

MEASUREMENT AND TECHNICAL REPORT

CARDIONET
1010 2nd Avenue
San Diego, CA 92101

DATE: 21 December 2006

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	Sensor	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: Defer until:	No: X
Company Name agrees to notify the Commission by: of the intended date of announcement of the product so that the grant can be issued on that date.	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*
(*) FCC Part 15, Paragraph(s) 15.247(a), 15.247(b), 15.247(c), 15.247(d), 15.107(a), and 15.109(a) and RSS-Gen 7.2; RSS 210, Annexes 7 and 8		
Report Prepared by:	TÜV AMERICA, INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 Fax: 858 546 0364	

TABLE OF CONTENTS

	Pages
1.0 GENERAL INFORMATION	<u>3 - 6</u>
1.1 Product Description	<u>3 - 4</u>
1.2 Related Submittal Grant	<u>5</u>
1.3 Tested System Details	<u>5</u>
1.4 Test Methodology	<u>5</u>
1.5 Test Facility	<u>6</u>
2.0 SYSTEM TEST CONFIGURATION	<u>7</u>
2.1 Justification	<u>7</u>
2.2 EUT Exercise Software	<u>7</u>
2.3 Special Accessories	<u>7</u>
2.4 Equipment Modifications	<u>7</u>
2.5 Configuration of Test System	<u>7</u>
3.0 EQUIPMENT / DATA	
BANDEDGE	
BANDWIDTH	
OUTPUT POWER	
CONDUCTED SPURIOUS	
POWER SPECTRAL DENSITY	
CONDUCTED EMISSIONS	
RADIATED EMISSIONS	<u>9</u>
4.0 ATTESTATION STATEMENT	<u>31</u>

1.0 GENERAL INFORMATION

1.1 Product Description

Sensor

General Equipment Description:			
EUT Description:	CardioNet C3 Ambulatory ECG Monitoring system		
EUT Name:	C3 Sensor		
Model No.:	100-0020-01	Serial No.:	Engineering Prototype

EUT Specifications					
Length:	3"	Width:	0.8"	Height:	2"
				Weight:	4.2oz

Power Requirements			
Voltage:	1.5V AA primary cell (If battery powered, make sure battery life is sufficient to complete testing.)		
# of Phases:			
Current (Amps/phase(max)):	260mA	Current (Amps/phase(nominal)):	60mA avg

EUT Power Cable			
Permanent	OR	Removable	
Shielded	OR	Unshielded	
x Not Applicable		Length (in meters):	

EUT Interface Ports and Cables												
Interface				Shielding		Connector Type	Port Termination	Length (in meters)	Removable	Permanent		
Type	Analog	Digital	Qty	Yes	No						Type	Termination
Patient cable	X		1	X		braid	Pin & socket	proprietary		.7		X

Sensor C3 (continued)

EUT Operating Modes to be Tested

Transmit carrier on low, mid, & high channels in ISM 915MHz band..

EUT System Components

Description	Model #	Serial #	FCC ID #
C3 Sensor	100-0020-01	Engineering prototype	QBI-1008

Support Equipment

Description	Model #	Serial #	FCC ID #
NONE			

Oscillator Frequencies

Frequency	Derived Frequency	Component # / Location	Description of Use
8MHz			Microcontroller crystal
32kHz			DSP crystal
12MHz	48MHz		DSP crystal
39MHz	915MHz		RF Transceiver (intentional radiator)

Power Supply

Manufacturer	Model #	Serial #	Type

Power Line Filters

Manufacturer	Model #	Location in EUT

Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Component # / Location
NONE				

EMC Critical Detail

Ferrite beads, shield cans, multi-layer PCB

1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the following tests.

TEST DESCRIPTION	PARAGRAPH NUMBER
Band Edge	15.247(a)(1); RSS 210, Annex 7, A7.3
Bandwidth	15.247(a)(2); RSS 210, Annex 8, A8.2
RF Output Power	15.247(b); RSS 210, Annex 8, A8.4
RF Conducted Spurious Emissions	15.247(c); RSS 210, Annex 8, A8.5
Radiated Spurious Emissions – Restricted Bands (1GHz to 25GHz)	15.247(c)/ 15.209(a); RSS 210, Annex 8, A8.5
Power Spectral Density	15.247(d); RSS 210, Annex 8, A8.2
Conducted Emissions	15.107(a); RSS-Gen 7.2.2
Radiated Emissions (30 to 1000 MHz)	15.209(a); RSS-Gen 7.2

Testing was performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions. Test photos indicate worst case.

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 678 1400
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Test Setup Photos Exhibit

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Test Setup Photos Exhibit

3.0 EQUIPMENT/DATA

Test Conditions:

BANDEDGE - FCC Part 15.247(a)(1)(i) and (a)(2); RSS 210 Annex 7, (2)
 BANDWIDTH - FCC Part 15.247(a)(1)(i) and (a)(2); RSS 210 Annex 8, A8.2
 OUTPUT POWER - FCC Part 15.247(b); RSS 210 Annex 8, A8.4
 CONDUCTED SPURIOUS - FCC Part 15.247(c); RSS 210 Annex 8, A8.5
 POWER SPECTRAL DENSITY - FCC Part 15.247(d); RSS 210 Annex 8, A8.2
 CONDUCTED EMISSIONS - FCC Part 15.107(a); RSS-Gen, 7.2
 RADIATED EMISSIONS - FCC Part 15.109(a); RSS-Gen, 7.2

