

## TEST REPORT

**Project Number: 3061521**  
**6/30/2004**

**Evaluation of the**  
**Vital Signs Transmitter**  
**Model Number: VST3**  
**FCC ID: SC7VST3**

**FCC Part 2**  
**FCC Part 22 Subpart H**  
**FCC Part 24 Subpart E**

**For**

**Biowatch Medical**

Test Performed by:

Intertek  
731 Enterprise Drive  
Lexington, KY 40510

Test Authorized by:

Biowatch Medical  
1233 Washington St.  
Columbia, SC 29201

**Prepared By:** Jason Centers **Date:** 6/30/2004

**Jason Centers, Project Engineer**

**Approved By:** Bryan C. Taylor **Date:** 6/30/2004

**Bryan C. Taylor, EMC Team Leader**

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**Intertek**

731 Enterprise Drive, Lexington, KY 40510

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## 1 EXECUTIVE SUMMARY

Testing was performed for Biowatch Medical on the model VST3 Vital Signs Transmitter. The VST3 contains a CDMA module manufactured by Sierra Wireless (FCCID: N7NSB555), which has previously been certified under FCC parts 22 and 24. Since the Sierra Wireless CDMA module has already been certified only the conducted output power and the spurious emission tests were performed on the VST3.

FCC RULE	IC RULE	DESCRIPTION OF TEST	RESULT	PAGE
§2.1046	RSS-129 §7.1, §9.1 RSS-133 §6.2	RF Power Output	<b>Compliant</b>	9
§22.913, §24.232	RSS-129 §7.1, §9.1 RSS-133 §6.2	ERP, EIRP	<b>Note<sup>1</sup></b>	-
§2.1049 §22.917(b)(d)	RSS-129 §6.3, RSS-129 §8.1	Emission Limitation, Occupied Bandwidth	<b>Note<sup>1</sup></b>	-
§2.1051 §22.917(e) §22.917(f) §24.238(a)	RSS-129 §6.3, §7.2.2, §8.1.1, §10 RSS-133 §6.3	Out of Band Emissions at Antenna Terminals Mobile Emissions In Base Frequency Range	<b>Note<sup>1</sup></b>	-
§2.1053	RSS-129 §8.1	Field Strength of Spurious Radiation	<b>Compliant</b>	10
§2.1091, §2.1093	RSS-129 §11, RSS-133 §8	Specific Absorption Rate	<b>N/S</b>	See Note <sup>2</sup>
§15.107, §15.207	IC ES-003	Power Line Conducted Emissions	<b>N/S<sup>3</sup></b>	-
§15.109	IC ES-003 RSS-129 §10, RSS-133 §9	Receiver Spurious Emission	<b>Note<sup>1</sup></b>	-
§2.1055, §22.355, §24.235	RSS-133 §7	Frequency Stability vs. Temperature	<b>Note<sup>1</sup></b>	-
§2.1055, §22.355, §24.235	--	Frequency Stability vs. Voltage	<b>Note<sup>1</sup></b>	-

N/S: Not under scope of this evaluation

<sup>1</sup> Evaluation of the VST3 to this criteria was not performed. Results from the Sierra Wireless CDMA module (FCC ID: N7NSB555) filing will be used to determine compliance.

<sup>2</sup> Specific Absorption Rate testing is covered in a separate report.

<sup>3</sup> FCC Part 15 testing was conducted on the VST3 at a previous date by another laboratory.

## 2 JOB DESCRIPTION

### 2.1 Client information

The Vital Signs Transmitter has been tested at the request of

**Company:** Biowatch Medical  
1233 Washington St.  
Columbia, SC 29201

**Name of contact:** Paul Mulvaney  
**Telephone:** (803) 233-0244  
**Fax:** (803) 233-0240

### 2.2 Test plan reference:

Tests were performed to the following standards:

- FCC Part 2
- FCC Part 24 Subpart E rules for an intentional radiator
- FCC Part 22 Subpart H rules for an intentional radiator

The test procedures described in this test report and ANSI C63.4: 1992 were employed.

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## 2.3 Equipment Under Test (EUT)

The Equipment Under Test (EUT) was a Vital Signs Transmitter that operated in the CDMA800 and CDMA1900 modes.

<b>Product</b>	Vital Signs Transmitter	
<b>EUT Model Number</b>	VST3	
<b>EUT Serial Number</b>	9900284004	
<b>Whether quantity (&gt;1) production is planned</b>	Quantity production is planned.	
<b>Cellular Phone standards</b>	CDMA 800 and 1900	
<b>Type(s) of Emission</b>	1M25F9W	
<b>RF Output Power</b>	23.31 dBm – CDMA 800 23.83 dBm – CDMA1900	
<b>Frequency Range</b>	824.7 – 848.31 MHz 1850 – 1910 MHz	CDMA800 CDMA1900
<b>Antenna &amp; Gain</b>	World GSM Antenna – P/N 100709	880 – 960 MHz (1 dBi Peak Gain) 1710 – 1990 MHz (1 dBi Peak Gain)
<b>Detachable Antenna</b>	None	
<b>External input</b>	<input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Digital Data	

EUT receive date: 6/1/2004

EUT receive condition: The EUT was received in good condition with no apparent damage.

Test start date: 6/15/2004

Test completion date: 6/30/2004

The test results in this report pertain only to the item tested.

### 2.3.1 System Support Equipment

Table 2-1 contains the details of the support equipment associated with the Equipment Under Test during the FCC testing.

*Table 2-1: System Support Equipment*

Description	Manufacturer	Model Number	Serial Number	FCC ID number
AC Battery Charger	Biowatch Medical	GTM21089-1305-W3	Not Labeled	Not Labeled

### 2.3.2 Cables associated with EUT

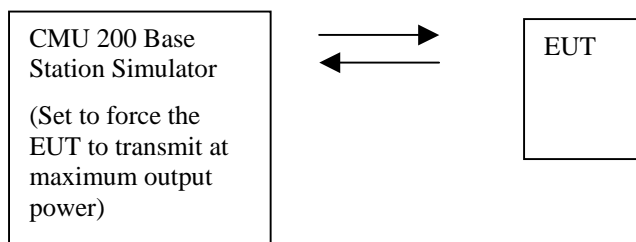
Table 2-2 contains the details of the cables associated with the EUT.

