



## EMISSIONS TEST REPORT

Report Number: 3184749BOX-014a

Project Number: 3184749

Testing performed on the

**Blood Pump**

**Model: Impella Mobile Console**

**To**


**FCC Part 15 Subpart C Section 15.225**

**For**


**Abiomed**

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

Test Authorized by:  
Abiomed  
22 Cherry Hill Dr  
DANVERS,MA,01923

Prepared by:   
Vathana Ven

Date: 10/05/09

Reviewed by:   
Michael Murphy

Date: 10/07/09

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## 1.0 Job Description

### 1.1 Client Information

This EUT has been tested at the request of:

**Company:** Abiomed  
22 Cherry Hill Dr  
DANVERS,MA,01923  
**Contact:** Mr. Ralph D'Ambrosio  
**Telephone:** (978) 646-1709  
**Fax:** (978) 777-5692  
**Email:** rdambrosio@abiomed.com

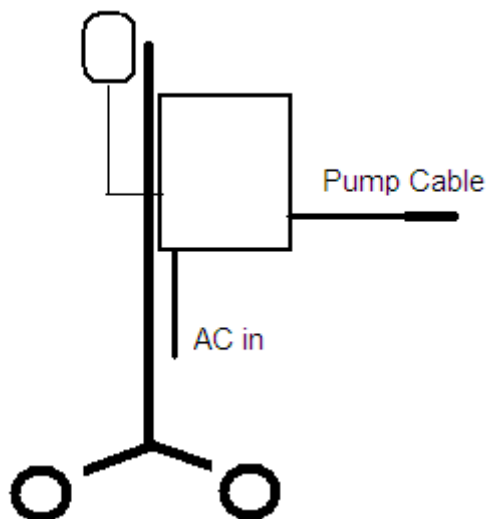
### 1.2 Equipment Under Test

**Equipment Type:** Blood Pump  
**Model Number(s):** Impella Mobile Console  
**Serial number(s):** IC0101  
**Manufacturer:** Abiomed  
**EUT receive date:** 09/08/09  
**EUT received condition:** Production unit in good condition  
**Test start date:** 07/28/09  
**Test end date:** 08/05/09

**1.3 Test Plan Reference:** ANSI C63.4-2003, FCC Part 15 Subpart C Section 15.225

**1.4 Test Configuration:** 100VAC 60Hz, 230VAC 50Hz, and battery.

#### 1.4.1 Block Diagram





#### 1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
Power cord	Braided	Standard US	2	1
Pump cable	Braided	Custom	2.9	1

#### 1.4.3. Support Equipment:

None

#### 1.5 Mode(s) of Operation:

The EUT was configured to transmit continuously in modulated and unmodulated modes.

1.6 Floor Standing Equipment:      Applicable:   X        Not Applicable:



## 2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 15 Subpart C Section 15.225		
SUB-TEST	TEST PARAMETER	PASS/FAIL
Fundamental Radiated Emissions	FCC Part 15 Subpart C Section 15.225	Pass
Spurious Radiated Emissions	FCC Part 15 Subpart B, Section 15.209	Pass
Frequency Stability	FCC Part 15 Subpart C, Section 15.225 – $\pm 0.01\%$ of Fundamental Frequency	Pass
Line Conducted Emissions	The field strength must not exceed FCC Part 15 Subpart B, Section 15.207	Pass

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project No.</u>	<u>Project Handler</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
10/05/09	3184749	Vathana Ven	4, 17, 18		Changed Section 15.209 to 15.207 and fixed frequency stability tables

### 3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
 AF = 7.4 dB/m  
 CF = 1.6 dB  
 AG = 29.0 dB  
 FS = 32 dB $\mu$ V/m

$$\text{Level in } \mu\text{V/m} = [10(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where NF = Net Reading in dB $\mu$ V

- RF = Reading from receiver in dB $\mu$ V
- LF = LISN Correction Factor in dB
- CF = Cable Correction Factor in dB
- AF = Attenuator Loss Factor in dB

