



# FCC TEST REPORT

**REPORT NO.:** RF990810E05

**MODEL NO.:** 2000C

**FCC ID:** TC22000C

**RECEIVED:** Aug. 11, 2010

**TESTED:** Aug. 16 to 27, 2010

**ISSUED:** Aug. 30, 2010

**APPLICANT:** Roku, LLC

**ADDRESS:** 19352 Hilton Rd Springdale, AR 72764.

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

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## 1. CERTIFICATION

**PRODUCT:** IP Set Top Box  
**BRAND NAME:** Roku  
**MODEL NO.:** 2000C  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Aug. 16 to 27, 2010  
**APPLICANT:** Roku, LLC  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003

The above equipment (Model: 2000C) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** : Carol Liao , **DATE:** Aug 30, 2010  
( Carol Liao, Specialist )

**TECHNICAL ACCEPTANCE** : Hank Chung , **DATE:** Aug 30, 2010  
( Hank Chung, Deputy Manager )

**APPROVED BY** : May Chen , **DATE:** Aug 30, 2010  
( May Chen, Deputy Manager )



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.66dB at 0.545MHz
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 -0.1dB at 2390.0MHz , 2484.32MHz and 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	No antenna connector is used.

## 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.3 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	IP Set Top Box
<b>MODEL NO.</b>	2000C
<b>FCC ID</b>	TC22000C
<b>POWER SUPPLY</b>	DC 5V 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): 130 / 117 / 104 / 78 / 52 / 39 / 26 / 13 / 65 / 58.5 / 52 / 39 / 26 / 19.5 / 13 / 6.5Mbps 802.11n (40MHz): 270 / 243 / 216 / 162 / 108 / 81 / 54 / 27 / 135 / 121.5 / 108 / 81 / 54 / 40.5 / 27 / 13.5Mbps
<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: 363.1mW 802.11g: 622.2mW 802.11n (20MHz): 628.6mW 802.11n (40MHz): 590.4mW
<b>ANTENNA TYPE</b>	Please see note 1
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	HDMI port x 1 ETHERNET port x 1 VIDEO R-AUDIO-L port x 1 (VIDEO(yellow), Right channel(Red), Left channel(White))
<b>ASSOCIATED DEVICES</b>	Remote control x 1

**NOTE:**

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

Chain	Antenna Type	Antenna Connector	Antenna Gain (dBi)
Chain (0)	PCB Printed	NA	3
Chain (1)	PCB Printed	NA	3

2. The EUT must be supplied with a power adapter and following two different models could be chosen:

<b>Adapter 1</b>	
<b>Brand:</b>	RoKu
<b>Model No.:</b>	FA-0502500SU
<b>Input power :</b>	AC100-240V, 0.5A, 50/60Hz
<b>Output power :</b>	DC 5V, 2.5A DC output cable (Unshielded, 1.5m)
<b>Adapter 2</b>	
<b>Brand:</b>	RoKu
<b>Model No.:</b>	DSA-15P-05 US 050125
<b>Input power :</b>	AC100-240V, 0.5A, 50/60Hz
<b>Output power :</b>	DC 5V, 2.5A DC output cable (Unshielded, 1.8m)

For radiated test, the EUT was pre-tested with above adapters, the worse case was found in adapter 2. Therefore only the test data of the adapter was recorded in this report.

3. The EUT incorporates a MIMO function with 802.11n. Physically, the EUT provides two completed transmitters and two completed receivers.
4. The EUT is 2 \* 2 spatial MIMO (2Tx & 2Rx) without beam forming function. The antenna configurations are two transmitter antennas and two receiver antennas, as there are 2 PCB Printed antennas. Spatial multiplexing modes for simultaneous transmission using 2 antennas, and for simultaneous receiver using 2 antennas. The 11b legacy mode is limited to single transmitter only.
5. The EUT complies with 802.11n standards and backwards compatible with 802.11b, 802.11g products.
6. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
7. 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	
1	√				With adapter 1
2	√	√	√	√	With 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

### ANTENNA COMBINATION MODE:

COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
A	802.11 b	√	
B	802.11 b		√
C	802.11 g	√	√
D	802.11n (20MHz) for MCS 0~15	√	√
E	802.11n (40MHz) for MCS 0~15	√	√

Note:  
1. The above information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.  
2. Mode A, C, D & E the worst modes, were 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)	TX COMBINATION
802.11g	1 to 11	6	OFDM	BPSK	6	C



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**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)	TX COMBINATION
802.11g	1 to 11	6	OFDM	BPSK	6	C

**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)	TX COMBINATION
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	C
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	D
802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	13.5	E

**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)	TX COMBINATION
802.11b	1 to 11	1, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 11	OFDM	BPSK	6	C
802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	6.5	D
802.11n (40MHz)	1 to 7	1, 7	OFDM	BPSK	13.5	E

※ After verification, conducted out band emission as show worst chain in report by investigations.



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### ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- The EUT have MIMO power save mode, one transmitter may be active (chain 0) while other is inactive (chain 1). Output power is no different compared to operation when both transmitter chains are active. Transmitter power is not increased or decreased for chain 0 when in single chain mode, compared to dual chain active mode.
- 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)	TX COMBINATION
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	A
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	C
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	D
802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	13.5	E

※ After verification, bandwidth as show worst chain in report by investigations.

### ※ TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE <sup>3</sup> 1G	27deg. C, 74%RH, 1013 hPa	120Vac, 60Hz	Eric Lee
RE<1G	28deg. C, 72%RH, 1013 hPa	120Vac, 60Hz	Rex Huang
PLC	26deg. C, 66%RH, 1013 hPa	120Vac, 60Hz	Max Tseng
APCM	28deg. C, 68%RH, 1013 hPa	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**

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

**NOTE:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



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### 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.

For conducted test					
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	12252644560	FCC DoC
2	WIRELESS ACCESS POINT	Air Station	WLA-G54	N/A	NA
3	TV MONITOR	Toshiba	21D7GT	87000018	NA
4	MONITOR	DELL	E2210Hc	CN-OG337R-64180-97S-OQMS	FCC DoC

For conducted test	
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m UTP cable
2	NA
3	1.8m Video & Audio cable
4	1.8m HDMI cable

**NOTE:** 1. All power cords of the above support units are non shielded (1.8m).



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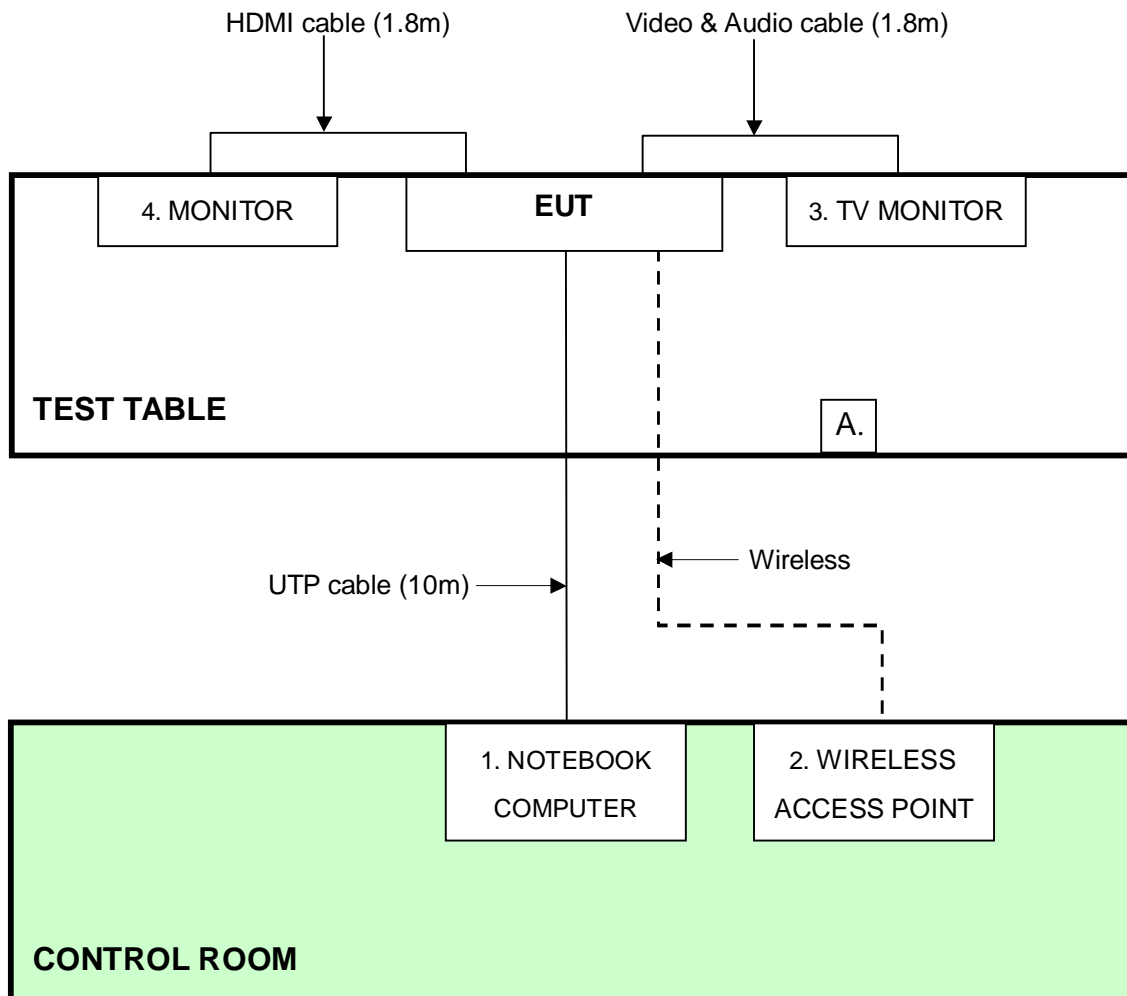
For other test items					
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	D600	CN-0G5152-48643-47H-7672	NA
2	TV MONITOR	Panasonic	TH-L26K10W	9540684	NA
3	MONITOR	DELL	U2410F	CNOJ257M728729A G14ML	FCC DoC
4	SPEAKERS	J-S	JY2003	090404619	FCC DoC

For other test items	
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m UTP cable
2	1.8m AV cable
3	1.5m HDMI cable
4	1.1 m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone plug, w/o core.

**NOTE:** 1. All power cords of the above support units are non shielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST

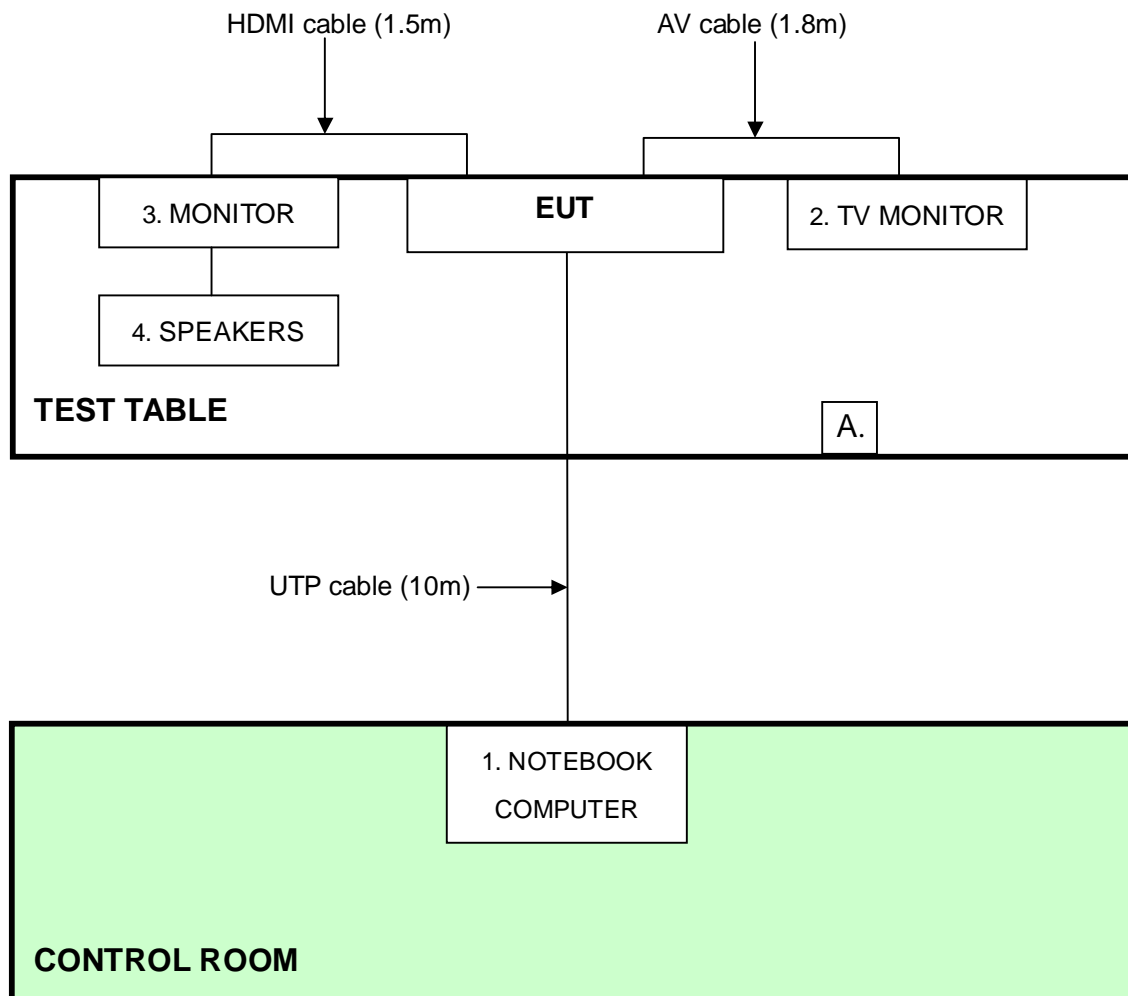
For conducted test:



**NOTE:** 1. Item A is the remote control of the EUT.



**For other test items:**



**NOTE:** 1. Item A is the remote control of the EUT.



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
0.15-0.5	Quasi-peak	Average
0.5-5	66 to 56	56 to 46
5-30	56	46
	60	50

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

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 11, 2010	June 10, 2011
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.

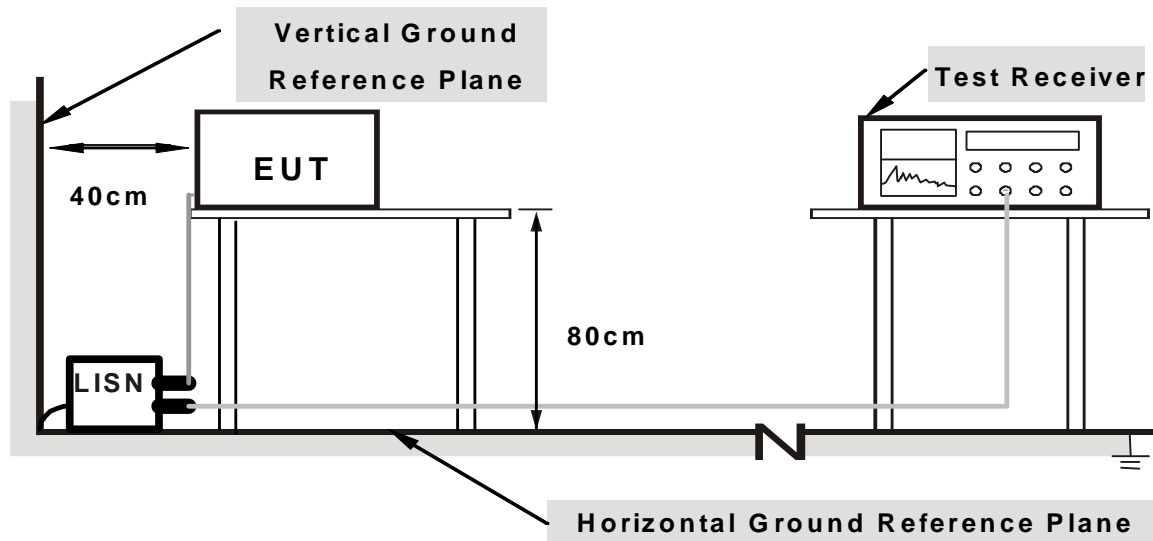
#### 4.1.3 TEST PROCEDURES

- 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) 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. Turn on the power of all equipment.
2. Support units 1 ~ 2 (Notebook Computer, Wireless Access Point) run a test program “Ping.exe” to enable of EUT via one UTP cable and wireless continuously.
3. EUT sends audio and video messages to TV monitor (support unit 3) via video cable and audio cable.
4. EUT sends audio and video messages to monitor (support unit 4) via HDMI cable.

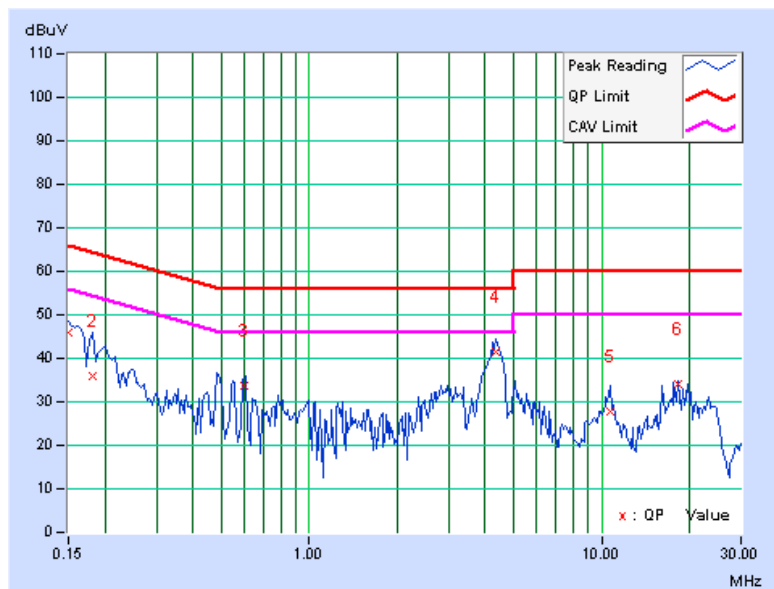
### 4.1.7 TEST RESULTS

#### 802.11g OFDM MODULATION:

<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	0.150	0.03	46.08	38.67	46.11	38.70	66.00	56.00	-19.89	-17.30
2	0.181	0.04	35.99	23.77	36.03	23.81	64.43	54.43	-28.40	-30.62
3	0.597	0.10	33.51	30.43	33.61	30.53	56.00	46.00	-22.39	-15.47
4	4.359	0.21	41.36	27.37	41.57	27.58	56.00	46.00	-14.43	-18.42
5	10.656	0.57	27.29	19.79	27.86	20.36	60.00	50.00	-32.14	-29.64
6	18.242	0.55	33.45	32.05	34.00	32.60	60.00	50.00	-26.00	-17.40

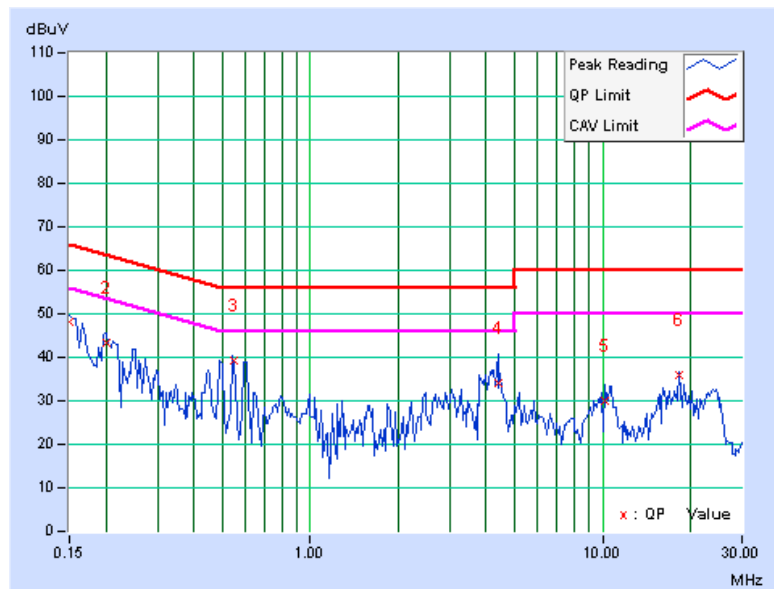
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = 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 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	0.150	0.04	48.16	37.85	48.20	37.89	66.00
2	0.201	0.05	43.28	31.71	43.33	31.76	63.58	53.58	-20.25	-21.82
<b>3</b>	<b>0.545</b>	<b>0.10</b>	<b>38.99</b>	<b>35.24</b>	<b>39.09</b>	<b>35.34</b>	<b>56.00</b>	<b>46.00</b>	<b>-16.91</b>	<b>-10.66</b>
4	4.383	0.23	33.75	21.10	33.98	21.33	56.00	46.00	-22.02	-24.67
5	10.238	0.59	29.26	22.21	29.85	22.80	60.00	50.00	-30.15	-27.20
6	18.242	0.56	35.31	34.02	35.87	34.58	60.00	50.00	-24.13	-15.42

- 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.

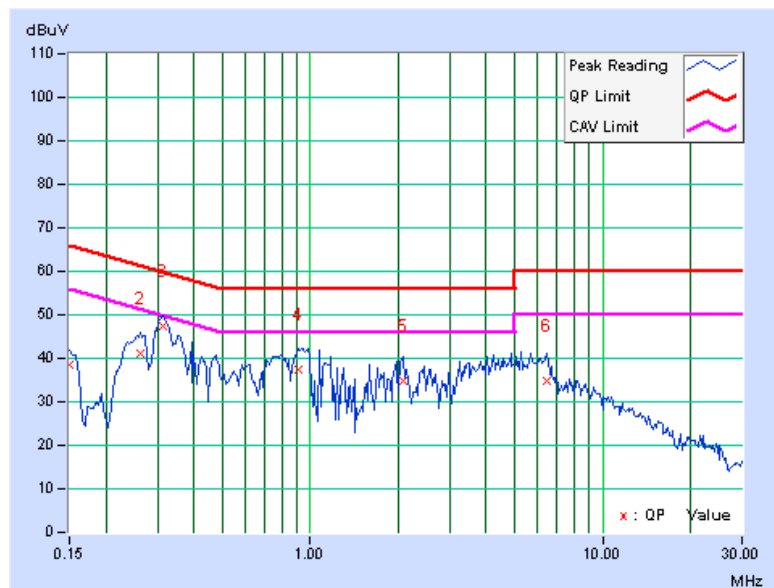


**802.11g OFDM MODULATION:**

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

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	0.150	0.03	38.48	27.72	38.51	27.75	66.00	56.00	-27.49	-28.25
2	0.263	0.04	41.09	27.34	41.13	27.38	61.33	51.33	-20.19	-23.94
3	0.314	0.05	47.20	37.77	47.25	37.82	59.86	49.86	-12.62	-12.05
4	0.912	0.19	37.11	27.06	37.30	27.25	56.00	46.00	-18.70	-18.75
5	2.082	0.23	34.52	23.90	34.75	24.13	56.00	46.00	-21.25	-21.87
6	6.449	0.35	34.63	27.86	34.98	28.21	60.00	50.00	-25.02	-21.79

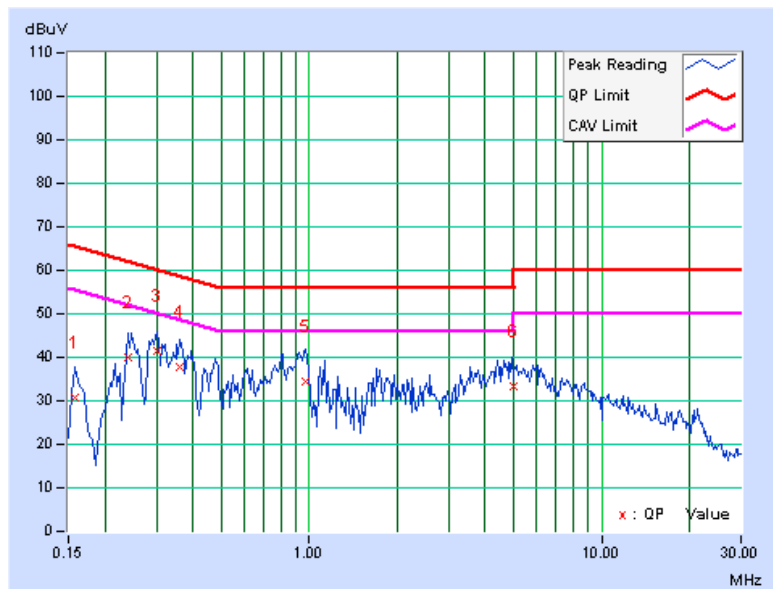
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = 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	0.158	0.05	30.84	13.80	30.89	13.85	65.58	55.58	-34.69	-41.73
2	0.240	0.05	40.04	27.88	40.09	27.93	62.10	52.10	-22.01	-24.17
3	0.302	0.06	41.53	28.12	41.59	28.18	60.18	50.18	-18.59	-22.00
4	0.361	0.06	37.85	24.89	37.91	24.95	58.71	48.71	-20.80	-23.76
5	0.974	0.21	34.12	21.95	34.33	22.16	56.00	46.00	-21.67	-23.84
6	5.000	0.27	33.18	25.51	33.45	25.78	56.00	46.00	-22.55	-20.22

- 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

##### Below 1GHz test (Test date: Aug. 23, 2010)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 02, 2010	Aug. 01, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Sep. 30, 2009	Sep. 29, 2010
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 30, 2009	Sep. 29, 2010
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_ V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.  
3. The test was performed in 966 Chamber No. G.  
4. The FCC Site Registration No. is 966073.  
5. The VCCI Site Registration No. is G-137.  
6. The CANADA Site Registration No. is IC 7450H-2.



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**Above 1GHz test (Test date: Aug. 24 to 27, 2010)**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520310	Aug. 17, 2010	Aug. 16, 2011
Agilent Signal Generator	N5181A	MY49060347	July 30, 2010	July 29, 2011
LIG NEX1 Test Receiver	ER-265	L09068005	Aug. 31, 2009	Aug. 30, 2010
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-04	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02465	Mar. 01, 2010	Feb. 28, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-361	Sep. 30, 2009	Sep. 29, 2010
AISI Horn_Antenna	AIH.8018	0000220091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 30, 2009	Sep. 29, 2010
RF CABLE	NA	RF104-205 RF104-207 RF104-208	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHHCAB_001	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.  
3. The test was performed in 966 Chamber No. H.  
4. The FCC Site Registration No. is 797305.  
5. The CANADA Site Registration No. is IC 7450H-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 10 meters Semi-anechoic 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 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 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.

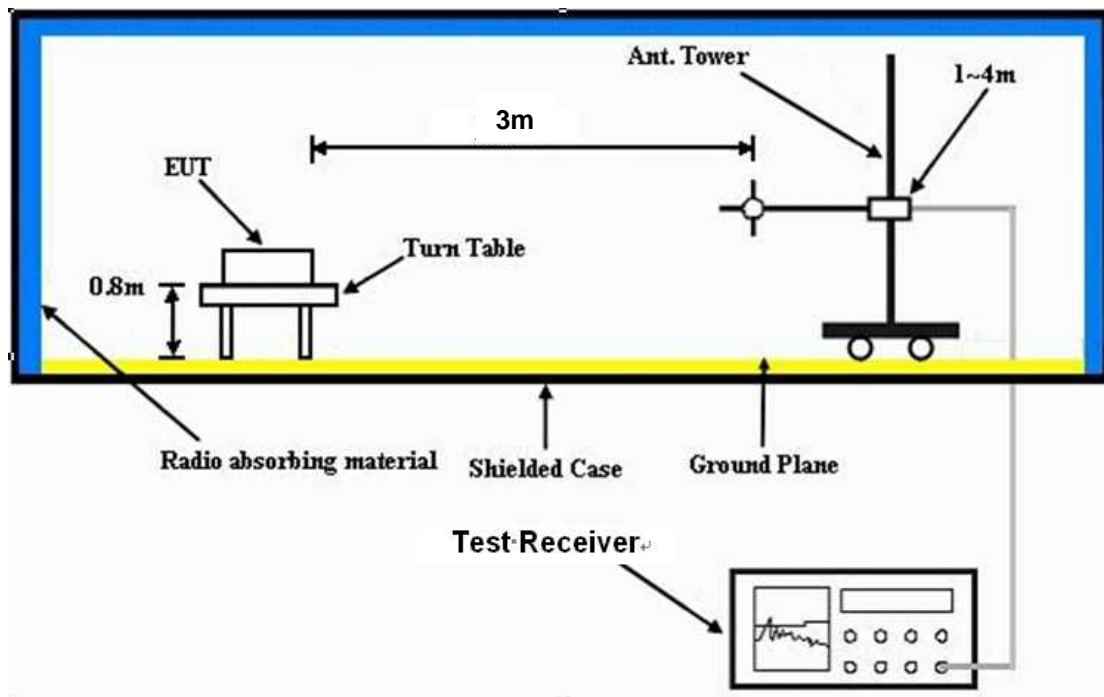
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and 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

1. Turn on the power of all equipment.
2. Support unit 1 (Notebook Computer) runs a test program “Telnet Broadcom command” to enable of EUT via UTP cable continuously.



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## 4.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	28deg. C, 72%RH 1013 hPa	TESTED BY	Rex Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	114.08	34.5 QP	43.5	-9.0	1.25 H	277	23.03	11.50
2	250.03	39.9 QP	46.0	-6.1	1.25 H	304	26.75	13.19
3	327.24	34.8 QP	46.0	-11.3	1.75 H	56	18.96	15.79
4	374.97	40.6 QP	46.0	-5.4	2.25 H	49	23.75	16.81
5	908.46	41.1 QP	46.0	-4.9	1.50 H	57	14.75	26.31
6	1000.00	49.6 QP	54.0	-4.4	1.25 H	321	22.54	27.08
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	37.50	39.2 QP	40.0	-0.8	1.00 V	256	25.61	13.57
2	196.98	38.0 QP	43.5	-5.5	2.00 V	0	27.28	10.76
3	231.32	41.2 QP	46.0	-4.8	1.75 V	121	29.00	12.21
4	374.97	42.3 QP	46.0	-3.7	1.50 V	201	25.48	16.81
5	480.00	40.6 QP	46.0	-5.4	1.00 V	351	21.36	19.23
6	1000.00	48.2 QP	54.0	-5.8	1.50 V	0	21.11	27.08

- 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.



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**ABOVE 1GHz WORST-CASE DATA**

**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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

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	58.9 PK	74.0	-15.1	1.00 H	255	27.66	31.24
2	2390.00	51.2 AV	54.0	-2.8	1.00 H	255	19.96	31.24
3	*2412.00	108.8 PK			1.01 H	250	77.50	31.30
4	*2412.00	106.3 AV			1.01 H	250	75.00	31.30
5	4824.00	53.1 PK	74.0	-20.9	1.00 H	122	13.67	39.43
6	4824.00	39.1 AV	54.0	-14.9	1.00 H	122	-0.33	39.43
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	58.0 PK	74.0	-16.0	1.06 V	300	26.76	31.24
2	2390.00	49.6 AV	54.0	-4.4	1.06 V	300	18.36	31.24
3	*2412.00	105.8 PK			1.00 V	298	74.50	31.30
4	*2412.00	103.6 AV			1.00 V	298	72.30	31.30
5	4824.00	46.9 PK	74.0	-27.1	1.26 V	88	7.47	39.43
6	4824.00	36.3 AV	54.0	-17.7	1.26 V	88	-3.13	39.43

- 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

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	114.2 PK			1.00 H	244	82.84	31.36
2	*2437.00	109.0 AV			1.00 H	244	77.64	31.36
3	4874.00	49.1 PK	74.0	-24.9	1.00 H	122	9.46	39.64
4	4874.00	37.6 AV	54.0	-16.4	1.00 H	122	-2.04	39.64
5	7311.00	58.1 PK	74.0	-15.9	1.27 H	47	14.01	44.09
6	7311.00	52.2 AV	54.0	-1.8	1.27 H	47	8.11	44.09
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	109.3 PK			1.01 V	288	77.94	31.36
2	*2437.00	106.4 AV			1.01 V	288	75.04	31.36
3	4874.00	47.1 PK	74.0	-26.9	1.30 V	90	7.46	39.64
4	4874.00	36.9 AV	54.0	-17.1	1.30 V	90	-2.74	39.64
5	7311.00	55.2 PK	74.0	-18.8	1.14 V	294	11.11	44.09
6	7311.00	42.8 AV	54.0	-11.2	1.14 V	294	-1.29	44.09

- 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

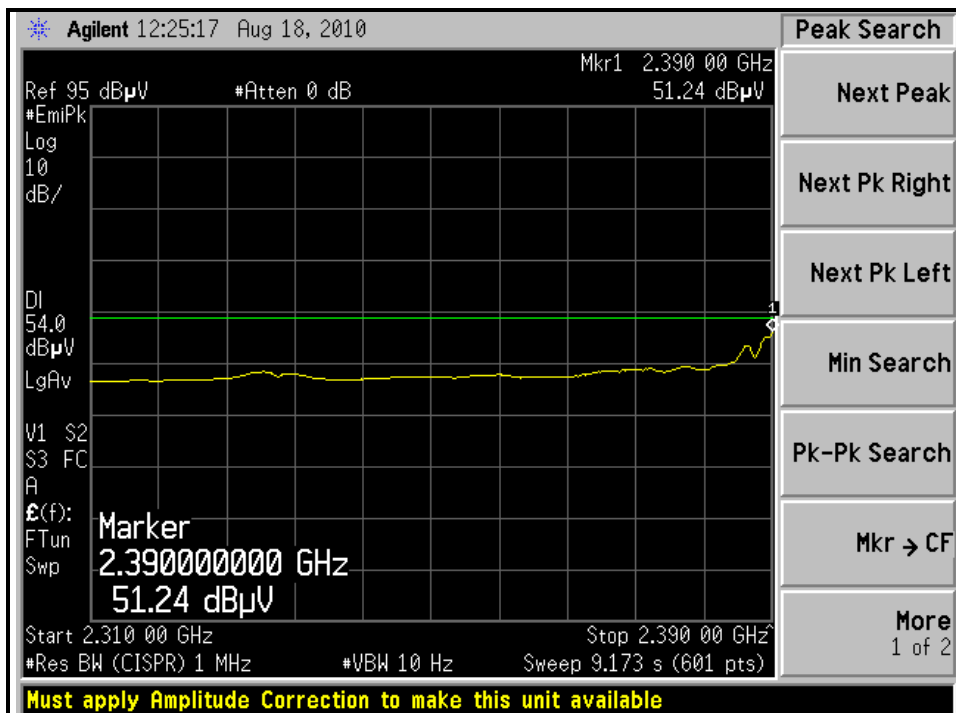
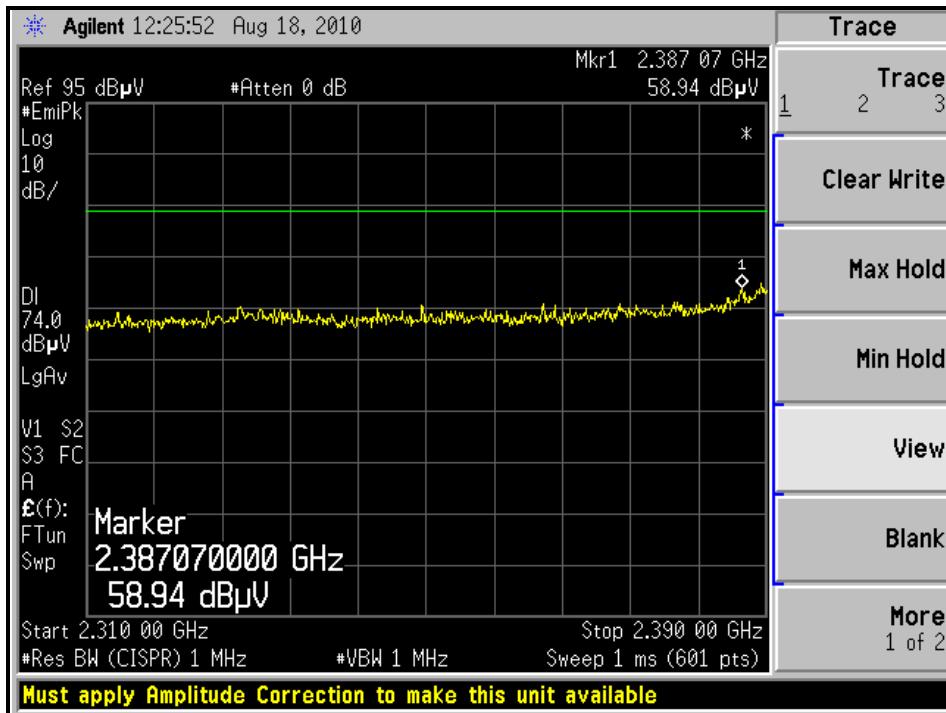
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.6 PK			1.00 H	242	77.14	31.43
2	*2462.00	106.3 AV			1.00 H	242	74.83	31.43
3	2483.50	61.3 PK	74.0	-12.7	1.00 H	242	29.80	31.48
4	2483.50	53.5 AV	54.0	-0.5	1.00 H	242	22.02	31.48
5	4924.00	53.5 PK	74.0	-20.5	1.00 H	248	13.65	39.85
6	4924.00	39.2 AV	54.0	-14.8	1.00 H	248	-0.65	39.85
7	7386.00	52.9 PK	74.0	-21.1	1.00 H	7	8.71	44.19
8	7386.00	40.0 AV	54.0	-14.0	1.00 H	7	-4.19	44.19
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	106.1 PK			1.01 V	299	74.67	31.43
2	*2462.00	103.9 AV			1.01 V	299	72.47	31.43
3	2483.50	59.7 PK	74.0	-14.3	1.00 V	302	28.22	31.48
4	2483.50	51.4 AV	54.0	-2.6	1.00 V	302	19.92	31.48
5	4924.00	46.5 PK	74.0	-27.5	1.29 V	88	6.65	39.85
6	4924.00	36.3 AV	54.0	-17.7	1.29 V	88	-3.55	39.85
7	7386.00	51.9 PK	74.0	-22.1	1.46 V	77	7.71	44.19
8	7386.00	38.2 AV	54.0	-15.8	1.46 V	77	-5.99	44.19

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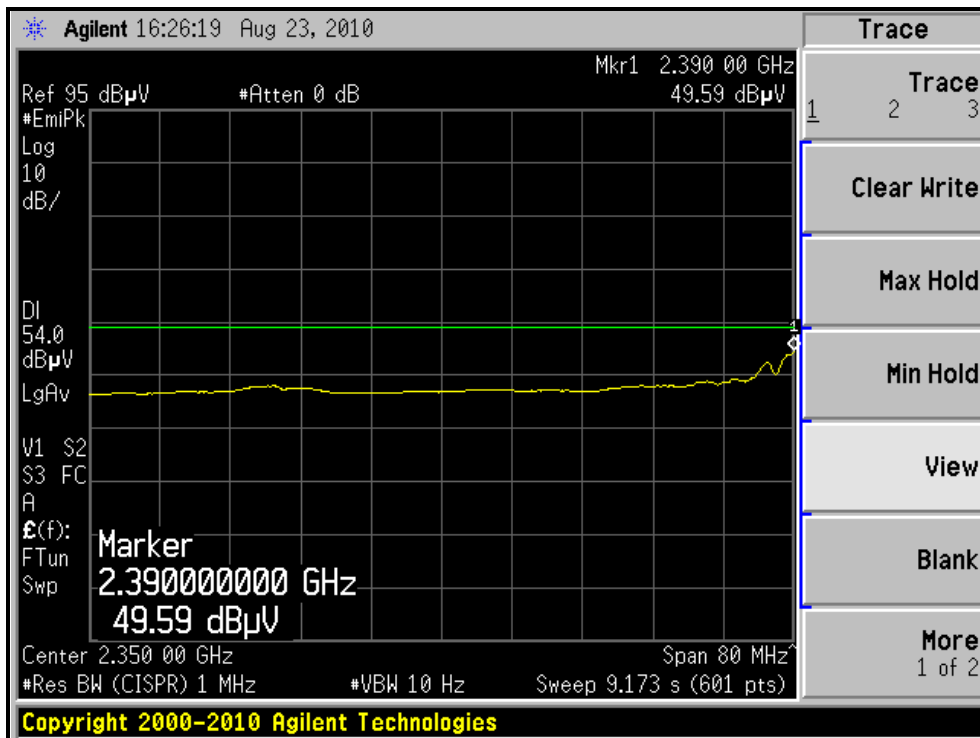
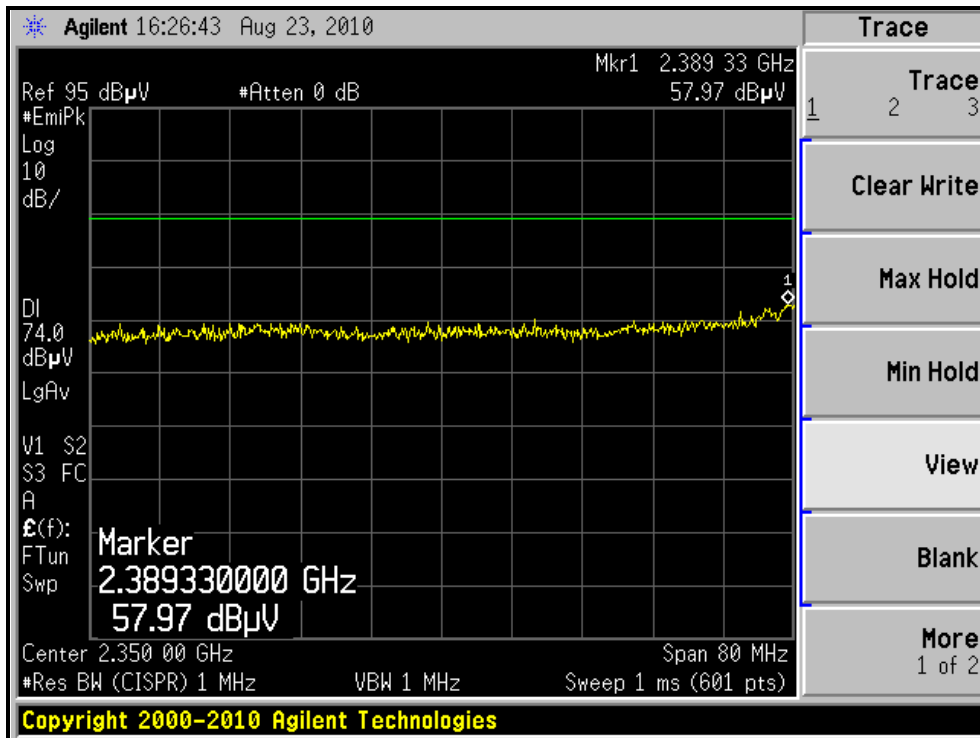
RESTRICTED BANDEDGE (802.11b MODE, CH1, HORIZONTAL)





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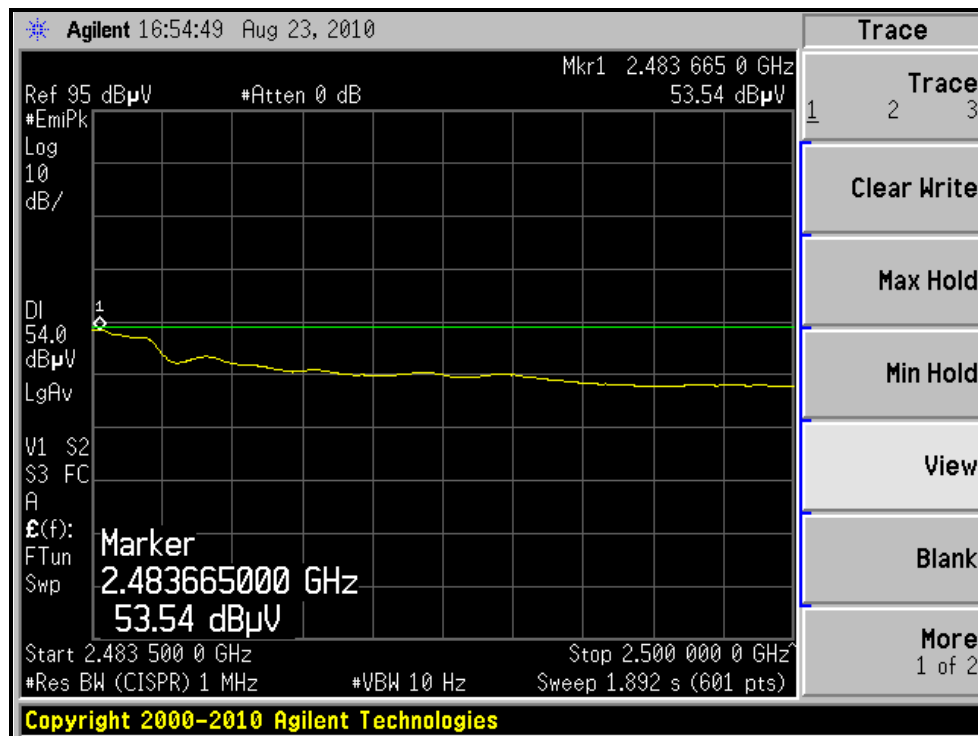
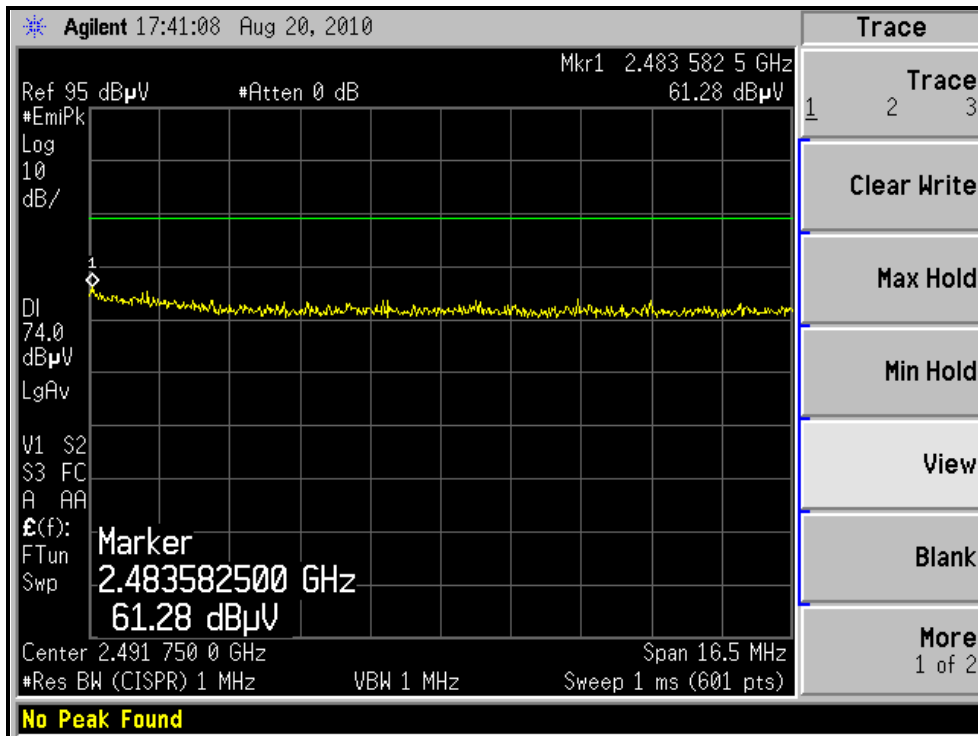
### RESTRICTED BANDEDGE (802.11b MODE, CH1, VERTICAL )





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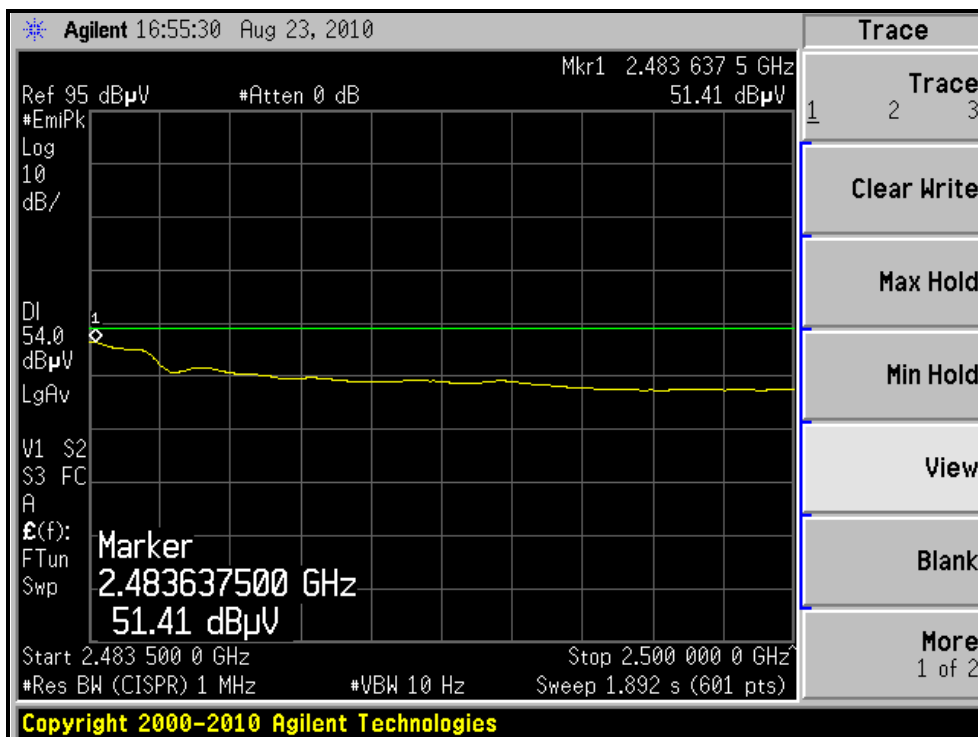
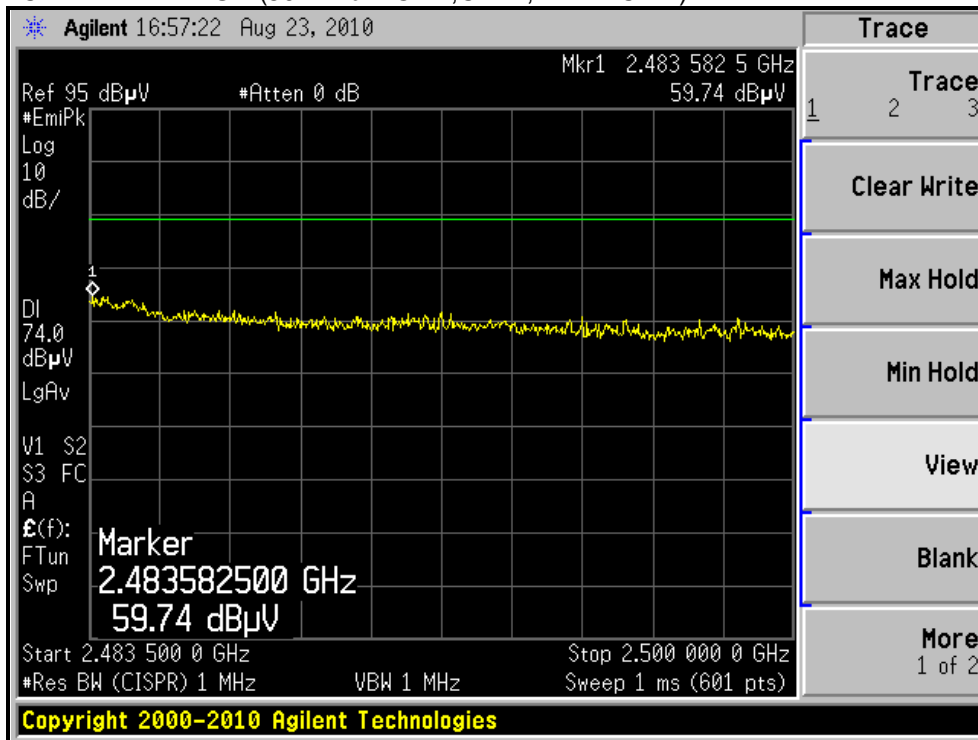
RESTRICTED BANDEDGE (802.11b MODE, CH11, HORIZONTAL )





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





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**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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

**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	*2412.00	108.2 PK			1.01 H	249	76.90	31.30
2	*2412.00	93.0 AV			1.01 H	249	61.7	31.30
3	2390.00	72.6 PK	74.00	-1.4	1.00 H	249	41.36	31.24
4	2390.00	53.8 AV	54.00	-0.2	1.00 H	249	22.56	31.24
5	4824.00	47.3 PK	74.00	-26.7	1.03 H	23	7.87	39.43
6	4824.00	36.5 AV	54.00	-17.5	1.03 H	23	-2.93	39.43

**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	62.3 PK	74.00	-11.2	1.01 V	291	31.53	31.24
2	2390.00	49.4 AV	54.00	-4.6	1.01 V	291	18.16	31.24
3	*2412.00	102.0 PK			1.00 V	300	70.70	31.30
4	*2412.00	85.7 AV			1.00 V	300	54.40	31.30
5	4824.00	44.2 PK	74.00	-29.8	1.26 V	95	4.77	39.43
6	4824.00	33.4 AV	54.00	-20.6	1.26 V	95	-6.03	39.43

- 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

**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	2387.20	73.6 PK	74.0	-0.4	1.00 H	245	42.36	31.24
2	2387.20	53.3 AV	54.0	-0.7	1.00 H	245	22.06	31.24
3	*2437.00	118.0 PK			1.00 H	246	86.64	31.36
4	*2437.00	108.3 AV			1.00 H	246	76.94	31.36
5	4874.00	48.9 PK	74.0	-25.1	1.05 H	31	9.26	39.64
6	4874.00	37.2 AV	54.0	-16.8	1.05 H	31	-2.44	39.64
7	7311.00	52.9 PK	74.0	-21.1	1.09 H	70	8.81	44.09
8	7311.00	38.4 AV	54.0	-15.6	1.09 H	70	-5.69	44.09

**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	106.6 PK			1.07 V	340	75.24	31.36
2	*2437.00	97.3 AV			1.07 V	340	65.94	31.36
3	4874.00	45.9 PK	74.0	-28.1	1.26 V	205	6.26	39.64
4	4874.00	36.1 AV	54.0	-17.9	1.26 V	205	-3.54	39.64
5	7311.00	51.9 PK	74.0	-22.1	1.14 V	88	7.81	44.09
6	7311.00	37.4 AV	54.0	-16.6	1.14 V	88	-6.69	44.09

- 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

**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	108.2 PK			1.00 H	247	76.72	31.43
2	*2462.00	98.7 AV			1.00 H	247	67.27	31.43
3	2484.32	68.1 PK	74.0	-5.9	1.00 H	247	36.58	31.48
4	<b>2484.32</b>	<b>53.9 AV</b>	<b>54.0</b>	<b>-0.1</b>	<b>1.00 H</b>	<b>247</b>	<b>22.37</b>	<b>31.48</b>
5	4924.00	48.2 PK	74.0	-25.8	1.06 H	40	8.35	39.85
6	4924.00	36.8 AV	54.0	-17.2	1.06 H	40	-3.05	39.85
7	7386.00	52.4 PK	74.0	-21.6	1.10 H	65	8.21	44.19
8	7386.00	39.7 AV	54.0	-14.3	1.10 H	65	-4.49	44.19

**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	103.2 PK			1.01 V	304	71.77	31.43
2	*2462.00	93.2 AV			1.01 V	304	61.77	31.43
3	2484.20	63.2 PK	74.0	-10.8	1.00 V	297	31.72	31.48
4	2484.20	49.2 AV	54.0	-4.8	1.00 V	297	17.72	31.48
5	4924.00	44.8 PK	74.0	-29.2	1.13 V	147	4.95	39.85
6	4924.00	33.3 AV	54.0	-20.7	1.13 V	147	-6.55	39.85
7	7386.00	51.2 PK	74.0	-22.8	1.20 V	59	7.01	44.19
8	7386.00	37.7 AV	54.0	-16.3	1.20 V	59	-6.49	44.19

**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.

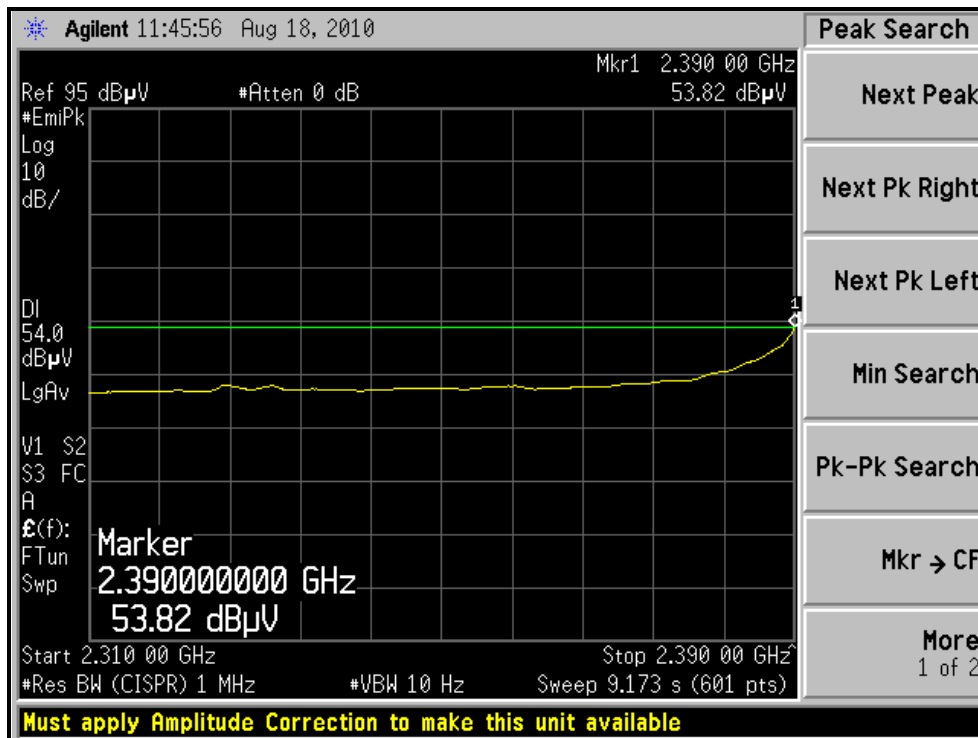
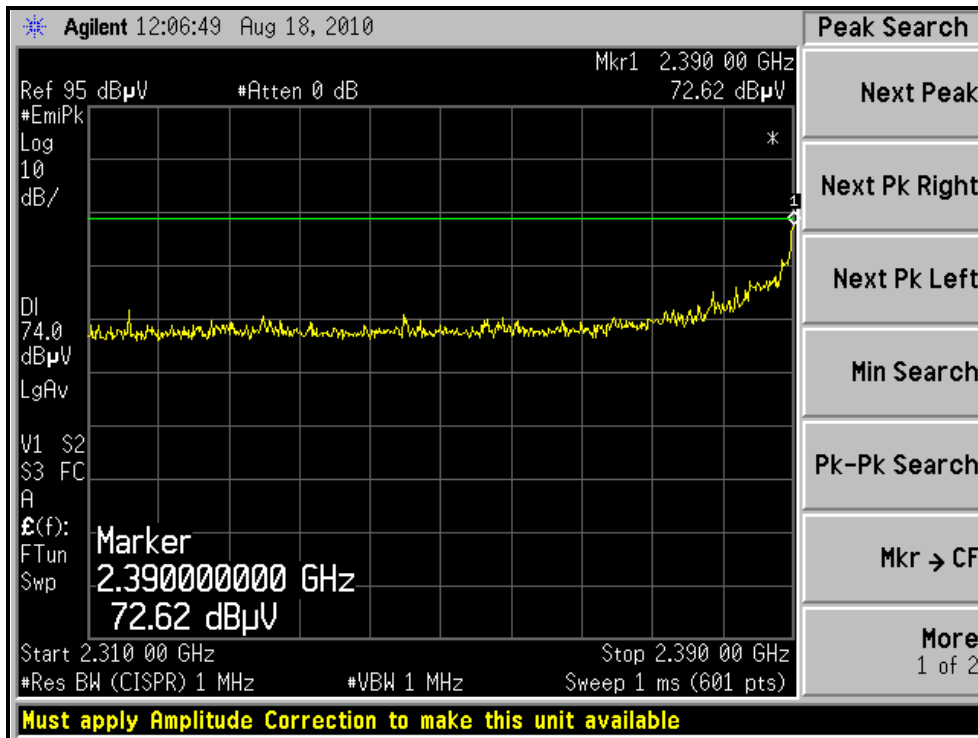
5. “ \* “: Fundamental frequency.