The following measurements were performed at the San Diego Testing Facility:

☐ - Test not applicable

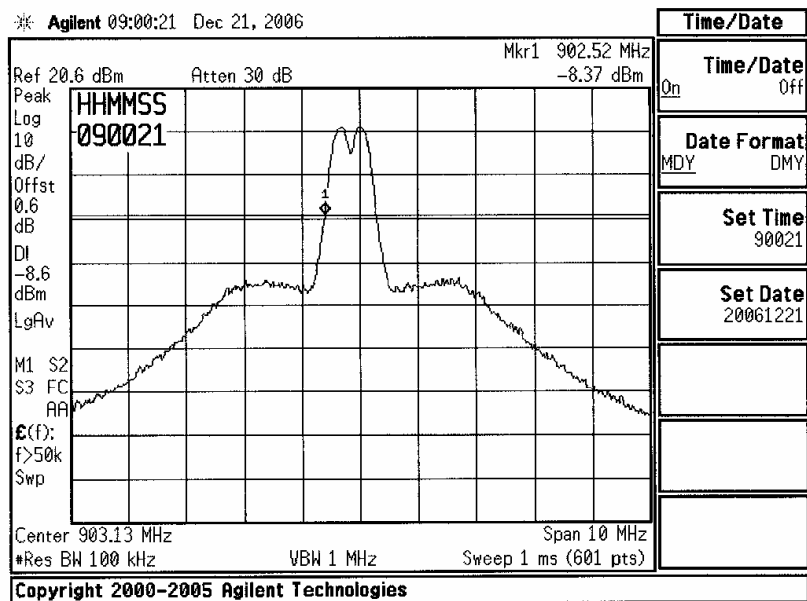
- - TR-2, Test Room
- - Roof (Small Open Area Test Site)
- - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
3146	6641	Antenna, Log Periodic Dipole	EMCO	106X	06/05
3115	6669	Double Ridge Antenna	EMCO	9412-4364	08/05
3110B	6644	Biconical Antenna	EMCO	9508-2134	10/05
E4440A	6814	Spectrum Analyzer	Hewlett Packard	MY42510441	02/06
8493A	--	20 dB Attenuator	Hewlett Packard	05391	Verified
VAT-20	--	20 dB Attenuator	Mini Circuits	--	Verified
LPB 2520/A	6622	Antenna, Bilog	Antenna Research	1170	07/05
ESVS 30	6732	EMI Test Receiver	Rhode & Schwarz	833825/003	11/05
3104	6663	Biconical Antenna	EMCO	3041	Verified
3115	6679	Double Ridge Guide Antenna	EMCO	2495	04/06
3146	6641	Log Periodic Dipole Antenna	EMCO	106X	Verified

Remarks: One year calibration cycle for all test equipment and sites.

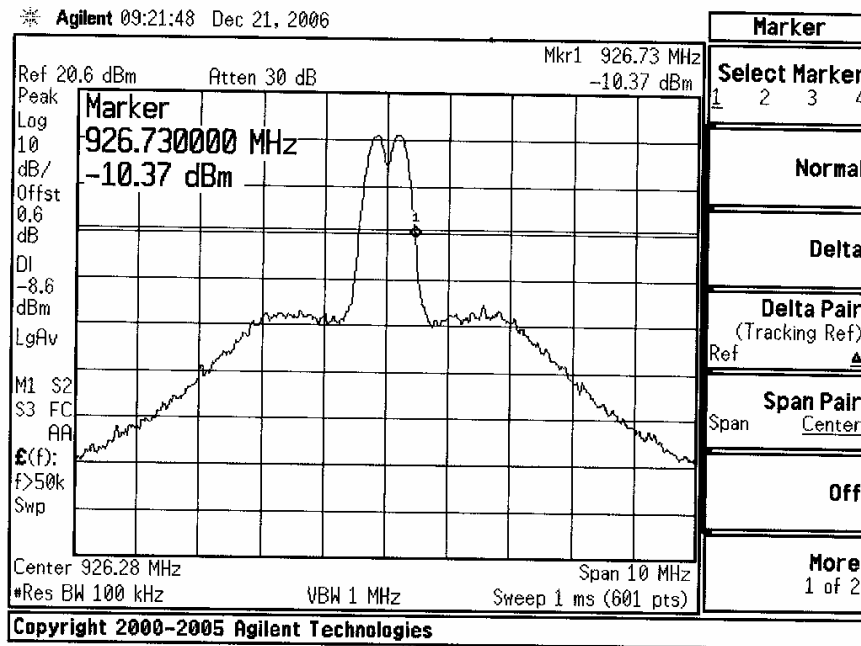
Part 15.247(a)(1), RSS 210, Annex 7 (2), Bandedge



