



Driving IoT Innovation

FLEET MANAGEMENT

# **Cello-CANiQ-M**<sup>TM</sup>

## *Intelligent Fleet Management Solution with Dual CAN Interface*

The Cello-CANiQ-M is an advanced fleet management solution that utilizes a smart algorithm to combine data from various vehicle environment interfaces. Based on the LTE CAT M1 network, it supports multiple standard protocols and interfaces simultaneously, using two separate CAN channels that enable driver identification, serial communication with third party devices, a wide range of measurement ports, and more.

All of these interfaces are designed and configured for maximum flexibility with CAN data aggregation, filtering, processing and event triggering.

With advanced multi-source data analytics delivered by the Cello-CANiQ-M, your business intelligence is reinforced and operating costs are reduced, due to lower fuel consumption, reduced warranty expenses, improved driving habits, and optimized maintenance processes.

The Cello-CANiQ-M is suitable for a wide range of applications such as fleet management, driver behavior, proactive maintenance and car sharing.





## Highlights

- Direct connectivity and data analytics for the vast majority of vehicle data buses and interfaces, enabling a wide range of applications driven by the vehicle CANBUS data.
- Dual CANBUS interface
- Supports the following standards:
  - OBDII (ISO 15765, ISO 14229)
  - CAN2.0 (ISO 11898, J1939, FMS)
  - K-Line (ISO 14230 parts 1&2, ISO 9141-2)
  - J1708 (SAE J1587)
- Supports the following hardware:
  - LTE CATM1/2G
  - Advanced multi-GNSS (GPS + GLONASS SBAS) with cutoff/short-circuit detection and optional external GPS antenna
  - BLE 5.2
  - COM port (RS-232)
  - 10 GPIO
  - 1-wire
- Variety of embedded algorithms for calculating a trip's total fuel consumption, based on different available CAN parameters, resulting in increased ROI realization.
- K-Line vehicle interface and CAN interface can work simultaneously.
- Flexible 'Drag & Drop' CAN Editor GUI tool to configure vehicle-data collection and manage real-time and powerful on-board logic engine.
- DTC (Diagnostic Trouble Code) reporting logic over supported CANBUS/K-line protocols.
- Flexible and configurable maneuver and trip scoring logic; includes on-board ECO and trip safety scores calculations, and online & real-time driver feedback display.
- AutoCAN - automates the process of finding the correct XML file for an installed Cello CANiQ unit, in either private or commercial vehicles.
  - Professional Services (CAN libraries) - Cellocator offers more than 3,000 complementary vehicle libraries, which include vehicle models and parameters sampled by our field engineering team. The libraries are updated and published on a monthly basis. Cellocator's Professional Services also include the configuration of the device's data collection and triggering logic according to your defined use case and to ensure quick time to market.
  - Real-time and on-board Triggering Logic - The Cello-CANiQ-M filters real-time data based on the vehicle's sensors and data it captures. It triggers logic based on the rules defined via the CAN Editor tool, and, as a result, generates events which are sent to the back-end and/or perform and/or perform I/Os related logics.

## Use Cases



### **Fuel Management**

Easy, low-cost monitoring of the fuel tanks includes fuel consumption rate, detection of fuel frauds (fuel syphoning), improved management of refueling time and location (gas station prices), accurate measurement of fuel efficiency, and so on. In addition, fleet managers can easily monitor driver behavior and improve their driving and vehicle operation skills in real-time by applying training plans. These plans can dramatically influence fuel usage and also reduce vehicle maintenance, thus increasing the fleet operational efficiency.



### **Fleet and Driver Safety with Driver Identification**

The Cello-CANiQ-M enables flexible and configurable maneuver and trip scoring logic, including on-board trip ECO and safety score calculations, and an online, real-time driver feedback display, which helps increase driver safety. Examples of related events include driver seat belt unbuckled, a hard right/left turn, and driving when the ESP lamp is on.



### **Proactive Vehicle Maintenance & Remote Diagnostics**

Real-time vehicle performance data - including engine temperature, oil pressure, tire pressure, emission and fuel consumption - are sent to the back-end with the DTC reporting in order to facilitate preventive maintenance. This enables an immediate reaction upon failure detection and dramatically reduces repair costs. In addition, it allows the workshop to receive data in advance regarding the vehicle's health status and in turn, helps fine-tune the periodic maintenance work. Furthermore, it facilitates the daily vehicle checklist which is usually done by the driver and now can be partially or fully automated.



### **Car Rental / Car Sharing Companies**

Effectively verify drivers by identifying who drives which car, allowing credential-based vehicle access. Real-time driver behavior feedback enables the rental company to take immediate preventive actions if required, such as disabling ignition.

## Add-On Accessories



### DFD

The real-time Driver Feedback Display (DFD) provides continuous real-time, visual and/or audible (via human speech in various languages) feedback to the driver via a dedicated feedback display device, indicating to the driver the risk level of their driving.



Harsh Acceleration



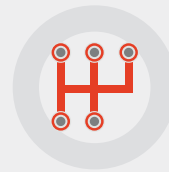
Hard Braking



Sharp Cornering



Over Speeding



Wrong Gear Handling



Excessive Idling



Off Road Warning

## Cello-CANiQ-M Specifications

Communication	
Cellular Communication	LTE CAT M1 WW with 2G Fallback CAT M1: B1, B2, B3, B4, B5, B8, B12, B13, B18, B19, B20, B26, B28 2G: GSM850, GSM900, DCS1800, PCS1900
Data Rates	CAT M1: uplink up to 375kbps, downlink up to 300kbps 2G (EGPRS): uplink up to 236kbps, downlink up to 296kbps
Power Output	2W 33db GSM, 0.5W 27db EDGE, 0.2W 23db LTE, ALL with $\pm 2$ db (1.5mW)
SIM	Internal, replaceable, remote PIN code management
Antenna	Internal, multi LTE + GSM bands
Packet Data	TCP/IP or UDP/IP for commands and events, FTP and TFTP for crash files upload
SMS	PDU, text SMS for data forwarding
BLE 5.2	
Chipset	TI CC2642R SimpleLink™ Bluetooth® 5.2 Low Energy Serial over BLE Wireless Maintenance / MDT Built-in chip antenna
GNSS	
Technology	Quectel LC76F
Sensitivity	High sensitivity: -165dBm during tracking, -148dBm during acquisition
Channels	99 acquisition / 33 tracking channels and 210 PRN channels
DGPS	DGPS, SBAS (WAAS/ EGNOS/ MSAS/ GAGAN)
TTFF @-130dBm with EASY™	Cold Start: <15s, Warm Start: <5s, Hot Start: <1s Cold <35Sec, Warm<35Sec, Hot<1Sec
Internal Antenna	On board, internal patch antenna
External Antenna	Optional

## Cello-CANiQ-M Specifications (Continued)

Inputs and Outputs											
<b>Inputs</b>	<ul style="list-style-type: none"> <li>One (1) input dedicated for ignition switch</li> <li>One (1) internally pulled up discrete dry or wet input with assignable functionality and configurable threshold for logical high and low states</li> <li>Two (2) configurable inputs capable of serving as:               <ul style="list-style-type: none"> <li>Frequency counters - configurable resolution; up to 5kHz input signal; signal level (<math>3V &lt; V_{in} &lt; 30V</math>), accuracy <math>\pm 2\%</math></li> <li>Analog inputs with variable resolution - 8bit, adapted to 0-2.5V signal, resolution 20mV, and accuracy <math>\pm 20mV</math>; 8bits, adapted to 0-30V Signal, resolution 100mV, accuracy <math>\pm 100mV</math></li> <li>Discrete Dry and Wet - both, configurable threshold for logical high and low states</li> </ul> </li> </ul>										
<b>Outputs</b>	4 general purpose open drain outputs (250mA max) with assignable functionality										
<b>Configurable I/Os</b>	2 pins either Digital inputs (internally pulled up or Wet) or outputs										
Interfaces											
<b>COM port (RS232)</b>	<table border="0"> <tr> <td>Selectable baud rate (9600 or 115000bps)</td> <td>Cellocator Serial Protocol</td> </tr> <tr> <td>True RS232 levels; 8-bit, 1 Stop Bit, No Parity</td> <td>Transparent data mode</td> </tr> <tr> <td>MDT Interface</td> <td>Configuration update</td> </tr> <tr> <td>Garmin™ Interface</td> <td>Firmware upgrade</td> </tr> <tr> <td>PSP™ (Car Alarm) Interface</td> <td></td> </tr> </table>	Selectable baud rate (9600 or 115000bps)	Cellocator Serial Protocol	True RS232 levels; 8-bit, 1 Stop Bit, No Parity	Transparent data mode	MDT Interface	Configuration update	Garmin™ Interface	Firmware upgrade	PSP™ (Car Alarm) Interface	
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<b>Debug port (UART)</b>	True RS232 levels; 8-bit, 1 Stop Bit, No Parity										
<b>J-1708 / RS485 (optional)</b>	SAE J1587 and SAE J1922										
<b>USB 2.1 OTG</b>	Micro USB (Type B) UART access for debug and Maintenance OTG ready hardware										
<b>2xCAN HS interface</b>	<table border="0"> <tr> <td>CAN FD HW readiness</td> <td>Extended -7V to 12V Common-Mode range</td> </tr> <tr> <td>CAN-H, CAN-L signals</td> <td>SAE J1939 Standard Data Bus Interface</td> </tr> <tr> <td>Bus-Pin Fault Protection up to <math>\pm 36V</math></td> <td>ISO 15765 for OBDII connectivity</td> </tr> <tr> <td>Bus-Pin ESD Protection exceeds 16-kV HBM</td> <td>ISO 11783 Standard Data Bus Interface</td> </tr> <tr> <td>ISO 11898; Signaling rate up to 1 Mbps</td> <td></td> </tr> </table>	CAN FD HW readiness	Extended -7V to 12V Common-Mode range	CAN-H, CAN-L signals	SAE J1939 Standard Data Bus Interface	Bus-Pin Fault Protection up to $\pm 36V$	ISO 15765 for OBDII connectivity	Bus-Pin ESD Protection exceeds 16-kV HBM	ISO 11783 Standard Data Bus Interface	ISO 11898; Signaling rate up to 1 Mbps	
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<b>Single Wire CAN</b>	SAE J2411 single wire										
<b>K-Line interface</b>	A bi-directional one-wire-bus interface compliant with ISO 9141-2 and ISO 14230 1&2										
<b>D8 interface (HW variant)</b>	D8 serial protocol Rx line for interfacing Digital Tachograph (DTCO)										
<b>1-Wire™ (Dallas port)</b>	DS1990A, DS1971 compliant Extended bus current source with 7 mA driving capability Driver management (up to 100 driver IDs) Car alarm authorization										
<b>Accelerometer</b>	3D, $\pm 2g/8g$ range, 12-bit representation, 1mg resolution, I2C interface										
<b>Connectors</b>	18pin Molex for IO applications, automotive 14pin Molex for CAN applications SMA switch for optional external GPS antenna										
Power											
<b>Input Voltage</b>	9-32VDC										
<b>Average Current Consumption</b>	Normal: 40mA Economic: 23mA Hibernation: $< 2.5mA$ Shipment (Off): $< 20uA$ (Internal Battery)										
<b>Internal Battery</b>	Li-Ion Polymer, 3.7V, 1Ah, rechargeable Up to 200 Tx @ 1Msg/min @ 25°C Embedded NTC for temperature-controlled charging Operating temperature: -20°C (65% charge) to 60°C Protections: over current, overcharge and over discharge										

## Cello-CANiQ-M Specifications (Continued)

Vehicle Environment Immunity	
Temp, operation	Compliant with ISO 7637 test level #4 (in accordance with e-mark directive)
Environment	
Temp, operation	-30°C to +70°C full performance
Temp, storage	-40°C to +85°C
Humidity	95% non-condensing
Ingress Protection	IP40
Vibration, Impact	ISO 16750
Power transients	ISO 7637 Test level 4 (e-mark directives compliant)
Mounting	Tie-wraps and/or double-sided adhesive
Certifications	
FCC	Part 15 Subpart B, part 22/24 compliant
Dimensions & Weight	
Dimensions	91x73x23mm
Weight	110gr
Harnesses	
711-00444	Harness for Cello Gen4 Full 18-pin
711-00445	Harness for Cello Gen4 Full 14-pin
711-00446	Harness for Cello Gen4 Minimal 14-pin
711-00385	OBDII splitter (supports K-Line)
Contactless CANBUS adapter (P/N: AR0288)	Ensures no writing to the bus. Listening mode only! Avoids warranty loss