

FCC TEST REPORT

according to

FCC Rules and Regulations Part 15 Subpart B & C

Applicant	Motorola Inc.
Address	101 Tournament Drive, Horsham, PA19044, USA
Equipment	Wireless Print Server
Model No.	WPS870G
FCC ID	ACQWPS870G
Trade Name	Motorola

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of **Exclusive Certification Corp.** the test report shall not be reproduced except in full.

Contents

1.	Report of Measurements and Examinations	4
1.1.	List of Measurements and Examinations	4
1.2.	Antenna Requirements	5
1.3.	Test of Conducted Emission	6
1.4.	Test of Radiated Emission	6
1.5.	6dB Bandwidth	6
1.6.	Maximum Peak Output Power	6
1.7.	Band Edges Measurement	6
1.8.	Power Spectral Density	6
1.9.	Restricted Bands of Operation	6
1.10.	Labeling Requirement	6
1.11.	RF Exposure	6
2.	Test Configuration of Equipment under Test	6
2.1.	Test Mode	6
2.2.	Description of Test System	6
2.3.	Connection Diagram of Test System	6
2.4.	Feature of Equipment under Test	6
2.5.	History of this test report	6
3.	General Information of Test	6
4.	Test Result and Data	6
4.1.	Antenna Requirement	6
4.2.	Test Result of Conducted Emission	6
4.3.	Test Result of Radiated Emission	6
4.4.	6dB Bandwidth Measurement Data	6
4.5.	Peak Output Power Measurement Data	6
4.6.	Band Edges Measurement Data	6
4.7.	Power Spectral Density Measurement Data	6
4.8.	Test Result of RF Exposure Evaluation	6
5.	List of Measuring Equipment Used	6
	Appendix A. Photographs of EUT	A1 ~ A4

CERTIFICATE OF COMPLIANCE

according to

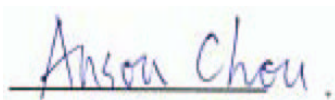
FCC Rules and Regulations Part 15 Subpart B & C

Applicant	Motorola Inc.
Address	101 Tournament Drive, Horsham, PA19044, USA
Equipment	Wireless Print Server
Model No.	WPS870G
FCC ID	ACQWPS870G

I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4**. The equipment was ***passed*** the test performed according to **FCC Rules and Regulations Part 15 Subpart B & C (2002)**. The test was carried out on Mar. 24, 2004 at *Exclusive Certification Corp.*

Signature



Anson Chou / Manager

1. Report of Measurements and Examinations

1.1. List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209	. Radiated Emission	Pass
15.247(a)(2)	. 6dB Bandwidth	Pass
15.247(b)	. Maximum Peak Output Power	Pass
15.247(c)	. 100kHz Bandwidth of Frequency Band Edges	Pass
15.247(d)	. Power Spectral Density	Pass
1.1307 1.1310 2.1091 2.1093	. RF Exposure Compliance	Pass

Test by: Tony

1.2. Antenna Requirements

1.2.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

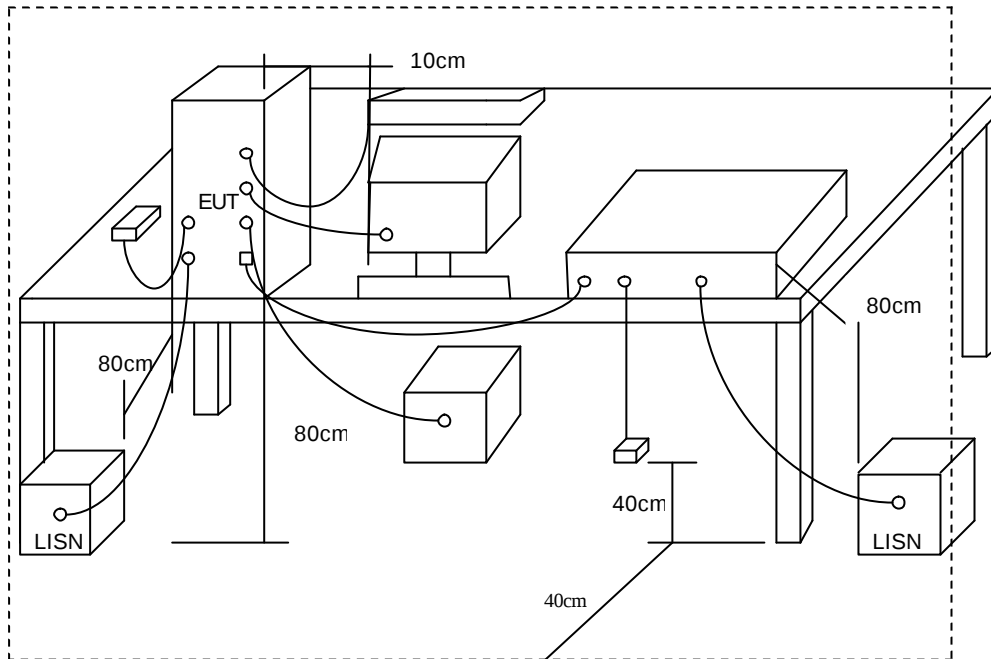
1.3. Test of Conducted Emission

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

1.3.1. Test Procedures

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connecting to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

1.3.2. Typical Test Setup Layout of Conducted Emission



1.3.3. Conducted Emission Requirement

Except for A digital devices, for equipment that is designed to be connected to the public utility (AC) power line on any frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150KHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the Radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

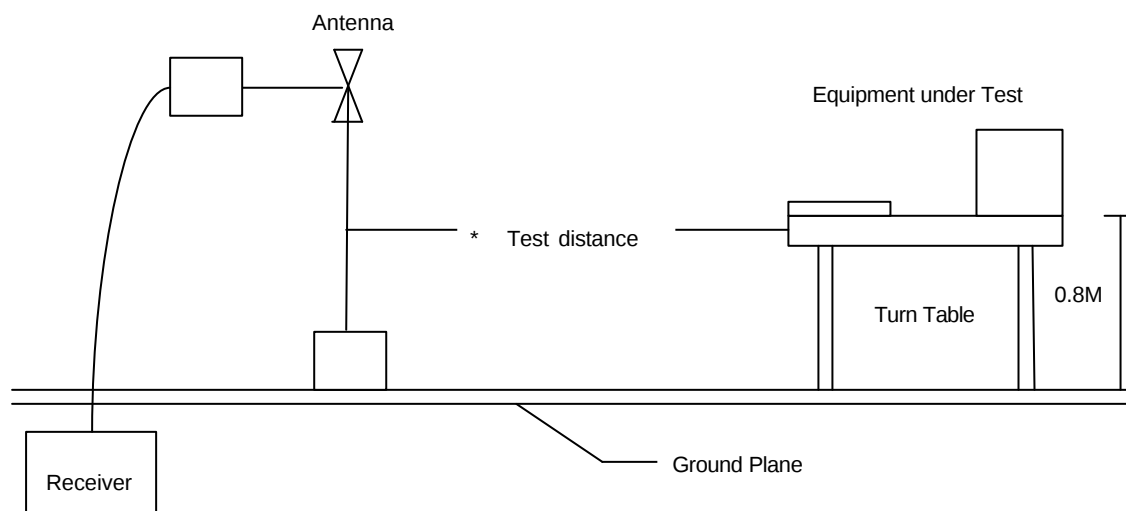
1.4. Test of Radiated Emission

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2001. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

1.4.1. Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

1.4.2. Typical Test Setup Layout of Radiated Emission

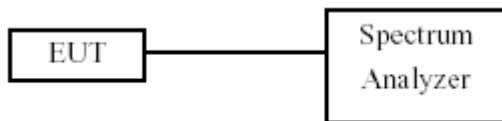


1.5. 6dB Bandwidth

1.5.1. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
3. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

1.5.2. Test Setup Layout :

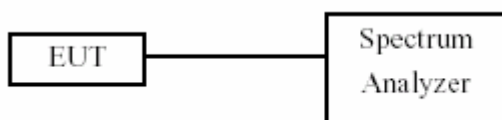


1.6. Maximum Peak Output Power

1.6.1. Test Procedure :

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

1.6.2. Test Setup Layout :



1.7. Band Edges Measurement

1.7.1. Test Procedure :

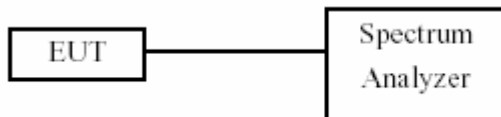
1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

1.8. Power Spectral Density

1.8.1. Test Procedure :

1. The transmitter output was connected to spectrum analyzer.
2. The spectrum analyzer' s resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
3. The power spectral density was measured and recorded.
4. The Sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

1.8.2. Test Setup Layout :



1.9. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.25
0.495 – 0.505**	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 - 4400	Above 38.6
13.36 -13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

1.10. Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.11. RF Exposure

FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093:

RF Exposure Compliance

1.11.1. Limit For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F=frequency in MHz

*Plane-wave equivalent power density

1.11.2. MPE Calculations

$$E \text{ (V/m)} = \frac{\sqrt{30 \cdot P \cdot G}}{d} \quad \text{Power Density: } Pd \text{ (mW/cm}^2\text{)} = \frac{E^2}{3770}$$

E = Electric field (V/m)

P = Peak output power (W)

G = Antenna numeric gain (numeric)

d = Separation distance (m)

Because the EUT is belong to General Population/ Uncontrolled Exposure. So the Limit of Power Density is 10 W/m². We can change the formula to:

$$d = \sqrt{\frac{30 \cdot P \cdot G}{3770}}$$

1.11.3. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation. Proposed RF exposure safety information to include in User's Manual.

2. Test Configuration of Equipment under Test

2.1. Test Mode

The following test mode was performed for conduction test:

- 802.11b (CH HI) • 802.11b (CH MID) • 802.11b (CH LO)
- 802.11g (CH HI) • 802.11g (CH MID) • 802.11g (CH LO)

The following test mode was performed for radiation test:

- Receiving / Transmitting

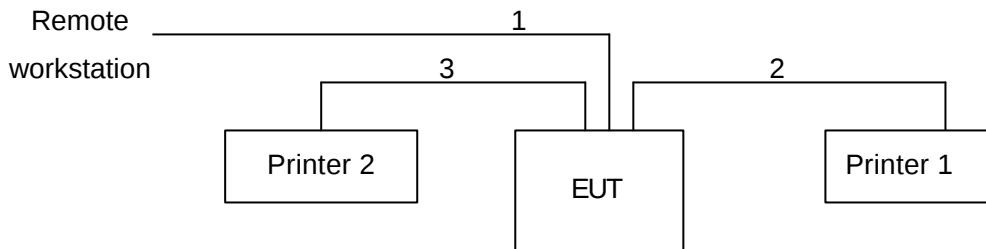
2.2. Description of Test System

Device	Manufacturer	Model No.	Description
Printer 1	HP	DJ400	Power Cord, Unshielding, 1.8m Data Cable, Shielding, 0.7m
Printer 2	EPSON	C43UX	Power Cord, Unshielding, 1.8m Data Cable, Shielding, 0.7m
PC (Remote site)	IBM	IGV	Power Cord, Unshielding, 1.8m
Monitor (Remote site)	SlimAGE	510A	Power Cord, Unshielding, 1.8m Data Cable, Shielding, 1.35m
Keyboard (Remote site)	IBM	KB-0225	Data Cable, Shielding, 1.85m
Mouse (Remote site)	IBM	MO28VO	Data Cable, Shielding, 1.85m

Use Cable:

Cable	Description
RJ-45	Unshielding, 10m

2.3. Connection Diagram of Test System



1. The TP cable is connected from remote workstation to the EUT.
2. The I/O cable is connected from EUT to the print 1.
3. The I/O cable is connected from EUT to the print 2.

2.4. Feature of Equipment under Test

Congratulations on the purchase of your new Wireless Print Server. Your Wireless Print Server was designed to provide a simple and efficient network printing solution. It is packed with features, including:

Wireless LAN Support: Wireless stations supporting the IEEE 802.11b/g standard can interoperate with the Wireless Print Server. Both LAN and WLAN users can print to the attached printer or printers.

Versatility: The Wireless Print Server supports up to four protocols: TCP/IP, SMB (Service Message Block), AppleTalk (EtherTalk), and NetBEUI. It features an Ethernet interface port and operating system support includes Unix, NetWare (NDPS LPR printing), and Microsoft Windows.

Easy Installation: The Wireless Print Server makes adding printers or plotters to your network simple.

Easy Setup: A number of utility programs are supplied to simplify setup. For Windows 95/ 98/ Me/ NT/ 2000/ XP users, the BiAdmin program makes it easy to configure the Wireless Print Server for a variety of network and server configurations.

Web-based Interface: The Web-based interface provides an easy method of configuration in TCP/IP networks to every model.

Compact Size: This allows the Wireless Print Server to be used even where space is limited.

Remote Management Tools: A variety of software tools are provided. In most environments, both the Wireless Print Server and attached bi-directional printers can be configured remotely.

SNMP Support: The Wireless Print Server can act as a SNMP agent, with its own MIB. This allows TCP/IP users to monitor, configure and troubleshoot the Wireless Print Server using their existing SNMP management tools.

Internet Printing Protocol (IPP) Support: The Wireless Print Server can act as an IPP (Internet Printing Protocol) Server, allowing clients, suppliers, colleagues and others to print to your printer from anywhere on the Internet. Windows IPP Client software is also supplied.

2.5. History of this test report

ORIGINAL.

3. General Information of Test

Test Site:	Exclusive Certification Corp. 4F-2, No. 28, Lane 78, Xing-Ai Rd. Nei-hu, Taipei City 114 Taiwan R.O.C.
Test Site Location (OATS1-SD):	No.68-1, Shihbachongsi, shihding Township, Taipei County 223, Taiwan, R.O.C.
Test Voltage:	AC 110V/ 60Hz
Test in Compliance with:	ANSI C63.4-1992 FCC Part 15 Subpart C
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 24620MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

4. Test Result and Data

4.1. Antenna Requirement

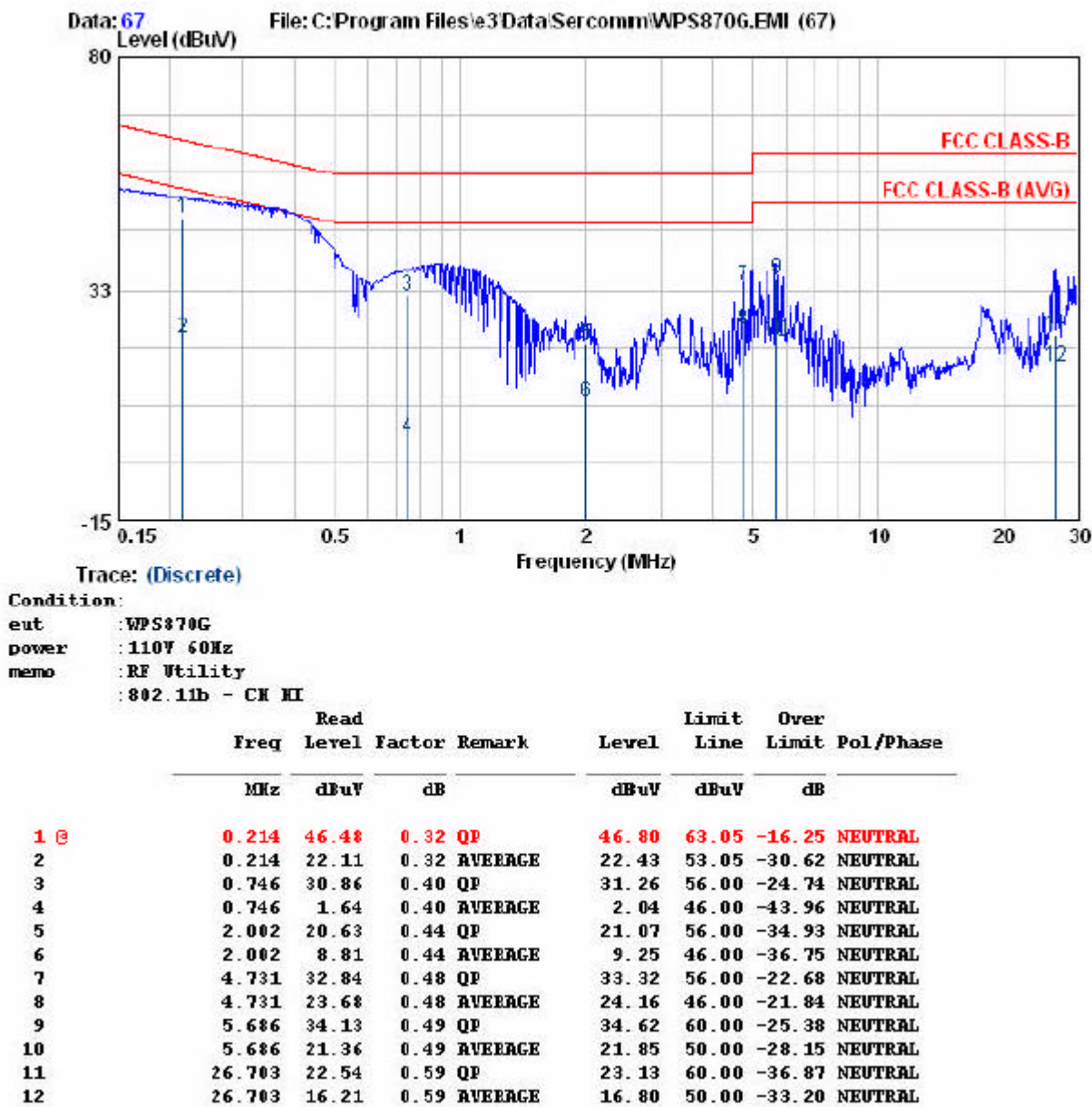
4.1.1. Antenna Construction and Directional Gain

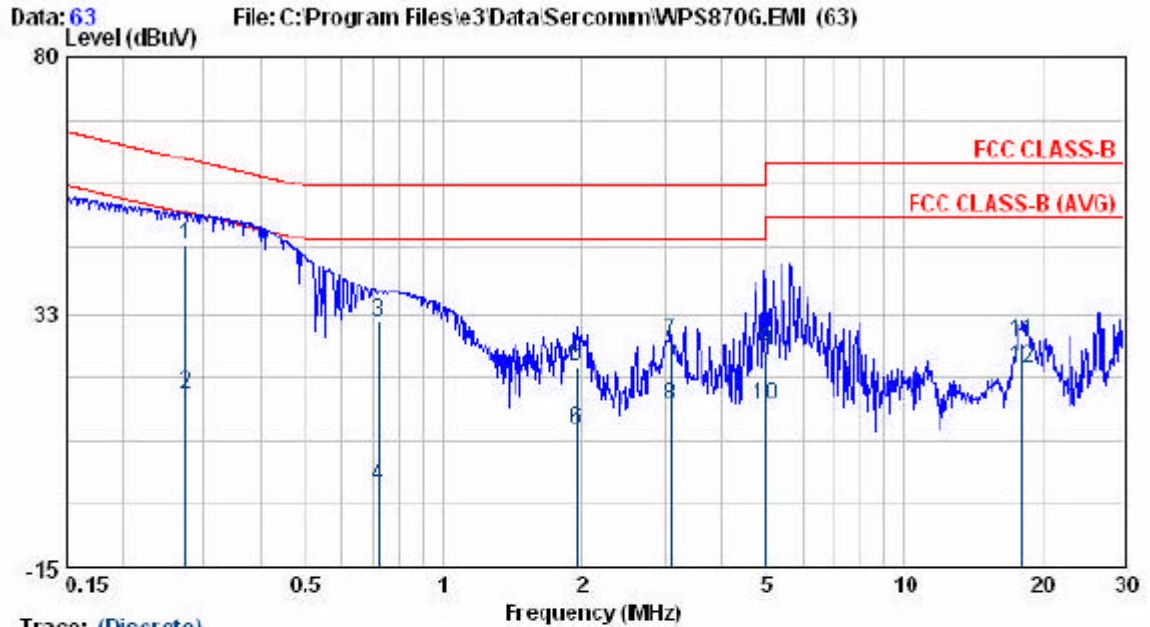
Antenna type: integral antenna; the maximum antenna gain: +2.0 dBi.

4.2. Test Result of Conducted Emission

4.2.1. Test Mode 1: 802.11b (CH HI)

- Relative Humidity: 55 %
- Temperature: 25°C
- Test Date: Mar. 10, 2004





Trace: (Discrete)

Condition:

cut : WPS870G

power : 110V 60Hz

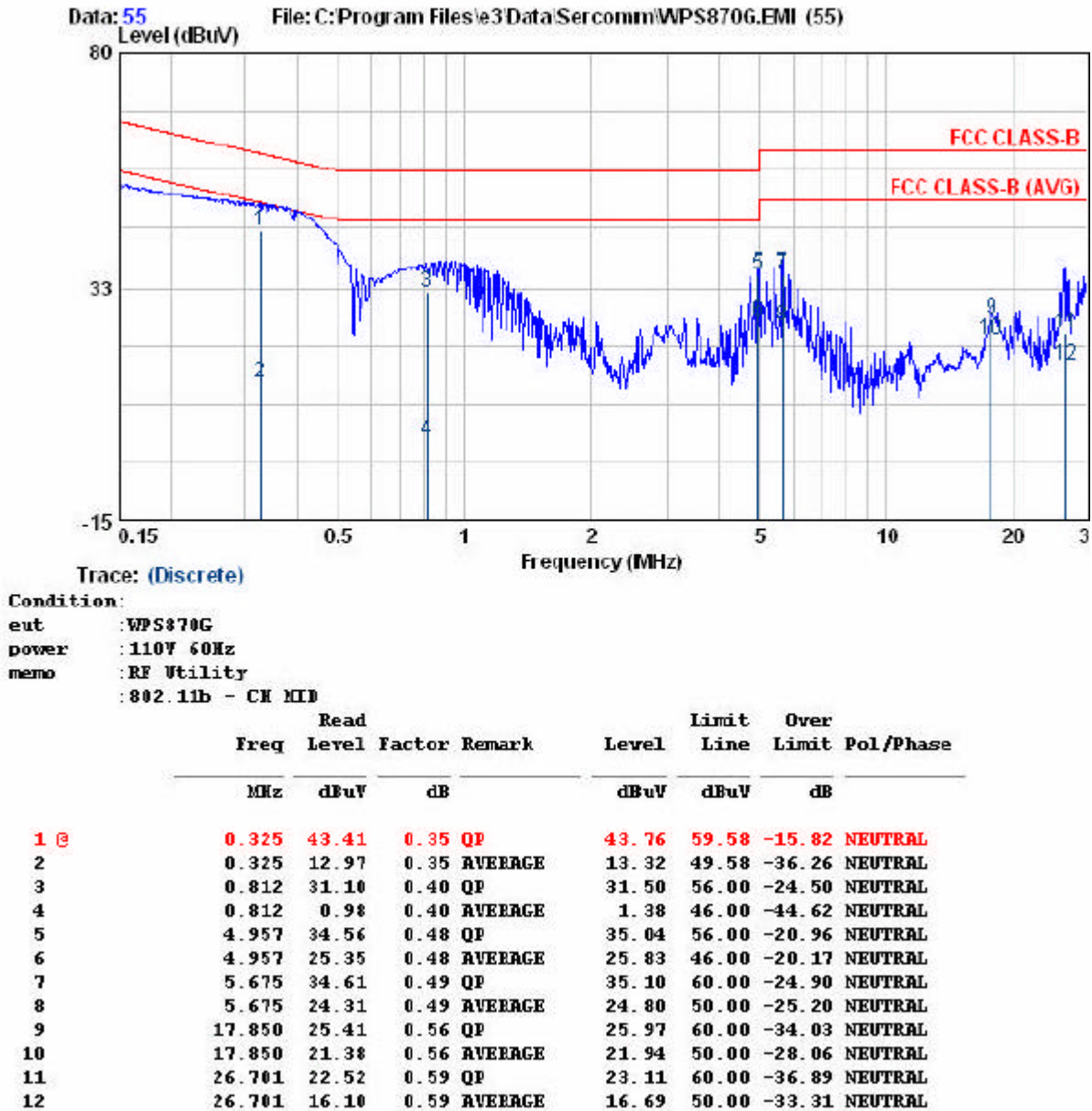
memo : RF Utility

: 802.11b - CH 11

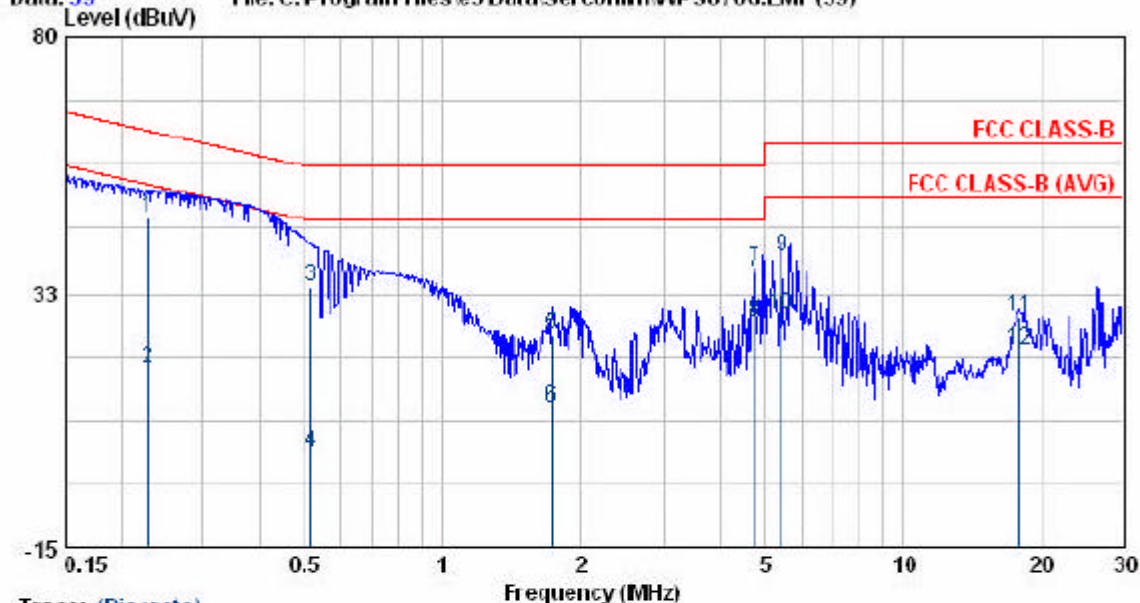
	Freq	Read			Limit	Over	
	MHz	Level	Factor	Remark	Level	Line	Limit Pol/Phase
	MHz	dBuV	dB		dBuV	dBuV	dB
1 @	0.273	44.47	0.34	QP	44.81	61.03	-16.22 LINE
2	0.273	17.05	0.34	AVERAGE	17.39	51.03	-33.64 LINE
3	0.720	30.45	0.39	QP	30.84	56.00	-25.16 LINE
4	0.720	-0.11	0.39	AVERAGE	0.28	46.00	-45.72 LINE
5	1.955	22.03	0.44	QP	22.47	56.00	-33.53 LINE
6	1.955	10.21	0.44	AVERAGE	10.65	46.00	-35.35 LINE
7	3.090	26.73	0.46	QP	27.19	56.00	-28.81 LINE
8	3.090	14.80	0.46	AVERAGE	15.26	46.00	-30.74 LINE
9	4.992	24.85	0.48	QP	25.33	56.00	-30.67 LINE
10	4.992	14.62	0.48	AVERAGE	15.10	46.00	-30.90 LINE
11	18.140	26.61	0.57	QP	27.18	60.00	-32.82 LINE
12	18.140	21.81	0.57	AVERAGE	22.38	50.00	-27.62 LINE

4.2.2. Test Mode 2: 802.11b (CH MID)

- Relative Humidity: 55 %
- Temperature: 25°C
- Test Date: Mar. 10, 2004



Data: 59 File: C:\Program Files\le3Data\Sercomm\WPS870G.EMI (59)



Trace: (Discrete)

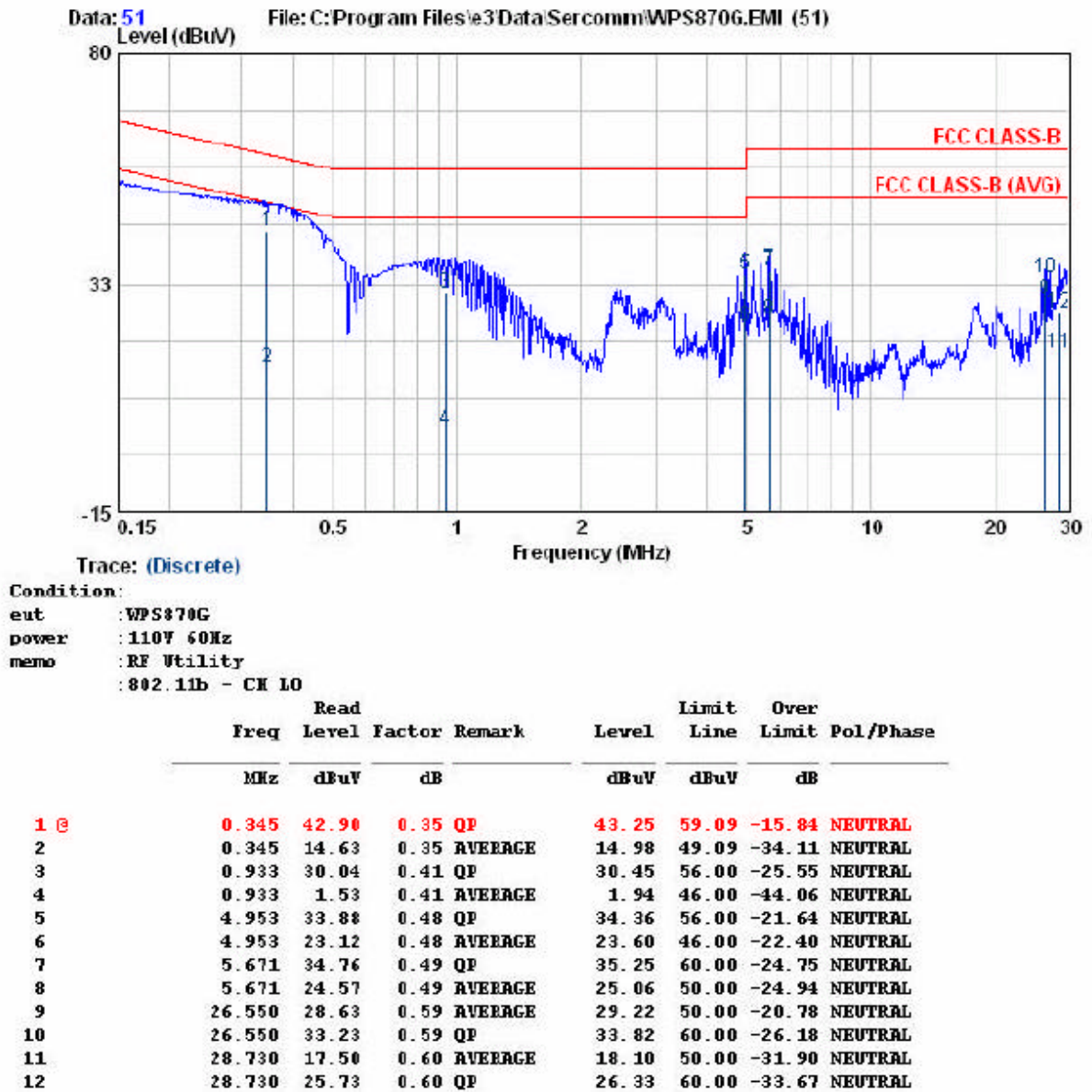
Condition:

cut : WPS870G
 power : 110V 60Hz
 memo : RF Utility
 : 802.11b - CH MID

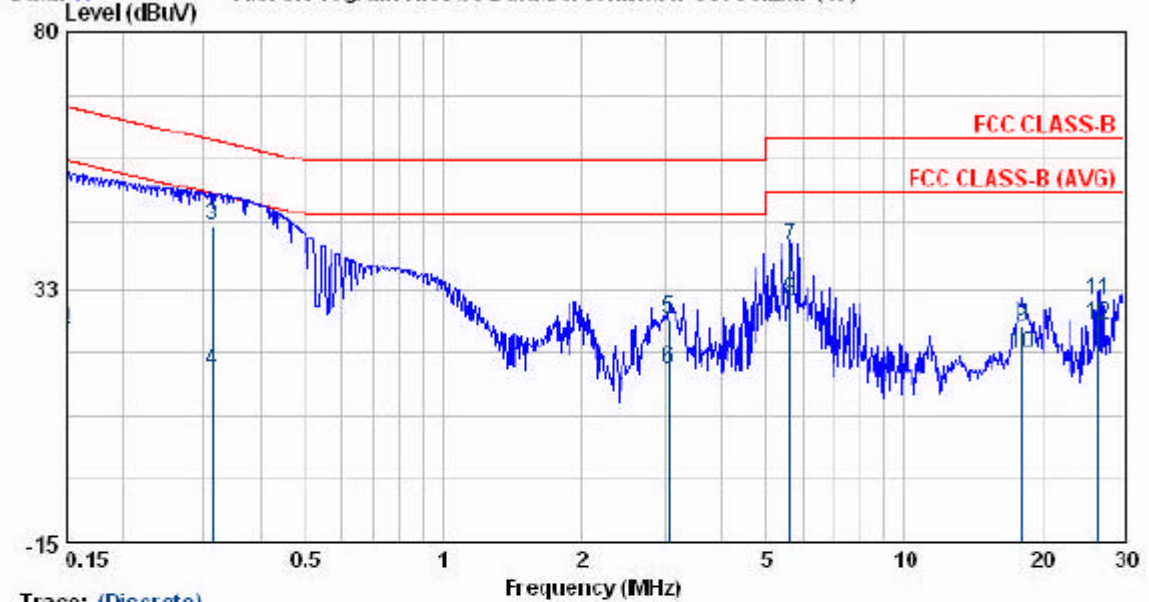
	Freq	Read Level	Factor	Remark	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBuV	dB		dBuV	dBuV	dB	
1 @	0.228	45.99	0.33	QP	46.32	62.52	-16.21	LINE
2	0.228	18.21	0.33	AVERAGE	18.54	52.52	-33.99	LINE
3	0.517	33.46	0.37	QP	33.83	56.00	-22.17	LINE
4	0.517	2.40	0.37	AVERAGE	2.77	46.00	-43.23	LINE
5	1.728	24.24	0.44	QP	24.68	56.00	-31.32	LINE
6	1.728	10.83	0.44	AVERAGE	11.27	46.00	-34.73	LINE
7	4.732	35.94	0.48	QP	36.42	56.00	-19.58	LINE
8	4.732	26.47	0.48	AVERAGE	26.95	46.00	-19.05	LINE
9	5.439	38.36	0.49	QP	38.85	60.00	-21.15	LINE
10	5.439	28.02	0.49	AVERAGE	28.51	50.00	-21.49	LINE
11	17.944	27.52	0.56	QP	28.08	60.00	-31.92	LINE
12	17.944	21.49	0.56	AVERAGE	22.05	50.00	-27.95	LINE

4.2.3. Test Mode 3: 802.11b (CH LO)

- Relative Humidity: 55 %
- Temperature: 25°C
- Test Date: Mar. 10, 2004



Data: 47 File: C:\Program Files\3Data\Sercomm\WPS870G.EMI (47)



Trace: (Discrete)

Condition:

out : WPS870G

power : 110V 60Hz

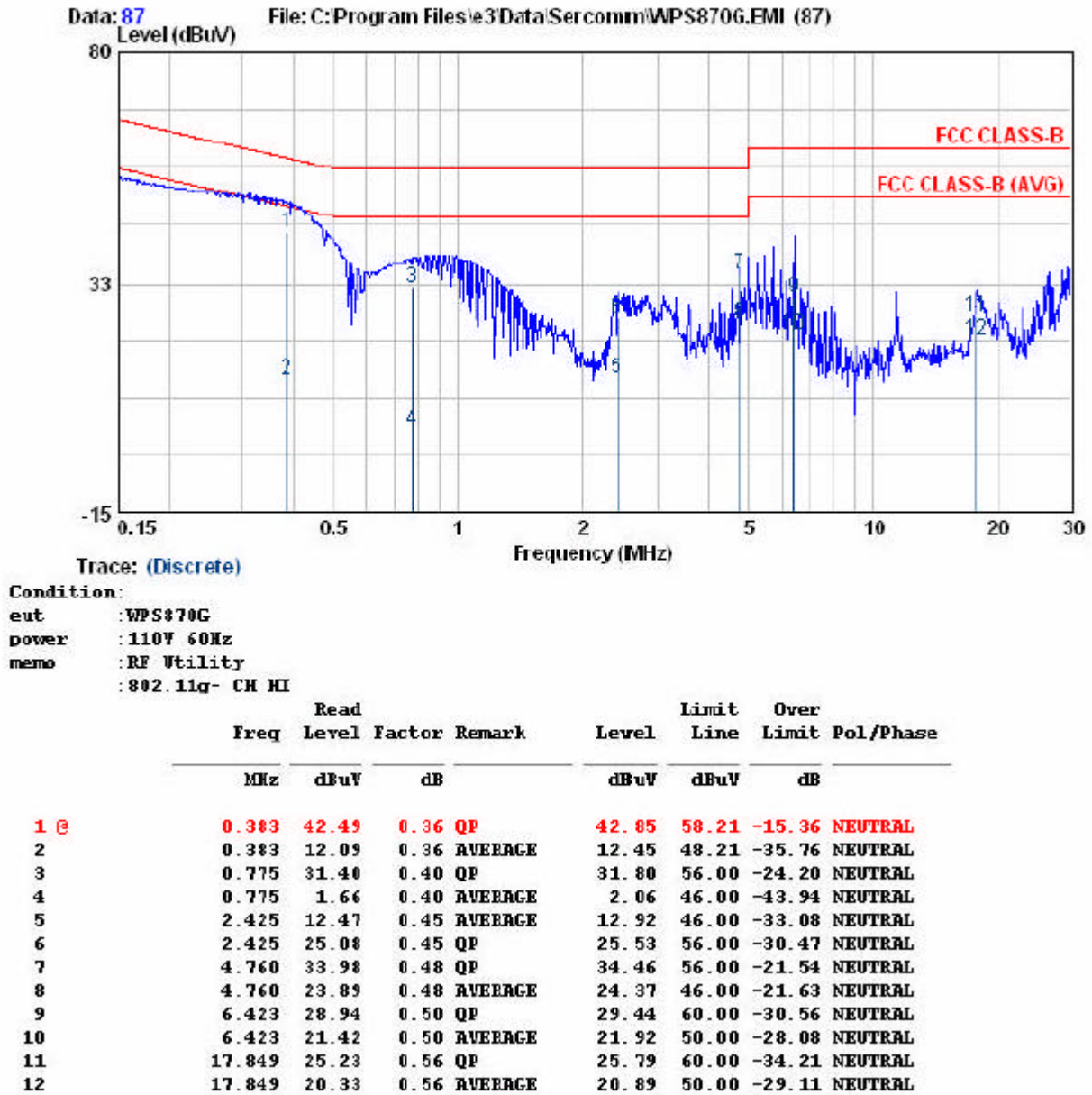
memo : RF Utility

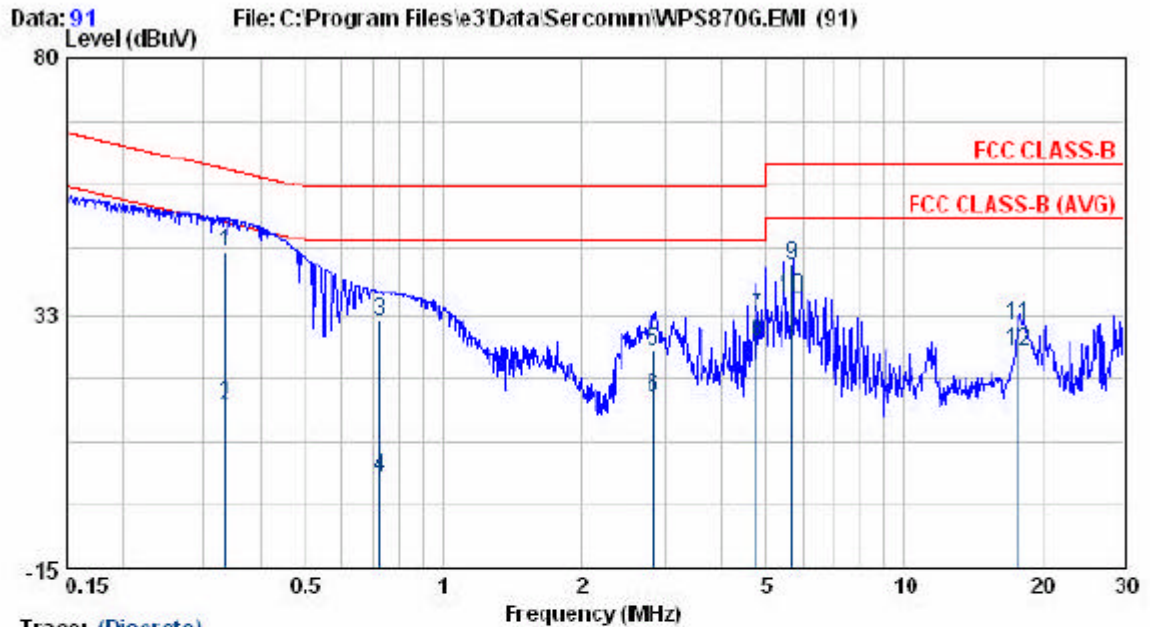
: 802.11b - CH 10

	Freq	Read Level	Factor	Remark	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBuV	dB		dBuV	dBuV	dB	
1	0.150	49.08	0.30	QP	49.38	66.00	-16.62	LINE
2	0.150	24.27	0.30	AVERAGE	24.57	56.00	-31.43	LINE
3 @	0.313	43.34	0.34	QP	43.68	59.88	-16.20	LINE
4	0.313	16.70	0.34	AVERAGE	17.04	49.88	-32.84	LINE
5	3.066	26.43	0.46	QP	26.89	56.00	-29.11	LINE
6	3.066	17.02	0.46	AVERAGE	17.48	46.00	-28.52	LINE
7	5.650	39.54	0.49	QP	40.03	60.00	-19.97	LINE
8	5.650	29.85	0.49	AVERAGE	30.34	50.00	-19.66	LINE
9	18.137	24.91	0.57	QP	25.48	60.00	-34.52	LINE
10	18.137	19.67	0.57	AVERAGE	20.24	50.00	-29.76	LINE
11	26.550	29.58	0.59	QP	30.17	60.00	-29.83	LINE
12	26.550	25.09	0.59	AVERAGE	25.68	50.00	-24.32	LINE

4.2.4. Test Mode 4: 802.11g (CH HI)

- Relative Humidity: 55 %
- Temperature: 25°C
- Test Date: Mar. 10, 2004





Condition:
 out : WPS870G
 power : 110V 60Hz
 memo : RF Utility
 : 802.11g- CH HI

	Freq	Read			Limit	Over	
	MHz	Level	Factor	Remark	Level	Line	Limit Pol/Phase
	MHz	dBuV	dB		dBuV	dBuV	dB
1	0.332	43.41	0.35	QP	43.76	59.39	-15.63 LINE
2	0.332	15.32	0.35	AVERAGE	15.67	49.39	-33.72 LINE
3	0.721	30.80	0.39	QP	31.19	56.00	-24.81 LINE
4	0.721	1.52	0.39	AVERAGE	1.91	46.00	-44.09 LINE
5	2.838	25.41	0.46	QP	25.87	56.00	-30.13 LINE
6	2.838	16.56	0.46	AVERAGE	17.02	46.00	-28.98 LINE
7	4.771	31.34	0.48	QP	31.82	56.00	-24.18 LINE
8	4.771	26.94	0.48	AVERAGE	27.42	46.00	-18.58 LINE
9	5.709	40.94	0.49	QP	41.43	60.00	-18.57 LINE
10	5.709	34.86	0.49	AVERAGE	35.35	50.00	-14.65 LINE
11	17.849	29.97	0.56	QP	30.53	60.00	-29.47 LINE
12	17.849	25.09	0.56	AVERAGE	25.65	50.00	-24.35 LINE