



FCC TEST REPORT

REPORT NO.: RF920923R01

MODEL NO.: DWL-2000AP

RECEIVED: Sept. 23, 2003

TESTED: Sept. 23, 2003 ~ Oct. 7, 2003

APPLICANT: D-Link Corporation

ADDRESS: No. 8, Li-Hsin VII Road Science Based
Industrial Park, Hsin-Chu, Taiwan

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei,
Taiwan, R.O.C.

This test report consists of 62 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, NVLAP or any government agencies. The test results in the report only apply to the tested sample.



0528
ILAC MRA



Lab Code: 200102-0



Table of Contents

1	CERTIFICATION	4
2	SUMMARY OF TEST RESULTS	5
3	GENERAL INFORMATION.....	6
3.1	GENERAL DESCRIPTION OF EUT	6
3.2	DESCRIPTION OF TEST MODES	7
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	7
3.4	DESCRIPTION OF SUPPORT UNITS	8
3.5	CONFIGURATION OF SYSTEM UNDER TEST	9
4	TEST TYPES AND RESULTS	10
4.1	CONDUCTED EMISSION MEASUREMENT	10
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	10
4.1.2	TEST INSTRUMENTS	10
4.1.3	TEST PROCEDURES	11
4.1.4	DEVIATION FROM TEST STANDARD	11
4.1.5	TEST SETUP	12
4.1.6	EUT OPERATING CONDITIONS	12
4.1.7	TEST RESULTS	13
4.2	RADIATED EMISSION MEASUREMENT	19
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT	19
4.2.2	TEST INSTRUMENTS	20
4.2.3	TEST PROCEDURES	21
4.2.4	DEVIATION FROM TEST STANDARD	21
4.2.5	TEST SETUP	22
4.2.6	EUT OPERATING CONDITIONS	22
4.2.7	TEST RESULTS	23
4.3	6dB BANDWIDTH MEASUREMENT.....	30
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	30
4.3.2	TEST INSTRUMENTS	30
4.3.3	TEST PROCEDURE	30
4.3.4	DEVIATION FROM TEST STANDARD	30
4.3.5	TEST SETUP	31
4.3.6	EUT OPERATING CONDITIONS	31



4.3.7	TEST RESULTS	32
4.4	MAXIMUM PEAK OUTPUT POWER	40
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	40
4.4.2	TEST INSTRUMENTS	40
4.4.3	TEST PROCEDURES	41
4.4.4	DEVIATION FROM TEST STANDARD	41
4.4.5	TEST SETUP	41
4.4.6	EUT OPERATING CONDITIONS	41
4.4.7	TEST RESULTS	42
4.5	POWER SPECTRAL DENSITY MEASUREMENT	43
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	43
4.5.2	TEST INSTRUMENTS	43
4.5.3	TEST PROCEDURE	44
4.5.4	DEVIATION FROM TEST STANDARD	44
4.5.5	TEST SETUP	44
4.5.6	EUT OPERATING CONDITIONS	44
4.5.7	TEST RESULTS	45
4.6	BAND EDGES MEASUREMENT	53
4.6.1	LIMITS OF BAND EDGES MEASUREMENT	53
4.6.2	TEST INSTRUMENTS	53
4.6.3	TEST PROCEDURE	53
4.6.4	DEVIATION FROM TEST STANDARD	53
4.6.5	EUT OPERATING CONDITION	54
4.6.6	TEST RESULTS	54
4.7	ANTENNA REQUIREMENT	59
4.7.1	STANDARD APPLICABLE	59
4.7.2	ANTENNA CONNECTED CONSTRUCTION	59
5	PHOTOGRAPHS OF THE TEST CONFIGURATION	60
6	INFORMATION ON THE TESTING LABORATORIES	62



1 CERTIFICATION

PRODUCT : 2.4GHz Wireless Access Point
MODEL NO.: DWL-2000AP
BRAND NAME : D-Link
APPLICANT : D-Link Corporation
TEST ITEM : ENGINEERING SAMPLE
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247),
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from Sept. 23, 2003 to Oct. 7, 2003. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

PREPARED BY : Emely Lu , **DATE :** Oct. 8, 2003
Emely Lu

APPROVED BY : Ellis Wu , **DATE :** Oct. 8, 2003
Ellis Wu, Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR 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 -11.78dB at 0.150MHz
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(c)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -1.20dB at 2688.00MHz
15.247(d)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
15.247(c)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	2.4GHz Wireless Access Point
MODEL NO.	DWL-2000AP
POWER SUPPLY	5VDC from power adapter
MODULATION TYPE	BPSK, QPSK, CCK, 16QAM, 64QAM
RADIO TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	1/2/5.5/6/9/11/12/18/24/36/48/54Mbps
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	16.96dBm
ANTENNA TYPE	Dipole antenna with 2.0dBi gain
DATA CABLE	NA
I/O PORTS	RJ45
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT was powered by the following adapter:

BRAND :	D-Link
MODEL :	SMP-T1178
INPUT :	100-120V 0.5A 50-60Hz
OUTPUT :	+5V-2.5A

2. The EUT operates in the 2.4GHz frequency spectrum and compatible with the draft 802.11g standard to provide a wireless data rate of up to 54Mbps.
3. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided to this EUT.

