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Test Report issued under the responsibility of:

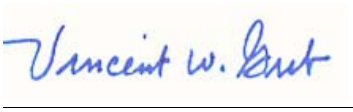
TEST REPORT

FCC Part 15
Radio Frequency Devices
Subpart C – Intentional Radiators

Report Reference No. ..... : ETRB60104, Rev. A

Compiled by (+ signature) ..... : Kevin Johnson.

Approved by (+ signature) ..... : Vincent W. Greb



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Testing Laboratory ..... : NTS Longmont

Address ..... : 1736 Vista View Drive.
Longmont, CO 80504
USA
Tel: +1 303-776-7249
Fax: +1 303-776-7314

FRN: **0015264914**

IC Registration Number: **7726A**

Applicant's name ..... : Covidien

Address..... : 6135 Gunbarrel Ave, Boulder, CO 80301

Model(s) Tested..... : OxiPOD

Test specification:

Standard ..... : FCC Part 15, Subpart C, ,Part 15.249, RSS-210 (Issue 8), including Amendment 1 (Feb 2015), RSS-Gen (Issue 4)

Test procedure..... : ANSI C63.4:2009, ANSI C63.10: 2013

Non-standard test method ..... : N/A

TRF Revision..... : 26 May 2016

Revision History

#	Description	Date
-	Initial Report Release	11 May 2016
A	Corrections based on client emails of 5-24-2016 and 5-25-2016.	26 May 2016

Notices:

1. This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
2. The test results presented in this report relate only to the object tested.
3. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.
4. "(See Enclosure #)" refers to additional information appended to the report.
5. Throughout this report a point is used as the decimal separator.
6. Dimensions in English units for convenience only, metric units prevail.

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Normative References

The following document(s) have been appropriately considered in the performance of the test results detailed in this report.

CFR Title 47, Part 15, Subpart C, 15.249
Radio Frequency Devices

RSS-210 (Issue 8, December 2010), including Amendment 1 (February 2015)
Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

RSS-Gen (Issue 4, November 2014),
General Requirements for Compliance of Radio Apparatus

ANSI C63.4: 2009
American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C63.10: 2013
American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

Equipment Under Test (EUT)

Details:

Test item description:

Model ..... : OxiPOD
Serial Number ..... : 0PA000800
Production Status ..... : ☐ Production ☒ Pre-Production ☐ Prototype
Other Status Info ..... : N/A.
EUT Received Date ..... : 4 February 2016
Ratings ..... : ☐ 1ϕ ☐ 3ϕ ☒ Internal Battery

General product description:

- The OxiPOD system is a wireless pulse oximeter indicated for prescription use as an automated spot check of functional oxygen saturation of arterial hemoglobin (SpO_2) and pulse rate of adult patients in motion and no motion conditions who are well or poorly perfused.
- The OxiPOD system consists of the OxiPOD and the OxiPOD Sensor.
- It should be noted that this report deals only with the FCC and IC testing of this unit.

Modifications to the EUT required for compliance:

No compliance modifications required.

Deviations from Test Methodology:

No deviations from the standard test methodology were made.

Engineering Judgements:

No engineering judgments based on the results in this test report have been made.

Approved by (+ signature) ..... : Vincent W. Greb

Table 1 – EUT Internal Operating Frequencies

Frequency	Description
32.768 kHz	Clock for Main MCU, Optional clock for Bluetooth and ECHO radio
16 MHz	Clock for Main MCU
32 MHz	Clock for ECHO radio transceiver
2.405 - 2.475 GHz	ECHO radio transceiver

Table 2 – EUT Operating Modes Used During Testing

Mode #	Description
1	Tx Low (modulated)
2	Tx Mid (modulated)
3	Tx High (modulated)
4	Rx mode

EUT Configuration

A minimum representative configuration, as defined by the manufacturer, has been used for the testing performed herein. The selection of hardware (including interface ports), software, and cables were chosen by the manufacturer as being representative of the product's intended use. The interconnection of various articles of equipment and the types of cables used has also been defined by the manufacturer.

As the transmit antenna was a chip antenna soldered to the PCB, measuring conducted emissions at the antenna port was not possible. Radiated emissions testing was performed for all three orthogonal axes of the UUT, and the worst-case orientation was used for all formal measurements. The final placement of the equipment under test has been, to the extent practical, arranged to maximize emissions. The UUT was operated using a continuous (i.e., 100%) duty cycle for all testing.

Cables, of the type and length specified by the manufacturer, were connected to at least one of each type of interface port provided by the EUT and if practical, were terminated by a device typical of actual usage. For multiple ports of the same type, the addition of cables did not significantly affect the emission level (i.e. < 2B variation).

The EUT had no external power supply.

Figure 1 - EUT Configuration Diagram

The block diagram for this product has been classified by client as "proprietary information" and is not included in this test report.

Table 3 – EUT Equipment List (No AE was required)

Item	Use*	Product Type	Manufacturer	Model	Serial No.
A	EUT	Oximeter	Covidien	OxiPOD	0PA000800

Note:
* Use = EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
SIM - Simulator (Not Subjected to Test)

Table 4 - Interconnecting Cables List – Not applicable

Item	Use*	Cable Type
1		
2		
3		
4		

EUT Photo(s)

Photo 1	EUT Photo	

Photographs of the PCB have been classified by client as "proprietary information" and are not included in this test report.

Supplemental Information:

Summary of Testing

Possible test case verdicts:

- test case does not apply to the test object : N/A
- test object does meet the requirement .....: P (Pass)
- test object does not meet the requirement : F (Fail)
- not tested (not part of this evaluation) .....: NT

Date(s) of performance of tests .....: 4 through 22 February 2016.

Clause	Test Description	Verdict	Comment
47 CFR			
2.1049	Occupied Bandwidth	P	
15.203	Antenna Requirement	P	
15.207	Conducted Emissions - Mains	N/A	Product was powered from internal DC battery and had no connection to the AC mains.
15.209	Radiated Emissions – Spurious Out of Band Emissions and Restricted Bands	P	
15.247(d)	Band Edge	P	
15.247(e)	RF Exposure	P	SAR Exemption Letter
15.249(a)	Field Strength of Fundamental	P	
15.249(a)	Field Strength of Harmonics	P	
RSS-210/RSS-Gen			
RSS-Gen, 6.6	Occupied Bandwidth	P	
RSS-Gen, 6.12	Transmitter Output Power	P	
RSS-210, 2.2	Emissions in Restricted Bands	P	
RSS-210, 2.5	General Field Strength Limits	P	

Notes:

General remarks:

As this product was powered by an internal DC battery which was disposable, it has no connection to the AC power mains. Therefore, conducted emissions testing was not applicable (“N/A”).

Summary of compliance with national requirements:

Compliance with this standard provides a means of conformity with the United States Federal Communication Commission (FCC) verification, certification, or declaration of conformity authorization procedures and Industry Canada (IC) rules.

Testing Location		
Testing Laboratory:		
Testing location/ address	:	NTS Longmont 1736 Vista View Drive Longmont, CO 80504
Testing procedure: TMP		
Tested by (name + signature)	:	Kevin Johnson 
Approved by (+ signature)	:	Vincent W. Greb 
Testing location/ address	:	NTS Longmont 1736 Vista View Drive Longmont, CO 80504
Supplemental Information:		
Testing results contained herein were performed at the location(s) listed above.		

Procedural Requirements

The following requirements are taken from the appropriate rules, other rules may apply and the manufacturer should consult the full text of the appropriate laws prior to marketing any device.

United States

Mandated procedures for digital devices are defined in 47 CFR 15.201, *Equipment authorization requirement*. Details of the authorization procedures (verification, declaration of conformity, and certification) can be found in 47 CFR, Part 2, Subpart J, *Equipment Authorization Procedures*.

Information to the User and Labeling Requirements

The following requirements are taken from the appropriate rules, other rules may apply and the manufacturer should consult the full text of the appropriate laws prior to marketing any device.

United States

Labeling

47 CFR 2.925

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term *FCC ID* in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID XXX123. XXX—Grantee Code 123—Equipment Product Code

47 CFR 15.19

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

(3) All other devices shall bear the following statement in a conspicuous location on the device:

> This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

47 CFR 15.19(b)(2) Label text and information should be in a size of type large enough to be readily legible, consistent with the dimensions of the equipment and the label. However, the type size for the text is not required to be larger than eight point.

47 CFR 15.19(b)(3): When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (b)(1) of this section on it, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instruction manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.

47 CFR 15.19(b)(4): The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in §2.925(d) of this chapter. “Permanently affixed” means that the label is etched, engraved, stamped, silkscreened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

Information to User

47 CFR 15.21: The user’s manual or instruction manual for an intentional or unintentional radiator shall caution the user that:

> Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

Technical Requirements

The testing requirements, as appropriate, were derived from ANSI C63.4; 47 CFR, Subpart A.

Conducted Emissions (Not Applicable)

The mains cable of the EUT or EUT host unit was connected to the LISN defined in this standard and is bonded to the reference plane. Where applicable, remaining auxiliary equipment was powered through an additional LISN (also bonded to the reference plane), using a multi-socket outlet strip if necessary. The LISNs were at least 0.8m away from the EUT. A vertical ground plane was used while the table-top EUTs were placed on a wooden table 0.8m high. Floor-standing EUTs were insulated from the ground plane and grounded according to the manufacturer's instructions.

Signal cables were positioned for their entire lengths, as far as possible, at a nominal distance of 0.4 m from the ground reference plane. Where the mains cable supplied by the manufacturer was longer than 1 m, the excess was folded at the center into a bundle no longer than 0.4 m, so that its length is shortened to 1 m. If the 1 m cable length cannot be achieved owing to physical limitations of the EUT arrangement, the cable length shall be as near to 1 m as possible.

All telecommunication and signal ports were correctly terminated using either appropriate associated equipment or a representative termination during the measurement of the conducted disturbances at the mains. If an ISN is connected to a telecommunications port during the measurement of conducted disturbances at the mains port, then the ISN receiver port was terminated in 50Ω. The ISNs were at least 0.8m away from the EUT.

Mains

Any power cable(s) from the equipment under test that were directly connected to the AC Mains have been tested. In the event that the equipment under test had no direct connection to the Mains, that is, it was connected to a Host unit (example: USB powered); then conducted emissions was performed on the Mains of the Host unit. Battery powered equipment was not tested for conducted emissions; however, if the equipment makes provisions for connections to a battery charger that is connected to the Mains, then conducted emissions were performed on the battery charger.

Table 5 – Class B Conducted Emissions Limits - Mains

Frequency	Limits (dBµV)	
	Quasi-peak	Average
150 kHz – 500 kHz	66 - 56	5-46
500 kHz – 5 MHz	56	46
5 MHz – 30 MHz	60	50
NOTE 1: The lower limit shall apply at the transition frequency. NOTE 2: The limit decreases linearly with the logarithm of the frequency in the range 150 kHz to 500 kHz.		

Radiated Emissions – Restricted Bands

The arrangement of the equipment is typical of a normal installation practice and as was practical, the arrangement was varied and emissions investigated for maximum amplitude. Final measurements were performed in a semi-anechoic chamber. The equipment was rotated 360° and the antenna height has been varied between 1m and 4m. Measurements were taken at both horizontal and vertical antenna polarities. The receiver bandwidth was set to 120 kHz for measurements below 1 GHz, and 1 MHz for measurements above 1 GHz. A peak detector is used to detect an emission; a quasi-peak detector may be used to record a final measurement below 1 GHz and an average detector may be used above 1 GHz. An inverse proportionality factor of 20 dB/decade (10 dB) was used, as noted in 15.31(f)(1), to normalize the measured data to the specified test distance for determining compliance.

Frequency range of radiated measurements (15.33(a)):

Operating frequency of intentional radiator	Lowest frequency searched	Highest frequency searched
Below 10 GHz	9 kHz or lowest operating frequency generated in the device, whichever is highest	10th harmonic of highest fundamental frequency or 40 GHz, whichever is lower
10 – 30 GHz	9 kHz or lowest operating frequency generated in the device, whichever is highest	5th harmonic of highest fundamental frequency or 100 GHz, whichever is lower
At or above 30 GHz	9 kHz or lowest operating frequency generated in the device, whichever is highest	5th harmonic of highest fundamental frequency or 200 GHz, whichever is lower

Restricted Bands 47 CFR 15.205

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1]0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	([2])
13.36–13.41			

Radiated Emission Limit – Restricted Bands

Reading on the measuring receiver showing fluctuations close to the limit, were observed for at least 15 s at each measurement frequency; the highest reading was recorded.

Table 6 – Radiated Emissions Limits per 47 CFR 15.209(a) & RSS-GEN 7.2.5

Frequency Range	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (m)
9 kHz – 490 kHz	2400/F(kHz)	48.5 – 13.8	300
490 kHz – 1.705 MHz	24000/F(kHz)	33.6 – 23.0	30
1.705 MHz – 30 MHz	30	29.5	30
30 MHz – 88 MHz	100	40.0	3
88 MHz – 216 MHz	150	43.5	3
216 MHz – 960 MHz	200	46.0	3
Above 960 MHz	500	54.0	3

20 dB Bandwidth

The following verbiage describes the procedure used for this measurement:

EUT configuration: The EUT is set to normal Tx mode for low, middle and high Tx frequencies.

Spectrum analyzer settings:

RBW = 100 kHz

VBW $\geq$ 3 x RBW

Trace mode = max hold

Sweep = auto

Allow trace to stabilize

Once the trace has stabilized, “view” trace and “peak search” with marker. Use the “marker delta” function and tune the marker so that it is 20 dB down from the peak on one side of the peak. Set the marker to “normal” and reset “marker delta” function. Tune the delta marker to the other side of the peak such that the delta between the two markers is as close to zero as possible. Record the delta frequency value. This measurement should be performed at the lowest and highest frequencies of the transmitter, as well as a middle frequency.

6 dB Bandwidth

The following verbiage describes the procedure used for this measurement:

EUT configuration: The EUT is set to normal Tx mode for low, middle and high Tx frequencies.

Spectrum analyzer settings:

RBW = 100 kHz

VBW $\geq$ 3 x RBW

Trace mode = max hold

Sweep = auto

Allow trace to stabilize

Once the trace has stabilized, “view” trace and “peak search” with marker. Use the “marker delta” function and tune the marker so that it is 6 dB down from the peak on one side of the peak. Set the marker to “normal” and reset “marker delta” function. Tune the delta marker to the other side of the peak such that the delta between the two markers is as close to zero as possible. Record the delta frequency value. This measurement should be performed at the lowest and highest frequencies of the transmitter, as well as a middle frequency.

Duty Cycle

The following verbiage describes the procedure used for this measurement:

EUT configuration: The EUT is set to normal Tx mode for low, middle and high Tx frequencies.

