L.S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012
262-375-4400 Fax: 262-375-4248

COMPLIANCE TESTING OF:

Criticare 802.11 Radio Transceiver In the Veris 8600 Systems

PREPARED FOR:

Criticare Systems, Incorporated
Attention: Mr. Robert Smith
20925 Crossroads Circle
Waukesha, WI 53186-4054

TEST REPORT NUMBER:

304348-Tx-v1 TCB Rev. 1

TEST DATE(S):

July 14TH to August 31ST, 2004

Table of Contents

1. L. S. Compliance In Review

L.S. Compliance - Accreditations and Listing's

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025 : 1999
with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: 1255.01

Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948
FCC Registration Number: 90756

Listing of 3 and 10 meter OATS based on Title 47CFR – Part 2.948
FCC Registration Number: 90757

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1
File Number: IC 3088-A

On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1
File Number: IC 3088

U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a U. S. Competent Body operating under the U. S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility –Council Directive 89/336/EEC, Article 10.2.
Date of Validation: January 16, 2001

Validated by the European Commission as a U.S. Notified Body operating under the U.S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Telecommunication Equipment – Council Directive 99/5/EC, Annex V.

Date of Validation: November 20, 2002
Notified Body Identification Number: 1243

2. A2LA Certificate

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

L.S. COMPLIANCE, INC.
Cedarburg, WI

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002 (1994).

Presented this 26th day of March 2003.

President
For the Accreditation Council
Certificate Number 1255.01
Valid to January 31, 2005

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

3. Scope of Accreditation

American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

L.S. COMPLIANCE, INC.
W66 N220 Commerce Court
Cedarburg, WI 53012
James Blaha Phone: 262 375 4400

ELECTRICAL (EMC)

Valid to: January 31, 2005 Certificate Number: 1255-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests:

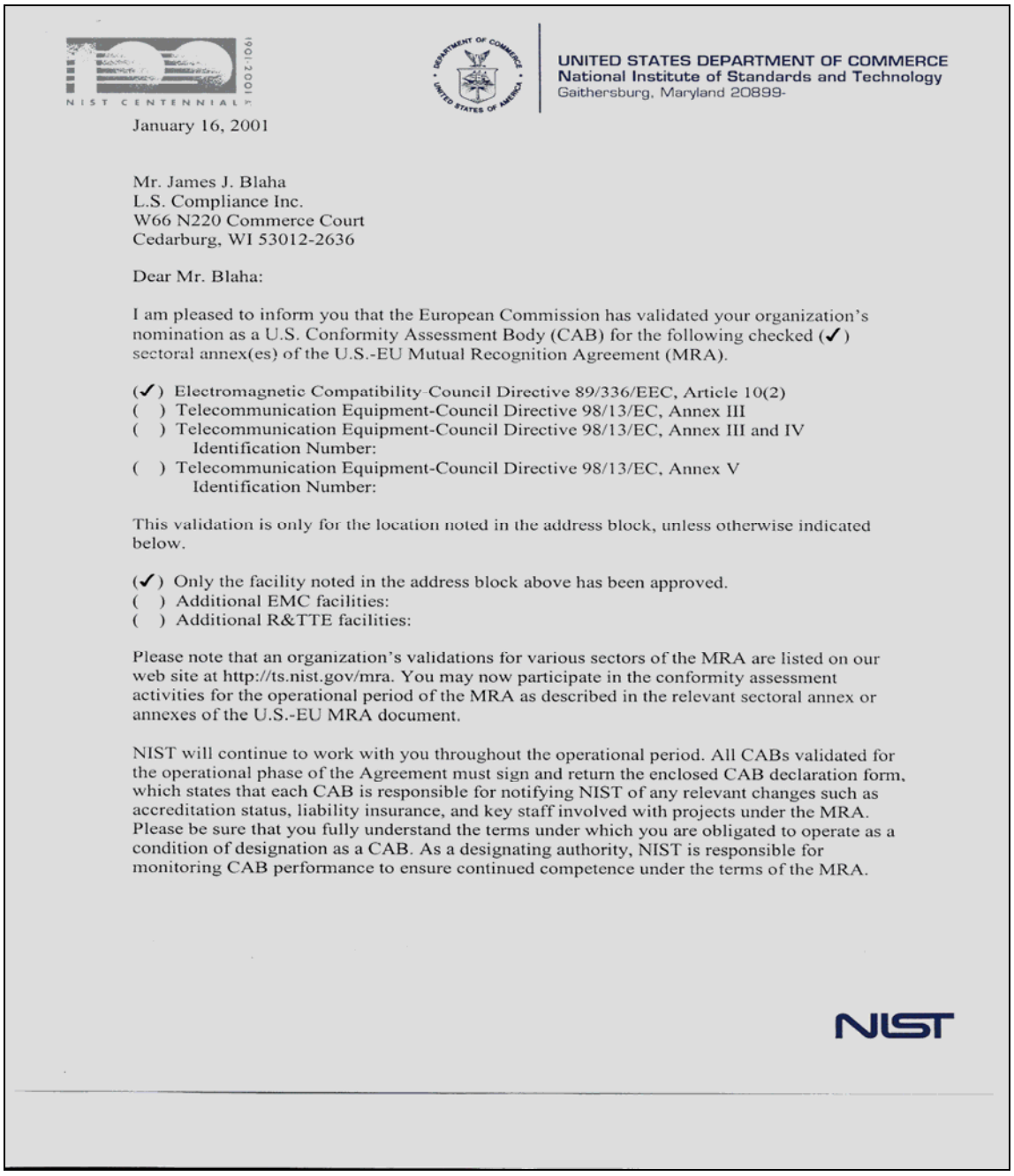
Test	Test Method(s)
Emissions	
Conducted	
Continuous/Discontinuous	Code of Federal Regulations (CFR) 47, FCC Method Parts 15, 18 using ANSI C63.4; EN: 55011, 55022, 50081-1, 50081-2; CISPR: 11, 12, 14-1, 22; CNS 13438
Radiated	Code of Federal Regulations (CFR) 47, FCC Method Parts 15, 18 using ANSI C63.4; EN: 55011, 55022, 50081-1, 50081-2; CISPR: 11, 12, 14-1, 22; CNS 13438
Current Harmonics	IEC 61000-3-2; EN 61000-3-2
Voltage Fluctuations & Flicker	IEC 61000-3-3; EN 61000-3-3
Immunity	EN: 50082-1, 50082-2 EN 61000-6-2 CISPR: 14-2, 24
Conducted Immunity	
Fast Transients/Burst	IEC 61000-4-4; EN 61000-4-4
Surge	IEC: 61000-4-5; ENV 50142; EN 61000-4-5
RF Fields	IEC: 61000-4-6; ENV 50141; EN 61000-4-6
Voltage Dips/Interruptions	IEC 61000-4-11; EN 61000-4-11

Roxanne M. Robinson

(A2LA Cert. No. 1255-01) 05/13/03 Page 1 of 2

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644 3248 • Fax: 301-662 2974

4. Validation Letter – U.S. Competent Body for EMC Directive 89/336/EEC



NIST CENTENNIAL 1901-2001

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

January 16, 2001

Mr. James J. Blaha
L.S. Compliance Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012-2636

Dear Mr. Blaha:

I am pleased to inform you that the European Commission has validated your organization's nomination as a U.S. Conformity Assessment Body (CAB) for the following checked (✓) sectoral annex(es) of the U.S.-EU Mutual Recognition Agreement (MRA).

(✓) Electromagnetic Compatibility–Council Directive 89/336/EEC, Article 10(2)
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III and IV
Identification Number:
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex V
Identification Number:

This validation is only for the location noted in the address block, unless otherwise indicated below.

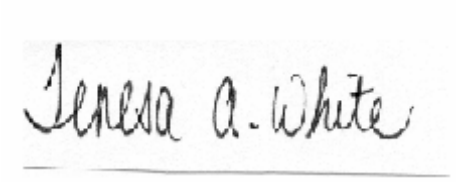
(✓) Only the facility noted in the address block above has been approved.
( ) Additional EMC facilities:
( ) Additional R&TTE facilities:

Please note that an organization's validations for various sectors of the MRA are listed on our web site at http://ts.nist.gov/mra. You may now participate in the conformity assessment activities for the operational period of the MRA as described in the relevant sectoral annex or annexes of the U.S.-EU MRA document.

NIST will continue to work with you throughout the operational period. All CABs validated for the operational phase of the Agreement must sign and return the enclosed CAB declaration form, which states that each CAB is responsible for notifying NIST of any relevant changes such as accreditation status, liability insurance, and key staff involved with projects under the MRA. Please be sure that you fully understand the terms under which you are obligated to operate as a condition of designation as a CAB. As a designating authority, NIST is responsible for monitoring CAB performance to ensure continued competence under the terms of the MRA.

