

FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

ZTE Coporation

ZTE Plaza, Hi-Tech Industrial Park, Shenzhen, P. R. China

FCC ID: Q78ZXR10W140A

2004-04-21

This Report Concerns: ☒ Original Report	Equipment Type: Transceiver, Access Point
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Report No.: RSH04031609	
Test Date: April 1-9, 2004	
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Note: This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government

TABLE OF CONTENTS

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S)	4
TEST METHODOLOGY	4
TEST FACILITY	4
HOST SYSTEM CONFIGURATION LIST AND DETAILS	5
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE	5
SYSTEM TEST CONFIGURATION.....	6
JUSTIFICATION	6
EUT EXERCISE SOFTWARE.....	6
SPECIAL ACCESSORIES	6
SCHEMATICS / BLOCK DIAGRAM.....	6
EQUIPMENT MODIFICATIONS.....	6
CONFIGURATION OF EUT	7
TEST SETUP BLOCK DIAGRAM	7
SUMMARY OF TEST RESULTS	8
§1.1307(B)(1) & §2.1091 - RF EXPOSURE.....	9
§15.207(A) - CONDUCTED EMISSION	10
MEASUREMENT UNCERTAINTY.....	10
EUT SETUP.....	10
SPECTRUM ANALYZER SETUP	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST PROCEDURE.....	11
TEST DATA.....	12
PLOT(S) OF TEST DATA.....	13
§15.209(A) - ANTENNA PORT CONDUCTED SPURIOUS EMISSION TEST (30M-25G)	17
STANDARD APPLICABLE.....	17
MEASUREMENT PROCEDURE	17
TEST EQUIPMENT LIST AND DETAILS.....	17
MEASUREMENT RESULT	18
§15.247(B)(3) - PEAK OUTPUT POWER MEASUREMENT	33
STANDARD APPLICABLE.....	33
MEASUREMENT PROCEDURE	33
TEST EQUIPMENT LIST AND DETAILS.....	33
MEASUREMENT RESULT	33
§15.247(A)(2) – 6 DB BANDWIDTH	40
STANDARD APPLICABLE.....	40
MEASUREMENT PROCEDURE	40
TEST EQUIPMENT LIST AND DETAILS.....	40
MEASUREMENT RESULT	40
§15.247(D) - POWER SPECTRAL DENSITY.....	47
STANDARD APPLICABLE.....	47
MEASUREMENT PROCEDURE	47
TEST EQUIPMENT LIST AND DETAILS.....	47
MEASUREMENT RESULT	47
§15.247(C) - 100 KHZ BANDWIDTH OF BAND EDGES	54
STANDARD APPLICABLE.....	54
MEASUREMENT PROCEDURE	54

TEST EQUIPMENT LIST AND DETAILS.....	54
MEASUREMENT RESULT	54
§15.203 - ANTENNA REQUIREMENT	58
STANDARD APPLICABLE.....	58
ANTENNA CONNECTED CONSTRUCTION	58
§15.209(F) - SPURIOUS RADIATED EMISSION	59
MEASUREMENT UNCERTAINTY.....	59
EUT SETUP.....	59
SPECTRUM ANALYZER SETUP	60
TEST EQUIPMENT LIST AND DETAILS.....	60
TEST PROCEDURE.....	60
CORRECTED AMPLITUDE & MARGIN CALCULATION	60
TEST DATA.....	61

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The ZTE Coporation's, model: W140A, or the "EUT" as referred to in this report is an W140A Wireless Access Point which measures approximately 34.5cm L x 30.0cm W x 8.0cm H, rated input voltage: DC 48V.

The base unit of EUT utilized the SEL's DC battery, M/N: CP12190.

Antenna: 1, Manufacturer: MOBI, M/N: MB2400-30-14;
2, Manufacturer: Joymax, M/N: TQJ-2.4G-8;
3, Manufacturer: Joymax, M/N: TDJ-2400BKF-Y;

** The test data gathered are from production sample, serial number: 040360, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of ZTE Coporation in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Out of Band Emission, Spurious Emission, Conducted and Spurious Radiated Emission.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC - conducted test site criteria set forth in ANSI C63.4-2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
LEGEND	System PC	Qitian1200	N/A	DoC
Seagate	Hard Drive	ST 320410A	5FG2TFAX	DoC
Sony	3.5" Floppy Drive	FDD-MPF920-E	72930348	DoC
LITEON	WK-Rom Drive	XT-HD166S	N/A	DoC
LEGEND	Motherboard	MS-6395	N/A	DoC
TELTA	SPS	DPS-145PB-111F	Lup0219016447C	DoC

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
HP	Laser Jet 5L Printer	C3941A	JPTV0132337	DoC
SAST	Modem	AEM-2100	0293	DoC
SAMSUNG	Monitor	550E	N/A	DoC
LEGEND	Keyboard	SK-1688	C205007790	DoC
LEGEND	Mouse	M-S61	LZA21702500	DoC

External I/O Cable

Cable Description	Length (M)	From/Port	To
Shielded Detachable LAN Cable	30.0	EUT	PC
Unshielded Detachable DC Cable	30.0	DC Power	EUT
Shielded Detachable KB Cable	1.60	KB Port/Host	Keyboard
Shielded Detachable Mouse Cable	1.50	Mouse Port/Host	Mouse
Shielded Detachable Printer Cable	1.60	Parallel Port/Host	Printer
Shielded Detachable Serial Cable	1.60	Serial Port/Host	Modem
Shielded Detachable VGA Cable	1.50	VGA Port/Host	Monitor

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2001.

The EUT was tested in the normal (native) operating mode to represent *worst-case* results during the final qualification test.

EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components.

Once loaded, set the Tx channel to low, mid and high for testing.

Special Accessories

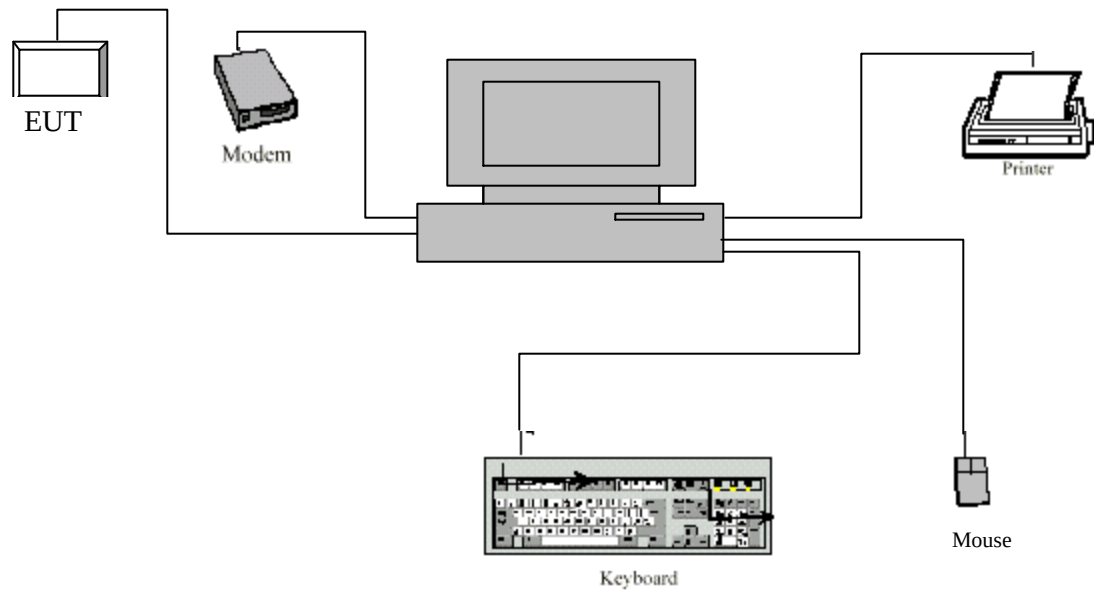
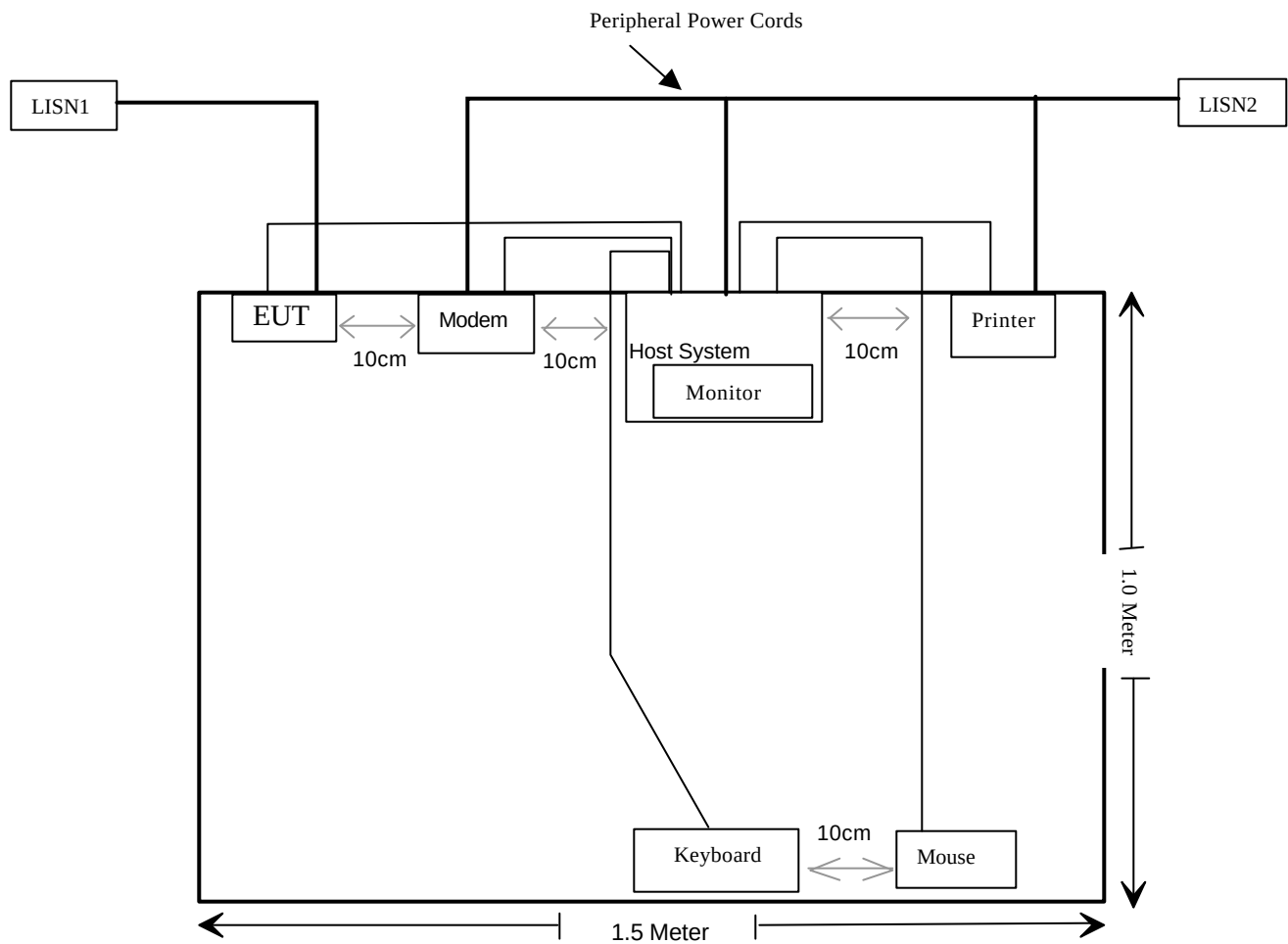
As shown in following test block diagram, all interface cables used for compliance testing are shielded.

Schematics / Block Diagram

Please refer to Exhibit A.

Equipment Modifications

No modifications were made to the EUT.

Configuration of EUT**Test Setup Block Diagram**

SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091	RF Exposure	Pass
§15.203	Antenna Requirement	Pass
§ 15.207 (a)	Conducted Emissions	Pass
§15.209 (a)	Spurious Emission	Pass
§15.247 (a)(2)	6 dB Bandwidth	Pass
§15.247 (b)(3)	Maximum Peak Output Power	Pass
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Pass
§15.247 (d)	Peak Power Spectral Density	Pass
§15.205	Restricted Band	Pass

§1.1307(b)(1) & §2.1091 - RF EXPOSURE

According to §15.247(b)(5) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 16.67 (dBm)

Maximum peak output power at antenna input terminal: 46.45 (mW)

Prediction distance: 20 (cm)

Predication frequency: 2400 (MHz)

Antenna Gain (typical): 8 (dBi)

antenna gain: 6.31 (numeric)

Power density at predication frequency at 20 cm: 0.058(mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm²)

Test Result

The EUT is a mobile device. The power density level at 20 cm is 0.058 mW/cm², which is below the uncontrolled exposure limit of 1.0mW/cm² at 2400 MHz.

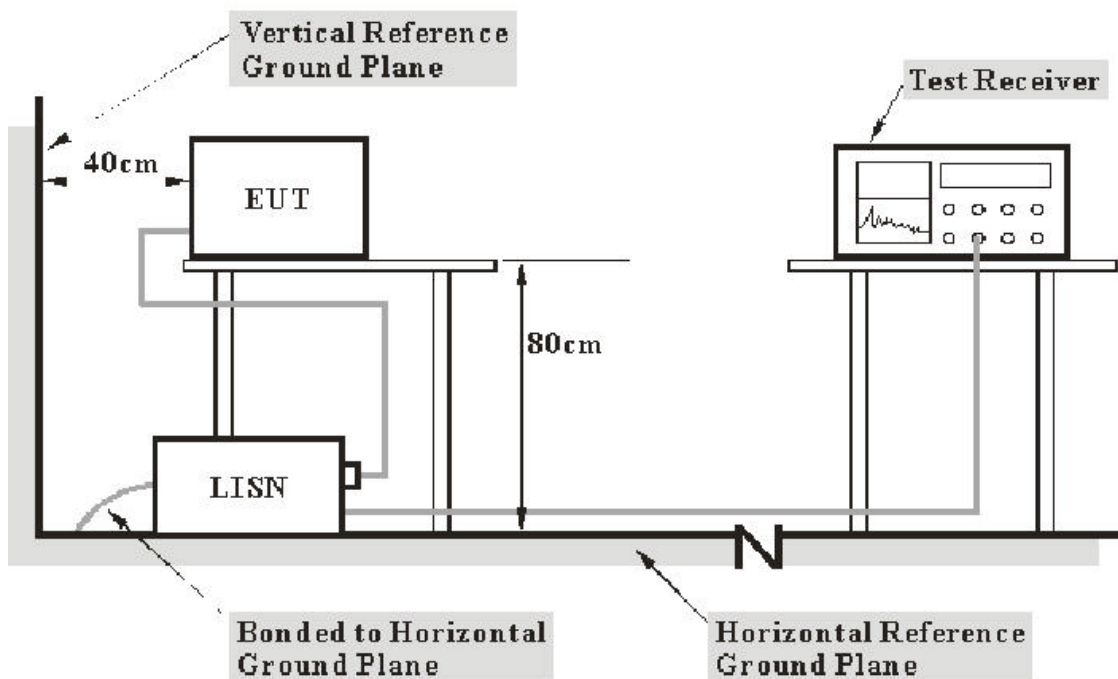
§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

EUT 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.

The setup of EUT is according with per ANSI C63.4-2001 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The Host PC was connected to a 120 VAC/ 60Hz power source.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 KHz to 30MHz.

During the conducted emission test, the spectrum analyzer was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
COM Power	LISN	LI-200	12208	2003-10-30	2004-10-29
COM Power	LISN	LI-200	12005	2003-10-30	2004-10-29
HP	Spectrum Analyzer	8568B	2517A01610	2003-10-30	2004-10-29
HP	Spectrum Analyzer Display Unit	8568B	2517A10039	2003-10-30	2004-10-29
HP	Quasi-Peak Adapter	8565A	3107A01572	2003-10-30	2004-10-29
R/S	Spectrum Analyzer	FSEM	849720/019	2003-10-30	2004-10-29
FLUKE	True RMS Multimeter	187	78540402	2004-3-23	2005-3-22

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the EUT power cord was connected to the outlet of the first LISN, the Host PC and all other support equipment power cords connected to the outlet of the second LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak detection mode.

Test Data

Date of Test : April 1-9,2004 Temperature : 25?
 EUT : W140A Wireless Access Point Humidity : 70%
 M/N : W140A Operating Mode : Running
 S/N : 040360 Test Engineer: Jandy SU

- CONDUCTED EMISSIONS				FCC PART 15.247	
Frequency MHz	Amplitude dBμV	Detector QP/AV/Peak	Phase -/+	Limit dBμV	Margin dB
Low Channel					
0.45	40.4	AV	+	46.88	-6.5
9.94	41.5	AV	+	50.00	-8.5
0.45	48.1	QP	+	56.88	-8.8
0.92	36.7	AV	-	46.00	-9.3
0.47	36.5	AV	-	46.51	-10.0
9.94	49.9	QP	+	60.00	-10.2
11.29	35.5	AV	+	50.00	-14.5
0.92	41.0	QP	-	56.00	-15.0
0.47	41.5	QP	-	56.51	-15.0
11.29	44.5	QP	+	60.00	-15.6
11.18	32.7	AV	-	50.00	-17.3
11.18	40.7	QP	-	60.00	-19.3
Middle Channel					
1.10	38.1	AV	-	46.00	-7.9
9.73	40.4	AV	-	50.00	-9.6
12.56	39.5	AV	+	50.00	-10.5
1.10	43.9	QP	-	56.00	-12.1
1.67	32.7	AV	+	46.00	-13.3
9.73	46.1	QP	-	60.00	-14.0
0.19	39.5	AV	-	54.04	-14.5
12.56	45.2	QP	+	60.00	-14.8
0.74	31.1	AV	+	46.00	-14.9
1.67	38.8	QP	+	56.00	-17.2
0.74	37.4	QP	+	56.00	-18.6
0.19	45.4	QP	-	64.04	-18.7

Continued:

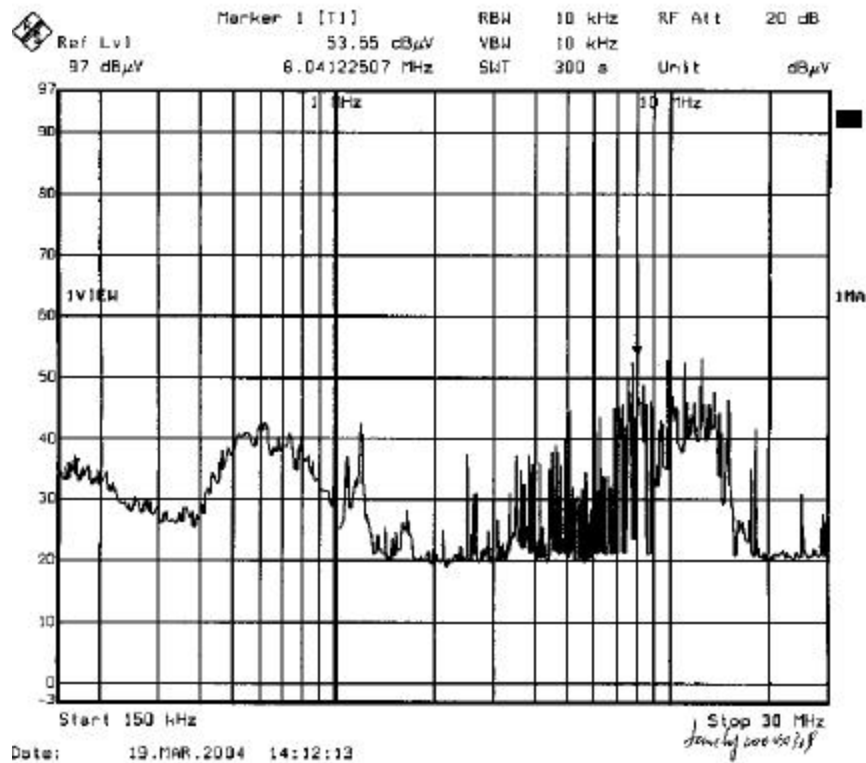
High Channel					
1.20	45.3	AV	-	46.00	-0.7
8.04	53.6	QP	-	60.00	-6.5
8.04	37.8	AV	-	50.00	-12.2
11.18	37.1	AV	-	50.00	-12.9
7.54	36.7	AV	+	50.00	-13.3
0.62	32.6	AV	+	46.00	-13.4
0.62	42.5	QP	-	56.00	-13.5
1.20	42.3	QP	-	56.00	-13.7
0.47	39.7	QP	+	56.51	-16.8
11.18	32.6	AV	+	50.00	-17.4
11.18	41.1	QP	+	60.00	-18.9
7.54	39.3	QP	+	60.00	-20.7

Test Result: Pass

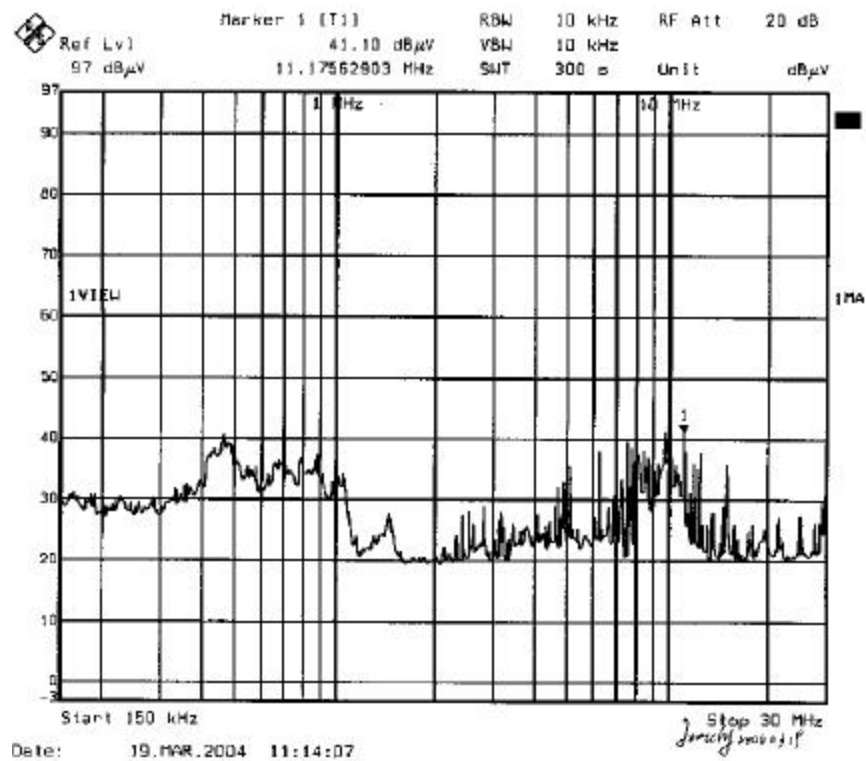
Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

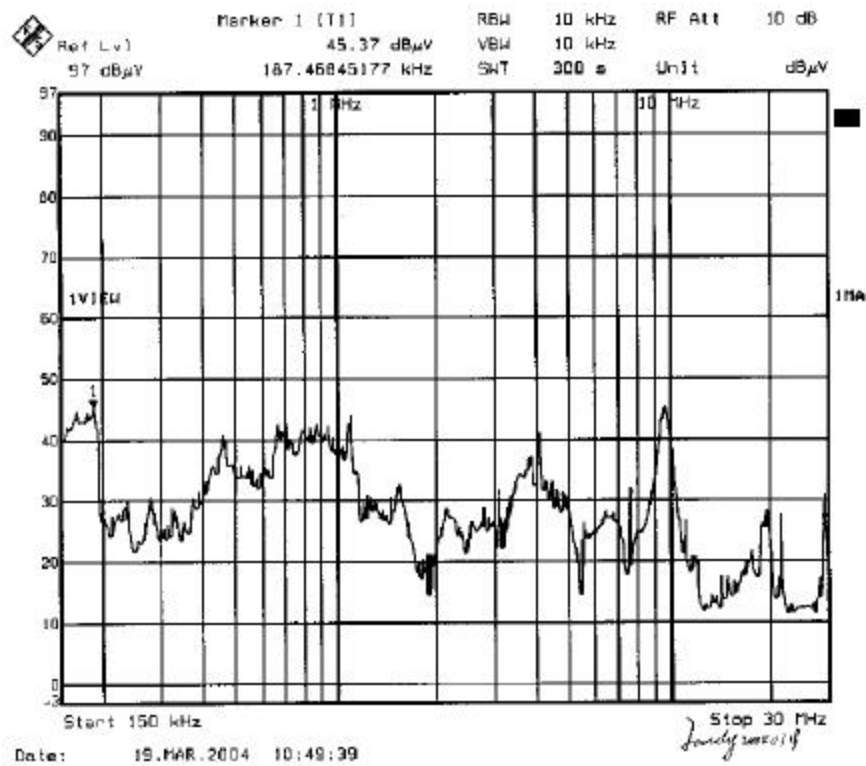
Low Channel +:



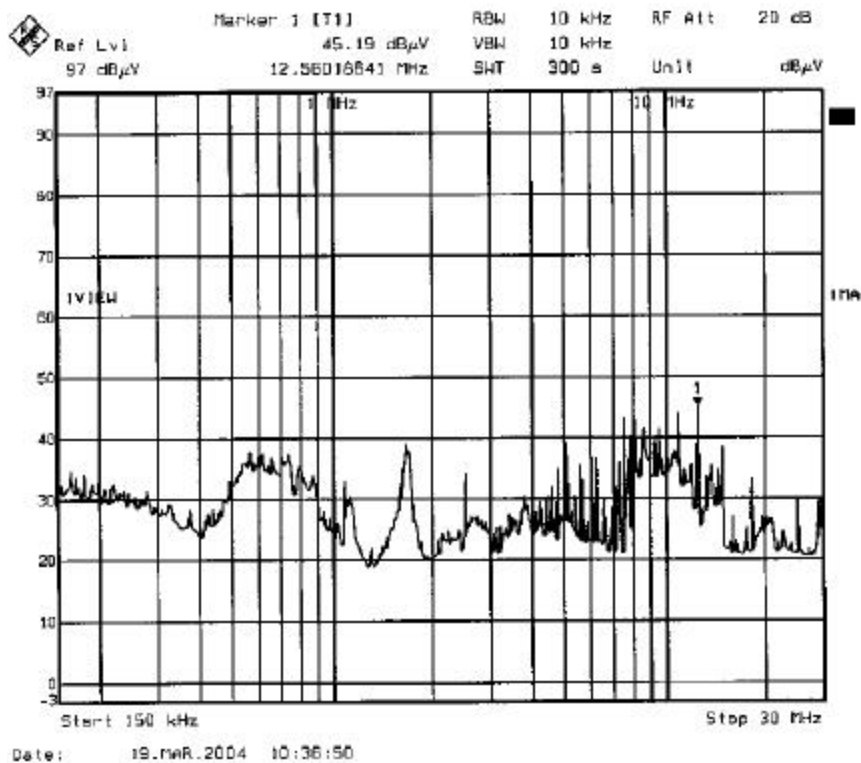
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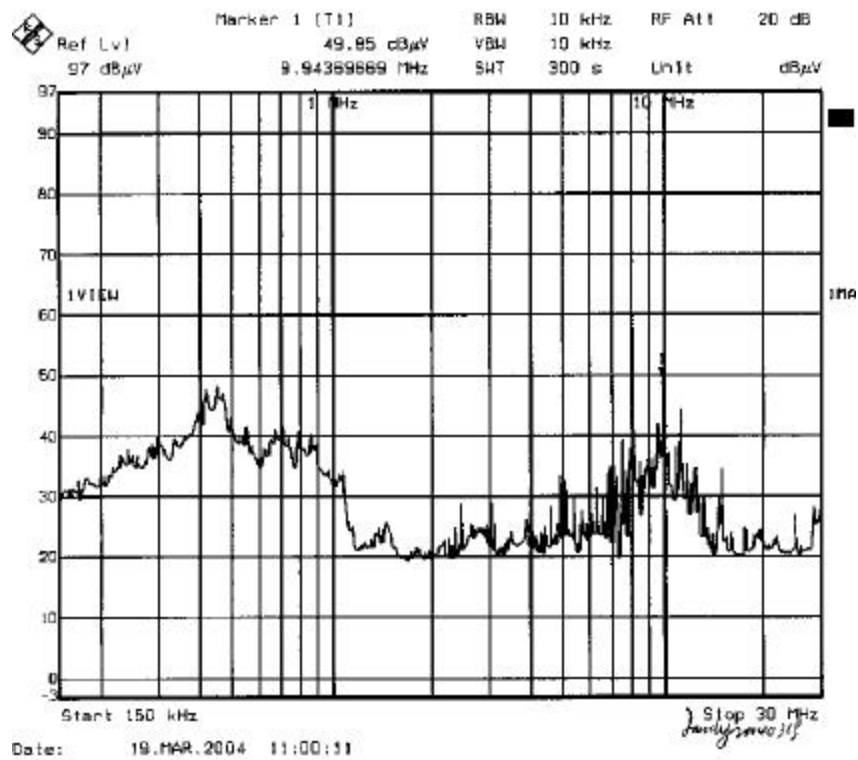
Middle Channel +:



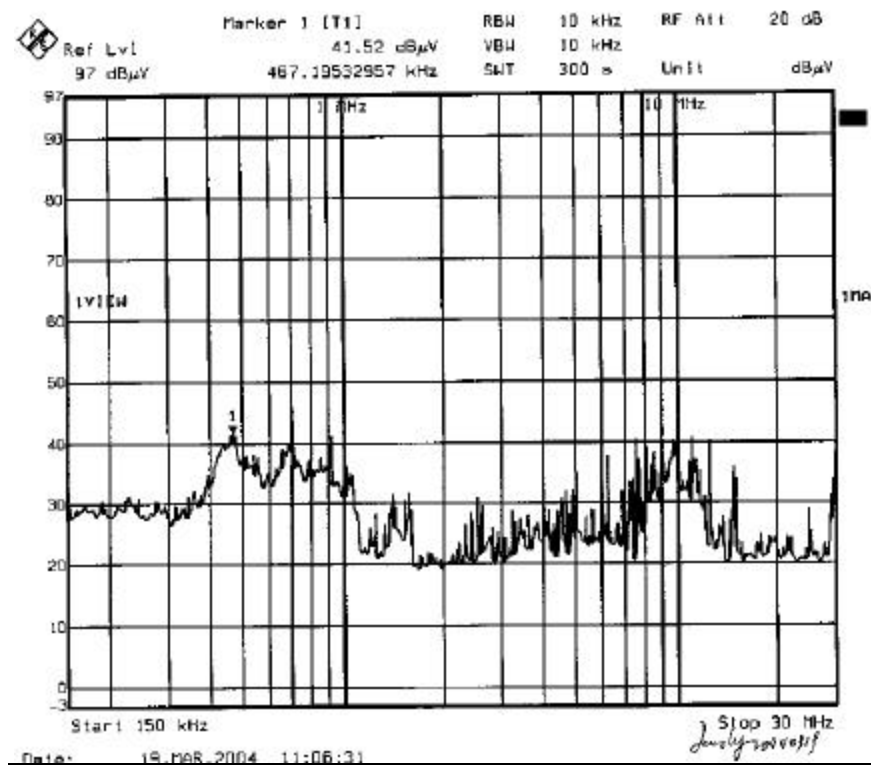
-:



High Channel +:



-:



§15.247(c) - ANTENNA PORT CONDUCTED SPURIOUS EMISSION TEST (30M-25G)

Standard Applicable

According to §15.209 (a), except as provided elsewhere in the subpart of 15.209, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Measurement Field strength (microvolts/meter)
0.009-0.490.....	2400/F(kHz)
0.490-1.705.....	24000/F(kHz)
1.705-30.0.....	30
30-88.....	100 **
88-216.....	150 **
216-960.....	200 **
Above 960.....	500

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

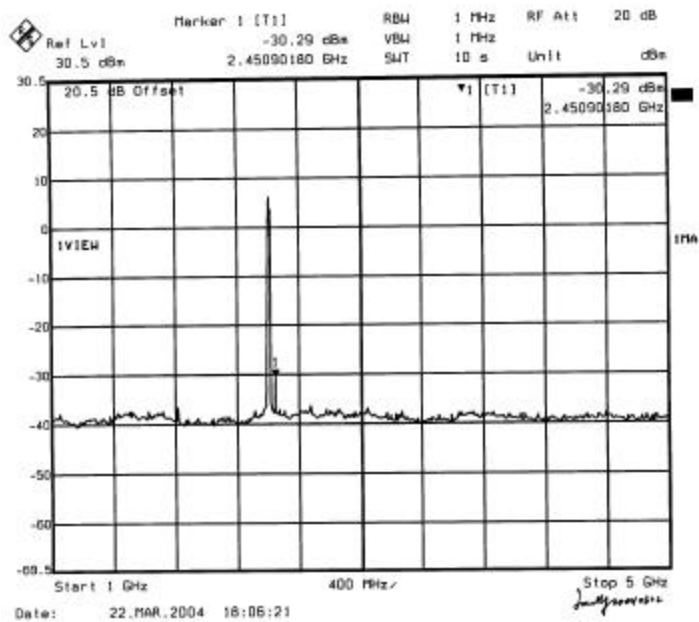
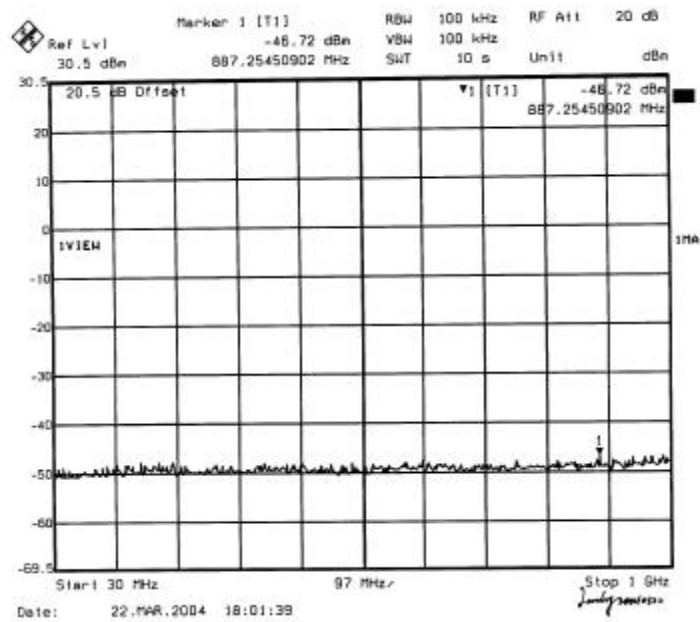
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R/S	Spectrum Analyzer	FSEM	849720/019	2003-10-30	2004-10-29

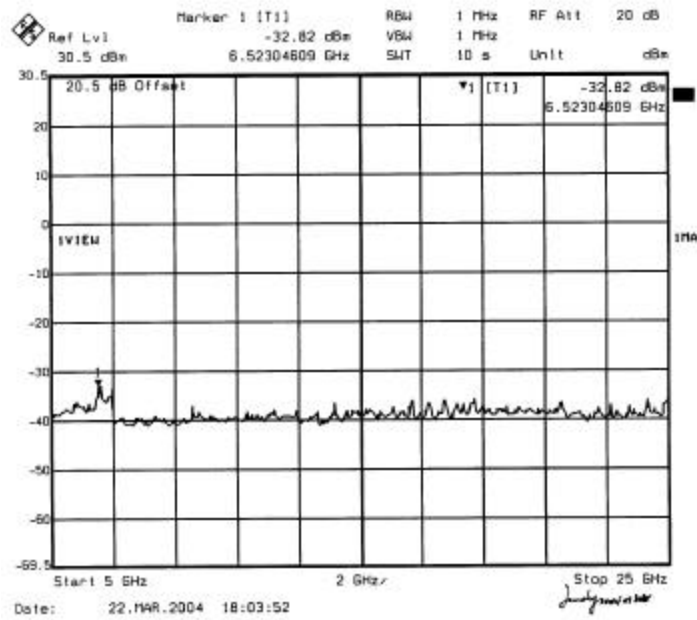
Measurement Result**Environmental Conditions**

Temperature:	24° C
Relative Humidity:	63%
ATM Pressure:	1100 mbar

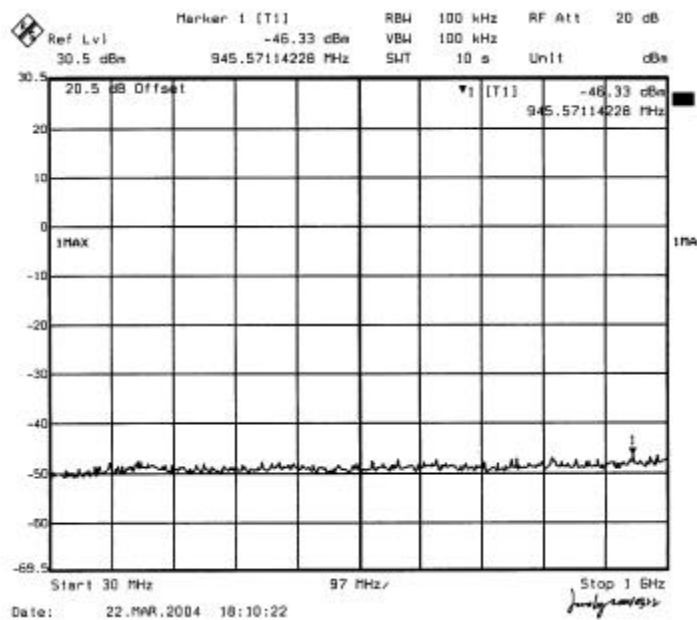
Please refer to following pages for plots of spurious emission.

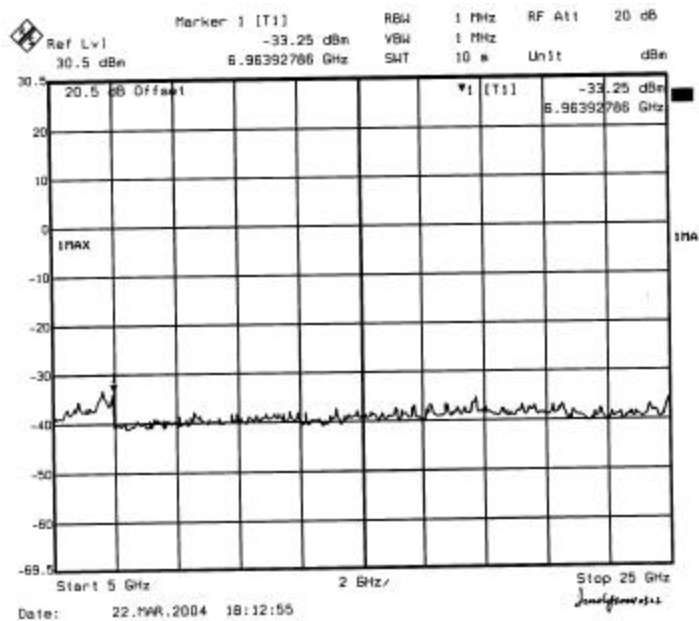
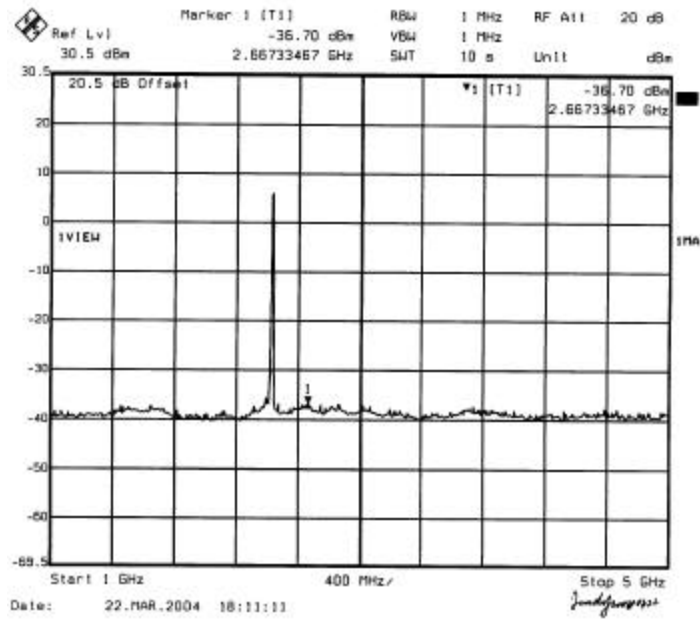
(2.4GHz-2.4835GHz) Low Channel QPSK 802.11b



