



FCC TEST REPORT

REPORT NO.: RF920321H01

MODEL NO.: FWAG114

RECEIVED: Mar. 21, 2003

TESTED: Mar. 27 to Apr. 17, 2003

APPLICANT: NETGEAR, Inc.

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Lab Code: 200376-0



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1. CERTIFICATION

PRODUCT : Broadband ProSafe Dual-Band Wireless VPN Firewall
BRAND NAME : NETGEAR
MODEL NO. : FWAG114
APPLICANT : NETGEAR, Inc.
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247), Subpart E (Section 15.407), ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from Mar. 27 to Apr. 17, 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.

CHECKED BY: Amanda Chu, **DATE:** Apr. 25, 2003
(Amanda Chu)

APPROVED BY: Eric Lin, **DATE:** Apr. 25, 2003
(Eric Lin, 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 -28.03dBuV at 10.023MHz
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)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -2.4dBuV at 2389.00 MHz
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



APPLIED STANDARD: 47 CFR Part 15, Subpart E			
Standard Section	Test Type	Result	REMARK
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -25.43dBuV at 23.129MHz
15.407(b/1/2/3)(b)(5)	Electric Field Strength Spurious Emissions, 30 MHz – 40000 MHz	PASS	Meet the requirement of limit Minimum passing margin is -1.0dBuV at 5150.00MHz
15.407(a/1/2/3)	Peak Transmit Power	PASS	Meet the requirement of limit
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Broadband ProSafe Dual-Band Wireless VPN Firewall
MODEL NO.	FWAG114
POWER SUPPLY	12VDC from AC adapter
MODULATION	DSSS, OFDM
TRANSFER RATE	802.11b and draft 802.11g: 1/2/5.5/6/9/11/12/18/24/36/48/54Mbps 802.11a: 6 to 54Mbps (Turbo mode: up to 108Mbps *see note 1)
FREQUENCY RANGE	802.11b and draft 802.11g: 2400MHz ~ 2483.5MHz 802.11a: 5.15~5.35GHz and 5.725~5.825GHz
NUMBER OF CHANNEL	802.11b and draft 802.11g: 11 802.11a: 12 for Normal mode / 5 for Turbo mode
CHANNEL SPACING	802.11b and draft 802.11g: 5MHz 802.11a: 20MHz for Normal mode / 40MHz for Turbo mode
OUTPUT POWER	802.11b: 15.0dBm / draft 802.11g: 18.04dBm 802.11a: 18.81dBm
DATA CABLE	NA
ANTENNA TYPE	Dipole antenna
I/O PORTS	LAN port x 4, WAN port x 1
ASSOCIATED DEVICES	NA

NOTE:

1. This EUT is capable of providing data rates of up to 108Mbps in Turbo Mode depending upon reception quality.
2. The EUT was powered by the following adapter:

Brand:	NETGEAR
Model No.:	DV-151A-1
Input power :	AC120V, 60Hz, 22W
Output power :	DC12V, 1.2A



3. Dual-band, the EUT communicates with Wireless-A (802.11a), Wireless-B, (802.11b), and Wireless-G (draft 802.11g) wireless networks.
4. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

For 802.11b: 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 1 GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 1, 6, and 11 were tested individually.
3. Transfer rate, 11Mbps with CCK technique and 54Mbps with OFDM technique, the worst case, were chosen for final test.
4. Test result A is for CCK technique and test result B is for OFDM technique which presented in Section 4.

For 802.11a: Twelve channels are provided to this EUT for Normal mode.

Channel	Frequency	Channel	Frequency
1	5180 MHz	7	5300 MHz
2	5200 MHz	8	5320 MHz
3	5220 MHz	9	5745MHz
4	5240 MHz	10	5765MHz
5	5260 MHz	11	5785MHz
6	5280 MHz	12	5805MHz

Five channels are provided to this EUT for Turbo Mode.

Channel	Frequency	Channel	Frequency
1	5210 MHz	4	5760MHz
2	5250 MHz	5	5800MHz
3	5290 MHz		

NOTE:

- 1..The EUT was tested in both normal mode (channel bandwidth of approximately 30MHz) and turbo mode (channel bandwidth of approximately 60MHz).
2. "Normal Mode" allows data rates of up to 54Mbps. The device was, therefore, tested in Normal mode at the data rate that produced the highest output power for normal mode (6Mbps).
3. "Turbo Mode" allows data rates of up to 108Mbps. At data rates higher than 12Mbps the PA gain is reduced to improve signal fidelity. The device was, therefore, tested in turbo mode at the data rate that produced the highest output power for turbo mode (12Mbps).
4. Channel 1, 4, 5, 8, 9 and 12 are the closest frequencies to the band edge, were chosen for final test of Normal Mode.
5. Channel 1 ~ 5 were chosen for final test of turbo mode.



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Broadband ProSafe Dual-Band Wireless VPN Firewall According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**47 CFR Part 15, Subpart C. (15.247),
Subpart E (15.407). 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 47CFR Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



