FCC TEST REPORT (15.247)

REPORT NO. :	RF940120A01
MODEL NO. :	R15D
RECEIVED :	Jan. 20, 2005
TESTED :	Jan. 22 ~ 27, 2005
ISSUED :	April 4, 2005

APPLICANT :	TWINHEAD INTERNATIONAL CORP.
ADDRESS :	10F, No. 550, Rueiguang Rd., Neihu Chiu, Taipei, Taiwan 114, R.O.C.

ISSUED BY :	Advance Data Technology Corporation
LAB LOCATION :	No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

ACCREDITED
No. 2177-01

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1. CERTIFICATION

PRODUCT:	Notebook PC
BRAND NAME:	Twinhead
MODEL NO.:	R15D
APPLICANT:	TWINHEAD INTERNATIONAL CORP.
TEST ITEM:	ENGINEERING SAMPLE
TESTED:	Jan. 22 ~ 27, 2005
STANDARDS:	FCC Part 15, Subpart C (Section 15.247) ANSI C63.4:2003

The above equipment has 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 : Annie Chang , **DATE:** April 4, 2005
(Annie Chang)

TECHNICAL ACCEPTANCE : , **DATE:** April 4, 2005
Responsible for EMI (Jun Wu)

APPROVED BY : , **DATE:** April 4, 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 (Section 15.247)			
Standard Section	**Test Type and Limit**	**Result**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is –11.05dB at 2.826MHz & 2.832MHz
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 –2.91dB at 585.95MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
15.247(d)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit

Note:1. The EUT was a Notebook PC (including wireless LAN card).
2. The EUT as operates in 2.412~2.462GHz, 5.150~5.350GHz and 5.725~5.850GHz frequencies band. This test report was recorded the RF parameters including 2.412~2.462GHz and 5.725~5.850GHz. For the 5.150~5.350GHz RF parameters was recorded in another test report.

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	Uncertainty
Conducted emissions	2.45 dB
Radiated emissions	3.74 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Notebook PC
MODEL NO.	R15D
POWER SUPPLY	20Vdc from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11a: 54/48/36/24/18/12/9/6Mbps
FREQUENCY RANGE	802.11b & 802.11g: 2.412 ~ 2.462GHz 802.11a: 5.150 ~ 5.350GHz and 5.725 ~ 5.850GHz
NUMBER OF CHANNEL	802.11b & 802.11g: 11 802.11a: 13
OUTPUT POWER	802.11b: 40.365mW 802.11g: 25.293mW 802.11a: 26.062mW for 5.150 ~ 5.350GHz 802.11a: 25.003mW for 5.725 ~ 5.850GHz
ANTENNA TYPE	PIFA antenna (UFL connector) For 2.412 ~ 2.462GHz frequency band: Antenna gain: 2.27dBi gain For 5.150 ~ 5.350GHz frequency band: Antenna gain: –2.35dBi gain For 5.725 ~ 5.850GHz frequency band: Antenna gain: –1.31dBi gain
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	N/A

NOTE:

1. The EUT is a Notebook PC (including wireless LAN card) which operates in both of the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.

2. The Notebook PC was powered by the following adapter:

Brand	LI SHIN
Model	LSE9802A2060
AC I/P	100-240V, 50/60Hz 1.5A
DC O/P	20V, 3.0A 60W MAX
Power Line	Non-shielded AC 1.5m, Shielded DC 1.5m with one core

3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in frequency range 2412 ~ 2462MHz:

For 802.11b/g: Eleven channels were provided to the EUT during the test:

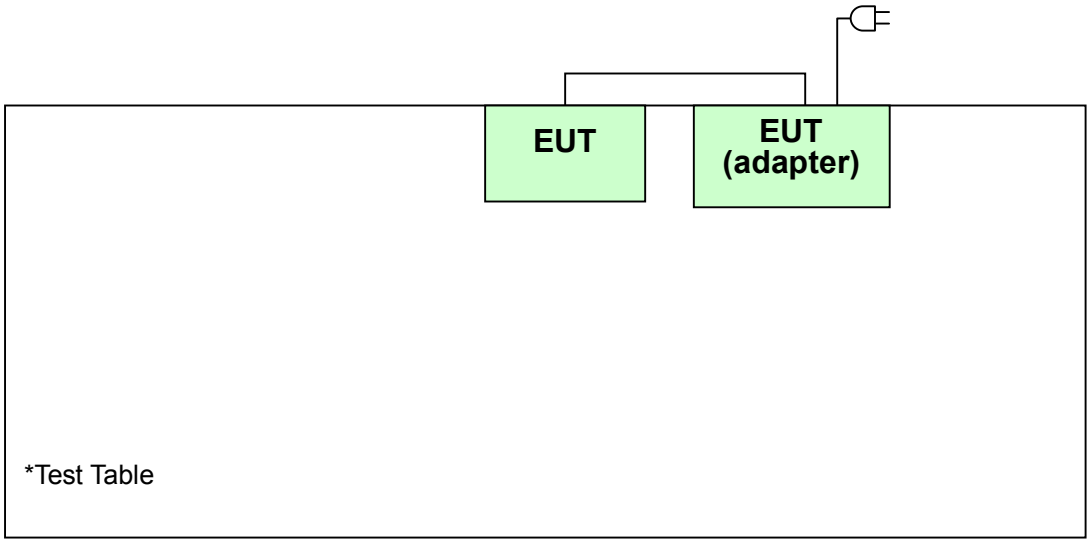
Channel	Frequency	Channel	Frequency
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

Operated in frequency range 5725 ~ 5850MHz:

For 802.11a: Five channels are provided to this EUT during the test:

Channel	Frequency
1	5745 MHz
2	5765 MHz
3	5785 MHz
4	5805 MHz
5	5825 MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

Applicable to				Description
PLC	RE<1G	RE≥1G	APCM	
x	x	x	x	

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
802.11a	1 to 5	3	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
802.11a	1 to 5	3	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
802.11a	1 to 5	1, 3, 5	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
802.11a	1 to 5	1, 5	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
802.11a	1 to 5	1, 3, 5	OFDM	BPSK	6

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Notebook PC (including wireless LAN card). 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 its power adapter.

4. TEST TYPES AND RESULTS (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	ESHS 30	828765/002	July 4, 2005
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	835239/001	Mar. 31, 2005
LISN With Adapter (for EUT)	AD10	C09Ada-001	Mar. 31, 2005
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	835239/002	Apr. 18, 2005
ROHDE & SCHWARZ 4-wire ISN	ENY41	935154/007	Apr. 20, 2005
ROHDE & SCHWARZ 2-wire ISN	ENY22	833823/026	Apr. 20, 2005
Software	ADT_Cond_V7.3.2	NA	NA
Software	ADT_ISN_V7.3.2	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	May 9, 2005
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 17, 2005

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in ADT Shielded Room No. 9.
3. The VCCI Site Registration No. 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.

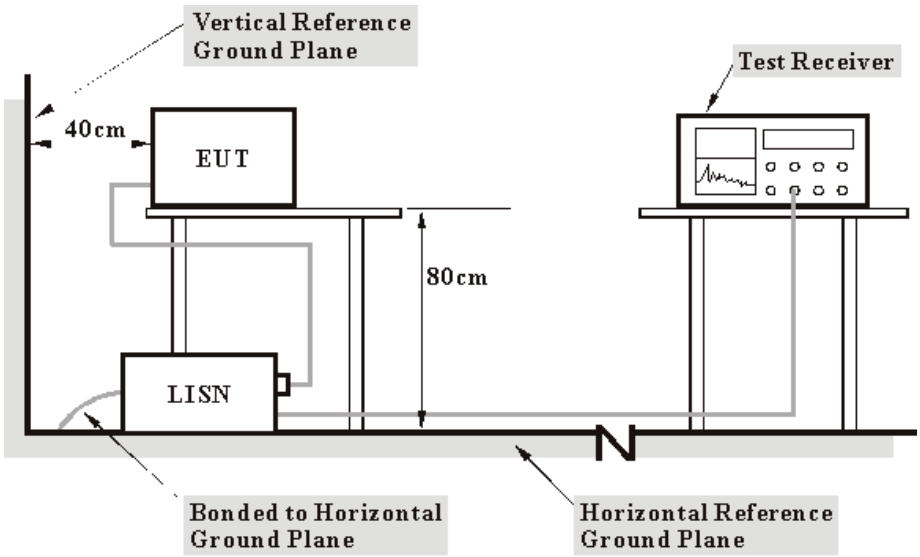
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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. Turned on the power of all equipment.
b. EUT ran a test program to enable to transmit/receive condition continuously at specific channel frequency.
c. EUT sent “H” messages to its screen.
d. Step c was repeated.

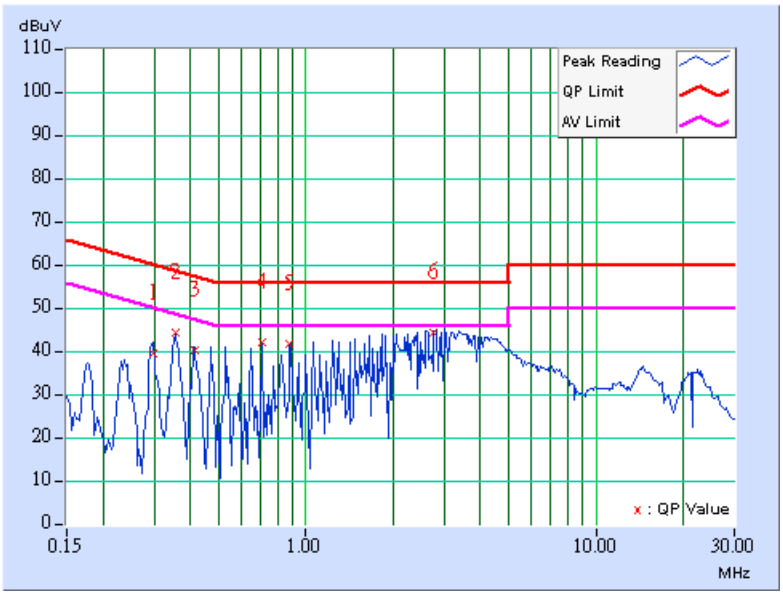
4.1.7 TEST RESULTS

Conducted Worst-Case Data

EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	1	**6dB BANDWIDTH**	9kHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	**TESTED BY**	Jamison Chan

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]	(dB)	[dB (uV)] Q.P.	AV.	[dB (uV)] Q.P.	AV.	[dB (uV)] Q.P.	AV.	(dB) Q.P.	AV.
1	0.297	0.20	39.31	-	39.51	-	60.33	50.33	-20.82	-
2	0.354	0.20	44.08	-	44.28	-	58.87	48.87	-14.59	-
3	0.414	0.20	40.20	-	40.40	-	57.57	47.57	-17.17	-
4	0.708	0.20	41.84	-	42.04	-	56.00	46.00	-13.96	-
5	0.882	0.20	41.50	-	41.70	-	56.00	46.00	-14.30	-
6	2.769	0.24	44.13	-	44.37	-	56.00	46.00	-11.63	-

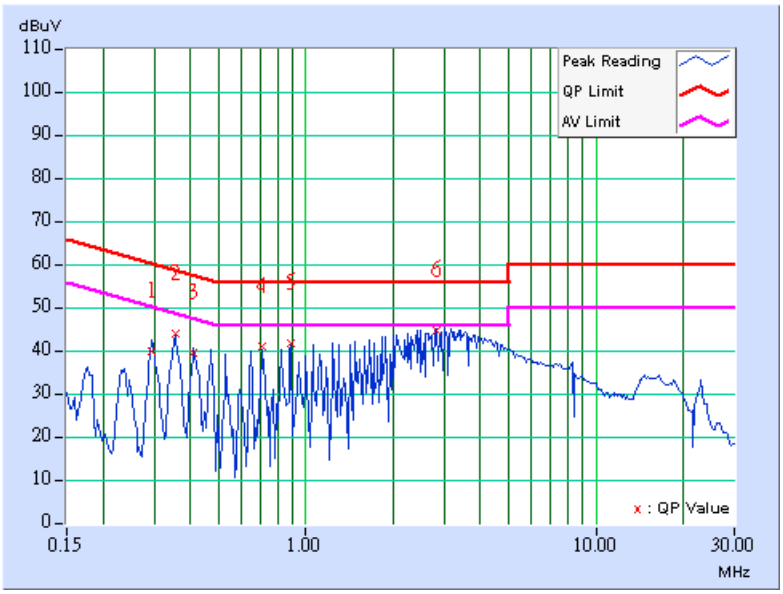
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Notebook PC	MODEL NO.	R15D
CHANNEL	1	6dB BANDWIDTH	9kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	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	0.294	0.20	39.67	-	39.87	-	60.41	50.41	-20.54	-
2	0.354	0.20	43.76	-	43.96	-	58.87	48.87	-14.91	-
3	0.411	0.20	39.36	-	39.56	-	57.63	47.63	-18.07	-
4	0.708	0.20	40.75	-	40.95	-	56.00	46.00	-15.05	-
5	0.885	0.20	41.58	-	41.78	-	56.00	46.00	-14.22	-
6	**2.832**	**0.30**	**44.65**	**-**	**44.95**	**-**	**56.00**	**46.00**	**-11.05**	**-**

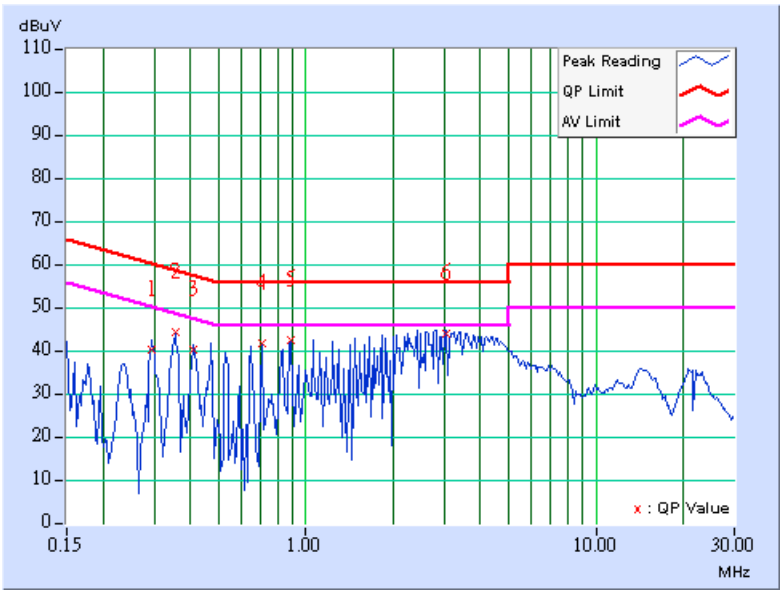
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Notebook PC	MODEL NO.	R15D
CHANNEL	6	6dB BANDWIDTH	9kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	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	0.294	0.20	40.11	-	40.31	-	60.41	50.41	-20.10	-
2	0.354	0.20	44.06	-	44.26	-	58.87	48.87	-14.61	-
3	0.411	0.20	40.00	-	40.20	-	57.63	47.63	-17.43	-
4	0.708	0.20	41.76	-	41.96	-	56.00	46.00	-14.04	-
5	0.885	0.20	42.40	-	42.60	-	56.00	46.00	-13.40	-
6	3.063	0.25	43.98	-	44.23	-	56.00	46.00	-11.77	-

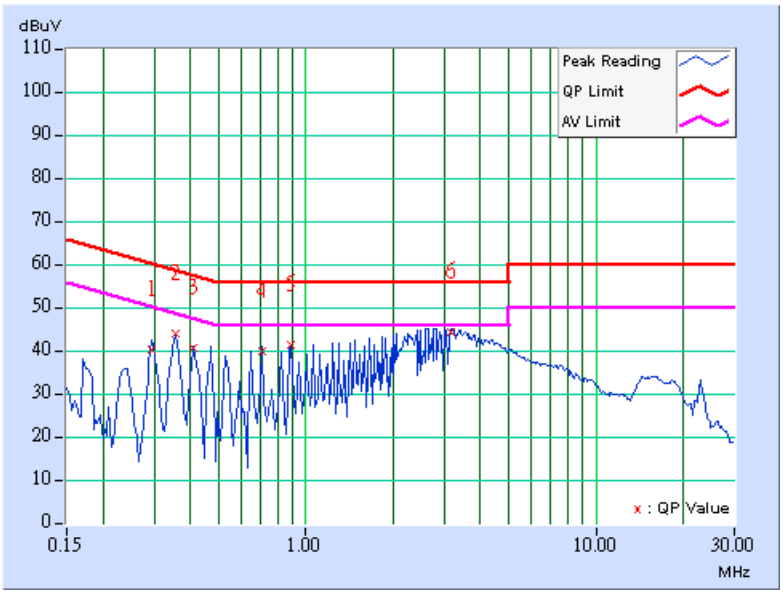
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Notebook PC	MODEL NO.	R15D
CHANNEL	6	6dB BANDWIDTH	9kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	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	0.294	0.20	39.99	-	40.19	-	60.41	50.41	-20.22	-
2	0.354	0.20	43.68	-	43.88	-	58.87	48.87	-14.99	-
3	0.411	0.20	40.26	-	40.46	-	57.63	47.63	-17.17	-
4	0.705	0.20	39.87	-	40.07	-	56.00	46.00	-15.93	-
5	0.885	0.20	41.26	-	41.46	-	56.00	46.00	-14.54	-
6	3.183	0.30	44.00	-	44.30	-	56.00	46.00	-11.70	-

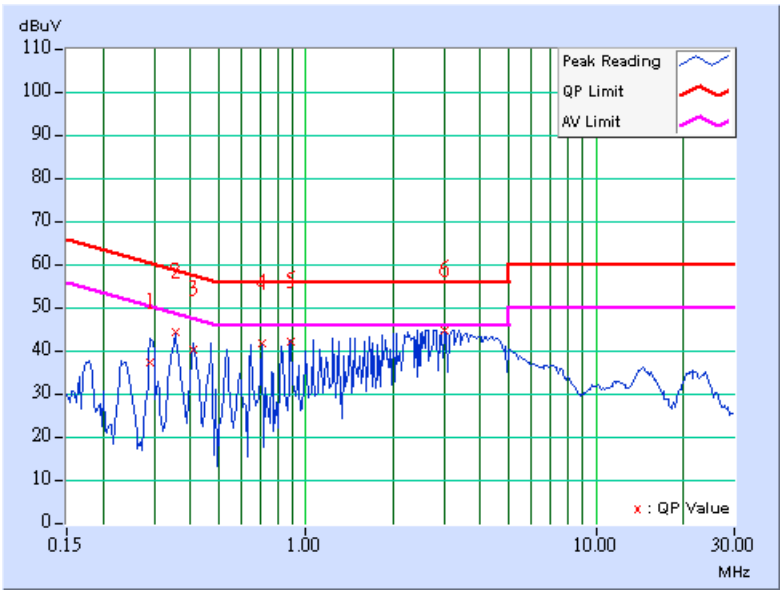
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	11	**6dB BANDWIDTH**	9kHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	**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	0.291	0.20	37.29	-	37.49	-	60.50	50.50	-23.01	-
2	0.354	0.20	44.06	-	44.26	-	58.87	48.87	-14.61	-
3	0.411	0.20	40.30	-	40.50	-	57.63	47.63	-17.13	-
4	0.708	0.20	41.66	-	41.86	-	56.00	46.00	-14.14	-
5	0.885	0.20	42.14	-	42.34	-	56.00	46.00	-13.66	-
6	3.003	0.25	44.60	-	44.85	-	56.00	46.00	-11.15	-