*Table 2-2: Interconnecting cables to EUT*

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
DC Power Cable	6 ft	None	None	DC Output of the Charger	DC Input of the VST3

### 2.3.3 System Block Diagram

The diagram shown below details the interconnection of the EUT and its accessories during FCC testing. For specific layout, refer to the test configuration photograph in the relevant section of this report.



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**2.3.4 Justification**

The EUT was operated in the stand-alone configuration.

**2.3.5 Mode(s) of operation**

The Vital Signs Transmitter was powered by an internal battery and a power supply for recharging.

**2.4 Modifications required for compliance**

No modifications were implemented by Intertek.

**2.5 Related Submittal(s) Grants**

Sierra Wireless CDMA Modem – FCC ID: N7NSB555

### 3 TEST FACILITY

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 1992. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The Industry Canada filing number for this site is 2055.

*Figure 3-1: 10-Meter EMC Site*





## 4 CONDUCTED RF POWER

FCC Rule: §2.1046

IC Rule: RSS-129 §7.1, §9.1 and RSS-133 §6.2

### 4.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a CMU-200 Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed into a call and the transmitter output was read off the CMU-200 in dBm. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the CMU-200 power reading.

Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitters.

### 4.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004

### 4.3 Test Results

The Vital Signs Transmitter met the RF power output requirements of FCC Part 22 Subpart H and FCC Part FCC Part 24 Subpart E. The test results are located in Table 4-1.

Table 4-1 RF Power

EUT Mode	TX Channel	Conducted Output Power (dBm)
CDMA 800	384	23.31
CDMA 800	777	22.9
CDMA 800	1013	23.25
CDMA 1900	25	23.83
CDMA 1900	600	23.26
CDMA 1900	1175	23.33

## 5 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053

RSS-129 §8.1

### 5.1 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The Base Station Simulator was set to force the EUT to its maximum power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels) in each operating band. Once spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-B section 2.2.12 (Radiated Spurious Emissions).

### 5.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
Signal Generator	HP	83620B	3844A01327	8/20/2004
Horn Antenna	EMCO	3115	6556	7/11/2004
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	10/2/2004
Bilog Antenna	EMCO	3142B	1674	8/2004
Preamplifier	HP	8449B	3008A00775	12/2004
High Pass Filter	Microwave Circuits	H3G020G2	3986-01 DC0408	2/2005

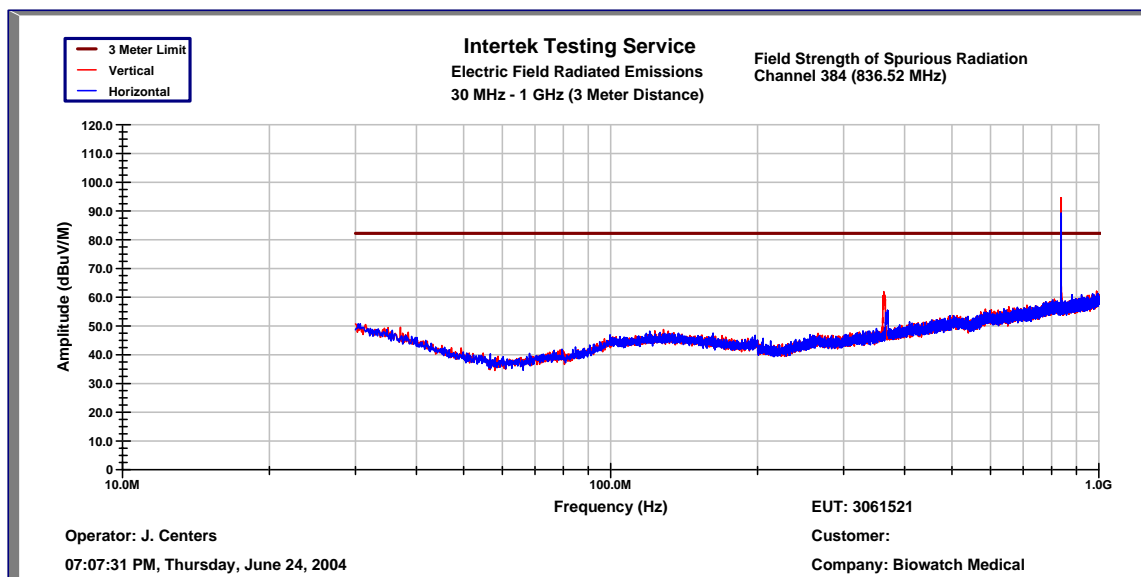
### 5.3 Test Results

The Vital Signs Transmitter met the field strength of spurious radiation requirements of FCC §2.1053. See Table 5-1 for measured radiated spurious emission power for emissions within 20 dB of the limit. See The Figure 5-1 through Figure 5-6 for the graphical test data.

*Table 5-1: Field Strength of Spurious Radiation*

EUT Mode	TX Channel	Frequency (GHz)	Vertical Reading (dBm)	Horizontal Reading (dBm)	Vertical Signal Generator (dBm)	Horizontal Signal Generator (dBm)	Cable Loss (dB)	Vertical Tx Antenna Gain (dBi)	Horizontal Tx Antenna Gain (dBi)	Vertical ERP (dBm)	Horizontal ERP (dBm)
CDMA 1900	1175	3.816985	-81.87	-78.23	-15.8	-11.8	15.54	8.6	8.6	-22.74	-18.74
CDMA 1900	600	3.761195	-81.76	-78.02	-17.3	-11.1	15.23	8.6	8.6	-23.93	-17.73
CDMA 1900	25	3.702124	-76.81	-82.33	-13.5	-16.6	15.15	8.6	8.6	-20.05	-23.15

*The Figure 5-1: Field Strength of Spurious Radiation (30 MHz – 1 GHz), CDMA 800 Channel 384, 777, and 1013<sup>4</sup>*



<sup>4</sup> The emission shown exceeding the limit in these three plots is the fundamental for channels 384, 777, and 1013.

