# Cameron Health, Inc.

# **SQ-RX Pulse Generator**

June 26, 2008

Report No. CAME0008

Report Prepared By



www.nwemc.com 1-888-EMI-CERT

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22975 NW Evergreen Parkway Suite 400 Hillsboro, Oregon 97124

#### **Certificate of Test**

Issue Date: June 26, 2008
Cameron Health, Inc.
Model: SQ-RX Pulse Generator

Emissions					
Test Description	Specification	Test Method	Pass/Fail		
Field Strength of Radiated Emissions	FCC 95I:2007	ANSI/TIA/EIA-603-C-2004	Pass		
Receiver Spurious Emissions	FCC 15.209:2007	ANSI C63.4:2003	Pass		
Field Strength of Fundamental	FCC 95I:2007	ANSI/TIA/EIA-603-C-2004	Pass		
Occupied Bandwidth	FCC 95I:2007	ANSI/TIA/EIA-603-C-2004	Pass		
Emission Mask	FCC 95I:2007	ANSI/TIA/EIA-603-C-2004	Pass		
Frequency Stability	FCC 95I:2007	ANSI/TIA/EIA-603-C-2004	Pass		

#### Modifications made to the product

See the Modifications section of this report

#### **Test Facility**

The measurement facility used to collect the data is located at:

Northwest EMC, Inc. 41 Tesla Ave. Irvine, CA 92618

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site Filing #2834B).

Approved By:

Sthan Schoonover, Sultan Lab Manager



**NVLAP Lab Code: 200676-0** 

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

# **Revision History**

Revision 05/05/03

Revision Number	Description	Date	Page Number
00	None		

**FCC:** Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.





**NVLAP:** Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



**Industry Canada:** Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.



**CAB:** Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.



**TÜV Product Service:** Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories, available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0604C.



**TÜV Rheinland:** Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



**NEMKO:** Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



**Australia/New Zealand:** The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



**VCCI:** Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Numbers. - Hillsboro: C-1071, R-1025, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294).



**BSMI:** Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). License No.SL2-IN-E-1017.



**GOST:** Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



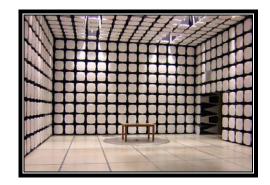
**MIC:** Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)



#### SCOPE

For details on the Scopes of our Accreditations, please visit: http://www.nwemc.com/accreditations/

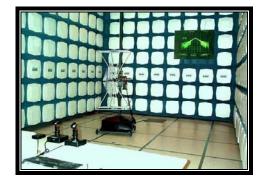




#### California – Orange County Facility Labs OC01 – OC13

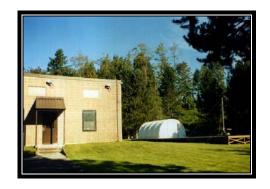
41 Tesla Ave. Irvine, CA 92618 (888) 364-2378 Fax: (503) 844-3826





#### Oregon – Evergreen Facility Labs EV01 – EV11

22975 NW Evergreen Pkwy. Suite 400 Hillsboro, OR 97124 (503) 844-4066 Fax: (503) 844-3826





#### Washington – Sultan Facility Labs SU01 – SU07

14128 339<sup>th</sup> Ave. SE Sultan, WA 98294 (888) 364-2378

#### Party Requesting the Test

Company Name:	Cameron Health, Inc.
Address:	229 Avenida Fabricante
City, State, Zip:	San Clemente, CA 92672
Test Requested By:	Paul Erlinger
Model:	SQ-RX Pulse Generator
First Date of Test:	June 11, 2008
Last Date of Test:	June 24, 2008
Receipt Date of Samples:	June 11, 2008
Equipment Design Stage:	Production
<b>Equipment Condition:</b>	No Damage

#### **Information Provided by the Party Requesting the Test**

#### Functional Description of the EUT (Equipment Under Test):

Pulse Generator

#### **Testing Objective:**

These tests were selected to satisfy the EMC requirements requested by the client.

#### **EUT Photo**





Revision 9/21/05

# **CONFIGURATION 1 CAME0008**

EUT						
Description	Manufacturer	Model/Part Number	Serial Number			
SQ-RX Pulse Generator	Cameron Health, Inc.	1010	1010-153-750			

Peripherals in test setup boundary						
Description Manufacturer Model/Part Number Serial Number						
Q-Tech Programmer 2020	Cameron Health, Inc	2020	2020-A100118			
Power Supply	ELPAC Power Systems	MW2415	002173			
Wand Antenna	Cameron Health, Inc.	4510	None			

Cables							
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2		
AC Cable	No	1.7m	No	Power Supply	AC Mains		
DC Cable	No	1.7m	No	Power Supply	Q-Tech Programmer 2020		
Wand Antenna	No	3m	No	Q-Tech Programmer 2020	Wand Antenna		
PA = Cab	PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.						

# **CONFIGURATION 3 CAME0008**

EUT						
Description	Manufacturer	Model/Part Number	Serial Number			
SQ-RX Pulse Generator	Cameron Health, Inc.	1010	1010-153-750			

Peripherals in test setup boundary					
Description Manufacturer Model/Part Number Serial Number					
Human Torso Test Fixture					

Remote Equipment Outside of Test Setup Boundary						
Description Manufacturer Model/Part Number Serial Number						
Q-Tech Programmer 2020	Cameron Health, Inc	2020	2020-A100118			
Power Supply	ELPAC Power Systems	MW2415	002173			
Wand Antenna	Cameron Health, Inc.	4510	None			

Cables						
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2	
Electrode	No	.5m	No	SQ-RX Pulse Generator	Unterminated	
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.						