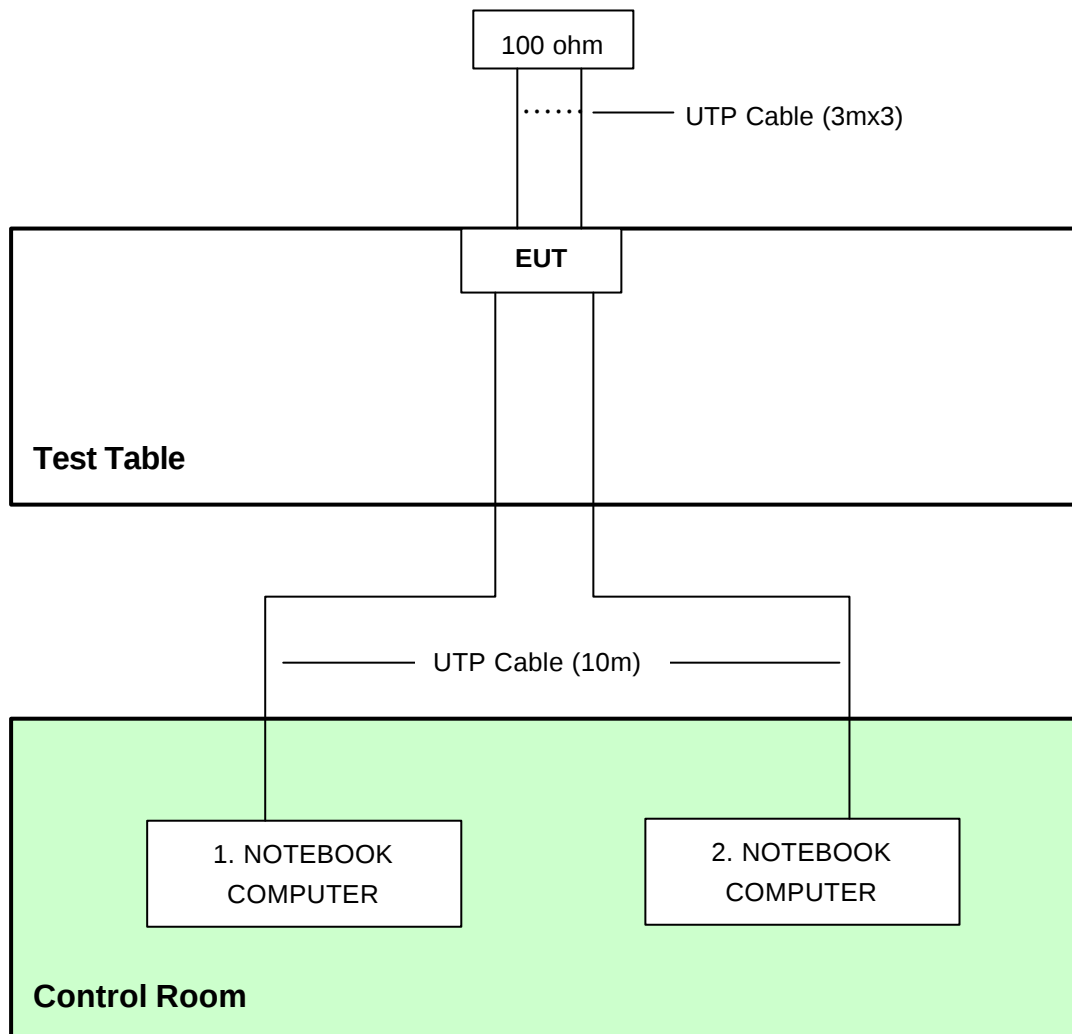
3.4 DESCRIPTION OF SUPPORT UNITS

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

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP01L	TW-09C748-12800-1 7Q-C504	FCC DoC
2	NOTEBOOK COMPUTER	Compaq	N800C	470048-515	FCC DoC

No.	Signal cable description
1	NA
2	NA

Note: 1. All power cords of the above support units are unshielded (1.8m).



NOTE: 1. Support units 1-2 were kept in the control room during the test.
2. Please refer to the photos of test configuration in Item 5 also.

4. TEST TYPES AND RESULTS (FOR PART 802.11b)

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	847124/029	Nov. 17, 2003
ROHDE & SCHWARZ LISN (for EUT)	ESHS-Z5	848773/004	Nov. 13, 2003
KYORITSU LISN (for peripheral)	KNW-407	8/1395/12	Jul. 23, 2003
RF Cable (JETBAO)	RG233/U	Cable_CA_01	Jul. 03, 2003
Terminator(for KYORITSU)	50	3	Apr. 11, 2004
Software	Cond-V2e	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 ADT Shielded Room No. A.
 3. The VCCI Con A Registration No. is C-817.



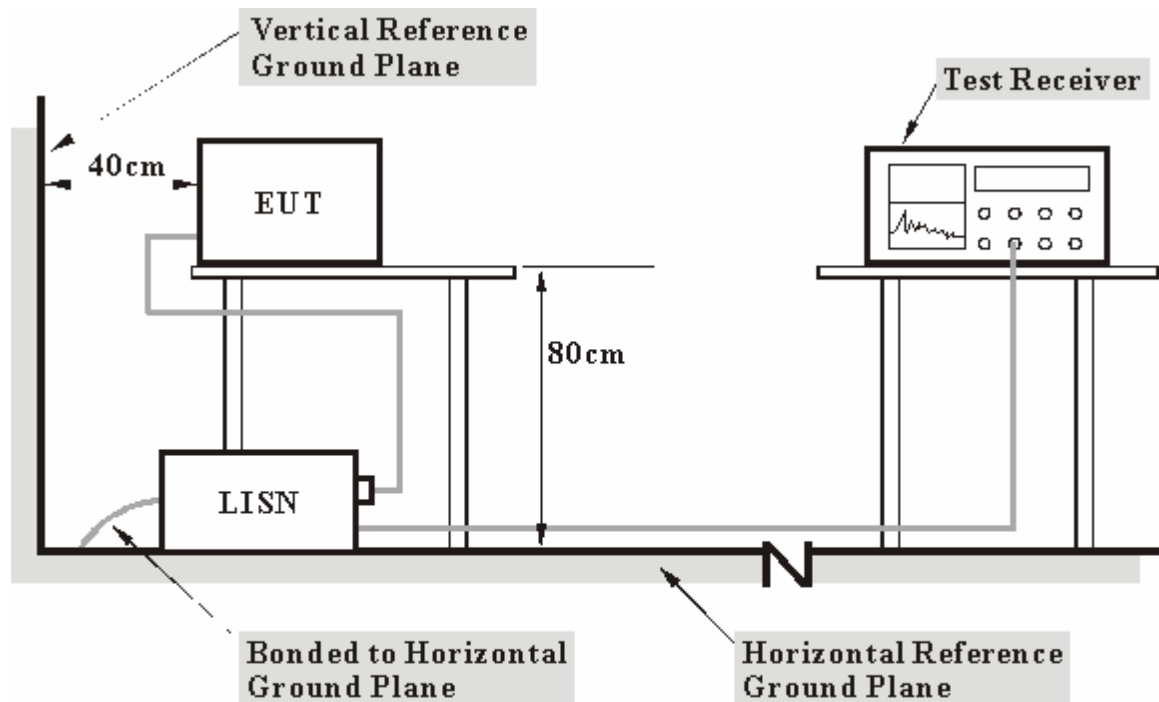
4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz 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

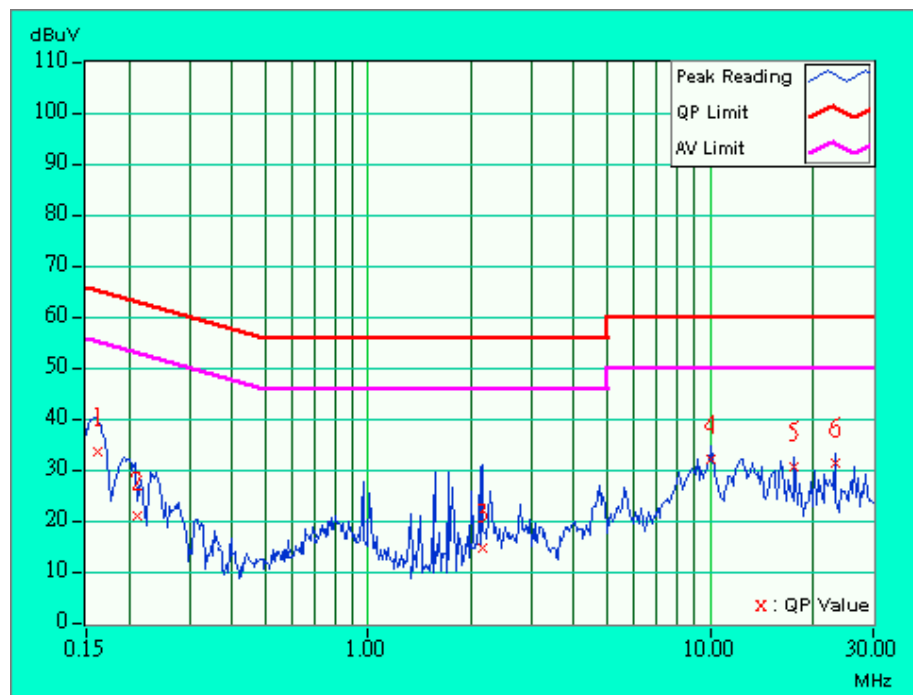
- a. Placed the EUT on the testing table.
- b. Prepared another computer system to act as a communication partner and placed it outside of testing area.
- c. The communication partner run a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ 45 cable and wireless.
- d. The communication partner sent data to EUT by command "PING".

