Radio Frequency Exposure Evaluation Report

For:

CalAmp

Model Name:
LMU3640LVB

Product Description:

Vehicle tracking and telemetry device

FCC ID: APV-3640LVB
IC ID: 5843A-3640LVB

Per:

CFR Part Part 1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC_CALAM-063-17001_FCC_IC_MPE_SVL

DATE: 10/9/2017

***CETECOM* Inc.**
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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated, respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
CalAmp	Vehicle tracking and telemetry device	LMU3640LVB

Report reviewed by: TCB Evaluator

Date	Section	Name	Signature
10/9/2017	Compliance	Peter Nevermann (Director Radio Communications and EMC)	Peter Nv

Responsible for the Report:

Date	Section	Name	Signature
10/9/2017	Compliance	Issa Ghanma (EMC Engineer)	Digitally signed by Issa Ghanma DN: cn=Issa Ghanma, c=US, o=CETECOM INC., email=issa.ghanma@cetecom.com Date: 2017.10.09 18:36:46 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
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Project Manager:	Laith Saman
Project Engineer:	Issa Ghanma

2.2 Identification of the Client / Manufacturer

Applicant's Name:	Calamp
Street Address:	2177 Dalk Ave, Suits 200
City/Zip Code	Carlasbad, CA 90228
Country	USA

3 Equipment under Assessment

Model #:	LMU3640LVB
HW Version :	REV A
SW Version :	6.1
FCC-ID :	APV-3640LVB
IC ID:	5843A-3640LVB
HVIN:	LMU3640LVB
PMN:	LMU-3640
Product Description:	Vehicle tracking and telemetry device
Regulatory Band:	**Bluetooth EDR/BDR, Bluetooth LE** Nominal band: 2400 – 2483.5 MHz **Cellular:** LTE BAND 4 : 1710.7MHz ~ 1754.3MHz LTE BAND 13 : 779.5MHz ~ 784.5MHz
Integrated Module Info:	**Bluetooth EDR/BDR, Bluetooth LE** Chipset name: CC2564. **Cellular**: LE910-SVL, FCC ID: RI7LE910SVL / IC ID: 5131A-LE910SVL.
Antenna Type:	**Bluetooth EDR/BDR, Bluetooth LE** Ethertronics M830320 BT Peak Gain 1.39dBi Cellular: EIRP measurements from OTA tesing results used because antenna gain is unknown.

Maximum Conducted Output Power from modular grant:	**Bluetooth EDR/BDR:** 11.51dBm **Bluetooth LE:** 8.89dBm **Cellular:** LTE Band 4: 22.88 dBm LTE Band 13: 22.3 dBm
Power Supply:	No Power supply is part of the sales package.
Rated Operating Voltage Range:	8 VDC – 32 VDC
Operating Temperature Range:	-10^{o} to 60^{o} C
Sample Revision:	☐Prototype Unit; ■Production Unit; ☐Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

IC

300 – 6000	0.02619 x f (MHz) $^{0.6834}$	6

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC
operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9);

IC
300MHz < = operating frequency < 6 GHz: excluded if EIRP < 0.0131 x f (MHz) $^{0.6834}$ W

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

where: S = power density (mW/cm² or W/m²)
P = power input to the antenna (mW or W)
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 (cm or m)

5 Evaluations

5.1 Analysis to Exclude Routine RF Exposure evaluation for Stand Alone Operation

band	lowest frequency [MHz]	FCC EIRP limit	IC EIRP limit in W	IC EIRP limit in dBm	EIRP in dBm	Verdict
LTE 4	1710.00	36.900	2.12	33.27	27.87	Exempt
LTE 13	777	33.900	1.24	30.94	25.68	Exempt
BT-LE	2400	36.900	2.68	34.28	10.28	Exempt
BT EDR/BDR	2400	36.900	2.68	34.28	12.9	Exempt

The single radios are exempt from routine environmental evaluation.

5.2 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on EIRP measured or calculated from known gain and conducted output power.
- Cellular and BT can transmit simultaneously

Radio	freq MHz	EIRP in W	Canada W/m2	Actual W/m2	How much of limit is used up
Band 4	1717.5	0.46	4.255	1.218	28.63%
Band 13	779.5	0.19	2.480	0.736	29.67%
BT-LE	2402	0.011	5.351	0.021	0.40%
BT EDR/BDR	2402	0.019	5.351	0.039	0.72%

Conclusion:

- **The worst case simultaneous transmission is Band 13 simultaneous with BT EDR/BDR which is using 30.4% of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.**

6 Revision History

Date	Report Name	Changes to report	Report prepared by
10/9/2017	EMC_CALAM-063-17001_FCC_IC_MPE_SVL	Initial Release	Issa Ghanma