Revision 4/28/03

	Equipment modifications							
Item	Date	Test	Modification	Note	Disposition of EUT			
1	6/11/2008	Emission Mask	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.			
2	6/11/2008	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.			
3	6/12/2008	Receiver Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.			
4	6/12/2008	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.			
5	6/24/2008	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.			
6	6/24/2008	Field Strength of Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.			

## RECEIVER SPURIOUS EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **MODES OF OPERATION**

Receive Mode.

#### **MODE USED FOR FINAL DATA**

Receive Mode.

#### **POWER SETTINGS INVESTIGATED**

Battery

#### **POWER SETTINGS USED FOR FINAL DATA**

Battery

FREQUENCY RANGE INVESTIGATED					
Start Frequency	30 MHz	Stop Frequency	12.8 GHz		

#### SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	10/13/2006	24
Antenna, Horn	ETS	3160-07	AHR	NCR	0
OC 10 Cables a, b, c, I Cables			OCO	2/2/2008	13
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	2/2/2008	13
Antenna, Horn	EMCO	3115	AHB	8/31/2007	24
OC10 cables a,b,c,e,f Horn Cables			OCJ	2/2/2008	13
Antenna, Biconilog	EMCO	3142	AXJ	2/25/2008	24
OC10 cables a,b,c,d Bilog			OCH	1/7/2008	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	1/7/2008	13
Spectrum Analyzer	Agilent	E4446A	AAQ	12/14/2007	13

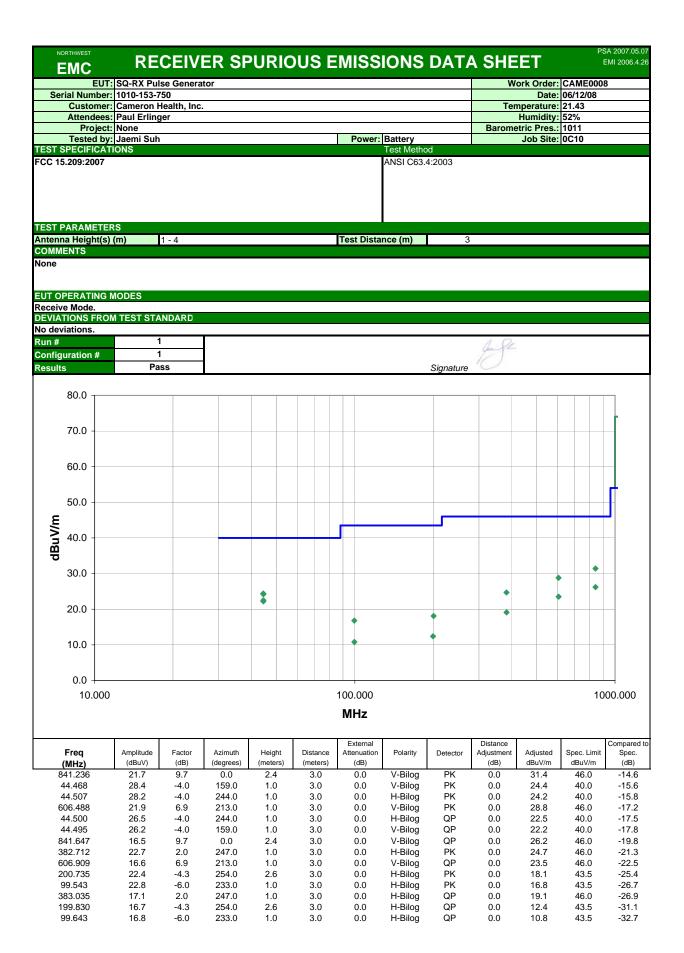
<b>MEASUREMEN</b>	T BANDWIDTHS			
	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
N	Measurements were made us	ing the bandwidths and dete	ctors specified. No video filt	er was used.

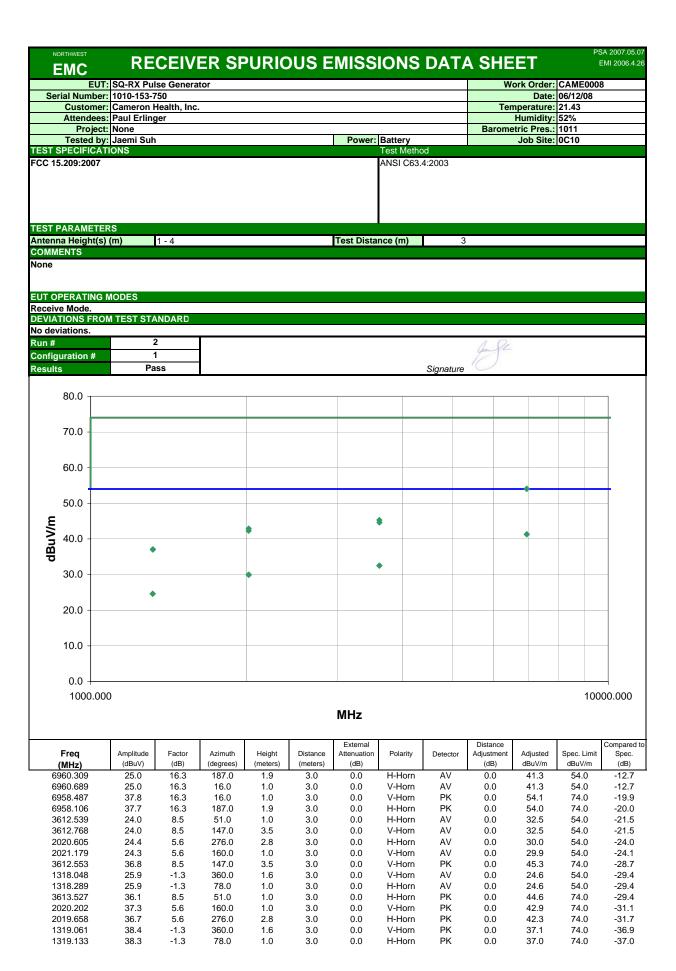
#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### **TEST DESCRIPTION**

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for mid channel receive frequency. For this configuration, the spectrum was scanned throughout the specified range. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes.





