Philips Oral Healthcare, Inc.

TEST REPORT FOR

Rechargeable Power Toothbrush with BLE and NFC 13.56
Model: HX99

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(DTS 2400-2483.5 MHz)

Report No.: 99020-10

Date of issue: December 16, 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:

Philips Oral Healthcare, Inc.
22100 Bothell-Everett Hwy
Bothell, WA 98021

REPRESENTATIVE: Timothy Rand
Customer Reference Number: US13-2100640728

REPORT PREPARED BY:

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

Project Number: 99020

DATE OF EQUIPMENT RECEIPT: October 27, 2016, 2016
DATE(S) OF TESTING: October 27 - November 7, 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.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	US1022	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

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
The actual testing date is stated in each section, the date/time on the plot data screen captured is incorrect.

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
Rechargeable Power Toothbrush with BLE and NFC 13.56	Philips Oral Healthcare, Inc.	HX99	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
Rechargeable Power Toothbrush with BLE and NFC 13.56	Philips Oral Healthcare, Inc.	HX99	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Inductive Charger	Philips Oral Healthcare, Inc.	CBA2001	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.15.1
Operating Frequency Range:	2402-2480MHz
Modulation Type(s):	GFSK 305kb/s
Maximum Duty Cycle:	100%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Inverted F antenna 0dBi gain
Beamforming Type:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	Battery Li-Ion or 115V/60Hz
Firmware / Software used for Test:	Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB

FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

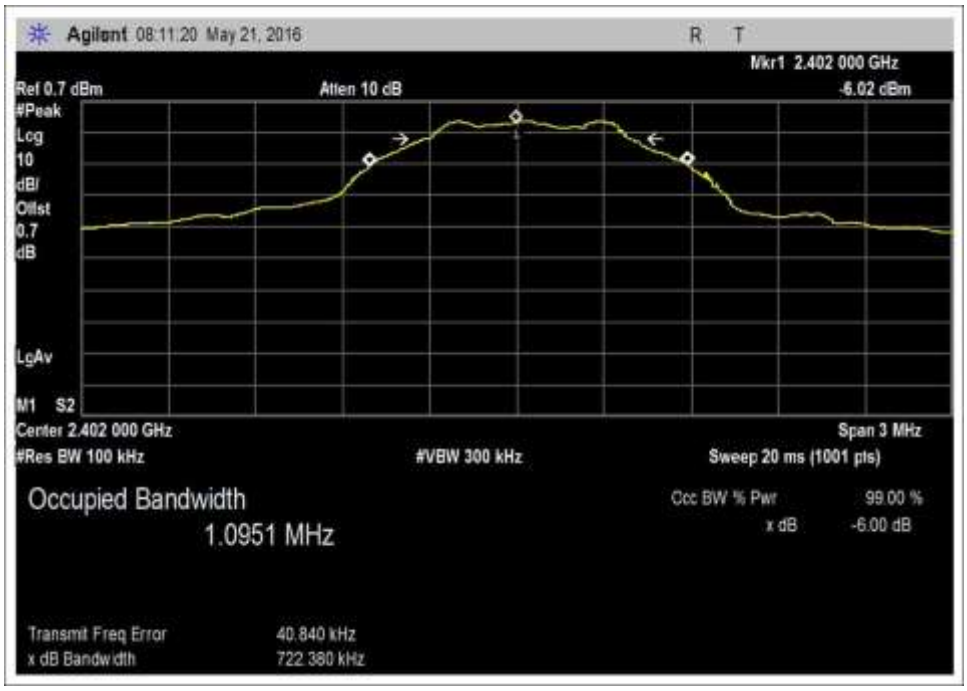
Test Setup/Conditions			
Test Location:	Bothell Lab C2	Test Engineer:	S. Pittsford
Test Method:	ANSI C63.10 (2013), KDB 558074v03r05 (April 8, 2016)	Test Date(s):	10/31/2016
Configuration:	1		
Test Setup:	Frequency Range: 2402-2480MHz Frequency tested: 2402, 2440, 2480MHz Firmware power setting: Max Power Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB Protocol /MCS/Modulation: GFSK Antenna type: Integral Inverted F antenna Antenna Gain: 0.0 dBi. Duty Cycle: Continuously Transmitting (100%) Test Mode: Continuously transmitting on low, mid, and high channels Test Setup: EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer. The EUT has a fresh battery installed. Modifications Added: None		

Environmental Conditions			
Temperature (ºC)	22	Relative Humidity (%):	39

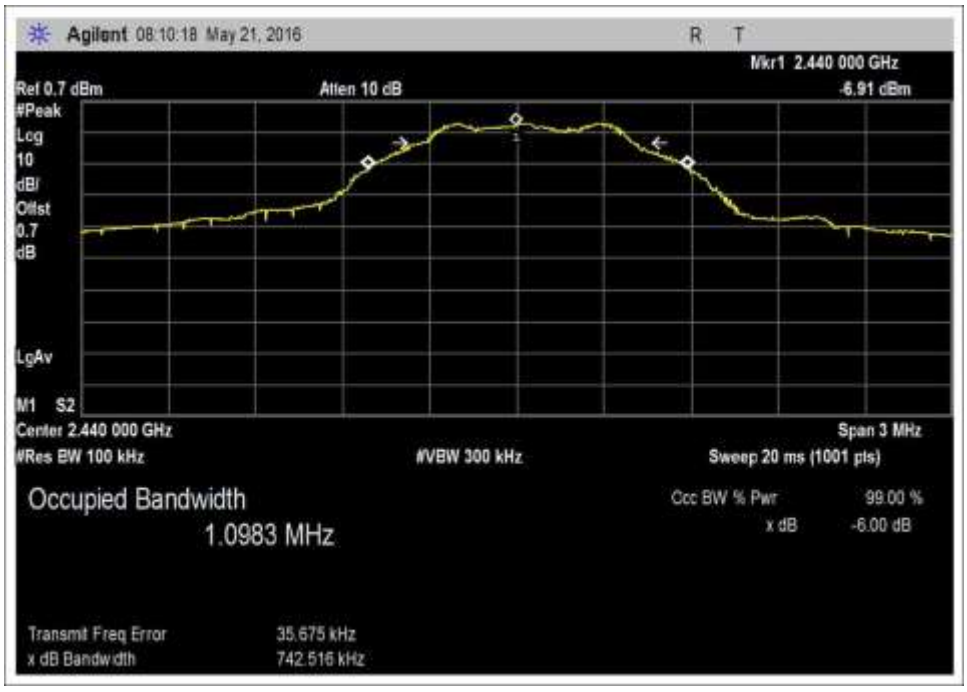
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	Agilent	E4446A	10/12/2015	10/12/2017
P06503	Cable	Astrolab	32026-29801-29801-36	4/28/2016	4/28/2018

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2402	1	GFSK	722.4	≥500	Pass
2440	1	GFSK	742.5	≥500	Pass
2480	1	GFSK	743.9	≥500	Pass

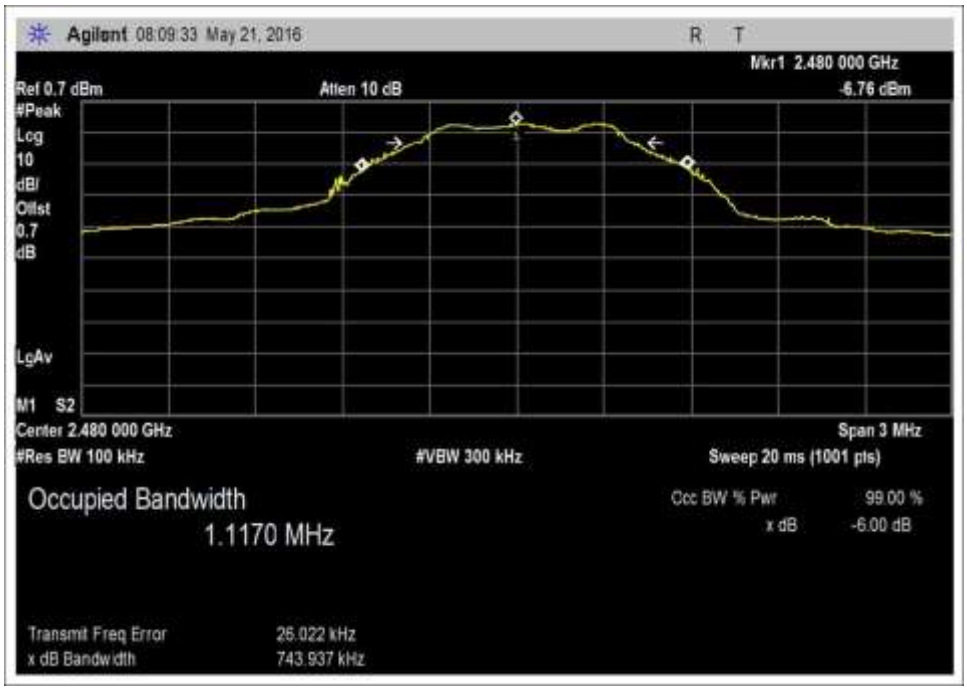
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo

15.247(b)(3) Output Power

Test Data Summary - Voltage Variations

This equipment is battery powered and manufacturer declares the equipment cannot operate while charging. Power output tests were performed using a fresh battery.

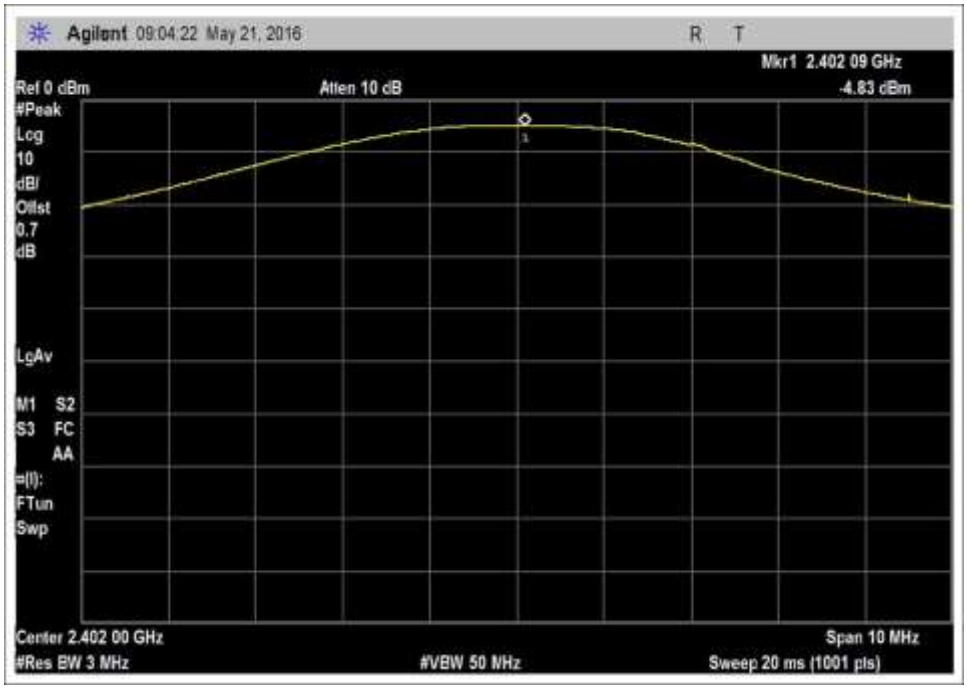
Power Output Test Data Summary - RF Conducted Measurement

Measurement Option: RBW > DTS Bandwidth

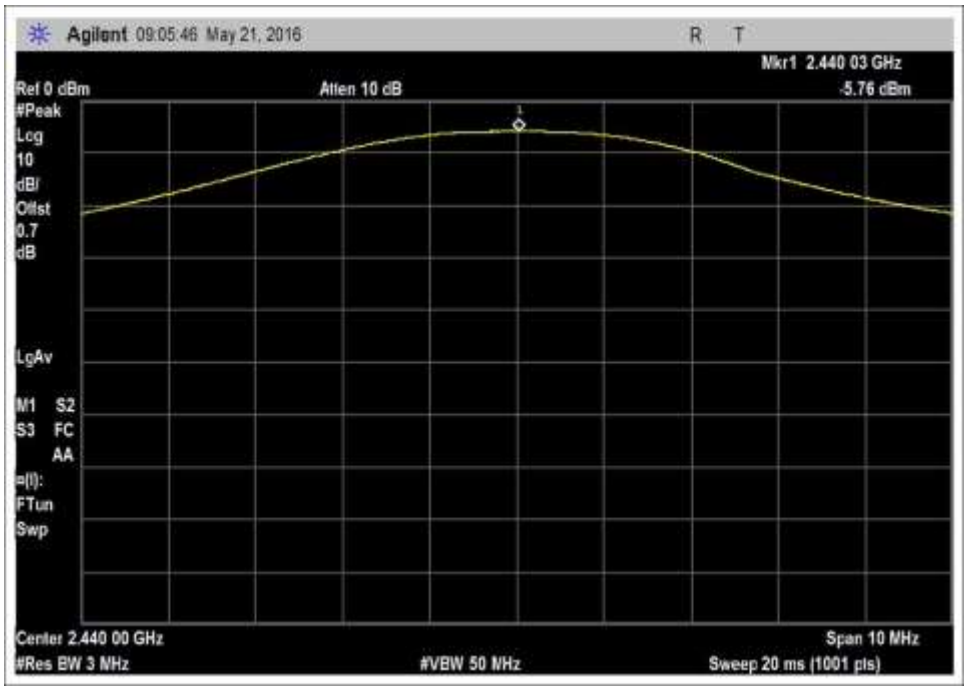
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
2402	GFSK	Inverted F antenna / 0dBi gain	-4.8	≤30	Pass
2440	GFSK	Inverted F antenna / 0dBi gain	-5.8	≤30	Pass
2480	GFSK	Inverted F antenna / 0dBi gain	-5.9	≤30	Pass

Note: The conducted measurements were recorded in dBuV and converted into dBm using a conversion factor for known system impedance of 50 ohms.

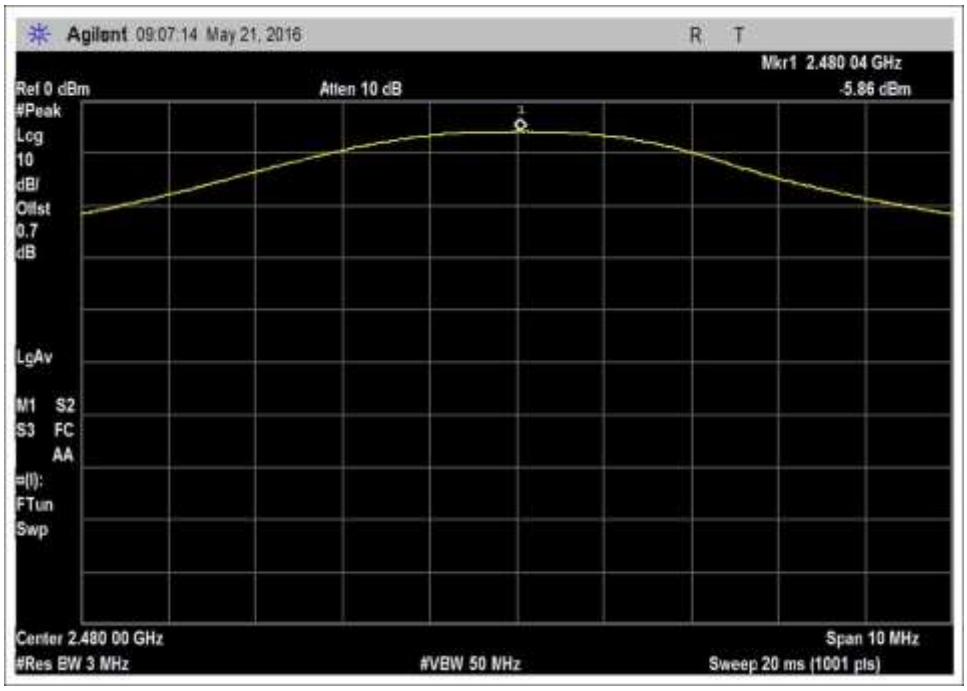
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.247(b) Power Output (2400-2483.5 MHz DTS)**		
Work Order #:	**99020**	Date:	10/31/2016
Test Type:	**Conducted Emissions**	Time:	10:56:36
Tested By:	Steven Pittsford	Sequence#:	1
Software:	EMITest 5.03.02		3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

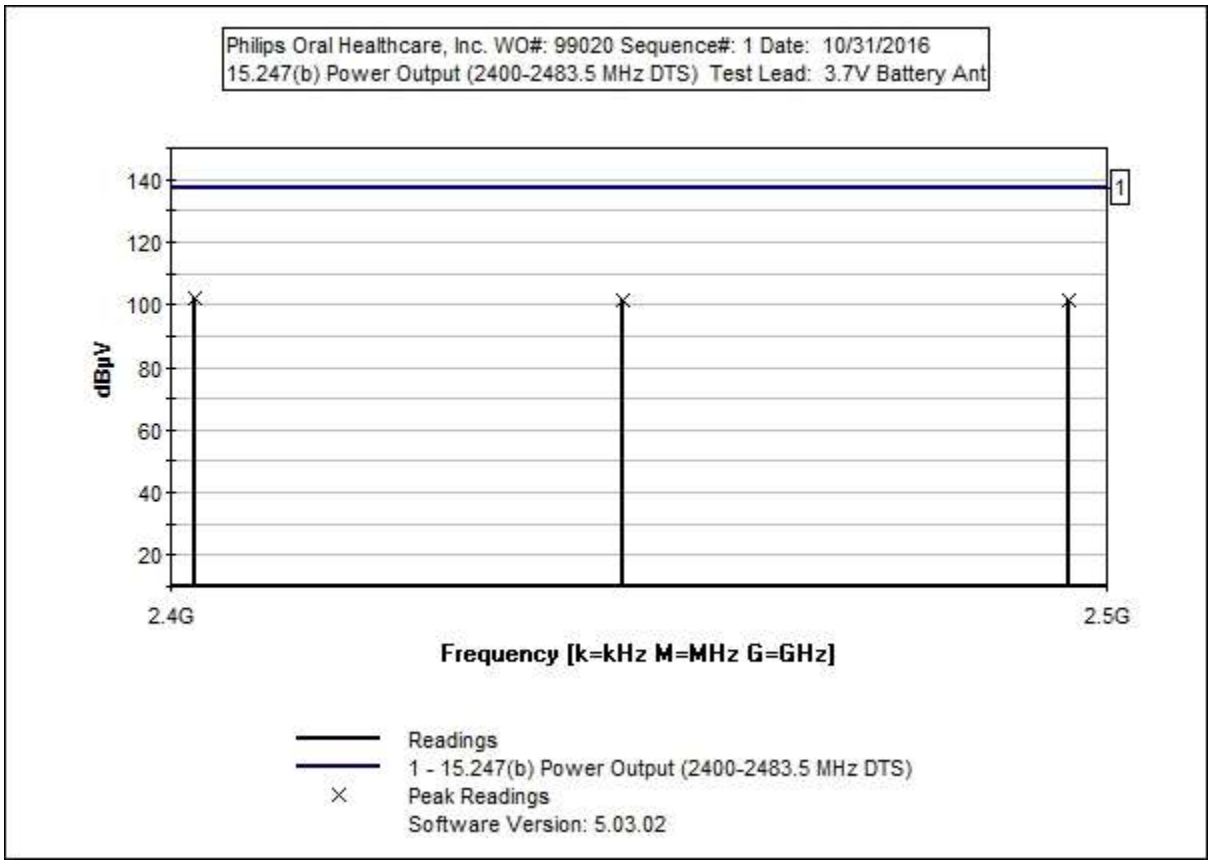
Test Conditions / Notes:

Frequency Range: 2402-2480MHz
Frequency tested: 2402, 2440, 2480MHz
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.
Duty Cycle: Continuously Transmitting (100%)
Test Mode: Continuously transmitting on low, mid, and high channels
The EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
Modifications Added: None

Temperature: 22°C
Relative Humidity: 39%

Test Method: ANSI C63.10 (2013), KDB 558074 v03r05 (April 8, 2016)



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	AN02673	Spectrum Analyzer	E4446A	10/12/2015	10/12/2017

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

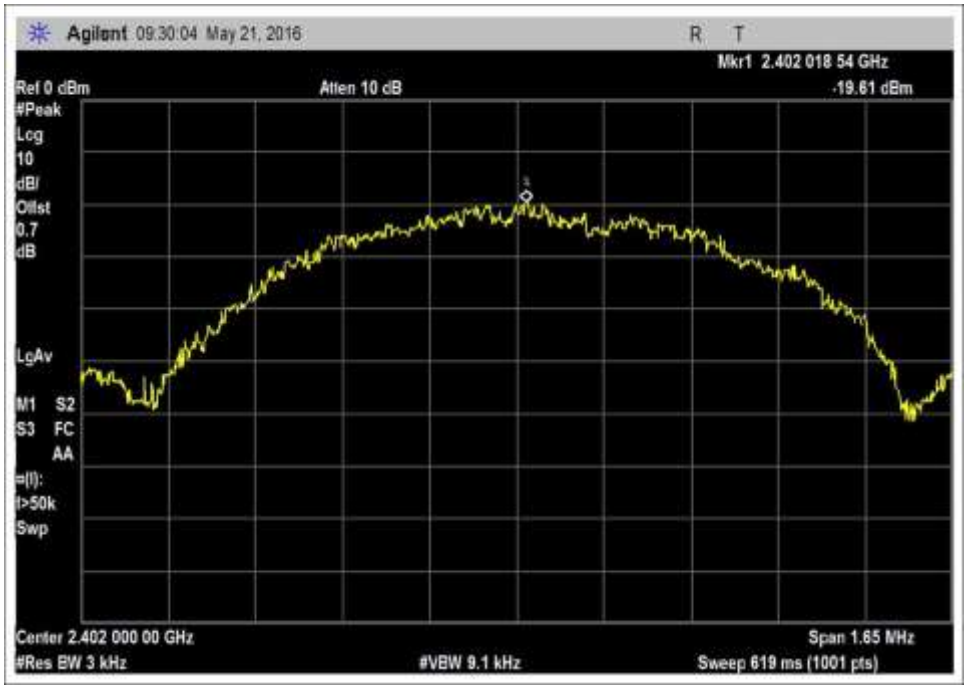
#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2402.090M	101.5	+0.7				+0.0	102.2	137.0	-34.8	Ant
2	2440.030M	100.5	+0.7				+0.0	101.2	137.0	-35.8	Ant
3	2480.040M	100.4	+0.7				+0.0	101.1	137.0	-35.9	Ant

Test Setup Photo

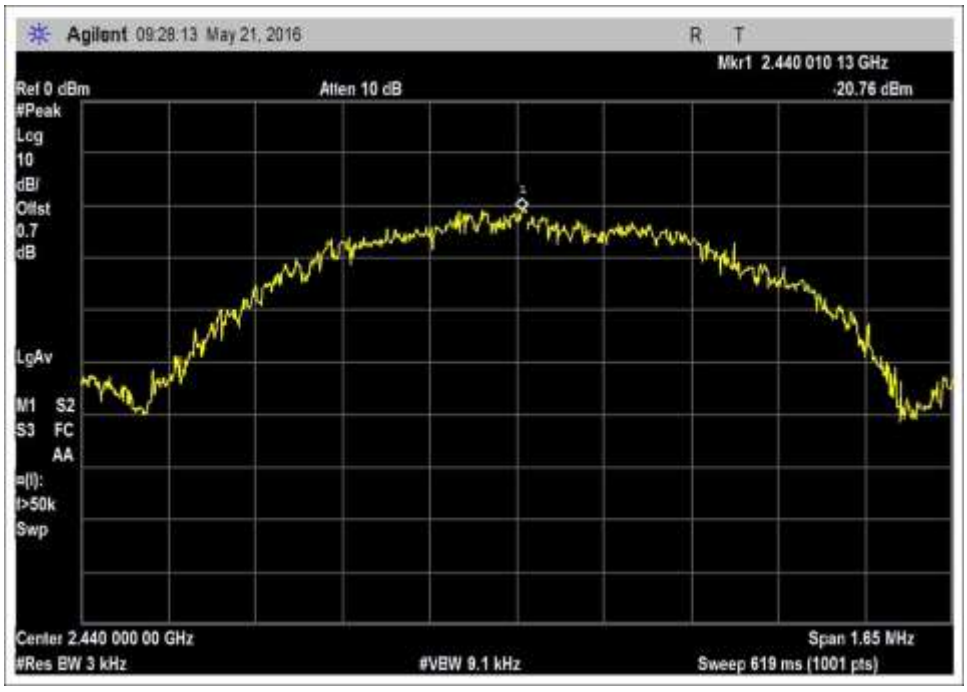
15.247(e) Power Spectral Density

PSD Test Data Summary - RF Conducted Measurement				
Measurement Method: PKPSD				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
2402	GFSK	-19.6	≤8	Pass
2440	GFSK	-20.8	≤8	Pass
2480	GFSK	-20.7	≤8	Pass

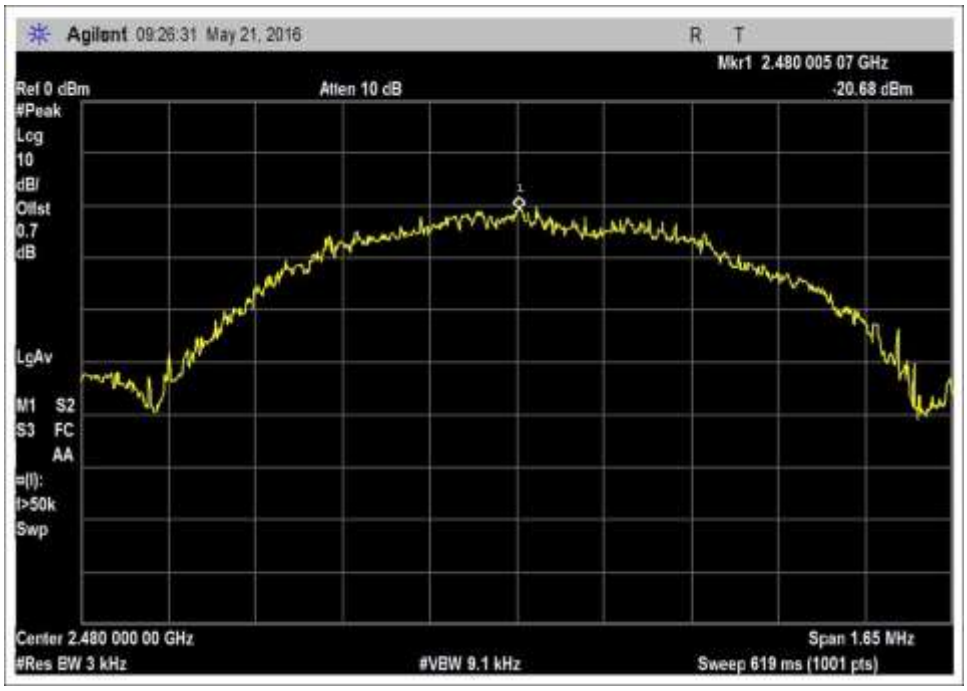
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)**		
Work Order #:	**99020**	Date:	10/31/2016
Test Type:	**Conducted Emissions**	Time:	11:19:16
Tested By:	Steven Pittsford	Sequence#:	2
Software:	EMITest 5.03.02		3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2402-2480MHz
Frequency tested: 2402, 2440, 2480MHz
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

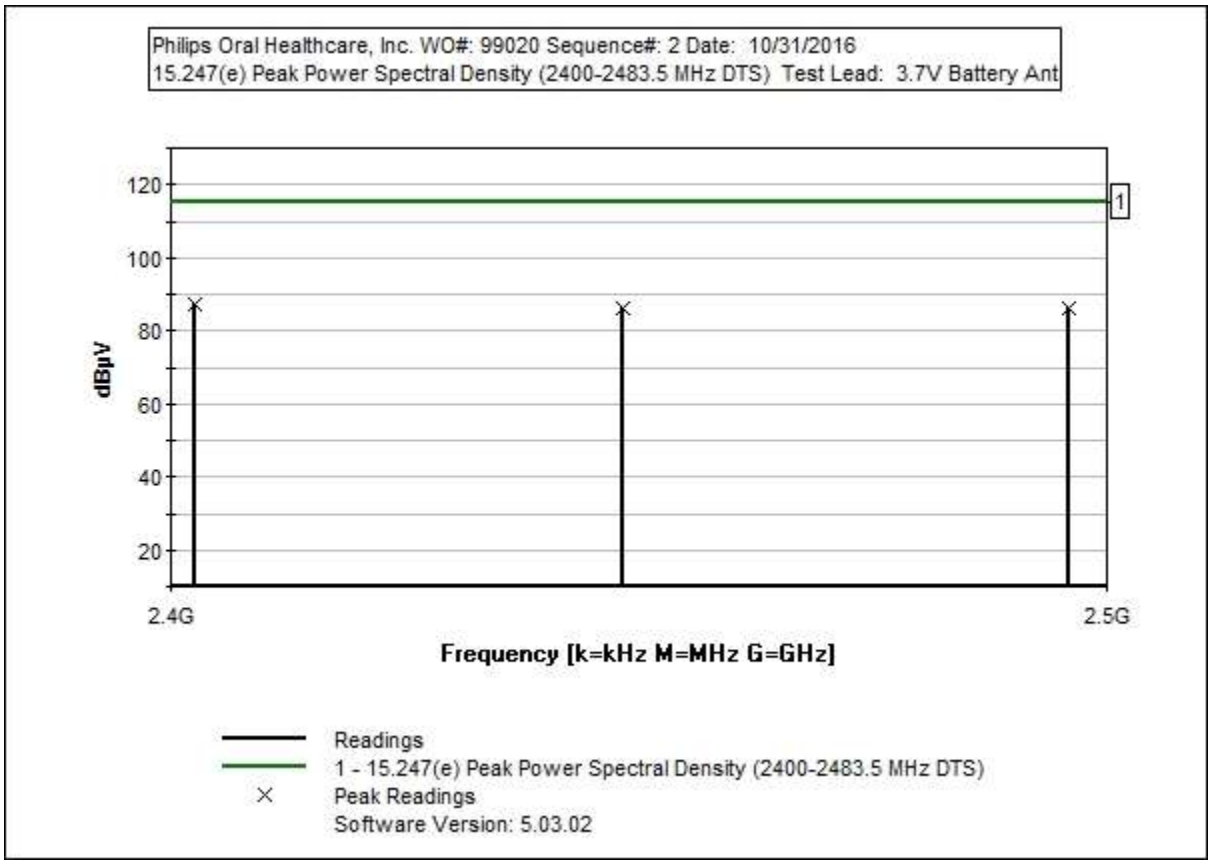
Duty Cycle: Continuously Transmitting (100%)

Test Mode: Continuously transmitting on low, mid, and high channels
The EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
The EUT has a fresh battery installed.

Modifications Added: None

Temperature: 22°C
Relative Humidity: 39%

Test Method: ANSI C63.10 (2013), KDB 558074 v03r05 (April 8, 2016)



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	AN02673	Spectrum Analyzer	E4446A	10/12/2015	10/12/2017

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2402.018M	86.7	+0.7				+0.0	87.4	115.0	-27.6	Ant
2	2480.005M	85.6	+0.7				+0.0	86.3	115.0	-28.7	Ant
3	2440.010M	85.5	+0.7				+0.0	86.2	115.0	-28.8	Ant

Test Setup Photo

15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**99020**	Date:	10/31/2016
Test Type:	**Conducted Emissions**	Time:	12:39:51
Tested By:	Steven Pittsford	Sequence#:	4
Software:	EMITest 5.03.02		3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz-25GHz
Frequency tested: 2402, 2440 2480MHz
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

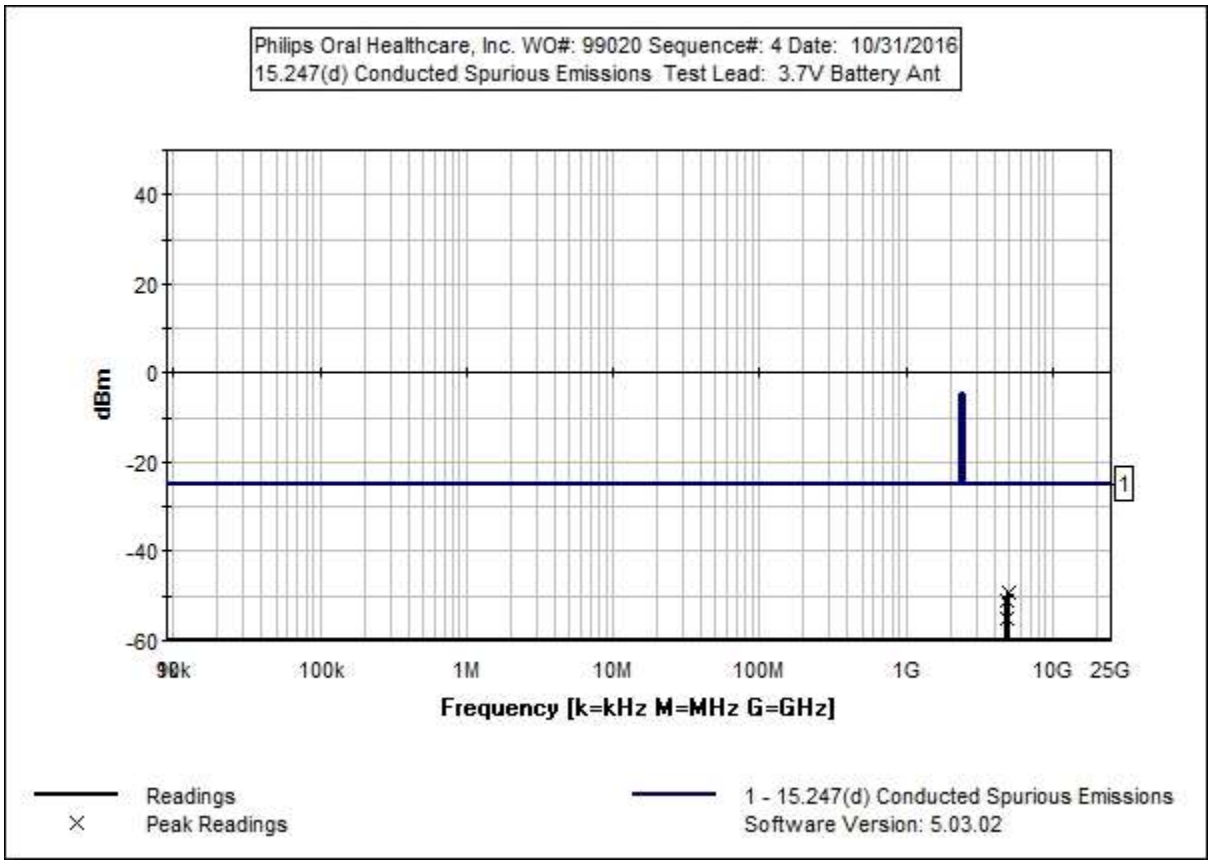
Duty Cycle: Continuously Transmitting (100%)

Test Mode: Continuously transmitting on low, mid, and high channels
The EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
The EUT has a fresh battery installed.

