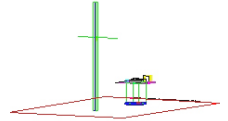


PCTEST Engineering Laboratory, Inc.

6660-B Dobbin Road • Columbia, MD 21045 • U.S.A.

TEL (410) 290-6652 • FAX (410) 290-6654

<http://www.pctestlab.com>



CERTIFICATE OF COMPLIANCE

SAMSUNG Electronics Co., Ltd.
416 Maetan-3 Dong, Paldal-Ku, Suwon City
Kyungki-Do, KOREA 441-742
Attention: Mr. JaeHong Park

Dates of Tests: December 6, 2002
Test Report S/N: 15.221122614.A3L
Test Site: PCTEST Lab, Columbia MD

FCC ID

A3LSWL-2250U

APPLICANT

SAMSUNG Electronics Co., Ltd.

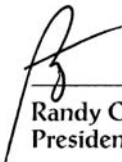
FCC Rule Part(s): § 15.247; ANSI C-63.4 (1992)
Classification: Spread Spectrum Transceiver (DSS) - Module
Method/System: Direct Transmission System (DTS)
Equipment Type: 2.4 GHz Wireless LAN Module for SAMSUNG Printer
Max. Output Power: 39.2 mW (15.92 dBm)
Frequency Range: 2412 – 2462 MHz
Model No(s): SWL-2250U

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63-4.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant Code(s): Limited Modular Approval

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.


Randy Ortanez
President







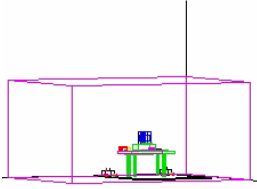
PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT		Reviewed By: Quality Manager
Test Report S/N: 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U
			Page 1 of 27

TABLE OF CONTENTS

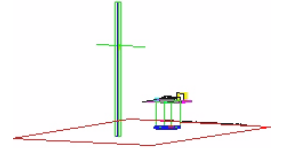
APPENDIX A –	COVER LETTER	
APPENDIX B -	ATTESTATION STATEMENT	
APPENDIX C -	TEST REPORT	
SCOPE		3
INTRODUCTION (SITE DESCRIPTION)		4
PRODUCT INFORMATION		5
DESCRIPTION OF TESTS		
A.	CONDUCTED EMISSIONS	6
B.	RADIATED EMISSIONS	7
C.	RESTRICTED BANDS	8
D.	ANTENNA REQUIREMENT	9
E.	POWER DENSITY	10
F.	MAXIMUM PEAK POWER OUTPUT	11
G.	DIRECT SEQUENCE BANDWIDTH	12
	RADIATED MEASUREMENTS (FUNDAMENTAL & HARMONICS)	13 - 24
	RADIATED MEASUREMENTS (RESTRICTED BAND)	25
	LIST OF TEST EQUIPMENT	26
	CONCLUSION	27
APPENDIX D -	TEST PLOTS	
APPENDIX E -	FCC ID LABEL & LOCATION	
APPENDIX F -	TEST SETUP PHOTOGRAPHS	
APPENDIX G -	EXTERNAL PHOTOGRAPHS	
APPENDIX H -	INTERNAL PHOTOGRAPHS	
APPENDIX I -	BLOCK DIAGRAM(S)	
APPENDIX J-	SCHEMATIC DIAGRAM(S)	
APPENDIX K -	OPERATIONAL DESCRIPTION	
APPENDIX L -	PART'S LIST	
APPENDIX M -	USER'S MANUAL	
APPENDIX N -	MPE REPORT	

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U Page 2 of 27

MEASUREMENT REPORT



Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.