#### NORTHWEST RECEIVER SPURIOUS EMISSIONS DATA SHEET EMI 2006.4.26 **EMC** EUT: SQ-RX Pulse Generator Work Order: CAME0008 Serial Number: 1010-153-750 Date: 06/12/08 Customer: Cameron Health, Inc. Temperature: 21.43 Attendees: Paul Erlinger Humidity: 52% Project: None Barometric Pres.: 1011 Tested by: Jaemi Suh Power: 120VAC/60Hz Job Site: 0C10 Test Method FCC 15.209:2007 ANSI C63.4:2003 TEST PARAMETERS Antenna Height(s) (m) 1 - 4 Test Distance (m) 3 COMMENTS None EUT OPERATING MODES Receive Mode. DEVIATIONS FROM TEST STANDARD No deviations. Run# 3 Configuration # 1 Results Pass Signature 80.0 70.0 60.0 50.0 dBuV/m 40.0 2 30.0 • 20.0 10.0 0.0 8500.000 9000.000 9500.000 10000.000 10500.000 11000.000 11500.000 12000.000 MHz External Distance Compared to Amplitude Azimuth Distance Polarity Adjusted Spec. Limit Frea Factor Height Detector Attenuation Adjustmen Spec. (dBuV) (meters) (dB) (dB) dBuV/m dBuV/m (dB) (degrees) (meters) (dB) (MHz) V-Horn ΑV 26.1 8584.935 35.3 -9.2 130.0 1.0 3.0 0.0 0.0 54.0 -27.9 8585.534 35.3 -9.2 16.0 1.0 3.0 0.0 H-Horn ΑV 0.0 26.1 54.0 -27.9 10210.170 34.5 -8.6 266.0 1.0 3.0 0.0 H-Horn ΑV 0.0 25.9 54.0 -28.1 10209.730 34.4 -8.6 208.0 1.0 3.0 0.0 V-Horn ΑV 0.0 25.8 54.0 -28.2 305.0 H-Horn 54.0 11939.040 34.3 -9.0 1.0 3.0 0.0 ΑV 0.0 25.3 -28.7 11939.710 34.3 -9.0 34.0 1.0 3.0 V-Horn ΑV 0.0 25.3 54.0 -28.7 0.0 305.0 H-Horn PK 11939 140 47 9 -9.0 1.0 3.0 0.0 0.0 38.9 74 0 -35 1 PΚ 10209.570 47.4 -8.6 208.0 1.0 3.0 0.0 V-Horn 0.0 38.8 74.0 -35.210209.280 47.3 -8.6 266.0 1.0 3.0 0.0 H-Horn PΚ 0.0 38.7 74.0 -35.3

8584.374

8584.276

11938.540

47.7

47.4

46.3

-9.2

-9.2

-9.0

130.0

16.0

34.0

1.0

1.0

1.0

3.0

3.0

3.0

0.0

0.0

0.0

V-Horn

H-Horn

V-Horn

PΚ

PΚ

0.0

0.0

0.0

38.5

38.2

37.3

74.0

74.0

74.0

-35.5

-35.8

-36.7

# RECEIVER SPURIOUS EMISSIONS



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAQ	12/14/2007	13

#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### **TEST DESCRIPTION**

Per 47 CFR 95.635(d)(4-5) the emission mask was measured. Emissions more than 150 kHz away from the center frequency must be attenuated below the transmitter output power by at least 20 dB. In addition, emissions 250 kHz or less above and below the MICS band (402-405 MHz) must be attenuated below the maximum permitted output power by at least 20 dB.

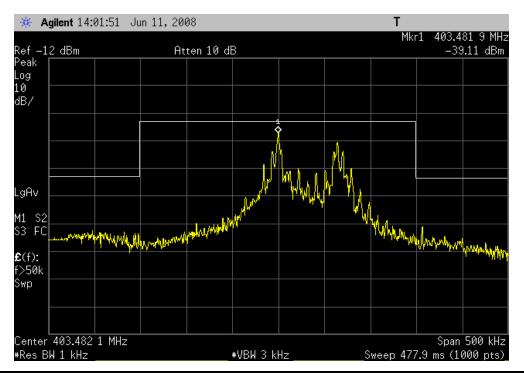
The emission mask was measured in the same configuration as radiated spurious emissions. All emissions measurements were made with the EUT placed in the tissue substitute material. First, the EUT orientation (horizontal or vertical), the turntable azimuth and measurement antenna height, were maximized to achieve the maximum field strength of the fundamental transmit frequency.

Then, a spectrum analyzer was used to measure the emission mask. A spectrum analyzer using a peak detector with no video filtering was used with a resolution bandwidth equal to approximately 1.0 percent of the emission bandwidth of the EUT. However, various plots were made using different frequency spans and resolution bandwidths in an attempt to not only satisfy the measurement criteria, but to also show that all emissions outside of the occupied band are greatly attenuated.

NORTHWEST EMC		EMISSIO	N MASK			XMit 2007.06.13
EUT:	SQ-RX Pulse Generator				Work Order: CAME	8000
Serial Number:	1010-153-750				Date: 06/11/0	08
	Cameron Health, Inc.			•	Temperature: 21.43°	С
Attendees:	Paul Erlinger				Humidity: 52%	
Project:				Baro	metric Pres.: 1011	
	Jaemi Suh		Power: Battery		Job Site: 0C10	
TEST SPECIFICATION	ONS		Test Method			
FCC 951:2007			ANSI/TIA/EIA-603	3-C-2004		
COMMENTS						
None						
DEVIATIONS FROM None	I TEST STANDARD					
Configuration #	1	Signature				
				Value	Limit	Results
1 kHz RBW, +150 kH		•	•	≤ -20 dBc	See Graph	Pass
1 kHz RBW, +250 kH	Iz of allowable band			≤ -20 dBc	See Graph	Pass
3 kHz RBW, +150 kH				≤ -20 dBc	See Graph	Pass
3 kHz RBW, +250 kH	dz of allowable band			≤ -20 dBc	See Graph	Pass

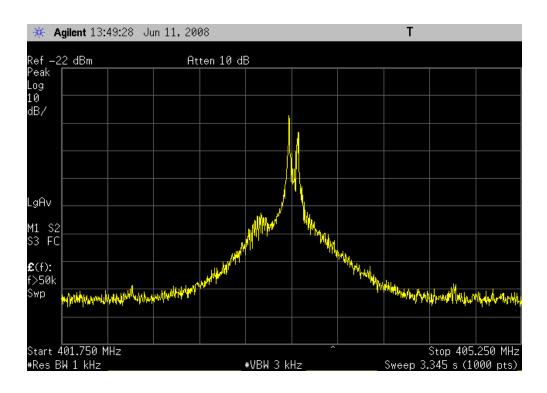
1 kHz RBW, ± 150 kHz fc

Result: Pass Value: ≤ -20 dBc Limit: See Graph



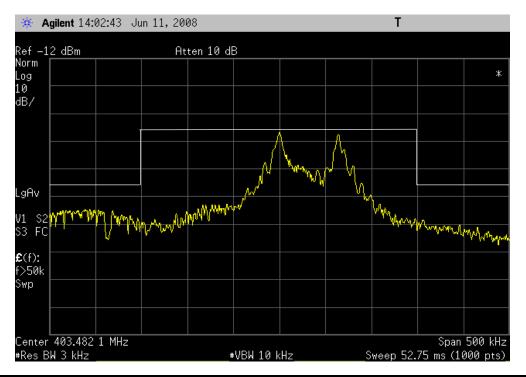
1 kHz RBW, ± 250 kHz of allowable band

Result: Pass Value: ≤ -20 dBc Limit: See Graph



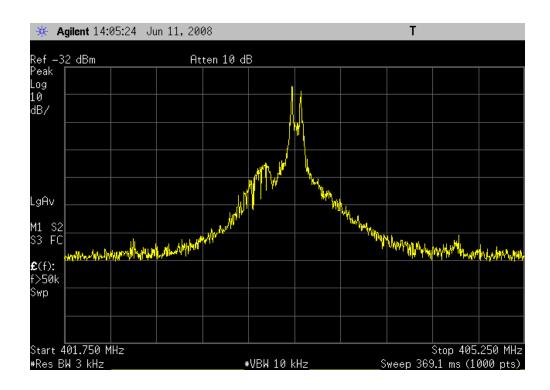
3 kHz RBW, ± 150 kHz fc

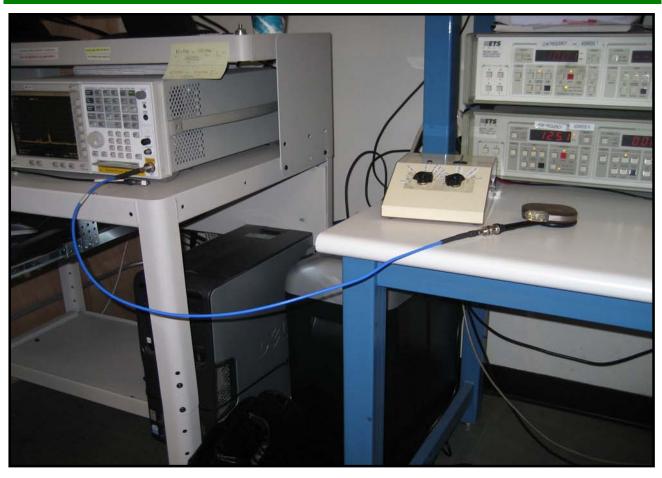
Result: Pass Value: ≤ -20 dBc Limit: See Graph



3 kHz RBW, ± 250 kHz of allowable band

Result: Pass Value: ≤ -20 dBc Limit: See Graph





#### FIELD STRENGTH OF RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **MODES OF OPERATION**

Transmit at 403.5 MHz.

#### MODE USED FOR FINAL DATA

Transmit at 403.5 MHz.

#### **POWER SETTINGS INVESTIGATED**

Battery

#### POWER SETTINGS USED FOR FINAL DATA

Battery

#### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 8000 MHz

#### **CLOCKS AND OSCILLATORS**

403.5 MHz

#### SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	2/2/2008	13
Antenna, Horn	EMCO	3115	AHB	8/31/2007	24
OC10 cables a,b,c,e,f Horn Cables			OCJ	2/2/2008	13
Antenna, Biconilog	EMCO	3142	AXJ	2/25/2008	24
OC10 cables a,b,c,d Bilog			OCH	1/7/2008	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	1/7/2008	13
Spectrum Analyzer	Agilent	E4446A	AAQ	12/14/2007	13

<b>MEASUREMENT</b>	BANDWIDTHS			
	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
Me	asurements were made usi	ng the bandwidths and detec	ctors specified. No video filt	er was used.

#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

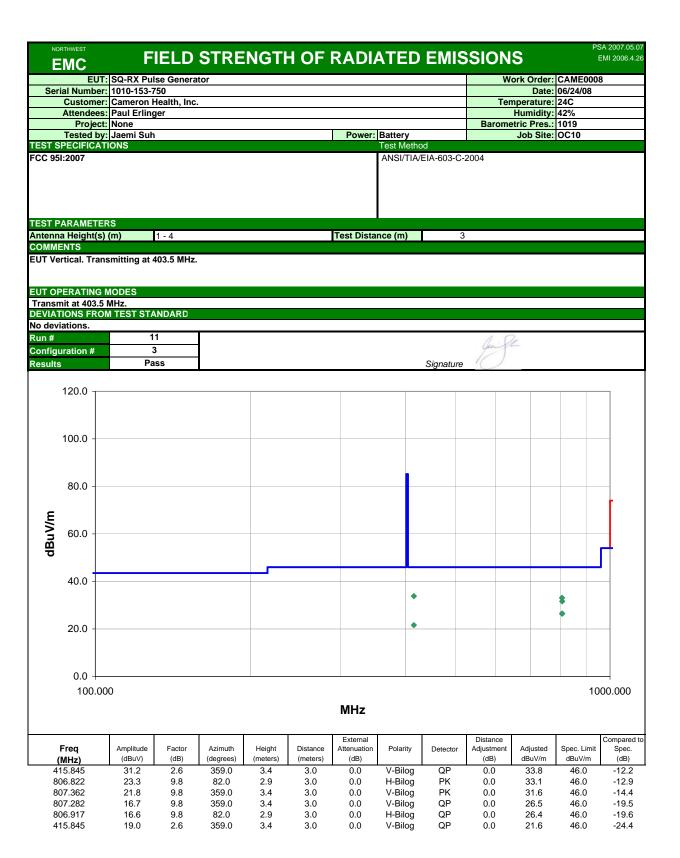
#### TEST DESCRIPTION

The Field Strength of Radiated Emissions were measured in the far-field at an FCC Listed Semi-anechoic Chamber. Spectrum analyzer and linearly polarized antennas were used to measure the unwanted radiated harmonics and spurious emissions.

The orientation of the EUT and measurement antenna were manipulated to maximize the level of emissions.

The EUT was configured to transmit in a fixture that simulates the human torso. The dimensions of the test fixture and the characteristics of the tissue substitute material met the requirements of 95.639(f)(2)(iii). The dielectric and conductivity properties of the tissue substitute material were verified the morning of the test (see client data for tissue substitute material), and the temperature was measured before and after the test to verify compliance with 95.639(f)(2)(i). At the start of the test, the tissue substitute material was 23.5 degrees centigrade. At the conclusion of testing, it was 23.2 degrees centigrade.

At an approved test site, the transmitter was placed in the human torso test fixture located on a remotely controlled turntable, and the measurement antenna was placed 3 meters from the transmitter. The height of the transmitter was 1.5-meter above the reference ground plane. The turntable azimuth was varied to maximize the level of radiated emissions. The height of the measurement antenna was also varied from 1 to 4 meters. The amplitude and frequency of the emissions were noted.



#### NORTHWEST FIELD STRENGTH OF RADIATED EMISSIONS EMI 2006.4.26 **EMC** EUT: SQ-RX Pulse Generator Work Order: CAME0008 Serial Number: 1010-153-750 Date: 06/10/08 Customer: Cameron Health, Inc. Temperature: 21.43 Attendees: Paul Erlinger Humidity: 52% Project: None Barometric Pres.: 1011 Tested by: Jaemi Suh Power: Battery Job Site: 0C10 FCC 951:2007 ANSI/TIA/EIA-603-C-2004 TEST PARAMETERS Test Distance (m) 3 Antenna Height(s) (m) 1 - 4 COMMENTS EUT Vertical. Transmitting at 403.5 MHz. EUT OPERATING MODES Transmit at 403.5 MHz. **DEVIATIONS FROM TEST STANDARD** No deviations. Run# 3 Configuration # 3 Results Pass Signature 0.08 70.0 60.0 50.0 • dBuV/m \$ 40.0 • 30.0 20.0 10.0 0.0 1000.000 10000.000 MHz External Distance Compared to Amplitude Azimuth Distance Polarity Adjusted Spec. Limit Frea Factor Height Detector Attenuation Adjustmen Spec. (dBuV) (dB) (meters) (dB) (dB) dBuV/m dBuV/m (dB) (MHz) (degrees) (meters) H-Horn ΑV 35.1 1614.099 33.9 1.2 67.0 1.0 0.0 0.0 0.0 54.0 -18.9 3228.023 25.3 7.4 1.0 1.7 0.0 0.0 V-Horn ΑV 0.0 32.7 54.0 -21.3 3231.982 25.3 7.4 184.0 1.0 0.0 0.0 H-Horn ΑV 0.0 32.7 54.0 -21.3 2017.709 25.3 5.6 6.0 2.3 0.0 0.0 V-Horn ΑV 0.0 30.9 54.0 -23.1 244.0 H-Horn -23.1 2420.947 25.4 5.5 1.9 0.0 0.0 ΑV 0.0 30.9 54.0 2421.078 25.4 5.5 360.0 2.2 0.0 V-Horn ΑV 0.0 30.9 54.0 -23.1 0.0 H-Horn 2017 460 24 9 5.6 201.0 1.0 0.0 0.0 ΑV 0.0 30.5 54.0 -23 5 1210.573 32 4 -2.0 320.0 1.4 0.0 0.0 H-Horn ΑV 0.0 30.4 54.0 -23.61614.075 27.4 1.2 202.0 1.0 0.0 0.0 V-Horn ΑV 0.0 28.6 54.0 -25.4 3227.872 37.9 7.4 184.0 1.0 0.0 0.0 H-Horn PΚ 0.0 45.3 74.0 -28.7 3228.503 37.5 7.4 1.0 1.7 0.0 0.0 V-Horn PΚ 0.0 44.9 74.0 -29.1 V-Horn 1207.616 26.1 -2.0 67.0 1.0 0.0 0.0 ΑV 0.0 24.1 54.0 -29.9 2418.668 38.5 5.5 360.0 2.2 0.0 0.0 V-Horn PK 0.0 44.0 74.0 -30.0 PK 2422.529 244.0 H-Horn 43.2 74.0 -30.8 37.7 5.5 1.9 0.0 0.0 0.0 H-Horn 2017 643 5.6 201.0 PK 74 0 -30.9 37.5 1.0 0.0 0.0 0.0 43 1 PK 2015.930 36.9 5.6 6.0 2.3 0.0 0.0 V-Horn 0.0 42.5 74.0 -31.51614.232 41.1 1.2 67.0 1.0 0.0 0.0 H-Horn PΚ 0.0 42.3 74.0 -31.7 1614.144 38.0 1.2 202.0 1.0 0.0 0.0 V-Horn PΚ 0.0 39.2 74.0 -34.8 1210.292 40.6 -2.0 320.0 H-Horn PK 74.0 -35.4 1.4 0.0 0.0 0.0 38.6

1208.556

38.0

-2.0

67.0

1.0

0.0

0.0

V-Horn

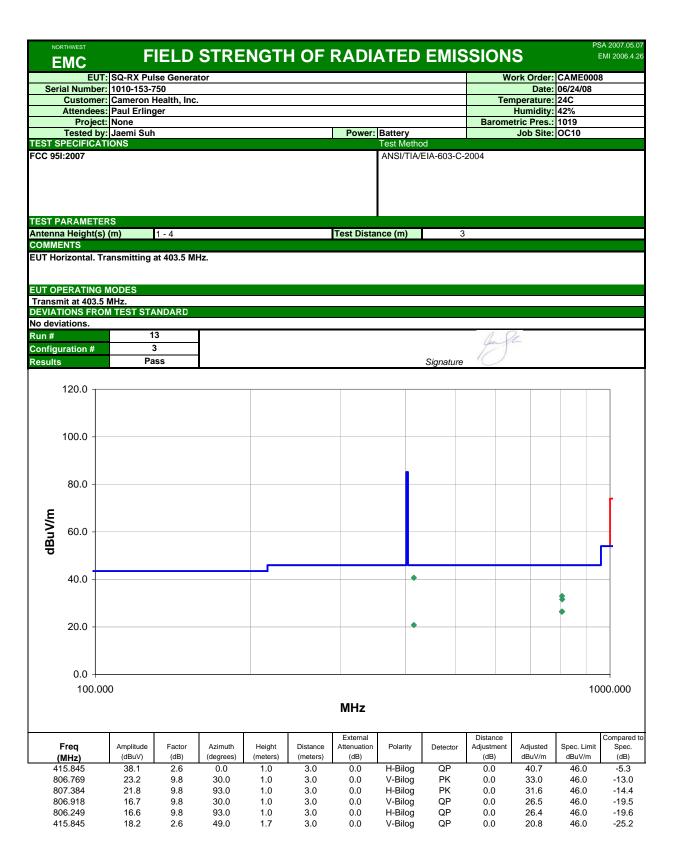
PΚ

0.0

36.0

74.0

-38.0



#### NORTHWEST FIELD STRENGTH OF RADIATED EMISSIONS EMI 2006.4.26 **EMC** EUT: SQ-RX Pulse Generator Work Order: CAME0008 Serial Number: 1010-153-750 Date: 06/10/08 Customer: Cameron Health, Inc. Temperature: 21.43 Attendees: Paul Erlinger Humidity: 52% Project: None Barometric Pres.: 1011 Tested by: Jaemi Suh Power: Battery Job Site: 0C10 FCC 951:2007 ANSI/TIA/EIA-603-C-2004 TEST PARAMETERS Test Distance (m) 3 Antenna Height(s) (m) 1 - 4 COMMENTS EUT Horizontal. Transmitting at 403.5 MHz. EUT OPERATING MODES Transmit at 403.5 MHz. **DEVIATIONS FROM TEST STANDARD** No deviations. Run# Configuration # 3 Results Pass Signature 120.0 100.0 0.08 dBuV/m 60.0 \$ 40.0 • 20.0 0.0 1000.000 10000.000 MHz External Distance Compared to Amplitude Azimuth Distance Polarity Adjusted Spec. Limit Frea Factor Height Detector Attenuation Adjustmen Spec. (dBuV) (dB) (meters) (dB) (dB) dBuV/m dBuV/m (dB) (degrees) (meters) (MHz) H-Horn ΑV 37.5 1614.092 36.3 1.2 146.0 1.0 0.0 0.0 0.0 54.0 -16.5 3232.834 25.3 7.4 108.0 1.0 0.0 0.0 H-Horn ΑV 0.0 32.7 54.0 -21.3 3230.077 25.2 7.4 188.0 1.0 0.0 0.0 V-Horn ΑV 0.0 32.6 54.0 -21.4 2017.622 26.5 5.6 103.0 2.6 0.0 0.0 H-Horn ΑV 0.0 32.1 54.0 -21.9 2017.495 V-Horn 25.3 5.6 239.0 2.2 0.0 0.0 ΑV 0.0 30.9 54.0 -23.1 2417.046 25.4 5.5 190.0 3.5 0.0 H-Horn ΑV 0.0 30.9 54.0 -23.1 0.0 V-Horn 2421 316 25.4 5.5 263.0 3 1 0.0 0.0 ΑV 0.0 30.9 54.0 -23 1 1614.070 29.2 1.2 188.0 1.0 0.0 0.0 V-Horn ΑV 0.0 30.4 54.0 -23.61210.466 27.4 -2.0 343.0 1.0 0.0 0.0 V-Horn ΑV 0.0 25.4 54.0 -28.6 3227.034 37.5 7.4 188.0 1.0 0.0 0.0 V-Horn PΚ 0.0 44.9 74.0 -29.1 1210.542 26.7 -2.0 157.0 1.4 0.0 0.0 H-Horn ΑV 0.0 24.7 54.0 -29.3 1613.801 43.0 1.2 146.0 1.0 0.0 0.0 H-Horn PΚ 0.0 44.2 74.0 -29.8 2419.782 38.4 5.5 190.0 3.5 0.0 0.0 H-Horn PK 0.0 43.9 74.0 -30.1 PK 3229.695 36.5 108.0 H-Horn 74.0 -30.1 7.4 1.0 0.0 0.0 0.0 43.9 2017 005 5.6 239 0 V-Horn PK 74 0 -30.7 37 7 22 0.0 0.0 0.0 433 PK 2017.757 37.7 5.6 103.0 2.6 0.0 0.0 H-Horn 0.0 43.3 74.0 -30.72421.749 37.5 5.5 263.0 3.1 0.0 0.0 V-Horn PΚ 0.0 43.0 74.0 -31.0 1614.041 39.0 1.2 188.0 1.0 0.0 0.0 V-Horn PΚ 0.0 40.2 74.0 -33.8 1211.209 -2.0 343.0 V-Horn PΚ 36.9 74.0 -37.1 38.9 1.0 0.0 0.0 0.0

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0.0

H-Horn

PΚ

0.0

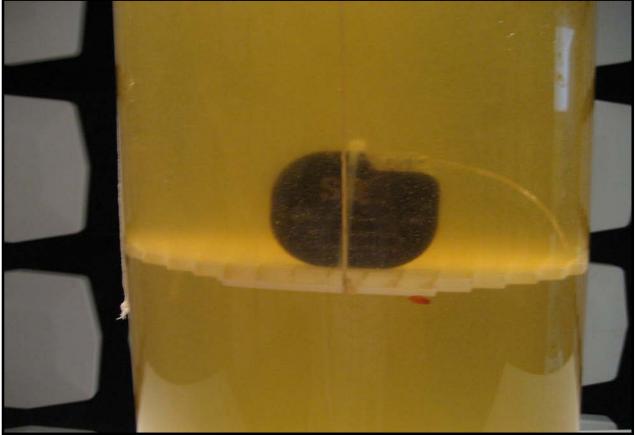
36.4

74.0

-37.6