NIST

5. Signature Page



Prepared By: December 6, 2004

Teresa A. White, Document Coordinator Date

Tested By: December 6, 2004

Abtin Spantman, EMC Engineer Date

Approved By: December 6, 2004

Kenneth L. Boston, EMC Lab Manager Date
PE #31926 Licensed Professional Engineer
Registered in the State of Wisconsin, United States

6. Product and General Information

Manufacturer:	**Criticare Systems, Inc.**					
Date(s) of Test:	**July 14th- August 31st, 2004**					
Test Engineer(s):		**Tom Smith**	√	**Abtin Spantman**		**Ken Boston**
Model #:	**8600 Main and 8600 Remote**					
Serial #:	**404017600 and 404017417 respectively**					
Voltage:	**100-240VAC and 50/60Hz**					
Operation Mode:	**Continuous Transmit - modulated, and Normal modes.**					

7. Introduction

Between July 14th and August 31ST , 2004, a series of Conducted and Radiated Emission tests were performed on two samples of the "DPAC Airborne™" transceiver modules as installed in the Criticare Systems' Veris, Model Number 8600 units. The first unit tested was the transceiver installation in the Veris 8600 'Main' unit, serial number 404017600, and the second unit tested was the installation in the Veris 8600 'Remote' unit, serial number 404017417. The transceiver radio module is referred to as the "*Equipment Under Test*" or "*EUT*". The transceiver modules were identical, and the wireless-link implementations are the same in both the remote and main units. The difference between the two devices was in the host, and not the wireless link. This report identifies the 'Main' unit host as the primary EUT because of the more complex nature of peripheral connections, and having the highest measured emissions during the preliminary investigations. The 'Remote' host unit was considered a secondary permutation to be investigated and verified. Where there are any differences between the 'Main' and 'Remote' unit host implementations, the worst-case data from both conditions are presented.

These tests were performed using the procedures outlined in ANSI C63.4-2003 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.209 (Industry Canada RSS-210) for a transmitter or digital device. These tests were performed by Ken Boston, EMC Lab Manager at L.S. Compliance, and Abtin Spantman, EMC Engineer of L.S. Compliance, Incorporated and witnessed by Mr. Robert Smith of Criticare Systems, Incorporated.

All Radiated and Conducted Emission tests upon the EUT were performed to measure the emissions in the frequency bands described in Title 47 CFR, FCC Part 15, including 15.35, 15.247, 15.207 and Industry Canada RSS-210 to determine whether these emissions are below the limits expressed within the standards. These tests were performed in accordance with the procedure described in the American National Standard for methods of measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2003). Another document used as a reference for the EMI Receiver specification was the Comite International Special Des Perturbations Radioelelectriques CISPR 16-1, 2002.

All tests were performed at L.S. Compliance, Inc. in Cedarburg, Wisconsin, unless otherwise noted.

Additional EMC test results on the 'Main' host unit is available in LSC report number 304306, and on the 'Remote' host unit in LSC report number 304307.

8. Product Description

The Veris 8600 Patient Monitor will be sold internationally to hospitals for use in MRI environments. Primary countries will be the U.S. and Canada. In the Veris 8600 Patient Monitor is a wireless link that transfers data, screen settings and control between the Veris 8600 '*Main*' unit, and the Veris 8600 '*Remote*' unit. This wireless link is the equipment under test. The wireless link is the "Airborne™ Wireless LAN Node Module" from DPAC Technologies. The "Airborne™ Wireless LAN Node Module" is a transceiver module operating on eleven channels within the 2400 MHz to 2483.5 MHz band. The link would be an ad-hock type link, established on command, by the end user, during the setup of the equipment prior to use.

The Veris 8600 Main Unit:

The Veris 8600 patient monitor is interprets and displays physiologic data as waveforms and numeric information which, depending on the configuration of the system, may include ECG, NIBP, SpO_2, CO_2, respiration, temperature, O_2, anesthetic gases and IBP. User defined alarm limits and alerts may be set for each parameter. Monitored parameter data is stored as tabular trend information and may be printed or downloaded.

The normal mode of operation is the monitoring mode. In this mode, patient vital signs are displayed by numeric values and/or by waveforms. Parameter and configuration settings can be accessed through the keys and trim knob on the front panel. Other available modes are the service mode and the simulation mode. The service mode is used for performing calibrations and downloading software updates. The simulation mode displays stored waveforms and numerics for demonstration purposes.

The Veris 8600 Remote Unit:

The remote display has no patient connections; however the remote unit does have an internal printer. The normal mode of operation is the monitoring mode. In this mode patient vital signs are displayed by numeric values and/or by waveforms. Parameter and configuration settings can be accessed through the keys and trim knob on the front panel. Other available modes are the service mode and the simulation mode. The service mode is used for performing calibrations and downloading software updates. The simulation mode displays stored waveforms and numerics for demonstration purposes.

9. Test Requirements

The above mentioned tests were performed in order to determine the compliance of the "DPAC Airborne™" transceiver modules as installed in the Criticare Systems' Veris, Model Number 8600 units, with limits contained in various provisions of Title 47 CFR, FCC Part 15, including:

15.31	15.205	15.247(b)	15.247(f)
15.33	15.207	15.247(c)	15.247(i)
15.35	15.209	15.247(d)	
15.37	15.247(a)(2)	15.247(e)	

10. Summary of Test Report

DECLARATION OF CONFORMITY

The "DPAC Airborne™" transceiver modules as installed in the Criticare Systems' Veris, Model Number 8600 units was found to **MEET** the requirements as described within the specification of Title 47 CFR FCC, Part 15, Subpart c; and I.C. RSS-210, Section 6 for an intentional radiator.

11. Radiated Emissions Test

Test Setup

The test setup was assembled in accordance with Title 47, CFR FCC Part 15 and ANSI C63.4-2003. The 'Main' EUT host has an ambulatory stand in normal use, and was tested with said stand, as a floor standing unit. The 'Remote' EUT host was placed on an 80cm high non-conductive table. During testing, the EUTs were centered on a flush mounted 2-meter diameter turntable inside a 3 meter Semi-Anechoic, FCC listed Chamber. The EUT was operated in continuous transmit mode, for portions of this test, with modulation from data, as provided internally by the test software. The power was provided by AC mains, and was investigated at 120 VAC, 60 Hz, and 240 VAC, 50 Hz. The unit has the capability to operate on 11 channels, controllable via a personal computer. The applicable limits apply at a 3 meter distance, and are found in later in this report. Measurements above 5 GHz to 18 GHz were performed at a 1.0 meter separation distance. Measurements between 18 GHz to 25 GHz were performed at a 1.0 meter separation distance. The calculations to determine these limits are detailed in the following pages. Please refer to Appendix A for a complete list of test equipment. The test sample was operated on one of three (3) standard channels: low (Ch 01: 2412.000 MHz), medium (Ch 06: 2437.0000 MHz) and high (Ch 11: 2462.0000 MHz) to comply with FCC Part 15.35. The channels and operating modes were changed using a personal computer.

Test Procedure

Radiated RF field strength measurements were performed on the EUT in a 3 meter Semi-Anechoic, FCC listed Chamber. The frequency range from 30 MHz to 25000 MHz was investigated and scanned for RF emissions. The radiated RF emission levels were manually noted, at the various fixed degree settings of azimuth on the turntable, and antenna height. The EUT was placed on a non-conductive pedestal in the 3 meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, and a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz. A Double-Ridged Waveguide Horn Antenna was used from 1 GHz to 18 GHz. From 18 GHz to 25 GHz, the EUT was measured at a 1.0 meter separation, using a standard gain Horn Antenna and pre-amplifier. The attitude for maximum radiated RF emission was found while raising and lowering the antenna height between 1 and 4 meters, and changing the antenna polarization to horizontal and vertical.

Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at an N.I.S.T. traceable site. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and a HP 8546A EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the HP 8546A EMI Receiver database. As a result, the data taken from the HP 8546A EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The HP 8546A EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 300 kHz), and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 1 MHz). From 5 GHz to 25 GHz, an HP E4407B spectrum analyzer and Horn antennas were used.

Test Results

The EUT was found to **MEET** the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.247 for a Digitally Modulated Transmitter (Canada RSS-210). The frequencies with significant signals were recorded and plotted as shown in the Data Charts and Graphs.

CALCULATION OF RADIATED EMISSIONS LIMITS

The maximum peak output power of an intentional radiator in the 2400-2483.5 MHz band, as specified in Title 47 CFR 15.247 (b)(2), is 1 Watt for systems. The harmonic and spurious RF emissions, as measured in any 100kHz bandwidth, as specified in 15.247 (d), shall be at least 20 dB below the measured power of the desired signal, and must also meet the requirements described in 15.205(c).

FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:
Operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz are allowed under section 15.247(b)(3), with a maximum peak output power of the intentional radiator not exceeding 1 Watt.

Peak Output Power = 1 Watt = 30 dBm conducted at RF port = 125.23 dBµV/m field intensity at 3 meters.

FIELD STRENGTH OF HARMONICS AND SPURIOUS EMISSIONS:
The spurious emissions, in any 100 kHz bandwidth outside the band of operation, shall be at least 20 dB below that of the fundamental peak power, also measured with a 100 kHz bandwidth. Adherence to the general limits described in section 15.209 is not required, but adherence to the emission limits in restricted bands of operation, as described in section 15.205 is required. The following table depicts the Class B limits for an unintentional radiator. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals **found in the 15.205 restricted bands.**

Frequency (MHz)	3 m Limit µV/m	3 m Limit (dBµV/m)	1 m Limit (dBµV/m)
30-88	100	40.0	-
88-216	150	43.5	-
216-960	200	46.0	-
960-25,000	500	54.0	63.5

Sample conversion from field strength µV/m to dBµV/m:
$dB\mu V/m = 20 \log_{10} (100)$
= 40 dBµV/m (from 30-88 MHz)

For measurements made at 1.0 meter, a 9.5 dB correction has been invoked.