§2983(a) General Information

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	416 Maetan-3 Dong, Paldal-Ku, Suwon City Kyungki-Do, KOREA 441-742
Attention:	Mr. Wallace Oh

- FCC ID: **A3LSWL-2250U**
- Class: Spread Spectrum Transceiver (DSS) - Module
- Type: 2.4 GHz Wireless LAN Module for SAMSUNG Printers
- Freq. Range: 2412 – 2462 MHz
- Method/System: Direct Transmission System (DTS)
- Model No(s): **SWL-2250U**
- Rule Part(s): § 15.247
- Dates of Tests: December 6, 2002
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 15.221122614.A3L

NOTE: The receiver portion was tested and complies with Part 15B under the verification procedure.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 3 of 27

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-1992) and FCC Public Notice dated July 12, 1995 entitled "Guidance on Measurement for Direct Sequence Spread Spectrum Systems" were used in the measurement of **Samsung Spread Spectrum 2.4 GHz Wireless LAN Module**.

These measurement tests were conducted at **PCTEST Engineering Laboratory, Inc.** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

PCTEST Location

The map at right shows the location of the PCTEST Lab, its proximity to the FCC Lab, the Columbia vicinity area, the Baltimore-Washington International (BWI) airport, and the city of Baltimore, and the Washington, D.C. area. (see Figure1).

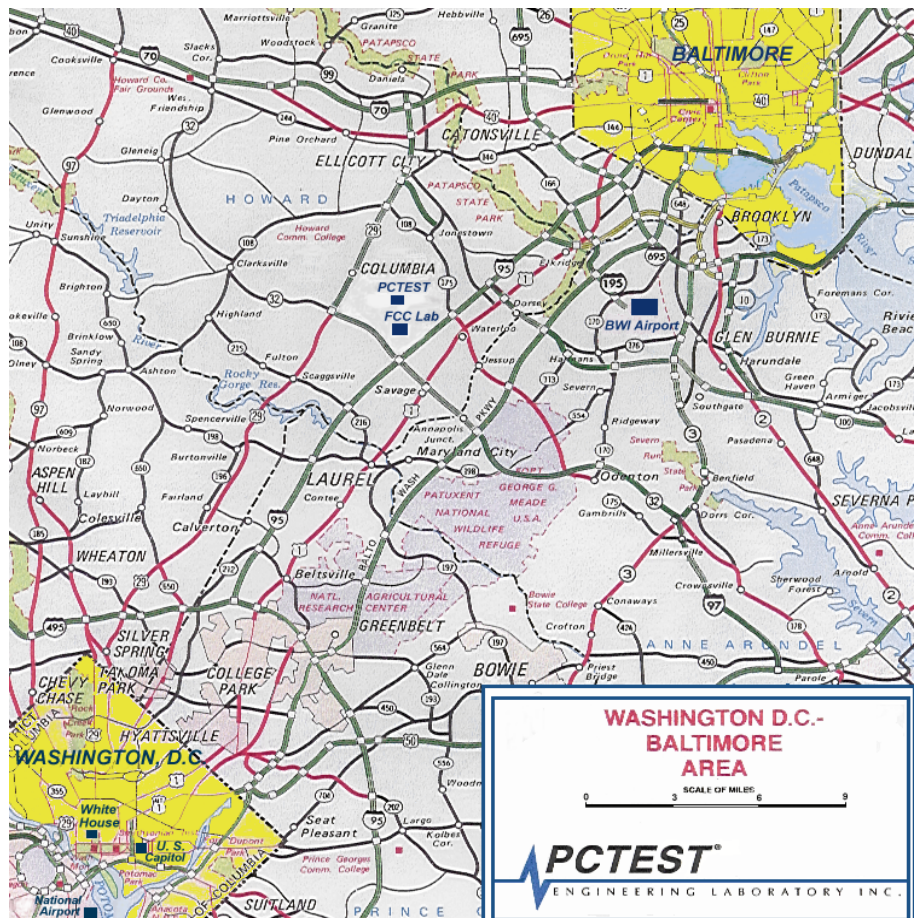




Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 4 of 27



PRODUCT INFORMATION

Equipment Description:

The Equipment under test (EUT) is the **Samsung Spread Spectrum 2.4 GHz Wireless LAN Module** using spread spectrum direct sequence and time division duplex techniques.

Frequency Range: 2412 – 2462 MHz
 Channels: 1, 6, 11
 Channel Separation: 5.0 MHz
 Antenna: omni-directional antenna
 Spread Spectrum Method: Direct Sequence (DBPSK modulation)

CH	Rx/Tx Freq. (MHz)	CH	Rx/Tx Freq. (MHz)
1	2412.0	7	2442.0
2	2417.0	8	2447.0
3	2422.0	9	2452.0
4	2427.0	10	2457.0
5	2432.0	11	2462.0
6	2437.0		

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 5 of 27

Description of Tests

Conducted Emissions

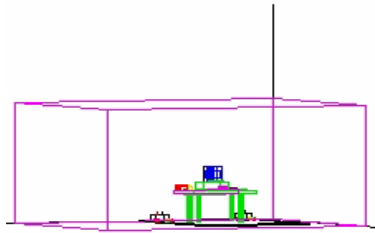


Figure 4. Shielded Enclosure Line-Conducted Test Facility

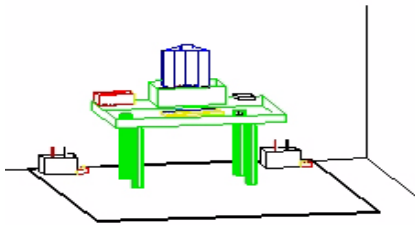


Figure 2. Line Conducted Emission Test Set-Up

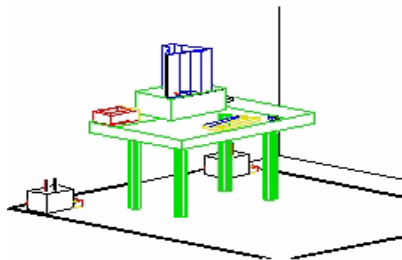


Figure 3. Wooden Table & Bonded LISNs

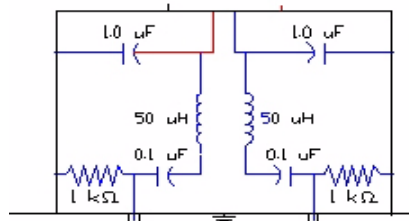


Figure 5. LISN Schematic

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure. It is manufactured by Ray Proof Series 81 (see Figure 2). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m. x 1.5m. wooden table 80cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room (see Figure 3). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 4). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filters (100dB 14kHz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Solar LISN. LISN schematic diagram is shown in Figure 5. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450kHz to 30MHz with 20 msec. sweep time. The frequency producing the maximum level was reexamined using EMI/ Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator.

Diagram PCTEST™ PT. 15.247 REPORT		FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 6 of 27	

Description of Tests (Continued)

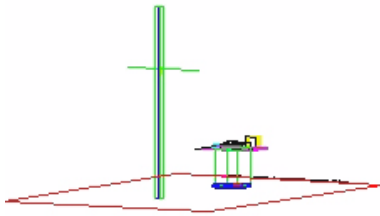


Figure 6. 3-Meter Test Site

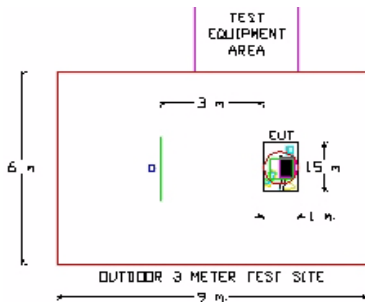


Figure 7. Dimensions of Outdoor Test Site

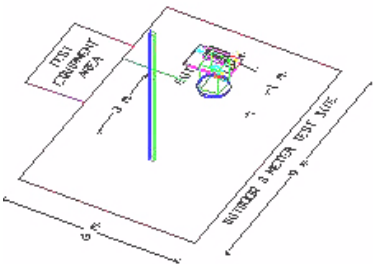


Figure 8. Turntable and System Setup

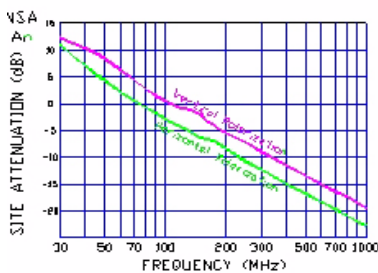


Figure 9. Normalized Site Attenuation Curves (H&V)

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using biconical antenna and from 200 to 1000 MHz using log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antenna (see Figure 6). The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area (see Figure 7). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 8). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 9.

