



1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

FCC Rules and Regulations / Intentional Radiators

Operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands

Part 15, Subpart C, Section 15.249

THE FOLLOWING "**MEETS**" THE ABOVE TEST SPECIFICATION

Formal Name: TT1 (T-antenna revision 1) RF Module

Kind of Equipment: Bicycle & training / fitness device

Test Configuration: Complete Indoor cycle; PowerBeam bicycle holding frame, bicycle hub and small user display (CPU) (Tested at 120 vac, 60 Hz)

Model Number(s): PowerBeam, Pro 300PT & PowerTap SL2.4

Model(s) Tested: PowerBeam, Pro 300PT & PowerTap SL2.4

Serial Number(s): Hub S/N 6xxxx, ERU S/N 58 & Hub S/N 6xxxx

Date of Tests: June 19 & 20 & 21, 2007

Test Conducted For: Saris Cycling Group Inc.  
5253 Verona Road  
Madison, Wisconsin 53711

**NOTICE:** "This report 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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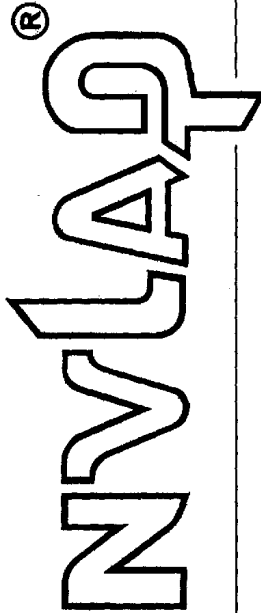
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United States Department of Commerce  
National Institute of Standards and Technology



## 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 Communiqué dated 18 June 2005).*

2006-10-01 through 2007-09-30

*Effective dates*



*Dolly A. Bucci*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-08-13)



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## 1.0 SUMMARY OF TEST REPORT

It was found that the TT1 (T-antenna revision 1) RF Module, Model Number(s) PowerBeam, Pro 300PT & PowerTap SL2.4, "**meets**" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.249 for operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands.

## 2.0 INTRODUCTION

On June 19 & 20 & 21, 2007, a series of radio frequency interference measurements was performed on TT1 (T-antenna revision 1) RF Module, Model Number(s) Pro 300PT, PowerBeam & PowerTap SL2.4, Serial Number: Hub S/N 6xxxx, ERU S/N 58 & Hub S/N 6xxxx. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2003. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

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.

## 3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.35(b), 15.37(d), 15.209 & 15.249 for Intentional Radiators operating in the Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24-24.25 GHz.



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#### 4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2003, Section 8, (Figures 11a and 11b). The conducted tests were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003, Section 4, (Figure 2).

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2003, Sections 6 and 8.

#### NOTE:

All 3 models tested use the same RF module. Therefore the measurements for Duty Cycle Correction and Emission bandwidth were taken on one sample only. All radiated emissions were taken for each model.

Only the PowerBeam has provision for connection to the AC mains. Therefore AC line conducted testing was performed on this model only.



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## 5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2003, Section 4.2.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

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.



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## 6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in MP-5 or ANSI C63.4-2003, as appropriate.





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## 7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

### 7.1 Description:

The TT1 (T-antenna revision 1) RF Module is use in the following Saris Products:

The PowerBeam electronic trainer system is used in conjunction with any bicycle; a small frame holds the bicycle such that the rear wheel is driving a roller on the PowerBeam resistance unit. The resistance unit provides a similar experience to real riding conditions in a stationary environment; typically indoors. The resistance unit controls the resistance and measures roller speed and loading forces using magnetic eddy current braking. The display unit mounts on the handle bars and displays the information to the user real time. The display unit calculates further parameters from the raw resistance unit data; Power (in Watts), speed in MPH, distance, ride time, KiloJoules.

The Pro 300PT is installed into a flywheel; the rear hub of the Indoor Cycle. The hub measure parameters of the rear wheel; torque, wheel speed, rider cadence. The hub transmits the information every 0.63 seconds. The Console receives the hub transmission and displays the information to the user real time. The Console calculates further parameters from the raw hub data; Power (in Watts), speed in MPH, distance, ride time etc.

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 transmits the information every 0.63 seconds. The CPU receives the hub transmission and displays the information to the user real time. The CPU calculates further parameters from the raw hub data; Power (in Watts), speed in MPH, distance, ride time etc.

NOTE: All 3 models use the same RF module.



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## 7.0 DESCRIPTION OF TEST SAMPLE: (CONT)

### 7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

PowerBeam 9.6" x 7" x 6.7"  
Pro 300PT Hub length 150mm (axle) x 120mm flange diameter  
PowerTap SL2.4 141mm x 70mm flange diameter

### 7.3 LINE FILTER USED:

NA

### 7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

None

Clock Frequencies:

0.03125, 0.032768, 1.000, 4.000, 8.000, 16.000 MHz

### 7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

- |   |                      |
|---|----------------------|
| 1. PowerBeam Hub electronics; RF circuit board                    | PN: 17709 revision 3 |
| 2. Pro 300PT & PowerTap SL2.4 Hub electronics; main circuit board | PN: 16748 revision E |
| 3. PowerBeam, Pro 300PT & PowerTap SL2.4 main circuit board       | PN: 17022 revision 3 |
| 4. Power Beam Pro 300PT & PowerTap SL2.4 RF circuit board         | PN: 17709 revision 3 |



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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:  
(See also Paragraph 7.0)

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

NOTE:

Tested in continuous transmit and normal operation.

I certify that the above, as described in paragraph 7.0, describes the equipment tested and will be manufactured as stated.

By: \_\_\_\_\_  
Signature Title

For: \_\_\_\_\_  
Company Date



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## 9.0 PHOTO INFORMATION AND TEST SET-UP

### Item 0 TT1 (T-antenna revision 1) RF Module

Model Numbers: PowerBeam, Pro 300PT & PowerTap SL2.4

Serial Number: Hub S/N 6xxxx & ERU S/N 58 & Hub S/N 6xxxx

### Item 1 Switching Power Supply

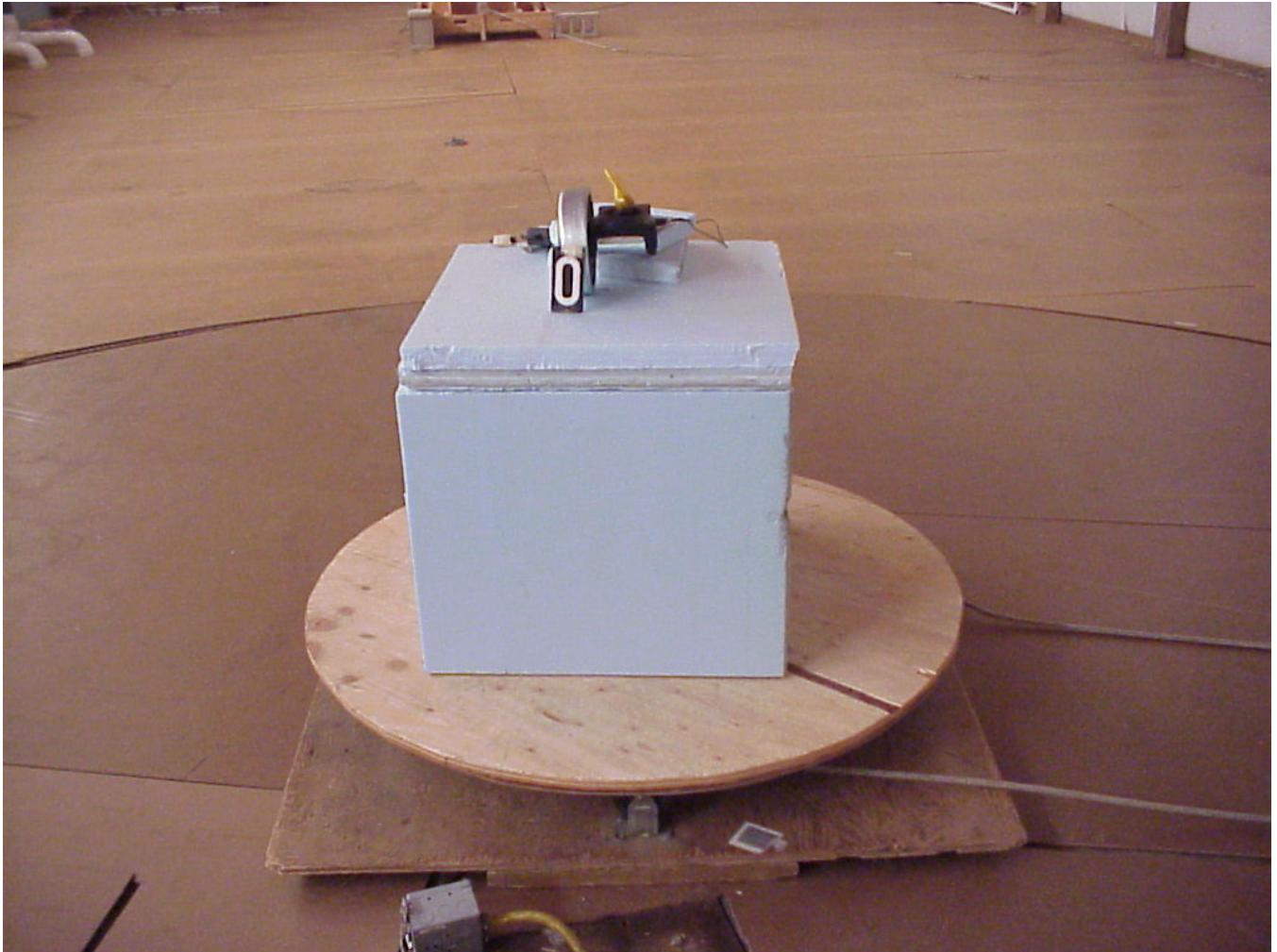
DP30B-241250



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## 10.0 RADIATED PHOTOS TAKEN DURING TESTING



