

Nonin Medical, Inc

Saber Module in Model 7600

Report No. NONN0018

Report Prepared By



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

© 2010 Northwest EMC, Inc

EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: December 03, 2010

Nonin Medical, Inc

Model: Saber Module in Model 7600

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.247:2010	ANSI C63.10:2009	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.
9349 W Broadway Ave.
Brooklyn Park, MN 55445

Phone: (763) 425-2281

Fax: (763) 424-3469

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834E-1).

Approved By:

Don Fecteau, IS Manager



NVLAP Lab Code: 200881-0

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 Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

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 National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. NVLAP is administered by the National Institute of Standards and Technology (NIST), an agency of the U.S. Commerce Department. 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-Gen, Issue 2 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. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)

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.

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).



Accreditations and Authorizations

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, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).*

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).

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

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. *(Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157, Brooklyn Park: US0175)*

VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.

SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Northwest EMC Locations



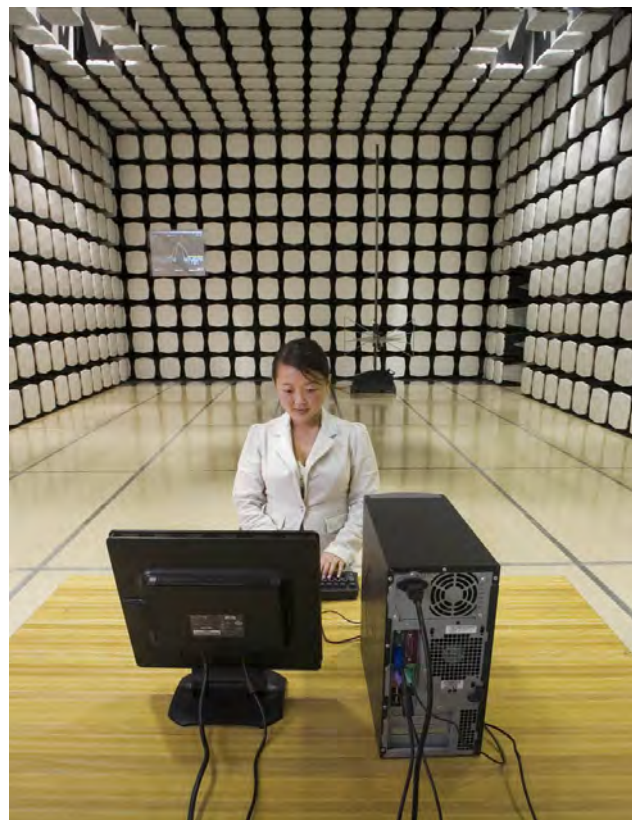
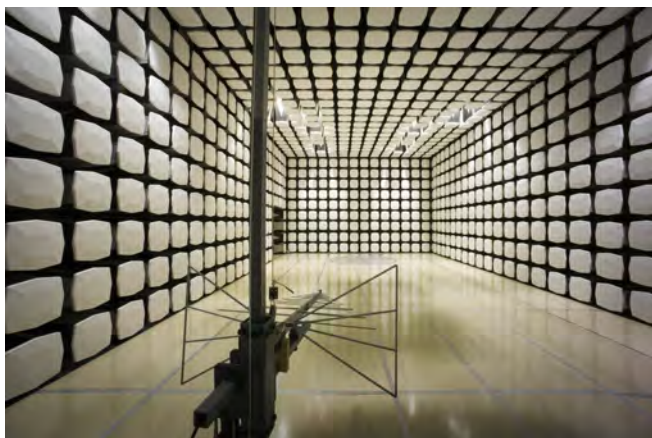
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796



Northwest EMC	Product Description	Rev 11/17/06
-------------------------	----------------------------	--------------

Party Requesting the Test

Company Name:	Nonin Medical, Inc
Address:	13700 1st Avenue North
City, State, Zip:	Plymouth, MN 55441-5443
Test Requested By:	Brodie Pedersen
Model:	Saber Module in Model 7600
First Date of Test:	December 3, 2010
Last Date of Test:	December 3, 2010
Receipt Date of Samples:	December 3, 2010
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test
--

Functional Description of the EUT (Equipment Under Test):
Regional Oximeter 4 channel View link enabled display

Testing Objective:
To demonstrate compliance to the radiated spurious emissions requirements of FCC 15.247.

CONFIGURATION 1 NONN0018

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
7600 Regional Display	Nonin Medical Inc	7600	RD13151

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Wallwart	Nonin Medical Inc	GTM41060-2512	None
Regional Oximeter	Nonin Medical Inc	7600B	501040302
Regional Oximeter	Nonin Medical Inc	7600B	501004191
Regional Oximeter	Nonin Medical Inc	7600B	501002253
Regional Oximeter	Nonin Medical Inc	7600B	500902265
Regional Sensor	Nonin Medical Inc	6945-000	RD12154
Regional Sensor	Nonin Medical Inc	6945-000	RD12153
Regional Sensor	Nonin Medical Inc	6945-000	RD13213
Regional Sensor	Nonin Medical Inc	6945-000	RD13181

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.80m	Yes	Wallwart	7600 Regional Display
AC Power	No	.80m	No	AC Mains	Wallwart
Y Patient Cable	Yes	4.50m	No	Regional Oximeter	7600 Regional Display
Regional Sensor Cable	Yes	.43m	No	Regional Oximeter	Regional Sensor
Regional Sensor Cable	Yes	.43m	No	Regional Oximeter	Regional Sensor
Regional Sensor Cable	Yes	.43m	No	Regional Oximeter	Regional Sensor
Regional Sensor Cable	Yes	.43m	No	Regional Oximeter	Regional Sensor
Null Modem Cable	Yes	3.65m	No	7600 Regional Display	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	12/3/2010	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

EMC**Spurious 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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmit mode bluetooth High channel 2480 MHz.

Transmit mode bluetooth Mid channel 2440 MHz.

Transmit mode bluetooth Low channel 2402 MHz.

POWER SETTINGS INVESTIGATED

120VAC/60Hz

CONFIGURATIONS INVESTIGATED

NONN0018 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	25 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	JSD4-18002600-26-8P	APU	1/27/2010	13 mo
MN05 Cables	N/A	18-26GHz Standard Gain Horn Cable	EVD	1/27/2010	13 mo
Antenna, Horn	ETS	3160-09	AHG	NCR	0 mo
Antenna, Horn	ETS	3160-07	AXP	NCR	0 mo
Antenna, Horn	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	7/19/2010	13 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	7/19/2010	13 mo
MN05 Cables	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	7/19/2010	13 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	7/19/2010	13 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	7/19/2010	13 mo
Antenna, Horn (DRG)	ETS Lindgren	3115	AIP	12/22/2009	24 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	1/15/2010	13 mo
Pre-Amplifier	Miteq	AM-1616-1000	AVY	7/19/2010	13 mo
Antenna, Biconilog	ETS Lindgren	3142D	AXO	12/30/2009	13 mo
Spectrum Analyzer	Agilent	E4446A	AAT	2/24/2010	12 mo
High Pass Filter	Micro-Tronics	HPM50111	HGQ	7/9/2010	13 mo
Low Pass Filter	Micro-Tronics	LPM50004	HGK	7/9/2010	13 mo

MEASUREMENT 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

Measurements were made using the IF bandwidths and detectors specified. No video filter was used, except in the case of the FCC

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are 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 low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. 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 (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

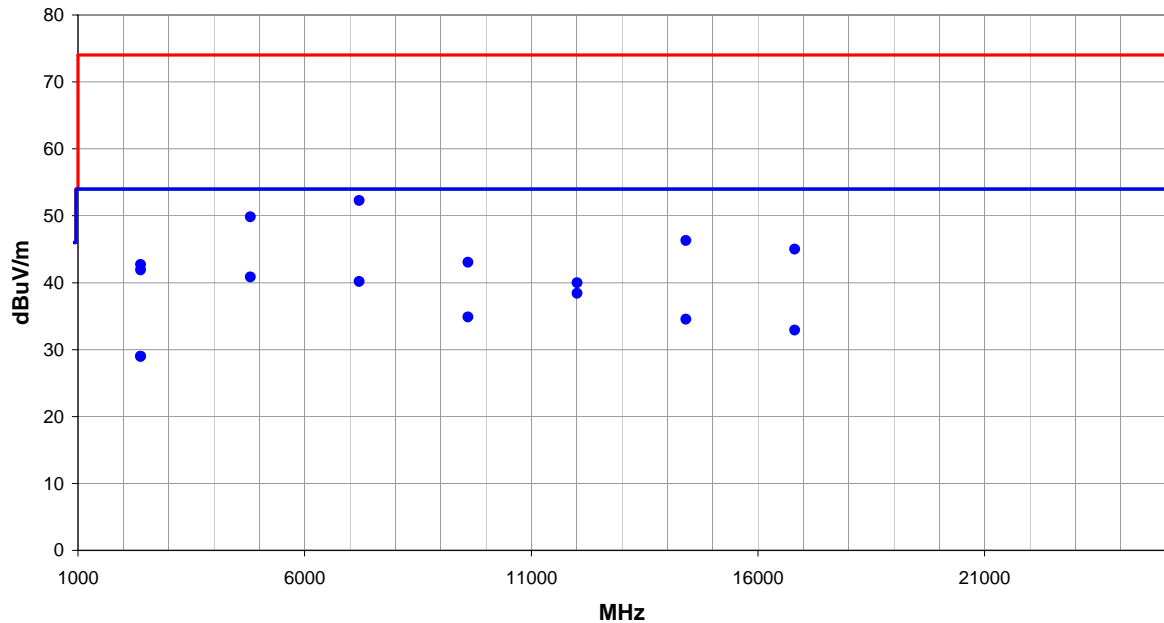
EMC

Spurious Radiated Emissions

Work Order:	NONN0018	Date:	12/03/10	<div>Trevor Bults</div>	
Project:	None	Temperature:	24.5		
Job Site:	MN05	Humidity:	9.28		
Serial Number:	RD13151	Barometric Pres.:	1025.5		
				Tested by:	Bryan Weller
EUT:	Saber Module in Model 7600				
Configuration:	1 - NONN0018				
Customer:	Nonin Medical, Inc				
Attendees:	Brodie Pedersen				
EUT Power:	120VAC/60Hz				
Operating Mode:	Transmit mode bluetooth Low channel 2402 MHz.				
Deviations:	None				
Comments:	EUT Vertical.				

Test Specifications	Test Method
FCC 15.247:2010	ANSI C63.10:2009

Run #	5	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
4804.017	37.3	3.5	1.0	186.0	3.0	0.0	Vert	AV	0.0	40.8	54.0	-13.2
7206.108	29.3	10.9	1.0	252.0	3.0	0.0	Vert	AV	0.0	40.2	54.0	-13.8
7206.468	41.4	10.9	1.0	252.0	3.0	0.0	Vert	PK	0.0	52.3	74.0	-21.7
4803.917	46.3	3.5	1.0	186.0	3.0	0.0	Vert	PK	0.0	49.8	74.0	-24.2
12008.820	44.5	-6.1	1.0	328.0	3.0	0.0	Vert	AV	0.0	38.4	54.0	-15.6
9608.033	44.2	-9.3	1.2	175.0	3.0	0.0	Horz	AV	0.0	34.9	54.0	-19.1
9607.893	52.4	-9.3	1.2	175.0	3.0	0.0	Horz	PK	0.0	43.1	74.0	-30.9
12008.240	46.1	-6.1	1.0	328.0	3.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0
14412.010	33.1	1.4	1.0	165.0	3.0	0.0	Horz	AV	0.0	34.5	54.0	-19.5
16811.920	29.5	3.4	1.0	339.0	3.0	0.0	Horz	AV	0.0	32.9	54.0	-21.1
14412.150	44.9	1.4	1.0	165.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7
16813.440	41.6	3.4	1.0	339.0	3.0	0.0	Horz	PK	0.0	45.0	74.0	-29.0
2386.313	33.4	-4.4	1.0	236.0	3.0	0.0	Horz	AV	0.0	29.0	54.0	-25.0
2386.987	33.4	-4.4	1.0	197.0	3.0	0.0	Vert	AV	0.0	29.0	54.0	-25.0
2385.600	47.1	-4.4	1.0	236.0	3.0	0.0	Horz	PK	0.0	42.7	74.0	-31.3
2386.653	46.3	-4.4	1.0	197.0	3.0	0.0	Vert	PK	0.0	41.9	74.0	-32.1

EMC

Spurious Radiated Emissions

Work Order:	NONN0018	Date:	12/03/10	<i>Trevor Bults</i>
Project:	None	Temperature:	24.5	
Job Site:	MN05	Humidity:	9.28	
Serial Number:	RD13151	Barometric Pres.:	1025.5	Tested by: Bryan Weller
EUT:	Saber Module in Model 7600			
Configuration:	1 - NONN0018			
Customer:	Nonin Medical, Inc			
Attendees:	Brodie Pedersen			
EUT Power:	120VAC/60Hz			
Operating Mode:	Transmit mode bluetooth Mid channel 2440 MHz.			
Deviations:	None			
Comments:	EUT Vertical.			

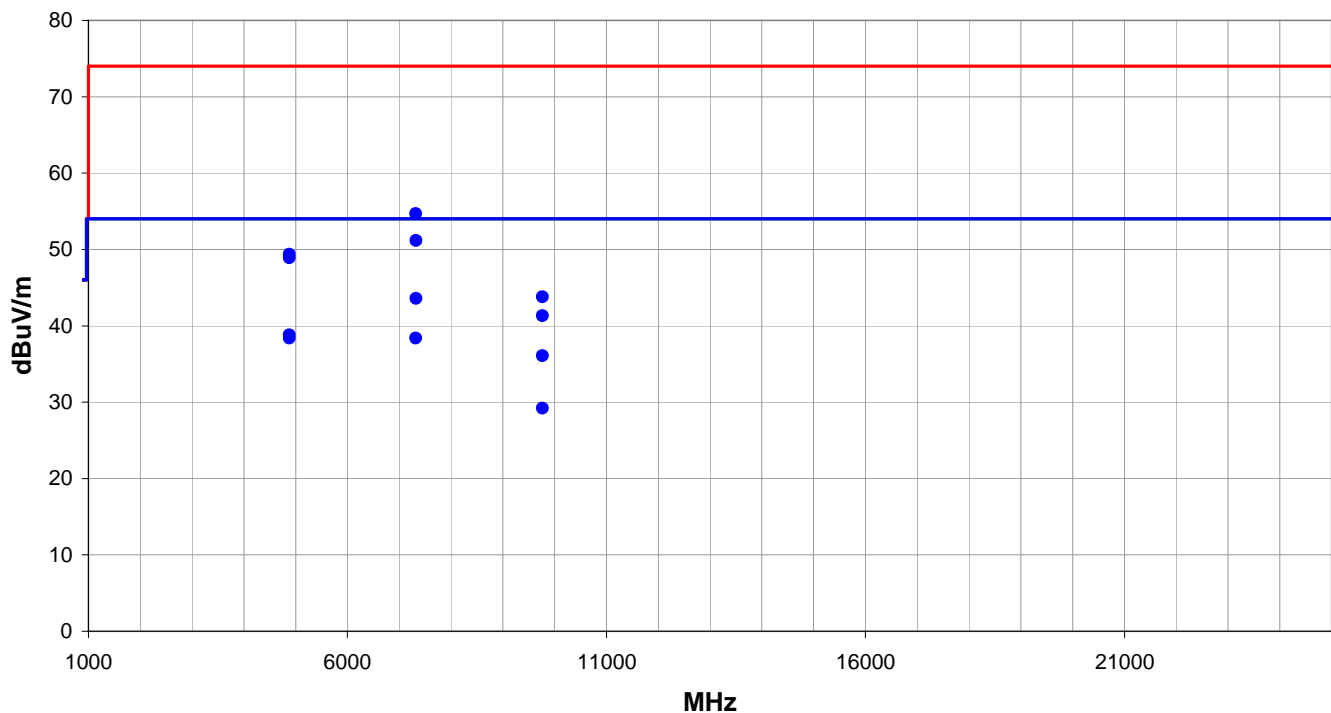
Test Specifications

FCC 15.247:2010

Test Method

ANSI C63.10:2009

Run #	24	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
--------------	----	--------------------------	---	--------------------------	------	----------------	------



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
4881.877	45.5	3.9	1.0	271.0	3.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6
4882.003	34.9	3.9	1.0	202.0	3.0	0.0	Vert	AV	0.0	38.8	54.0	-15.2
4882.017	45.0	3.9	1.0	202.0	3.0	0.0	Vert	PK	0.0	48.9	74.0	-25.1
4882.030	34.5	3.9	1.0	271.0	3.0	0.0	Horz	AV	0.0	38.4	54.0	-15.6
7322.713	43.0	11.7	1.2	216.0	3.0	0.0	Vert	PK	0.0	54.7	74.0	-19.3
7322.740	26.7	11.7	1.0	74.0	3.0	0.0	Horz	AV	0.0	38.4	54.0	-15.6
7322.969	31.9	11.7	1.2	216.0	3.0	0.0	Vert	AV	0.0	43.6	54.0	-10.4
7323.691	39.5	11.7	1.0	74.0	3.0	0.0	Horz	PK	0.0	51.2	74.0	-22.8