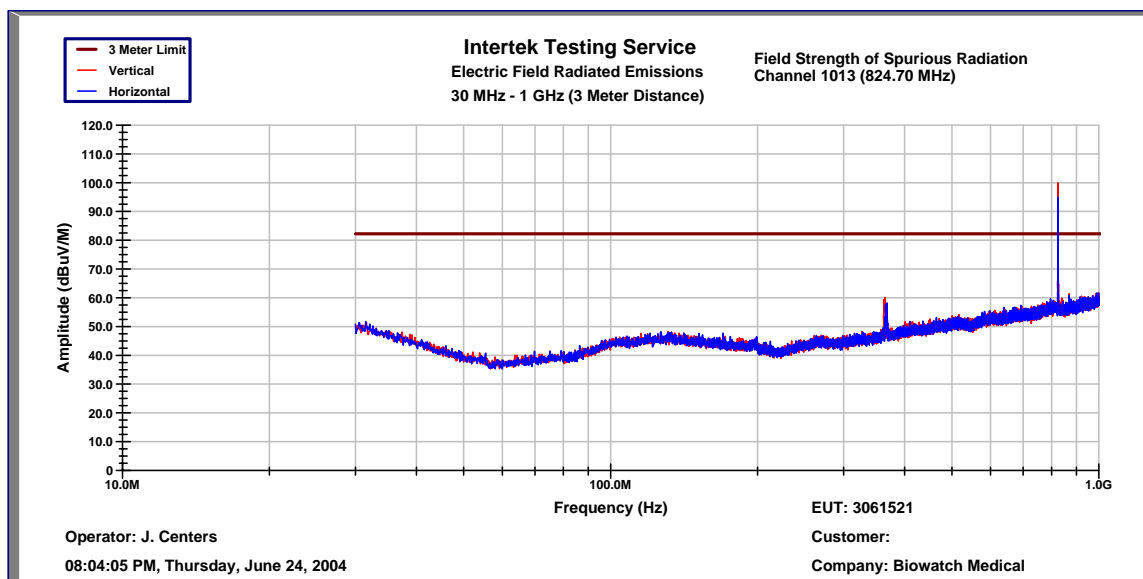
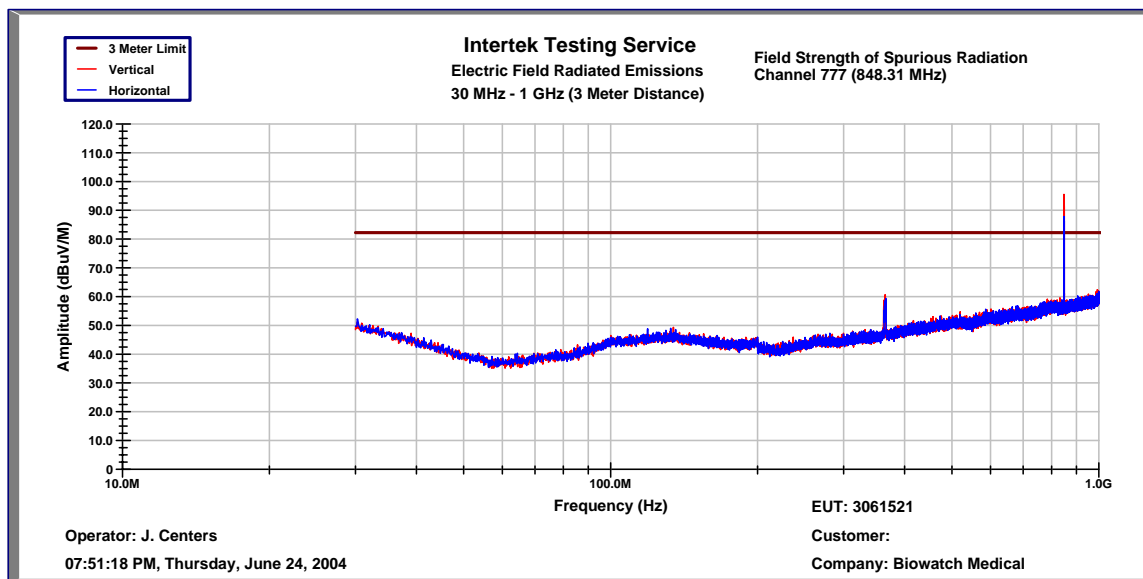
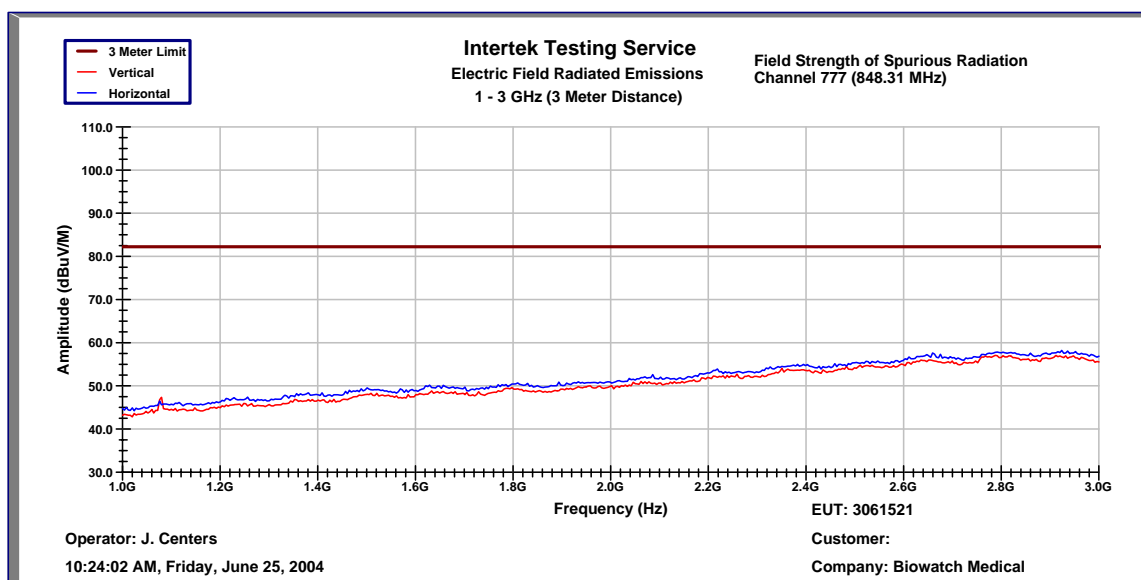
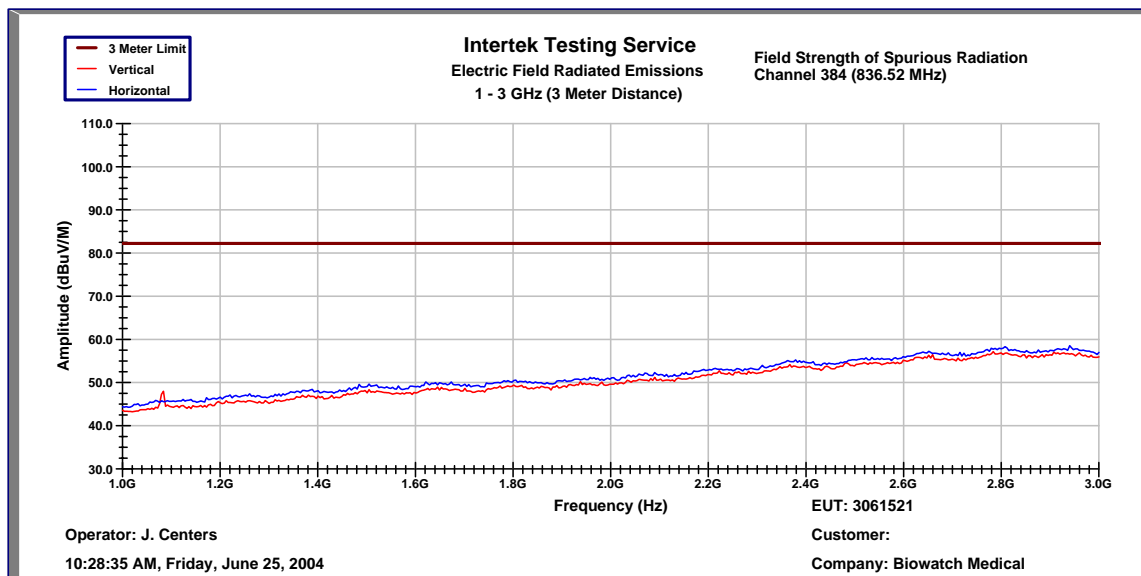


Figure 5-2: Field Strength of Spurious Radiation (1 GHz – 3 GHz), CDMA 800 Channel 384,777, 1013



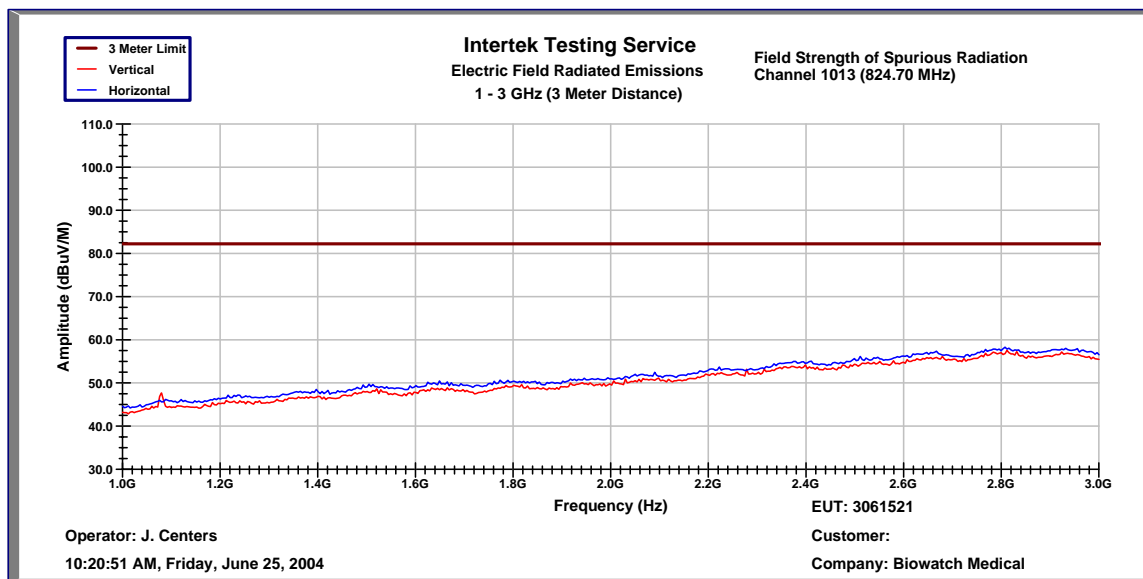
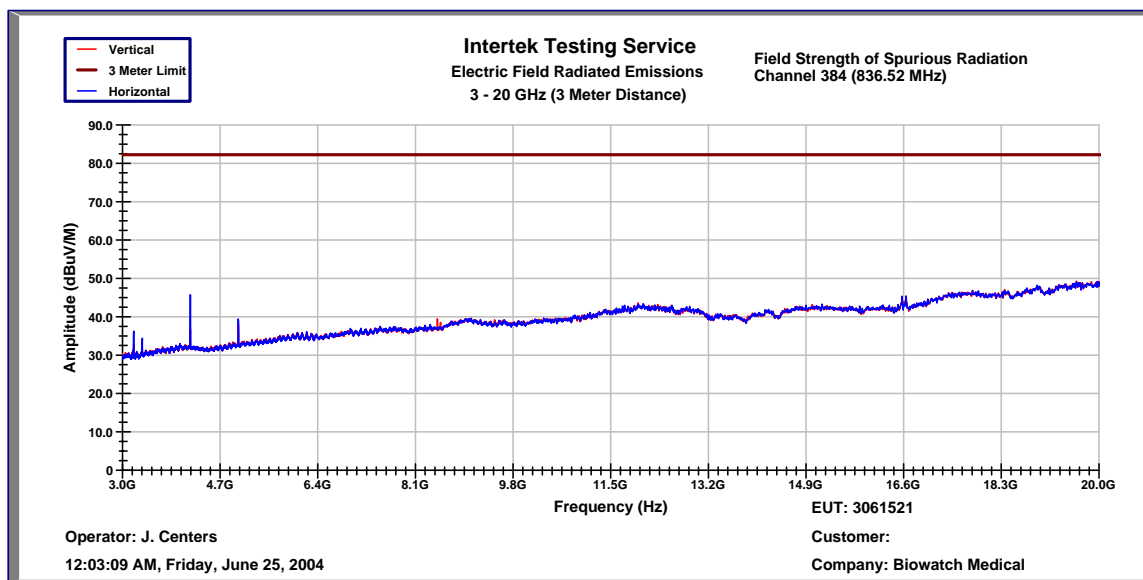


