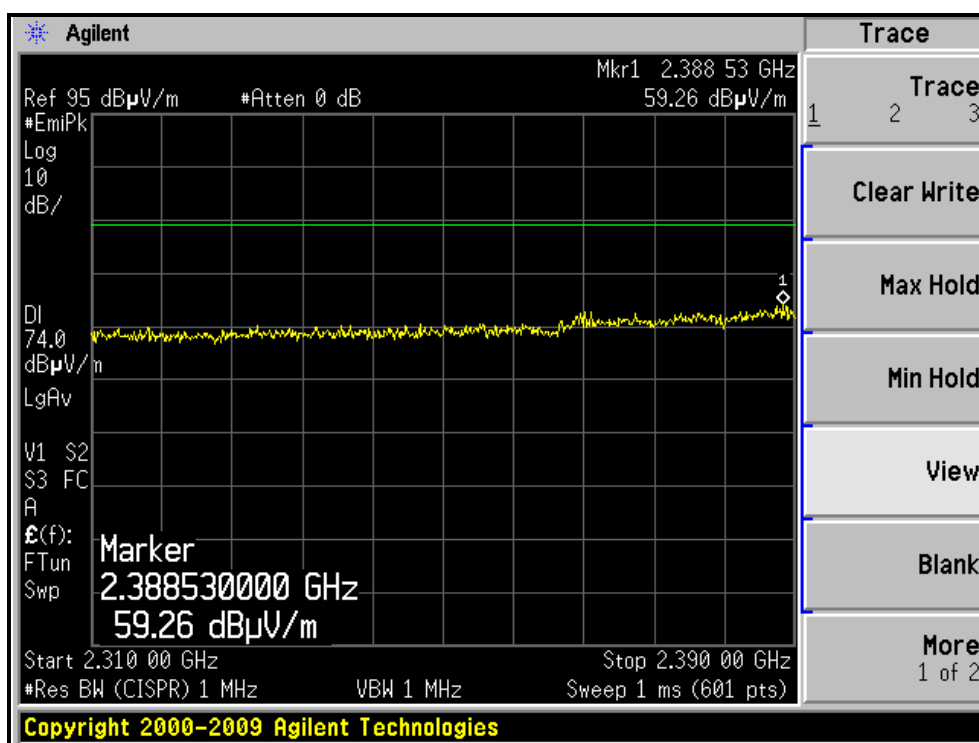
A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 66%RH	TESTED BY	Frank Liu

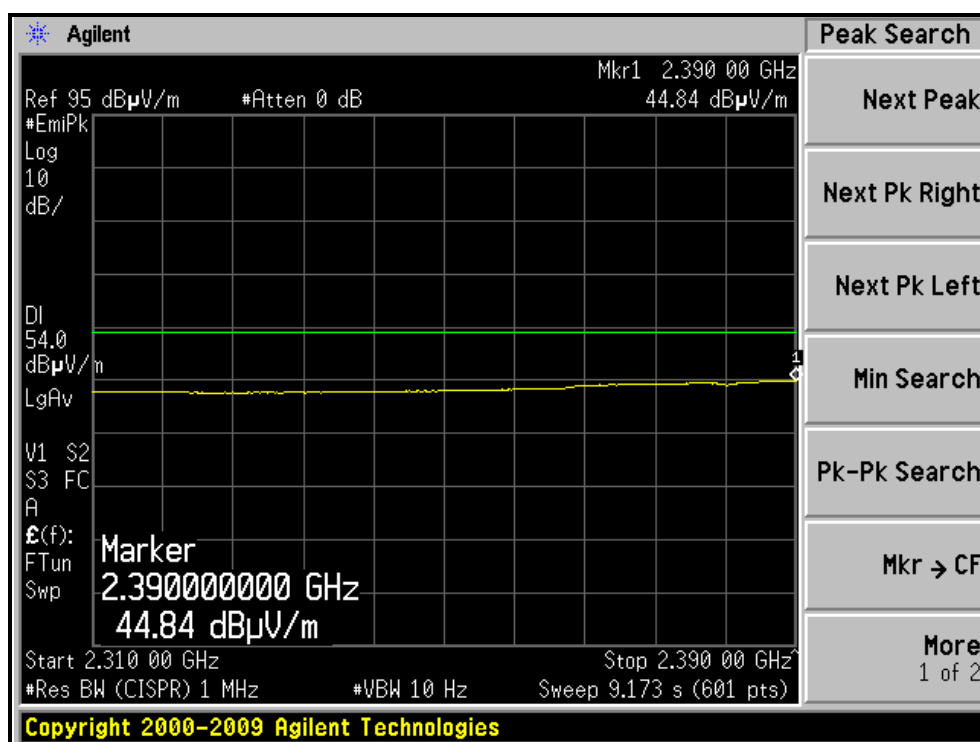
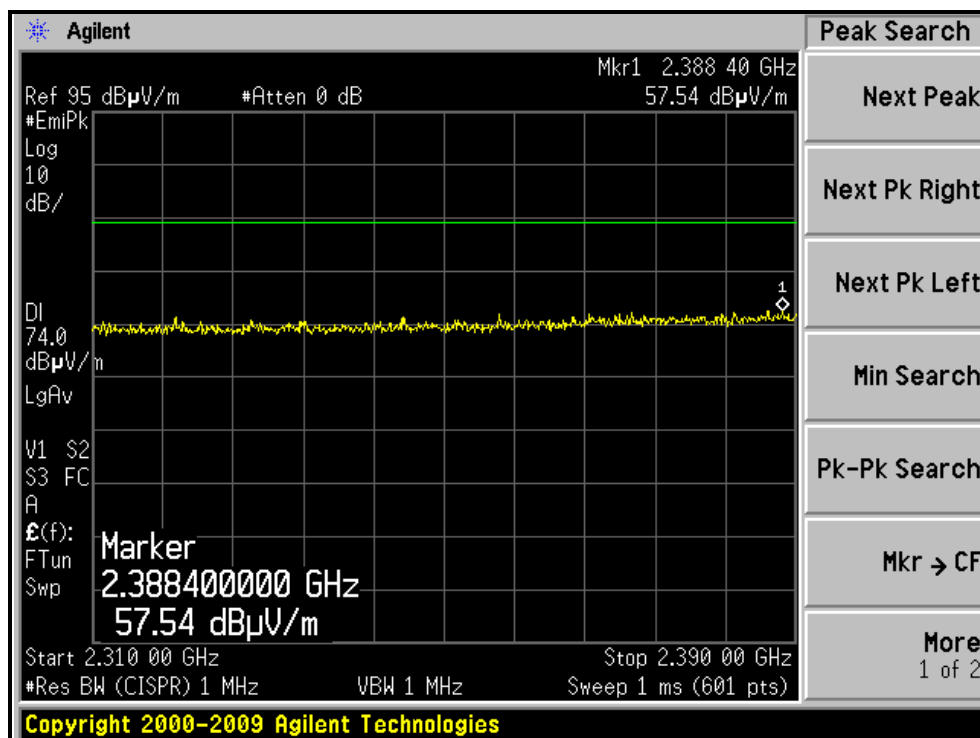
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	102.9 PK			1.20 H	344	70.93	31.97
2	*2452.00	92.3 AV			1.20 H	344	60.33	31.97
3	2483.50	56.9 PK	74.0	-17.1	1.20 H	348	24.81	32.09
4	2483.50	46.6 AV	54.0	-7.4	1.20 H	348	14.51	32.09
5	4904.00	48.2 PK	74.0	-25.8	1.05 H	311	8.60	39.60
6	4904.00	34.6 AV	54.0	-19.4	1.05 H	311	-5.00	39.60
7	7356.00	54.3 PK	74.0	-19.7	1.17 H	328	7.47	46.83
8	7356.00	41.0 AV	54.0	-13.0	1.17 H	328	-5.83	46.83
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	*2452.00	95.0 PK			1.00 V	229	63.03	31.97
2	*2452.00	84.8 AV			1.00 V	229	52.83	31.97
3	2493.62	57.5 PK	74.0	-16.5	1.00 V	227	25.37	32.13
4	2493.62	44.2 AV	54.0	-9.8	1.00 V	227	12.07	32.13
5	4904.00	48.9 PK	74.0	-25.1	1.15 V	61	9.30	39.60
6	4904.00	39.0 AV	54.0	-15.0	1.15 V	61	-0.60	39.60
7	7356.00	54.3 PK	74.0	-19.7	1.24 V	216	7.47	46.83
8	7356.00	40.8 AV	54.0	-13.2	1.24 V	216	-6.03	46.83

