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ENGINEERING TEST REPORT # 314250 B
LSR Job #: C-2013

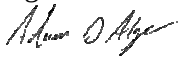
RF Exposure Compliance of:
Remote Puffer

Test Date(s):
August 7, 8, 11, 12 2014

Prepared For:
Suterra
Attn: Matt Hamman
20950 NE Talus Place
Bend, OR 97701 USA

This Test Report is issued under the Authority of: Adam Alger, EMC Engineer

Signature: Date: 8-18-2014



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LSR, LLC in Review

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: 1255.01

Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948
FCC Registration Number: 90756

Industrie Canada Industry Canada

Canada

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1
File Number: IC 3088-A
On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1
File Number: IC 3088

U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a U. S. Competent Body operating under the U. S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility –Council Directive 2004/108/EC (formerly 89/336/EEC, Article 10.2).
Date of Validation: January 16, 2001

Validated by the European Commission as a U.S. Notified Body operating under the U.S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union Telecommunication Equipment – Council Directive 99/5/EC, Annex V.
Date of Validation: November 20, 2002
Notified Body Identification Number: 1243

1.0 Conformance Summary

The EUT was found to MEET the 5mm minimum test separation distance threshold for SAR test exclusion per FCC §2.1091(mobile) and §2.1093(portable) using methods of FCC KDB 447498 D01 General RF Exposure Guidance v05r02 as a standalone device.

2.0 SAR Test Exclusion Threshold

SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm

1-g SAR test exclusion threshold equation:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≤ 3.0

10-g SAR test exclusion threshold equation:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≤ 7.5

3.0 Client Information

Manufacturer Name:	Suterra, LLC
Address:	20950 NE Talus Place
Contact Person:	Matt Hamman

3.1 Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	Remote Puffer
Model Number:	SUT01B
Serial Number:	Radiated (14210107); RF Conducted (14210030)
FCC ID	2ACYJ-1

3.2 Product Description

EUT utilizes Bluetooth Low Energy with an integral antenna that has a peak gain of 4.7 dBi as measured over a ground plane.

3.3 Modifications Incorporated In the EUT for Compliance Purposes

None noted at time of test

3.4 Deviations & Exclusions from Test Specifications

None noted at time of test

3.5 Additional Information

EUT programmed for continuous transmit or receive on low (2402 MHz), middle (2440 MHz), and high (2480 MHz) via a TI CC Debugger connected to pin-holes on the EUT and USB cable connected to laptop running TI Smart RF Studio software. Normal mode of operation was accessible via a button press on the EUT which activated the motors in a few second intervals.

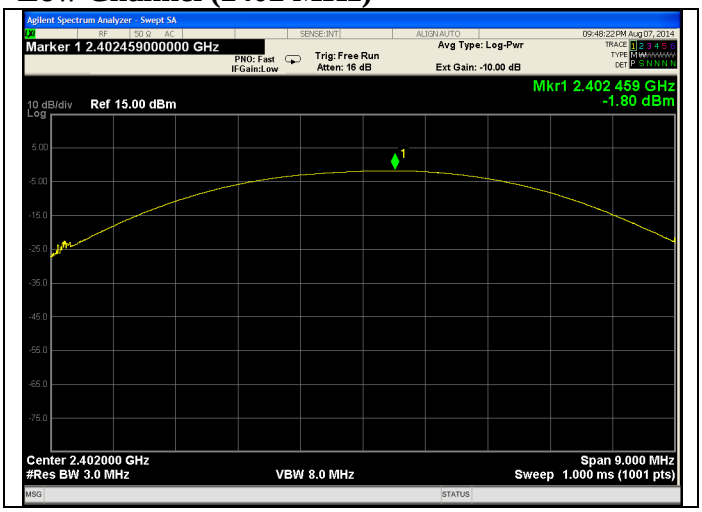
4.0 RF Conducted Measurement Data

Table

Frequency (MHz)	Power (dBm)
2402	-1.80
2440	-2.40
2480	-3.16

Plots

Low Channel (2402 MHz)



5.0 SAR Test Exclusion Calculation

Note: 100 % duty cycle

Description	Line #	Data	Unit	Additional Description
Transmit Packet on time:	1	100	(ms)	Worst case
Packet repetion time:	2	100	(ms)	Worst case
Duty factor:	3	1		Transmit Packet on time / Packet repetion time (Line # 1/2)
Maximum peak output power at antenna input terminal:	4	-1.80	(dBm)	Measured worst case
Maximum peak power:	5	0.661	(mW)	dBm to mW conversion
Prediction distance:	6	5	(mm)	Minimum test seperation distance
Prediction frequency:	7	2.402	(GHz)	Measured frequency
Square root of frequency (GHz):	8	1.549839		Calculation
Duty factor applied to maximum peak radiated power (mW):	9	0.660693	(mW)	duty factor * maximum peak power (Line # 11*3)
Source based power (mW) / min test seperation distance (mm):	10	0.132139		Calculation (Line # 5/6)
SAR exclusion calculation:	11	0.20		Calculation (Line # 10*8)
Threshold:	12	3		
Margin:	13	2.80		Calculation (Line # 12-11)

6.0 MPE Calculation

Note: Antenna gain over ground plane.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	-1.80	(dBm)
Maximum peak output power at antenna input terminal:	0.661	(mW)
Antenna gain(typical):	4.7	(dBi)
Maximum antenna gain:	2.951	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2402	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at prediction frequency:	0.000388	(mW/cm^2)
Maximum allowable antenna gain:	38.8	(dBi)
Margin of Compliance at 20 cm =	34.1	dB

END OF REPORT

Date	Version	Comments	Person
8-18-14	V0	Draft	Adam A
1-19-15	V1	Final	Adam A