Wireless 2000

PAM™ 3000

Bed Sensor Panel

(BSP)

FCC ID #: WHQ20000310

MODEL #: 20000310

FCC PT 15.517 & PT 15.249 COMPOSITE DEVICE PT 15.517 INDOOR UWB DEVICE TEST REPORT

Revision 2.0

August 22, 2008

Approved by		
Checked by	David Johanson, Technical Manager	21.Aug.08 Date

Protocol Data Systems Inc, EMC Lab, Abbotsford BC, Canada
SCC ISO/17025 (CAN-P-4E) Accredited Laboratory No. 612
FCC O.A.T.S. Registration Number 96437
Industry Canada O.A.T.S. Registration Number IC3384

Index

Section I: Report of Measurements Testing Information

General Information

Applicant Company Name	Wireless 2000 RF & UWB Technologies Ltd.
Address	2421 Alpha Avenue
	Burnaby, BC V5C 5L2
	Phone: 604-298-8471
	Fax 604-298-8470
	Contact Person: Vlad Goldenberg
	Email: vgoldenberg@wireless2000.com
Product Name	PAM ™3000 Bed Sensor Panel
FCC ID#	WHQ20000310
Applicable Standard	FCC Part 15.517, ANSI C63.4:2003 ; Part 15.207, 15.209
Test Results	Pass
Related Report/s Approval	1) Wireless 2000 15.249 03265-1 Rev 1.0.PDF for Pt 15.249 Low Power device 2) Wireless 2000 FCC IC 03265 Rev 1.0.pdf for Pt 15.209 digital interface portion.
Statement of Compliance	This equipment has been tested in accordance with the standards indentified in the referenced test report. To the best of our knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. – Signature on Front Cover Page.

Equipment Under Test Specification

Manufacturer	Wireless 2000 RF & UWB Technologies Ltd.
Product Description	Bed Sensor Panel
FCC ID	WHQ20000310
Model Number	20000310
Name	PAM ™3000 Bed Sensor Panel
Operating Frequency	3.5-4.5GHz
Emission Designator	UWB
EUT Power Source	5Vdc from Jerome Power Supply
Test Item	Production Unit
Type of Equipment	Mobile
Antennas	Internal PCB
Antenna Connector	permanently attached
Test Voltage	120Vac 60Hz

Test Environment

Test Facility	Protocol Data Systems Inc.
	28945 McTavish Road
	Abbotsford, BC V4X 2E7
	Phone: 604-607-0012
	Fax: 604-607-0019
	Email: info@protocol-emc.com
	Website: www.protocol-emc.com
Test Facility ID's	SCC ISO/17025 (CAN-P-4E) Accredited Laboratory No. 612
	FCC O.A.T.S. Registration Number 96437
	Industry Canada O.A.T.S. Registration Number IC3384
Date Tested	2July08
Tested By	David Johanson

Test Setup

Test Supporting Equipment	120Vac to 5Vdc Power Supply Manufacturer: Jerome Industries Part Number: WSC150M
Test Conditions	Temperature and Humidity: 7.0°C, 87%
Test Exercise e.g. software description, test signal, etc.	The EUT was set for continuous transmit mode of operation.
Deviation from Standard/s	No deviation from Standard
Modification to the EUT	No modifications was made.

Test Equipment List

EMISSION				
Manufacturer	**Model**	**Equipment Description**	**Serial No.**	**Next Cal**
HP	85650A	CDN Quasi-Peak Adapter	2043A00240	18/09/09
HP	85662A	Spectrum Analyzer Display	2318A05184	18/09/09
HP	8566B	Spectrum Analyzer RF Section	2241A02102	18/09/09
HP	85685A	RF-Preselector	3107A01222	18/09/09
Solar	8012-50-R-24	LISN	863092	28/09/08
EMCO	CPA-30	Ant Log Periodic 200-1000MHZ	563	05/12/08
EMCO	3110B	Ant Biconical 20-300MHz	9401-1850	05/12/08
EMCO	3115	DGR Horn At. 1-18GHzMHz	3429	15/12/08
AH Systems	SAS-200/550-1	Active Monopole Antenna	631	08/05/09
EMCO	6502	Active Loop Antenna	9002-2489	28/02/09
Rhientech	Custom	Antenna Mast	N/A	N/A
Protocol EMC	Custom	Turntable	N/A	N/A