960 MHz to 25,000 MHz
500µV/m or 54.0 dB/µV/m at 3 meters
54.0 + 9.5 = 63.5 dB/µV/m at 1 meter

Radiated Emissions Data Chart

Test Standard: Title 47 CFR Parts 15.247 and 15.205

Frequency Range Inspected: 30 MHz to 25000 MHz

Manufacturer:	**Criticare Systems, Inc.**								
Date(s) of Test:	**July 14th- August 31st, 2004**								
Test Engineer(s):		Tom Smith	√	Abtin Spantman		Ken Boston			
Model #:	**8600 Main and Remote**								
Serial #:	**404017600**								
Voltage:	**100-240VAC and 50/60Hz**								
Operation Mode:	**Continuous Transmit - modulated, and Normal modes.**								
Distance:	√	3 Meters				10 Meters			
EUT Power:	√	Single Phase 230 VAC				3 Phase ___VAC			
		Battery				Other:			
EUT Placement:	√	80cm non-conductive table				10cm Spacers			
EUT Test Location:	√	3 Meter Semi-Anechoic FCC Listed Chamber				3/10m OATS			
Measurements:		Pre-Compliance		Preliminary	√	Final			
Detectors Used:		Peak	√	Quasi-Peak	√	Average			

Environmental Conditions in the Lab:

Temperature: 20 – 25°C

Relative Humidity: 30 – 60 %

Test Equipment Used:

EMI Measurement Instrument: HP8546A and Agilent E4407B

Log Periodic Antenna: EMCO #93146

Horn Antenna: EMCO #3115

Biconical Antenna: EMCO 93110

Pre-Amp: Advanced Microwave WHA6224

Standard Gain Horn: EMCO 3160-09

The following table depicts the level of significant radiated emissions found:

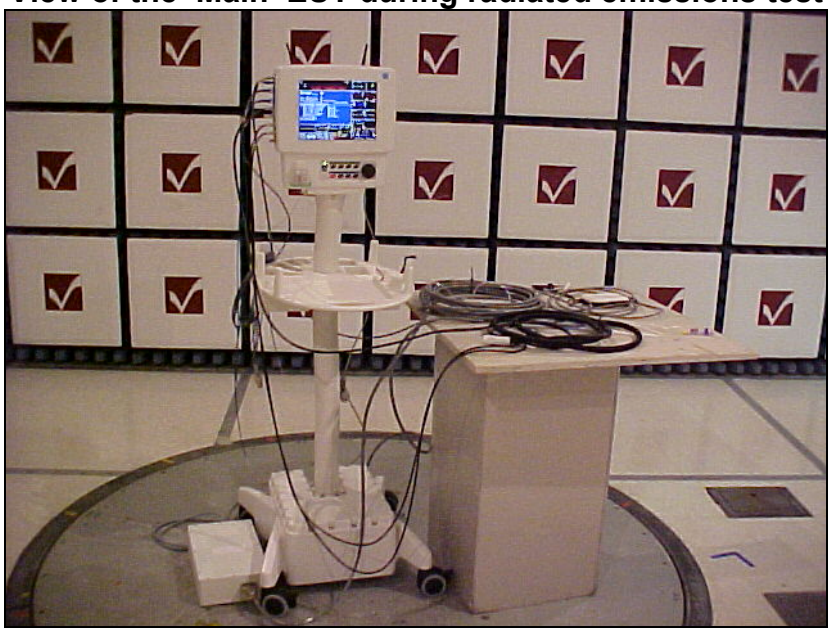
Frequency (MHz)	Antenna Polarity	Channel	Height (meters)	Azimuth (0° - 360°)	EMI Meter Reading (dBμV/m)	15.247 & 15.205 Limit (dBμV/m)	Margin (dB)
120.0	V	06	1.00	0	33.7	43.0	9.3
150.0	H	06	1.30	270	32.0	43.0	11.0
250.0	H	06	1.50	265	38.6	46.0	7.4
264.0	H	06	1.20	280	39.8	46.0	6.2
275.0	H	06	1.30	255	35.0	46.0	11.0
1657	H	01	1.90	125	50.1	54.0	3.9
1695	H	06	1.95	120	44.2	54.0	9.8
1733	H	11	1.20	175	51.5	54.0	2.5
(4) 2412	H	01	1.59	180	100.2	125.2	25.0
4824	H	01	1.00	0	42.1	54.0	11.9
(3) 9648	H	01	1.55	200	46.6	90.7	44.1
(4) 2437	H	06	1.24	190	100.0	125.2	25.2
4874	H	06	1.00	0	39.9	54.0	14.1
(3) 9748	H	06	1.55	200	45.8	90.5	44.7
(4) 2462	H	11	1.55	180	99.2	125.2	26.0
4924	H	11	1.00	0	39.4	54.0	14.6

Note:

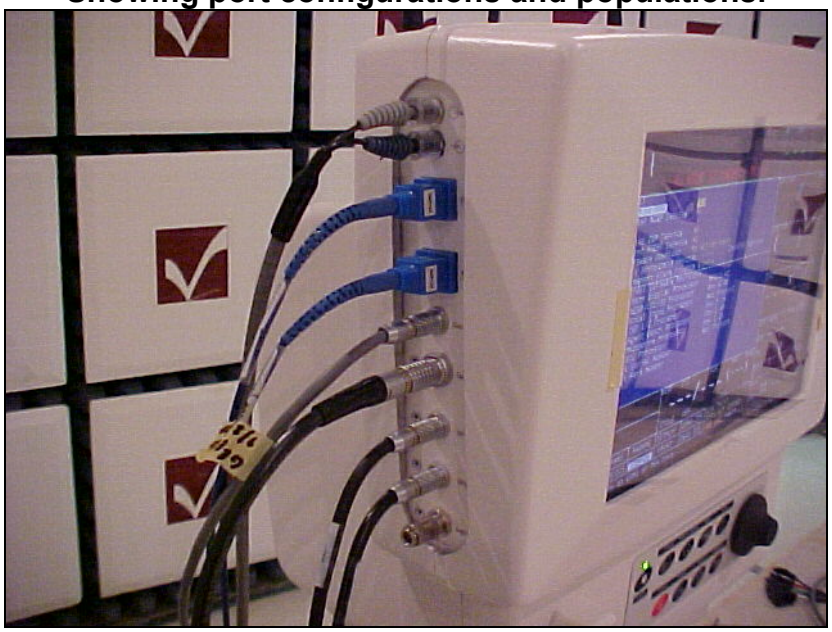
1) *A Quasi-Peak Detector was used in measurements below 1 GHz, and an Average Detector was used in measurements above 1 GHz.*
2) *Peak emissions were also measured using a peak detector to ensure the emissions do not exceed 20 dB above the limit. Other emissions seen were greater than 20 dB below the limits.*
3) *Measurements above 5 GHz were made at 1 meters of separation from the EUT.*
4) *Measured to confirm compliance of the EIRP of the transmitter.*

Photos Taken During Radiated Emission Testing

View of the 'Main' EUT during radiated emissions test



View of the 'Main' EUT during radiated emissions test, Showing port configurations and populations.



View of the 'Remote' EUT during radiated emissions test

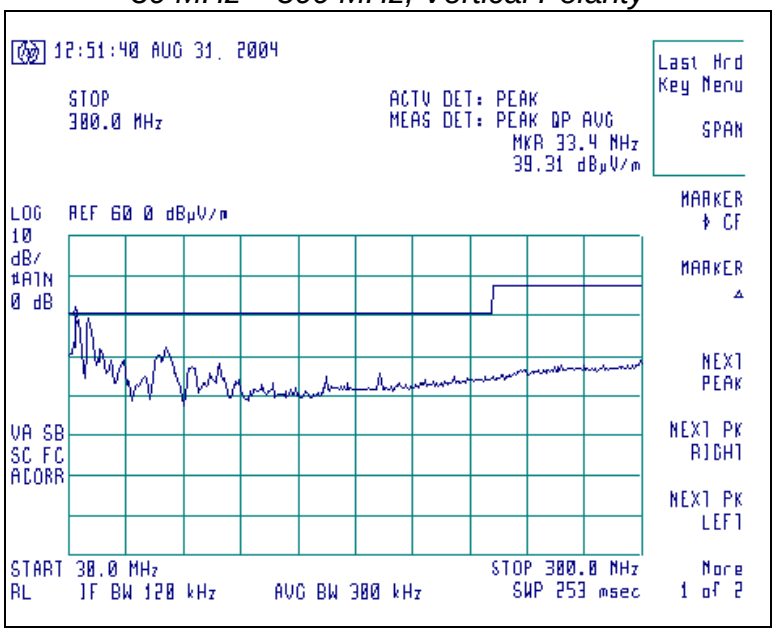
View of the 'Remote' EUT during radiated emissions test, Showing port configurations and populations.

Screen Captures of Radiated RF Emissions:

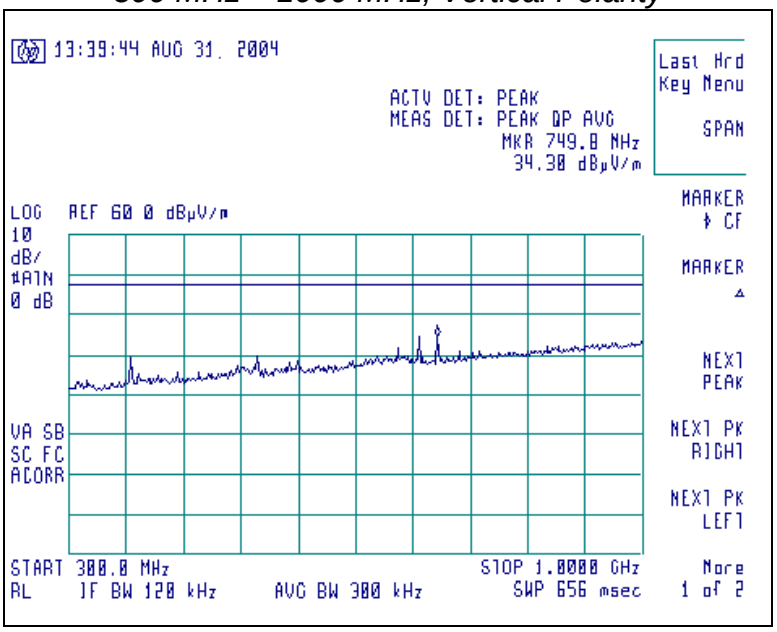
Please note these screen captures represent Peak Emissions. For radiated emission measurements, we utilize a Quasi-Peak detector function when measuring frequencies below 1 GHz, and both an Average and a Peak detector function when measuring frequencies above 1 GHz.

The signature scans shown here are from channel 06, which was chosen as being a good representative of all channels, with the sense and EUT antennas in worst case presentations.

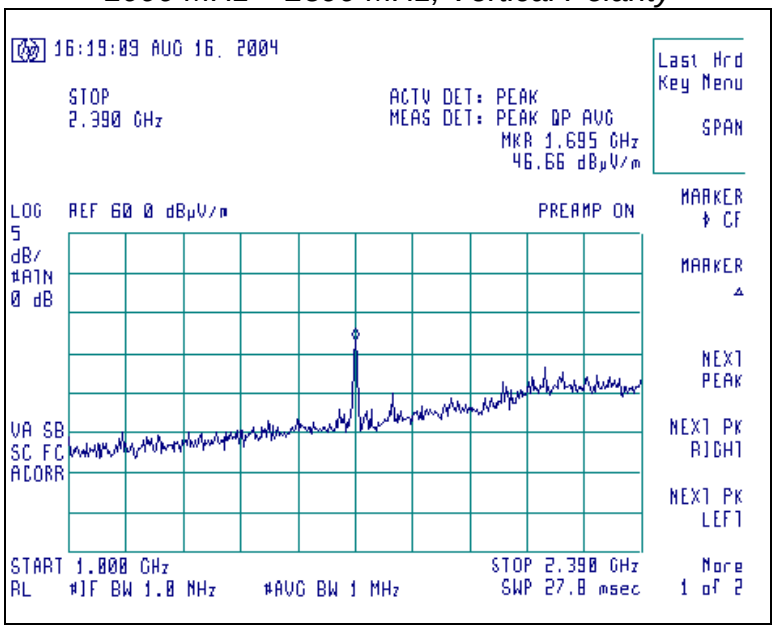
Signature Scan of Peak Radiated Emissions
30 MHz – 300 MHz, Vertical Polarity



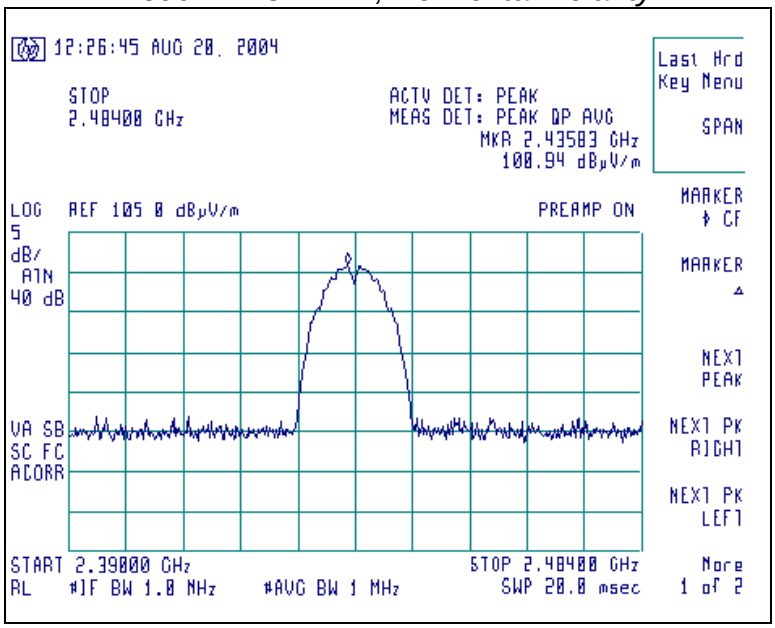
Signature Scan of Peak Radiated Emissions
300 MHz – 1000 MHz, Vertical Polarity



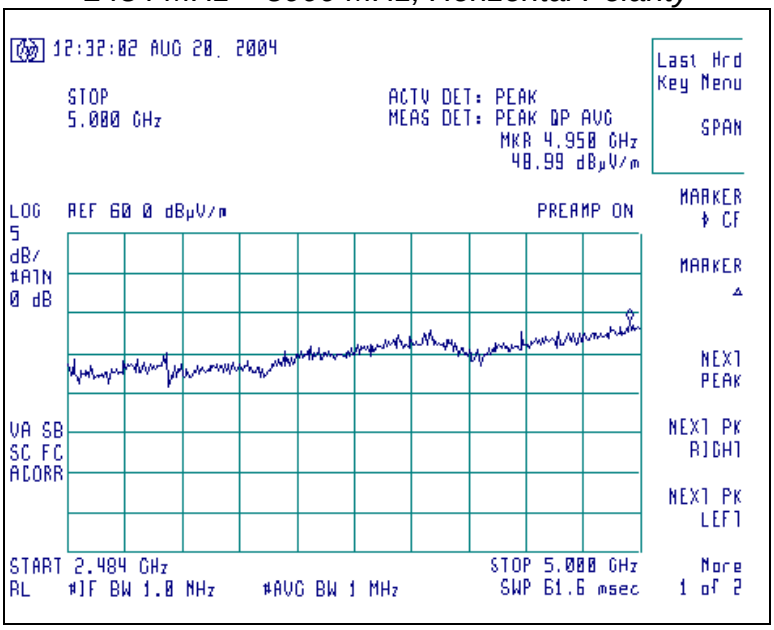
Signature Scan of Peak Radiated Emissions
1000 MHz – 2390 MHz, Vertical Polarity



Signature Scan of Peak Radiated Emissions
2390 – 2484 MHz, Horizontal Polarity



Signature Scan of Peak Radiated Emissions
2484 MHz – 5000 MHz, Horizontal Polarity



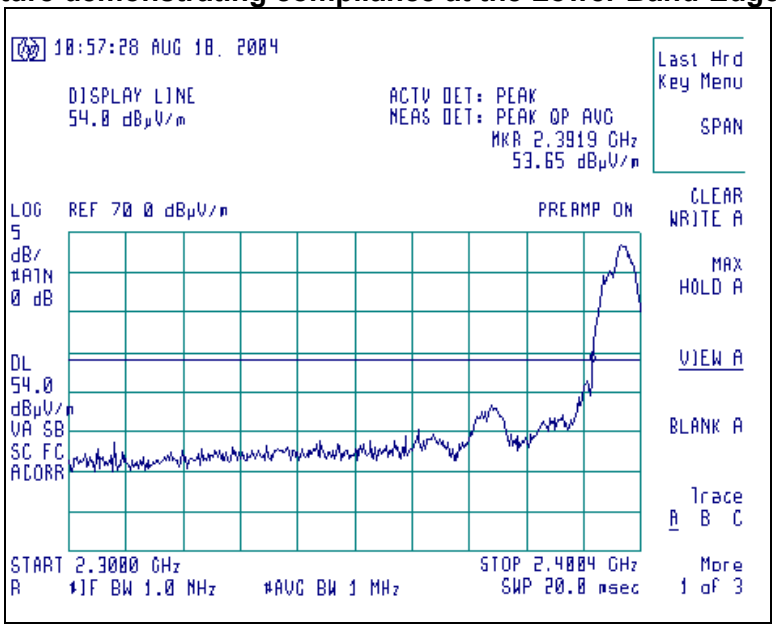
Signature Scan of Peak Radiated Emissions
5000 – 18000 MHz, Horizontal Polarity, at 1 meter separation.

No significant emissions were noted above 18 GHz.

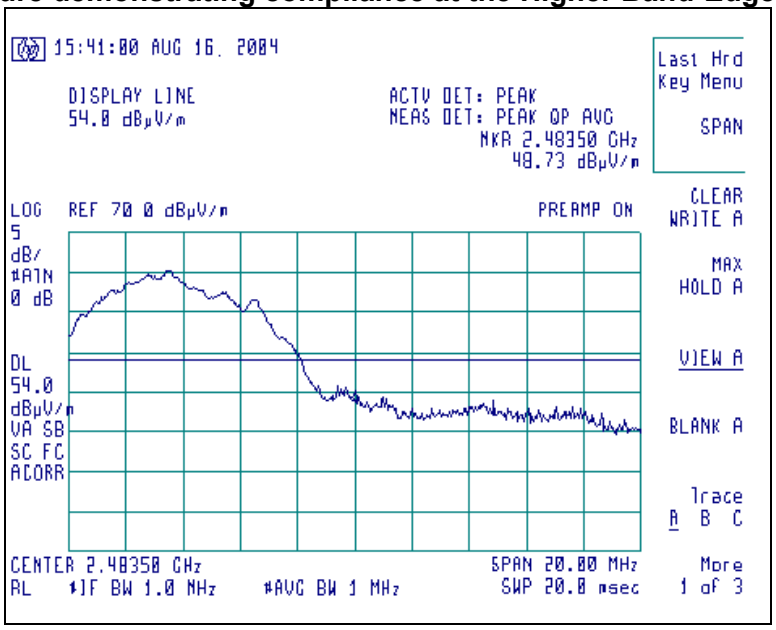
12. Band-Edge Measurements

FCC 15.209(b) and 15.249(d) require a measurement of spurious emission levels, in particular at the band-edges where the intentional radiator operates. The following measurements demonstrate compliance of the intentional radiator at the 2400 MHz and 2483.5 MHz band-edges. The EUT was operated at the lowest channel, with continuous modulation, with typical data packets as the modulating source, for the investigation of the lower band-edge, and at the highest channel for the investigation of the higher band-edge.

Screen Capture demonstrating compliance at the Lower Band-Edge, Channel 1



Screen Capture demonstrating compliance at the Higher Band-Edge, Channel 11



13. Conducted Emissions Test, AC Power Line

Test Setup

The Conducted Emissions test was performed at L.S. Compliance, Inc. in Cedarburg, Wisconsin. The test area and setup are in accordance with ANSI C63.4-2003 and with Title 47 CFR, FCC Part 15 (Industry Canada RSS-210). The 'Main' EUT was tested as a floor-standing device. The EUT's power cable was plugged into a 50Ω (ohm), 50/250 μH Line Impedance Stabilization Network (LISN). The AC power supply of 100 VAC was provided inside the Shielded Room via an appropriate broadband EMI Filter, and then to the LISN line input. After the EUT was setup and connected to the LISN, the RF Sampling Port of the LISN was connected to a 10 dB Attenuator-Limiter, and then to the HP 8546A EMI Receiver. The EMCO LISN used has the ability to terminate the unused port with a 50Ω (ohm) load when switched to either L1 (line) or L2 (neutral).

Test Procedure

The EUT was placed in continuous transmit mode for this portion of the testing. The appropriate frequency range and bandwidths were entered into the EMI Receiver, and measurements were made. The bandwidth used for these measurements is 9 kHz, as specified in CISPR 16-1 (2002), Section 1, Table 1, for Quasi-Peak and Average detectors in the frequency range of 150 kHz to 30MHz. Final readings were then taken and recorded.

Test Equipment Utilized

A list of the test equipment and accessories utilized for the Conducted Emissions test is provided in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. Calibrations of the LISN and Limiter are traceable to N.I.S.T. All cables are calibrated and checked periodically for conformance. The emissions are measured on the HP 8546A EMI Receiver, which has automatic correction for all factors stored in memory and allows direct readings to be taken.

Test Results

The EUT was found to **MEET** the Conducted Emission requirements of FCC Part 15, Conducted Emissions for an Intentional Radiator. See the Data Charts and Graphs for more details of the test results.

Conducted Emissions Data Chart

Test Standard: FCC 15.207
Frequency Range Inspected: 150 kHz to 30 MHz

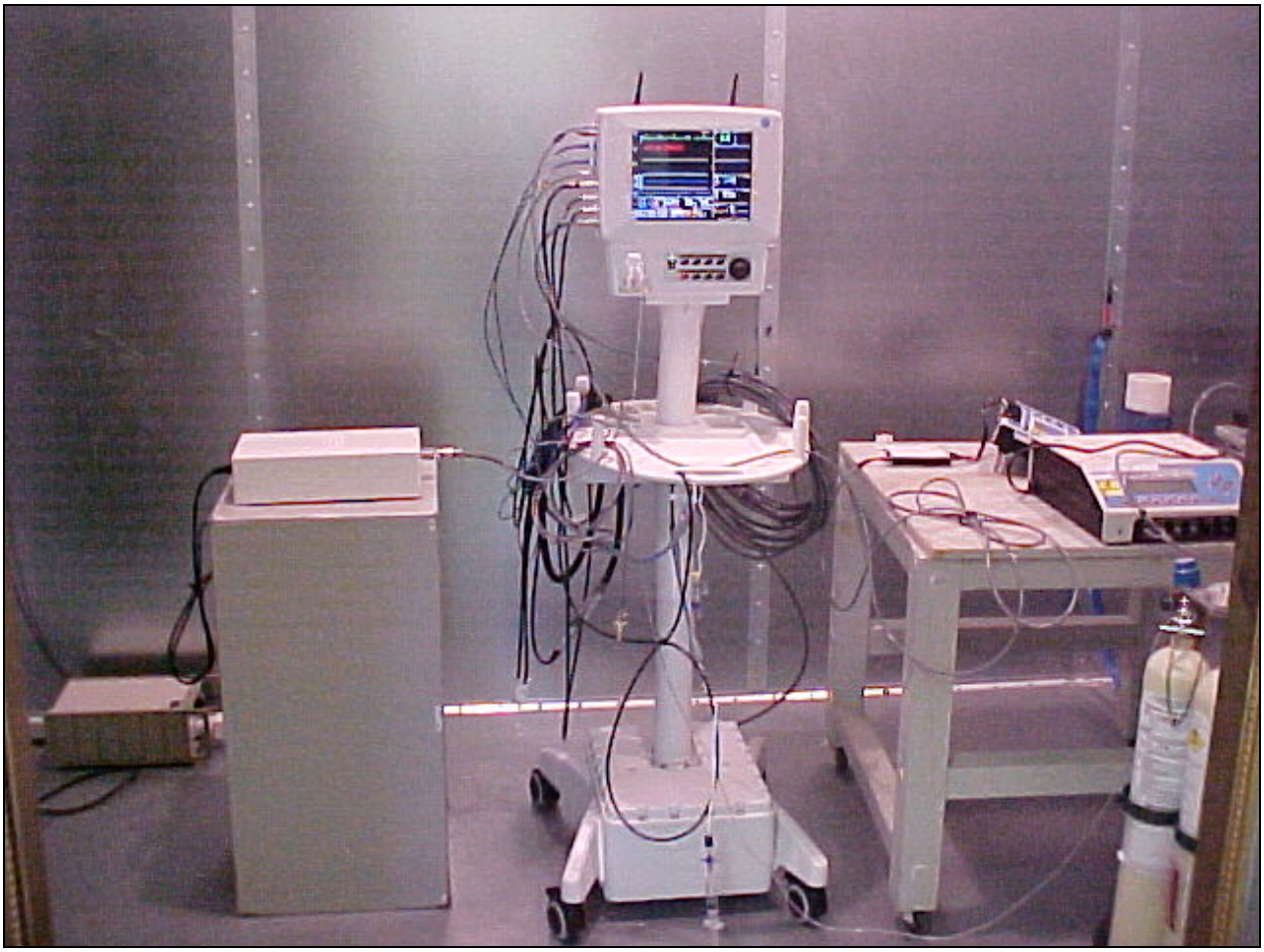
Manufacturer:	**Criticare Systems, Inc.**							
Date(s) of Test:	**July 14th, 2004**							
Test Engineer:	√	**Tom Smith**		**Abtin Spantman**		**Ken Boston**		
Model #:	**8600 Main**							
Serial #:	**404017600**							
Voltage:	**100VAC/60Hz**							
Operation Mode:	**Normal**							
Test Location:	√	**Shielded Room**				**Chamber**		
EUT Placed On:	√	**40cm from Vertical Ground Plane**				**10cm Spacers**		
		80cm above Ground Plane			√	**Other:**		
Measurements:		Pre-Compliance		Preliminary	√	Final		
Detectors Used:		Peak	√	Quasi-Peak	√	Average		

Environmental Conditions in the Lab:
Temperature: 20 – 25° C
Atmospheric Pressure: 86 kPa – 106 kPa
Relative Humidity: 30 – 60%

Test Equipment Utilized:
EMI Receiver: HP 8546A
LISN: EMCO 3816/2NM
Transient Limiter: HP 119474A

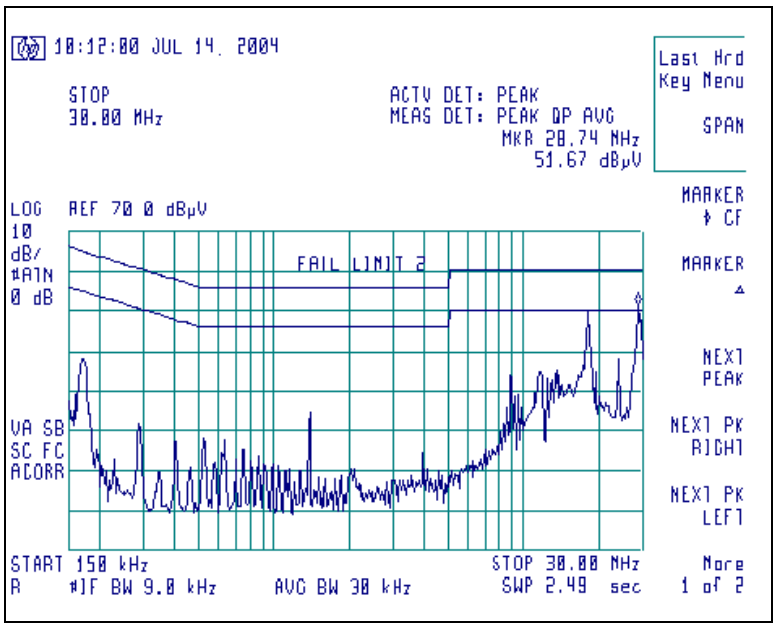
		QUASI-PEAK			*AVERAGE*		
Frequency (MHz)	*Line*	*Q-Peak Reading (dBμV/m)*	*Q-Peak Limit (dBμ V/m)*	*Quasi-Peak Margin (dB)*	*Average Reading (dBμV/m)*	*Average Limit (dBμ V/m)*	Average Margin (dB)
0.1734	L1	38.0	64.7	26.7	37.6	54.7	17.1
18.18	L1	49.5	60.0	10.5	45.7	50.0	4.3
18.46	L1	43.3	60.0	16.7	37.3	50.0	12.7
28.81	L1	48.1	60.0	11.9	42.3	50.0	7.7
29.09	L1	53.0	60.0	7.0	47.1	50.0	2.9
29.37	L1	48.0	60.0	12.0	42.9	50.0	7.1
18.17	L2	49.9	60.0	10.1	45.4	50.0	4.6
18.45	L2	44.1	60.0	15.9	38.1	50.0	11.9
24.05	L2	33.6	60.0	26.4	27.4	50.0	22.6
28.8	L2	48.5	60.0	11.5	43.0	50.0	7.0
29.07	L2	51.9	60.0	8.1	45.1	50.0	4.9
29.35	L2	48.2	60.0	11.8	42.1	50.0	7.9

View of the setup during the Conducted Emissions Test

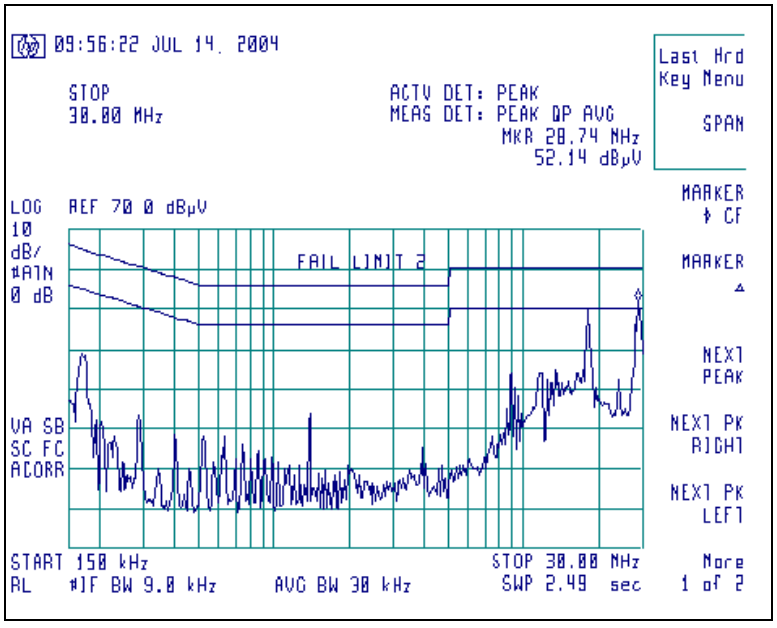


Signature Scans of Conducted Emissions

Signature Scan
100VAC/60Hz Line 1



Signature Scan
100VAC/60Hz Line 2



14. Conducted Emissions Test, Power Output

For the FCC Part 15.247b measurement, the output of the EUT antenna port was connected via a coaxial cable to the Gigatronics 8542C Power Meter. The loss from the cable was added to the measurements and is presented in the table below. The unit was configured to run in a continuous transmit mode, while being supplied with internal data as a modulation source.

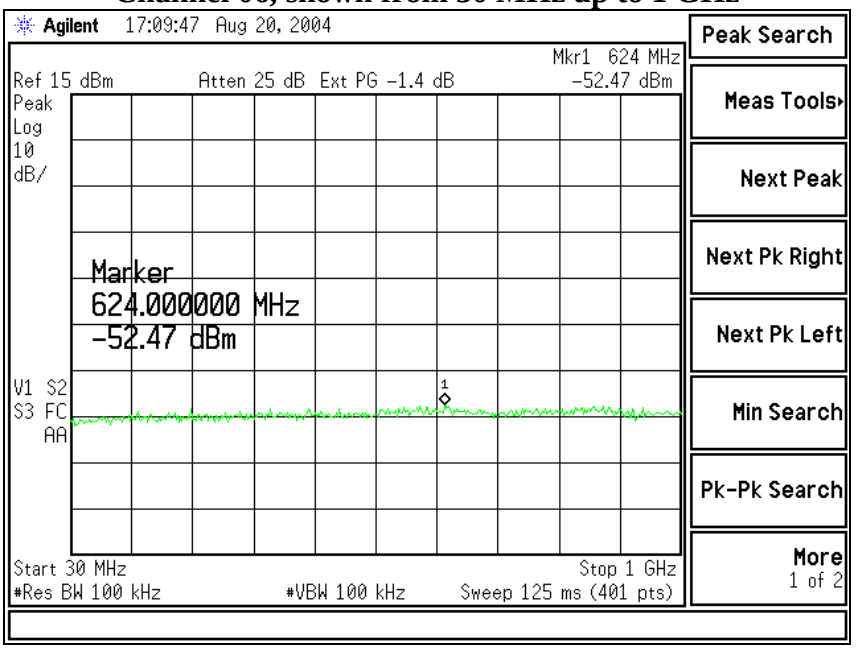
The Power Meter was used for this measurement, because it is capable of making wide-band measurements as needed in this case, with the EUT having a -6dBc occupied bandwidth in excess of 10 MHz. The RF power level was measured, and the data was collected for all three channels, and across varied mains line voltages as presented to the EUT. The data has a power supply that can accept mains input voltages ranging between 120 VAC, 60 Hz to 240 VAC, at 50 Hz. The unit was measured at -15% from the lower voltage, and at +15% from the highest allowed input voltages, as well as the nominal voltage for U.S.A. at 120 VAC, 60 Hz. Approximately 1.5 dB of variation was observed during these tests as can be seen in the chart presented below.

		Measured Power (dBm)			
Channel	Frequency (MHz)	102 VAC	120 VAC	276 VAC	LIMIT (dBm)
01	2412	+10.3	+10.0	+10.1	+30
06	2437	+9.1	+9.0	+9.1	+30
11	2462	+8.9	+8.8	+8.8	+30

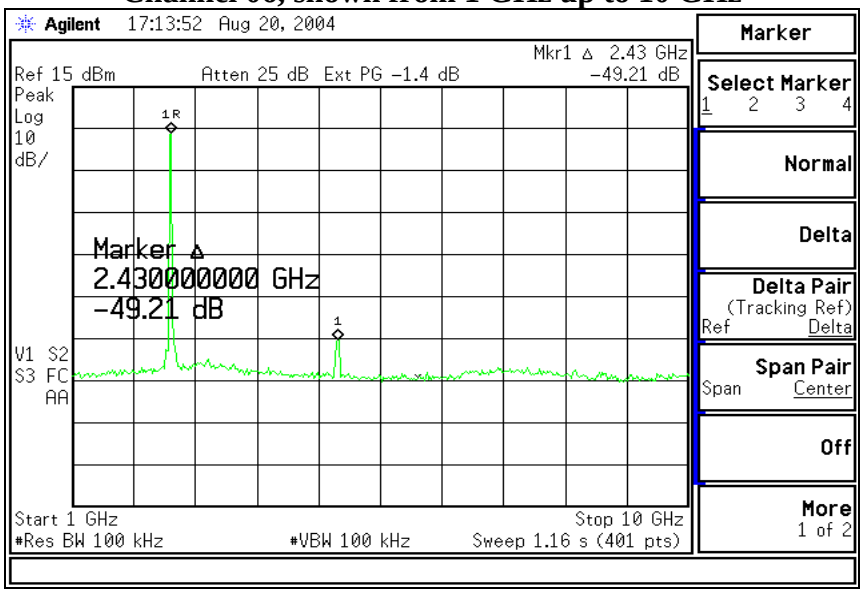
15. Conducted Emissions Test, Spurious Emissions

FCC Part 15.247 (d) requires a conducted measurement of harmonic and spurious RF emission levels, as reference to the carrier frequency in a 100 kHz bandwidth. For this test, the transceiver module was connected to the HP E4407B Spectrum Analyzer, through a very short Coaxial Cable. The loss from the cable was added on the analyzer as gain offset settings, there by allowing direct readings of the measurements made without the need for any further corrections. Harmonic and spurious signals were identified. No significant levels at any spurious products could be found within -20 dBc of the fundamental of the transmitter. Signals that were observed were greater than 45 dB down from the fundamental level. (In the 100 kHz bandwidth)
No significant emissions could be noted within -45 dBc of the fundamental level for this product.

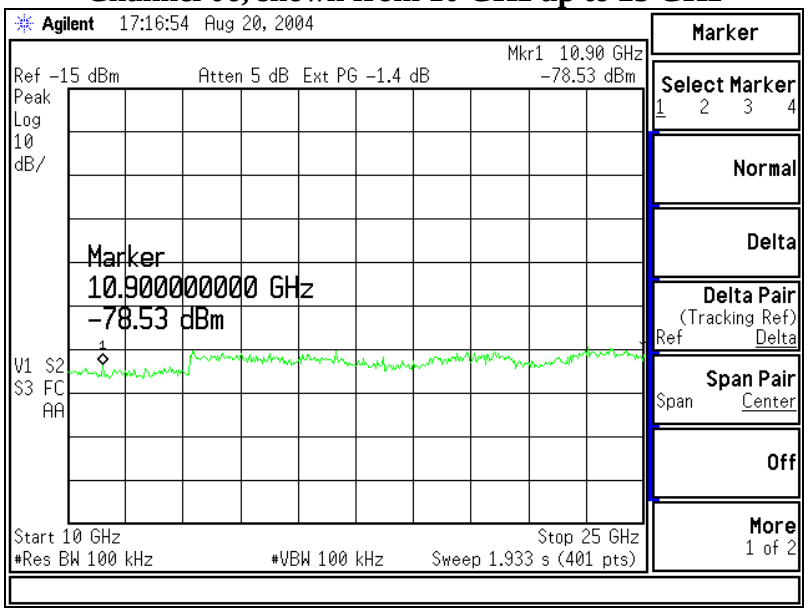
Channel 06, shown from 30 MHz up to 1 GHz



Channel 06, shown from 1 GHz up to 10 GHz



Channel 06, shown from 10 GHz up to 25 GHz

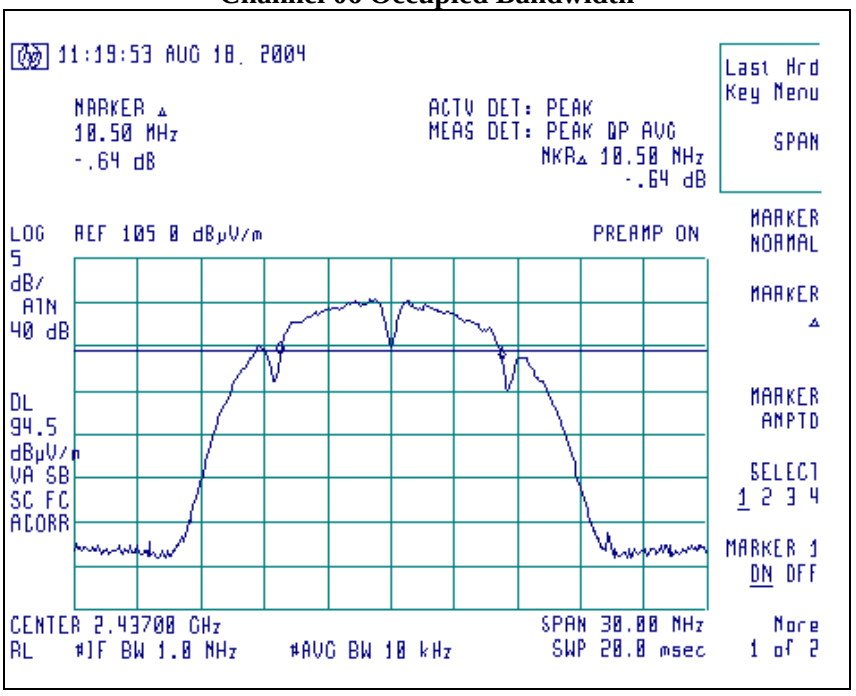


16. Conducted Emissions Test, Occupied Bandwidth

FCC Part 15.247(a)(2) requires a minimum 6dB occupied bandwidth of 500 kHz, for a digitally modulated transmitter. For this portion of the tests, the receiver resolution bandwidth was increased to 1 MHz. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The receiver was used in peak-hold mode while measurements were made, as presented in the chart below. From this data, the bandwidth of closest data to the specification limit, is 10500 kHz, which is above the minimum of 500 kHz.

CHANNEL	CENTER FREQ (MHz)	MEASURED 6 dB BW (kHz)	MINIMUM LIMIT (kHz)
1	2412.0	10500	500
6	2437.0	10500	500
11	2462.0	10500	500

Channel 06 Occupied Bandwidth

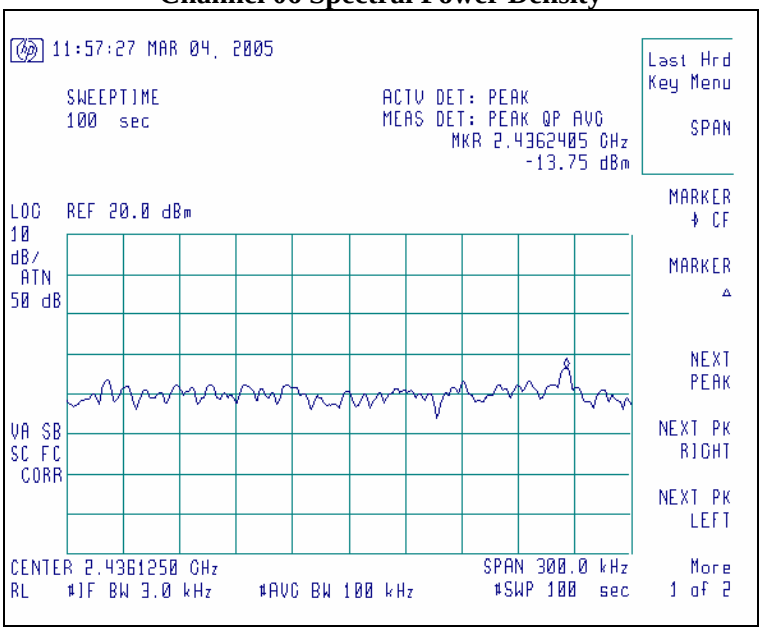


17. Conducted Emissions Test, Spectral Density

In accordance with FCC Part 15.247(e), the peak power spectral density should not exceed +8 dBm in any 3 kHz band. The EUT was placed in continuous transmit, with modulation from typical data. The highest peak at each frequency was selected, and investigated in detail. The peak output frequency for each representative frequency was scanned, with a narrow bandwidth, and reduced sweep, and a power density measurement was performed using RBW=3 kHz, VBW=100 kHz, span=300 kHz, sweep=100 seconds along with the peak detector in maximum-hold mode. The highest density was found to be no greater than –13.75 dBm, which is under the allowable limit by 21 dB.

Channel	Center Frequency (MHz)	Measured Channel Power (dBm)	Limit (dBm)	Margin (dB)
01	2412	-14.3	+8.0	22.3
06	2437	-13.7	+8.0	21.7
11	2462	-15.6	+8.0	23.6

Channel 06 Spectral Power Density



18. Frequency Stability across input voltage

The fundamental frequency emission of the transmitter needs to be stable with varying voltage. The EUT was tested in a temperature controlled chamber, with the transmitter portion of the EUT placed in continuous transmit mode. The fundamental frequency was measured in a conducted fashion, into the spectrum analyzer with a receiver bandwidth of 10 kHz, and video bandwidth of 10 kHz while the voltage input to the EUT was varied between 100 VAC, 60 Hz, and 240 VAC, 50 Hz (Please refer to section 14 of this report). The EUT (Remote host chosen for this test because of size) was then tested across temperature variations, and voltage variations of +/- 15% from the nominal set point, chosen as 180 VAC, 60 Hz.

No anomalies were noted, in the frequency of operation, during the voltage and temperature variation tests. Variations in measured output power were not discernable, as a function of the change in power supply voltage, and in all cases measured less than 1 dB in variance. The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characteristics were well behaved, and the system returned to the proper state of operation after a complete power cycle, requiring the user to re-initiate the test mode settings.

Voltage Temperature Stability of Frequency:

Center Freq	2412.00	MHz

		AC Mains Voltage Source		
		153.00	180.00	207.00
Temperature °C	+55	2412.02990	2412.02990	2412.02990
	+40	2411.99920	2411.99920	2411.99920
	+30	2411.99140	2411.99140	2411.99140
	+25	2411.98980	2411.98980	2411.98980
	+20	2411.99060	2411.99060	2411.99060
	+10	2411.98880	2411.98880	2411.98890
	0	2411.99280	2411.99290	2411.99290
	-10	2412.00090	2412.00090	2412.00080
	-20	2412.00240	2412.00250	2412.00250
		Measured Frequency (MHz)		

Max Freq	2412.02990	MHz
Min Freq	2411.98880	MHz
Total Freq Excursion	0.0411	MHz
Limit (100ppm)	0.2412	MHz
	Pass	

Center Freq	2437.00	MHz

		AC Mains Voltage Source		
		153.00	180.00	207.00
Temperature °C	+55	2437.03010	2437.03010	2437.03010
	+40	2436.99925	2436.99925	2436.99920
	+30	2436.99160	2436.99160	2436.99160
	+25	2436.99000	2436.99000	2436.99000
	+20	2436.99050	2436.99050	2436.99050
	+10	2436.98860	2436.98860	2436.98860
	0	2436.99240	2436.99250	2436.99250
	-10	2437.00110	2437.00110	2437.00110
	-20	2437.00130	2437.00130	2437.00130
		Measured Frequency (MHz)		

Max Freq	2437.03010	MHz
Min Freq	2436.98860	MHz
Total Freq Excursion	0.0415	MHz
Limit (100ppm)	0.2437	MHz
	Pass	

Center Freq	2462.00	MHz

		AC Mains Voltage Source		
		153.00	180.00	207.00
Temperature °C	+55	2462.03050	2462.03040	2462.03040
	+40	2461.99925	2461.99930	2461.99930
	+30	2461.99150	2461.99150	2461.99150
	+25	2461.99000	2461.99000	2461.99000
	+20	2461.99050	2461.99050	2461.99050
	+10	2461.98850	2461.98850	2461.98850
	0	2461.99250	2461.99250	2461.99250
	-10	2462.00110	2462.00110	2462.00110
	-20	2462.00090	2462.00100	2462.00100
		Measured Frequency (MHz)		

Max Freq	2462.03050	MHz
Min Freq	2461.98850	MHz
Total Freq Excursion	0.042	MHz
Limit (100ppm)	0.2462	MHz
	Pass	

19. MPE Calculations

According to 15.247 (i), the system should operate in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

MPE Calcluation using Astron Model: AXH24RPSMA type antenna:

