Excellence in Compliance Testing

Certification Test Report

FCC ID: WIX08270924
IC: 7984A-08270924

FCC Rule Part: 15.231
IC Radio Standards Specification: RSS-210

ACS Report Number 08-0382-15C

Applicant: Polartec, LLC
Model(s): PLTH-4000

Test Begin Date: October 10, 2008
Test End Date: October 22, 2008

Report Issue Date: November 6, 2008

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

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This report contains 14 pages

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1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210.

1.2 Product Description

1.2.1 General

The Polartec Heat® Jacket/Vest contains the Polartec Heat® system, a lithium-ion battery-powered heating panel designed to keep the wearer warm in cold weather. A wireless remote control, model PLTH-4000, powers the system on and off, and changes the heat settings from low to medium to high.

Only the wireless remote transmitter model PLTH-4000 is addressed in this report. Other components of the Polartec Heat® system are addressed in separate equipment authorizations.

Manufacturer Information:
Polartec, LLC
46 Stafford Street
PO Box 809
Lawrence, MA 01842
USA

Test Sample Serial Number(s):
ACS#1, ACS#2

Test Sample Condition:
The test samples were provided in good working order with no visible defects.

Detailed photographs of the EUT are filed separately with this filing.

1.2.2 Intended Use

The intended of wireless remote control model PLTH-4000 is to control on/off power and heater settings for the Polartec Heat® Jacket/Vest.

1.3 Test Methodology and Considerations

The PLTH-4000 wireless remote was evaluated in multiple configurations for radiated emissions. Test configurations consisted of the remote placed in the X, Y, and Z orientation. Test setup photographs show additional detail.

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 894540
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