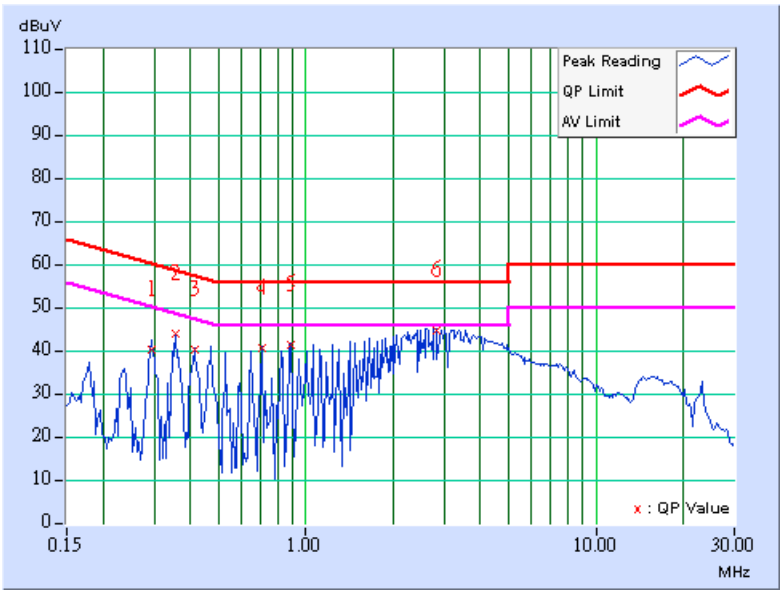
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Notebook PC	MODEL NO.	R15D
CHANNEL	11	6dB BANDWIDTH	9kHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	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	0.294	0.20	39.95	-	40.15	-	60.41	50.41	-20.26	-
2	0.354	0.20	43.64	-	43.84	-	58.87	48.87	-15.03	-
3	0.414	0.20	40.22	-	40.42	-	57.57	47.57	-17.15	-
4	0.708	0.20	40.53	-	40.73	-	56.00	46.00	-15.27	-
5	0.885	0.20	41.18	-	41.38	-	56.00	46.00	-14.62	-
6	2.826	0.30	44.55	-	44.85	-	56.00	46.00	-11.15	-

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	8590L	3544A01176	May. 31, 2005
HP Preamplifier	8447D	2944A08485	Apr. 26, 2005
HP Preamplifier	8449B	3008A01924	Sep. 19, 2005
HP Preamplifier	8449B	3008A01638	Sep. 30, 2005
SCHAFFNER TEST RECEIVER	SCR 3501	408	Jan. 03, 2006
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 03, 2006
SCHWARZBECK Tunable Dipole Antenna	VHA 9103	NA	Oct. 29, 2005
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
CHASE BILOG Antenna	CBL6112A	2221	Oct 19, 2005
EMCO Horn Antenna	3115	6714	Oct. 28, 2005
EMCO Horn Antenna	3115	9312-4192	Feb. 28, 2006
EMCO Turn Table	1060	1115	NA
CHANCE Tower	CM-AT40	CM-A010	NA
Software	ADT_Radiated_V7.5.14	NA	NA
ADT RF Switches	EM-H-01-1	1002	Dec. 02, 2005
TIMES RF cable	LMR-600	CABLE-ST5-01	Dec. 02, 2005

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 horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. 5.
4. The VCCI Site Registration No. R-1039.

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 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.

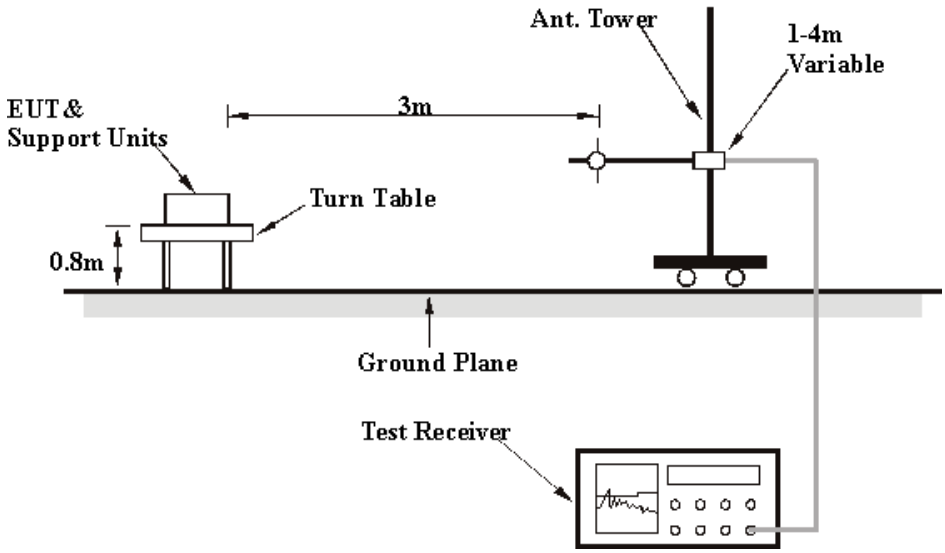
NOTE:

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 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	Notebook PC	MODEL NO.	R15D
CHANNEL	11	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1002 hPa	TESTED BY	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	195.23	38.37 QP	43.50	-5.13	2.00 H	67	28.18	10.19
2	228.28	41.45 QP	46.00	-4.55	2.00 H	70	29.40	12.05
3	259.38	40.19 QP	46.00	-5.81	2.00 H	58	25.61	14.58
4	391.56	41.81 QP	46.00	-4.19	1.00 H	265	23.73	18.08
5	455.71	40.00 QP	46.00	-6.00	1.88 H	205	20.84	19.16
6	521.80	39.88 QP	46.00	-6.12	2.00 H	64	19.21	20.67
7	**585.95**	**43.09 QP**	**46.00**	**-2.91**	**3.00 H**	**145**	**20.99**	**22.10**
8	681.20	40.56 QP	46.00	-5.44	1.02 H	190	17.36	23.20
9	716.19	41.39 QP	46.00	-4.61	1.11 H	283	17.78	23.61
10	813.39	41.92 QP	46.00	-4.08	2.01 H	205	17.52	24.40

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	53.33	35.88 QP	40.00	-4.12	1.12 V	223	27.09	8.79
2	142.75	36.98 QP	43.50	-6.52	1.98 V	25	25.40	11.58
3	222.44	42.81 QP	46.00	-3.19	1.03 V	187	31.12	11.69
4	253.55	41.68 QP	46.00	-4.32	1.00 V	187	27.83	13.85
5	444.05	40.06 QP	46.00	-5.94	2.00 V	289	21.11	18.95
6	455.71	42.49 QP	46.00	-3.51	1.00 V	4	23.33	19.16
7	585.95	41.36 QP	46.00	-4.64	1.03 V	145	19.26	22.10
8	652.04	42.34 QP	46.00	-3.66	1.00 V	4	19.49	22.85
9	716.19	42.74 QP	46.00	-3.26	1.00 V	49	19.13	23.61
10	871.70	41.26 QP	46.00	-4.74	1.15 V	214	16.30	24.96

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	Notebook PC	**MODEL NO.**	R15D
CHANNEL	1	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	CCK	**TRANSFER RATE**	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1009 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	44.43 PK	74.00	-29.57	1.10 H	58	13.33	31.10
1	2390.00	36.84 AV	54.00	-17.16	1.10 H	58	5.74	31.10
2	*2412.00	108.01 PK			1.10 H	58	76.85	31.16
2	*2412.00	100.42 AV			1.10 H	58	69.26	31.16
3	4824.00	46.22 PK	74.00	-27.78	1.05 H	12	9.08	37.14
3	4824.00	34.08 AV	54.00	-19.92	1.05 H	12	-3.06	37.14

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	42.81 PK	74.00	-31.19	1.00 V	233	10.05	32.76
1	2390.00	34.19 AV	54.00	-19.81	1.00 V	233	1.43	32.76
2	*2412.00	106.39 PK			1.00 V	233	73.56	32.83
2	*2412.00	97.77 AV			1.00 V	233	64.94	32.83
3	4824.00	47.54 PK	74.00	-26.46	1.00 V	115	8.93	38.61
3	4824.00	35.04 AV	54.00	-18.96	1.00 V	115	-3.57	38.61

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	Notebook PC	**MODEL NO.**	R15D
CHANNEL	6	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	CCK	**TRANSFER RATE**	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1009 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	108.23 PK			1.09 H	56	77.00	31.23
1	*2437.00	100.70 AV			1.09 H	56	69.47	31.23
2	4874.00	46.80 PK	74.00	-27.20	1.21 H	69	9.51	37.28
2	4874.00	34.43 AV	54.00	-19.57	1.21 H	69	-2.86	37.28

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	106.38 PK			1.00 V	248	73.48	32.90
1	*2437.00	98.94 AV			1.00 V	248	66.04	32.90
2	4874.00	47.37 PK	74.00	-26.63	1.00 V	261	8.63	38.73
2	4874.00	36.31 AV	54.00	-17.69	1.00 V	261	-2.43	38.73

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	Notebook PC	**MODEL NO.**	R15D
CHANNEL	11	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	CCK	**TRANSFER RATE**	11Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1009 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.37 PK			1.10 H	115	78.08	31.29
1	*2462.00	101.86 AV			1.10 H	115	70.57	31.29
2	2483.50	45.54 PK	74.00	-28.46	1.10 H	115	14.19	31.35
2	2483.50	38.03 AV	54.00	-15.97	1.10 H	115	6.68	31.35
3	4924.00	47.01 PK	74.00	-26.99	1.11 H	112	9.58	37.43
3	4924.00	35.10 AV	54.00	-18.90	1.11 H	112	-2.33	37.43

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	108.89 PK			1.03 V	106	75.91	32.98
1	*2462.00	101.39 AV			1.03 V	106	68.41	32.98
2	2483.50	45.06 PK	74.00	-28.94	1.03 V	106	12.02	33.04
2	2483.50	37.56 AV	54.00	-16.44	1.03 V	106	4.52	33.04
3	4924.00	48.34 PK	74.00	-25.66	1.03 V	211	9.48	38.86
3	4924.00	36.37 AV	54.00	-17.63	1.03 V	211	-2.49	38.86

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	Notebook PC	**MODEL NO.**	R15D
CHANNEL	1	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1009 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	54.66 PK	74.00	-19.34	1.16 H	108	22.79	31.87
1	2390.00	43.81 AV	54.00	-10.19	1.16 H	108	11.94	31.87
2	*2412.00	104.48 PK			1.16 H	108	72.52	31.96
2	*2412.00	93.63 AV			1.16 H	108	61.67	31.96
3	4824.00	48.28 PK	74.00	-25.72	1.02 H	155	37.83	10.45

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	54.39 PK	74.00	-19.61	1.03 V	243	22.52	31.87
1	2390.00	43.06 AV	54.00	-10.94	1.03 V	243	11.19	31.87
2	*2412.00	104.21 PK			1.03 V	243	70.46	31.96
2	*2412.00	92.88 AV			1.03 V	243	59.44	31.96
3	4824.00	48.12 PK	74.00	-25.88	1.00 V	358	10.29	37.83

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	Notebook PC	**MODEL NO.**	R15D
CHANNEL	6	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1009 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	104.15 PK			1.15 H	116	72.09	32.06
1	*2437.00	94.99 AV			1.15 H	116	62.93	32.06
2	4874.00	46.65 PK	74.00	-27.35	1.08 H	58	8.67	37.98

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	102.51 PK			1.00 V	251	70.45	32.06
1	*2437.00	93.20 AV			1.00 V	251	61.14	32.06
2	4874.00	47.50 PK	74.00	-26.50	1.06 V	259	9.52	37.98

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	Notebook PC	**MODEL NO.**	R15D
CHANNEL	11	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1009 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	104.24 PK			1.09 H	122	72.08	32.16
1	*2462.00	96.10 AV			1.09 H	122	63.94	32.16
2	2486.70	51.38 PK	74.00	-22.62	1.09 H	122	19.12	32.26
2	2486.70	43.95 AV	54.00	-10.05	1.09 H	122	11.69	32.26
3	4924.00	47.38 PK	74.00	-26.62	1.06 H	255	9.24	38.14

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	102.04 PK			1.22 V	247	69.88	32.16
1	*2462.00	94.93 AV			1.22 V	247	62.77	32.16
2	2486.70	49.83 PK	74.00	-24.17	1.22 V	247	17.58	32.25
2	2486.70	42.72 AV	54.00	-11.28	1.22 V	247	10.47	32.25
3	4924.00	48.19 PK	74.00	-25.81	1.01 V	232	10.05	38.14

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	FSP 40	100036	Mar 18. 2006

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.

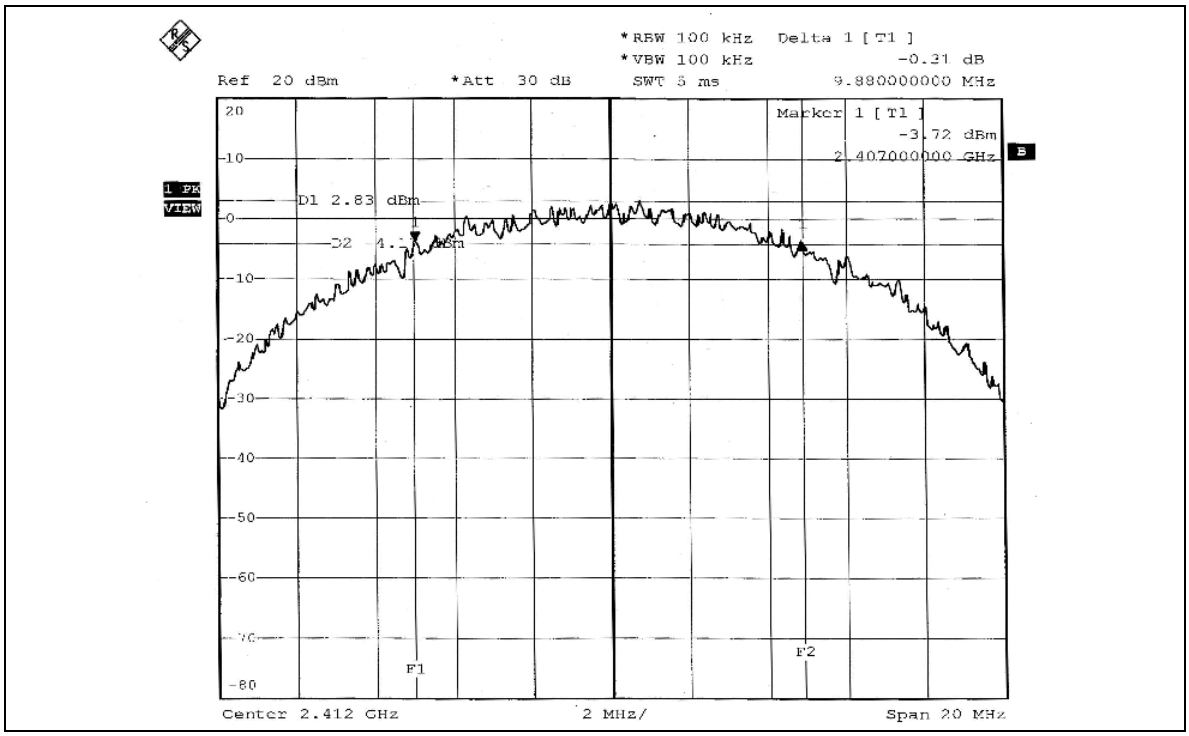
4.3.7 TEST RESULTS

802.11b DSSS modulation

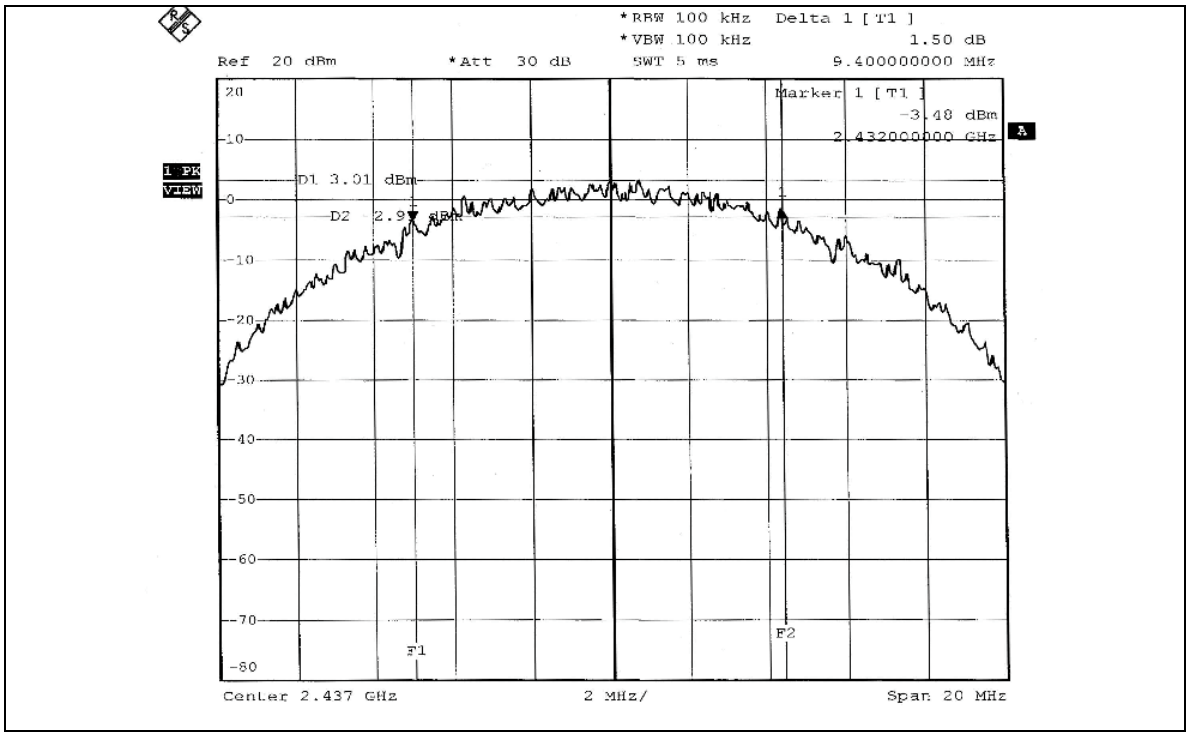
EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.88	0.5	PASS
6	2437	9.40	0.5	PASS
11	2462	9.56	0.5	PASS

