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# FCC TEST REPORT (15.247)

**REPORT NO.:** RF110128E05C

**MODEL NO.:** WA4271, NA4271, WA4271-R, NA4271-R,  
WA4281, NA4281, WA4281-R, NA4281-R

**FCC ID:** ZLP-WA4200

**RECEIVED:** Jan. 31, 2011

**TESTED:** Jan. 31 to Feb. 14, 2011

**ISSUED:** July 12, 2011

**APPLICANT:** EtherWAN Systems

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**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110128E05C	Original release	July 12, 2011



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## 1. CERTIFICATION

**PRODUCT:** Industrial Dual Radio Multi-function Wireless Device,  
Hardened Dual Radio Multi-function Wireless Device

**BRAND NAME:** EtherWAN Systems

**MODEL NO.:** WA4271, NA4271, WA4271-R, NA4271-R, WA4281,  
NA4281, WA4281-R, NA4281-R

**TEST SAMPLE:** MASS-PRODUCTION

**APPLICANT:** EtherWAN Systems

**TESTED:** Jan. 31 to Feb. 14, 2011

**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (Model: WA4281) 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: July 12, 2011  
( Midoli Peng, Specialist )

**APPROVED BY** : May Chen, DATE: July 12, 2011  
( May Chen, Deputy Manager )



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 2.4GHz, 2412~2462MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -0.59dB at 0.554MHz
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 30.62MHz
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 N PLUG for professional Install device.



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For 5GHz, 5725~5850MHz Band

**APPLIED STANDARD: FCC Part 15, Subpart C**

Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -0.61dB at 0.554MHz
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 -0.69dB at 30.62MHz
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 N PLUG for professional Install device.

**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)	3.3 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Industrial Dual Radio Multi-function Wireless Device, Hardened Dual Radio Multi-function Wireless Device
MODEL NO.	WA4271, NA4271, WA4271-R, NA4271-R, WA4281, NA4281, WA4281-R, NA4281-R
FCC ID	ZLP-WA4200
POWER SUPPLY	DC 48V from POE
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps 802.11b: 11 / 5.5 / 2 / 1Mbps 802.11a: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps
OPERATING FREQUENCY	<b>For 15.407</b> 802.11a: 5.18 ~ 5.24GHz <b>For 15.247</b> 802.11b & 802.11g: 2.412 ~ 2.462GHz 802.11a: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	<b>For 15.407</b> 4 for 802.11a <b>For 15.247(2.4GHz)</b> 11 for 802.11b, 802.11g <b>For 15.247(5GHz)</b> 5 for 802.11a
MAXIMUM OUTPUT POWER	<b>For 15.407</b> 802.11a: 24.5mW <b>For 15.247(2.4GHz)</b> 802.11b: 109.6mW 802.11g: 371.5mW <b>For 15.247(5GHz)</b> 802.11a: 537.0mW
ANTENNA TYPE	Please see note
DATA CABLE	NA
I/O PORTS	RJ-45(POE) port x 2
ASSOCIATED DEVICES	NA



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**NOTE:**

1. The EUT has two product names, brand names and eight model names which are identical to each other in all aspects except for the following table:

Product	Brand	Model No.	Description	Material
Industrial Dual Radio Multi-function Wireless Device	EtherWANSystems	WA4271	for different marketing	Plastics
	NA	NA4271		
	EtherWANSystems	WA4271-R		
	NA	NA4271-R		
Hardened Dual Radio Multi-function Wireless Device	EtherWANSystems	WA4281	for different marketing	Aluminum
	NA	NA4281		
	EtherWANSystems	WA4281-R		
	NA	NA4281-R		

Above modes were pre-tested in chamber, the worst case was found in **WA4281**. Therefore only the test data of the model was recorded in this report.

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

Manufacturer	Model No.	Antenna Type	Gain (dBi)	Frequency range (MHz)
ARISTOTLE	RFA-25-T27	Onmi	4.95	2400~2500
ARISTOTLE	RFA-25-T27	Onmi	7.14	5150~5850

3. The EUT must be supplied with a power adapter as following table:

POE 1(Only for test, not for sale) – for conduct test item	
BRAND	symbol
MODEL	AP-PSBISA-T-1P-AF
INPUT POWER	100-240V 50-60Hz 0.34-0.17A
OUTPUT POWER	48V 1.0A
POE 2(Only for test, not for sale) – for radiated test item	
BRAND	NA
MODEL	F919I-48 10
INPUT POWER	100-240V 50-60Hz 2A
OUTPUT POWER	48V 1.0A
POE 3(Only for test, not for sale) – for other test items	
BRAND	UMEC
MODEL	UP0181B-48PA
INPUT POWER	100-240V~ 50/60Hz 0.4A MAX
OUTPUT POWER	+48V~ 0.38A 18W MAX



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4. The EUT has two same modules inside, the detail information as below table:

No.	Brand Name	Model Name
1	WNC	DCMA-83
2	WNC	DCMA-83

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.
6. Spurious emission of the simultaneous operation has been evaluated and no non-compliance found.
7. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

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

Eleven channels are provided for 802.11b, 802.11g:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

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

Five channels are provided for 802.11a:

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



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### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **PLC**: Power Line Conducted Emission

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

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

**APCM**: Antenna Port Conducted Measurement

#### POWER LINE CONDUCTED EMISSION TEST:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
For 2.4 GHz 802.11g	1 to 11	6	OFDM	BPSK	6
For 5 GHz 802.11a	149 to 165	149	OFDM	BPSK	6

#### RADIATED EMISSION TEST (BELOW 1 GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
For 2.4 GHz 802.11g	1 to 11	6	OFDM	BPSK	6
For 5 GHz 802.11a	149 to 165	149	OFDM	BPSK	6



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**RADIATED EMISSION TEST (ABOVE 1 GHz):**

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6

**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)
802.11b	1 to 11	1, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 11	OFDM	BPSK	6
802.11a	149 to 165	149, 165	OFDM	BPSK	6

**ANTENNA PORT CONDUCTED MEASUREMENT:**

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6



※ **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE <sup>3</sup> 1G	20deg. C, 70%RH, 1024 hPa / 15deg. C, 66%RH, 1024 hPa	120Vac, 60Hz	Eric Lee / Frank Liu
RE<1G	16deg. C, 70%RH, 1024 hPa	120Vac, 60Hz	Kent Liu
PLC	16deg. C, 72%RH, 1024 hPa / 21deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Kyle Huang
APCM	13deg. C, 67%RH, 1024 hPa / 25deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Rex Huang

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

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

**ANSI C63.4-2003**

**ANSI C63.10-2009**

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

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



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### 3.4 DESCRIPTION OF SUPPORT UNITS

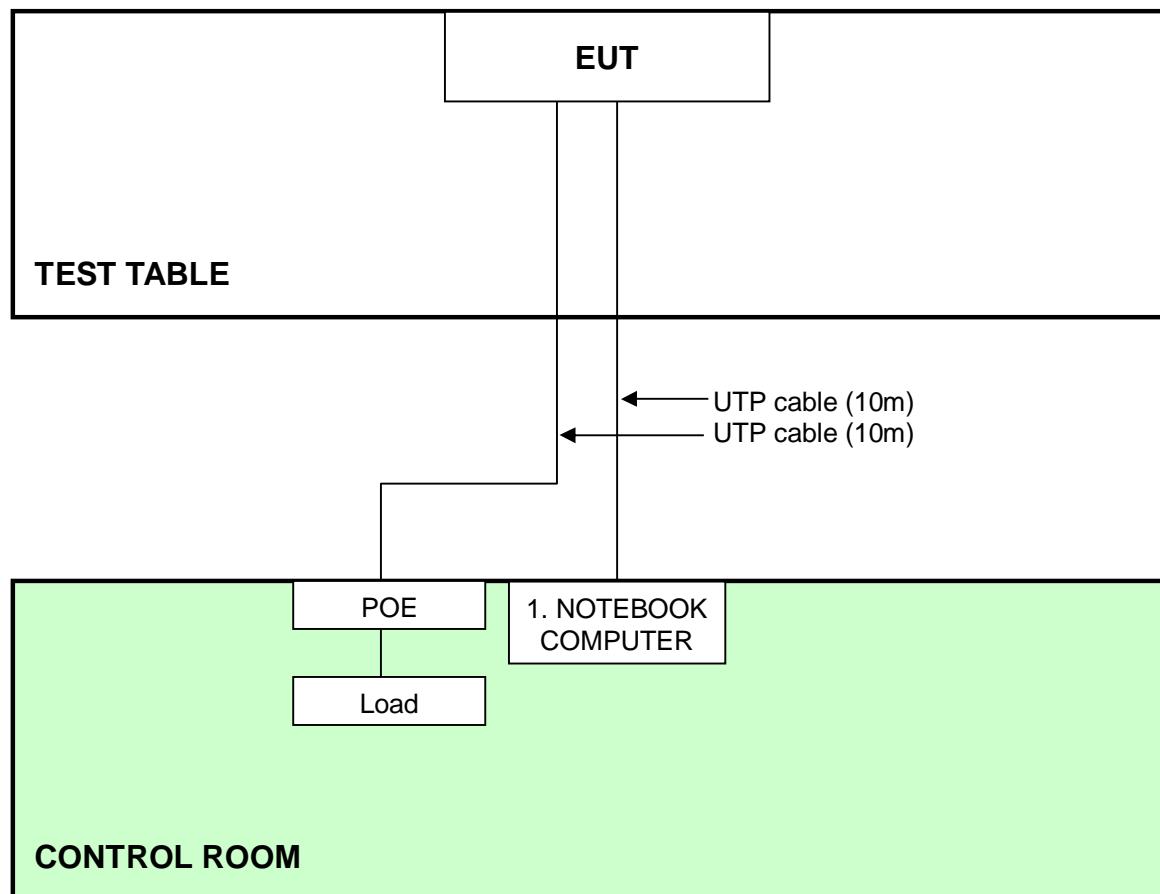
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC

No.	Signal cable description
1	UTP Cable (10m)

Note: The power cords of the above support units were unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST





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## 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 (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

**NOTE:**

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

#### 4.1.2 TEST INSTRUMENTS

Test date: Feb. 10, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 08, 2010	Sep. 07, 2011
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 03, 2010	Nov. 02, 2011
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 30, 2010	Aug. 29, 2011
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.



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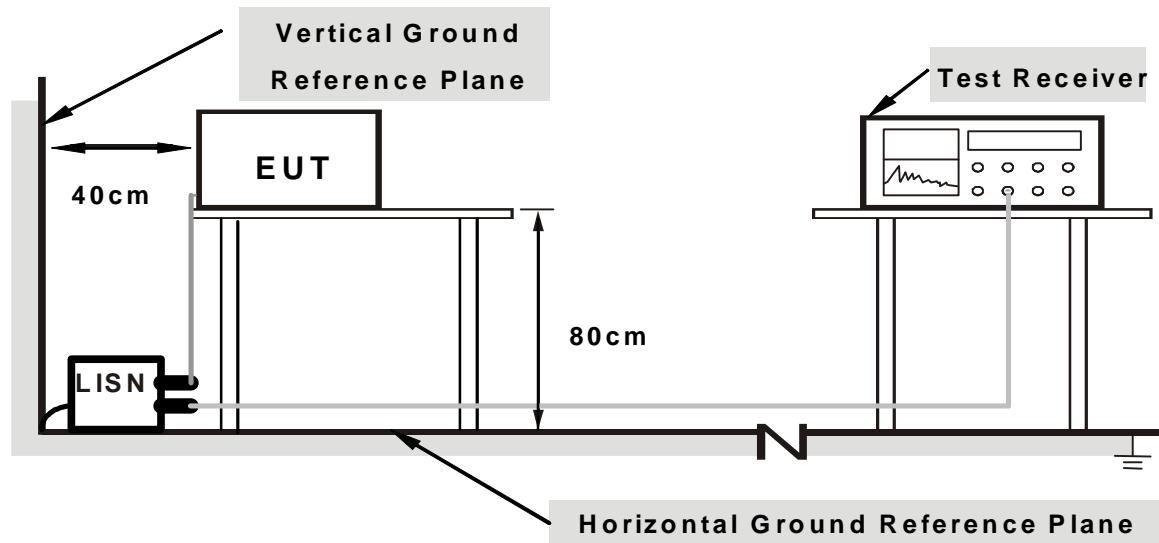
#### 4.1.3 TEST PROCEDURES

- 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 cm from other units and other metal planes**

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

#### 4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared other computer system (support unit 1) to act as communication partner and placed it outside of testing area.
3. The communication partner ran test program “HyperTerminal Command” to enable EUT under transmission/receiving condition continuously via one UTP cable.

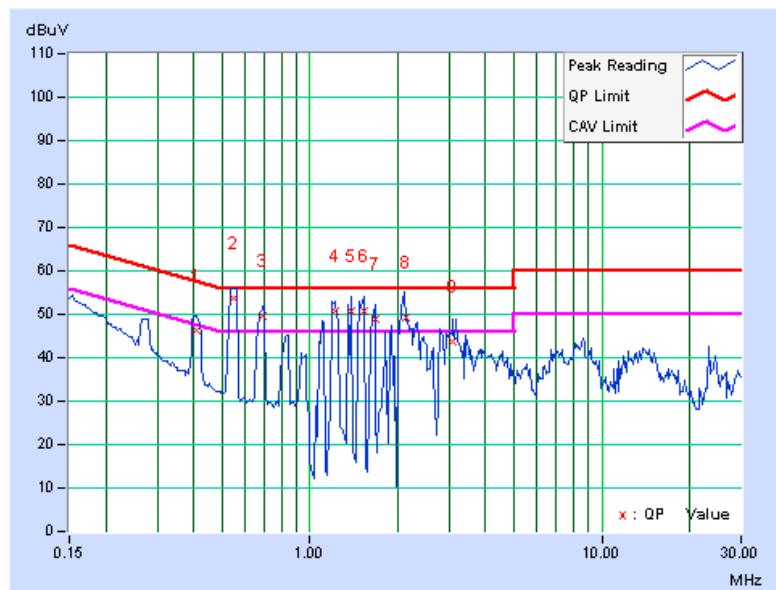
#### 4.1.7 TEST RESULTS

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

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.408	0.06	46.26	-	46.32	-	57.69	47.69	-11.37	-
2	0.551	0.07	53.66	44.74	53.73	44.81	56.00	46.00	-2.27	-1.19
3	0.689	0.07	49.74	38.42	49.81	38.49	56.00	46.00	-6.19	-7.51
4	1.228	0.10	50.72	36.66	50.82	36.76	56.00	46.00	-5.18	-9.24
5	1.395	0.11	50.71	35.74	50.82	35.85	56.00	46.00	-5.18	-10.15
6	1.527	0.11	50.46	34.19	50.57	34.30	56.00	46.00	-5.43	-11.70
7	1.667	0.12	48.84	32.05	48.96	32.17	56.00	46.00	-7.04	-13.83
8	2.143	0.13	49.05	29.94	49.18	30.07	56.00	46.00	-6.82	-15.93
9	3.078	0.16	43.64	-	43.80	-	56.00	46.00	-12.20	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

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





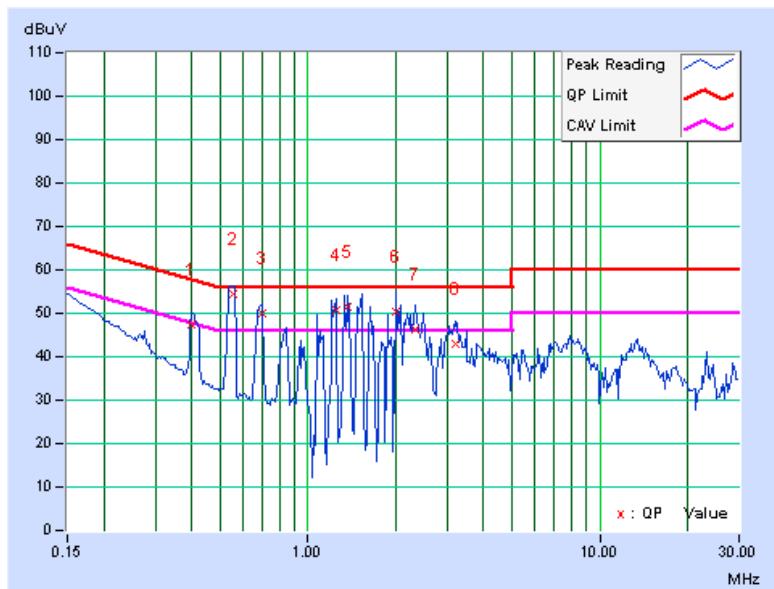
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PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.400	0.07	47.28	-	47.35	-	57.85	47.85	-10.50	-
2	<b>0.554</b>	<b>0.08</b>	<b>54.35</b>	<b>45.33</b>	<b>54.43</b>	<b>45.41</b>	<b>56.00</b>	<b>46.00</b>	<b>-1.57</b>	<b>-0.59</b>
3	0.697	0.08	50.07	38.32	50.15	38.40	56.00	46.00	-5.85	-7.60
4	1.246	0.11	50.58	36.12	50.69	36.23	56.00	46.00	-5.31	-9.77
5	1.371	0.11	51.19	36.21	51.30	36.32	56.00	46.00	-4.70	-9.68
6	2.016	0.14	50.30	31.13	50.44	31.27	56.00	46.00	-5.56	-14.73
7	2.348	0.15	46.31	27.86	46.46	28.01	56.00	46.00	-9.54	-17.99
8	3.191	0.18	42.77	-	42.95	-	56.00	46.00	-13.05	-

**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:

<b>Frequencies (MHz)</b>	<b>Field strength (microvolts/meter)</b>	<b>Measurement distance (meters)</b>
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 (dB<sub>u</sub>V/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.



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#### 4.2.2 TEST INSTRUMENTS

Below 1GHz test: test date Feb. 11, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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



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**Above 1GHz test: test date: Jan. 31, 2011**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	May 12 , 2010	May 11 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 01, 2010	Oct. 31, 2011
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 03, 2010	Sep. 02, 2011
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2010	Dec. 16, 2011
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 17, 2011	Jan. 16, 2012
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 104+ Sucoflex 106	RF104-101+R F106-101	Aug. 24, 2010	Aug. 23, 2011
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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

2. The horn antenna, preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. C.

4. The FCC Site Registration No. is 656396.

5. The VCCI Site Registration No. is R-1626.

6. The CANADA Site Registration No. is IC 7450G-3.



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#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room for below 1GHz test and 10 meter open site for above 1GHz test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### NOTE:

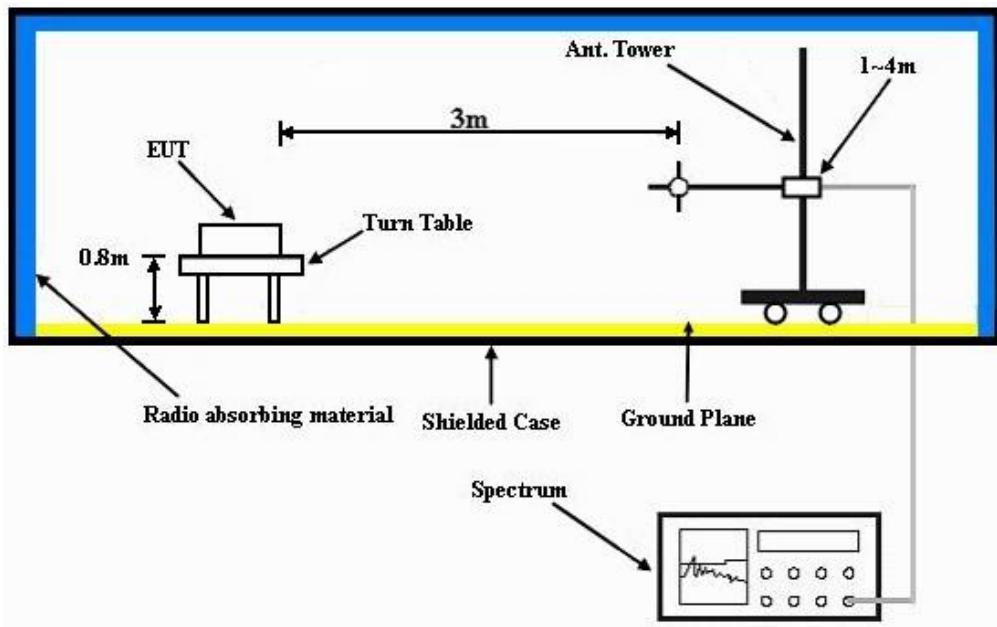
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

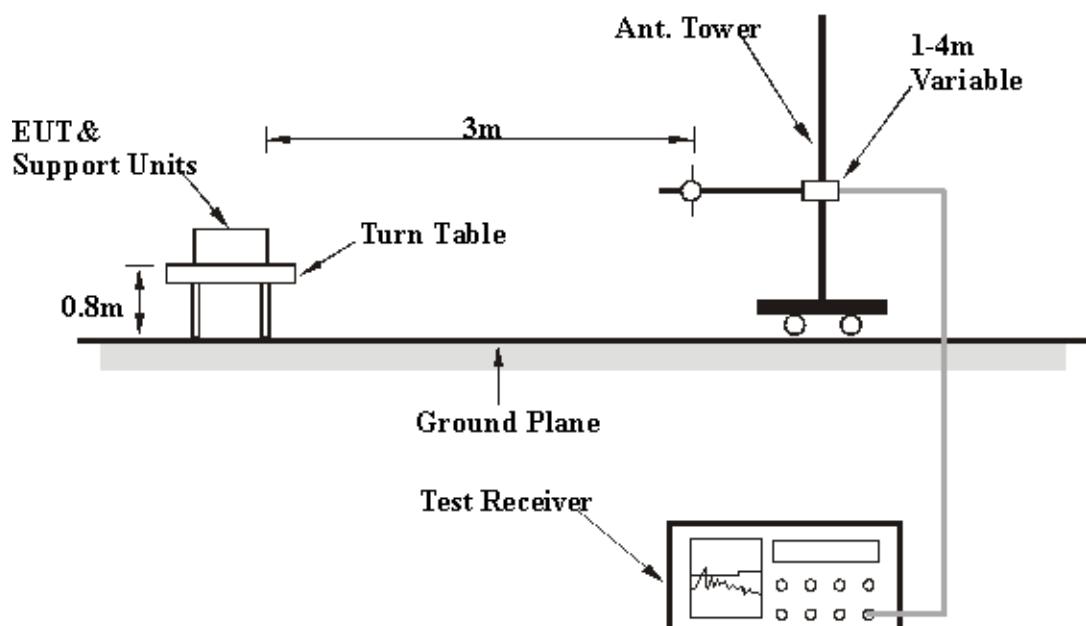
No deviation

#### 4.2.5 TEST SETUP

##### Below 1GHz test:



##### Above 1GHz test:



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



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#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6



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#### 4.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 6		FREQUENCY RANGE
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION
ENVIRONMENTAL CONDITIONS		16deg. C, 70%RH 1024 hPa		TESTED BY
				Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	132.11	38.1 QP	43.5	-5.4	1.50 H	73	24.64	13.48
2	153.65	40.5 QP	43.5	-3.0	1.75 H	276	26.24	14.26
3	230.02	39.7 QP	46.0	-6.3	1.50 H	96	27.35	12.38
4	250.03	40.1 QP	46.0	-6.0	1.00 H	276	26.63	13.42
5	294.44	36.7 QP	46.0	-9.3	1.00 H	341	21.45	15.23
6	660.01	36.8 QP	46.0	-9.2	1.00 H	0	13.60	23.17
7	885.60	36.3 QP	46.0	-9.7	1.00 H	360	9.72	26.55

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	30.62	39.5 QP	40.0	-0.5	1.00 V	2	26.87	12.63
2	47.76	37.9 QP	40.0	-2.1	1.00 V	39	23.71	14.17
3	124.97	39.8 QP	43.5	-3.7	1.00 V	360	26.76	13.00
4	133.26	42.4 QP	43.5	-1.1	1.00 V	360	28.83	13.56
5	250.03	39.2 QP	46.0	-6.8	1.00 V	111	25.77	13.42
6	324.99	42.2 QP	46.0	-3.8	1.50 V	360	26.21	16.01
7	500.02	33.6 QP	46.0	-12.4	1.00 V	289	13.51	20.10

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.



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## ABOVE 1GHz WORST-CASE DATA

## 802.11b DSSS MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		FREQUENCY RANGE		1 ~ 25GHz
INPUT POWER		DETECTOR FUNCTION		Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		TESTED BY		Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2386.10	55.3 PK	74.0	-18.7	1.22 H	200	24.35	30.95
2	2386.10	43.4 AV	54.0	-10.6	1.22 H	200	12.45	30.95
3	*2412.00	104.9 PK			1.22 H	200	73.83	31.07
4	*2412.00	103.0 AV			1.22 H	200	71.93	31.07
5	4824.00	48.0 PK	74.0	-26.0	1.22 H	288	10.89	37.11
6	4824.00	43.4 AV	54.0	-10.6	1.22 H	288	6.29	37.11

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2386.10	57.6 PK	74.0	-16.4	1.18 V	340	26.65	30.95
2	2386.10	45.2 AV	54.0	-8.8	1.18 V	340	14.25	30.95
3	*2412.00	108.7 PK			1.16 V	335	77.63	31.07
4	*2412.00	106.3 AV			1.16 V	335	75.23	31.07
5	4824.00	54.5 PK	74.0	-19.5	1.22 V	250	17.39	37.11
6	4824.00	52.8 AV	54.0	-1.2	1.22 V	250	15.69	37.11

**REMARKS:**

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



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 6		FREQUENCY RANGE 1 ~ 25GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.0 PK			1.25 H	201	74.83	31.17
2	*2437.00	104.1 AV			1.25 H	201	72.93	31.17
3	4874.00	47.6 PK	74.0	-26.4	1.30 H	288	10.37	37.23
4	4874.00	43.2 AV	54.0	-10.8	1.30 H	288	5.97	37.23
5	7311.00	47.1 PK	74.0	-26.9	1.26 H	76	2.74	44.36
6	7311.00	37.1 AV	54.0	-16.9	1.26 H	76	-7.26	44.36
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	109.8 PK			1.15 V	197	78.63	31.17
2	*2437.00	107.2 AV			1.15 V	197	76.03	31.17
3	4874.00	53.9 PK	74.0	-20.1	1.28 V	83	16.67	37.23
4	4874.00	51.7 AV	54.0	-2.3	1.28 V	83	14.47	37.23
5	7311.00	48.2 PK	74.0	-25.8	1.30 V	99	3.84	44.36
6	7311.00	38.4 AV	54.0	-15.6	1.30 V	99	-5.96	44.36

**REMARKS:**

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



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 11		FREQUENCY RANGE 1 ~ 25GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.6 PK			1.23 H	199	74.32	31.28
2	*2462.00	103.1 AV			1.23 H	199	71.82	31.28
3	2487.80	56.1 PK	74.0	-17.9	1.23 H	200	24.71	31.39
4	2487.80	44.1 AV	54.0	-9.9	1.23 H	200	12.71	31.39
5	4924.00	47.5 PK	74.0	-26.5	1.23 H	290	10.16	37.34
6	4924.00	43.2 AV	54.0	-10.8	1.23 H	290	5.86	37.34
7	7386.00	46.9 PK	74.0	-27.1	1.11 H	28	2.31	44.59
8	7386.00	37.2 AV	54.0	-16.8	1.11 H	28	-7.39	44.59

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	109.6 PK			1.14 V	200	78.32	31.28
2	*2462.00	107.5 AV			1.14 V	200	76.22	31.28
3	2487.80	57.2 PK	74.0	-16.8	1.16 V	202	25.81	31.39
4	2487.80	45.8 AV	54.0	-8.2	1.16 V	202	14.41	31.39
5	4924.00	54.1 PK	74.0	-19.9	1.51 V	318	16.76	37.34
6	4924.00	51.8 AV	54.0	-2.2	1.51 V	318	14.46	37.34
7	7386.00	48.5 PK	74.0	-25.5	1.22 V	101	3.91	44.59
8	7386.00	38.3 AV	54.0	-15.7	1.22 V	101	-6.29	44.59

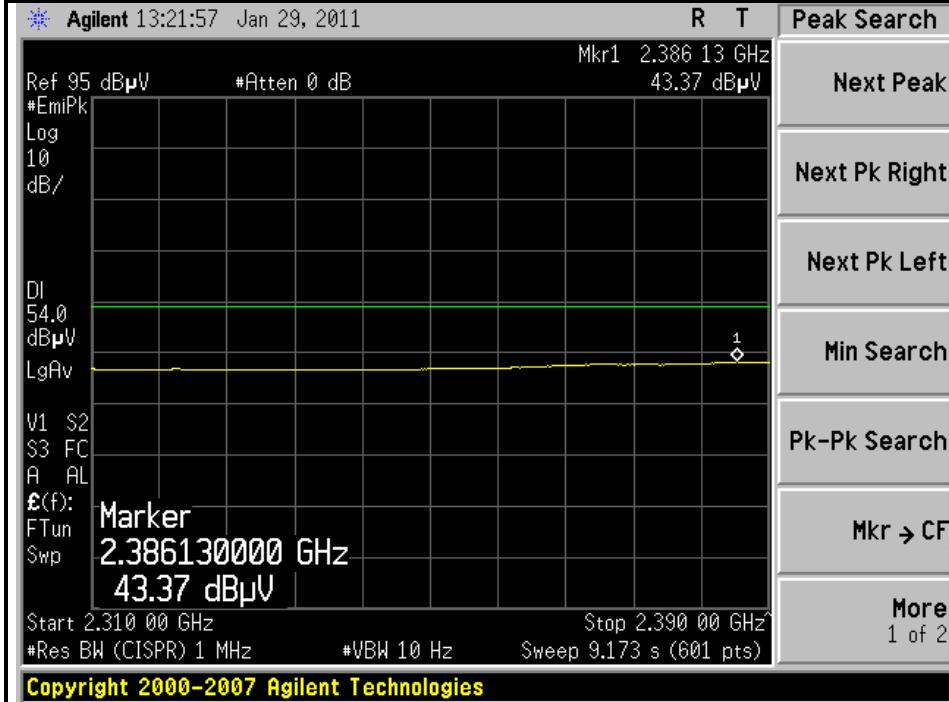
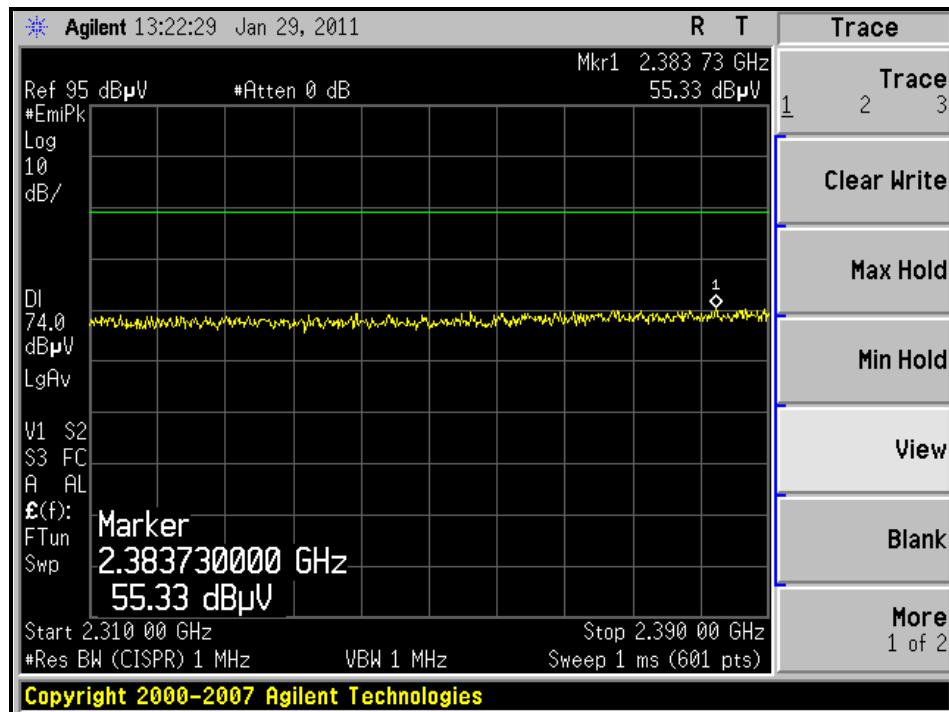
**REMARKS:**

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



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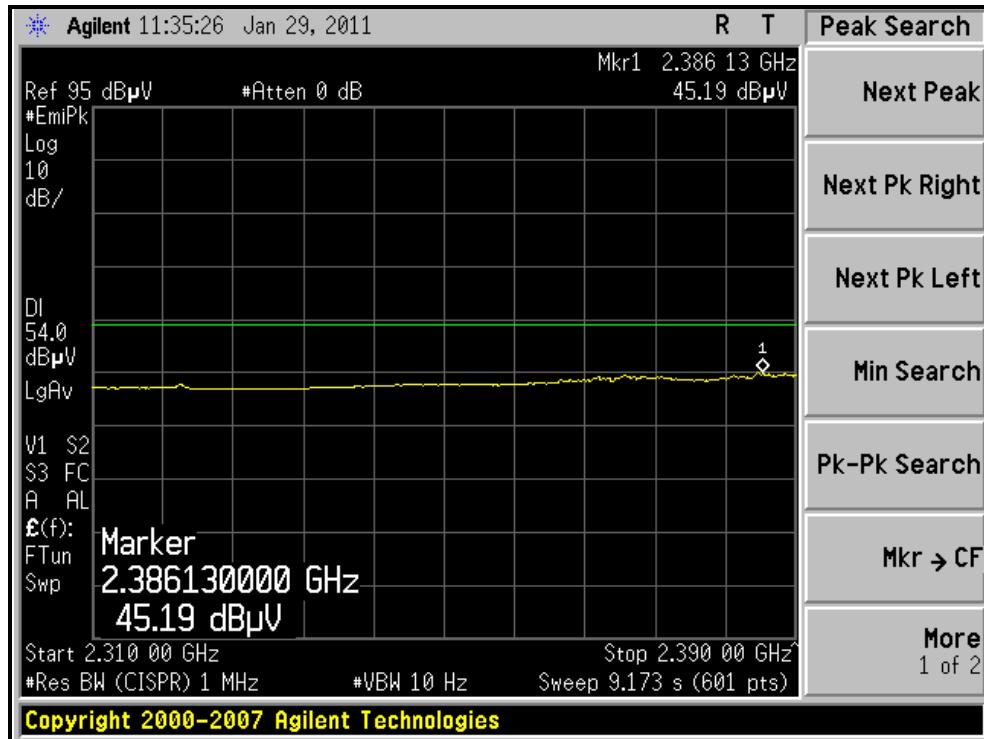
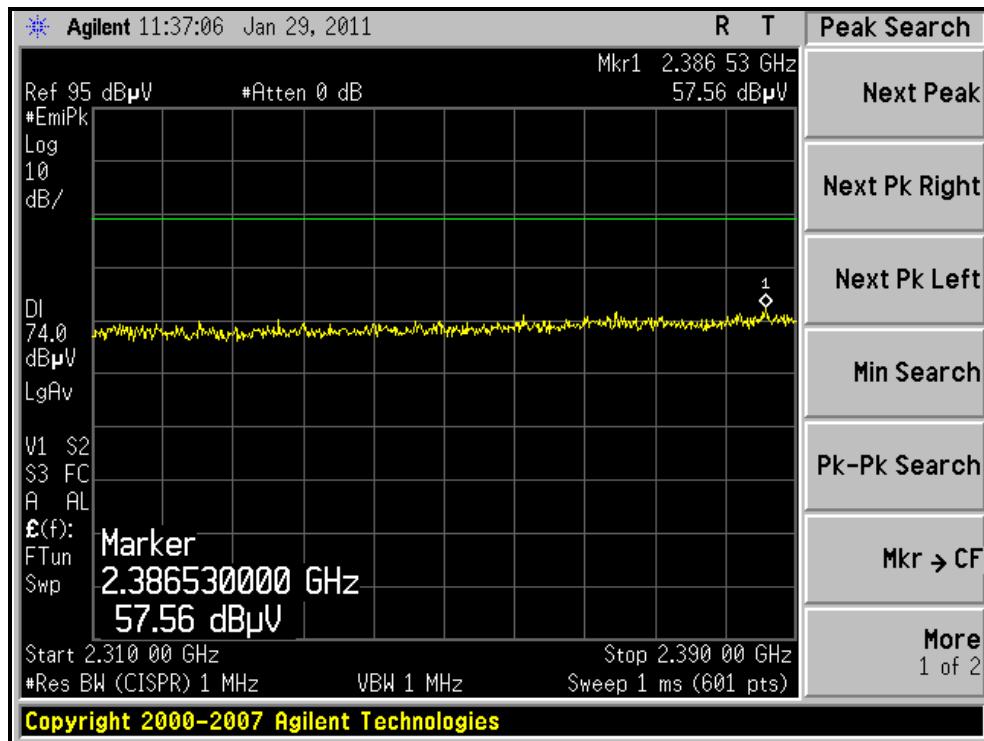
RESTRICTED BANDEDGE (802.11b MODE,CH1, HORIZONTAL )





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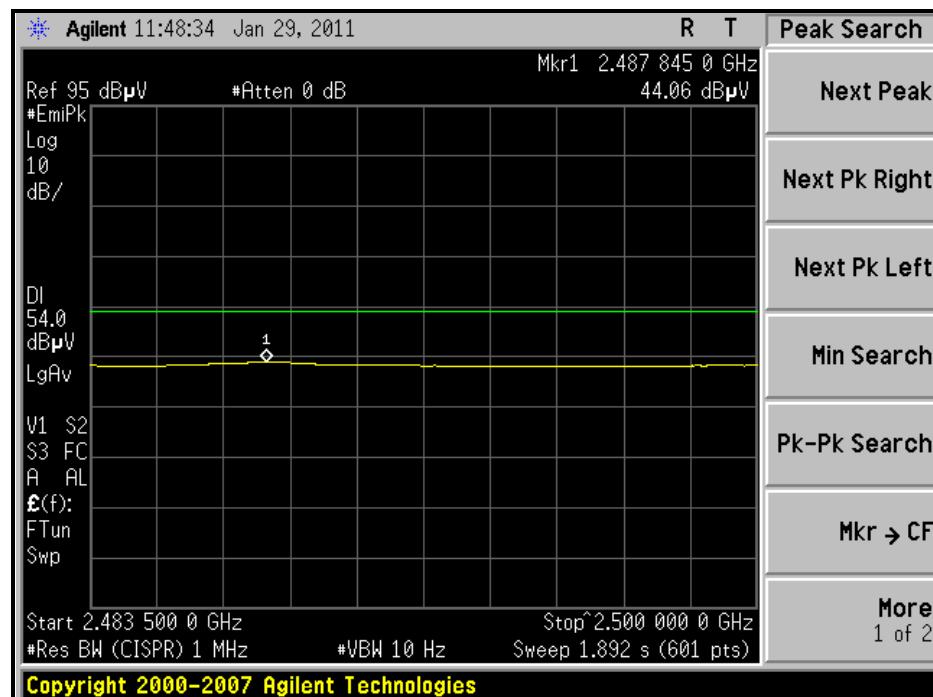
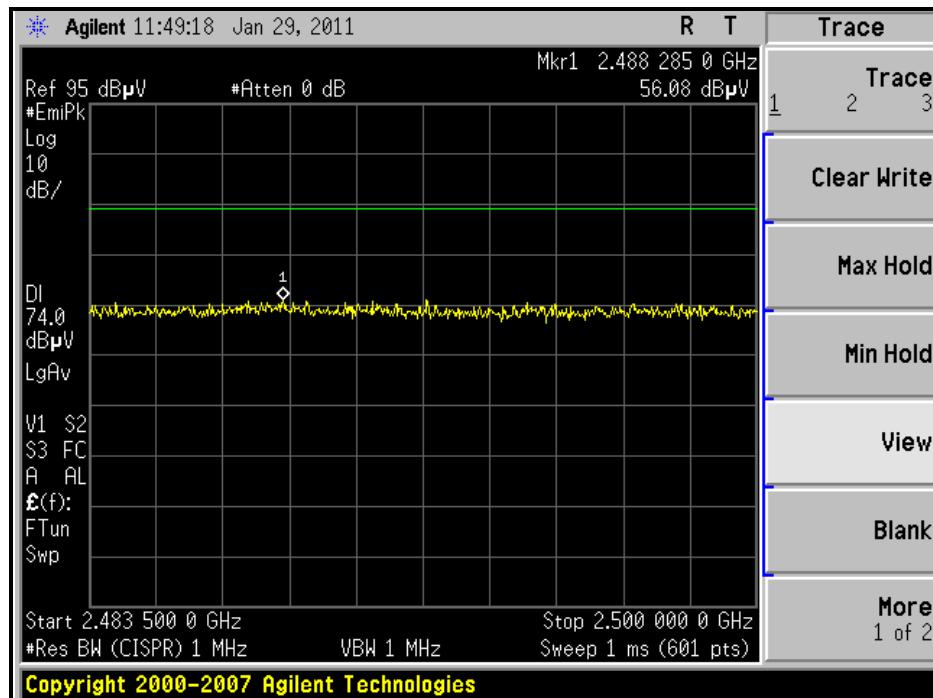
RESTRICTED BANDEDGE (802.11b MODE,CH1, VERTICAL )





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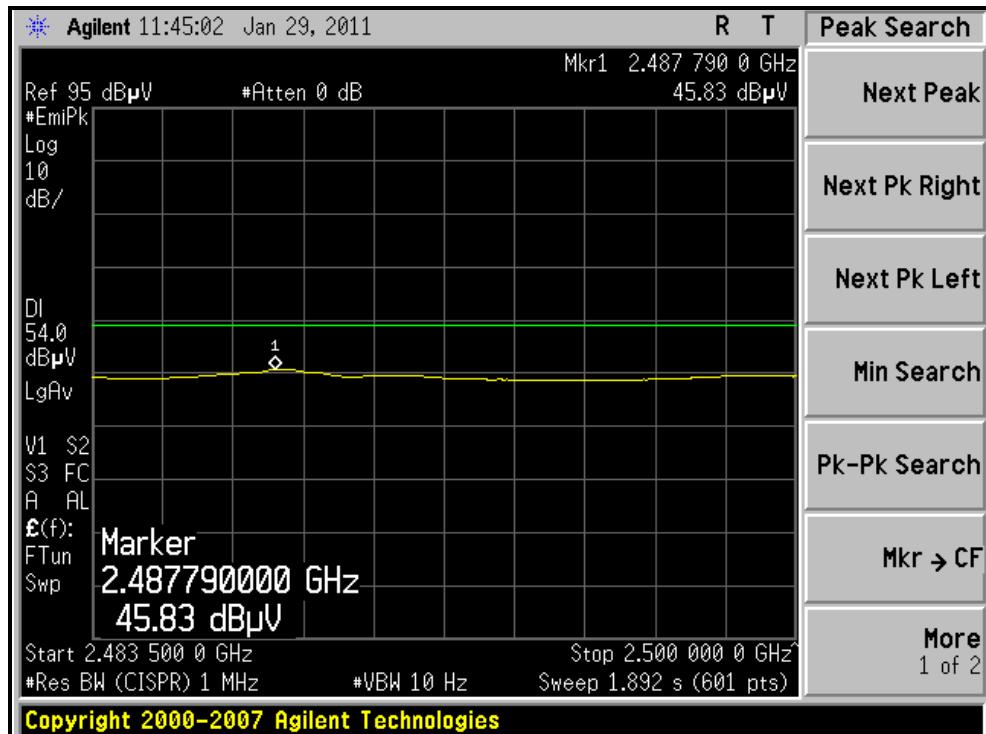
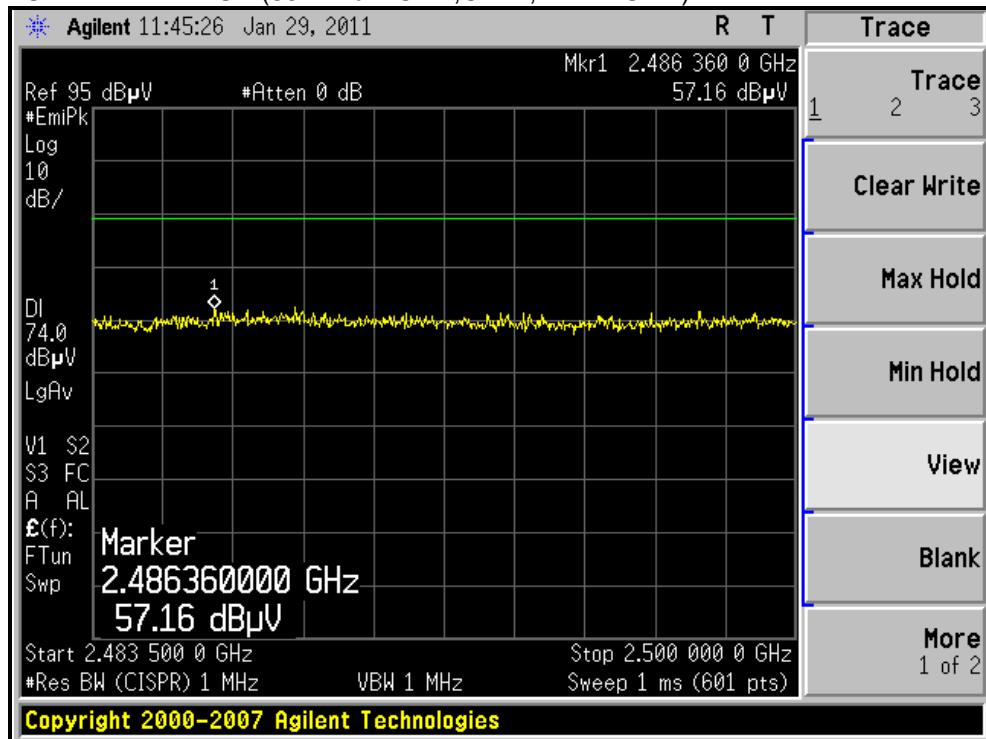
RESTRICTED BANDEDGE (802.11b MODE,CH11, HORIZONTAL )





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RESTRICTED BANDEDGE (802.11b MODE,CH11, VERTICAL )





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## 802.11g OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 1		FREQUENCY RANGE 1 ~ 25GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.4 PK	74.0	-12.6	1.23 H	109	30.43	30.97
2	2390.00	46.8 AV	54.0	-7.2	1.23 H	109	15.83	30.97
3	*2412.00	107.9 PK			1.24 H	194	76.83	31.07
4	*2412.00	97.4 AV			1.24 H	194	66.33	31.07
5	4824.00	46.8 PK	74.0	-27.2	1.11 H	39	9.69	37.11
6	4824.00	36.1 AV	54.0	-17.9	1.11 H	39	-1.01	37.11
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	65.9 PK	74.0	-8.1	1.20 V	85	34.93	30.97
2	2390.00	52.4 AV	54.0	-1.6	1.20 V	85	21.43	30.97
3	*2412.00	110.4 PK			1.20 V	85	79.33	31.07
4	*2412.00	100.4 AV			1.20 V	85	69.33	31.07
5	4824.00	53.7 PK	74.0	-20.3	1.20 V	217	16.59	37.11
6	4824.00	41.4 AV	54.0	-12.6	1.20 V	217	4.29	37.11

**REMARKS:**

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



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 6		FREQUENCY RANGE 1 ~ 25GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.2 PK			1.26 H	199	77.03	31.17
2	*2437.00	99.8 AV			1.26 H	199	68.63	31.17
3	4874.00	45.4 PK	74.0	-28.6	1.11 H	86	8.17	37.23
4	4874.00	36.1 AV	54.0	-17.9	1.11 H	86	-1.13	37.23
5	7311.00	47.0 PK	74.0	-27.0	1.23 H	71	2.64	44.36
6	7311.00	37.2 AV	54.0	-16.8	1.23 H	71	-7.16	44.36
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	111.4 PK			1.17 V	26	80.23	31.17
2	*2437.00	101.1 AV			1.17 V	26	69.93	31.17
3	4874.00	54.2 PK	74.0	-19.8	1.19 V	48	16.97	37.23
4	4874.00	41.9 AV	54.0	-12.1	1.19 V	48	4.67	37.23
5	7311.00	49.9 PK	74.0	-24.1	1.25 V	251	5.54	44.36
6	7311.00	38.4 AV	54.0	-15.6	1.25 V	251	-5.96	44.36

**REMARKS:**

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



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 11		FREQUENCY RANGE 1 ~ 25GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.0 PK			1.25 H	201	75.72	31.28
2	*2462.00	98.4 AV			1.25 H	201	67.12	31.28
3	2483.50	64.1 PK	74.0	-9.9	1.23 H	199	32.73	31.37
4	2483.50	47.3 AV	54.0	-6.7	1.23 H	199	15.93	31.37
5	4924.00	45.7 PK	74.0	-28.3	1.22 H	65	8.36	37.34
6	4924.00	36.3 AV	54.0	-17.7	1.22 H	65	-1.04	37.34
7	7386.00	47.2 PK	74.0	-26.8	1.31 H	48	2.61	44.59
8	7386.00	37.9 AV	54.0	-16.1	1.31 H	48	-6.69	44.59

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	110.8 PK			1.17 V	28	79.52	31.28
2	*2462.00	100.3 AV			1.17 V	28	69.02	31.28
3	2483.50	66.4 PK	74.0	-7.6	1.17 V	27	35.03	31.37
4	2483.50	49.6 AV	54.0	-4.4	1.17 V	27	18.23	31.37
5	4924.00	54.3 PK	74.0	-19.7	1.20 V	304	16.96	37.34
6	4924.00	41.8 AV	54.0	-12.2	1.20 V	304	4.46	37.34
7	7386.00	48.2 PK	74.0	-25.8	1.23 V	65	3.61	44.59
8	7386.00	37.9 AV	54.0	-16.1	1.23 V	65	-6.69	44.59

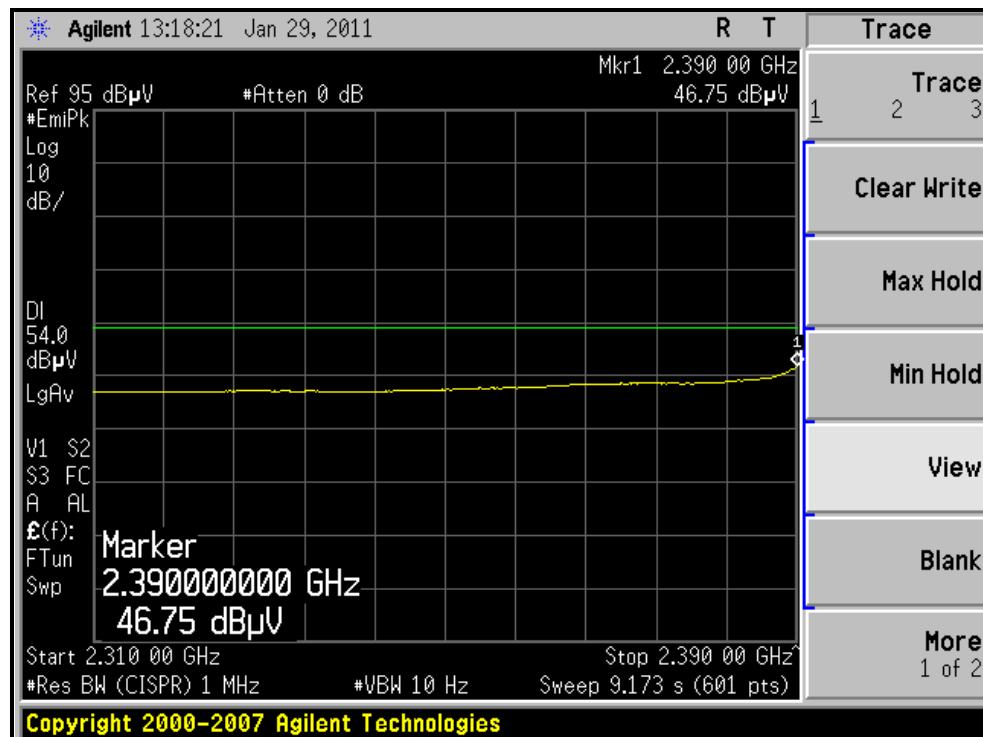
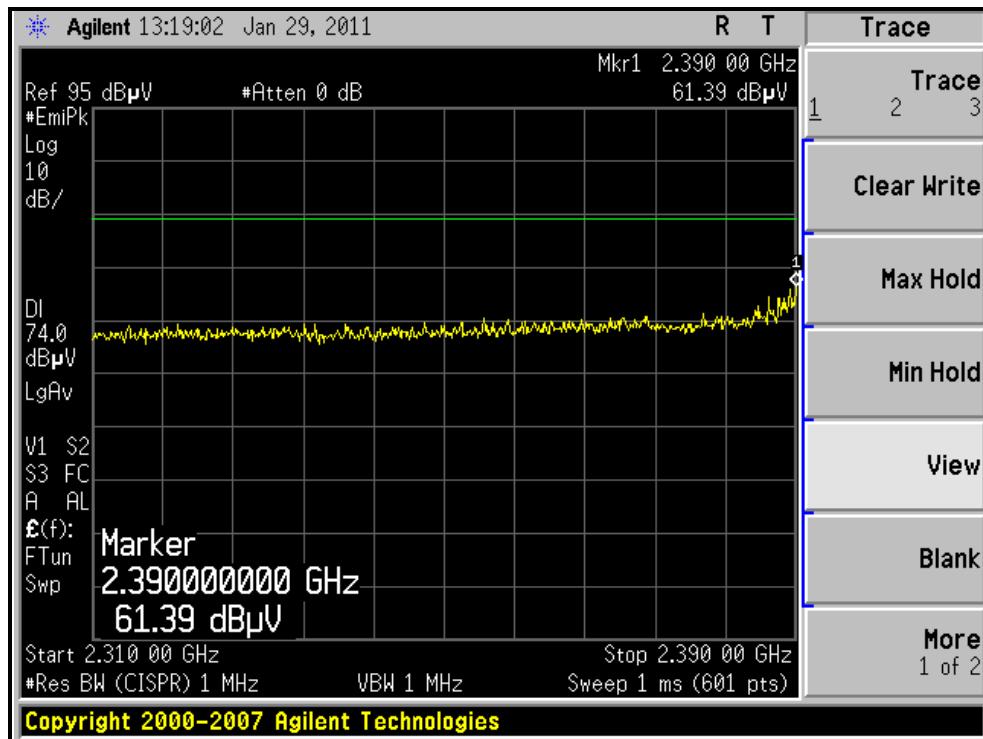
**REMARKS:**

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



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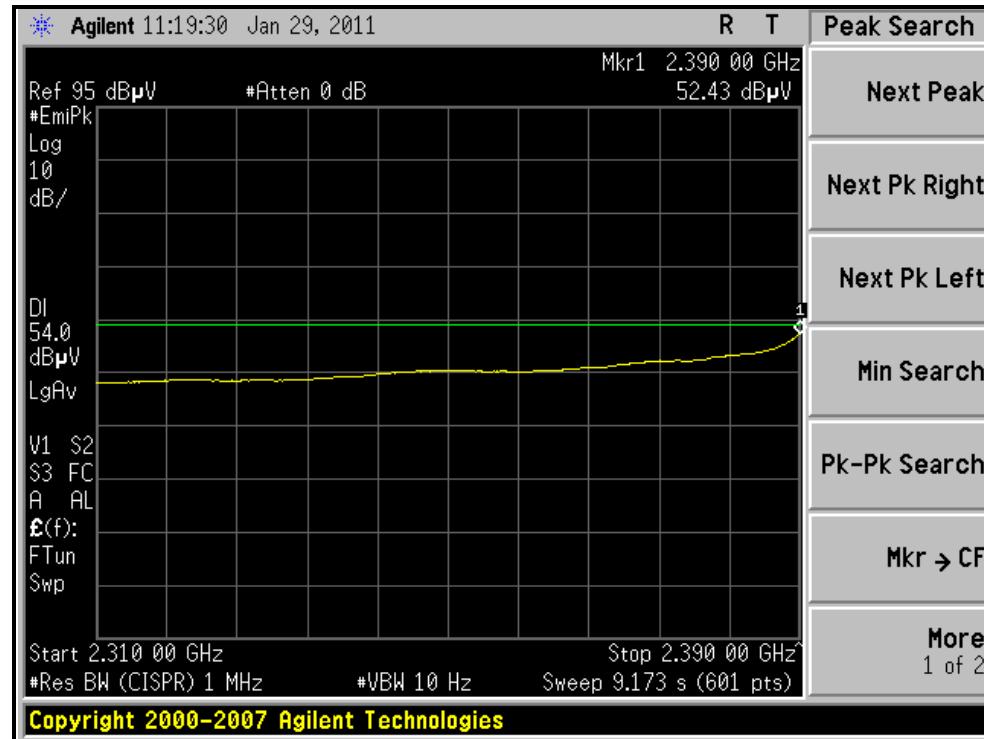
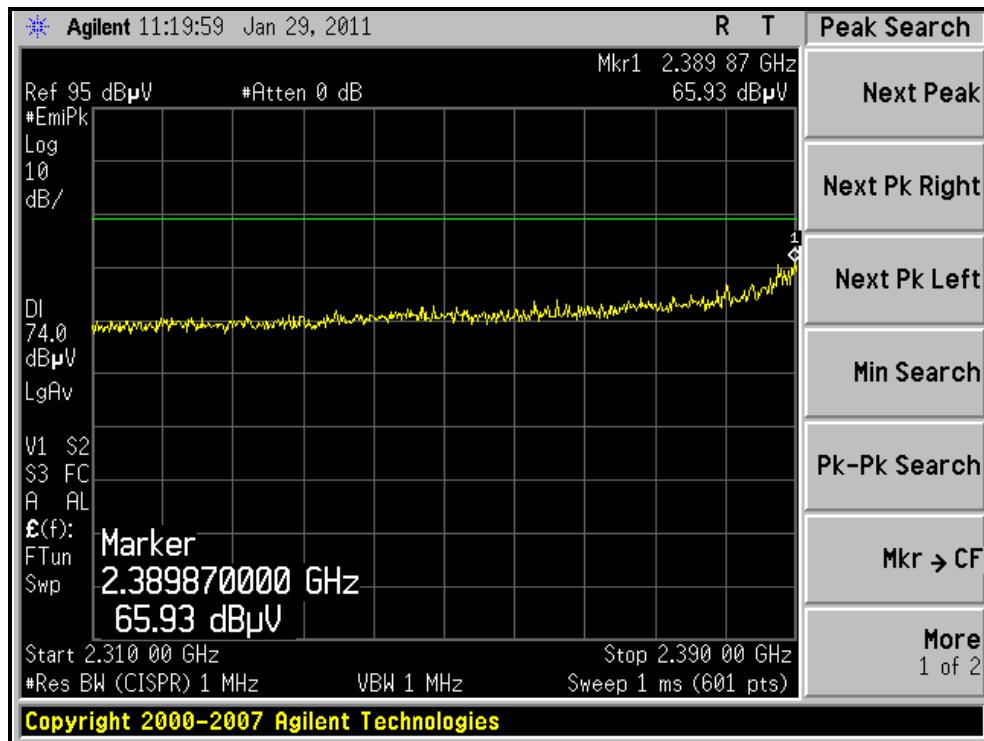
RESTRICTED BANDEDGE (802.11g MODE,CH1, HORIZONTAL )





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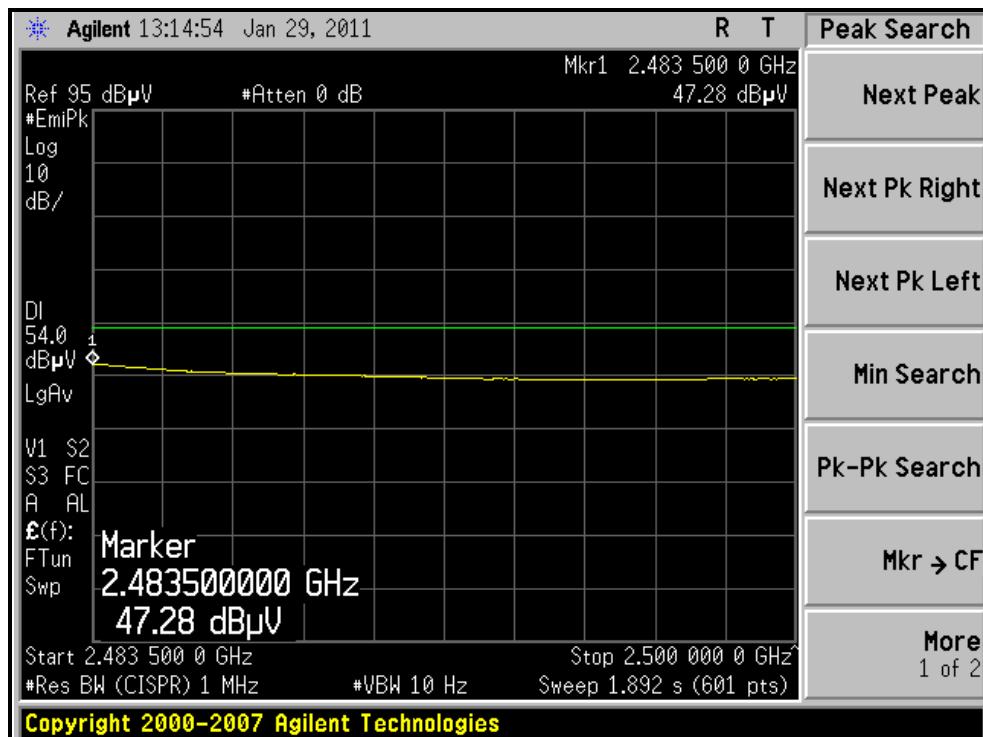
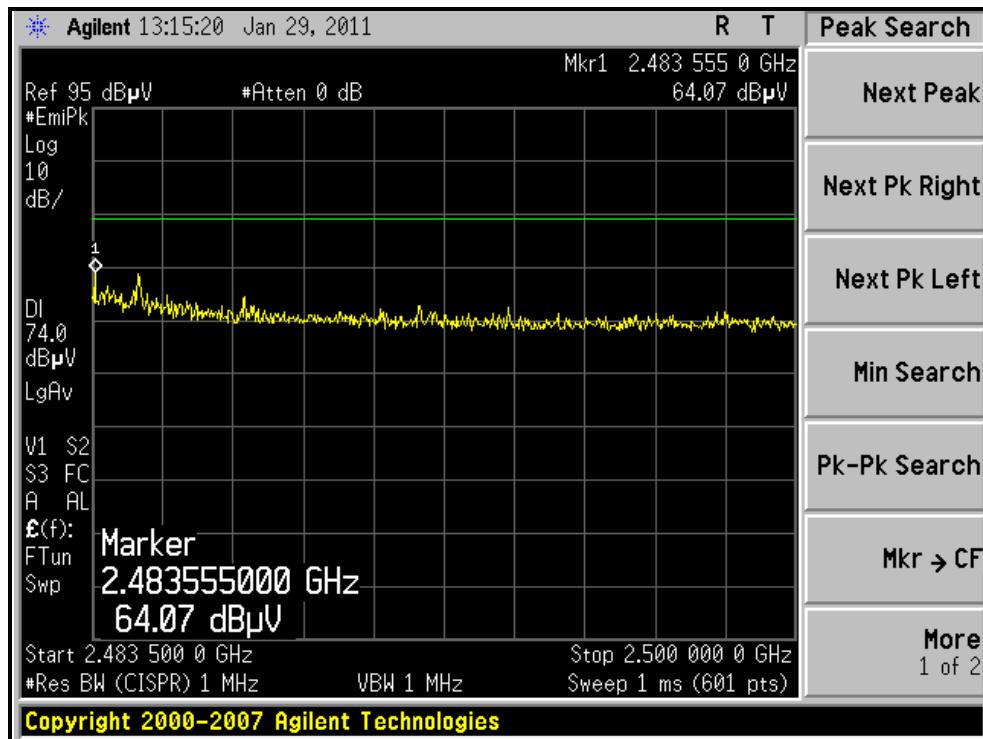
RESTRICTED BANDEDGE (802.11g MODE,CH1, VERTICAL )





A D T

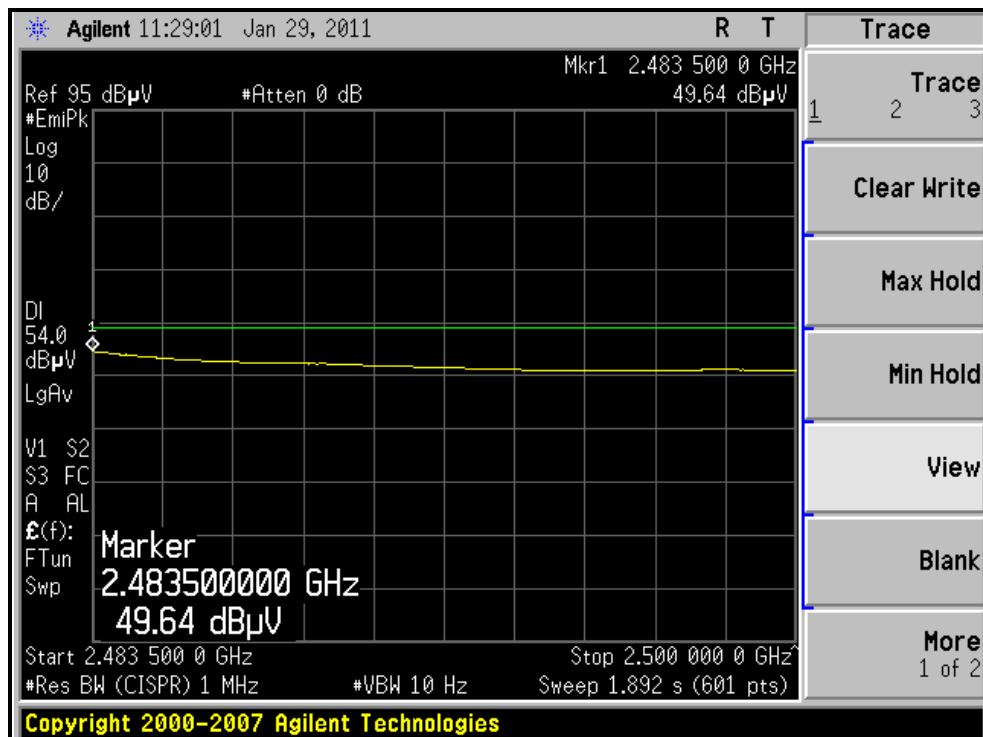
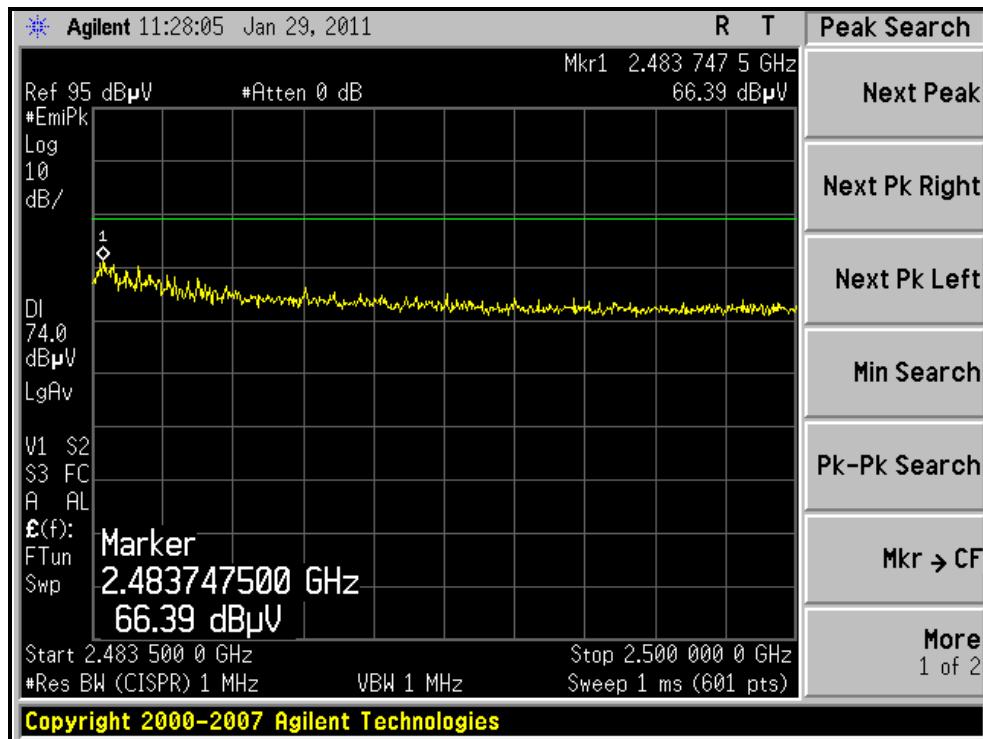
RESTRICTED BANDEDGE (802.11g MODE,CH11, HORIZONTAL )





A D T

RESTRICTED BANDEDGE (802.11g 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
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

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

#### 4.3.3 TEST PROCEDURE

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

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

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



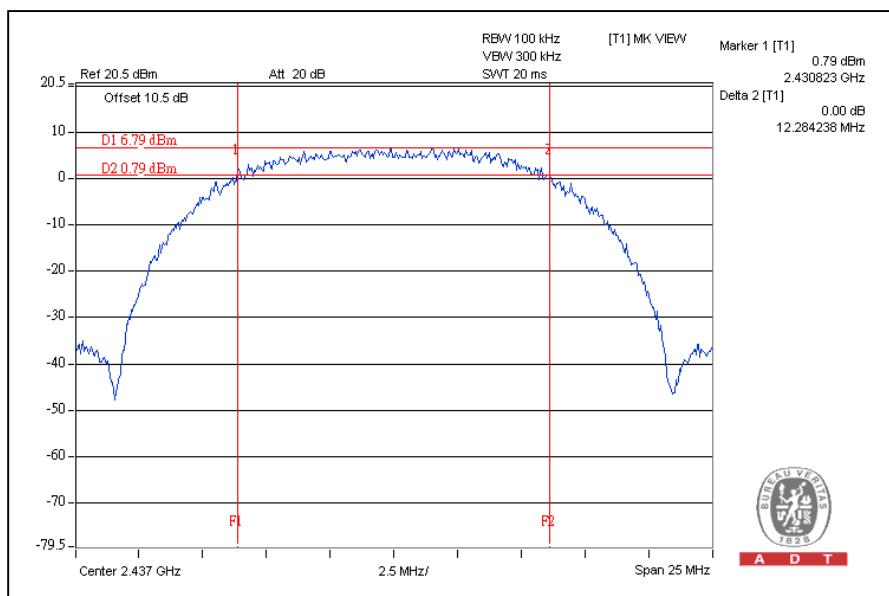
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#### 4.3.7 TEST RESULTS

##### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	12.06	0.5	PASS
6	2437	12.28	0.5	PASS
11	2462	11.20	0.5	PASS

CH6



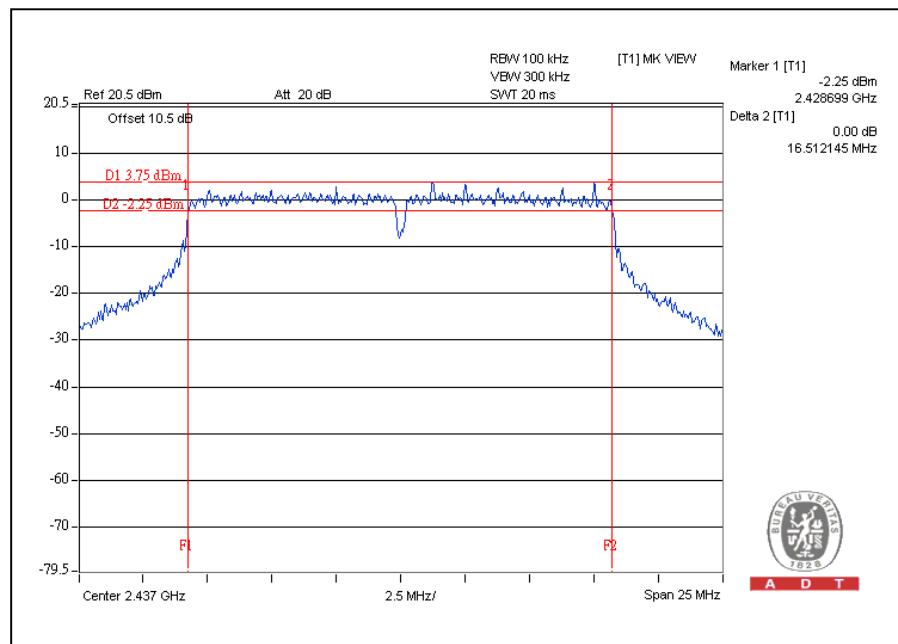


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### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.41	0.5	PASS
6	2437	16.51	0.5	PASS
11	2462	16.43	0.5	PASS

CH6





## 4.4 MAXIMUM PEAK OUTPUT POWER

### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

### 4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Peak Power Meter	ML2495A	0824006	May 04, 2010	May 03, 2011
Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

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

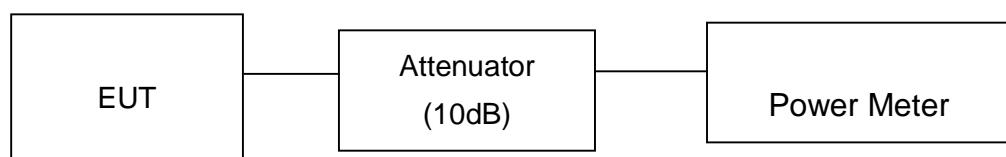
### 4.4.3 TEST PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the power level.