**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.

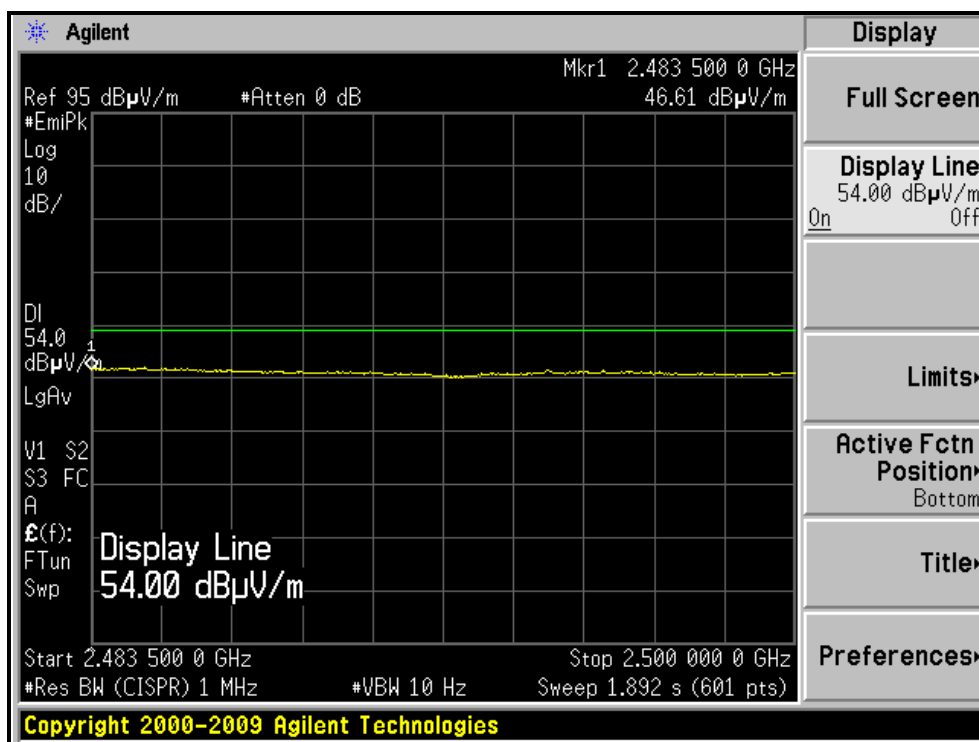
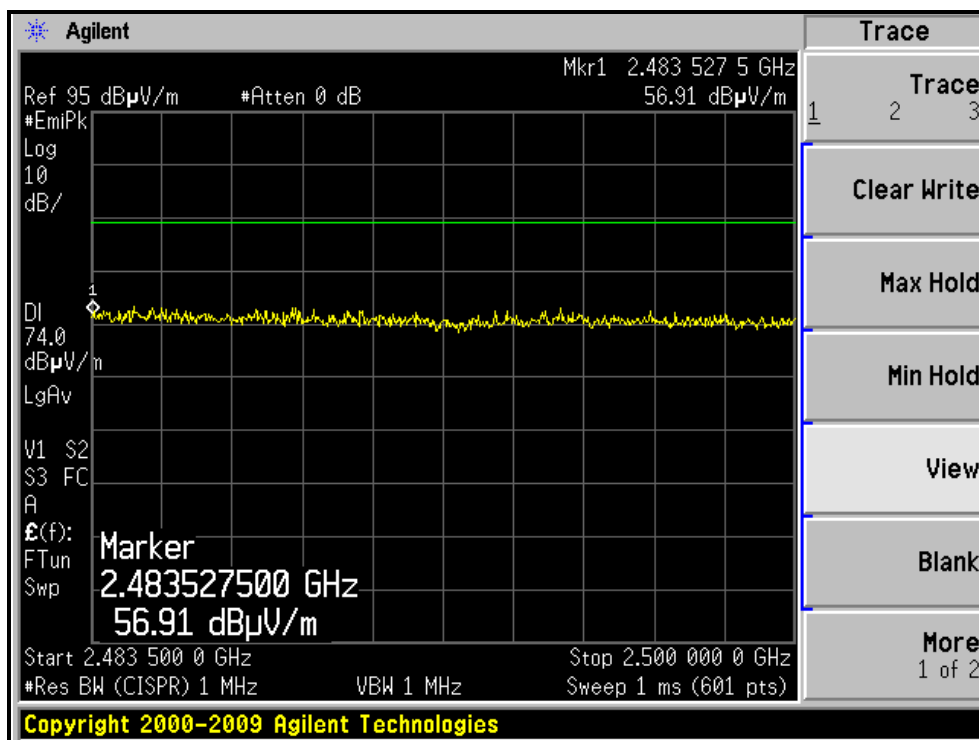
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH3, HORIZONTAL )



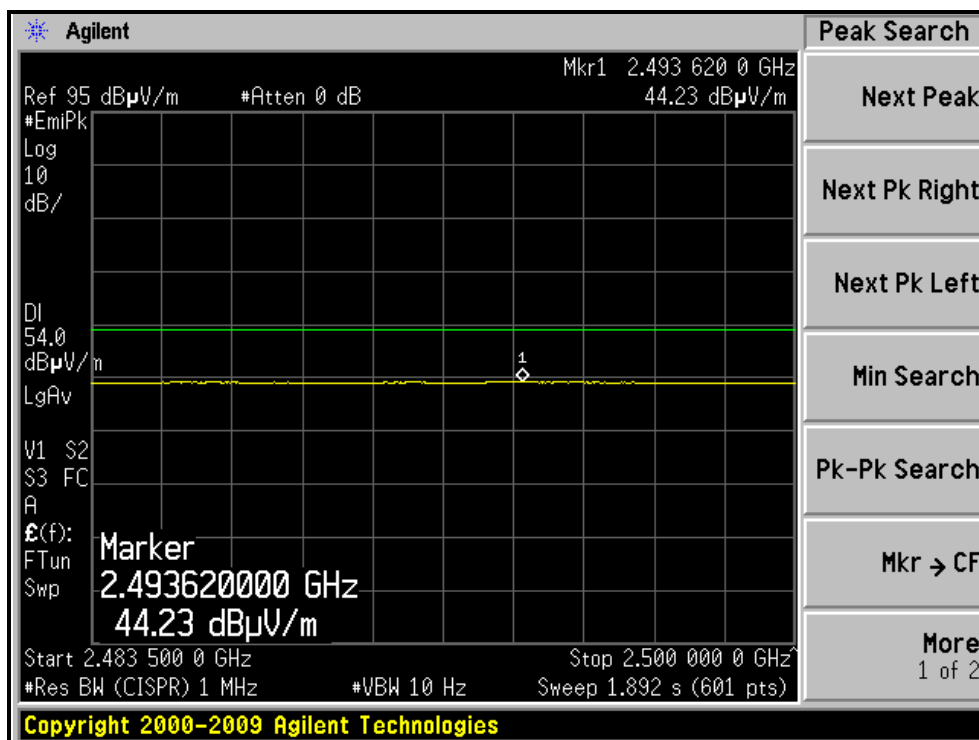
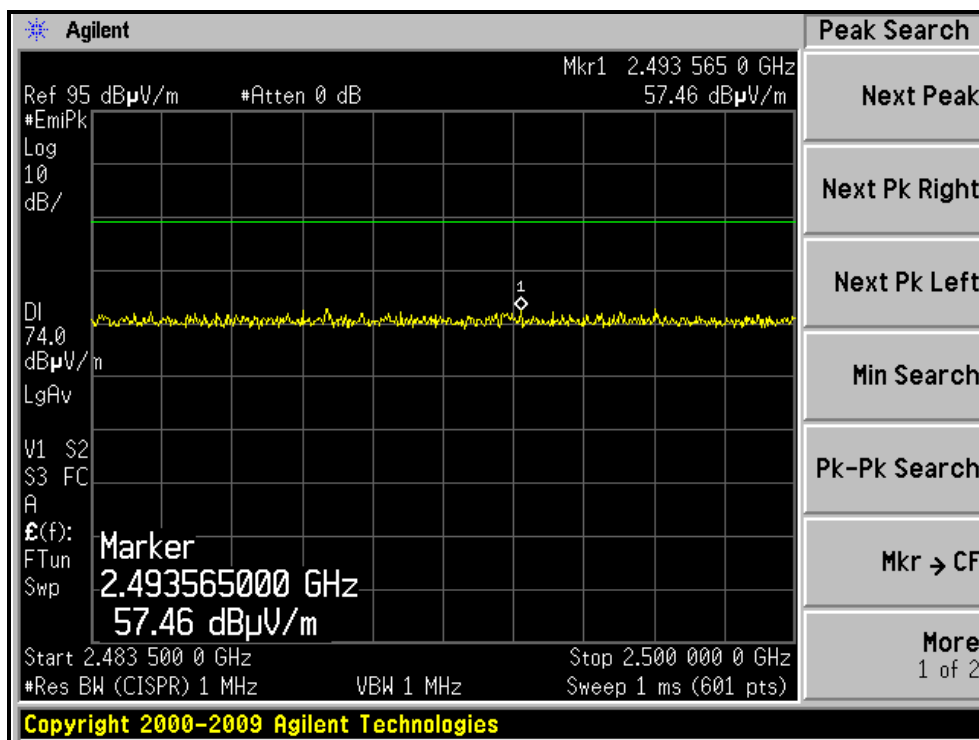
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH3, VERTICAL )



RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH9, HORIZONTAL )



# RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH9, VERTICAL )



### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

Test date: Sep. 28, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

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

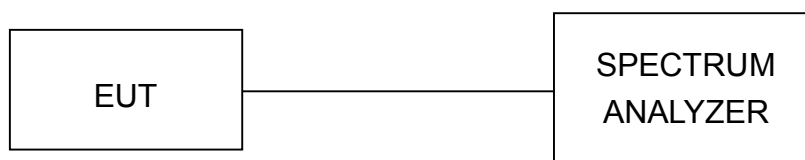
#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

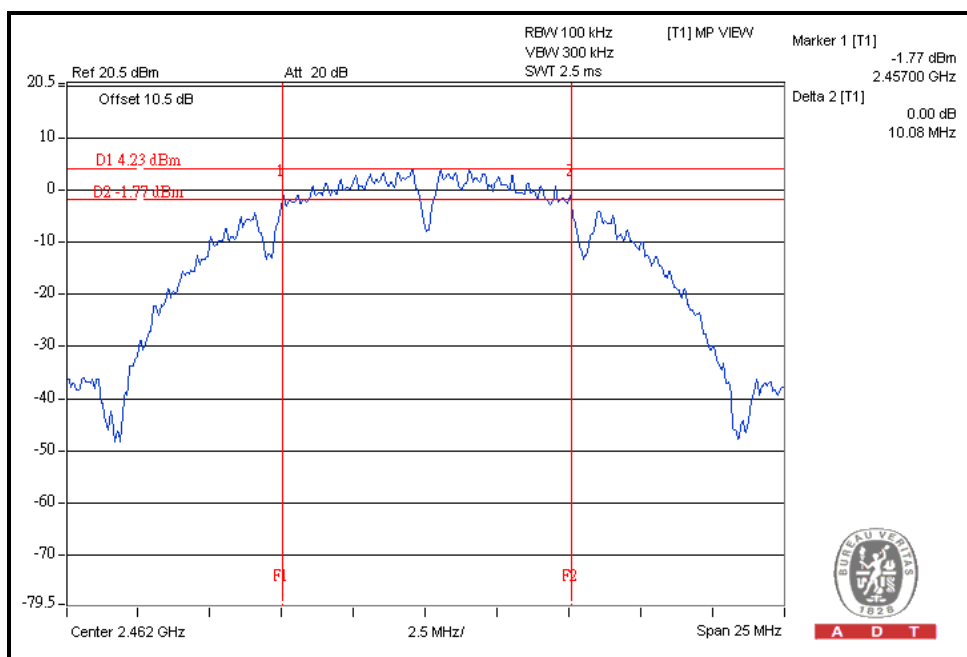
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 4.3.7 TEST RESULTS

#### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.06	0.5	PASS
6	2437	10.02	0.5	PASS
11	2462	10.08	0.5	PASS

#### CH11

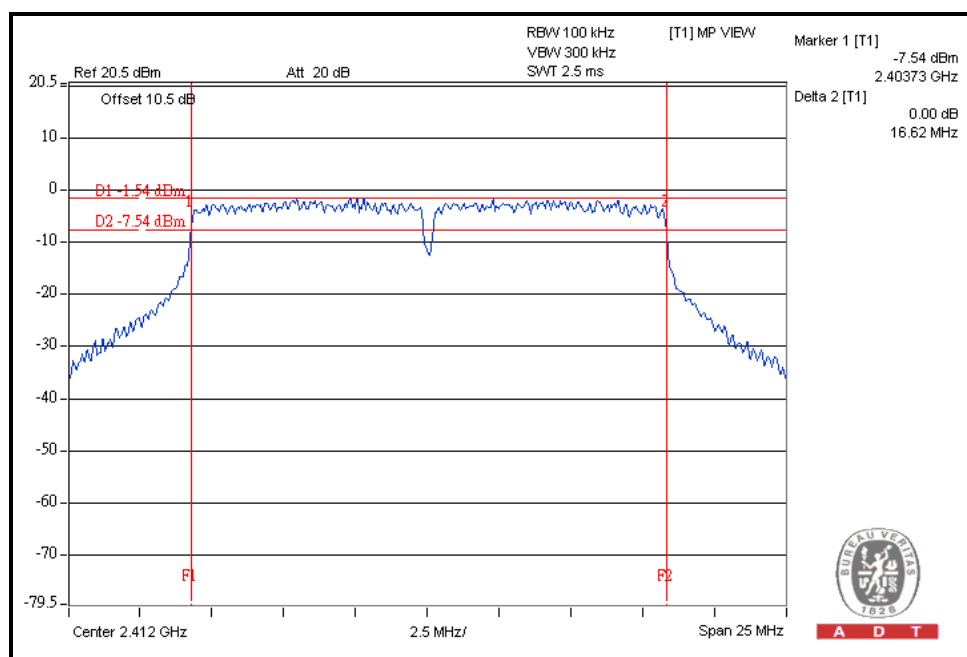




## 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.62	0.5	PASS
6	2437	16.61	0.5	PASS
11	2462	16.60	0.5	PASS

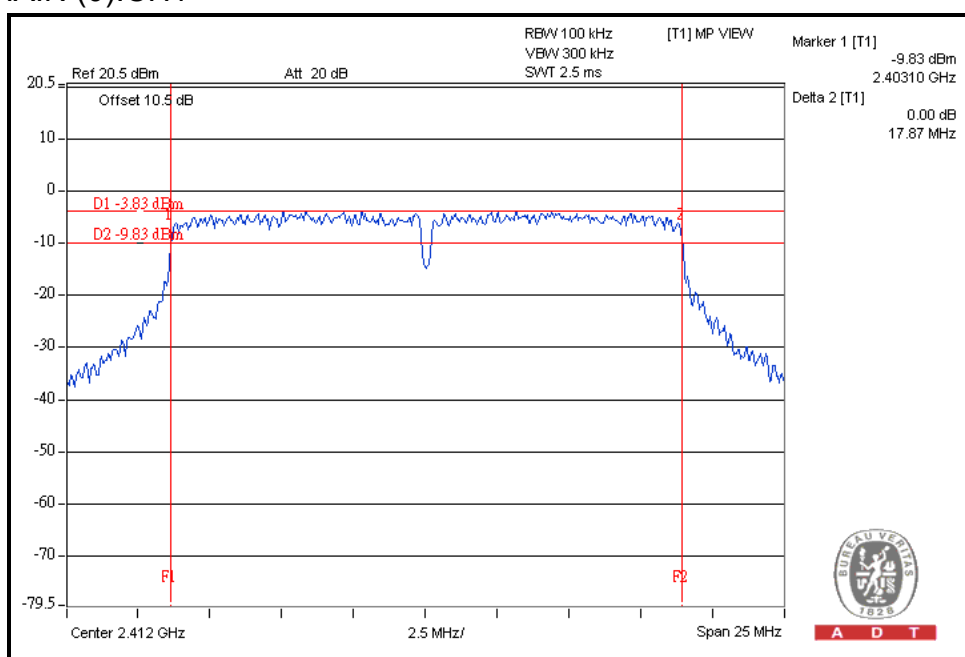
CH1



### 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	17.87	17.76	0.5	PASS
6	2437	17.82	17.75	0.5	PASS
11	2462	17.85	17.79	0.5	PASS

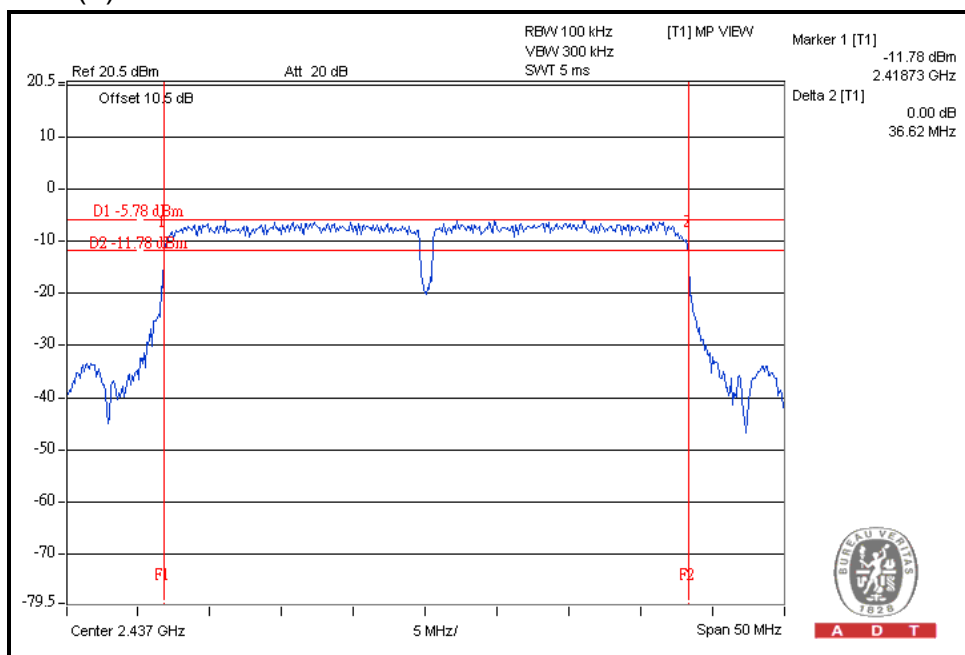
### CHAIN (0):CH1



## 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
3	2422	36.51	36.47	0.5	PASS
6	2437	36.62	36.52	0.5	PASS
9	2452	36.58	36.52	0.5	PASS