Cardionet
Channel ϕ
reaches -20dBc point at 902.5 MHz
band edge is 902 MHz - OK

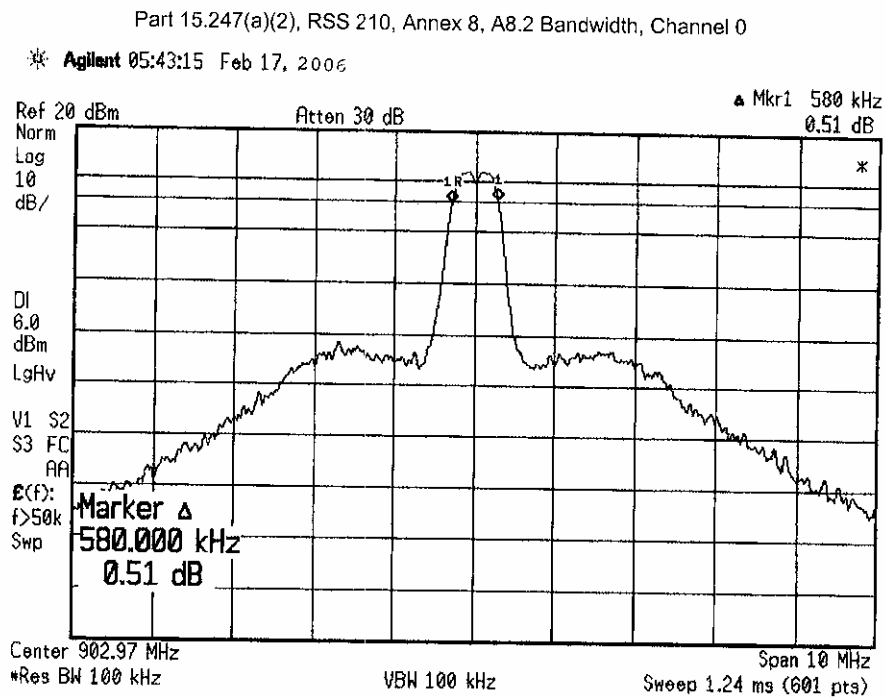
gts

Part 15.247(a)(1), RSS 210, Annex 7 (2), Bandedge



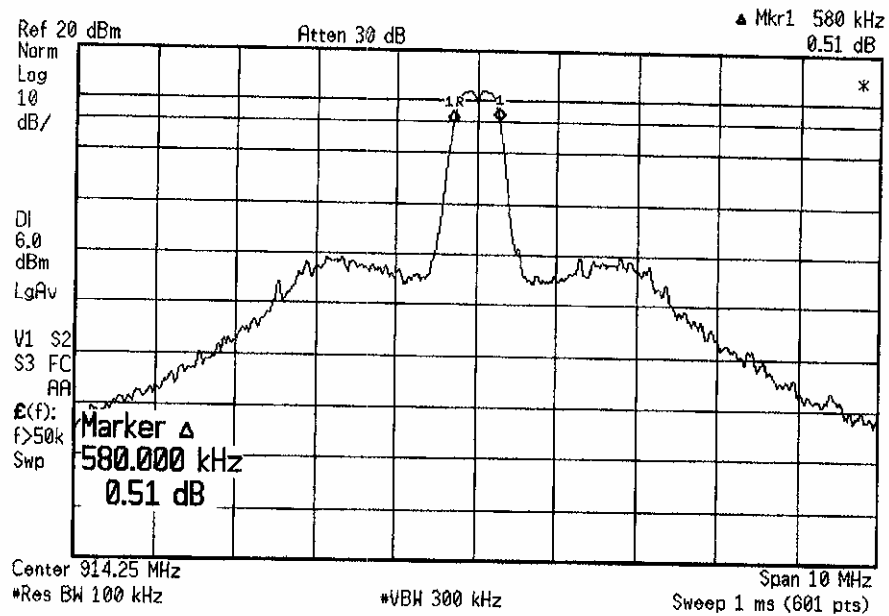
Cardionet
Highest channel
Band edge at 928 MHz
reaches -20dBc @ 926.7 MHz - OK

GT2



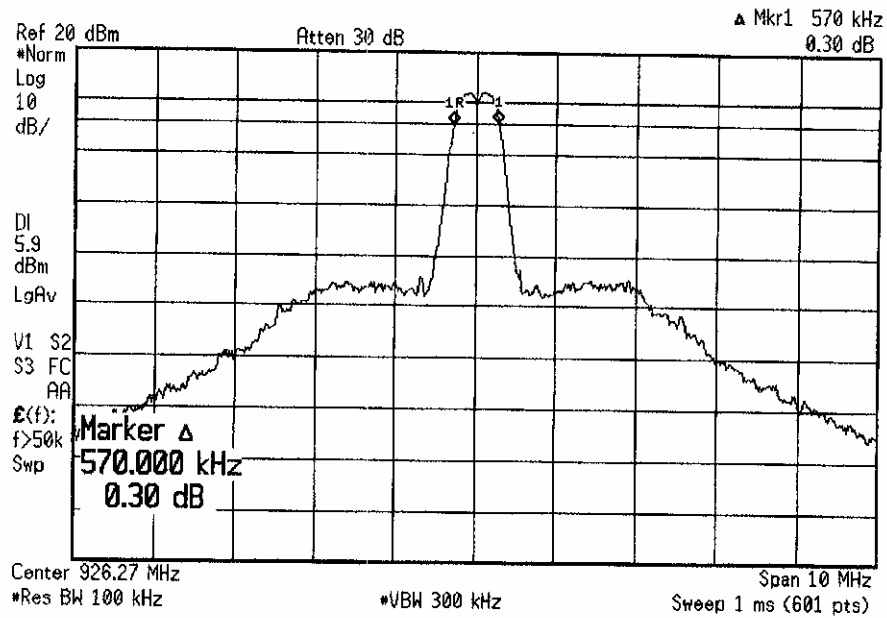
Part 15.247(a)(2), RSS 210, Annex 8, A8.2 Bandwidth, Channel 15