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	10.30	(dBm)
Maximum peak output power at antenna input terminal:	10.715	(mW)
Antenna gain(typical):	2	(dBi)
Maximum antenna gain:	1.585	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	915	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	0.62	(mW/cm^2)

Power density at prediction frequency:	0.003379	(mW/cm^2)
Maximum allowable antenna gain:	24.6	(dBi)
Margin of Compliance at 20 cm =	22.6	dB

Appendix A

Test Equipment List

Asset #	Manufacturer	Model #	Serial #	Description	Date	Due
AA960008	EMCO	3816/2NM	9701-1057	Line Impedance Stabilization Network	9/15/04	9/15/05
AA960031	HP	119474A	3107A01708	Transient Limiter	Note 1	Note 1
AA960077	EMCO	93110B	9702-2918	Biconical Antenna	9/16/04	9/16/05
AA960078	EMCO	93146	9701-4855	Log-Periodic Antenna	9/16/04	9/16/05
AA960081	EMCO	3115	6907	Double Ridge Horn Antenna	11-14-03	11-14-04
CC00221C	Agilent	E4407B	US39160256	Spectrum Analyzer	11-04-03	11-04-04
EE960004	EMCO	2090	9607-1164	Device Controller	N/A	N/A
EE960013	HP	8546A	3617A00320	Receiver RF Section	9/16/04	9/16/05
EE960014	HP	85460A	3448A00296	Receiver Pre-Selector	9/16/04	9/16/05
N/A	LSC	Cable	0011	3 Meter ½" Armored Cable	Note 1	Note 1
N/A	LSC	Cable	0038	1 Meter RG 214 Cable	Note 1	Note 1
N/A	LSC	Cable	0050	10 Meter RG 214 Cable	Note 1	Note 1
N/A	Pasternack	Attenuator	N/A	10 dB Attenuator	Note 1	Note 1

Note 1 - Equipment calibrated within a traceable system.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V

Appendix B

List of Peripheral Equipment and Attachments

The Veris 8600 Patient Monitor will be sold internationally to hospitals for use in MRI environments. Primary countries will be the U.S. and Canada.

The Veris 8600 Main Unit:

The Veris 8600 patient monitor is interprets and displays physiologic data as waveforms and numeric information which, depending on the configuration of the system, may include ECG, NIBP, SpO_2, CO_2, respiration, temperature, O_2, anesthetic gases and IBP. User defined alarm limits and alerts may be set for each parameter. Monitored parameter data is stored as tabular trend information and may be printed or downloaded.

There can be up to nine connections for patient monitoring. The electrocardiogram (ECG), pulse oximetry (SpO_2), and the non-invasive blood pressure (NIBP) measuring connections are standard on all Veris 8600 models. The ECG uses a fiber optic connector (from the FOX module) located at the top. Two optional temperature cable sockets may be located near the top of the left side. The optional gating connection may be located in the middle of the connection panel. The DB-9 female serial connector is used for SpO_2 sensor connection. Two optional IBP sockets may be located above the NIBP connection. A male quick-connect style NIBP fitting is located at the bottom on the left side. The remote display has no patient connections.

There are three communications sockets available along the back edge of the monitor. These connections provide links to external printers, computers and other medical devices. A DC power cable connection is located at the center of the pedestal base of the patient monitor (main unit). The remote unit has an AC power connector located slightly below center in the back. The remote unit also has an internal printer.

The normal mode of operation is the monitoring mode. In this mode, patient vital signs are displayed by numeric values and/or by waveforms. Parameter and configuration settings can be accessed through the keys and trim knob on the front panel. Other available modes are the service mode and the simulation mode. The service mode is used for performing calibrations and downloading software updates. The simulation mode displays stored waveforms and numerics for demonstration purposes.

The Veris 8600 Main Unit - Continued:

The following is a list of cables used in conjunction with the Veris 8600 Patient Monitor:

Connecting cables	Part No.
Fiber Optic ECG Cable, Duplex, 5m	3010460
ECG Lead set,3 conductor, 30cm	3010461
ECG Gating Cable,Universal, 2 cond., 5m	3010477
SpO2 Probes Pulse Oximeter Probe, Adult, 2m	3010462
Pulse Oximeter Probe,Pediatric, 2m	3010794
Pulse Oximeter Probe,Neonatal, 2m	3010795
Pulse Oximeter Extension Cable, 3m	3010463
Pulse Oximeter Gating Cable,GE	3010562
IBP interface Cable,Abbot, 5m	3010478
IBP interface Cable,Baxter / Edwards,5m	3010479
IBP interface Cable,Braun, 5m	3010480
IBP interface Cable,Medex, 5m	3010536
Skin Temperature Probe	3010515
DC power Cable, 15 meters (50ft.)	3010557
AC power Cable, North American	3005946
AC power Cable, International	3005182
Accessories-	
Fox II Module FOX II Module (complete with battery)	3010459
Blood Pressure Cuff,Adult, 25-35cm	3010466
NIBP Connection Tube, 5 meters	3010471
AC to DC Power Supply	3010555

The Veris 8600 Remote Unit:

The remote display has no patient connections; however the remote unit does have an internal printer. The normal mode of operation is the monitoring mode. In this mode patient vital signs are displayed by numeric values and/or by waveforms. Parameter and configuration settings can be accessed through the keys and trim knob on the front panel. Other available modes are the service mode and the simulation mode. The service mode is used for performing calibrations and downloading software updates. The simulation mode displays stored waveforms and numerics for demonstration purposes.

Appendix C
Programming Instructions for the DPAC Module

The following command line instructions were issued to the DPAC transceiver module during the test process in order to achieve the desired modes of operation for testing purposes only. For a more detailed explanation of the command set and options, please refer to module documentation for the "Airborne™ Wireless LAN Node Module Data Book" from DPAC Technologies, document number 39L3702-01, Rev B, 02/02, which may be obtained from their Web Site: WWW.DPACTECH.COM, available at this time.

A terminal program was used in conjunction with a personal computer, communicating with the EUT through the 'RS-232' port, also referred to as the 'DB-9' or 'Comm.-port'.

A 'Null-Modem' module is required in series with the Comm.-port

The Comm.-port settings should be as follows:
Baud Rate: 57600
Data: 8 Bit
Parity: None
Stop Bit: 1 Bit
Flow Control: None

Transmit Command Line Instructions:

Channel nn, continuous transmit, modulated with 1010 pattern, 11Mbps data rate:
Channel 01: WL-TX-TEST 1 0 0 0x38 1 3 0xaaaa
Channel 06: WL-TX-TEST 1 0 0 0x38 6 3 0xaaaa
Channel 01: WL-TX-TEST 1 0 0 0x38 11 3 0xaaaa

Receive Command Line Instructions:

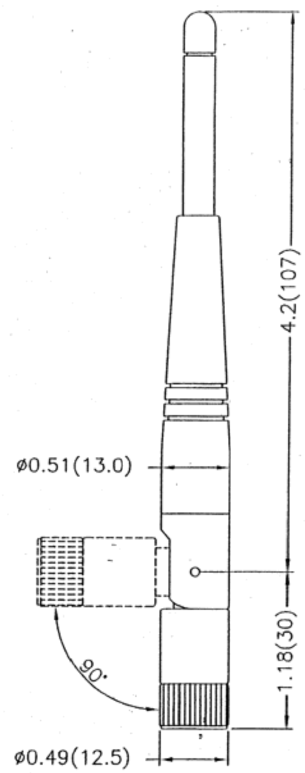
Channel nn, continuous receive:
Channel 01: WL-RX-TEST 1 3
Channel 06: WL-RX-TEST 6 3
Channel 01: WL-RX-TEST 11 3

Appendix D
Antenna Specifications

ASTRON
Wireless Technologies, Inc.
Antennas RF Components System Integration

AXH24RPSMA

ASTRON PROPRIETARY INFORMATION/DATA



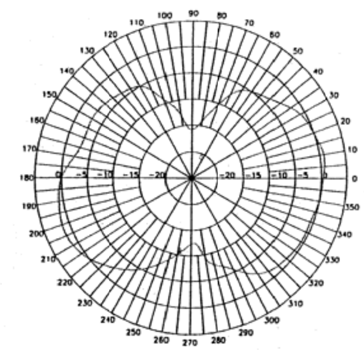
Electrical Properties:

Frequency Range:	2.4~2.5 GHz
Impedance:	50Ω nominal
VSWR:	<2.0:1
Gain:	2 dBi
Radiation:	Omni
Polarization:	Vertical
Wave:	Half Wave Dipole

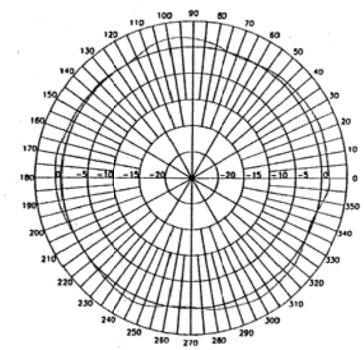
Mechanical Properties:

Connector:	REV.POL.SMA MALE
Material:	
Whip:	Polyurethene(Black)
Swivel Mechanism:	Polycarbonate(Black)
Connector:	Brass with black chrome plating
Operation Temp.:	−20°C to +65°C
Storage Temp.:	−30°C to +75°C

E-Plane Pattern @ 2.45GHz



H-Plane Pattern @ 2.45GHz



22560 Glenn Drive, Suite 114 – Sterling, Virginia 20164 – Tel: 703-450-5517 – www.astronwireless.com