Modifications Added: None

Temperature: 22°C
Relative Humidity: 39%

Test Method: ANSI C63.10 (2013), KDB 558074 v03r05 (April 8, 2016)



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	AN02673	Spectrum Analyzer	E4446A	10/12/2015	10/12/2017

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	4975.000M	-50.2	+1.1				+0.0	-49.1	-24.8	-24.3	Ant
2	4800.000M	-52.2	+1.1				+0.0	-51.1	-24.8	-26.3	Ant
3	4875.000M	-56.0	+1.1				+0.0	-54.9	-24.8	-30.1	Ant

Band Edge

Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB.				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2400.0	GFSK	-42.7	<-24.8	Pass
2483.5	GFSK	-50.3	<-24.8	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98021 • 1-800-500-4EMC (4362)
Customer: **Philips Oral Healthcare, Inc.**
Specification: **15.247(d) Conducted Spurious Emissions**
Work Order #: **99020** Date: 10/31/2016
Test Type: **Conducted Emissions** Time: 12:30:50
Tested By: Steven Pittsford Sequence#: 4
Software: EMITest 5.03.02 3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

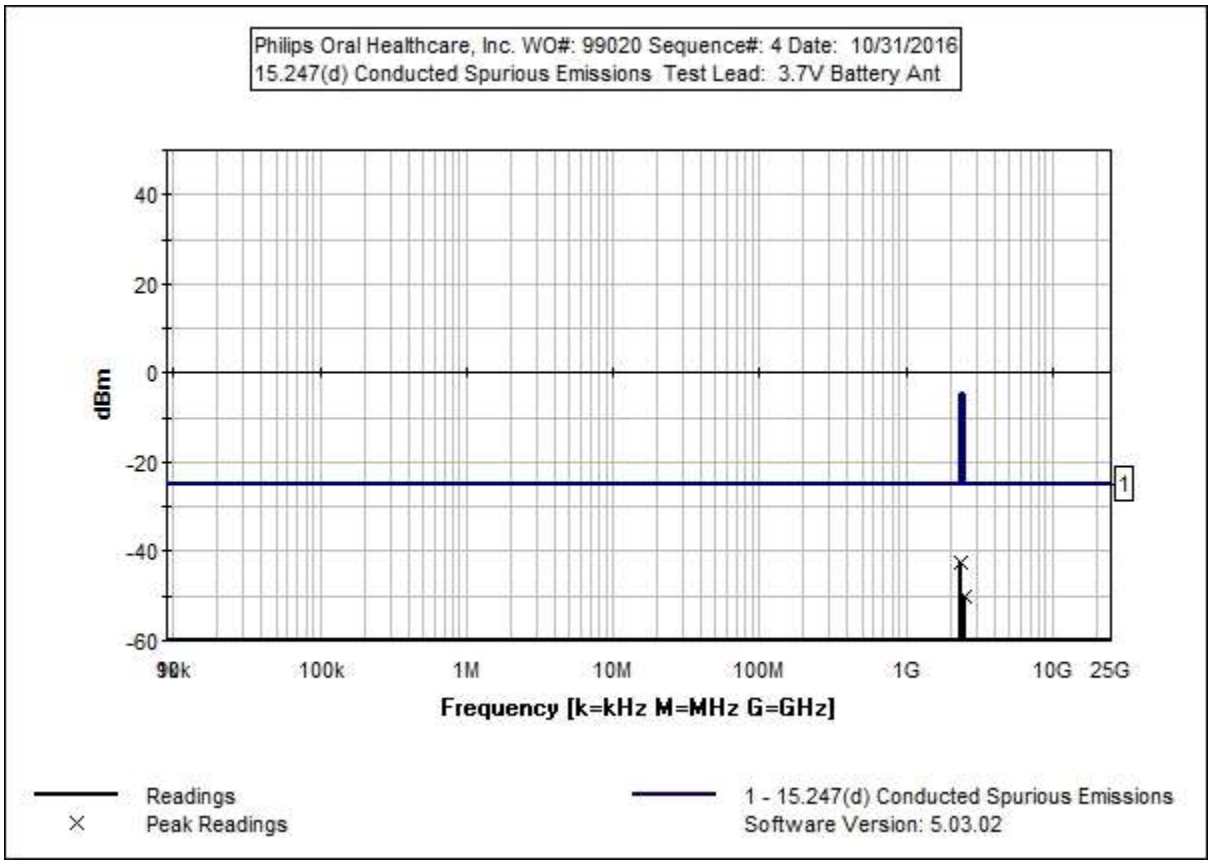
Frequency Range: 2402-2480MHz
Frequency tested: 2402, 2480MHz Band Edge
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

Duty Cycle: Continuously Transmitting (100%)

Test Mode: Continuously transmitting on low, mid, and high channels
The EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
The EUT has a fresh battery installed.

Modifications Added: None



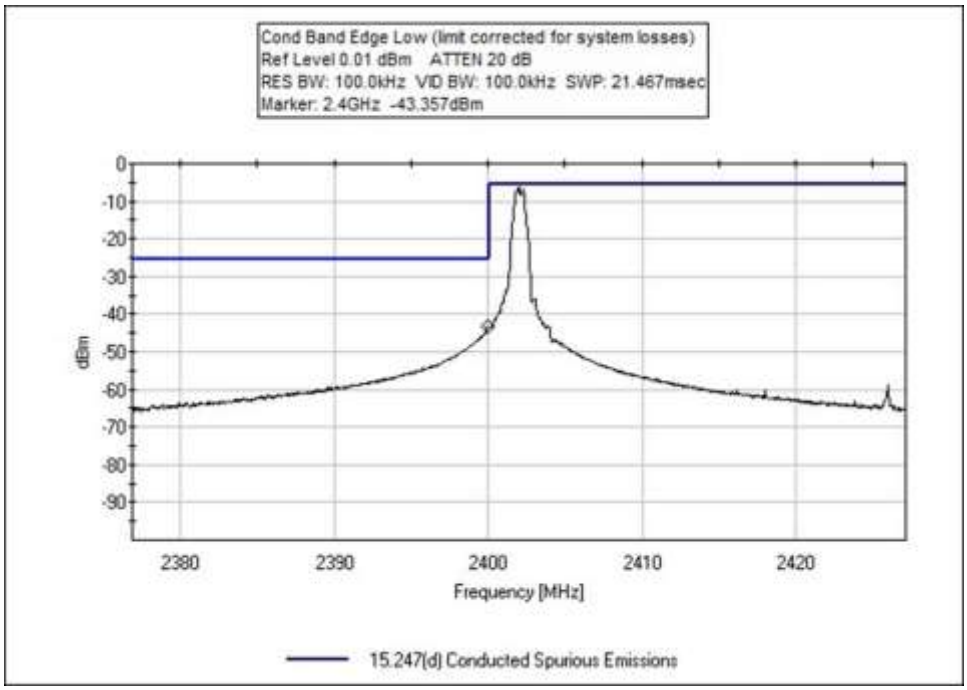
Test Equipment:

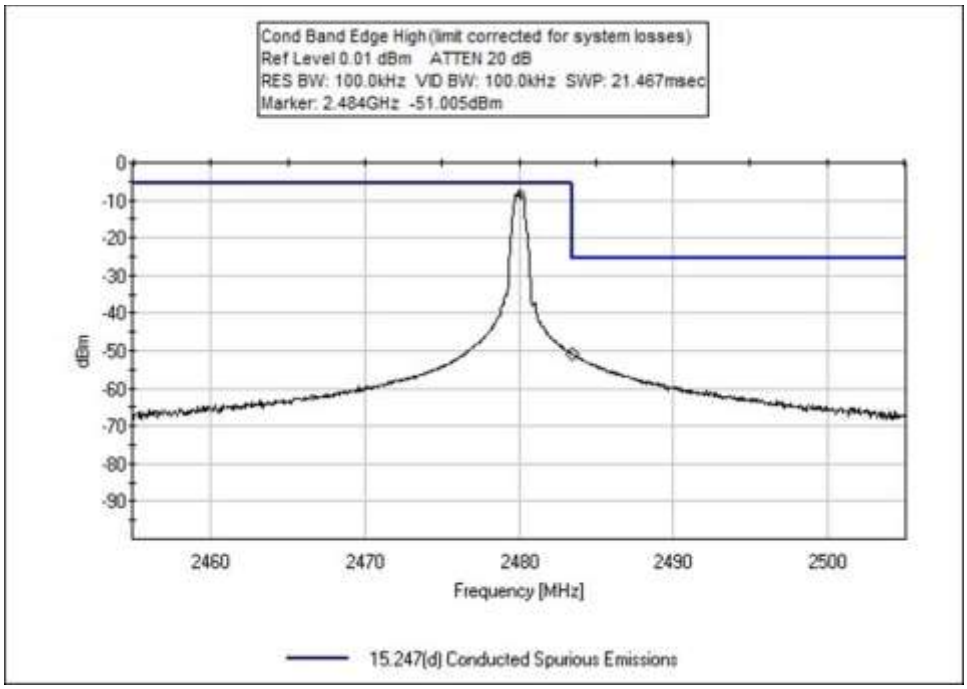
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	AN02673	Spectrum Analyzer	E4446A	10/12/2015	10/12/2017

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	2400.000M	-43.4	+0.7				+0.0	-42.7	-24.8	-17.9	Ant
2	2483.500M	-51.0	+0.7				+0.0	-50.3	-24.8	-25.5	Ant

Band Edge Plots





Test Setup Photo

15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99020**	Date:	11/8/2016
Test Type:	**Maximized Emissions**	Time:	13:52:32
Tested By:	Michael Atkinson	Sequence#:	4
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz-25GHz
Frequency tested: 2402, 2440, 2480MHz
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

Duty Cycle: Continuously Transmitting (100%)

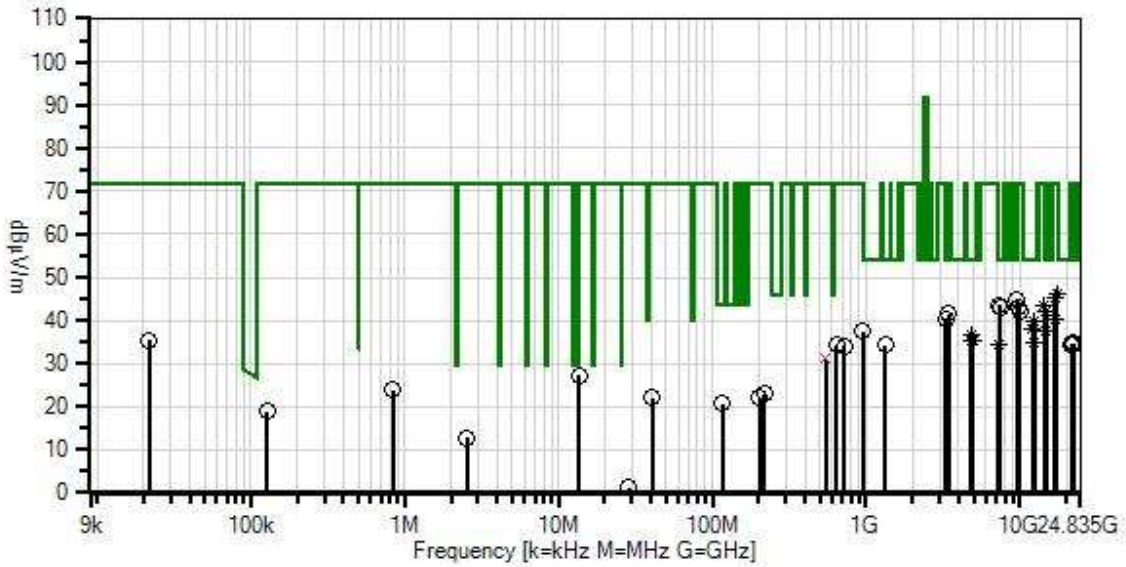
Test Mode: Continuously transmitting on low, mid, and high channels
The EUT is transmitting through integral antenna. EUT X, Y, Z axis investigated, horizontal and vertical antenna polarities (above 30MHz) + 3 orthogonal polarities (below 30MHz), only worst case reported.
The EUT has a fresh battery installed.

Modifications Added: None

Temperature: 24°C
Relative Humidity: 39%

Test Method: ANSI C63.10 (2013), KDB 558074 v03r05 (April 8, 2016)

Philips Oral Healthcare, Inc. WO#: 99020 Sequence#: 4 Date: 11/8/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters H+V



Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05963	Cable	RG-214	2/15/2016	2/15/2018
T4	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T5	AN02307	Preamp	8447D	2/15/2016	2/15/2018
T6	AN01991	Biconilog Antenna	CBL6111C	3/11/2016	3/11/2018
T7	ANP05657	Attenuator	PE7004-6	12/22/2015	12/22/2017
T8	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T9	AN03540	Preamp	83017A	4/30/2015	4/30/2017
T10	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	8/12/2015	8/12/2017
T11	ANP06935	Cable	32026-29801-29801-18	3/11/2016	3/11/2018
T12	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	1/14/2015	1/14/2017
T13	ANP06678	Cable	32026-29801-29801-144	9/19/2016	9/19/2018
T14	AN00052	Loop Antenna	6502	4/8/2016	4/8/2018

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

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10 T14	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	7320.580M	35.6	+0.0 +0.0 -34.6 +0.0	+1.2 +0.0 +36.1 +0.0	+0.0 +0.0 +0.6	+0.0 +4.7 +0.0	+0.0	43.6	54.0 Mid	-10.4	H+V
2	7439.800M	34.2	+0.0 +0.0 -34.7 +0.0	+1.3 +0.0 +36.6 +0.0	+0.0 +0.0 +0.6	+0.0 +4.8 +0.0	+0.0	42.8	54.0 High	-11.2	H+V
3	12399.800 M Ave	26.1	+0.0 +0.0 -34.7 +0.0	+1.6 +0.0 +39.5 +0.0	+0.0 +0.0 +0.9	+0.0 +6.4 +0.0	+0.0	39.8	54.0 High	-14.2	H+V
^	12399.800 M	32.9	+0.0 +0.0 -34.7 +0.0	+1.6 +0.0 +39.5 +0.0	+0.0 +0.0 +0.9	+0.0 +6.4 +0.0	+0.0	46.6	54.0 High	-7.4	H+V

5	12009.860 M Ave	25.2	+0.0 +0.0 -35.0 +0.0	+1.5 +0.0 +39.2 +0.0	+0.0 +0.0 +0.8	+0.0 +6.4 +0.0	+0.0	38.1	54.0 Low	-15.9	H+V
^	12009.860 M	30.3	+0.0 +0.0 -35.0 +0.0	+1.5 +0.0 +39.2 +0.0	+0.0 +0.0 +0.8	+0.0 +6.4 +0.0	+0.0	43.2	54.0 Low	-10.8	H+V
7	4880.000M Ave	32.4	+0.0 +0.0 -34.2 +0.0	+0.9 +0.0 +32.7 +0.0	+0.0 +0.0 +0.5	+0.0 +4.4 +0.0	+0.0	36.7	54.0 Mid	-17.3	H+V
^	4880.010M	43.6	+0.0 +0.0 -34.2 +0.0	+0.9 +0.0 +32.7 +0.0	+0.0 +0.0 +0.5	+0.0 +4.4 +0.0	+0.0	47.9	54.0 Mid	-6.1	H+V
9	4804.200M Ave	31.1	+0.0 +0.0 -34.2 +0.0	+0.9 +0.0 +32.7 +0.0	+0.0 +0.0 +0.5	+0.0 +4.3 +0.0	+0.0	35.3	54.0 Low	-18.7	H+V
^	4804.200M	43.2	+0.0 +0.0 -34.2 +0.0	+0.9 +0.0 +32.7 +0.0	+0.0 +0.0 +0.5	+0.0 +4.3 +0.0	+0.0	47.4	54.0 Low	-6.6	H+V
11	4959.878M Ave	30.9	+0.0 +0.0 -34.2 +0.0	+0.9 +0.0 +32.8 +0.0	+0.0 +0.0 +0.5	+0.0 +4.4 +0.0	+0.0	35.3	54.0 High	-18.7	H+V
^	4959.800M	43.3	+0.0 +0.0 -34.2 +0.0	+0.9 +0.0 +32.8 +0.0	+0.0 +0.0 +0.5	+0.0 +4.4 +0.0	+0.0	47.7	54.0 High	-6.3	H+V
13	12198.670 M Ave	21.5	+0.0 +0.0 -34.8 +0.0	+1.5 +0.0 +39.4 +0.0	+0.0 +0.0 +0.8	+0.0 +6.6 +0.0	+0.0	35.0	54.0 Mid	-19.0	H+V
^	12198.670 M	34.2	+0.0 +0.0 -34.8 +0.0	+1.5 +0.0 +39.4 +0.0	+0.0 +0.0 +0.8	+0.0 +6.6 +0.0	+0.0	47.7	54.0 Mid	-6.3	H+V
15	22317.250 M	43.1	+0.0 +0.0 +0.0 +8.4	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 -16.7	+0.0	34.8	54.0	-19.2	H+V
16	1324.000M	43.1	+0.0 +0.0 -36.1 +0.0	+0.4 +0.0 +24.5 +0.0	+0.0 +0.0 +0.3	+0.0 +2.1 +0.0	+0.0	34.3	54.0	-19.7	H+V
17	115.400M	29.3	+0.0 -27.7 +0.0 +0.0	+0.1 +11.2 +0.0 +0.0	+1.2 +6.0 +0.0	+0.6 +0.0 +0.0	+0.0	20.7	43.5	-22.8	H+V

18	17359.800	26.7	+0.0	+2.0	+0.0	+0.0	+0.0	46.3	71.6	-25.3	H+V
	M		+0.0	+0.0	+0.0	+8.8					
	Ave		-34.5	+42.3	+1.0	+0.0			High		
			+0.0	+0.0							
^	17359.800	29.3	+0.0	+2.0	+0.0	+0.0	+0.0	48.9	71.6	-22.7	H+V
	M		+0.0	+0.0	+0.0	+8.8					
			-34.5	+42.3	+1.0	+0.0			High		
			+0.0	+0.0							
20	16813.860	27.3	+0.0	+2.1	+0.0	+0.0	+0.0	45.4	71.6	-26.2	H+V
	M		+0.0	+0.0	+0.0	+8.6					
	Ave		-34.5	+40.9	+1.0	+0.0			Low		
			+0.0	+0.0							
^	16813.860	31.9	+0.0	+2.1	+0.0	+0.0	+0.0	50.0	71.6	-21.6	H+V
	M		+0.0	+0.0	+0.0	+8.6					
			-34.5	+40.9	+1.0	+0.0			Low		
			+0.0	+0.0							
22	9607.860M	33.9	+0.0	+1.5	+0.0	+0.0	+0.0	44.7	71.6	-26.9	H+V
			+0.0	+0.0	+0.0	+6.1			Low		
			-35.0	+37.4	+0.8	+0.0					
			+0.0	+0.0							
23	14411.860	27.4	+0.0	+1.8	+0.0	+0.0	+0.0	43.6	71.6	-28.0	H+V
	M		+0.0	+0.0	+0.0	+7.7					
	Ave		-35.0	+40.7	+1.0	+0.0			Low		
			+0.0	+0.0							
^	14411.860	32.3	+0.0	+1.8	+0.0	+0.0	+0.0	48.5	71.6	-23.1	H+V
	M		+0.0	+0.0	+0.0	+7.7					
			-35.0	+40.7	+1.0	+0.0			Low		
			+0.0	+0.0							
25	9760.580M	32.7	+0.0	+1.4	+0.0	+0.0	+0.0	43.1	71.6	-28.5	H+V
			+0.0	+0.0	+0.0	+6.1			Mid		
			-35.1	+37.3	+0.7	+0.0					
			+0.0	+0.0							
26	9919.800M	32.0	+0.0	+1.3	+0.0	+0.0	+0.0	42.2	71.6	-29.4	H+V
			+0.0	+0.0	+0.0	+6.1			High		
			-35.2	+37.2	+0.8	+0.0					
			+0.0	+0.0							
27	14879.800	27.5	+0.0	+1.8	+0.0	+0.0	+0.0	42.0	71.6	-29.6	H+V
	M		+0.0	+0.0	+0.0	+7.7					
	Ave		-34.9	+39.0	+0.9	+0.0			High		
			+0.0	+0.0							
^	14879.800	33.7	+0.0	+1.8	+0.0	+0.0	+0.0	48.2	71.6	-23.4	H+V
	M		+0.0	+0.0	+0.0	+7.7					
			-34.9	+39.0	+0.9	+0.0			High		
			+0.0	+0.0							
29	3457.000M	41.8	+0.0	+0.8	+0.0	+0.0	+0.0	41.6	71.6	-30.0	H+V
			+0.0	+0.0	+0.0	+3.5					
			-34.3	+29.4	+0.4	+0.0					
			+0.0	+0.0							

30	17078.670 M Ave	21.5	+0.0 +0.0 -34.4 +0.0	+2.1 +0.0 +41.7 +0.0	+0.0 +0.0 +1.0	+0.0 +8.6 +0.0	+0.0	40.5	71.6 Mid	-31.1	H+V
^	17078.670 M	31.3	+0.0 +0.0 -34.4 +0.0	+2.1 +0.0 +41.7 +0.0	+0.0 +0.0 +1.0	+0.0 +8.6 +0.0	+0.0	50.3	71.6 Mid	-21.3	H+V
32	3313.000M	40.8	+0.0 +0.0 -34.3 +0.0	+0.7 +0.0 +29.5 +0.0	+0.0 +0.0 +0.4	+0.0 +3.4 +0.0	+0.0	40.5	71.6	-31.1	H+V
33	14638.670 M Ave	21.9	+0.0 +0.0 -34.9 +0.0	+1.8 +0.0 +39.9 +0.0	+0.0 +0.0 +0.9	+0.0 +7.8 +0.0	+0.0	37.4	71.6 Mid	-34.2	H+V
^	14638.670 M	32.6	+0.0 +0.0 -34.9 +0.0	+1.8 +0.0 +39.9 +0.0	+0.0 +0.0 +0.9	+0.0 +7.8 +0.0	+0.0	48.1	71.6 Mid	-23.5	H+V
35	955.400M	28.1	+0.0 -27.2 +0.0 +0.0	+0.4 +25.4 +0.0 +0.0	+2.5 +6.1 +0.0	+2.1 +0.0 +0.0	+0.0	37.4	71.6	-34.2	H+V
36	21.900k	62.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +13.4	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	35.4	71.6	-36.2	Para+
37	7205.860M Ave	27.1	+0.0 +0.0 -34.5 +0.0	+1.2 +0.0 +35.7 +0.0	+0.0 +0.0 +0.6	+0.0 +4.5 +0.0	+0.0	34.6	71.6 Low	-37.0	H+V
^	7205.860M	40.8	+0.0 +0.0 -34.5 +0.0	+1.2 +0.0 +35.7 +0.0	+0.0 +0.0 +0.6	+0.0 +4.5 +0.0	+0.0	48.3	71.6 Low	-23.3	H+V
39	21619.080 M	42.2	+0.0 +0.0 +0.0 +8.2	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 -15.8	+0.0	34.6	71.6	-37.0	H+V
40	21963.670 M	42.6	+0.0 +0.0 +0.0 +8.3	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 -16.4	+0.0	34.5	71.6	-37.1	H+V
41	641.100M	31.6	+0.0 -28.1 +0.0 +0.0	+0.3 +20.6 +0.0 +0.0	+2.1 +6.0 +0.0	+1.7 +0.0 +0.0	+0.0	34.2	71.6	-37.4	H+V
42	715.800M	30.1	+0.0 -27.9 +0.0 +0.0	+0.3 +21.8 +0.0 +0.0	+2.2 +6.0 +0.0	+1.7 +0.0 +0.0	+0.0	34.2	71.6	-37.4	H+V

43	542.265M	30.6	+0.0	+0.3	+2.0	+1.5	+0.0	31.1	71.6	-40.5	H+V
	QP		-28.2	+18.9	+6.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	542.200M	33.2	+0.0	+0.3	+2.0	+1.5	+0.0	33.7	71.6	-37.9	H+V
			-28.2	+18.9	+6.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
45	13.570M	38.7	+0.0	+0.0	+0.0	+0.0	-20.0	27.4	71.6	-44.2	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+8.7							
46	839.500k	34.1	+0.0	+0.0	+0.0	+0.0	-20.0	23.9	71.6	-47.7	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.8							
47	217.200M	31.5	+0.0	+0.2	+1.4	+0.9	+0.0	23.0	71.6	-48.6	H+V
			-27.2	+10.2	+6.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
48	203.600M	31.7	+0.0	+0.2	+1.4	+0.8	+0.0	22.1	71.6	-49.5	H+V
			-27.2	+9.2	+6.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
49	40.700M	29.1	+0.0	+0.1	+0.5	+0.3	+0.0	22.1	71.6	-49.5	H+V
			-27.9	+14.0	+6.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
50	127.300k	49.0	+0.0	+0.0	+0.0	+0.0	-40.0	18.8	71.6	-52.8	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.8							
51	2.550M	23.2	+0.0	+0.0	+0.0	+0.0	-20.0	12.7	71.6	-58.9	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.5							
52	28.600M	15.1	+0.0	+0.0	+0.0	+0.0	-20.0	1.2	71.6	-70.4	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+6.1							

Band Edge

Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0 (PEAK)	GFSK	Inverted F antenna / 0dBi gain	55.0	<74	Pass
2400.0 (PEAK)	GFSK	Inverted F antenna / 0dBi gain	72.7	<91.6	Pass
2483.5 (PEAK)	GFSK	Inverted F antenna / 0dBi gain	60.+	<74	Pass
2390.0 (AVG)	GFSK	Inverted F antenna / 0dBi gain	24.9	<54	Pass
2400.0 (AVG)	GFSK	Inverted F antenna / 0dBi gain	35.6	<71.6	Pass
2483.5 (AVG)	GFSK	Inverted F antenna / 0dBi gain	25.7	<54	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC
Customer: **Philips Oral Healthcare, Inc.**
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions (AVG)**
Work Order #: **99020** Date: 11/8/2016
Test Type: **Maximized Emissions** Time: 08:12:58
Tested By: Michael Atkinson Sequence#: 5
Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

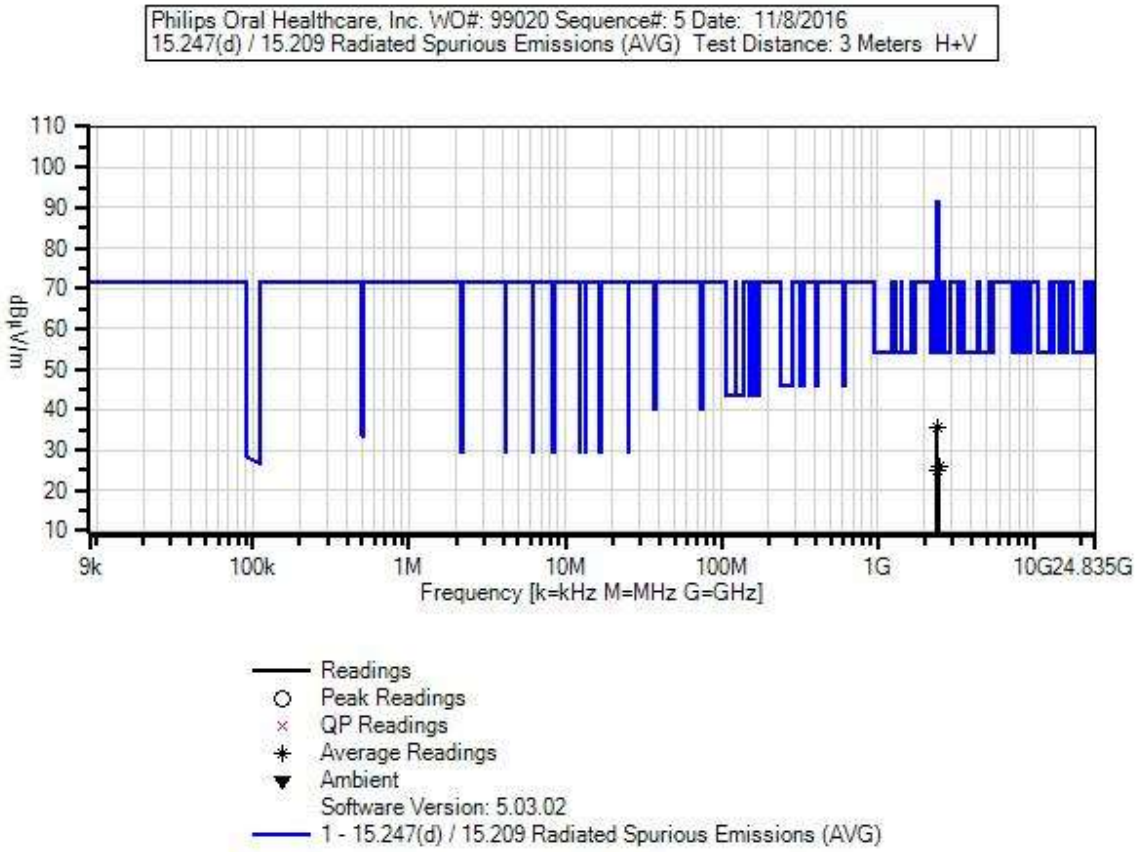
Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2402-2480MHz
Frequency tested: 2402, 2480MHz Band Edge
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

Duty Cycle: Continuously Transmitting (100%)
Test Mode: Continuously transmitting on low, mid, and high channels
The EUT is transmitting through integral antenna. EUT X, Y, Z axis investigated, horizontal and vertical antenna polarities investigated, only worst case reported.
The EUT has a fresh battery installed.
Modifications Added: None


Philips Oral Healthcare, Inc. WO#: 99020 Sequence#: 5 Date: 11/8/2016
15.247(d) / 15.209 Radiated Spurious Emissions (AVG) Test Distance: 3 Meters H+V
110
100
90
80
70
60
50
40
30
20
10
dBµV/m
9k
100k
1M
10M
100M
1G
10G24.835G
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.02
1 - 15.247(d) / 15.209 Radiated Spurious Emissions (AVG)

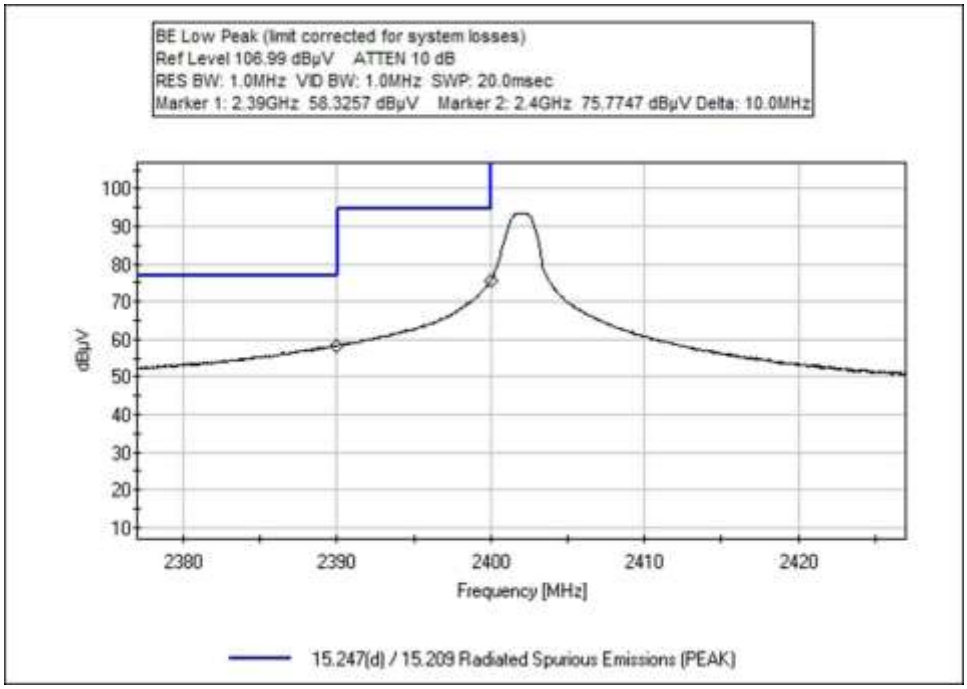
Test Equipment:

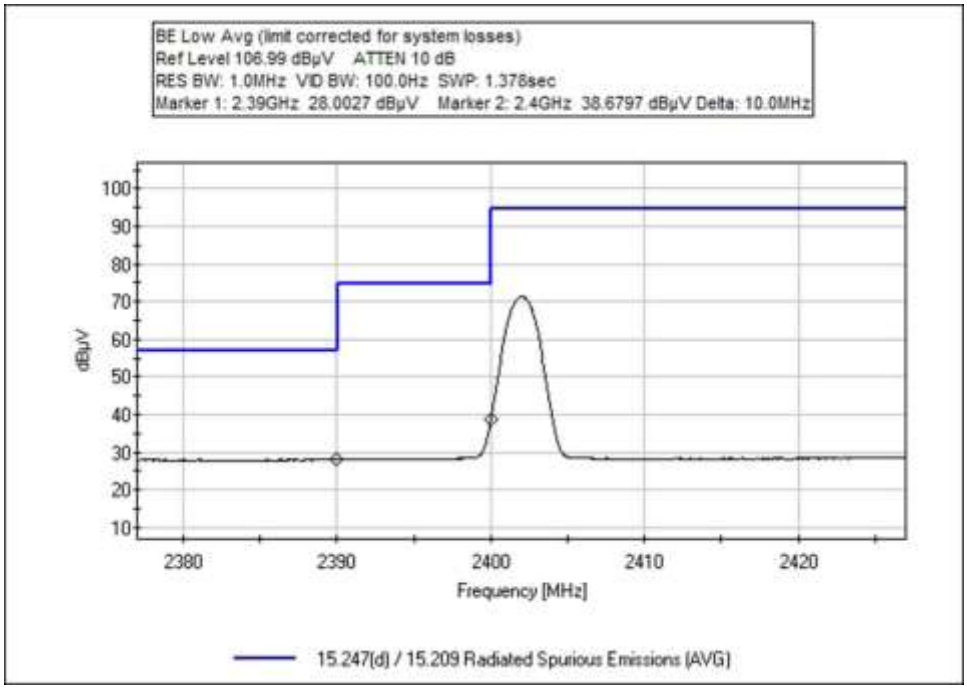
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	AN03540	Preamp	83017A	4/30/2015	4/30/2017
T5	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	8/12/2015	8/12/2017
T6	ANP06935	Cable	32026-29801-29801-18	3/11/2016	3/11/2018

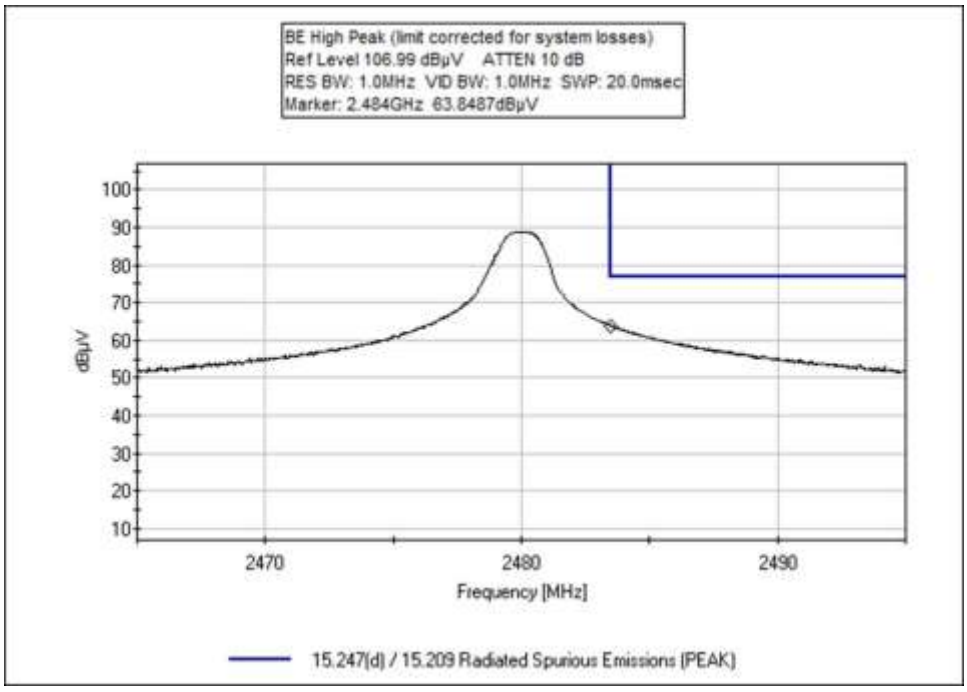
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

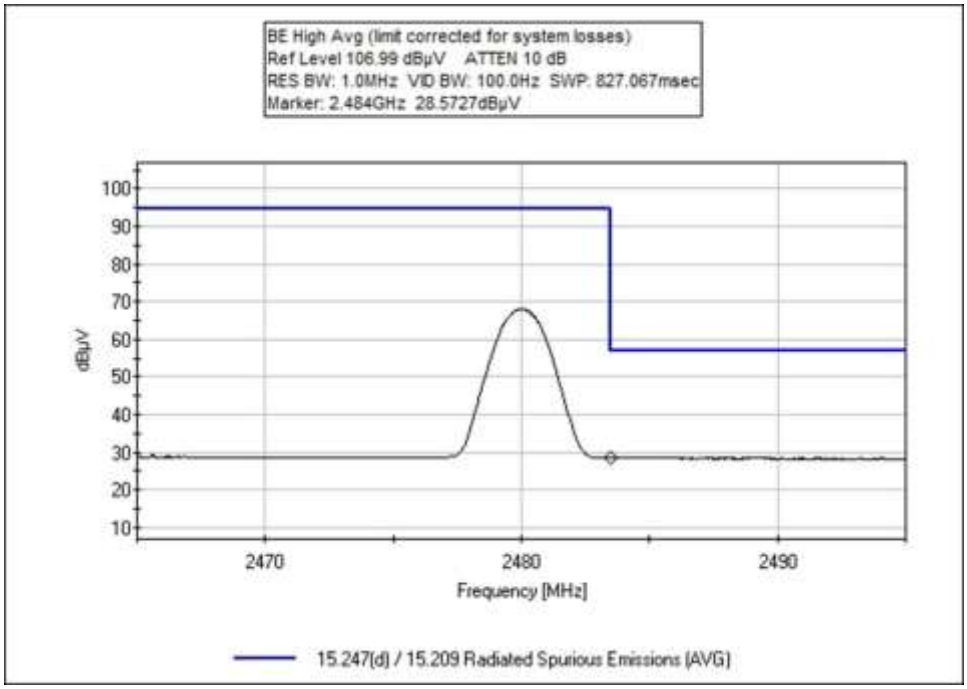
#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2483.500M Ave	28.6	+0.0 +27.7	+0.6 +0.4	+2.9	-34.5	+0.0	25.7	54.0	-28.3	H+V
^	2483.500M	63.8	+0.0 +27.7	+0.6 +0.4	+2.9	-34.5	+0.0	60.9	74.0	-13.1	H+V
3	2390.000M Ave	28.0	+0.0 +27.7	+0.6 +0.4	+2.8	-34.6	+0.0	24.9	54.0	-29.1	H+V
^	2390.000M	58.3	+0.0 +27.7	+0.6 +0.4	+2.8	-34.6	+0.0	55.2	74.0	-18.8	H+V
5	2400.000M Ave	38.7	+0.0 +27.7	+0.6 +0.4	+2.8	-34.6	+0.0	35.6	71.6	-36.0	H+V
^	2400.000M	75.8	+0.0 +27.7	+0.6 +0.4	+2.8	-34.6	+0.0	72.7	91.6	-18.9	H+V

Band Edge Plots



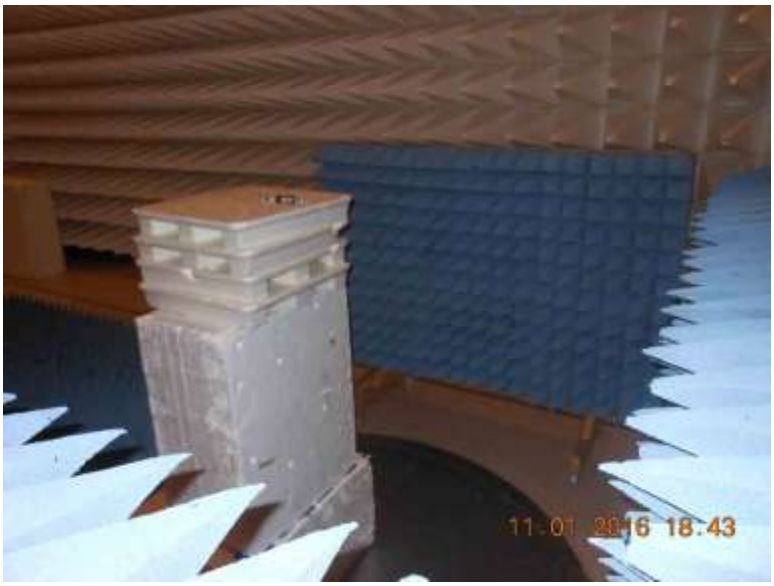



BE High Peak (limit corrected for system losses)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 63.8487dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2470
2480
2490
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions (PEAK)


BE High Avg (limit corrected for system losses)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 827.067msec
Marker: 2.484GHz 28.5727dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2470
2480
2490
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions (AVG)

Test Setup Photos

< 1GHz



> 1GHz

X Axis

Y Axis

Z Axis

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**99020**	Date:	10/27/2016
Test Type:	**Conducted Emissions**	Time:	15:36:54
Tested By:	Michael Atkinson	Sequence#:	1
Software:	EMITest 5.03.02		115V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Frequency Range: 0.15-30MHz
Frequency tested: 2402-2480MHz
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

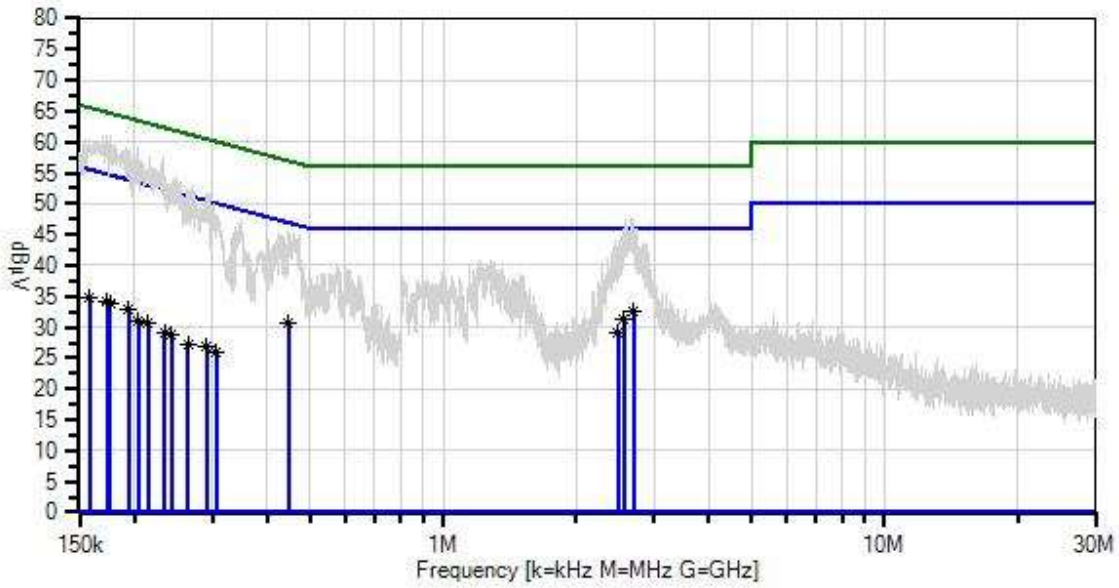
Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