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.4.5 TEST SETUP



### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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#### 4.4.7 TEST RESULTS

##### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	85.1	19.3	30	PASS
6	2437	107.2	20.3	30	PASS
11	2462	109.6	20.4	30	PASS

##### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
1	2412	363.1	25.6	30	PASS
6	2437	371.5	25.7	30	PASS
11	2462	269.2	24.3	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
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

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

### 4.5.3 TEST PROCEDURE

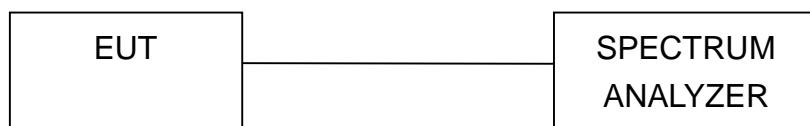
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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



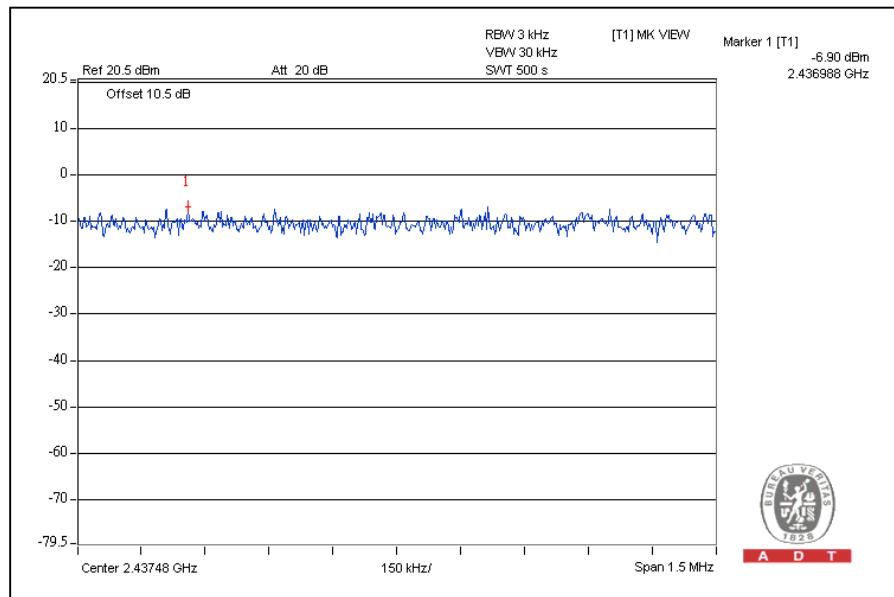
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#### 4.5.7 TEST RESULTS

##### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-8.3	8	PASS
6	2437	-6.9	8	PASS
11	2462	-7.0	8	PASS

CH6



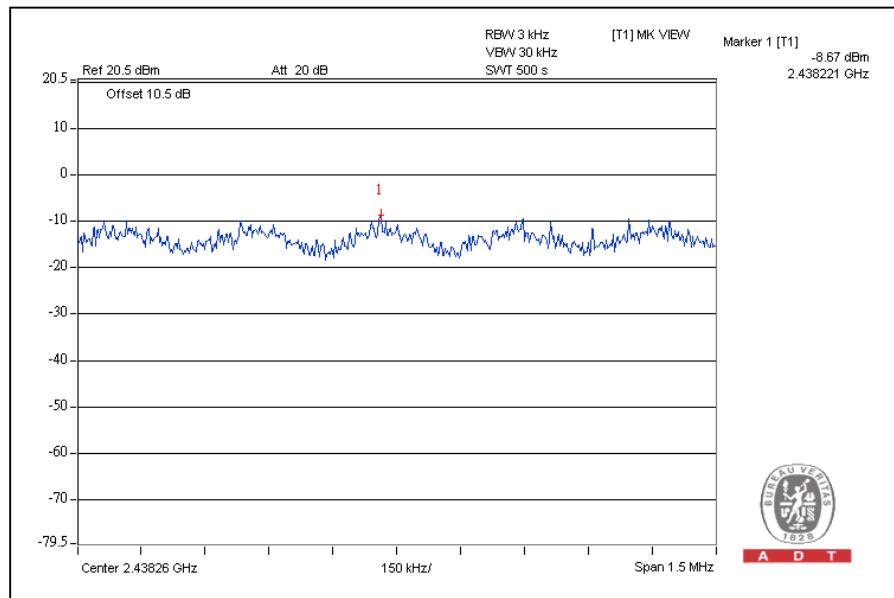


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### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-9.8	8	PASS
6	2437	-8.7	8	PASS
11	2462	-9.0	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  $100\text{kHz}$  Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

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

### 4.6.3 TEST PROCEDURE

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

The spectrum plots (RBW =  $100\text{kHz}$ , VBW =  $300\text{kHz}$ ) 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

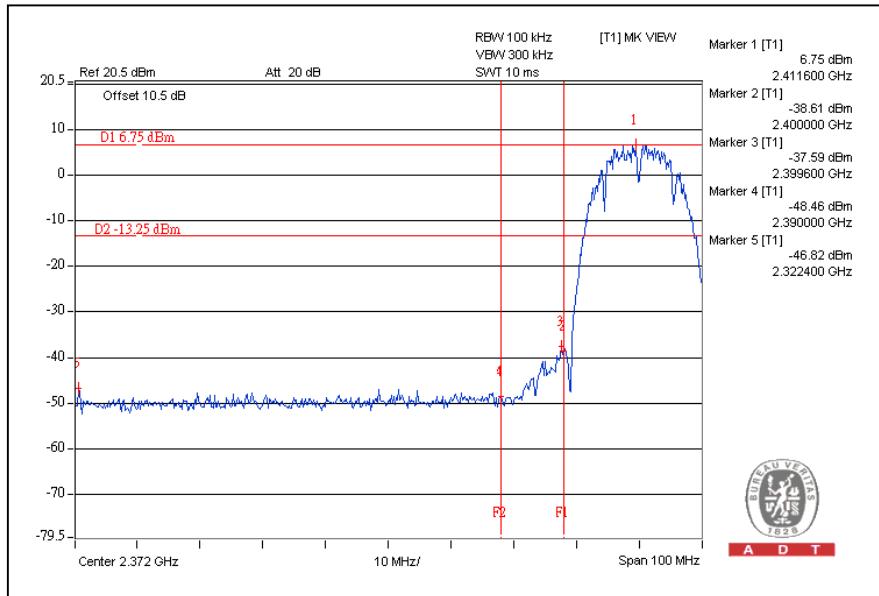
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the  $20\text{dB}$  offset below D1. It shows compliance with the requirement in part 15.247(d).



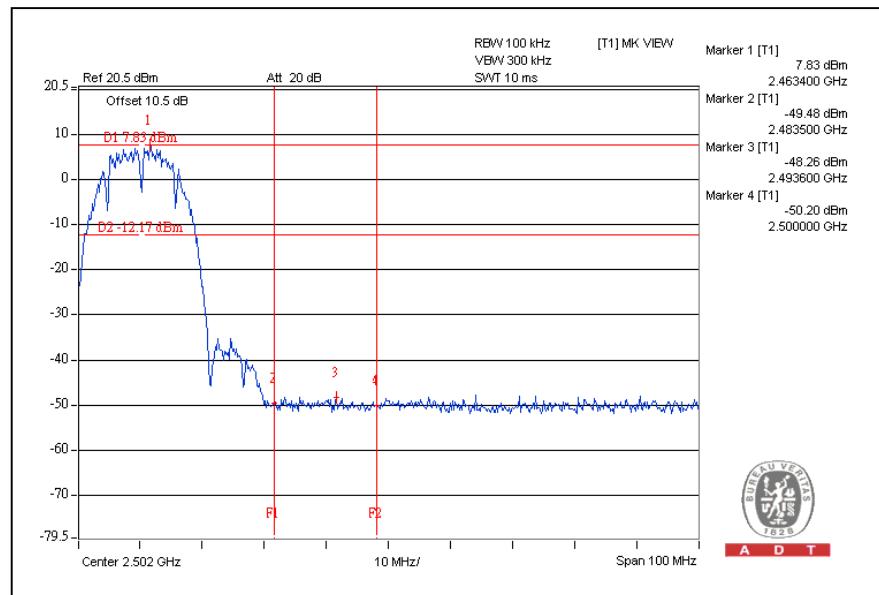
A D T

## 802.11b DSSS MODULATION:

CH1



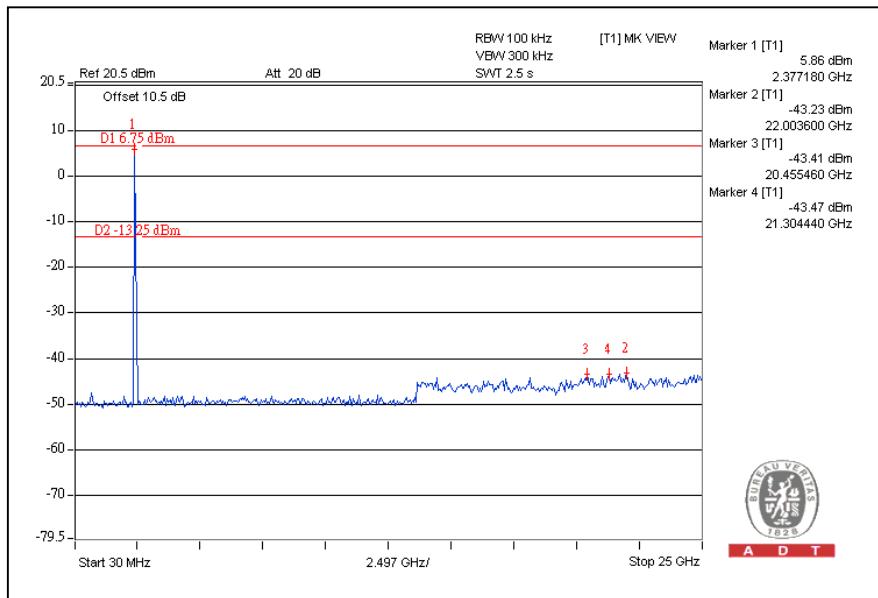
CH11



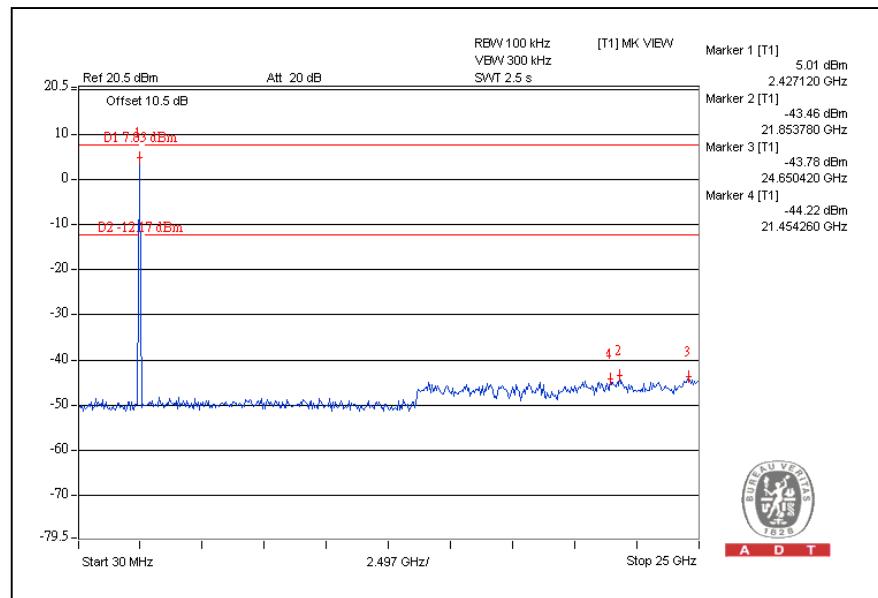


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CH1



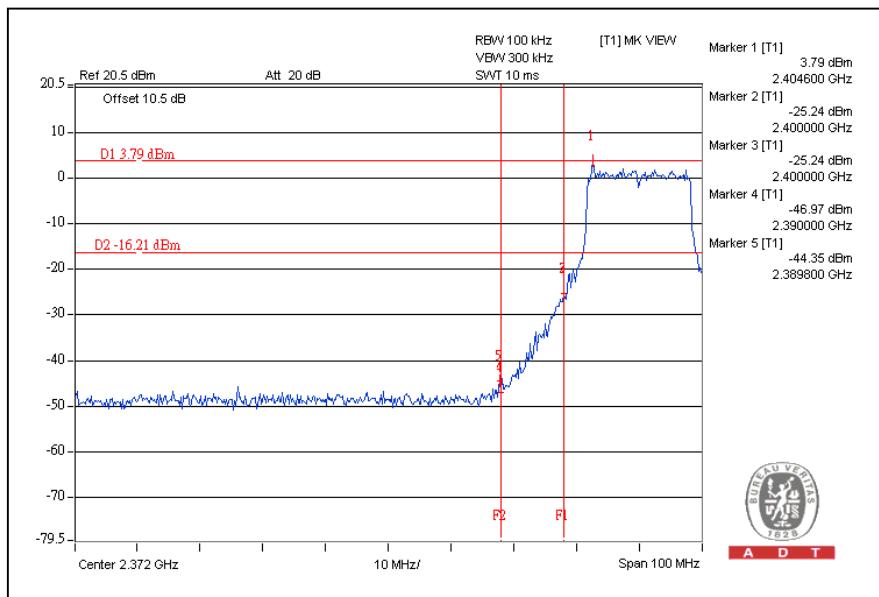
CH11



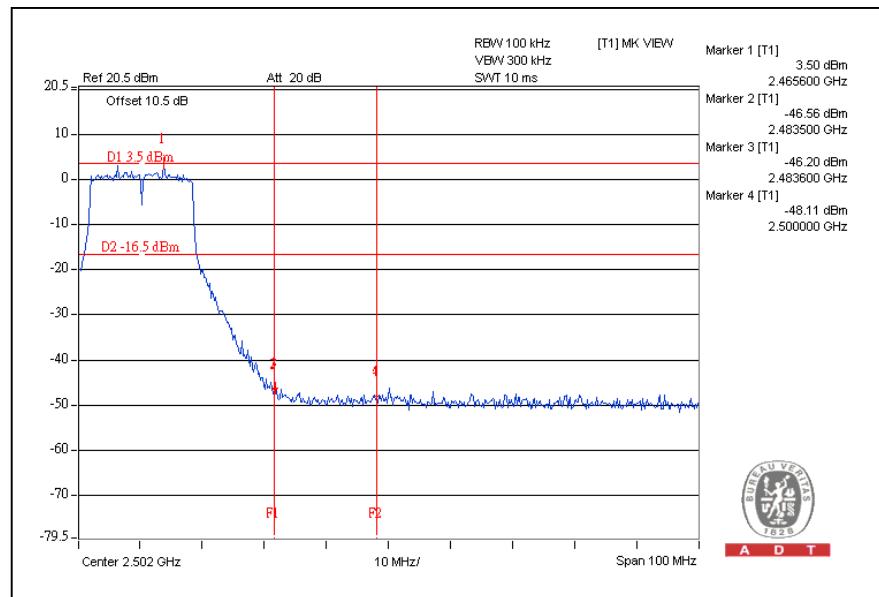


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## 802.11g OFDM MODULATION: CH1



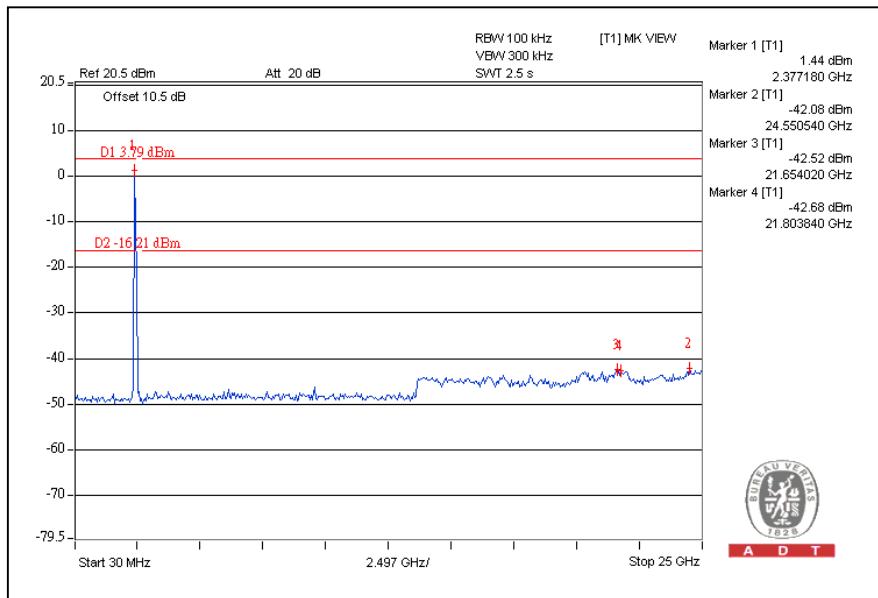
CH11



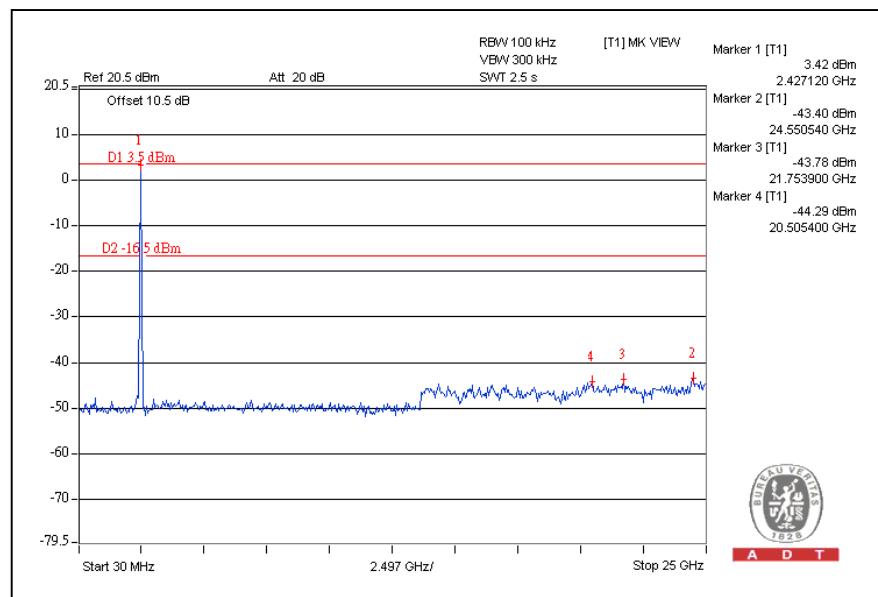


A D T

CH1



CH11





A D T

## 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

Test date: Feb. 10, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 08, 2010	Sep. 07, 2011
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 03, 2010	Nov. 02, 2011
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 30, 2010	Aug. 29, 2011
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.



A D T

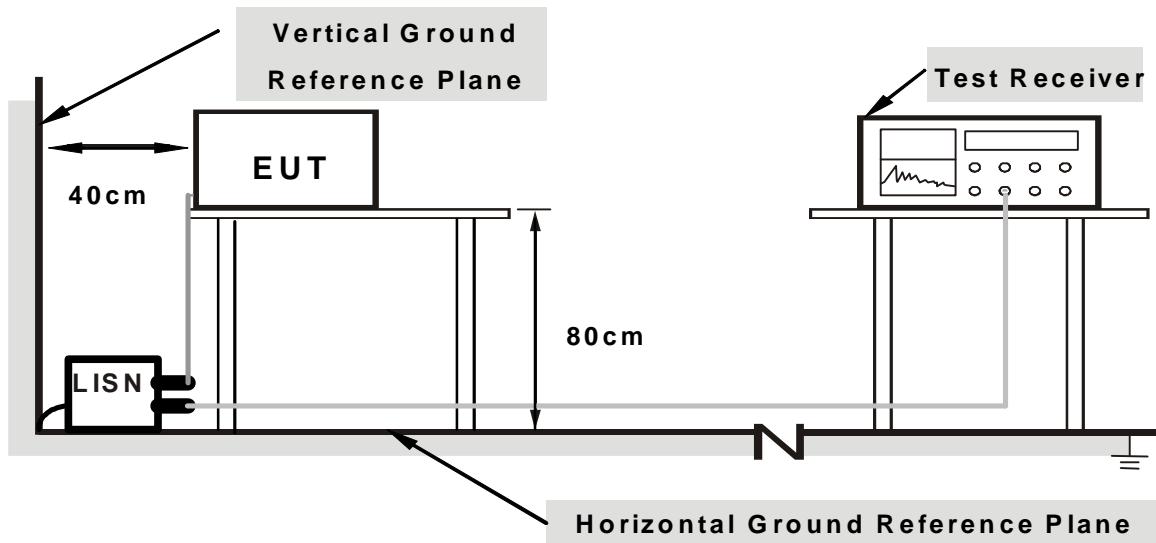
### 5.1.3 TEST PROCEDURES

- 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 cm 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

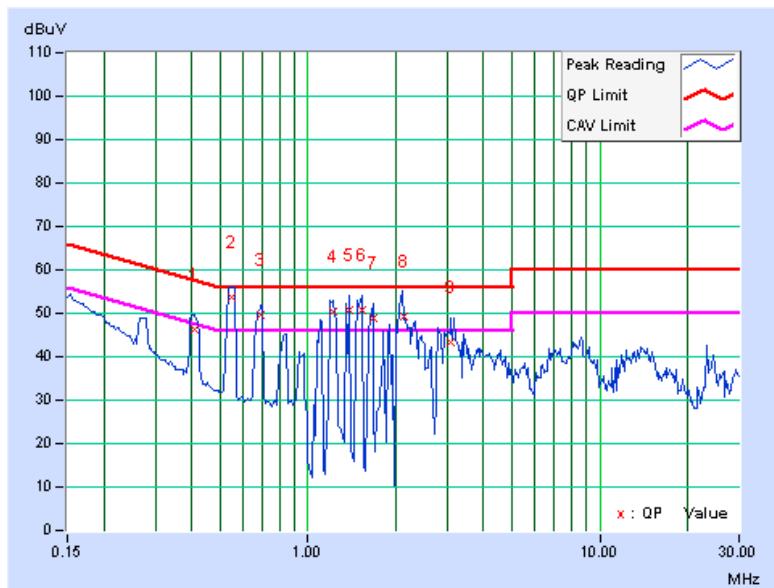
## 5.1.7 TEST RESULTS

PHASE		Line (L)		6dB BANDWIDTH		9 kHz	
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.408	0.06	46.26	-	46.32	-	57.69	47.69	-11.37	-
2	0.551	0.07	53.59	44.64	53.66	44.71	56.00	46.00	-2.34	-1.29
3	0.689	0.07	49.44	38.70	49.51	38.77	56.00	46.00	-6.49	-7.23
4	1.227	0.10	50.38	35.50	50.48	35.60	56.00	46.00	-5.52	-10.40
5	1.395	0.11	50.70	35.38	50.81	35.49	56.00	46.00	-5.19	-10.51
6	1.527	0.11	50.46	34.29	50.57	34.40	56.00	46.00	-5.43	-11.60
7	1.668	0.12	48.84	32.35	48.96	32.47	56.00	46.00	-7.04	-13.53
8	2.144	0.13	49.05	29.94	49.18	30.07	56.00	46.00	-6.82	-15.93
9	3.078	0.16	43.03	-	43.19	-	56.00	46.00	-12.81	-

**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	
	[MHz]	Factor (dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.400	0.07	47.39	-	47.46	-	57.85	47.85	-10.39	-
2	<b>0.554</b>	<b>0.08</b>	<b>54.73</b>	<b>45.31</b>	<b>54.81</b>	<b>45.39</b>	<b>56.00</b>	<b>46.00</b>	<b>-1.19</b>	<b>-0.61</b>
3	0.697	0.08	50.07	38.32	50.15	38.40	56.00	46.00	-5.85	-7.60
4	1.246	0.11	50.58	36.12	50.69	36.23	56.00	46.00	-5.31	-9.77
5	1.371	0.11	51.19	36.21	51.30	36.32	56.00	46.00	-4.70	-9.68
6	2.015	0.14	50.32	31.44	50.46	31.58	56.00	46.00	-5.54	-14.42
7	2.348	0.15	46.31	28.12	46.46	28.27	56.00	46.00	-9.54	-17.73
8	3.191	0.18	42.77	-	42.95	-	56.00	46.00	-13.05	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

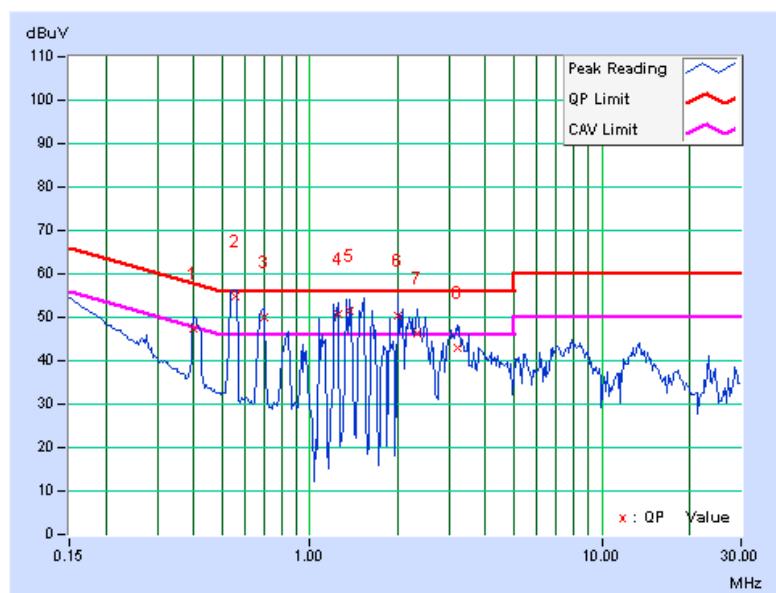
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

3. The emission levels of other frequencies were very low against the limit.

4. Margin value = Emission level - Limit value

5. Correction factor = Insertion loss + Cable loss

6. Emission Level = Correction Factor + Reading Value.





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## 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 (dB<sub>u</sub>V/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.



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## 5.2.2 TEST INSTRUMENTS

**Below 1GHz test: test date Feb. 14, 2011**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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



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**Above 1GHz test: test date: Jan. 31, 2011**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	May 12, 2010	May 11, 2011
HP Pre_Amplifier	8449B	300801923	Nov. 01, 2010	Oct. 31, 2011
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 03, 2010	Sep. 02, 2011
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2010	Dec. 16, 2011
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 17, 2011	Jan. 16, 2012
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 104+ Sucoflex 106	RF104-101+R F106-101	Aug. 24, 2010	Aug. 23, 2011
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

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

2. The horn antenna, preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. C.

4. The FCC Site Registration No. is 656396.

5. The VCCI Site Registration No. is R-1626.

6. The CANADA Site Registration No. is IC 7450G-3.



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### 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 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 height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

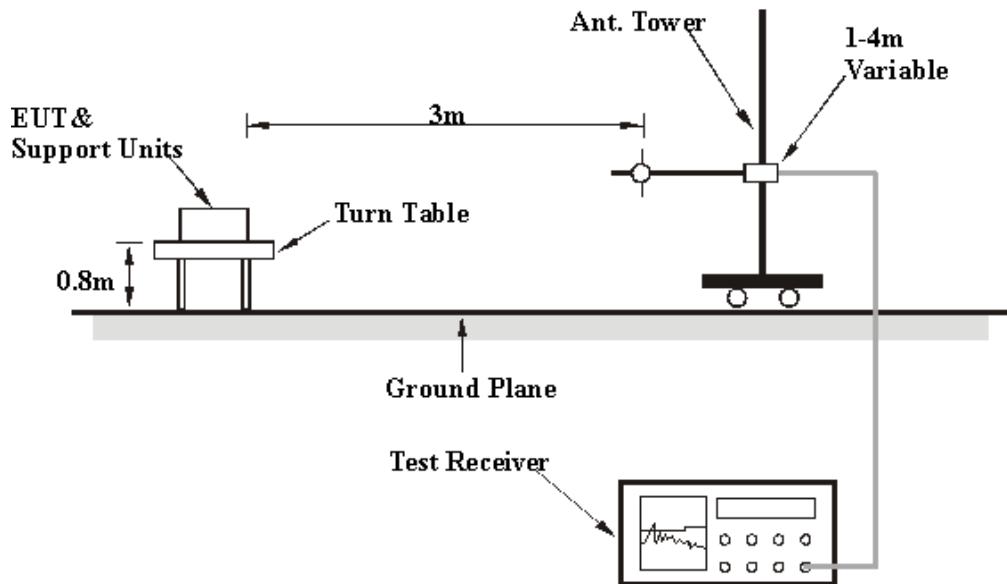
#### NOTE:

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



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## 5.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 149		FREQUENCY RANGE Below 1000MHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Quasi-Peak
ENVIRONMENTAL CONDITIONS		16deg. C, 70%RH 1024 hPa		TESTED BY Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	132.11	38.4 QP	43.5	-5.1	1.46 H	129	24.94	13.48
2	153.65	40.4 QP	43.5	-3.1	1.59 H	257	26.11	14.26
3	230.02	39.2 QP	46.0	-6.8	1.42 H	129	26.86	12.38
4	250.03	40.4 QP	46.0	-5.6	1.00 H	283	27.00	13.42
5	294.44	36.3 QP	46.0	-9.7	1.00 H	341	21.03	15.23
6	660.01	36.2 QP	46.0	-9.8	1.00 H	19	13.06	23.17
7	885.60	36.5 QP	46.0	-9.5	1.00 H	112	9.92	26.55
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	30.62	39.3 QP	40.0	-0.7	1.00 V	29	26.68	12.63
2	47.76	37.6 QP	40.0	-2.4	1.00 V	123	23.41	14.17
3	124.97	39.5 QP	43.5	-4.0	1.00 V	340	26.46	13.00
4	133.26	42.5 QP	43.5	-1.0	1.00 V	341	28.93	13.56
5	250.03	39.1 QP	46.0	-6.9	1.00 V	129	25.70	13.42
6	324.99	42.6 QP	46.0	-3.5	1.50 V	327	26.54	16.01
7	500.02	33.8 QP	46.0	-12.2	1.00 V	259	13.74	20.10

**REMARKS:**

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



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## ABOVE 1GHz WORST-CASE DATA

## 802.11a OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		FREQUENCY RANGE		1 ~ 40GHz
INPUT POWER		DETECTOR FUNCTION		Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		TESTED BY		Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	95.9 PK			1.40 H	244	56.66	39.24
2	*5745.00	86.3 AV			1.40 H	244	47.06	39.24
3	11490.00	54.8 PK	74.0	-19.2	1.33 H	250	3.13	51.67
4	11490.00	43.7 AV	54.0	-10.3	1.33 H	250	-7.97	51.67

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	106.7 PK			1.39 V	85	67.46	39.24
2	*5745.00	97.0 AV			1.39 V	85	57.76	39.24
3	11490.00	57.2 PK	74.0	-16.8	1.00 V	359	5.53	51.67
4	11490.00	44.9 AV	54.0	-9.1	1.00 V	359	-6.77	51.67

**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.



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 157		FREQUENCY RANGE 1 ~ 40GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	96.3 PK			1.58 H	340	56.95	39.35
2	*5785.00	86.1 AV			1.58 H	340	46.75	39.35
3	11570.00	55.0 PK	74.0	-19.0	1.41 H	250	3.57	51.43
4	11570.00	43.7 AV	54.0	-10.3	1.41 H	250	-7.73	51.43
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	107.2 PK			1.40 V	40	67.85	39.35
2	*5785.00	97.3 AV			1.40 V	40	57.95	39.35
3	11570.00	56.9 PK	74.0	-17.1	1.00 V	360	5.47	51.43
4	11570.00	44.8 AV	54.0	-9.2	1.00 V	360	-6.63	51.43

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “\*”: Fundamental frequency.
6. The limit value is defined as per 15.247.



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 165		FREQUENCY RANGE 1 ~ 40GHz
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		20deg. C, 70%RH 1024 hPa		TESTED BY Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	93.1 PK			1.62 H	339	53.65	39.45
2	*5825.00	85.2 AV			1.62 H	339	45.75	39.45
3	11650.00	55.2 PK	74.0	-18.8	1.38 H	241	4.06	51.14
4	11650.00	43.9 AV	54.0	-10.1	1.38 H	241	-7.24	51.14
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	106.0 PK			1.02 V	106	66.55	39.45
2	*5825.00	96.3 AV			1.02 V	106	56.85	39.45
3	11650.00	56.6 PK	74.0	-17.4	1.00 V	306	5.46	51.14
4	11650.00	44.6 AV	54.0	-9.4	1.00 V	306	-6.54	51.14

**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.



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## 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
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

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

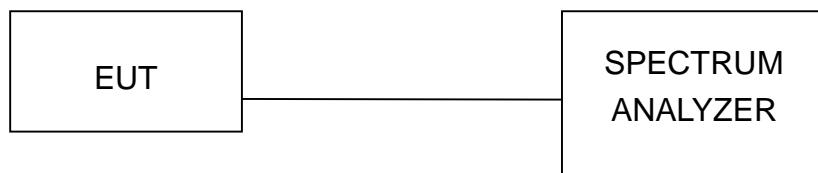
### 5.3.3 TEST PROCEDURE

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 300kHz 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.



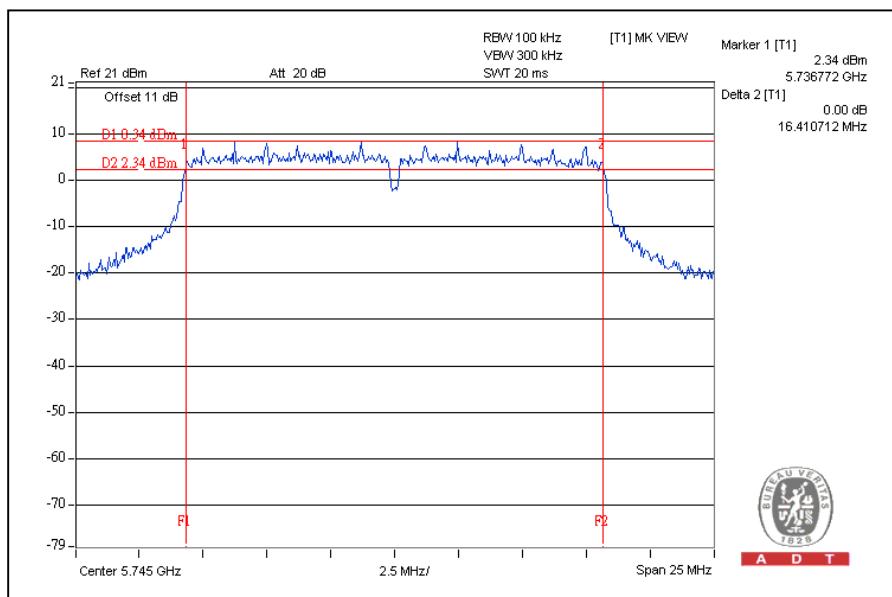
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### 5.3.7 TEST RESULTS

#### 802.11a OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.41	0.5	PASS
157	5785	16.40	0.5	PASS
165	5825	16.39	0.5	PASS

CH149





## 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
Peak Power Meter	ML2495A	0824006	May 04, 2010	May 03, 2011
Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

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

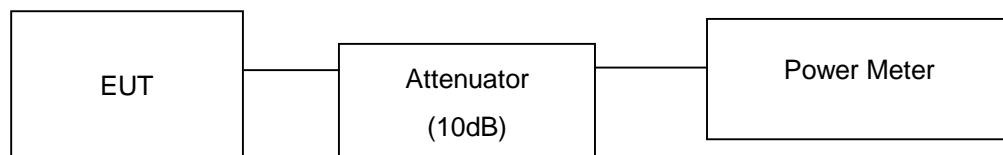
### 5.4.3 TEST PROCEDURES

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



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## 5.4.7 TEST RESULTS

### 802.11a OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
149	5745	537.0	27.3	28.9	PASS
157	5785	512.9	27.1	28.9	PASS
165	5825	489.8	26.9	28.9	PASS

Note:

Transmitting antennas of directional gain greater than 6 dBi, power limitation was reduced by the amount in dB that the transmitting antennas of directional gain greater than 6 dBi.



## 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
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

**NOTE:** 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





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### 5.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



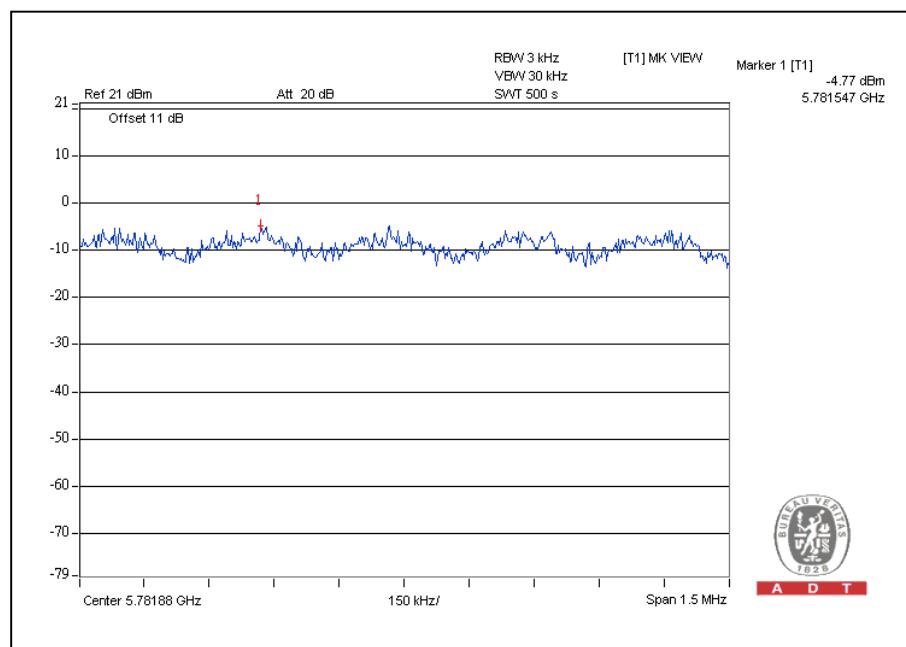
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## 5.5.7 TEST RESULTS

### 802.11a OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
149	5745	-5.9	8	PASS
157	5785	-4.8	8	PASS
165	5825	-5.3	8	PASS

CH157





## 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
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

**NOTE:** 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 100MHz 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

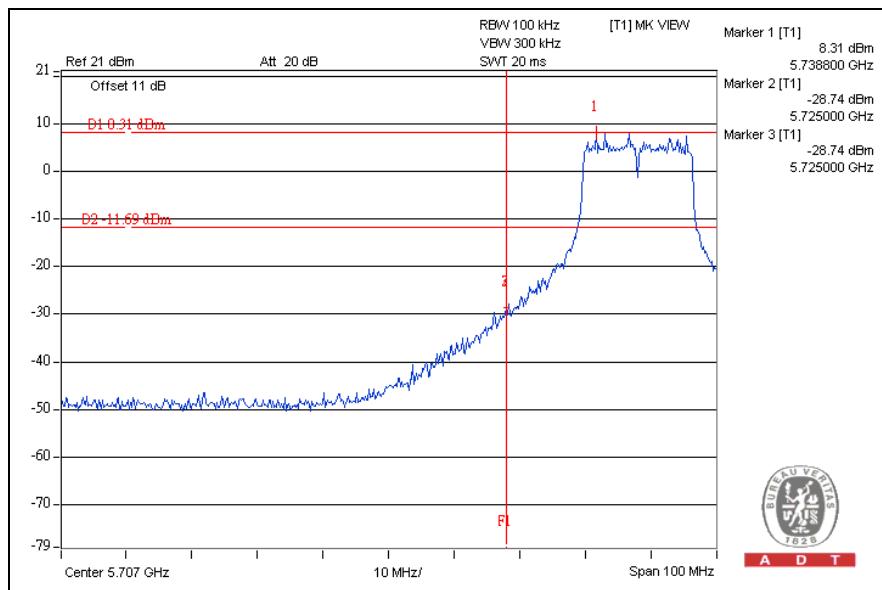
The spectrum plots are attached on the following pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).



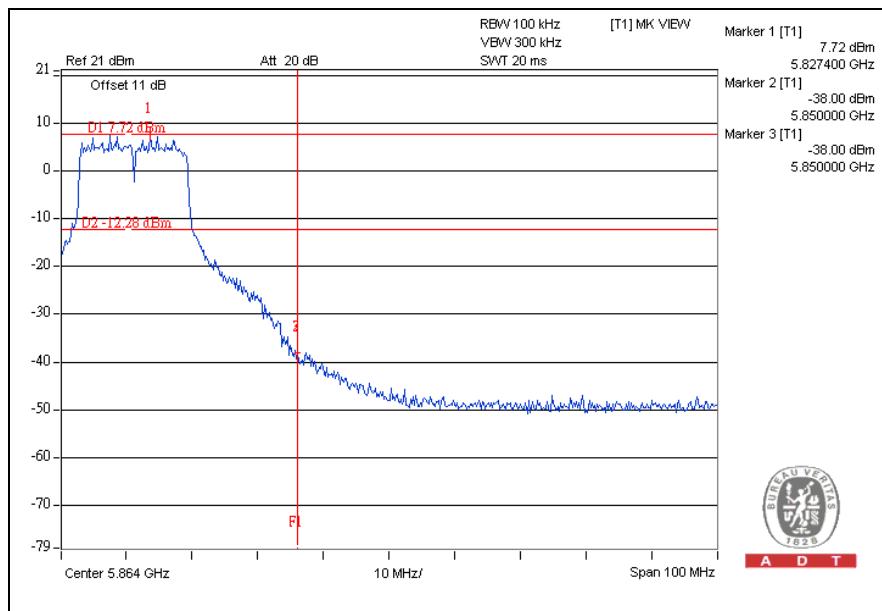
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## 802.11a OFDM modulation

CH149



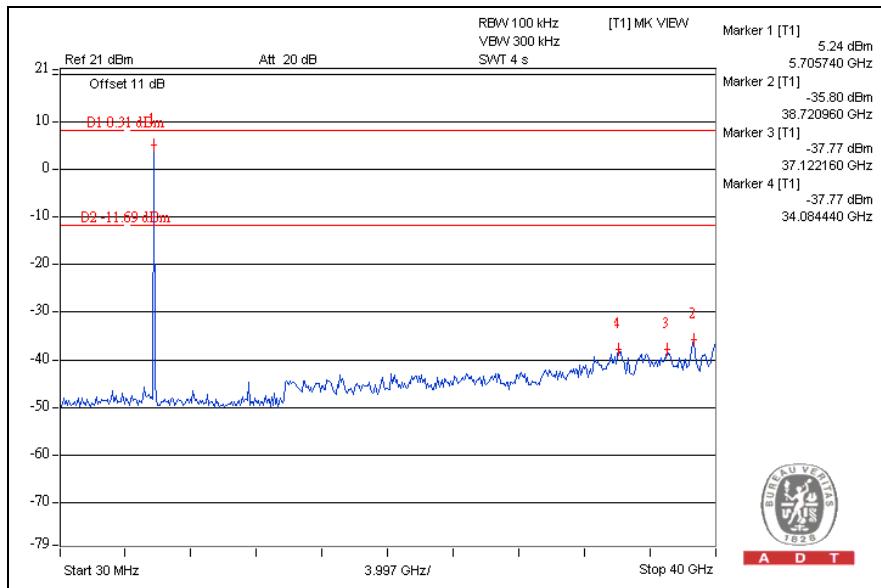
CH165



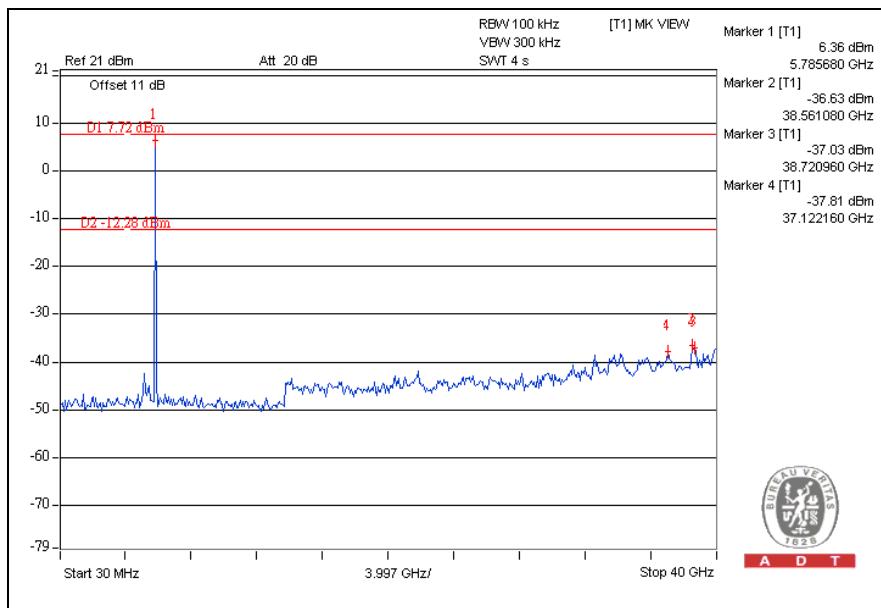


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## CH149



## CH165





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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 ---