* Agilent 06:12:56 Feb 17, 2006



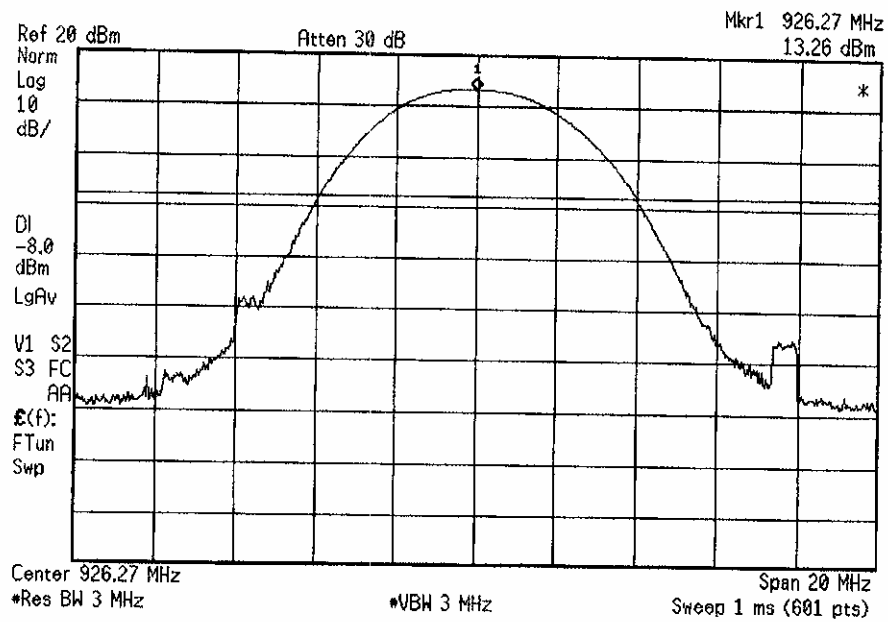
Part 15.247(a)(2), RSS 210, Annex 8, A8.2 Bandwidth, Channel 31

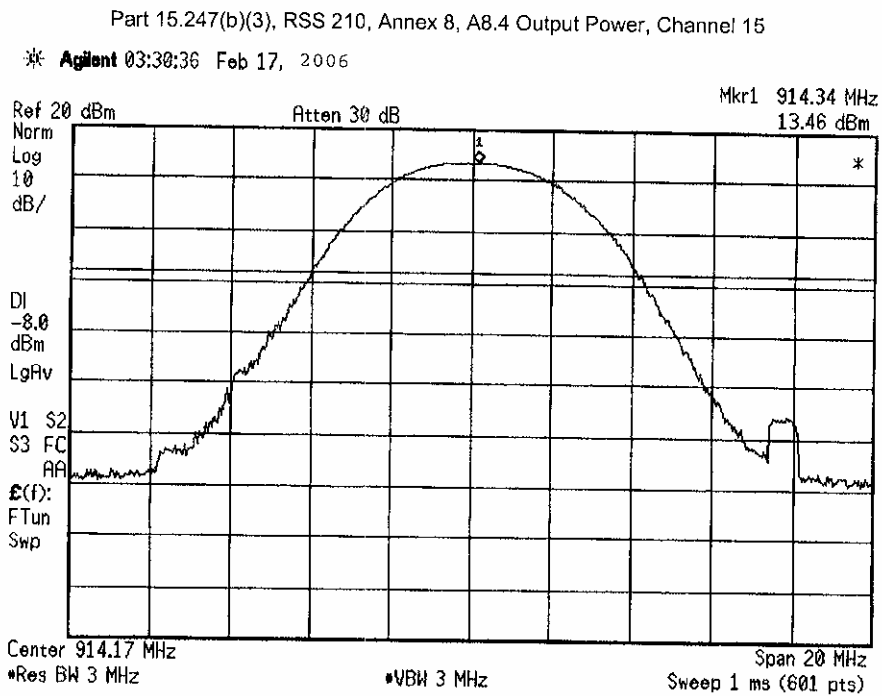
* Agilent 06:06:47 Feb 17, 2006

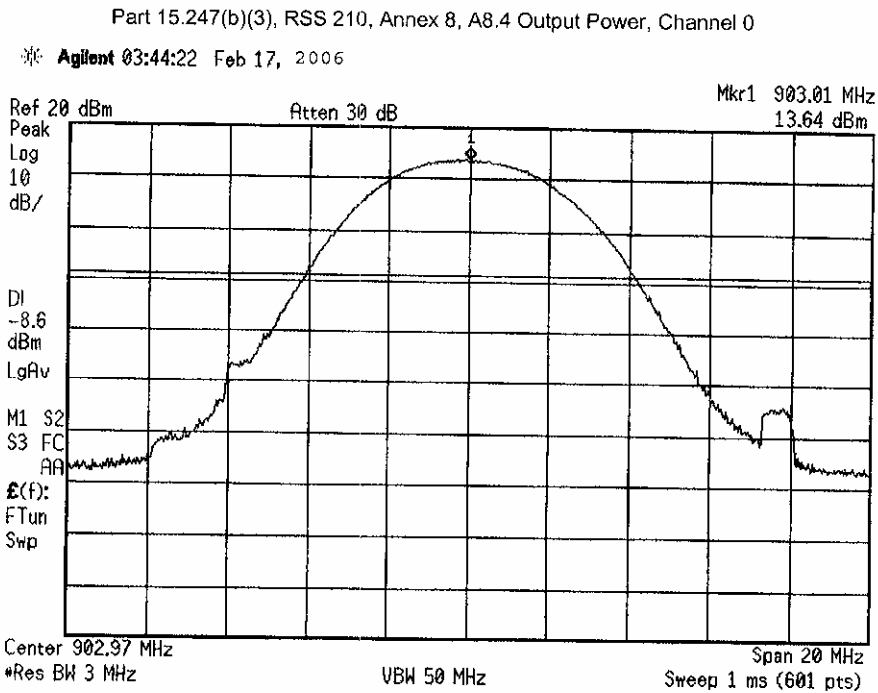


Part 15.247(b)(3), RSS 210, Annex 8, A8.4 Output Power, Channel 31

* Agilent 03:27:09 Feb 17, 2006

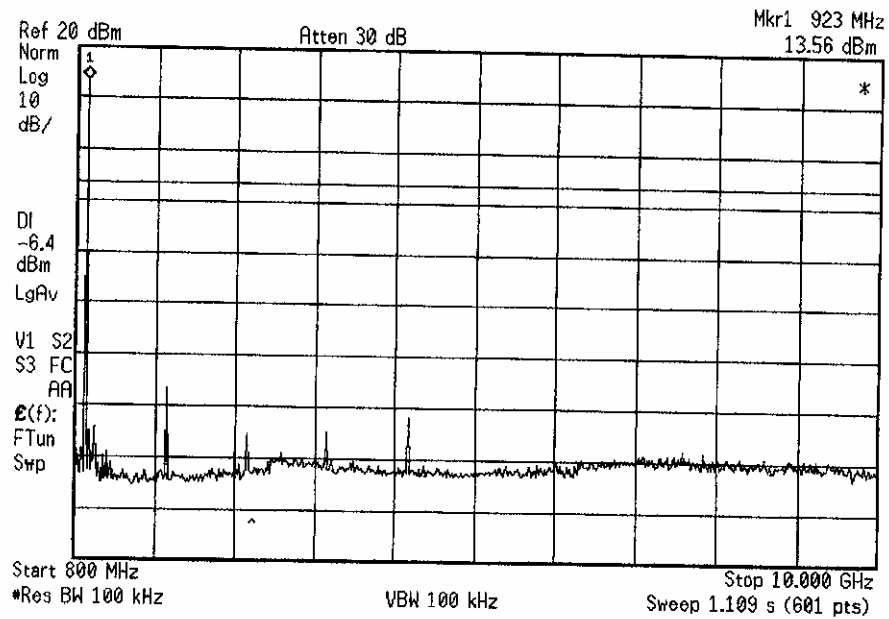






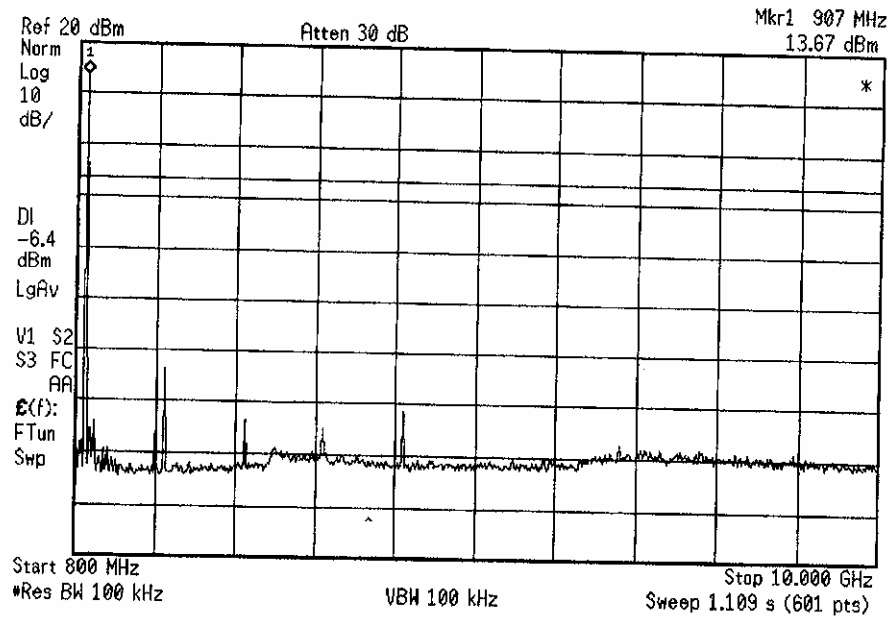
Part 15.247(c), RSS 210, Annex 8, A8.5 Conducted Spurious Emissions, Channel 31

* Agilent 03:07:05 Feb 17, 2006



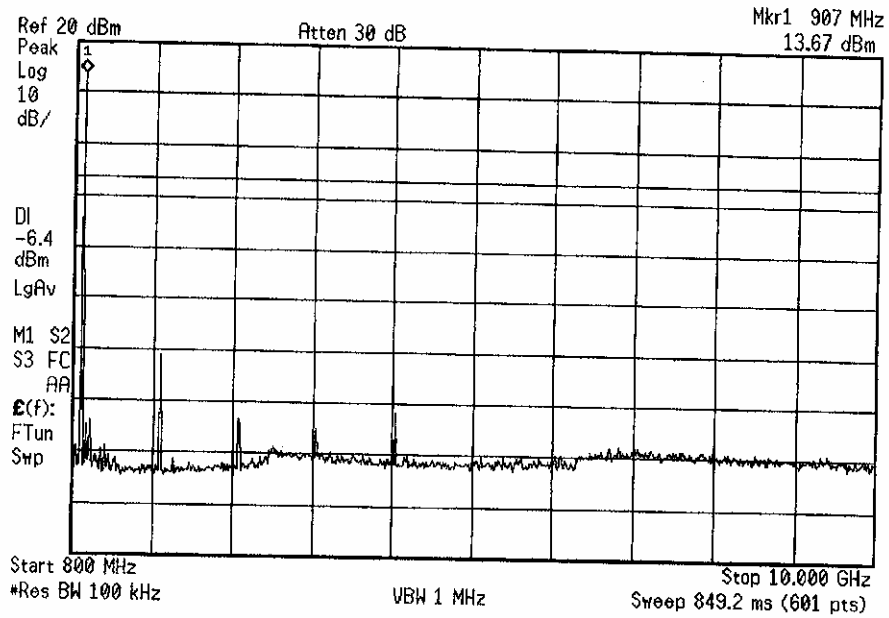
Part 15.247(c), RSS 210, Annex 8, A8.5 Conducted Spurious Emissions, Channel 15

* Agilent 03:10:04 Feb 17, 2006



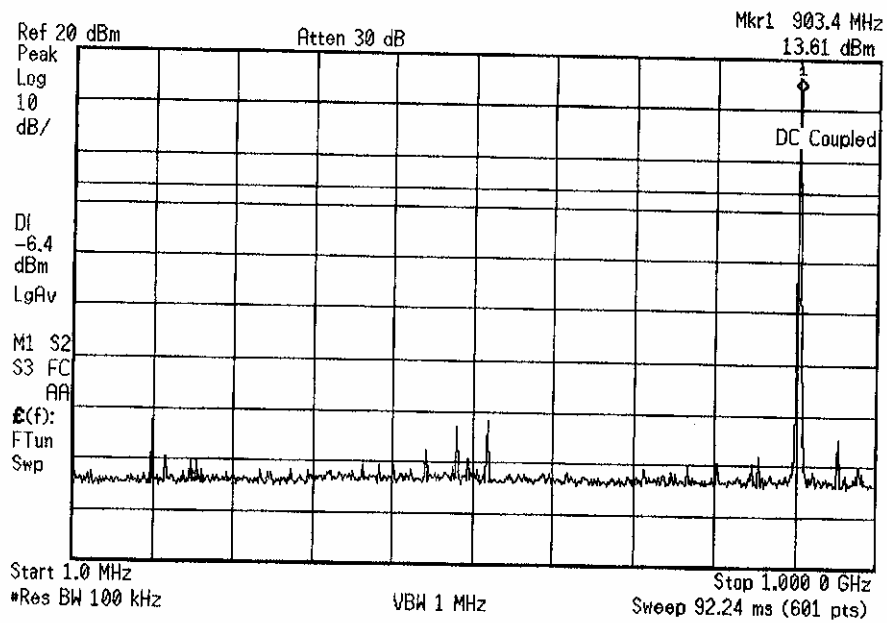
Part 15.247(c), RSS 210, Annex 8, A8.5 Conducted Spurious Emissions, Channel 0

* Agilent 03:11:46 Feb 17, 2006



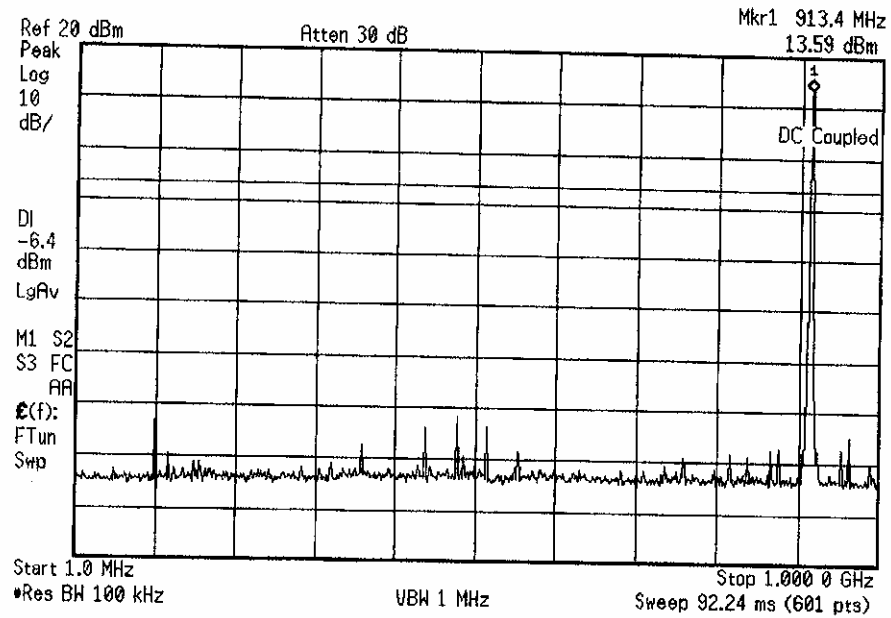
Part 15.247(c), RSS 210, Annex 8, A8.5 Conducted Spurious Emissions, Channel 0