# EMC FIELD STRENGTH OF RADIATED EMISSIONS





# EMC FIELD STRENGTH OF RADIATED EMISSIONS





# Field Strength of Fundamental

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### **MODES OF OPERATION**

Transmit at 403.5 MHz.

#### **MODE USED FOR FINAL DATA**

Transmit at 403.5 MHz.

#### **POWER SETTINGS INVESTIGATED**

Battery Powered

#### **POWER SETTINGS USED FOR FINAL DATA**

Battery Powered

FREQUENCY RANGE INV	/ESTIGATED		
Start Frequency	30 MHz	Stop Frequency	1000

#### SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Biconilog	EMCO	3142	AXJ	2/25/2008	24
OC10 cables a,b,c,d Bilog			OCH	1/7/2008	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	1/7/2008	13
Spectrum Analyzer	Agilent	E4446A	AAQ	12/14/2007	13

Frequency Range	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### **TEST DESCRIPTION**

Per 95.635(b), the maximum EIRP for a MICS transmitter is 25uW. This is equivalent to a radiated field strength 85.2 dBuV/m at 3 meters when measured over a reference ground plane.

The Field Strength of the Fundamental was measured in the far-field at an FCC Listed Semi-anechoic Chamber. Spectrum analyzer and linearly polarized antennas were used to measure the effective radiated power (EIRP) of the fundamental.

The orientation of the EUT and measurement antenna were manipulated to maximize the level of emissions. The turntable azimuth was varied to maximize the level of radiated emissions. The height of the measurement antenna was also varied from 1 to 4 meters. The amplitude and frequency of the emissions were noted.

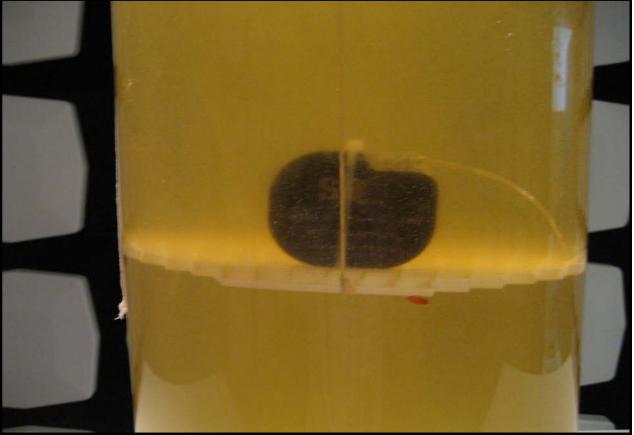
The EUT was configured to transmit in a fixture that simulates the human torso. The dimensions of the test fixture and the characteristics of the tissue substitute material met the requirements of 95.639(f)(2)(iii). The dielectric and conductivity properties of the tissue substitute material were verified the morning of the test (see client data for tissue substitute material), and the

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# Field Strength of Fundamental





# Field Strength of Fundamental





# **FREQUENCY STABILITY**

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	12/14/2007	13
Chamber, Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPHS-32-3.5-SCT/AC	TBE	5/22/2008	13

#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### **TEST DESCRIPTION**

The Frequency Stability was measured using a near-field probe and a spectrum analyzer. The spectrum analyzer is configured with a precision frequency reference that exceeds the stability requirement of the transmitter.

