LMU-364x™

LMU-364x Datasheets

LMU-3640 LTE CAT-M1

calamp.com
LMU-3640MB LTE CAT M1 Internal Antenna

LMU-3641™ LTE CAT-M1: External Antenna

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LMU-3641™ CAT M1 | External Antenna

LMU-3640™ LTE CAT-1 & 3G HSPA

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LMU-3640™

BG96 App Note

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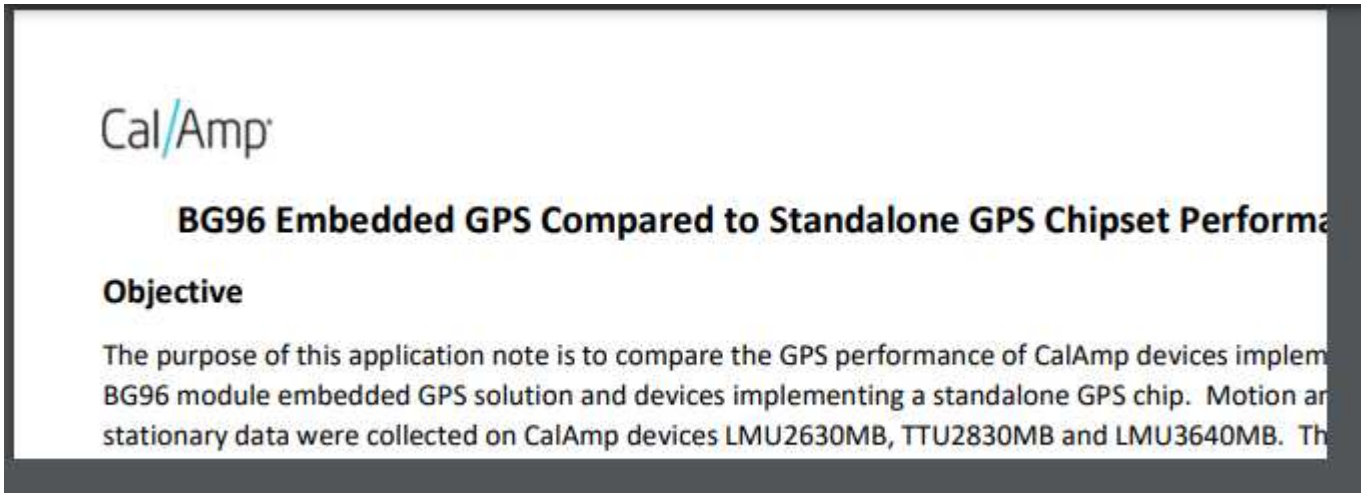

Introduction

Welcome to the LMU-3640™ Hardware and Installation Guide. This manual is intended to give you information on the basic setup and installation of the CalAmp LMU-3640™ product(s) including hardware descriptions, environmental specifications, wireless network overviews and device installation.

About This Manual

The LMU-3640™ is a next generation telematics gateway that includes a range of wireless and peripheral connectivity options and is equipped with CalAmp's purpose built vehicle interface technologies for both light and heavy-duty vehicle. In order to accurately describe the functionality of these units we have broken this manual into the following sections:

- System Overview – A basic description of a CalAmp LMU-3640™. This includes a description of roles and responsibilities of each of the CalAmp components as well as a brief overview of the wireless data technologies used by the LMU-3640™.
- Hardware Overview – Describes the physical characteristics and interfaces of the LMU-3640™.
- Installation and Verification – Provides guidance for the installation of the LMU-3640™ versions in a vehicle and instructions on how to verify the installation is performing adequately.

About The Reader

In order to limit the size and scope of this manual, the following assumptions have been made about the reader.

- You are familiar with GPS and cellular concepts and terminology
- You have some experience with installing equipment in vehicles
- You are familiar with the use of AT Commands
- You are familiar with the use of terminal programs such as HyperTerminal or PuTTY

About the CalAmp LMU-3640™

The CalAmp Location and Messaging unit-LMU-3640™ is a mobile device that resides in private, commercial or government vehicles. The LMU-3640™ is a single box enclosure incorporating a processor, a GPS receiver, a wireless data modem, and a vehicle-rated power supply. The LMU-3640™ also supports inputs and outputs to monitor and react to the vehicular environment and/or driver actions.

The LMU-3640™ collects, stores and transmits vehicular and location data over a designated wireless network including LTE, HSPA and GSM. Vehicular and location data are transmitted to a customized software application that has been designed to receive, acknowledge, process, store, and respond to this data.

Unit location and vehicular information is sent at pre-determined intervals, on demand, or when pre-programmed vehicular conditions are met. Transmission of data are sent immediately when in wireless network coverage and stored for later transmission when out of the wireless coverage area. SMS messaging can be used as an alternative or redundant communication backup.

The LMU-3640™ is designed to support a variety of custom fleet applications starting with basic automatic vehicle location and including applications requiring more sophisticated features such as geo-fencing, speed and mileage monitoring, third party security monitoring, dynamic reporting routines, and an array of exception alerts.

LMU-3640™ are sold exclusively to authorized systems integrators, software firms, and service providers who have developed their offering around the capabilities of the LMU-3640™. Customers are trained by CalAmp to integrate the mobile device with their system and to assist in support and maintenance of the devices.

Installations of LMU-3640™ are performed by CalAmp customers or contracted installers. Typical installations include hook-up to power, ignition, and ground. LMU-3640™s and the corresponding wiring are almost always hidden from view and general access. Placement of the units is usually under dashboards, in trunks or in compartments.

Overview

The entire purpose behind a fleet management system is to be able to remotely contact a vehicle, determine its location or status, and do something meaningful with that information. This could

include displaying the vehicle location on a map, performing an address look-up, providing real-time driving directions, updating the vehicle's ETA, monitoring vehicle and driver status or dispatching the vehicle to its next pick up.

These functions, of course, are completely dependent on the capabilities of the vehicle management application. The role of the CalAmp LMU-3640™ is to deliver the location information when and where it is needed.

A typical fleet management system based on a CalAmp device includes the following components:
A wireless data network

- An LMU-3640™
- Host Device (GPS NMEA only)
- An LM Direct™ communications server
- Backend mapping and reporting software which typically includes mapping and fleet reporting functions
- DM-CTC
- LMU Manager™

Component Descriptions

Backend Software
Backend software is a customer provided software application. Regardless of its purpose one of its primary functions is to parse and present data obtained from the LM Direct server. This allows the application to do any of the following:

- Display location data base on reports received from the LMU-3640™ in a variety of formats.
- Present historic information received from the LMU-3640™ typically in a report/chart style format
- Request location updates from one or more LMU-3640™
- Update and change the configuration of one or more LMU-3640™

LMU Manager
LMU Manager is the primary support and configuration tool in the CalAmp system. It allows access to almost every feature available to the LMU-3640™. Unlike the backend software, it has the option of talking directly to an LMU-3640™ or making a request forwarded by the LM Direct server.
For further details on using LMU Manager, please refer to the LMU Manager Users Guide.

LM Direct Server
LM Direct is a message interface specification detailing the various messages and their contents the LMU-3640™ is capable of sending and receiving. This interface allows System Integrators to communicate directly with LMU-3640™s.

Sample code is available to system integrators upon request to aid in the development of an LM Direct Server.

Wireless Data Network

The Wireless Data Network provides the information bridge between the LM Direct server and the LMU-3640™s. Wireless data networks can take a variety of forms, such as cellular networks, satellite systems or local area networks. At this point in time, the networks available to the LMU-3640™ are:

- LTE Cat M
- LTE Cat 1
- HSPA/UMTS
- GSM/GPRS

Data Requests

The LMU-3640™ is responsible for delivering the location and status information when and where it is needed. Data requests can come from any of the following sources:

- PEG™ script within the LMU-3640™
- A location or status request from the LM Direct server
- A location or status request from LMU Manager
- A request made from a host device such as a laptop, PDA or MDT

Host Device

In some cases, it is necessary to run an application in the vehicle while it is being tracked by the back-end software. Such examples could include instant messaging between vehicles or a central office, in-vehicle mapping or driving directions, email or database access. In most of these cases you will be using the LMU-3640™ as a wireless modem as well as a vehicle-location device.

Cellular Data Primer

This section is meant to give an overview of the wireless data technologies employed by the CalAmp location products.

SMS (Short Message Service)

The Short Message Service (SMS) is the ability to send and receive text messages to and from mobile telephones. The text can comprise of words or numbers or an alphanumeric combination. SMS was created as part of the GSM Phase 1 standard.(Excerpt taken from the GSM World website (http://www.gsmworld.com/technology/sms/intro.shtml#1))
SMS message are typically text based, though binary messages are possible and can range in size from 140 characters to 256 characters depending on the network being used.

LTE (Long-Term Evolution)

Long-term evolution (LTE) is the latest and rapidly growing global data transmission technology. Based on GSM and UMTS/HSPA standards, LTE is a standard of high-speed wireless data transmission and communication. Continuously evolving, LTE advancements continue to push data capacity and user experience on a global scale. With a peak downlink rate of 300 mbps, uplink rate of 75 mbps, LTE sits in 1.4 MHz to 20 MHz bands, while also supporting FDD, TDD, and not sacrificing data capability.

"Both LTE FDD and TDD offer very high data rates, low latency, and seamless interworking with 3G, as well as between FDD and TDD networks. They also leverage common core network." (Excerpt taken from the Qualcomm website (https://www.qualcomm.com/invention/technologies/lte))
LTE is the most current and advanced data technology network for MDT's (mobile data terminals) and other mobile devices, and an upgrade over GSM/UMTS and CDMA. LTE frequency bands vary internationally, so it is important to note device configuration will dictate proper functionality.

Hardware Overview

LMU-3640™ Handling Precautions
Electrostatic Discharge (ESD)
Electrostatic discharge (ESD) is the sudden and momentary electric current that flows between two objects at different electrical potentials caused by direct contact or induced by an electrostatic field. The term is usually used in the electronics and other industries to describe momentary unwanted currents that may cause damage to electronic equipment.

> ❗ This product can expose you to chemicals including carbon black, nickel, & bisphenol A, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to https://www.P65Warnings.ca.gov.

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ESD Handling Precautions
ESD prevention is based on establishing an Electrostatic Protective Area (EPA). The EPA can be a small working station or a large manufacturing area. The main principle of an EPA is that there are no highly charging materials in the vicinity of ESD sensitive electronics, all conductive materials are grounded, workers are grounded, and charge build-up on ESD sensitive electronics is prevented. International standards are used to define typical EPA and can be obtained for example from International Electro-technical Commission (IEC) or American National Standards Institute (ANSI).
This ESD classification of the sub assembly will be defined for the most sensitive component, therefore the following classifications apply:
Class 1B – Human Model (< 1 kV)
Class M1 – Machine Model (< 100V)

When handling the LMU-3640™'s™ main-board (i.e. sub assembly) by itself or in a partial housing proper ESD precautions should be taken. The handler should be in an ESD safe area and be properly grounded.

GPS Ceramic Patch Handling
When handling the sub assembly it may be natural to pick it up by sides and make contact with the antenna boards. In an uncontrolled ESD environment contact with the center pin of ceramic patch

antenna can create a path for electrostatic discharge directly to the GPS Module. The GPS Module is very sensitive to ESD and can be damaged and rendered non-functional at low levels of ESD.
One should avoid contact with the center pin of the patch during handling.

Packaging
Anytime the sub assembly is shipped and it is not fully packaged in its final housing it must be sealed in an ESD safe bag.

Electrical Over-Stress (EOS)
The GPS receiver can be damaged if exposed to an RF level that exceeds its maximum input rating. Such exposure can happen if a nearby source transmits an RF signal at sufficiently high level to cause damage.

Storage and Shipping
One potential source of EOS is proximity of one LMU-3640™ GPS Antenna to another LMU-3640™ GSM Antenna. Should one of the units be in a transmit mode the potential exists for the other unit to become damaged. Therefore any LMU-3640™ GPS Antenna should be kept at least four inches apart from any active LMU-3640™ GSM Antenna or any other active high power RF transmitter with power greater than 1 Watt.

Battery Back-up Devices
Please properly dispose of the battery in any of the CalAmp products that utilize one, do not just throw used batteries, replaced batteries, or units containing a back-up battery into the trash. Consult your local waste management facility for proper disposal instructions.

Environmental Specifications
The LMU-3640™ is designed to operate in environments typically encountered by heavy and light duty fleet vehicles, including wide temperature extremes, voltage transients, and potential interference from other vehicle equipment.

To ensure proper operation in such an environment, LMU-3640™s were subjected to standard tests defined by the Society of Automotive Engineers (SAE). The specific tests included temperature, shock, vibration, and EMI/EMC. These tests were performed by independent labs and documented in a detailed test report.

The following shows the environmental conditions the LMU-364x™ Cat M (LMU364xMB-HRZL-xxxxx) is designed to operate in and the relevant SAE tests that were performed. No formal altitude tests were conducted.

Temperature

- -30° C to 60° C (connected to primary power)
- -10° C to 60° C (operating on internal battery)
- -20° C to 25° C 6 months (long term storage with battery)
  Humidity
- 85% relative humidity, 50° non-condensing

- U.S. Military Standards 202G, SAEJ1455 Load Dump
- ESD: IEC 61000-4-2 (4KV test)
  Altitude
  Operates at altitudes of up to 10,000 feet and can be stored safely up to 40,000 feet
  Electromagnetic Compatibility (EMC)
  EMC compliant for a ground vehicle environment
  Operating Voltage Range
  The LMU-364x™ supports vehicles with 12 or 24 VDC systems including transients and electrical system noise.; this includes ranges from 9 to 30 VDC.
  Backup Battery
  The LMU-364x™ supports a Lithium-Ion 1000 mAh backup battery input to be used when primary power is lost; the supported voltage range is 9 to 16 VDC
  Transient Protection
  Input voltage transients typical of large trucks
  Electrostatic Discharge (ESD)
  No damage or performance degradation after the ESD disturbance.

The following shows the environmental conditions the LMU-3640™ (LTE Cat 1 & HSPA/UMTS+ Variants) is designed to operate in and the relevant SAE tests that were performed. No formal altitude tests were conducted.

Temperature

- -30° C to 75° C (connected to primary power)
- -10° C to 60° C (operating on internal battery)
- -20° C to 25° C 6 months (long term storage with battery)
  Humidity
- 95% relative humidity, 50° non-condensing
- U.S. Military Standards 202G, SAEJ1455 Load Dump
- ESD: IEC 61000-4-2 (4KV test)
  Altitude
  Operates at altitudes of up to 10,000 feet and can be stored safely up to 40,000 feet
  Electromagnetic Compatibility (EMC)
  Shock and Vibration
- Ground vehicle environment with associated shock and vibration
- SAE Test: SAE J1455
- Mil Standard 202G
  EMC compliant for a ground vehicle environment
  Operating Voltage Range
  The LMU-364x™ supports vehicles with 12 or 24 VDC systems including transients and electrical system noise.; this includes ranges from 9 to 30 VDC.
  Backup Battery
  The LMU-364x™ supports a Lithium-Ion 1000 mAh backup battery input to be used when primary

power is lost; the supported voltage range is 9 to 16 VDC

Transient Protection

Input voltage transients typical of large trucks

Electrostatic Discharge (ESD)

No damage or performance degradation after the ESD disturbance.

Power Consumption - LMU2630MB-xxxx-xxxxx only

- Typical <400uA @ 12V (low power sleep)
- Typical <4mA @ 12 V (sleep)
- Typical 25mA @ 12 V (radio-active sleep)
- Typical 50mA @ 12 V (GPS tracking and cell idle)

Power Consumption - LTE CAT-1, HSPA and GSM variants

- Typical <3mA @ 12V (deep sleep)
- Typical 25mA @ 12 V (radio-active sleep)
- Typical 50mA @ 12 V (GPS tracking and cell idle)

Hardware Specifications

Communication

Cellular

Global Variants LTE

LMU364xMB-HRZL-xxxxx

LTE CAT-1: 2100 (B1)/1900 (B2)/1800 (B3)AWS 1700 (B4)/850 (B5)/900 (B8)/700 (B12/B13/B28)/800 (B18/B19/B20)/1900 (B39/B25) MHz

GSM/GPRS:850/900/1800/1900 MHz

North American Variant I

LMU3640LAB-HRZT-xxxxx

LTE CAT-1: 1900 (B2)/AWS 1700 (B4)/850 (B5)/700 (B12) MHz

HSPA/UMTS: 850 (V)/1900 (II) MHz

North American Variant II

LMU3640LVB-HRZT-xxxxx

LTE CAT-1: AWS 1700 (B4)/700 (B13) MHz

Americas Variant

LMU3640HEB-HRZLT-xxxxx

HSPA/UMTS: 850 (V)/1900 (II) MHz

GSM/GPRS: 900/1800 MHz

Data Support

SMS/UDP Packet Data, TCP, CalAmp Telematics Cloud API

LMU-3640 Physical Specifications

The following shows the environmental conditions the LMU-3640™ is designed to operate in and the relevant SAE tests that were performed.

