

EMISSION TEST REPORT

Report Number: 3064675_EMC

Project Number: 3064675

Testing performed on the:

SenseWear Wireless Gateway

Model: BMSWWGPOTS

To:

Basic Standards from FCC Part 15 Subpart C, Section 249

and

FCC Part 15 Subpart B, Class B

For:

BodyMedia

Test Performed by:
Intertek – ETL SEMKO
70 Codman Hill Road
Boxborough, MA 01719

Test Authorized by:
BodyMedia
4 Smithfield Street
Suite 1200
Pittsburgh, PA 15222

Prepared by: _____
Vathana F. Ven, Sr. Project Engineer

Date: _____

Reviewed by: _____
Michael F. Murphy, EMC Staff Engineer

Date: _____

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1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company: BodyMedia
4 Smithfield Street
Suite 1200
Pittsburgh, PA 15222
Contact: Maria Fattore-Gill
Telephone: (412) 288-9901
Fax: (412) 288-9902
Email: maria@bodymedia.com

1.2 Equipment Under Test

Equipment Type: SenseWear Wireless Gateway
Model Number(s): BMSWWGPOTS
Serial number(s): Prototype
Manufacturer: BodyMedia
EUT receive date: October 5, 2004
EUT received condition: Good
Test start date: October 5, 2004
Test end date: October 6, 2004

1.3 Test Plan Reference: ANSI 63.4C

1.4 Test Configuration

1.4.1. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
RJ-11C	None	Plastic	3	2
AC cable	None	Plastic	1.5	1

1.4.2. Support Equipment:

Name: Cui Stack ac adapter
Model No.: DV-3400
Serial No.: Not labeled

Name: Hon-Kwang Class 2 Transformer
Model No.: D9300
Serial No.: Not labeled

Name: Zoom Technologies Modem
Model No.: 2838
Serial No.: 3286ZM4X0235

Name: Teltone Line Simulator
Model No.: TLS-5
Serial No.: 28110

Name: IBM ac adapter
Model No.: 85G6695
Serial No.: H2803000208T

Name: IBM Laptop
Model No.: 365X
Serial No.: 78-Z0613 96/11

1.5 Mode(s) of Operation:

The device was wired to transmit continuously for the entire FCC Part 15, Subpart C testing. It was also configured to have its modem transmitted data continuously for the FCC Part 15, Subpart B testing.

1.5a EUT Cycle Time: Continuously on.

2.0 Test Summary

TEST STANDARD	RESULTS	
Basic Standards from FCC Part 15 Subpart C, Section 249 & FCC Part 15 Subpart B (Class B limits)		
SUB-TEST	TEST PARAMETER	COMMENT
FCC Part 15 Subpart C, Section 249, Emissions	Emissions below specified limits	Pass
FCC Part 15 Subpart B Emissions	Class B Emissions below specified limits	Pass

3.0 Test Results: Pass

3.1 Test Standard: Basic Standards from FCC Part 15 Subpart C, Section 249

3.2 Test: Radiated emissions

3.3 Performance Criterion: Readings below specified limits.

3.4 Test Environment:

Temp: 20°C

Humidity: 47%

Pressure: 1009 mbar

3.5 Maximum Test Disturbance Parameters: Readings below specified limits.

Test Date: October 5, 2004
Test Engineer: Vathana F. Ven

Test Engineer Initials:
Reviewer Initials:

Date:
Date:

3.6 Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
LOG2	EMCO	3142	9711-1223	11/20/2004
S1 3M FLR	ITS	RG214B/U	S1 3M FLR	09/15/2005
BAR1	Mannix	0ABA116	BAR1	07/26/2005
CBL027	Megaphase	TM40 K1K1 197	CBL027	11/11/2004
CBL029	Megaphase	TM40 K1K1 80	CBL029	11/11/2004
HORN1	EMCO	3115	9512-4632	10/24/2004
ROS001	Rohde & Schwarz	FSEK-30	100225	06/04/2005
N/A	Hewlett Packard	8546 HP	213109	04/12/05

3.7 Test Results:

Radiated Emissions / Interference

Company: BodyMedia Model #: BMSWWGPOTS
 Engineer: Vathana F. Ven Location: Site 1C Serial #: Prototype
 Project #: 3064675 Pressure: 1009 mb Receiver: HP 8542E
 Date: 10/05/04 Temp: 20c Antenna: LOG2 11-20-04 V3.ant LOG2 11-20-04 H3.ant
 Standard: FCC Part 15 Subpart C Humidity: 47% PreAmp: None
 Section: 15.249 Group: None Cable(s): Site2, 3M Floor 9-15-05.cbl None
 Limit Distance: 3 meters Test Distance: 3 meters
 Voltage/Frequency: 120 Vac/60 Hz Frequency Range: 30-1000 MHz

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
V	172.000	20.0	8.7	1.6	0.0	0.0	30.3	43.5	-13.2
H	229.375	20.0	11.7	1.9	0.0	0.0	33.6	46.0	-12.4
H	245.775	21.4	12.3	2.0	0.0	0.0	35.7	46.0	-10.3
H	261.130	21.8	12.8	2.1	0.0	0.0	36.7	46.0	-9.3
H	278.530	23.7	13.4	2.1	0.0	0.0	39.3	46.0	-6.7
V	327.690	25.2	14.8	2.3	0.0	0.0	42.3	46.0	-3.7
V	344.083	25.3	15.2	2.4	0.0	0.0	42.9	46.0	-3.1
V	376.850	26.4	15.5	2.5	0.0	0.0	44.5	46.0	-1.5
V	417.810	22.6	16.3	2.7	0.0	0.0	41.6	46.0	-4.4
V	442.400	22.5	17.3	2.8	0.0	0.0	42.6	46.0	-3.4
V	475.200	22.3	18.2	2.9	0.0	0.0	43.4	46.0	-2.6
V	532.500	20.1	19.6	3.0	0.0	0.0	42.8	46.0	-3.2
V	827.400	14.0	22.0	4.1	0.0	0.0	40.0	46.0	-6.0

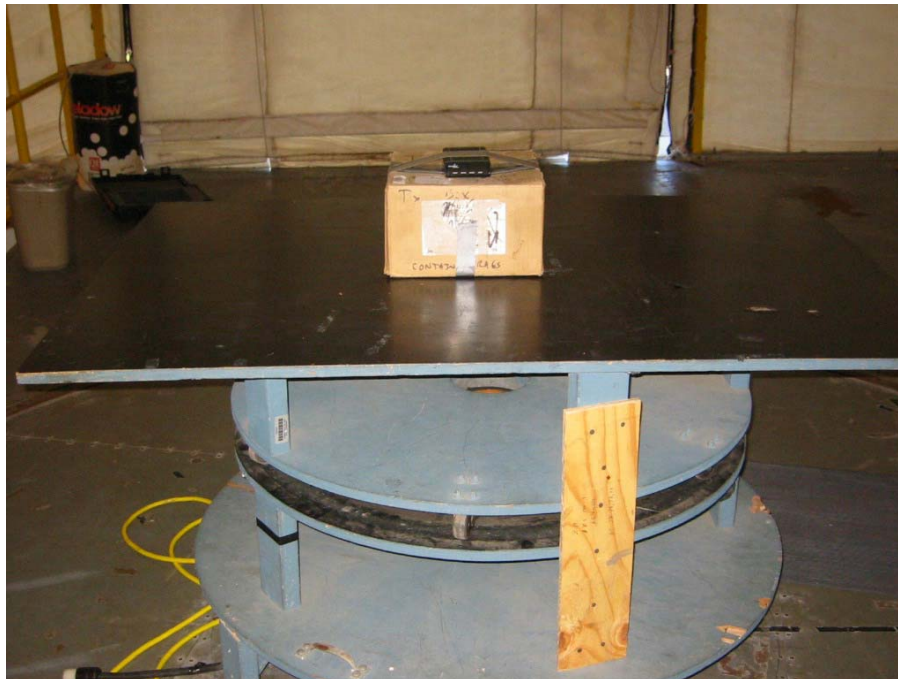
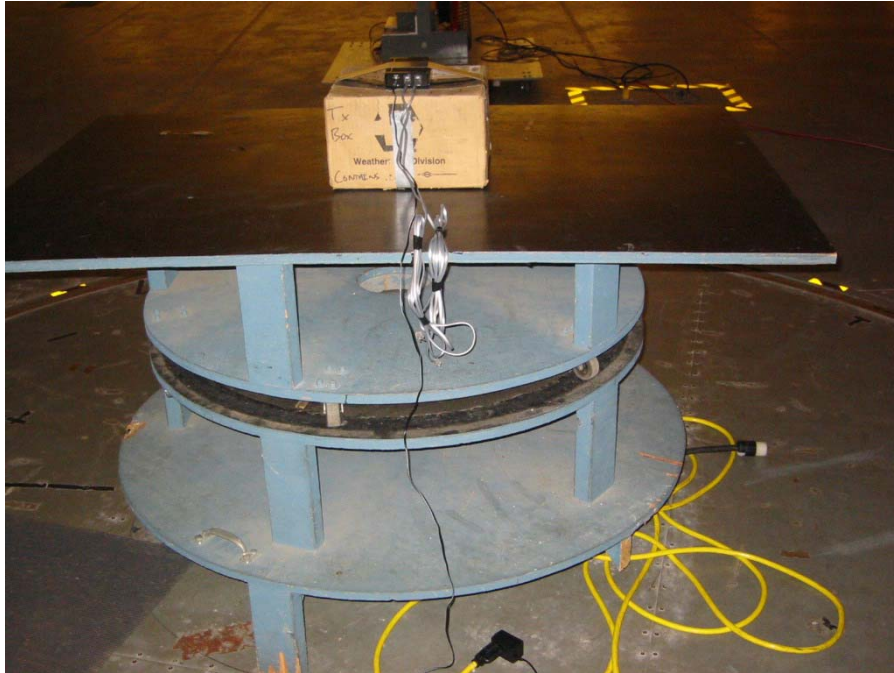
Radiated Emissions / Interference

Company: BodyMedia Model #: BMSWWGPOTS
 Engineer: Vathana F. Ven Location: Site 1C Serial #: Prototype
 Project #: 3064675 Pressure: 1009 mb Receiver: HP 8542E & ROS001
 Date: 10/05/04 Temp: 20c Antenna: LOG2 HORN1
 Standard: FCC Part 15 Subpart C Humidity: 47% PreAmp: None
 Section: 15.249 Group: None Cable(s): Site2, 3M Floor 9-15-05.cbl CBL027 & 029
 Limit Distance: 3 meters Test Distance: 3 meters
 Voltage/Frequency: 120 Vac/60 Hz Frequency Range: 916.6 MHz & 1 - 10 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
V	916.618	63.0	23.9	4.4	0.0	0.0	91.2	94.0	-2.8
H	1007.540	15.2	25.1	4.5	0.0	0.0	44.8	54.0	-9.2
V	1040.440	14.9	23.9	4.7	0.0	0.0	43.5	54.0	-10.5

PRE8 was used above 6 GHz.

FCC Part 15 Subpart C Radiated emissions setup photos



4.0 Test Results: Pass

4.1 Test Standard: Basic Standards from FCC Part 15 Subpart B, Section 249

4.2 Test: Line conducted emissions

4.3 Performance Criterion: Class B

4.4 Test Environment:

Temp: 20°C

Humidity: 51%

Pressure: 1018 mbar

4.5 Maximum Test Disturbance Parameters: Readings below specified limits.

Test Date: October 5, 2004
Test Engineer: Vathana F. Ven

Test Engineer Initials: Date:
Reviewer Initials: Date:

4.6 Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
N/A	Hewlett Packard	8546 HP	213109	04/12/05
CBLBNC1	ITS	BNC-30	CBLBNC1	01/20/05
LISN10	Solar Electronics	9252-50-R-24-BNC	941712	06/06/05
DS22	Mini Circuits	20dB, 50 ohm	DS22	01/20/05