Figure 5-3: Field Strength of Spurious Radiation (3GHz – 20GHz), CDMA 800 Channel 384, 777, and 1013



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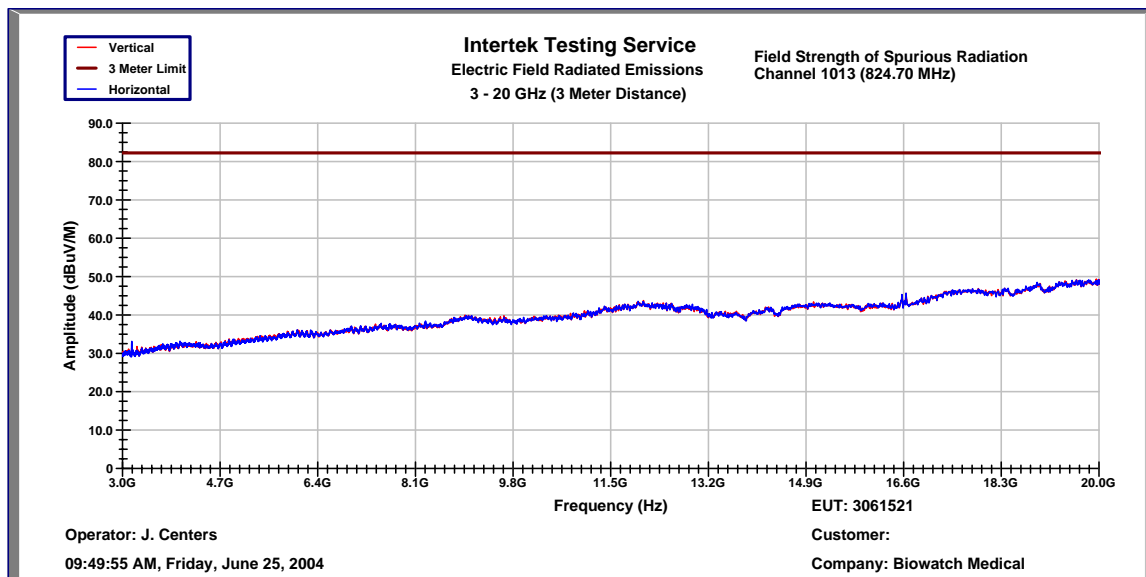