4.1.7 TEST RESULTS

EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 976 hPa	TESTED BY	Tony Chen

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.10	32.43	-	32.53	-	65.38	55.38	-32.85	-
2	0.212	0.10	20.08	-	20.18	-	63.12	53.12	-42.94	-
3	2.176	0.11	13.62	-	13.73	-	56.00	46.00	-42.27	-
4	10.117	0.60	31.12	-	31.72	-	60.00	50.00	-28.28	-
5	17.695	0.91	29.66	-	30.57	-	60.00	50.00	-29.43	-
6	23.129	1.13	30.49	-	31.62	-	60.00	50.00	-28.38	-

- NOTES: (1) "-": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 976 hPa	TESTED BY	Tony Chen

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.166	0.10	32.26	-	32.36	-	65.18	55.18	-32.82	-
2	0.213	0.10	22.81	-	22.91	-	63.11	53.11	-40.20	-
3	0.795	0.10	15.75	-	15.85	-	56.00	46.00	-40.15	-
4	1.931	0.10	7.13	-	7.23	-	56.00	46.00	-48.77	-
5	10.086	0.50	31.30	-	31.80	-	60.00	50.00	-28.20	-
6	12.215	0.54	31.00	-	31.54	-	60.00	50.00	-28.46	-

NOTES: (1) "-": Undetectable

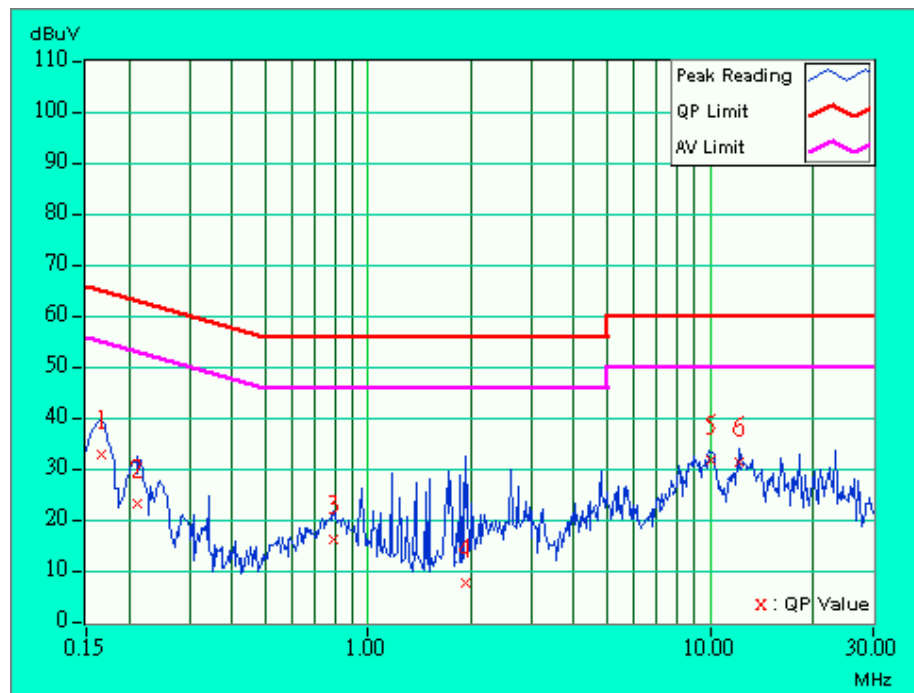
(2) Q.P. and AV. are abbreviations of quasi-peak and average.

(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.

(4) The emission levels of other frequencies were very low against the limit.

(5) Correction Factor = Insertion loss + Cable loss

(6) Margin value = Emission level - Limit value



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 976 hPa	TESTED BY	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	0.10	33.42	-	33.52	-	65.58	55.58	-32.06	-
2	0.806	0.10	15.51	-	15.61	-	56.00	46.00	-40.39	-
3	2.705	0.14	7.75	-	7.89	-	56.00	46.00	-48.11	-
4	8.832	0.56	28.79	-	29.35	-	60.00	50.00	-30.65	-
5	10.246	0.61	29.75	-	30.36	-	60.00	50.00	-29.64	-
6	17.695	0.91	29.51	-	30.42	-	60.00	50.00	-29.58	-

NOTES: (1) "-": Undetectable

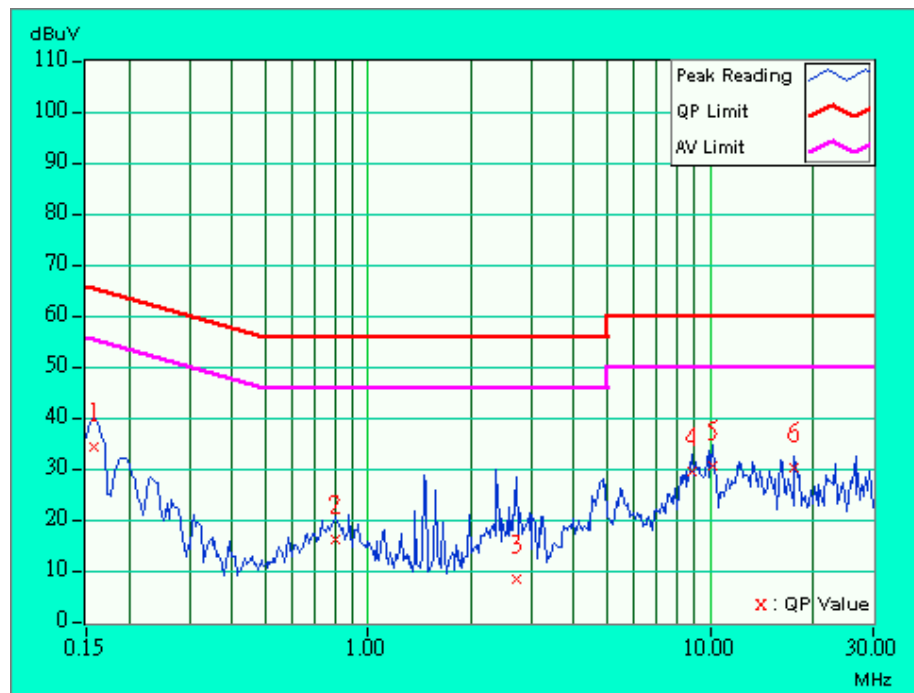
(2) Q.P. and AV. are abbreviations of quasi-peak and average.

(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.

(4) The emission levels of other frequencies were very low against the limit.

(5) Correction Factor = Insertion loss + Cable loss

(6) Margin value = Emission level - Limit value



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 976 hPa	TESTED BY	Tony Chen

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	0.10	32.67	-	32.77	-	65.58	55.58	-32.81	-
2	0.193	0.10	25.31	-	25.41	-	63.91	53.91	-38.50	-
3	0.877	0.10	16.29	-	16.39	-	56.00	46.00	-39.61	-
4	4.625	0.27	21.17	-	21.44	-	56.00	46.00	-34.56	-
5	10.086	0.50	31.34	-	31.84	-	60.00	50.00	-28.16	-
6	16.000	0.62	30.90	-	31.52	-	60.00	50.00	-28.48	-

