Philips Oral Healthcare, Inc.

EMC TEST REPORT FOR

Children's Rechargeable Power Toothbrush with BLE
Model: HX6340

Tested To The Following Standards:

FCC Part 15 Subpart C Section: 15.247

Report No.: 96690-12

Date of issue: April 20, 2015

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: US13-2100550088

REPORT PREPARED BY:

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

Project Number: 96690

DATE OF EQUIPMENT RECEIPT: March 24, 2015
DATE(S) OF TESTING: March 24-26, 2015

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	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure	Description	Modifications*	Results
15.247(a)(2)	Occupied Bandwidth	NA	Pass
15.247(b)(3)	Maximum Output Power	NA	Pass
15.247(d)	Conducted Spurious Emissions and Band Edge	NA	Pass
15.247(d)	Radiated Spurious Emissions and Band Edge	NA	Pass
15.247(e)	Power Spectral Density	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
The manufacturer declares the EUT cannot transmit while on the charger.
The actual testing date is stated in each test section; the date/time on the screen captures is not set and is incorrect.

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Children's Rechargeable Power Toothbrush with BLE
Manuf: Philips Oral Healthcare, Inc.
Model: HX6340
Serial: NA

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Inductive Charger
Manuf: Philips Oral Healthcare, Inc.
Model: HX6100
Serial: NA

FCC PART 15 SUBPART C

15.247(a)(2) Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425.402.1717

Customer: **Philips Oral Healthcare, Inc.**
Specification: **15.247(a)(2) OBW**
Work Order #: **96690** Date: 3/24/2015
Test Type: **Maximized Emissions** Time: 14:05:58
Equipment: **Children's Rechargeable Power Toothbrush with BLE** Sequence#: 1
Manufacturer: Philips Oral Healthcare, Inc. Tested By: Steven Pittsford
Model: HX6340
S/N:

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T2	AN02871	Spectrum Analyzer	E4440A	2/9/2015	2/9/2017

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Children's Rechargeable Power Toothbrush with BLE*	Philips Oral Healthcare, Inc.	HX6340	

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

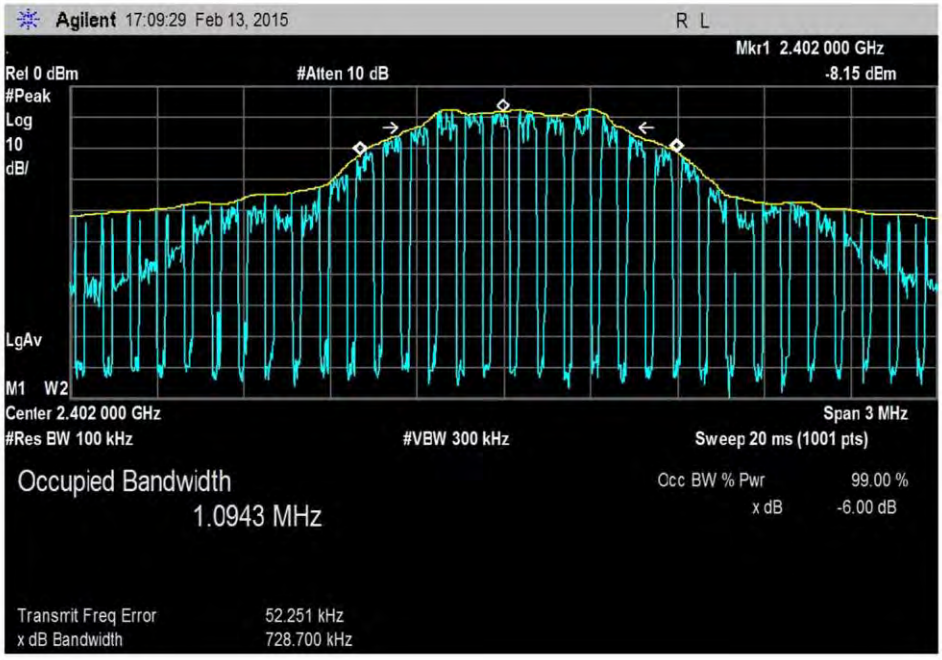
Temperature: 24°C
Humidity: 33%
Pressure: 102.6kPa
Frequency: 9kHz-26GHz

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2009)

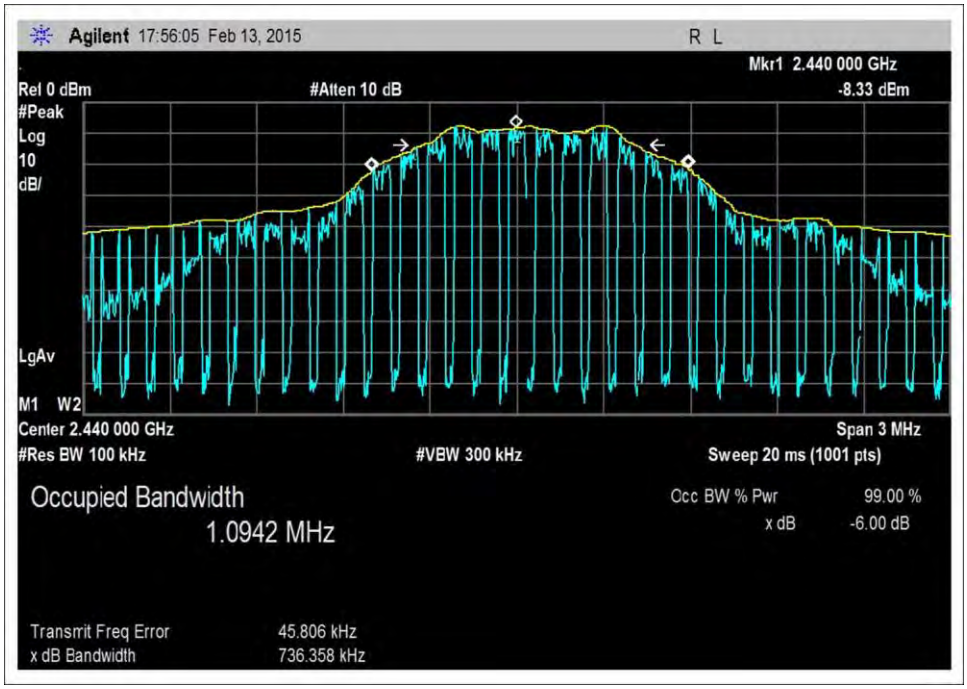
The EUT has a temporary antenna connector attached.
The EUT is connected to the spectrum analyzer through a cable.
Low, Mid and High channels investigated.
15.31(e) Fresh battery installed

Frequency	-6dB Occupied Bandwidth
2.402GHz	728.7kHz
2.440GHz	736.4kHz
2.480GHz	728.2kHz

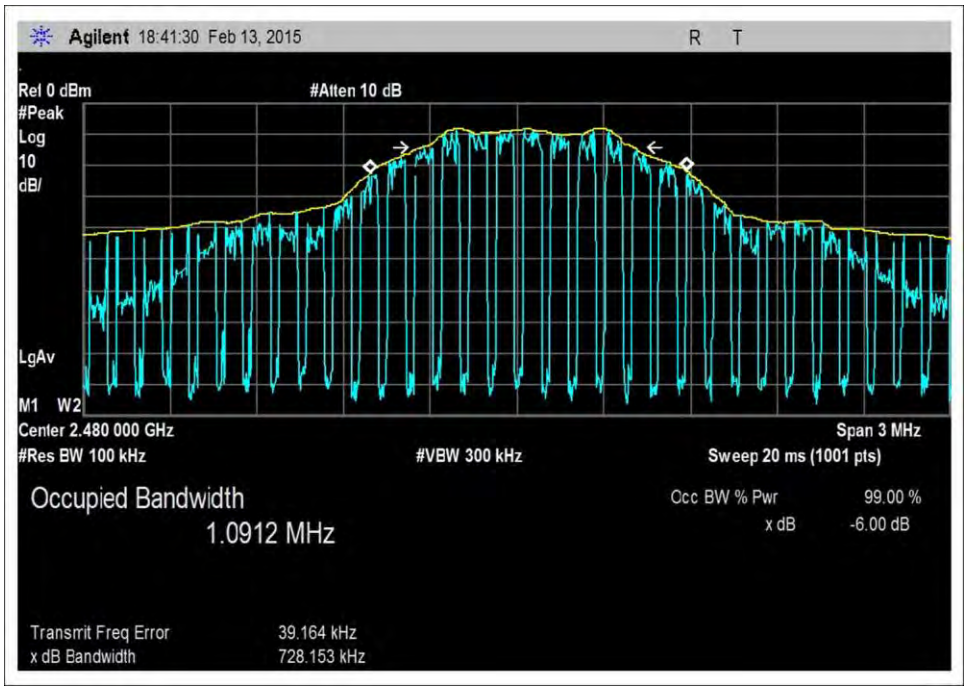
Test Data



Low Channel

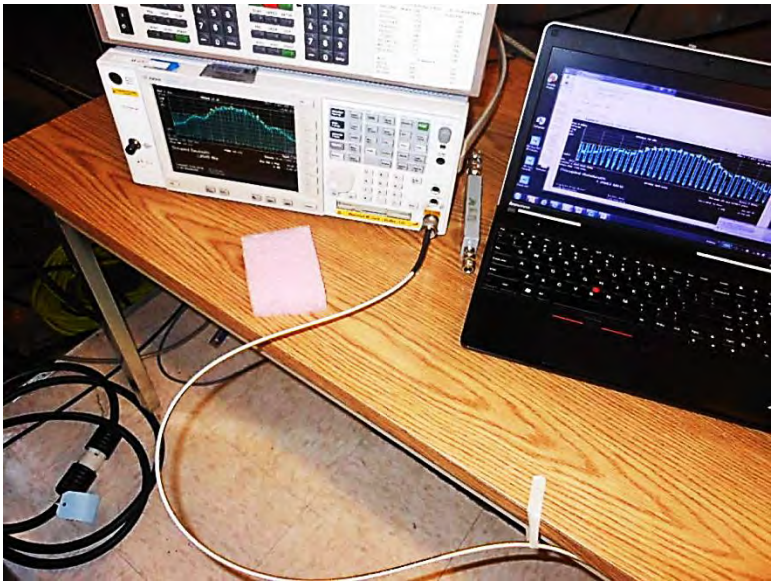


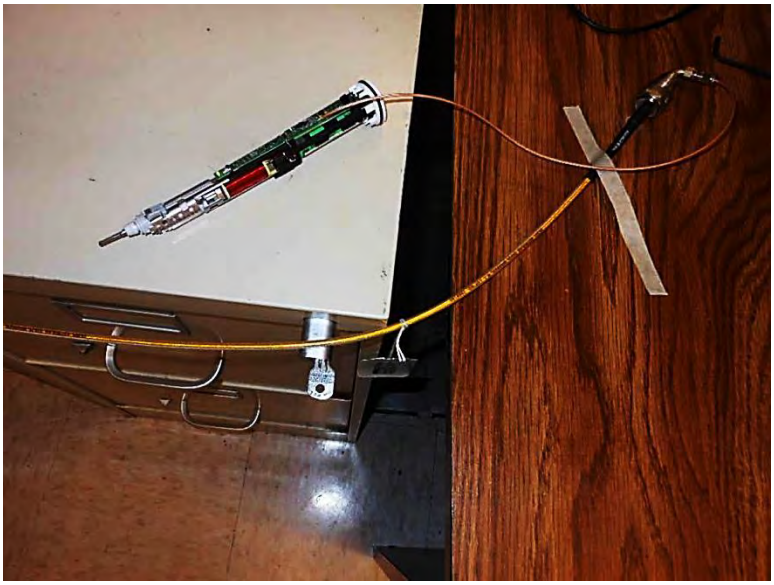
Mid Channel



High Channel

Test Setup Photos





15.247(b)(3) Maximum Output Power

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425.402.1717

Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.247(b)(3) Max Power**		
Work Order #:	**96690**	Date:	3/24/2015
Test Type:	**Maximized Emissions**	Time:	14:05:58
Equipment:	**Children's Rechargeable Power Toothbrush with BLE**	Sequence#:	1
Manufacturer:	Philips Oral Healthcare, Inc.	Tested By:	Steven Pittsford
Model:	HX6340		
S/N:			

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T2	AN02871	Spectrum Analyzer	E4440A	2/9/2015	2/9/2017

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Children's Rechargeable Power Toothbrush with BLE*	Philips Oral Healthcare, Inc.	HX6340	

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

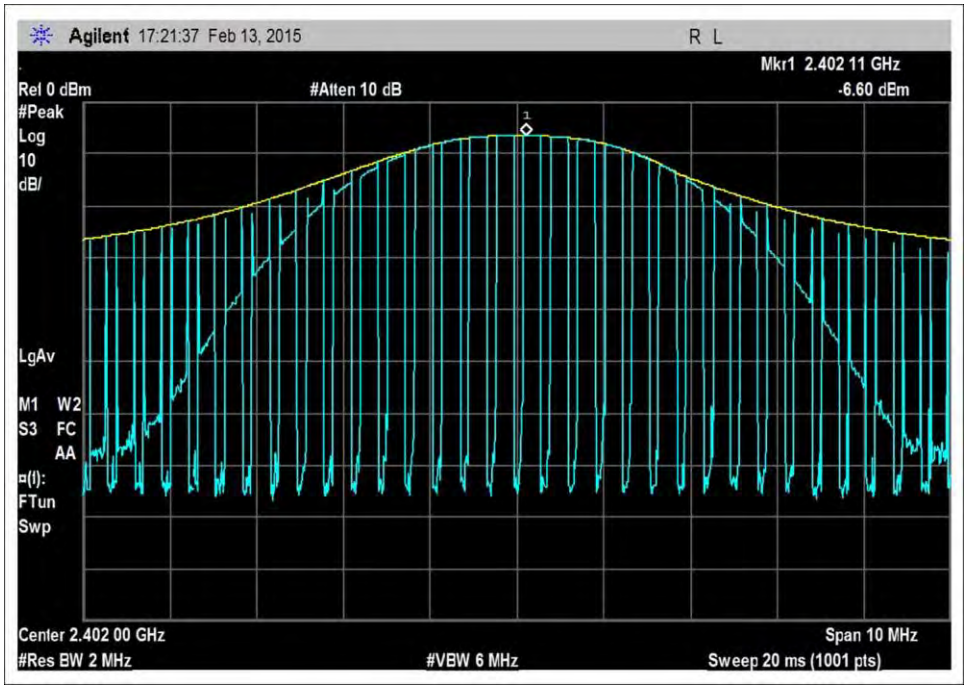
Temperature: 24°C
Humidity: 33%
Pressure: 102.6kPa
Frequency: 9kHz-26GHz

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2009)

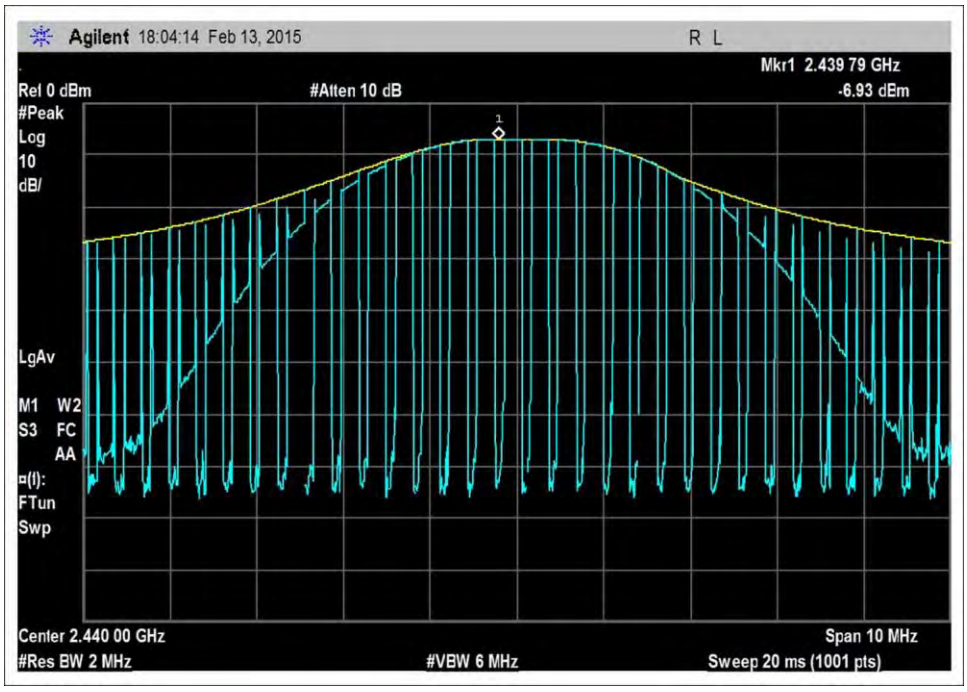
The EUT has a temporary antenna connector attached.
The EUT is connected to the spectrum analyzer through a cable.
Low, Mid and High channels investigated.
15.31(e) Fresh battery installed.

Frequency	Uncorrected Analyzer Reading (dBm)	Correction due to cables (dB)	Corrected Analyzer Reading (dBm)	Conducted Power (watts)
2.402GHz	-6.6	1.4	-5.2	0.000302
2.402GHz	-6.9	1.4	-5.5	0.000282
2.402GHz	-7.3	1.4	-5.9	0.000257

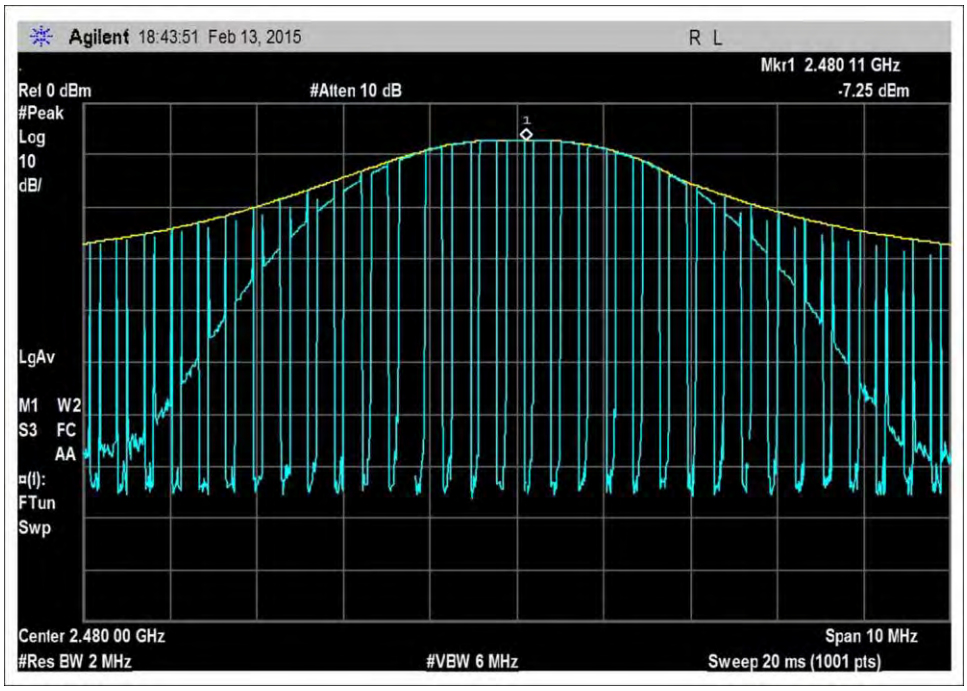
Test Data



Low Channel

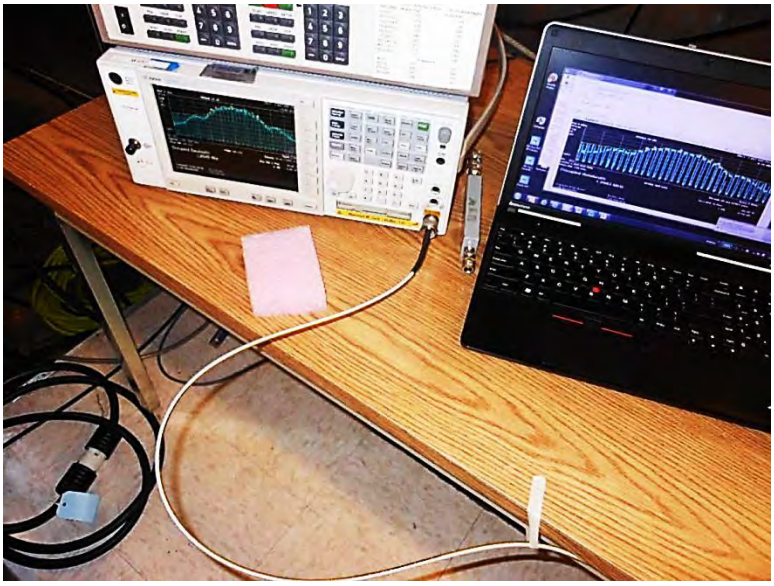


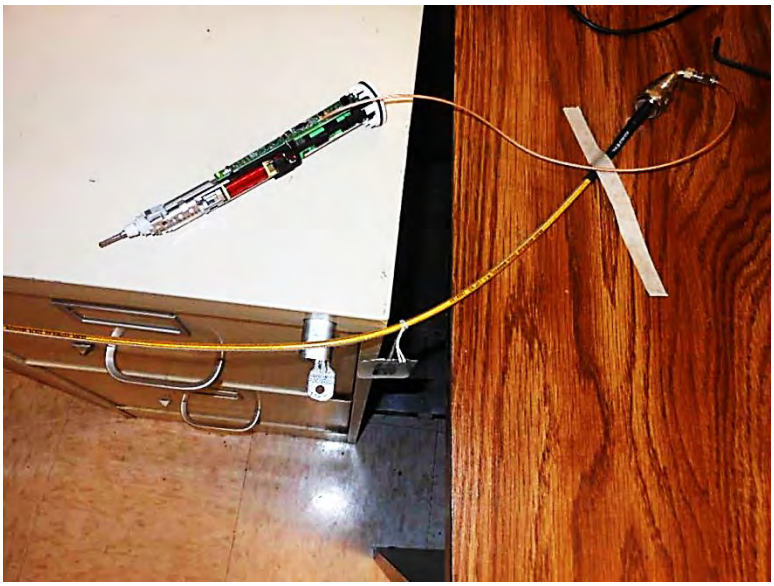
Middle Channel



High Channel

Test Setup Photos





15.247(d) Conducted Spurious Emissions and Band Edge

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425.402.1717

Customer:	**Philips Oral Healthcare, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**96690**	Date:	3/24/2015
Test Type:	**Conducted Emissions**	Time:	14:30:21
Equipment:	**Children's Rechargeable Power Toothbrush with BLE**	Sequence#:	2
Manufacturer:	Philips Oral Healthcare, Inc.	Tested By:	Steven Pittsford
Model:	HX6340		None
S/N:			

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03122	Cable	32026-2-29801-36	5/13/2014	5/13/2016
	AN02871	Spectrum Analyzer	E4440A	2/9/2015	2/9/2017

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Children's Rechargeable Power Toothbrush with BLE*	Philips Oral Healthcare, Inc.	HX6340	

Support Devices:

Function	Manufacturer	Model #	S/N

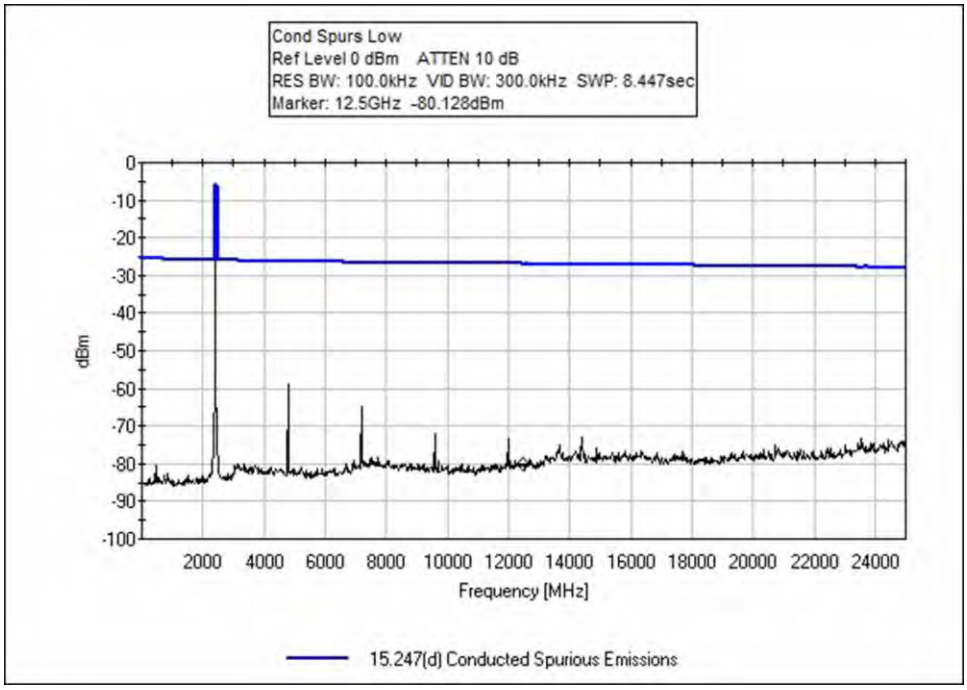
Test Conditions / Notes:

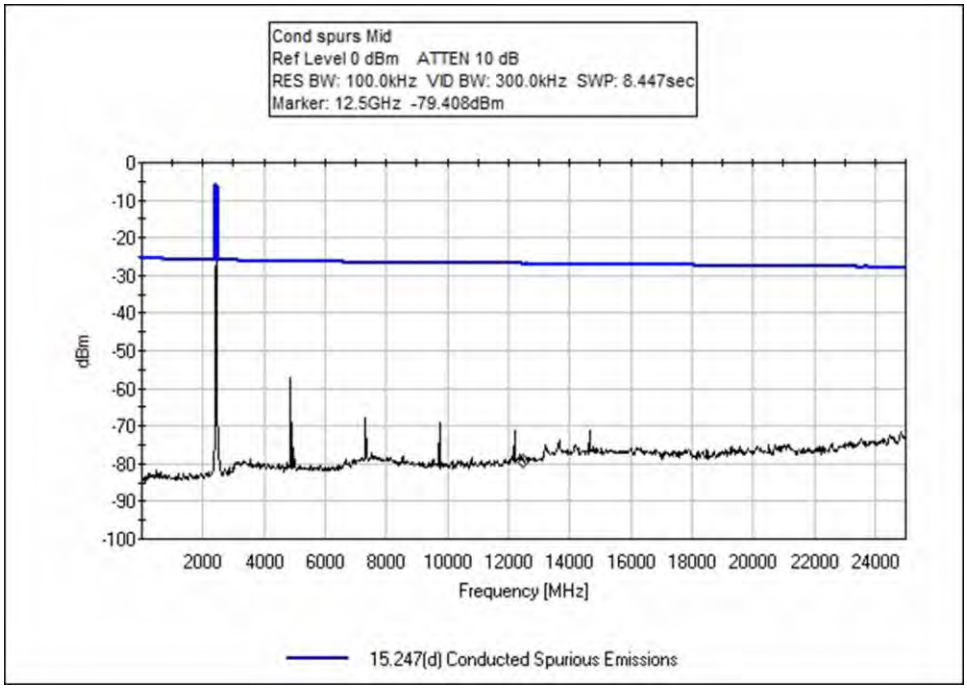
Temperature: 24°C
Humidity: 33%
Pressure: 102.6kPa
Frequency: 9kHz-26GHz

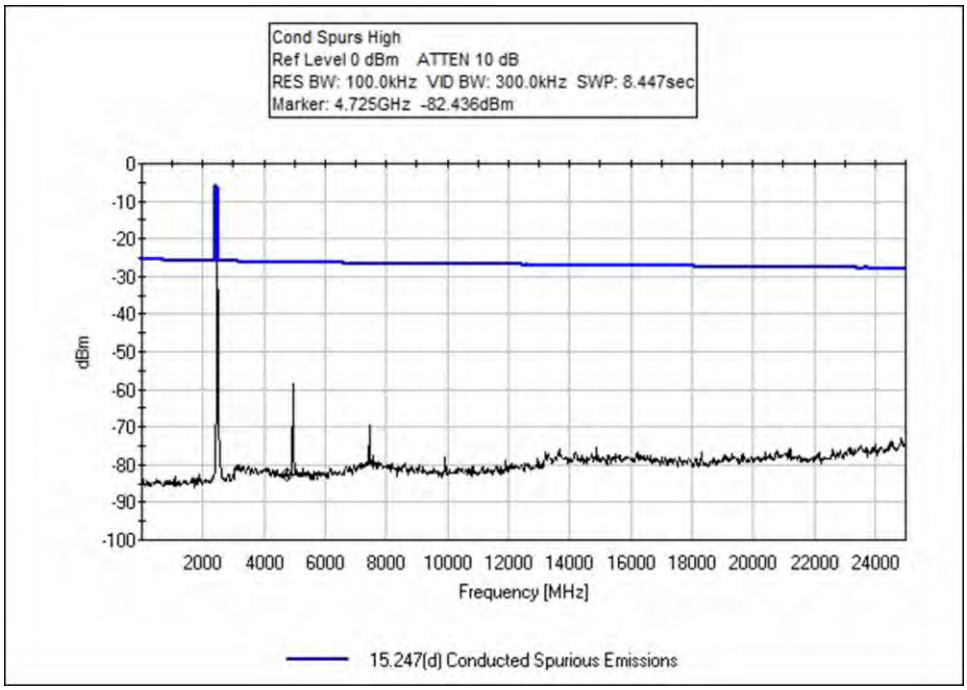
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2009)

The EUT has a temporary antenna connector attached.
The EUT is connected to the spectrum analyzer through a cable.
Low, Mid and High channels investigated.
15.31(e) Fresh battery installed

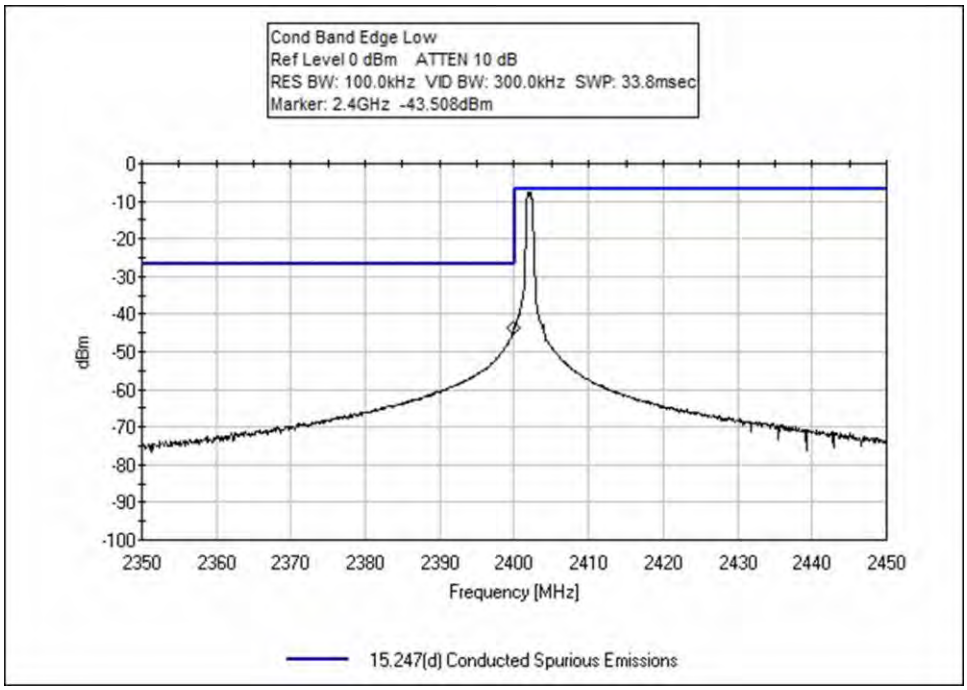
Test Data

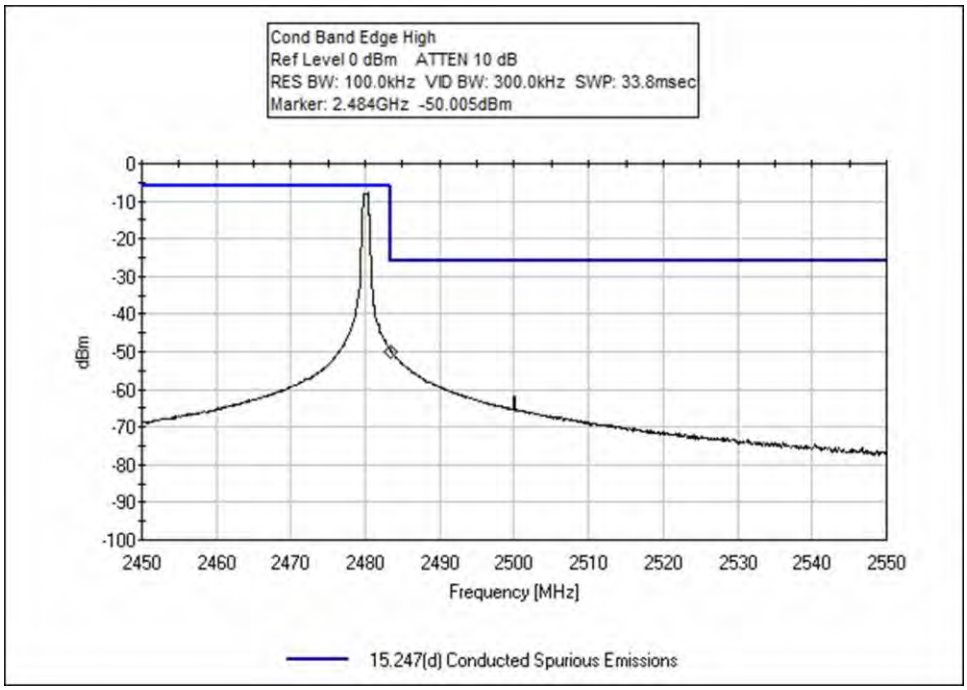

Cond Spurs Low
Ref Level 0 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 8.447sec
Marker: 12.5GHz -80.128dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
2000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 24000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond spurs Mid
Ref Level 0 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 8.447sec
Marker: 12.5GHz -79.408dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
2000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 24000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

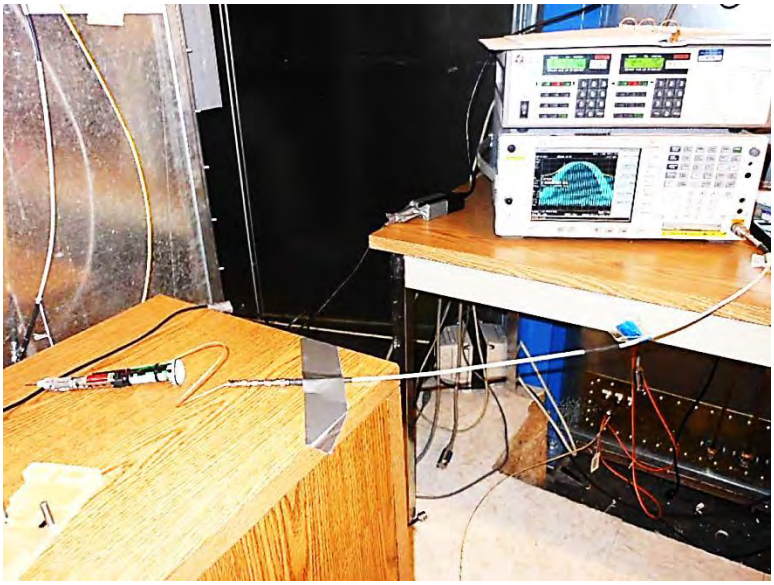

Cond Spurs High
Ref Level 0 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 8.447sec
Marker: 4.725GHz -82.436dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
dBm
2000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 24000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

Band Edge


Cond Band Edge Low
Ref Level 0 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 33.8msec
Marker: 2.4GHz -43.508dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
2450
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond Band Edge High
Ref Level 0 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 33.8msec
Marker: 2.484GHz -50.005dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
2450
2460
2470
2480
2490
2500
2510
2520
2530
2540
2550
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

Test Setup Photo



15.247(d) Radiated Spurious Emissions and Band Edge

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425.402.1717

Customer: **Philips Oral Healthcare, Inc.**
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
Work Order #: **96690** Date: 3/26/2015
Test Type: **Maximized Emissions** Time: 13:17:07
Equipment: **Children's Rechargeable Power Toothbrush with BLE** Sequence#: 1
Manufacturer: Philips Oral Healthcare, Inc. Tested By: Steven Pittsford
Model: HX6340
S/N:

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02307	Preamp	8447D	3/14/2014	3/14/2016
T2	AN01996	Biconilog Antenna	CBL6111C	7/16/2014	7/16/2016
T3	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T4	ANP05963	Cable	RG-214	2/21/2014	2/21/2016
T5	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T6	AN02871	Spectrum Analyzer	E4440A	2/9/2015	2/9/2017
T7	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	9/16/2013	9/16/2015
T8	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T9	AN00052	Loop Antenna	6502	5/20/2014	5/20/2016
T10	AN03303	Preamp	AMF-7D-00101800-30-10P	9/4/2014	9/4/2016
T11	AN03116	High Pass Filter	11SH10-00313	2/6/2015	2/6/2017
T12	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	1/14/2015	1/14/2017
T13	AN02763-69	Waveguide	Multiple	5/21/2014	5/21/2016
T14	ANP06678	Cable	32026-29801-29801-144	9/18/2014	9/18/2016
	ANP05747	Attenuator	PE7004-20	2/13/2014	2/13/2016
	ANP06124	Attenuator	18N-6	5/13/2013	5/13/2015
T15	AN03209	Preamp	83051A	3/20/2015	3/20/2017
T16	AN03122	Cable	32026-2-29801-36	5/13/2014	5/13/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Children's Rechargeable Power Toothbrush with BLE*	Philips Oral Healthcare, Inc.	HX6340	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Inductive Charger	Philips Oral Healthcare, Inc.	HX6100	NA

Test Conditions / Notes:

Temperature: 22°C
Humidity: 33%
Pressure: 102.2kPa
Frequency: 9kHz-26GHz

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2009)

EUT: Unit is on 80cm foam table. EUT is connected to Charger which is connected to 115V/60Hz.
Transmitting continuously at 2.402GHz (Low), 2.440GHz (Mid), 2.480GHz (High).

X, Y, Z axis and Horizontal and Vertical antenna polarities investigated, only worst case reported.
15.31€ Fresh Battery Installed.

Ext Attn: 0 dB

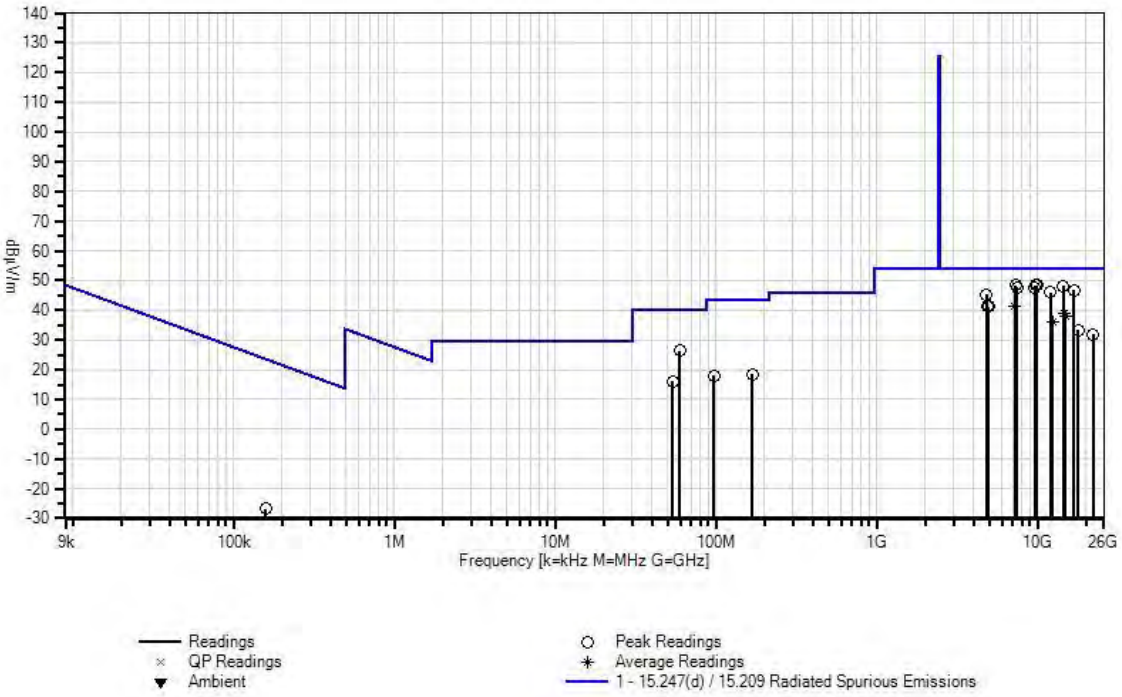
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10 T14	T3 T7 T11 T15	T4 T8 T12 T16	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	9759.075M	28.9	+0.0 +2.9 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +37.4 +0.0 -27.0	+0.0 +6.3 +0.0 +0.0	+0.0 360	48.5	54.0 Mid	-5.5	Vert 119
2	9917.615M	28.8	+0.0 +2.9 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +37.3 +0.0 -26.9	+0.0 +6.3 +0.0 +0.0	+0.0 360	48.4	54.0 High	-5.6	Vert 107
3	7322.175M	31.2	+0.0 +2.4 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +37.0 +0.0 -27.0	+0.0 +4.8 +0.0 +0.0	+0.0	48.4	54.0 Mid	-5.6	Vert 119
4	14410.883 M	53.1	+0.0 +4.2 +0.0 +0.0	+0.0 +0.0 -59.1 +0.0	+0.0 +41.1 +0.8 +0.0	+0.0 +8.1 +0.0 +0.0	+0.0	48.2	54.0 Low	-5.8	Vert 123
5	7440.705M	30.1	+0.0 +2.5 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +37.5 +0.0 -27.0	+0.0 +4.7 +0.0 +0.0	+0.0	47.8	54.0 High	-6.2	Vert 107
6	9606.283M	58.6	+0.0 +2.9 +0.0 +0.0	+0.0 +0.0 -59.1 +0.0	+0.0 +37.5 +1.3 +0.0	+0.0 +6.3 +0.0 +0.0	+0.0	47.5	54.0 Low	-6.5	Vert 123
7	16815.033 M	51.0	+0.0 +4.4 +0.0 +0.0	+0.0 +0.0 -58.3 +0.0	+0.0 +40.7 +0.7 +0.0	+0.0 +8.3 +0.0 +0.0	+0.0	46.8	54.0 Low	-7.2	Vert 123

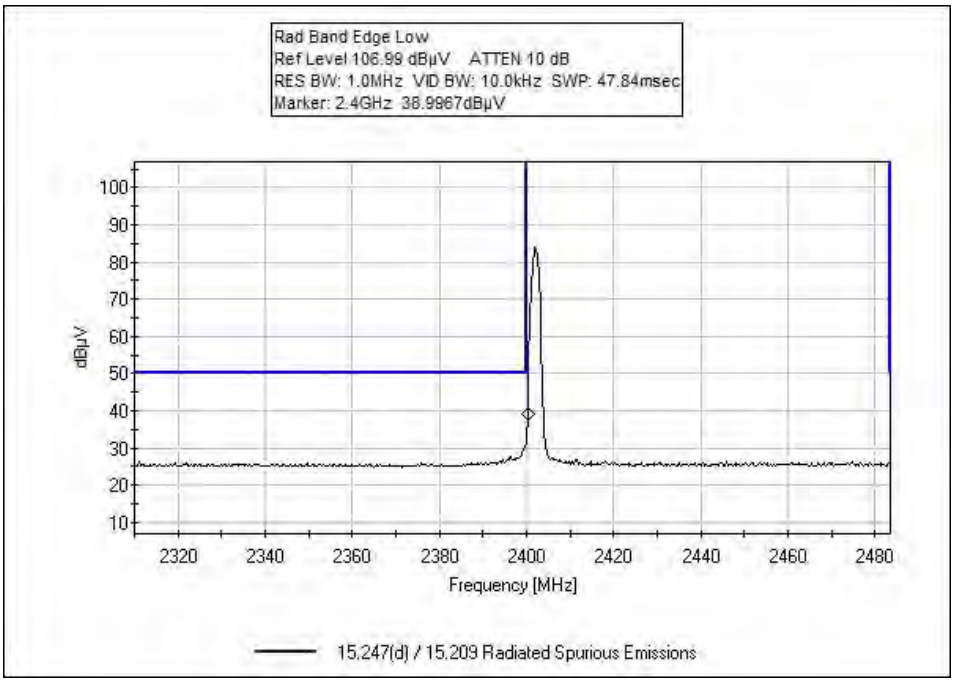
8	12011.517 M	56.5	+0.0 +3.6 +0.0 +0.0	+0.0 +0.0 -59.8 +0.0	+0.0 +38.3 +0.6 +0.0	+0.0 +6.8 +0.0 +0.0	+0.0 360	46.0	54.0 Low	-8.0	Vert 123
9	4804.100M	65.7	+0.0 +2.5 +0.0 +0.0	+0.0 +0.0 -59.5 +0.0	+0.0 +32.1 +0.8 +0.0	+0.0 +3.8 +0.0 +0.0	+0.0 360	45.4	54.0 Low	-8.6	Vert 111
10	4880.092M	34.3	+0.0 +2.7 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +32.3 +0.0 -29.2	+0.0 +3.9 +0.0 +0.0	+0.0 115	41.3	54.0 Mid	-12.7	Vert 106
11	7206.933M Ave	53.9	+0.0 +2.4 +0.0 +0.0	+0.0 +0.0 -57.2 +0.0	+0.0 +36.5 +0.8 +0.0	+0.0 +4.8 +0.0 +0.0	+0.0	41.2	54.0 Low	-12.8	Vert 123
^	7206.933M	67.1	+0.0 +2.4 +0.0 +0.0	+0.0 +0.0 -57.2 +0.0	+0.0 +36.5 +0.8 +0.0	+0.0 +4.8 +0.0 +0.0	+0.0	54.4	54.0 Low	+0.4	Vert 123
13	4959.410M	33.9	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +32.5 +0.0 -29.2	+0.0 +4.0 +0.0 +0.0	+0.0	41.2	54.0 High	-12.8	Vert 153
14	59.470M	46.6	-27.9 +0.3 +0.0 +0.0	+6.7 +0.0 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0	+0.3 +0.0 +0.0 +0.0	+0.0 374	26.4	40.0	-13.6	Vert 98
15	14641.400 M Ave	17.1	+0.0 +3.8 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +40.2 +0.0 -30.3	+0.0 +8.3 +0.0 +0.0	+0.0 360	39.1	54.0 Mid	-14.9	Horiz 107
^	14641.400 M	31.7	+0.0 +3.8 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +40.2 +0.0 -30.3	+0.0 +8.3 +0.0 +0.0	+0.0	53.7	54.0 Mid	-0.3	Horiz 119
17	14881.360 M Ave	16.7	+0.0 +3.7 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +39.4 +0.0 -30.2	+0.0 +8.4 +0.0 +0.0	+0.0	38.0	54.0 High	-16.0	Vert 107
^	14881.360 M	29.7	+0.0 +3.7 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +39.4 +0.0 -30.2	+0.0 +8.4 +0.0 +0.0	+0.0	51.0	54.0 High	-3.0	Vert 107
19	12399.610 M Ave	15.2	+0.0 +3.5 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +38.3 +0.0 -27.8	+0.0 +7.1 +0.0 +0.0	+0.0	36.3	54.0 High	-17.7	Vert 107
^	12399.610 M	30.1	+0.0 +3.5 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +38.3 +0.0 -27.8	+0.0 +7.1 +0.0 +0.0	+0.0	51.2	54.0 High	-2.8	Vert 107