4.7 Test Results:

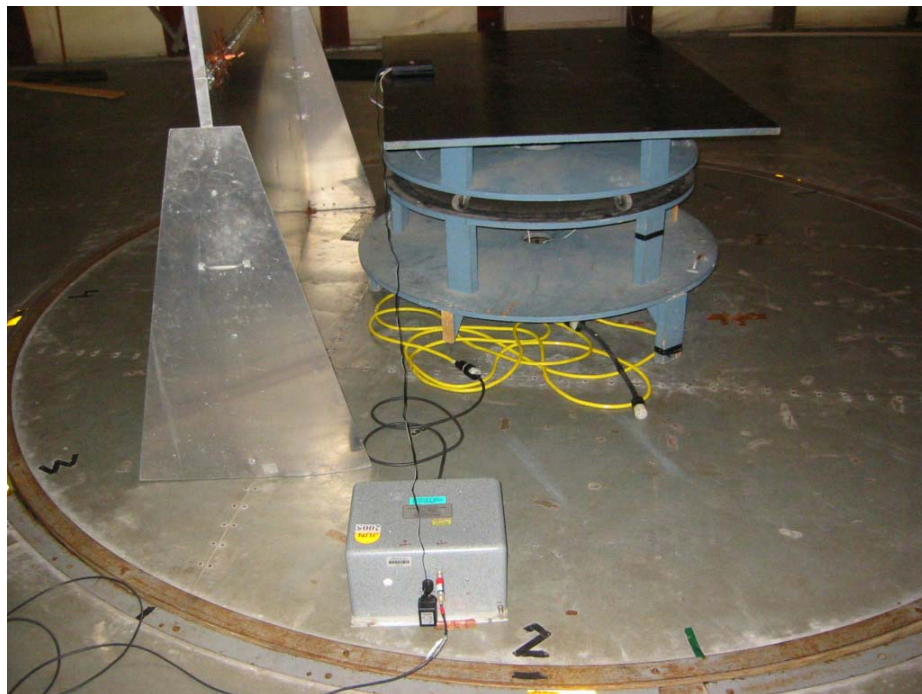
Conducted Emissions / Interference

Company: BodyMedia
 Engineer: Vathana F. Ven
 Project #: 3064675
 Date: 10/05/04
 Standard: FCC Part 15 Subpart C
 Section: 15.249
 Preamp: None
 Voltage/Frequency: 120 Vac/60 Hz
 Location: Site 1C
 Pressure: 1018mb
 Temp: 20C
 Humidity: 51%
 Group: None
 Model #: BMSWWGPOTS
 Serial #: Prototype
 Receiver: HP 8542E
 Cable: CBLBNC1 1-20-05.cbl
 LISN 1, 2: LISN10 [1] 6-06-05.lsn LISN10 [2] 6-06-05.lsn
 LISN 3, N: None
 Attenuator: DS22 1-20-05.att
 Frequency Range: 0.150-30 MHz
 Net is the sum of worst-case lsn, cable, & attenuator losses, preamp gain, and initial reading

Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Neutral dB(uV)	Quasi-Peak		
					Net dB(uV)	Limit dB(uV)	Margin dB
0.150	10.7	N/A	N/A	11.9	33.4	66.0	-32.6
0.155	10.6	N/A	N/A	11.0	33.3	65.7	-32.4
0.190	7.2	N/A	N/A	7.5	29.8	64.0	-34.2
14.300	-2.4	N/A	N/A	-6.4	21.2	60.0	-38.8
16.610	-2.0	N/A	N/A	-3.2	21.3	60.0	-38.7
19.000	3.1	N/A	N/A	4.6	25.7	60.0	-34.3

Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Neutral dB(uV)	Average		
					Net dB(uV)	Limit dB(uV)	Margin dB
0.150	-1.9	N/A	N/A	-2.0	22.7	56.0	-33.3
0.155	-0.1	N/A	N/A	-0.1	22.7	55.7	-33.0
0.190	-9.6	N/A	N/A	-10.1	22.6	54.0	-31.4
14.300	-8.7	N/A	N/A	-12.6	21.2	50.0	-28.8
16.610	-4.4	N/A	N/A	-7.3	21.3	50.0	-28.7
19.000	0.7	N/A	N/A	2.0	23.1	50.0	-26.9

FCC Part 15 Subpart C Line conducted emissions setup photos



5.0 Test Results: Pass

5.1 Test Standard: Basic Standards from FCC Part 15 Subpart B

5.2 Test: Radiated emissions

5.3 Performance Criterion: Class B

5.4 Test Environment:

Temp: 20°C

Humidity: 47%

Pressure: 1009 mbar

5.5 Maximum Test Disturbance Parameters: Readings below specified limits.

Test Date: October 6, 2004
Test Engineer: Vathana F. Ven

Test Engineer Initials:
Reviewer Initials:

Date:
Date:

