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ENGINEERING TEST REPORT # TR 315145 B
LSR Job #: C-2246

RF Exposure Compliance of:

Axon Flex Controller

Test Date(s):

July 27, 28, 29, 30 2015

Prepared For:

TASER

Attn: Mark Hanchett

17800 N. 85th St.

Scottsdale, AZ 58255

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

Signature:

Date: 8-14-15

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Prepared For: TASER	Name: Axon Flex Controller
Report: TR 315145 B	Model: T00062 REV X2
LSR: C-2246	Serial: See Section 2.1

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LS Research, 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

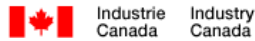
A2LA Certificate Number: 1255.01



Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948

FCC Registration Number: 90756



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

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1.0 Equipment Under Test (EUT) Information

Product Name:	Axon Flex Controller
Model Number:	T00062 REV X2
Serial Number:	None (engineering sample)
FCC ID:	X4GS00832
IC:	8803A-S00832

1.1 Product Description

Bluetooth Low Energy product utilizing internal chip antenna with peak gain of 0.5 dBi.

1.2 Additional Information

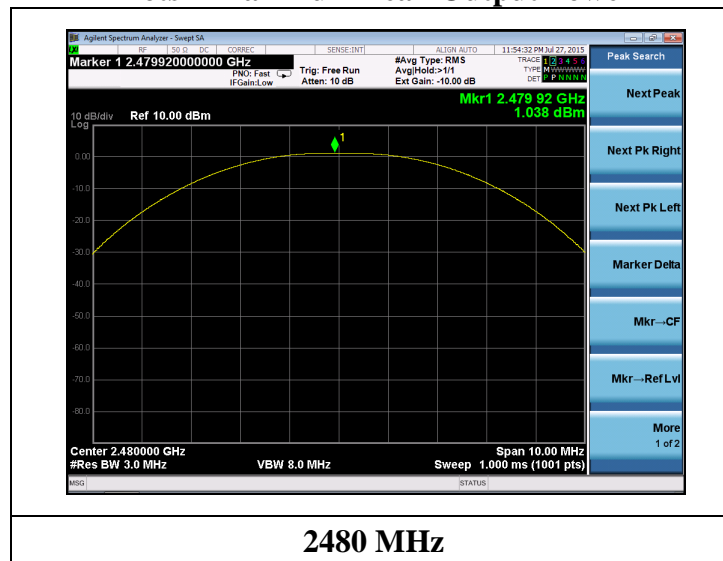
EUT programmed for continuous transmit or receive via FTDI to USB cable connected to laptop computer running Broadcom Blue Tool v 1.8.4.6. Test channels; Low Channel (2402 MHz), Mid Channel (2440 MHz), and High Channel (2480 MHz).

2.0 RF Conducted Measurement Data

Table

Frequency (MHz)	6 dB DTS BW (kHz)	99% OBW (MHz)	20 dB OBW (MHz)	100 kHz PSD (dBm)	PSD Limit (dBm / 3 kHz)	PSD Margin (dB)	Max Output Power (dBm)	Max Output Power Limit (dBm)	Max Output Power Margin (dB)
2402	856	1.148	1.237	0.07	8	7.9	0.84	30	29.2
2440	837	1.140	1.233	0.16	8	7.8	0.92	30	29.1
2480	823	1.129	1.231	0.30	8	7.7	1.04	30	29.0

Plots – Maximum Peak Output Power



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3.0 FCC 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:

$$\left[\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \right] * \sqrt{f(\text{GHz})} \leq 3.0$$

10-g SAR test exclusion threshold equation:

$$\left[\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \right] * \sqrt{f(\text{GHz})} \leq 7.5$$

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3.1 FCC SAR Test Exclusion Calculation

Description	Line #	Data	Unit	Additional Description
Transmit Packet on time:	1	100	(ms)	Worst case (supplied by applicant)
Packet repetition time:	2	100	(ms)	Worst case (supplied by applicant)
Duty factor:	3	1		Transmit Packet on time / Packet repetition time (1/2)
Maximum peak output power at antenna input terminal:	4	1.04	(dBm)	Measured worst case
Maximum peak radiated power:	5	1.271	(mW)	dBm to mW conversion
Prediction distance:	6	5	(mm)	Minimum test separation distance
Prediction frequency:	7	2.48	(GHz)	Measured frequency
Square root of frequency (GHz):	8	1.574802		Calculation
Duty factor applied to maximum peak radiated power (mW):	9	1.270574	(mW)	duty factor * maximum peak conducted power
Source based power (mW) / min test separation distance (mm):	10	0.254115		Calculation
SAR exclusion calculation:	11	0.40		Calculation
Threshold:	12	3		
Margin:	13	2.60		Calculation

Note: 100% duty factor

3.2 FCC 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.

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4.0 Industry Canada Low Power Exemption

RSS 102 Issue 5 Section 2.5 states that all transmitters that meet the exemption limits as stated in section 2.5.1 are exempt from routine SAR and RF exposure evaluation.

Output Power Evaluation.

Evaluation Frequency = 2480 MHz

Device Operation separation distance: 5mm

Maximum Effective Isotropic Radiated Power (dBm) = 1.04 dBm + 0.5 dBi = 1.54 dBm

Maximum Effective Isotropic Radiated Power (mW) = $\log^{-1}(\text{EIRP (dBm)}/10)$ = **1.426 mW**

Section 2.5.1 Table 1 general public use limit at for devices operating less than 20cm:

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤ 300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Interpolate to obtain limit of frequency 2480 MHz at separation of ≤ 5 mm: **3.943 mW**

4.1 IC Conformance Summary

The EUT was found to MEET the 5mm minimum test separation distance threshold for SAR test exclusion per IC RSS-102 Issue 5.

5.0 MPE Calculation

Type: RF Evaluation

Evaluated Against: General Population/Uncontrolled Exposure

Duty Cycle: 100 %

Document Used for Evaluation: RSS-102 Issue 5

Measurement Distance: 0.005 m

Power Density Limit: $0.02619 f^{0.6834} = 5.4689 \text{ W/m}^2 @ 2480 \text{ MHz}$

Calculated Value:

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

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:	<u>1.04</u> (dBm)
Maximum peak output power at antenna input terminal:	<u>0.00127</u> (W)
Antenna gain(typical):	<u>0.5</u> (dBi)
Maximum antenna gain:	<u>1.122</u> (numeric)
Prediction distance:	<u>0.005</u> (m)
Prediction frequency:	<u>2480</u> (MHz)
MPE limit for uncontrolled exposure at prediction frequency:	<u>5.4689</u> (W/m ²)
Power density at prediction frequency:	<u>4.537850</u> (W/m ²)

END OF REPORT

Date	Version	Comments	Person
8-6-15	V1	Final	Adam A
8-14-15	V1a	TCB Comment addressed	Adam A

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