POWER BEAM - FRONT VIEW

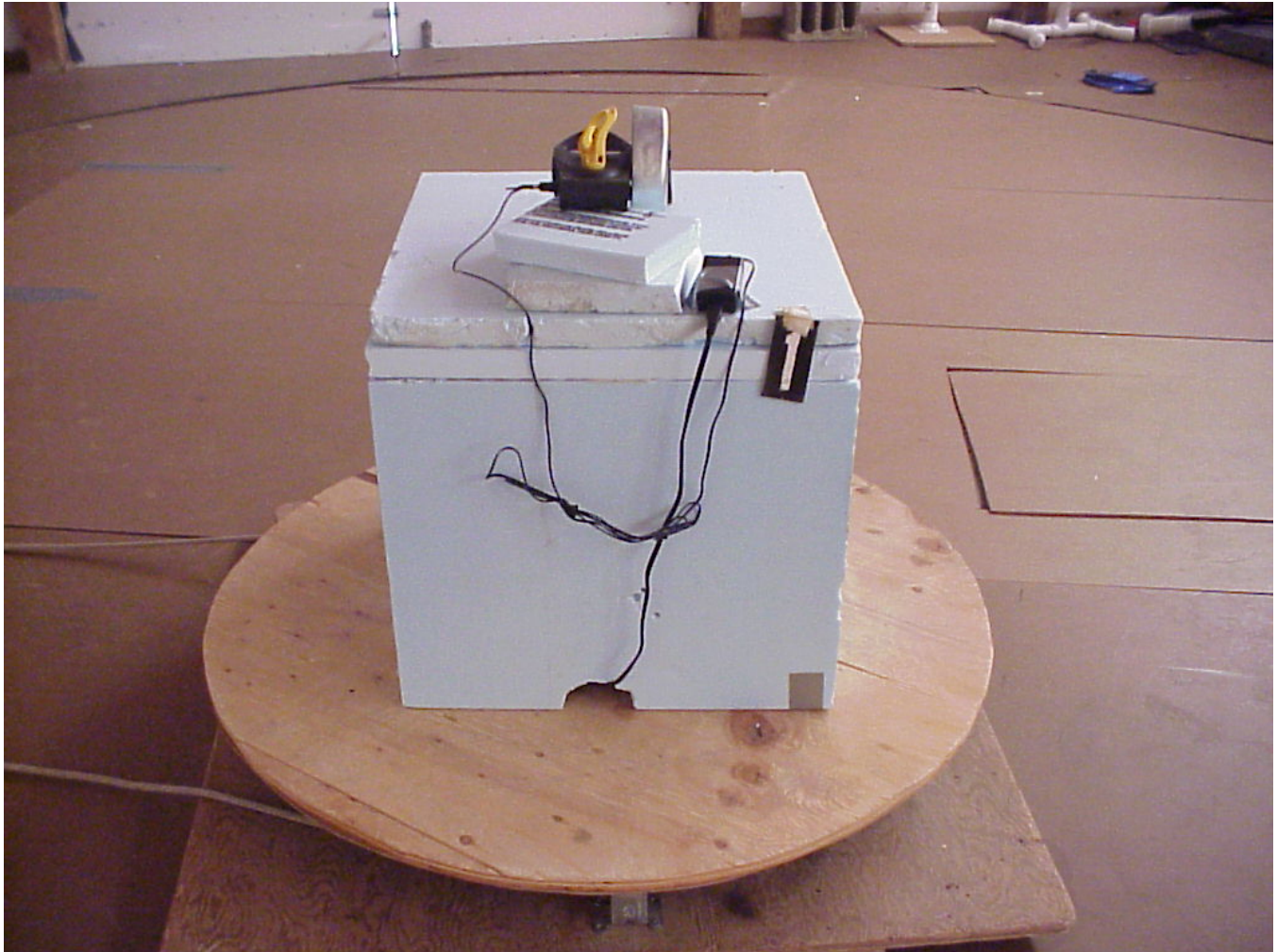




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## 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



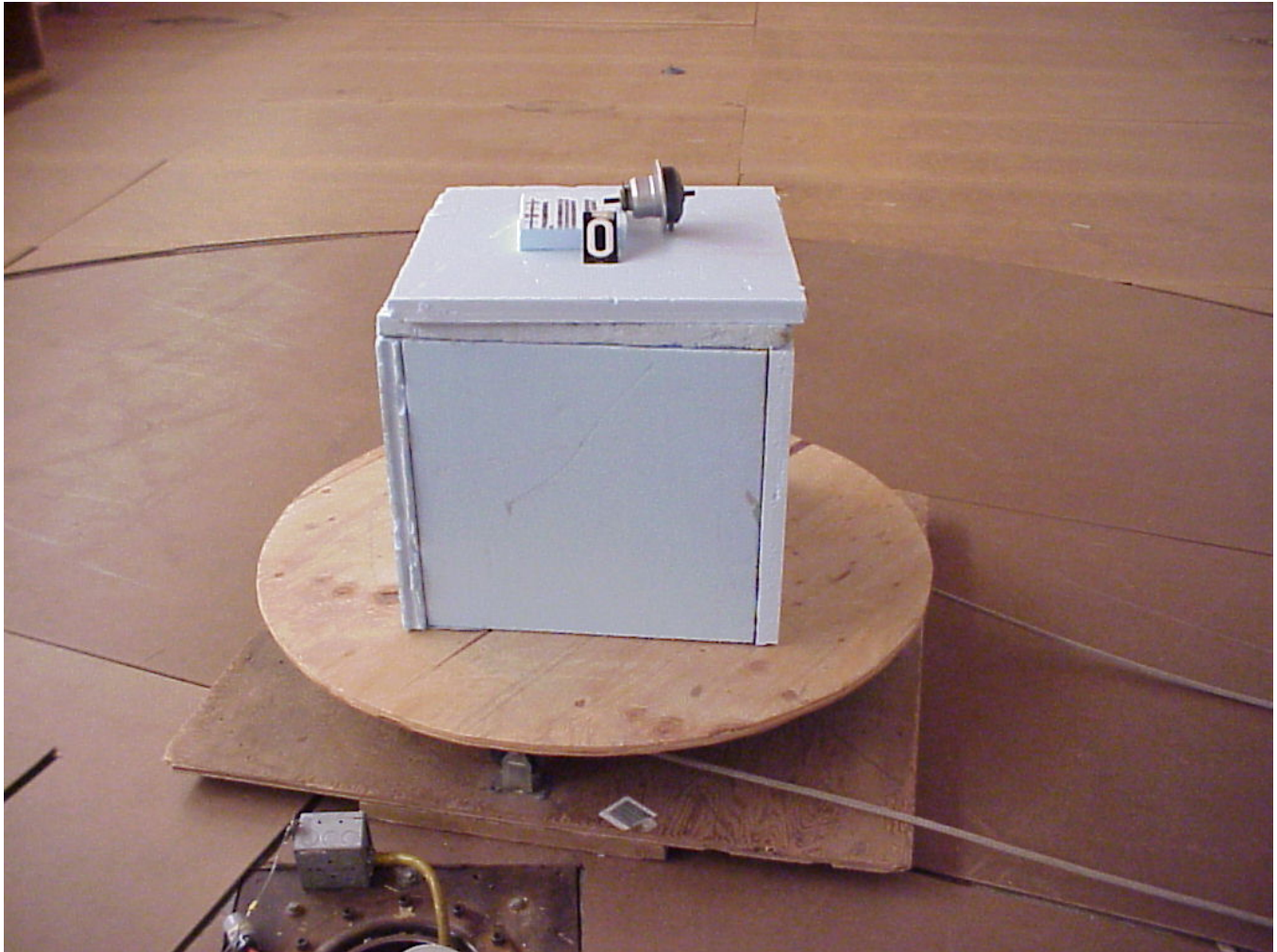
POWER BEAM - REAR VIEW



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Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
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## 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



PRO 300PT- FRONT VIEW

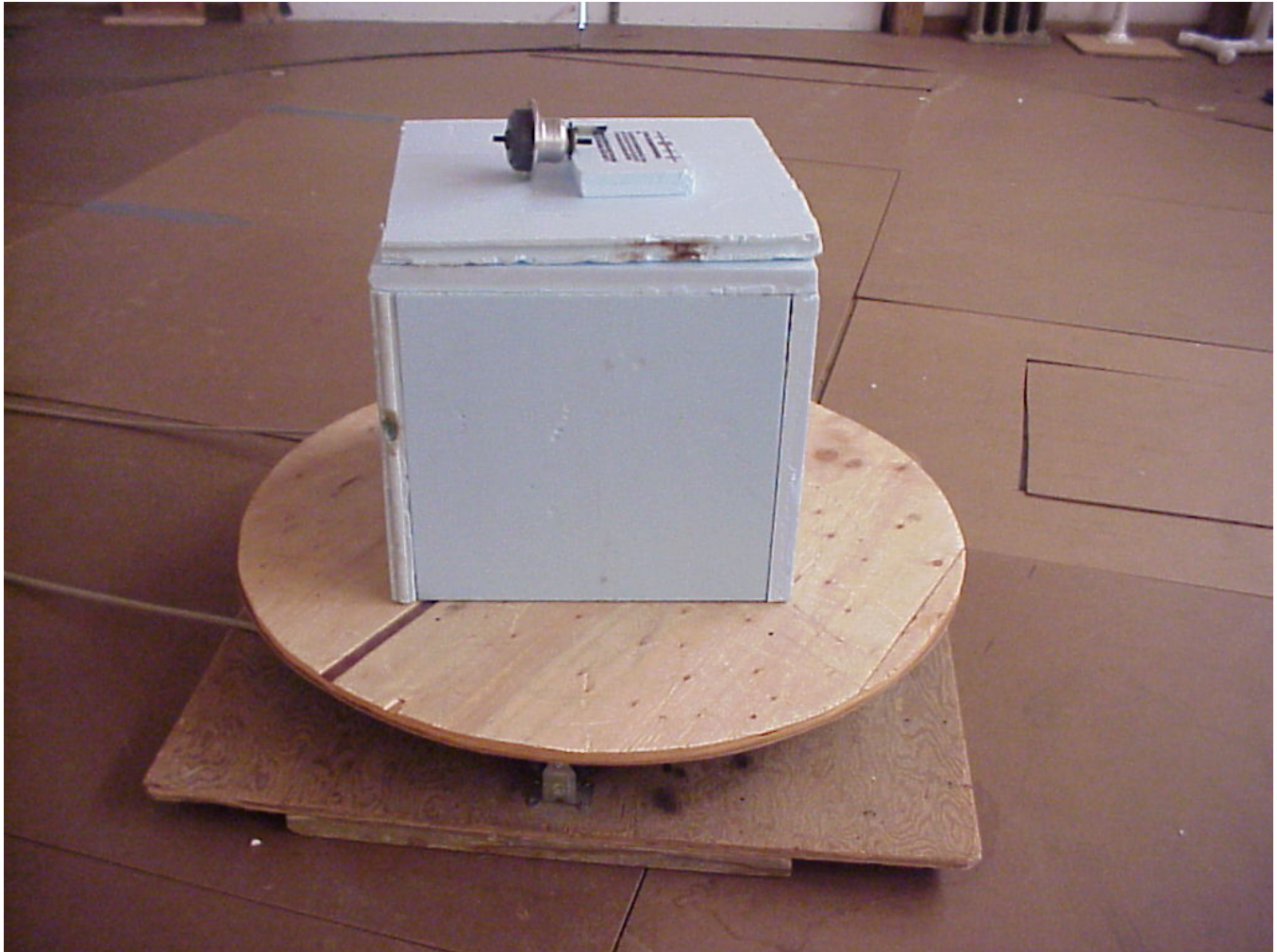




Company: Saris Cycling Group Inc.  
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## 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



PRO 300PT- REAR VIEW

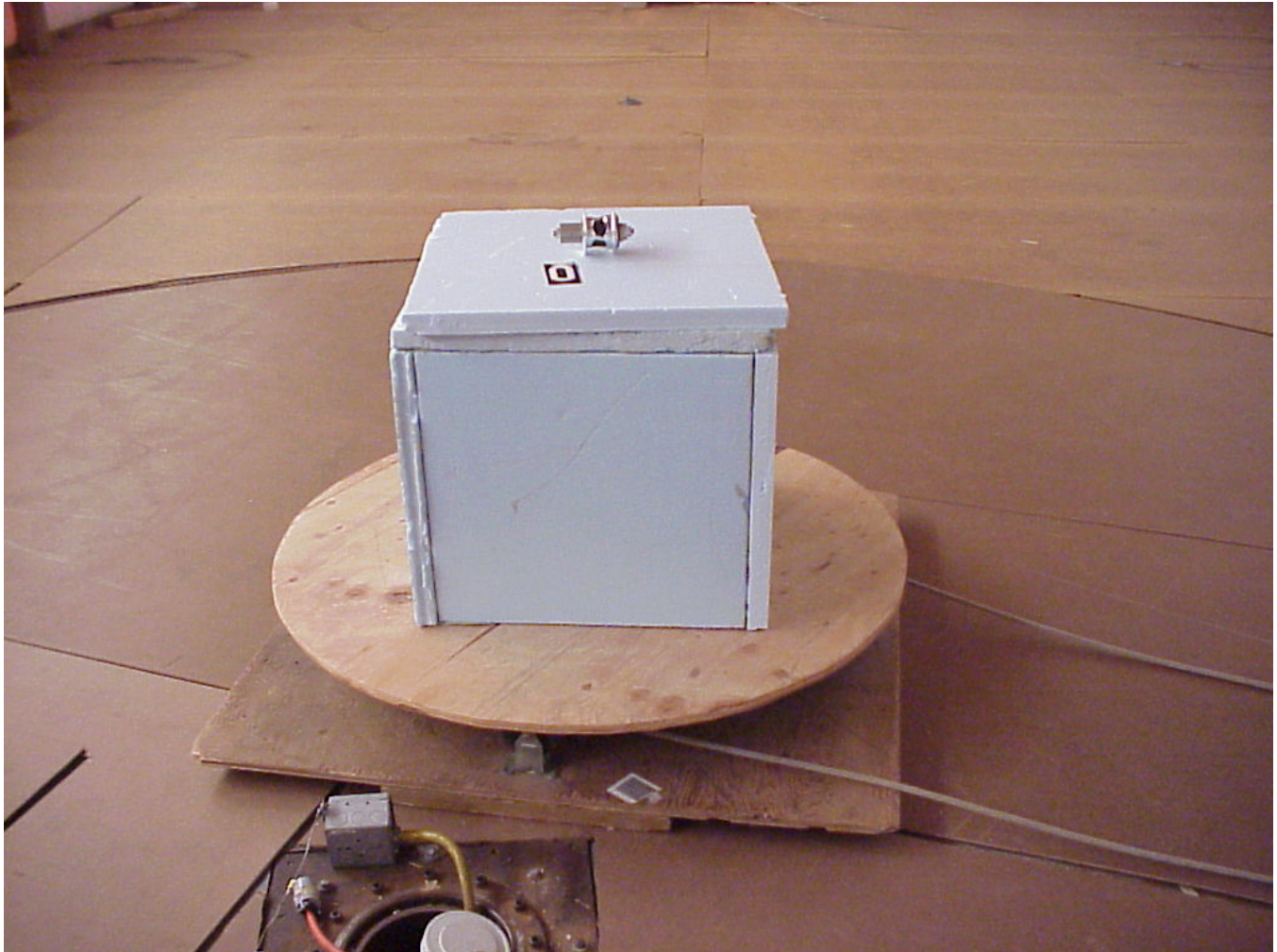




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## 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



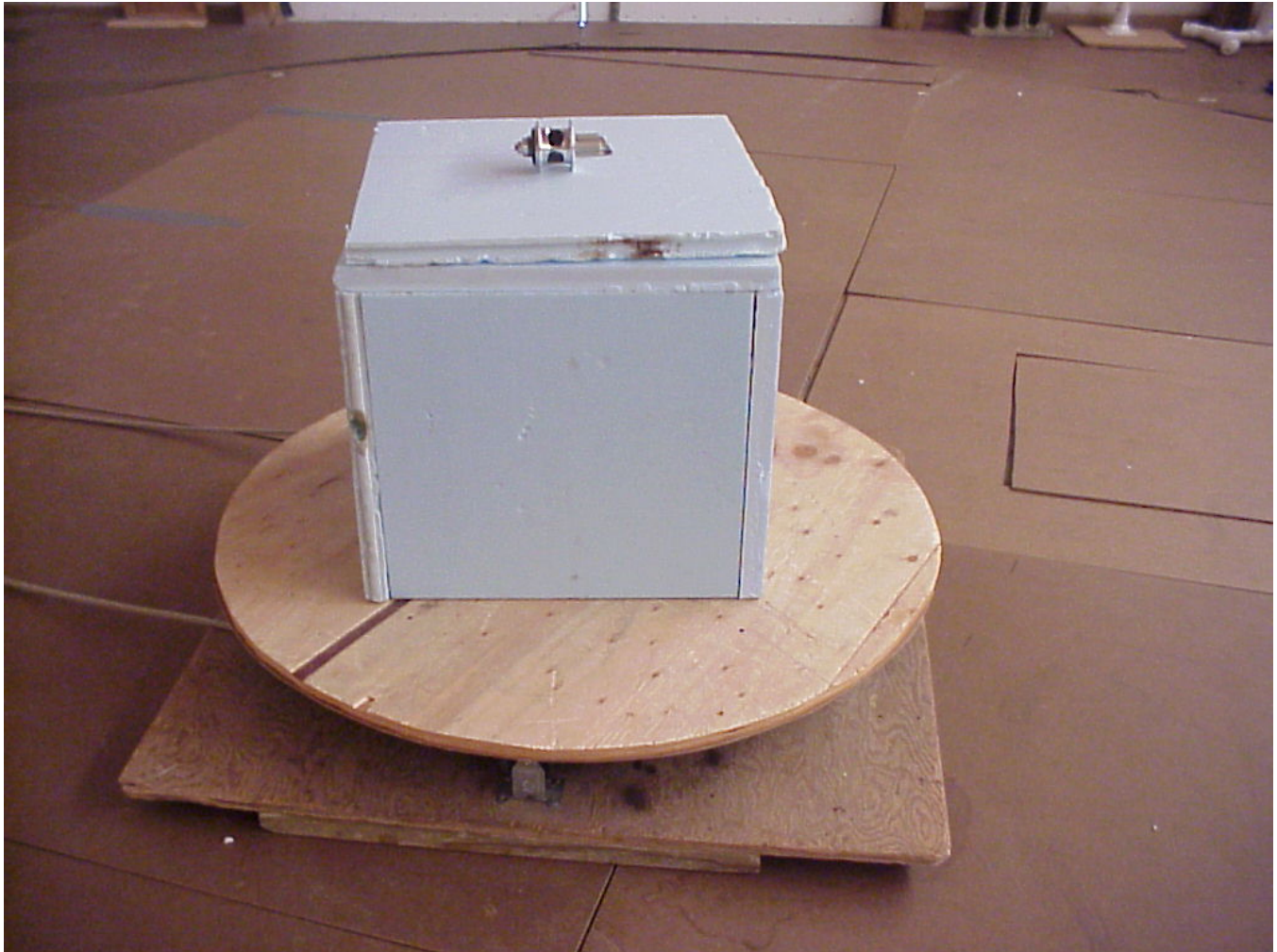
POWERTAP SL2.4 FRONT VIEW



Company: Saris Cycling Group Inc.  
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#### 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



POWERTAP SL2.4 REAR VIEW





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## 10.0 CONDUCTED PHOTOS TAKEN DURING TESTING



POWERBEAM LINE CONDUCTED



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## 11.0 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.

## 12.0 CONCLUSION

It was found that the TT1 (T-antenna revision 1) RF Module, Model Number(s) PowerBeam, Pro 300PT & PowerTap SL2.4 "meets" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.249 for operational in the 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz Bands.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/07
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/07
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/07
Preamp	R&S	TS-PR40	032001/003	26GHz-40GHz	1/10/2008
Preamp	Miteq	AMF-8B-180265-40-10P-H/S		18GHz-26GHz	9/18/07
Preamp	Miteq	MF-6D-010100-50 A	213976	10GHz-18GHz	5/8/2008
Preamp	Miteq	AMF-6F-100200-50-10P	668382	10GHz-18GHz	1/4/2008
Preamp	Miteq	AMF-6D-100200-50	313936	1GHz-10GHz	5/8/2008
Preamp	Ciao	CA118-4010		1GHz-18GHz	1/4/2008
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/08
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/08
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/08
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/08
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/08
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/08
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/08
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/07



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TABLE 1 – EQUIPMENT LIST

<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Frequency Range</b>	<b>Cal Due Dates</b>
Horn Antenna	EMCO	3116	2549	18 GHz – 40 GHz	5/16/2007
Horn Antenna	ETS Lindgren	3116	00062917	18 GHz – 40 GHz	10/31/07
Horn Antenna	A.H. Systems	SAS-574	221	18 GHz – 40 GHz	4/25/08
Horn Antenna	A.H. Systems	SAS-574	222	18 GHz – 40 GHz	4/25/08
Horn Antenna	Com Power	AH 118	071127	1 GHz – 18 GHz	5/2/08
Horn Antenna	EMCO	3115	4451	1 GHz – 18 GHz	5/8/07
Horn Antenna	EMCO	3115	6204	1 GHz – 18 GHz	5/16/07
Horn Antenna	EMCO	3115	5731	1 GHz – 18 GHz	6/7/07
Signal Generator	R&S	SMR-40	100092	1 GHz – 40 GHz	8/18/2007
Signal Generator	Hewlett-Packard	HP8341B	2819A01017	10 MHz – 20 GHz	8/23/07
Power Meter	Anritsu	ML2487A	6K00002069	NA	10/2/2007
Power Sensor	Anritsu	MA2411A	031563	300 MHz-40 GHz	10/2/2007
Power Sensor	Anritsu	MA2490A	NA	50 MHz-8 GHz	10/2/2007
Power Sensor	Anritsu	MA2491A	NA	50 MHz-18 GHz	10/2/2007

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



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TABLE 1 – EQUIPMENT LIST

<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Frequency Range</b>	<b>Cal Due Dates</b>
Audio Analyzer	HP	8903A	2336A03043	20 Hz-100 kHz	12/1/2007
Modulation Analyzer	HP	8901B	2920A02096	150 kHz-1.3 GHz	11/30/2007
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/07
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/07
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/07
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/07
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/07

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



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## APPENDIX A

### TEST PROCEDURE

Part 15, Subpart C, Section 15.249a-e

Operation within the Bands 902-928 MHz,  
2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz





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## APPENDIX A

### 1.0 CONDUCTED EMISSION MEASUREMENTS

Conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements as specified in FCC Part 15, Subpart C, Section 15.207 & ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high (hot) and low (neutral) sides, were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. During the test, the cables were placed and items moved (when appropriate) to maximize emissions. All signals were then recorded. The allowed levels for Intentional Radiators which is designed to connected to the public utility (AC) power line cannot exceed the following:

Frequency of Emissions (MHz)	Conducted Limits (dBuV)	
	Quasi Peak	Average
.15 to .5	66 to 56	56 to 46
.5 to 5	56	46
5 to 30	60	50

#### **NOTE:**

Only the PowerBeam has provision for connection to the AC mains. Therefore AC line conducted testing was performed on this model only.

All test measurements were made at a screen room temperature of **72°F** at **49%** relative humidity.



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## APPENDIX A

# CONDUCTED DATA AND GRAPH(S) TAKEN DURING TESTING

## PART 15.207

### **NOTE:**

Only the PowerBeam has provision for connection to the AC mains. Therefore AC line conducted testing was performed on this model only.

