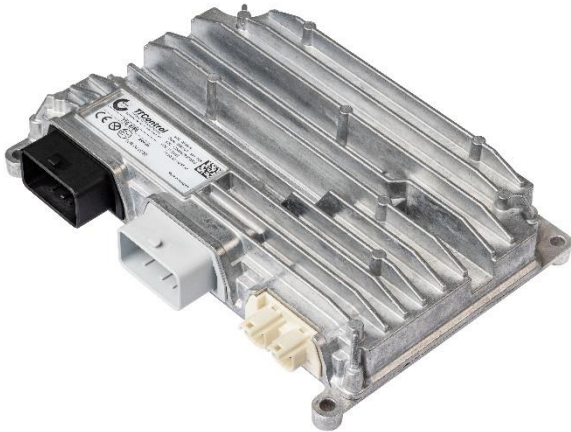# TTC 2300 Family

Off-highway powerful safety electronic control units

Key benefits

- Future proof high-performance Infineon AURIX™ TriCore™ CPU 300 MHz, 3 cores (2 lockstep cores) and Hardware Security Module
- C-programming API with multicore real-time operating system
- Mixed-criticality support for efficient application development and validation
- 4 x CAN FD interfaces
- 2 x 100BASE-T1 / -TX Ethernet interfaces via dedicated 2-port HSD connector
- 3 x status LEDs integrated into the housing
- Up to 45 A total load current

TTC 2300 is TTControl's latest product family of rugged electronic control units, designed not only to meet the requirements of today's mobile machines, but also those of tomorrow.

TTC 2300 electronic controls are designed for use in demanding safety-relevant applications.

The product variants TTC 2310, TTC 2380, TTC 2385 and TTC 2390 fulfill safety requirements up to SIL 2 (IEC 61508), PL d (EN ISO 13849), AgPL d (ISO 25119), ASIL C (ISO 26262) and MPL d (ISO 19014) and are TÜV Nord safety certified.

Integrated PXROS real-time operating system with multicore support

The TTC 2300 product family comes with a real-time operating system providing a high level of application robustness and responsiveness to safety events and can be programmed in either C or in CODESYS©* Safety SIL 2.

The mixed-criticality support allows safety-related and non-safety-related code to be run on the same CPU without reducing the overall safety level. This leads to low development costs of the mobile machinery electronics and fast time-to-market.

Rich and flexible I/O set

Up to 60 highly configurable I/Os are available, which can be initialized at the application level as different types of inputs or outputs. In adition to analog and digital timer inputs, the ECU is also equipped with HS PWM and PVG outputs. This ensures that the various hydraulic valves used in the off-highway machines can be controlled, making the TTC 2300 the perfect solution for hydraulics control.

Part of the design are multiple current measurement feedback loops and plausibility checks which enable runtime self-diagnosis of the vehicle and various safety architectures. For connection of smart sensors, up to four SENT interfaces (compliant with SAE J2716 standard) with Short PWM Code (SPC) support,

Application fields

- Agricultural machines
- Construction / material handling machines
- Municipal vehicles

are available and enable cost efficient transmission of sensor data to the ECU. Dedicated LED outputs allow control of the vehicle LEDs as well as four full H-bridge* interfaces the control of electric motors.

High-speed connectivity

Beside four CAN FD interfaces (bitrate of up to 2 Mbit/s), featuring Wake-Up over CAN and ISOBUS compatibility, the TTC 2300 is equipped with 1 LIN and two traditional Ethernet (100BASE-TX) or two automotive Ethernet (100BASE-T1) interfaces on dedicated highspeed signal connectors.

Extended software feature set

TCP/IP* and UDP/IP* communication facilitates integration into various Ethernet architectures. For efficient memory management, data logging and configuration, a filesystem is provided. The bootloader is compatible with the Unified Diagnostic Services (UDS) for standardized vehicle diagnosis and software updates.

In an emergency case, up to two safety groups of freely assignable output pins can be deactivated via external switch. This enables easy and cost-efficient implementation of an emergency button* to the machine.

Variant overview

	TTC 2310	TTC 2380	TTC 2385	TTC 2390
CPU	Infineon Aurix™ TriCore™ TC377 300 MHz, 3 cores (2 lockstep cores)			32-bit Infineon TriCore™ Aurix™ TC397 300 MHz 6 cores (4 lockstep cores)
	992 kB int. SRAM, 6 MB int. Flash			6.47 MB int. SRAM, 16 MB int. Flash
	16 MB ext. serial Flash			32 MB ext. serial Flash
	8 kB ext. FRAM			
	256 kB int. EEPROM emulation			1 MB int. EEPROM emulation
	Hardware security module			
Interfaces	4 x CAN FD up to 2 Mbit/s (1 x CAN ISOBUS compliant; 1 x CAN wake-up capable)			
		2 x 100BASE-T1, up to 100 Mbit/s	2 x 100BASE-TX, up to 100 Mbit/s	
	1 x LIN serial interface			
Number I/Os	20 inputs / 36 outputs (10 x HS PWM; 4 x SENT)	20 inputs / 40 outputs (18 x HS PWM; 4 x SENT)		
H-bridge	4 x full H-bridge* interfaces for electric motor control			
Sensor supply	1 x sensor supply, 5 - 12 V, max 750mA, configurable by SW in 50mV steps			
	2 x sensor supplies 5 V / max. 750 mA			
Internal	Internal monitoring of board temperature, sensor supply and supply voltage Power-On via Terminal 15 or Wake-up pins			
	2 x independent shut-off groups for output stages			
Software	C-Programming with PXROS multicore real-time operating system			
	CODESYS©* Safety SIL 2 including support for CANopen Safety Master			
Functional safety	IEC 61508:2010 SIL 2 / EN ISO 13849:2015 PL d / ISO 25119:2018 AgPL d / ISO 26262:2018 ASIL C / ISO 19014 MPL d			

*Upcoming feature

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