OLEA® T222 FPCU

Silicon Mobility

OLEA® T222
File Programmable Control Unit

Hybrid and Electric Vehicles Powertrain Control

- Electric Motor and Inverter control
- High Frequency DC-DC converter control
- High Frequency On Board Charger control
- Transmission control
- Powertrain systems control

One of a kind

OLEA® T222 FPCU is a member of the OLEA family for safe and real-time automotive control solutions. OLEA® T222 FPCU is the industry's first Field Programmable Control Unit (FPCU), a unique semiconductor architecture defined as a combination of the hardware flexibility of the AMEC® real-time control unit with the software flexibility of a standard processor into a single chip.

AMEC® integrates parallel data paths between acquisition and actuation peripherals and the Flexible Logic Unit (FLU), an automotive specific and robust embedded programmable logic with DSP resources. OLEA® T222 FPCU also benefits from SILant®, an ASIL-D functional safety integrated architecture. SILant® increases faults coverage and implements reliable countermeasures at chip level and at application level without compromising the performances.

FPCU removes software bottleneck by enabling software and hardware execution of high frequency and precise PWM control algorithm while limiting heat dissipation. Using Silicon Mobility's FPCU, user's control command can be programmed in hardware into FLU and delivers the following performances compared to conventional microcontroller based solutions:
- 40x acceleration of data processing capabilities
- Up to 20x faster hard real-time control loop
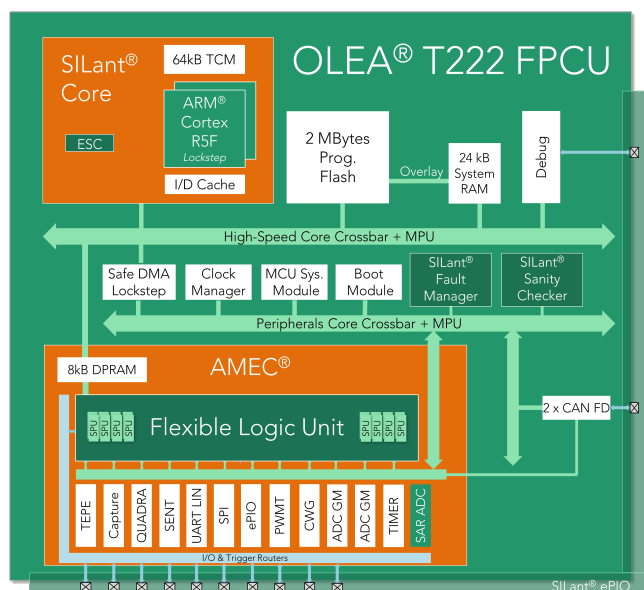
Unique Technologies
- AMEC® FLU: Real-time actuators/sensors control and processing unit based on programmable logic
- SILant®: ISO 26262 ASIL-D functional safety solution

Open Architecture
- ARM® Cortex-R5F in lockstep
- Embedded Flash
- CAN & LIN Communication ports

Standards Compliancy
- ISO 26262 ASIL-D
- AUTOSAR 4.3
- AEC-Q100 Automotive Quality

Featuring

Processing	**32-bit ARM® Cortex-R5F in lockstep** • 200 MHz operating frequency • 16 KB / 8 KB instruction and data cache L1 with ECC • 64 KB Tightly Coupled Memory with ECC • Floating point unit • Thumb2 high code density	

Sensors Actuators Control and Processing	**Advanced Motor Event Control - AMEC®**
	• Flexible Logic Unit
	  • 4 560 Programmable Logic Elements
	  • 20 x 24-bit Signal Processing Units
	  • 200 MHz clock input
	  • 8 KB DPRAM
	  • Parallel access for acquisition & control
	• Complex Waveform Generator (CWG) with 4 channels
	• 5 x 200MHz Pulse Width Modulator (PWM) w. 4 channels
		• 16 channels Capture
		• Quad-Encoder
		• Thermal Estimator Position Engine
		• 3 x SENT
		• 2 x SPI with PSI5-S support
		• 3 x UART with PSI5-S support
		• 2 x ADC Group Manager
		• Triggers Router
		• 118-ch Multiplexed General Purpose I/O
		• 33 Programmable Input filters

Safety	**Safety Integrated Level Agent - SILant®** • ASIL-D architecture and infrastructure including, for transient faults, system Events Sequences Controlling (ESC), Masters and PWM in lockstep, end to end ECC transfers, safe DMA transfers, CRC; and protections for , I/O, clock, configuration registers, chip supply • Sanity Checker providing BIST for latent faults in logic / memory (LBIST & MBIST) on safety mechanisms , ADC Self-test • Fault Manager Unit	
System	• 2 MB eFlash with EEPROM Emulation support • 24 KB of System SRAM with ECC • DMA Controller with CRC providing 16 channels in lockstep mode and 32 channels DMA split-mode • 8 x System Timers • Watchdog complying AUTOSAR 4.3	• MCU System Configuration Module • 16-priorities Advanced Generic Interrupt Controller (AGIC) • Interconnect with end to end ECC and Multilayer MPU • JTAG and SWD debug ports • Trace Port Interface Unit and Embedded Trace Buffer • 16 KB Overlay RAM
Communication Ports	• 2 x CAN FD complying ISO 11898-1:2015 • 3 x UART-LIN complying LIN 1.3; 2.0 and 2.1	
Analog	• 50 MHz Internal Ring Oscillator • Crystal oscillator input 1-50 MHz • Voltage Regulator (3.3V to 1.2V) with bypass • Power on Reset with LVD/HVD	• 8 x 4 channels 12-bit ADC SAR @ 2MS/s MAX • 8 x Analog comparators • 2 x Temperature Sensors
Miscellaneous	Supply • 3.3 or 1.2 V for Core supply • 3.3 V for I/O supply • 3.3 V for ADC supply Packages • QFP 100 and 176	Power Consumption • < 200mW Ambient Temperature Range • -40°C to +125°C (AEC-Q100 Grade 1)

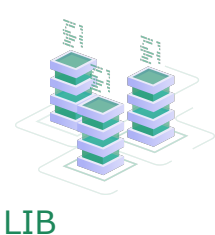# More than a chip. A complete end to end solution
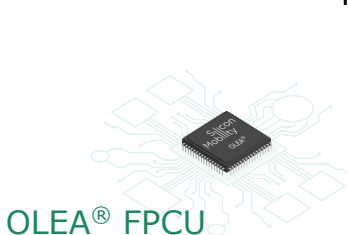
OLEA® FPCU

Automotive semiconductor solution designed to process critical information faster with 100% predictability and accuracy.
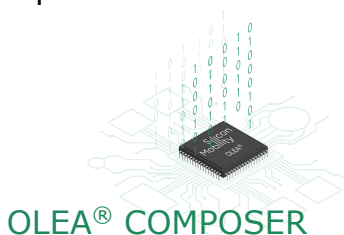
OLEA® COMPOSER

Robust development and calibration framework for rapid application development with OLEA® FPCU using best of industry's standard EDA tools.

OLEA® LIB

Highly optimized automotive control algorithms and software libraries for OLEA® FPCU

Everything needed is there

A wide eco-system of tools, software and hardware is available with OLEA® from Silicon Mobility or third parties for a fast application design start. Technical manuals, test reports, PPAP documentation and ISO 26262 safety work products package are also available.

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