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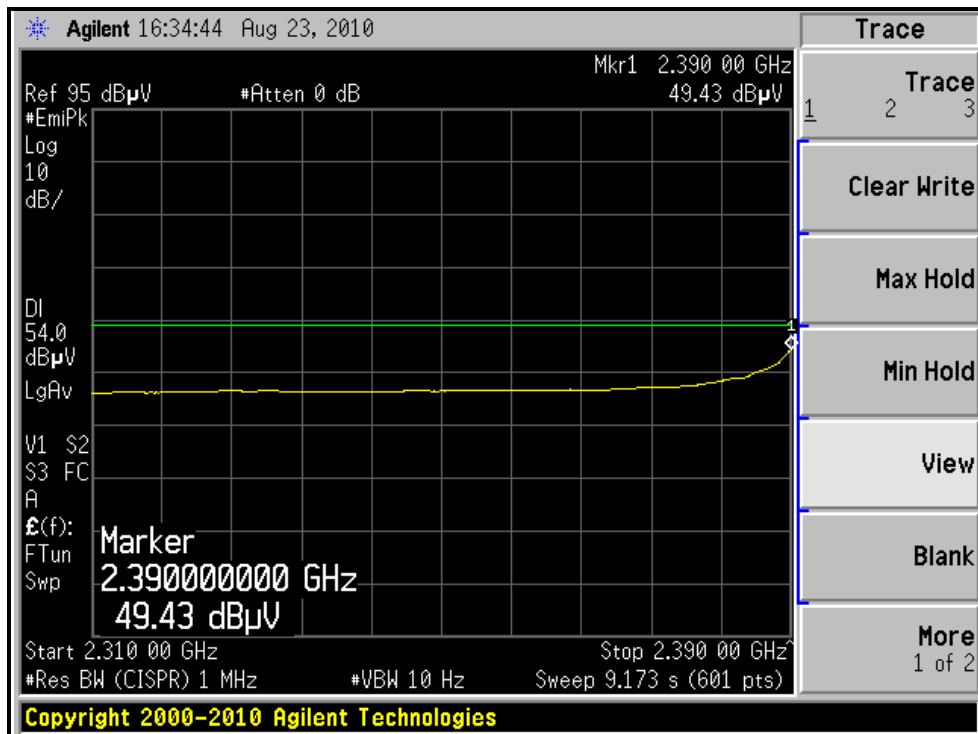
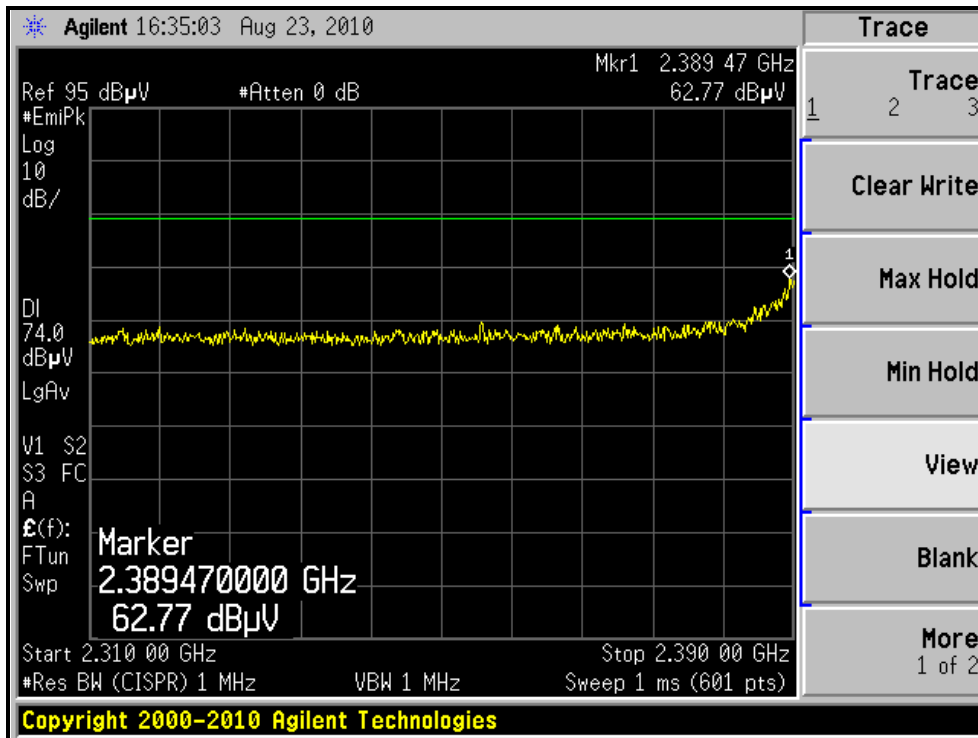
RESTRICTED BANDEDGE (802.11g MODE, CH1, HORIZONTAL )





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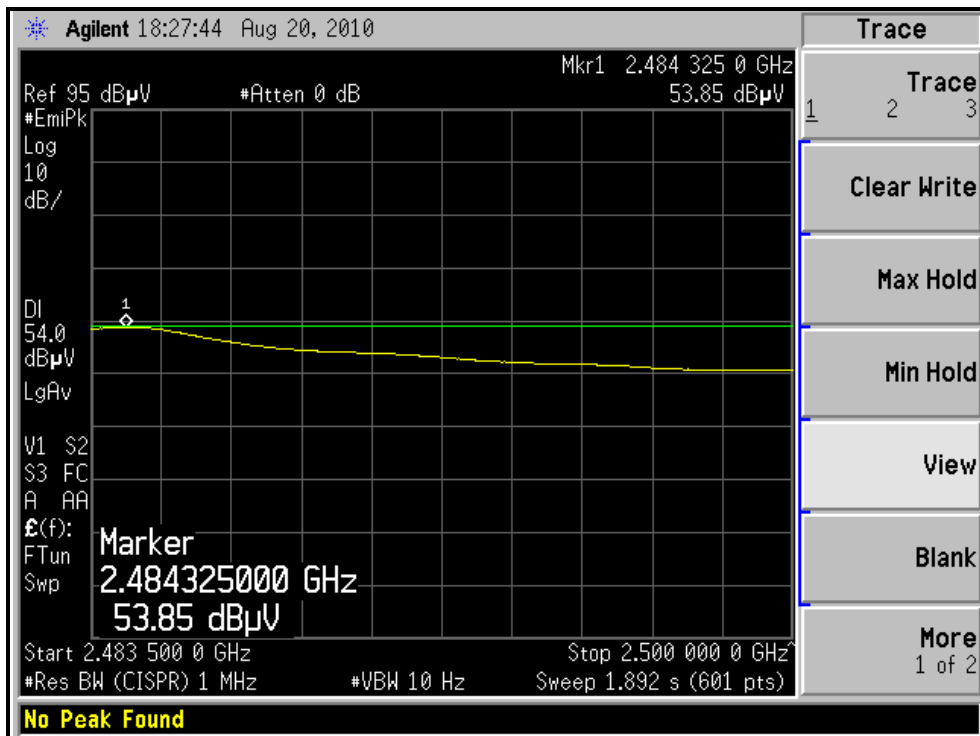
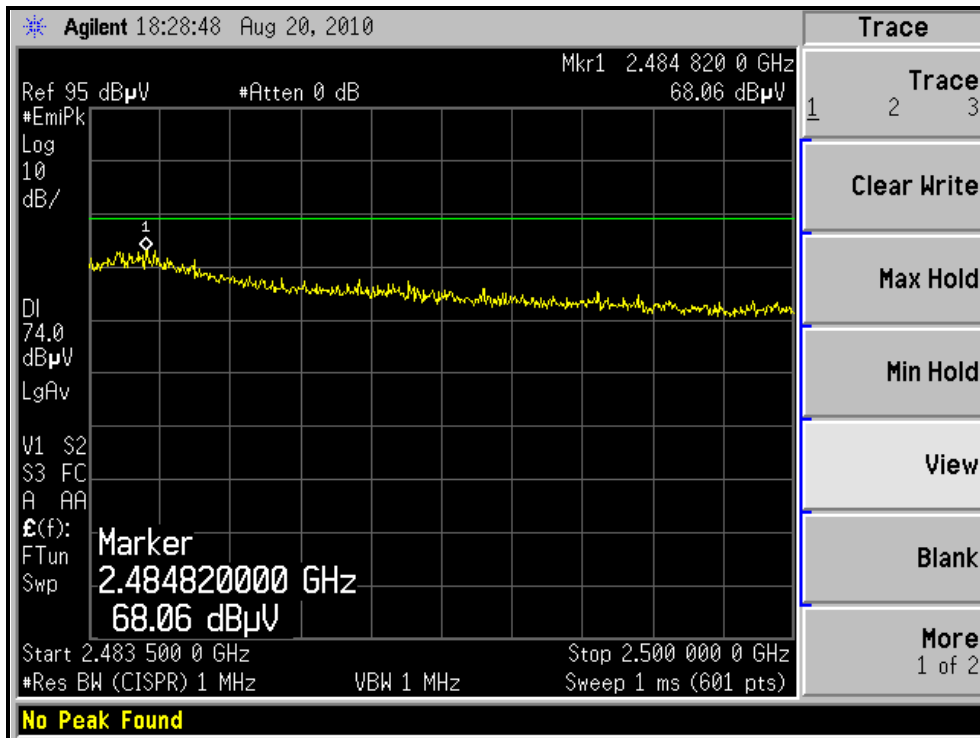
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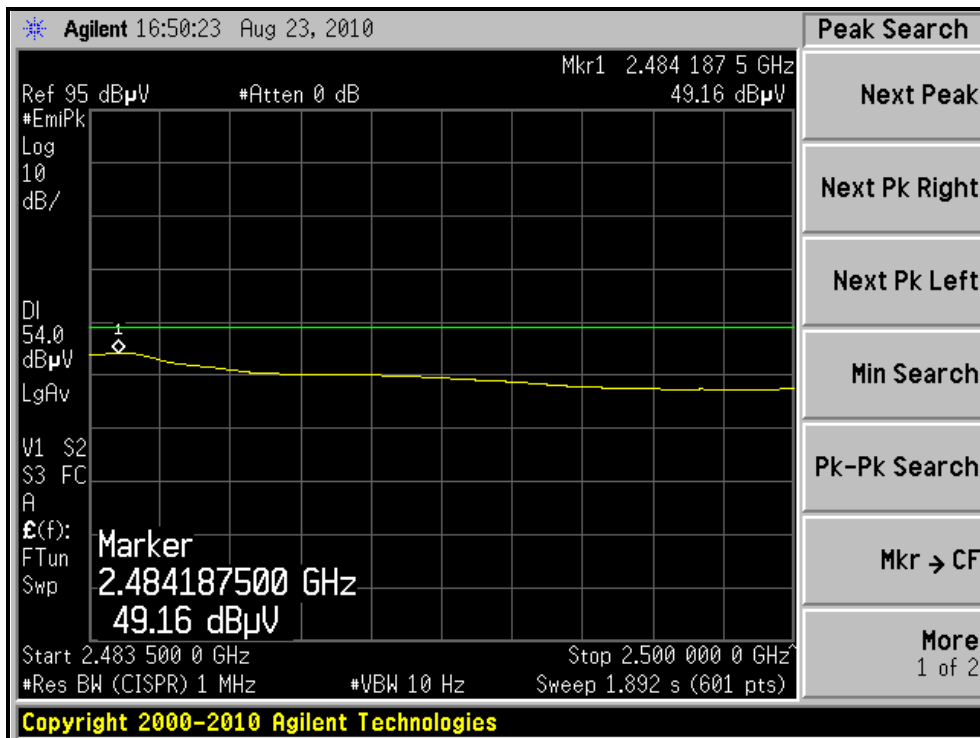
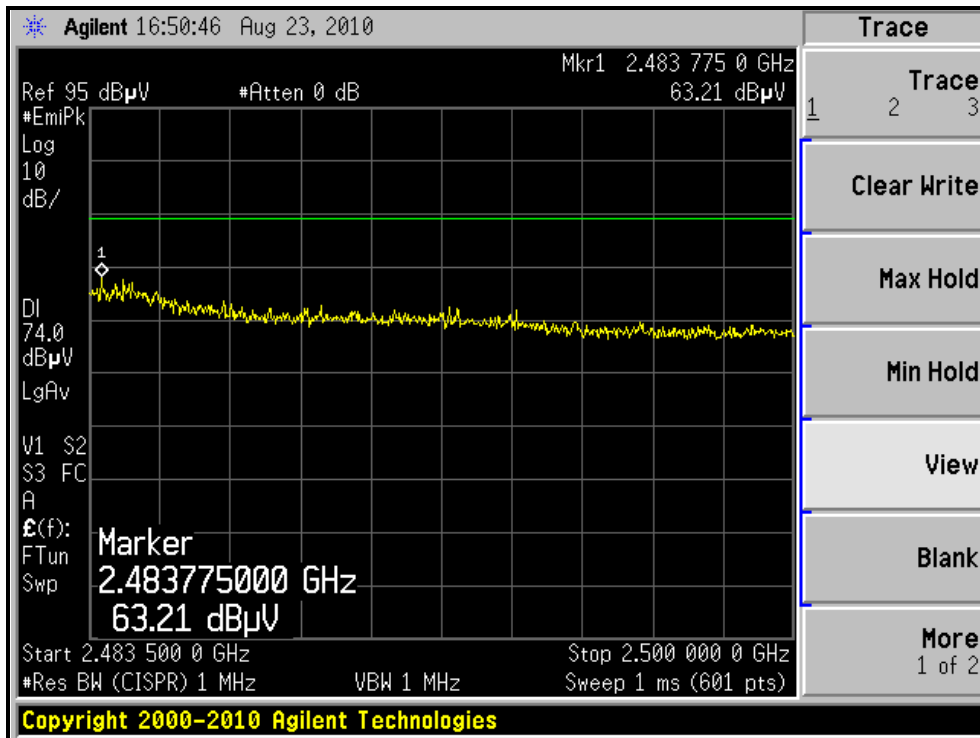
RESTRICTED BANDEDGE (802.11g MODE, CH11, HORIZONTAL )





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RESTRICTED BANDEDGE (802.11g MODE, CH11, VERTICAL )





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### 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

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	73.5 PK	74.0	-0.5	1.00 H	253	42.26	31.24
2	<b>2390.00</b>	<b>53.9 AV</b>	<b>54.0</b>	<b>-0.1</b>	<b>1.00 H</b>	<b>253</b>	<b>22.66</b>	<b>31.24</b>
3	*2412.00	110.1 PK			1.00 H	253	78.80	31.30
4	*2412.00	89.4 AV			1.00 H	253	58.10	31.30
5	4824.00	47.5 PK	74.0	-26.5	1.09 H	30	8.07	39.43
6	4824.00	36.4 AV	54.0	-17.6	1.09 H	30	-3.03	39.43
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	67.9 PK	74.0	-6.1	1.01 V	298	36.66	31.24
2	2390.00	51.1 AV	54.0	-2.9	1.01 V	298	19.86	31.24
3	*2412.00	105.3 PK			1.00 V	301	74.00	31.30
4	*2412.00	86.9 AV			1.00 V	301	55.60	31.30
5	4824.00	44.2 PK	74.0	-29.8	1.40 V	351	4.77	39.43
6	4824.00	33.4 AV	54.0	-20.6	1.40 V	351	-6.03	39.43

- 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.



A D T

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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

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	2388.00	73.5 PK	74.0	-0.5	1.00 H	246	42.26	31.24
2	2388.00	50.4 AV	54.0	-3.6	1.00 H	246	19.16	31.24
3	*2437.00	117.3 PK			1.00 H	245	85.94	31.36
4	*2437.00	106.2 AV			1.00 H	245	74.84	31.36
5	4874.00	46.9 PK	74.0	-27.1	1.28 H	66	7.26	39.64
6	4874.00	37.1 AV	54.0	-16.9	1.28 H	66	-2.54	39.64
7	7311.00	53.9 PK	74.0	-20.1	1.33 H	122	9.81	44.09
8	7311.00	38.9 AV	54.0	-15.1	1.33 H	122	-5.19	44.09
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	105.4 PK			1.01 V	340	74.04	31.36
2	*2437.00	95.1 AV			1.01 V	340	63.74	31.36
3	4874.00	45.5 PK	74.0	-28.5	1.32 V	71	5.86	39.64
4	4874.00	35.3 AV	54.0	-18.7	1.32 V	71	-4.34	39.64
5	7311.00	52.1 PK	74.0	-21.9	1.25 V	269	8.01	44.09
6	7311.00	37.2 AV	54.0	-16.8	1.25 V	269	-6.89	44.09

- 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

**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	110.2 PK			1.01 H	250	78.77	31.43
2	*2462.00	88.1 AV			1.01 H	250	56.67	31.43
3	2483.50	73.9 PK	74.0	-0.1	1.00 H	252	42.42	31.48
4	2483.50	53.9 AV	54.0	-0.1	1.00 H	252	22.42	31.48
5	4924.00	47.9 PK	74.0	-26.1	1.10 H	25	8.05	39.85
6	4924.00	36.8 AV	54.0	-17.2	1.10 H	25	-3.05	39.85
7	7386.00	53.1 PK	74.0	-20.9	1.40 H	111	8.91	44.19
8	7386.00	38.0 AV	54.0	-16.0	1.40 H	111	-6.19	44.19

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

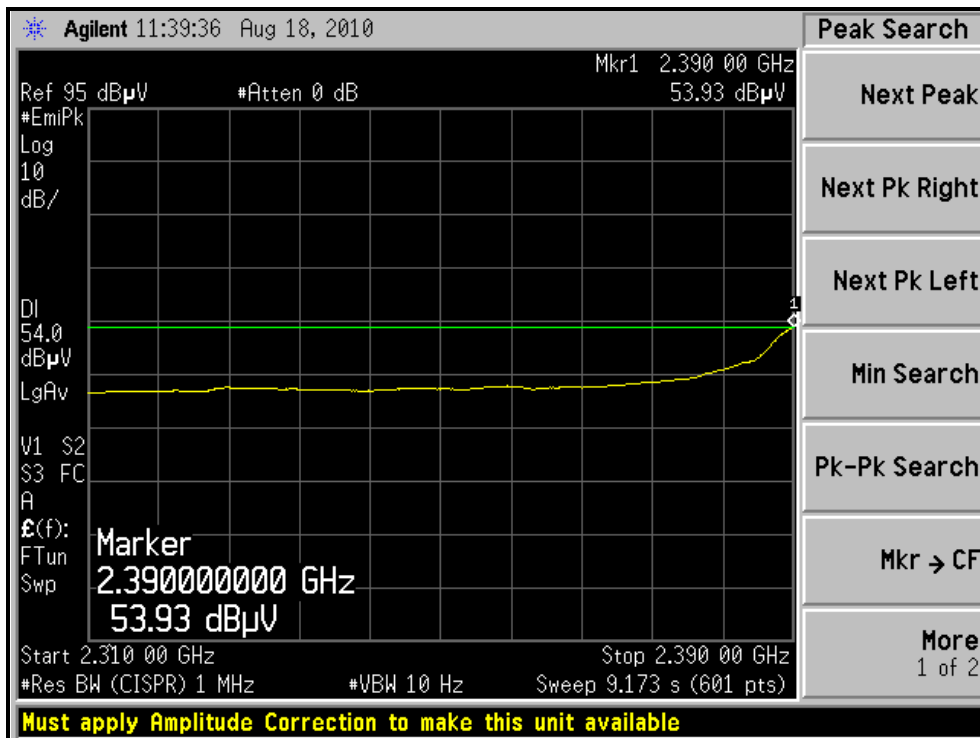
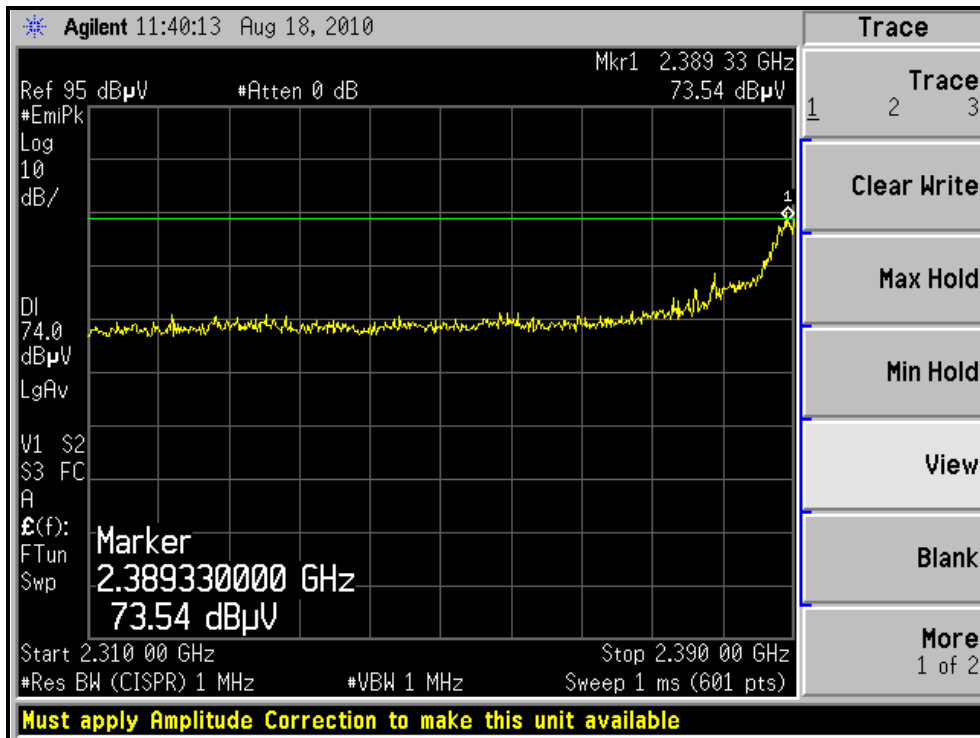
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.9 PK			1.01 V	300	74.47	31.43
2	*2462.00	86.9 AV			1.01 V	300	55.47	31.43
3	2483.70	67.3 PK	74.0	-6.7	1.02 V	291	35.82	31.48
4	2483.70	50.7 AV	54.0	-3.3	1.02 V	291	19.22	31.48
5	4924.00	44.3 PK	74.0	-29.7	1.80 V	57	4.45	39.85
6	4924.00	33.2 AV	54.0	-20.8	1.80 V	57	-6.65	39.85
7	7386.00	51.8 PK	74.0	-22.2	1.69 V	265	7.61	44.19
8	7386.00	37.0 AV	54.0	-17.0	1.69 V	265	-7.19	44.19

- 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 )

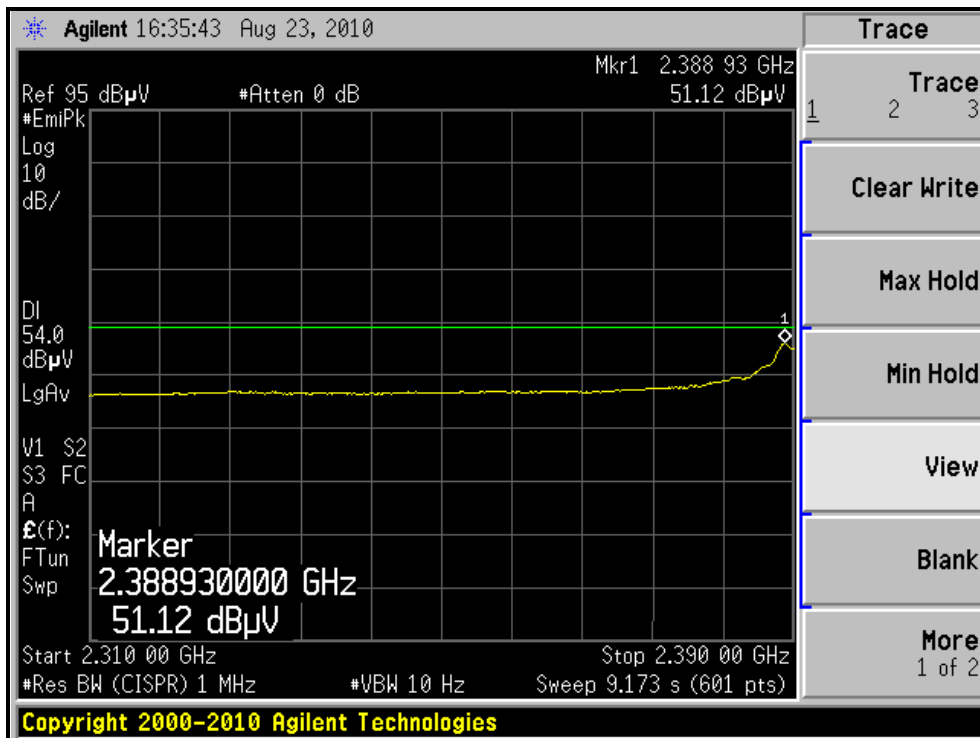
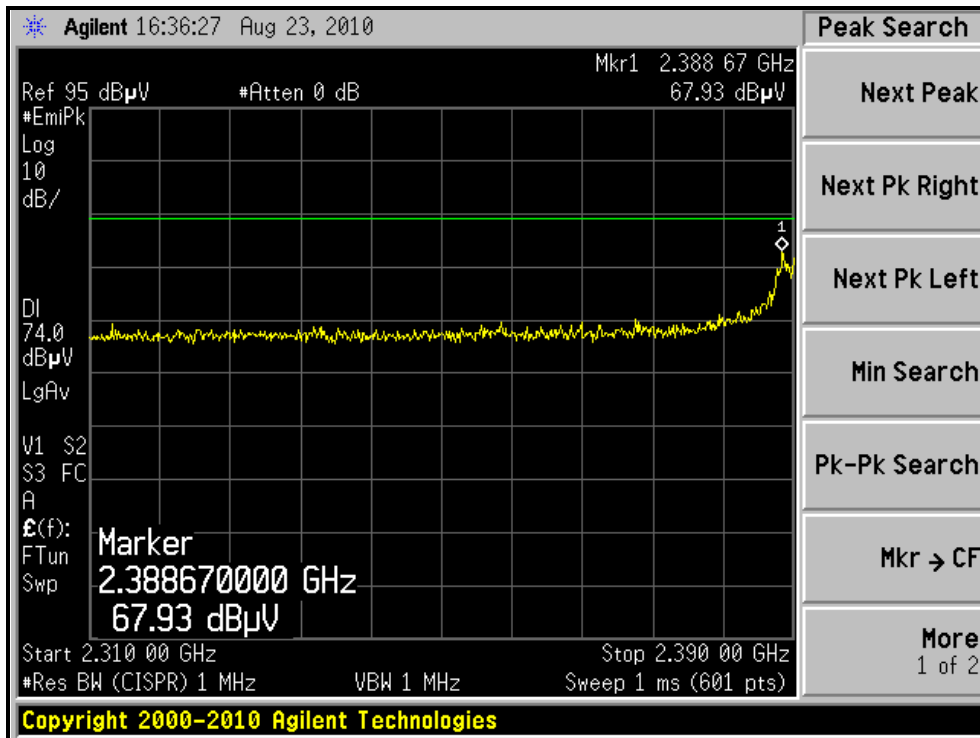






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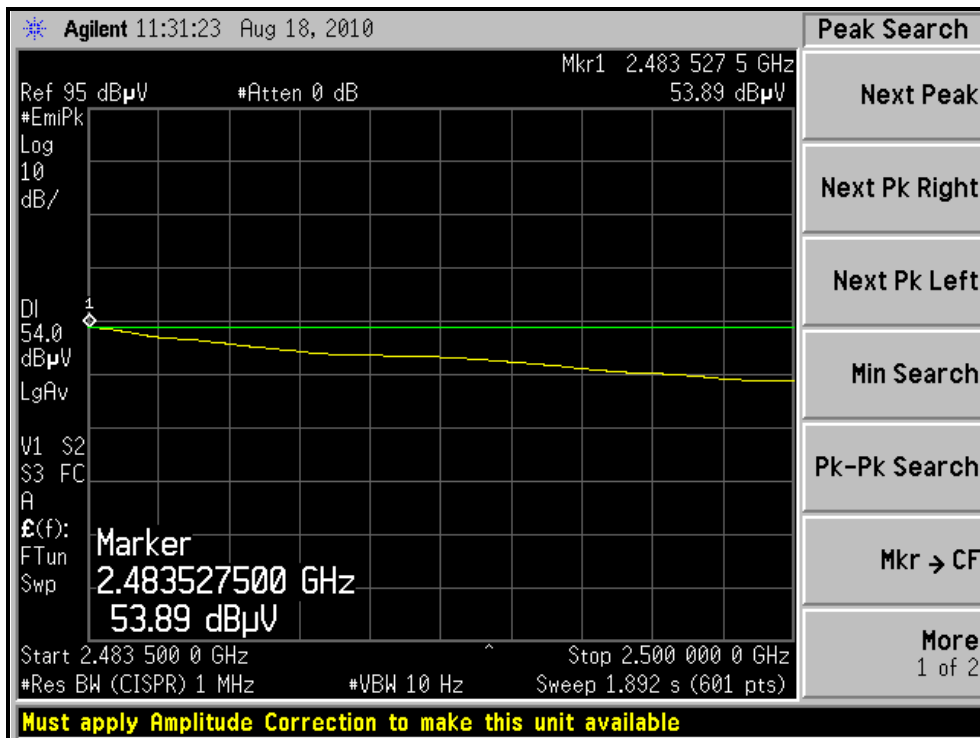
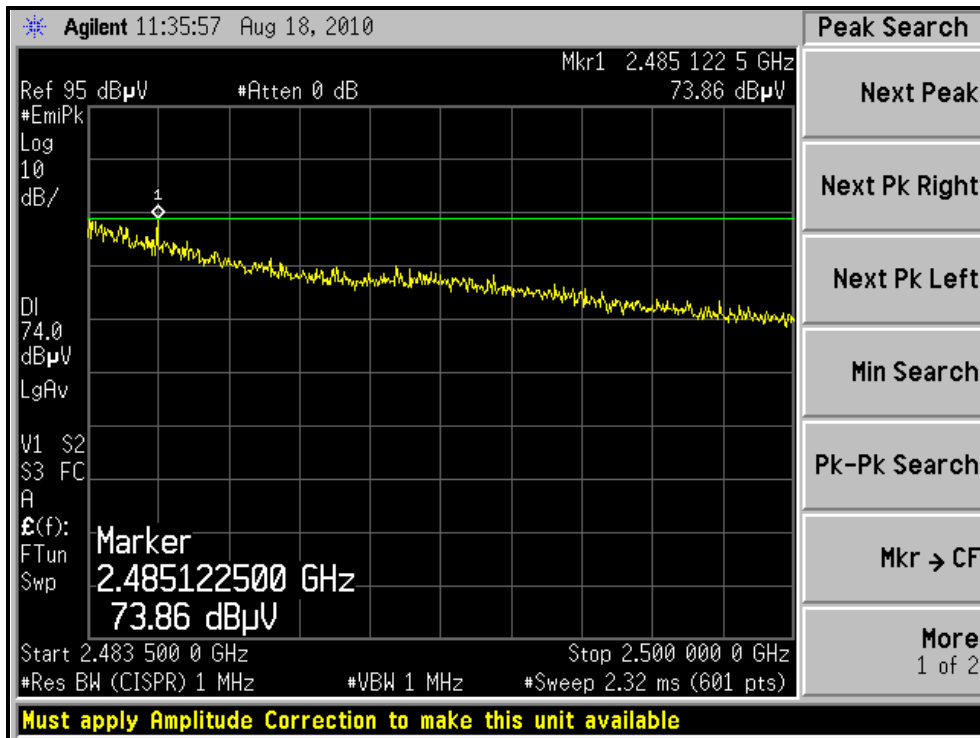
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, VERTICAL )





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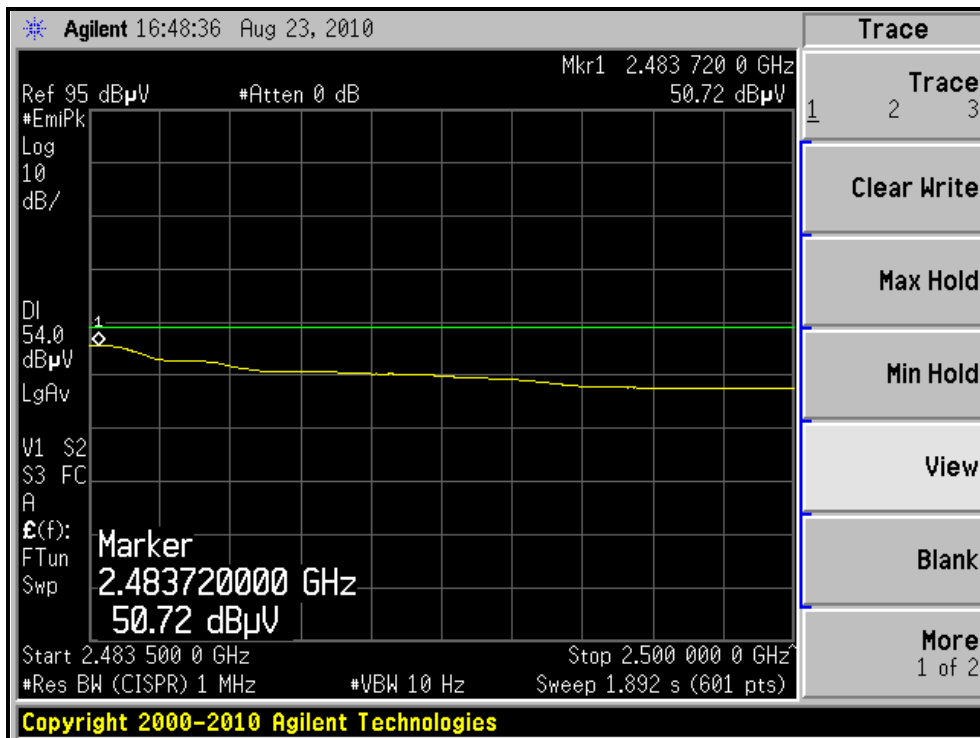
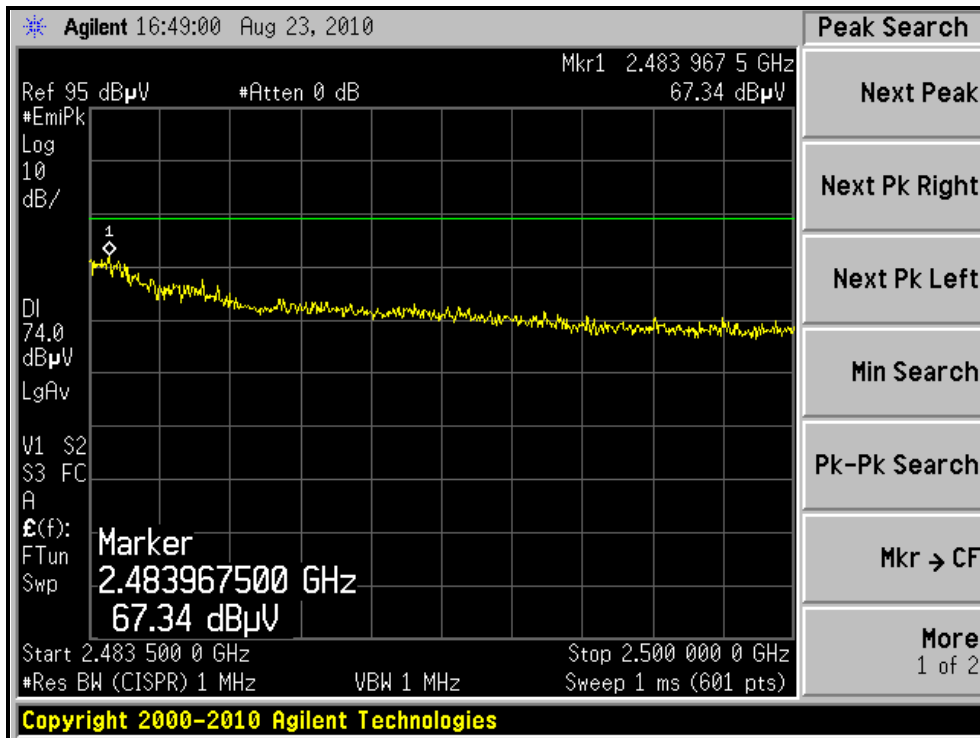
RESTRICTED BANDEDGE (802.11n (20MHz) MODE, CH11, HORIZONTAL )





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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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

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	73.6 PK	74.0	-0.4	1.00 H	250	42.36	31.24
2	2390.00	53.0 AV	54.0	-1.0	1.00 H	250	21.76	31.24
3	*2422.00	105.6 PK			1.01 H	251	74.28	31.32
4	*2422.00	89.4 AV			1.01 H	251	58.08	31.32
5	4844.00	46.9 PK	74.0	-27.1	1.14 H	241	7.39	39.51
6	4844.00	35.9 AV	54.0	-18.1	1.14 H	241	-3.61	39.51
7	7266.00	52.8 PK	74.0	-21.2	1.08 H	69	8.75	44.05
8	7266.00	37.8 AV	54.0	-16.2	1.08 H	69	-6.25	44.05
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	2388.90	66.2 PK	74.0	-7.8	1.01 V	310	34.96	31.24
2	2388.90	50.2 AV	54.0	-3.8	1.01 V	310	18.96	31.24
3	*2422.00	101.8 PK			1.00 V	296	70.48	31.32
4	*2422.00	87.1 AV			1.00 V	296	55.78	31.32
5	4844.00	42.9 PK	74.0	-31.1	1.38 V	65	3.39	39.51
6	4844.00	33.1 AV	54.0	-20.9	1.38 V	65	-6.41	39.51
7	7266.00	51.9 PK	74.0	-22.1	1.42 V	171	7.85	44.05
8	7266.00	37.1 AV	54.0	-16.9	1.42 V	171	-6.95	44.05

- 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 4	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	28deg. C, 67%RH 1013 hPa	TESTED BY	Eric Lee

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	2389.00	73.7 PK	74.0	-0.3	1.00 H	224	42.46	31.24
2	2389.00	53.5 AV	54.0	-0.5	1.00 H	224	22.26	31.24
3	*2437.00	110.2 PK			1.00 H	245	78.84	31.36
4	*2437.00	100.1 AV			1.00 H	245	68.74	31.36
5	4874.00	49.6 PK	74.0	-24.4	1.52 H	44	9.96	39.64
6	4874.00	38.9 AV	54.0	-15.1	1.52 H	44	-0.70	39.64
7	7311.00	55.7 PK	74.0	-18.3	1.09 H	241	11.61	44.09
8	7311.00	39.5 AV	54.0	-14.5	1.09 H	241	-4.50	44.09
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	70.7 PK	74.0	-3.3	1.00 V	333	39.46	31.24
2	2390.00	48.8 AV	54.0	-5.2	1.00 V	333	17.56	31.24
3	*2437.00	101.3 PK			1.03 V	333	69.94	31.36
4	*2437.00	91.5 AV			1.03 V	333	60.14	31.36
5	4874.00	45.1 PK	74.0	-28.9	1.50 V	250	5.46	39.64
6	4874.00	35.5 AV	54.0	-18.5	1.50 V	250	-4.10	39.64
7	7311.00	53.2 PK	74.0	-20.8	1.61 V	333	9.11	44.09
8	7311.00	38.1 AV	54.0	-15.9	1.61 V	333	-5.99	44.09

- 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	27deg. C, 74%RH 1013 hPa	TESTED BY	Eric Lee

**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	106.7 PK			1.00 H	254	75.30	31.40
2	*2452.00	90.5 AV			1.00 H	254	59.07	31.40
3	2489.90	73.5 PK	74.0	-0.5	1.00 H	253	42.01	31.49
4	2489.90	53.3 AV	54.0	-0.7	1.00 H	253	21.81	31.49
5	4904.00	47.2 PK	74.0	-26.8	1.20 H	83	7.43	39.77
6	4904.00	35.8 AV	54.0	-18.2	1.20 H	83	-3.97	39.77
7	7356.00	53.4 PK	74.0	-20.6	1.14 H	69	9.25	44.15
8	7356.00	37.5 AV	54.0	-16.5	1.14 H	69	-6.65	44.15

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

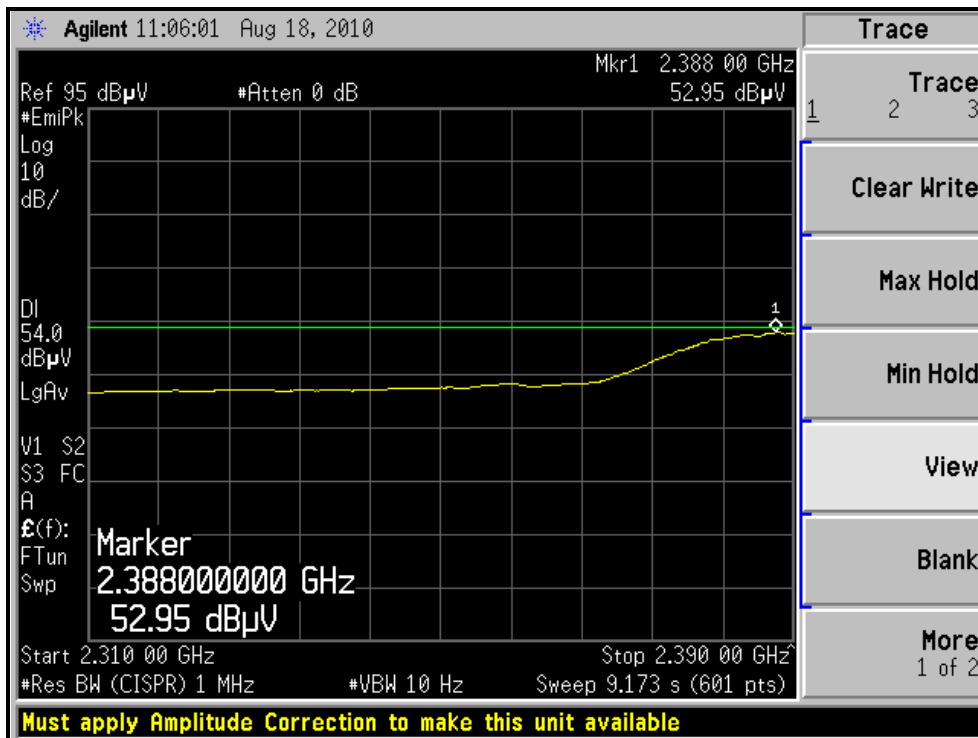
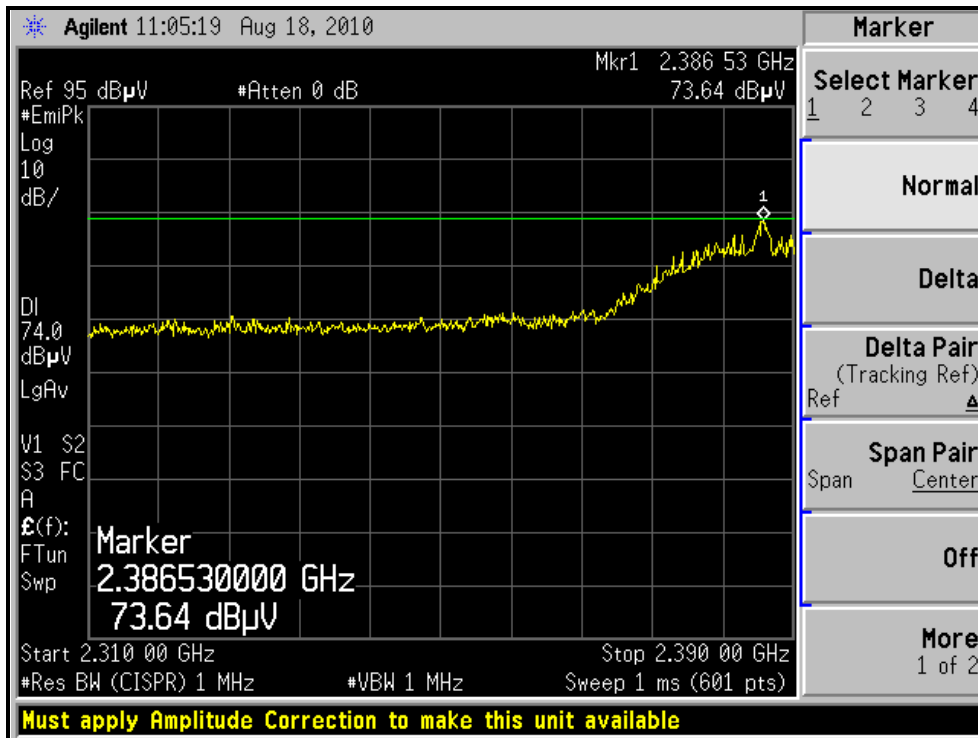
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	101.9 PK			1.02 V	311	70.50	31.40
2	*2452.00	87.7 AV			1.02 V	311	56.28	31.40
3	2483.80	64.8 PK	74.0	-9.2	1.01 V	304	33.32	31.48
4	2483.80	50.3 AV	54.0	-3.7	1.01 V	304	18.82	31.48
5	4904.00	42.8 PK	74.0	-31.2	1.36 V	111	3.03	39.77
6	4904.00	33.3 AV	54.0	-20.7	1.36 V	111	-6.47	39.77
7	7356.00	52.5 PK	74.0	-21.5	1.08 V	242	8.35	44.15
8	7356.00	37.3 AV	54.0	-16.7	1.08 V	242	-6.85	44.15

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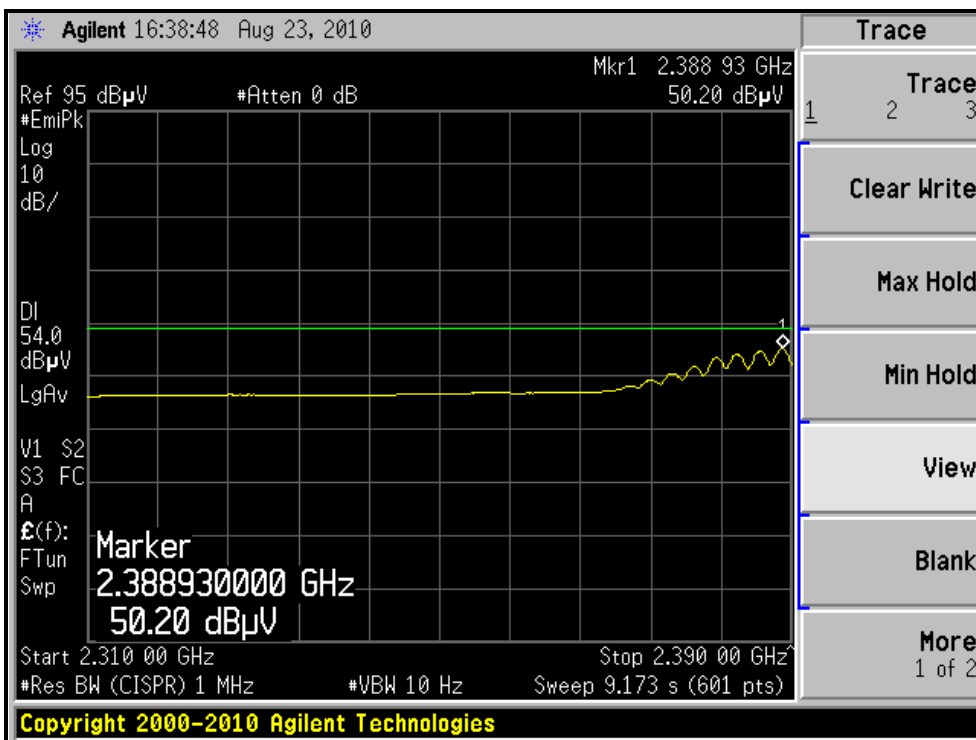
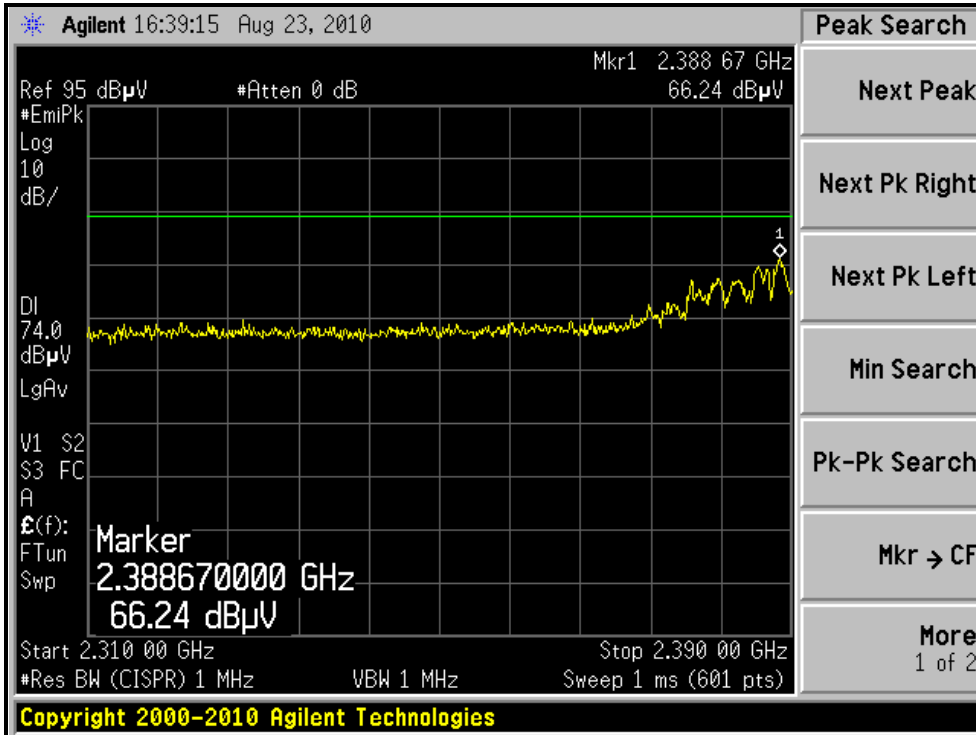
RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH1, HORIZONTAL )





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

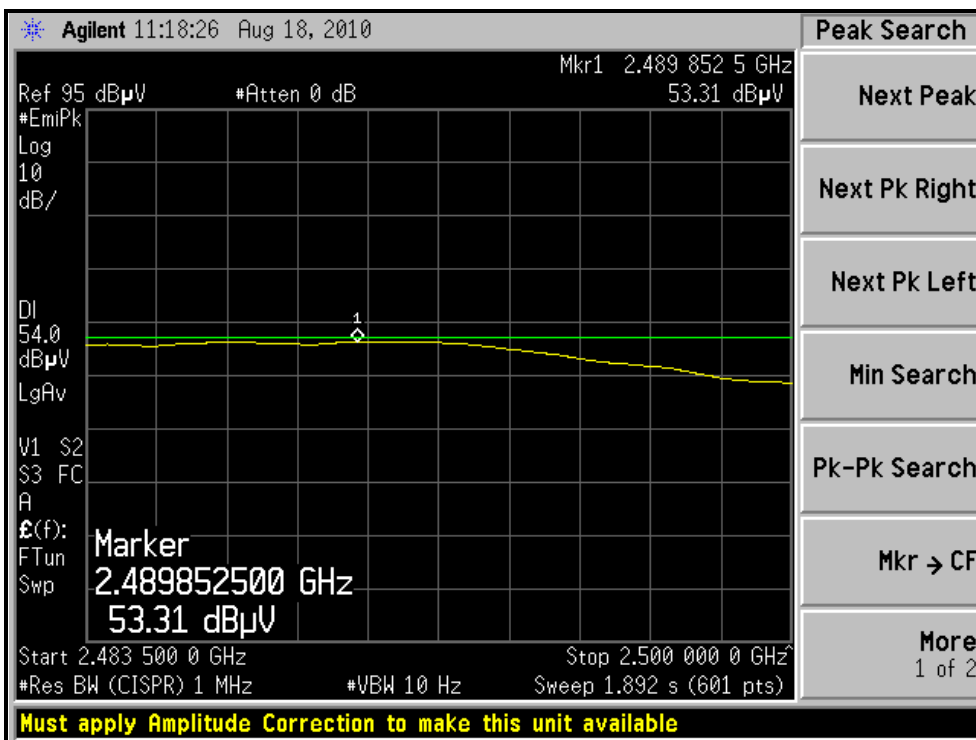
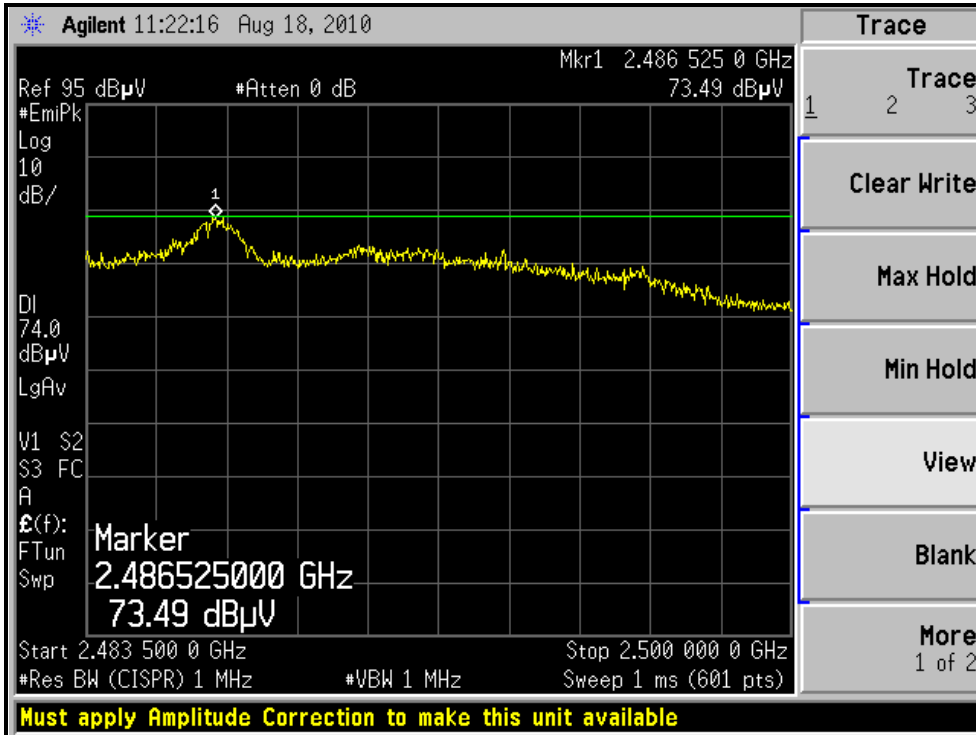






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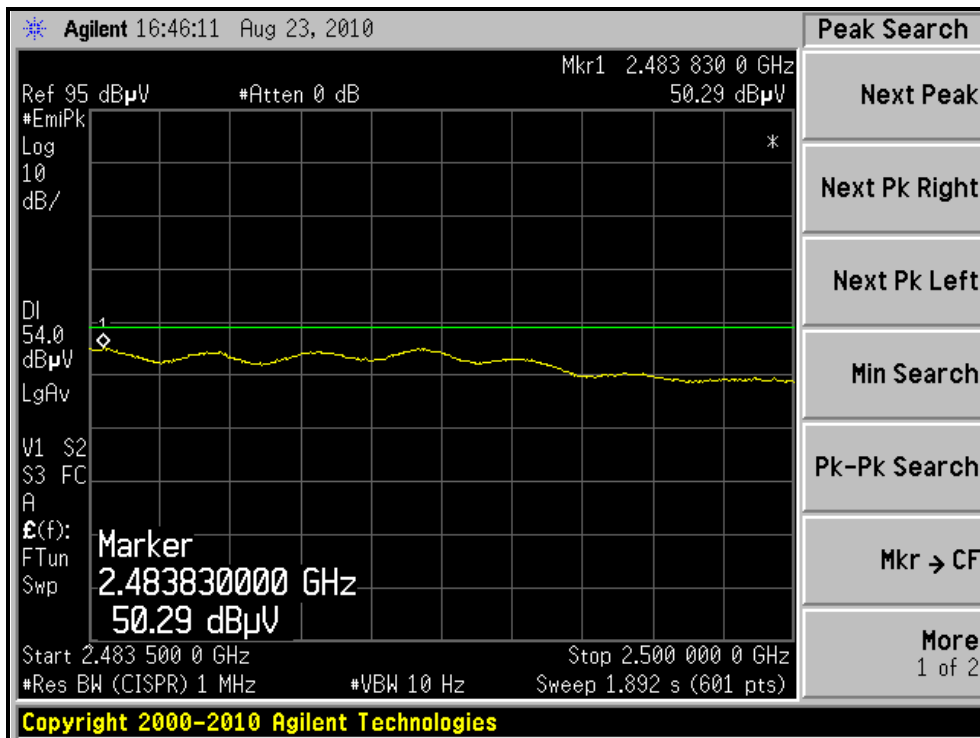
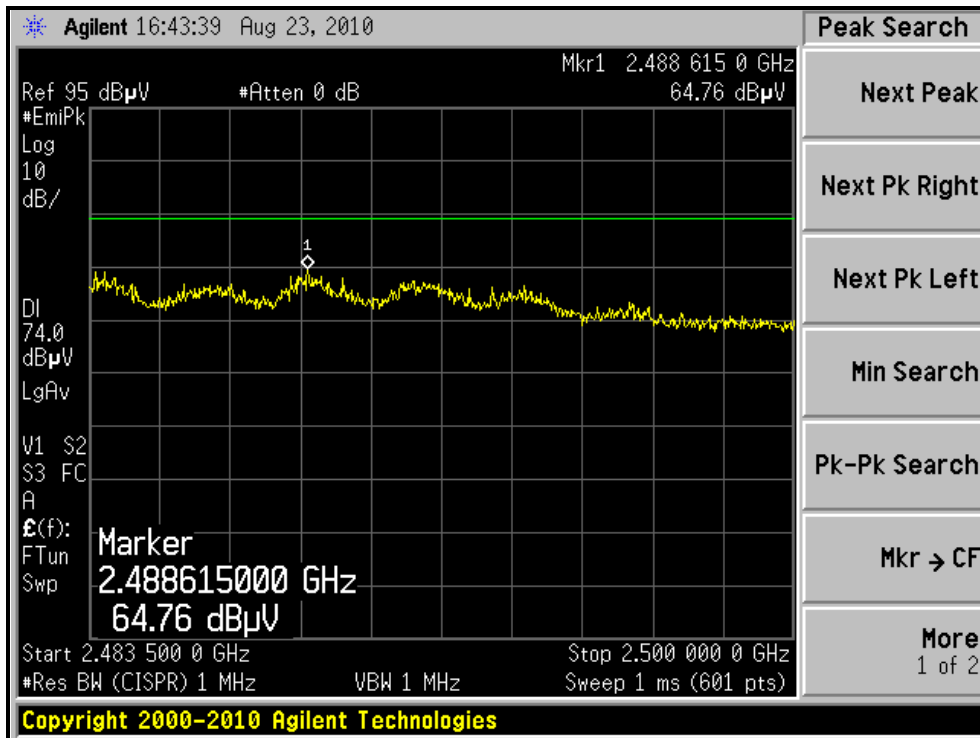
RESTRICTED BANDEDGE (802.11n (40MHz) MODE,CH7, HORIZONTAL )





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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	E4446A	MY48250253	Aug. 02, 2010	Aug. 01, 2011

**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.



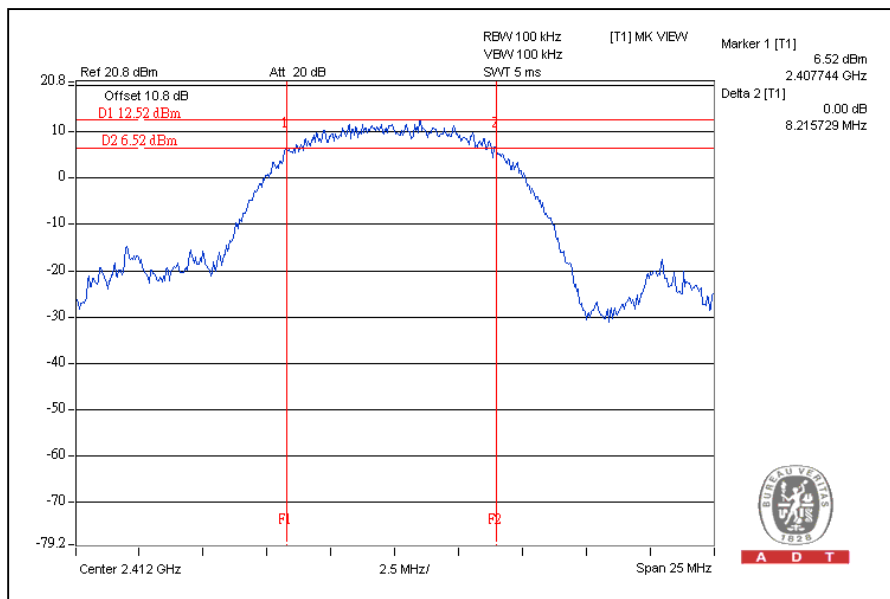
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### 4.3.7 TEST RESULTS

#### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.21	0.5	PASS
6	2437	7.88	0.5	PASS
11	2462	8.03	0.5	PASS

CH1



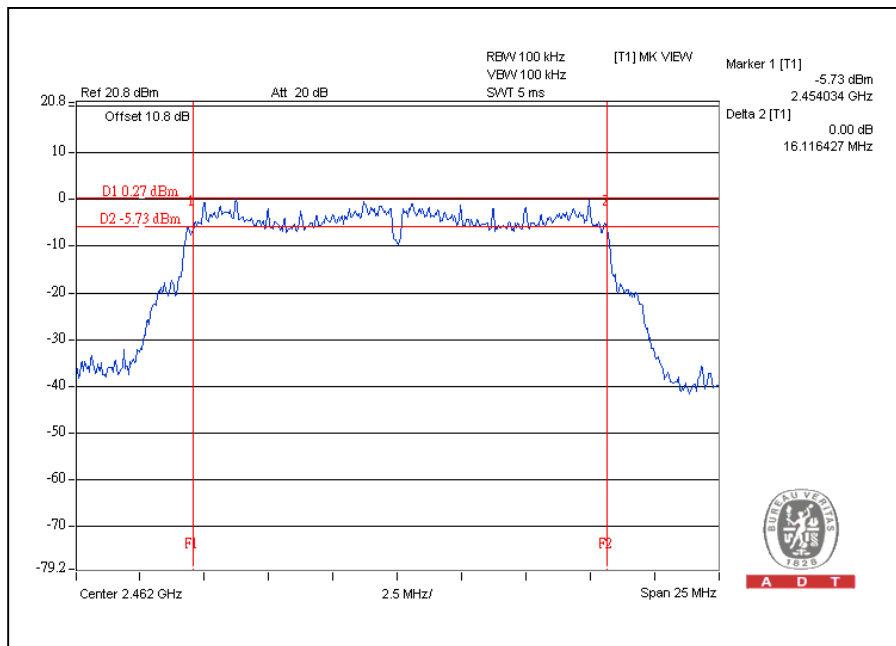


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### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.09	0.5	PASS
6	2437	16.07	0.5	PASS
11	2462	16.11	0.5	PASS

### CH11



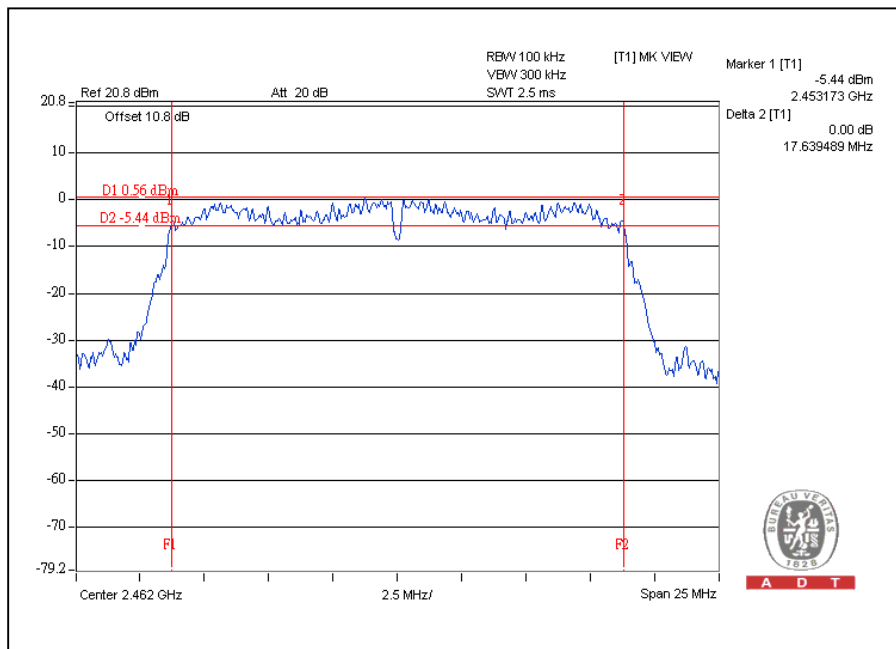


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### 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.58	0.5	PASS
6	2437	16.98	0.5	PASS
11	2462	17.63	0.5	PASS

CH11



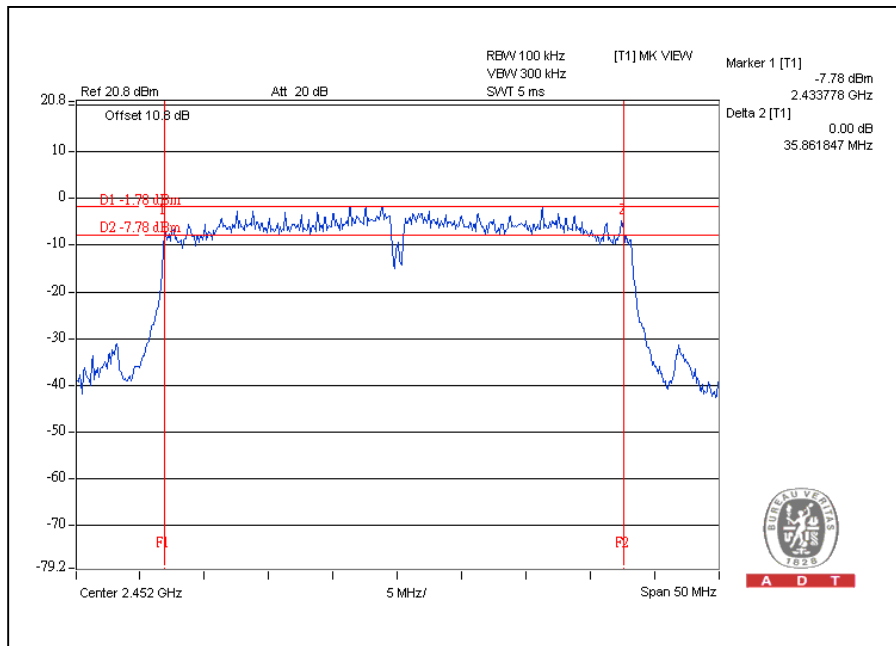


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### 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2422	35.73	0.5	PASS
4	2437	35.28	0.5	PASS
7	2452	35.86	0.5	PASS

CH7





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#### 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	May 04, 2010	May 03, 2011
Pulse Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

**NOTE:**

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

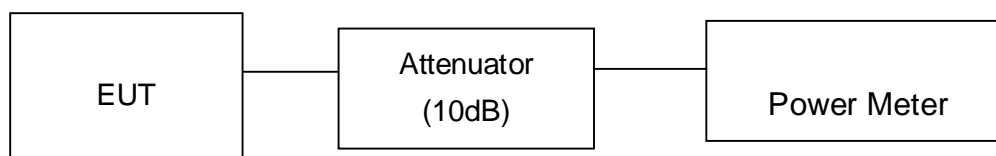
##### 4.4.3 TEST PROCEDURES

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	229.1	23.6	30	PASS
6	2437	363.1	25.6	30	PASS
11	2462	204.2	23.1	30	PASS

##### 802.11g 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	21.0	21.3	260.8	24.2	30	PASS
6	2437	24.4	25.4	622.2	27.9	30	PASS
11	2462	21.4	21.5	279.3	24.5	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	20.4	20.3	216.8	23.4	30	PASS
6	2437	24.5	25.4	628.6	28.0	30	PASS
11	2462	20.7	20.9	240.5	23.8	30	PASS



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### 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)				
1	2422	20.0	20.1	202.3	23.1	30	PASS
4	2437	24.6	24.8	590.4	27.7	30	PASS
7	2452	20.4	20.5	221.9	23.5	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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	E4446A	MY48250253	Aug. 02, 2010	Aug. 01, 2011

**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

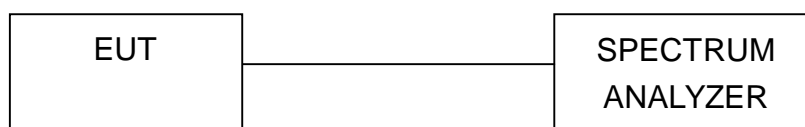
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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

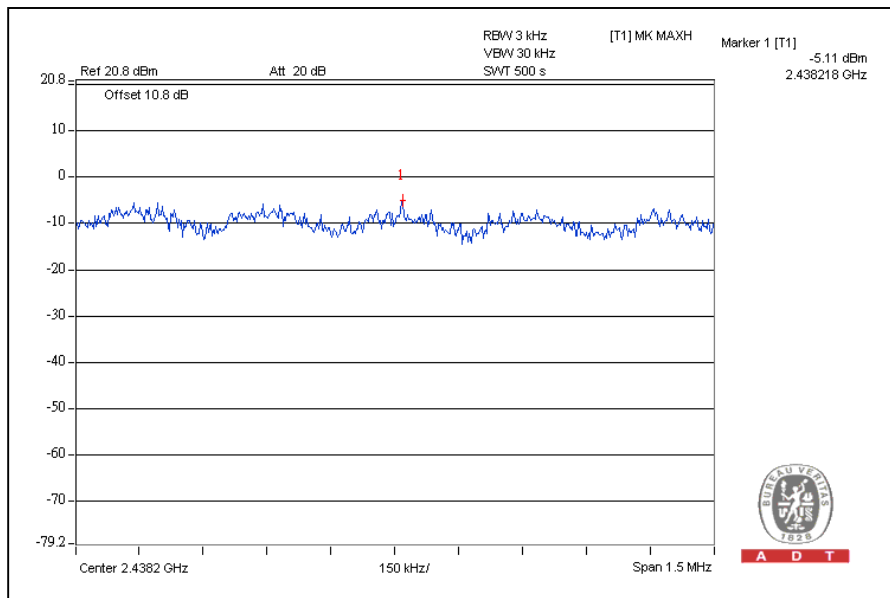
Same as Item 4.3.6



**802.11g 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	-14.4	-13.9	-11.1	8	PASS
6	2437	-5.4	-5.1	-2.2	8	PASS
11	2462	-12.3	-13.0	-9.6	8	PASS

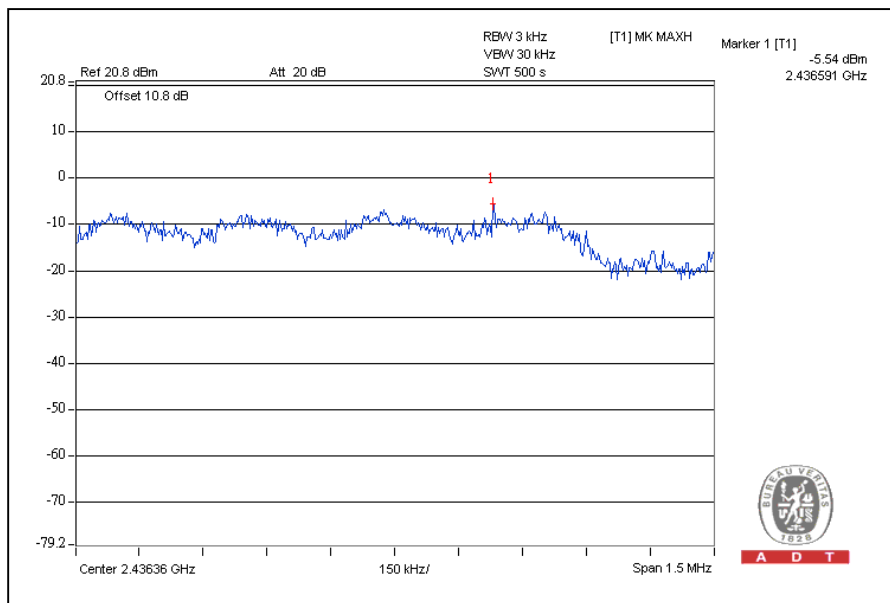
For Chain(1): CH6



**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	-11.1	-12.2	-8.6	8	PASS
6	2437	-6.7	-5.5	-3.0	8	PASS
11	2462	-11.9	-12.8	-9.3	8	PASS

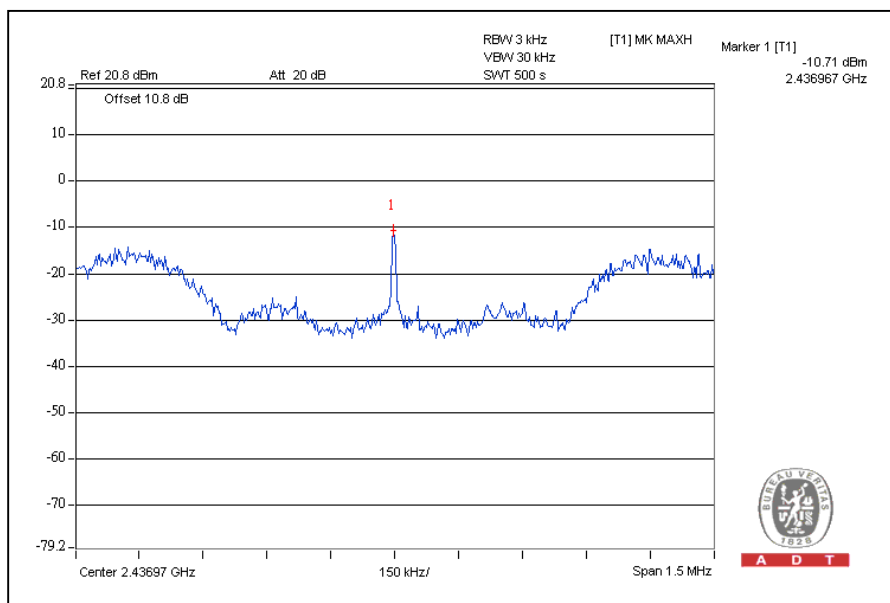
For Chain(1): CH6



### 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)			
1	2422	-15.9	-15.7	-12.8	8	PASS
4	2437	-10.7	-14.6	-9.2	8	PASS
7	2452	-12.7	-14.1	-10.3	8	PASS

For Chain (0): CH4



## 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	E4446A	MY482502 53	Aug. 02, 2010	Aug. 01, 2011

**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 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 was 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

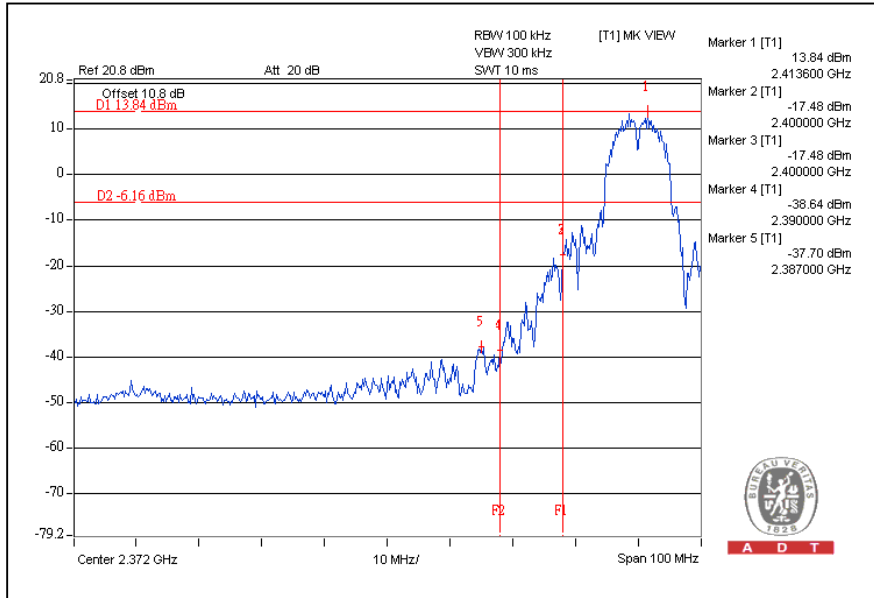
### 4.6.6 TEST RESULTS

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).

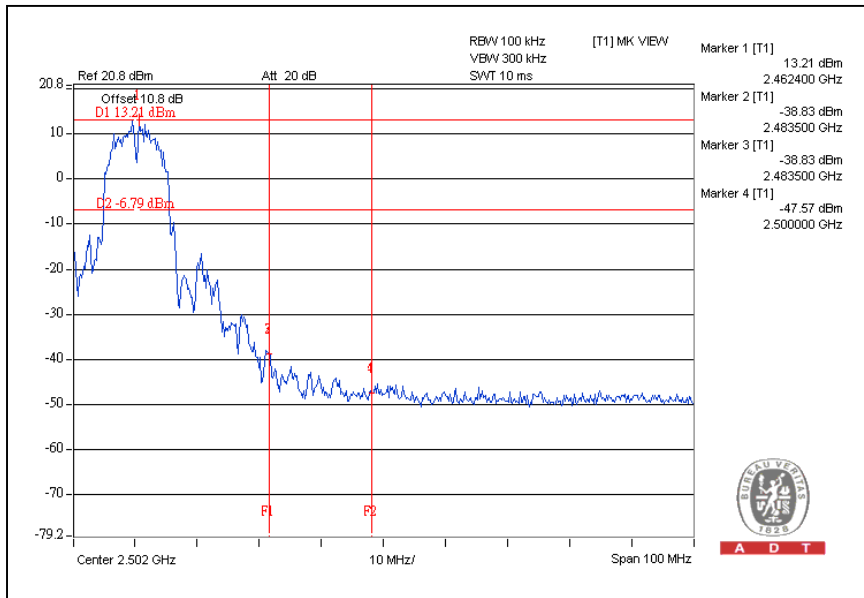


## 802.11b DSSS MODULATION:

### CH1



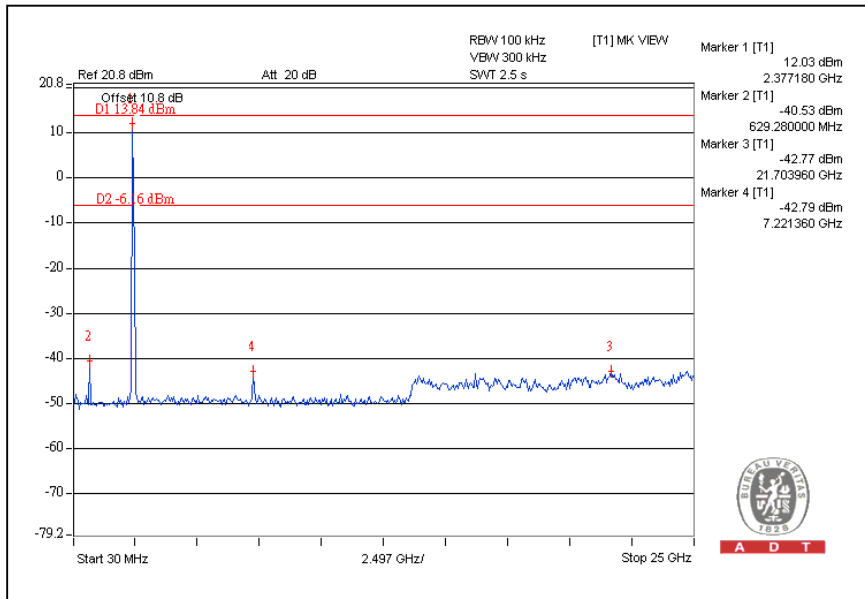
### CH11



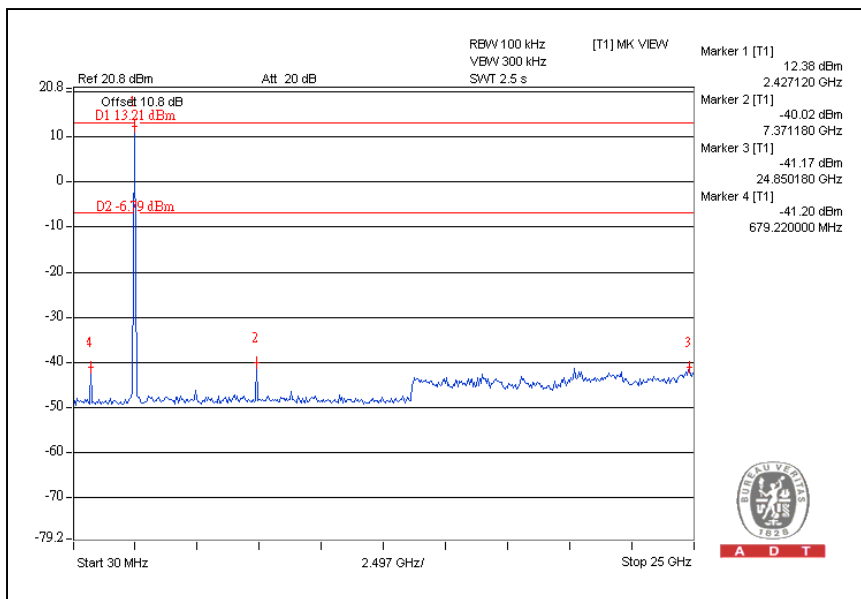


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### CH1

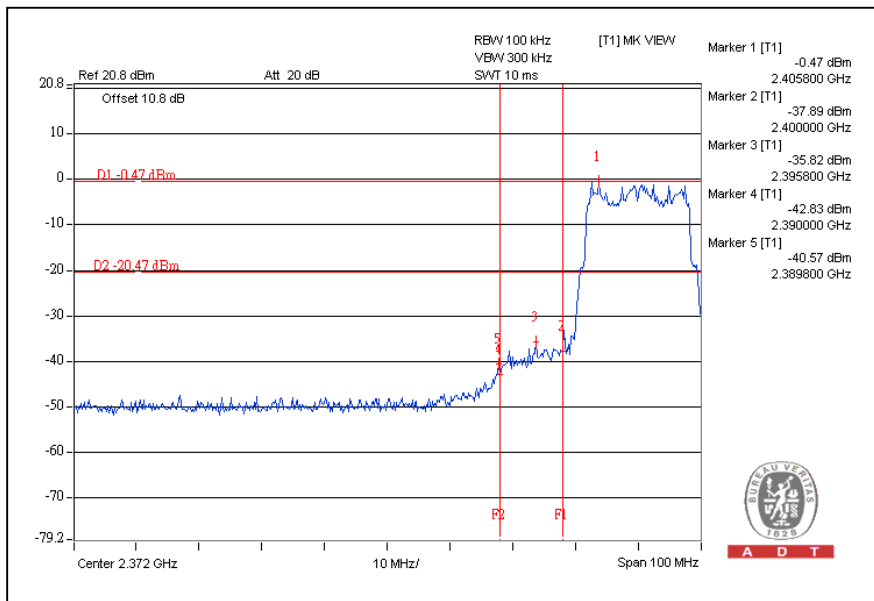


### CH11

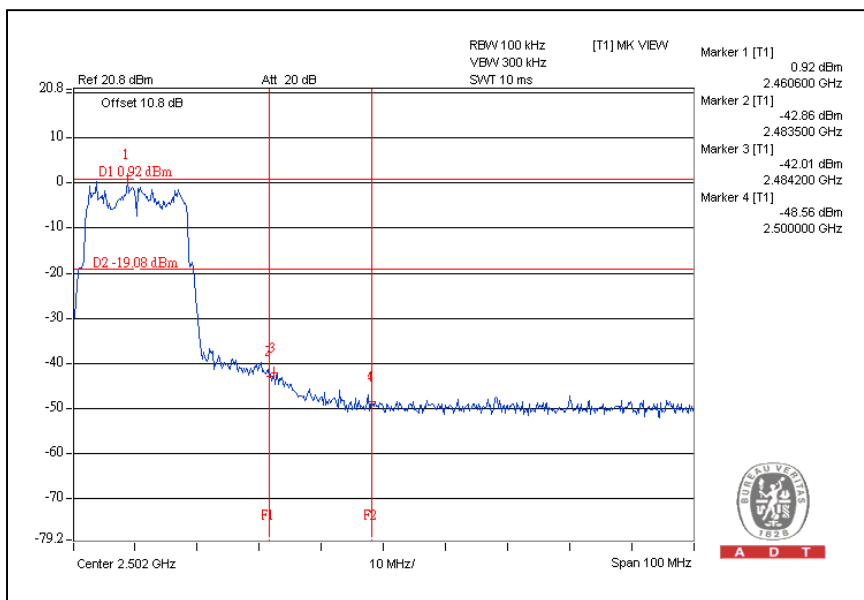


### 802.11g OFDM MODULATION:

#### CH1



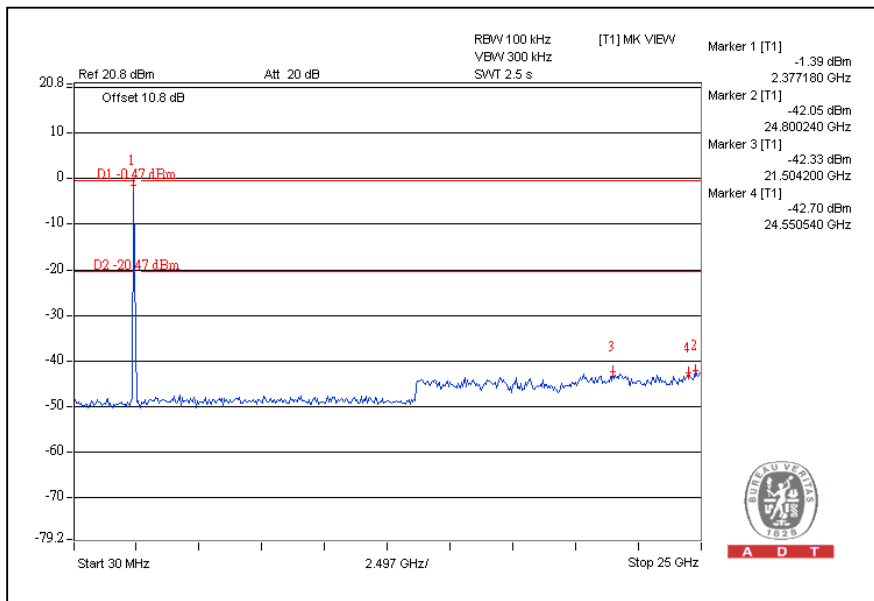
#### CH11



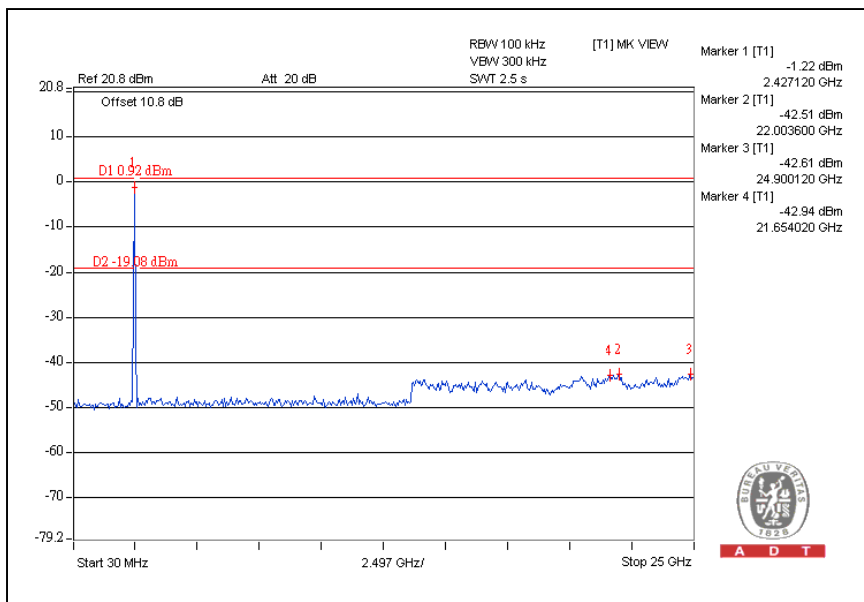


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### CH1

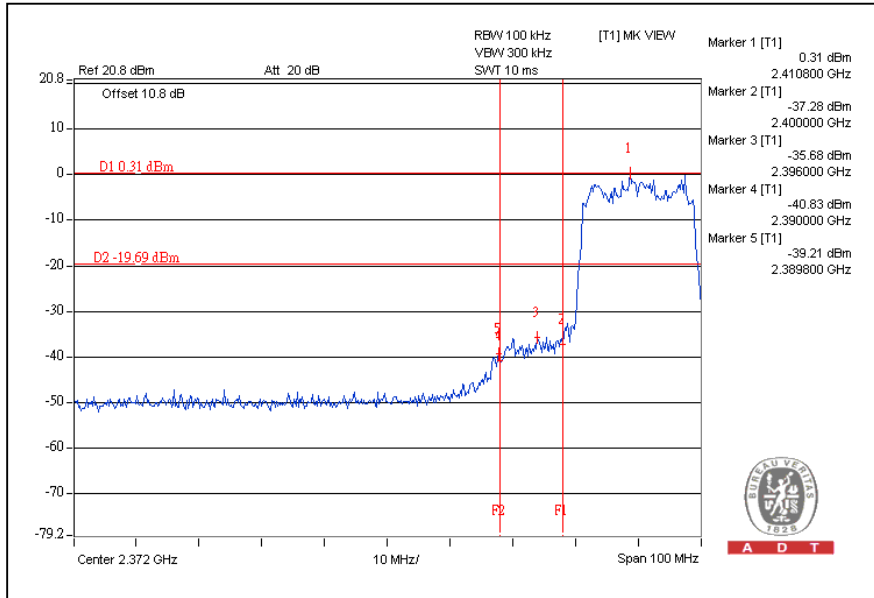


### CH11

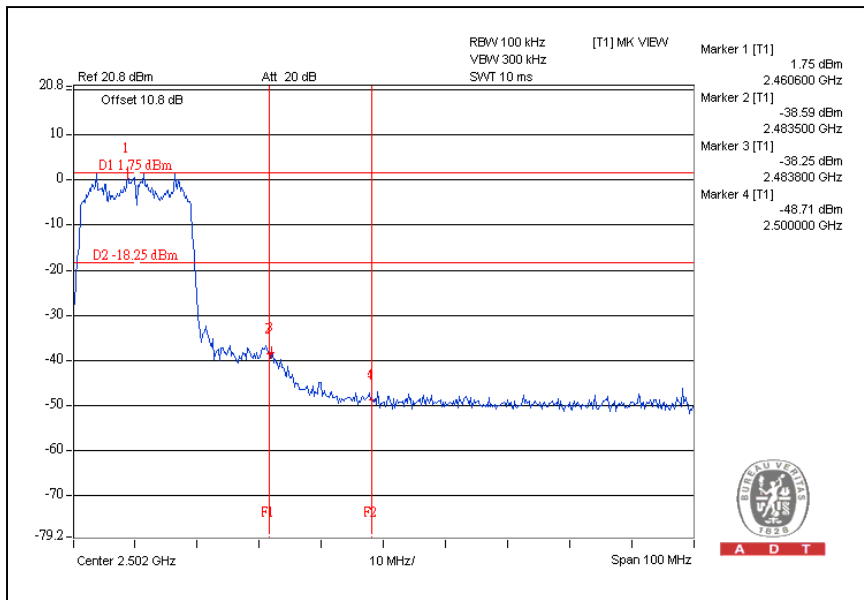


### 802.11n (20MHz) OFDM MODULATION:

#### CH1



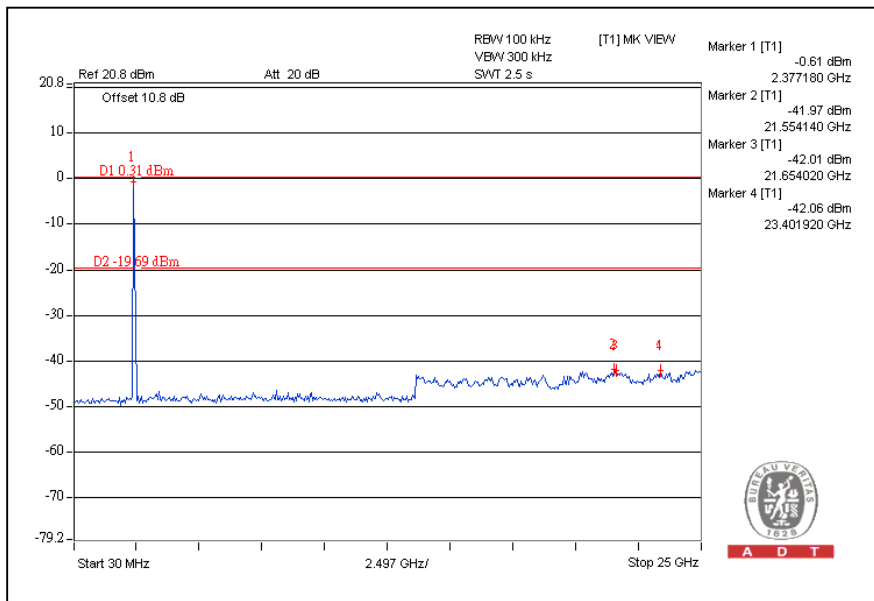
#### CH11



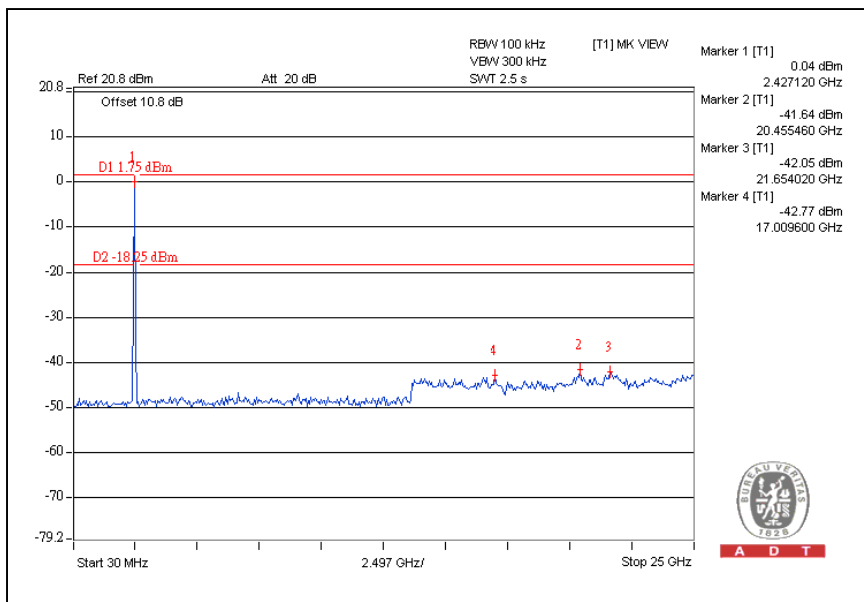


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### CH1

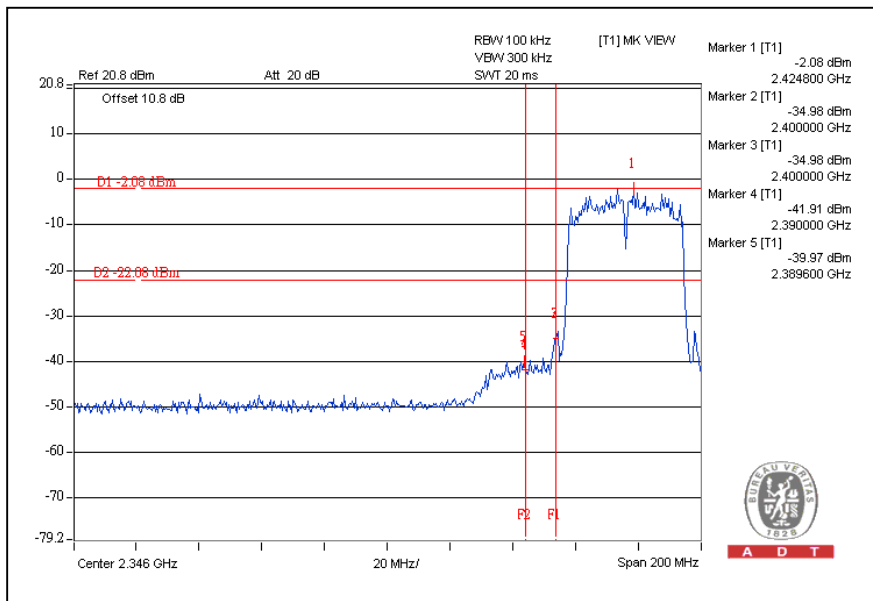


### CH11

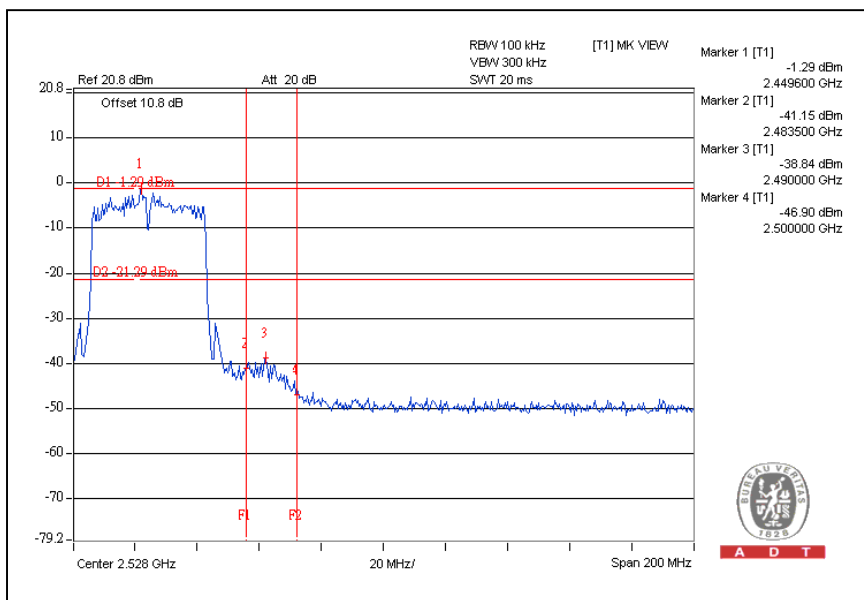


## 802.11n (40MHz) OFDM MODULATION:

### CH1



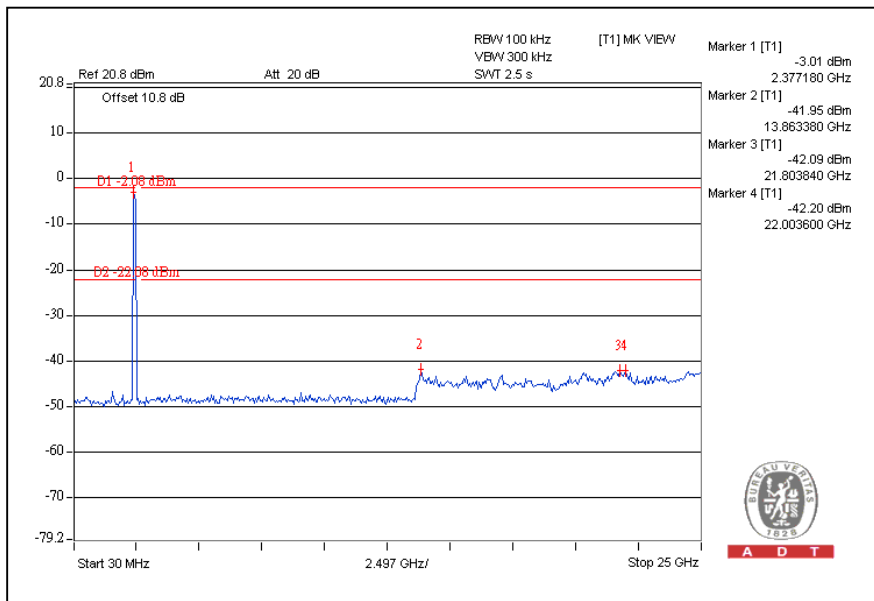
### CH7



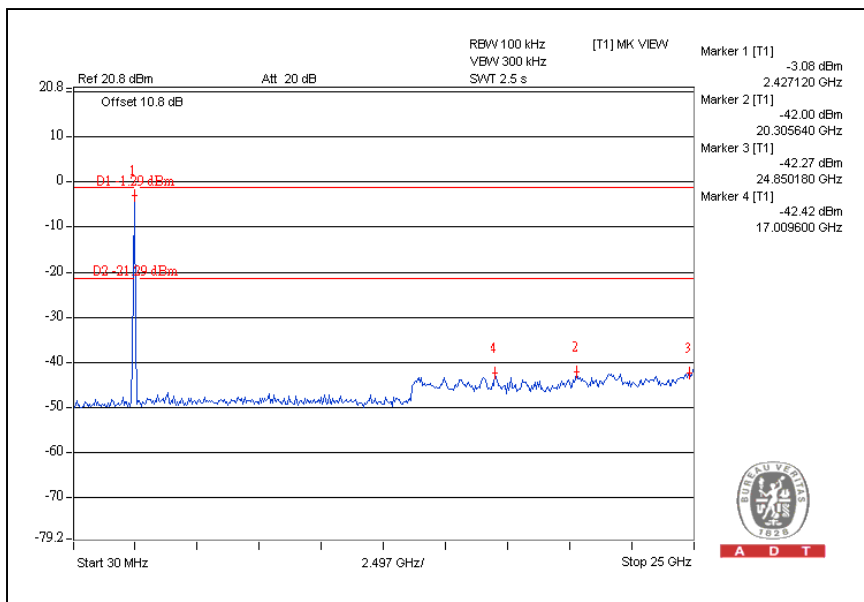


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### CH1



### CH7







## 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

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

**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 ---**