To convert from dB $\mu$ V to  $\mu$ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where UF = Net Reading in } \mu\text{V}$$

#### Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 285.1 \mu\text{V/m}$$

### 3.1 Measurement Uncertainty

For radiated emissions,  $U_{lab}$  (4.9 dB at 3m and 4.2 dB at 10m)  $< U_{CISPR}$  (5.2 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

For conducted emissions,  $U_{lab}$  (3.2 dB in worst case)  $< U_{CISPR}$  (3.6 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

### 3.2 Site Description

#### Test Site(s): 2 and Immunity

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 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 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 (12,000 lb. in Site 3) 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 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 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.





**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart C, Section 15.225

**Test:** Carrier Fundamental Field Strength

**Performance Criterion:** Not Applicable

**Test Environment:**

Environmental Conditions During Testing:		Ambient (°C):	24	Humidity (%):	58	Pressure (hPa):	1005
Pretest Verification Performed		Yes		Equipment under Test:		Impella Mobile Console	
Test Engineer(s):	Vathana Ven			EUT Serial Number:		IC0101	
Engineer's Initials:		Date Test Performed:	07/28/09	Reviewer's Initials:		Date Reviewed:	10/07/09

**Maximum Test Disturbance Parameters:**

FCC Part 15 Subpart C Section 15.225: The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter (84dBuV/m) at 30 meters.

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80519A93	06/10/2010
2	Active Loop Antenna (10 khz to 30 mhz)	EMCO	6502/1	9902-3267	11/07/2009
3	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	02/20/2010
4	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010

**Software Utilized:**

Name	Manufacturer	Version
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	4/17/09

**Test Details:**

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail N/A	Comment
Around the EUT	As Specified	Below Specified Limit	Pass	None



## Radiated Emissions

Company: Abiomed  
 Model #: Impella Mobile Console  
 Serial #: IC0101  
 Engineers: Vathana Ven  
 Project #: 3184749  
 Standard: 15.225/RSS-210  
 Receiver: R&S ESCI (ROS002) 02-17-2010  
 PreAmp: NONE  
 Antenna & Cables: LF Bands: N, LF, HF, SHF  
 Antenna: LOOP 145-019 E-Field 11-07-09.txt LOOP 145-019 H-Field 11-07-09.txt  
 Cable(s): S2 3M FLR 02-20-2010.txt NONE.  
 Barometer: DAV002 Filter: NONE  
 Location: Site 2  
 Date(s): 07/28/09  
 Temp/Humidity/Pressure: 24 deg. C 58% 1005 mB  
 Limit Distance (m): 30  
 Test Distance (m): 3  
 Voltage/Frequency: 120Vac/60 Hz  
 Frequency Range: See Frequencies  
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)  
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	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	Bandwidth
PK	V	13.560	41.10	10.72	0.36	0.00	40.00	12.18	84.00	-71.82	9/30 kHz
PK	V	13.553	35.10	10.72	0.36	0.00	40.00	6.18	84.00	-77.82	9/30 kHz
PK	V	13.567	28.30	10.71	0.36	0.00	40.00	-0.62	84.00	-84.62	9/30 kHz
PK	V	13.410	17.70	10.73	0.36	0.00	40.00	-11.21	50.50	-61.71	9/30 kHz
PK	V	13.710	19.90	10.70	0.37	0.00	40.00	-9.03	50.50	-59.53	9/30 kHz
PK	V	13.110	16.90	10.75	0.36	0.00	40.00	-11.99	40.50	-52.49	9/30 kHz

FCC

IC

Harmonic?