5.6 Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
LOG2	EMCO	3142	9711-1223	11/20/2004
S1 3M FLR	ITS	RG214B/U	S1 3M FLR	09/15/2005
BAR1	Mannix	0ABA116	BAR1	07/26/2005
CBL027	Megaphase	TM40 K1K1 197	CBL027	11/11/2004
CBL029	Megaphase	TM40 K1K1 80	CBL029	11/11/2004
HORN1	EMCO	3115	9512-4632	10/24/2004
ROS001	Rohde & Schwarz	FSEK-30	100225	06/04/2005
N/A	Hewlett Packard	8546 HP	213109	04/12/05

5.7 Test Results:

Radiated Emissions / Interference

Company: BodyMedia
 Engineer: Vathana F. Ven
 Project #: 3064675
 Date: 10/06/04
 Standard: FCC Part 15 Subpart B
 Class: B
 Limit Distance: 3
 Voltage/Frequency: 120 Vac/60 Hz

Location: Site 1C
 Pressure: 1009 mb
 Temp: 20c
 Humidity: 47%
 Group: None
 meters
 meters

Model #: BMSWWGPOTS
 Serial #: Prototype
 Receiver: HP 8542E & ROS001
 Antenna: LOG2
 PreAmp: PRE8
 Cable(s): Site2, 3M Floor 9-15-05.cbl
 HORN1
 CBL027&0CBL029
 Test Distance: 3
 Frequency Range: 30-1000 MHz

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
V	172.000	19.8	8.7	1.6	0.0	0.0	30.1	43.5	-13.4
H	229.375	19.2	11.7	1.9	0.0	0.0	32.8	46.0	-13.2
H	245.775	20.3	12.3	2.0	0.0	0.0	34.6	46.0	-11.4
H	262.162	22.7	12.8	2.1	0.0	0.0	37.6	46.0	-8.4
H	278.530	25.6	13.4	2.1	0.0	0.0	41.1	46.0	-4.9
H	327.690	25.2	15.3	2.3	0.0	0.0	42.8	46.0	-3.2
H	344.083	27.9	15.7	2.4	0.0	0.0	46.0	46.0	+0.0
H	376.850	27.3	16.2	2.5	0.0	0.0	46.0	46.0	+0.0
H	417.810	24.8	16.8	2.7	0.0	0.0	44.3	46.0	-1.7
H	442.400	24.4	17.4	2.8	0.0	0.0	44.6	46.0	-1.4
H	475.200	22.4	18.0	2.9	0.0	0.0	43.3	46.0	-2.7
V	532.500	20.1	19.6	3.0	0.0	0.0	42.8	46.0	-3.2
V	827.400	14.0	22.0	4.1	0.0	0.0	40.0	46.0	-6.0
H	1007.540	15.2	25.1	4.5	0.0	0.0	44.8	54.0	-9.2
V	1040.440	14.9	23.9	4.7	0.0	0.0	43.5	54.0	-10.5

FCC Part 15 Subpart B Radiated emissions setup photos



6.0 Test Results: Pass

EMC Report for BodyMedia on the Model: BMSWWGPOTS
Report Number 3064675_EMC

6.1 Test Standard: Basic Standards from FCC Part 15 Subpart B

6.2 Test: Line conducted emissions

6.3 Performance Criterion: Class B

6.4 Test Environment:

Temp: 20°C

Humidity: 51%

Pressure: 1018 mbar

6.5 Maximum Test Disturbance Parameters: Readings below specified limits.

Test Date: October 5, 2004

Test Engineer Initials:

Date:

Test Engineer: Vathana F. Ven

Reviewer Initials:

Date:

6.6 Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
N/A	Hewlett Packard	8546 HP	213109	04/12/05
CBLBNC1	ITS	BNC-30	CBLBNC1	01/20/05
LISN10	Solar Electronics	9252-50-R-24-BNC	941712	06/06/05
DS22	Mini Circuits	20dB, 50 ohm	DS22	01/20/05

6.7 Test Results:

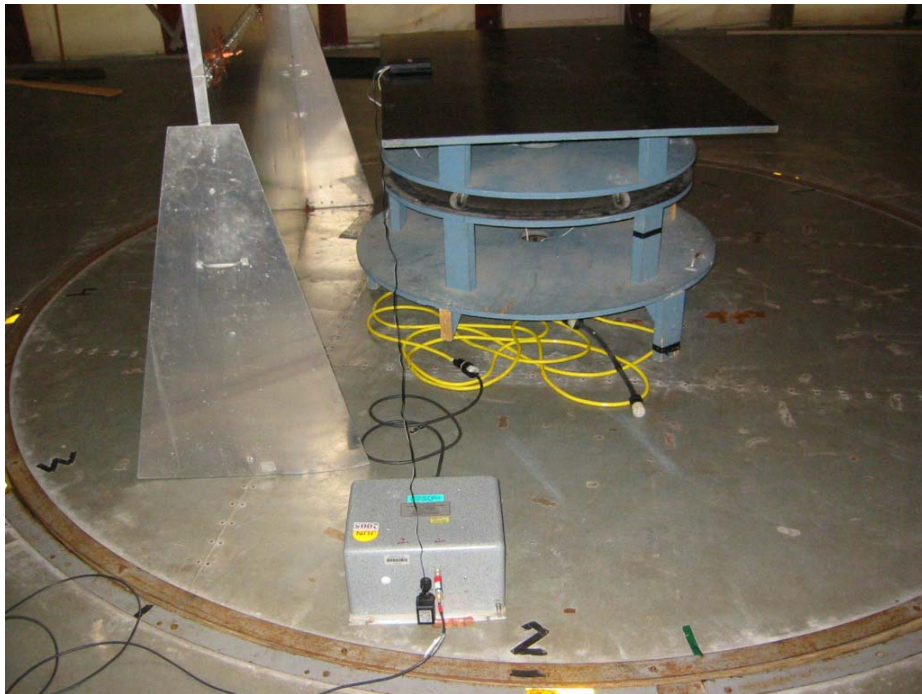
Conducted Emissions / Interference

Company: BodyMedia Model #: BMSWWGPOTS
 Engineer: Vathana F. Ven Location: Site 1C Serial #: Prototype
 Project #: 3064675 Pressure: 1018mb Receiver: HP 8542E
 Date: 10/05/04 Temp: 20C Cable: CBLBNC1 1-20-05.cbl
 Standard: FCC Part 15 Subpart B Humidity: 51% LISN 1, 2: LISN10 [1] 6-06-05.lsn LISN10 [2] 6-06-05.lsn
 Class: B Group: None LISN 3, N: None None
 Preamp: None Attenuator: DS22 1-20-05.att
 Voltage/Frequency: 120 Vac/60 Hz Frequency Range: 0.150-30 MHz
 Net is the sum of worst-case lsn, cable, & attenuator losses, preamp gain, and initial reading

Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Neutral dB(uV)	Quasi-Peak		
					Net dB(uV)	Limit dB(uV)	Margin dB
0.150	10.7	N/A	N/A	11.9	33.4	66.0	-32.6
0.155	10.6	N/A	N/A	11.0	33.3	65.7	-32.4
0.190	7.2	N/A	N/A	7.5	29.8	64.0	-34.2
14.300	-2.4	N/A	N/A	-6.4	21.2	60.0	-38.8
16.610	-2.0	N/A	N/A	-3.2	21.3	60.0	-38.7
19.000	3.1	N/A	N/A	4.6	25.7	60.0	-34.3

Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Neutral dB(uV)	Average		
					Net dB(uV)	Limit dB(uV)	Margin dB
0.150	-1.9	N/A	N/A	-2.0	22.7	56.0	-33.3
0.155	-0.1	N/A	N/A	-0.1	22.7	55.7	-33.0
0.190	-9.6	N/A	N/A	-10.1	22.6	54.0	-31.4
14.300	-8.7	N/A	N/A	-12.6	21.2	50.0	-28.8
16.610	-4.4	N/A	N/A	-7.3	21.3	50.0	-28.7
19.000	0.7	N/A	N/A	2.0	23.1	50.0	-26.9

FCC Part 15 Subpart B Line conducted emissions setup photos



Emissions Site Description:

EMC Report for BodyMedia on the Model: BMSWWGPOTS
Report Number 3064675_EMC

Site 1C (Top Site) is a 3m and 10m sheltered emissions 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 ground plane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets 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 tabletop 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 ground plane 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 a 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 ground plane (2 meter X 2 meter area) is used for line-conducted measurements for tabletop equipment. The vertical ground plane is electrically connected to the reference ground plane.

Measurement Uncertainty:

Note that the measurement uncertainty contained herein is ± 4.0 dB for radiated emissions and ± 2.0 dB for line-conducted emissions.