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

NOTE:

1. Below 1GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, the worst case, was chosen for final test.
2. Above 1GHz, the channel 1, 6, and 11 were tested individually.
3. Transfer rate at 11Mbps with CCK technique and 6Mbps with OFDM technique, the worst cases, were chosen for final test.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart C. (15.247)

ANSI C63.4: 1992

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

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



3.4 DESCRIPTION OF SUPPORT UNITS

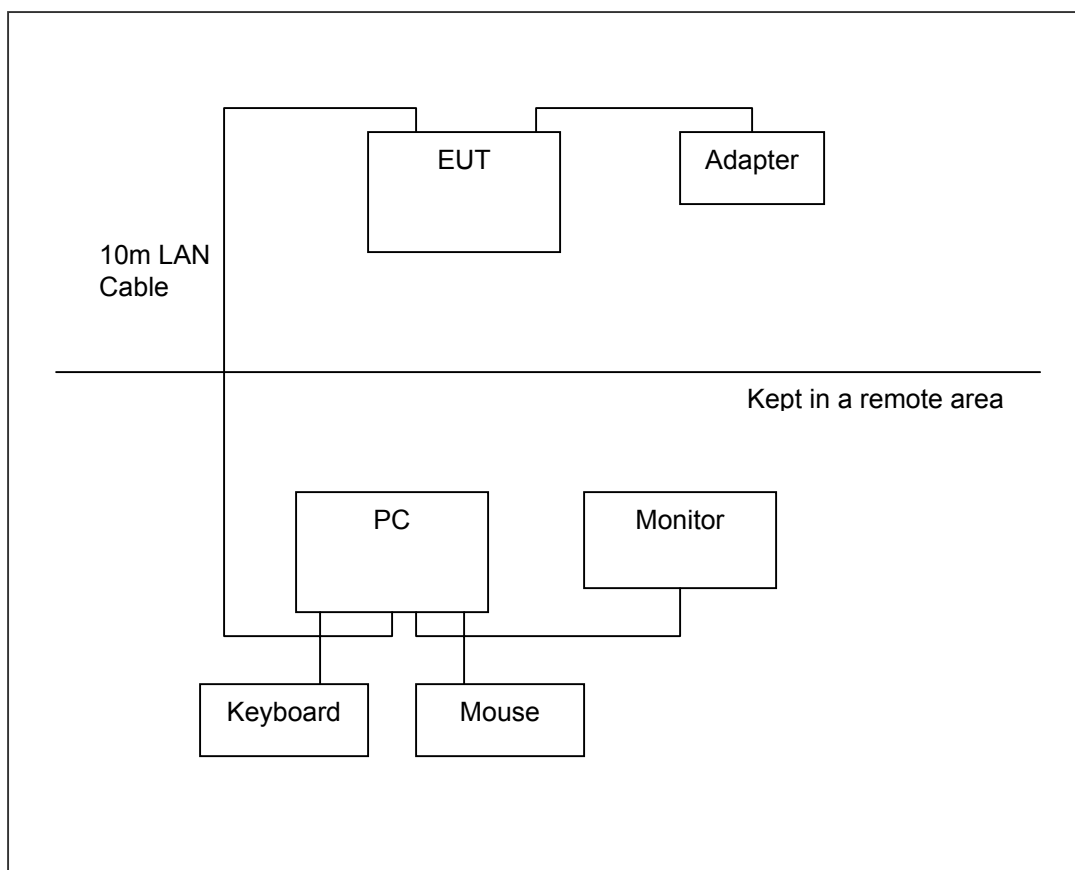
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PERSONAL COMPUTER	HP	Brio BA410	SG12902751	FCC DoC
2	MONITOR	HP	D2842A	KR93473113	BEJCB910
3	USB KEYBOARD	BTC	5200U	G09302046486	E5XKB5122U
4	PS/2 MOUSE	LOGITECH	M-S61	HCA12013267	JNZ211403

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core.
3	1.5 m braid shielded wire, terminated with USB connector via drain wire, w/o core.
4	1.8 m Non shielded wire, terminated with PS/2 connector via drain wire, w/o core.

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Jan. 20, 2004
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100218	Dec. 18, 2003
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100219	Dec. 18, 2003
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100220	Dec. 18, 2003
ROHDE & SCHWARZ 4-wire ISN	ENY41	837032/016	Nov. 29 2003
ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Nov. 29 2003
Software	Cond-V2M3	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	May 01, 2004
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010770	Mar. 24, 2004
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Apr. 06, 2004

- 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. “*”: These equipment are used for conducted telecom port test only (if tested).
 3. The test was performed in ADT Shielded Room No. 10.
 4. The VCCI Site Registration No. is C-1312.



