



Engineering and Testing for EMC and Safety Compliance

## FCC TYPE CERTIFICATION REPORT

For

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**MODEL: Cambiatta CM1**

**FCC ID: S84-CM1**

***May 3, 2005***

Standards Referenced for This Report	
American National Standard Institute	ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
FCC Rules Part 2: 2004	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
FCC Rules Part 15: 2004	§15.209: Radiated Emissions Limits

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
.125	N/A	N/A	N/A

**REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS**

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## 1 GENERAL INFORMATION

The following certification report is prepared on behalf of **Cambiatta** in accordance with the Federal Communications Commission Rules and Regulations. The Equipment Under Test (EUT) is the **Cambiatta CM1** and falls under FCC classification DCD, Part 15 Low Power Transmitter Below 1705 kHz. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, Part 15, and ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

Please note that portions of the EUT are subject to Part 15 DoC testing. A DoC report is on file for this product.

### 1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

### 1.2 PRODUCT DESCRIPTION

The Cambiatta CM1 is a bicycling performance monitoring system that collects and stores wheel speed, pedal cadence, and the cyclist's heart rate. It can then be downloaded to a compatible PC for analysis. The system is battery operated and has an effective range of <1.4 meters.

## 2 CONFORMANCE STATEMENT

Standards Referenced for This Report	
American National Standard Institute:	ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
FCC Rules Part 2: 2004	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
FCC Rules Part 15: 2004	§15.209: Radiated Emissions Limits

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
.125	N/A	N/A	N/A

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

Furthermore, there was no deviation from, additions to or exclusions from the above standards for Certification methodology.

Signature: 

Date: May 3, 2005

Typed/Printed Name: Desmond Fraser

Position: President

Signature: 

Date: May 3, 2005

Typed/Printed Name: Daniel W. Biggs

Position: Test Engineer

### 3 TESTED SYSTEM DETAILS

The EUT test sample was received on April 20, 2005. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

The Cambiatta CM1 system consists of a 125 kHz wireless wheel and/or cadence transmitter, and a data logger receiver. The EUT is battery operated and has a transmit/receive range of <1.4 meters. The receiver has a USB cable for interfacing with a PC for processing data collected by the system.

Transmitter operating frequency: 125 kHz

**TABLE 3-1: EQUIPMENT UNDER TEST (EUT)**

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Cadence Transmitter Unit	Cambiatta	CM1	N/A	S84-CM1	16627
Data Logger	Cambiatta	CM1	N/A	N/A	16628

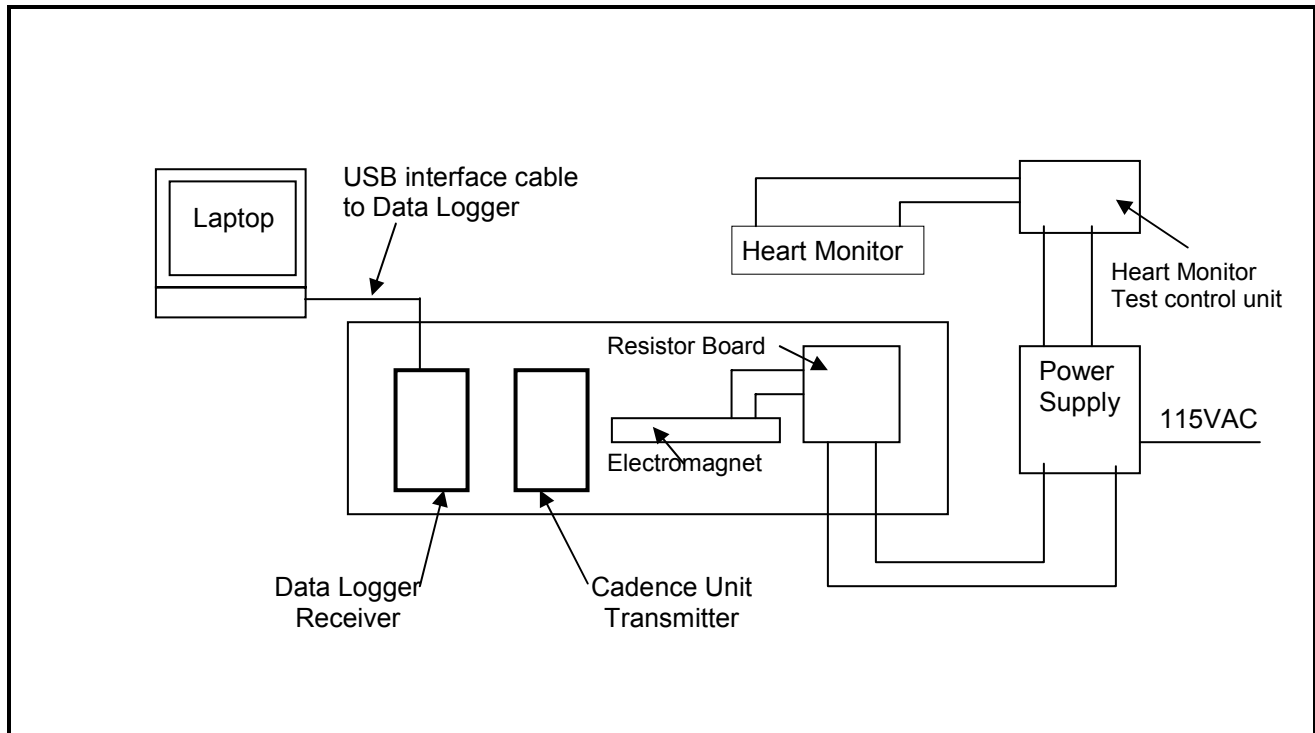
**TABLE 3-2: SUPPORT EQUIPMENT**

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Test Control Unit	Cambiatta	N/A	N/A	N/A	16629
Heart Monitor	CycleOps	N/A	N/A	N/A	16630
Electromagnet and Board	Cambiatta	N/A	N/A	N/A	16633
Notebook Computer	N/A	N/A	N/A	N/A	N/A
USB Interface Cable	N/A	N/A	N/A	N/A	16626
Power Supply	Kikusui	PAB 18-3A	N/A	N/A	16634

#### 3.1 EXERCISING THE EUT

The manufacturer provided a test jig that simulated normal operating functions. An electromagnet was used for a cadence simulator and a heart monitor strap was used to simulate heart beat. The receiver was placed in range to receive the data sent by the cadence unit and the heart monitor, and was connected to a laptop PC. See Figure 3-1 for the test system diagram.

**FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM**



## **4 FCC RULES AND REGULATIONS §15.209 RADIATED EMISSIONS**

### **4.1 TEST METHODOLOGY FOR RADIATED EMISSIONS MEASUREMENTS**

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter, in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the ten-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to above 1000 MHz using a spectrum analyzer, a quasi-peak adapter, and EMCO log periodic and biconical antenna.

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

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



## 4.2 RADIATED EMISSIONS DATA

This location allowed the spurious and fundamental radiated testing to be performed 10 meters away from the EUT with 360° of antenna wire connected to the EUT.

Note: Peak readings, average limits. Measurements were taken with antenna in horizontal polarity, as this was determined to be the worst-case emissions. Measurements were taken at 10 meters and corrected to 300 meters. These measurements were corrected to 300 meters by the following:  $40 \log (300/10) = 59.1$ .

Sample calculation:

Corrected SA Peak Level to 300m (dBuV/m) = SA reading (dBuV) + SCF (dB/m)  
Correction from 10m to 300m (dB)

For example, at 125.12 kHz:

Corrected SA Peak Level to 300m (dBuV/m) = 26.35(dBuV) + 19.2(dB/m) – 59.1(dB) = **-13.55 dBuV/m**

**TABLE 4-1: SPURIOUS AND FUNDAMENTAL EMISSIONS TEST DATA**

Frequency (kHz)	Spectrum Analyzer Peak (dBuV)	Site Correction Factor (dB/m)	Corrected Spectrum Analyzer Peak Level to 10m (dBuV/m)	Correction from 10m to 300m (dB)	Corrected Spectrum Analyzer Peak Level to 300m (dBuV/m)	Limit (dBuV/m) at 300m	Margin (dB)
125.12 <sup>1</sup>	26.35	19.2	45.55	59.1	-13.55	25.66	-39.21
250.25	10.50	19.2	29.70	59.1	-29.40	19.64	-49.04
375.36	9.85	19.5	29.35	59.1	-29.75	16.12	-45.86

FUNDAMENTAL

Frequency (kHz)	Spectrum Analyzer Peak (dBuV)	Site Correction Factor (dB/m)	Corrected Spectrum Analyzer Peak Level to 10m (dBuV/m)	Correction from 10m to 30m (dB)	Corrected Spectrum Analyzer Peak Level to 30m (dBuV/m)	Limit (dBuV/m) at 30m	Margin (dB)
500.48	8.75	19.5	28.25	19.1	9.15	33.62	-24.47
625.60	7.50	19.5	27.00	19.1	7.90	31.68	-23.78
750.72	7.45	19.6	27.05	19.1	7.95	30.09	-22.14

**TABLE 4-2: TEST EQUIPMENT FOR RADIATED EMISSIONS**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	09/20/05
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridge Guide Antenna (1 - 18 GHz)	2310	02/17/06
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	N/A
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05
900889	Hewlett Packard	85685A	RF Preselector for HP 8566B or 8568B (20 Hz - 2 GHz)	3146A01309	04/05/06
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz - 30 MHz)	827525/019	08/25/06

**TEST PERSONNEL**

Daniel Biggs		April 22, 2005
Test Technician/Engineer	Signature	Date Of Test

## 5 CONCLUSION

The data in this measurement report shows that the **Cambiatta** Model **Cambiatta CM1**, complies with the applicable requirements of Part 2 and Part 15 of the FCC Rules.