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# FCC TEST REPORT

**REPORT NO.:** RF990108H03

**MODEL NO.:** DIR-456

**RECEIVED:** Jan. 08, 2010

**TESTED:** Jan. 19 to 25, 2010

**ISSUED:** Mar. 29, 2010

**APPLICANT:** D-Link Co.

**ADDRESS:** No.289, Shinhu 3rd Rd., Neihu District, Taipei City  
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**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
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## 1. CERTIFICATION

**PRODUCT :** Residential USIM Embedded HSDPA 3G Router  
**BRAND :** D-Link  
**MODEL NO.:** DIR-456  
**APPLICANT :** D-Link Co.  
**TESTED :** Jan. 19 to 25, 2010  
**TEST SAMPLE :** MASS-PRODUCTION  
**STANDARDS :** FCC Part 15, Subpart C (Section 15.247),  
ANSI C63.4-2003

The above equipment (Model: DIR-456) 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 :** Midoli Peng , **DATE:** Mar. 29, 2010  
( Midoli Peng, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** Mar. 29, 2010  
( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** Mar. 29, 2010  
( May Chen, Deputy Manager )



## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: FCC Part 15, Subpart C</b>			
<b>STANDARD SECTION</b>	<b>TEST TYPE AND LIMIT</b>	<b>RESULT</b>	<b>REMARK</b>
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -9.72dB at 0.392MHz.
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)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -1.5dB at 2483.5MHz.
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	Antenna connector is MHF not a standard connector.

## 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>	Residential USIM Embedded HSDPA 3G Router
<b>MODEL NO.</b>	DIR-456
<b>FCC ID</b>	KA2DIR456A1
<b>POWER SUPPLY</b>	12V from power adapter
<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 802.11n (20MHz, 800ns GI): 65 / 58.5 / 52 / 39 / 26 / 19.5 / 13 / 6.5Mbps 802.11n (40MHz, 800ns GI): 135 / 121.5 / 108 / 81 / 54 / 40.5 / 27 / 13.5Mbps 802.11n (20MHz, 400ns GI): 72.2 / 65 / 57.8 / 43.3 / 28.9 / 21.7 / 14.4 / 7.2Mbps 802.11n (40MHz, 400ns GI): 150 / 135 / 120 / 90 / 60 / 45 / 30 / 15Mbps
<b>FREQUENCY RANGE</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: 91.2mW 802.11g: 288.4mW 802.11n (20MHz): 182.0mW 802.11n (40MHz): 154.9mW
<b>ANTENNA TYPE</b>	Please see note 1
<b>ANTENNA CONNECTOR</b>	Please see note 1
<b>DATA CABLE</b>	RJ-11 Cable (Unshielded, 1.8m) Ethernet cable (Unshielded, 1.5m)
<b>I/O PORT</b>	WAN Port x1 (Ethernet (10,100Mbps)) LAN Port x1 (Ethernet (10,100Mbps)) PHONE Port x1 3G SIM Port x1
<b>ASSOCIATED DEVICES</b>	Adapter x1



**NOTE:**

1. There is one antenna provided to this EUT, please refer to the following table:

Brand No.	Model No.	Net Gain (dBi)	Antenna Type	Connector
WHA YU GROUP	C037-511052-A (SSR-209493)	2.41	PCB Antenna	MHF

2. The EUT's appearance has two different colors (black and white).
3. The EUT must be supplied with a power adapter and following two different models could be chosen:

Adapter 1	
<b>Brand:</b>	D-Link
<b>Model No.:</b>	AMS4-1202000SU
<b>Input power :</b>	100-240V, 0.8A, 60Hz
<b>Output power :</b>	+12V, 2.0A DC Power cord: 1.5m/ Without core/ Non shielded
Adapter 2	
<b>Brand:</b>	D-Link
<b>Model No.:</b>	CG2412-B
<b>Input power :</b>	100-240V, 0.5A, 50/60Hz
<b>Output power :</b>	+12V, 2.0A DC Power cord: 1.5m/ Without core/ Non shielded

The EUT was pre-tested in chamber with above adapters, the radiated emission worst case was found in model: **AMS4-1202000SU**. Therefore only the test data of the mode was recorded in this report.

4. The EUT is a Residential USIM Embedded HSDPA 3G Router. The functions of EUT listed as below table:

FUNCTIONS	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g	FCC Part 15	RF990108H03
GSM 850 / WCDMA 850	FCC Part 22	RF990108H03-1
PCS 1900 / WCDMA 1900	FCC Part 24	RF990108H03-2

5. The communicated functions of EUT listed as below:

		GSM850MHz	PCS1900MHz	WCDMA850MHz	WCDMA1900MHz
2G	GSM	√	√		
	GPRS	√	√		
	E-GPRS	√	√		
3G	WCDMA			√	√
	Release 5 HSDPA			√	√



6. The EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Level-set
<b>Mode B</b>	<b>Tower-set</b>

From the above modes, the radiated emission worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

7. The EUT incorporates a SISO function with 802.11b, 802.11g, 802.11n. Physically, the EUT provides one completed transmitter and receiver.
8. The EUT is 1 \* 1 spatial SISO without beam forming function. The antenna configuration is one transmitter antenna and one receiver antenna, as there is 1 PCB antenna. There is one transmitter and one receiver.
9. The EUT complies with 802.11n standards and backwards compatible with 802.11b, 802.11g products.
10. The EUT, operates in the 2.4GHz frequency range, lets you connect IEEE 802.11g or IEEE 802.11b and 802.11n technique devices to the network.
11. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 DESCRIPTION OF TEST MODES

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
1	2422MHz	5	2442MHz
2	2427MHz	6	2447MHz
3	2432MHz	7	2452MHz
4	2437MHz		



### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
A	√	√	√	√	Adapter 1
B	√	-	-	-	Adapter 2

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)	EUT CONFIGURE MODE
802.11g	1 to 11	11	OFDM	BPSK	6	A, B

#### **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)	EUT CONFIGURE MODE
802.11g	1 to 11	11	OFDM	BPSK	6	A

**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)	EUT CONFIGURE MODE
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	A
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	A
802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	13.5	A

**BANDEDGE 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)	EUT CONFIGURE MODE
802.11b	1 to 11	1, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 11	OFDM	BPSK	6	A
802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	6.5	A
802.11n (40MHz)	1 to 7	1, 7	OFDM	BPSK	13.5	A

**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)	EUT CONFIGURE MODE
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	A
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	A
802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	13.5	A



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**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	12deg. C, 66%RH, 1023 hPa	120Vac, 60Hz	Frank Liu
RE<1G	12deg. C, 66%RH, 1023 hPa	120Vac, 60Hz	Wen Yu
PLC	24deg. C, 58%RH, 1023 hPa	120Vac, 60Hz	Leo Peng
APCM	20deg. C, 60%RH, 1023 hPa	120Vac, 60Hz	Phoenix Huang

### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is an RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.247)**

**ANSI C63.4-2003**

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

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



### 3.4 DESCRIPTION OF SUPPORT UNITS

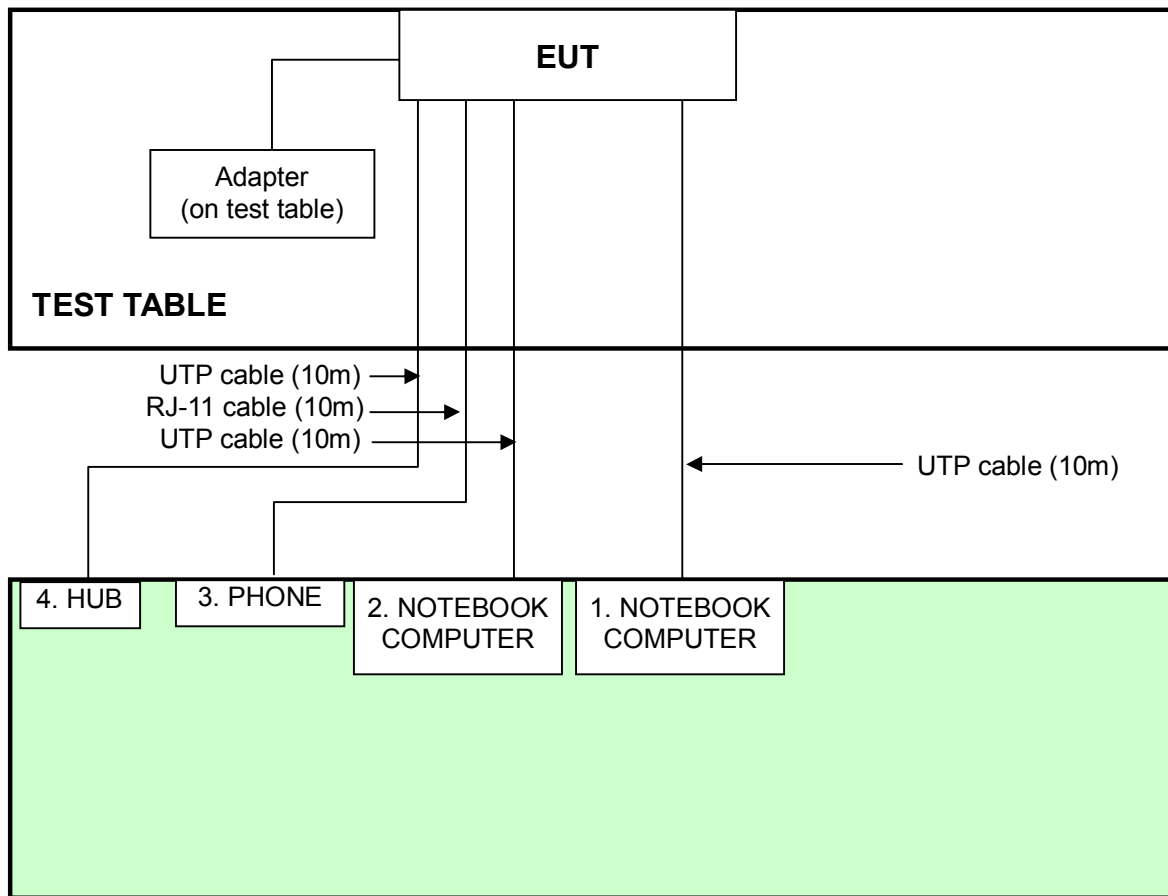
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	6976685584	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP17L	CN-ONF743-48643-7AV-0124	FCC DoC
3	TELEPHONE	Romeo	TE-812	97280926	NA
4	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable (Unshielded, 10m)
2	UTP cable (Unshielded, 10m)
3	RJ-11 cable (Unshielded, 10m)
4	UTP cable (Unshielded, 10m)

**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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 05, 2009	Mar. 04, 2010
Line-Impedance Stabilization Network (for EUT)	KNW-407	8-1395-12	May 04, 2009	May 03, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYBAO)	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.

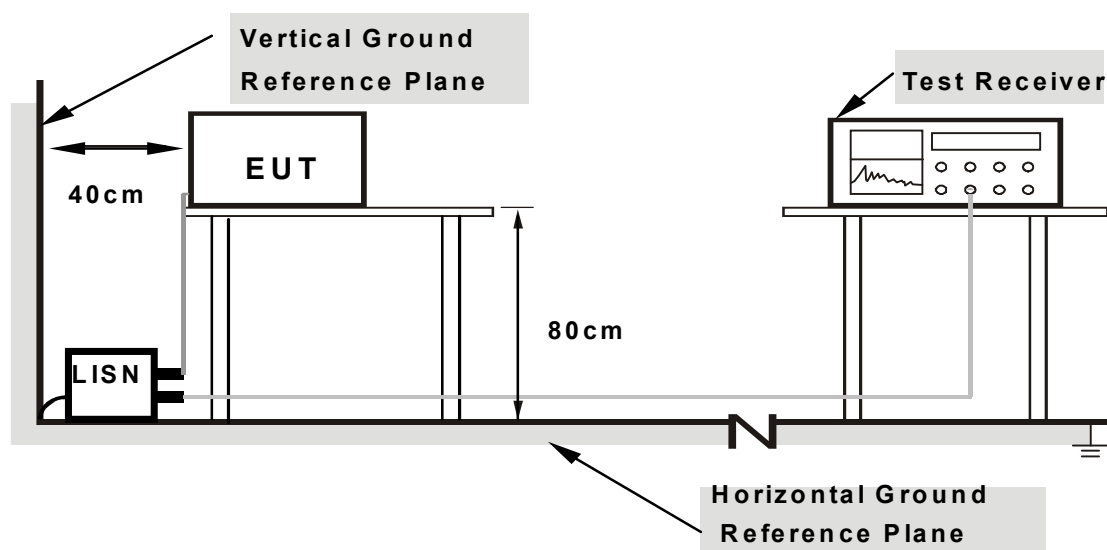
### 4.1.3 TEST PROCEDURES

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

### 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 outside of testing area.
3. The support unit 3 (Telephone) link EUT via one RJ11 cable.
4. The communication partners run test program “RT3052QA.EXE” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

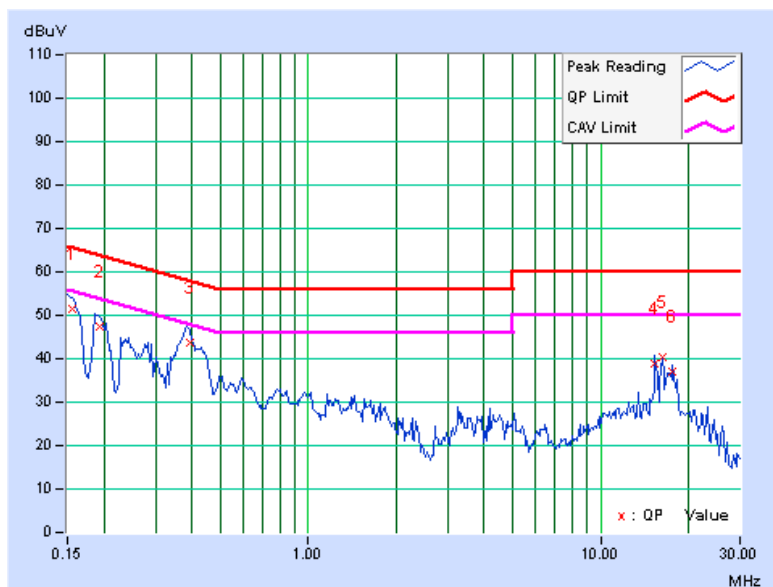


### 4.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>6dB BANDWIDTH</b>	9 kHz
<b>TEST MODE</b>	With adapter 1		

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	0.157	0.04	51.52	44.11	51.56	44.15	65.64	55.64	-14.08	-11.49
2	0.194	0.04	47.26	38.93	47.30	38.97	63.85	53.85	-16.55	-14.88
<b>3</b>	<b>0.392</b>	<b>0.06</b>	<b>43.56</b>	<b>38.24</b>	<b>43.62</b>	<b>38.30</b>	<b>58.02</b>	<b>48.02</b>	<b>-14.40</b>	<b>-9.72</b>
4	15.363	0.47	38.57	36.27	39.04	36.74	60.00	50.00	-20.96	-13.26
5	16.227	0.48	39.89	38.91	40.37	39.39	60.00	50.00	-19.63	-10.61
6	17.695	0.51	36.36	33.33	36.87	33.84	60.00	50.00	-23.13	-16.16

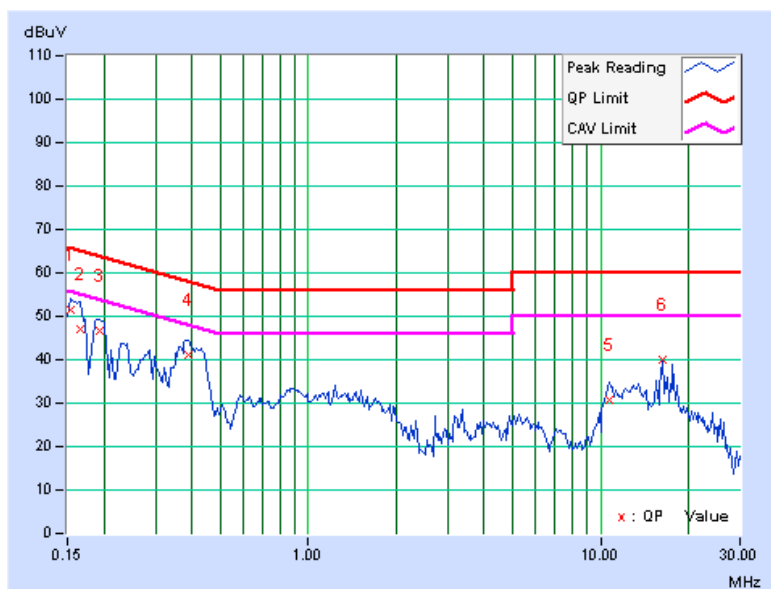
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = 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
TEST MODE	With adapter 1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.05	51.38	43.93	51.43	43.98	65.79	55.79	-14.36	-11.81
2	0.166	0.05	46.81	38.53	46.86	38.58	65.18	55.18	-18.32	-16.60
3	0.193	0.05	46.77	38.67	46.82	38.72	63.91	53.91	-17.09	-15.19
4	0.391	0.07	41.14	35.27	41.21	35.34	58.04	48.04	-16.83	-12.70
5	10.727	0.39	30.28	25.19	30.67	25.58	60.00	50.00	-29.33	-24.42
6	16.227	0.50	39.47	38.49	39.97	38.99	60.00	50.00	-20.03	-11.01

- 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.



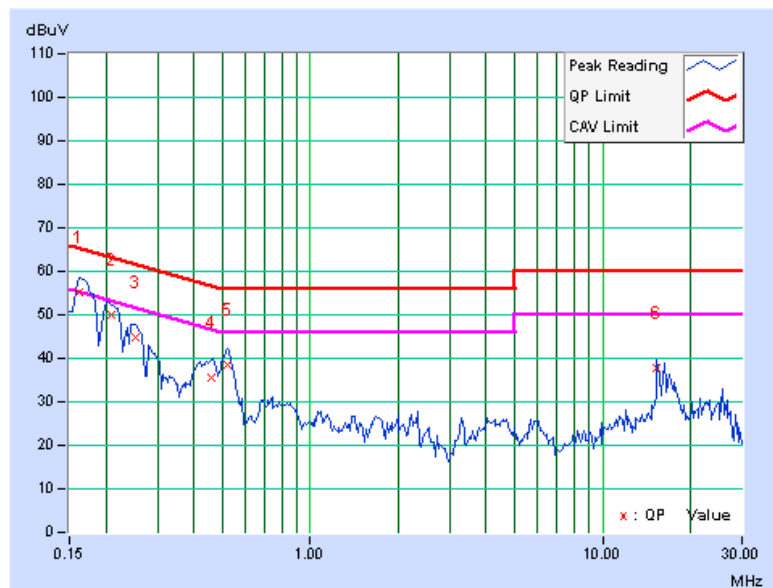


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PHASE	Line (L)	6dB BANDWIDTH	9 kHz
TEST MODE	With adapter 2		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.04	55.13	41.99	55.17	42.03	65.38	55.38	-10.21	-13.35
2	0.208	0.04	50.08	39.79	50.12	39.83	63.29	53.29	-13.17	-13.46
3	0.252	0.05	44.66	34.55	44.71	34.60	61.71	51.71	-17.00	-17.11
4	0.459	0.06	35.33	27.17	35.39	27.23	56.72	46.72	-21.33	-19.49
5	0.521	0.07	38.58	30.20	38.65	30.27	56.00	46.00	-17.35	-15.73
6	15.363	0.47	37.49	34.97	37.96	35.44	60.00	50.00	-22.04	-14.56

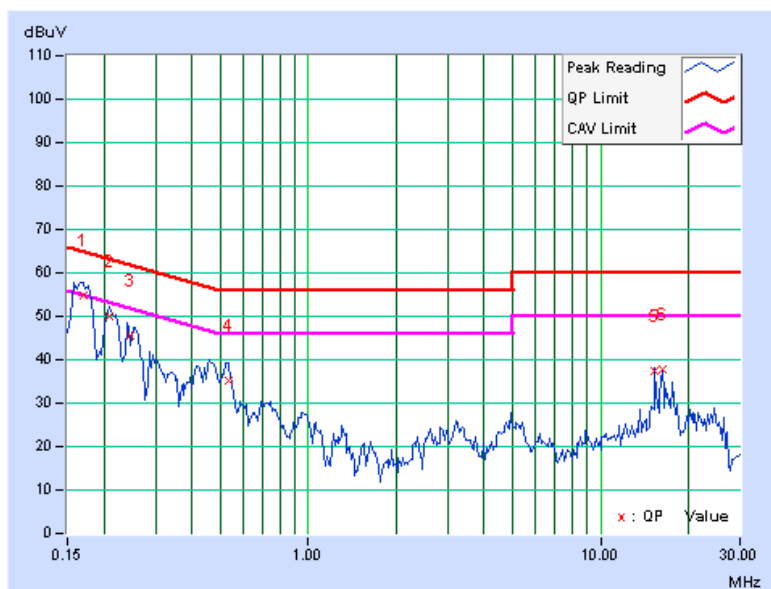
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



<b>PHASE</b>	Neutral (N)	<b>6dB BANDWIDTH</b>	9 kHz
<b>TEST MODE</b>	With adapter 2		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.05	54.75	42.92	54.80	42.97	64.98	54.98	-10.18	-12.01
2	0.209	0.05	49.82	37.80	49.87	37.85	63.26	53.26	-13.39	-15.41
3	0.245	0.05	45.34	32.77	45.39	32.82	61.92	51.92	-16.52	-19.09
4	0.533	0.08	35.03	27.05	35.11	27.13	56.00	46.00	-20.89	-18.87
5	15.359	0.49	36.92	35.80	37.41	36.29	60.00	50.00	-22.59	-13.71
6	16.227	0.50	37.35	35.70	37.85	36.20	60.00	50.00	-22.15	-13.80

- 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 18, 2009	Nov. 17, 2010
ADVANTEST Spectrum Analyzer	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100027	May 05, 2009	May 04, 2010
SCHWARZBECK Broadband Antenna	VULB-9168	263	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 09, 2010
RF Cable	8DFB	STACAB-30M-1GHz-091	Feb. 19, 2009	Feb. 18, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	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, HP 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.