Dimensions
5.7”(L) x 2.1”(W) x 1.3”(H)
145mm (L) x 53mm (W) x 33mm (H)

Weight
5oz (142g)

Operating Voltage Range
The LMU-3640™ supports vehicles with 12 or 24 VDC systems including transients and electrical system noise; this includes ranges from 7 to 32 VDC.

Electrostatic Discharge (ESD)
No damage or performance degradation after the ESD disturbance.

Power Consumption for LMU-364x Cat M1

- 12/24 VDC Vehicle Systems
- 9-30 VDC (start-up, operating)
- 7-32 VDC (momentary)
- Typical 600uA @ 12V (deep sleep)
- Typical 15mA @ 12V (radio-active sleep)
- Typical 90mA @ 12V (active tracking w/GPS and cell enabled)

Power Consumption for LMU-3640 Cat 1 and HSPA/UMTS+

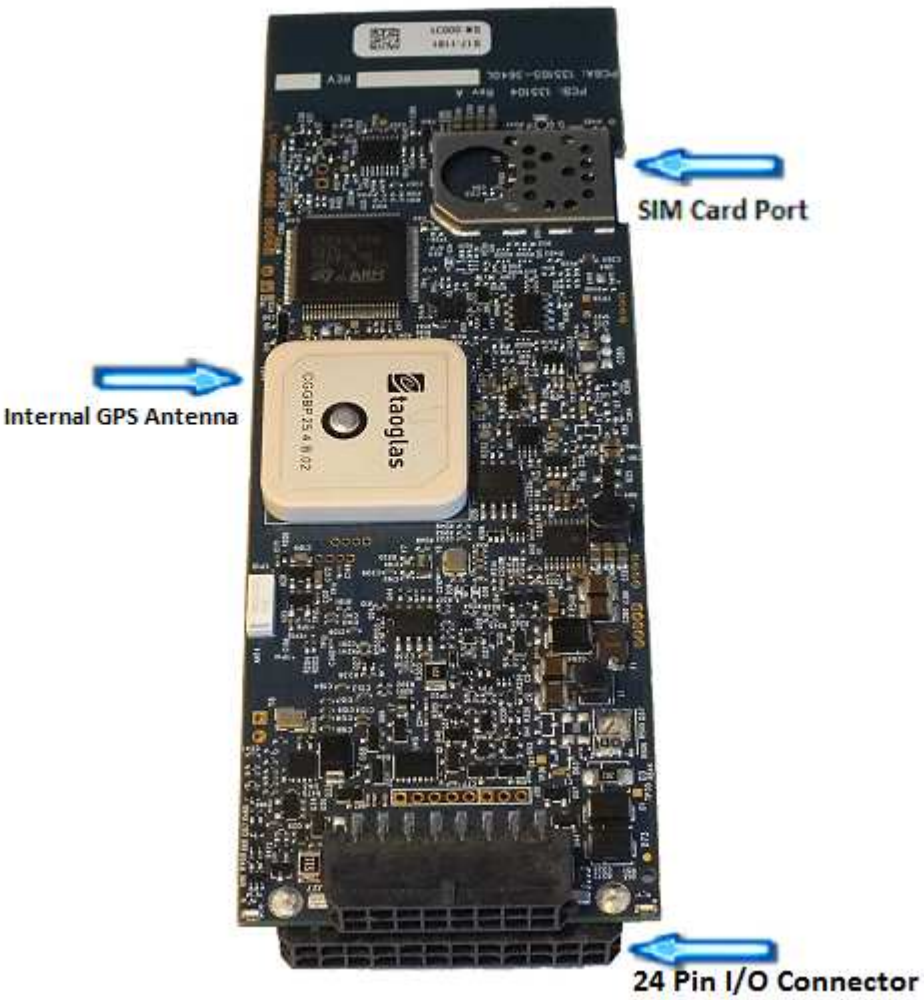
- 12/24 VDC Vehicle Systems
- 9-30 VDC (start-up, operating)
- 7-32 VDC (momentary)
- Typical 450uA @ 12 V (deep sleep)
- Typical 15mA @ 12 V (radio-active sleep)
- Typical 100mA @ 12 V (active tracking with GPS and cell enabled)

LMU-3640™ Connectors

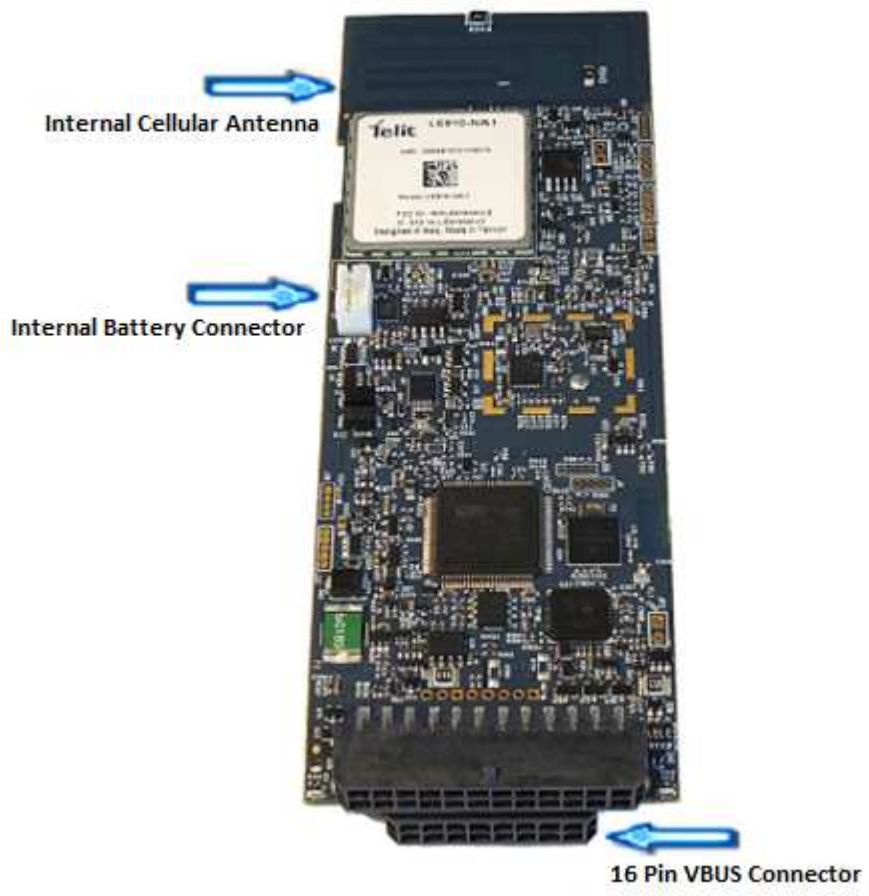
The LMU-3640™ offers connectors to access VBUS, I/O, other expansion capabilities. These connectors are:

- 16 Pin VBUS Connector
- 24 Pin I/O Connector

- Battery Applicator
- SIM Card Port



LMU-3640™ PCBA Top



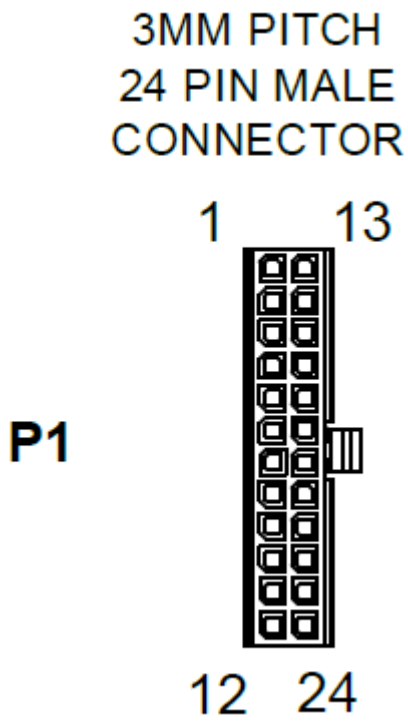
LMU-3640™ PCBA Bottom

I/O Connector

The LMU-3640™'s features expanded power and I/O capabilities via its 24-Pin Molex 43045-2406 connector. Its pin-out is as follows:

Pin	Signal Name	Color
1	Input 1	Blue
2	Input 2	Blue/Orange
3	Input 3	Violet
4	Input 4	Grey
5	ADC-1	Pink
6	ADC-2	Black/Red

Pin	Signal Name	Color
7	AUX1 TX	Brown/Blue
8	AUX1 RX	Brown/Green
9	GND	Black
10	GND	Black
11	GND	Black
12	VIN SW	Blue/Red
13	Input 0	White
14	VCC 3V3 AUX1	Brown/Orange
15	VCC 3V3 AUX2	Yellow/Orange
16	1BB T DATA	Green/Black
17	AUX2 RX	Yellow/Green
18	AUX2 TX	Yellow/Blue
19	OUT 0	Green
20	OUT 1	Brown
21	OUT 2	Yellow
22	GND	Black
23	VIN 1	Red
24	VIN 2	Orange



LMU-3640™ 24 Pin Connector (looking into LMU)

VBUS Connector

The LMU-3640™'s features a 16-Pin Molex 43045-1609 connector to the vehicle bus. Its pin-out is as follows:

Pin	Signal Name	OBD Pin	J1939 Type IIA Pin	J1939 Type IIB Pin
1	J1708H	NC	F	NC
2	J1850L	10	NC	NC
3	CAN2L-11	11	J	G
4	K-Line_12/HD	12	NC	NC
5	J1708L	NC	G	NC
6	CAN1L	14	D	D
7	K/L-Line	15	NC	NC
8	Vcc In	16	B	B
9	SWCAN	1	NC	NC
10	J1850H	2	NC	NC
11	CAN2H	3	H	B

Pin	Signal Name	OBD Pin	J1939 Type IIA Pin	J1939 Type IIB Pin
12	GND	4	NC	NC
13	GND	5	A	A
14	CAN1H	6	C	C
15	ISO/K-Line	7	NC	NC
16	CAN2L-8	8	NC	NC

External Antenna - LMU3641MB-HRZL-xxxxx

For LTE Cat M1, CalAmp offers a variant with external antennas for GPS and cellular connectivity

The LMU-364x™ LTE Cat M1 (LMU3640MB-HRZL-xxxxx, LMU3641MB-HRZL-xxxxx) is Bluetooth Low Energy (BLE) 5.0 capable, and supports BLE applications. The current services supported are:

- CalAmp iOn Tag - 120 Tags Supported
- SPS

Bluetooth Low Energy (BLE) Support

The LMU-364x™ LTE Cat M1 (LMU3640MB-HRZL-xxxxx, LMU3641MB-HRZL-xxxxx) is Bluetooth Low Energy (BLE) 5.0 capable, and supports BLE applications. The current services supported are:

- CalAmp iOn Tag - 120 Tags Supported
- SPS

GPS Receiver

Satellite Location (GNSS)
Constellation Support: Hybrid GPS, SBAS Engine (WAAS, EGNOS, MSAS)

55 channel
Tracking Sensitivity:
-167 dBm
Acquisition Sensitivity:
-156 dBm (hot start)
-148 dBm (cold start) acquisition sensitivity
Location Accuracy: ~2.0m CEP Open Sky (GPS SBAS 24 hours static)
Location Update Rate: Up to 4 Hz
AGPS Location Assistance Capable

Satellite Location (GNSS) - LMU364xMB-HRZL-xxxxx only
Constellation Support Hybrid GPS, GLONASS, SBAS Engine (WAAS, EGNOS, MSAS)
Hybrid default constellations are GPS and GLONASS
Module: UBlox M8
55 channel
Tracking Sensitivity:
-167 dBm
Acquisition Sensitivity:
-156 dBm (hot start)
-148 dBm (cold start) acquisition sensitivity
Location Accuracy: ~2.0m CEP Open Sky (GPS SBAS 24 hours static)
Location Update Rate: Up to 4 Hz
AGPS Location Assistance Capable

I/O Descriptions

The LMU-3640™ provides the following logical mapping of inputs and outputs (I/O):
Digital Inputs

- Input 0: Ignition Sense (Always biased low)
- Input 1: In-1 sel Generic Digital Input (Biased high or low/ S-158 Bit 1)
- Input 2: In-2 sel Generic Digital Input (Biased high or low/ S-158 Bit 2)
- Input 3: In-3 sel Generic Digital Input (Biased high or low/ S-158 Bit 3)
- Input 4: In-4 sel Generic Digital Input (Biased high or low/ S-158 Bit 4)
  Internal Inputs
- Input 8: Motion Sensor (low = no motion, high = motion)
- Input 9: VBUS Active
- Input 10: Pwr State (low = main power, high = battery power)
- Input 11: Vbatt Low
- Input 12: 1BB Detect
- Input 13: Batt Virt Ign
- Input 14: Pure Virt Ign

- Input 15: Radio Ring Wake
- Input 16: DB Wake
- Input 17: Vbus Wake
- Input 18: Pwr State 2
- Input 19: Crank Detect

Analog to Digital Inputs

- A/D 0: External Power Supply Monitor (VIN1)
- A/D 1: Ext ADC1 Generic External Analog to Digital Input
- A/D 2: EXT ADC2 Generic External Analog to Digital Input
- A/D 3: HW Config
- A/D 4: VIN2
- A/D 5: VIN_VBUS
- A/D 6: GPS Antenna Monitor
- A/D 7: µP Temperature (internal use only)
- A/D 8: Vref
- A/D 9: Battery

Outputs:

- Output 0: Out-0
- Output 1: Out-1
- Output 2: Out-2
- Internal Outputs
- Output 7: Pwr Switch
- Output 8: Chrg Disable
- Output 13: 12Vout Enable
- Output 14: Internal Buzzer (Optional)

Internal Buzzer

The LMU-3640™ supports an internal buzzer on output 14. Buzzer volume can be set from 0 to 100% volume and can be turned on and off with the corresponding AT commands.

Text

```
(at$app param 1078,0,50 // set the buzzer volume to 50% (range 0-100)
at$app peg action 8 14 // turn buzzer on
at$app peg action 9 14 // turn buzzer off)
```

3-Axis Accelerometer Input

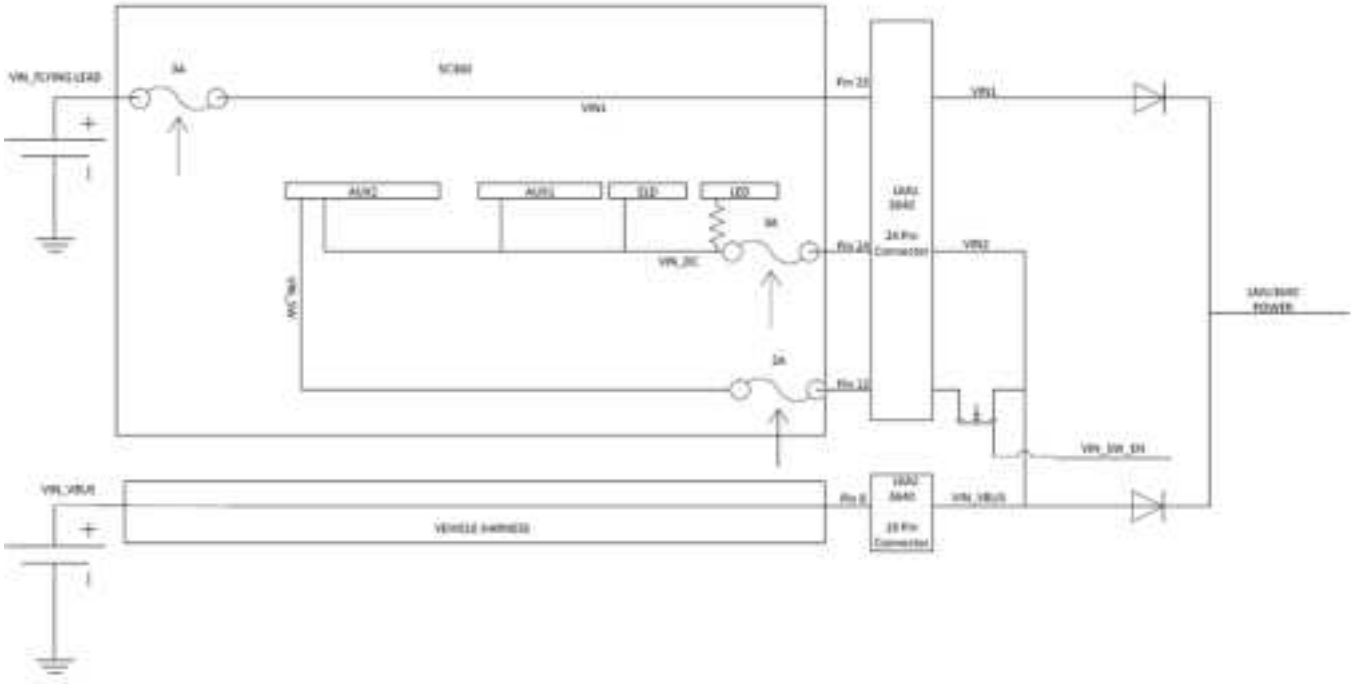
The LMU-3640™ supports an internal 3 Axis Precision Accelerometer as one of its discreet inputs. When the LMU is moved in any direction, the associated input will be in the High state. If the LMU's

accelerometer does not detect motion, then the input will be in the Low state. No external connections are required for this functionality to be operational.

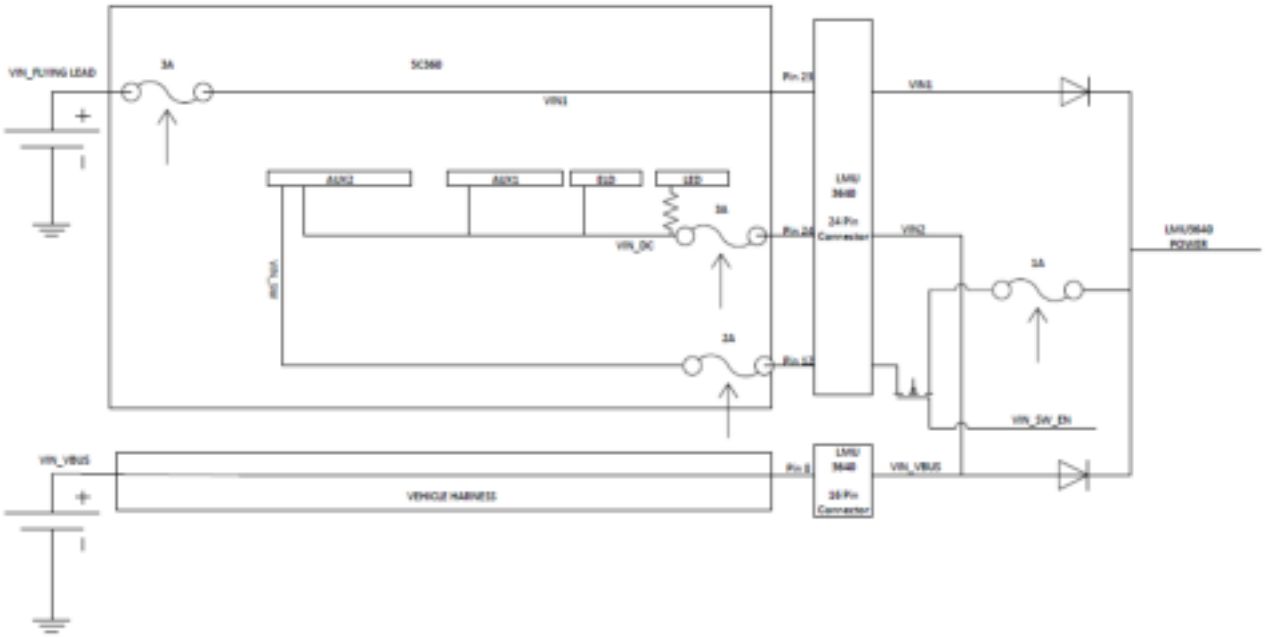
Ignition and Inputs

The LMU-3640™ provides up to 5 inputs. These inputs are protected from typical vehicle transients and can be directly connected to most vehicle level logical inputs from 0 volts up to the vehicle power input level (typically 12 VDC). One of these inputs is dedicated to sensing the vehicle's ignition status to provide for flexible power management. The other 4 inputs may be used to sense vehicle inputs such as cooling unit operation, a hidden driver "Panic" switch, taxi on-duty/off-duty meter status or many others.

The ignition input is pulled to ground through the 268k resistance, where the other inputs can be configured to be normally High (i.e. pulled to +6v through a 210k resistor) or Low (i.e. pulled to ground through a 43k resistor). The diagrams below show how to connect the inputs in both a high- and low-biased configuration:



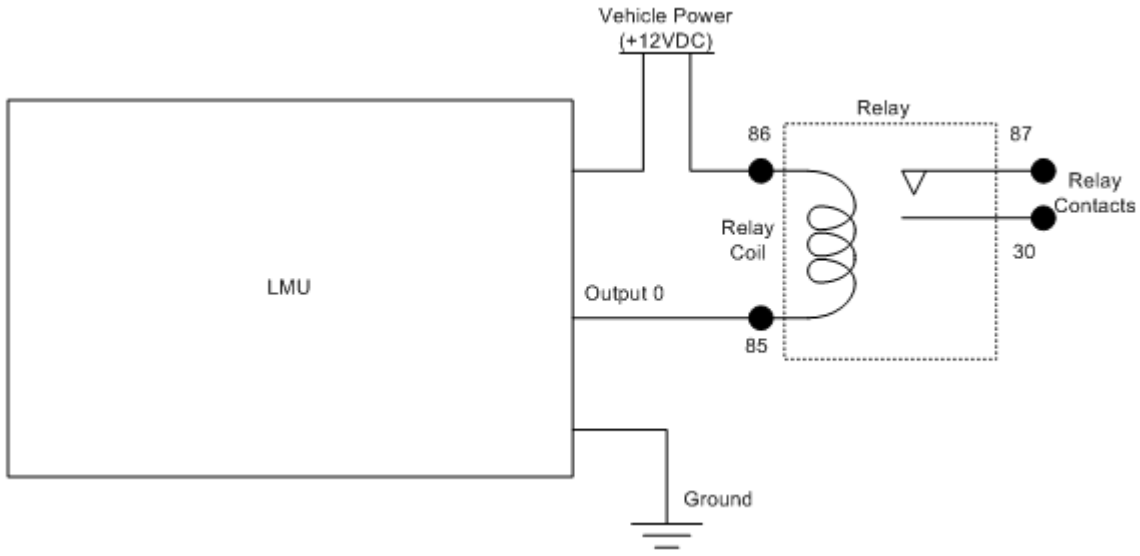
LMU-3640™ HSPA/LTE CAT 1 Input Wiring



LMU-364x™ LTE Cat M1 Input Wiring

Outputs

The LMU's outputs are designed to drive external relays. These outputs provide a high-current, open-collector driver that can sink up to 150 mA each. These drivers may be used to drive external relays that can then control vehicle functions such as door locks, fuel shut-off valves, sirens and lights. If additional current is required to drive the relays, external circuitry can be added to source the current. This diagram is a typical use of an output to drive a relay.



Sample Relay Wiring

Serial Streams

Stream	Port	Rate	Word
0:User0	--	--	--
1:Modem	4:Radio	460800	8/N/1
2:User1	--	--	--
3:Debug	0:Aux1	115200	8/N/1
4:NMEA Out	--	--	--
5:DUN	1:Aux2	460800	8/N/1
6:PEG Serial	--	--	--
7:VBUS	10:Aux3	115200	8/N/1
8:GPS Rcvr	5:GPS	115200	8/N/1
9:AltMdm	--	--	--
10:HostApp0	--	--	--
11:HostApp1	--	--	--
12:HostApp2	--	--	--
13:Undef.	--	--	--
14:BlueTooth	--	--	--
15:ATCmd-1	--	--	--
16:ATCmd-2	--	--	--
17:SatMdm	--	--	--
18:SBB	--	--	--
19:WSP	--	--	--

Status LEDs

The LMU-3640™ is equipped with 4 Status LEDs; one for GPS, one for COMM (wireless network status), one for GPS, one for VBUS and one for WiFi. The LEDs use the following colors to indicate service:

LED Table

LED	Status	Color
1	WiFi/BT	Blue
2	Comm	Orange
3	VBUS	Red
4	GPS	Green

LED #1 (BT - Blue) Definitions

See PEG action 133. AUX options allow PEG script to control blue LED.

Condition	LED 1
BT Off	Off
BT On	On

LED #2 (Comm LED - Orange) Definitions

Condition	LED 2
Modem Off	Off
Comm On - Searching	Slow Blinking
Network Available	Fast Blinking
Registered but no Inbound Acknowledgement	Alternates from Solid to Fast Blink every 1s
Registered and Received Inbound Acknowledgement	Solid

LED #3 (VBUS - Red) Definitions

See PEG action 99. Modifiers 33 - 40 allow PEG script to control red LED.

Condition	LED 3
VBUS Off	Off
VBUS On	On

LED #4 (GPS LED - Green) Definitions

Condition	LED 4
GPS Off	Off
GPS On	Slow Blinking
GPS Time Sync	Fast Blinking
GPS Fix	Solid

Configuration of the Vehicle Bus Interface

The VBU2 Vehicle Bus Interface embedded in the LMU-3640 is capable of supporting both Light Duty (cars, trucks, vans) as well as Heavy Duty (trucks and buses) vehicles. In many cases, the VBU2 interface can automatically identify the vehicle type as heavy duty or light duty(OBD). Detection of operating mode today is primarily based on the correct selection of the cable for the vehicle type.

- In order to avoid vehicle interference from the device, ensure the correct cable is selected for the specific vehicle that the device is installed into
  The VBU2 interface can be configured to select the desired interface mode (Heavy Duty or OBD) using either autodetect or forced setting of the interface mode from the configuration file. Autodetect determines vehicle type upon ignition (based on pin 4 of 16 pin VBUS connector), forced allows user to command vehicle type via configuration file settings.

The Heavy Duty vehicle mode emulates the CalAmp JPOD2 accessory for vehicles with Heavy Duty vehicle bus interfaces. In this mode, the VBU2 interface will operate and communicate with heavy duty vehicle using protocols such as J1939 or J1708. For detailed JPOD2 information, refer to the JPOD2 Tutorial.

The Light Duty vehicle mode emulates the CalAmp VPOD2 accessory for vehicles with OBD2 vehicle bus interfaces. In this mode, the VBU2 interface connects to an OBD2 compliant diagnostic port of the vehicle and will communicate with the vehicle using CAN or other OBD2 protocol(s). Once the vehicle ignition is turned on, the vehicle discovery process is launched. For PEG scripting, OBD configuration, and VBUS data

Refer to the steps below to properly install, configure and run VBU2 interface of the LMU-3640.

VBU2 Mode Configuration and Testing Instructions

- The LMU-3640 firmware with the correct app id should be preinstalled on the device.
- To configure LMU in forced JPOD2 (Heavy Duty) configuration:

Text

```
ats178=13
      at$app param 3352,0,1
```

- To configure LMU in forced VPOD2 (OBD2) configuration:

Text

```
ats178=73
      at$app param 3352,0,1
```

- Testing in forced VBUS configuration

Text

```
enter the command
     ats$app param 3352,0,1
   for VPOD2, enter the command
     ats178=9  - or 73 for debug
   for JPOD2, enter the command
     ats178=13
   begin testing.
```

- To configure LMU in forced Auto Mode Select configuration:

Text

```
ats178=13
      at$app param 3352,0,0
```

- Testing in auto-detect VBUS configuration

Text

```
enter the command
     ats$app param 3352,0,0
     ats$app178=9 (or 13)  - note, this does not matter as auto detect will pick the correct on
   for VPOD2, ensure pin 4 of the 16 pin VBUS connector is floating/open.
   for JPOD2, ensure pin 4 of the 16 pin VBUS connector is tied to ground.
   reboot from cold start.
   begin testing.
```

```
Note: pin 4 of the 16 pin VBUS connector is pin 10 of the 15 pin
      VBUS connector on the conversion cable.
```

Configuration and Activation

This section details how to quickly get an LMU-3640™ provisioned and configured to point at a specific server. It is assumed that a PEG script has already been created and is being managed through LMU Manager or DM-CTC.

We are making three assumptions to simplify the setup process:

- You have created, installed and configured an LM Direct™ Server to receive messages from the LMU-3640™. (See LM Direct™ Reference Guide for details)
- You are using the standard wiring harness from CalAmp and the serial port expansion harness.
- You have created a HyperTerminal or Putty session.
- You have contacted the CalAmp sales team regarding the network availability of the LMU-3640™.

Quick Start - General Config

All LMU-3640™s must go through a common step during the configuration and provisioning process. Specifically, this is pointing the LMU to your LM Direct™ server, either via IP or a URL.
This configuration process is accomplished via a series of AT Commands:

- Power up the LMU-3640™ and connect a serial cable from the LMU to your laptop
- Open a terminal session to the LMU-3640™
- Enter the address of the LM Direct™ server:

Text

```
AT$APP PARAM 2319,0,ddd.ddd.ddd.ddd
AT$APP PARAM 768,0,ddd.ddd.ddd.ddd     (32-bit products only)
AT$APP PARAM 769,0,ppppp
```

Where ddd.ddd.ddd.ddd is the publicly addressable IPV4 address of your LM Direct™ server and ppppp is the UDP port number.

- Alternatively if a URL has been set up for your LM Direct™ server, the LMU may be programmed with:

Text

```
AT$APP PARAM 2319,0,myURL.MyCompany.Com
```

Where myURL.MyCompany.com is the URL assigned to the server.

- Enter ATIC to verify the correct settings are displayed for your Inbound Server.

This configuration process is accomplished via a series of SMS Commands:

- Power up the LMU-3640™ and your handset
- From the handset, send an SMS message to the LMU-3640™ phone number:

Text

```
!RP,2319,0,ddd.ddd.ddd.ddd
!RP,768,0,ddd.ddd.ddd.ddd     (32-bit products only)
!RP,769,0,ppppp
```

Where ddd.ddd.ddd.ddd is the publicly addressable IPV4 address of your LM Direct™ server and ppppp is the UDP port number

- Alternatively if a URL has been set up for your LM Direct™ server, the LMU may be programmed with:

Text

```
!RP,2319,0,myURL.MyCompany.Com
```

Company.com is the URL assigned to the server

- Verify your settings by sending the commands:

Text

```
!RP?2319,0
!RP?769,0
```

Activating LTE Cat 1 Variants Using AT Commands

There are two variants of LTE Cat 1 modems; LTE AT&T and LTE Verizon. Both variants require a SIM card to be inserted.
If you get an LMU without a SIM card (which is the typical case), the operator will simply ask for the IMEI of the LMU. The IMEI (International Mobile Equipment Identifier) is printed on the label of the LMU. DO NOT give the operator the CalAmp ESN of the LMU.
The operator will provide you with a SIM card for each account activated. They will also give you a list tying the IMSI (International Subscriber Identifier) of the SIM to the phone number assigned to it. Please note that the operator will likely tie the IMSI (i.e. the SIM) to a specific IMEI. Making sure the

specific SIM matches to the right IMEI isn't strictly necessary, but it will keep everyone's book-keeping a little cleaner.

If you do happen to have a SIM card, the operator will ask for the IMSI and ICC-ID (Integrated Circuit Card Identifier) along with the IMEI of the LMU. Again, in return you should get a list of IMSIs and Phone Numbers.
The IMEI, IMSI and ICC-ID are all available through the ATI1 command. The IMEI should also be printed on the label of the LMU.
Operators can offer more than one type of APN and can even set up a custom APN just for your devices. The rates they charge will vary depending on the APN service you want. Operators may also request you use a blank APN. With the APN, you may also receive a username and password combination.
The last item an operator may provide is a SIM PIN. The PIN is effectively a password to the device. The main difference here is that the PIN will restrict all the capabilities of the device, where the SPC is used just for configuration.

LTE Cat 1 AT&T Activation
The activation sequence for an LTE AT&T modem would therefore look as follows:

Text

```
AT$APP PARAM 2306,0,“myAPN.myOperator.com”
AT$APP PARAM 2306,1,“myAPN.myOperator.com”
AT$APP PARAM 2314,0,“myUSername” (only if required by the carrier)
AT$APP PARAM 2315,0,“myPassword” (only if required by the carrier)
ATS155=1 (to disable APN auto-provisioning)
```

To clear the APN, the following command can be used:

Text

```
AT$APP PARAM 2306,0,“”
AT$APP PARAM 2306,1,“”
```

Only enter this next command if you have been given a non-zero PIN as any errors may lock you out of the modem. If a SIM pin is needed, contact your support team.

Text

```
AT$APP PIN <SIM pin>
```

You can confirm activation by watching the Comm LED to see if it goes solid. You may also confirm activation by entering AT command

Text

```
AT$APP COMM STATUS? or ATIC
```

LTE Cat 1 Verizon Activation
The activation sequence for an LTE Verizon modem would therefore look as follows:

The LMU must be registered on the Verizon network. Having the device roaming or in poor Verizon coverage will not allow the execution of the activation process.
The activation is an automatic process where Verizon pushes the APN to the modem.
In some cases, there might be a delay up to 15 minutes until the unit gets activated and is able to make a data call.
For Verizon LTE, parameter 2306 (APN) is currently disabled.

You can confirm activation by watching the Comm LED to see if it goes solid. You may also confirm activation by entering AT command

Text

```
AT$APP COMM STATUS? or ATIC
```

Preparing for Installation

- The LMU to be installed
- A power harness
- 24 Pin Molex I/O Connector
- 16 Pin Molex VBUS Connector
  Optional Components:
- Input and output cables
- Relays
- LMU peripherals (i.e. Serial adapter, jPOD, TetheredLocator)
- Host serial devices (e.g. PDAs, laptops, other serial devices)

Plan The Installation
Verify Power, Ground and Ignition. Be sure to check each source (power, ground and ignition) to ensure that the proper signaling exists. This is typically accomplished with a multi-meter.
Before drilling any holes or running any wires, decide where each hardware component will be located (LMU, antennas, peripherals, etc.). Be sure that the cables to the LMU are not bent or constricted in any way. Also make sure that the LMU is kept free from direct exposure to the elements (sun, heat, rain, moisture etc...).

Be advised that an installation that violates the environmental specifications of the LMU will void the warranty.

The best way to ensure a trouble-free installation is to consider your options and make some decisions before you start. Take a look at the vehicle and determine how to best install the LMU for the following purposes:

- Accurate data gathering and simulation of how customers actually use your solution
- Ongoing monitoring and maintenance of LMU equipment
- Accidental or intentional alteration of the equipment or cable connections
- The following sections cover some of the issues to consider when planning your LMU installation.

Size and Placement of LMU Unit
The dimensions of the LMU should be taken into account, particularly when installing in a vehicle: Whether you intend to place the LMU under a seat or into a cavity behind the vehicle's interior molded trim, be sure the LMU will fit before drilling any holes or running cable
Be certain that the cables running to the LMU will not be bent or constricted. Damage to the cables may impede the LMU's performance.
Be certain that the installation point will not violate any of the LMU's environmental specification (temperature, moisture, etc...) as improper installation of the LMU may void the warranty.
See the LMU Environmental Specifications for the exact measurements and specifications of the LMU-3640™.
Typical installations will place the LMU under the vehicle dash board, or in the trunk. Make sure you can get access to the unit afterwards as under some circumstances it may be necessary to add additional wiring or connections to the LMU.

Access to the SIM (Subscriber Identity Module) Card
When used on a LTE Cat M, HSPA, or GSM network, each LMU uses a Subscriber Identity Module (SIM) card, which should be inserted before you install the LMU for the first time. The SIM card is attached to the main-board inside the housing of the LMU unit.
At some future time, you might need or want to replace the SIM card with a different one, so try to install the LMU in such a way that the cover can be removed to make the SIM card accessible.

Protection from Heat
It is best not to place the LMU unit in an unusually warm location such as directly near heater vents, near hot engine components or in direct sunlight. The maximum temperature that can be tolerated by the LMU is described in the LMU Environmental Specifications section.

Visibility of Diagnostic LEDs
Status LED lights on the front of the LMU unit can provide valuable information about the operation of the LMU. When feasible, attempt to install the LMU in such a way that these lights can be seen with reasonable ease.
You may find it useful to be able to view the LEDs periodically to make sure that the LMU is operating properly. If at any time you should encounter a problem with the LMU, you may need to read the LEDs in order to troubleshoot the problem. If you cannot fix the LMU yourself, you will need to provide the

LED information to CalAmp customer support.
For information about how to interpret the LEDs, see the Status LED Behavior section.

Cable Length
Do not cut cables. Instead, coil any excess length, making sure not to crimp or flatten any cable.

Moisture and Weather Protection
The LMU unit must be located where it will not be exposed to moisture or water. In a typical installation inside a vehicle this is not commonly thought to be a concern; however, it might be best to avoid locating the LMU below a car's cup holders, or where rain might easily splash into the compartment when a door is opened.

Preventing Accidental or Unauthorized Modification
If you anticipate that fleet drivers or others might interfere with the LMUs once they are installed, take steps to be sure that it is not easy to remove the LMU from its power source, or disrupt internal antenna interference.
Two common methods are the use of Tamper Proof Sealant or creation of PEG Script to detect power loss or GPS antenna disconnections.

Installing the LMU in a Vehicle

This section provides instructions for installing an LMU in a vehicle.
Be sure to consider the design decisions described in the previous sections. When you are ready to begin installing the LMU, follow these steps:

Place the LMU-3640in the vehicle.
The LMU-3640contains an internal battery, and thus should be oriented with the label facing upwards towards the sky. LMUs with internal antennas should be placed directly under a thick panel to maximize their performance and protect from external elements. A typical location include under the dash close to the front wind-shield.
Attach the LMU to the solid body of the vehicle, not to plastic panels. The LMU can be placed out of sight by removing interior trim and molding to expose available space, then replacing the trim once the LMU is in place.

Connect power, ignition, and ground.
The power input (red wire) must be connected to a constant (un-switched) +12 VDC or +24 VDC supply; preferably, connected directly to the vehicle battery terminal or as close to it as possible. This connection point should be fuse protected to not more than 5 Amps.
The ignition input (white wire) must be connected to the vehicle ignition or another appropriate key operated line, such as ACCESSORY, ensuring that power to the ignition wire is available only when the vehicle ignition is on.
The ground line (black wire) must be connected to chassis ground.
Failure to connect these lines in the manner described may result in discharge of the vehicle battery. For best results, it is strongly recommended that the LMU connection be on its own circuit. Connect the power input directly to the vehicle battery if possible and protect the circuit with an inline fuse. If

you must connect through the fuse box, use standard commercial wiring practices to create a permanent installation rather than using press-in fuse clips or other temporary measures.
DO NOT connect the power cable to the LMU at this time.

Typical Connection Sequence

Connect any peripherals to the LMU
Plug in the power harness.
The physical installation of the LMU hardware is now complete.

Installation Verification

In many cases it is desirable to verify that an installed LMU-3640™ is working properly. That is, installers should verify that the GPS and communications functions of the LMU-3640™ are working properly before departing the installation site. In more robust cases, some key configuration settings such as the Inbound Address and URL should also be verified.
Note that these processes are all based on issuing AT Commands to the LMU-3640™. It is expected that installers will have access to a serial port expansion cable and a laptop or PDA capable of a terminal connection. Alternatively, an SMS message can be sent to an LMU-3640™ to obtain its current status.

Comm Verification

Installers should first verify that the LMU-3640™ has been acquired and has registered to the wireless network. This may be verified in one of two ways. First, installers may look at the Comm LED (i.e., the one closest to the SMC antenna connector). If this LED is solid, then the LMU has registered to the network and established a data session.
If the LED is not visible, then Comm may be verified using an AT Command:

Text

```
ATIC
```

Depending on the wireless network being used something similar to what is shown below will be displayed. It is important to verify that 'Yes' values are displayed at the top for Data and Network registration and the correct APN is displayed.

Text

```
Radio Access    : GSM
        Network Reg.    : Yes, Home
        Data Reg.       : Yes, Home
        Connection      : Yes
        RSSI            :      -97 dBm
        BER             :       99
        Channel         :      737
        Cell ID         :     3441
        Base Station ID :       40
```

```
        Local Area Code :    31003
        Network Code    :      410
        Country Code    :      310
        IMEI (Modem S/N): 351802055396182
        IMSI (SIM ID)   : 310410202524377
        ICC-ID (SIM S/N): 89014102211025243778
        Phone Number    :
        GPRS APN        : ISP.CINGULAR
        Maint. Server   : maint.vehicle-location.com(216.177.93.246):20500
        Inbound Server  : (0.0.0.0):20500
        Dual Comm       : routing id=0, log cid=0, modem type=21, inbnd index=0

OK
```

For LTE CAT-M1, the ATIC output is as follows

Text

```
Radio Access    : LTE-M
Network Reg.    : Yes, Home
Data Reg.       : Yes, Home
Connection      : Yes
Ref Sig Rcvd Pwr:   -98 dBm [Good]
Ref Sig Rcvd Qty: -15.0 dBm [Fair]
Channel         :     5110
Cell ID         : 79877392
Trking Area Code:    33553
Network Code    :      410
Country Code    :      310
IMEI (Modem S/N): 865284040700852
IMSI (SIM ID)   : 310170837674259
ICC-ID (SIM S/N): 89011703278376742592
Phone Number    :
GPRS APN        : lojack03.com.attz
Modem Mode      : Att
Maint. Server   : 216.177.93.246(216.177.93.246):20500
Inbound Server  : 172.18.16.243(172.18.16.243):20510
Primary Service : srvc(0) log(0) radio(0) inbnd_index(0) mode(0)
```

For LTE Cat 1, the ATIC output is as follows

Text

```
Radio Access    : LTE
Network Reg.    : Yes, Home
Data Reg.       : Yes, Home
Connection      : Yes
Ref Sig Rcvd Pwr:   -95 dBm [Good]
Ref Sig Rcvd Qty: -15.0 dBm [Fair]
Channel         :      700
```

```
Cell ID         : 51396865
Base Station ID :        0
Trking Area Code:    33553
Network Code    :      410
Country Code    :      310
IMEI (Modem S/N): 357766097122035
IMSI (SIM ID)   : 310410154678815
ICC-ID (SIM S/N): 89014104271546788156
Phone Number    : 2345678901
GPRS APN        : lojack03.com.attz
Maint. Server   : 216.177.93.246(216.177.93.246):20500
Inbound Server  : 52.7.195.15(52.7.195.15):20510
Primary Service : srvc(0) log(0) radio(0) inbnd_index(0) mode(0)
```

For HSPA/UMTS, the ATIC output is as follows

Text

```
Radio Access    : UMTS
GSM Registered  : Yes, Home
GPRS Registered : Yes, Home
Connection      : Yes
RSSI            :      -79 dBm
BER             :       99
Channel         :     4385
Cell ID         : 37227580
Base Station ID :      179
Local Area Code :    31982
Network Code    :      410
Country Code    :        310
IMEI (Modem S/N): 358077091262820
IMSI (SIM ID)   : 310410154678815
ICC-ID (SIM S/N): 89014104271546788156
Phone Number    : 2345678901
GPRS APN        : lojack03.com.attz
Maint. Server   : maint.vehicle-location.com(216.177.93.246):20500
Inbound Server  : 52.7.195.15(52.7.195.15):20510
Primary Service : srvc(0) log(0) radio(0) inbnd_index(0) mode(0)
```

If any of the responses return Not-Acquired or Not-Registered (and the APN is correct), the wireless network operator should be contacted for further troubleshooting.
Please note that it may take several seconds (or longer) for the LMU-3640™ to communicate with the modem and acquire the wireless network.

GPS Verification

The next step is to verify that the GPS receiver is seeing enough satellites to obtain a valid GPS position. Again, installers have two choices on how to perform this verification. First, like the Comm Verification, there is a GPS status LED (i.e., the one closest to the SMA connector). If this LED is solid,

then the LMU has found GPS service.
If the LED is not visible then GPS service may be verified using an AT Command:

Text

```
AT$APP GPS?
```

The response should be similar to:

Text

```
Lat=3304713, Lon=-11727730, Alt=0
Hdg=113 Spd=0 3D-RTIME HDOP=130 nSats=7
```

Installers are looking for the 3D-RTIME setting along with a valid Lat, Long pair (i.e. something other than 0). If the GPS receiver does not have a valid lock within 2-3 minutes.

Inbound Verification
The last item to verify is that the LMU-3640™ is sending data to the correct server. In general, this is a two-step process that will need the aid of an observer on the back end. That is, a technician will have to be logged in so they can monitor data coming into the backend mapping/vehicle management application.

First, verify that the LMU-3640™ is using the correct Inbound IP address by using:

Text

```
AT$APP INBOUND?
```

The response should be similar to:

Text

```
INBOUND LMD
INBOUND 0 ADDR ddd.ddd.ddd.ddd:ppppp *
INBOUND 0 URL  myURL.myCompany.com
INBOUND 1 ADDR 0.0.0.0:20500
INBOUND 1 URL
INBOUND 2 ADDR 0.0.0.0:20500
INBOUND 3 ADDR 0.0.0.0:20500
```

The installer will need to verify with a backend technician that the, URL (myURL.myCompany.com), IP address (ddd.ddd.ddd.ddd) and port () are correct.
The second step is to verify that the LMU-3640™ is sending data. The best way to do this is to force

the LMU-3640™ to send in an unacknowledged Event Report (i.e., its current GPS location) with the following command:

```
Text

AT$APP PEG SUNRPT 255
```

The LMU-3640™ will respond with: OK
The backend monitor must then be contacted to confirm that they received an Event Report with Event Code 255.
Assuming that all three sections have passed, the installation can be considered to be complete.

Verification via SMS
The current Comm, GPS and Inbound status of a GSM LMU can be obtained via SMS provided you have access to an SMS capable phone or PDA.
Using your handset, send the following SMS Message to the LMU:

```
Text

!R0
```

Within a few minutes, the LMU should return a response in the following format:

```
Text

APP: <App ID> <Firmware Version>
COM:<RSSI> [./d/D][./a/A][./L][IP address] [<APN>]
GPS:[Antenna <Short/Open/Off>] | [No Time Sync] | [<FixStatus> <Sat Count>]
INP:<inputs states> <vehicle voltage>
MID:<mobile ID> <mobile ID type>
INB:<inbound IP address>:<inbound port> <Inbound Protocol (LMD/LMX)>
```

APP:
o :
The Application ID value of the LMU indicating the host platform and the wireless networking technology of the LMU.
o :
The current firmware version in use by the LMU
COM:
o :
This is the signal strength the wireless modem sees from the network. In general the LMU is at least scanning for the network if the RSSI is not -113.
o [./d/D]:
If the character ‘D’ is present, it indicates the LMU had a data session established when it responded

to the status request. For the 8-Bit product line an upper case ‘D’ indicates both the Inbound and Maintenance sockets are ready. The lower case ‘d’ indicates that only the Maintenance socket is ready. A ‘.’ indicates no sockets are ready.

- **[./a/A]:**

This field indicates if the LMU has received an Acknowledgement from the Inbound server. This field will be empty if the LMU has never received an ACK. The lower case ‘a’ will be present if it has received an ACK since the last cold boot (i.e. power cycle) but not the last warm boot (App Restart or Sleep). The upper case ‘A’ will be present if the LMU has received an ACK since the last warm boot. A ‘.’ Indicates no acknowledgement has been received.

- **[./L]:**

This field indicates if the LMU’s log is currently active. An ‘L’ indicates that the log is currently in use (i.e. one or more records have been stored) where a ‘.’ indicates the log is inactive.

- **[IP Address]:**

This is an optional field if and is only present if the LMU has established a valid data session. This field will contain the current IP address of the LMU as assigned by the wireless network. Note that if you see a value of 192.168.0.0, this is an indication that the LMU has not been able to establish a data session.

- **[]**

The current Access Point Name in use by a GSM LMU.

GPS:

- **[Antenna <Short/Open/Off>]:**

This field, if present, indicates a problem with the LMU’s GPS antenna. A value of Short indicates that the antenna cable has likely been crushed. A value of Open indicates that the antenna cable is either cut or disconnected. A value of Off indicates that the LMU’ GPS receiver is off.

- **[No Time Sync]:**

If this field is present, it indicates that the LMU’s GPS receiver has not been able to find even a single GPS satellite. This would likely been seen in conjunction with the above antenna error, or if the LMU GPS antenna is otherwise blocked.

- **[ ]:**

If these fields are present it indicates that the LMU has, or had a valid GPS solution. The field indicates how many GPS satellites are currently in use by the LMU. The field indicates the type of fix. The Fix Status types are detailed in the LM Direct Reference Guide.

INP:

- **:**

This field details the current state of each of the LMU’s discreet inputs. This field is always 8 characters long. The left most character represents the state of input 7 where the right most represents the state of input 0 (i.e. the ignition). A value of 1 indicates the input is currently in the high state. A value of 0 indicates it is currently in the low state.

- **:**

This field will contain the current reading of the LMU’s internal A/D. This will be the supply voltage provided to the LMU in mV.

MID:

- **:**

This will be the current mobile ID in use by the LMU.

o :

This will be the type of Mobile ID in use by the LMU. The available types are, Off, ESN, IMEI, IMSI, USER, MIN and IP ADDRESS.

INB:

o :

This is the current IP address in use by the LMU. This value should match the IP address of your LM Direct™ server.

o :

This is the current UDP port the LMU will use to deliver its LM Direct™ data. This value should match UDP port you are using on your LM Direct™ server. It is typically 20500.

o <Inbound Protocol (LMD/LMX)>:

This is the current UDP/IP messaging protocol in use by the LMU. In general it should be LMD.

Updated 20 days ago

← LMU-3040™/LMU-3240™ TTU-3640™ →

FCC Caution.

a、§ 15.19 Labeling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

b、§ 15.21 Changes or modification warning.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

c、§ 15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

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*RF warning for Mobile device:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) This device may not cause interference, and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement