

# FCC TEST REPORT (15.247)

**REPORT NO.:** RF981120H03

**MODEL NO.:** C2104001

**RECEIVED:** Nov. 20, 2009

**TESTED:** Dec. 15 to 28, 2009

**ISSUED:** Dec. 30, 2009

**APPLICANT:** Ubee Interactive Corp.

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Hsinchu County 302, Taiwan.

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

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

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## 1. CERTIFICATION

**PRODUCT:** BCM 43224 WiFi Card  
**BRAND NAME:** Ubee  
**MODEL NO.:** C2104001  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Dec. 15 to 28, 2009  
**APPLICANT:** Ubee Interactive Corp.  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247),  
ANSI C63.4-2003

The above equipment (Model: C2104001) 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:** Dec. 30, 2009  
( Midoli Peng, Specialist )

**TECHNICAL ACCEPTANCE** : Hank Chung , **DATE:** Dec. 30, 2009  
( Hank Chung, Deputy Manager )

**APPROVED BY** : May Chen , **DATE:** Dec. 30, 2009  
( May Chen, Deputy Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 802.11b & g, 2412~2462MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -3.18dB at 0.738MHz
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 -0.5dB at 2483.5MHz & 2390.0MHz
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 RP-SMA not a standard connector.

For 802.11a, 5725~5850MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -3.04dB at 0.739MHz
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 -3.1dB at 75.5MHz
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 RP-SMA not a standard connector.

**NOTE:**

1. The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz and 5.725~5.850GHz. For the 5.15~5.25GHz RF parameters was recorded in another test report.



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## 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>	BCM 43224 WiFi Card
<b>MODEL NO.</b>	C2104001
<b>FCC ID</b>	XCNC2104001
<b>POWER SUPPLY</b>	DC 3.3V from host equipment
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11b: 11/5.5/2/1Mbps Draft 802.11n (20MHz): 130 / 117 / 104 / 78 / 52 / 39 / 26 / 13 / 65 / 58.5 / 52 / 39 / 26 / 19.5 / 13 / 6.5Mbps Draft 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>	<b>For 15.407</b> 802.11a: 5.18 ~ 5.24GHz
	<b>For 15.247</b> 802.11b & 802.11g: 2412 ~ 2462MHz 802.11a: 5.745 ~ 5.825GHz
	<b>For 15.407</b> 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>NUMBER OF CHANNEL</b>	<b>For 15.247(2.4GHz)</b> 11 for 802.11b, 802.11g, 802.11n (20MHz)
	<b>For 15.247(5GHz)</b> 5 for 802.11a, 802.11n (20MHz)
	2 for 802.11n (40MHz)

<b>MAXIMUM OUTPUT POWER</b>	<b>For 15.407</b> 802.11a: 21.9mW 802.11n (20MHz): 24.1mW 802.11n (40MHz): 37.0mW <b>For 15.247(2.4GHz)</b> 802.11b: 85.1mW 802.11g: 557.3mW 802.11n (20MHz): 526.2mW <b>For 15.247(5GHz)</b> 802.11a: 314.4mW 802.11n (20MHz): 318.3mW 802.11n (40MHz): 252.4mW
<b>ANTENNA TYPE</b>	Please see note 1
<b>ANTENNA CONNECTOR</b>	Please see note 1
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

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

Chain	Antenna Gain		Antenna Type	Connector
	For 2.4GHz Gain (dBi)	For 5GHz Gain (dBi)		
Chain (0)	1.79	3.97	Dipole	RP-SMA
Chain (1)	1.79	3.97	Dipole	RP-SMA

- The EUT incorporates a MIMO function with 802.11n. Physically, the EUT provides two completed transmitters and two completed receivers.
- 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 Dipole 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.
- The EUT complies with 802.11n standards and backwards compatible with 802. 11a, 802.11b, 802.11g products.
- 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

#### Operated in 2400 ~ 2483.5MHz band:

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		

#### Operated in 5725 ~ 5850MHz band:

Five channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

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

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **PLC**: Power Line Conducted Emission

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

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

**APCM**: Antenna Port Conducted Measurement

#### ANTENNA COMBINATION MODE:

For 2.4 GHz			
COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
A	802.11 b	√	
B	802.11 g	√	√
C	802.11n(20MHz) for MCS0~7	√	
D	802.11n(20MHz) for MCS8~15	√	√
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, B and D the worst modes, were selected as representative mode for the report.			
For 5 GHz			
COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
E	802.11 a	√	√
F	802.11n(20MHz) for MCS0~7	√	
G	802.11n(20MHz) for MCS8~15	√	√
H	802.11n(40MHz) for MCS0~7	√	
I	802.11n(40MHz) for MCS8~15	√	√
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 E, G and I 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
For 2.4 GHz 802.11g	1 to 11	6	OFDM	BPSK	6	B
For 5 GHz 802.11a	149 to 165	165	OFDM	BPSK	6	E

### 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
For 2.4 GHz 802.11g	1 to 11	6	OFDM	BPSK	6	B
For 5 GHz 802.11a	149 to 165	165	OFDM	BPSK	6	E

### 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	B
For 2.4 GHz 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	13	D
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6	E
For 5 GHz 802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	13	G
For 5 GHz 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	27	I

### **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	B
For 2.4 GHz 802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	13	D
802.11a	149 to 165	149, 165	OFDM	BPSK	6	E
For 5 GHz 802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	13	G
For 5 GHz 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	27	I

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

### **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)	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	B
For 2.4 GHz 802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	13	D
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6	E
For 5 GHz 802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	13	G
For 5 GHz 802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	27	I

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

# TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER(SYSTEM)	TESTED BY
RE≥1G	14deg. C, 68%RH, 1021 hPa	120Vac, 60Hz	Duke Tseng
RE<1G	14deg. C, 68%RH, 1021 hPa	120Vac, 60Hz	Wen Yu
PLC	20deg. C, 58%RH, 1012 hPa	120Vac, 60Hz	Leo Peng
APCM	253deg. C, 54%RH, 1012 hPa	120Vac, 60Hz	Wen Yu

## 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a BCM 43224 WiFi Card. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

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

**ANSI C63.4-2003**

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

### 3.4 DESCRIPTION OF SUPPORT UNITS

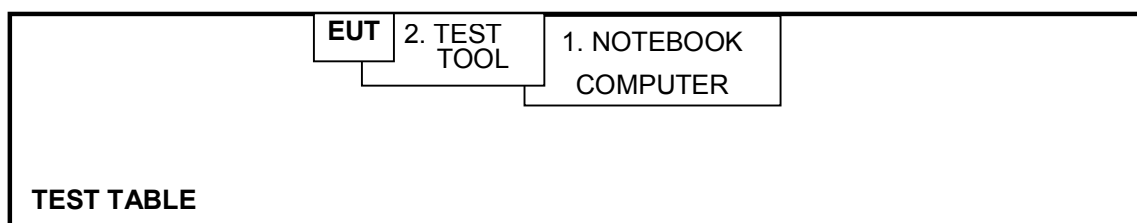
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP19L	CN-OHC416-70166-5C A-0448	PIW632500516610
2	TEST TOOL	Ubee	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

**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 (802.11b & g, 2400 ~ 2483.5MHz Band)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
0.15-0.5 0.5-5 5-30	Quasi-peak	Average
	66 to 56	56 to 46
	56 60	46 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 (JYEBAO)	5DFB	COACAB-001	Dec 14, 2009	Dec 13, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

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

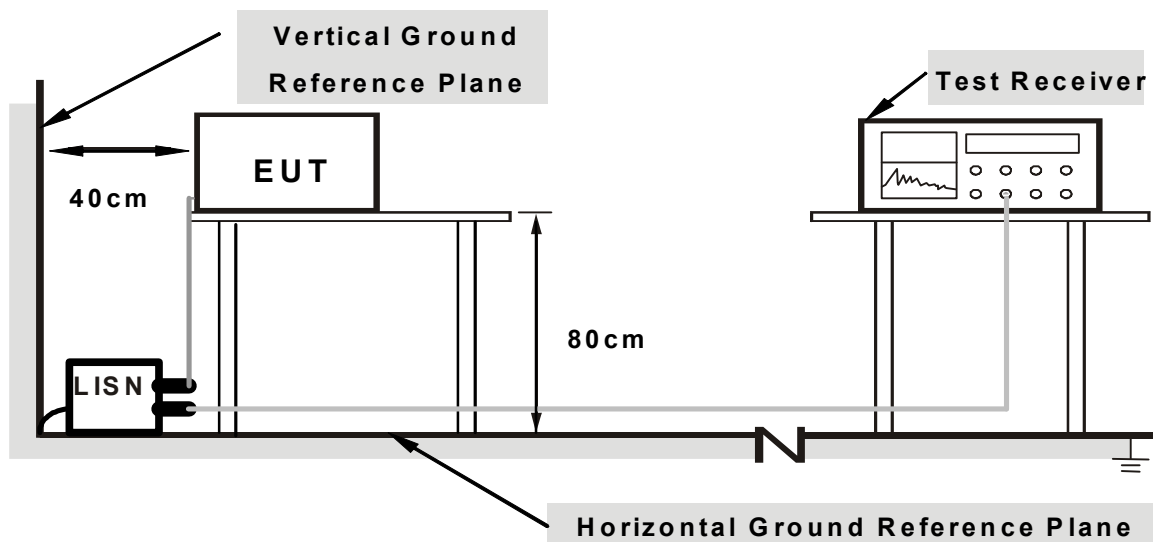
#### 4.1.3 TEST PROCEDURES

- 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. Connect the EUT with the support unit 1 (Notebook Computer) which placed on a testing table.
2. The communication partner run test program “BCM Tool” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

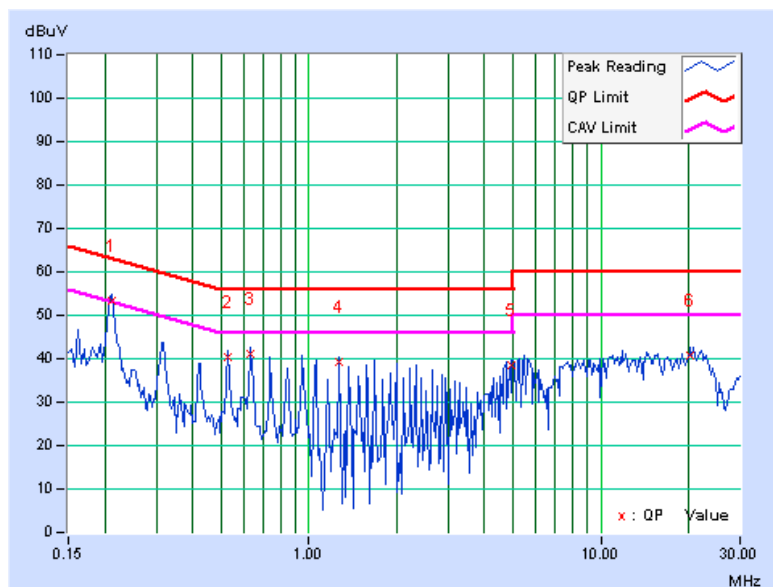
#### 4.1.7 TEST RESULTS

##### 802.11g OFDM MODULATION:

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.18	53.01	47.04	53.19	47.22	63.11	53.11	-9.92	-5.89
2	0.528	0.11	40.13	39.73	40.24	39.84	56.00	46.00	-15.76	-6.16
3	0.630	0.10	40.95	40.66	41.05	40.76	56.00	46.00	-14.95	-5.24
4	1.266	0.10	39.31	38.69	39.41	38.79	56.00	46.00	-16.59	-7.21
5	4.957	0.23	38.47	35.84	38.70	36.07	56.00	46.00	-17.30	-9.93
6	20.242	0.59	40.17	37.31	40.76	37.90	60.00	50.00	-19.24	-12.10

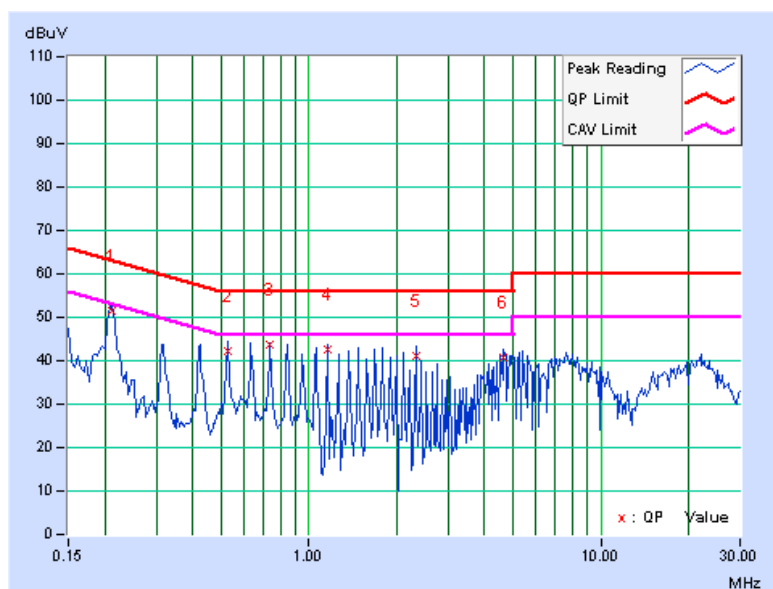
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.212	0.19	51.29	47.79	51.48	47.98	63.12	53.12	-11.65	-5.15
2	0.529	0.12	42.09	41.98	42.21	42.10	56.00	46.00	-13.79	-3.90
3	0.738	0.11	43.61	42.71	43.72	42.82	56.00	46.00	-12.28	-3.18
4	1.160	0.11	42.30	42.13	42.41	42.24	56.00	46.00	-13.59	-3.76
5	2.320	0.15	40.78	36.86	40.93	37.01	56.00	46.00	-15.07	-8.99
6	4.639	0.24	40.37	35.22	40.61	35.46	56.00	46.00	-15.39	-10.54

- 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
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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

2. The horn antenna, 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 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

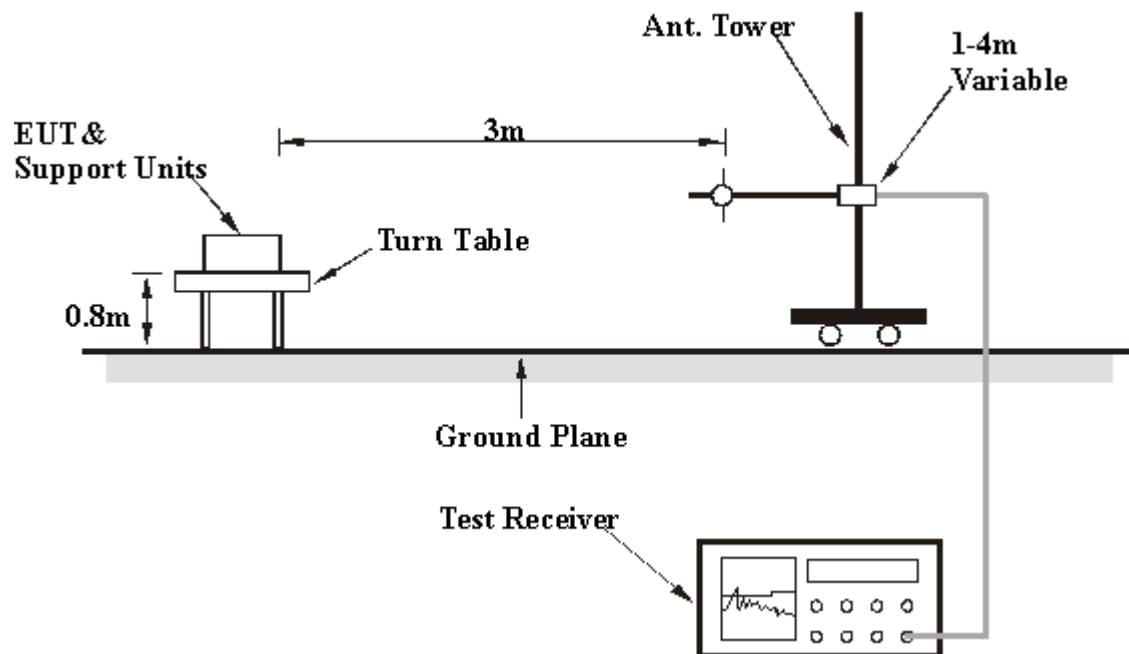
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK)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

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation



#### 4.2.5 TEST SETUP



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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

## 4.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 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	75.40	25.2 QP	40.0	-14.8	1.15 H	135	13.69	11.54
2	241.70	28.6 QP	46.0	-17.5	1.25 H	99	15.16	13.39
3	398.80	32.6 QP	46.0	-13.4	1.10 H	151	14.13	18.51
4	500.00	41.6 QP	46.0	-4.4	1.60 H	22	20.32	21.31
5	750.00	36.2 QP	46.0	-9.8	1.00 H	311	10.52	25.71
6	1000.00	48.5 QP	54.0	-5.5	1.55 H	1	19.48	29.04
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	66.60	32.6 QP	40.0	-7.4	1.00 V	322	19.61	13.01
2	75.45	36.2 QP	40.0	-3.8	1.00 V	166	24.68	11.53
3	118.00	28.5 QP	43.5	-15.0	1.00 V	239	16.72	11.75
4	138.50	36.5 QP	43.5	-7.0	1.00 V	52	22.58	13.92
5	550.00	40.0 QP	46.0	-6.0	1.00 V	2	17.40	22.60
6	750.00	39.6 QP	46.0	-6.4	1.00 V	355	13.93	25.71
7	1000.00	49.9 QP	54.0	-4.1	1.00 V	12	20.85	29.04

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

# ABOVE 1GHz WORST-CASE DATA

## 802.11b DSSS MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	60.6 PK	74.0	-13.4	1.00 H	120	30.23	30.38
2	2390.00	43.3 AV	54.0	-10.7	1.00 H	120	12.88	30.38
3	*2412.00	96.1 PK			1.00 H	71	65.68	30.46
4	*2412.00	92.7 AV			1.00 H	71	62.25	30.46
5	4824.00	45.3 PK	74.0	-28.7	1.54 H	132	9.41	35.89
6	4824.00	38.9 AV	54.0	-15.1	1.54 H	132	3.01	35.89
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	56.4 PK	74.0	-17.6	1.38 V	283	25.98	30.38
2	2390.00	44.5 AV	54.0	-9.5	1.38 V	283	14.15	30.38
3	*2412.00	107.4 PK			1.38 V	283	76.94	30.46
4	*2412.00	105.3 AV			1.38 V	283	74.84	30.46
5	4824.00	50.4 PK	74.0	-23.6	1.35 V	171	14.53	35.89
6	4824.00	47.0 AV	54.0	-7.0	1.35 V	171	11.08	35.89

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	95.2 PK			1.00 H	72	64.62	30.56
2	*2437.00	91.6 AV			1.00 H	72	61.04	30.56
3	4874.00	45.3 PK	74.0	-28.7	1.51 H	138	9.27	36.00
4	4874.00	38.9 AV	54.0	-15.1	1.51 H	138	2.94	36.00
5	7311.00	48.6 PK	74.0	-25.4	1.10 H	218	6.54	42.08
6	7311.00	36.7 AV	54.0	-17.3	1.10 H	218	-5.38	42.08
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	*2437.00	104.8 PK			1.38 V	50	74.20	30.56
2	*2437.00	101.7 AV			1.38 V	50	71.14	30.56
3	4874.00	48.9 PK	74.0	-25.1	1.04 V	5	12.88	36.00
4	4874.00	45.1 AV	54.0	-9.0	1.04 V	5	9.05	36.00
5	7311.00	48.8 PK	74.0	-25.2	1.24 V	307	6.70	42.08
6	7311.00	36.6 AV	54.0	-17.5	1.24 V	307	-5.53	42.08

