

FCC TEST REPORT

REPORT NO.: RF930903L08

MODEL NO.: WRV54G ver. 2

RECEIVED: Jul. 02, 2004

TESTED: Jul. 02 ~ Sep. 08, 2004

ISSUED: Mar. 09, 2005

APPLICANT: Cisco-Linksys LLC

ADDRESS: 121 Theory Drive Irvine, CA 92617 (USA)

ISSUED BY: Advance Data Technology Corporation

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ILAC MRA



No. 2177-01

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1. CERTIFICATION

PRODUCT: Wireless-G VPN Broadband Router
BRAND NAME: Linksys
MODEL NO.: WRV54G ver. 2
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: Jul. 02 ~ Sep. 08, 2004
APPLICANT: Cisco-Linksys LLC
STANDARDS: FCC Part 15, Subpart C (Section 15.247),
ANSI C63.4-2003

The above equipment have been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Candice Chen , **DATE:** Mar. 09, 2005
(Candice Chen)

TECHNICAL
ACCEPTANCE : Gary Chang , **DATE:** Mar. 09, 2005
Responsible for RF (Gary Chang)

APPROVED BY : Cody Chang , **DATE:** Mar. 09, 2005
(Cody Chang,
Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.85dB at 0.275MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.72dB at 2063.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.55 dB
	200MHz ~ 1000MHz	3.58 dB
	1GHz ~ 18GHz	1.10 dB
	18GHz ~ 40GHz	0.91 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wireless-G VPN Broadband Router
MODEL NO.	WRV54G ver. 2
POWER SUPPLY	12Vdc from AC adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
RADIO TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	101.391mW
ANTENNA TYPE	Dipole antenna with 3dBi gain
DATA CABLE	NA
I/O PORTS	RJ45
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT was tested with the following adapter:

MODEL :	LINKSYS
BRAND :	411210003CT
INPUT :	120Vac, 60Hz, 20W
OUTPUT :	12Vdc, 1000mA
POWER LINE :	DC 1.8m non-shielded cable without core

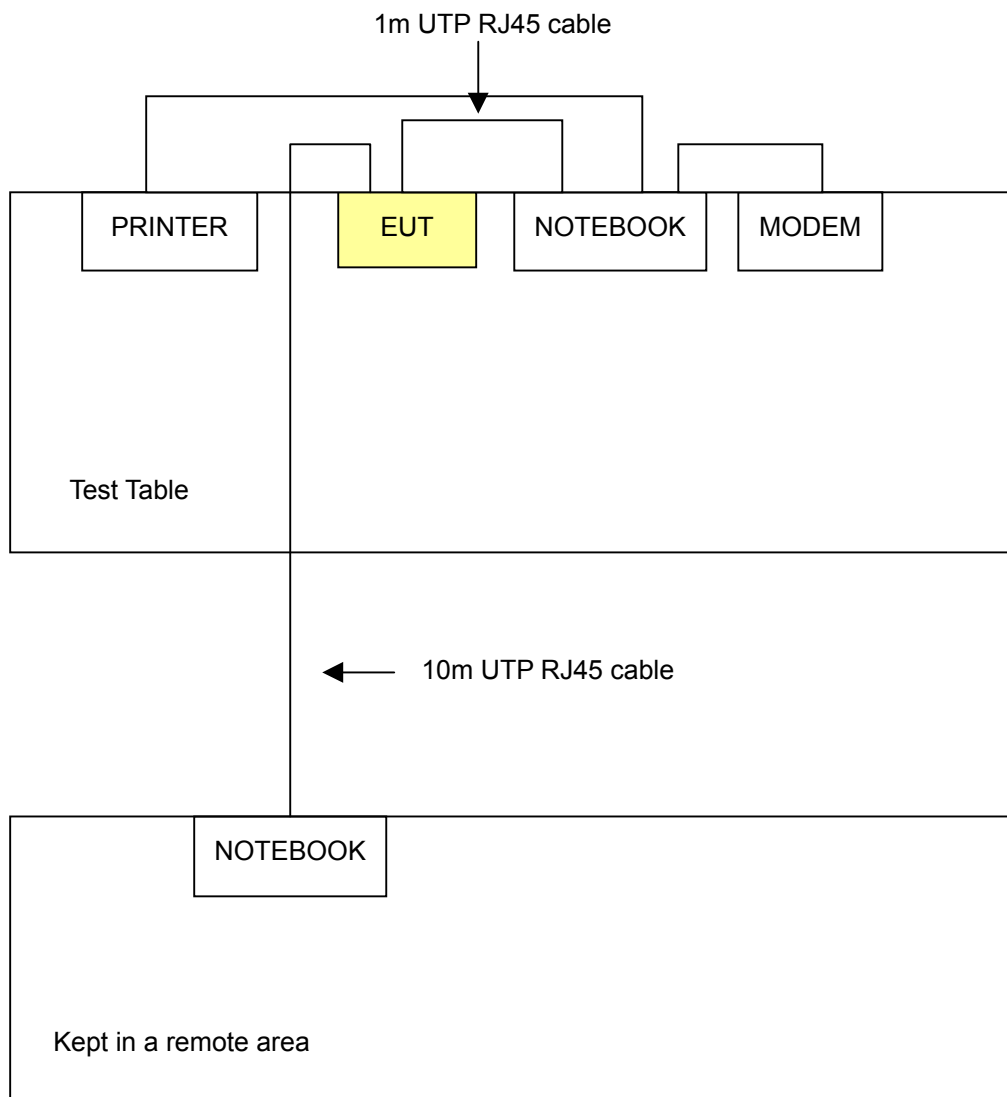
2. The EUT operates in the 2.4GHz frequency spectrum with throughput of up to 54Mbps.
3. The EUT complies with IEEE 802.11g standards and backwards compatible with IEEE 802.11b products.
4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

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		

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	X	X	X	X	NA

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Power Line Conducted Emission Test:

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

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6

Radiated Emission Test (Below 1 GHz):

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

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11g	1 to 11	11	OFDM	BPSK	6

Radiated Emission Test (Above 1 GHz):

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

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	CCK	11
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6

**Bandedge Measurement:**

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

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 11	DSSS	CCK	11
802.11g	1 to 11	1, 11	OFDM	BPSK	6

Antenna Port Conducted Measurement:

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

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	CCK	11
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless-G VPN Broadband Router. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)

ANSI C63.4- 2003

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

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	NOTEBOOK COMPUTER	DELL	PP05L	25191592336	E2K24CLNS
2	NOTEBOOK COMPUTER	DELL	PP05L	12130898320	E2K24CLNS
3	PRINTER	EPSON	LQ-300+	DCGY047265	FCC DoC Approved
4	MODEM	ACEEX	1414	980020504	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	1.2m shielded cable without core.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 2 act as a communication partner to transfer data.

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 06, 2005
RF signal cable Woken	5D-FB	Cable-HyC02-01	Jan. 09, 2006
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 20, 2006
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jan. 20, 2006
Software ADT	ADT_Cond_V3	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 HwaYa Shielded Room 3.
 3. The VCCI Site Registration No. is C-2047.



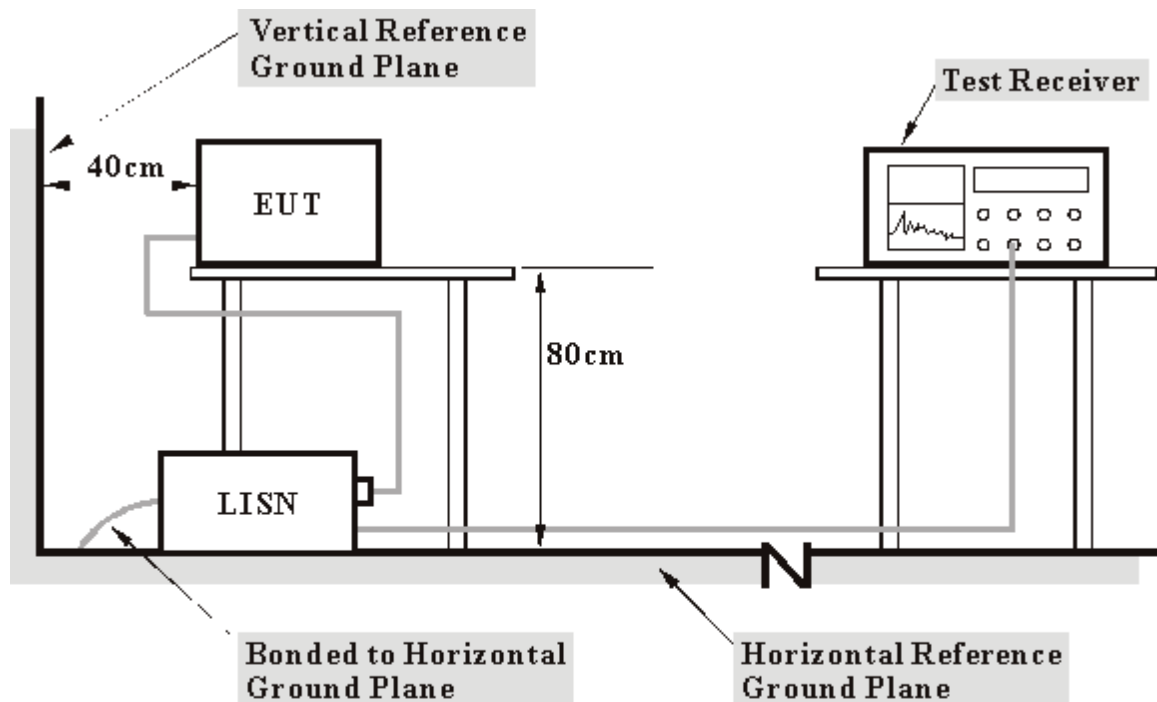
4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 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. Connected the EUT with a notebook system placed on the testing table.
- b. Prepared another Notebook system to act as a communication partner and placed it outside of testing area.
- c. The communication partner run a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ45 cable.
- d. The notebook system sent "H" messages to its screen.
- e. The notebook system sent "H" messages to modem.
- f. The notebook system sent "H" messages to printer, and the printer printed them on paper.
- g. Steps d ~ f were repeated.

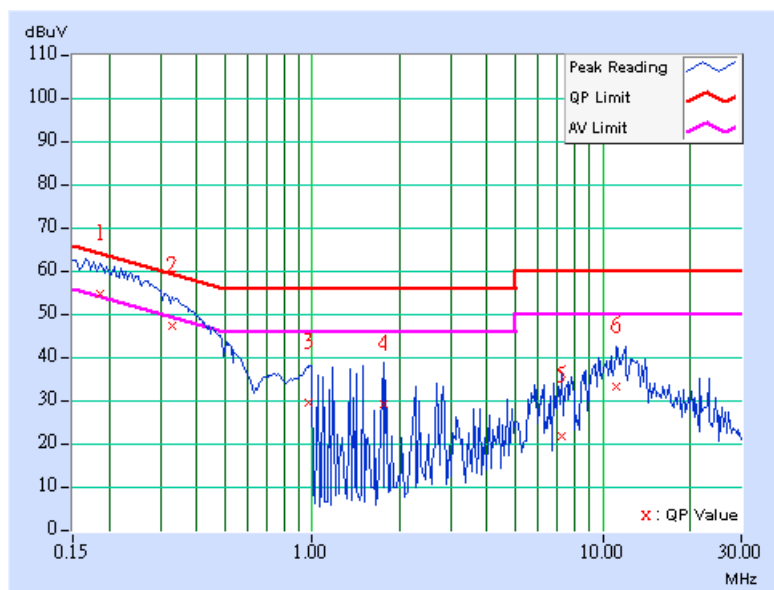
4.1.7 TEST RESULTS

Conducted Worst-Case Data

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 1	6dB BANDWIDTH	9 kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa	TESTED BY	Leo Hung

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	0.185	0.10	54.19	23.65	54.29	23.75	64.25	54.25	-9.96	-30.50
2	0.330	0.11	46.71	-	46.82	-	59.46	49.46	-12.64	-
3	0.974	0.24	28.93	-	29.17	-	56.00	46.00	-26.83	-
4	1.762	0.26	28.73	-	28.99	-	56.00	46.00	-27.01	-
5	7.246	0.45	21.16	-	21.61	-	60.00	50.00	-38.39	-
6	11.133	0.57	32.95	-	33.52	-	60.00	50.00	-26.48	-

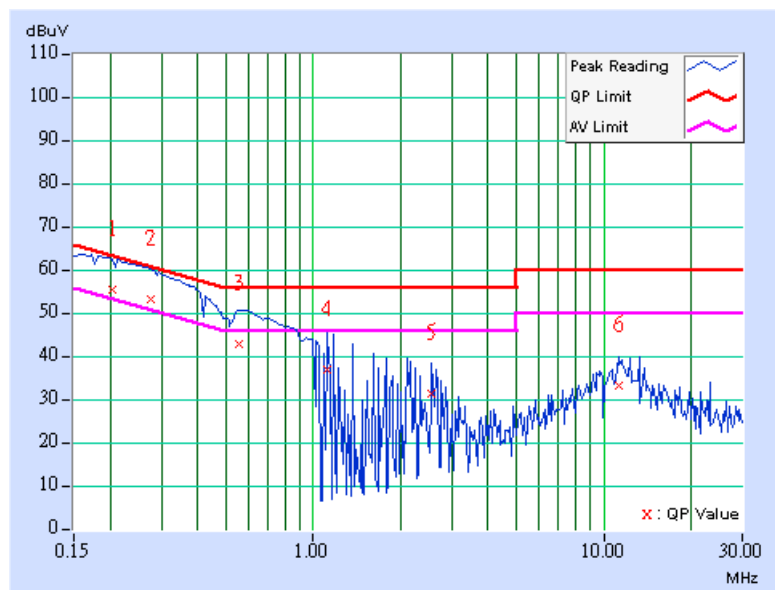
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 1	6dB BANDWIDTH	9 kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa	TESTED BY	Leo Hung

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	0.205	0.10	54.94	24.36	55.04	24.46	63.42	53.42	-8.38	-28.96
2	0.275	0.11	53.01	22.50	53.12	22.61	60.97	50.97	-7.85	-28.36
3	0.556	0.15	42.37	-	42.52	-	56.00	46.00	-13.48	-
4	1.113	0.24	36.41	-	36.65	-	56.00	46.00	-19.35	-
5	2.559	0.26	31.03	-	31.29	-	56.00	46.00	-24.71	-
6	11.211	0.51	32.97	-	33.48	-	60.00	50.00	-26.52	-