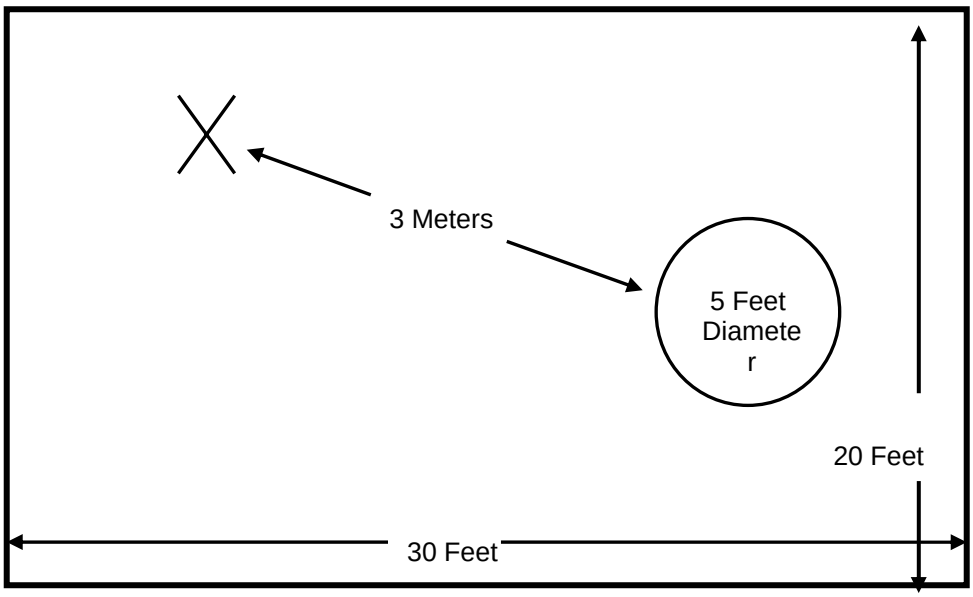

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

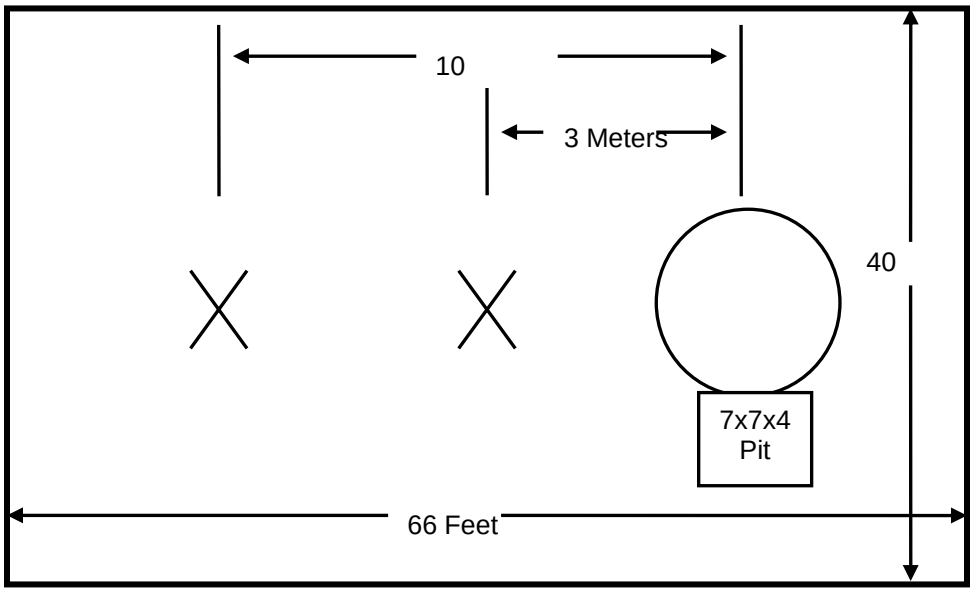

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

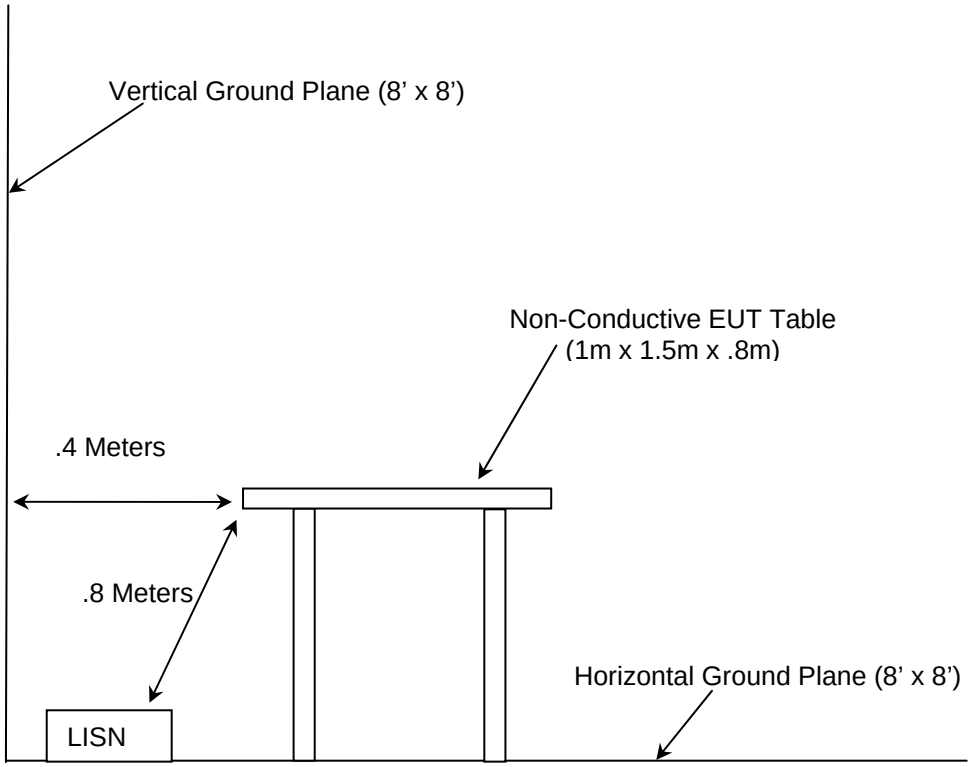

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2008
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2008
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 7 June 2007
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue2, June 2007.

4.0 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	9/19/2009
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	9/19/2009
22	Agilent	Amplifiers	8449B	3008A00526	10/22/2009
25	Chase	Antennas	CBL6111	1043	8/22/2009
30	Spectrum Technologies	Antennas	DRH-0118	970102	5/7/2009
167	ACS	Cable Set	Chamber EMI Cable Set	167	1/4/2009
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	9/19/2009
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11/21/08 (See Note1)
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11/21/08 (See Note1)
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	10/8/2009
422	Florida RF	Cables	SMS-200AW-72.0-SMR	805	02/25/09 (See Note1)

Note1: Items characterized on an annual cycle. The date shown indicates the next characterization due date.

5.0 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number	FCC ID
The EUT was tested stand-alone with support equipment utilized.					