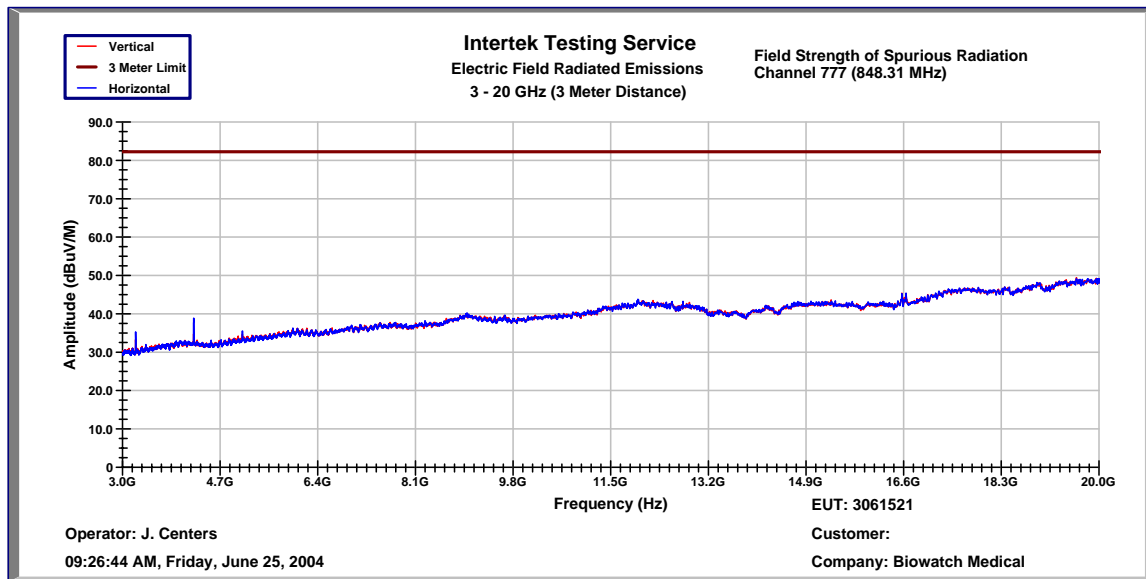
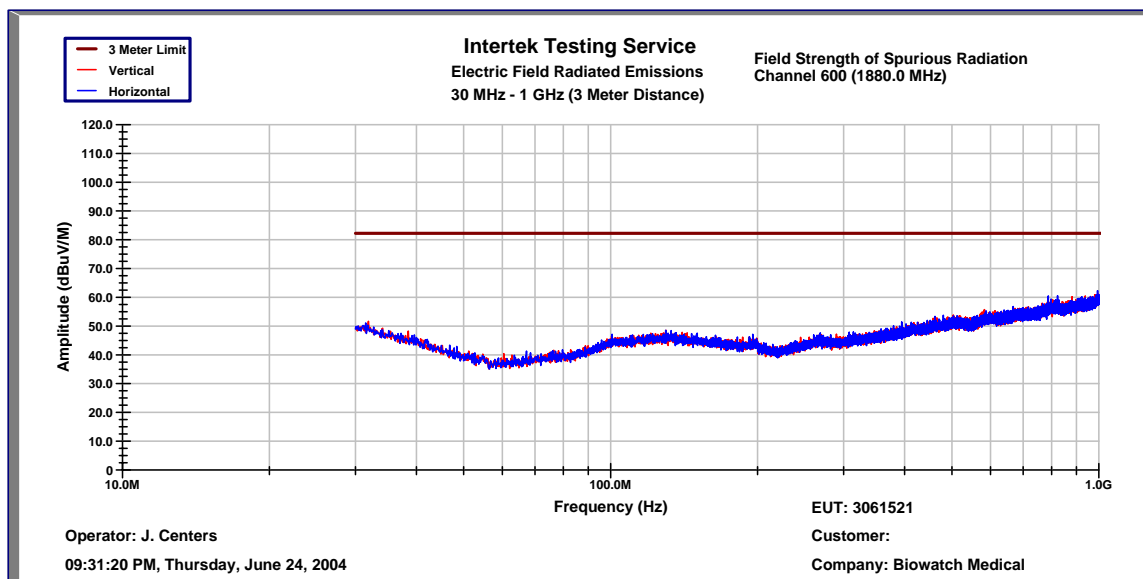
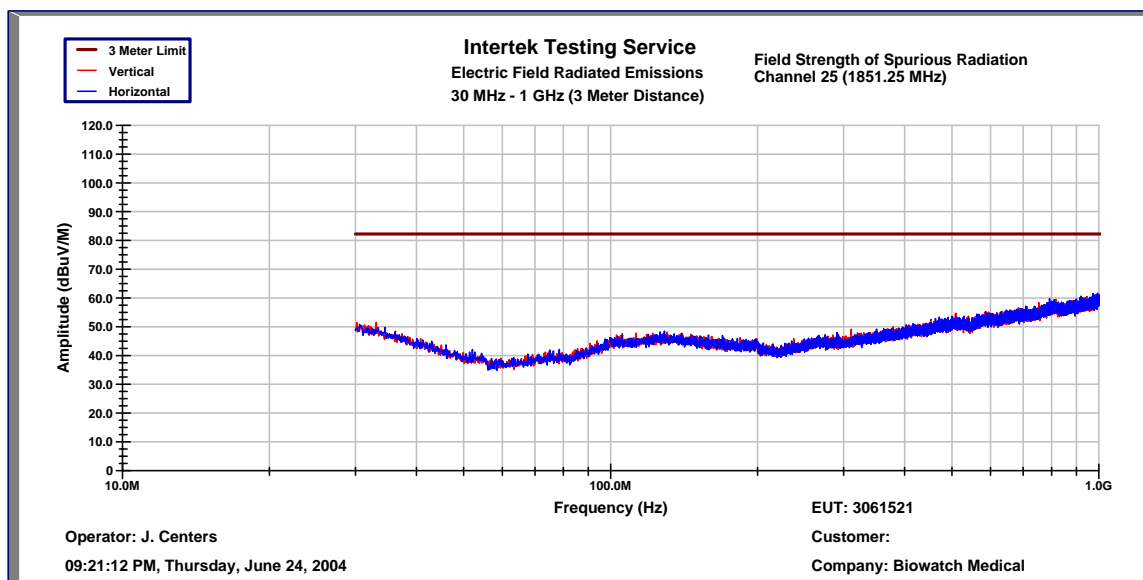


Figure 5-4: Field Strength of Spurious Radiation (30 MHz – 1 GHz), CDMA 1900 Channel 25, 600, and 1175





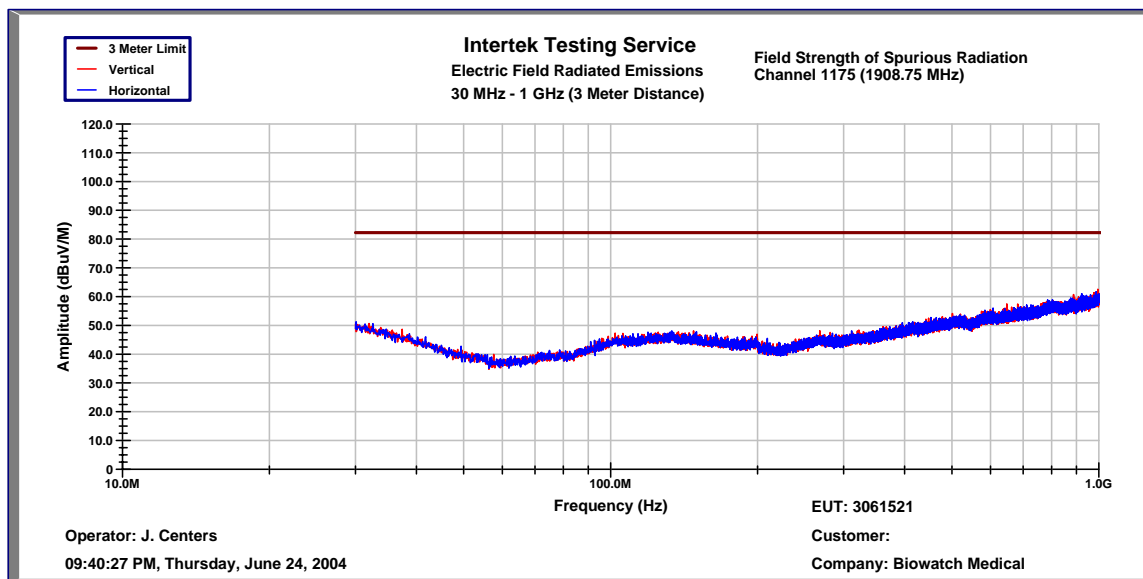
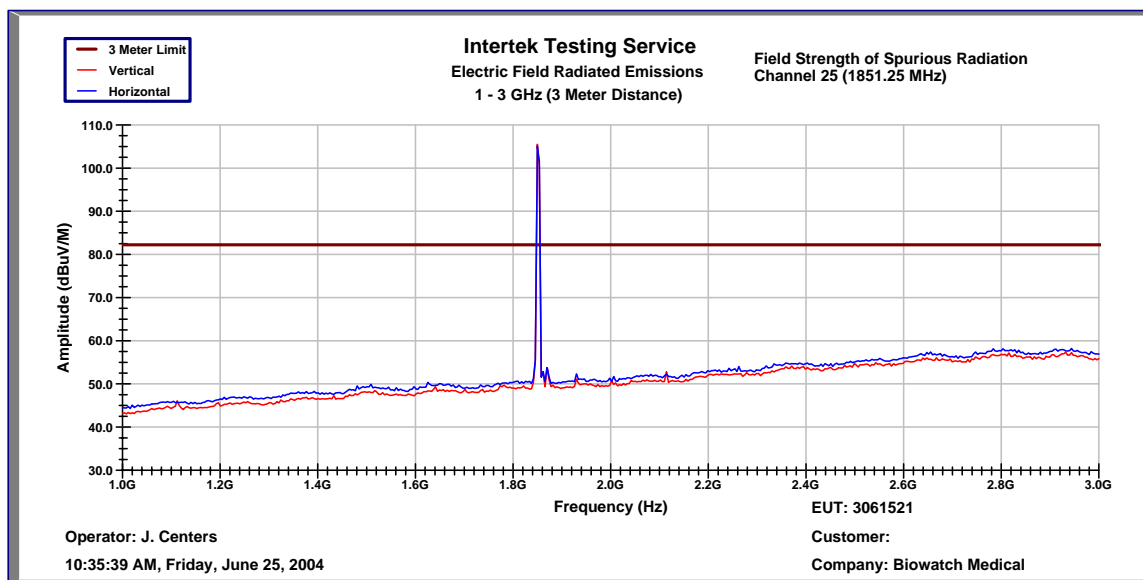


Figure 5-5: Field Strength of Spurious Radiation (1 GHz – 3 GHz), CDMA 1900 Channel 25, 600, and 1175<sup>5</sup>



<sup>5</sup> The emission shown in these three plots is the fundamental for channels 25, 600, and 1175.