PCTEST™ PT. 15.247 REPORT	FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 7 of 27

§ 15.205 Restricted Bands



Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operation. The EUT was tested from 9kHz and up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average measurements was used using RBW 1 MHz – VBW 10Hz and linearly polarized horn antennas. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table 2 per 15.209.

Frequency (MHz)	F/S (UV/m)	Meas. Dist. (Meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.00	30	30
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

Tab. 2. Radiated Emission Limits Per 15.209

Test Equipment

HP 8566B	Spectrum Analyzer 100Hz-22GHz
HP83017A	Microwave Analyzer 40dB Gain (0.5 – 26.5 GHz)
HP 3784A	Digital Transmission Analyzer
EMCO 3115	Horn Antenna (1 – 18GHz)
HP 8495A	20dB Attenuator (DC-40GHz)
HP 8493B	10dB Attenuator
MicroCoax Cables	Low Loss Microwave Cables (1-26.5 GHz)
CDI Dipoles	Dipole Antennas (30 – 1000 MHz)

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U Page 8 of 27



§ 15.203 Antenna Requirement

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

The SAMSUNG **SWL-2250U** unit complies with the requirement of §15.203

CONCLUSION

There are provisions for connection to an external 3 dBi antenna with a reverse SMA connector. The unit meets the unique Antenna Requirements of §15.203.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 9 of 27

§15.247(a) – Power Density

Minimum Standard – The transmitted power density averaged over any 1 second interval shall not be greater than 8dBm in any 3kHz bandwidth within these bands.

Res. Bandwidth = 3 kHz (7dB/div)
 Vid. BW = 3 kHz
 Span = 40 MHz
 Ref. Level 8.0 dBm
 Sweep 1000 seconds

Peak + Atten = dBm ⇒ (Limit < 8dBm)

(see attached spectrum plots)



FREQ (MHz)	Channel	Power Output (dBm)
2412	1	- 8.68
2438	6	- 8.09
2462	11	- 7.22

Table 3. Power Density

Minimum Standard – The transmitter power density average over and 1 second interval shall not be greater than 8dBm in any 3 kHz BW within these bands. These are conducted measurements.

REMARKS:

PASS

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U	Page 10 of 27

§15.247(b) Maximum Peak Output Power

Minimum Standard – The maximum peak output power of the transmitter shall not exceed 1 watt. This is a radiated measurement.

Max. Power Peak + Atten = dBm \Rightarrow Watts



FREQ (MHz)	Channel	Power Output (dBm)
2412	1	14.92
2438	6	15.92
2462	11	15.84

Table 4. Output Power Measurements

REMARKS:

PASS

The table above was derived by taking a conducted reading with a peak power meter.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U Page 11 of 27

§15.247(c) 6 dB Bandwidth



Res. Bandwidth = 100 kHz (5dB/div)
 Vid. BW = 100 kHz
 Span = 40 MHz
 Ref. Level 5.0 dBm
 Sweep 10 ms.

FREQ (MHz)	Channel	6 dB Bandwidth (MHz)
2412	1	8.40
2438	6	11.00
2462	11	10.80

Minimum Standard – The transmitter shall have a minimum 6 dB Bandwidth of 500kHz. These are conducted measurements.

Remarks:

PASS

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 12 of 27

RADIATED MEASUREMENTS (FUNDAMENTAL & HARMONICS)

A. Transmitter Portion

Operating Frequency: 2412 MHz (1 Mbps)
 Distance of Measurements: 3 meters
 Channel: 1

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μ V/m)	F/S (dB μ V/m)	Margin (dB)
2412	- 29.55	32.70	V	Peak	321736	110.15	n/a
4824	- 101.8	40.39	V	Peak	190.327	45.59	8.41
7236	- 106.9	47.42	V	Peak	237.684	47.52	6.48
9648	- 119.2	50.3	V	Peak	80.3526	38.10	15.9
12060	< - 120						

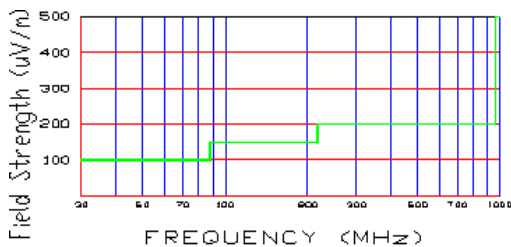




Figure 10. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 13 of 27

RADIATED Measurements (Fundamental & Harmonics)

B. Transmitter Portion

Operating Frequency: 2438 MHz (1 Mbps)
 Distance of Measurements: 3 meters
 Channel: 6

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2438	- 28.65	32.8	V	Peak	360994	111.15	n/a
4876	- 101.7	40.5	V	Peak	194.984	45.80	8.20
7314	- 107.0	48.0	V	Peak	251.189	48.00	6.00
9752	- 119.5	50.3	V	Peak	77.6247	37.80	16.2
12190	< - 120						

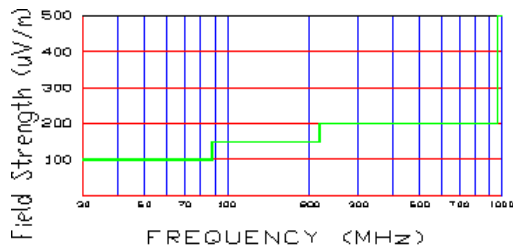




Figure 11. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 14 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

C. Transmitter Portion

Operating Frequency: 2462 MHz (1 Mbps)
 Distance of Measurements: 3 meters
 Channel: 11

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2462	- 28.83	32.9	V	Peak	357684	111.07	n/a
4924	- 101.0	40.7	V	Peak	216.272	46.70	7.30
7386	- 105.9	48.2	V	Peak	291.743	49.30	4.70
9848	- 118.8	50.4	V	Peak	85.1138	38.60	15.4
12310	< - 120						

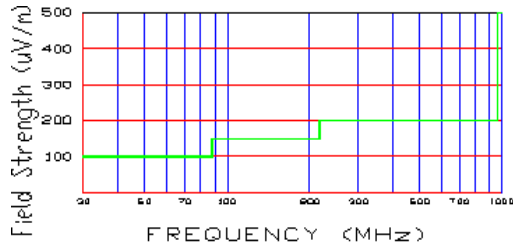




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
8. < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 15 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2412 MHz (2 Mbps)
 Distance of Measurements: 3 meters
 Channel: 1

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2412	- 29.55	32.70	V	Peak	321736	110.15	n/a
4824	- 101.5	40.39	V	Peak	197.015	45.89	8.11
7236	- 106.3	47.42	V	Peak	254.683	48.12	5.88
9648	- 118.9	50.30	V	Peak	83.1764	38.40	15.6
12060	< - 120						

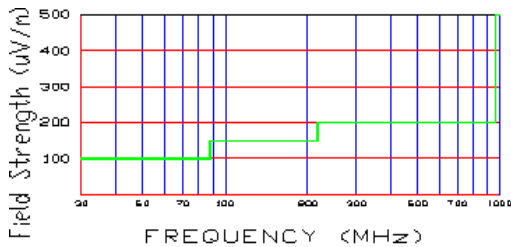




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 16 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2438 MHz (2 Mbps)
 Distance of Measurements: 3 meters
 Channel: 6

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2438	- 28.65	32.8	V	Peak	360994	111.15	n/a
4876	- 101.5	40.5	V	Peak	199.526	46.00	8.00
7314	- 107.0	48.0	V	Peak	251.189	48.00	6.00
9752	- 119.3	50.3	V	Peak	79.4328	38.00	16.0
12190	< - 120						

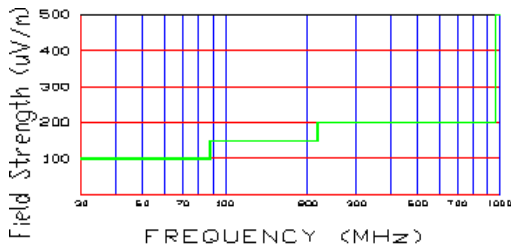




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 17 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2462 MHz (2 Mbps)
 Distance of Measurements: 3 meters
 Channel: 11

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2462	- 28.83	32.9	V	Peak	357684	111.07	n/a
4924	- 101.0	40.7	V	Peak	216.272	46.70	7.30
7386	- 105.5	48.2	V	Peak	305.492	49.70	4.30
9848	- 118.8	50.4	V	Peak	85.1138	38.60	15.4
12310	< - 120						

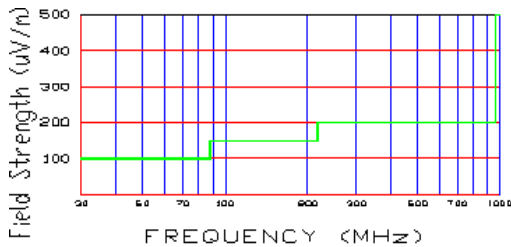




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
8. < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 18 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2412 MHz (5.5 Mbps)
 Distance of Measurements: 3 meters
 Channel: 1

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2412	- 29.55	32.70	V	Peak	321736	110.15	n/a
4824	- 101.3	40.39	V	Peak	201.604	46.09	7.91
7236	- 106.5	47.42	V	Peak	248.886	47.92	6.08
9648	- 119.0	50.30	V	Peak	82.2243	38.30	15.7
12060	< - 120						

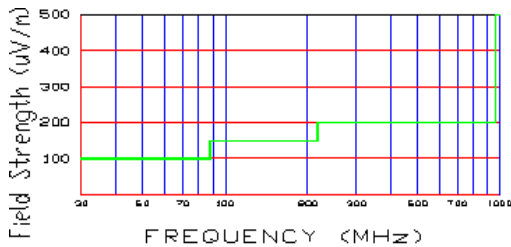




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 19 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2438 MHz (5.5 Mbps)
 Distance of Measurements: 3 meters
 Channel: 6

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2438	- 28.65	32.8	V	Peak	360994	111.15	n/a
4876	- 101.3	40.5	V	Peak	204.174	46.20	7.80
7314	- 106.8	48.0	V	Peak	257.040	48.20	5.80
9752	- 119.0	50.3	V	Peak	82.2243	38.30	15.7
12190	< - 120						

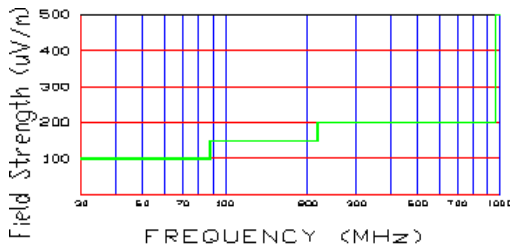




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U	Page 20 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2462 MHz (5.5 Mbps)
 Distance of Measurements: 3 meters
 Channel: 11

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2462	- 28.83	32.9	V	Peak	357684	111.07	n/a
4924	- 100.0	40.7	V	Peak	242.661	47.70	6.30
7386	- 105.1	48.2	V	Peak	319.890	50.10	3.90
9848	- 118.5	50.4	V	Peak	88.1049	38.90	15.1
12310	< - 120						

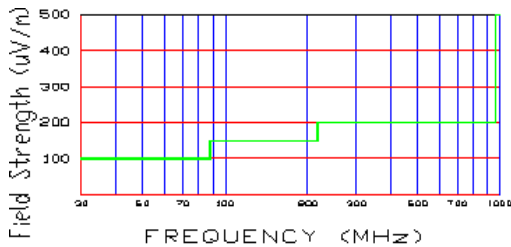




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
8. < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 21 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2412 MHz (11 Mbps)
 Distance of Measurements: 3 meters
 Channel: 1

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2412	- 29.55	32.70	V	Peak	321736	110.15	n/a
4824	- 100.0	40.39	V	Peak	234.153	47.390	6.61
7236	- 106.0	47.42	V	Peak	263.633	48.420	5.58
9648	- 119.5	50.3	V	Peak	77.6247	37.800	16.2
12060	< - 120						

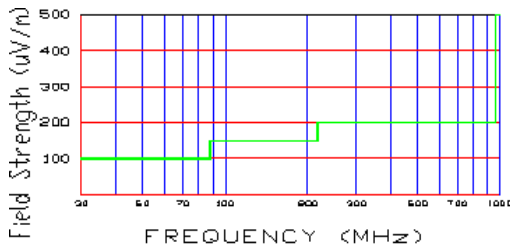




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U	Page 22 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2438 MHz (11 Mbps)
 Distance of Measurements: 3 meters
 Channel: 6

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2438	- 28.65	32.8	V	Peak	360994	111.15	n/a
4876	- 100.5	40.5	V	Peak	223.872	47.00	7.00
7314	- 106.3	48.0	V	Peak	272.270	48.70	5.30
9752	- 118.2	50.3	V	Peak	90.1571	39.10	14.9
12190	< - 120						

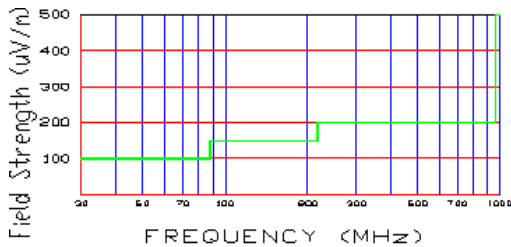




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
8. < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U	Page 23 of 27

RADIATED Measurements (Fundamental & Harmonics) (CONT.)

D. Transmitter Portion

Operating Frequency: 2462 MHz (11 Mbps)
 Distance of Measurements: 3 meters
 Channel: 11

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET QP/AVG	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2462	- 28.83	32.9	V	Peak	357684	111.07	n/a
4924	- 99.80	40.7	V	Peak	248.313	47.90	6.10
7386	- 105.1	48.2	V	Peak	319.89	50.10	3.90
9848	- 118.0	50.4	V	Peak	93.3254	39.40	14.6
12310	< - 120						

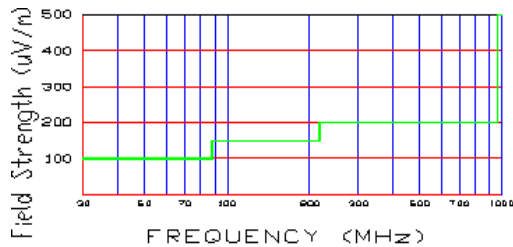




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:

- All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
- All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
- Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
- The peak emissions above 1 GHz are not more than 20 dB above the average limit.
- The antenna is manipulated through typical positions, polarity and length during the tests.
- The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
- The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
- < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 24 of 27

RADIATED Measurements (Restricted Band)

Transmitter Portion

Operating Frequency: 2462 MHz (11 Mbps)
 Distance of Measurements: 3 meters
 Channel(s): 11

FREQ. (MHz)	Level* (dBm)	AFCL (dB)	POL (H/V)	DET (W)	F/S (μV/m)	F/S (dBμV/m)	Margin (dB)
2483.7	- 99.5	33.0	V	3.37E-09	105.925	40.5	13.5
2248.4	- 93.5	33.0	V	1.34E-08	211.349	46.5	7.50
2484.4	- 95.0	33.1	V	9.71E-09	179.887	45.1	7.50
2486.2	- 97.3	33.1	V	5.72E-09	138.038	42.8	11.2
2493.0	- 100	33.2	V	3.14E-09	102.329	40.2	13.8
2496.0	- 99.4	33.2	V	3.61E-09	109.648	40.8	13.2