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

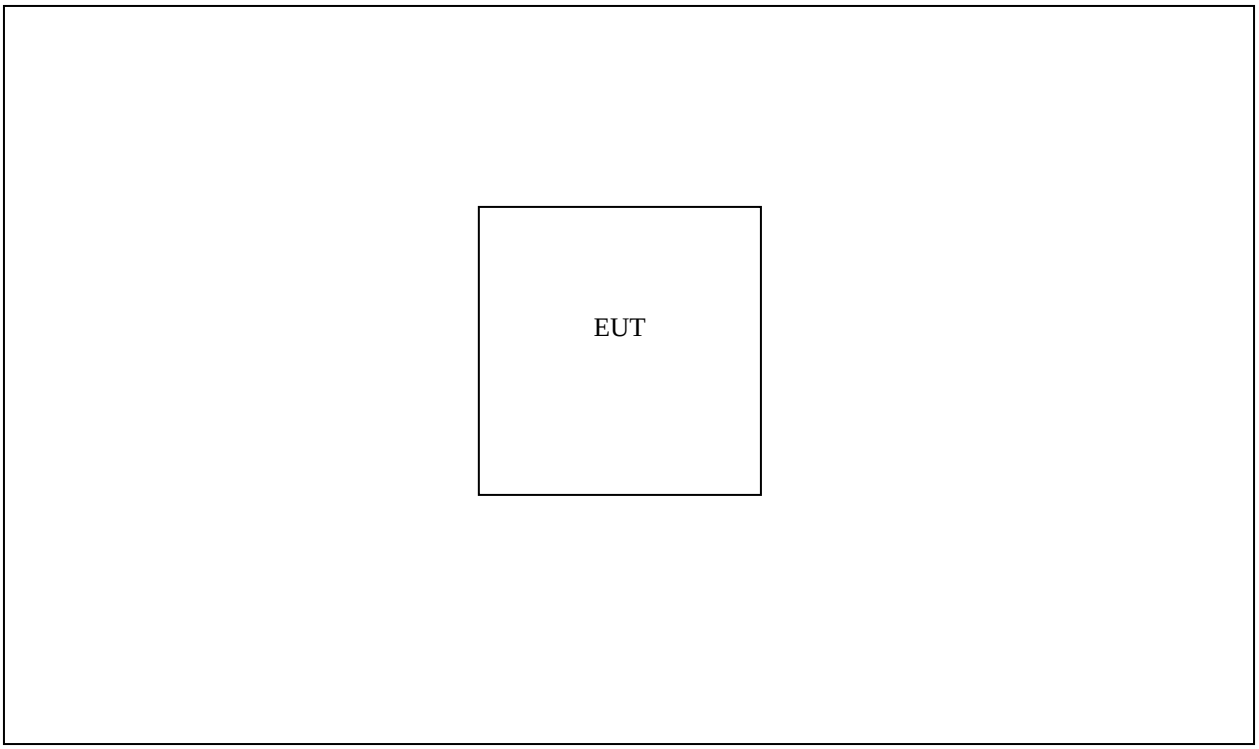

Figure 6-1: EUT Test Setup

The EUT operates from an internal 3V battery.

*See Test Setup photographs for additional detail.

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC: CFR 47 Part 15.203

The EUT utilizes an integral antenna PCB antenna which can not be removed or modified with damaging the device.

7.2 Power Line Conducted Emissions – FCC: CFR 47 Part 15.207 IC: RSS-GEN 7.2.2

The EUT is battery operated therefore the requirements for AC power line conducted emissions are not applicable.

7.3 Periodic Operation – FCC: CFR 47 15.231(a) (1)/ IC: RSS-210 A1.1.1(a)

7.3.1 Test Methodology

A transmitter activated automatically shall cease transmission within 5 seconds after activation, (i.e. maximum 5 seconds of operation).

A manually operated transmitter shall employ a push-to-operate switch and be under manual control at all transmission times. When released, the transmitter shall cease transmission (holdover time of up to 5 seconds is permitted).

The PLTH-4000 transmitter is manually activated and was evaluated using a spectrum analyzer at zero span.

7.3.2 Test Results

The transmitter deactivated after 890ms. The results are shown in Figure 7.3.2-1.

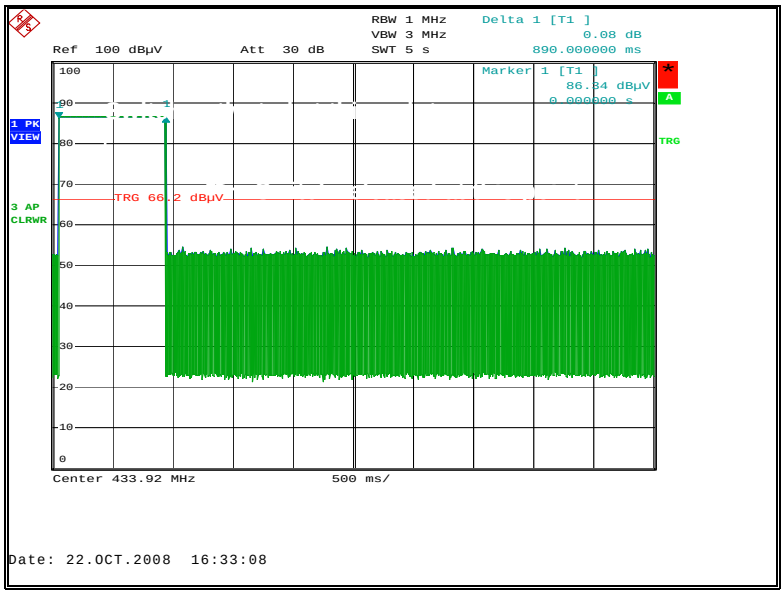

Figure 7.3.2-1: Transmitter Hold Time

7.4 Occupied Bandwidth – FCC: CFR 47 15.231(c) (1) IC: RSS-210 A1.1.3

7.4.1 Test Methodology

For devices operating above 70MHz and below 900 MHz, the bandwidth of the emission shall be no wider than 0.25% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier for FCC compliance and the 99% bandwidth for IC compliance.

7.4.2 Test Results

The 20dB and 99% bandwidth was measured as 7.08kHz and 6.92kHz respectively. 0.25% of the center frequency 433.92MHz is equivalent to 1085kHz. Therefore the 20dB and 99% bandwidths of the emission is less than 0.25% of the center frequency. The results are shown in Figure 7.4.2-1 and 7.4.2-2.

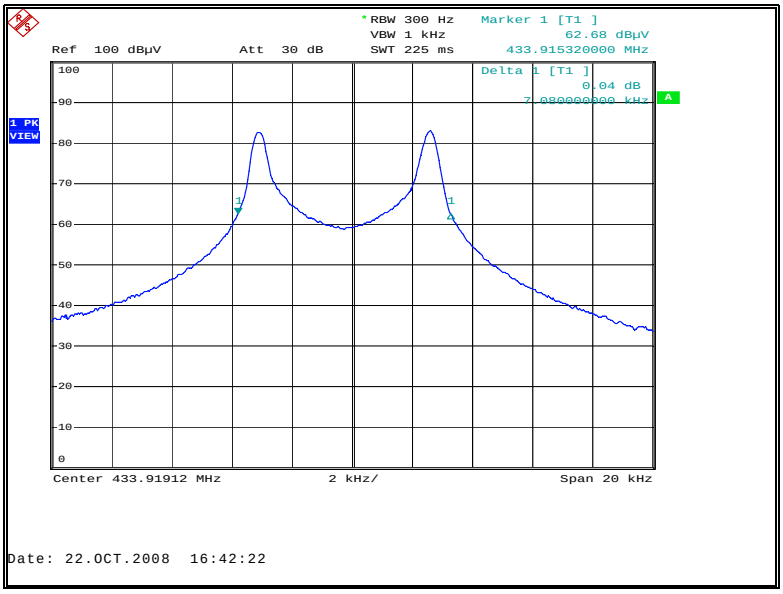

Figure 7.4.2-1: Occupied Bandwidth – 20dB

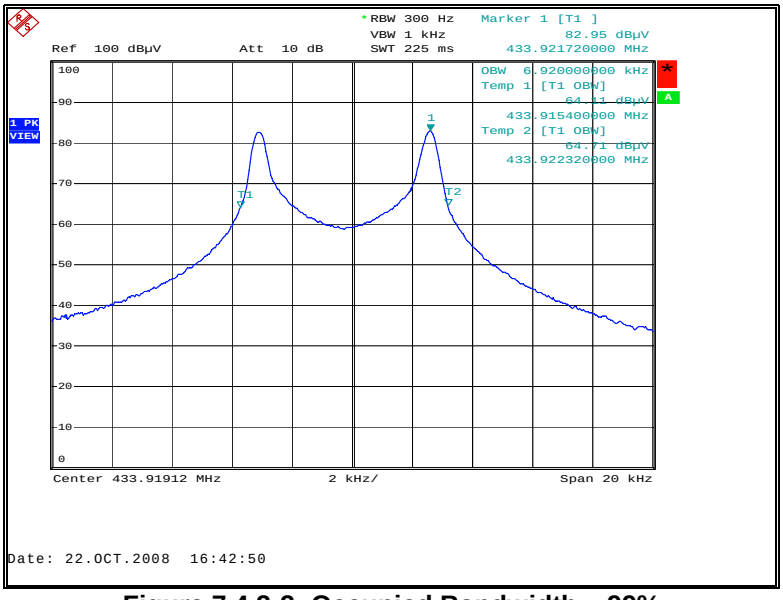

Figure 7.4.2-2: Occupied Bandwidth – 99%

7.5 Radiated Emissions (Field Strength/Spurious) – FCC: CFR 47 15.231(b) IC: RSS-210 A1.1.2

7.5.1 Test Methodology

Radiated emissions tests were made over the frequency range of 30MHz to 4339.2MHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, average measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For frequencies above 1000MHz, average and peak measurements were made with RBW of 1 MHz and a VBW of 3 MHz.

Further, compliance with the provisions of 15.205 was demonstrated using the measurement instrumentation specified in that section where applicable.

The EUT was evaluated in multiple orientations (X, Y, & Z) based on the intended use. Data for all orientations evaluated is presented below in section 7.5.3-1 to 7.5.3-3.

7.5.3 Test Results

Radiated spurious emissions are reported in Table 7.5.3-1.

Table 7.5.3-1: Radiated Emissions – X Orientation (Upright)

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Frequency										
433.92	79.72	79.60	H	-7.36	72.36	72.24	100.8	80.8	28.47	8.56
433.92	88.17	88.10	V	-7.54	80.63	80.56	100.8	80.8	20.20	0.24
Spurious Emissions										
867.84	39.96	37.70	H	0.68	40.64	38.38	80.8	60.8	40.19	22.45
867.84	38.72	37.07	V	0.20	38.92	37.27	80.8	60.8	41.91	23.56
1301.76	49.73	45.36	H	-6.20	43.53	39.16	74.0	54.0	30.47	14.84
1301.76	53.41	50.70	V	-6.18	47.23	44.52	74.0	54.0	26.77	9.48
1735.68	47.50	41.91	H	-3.97	43.53	37.94	80.8	60.8	37.29	22.88
1735.68	46.05	38.76	V	-3.96	42.09	34.80	80.8	60.8	38.74	26.03
2169.6	48.97	44.91	H	-2.05	46.92	42.86	80.8	60.8	33.91	17.97
2169.6	48.01	42.49	V	-2.19	45.82	40.30	80.8	60.8	35.00	20.52
2603.52	51.79	48.92	H	-0.10	51.69	48.82	80.8	60.8	29.13	12.00
2603.52	51.36	48.18	V	-0.30	51.06	47.88	80.8	60.8	29.76	12.94
3037.44	50.42	47.40	H	1.24	51.66	48.64	80.8	60.8	29.17	12.19
3037.44	49.71	46.38	V	1.05	50.76	47.43	80.8	60.8	30.06	13.39
3471.36	52.73	50.06	H	2.68	55.41	52.74	80.8	60.8	25.41	8.08
3471.36	52.04	49.15	V	2.67	54.71	51.82	80.8	60.8	26.11	9.00
3905.28	48.13	43.64	H	4.38	52.51	48.02	74.0	54.0	21.49	5.98
3905.28	46.18	39.70	V	4.46	50.64	44.16	74.0	54.0	23.36	9.84
4339.2	45.16	38.56	H	5.02	50.18	43.58	74.0	54.0	23.82	10.42
4339.2	45.24	38.38	V	5.12	50.36	43.50	74.0	54.0	23.64	10.50

***** The magnitude of all emissions not reported were below the noise floor of the measurement system.

Table 7.5.3-2: Radiated Emissions – Y Orientation (Back)

