CHOMERICS
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TEST SERVICES

EMC EVALUATION OF THE
POWER MEDICAL INTERVENTIONS
SURGEASSIST SYSTEM
WITH WIRELESS REMOTE CONTROL
IN ACCORDANCE WITH
FCC PART 15 SUBPART C CERTIFICATION
FCC PART 15 SUBPART B CLASS B

PREPARED FOR: **POWER MEDICAL INTERVENTIONS**
110 UNION SQUARE DRIVE
NEW HOPE, PENNSYLVANIA 18935
ATTENTION: DON MALINOUSKAS

PREPARED BY: **DENNIS HENNIGAN N.C.E.**
CHOMERICS TEST SERVICES
77 DRAGON COURT
WOBURN, MASSACHUSETTS 01888

Date: **JANUARY 30, 2002**

Test Report Number: **TR3265B.02**

Test Technician or Engineer: _____

CTS Approved Signatory: _____

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LIST OF DEFINITIONS/ABBREVIATIONS

AC	Alternating Current
BB	Broadband
BW	Bandwidth
cm	Centimeter
CPU	Calibrate Prior to Use
dB	Decibel
DC	Direct Current
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ER	Electric Radiation
EUT	Equipment Under Test
GHz	Gigahertz
Hz	Hertz
I-face	Interface
kHz	Kilohertz
m	Meter
MHz	Megahertz
mm	Millimeter
mS	Millisecond
mV	Millivolt
MR	Magnetic Radiation
NB	Narrowband
NCR	No Calibration Required
PLC	Power Line Conduction
PPS	Pulses Per Second
uF	Microfarad
uH	Microhenry
uS	Microsecond
uV	Microvolt
UWC	Use With Calibrated Equipment

1.0 GENERAL

1.1 Introduction

1.1.1 Purpose

The purpose of this report is to document the performance of the Power Medical Interventions Surge Assist System during an electromagnetic interference (EMI) test and record the test requirements and procedures used. At the request of Power Medical Interventions, the tests were performed by Chomerics Test Services (CTS) of Woburn, Massachusetts. The assessment will determine the compliance or non-compliance with the requirements set up by the Electromagnetic Interference (EMI) Standard FCC Part 15 Subpart B Class B and FCC Part B subpart C for intentional radiators.

The Radiated and Conducted Emission Standard FCC Part 15 Subpart B Class B is designated for Information Technology Equipment (ITE).

Testing was performed during the period of January 16 - 18, 2002 under purchase order number 747.

1.1.2 Requirements

The requirements for the sequence of tests performed on the Surge Assist System are as follows:

FCC Part 15 Subpart B Class B Radiated and Conducted Electromagnetic Emissions

FCC Part 15 Subpart B Class B radiated and conducted emission requirements for Information Technology Equipment (ITE).

FCC Part 15.231 Periodic Operation in the band of 40.66-40.70MHz and above 70MHz

The intentional radiator is restricted to the transmission of a control signal.

FCC Part 15.231 Field Strength and
Spurious Emissions

The field strength of emissions from intentional radiators operated under this section shall not exceed the limits in Section 15.231.

FCC Part 15.231 Occupied Bandwidth

The Bandwidth of the emissions shall be no wider than the limits in Section 15.231.

FCC Part 15.231 Transmitter Timing

A manually operated transmitter shall operate within the requirements of Section 15.231.

1.2 TEST SUMMARY

The terms "Passed" or "Failed" in this section are intended to guide the reader as to whether or not the EUT met the minimum requirements that can be interpreted from the FCC Part 15 Subpart B Class B Standard as defined in Section 1.5. The "Results" paragraph in each test section to follow and the test data sheets will outline specifically how the EUT performed during each test.

FCC Part 15 Subpart B Class B Radiated Emissions	PASSED
FCC Part 15 Subpart B Class B Conducted Emissions	PASSED
FCC Part 15 Subpart C Section 15.231 Field Strength and Spurious Emissions	PASSED
FCC Part 15 Subpart C Section 15.231 Bandwidth of Emissions	PASSED
FCC Part 15 Subpart C Section 15.231 Transmitter Timing	Supplied by customer

1.2.1 Summary of Recommendations

The Power Medical Interventions Surge Assist System will require no modifications in order to insure compliance with the Electromagnetic Interference Standard FCC Part 15 Subpart B for Class B devices.

The Power Medical Interventions Surge Assist System will require no modifications in order to insure compliance with the Electromagnetic Interference Standard FCC Part 15 Subpart C, Section 15.231 for periodic operation above 70MHz.

Please note that if any modifications and or fixes were implemented to the EUT to achieve compliance, other approaches to solving the problem may exist. In addition, any EMI/EMC shielding products listed in this report may be substituted with an equivalent.

1.3 Administrative Data

1.3.1 Test Facility

Chomerics test facility is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for NVLAP Codes 12F01; FCC test methods – 47 CFR Part 15 – Digital Devices, 12F01a; Conducted Emissions, and 12F01b; Radiated Emissions under NVLAP Accreditation Number 100296-0. Tests within this report not conforming to these NVLAP Codes are not covered under Chomerics NVLAP accreditation. Chomerics NVLAP accreditation covers test method 12/CIS22 for IEC/CISPR 22:1993, 12/CIS22a for IEC/CISPR 22 Amendment 1:1995 and Amendment 2:1996. Chomerics NVLAP accreditation code 12/CIS22b covers Chinese National Standard CNS 13438:1997.

Chomerics Radiated and Conducted Emissions testing to AS/NZS3548 is accredited to the Australian Telecommunications Authority (AUSTEL) under file number A92/TH/0048.

Chomerics' Open Area Test Sites A and B are accredited for Radiated and Conducted Emissions through Industry Canada under file numbers IC2959A and IC2959B respectively.

Chomerics' Open Area Test Site A is accredited to the Voluntary Control Council for Interference (VCCI) in Japan for Radiated and Conducted Emissions testing under file R-749 and C-770 respectively.

Chomerics test facility operates under the current revision of Chomerics Quality Assurance (QA) Manual Document Number QA002.

The QA Manual has been constructed to reflect a quality program in accordance with the requirements of the National Institute of Standards and Technology (NIST), ISO 9002, ISO Guide 25, NIST Handbook 150, EN 45001, MIL-I-45208A, MIL-STD-461D, 462D and Chomerics Quality Assurance Program (QAP).

The QA Manual outlines and describes the procedures for establishing and maintaining the quality of analysis, research, inspection, and testing within Chomerics Test Service (CTS).

This test report does not represent an endorsement by the U.S. Government.

The results and/or conclusions within this test report refer and/or apply only to the unit(s) tested as defined by this report.

Measurements performed for this test are traceable to the National Institute of Standards and Technology (NIST) based on the fact that all test equipment used for the measurements were previously calibrated using standards traceable to NIST.

No deviations, additions to, or exclusions from the test specification(s) were made.

The system amplitude accuracy for the measurements made during the radiated emission tests was ±3dB. Chomerics Test Services measurement uncertainty calculations are available for review upon request.

1.3.2 Equipment Calibration

The calibration of Chomerics test facility equipment is controlled under the current edition of Chomerics Laboratory Test Equipment Calibration Manual Document Number QA001.

The test equipment used throughout this test sequence conforms to laboratory calibration standards, MIL-STD-45662, traceable to the National Institute of Standards and Technology (NIST). The date of the next due scheduled calibration is listed in each test section for the applicable equipment.

All test equipment is calibrated in one year intervals.

1.3.3 Test Personnel

The test personnel performing or supervising the tests are accredited by the National Association of Radio and Telecommunications Engineers, Inc. (NARTE) as Certified Electromagnetic Compatibility Engineers (N.C.E.) and Technicians (N.C.T.).

1.4 Test Set-up

1.4.1 Test Site Matrix

The specific test locations used for the emissions testing of the Power Medical Interventions Surge Assist System are as follows: (Refer to Section 1.4.2 for test site descriptions).

Emissions Test	Test Site
FCC Part 15 Subpart B Class B Radiated Emissions	Open Area Test Site A
FCC Part 15 Subpart B Class B Conducted Emissions	Open Area Test Site A
FCC Part 15 Subpart C Section 15.231 Power and Spurious Emissions	Open Area Test Site A
FCC Part 15 Subpart C Section 15.231 Bandwidth of Emissions	Open Area Test Site A

1.4.2 Test Site Descriptions

The following is a list of test sites and descriptions of each. Refer to Section 1.4.1 for specific test sites used for testing.

Open Area Test Site A: Chomerics' Open Area Test Site "A" if used for this test program is located in the lower parking lot attached to the Seeger Building at Chomerics, 84 Dragon Court, Woburn, Massachusetts (see Figure 1). Parking is permitted on one side of Test Site "A" at a discrete distance from the imaginary ellipse.

The Open Area Test Site "A" enclosure is a wooden structure measuring 56 x 30 x 25 feet in size with galvanized steel sheet metal used as the ground plane. The structure is sized to allow 3 meter measurements and is heated and/or air conditioned.

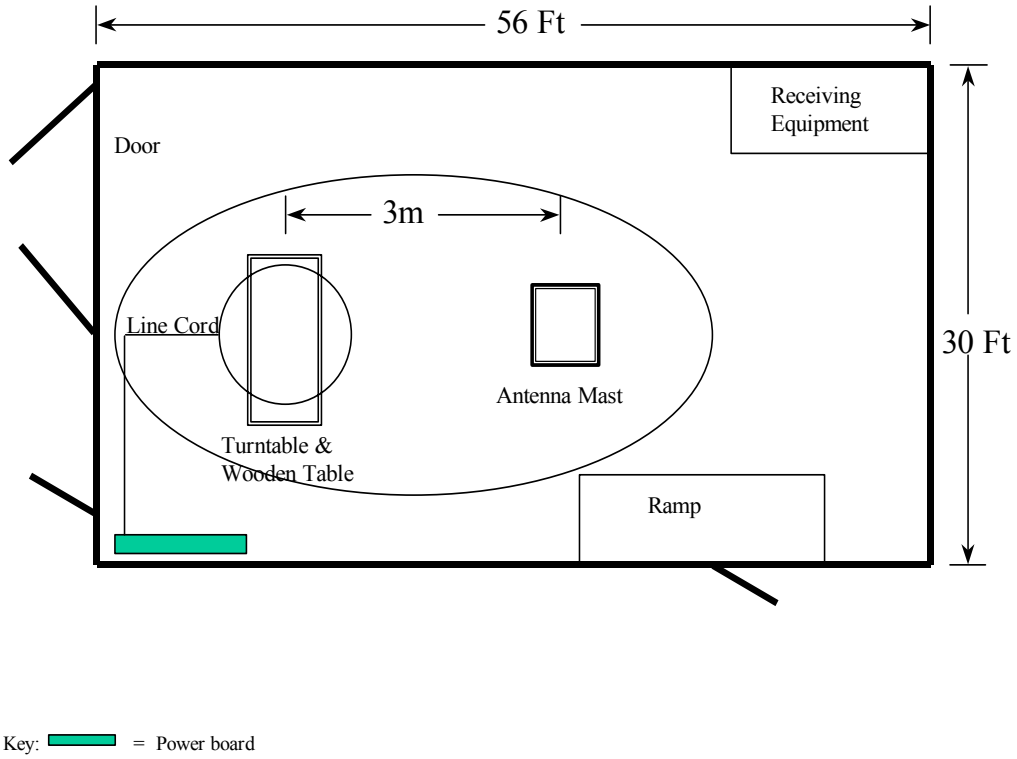
The structure used to support equipment under test is an EMCO 4 foot diameter motorized turntable. For tabletop equipment, a wooden table measuring 1.5 x 1 meter in size is positioned at the center of the turntable, at the proper height above the ground plane.

The area at the end of the Open Area Test Site "A" is the location for the test personnel and equipment to ensure they are outside the imaginary ellipse.

The available AC power within Open Area Test Site "A" is 120V 60Hz Single Phase 60Amps; 208V 60Hz Three Phase 60Amps; 208V 60Hz Single Phase 60Amps; 230V 50Hz Single Phase 50Amps.

This Site is listed with the Federal Communications Commission (FCC) and approved by BSMI, VCCI, AUSTEL and CSA.

OPEN AREA TEST SITE A
Figure 1



Open Area Test Site B: Chomerics' Open Area Test Site "B" if used for this test program is located in the lower parking lot behind the Seeger Building at Chomerics, 84 Dragon Court, Woburn, Massachusetts (see Figure 2). Parking is permitted on one side of Test Site "B" at a discrete distance from the imaginary ellipse.

The Open Area Test Site "B" enclosure is a wooden structure measuring 56 x 30 x 25 feet in size with galvanized steel sheet metal used as the ground plane. The structure is sized to allow both 3 and 10 meter measurements and is heated and/or air conditioned.

The structure used to support equipment under test is a 14 foot diameter motorized turntable. The sheet metal surface is flush with the ground plane. To ground the turntable, copper fingers (1" x 1.5") are mounted around the outer edge of the turntable using machine screws. The spring fingers are equally spaced and provide a uniform interface between the turntable metal surface and ground plane. For tabletop equipment, a wooden table measuring 1.5 x 1 meter in size is positioned at the center of the turntable, at the proper height above the ground plane.

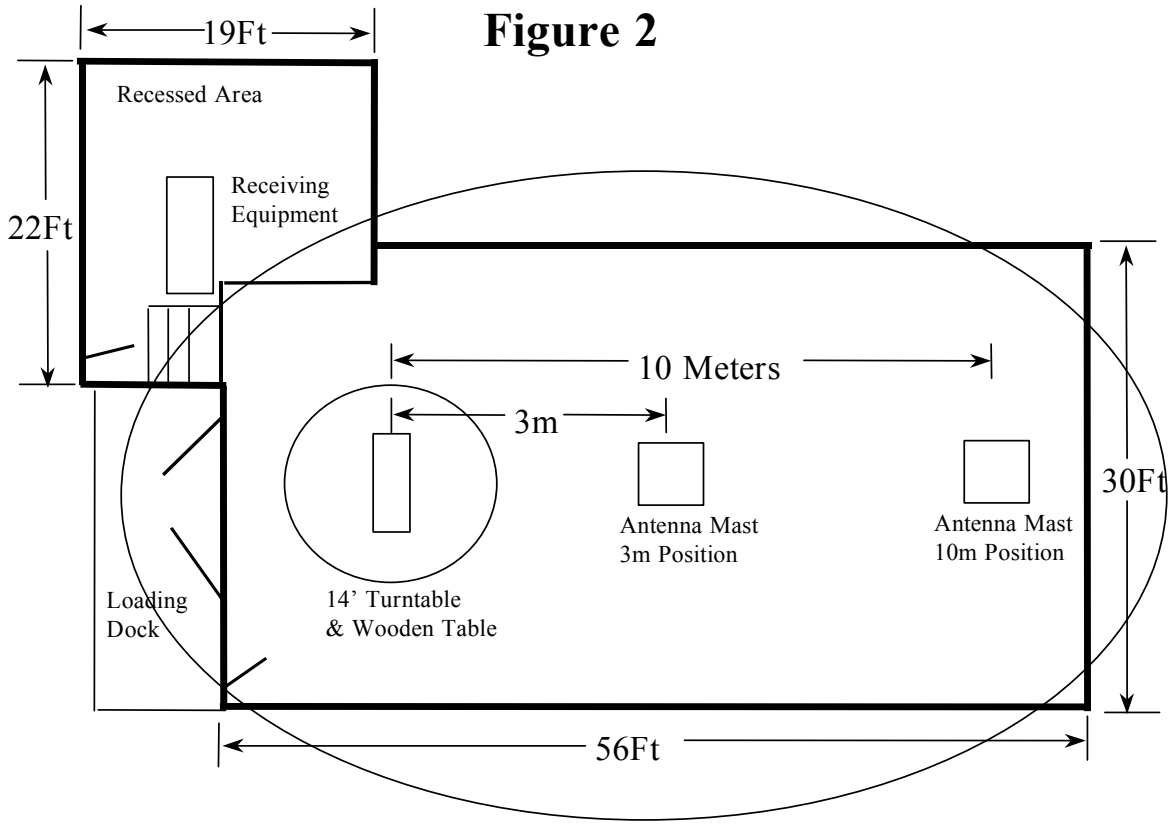
The addition at the end of the Open Area Test Site "B" is the location for the test personnel and equipment to ensure they are outside the imaginary ellipse.

The available AC power within Open Area Test Site "B" is 120V 60Hz Single Phase 60Amps; 208V 60Hz Three Phase 60Amps; 208V 60Hz Single Phase 60Amps; 230V 50Hz Single Phase 50Amps.

This Site is listed with the Federal Communications Commission (FCC) and approved by BSMI, AUSTEL and CSA.

OPEN AREA TEST SITE B

Figure 2



1.4.3 Equipment Under Test

The equipment needed to run the Power Medical Interventions Surge Assist System in the normal mode of operation consisted of the following:

a. Power Console PC100 (PN 06-00150-001-1) (SN A200109A01612)
b. Flex Shaft two meters
c. Digital Loading Unit (DLU) Staple Cartridge Slide with anvil Attachment
d. Receiver RF RXM-418-LC-R Module
e. Wireless Remote Control 418MHz transmitter unit. (Emissions Tests)
f. Wireless Remote Control 418MHz transmitter unit modified with an internal switch added to enable the transmitter to constantly transmit RF. (Power Test)

The Surge Assist System operates on 110VAC 60Hz power supplied by Chomerics AC mains. There is one I/O connection other than the standard unshielded 12 foot power cord. They are as follows:

a. Flex Shaft with DCU attached

The normal mode of operation was used for emissions tests. The Surge Assist System was monitored during the tests by Dennis Hennigan of Chomerics Test Services.

The transmitter was periodically activated during the emissions scans to measure any motor noise from the Surge Assist System Flex Shaft and DCU.

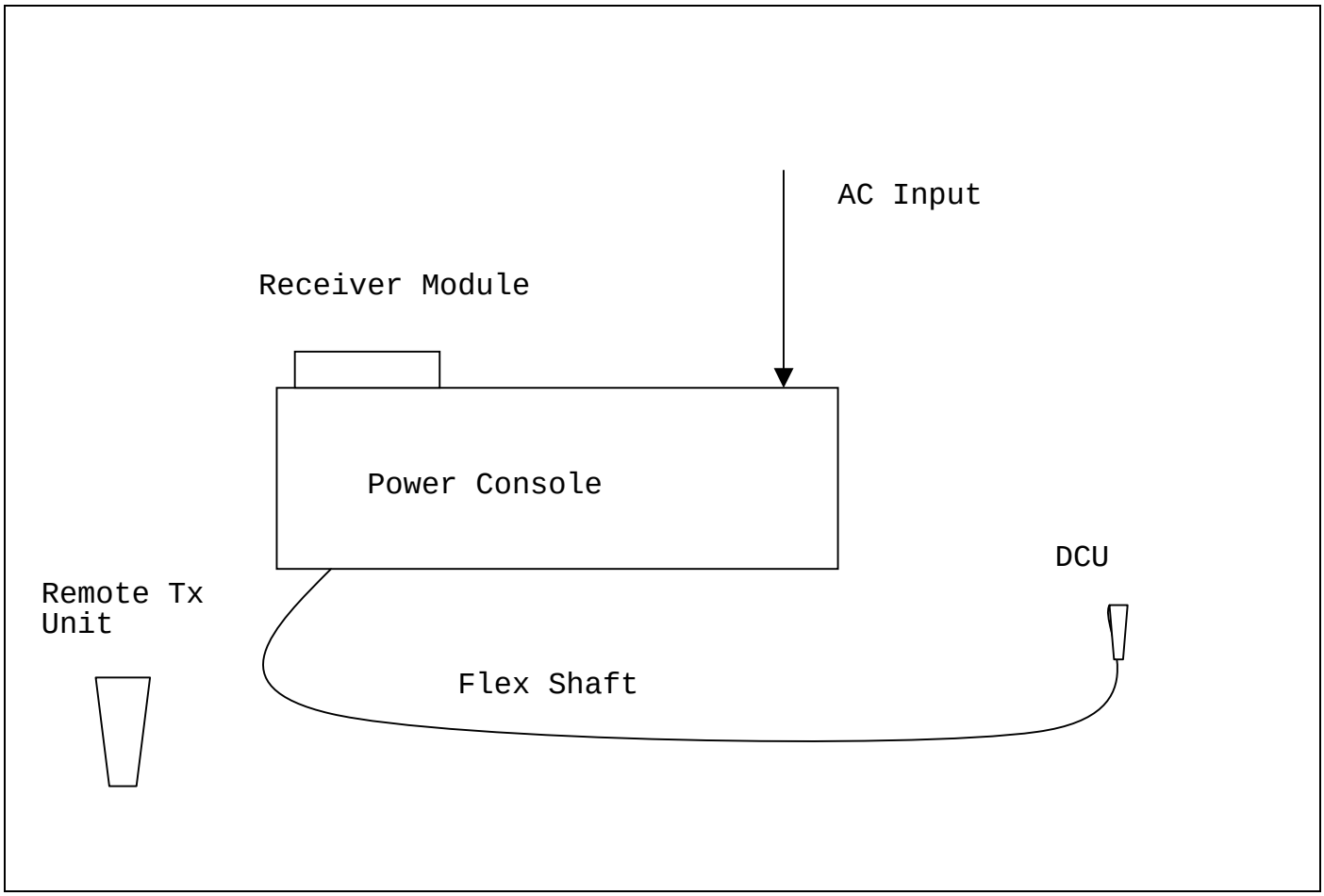
Designation of Emission: 1K96K1D.

The equipment under test was setup as illustrated on CTS-Form-014.

1.4.4 Block Diagram

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM

DATE: JANUARY 16, 2002
TESTED BY: DENNIS HENNIGAN



System Configuration Block Diagram – Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside the testing field.

FORM CTS-014

1.5 Pass/Fail Criteria

For the FCC Part 15 Subpart B Class B tests performed in Open Area Test Site A, the emission levels shall not exceed the Class B limits in the frequency range of .450MHz to 30MHz and 30MHz to 1000MHz for conducted and radiated tests respectively.

For the FCC Part 15 Subpart C, Section 15.231 tests performed in Open Area Test Site A:

a. The emission levels shall not exceed the limits in paragraph b of part 15 Subpart C, Section 5.231.
b. The Bandwidth of the transmitted signal shall not exceed the limits in paragraph c of Part 15 Subpart C, Section 15.231.
c. A manually operated transmitter shall operate within the requirements of paragraph a of Part 15 Subpart C, Section 15.231.

2.0 EMISSIONS TESTS PERFORMED

2.1 FCC Part 15 Subpart B Class B Radiated Electromagnetic Emissions

2.1.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	Tektronix 496 Spectrum Analyzer	1	B010559	10/02
	Tektronix 496 Spectrum Analyzer	77	B020852	1/03
	Tektronix 494 AP Spectrum Analyzer	543	B010201	9/02
	Rhode and Schwartz ESV Test Receiver	15	875931049	9/02
X	Rhode and Schwartz ESV Test Receiver	521	979531/031	1/03
	Hewlett Packard 8447D Pre Amp (Site B)	12	2944A06414	1/03
X	Hewlett Packard 8447F Pre Amp (Site A)	633	2805A3022	8/02
	Electro Metrics ALR-25M Loop Antenna	17	4706	1/03
X	EMCO 3120 Tuned Dipole Antenna B1 (Site A)	474	21	1/03
X	EMCO 3121 Tuned Dipole Antenna B2 (Site A)	475	177	1/03
X	EMCO 3121 Tuned Dipole Antenna B3 (Site A)	476	698	1/03
	EMCO 3120 Tuned Dipole Antenna B1 (Site B)	453	42	1/03
	EMCO 3121 Tuned Dipole Antenna B2 (Site B)	478	176	1/03
	EMCO 3121 Tuned Dipole Antenna B3 (Site B)	455	9501-1101	1/03
	EMCO 3115 Microwave Horn Antenna	376	2796	1/03
	EMCO 3105 Microwave Horn Antenna	78	2118	1/03
	Polarad MDS21 Absorbing Clamp	435	301404/003	NCR
	Log Periodic Antenna 3146	80	3381	1/03
	Biconical Antenna 3109	116	2415	1/03

2.1.2 Test Conditions

Radiated emissions testing was performed with the EUT set up on a wooden table above the turntable at a distance of 3 meters from the tuned dipole antennas within Open Area Test Site A.

The Power Medical Interventions Surge Assist System was configured to operate in the normal mode of operation to maximize the emissions. The Surge Assist System was set up and powered by 110VAC 60Hz for radiated emission tests. The worst case signals detected were recorded.

2.1.3 Test Method

The test method of FCC Part 15 Subpart B Class B was followed for Class A equipment. For the radiated emission measurements, a manual scan was performed from 30MHz to 1000MHz. During this scan, the antenna, turntable and the EUT's cable positions were manipulated to maximize the emission levels in a given frequency band displayed on the spectrum analyzer.

2.1.4 Results

The Power Medical Interventions Surge Assist Transmitter meets the requirements for radiated emissions as required by FCC Part 15 Subpart B Class B, Class B equipment.

The Power Medical Interventions Surge Assist Receiver meets the requirements for radiated emissions as required by FCC Part 15 Subpart B Class B, Class B equipment.

2.1.5 Test Data

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM TRANSMITTER REMOTE
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL
BANDWIDTH: [X] 100 KHZ (PEAK)/120 KHZ (QP)
OTHER (SPECIFY)
FREQUENCY RANGE: [X] 30MHZ – 1 GHZ
[ ] 11.76 GHZ – 12.7 GHZ
OTHER (SPECIFY)

DATE: JANUARY 16, 2002
TEST NUMBER: 1

COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART B CLASS B
PROCEDURE: ANSI C63.4

ANTENNA DISTANCE: [X] 3 METERS
[ ] 10 METERS

FREQUENCY MHZ	PEAK MEASURED LEVEL -dBm	QUASI-PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m ✧	LIMIT dBuV/m (QP)
		No	**Signals**	**Detected**	**Within**	**15dB**		
			of	**The**	**Limit**			
							MDS	
30		**0**				**.2**	**0**	**40**
50		**0**				**4.5**	**5**	**40**
100		**0**				**8.6**	**9**	**40**
250		**0**				**-8.9**	**-9**	**47.5**
500		**0**				**-1.5**	**01**	**47.5**
1000		**0**				**9.3**	**10**	**47.5**

✧All signals greater than 3dB from the limit are calculate to the nearest whole number.
✧Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)
Ambient Temperature: 68°F Humidity: 30% Atmospheric Pressure: 30.3″
NOTES: MDS = Minimum Discernable Signal

FORM CTS-DS-001R

Test Data

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM RECEIVER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL
BANDWIDTH: [X] 100 KHZ (PEAK)/120 KHZ (QP)
OTHER (SPECIFY)
FREQUENCY RANGE: [X] 30MHZ – 1 GHZ
[ ] 11.76 GHZ – 12.7 GHZ
OTHER (SPECIFY)

DATE: JANUARY 16, 2002
TEST NUMBER: 2
COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART B CLASS B
PROCEDURE: ANSI C63.4

ANTENNA DISTANCE: [X] 3 METERS
[ ] 10 METERS

FREQUENCY MHZ	PEAK MEASURED LEVEL -dBm	QUASI-PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m ✧	LIMIT dBuV/m (QP)
57		**25**	**1.5**	**180**	**V**	**5.2**	**30**	**40**
61		**27**	**1.5**	**180**	**V**	**5.3**	**32**	**40**
64		**28**	**1.7**	**170**	**V**	**5.3**	**33**	**40**
66		**33**	**1.5**	**180**	**V**	**5.3**	**38.3**	**40**
69		**32**	**1.5**	**180**	**V**	**5.3**	**37.3**	**40**
71		**26**	**1.5**	**180**	**V**	**6**	**32**	**40**
240		**15**	**1**	**000**	**H**	**17.7**	**33**	**47.5**
244		**12**	**1**	**330**	**H**	**17.7**	**30**	**47.5**
280		**6**	**1**	**060**	**H**	**19.2**	**25**	**47.5**

✧All signals greater than 3dB from the limit are calculate to the nearest whole number.
✧Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)
Ambient Temperature: 68°F Humidity: 30% Atmospheric Pressure: 30.3″
NOTES:

FORM CTS-DS-001R

2.1.6 Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM TRANSMITTER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2002
TEST NUMBER: 1
COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART B CLASS B

Photograph Description: Radiated set-up Transmitter

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM TRANSMITTER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2002
TEST NUMBER: 1
COUPLING DEVICE: ANTENNAS`
TEST SPEC: FCC PART 15 SUBPART B CLASS B

Photograph Description: Radiated set-up Transmitter

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM RECEIVER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2002
TEST NUMBER: 2
COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART B CLASS B

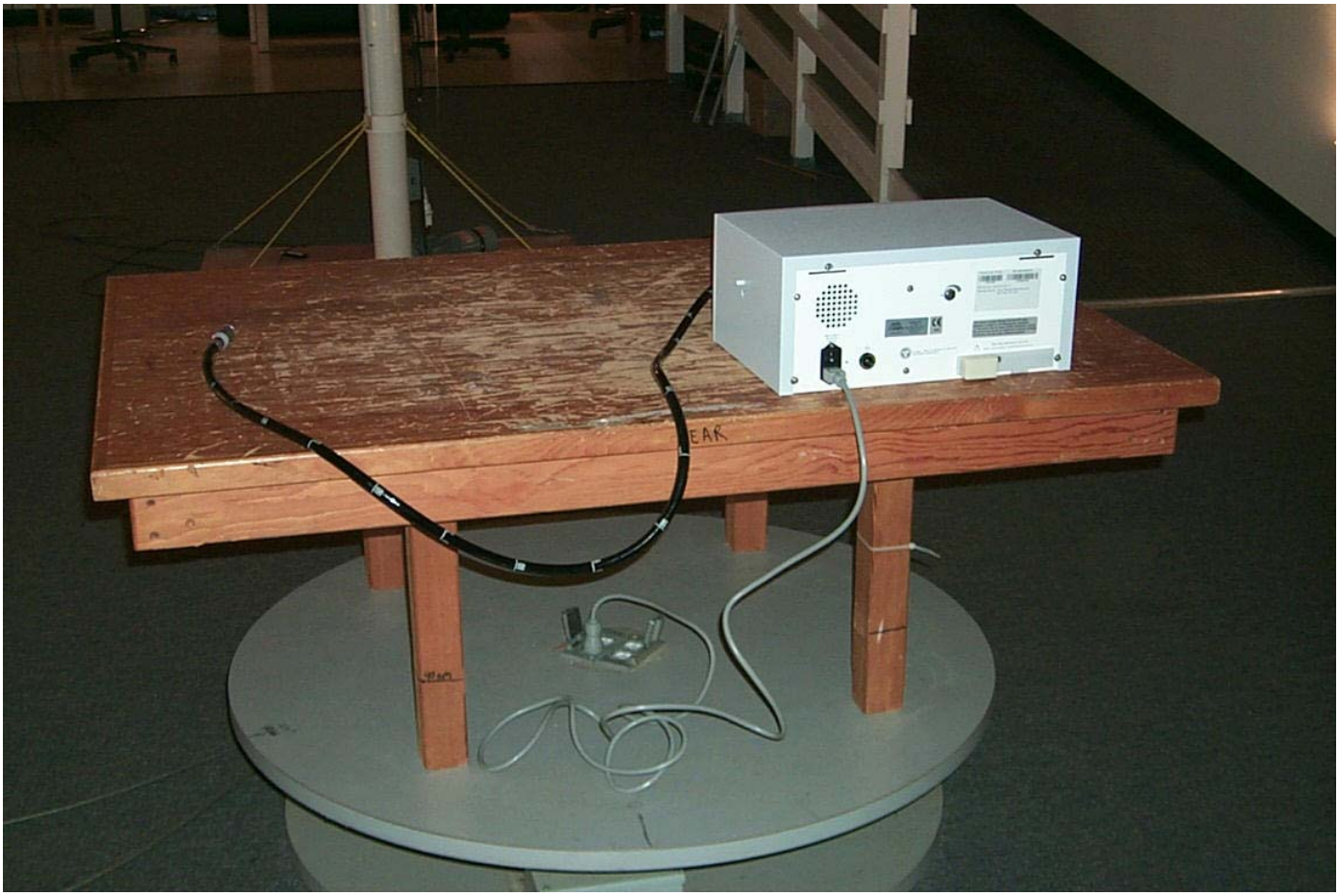
Photograph Description: Radiated set-up Receiver

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2002
TEST NUMBER: 2
COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART B CLASS B



Photograph Description: Radiated set-up Receiver

FORM CTS-PHOTO

2.2 FCC Part 15 Subpart B Class B Conducted Electromagnetic Emissions

2.2.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	Tektronix 496 Spectrum Analyzer	1	B010559	10/02
	Tektronix 496 Spectrum Analyzer	77	B020852	1/03
	Rhode and Schwartz ESH-2 Test Receiver	16	8799631020	9/02
X	Rhode and Schwartz ESH-2 Test Receiver	488	879575/006	2/02
	Polarad ESH2-25 Artificial Mains Network	23	890484/016	1/03
X	EMCO 3810/2NM L.I.S.N.	601	9612-1740	1/03
	EMCO Voltage Probe 3701	499	9604-1130	4/02
	Solar 50 Ohm/50uH L.I.S.N.	20	894305	1/03
	Solar 50 Ohm/50uH L.I.S.N.	21	894307	1/03
	Solar 50 Ohm/50uH L.I.S.N.	22	8923108	1/03

2.2.2 Test Conditions

Conducted emissions testing was performed with the EUT placed on the table and the test receiver connected to the Artificial Mains Network or Line Impedance Stabilization Network (LISN).

The Power Medical Interventions Surge Assist System was configured to operate in the normal mode of operation to maximize the emissions. The Surge Assist System was set up and powered by 110VAC 60Hz for conducted emission tests. The worst case signals detected were recorded.

2.2.3 Test Method

The test method of FCC Part 15 was followed for Class B equipment. A manual scan was performed from .450MHz to 30MHz with the Power Medical Interventions Surge Assist System powered through the Artificial Mains Network or Line Impedance Stabilization Network (LISN).

2.2.4 Results

The Power Medical Interventions Surge Assist Receiver meets the requirements for conducted emissions as required by FCC Part 15, Class B equipment.

The Power Medical Interventions Surge Assist Transmitter does not require conducted emission for hand held internal DC powered devices.

2.2.5 Test Data

CONDUCTED EMISSION MEASUREMENTS

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM RECEIVER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL
BANDWIDTH: [ ] 200 HZ [X] 9 KHZ [ ] 10 KHZ
FREQUENCY RANGE: [ ] 10 KHZ – 30 MHZ
[X] 450 KHZ – 30 MHZ
[X] 110/208 V AC [ ] 240 V AC [ ] OTHER

DATE: JANUARY 16, 2002
TEST NUMBER: 3
COUPLING DEVICE: LISN
TEST SPEC: FCC PART 15 SUBPART B CLASS B
PROCEDURE: ANSI C.63.4
[ ] 150 KHZ – 30 MHZ

[ ] 50 HZ [X] 60 HZ [X] SINGLE ∅ [ ] 3∅

FREQUENCY MHZ	PEAK MEASURED LEVEL dBuV				AVERAGE MEASURED LEVEL dBuV				QUASI-PEAK MEASURED LEVEL dBuV				LIMIT dBuV	
	AØ	BØ	CØ	NØ	AØ	BØ	CØ	NØ	AØ	BØ	CØ	NØ	Average	Quasi-Peak
.450										**34**		**32**	**47**	**57**
.509										**47.5**		**45**	**46**	**56**
.541										**45**		**43**	**46**	**56**
.635										**43**		**42**	**46**	**56**
.891										**36**		**36**	**46**	**56**
1.01										**42**		**42**	**46**	**56**
1.52										**37**		**37**	**46**	**56**
8.5										**37**		**38**	**50**	**60**
10.2										**42**		**43**	**50**	**60**
10.6										**45**		**44**	**50**	**60**
10.8										**44**		**44**	**50**	**60**
11.2										**44**		**45**	**50**	**60**
12.3										**39**		**39**	**50**	**60**

✧All signals greater than 3dB from the limit are calculated to the nearest whole number.
Ambient Temperature: 68°F Humidity: 30% Atmospheric Pressure: 30.3″

FORM CTS-DS-002C

2.2.6 Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM RECEIVER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2002
TEST NUMBER: 3
COUPLING DEVICE: LISN
TEST SPEC: FCC PART 15 SUBPART B CLASS B

Photograph Description: Conducted set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM RECEIVER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2002
TEST NUMBER: 3
COUPLING DEVICE: LISN
TEST SPEC: FCC PART 15 SUBPART B CLASS B

Photograph Description: Conducted set-up

FORM CTS-PHOTO

2.3. FCC Part 15 Subpart C Emission Field Strength and Spurious Emissions (Part 15.231b)

2.3.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
X	Agilent E4440A Spectrum Analyzer	704	USA41421236	1/03
X	Rhode and Schwartz ESV Test Receiver	521	979531/031	1/03
X	EMCO 3121 Tuned Dipole Antenna B3 (Site A)	476	698	1/03
X	EMCO 3115 Microwave Horn Antenna	376	2796	1/03

2.3.2 Test Conditions

The Surge Assist Transmitter was configured to operate in a normal mode of operation. The Surge Assist Transmitter unit used was modified by an internal switch for constant transmit operation. The transmitter was powered by the internal 3.9VDC Lithium AA battery.

The Rhode and Schwartz ESV Test Receiver in the Quasi Peak mode was used to measure the Surge Assist Transmitters power output at a distance of 3 meters from the receiving antenna. The transmit antenna is an integral part of the transmit unit with no external 50Ohm port.

The Agilent E4440A Spectrum Analyzer was used to measure the spurious emissions at a distance of 3 meters from the receiving antennas located on the test table in site A.

2.3.3 Test Method

The power output measurements of Surge Assist Transmitter band was measured at the fixed frequency of 418.04MHz. The frequency of 418.04MHz was found to be the center frequency. The output power was measured with the modified transmitter switched in the constant transmit mode of operation. The spurious emissions were measured between the frequency range of 25MHz to 5GHz.

The Surge Assist Transmitter was tested at the following frequencies:
Power Output:
418.04MHz

Spurious Emissions:
20Mhz to 5GHz

2.3.4 Results

The Power Medical Interventions Surge Assist Transmitter meets the power and spurious emission requirements of FCC Part 15.231 Paragraph b.

2.1.5 Test Data

FUNDEMENTAL POWER MEASUREMENTS

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM TRANSMITTER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 16, 2001
TEST NUMBER: 4
COUPLING DEVICE: ANALYZER
TEST SPEC: FCC PART 15 SUBPART C 15.231

FREQUENCY MHZ	PEAK MEASURED LEVEL -dBm	QUASI-PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m	LIMIT dBuV/m (QP)
418.04		**54**	**1**	**240**	**H**	**23.5**	**77.5**	**80.1**
418.04		**48**	**1**	**050**	**V**	**23.5**	**71.5**	**80.1**

✧All signals greater than 3dB from the limit are calculate to the nearest whole number.
✧Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)
Ambient Temperature: 68°F Humidity: 30% Atmospheric Pressure: 30.3″
NOTES:

FORM CTS-DS-001R

Test Data

SPURIOUS EMISSIONS MEASUREMENTS

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 17, 2001
TEST NUMBER: 5
COUPLING DEVICE: ANALYZER
TEST SPEC: FCC PART 15 SUBPART C 15.231
.2 METER SPACING

FREQUENCY MHZ	PEAK MEASURED LEVEL -dBm	QUASI-PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m	DELTA -dB (QP)	LIMIT -dB (QP)
418.04*		**54**	**1**	**H**	**23.5**	**77.5**		
836.7		**6**	**2.3**	**H**	**31.2**	**37.2**	**40.3**	**20**
1.253		**19**	**1.5**	**H**	**31.2**	**50.2**	**27.3**	**20**
1.673		**24.2**	**1**	**H**	**24.6**	**48.8**	**28.7**	**20**
2.093		**24.3**	**1**	**H**	**27**	**51.3**	**26.2**	**20**

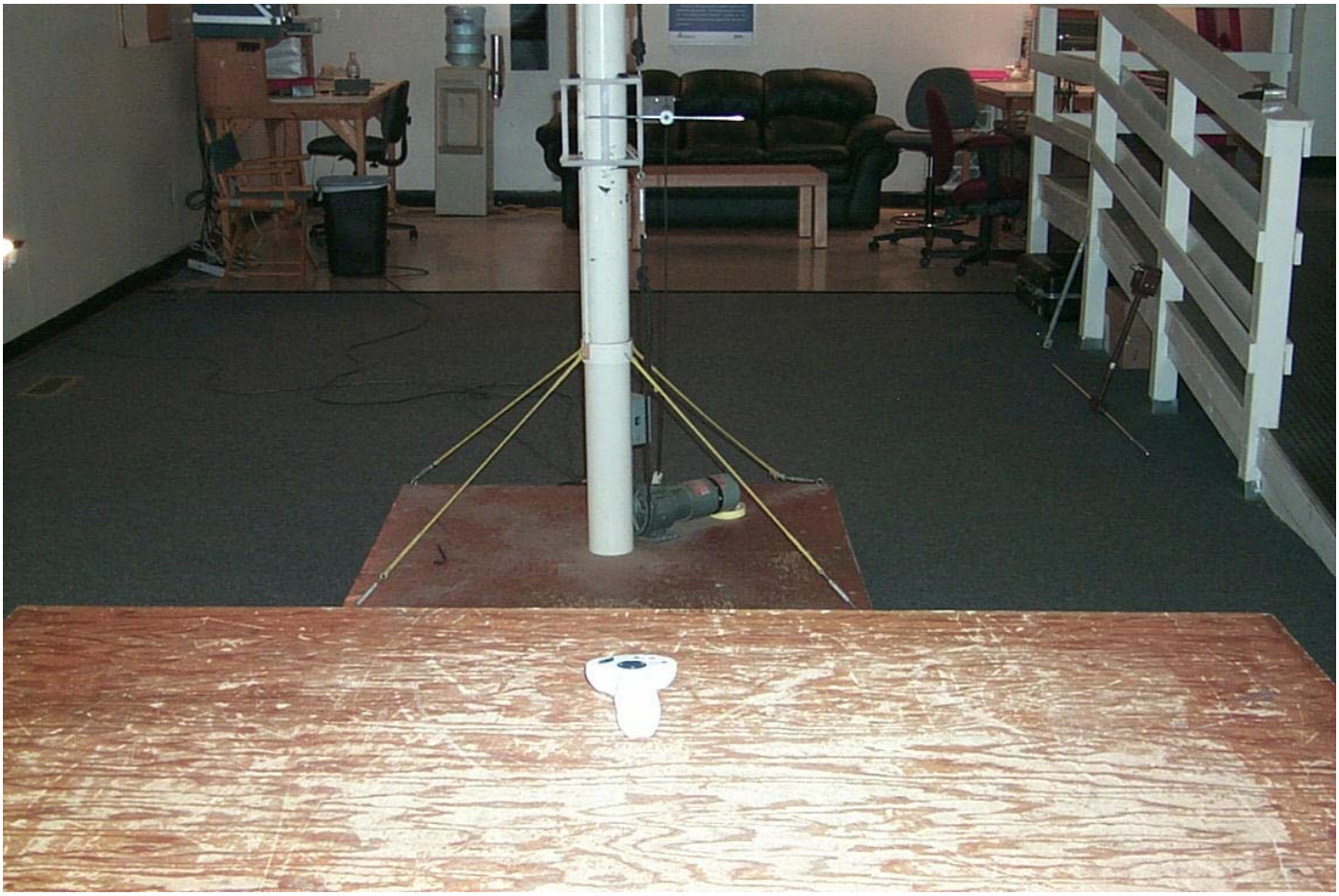
✧All signals greater than 3dB from the limit are calculate to the nearest whole number.
✧Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)
Ambient Temperature: 70°F Humidity: 35% Atmospheric Pressure: 30.1″
NOTES: *= Fundamental Frequency

FORM CTS-DS-001R

2.3.6 Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM TRANSMITTER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 17, 2002
TEST NUMBER: 4 & 5
COUPLING DEVICE: ANALYZER
TEST SPEC: FCC PART 15 SUBPART C 15.231



Photograph Description: Power Emissions set-up

FORM CTS-PHOTO

Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM TRANSMITTER
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 17, 2002
TEST NUMBER: 4 & 5
COUPLING DEVICE: ANALYZER
TEST SPEC: FCC PART 15 SUBPART C 15.231

Photograph Description: **Power Emissions set-up**

FORM CTS-PHOTO

2.4 FCC Part 15 Subpart C Bandwidth Emission (Part 15.231c)

2.4.1 Equipment Used

Test Equipment		Asset #	Serial #	Cal Date
	Agilent E4440A Spectrum Analyzer	704	USA41421236	1/03
X	Rhode and Schwartz ESV Test Receiver	521	979531/031	1/03
X	EMCO 3121 Tuned Dipole Antenna B3 (Site A)	476	698	1/03
	EMCO 3115 Microwave Horn Antenna	376	2796	1/03

2.4.2 Test Conditions

The Surge Assist Transmitter was configured to operate in a normal mode of operation. The Surge Assist Transmitter unit used was modified by an internal switch for constant transmit operation. The transmitter was powered by the internal 3.9VDC AA battery.

The Rhode and Schwartz ESV Test Receiver in the Quasi Peak mode was used to measure the Surge Assist Transmitters RF output bandwidth at a distance of .2 meters from the receiving antenna. The transmit antenna is an integral part of the transmit unit with no external 50Ohm port.

2.4.3 Test Method

The bandwidth measurements of Surge Assist Transmitter was measured at 418.04MHz. The frequency of 418.04MHz was found to be the center frequency. The RF output power was measured with the modified transmitter switched in the constant transmit mode of operation. The bandwidth was determined by measuring the points 20dB down from the modulated carrier.

The Surge Assist Transmitter was tested at the following frequencies:
418.04MHz Center Frequency

2.4.4 Results

The Power Medical Interventions Surge Assist Transmitter meets the bandwidth emission requirements of FCC Part 15.231 Paragraph c.

2.4.5 Test Data

EMISSION BANDWIDTH MEASUREMENTS

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 18, 2001
TEST NUMBER: 6
COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART C 15.231

FREQUENCY MHZ	PEAK MEASURED LEVEL -dBm	QUASI-PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB		20dB BAND WIDTH kHz
			NA	**NA**	**NA**	**NA**		
417.90		**18**						**140**
418.04		**38**						**0**
418.096		**18**						**56**
								=196

✧All signals greater than 3dB from the limit are calculate to the nearest whole number.
✧Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)
Ambient Temperature: 70°F Humidity: 38% Atmospheric Pressure: 30.0″
NOTES:

FORM CTS-DS-001R

2.4.5 Photographic Documentation

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM
TESTED BY: DENNIS HENNIGAN
OPERATING MODE: NORMAL

DATE: JANUARY 18, 2002
TEST NUMBER: 6
COUPLING DEVICE: ANTENNAS
TEST SPEC: FCC PART 15 SUBPART C 15.231

Photograph Description: **Test Setup**

FORM CTS-PHOTO

APPENDIX A

TEST LOG

TEST LOG

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM
PROGRAM:
TESTED BY: DENNIS HENNIGAN

Pre-Test Checklist	Date	Comments
	1/16/02	Test Plan/Procedure: ANSI C63.4 and per Test Specification Test Specification: FCC Part 15 Subpart B, Subpart C 15.231, Class B Chomerics Procedure: CHO TPEC T1 T2 EUT Power Requirement Verified: Voltage 110 Frequency 60 Phase EUT Functional Operational Check: [X] Pass [ ] Fail Environmental: Bonding/Grounding: N/A Safety Issues: N/A

In-Process Test Checklist	Date	Test #	Test Type	Test Equipment Calibrated	Test Performed Properly – Data Accepted	EUT Set-up Check/ Operational Check	EUT Pass/ Fail
			FCC Subpart B				
	1/16/02	1	Transmitter RE	X	X	X	PASS
	1/16/02	2	Receiver RE	X	X	X	PASS
	1/16/02	3	Receiver CE	X	X	X	PASS
			FCC Subpart C				
	1/16/02	4	Fundamental Power	X	X	X	PASS
	1/17/02	5	Spurious Emissions	X	X	X	PASS
	1/18/02	6	Bandwidth	X	X	X	PASS

Post Test Checklist	Date: 1/18/02	EUT Functional Operation Check: [X] Pass [ ] Fail	Test Engineer/Tech	Approved Signatory

FORM CTS-010

APPENDIX B

CUSTOMER SUPPLIED
EUT DESCRIPTION AND OPERATION

Description of Unit:

The Remote Control Unit is a battery powered, hand held device that has transmits control commands to the Power console. A battery capable of supplying power throughout the life of the Remote is permanently installed in the hermetically sealed case. All remotes share the same transmit frequency, but each Remote Control Unit is preprogrammed with a unique identification code. When the Remote is used to power-on the Power Console, this identification code is read and stored by the Console. The Console with the stored identification code will then only respond to commands sent by its corresponding Remote Control.

Interference from other remotes in the area is prevented by the summation of the following:

1. Each command issued from the remote control is of very short duration, the probability of any two remotes being activated at exactly the same time is unlikely.

2. The Remote Control identification number precedes every command sent. The Power Console will only respond to commands sent from the Remote identified when the system was initially turned on.

3. The receiver sensitivity is reduced to minimize long-range reception from possible interfering transmissions. The physical closeness of its own remote with its relatively high RF output level should easily overpower any interfering signal.

The storage capacity of the permanently encapsulated battery is sufficient to power the Remote beyond the life expectancy of the RCU plastic housing when the housing is subjected to continuous sterilization cycles. The on-board microprocessor keeps track of the number of commands sent and transmits this information as part of the command packet. Sufficient capacity will be reserved to complete numerous procedures after a low battery condition is detected and is reported on the Power Console display.

Minimum operating distance (Hand held remote control, from antenna): 1 CM

- Modulation method: Saw based CPCA AM (Pulsed carrier)

- antenna input power (50 ohms): + 4dbm max.
- antenna loss: -5 dB

- Operation: A maximum of fifteen five second transmissions over each six minute time period.
  Max duty cycle (carrier on /carrier off, for each transmission): 0.27

- Average power over 6 minute time period (antenna input): 2 mw * duty cycle
* 75 seconds/360 seconds = 112.5 microwatts

- Occupied bandwidth: < 200 KHz (estimate)

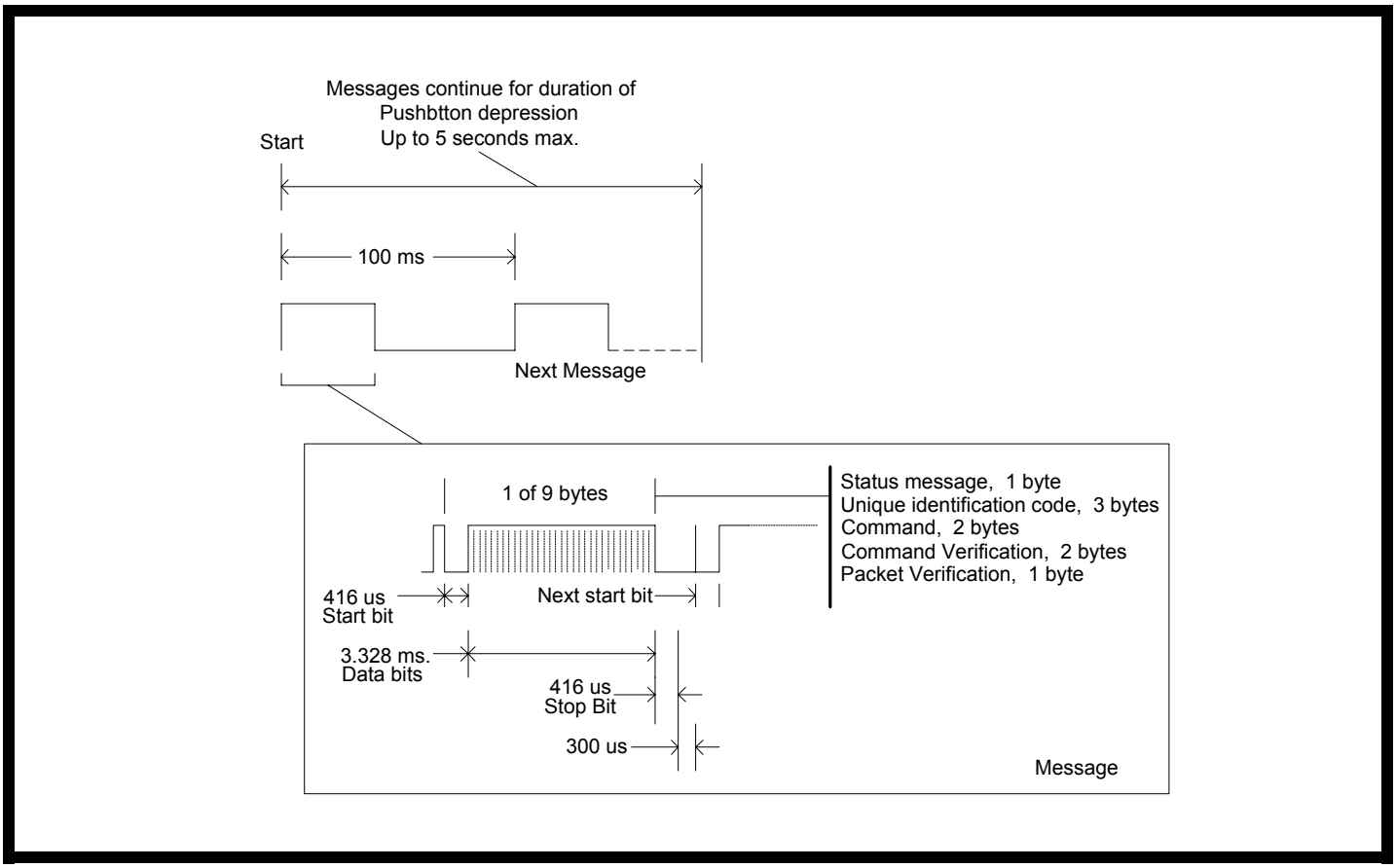
- Fc:418 MHz

APPENDIX C

CUSTOMER SUPPLIED TEST DATA

CUSTOMER: POWER MEDICAL INTERVENTIONS
EQUIPMENT: SURGE ASSIST SYSTEM
TESTED BY: POWER MEDICAL INTERVENTIONS
OPERATING MODE: NORMAL

DATE: JANUARY 2002
TEST NUMBER: CUSTOMER SUPPLIED
COUPLING DEVICE:
TEST SPEC: FCC PART 15



Wireless RCU Data Stream