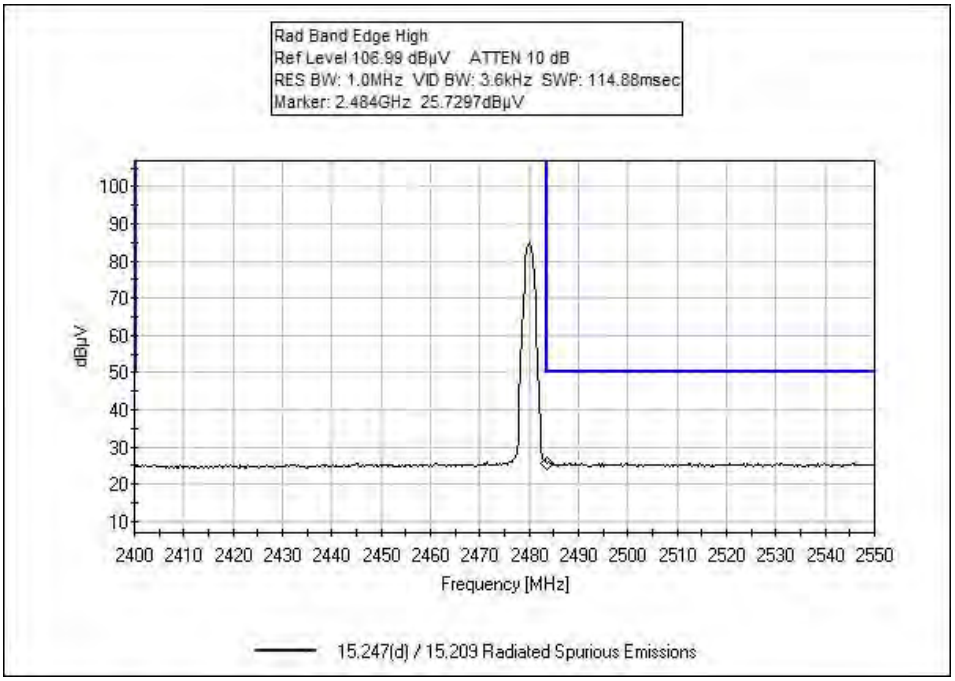
21	18000.000 M	35.7	+0.0 +0.0 +0.0 +2.8	+0.0 +0.0 +0.0 +6.6	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 -13.9 +2.1	+0.0 -16	33.3	54.0	-20.7	V & H 110
22	22203.600 M	35.6	+0.0 +0.0 +0.0 +3.2	+0.0 +0.0 +0.0 +7.4	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 -16.8 +2.5	+0.0 261	31.9	54.0	-22.1	V & H 110
23	53.800M	34.9	-27.9 +0.3 +0.0 +0.0	+8.0 +0.0 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0	+0.3 +0.0 +0.0 +0.0	+0.0 374	16.0	40.0	-24.0	Vert 98
24	168.830M	34.1	-27.5 +0.4 +0.0 +0.0	+10.1 +0.0 +0.0 +0.0	+0.8 +0.0 +0.0 +0.0	+0.6 +0.0 +0.0 +0.0	+0.0 374	18.5	43.5	-25.0	Vert 98
25	97.150M	34.7	-27.8 +0.3 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+0.6 +0.0 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0	+0.0 374	18.0	43.5	-25.5	Vert 98
26	159.000k	43.7	+0.0 +0.0 +9.6 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-80.0 361	-26.7	23.6	-50.3	Perp 110

CKC Laboratories, Inc. Date: 3/26/2015 Time: 13:17:07 Philips Oral Healthcare, Inc. WO#: 96690
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Sequence#: 1 Ext ATTN: 0 dB
Children's Rechargeable Power Toothbrush with BLE Philips Oral Healthcare, Inc. HX6340



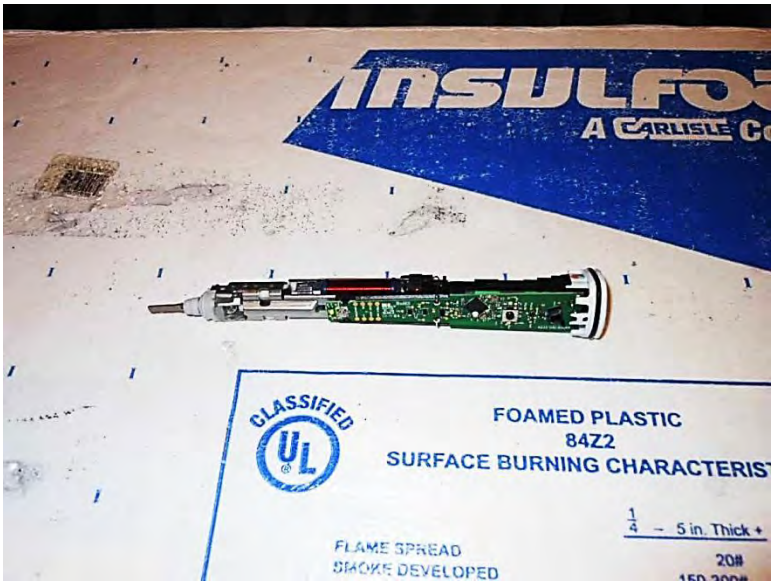
Band Edge


Rad Band Edge Low
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 10.0kHz SWP: 47.84msec
Marker: 2.4GHz 38.9967dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2320
2340
2360
2380
2400
2420
2440
2460
2480
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

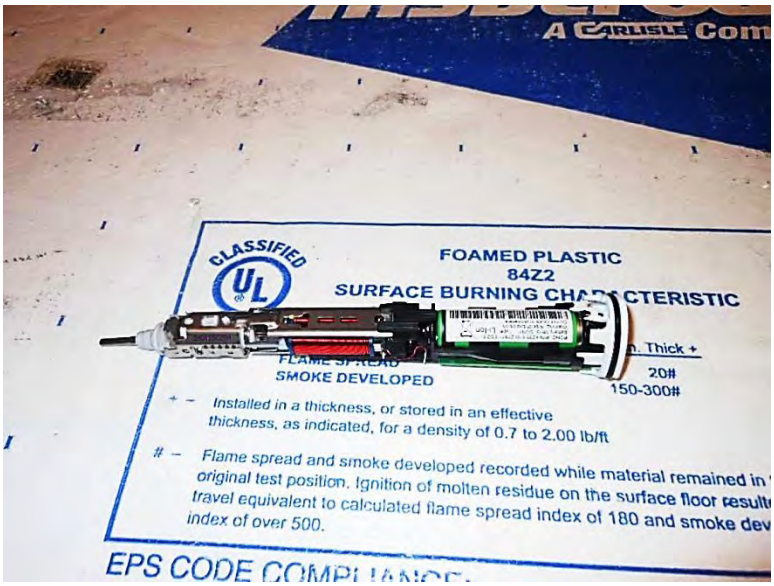

Rad Band Edge High
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 3.6kHz SWP: 114.88msec
Marker: 2.484GHz 25.7297dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2400 2410 2420 2430 2440 2450 2460 2470 2480 2490 2500 2510 2520 2530 2540 2550
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup Photos

X Axis



Y Axis


CLASSIFIED
UL
FOAMED PLASTIC
84Z2
SURFACE BURNING CHARACTERISTIC
SMOKE DEVELOPED
20#
150-300#
+ – Installed in a thickness, or stored in an effective thickness, as indicated, for a density of 0.7 to 2.00 lb/ft
# – Flame spread and smoke developed recorded while material remained in original test position. Ignition of molten residue on the surface floor result travel equivalent to calculated flame spread index of 180 and smoke dev index of over 500.
EPS CODE

Z Axis

15. 247(e) Power Spectral Density

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425.402.1717

Customer: **Philips Oral Healthcare, Inc.**
Specification: **15.247(e) PSD**
Work Order #: **96690** Date: 3/24/2015
Test Type: **Maximized Emissions** Time: 14:25:58
Equipment: **Children's Rechargeable Power Toothbrush with BLE** Sequence#: 1
Manufacturer: Philips Oral Healthcare, Inc. Tested By: Steven Pittsford
Model: HX6340
S/N:

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T2	AN02871	Spectrum Analyzer	E4440A	2/9/2015	2/9/2017

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Children's Rechargeable Power Toothbrush with BLE*	Philips Oral Healthcare, Inc.	HX6340	

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

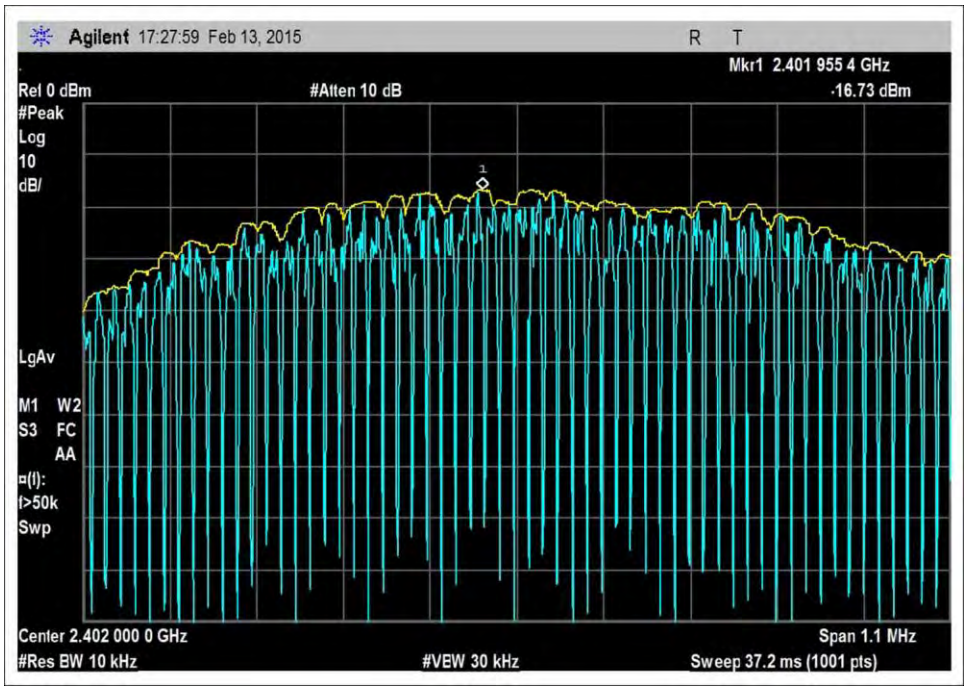
Temperature: 24°C
Humidity: 33%
Pressure: 102.6kPa
Frequency: 9kHz-26GHz

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2009)

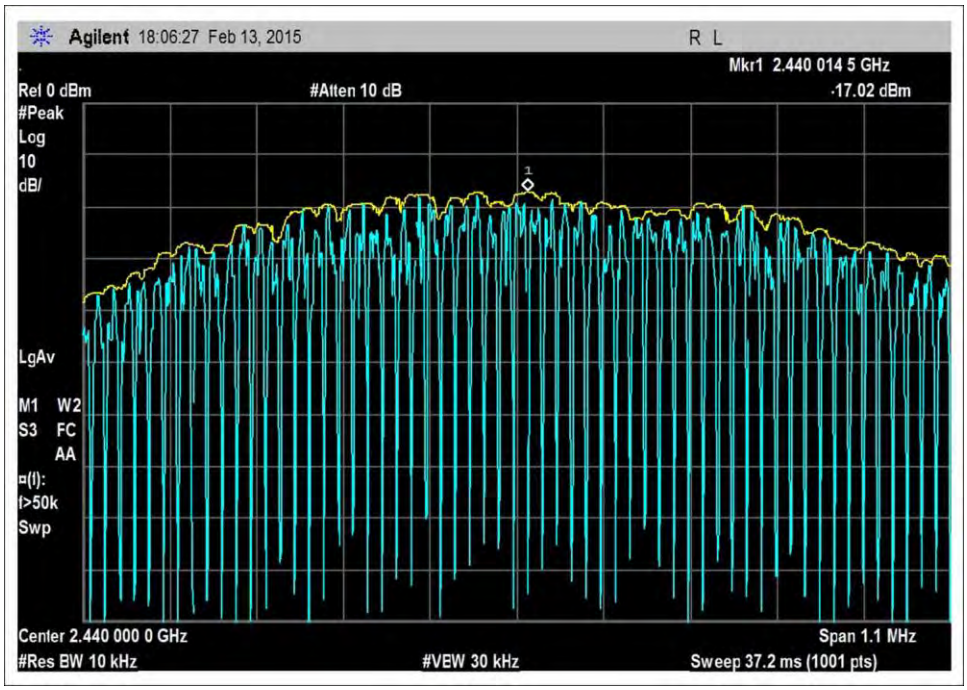
The EUT has a temporary antenna connector attached.
The EUT is connected to the spectrum analyzer through a cable.
Low, Mid and High channels investigated.
15.31(e) Fresh battery installed.

Frequency	Uncorrected Analyzer Reading (dBm)	Correction due to cables (dB)	Corrected Analyzer Reading (dBm)
2.402GHz	-16.7	1.4	-14.3
2.440GHz	-17.0	1.4	-14.6
2.480GHz	-17.5	1.4	-16.1

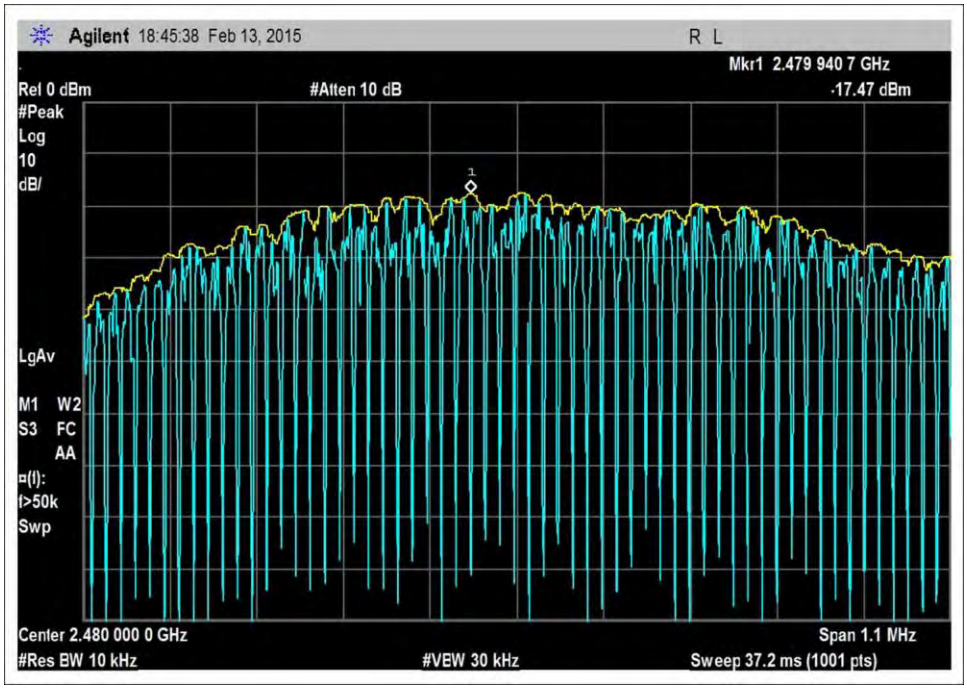
Test Data



Low Channel

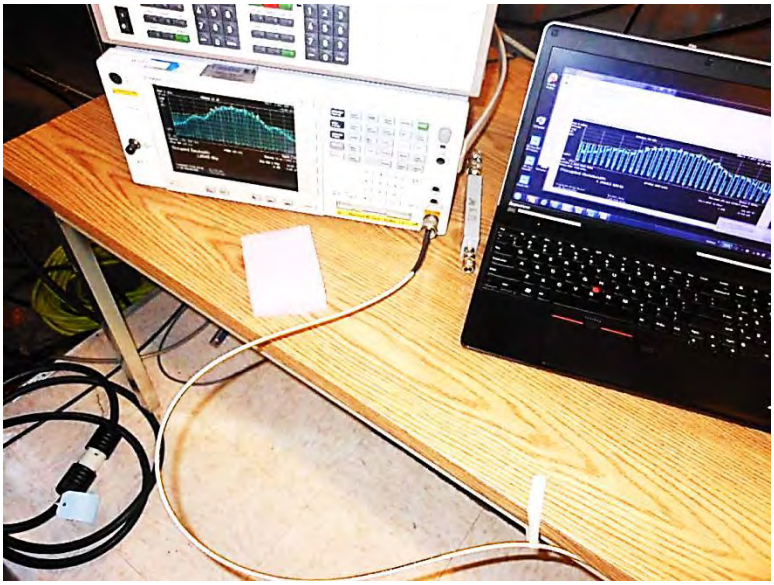


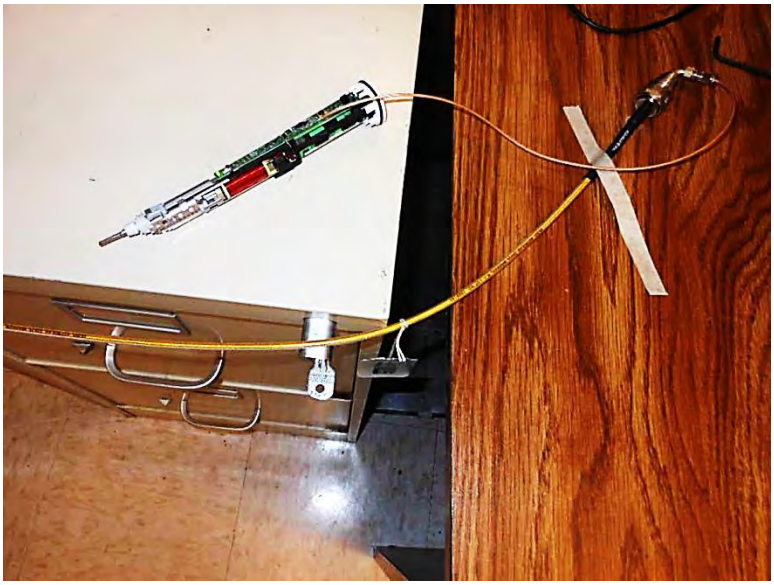
Middle Channel



High Channel

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.

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.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	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 carrot ("^") 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.