



ETL SEMKO

**FCC Part 15 Subparts B & C Report
(FCC § 15.109, § 15.249)
for
BodyMedia, Inc.
on the
SenseWear BioTransceiver in Tanita HD351 Weight Scale
Model: BMSWBTWS**

Test Report #: 3064701

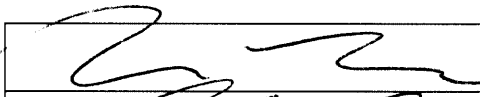
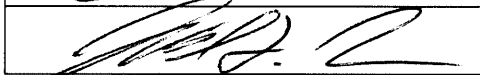
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Project #: 3064701

Date of Test: October 5-7, 14, 2004

Report Date: October 14, 2004

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	Nicholas Abbondante, Test Engineer
	Michael F. Murphy, Staff Engineer, EMC

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70 Codman Hill Road Boxborough MA 01719

BodyMedia, Inc.
Model: BMSWBTWS

Date of Test: October 5-7, 14, 2004

1.0 Summary of Tests

Model: BMSWBTWS
Serial Number: 540514

FCC RULE	DESCRIPTION OF TEST	REPORT PAGE
FCC § 15.207, § 15.107	Line-Conducted Emissions	13
FCC § 15.209, § 15.109 FCC § 15.249	Radiated Emissions	8

BodyMedia, Inc.
Model: BMSWBWTS

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2.0 General Description

2.1 Product Description

The SenseWear BioTransceiver is a transceiver that operates in the 902-928 MHz band. It communicates with another transceiver attached to a computer to relay physiological data for recording on the computer. The SenseWear BioTransceiver has been installed into a Tanita HD351 Weight Scale. The EUT antenna is not user accessible.

The EUT has been tested at the request of

Company Name: BodyMedia, Inc.
4 Smithfield Street, Suite 1200
Pittsburgh, PA 15222
Contact: Maria Fattore-Gill
Telephone: 412.288.9901 **Fax:** 412.288.9902

In summary, this report confirms that the EUT is compliant with the FCC Part 15, Subpart B, and FCC Part 15, Subpart C, § 15.249 requirements when production units conform to the initial sample. Please address all questions and comments concerning this report to Nicholas Abbondante, Compliance Engineer.

2.2 Test Facility

Site 2C (Middle Site) is a 3m and 10m sheltered EMI measurement range located in a light commercial environment in Boxborough, Massachusetts. It meets the technical requirements of ANSI C63.4-1992 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets of metal are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

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2.3 Test Equipment and Support Equipment

The following equipment was used to make measurements for emissions testing:

Description	Manufacturer	Model	Serial #	Cal Due
ANTENNA	EMCO	3142	9711-1224	02/02/2005
HORN ANTENNA	EMCO	3115	9512-4632	10/24/2004
PREAMPLIFIER 1-40GHz	MITEQ	NSP4000-NF	507145	10/22/2004
Hi-Frequency Cable 40Ghz	Megaphase	TM40 K1K1 80	CBL030	11/11/2004
Hi-Frequency Cable 40Ghz	Megaphase	TM40 K1K1 197	CBL028	11/11/2004
Spectrum Analyzer	Hewlett Packard	8591EM	3639A00943	07/07/2005

Cables:

QTY	Description	Shield Description	Hood Description	Length (m)
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There were no cables associated with the device.

Support Equipment:

Description	Manufacturer	Model	Serial #
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No support equipment was present during testing.

2.4 General Test Setup

Description of how the EUT was exercised during test

The transmitter was programmed to operate continuously when powered. During testing the EUT was activated from fresh batteries to enable normal functionality and continuous transmission.

Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (1992).

For maximizing emissions, the system was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported.

The transmitter was configured for testing in a typical fashion (as a customer would normally use it). The device was mounted to a cardboard box, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

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Date of Test: October 5-7, 14, 2004

3.0 Radiated Emissions

FCC § 15.109, FCC § 15.209, FCC § 15.249

3.1 Test Procedure

Radiated emissions from the complete system under test are measured on an open field test site, calibrated under ANSI C63.4. The EUT is rotated around its vertical axis and the measurement antenna height is varied from 1 to 4 meters above the reference ground plane in order to find the direction of the maximum emission at each relevant frequency. The EUT is investigated in three orthogonal axes by mounting it on a cardboard box if the EUT geometry precludes such manipulation. The frequency range investigated is from 30 MHz to the tenth harmonic of the fundamental frequency. A quasi-peak detector was used below 1 GHz, and an average detector was used above 1 GHz. A plot shows the fundamental meets the requirement to stay in band.

Requirement: The FCC states that the fundamental field strength must not exceed 50,000 uV/m (94 dBuV/m) between 902-928 MHz. The fundamental must be within the 902-928 MHz band. Harmonics must not exceed 500 uV/m (54 dBuV/m). Emissions measured using an average detector must also meet limits 20 dB higher than specified when measured using a peak detector. Spurious emissions must be attenuated by 50 dB below the fundamental or must not exceed the general limits of FCC § 15.209 shown in the table below. Limits are specified as measured at a distance of 3 meters from the EUT. Receiver spurious emissions (Non-fundamental and non-harmonic emissions) must not exceed the limits of FCC § 15.109 which are identical to the FCC § 15.209 limits.

Frequency Range (MHz)	Field Strength (dBµV/m)	Measurement Distance (m)
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

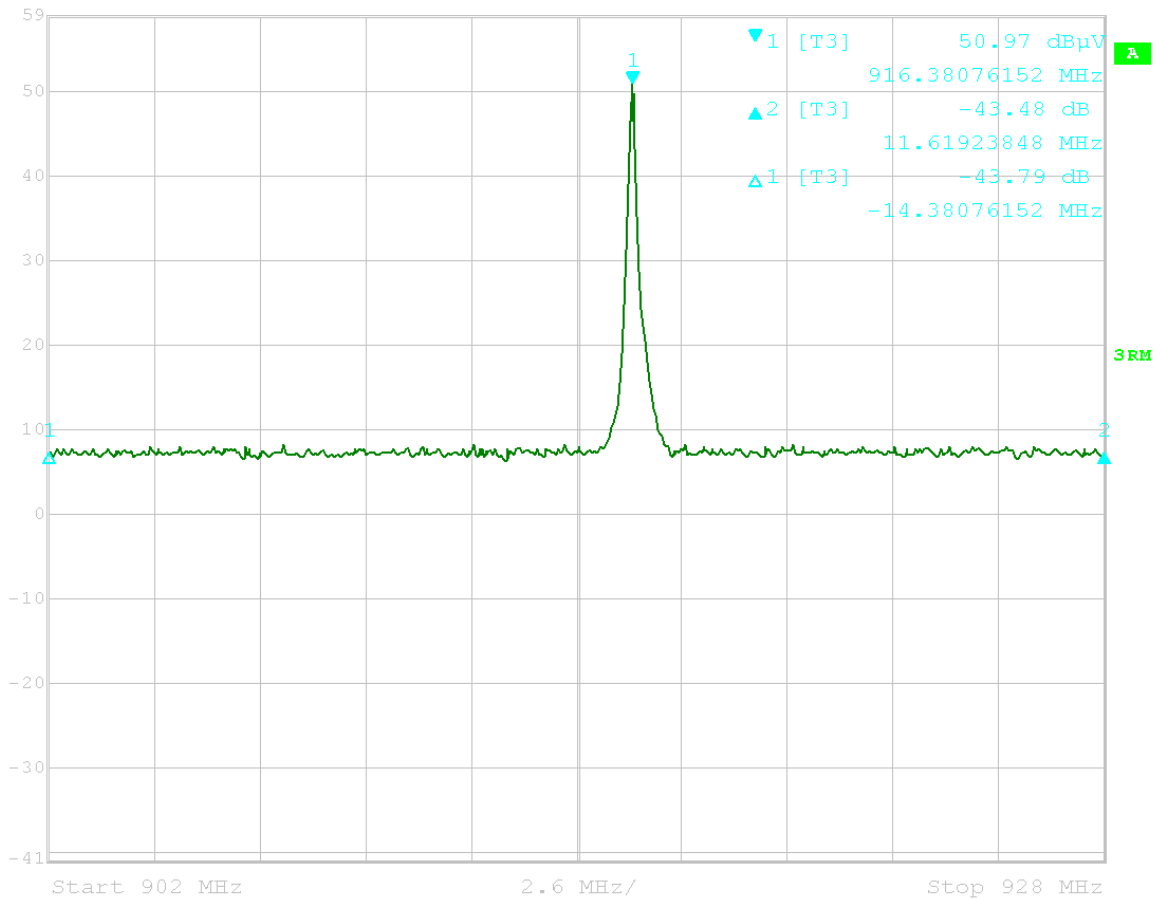
BodyMedia, Inc.
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3.2 Test Results



