

## FCC ISED RF Exposure Evaluation Report

<b>Test Report Number</b>	CMP-20011621-LC-FCC-IC-MPE
<b>FCC ID</b> <b>ISED ID</b>	APV-3640MB 5843C-3640MB
<b>Applicant</b>	<b>CalAmp</b>
<b>Applicant Address</b>	2177 Salk Ave, Suite 200, Carlsbad, CA 92008 USA
<b>Product Name</b>	Fleet Management and Tracking Device
<b>Model (s)</b>	LMU3640MB
<b>Date of Receipt</b>	04/20/2020
<b>Date of Test</b>	04/20/2020-05/08/2020
<b>Report Issue Date</b>	05/19/2020
<b>Test Standards</b>	47 CFR §1.1307(b), 47 CFR §1.1310 RSS-102 Issue 5: March 2015
<b>Test Result</b>	<b>PASS</b>
	<p>Issued by:</p> <p><b>Vista Compliance Laboratories</b> 1261 Puerta Del Sol, San Clemente, CA 92673 USA <a href="http://www.vista-compliance.com">www.vista-compliance.com</a></p>
 <hr/> <p><b>Daniel Bruno (Test Technician)</b></p>	 <hr/> <p><b>David Zhang (Technical Manager)</b></p>
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**REVISION HISTORY**

<b>Report Number</b>	<b>Version</b>	<b>Description</b>	<b>Issued Date</b>
CMP-20011621-LC-FCC-IC-MPE	01	Initial report	05/19/2020

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## 1 General Information

### 1.1 Applicant

<b>Applicant</b>	CalAmp
<b>Applicant address</b>	2177 Salk Ave, Suite 200, Carlsbad, CA 92008 USA
<b>Manufacturer</b>	CalAmp
<b>Manufacturer Address</b>	2177 Salk Ave, Suite 200, Carlsbad, CA 92008 USA

### 1.2 Product information

<b>Product Name</b>	Fleet Management and Tracking Device
<b>Product Description</b>	Fleet Management and Tracking Device
<b>Model Number</b>	LMU3640MB
<b>Family Models</b>	N/A
<b>Serial Number</b>	18CE06601002-0B
<b>Frequency Band</b>	BLE: 2402-2480MHz GSM850: 824.2 - 848.8 MHz GSM1900: 1850.2 - 1909.8 MHz LTE CAT-M1 Band 2: 1850.7-1909.3MHz LTE CAT-M1 Band 4: 1710.7-1754.3MHz LTE CAT-M1 Band 5: 824.7-848.3MHz LTE CAT-M1 Band 12: 699.7-715.3MHz LTE CAT-M1 Band 13: 779.5-784.5 MHz LTE CAT-M1 Band 25: 1850.7 - 1914.3 MHz
<b>Type of modulation</b>	BLE: GFSK GSM: GMSK, 8PSK LTE CAT-M1: QPSK, 16QAM
<b>Equipment Class</b>	DTS, PCB
<b>Antenna Information</b>	Bluetooth ceramic antenna, peak Gain: 1.88dBi; P/N: 1001312 Cellular LPWA antenna: peak gain: 3.1dBi; P/N: 1004795
<b>Clock Frequencies</b>	N/A
<b>Input Power</b>	Vehicle Battery powered: 12-24VDC
<b>Power Adapter Manufacturer/Model</b>	N/A
<b>Power Adapter SN</b>	N/A
<b>Hardware version</b>	N/A
<b>Software version</b>	N/A
<b>Simultaneous Transmission</b>	BT and GSM/LTE can transmit simultaneously
<b>Additional Info</b>	EMC Emission Class B

### 1.3 Test standard and method

<b>Test standard</b>	47 CFR §1.1307(b), 47 CFR §1.1310 RSS-102 Issue 5: March 2015
<b>Test method</b>	47 CFR §1.1307(b), 47 CFR §1.1310 RSS-102 Issue 5: March 2015

## 2 Test Site Information

<b>Lab performing tests</b>	Vista Laboratories, Inc.
<b>Lab Address</b>	1261 Puerta Del Sol, San Clemente, CA 92673 USA
<b>Phone Number</b>	+1 (949) 393-1123
<b>Website</b>	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
RF Testing	23.5°C	58.2%	996 mbar
Radiated Emission Testing	23.5°C	58.2%	996 mbar

### 3 Test Results

#### 3.1 FCC MPE CALCULATION

RF Exposure Requirements: 47 CFR §1.1307(b)  
 RF Radiation Exposure Limits: 47 CFR §1.1310  
 RF Radiation Exposure Guidelines: FCC OST/OET Bulletin Number 65  
 EUT Frequency Band:

BLE: 2402-2480MHz  
 GSM850: 824.2 - 848.8 MHz  
 GSM1900: 1850.2 - 1909.8 MHz  
 LTE CAT-M1 Band 2: 1850.7-1909.3MHz  
 LTE CAT-M1 Band 4: 1710.7-1754.3MHz  
 LTE CAT-M1 Band 5: 824.7-848.3MHz  
 LTE CAT-M1 Band 12: 699.7-715.3MHz  
 LTE CAT-M1 Band 13: 779.5-784.5 MHz  
 LTE CAT-M1 Band 25: 1850.7 - 1914.3 MHz

Limits for General Population/Uncontrolled Exposure in the band of: 300 - 1500 MHz,  
 Power Density Limit: f/1500 mW/cm<sup>2</sup>

Limits for General Population/Uncontrolled Exposure in the band of: 1500 - 100,000 MHz  
 Power Density Limit: 1 mW / cm<sup>2</sup>

Equation:  $S = PG / 4\pi R^2$  or  $R = \sqrt{PG / 4\pi S}$

Where, S = Power Density

P = Power Input to Antenna

G = Antenna Gain

R = distance to the center of radiated antenna

Prediction distance 20 cm

Radio	Frequency (MHz)	Max Conducted Output Power (dBm)	Antenna Gain (dBi)	Separation distance (cm)	Power Density (mW/ cm <sup>2</sup> )	MPE Limit (mW/ cm <sup>2</sup> )
BLE	2402-2480	5.43	1.88	20	0.001	1
GSM850	824.2-848.8	23.97	3.1	20	0.101	0.549
GSM1900	1850.2-1909.8	20.97	3.1	20	0.051	1
LTE Band2	1850.7-1909.3	24.00	3.1	20	0.102	1
LTE Band4	1710.7-1754.3	23.00	3.1	20	0.081	1
LTE Band5	824.7-848.3	24.00	3.1	20	0.102	0.550
LTE Band12	699.7-715.3	24.00	3.1	20	0.102	0.466
LTE Band13	779.5-784.5	24.00	3.1	20	0.102	0.520
LTE Band25	1850.7-1914.3	25.00	3.1	20	0.128	1

The above results show that the device complies with the MPE requirement.

The BLE is able to transmit simultaneously with GSM/LTE.

The ratio =  $0.001/1 + 0.102/0.466 = 0.219 < 1.0$

The above results show that the device complies with the simultaneous transmission MPE requirement.

### 3.2 ISED RF Exposure Evaluation

RF Exposure Requirements:

RF Radiation Exposure Limits:

RF Radiation Exposure Guidelines:

EUT Frequency Band:

RSS-102 Issue 5: March 2015

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BLE: 2402-2480MHz

GSM850: 824.2 - 848.8 MHz

GSM1900: 1850.2 - 1909.8 MHz

LTE CAT-M1 Band 2: 1850.7-  
1909.3MHz

LTE CAT-M1 Band 4: 1710.7-  
1754.3MHz

LTE CAT-M1 Band 5: 824.7-848.3MHz

LTE CAT-M1 Band 12: 699.7-715.3MHz

LTE CAT-M1 Band 13: 779.5-784.5

MHz

LTE CAT-M1 Band 25: 1850.7 - 1914.3  
MHz

Limits for General Population/Uncontrolled Exposure in the band of:

300 - 6,000 MHz

Exemption limit for Routine Evaluation:

$1.31 \times 10^{-2} f_{0.6834} W$

Radio	Frequency (MHz)	Max Conducted Output Power (dBm)	Antenna Gain (dBi)	Max E.I.R.P (dBm)	Max E.I.R.P (W)	Evaluation Exemption limit (W)
BLE	2402-2480	5.43	1.88	7.31	0.005	2.676
GSM850	824.2-848.8	23.97	3.1	27.07	0.509	1.289
GSM1900	1850.2-1909.8	20.97	3.1	24.07	0.255	2.239
LTE Band2	1850.7-1909.3	24.00	3.1	27.1	0.513	2.240
LTE Band4	1710.7-1754.3	23.00	3.1	26.1	0.407	2.122
LTE Band5	824.7-848.3	24.00	3.1	27.1	0.513	1.289
LTE Band12	699.7-715.3	24.00	3.1	27.1	0.513	1.152
LTE Band13	779.5-784.5	24.00	3.1	27.1	0.513	1.240
LTE Band25	1850.7-1914.3	25.00	3.1	28.1	0.646	2.240

The above results show that the E.I.R.P of this device is below the exemption limit for Routine Evaluation.