TTC 590 – High-Performance Safety Controller

General Description
TTC 590 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 590 fulfills safety requirements up to ASIL C (ISO 26262) / SIL 2 (IEC 61508) / PL d (ISO 13849) and AgPL d (ISO 25119).

The TTC 590 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 V_{\text{max}}</td>
</tr>
<tr>
<td>Supply current at 12/24V without load</td>
<td>400/200 mA_{\text{max}}</td>
</tr>
<tr>
<td>Standby current</td>
<td>&lt;1 mA_{\text{max}}</td>
</tr>
<tr>
<td>Total load current</td>
<td>60 A_{\text{max}}</td>
</tr>
</tbody>
</table>

Standards

<table>
<thead>
<tr>
<th>Functional safety</th>
<th>IEC 61508 SIL 2</th>
</tr>
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<tbody>
<tr>
<td>CE-Mark</td>
<td>EN ISO 13849 PL d</td>
</tr>
<tr>
<td>E-Mark</td>
<td>ISO 25119 AgPL d</td>
</tr>
<tr>
<td>EMC</td>
<td>ISO 26262 SIL C*</td>
</tr>
<tr>
<td>ESD</td>
<td>EN ISO 13309</td>
</tr>
<tr>
<td>Electrical</td>
<td>ISO 14982</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>C1000P</td>
</tr>
<tr>
<td>Climatic</td>
<td>ISO 16750-4</td>
</tr>
<tr>
<td>Mechanical</td>
<td>ISO 16750-3</td>
</tr>
<tr>
<td>ISOBUS</td>
<td>ISO 11783</td>
</tr>
</tbody>
</table>

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 T1 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
- 32 MB ext. Flash, 2 MB ext. RAM, 32 kB ext. FRAM
- Safety Companion CPU

Interfaces
- 6 x CAN 50 kbit/s up to 1 Mbit/s
- 1 x CAN ISOBUS
- 4 x CAN bus termination, configurable via connector pins
- 1 x 100BASE-T1 BroadR-Reach®
- 1 x LIN, 1 x RS232
- 1 x Real Time Clock

Outputs
- 36 x PWM OUT or digital OUT, up to 4 A, high side, with high side current measurement
- 8 of these outputs can be alternatively used as digital timer IN (0.1 Hz - 10 kHz)
- 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 12 bit, 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 12 bit, 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

Multi-Purpose I/Os
- 8 x configurable as
  - PVG OUT, 10 - 90% of BAT+ or
  - voltage OUT, 0 - 100% of BAT+ or
  - digital OUT up to 4 A high side or
  - LED control OUT or
  - analog IN 12 bit, 0 - 32 V

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
- 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. Three 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

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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