Agilent 03:14:24 Feb 17, 2006



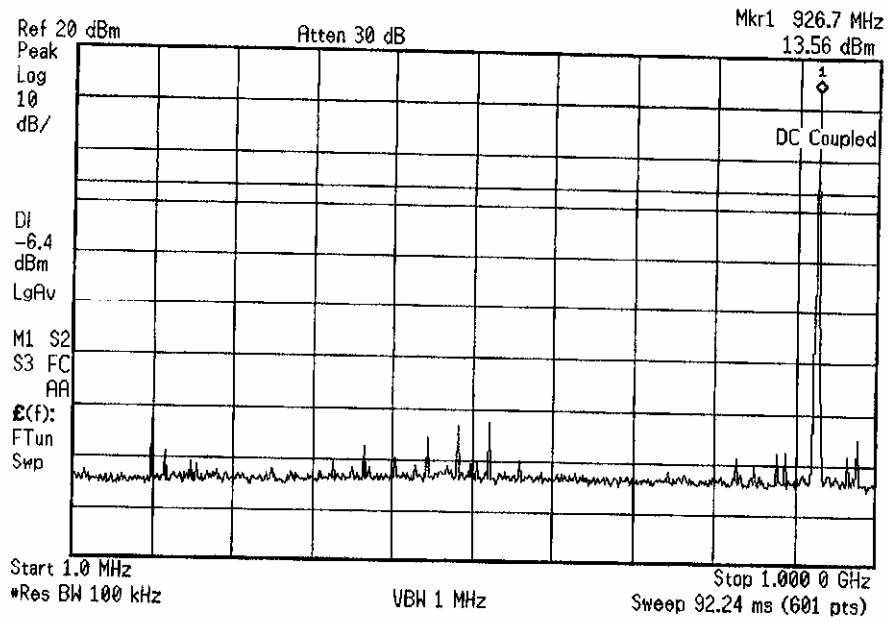
Part 15.247(c), RSS 210, Annex 8, A8.5 Conducted Spurious Emissions, Channel 15

* Agilent 03:15:40 Feb 17, 2006



Part 15.247(c), RSS 210, Annex 8, A8.5 Conducted Spurious Emissions, Channel 31

* Agilent 03:16:52 Feb 17, 2006



REPORT NO: SC600647	TESTER:	Model	Resolution	SPEC:	FCC Part 15 para 15.209(a)
CUSTOMER: CardioNet				TEST DIST:	3 Meters
E U T: C3 Sensor				TEST SITE:	Roof
EUT MODE: Transmit				BICONICAL:	234
DATE: June 1, 2006				LOG:	243
NOTES:				OTHER:	251
					above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG
					below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG
					CF = Antenna Factor + Cable Loss - Preamp/plier Gain + Prescaler Loss

[illegible]

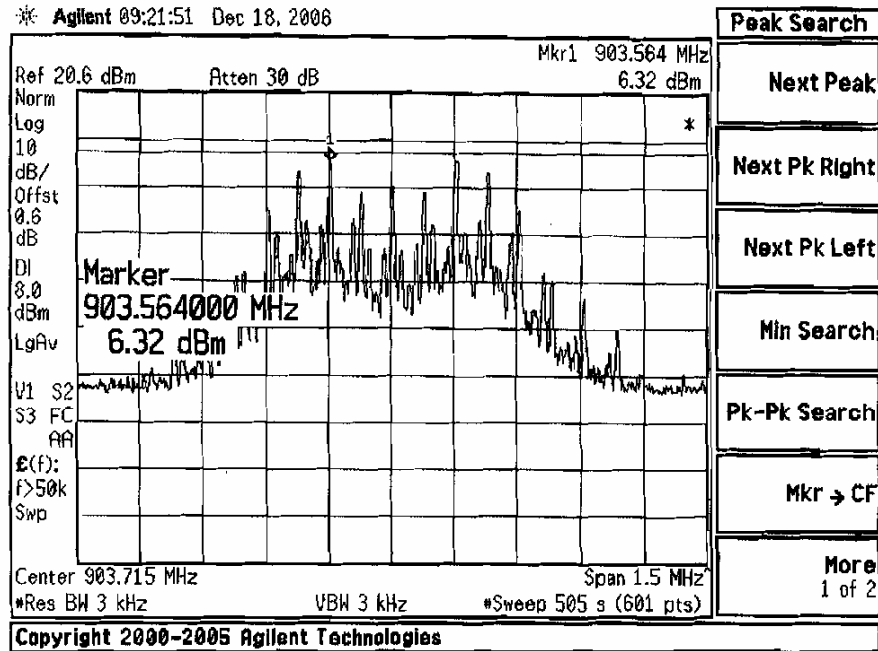
REPORT No: SC600647	TESTER: Rodel Resolme	SPEC: FCC Part 15 para 15.209(a)
CUSTOMER: CardioNet		TEST DIST: 3 Meters
E U T: C3 Sensor		TEST SITE: Roof
EUT MODE: Transmit		BICONICAL: 234
DATE: June 1, 2006		LOG: 243
NOTES:		OTHER: 251
<u>above 1GHz; RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG</u>		

[illegible]

REPORT No:	SC600647	TESTER:	Rodel Resolme	SPEC:	FCC Part 15 para 15.209(a)
CUSTOMER:	CardioNet			TEST DIST:	3 Meters
E U T:	C3 Sensor			TEST SITE:	Roof
EUT MODE:	Transmit			BICONICAL:	234
DATE:	June 1, 2006			LOG:	243
NOTES:				OTHER:	251
<u>above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG</u>					

[illegible]

low channel power spectral density goes here



Cardionet

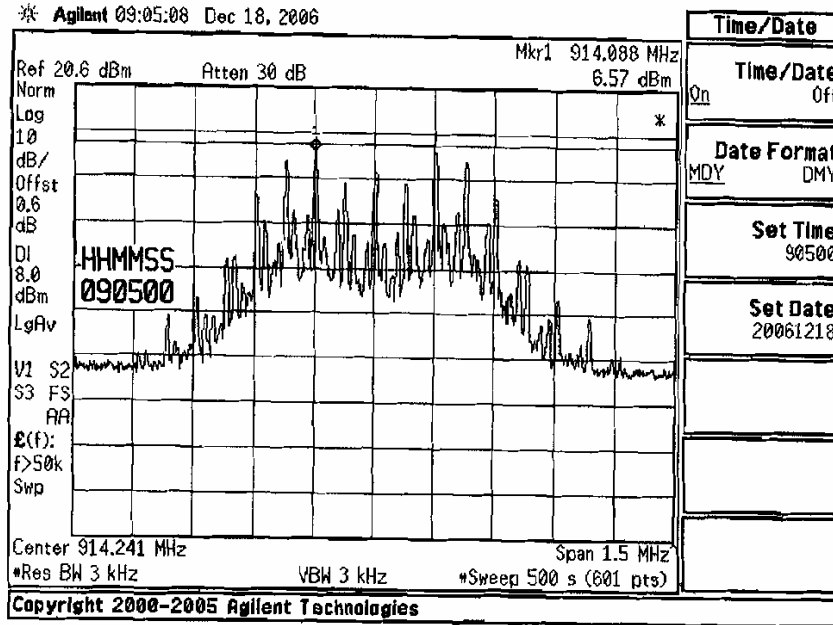
low-channel - highest power

Power spectral density

<8 dBm - OK

YTS

mid channel power spectral density goes here



Cardionet

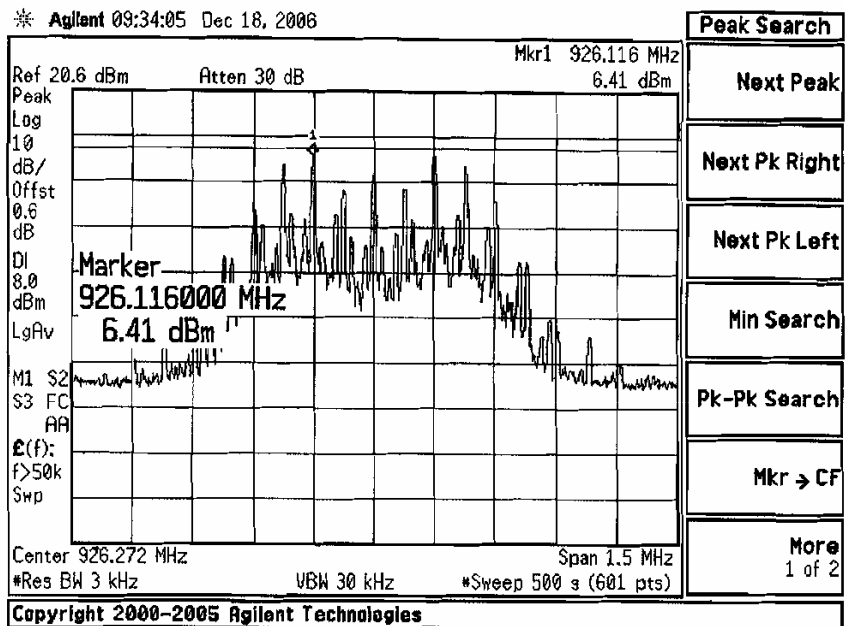
Mid-channel - highest power

Power spectral density

<8 dBm - OK

JTS

high channel power spectral density goes here



Cardionet

High channel - highest power

Power spectral density

<8 dBm - OK

JTS

Part 15.107(a); RSS-Gen 7.2.2, Conducted Emissions

The device is not capable of connecting to the AC power means in any mode.

4.0 ATTESTATION STATEMENT

GENERAL REMARKS:

NOTES: 1) Antenna gain is less than 6 dBi.
2) Radiated Emissions - Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions. Test photos indicate worst case.

SUMMARY:

All tests were performed per CFR 47, Part(s) 15.247(a), 15.247(b), 15.247(c), 15.247(d), 15.107(a), 15.207(a), and 15.209(a)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part(s) 15.247(a), 15.247(b), 15.247(c), 15.247(d), 15.107(a), 15.207(a), and 15.209(a)

Testing Start Date: 15 February 2006

Testing End Date: 16 March 2006

- TÜV AMERICA, INC. -

Reviewing Engineer:



Chuck Rickard
(EMC Engineer)

Test Engineer:



David Gray
(EMC Engineer)