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



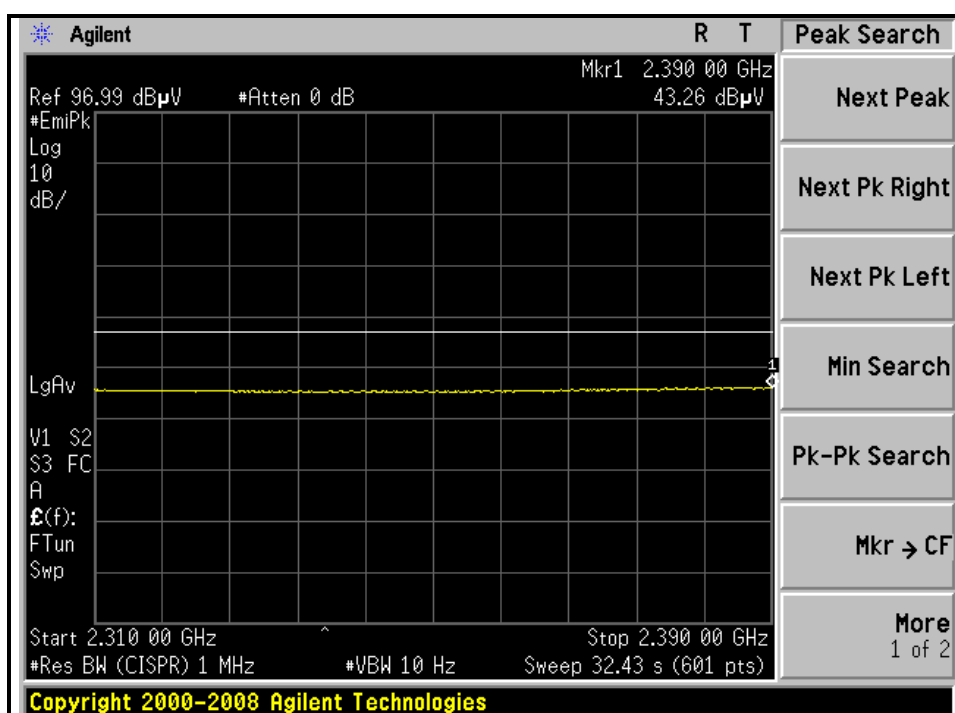
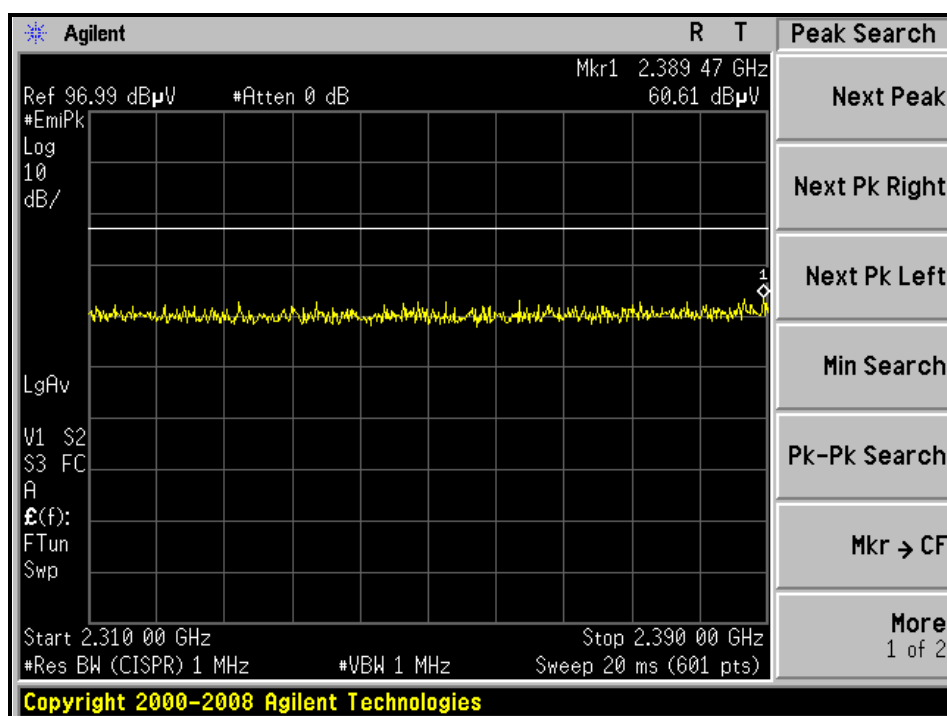
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

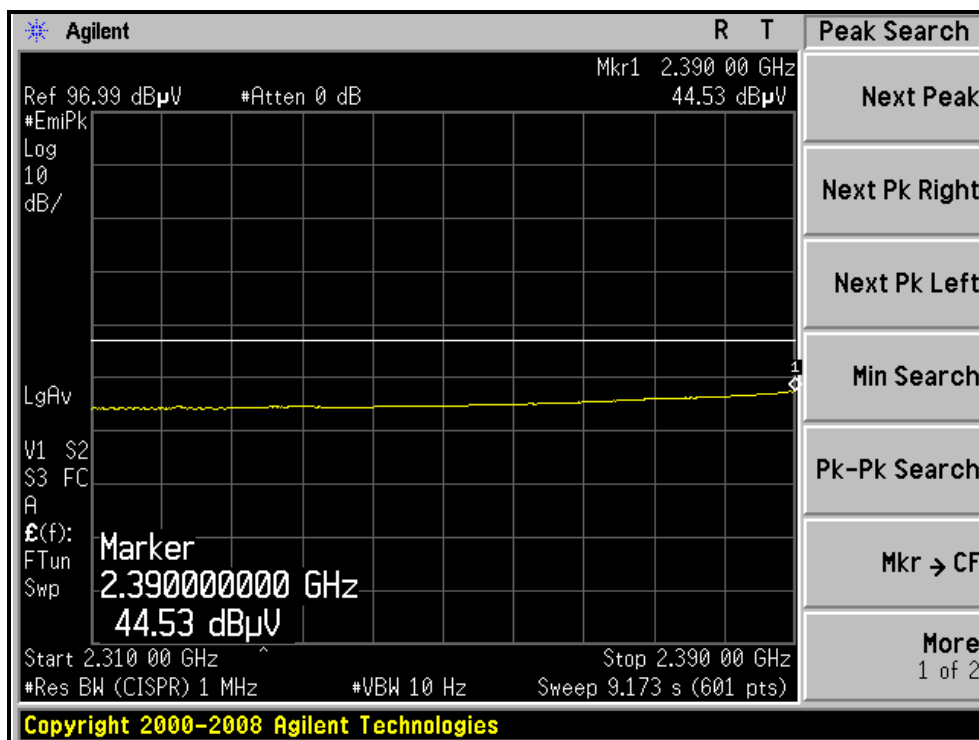
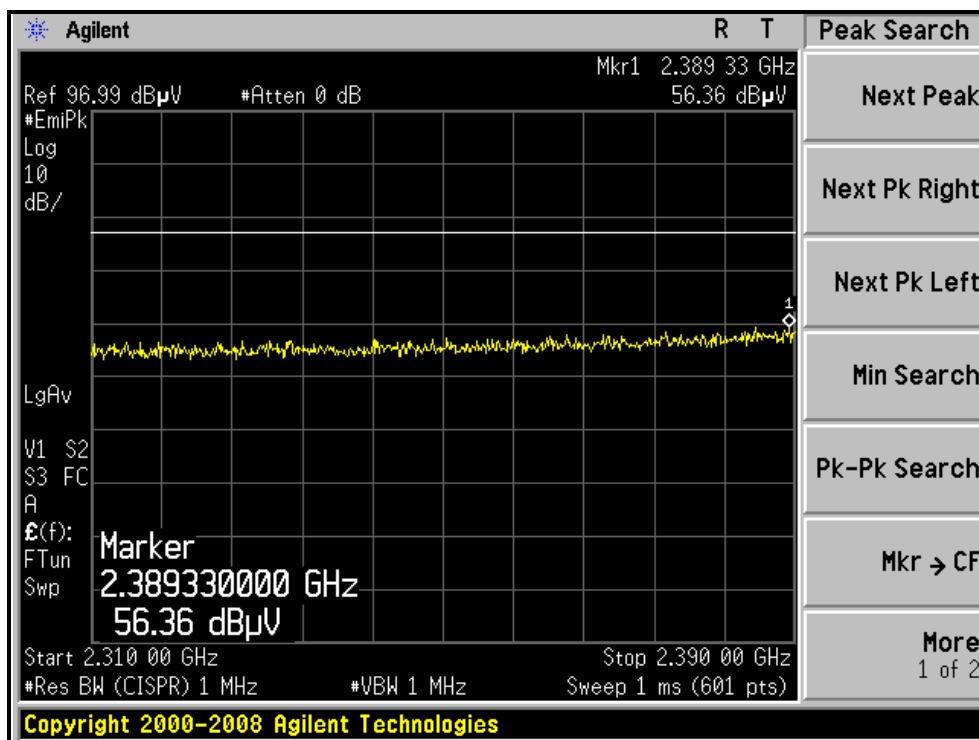
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	95.2 PK			1.00 H	74	64.52	30.65
2	*2462.00	91.8 AV			1.00 H	74	61.14	30.65
3	2490.79	61.6 PK	74.0	-12.4	1.00 H	152	30.87	30.76
4	2490.79	43.4 AV	54.0	-10.6	1.00 H	152	12.60	30.76
5	4924.00	45.1 PK	74.0	-28.9	1.52 H	131	9.00	36.10
6	4924.00	38.4 AV	54.0	-15.6	1.52 H	131	2.30	36.10
7	7386.00	49.2 PK	74.0	-24.8	1.14 H	213	6.94	42.26
8	7386.00	37.1 AV	54.0	-16.9	1.14 H	213	-5.16	42.26
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	105.6 PK			1.36 V	282	74.95	30.65
2	*2462.00	103.2 AV			1.36 V	282	72.55	30.65
3	2489.80	60.1 PK	74.0	-13.9	1.36 V	282	29.33	30.75
4	2489.80	46.1 AV	54.0	-7.9	1.36 V	282	15.36	30.75
5	4924.00	49.3 PK	74.0	-24.8	1.42 V	12	13.15	36.10
6	4924.00	45.4 AV	54.0	-8.6	1.42 V	12	9.27	36.10
7	7386.00	49.0 PK	74.0	-25.0	1.25 V	318	6.71	42.26
8	7386.00	36.8 AV	54.0	-17.2	1.25 V	318	-5.48	42.26

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

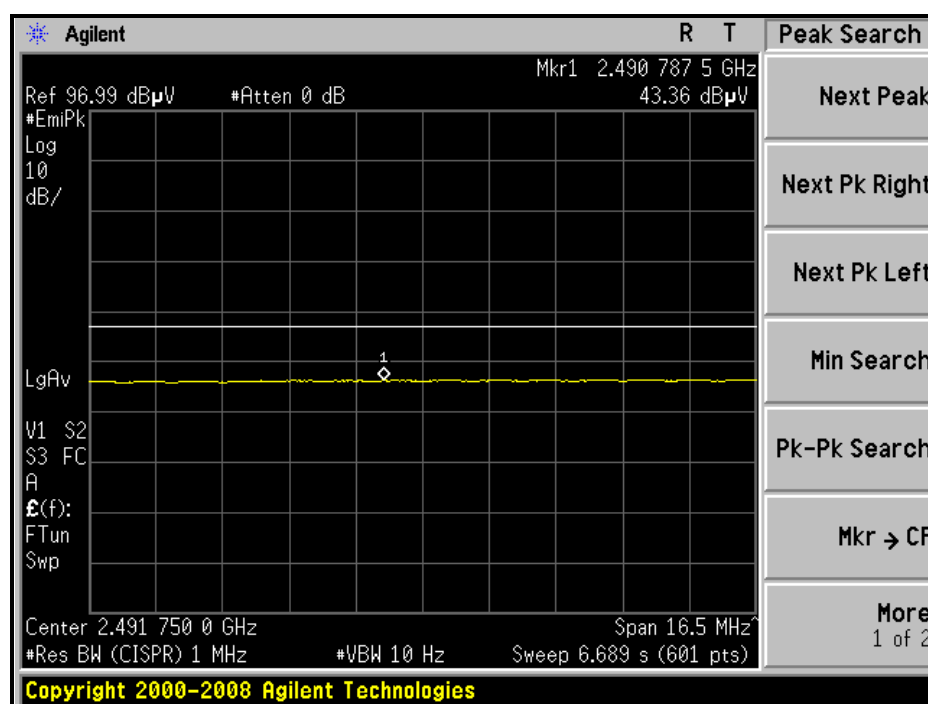
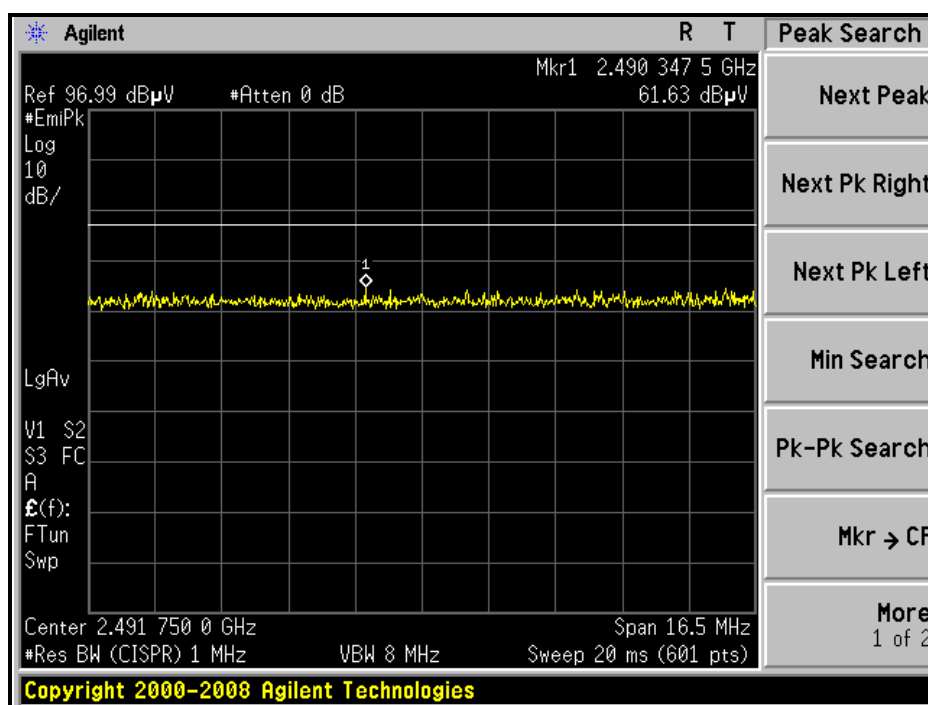
# RESTRICTED BANDEDGE (802.11b MODE,CH1, HORIZONTAL )



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

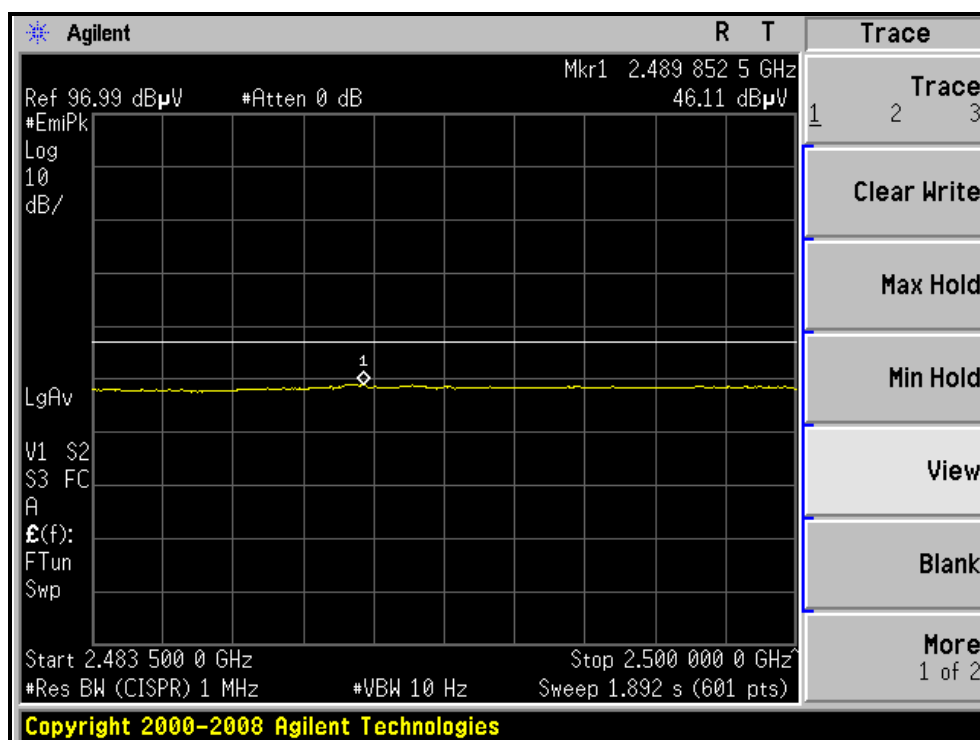
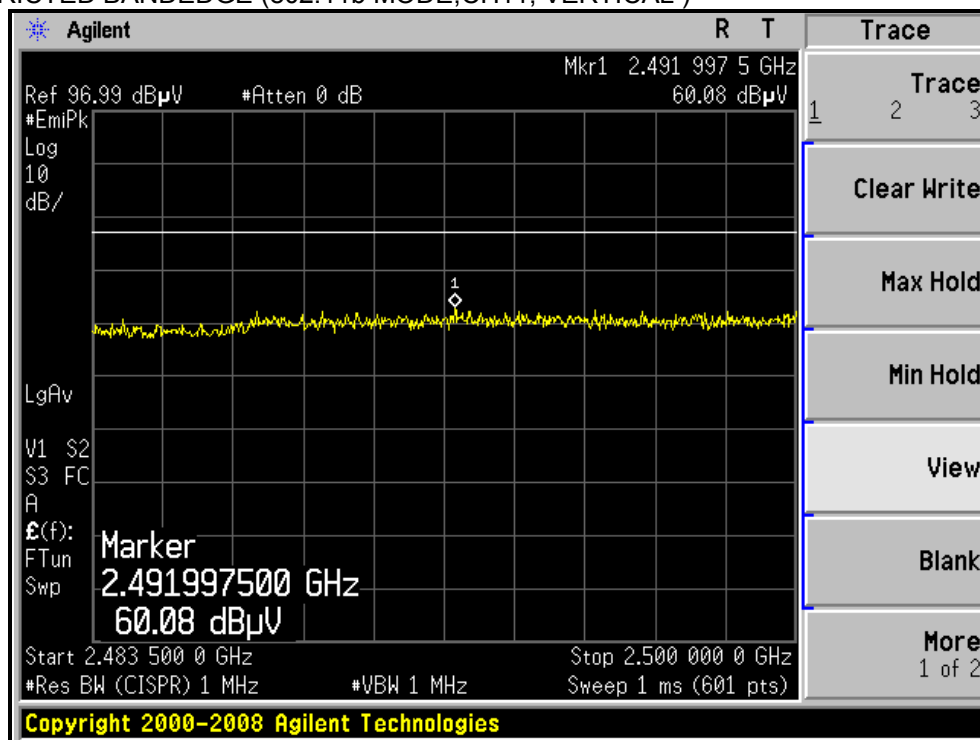


# RESTRICTED BANDEDGE (802.11b MODE,CH11, HORIZONTAL )





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





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## 802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	62.7 PK	74.0	-11.3	1.00 H	25	32.36	30.38
2	2390.00	45.5 AV	54.0	-8.6	1.00 H	25	15.07	30.38
3	*2412.00	97.1 PK			1.00 H	20	66.67	30.46
4	*2412.00	84.7 AV			1.00 H	20	54.27	30.46
5	4824.00	45.6 PK	74.0	-28.4	1.51 H	127	9.71	35.89
6	4824.00	38.4 AV	54.0	-15.6	1.51 H	127	2.51	35.89
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	73.0 PK	74.0	-1.0	1.65 V	351	42.63	30.38
2	2390.00	53.4 AV	54.0	-0.6	1.65 V	351	23.01	30.38
3	*2412.00	110.1 PK			1.63 V	356	79.63	30.46
4	*2412.00	95.6 AV			1.63 V	356	65.16	30.46
5	4824.00	47.6 PK	74.0	-26.4	1.34 V	157	11.71	35.89
6	4824.00	41.3 AV	54.0	-12.7	1.34 V	157	5.41	35.89

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	98.5 PK			1.00 H	72	67.91	30.56
2	*2437.00	86.4 AV			1.00 H	72	55.82	30.56
3	4874.00	44.9 PK	74.0	-29.1	1.54 H	123	8.90	36.00
4	4874.00	38.1 AV	54.0	-15.9	1.54 H	123	2.10	36.00
5	7311.00	48.8 PK	74.0	-25.2	1.13 H	217	6.72	42.08
6	7311.00	36.9 AV	54.0	-17.1	1.13 H	217	-5.18	42.08
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	*2437.00	112.4 PK			1.36 V	33	81.80	30.56
2	*2437.00	98.6 AV			1.36 V	33	68.08	30.56
3	4874.00	47.9 PK	74.0	-26.1	1.45 V	23	11.90	36.00
4	4874.00	42.6 AV	54.0	-11.4	1.45 V	23	6.60	36.00
5	7311.00	49.2 PK	74.0	-24.8	1.24 V	313	7.12	42.08
6	7311.00	36.9 AV	54.0	-17.1	1.24 V	313	-5.18	42.08