### CHAIN (0):CH6



## 4.4 MAXIMUM PEAK OUTPUT POWER

### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

### 4.4.2 INSTRUMENTS

Test date: Sep. 28, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	May 04, 2011	May 03, 2012
Pulse Power Sensor	MA2411B	0738172	May 03, 2011	May 02, 2012

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

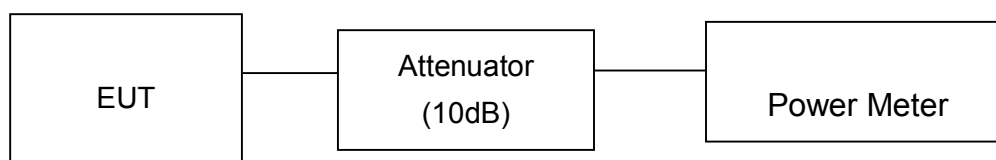
### 4.4.3 TEST PROCEDURES

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

Same as Item 4.3.6

#### 4.4.7 TEST RESULTS

##### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	20.4	13.1	30	PASS
6	2437	26.3	14.2	30	PASS
11	2462	40.7	16.1	30	PASS

##### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	162.2	22.1	30	PASS
6	2437	138.0	21.4	30	PASS
11	2462	141.3	21.5	30	PASS

##### 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
1	2412	20.2	19.8	200.2	23.0	30	PASS
6	2437	20.5	19.7	205.5	23.1	30	PASS
11	2462	19.7	19.5	182.5	22.6	30	PASS

##### 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
3	2422	19.1	19.6	172.5	22.4	30	PASS
6	2437	19.2	18.9	160.8	22.1	30	PASS
9	2452	18.7	19.2	157.3	22.0	30	PASS

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

Test date: Sep. 28, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

**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

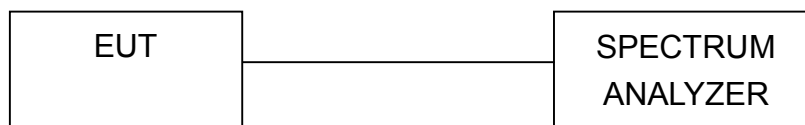
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP



### 4.5.6 EUT OPERATING CONDITION

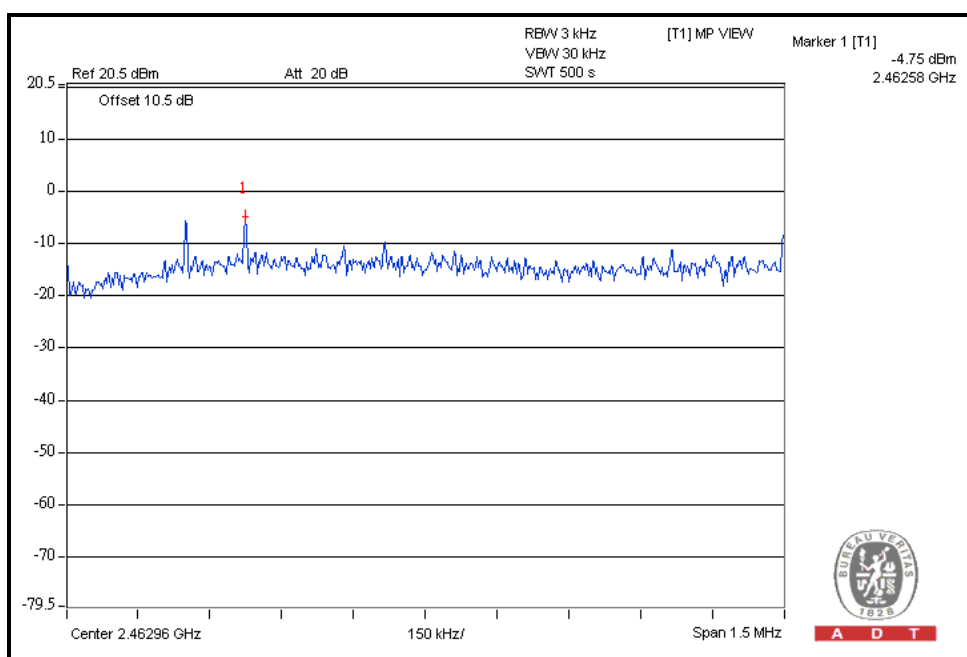
Same as Item 4.3.6

## 4.5.7 TEST RESULTS

### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-11.9	8	PASS
6	2437	-7.4	8	PASS
11	2462	-4.8	8	PASS

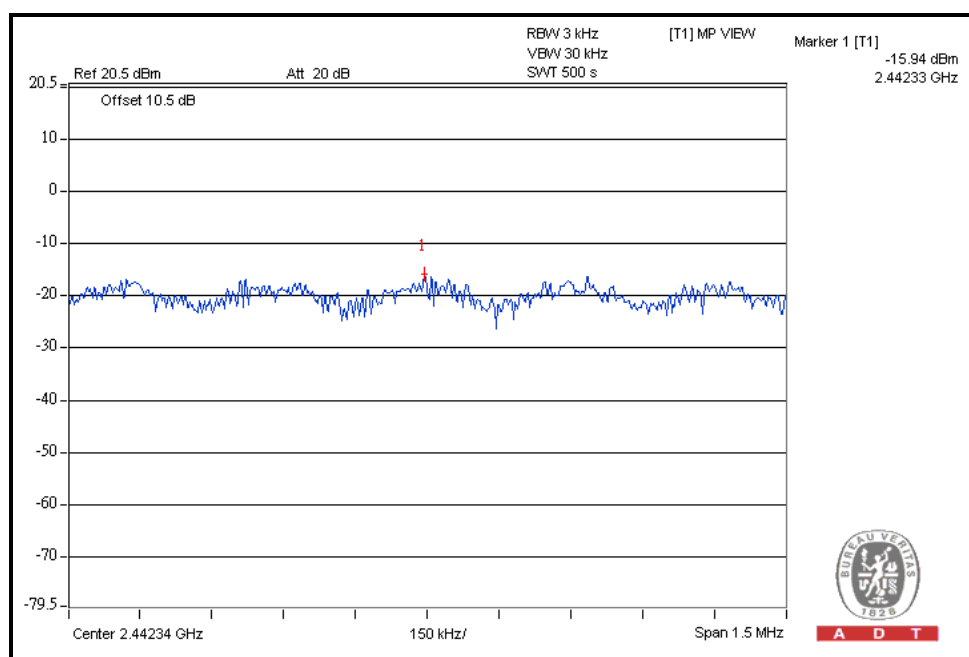
## CH11



## 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-16.0	8	PASS
6	2437	-15.9	8	PASS
11	2462	-16.0	8	PASS

## CH6

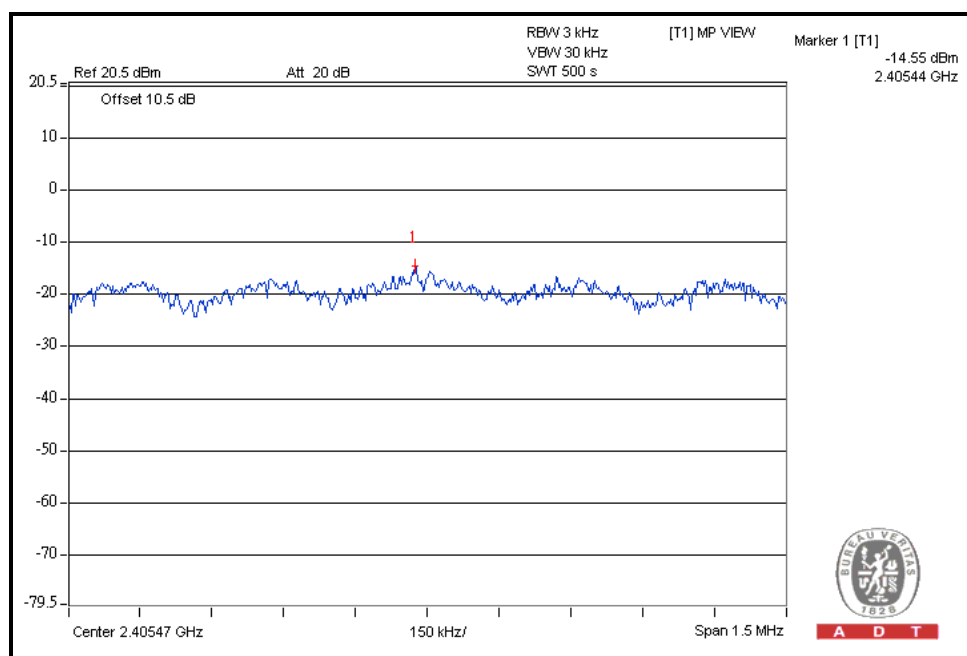




## 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)			
1	2412	-16.7	-14.6	-12.5	8	PASS
6	2437	-17.6	-15.5	-13.4	8	PASS
11	2462	-17.8	-14.7	-13.0	8	PASS

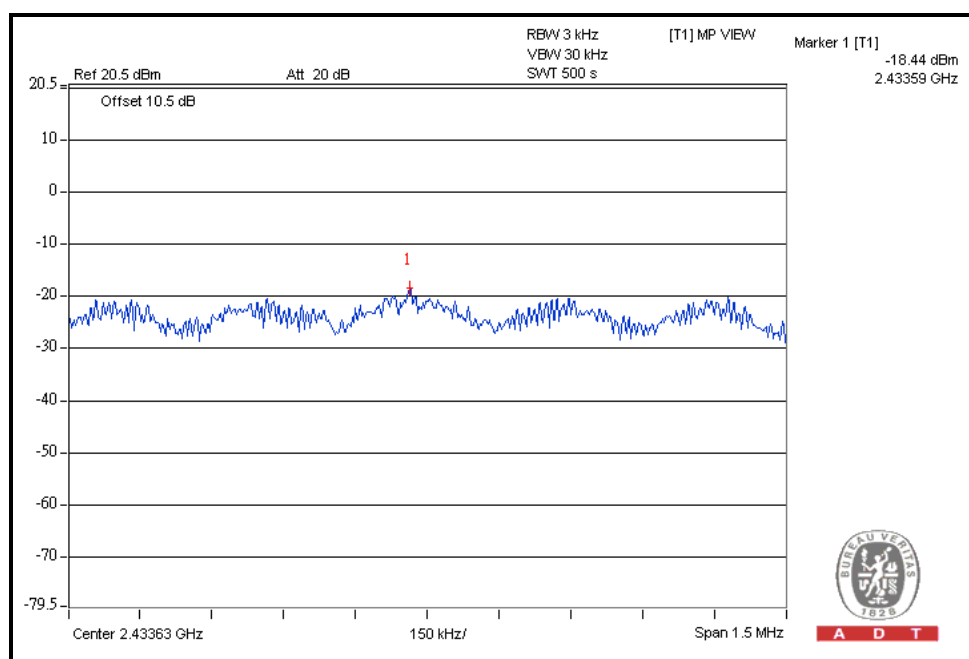
For Chain(1): CH1



## 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)			
3	2422	-19.3	-19.4	-16.3	8	PASS
6	2437	-18.4	-19.6	-15.9	8	PASS
9	2452	-19.5	-19.6	-16.5	8	PASS

For Chain(0): CH6



## 4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

Test date: Sep. 28, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

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

### 4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set RBW of spectrum analyzer to 100kHz and VBW of spectrum analyzer to 300kHz with suitable frequency span including 100 MHz or 200 MHz bandwidth from band edge. The band edges were measured and recorded.

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

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 EUT OPERATING CONDITION

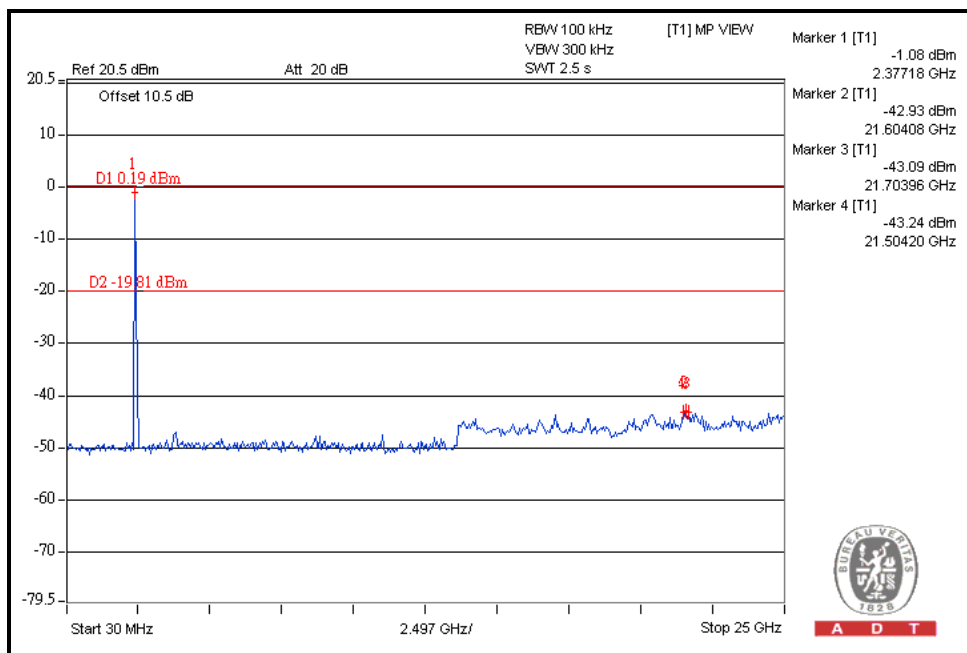
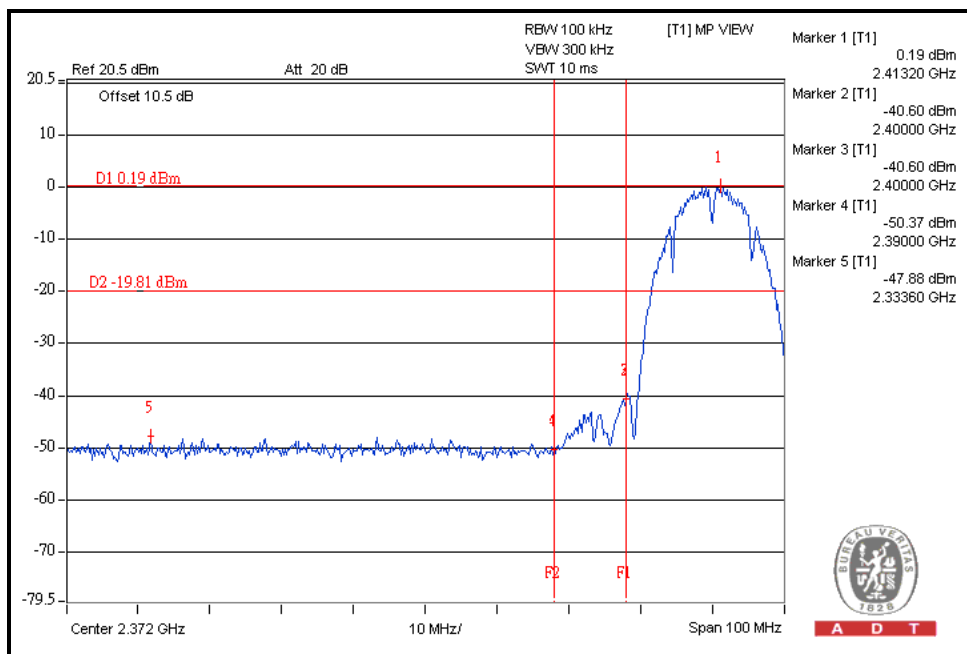
Same as Item 4.3.6

### 4.6.6 TEST RESULTS

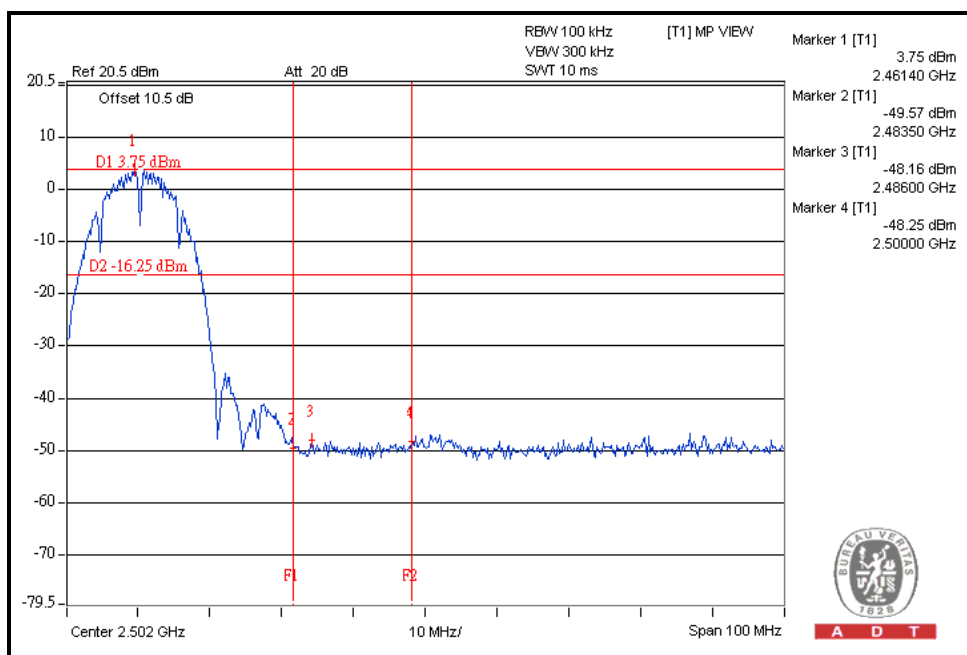
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

## Performing measurements: Measure and add 10 log(N) dB 802.11b DSSS MODULATION:

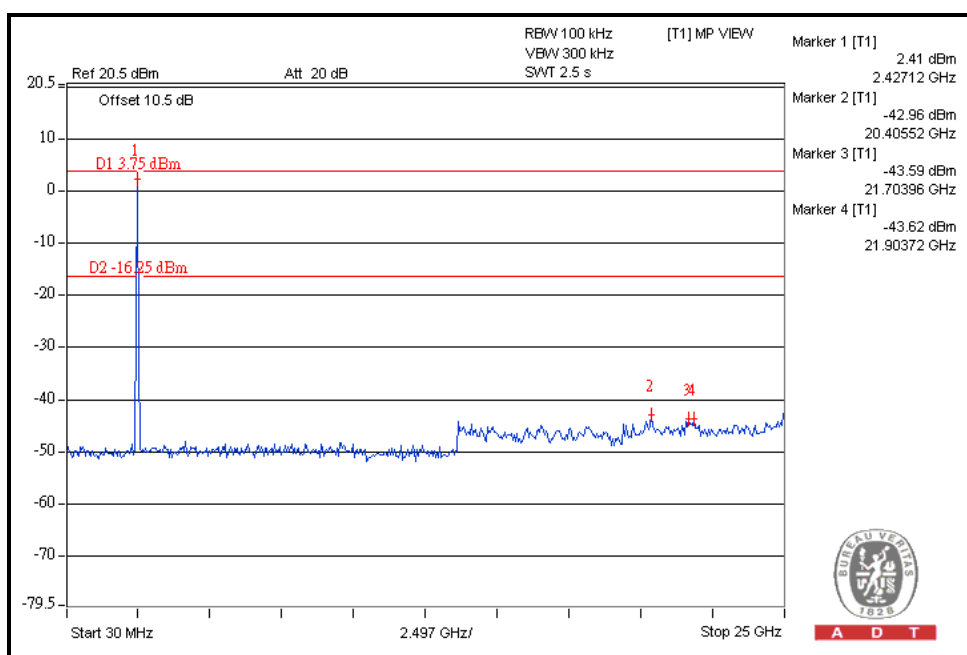
CH1



# CH11



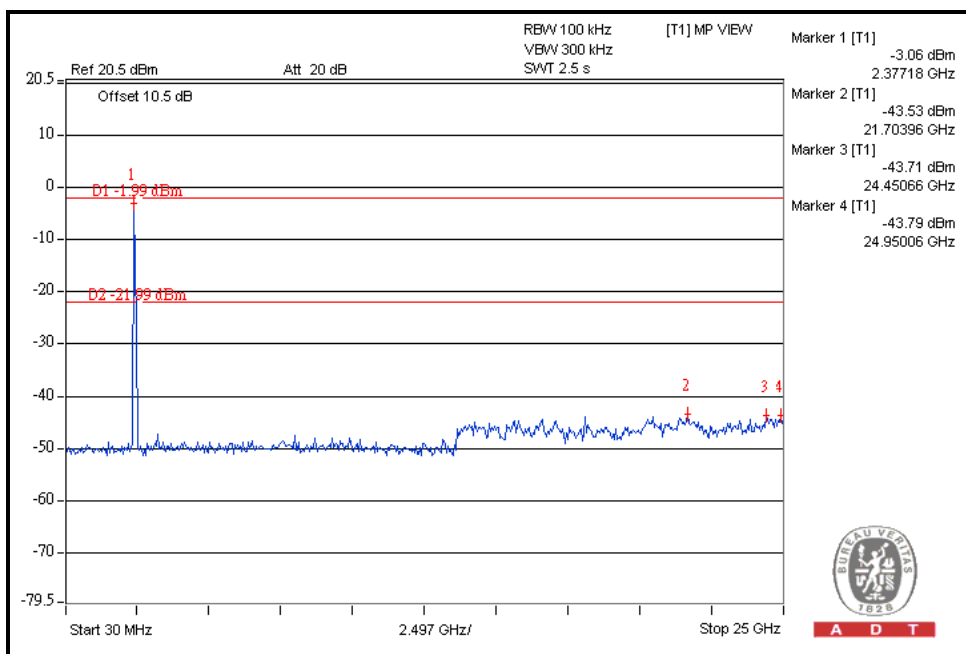
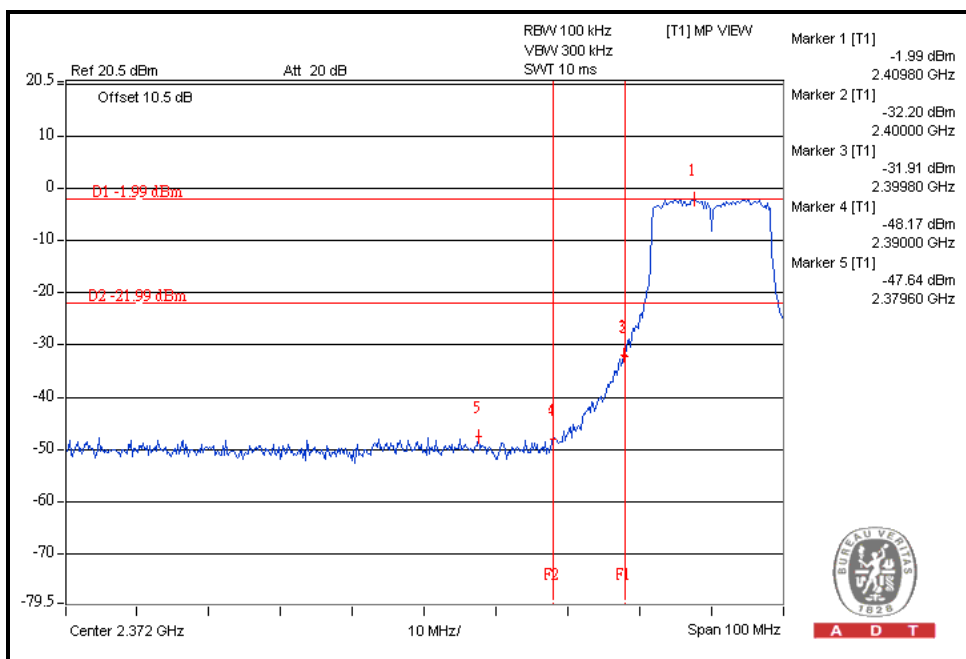
A D T



A D T

## 802.11g OFDM MODULATION:

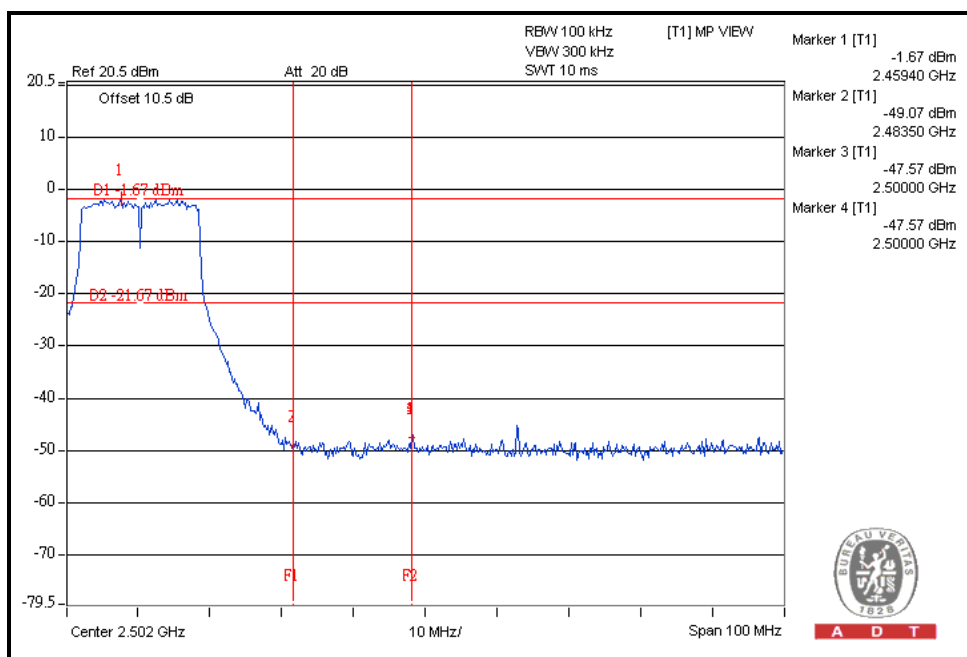
CH1



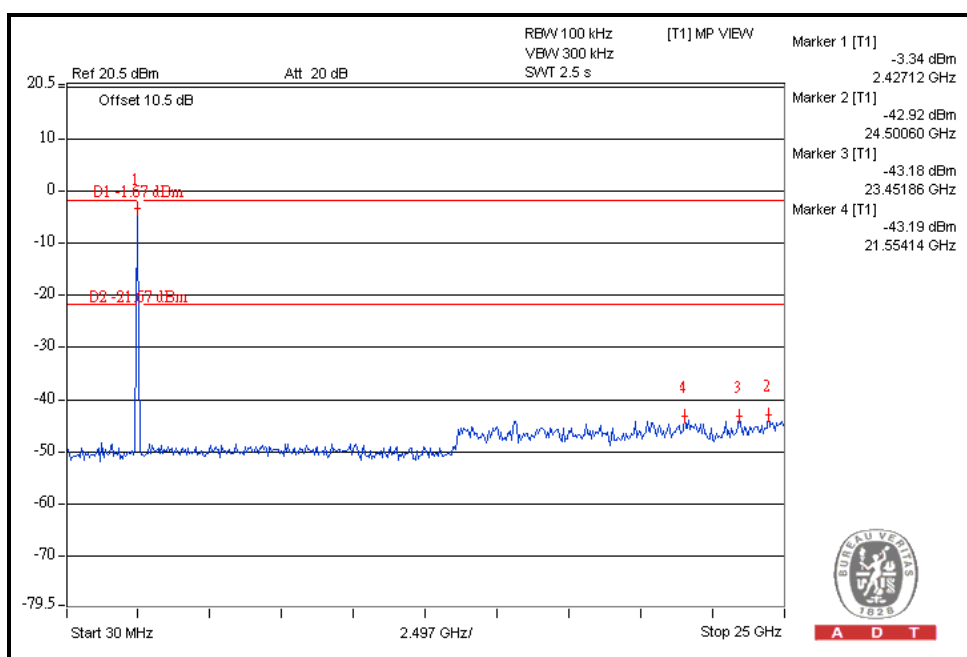


A D T

## CH11



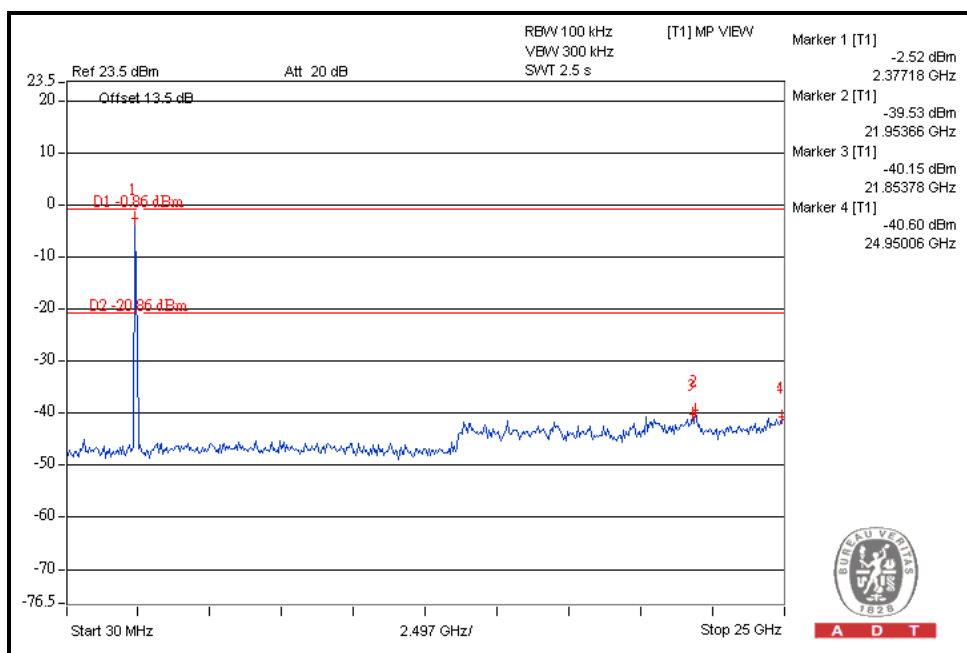
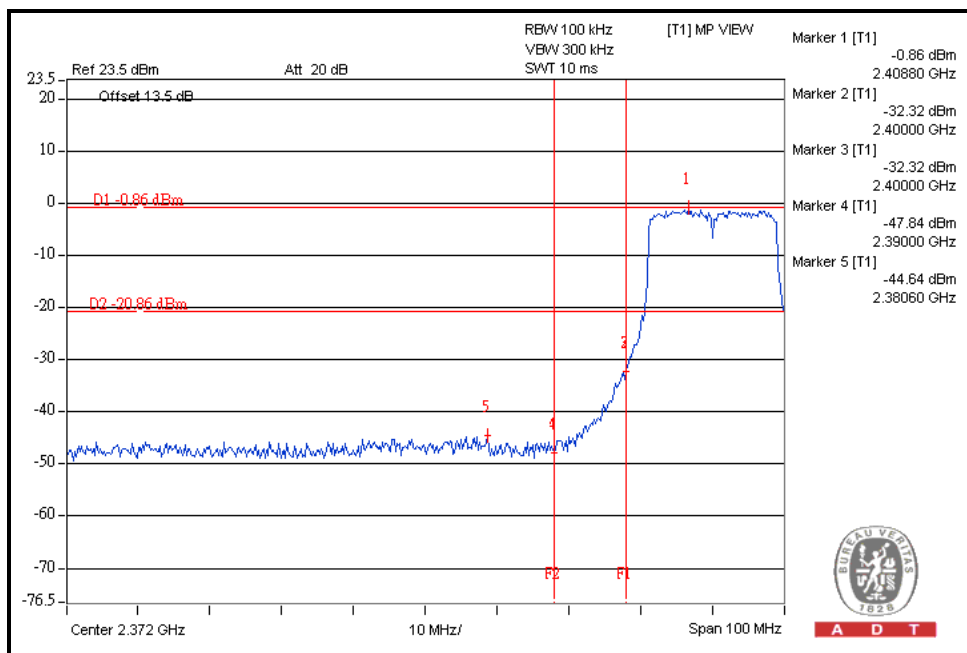
A D T



A D T

## 802.11n (20MHz) OFDM MODULATION:

CH1

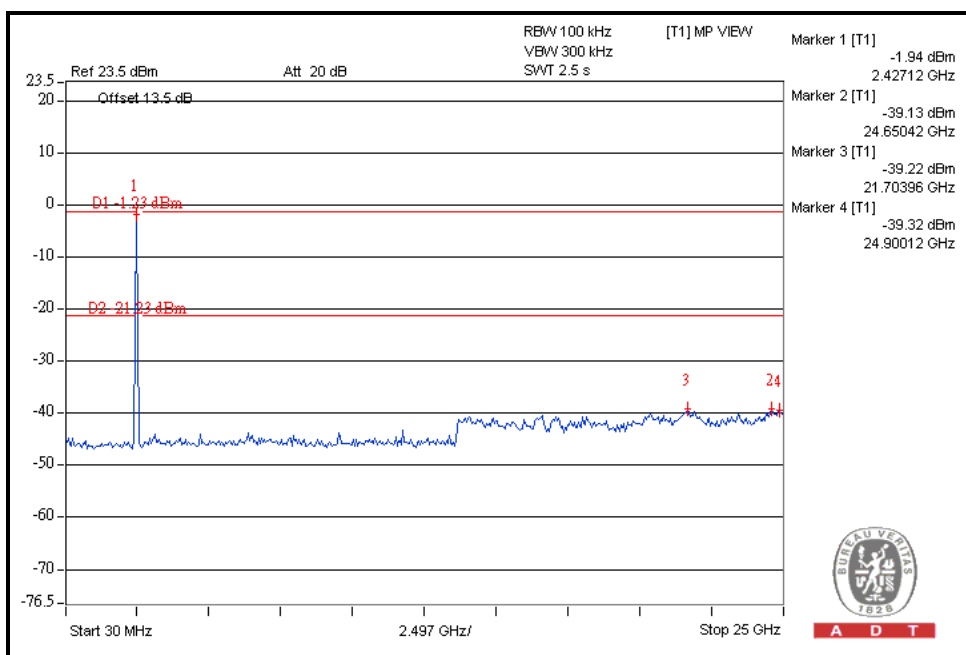
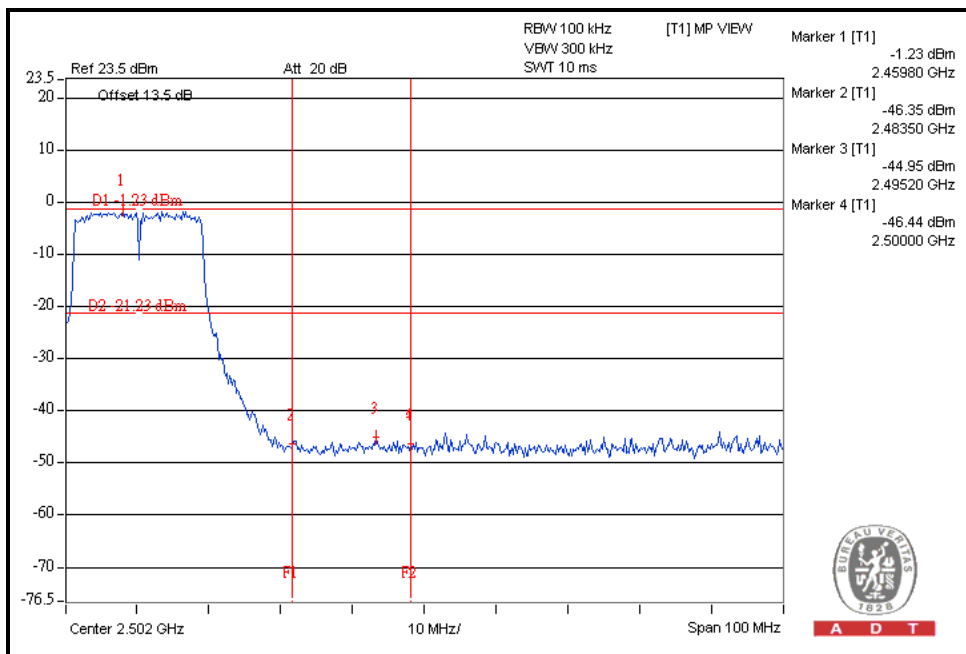






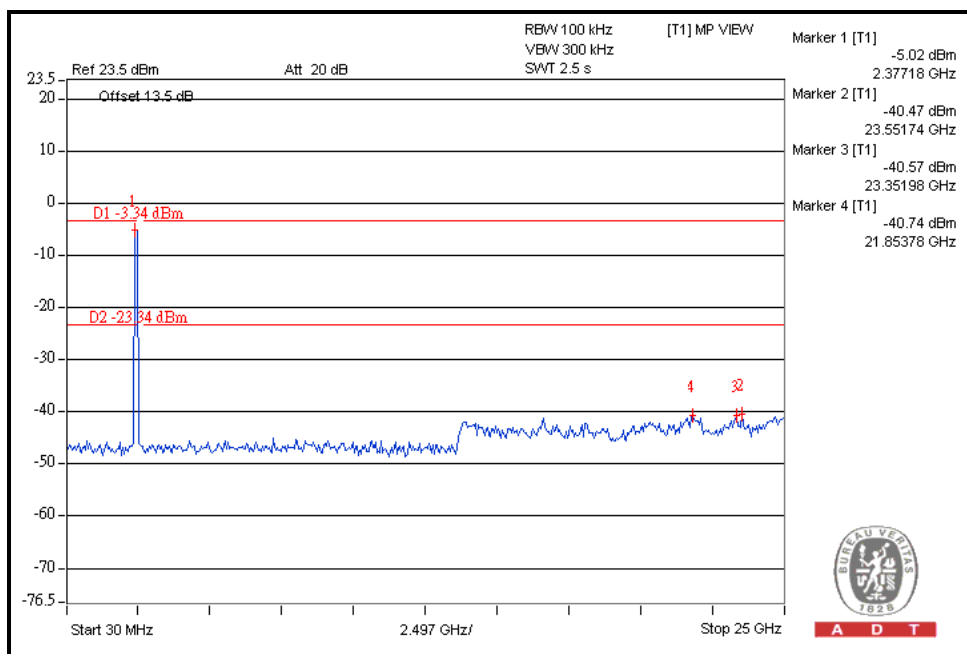
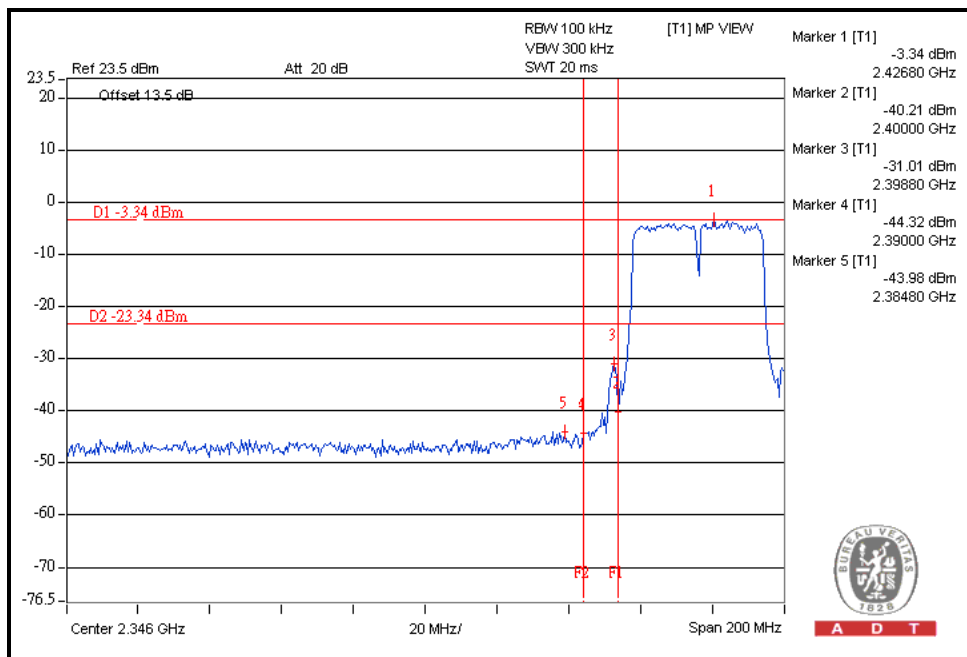
A D T

## CH11



## 802.11n (40MHz) OFDM MODULATION:

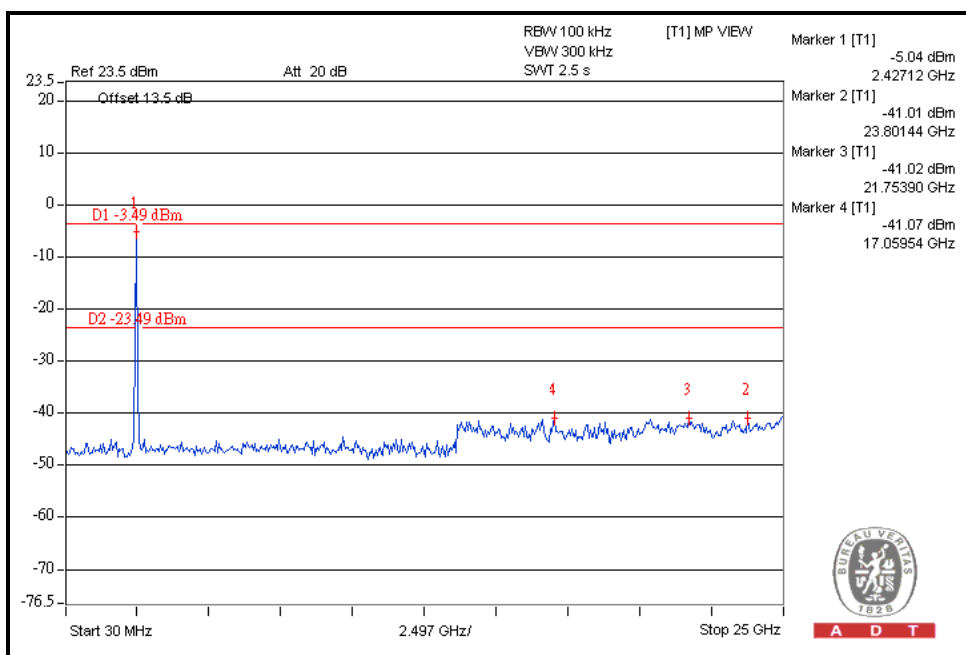
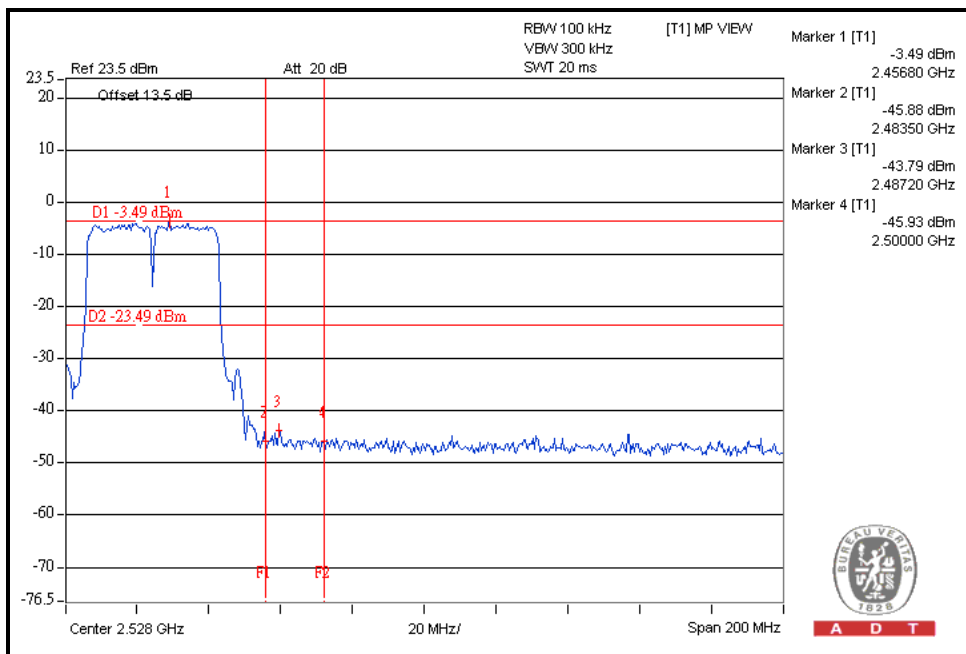
CH3





A D T

## CH9



## 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 and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml).

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

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3185050

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**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.



A D T

## **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 ---**