RB

RB



## **Radiated Emissions Setup Photos**

Not available



**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart C, Section 15.225

**Test:** Spurious Radiated Emissions Below 30 MHz

**Performance Criterion:** Not Applicable

**Test Environment:**

Environmental Conditions During Testing:		Ambient (°C):	24	Humidity (%):	58	Pressure (hPa):	1005
Pretest Verification Performed		Yes		Equipment under Test:		Impella Mobile Console	
Test Engineer(s):	Vathana Ven			EUT Serial Number:		IC0101	
Engineer's Initials:		Date Test Performed:	07/28/09	Reviewer's Initials:		Date Reviewed:	10/07/09

**Maximum Test Disturbance Parameters:**

The field strength of spurious emissions below 30 MHz must not exceed FCC Part 15 Subpart B, Section 15.209

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80519A93	06/10/2010
2	Active Loop Antenna (10 khz to 30 mhz)	EMCO	6502/1	9902-3267	11/07/2009
3	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	02/20/2010
4	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010

**Software Utilized:**

Name	Manufacturer	Version
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	4/17/09

## Test Results:

### Radiated Emissions

Company: Abiomed  
 Model #: Impella Mobile Console  
 Serial #: IC0101  
 Engineers: Vathana Ven  
 Project #: 3184749  
 Standard: 15.225/RSS-210  
 Receiver: R&S ESCI (ROS002) 02-17-2010  
 PreAmp: NONE  
 Date(s): 07/28/09  
 Location: Site 2  
 Barometer: DAV002  
 Temp/Humidity/Pressure: 24 deg. C 58% 1005 mB  
 Antenna & Cables: LF Bands: N, LF, HF, SHF  
 Antenna: LOOP 145-019 E-Field 11-07-09.txt LOOP 145-019 H-Field 11-07-09.txt  
 Cable(s): S2 3M FLR 02-20-2010.txt NONE  
 Filter: NONE  
 Voltage/Frequency: 120Vac/60 Hz  
 Frequency Range: See Frequencies  
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)  
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	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	Bandwidth
No emissions were detected above the measuring noise floor											

FCC IC Harmonic?





**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart C, Section 15.225

**Test:** Spurious Radiated Emissions Above 30 MHz

**Performance Criterion:** Not Applicable

**Test Environment:**

Environmental Conditions During Testing:	Ambient (°C):	24	Humidity (%):	58	Pressure (hPa):	1005
Pretest Verification Performed	Yes		Equipment under Test:	Impella Mobile Console		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	IC0101		
Engineer's Initials:		Date Test Performed:	07/28/09	Reviewer's Initials:		Date Reviewed: 10/07/09

**Maximum Test Disturbance Parameters:**

The field strength of spurious emissions below 30 MHz must not exceed FCC Part 15 Subpart B, Section 15.209

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80519A93	06/10/2010
2	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010
3	ANTENNA	EMCO	3142	9711-1224	12/12/2009
4	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	02/20/2010

**Software Utilized:**

Name	Manufacturer	Version
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	4/17/09

