

## Compact Safety Electronic Control Unit – TTC 2038

### General description

The TTC 2038 is a robust and powerful compact electronic control solution for off-highway applications. The TTC 2038 is equipped with Infineon's TriCore™ Aurix™ TC367 CPU and designed to fulfil the requirements of demanding safety-relevant off-highway and automotive applications.

The TTC 2038 is part of a complete and compatible product range for the off-highway and automotive industry. The module is protected by a compact automotive style housings which is perfectly suited for harsh operating conditions.

### Specifications

Parameter		Unit
Ecu dimensions	147 x 92 x 38	mm
Dimensions for minimum connector release clearance	208 x 92 x 38	mm
Weight	330	g
Connector	1 x 48	pins
Operating temperature	-40 to +85	°C
Operating altitude	0 to 4000	m
Supply voltage	8 to 32	V
Supply current at 12/24V without load	200/100	mA <sub>max</sub>
Standby current	≤ 0,8	mA <sub>max</sub>
Total load current	24	A <sub>max</sub>

### Standards

Functional safety	IEC 61508 SIL2 EN ISO 13849 PL d ISO 25119 AgPL d SRL2	ISO 26262 ASIL C ISO 19014 MPL d
CE-Mark	2014/30/EU 2006/42/EC	
E-Mark	ECE-R10 Rev.6	
FCC-Mark	47 CFR Part 15B, Class A	
EMC	EN 13766 ISO 14982 CISPR 25	IEC 61000-4-2/-3/-4/-5/-6/-8 IEC 61000-6-4
ESD	ISO 10605	
Electrical	ISO 16750-2 ISO 7637-2, -3, limited to 40 V by external load dump protection	
Ingress protection	EN 60529 IP65 and IP67 ISO 20653 IP6k9k	
Climatic	ISO 16750-4	
Mechanical	ISO 16750-3	
ISOBUS	ISO 11783	

Board temperature, sensor supply, and supply voltage are monitored by software.

One safety shut-off group for PWM output stages is available.

Details to the standards can be found in the system manual.

Software:

- C Programming Environment featuring RTOS support
- CODESYS® V3 including support for CANopen® Master\*
- CODESYS® Safety SIL 2 including support for CANopen® Safety Master\*



### Features

#### CPU Core

- 32-Bit Infineon TriCore™ Aurix™ TC367
- 2 cores (lockstep cores) running at 300 MHz and memory protection for safety-relevant applications
- Floating-Point Unit and Hardware Security Module
- 576 KB int. SRAM, 4 MB int. Flash
- 128 KB int. EEPROM emulation

#### Interfaces

- 2 x CAN FD 50 kbit/s up to 2 Mbit/s (1 x CAN FD with wake-up capability and 1 x CAN FD ISOBUS)
- 4 x SENT with SPC support
- 1 x LIN

#### Outputs

- 8 x PWM OUT up to 1 kHz or digital OUT, up to 4 A, high side, with current measurement, alternative use as digital timer IN (0.1 Hz - 20 kHz) configurable pull-up in groups of 2 or analog IN 12 bit, 0 - 32 V with configurable pull-up or LED control OUT
- 6 x digital OUT up to 4 A, high side, current sense alternative use as PVG OUT, 10 - 90% of BAT+ or voltage OUT 0 V - 75 % BAT+ or LED control OUT or analog IN 12 bit, 0 - 32 V or 1 x as emergency stop OUT
- 2 x PWM OUT up to 4 kHz, up to 4 A, low side, current measurement, featuring timer feedback, alternative use digital timer IN (0.1 Hz - 20 kHz) or analog IN 12 bit, 0 - 5 V, 0 - 32 V

#### Inputs

- 8 x analog IN 12 bit, 0 - 5 V with configurable pull-up/down, 0 - 25 mA, 0 - 100 kOhm, LED control
- 2 x analog IN 12 bit, 0 - 5 V, 0 - 32 V with configurable pull-up/down or emergency stop IN
- 2 x digital timer IN (0.1 Hz - 20 kHz), encoder support, configurable pull-up/down, support for 7/14 mA current loop speed-sensor alternative use as analog IN 12 bit, 0 - 32 V, 0 - 25 mA
- 4 x digital timer IN (0.1 Hz - 20 kHz), encoder support, configurable pull-up alternative use as analog IN 12 bit, 0 - 32 V or SENT interface or digital IN for switching to GND and BAT+
- 1 x Terminal 15
- 1 x Wake-Up