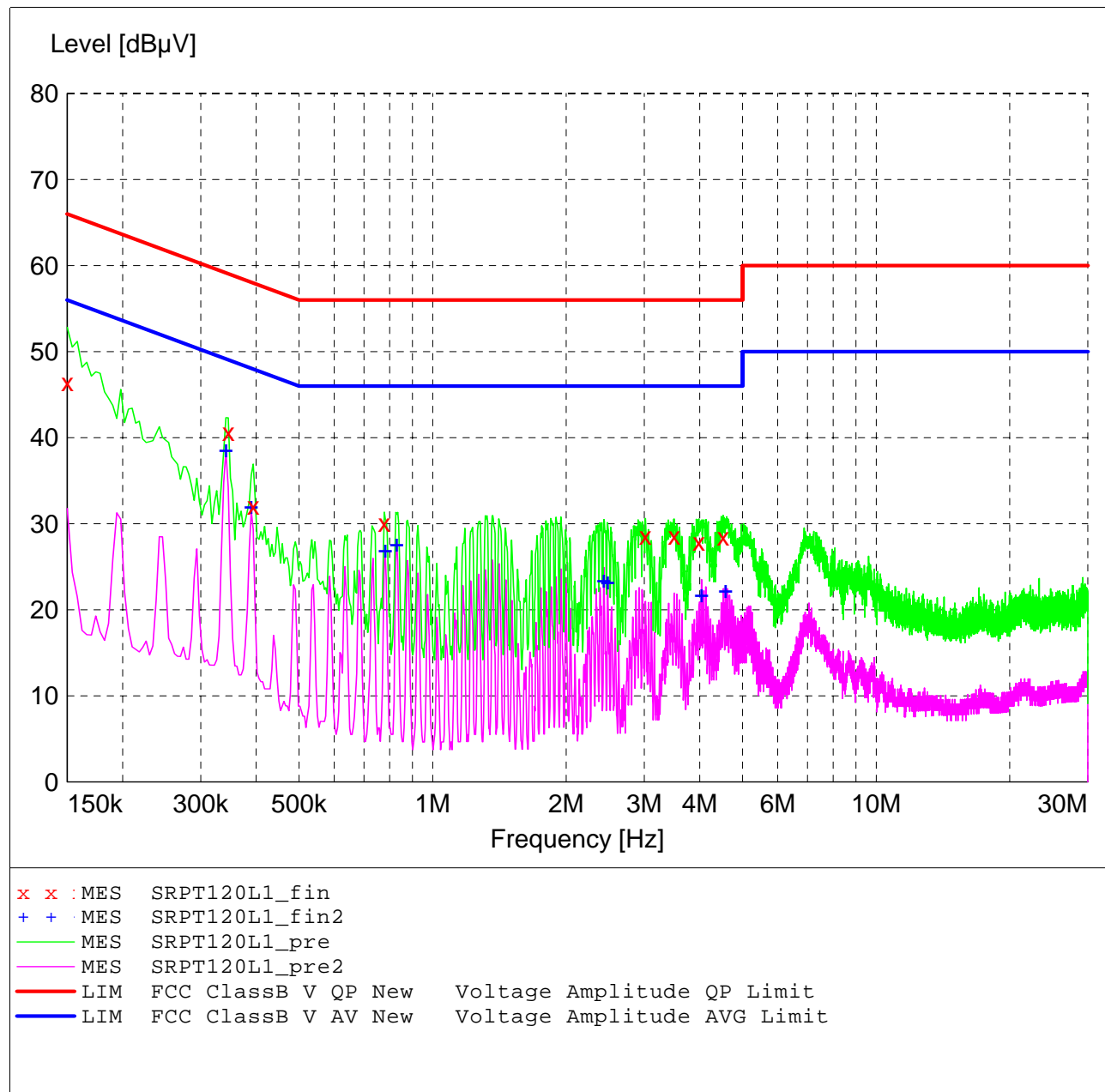
# FCC Part 15 Class B

## Voltage Mains Test

EUT: Power Beam Trainer Transmitter  
Manufacturer: Saris  
Operating Condition: 72 deg. F, 49% R.H.  
Test Site: DLS O.F. Site 1 (Screenroom)  
Operator: Jason Lauer  
Test Specification: 120 VAC @ 60 Hz  
Comment: Line 1 (Hot)  
Date: 06-20-2007

### SCAN TABLE: "Line Cond Scrn RmFin"

Short Description:			Line Conducted Emissions			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	2.0 s	9 kHz	LISN DLS#128
CISPR AV						



**MEASUREMENT RESULT: "SRPT120L1\_fin"**

6/20/2007 10:02AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	46.40	11.5	66	19.6	QP	---	---
0.346000	40.60	10.4	59	18.5	QP	---	---
0.394000	32.10	10.4	58	25.9	QP	---	---
0.778000	30.10	10.3	56	25.9	QP	---	---
3.018000	28.60	10.4	56	27.4	QP	---	---
3.506000	28.60	10.5	56	27.4	QP	---	---
3.982000	27.90	10.5	56	28.1	QP	---	---
4.518000	28.50	10.5	56	27.5	QP	---	---

**MEASUREMENT RESULT: "SRPT120L1\_fin2"**

6/20/2007 10:02AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.342000	38.70	10.5	49	10.5	CAV	---	---
0.390000	32.10	10.4	48	16.0	CAV	---	---
0.782000	27.00	10.3	46	19.0	CAV	---	---
0.830000	27.70	10.2	46	18.3	CAV	---	---
2.434000	23.50	10.3	46	22.5	CAV	---	---
2.482000	23.30	10.3	46	22.7	CAV	---	---
4.038000	21.80	10.5	46	24.2	CAV	---	---
4.574000	22.30	10.5	46	23.7	CAV	---	---

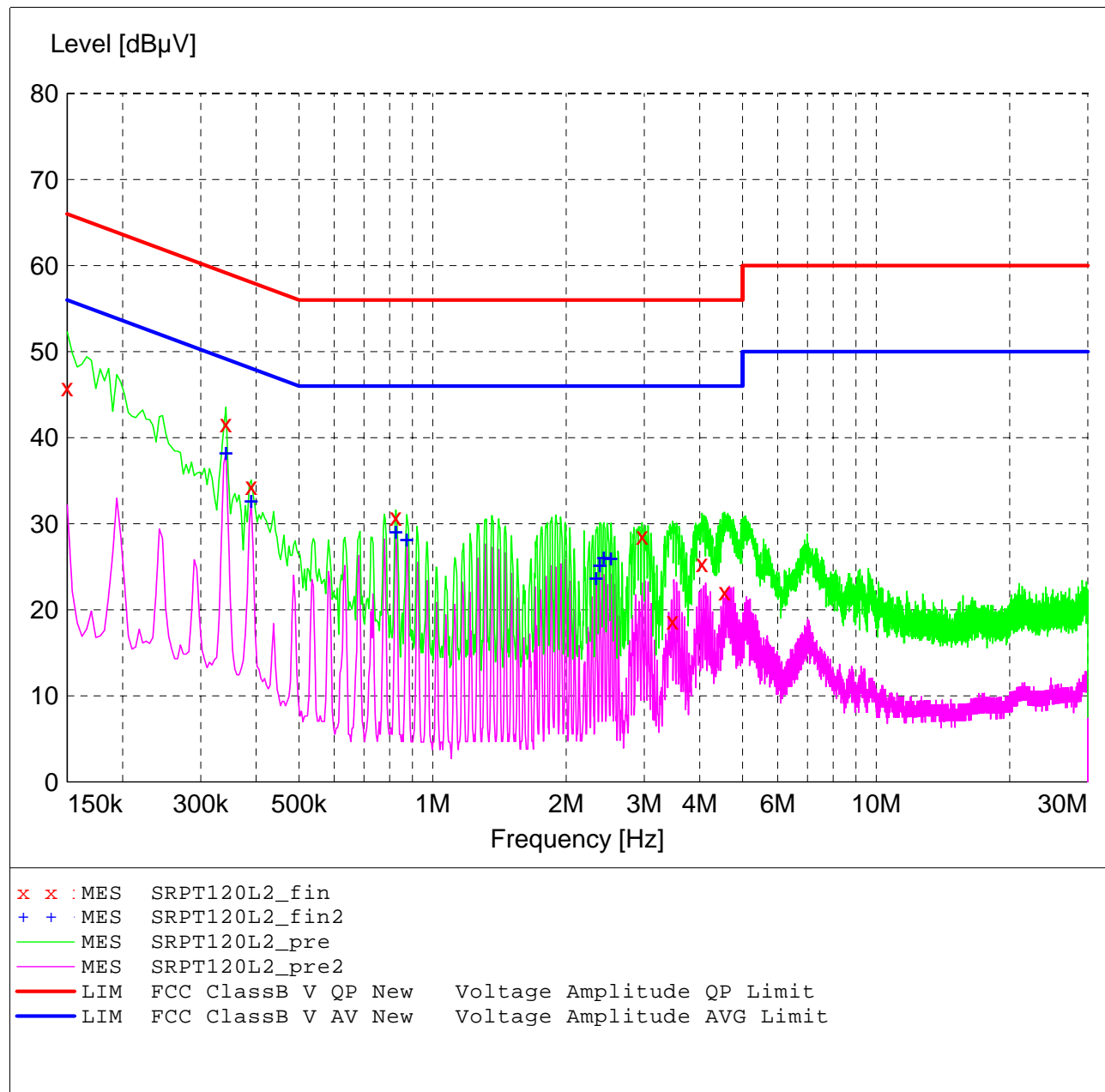
# FCC Part 15 Class B

## Voltage Mains Test

EUT: Power Beam Trainer Transmitter  
Manufacturer: Saris  
Operating Condition: 72 deg. F, 49% R.H.  
Test Site: DLS O.F. Site 1 (Screenroom)  
Operator: Jason Lauer  
Test Specification: 120 VAC @ 60 Hz  
Comment: Line 2 (Neutral)  
Date: 06-20-2007