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Frequency										
433.92	87.40	87.27	H	-7.36	80.04	79.91	100.8	80.8	20.79	0.92
433.92	68.59	68.47	V	-7.54	61.05	60.93	100.8	80.8	39.78	19.90
Spurious Emissions										
867.84	46.82	45.95	H	0.68	47.50	46.63	80.8	60.8	33.33	14.20
867.84	39.15	37.07	V	0.20	39.35	37.27	80.8	60.8	41.48	23.56
1301.76	49.64	48.13	H	-6.20	43.44	41.93	74.0	54.0	30.56	12.07
1301.76	44.79	43.05	V	-6.18	38.61	36.87	74.0	54.0	35.39	17.13
1735.68	42.63	39.75	H	-3.97	38.66	35.78	80.8	60.8	42.16	25.04
1735.68	43.03	40.16	V	-3.96	39.07	36.20	80.8	60.8	41.76	24.63
2169.6	41.21	38.23	H	-2.05	39.16	36.18	80.8	60.8	41.67	24.65
2169.6	40.37	38.56	V	-2.19	38.18	36.37	80.8	60.8	42.64	24.45
2603.52	43.36	41.78	H	-0.10	43.26	41.68	80.8	60.8	37.56	19.14
2603.52	43.67	38.88	V	-0.30	43.37	38.58	80.8	60.8	37.45	22.24
3037.44	44.35	43.89	H	1.24	45.59	45.13	80.8	60.8	35.24	15.70
3037.44	44.48	43.92	V	1.05	45.53	44.97	80.8	60.8	35.29	15.85
3471.36	45.12	43.92	H	2.68	47.80	46.60	80.8	60.8	33.02	14.22
3471.36	45.50	44.73	V	2.67	48.17	47.40	80.8	60.8	32.65	13.42
3905.28	41.26	39.45	H	4.38	45.64	43.83	74.0	54.0	28.36	10.17
3905.28	39.79	37.95	V	4.46	44.25	42.41	74.0	54.0	29.75	11.59
4339.2	40.57	39.12	H	5.02	45.59	44.14	74.0	54.0	28.41	9.86
4339.2	38.54	36.30	V	5.12	43.66	41.42	74.0	54.0	30.34	12.58

Table 7.5.3-2: Radiated Emissions – Z Orientation (Side)

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Frequency										
433.92	81.20	81.02	H	-7.36	73.84	73.66	100.8	80.8	26.99	7.17
433.92	87.60	87.45	V	-7.54	80.06	79.91	100.8	80.8	20.77	0.92
Spurious Emissions										
867.84	41.51	39.99	H	0.68	42.19	40.67	80.8	60.8	38.64	20.16
867.84	39.53	37.50	V	0.20	39.73	37.70	80.8	60.8	41.10	23.13
1301.76	46.33	45.97	H	-6.20	40.13	39.77	74.0	54.0	33.87	14.23
1301.76	50.14	49.86	V	-6.18	43.96	43.68	74.0	54.0	30.04	10.32
1735.68	41.28	39.78	H	-3.97	37.31	35.81	80.8	60.8	43.51	25.01
1735.68	46.26	45.77	V	-3.96	42.30	41.81	80.8	60.8	38.53	19.02
2169.6	40.16	38.89	H	-2.05	38.11	36.84	80.8	60.8	42.72	23.99
2169.6	40.70	38.84	V	-2.19	38.51	36.65	80.8	60.8	42.31	24.17
2603.52	44.94	44.03	H	-0.10	44.84	43.93	80.8	60.8	35.98	16.89
2603.52	48.57	46.94	V	-0.30	48.27	46.64	80.8	60.8	32.55	14.18
3037.44	45.78	45.52	H	1.24	47.02	46.76	80.8	60.8	33.81	14.07
3037.44	49.32	48.99	V	1.05	50.37	50.04	80.8	60.8	30.45	10.78
3471.36	47.30	46.91	H	2.68	49.98	49.59	80.8	60.8	30.84	11.23
3471.36	47.88	47.83	V	2.67	50.55	50.50	80.8	60.8	30.27	10.32
3905.28	40.57	38.81	H	4.38	44.95	43.19	74.0	54.0	29.05	10.81
3905.28	42.32	40.82	V	4.46	46.78	45.28	74.0	54.0	27.22	8.72
4339.2	37.09	33.96	H	5.02	42.11	38.98	74.0	54.0	31.89	15.02
4339.2	41.05	39.45	V	5.12	46.17	44.57	74.0	54.0	27.83	9.43

7.5.4 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Fundamental Frequency (X Orientation)

PEAK:
Corrected Level: 88.17 - 7.36 = 80.63dBuV
Margin: 100.8dBuV – 80.63dBuV = 20.2dB

AVERAGE:
Corrected Level: 88.10 - 7.54 - 0 = 80.56dBuV
Margin: 80.8dBuV – 80.56dBuV = 0.24dB

8.0 CONCLUSION

In the opinion of ACS, Inc. Polartec, LLC model PLTH-4000, meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT