Test Report # TR 318008 RFX

Equipment Under Test:	Trigger Box
Test and Evaluation Date(s):	2 March and 4 May 2018
Prepared for:	L3 Mobile-Vision, Inc. Attn: Leonid Y. Ayzenshtat 400 Commons Way Rockaway, NJ 07866

Report Issued by: Laura Zehnder, EMC Engineer

Signature: Date: 7 May 2018

Report Reviewed by: Adam Alger, Quality Manager

Signature: Date: 05/07/2018

Report Constructed by: Laura Zehnder, EMC Engineer

Signature: Date: 7 May 2018

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Laird Technologies Test Services in Review

The Laird Technologies, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:

TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope
A2LA Certificate Number: 1255.01
Scope of accreditation includes all test methods listed herein, unless otherwise noted.

Federal Communications Commission (FCC) – USA

Accredited recognition of two 3 meter Semi-Anechoic Chambers

Accredited Test Firm Registration Number: 953492

Government of Canada

Innovation, Science and Economic Development Canada

ISED Site listing of two 3 meter Semi-Anechoic Chambers based on RSS-GEN – Issue 4
File Number: IC 3088A-2
File Number: IC 3088A-3

1 TEST REPORT SUMMARY

On 4 May 2018 the Equipment Under Test (EUT), Trigger Box, as provided by L3 Mobile-Vision, Inc was tested to the following requirements:

Requirements	Description	Evaluation Guidance	Evaluation Result
FCC 2.1092	Radio frequency radiation exposure evaluation: mobile devices	KDB 447498	Below SAR test exclusion threshold
RSS-102	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	RSS-102	Below exemption limits for routine evaluation

Notice:

The results relate only to the item tested and described in this report. Any modifications made to the equipment under test after the specified test date(s) may invalidate the data herein.

If the resulting measurement margin is seen to be within the uncertainty value, as listed in this report, the possibility exists that this unit may not meet the required limit specification if subsequently tested.

2 CLIENT INFORMATION

Company Name	L3 Mobile-Vision, Inc.
Contact Person	Leonid Y. Ayzenshtat
Address	400 Commons Way Rockaway, NJ 07866

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Trigger Box
Model Number	ZAS-TM010001
Serial Number	10000000001
FCC ID **IC**	2AOSO-TB-100 23745-TB100

2.2 Product Description

The Trigger Box device is for use in law enforcement vehicles. This device will be mounted in a vehicle either under the dash or in the trunk. This device will enable BLE triggering between the BWX-100 body worn cameras and the car's video recording system.

2.3 Modifications Incorporated for Compliance

Added ferrite FairRite part number 2675102002 to power cable.

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 EUT Power

The EUT is intended to run off a standard 12V car battery. All testing was performed with the EUT powered via a 12 VDC power supply.

2.6 Programming the EUT

The EUT was programmed using a PuTTY interface using WiLink 8.0 Bluetooth Vendor-Specific HCI Commands.

2.7 Antenna options

The manufacturer wishes to allow the customer to use the following antennas.

1. Walsin Technology / RFDPA391300SBAB8G1 – Gain 9dBi
2. Nearson Inc. / S171AH-2450S – Gain 7dBi
3. Laird Technologies / IN24-5RD-RSMA – Gain 5.5dBi
4. Nearson Inc. / S131AH-2450S – Gain 5dBi
5. Pulse Larsen / W1037 – Gain 3.2dBi

Laird Technologies / 001-0001 – Gain 2dBi

3 REFERENCES

Publication	Edition	Date
FCC CFR Title 47 Part 2	-	2018
FCC OET KDB 447498	06	Oct 2015
RSS-102	5	March 2015

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k = 2.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty ±
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

Parameter	ETSI U.C. ±	U.C. ±
Radio Frequency, from F0	$1x10^{-7}$	$0.55x10^{-7}$
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1.1

Operator	Zach Wilson
QA	Laura Zehnder
Test Date	3/2/2018
Location	Radio Benches
Temp. / R.H.	70F / 38%
Requirement	FCC 15.247
Method	ANSI C63.10

Test Parameters

Requirement	FCC 15.247(b)(3) and (4) & RSS-247 5.4(d)
Method	ANSI C63.10 Section 11.9.1.1
Settings	RBW = 3 MHz VBW= 50 MHz

Instrumentation

Laird
Smart Technology. Delivered.

Date : 23-Feb-2018 Test : Conducted Measurements Job : C-2932

PE : Laura Zehnder Customer : L3 Technologies Quote : 318008

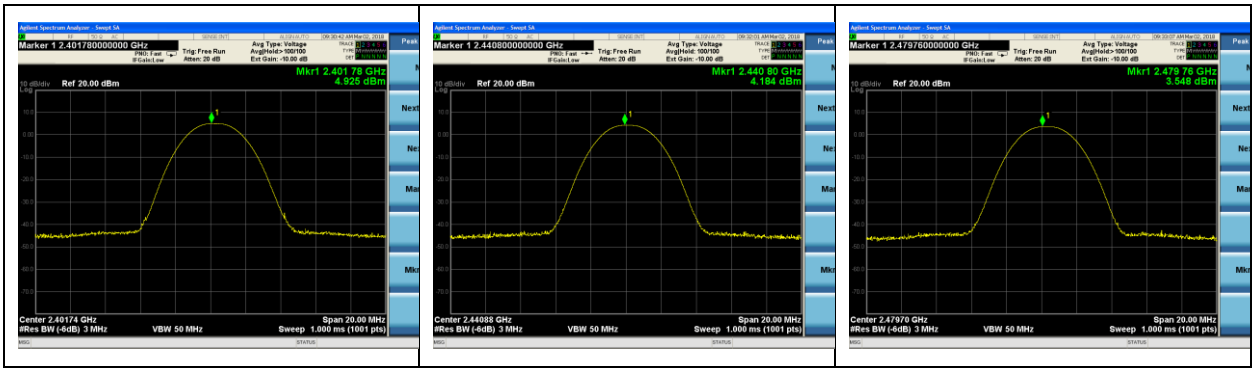
No.	Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due Date	Equipment Status
1	EE 960088	Analyzer - EMI Receiver	Agilent	N9038A	MY51210138	3/2/2017	3/2/2018	Active Calibration
2	AA 960171	Cable	A.H. Systems, Inc	SAC-26G-6	386	11/15/2017	11/15/2018	Active Verification

Table

Output Power			
Channel	Output Power (dBm)	Power Limit (dBm)	Power Margin (dBm)
0	4.9	27.0	22.1
19	4.2	27.0	22.8
39	3.5	27.0	23.5

Note: Power limit was reduced by 3 dB (from 30 dB stated in FCCC 15.247) as the max antenna gain option is 9 dBi.

Plots



6 EXCLUSION CALCULATION

For the exclusion SAR Exemption Calculations, the following values were used:

Max power: 3.09 mW, 4,9 dBm

Highest Gain Antenna: 9 dBi

Tune up tolerance: + 2 dB

Max power including tune up tolerance: 38.9 mW

Min. test separation distance: 200 mm

Frequency: 2.402 GHz

Separation distance as declared in the user's manual: 20 cm

6.1 FCC

Limit: Per Appendix B in KDB 447498, T 190 mm test separation distance, 2402 MHz, the threshold is **1500.301 mW. And the output of the radio is 38.9 mw, thus meets the exclusion threshold.**

Justification below:

a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,[30] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz

= **(**38.9 mW / 200 mm) * 2.402 GHz = 0.301

b) For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following (also illustrated in Appendix B):[32]

1) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW, for 100 MHz to 1500 MHz
2) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

= 0.301 + (200-50)*10 = **1500.301**

6.2 Industry Canada

Per RSS-102, the exemption limit for a device that operates at 2450 MHz is 309 mW at a separation distance of ≥50 cm. Linear interpolation to 2402 MHz, places the threshold at 302 mW.

EIRP = Max output power + tune-up tolerance + antenna gain
EIRP = 4.9 dBm + 2 dB + 9 dBi = 15.9 dBm = 38.9 mW

The output power is 38.9 mW at 2402 MHz, thus meeting the exemption threshold.

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

7 REVISION HISTORY

Version	Date	Notes	Reference Personnel
0.0	4 May 2018	Initial Release for Review	Laura Zehnder
0.1	7 May 2018	Include example equations	Laura Zehnder

END OF REPORT