Test Mode: EUT is on charging cradle in normal discovery mode.
Test Setup: EUT is charging on charging cradle, EUT is transmitting through internal antenna.
Modifications Added: None

Temperature: 24°C
Relative Humidity: 40%

Test Method: ANSI C63.10 (2013)

Philips Oral Healthcare, Inc. WO#: 99020 Sequence#: 1 Date: 10/27/2016
15.207 AC Mains - Average Test Lead: 115V 60Hz Line



Sweep Data
× QP Readings
Software Version: 5.03.02
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
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	2/18/2016	2/18/2018
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	ANP06219	Attenuator	768-10	4/12/2016	4/12/2018
T5	AN01492	50uH LISN-Line	3816/2NM	8/5/2015	8/5/2017
	AN01492	50uH LISN-Neutral	3816/2NM	8/5/2015	8/5/2017

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	2.696M	23.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	32.7	46.0	-13.3	Line
Ave											
^	2.696M	37.8	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.5	46.0	+1.5	Line
3	2.564M	21.6	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	31.3	46.0	-14.7	Line
Ave											
^	2.564M	38.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.9	46.0	+1.9	Line
5	446.200k	20.7	+0.2 +0.6	+0.0	+0.0	+9.1	+0.0	30.6	46.9	-16.3	Line
Ave											
^	446.200k	36.2	+0.2 +0.6	+0.0	+0.0	+9.1	+0.0	46.1	46.9	-0.8	Line
7	2.495M	19.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	29.1	46.0	-16.9	Line
Ave											
^	2.495M	35.3	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	45.0	46.0	-1.0	Line
9	173.684k	23.1	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	34.2	54.8	-20.6	Line
Ave											
10	158.020k	23.4	+0.6 +1.8	+0.0	+0.0	+9.1	+0.0	34.9	55.6	-20.7	Line
Ave											
^	158.020k	49.4	+0.6 +1.8	+0.0	+0.0	+9.1	+0.0	60.9	55.6	+5.3	Line
12	175.990k	23.0	+0.3 +1.6	+0.0	+0.0	+9.1	+0.0	34.0	54.7	-20.7	Line
Ave											
^	175.989k	50.2	+0.3 +1.6	+0.0	+0.0	+9.1	+0.0	61.2	54.7	+6.5	Line
^	173.684k	50.0	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	61.1	54.8	+6.3	Line
15	194.100k	22.4	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	33.0	53.9	-20.9	Line
Ave											
^	194.100k	47.7	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	58.3	53.9	+4.4	Line
17	214.960k	20.3	+0.2 +1.2	+0.0	+0.0	+9.1	+0.0	30.8	53.0	-22.2	Line
Ave											
^	214.960k	46.0	+0.2 +1.2	+0.0	+0.0	+9.1	+0.0	56.5	53.0	+3.5	Line

19	203.761k	20.4	+0.2	+0.0	+0.0	+9.1	+0.0	31.0	53.5	-22.5	Line
	Ave		+1.3								
^	203.761k	48.7	+0.2	+0.0	+0.0	+9.1	+0.0	59.3	53.5	+5.8	Line
			+1.3								
21	234.330k	18.6	+0.2	+0.0	+0.0	+9.1	+0.0	29.0	52.3	-23.3	Line
	Ave		+1.1								
^	234.330k	47.5	+0.2	+0.0	+0.0	+9.1	+0.0	57.9	52.3	+5.6	Line
			+1.1								
23	243.120k	18.3	+0.2	+0.0	+0.0	+9.1	+0.0	28.6	52.0	-23.4	Line
	Ave		+1.0								
^	243.120k	45.1	+0.2	+0.0	+0.0	+9.1	+0.0	55.4	52.0	+3.4	Line
			+1.0								
25	291.550k	16.7	+0.1	+0.0	+0.0	+9.1	+0.0	26.7	50.5	-23.8	Line
	Ave		+0.8								
^	291.550k	41.5	+0.1	+0.0	+0.0	+9.1	+0.0	51.5	50.5	+1.0	Line
			+0.8								
27	264.460k	17.1	+0.2	+0.0	+0.0	+9.1	+0.0	27.3	51.3	-24.0	Line
	Ave		+0.9								
^	264.460k	42.7	+0.2	+0.0	+0.0	+9.1	+0.0	52.9	51.3	+1.6	Line
			+0.9								
29	306.330k	16.0	+0.1	+0.0	+0.0	+9.1	+0.0	26.0	50.1	-24.1	Line
	Ave		+0.8								
^	306.330k	39.9	+0.1	+0.0	+0.0	+9.1	+0.0	49.9	50.1	-0.2	Line
			+0.8								

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**99020**	Date:	10/27/2016
Test Type:	**Conducted Emissions**	Time:	15:46:04
Tested By:	Michael Atkinson	Sequence#:	2
Software:	EMITest 5.03.02		115V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Frequency Range: 0.15-30MHz
Frequency tested: 2402-2480MHz
Firmware power setting: Max Power
Firmware UUID:00002A26-0000-1000-8000-00805F9B64FB
Protocol /MCS/Modulation: GFSK

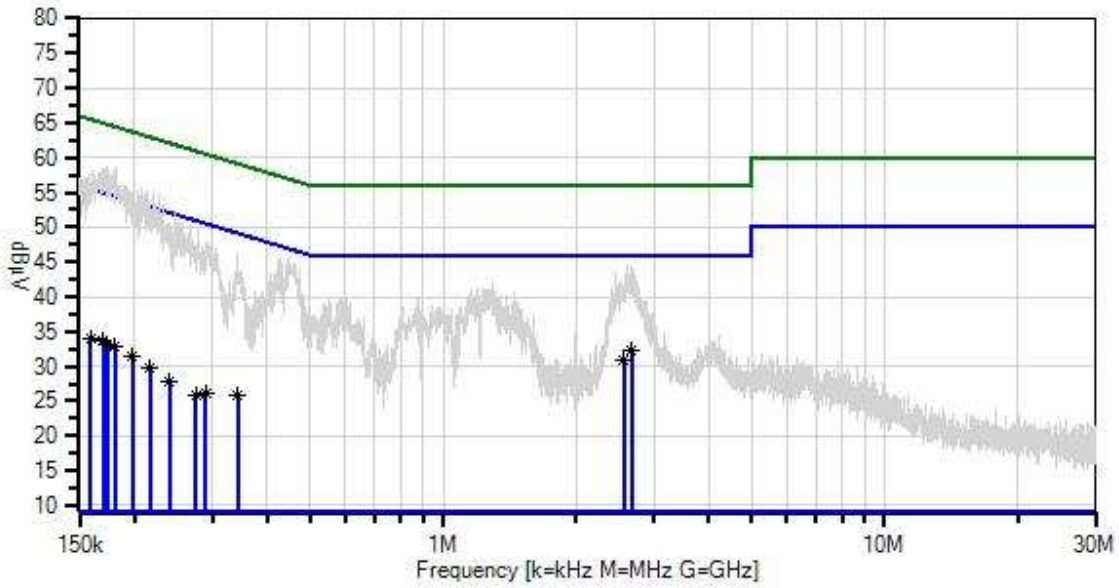
Antenna type: Integral Inverted F antenna
Antenna Gain: 0.0 dBi.

Test Mode: EUT is on charging cradle in normal discovery mode.
Test Setup: EUT is charging on charging cradle, EUT is transmitting through internal antenna.
Modifications Added: None

Temperature: 24°C
Relative Humidity: 40%

Test Method: ANSI C63.10 (2013)

Philips Oral Healthcare, Inc. WO#: 99020 Sequence#: 2 Date: 10/27/2016
15.207 AC Mains - Average Test Lead: 115V 60Hz Return



Sweep Data
× QP Readings
Software Version: 5.03.02
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
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	2/18/2016	2/18/2018
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	ANP06219	Attenuator	768-10	4/12/2016	4/12/2018
	AN01492	50uH LISN-Line	3816/2NM	8/5/2015	8/5/2017
T5	AN01492	50uH LISN-Neutral	3816/2NM	8/5/2015	8/5/2017

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	2.669M	22.5	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	32.2	46.0	-13.8	Retur
Ave											
^	2.669M	34.8	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	44.5	46.0	-1.5	Retur
3	2.567M	21.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	30.9	46.0	-15.1	Retur
Ave											
^	2.567M	35.1	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	44.8	46.0	-1.2	Retur
5	169.492k	22.5	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	33.6	55.0	-21.4	Retur
Ave											
6	181.020k	22.1	+0.3 +1.5	+0.0	+0.0	+9.1	+0.0	33.0	54.4	-21.4	Retur
Ave											
^	181.020k	47.5	+0.3 +1.5	+0.0	+0.0	+9.1	+0.0	58.4	54.4	+4.0	Retur
8	173.580k	22.2	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	33.3	54.8	-21.5	Retur
Ave											
^	173.579k	47.7	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	58.8	54.8	+4.0	Retur
^	169.492k	47.3	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	58.4	55.0	+3.4	Retur
11	158.700k	22.3	+0.6 +1.8	+0.0	+0.0	+9.1	+0.0	33.8	55.5	-21.7	Retur
Ave											
^	158.700k	46.8	+0.6 +1.8	+0.0	+0.0	+9.1	+0.0	58.3	55.5	+2.8	Retur
13	198.020k	20.9	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	31.5	53.7	-22.2	Retur
Ave											
^	198.020k	46.2	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	56.8	53.7	+3.1	Retur
15	216.410k	19.4	+0.2 +1.2	+0.0	+0.0	+9.1	+0.0	29.9	53.0	-23.1	Retur
Ave											
^	216.410k	44.3	+0.2 +1.2	+0.0	+0.0	+9.1	+0.0	54.8	53.0	+1.8	Retur
17	342.220k	16.1	+0.1 +0.7	+0.0	+0.0	+9.1	+0.0	26.0	49.1	-23.1	Retur
Ave											
^	342.220k	35.4	+0.1 +0.7	+0.0	+0.0	+9.1	+0.0	45.3	49.1	-3.8	Retur

19	240.440k	17.5	+0.2	+0.0	+0.0	+9.1	+0.0	27.8	52.1	-24.3	Retur
	Ave		+1.0								
^	240.440k	44.2	+0.2	+0.0	+0.0	+9.1	+0.0	54.5	52.1	+2.4	Retur
			+1.0								
21	289.810k	16.1	+0.1	+0.0	+0.0	+9.1	+0.0	26.1	50.5	-24.4	Retur
	Ave		+0.8								
^	289.810k	39.3	+0.1	+0.0	+0.0	+9.1	+0.0	49.3	50.5	-1.2	Retur
			+0.8								
23	275.010k	15.7	+0.1	+0.0	+0.0	+9.1	+0.0	25.8	51.0	-25.2	Retur
	Ave		+0.9								
^	275.010k	40.5	+0.1	+0.0	+0.0	+9.1	+0.0	50.6	51.0	-0.4	Retur
			+0.9								

Test Setup Photo

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 subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than 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.