

# Wireless 2000

# PAM™ 3000

# Bed Sensor Panel

# (BSP)

**FCC ID #: WHQ20000310**  
**MODEL #: 20000310**

## **FCC PT 15.517 & PT 15.249 COMPOSITE DEVICE** **PT 15.249 LOW POWER DEVICE TEST REPORT**

Revision 2.0

August 21, 2008

Approved by		
Checked by	 David Johanson, Technical Manager	21AUG08 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

This report is for the exclusive use of Protocol Data Systems Customer and is provided pursuant to the agreement between Protocol and its Customer. Protocol's responsibility and liability are limited to the terms and conditions of the agreement. Protocol assumes no liability to any party, other than to the Customer in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Customer is authorized to copy or distribute this report and then only in its entirety. Any use of the Protocol Data Systems name for the sale or advertisement of the tested material, product or service must first be approved in writing by Protocol Data Systems. The observations and test results in this report are relevant only to the sample/s tested.

## Index

Section I:	Report of Measurements Testing Information .....	3
Section II:	Report of Measurements Test Procedure .....	5
Section III:	Report of Measurements to Radiation Interference.....	6
Section IV:	Report of Maximum Permissible Exposure.....	7
Section V:	Report of Measurements to Occupied Bandwidth .....	11
Section VI:	Report of Measurements to Power Line Conducted Interference .....	13
Section VII:	Report of Measurements EUT Photos.....	15

## 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 UWB 15.517 03265-2 Rev 1.0.PDF for Pt 15.517 Indoor UWB 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	902-928MHz
Emission Designator	DSS
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	2April08
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. It was tested using a wireless connection from a remotely located Laptop running the Radiotronics program Wi232DTSTest.exe and the Wireless 2000 program GUI_VitalViewer
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 the 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 antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The EUT was re-positioned to produce the highest emission level. 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 dB $\mu$ V) 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:

$$\begin{array}{llllll} \text{Freq (MHz)} & \text{Meter Reading} & +\text{ACF} & +\text{CL} & = \text{FS} \\ 330 & 20 \text{ dB}\mu\text{V} & +10.36 \text{ dB} & +0.5 & = 30.86 \text{ dB}\mu\text{V/m} @ 3\text{m} \end{array}$$

Where the field strength was too low to get an accurate reading at the required distance of 3meters, the Antenna was moved closer to 1 meter. The resulting measurement was distance corrected for 3 meters by using the formula:

$$(1 \text{ meter result}) - (20\text{Log}(\text{measured distance}/\text{required distance})) = (3 \text{ meter result})$$

Example:

$$1 \text{ meter result} + \text{distance correction} = 3 \text{ meter result}$$

$$54.5 \text{ dB}\mu\text{V} + -9.54\text{dB} = 45 \text{ dB}\mu\text{V}$$

### Power Line Conducted Interference:

The procedure used was ANSI C63.4-2003 using a 50 $\mu$ H LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30MHz. The measurement was performed on an Open Air Test Site at 0.8meters above the horizontal groundplane.

### 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.

### ANSI C63.4-2003 Measurement Procedures:

The EUT was placed in a horizontal orientation, laying flat, on top of 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). 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.

Due to the construction of the EUT, the EUT was also placed in a vertical orientation and rotated on its axis and the emissions were maximized again to identify the highest emission level.

Frequencies less than 1GHz were measured using the Quasi-Peak receiver. Frequencies equal to and greater than 1GHz were measured using the Average receiver

## Section III: Report of Measurements to Radiation Interference

### Rules Part No.:

Pt 15.249, Pt 15.209

Frequency	Limits
<b>Part 15.209</b>	
9 to 490 kHz	2400/F (kHz) $\mu$ V/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) $\mu$ V/m @ 30 meters
1705 to 30 MHz	29.54 dB $\mu$ V/m @ 30 meters
30 – 88	40.0 dB $\mu$ V/m @ 3 meters
80 – 216	43.5 dB $\mu$ V/m @ 3 meters
216 - 960	46.0 dB $\mu$ V/m @ 3 meters
Above 960	54.0 dB $\mu$ V/m @ 3 meters
<b>Part 15.249</b>	
Fundamental 902-928 MHz	94.0 dB $\mu$ V/m @ 3 meters
Fundamental 2.4-2.4835 MHz	94.0 dB $\mu$ V/m @ 3 meters
Harmonics	54.0 dB $\mu$ V/m @ 3 meters

### Test Data:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dB $\mu$ V at 3m	Antenna Polarity V/H	Duty Cycle C.F. (dB)	Coax Loss dB	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Margin dB
902.725	902.738	63.8	H	-34.6	6.4	22.3	57.9	36.1
902.725	1805.476	4.2	H	-34.6	11.0	28.8	9.4	44.5
902.725	2708.176	1.3	H	-34.6	15.6	31.4	13.7	40.3
902.725	3610.911	1.4	H	-34.6	17.6	31.0	15.4	38.6
915.152	914.514	57.7	H	-34.6	7.0	22.4	52.5	41.5
915.152	1830.406	8.5	H	-34.6	11.4	29.0	14.3	39.7
915.152	2745.616	1.8	H	-34.6	15.9	31.5	14.6	39.4
915.152	3660.847	0.9	H	-34.6	18.2	33.9	18.4	35.6
926.041	926.532	40.2	H	-34.6	6.6	22.5	34.7	59.3
926.041	1852.081	9.3	H	-34.6	11.3	29.1	15.1	38.9
926.041	2778.124	5.5	H	-34.6	16.0	31.6	18.5	35.5
926.041	3764.167	3.8	H	-34.6	18.4	34.1	21.7	32.3

No Other emissions were detected. The spectrum was checked to the tenth harmonic.

## Section IV: Report of Maximum Permissible Exposure

**Rules Part No.:** Pt 1.1310 and 2.1091

**Requirements:** General Population/Uncontrolled Exposure :  $1\text{mW/cm}^2$

**Calculation:**

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

S = Power Density

P = Power at Antenna Terminal

G = Gain of the Transmit Antenna

EIRP = Effective Isotropic Radiated power

r = Measurement Distance

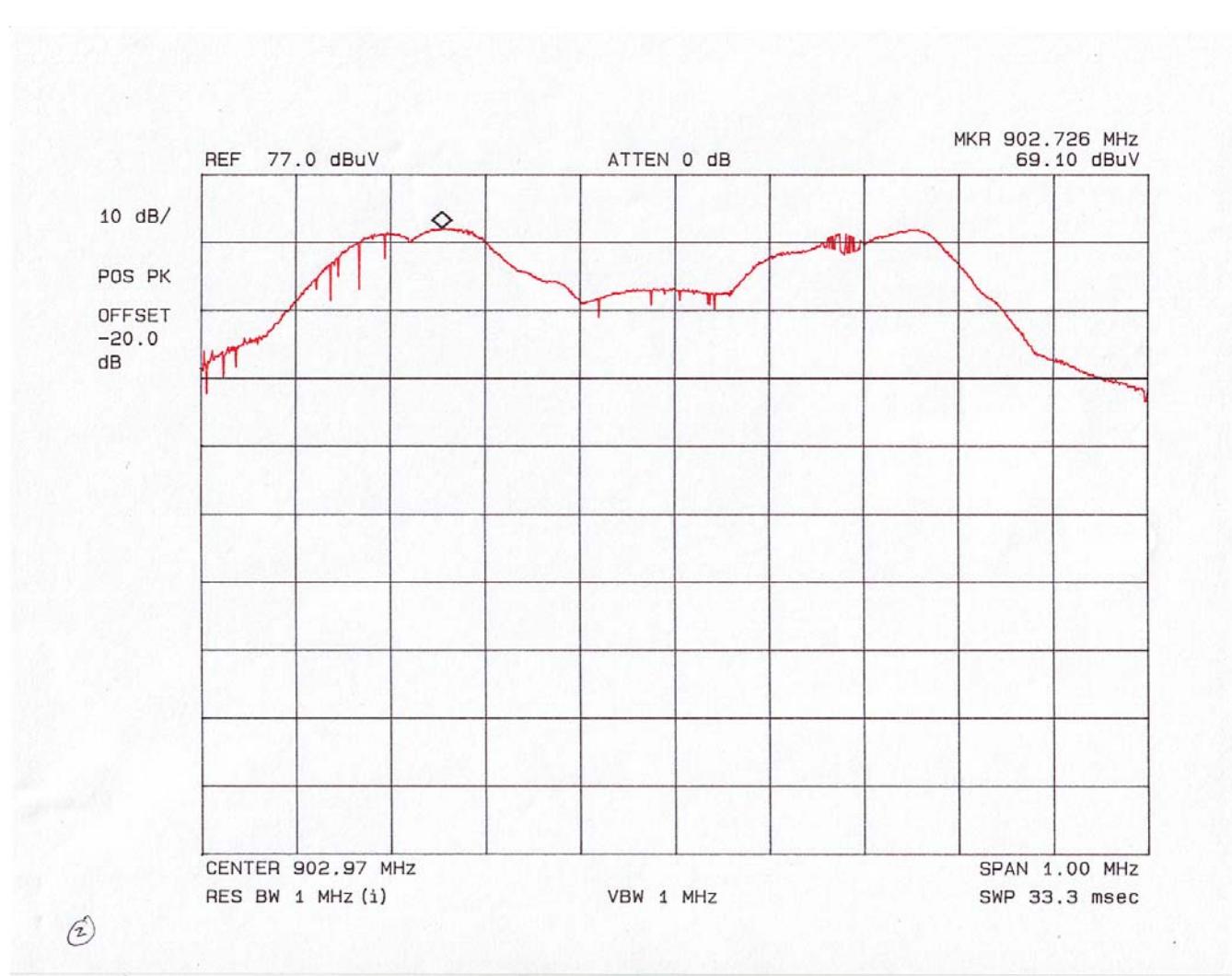
$$\begin{aligned} \text{EIRP Measurement at 3m at 1MHz RBW (peak)} &= 63.8 \text{ dBuV} \\ \text{Conversion to dBm (dBuV} - 107) &= -43.2 \text{ dBm at 300 cm} \\ \text{Conversion to 20cm } (-43.2 + (20\log(300/20))) &= -19.68 \text{ dBm at 20 cm} \\ \text{Conversion to mW EIRP } (10^{\frac{-19.68}{10}}) &= 0.011\text{mW EIRP at 20cm} \\ \text{Power Density} = \frac{0.011}{4\pi(20)^2} &= 0.000002 \text{ mW/cm}^2 \text{ at 20cm} \end{aligned}$$

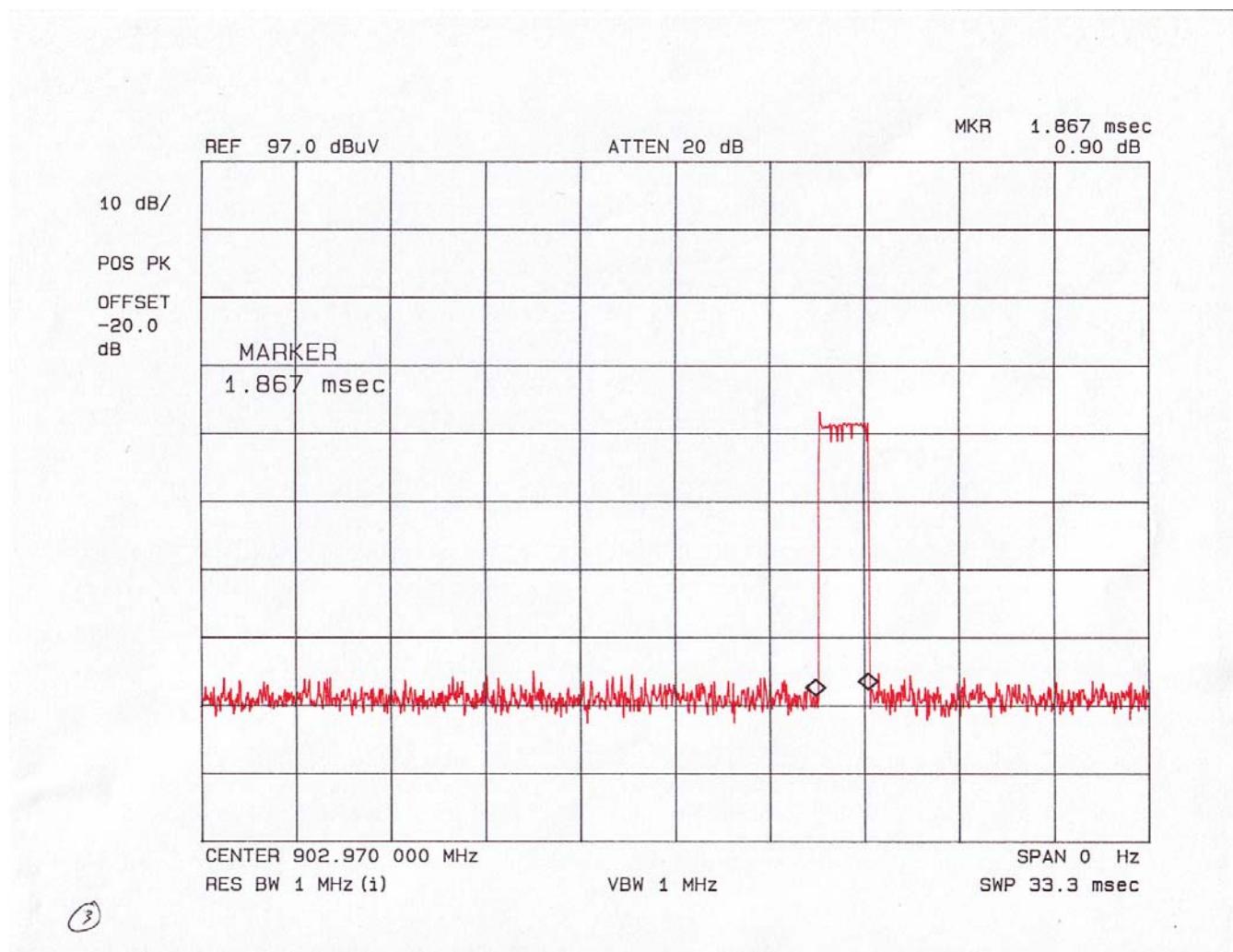
$$\text{Power Density at 3cm} = 0.004 \text{ mW/cm}^2 \text{ at 3cm}$$

$$\text{Power Density at 1cm} = 0.342 \text{ mW/cm}^2 \text{ at 1cm}$$

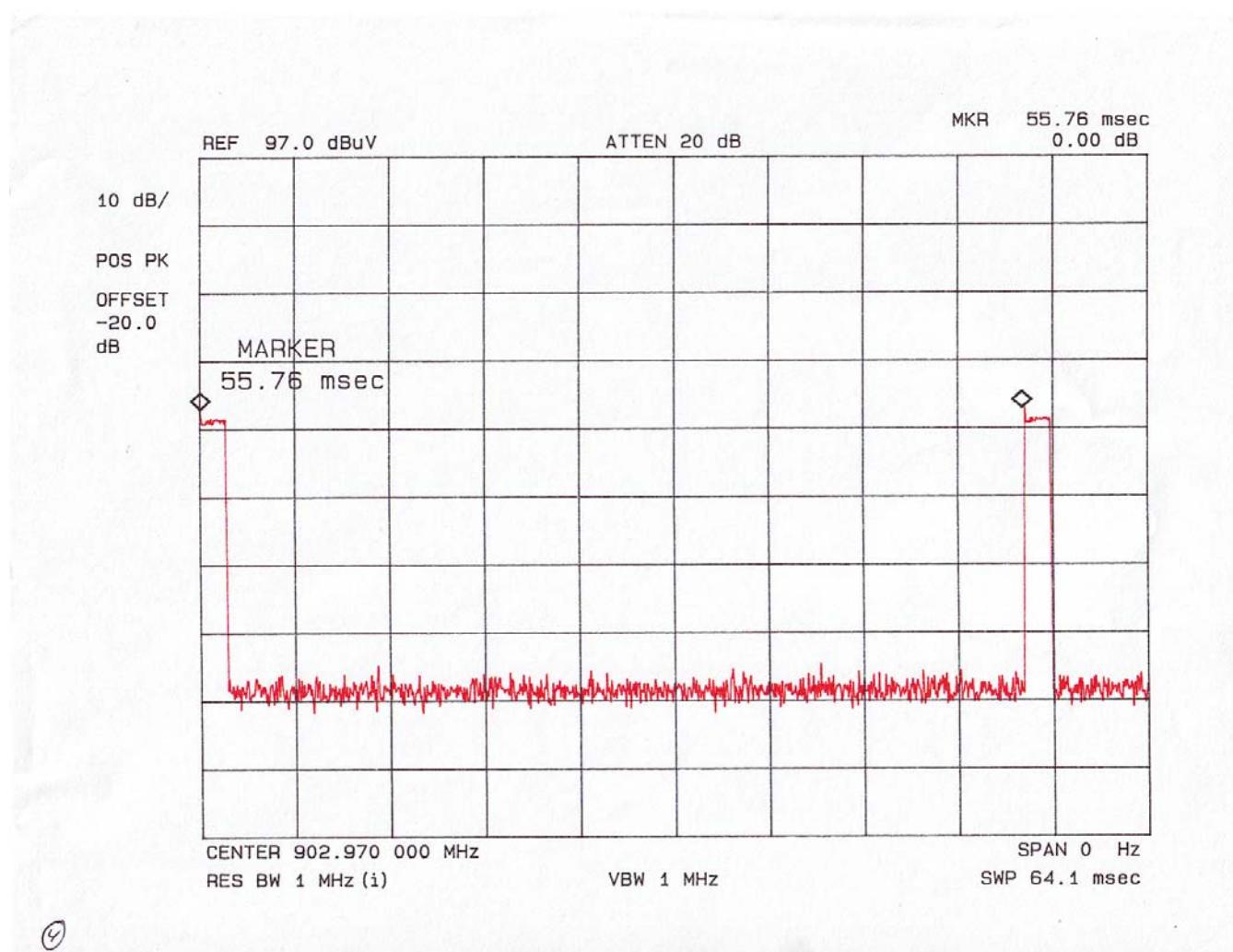
**Recommendations:**

Based on these worst case calculations the EUT is well below the maximum permissible exposure limit of  $1\text{mW/cm}^2$  at 20cm. Further calculations for exposure at closer distances shows that this EUT could be at least 1cm away from the General Population.





Pulse Duration



Pulse Spacing

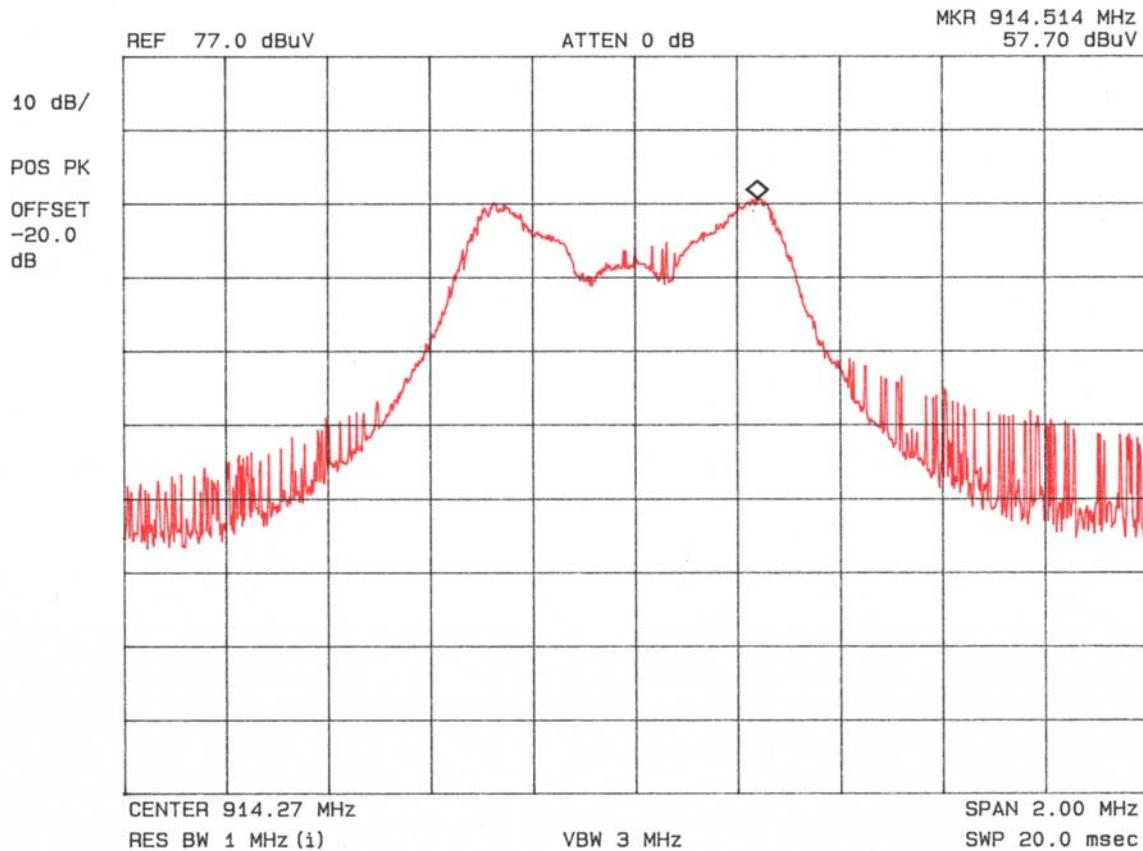
## **Section V: Report of Measurements to Occupied Bandwidth**

**Rules Part No.:** Pt 15.249. (d)

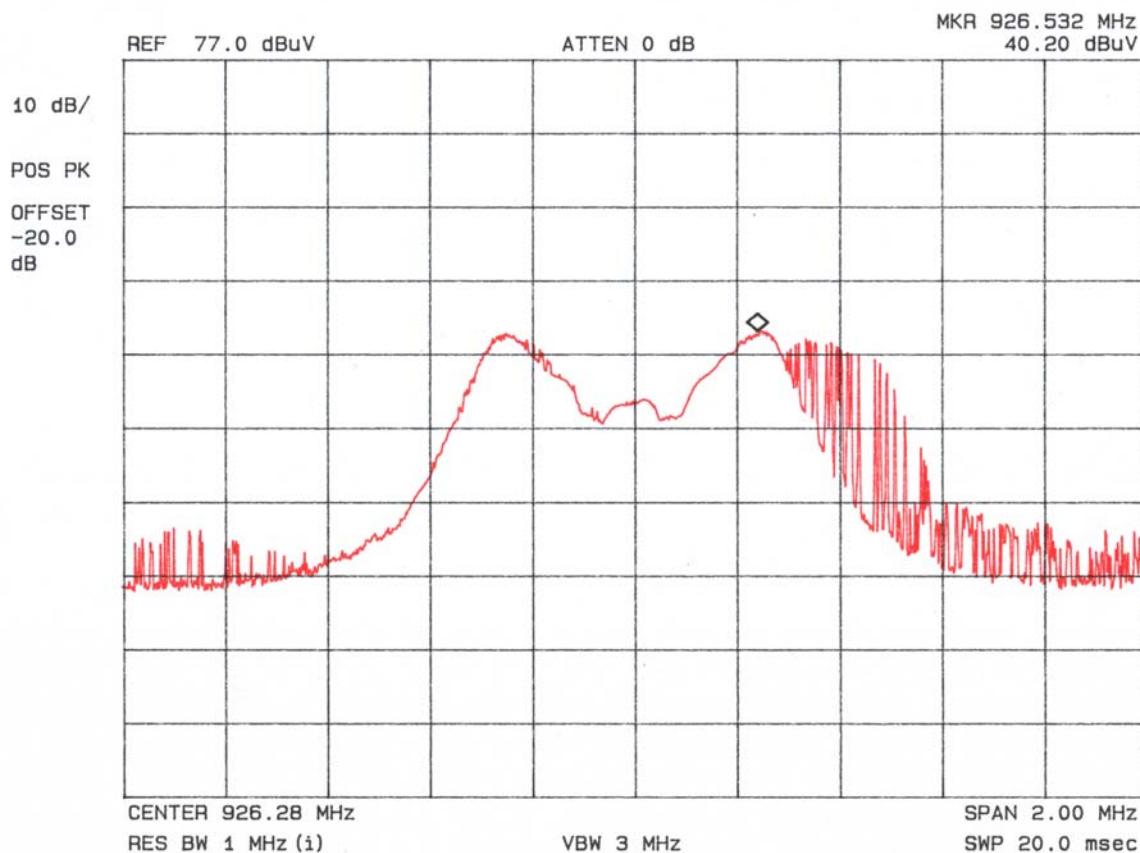
**Requirements:** The field strength of any emissions appearing outside the bandedges and up to 10kHz and below the band edges shall be attenuated at least 50dB below the Level of the carrier or to the general limits of 15.209. Which ever is the lesser

### **Test Data:**

All emissions at the band edges are below the 15.209 limit line.



### Low Frequency Band Edge.



High Frequency Band Edge.

## Section VI: Report of Measurements to Power Line Conducted Interference

Rules Part No.:

Pt 15.207

Requirements:

Frequency MHz	Quasi Peak Limits dB $\mu$ V	Average Limits dB $\mu$ V
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

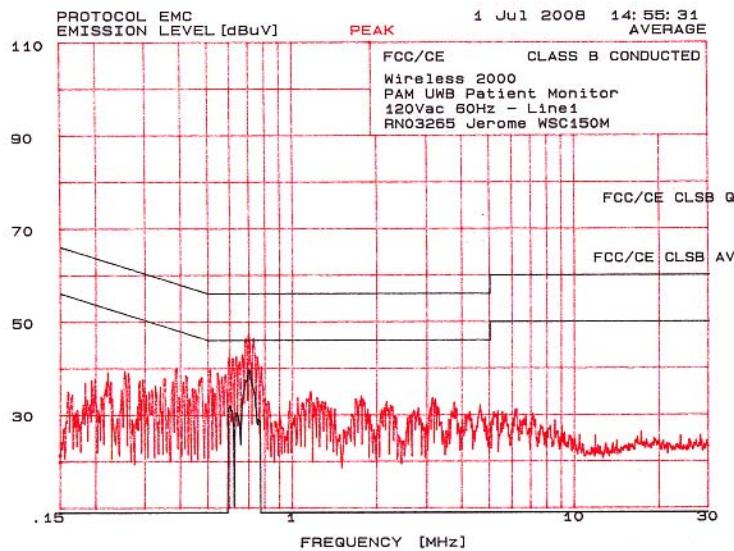
### Test Data:

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

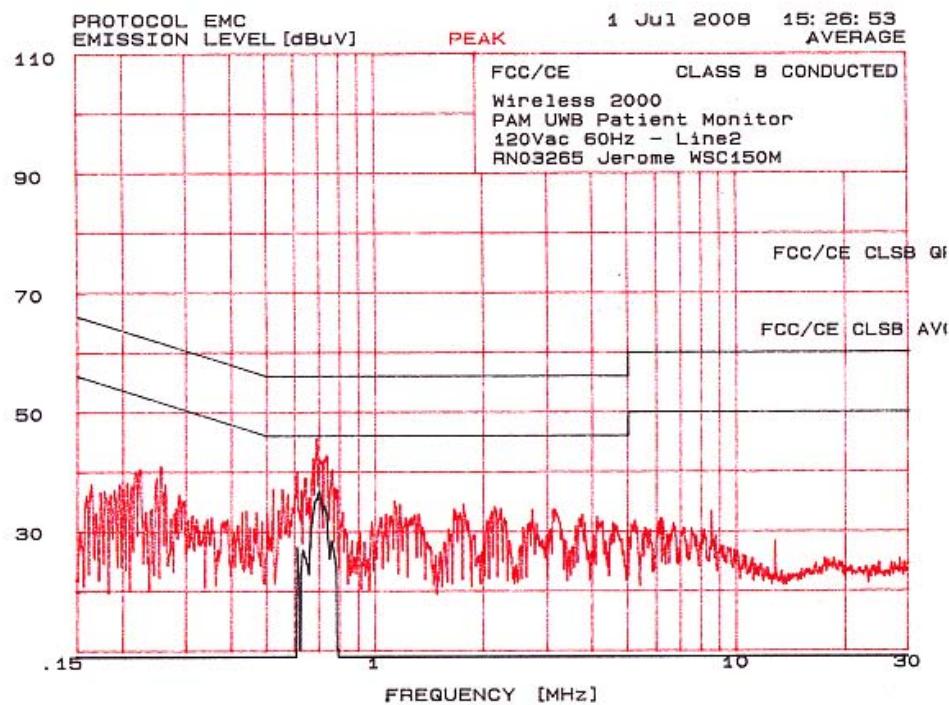
Frequency (MHz)	Limit (dB $\mu$ V)	DeLLim-Pk (dB)
0.6999	47.7	+1.7
0.7263	46.4	-0.4
0.6816	46.3	+0.3
0.6638	43.0	-3.0
0.6329	42.5	-3.5
0.7497	42.5	-3.5
AVERAGE		
0.6999	39.6	-6.4
0.6003	31.8	-14.2
0.6329	30.4	-15.6
0.7577	29.0	-17.0

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

Frequency (MHz)	Limit (dB $\mu$ V)	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



Conducted Emissions Line 2 – 120Vac, 60Hz

## Section VII: Report of Measurements EUT Photos



Test Setup of EUT Front View



Test Setup of EUT for AC Mains Conducted Emissions