### SCAN TABLE: "Line Cond Scrn RmFin"

Short Description:			Line Conducted Emissions			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	2.0 s	9 kHz	LISN DLS#128
CISPR AV						



**MEASUREMENT RESULT: "SRPT120L2\_fin"**

6/20/2007 10:11AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	45.80	11.5	66	20.2	QP	---	---
0.342000	41.70	10.5	59	17.5	QP	---	---
0.390000	34.40	10.4	58	23.7	QP	---	---
0.826000	30.80	10.2	56	25.2	QP	---	---
2.966000	28.60	10.4	56	27.4	QP	---	---
3.474000	18.70	10.5	56	37.3	QP	---	---
4.050000	25.40	10.5	56	30.6	QP	---	---
4.550000	22.10	10.5	56	33.9	QP	---	---

**MEASUREMENT RESULT: "SRPT120L2\_fin2"**

6/20/2007 10:11AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.342000	38.30	10.5	49	10.9	CAV	---	---
0.390000	32.80	10.4	48	15.3	CAV	---	---
0.826000	29.20	10.2	46	16.8	CAV	---	---
0.874000	28.30	10.2	46	17.7	CAV	---	---
2.334000	23.80	10.3	46	22.2	CAV	---	---
2.382000	25.30	10.3	46	20.7	CAV	---	---
2.430000	26.20	10.3	46	19.8	CAV	---	---
2.526000	26.10	10.3	46	19.9	CAV	---	---



1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

### 2.0 RESTRICTED BAND COMPLIANCE

The field strength of any emissions appearing outside the 2400 – 2483.5 MHz band shall not exceed the general radiated emissions limits as stated Section 15.209. The fundamental from the TT1 (T-antenna revision 1) RF Module shall not be inside the restricted bands.

As stated in Section 15.205a, the fundamental emission from the TT1 (T-antenna revision 1) RF Module shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

#### NOTE:

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

See the page(s) 36 – 39 for the data made showing compliance for the Restricted Band.



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Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

### 3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (SECTION 15.249a-d)

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the TT1 (T-antenna revision 1) RF Module, Model Number(s): Pro 300PT, PowerBeam & PowerTap SL2.4, are shown in tabulated and graph form. Preliminary radiation measurements were performed at a 3 meter test distance with the limits adjusted linearly when required. The frequency range from 30 MHz to over 960 MHz, depending upon the fundamental frequency as stated in Part 15.33a, was automatically scanned and plotted at various angles.

Measurements for the TT1 (T-antenna revision 1) RF Module were made up to 25000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 2457 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 30 MHz, up to at least the tenth harmonic of the highest fundamental frequency or 10 GHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made over the entire frequency range specified in FCC Part 15, Subpart C, Section 15.249 at the open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**. When required, levels were extrapolated from 10 meters to 3 meters using a linear extrapolation.

All signals in the frequency range of 30 MHz to 2000 MHz were measured with a Biconical Antenna or tuned dipoles and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. From 1000 MHz to 10 GHz Horn Antennas were used. During the test the equipment was rotated and the antenna was raised and lowered from 1 meter to 4 meters to find the maximum level of emissions. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. The EUT, peripheral equipment and cables were configured to meet the conditions in ANSI C63.4-2003, Clauses 6 & 8. Tests were made with the receive antenna(s) in both the horizontal and vertical planes of polarization. In each case, the table was rotated to find the maximum emissions.





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Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

### 3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T)

For operation in the bands 902 to 928 MHz, 2400 to 2483.5 MHz, 5725 to 5875 MHz, and 24.0 to 24.25 GHz the field strength of any emissions within this band shall not exceed the field strength levels specified in the following table as stated in FCC, Part 15, Section 15.249(a).

Frequency range in MHz	Field Strength of Fundamental millivolts/meter	Field Strength of Fundamental dBuV/meter	Field Strength of Harmonics microvolts/meter	Field Strength of Harmonics dBuV/meter
902 to 928	50	93.98	500	53.98
2400 to 2483.5	50	93.98	500	53.98
5725 to 5875	50	93.98	500	53.98
24000 to 24250	250	107.96	2500	67.96

Field strength limits are at a distance of 3 meters. The emission limits shown are based on measurement instrumentation employing an average detector.

Emissions radiated outside of the specified frequency bands, except for harmonics are attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Preliminary radiated emission measurements were performed at a 3 meter test distance. The frequency range from 30 MHz to 1000 MHz was automatically scanned and plotted at various angles.

#### **NOTE:**

**All radiated emissions measurements were made at a test room temperature of 72°F at 53% relative humidity.**



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Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

# RADIATED DATA TAKEN FOR FUNDAMENTAL EMISSION MEASUREMENTS PART 15.249

### NOTE:

See the following FCC ID #s for additional radiated emissions test data.

T8P-SL2P401 (PowerTap SL2.4)

T8P-SL2P402 (Pro 300PT)



1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

### DLS Electronic Systems, Inc.

Company: Saris Cycling

Operator: Jason Lauer

Date of test: 06-21-2007

Temperature: 73 deg. F

Humidity: 54% R.H.

### EIRP - Substitution Method on Fundamental

Model: **Power Beam Trainer**

Frequency and Polarization (MHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Factor to Convert to dBm	Power EIRP in dBm	Strength of emission [EIRP] (mW)
2457 vertical	97.9	95.9	2	1.58
2457 horizontal	102.2	97.7	4.5	2.82



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Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

# RADIATED DATA TAKEN DURING TESTING FOR HARMONIC AND RESTRICTED BANDS SPURIOUS EMISSION MEASUREMENTS

## PART 15.209

### NOTE:

See the following FCC ID #s for additional radiated emissions test data.

T8P-SL2P401 (PowerTap SL2.4)

T8P-SL2P402 (Pro 300PT)



Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### 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:** Power Beam Trainer Transmitter  
**Manufacturer:** Saris Cycling Group  
**Operating Condition:** 72 deg F; 53% R.H.  
**Test Site:** Site 2  
**Operator:** Jason Lauer  
**Test Specification:** FCC Part 15.249, Part 15.205 and Part 15.209  
**Comment:** Continuous Transmit  
**Date:** 06/19/2007

**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 FCC Part 15.209 limits  
(3) No emissions were found at the upper and lower band-edges

Frequency (MHz)	Measurement Detector	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
2457	Max Peak	Vert	66.82	28.78	2.3	97.9	NA	97.9	113.98 (Peak)	16.1	1.1	180	Fundamental
2457	Max Peak	Vert	66.82	28.78	2.3	97.9	-20	77.9	93.98 (Avg)	16.1	1.1	180	Fundamental
2457	Max Peak	Horz	71.08	28.78	2.3	102.2	NA	102.2	113.98 (Peak)	11.8	1.1	90	Fundamental
2457	Max Peak	Horz	71.08	28.78	2.3	102.2	-20	82.2	93.98 (Avg)	11.8	1.1	90	Fundamental
4914	Max Peak	Vert	54.42	33.53	-35.5	52.5	NA	52.5	74 (Peak)	21.6	1.1	90	Res. Band
4914	Max Peak	Vert	54.42	33.53	-35.5	52.5	-20	32.5	54 (Avg)	21.6	1.1	90	Res. Band
4914	Max Peak	Horz	54.7	33.53	-35.5	52.7	NA	52.7	74 (Peak)	21.3	1.2	270	Res. Band
4914	Max Peak	Horz	54.7	33.53	-35.5	52.7	-20	32.7	54 (Avg)	21.3	1.2	270	Res. Band
7371	Max Peak	Vert	56.87	36.44	-32.8	60.5	NA	60.5	74 (Peak)	13.5	1.1	160	Harmonic
7371	Max Peak	Vert	56.87	36.44	-32.8	60.5	-20	40.5	54 (Avg)	13.5	1.1	160	Harmonic
7371	Max Peak	Horz	58.02	36.44	-32.8	61.7	NA	61.7	74 (Peak)	12.3	1.1	270	Harmonic
7371	Max Peak	Horz	58.02	36.44	-32.8	61.7	-20	41.7	54 (Avg)	12.3	1.1	270	Harmonic



Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### 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:** Pro 300PT Hub Transmitter  
**Manufacturer:** Saris Cycling Group  
**Operating Condition:** 72 deg F; 53% R.H.  
**Test Site:** Site 2  
**Operator:** Jason Lauer  
**Test Specification:** FCC Part 15.249, Part 15.205 and Part 15.209  
**Comment:** Continuous Transmit  
**Date:** 06/19/2007

- 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 FCC Part 15.209 limits  
(3) No emissions were found at the upper and lower band-edges

Frequency (MHz)	Measurement Detector	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
2457	Max Peak	Vert	57.05	28.78	2.3	88.1	NA	88.1	113.98 (Peak)	25.9	1.1	180	Fundamental
2457	Max Peak	Vert	57.05	28.78	2.3	88.1	-20	68.1	93.98 (Avg)	25.9	1.1	180	Fundamental
2457	Max Peak	Horz	61.58	28.78	2.3	92.7	NA	92.7	113.98 (Peak)	21.3	1.1	325	Fundamental
2457	Max Peak	Horz	61.58	28.78	2.3	92.7	-20	72.7	93.98 (Avg)	21.3	1.1	325	Fundamental
4914	Max Peak	Vert	57.08	33.53	-35.5	55.1	NA	55.1	74 (Peak)	18.9	1.1	225	Res. Band
4914	Max Peak	Vert	57.08	33.53	-35.5	55.1	-20	35.1	54 (Avg)	18.9	1.1	225	Res. Band
4914	Max Peak	Horz	60.68	33.53	-35.5	58.7	NA	58.7	74 (Peak)	15.3	1.1	180	Res. Band
4914	Max Peak	Horz	60.68	33.53	-35.5	58.7	-20	38.7	54 (Avg)	15.3	1.1	180	Res. Band
7371	Max Peak	Vert	60.23	36.44	-32.8	63.9	NA	63.9	74 (Peak)	10.1	1.1	180	Harmonic
7371	Max Peak	Vert	60.23	36.44	-32.8	63.9	-20	43.9	54 (Avg)	10.1	1.1	180	Harmonic
7371	Max Peak	Horz	57.48	36.44	-32.8	61.1	NA	61.1	74 (Peak)	12.9	1.0	160	Harmonic
7371	Max Peak	Horz	57.48	36.44	-32.8	61.1	-20	41.1	54 (Avg)	12.9	1.0	160	Harmonic
9828	Max Peak	Vert	52.78	38.27	-33.5	57.6	NA	57.6	74 (Peak)	16.5	1.1	225	Harmonic
9828	Max Peak	Vert	52.78	38.27	-33.5	57.6	-20	37.6	54 (Avg)	16.5	1.1	225	Harmonic
9828	Max Peak	Horz	52.25	38.27	-33.5	57.0	NA	57.0	74 (Peak)	17.0	1.0	180	Harmonic
9828	Max Peak	Horz	52.25	38.27	-33.5	57.0	-20	37.0	54 (Avg)	17.0	1.0	180	Harmonic



Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

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## APPENDIX A

### 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:** PowerTap SL2.4 Hub Transmitter  
**Manufacturer:** Saris Cycling Group  
**Operating Condition:** 72 deg F; 53% R.H.  
**Test Site:** Site 2  
**Operator:** Jason Lauer  
**Test Specification:** FCC Part 15.249, Part 15.205 and Part 15.209  
**Comment:** Continuous Transmit  
**Date:** 06/19/2007

- 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 FCC Part 15.209 limits  
(3) No emissions were found at the upper and lower band-edges

Frequency (MHz)	Measurement Detector	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
2457	Max Peak	Vert	54.02	28.78	2.3	85.1	NA	85.1	113.98 (Peak)	28.9	1.2	180	Fundamental
2457	Max Peak	Vert	54.02	28.78	2.3	85.1	-20	65.1	93.98 (Avg)	28.9	1.2	180	Fundamental
2457	Max Peak	Horz	64.22	28.78	2.3	95.3	NA	95.3	113.98 (Peak)	18.7	1.2	170	Fundamental
2457	Max Peak	Horz	64.22	28.78	2.3	95.3	-20	75.3	93.98 (Avg)	18.7	1.2	170	Fundamental
4914	Max Peak	Vert	62.27	33.53	-35.5	60.3	NA	60.3	74 (Peak)	13.7	1.0	45	Res. Band
4914	Max Peak	Vert	62.27	33.53	-35.5	60.3	-20	40.3	54 (Avg)	13.7	1.0	45	Res. Band
4914	Max Peak	Horz	60.97	33.53	-35.5	59.0	NA	59.0	74 (Peak)	15.0	1.1	90	Res. Band
4914	Max Peak	Horz	60.97	33.53	-35.5	59.0	-20	39.0	54 (Avg)	15.0	1.1	90	Res. Band
7371	Max Peak	Vert	38.66	36.44	-32.8	42.3	NA	42.3	74 (Peak)	31.7	1.0	225	Harmonic
7371	Max Peak	Vert	38.66	36.44	-32.8	42.3	-20	22.3	54 (Avg)	31.7	1.0	225	Harmonic
7371	Max Peak	Horz	52.66	36.44	-32.8	56.3	NA	56.3	74 (Peak)	17.7	1.0	90	Harmonic
7371	Max Peak	Horz	52.66	36.44	-32.8	56.3	-20	36.3	54 (Avg)	17.7	1.0	90	Harmonic
9828	Max Peak	Horz	52.83	38.27	-33.5	57.6	NA	57.6	74 (Peak)	16.4	1.0	125	Harmonic
9828	Max Peak	Horz	52.83	38.27	-33.5	57.6	-20	37.6	54 (Avg)	16.4	1.0	125	Harmonic



1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

# DUTY CYCLE CORRECTION FACTOR



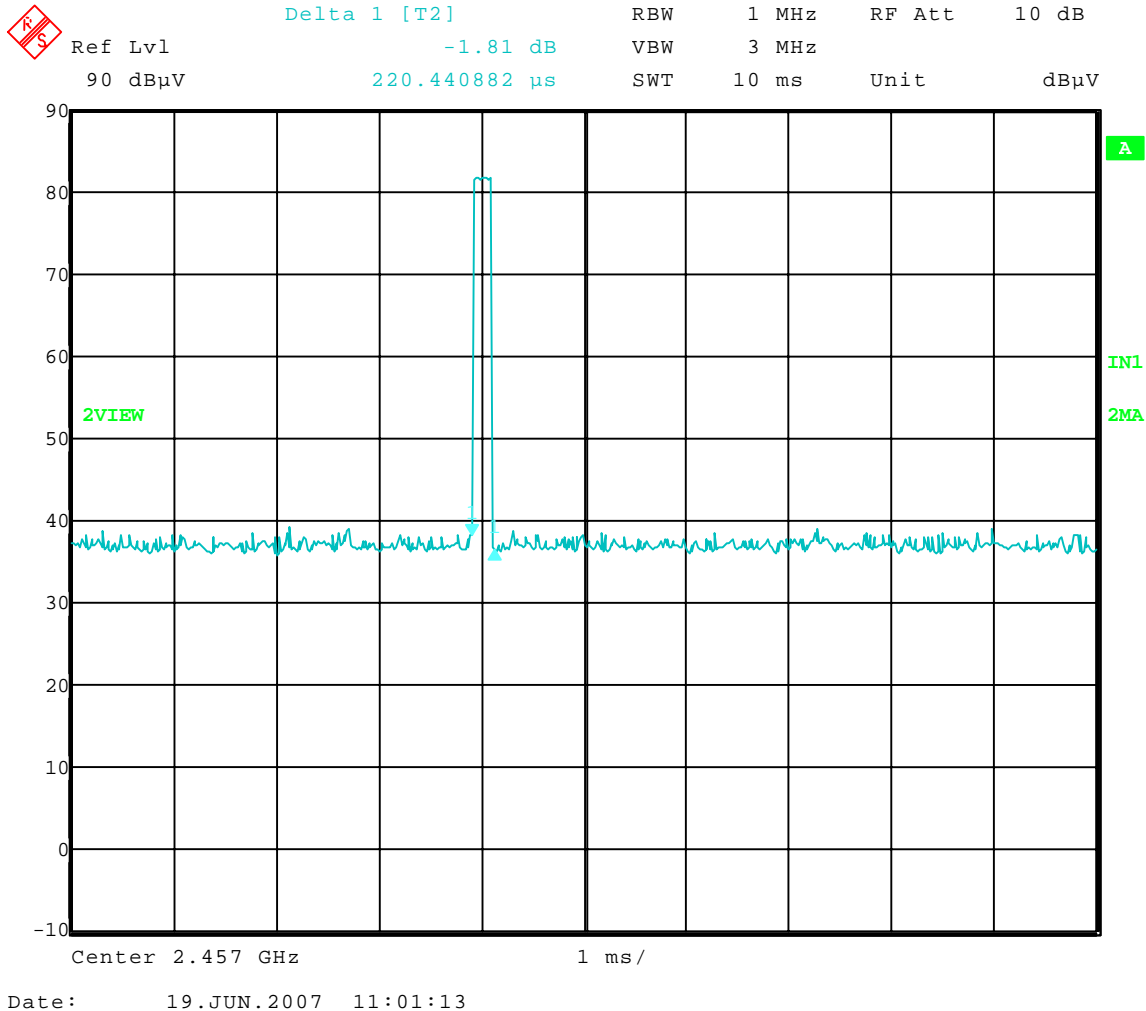


Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 06-19-2007  
Company: Saris Cycling Group  
EUT: PowerTap SL2.4 Hub Transmitter  
Test: Duty Cycle (FCC Part 15.35)  
Operator: Jason Lauer  
Comment: 10 ms sweep  
Comment: Total ON Time during 100 ms = 0.2404 ms  
 $20 \log (0.2404\text{ms} / 100\text{ms}) = (52.38 \text{ dB}) > 20 \text{ dB Limit}$   
**Duty cycle correction factor = 20 dB**



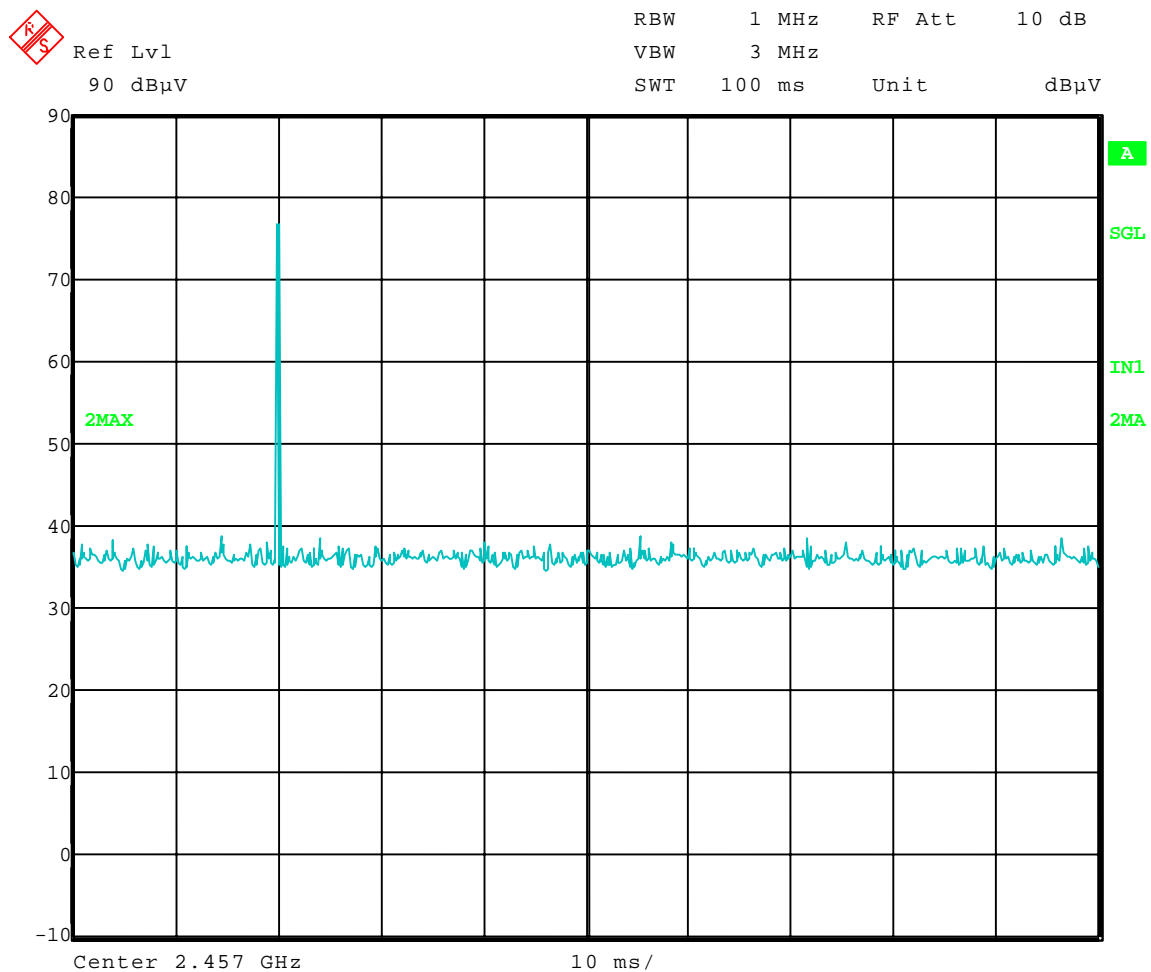


Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 06-19-2007  
Company: Saris Cycling Group  
EUT: PowerTap SL2.4 Hub Transmitter  
Test: Duty Cycle  
Operator: Jason Lauer  
Comment: 100 ms sweep



Date: 19.JUN.2007 10:59:29



1250 Peterson Dr., Wheeling, IL 60090

Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

## APPENDIX A

# GRAPH(S) TAKEN OF THE 20 dB EMISSION BANDWIDTH



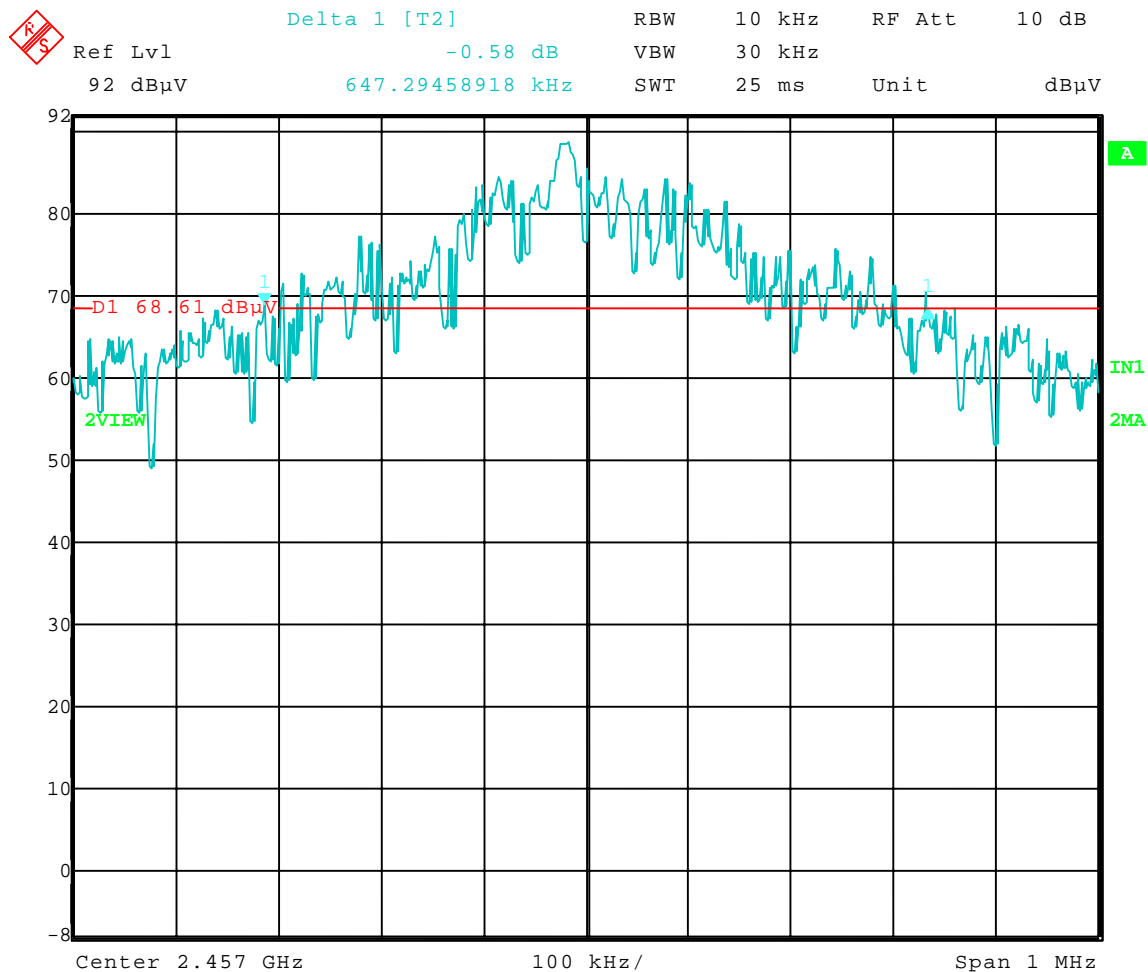
Company: Saris Cycling Group Inc.  
Model Tested: PowerBeam, Pro 300PT & PowerTap SL2.4  
Report Number: 13338

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 06-19-2007  
Company: Saris Cycling Group  
EUT: PowerTap SL2.4 Hub Transmitter  
Test: 20 dB Bandwidth (FCC Part 15.249) To Show in Band Operation  
Operator: Jason Lauer  
Comment: Frequency – 2.457 GHz

**20 dB Bandwidth = 647.30 kHz**



Date: 19.JUN.2007 12:02:55