The EUT was placed inside a temperature / humidity chamber. The near-field probe was placed near the transmitter. A low-loss coaxial cable connected the near-field probe to the spectrum analyzer outside of the chamber.

The transmit frequency was recorded at the extremes of the specified temperature range (25° to +45° C) and at 10°C intervals.

NORTHWEST		EDECLIENCY	CTABILITY		XMit 2006.08.25
EMC		FREQUENCY	YSTABILITY		
EUT:	SQ-RX Pulse Generator			Work Order:	
Serial Number:					06/12/08
	Cameron Health, Inc.			Temperature:	
	Paul Erlinger			Humidity:	
Project:				Barometric Pres.:	
	Jaemi Suh		Power: Battery	Job Site:	0C13
TEST SPECIFICATION	ONS		Test Method		
FCC 95I:2007			ANSI/TIA/EIA-603-C-2004		
COMMENTS					
None					
DEVIATIONS FROM	TEST STANDARD				
None					
Configuration #	1	Signature			

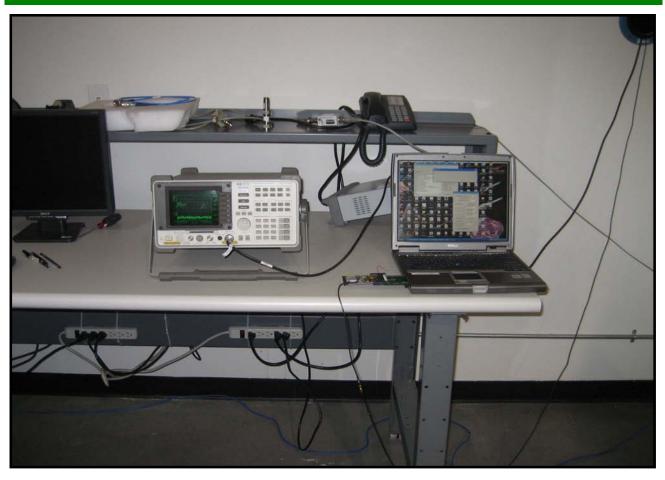
Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Specification (ppm)
25	403.510800	403.512150	3.35	100
35	403.510800	403.513150	5.82	100
45	403.510800	403.513850	7.56	100

# FREQUENCY STABILITY





# FREQUENCY STABILITY



# **OCCUPIED BANDWIDTH**

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT								
Description	Manufacturer	Model	ID	Last Cal.	Interval			
Spectrum Analyzer	Agilent	E4446A	AAQ	12/14/2007	13			

#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### **TEST DESCRIPTION**

Per 47 CFR 95.633(e)(3), the emission bandwidth was determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 20 dB down relative to the maximum level of the modulated carrier. A spectrum analyzer using a peak detector with no video filtering was used with a resolution bandwidth equal to approximately 1.0 percent of the emission bandwidth of the EUT.

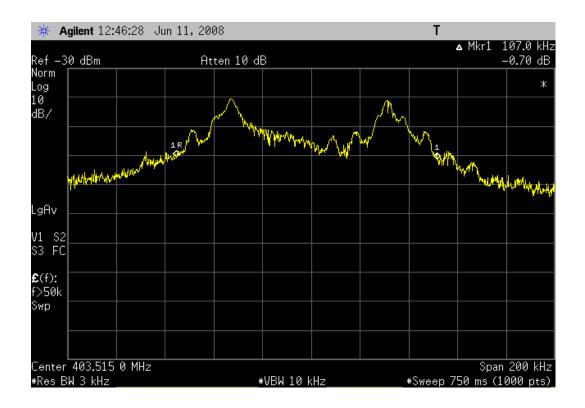
An emission bandwidth measurement was made using a 3 kHz resolution bandwidth (no video filtering) and a peak detector. This most closely satisfied the specified measurement criteria. It is important to use a RBW that is sufficiently narrow to plot the actual bandwidth of the signal and not the filter response curve of the spectrum analyzer.

NORTHWEST EMC		OCCUPIED	BANDWIDTH			XMit 2007.06.1
	: SQ-RX Pulse Generator				Work Order: C	AME0008
	: 1010-153-750				Date: 0	
Customer	: Cameron Health, Inc.			Т	emperature: 2	1.43°C
Attendees	: Paul Erlinger				Humidity: 5	2%
Project	:: None			Baro	metric Pres.: 1	011
	: Jaemi Suh		Power: Battery		Job Site: 0	C10
TEST SPECIFICAT	TIONS		Test Method			
FCC 951:2007			ANSI/TIA/EIA-6	03-C-2004		
COMMENTS						
None						
DEVIATIONS FRO	M TEST STANDARD					
None						
Configuration #	1	Signature Signature				
				Value	Limi	t Results
3 kHz RBW			_	107.0 kHz	300 k	Hz Pass

# OCCUPIED BANDWIDTH

3 kHz RBW

Result: Pass Value: 107.0 kHz Limit: 300 kHz



# **OCCUPIED BANDWIDTH**