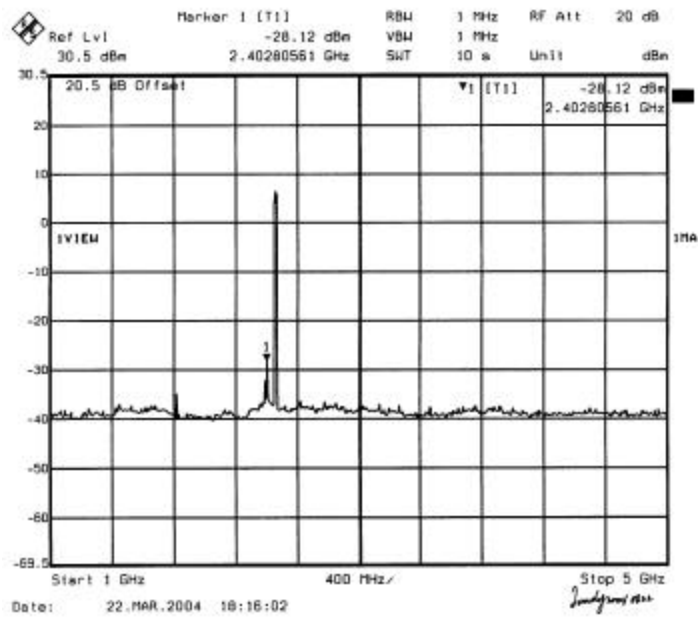
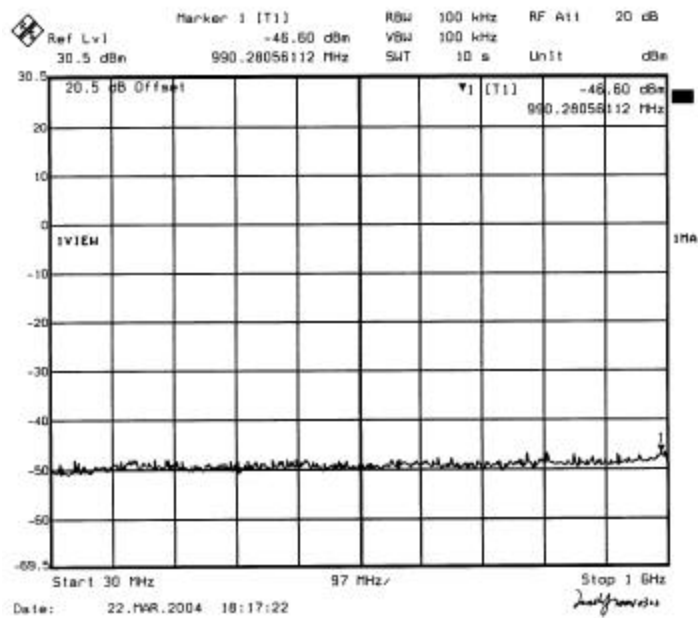


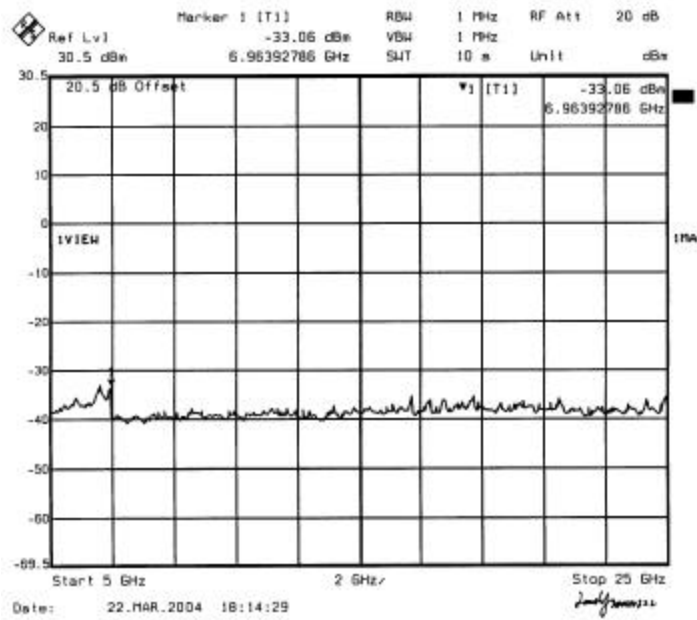
(2.4GHz-2.4835GHz) Middle Channel QPSK 802.11b



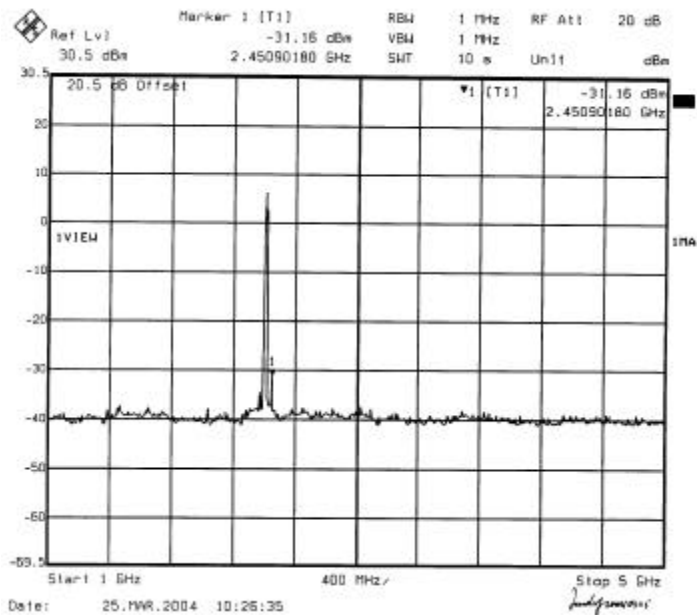


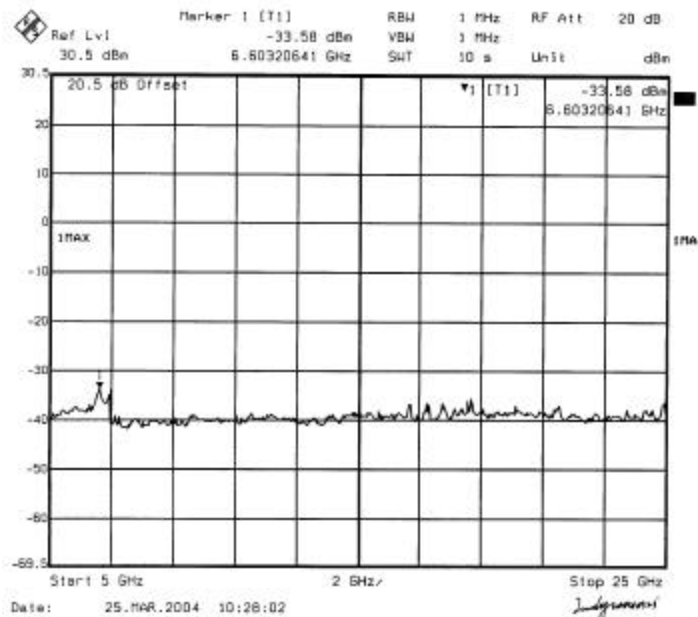
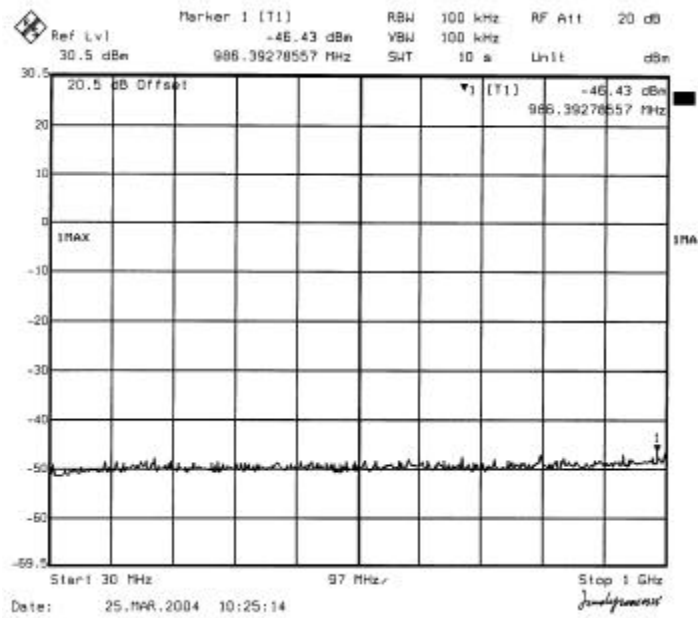
(2.4GHz-2.4835GHz) High Channel QPSK 802.11b



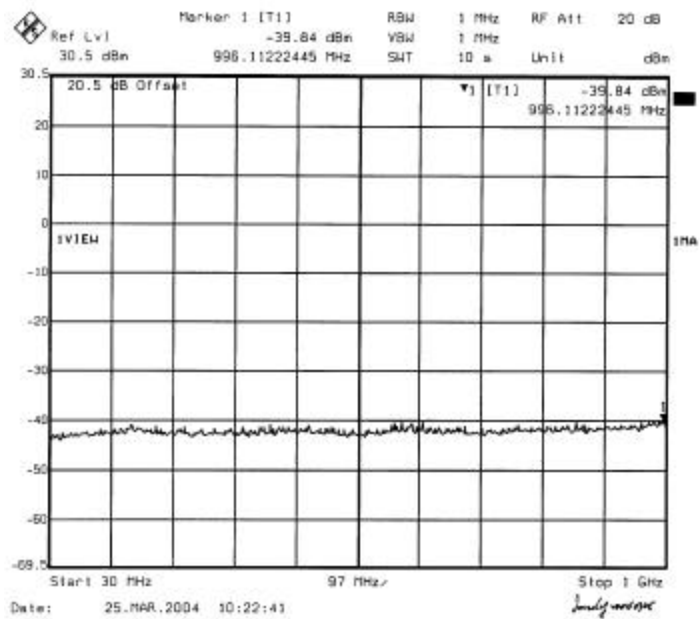
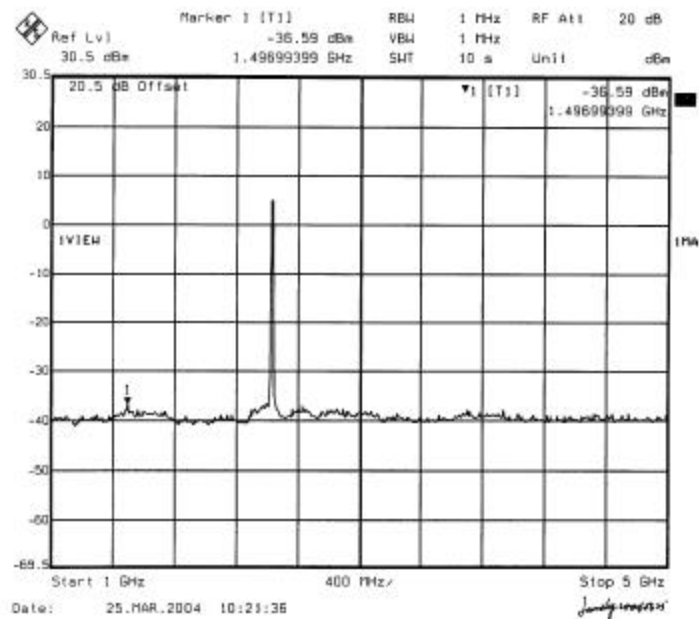


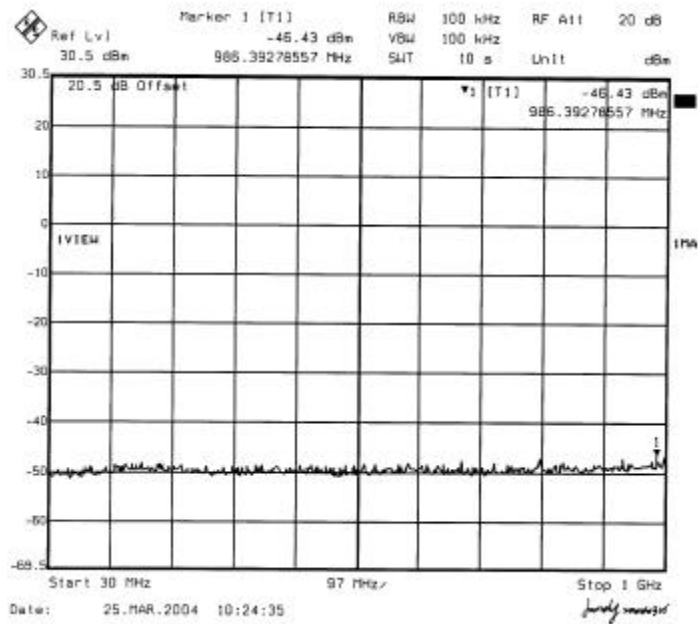
(2.4GHz-2.4835GHz) Low Channel BPSK 802.11b



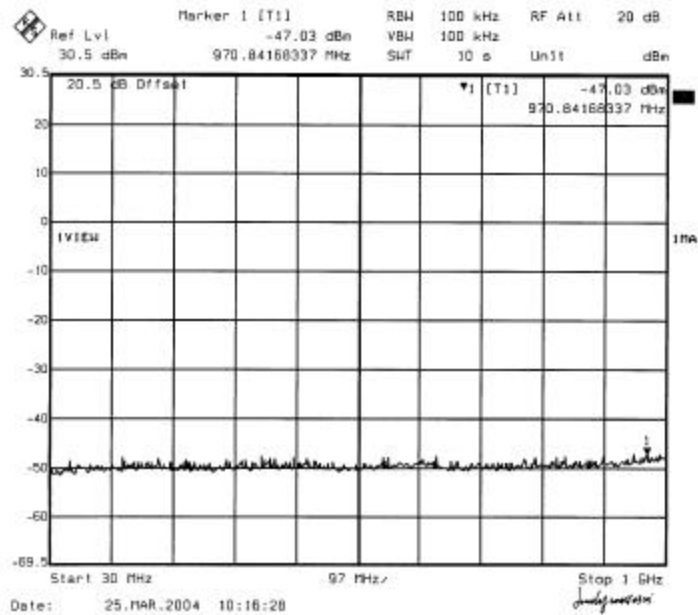


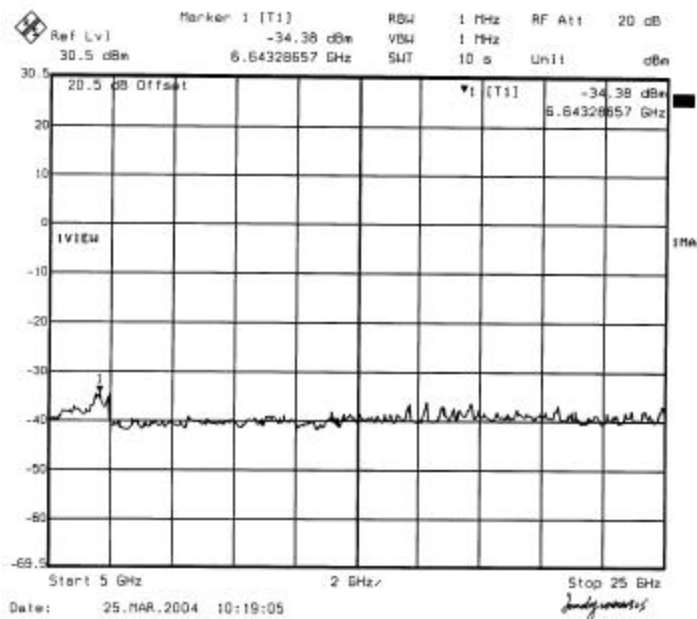
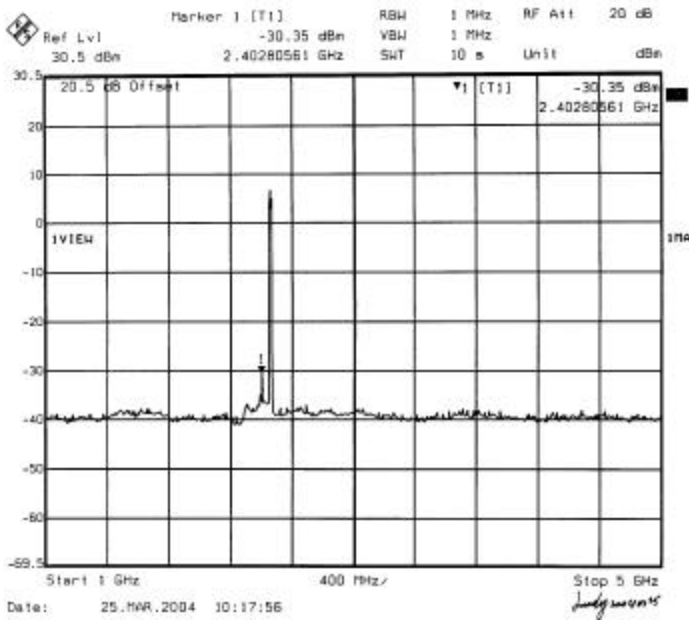
(2.4GHz-2.4835GHz) Middle Channel BPSK 802.11b