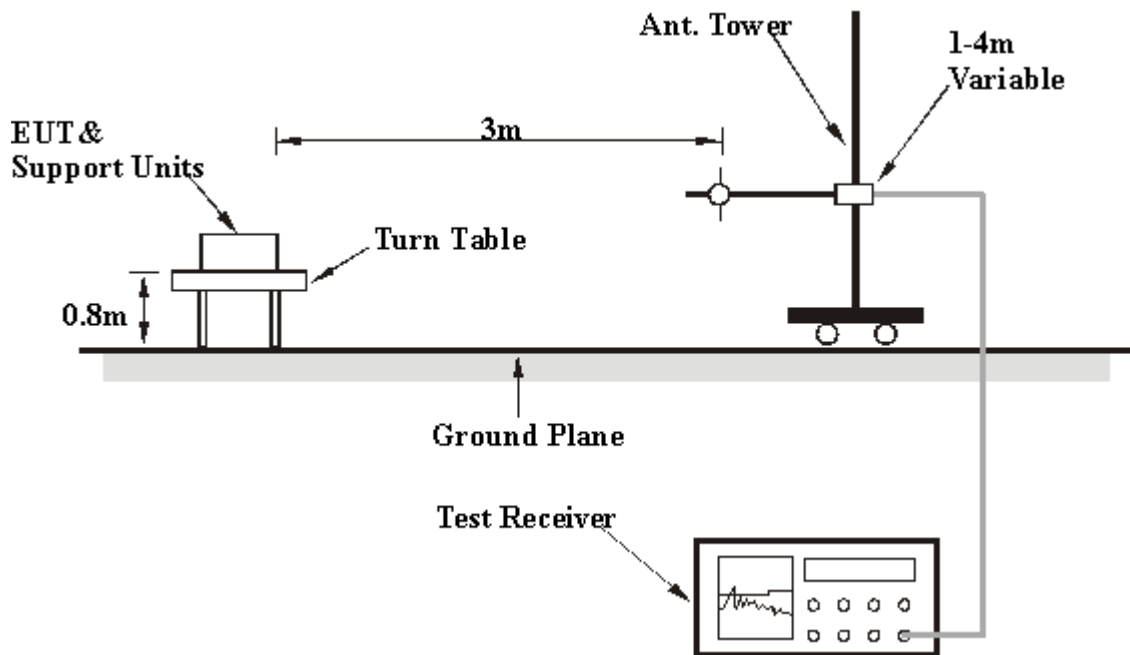
**NOTE:**

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 4.1.6

**Below 1GHz Test Data****4.2.7 TEST RESULTS****BELOW 1GHz DATA : 802.11g OFDM MODULATION**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 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	212.50	26.6 QP	43.5	-16.9	2.20 H	74	14.31	12.32
2	426.66	32.0 QP	46.0	-14.0	1.00 H	104	12.73	19.26
3	500.03	29.1 QP	46.0	-16.9	1.34 H	268	7.75	21.31
4	639.99	30.8 QP	46.0	-15.2	2.20 H	20	6.56	24.27
5	853.32	36.8 QP	46.0	-9.2	1.00 H	188	9.35	27.42
6	959.99	37.2 QP	46.0	-8.8	1.00 H	253	8.55	28.68
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	213.33	28.2 QP	43.5	-15.3	1.35 V	179	15.89	12.35
2	320.00	29.0 QP	46.0	-17.0	1.00 V	328	12.50	16.51
3	375.00	27.1 QP	46.0	-19.0	1.00 V	261	9.15	17.90
4	426.66	31.5 QP	46.0	-14.6	1.16 V	163	12.19	19.26
5	500.03	26.4 QP	46.0	-19.6	1.99 V	223	5.05	21.31
6	853.32	33.4 QP	46.0	-12.6	1.13 V	0	5.96	27.42
7	959.99	34.5 QP	46.0	-11.5	1.43 V	240	5.82	28.68

- 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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	58.3 PK	74.0	-15.7	1.50 H	186	28.20	30.06
2	2390.00	48.8 AV	54.0	-5.2	1.50 H	186	18.72	30.06
3	*2412.00	109.0 PK			1.41 H	138	78.85	30.15
4	*2412.00	105.8 AV			1.41 H	138	75.63	30.15
5	4824.00	49.1 PK	74.0	-24.9	1.15 H	109	13.67	35.43
6	4824.00	44.1 AV	54.0	-9.9	1.15 H	109	8.67	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	2346.67	53.5 PK	74.0	-20.5	1.52 V	105	23.59	29.89
2	2346.67	45.1 AV	54.0	-8.9	1.52 V	105	15.17	29.89
3	*2412.00	102.5 PK			1.55 V	103	72.35	30.15
4	*2412.00	99.5 AV			1.55 V	103	69.35	30.15
5	4824.00	46.3 PK	74.0	-27.7	1.00 V	199	10.87	35.43
6	4824.00	39.6 AV	54.0	-14.4	1.00 V	199	4.17	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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	109.3 PK			1.42 H	134	79.06	30.24
2	*2437.00	105.9 AV			1.42 H	134	75.66	30.24
3	4874.00	46.0 PK	74.0	-28.0	1.01 H	201	10.48	35.52
4	4874.00	41.0 AV	54.0	-13.0	1.01 H	201	5.48	35.52
5	7311.00	52.4 PK	74.0	-21.6	1.06 H	124	10.44	41.96
6	7311.00	40.1 AV	54.0	-13.9	1.06 H	124	-1.86	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	100.6 PK			1.29 V	79	70.40	30.24
2	*2437.00	98.1 AV			1.29 V	79	67.89	30.24
3	4874.00	43.4 PK	74.0	-30.7	1.34 V	173	7.83	35.52
4	4874.00	36.1 AV	54.0	-17.9	1.34 V	173	0.54	35.52
5	7311.00	48.4 PK	74.0	-25.6	1.21 V	179	6.40	41.96
6	7311.00	36.0 AV	54.0	-18.0	1.21 V	179	-5.96	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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	TESTED BY	Frank Liu

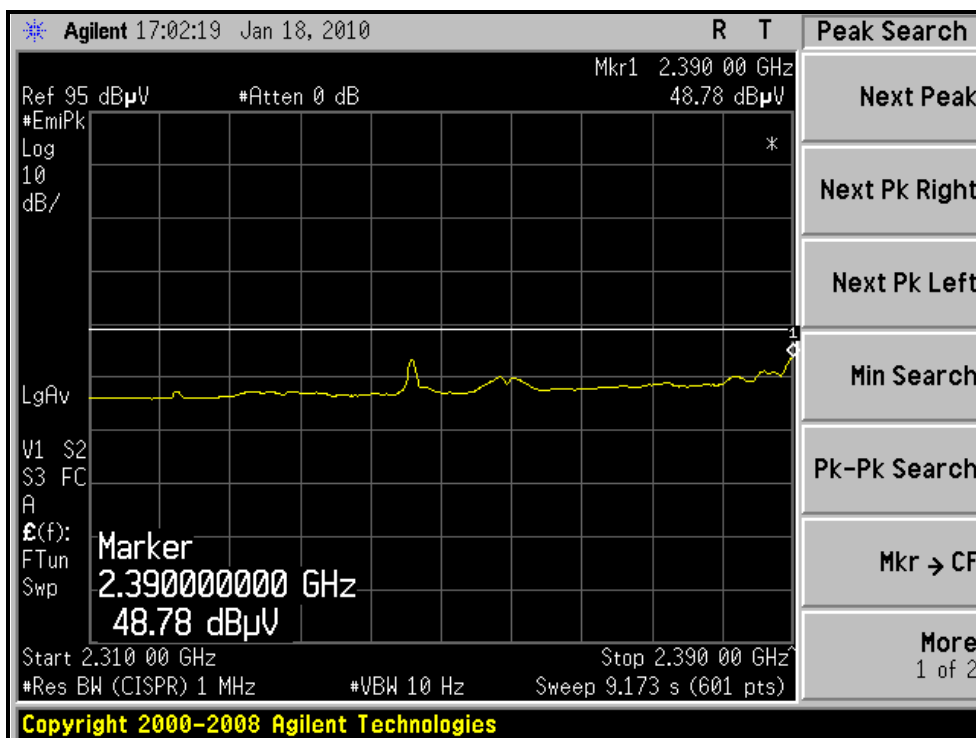
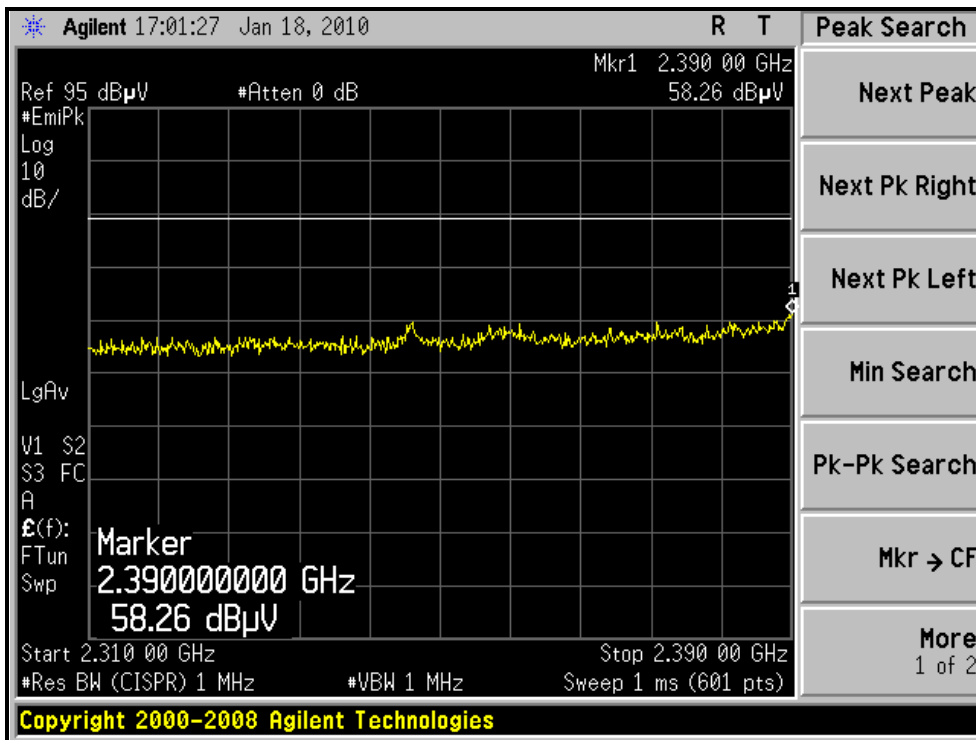
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NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.2 PK			1.43 H	135	77.86	30.34
2	*2462.00	105.2 AV			1.43 H	135	74.86	30.34
3	2487.68	58.4 PK	74.0	-15.6	1.40 H	194	27.92	30.44
4	2487.68	48.5 AV	54.0	-5.5	1.40 H	194	18.04	30.44
5	4924.00	46.4 PK	74.0	-27.6	1.04 H	203	10.78	35.62
6	4924.00	41.2 AV	54.0	-12.8	1.04 H	203	5.58	35.62
7	7386.00	51.2 PK	74.0	-22.8	1.04 H	301	9.10	42.10
8	7386.00	39.6 AV	54.0	-14.4	1.04 H	301	-2.50	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	102.9 PK			1.54 V	106	72.56	30.34
2	*2462.00	99.7 AV			1.54 V	106	69.36	30.34
3	2487.59	54.56 PK	74.0	-19.4	1.47 V	94	24.12	30.44
4	2487.59	43.2 AV	54.0	-10.8	1.47 V	94	12.76	30.44
5	4924.00	43.5 PK	74.0	-30.5	1.32 V	157	7.89	35.62
6	4924.00	35.6 AV	54.0	-18.4	1.32 V	157	-0.04	35.62
7	7386.00	51.4 PK	74.0	-22.6	1.21 V	205	9.30	42.10
8	7386.00	39.8 AV	54.0	-14.2	1.21 V	205	-2.30	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.



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RESTRICTED BANDEDGE (802.11b MODE, CH1, HORIZONTAL )

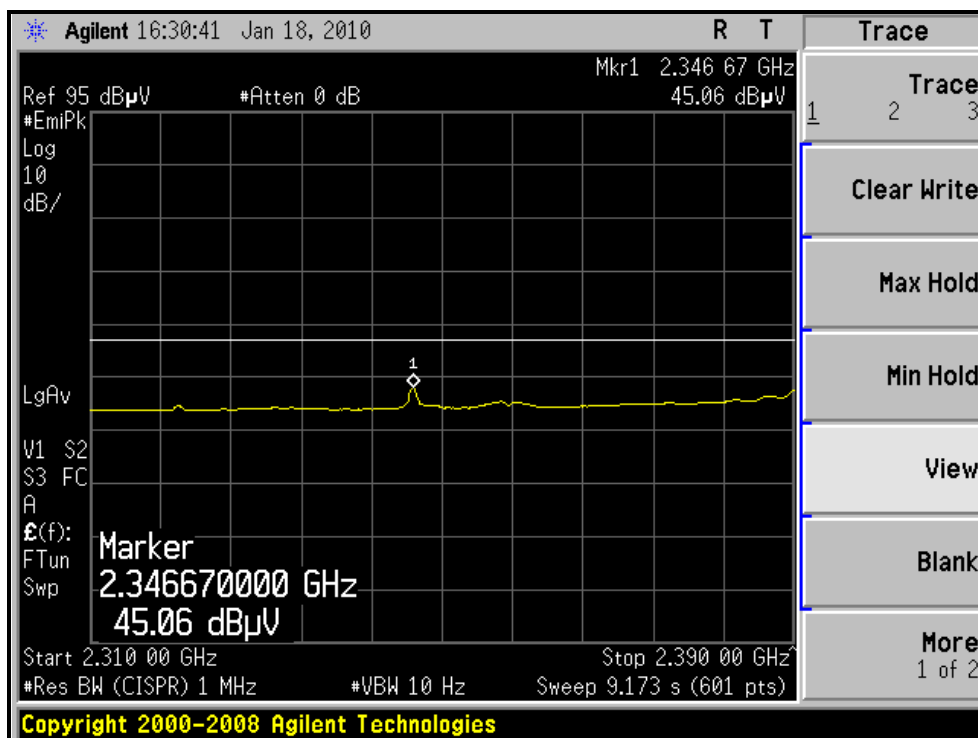
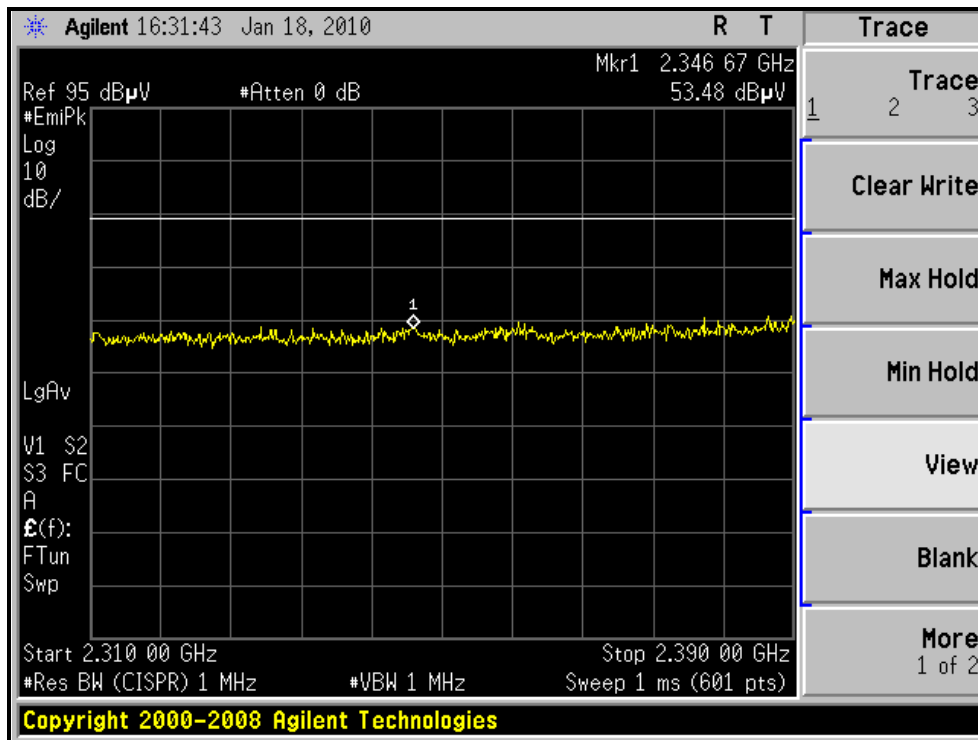






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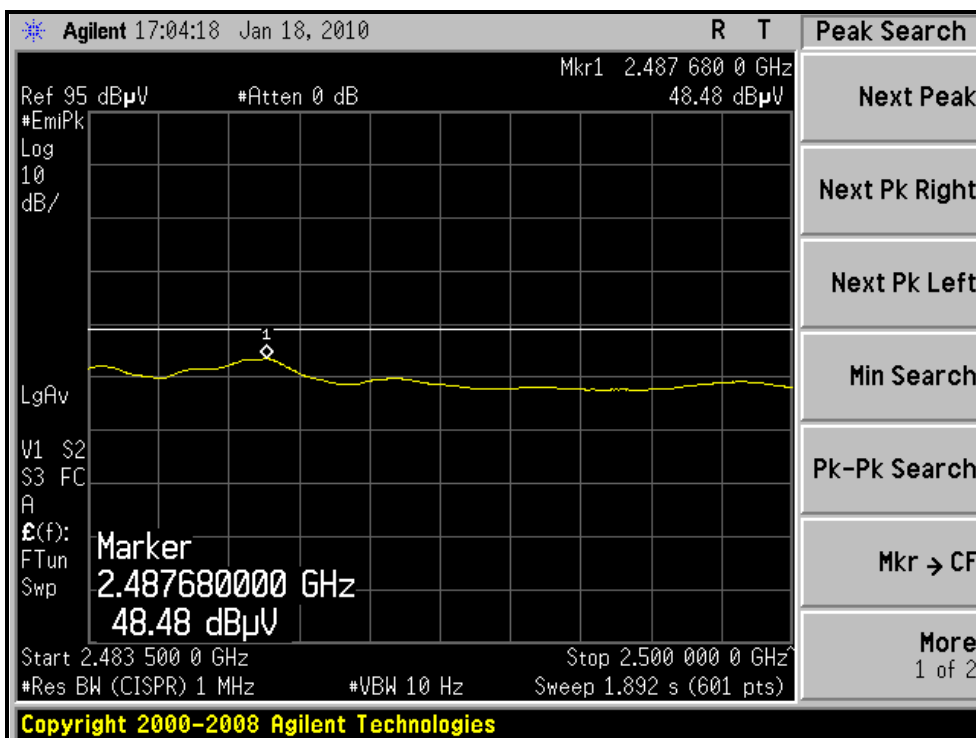
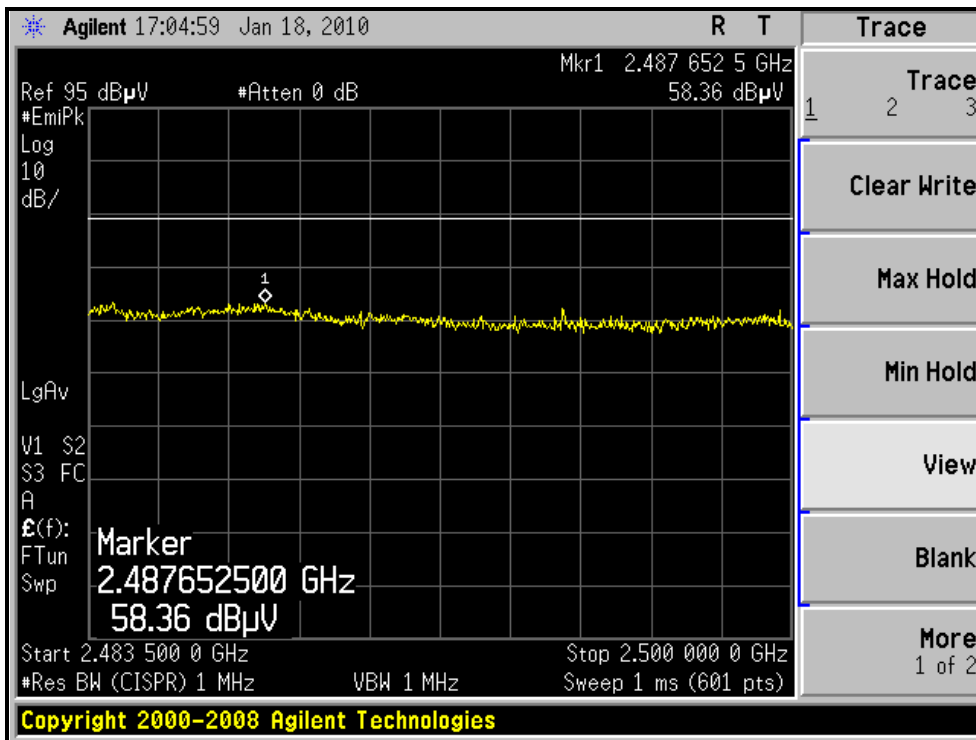
RESTRICTED BANDEDGE (802.11b MODE,CH1, VERTICAL )





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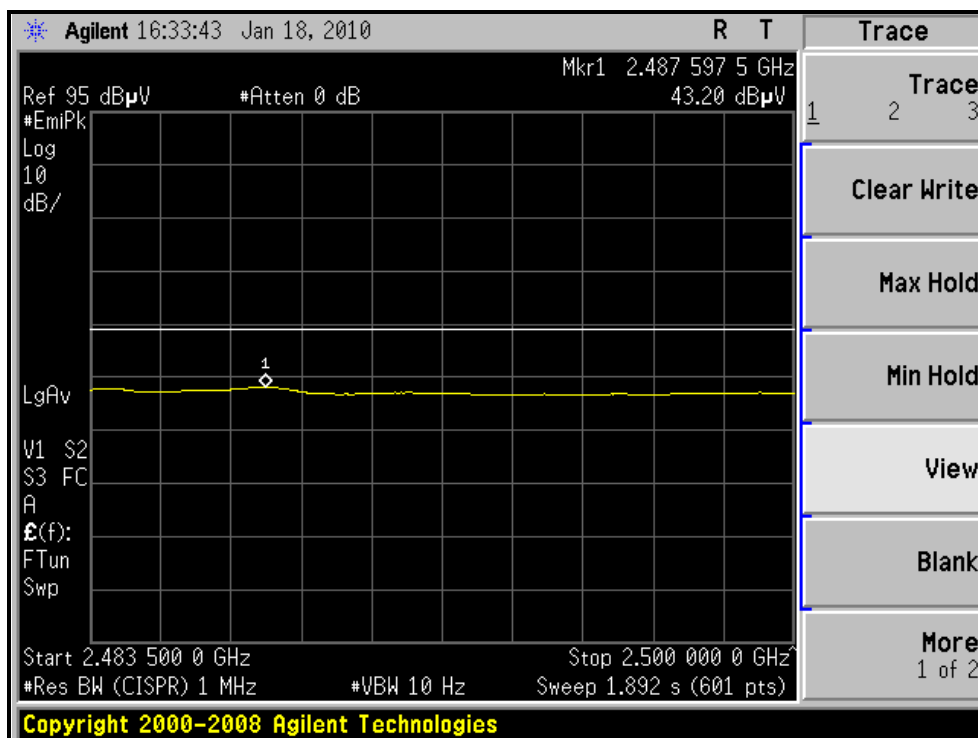
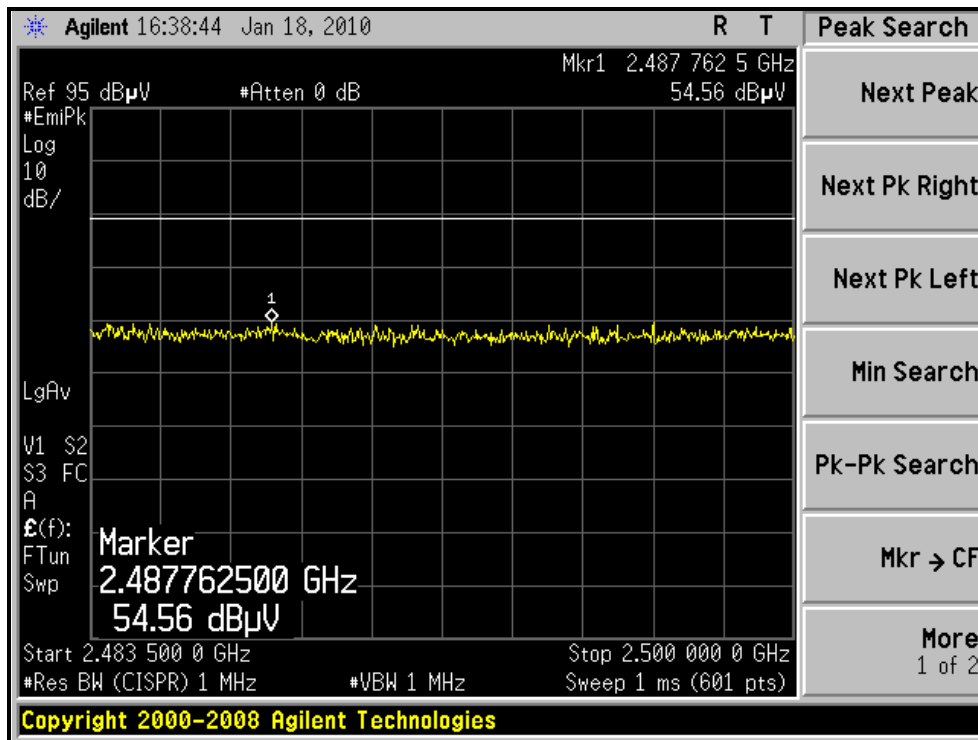
RESTRICTED BANDEDGE (802.11b MODE, CH11, HORIZONTAL )





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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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	69.7 PK	74.0	-4.3	1.22 H	132	39.64	30.06
2	2390.00	51.7 AV	54.0	-2.3	1.22 H	132	21.63	30.06
3	*2412.00	110.3 PK			1.43 H	127	80.15	30.15
4	*2412.00	101.4 AV			1.43 H	127	71.25	30.15
5	4824.00	44.6 PK	74.0	-29.4	1.08 H	243	9.19	35.43
6	4824.00	31.8 AV	54.0	-22.2	1.08 H	243	-3.65	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	59.6 PK	74.0	-14.5	1.47 V	94	29.49	30.06
2	2390.00	45.0 AV	54.0	-9.0	1.47 V	94	14.90	30.06
3	*2412.00	103.2 PK			1.49 V	87	73.05	30.15
4	*2412.00	96.3 AV			1.49 V	87	66.15	30.15
5	4824.00	42.9 PK	74.0	-31.1	1.36 V	182	7.43	35.43
6	4824.00	30.9 AV	54.0	-23.1	1.36 V	182	-4.56	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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	109.3 PK			1.36 H	130	79.04	30.24
2	*2437.00	100.0 AV			1.36 H	130	69.77	30.24
3	4874.00	41.8 PK	74.0	-32.2	1.09 H	256	6.28	35.52
4	4874.00	30.1 AV	54.0	-23.9	1.09 H	256	-5.44	35.52
5	7311.00	47.4 PK	74.0	-26.6	1.02 H	114	5.42	41.96
6	7311.00	35.4 AV	54.0	-18.6	1.02 H	114	-6.59	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	102.5 PK			1.28 V	80	72.26	30.24
2	*2437.00	93.4 AV			1.28 V	80	63.18	30.24
3	4874.00	42.7 PK	74.0	-31.3	1.35 V	181	7.22	35.52
4	4874.00	30.3 AV	54.0	-23.7	1.35 V	181	-5.26	35.52
5	7311.00	46.5 PK	74.0	-27.5	1.11 V	27	4.51	41.96
6	7311.00	35.3 AV	54.0	-18.7	1.11 V	27	-6.63	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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	TESTED BY	Frank Liu

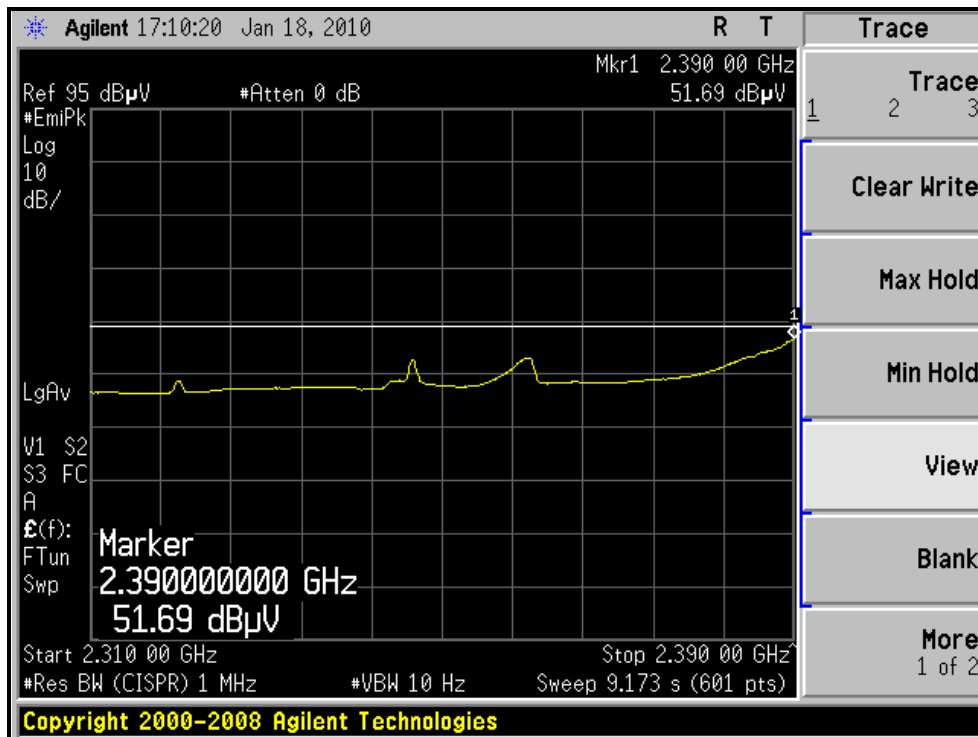
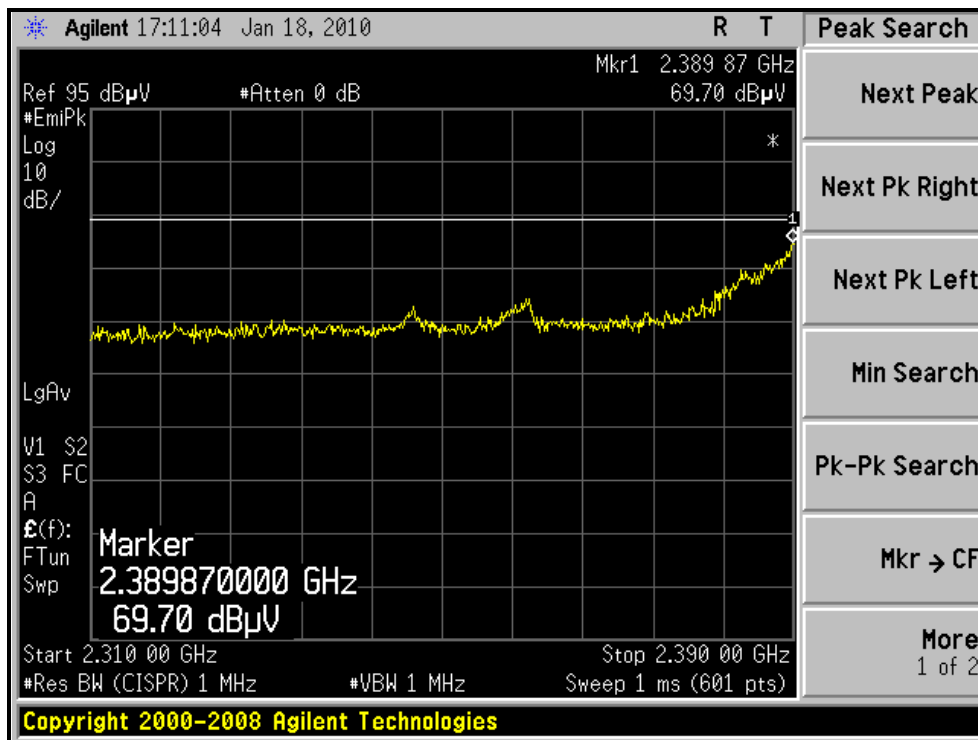
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.4 PK			1.41 H	130	79.06	30.34
2	*2462.00	100.6 AV			1.41 H	130	70.26	30.34
3	2483.50	68.4 PK	74.0	-5.6	1.42 H	129	38.00	30.43
4	<b>2483.50</b>	<b>52.5 AV</b>	<b>54.0</b>	<b>-1.5</b>	<b>1.42 H</b>	<b>129</b>	<b>22.06</b>	<b>30.43</b>
5	4924.00	41.9 PK	74.0	-32.1	1.08 H	254	6.28	35.62
6	4924.00	30.3 AV	54.0	-23.7	1.08 H	254	-5.36	35.62
7	7386.00	47.6 PK	74.0	-26.4	1.00 H	115	5.48	42.10
8	7386.00	35.4 AV	54.0	-18.6	1.00 H	115	-6.68	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			1.46 V	103	72.06	30.34
2	*2462.00	95.7 AV			1.46 V	103	65.36	30.34
3	2483.50	60.1 PK	74.0	-13.9	1.47 V	94	29.65	30.43
4	2483.50	44.9 AV	54.0	-9.1	1.47 V	94	14.50	30.43
5	4924.00	42.4 PK	74.0	-31.6	1.38 V	189	6.76	35.62
6	4924.00	30.2 AV	54.0	-23.8	1.38 V	189	-5.44	35.62
7	7386.00	46.5 PK	74.0	-27.5	1.15 V	29	4.43	42.10
8	7386.00	35.5 AV	54.0	-18.5	1.15 V	29	-6.63	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.



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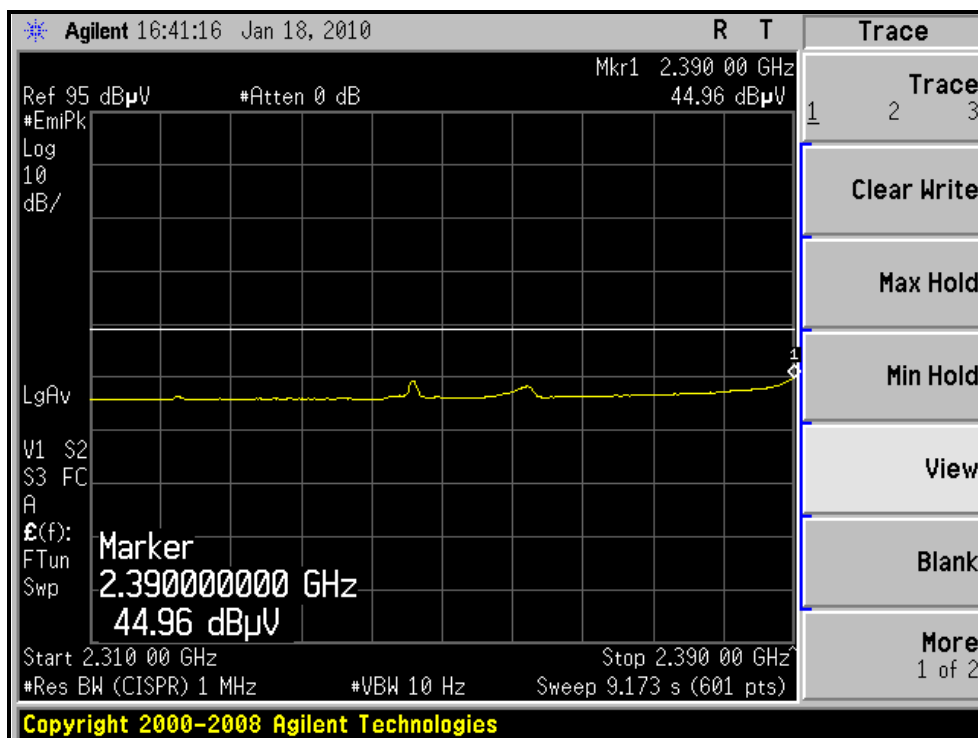
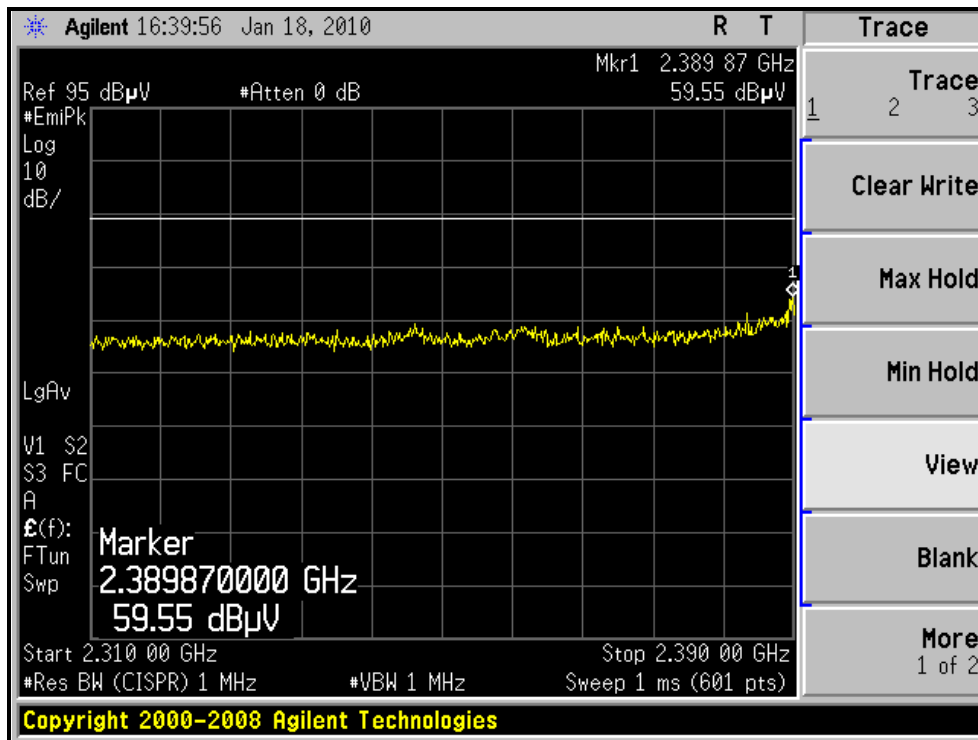
RESTRICTED BANDEDGE (802.11g MODE, CH1, HORIZONTAL )