#### Sensor supply

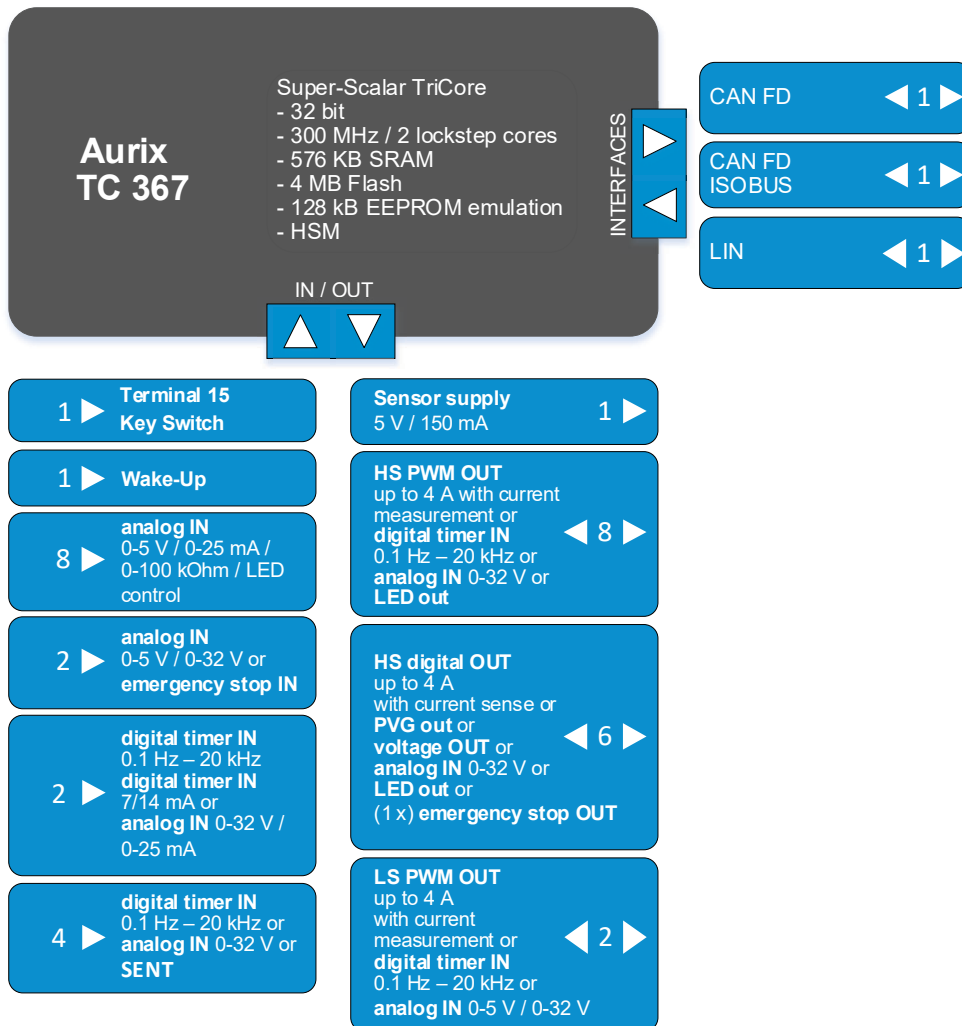
- 1 x sensor supply, 5 V, max. 150 mA

All inputs and outputs supporting analog IN can also be used as digital Input.

All I/Os and interfaces are protected against short circuit to GND and BAT+ and can be configured by software.

\* upcoming feature

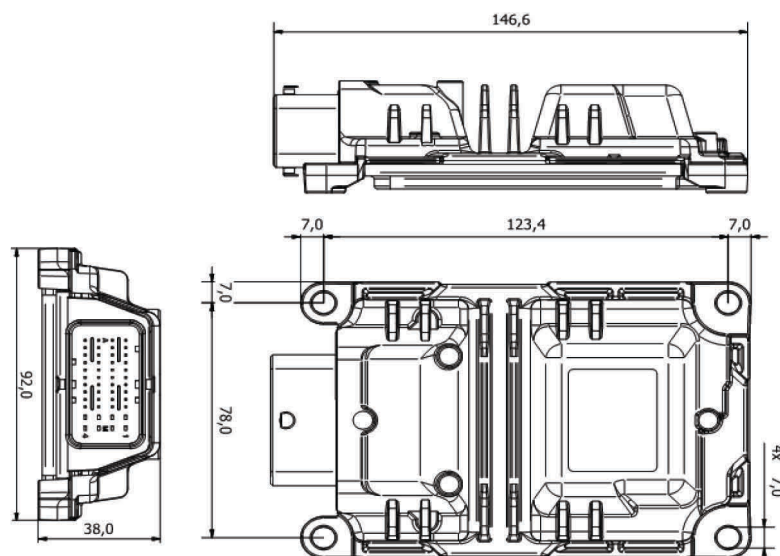
## Block diagram



## Housing and connector

Aluminum die-cast housing

1 x 48 pin connector



For further information, including price and availability, please contact [products@ttcontrol.com](mailto:products@ttcontrol.com)

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