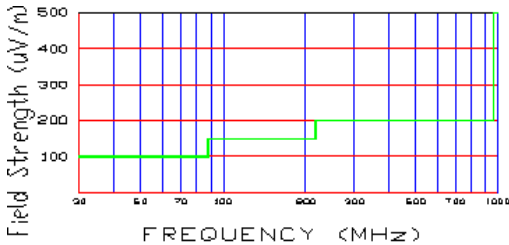




Figure 12. Restricted band harmonics and spurious limits.

Above 1 GHz limit is 500 uV/m (54dBu/m)

NOTES:



1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in table 2. (note: * Restricted Band)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully recharged battery.
7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
8. < - 120 are below the analyzer floor level.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U	Page 25 of 27

TEST EQUIPMENT



Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	12/05/03	3638A08713
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	04/17/03	2542A11898
Spectrum Analyzer/Tracking Gen.	HP 8591A (9kHz-1.8GHz)	06/02/03	3144A02458
Spectrum Analyzer	HP 8591A (9kHz-1.8GHz)	10/15/03	3108A02053
Spectrum Analyzer	HP 8594A (9kHz-2.9GHz)	11/02/03	3051A00187
Signal Generator	HP 8640B (500Hz-1GHz)	06/02/03	2232A19558
Signal Generator	HP 8640B (500Hz-1GHz)	06/02/03	1851A09816
Signal Generator	Rohde & Schwarz (0.1-1000MHz)	09/11/03	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30-1000MHz)	04/12/03	0792-03271
Ailtech/Eaton Receiver	NM 37/57A (30-1000MHz)	03/11/03	0805-03334
Ailtech/Eaton Receiver	NM17/27A (0.1-32MHz)	09/17/03	0608-03241
Quasi-Peak Adapter	HP 85650A	08/09/03	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/03	0194-04082
RG58 Coax Test Cable	No. 167		n/a
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP 8447D		1145A00470, 1937A03348
Broadband Amplifier	HP 8447F		2443A03784
Transient Limiter	HP 11947A (9kHz-200MHz)		2820A00300
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design 1295, 1332, 0355		
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set) A100		5118
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN (2)	3816/2		1077, 1079
EMCO LISN	3725/2		2009
Microwave Preamplifier 40dB Gain	HP 83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Ailtech/Eaton Receiver	NM37/57A-SL		0792-03271
Spectrum Analyzer	HP 8591A		3034A01395
Modulation Analyzer	HP 8901A		2432A03467
NTSC Pattern Generator	Leader 408		0377433
Noise Figure Meter	HP 8970B		3106A02189
Noise Figure Meter	Ailtech 7510		TE31700
Noise Generator	Ailtech 7010		1473
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)		80931
Digital Thermometer	Extech Instruments 421305		426966
Attenuator	HP 8495A (0-70dB) DC-4GHz		
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)		
Shielded Screen Room	RF Lindgren Model 26-2/2-0		6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81		R2437 (PCT278)
Environmental Chamber	Associated Systems Model 1025 (Temperature/Humidity)		PCT285

* Calibration traceable to the National Institute of Standards and Technology (NIST).

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT 		Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL-2250U Page 26 of 27

Conclusion

The data collected shows that the **SAMSUNG 2.4 GHz Wireless LAN Module FCC ID: A3LSWL-2250U** complies with Part 15C of the FCC Rules.

PCTEST™ PT. 15.247 REPORT	 FCC MEASUREMENT REPORT			Reviewed By: Quality Manager
Test Report 15.221122614.A3L	Test Dates: December 6, 2002	EUT Type: 2.4 GHz Wireless LAN Module	FCC ID: A3LSWL- 2250U	Page 27 of 27