Senseonics, Inc.

TEST REPORT FOR

Novara 2.2 Transmitter
Model: 101743-005

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.249

Report No.: 97782-23

Date of issue: March 9, 2016

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Senseonics, Inc.
20451 Seneca Meadows Pkwy
Germantown, MD 20876

REPRESENTATIVE: Dawit Belete
Customer Reference Number: 70003494

REPORT PREPARED BY:

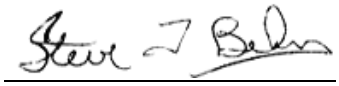
Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 97782

DATE OF EQUIPMENT RECEIPT: February 19, 2016
DATE(S) OF TESTING: February 19-23, 2016

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.00

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea D	US0060	SL2-IN-E-1146R	3082D-2	100638	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.249

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.249(a)	Field Strength of Fundamental	NA	Pass
15.249(a)	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Novara 2.2 Transmitter	Senseonics, Inc.	101743-005	05068

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Vostro 3550	NA

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
Novara 2.2 Transmitter	Senseonics, Inc.	101743-005	05068
USB Charger	TRUMPower	FRM06-S05-UU	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	GFSK
Maximum Duty Cycle:	1%
Antenna Gain	1.2 dBi
Antenna Connection Type:	Integral
Nominal Input Voltage:	5VDC
Firmware / Software used for Test:	nRFgo Studio, version 1.16.1.3119

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

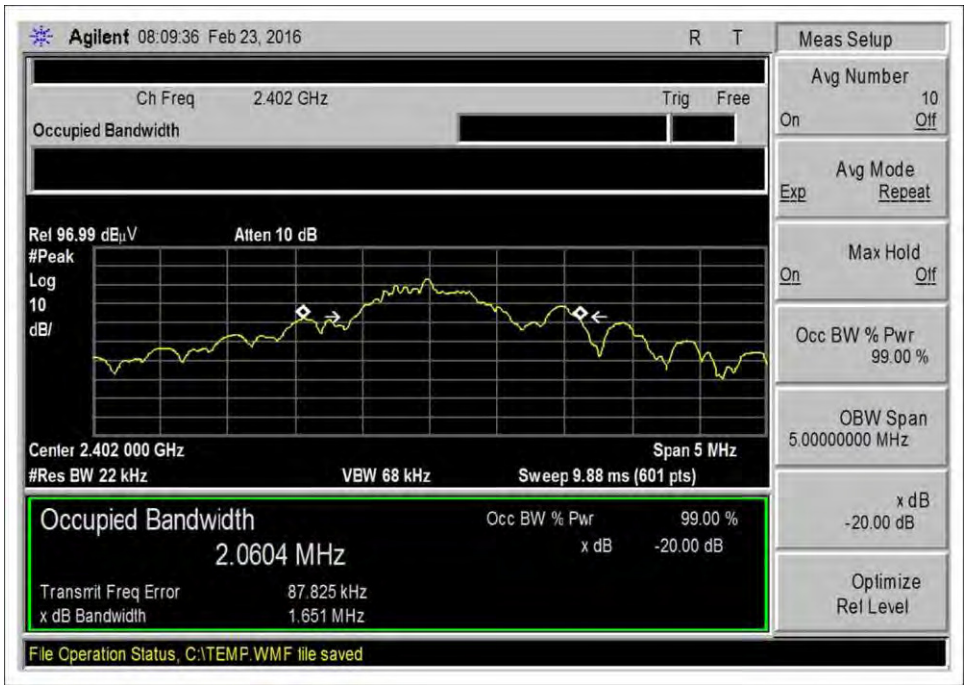
Test Setup/Conditions			
Test Location:	Brea Lab D	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/23/2016
Configuration:	1		

Environmental Conditions			
Temperature (ºC)	19	Relative Humidity (%):	46

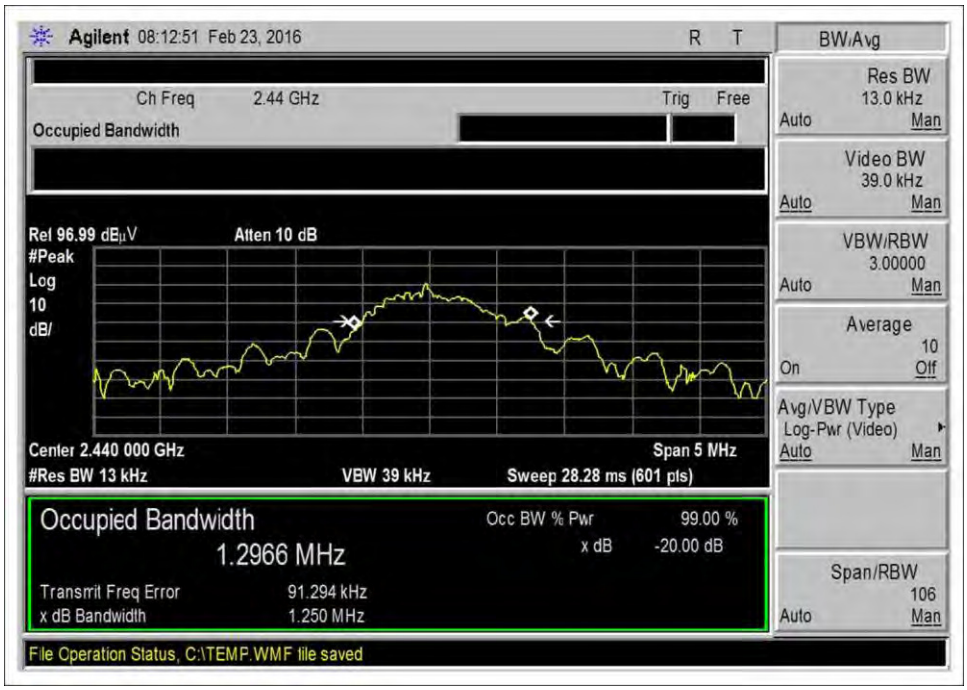
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
00787	Preamp	HP	83017A	6/10/2015	6/10/2017
01646	Horn Antenna	Emco	3115	3/18/2014	3/18/2016
P06360	Cable	Andrew	L1-PNMNM-48	7/29/2014	7/29/2016
P04382	Cable	Andrew	LDF-50	7/30/2014	7/30/2016
P06544	Cable	Astro Steel	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
02869	Spectrum Analyzer	Agilent	E4440A	7/17/2015	7/17/2016

Test Data Summary				
Frequency (MHz)	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2402	GFSK	1651	None	NA
2440	GFSK	1250	None	NA
2480	GFSK	1053	None	NA

Plots



Low Channel



Middle Channel

High Channel

Test Setup Photos

X Axis

Y Axis

Z Axis

15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation**	**$V_{Minimum}$ (dBuV/m)**	**$V_{Nominal}$ (dBuV/m)**	**$V_{Maximum}$ (dBuV/m)**	**Max Deviation from $V_{Nominal}$ (dB)**
2402	GFSK	NA	84.8	NA	NA

Test performed using operational mode with the highest output power, representing worst case.
Power output tests were performed using a fresh battery.
NA: This equipment is battery powered and manufacturer declares the equipment cannot operate while charging.