## Test Results:

### Special Radiated Emissions

Company: Abiomed  
 Model #: Impella Mobile Console  
 Serial #: IC0101  
 Engineers: Vathana Ven  
 Project #: 3184749  
 Standard: FCC Part 15/Cispr22 Class B  
 Receiver: R&S ESCI (ROS002) 02-17-2010  
 PreAmp: NONE  
 Antenna & Cables: N Bands: N, LF, HF, SHF  
 Antenna: LOG3 V3m 12-12-09.txt LOG3 H3m 12-12-09.txt  
 Cable(s): S2 3M FLR 02-20-2010.txt NONE  
 Barometer: DAV002 Filter: NONE  
 Location: Site 2  
 Date(s): 07/28/09  
 Temp/Humidity/Pressure: 24 deg. C 58% 1005 mB  
 Limit Distance (m): 10  
 Test Distance (m): 3  
 PreAmp Used? (Y or N): N Voltage/Frequency: 120 Vac/60 Hz Frequency Range: 30-1000 MHz  
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)  
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	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	Bandwidth	FCC	IC	Harmonic?
QP	V	42.200	15.00	10.32	0.72	0.00	10.46	15.58	30.00	-14.42	120/300 kHz			
QP	V	43.660	21.10	9.80	0.73	0.00	10.46	21.17	30.00	-8.83	120/300 kHz			
QP	V	59.620	21.90	9.05	0.86	0.00	10.46	21.36	30.00	-8.64	120/300 kHz			
QP	V	63.620	18.80	7.51	0.91	0.00	10.46	16.76	30.00	-13.24	120/300 kHz			
QP	V	134.410	14.00	7.95	1.34	0.00	10.46	12.83	30.00	-17.17	120/300 kHz			
QP	H	232.240	12.60	11.83	1.84	0.00	10.46	15.82	37.00	-21.18	120/300 kHz		RB	
QP	H	250.000	12.30	12.40	1.89	0.00	10.46	16.14	37.00	-20.86	120/300 kHz		RB	
QP	H	260.000	11.00	12.80	1.94	0.00	10.46	15.28	37.00	-21.72	120/300 kHz		RB	
QP	H	280.000	13.90	12.90	2.03	0.00	10.46	18.37	37.00	-18.63	120/300 kHz		RB	
QP	H	288.000	14.30	13.18	2.08	0.00	10.46	19.10	37.00	-17.90	120/300 kHz		RB	
QP	H	340.000	12.50	15.10	2.23	0.00	10.46	19.37	37.00	-17.63	120/300 kHz			
QP	H	380.000	12.00	16.40	2.41	0.00	10.46	20.35	37.00	-16.65	120/300 kHz			
QP	H	420.000	14.10	16.40	2.56	0.00	10.46	22.60	37.00	-14.40	120/300 kHz			
QP	V	480.000	19.10	18.00	3.07	0.00	10.46	29.71	37.00	-7.29	120/300 kHz			



**Radiated Emissions Setup Photos**

Not available





**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart C, Section 15.225

**Test:** Frequency Stability

**Performance Criterion:** Frequency remains within the assigned band

**Test Environment:**

Environmental Conditions During Testing:		Ambient (°C):	21	Humidity (%):	71	Pressure (hPa):	1003
Pretest Verification Performed		Yes		Equipment under Test:		Impella Mobile Console	
Test Engineer(s):	Vathana Ven			EUT Serial Number:		IC0101	
Engineer's Initials:		Date Test Performed:	07/29/09	Reviewer's Initials:		Date Reviewed:	10/07/09

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	MAN1	06/24/2010
2	Spectrum Analyzer	Agilent	E7405A	US40240205	08/21/2009
3	CABLE, BNC/BNC	Alpha	RG58B/U	CBL310E	03/12/2010
4	Triple Output Power Supply	Hewlett Packard	6235A	2005A-04760	Verified
5	Temp/Humidity Chamber	Envirotronics	SH27C	08015563S11 264	Verified

**Software Utilized:**

Name	Manufacturer	Version
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	4/17/09



## Test Results:

Company: Abiomed  
Model #: Impella Mobile Console  
Serial #: IC0101  
Engineer(s): Vathana Ven  
Project #: 3184749  
Standard: FCC Part 15

Date(s): 07/29/09

Location: EMC

Test Equipment Used:  
148-022 148-013 AGL001 MAN1

21 deg C 71% 1003 mB

Limit: PPM  
Nominal f: 13.56 MHz

Voltage: 24 VDC 14.4 VDC

Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-30	13.558181	0.021	1.36
-20	13.558187	0.027	1.36
-10	13.558182	0.022	1.36
0	13.558161	0.001	1.36
10	13.558160	0	1.36
20	13.558160	0	1.36
30	13.558160	0	1.36
40	13.558150	-0.01	1.36
50	13.558016	-0.144	1.36

Voltage Volts	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
24	-30	13.558182	-0.021000	1.36
24	-20	13.558185	0.024	1.36
24	-10	13.558187	0.026	1.36
24	0	13.558187	0.026	1.36
24	10	13.558186	0.025	1.36
27.6	20	13.558160	-0.001	1.36
24	20	13.558161	0	1.36
20.4	20	13.558161	0	1.36
24	30	13.558186	0.025	1.36
24	40	13.558180	0.019	1.36
24	50	13.558179	0.018	1.36



**Test Results:** Pass

**Test Standard:** FCC Part 15 Subpart C, Section 15.225

**Test:** Line-conducted Emissions

**Performance Criterion:** Not Applicable

**Test Environment:**

Environmental Conditions During Testing:	Ambient (°C):	21	Humidity (%):	71	Pressure (hPa):	1003
Pretest Verification Performed	Yes		Equipment under Test:	Impella Mobile Console		
Test Engineer(s):	Minal Shah		EUT Serial Number:	IC0101		
Engineer's Initials:		Date Test Performed:	08/05/09	Reviewer's Initials:		Date Reviewed: 10/07/09

**Maximum Test Disturbance Parameters:** The field strength must not exceed FCC Part 15 Subpart B, Section 15.207.

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	MAN1	06/24/2010
2	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010
3	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS29	03/12/2010
4	LISN, 50uH, .01 - 50MHz, 24A	Solar Electronics	9252-50-R-24-BNC	941713	10/06/2009
5	CABLE, BNC/BNC	Alpha	RG58B/U	CBL310E	03/12/2010

**Software Utilized:**

Name	Manufacturer	Version
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	4/17/09

## Test Results:

### Conducted Emissions

Company: Abiomed  
 Model #: Impella Mobile Console  
 Serial #: IC0101  
 Engineer(s): Minal Shah  
 Project #: 3184749  
 Standard: 15.225/RSS-210  
 Barometer: MAN1  
 Temp/Humidity/Pressure: 21 deg C 77% 1002 mB  
 Voltage/Frequency: 120V, 60 Hz  
 Frequency Range: 0.150-30 MHz  
 Receiver: R&S ESCI (ROS002) 02-17-2010  
 Cable: CBL310E 3-12-10.txt  
 LISN 1: LISN11 [1] 10-06-09.txt  
 LISN 2: LISN11 [2] 10-06-09.txt  
 LISN 3: NONE.  
 LISN 4: NONE.  
 Attenuator: DS29 3-12-10.txt  
 Location: Immunity Lab  
 Date: 08/05/09  
 Net is the sum of worst-case lisn, cable, & attenuator losses, and initial reading, factors are not shown  
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor; Bandwidth denoted as RBW/BW

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	QP Limit dB(uV)	Margin dB	Bandwidth
QP	0.150	37.44	39.90			59.82	66.00	-6.18	9/30 kHz
QP	0.206	19.98	25.30			45.17	63.37	-18.20	9/30 kHz
QP	0.225	21.62	24.90			44.78	62.63	-17.85	9/30 kHz
QP	0.595	15.43	15.48			35.52	56.00	-20.48	9/30 kHz
QP	10.950	22.24	18.25			42.95	60.00	-17.05	9/30 kHz
QP	13.500	24.48	19.16			45.15	60.00	-14.85	9/30 kHz
QP	17.900	27.34	27.09			47.94	60.00	-12.06	9/30 kHz
QP	18.060	26.45	27.12			47.69	60.00	-12.31	9/30 kHz

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	Average Limit dB(uV)	Margin dB	Bandwidth
AVG	0.150	33.56	34.77			54.69	56.00	-1.31	9/30 kHz
AVG	0.206	17.59	24.83			44.70	53.37	-8.67	9/30 kHz
AVG	0.225	16.17	17.81			37.69	52.63	-14.94	9/30 kHz
AVG	0.595	10.04	10.18			30.22	46.00	-15.78	9/30 kHz
AVG	10.950	15.53	17.86			38.54	50.00	-11.46	9/30 kHz
AVG	13.500	22.09	16.31			42.76	50.00	-7.24	9/30 kHz
AVG	17.900	20.30	20.45			41.02	50.00	-8.98	9/30 kHz
AVG	18.060	19.41	19.65			40.22	50.00	-9.78	9/30 kHz

Notes:

## Line-conducted Emissions Setup Photos