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



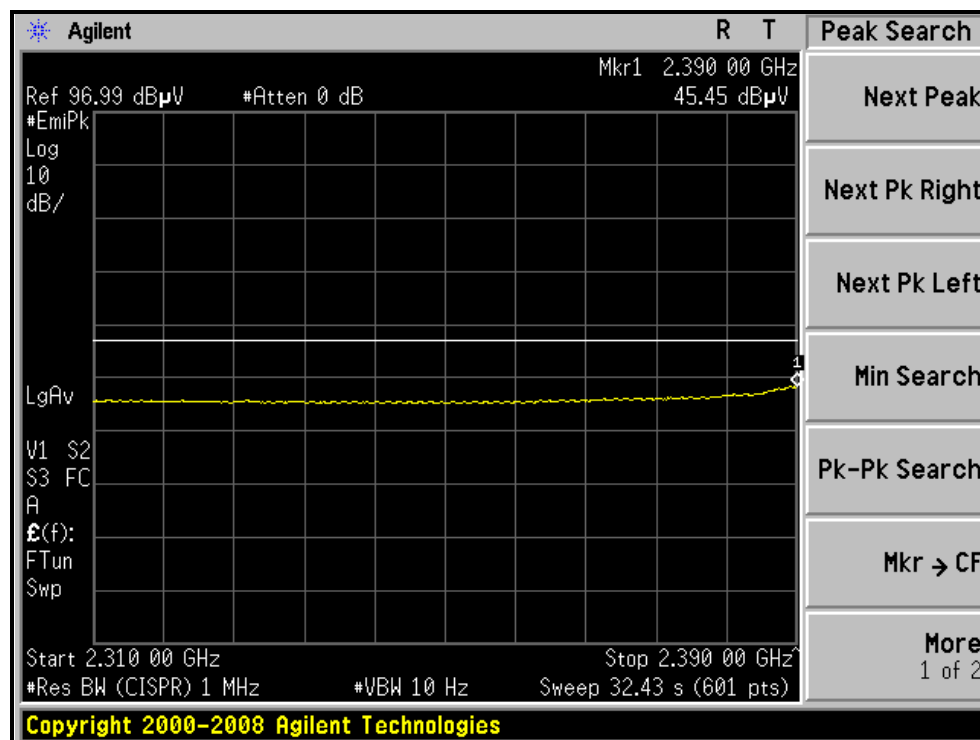
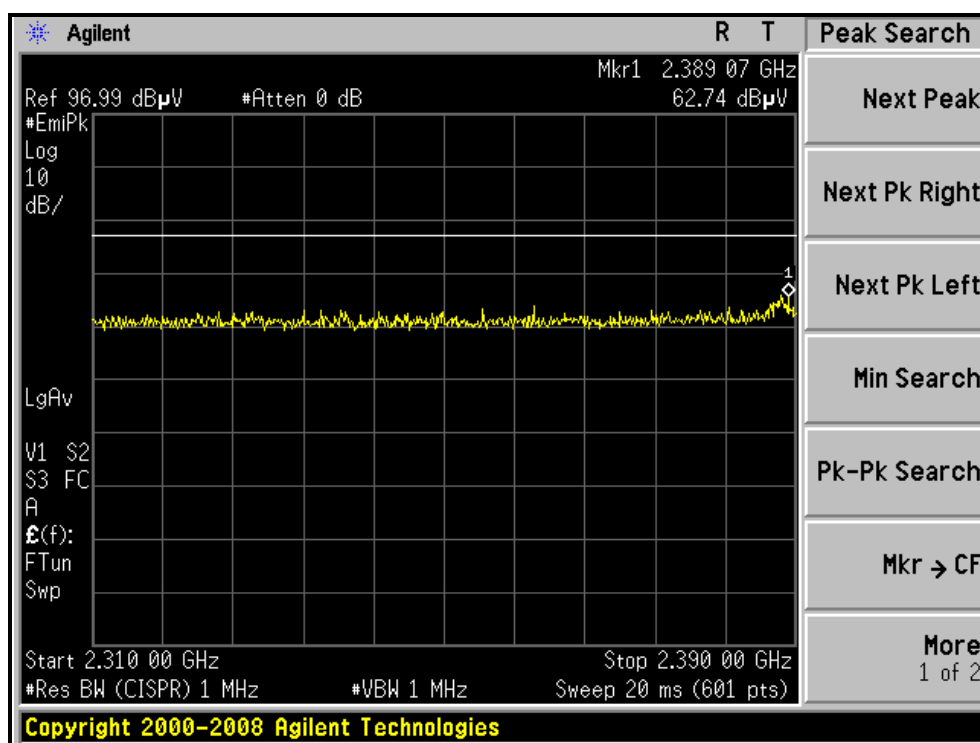
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

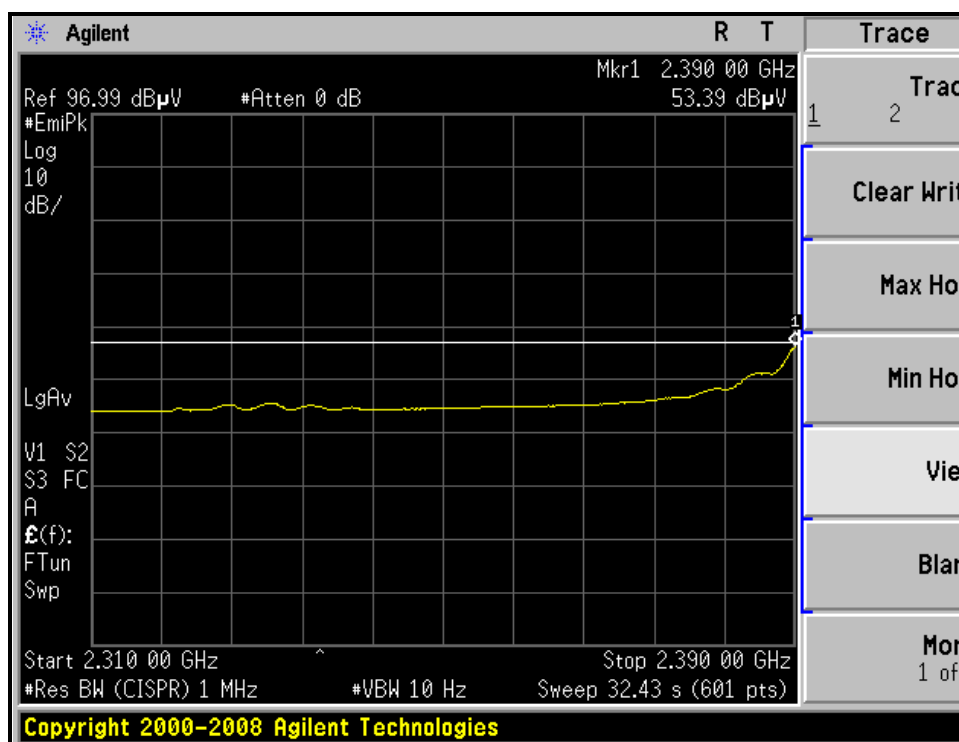
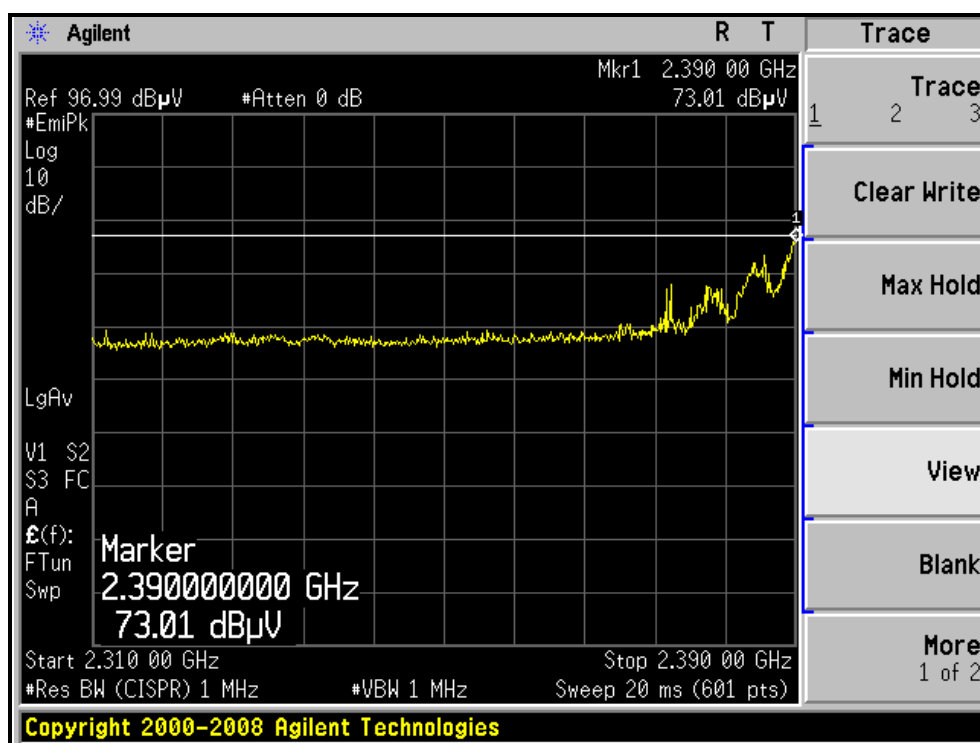
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	98.8 PK			1.00 H	76	68.11	30.65
2	*2462.00	86.8 AV			1.00 H	76	56.10	30.65
3	2483.50	61.4 PK	74.0	-12.6	1.23 H	73	30.68	30.73
4	2483.50	46.0 AV	54.0	-8.0	1.23 H	73	15.30	30.73
5	4924.00	45.3 PK	74.0	-28.7	1.57 H	126	9.20	36.10
6	4924.00	38.4 AV	54.0	-15.6	1.57 H	126	2.30	36.10
7	7386.00	49.2 PK	74.0	-24.8	1.19 H	214	6.94	42.26
8	7386.00	37.3 AV	54.0	-16.7	1.19 H	214	-4.96	42.26
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	109.0 PK			1.55 V	234	78.35	30.65
2	*2462.00	95.0 AV			1.55 V	234	64.35	30.65
3	2483.50	69.3 PK	74.0	-4.7	1.56 V	236	38.57	30.73
4	<b>2483.50</b>	<b>53.5 AV</b>	<b>54.0</b>	<b>-0.5</b>	<b>1.56 V</b>	<b>236</b>	<b>22.75</b>	<b>30.73</b>
5	4924.00	48.1 PK	74.0	-25.9	1.44 V	29	12.00	36.10
6	4924.00	42.5 AV	54.0	-11.5	1.44 V	29	6.40	36.10
7	7386.00	48.5 PK	74.0	-25.5	1.31 V	314	6.24	42.26
8	7386.00	36.3 AV	54.0	-17.7	1.31 V	314	-5.96	42.26

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

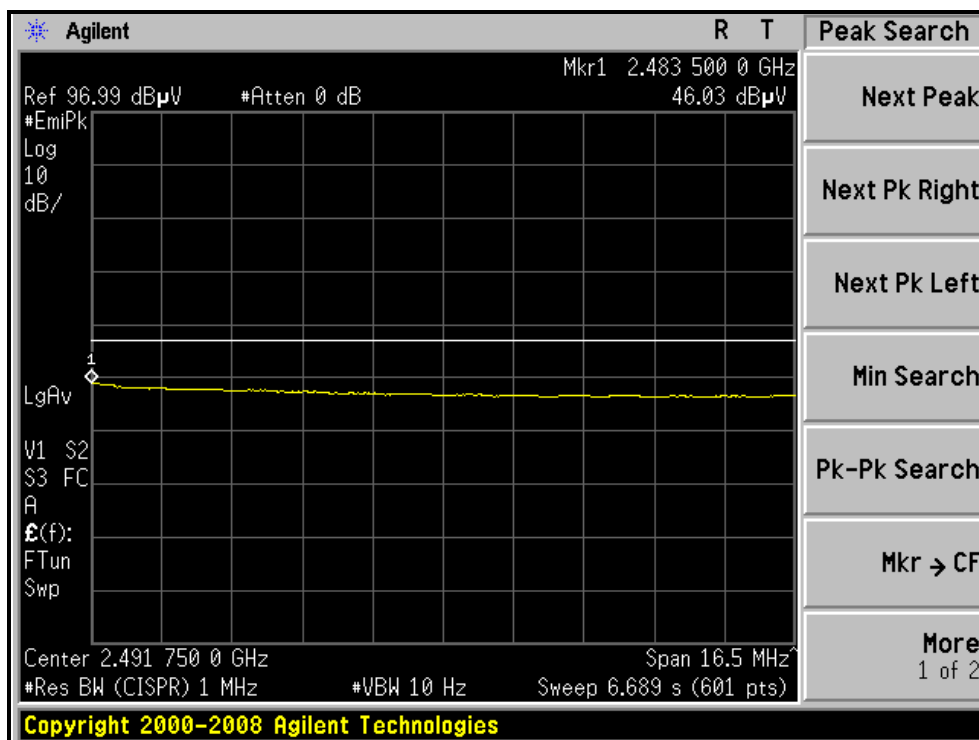
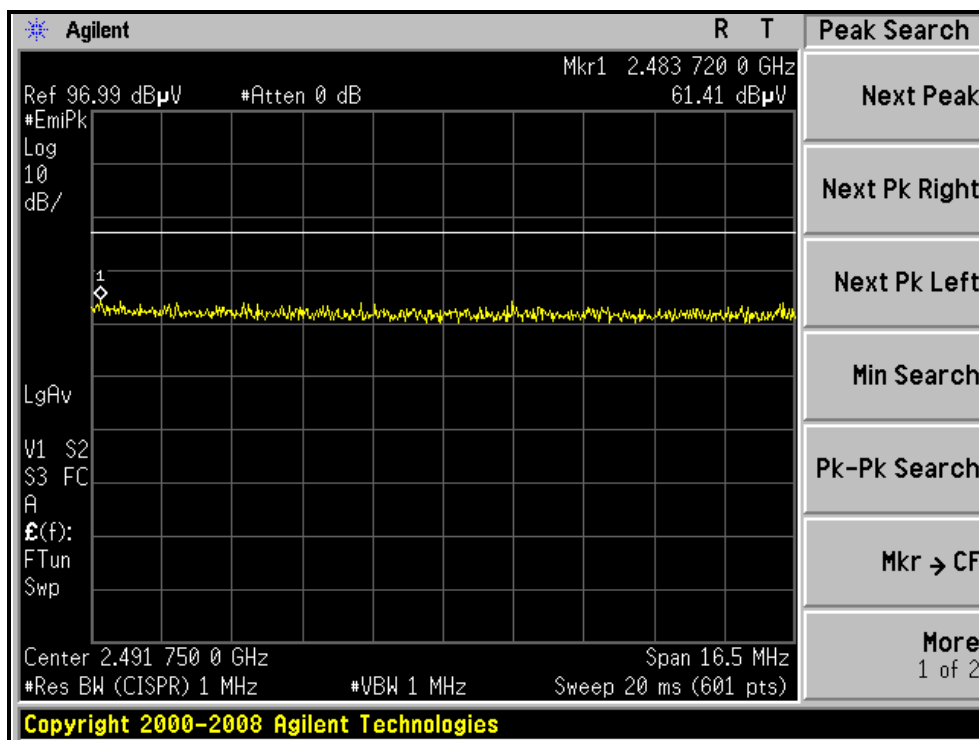
# RESTRICTED BANDEDGE (802.11g MODE,CH1, HORIZONTAL )



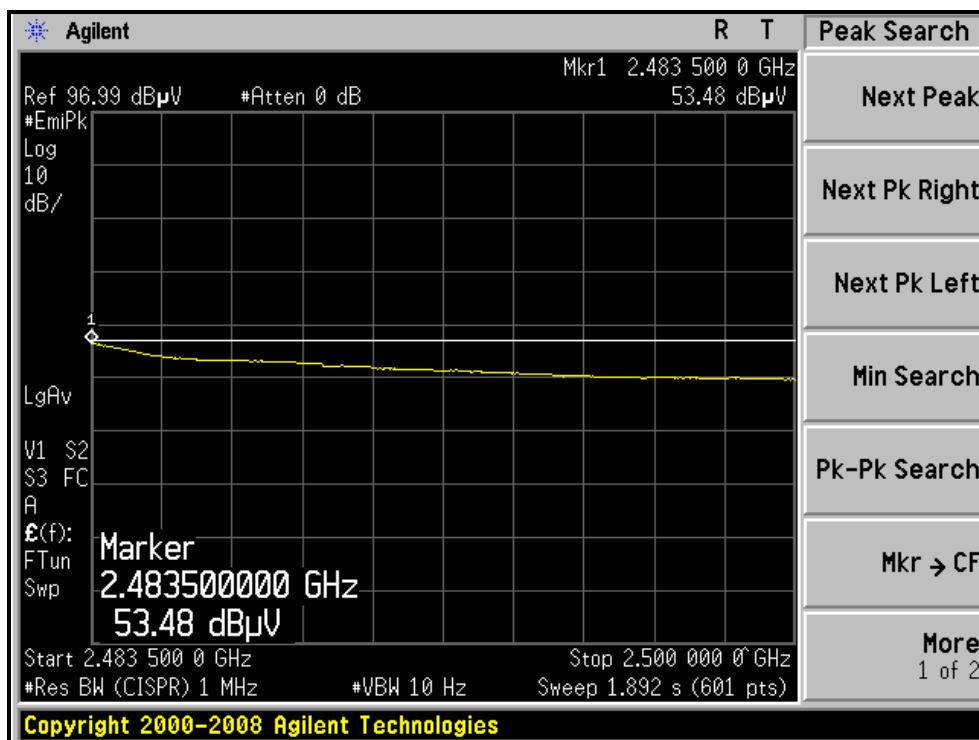
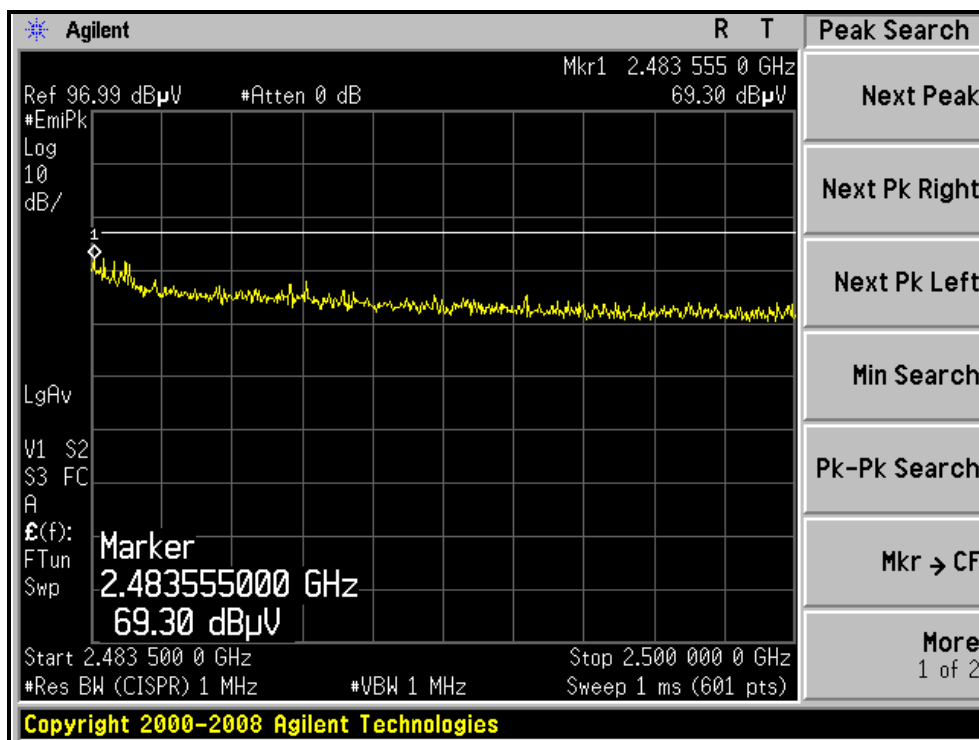
# RESTRICTED BANDEDGE (802.11g MODE,CH1, VERTICAL )



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



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







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**802.11n (20MHz) OFDM MODULATION**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	63.5 PK	74.0	-10.5	1.30 H	77	33.11	30.38
2	2390.00	46.1 AV	54.0	-7.9	1.30 H	77	15.69	30.38
3	*2412.00	98.1 PK			1.30 H	78	67.59	30.46
4	*2412.00	83.6 AV			1.30 H	78	53.17	30.46
5	4824.00	45.1 PK	74.0	-28.9	1.54 H	129	9.21	35.89
6	4824.00	38.2 AV	54.0	-15.8	1.54 H	129	2.31	35.89
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	71.3 PK	74.0	-2.7	1.38 V	266	40.92	30.38
2	2390.00	53.5 AV	54.0	-0.5	1.38 V	266	23.09	30.38
3	*2412.00	110.5 PK			1.38 V	282	80.04	30.46
4	*2412.00	91.4 AV			1.38 V	282	60.94	30.46
5	4824.00	48.4 PK	74.0	-25.6	1.41 V	37	12.51	35.89
6	4824.00	42.9 AV	54.0	-11.1	1.41 V	37	7.01	35.89

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	99.4 PK			1.30 H	80	68.84	30.56
2	*2437.00	84.4 AV			1.30 H	80	53.84	30.56
3	4874.00	46.3 PK	74.0	-27.7	1.54 H	123	10.30	36.00
4	4874.00	38.1 AV	54.0	-15.9	1.54 H	123	2.10	36.00
5	7311.00	49.7 PK	74.0	-24.3	1.24 H	216	7.62	42.08
6	7311.00	38.2 AV	54.0	-15.8	1.24 H	216	-3.88	42.08
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	*2437.00	111.0 PK			1.37 V	25	80.44	30.56
2	*2437.00	92.6 AV			1.37 V	25	61.99	30.56
3	4874.00	47.4 PK	74.0	-26.6	1.42 V	24	11.40	36.00
4	4874.00	41.3 AV	54.0	-12.7	1.42 V	24	5.30	36.00
5	7311.00	48.9 PK	74.0	-25.1	1.24 V	315	6.82	42.08
6	7311.00	37.3 AV	54.0	-16.7	1.24 V	315	-4.78	42.08

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



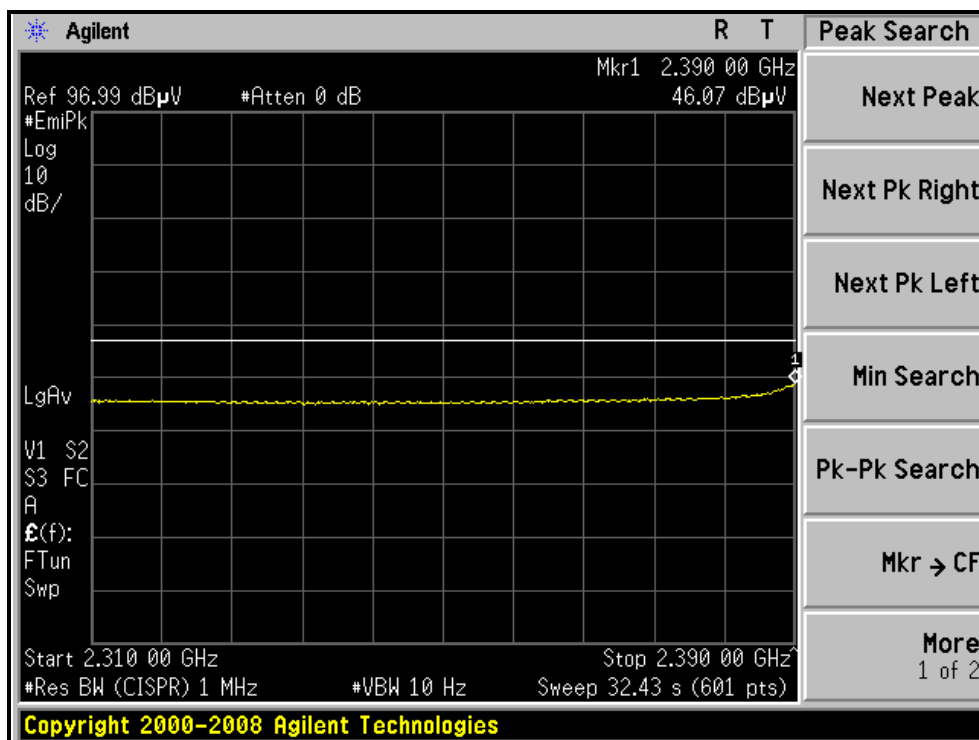
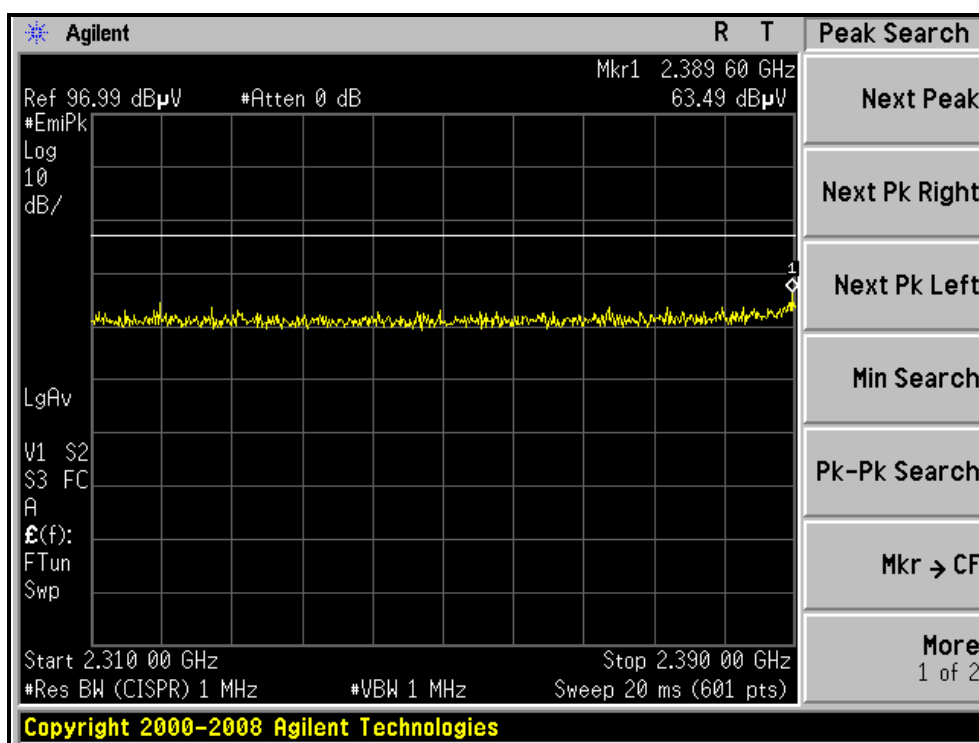
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

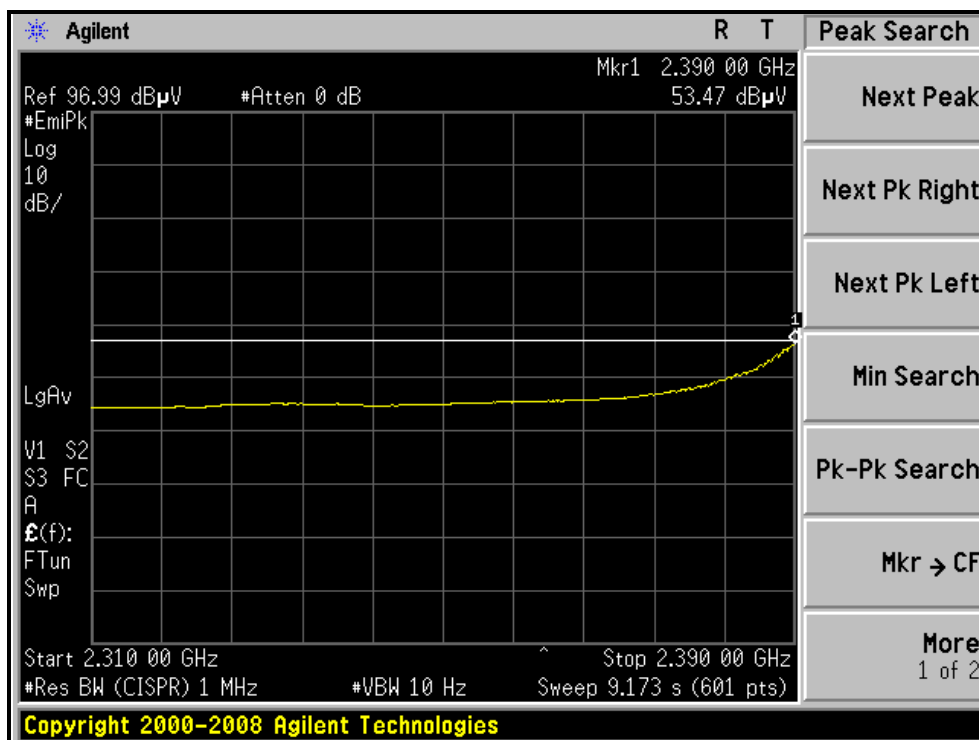
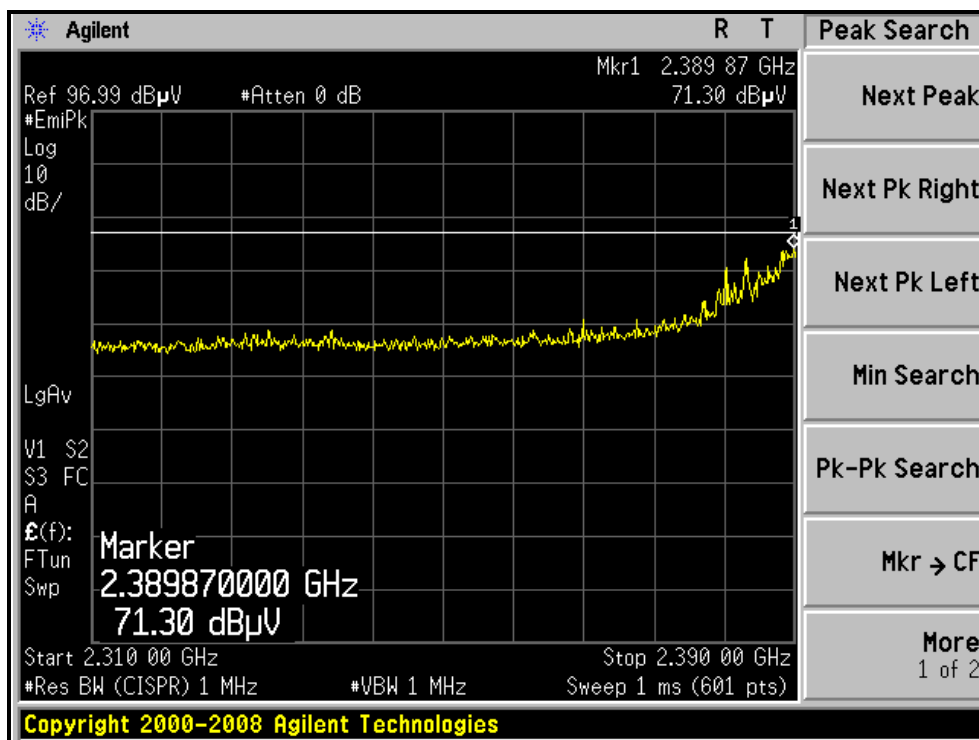
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	95.4 PK			1.00 H	290	64.77	30.65
2	*2462.00	81.9 AV			1.00 H	290	51.29	30.65
3	2483.50	62.0 PK	74.0	-12.0	1.27 H	73	31.25	30.73
4	2483.50	45.4 AV	54.0	-8.6	1.27 H	73	14.71	30.73
5	4924.00	45.7 PK	74.0	-28.3	1.59 H	127	9.60	36.10
6	4924.00	38.6 AV	54.0	-15.4	1.59 H	127	2.50	36.10
7	7386.00	49.3 PK	74.0	-24.7	1.14 H	213	7.04	42.26
8	7386.00	37.6 AV	54.0	-16.4	1.14 H	213	-4.66	42.26
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	110.5 PK			1.37 V	265	79.85	30.65
2	*2462.00	91.5 AV			1.37 V	265	60.85	30.65
3	2483.50	71.7 PK	74.0	-2.3	1.37 V	276	40.97	30.73
4	2483.50	53.3 AV	54.0	-0.8	1.37 V	276	22.52	30.73
5	4924.00	48.3 PK	74.0	-25.7	1.42 V	32	12.20	36.10
6	4924.00	42.6 AV	54.0	-11.4	1.42 V	32	6.50	36.10
7	7386.00	48.4 PK	74.0	-25.6	1.26 V	317	6.14	42.26
8	7386.00	36.7 AV	54.0	-17.3	1.26 V	317	-5.56	42.26

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

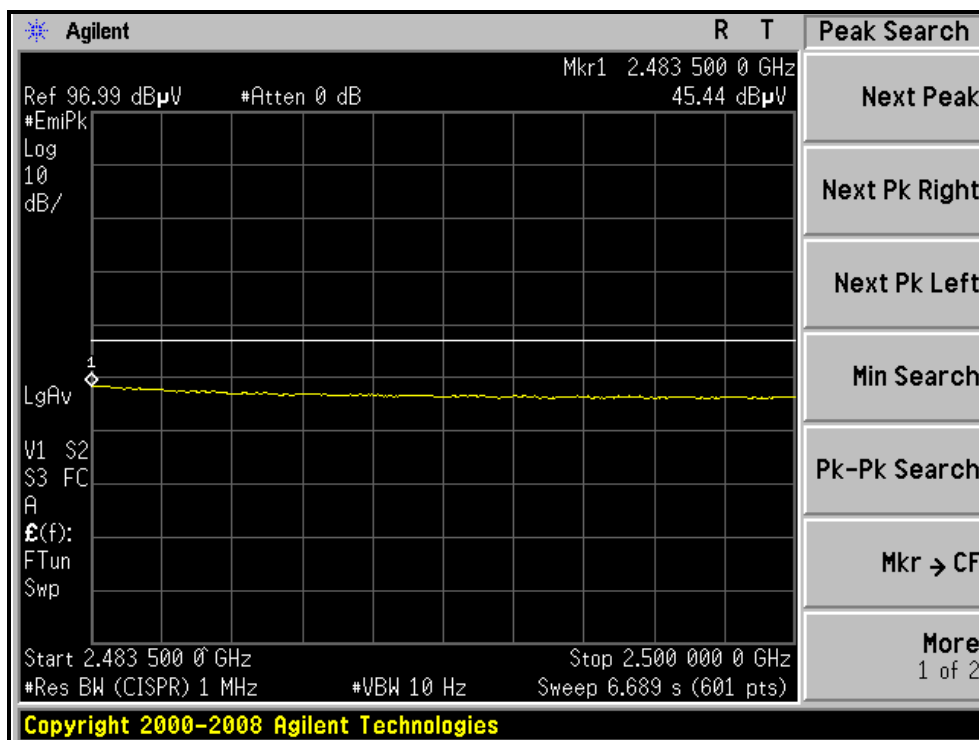
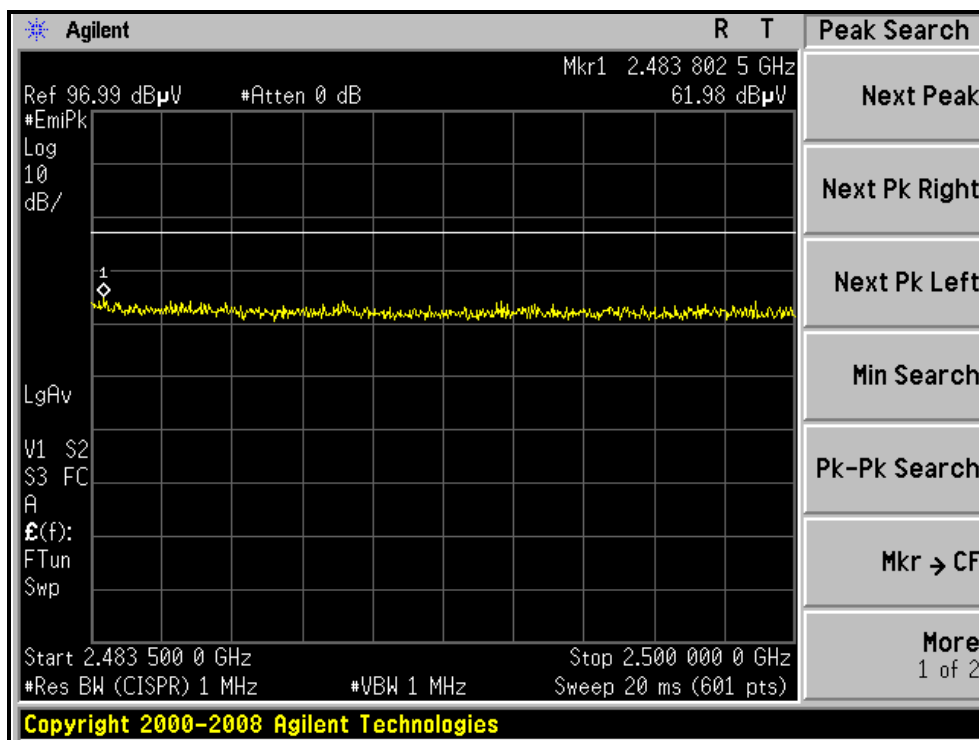
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, HORIZONTAL )



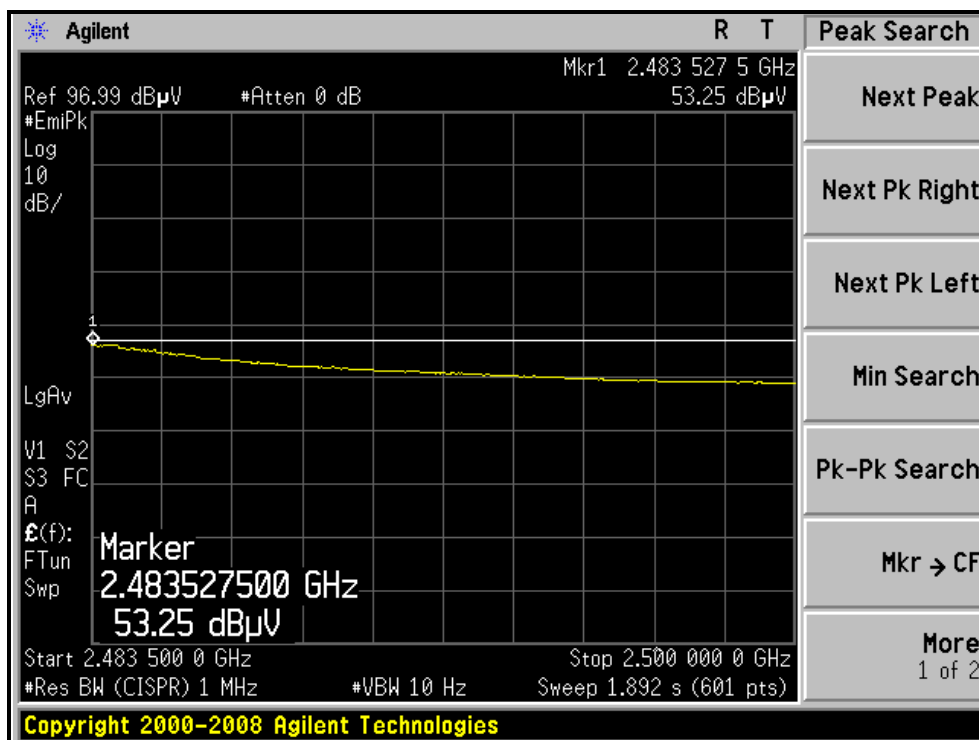
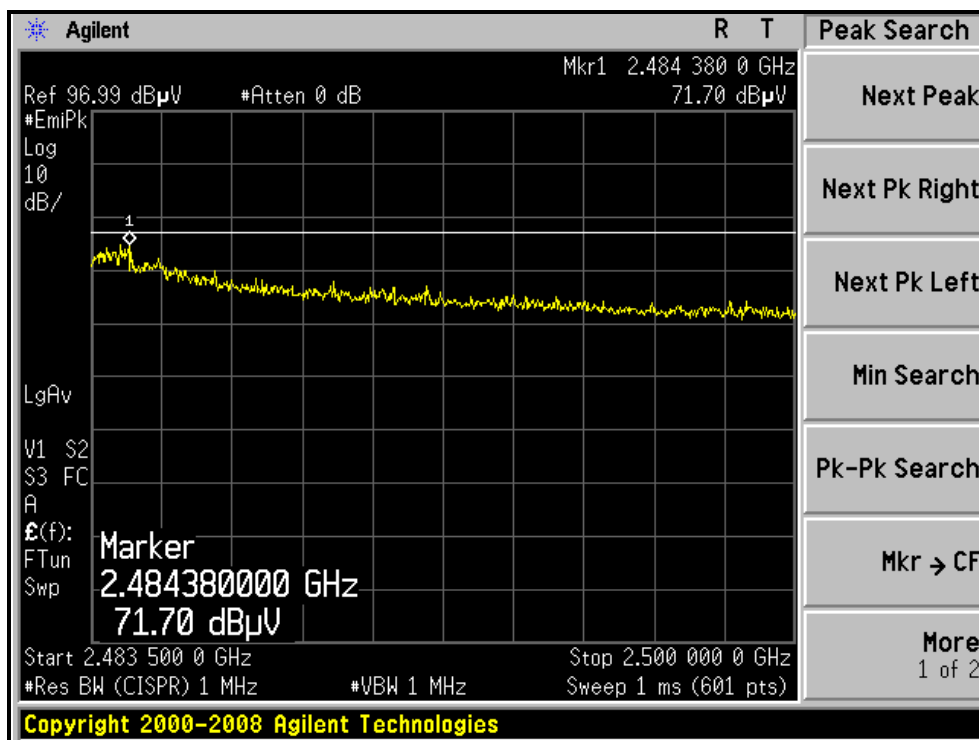
RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH1, VERTICAL )



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



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



### 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

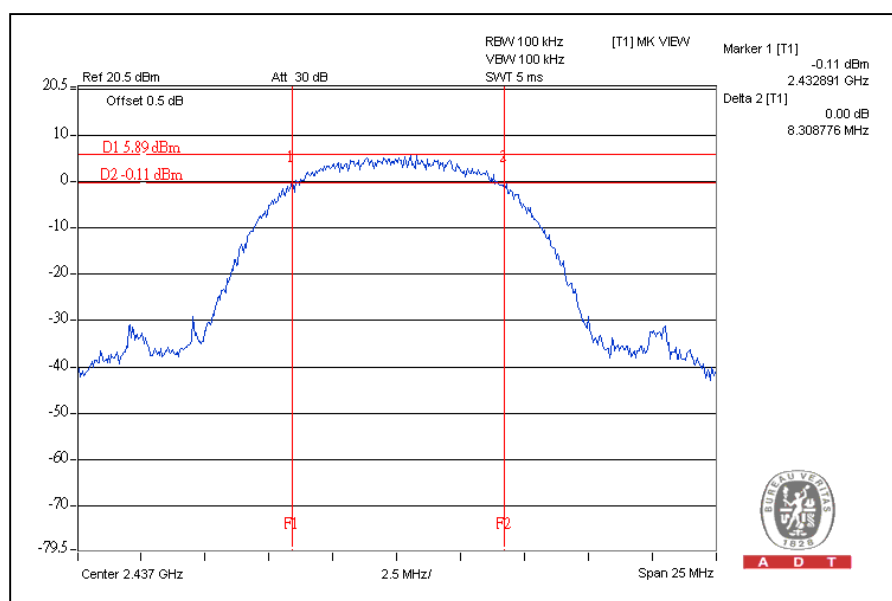
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

## 4.3.7 TEST RESULTS

### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.03	0.5	PASS
6	2437	8.31	0.5	PASS
11	2462	7.4	0.5	PASS

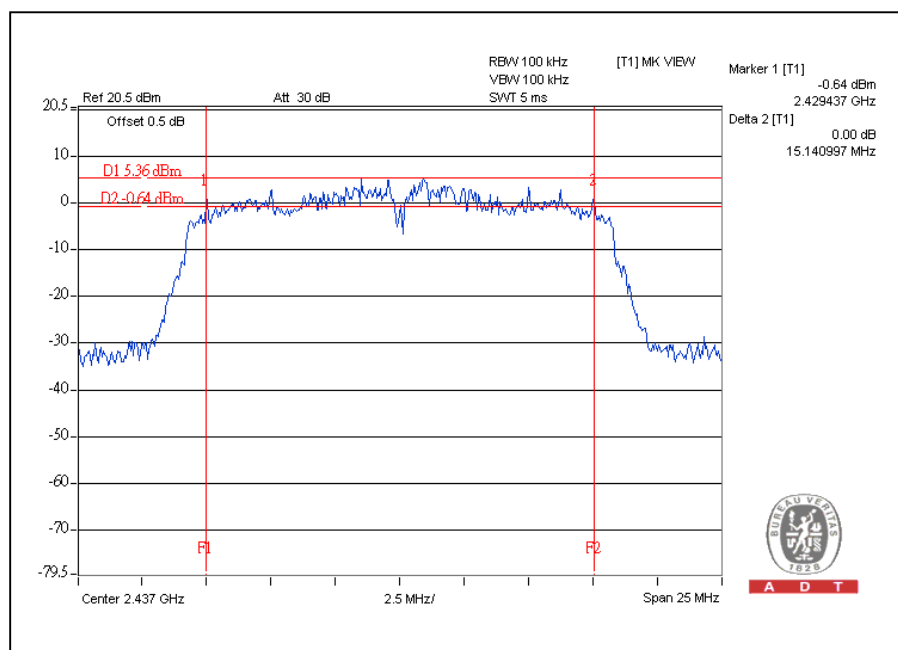
## CH6



## 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	14.42	0.5	PASS
6	2437	15.14	0.5	PASS
11	2462	15.07	0.5	PASS

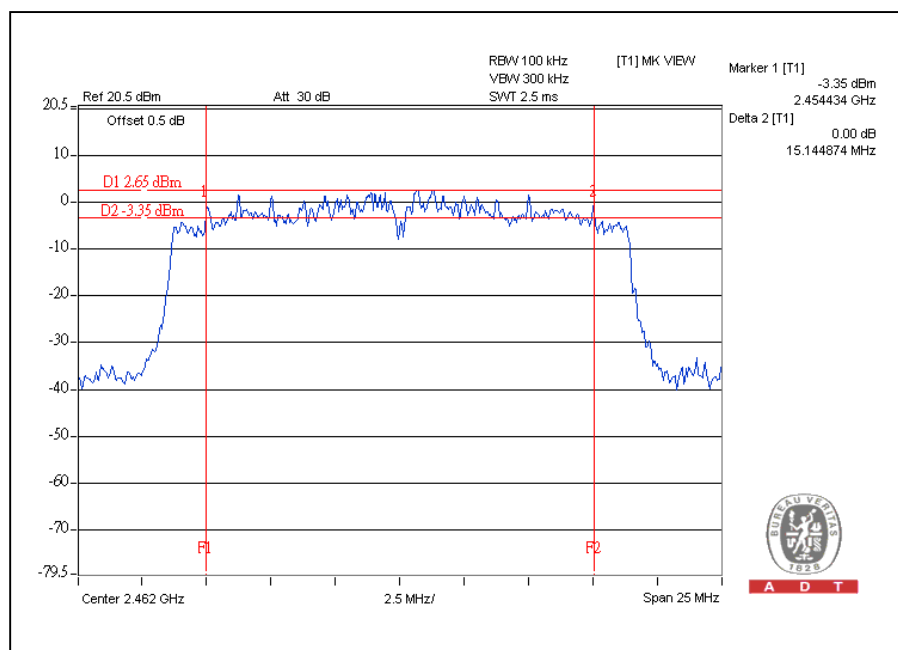
## CH6



## 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	13.87	0.5	PASS
6	2437	15.09	0.5	PASS
11	2462	15.14	0.5	PASS

CH11





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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	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.