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

Parameter	Value
$V_{Nominal}$:	5VDC
$V_{Minimum}$:	NA
$V_{Maximum}$:	NA

NA: This equipment is battery powered and manufacturer declares the equipment cannot operate while charging.

Test Data Summary – Radiated Field Strength Measurement					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Measured (dBuV/m @ 3m)**	**Limit (dBuV/m @ 3m)**	**Results**
2402	GFSK	Integral	84.8	≤94	Pass

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714 993-6112		
Customer:	**Senseonics, Inc.**		
Specification:	**15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**		
Work Order #:	**97782**	Date:	2/22/2016
Test Type:	**Maximized Emissions**	Time:	14:08:30
Tested By:	Don Nguyen	Sequence#:	1
Software:	EMITest 5.03.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

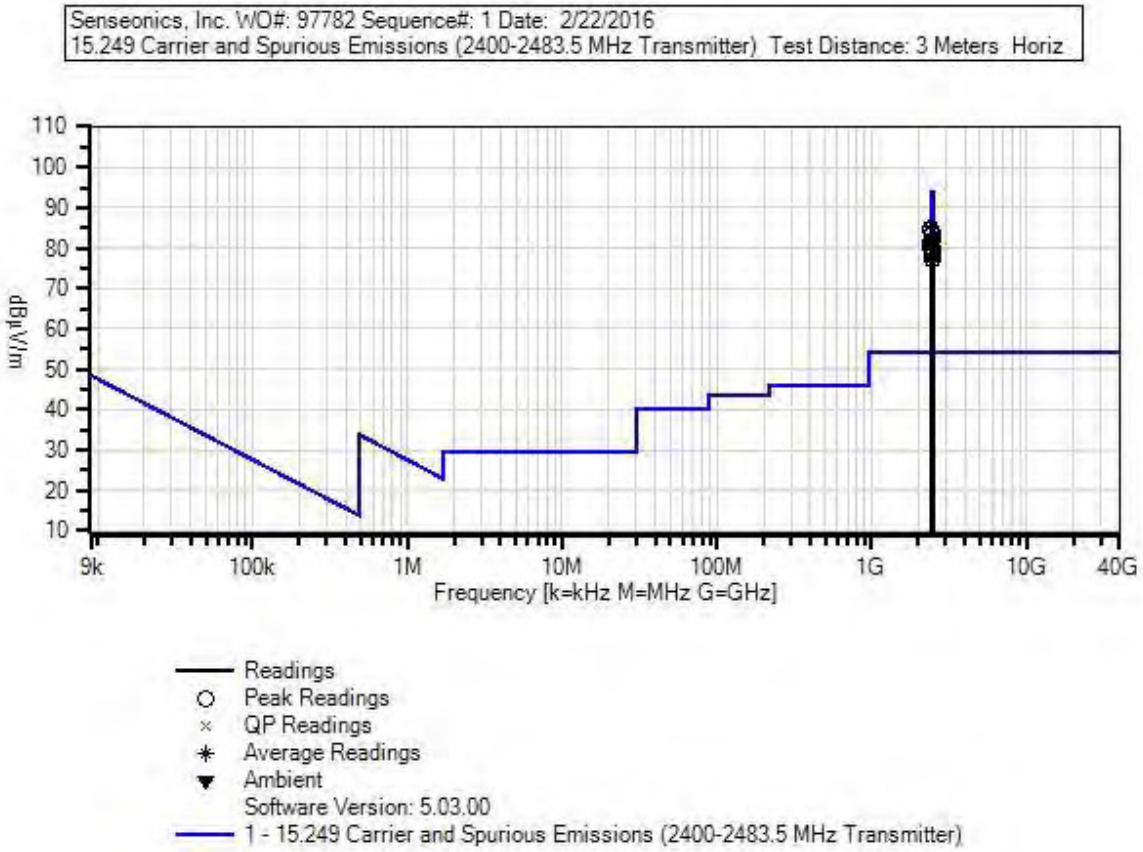
Test Conditions / Notes:

The equipment under test EUT is placed on Styrofoam platform at 1.5m in height. The support laptop is running software nRFgo Studio, version 1.16.1.3119 to configure the settings on the EUT. The transmitter is inactive when the EUT is charged via USB charger.
Payload model: PRBS9
The EUT is rotated in three orthogonal axis during testing.
Declared operating frequency: 2402-2480MHz
Operating frequency under test: 2402, 2440, 2480MHz.
Protocol / Modulation: BLE (GFSK)
Antenna type: integral
Duty Cycle: 100%
Test Mode: constant transmitting.

Frequency range of measurement = 2402, 2440, and 2480MHz
RBW=1 MHz, VBW=1 MHz.

Test environment conditions:
Temperature: 19°C
Relative Humidity: 46%
Pressure: 100kPa

Site D
Test method: ANSI C63.10 (2013)


Senseonics, Inc. WO#: 97782 Sequence#: 1 Date: 2/22/2016
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Horiz
dBµV/m
110
100
90
80
70
60
50
40
30
20
10
9k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.00
1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

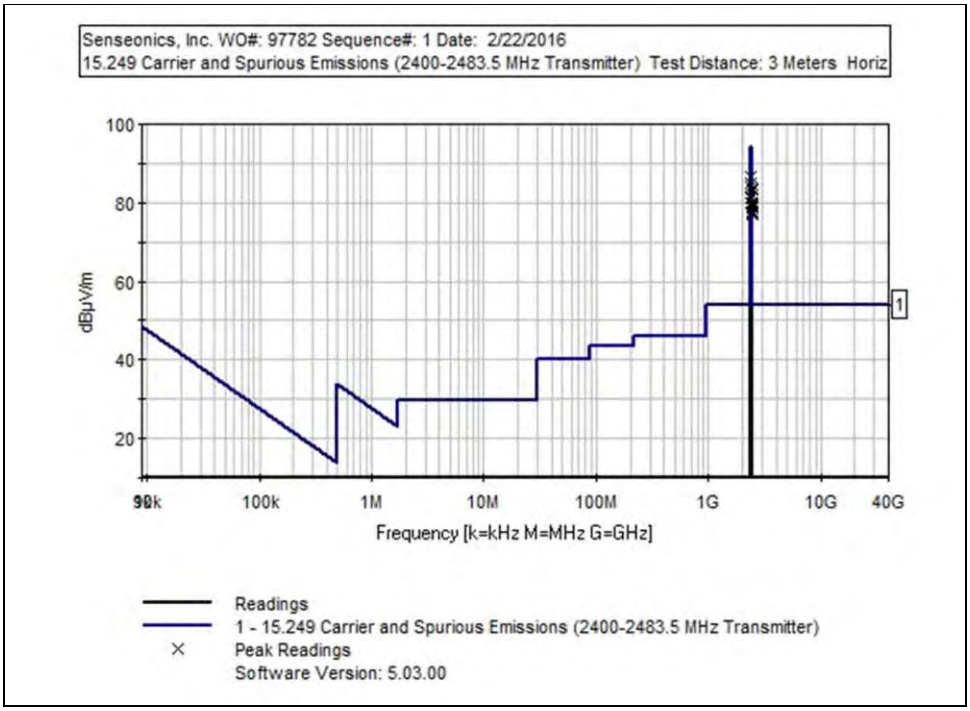
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00787	Preamp	83017A	6/10/2015	6/10/2017
T2	AN01646	Horn Antenna	3115	3/18/2014	3/18/2016
T3	ANP04382	Cable	LDF-50	7/30/2014	7/30/2016
T4	ANP06360	Cable	L1-PNMNM-48	7/29/2014	7/29/2016
T5	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T6	AN02869	Spectrum Analyzer	E4440A	7/17/2015	7/17/2016

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2402.000M	88.6	-39.6 +0.7	+25.4 +0.0	+6.5	+3.2	+0.0	84.8	94.0 X axis	-9.2	Horiz
2	2402.000M	88.1	-39.6 +0.7	+25.4 +0.0	+6.5	+3.2	+0.0	84.3	94.0 Y axis	-9.7	Horiz
3	2440.000M	87.6	-39.7 +0.7	+25.4 +0.0	+6.5	+3.3	+0.0	83.8	94.0 X axis	-10.2	Horiz
4	2480.000M	87.2	-39.7 +0.7	+25.5 +0.0	+6.5	+3.4	+0.0	83.6	94.0 X axis	-10.4	Horiz
5	2440.000M	87.0	-39.7 +0.7	+25.4 +0.0	+6.5	+3.3	+0.0	83.2	94.0 Y axis	-10.8	Horiz
6	2480.000M	85.5	-39.7 +0.7	+25.5 +0.0	+6.5	+3.4	+0.0	81.9	94.0 Y axis	-12.1	Horiz
7	2402.000M	85.1	-39.6 +0.7	+25.4 +0.0	+6.5	+3.2	+0.0	81.3	94.0 Z axis	-12.7	Vert
8	2440.000M	83.9	-39.7 +0.7	+25.4 +0.0	+6.5	+3.3	+0.0	80.1	94.0 Z axis	-13.9	Horiz
9	2402.000M	83.8	-39.6 +0.7	+25.4 +0.0	+6.5	+3.2	+0.0	80.0	94.0 X axis	-14.0	Vert
10	2402.000M	83.7	-39.6 +0.7	+25.4 +0.0	+6.5	+3.2	+0.0	79.9	94.0 Y axis	-14.1	Vert
11	2402.000M	83.7	-39.6 +0.7	+25.4 +0.0	+6.5	+3.2	+0.0	79.9	94.0 Z axis	-14.1	Horiz
12	2480.000M	83.0	-39.7 +0.7	+25.5 +0.0	+6.5	+3.4	+0.0	79.4	94.0 Z axis	-14.6	Vert
13	2480.000M	82.7	-39.7 +0.7	+25.5 +0.0	+6.5	+3.4	+0.0	79.1	94.0 Z axis	-14.9	Horiz
14	2440.000M	82.8	-39.7 +0.7	+25.4 +0.0	+6.5	+3.3	+0.0	79.0	94.0 Z axis	-15.0	Vert
15	2440.000M	82.3	-39.7 +0.7	+25.4 +0.0	+6.5	+3.3	+0.0	78.5	94.0 X axis	-15.5	Vert
16	2440.000M	81.7	-39.7 +0.7	+25.4 +0.0	+6.5	+3.3	+0.0	77.9	94.0 Y axis	-16.1	Vert
17	2480.000M	80.9	-39.7 +0.7	+25.5 +0.0	+6.5	+3.4	+0.0	77.3	94.0 Y axis	-16.7	Vert
18	2480.000M	80.5	-39.7 +0.7	+25.5 +0.0	+6.5	+3.4	+0.0	76.9	94.0 X axis	-17.1	Vert

Plot



15.35(c) Duty Cycle Correction Factor

NA: EUT operates at 100%, duty cycle correction factor is not applicable.

Test Setup Photos

X Axis

Y Axis

Z Axis

15.249(a) Radiated Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714 993-6112		
Customer:	**Senseonics, Inc.**		
Specification:	**15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**		
Work Order #:	**97782**	Date:	2/22/2016
Test Type:	**Maximized Emissions**	Time:	13:09:38
Tested By:	Don Nguyen	Sequence#:	2
Software:	EMITest 5.03.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

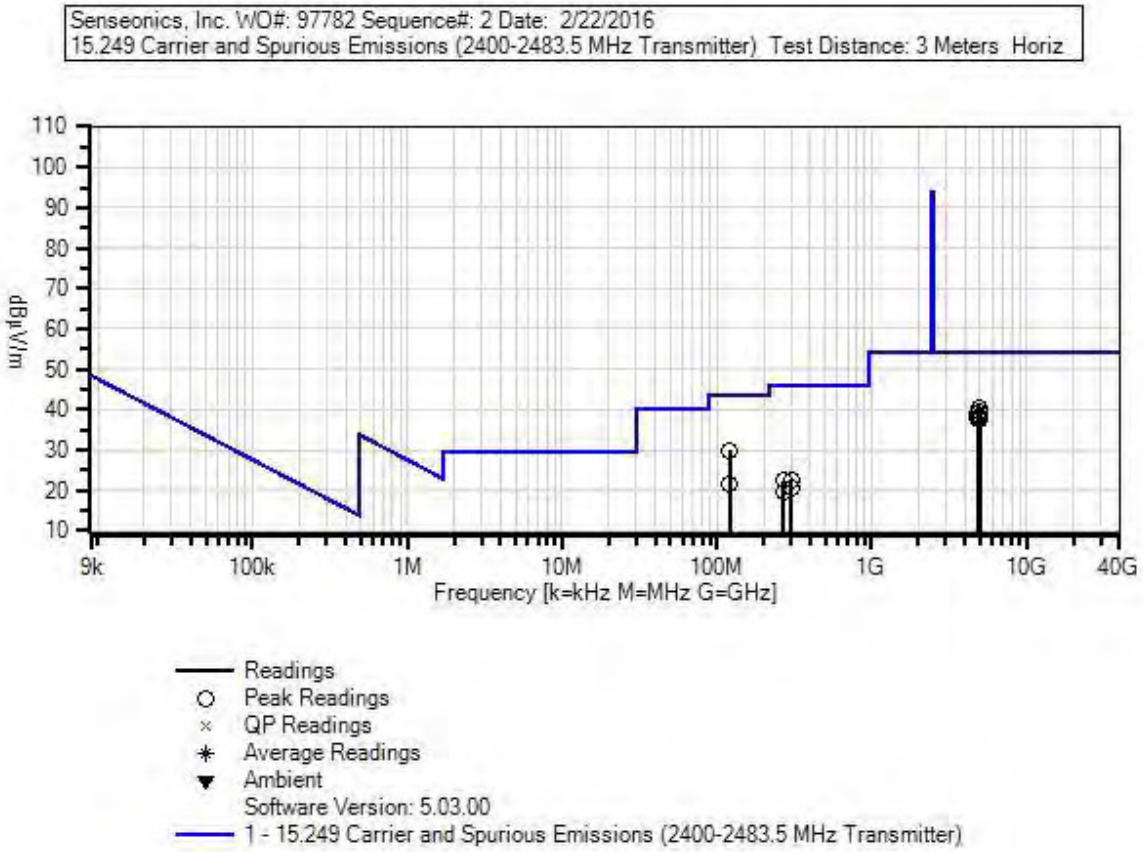
Test Conditions / Notes:

The equipment under test EUT is placed on Styrofoam platform at 1.5m in height (above 1GHz) and 0.8m (below 1GHz). The support laptop is running software nRFgo Studio, version 1.16.1.3119 to configure the settings on the EUT. The transmitter is inactive when the EUT is charged via USB charger.
Payload model: PRBS9
The EUT is rotated in three orthogonal axis during testing. Data represents the worst case emission.
Declared operating frequency: 2402-2480MHz
Operating frequency under test: 2402, 2440, 2480MHz.
Protocol / Modulation: BLE (GFSK)
Antenna type: integral
Duty Cycle: 100%
Test Mode: constant transmitting.

Frequency range of measurement = 9k-25000MHz
0.009MHz to 0.15MHz RBW=VBW=0.2kHz.
0.15MHz to 30MHz RBW=VBW=9kHz.
30MHz to 1000MHz RBW=VBW=120kHz.
1000MHz to 25000MHz RBW=VBW=1MHz.

Test environment conditions:
Temperature: 19°C
Relative Humidity: 46%
Pressure: 100kPa

Site D
Test method: ANSI C63.10 (2013)


Senseonics, Inc. WO#: 97782 Sequence#: 2 Date: 2/22/2016
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Horiz
dBµV/m
110
100
90
80
70
60
50
40
30
20
10
9k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.00
1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00787	Preamp	83017A	6/10/2015	6/10/2017
T2	AN01646	Horn Antenna	3115	3/18/2014	3/18/2016
T3	ANP06360	Cable	L1-PNMNM-48	7/29/2014	7/29/2016
T4	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T5	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/15/2015	6/15/2017
T6	ANP04382	Cable	LDF-50	7/30/2014	7/30/2016
T7	AN02869	Spectrum Analyzer	E4440A	7/17/2015	7/17/2016
T8	AN00010	Preamp	8447D	3/12/2014	3/12/2016
T9	AN01992	Biconilog Antenna	CBL6111C	12/4/2014	12/4/2016
T10	ANP05555	Cable	RG223/U	5/7/2014	5/7/2016
T11	ANP05569	Cable	RG-214/U	5/7/2014	5/7/2016
	AN00314	Loop Antenna	6502	7/2/2014	7/2/2016
	AN01413	Horn Antenna	84125-80008	11/25/2014	11/25/2016

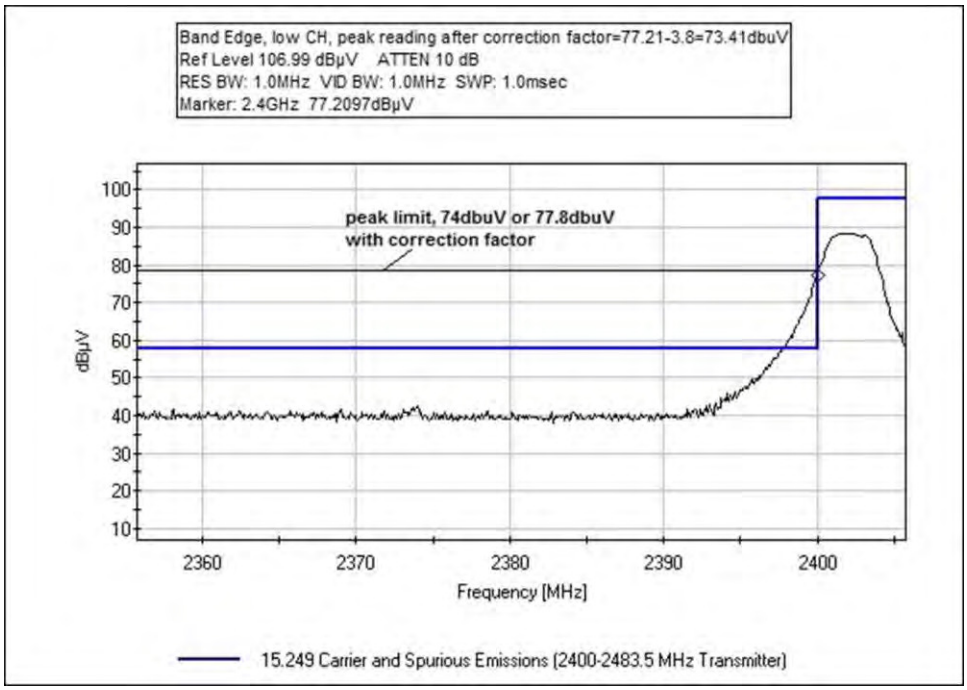
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

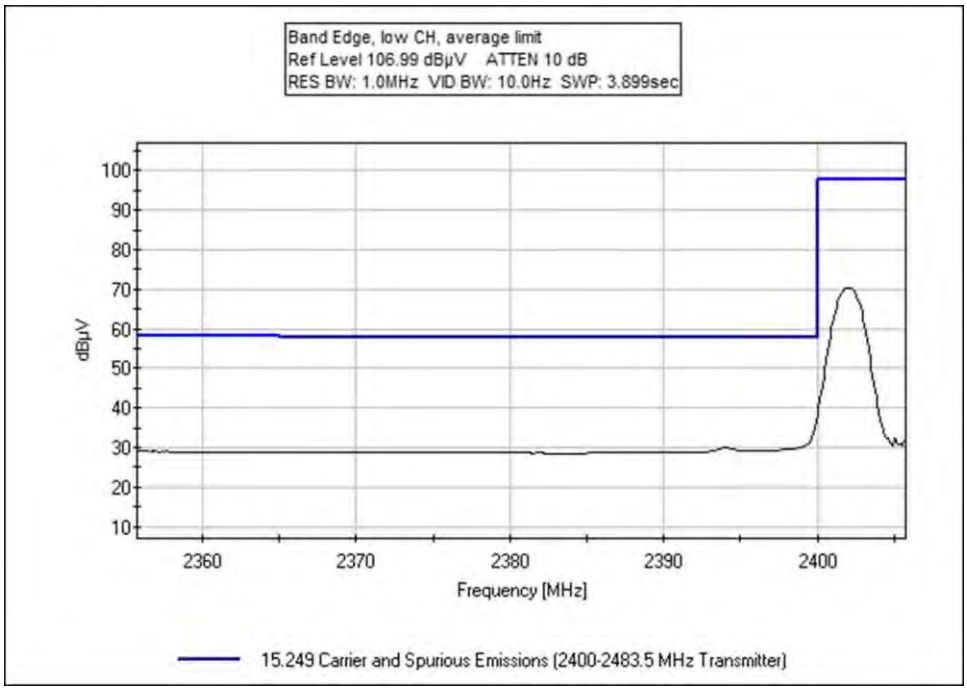
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	4880.000M	35.4	-40.2 +0.1 +0.0	+30.2 +9.3 +0.0	+4.8 +0.0 +0.0	+1.0 +0.0	+0.0	40.6	54.0	-13.4	Vert
2	120.000M	43.1	+0.0 +0.0 +11.5	+0.0 +1.2 +0.1	+0.0 +0.0 +1.1	+0.0 -27.0	+0.0	30.0	43.5	-13.5	Vert
3	4960.000M	33.9	-40.1 +0.1 +0.0	+30.4 +9.4 +0.0	+4.8 +0.0 +0.0	+1.0 +0.0	+0.0	39.5	54.0	-14.5	Vert
4	4804.000M	34.4	-40.5 +0.1 +0.0	+30.1 +9.2 +0.0	+4.7 +0.0 +0.0	+1.0 +0.0	+0.0	39.0	54.0	-15.0	Vert
5	4804.000M	33.5	-40.5 +0.1 +0.0	+30.1 +9.2 +0.0	+4.7 +0.0 +0.0	+1.0 +0.0	+0.0	38.1	54.0	-15.9	Horiz
6	4960.000M	32.5	-40.1 +0.1 +0.0	+30.4 +9.4 +0.0	+4.8 +0.0 +0.0	+1.0 +0.0	+0.0	38.1	54.0	-15.9	Horiz

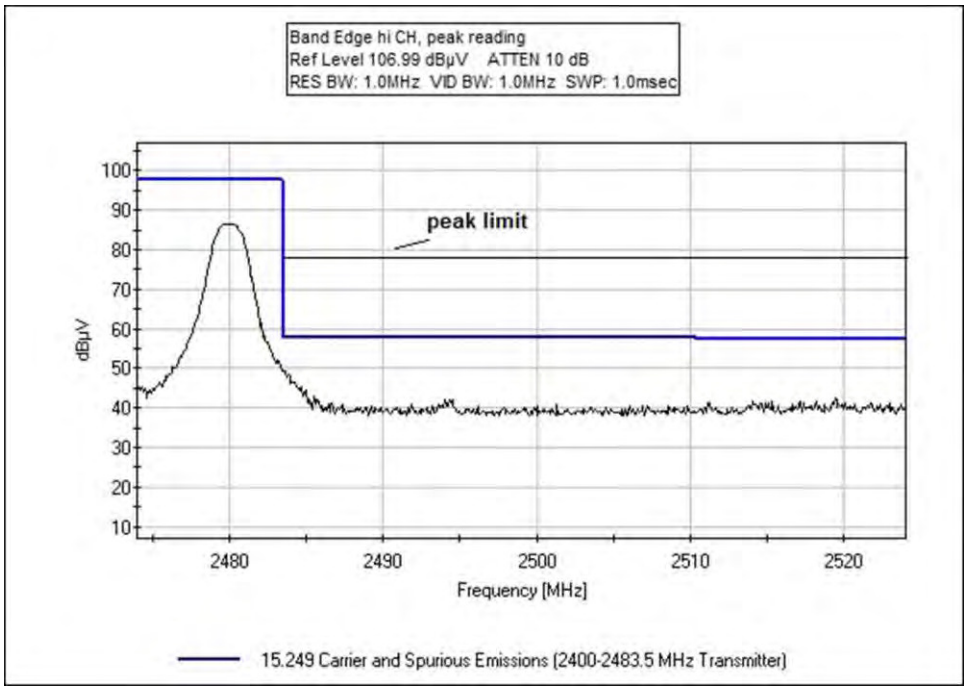
7	4880.000M	32.3	-40.2 +0.1 +0.0	+30.2 +9.3 +0.0	+4.8 +0.0 +0.0	+1.0 +0.0	+0.0	37.5	54.0	-16.5	Horiz
8	120.000M	34.7	+0.0 +0.0 +11.5	+0.0 +1.2 +0.1	+0.0 +0.0 +1.1	+0.0 -27.0	+0.0	21.6	43.5	-21.9	Horiz
9	300.000M	31.7	+0.0 +0.0 +13.3	+0.0 +1.9 +0.3	+0.0 +0.0 +1.8	+0.0 -26.5	+0.0	22.5	46.0	-23.5	Vert
10	269.663M	32.2	+0.0 +0.0 +12.9	+0.0 +1.8 +0.2	+0.0 +0.0 +1.7	+0.0 -26.5	+0.0	22.3	46.0	-23.7	Horiz
11	300.000M	30.0	+0.0 +0.0 +13.3	+0.0 +1.9 +0.3	+0.0 +0.0 +1.8	+0.0 -26.5	+0.0	20.8	46.0	-25.2	Horiz
12	269.960M	29.2	+0.0 +0.0 +13.0	+0.0 +1.8 +0.2	+0.0 +0.0 +1.7	+0.0 -26.5	+0.0	19.4	46.0	-26.6	Vert

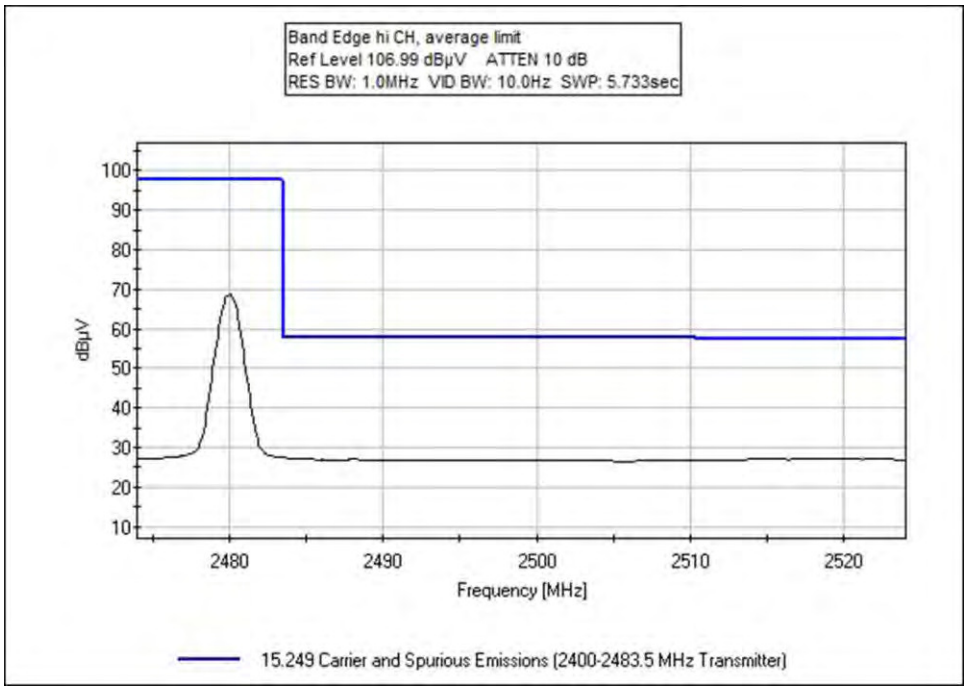
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2400	GFSK	integral	39	<54	Pass
2483.5	GFSK	integral	27	<54	Pass

Band Edge Plots




Band Edge, low CH, average limit
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 3.899sec
dBµV
100
90
80
70
60
50
40
30
20
10
2360
2370
2380
2390
2400
Frequency [MHz]
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)


Band Edge hi CH, peak reading
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 1.0msec
peak limit
dBµV
100
90
80
70
60
50
40
30
20
10
2480
2490
2500
2510
2520
Frequency [MHz]
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)


Band Edge hi CH, average limit
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 10.0Hz SWP: 5.733sec
100
90
80
70
60
50
40
30
20
10
dBµV
2480
2490
2500
2510
2520
Frequency [MHz]
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

Test Setup Photos

X Axis

Y Axis

Z Axis

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714 993-6112		
Customer:	**Senseonics, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**97782**	Date:	2/19/2016
Test Type:	**Conducted Emissions**	Time:	2:33:58 PM
Tested By:	Don Nguyen	Sequence#:	3
Software:	EMITest 5.03.00		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

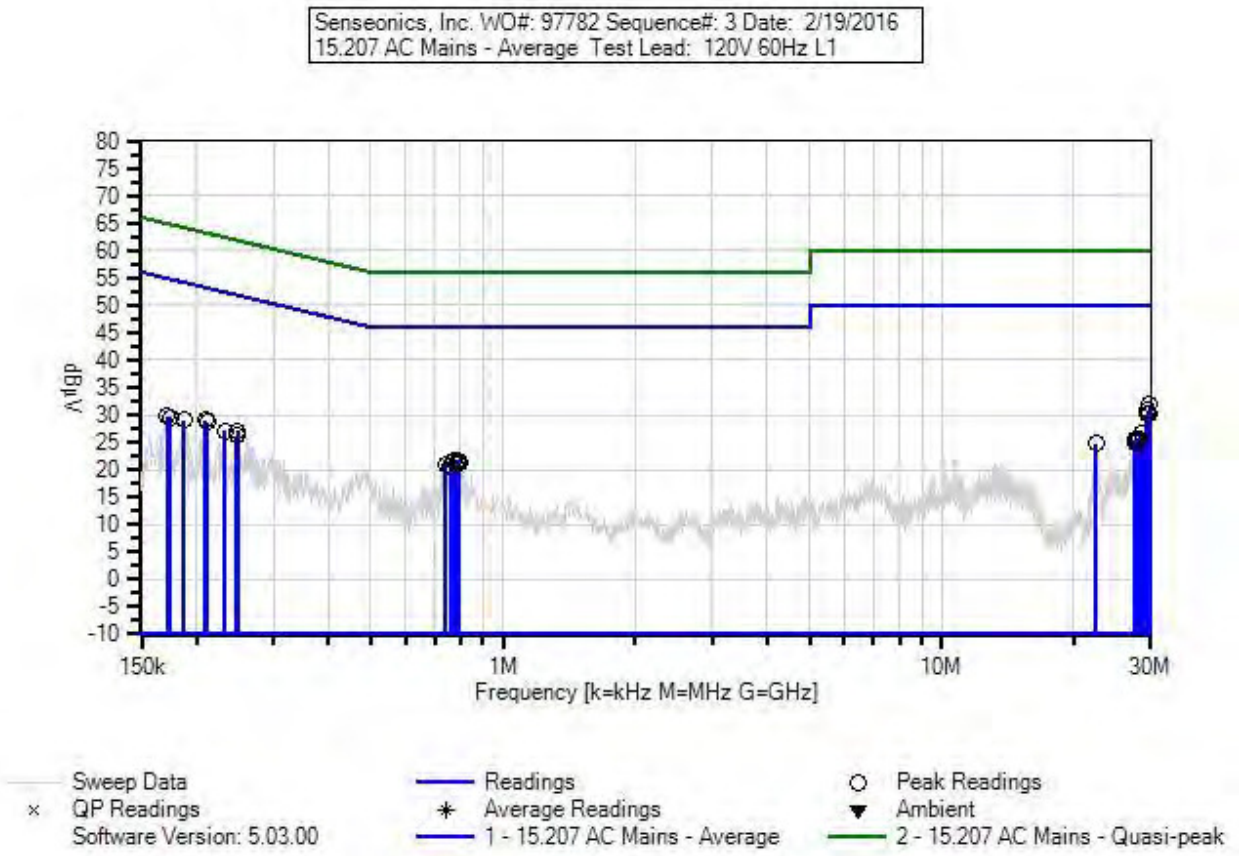
Test Conditions / Notes:

The equipment under test EUT is placed on table top. The EUT is connected to USB charger.
Test Mode: charging, transmitter is inactive.

Frequency range of measurement = 150kHz-30MHz
0.15MHz to 30MHz RBW=VBW=9kHz.

Test environment conditions:
Temperature: 21°C
Relative Humidity: 48%
Pressure: 100kPa

Site D
Test method: ANSI C63.10 (2013)


Senseonics, Inc. WO#: 97782 Sequence#: 3 Date: 2/19/2016
15.207 AC Mains - Average Test Lead: 120V 60Hz L1
dBµV
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
150k
1M
10M
30M
Frequency [k=kHz M=MHz G=GHz]
Sweep Data
QP Readings
Software Version: 5.03.00
Readings
Average Readings
1 - 15.207 AC Mains - Average
Peak Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01910	Cable	RG-142	11/30/2015	11/30/2017
T2	AN00969A	50uH LISN-Line 1 (L1) (dB)	3816/2NM	3/12/2015	3/12/2017
	AN00969A	50uH LISN-Line 2 (L2) (dB)	3816/2NM	3/12/2015	3/12/2017
	AN02869	Spectrum Analyzer	E4440A	7/17/2015	7/17/2016
T3	AN02343	High Pass Filter	HE9615-150K-50-720B	1/8/2015	1/8/2017
T4	ANP06085	Attenuator	SA18N10W-09	12/17/2014	12/17/2016

Measurement Data: Reading listed by margin. Test Lead: L1

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	29.753M	24.9	+0.2	+0.9	+0.2	+5.7	+0.0	31.9	50.0	-18.1	L1
2	29.424M	23.8	+0.2	+0.9	+0.2	+5.7	+0.0	30.8	50.0	-19.2	L1
3	29.616M	23.2	+0.2	+0.9	+0.2	+5.7	+0.0	30.2	50.0	-19.8	L1
4	29.253M	23.1	+0.2	+0.9	+0.2	+5.7	+0.0	30.1	50.0	-19.9	L1
5	29.671M	23.1	+0.2	+0.9	+0.2	+5.7	+0.0	30.1	50.0	-19.9	L1
6	28.575M	19.9	+0.2	+0.8	+0.2	+5.7	+0.0	26.8	50.0	-23.2	L1
7	28.431M	19.7	+0.2	+0.8	+0.2	+5.7	+0.0	26.6	50.0	-23.4	L1
8	209.630k	23.1	+0.0	+0.1	+0.1	+5.7	+0.0	29.0	53.2	-24.2	L1
9	792.850k	15.8	+0.0	+0.1	+0.1	+5.7	+0.0	21.7	46.0	-24.3	L1
10	28.020M	18.8	+0.2	+0.8	+0.2	+5.7	+0.0	25.7	50.0	-24.3	L1
11	28.123M	18.8	+0.2	+0.8	+0.2	+5.7	+0.0	25.7	50.0	-24.3	L1
12	211.812k	22.8	+0.0	+0.1	+0.1	+5.7	+0.0	28.7	53.1	-24.4	L1
13	776.124k	15.7	+0.0	+0.1	+0.1	+5.7	+0.0	21.6	46.0	-24.4	L1
14	28.040M	18.7	+0.2	+0.8	+0.2	+5.7	+0.0	25.6	50.0	-24.4	L1
15	27.499M	18.5	+0.2	+0.8	+0.2	+5.7	+0.0	25.4	50.0	-24.6	L1
16	795.031k	15.5	+0.0	+0.1	+0.1	+5.7	+0.0	21.4	46.0	-24.6	L1
17	248.172k	21.2	+0.0	+0.1	+0.1	+5.7	+0.0	27.1	51.8	-24.7	L1
18	27.992M	18.4	+0.2	+0.8	+0.2	+5.7	+0.0	25.3	50.0	-24.7	L1

19	788.486k	15.3	+0.0	+0.1	+0.1	+5.7	+0.0	21.2	46.0	-24.8	L1
20	27.958M	18.2	+0.2	+0.8	+0.2	+5.7	+0.0	25.1	50.0	-24.9	L1
21	741.945k	15.1	+0.0	+0.1	+0.1	+5.7	+0.0	21.0	46.0	-25.0	L1
22	187.087k	23.2	+0.0	+0.1	+0.1	+5.7	+0.0	29.1	54.2	-25.1	L1
23	779.760k	15.0	+0.0	+0.1	+0.1	+5.7	+0.0	20.9	46.0	-25.1	L1
24	171.816k	23.6	+0.0	+0.1	+0.3	+5.7	+0.0	29.7	54.9	-25.2	L1
25	174.725k	23.4	+0.0	+0.1	+0.3	+5.7	+0.0	29.5	54.7	-25.2	L1
26	22.409M	18.0	+0.2	+0.7	+0.2	+5.7	+0.0	24.8	50.0	-25.2	L1
27	760.125k	14.8	+0.0	+0.1	+0.1	+5.7	+0.0	20.7	46.0	-25.3	L1
28	27.629M	17.8	+0.2	+0.8	+0.2	+5.7	+0.0	24.7	50.0	-25.3	L1
29	232.174k	21.1	+0.0	+0.1	+0.1	+5.7	+0.0	27.0	52.4	-25.4	L1
30	246.718k	20.3	+0.0	+0.1	+0.1	+5.7	+0.0	26.2	51.9	-25.7	L1

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714 993-6112		
Customer:	**Senseonics, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**97782**	Date:	2/19/2016
Test Type:	**Conducted Emissions**	Time:	2:41:15 PM
Tested By:	Don Nguyen	Sequence#:	4
Software:	EMITest 5.03.00		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

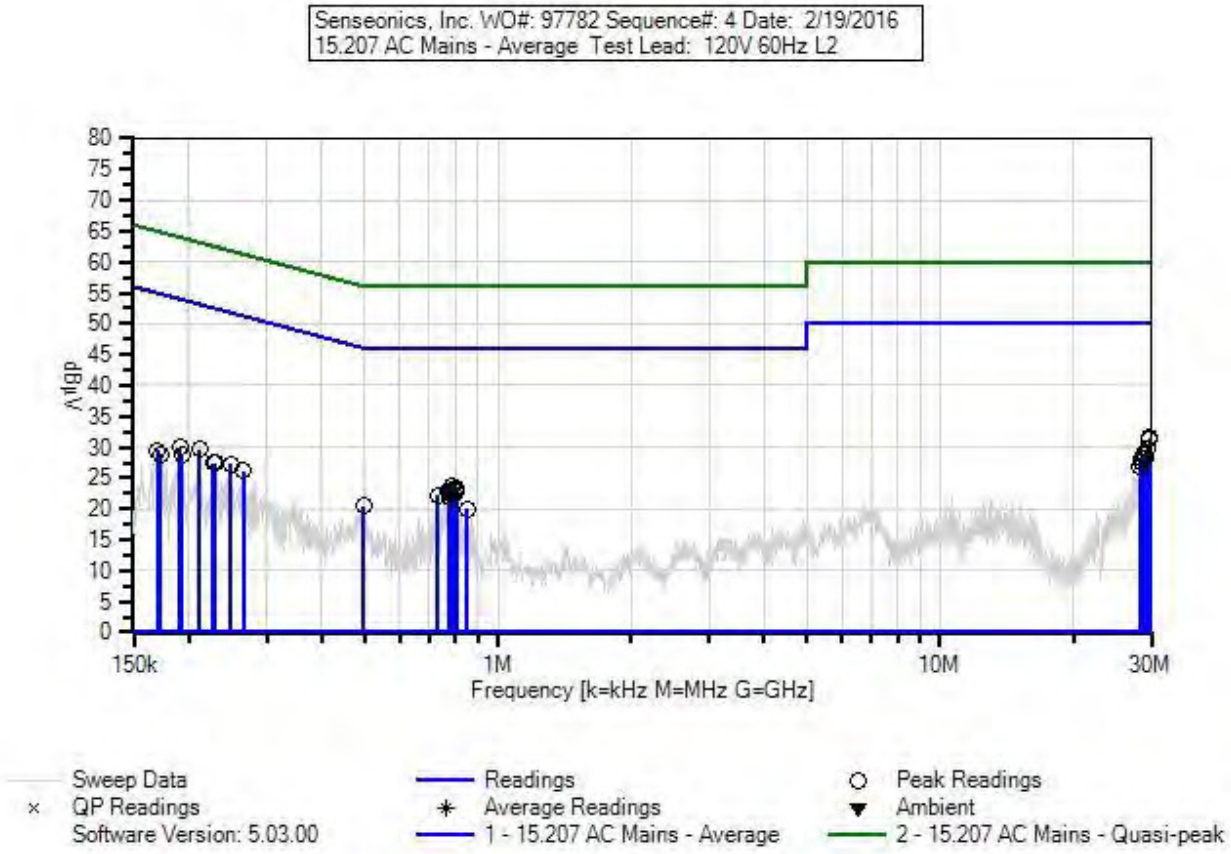
Test Conditions / Notes:

The equipment under test EUT is placed on table top. The EUT is connected to USB charger.
Test Mode: charging, transmitter is inactive.

Frequency range of measurement = 150kHz-30MHz
0.15MHz to 30MHz RBW=VBW=9kHz.

Test environment conditions:
Temperature: 21°C
Relative Humidity: 48%
Pressure: 100kPa

Site D
Test method: ANSI C63.10 (2013)


Senseonics, Inc. WO#: 97782 Sequence#: 4 Date: 2/19/2016
15.207 AC Mains - Average Test Lead: 120V 60Hz L2
dBµV
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
150k
1M
10M
30M
Frequency [k=kHz M=MHz G=GHz]
Sweep Data
QP Readings
Software Version: 5.03.00
Readings
Average Readings
1 - 15.207 AC Mains - Average
Peak Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
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	AN00969A	50uH LISN-Line 1 (L1) (dB)	3816/2NM	3/12/2015	3/12/2017
T2	AN00969A	50uH LISN-Line 2 (L2) (dB)	3816/2NM	3/12/2015	3/12/2017
	AN02869	Spectrum Analyzer	E4440A	7/17/2015	7/17/2016
T3	AN02343	High Pass Filter	HE9615-150K-50-720B	1/8/2015	1/8/2017
T4	ANP06085	Attenuator	SA18N10W-09	12/17/2014	12/17/2016

Measurement Data: Reading listed by margin. Test Lead: L2

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	29.712M	24.4	+0.2	+1.1	+0.2	+5.7	+0.0	31.6	50.0	-18.4	L2
2	29.801M	24.1	+0.2	+1.1	+0.2	+5.7	+0.0	31.3	50.0	-18.7	L2
3	29.328M	22.5	+0.2	+1.0	+0.2	+5.7	+0.0	29.6	50.0	-20.4	L2
4	29.130M	21.7	+0.2	+1.0	+0.2	+5.7	+0.0	28.8	50.0	-21.2	L2
5	28.760M	21.6	+0.2	+1.0	+0.2	+5.7	+0.0	28.7	50.0	-21.3	L2
6	29.006M	21.0	+0.2	+1.0	+0.2	+5.7	+0.0	28.1	50.0	-21.9	L2
7	28.499M	20.9	+0.2	+1.0	+0.2	+5.7	+0.0	28.0	50.0	-22.0	L2
8	788.486k	17.7	+0.0	+0.1	+0.1	+5.7	+0.0	23.6	46.0	-22.4	L2
9	28.657M	20.5	+0.2	+1.0	+0.2	+5.7	+0.0	27.6	50.0	-22.4	L2
10	800.849k	17.4	+0.0	+0.1	+0.1	+5.7	+0.0	23.3	46.0	-22.7	L2
11	802.303k	17.1	+0.0	+0.1	+0.1	+5.7	+0.0	23.0	46.0	-23.0	L2
12	781.942k	17.0	+0.0	+0.1	+0.1	+5.7	+0.0	22.9	46.0	-23.1	L2
13	28.356M	19.8	+0.2	+1.0	+0.2	+5.7	+0.0	26.9	50.0	-23.1	L2
14	805.939k	16.9	+0.0	+0.1	+0.1	+5.7	+0.0	22.8	46.0	-23.2	L2
15	773.215k	16.8	+0.0	+0.1	+0.1	+5.7	+0.0	22.7	46.0	-23.3	L2
16	211.812k	23.8	+0.0	+0.1	+0.1	+5.7	+0.0	29.7	53.1	-23.4	L2
17	779.033k	16.4	+0.0	+0.1	+0.1	+5.7	+0.0	22.3	46.0	-23.7	L2
18	795.031k	16.4	+0.0	+0.1	+0.1	+5.7	+0.0	22.3	46.0	-23.7	L2

19	730.310k	16.3	+0.0	+0.1	+0.1	+5.7	+0.0	22.2	46.0	-23.8	L2
20	190.723k	24.0	+0.0	+0.1	+0.1	+5.7	+0.0	29.9	54.0	-24.1	L2
21	780.487k	15.9	+0.0	+0.1	+0.1	+5.7	+0.0	21.8	46.0	-24.2	L2
22	248.900k	21.3	+0.0	+0.1	+0.1	+5.7	+0.0	27.2	51.8	-24.6	L2
23	192.905k	23.0	+0.0	+0.1	+0.1	+5.7	+0.0	28.9	53.9	-25.0	L2
24	229.265k	21.6	+0.0	+0.1	+0.1	+5.7	+0.0	27.5	52.5	-25.0	L2
25	266.352k	20.2	+0.0	+0.1	+0.1	+5.7	+0.0	26.1	51.2	-25.1	L2
26	227.083k	21.5	+0.0	+0.1	+0.1	+5.7	+0.0	27.4	52.6	-25.2	L2
27	169.634k	23.4	+0.0	+0.1	+0.3	+5.7	+0.0	29.5	55.0	-25.5	L2
28	497.604k	14.4	+0.0	+0.1	+0.2	+5.7	+0.0	20.4	46.0	-25.6	L2
29	172.543k	22.8	+0.0	+0.1	+0.3	+5.7	+0.0	28.9	54.8	-25.9	L2
30	851.026k	14.1	+0.0	+0.1	+0.1	+5.7	+0.0	20.0	46.0	-26.0	L2

Test Setup Photos

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on the limit value subtracting the corrected measured value; a negative margin represents a measurement less than the limit while a positive margin represents a measurement exceeding the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.