NOTES: (1) "-": Undetectable

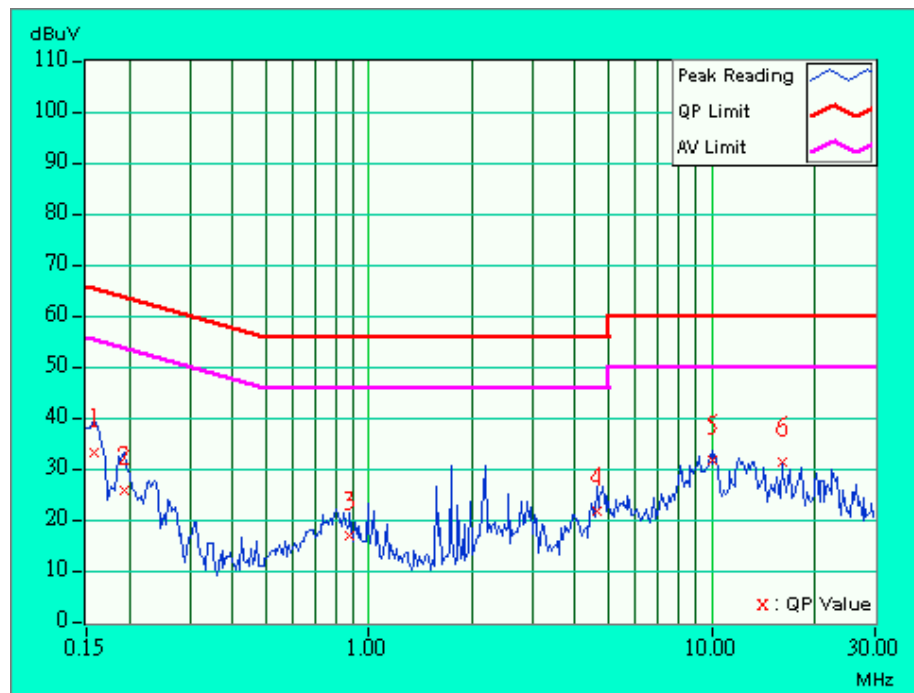
(2) Q.P. and AV. are abbreviations of quasi-peak and average.

(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.

(4) The emission levels of other frequencies were very low against the limit.

(5) Correction Factor = Insertion loss + Cable loss

(6) Margin value = Emission level - Limit value



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 976 hPa	TESTED BY	Tony Chen

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)] Q.P.	[dB (uV)] AV.	[dB (uV)] Q.P.	[dB (uV)] AV.	[dB (uV)] Q.P.	[dB (uV)] AV.	(dB) Q.P.	(dB) AV.
1	0.154	0.10	33.52	-	33.62	-	65.79	55.79	-32.17	-
2	0.216	0.10	20.74	-	20.84	-	62.95	52.95	-42.11	-
3	0.806	0.10	16.56	-	16.66	-	56.00	46.00	-39.34	-
4	2.677	0.13	10.91	-	11.04	-	56.00	46.00	-44.96	-
5	10.023	0.60	31.37	-	31.97	-	60.00	50.00	-28.03	-
6	16.227	0.85	32.48	-	33.33	-	60.00	50.00	-26.67	-

NOTES: (1) "-": Undetectable

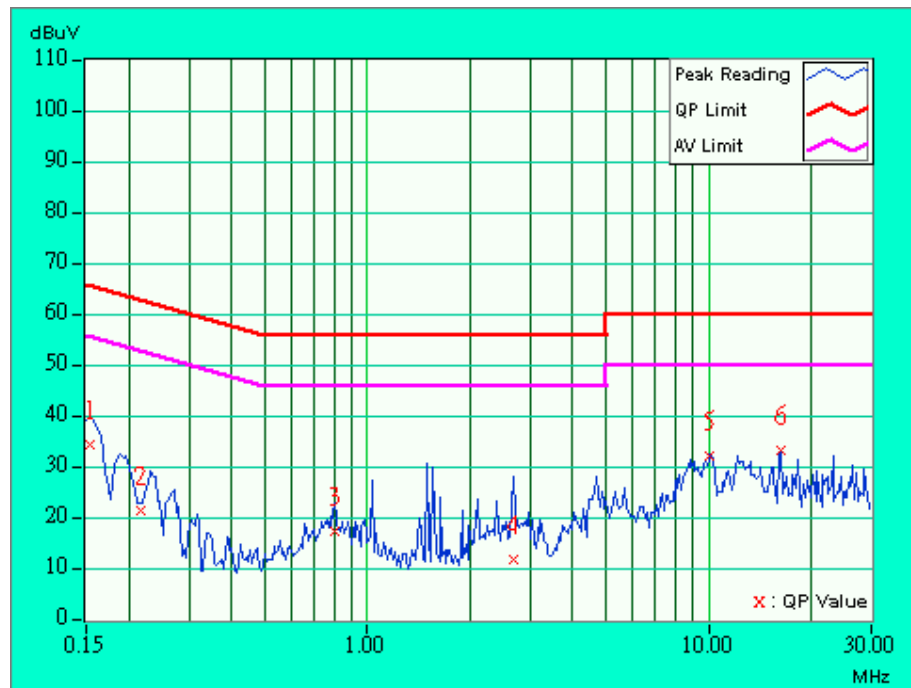
(2) Q.P. and AV. are abbreviations of quasi-peak and average.

(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.

(4) The emission levels of other frequencies were very low against the limit.

(5) Correction Factor = Insertion loss + Cable loss

(6) Margin value = Emission level - Limit value



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 976 hPa	TESTED BY	Tony Chen

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	0.10	32.62	-	32.72	-	65.58	55.58	-32.86	-
2	0.810	0.10	17.08	-	17.18	-	56.00	46.00	-38.82	-
3	2.283	0.11	11.48	-	11.59	-	56.00	46.00	-44.41	-
4	4.605	0.27	21.61	-	21.88	-	56.00	46.00	-34.12	-
5	9.961	0.50	30.61	-	31.11	-	60.00	50.00	-28.89	-
6	19.707	0.69	28.84	-	29.53	-	60.00	50.00	-30.47	-

NOTES: (1) "-": Undetectable

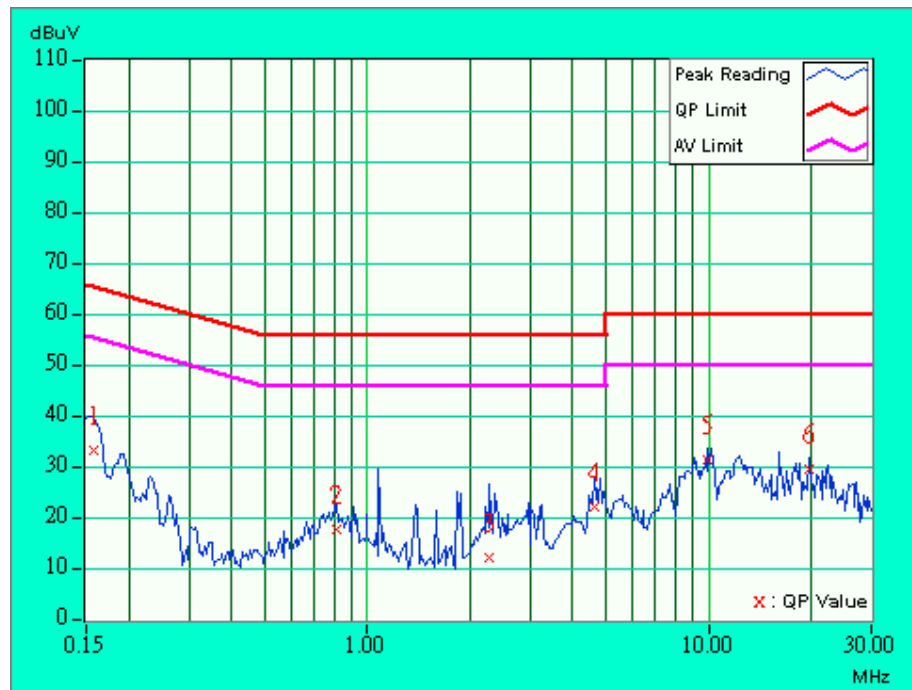
(2) Q.P. and AV. are abbreviations of quasi-peak and average.

