1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc
Model Tested: SL2.4
Report Number: 14637

LOW-POWER LICENCE-EXEMPT RADIO COMMUNICATION DEVICES
(ALL FREQUENCY BANDS: CATEGORY I EQUIPMENT)

RADIO STANDARDS SPECIFICATION
RSS-210, ISSUE 7
JUNE, 2007

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name:	PowerTap SL2.4
Kind of Equipment:	RF Module in 2 host units
Test Configuration:	two parts system; bicycle hub and user display (CPU)
Model Number(s):	SL2.4
Model(s) Tested:	SL2.4
Serial Number(s):	51739
Date of Tests:	August 1, 4, 14, 20, & 21, 2008
Test Conducted For:	Saris Cycling Group Inc 5253 Verona Road Madison, Wisconsin 53711

NOTICE: "This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

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SIGNATURE PAGE

Report By:

Arnom C. Rowe
Test Engineer
EMC-001375-NE

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

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United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.

Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2007-10-01 through 2008-09-30

Effective dates

For the National Institute of Standards and Technology

NVI AP-01C (REV 2006-03-13)

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1.0 SUMMARY OF TEST REPORT

It was found that the PowerTap SL2.4, Model Number(s) SL2.4 **meets** the radio interference radiated emission requirements of RSS-210 Issue 7, June, 2007. The Power Line Conducted emissions test was not required because the PowerTap SL2.4 is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.

2.0 INTRODUCTION

On August 1, 4, 14, 20, & 21, 2008, a series of radio frequency interference measurements was performed on PowerTap SL2.4, Model Number(s) SL2.4, Serial Number: 51739. The tests were performed in conformance with RSS-210, Issue 7, June, 2007. Tests were completed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

3.0 TEST FACILITY

All emissions were performed at D.L.S. Electronic Systems, Inc. at an open field test site located at Genoa City, Wisconsin, Industry Canada File Number: IC 2060A-1 (Site #1), IC 2060A-2 (Site #2), & IC 2060A-3 (Site #3).

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at http://www.dlsemc.com/certificate. Our facilities are registered with the FCC, Industry Canada, and VCCI.

4.0 TEST EQUIPMENT (Bandwidths and Detector Function)

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

5.0 CONDUCTED EMISSION MEASUREMENTS

The PowerTap SL2.4 is powered from a D.C. power source and will not at any time be directly plugged into the public utility lines, therefore the Power Line Conducted emissions test was not performed.

6.0 RADIATED EMISSION MEASUREMENTS

Radiated emissions were measured in accordance with RSS-310, Issue 2. Plots and tabular data can be viewed in Appendix B or the Annexes at the end of this test report.

NOTE:

The PowerTap SL2.4 measurements were made up to 25000 MHz, since the fundamental frequency is 2453 MHz & 2457 MHz MHz.

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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 6.0)

7.1 Description:

The PowerTap SL2.4 system is installed in any bicycle; the rear hub (or wheel) of the bicycle is replaced with the SL2.4 hub and the CPU mounts on the handle bars.

The hub measures parameters of the rear wheel; torque, wheel speed, rider cadence. The hub calculates power in watts and transmits the information at a predetermined periodic rate. The CPU receives the hub transmission and displays the information to the user real time.

The CPU calculates some parameters from the hub transmission; speed in MPH, distance, ride time etc.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

SL2.4 length = 141mm x 70mm flange diameter

7.3 LINE FILTER USED:

none - batteries only

7.4 INTERNAL CLOCK FREQUENCIES:

0.03125, 0.032768, 1.000, 4.000, 16.000 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

SL2.4 electronics; main circuit board	16748 revision E
SL2.4 electronics; RF circuit board	16776 revision 1

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8.0 MODIFICATIONS MADE TO EUT FOR EMC COMPLIANCE:

There were no additional descriptions noted at the time of test.

NOTE:

Continuous Transmit.
Continuous Receive.

9.0 RESULTS OF TESTS

The radio interference emission charts can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

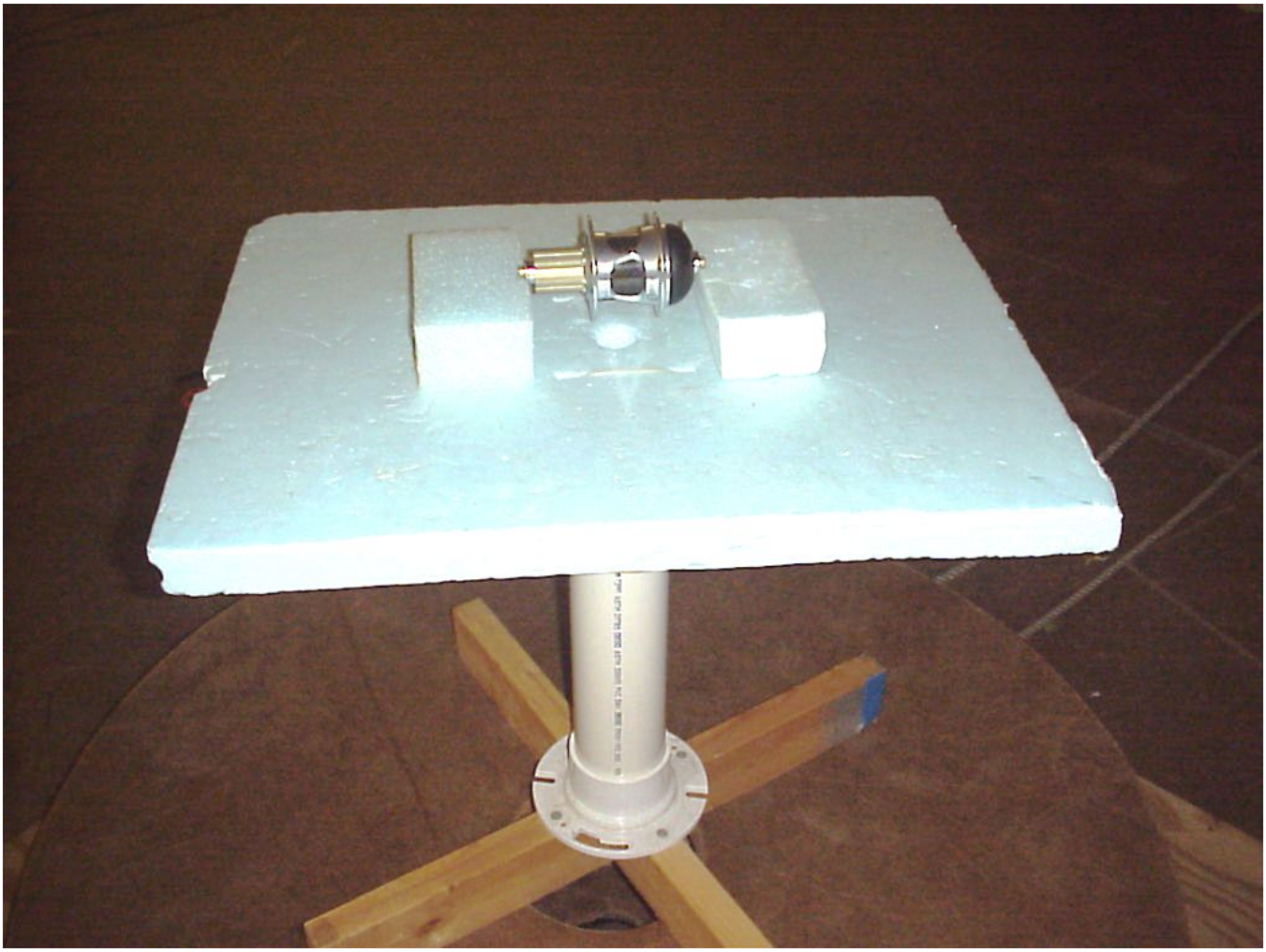
10.0 CONCLUSION

It was found that the PowerTap SL2.4, Model Number(s) SL2.4 **meets** the radio interference radiated emission requirements of RSS-210 Issue 7, June, 2007. The Power Line Conducted emissions test was not required because the PowerTap SL2.4 is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.

11.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 PowerTap SL2.4
Model Number: SL2.4; Serial Number: 51739

12.0 RADIATED EMISSIONS PHOTOS TAKEN DURING TESTING



HUB SETUP

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver, RF, Tuned	Rohde & Schwarz	ESI 40	837808/006	20 Hz-40 GHz	3/24/2009
Preamp, RF	Miteq	AMF-6D-100200-50	313936	1-10 GHz	5/8/2009
Preamp, RF	Miteq	AMF-6D-010100-50	213976	10-18 GHz	5/8/2009
Preamp	Miteq	AMF-8B-180265-40-10P-H/S	NA	18-26 GHz	9/18/2008
Preamp, RF	Rohde & Schwarz	TS-PR10	032001/005		3/10/2009
RF 20dB Fixed Attenuator	Aeroflex/weinschel	75A-20-12	1071		7/28/2009
Biconical Antenna	EMCO	3104C	9701-4785	20-220 MHz	4/21/2009
Log Periodic Antenna	EMCO	3146	9702-4895	200 MHz-1 GHz	4/21/2009
Horn Antenna	EMCO	3115	9903-5731	1-18 GHz	6/12/2009
Horn Antenna	EMCO	3116	2549	18-40 GHz	6/12/2009
High Pass Filter	Q Microwave, Inc.	100462	1		5/8/2009

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.

APPENDIX A

DUTY CYCLE CORRECTION FACTOR

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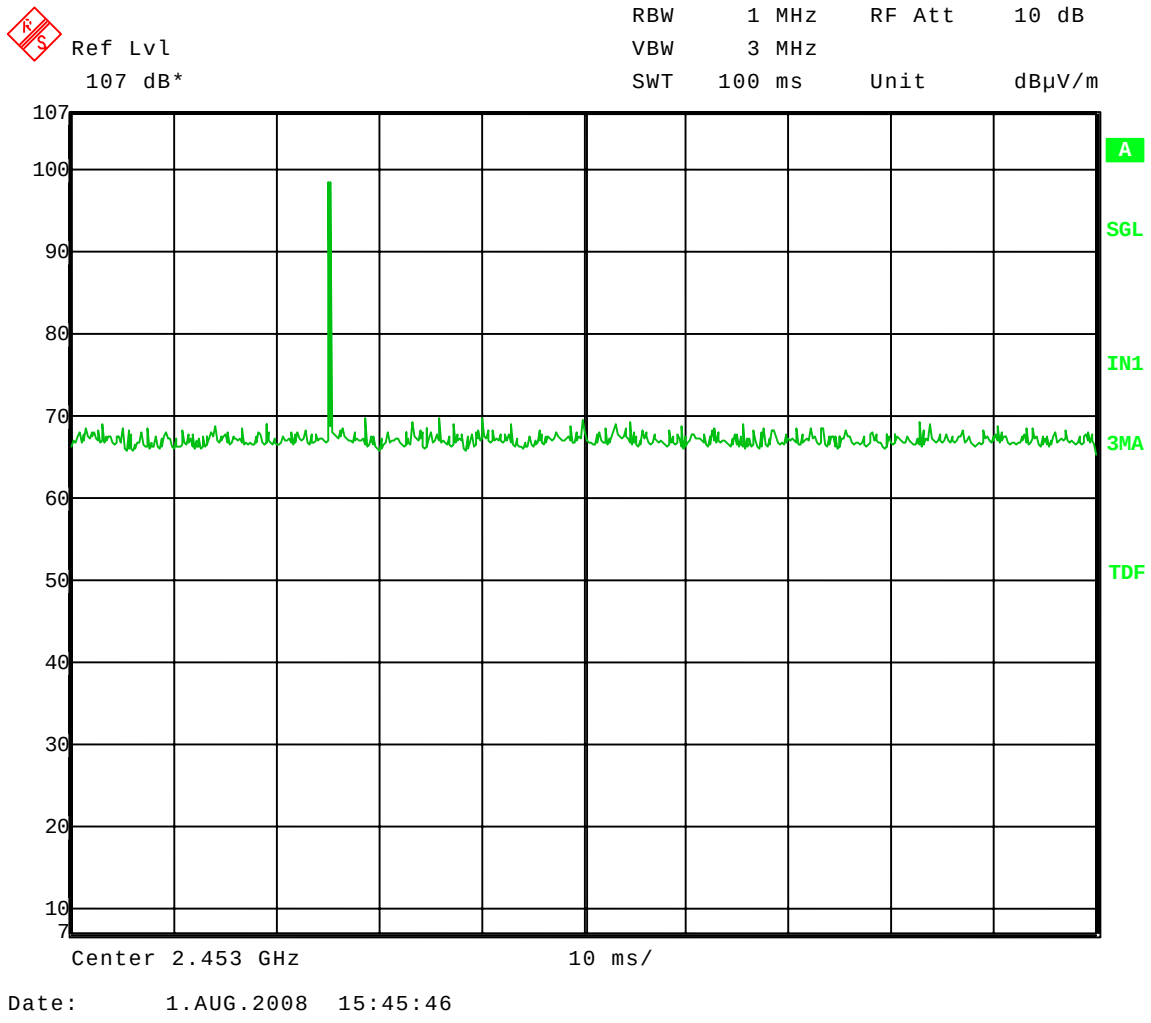
Company: Saris Cycling Group Inc
Model Tested: SL2.4
Report Number: 14637

Test Date: 08-01-2008
Company: Saris Cycling Group
EUT: SL2.4 module
Test: Pulsed Operation (RSS-GEN Section 4.3)
Operator: Craig B
Comment: Total ON Time during 100 ms = 0.20441 ms
20 log (0.20441 /100) = -53.8
Duty cycle correction factor = 53.8 dB

100 ms sweep:



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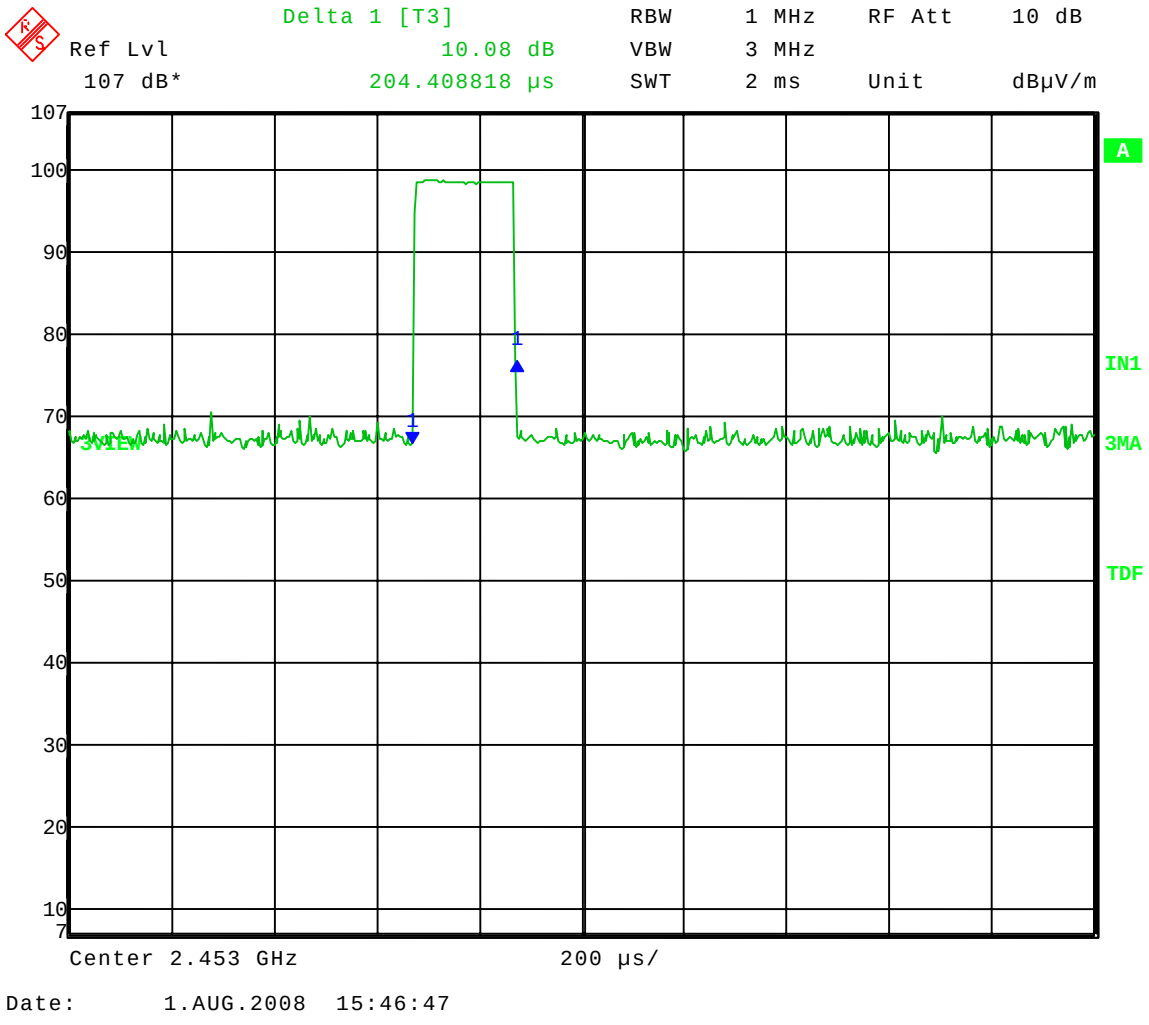
Company: Saris Cycling Group Inc
Model Tested: SL2.4
Report Number: 14637

Test Date: 08-01-2008
Company: Saris Cycling Group
EUT: SL2.4 module
Test: Pulsed Operation (RSS-GEN Section 4.3)
Operator: Craig B
Comment:

Duration of one pulse:



APPENDIX B

RADIATED DATA

AND

CHARTS TAKEN DURING TESTING

1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc
Model Tested: SL2.4
Report Number: 14637

Radiated Fundamental and Spurious Emissions – 30 MHz to 25 GHz

Tested at a 3 Meter Distance (30 MHz to 10 GHz)

Tested at a 1 Meter Distance (10 GHz to 25 GHz)

EUT: SL2.4 (Hub) with SL2.4 module
Manufacturer: Saris Cycling Group
Operating Condition: 73 deg F; 63% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: RSS-210 Sections A2.9, 2.2 (Restricted Bands), & 2.6 (General Field Strength Limits)
Comment: Continuous Transmit
Channel: **2.453** GHz
Date: 08/04/2008

Notes: **(1)** The EUT was measured in 3 orthogonal axis and placed in the worst case axis for the following measurements.
(2) All other emissions at least 20 dB under the limit
(3) No emissions where found at the upper and lower band-edges

Frequency (MHz)	Measurement Type	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
2453	Max Peak	Vert	52.99	28.60	3.8	85.4	---	85.4	114	28.6	1.0	270	Fundamental
2453	Average	Vert	52.99	28.60	3.8	85.4	-53.8	31.6	94	62.4	1.0	270	Fundamental
2453	Max Peak	Horz	57.75	28.60	3.8	90.2	---	90.2	114	23.9	1.2	300	Fundamental
2453	Average	Horz	57.75	28.60	3.8	90.2	-53.8	36.4	94	57.7	1.2	300	Fundamental
4906	Max Peak	Vert	64.11	33.01	-32.4	64.7	---	64.7	74	9.3	1.0	270	Res. Band
4906	Average	Vert	64.11	33.01	-32.4	64.7	-53.8	10.9	54	43.1	1.0	270	Res. Band
4906	Max Peak	Horz	64.37	33.01	-32.4	65.0	---	65.0	74	9.0	1.7	315	Res. Band
4906	Average	Horz	64.37	33.01	-32.4	65.0	-53.8	11.2	54	42.8	1.7	315	Res. Band
7359	Max Peak	Vert	Noise Floor										Res. Band
7359	Average	Vert	Noise Floor										Res. Band
7359	Max Peak	Horz	Noise Floor										Res. Band
7359	Average	Horz	Noise Floor										Res. Band