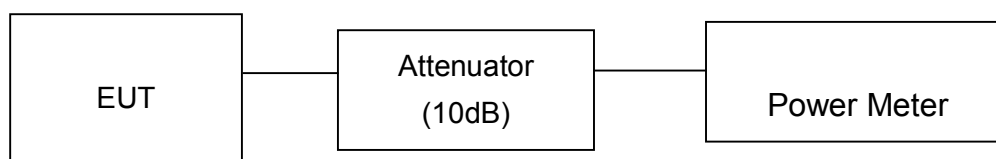
##### 4.4.3 TEST PROCEDURES

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 4.3.6

#### 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	19.2	83.2	30	PASS
6	2437	19.3	85.1	30	PASS
11	2462	19.2	83.2	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	22.0	21.5	299.7	24.8	30	PASS
6	2437	24.5	24.4	557.3	27.5	30	PASS
11	2462	22.1	21.9	317.1	25.0	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	23.4	23.1	423.0	26.3	30	PASS
6	2437	24.1	24.3	526.2	27.2	30	PASS
11	2462	22.8	22.8	381.1	25.8	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	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.



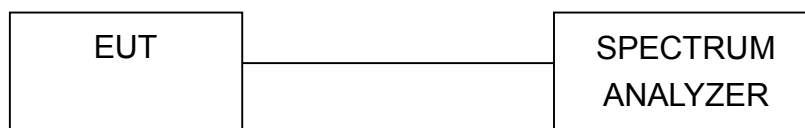
#### 4.5.3 TEST PROCEDURE

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

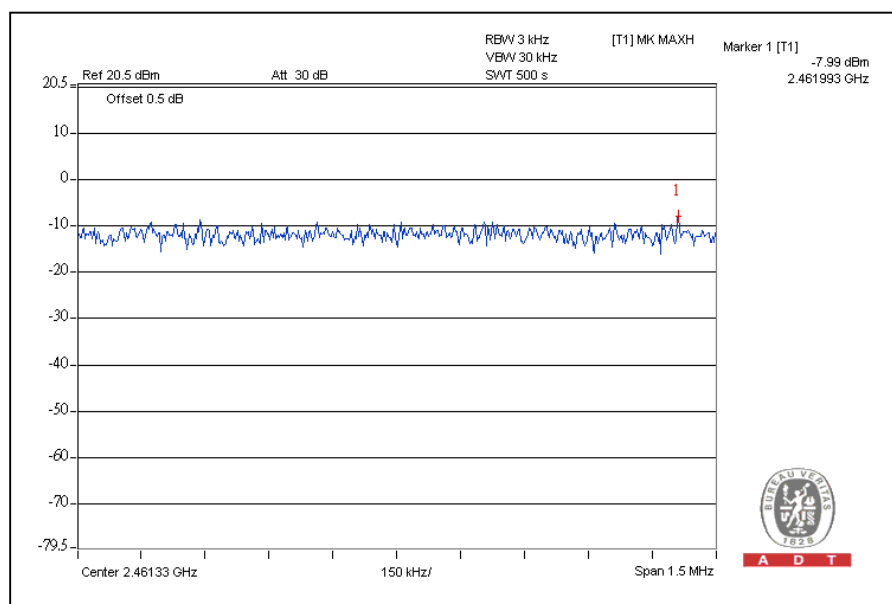
Same as Item 4.3.6

## 4.5.7 TEST RESULTS

### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-8.2	8	PASS
6	2437	-8.8	8	PASS
11	2462	-8.0	8	PASS

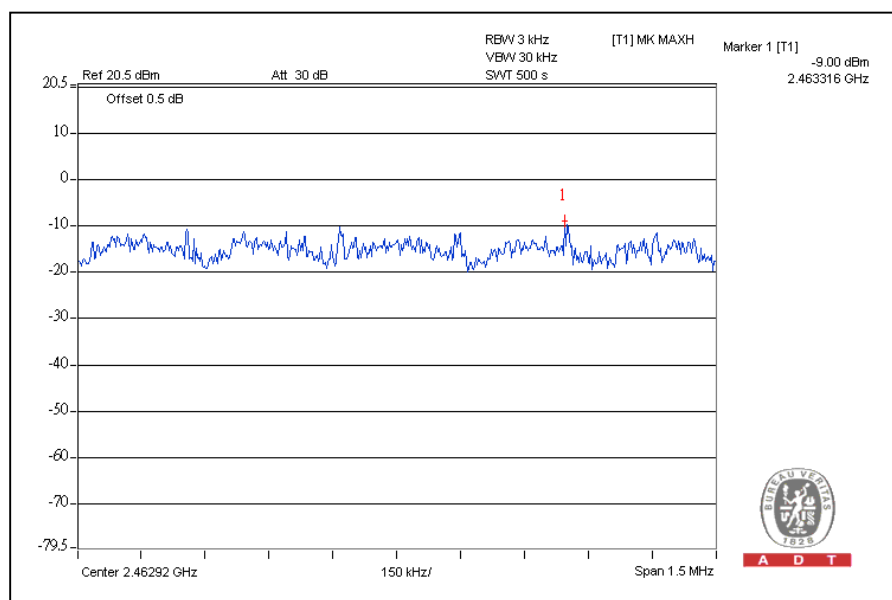
### CH11



## 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	-9.9	-11.5	-7.6	8	PASS
6	2437	-9.2	-9.2	-6.2	8	PASS
11	2462	-9.0	-11.2	-7.0	8	PASS

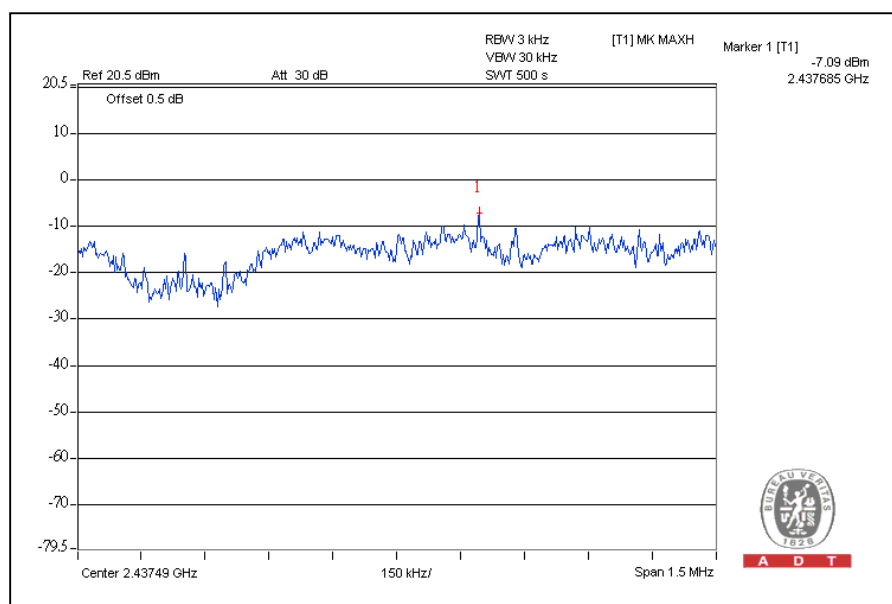
### CH11



## 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	-9.6	-7.3	8	PASS
6	2437	-7.1	-10.9	-5.6	8	PASS
11	2462	-11.5	-11.2	-8.3	8	PASS

## CH6



## 4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 4.6.2 TEST INSTRUMENTS

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

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

#### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 EUT OPERATING CONDITION

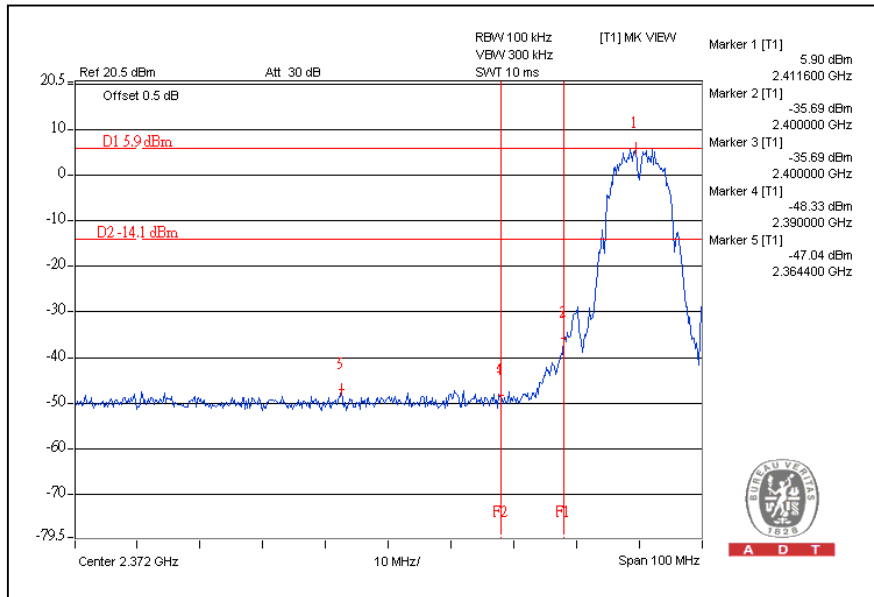
Same as Item 4.3.6

#### 4.6.6 TEST RESULTS

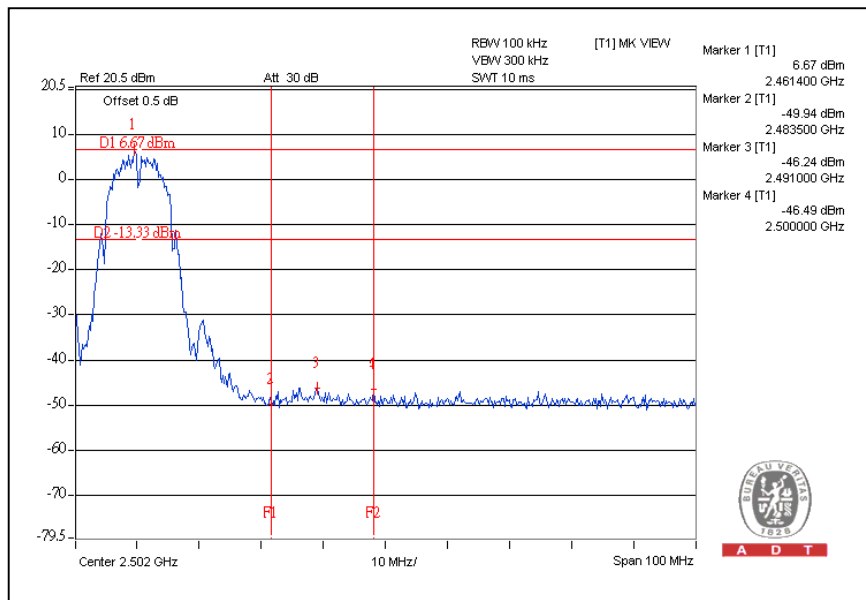
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

## 802.11b DSSS MODULATION:

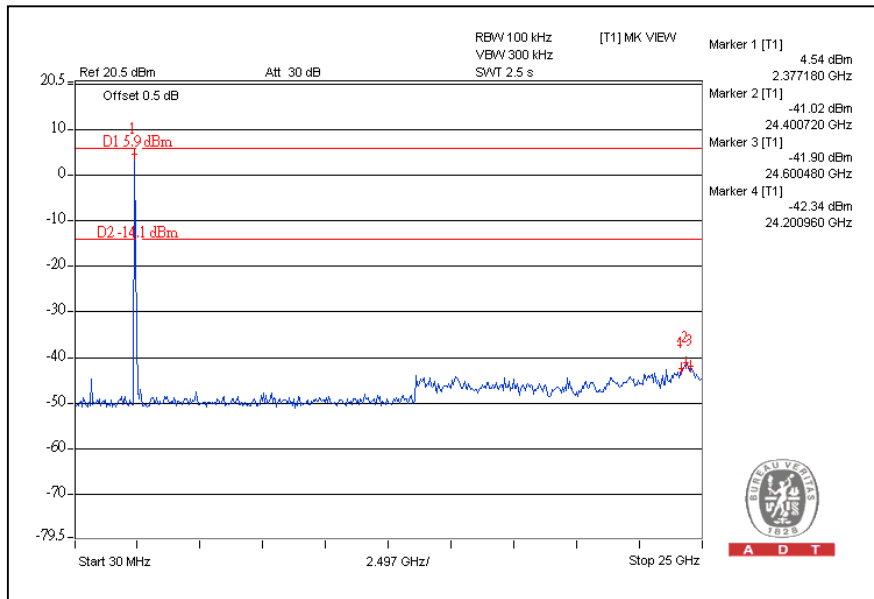
### CH1



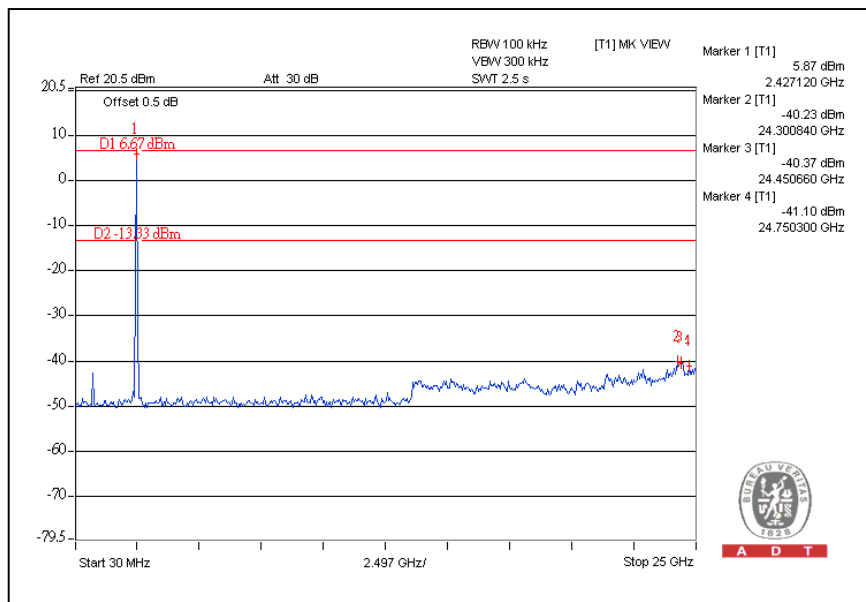
### CH11



## CH1



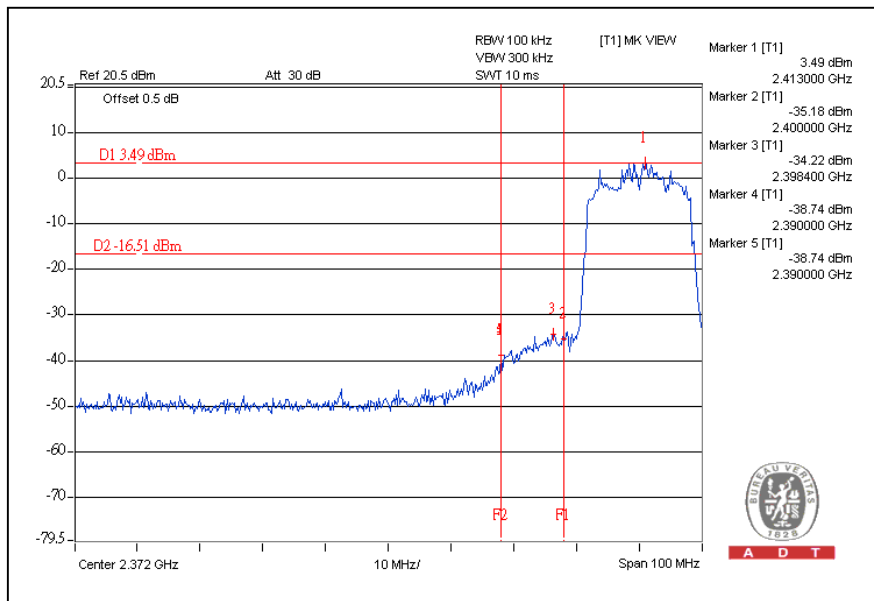
## CH11



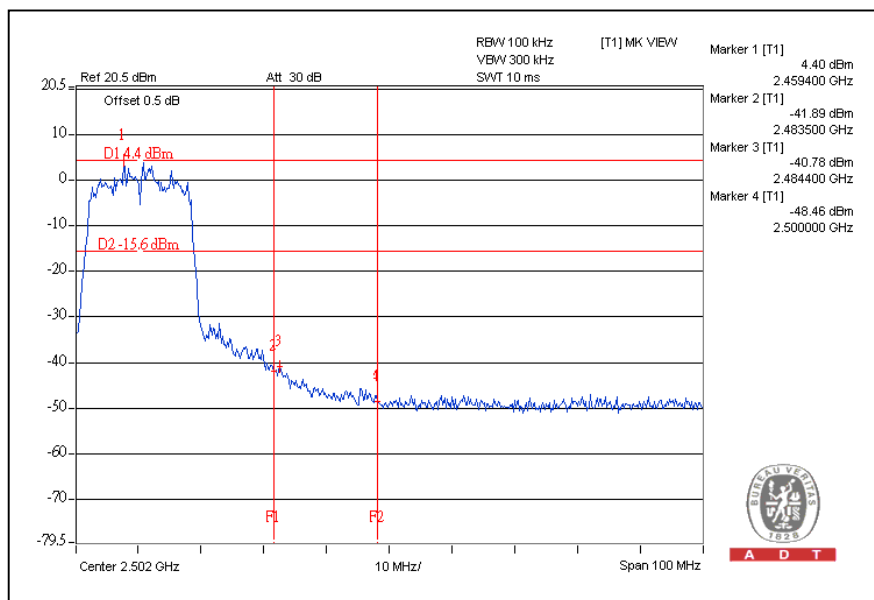


## 802.11g OFDM MODULATION::

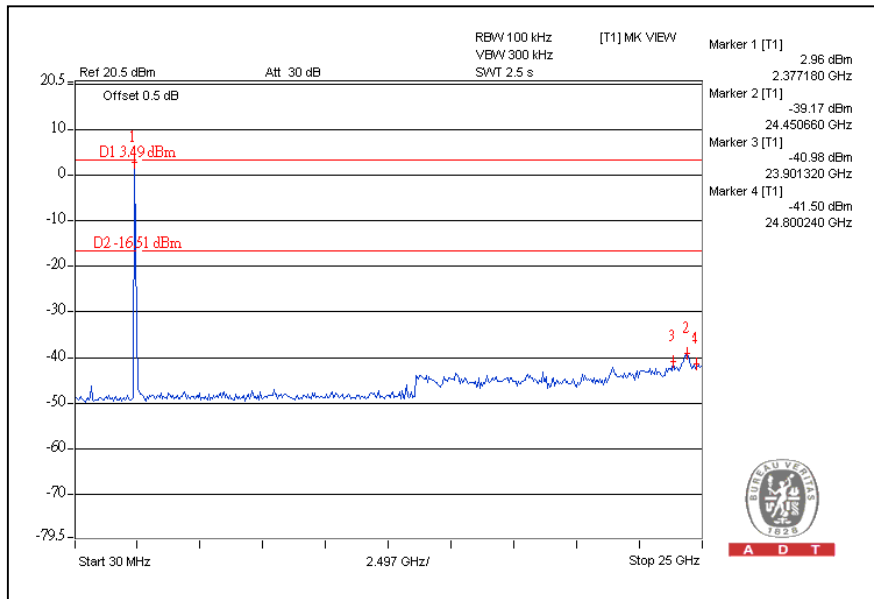
### CH1



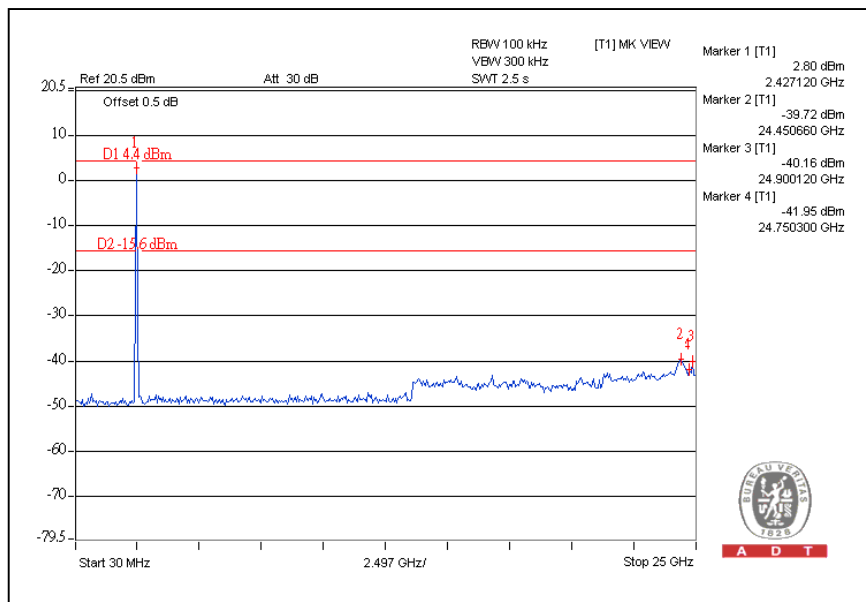
### CH11



## CH1

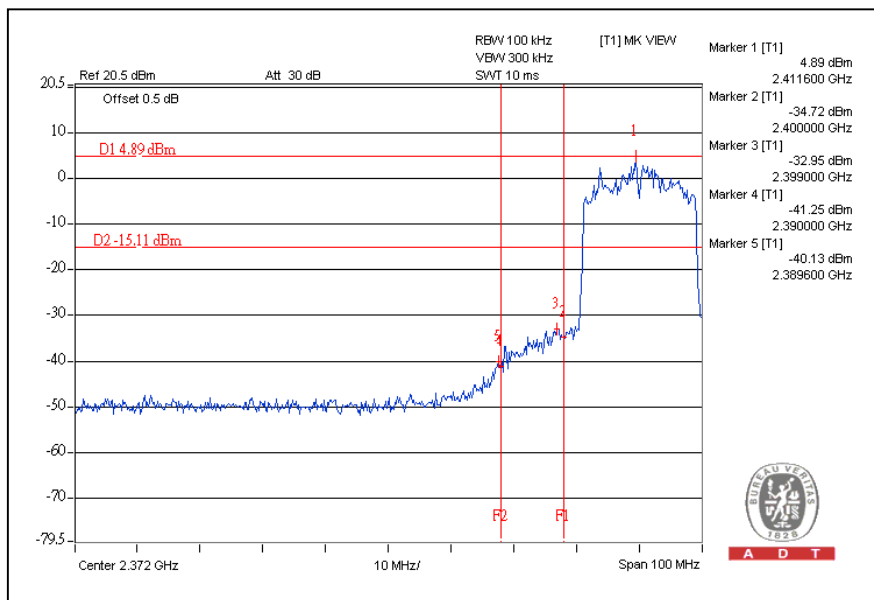


## CH11

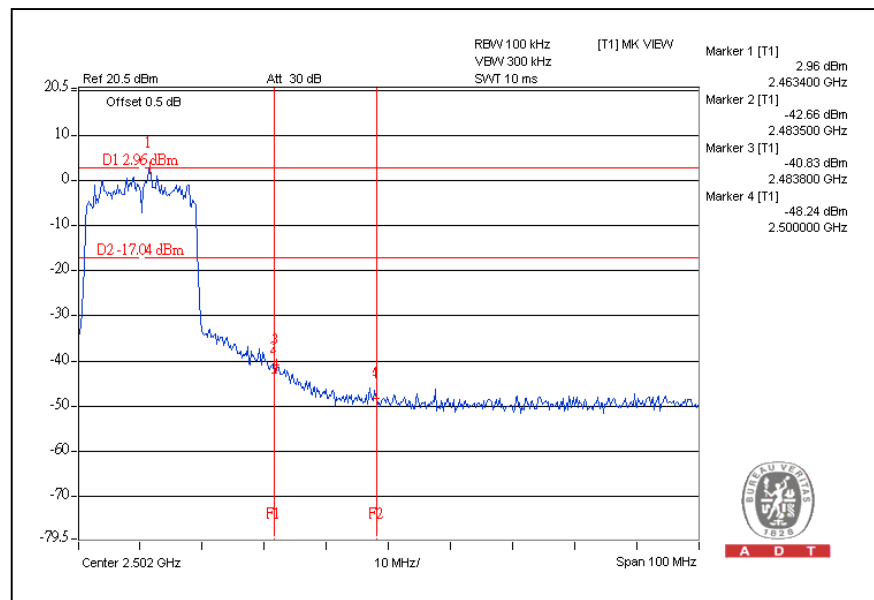


## 802.11n (20MHz) OFDM MODULATION:

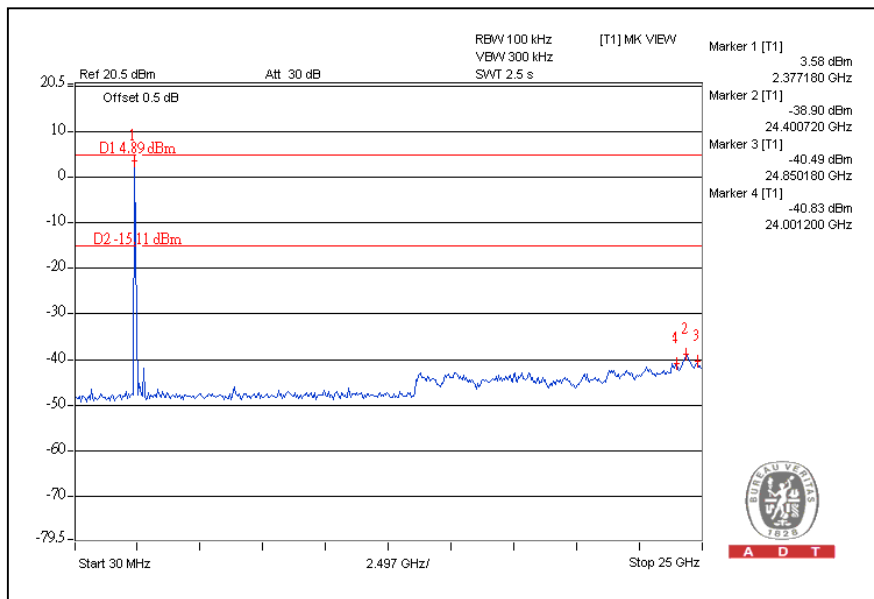
### CH1



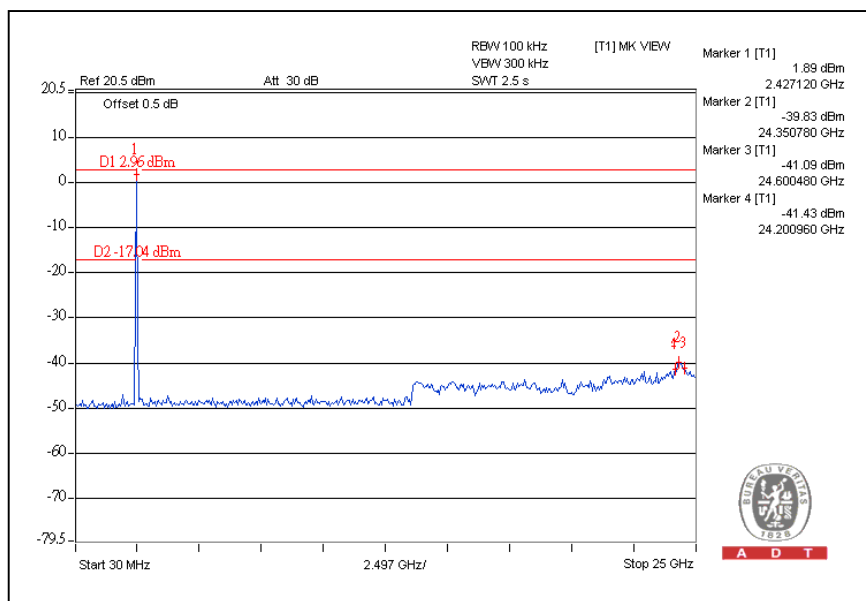
### CH11



## CH1



## CH11



## 5. TEST TYPES AND RESULTS (802.11a, 5725~5850MHz Band)

### 5.1 CONDUCTED EMISSION MEASUREMENT

#### 5.1.1 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.

#### 5.1.2 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 (JYEBAO)	5DFB	COACAB-001	Dec 14, 2009	Dec 13, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

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

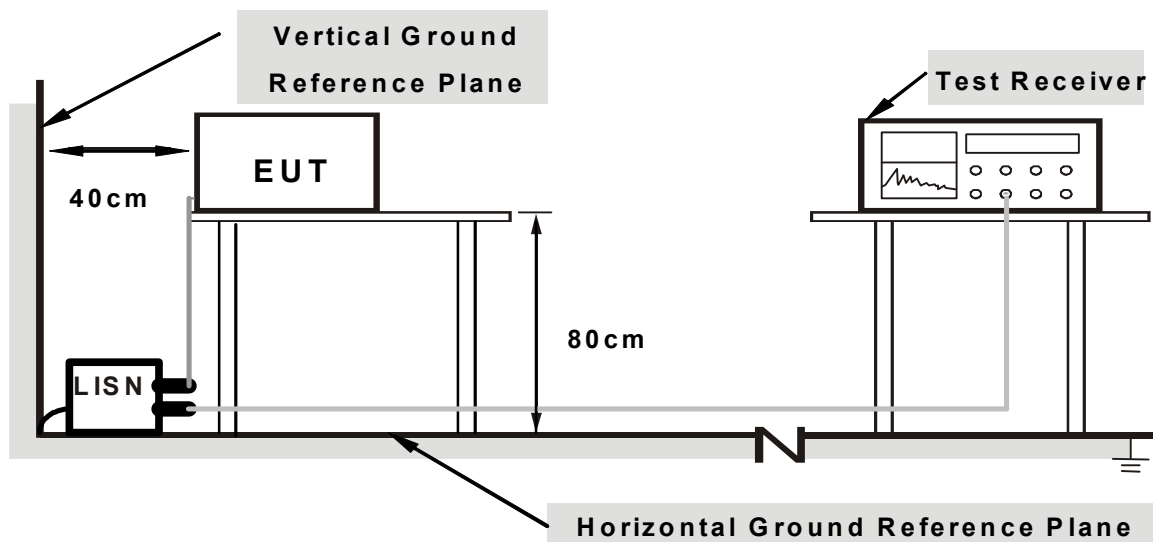
### 5.1.3 TEST PROCEDURES

- 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.

### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.1.5 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.

### 5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

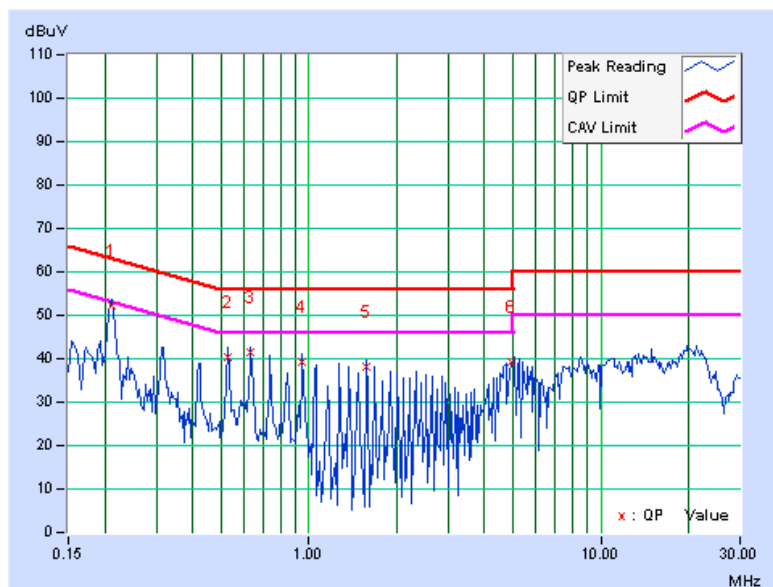
## 5.1.7 TEST RESULTS

### 802.11a OFDM MODULATION::

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.18	52.02	46.70	52.20	46.88	63.11	53.11	-10.91	-6.23
2	0.525	0.11	40.21	39.27	40.32	39.38	56.00	46.00	-15.68	-6.62
3	0.632	0.10	41.33	41.14	41.43	41.24	56.00	46.00	-14.57	-4.76
4	0.947	0.09	39.16	38.87	39.25	38.96	56.00	46.00	-16.75	-7.04
5	1.582	0.10	38.01	37.13	38.11	37.23	56.00	46.00	-17.89	-8.77
6	4.953	0.23	39.00	37.56	39.23	37.79	56.00	46.00	-16.77	-8.21

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

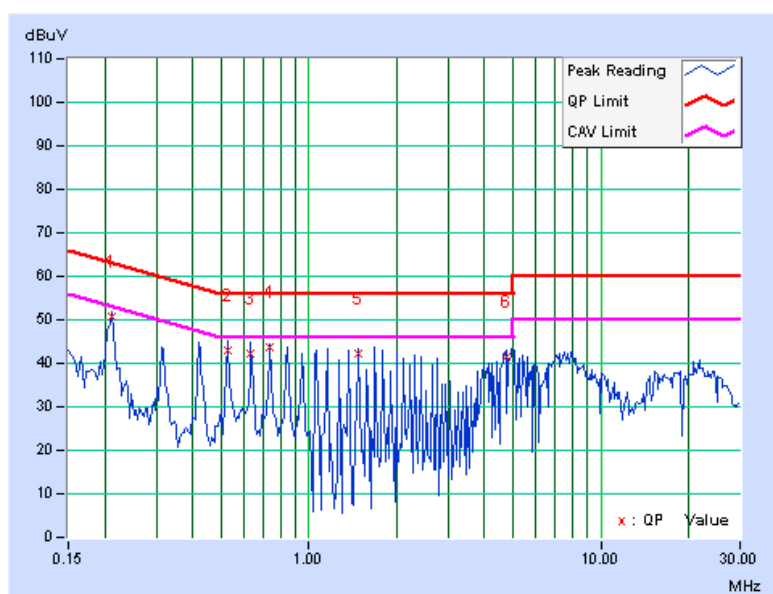




PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.19	50.49	47.55	50.68	47.74	63.11	53.11	-12.43	-5.37
2	0.528	0.12	42.77	42.75	42.89	42.87	56.00	46.00	-13.11	-3.13
3	0.634	0.12	42.06	41.02	42.18	41.14	56.00	46.00	-13.82	-4.86
4	0.739	0.11	43.73	42.85	43.84	42.96	56.00	46.00	-12.16	-3.04
5	1.477	0.12	42.09	42.00	42.21	42.12	56.00	46.00	-13.79	-3.88
6	4.742	0.24	41.24	39.83	41.48	40.07	56.00	46.00	-14.52	-5.93

- 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.



## 5.2 RADIATED EMISSION MEASUREMENT

### 5.2.1 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.

**A D T**

## 5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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

2. The horn antenna, 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.

### 5.2.3 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 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

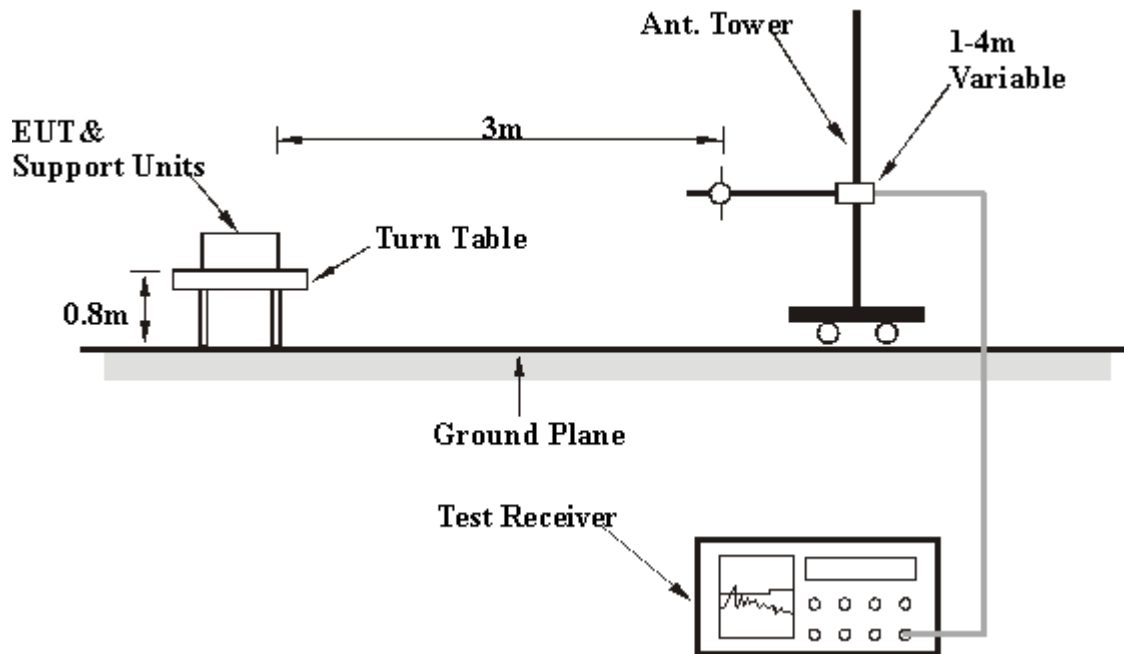
**NOTE:**

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 of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation

## 5.2.5 TEST SETUP



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

## 5.2.6 EUT OPERATING CONDITIONS

Same as the 4.2.6

## 5.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 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	75.40	25.2 QP	40.0	-14.8	1.15 H	134	13.68	11.54
2	241.70	28.2 QP	46.0	-17.9	1.24 H	99	14.76	13.39
3	398.90	32.1 QP	46.0	-13.9	1.12 H	150	13.60	18.51
4	500.00	41.2 QP	46.0	-4.8	1.60 H	25	19.92	21.31
5	750.00	36.1 QP	46.0	-9.9	1.02 H	333	10.43	25.71
6	1000.00	48.3 QP	54.0	-5.7	1.55 H	13	19.23	29.04
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	66.60	32.4 QP	40.0	-7.6	1.00 V	326	19.42	13.01
2	75.50	36.9 QP	40.0	-3.1	1.00 V	165	25.40	11.52
3	118.00	28.6 QP	43.5	-14.9	1.00 V	293	16.89	11.75
4	138.50	36.1 QP	43.5	-7.4	1.10 V	50	22.20	13.92
5	550.00	39.8 QP	46.0	-6.3	1.00 V	25	17.15	22.60
6	750.00	39.4 QP	46.0	-6.6	1.00 V	351	13.66	25.71
7	1000.00	50.2 QP	54.0	-3.8	1.00 V	2	21.19	29.04

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



A D T

## ABOVE 1GHz DATA

## 802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

## ANTENNA POLARITY &amp; 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	*5745.00	99.0 PK			1.25 H	23	61.74	37.26
2	*5745.00	89.6 AV			1.25 H	23	52.34	37.26
3	11490.00	53.4 PK	74.0	-20.6	1.28 H	169	6.37	47.03
4	11490.00	42.6 AV	54.0	-11.4	1.28 H	169	-4.43	47.03
5	#17235.00	60.7 PK	79.0	-18.3	1.22 H	0	10.93	49.77
6	#17235.00	49.1 AV	69.6	-20.5	1.22 H	0	-0.67	49.77

## ANTENNA POLARITY &amp; 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	*5745.00	114.2 PK			1.13 V	104	76.94	37.26
2	*5745.00	102.4 AV			1.13 V	104	65.14	37.26
3	11490.00	54.4 PK	74.0	-19.6	1.48 V	11	7.37	47.03
4	11490.00	43.6 AV	54.0	-10.4	1.48 V	11	-3.43	47.03
5	#17235.00	59.6 PK	94.2	-34.6	1.13 V	147	9.83	49.77
6	#17235.00	49.0 AV	82.4	-33.4	1.13 V	147	-0.77	49.77

**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.

6. The limit value is defined as per 15.247.

7. “#”:The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5785.00	99.2 PK			1.25 H	25	61.86	37.34
2	*5785.00	89.8 AV			1.25 H	25	52.46	37.34
3	11570.00	53.8 PK	74.0	-20.2	1.25 H	156	6.93	46.91
4	11570.00	42.8 AV	54.0	-11.2	1.25 H	156	-4.11	46.91
5	#17355.00	60.5 PK	79.2	-18.7	1.20 H	341	10.29	50.22
6	#17355.00	49.5 AV	69.8	-20.3	1.20 H	341	-0.72	50.22
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	*5785.00	115.6 PK			1.17 V	112	78.26	37.34
2	*5785.00	102.7 AV			1.17 V	112	65.36	37.34
3	11570.00	54.6 PK	74.0	-19.4	1.43 V	29	7.69	46.91
4	11570.00	43.1 AV	54.0	-10.9	1.43 V	29	-3.81	46.91
5	#17355.00	60.1 PK	95.6	-35.5	1.19 V	123	9.88	50.22
6	#17355.00	50.2 AV	82.7	-32.5	1.19 V	123	-0.02	50.22

**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.  
6. The limit value is defined as per 15.247.  
7. “#”:The radiated frequency is out the restricted band.





A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5825.00	97.3 PK			1.24 H	61	59.88	37.42
2	*5825.00	89.0 AV			1.24 H	61	51.58	37.42
3	11650.00	54.1 PK	74.0	-19.9	1.26 H	147	7.32	46.78
4	11650.00	43.0 AV	54.0	-11.0	1.26 H	147	-3.78	46.78
5	#17475.00	60.7 PK	77.3	-16.6	1.18 H	358	10.04	50.66
6	#17475.00	50.3 AV	69.0	-18.7	1.18 H	358	-0.36	50.66
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	*5825.00	115.3 PK			1.14 V	109	77.88	37.42
2	*5825.00	103.4 AV			1.14 V	109	65.98	37.42
3	11650.00	53.6 PK	74.0	-20.4	1.44 V	21	6.82	46.78
4	11650.00	42.8 AV	54.0	-11.2	1.44 V	21	-3.98	46.78
5	#17475.00	60.3 PK	95.3	-35.0	1.14 V	121	9.64	50.66
6	#17475.00	50.0 AV	83.4	-33.4	1.14 V	121	-0.66	50.66

**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.  
6. The limit value is defined as per 15.247.  
7. “#”:The radiated frequency is out the restricted band.



A D T

## 802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5745.00	99.2 PK			1.36 H	35	61.94	37.26
2	*5745.00	87.0 AV			1.36 H	35	49.74	37.26
3	11490.00	52.3 PK	74.0	-21.7	1.24 H	146	5.27	47.03
4	11490.00	41.6 AV	54.0	-12.4	1.24 H	146	-5.43	47.03
5	#17235.00	61.2 PK	79.2	-18.0	1.37 H	21	11.43	49.77
6	#17235.00	49.4 AV	67.0	-17.6	1.37 H	21	-0.37	49.77
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	*5745.00	114.8 PK			1.16 V	107	77.54	37.26
2	*5745.00	102.9 AV			1.16 V	107	65.64	37.26
3	11490.00	52.9 PK	74.0	-21.1	1.48 V	35	5.87	47.03
4	11490.00	42.7 AV	54.0	-11.3	1.48 V	35	-4.33	47.03
5	#17235.00	61.3 PK	94.8	-33.5	1.14 V	163	11.53	49.77
6	#17235.00	49.1 AV	82.9	-33.8	1.14 V	163	-0.67	49.77

**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.  
6. The limit value is defined as per 15.247.  
7. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5785.00	99.5 PK			1.35 H	30	62.16	37.34
2	*5785.00	87.3 AV			1.35 H	30	49.96	37.34
3	11570.00	52.9 PK	74.0	-21.1	1.29 H	140	5.99	46.91
4	11570.00	42.1 AV	54.0	-11.9	1.29 H	140	-4.81	46.91
5	#17355.00	61.4 PK	79.5	-18.1	1.25 H	28	11.18	50.22
6	#17355.00	49.8 AV	67.3	-17.5	1.25 H	28	-0.42	50.22
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	*5785.00	115.2 PK			1.21 V	101	77.86	37.34
2	*5785.00	103.1 AV			1.21 V	101	65.76	37.34
3	11570.00	52.4 PK	74.0	-21.6	1.44 V	39	5.49	46.91
4	11570.00	41.6 AV	54.0	-12.4	1.44 V	39	-5.31	46.91
5	#17355.00	61.7 PK	95.2	-33.5	1.23 V	162	11.48	50.22
6	#17355.00	49.8 AV	83.1	-33.3	1.23 V	162	-0.42	50.22

**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.  
 6. The limit value is defined as per 15.247.  
 7. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5825.00	99.5 PK			1.38 H	33	62.08	37.42
2	*5825.00	87.8 AV			1.38 H	33	50.38	37.42
3	11650.00	53.3 PK	74.0	-20.7	1.27 H	145	6.52	46.78
4	11650.00	42.6 AV	54.0	-11.4	1.27 H	145	-4.18	46.78
5	#17475.00	61.5 PK	79.5	-18.0	1.21 H	20	10.84	50.66
6	#17475.00	51.3 AV	67.8	-16.5	1.21 H	20	0.64	50.66
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	*5825.00	115.9 PK			1.14 V	106	78.48	37.42
2	*5825.00	103.8 AV			1.14 V	106	66.38	37.42
3	11650.00	52.0 PK	74.0	-22.0	1.41 V	32	5.22	46.78
4	11650.00	41.2 AV	54.0	-12.8	1.41 V	32	-5.58	46.78
5	#17475.00	62.4 PK	95.9	-33.5	1.19 V	171	11.74	50.66
6	#17475.00	51.6 AV	83.8	-32.2	1.19 V	171	0.94	50.66

**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.  
6. The limit value is defined as per 15.247.  
7. “#”:The radiated frequency is out the restricted band.

# 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5755.00	97.3 PK			1.36 H	29	60.02	37.28
2	*5755.00	81.6 AV			1.36 H	29	44.32	37.28
3	11510.00	56.7 PK	74.0	-17.3	1.33 H	186	9.69	47.01
4	11510.00	43.5 AV	54.0	-10.5	1.33 H	186	-3.51	47.01
5	#17265.00	63.4 PK	77.3	-13.9	1.20 H	10	13.51	49.89
6	#17265.00	50.8 AV	61.6	-10.8	1.20 H	10	0.91	49.89
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	*5755.00	110.7 PK			1.14 V	89	73.42	37.28
2	*5755.00	96.3 AV			1.14 V	89	59.02	37.28
3	11510.00	54.3 PK	74.0	-19.7	1.42 V	29	7.29	47.01
4	11510.00	43.4 AV	54.0	-10.6	1.42 V	29	-3.61	47.01
5	#17265.00	61.2 PK	90.7	-29.5	1.03 V	134	11.31	49.89
6	#17265.00	50.8 AV	76.3	-25.5	1.03 V	134	0.91	49.89

**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.  
6. The limit value is defined as per 15.247.  
7. “#”:The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	14deg. C, 68%RH 1021 hPa	TESTED BY	Duke Tseng

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	*5795.00	98.2 PK			1.38 H	31	60.84	37.36
2	*5795.00	82.5 AV			1.38 H	31	45.14	37.36
3	11590.00	56.3 PK	74.0	-17.7	1.34 H	192	9.42	46.88
4	11590.00	43.3 AV	54.0	-10.7	1.34 H	192	-3.58	46.88
5	#17385.00	62.9 PK	78.2	-15.3	1.21 H	17	12.57	50.33
6	#17385.00	50.4 AV	62.5	-12.1	1.21 H	17	0.07	50.33
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	*5795.00	111.8 PK			1.14 V	74	74.44	37.36
2	*5795.00	96.6 AV			1.14 V	74	59.24	37.36
3	11590.00	55.1 PK	74.0	-18.9	1.46 V	23	8.22	46.88
4	11590.00	43.7 AV	54.0	-10.3	1.46 V	23	-3.18	46.88
5	#17385.00	61.9 PK	91.8	-29.9	1.12 V	131	11.57	50.33
6	#17385.00	50.9 AV	76.6	-25.7	1.12 V	131	0.57	50.33

**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.  
6. The limit value is defined as per 15.247.  
7. “#”:The radiated frequency is out the restricted band.

### 5.3 6dB BANDWIDTH MEASUREMENT

#### 5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 5.3.2 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.

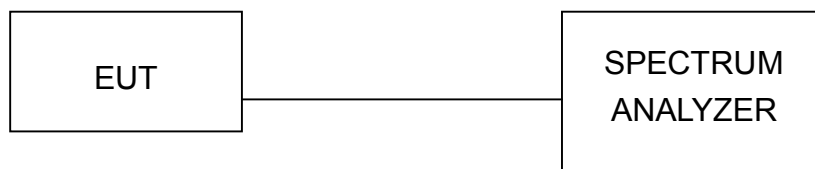
### 5.3.3 TEST PROCEDURE

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.

### 5.3.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.3.5 TEST SETUP



### 5.3.6 EUT OPERATING CONDITIONS

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



## 5.3.7 TEST RESULTS

### 802.11a OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.17	0.5	PASS
157	5785	15.14	0.5	PASS
165	5825	15.19	0.5	PASS

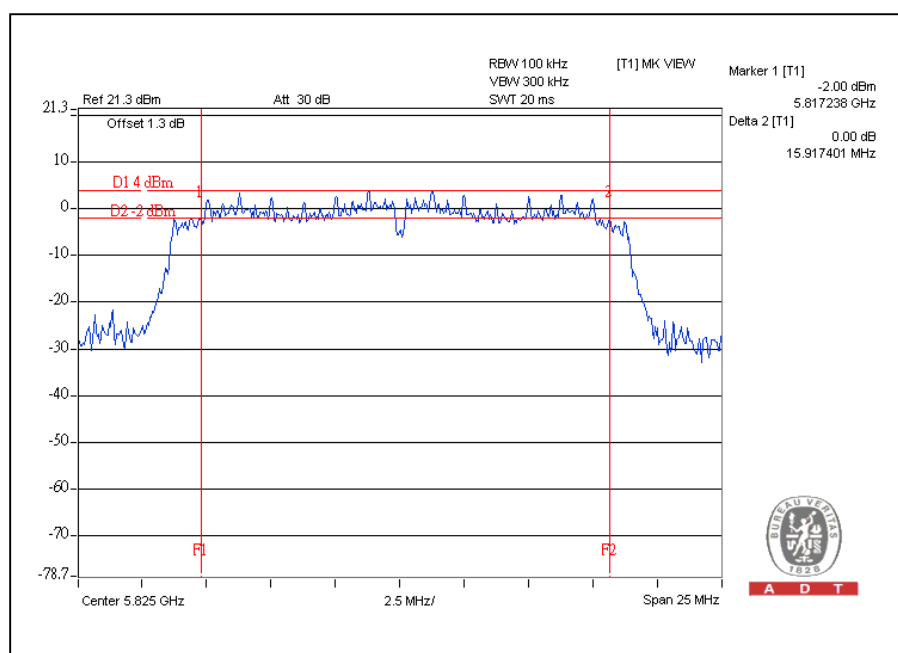
### CH165



## 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.17	0.5	PASS
157	5785	15.17	0.5	PASS
165	5825	15.92	0.5	PASS

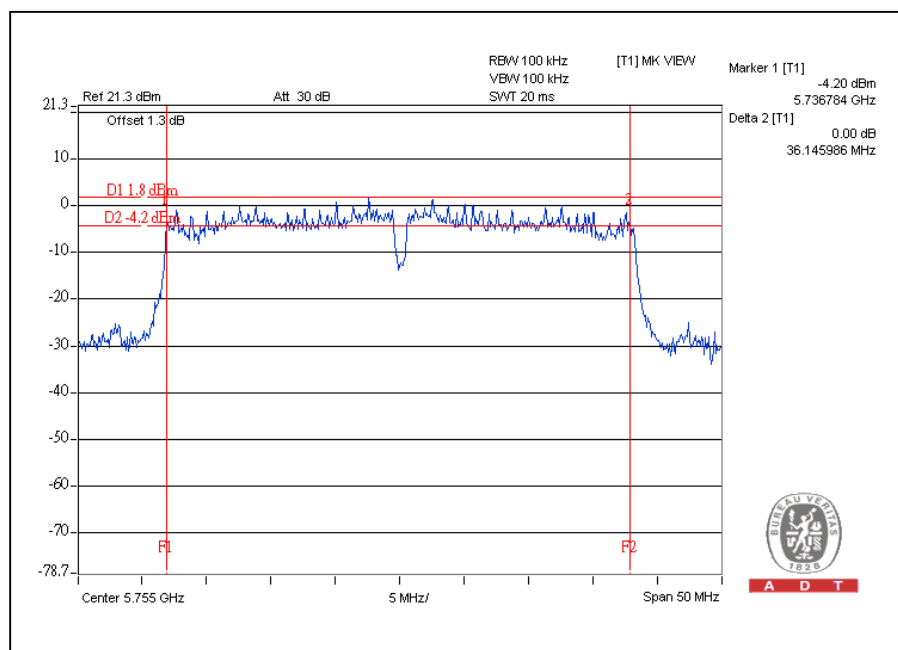
### CH165



## 802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
151	5755	36.15	0.5	PASS
159	5795	35.83	0.5	PASS

### CH151



## 5.4 MAXIMUM PEAK OUTPUT POWER

### 5.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

### 5.4.2 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.

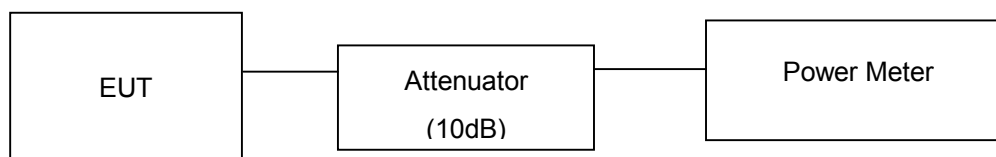
### 5.4.3 TEST PROCEDURES

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.

### 5.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.4.5 TEST SETUP



### 5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

## 5.4.7 TEST RESULTS

### 802.11a 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)				
149	5745	21.5	21.7	289.2	24.6	30	PASS
157	5785	21.4	22.1	300.2	24.8	30	PASS
165	5825	21.6	22.3	314.4	25.0	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)				
149	5745	21.4	21.8	289.4	24.6	30	PASS
157	5785	21.5	21.4	279.3	24.5	30	PASS
165	5825	21.6	22.4	318.3	25.0	30	PASS

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

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
151	5755	20.4	20.9	232.7	23.7	30	PASS
159	5795	20.7	21.3	252.4	24.0	30	PASS

## 5.5 POWER SPECTRAL DENSITY MEASUREMENT

### 5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 5.5.2 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.

### 5.5.3 TEST PROCEDURE

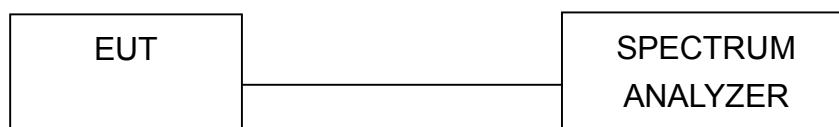
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time = span/3 kHz. The power spectral density was measured and recorded.

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

### 5.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.5.5 TEST SETUP



### 5.5.6 EUT OPERATING CONDITION

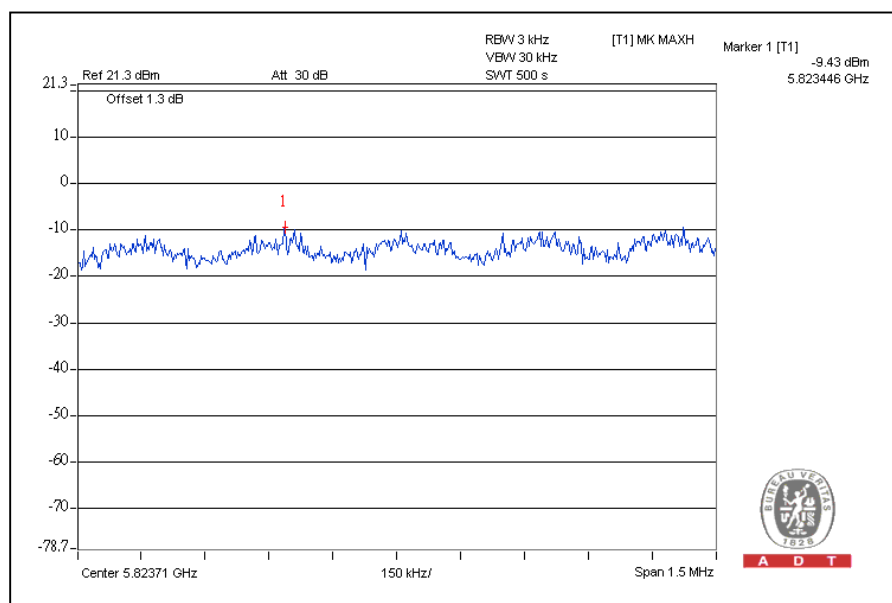
Same as Item 4.3.6

## 5.5.7 TEST RESULTS

### 802.11a 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)			
149	5745	-11.3	-10.5	-7.9	8	PASS
157	5785	-10.4	-9.8	-7.1	8	PASS
165	5825	-9.4	-9.4	-6.4	8	PASS

## CH165

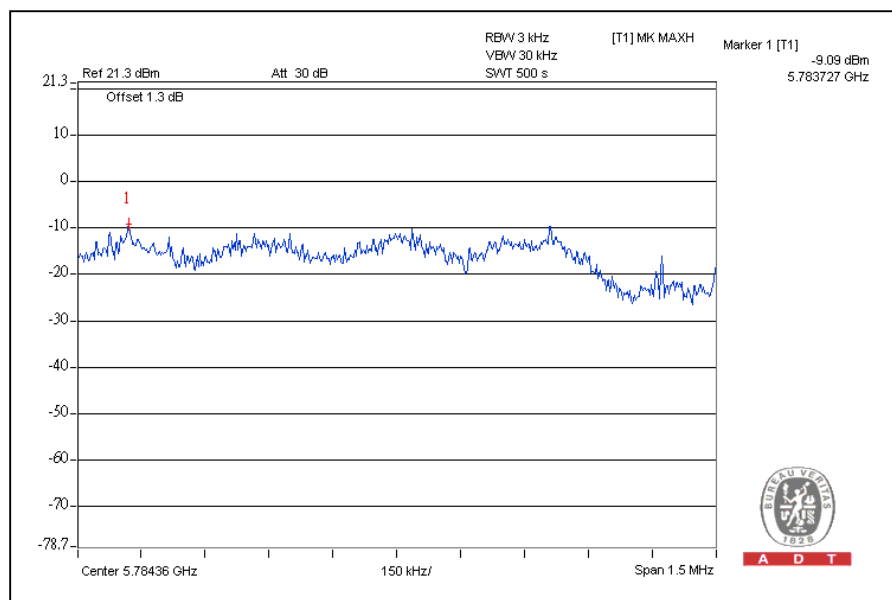




## 802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		TOTAL POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)			
149	5745	-10.8	-10.5	-7.6	8	PASS
157	5785	-9.1	-9.7	-6.4	8	PASS
165	5825	-11.1	-9.8	-7.4	8	PASS

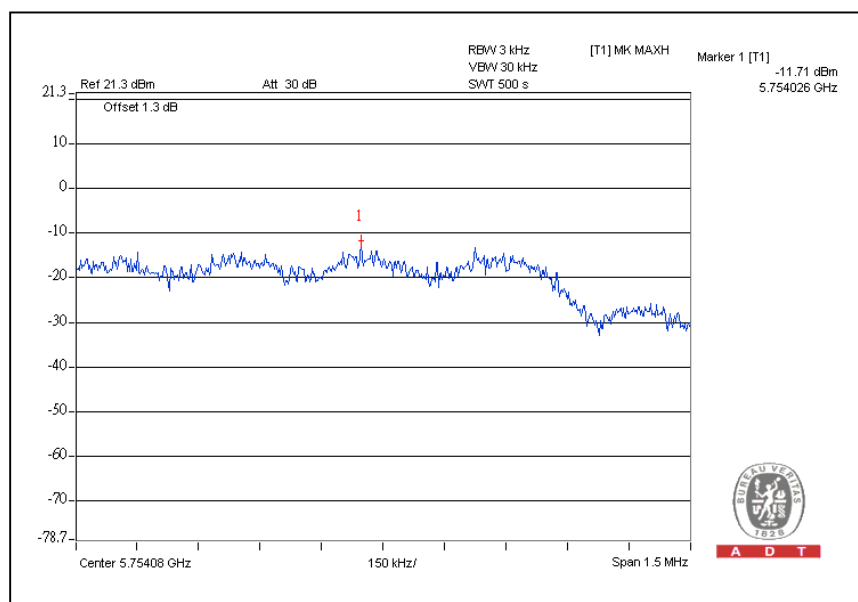
## CH157



## 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)			
151	5755	-13.7	-11.7	-9.6	8	PASS
159	5795	-12.9	-12.7	-9.8	8	PASS

## CH151



## 5.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 5.6.2 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.

### 5.6.3 TEST PROCEDURE

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

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.6.5 EUT OPERATING CONDITION