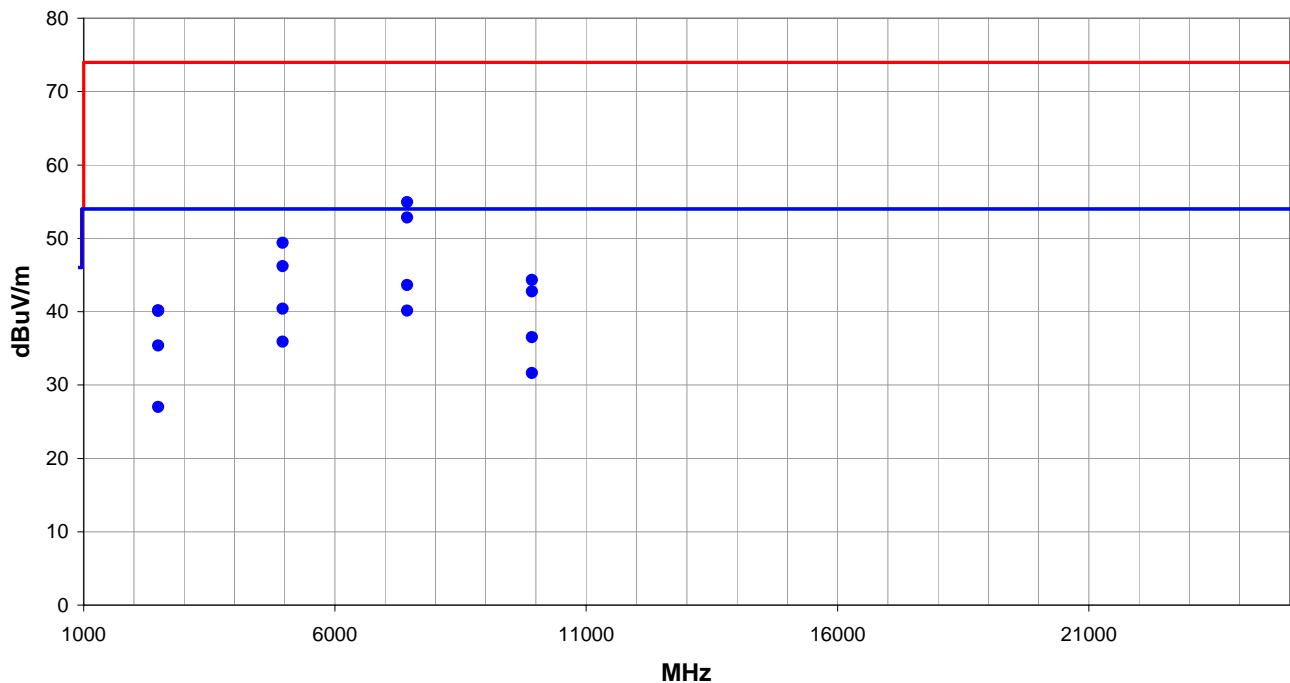
EMC

Spurious Radiated Emissions

Work Order:	NONN0018	Date:	12/03/10	<i>Trevor Buls</i>
Project:	None	Temperature:	24.5	
Job Site:	MN05	Humidity:	9.28	
Serial Number:	RD13151	Barometric Pres.:	1025.5	
EUT:	Saber Module in Model 7600			
Configuration:	1 - NONN0018			
Customer:	Nonin Medical, Inc			
Attendees:	Brodie Pedersen			
EUT Power:	120VAC/60Hz			
Operating Mode:	Transmit mode bluetooth High channel 2480 MHz.			
Deviations:	None			
Comments:	EUT Vertical.			

Test Specifications FCC 15.247:2010	Test Method ANSI C63.10:2009
---	--

Run #	24	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
--------------	----	--------------------------	---	--------------------------	------	----------------	------



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
2483.373	31.4	-4.4	1.0	249.0	3.0	0.0	Vert	AV	0.0	27.0	54.0	-27.0
2483.413	44.6	-4.4	1.0	249.0	3.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8
2483.873	44.6	-4.4	1.0	249.0	3.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9
2483.913	31.4	-4.4	1.0	249.0	3.0	0.0	Horz	AV	0.0	35.4	54.0	-18.6
4959.503	45.2	4.2	1.0	210.0	3.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6
4960.003	36.2	4.2	1.0	210.0	3.0	0.0	Horz	AV	0.0	40.4	54.0	-13.6
4960.028	31.7	4.2	1.4	188.0	3.0	0.0	Vert	AV	0.0	35.9	54.0	-18.1
4960.208	42.0	4.2	1.4	188.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8
7439.600	42.7	12.2	1.0	211.0	3.0	0.0	Vert	PK	0.0	54.9	74.0	-19.1
7439.946	31.4	12.2	1.0	211.0	3.0	0.0	Vert	AV	0.0	43.6	54.0	-10.4
7440.006	27.9	12.2	1.0	284.0	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9
7440.040	40.6	12.2	1.0	284.0	3.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2