FCC TEST REPORT

REPORT NO.: RF921226R04
MODEL NO.: WRT54AG
RECEIVED: Dec. 19, 2003
TESTED: Dec. 22, 2003 ~ Jan. 9, 2004

APPLICANT: Cisco-Linksys, LLC

ADDRESS: 17401 Armstrong Ave., Irvine, CA 92614

ISSUED BY: Advance Data Technology Corporation

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

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1. CERTIFICATION

PRODUCT : Wireless A/G Broadband Router
BRAND NAME : Linksys
MODEL NO. : WRT54AG
TEST ITEM : ENGINEERING SAMPLE
APPLICANT : Cisco-Linksys, LLC
STANDARDS : FCC 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 Dec. 22, 2003 ~ Jan. 9, 2004. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

PREPARED BY: _____ , **DATE:** Jan. 13, 2004
Rita Yi

APPROVED BY: _____ , **DATE:** Jan. 13, 2004
Ellis Wu, 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 –16.21dB at 0.420MHz
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 –1.11dB at 2483.50MHz
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

NOTE: The information of measurement uncertainty is available upon the customer's request.

APPLIED STANDARD: FCC 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 –16.29dB at 0.416MHz
15.407(b/1/2/3)(b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit Minimum passing margin is –2.37dB at 280.76MHz
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

NOTE: The information of measurement uncertainty is available upon the customer's request.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless A/G Broadband Router
MODEL NO.	WRT54AG
POWER SUPPLY	5Vdc from power adapter
MODULATION TYPE	BPSK, QPSK, CCK,16QAM, 64QAM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	54/48/36/24/18/12/11/9/6/5.5/2/1Mbps
FREQUENCY RANGE	802.11b and 802.11g: 2412~2462MHz 802.11a: 5.15~5.35GHz
NUMBER OF CHANNEL	802.11b and 802.11g: 11 802.11a: 8
CHANNEL SPACING	802.11b and 802.11g: 5MHz 802.11a: 20MHz
OUTPUT POWER	802.11b and 802.11g: 13.6dBm 802.11a: 13.54dBm
ANTENNA TYPE	Dipole antenna
DATA CABLE	Unshielded Twisted Pair, UTP, Cable
I/O PORTS	RJ45
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT was powered by the following adapter:

BRAND :	Linksys
MODEL :	MS15-050250-A1D
INPUT :	100-240Vac, 50/60Hz, 0.5A
OUTPUT :	5Vdc / 2.5A

2. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11g technology.
3. IEEE 802.11a, 802.11b, and draft 802.11g compliant.
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 and 802.11g: Eleven channels are provided to this EUT.

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

NOTE:

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

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

Channel	Frequency	Channel	Frequency
1	5180 MHz	5	5260 MHz
2	5200 MHz	6	5280 MHz
3	5220 MHz	7	5300 MHz
4	5240 MHz	8	5320 MHz

NOTE:

1. The EUT was tested in normal mode (channel bandwidth of approximately 30MHz).
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 at 6Mbps.
3. Channel 1, 4, 5, and 8 are the closest frequencies to the band edge, were chosen for final test of Normal Mode.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless A/G 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),
Subpart E (15.407)
ANSI C63.4-1992

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

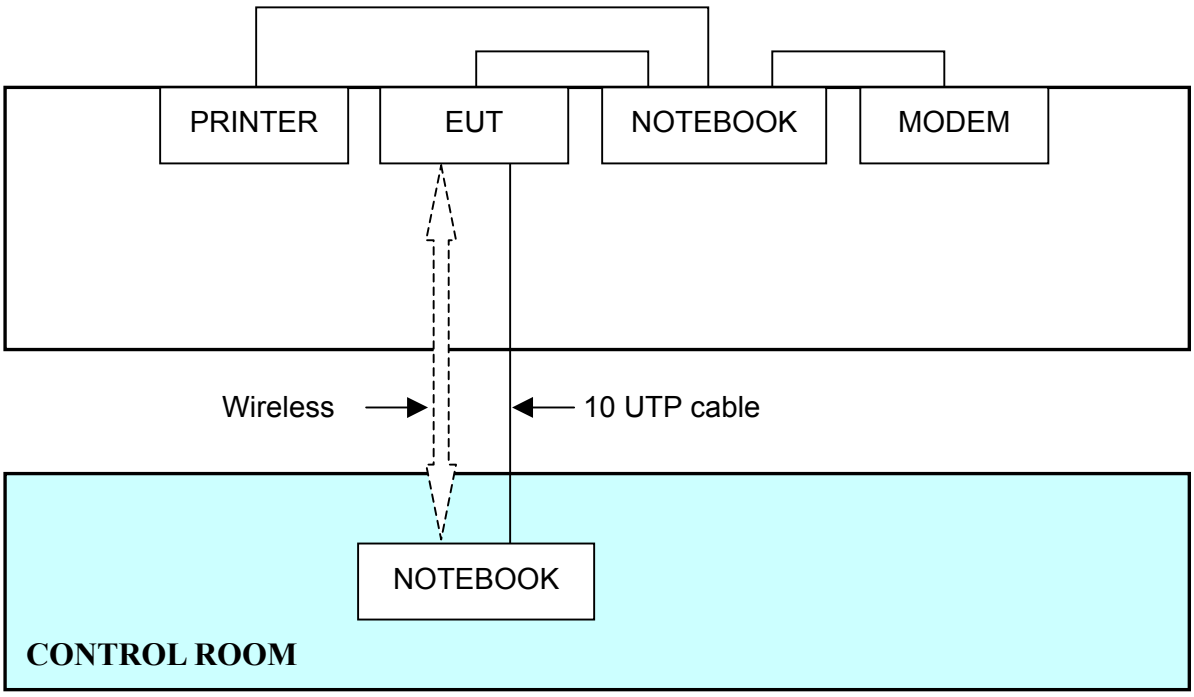
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	DELL	C600	N/A	FCC DoC Approved
2	PRINTER	EPSON	LQ-300+	DCGY017096	FCC DoC Approved
3	MODEM	ACEEX	1414	980020503	IFAXDM1414
4	NOTEBOOK	Compaq	N800C	470048-515	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
4	N/A

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Jan. 20, 2004
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100218	Dec. 09, 2004
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100219	Dec. 09, 2004
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100220	Dec. 09, 2004
*ROHDE & SCHWARZ 4-wire ISN	ENY41	837032/016	Nov. 19, 2004
*ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Nov. 19, 2004
Software	Cond-V2M3	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	May 01, 2004
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010770	Mar. 24, 2004
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Apr. 06, 2004

NOTE:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. "*": These equipment are used for conducted telecom port test only (if tested).
3. The test was performed in ADT Shielded Room No. 10.
4. The VCCI Site Registration No. is C-1312.

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

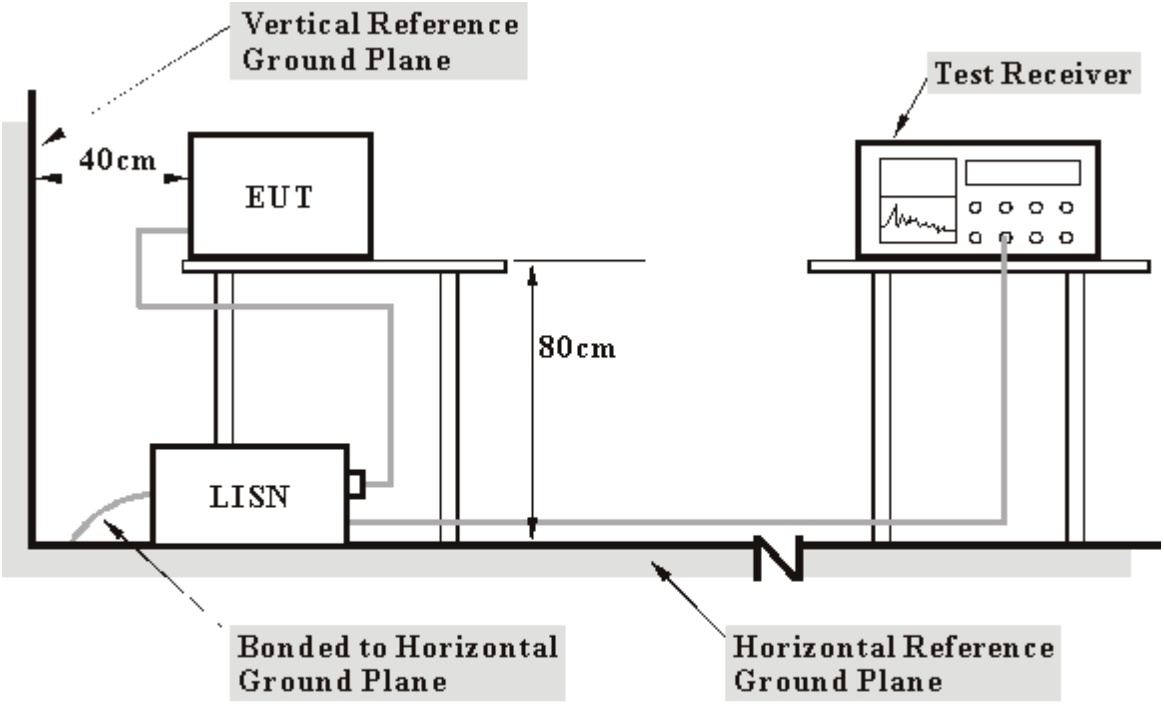
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz was searched. Emission levels 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

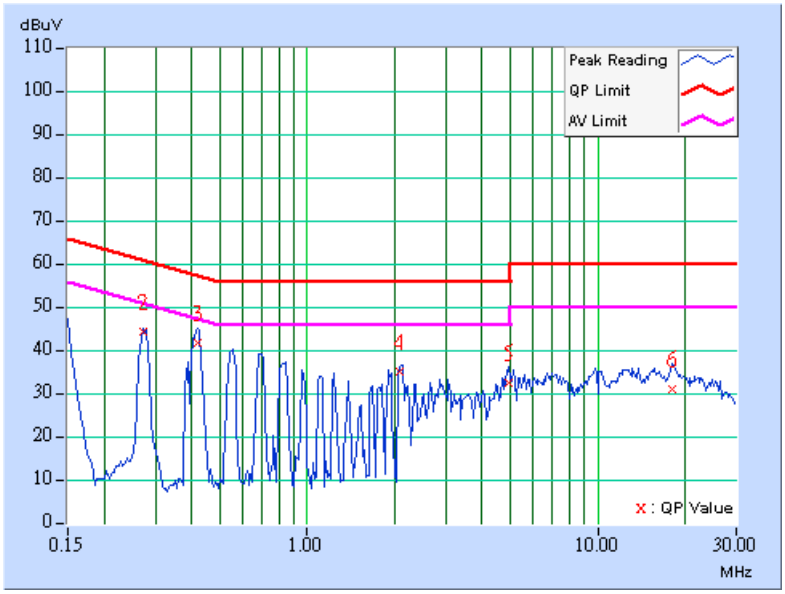
a. Placed the EUT on the testing table.
b. The computer system sent data to EUT by command "PING" via RJ45 cable.
c. The computer system displayed "H" patterns on its screen.
d. The computer system sent “H” messages to modem.
e. The computer system sent "H" messages to the printer, and the printer prints them on paper.
f. Prepared another computer system to act as a communication partner and placed it outside of testing area.
g. The communication partner ran a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via RJ45 cable and wireless.
h. The communication partner sent data to EUT by command "PING".
i. Repeat steps b~i.

4.1.7 TEST RESULTS

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	1	**6dB BANDWIDTH**	9kHz
MODULATION	OFDM	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	20deg.C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.138	0.10	44.28	55.75	44.38	55.85	-	-	-	-
2	0.274	0.10	43.60	-	43.70	-	61.01	51.01	-17.31	-
3	**0.420**	**0.10**	**41.14**	**-**	**41.24**	**-**	**57.46**	**47.46**	**-16.21**	**-**
4	2.080	0.20	34.49	-	34.69	-	56.00	46.00	-21.31	-
5	4.914	0.35	31.66	-	32.01	-	56.00	46.00	-23.99	-
6	18.023	0.86	30.26	-	31.12	-	60.00	50.00	-28.88	-

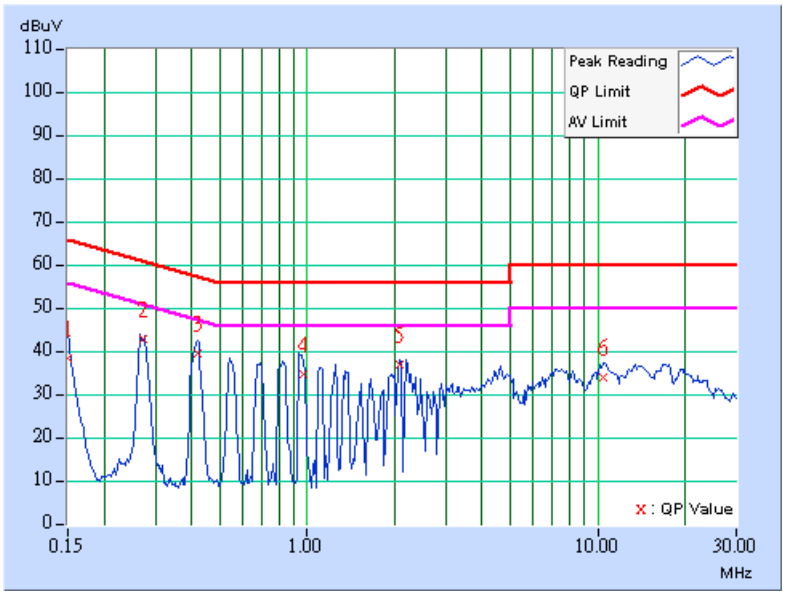
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	1	**6dB BANDWIDTH**	9kHz
MODULATION	OFDM	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	20deg.C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	38.12	-	38.22	-	66.00	56.00	-27.78	-
2	0.274	0.10	42.48	-	42.58	-	61.01	51.01	-18.43	-
3	0.420	0.10	39.03	-	39.13	-	57.46	47.46	-18.32	-
4	0.969	0.19	34.34	-	34.53	-	56.00	46.00	-21.47	-
5	2.090	0.20	36.54	-	36.74	-	56.00	46.00	-19.26	-
6	10.473	0.52	33.66	-	34.18	-	60.00	50.00	-25.82	-

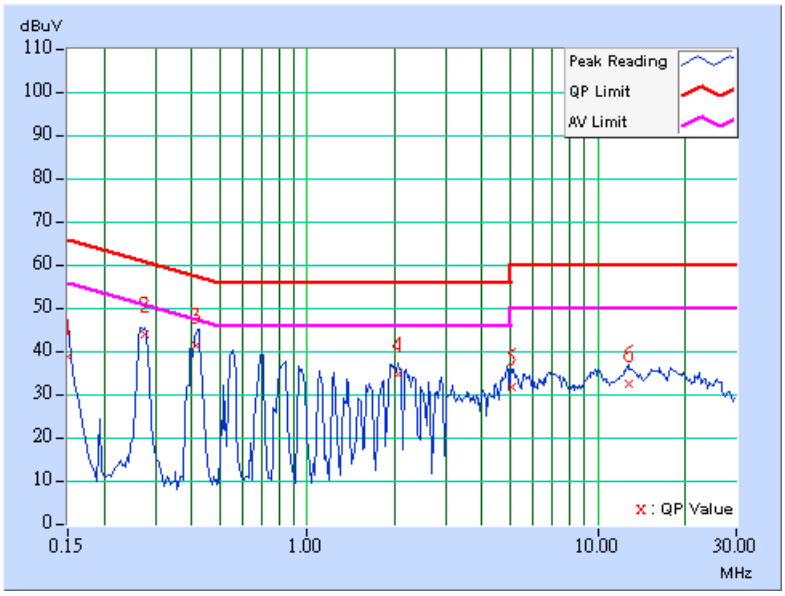
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	6	**6dB BANDWIDTH**	9kHz
MODULATION	OFDM	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	20deg.C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	38.20	-	38.30	-	66.00	56.00	-27.70	-
2	0.276	0.10	43.47	-	43.57	-	60.93	50.93	-17.36	-
3	0.417	0.10	40.93	-	41.03	-	57.51	47.51	-16.48	-
4	2.063	0.20	34.14	-	34.34	-	56.00	46.00	-21.66	-
5	5.055	0.35	31.32	-	31.67	-	60.00	50.00	-28.33	-
6	12.809	0.71	31.70	-	32.41	-	60.00	50.00	-27.59	-

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 A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	6	**6dB BANDWIDTH**	9kHz
MODULATION	OFDM	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	20deg.C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	36.11	-	36.21	-	66.00	56.00	-29.79	-
2	0.270	0.10	42.09	-	42.19	-	61.12	51.12	-18.93	-
3	0.420	0.10	36.96	-	37.06	-	57.46	47.46	-20.39	-
4	0.955	0.19	36.75	-	36.94	-	56.00	46.00	-19.06	-
5	2.195	0.21	35.54	-	35.75	-	56.00	46.00	-20.25	-
6	10.531	0.52	33.62	-	34.14	-	60.00	50.00	-25.86	-

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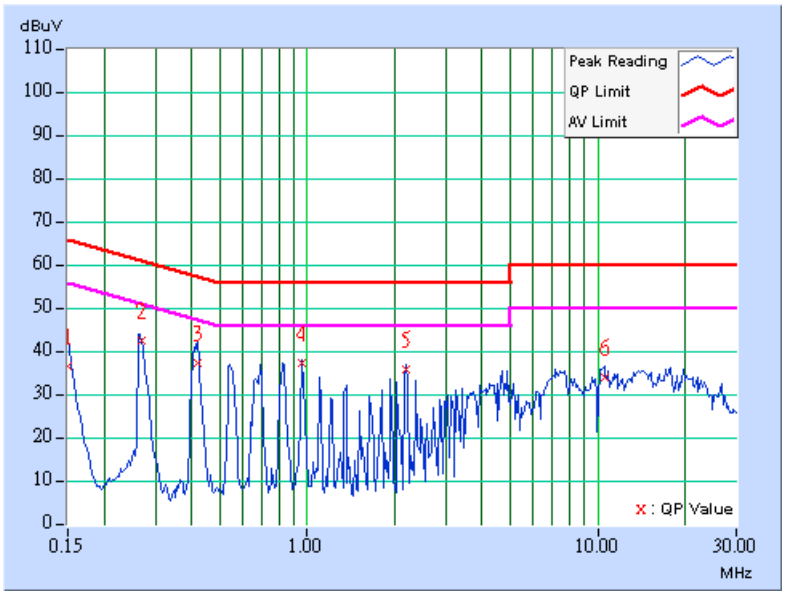
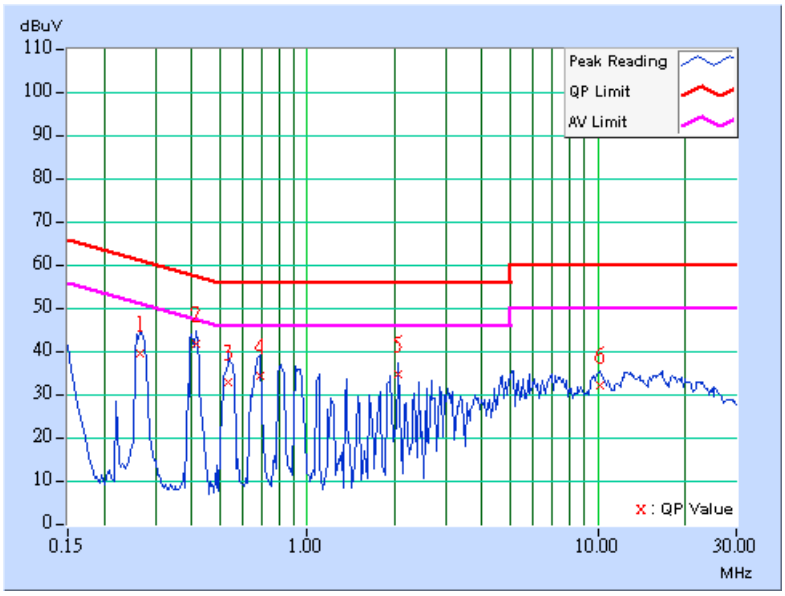
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	11	**6dB BANDWIDTH**	9kHz
MODULATION	OFDM	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	20deg.C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.267	0.10	38.96	-	39.06	-	61.20	51.20	-22.14	-
2	0.416	0.10	41.18	-	41.28	-	57.54	47.54	-16.25	-
3	0.537	0.12	32.47	-	32.59	-	56.00	46.00	-23.41	-
4	0.689	0.15	33.76	-	33.91	-	56.00	46.00	-22.09	-
5	2.066	0.20	34.11	-	34.31	-	56.00	46.00	-21.69	-
6	10.160	0.61	31.52	-	32.13	-	60.00	50.00	-27.87	-

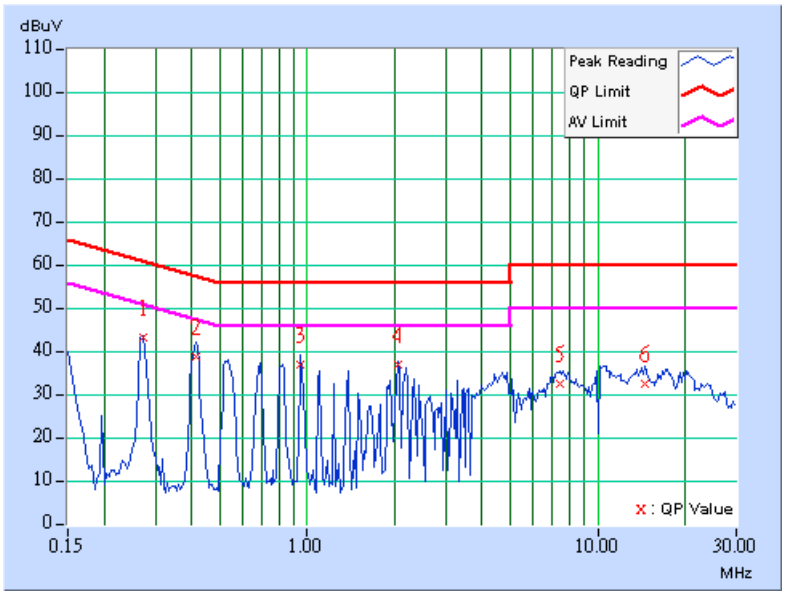
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	11	**6dB BANDWIDTH**	9kHz
MODULATION	OFDM	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	20deg.C, 60%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.273	0.10	42.60	-	42.70	-	61.04	51.04	-18.34	-
2	0.416	0.10	38.11	-	38.21	-	57.54	47.54	-19.32	-
3	0.951	0.19	36.53	-	36.72	-	56.00	46.00	-19.28	-
4	2.063	0.20	36.38	-	36.58	-	56.00	46.00	-19.42	-
5	7.375	0.41	32.03	-	32.44	-	60.00	50.00	-27.56	-
6	14.570	0.68	31.74	-	32.42	-	60.00	50.00	-27.58	-

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



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

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

NOTE:

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
* HP Spectrum Analyzer	8593E	3911A07465	July 07, 2004
* HP Preamplifier	8447D	2432A03504	June 10, 2004
* HP Preamplifier	8449B	3008A01201	Dec. 11, 2004
SCHAFFNER Tunable Dipole Antenna SCHWARZBECK Tunable Dipole Antenna	VHBA 9123 UHA 9105	459 977	Jun. 26, 2004
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 13, 2004
*Schwarzbeck Antenna	VULB9168	137	Apr. 03, 2004
SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	June 30, 2004
*ADT. Turn Table	TT100	0306	NA
*ADT. Tower	AT100	0306	NA
*Software	ADT_Radiated_V 5.14	NA	NA
*TIMES RF cable	LL142	CABLE-CH6-01	Apr. 30, 2004

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. "*" = These equipment are used for 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 Chamber No. 6.

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 meters 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.

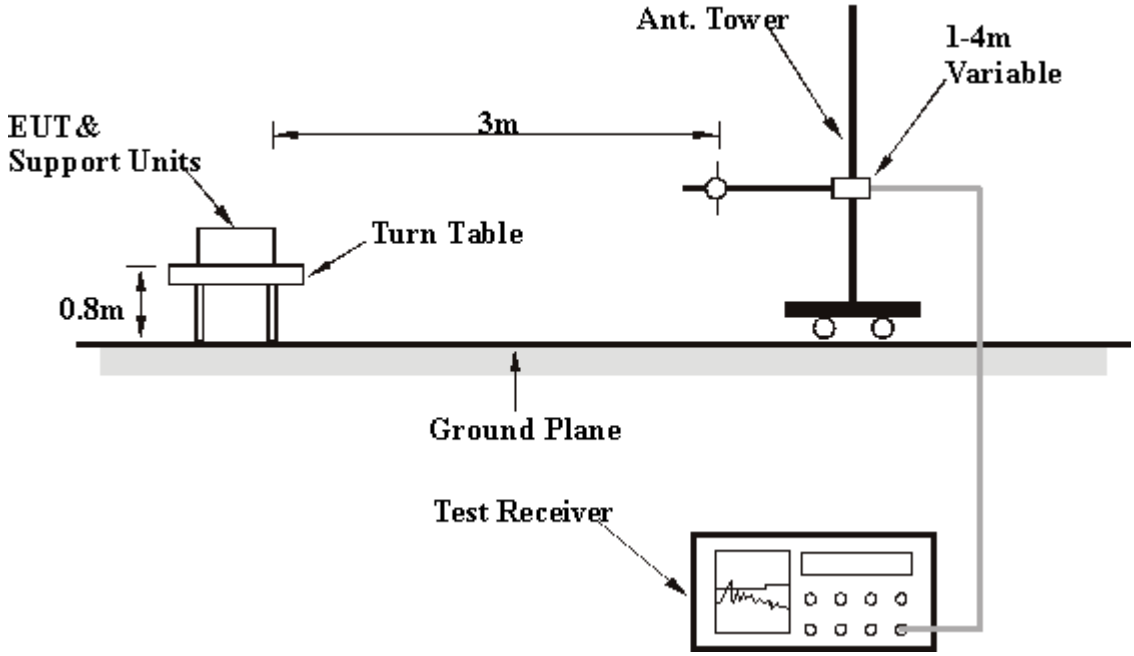
NOTE:

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 1MHz 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 10Hz 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	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	11	**FREQUENCY RANGE**	Below 1000MHz
MODULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Quasi-Peak
TESTED BY	Steven Lu		

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	218.51	41.32 QP	46.00	-4.68	1.25 H	33	29.21	12.11
2	**280.76**	**43.63 QP**	**46.00**	**-2.37**	**1.00 H**	**331**	**28.98**	**14.65**
3	300.20	38.79 QP	46.00	-7.21	1.00 H	88	23.70	15.10
4	342.97	34.69 QP	46.00	-11.31	1.00 H	205	18.45	16.23
5	374.07	34.89 QP	46.00	-11.11	1.00 H	235	17.85	17.04
6	500.42	37.03 QP	46.00	-8.97	1.50 H	307	17.01	20.02
7	562.63	30.91 QP	46.00	-15.09	1.50 H	355	9.42	21.49
8	624.83	39.32 QP	46.00	-6.68	1.00 H	37	16.40	22.92
9	687.03	34.75 QP	46.00	-11.25	1.00 H	340	10.96	23.79
10	720.08	38.77 QP	46.00	-7.23	1.00 H	1	14.24	24.53
11	749.24	36.51 QP	46.00	-9.49	1.00 H	181	11.18	25.33
12	817.27	36.50 QP	46.00	-9.50	1.00 H	148	10.70	25.80
13	912.53	38.21 QP	46.00	-7.79	1.00 H	229	10.93	27.28

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.

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	11	**FREQUENCY RANGE**	Below 1000MHz
MODULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Quasi-Peak
TESTED BY	Steven Lu		

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	218.51	43.57 QP	46.00	-2.43	1.00 V	54	31.46	12.11
2	280.76	37.64 QP	46.00	-8.36	1.50 V	10	22.99	14.65
3	342.97	31.76 QP	46.00	-14.24	1.50 V	262	15.53	16.23
4	342.97	31.76 QP	46.00	-14.24	1.50 V	262	15.53	16.23
5	374.07	37.94 QP	46.00	-8.06	1.50 V	250	20.89	17.04
6	399.34	33.53 QP	46.00	-12.47	1.00 V	7	15.83	17.69
7	500.42	38.02 QP	46.00	-7.98	1.00 V	79	18.00	20.02
8	624.83	40.28 QP	46.00	-5.72	1.00 V	298	17.36	22.92
9	720.08	38.56 QP	46.00	-7.44	1.00 V	355	14.03	24.53
10	749.24	41.91 QP	46.00	-4.09	1.00 V	355	16.59	25.33
11	817.27	36.40 QP	46.00	-9.60	1.50 V	82	10.60	25.80
12	875.59	36.03 QP	46.00	-9.97	1.50 V	166	9.38	26.65
13	912.53	37.63 QP	46.00	-8.37	1.00 V	88	10.34	27.28

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.

4.2.8 TEST RESULTS

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	1	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION	CCK	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	47.96 PK	74.00	-26.04	1.00 H	309	18.31	29.65
1	2390.00	41.30 AV	54.00	-12.70	1.00 H	309	11.60	29.65
2	*2412.00	104.48 PK			1.00 H	309	74.76	29.72
2	*2412.00	97.81 AV			1.00 H	309	68.09	29.72
3	4824.00	43.85 PK	74.00	-30.15	1.05 H	126	8.40	35.45
4	9648.00	55.88 PK	84.48	-28.60	1.56 H	139	11.41	44.46
4	9648.00	44.18 AV	77.81	-33.63	1.56 H	139	-0.29	44.46

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	55.67 PK	74.00	-18.33	1.00 V	124	26.02	29.65
1	2390.00	48.50 AV	54.00	-5.50	1.00 V	124	18.85	29.65
2	*2412.00	112.19 PK			1.00 V	124	82.47	29.72
2	*2412.00	105.02 AV			1.00 V	124	75.30	29.72
3	4824.00	45.00 PK	74.00	-29.00	1.05 V	177	9.55	35.45
4	9648.00	56.93 PK	92.19	-35.26	1.13 V	106	12.46	44.46
4	9648.00	51.33 AV	85.02	-33.69	1.13 V	106	6.86	44.46

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

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	6	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION	CCK	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	103.23 PK			1.70 H	201	73.44	29.79
1	*2437.00	95.67 AV			1.70 H	201	65.88	29.79
2	4874.00	44.17 PK	74.00	-29.83	1.20 H	213	8.38	35.79
3	9748.00	54.12 PK	83.23	-29.11	1.16 H	177	9.92	44.20
3	9748.00	43.28 AV	75.67	-32.39	1.16 H	177	-0.92	44.20

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	113.46 PK			1.00 V	116	83.67	29.79
1	*2437.00	106.21 AV			1.00 V	116	76.42	29.79
2	4874.00	45.25 PK	74.00	-28.75	1.04 V	158	9.46	35.79
3	9748.00	56.84 PK	93.46	-36.62	1.08 V	103	12.64	44.20
3	9748.00	51.38 AV	86.21	-34.83	1.08 V	103	7.18	44.20

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

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	11	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION	CCK	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	103.16 PK			1.00 H	303	73.31	29.85
1	*2462.00	96.11 AV			1.00 H	303	66.26	29.85
2	2483.50	47.54 PK	74.00	-26.46	1.00 H	303	17.63	29.91
3	4924.00	43.87 PK	74.00	-30.13	1.05 H	183	7.78	36.09
4	9848.00	54.25 PK	83.16	-28.91	1.98 H	36	10.15	44.10
4	9848.00	45.06 AV	76.11	-31.05	1.98 H	36	0.96	44.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	112.17 PK			1.00 V	195	82.32	29.85
1	*2462.00	105.11 AV			1.00 V	195	75.26	29.85
2	2483.50	56.55 PK	74.00	-17.45	1.00 V	195	26.64	29.91
2	2483.50	49.49 AV	54.00	-4.51	1.00 V	195	19.58	29.91
3	4924.00	46.00 PK	74.00	-28.00	1.05 V	187	9.91	36.09
4	9848.00	57.91 PK	92.17	-34.26	1.56 V	102	13.80	44.10
4	9848.00	51.54 AV	85.11	-33.57	1.56 V	102	7.43	44.10

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

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	1	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	50.88 PK	74.00	-23.12	1.70 H	345	21.23	29.65
1	2390.00	42.68 AV	54.00	-11.32	1.70 H	345	13.03	29.65
2	*2412.00	100.55 PK			1.70 H	345	70.83	29.72
2	*2412.00	92.35 AV			1.70 H	345	62.63	29.72
3	4824.00	44.14 PK	74.00	-29.86	1.00 H	235	8.69	35.45
4	9648.00	54.97 PK	80.55	-25.58	1.07 H	182	10.50	44.46
4	9648.00	44.82 AV	72.35	-27.53	1.07 H	182	0.35	44.46

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	58.14 PK	74.00	-15.86	1.78 V	60	28.49	29.65
1	2390.00	50.25 AV	54.00	-3.75	1.78 V	60	20.60	29.65
2	*2412.00	107.81 PK			1.78 V	60	78.09	29.72
2	*2412.00	99.92 AV			1.78 V	60	70.20	29.72
3	4824.00	45.29 PK	74.00	-28.71	1.10 V	144	9.84	35.45
4	9648.00	58.11 PK	87.81	-29.70	1.13 V	108	13.64	44.46
4	9648.00	50.19 AV	79.92	-29.73	1.13 V	108	5.72	44.46

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

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	6	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	98.87 PK			1.00 H	304	69.08	29.79
1	*2437.00	90.84 AV			1.00 H	304	61.05	29.79
2	4874.00	44.70 PK	74.00	-29.30	1.02 H	268	8.91	35.79
3	9748.00	54.01 PK	78.87	-24.86	1.14 H	183	9.82	44.20
3	9748.00	43.67 AV	70.84	-27.71	1.14 H	183	-0.52	44.20

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2437.00	*108.87 PK			1.00 V	110	79.08	29.79
1	2437.00	*100.86 AV			1.00 V	110	71.07	29.79
2	4874.00	45.70 PK	74.00	-28.30	1.24 V	120	9.91	35.79
3	9748.00	57.12 PK	88.87	-31.75	1.56 V	106	12.93	44.20
3	9748.00	50.32 AV	80.86	-30.54	1.56 V	106	6.13	44.20

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

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
CHANNEL	11	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	20deg.C, 70%RH, 991hPa	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
TESTED BY	Steven Lu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	99.23 PK			1.70 H	14	69.38	29.85
1	*2462.00	91.17 AV			1.70 H	14	61.32	29.85
2	2483.50	52.18 PK	74.00	-21.82	1.70 H	14	22.27	29.91
2	2483.50	44.12 AV	54.00	-9.88	1.70 H	14	14.21	29.91
3	4924.00	44.11 PK	74.00	-29.89	1.04 H	188	8.02	36.09
4	9848.00	54.90 PK	79.23	-24.33	2.08 H	4	10.79	44.10
4	9848.00	44.94 AV	71.17	-26.23	2.08 H	4	0.83	44.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	107.58 PK			1.00 V	111	77.73	29.85
1	*2462.00	99.94 AV			1.00 V	111	70.09	29.85
2	2483.50	60.53 PK	74.00	-13.47	1.00 V	111	30.62	29.91
2	**2483.50**	**52.89 AV**	**54.00**	**-1.11**	**1.00 V**	**111**	**22.98**	**29.91**
3	4924.00	44.19 PK	74.00	-29.81	1.00 V	108	8.10	36.09
4	9848.00	57.14 PK	87.58	-30.44	1.00 V	111	13.03	44.10
4	9848.00	50.84 AV	79.94	-29.10	1.00 V	111	6.73	44.10

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

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	FSEK30	100049	Aug.12, 2004

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

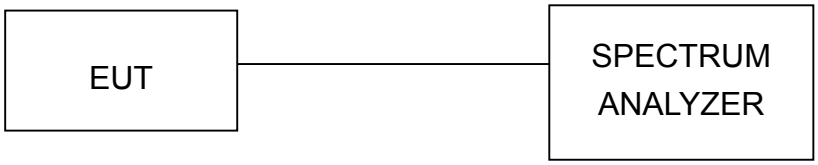
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

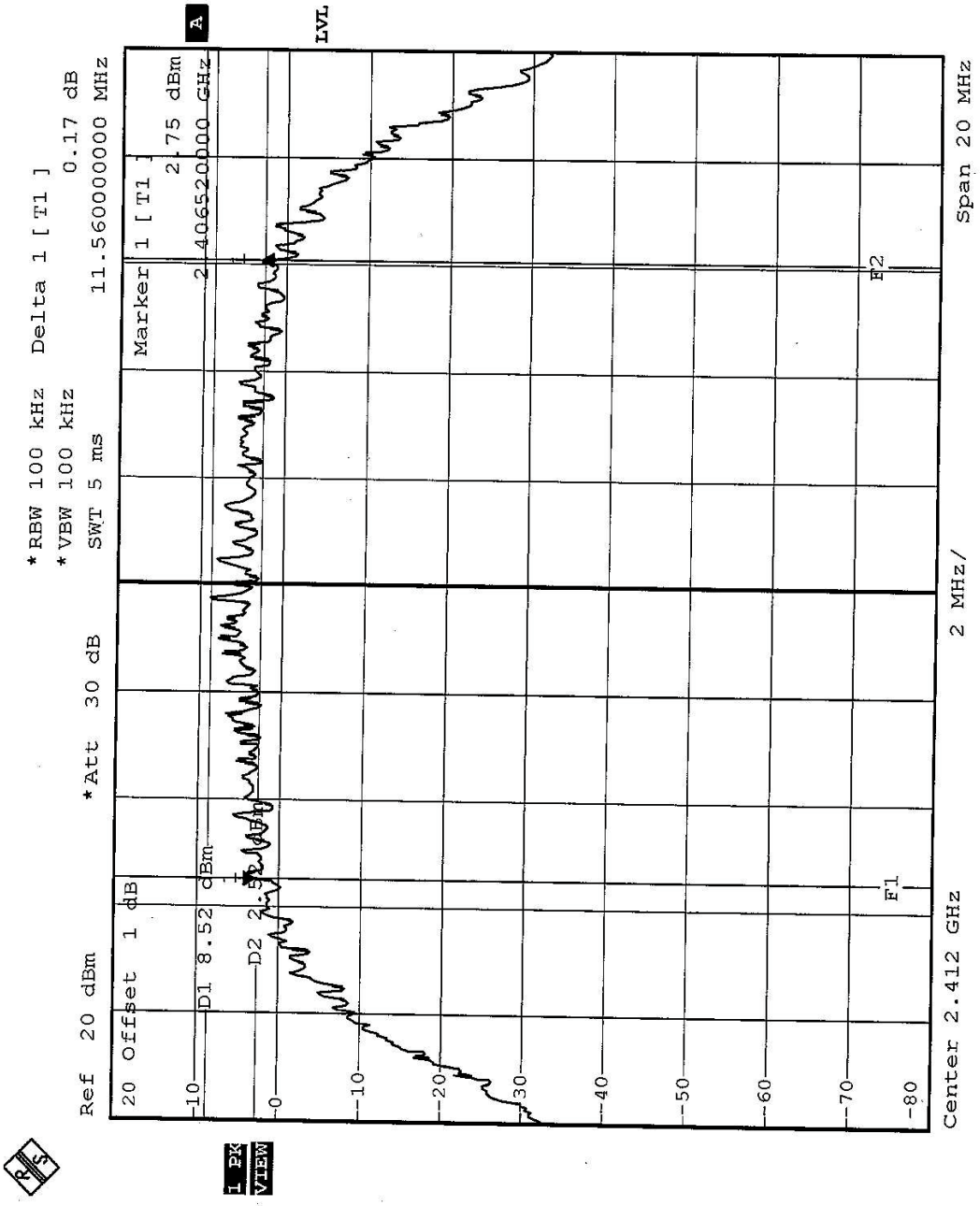
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

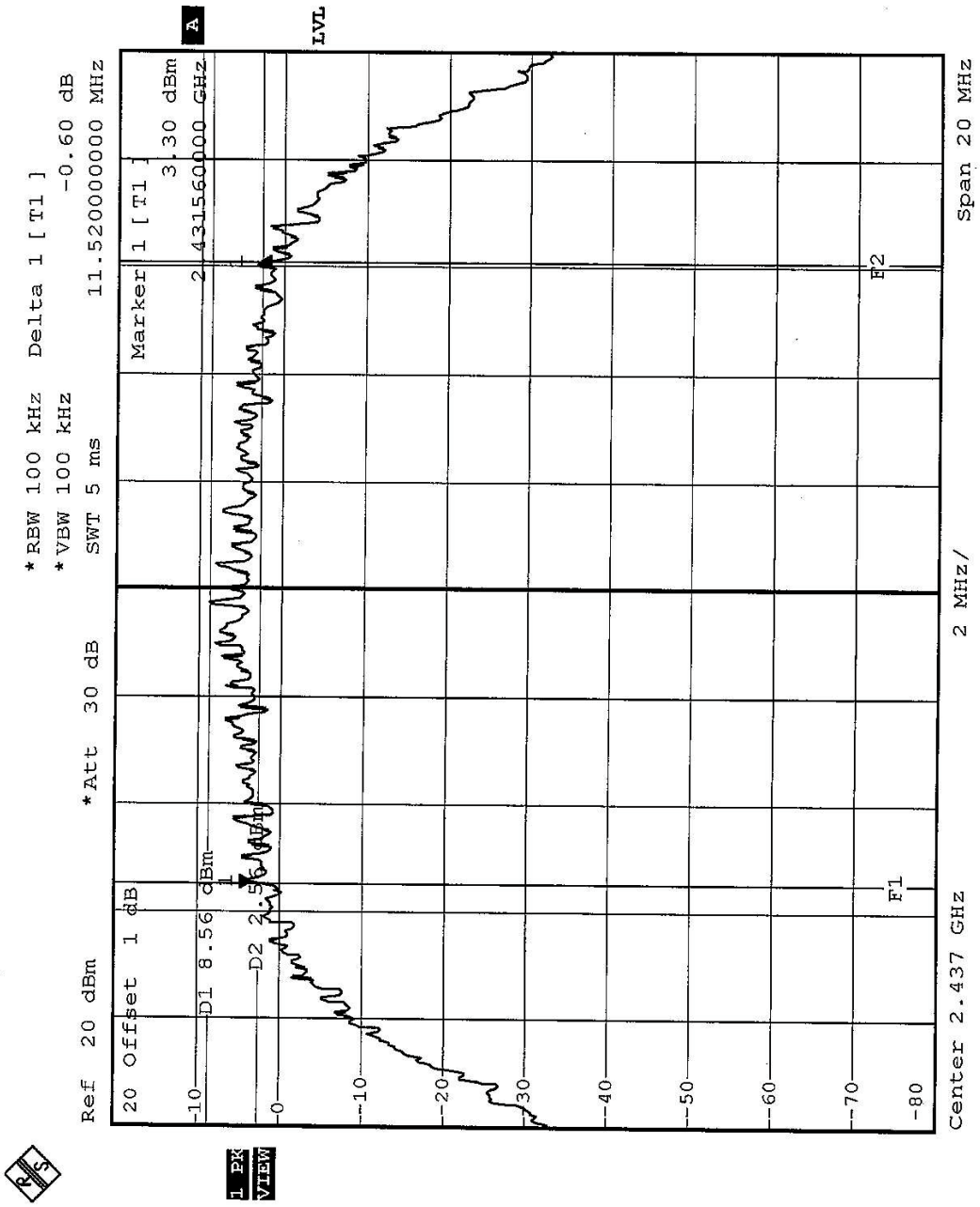
EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
MPDULATION	CCK	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	27deg.C, 60%RH, 991hPa	**TESTED BY**	Jamison Chan

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	11.56	0.5	PASS
6	2437	11.52	0.5	PASS
11	2462	11.52	0.5	PASS

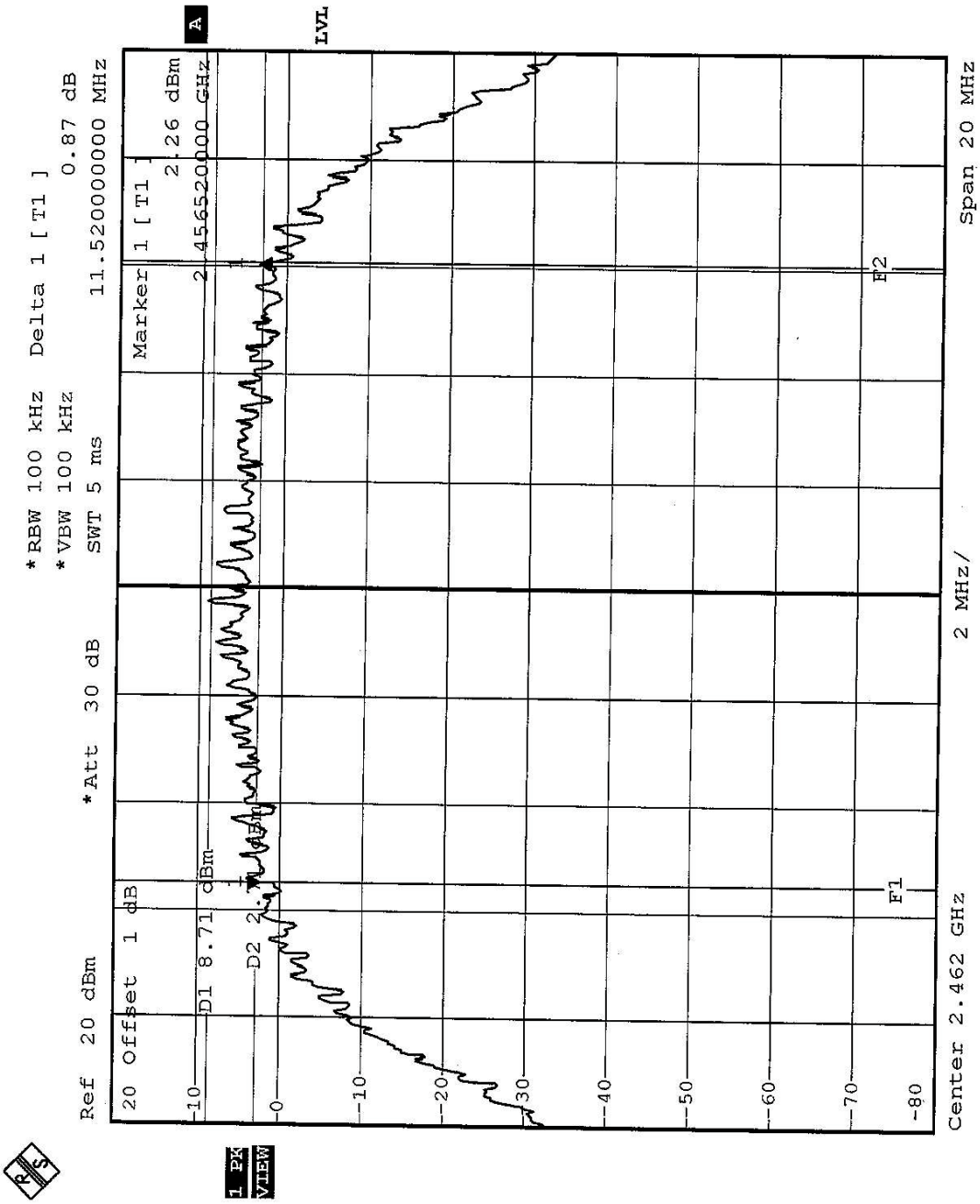
CH1


Ref 20 dBm
Offset 1 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
0.17 dB
11.560000000 MHz
Marker 1 [T1]
2.75 dBm
2.406520000 GHz
D1 8.52 dBm
D2 2.52 dBm
F1
F2
LVL
A
1 PK
VIEW
Center 2.412 GHz
2 MHz/
Span 20 MHz

CH6


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
-0.60 dB
11.520000000 MHz
Marker 1 [T1]
3.30 dBm
2.431560000 GHz
D1 8.56 dBm
D2 2.56 dBm
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz
LVL
1 PK
VIEW

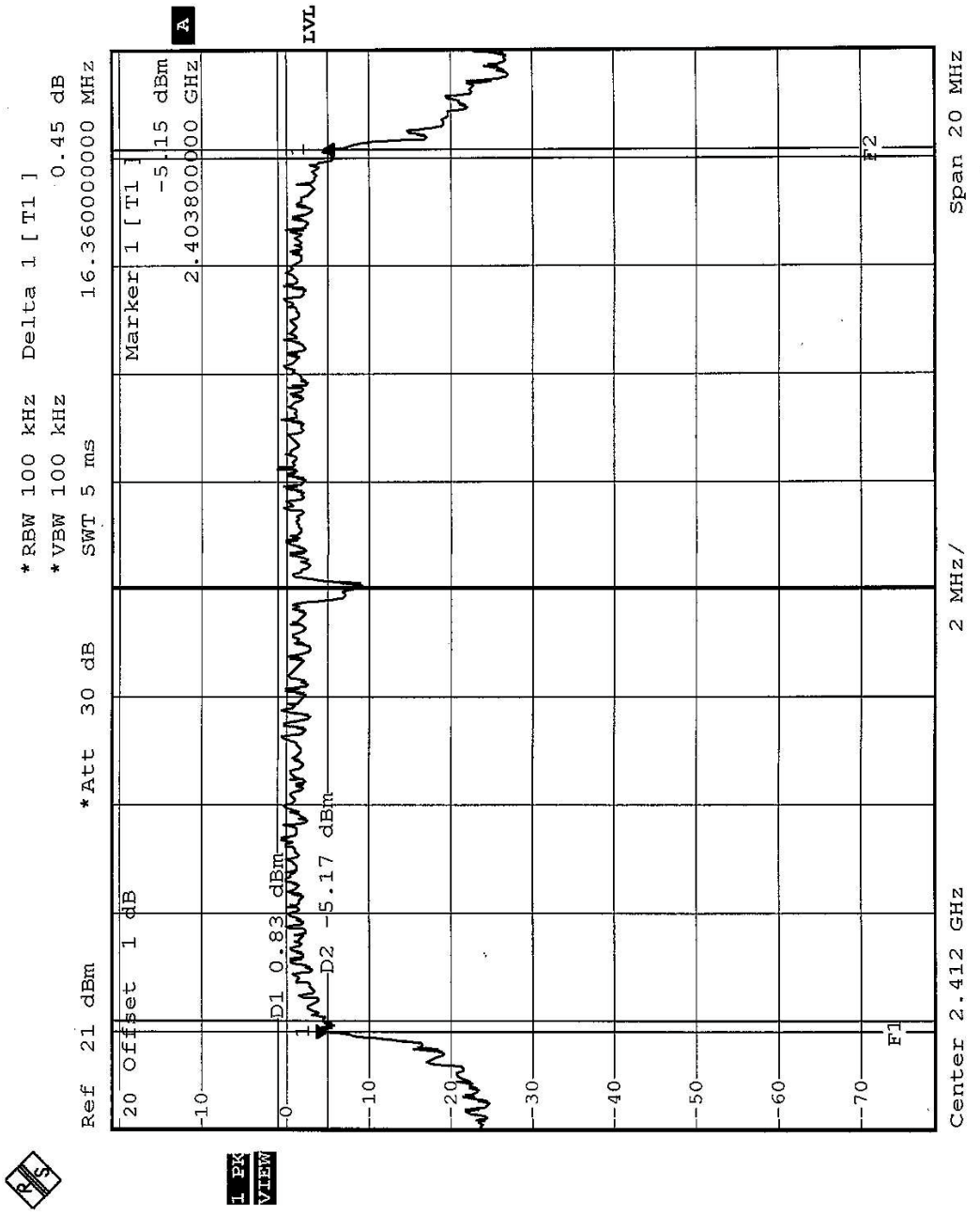
CH11


Ref 20 dBm
Att 30 dB
Offset 1 dB
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
0.87 dB
11.520000000 MHz
Marker 1 [T1]
2.26 dBm
2.456520000 GHz
D1 8.71 dBm
D2 2.
LVL
A
1 PK
VIEW
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz

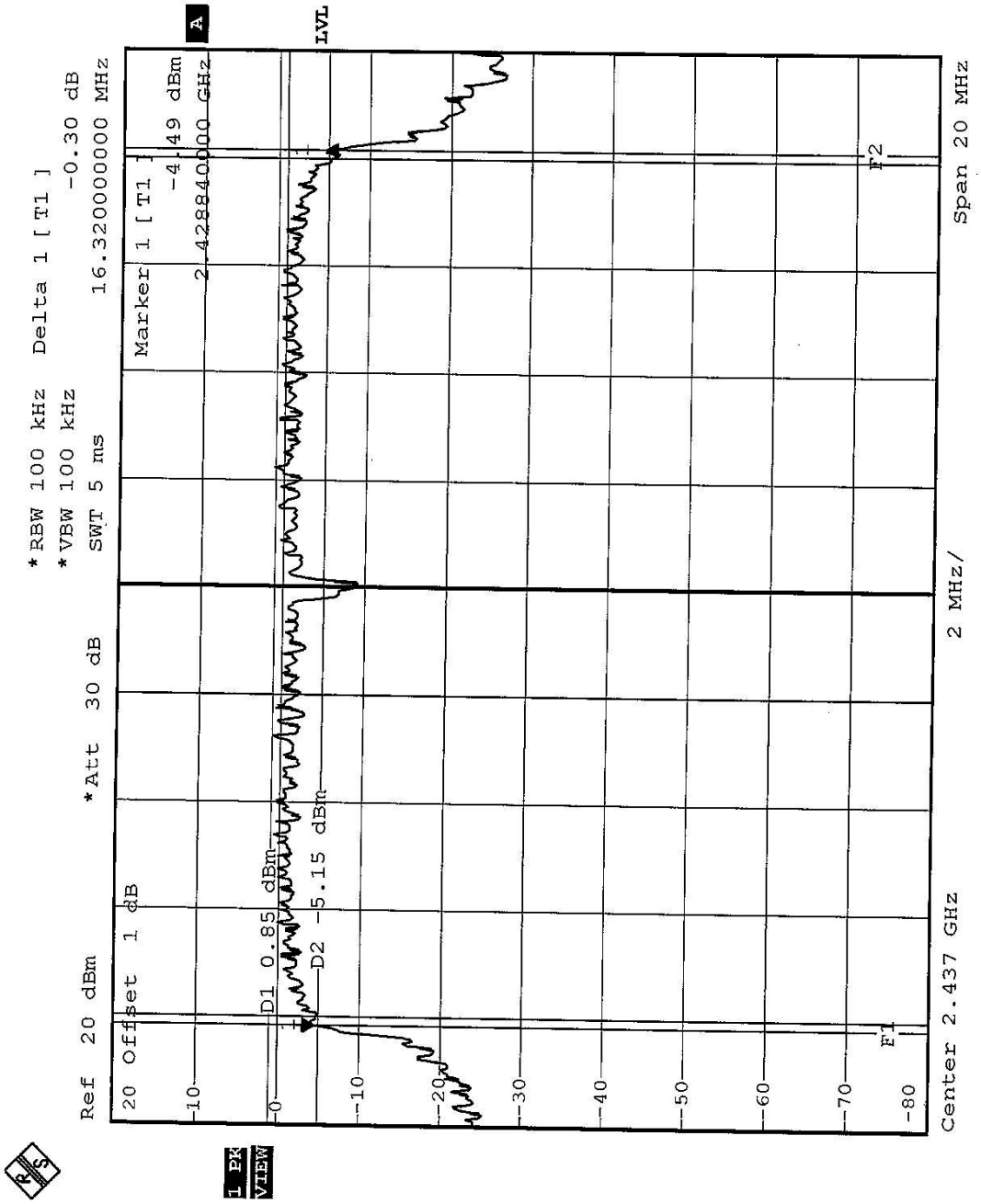
EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
MPDULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	27deg.C, 60%RH, 991hPa	**TESTED BY**	Jamison Chan

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.36	0.5	PASS
6	2437	16.32	0.5	PASS
11	2462	16.36	0.5	PASS

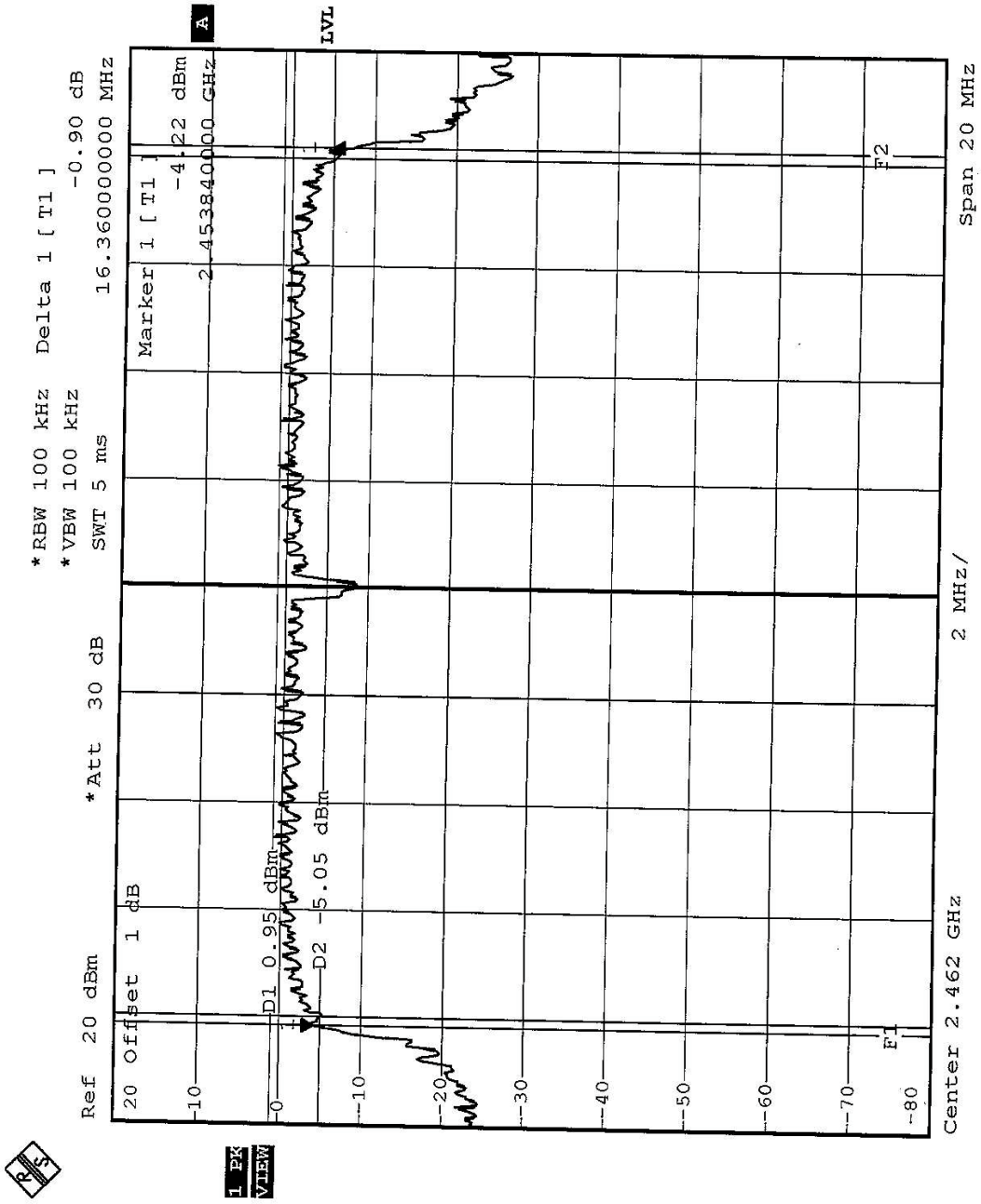
CH1


Ref 21 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
0.45 dB
16.36000000 MHz
Marker 1 [T1]
-5.15 dBm
2.403800000 GHz
20 Offset 1 dB
D1 0.83 dBm
D2 -5.17 dBm
Center 2.412 GHz
2 MHz/
Span 20 MHz
1 PK
VIEW
A
LVL
F1
F2

CH6


Ref 20 dBm
*Att 30 dB
Offset 1 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
-0.30 dB
16.32000000 MHz
Marker 1 [T1]
-4.49 dBm
2.428400000 GHz
D1 0.85 dBm
D2 -5.15 dBm
LVL
A
1 PK
VIEW
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz

CH11


Ref 20 dBm
*Att 30 dB
Offset 1 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
-0.90 dB
16.36000000 MHz
Marker 1 [T1]
-4.22 dBm
2.45384000 GHz
D1 0.95 dBm
D2 -5.05 dBm
LVL
A
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz
1 PK
VIEW

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 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004
R&S SIGNAL GENERATOR	SMP04	100011	May 28, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	B048470	Mar. 05, 2004
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.

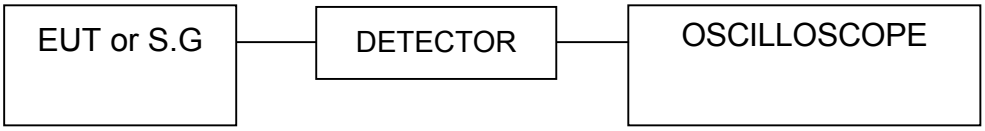
4.4.3 TEST PROCEDURES

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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
MPDULATION	CCK	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	27deg.C, 60%RH, 991hPa	**TESTED BY**	Jamison Chan

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	13.5	30	PASS
6	2437	13.5	30	PASS
11	2462	13.6	30	PASS

EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
MPDULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	27deg.C, 60%RH, 991hPa	**TESTED BY**	Jamison Chan

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	13.4	30	PASS
6	2437	13.6	30	PASS
11	2462	13.5	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
SPECTRUM ANALYZER	FSEK30	100049	Aug.12, 2004

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

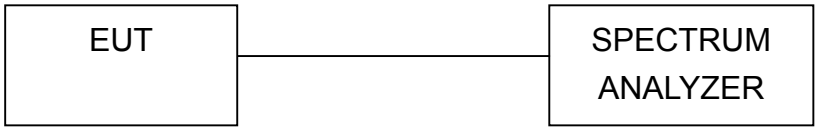
4.5.3 TEST PROCEDURE

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

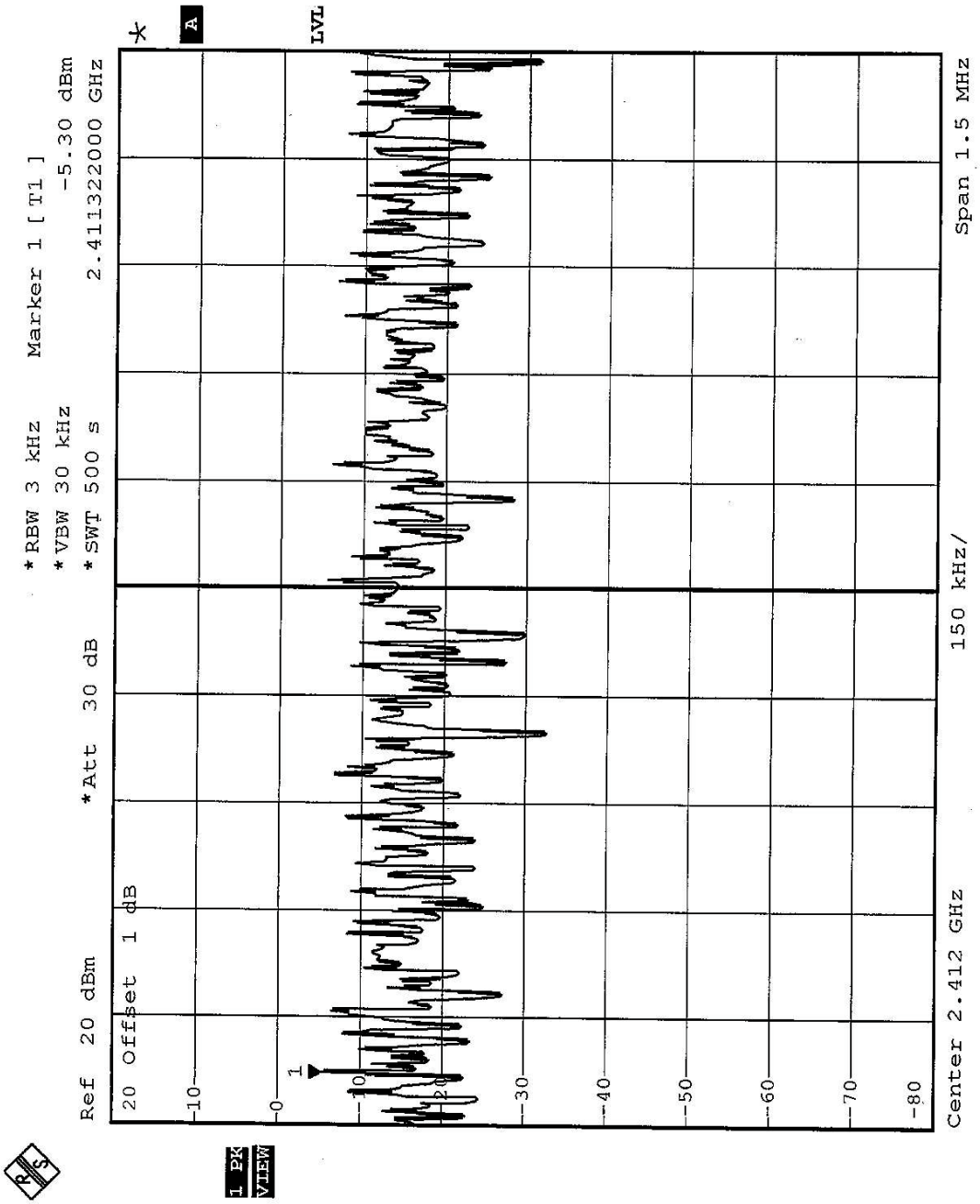
Same as Item 4.3.6

4.5.7 TEST RESULTS

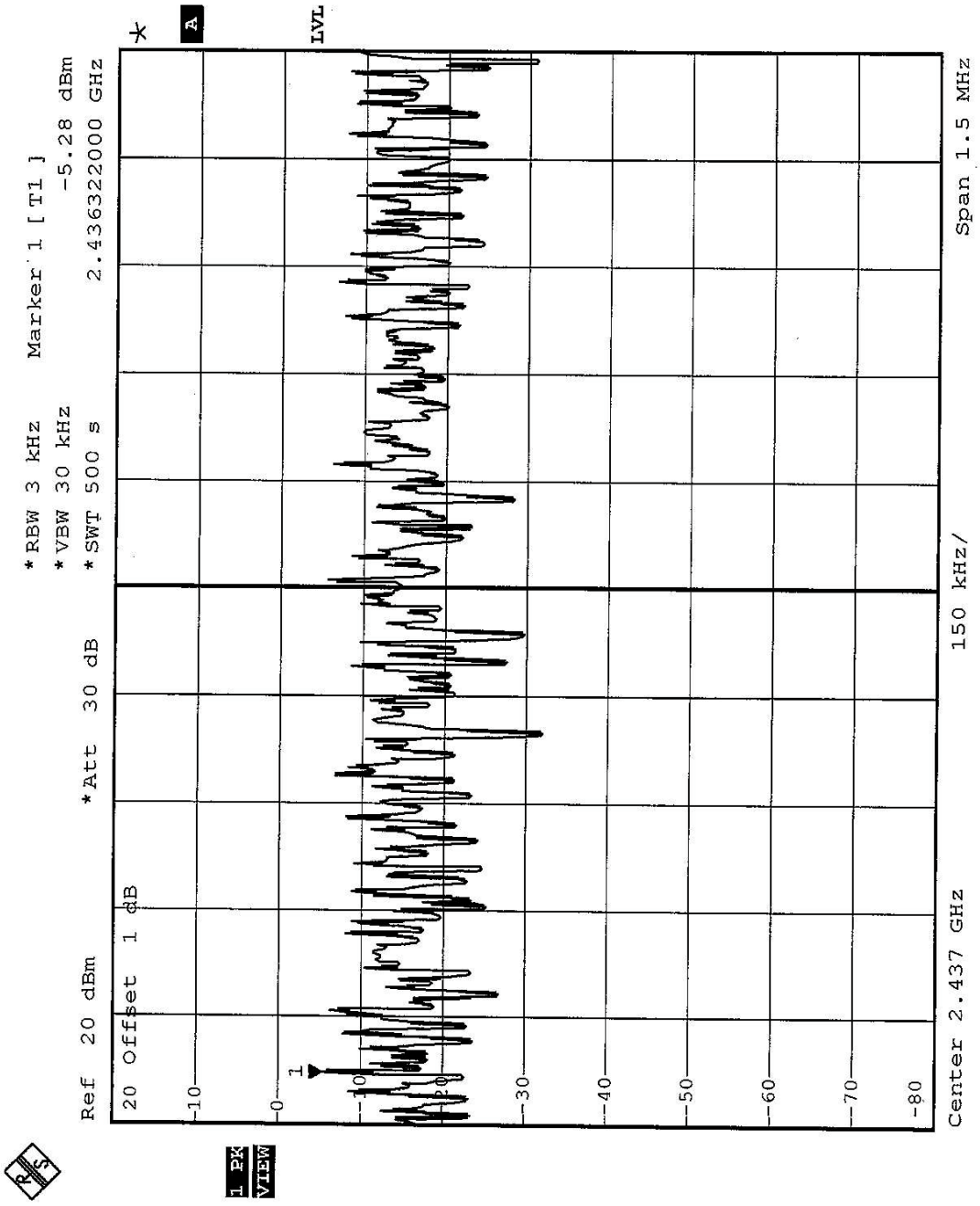
EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
MPDULATION	CCK	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	27deg.C, 60%RH, 991hPa	**TESTED BY**	Jamison Chan

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-5.30	8	PASS
6	2437	-5.28	8	PASS
11	2462	-5.15	8	PASS

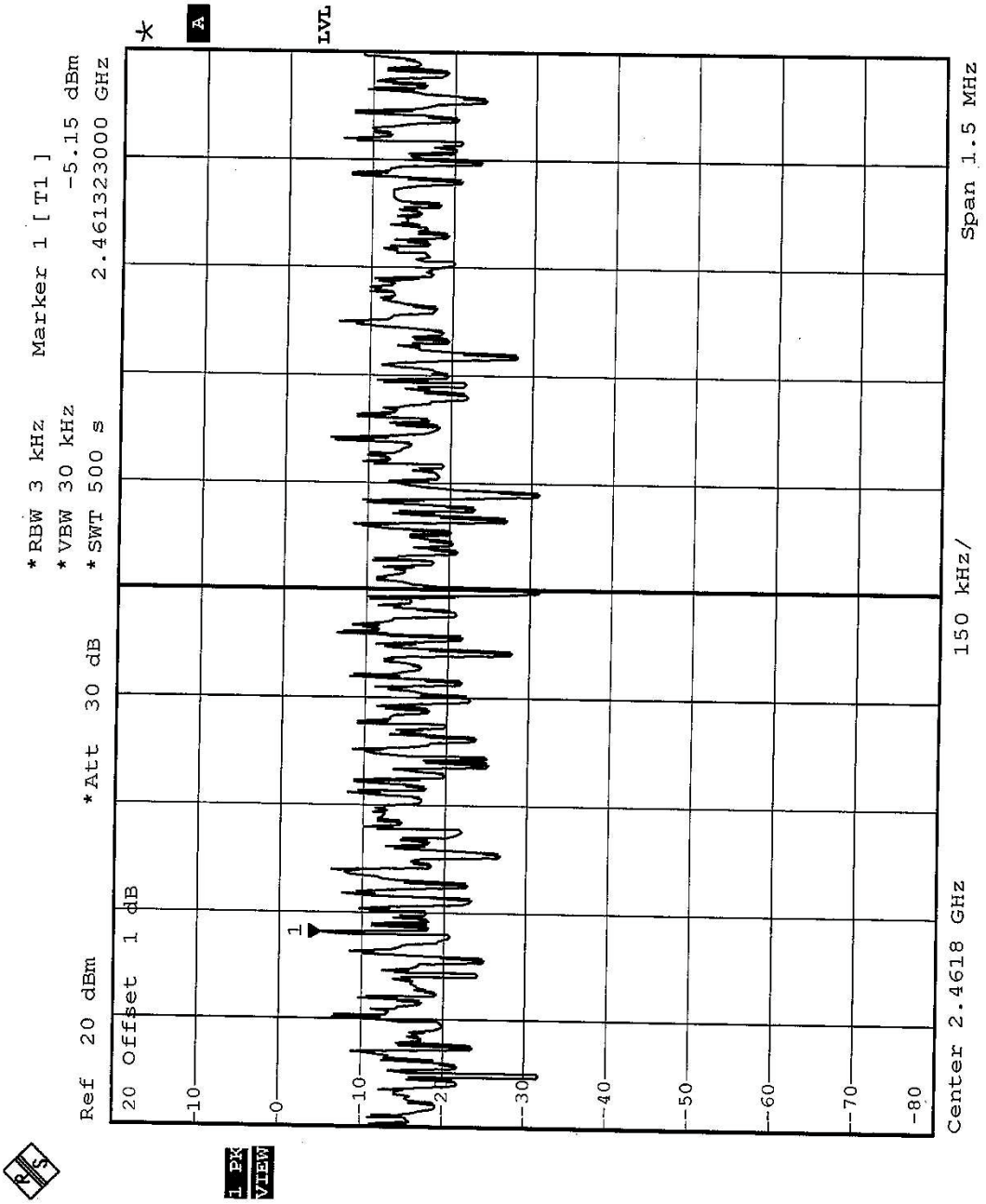
CH1


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-5.30 dBm
2.411322000 GHz
1 PK
VIEW
A
LVL
Center 2.412 GHz
150 kHz/
Span 1.5 MHz

CH6


Ref 20 dBm
Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-5.28 dBm
2.436322000 GHz
LVL
A
1 PK
VIEW
Center 2.437 GHz
150 kHz/
Span 1.5 MHz

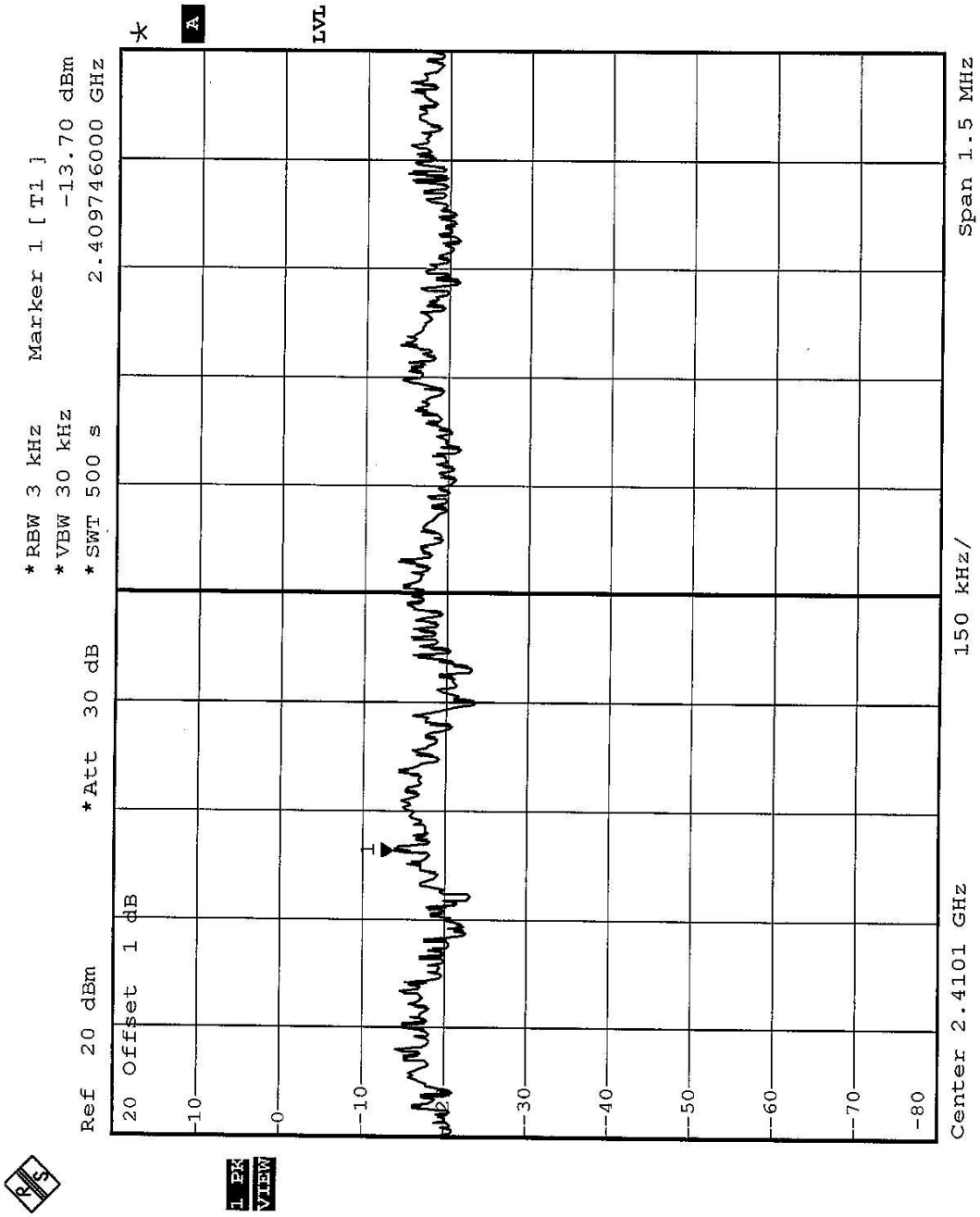
CH11


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-5.15 dBm
2.461323000 GHz
A
LVL
1 PK
VIEW
Center 2.4618 GHz
150 kHz/
Span 1.5 MHz

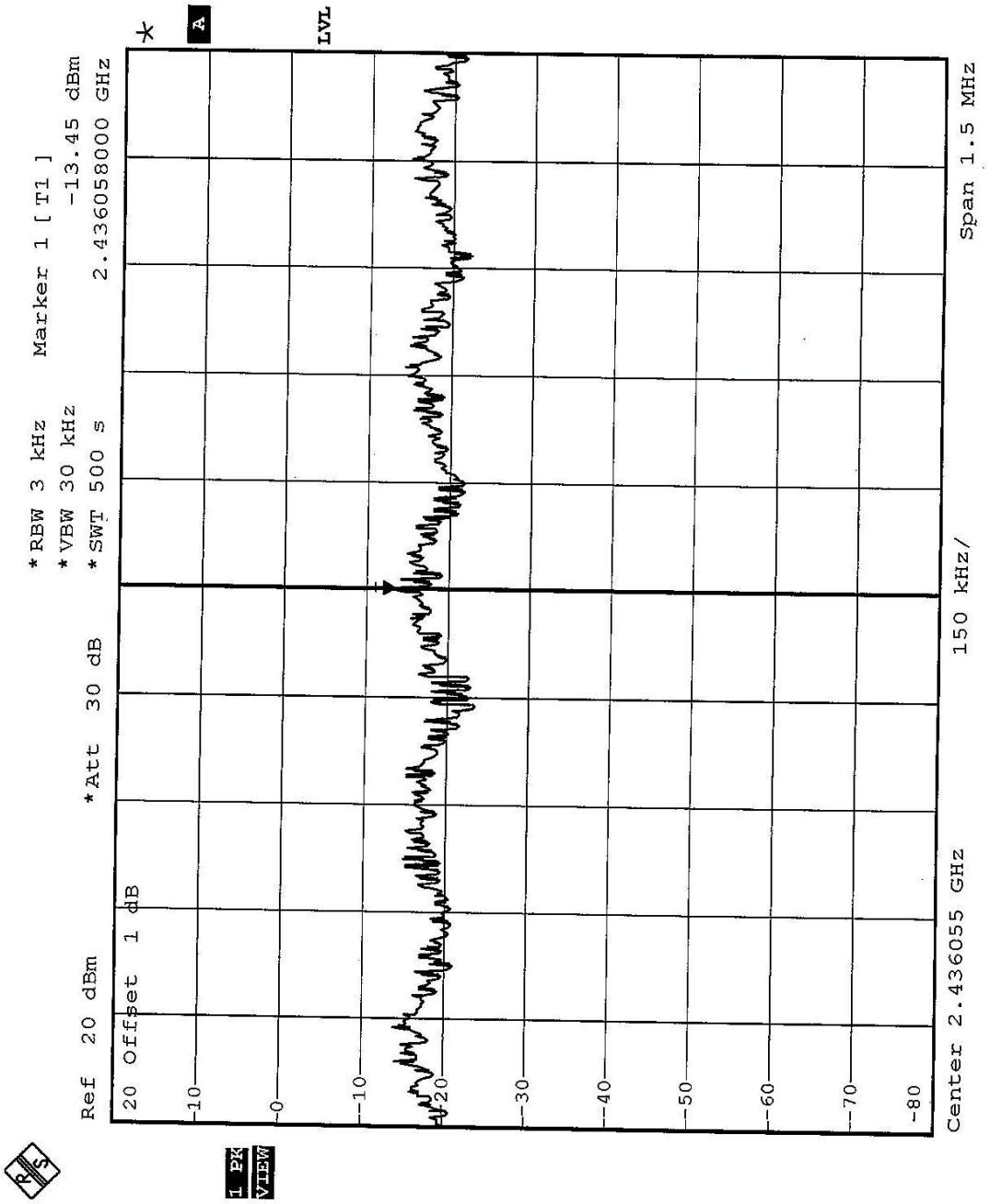
EUT	Wireless A/G Broadband Router	**MODEL**	WRT54AG
MPDULATION	OFDM	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	27deg.C, 60%RH, 991hPa	**TESTED BY**	Jamison Chan

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-13.70	8	PASS
6	2437	-13.45	8	PASS
11	2462	-13.27	8	PASS

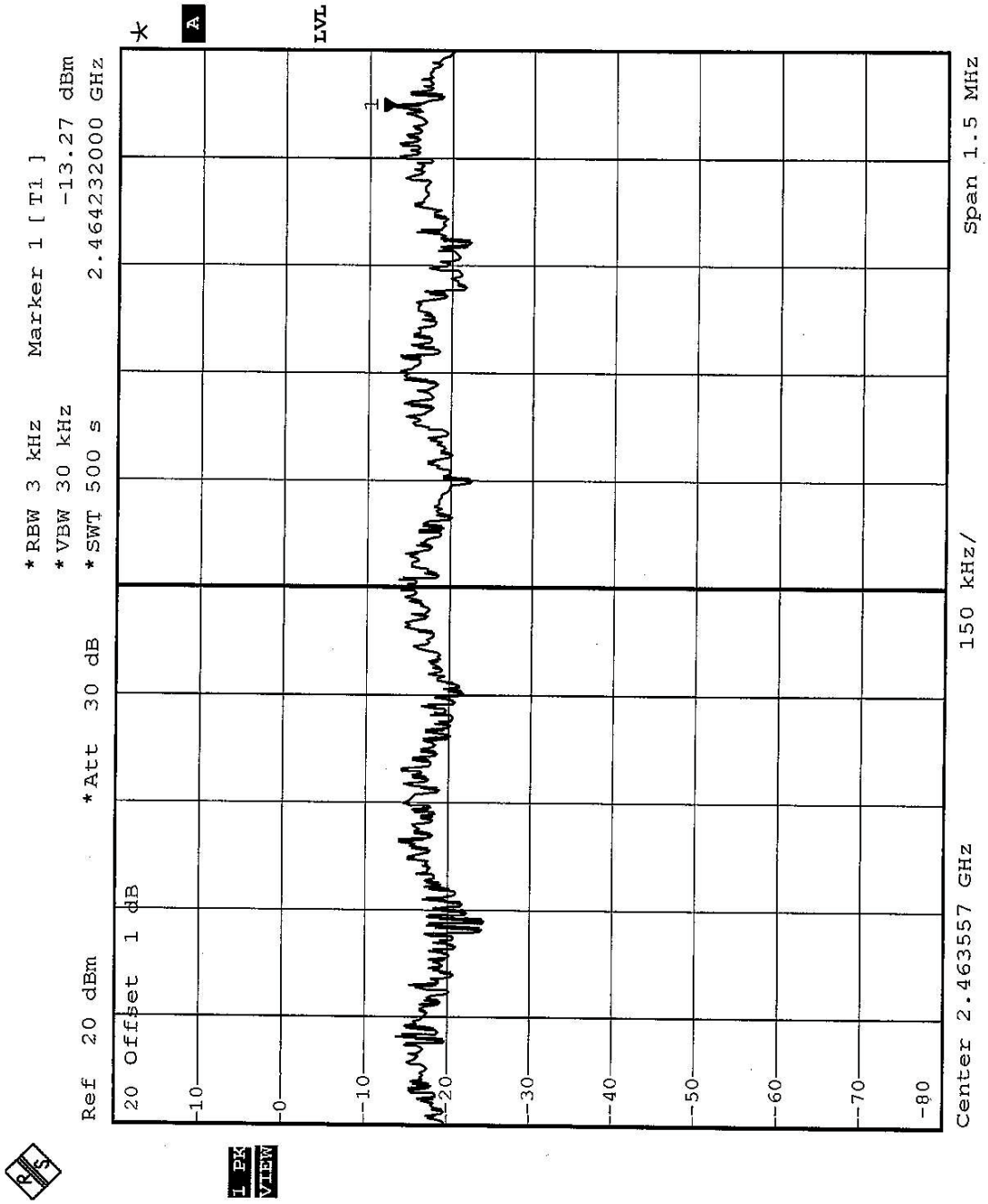
CH1


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-13.70 dBm
2.409746000 GHz
A
LVL
1 PK
VIEW
Center 2.4101 GHz
150 kHz/
Span 1.5 MHz

CH6


Ref 20 dBm
Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-13.45 dBm
2.436058000 GHz
1 PK
VIEW
A
LVL
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.436055 GHz
150 kHz/
Span 1.5 MHz

CH11


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-13.27 dBm
2.464232000 GHz
Center 2.463557 GHz
150 kHz/
Span 1.5 MHz
LVL
A
1 PK
VIEW
-10
0
-10
-20
-30
-40
-50
-60
-70
-80

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
SPECTRUM ANALYZER	FSEK30	100049	Aug.12, 2004

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

4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge for CCK technique and set RBW=1MHz and VBW=10Hz of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge for OFDM technique. The band edges was measured and recorded.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

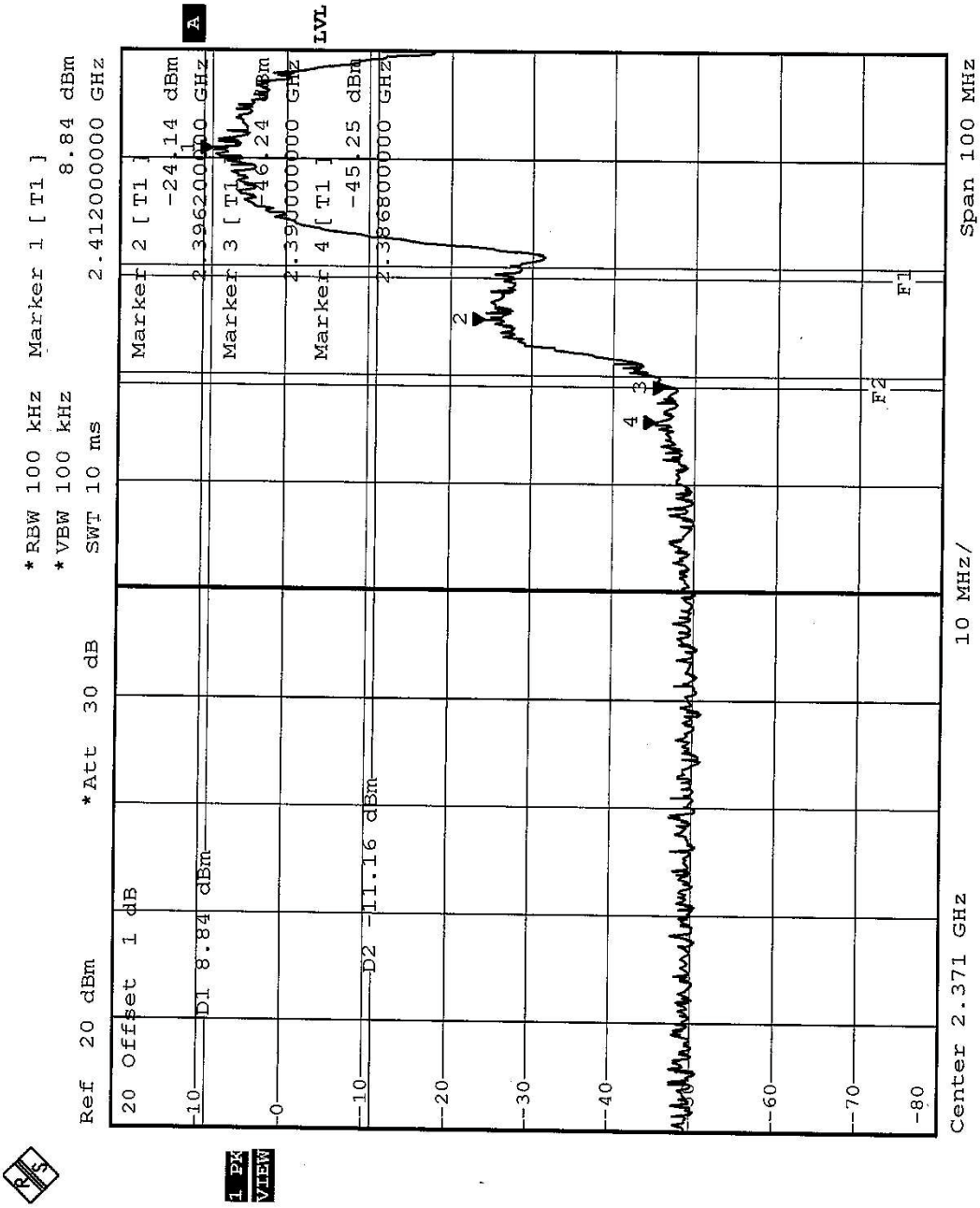
4.6.6 TEST RESULTS

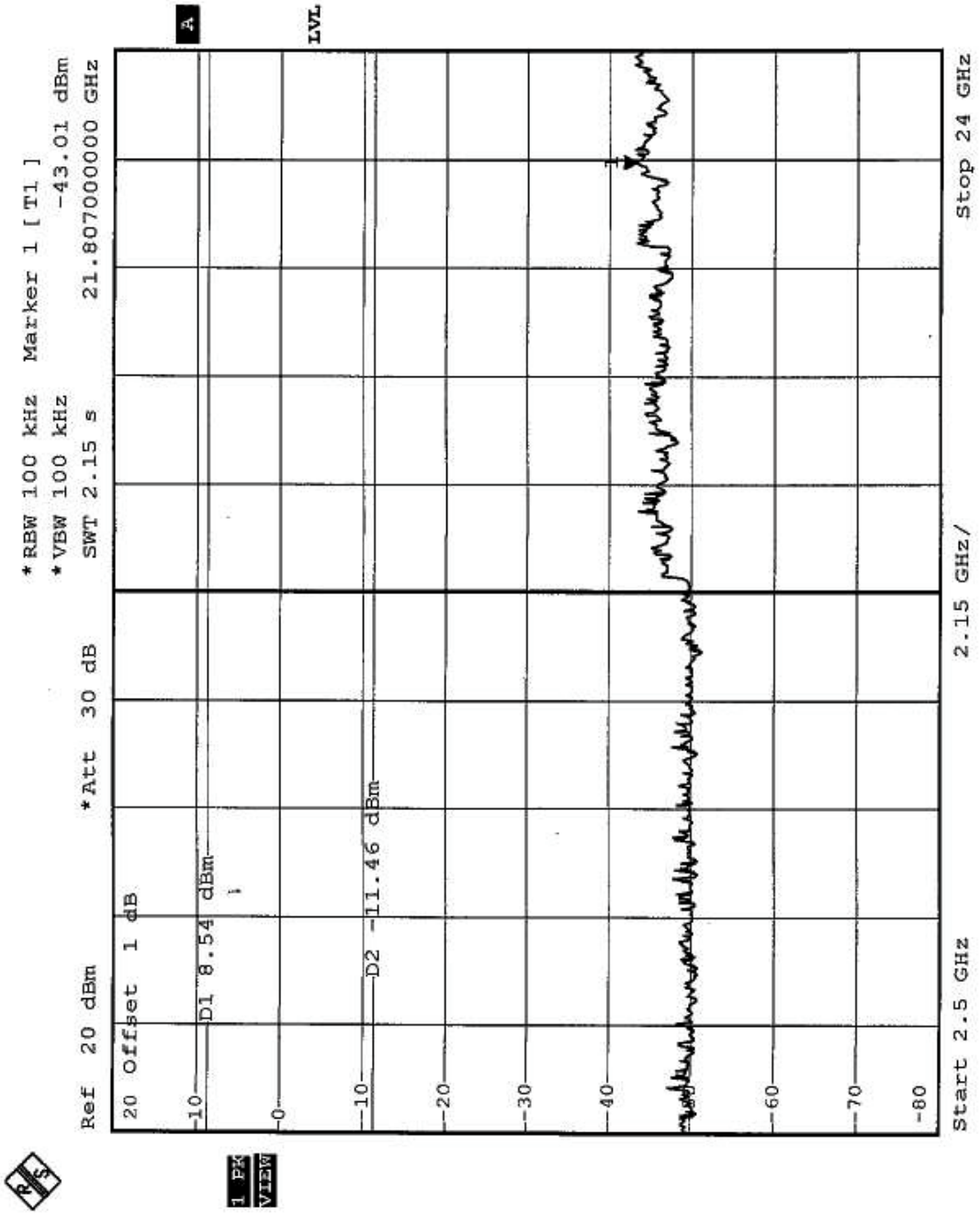
The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

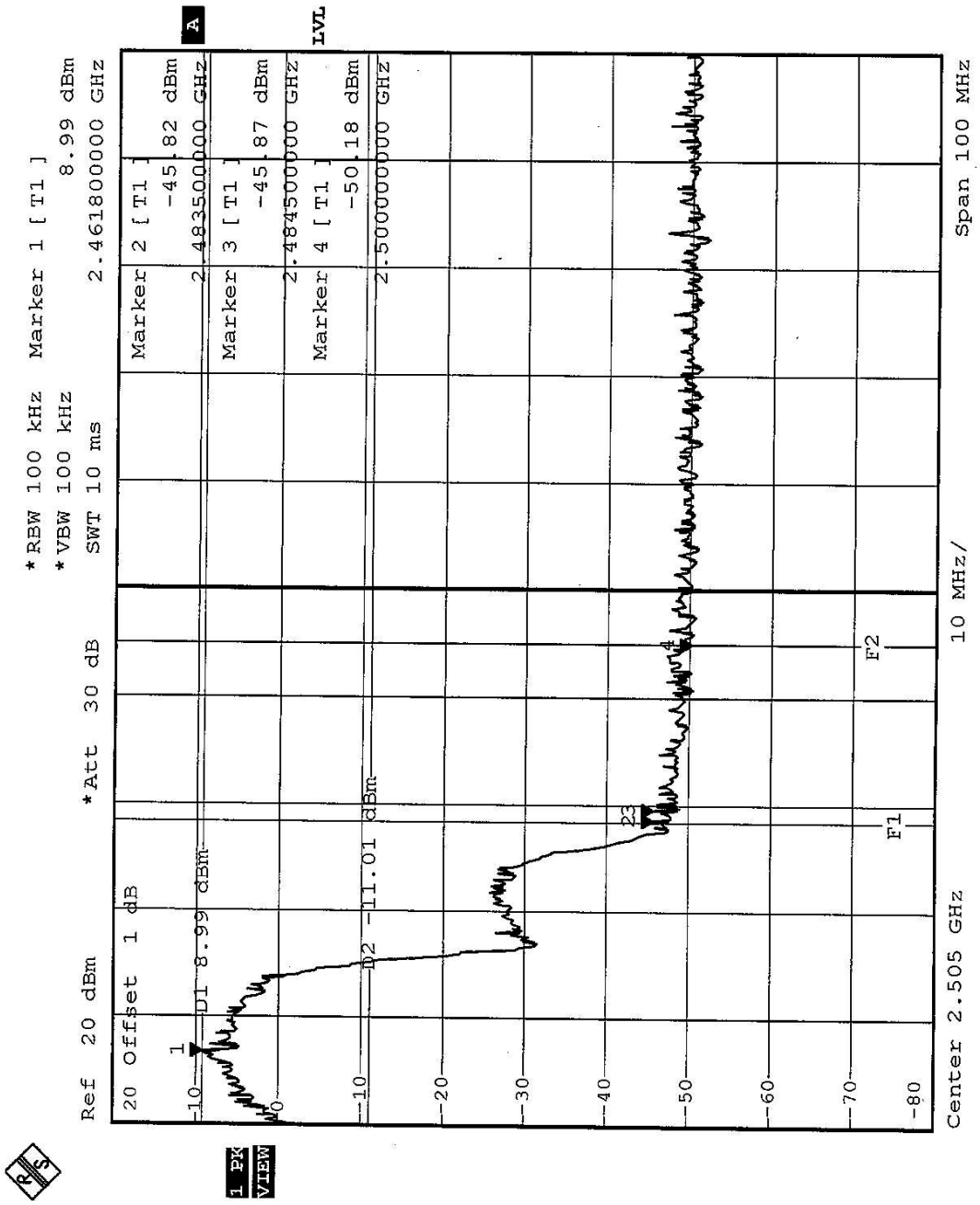
FOR MODULATION CCK

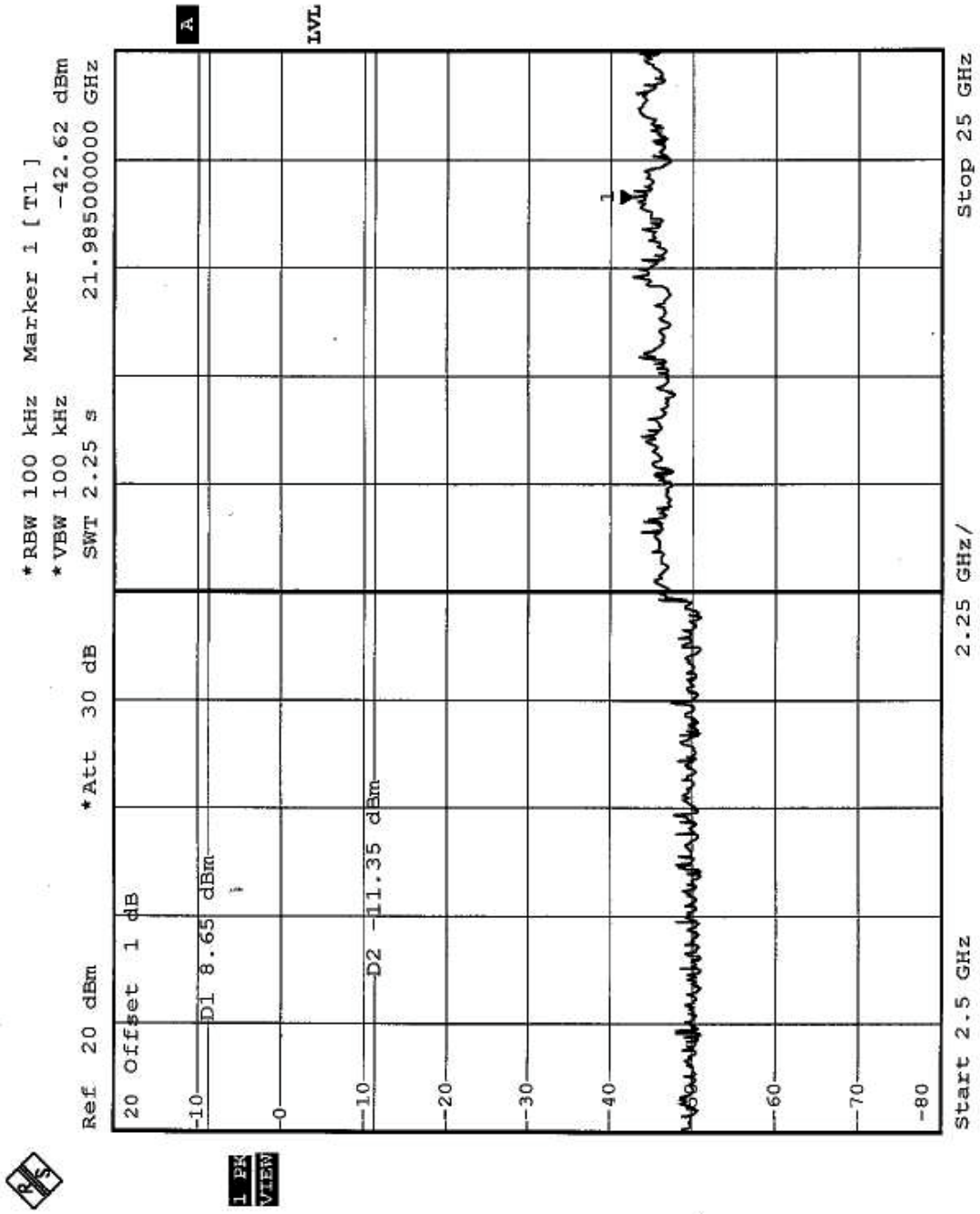
NOTE 1: The band edge emission plot of CCK technique on the following page shows 54.09dB delta between carrier maximum power and local maximum emission in restrict band (2.3868GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.8 is 105.02dBuV/m, so the maximum field strength in restrict band is 105.02-54.09=50.93dBuV/m, which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot of CCK on the following 2nd page shows 54.81dB 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 4.2.8 is 105.11dBuV/m, so the maximum field strength in restrict band is 105.11-54.81=50.30dBuV/m, which is under 54dBuV/m limit.


Ref 20 dBm
Att 30 dB
RBW 100 kHz
VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
8.84 dBm
2.412000000 GHz
Marker 2 [T1]
-24.14 dBm
2.396200000 GHz
Marker 3 [T1]
-46.24 dBm
2.390000000 GHz
Marker 4 [T1]
-45.25 dBm
2.386800000 GHz
D1 8.84 dBm
D2 -11.16 dBm
Center 2.371 GHz
10 MHz/
Span 100 MHz


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.15 s
Marker 1 [T1]
-43.01 dBm
21.807000000 GHz
20 Offset 1 dB
D1 8.54 dBm
D2 -11.46 dBm
LVL
A
1 PK
VIEW
Start 2.5 GHz
2.15 GHz/
Stop 24 GHz


Ref 20 dBm
20 Offset 1 dB
D1 8.99 dBm
D2 -11.01 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
8.99 dBm
2.461800000 GHz
Marker 2 [T1]
-45.82 dBm
2.483500000 GHz
Marker 3 [T1]
-45.87 dBm
2.484500000 GHz
Marker 4 [T1]
-50.18 dBm
2.500000000 GHz
A
LVL
1 PK
VIEW
F1
F2
Center 2.505 GHz
10 MHz/
Span 100 MHz


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.25 s
Marker 1 [T1]
-42.62 dBm
21.985000000 GHz
D1 8.65 dBm
D2 -11.35 dBm
1 PK
VIEW
A
LVL
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz