



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 15.247 CERTIFICATION & INDUSTRY CANADA CERTIFICATION

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FCC ID:	E2XSWL-2210P	GRANTEE FRN NUMBER:	0006-9029-36
PLAT FORM:	N/A	RTL WORK ORDER NUMBER:	2002120
MODEL(S):	SWL-2210P	RTL QUOTE NUMBER:	QRTL02-485
DATE OF TEST REPORT:	August 23, 2002		
American National Standard Institute:	DA000705 for FHSS and fcc97114 for DSSS		
FCC Classification:	DTS – Digital Transmission System		
FCC Rule Part(s):	Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System		
Industry Canada Standard:	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
2412-2462	0.0339	N/A	N/A

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, Industry Canada RSS-210, ANSI C63.4, DA000705 for FHSS and fcc97114 for DSSS.

Signature: 

Date: August 23, 2002

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

IC RSS-210 Section 6.2.2(o): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

A direct sequence (DS) system is a spread spectrum (SS) system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high-speed code sequence dominates the “modulating function” and is the direct cause of the wide spreading of the transmitted signal.

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for Certification for the WLAN PCI card M/N: SWL-2210P, FCC ID: E2XSWL-2210P. The IF, LO and up to the 2nd LO were investigated and tested.

2 TEST INFORMATION

2.1 TEST JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. Channel 1 at 2412 MHz, Channel 6 at 2437 MHz and channel 11 at 2462 MHz were tested and investigated from 9 kHz to 24 GHz. Data for all three channels are presented in this report.

The EUT contains an antenna. In order to complete the configuration required, the transmitter was tested with a PCI in a computer (tower computer configuration) with an external antenna. The patch antenna transmits, receives, and is connected to the only antenna port available. The PCI WLAN output connector was connected to the antenna via a coaxial cable. The antenna was placed in three orthogonal positions, i.e. X-Y, X-Z and Y-Z during testing.

The worst-case data taken in this report represents the highest data rate at 11 MBPS. Data rates of 5.5 MBPS, 2 MBPS and 1 MBPS were investigated and found to be in compliance. The change in envelope did not cause the EUT to be non-compliant in any of the aforementioned modes.

2.2 EXERCISING THE EUT

The EUT was provided with the software to continuously transmit during testing. The carrier was also checked to verify that the information was being transmitted.

2.3 TEST RESULT SUMMARY

TABLE 2-1: TEST RESULT SUMMARY WITH FCC RULES AND REGULATIONS

STANDARD	TEST	PASS/FAIL OR N/A
FCC 15.205	Compliance with the restricted Band Edge	Pass
FCC 15.207	Conducted Emissions	Pass
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(a)(2)	Modulated Bandwidth	Pass
FCC 15.247(b)	Power Output	Pass
FCC 15.247(c)	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	Power Spectral Density	Pass

2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are shown in Table 2-2:

TABLE 2-2: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
WLAN PCI CARD	SAMSUNG ELECTRO-MECHANICS CO., LTD	SWL-2210P	N/A	E2XSWL-2210P	N/A	014241

TABLE 2-3: EXTERNAL COMPONENTS IN TEST CONFIGURATION

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
CD-ROM DRIVE	PHILIPS BUSINESS ELECTRONICS	CDD4201/ 81 CDR/W	4VO1947DG0 2397	N/A	INTERNAL	012274
FLOPPY DRIVE	MITSUMI	D353M3	N/A	N/A	INTERNAL	012114
COMPUTER HOST	GATEWAY COMPANIES, INC.	ATXSTF	N/A	N/A	N/A	012332
VIDEO CARD	VISIONTEK	NV996.0 REV.D (RIVA TNT 2)	0223655	N/A	N/A	012900
MOUSE	MICROSOFT CORPORATION	INTELLIMOUSE USB	X05-22941	N/A	SHIELDED WITH FERRITE CONNECTOR END I/O	012301
POWER SUPPLY	EOS	ZVC60NT12AD	00000-94-5797	N/A	UNSHIELDED	014274
KEYBOARD	MAXI-SWITCH	G9900H	2000022106	N/A	SHIELDED I/O	011754
MODEM	USROBOTICS	0413	000839032B26 M4PN	N/A	SHIELDED I/O UNSHIELDED POWER	900407
MONITOR	LG	EVF720	N/A	N/A	SHIELDED I/O UNSHIELDED POWER	011929
PRINTER	HEWLETT PACKARD	C3941A	USCB233387	N/A	SHIELDED I/O UNSHIELDED POWER	900293

2.5 CONFIGURATION OF TESTED SYSTEM

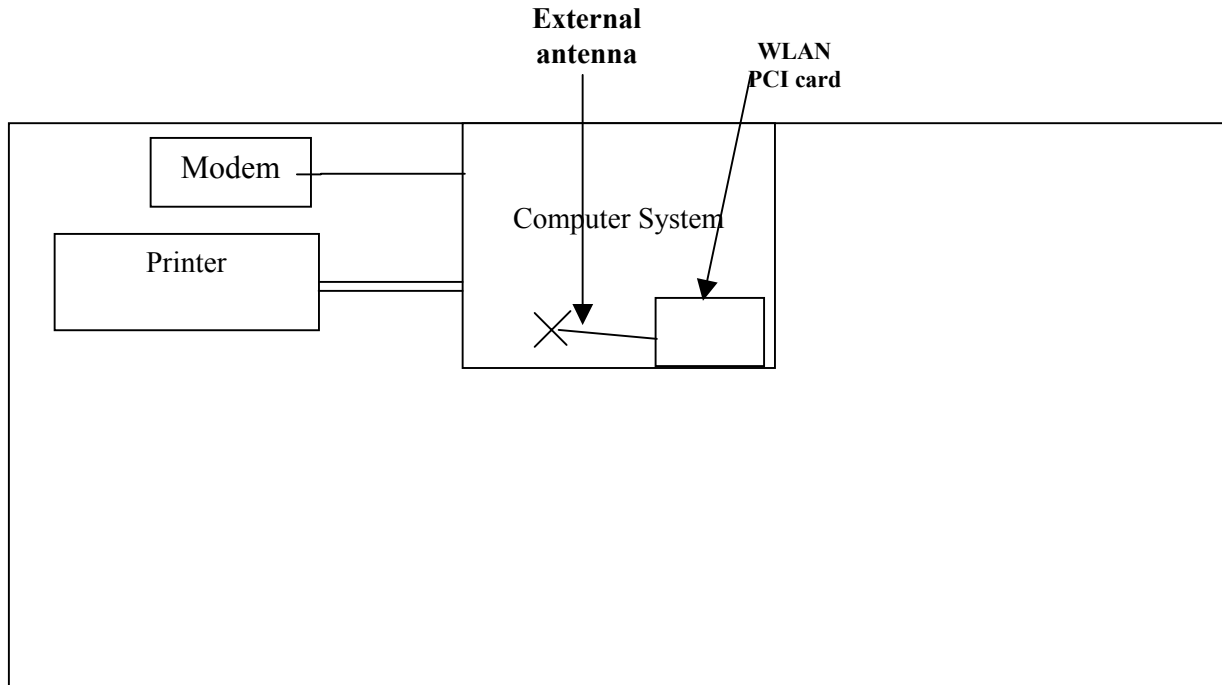


FIGURE 1: WORST CASE CONFIGURATION OF SYSTEM UNDER TEST

3 COMPLIANCE WITH THE RESTRICTED BAND EDGE - §15.205

3.1 TEST PROCEDURE

Compliance with the band edges was performed using the rules found in FCC Parts 15.205 and 15.209 respectively. The final data derived below are from radiated measurements applying absolute detector values only. The data taken in this report represents the worst-case band edges at 11 MBPS with 100% duty cycle. Data rates of 5.5MBPS, 2 MBPS and 1 MBPS were investigated and found to be in compliance.

3.2 COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA

Operating Frequency (MHz): 2412-2462
 Channel: 1 & 11
 Distance (m): 3
 Limit (dBuV/m): 54

TABLE 3-1: COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA

Channel Set to	Frequency tested (MHz)	Detector	Field Strength Level (dBμV/m)	Level Corrected (dBμV/m)	FCC Limit (dBμV/m)	FCC Margin (dB)
1	2390.0	Absolute measurement	37.3	48.3	54.0	-5.7
11	2483.5	Absolute measurement	39.2	50.2	54.0	-3.8

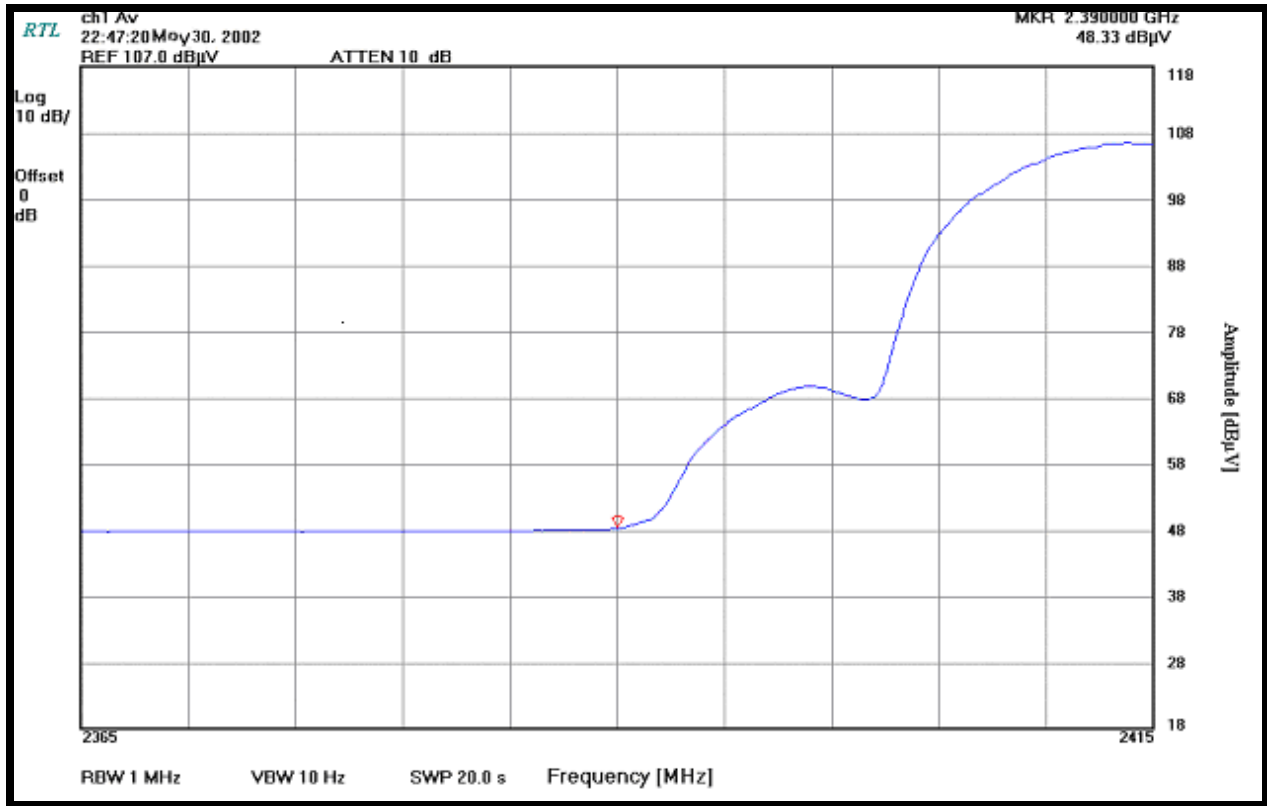
TEST PERSONNEL:

Franck Schuppius		05/30/02
Test Technician/Engineer	Signature	Date Of Test

3.3 COMPLIANCE WITH THE RESTRICTED BAND EDGE PLOTS


Channel Number: 1
Frequency (MHz): 2412
Resolution Bandwidth (MHz): 1
Video Bandwidth (Hz): 10
Sweep Time (s): 20.0

PLOT 3-1: BAND EDGE: AVERAGE MEASUREMENT FOR CHANNEL 1



TEST PERSONNEL:

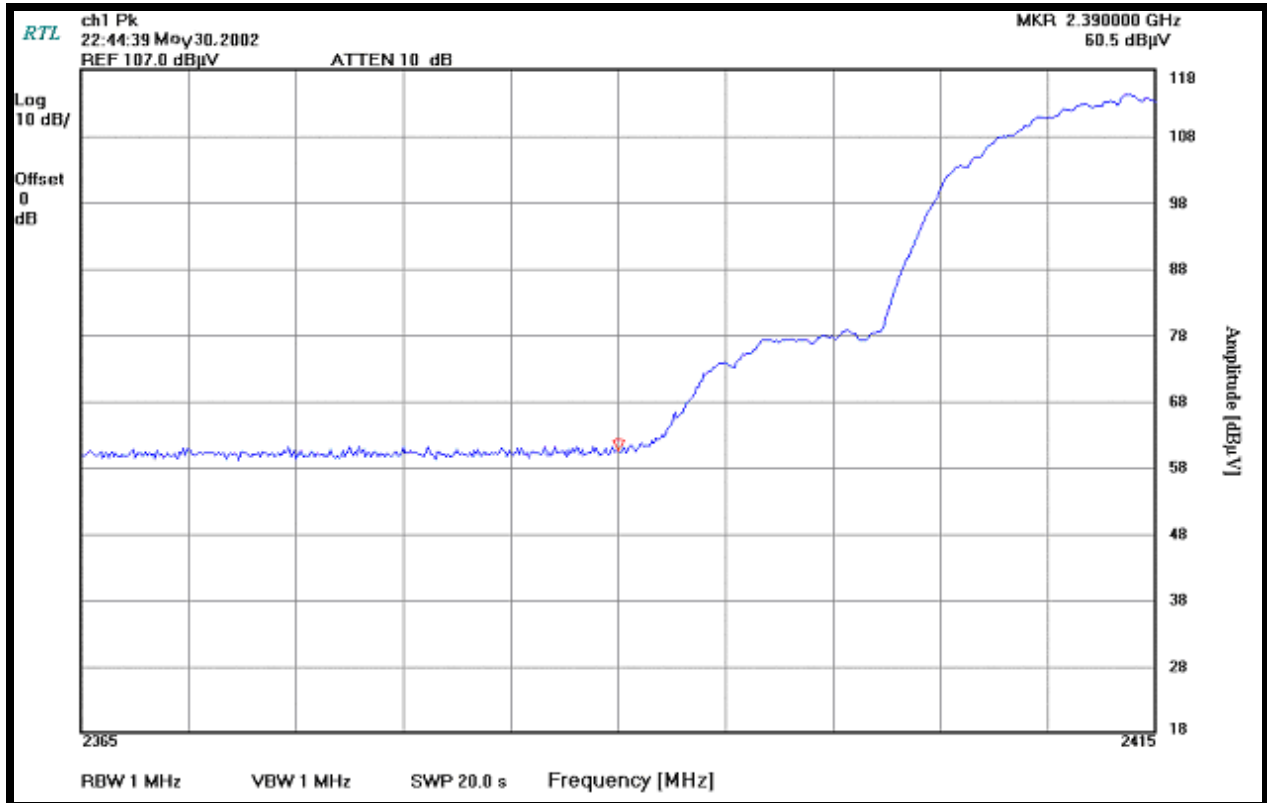
Franck Schuppius
Test Technician/Engineer


Signature

05/30/02
Date Of Test


Channel Number: 1
Frequency (MHz): 2412
Resolution Bandwidth (MHz): 1
Video Bandwidth (MHz): 1
Sweep Time (s): 20.0

PLOT 3-2: BAND EDGE: PEAK MEASUREMENT FOR CHANNEL 1



TEST PERSONNEL:

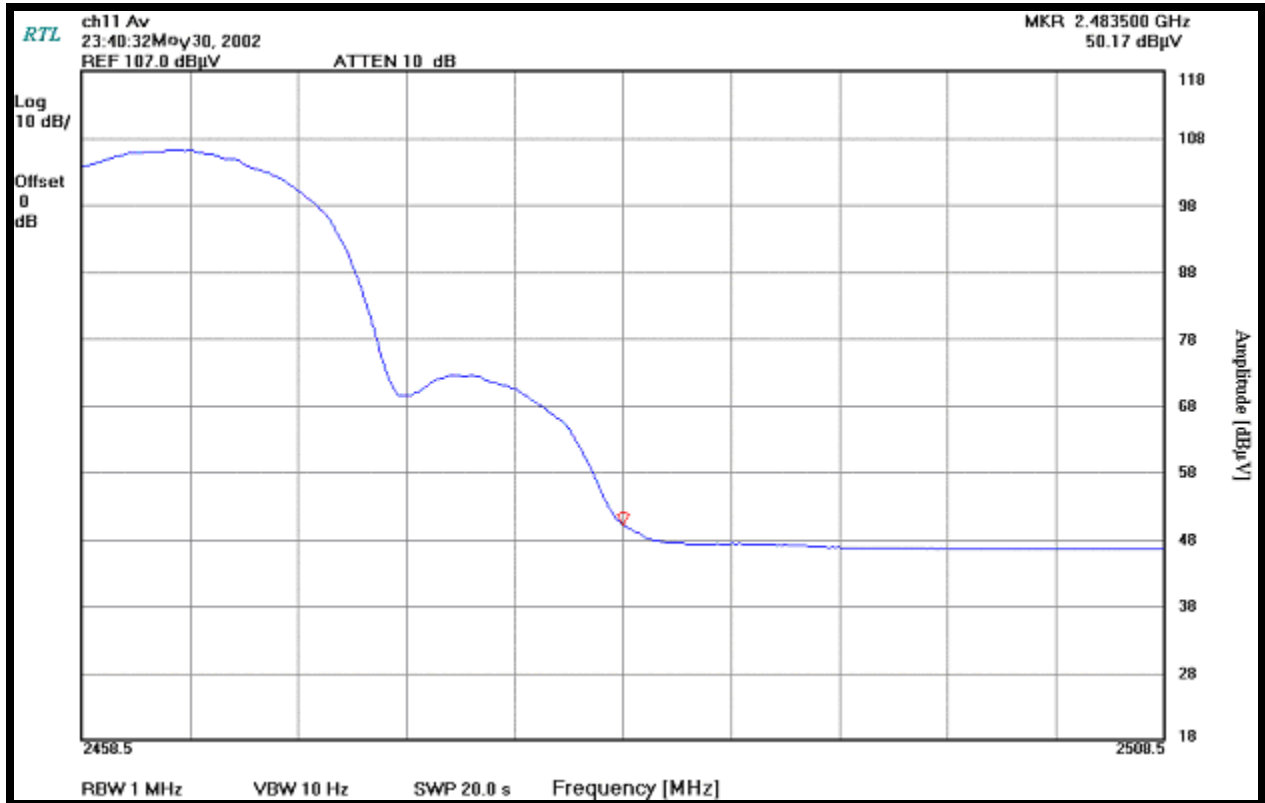
Franck Schuppius
Test Technician/Engineer


Signature

05/30/02
Date Of Test

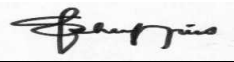
Channel Number: 11
Frequency (MHz): 2462
Resolution Bandwidth (MHz): 1
Video Bandwidth (Hz): 10
Sweep Time (s): 20.0

PLOT 3-3: BAND EDGE: AVERAGE MEASUREMENT FOR CHANNEL 11



TEST PERSONNEL:

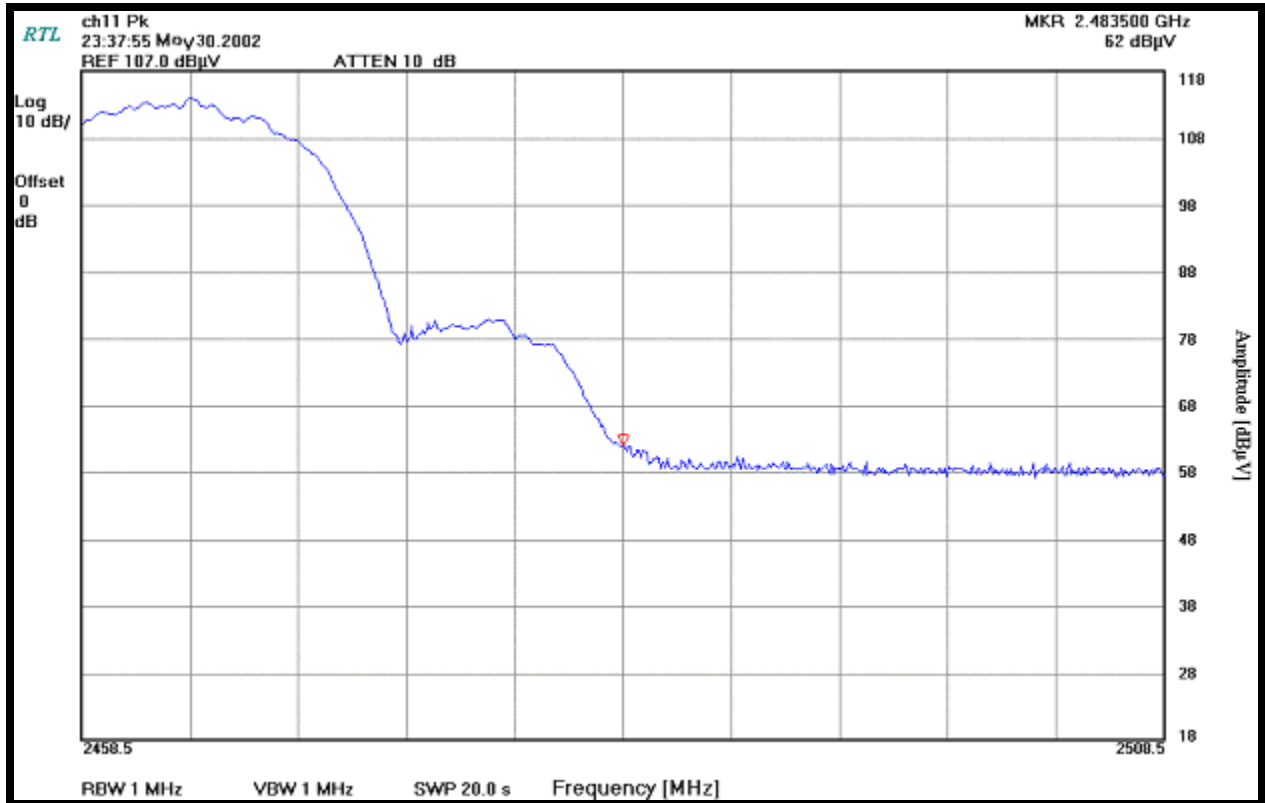
Franck Schuppius
Test Technician/Engineer


Signature

05/30/02
Date Of Test

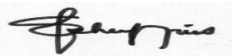
Channel Number: 11
Frequency (MHz): 2462
Resolution Bandwidth (MHz): 1
Video Bandwidth (MHz): 1
Sweep Time (s): 20.0

PLOT 3-4: BAND EDGE: PEAK MEASUREMENT FOR CHANNEL 11



TEST PERSONNEL:

Franck Schuppius
Test Technician/Engineer


Signature

05/30/02
Date Of Test

4 CONDUCTED LIMITS - §15.207

4.1 TEST METHODOLOGY FOR CONDUCTED EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

4.2 CONDUCTED EMISSION TEST

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode. If the quasi-peak measurement is at least 6dB higher than the amplitude in the average mode, the level measured in the quasi-peak mode may be reduced by 13dB before comparing it to the limit.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 450 kHz to 30 MHz on the NEUTRAL SIDE and PHASE SIDE. Channels 1, 6, and 11 in the transmitting and receiving modes were investigated and tested. Worst-case data for channel 6 in the transmitting and receiving mode is provided.

TABLE 4-1: CONDUCTED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
900931	HP	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771
900070	Solar		LISN	

4.3 CONDUCTED EMISSION TEST DATA

TABLE 4-2: CONDUCTED EMISSIONS (NEUTRAL SIDE) TRANSMITTING CH 6

		Temperature: 74°F		Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
3.617	Pk	29.8	1.4	31.2	48.0	-16.8
9.502	Pk	36.3	2.1	38.4	48.0	-9.6
10.870	Pk	41.8	2.2	44.0	48.0	-4.0
11.092	Pk	34.4	2.2	36.6	48.0	-11.4
11.320	Pk	40.1	2.3	42.4	48.0	-5.6
12.220	Pk	39.4	2.5	41.9	48.0	-6.1
12.671	Pk	36.5	2.5	39.0	48.0	-9.0
23.102	Pk	34.1	3.2	37.3	48.0	-10.7

TABLE 4-3: CONDUCTED EMISSIONS (PHASE SIDE) TRANSMITTING CH 6

		Temperature: 74°F		Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
2.088	Pk	33.6	1.2	34.8	48.0	-13.2
9.500	Pk	37.4	1.7	39.1	48.0	-8.9
10.870	Pk	41.9	2.2	44.1	48.0	-3.9
11.090	Pk	34.0	2.3	36.3	48.0	-11.7
11.320	Pk	40.3	2.4	42.7	48.0	-5.3
12.220	Pk	39.7	2.5	42.2	48.0	-5.8
23.100	Pk	36.3	3.3	39.6	48.0	-8.4

TEST PERSONNEL:

Franck Schuppius Test Technician/Engineer	 Signature	05/29/02 Date Of Test
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TABLE 4-4: CONDUCTED EMISSIONS (PHASE SIDE) RECEIVING CH 6

		Temperature: 74°F		Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.455	Pk	37.6	0.8	38.4	48.0	-9.6
9.500	Pk	36.9	2.1	39.0	48.0	-9.0
10.870	Pk	41.7	2.2	43.9	48.0	-4.1
11.320	Pk	39.6	2.3	41.9	48.0	-6.1
12.220	Pk	39.1	2.5	41.6	48.0	-6.4
12.670	Pk	35.9	2.5	38.4	48.0	-9.6
14.030	Pk	32.1	2.6	34.7	48.0	-13.3
23.110	Pk	35.6	3.2	38.8	48.0	-9.2

TABLE 4-5: CONDUCTED EMISSIONS (NEUTRAL SIDE) RECEIVING CH 6

		Temperature: 74°F		Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.455	Pk	31.3	0.8	32.1	48.0	-15.9
9.500	Pk	36.2	1.7	37.9	48.0	-10.1
10.870	Pk	41.2	2.2	43.4	48.0	-4.6
11.320	Pk	39.6	2.4	42.0	48.0	-6.0
12.230	Pk	38.8	2.5	41.3	48.0	-6.7
12.680	Pk	36.3	2.5	38.8	48.0	-9.2
23.110	Pk	36.7	3.3	40.0	48.0	-8.0

TEST PERSONNEL:

Franck Schuppis Test Technician/Engineer	 Signature	05/29/02 Date Of Test
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5 RADIATED EMISSION LIMITS RECEIVER/DIGITAL INTERFACE - §15.209

5.1 RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The IF, LO and up to the 2nd LO were investigated and tested. Channels 1, 6, and 11 were tested and investigated in the transmitting and receiving mode between 10kHz and 1GHz. The data for the worst –case, channel 11 in both modes, is presented in the tables below.

5.2 RADIATED EMISSION LIMITS TEST DATA

TABLE 5-1: RADIATED EMISSIONS TRANSMITTING CH 11

		Temperature: 43°F			Humidity: 51%				
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
132.000	Qp	V	180	1.0	41.4	-15.5	25.9	43.5	-17.6
176.000	Qp	V	145	1.0	42.7	-17.5	25.2	43.5	-18.3
220.000	Qp	V	0	1.0	46.1	-17.5	28.6	46.0	-17.4
396.000	Qp	V	90	1.0	36.2	-11.1	25.1	46.0	-20.9
528.000	Qp	V	145	1.0	35.3	-7.9	27.4	46.0	-18.6
723.231	Qp	V	1	1.0	72.4	-4.6	67.8	46.0	21.8
924.000	Qp	V	225	1.0	35.8	-3.7	32.1	46.0	-13.9

QP: RES. =100 kHz, VID= 100 kHz

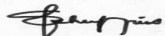
TABLE 5-2: RADIATED EMISSIONS RECEIVING CH 11

		Temperature: 43°F			Humidity: 51%				
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
87.976	Qp	V	145	1.2	42.7	-20.8	21.9	40.0	-18.1
219.992	Qp	V	175	1.2	43.9	-17.5	26.4	46.0	-19.6
263.990	Qp	V	180	1.2	38.8	-14.5	24.3	46.0	-21.7
395.990	Qp	V	180	1.0	34.6	-11.1	23.5	46.0	-22.5
439.990	Qp	V	320	1.2	33.0	-9.4	23.6	46.0	-22.4
527.990	Qp	V	145	1.0	34.9	-7.9	27.0	46.0	-19.0
1187.990	Av	V	0	1.5	31.9	-1.2	30.7	54.0	-23.3

QP: RES. =100 kHz, VID= 100 kHz

TEST PERSONNEL:

Franck Schuppis
 Test Technician/Engineer


 Signature

05/29/02
 Date Of Test

6 RADIATED EMISSION LIMITS RADIATED HARMONICS - §15.247

6.1 RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The PCI WLAN output connector was connected to the antenna via a coaxial cable. The antenna was placed in three orthogonal positions i.e. X-Y, X-Z and Y-Z during testing.

6.2 RADIATED EMISSION LIMITS TEST DATA

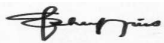
Channel: 1
 Measured Cond. Pwr. (dBm): 15.1
 Antenna: Patch

TABLE 6-1: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 1)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
2412.000	Av	V	10	1.0	96.5	11	107.5	Fundamental
2412.000	Pk	V	10	1.0	102.3	11	113.3	Fundamental
4075.971	Av	V	10	1.0	<20 dB			54.0
4824.000	Av	V	10	1.0	<20 dB			54.0
7236.000	Av	V	20	1.0	<20 dB			54.0
9648.000	Av	V	20	1.0	<20 dB			54.0
12060.000	Av	V	10	1.0	<20 dB			54.0
14472.000	Av	V	10	1.0	<20 dB			54.0
16884.000	Av	V	10	1.0	<20 dB			54.0
19296.000	Av	V	10	1.0	<20 dB			54.0
21708.000	Av	V	10	1.0	<20 dB			54.0
24120.000	Av	V	10	1.0	<20 dB			54.0

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; <20dB= 20dB BELOW THE LIMIT

TEST PERSONNEL:

Franck Schuppius Test Technician/Engineer	 Signature	05/29/02 Date Of Test
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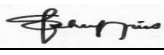
Channel: 6
 Measured Cond. Pwr. (dBm): 15.2
 Antenna: Patch

TABLE 6-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 6)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
2437.000	Av	V	20	1.2	96.5	11	107.5	Fundamental
2437.000	Pk	V	20	1.2	103.7	11	114.7	Fundamental
4125.960	Av	V	20	1.0	<20 dB			54.0
4874.000	Av	V	20	1.0	<20 dB			54.0
7311.000	Av	V	10	1.2	<20 dB			54.0
9748.000	Av	V	10	1.2	<20 dB			54.0
12185.000	Av	V	10	1.0	<20 dB			54.0
14622.000	Av	V	10	1.0	<20 dB			54.0
17059.000	Av	V	10	1.0	<20 dB			54.0
19496.000	Av	V	10	1.0	<20 dB			54.0
21933.000	Av	V	10	1.0	<20 dB			54.0
24370.000	Av	V	10	1.0	<20 dB			54.0
4125.960	Av	V	10	1.0	<20 dB			54.0

AVERAGE: RES. =1 MHz, VID= 10Hz; <20dB= 20dB BELOW THE LIMIT

TEST PERSONNEL:

Franck Schuppius		05/29/02
Test Technician/Engineer	Signature	Date Of Test

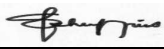
Channel: 11
 Measured Cond. Pwr. (dBm): 15.3
 Antenna: Patch

TABLE 6-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 11)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
2462.000	Av	V	20	1.3	95.8	11	106.8	Fundamental
2462.000	Pk	V	20	1.3	102.5	11	113.5	Fundamental
4125.960	Av	V	20	1.2	<20 dB			54.0
4924.000	Av	V	20	1.2	<20 dB			54.0
7386.000	Av	V	10	1.2	<20 dB			54.0
9848.000	Av	V	10	1.0	<20 dB			54.0
12310.000	Av	V	10	1.0	<20 dB			54.0
14772.000	Av	V	10	1.2	<20 dB			54.0
17234.000	Av	V	10	1.0	<20 dB			54.0
19696.000	Av	V	10	1.0	<20 dB			54.0
22158.000	Av	V	10	1.0	<20 dB			54.0
24620.000	Av	V	10	1.0	<20 dB			54.0

AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR; <20dB= 20dB BELOW THE LIMIT

TEST PERSONNEL:

Franck Schuppis		05/29/02
Test Technician/Engineer	Signature	Date Of Test

6.3 TEST EQUIPMENT USED FOR TESTING

TABLE 6-4: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
900772	EMCO	3161-02	Horn ANTENNA (2-4 GHz)	900772
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020
900323	EMCO	3160-7	Horn Antennas (8,2-12,4 GHz)	9605-1054
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051
900723	Miteq	NA	AMP 100MHz-26GHz	NA
900791	Schaffner - Chase	CBL6112	Antenna (25 MHz - 2 GHz)	2099

7 MODULATED BANDWIDTH - §15.247(A)(2)

7.1 MODULATED BANDWIDTH TEST PROCEDURE

The minimum 6 dB bandwidth per FCC 15.247 (a)(2) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The minimum 6 dB modulated bandwidths are shown in Table 7-2.

7.2 TEST EQUIPMENT USED FOR TESTING

TABLE 7-1: TEST EQUIPMENT USED FOR TESTING (MODULATED BANDWIDTH)

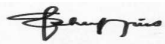
RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771

7.3 MODULATED BANDWIDTH TEST DATA

TABLE 7-2: MINIMUM 6 DB MODULATED BANDWIDTHS

CHANNEL	6 dB BANDWIDTH (MHz)
1	11.08
6	11.06
11	11.06

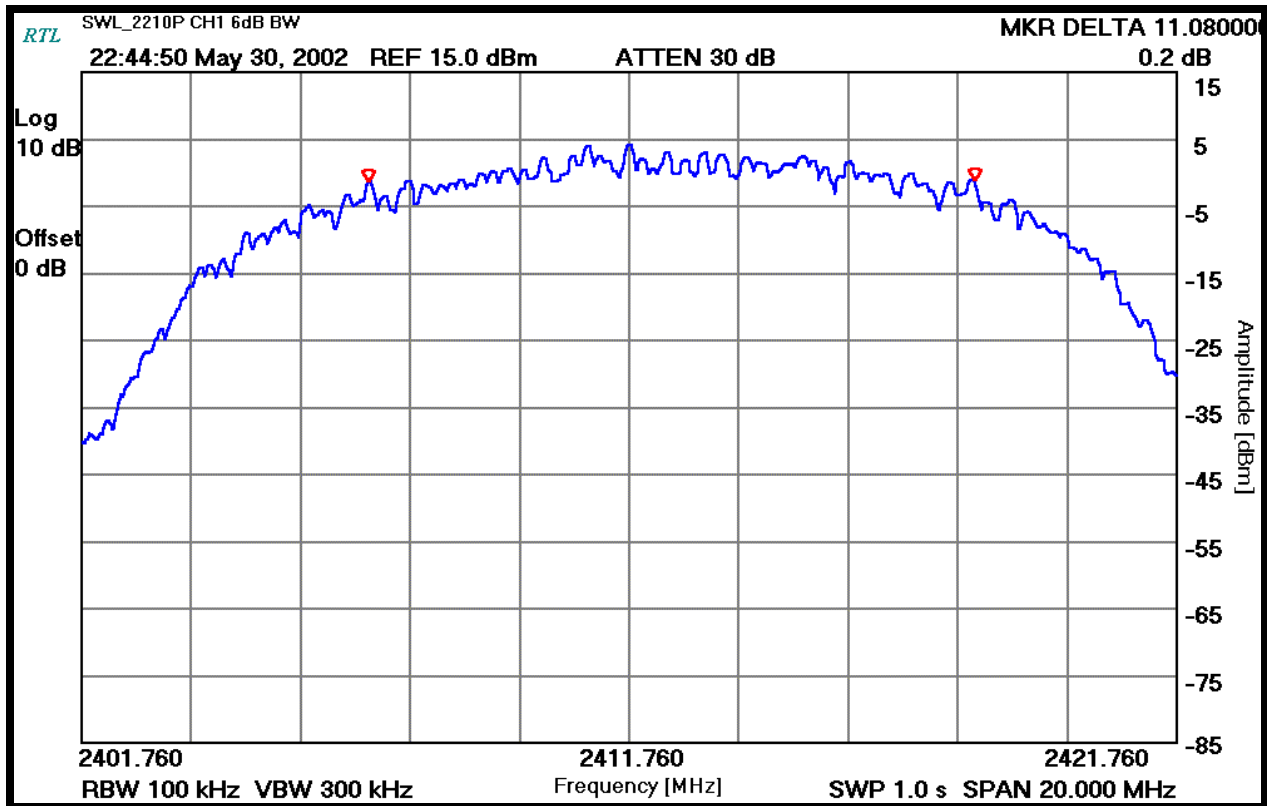
TEST PERSONNEL:

Franck Schuppius Test Technician/Engineer	 Signature	05/30/02 Date Of Test
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7.4 MODULATED BANDWIDTH PLOTS

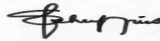
Channel Number: 1
Frequency (MHz): 2412
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 300
Sweep Time (s): 1.0

PLOT 7-1: MODULATED BANDWIDTH CHANNEL 1



TEST PERSONNEL:

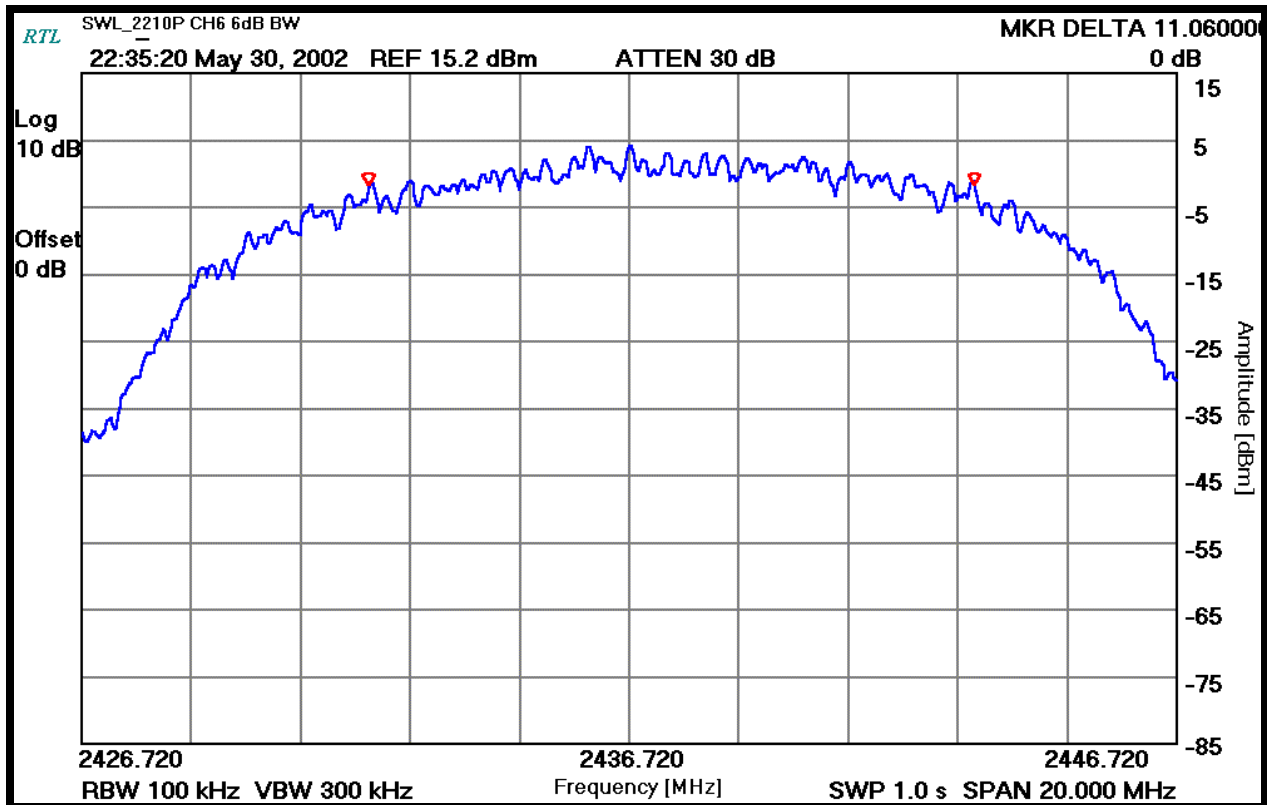
Franck Schuppius
Test Technician/Engineer


Signature

05/30/02
Date Of Test

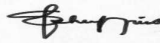
Channel Number: 6
Frequency (MHz): 2437
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 300
Sweep Time (s): 1.0

PLOT 7-2: MODULATED BANDWIDTH CHANNEL 6



TEST PERSONNEL:

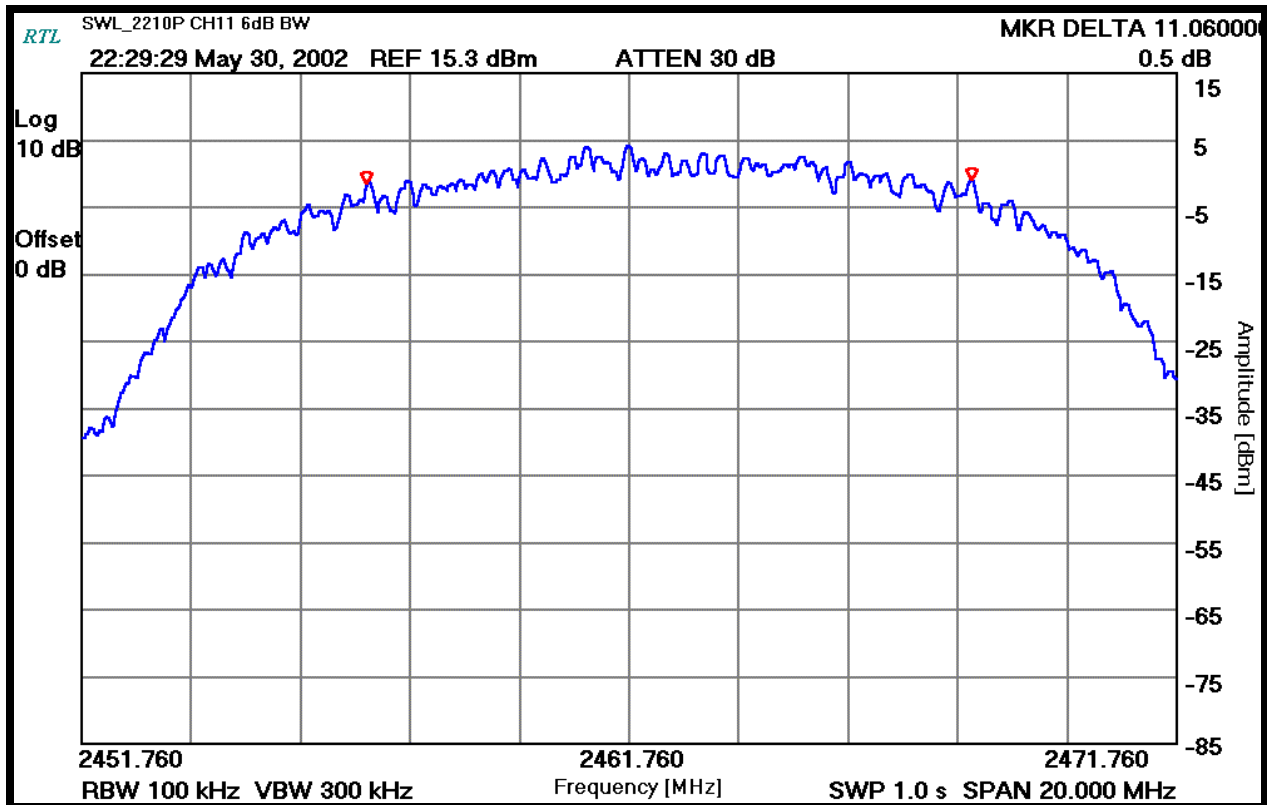
Franck Schuppis
Test Technician/Engineer


Signature

05/30/02
Date Of Test

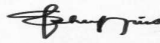
Channel Number: 11
Frequency (MHz): 2462
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 300
Sweep Time (s): 1.0

PLOT 7-3: MODULATED BANDWIDTH CHANNEL 11



TEST PERSONNEL:

Franck Schuppis
Test Technician/Engineer


Signature

05/30/02
Date Of Test

8 POWER OUTPUT - §15.247(B)

8.1 POWER OUTPUT TEST PROCEDURE

The peak conducted output power of the EUT was measured using an Agilent 4416A EPM-P Series Power Meter with an E9323A Peak and Average Power Sensor. The EIRP measurement was performed as a radiated test using the substitution method

8.2 TEST EQUIPMENT USED FOR TESTING

TABLE 8-1: TEST EQUIPMENT USED FOR TESTING (RADIATED RF OUTPUT – EIRP)

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
901186	Agilent Technologies	E9323A (50MHz-6GHz)	Peak & Avg. Power Sensor	US40410380
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
900772	EMCO	3161-02	Horn ANTENNA (2-4 GHz)	900772
900723	Miteq	NA	AMP 100MHz-26GHz	NA
900814	Electro-Metrics	RGA-60	Double Ridges Guide Antenna (1-18 GHz)	2310

8.3 POWER OUTPUT TEST DATA

TABLE 8-2: POWER OUTPUT TEST DATA

Operating Frequency (MHz): 2412, 2437 & 2462
 Channel: 1, 6 & 11
 Measured Cond. Pwr. (dBm): 15.1, 15.2 & 15.3
 Modulation Bandwidth (MHz): 11.08
 Antenna: Patch

TABLE 8-3: POWER OUTPUT TEST DATA

CHANNEL	CALCULATED EIRP (dBm)*	POWER CONDUCTED OUTPUT (dBm)
1	20.1	15.1
6	20.2	15.2
11	20.3	15.3

*Measurement accuracy is +/- 1.5 dB

Antenna gain = 5 dBi

Note: Calculated EIRP = conducted power + antenna gain

TEST PERSONNEL:

Franck Schuppius Test Technician/Engineer	 Signature	5/29/2002 Date Of Test
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9 ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.247(C)

9.1 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURES

Antenna conducted spurious emissions per FCC 15.247(c) were measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier was identified at 2.410GHz for Channel 1, 2.437GHz for Channel 6 and 2.463GHz for Channel 11. No other harmonics or spurs were found within 20 dB of the carrier level, and from 9kHz to the carriers 10th harmonic. Channels 1, 6, and 11 were investigated and tested. Refer to the antenna conducted spurious emissions noise tables that follow.

9.2 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST DATA

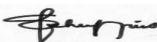
Operating Frequency (MHz): 2412
 Channel: 1
 Measured Cond. Pwr. (dBm): 15.1
 Limit (dBm): -4.6

TABLE 9-1: ANTENNA CONDUCTED SPURIOUS EMISSIONS CHANNEL 1

Frequency (MHz)	Measured Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Measured Level (dBc)	Margin (dB)
4075.971	-51.7	1.4	65.7	-70.3
4824.000	-58.3	2.3	71.4	-76.0
7236.000	-53.7	2.4	66.7	-71.3
9648.000	-54.1	9.3	60.2	-64.8
12060.000	-53.8	6.7	62.5	-67.1
14472.000	-49.6	6.5	58.5	-63.1
16884.000	-48.7	8.8	55.3	-59.9
19296.000	-44.4	8.8	51.0	-55.6
21708.000	-45.4	8.4	52.4	-57.0
24120.000	-45.1	8.3	52.2	-56.8

TEST PERSONNEL:

Franck Schuppius
 Test Technician/Engineer


 Signature

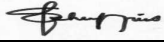
05/16/02
 Date Of Test

Operating Frequency (MHz): 2437
 Channel: 6
 Measured Cond. Pwr. (dBm): 15.2
 Limit (dBm): -3.9

TABLE 9-2: ANTENNA CONDUCTED SPURIOUS EMISSIONS CHANNEL 6

Frequency (MHz)	Measured Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Measured Level (dBc)	Margin (dB)
4125.960	-51.7	1.5	66.3	-70.2
4874.000	-58.8	2.3	72.6	-76.5
7311.000	-52.1	2.5	65.7	-69.6
9748.000	-54.3	10.1	60.3	-64.2
12185.000	-54.4	7.0	63.5	-67.4
14622.000	-51.4	6.5	61.0	-64.9
17059.000	-50.8	8.7	58.2	-62.1
19496.000	-46.3	8.8	53.6	-57.5
21933.000	-46.4	8.3	54.2	-58.1
24370.000	-46.4	8.3	54.2	-58.1

TEST PERSONNEL:

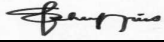
Franck Schuppius Test Technician/Engineer	 Signature	05/16/02 Date Of Test
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Operating Frequency (MHz): 2462
Channel: 11
Measured Cond. Pwr. (dBm): 15.3
Limit (dBm): -3.4

TABLE 9-3: ANTENNA CONDUCTED SPURIOUS EMISSIONS CHANNEL 11

Frequency (MHz)	Measured Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Measured Level (dBc)	Margin (dB)
4125.960	-51.6	1.6	66.6	-70.0
4924.000	-58.4	2.4	72.6	-76.0
7386.000	-52.3	2.5	66.4	-69.8
9848.000	-54.1	10.2	60.5	-63.9
12310.000	-54.3	7.1	63.8	-67.2
14772.000	-51.5	6.6	61.5	-64.9
17234.000	-50.6	8.5	58.7	-62.1
19696.000	-46.5	9.0	54.1	-57.5
22158.000	-46.5	8.4	54.7	-58.1
24620.000	-46.5	8.3	54.8	-58.2

TEST PERSONNEL:

Franck Schuppius Test Technician/Engineer	 Signature	05/16/02 Date Of Test
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10 POWER SPECTRAL DENSITY - §15.247(D)

10.1 POWER SPECTRAL DENSITY TEST PROCEDURE

The power spectral density per FCC 15.247(d) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 30kHz, and the sweep time set at 1000 seconds. Since the EUT has an integral antenna, the test was performed as radiated testing. The 6 dB value on the bandwidth plots was corrected using the site correction factor (i.e. cable loss, amplifier gain, and antenna factor) and the path loss at 3 meter distance; and referenced to the EIRP value measured in Section 8 of this report. The spectral lines were resolved for the modulated carriers at 2.412GHz, 2.437GHz, and 2.463GHz respectively. These levels are well below the +8 dBm limit. Refer to the power spectral density data table and plots that follow.

10.2 TEST EQUIPMENT USED FOR TESTING

TABLE 10-1: TEST EQUIPMENT USED FOR TESTING (POWER SPECTRAL DENSITY)

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771

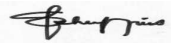
10.3 POWER SPECTRAL DENSITY TEST DATA

Operating Frequency (MHz): 2412, 2437 & 2462
 Channel: 1, 6 & 11
 Measured Cond. Pwr. (dBm): 15.1, 15.2, 15.3
 Modulation Bandwidth (MHz): 10.3
 Limit (dBm): 8

TABLE 10-2: POWER SPECTRAL DENSITY

CHANNEL	POWER SPECTRAL DENSITY LIMIT = +8dBm
1	-10.8
6	-10.0
11	-9.9

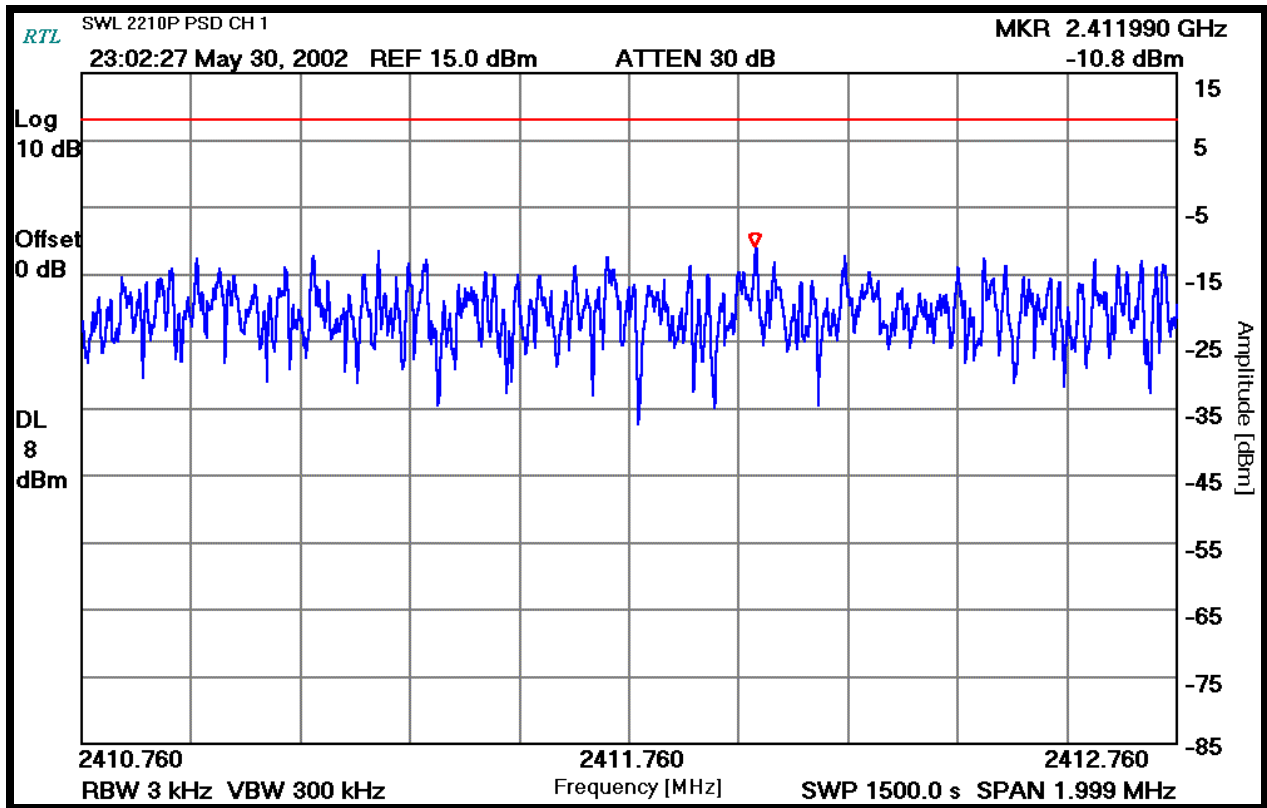
TEST PERSONNEL:

Franck Schuppis Test Technician/Engineer	 Signature	05/30/02 Date Of Test
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10.4 POWER SPECTRAL DENSITY PLOTS

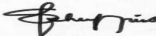
Operating Frequency (MHz): 2412
Channel: 1
Measured Cond. Pwr. (dBm): 15.1
Resolution Bandwidth (kHz): 3
Video Bandwidth (kHz): 300
Sweep Time (s): 1500.0

PLOT 10-1: POWER SPECTRAL DENSITY: CHANNEL 1



TEST PERSONNEL:

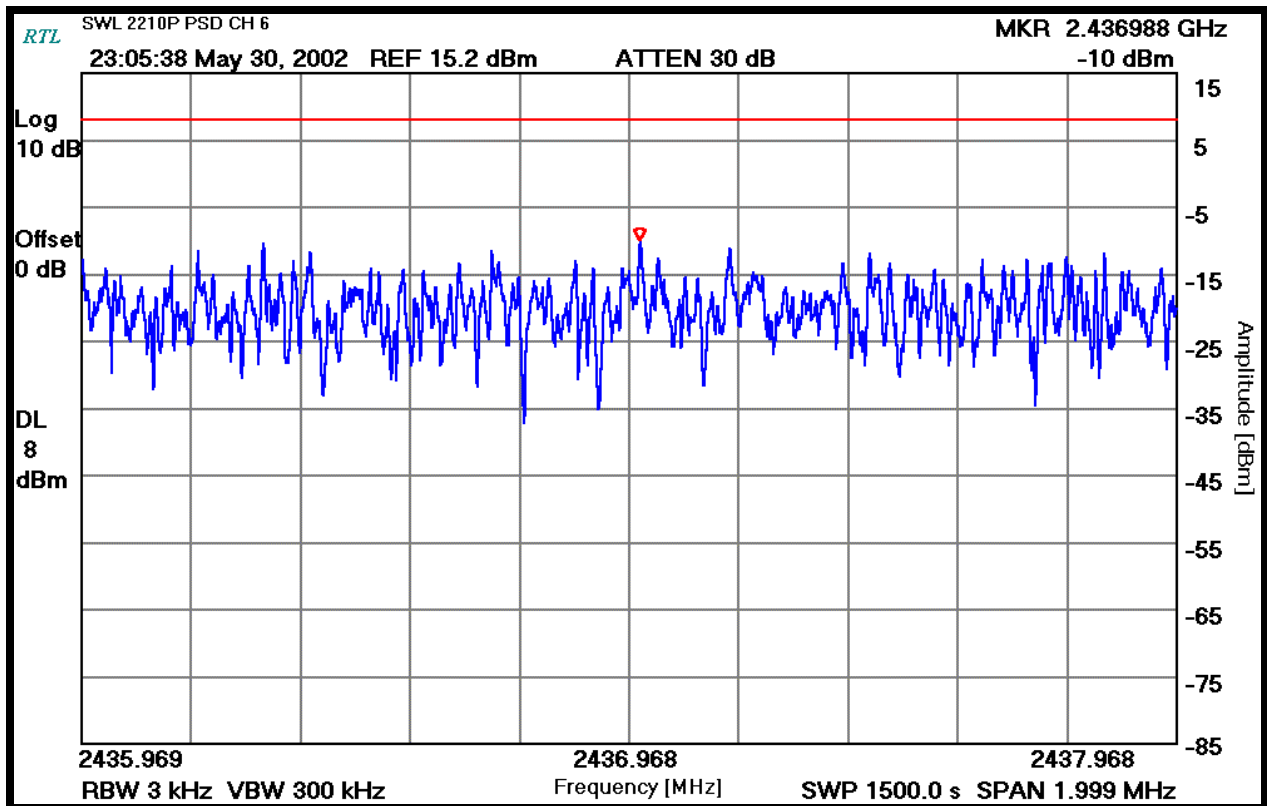
Franck Schuppis
Test Technician/Engineer


Signature

05/30/02
Date Of Test

Operating Frequency (MHz): 2437
 Channel: 6
 Measured Cond. Pwr. (dBm): 15.2
 Resolution Bandwidth (kHz): 3
 Video Bandwidth (kHz): 300
 Sweep Time (s): 1500.0

PLOT 10-2: POWER SPECTRAL DENSITY: CHANNEL 6



TEST PERSONNEL:

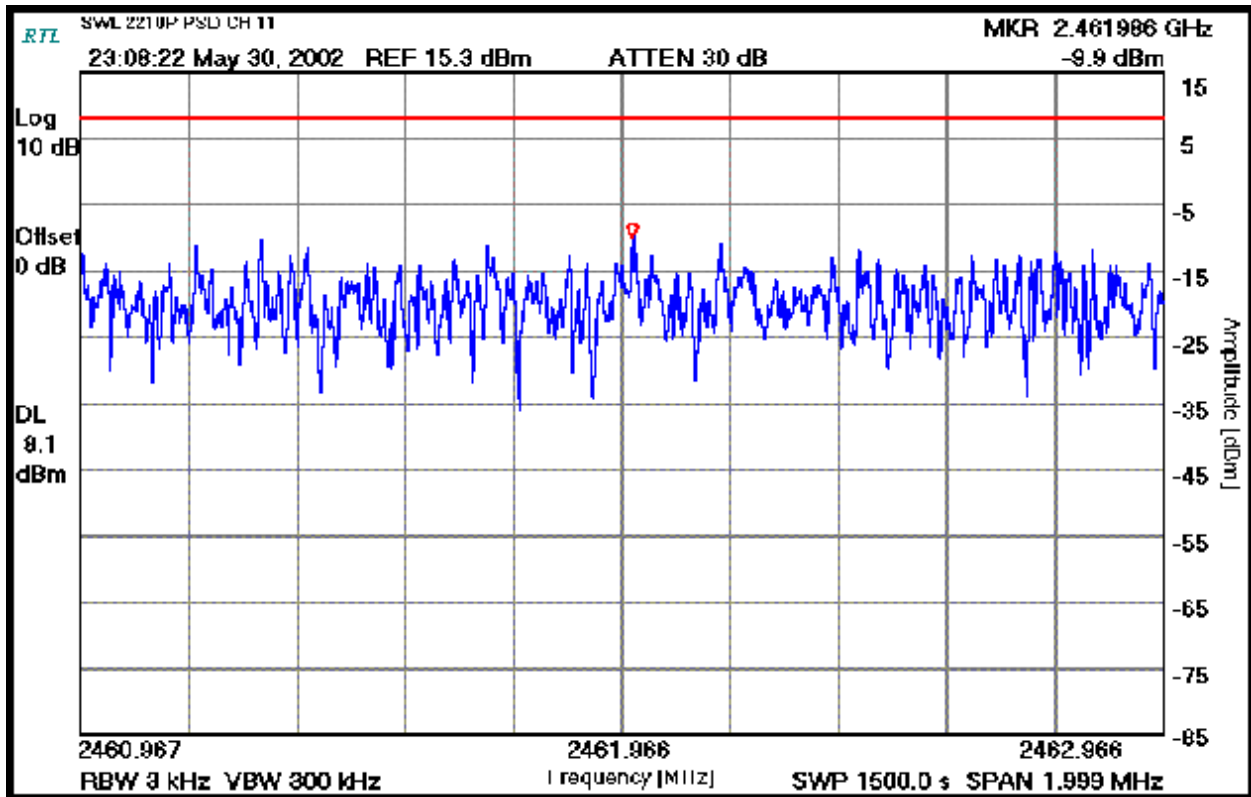
Franck Schuppius
 Test Technician/Engineer

Franck Schuppius
 Signature

05/30/02
 Date Of Test

Operating Frequency (MHz): 2462
 Channel: 11
 Measured Cond. Pwr. (dBm): 15.3
 Resolution Bandwidth (kHz): 3
 Video Bandwidth (kHz): 300
 Sweep Time (s): 1500.0

PLOT 10-3: POWER SPECTRAL DENSITY: CHANNEL 11



TEST PERSONNEL:

Franck Schuppis
 Test Technician/Engineer

Franck Schuppis
 Signature

05/30/02
 Date Of Test

Rhein Tech Laboratories
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Report number: 2002120
FCC: Part 15.247
Industry Canada: RSS-210
FCC ID: E2XSWL-2210P
M/N: SWL-2210P

11 CONCLUSION

The data in this measurement report shows that the Samsung Electro-Mechanics Co., LTD, Model: SWL-2210P FCC ID: E2XSWL-2210P complies with all the requirements of Parts 2 and 15 of the FCC Rules and Industry Canada RSS-210.