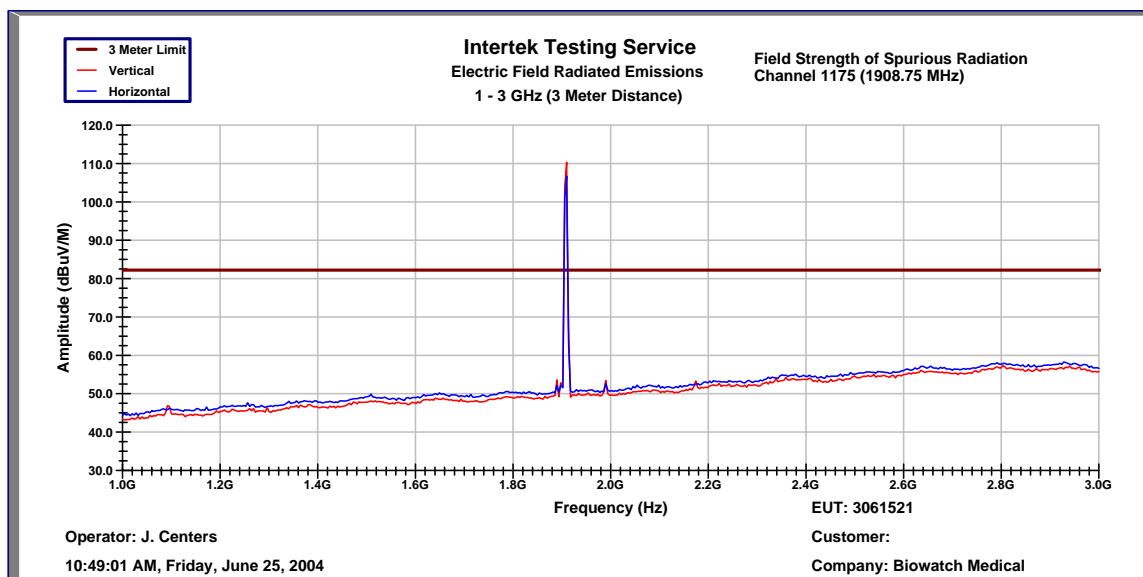
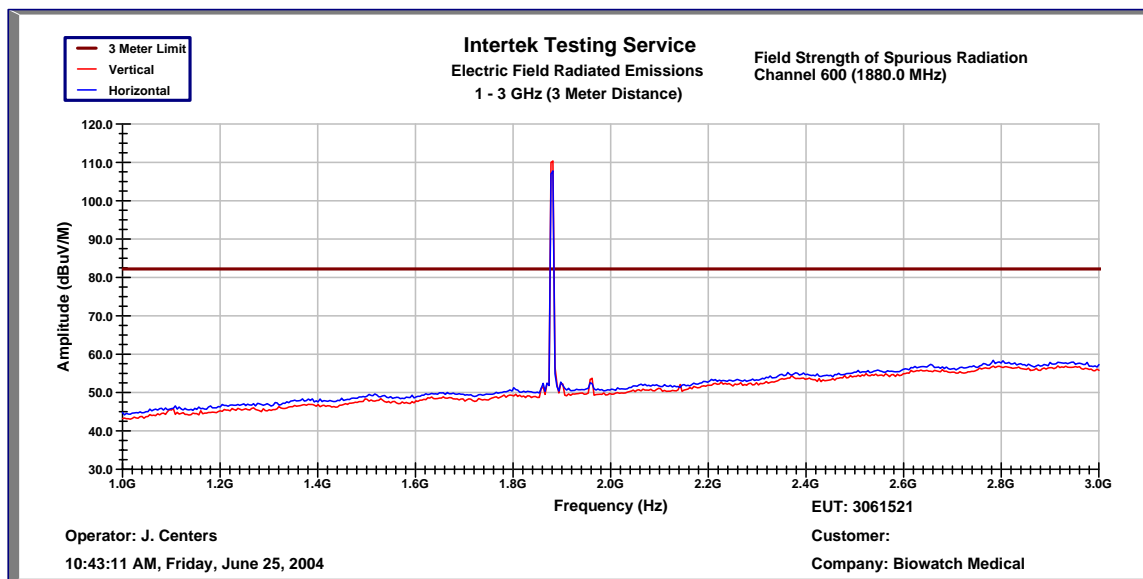
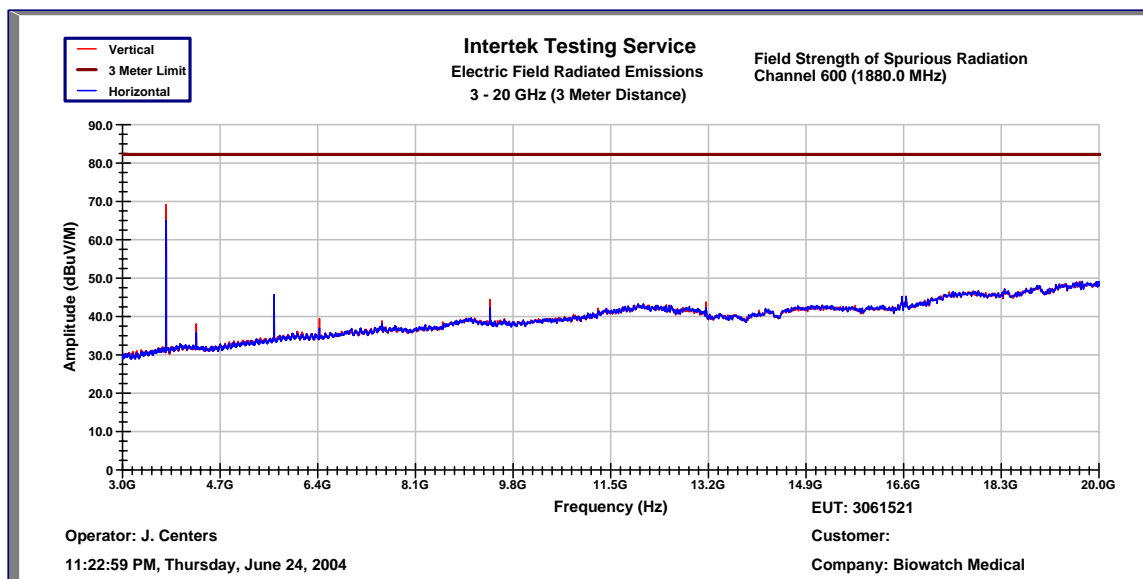
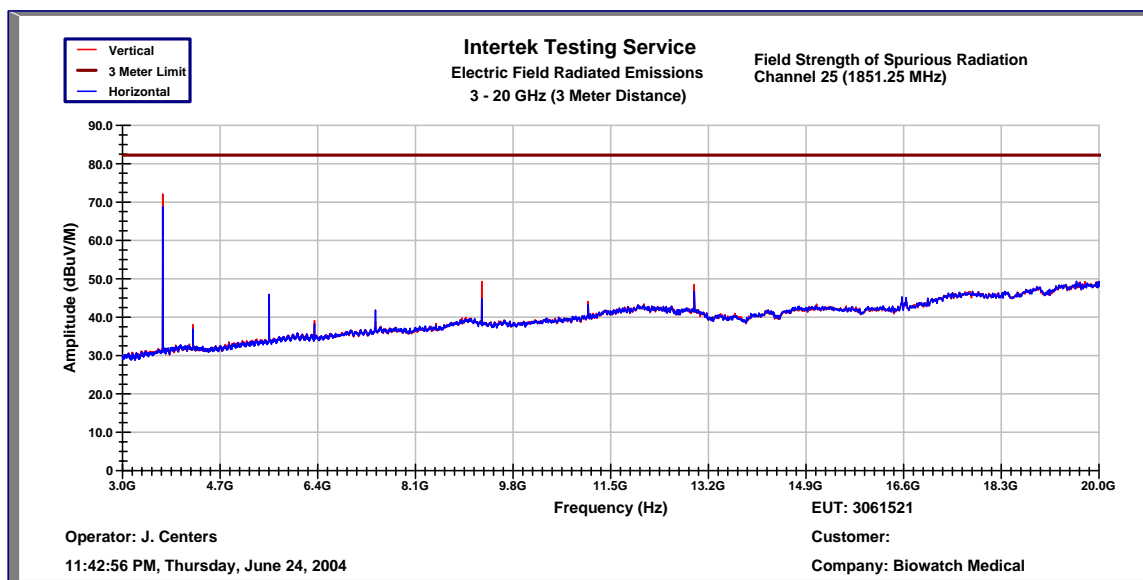


Figure 5-6: Field Strength of Spurious Radiation (3GHz – 20GHz), CDMA 1900 Channel 25, 600, and 1175



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