Spectrum analyzer settings:

RBW = 1 MHz

VBW = 3 x RBW, or 3 MHz

Trace mode = single shot

Sweep Time = 100 msec

Once the trace has been captured, determine the on time (“t_{on}”) of all the data pulses over the 100 msec period. Once the “t_{on}” value has been determined, calculate the duty cycle correction using the following equation:

Duty Cycle Correction (dB) = 20 * $\log_{10}$ (t_{on} (in msec)/100 msec)

Sample calculation: If t_{on} = 10 msec, then the duty cycle correction is:

Duty Cycle Correction (dB) = 20 * $\log_{10}$ (10 msec/100 msec) = -20 dB

Fundamental Field Strength

The field strength of the fundamental is measured with the EUT configured for Tx mode for low, middle and high frequencies. The EUT is oriented in the x-, - and z-axes to determine worst case. Once worst-case orientation has been established, a scan is performed from 2 to 3 GHz. The Tx frequency is then maximized for azimuth and elevation. Both average and peak field strength measurements are taken, and the final (i.e., corrected) field strength reading is compared against the limits defined by FCC Part 15.249(a), shown below:

§15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz.

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The limits above are specified for a 3-meter antenna separation. A field strength of 50 mV/m equates to a field strength of 94 dBuV/m. This is an average measurement and the peak field strength is 20 dB higher, or 114 dBuV/m. The average field strength may be adjusted by the duty cycle, if required; but the peak field strength may not exceed the peak limit. In other words, no duty cycle correction is allowed for the peak field strength measurement.

Emissions in Non-Restricted Bands

Section 12.0. Same method and data as for emissions in restricted bands.

Band-Edge

EUT test mode: The EUT is set in its normal Tx mode for lowest and highest channels.

Spectrum analyzer settings:

The marker-delta method, as described in ANSI C63.10, can be used to perform measurements of the radiated unwanted emissions level at the band-edges provided that the 99% OBW of the fundamental emission is within 2 MHz of the authorized band edge.

Verify that emissions at band-edge and below/above band-edge comply with FCC 15.209 limit.

Spurious Emissions

15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits is not required. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits specified.

Spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Band edge spurious emissions:

Measurement shall be made in the following bands:

2310 – 2390 MHz

2483.5 – 2500 MHz

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Measurement Uncertainty

Determining compliance with the limits in these standards was based on the results of the measurement, and does not take into account the measurement instrumentation uncertainty.

Referencing the measurement instrumentation uncertainty considerations contained in CISPR 16-4-2, the expanded measurement uncertainty numbers for each test is given in Table 7.

Table 7 – Measurement Uncertainty Summary

Test	Measurement Uncertainty
Bandwidth	0.7 dB
Fundamental Emission Output Power	0.5 dB
Power Spectral Density	0.5 dB
20 dB Occupied Bandwidth	0.7 dB
Band-Edge	1%
Peak RF Output Power	0.5 dB
Spurious Emissions	3.2 dB
Conducted Emissions	3.04 dB

List of Test Equipment

The following test equipment was used in the performance of the testing herein.

Table 8 – Test Equipment Used

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1341	HP	85650A	2811A01351	Quasi-Peak Adapter	05/31/2015	05/31/2016
1340	HP	8566B	2542A11546	Spectrum Analyzer Display	05/31/2015	05/31/2016
1339	HP	8566B	2937A06103	Spectrum Analyzer with 2542A11546	05/31/2015	05/31/2016
1337	HP	85685A	2833A00775	RF Preselector	05/31/2015	05/31/2016
1215	HP	8564E	3943A01645	9kHz-40GHz Portable Spectrum Analyzer	05/06/2015	05/06/2016
1220	Mini-Circuits	ZKL-2	NA	Preamp, 10 - 2000 MHz, 30 dB	03/30/2015	03/30/2016
1403	Ciao Wireless	CA118-3010	105+106	Preamp Assembly, 1-18 GHz, 56 dB gain	03/31/2015	03/31/2016
1537	Extech Instuments	445715	Z315813	Hygro-Thermometer	04/08/2015	04/08/2016
1396	CIR Enterprises	10m Chamber #2	002	10m Chamber with 4m turntable	08/14/2015	08/14/2016
1253	Narda West	1840N506	010-100	18 to 40 GHz Preamplifier, 40dB Gain Nominal	09/22/2015	09/22/2016
1246	Micro-Tronics	BRM50701	038	2.4 GHz Notch Filter	02/28/2015	02/28/2016
1232	Sunol Sciences	JB1	A071605-2	Bilog Antenna, 30 MHz to 2.0 GHz	09/04/2015	09/04/2016
1392	Sunol Sciences	DRH-118	A020311	1-18 GHz Double-Ridged Horn Antenna	01/05/2016	01/05/2017

Test Results – Antenna Requirement

Table No. 1	**Antenna requirement**	Verdict
		P

Type of antenna connection	☐ Integral antenna	☒ Permanently attached	☐ Unique connector
Type of unique connector	N/A		
Method of permanent connection	The antenna is a chip antenna soldered onto the PCB.		

Photographs of the PCB have been classified by client as “proprietary information” and are not included in this test report.

Supplemental Information:

Tested by (+ signature) .....: Kevin Johnson.

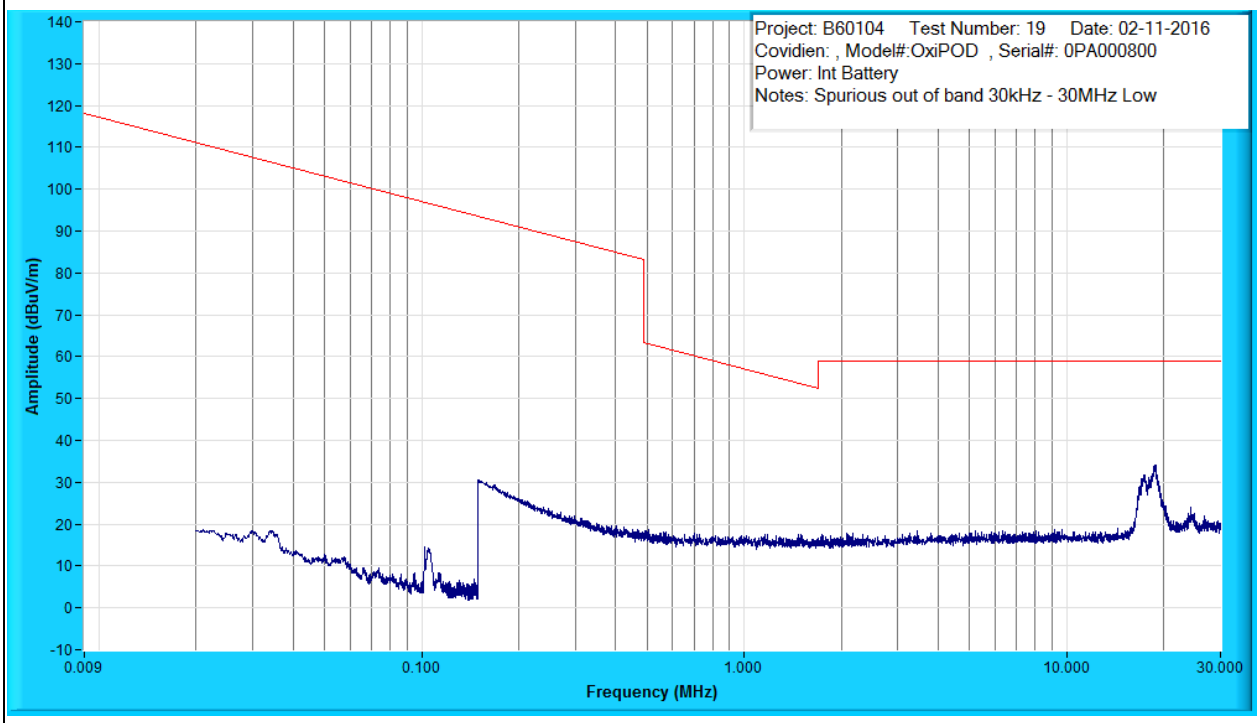
Test Results – Radiated Emissions – Harmonics, Spurious Out of Band & Restricted Bands

Table No. 2	**Radiated Emissions – Harmonics, Spurious Out of Band & Restricted Bands, Low, Mid and High Channels**	Verdict
		P

Frequency Range ..... : 30 kHz to 25 GHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 10 m (30 kHz to 1 GHz); 3 m (1-18 GHz); 1 m (18-25 GHz)
EUT Configuration ..... : See individual plots for antenna, modulation and channel details
Test Date ..... : 02-05-2016 & 02-11-2016
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

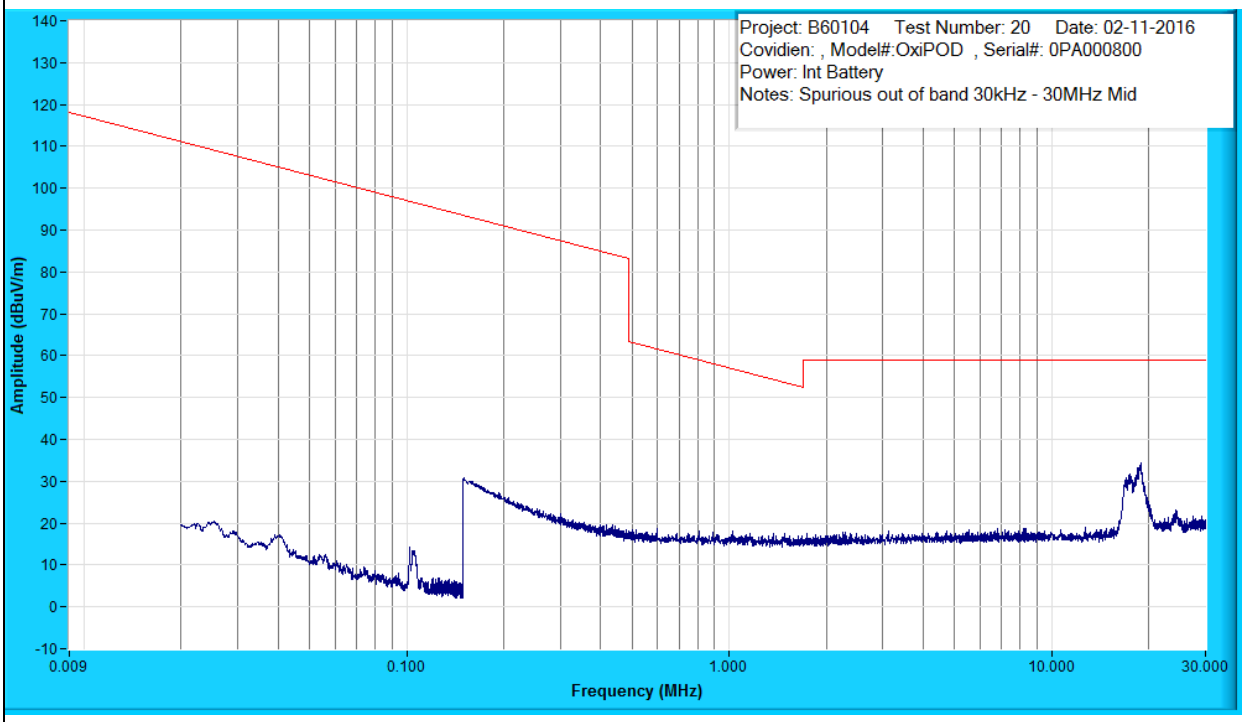
Supplemental Information:

Spurious Emissions, 30 kHz – 30 MHz low



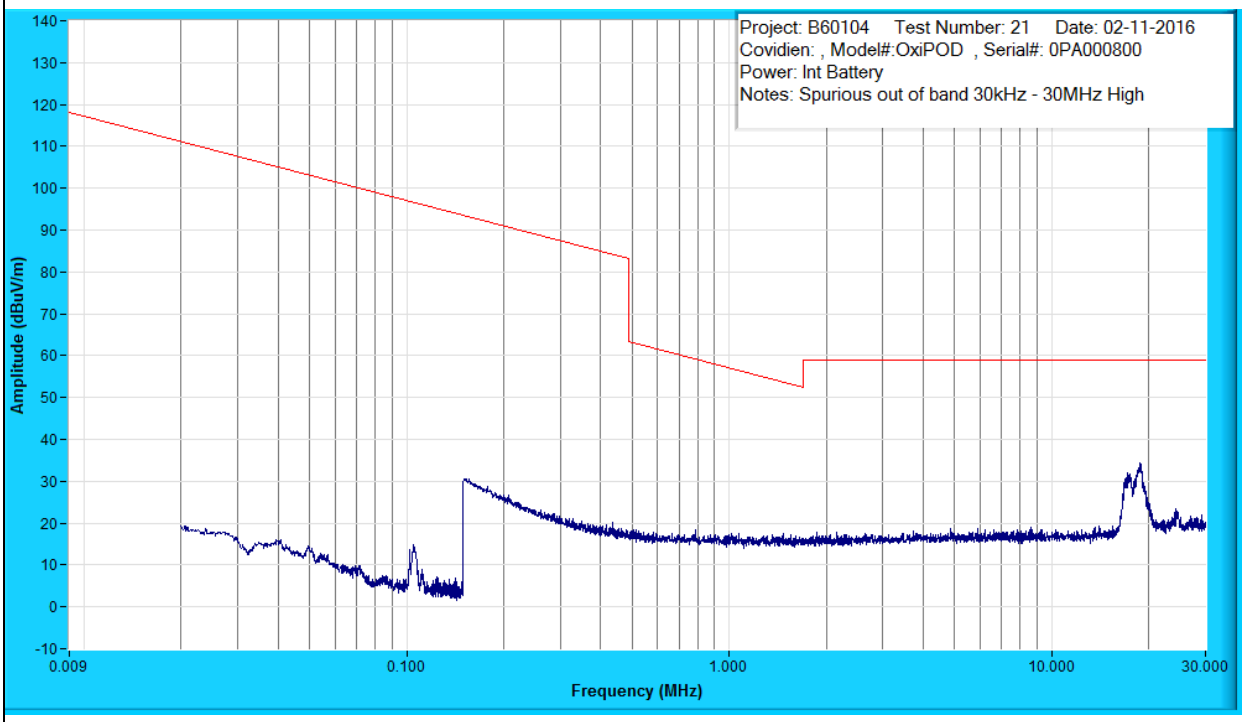
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)		Margin: FCC Part 15 Low Freq AV (dB)
AV	0.106	4.2	4.0	0.0	8.2	270/V-Pole/1.00	-	102.85
AV	17.393	30.6	5.0	0.0	35.7	315/V-Pole/1.00	-	23.42
AV	18.846	33.8	5.1	0.0	38.9	225/V-Pole/1.00	-	20.16

Spurious Emissions, 30 kHz – 30 MHz Mid



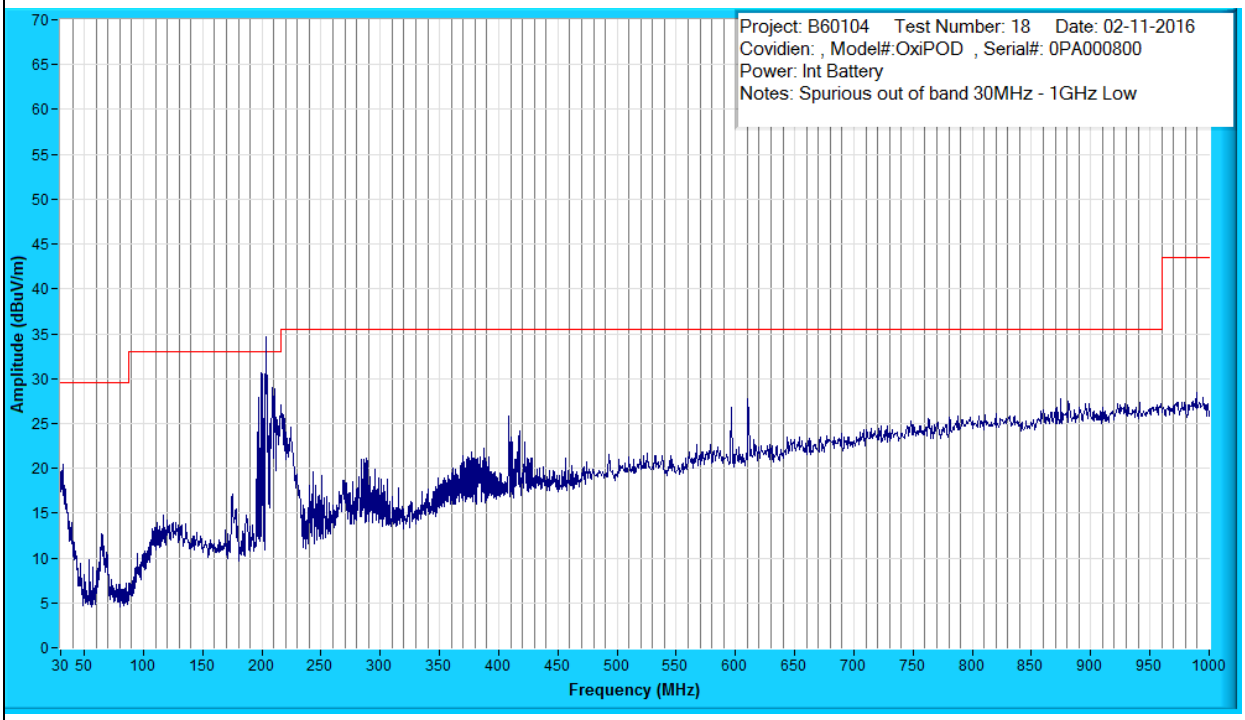
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)		Margin: FCC Part 15 Low Freq AV (dB)
AV	0.102	5.0	4.1	0.0	9.1	90/V-Pole/1.00	-	102.30
AV	16.887	30.4	5.0	0.0	35.4	225/V-Pole/1.00	-	23.65
AV	18.915	32.4	5.1	0.0	37.5	45/V-Pole/1.00	-	21.60

Spurious Emissions, 30 kHz – 30 MHz High



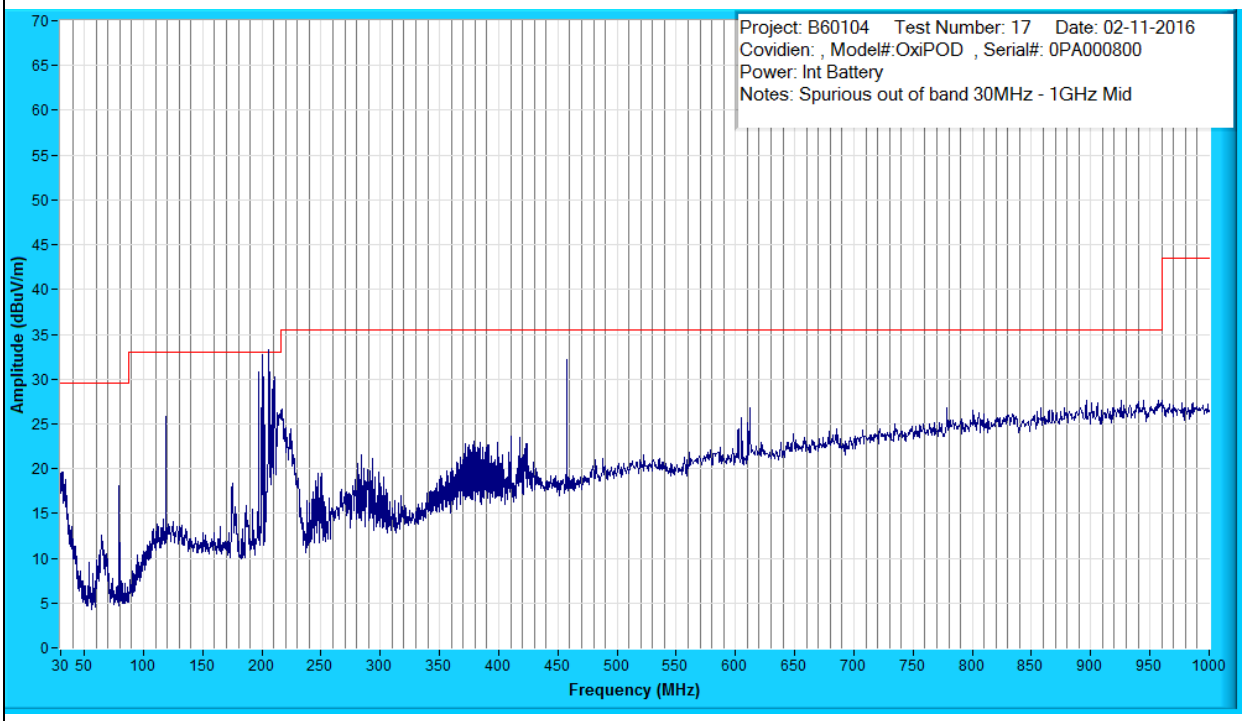
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)		Margin: FCC Part 15 Low Freq AV (dB)
AV	0.105	4.6	4.0	0.0	8.6	90/V-Pole/1.00	-	102.48
AV	17.251	32.0	5.0	0.0	37.0	185/V-Pole/1.00	-	22.07
AV	18.698	34.2	5.1	0.0	39.3	131/V-Pole/1.00	-	19.78

Spurious Emissions, 30 MHz – 1GHz, Low



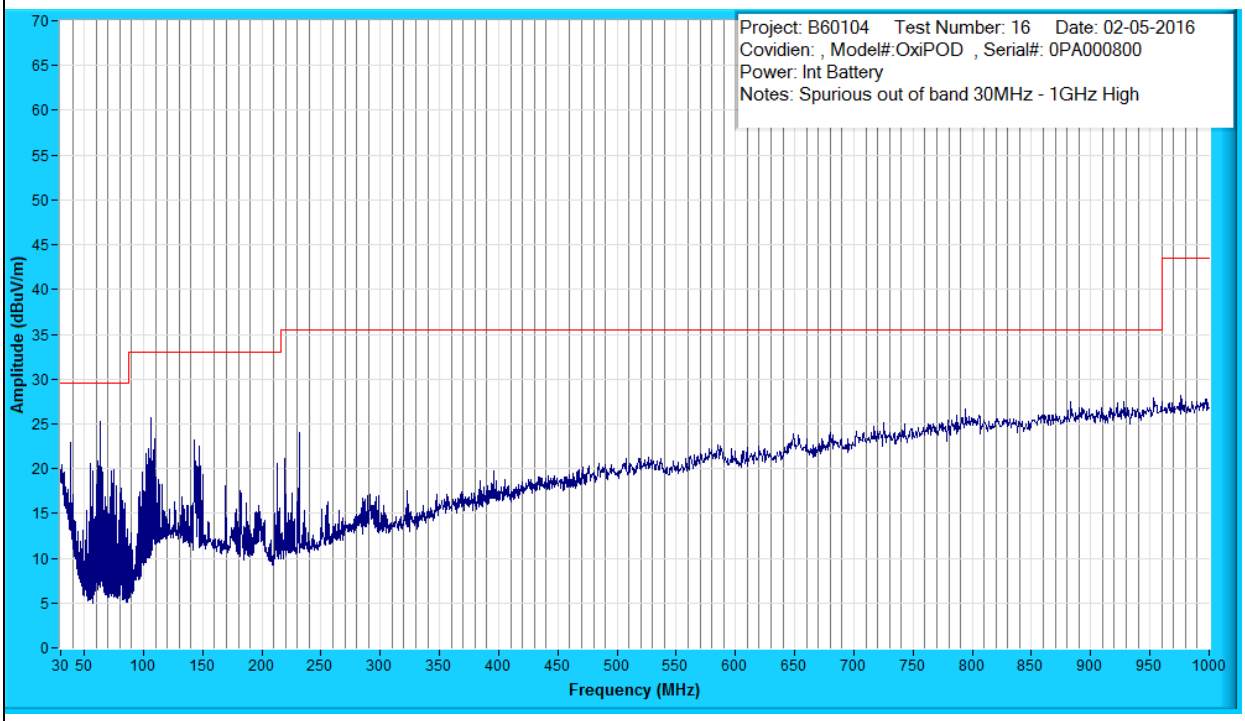
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B QP (dB)	Margin: FCC Class B AV (dB)
QP	31.563	25.3	19.9	-31.0	14.2	236/H-Pole/1.74	15.35	-
QP	200.159	31.6	12.9	-29.4	15.1	326/V-Pole/2.52	17.97	-
QP	202.923	36.8	11.5	-29.4	18.9	24/V-Pole/1.01	14.10	-
QP	211.357	38.0	10.4	-29.3	19.1	96/V-Pole/3.96	13.96	-
QP	408.222	25.2	15.8	-27.7	13.2	97/V-Pole/2.05	22.32	-

Spurious Emissions, 30 MHz – 1GHz, Mid



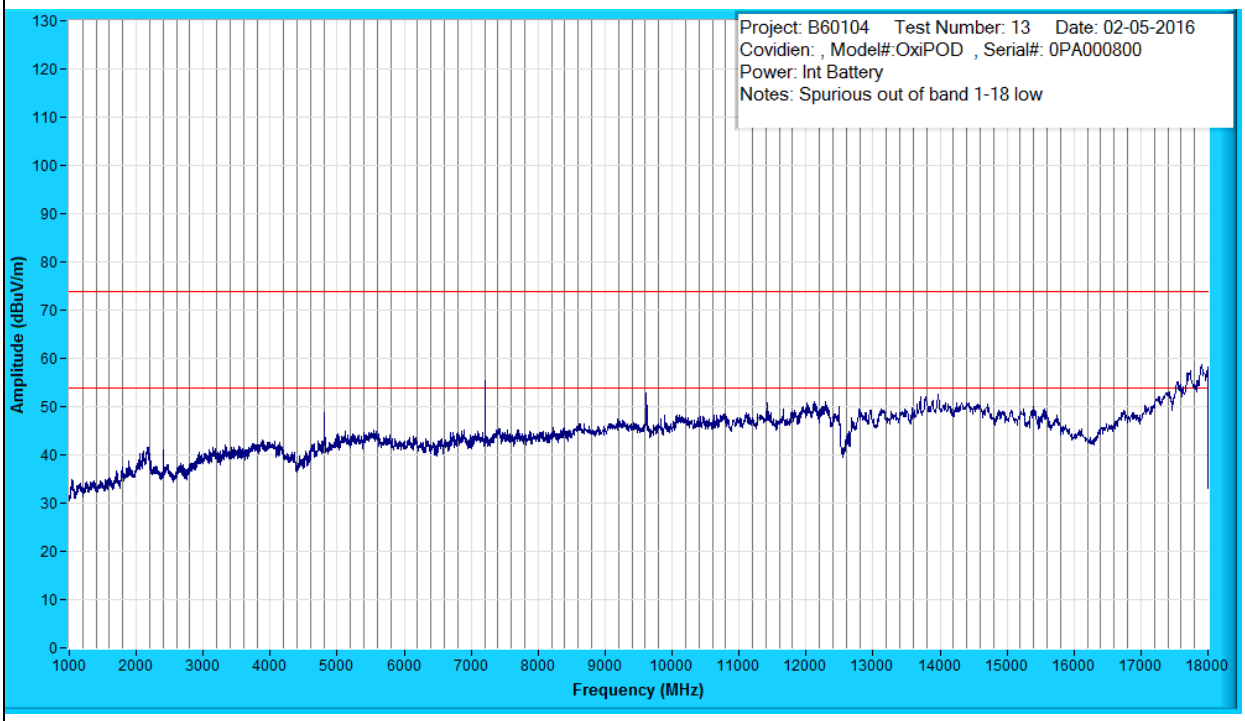
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B QP (dB)	Margin: FCC Class B AV (dB)
QP	79.826	25.6	7.7	-30.5	2.8	134/V-Pole/3.29	26.72	-
QP	118.787	24.6	13.9	-30.0	8.5	168/V-Pole/2.78	24.54	-
QP	196.917	25.7	12.8	-29.4	9.0	357/V-Pole/3.82	24.02	-
QP	200.140	32.3	12.9	-29.4	15.8	143/V-Pole/3.35	17.25	-
QP	205.416	38.7	10.5	-29.4	19.9	308/V-Pole/1.00	13.19	-
QP	458.317	25.1	16.7	-27.4	14.4	116/H-Pole/2.36	21.19	-

Spurious Emissions, 30 MHz – 1GHz, High



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B QP (dB)	Margin: FCC Class B AV (dB)
QP	38.311	24.5	15.0	-31.0	8.5	82/V-Pole/3.87	21.08	-
QP	65.289	29.8	7.9	-30.9	6.8	66/V-Pole/3.64	22.71	-
QP	106.310	25.6	12.1	-30.1	7.5	253/V-Pole/2.92	25.53	-
QP	143.238	25.2	12.8	-29.8	8.2	219/V-Pole/4.00	24.83	-
QP	212.829	24.5	10.5	-29.3	5.6	340/H-Pole/4.00	27.40	-
QP	231.763	14.7	11.1	-29.2	-3.4	225/V-Pole/4.00	38.97	-

