TTC 540 – High-Performance Safety Controller

General Description

TTC 540 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 540 fulfills safety requirements up to SIL 2 (ISO 26262) / PL d (ISO 13849).

The TTC 540 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>50 Amax</td>
</tr>
</tbody>
</table>

Standards

- **Functional safety**: EN IEC 61508 SIL 2, EN ISO 13849 PL d
- **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 26533 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

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

Outputs
- 28 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

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 - 10 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 analog IN 12 bit, 0 - 10 V with pull-up
- 8 x analog IN 12 bit, 0 – 32 V
- 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

www.tttech-auto.com
HS PWM OUT
up to 4 A with
current measurement

TMS 570
ARM Cortex
Dual-core lockstep
- 32 bit / 180 MHz
- 256 kB RAM
- 3 MB Flash
- Safety Companion

IN / OUT

1 K15 Key Switch
1 Wake-Up

8 analog IN
0-5 V / 0-25 mA / 0-100 kOhm

8 analog IN
0-5 V / 0-10 V / 0-25 mA

8 analog IN
0-5 V / 0-32 V / 0-25 mA

6 digital timer IN
0.1 Hz – 20 kHz or
digital timer IN
7.5 mA or
analog IN

6 digital timer IN
0.1 Hz – 20 kHz or
digital timer IN
7.5 mA or
analog IN

6 digital timer IN
0.1 Hz – 10 kHz with pull-up

8 analog IN
0-32 V

Sensor supply
6 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

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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