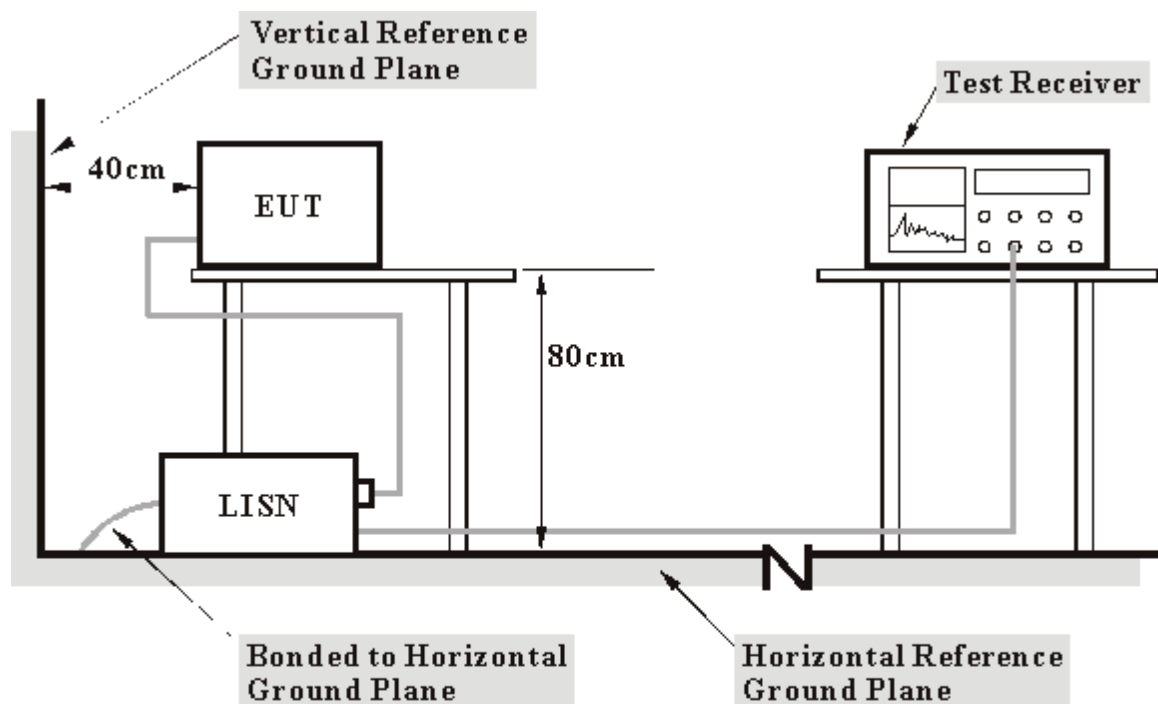
4.1.3 TEST PROCEDURES

- 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 over 10dB under the prescribed limits could not be reported

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) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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

4.1.6 EUT OPERATING CONDITIONS

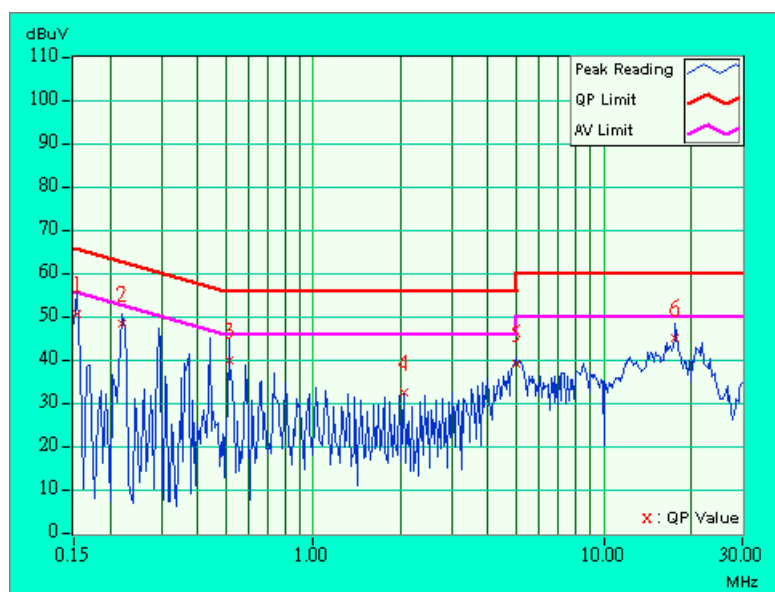
- Placed the EUT on the testing table.
- Prepared another computer system to act as a communication partner and placed it outside of testing area.
- The communication partner ran a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ45 cable.
- The communication partner sent data to EUT by command "PIN".

4.1.7 TEST RESULTS

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 1	6dB BANDWIDTH	9kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25deg.C, 70%RH, 991hPa	TESTED BY: Martin Lee	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.06	50.16	-	50.22	-	65.79	55.79	-15.57	-
2	0.220	0.06	47.98	-	48.04	-	62.81	52.81	-14.77	-
3	0.513	0.08	39.26	-	39.34	-	56.00	46.00	-16.66	-
4	2.051	0.18	31.88	-	32.06	-	56.00	46.00	-23.94	-
5	4.980	0.26	38.76	-	39.02	-	56.00	46.00	-16.98	-
6	17.695	0.60	44.59	-	45.19	-	60.00	50.00	-14.81	-

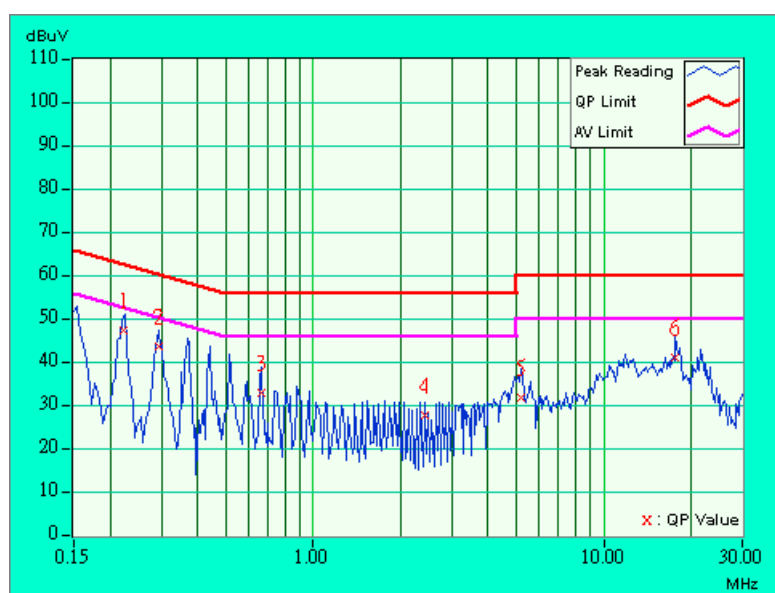
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 1	6dB BANDWIDTH	9kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25deg.C, 70%RH, 991hPa	TESTED BY: Martin Lee	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.222	0.05	46.85	-	46.90	-	62.76	52.76	-15.86	-
2	0.295	0.05	43.28	-	43.33	-	60.40	50.40	-17.07	-
3	0.662	0.10	32.59	-	32.69	-	56.00	46.00	-23.31	-
4	2.419	0.19	27.22	-	27.41	-	56.00	46.00	-28.59	-
5	5.207	0.24	31.30	-	31.54	-	60.00	50.00	-28.46	-
6	17.695	0.50	40.67	-	41.17	-	60.00	50.00	-18.83	-

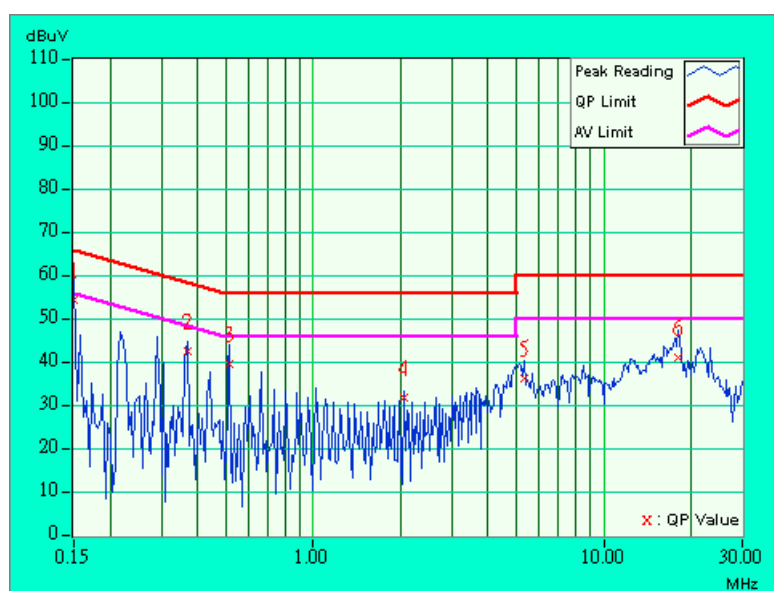
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 6	6dB BANDWIDTH	9kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25deg.C, 70%RH, 991hPa	TESTED BY: Martin Lee	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.05	53.95	-	54.00	-	66.00	56.00	-12.00	-
2	0.369	0.06	41.82	-	41.88	-	58.53	48.53	-16.65	-
3	0.513	0.08	39.12	-	39.20	-	56.00	46.00	-16.80	-
4	2.047	0.18	31.11	-	31.29	-	56.00	46.00	-24.71	-
5	5.344	0.27	35.80	-	36.07	-	60.00	50.00	-23.93	-
6	17.938	0.61	40.55	-	41.16	-	60.00	50.00	-18.84	-

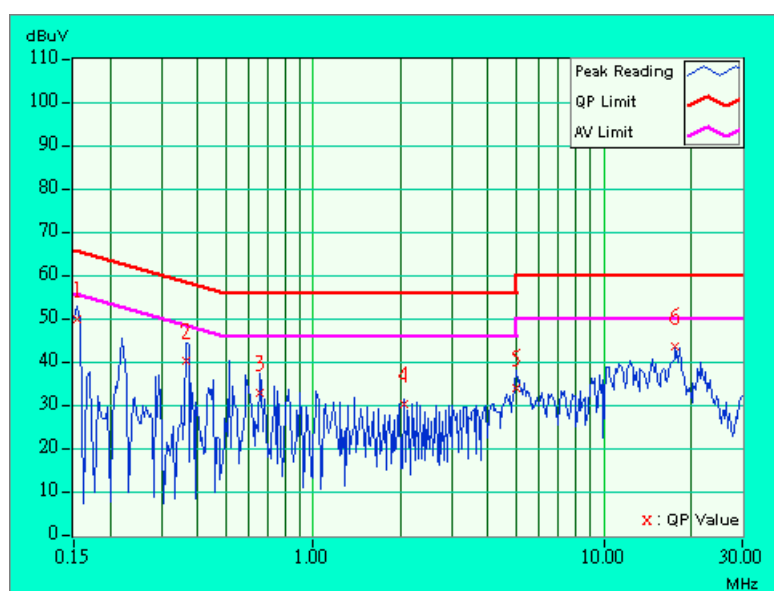
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 6	6dB BANDWIDTH	9kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25deg.C, 70%RH, 991hPa	TESTED BY: Martin Lee	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.05	49.55	-	49.60	-	65.79	55.79	-16.19	-
2	0.365	0.05	39.78	-	39.83	-	58.62	48.62	-18.79	-
3	0.658	0.10	32.49	-	32.59	-	56.00	46.00	-23.41	-
4	2.047	0.18	29.80	-	29.98	-	56.00	46.00	-26.02	-
5	4.973	0.24	33.64	-	33.88	-	56.00	46.00	-22.12	-
6	17.695	0.50	43.11	-	43.61	-	60.00	50.00	-16.39	-

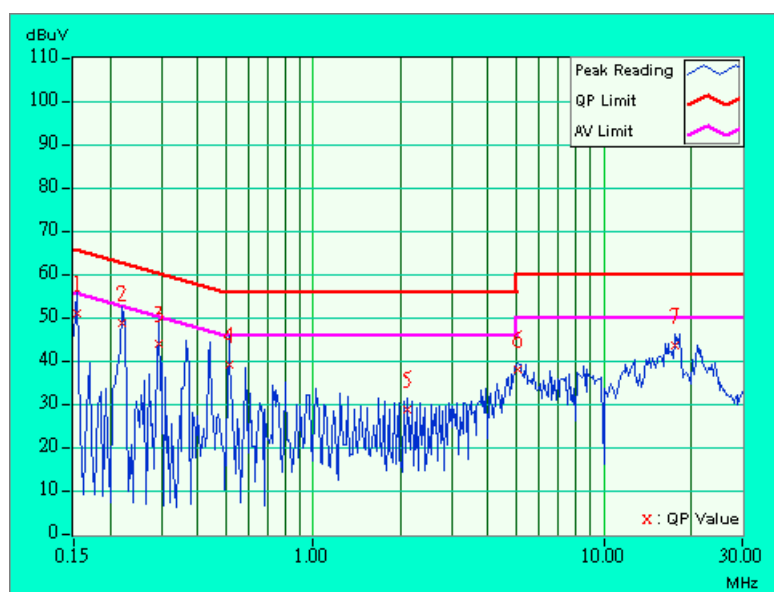
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 11	6dB BANDWIDTH	9kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25deg.C, 70%RH, 991hPa	TESTED BY: Martin Lee	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.06	50.44	-	50.50	-	65.79	55.79	-15.29	-
2	0.220	0.06	48.47	-	48.53	-	62.81	52.81	-14.28	-
3	0.295	0.06	43.44	-	43.50	-	60.40	50.40	-16.90	-
4	0.513	0.08	38.49	-	38.57	-	56.00	46.00	-17.43	-
5	2.121	0.18	28.46	-	28.64	-	56.00	46.00	-27.36	-
6	5.043	0.26	37.66	-	37.92	-	60.00	50.00	-22.08	-
7	17.695	0.60	43.23	-	43.83	-	60.00	50.00	-16.17	-

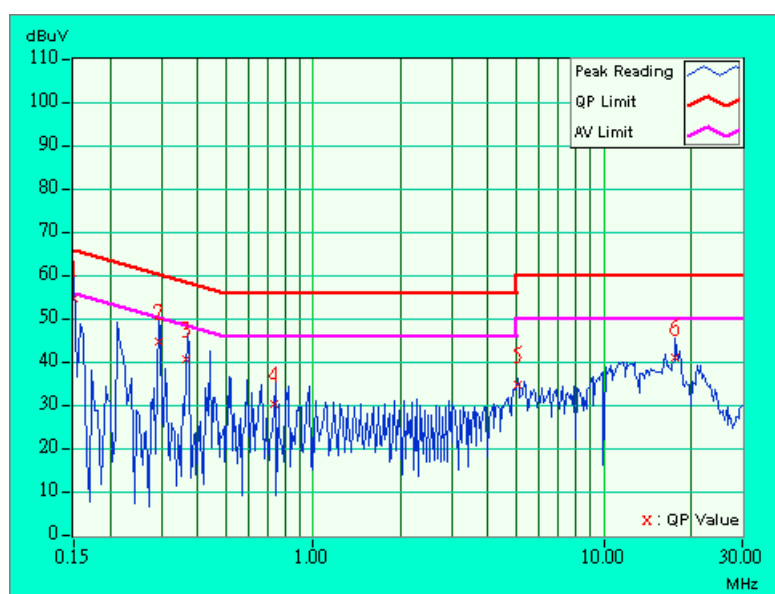
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 11	6dB BANDWIDTH	9kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25deg.C, 70%RH, 991hPa	TESTED BY: Martin Lee	

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	0.150	0.05	54.17	-	54.22	-	66.00	56.00	-11.78	-
2	0.295	0.05	44.42	-	44.47	-	60.40	50.40	-15.93	-
3	0.365	0.05	40.28	-	40.33	-	58.62	48.62	-18.29	-
4	0.732	0.11	29.88	-	29.99	-	56.00	46.00	-26.01	-
5	5.042	0.24	34.21	-	34.45	-	60.00	50.00	-25.55	-
6	17.695	0.50	40.57	-	41.07	-	60.00	50.00	-18.93	-

- 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.





4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8594E	3911A07465	Jul. 07, 2004
HP Preamplifier	8447D	2944A10386	Aug. 12, 2004
* HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
* HP Preamplifier	8449B	3008A01292	Aug. 11, 2004
SCHAFFNER Tunable Dipole Antenna	VHBA 9123	459	Nov. 22, 2003
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
SCHAFFNER TEST RECEIVER	SCR 3501	409	Jan. 26, 2004
* SCHAFFNER BILOG Antenna	CBL6111C	2727	Jul. 15, 2004
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	Jun 30, 2004
* EMCO Horn Antenna	3115	9312-4192	Mar. 23 2004
* ADT. Turn Table	TT100	0201	NA
* ADT. Tower	AT100	0201	NA
* Software	ADT_Radiated_V5.14	NA	NA
* ANRITSU RF Switches	MP59B	6100237246	Oct. 30, 2003
* TIMES RF cable	LMR-600	CABLE-ST10-01	Oct. 30, 2003

- 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. "*" = These equipment are used for the final measurement.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The test was performed in ADT Open Site No. 10.
 5. The VCCI Site Registration No. is R-1625.



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 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

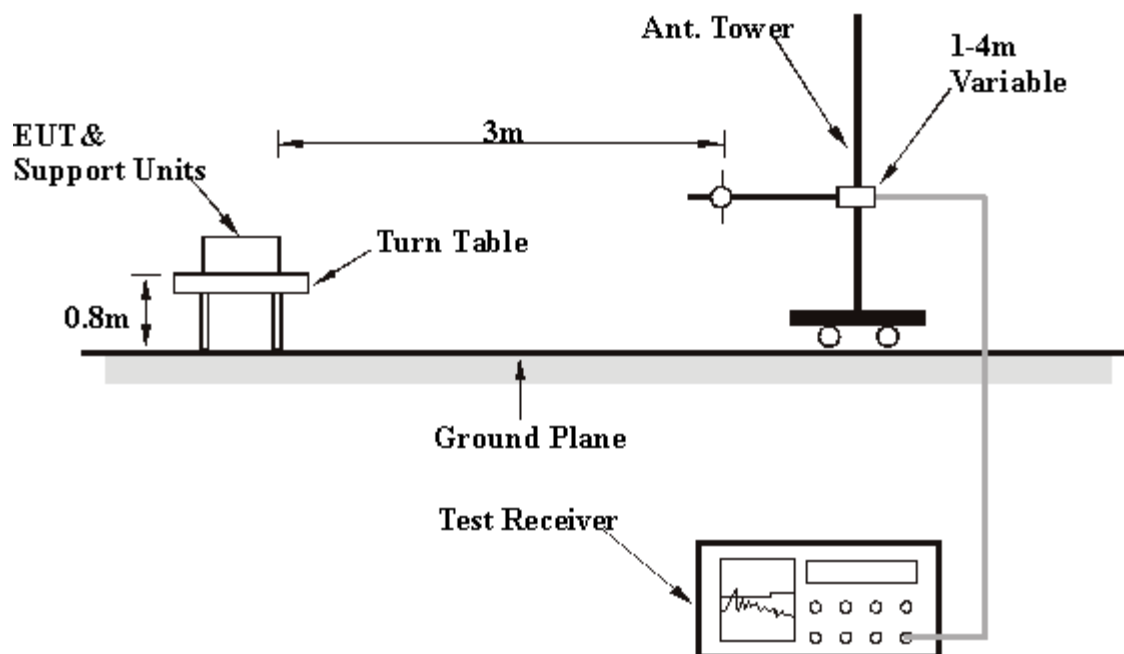
NOTE:

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 and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 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

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	30deg. C, 60%RH, 991hPa	TESTED BY: Martin 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	49.15	31.1 QP	40.00	-8.88	1.86 H	234	22.96	8.16
2	175.25	22.8 QP	43.50	-20.71	1.69 H	28	13.55	9.24
3	200.02	23.7 QP	43.50	-19.79	1.80 H	109	14.40	9.31
4	250.03	36.1 QP	46.00	-9.91	1.11 H	292	23.57	12.52
5	375.05	33.6 QP	46.00	-12.45	1.00 H	313	17.14	16.41
6	450.50	32.1 QP	46.00	-13.90	1.00 H	114	13.93	18.17
7	500.06	32.7 QP	46.00	-13.27	1.24 H	291	13.22	19.51
8	539.99	39.2 QP	46.00	-6.83	2.00 H	191	18.71	20.46
9	875.11	36.0 QP	46.00	-10.03	2.10 H	135	10.60	25.37

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	54.36	35.4 QP	40.00	-4.60	1.00 V	251	28.73	6.67
2	83.83	31.6 QP	40.00	-8.40	1.67 V	296	23.82	7.78
3	125.14	27.5 QP	43.50	-16.04	1.00 V	99	15.68	11.78
4	151.59	22.8 QP	43.50	-20.75	1.00 V	15	12.12	10.63
5	175.09	23.1 QP	43.50	-20.40	1.00 V	294	13.85	9.25
6	200.14	29.1 QP	43.50	-14.43	1.00 V	22	19.75	9.32
7	250.02	33.2 QP	46.00	-12.77	1.61 V	313	20.72	12.51
8	375.03	36.4 QP	46.00	-9.60	1.60 V	186	19.99	16.41
9	500.04	33.6 QP	46.00	-12.41	1.42 V	1	14.08	19.51
10	625.07	33.3 QP	46.00	-12.71	1.00 V	71	11.24	22.05
11	750.09	32.2 QP	46.00	-13.82	1.71 V	284	8.08	24.10
12	875.10	35.9 QP	46.00	-10.15	1.00 V	87	10.48	25.37
13	989.99	35.0 QP	54.00	-19.02	1.74 V	32	8.20	26.78

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.

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 1	FREQUENCY RANGE	Above 1000MHz
MODE	CCK		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	30deg. C, 60%RH, 991hPa	TESTED BY: Jamison Chan	

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	52.4 PK	74.00	-21.60	1.14 H	67	18.80	33.60
1	2390.00	47.6 AV	54.00	-6.40	1.14 H	67	14.10	33.60
2	*2412.00	97.0 PK			1.14 H	67	63.30	33.70
2	*2412.00	92.3 AV			1.14 H	67	58.60	33.70
3	2688.00	52.8 PK	74.00	-21.20	1.14 H	67	18.10	34.70
3	2688.00	48.1 AV	54.00	-5.90	1.14 H	67	13.40	34.70
4	4824.00	52.2 PK	74.00	-21.80	1.31 H	275	11.10	41.10
4	4824.00	50.4 AV	54.00	-3.60	1.31 H	275	9.20	41.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2360.00	50.50 PK	74.00	-23.50	1.03 V	119	17.10	33.40
1	2360.00	45.70 AV	54.00	-8.30	1.03 V	119	12.30	33.40
2	*2412.00	106.5 PK			1.03 V	119	72.80	33.70
2	*2412.00	101.7 AV			1.03 V	119	68.00	33.70
3	2688.00	52.00 PK	74.00	-22.00	1.03 V	119	17.30	34.70
3	2688.00	47.20 AV	54.00	-6.80	1.03 V	119	12.50	34.70
4	4824.00	50.4 PK	74.00	-23.60	1.30 V	37	9.20	41.10
4	4824.00	43.5 AV	54.00	-10.50	1.30 V	37	2.40	41.10
5	7236.00	51.0 PK	74.00	-23.00	1.00 V	159	6.10	44.80
5	7236.00	40.6 AV	54.00	-13.40	1.00 V	159	-4.20	44.80
6	9648.00	53.5 PK	74.00	-20.50	1.00 V	198	6.10	47.50
6	9648.00	43.5 AV	54.00	-10.50	1.00 V	198	-3.90	47.50

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

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 6	FREQUENCY RANGE	Above 1000MHz
MODE	CCK		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	30deg. C, 55%RH, 991hPa	TESTED BY: Steven Lu	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M

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	101.9 PK			1.15 H	200	68.20	33.70
1	*2437.00	94.1 AV			1.15 H	200	60.40	33.70
2	2688.00	45.1 PK	74.00	-28.90	1.15 H	200	10.60	34.50
2	2688.00	37.3 AV	54.00	-16.70	1.15 H	200	2.80	34.50
3	4874.00	49.6 PK	74.00	-24.40	1.47 H	236	8.90	40.70
3	4874.00	39.2 AV	54.00	-14.80	1.47 H	236	-1.50	40.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M

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	112.5 PK			1.11 V	117	78.90	33.70
1	*2437.00	103.0 AV			1.11 V	117	69.30	33.70
2	2688.00	55.7 PK	74.00	-18.30	1.11 V	117	21.20	34.50
2	2688.00	46.2 AV	54.00	-7.80	1.11 V	117	11.70	34.50
3	4874.00	50.0 PK	74.00	-24.00	1.11 V	242	9.20	40.70
3	4874.00	40.0 AV	54.00	-14.00	1.11 V	242	-0.70	40.70
4	7311.00	55.7 PK	74.00	-18.30	1.20 V	300	10.40	45.30
4	7311.00	42.3 AV	54.00	-11.70	1.20 V	300	-3.00	45.30

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

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 11	FREQUENCY RANGE	Above 1000MHz
MODE	CCK		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	30deg. C, 55%RH, 991hPa	TESTED BY: Steven Lu	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M

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	101.6 PK			1.11 H	211	67.90	33.70
1	*2462.00	93.4 AV			1.11 H	211	59.70	33.70
2	2483.50	43.50 PK	74.00	-30.50	1.11 H	211	9.70	33.80
2	2483.50	35.20 AV	54.00	-18.80	1.11 H	211	1.50	33.80
3	2688.00	49.60 PK	74.00	-24.40	1.11 H	211	15.10	34.50
3	2688.00	41.40 AV	54.00	-12.60	1.11 H	211	6.90	34.50
4	4924.00	48.2 PK	74.00	-25.80	1.55 H	26	7.30	40.90
4	4924.00	37.30 AV	54.00	-16.70	1.55 H	26	-3.60	40.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M

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	109.2 PK			1.57 V	196	75.50	33.70
1	*2462.00	101.2 AV			1.57 V	196	67.50	33.70
2	2483.50	51.1 PK	74.00	-22.90	1.57 V	196	17.30	33.80
2	2483.50	43.0 AV	54.00	-11.00	1.57 V	196	9.30	33.80
3	2688.00	57.2 PK	74.00	-16.80	1.57 V	196	22.70	34.50
3	2688.00	49.2 AV	54.00	-4.80	1.57 V	196	14.70	34.50
4	4924.00	49.2 PK	74.00	-24.80	1.11 V	243	8.30	40.90
4	4924.00	39.5 AV	54.00	-14.50	1.11 V	243	-1.40	40.90
5	7386.00	54.2 PK	74.00	-19.80	1.20 V	296	9.00	45.20
5	7386.00	41.1 AV	54.00	-12.90	1.20 V	296	-4.10	45.20

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

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 1	FREQUENCY RANGE	Above 1000MHz
MODE	OFDM		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	30deg. C, 60%RH, 991hPa	TESTED BY: Jamison Chan	

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	61.9 PK	74.00	-12.10	1.03 H	208	28.30	33.60
1	2390.00	51.2 AV	54.00	-2.80	1.03 H	208	17.60	33.60
2	*2412.00	99.7 PK			1.03 H	208	66.00	33.70
2	*2412.00	89.0 AV			1.03 H	208	55.30	33.70
3	2688.00	62.5 PK	74.00	-11.50	1.03 H	208	27.80	34.70
3	2688.00	51.8 AV	54.00	-2.20	1.03 H	208	62.50	34.70

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	61.6 PK	74.00	-12.40	1.00 V	120	28.00	33.60
1	2390.00	51.3 AV	54.00	-2.70	1.00 V	120	17.70	33.60
2	*2412.00	110.1 PK			1.00 V	120	76.50	33.70
2	*2412.00	99.8 AV			1.00 V	120	66.10	33.70
3	2688.00	58.6 PK	74.00	-15.40	1.00 V	120	23.90	34.70
3	2688.00	48.3 AV	54.00	-5.70	1.00 V	120	13.60	34.70
4	4824.00	51.4 PK	74.00	-22.60	1.09 V	194	10.20	41.10
4	4824.00	39.2 AV	54.00	-14.80	1.09 V	194	-2.00	41.10

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



EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 6	FREQUENCY RANGE	Above 1000MHz
MODE	OFDM		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	30deg. C, 60%RH, 991hPa	TESTED BY: Jamison Chan	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M

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	90.9 PK			1.03 H	226	57.10	33.80
1	*2437.00	90.7 AV			1.03 H	226	57.00	33.80
2	2688.00	55.5 PK	74.00	-18.50	1.03 H	226	20.80	34.70
2	2688.00	45.2 AV	54.00	-8.80	1.03 H	226	10.60	34.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M

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	109.9 PK			1.00 V	148	76.10	33.80
1	*2437.00	99.7 AV			1.00 V	148	66.00	33.80
2	2688.00	57.1 PK	74.00	-16.90	1.00 V	148	22.40	34.70
2	2688.00	46.9 AV	54.00	-7.10	1.00 V	148	12.20	34.70
3	4874.00	52.6 PK	74.00	-21.40	1.00 V	171	11.30	41.30
3	4874.00	39.6 AV	54.00	-14.40	1.00 V	171	-1.70	41.30

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

EUT	2.4GHz Wireless Access Point	MODEL	DWL-2000AP
CHANNEL	Channel 11	FREQUENCY RANGE	Above 1000MHz
MODE	OFDM		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	30deg. C, 60%RH, 991hPa	TESTED BY: Jamison Chan	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	102.9 PK			1.00 H	124	69.00	33.90
1	*2462.00	92.3 AV			1.00 H	124	58.50	33.90
2	2483.50	62.9 PK	74.00	-11.10	1.00 H	124	29.00	33.90
2	2483.50	52.3 AV	54.00	-1.70	1.00 H	124	18.40	33.90
3	2688.00	63.4 PK	74.00	-10.60	1.00 H	124	28.70	34.70
3	2688.00	52.8 AV	54.00	-1.20	1.00 H	124	18.10	34.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M

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	109.2 PK			1.00 V	119	75.30	33.90
1	*2462.00	100.3 AV			1.00 V	119	66.50	33.90
2	2483.50	61.2 PK	74.00	-12.80	1.03 V	197	27.30	33.90
2	2483.50	52.3 AV	54.00	-1.70	1.03 V	197	18.40	33.90
3	2688.00	58.5 PK	74.00	-15.50	1.00 V	119	23.80	34.70
3	2688.00	49.6 AV	54.00	-4.40	1.00 V	119	14.90	34.70
4	4924.00	53.6 PK	74.00	-20.40	1.04 V	252	12.20	41.40
4	4924.00	40.4 AV	54.00	-13.60	1.04 V	252	-1.00	41.40

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

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 Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004

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

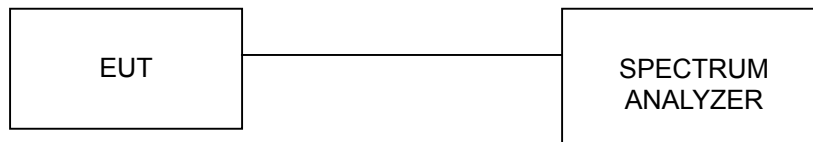
4.3.3 TEST PROCEDURE

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 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



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

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.