Measurement Uncertainty

Parameter	**Uncertainty**
Radio Frequency	±1 x 10-5
Total RF power, conducted	±1,5 dB
RF power density, conducted	±3 dB
Spurious emissions, conducted	±3 dB
All emissions, radiated	±3 dB
Temperature	±1°C
Humidity	±5 %
DC and low frequency voltages	±3 %

Section II: Report of Measurements Test Procedure

Radiation Interference:

The measurement was made per ANSI C63.4-2003 using an Agilent model 8566B spectrum analyzer, a model 85685A Preselector, a model 85650A quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100kHz with an appropriate sweep speed and the video bandwidth was 300kHz up to 1GHz and 1MHz with a VBW greater than or equal to the RBW above 1GHz. When an emission was found, the table was rotated to produce the maximum, signal strength. The EUT was tested in various orientations and rotated to maximize the signal strength. The antenna was placed in both the horizontal and vertical planes for each EUT orientation and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

Formula of Conversion Factors:

The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBμV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the spectrum analyzer meter reading.

Example:

Freq (MHz)	Meter Reading	+ACF	+CL	= FS
33	20 dBμV	+10.36 dB	+0.5	= 30.86 dBμV/m @ 3m

Power Line Conducted Interference:

The procedure used was ANSI C63.4-2003 using a 50μH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned fro 0.15 to 30MHz

Occupied Bandwidth:

A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10dB per division. Due to the size of the Antenna elements in the EUT and the fact that the 4 antenna elements were set to broadcast at the same time, the EUT was placed 5m away from the measurement antenna to ensure that the EUT was measured in the Far Field. The measured field strength was then corrected in accordance with ANSI C63.4:2003 procedures using the formula:

(5meter Meter Reading) + (20 Log (5/3)) = (3meter Meter Reading)

ANSI C63.4-2003 Measurement Procedures:

The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.m side) in various orientations. The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes for each product orientation to verify that the maximum signal strength was measured.

Section III: Report of Measurements to Radiation Interference

Rules Part No.:

Pt 15.517, Pt 15.209

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) μV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) μV/m @ 30 meters
1705 to 30 MHZ	29.54 dBμV/m @ 30 meters
30 – 88	40.0 dBμV/m @ 3 meters
80 – 216	43.5 dBμV/m @ 3 meters
216 - 960	46.0 dBμV/m @ 3 meters
Above 960	54.0 dBμV/m @ 3 meters
Part 15.517 EIRP	
960-1610 MHz	-75.3 dBm @ 3 meters
1610-1990MHz	-53.3 dBm @ 3 meters
1990-3100MHz	-51.3 dBm @ 3 meters
3100-10600MHz	-41.3 dBm @ 3 meters
Above 10600MHz	-51.3 dBm @ 3 meters

Test Data:

Part 15.209 - Even when investigated at 1meter, no frequencies applicable to part 15.209 were found.

Part 15.517 - The procedures af ANSI C63.4:2003 were followed with the exception that the measurement distance was at 5meters to ensure that the product was measured in the Far Field and the measurement was corrected to reflect the 3meter equivalent.

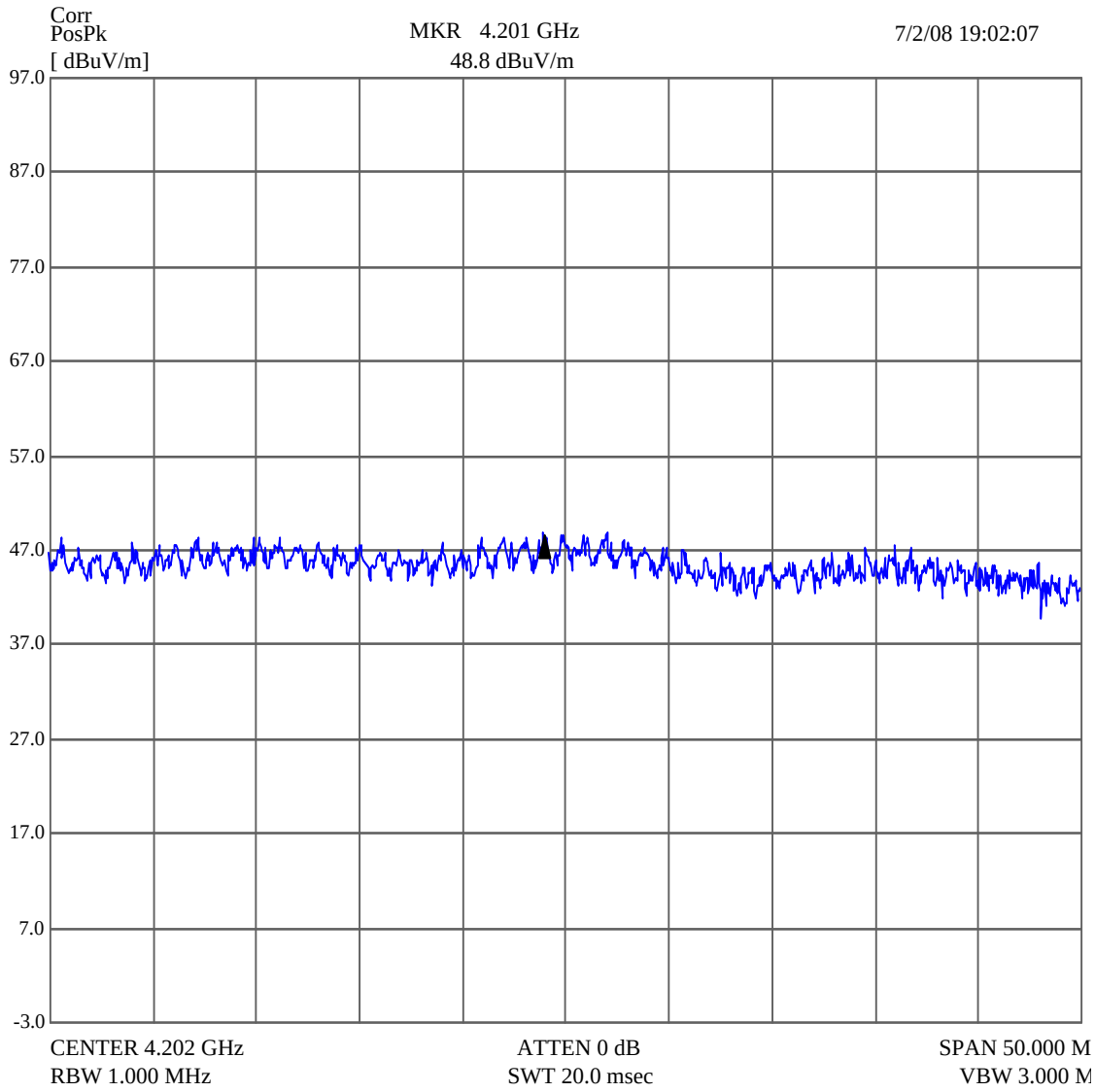
The Meter Reading was measured using the Peak Detector and then automatically corrected by the Correction Factor which is a combination of coax loss(CL), preamp gain (Gamp) and antenna factor(AF). This was further corrected with a “measurement distance” correction factor (Dcf = 20 log (D/3) where D is the measurement distance in meters). The Field Strength = (Meter Reading +AF –(Gamp-CL)) +Dcf

The EIRP limits in dBm were converted to field strength limits in dBμV/m @ 3 meters in accordance with procedures in Part 15.521(g) – F.S.limt = EIRP Limit +95.2.

Emission Frequency GHz	Meter Reading (including correction Factor) dBμV	Antenna Polarity V/H	Distance Correction Factor dB	Field Strength dBμV/m	Field Strength Limit dBμV/m	Margin dB
4.201	48.8	H	4.4	53.2	53.9	0.7

The spectrum was checked to the tenth harmonic and investigated at 0.5 meters and no other frequencies above 5GHz were detected.

Peak Measurement Plot:



Section IV: Report of Measurements to Occupied Bandwidth

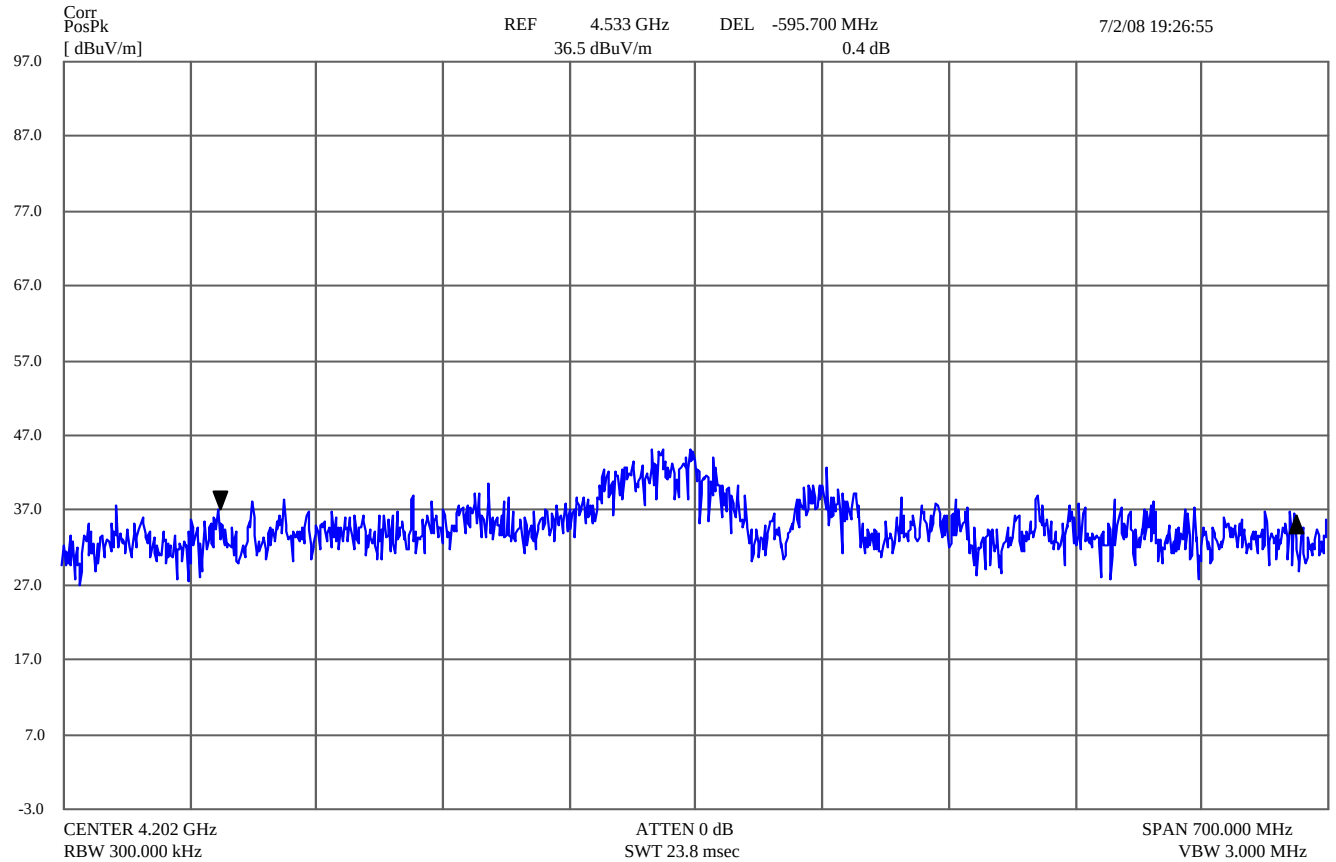
Rules Part No.: Pt 15.517 (b)

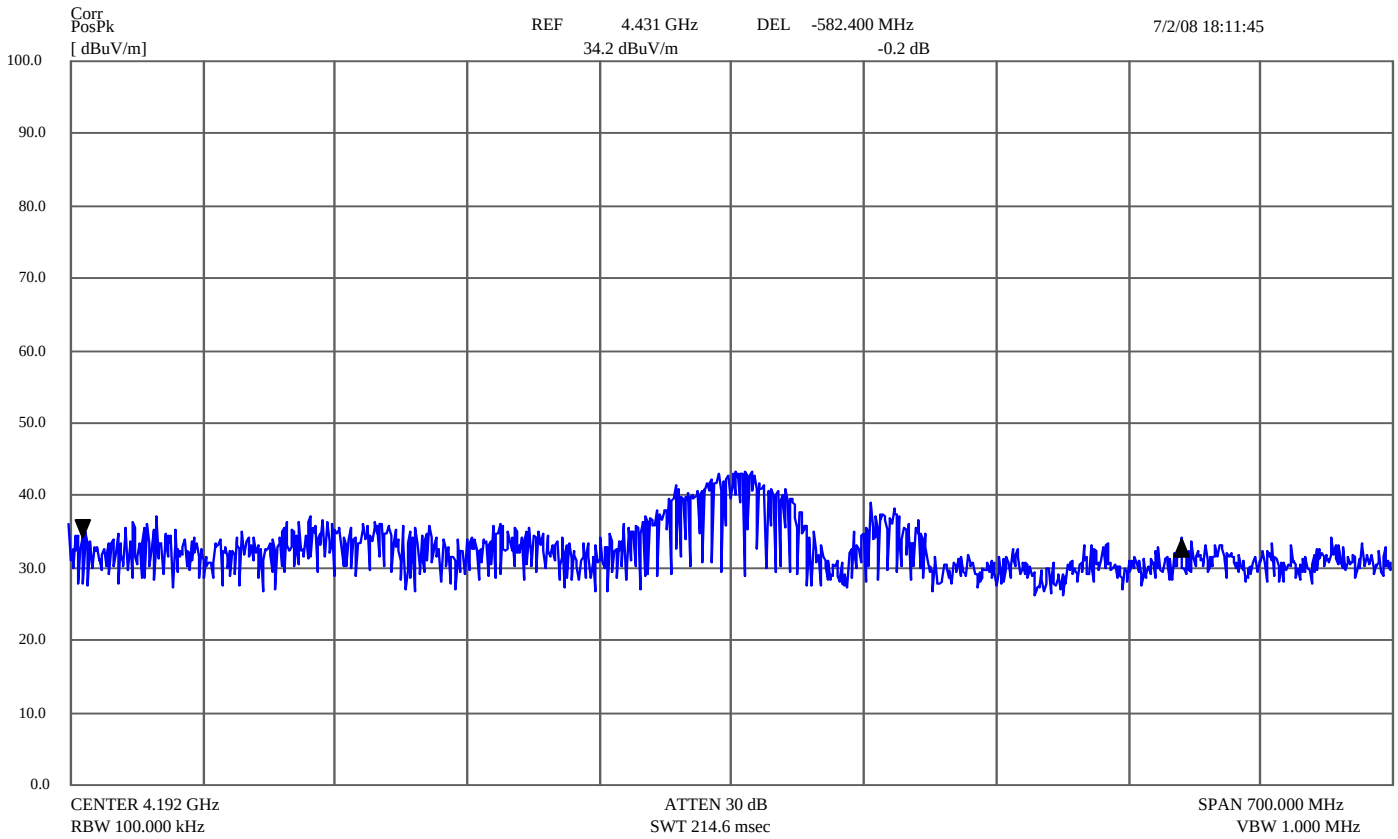
Requirements: The UWB bandwidth must be contained between 3100GHz and 10.6GHz.

Test Data: The measurement was taken at 5meters to ensure that the measurement was done in the Far Field. The measurement was first performed using a RBW of 100kHz to determine the Lowest and Highest frequencies. Then the measurement was performed at 300KHz RBW to determine the 10dB measurement. Due to the distance and the low power of the signal, it was not possible to determine the 10dB BW using 1MHz RBW.

The freq. with the highest emission is: 4.201 GHz
The lower –10dB point is 3.9373 GHz
The upper –10dB point is 4.533 GHz
The 10dB bandwidth at 300kHz RBW is 595.7MHz

Plots:




Corr
PosPk
[dBuV/m]
REF 4.431 GHz
34.2 dBuV/m
DEL -582.400 MHz
-0.2 dB
7/2/08 18:11:45
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
CENTER 4.192 GHz
RBW 100.000 kHz
ATTEN 30 dB
SWT 214.6 msec
SPAN 700.000 MHz
VBW 1.000 MHz

Section V: Report of Maximum Permissible Exposure

Rules Part No.: Pt 1.1310 and 2.1091

Requirements: General Population/Uncontrolled Exposure : 1mW/cm^2

Calculation:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

S = Power Density
P = Power at Antenna Terminal
G = Gain of the Transmit Antenna
EIRP = Effective Isotropic Radiated power
r = Measurement Distance

EIRP Measurement at 3m at 1MHz RBW (peak) = 53.2 dBuV
Conversion to dBm (dBuV – 107) = -53.8 dBm at 300 cm
Conversion to 50MHz RBW (-53.8 + (20log (50/1)) = -19.82 dBm
Conversion to 20cm (-19.82 + (20log (300/20)) = 3.70 dBm at 20 cm
Conversion to mW EIRP ($10^{(3.7/10)}$) = 2.3mW EIRP at 20cm
Power Density = $\frac{2.3}{4\pi(20)^2}$ = 0.000457 mW/ cm^2 at 20cm

Power Density at 10cm = 0.00746 mW/cm^2 at 10cm

Power Density at 5cm = 0.119 mW/cm^2 at 5cm

Power Density at 3cm = 0.922 mW/cm^2 at 3cm

Recommendations: Based on these worst case calculation the EUT is well below the maximum permissible exposure limit of 1mW/cm^2 at 20cm. Further calculations for exposure at closer distances shows that this EUT should be at least 3cm away from the General Population.

Section VI: Report of Measurements to Power Line Conducted Interference

Rules Part No.: Pt 15.207

Requirements:

Frequency MHz	Quasi Peak Limits dBµV	Average Limits dBµV
0.15 – 0.5	66 – 56	56 -46
0.5 – 5.0	56	46
5.0 – 30	60	50

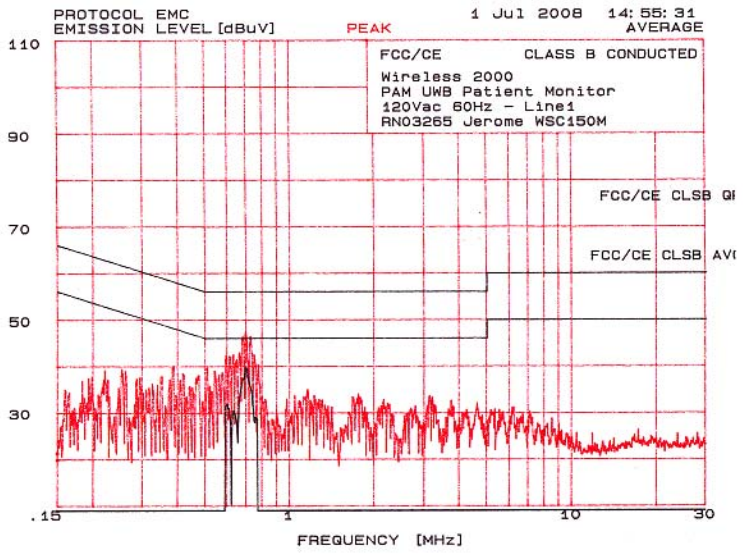
Test Data:

Table 1: Line 1- 120Vac, 60Hz Peak

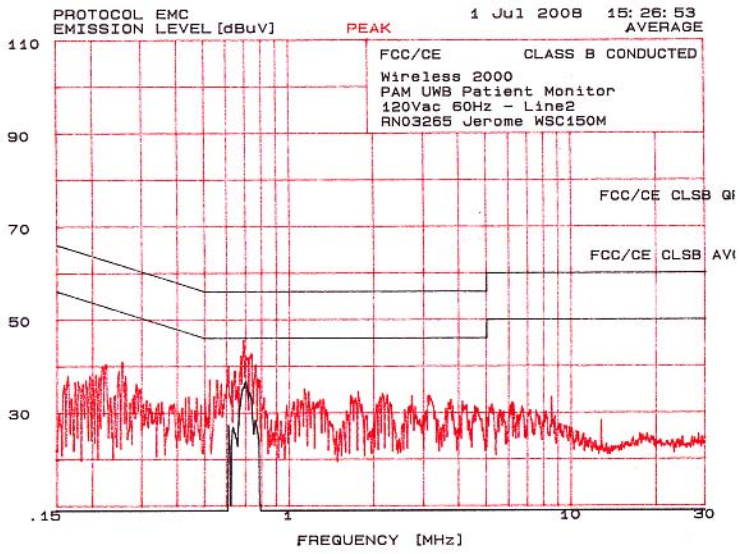
Frequency (MHz)	Limit (dBµV)	DelLim-Pk (dB)
0.6999	47.7	+1.7
0.7263	46.4	-0.4
0.6816	46.3	+0.3
0.6638	43.0	-3.0
0.6329	42.5	-3.5
0.7497	42.5	-3.5
AVERAGE		
0.6999	39.6	-6.4
0.6003	31.8	-14.2
0.6329	30.4	-15.6
0.7577	29.0	-17.0

Table 2: Line 2- 120Vac, 60Hz Peak

Frequency (MHz)	Limit (dBµV)	DelLim-Pk (dB)
0.6889	45.6	-0.4
0.7340	42.7	-3.3
0.6744	42.2	-3.8
0.6999	42.0	--4.0
0.7617	40.4	-5.6
0.6099	40.1	-5.9
AVERAGE		
0.6999	36.6	-9.4
0.7263	34.3	-11.7
0.7977	28.4	-17.6
0.6099	27.3	-18.7
0.6329	26.9	-19.1

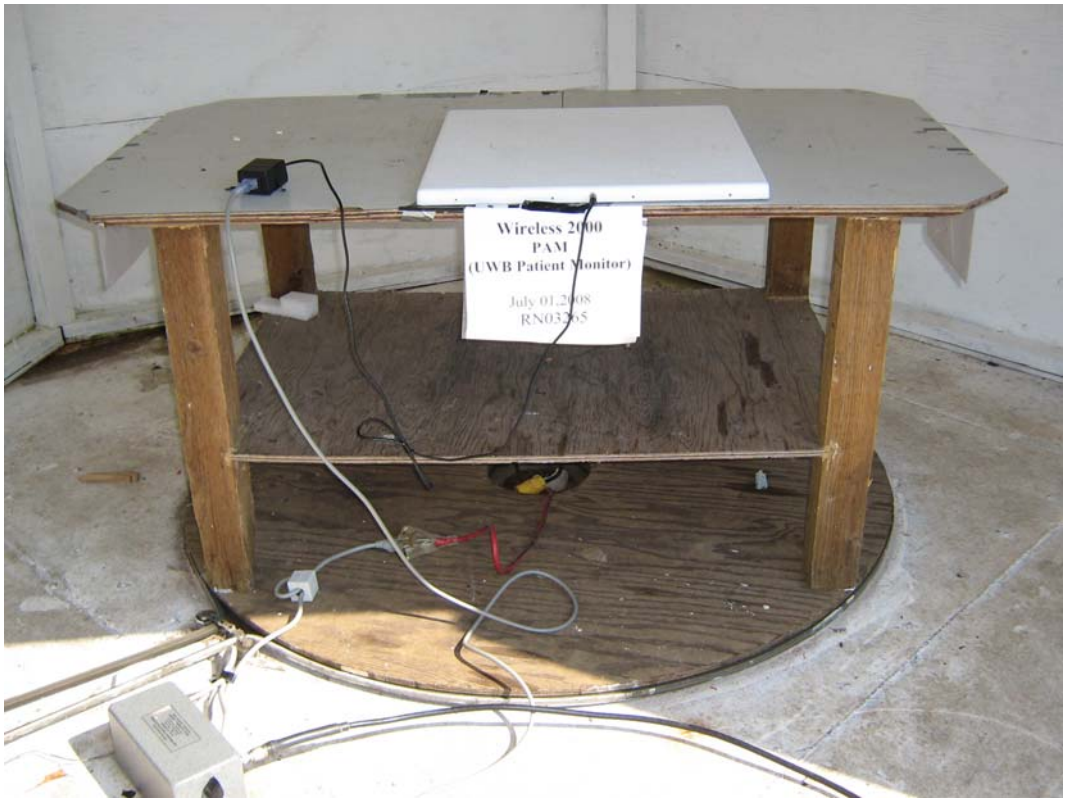


Conducted Emissions Line 1 – 120Vac, 60Hz


PROTOCOL EMC
EMISSION LEVEL [dBuV]
1 Jul 2008 15:26:53
PEAK
AVERAGE
FCC/CE CLASS B CONDUCTED
Wireless 2000
PAM UWB Patient Monitor
120Vac 60Hz - Line2
RN03265 Jerome WSC150M
FCC/CE CLSB QI
FCC/CE CLSB AVI
110
90
70
50
30
.15
1
10
30
FREQUENCY [MHz]

Section VII: Report of Measurements EUT Photos

Test Setup of EUT Front View



Test Setup of EUT for AC Mains Conducted Emissions