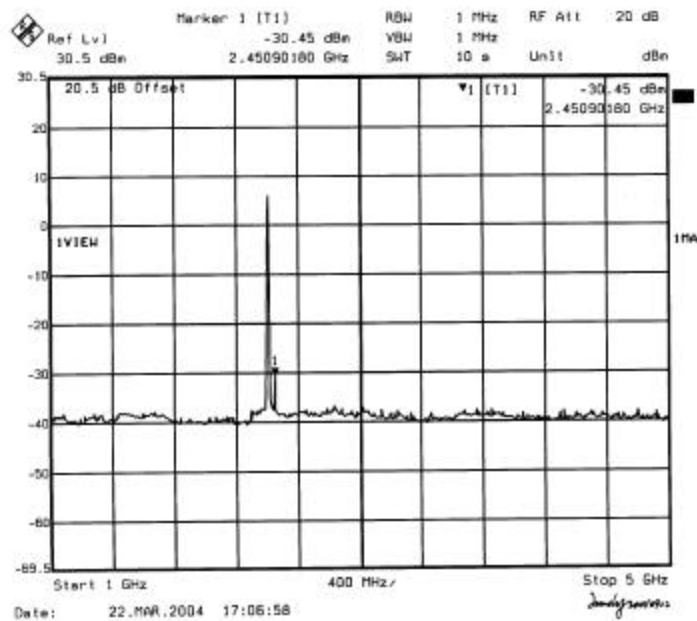
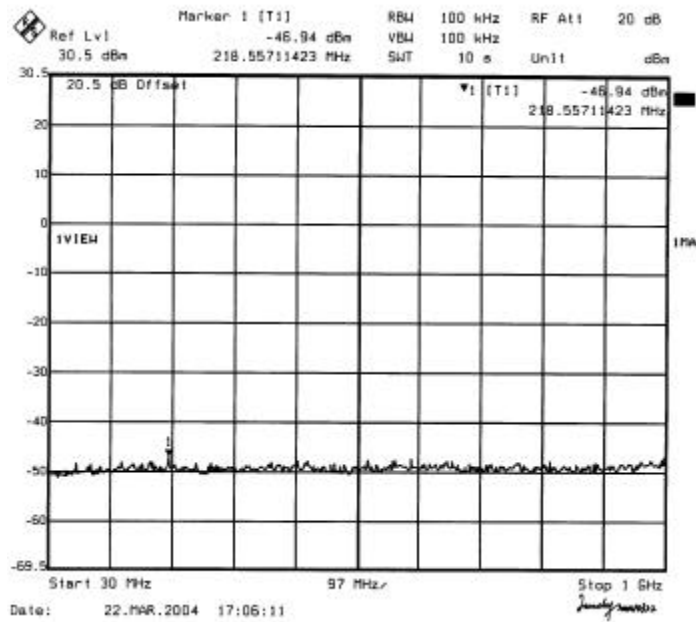


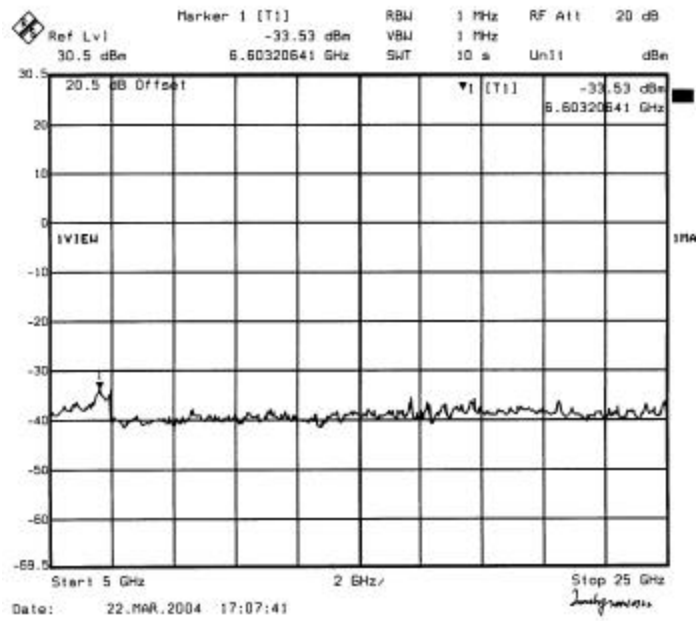
(2.4GHz-2.4835GHz) High Channel BPSK 802.11b



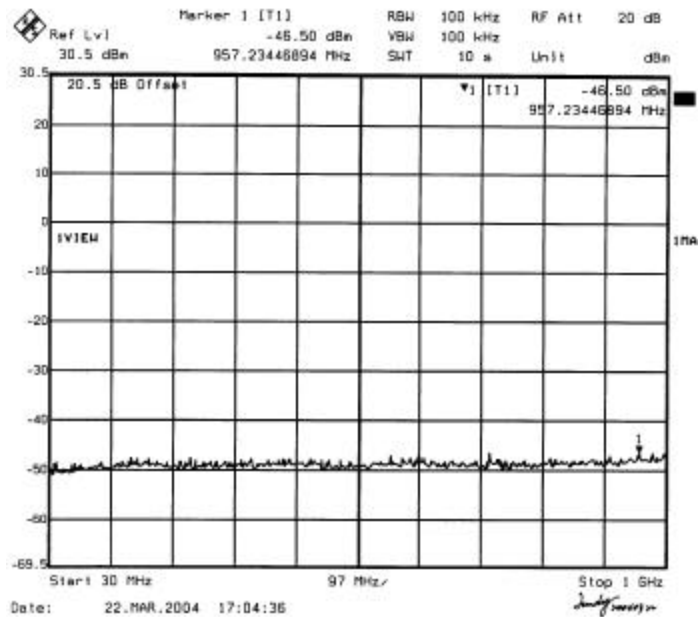


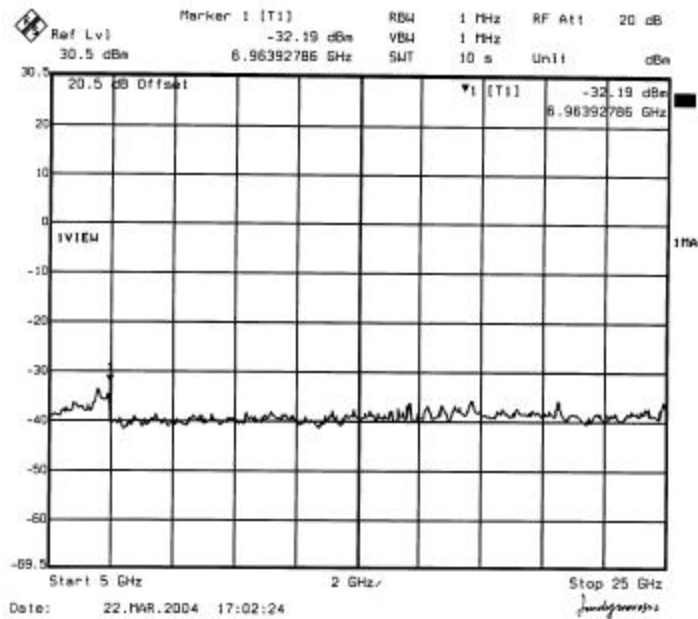
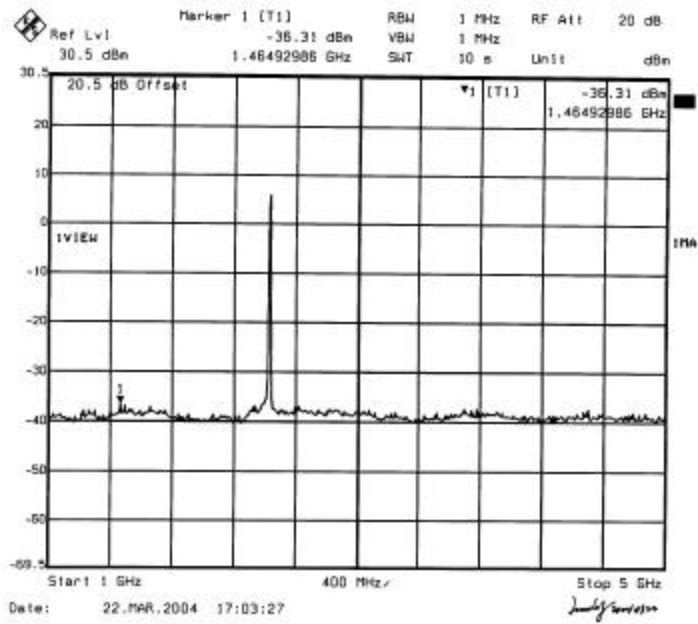
(2.4GHz-2.4835GHz) Low Channel CCK 802.11b





(2.4GHz-2.4835GHz) Middle Channel CCK 802.11b





(2.4GHz-2.4835GHz) High Channel CCK 802.11b