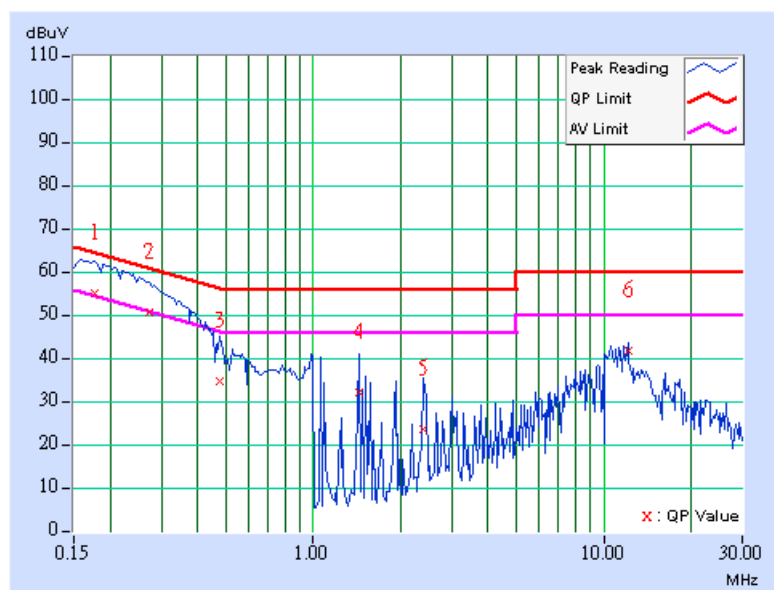
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3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 6	6dB BANDWIDTH	9 kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa	TESTED BY	Leo Hung

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	0.177	0.10	54.42	-	54.52	-	64.61	54.61	-10.09	-
2	0.271	0.10	50.31	-	50.41	-	61.08	51.08	-10.67	-
3	0.478	0.13	34.03	-	34.16	-	56.37	46.37	-22.21	-
4	1.438	0.25	31.57	-	31.82	-	56.00	46.00	-24.18	-
5	2.398	0.27	23.02	-	23.29	-	56.00	46.00	-32.71	-
6	12.176	0.60	41.21	-	41.81	-	60.00	50.00	-18.19	-

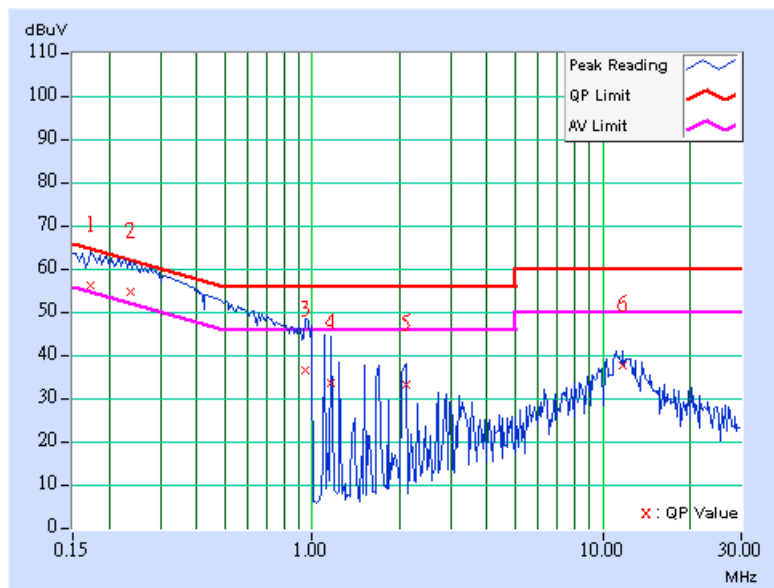
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EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 6	6dB BANDWIDTH	9 kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa	TESTED BY	Leo Hung

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	0.173	0.10	55.80	25.17	55.90	25.27	64.79	54.79	-8.90	-29.53
2	0.236	0.10	54.28	23.88	54.38	23.98	62.24	52.24	-7.86	-28.26
3	0.947	0.23	36.04	-	36.27	-	56.00	46.00	-19.73	-
4	1.160	0.24	33.28	-	33.52	-	56.00	46.00	-22.48	-
5	2.113	0.25	32.66	-	32.91	-	56.00	46.00	-23.09	-
6	11.742	0.51	37.20	-	37.71	-	60.00	50.00	-22.29	-

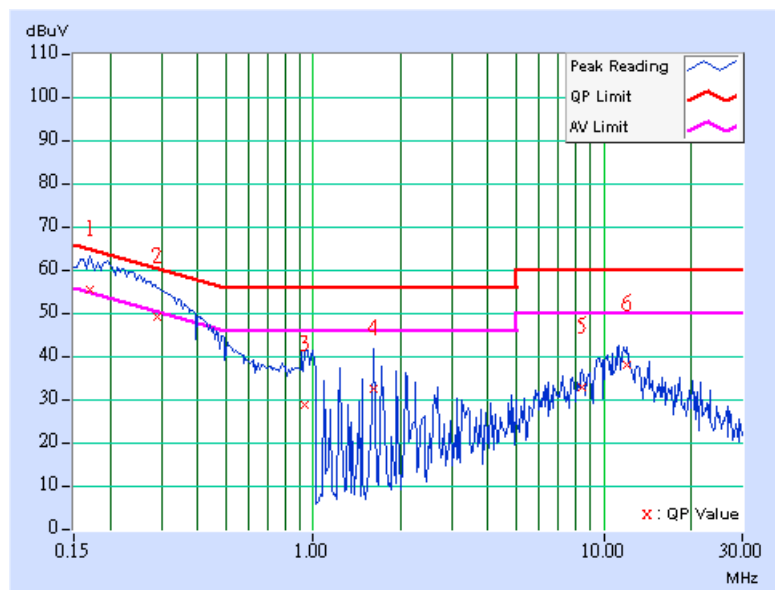
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EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 11	6dB BANDWIDTH	9 kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa	TESTED BY	Leo Hung

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	0.170	0.10	54.86	-	54.96	-	64.98	54.98	-10.02	-
2	0.291	0.11	48.64	-	48.75	-	60.51	50.51	-11.76	-
3	0.935	0.23	28.12	-	28.35	-	56.00	46.00	-27.65	-
4	1.617	0.26	32.04	-	32.30	-	56.00	46.00	-23.70	-
5	8.445	0.48	32.37	-	32.85	-	60.00	50.00	-27.15	-
6	12.043	0.60	37.47	-	38.07	-	60.00	50.00	-21.93	-

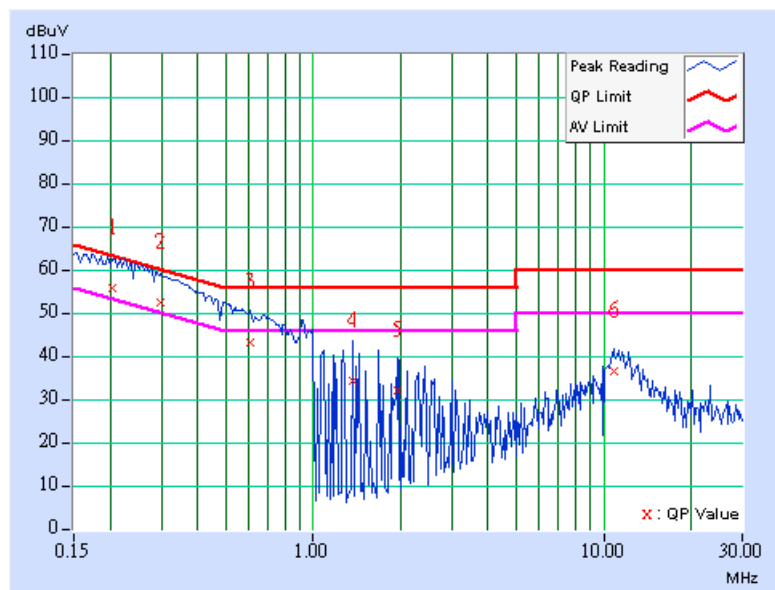
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5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 11	6dB BANDWIDTH	9 kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa	TESTED BY	Leo Hung

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	0.205	0.10	55.24	24.63	55.34	24.73	63.42	53.42	-8.08	-28.69
2	0.298	0.11	52.22	21.87	52.33	21.98	60.29	50.29	-7.96	-28.31
3	0.607	0.15	42.80	-	42.95	-	56.00	46.00	-13.05	-
4	1.363	0.24	33.96	-	34.20	-	56.00	46.00	-21.80	-
5	1.941	0.25	31.71	-	31.96	-	56.00	46.00	-24.04	-
6	10.816	0.50	36.27	-	36.77	-	60.00	50.00	-23.23	-

- 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
Test Receiver ROHDE & SCHWARZ	ESI7	100033	Jun. 08, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jun. 03, 2005
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Jun. 01, 2005
HORN Antenna SCHWARZBECK	9120D	9120D-408	Jan. 17, 2006
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Jan. 23, 2006
Preamplifier Agilent	8447D	2944A10633	Nov. 09, 2005
Preamplifier Agilent	8449B	3008A01964	Nov. 06, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218183/4	Jan. 26, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218195/4	Jan. 26, 2006
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 HwaYa Chamber 2.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The VCCI Site Registration No. is R-237.

5. The IC Site Registration No. is IC4924-3.

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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.

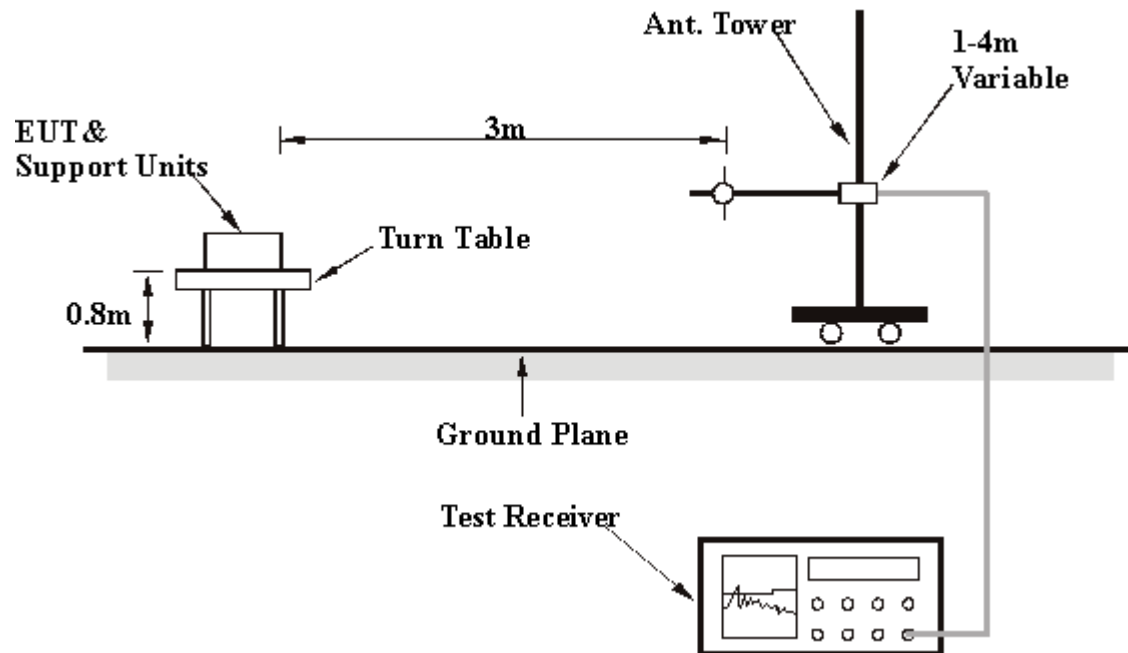
NOTE:

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 10 Hz for Average detection (AV) at frequency above 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

Below 1GHz Worst-Case Data

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa	TESTED BY	Match Tsui

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	133.03	33.28 QP	43.50	-10.22	1.75 H	211	19.34	13.94
2	168.02	36.79 QP	43.50	-6.71	1.50 H	262	22.67	14.12
3	201.06	33.79 QP	43.50	-9.71	1.75 H	82	22.37	11.41
4	249.66	38.02 QP	46.00	-7.98	1.00 H	4	24.80	13.22
5	300.20	35.23 QP	46.00	-10.77	1.00 H	157	20.72	14.50
6	333.25	37.25 QP	46.00	-8.75	1.00 H	70	21.99	15.26
7	500.42	41.57 QP	46.00	-4.43	1.00 H	100	22.84	18.74
8	533.47	43.96 QP	46.00	-2.04	1.75 H	235	24.59	19.37
9	549.02	37.57 QP	46.00	-8.43	1.75 H	271	17.90	19.67
10	582.06	36.43 QP	46.00	-9.57	1.50 H	232	15.89	20.54
11	667.60	36.28 QP	46.00	-9.72	1.50 H	358	14.38	21.90
12	933.20	38.36 QP	46.00	-7.64	1.46 H	273	12.90	25.46

- 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	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa	TESTED BY	Match Tsui

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	37.78	38.62 QP	40.00	-1.38	1.00 V	298	23.75	14.87
2	70.82	31.57 QP	40.00	-8.43	1.00 V	280	19.21	12.37
3	101.92	37.73 QP	43.50	-5.77	1.25 V	241	26.56	11.18
4	166.60	34.21 QP	43.50	-9.29	1.00 V	318	19.96	14.25
5	201.06	35.66 QP	43.50	-7.84	1.00 V	211	24.24	11.41
6	249.66	41.06 QP	46.00	-4.94	1.00 V	106	27.84	13.22
7	333.25	36.48 QP	46.00	-9.52	1.25 V	328	21.21	15.26
8	500.42	37.47 QP	46.00	-8.53	1.25 V	337	18.73	18.74
9	533.47	39.81 QP	46.00	-6.19	1.00 V	10	20.44	19.37
10	580.12	36.74 QP	46.00	-9.26	1.25 V	175	16.25	20.49
11	667.60	43.71 QP	46.00	-2.29	1.50 V	295	21.81	21.90
12	801.72	36.73 QP	46.00	-9.27	1.00 V	340	12.89	23.83
13	935.85	41.95 QP	46.00	-4.05	1.50 V	322	16.46	25.49

- 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.

802.11b DSSS modulation

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 55%RH, 991hPa	TESTED BY	Long Chen

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	1066.00	54.21 PK	74.00	-19.79	1.12 H	258	26.42	27.79
1	1066.00	44.17 AV	54.00	-9.83	1.12 H	258	16.38	27.79
2	1200.00	46.80 PK	74.00	-27.20	1.42 H	256	18.33	28.47
3	1333.00	48.71 PK	74.00	-25.29	1.42 H	193	19.41	29.30
4	2038.00	46.28 PK	74.00	-27.72	1.74 H	249	16.24	30.04
5	2386.40	35.66 PK	74.00	-38.34	1.03 H	319	4.06	31.60
6	*2412.00	93.42 PK			1.03 H	319	61.72	31.70
6	*2412.00	90.22 AV			1.03 H	319	58.52	31.70
7	4824.00	53.51 PK	74.00	-20.49	1.03 H	319	15.93	37.58
7	4824.00	48.95 AV	54.00	-5.05	1.03 H	319	11.37	37.58

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	1066.00	51.24 PK	74.00	-22.76	1.24 V	224	23.45	27.79
1	1066.00	40.89 AV	54.00	-13.11	1.24 V	224	13.10	27.79
2	1200.00	48.69 PK	74.00	-25.31	1.31 V	248	20.22	28.47
3	1333.00	51.41 PK	74.00	-22.59	1.00 V	248	22.11	29.30
3	1333.00	48.20 AV	54.00	-5.80	1.00 V	248	18.90	29.30
4	2038.00	53.16 PK	74.00	-20.84	1.14 V	275	23.12	30.04
4	2038.00	50.82 AV	54.00	-3.18	1.14 V	275	20.78	30.04
5	2386.40	51.16 PK	74.00	-22.84	1.00 V	136	19.56	31.60
5	2386.40	47.74 AV	54.00	-6.26	1.00 V	136	16.14	31.60
6	*2412.00	108.92 PK			1.00 V	136	77.22	31.70
6	*2412.00	105.50 AV			1.00 V	136	73.80	31.70
7	4824.00	55.89 PK	74.00	-18.11	1.12 V	274	18.31	37.58
7	4824.00	51.52 AV	54.00	-2.48	1.12 V	274	13.94	37.58

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

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 55%RH, 991hPa	TESTED BY	Long Chen

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	1066.00	53.95 PK	74.00	-20.05	1.24 H	261	26.16	27.79
1	1066.00	44.81 AV	54.00	-9.19	1.24 H	261	17.02	27.79
2	1200.00	47.82 PK	74.00	-26.18	1.14 H	258	19.35	28.47
3	1333.00	48.71 PK	74.00	-25.29	1.42 H	249	19.41	29.30
4	2063.00	47.32 PK	74.00	-26.68	1.14 H	248	17.15	30.17
5	*2437.00	94.39 PK			1.43 H	215	62.54	31.85
5	*2437.00	90.59 AV			1.43 H	215	58.74	31.85
6	4874.00	51.82 PK	74.00	-22.18	1.51 H	107	14.16	37.66
6	4874.00	46.05 AV	54.00	-7.95	1.51 H	107	8.39	37.66

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1066.00	51.14 PK	74.00	-22.86	1.12 V	247	23.35	27.79
1	1066.00	42.39 AV	54.00	-11.61	1.12 V	247	14.60	27.79
2	1200.00	49.22 PK	74.00	-24.78	1.00 V	245	20.75	28.47
3	1333.00	53.14 PK	74.00	-20.86	1.22 V	328	23.84	29.30
3	1333.00	49.61 AV	54.00	-4.39	1.22 V	328	20.31	29.30
4	2038.00	55.32 PK	74.00	-18.68	1.00 V	241	25.28	30.04
4	2038.00	52.69 AV	54.00	-1.31	1.00 V	241	22.65	30.04
5	*2437.00	108.80 PK			1.18 V	2	76.95	31.85
5	*2437.00	105.43 AV			1.18 V	2	73.58	31.85
6	4874.00	56.28 PK	74.00	-17.72	1.32 V	2	18.62	37.66
6	4874.00	51.92 AV	54.00	-2.08	1.32 V	2	14.26	37.66

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

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 55%RH, 991hPa	TESTED BY	Long Chen

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	1066.00	53.82 PK	74.00	-20.18	1.14 H	268	26.03	27.79
1	1066.00	43.71 AV	54.00	-10.29	1.14 H	268	15.92	27.79
2	1200.00	46.21 PK	74.00	-27.79	1.12 H	248	17.74	28.47
3	1333.00	49.74 PK	74.00	-24.26	1.02 H	268	20.44	29.30
4	2088.00	45.82 PK	74.00	-28.18	1.12 H	284	15.52	30.30
5	*2462.00	91.74 PK			1.85 H	186	59.74	32.00
5	*2462.00	88.55 AV			1.85 H	186	56.55	32.00
6	2487.90	34.45 PK	74.00	-39.55	1.85 H	186	2.29	32.16
7	4924.00	53.60 PK	74.00	-20.40	1.50 H	99	15.86	37.74
7	4924.00	49.45 AV	54.00	-4.55	1.50 H	99	11.71	37.74

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	1066.00	52.48 PK	74.00	-21.52	1.00 V	226	24.69	27.79
1	1066.00	42.95 AV	54.00	-11.05	1.00 V	226	15.16	27.79
2	1200.00	48.39 PK	74.00	-25.61	1.28 V	225	19.92	28.47
3	1333.00	52.84 PK	74.00	-21.16	1.42 V	239	23.54	29.30
3	1333.00	48.62 AV	54.00	-5.38	1.42 V	239	19.32	29.30
4	2088.00	54.28 PK	74.00	-19.72	1.12 V	274	23.98	30.30
4	2088.00	51.39 AV	54.00	-2.61	1.12 V	274	21.09	30.30
5	*2462.00	108.61 PK			1.04 V	38	76.61	32.00
5	*2462.00	105.04 AV			1.04 V	38	73.04	32.00
6	2487.90	50.85 PK	74.00	-23.15	1.04 V	38	18.69	32.16
6	2487.90	47.28 AV	54.00	-6.72	1.04 V	38	15.12	32.16
7	4924.00	55.84 PK	74.00	-18.16	1.14 V	1	18.10	37.74
7	4924.00	51.47 AV	54.00	-2.53	1.14 V	1	13.73	37.74

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

802.11g OFDM modulation

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 55%RH, 991hPa	TESTED BY	Long Chen

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	1066.00	53.50 PK	74.00	-20.50	1.14 H	262	25.70	27.79
1	1066.00	42.66 AV	54.00	-11.34	1.14 H	262	14.86	27.79
2	1200.00	45.78 PK	74.00	-28.22	1.01 H	256	17.31	28.47
3	1332.00	49.61 PK	74.00	-24.39	1.01 H	301	20.32	29.29
4	2038.00	44.96 PK	74.00	-29.04	1.00 H	277	14.92	30.04
5	2390.00	45.29 PK	74.00	-28.71	1.14 H	236	13.68	31.61
6	*2412.00	95.34 PK			1.14 H	236	63.64	31.70
6	*2412.00	86.29 AV			1.14 H	236	54.59	31.70
7	4824.00	49.62 PK	74.00	-24.38	1.00 H	180	12.04	37.58

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	1066.00	51.47 PK	74.00	-22.53	1.00 V	214	23.67	27.79
1	1066.00	41.70 AV	54.00	-12.30	1.00 V	214	13.90	27.79
2	1200.00	47.84 PK	74.00	-26.16	1.32 V	256	19.37	28.47
2	1200.00	44.96 AV	54.00	-9.04	1.32 V	256	16.49	28.47
3	1332.00	50.53 PK	74.00	-23.47	1.13 V	261	21.23	29.29
3	1332.00	47.35 AV	54.00	-6.65	1.13 V	261	18.05	29.29
4	2038.00	52.71 PK	74.00	-21.29	1.04 V	248	22.67	30.04
4	2038.00	51.12 AV	54.00	-2.88	1.04 V	248	21.08	30.04
5	2390.00	60.44 PK	74.00	-13.56	1.20 V	360	28.83	31.61
5	2390.00	51.74 AV	54.00	-2.26	1.20 V	360	20.13	31.61
6	*2412.00	110.49 PK			1.20 V	360	78.79	31.70
6	*2412.00	101.79 AV			1.20 V	360	70.09	31.70
7	4824.00	54.27 PK	74.00	-19.73	1.27 V	26	16.69	37.58
7	4824.00	41.06 AV	54.00	-12.94	1.27 V	26	3.48	37.58

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

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 55%RH, 991hPa	TESTED BY	Long Chen

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	1066.00	52.10 PK	74.00	-21.90	1.14 H	242	24.31	27.79
1	1066.00	41.66 AV	54.00	-12.34	1.14 H	242	13.87	27.79
2	1200.00	47.28 PK	74.00	-26.72	1.02 H	258	18.81	28.47
3	1332.00	50.21 PK	74.00	-23.79	1.05 H	279	20.92	29.29
3	1332.00	43.28 AV	54.00	-10.72	1.05 H	279	13.99	29.29
4	2063.00	46.28 PK	74.00	-27.72	1.00 H	247	16.11	30.17
5	*2437.00	99.02 PK			1.47 H	215	67.17	31.85
5	*2437.00	90.13 AV			1.47 H	215	58.28	31.85
6	4874.00	50.75 PK	74.00	-23.25	1.08 H	176	13.09	37.66
6	4874.00	38.92 AV	54.00	-15.08	1.08 H	176	1.26	37.66
7	7311.00	53.17 PK	74.00	-20.83	1.12 H	328	8.84	44.33
7	7311.00	41.89 AV	54.00	-12.11	1.12 H	328	-2.44	44.33

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1066.00	52.38 PK	74.00	-21.62	1.00 V	251	24.59	27.79
1	1066.00	42.19 AV	54.00	-11.81	1.00 V	251	14.40	27.79
2	1200.00	49.37 PK	74.00	-24.63	1.12 V	274	20.90	28.47
3	1333.00	51.48 PK	74.00	-22.52	1.12 V	264	22.18	29.30
3	1333.00	48.69 AV	54.00	-5.31	1.12 V	264	19.39	29.30
4	2063.00	54.65 PK	74.00	-19.35	1.39 V	15	24.48	30.17
4	2063.00	53.28 AV	54.00	-0.72	1.39 V	15	23.11	30.17
5	*2437.00	112.11 PK			1.00 V	333	80.26	31.85
5	*2437.00	103.67 AV			1.00 V	333	71.82	31.85
6	4874.00	55.79 PK	74.00	-18.21	1.04 V	26	18.13	37.66
6	4874.00	43.13 AV	54.00	-10.87	1.04 V	26	5.47	37.66
7	7311.00	59.48 PK	74.00	-14.52	1.13 V	351	15.16	44.33
7	7311.00	44.47 AV	54.00	-9.53	1.13 V	351	0.15	44.33

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

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 55%RH, 991hPa	TESTED BY	Long Chen

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	1066.00	52.48 PK	74.00	-21.52	1.12 H	242	24.69	27.79
1	1066.00	42.16 AV	54.00	-11.84	1.12 H	242	14.37	27.79
2	1200.00	46.21 PK	74.00	-27.79	1.00 H	254	17.74	28.47
3	1332.00	51.26 PK	74.00	-22.74	1.00 H	305	21.97	29.29
3	1332.00	41.92 AV	54.00	-12.08	1.00 H	305	12.63	29.29
4	2088.00	46.24 PK	74.00	-27.76	1.02 H	262	15.94	30.30
5	*2462.00	94.80 PK			1.01 H	316	62.80	32.00
5	*2462.00	86.20 AV			1.01 H	316	54.20	32.00
6	2483.50	46.43 PK	74.00	-27.57	1.01 H	316	14.30	32.13
7	4924.00	50.17 PK	74.00	-23.83	1.12 H	189	12.43	37.74
7	4924.00	37.89 AV	54.00	-16.11	1.12 H	189	0.15	37.74

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	1066.00	51.82 PK	74.00	-22.18	1.00 V	251	24.03	27.79
1	1066.00	43.61 AV	54.00	-10.39	1.00 V	251	15.82	27.79
2	1200.00	48.95 PK	74.00	-25.05	1.15 V	262	20.48	28.47
3	1332.00	51.16 PK	74.00	-22.84	1.12 V	245	21.87	29.29
3	1332.00	48.21 AV	54.00	-5.79	1.12 V	245	18.92	29.29
4	2088.00	56.52 PK	88.62	-33.00	1.08 V	265	26.22	30.30
4	2088.00	55.90 AV	80.31	-24.41	1.08 V	265	25.60	30.30
5	*2462.00	108.62 PK			1.13 V	235	76.62	32.00
5	*2462.00	100.31 AV			1.13 V	235	68.31	32.00
6	2483.50	60.25 PK	74.00	-13.75	1.13 V	235	28.12	32.13
6	2483.50	51.94 AV	54.00	-2.06	1.13 V	235	19.81	32.13
7	4924.00	54.72 PK	74.00	-19.28	1.31 V	3	16.98	37.74
7	4924.00	40.52 AV	54.00	-13.48	1.31 V	3	2.78	37.74

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

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
SPECTRUM ANALYZER	FSEK 30	100049	Aug. 12, 2005

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

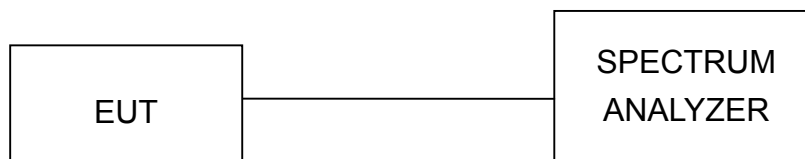
4.3.3 TEST PROCEDURE

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



4.3.6 EUT OPERATING CONDITIONS

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



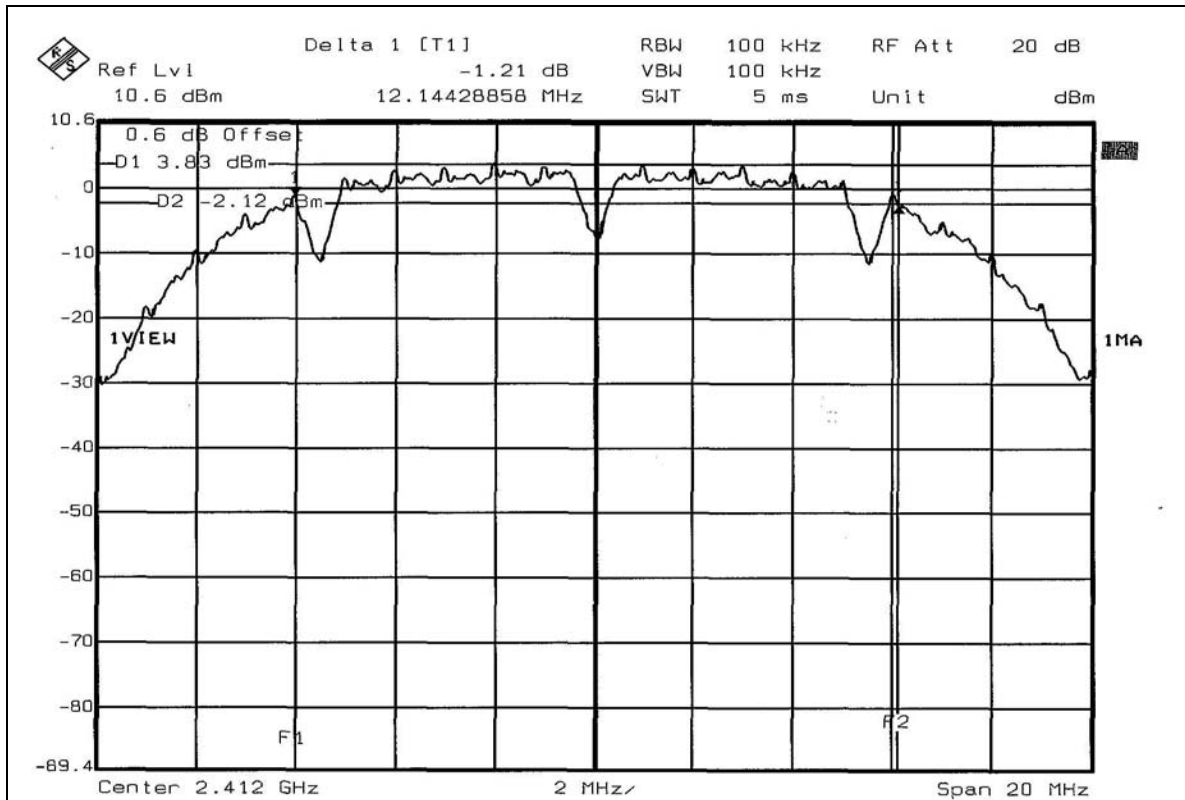
4.3.7 TEST RESULTS

802.11b DSSS modulation

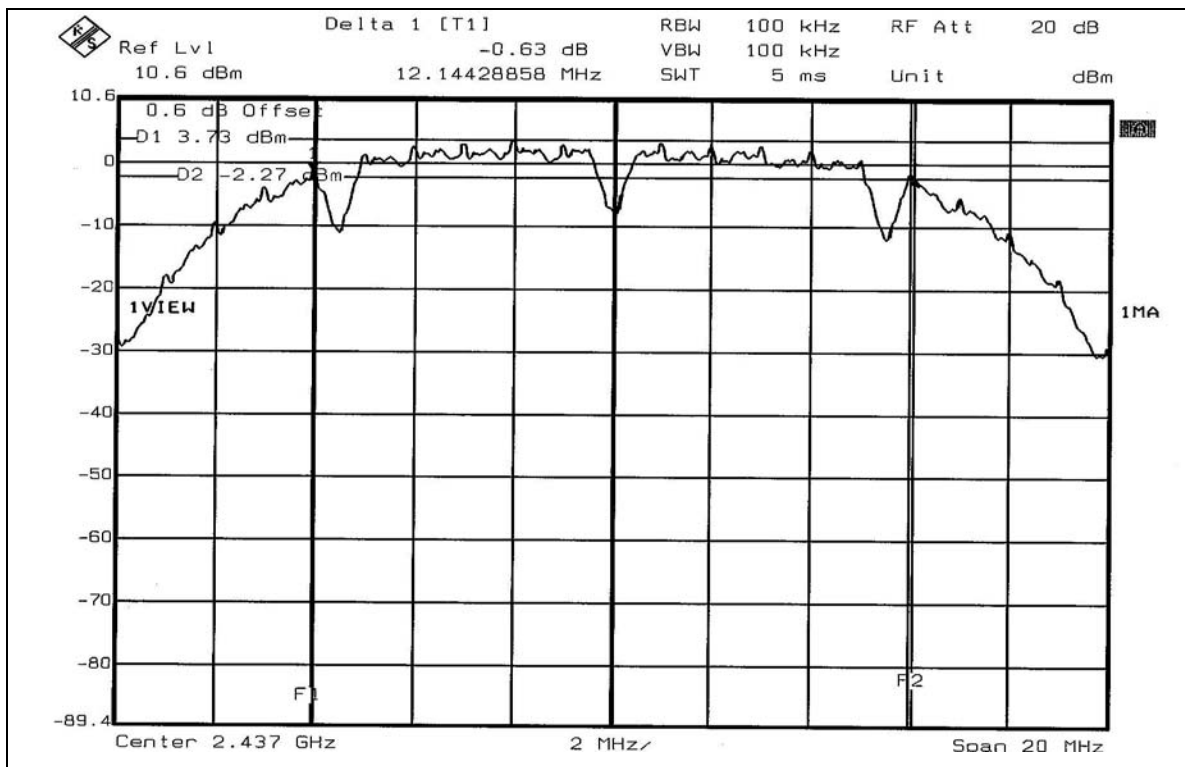
EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg. C, 53%RH, 991hPa
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	12.14	0.5	PASS
6	2437	12.14	0.5	PASS
11	2462	12.14	0.5	PASS

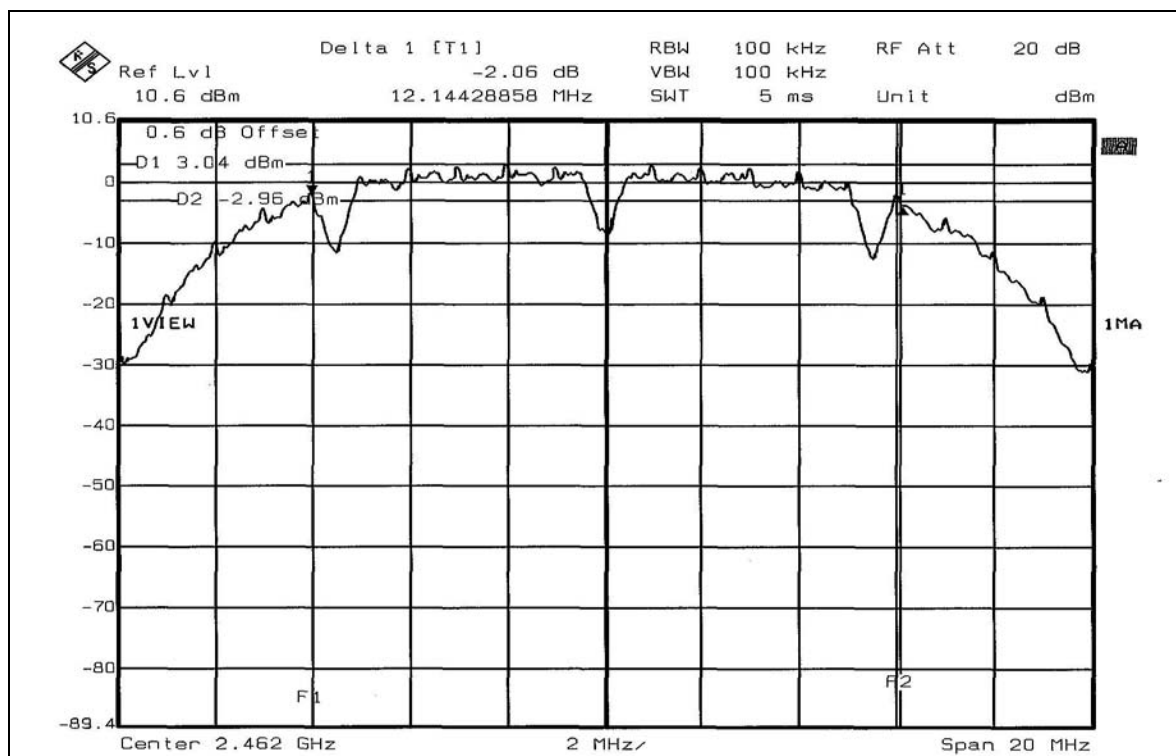
CH1



CH6



CH11



802.11g OFDM modulation

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg. C, 53%RH, 991hPa
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.59	0.5	PASS
6	2437	16.55	0.5	PASS
11	2462	16.55	0.5	PASS

Delta 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -0.59 dB VBW 100 kHz
 10.6 dBm 16.59318637 MHz SWT 5 ms Unit dBm

0.6 dB Offset
 D1 0.6 dBm
 D2 -5.4 dBm

1 IEW 1MA

F1 F2

Center 2.412 GHz 2 MHz/ Span 20 MHz

Delta 1 [T1]

RBW 100 kHz RF Att 20 dB

VBW 100 kHz

SWT 5 ms Unit dBm

Ref Lvl 10.6 dBm

-0.89 dB

16.55310621 MHz

0.6 dB Offset

D1 3.41 dBm

D2 -2.59 dBm

1VIEW

1MA

F1

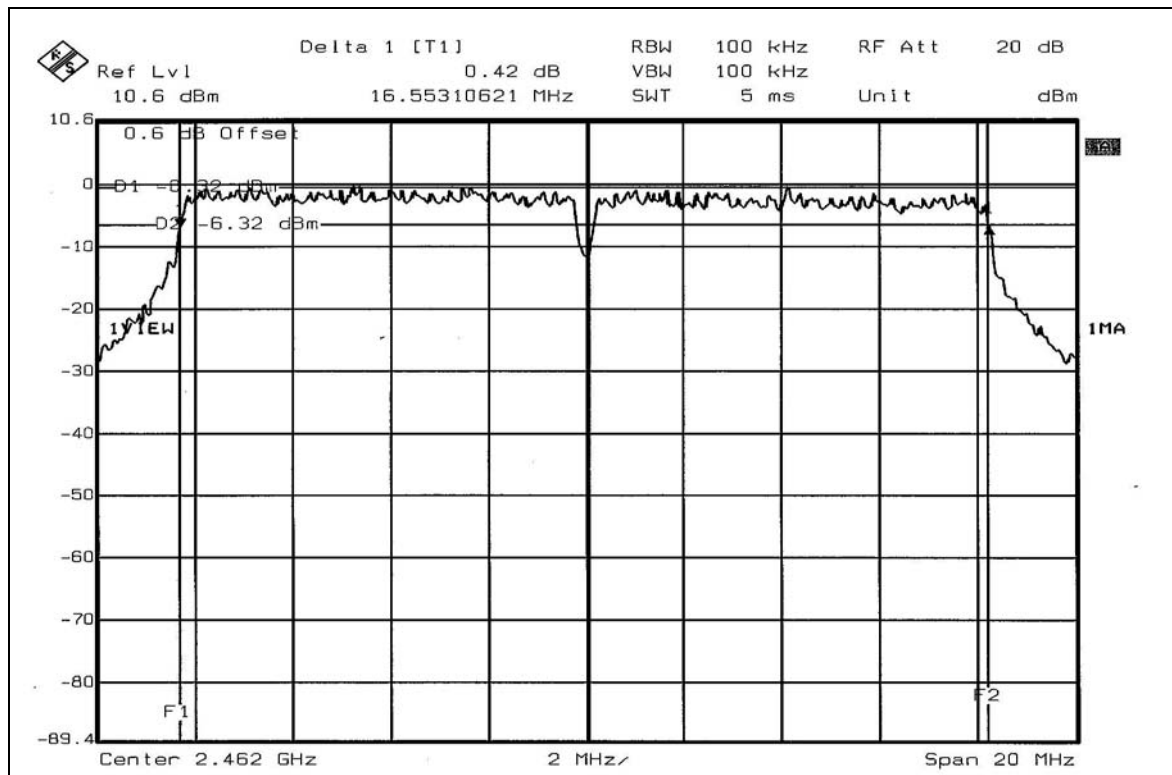
F2

Center 2.437 GHz

2 MHz

Span 20 MHz

CH11



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005
AGILENT SIGNAL GENERATOR	E8257C	MY43320668	Dec. 06, 2005
TEKTRONIX OSCILLOSCOPE	TDS 1012	C019167	Feb. 01, 2006
NARDA DETECTOR	4503A	FSCM99899	NA

NOTE:

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

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4.4.1 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.2 DEVIATION FROM TEST STANDARD

No deviation

4.4.3 TEST SETUP



4.4.4 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.3 TEST RESULTS

802.11b DSSS modulation

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	24deg.C, 53%RH, 991hPa
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	50.350	17.02	30	PASS
6	2437	50.699	17.05	30	PASS
11	2462	40.087	16.03	30	PASS

802.11g OFDM modulation

EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	24deg.C, 64%RH, 991hPa
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	63.387	18.02	30	PASS
6	2437	101.391	20.06	30	PASS
11	2462	50.466	17.03	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

NOTE:

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

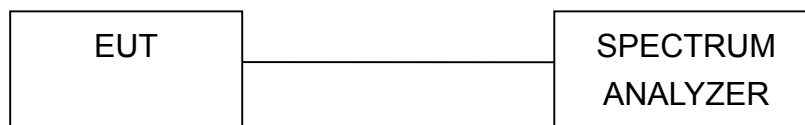
4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

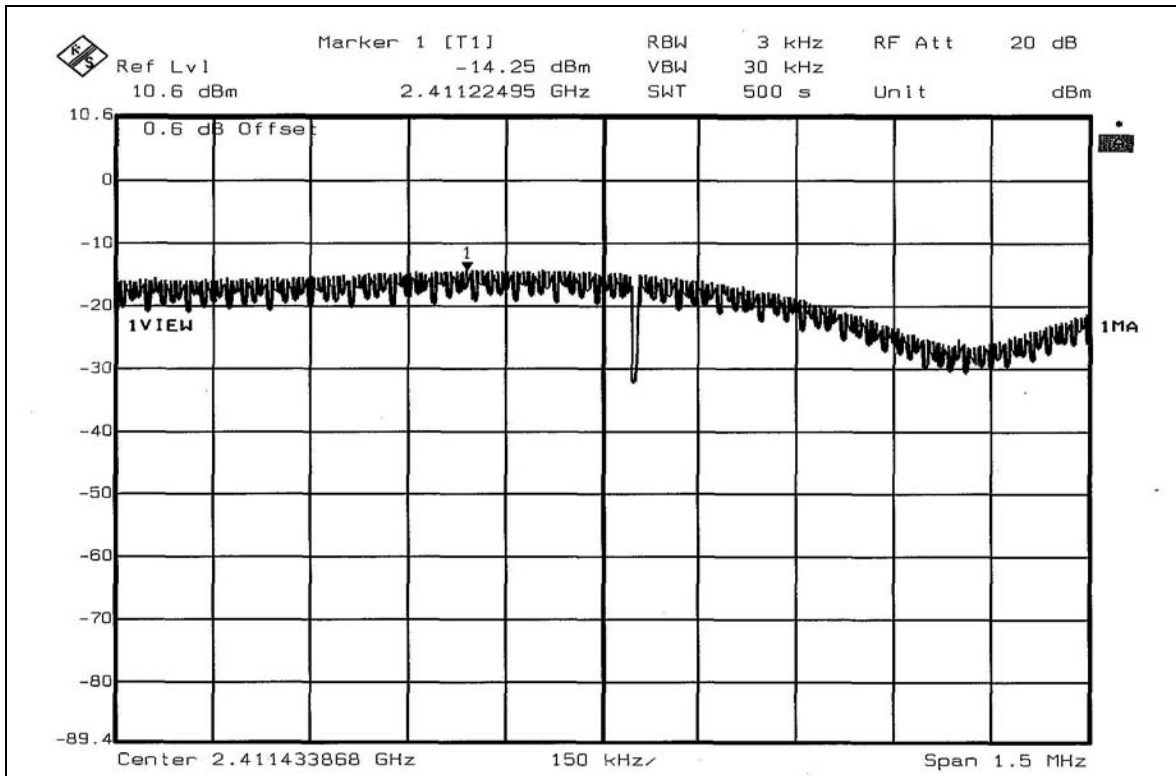
4.5.7 TEST RESULTS

802.11b DSSS modulation

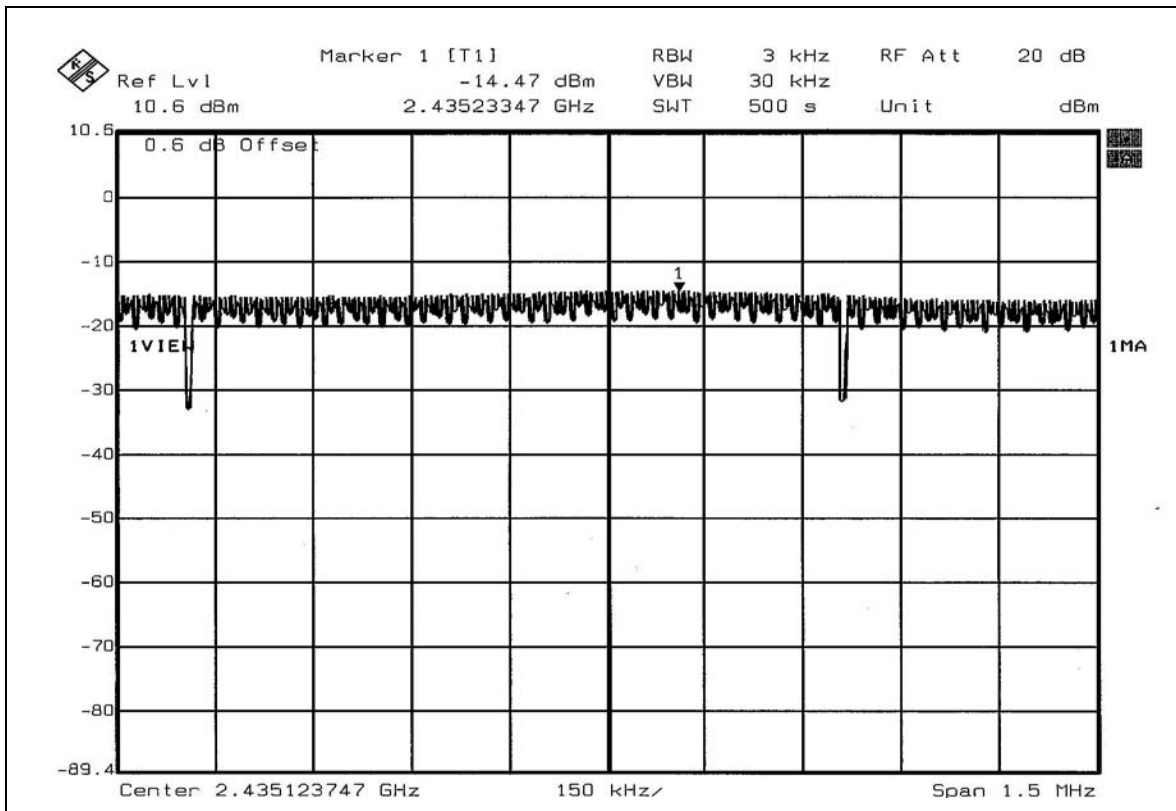
EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	24deg.C, 53%RH, 991hPa
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-14.25	8	PASS
6	2437	-14.47	8	PASS
11	2462	-15.23	8	PASS

CH1

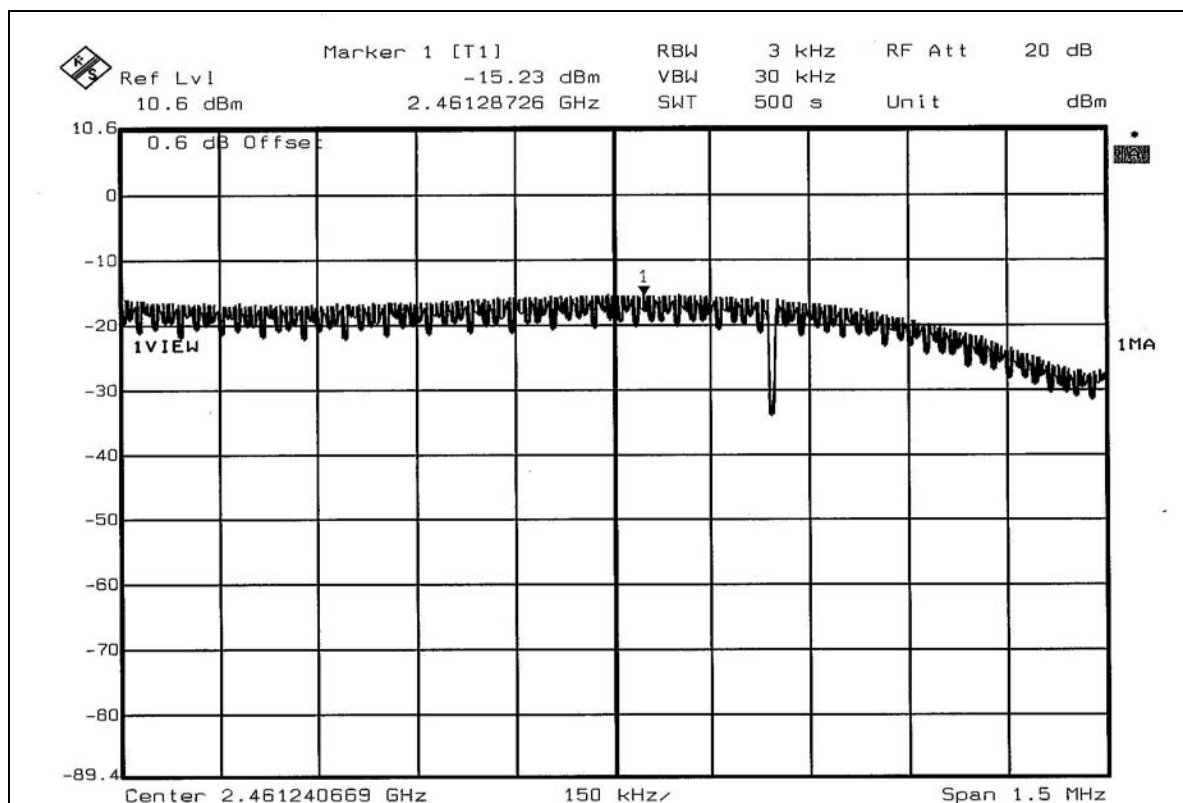


CH6





CH11

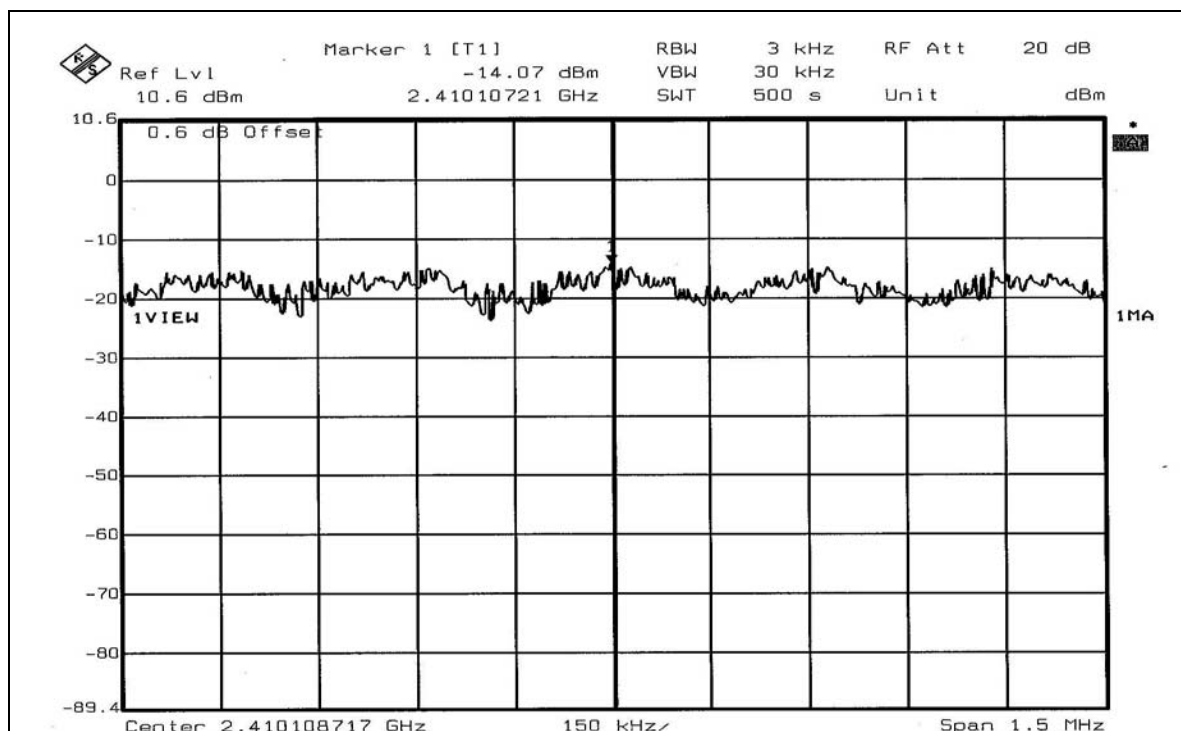


**802.11g OFDM modulation**

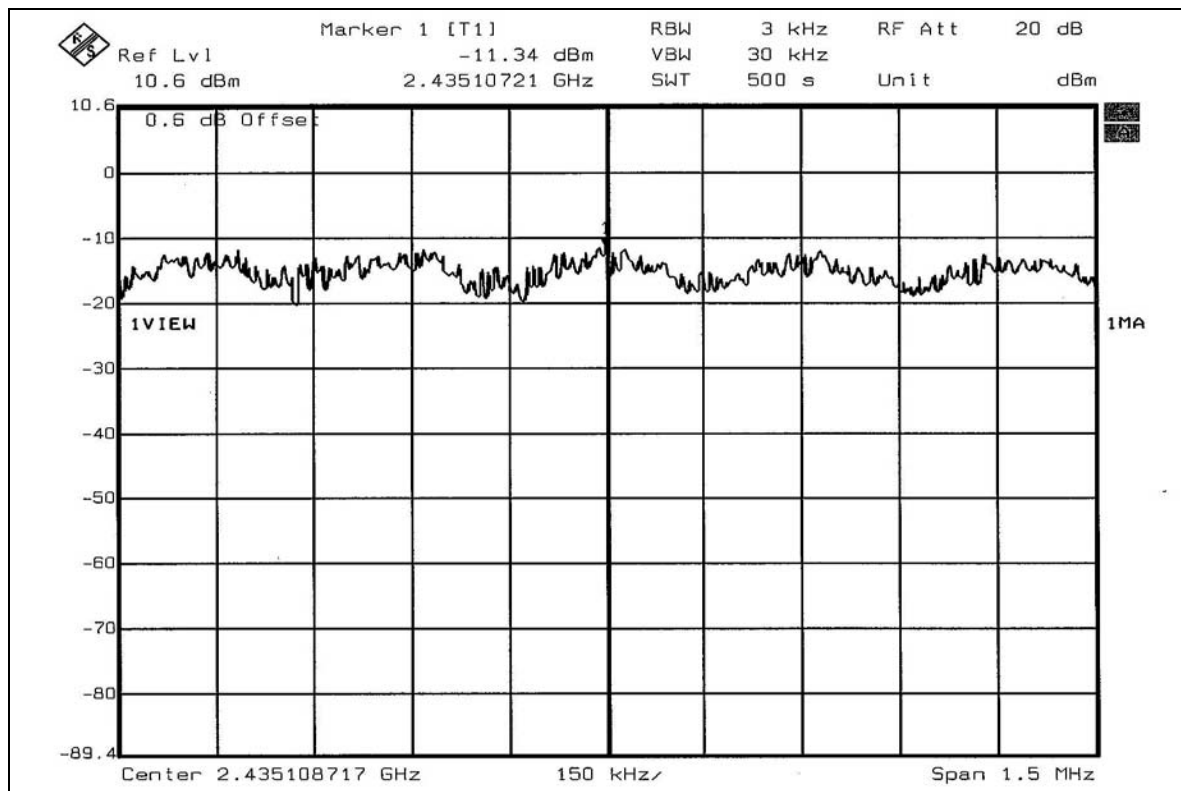
EUT	Wireless-G VPN Broadband Router	MODEL	WRV54G ver. 2
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	24deg.C, 53%RH, 991hPa
TESTED BY	Rush Kao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-14.07	8	PASS
6	2437	-11.34	8	PASS
11	2462	-14.82	8	PASS

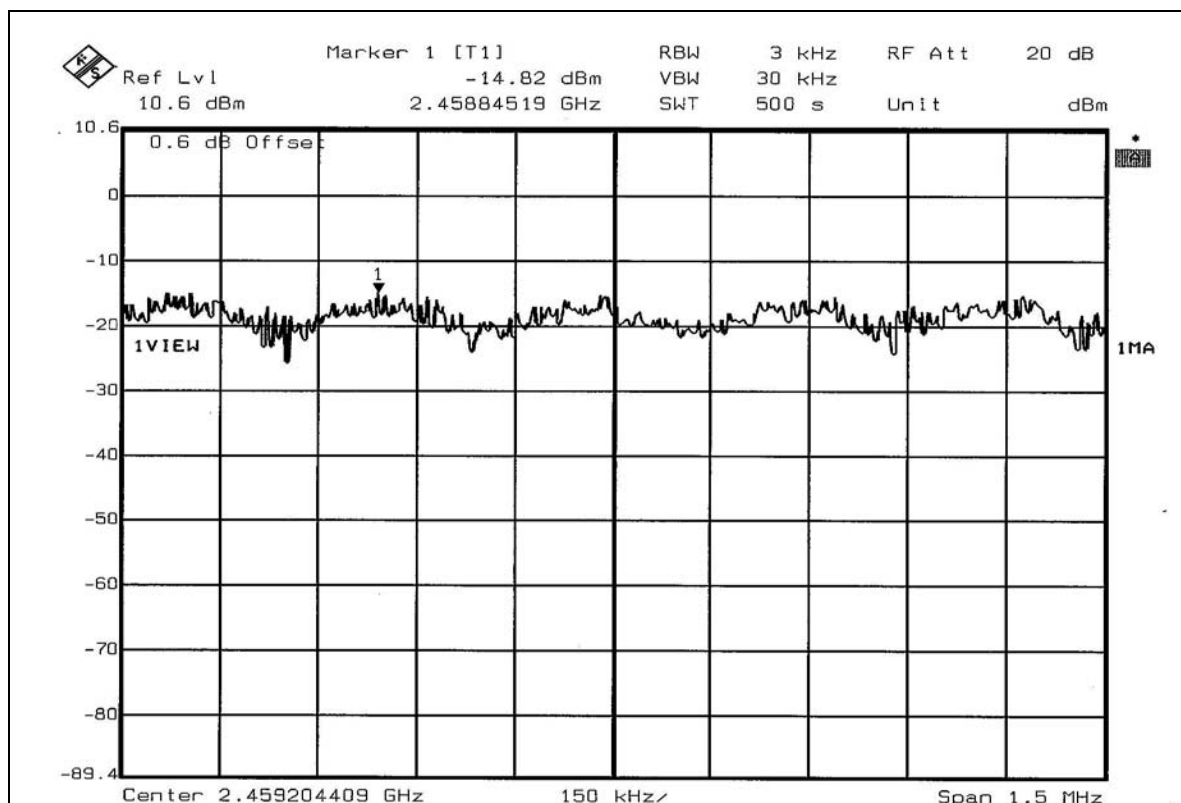
CH1



CH6



CH11



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

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

4.6.3 TEST PROCEDURE

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

The spectrum plots (Peak RBW=VBW=100kHz ; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

The spectrum plots are attached on the following 12 images. D2 line indicates the highest level, and D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

4.6.7 TEST RESULTS

802.11b DSSS modulation

NOTE 1: The band edge emission plot on page 54 show 52.92dBc delta between carrier maximum power and local maximum emission in restrict band (2.3860GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 108.92dBuV/m (Peak), so the maximum field strength in restrict band is $108.92 - 52.92 = 56.00$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on page 54 show 54.84dBc delta between carrier maximum power and local maximum emission in restrict band (2.3862GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 105.50dBuV/m (Average), so the maximum field strength in restrict band is $105.50 - 54.84 = 50.66$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the page 55 show 50.77dBc delta between carrier maximum power and local maximum emission in restrict band (2.4879GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 108.61dBuV/m (Peak), so the maximum field strength in restrict band is $108.61 - 50.77 = 57.84$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the page 56 show 54.83dBc delta between carrier maximum power and local maximum emission in restrict band (2.4879GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 105.04dBuV/m (Average), so the maximum field strength in restrict band is $105.04 - 54.83 = 50.21$ dBuV/m which is under 54dBuV/m limit.

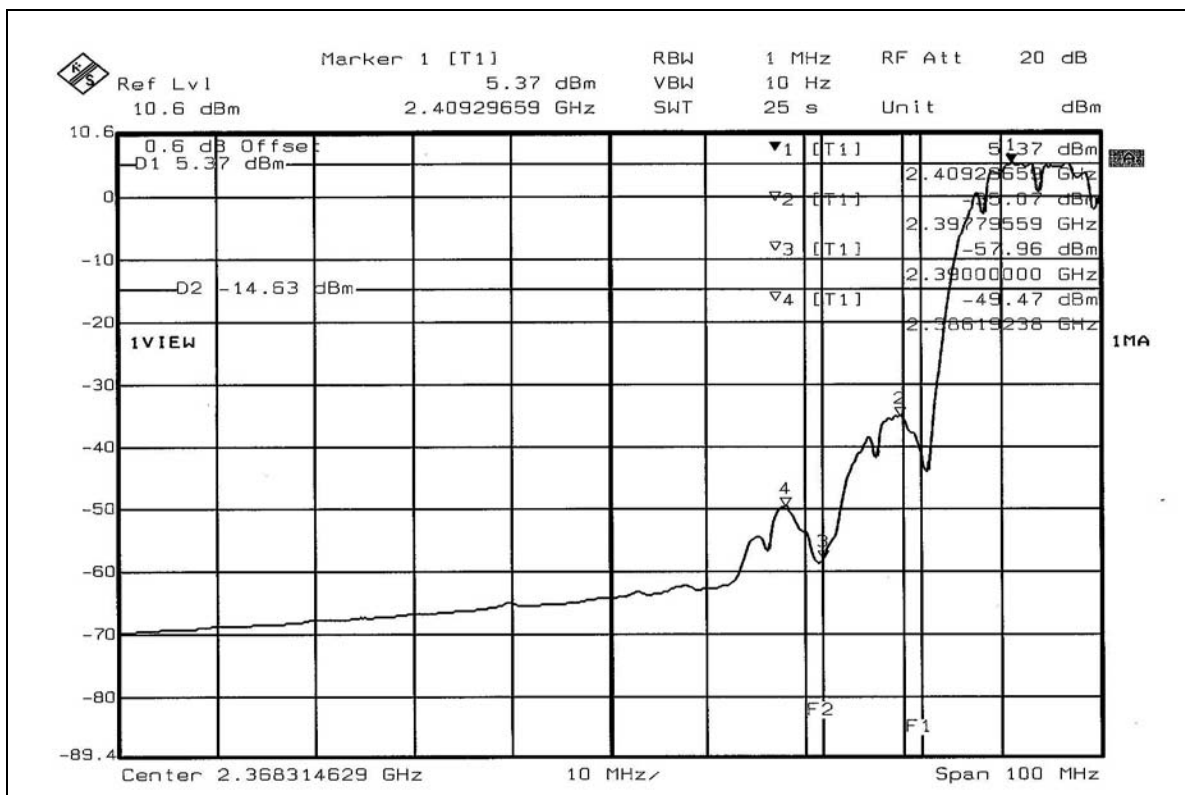
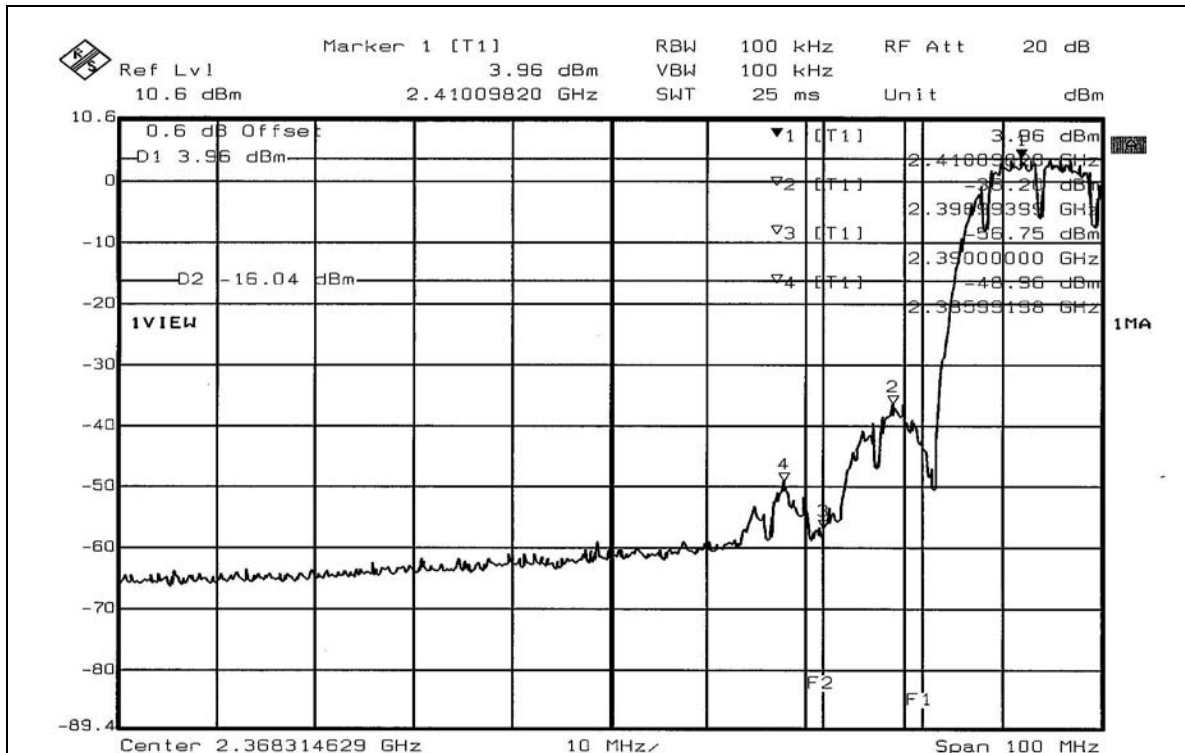
**802.11g OFDM modulation**

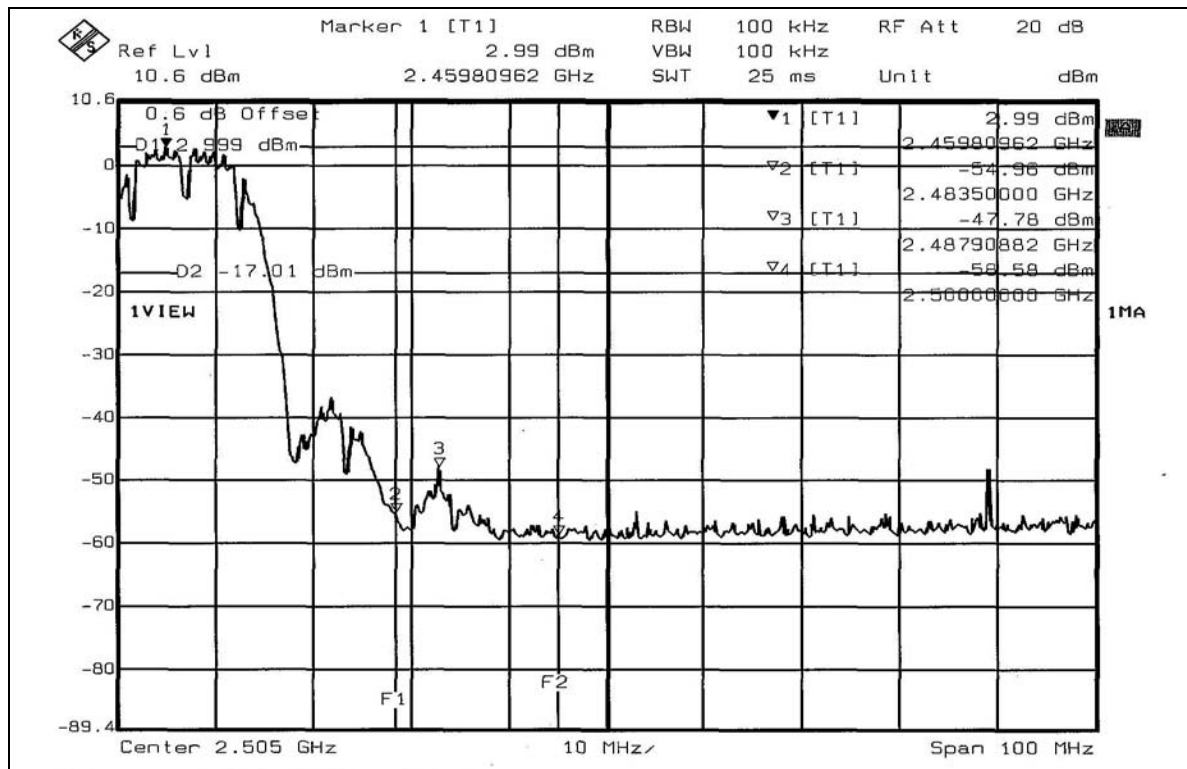
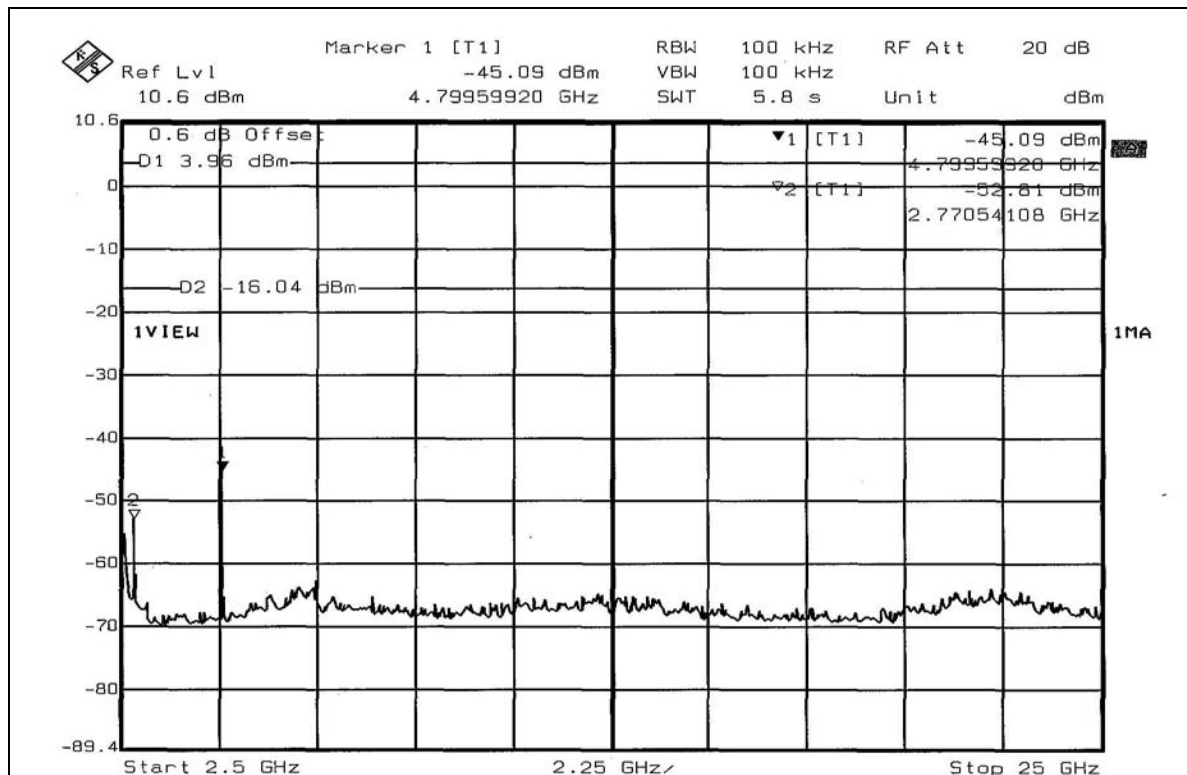
NOTE 1: The band edge emission plot on page 57 show 46.78dBc delta between carrier maximum power and local maximum emission in restrict band (2.3892GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 110.49dBuV/m (Peak), so the maximum field strength in restrict band is $110.49 - 46.78 = 63.71$ dBuV/m which is under 74dBuV/m limit.

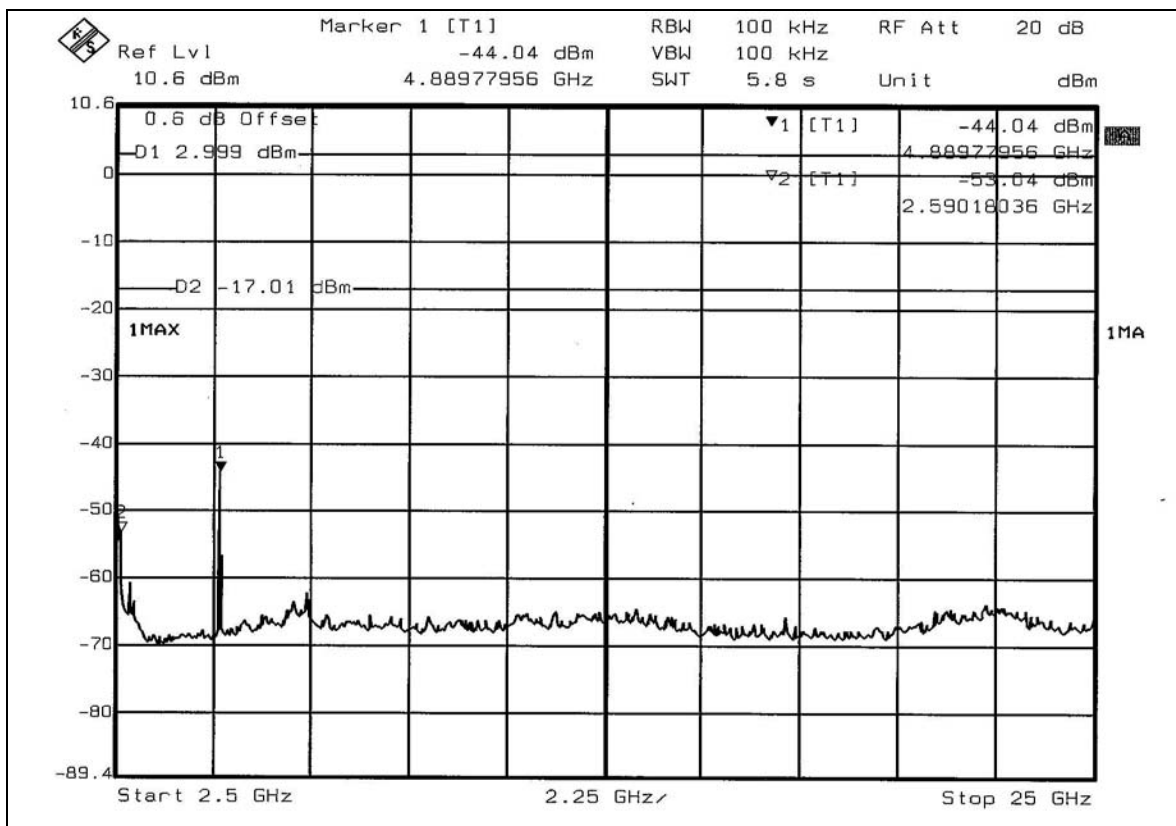
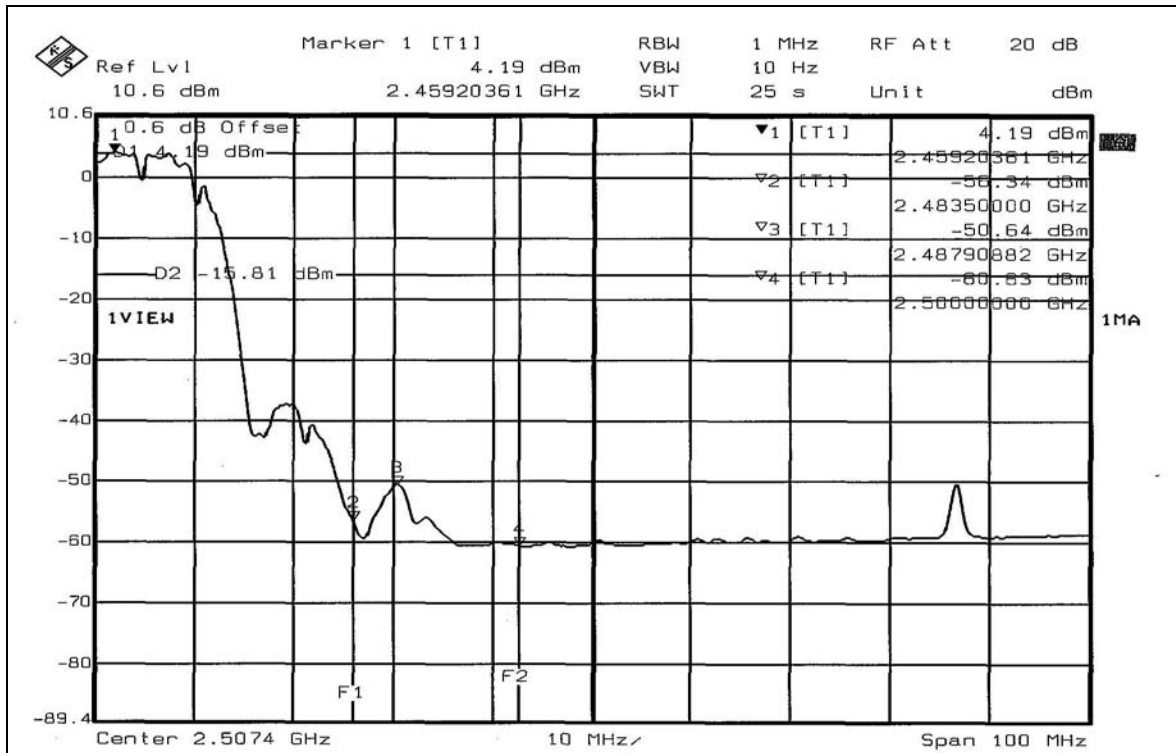
The band edge emission plot on page 57 show 50.10dBc delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 101.79dBuV/m (Average), so the maximum field strength in restrict band is $101.79 - 50.10 = 51.69$ dBuV/m which is under 54dBuV/m limit.

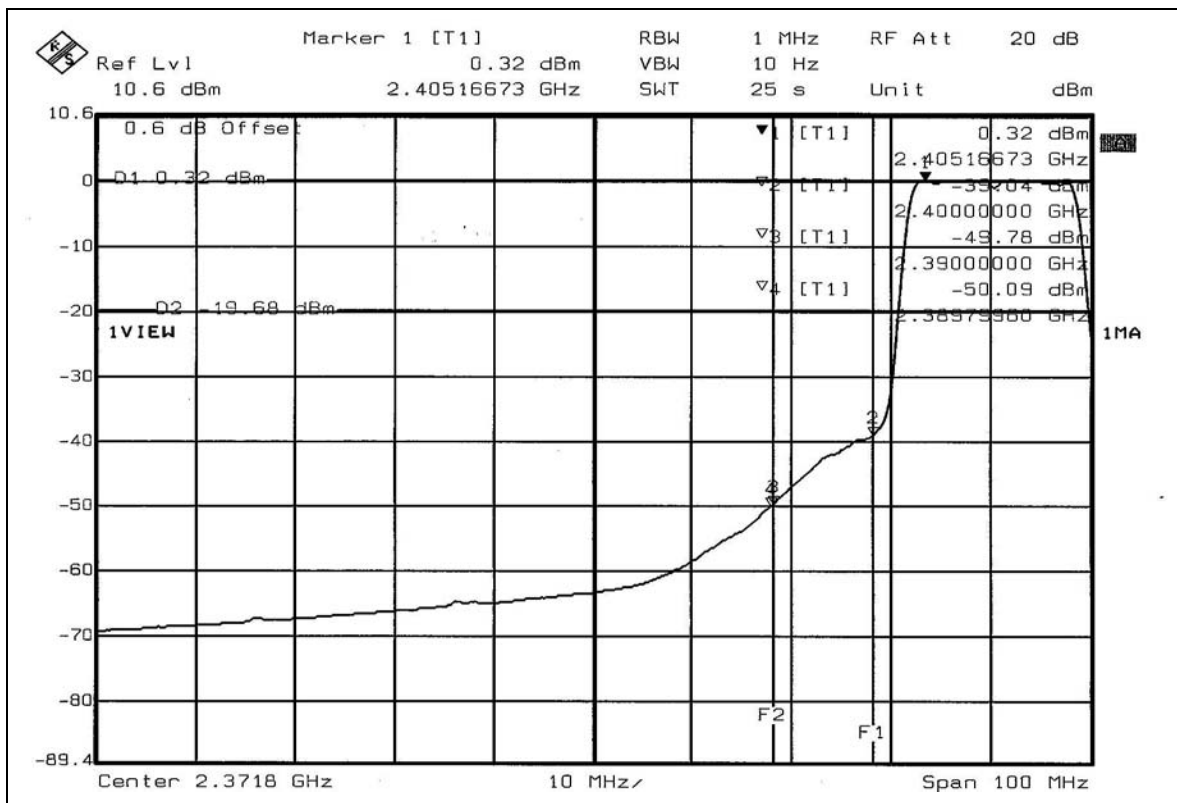
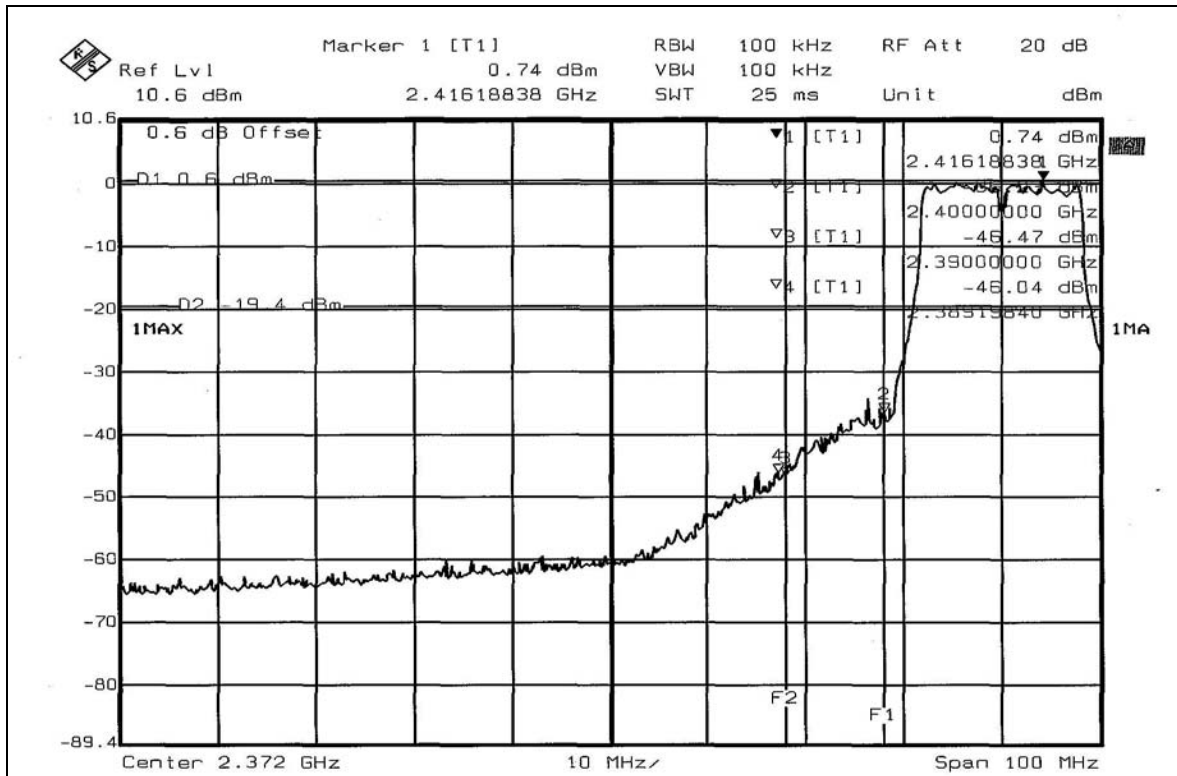
NOTE 2: The band edge emission plot on page 58 show 45.16dBc delta between carrier maximum power and local maximum emission in restrict band (2.4845GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 108.62dBuV/m (Peak), so the maximum field strength in restrict band is $108.62 - 45.16 = 63.46$ dBuV/m which is under 74dBuV/m limit.