Ref Lvl	Delta 2 [T3]	RBW	100 kHz	RF Att	0 dB
59 dBμV	-43.48 dB	VBW	300 kHz		
	11.61923848 MHz	SWT	500 ms	Unit	dBμV



Date: 14.OCT.2004 09:52:21

BodyMedia, Inc.
Model: BMSWBWTS

Date of Test: October 5-7, 14, 2004

Radiated Emissions / Interference

Company: BodyMedia Model #: BMSWBWTS
Engineer: Nicholas Abbondante Location: Site 2 Serial #: 540514
Project #: 3064701 Pressure: 1018 mB Receiver: R&S FSEK-30
Date: 10/07/04 Temp: 19c Antenna: HORN1 10-24-04 V3.ant HORN1 10-24-04 H3.ant
Standard: FCC Part 15/Cispr22 Humidity: 56% PreAmp: PRE8 10-22-04.amp
Class: B Group: None Cable(s): CBL028 11-11-2004.cbl CBL030 11-11-2004.cbl
Limit Distance: 3 meters Test Distance: 3 meters
Voltage/Frequency: Battery Frequency Range: 30 MHz - 10 GHz
LOG3 antenna and Site 2. 3M Floor cable used below 1 GHz

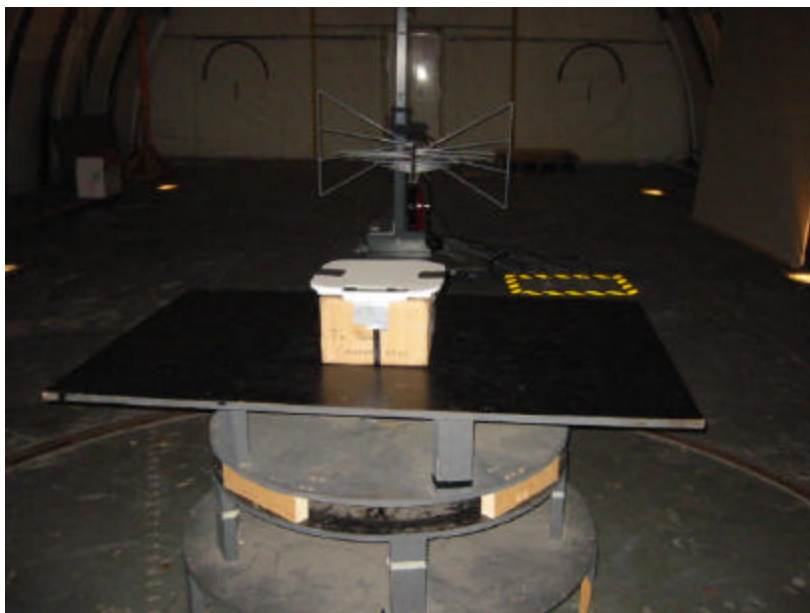
	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
Peak	H	916.337	63.1	23.7	4.4	0.0	0.0	91.2	94.0	-2.8 *
AVG	V	1832.700	32.3	28.5	3.6	19.5	0.0	45.0	74.0	-29.0
Peak	V	1832.700	28.3	28.5	3.6	19.5	0.0	41.0	54.0	-13.0
Peak	V	2749.300	39.1	31.4	4.5	19.7	0.0	55.3	74.0	-18.6
AVG	V	2749.300	31.7	31.4	4.5	19.7	0.0	47.9	54.0	-6.0
Peak	V	3665.600	26.6	34.0	5.4	20.0	0.0	46.0	74.0	-28.0
AVG	V	3665.600	23.0	34.0	5.4	20.0	0.0	42.4	54.0	-11.6
Peak	V	4581.800	24.2	35.2	6.8	20.6	0.0	45.6	74.0	-28.4
AVG	V	4581.800	20.3	35.2	6.8	20.6	0.0	41.7	54.0	-12.2
Peak	V	5499.500	24.7	36.5	6.8	21.0	0.0	46.9	74.0	-27.0
AVG	V	5499.500	21.5	36.5	6.8	21.0	0.0	43.7	54.0	-10.2
Peak	V	6414.600	24.8	37.0	7.4	20.8	0.0	48.5	74.0	-25.5
AVG	V	6414.600	21.5	37.0	7.4	20.8	0.0	45.2	54.0	-8.8
Peak	V	7331.000	24.5	38.0	8.1	19.8	0.0	50.8	74.0	-23.2
AVG	V	7331.000	21.9	38.0	8.1	19.8	0.0	48.2	54.0	-5.8
Peak	V	8247.300	24.7	38.9	8.6	18.8	0.0	53.5	74.0	-20.5
AVG	V	8247.300	21.9	38.9	8.6	18.8	0.0	50.7	54.0	-3.3 *
Peak	V	9163.800	23.1	39.5	9.2	18.1	0.0	53.8	74.0	-20.2
AVG	V	9163.800	20.2	39.5	9.2	18.1	0.0	50.9	54.0	-3.1 *

* - Note that this emission falls within our range of measurement uncertainty, which is +/- 4dB.

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3.3 Configuration Photographs - Radiated Emissions



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3.4 Sample Calculation - Radiated Emissions

The following is how net radiated field strength readings were determined:

$$NF = RF + AF + CF - PF - AVF - DF$$

Where,

NF = Net Reading in dB μ V/m

RF = Reading from receiver in dB μ V

AF = Antenna Correction Factor in dB(1/m)

CF = Cable Correction Factor in dB

PF = Pre-Amplifier Correction Factor in dB

AVF = Duty Cycle Correction Factor in dB (only if applicable)

DF = Distance Factor in dB (using 20 dB/decade unless otherwise specified)

To convert from dB μ V/m to μ V/m or mV/m the following was used:

$$UF = 10^{(NF / 20)}$$

Where,

UF = Net Reading in μ V/m

Example:

$$NF = RF + AF + CF - PF - AVF - DF = 62.9 + 13.7 + 2.1 - 16.1 - 0.0 - 10.5 = 52.1 \text{ dB}\mu\text{V/m}$$

$$UF = 10^{(52.1 \text{ dB}\mu\text{V} / 20)} = 403 \mu\text{V/m}$$

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4.0 Line-Conducted Emissions

FCC § 15.107, § 15.207

4.1 Test Procedure

Conducted emissions are measured in the frequency range of 150 kHz to 30 MHz on AC power lines. Floor-standing equipment is placed on a conductive ground plane. Interference voltages are measured with a LISN connected to a spectrum analyzer or receiver. Tabletop equipment is placed 40 cm from a vertical ground plane on a non-conductive table with a height of 80 cm above the horizontal ground plane.

Requirement: The AC line-conducted emissions must not exceed the FCC §15.207 and §15.107 limits, which correspond to the Class B limits shown in the table below.

FCC Limits for Mains Ports Conducted Disturbances

Frequency band MHz	Class A Limit (dBµV)		Class B Limit (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	79	66	66 to 56*	56 to 46*
0.50-5.00	73	60	56	46
5.00-30.00	73	60	60	50

* The limit decreases linearly with the logarithm of the frequency in the range of 0.15 MHz to 0.50 MHz.

Note: The lower limit shall apply at the transition frequency

4.2 Test Results

The EUT is battery powered and therefore line-conducted emissions testing was not performed.

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4.3 Configuration Photographs – Line-Conducted Emissions

Not Available – EUT was battery powered and the test was not performed