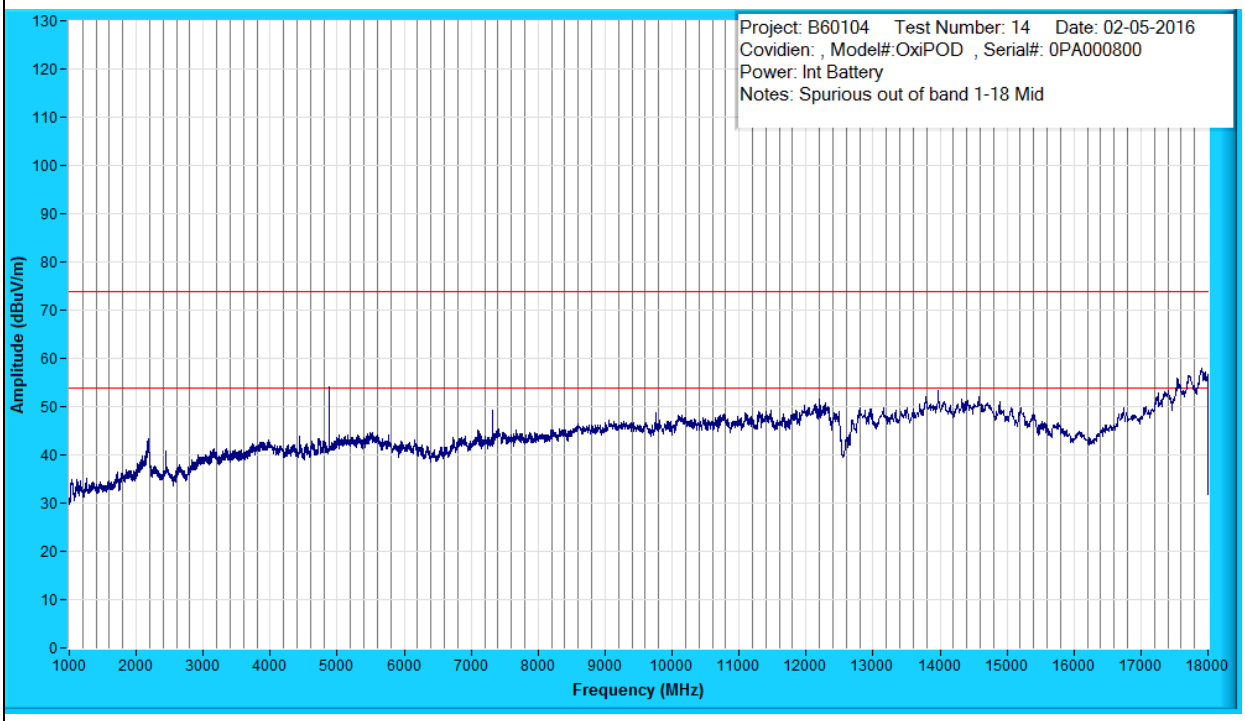
Spurious Emissions, 1GHz – 18 GHz, Low



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)
AV	4808.971	83.0	33.4	-72.1	44.3	221/H-Pole/2.60	-	9.70
PK	4808.971	90.0	33.4	-72.1	51.3	221/H-Pole/2.60	22.65	-
EUT Vertical								
AV	4809.971	83.2	33.4	-72.1	44.5	220/H-Pole/1.59	-	9.45
PK	4809.971	89.9	33.4	-72.1	51.2	220/H-Pole/1.59	22.75	-
EUT Side								
AV	4809.970	83.7	33.4	-72.1	45.0	219/V-Pole/1.72	-	8.95
PK	4809.970	89.0	33.4	-72.1	50.3	219/V-Pole/1.72	23.65	-
EUT Horizontal								
AV	7216.389	81.0	37.5	-69.8	48.6	56/V-Pole/2.67	-	5.33
PK	7216.389	88.8	37.5	-69.8	56.5	56/V-Pole/2.67	17.48	-
EUT Horizontal								
AV	7216.413	82.8	37.5	-69.8	50.4	230/V-Pole/1.51	-	3.53
PK	7216.413	90.0	37.5	-69.8	57.7	230/V-Pole/1.51	16.28	-
EUT Side								
AV	7216.413	82.3	37.5	-69.8	50.0	253/H-Pole/1.40	-	3.98
PK	7216.413	90.3	37.5	-69.8	58.0	252/H-Pole/1.40	15.98	-
EUT Vertical								

AV	9619.944	76.0	38.0	-68.2	45.8	209/H-Pole/2.21	-	8.18
PK	9619.944	83.8	38.0	-68.2	53.5	209/H-Pole/2.21	20.43	-
EUT Vertical								
AV	9619.943	74.7	38.0	-68.2	44.4	210/V-Pole/1.00	-	9.58
PK	9619.943	83.9	38.0	-68.2	53.6	210/V-Pole/1.00	20.33	-
EUT Side								
AV	9619.943	74.2	38.0	-68.2	43.9	171/H-Pole/1.96	-	10.03
PK	9619.943	83.3	38.0	-68.2	53.0	171/H-Pole/1.96	20.93	-
EUT Horizontal								
AV	12028.300	67.3	39.9	-66.8	40.4	146/H-Pole/1.03	-	13.55
PK	12028.300	78.8	39.9	-66.8	51.9	146/H-Pole/1.03	22.05	-
EUT Horizontal								
AV	12028.310	69.6	39.9	-66.8	42.7	159/V-Pole/1.04	-	11.25
PK	12028.310	81.2	39.9	-66.8	54.3	159/V-Pole/1.04	19.65	-
EUT Side								
AV	12028.000	66.7	39.9	-66.8	39.8	159/V-Pole/1.12	-	14.15
PK	12028.000	77.7	39.9	-66.8	50.8	159/V-Pole/1.12	23.15	-
EUT Vertical								

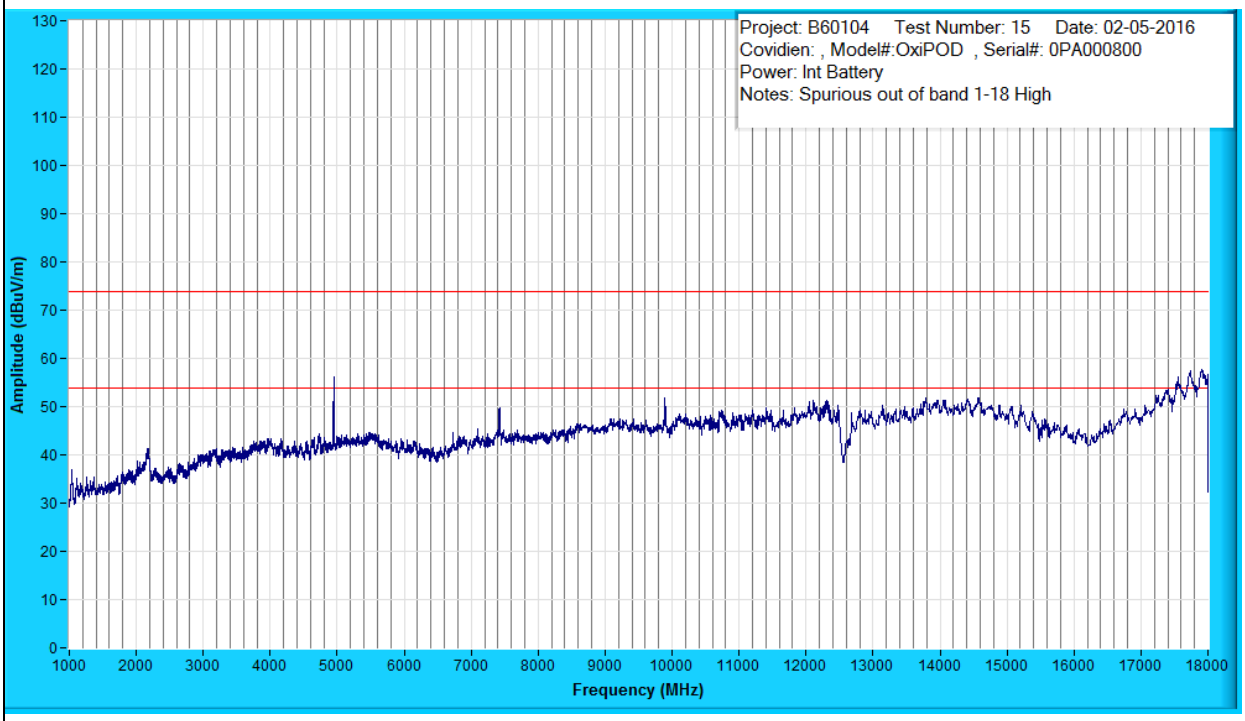
Spurious Emissions, 1GHz – 18 GHz, Mid



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)
AV	4878.974	88.2	33.6	-72.0	49.7	92/V-Pole/2.51	-	4.29
PK	4878.974	93.5	33.6	-72.0	55.0	92/V-Pole/2.51	18.94	-
EUT Horizontal								
AV	4878.976	87.8	33.6	-72.0	49.4	146/H-Pole/1.07	-	4.59
PK	4878.976	93.4	33.6	-72.0	54.9	146/H-Pole/1.07	19.04	-
EUT Side								
AV	4879.026	85.8	33.6	-72.0	47.4	130/H-Pole/3.70	-	6.59
PK	4879.026	92.6	33.6	-72.0	54.1	130/H-Pole/3.70	19.84	-
EUT Vertical								
AV	7318.563	70.6	37.6	-69.5	38.7	345/V-Pole/1.74	-	15.27
PK	7318.563	81.1	37.6	-69.5	49.2	345/V-Pole/1.74	24.77	-
EUT Vertical								
AV	7318.413	79.1	37.6	-69.5	47.2	222/V-Pole/2.63	-	6.77
PK	7318.413	88.5	37.6	-69.5	56.6	222/V-Pole/2.63	17.37	-
EUT Side								
AV	7318.233	74.3	37.6	-69.5	42.4	42/V-Pole/2.91	-	11.53

PK	7318.233	85.2	37.6	-69.5	53.3	42/V-Pole/2.91	20.68	-
EUT Horizontal								
AV	9761.944	70.5	38.1	-67.7	40.9	166/H-Pole/2.15	-	13.04
PK	9761.944	80.7	38.1	-67.7	51.1	166/H-Pole/2.15	22.89	-
EUT Horizontal								
AV	9761.945	70.8	38.1	-67.7	41.2	150/V-Pole/1.94	-	12.74
PK	9761.945	81.2	38.1	-67.7	51.6	150/V-Pole/1.94	22.39	-
EUT Side								
AV	9757.942	71.5	38.1	-67.7	41.8	10/H-Pole/2.11	-	12.11
PK	9757.942	82.2	38.1	-67.7	52.5	10/H-Pole/2.11	21.41	-
EUT Vertical								
AV	12201.000	66.3	40.0	-67.1	39.1	187/H-Pole/1.43	-	14.84
PK	12201.000	77.1	40.0	-67.1	49.9	187/H-Pole/1.43	24.04	-
EUT Vertical								
AV	12201.000	64.3	40.0	-67.1	37.2	185/H-Pole/1.07	-	16.79
PK	12201.000	76.7	40.0	-67.1	49.5	214/H-Pole/1.07	24.44	-
EUT Side								
AV	12201.000	64.8	40.0	-67.1	37.6	144/H-Pole/1.59	-	16.39
PK	12201.000	77.2	40.0	-67.1	50.0	144/H-Pole/1.59	23.94	-
EUT Horizontal								

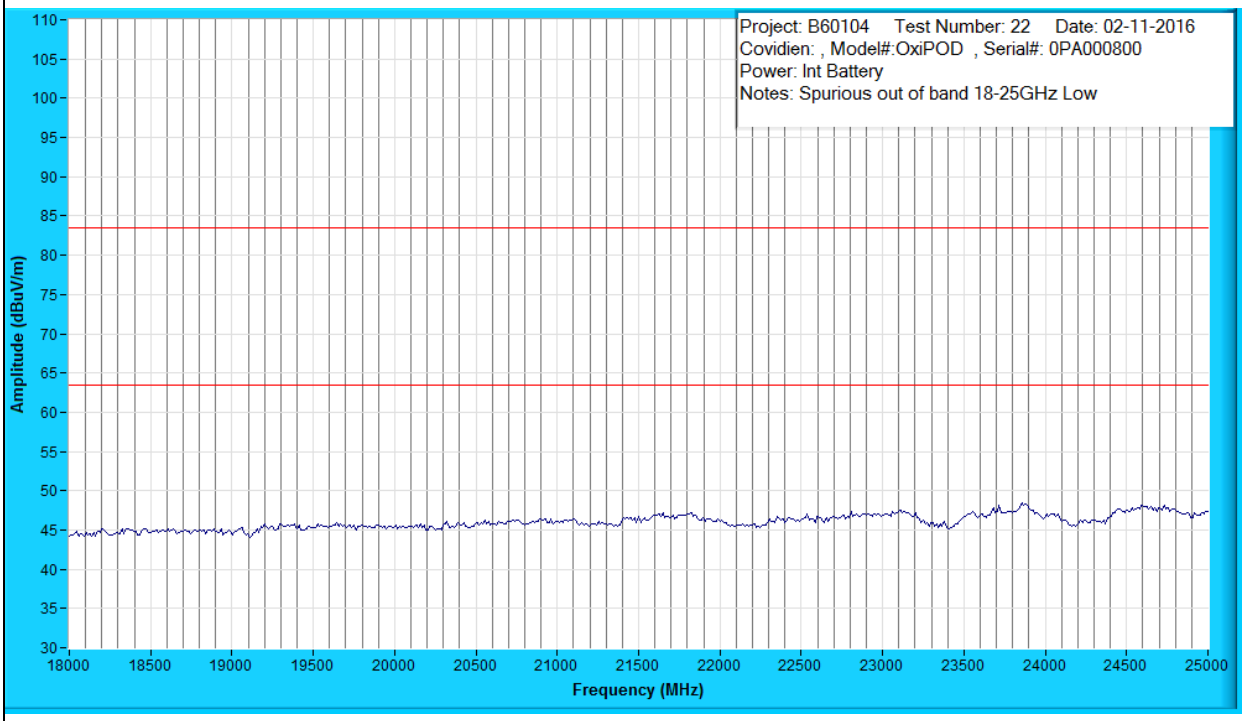
Spurious Emissions, 1GHz – 18 GHz, High



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)
AV	4948.970	89.0	33.8	-71.8	51.0	95/V-Pole/2.25	-	2.99
PK	4948.970	95.2	33.8	-71.8	57.2	95/V-Pole/2.25	16.79	-
EUT Vertical								
AV	4948.970	90.7	33.8	-71.8	52.6	73/H-Pole/1.91	-	1.34
PK	4948.970	96.9	33.8	-71.8	58.9	73/H-Pole/1.91	15.09	-
EUT Side								
AV	4948.970	88.6	33.8	-71.8	50.6	88/V-Pole/1.90	-	3.39
PK	4948.970	94.8	33.8	-71.8	56.8	88/V-Pole/1.90	17.19	-
EUT Horizontal								
AV	7426.361	76.3	37.6	-68.6	45.3	72/V-Pole/2.37	-	8.64
PK	7426.361	84.8	37.6	-68.6	53.8	72/V-Pole/2.37	20.14	-
EUT Horizontal								
AV	7426.361	78.0	37.6	-68.6	47.1	69/V-Pole/1.42	-	6.89
PK	7426.361	86.1	37.6	-68.6	55.1	69/V-Pole/1.42	18.84	-
EUT Side								
AV	7426.361	79.5	37.6	-68.6	48.6	76/H-Pole/2.10	-	5.39

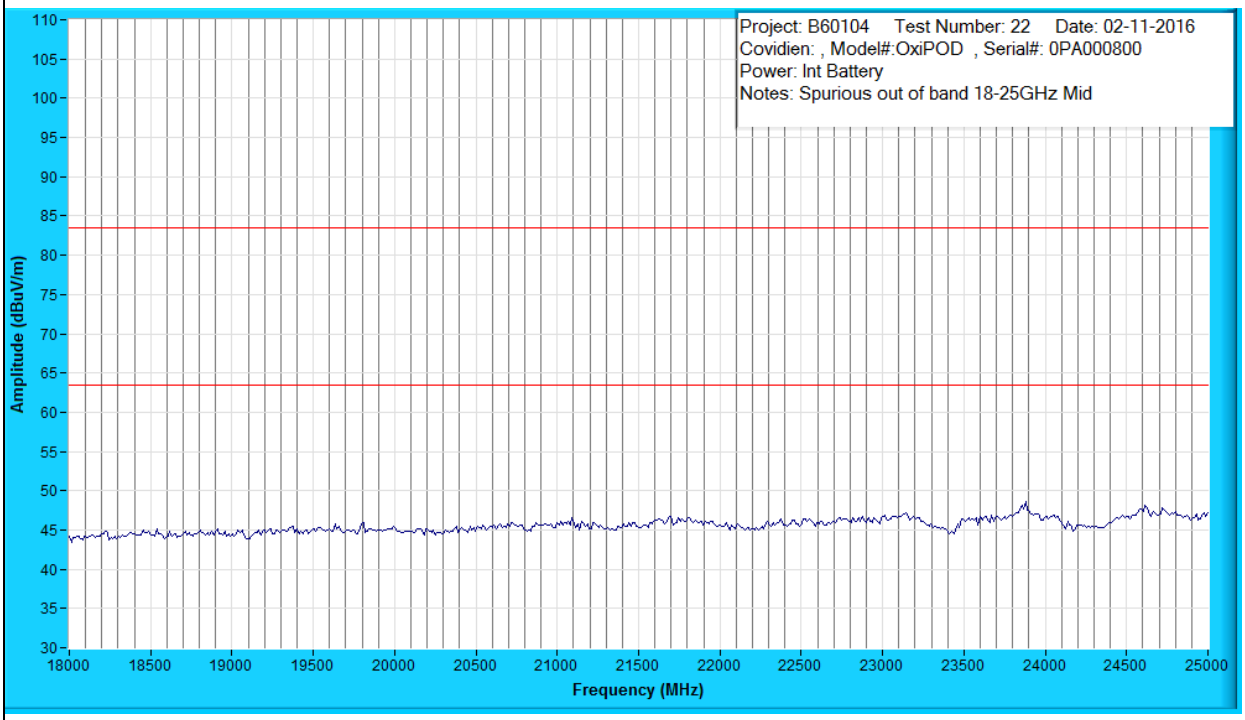
PK	7426.361	87.5	37.6	-68.6	56.5	76/H-Pole/2.10	17.44	-
EUT Vertical								
AV	9897.933	70.8	38.2	-66.8	42.1	152/H-Pole/1.11	-	11.85
PK	9897.933	81.7	38.2	-66.8	53.1	152/H-Pole/1.11	20.90	-
EUT Vertical								
AV	9897.933	72.6	38.2	-66.8	44.0	154/V-Pole/1.65	-	10.00
PK	9897.933	82.3	38.2	-66.8	53.7	154/V-Pole/1.65	20.30	-
EUT Side								
AV	9897.933	72.7	38.2	-66.8	44.0	155/H-Pole/2.86	-	9.95
PK	9897.933	82.5	38.2	-66.8	53.9	155/H-Pole/2.86	20.10	-
EUT Horizontal								
AV	12372.600	65.2	40.0	-67.4	37.8	130/H-Pole/1.07	-	16.17
PK	12372.600	77.8	40.0	-67.4	50.4	130/H-Pole/1.07	23.52	-
EUT Horizontal								
AV	12372.600	64.8	40.0	-67.4	37.5	172/H-Pole/1.02	-	16.47
PK	12372.600	76.8	40.0	-67.4	49.4	172/H-Pole/1.02	24.52	-
EUT Side								
AV	12372.600	67.8	40.0	-67.4	40.4	150/V-Pole/1.15	-	13.52
PK	12372.600	79.7	40.0	-67.4	52.3	150/V-Pole/1.15	21.62	-
EUT Vertical								

Spurious Emissions, 18 GHz – 25GHz, Low



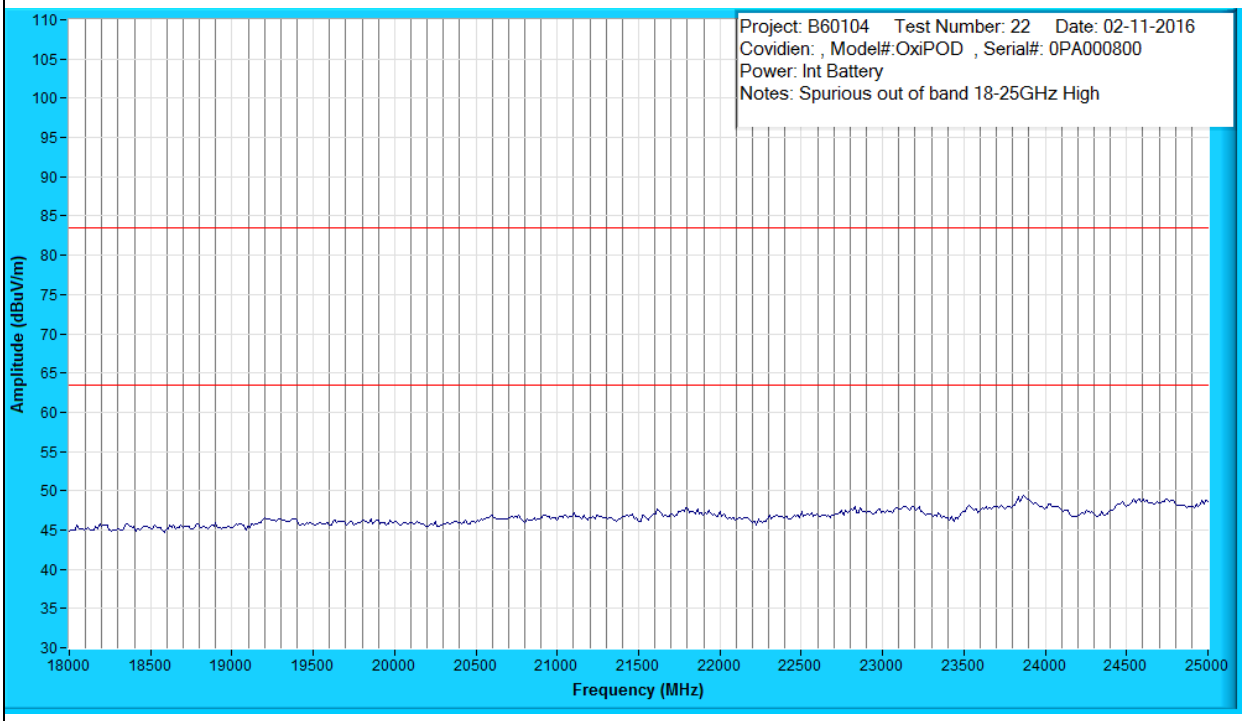
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)

Spurious Emissions, 18 GHz – 25GHz, Mid



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)

Spurious Emissions, 18 GHz – 25GHz, High



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)

All harmonics, spurious out-of-band and restricted band emissions complied with the limits defined by FCC 15.209. Pass.

Tested by (+ signature) .....: Kevin Johnson.

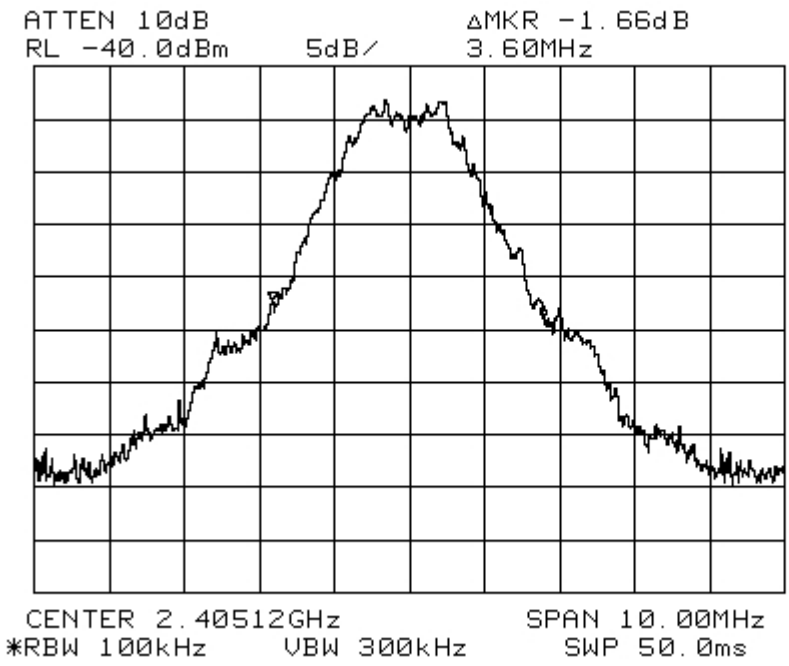
Test Results – 99% Occupied Bandwidth

Table No. 3	99% Occupied Bandwidth	Verdict
		P

Frequency Range ..... : 2,402 to 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit - mid
Test Date ..... : 02-04-2016
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

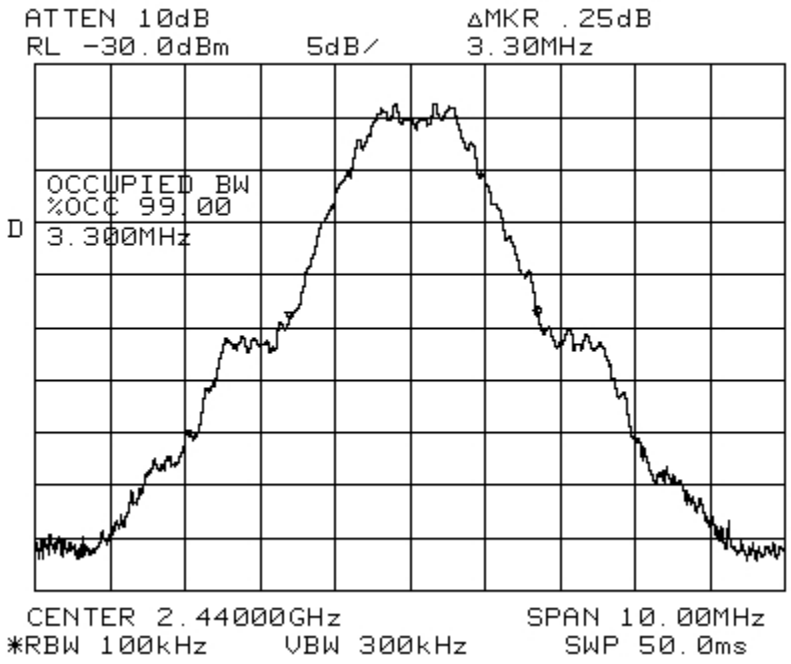
Supplemental Information:

99% BW - Low



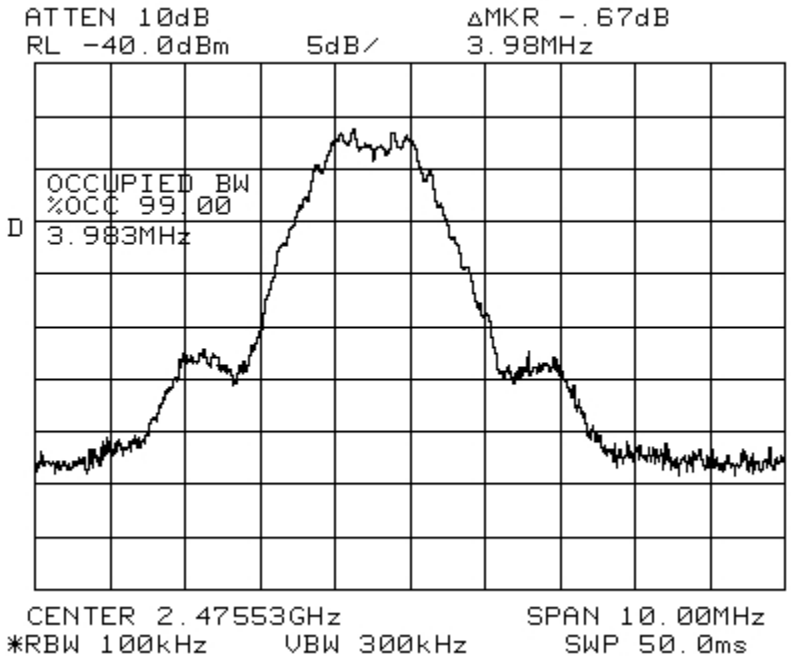
The 99% occupied BW for the lowest frequency is 3.60 MHz.

99% BW - Mid



The 99% occupied BW for the middle frequency is 3.30 MHz.

99% BW – High



The 99% occupied BW for the highest frequency is 3.98 MHz.

Tested by (+ signature) .....: Kevin Johnson.

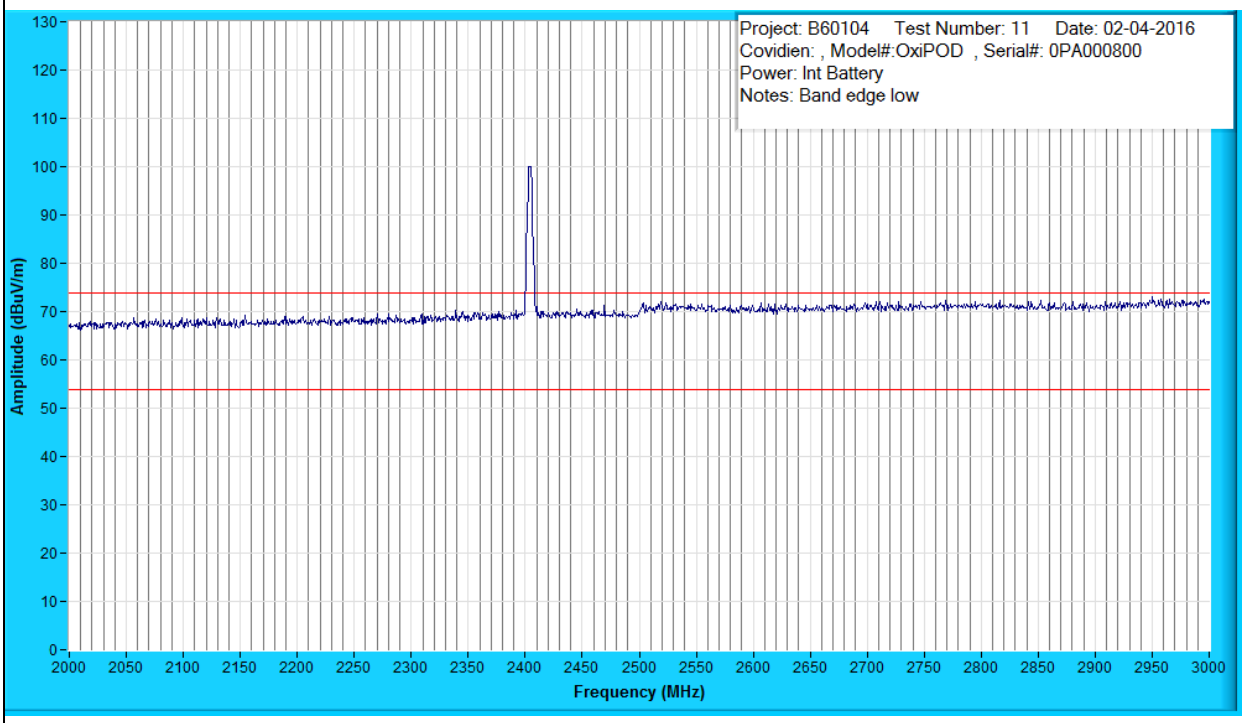
Test Results – Band Edge

Table No. 4	Band-Edge	Verdict
		P

Frequency Range ..... : 2,402 MHz & 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit – low and high
Test Date ..... : 02-05-2016
Temperature ..... : 21°C Relative Humidity .... : 26 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

Supplemental Information:

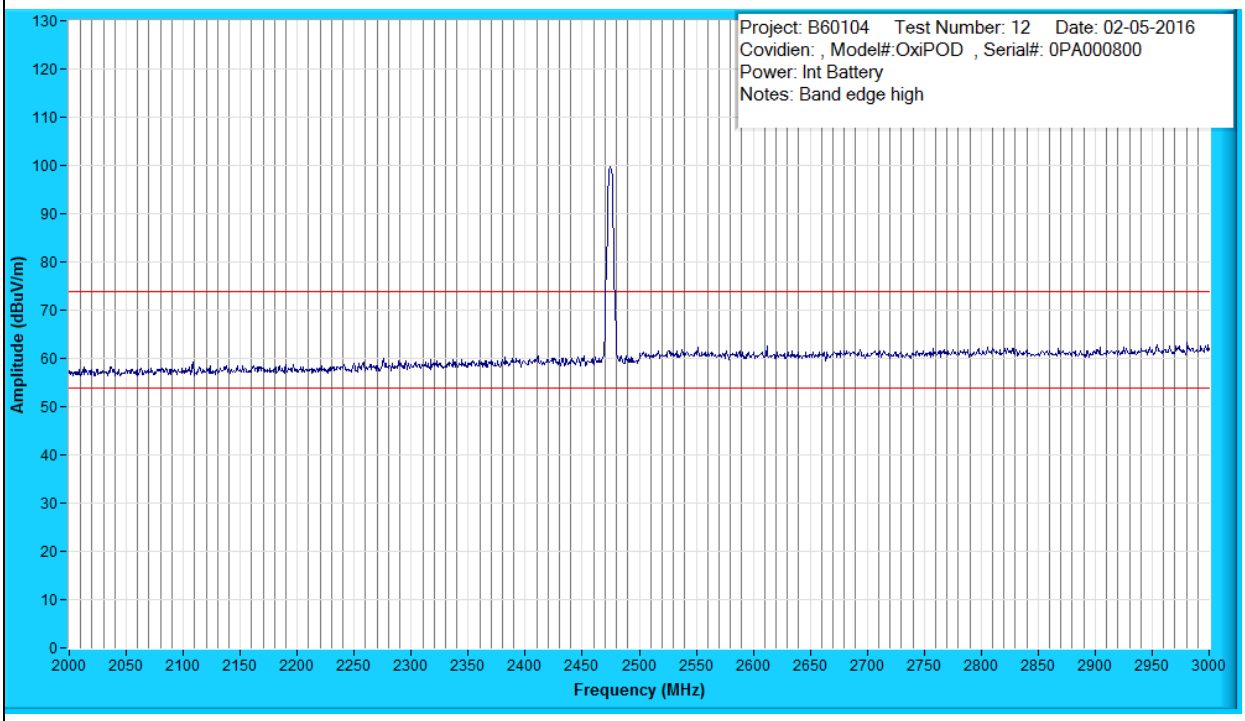
Lower Band Edge



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)
AV	2400.000	29.0	29.6	0.0	58.6	16/V-Pole/1.52	-	-4.65
PK	2400.000	33.7	29.6	0.0	63.3	16/V-Pole/1.52	10.65	-
AV	2399.000	28.1	29.6	0.0	57.8	66/V-Pole/1.36	-	-3.79
PK	2399.000	32.7	29.6	0.0	62.3	66/V-Pole/1.36	11.66	-
AV	2398.000	27.9	29.6	0.0	57.5	36/V-Pole/1.50	-	-3.58
PK	2398.000	31.9	29.6	0.0	61.5	36/V-Pole/1.51	12.47	-
AV	2397.000	28.0	29.6	0.0	57.6	36/V-Pole/1.62	-	-3.62
PK	2397.000	31.0	29.6	0.0	60.6	36/V-Pole/1.62	13.38	-

Band edge low

Upper Band Edge



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B >1GHz PK (dB)	Margin: FCC Class B >1GHz AV (dB)
AV	2483.500	18.8	29.7	0.0	48.4	45/H-Pole/1.42	-	5.55
PK	2483.500	32.0	29.7	0.0	61.7	45/H-Pole/1.42	12.30	-
AV	2484.500	18.5	29.7	0.0	48.2	45/H-Pole/1.96	-	5.80
PK	2484.500	31.6	29.7	0.0	61.3	45/H-Pole/1.96	12.70	-
AV	2485.500	18.1	29.7	0.0	47.8	27/H-Pole/1.75	-	6.15
PK	2485.500	31.1	29.7	0.0	60.8	27/H-Pole/1.75	13.20	-
AV	2486.500	18.1	29.7	0.0	47.8	43/H-Pole/1.59	-	6.20
PK	2486.500	30.7	29.7	0.0	60.4	43/H-Pole/1.59	13.60	-
Band edge high								

Band-edge should be -20 dBc (peak) and -30 dBc (average), or must comply with the limits of 15.209 if they fall in a restricted band.

Average values for both lower and upper band-edge comply with the FCC 15.209 limits => Pass.

Tested by (+ signature) .....: Kevin Johnson.

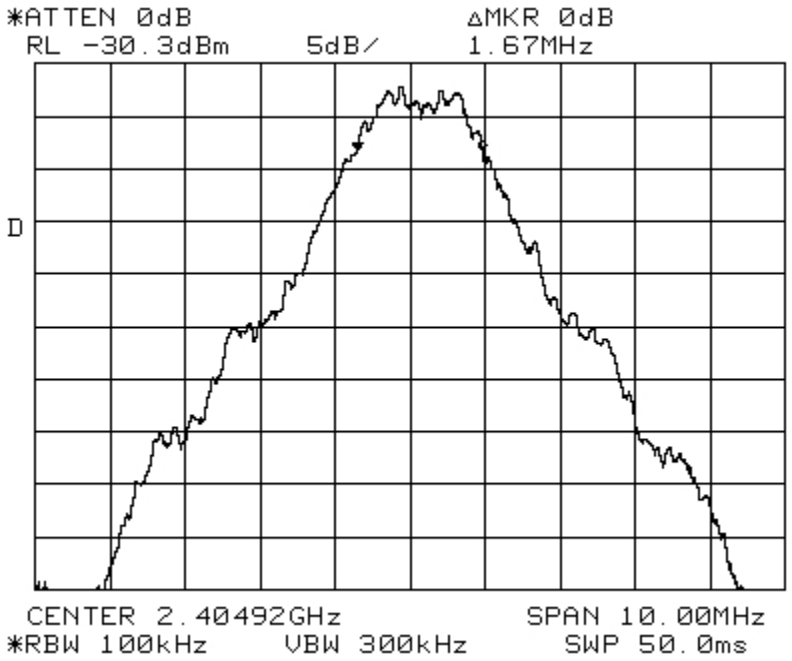
Test Results – 6 dB Occupied Bandwidth

Table No. 5	6 dB Bandwidth	Verdict
		P

Frequency Range ..... : 2,402 to 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit – low, mid and high
Test Date ..... : 02-04-2016
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

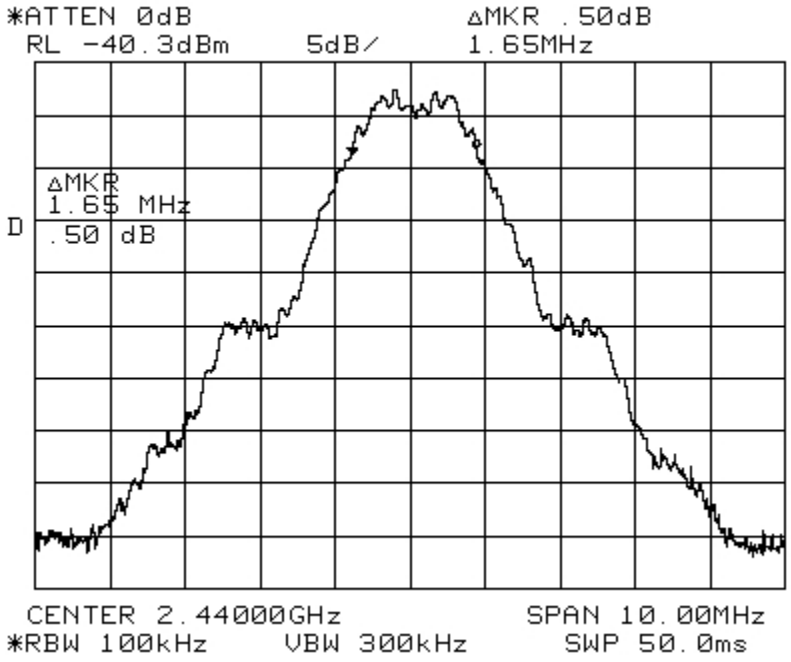
Supplemental Information:

6dB BW Low



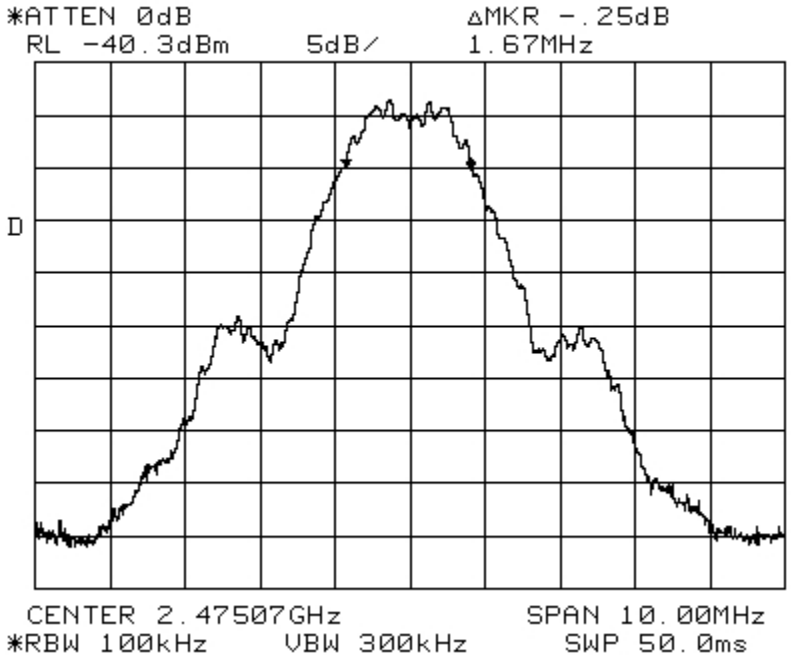
The 6 dB bandwidth for the low frequency is 1.67 MHz.

6dB BW Mid



The 6 dB bandwidth for the mid frequency is 1.65 MHz.

6 dB BW High



The 6 dB bandwidth for the high frequency is 1.67 MHz.

DTS 6 dB bandwidth shall be at least 500 kHz.

Minimum measured 6 dB bandwidth was 1.65 MHz => Pass.

Tested by (+ signature) .....: Kevin Johnson.

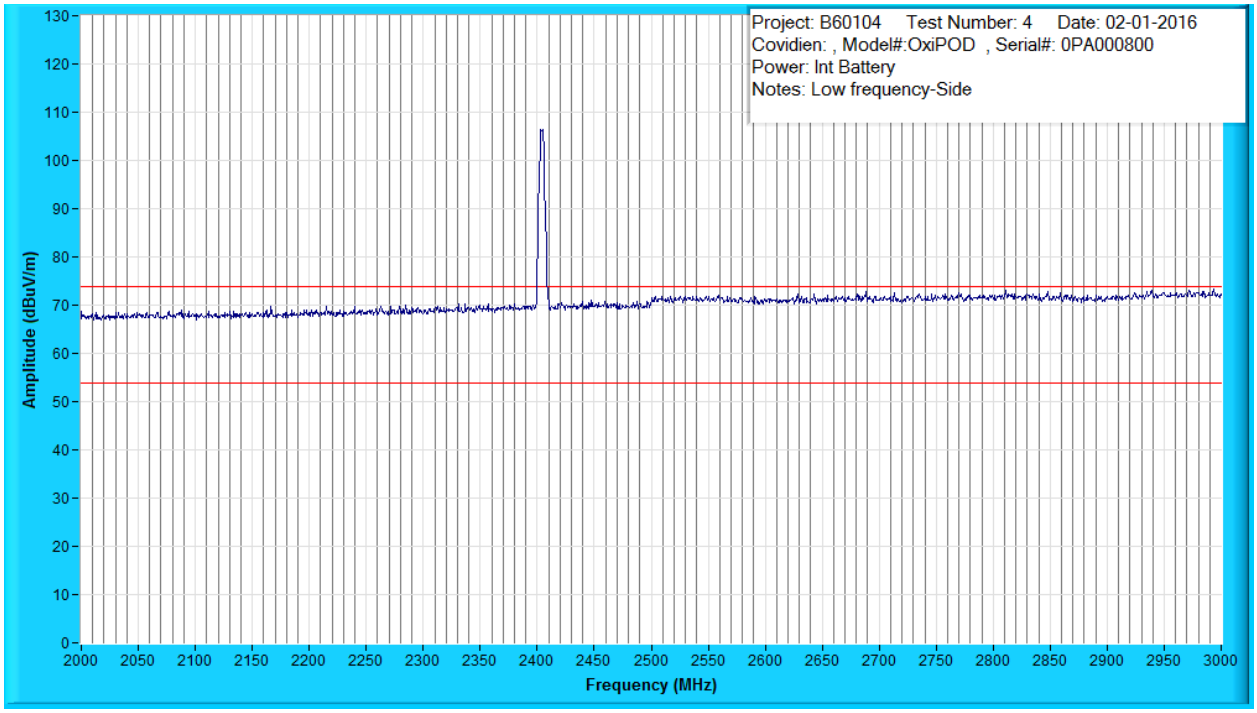
Test Results – Fundament Field Strength

Table No. 6	Fundamental Field Strength	Verdict
		P

Frequency Range ..... : 2,402 to 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit – low, mid and high
Test Date ..... : 02-04-2016.
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

Supplemental Information:

Radiated Fundamental Field Strength, Low



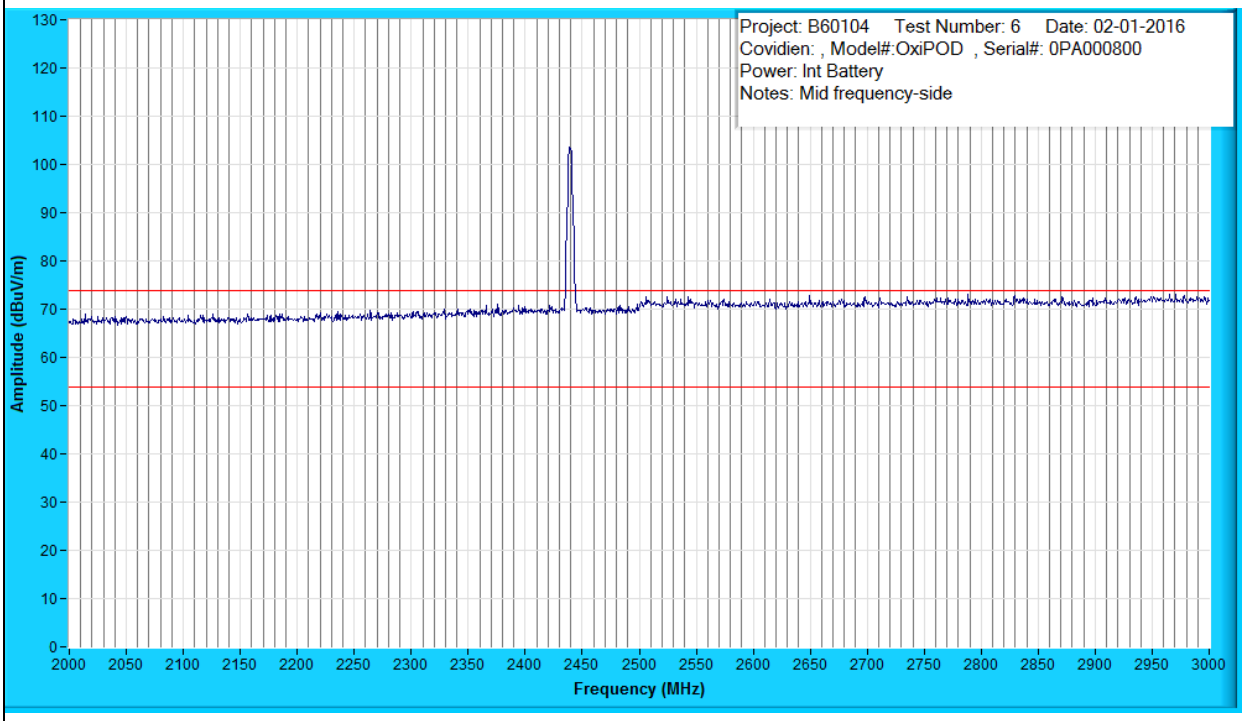
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/ Hgt(m)	Duty Cycle Correction (dB)	Final Peak (dBuV/m) @ 3 meters	Final Average (dBuV/m) @ 3 meters
AV	2404.481	73.5	29.6	0.0	103.1	92/V-Pole/1.15	-19.2	-	83.9
PK	2404.481	77.5	29.6	0.0	107.1	92/V-Pole/1.15	N/A	107.1	-

Low frequency

Average Limit is 94 dBuV/m @ 3 meters; with duty cycle correction, product meets average limit with 10.1 dB margin.

Peak Limit is 114 dBuV/m @ 3 meters; product meets peak limit with 6.9 dB margin.

Radiated Fundamental Field Strength, Mid



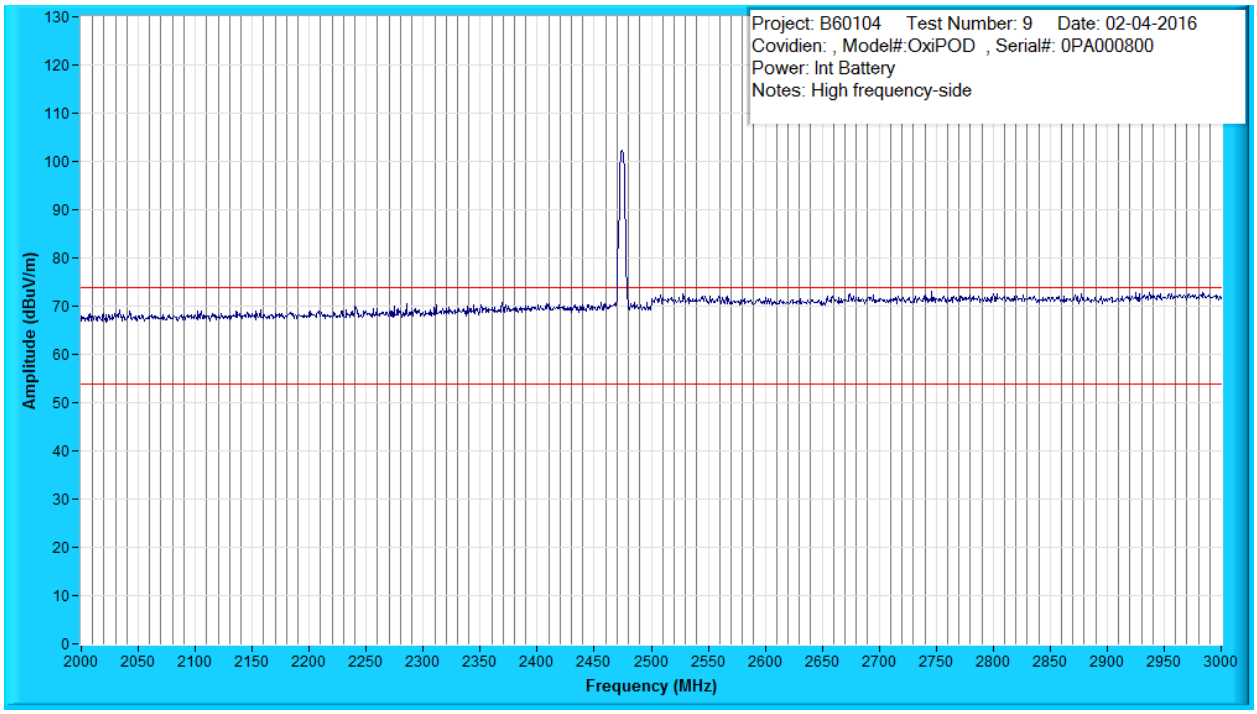
Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/ Hgt(m)	Duty Cycle Correction (dB)	Final Peak (dBuV/m) @ 3 meters	Final Average (dBuV/m) @ 3 meters
AV	2439.425	70.3	29.6	0.0	100.0	86/V-Pole/1.11	-19.2	-	80.8
PK	2439.425	74.9	29.6	0.0	104.5	86/V-Pole/1.11	N/A	104.5	-

Mid frequency

Average Limit is 94 dBuV/m @ 3 meters; with duty cycle correction, product meets average limit with 13.2 dB margin.

Peak Limit is 114 dBuV/m @ 3 meters; product meets peak limit with 9.5 dB margin.

Radiated Fundamental Field Strength, High



Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/ Hgt(m)	Duty Cycle Correction (dB)	Final Peak (dBuV/m) @ 3 meters	Final Average (dBuV/m) @ 3 meters
AV	2474.978	71.7	29.6	0.0	101.3	96/V-Pole/1.24	-19.2	-	82.1
PK	2474.978	72.9	29.6	0.0	102.5	96/V-Pole/1.24	N/A	102.5	-

Mid frequency

Average Limit is 94 dBuV/m @ 3 meters; with duty cycle correction, product meets average limit with 11.9 dB margin.

Peak Limit is 114 dBuV/m @ 3 meters; product meets peak limit with 11.5 dB margin.

Fundamental Radiated Field Strength Limit is 50 mV/m at 3 meters. This equates to 94 dBuV/m (average) and 114 dBuV/m (peak). A duty cycle correction of -19.2 dB was applied to the average measurements. The derivation for the duty cycle correction is shown below.

The duty cycle correction was used, as follows: 20 log (t_{on} msec/100 msec). "t_{on}" over a 100 msec period was 11 msec, resulting in a duty cycle correction of -19.2 dB. Duty cycle data is contained in a separate appendix of this report.

With the duty cycle correction, all maximized average emissions were under the 94 dBuV/m limit. => Pass.

All maximized peak emissions were under the 114 dBuV/m limit => Pass.

Tested by (+ signature) .....: Kevin Johnson.

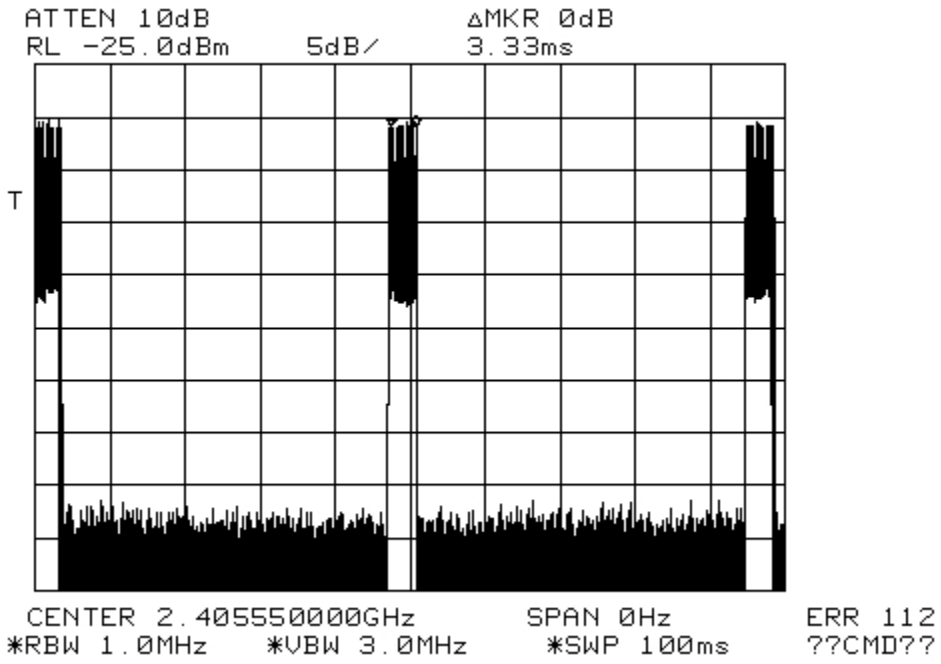
Test Results – Duty Cycle

Table No. 7	Duty Cycle	Verdict
		P

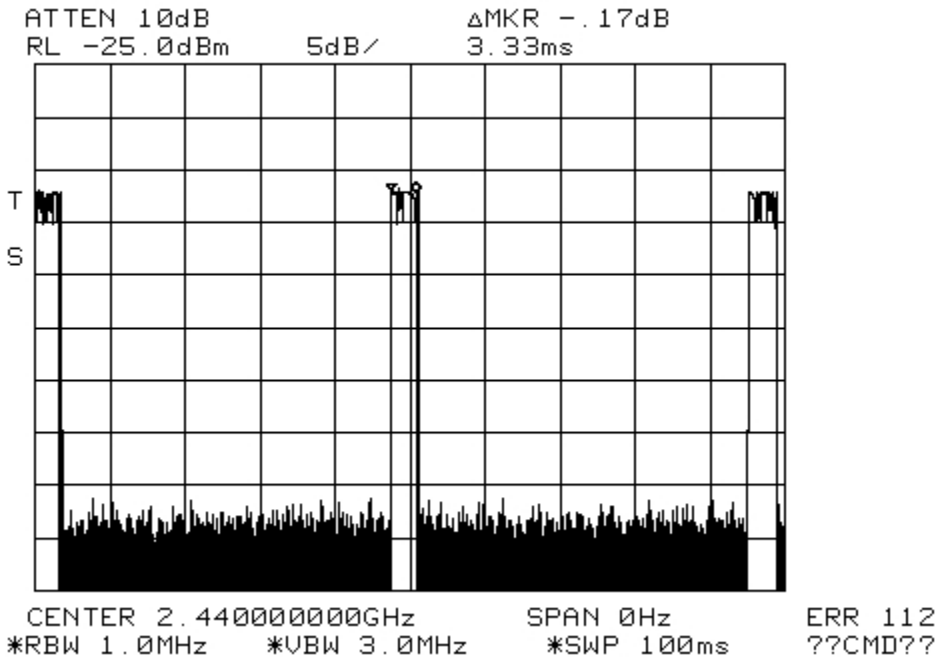
Frequency Range ..... : 2,402 to 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit – low, mid and high
Test Date ..... : 02-04-2016
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

Supplemental Information:

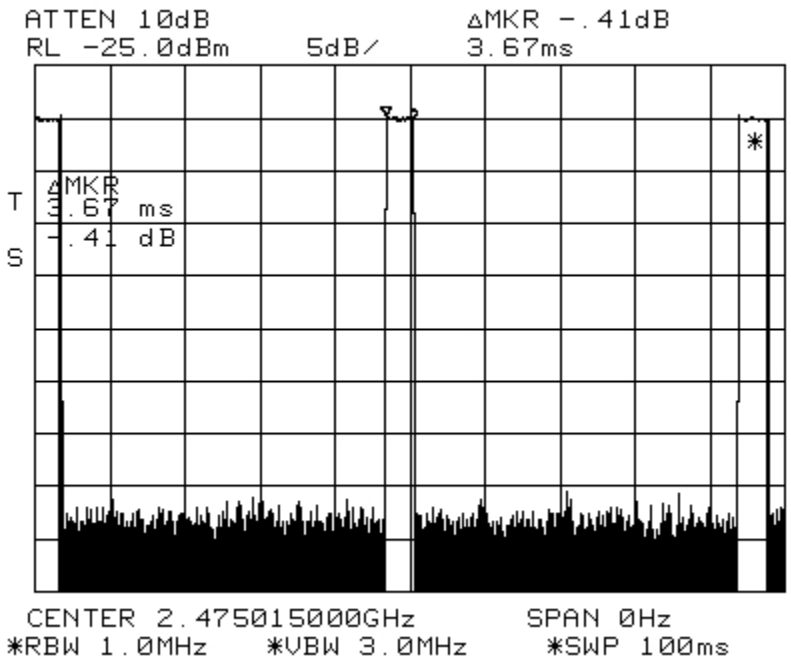
Duty Cycle over 100 msec – Low



Duty Cycle over 100 msec - MID



Duty Cycle over 100 msec - High



The duty cycle correction was calculated, as follows:

- t_{on} over 100 msec was (3.67 msec x 3) = 11 msec
- Duty cycle correction equation is 20 log (t_{on} msec/100 msec).
- Duty cycle correction is 20 log (11 msec/100 msec) = -19.2 dB.
- Duty cycle correction is -19.2 dB.

Tested by (+ signature) .....: Kevin Johnson.

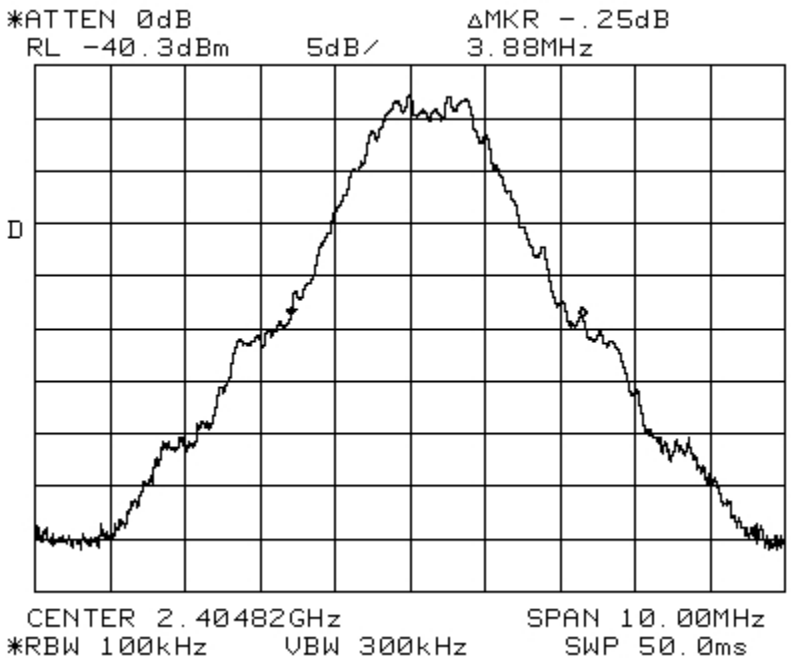
Test Results – 20 dB Bandwidth

Table No. 8	20 dB Bandwidth	Verdict
		P

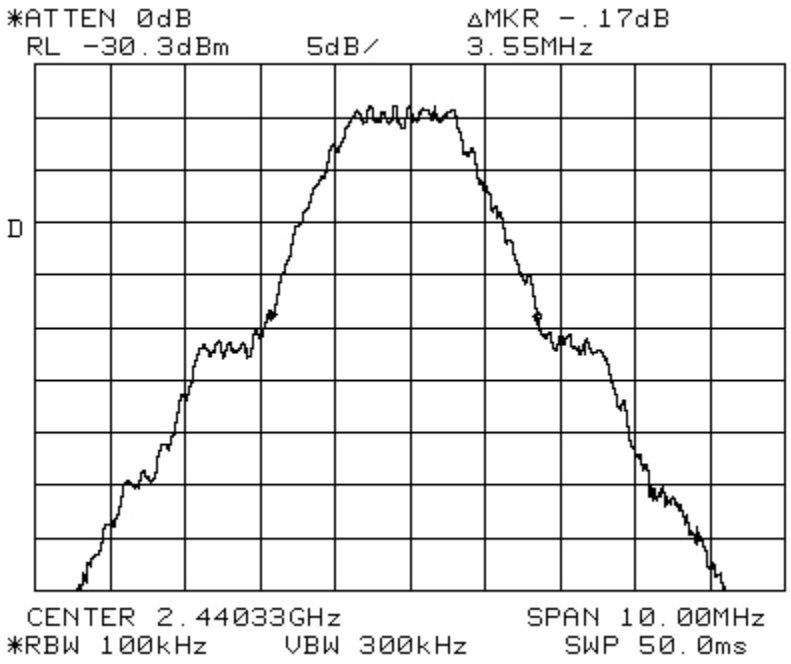
Frequency Range ..... : 2,402 to 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit with full modulation – low, mid and high
Test Date ..... : 02-04-2016.
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

Supplemental Information:

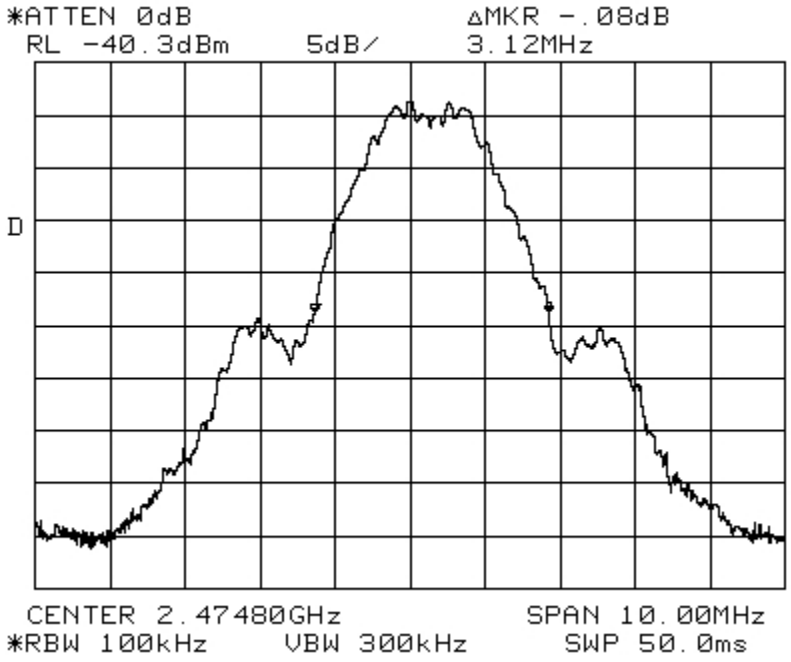
20 dB Bandwidth - Low



20 dB Bandwidth - Mid



20 dB Bandwidth - High



Tested by (+ signature) .....: Kevin Johnson.

Test Results – RF Power Output

Table No. 7	RF Power Output	Verdict
		P

Frequency Range ..... : 2,402 to 2,480 MHz Test Location ..... : 10m Chamber #2
Test Method..... : ANSI C63.4 & ANSI C63.10
Test Distance ..... : 3 meters
EUT Configuration ..... : Transmit – low, mid and high
Test Date ..... : 02-04-2016
Temperature ..... : 22°C Relative Humidity .... : 24 %
Test Equipment Asset Tag List : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

Supplemental Information:

Maximum average RF power output was calculated for the purposes of completing the SAR Exemption Letter. (Maximum average power numbers included the duty cycle correction.)

Peak Power Calculation

Frequency (MHz)	P_{meas} Meter reading (dBm)	G_R RX antenna gain (dBi)	L_C Cable loss (dB)	G_{amp} Pre-amp Gain (dB)	P_R Adjusted RX Power (dBm)	L_P Free-space propogation loss (dB)	**EIRP (dBm)**	G_T TX antenna gain (dBi)	**P_T Transmit power at antenna port (dBm)**	**Duty Cycle Correction (dB)**	**Final Transmit Power at antenna port (dBm)**	P_T Transmit power at antenna port (mW)
2404.000	-29.5	8.3	5.3	0.0	-32.5	49.7	**17.2**	1.0	**16.2**	**-19.2**	**-3.0**	0.497
2439.000	-32.1	8.3	5.6	0.0	-34.8	49.8	**15.0**	1.0	**14.0**	**-19.2**	**-5.2**	0.301
2475.000	-34.9	8.3	5.6	0.0	-37.6	49.9	**12.3**	1.0	**11.3**	**-19.2**	**-7.9**	0.163

The highest peak power is 0.497 mW at 2,404 MHz.

Tested by (+ signature) .....: Kevin Johnson.

Test Results - RF Exposure

Table No. 2	RF Exposure	Verdict
		P

Test Method..... : ANSI C63.4
EUT Configuration ..... :
Power Input..... : ☐ 1ϕ ☐ 3ϕ ☒ Internal Battery
Test Date ..... : 02-04-2016
Temperature ..... : 21.5°C Relative Humidity .....: 23 %
Test Equipment Asset Tag List ..... : 1337, 1339, 1340, 1341, 1215, 1220, 1403, 1246, 1537, 1396, 1253, 1232, 1392

FCC SAR Exemption per KDB 447498

KDB 447498 D01 General RF Exposure Guidance v05r02 (February 7, 2014)

1.Declaration of RF exposure compliance for exemption from routine evaluation limits

FCC ID:	LF5-OS1E100
Model number:	OxiPOD
Manufacturer:	Covidien
4.3.1. Standalone SAR test exclusion considerations:	During normal operation, user extremities can come within 20 cm of the internal antenna and therefore product is considered as “Portable”. The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at Test separation distances ≤ 50 mm are determined by: [(max. power of channel, including tune-up tolerance, mW) ÷ (min. test separation distance, mm)] × [F (GHz) $^{1/2}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where f(GHz) is the RF channel transmit frequency in GHz Power and distance are rounded to the nearest mW and mm before calculation The result is rounded to one decimal place for comparison The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion Calculation based on the above formula: Separation Distance = 5 mm Conducted Output Power = -3 dBm = 0.497 mW Frequency = 2.404 GHz Calculation = (0.497 / 5) x $(2.404)^{1/2}$ = 0.15 < 3 The calculation is below the threshold, therefore the product exempt from the SAR test requirements

2.Attestation

ATTESTATION: I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:	
Date:	May 11, 2016
Name:	Vincent W. Greb, NTS Longmont

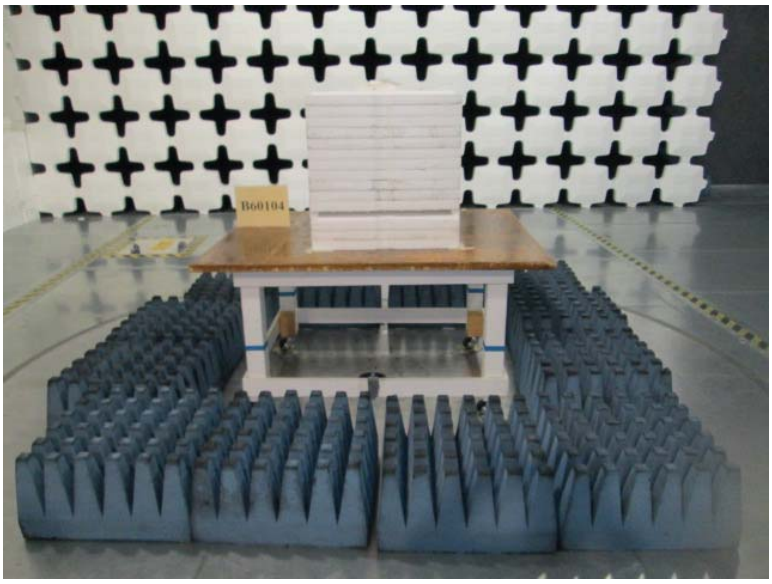
Supplemental Information:

Conducted power was determined by measuring the radiated power at 3-meters and calculating the power delivered to the Tx antenna using FCC Guidance Note 412172. Calculation table contained on page 60 of this report.

Tested by (+ signature) ..... : Kevin Johnson. 

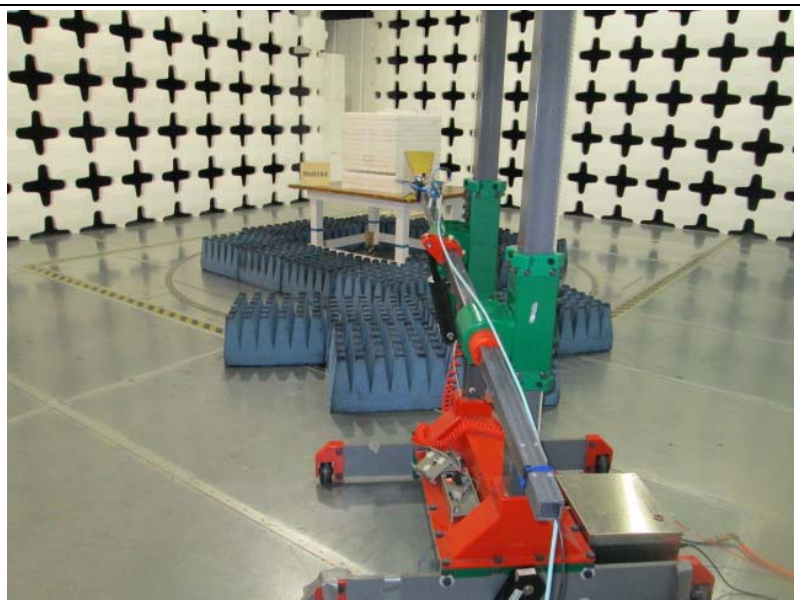
Setup Photos

Photo 1	**Test Setup – Radiated Measurements**	



Supplemental Information:

Measurements from 30 kHz to 1 GHz were made using a 10-meter antenna separation.
Measurements from 1 to 18 GHz were made using a 3-meter antenna separation.
Measurements from 18 – 25 GHz were made using a 1-meter antenna separation.



Supplemental Information:

Measurements from 30 kHz to 1 GHz were made using a 10-meter antenna separation.
Measurements from 1 to 18 GHz were made using a 3-meter antenna separation.
Measurements from 18 – 25 GHz were made using a 1-meter antenna separation.