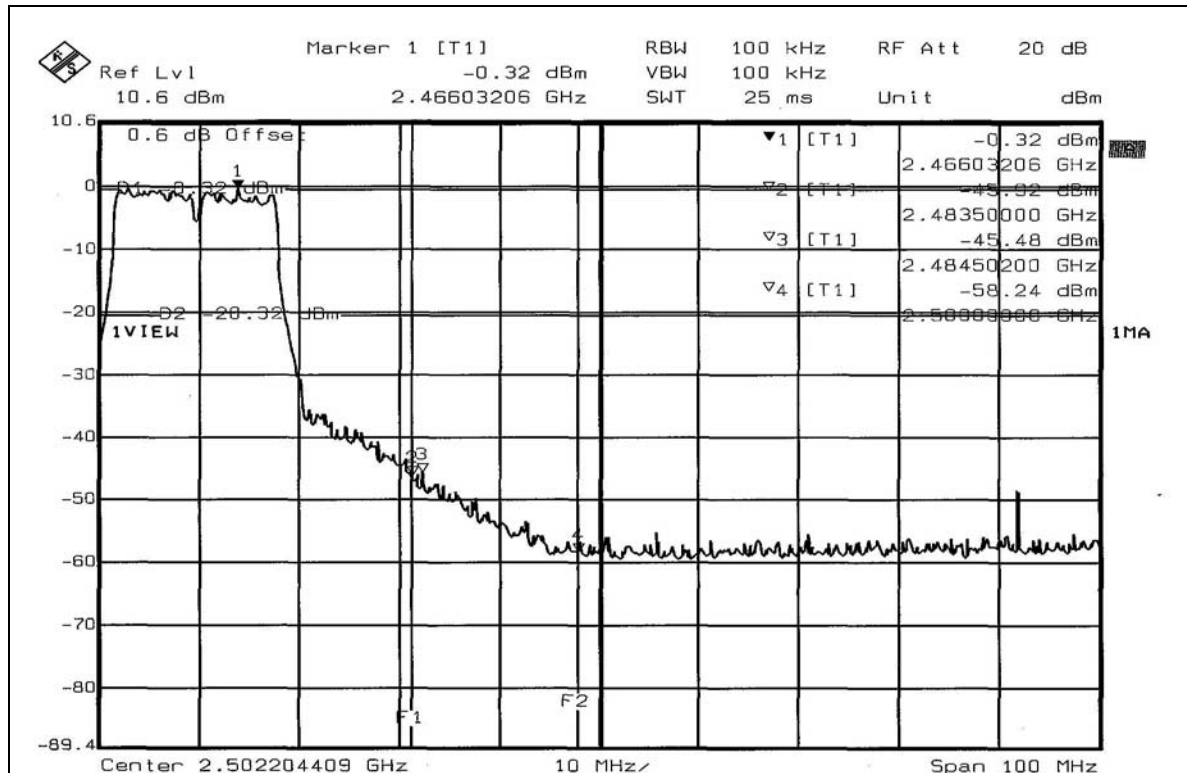
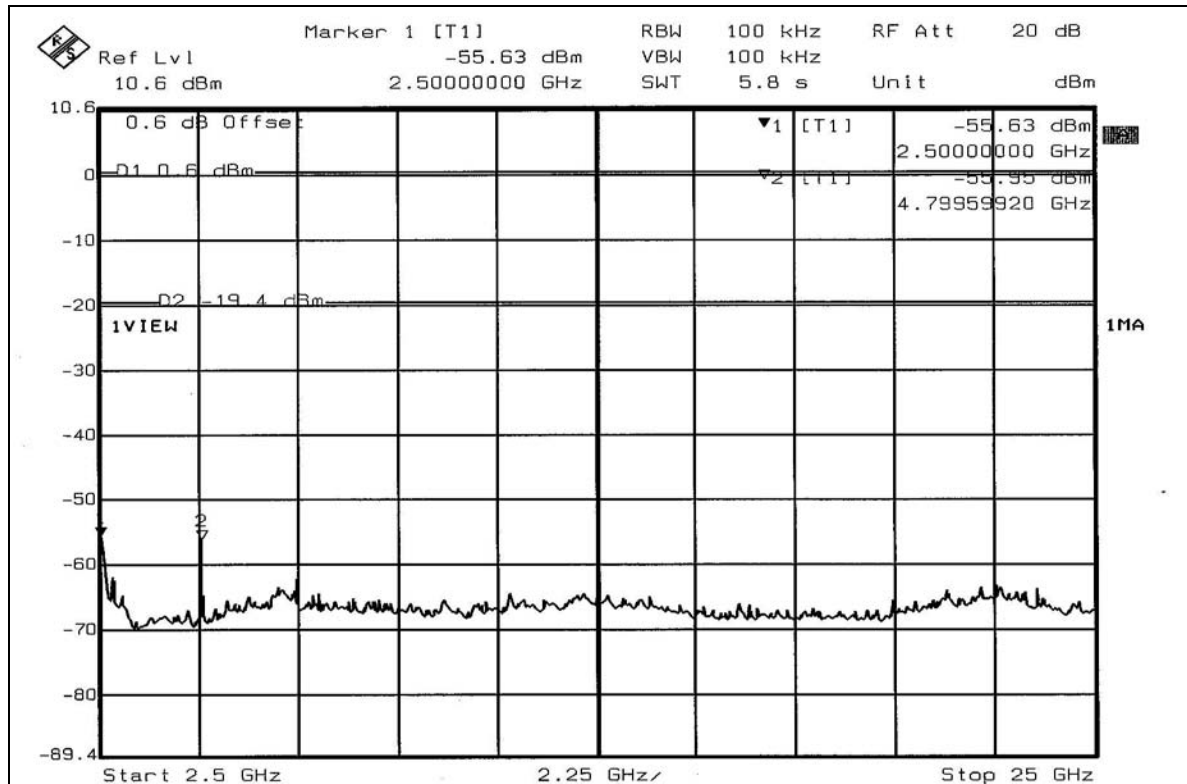
The band edge emission plot on page 59 show 48.65dBc delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 100.31dBuV/m (Average), so the maximum field strength in restrict band is $100.31 - 48.65 = 51.66$ dBuV/m which is under 54dBuV/m limit.

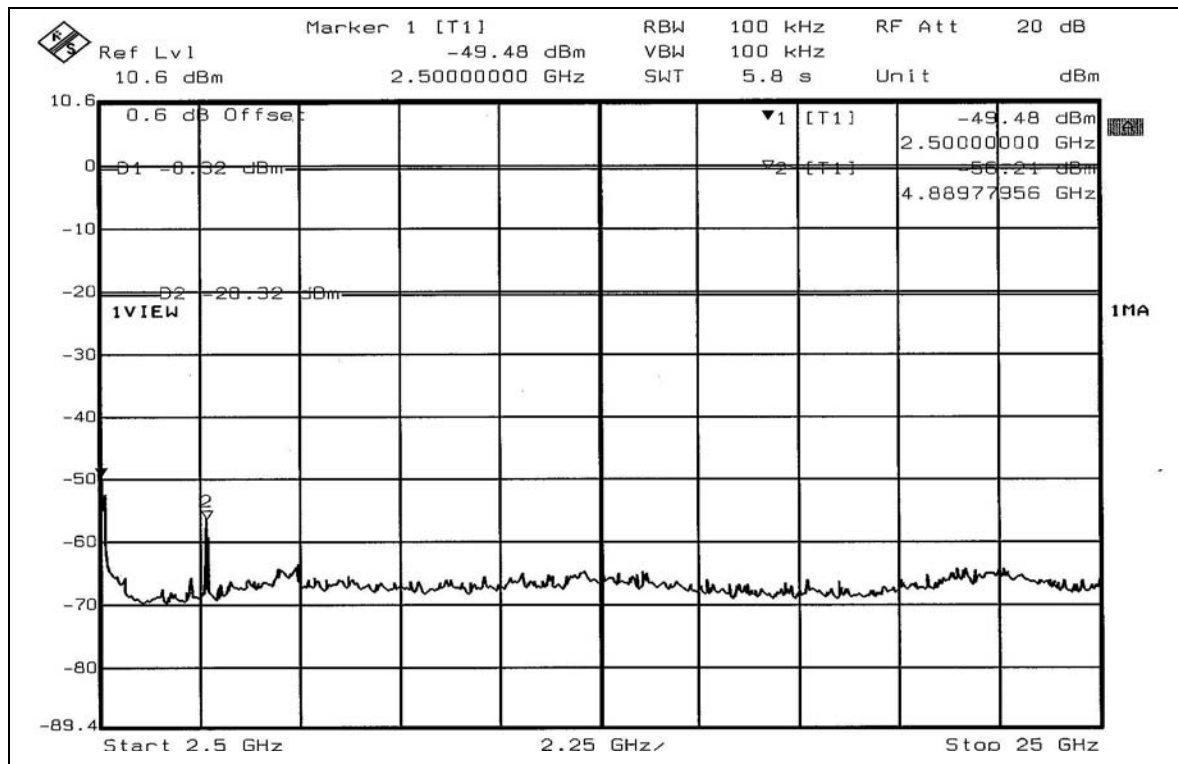
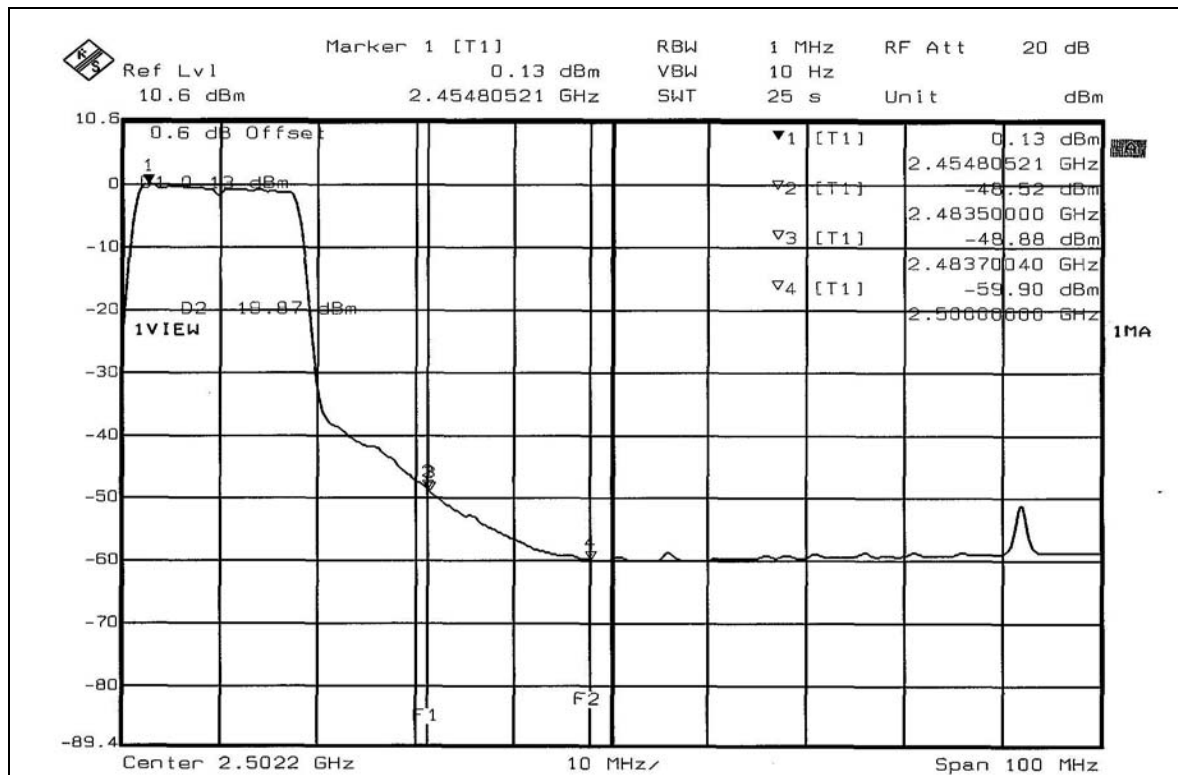
802.11b DSSS modulation





802.11g OFDM modulation







4.7 ANTENNA REQUIREMENT

4.7.1 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.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

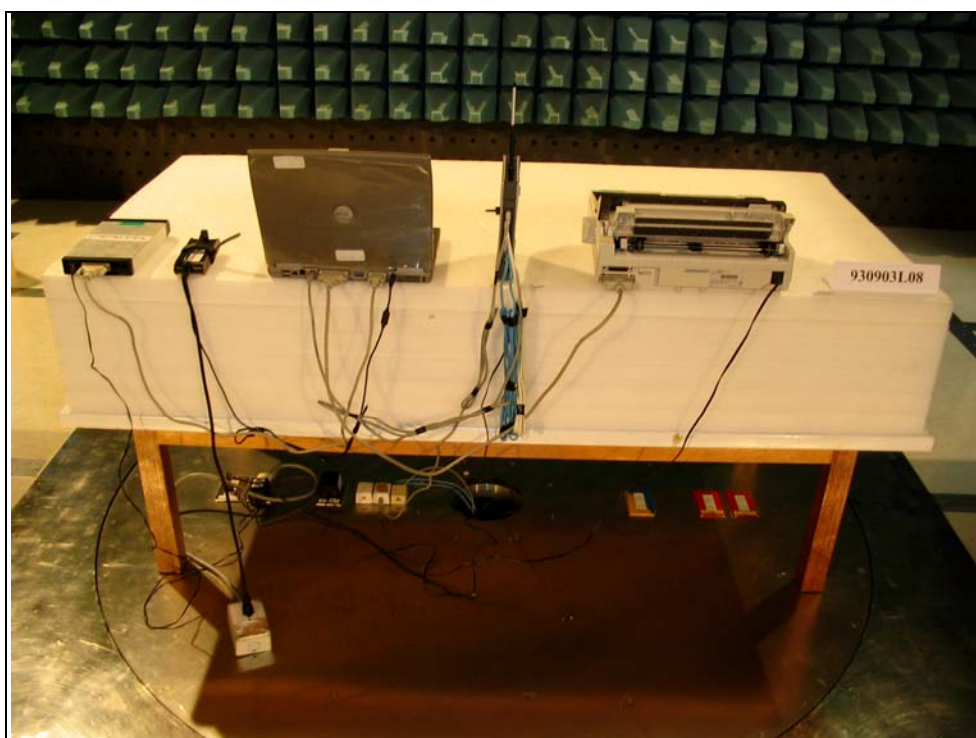
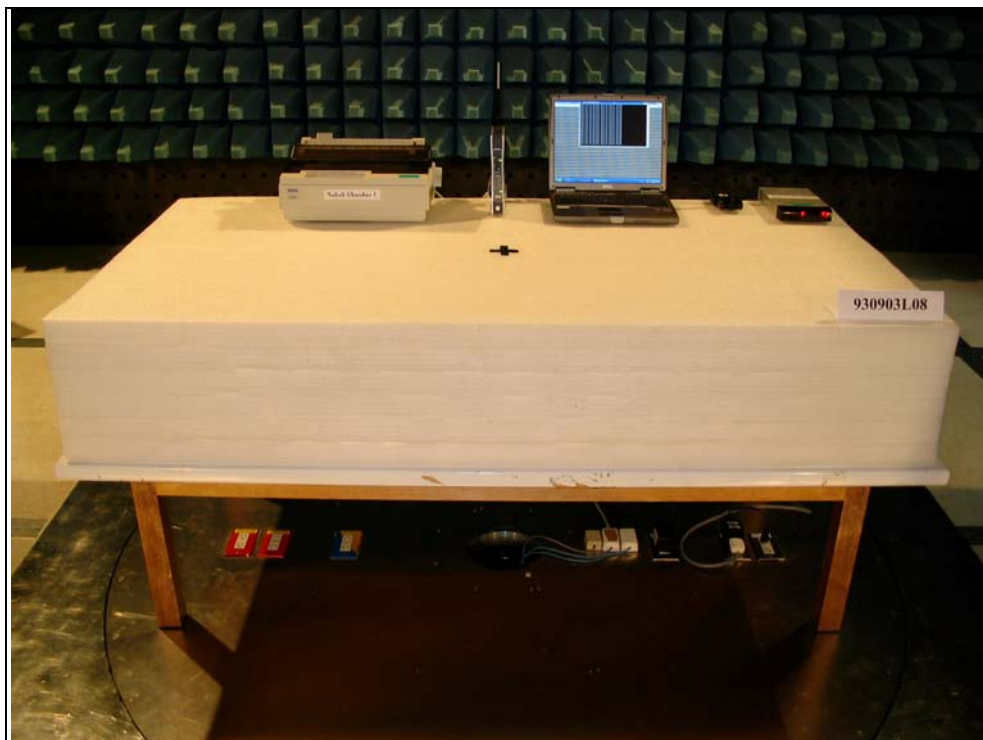
The antenna used in this product is Dipole antenna with Reversed SMA antenna connector. The maximum Gain of the antenna is 3dBi.

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



RADIATED EMISSION TEST



6. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, NVLAP, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

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Tel: 886-2-26052180

Fax: 886-2-26052943

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The address and road map of all our labs can be found in our web site also