

Silicon Mobility introduces OLEA U310, a single chip solution for highly integrated powertrain domain control and energy management

Sophia Antipolis, France (June 11th 2024) – Silicon Mobility, an Intel company and a technology leader in automotive semiconductor and software control solutions, today announced the OLEA® U310 Field Programmable Control Unit (FPCU) as part of its next generation of OLEA FPCU Series.

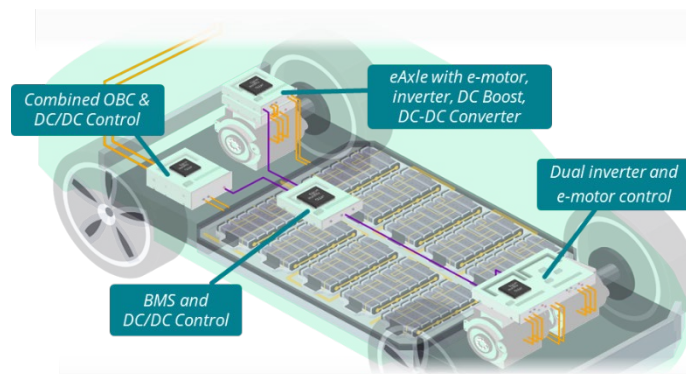
The new OLEA U310 consolidates the functionalities of multiple traditional microcontrollers into a single system on chip (SoC), leading to substantial benefits for electric vehicle (EV) manufacturers and consumers alike. A first for the industry, it **replaces up to six separate microcontrollers while simultaneously delivering real-time control of multiple and diverse power and energy functions and guaranteeing maximum safety integrity and future-proofed cybersecurity**. The unique design allows original equipment manufacturers (OEMs) to break free from the conventions of EV domain controls and move to a highly integrated X-in-1 powertrain that delivers unmatched system performance. It will help to make EVs more energy efficient, lighter and ultimately more cost-effective, to accelerate their adoption on a global scale.

All-in-One Capabilities for EV Power and Energy Control

The rise of electric vehicles is triggering a profound shift in the automotive industry. The traditional embedded electric architecture is being reinvented to support a software-driven approach. This "software-defined vehicle" concept promises a more sustainable model for car development and a constantly updatable and evolving user experience. However, it requires powerful computational and control solutions that seamlessly integrate hardware and software.

The OLEA U310 is specifically engineered to match the need for powertrain domain control in electrical architectures with distributed software. Built with a unique hybrid and heterogenous architecture it surpasses the capabilities of traditional microcontrollers. Up to 6 standard microcontrollers can be replaced by a single OLEA U310 in a system combination where the FPCU is controlling in parallel an inverter, a motor, a gearbox, a DC-DC converter and an on-board-charger. The SoC embeds multiple software and hardware programmable processing and control units while seamlessly integrating functional safety and cybersecurity into its core design. This allows OEMs to run multiple time-based applications while simultaneously executing multiple event-based control functions.

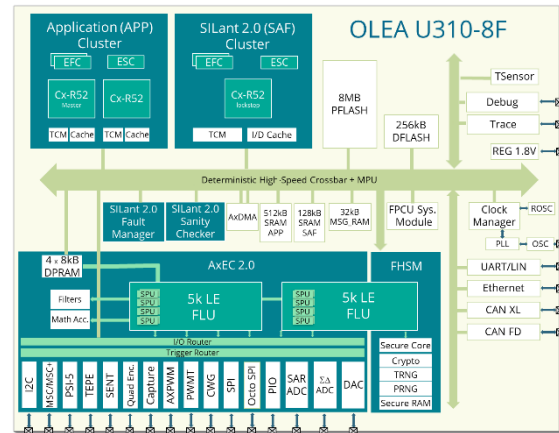
OEMs and automotive tier 1s can design several variants of system integration with OLEA U310 including a combination of the following functions: traction inverter and electric motor control with gearbox, DC-DC converter control, power factor converter control, on board charger, air compressor for fuel cell, battery management system, thermal management system with high-voltage e-compressor control, and more.



Key technologies at the heart of OLEA U310

The OLEA U310 is a three Cortex-R52 cores controller chip which leverage its strength from three unique technologies:

- **AxEC 2.0:** The Advanced execution and Events Control is a data processing and real-time control unit based on programmable hardware and configurable peripherals supporting multiple parallel applications thanks to multi-Flexible Logic Units (FLU) clusters.
- **SILant 2.0:** The Safety Integrity Level agent is a set of units and functionalities dedicated to the FPCU and the system functional safety ensuring ISO 26262 ASIL-D compliancy. This new generation has a deterministic multi-core and multi-FLU cluster which guarantees worst-case execution timing.
- **FHSM:** The Flexible Hardware Security Module is a sub-system dedicated to the cybersecurity of the FPCU integrating encryption/decryption accelerators and is compliant to EVITA Full and ISO 21434. It is combined with a hardware programmable cluster to support unidentified threats and strengthen security.



Unmatched performance

Silicon Mobility is the only provider to offer a complete solution combining hardware and software. Leveraging its strength in control software, the future roadmap will include advanced algorithms to address model predictive control with optimized pulse pattern modulation, combined with real-time and local neuronal network acceleration or variable voltage inverter/motor control.

The OLEA U310 delivers unparalleled real-time processing enabling the implementation of the most demanding and time constrained control algorithms for maximum efficiency in energy saving. It can control up to 4 traction inverters and their motor in parallel at an impressive speed of 1000 kHz field-oriented control loop with high PWM precision of hundreds of picoseconds. The beneficial impacts on the system are multiple. In addition to the BoM reduction, early figures show up to 5% energy efficiency improvement, 25% motor downsizing for the same power, 35% less cooling need and up to 30 times passive component downsizing.

Key features

- 2nd generation of FPCU
- 3x Cortex-R52 @ 350MHz – 2196 DMIPS
- AxEC 2.0: 2x FLUs @ 175Mhz – 400 GOPS + 9.1 GMAC
- SILant 2.0: Safe and Determinist Multi-Core/FLU
- Flexible HSM: HW & SW EVITA Full
- 8MB of P-Flash, 256kB of D-Flash, 1MB of RAM
- CAN FD, CAN XL, Ethernet
- ISO 26262 ASIL-D design ready
- ISO/SAE 21434
- AEC-Q100 Grade 1
- 292 BGA

Available today

The OLEA U310 is equipped with a complete software suite from Silicon Mobility to enable the development of concurrent control algorithms for automotive power and energy application control.

OLEA COMPOSER: This design framework seamlessly integrates with leading development tools throughout the V-Model design cycle, significantly accelerating the development process for OLEA FPCUs. It supports various simulation environments from MiL to HiL and leverages the hardware/software split within the OLEA U310 to dramatically reduce development, validation, and calibration times while achieving superior performance.

OLEA LIB: This companion software library provides engineers with a modular set of pre-built, pre-tested functional blocks (reference and target models for MATLAB and Simulink) tailored to common powertrain control tasks. These building blocks offer increasing levels of performance and content based on specific customer and application needs. Models from OLEA LIB can be directly used within OLEA COMPOSER for MiL simulations and automatic code generation, further streamlining the development process.

OLEA U310 is available today to selective customers and will be exhibited at booth 210, Hall 5, PCIM 2024, Nuremberg, June 11-13.

Press Contacts

David Fresneau
Silicon Mobility
Tel: +33 4 84 79 10 20
David.fresneau@silicon-mobility.com

Marcie Miller
Intel Corporation
Tel: +1 480 319 4629
Marcie.m.miller@intel.com

About Silicon Mobility:

Silicon Mobility, an Intel company, is a pioneering technology company that has revolutionized the automotive industry with the invention of the FPCU - a flexible, real-time, safe, and open semiconductor solution. The main objective is to accelerate the transition to e-mobility in the cleanest, safest, and smartest way possible.

At Silicon Mobility, we design, develop, and sell solutions combining innovative semiconductor and advanced control algorithms for the automotive industry that increase energy efficiency. The products we supply to OEMs for electric motors control enable manufacturers to improve efficiency, reduce the size, weight, and cost of electric powertrain, and increase battery range and durability.

Since February 2024, in partnership with Intel Automotive we have the ambitious goal of accelerating the software-defined vehicle revolution, and thus bringing efficiency gains in electric vehicle (EV) energy management to the Automotive Industry.

Performance varies by use, configuration and other factors. For more information on our dynamic and promising high-technology company, please visit our website at www.silicon-mobility.com.



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