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LMU-3030 Tracking Unit

CRS – Commercial Requirements Specification

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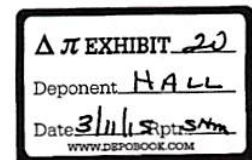
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Change History

Date	Person	Version	Reason
01-07-2013	S. Hall	0.1	Initial Draft
01-10-2013	S. Hall	0.2	Update from review meeting
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1 General

1.1 Purpose

The purpose of this document is to define the commercial, functional and technical requirements for the LMU-3030 product.

1.2 Scope

The scope of this document is limited to describing the commercial opportunity and requirements for the LMU-3030 product described herein; further it describes the basic functional and technical requirements as required to initiate development of the product

This document is intended to outline the functional and technical requirements from a general market and/or customer perspective. It is not intended to be a detailed technical design specification. Additional design specifications and other technical documentation will be generated as needed over the course of the development process.

1.3 General Product Description

The LMU-3030 is a self-contained vehicle tracking and data monitoring unit. The product is capable of monitoring and communicating with the vehicle Engine Control Unit via the OBD II port to retrieve vehicle status and diagnostic data. This product will be offered in GSM/GPRS, HSPA and CDMA/1xRTT versions.

The device is packaged in a J1962 compatible OBD II plug form-factor plastic case. This configuration provides for an extremely simple installation that can be easily completed by a consumer or an untrained installer.

The LMU-3030 incorporates a new and improved OBD2 interface as well as improved GPS receiver performance. This new design also adds a Lithium-Ion backup battery and charger, and a Bluetooth interface option.

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2 Commercial Overview

2.1 Target Market(s)

The target market(s) for the LMU-3030 product are simple low-cost vehicle tracking and monitoring applications where ease of install is critical.

2.1.1 Reserved

2.2 Reserved

2.3 Reserved

2.4 Reserved

2.5 Reserved

2.6 Reserved

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3 Technical Requirements

3.1 Product Features

3.1.1 Hardware Feature Summary

- Application Processor
 - STM32F205 microcontroller (*or similar ST Micro device*)
 - 512 Flash / 128KB RAM minimum (*subject to confirmation*)
- Integrated surface-mounted cellular module. (3) versions
 - GSM/GPRS quad band (uBlox – SARA G3xx)
 - GSM/GPRS/HSPA (uBlox – LISA-U2xx)
 - CDMA 1x Dual Band (uBlox – LISA-C2xx)
- Cellular Antenna
 - Internal cellular antenna
- Internal SIM socket
- Integrated uBlox 7 GPS receiver chipset with TCXO
- GPS Antenna:
 - Internal GPS antenna (18/25mm patch with LNA)
 - Facing out from end opposite OBD connector
- Power Supply
 - Filtered 12V automotive power supply input (7~18V operating range)
 - Input voltage monitor ADC
- Internal Rechargeable Battery and charger
 - Small (100~200mA) 'last gasp' battery (up to 1hr tracking/reporting / >20 locates)
- Low current consumption (average)
 - <5mA sleep mode
 - <15mA radio-active sleep mode (SMS)
 - <20mA idle w/IP connection open
 - <60mA active tracking w/GPS and Cell enabled
- Internal 3-axis MEMS accelerometer for motion detection (LIS3DH)
- Interface connector – 16-pin J1962 compliant OBD-II type plug connector
- Integrated OBD-II Interface
 - Support for CAN, J1850 PWM/VPW, K-Line, and KWP connections
 - Support for CAN Single-wire interface
 - Support for optional OE interfaces
 - OBD Controller
 - STM32F205 microcontroller (*or similar ST Micro device*)
 - 128K Flash / 64K RAM minimum (*subject to confirmation*)
- Integrated Bluetooth 4.0 Dual transceiver and antenna (external clip-on option)
- Integrated Buzzer (*details TBD*)
- Inputs and Outputs
 - None
- (1) Serial Interface
 - External 4-pin connector interface
- (3) Status LEDs

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3.1.2 Firmware/Software Feature Summary

The LMU-3000 firmware will serve as the base firmware for the LMU-3030 product. The following is a summary of the anticipated changes/additions:

- Update OBD interface to replace B&B with Innova HW and SW interface
- OBD2 support for the following Parameters on at least 85% of vehicles on the road today in North America:
 1. VIN
 2. Odometer
 3. Vehicle Speed
 4. Engine RPM
 5. Fuel Level
 6. Fuel Usage (trip)
 7. Fuel Usage
 8. Coolant Temperature
 9. Accelerator Pedal Position
- OBD2 support for the same list of Parameters on at least 85% of vehicles on the road today in Europe.
- Support for detecting and passing DTCs for all vehicles above
- Support for pass-through of OBD2 commands and data to PEG and Hosted Applications
- Follow-on support for expanded list of parameters on same vehicles as above. Expanded list to include the following as a minimum:
 10. Oil Pressure
 11. ABS Status
 12. Brake Pedal Position
 13. Seatbelt Status
 14. SRS Status

Note that support for the parameters listed above is contingent upon support for each parameter on standard OBD2 interfaces by each individual vehicle configuration. There will be some parameters that are not supported on specific vehicle configurations.

3.1.3 Product Options

The following options will be offered in conjunction with this product:

- TBD

3.1.4 Product Accessories

The following accessories will be offered in conjunction with the LMU-3030 product:

- Low-profile 4-pin Serial Cable Adapter (requires 133337 or equivalent RS232 adapter)

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4 Interface Requirements

4.1.1 User Interface

The LMU-3030 product is generally an unattended device. The customer for this device is a system integrator / OEM who will market various configurations of this device into a variety of applications and channels.

User access to the device is via a remote application server or software application operating across the wireless network. The skill level of the remote operator should have little bearing on the design of the tracking unit itself.

The local user interface is limited to that which is needed to support installation and verification in the field and a buzzer to facilitate audible feedback for various applications.

4.1.1.1 Status Indicators

The product shall include support for three (3) LEDs for indication of status of the GPS and Communication sub-systems. Status should be indicated using blinking patterns of the individual LEDs. LED colors shall be green for GPS status, orange for Communication status and red for OBD status. Firmware supporting the LEDs shall have the ability to disable them after a period of inactivity in order to conserve battery power.

4.1.1.2 Buzzer

The product shall include support for an internal buzzer function implemented using a small piezo speaker/buzzer or similar solution. The audio level of the buzzer should be sufficient for the vehicle operator to hear under normal driving conditions.

4.1.2 RF Interfaces

4.1.2.1 Cell

The RF interface to the Cell Module shall utilize an internal antenna (integrated directly on the PCB of the product).

4.1.2.2 GPS

The RF interface to the GPS receiver shall utilize an internal antenna (integrated directly on the PCB containing the GPS receiver and LNA).

4.1.3 Communication Interfaces

4.1.3.1 Serial

The device shall incorporate one (1) serial interface. The objective of this interface is to provide access to the LMU-3030 CPU for purposes of programming, testing, and provisioning.

Note that the serial interface is 3.3V logic level and interfaces directly to the UART of the CPU. An external converter must be used for connection to a standard RS232 serial port.

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4.1.4 I/O Interfaces

4.1.4.1 Inputs

The LMU-3030 design will not support any external I/O connections.

4.1.4.2 Outputs

The LMU-3030 design will not support any external I/O connections.

4.1.4.3 A/D

The LMU-3030 design will not support any external I/O connections.

4.1.5 OBD-II Interface

The LMU-3030 design will incorporate a simple integrated electrical interface supporting all five (5) of the standard OBD-II physical layer interfaces. This interface will support data on any one or more of the interfaces

- ISO 15765 CAN
- ISO 9141-2 K-Line
- ISO 14230 KWP2000
- J1850 PWM
- J1850 VPW

On addition, the OBD-II interface shall support the Single Wire CAN interface on Pin 1.

The connector and pin-out shall be fully compatible with the J1962 OBD-II connector standard.

4.1.6 Cables and Harnesses

The LMU-3030 design will not support any external connections except for serial data. The only accessory supported will be a serial adapter cable to allow use of a 133337 RS-232 adapter cable for provisioning and debug.

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5 Physical Requirements

5.1.1 Design

The LMU-3030 products are complete finished and enclosed assemblies. The basic form-factor of the product shall be similar to the LMU-3000. The device must be designed to withstand the stresses of continuous operation in an automotive interior environment.

5.1.2 Mechanical

The LMU-3030 products will be designed to be compatible with the OBD-II interface connector utilized in all cars and light trucks in North America. The enclosure shall be a simple low-cost snap-together plastic enclosure with the contact pins attached to the PCB assembly.

5.1.2.1 Size

The target dimensions of the LMU-3030 product shall be:

51(L) x 43(W) x 25(H) mm

(Length with connector: 63 mm)

Smaller dimensions are highly desirable, if possible.

5.1.2.2 Material

The product enclosure shall be fabricated using black plastic. Finish shall be textured as on the existing LMU-3000 product.

5.1.2.3 Special Requirements

Provisions must be included allowing for easy installation of the SIM card into the socket of the product without major disassembly of the unit.

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5.1.3 Product Labeling

Each product unit shall be individually labeled. The labeling shall be as defined below.

5.1.3.1 Type

An adhesive label shall be printed and affixed to the under-side of the unit.

5.1.3.2 Material

White polyester labels with permanent adhesive shall be used.

5.1.3.3 Size

The label shall be approximately 40 x 70 mm in size.

5.1.3.4 Content

At a minimum, the label shall contain the following information:

- Model Number
- FCC and IC identifiers
- Serial Number in Numeric and Barcode form

In addition, the following fields shall be optionally available to be printed on the label. A combination of up to (4) of these fields may be printed on a given label.

1. ESN
2. IMEI
3. IMSI
4. ICCID
5. MIN/MSISDN
6. MEID

The label shall be customizable for specific customers that desire their own identity information on the labels. In addition, customers may specify alternate information fields to be printed on the label.

The option of providing a separate second serial number label to be placed with the customer installation paperwork shall be supported.

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5.2 Environmental Requirements

5.2.1 Operational Environmental Requirements

Temperature	-30 to +85 degrees C
Humidity	0 to 90% non-condensing
Vibration	SAE J1455
Shock	SAE J1455

5.2.2 Storage Environmental Requirements

Temperature	-40 to +85 degrees C
Humidity	0 to 90% non-condensing

5.2.3 Other Environmental Requirements

This device and all associated accessories and materials must be 100% RoHS compliant.

ESD protection to J1455 method at a minimum level of 4kV using both direct and air discharge methods.

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6 Packaging Requirements

6.1 General Packaging Requirements

The product will require new/alterd packaging design. ☒ yes ☐ no

The product will require new packaging design to accommodate the new form-factor.

6.2 Unit Packaging

The product will have the option of being enclosed in individual package units.
☒ yes ☐ no

If applicable, individual packaging will be a:

☒ cardboard box ☐ plastic blister pack ☐ plastic bag

If applicable, individual packaging shall be suitable for direct shipment: ☒ yes ☐ no

6.3 Retail Master Packs

When product is packaged in individual unit packaging, multiple units can be shipped in Retail Master Packs of either 5 units or 20 units.

6.4 Bulk Packaging

Multiple units of the product will be packaged in Bulk Shipping Cartons in quantities of (100) units per box.

Units will be packed in the Bulk Shipping Carton using:

☒ molded plastic trays ☐ cut foam trays
☐ cardboard dividers ☐ nothing (bulk)

6.5 Package Labeling

Both Bulk Shipping Carton and Master Cartons shall be labeled on top and at least 2 opposing sides with model / part number in both numeric and barcode forms. Labeling should also identify country of origin and container quantity.

Individual Product Boxes shall be labeled with model / part number in both numeric and barcode forms.

Cartons shall also be labeled with ESD Sensitive Device warning labels.

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6.6 Packaging Standards

Product and accessories must be able to survive, undamaged when fully loaded Bulk Shipping Carton, Individual Product Box, or fully loaded Master Carton is subjected to standard flat drop and corner drop tests at a height of 1 meter.

6.6.1 ESD

All packaging materials shall be ESD-safe.

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7 Product Development

7.1 Proposed Development Approach

Development of the LMU-3030 product is assumed to be a new design based roughly upon the architecture of the existing LMU-3000 designs. New board designs will be required for all layers as well as a new antennas and enclosure/mechanical design. The existing LMU-3000 OBD layer shall be replaced with a new design utilizing a STM32 microcontroller and an optimized OBD interface. The design will be updated to reduce material and manufacturing cost wherever possible.

The design deliverables will include a total of two (2) Application layer PCB designs:

- GPRS
- HSPA/CDMA

7.2 Technology Requirements

Updated OBD controller and hardware interface along with OBD software stack from Innova.

7.3 Development Constraints

This product is highly dependent upon low-power operation. Time to market is important but any design tradeoffs should insure the lowest possible cost while fulfilling the power requirements and meeting project schedule.

7.4 Reserved

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8 Quality and Certification Requirements

8.1 General

As with all MRM products, product reliability is very important. The product must have a high degree of reliability under the full range of operating conditions in the field.

In the event of a hard failure, measures must be taken to insure that RF transmitter(s) are left in a disabled state and all I/O outputs are in their disabled state.

8.2 Product Qualification

The product qualification plan (QP) for this product must incorporate tests or test cases to insure compliance with the following elements:

- Physical/mechanical specifications
- Electrical specifications
- Environmental specifications
- Functional specifications
- Applicable standards and regulations

8.3 Agency Certifications

The product must be certified under the following agencies/standards:

- FCC Equipment Authorization parts 22, 24
- FCC EMI Part 15
- Industry Canada
- CE
- PTCRB
- GCF

8.4 Carrier Certifications

The product must be certified for operation on the following carrier networks at launch:
 (Additional carriers may follow based upon customer demand)

GPRS:	HSPA:	CDMA:
☐ AT&T	☒ AT&T	☒ Verizon
☐ Rogers Canada	☐ Bell Mobility	☒ Sprint
☒ T-Mobile	☐ Rogers Canada	☐ .
☒ Vodafone	☒ T-Mobile	
☒ Telefonica	☐ Telus	
MVNO:	MVNO:	MVNO:
☐ Jasper	☐ Jasper	☐ .
☐ Kore	☐ Kore	☐ ..

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9 Production Requirements

9.1 General Production Requirements

The product shall be documented in a thorough and complete manner to facilitate rapid introduction into manufacturing. In addition, it shall be designed in such a way to facilitate efficient and low-cost production and test as appropriate for the volumes specified for this product.

9.2 Production Test Requirements

Reserved.

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