TTC 510 – High-Performance Safety Controller

General Description

TTC 510 is a high-end electronic control solution for the automotive industry, suitable for a wide range of applications. The core of the controller is the very powerful TMS570 CPU designed for use in demanding, safety-critical and complex automotive and transportation scenarios. The TTC 510 fulfills safety requirements up to ASIL C (ISO 26262*) / SIL 2 (IEC 61508) / PL d (ISO 13849).

The TTC 510 is part of a complete and compatible product family and is protected by a rugged automotive housing.

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU dimensions</td>
<td>231.3 x 204.9 x 38.8 mm</td>
</tr>
<tr>
<td>Dimensions for minimum connector release clearance</td>
<td>315.3 x 204.9 x 38.8 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1,200 g</td>
</tr>
<tr>
<td>Connector</td>
<td>154 pins</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 to +85 °C</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>0 to 4,000 m</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8 to 32 V</td>
</tr>
<tr>
<td>Peak supply voltage</td>
<td>45 Vmax</td>
</tr>
<tr>
<td>Supply current at 12/24V without load</td>
<td>400/200 mAmax</td>
</tr>
<tr>
<td>Standby current</td>
<td>&lt;1 mAmax</td>
</tr>
<tr>
<td>Total load current</td>
<td>40 Amax</td>
</tr>
</tbody>
</table>

Standards

- Functional safety: IEC 61508 SIL 2, EN ISO 13849 PL d, ISO 26262 ASIL C
- CE-Mark: 2014/30/EU, 2006/42/EC
- E-Mark: ECE-R10 Rev.4
- EMC: EN 13309, ISO 14982, CISPR 25
- ESD: ISO 10605
- Electrical: ISO 16750-2, ISO 7637-2,-3
- Ingress protection: EN 60529 IP67, ISO 20653 IP6K9k
- Climatic: ISO 16750-4
- Mechanical: ISO 16750-3

Software Options

- C programming environment (incl. BSP and driver library)
- MATLAB Simulink I/O block library
- CODESYS® Safety SIL 2 and CODESYS® V3 including support for CANopen® Safety Master
- Programmable environment (incl. BSP and driver library)
- MATLAB Simulink I/O block library
- CODESYS® Safety SIL 2 and CODESYS® V3 including support for CANopen® Safety Master

Features

- CPU Core: 32-Bit TI TMS570, ARM cortex-R4F based
- Dual-core lockstep CPU and memory protection for safety-relevant applications
- 180 MHz, 298 DMIPS, Floating-Point Unit
- 3 MB int. Flash, 256 kB int. RAM
- 2 MB ext. RAM, 64 kB ext. EEPROM
- Safety Companion CPU

Interfaces

- 3 x CAN 50 kbit/s up to 1 Mbit/s
- 3 x CAN bus termination configurable via connector pins
- 1 x LIN

Outputs

- 16 x PWM OUT or digital OUT, up to 4 A, high side, with high side current measurement
- 8 x digital OUT up to 4 A, high side, overload and open load detection, current sense alternative use as LED control OUT or analog IN 0 – 32 V, with configurable pull-up/down
- 8 x digital OUT up to 4 A, low side, current sense, overload and open load detection, alternative use as analog IN, 0 – 32 V
- Wiring option to use up to 8 of the digital OUT, high side and 8 digital OUT, low side, as full H-bridge for motor control
- 8 x digital OUT up to 4 A, high side or PVG OUT, 10 – 90% of BAT+ or voltage OUT, 0 – 100% of BAT+

Inputs

- 8 x analog IN 12 bit, 0 - 5 V, 0 - 25 mA, 0 - 100 kOhm
- 8 x analog IN 12 bit, 0 - 5 V, 0 - 10 V, 0 - 25 mA
- 8 x analog IN 12 bit, 0 - 5 V, 0 - 32 V, 0 - 25 mA
- 6 x digital timer IN (0.1 Hz - 20 kHz), encoder supporting digital voltage sensors with configurable pull-up/down, digital (7/14 mA) current loop speed-sensor alternative use as analog IN 12 bit, 0 – 32 V
- 6 x digital timer IN (0.1 Hz - 20 kHz), encoder supporting digital voltage sensors with configurable pull-up/down, alternative use as analog IN 12 bit, 0 – 32 V
- 8 x digital timer IN (0.1 Hz - 10 kHz) with pull-up
- K15 and wake up

Sensor Supply

- 2 x sensor supply, 5 V, max. 500 mA
- 1 x sensor supply, 5 – 10 V, max. 2.5 W, configurable by SW in 1 V steps

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

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

Inputs and outputs can also be used as digital input.

Two independent shut-off groups for PWM output stages.

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

* available for C-Programming environment only
Block Diagram

TMS 570
ARM Cortex

Dual-core lockstep
- 32 bit / 180 MHz
- 256 kB RAM
- 3 MB Flash
- Safety Companion

RAM: 2 MB
EEPROM: 64 kB

IN / OUT

K15 Key Switch
Wake-Up
analog IN
0-5 V / 0-25 mA / 0-100 kHz
analog IN
0-5 V / 0-10 V / 0-25 mA
analog IN
0-5 V / 0-32 V / 0-25 mA
digital timer IN
0.1 Hz – 20 kHz or digital timer IN
7.14 mA or analog IN
digital timer IN
0.1 Hz – 10 kHz or analog IN

can

Sensor supply
5 V / 500 mA
Sensor supply
5-10 V
HS PWM OUT
up to 4 A with current measurement
HS digital OUT
up to 4 A with current sense or LED ctrl OUT or analog IN
LS digital OUT
up to 4 A with current sense or analog IN
HS digital OUT
up to 4 A / PVG OUT or voltage OUT

16
8
8
8
8

Housing and Connector

Aluminum die-cast housing
154-pin connector

For further information, including price and availability, please contact products@tttech-auto.com.

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