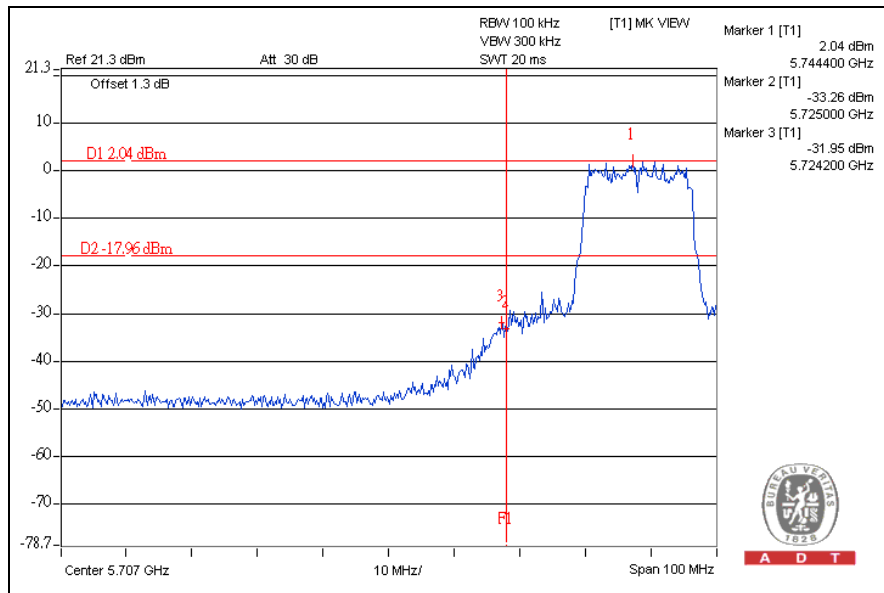
Same as Item 4.3.6

#### 5.6.6 TEST RESULTS

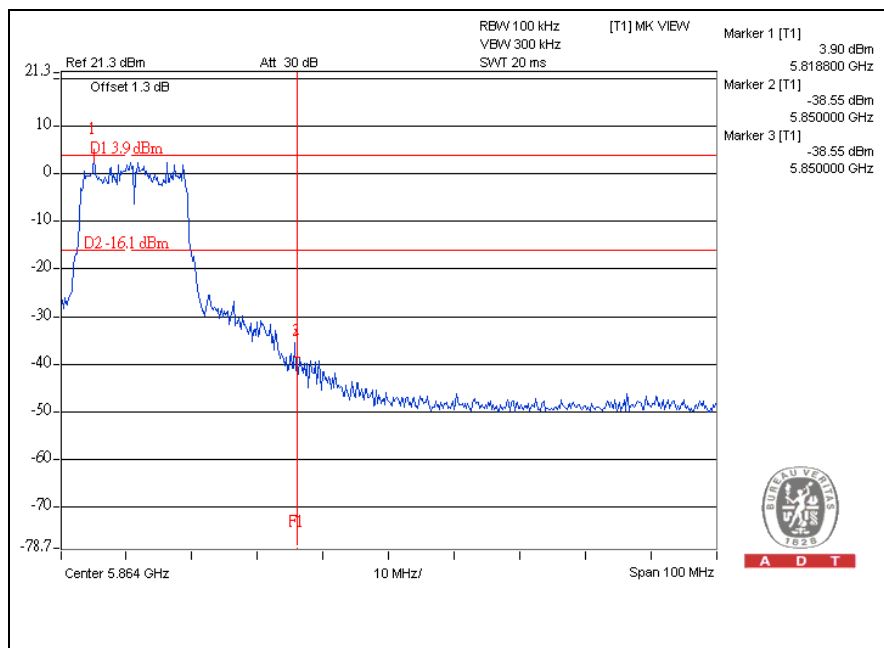
The spectrum plots are attached on the following pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

## 802.11a OFDM modulation

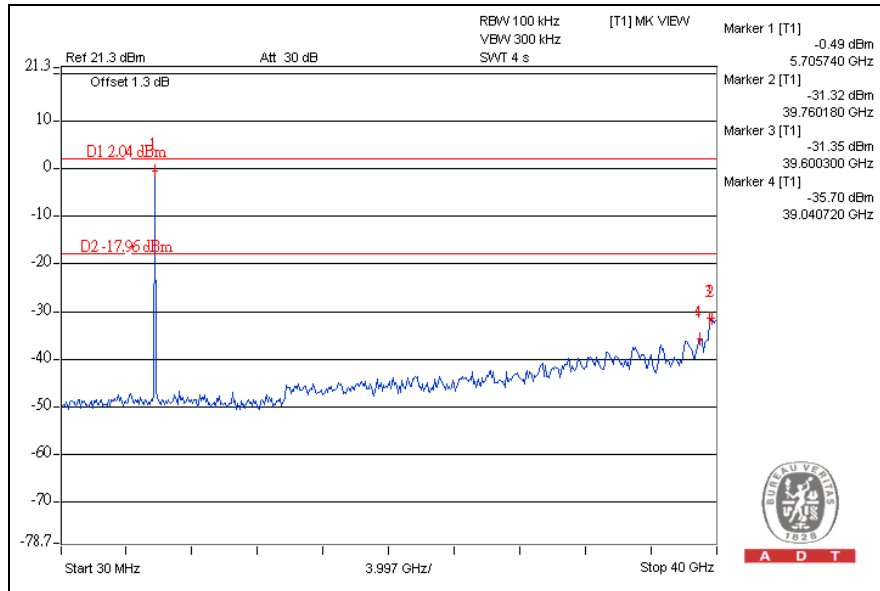
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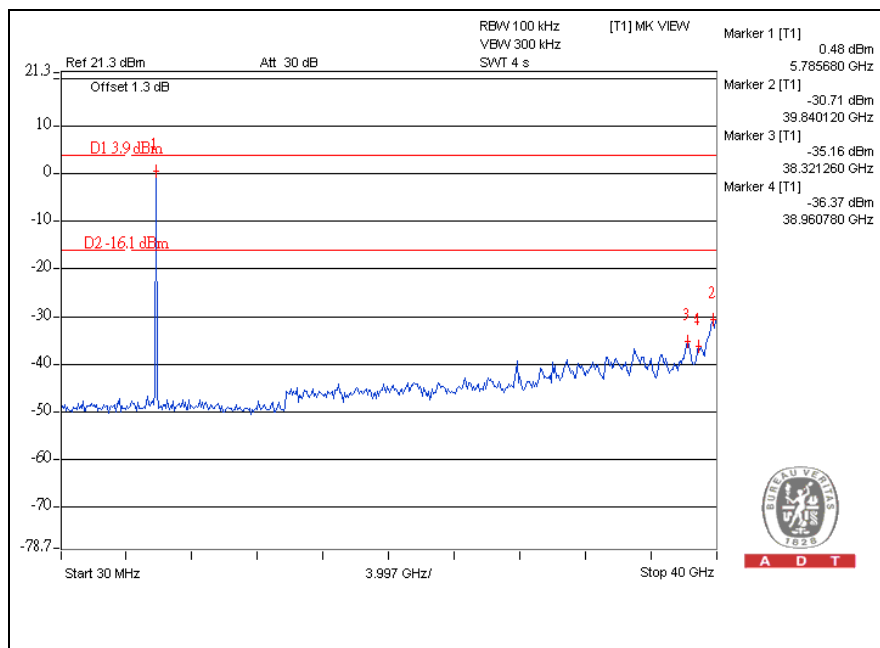
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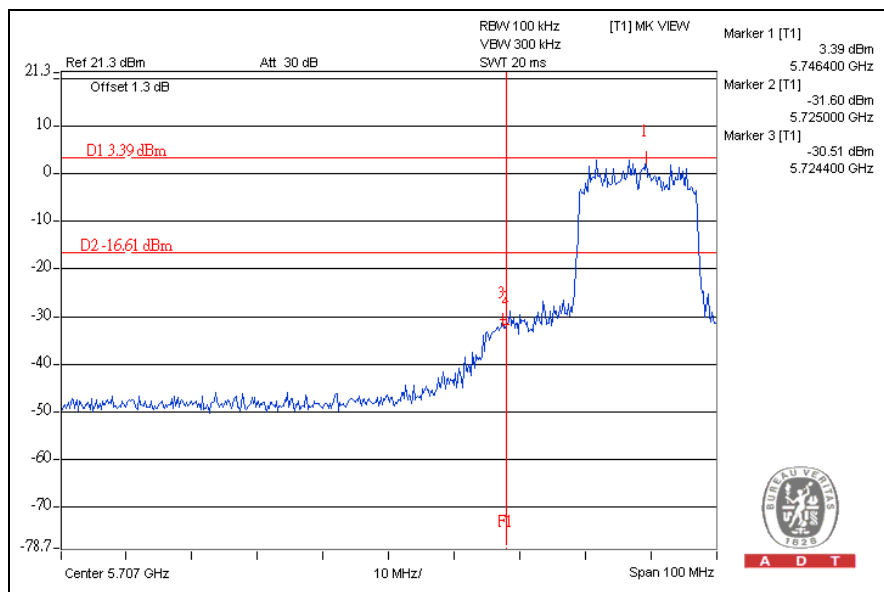


## CH165

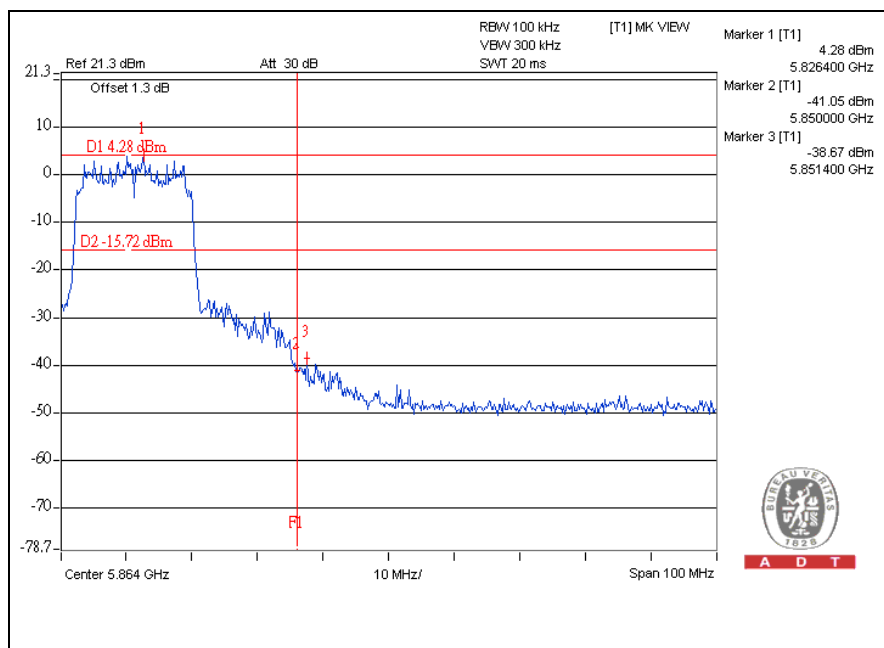


## 802.11n (20MHz) OFDM MODULATION:

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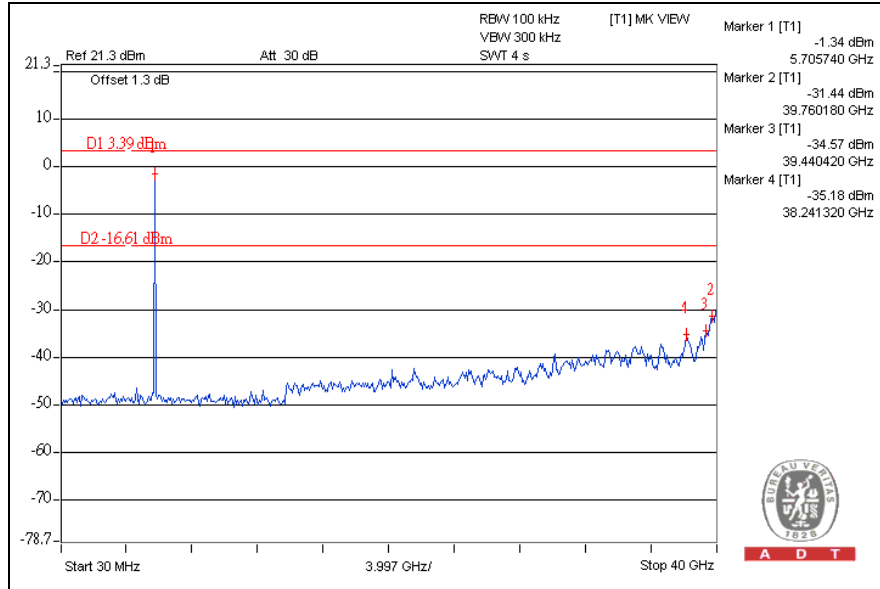


### CH165

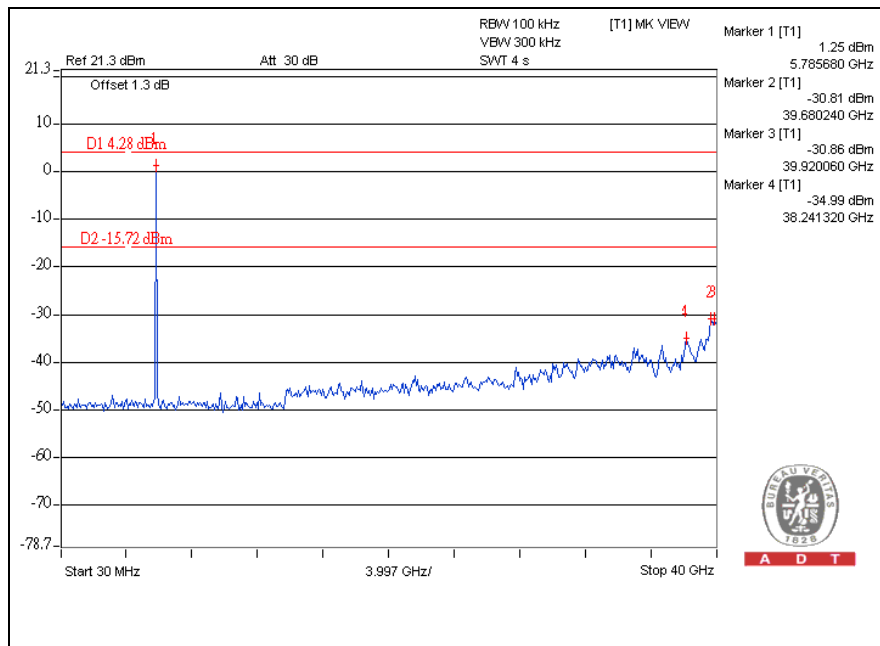




## CH149

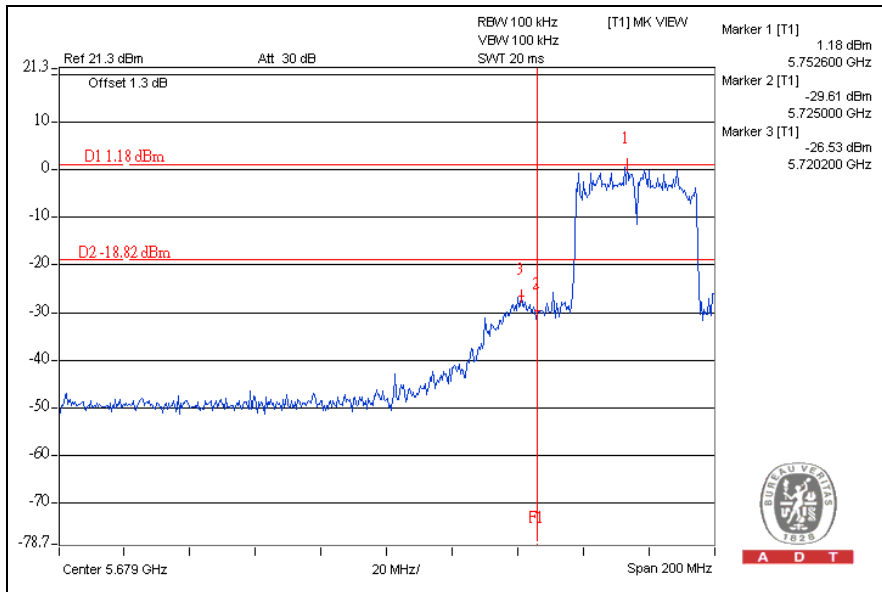


## CH165

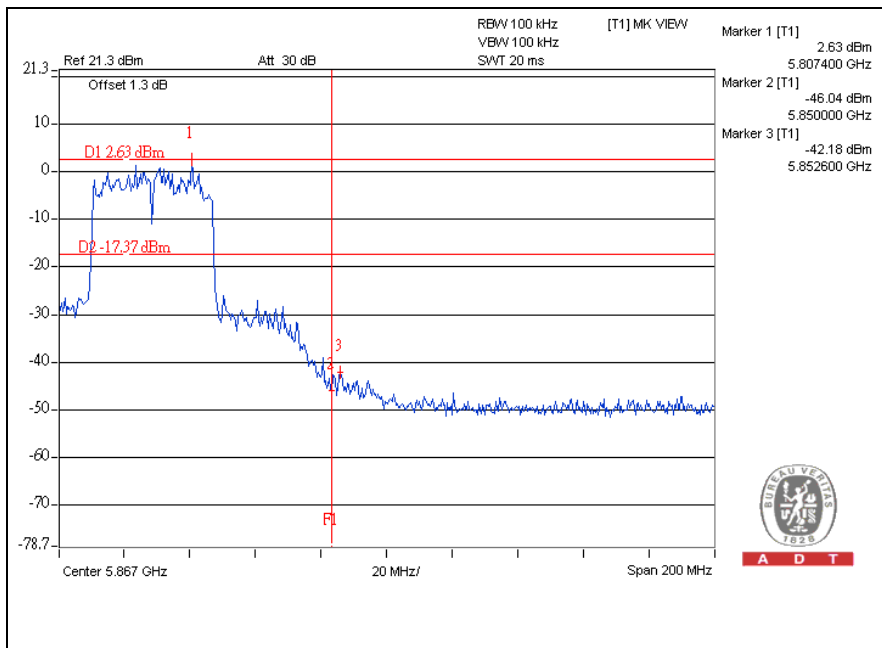


## 802.11n (40MHz) OFDM MODULATION:

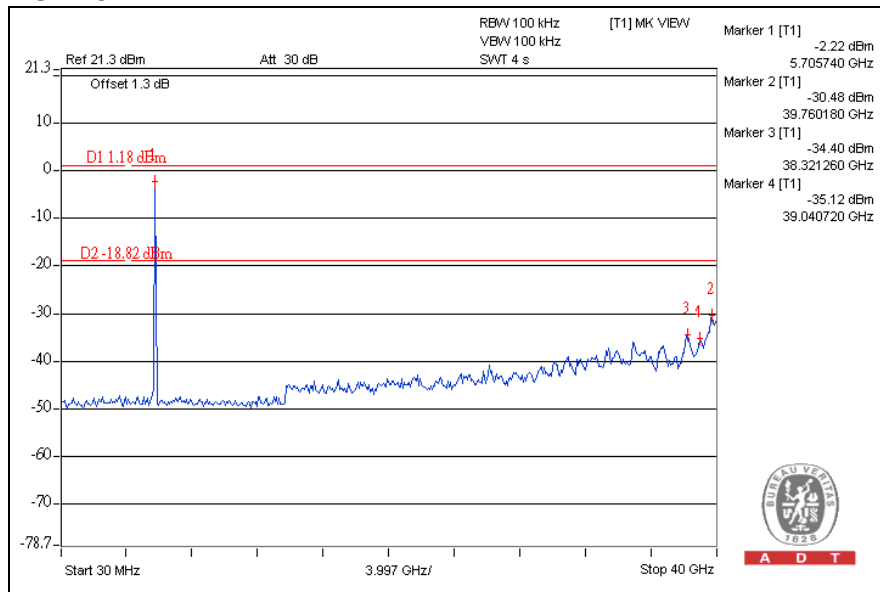
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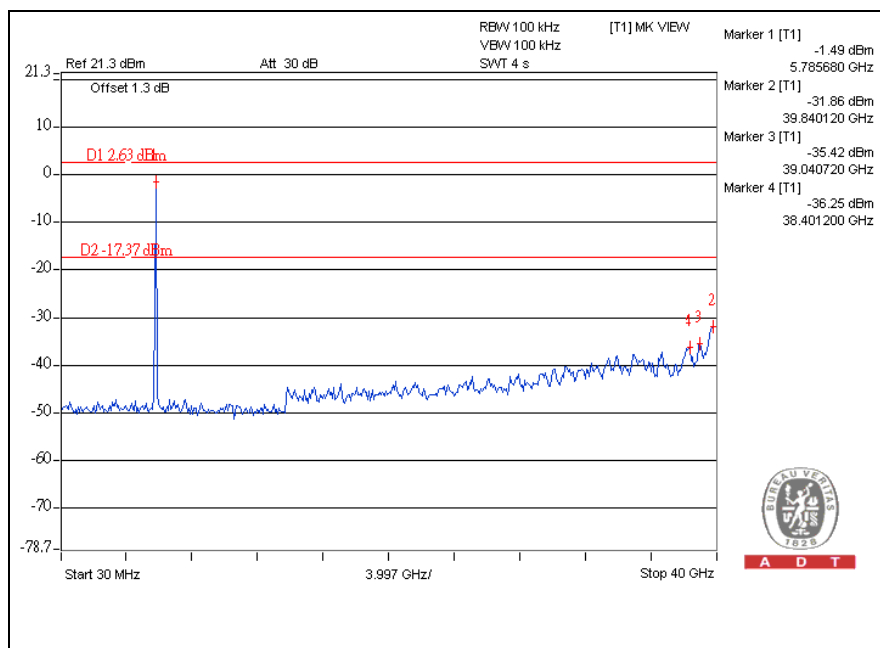
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## 6. INFORMATION ON THE TESTING LABORATORIES

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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## **7.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---