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RESTRICTED BANDEDGE (802.11g MODE,CH1, VERTICAL )

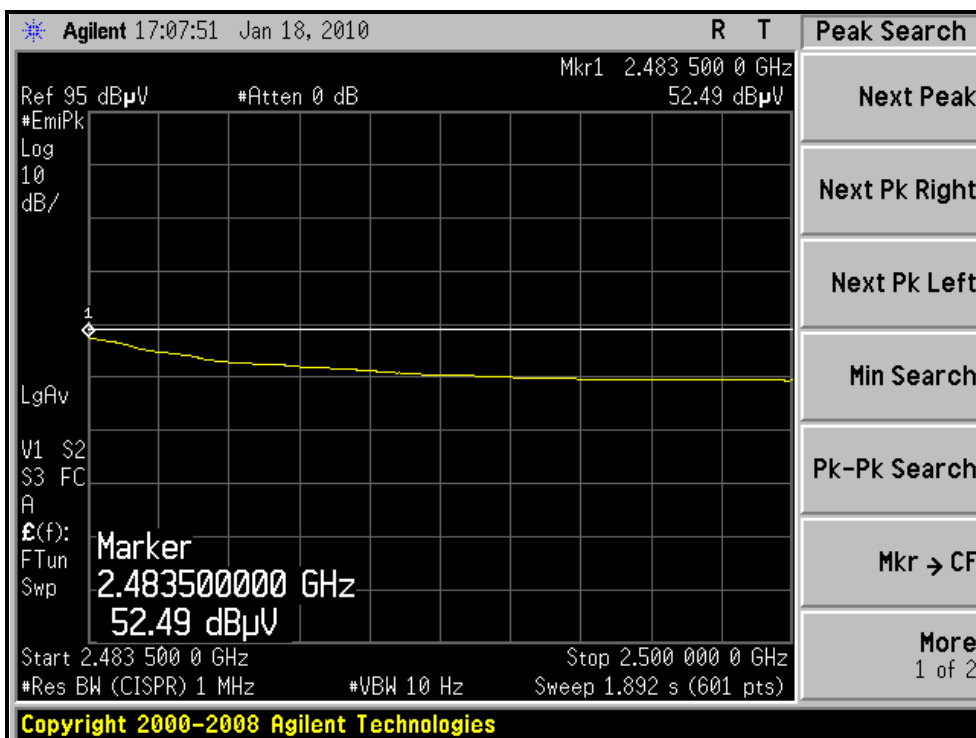
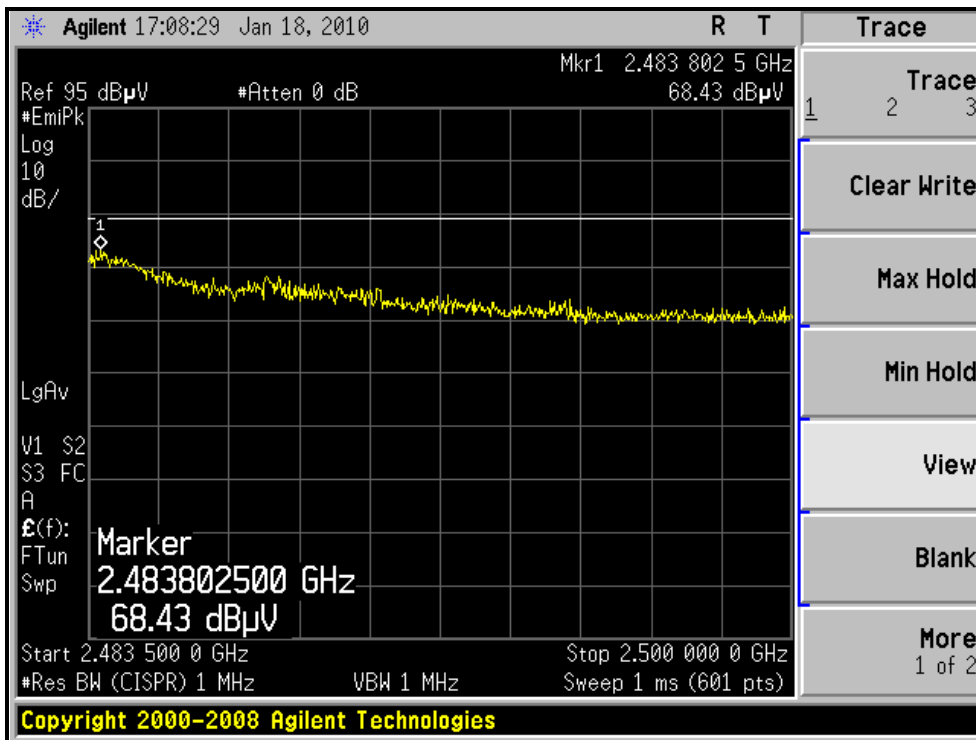






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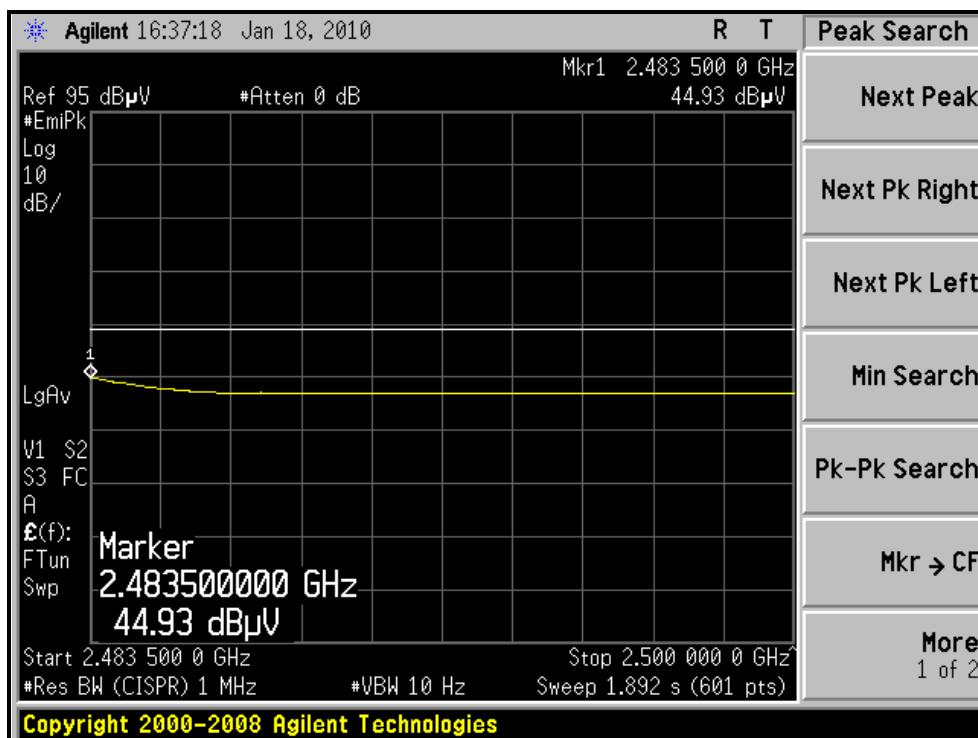
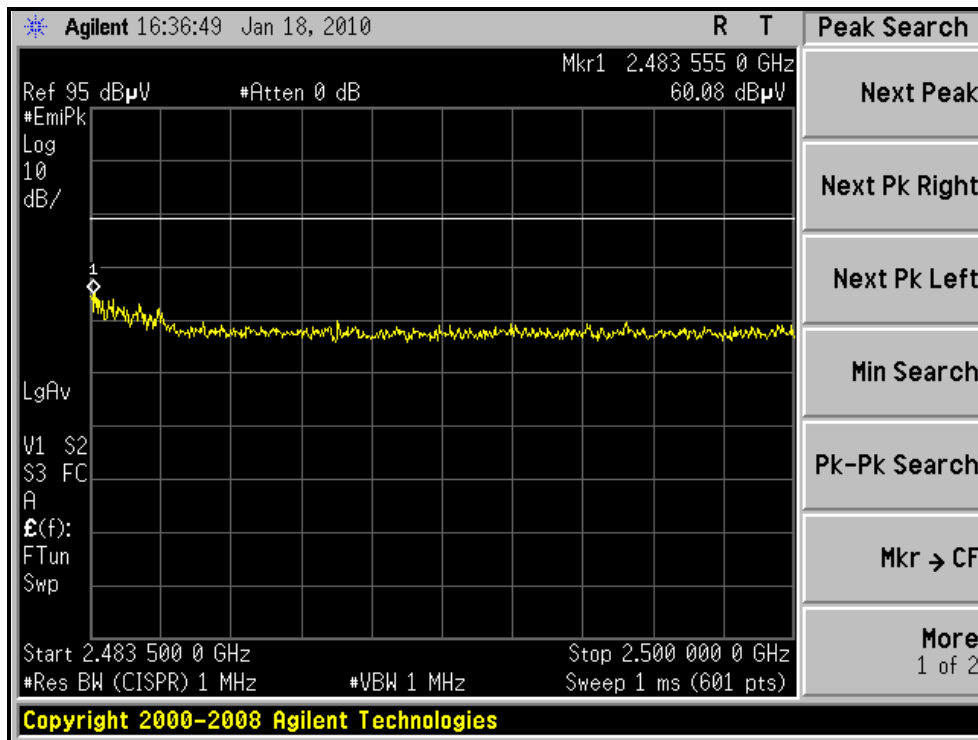
RESTRICTED BANDEDGE (802.11g MODE, CH11, HORIZONTAL )





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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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	67.5 PK	74.0	-6.5	1.45 H	136	37.42	30.06
2	2390.00	50.6 AV	54.0	-3.4	1.45 H	136	20.58	30.06
3	*2412.00	108.4 PK			1.42 H	130	78.25	30.15
4	*2412.00	99.4 AV			1.42 H	130	69.25	30.15
5	4824.00	41.6 PK	74.0	-32.4	1.10 H	267	6.19	35.43
6	4824.00	30.3 AV	54.0	-23.7	1.10 H	267	-5.15	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	2346.67	54.9 PK	74.0	-19.1	1.25 V	80	25.03	29.89
2	2346.67	44.3 AV	54.0	-9.7	1.25 V	80	14.39	29.89
3	*2412.00	101.3 PK			1.21 V	74	71.15	30.15
4	*2412.00	94.3 AV			1.21 V	74	64.15	30.15
5	4824.00	42.8 PK	74.0	-31.3	1.36 V	181	7.32	35.43
6	4824.00	31.6 AV	54.0	-22.4	1.36 V	181	-3.85	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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	107.5 PK			1.36 H	132	77.22	30.24
2	*2437.00	97.9 AV			1.36 H	132	67.69	30.24
3	4874.00	41.9 PK	74.0	-32.1	1.11 H	263	6.35	35.52
4	4874.00	30.2 AV	54.0	-23.8	1.11 H	263	-5.35	35.52
5	7311.00	47.6 PK	74.0	-26.4	1.00 H	125	5.60	41.96
6	7311.00	35.4 AV	54.0	-18.6	1.00 H	125	-6.58	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	100.4 PK			1.30 V	80	70.19	30.24
2	*2437.00	91.2 AV			1.30 V	80	60.98	30.24
3	4874.00	42.7 PK	74.0	-31.3	1.38 V	192	7.22	35.52
4	4874.00	31.4 AV	54.0	-22.6	1.38 V	192	-4.08	35.52
5	7311.00	46.8 PK	74.0	-27.2	1.15 V	36	4.81	41.96
6	7311.00	35.8 AV	54.0	-18.2	1.15 V	36	-6.17	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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	TESTED BY	Frank Liu

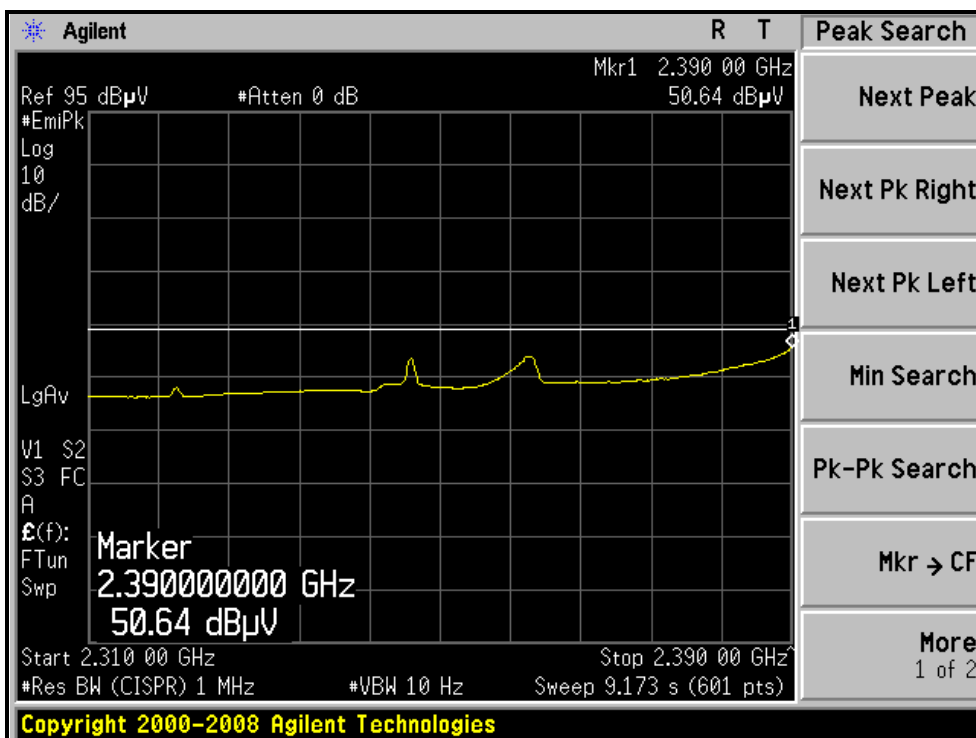
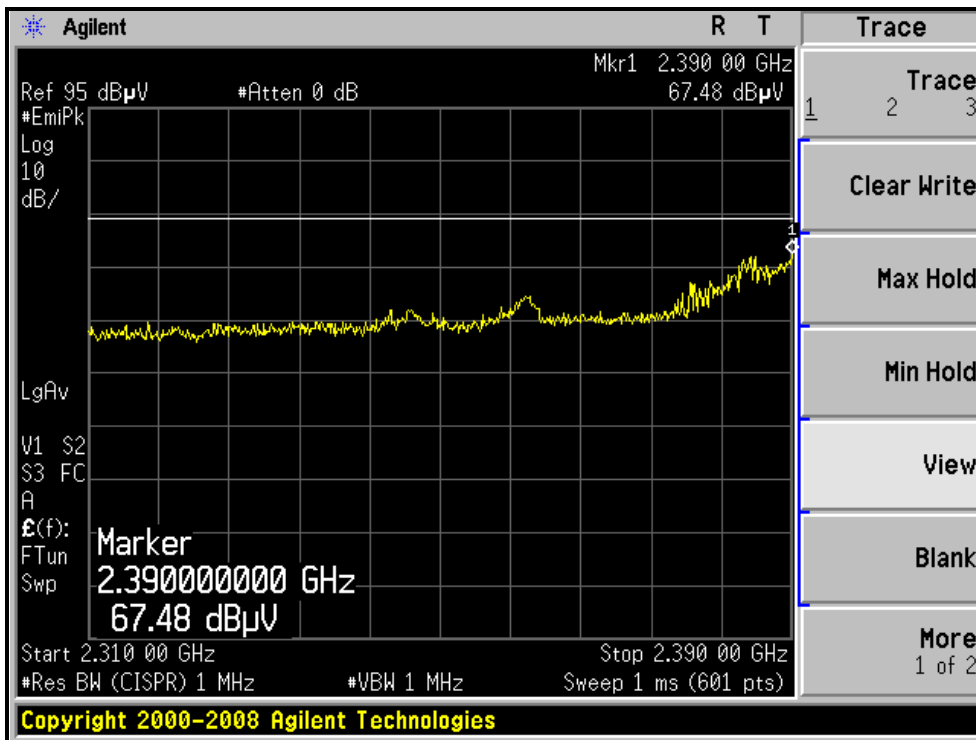
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.4 PK			1.44 H	133	77.06	30.34
2	*2462.00	98.1 AV			1.44 H	133	67.76	30.34
3	2483.50	65.6 PK	74.0	-8.4	1.42 H	131	35.18	30.43
4	2483.50	49.6 AV	54.0	-4.4	1.42 H	131	19.15	30.43
5	4924.00	42.0 PK	74.0	-32.1	1.10 H	259	6.33	35.62
6	4924.00	30.3 AV	54.0	-23.7	1.10 H	259	-5.35	35.62
7	7386.00	47.6 PK	74.0	-26.4	1.05 H	113	5.53	42.10
8	7386.00	35.5 AV	54.0	-18.5	1.05 H	113	-6.64	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	100.6 PK			1.04 V	85	70.26	30.34
2	*2462.00	93.7 AV			1.04 V	85	63.36	30.34
3	2483.50	57.6 PK	74.0	-16.4	1.35 V	97	27.19	30.43
4	2483.50	43.1 AV	54.0	-10.9	1.35 V	97	12.70	30.43
5	4924.00	42.9 PK	74.0	-31.1	1.35 V	180	7.27	35.62
6	4924.00	31.5 AV	54.0	-22.5	1.35 V	180	-4.15	35.62
7	7386.00	46.7 PK	74.0	-27.4	1.20 V	28	4.55	42.10
8	7386.00	35.7 AV	54.0	-18.3	1.20 V	28	-6.42	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.