CH1



CH6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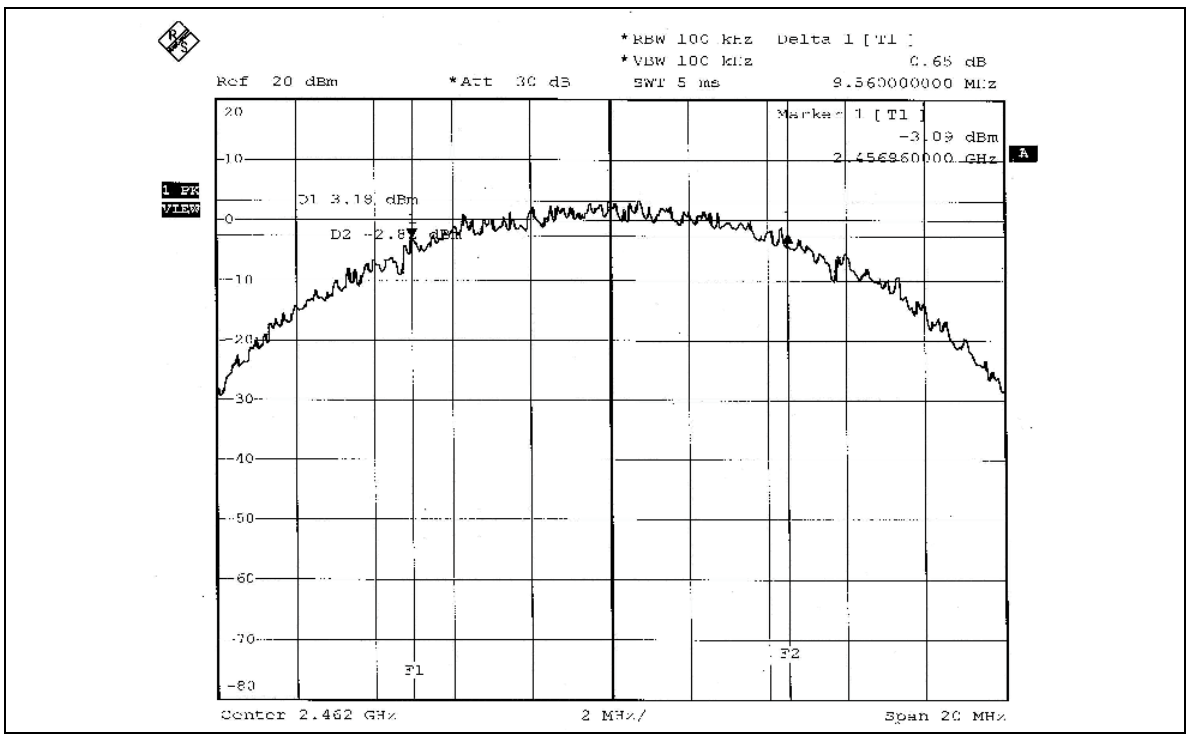
Delta 1 [T1]
*VBW 100 kHz
1.50 dB
Ref 20 dBm
*Att 30 dB
SWT 5 ms
9.400000000 MHz
Marker 1 [T1]
-3.48 dBm
2.432000000 GHz
D1 3.01 dBm
D2 2.9 dBm
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz

CH11

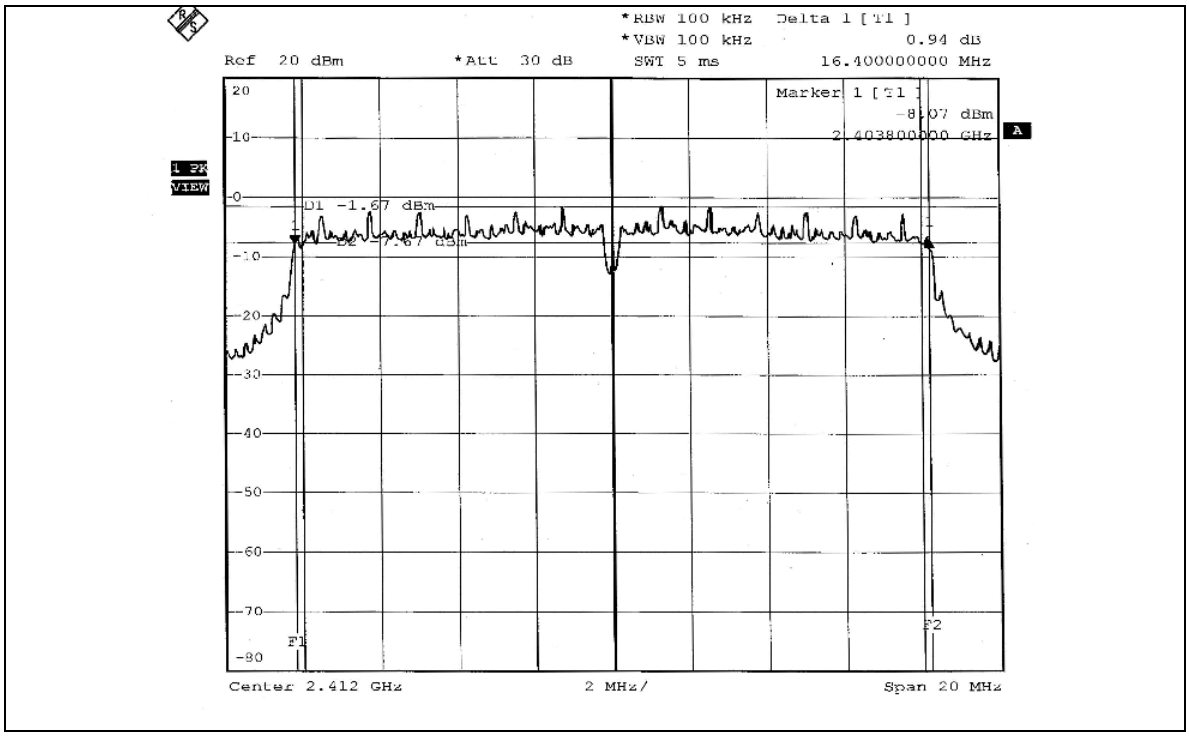

*RBW 100 kHz
Delta 1 [T1]
*VBW 100 kHz
0.65 dB
Ref 20 dBm
*Att 30 dB
SWT 5 ms
9.560000000 MHz
Marker 1 [T1]
-3.09 dBm
2.456960000 GHz
D1 3.19 dBm
D2 -2.8 dBm
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz

802.11g OFDM modulation

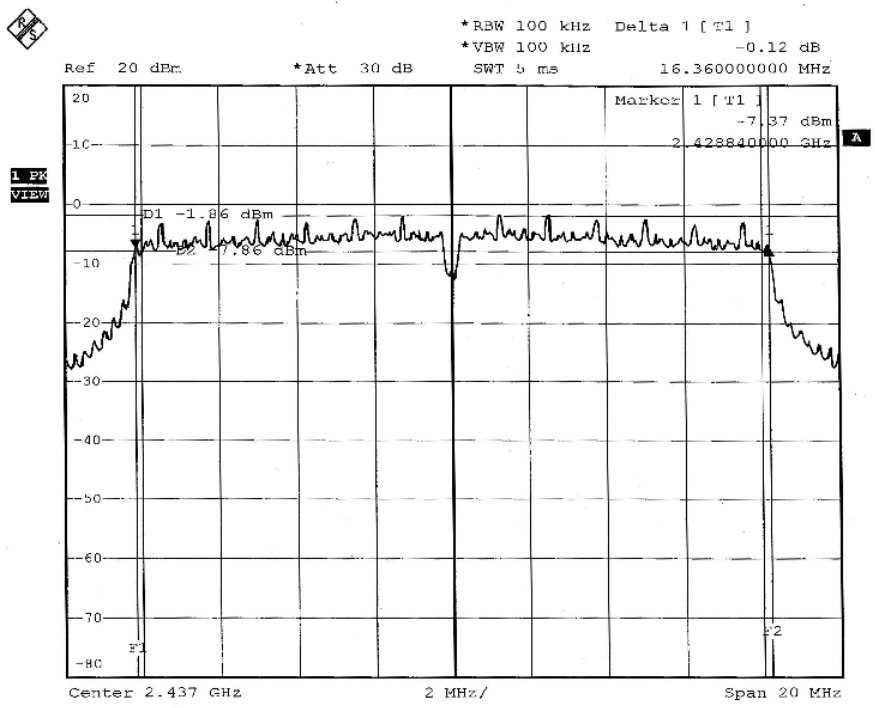
EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.40	0.5	PASS
6	2437	16.36	0.5	PASS
11	2462	15.12	0.5	PASS

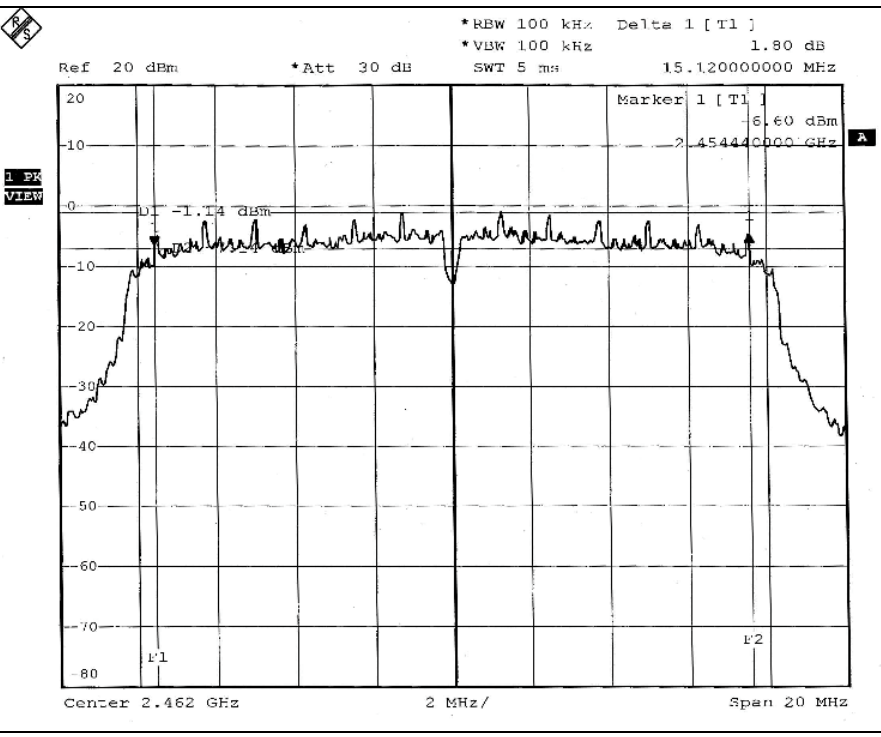
CH1



CH6


*RBW 100 kHz
Delta 1 [T1]
*VBW 100 kHz
-0.12 dB
Ref 20 dBm
*Att 30 dB
SWT 5 ms
16.360000000 MHz
Marker 1 [T1]
-7.37 dBm
2.428840000 GHz
1 PK
VIEW
D1 -1.86 dBm
D2 -7.86 dBm
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz

CH11


*RBW 100 kHz
Delta 1 [T1]
*VBW 100 kHz
1.80 dB
Ref 20 dBm
*Att 30 dB
SWT 5 ms
15.120000000 MHz
Marker 1 [T1]
-6.60 dBm
2.454440000 GHz
1 PK
VIEW
D1 -1.14 dBm
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz

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
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	Mar 18. 2006
ROHDE & SCHWARZ Signal Generator	SMR40	100231	Mar. 17. 2006
Tektronix Oscilloscope	TDS1012	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.

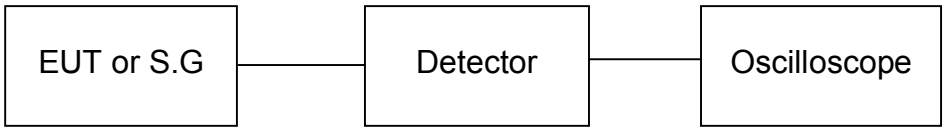
4.4.3 TEST PROCEDURES

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

802.11b DSSS modulation

EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	40.365	16.06	30	PASS
6	2437	39.537	15.97	30	PASS
11	2462	39.994	16.02	30	PASS

802.11g OFDM modulation

EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	25.119	14.00	30	PASS
6	2437	25.235	14.02	30	PASS
11	2462	25.293	14.03	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
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2006

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

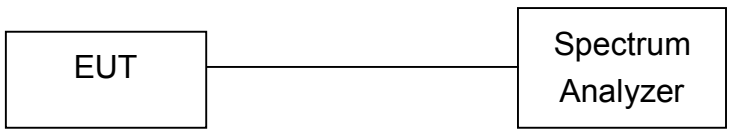
4.5.3 TEST PROCEDURE

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.

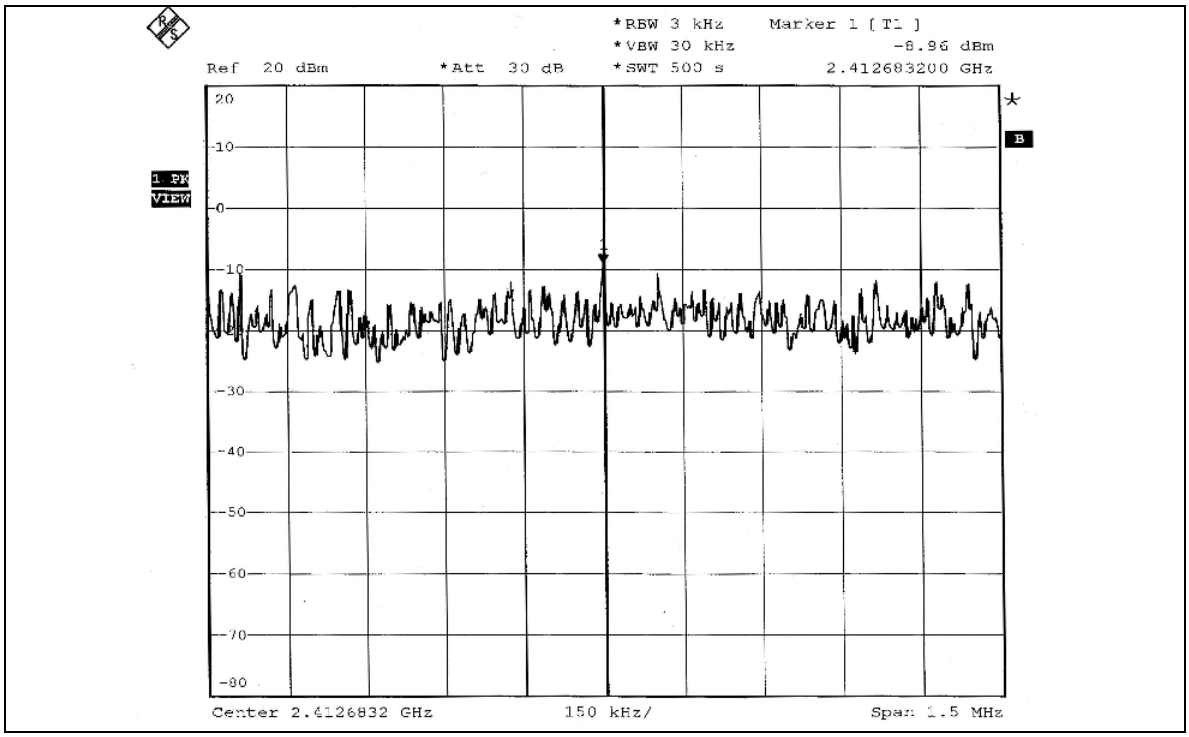
4.5.7 TEST RESULTS

802.11b DSSS modulation

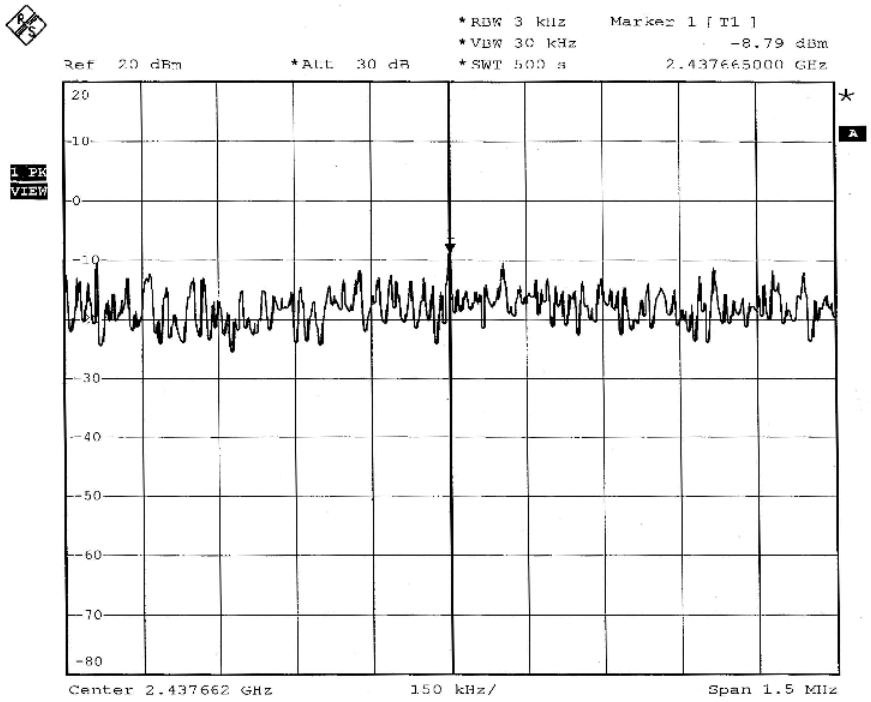
EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	CCK	TRANSFER RATE	11Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-8.96	8	PASS
6	2437	-8.79	8	PASS
11	2462	-8.87	8	PASS

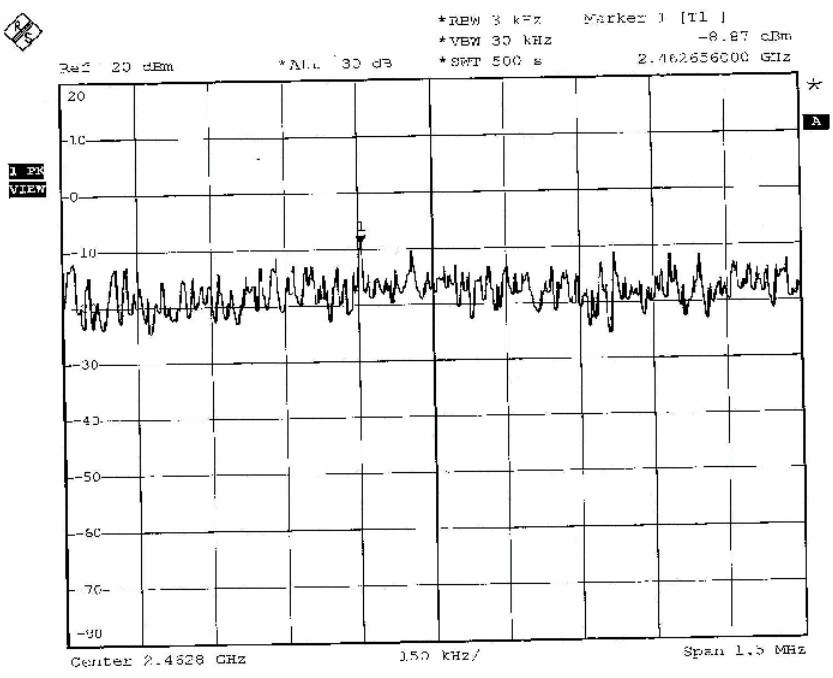
CH1



CH6


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-8.79 dBm
2.437665000 GHz
Ref 20 dBm
*Att 30 dB
1 PK VIEW
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.437662 GHz
150 kHz/
Span 1.5 MHz

CH11

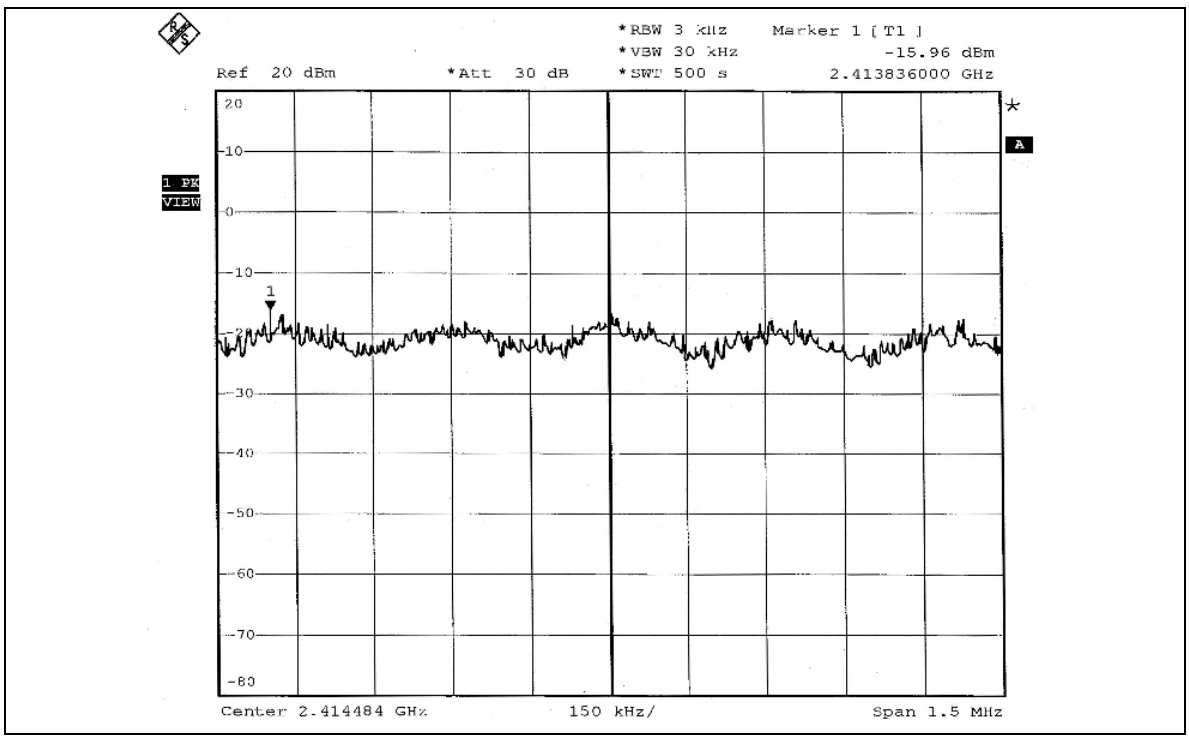

*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-8.87 dBm
2.462656000 GHz
Ref 20 dBm
*Att 30 dB
1 PK VIEW
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.4628 GHz
150 kHz/
Span 1.5 MHz

802.11g OFDM modulation

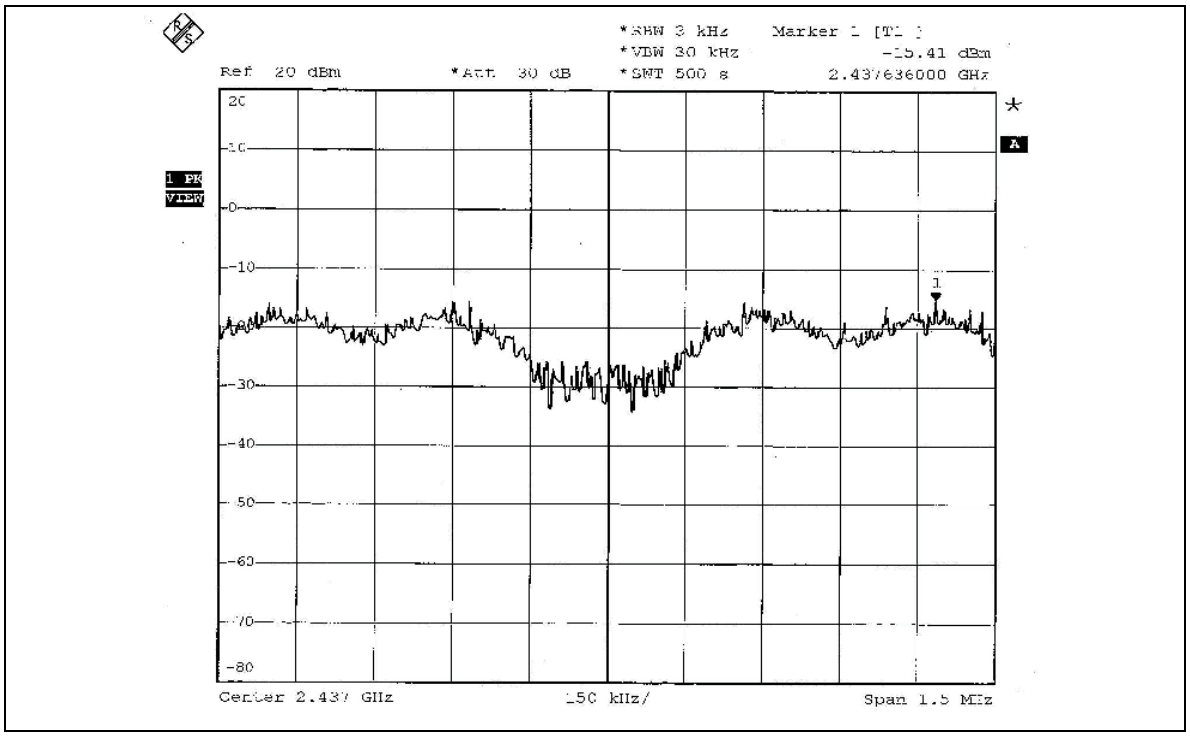
EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-15.96	8	PASS
6	2437	-15.41	8	PASS
11	2462	-15.72	8	PASS

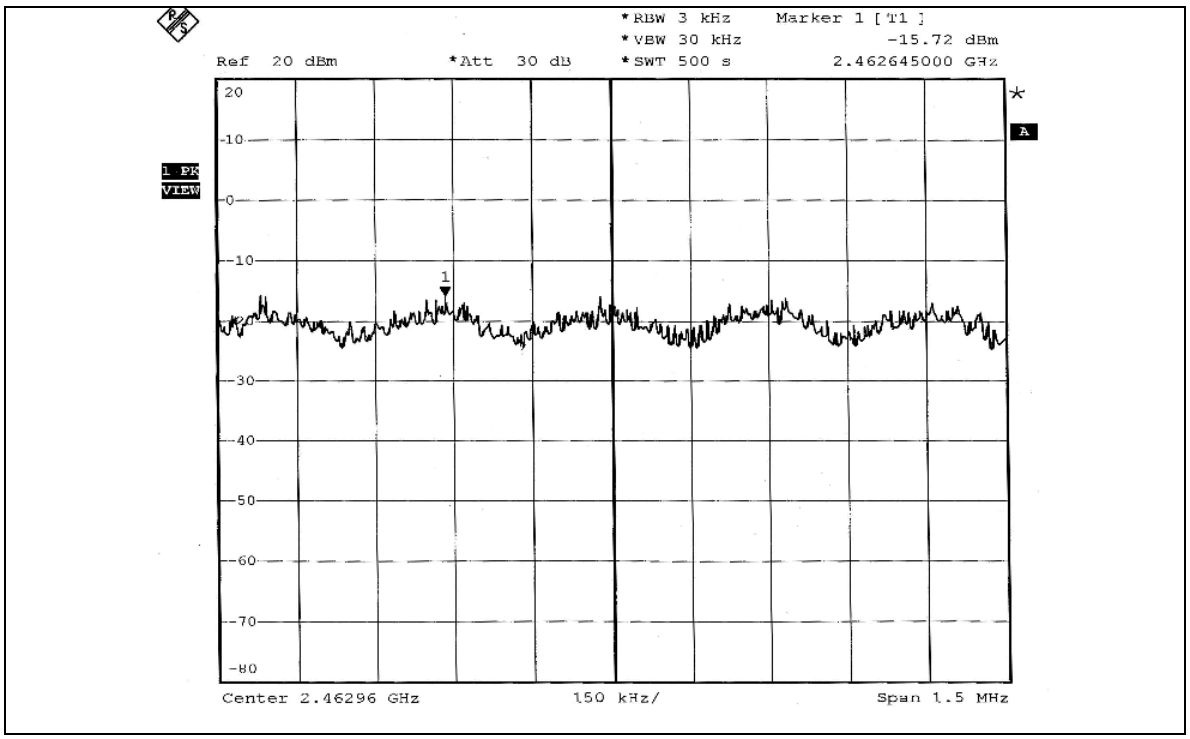
CH1



CH6


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-15.41 dBm
2.437636000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
A
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.437 GHz
150 kHz/
Span 1.5 MHz

CH11


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-15.72 dBm
2.462645000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
A
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.46296 GHz
150 kHz/
Span 1.5 MHz

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	FSP 40	100036	Mar 18. 2006

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 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).

802.11b DSSS modulation

NOTE 1: The band edge emission plot on page 49 shows 52.26dBc between carrier maximum power and local maximum emission in restrict band (2.3886GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 108.01dBuV/m (Peak), so the maximum field strength in restrict band is 108.01-52.26=55.75dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on page 49 shows 62.12dBc between carrier maximum power and local maximum emission in restrict band (2.3600GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 100.42dBuV/m (Average), so the maximum field strength in restrict band is 100.42-62.12=38.3dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on page 50 shows 51.27dBc between carrier maximum power and local maximum emission in restrict band (2.4871GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 109.37dBuV/m (Peak), so the maximum field strength in restrict band is 109.37-51.27=58.10dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on page 51 shows 62.24dBc 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 101.86dBuV/m (Average), so the maximum field strength in restrict band is 101.86-62.24=39.62dBuV/m which is under 54dBuV/m limit.

802.11g OFDM modulation

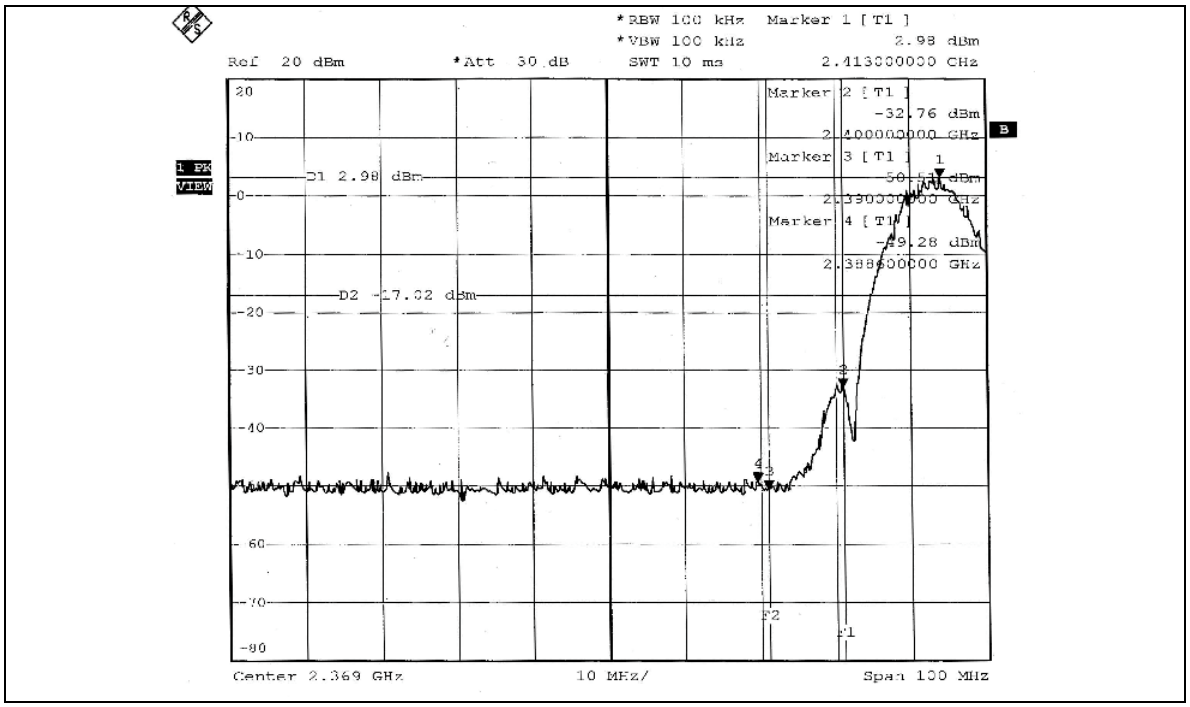
NOTE 1: The band edge emission plot on page 52 shows 46.61dBc delta between carrier maximum power and local maximum emission in restrict band (2.3896GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 104.48dBuV/m (Peak), so the maximum field strength in restrict band is 104.48-46.61=57.87dBuV/m which is under 74dBuV/m limit.

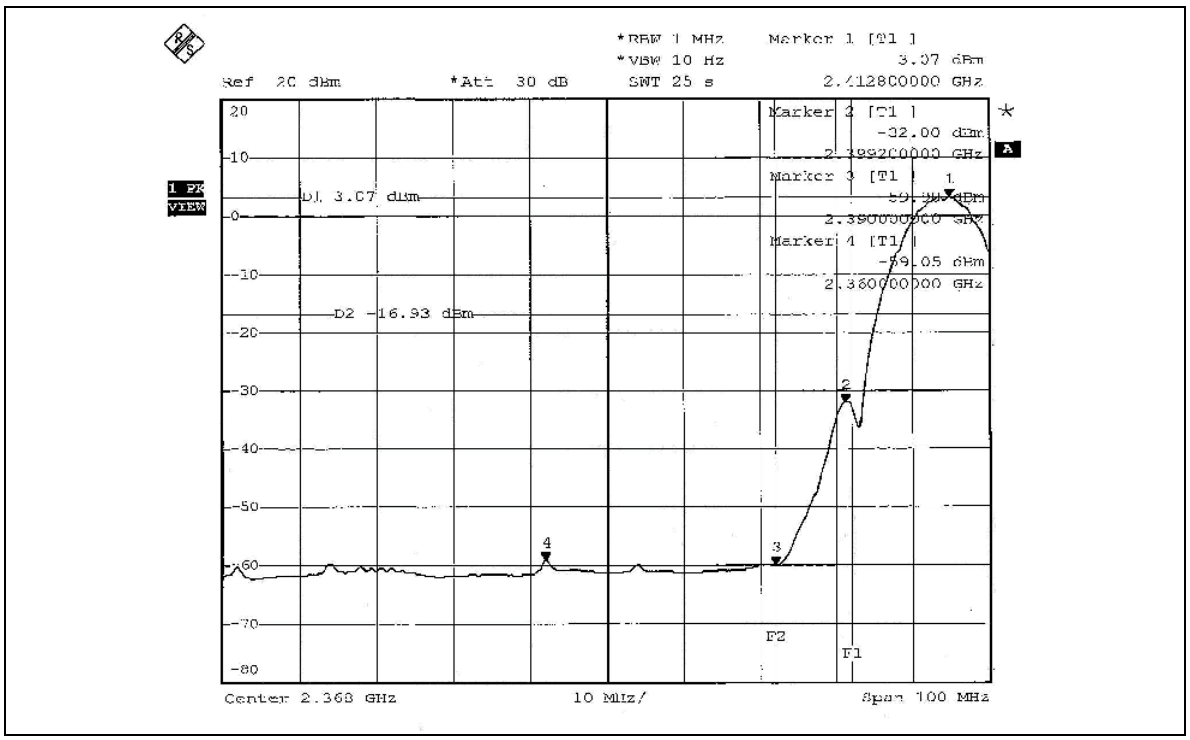
The band edge emission plot on page 52 shows 50.22dBc delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 93.63dBuV/m (Average), so the maximum field strength in restrict band is 93.63-50.22=43.41dBuV/m which is under 54dBuV/m limit.

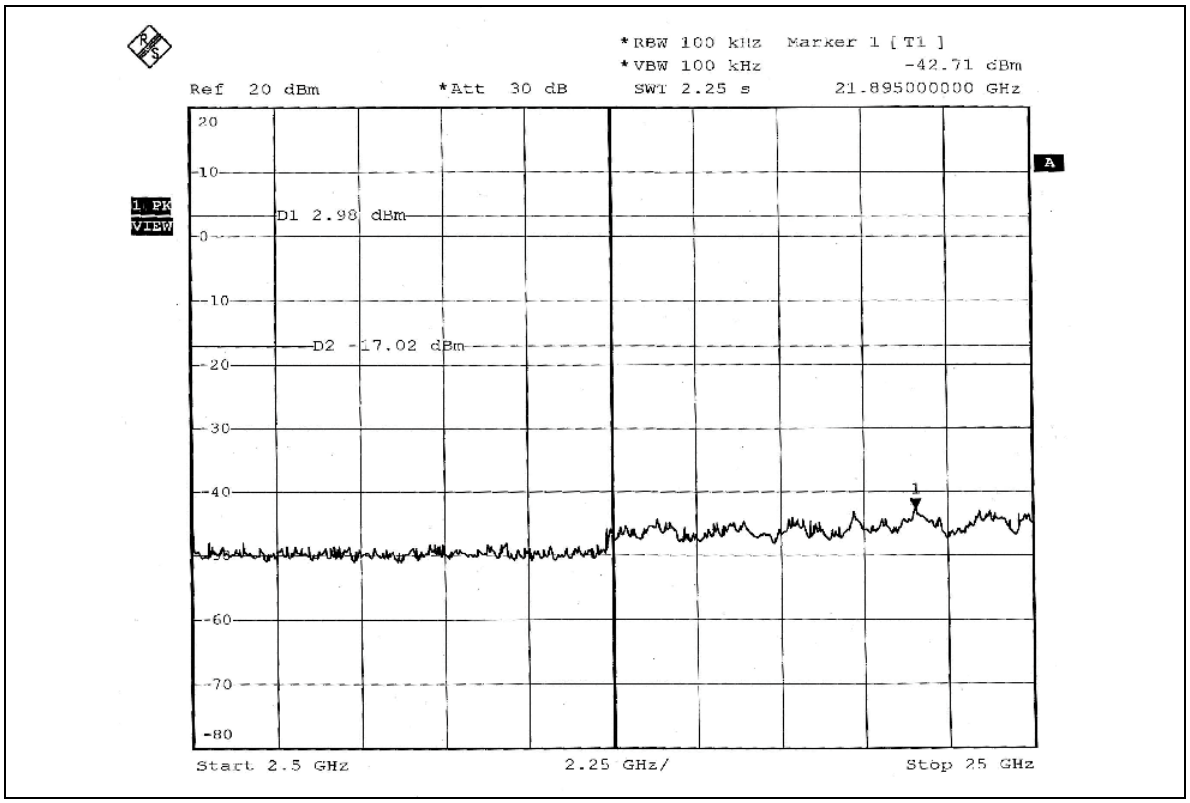
NOTE 2: The band edge emission plot on page 53 shows 45.21dBc delta between carrier maximum power and local maximum emission in restrict band (2.4865GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 104.24dBuV/m (Peak), so the maximum field strength in restrict band is 104.24-45.21=59.03dBuV/m which is under 74dBuV/m limit.

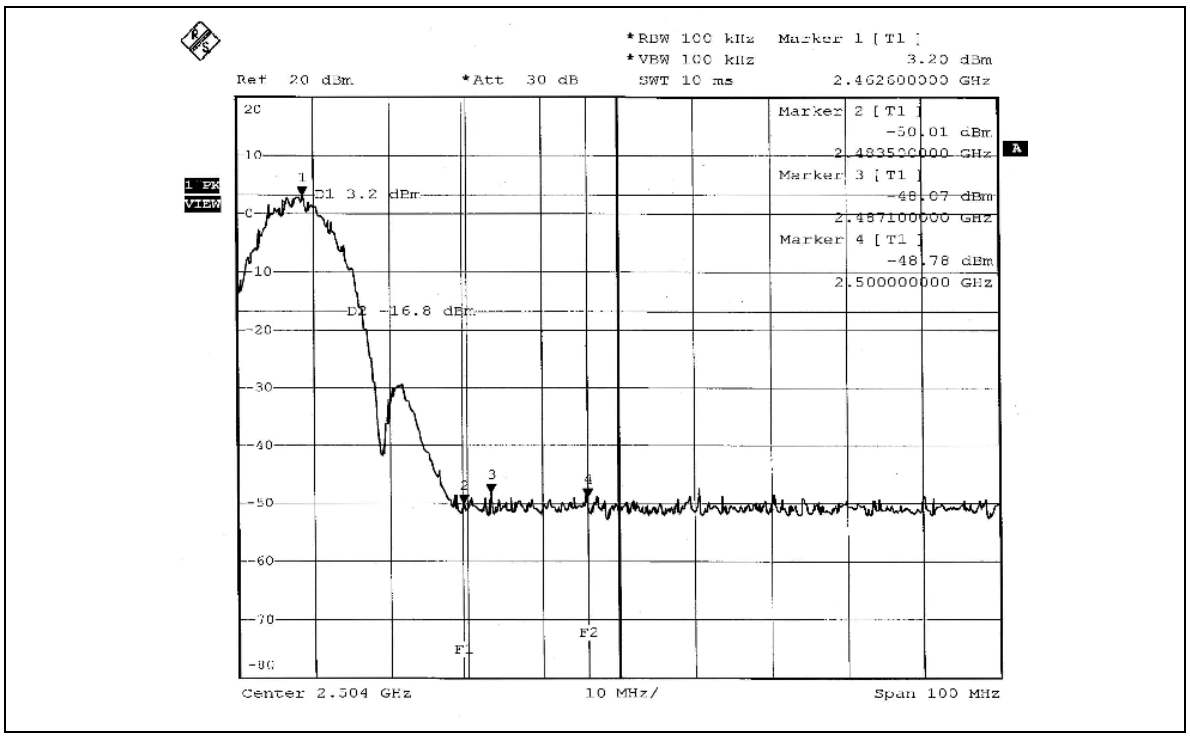
The band edge emission plot on page 54 shows 51.28dBc delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 96.10dBuV/m (Average), so the maximum field strength in restrict band is 96.10-51.28=44.82dBuV/m which is under 54dBuV/m limit.

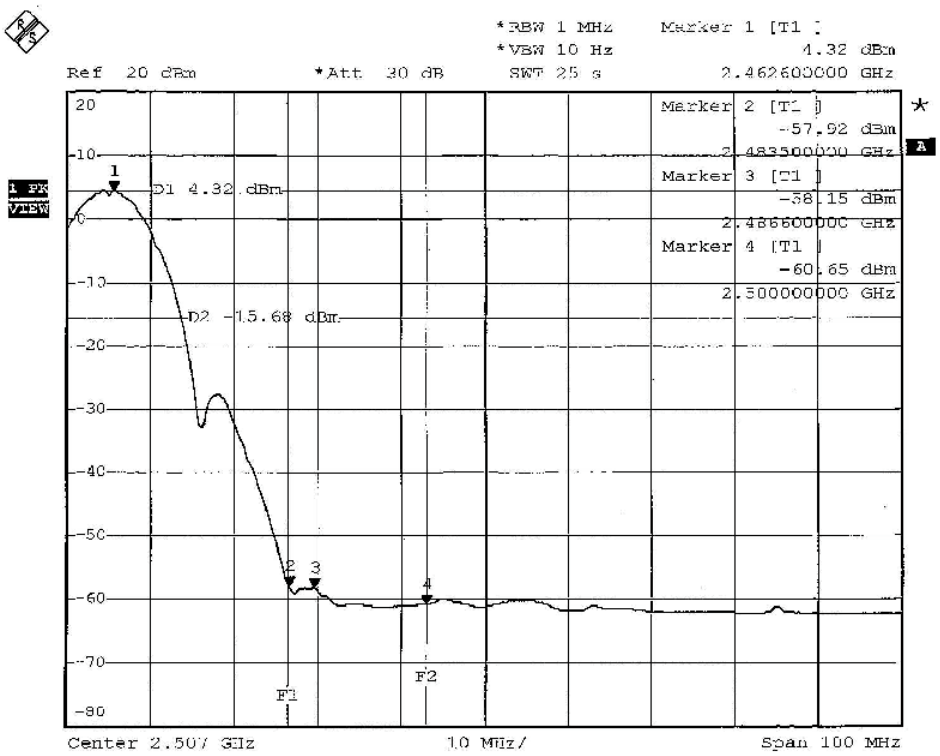
802.11b DSSS modulation

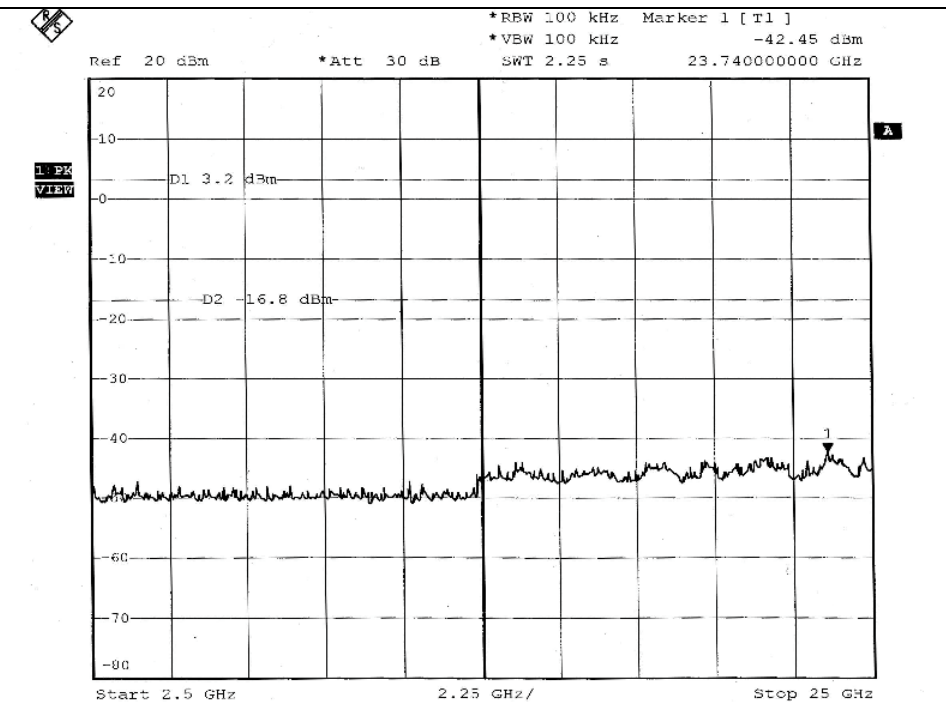




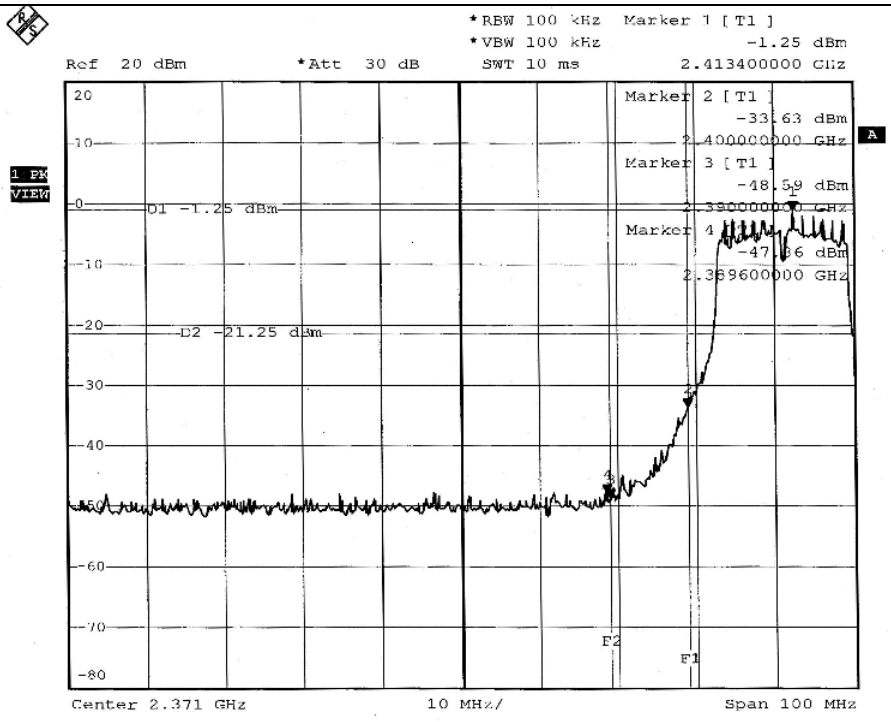

*RBW 100 kHz
*VBW 100 kHz
Marker 1 [T1]
-42.71 dBm
21.895000000 GHz
Ref 20 dBm
*Att 30 dB
SWT 2.25 s
1 PK
VIEW
D1 2.98 dBm
D2 -17.02 dBm
A
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz

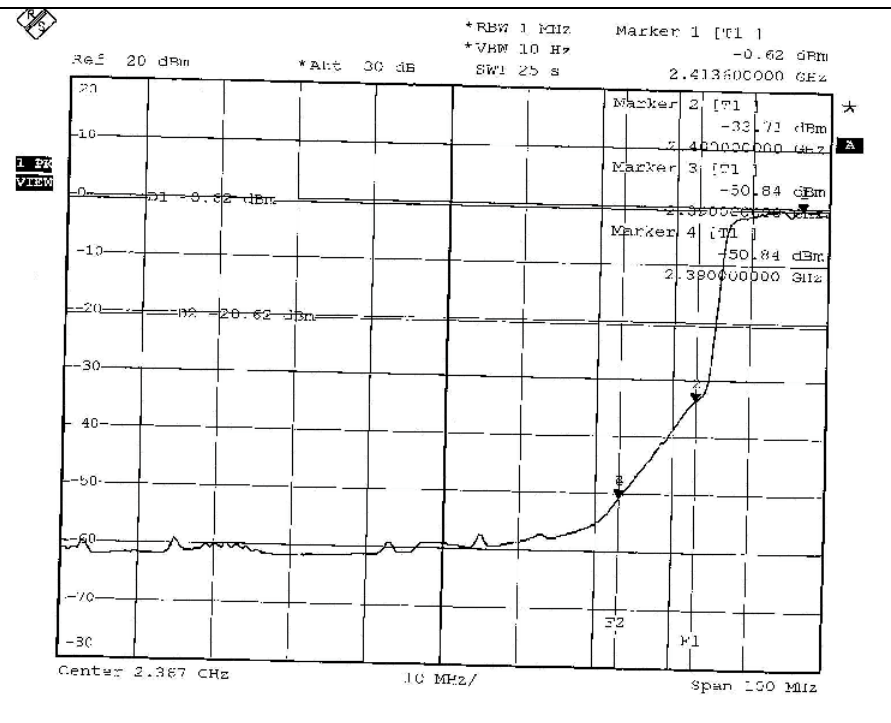

*RBW 100 kHz
*VBW 100 kHz
Marker 1 [T1]
3.20 dBm
2.402600000 GHz
Ref 20 dBm
*Att 30 dB
SWT 10 ms
Marker 2 [T1]
-50.01 dBm
2.483500000 GHz
Marker 3 [T1]
-48.07 dBm
2.487100000 GHz
Marker 4 [T1]
-48.78 dBm
2.500000000 GHz
1 PK
VIEW
D1 3.2 dBm
D2 -16.8 dBm
A
F1
F2
Center 2.504 GHz
10 MHz/
Span 100 MHz

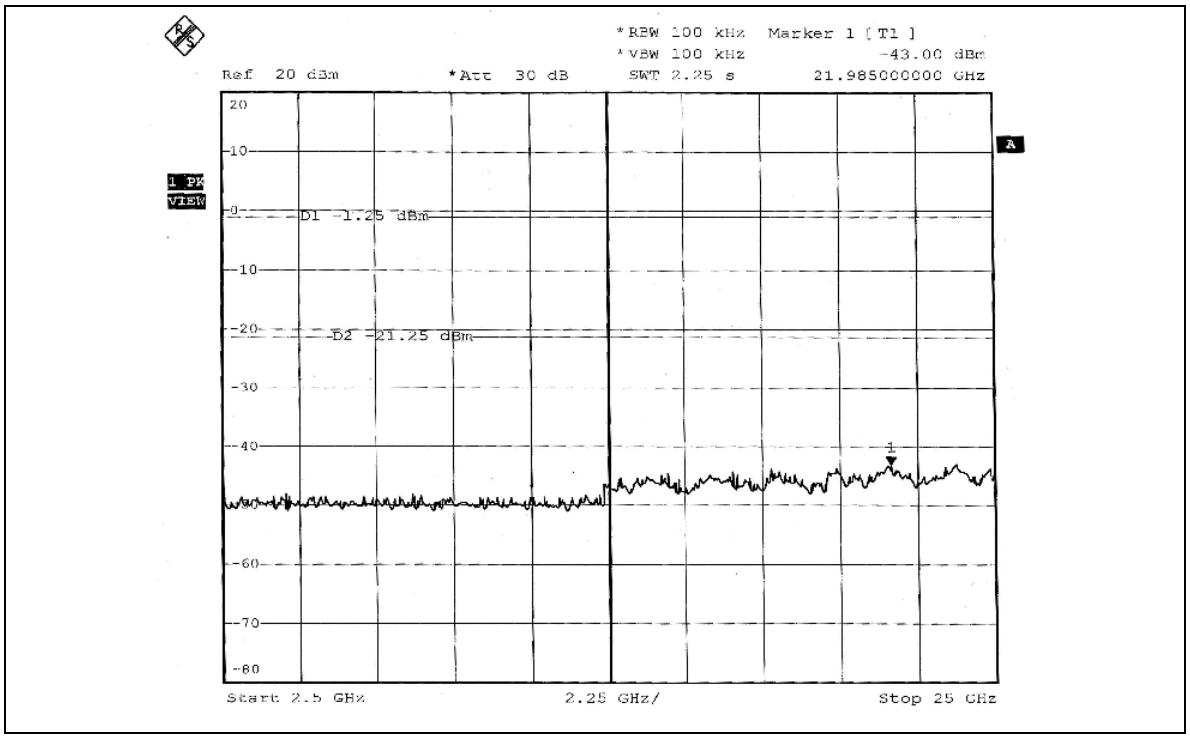

*RBW 1 MHz
*VBW 10 Hz
Ref 20 dBm
*Att 30 dB
SWT 25 s
Marker 1 [T1]
4.32 dBm
2.462600000 GHz
Marker 2 [T1]
-57.92 dBm
Marker 3 [T1]
-58.15 dBm
2.486600000 GHz
Marker 4 [T1]
-60.65 dBm
2.500000000 GHz
1 PK VIEW
D1 4.32 dBm
D2 -15.68 dBm
F1
F2
Center 2.507 GHz
1.0 MHz/
Span 100 MHz

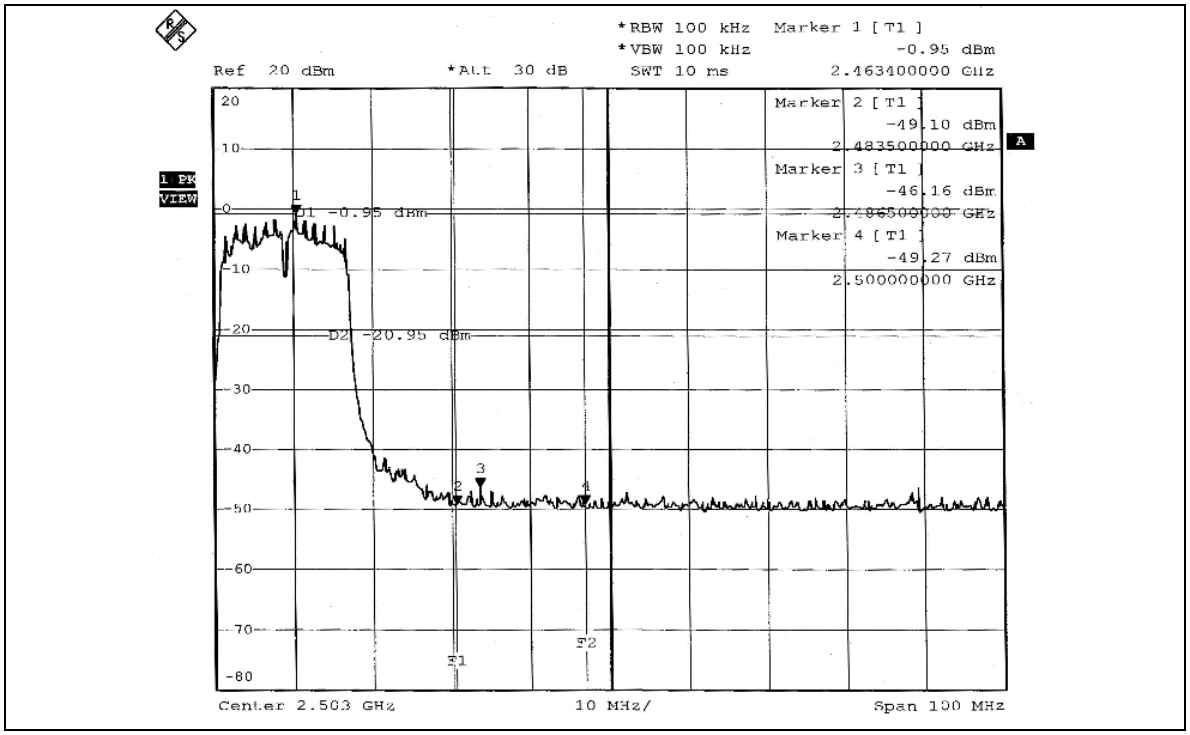

*RBW 100 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 2.25 s
Marker 1 [T1]
-42.45 dBm
23.740000000 GHz
1 PK VIEW
D1 3.2 dBm
D2 -16.8 dBm
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz

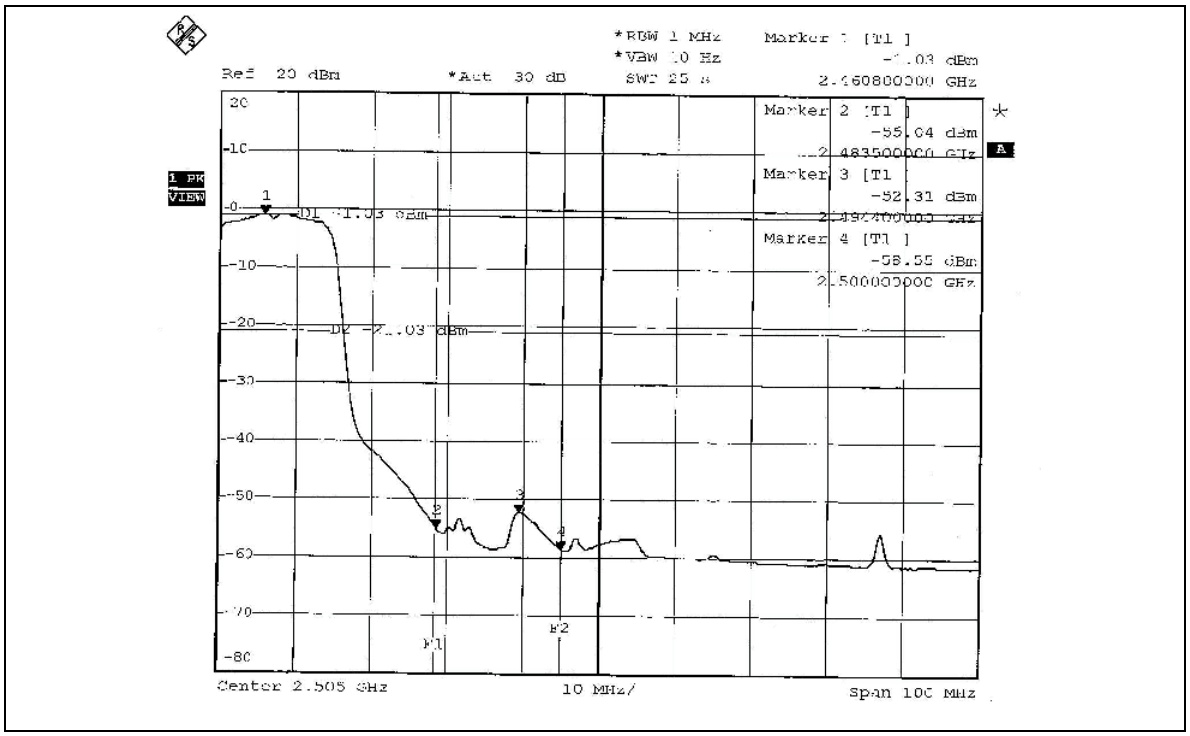
802.11g OFDM modulation

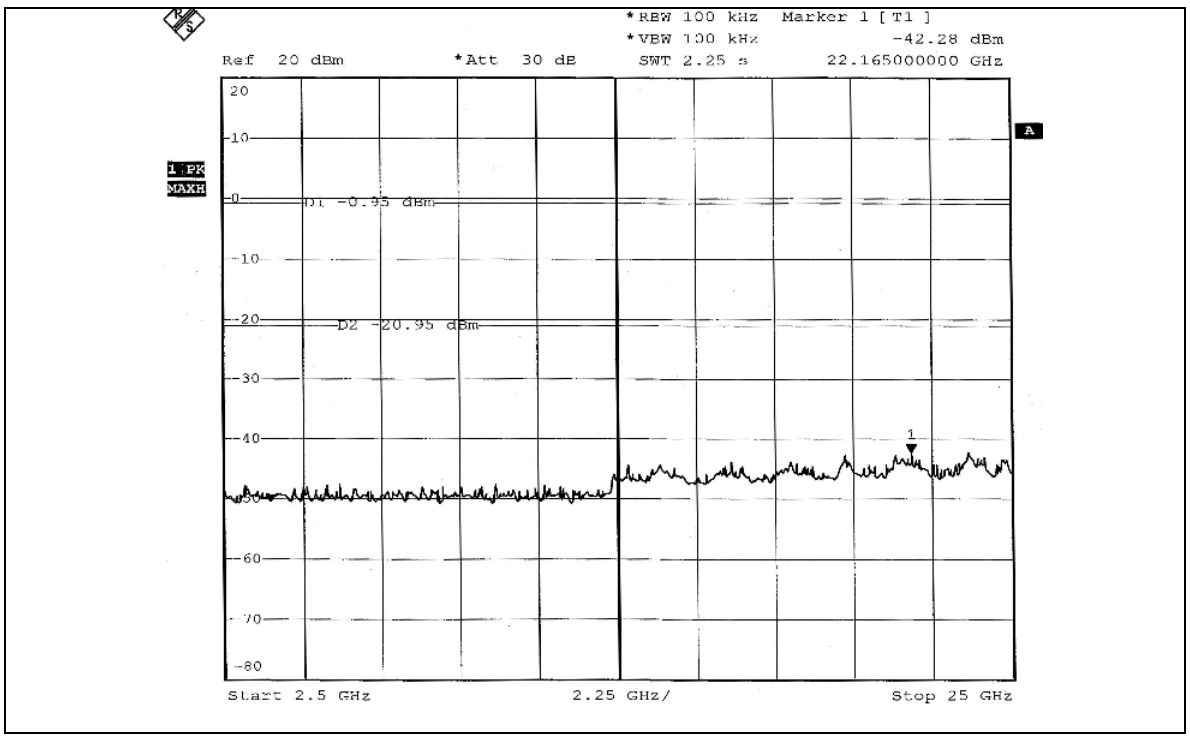





*RBW 100 kHz
*VBW 100 kHz
SWT 2.25 s
Marker 1 [T1]
-43.00 dBm
21.985000000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
D1 -1.25 dBm
D2 -21.25 dBm
A
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
-0.95 dBm
2.463400000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-49.10 dBm
2.483500000 GHz
Marker 3 [T1]
-46.16 dBm
2.486500000 GHz
Marker 4 [T1]
-49.27 dBm
2.500000000 GHz
1 PK
VIEW
D1 -0.95 dBm
D2 -20.95 dBm
A
F1
F2
Center 2.503 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 10 Hz
Ref 20 dBm
*Att 30 dB
SWT 25 s
Marker 1 [T1]
-1.03 dBm
2.160800000 GHz
Marker 2 [T1]
-55.04 dBm
Marker 3 [T1]
-52.31 dBm
Marker 4 [T1]
-58.55 dBm
2.500000000 GHz
1 PK
VIEW
D1 -1.03 dBm
D2 -7.03 dBm
Center 2.505 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
Marker 1 [T1]
-42.28 dBm
Ref 20 dBm
*Att 30 dB
SWT 2.25 s
22.165000000 GHz
1 PK
MAXH
D1 -0.95 dBm
D2 -20.95 dBm
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz

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 PIFA antenna with UFL connector. The maximum Gain of the antenna is 2.27dBi.

5. TEST TYPES AND RESULTS (5725~5850MHz Band)

5.1 CONDUCTED EMISSION MEASUREMENT

5.1.1 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.

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESHS 30	828765/002	July 4, 2005
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	835239/001	Mar. 31, 2005
LISN With Adapter (for EUT)	AD10	C09Ada-001	Mar. 31, 2005
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	835239/002	Apr. 18, 2005
ROHDE & SCHWARZ 4-wire ISN	ENY41	935154/007	Apr. 20, 2005
ROHDE & SCHWARZ 2-wire ISN	ENY22	833823/026	Apr. 20, 2005
Software	ADT_Cond_V7.3.2	NA	NA
Software	ADT_ISN_V7.3.2	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	May 9, 2005
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 17, 2005

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. 9.
4. The VCCI Site Registration No. C-1312.

5.1.3 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.

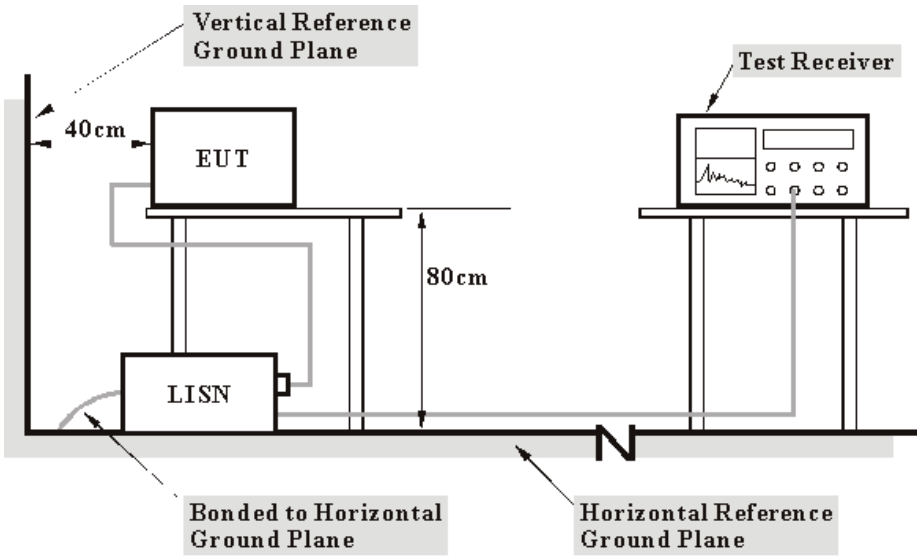
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 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.

5.1.6 EUT OPERATING CONDITIONS

Same as 4.1.6

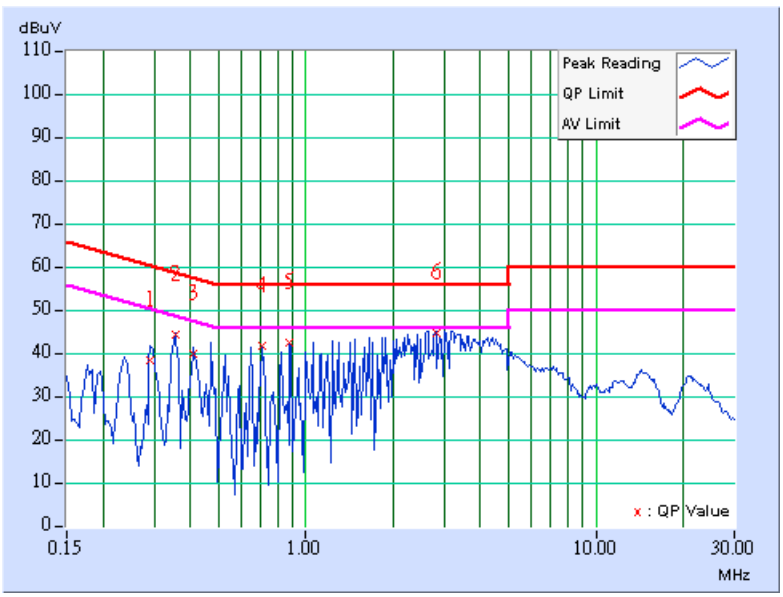
5.1.7 TEST RESULTS

Conducted Worst Case Data

EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	3	**6dB BANDWIDTH**	9kHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	**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	0.291	0.20	38.45	-	38.65	-	60.50	50.50	-21.85	-
2	0.354	0.20	44.20	-	44.40	-	58.87	48.87	-14.47	-
3	0.411	0.20	39.78	-	39.98	-	57.63	47.63	-17.65	-
4	0.708	0.20	41.78	-	41.98	-	56.00	46.00	-14.02	-
5	0.882	0.20	42.44	-	42.64	-	56.00	46.00	-13.36	-
6	**2.826**	**0.24**	**44.71**	**-**	**44.95**	**-**	**56.00**	**46.00**	**-11.05**	**-**

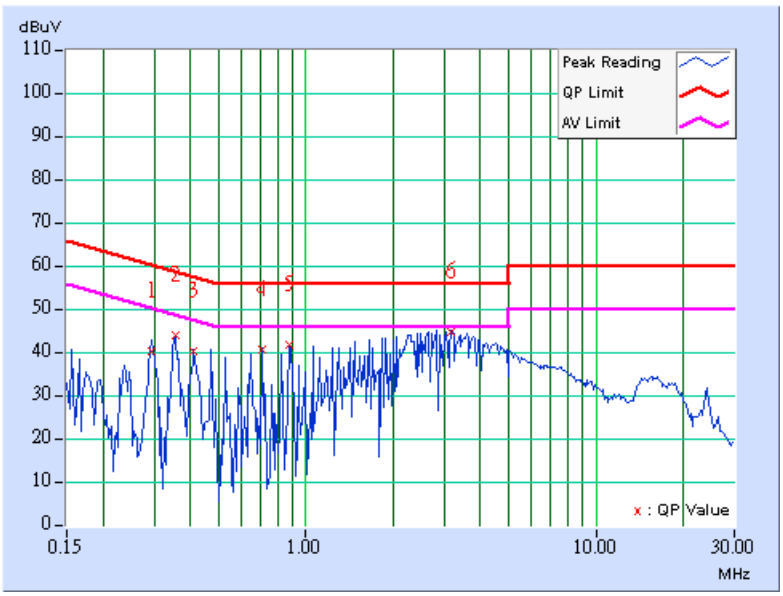
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	3	**6dB BANDWIDTH**	9kHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	**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	0.294	0.20	40.13	-	40.33	-	60.41	50.41	-20.08	-
2	0.354	0.20	43.86	-	44.06	-	58.87	48.87	-14.81	-
3	0.411	0.20	40.18	-	40.38	-	57.63	47.63	-17.25	-
4	0.708	0.20	40.55	-	40.75	-	56.00	46.00	-15.25	-
5	0.882	0.20	41.48	-	41.68	-	56.00	46.00	-14.32	-
6	3.180	0.30	44.46	-	44.76	-	56.00	46.00	-11.24	-

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.



5.2 RADIATED EMISSION MEASUREMENT

5.2.1 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.

5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8590L	3544A01176	May. 31, 2005
HP Preamplifier	8447D	2944A08485	Apr. 26, 2005
* HP Preamplifier	8449B	3008A01924	Sep. 19, 2005
* HP Preamplifier	8449B	3008A01638	Sep. 30, 2005
*SCHAFFNER TEST RECEIVER	SCR 3501	408	Jan. 03, 2006
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 03, 2006
SCHWARZBECK Tunable Dipole Antenna SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	NA 977	Oct. 29, 2005
* CHASE BILOG Antenna	CBL6112A	2221	Oct 19, 2005
* EMCO Horn Antenna	3115	6714	Oct. 28, 2005
* EMCO Horn Antenna	3115	9312-4192	Feb. 28, 2006
* EMCO Turn Table	1060	1115	NA
* CHANCE Tower	CM-AT40	CM-A010	NA
* Software	ADT_Radiated_V7.5.14	NA	NA
* ADT RF Switches	EM-H-01-1	1002	Dec. 02, 2005
* TIMES RF cable	LMR-600	CABLE-ST5-01	Dec. 02, 2005

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. "*" = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. 5.
5. The VCCI Site Registration No. R-1039.

5.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 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 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

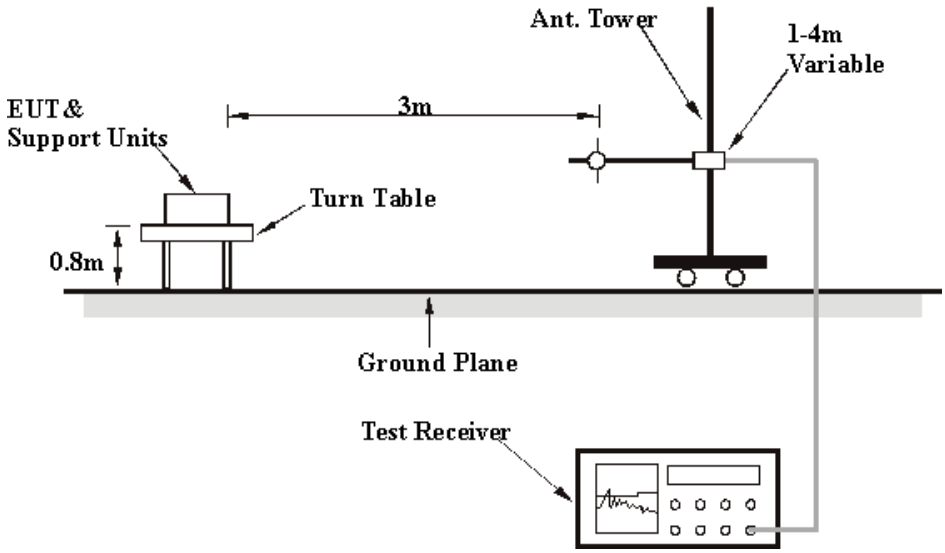
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for 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.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP



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

5.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

5.2.7 TEST RESULTS

Below 1GHz Worst Case Data

EUT	Notebook PC	MODEL NO.	R15D
CHANNEL	3	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1002 hPa	TESTED BY	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	195.23	35.89 QP	43.50	-7.61	3.00 H	259	24.23	11.66
2	228.28	40.18 QP	46.00	-5.82	2.00 H	106	27.94	12.23
3	259.38	37.39 QP	46.00	-8.61	1.00 H	271	24.15	13.24
4	652.04	38.03 QP	46.00	-7.97	3.00 H	4	16.54	21.49
5	716.19	39.61 QP	46.00	-6.39	3.00 H	310	17.20	22.41
6	838.66	40.16 QP	46.00	-5.84	1.00 H	142	16.36	23.81

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	195.23	37.12 QP	43.50	-6.38	3.00 V	220	25.46	11.66
2	228.28	42.16 QP	46.00	-3.84	1.00 V	169	29.93	12.23
3	260.58	42.55 QP	46.00	-3.45	1.99 V	92	29.28	13.27
4	391.56	34.64 QP	46.00	-11.36	2.00 V	148	18.11	16.53
5	652.04	36.68 QP	46.00	-9.32	3.00 V	34	15.19	21.49
6	716.19	37.82 QP	46.00	-8.18	2.00 V	178	15.41	22.41

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.

802.11a OFDM modulation

EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	1	**FREQUENCY RANGE**	1 ~ 40GHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21 deg. C, 61% RH, 1004 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5745.00	102.46 PK			1.76 H	339	62.98	39.48
1	*5745.00	89.97 AV			1.76 H	339	50.49	39.48
2	#11490.00	56.52 PK	74.00	-17.48	1.25 H	177	5.81	50.71
2	#11490.00	47.29 AV	54.00	-6.71	1.25 H	177	-3.42	50.71

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	*5745.00	97.24 PK			1.00 V	334	57.76	39.48
1	*5745.00	86.35 AV			1.00 V	334	46.87	39.48
2	#11490.00	57.85 PK	74.00	-16.15	1.01 V	286	7.14	50.71
2	#11490.00	47.94 AV	54.00	-6.06	1.01 V	286	-2.77	50.71

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.
6. "#"The radiated frequency falling in the restricted band.
7. The limit value is defined as per 15.247

EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	3	**FREQUENCY RANGE**	1 ~ 40GHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21 deg. C, 61% RH, 1004 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5785.00	101.96 PK			1.77 H	22	62.41	39.55
1	*5785.00	89.77 AV			1.77 H	22	50.22	39.55
2	#11570.00	56.95 PK	74.00	-17.05	1.85 H	23	6.30	50.65
2	#11570.00	46.24 AV	54.00	-7.76	1.85 H	23	-4.41	50.65

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	*5785.00	99.09 PK			1.00 V	360	59.54	39.55
1	*5785.00	86.89 AV			1.00 V	360	47.34	39.55
2	#11570.00	58.00 PK	74.00	-16.00	1.12 V	251	7.35	50.65
2	#11570.00	47.73 AV	54.00	-6.27	1.12 V	251	-2.92	50.65

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.
6. "#"The radiated frequency falling in the restricted band.
7. The limit value is defined as per 15.247

EUT	Notebook PC	**MODEL NO.**	R15D
CHANNEL	5	**FREQUENCY RANGE**	1 ~ 40GHz
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21 deg. C, 61% RH, 1004 hPa	**TESTED BY**	Jamison Chan

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*5825.00	102.94 PK			1.64 H	360	63.36	39.58
1	*5825.00	91.39 AV			1.64 H	360	51.81	39.58
2	#11650.00	56.84 PK	74.00	-17.16	1.55 H	288	6.25	50.59
2	#11650.00	46.91 AV	54.00	-7.09	1.55 H	288	-3.68	50.59

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	*5825.00	100.64 PK			1.00 V	14	61.06	39.58
1	*5825.00	90.55 AV			1.00 V	14	50.97	39.58
2	#11650.00	57.70 PK	74.00	-16.30	1.05 V	212	7.11	50.59
2	#11650.00	47.65 AV	54.00	-6.35	1.05 V	212	-2.94	50.59

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.
6. "#"The radiated frequency falling in the restricted band.
7. The limit value is defined as per 15.247

5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2006

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

5.3.3 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.

5.3.4 DEVIATION FROM TEST STANDARD

No deviation.

5.3.5 TEST SETUP

5.3.6 EUT OPERATING CONDITIONS

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

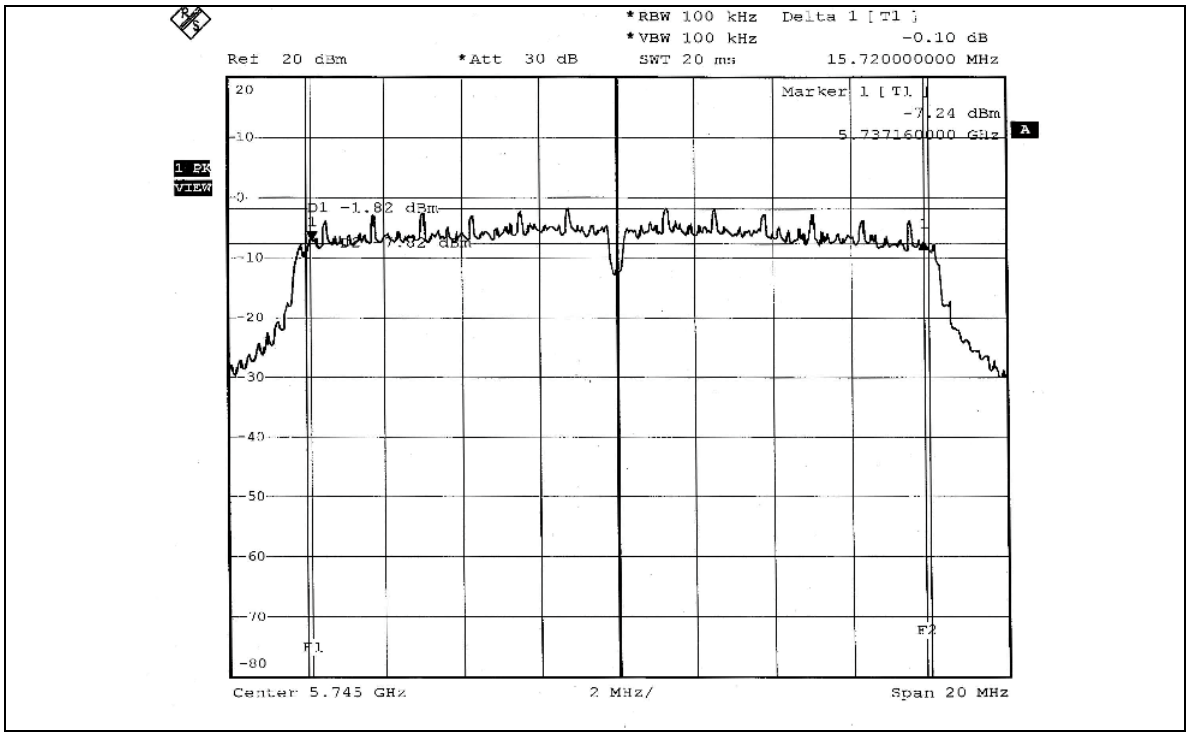
5.3.7 TEST RESULTS

802.11a OFDM modulation

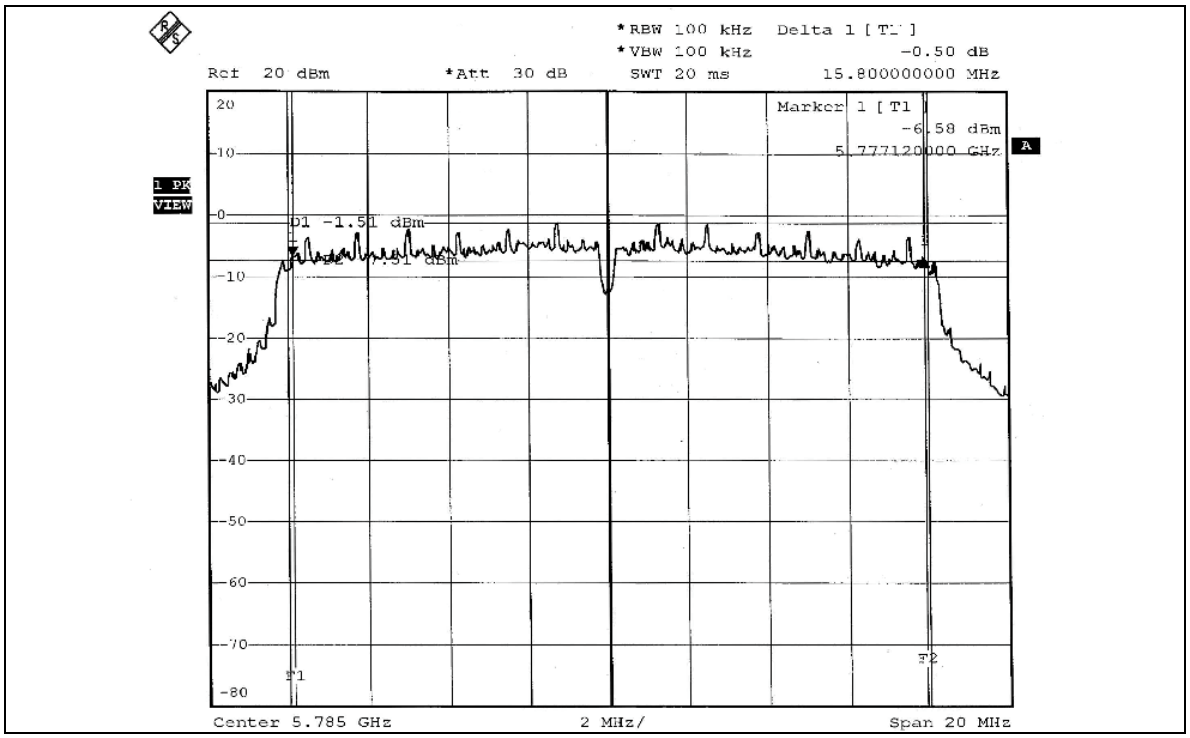
EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	5745	15.72	0.5	PASS
3	5785	15.80	0.5	PASS
5	5825	16.04	0.5	PASS

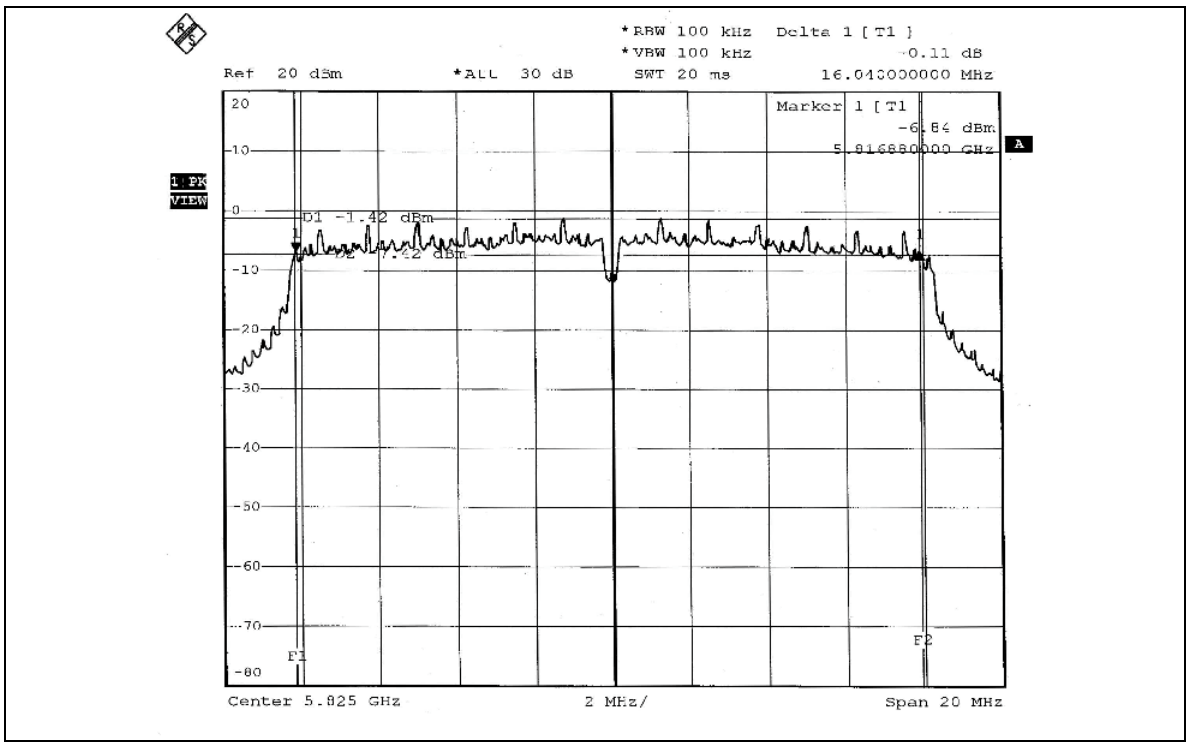
CH1



CH3


*RBW 100 kHz
*VBW 100 kHz
SWT 20 ms
Delta 1 [T1]
-0.50 dB
15.800000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
-6.58 dBm
5.77712000 GHz
1 PK
VIEW
D1 -1.51 dBm
F1
F2
Center 5.785 GHz
2 MHz/
Span 20 MHz

CH5


*RBW 100 kHz
*VBW 100 kHz
SWT 20 ms
Delta 1 [T1]
-0.11 dB
16.040000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
-6.84 dBm
5.81688000 GHz
1 PK
VIEW
D1 -1.42 dBm
F1
F2
Center 5.825 GHz
2 MHz/
Span 20 MHz

5.4 MAXIMUM PEAK OUTPUT POWER

5.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

5.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	Mar 18. 2006
ROHDE & SCHWARZ Signal Generator	SMR40	100231	Mar. 17. 2006
Tektronix Oscilloscope	TDS1012	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.

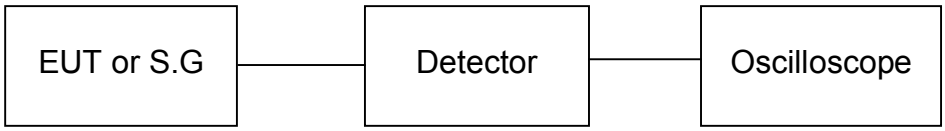
5.4.3 TEST PROCEDURES

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.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6.

5.4.7 TEST RESULTS

802.11a OFDM modulation

EUT	Notebook PC	**MODEL**	R15D
MODULATION TYPE	BPSK	**TRANSFER RATE**	6Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	**INPUT POWER (SYSTEM)**	120Vac, 60Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	5745	25.003	13.98	30	PASS
3	5785	24.946	13.97	30	PASS
5	5825	24.889	13.96	30	PASS

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2006

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

5.5.3 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.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 TEST SETUP

5.5.6 EUT OPERATING CONDITION

Same as Item 5.3.6.

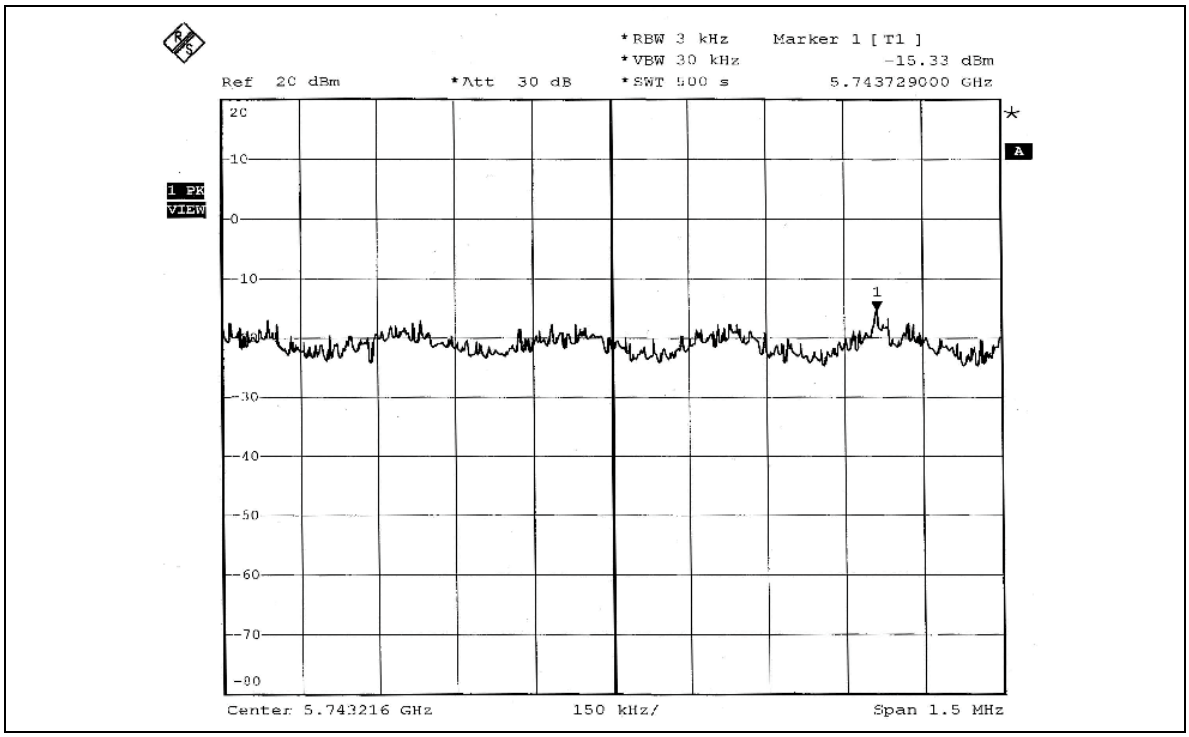
5.5.7 TEST RESULTS

802.11a OFDM modulation

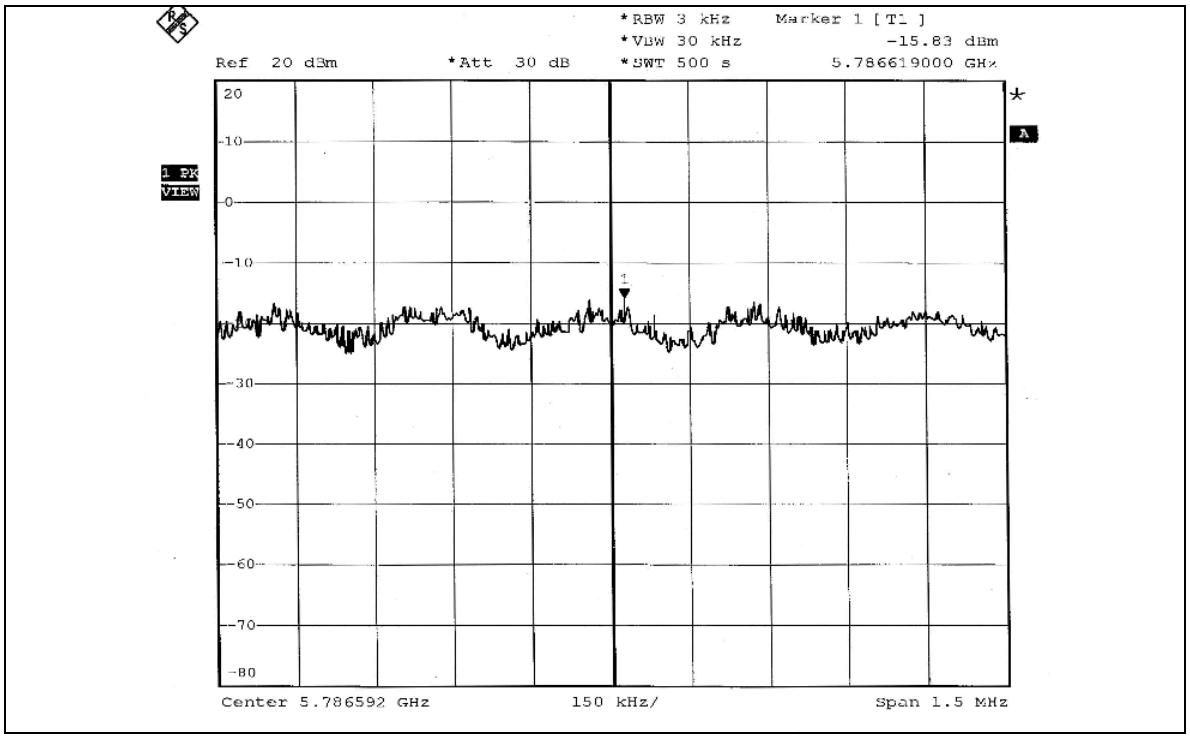
EUT	Notebook PC	MODEL	R15D
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
ENVIRONMENTAL CONDITIONS	20 deg. C, 60% RH, 1004 hPa	INPUT POWER (SYSTEM)	120Vac, 60Hz
TESTED BY	Jamison Chan		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	5745	-15.33	8	PASS
3	5785	-15.83	8	PASS
5	5825	-15.29	8	PASS

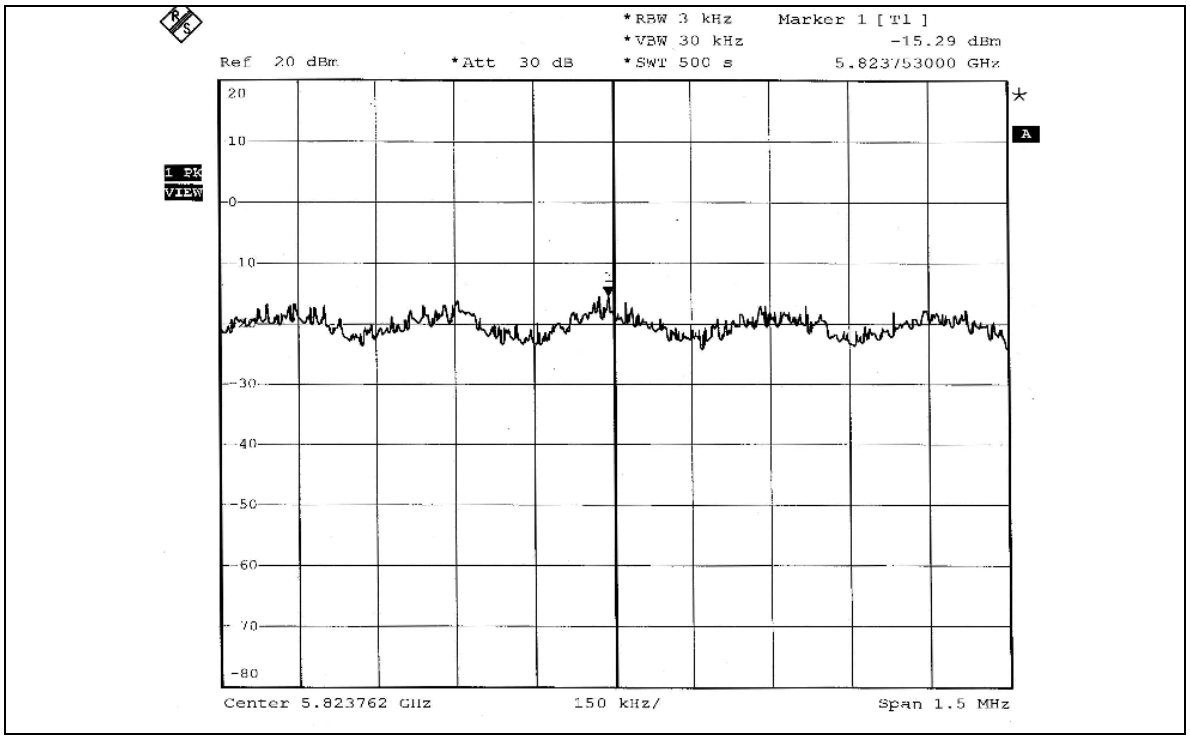
CH1



CH3


*RBW 3 kHz
Marker 1 [T1]
*VBW 30 kHz
-15.83 dBm
Ref 20 dBm
*Att 30 dB
*SWT 500 s
5.786619000 GHz
1 PK
VIEW
A
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 5.786592 GHz
150 kHz/
Span 1.5 MHz

CH5


*RBW 3 kHz
Marker 1 [T1]
*VBW 30 kHz
-15.29 dBm
Ref 20 dBm
*Att 30 dB
*SWT 500 s
5.823753000 GHz
1 PK
VIEW
A
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 5.823762 GHz
150 kHz/
Span 1.5 MHz

5.6 BAND EDGES MEASUREMENT

5.6.1 LIMITS OF BAND EDGES MEASUREMENT

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

5.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSP 40	100036	Mar 18. 2006

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

5.6.3 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 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation.

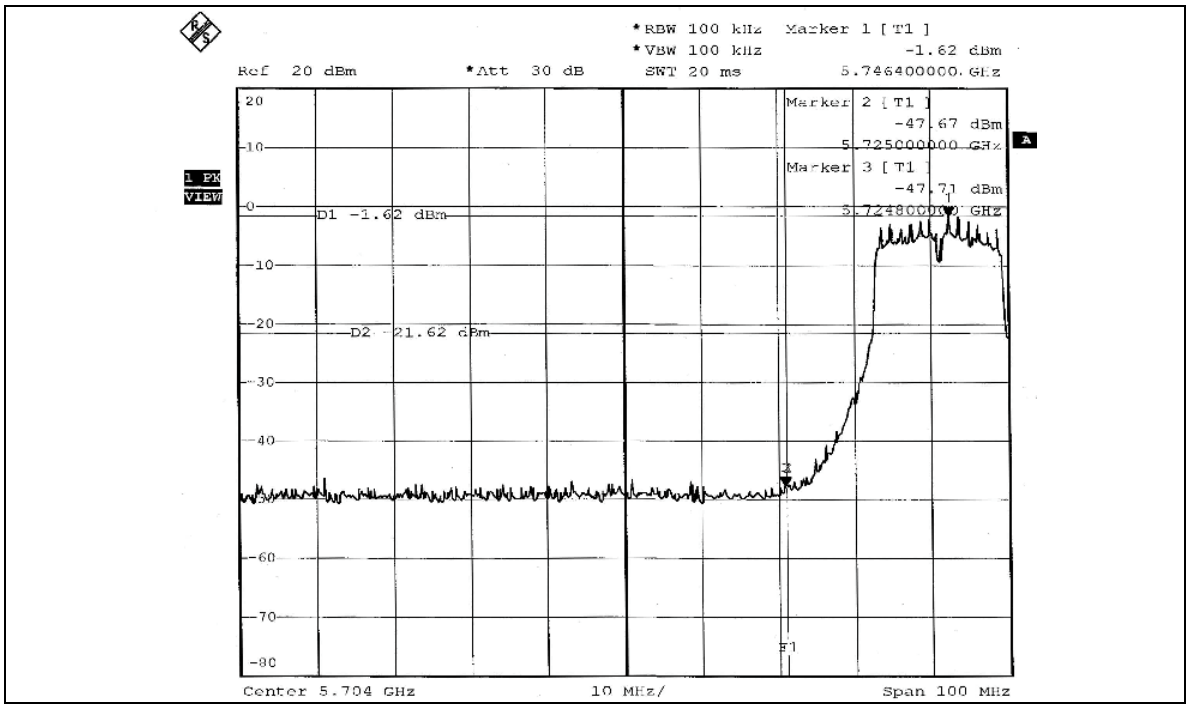
5.6.5 EUT OPERATING CONDITION

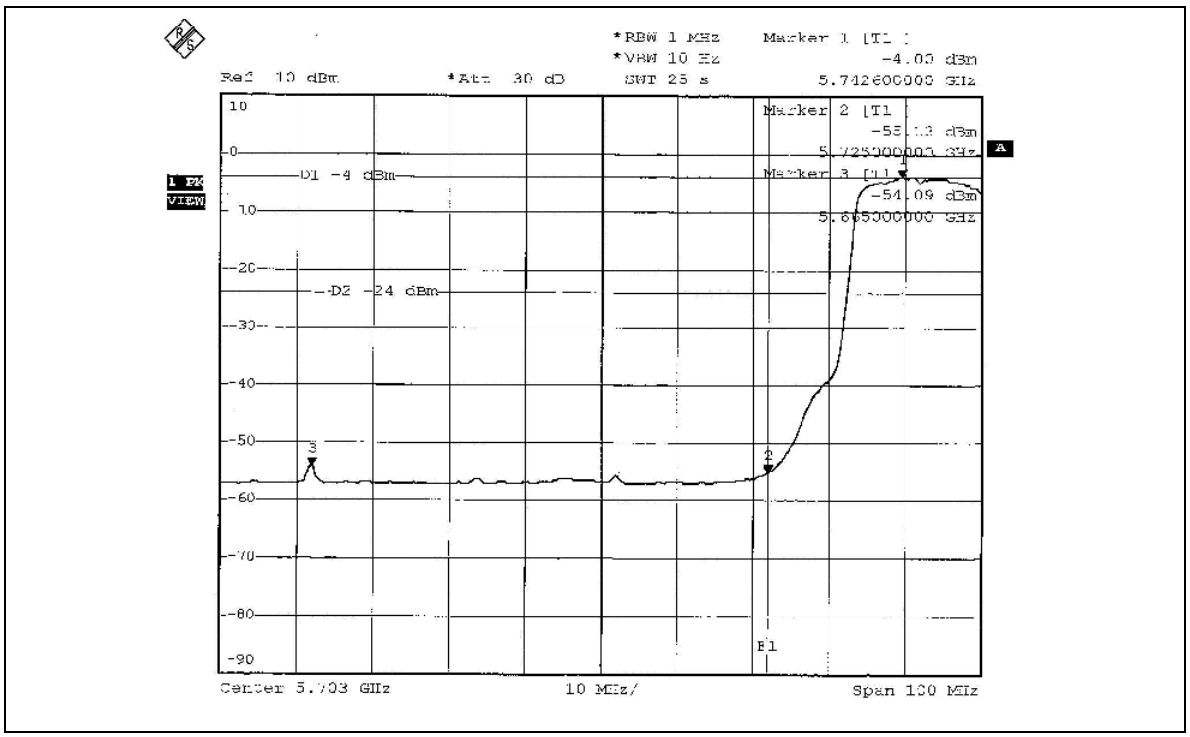
Same as Item 5.3.6.

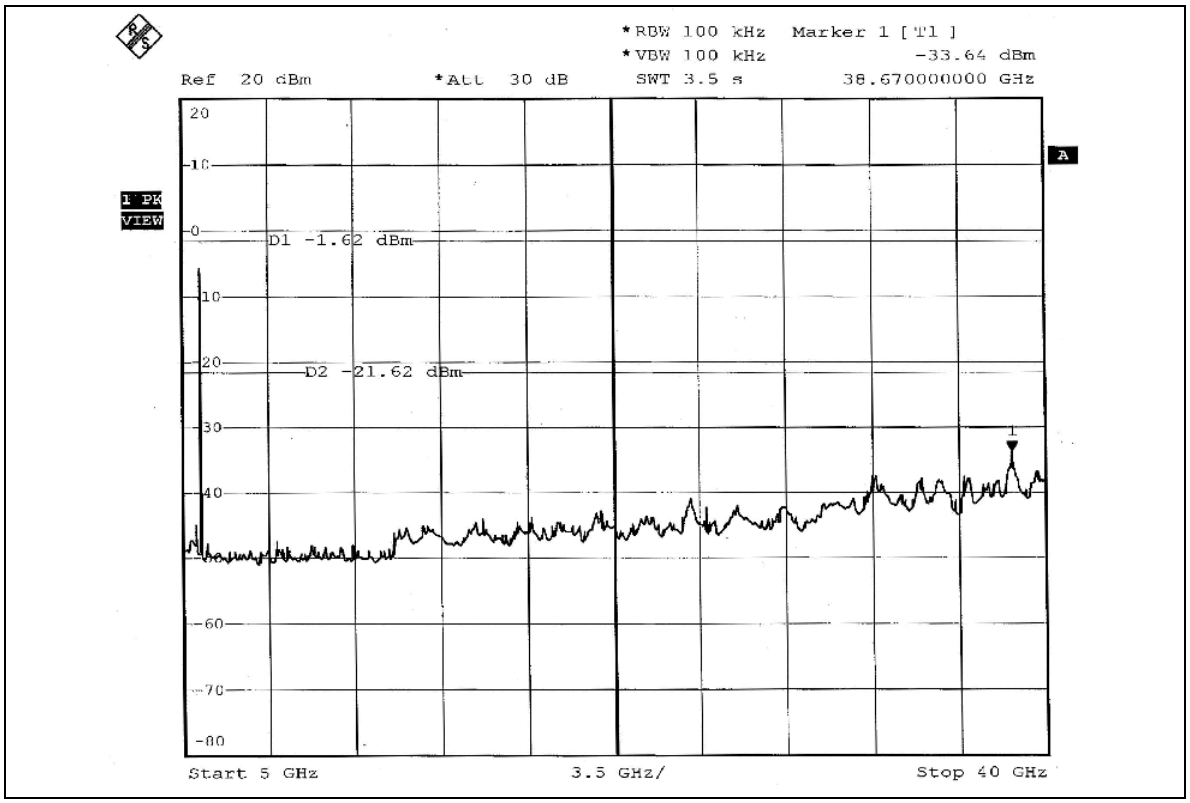
5.6.6 TEST RESULTS

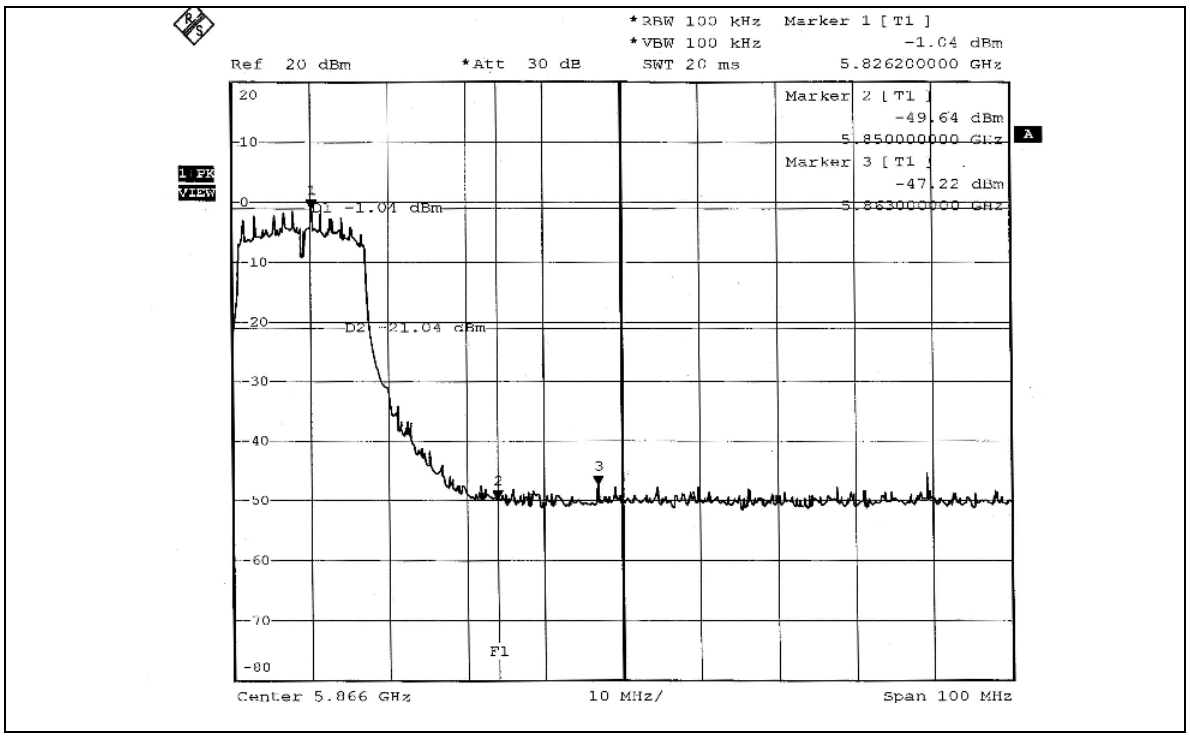
The spectrum plots are attached on the following 6 images. D2 line indicates the highest level, and D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

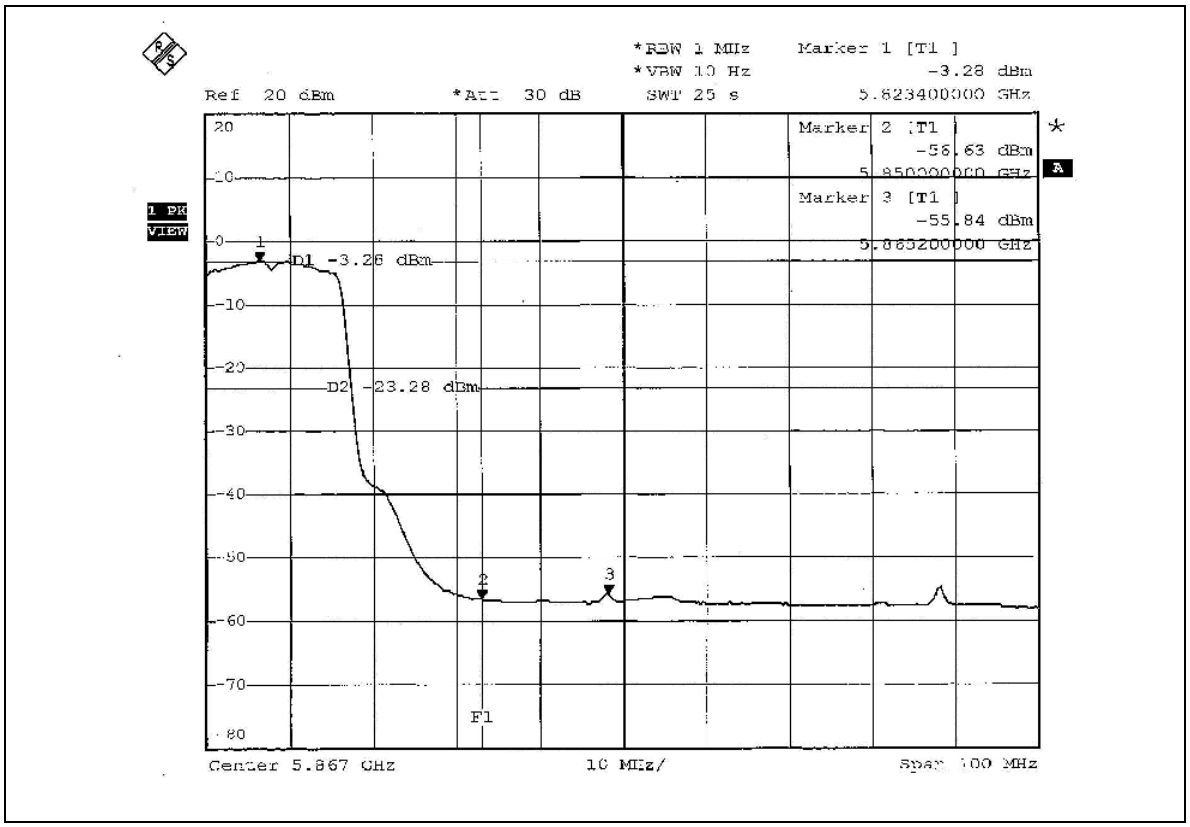
802.11a OFDM modulation

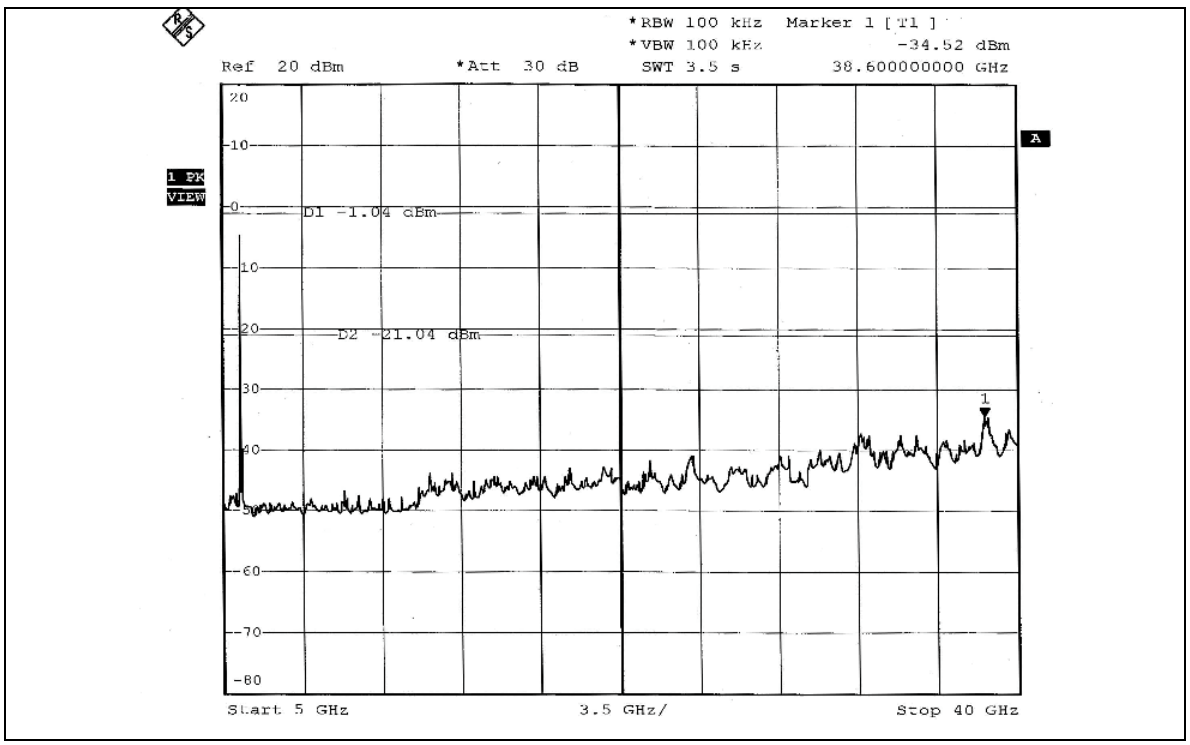





*RBW 100 kHz
*VBW 100 kHz
Marker 1 [T1]
-33.64 dBm
38.670000000 GHz
Ref 20 dBm
*Att 30 dB
SWT 3.5 s
1 PK
VIEW
D1 -1.62 dBm
D2 -21.62 dBm
A
Start 5 GHz
3.5 GHz/
Stop 40 GHz


*RBW 100 kHz
*VBW 100 kHz
Marker 1 [T1]
-1.04 dBm
5.826200000 GHz
Ref 20 dBm
*Att 30 dB
SWT 20 ms
Marker 2 [T1]
-49.64 dBm
5.850000000 GHz
Marker 3 [T1]
-47.22 dBm
5.863000000 GHz
1 PK
VIEW
D1 -1.04 dBm
D2 -21.04 dBm
A
F1
Center 5.866 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 10 Hz
Ref 20 dBm
*Att 30 dB
SWT 25 s
Marker 1 [T1]
-3.28 dBm
5.823400000 GHz
Marker 2 [T1]
-56.63 dBm
5.850200000 GHz
Marker 3 [T1]
-55.84 dBm
5.865200000 GHz
1 PK
VIEW
D1 -3.26 dBm
D2 -23.28 dBm
F1
Center 5.867 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 3.5 s
Marker 1 [T1]
-34.52 dBm
38.600000000 GHz
1 PK
VIEW
D1 -1.04 dBm
D2 -21.04 dBm
Start 5 GHz
3.5 GHz/
Stop 40 GHz

5.7 ANTENNA REQUIREMENT

5.7.1 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.

5.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PIFA antenna with UFL connector. The maximum Gain of the antenna is –1.31dBi.

6. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

7. 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:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab
Tel: 886-3-3183232
Fax: 886-3-3185050

Email: service@adt.com.tw
Web Site: www.adt.com.tw

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