(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.

(4) The emission levels of other frequencies were very low against the limit.

(5) Correction Factor = Insertion loss + Cable loss

(6) Margin value = Emission level - Limit 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	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	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 ($\mu\text{V/m}$).
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	8594ER	3829U04676	Jul. 14, 2003
ADVANTEST Spectrum Analyzer	R3271A	85060311	May 21, 2003
CHASE RF Pre_Amplifier	CPA9232	1057	Apr. 24, 2003
HP Pre_Amplifier	8449B	3008A01281	June 27, 2003
ROHDE & SCHWARZ Test Receiver	ESVS 10	849231 /019	Nov. 03, 2003
CHASE Broadband Antenna	CBL6111c	2730	Jul 17, 2003
Schwarzbeck Horn_Antenna	BBHA9120-D1	D123	Jul. 31, 2003
SCHWARZBECK Tunable Dipole Antenna	UHAP	897	Mar. 07, 2005
SCHWARZBECK Tunable Dipole Antenna	VHAP	880	Mar. 07, 2005
RF Switches (ARNITSU)	CS-201	1565157	Jul. 29, 2003
RF CABLE (Chaintek) 1GHz -20GHz	Ak 9515-D	001	Aug, 20.2003
RF Cable(RICHTEC)	9913-30M	STCCAB-30M-1 GHz-021	Nov. 5, 2003
Software	AS60P8	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Tunable Dipole Antenna) 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. C.

5. The FCC Site Registration No. is 656396.

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



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 the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

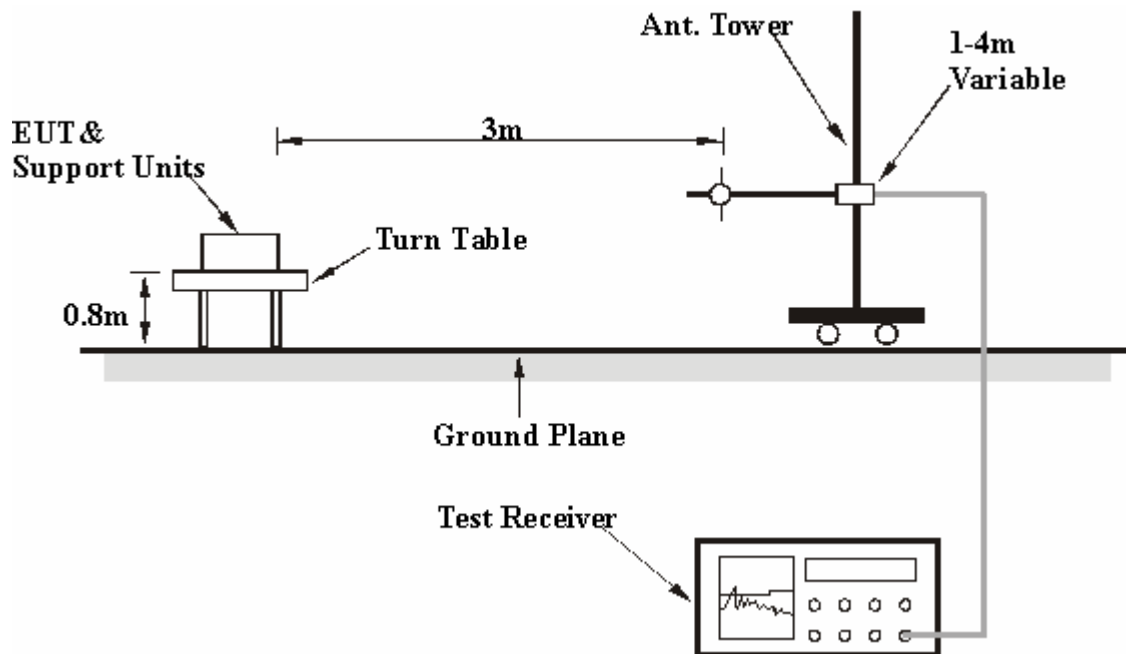
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 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 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	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 11	FREQUENCY RANGE	Below 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	19deg. C, 78%RH, 976 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	125.01	17.5 QP	43.50	-26.00	3.11 H	172	5.40	12.00
2	300.01	28.2 QP	46.00	-17.80	1.00 H	119	14.00	14.20
3	375.01	30.7 QP	46.00	-15.30	1.00 H	169	14.50	16.20
4	400.01	33.1 QP	46.00	-12.90	1.02 H	174	16.00	17.10
5	480.00	30.7 QP	46.00	-15.30	1.00 H	143	11.80	18.90
6	600.01	27.6 QP	46.00	-18.40	1.07 H	118	6.70	20.90
7	624.01	36.2 QP	46.00	-9.80	1.00 H	124	14.50	21.70
8	748.81	39.6 QP	46.00	-6.40	1.37 H	146	15.80	23.80
9	873.61	36.1 QP	46.00	-9.90	1.36 H	106	11.10	25.00
10	998.41	37.8 QP	54.00	-16.20	1.10 H	118	11.20	26.60

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	62.94	30.9 QP	40.00	-9.10	1.00 V	209	25.70	5.20
2	125.01	23.1 QP	43.50	-20.40	1.00 V	258	11.10	12.00
3	175.01	27.7 QP	43.50	-15.80	1.00 V	223	18.40	9.20
4	384.01	32.3 QP	46.00	-13.70	1.42 V	11	15.80	16.50
5	480.00	33.5 QP	46.00	-12.50	1.00 V	340	14.60	18.90
6	600.02	33.4 QP	46.00	-12.60	1.05 V	51	12.50	20.90
7	624.01	41.5 QP	46.00	-4.50	1.00 V	64	19.70	21.70
8	748.81	39.5 QP	46.00	-6.50	1.00 V	170	15.70	23.80
9	873.61	35.2 QP	46.00	-10.80	1.21 V	2	10.10	25.00
10	998.41	36.7 QP	54.00	-17.30	1.10 V	25	10.10	26.60

- 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. The limit value is defined as per 15.247



TEST RESULTS(A)- DSSS

EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 1	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 68%RH, 976 hPa	TESTED BY	Eric Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2389.00	42.1 PK	74.00	-31.90	1.48 H	325	12.30	29.80
2	*2412.00	95.0 PK			1.02 H	333	65.10	29.90
2	*2412.00	91.3 AV			1.02 H	333	61.40	29.80
3	2496.00	42.3 PK	74.00	-31.70	1.13 H	345	12.10	30.20
4	3168.00	34.8 PK	74.00	-39.20	1.50 H	84	2.70	32.00
5	4824.00	38.8 PK	74.00	-35.20	2.03 H	221	2.50	36.20
6	6336.00	46.5 PK	74.00	-27.50	1.58 H	57	7.90	38.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2388.00	51.4 PK	74.00	-22.60	1.30 V	57	21.60	29.80
1	2388.00	46.3 AV	54.00	-7.70	1.30 V	57	16.60	29.80
2	*2412.00	100.8 PK			1.78 V	358	70.90	29.90
2	*2412.00	97.5 AV			1.78 V	358	67.60	29.90
3	2496.00	50.1 PK	74.00	-23.90	1.15 V	350	19.90	30.20
4	3168.00	37.8 PK	74.00	-36.20	1.90 V	84	5.70	32.00
5	4824.00	41.5 PK	74.00	-32.50	1.00 V	322	5.30	36.20
6	6336.00	48.3 PK	74.00	-25.70	1.78 V	10	9.60	38.60

- NOTE:**
1. Emission level = Raw Value - Correction Factor
 2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss
(External Preamp. Gain = 0, when the test receiver is used for the test.)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.247
 6. " * " : Fundamental frequency



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 6	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 68%RH, 976 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	2336.00	37.9 PK	74.00	-36.10	1.54 H	306	8.20	29.60
2	2371.00	39.3 PK	74.00	-34.70	1.41 H	313	9.60	29.70
3	*2437.00	94.3 PK			1.32 H	305	64.30	30.00
3	*2437.00	92.8 AV			1.32 H	305	62.90	29.60
4	2496.00	44.3 PK	74.00	-29.70	1.36 H	316	14.10	30.20
5	3168.00	34.7 PK	74.00	-39.30	1.86 H	314	2.70	32.00
6	4874.00	37.5 PK	74.00	-36.50	1.46 H	302	1.10	36.50
7	6336.00	45.3 PK	74.00	-28.70	1.22 H	141	6.70	38.60

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	2336.00	44.2 PK	74.00	-29.80	1.14 V	306	14.60	29.60
2	2367.00	48.2 PK	74.00	-25.80	1.21 V	294	18.50	29.70
3	*2437.00	100.4 PK			1.40 V	309	70.40	30.00
3	*2437.00	98.7 AV			1.40 V	309	68.70	29.60
4	2496.00	46.7 PK	74.00	-27.30	1.73 V	262	16.50	30.20
5	3168.00	35.7 PK	74.00	-38.30	1.20 V	200	3.60	32.00
6	4874.00	38.3 PK	74.00	-35.70	1.70 V	359	1.90	36.50
7	6335.00	51.6 PK	74.00	-22.40	1.54 V	172	13.00	38.60
7	6335.00	46.9 AV	54.00	-7.10	1.54 V	172	8.30	29.70

- NOTE:**
1. Emission level = Raw Value - Correction Factor
 2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss
(External Preamp. Gain = 0, when the test receiver is used for the test.)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.247
 6. " * " : Fundamental frequency



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 11	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 68%RH, 976 hPa	TESTED BY	Eric Lee

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	2335.00	37.0 PK	74.00	-37.00	1.88 H	306	7.40	29.60
2	2367.00	39.0 PK	74.00	-35.00	2.09 H	307	9.30	29.70
3	*2464.00	91.6 PK			1.81 H	142	61.50	30.10
3	*2464.00	89.6 AV			1.81 H	142	59.50	29.60
4	2495.00	42.4 PK	74.00	-31.60	2.16 H	142	12.20	30.20
5	3168.00	33.9 PK	74.00	-40.10	1.64 H	308	1.80	32.00
6	4924.00	39.1 PK	74.00	-34.90	2.09 H	221	2.40	36.70
7	6335.00	44.9 PK	74.00	-29.10	1.23 H	129	6.30	38.60

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	2335.00	41.6 PK	74.00	-32.40	1.88 V	325	12.00	29.60
2	2367.00	43.1 PK	74.00	-30.90	2.11 V	326	13.40	29.70
3	*2464.00	100.6 PK			1.97 V	190	70.50	30.10
3	*2464.00	98.9 AV			1.97 V	190	68.80	29.60
4	2495.00	51.9 PK	74.00	-22.10	1.58 V	169	21.70	30.20
4	2495.00	45.2 AV	54.00	-8.80	1.58 V	169	15.00	29.70
5	3168.00	35.0 PK	74.00	-39.00	1.00 V	303	3.00	32.00
6	4924.00	42.3 PK	74.00	-31.70	1.02 V	342	5.60	36.70
7	6336.00	49.5 PK	74.00	-24.50	2.14 V	337	10.90	38.60

- NOTE:**
1. Emission level= Raw Value - Correction Factor
 2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss
(External Preamp. Gain = 0, when the test receiver is used for the test.)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.247
 6. " * " : Fundamental frequency



TEST RESULTS(B)- OFDM

EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 1	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 68%RH, 976 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	2336.00	38.8 PK	74.00	-35.20	1.38 H	341	9.20	29.60
2	2390.00	60.5 PK	74.00	-13.50	1.43 H	141	30.70	29.80
2	2390.00	45.7 AV	54.00	-8.30	1.43 H	141	15.90	29.60
3	*2412.00	95.2 PK			1.85 H	135	65.30	29.90
3	*2412.00	88.4 AV			1.85 H	135	58.50	29.80
4	2496.00	39.6 PK	74.00	-34.40	1.47 H	339	9.40	30.20
5	3168.00	34.1 PK	74.00	-39.90	1.75 H	341	2.00	32.00
6	4824.00	38.8 PK	74.00	-35.20	1.49 H	341	2.60	36.20
7	6336.00	46.9 PK	74.00	-27.10	1.61 H	355	8.20	38.60

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	2336.00	43.2 PK	74.00	-30.80	1.97 V	247	13.60	29.60
2	2389.00	63.1 PK	74.00	-10.90	1.59 V	352	33.30	29.80
2	2389.00	51.6 AV	54.00	-2.40	1.59 V	352	21.80	29.60
3	*2404.00	104.0 PK			1.12 V	302	74.10	29.90
3	*2404.00	97.1 AV			1.12 V	302	67.20	29.80
4	2496.00	51.7 PK	74.00	-22.30	1.23 V	350	21.50	30.20
4	2496.00	42.9 AV	54.00	-11.10	1.23 V	350	12.70	29.90
5	3168.00	37.1 PK	74.00	-36.90	1.94 V	355	5.00	32.00
6	4824.00	37.8 PK	74.00	-36.20	2.11 V	353	1.60	36.20
7	6336.00	49.0 PK	74.00	-25.00	1.37 V	333	10.40	38.60

- NOTE:**
1. Emission level = Raw Value - Correction Factor
 2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss
(External Preamp. Gain = 0, when the test receiver is used for the test.)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.247
 6. " * " : Fundamental frequency



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 6	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 68%RH, 976 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	2336.00	39.0 PK	74.00	-35.00	1.05 H	130	9.40	29.60
2	2380.00	43.1 PK	74.00	-30.90	1.79 H	132	13.40	29.70
3	*2437.00	91.2 PK			1.25 H	58	61.20	30.00
3	*2437.00	85.2 AV			1.25 H	58	55.30	29.60
4	2495.00	41.2 PK	74.00	-32.80	1.91 H	132	11.00	30.20
5	3168.00	34.9 PK	74.00	-39.10	1.81 H	295	2.90	32.00
6	4873.00	37.5 PK	74.00	-36.50	1.67 H	327	1.00	36.50
7	6336.00	45.1 PK	74.00	-28.90	1.33 H	351	6.50	38.60

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	2336.00	49.5 PK	74.00	-24.50	1.05 V	69	19.80	29.60
2	2380.00	52.8 PK	74.00	-21.20	1.00 V	59	23.10	29.70
2	2380.00	43.6 AV	54.00	-10.40	1.00 V	59	13.90	29.60
3	*2444.00	103.7 PK			1.19 V	53	73.70	30.00
3	*2444.00	98.1 AV			1.19 V	53	68.10	29.70
4	2495.00	46.0 PK	74.00	-28.00	1.22 V	292	15.90	30.20
5	3168.00	38.0 PK	74.00	-36.00	1.35 V	264	5.90	32.00
6	4873.00	39.7 PK	74.00	-34.30	1.50 V	360	3.20	36.50
7	6336.00	49.4 PK	74.00	-24.60	1.43 V	336	10.80	38.60

- NOTE:**
1. Emission level = Raw Value - Correction Factor
 2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss
(External Preamp. Gain = 0, when the test receiver is used for the test.)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.247
 6. " * " : Fundamental frequency



EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
MODE	Channel 11	FREQUENCY RANGE	Above 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 68%RH, 976 hPa	TESTED BY	Eric Lee

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	2335.00	41.2 PK	74.00	-32.80	1.64 H	325	11.60	29.60
2	2367.00	39.1 PK	74.00	-34.90	1.21 H	341	9.40	29.70
3	*2458.00	96.4 PK			1.34 H	103	66.40	30.00
3	*2458.00	89.1 AV			1.34 H	103	59.00	29.60
4	2495.00	45.8 PK	74.00	-28.20	1.24 H	108	15.60	30.20
5	3168.00	34.3 PK	74.00	-39.70	1.05 H	343	2.30	32.00
6	4924.00	37.4 PK	74.00	-36.60	1.23 H	340	0.70	36.70
7	6336.00	46.7 PK	74.00	-27.30	1.64 H	346	8.10	38.60

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	2335.00	48.5 PK	74.00	-25.50	1.08 V	351	18.90	29.60
2	2367.00	45.4 PK	74.00	-28.60	1.41 V	348	15.70	29.70
3	*2458.00	104.4 PK			1.56 V	77	74.30	30.00
3	*2458.00	96.0 AV			1.56 V	77	65.90	29.60
4	2495.00	50.0 PK	74.00	-24.00	1.21 V	79	19.80	30.20
5	3168.00	35.6 PK	74.00	-38.40	1.00 V	340	3.60	32.00
6	4924.00	40.0 PK	74.00	-34.00	1.16 V	340	3.30	36.70
7	6336.00	50.4 PK	74.00	-23.60	2.20 V	339	11.80	38.60

- NOTE:**
1. Emission level= Raw Value - Correction Factor
 2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss
(External Preamp. Gain = 0, when the test receiver is used for the test.)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.247
 6. " * " : 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	FSP	1093.4495.30	Dec. 19, 2003

NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

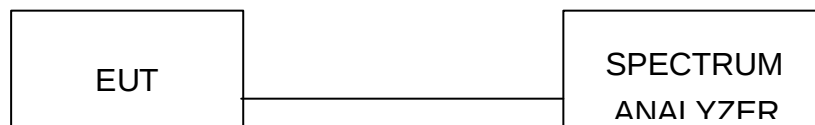
4.3.3 TEST PROCEDURE

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 6 dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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



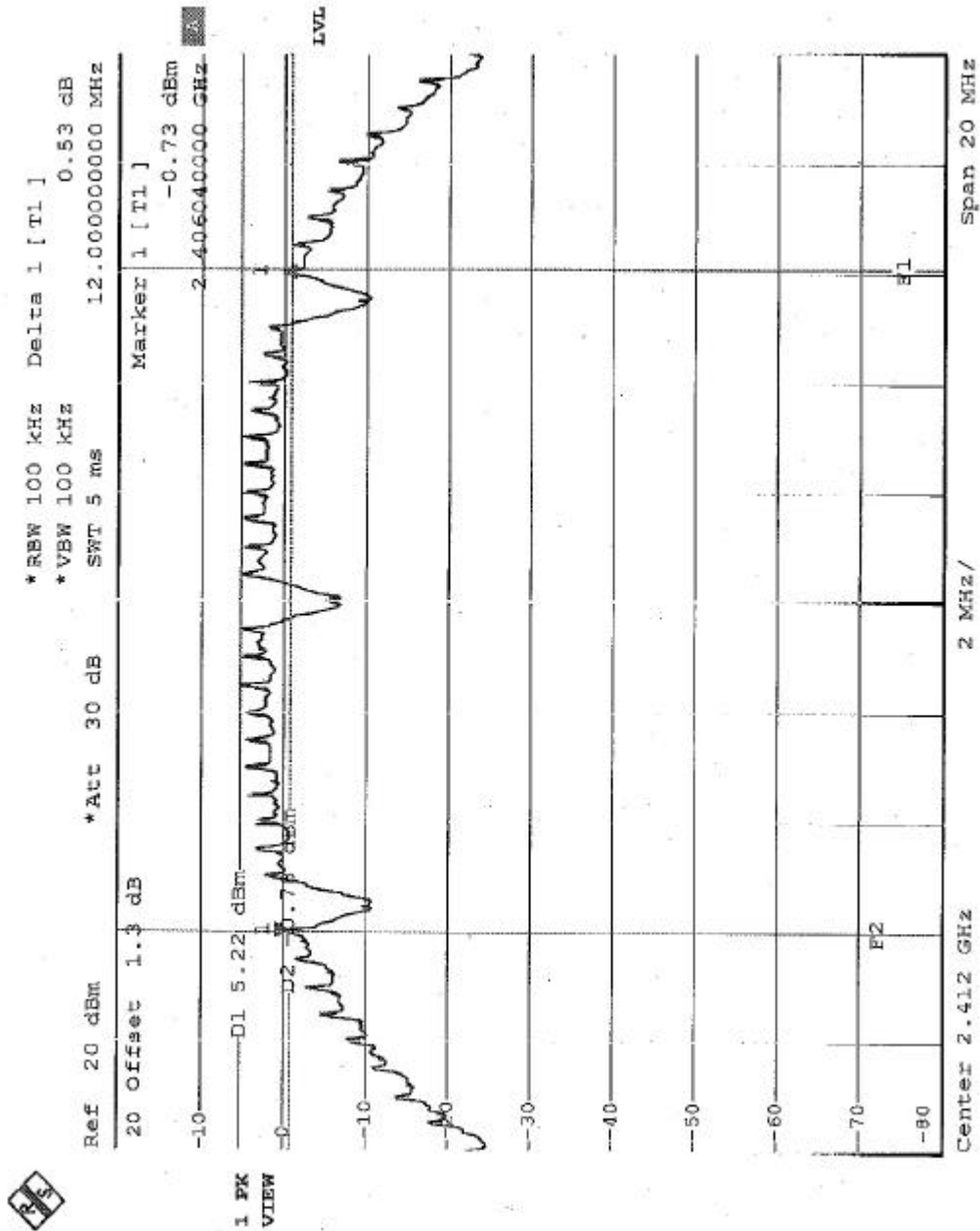
4.3.7 TEST RESULTS (A)

EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	19deg. C, 64%RH, 976 hPa
TESTED BY	Hank Chung		

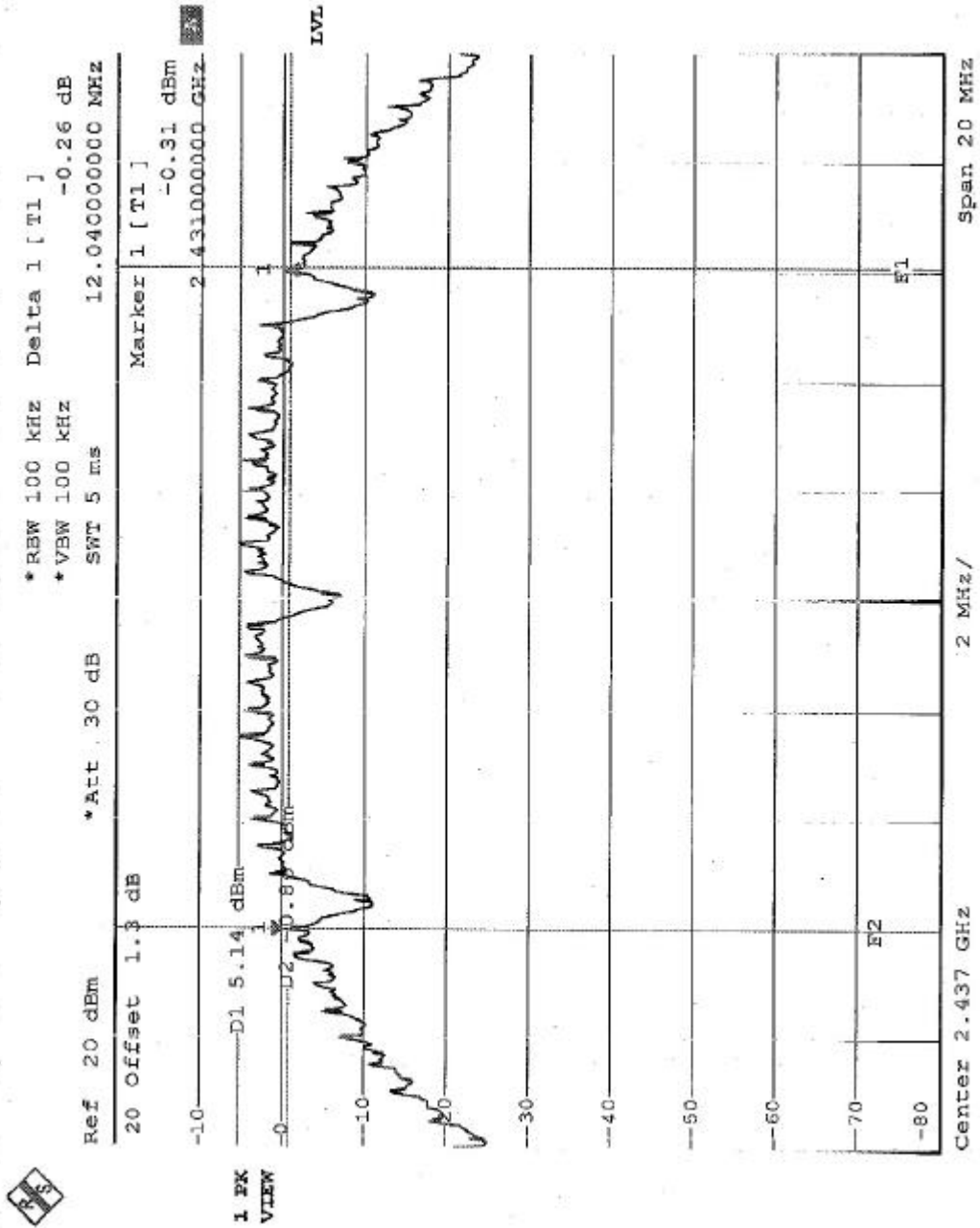
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	12.00	0.5	PASS
6	2437	12.04	0.5	PASS
11	2462	11.08	0.5	PASS



CH1

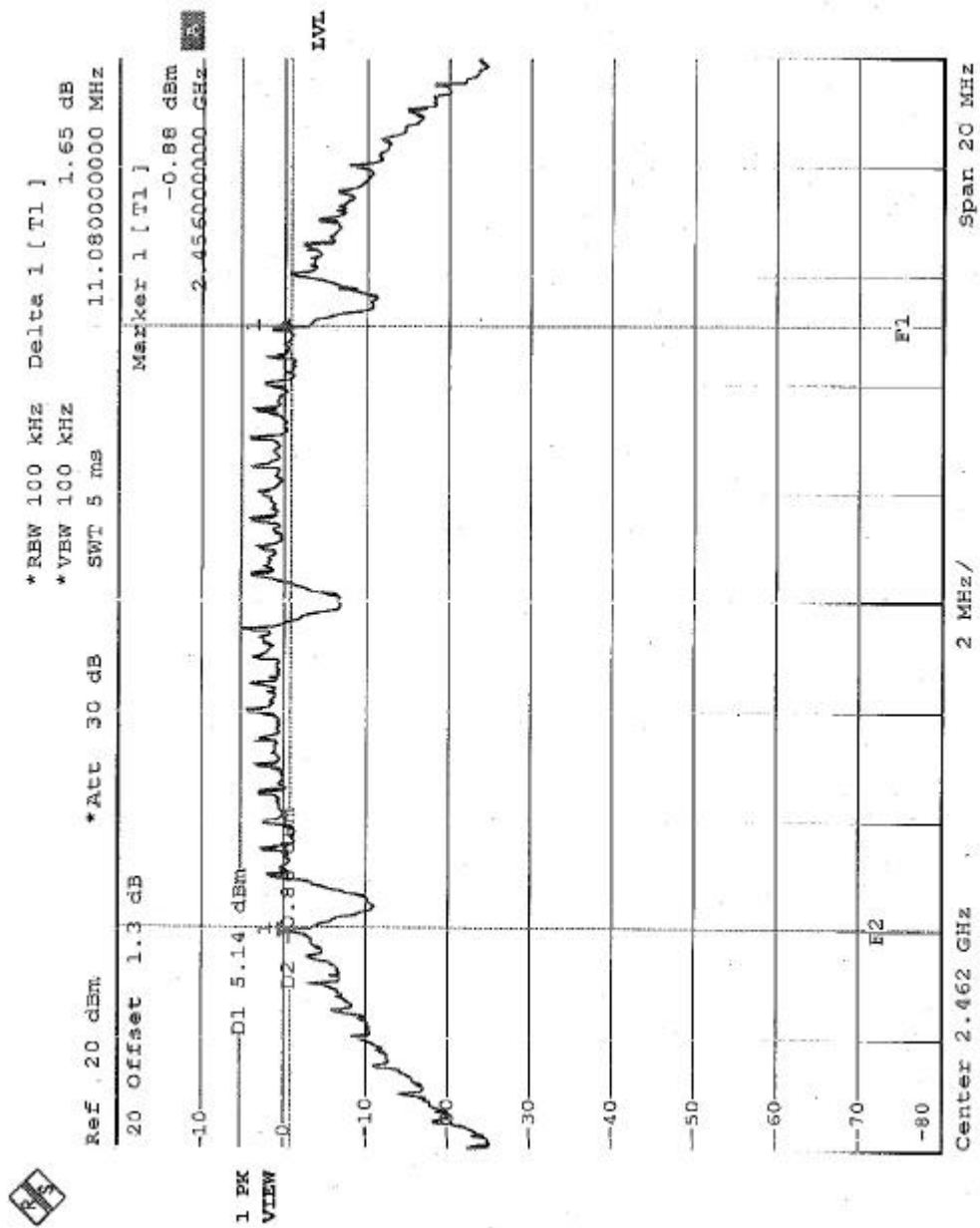


CH6





CH11





4.3.8 TEST RESULTS (B)

EUT	Broadband ProSafe Dual-Band Wireless VPN Firewall	MODEL	FWAG114
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	19deg. C, 64%RH, 976 hPa
TESTED BY	Hank Chung		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.44	0.5	PASS
6	2437	16.56	0.5	PASS
11	2462	16.52	0.5	PASS