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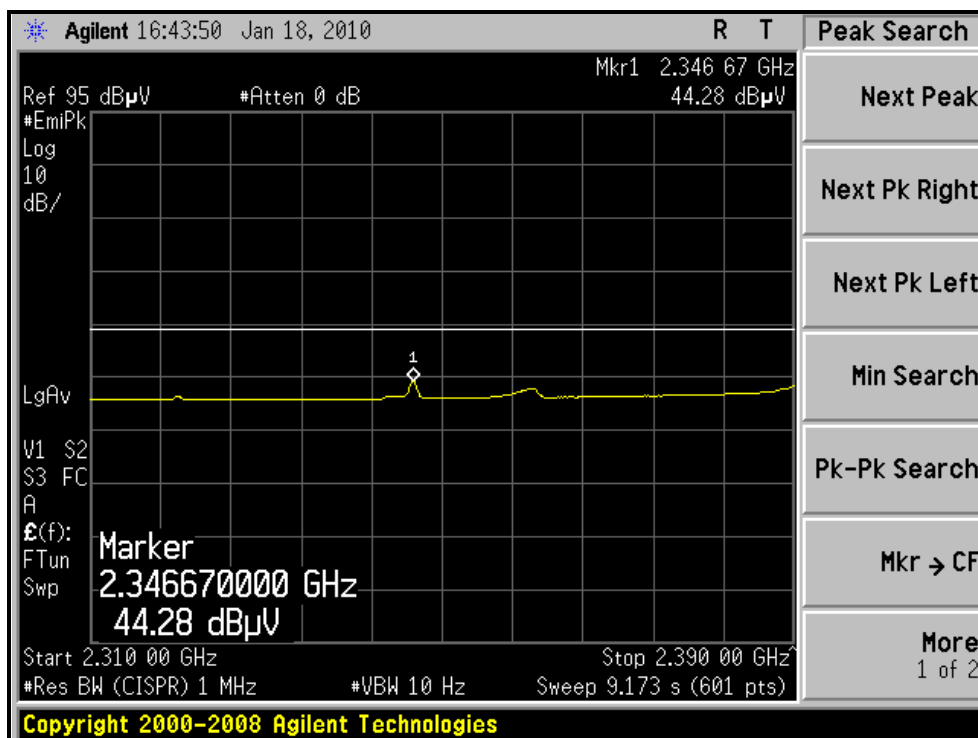
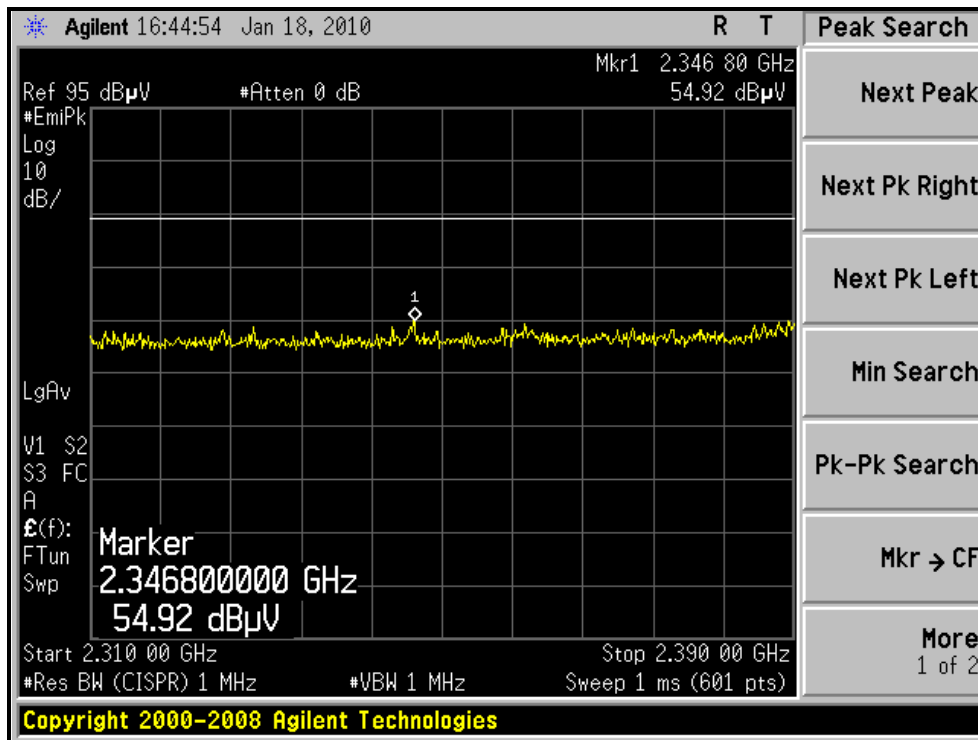
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, HORIZONTAL )





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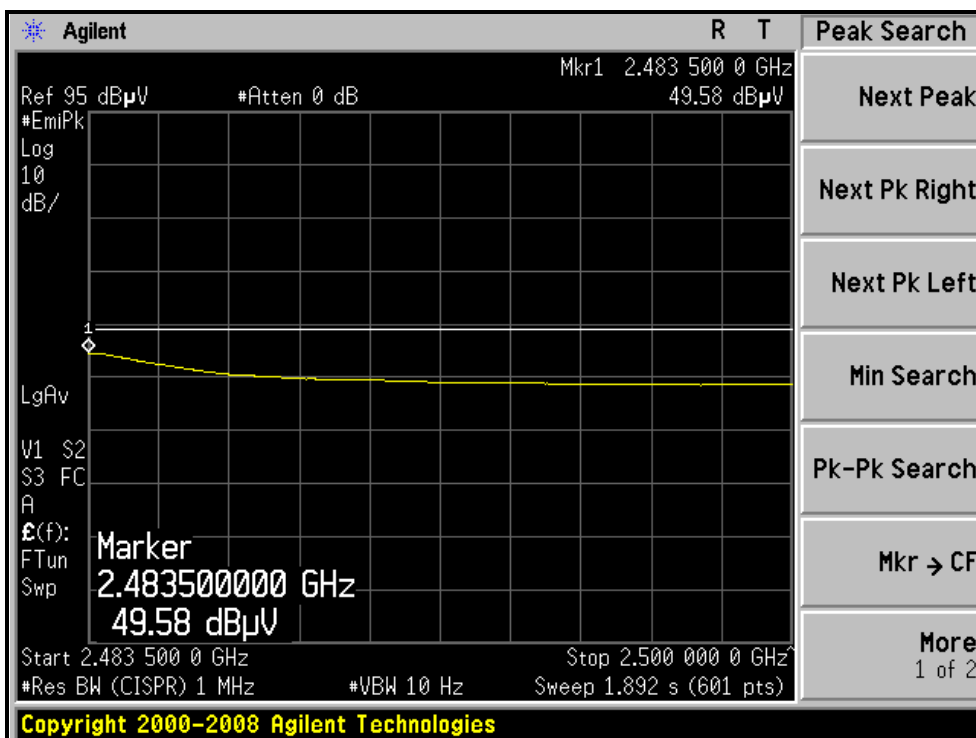
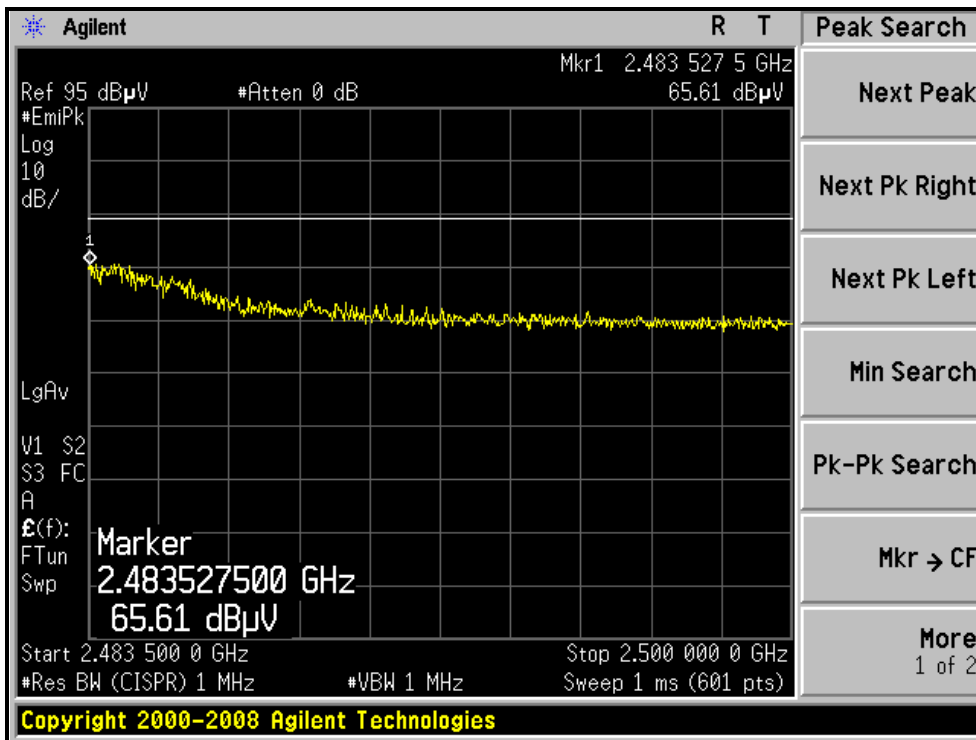
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, VERTICAL )





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

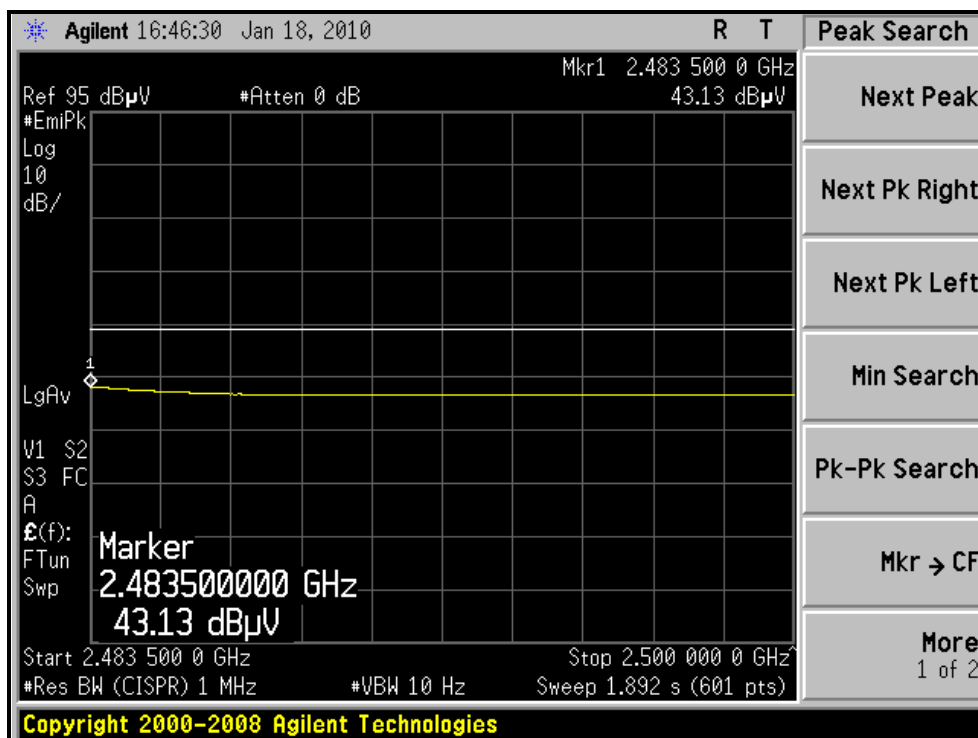
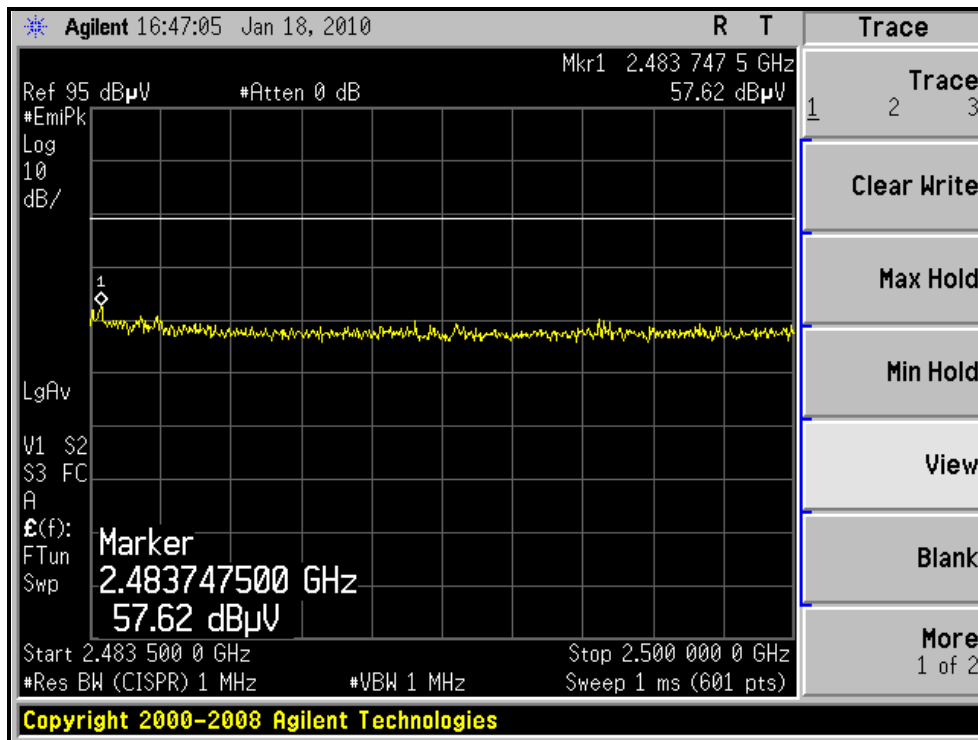






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RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH11, VERTICAL )





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## 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	66.4 PK	74.0	-7.6	1.22 H	133	36.37	30.06
2	2390.00	51.1 AV	54.0	-2.9	1.22 H	133	21.01	30.06
3	*2422.00	103.8 PK			1.42 H	129	73.63	30.19
4	*2422.00	94.5 AV			1.42 H	129	64.31	30.19
5	4844.00	42.7 PK	74.0	-31.3	1.15 H	266	7.19	35.47
6	4844.00	31.6 AV	54.0	-22.4	1.15 H	266	-3.89	35.47
7	7266.00	47.7 PK	74.0	-26.3	1.01 H	125	5.82	41.87
8	7266.00	35.4 AV	54.0	-18.6	1.01 H	125	-6.43	41.87
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	56.6 PK	74.0	-17.5	1.34 V	78	26.49	30.06
2	2390.00	44.5 AV	54.0	-9.5	1.34 V	78	14.46	30.06
3	*2422.00	96.2 PK			1.27 V	94	66.01	30.19
4	*2422.00	89.2 AV			1.27 V	94	59.01	30.19
5	4844.00	42.6 PK	74.0	-31.4	1.32 V	187	7.10	35.47
6	4844.00	31.5 AV	54.0	-22.5	1.32 V	187	-3.99	35.47
7	7266.00	47.6 PK	74.0	-26.4	1.20 V	29	5.72	41.87
8	7266.00	35.6 AV	54.0	-18.4	1.20 V	29	-6.31	41.87

- 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.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	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	102.6 PK			1.36 H	130	72.36	30.24
2	*2437.00	93.1 AV			1.36 H	130	62.88	30.24
3	4874.00	42.8 PK	74.0	-31.2	1.12 H	265	7.31	35.52
4	4874.00	31.7 AV	54.0	-22.3	1.12 H	265	-3.78	35.52
5	7311.00	47.9 PK	74.0	-26.2	1.00 H	127	5.89	41.96
6	7311.00	35.6 AV	54.0	-18.4	1.00 H	127	-6.40	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	95.6 PK			1.27 V	86	65.40	30.24
2	*2437.00	86.2 AV			1.27 V	86	56.00	30.24
3	4874.00	42.6 PK	74.0	-31.4	1.41 V	185	7.11	35.52
4	4874.00	31.6 AV	54.0	-22.4	1.41 V	185	-3.94	35.52
5	7311.00	47.7 PK	74.0	-26.3	1.20 V	17	5.70	41.96
6	7311.00	35.5 AV	54.0	-18.5	1.20 V	17	-6.49	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.



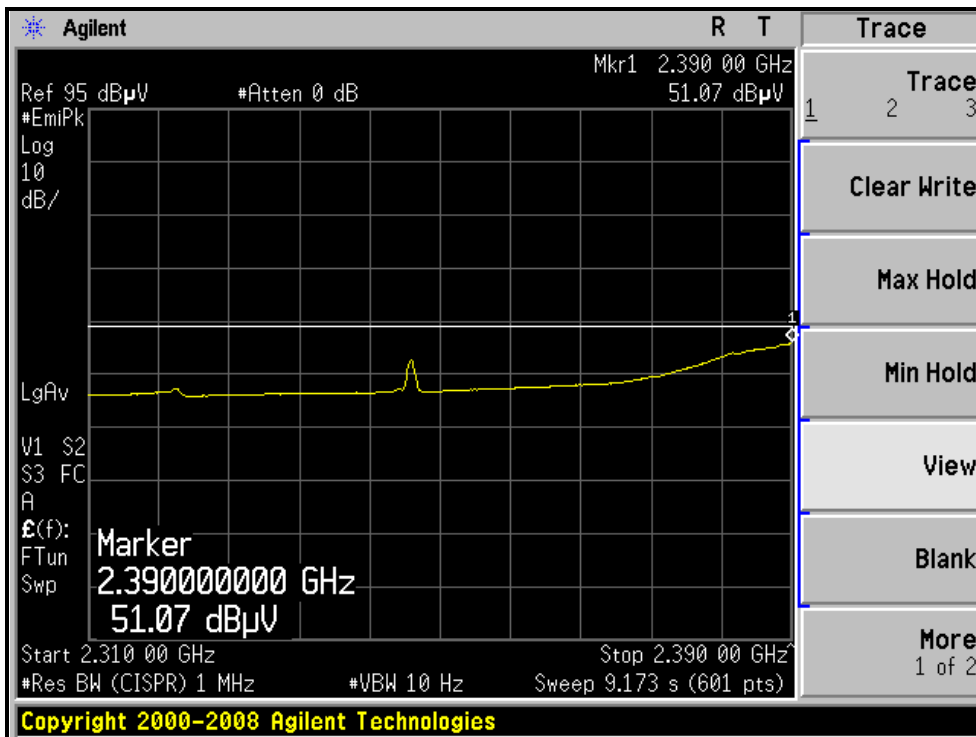
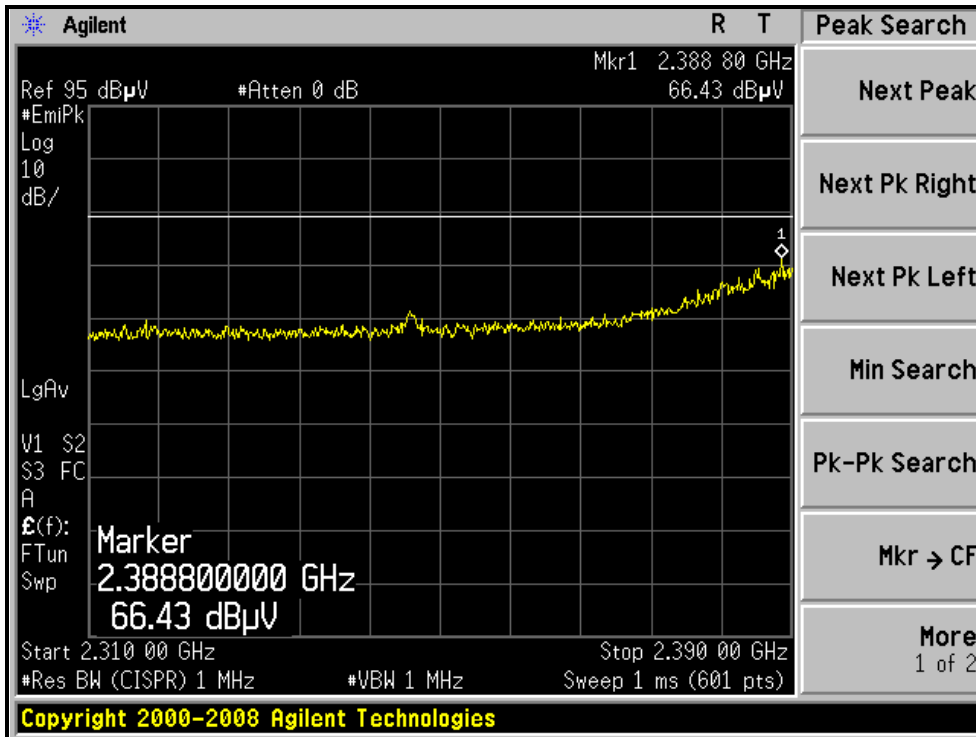
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	12deg. C, 66%RH 1023 hPa	TESTED BY	Frank Liu

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	102.2 PK			1.41 H	137	71.90	30.30
2	*2452.00	93.4 AV			1.41 H	137	63.10	30.30
3	2483.50	65.4 PK	74.0	-8.7	1.41 H	134	34.92	30.43
4	2483.50	50.8 AV	54.0	-3.2	1.41 H	134	20.37	30.43
5	4904.00	42.7 PK	74.0	-31.3	1.15 H	273	7.16	35.58
6	4904.00	31.6 AV	54.0	-22.4	1.15 H	273	-3.96	35.58
7	7356.00	47.8 PK	74.0	-26.2	1.05 H	128	5.74	42.04
8	7356.00	35.5 AV	54.0	-18.6	1.05 H	128	-6.59	42.04
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	*2452.00	95.3 PK			1.26 V	89	65.00	30.30
2	*2452.00	88.4 AV			1.26 V	89	58.10	30.30
3	2483.50	54.6 PK	74.0	-19.4	1.35 V	96	24.18	30.43
4	2483.50	43.5 AV	54.0	-10.5	1.35 V	96	13.05	30.43
5	4904.00	42.8 PK	74.0	-31.3	1.36 V	181	7.17	35.58
6	4904.00	31.6 AV	54.0	-22.4	1.36 V	181	-3.95	35.58
7	7356.00	47.8 PK	74.0	-26.2	1.21 V	36	5.74	42.04
8	7356.00	35.4 AV	54.0	-18.6	1.21 V	36	-6.68	42.04

- 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.
  5. “ \* “: Fundamental frequency.

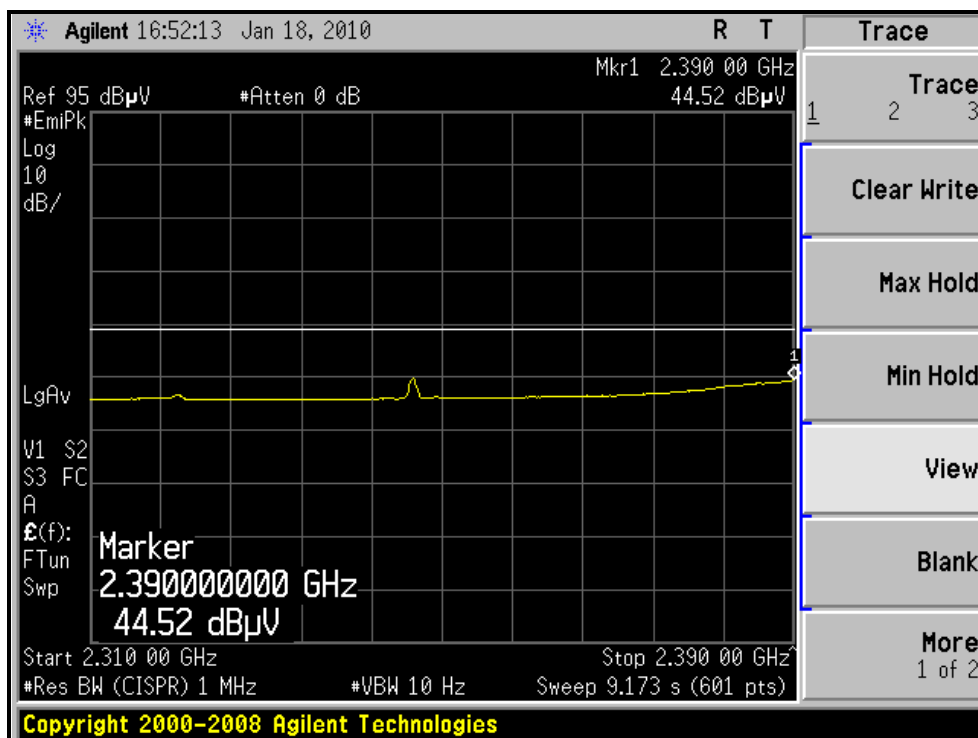
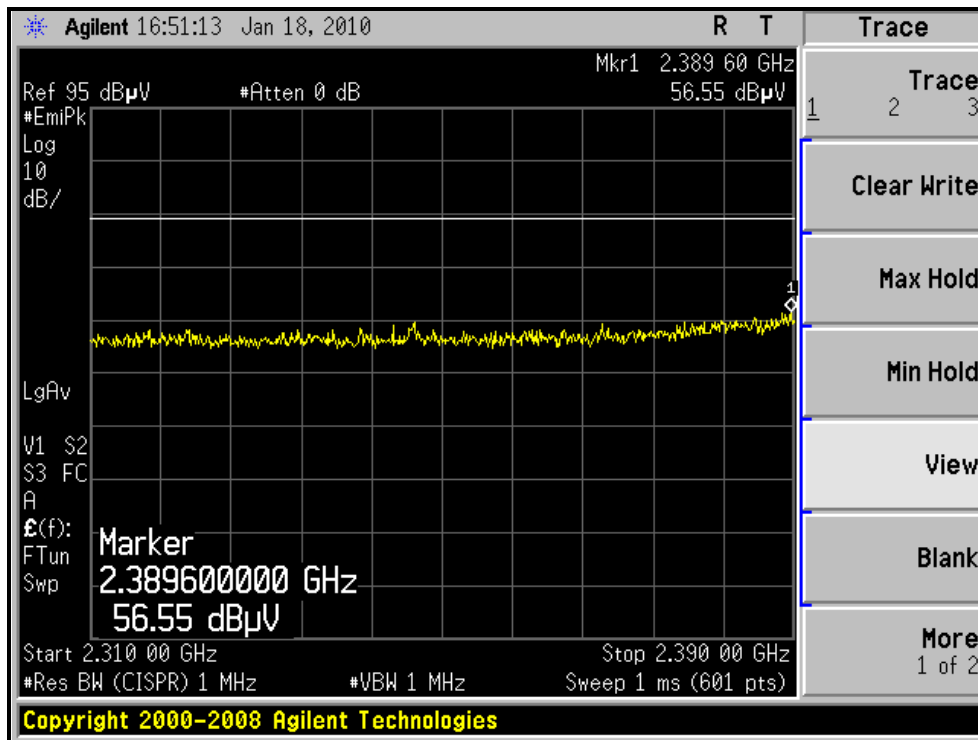
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH1, HORIZONTAL )



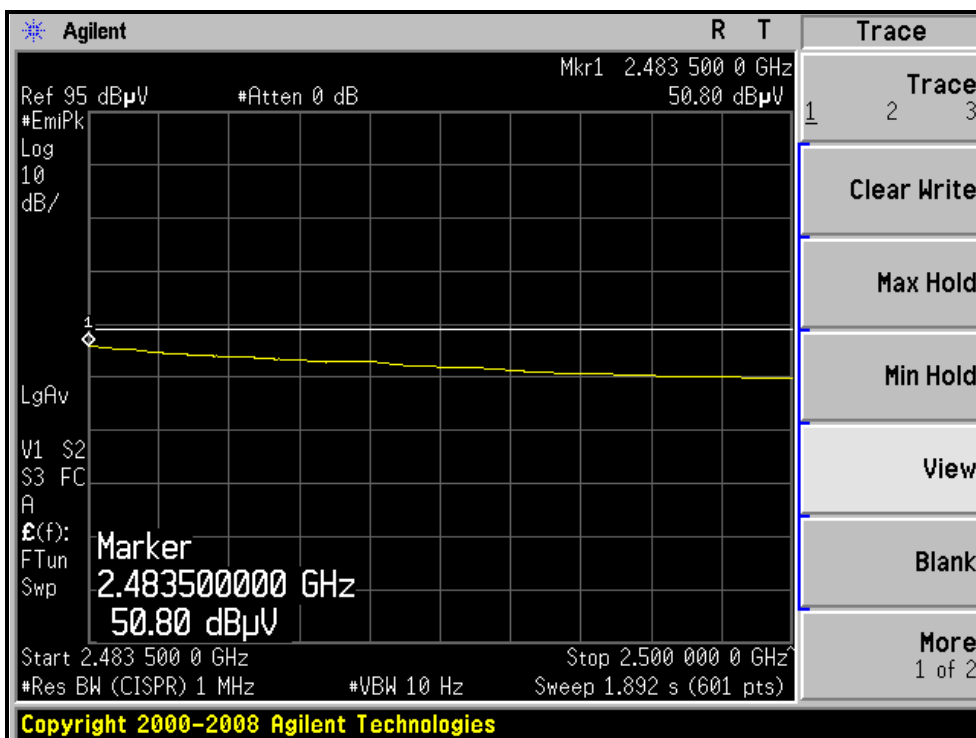
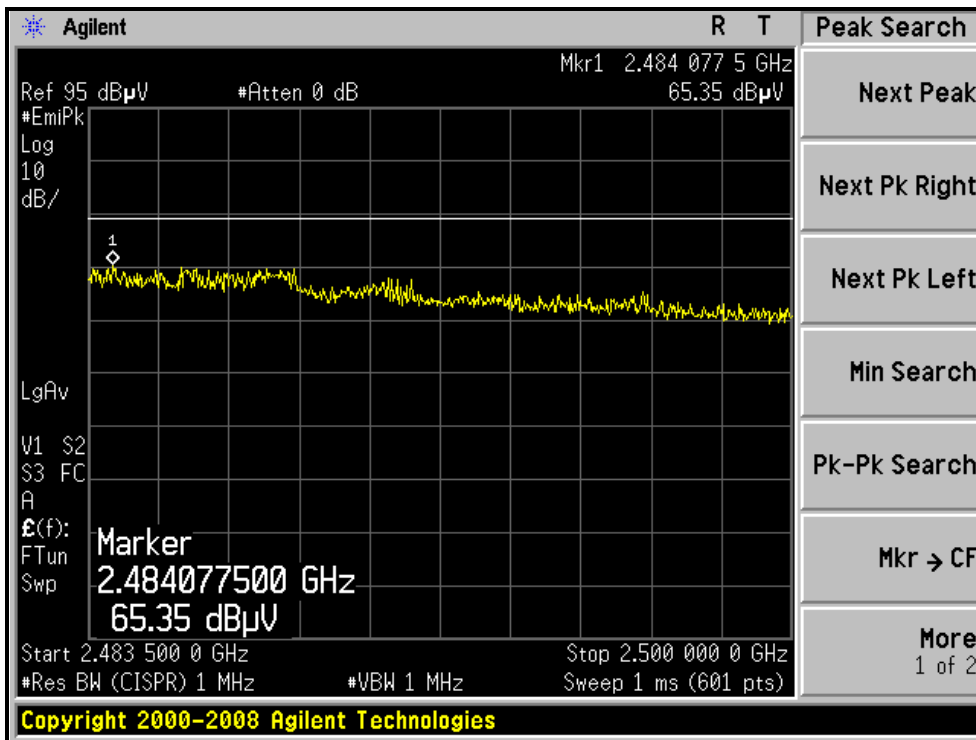


A D T

RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH1, VERTICAL )



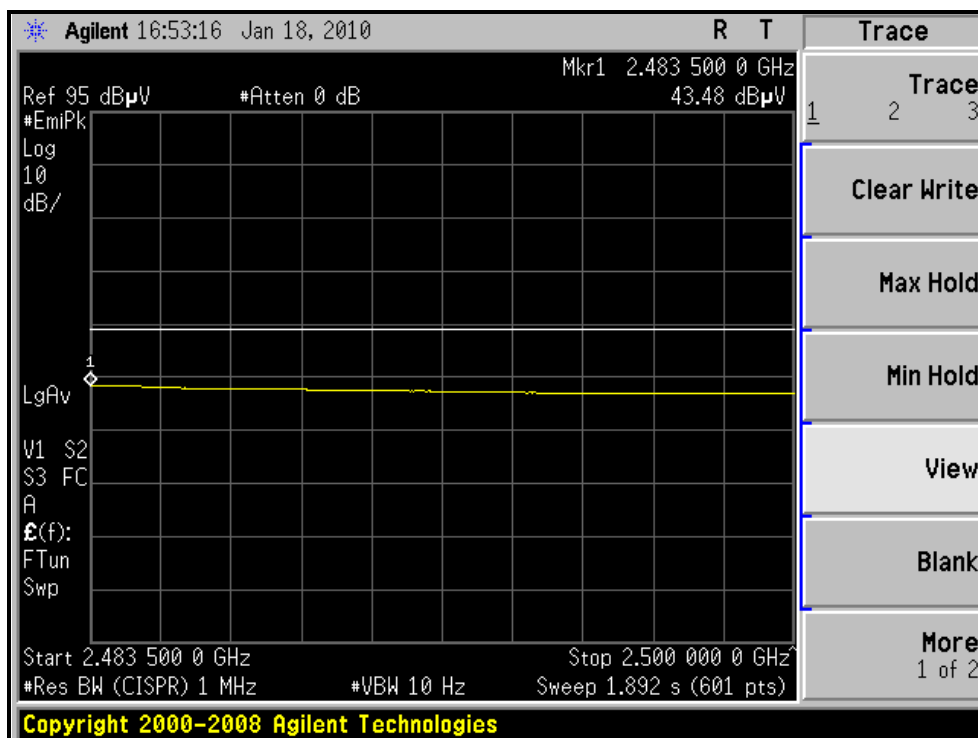
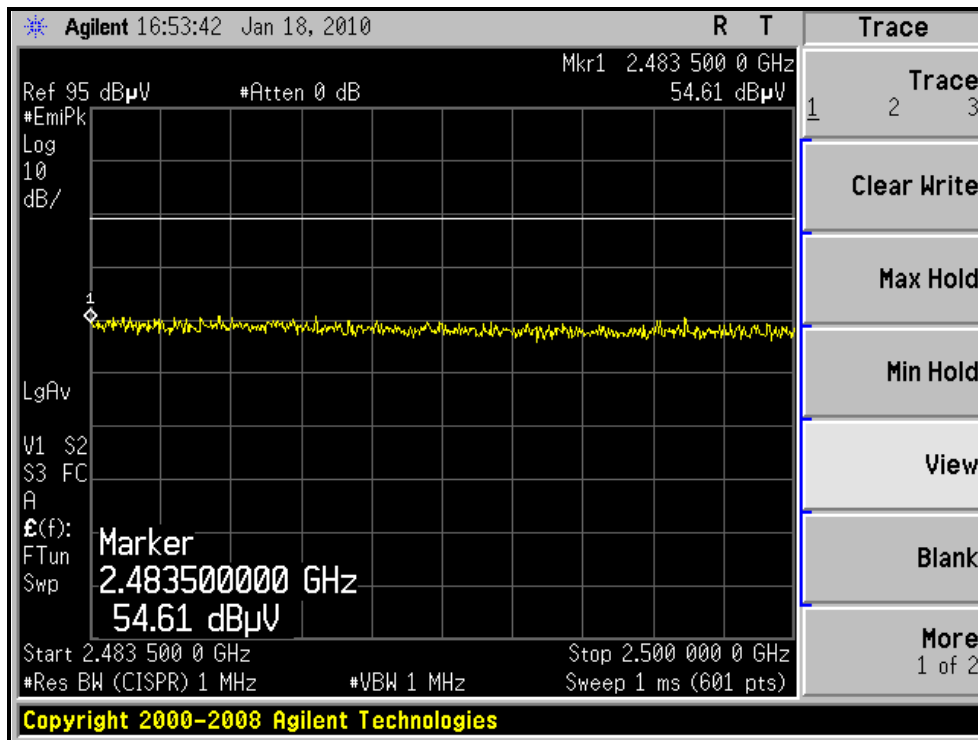
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH7, HORIZONTAL )





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RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH7, 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

**NOTE:**

1. 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 100kHz 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.



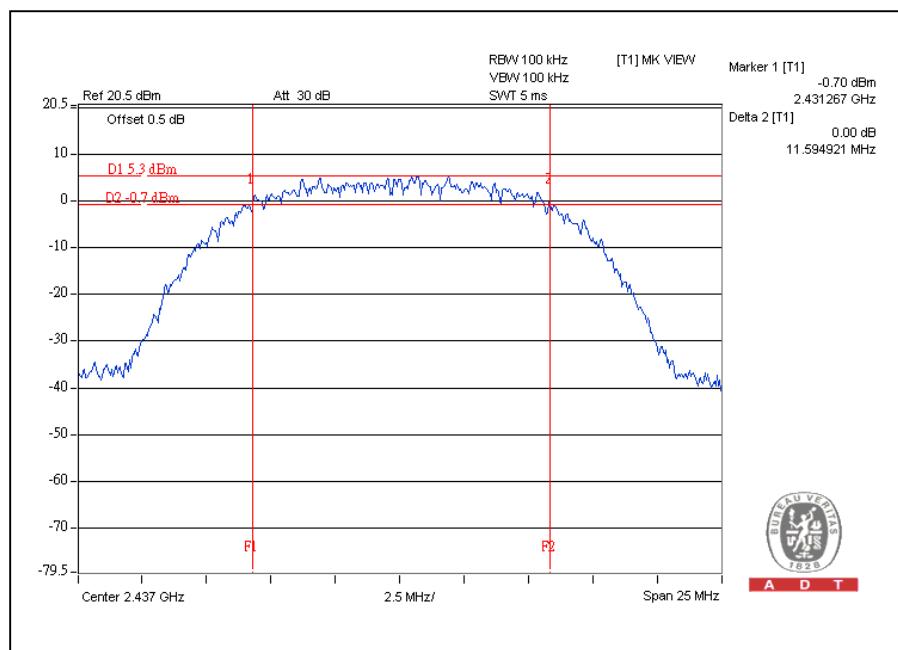
A D T

### 4.3.7 TEST RESULTS

#### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	11.59	0.5	PASS
6	2437	11.59	0.5	PASS
11	2462	11.59	0.5	PASS

#### CH6



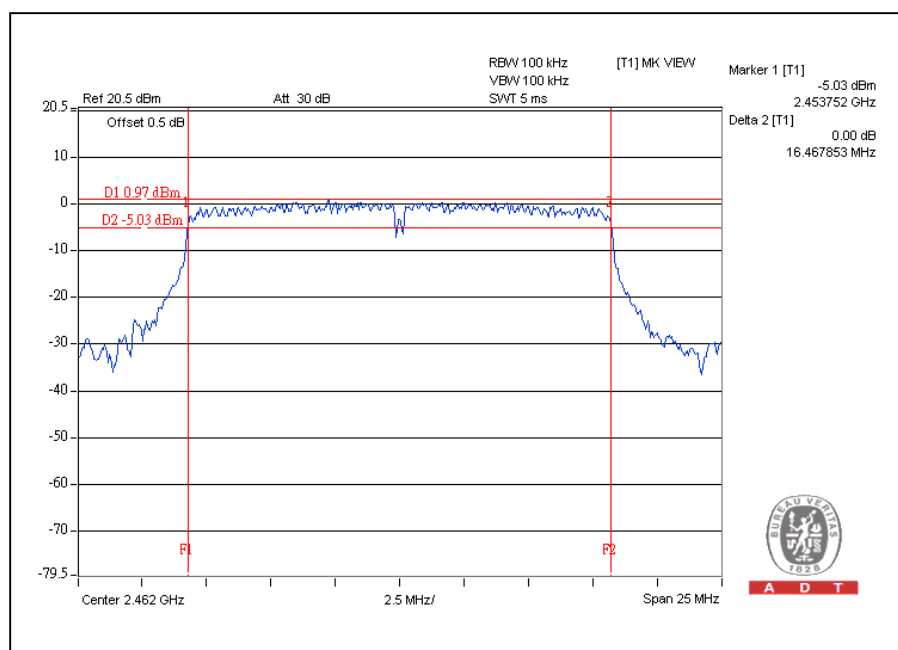


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### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.44	0.5	PASS
6	2437	16.46	0.5	PASS
11	2462	16.46	0.5	PASS

### CH11



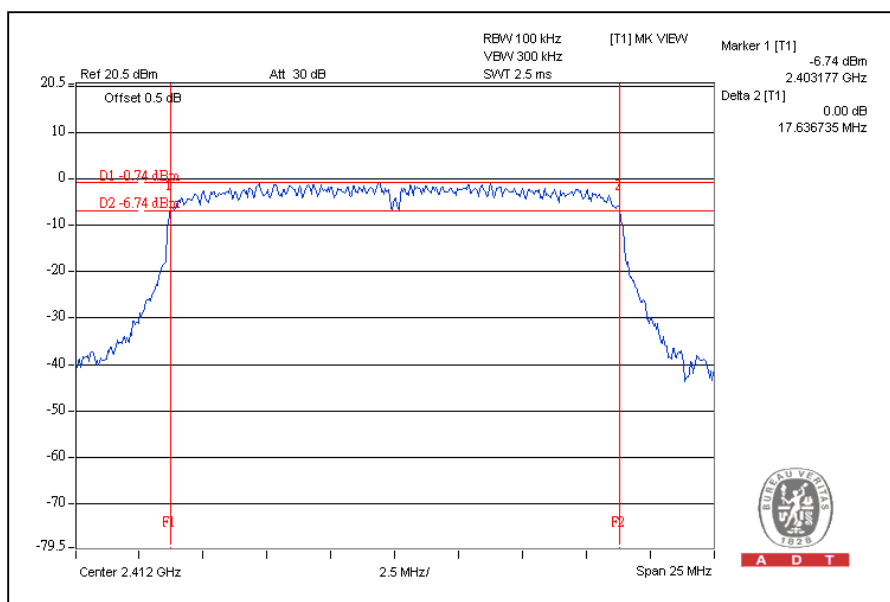


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### 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.63	0.5	PASS
6	2437	17.61	0.5	PASS
11	2462	17.61	0.5	PASS

CH1



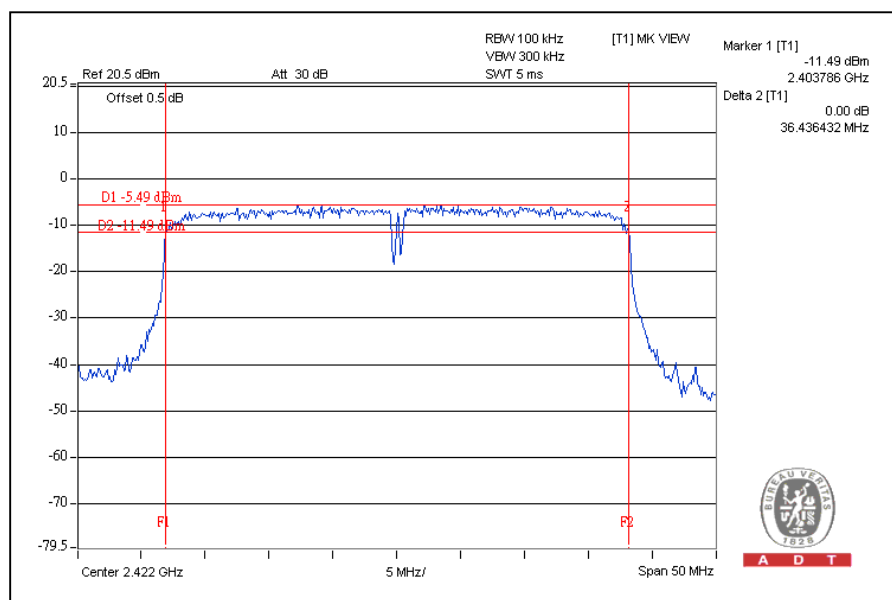


A D T

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

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2422	36.43	0.5	PASS
4	2437	36.43	0.5	PASS
7	2452	36.41	0.5	PASS

CH1





#### 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

Description & Manufacturer	Model no.	Serial No.	Calibrated date	Calibrated Until
Anritsu Power Meter	ML2495A	0824006	April 25, 2009	April 24, 2010
Pulse Power Sensor	MA2411B	0738172	April 25, 2009	April 24, 2010

**NOTE:**

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

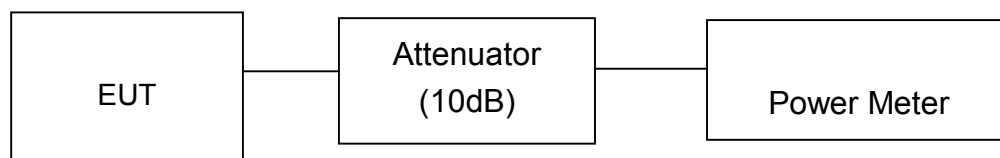
##### 4.4.3 TEST PROCEDURES

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 4.2.6



#### 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	19.4	87.1	30	PASS
6	2437	19.6	91.2	30	PASS
11	2462	19.3	85.1	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	24.4	275.4	30	PASS
6	2437	24.3	269.2	30	PASS
11	2462	24.6	288.4	30	PASS

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

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	22.4	173.8	30	PASS
6	2437	22.3	169.8	30	PASS
11	2462	22.6	182.0	30	PASS

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

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2422	21.7	147.9	30	PASS
4	2437	21.4	138.0	30	PASS
7	2452	21.9	154.9	30	PASS



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## 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

**NOTE:**

1. 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

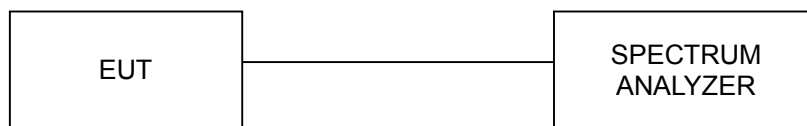
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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 4.2.6



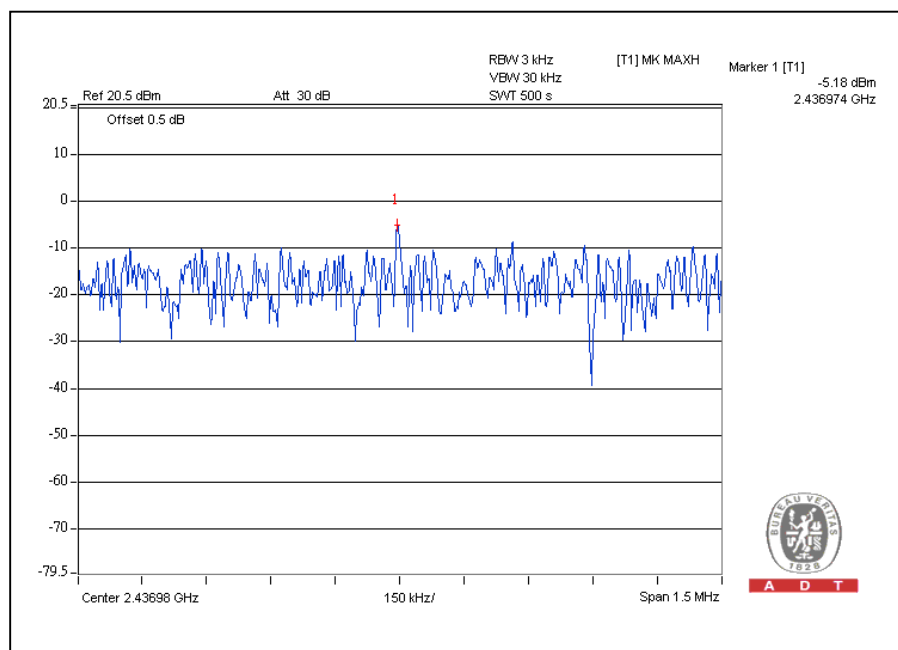
A D T

### 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	-5.6	8	PASS
6	2437	-5.2	8	PASS
11	2462	-5.6	8	PASS

### CH6



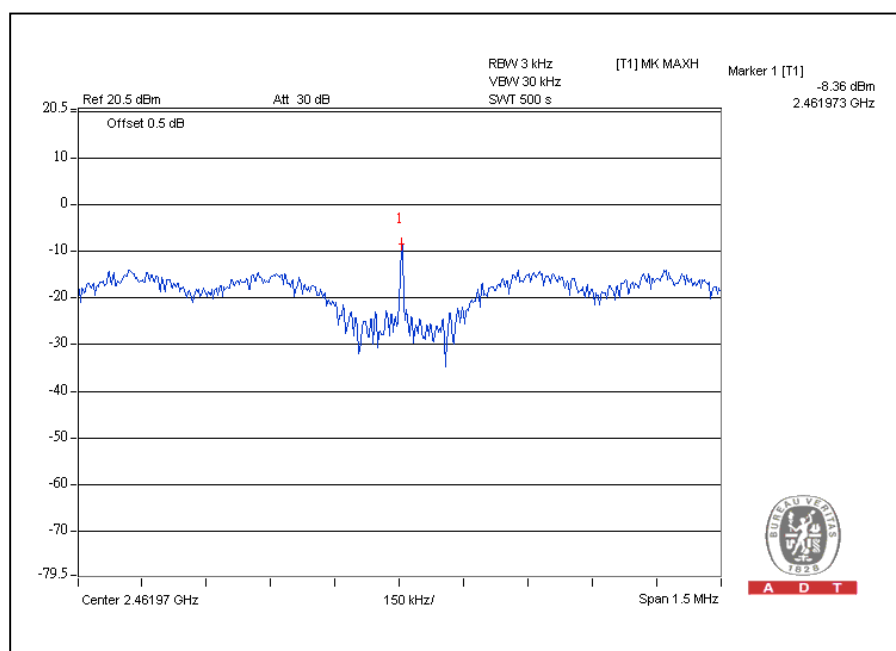


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### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-8.4	8	PASS
6	2437	-8.5	8	PASS
11	2462	-8.4	8	PASS

### CH11



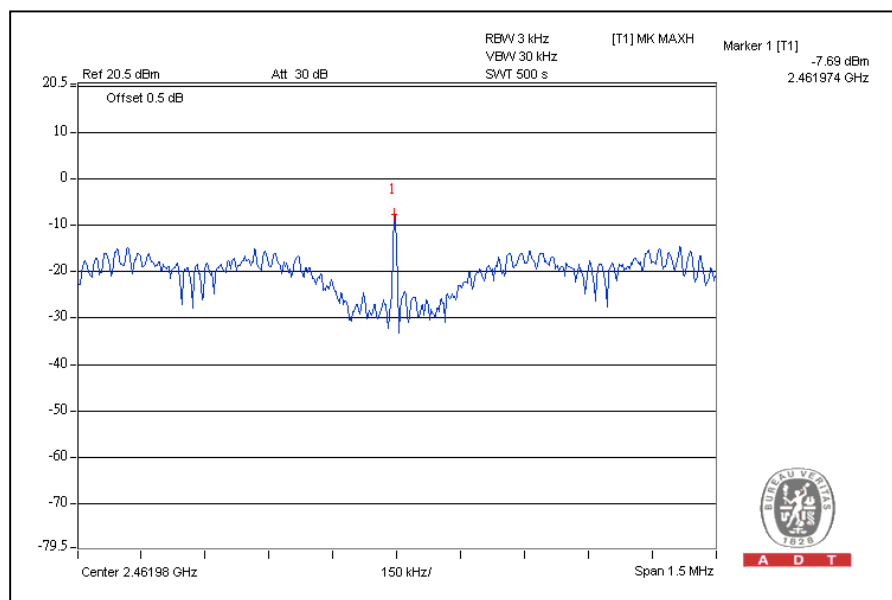


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### 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-7.9	8	PASS
6	2437	-7.8	8	PASS
11	2462	-7.7	8	PASS

### CH11



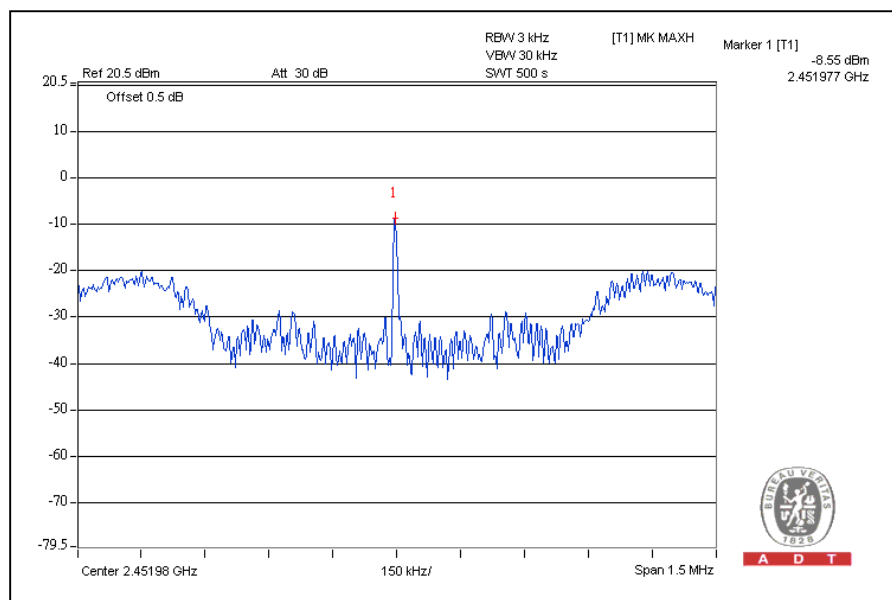


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### 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2422	-9.0	8	PASS
4	2437	-9.0	8	PASS
7	2452	-8.6	8	PASS

CH7





## 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

**NOTE:**

1. 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 lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

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



#### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 EUT OPERATING CONDITION

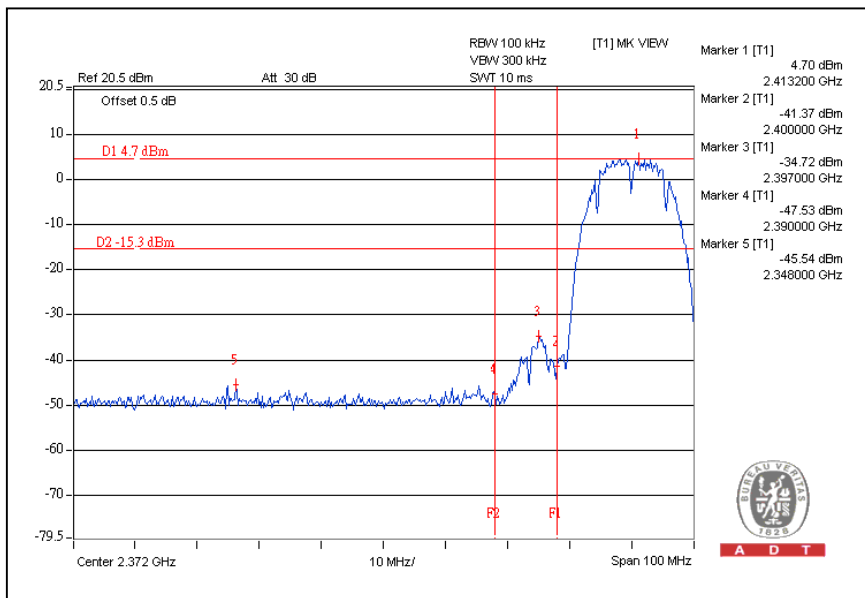
Same as Item 4.2.6

#### 4.6.6 TEST RESULTS

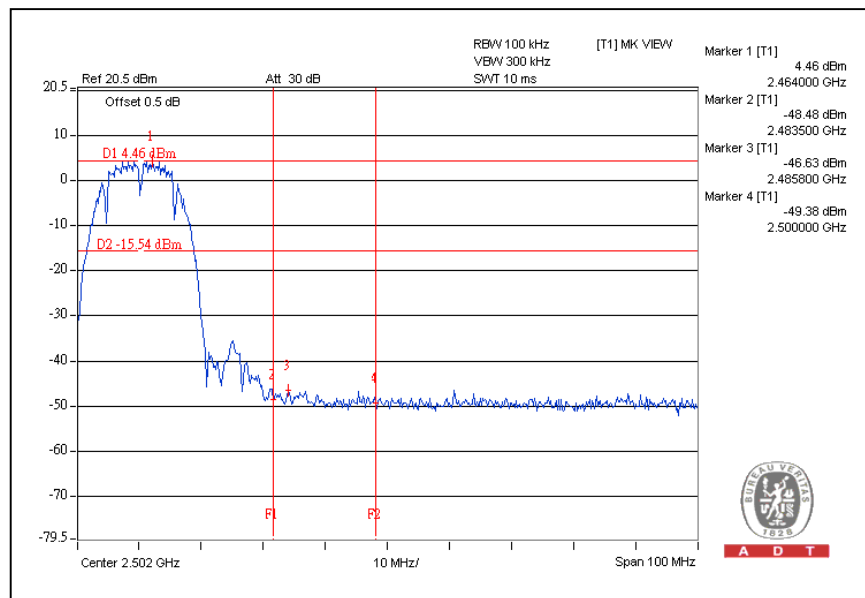
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

### 802.11b DSSS MODULATION:

#### CH1



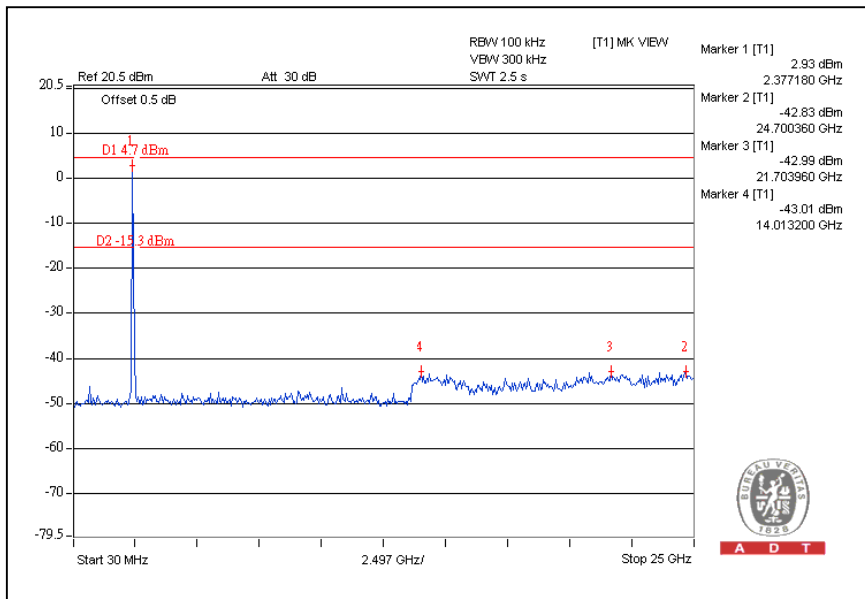
#### CH11



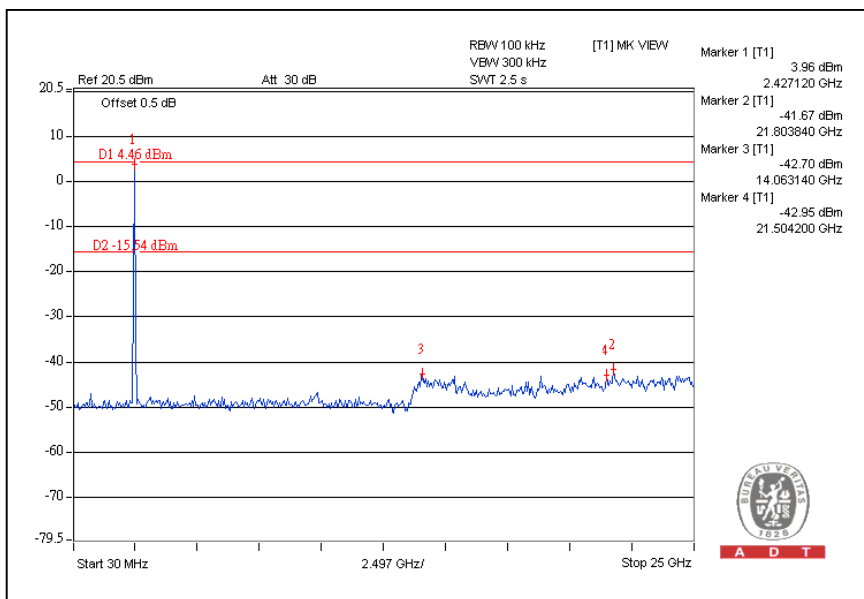


A D T

# CH1

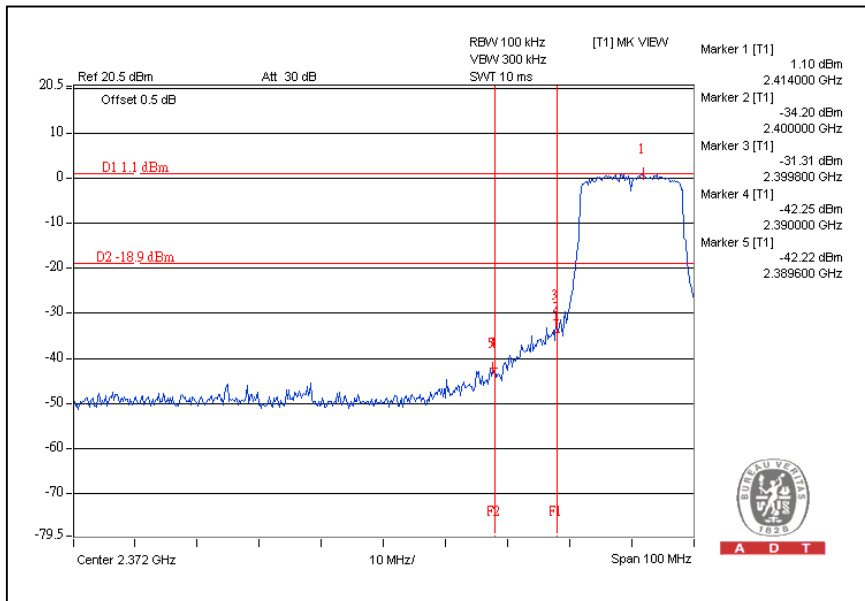


# CH11

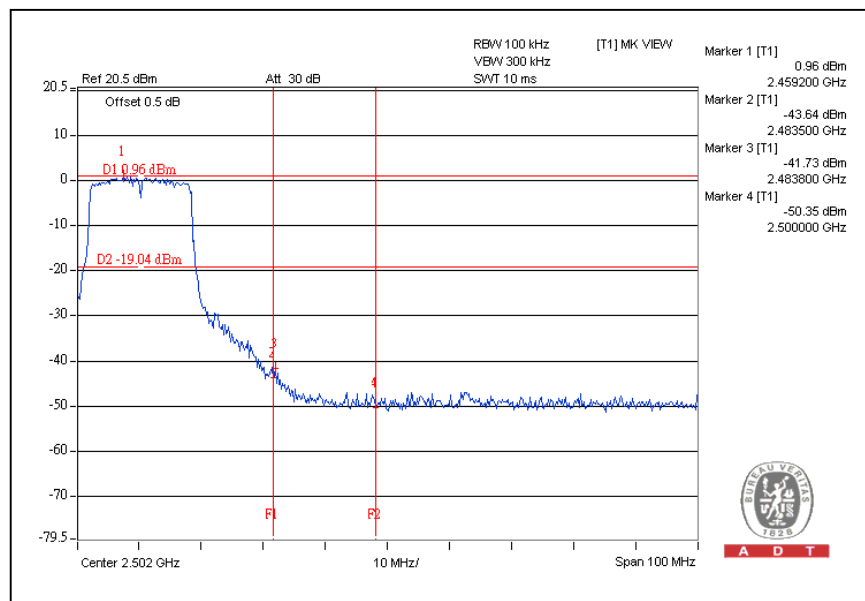


# 802.11g OFDM MODULATION:

## CH 1



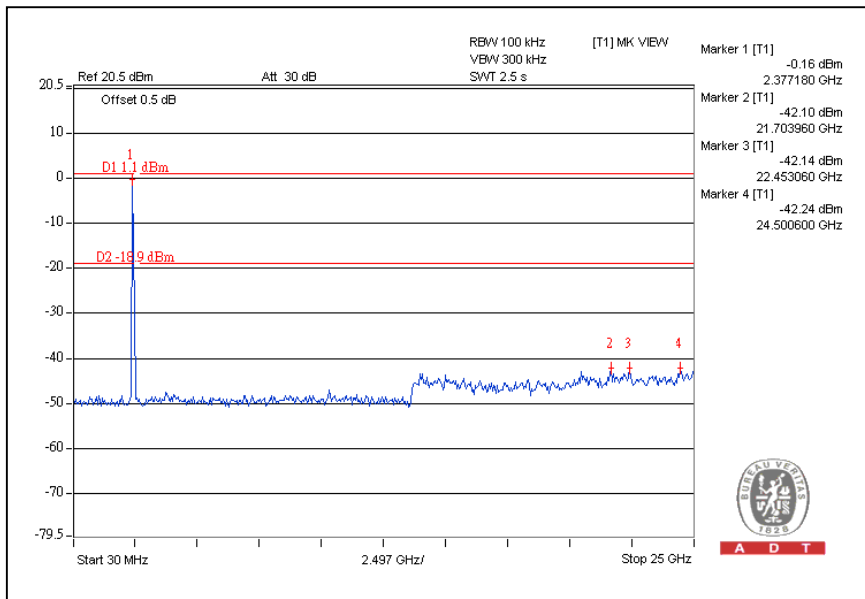
## CH11



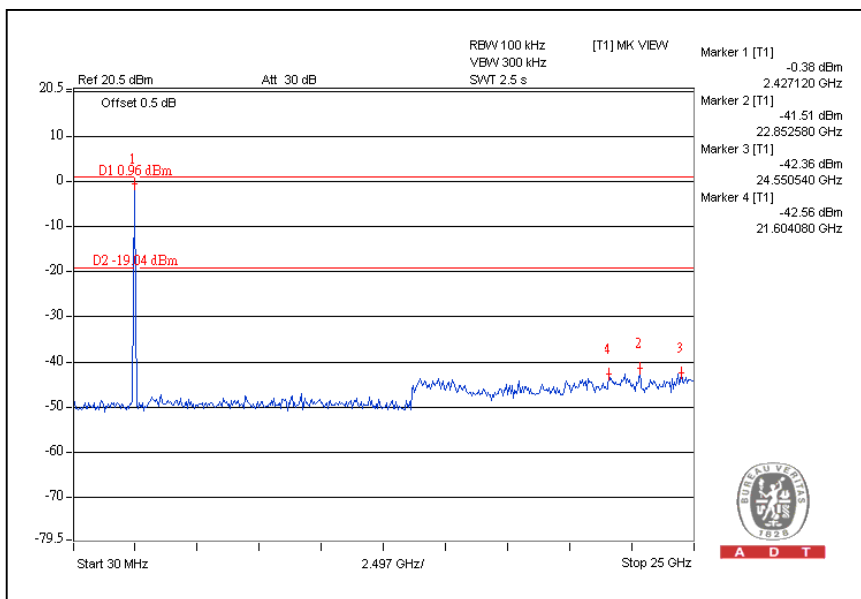


A D T

# CH1



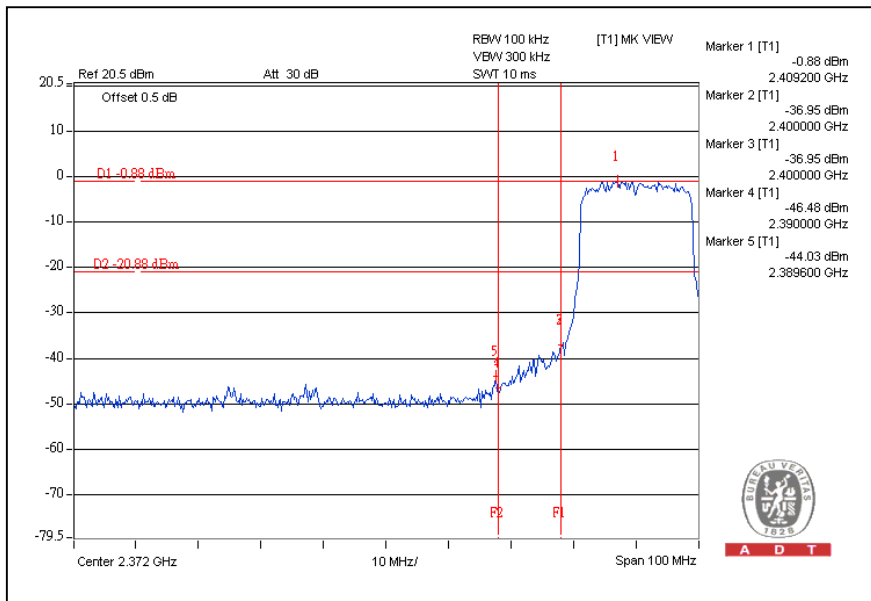
# CH11



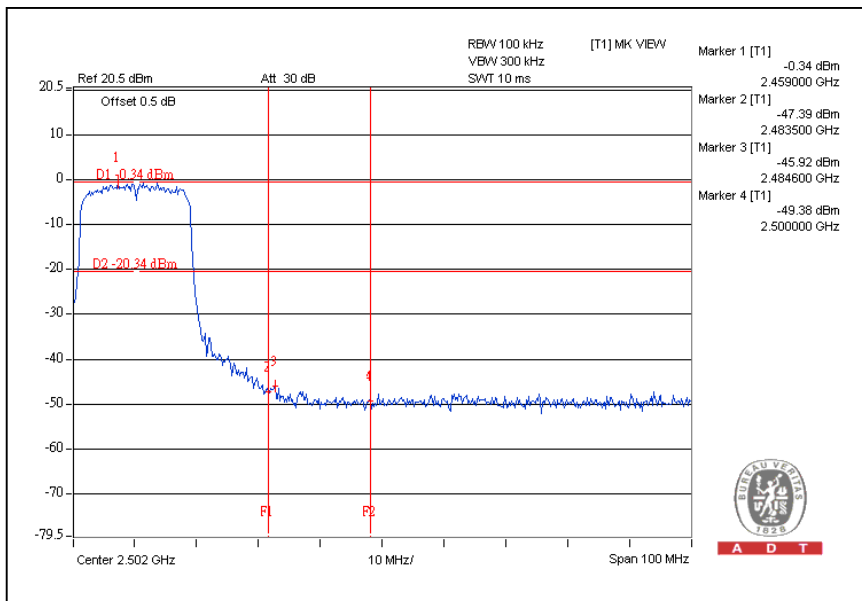


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# 802.11n (20MHz) OFDM MODULATION: CH1



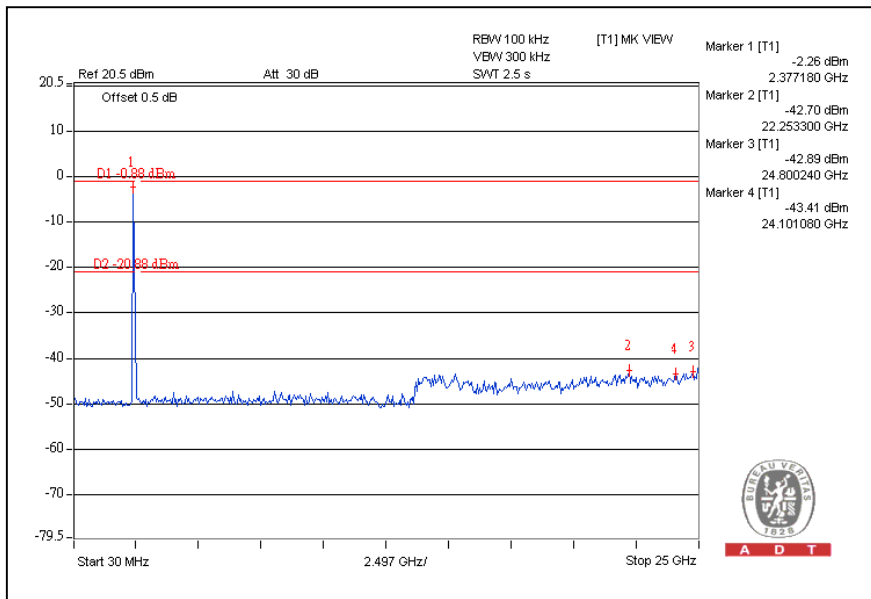
# CH11



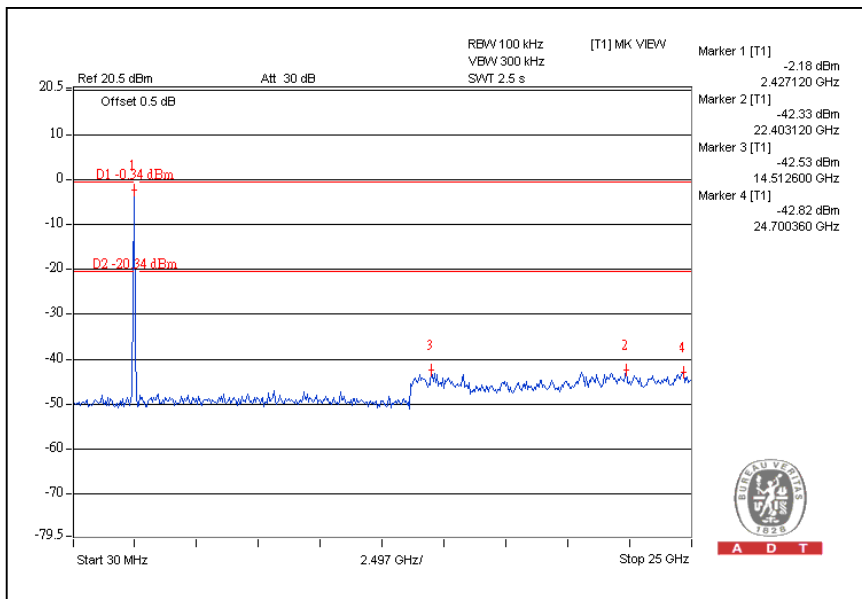


A D T

# CH1



# CH11

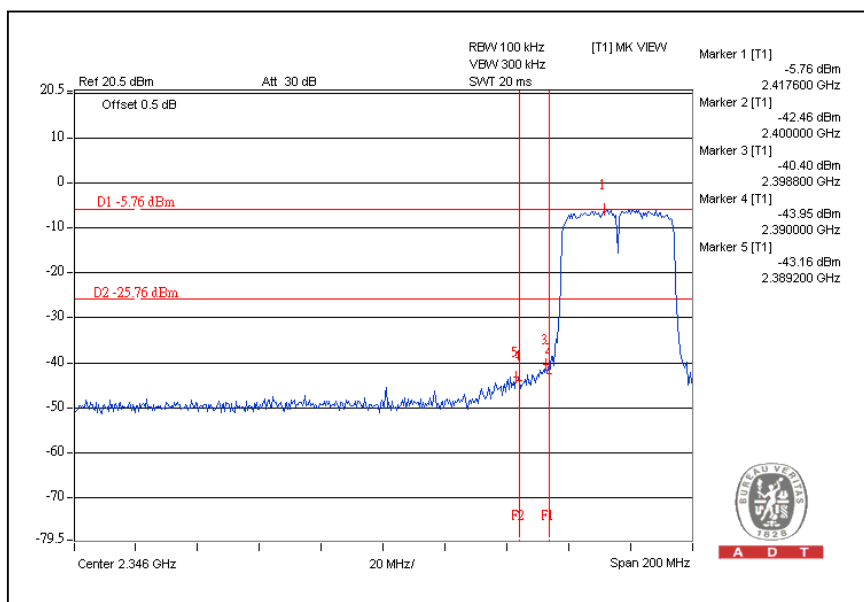




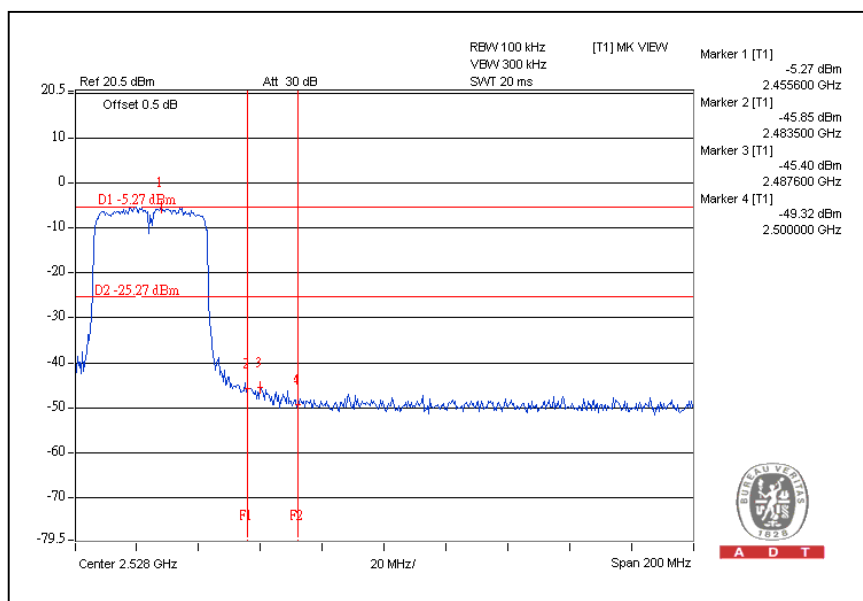
A D T

# 802.11n (40MHz) OFDM MODULATION:

## CH1



## CH7

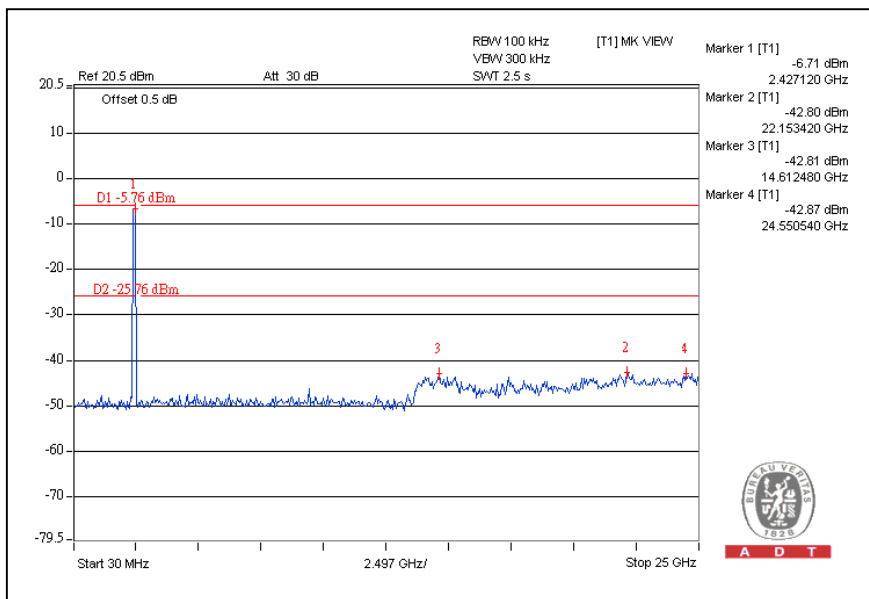




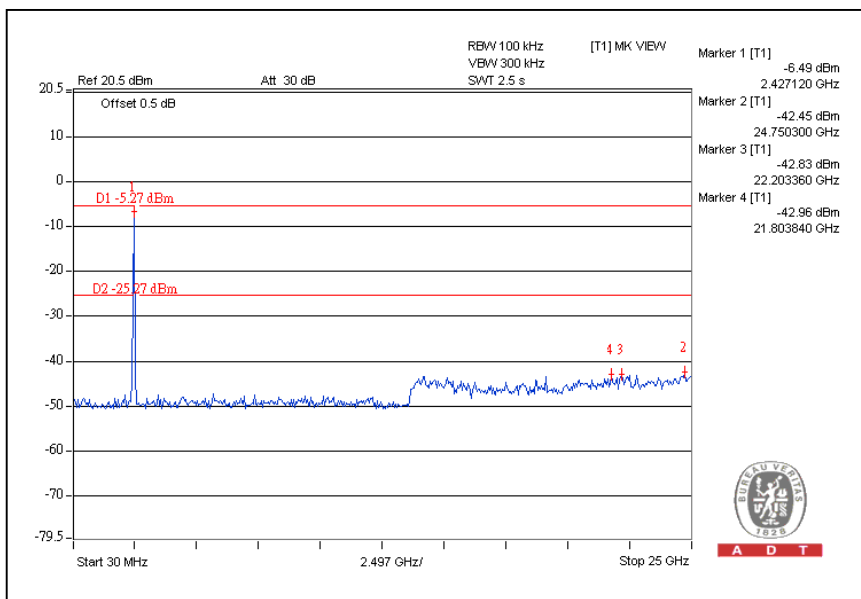


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# CH1



# CH7





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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

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3185050

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

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



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## 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 ---