High Performance Safety Controller – HY-TTC 590

General Description

HY-TTC 590 is a high-end electronic control solution for the off-highway industry satisfying all upcoming needs: The core of the controller is the very powerful TMS570 CPU designed for use in demanding safety-critical automotive and transportation applications. The HY-TTC 590 fulfills safety requirements up to SIL 2 (IEC 61508) / PL d (ISO 13849) and AgPL d (ISO 25119).

The HY-TTC 590 is part of a complete and compatible product family and is protected by a compact, automotive-style housing suited to mobile applications.

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>1200 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 4000 m</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>8 to 32 V</td>
</tr>
<tr>
<td>Peak Supply Voltage</td>
<td>45 V_{max}</td>
</tr>
<tr>
<td>Supply Current at 12/24V without load</td>
<td>400/200 mA_{max}</td>
</tr>
<tr>
<td>Standby Current</td>
<td>&lt;1 mA_{max}</td>
</tr>
<tr>
<td>Total Load Current</td>
<td>60 A_{max}</td>
</tr>
</tbody>
</table>

Standards

- Functional safety: IEC 61508 SIL2, 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, EN 61000-6-2/-4
- 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
- ISOBUS: ISO 11783

Software

- C Programming Environment (extended with SAFERTOS® Integration)
- CODESYS® Safety SIL 2 including support for CANopen® Safety Master
- CODESYS® V3 including support for CANopen® 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
- 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/O’s

- 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 software.

Inputs and Outputs can also be used as digital Input.

Three independent shut-off groups for PWM output stages.

Details to the standards can be found in the System-Manual.
Block Diagram

**TMS 570 ARM Cortex**

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

**INTERFACES**

- **IN / OUT**
  - 2 MB RAM
  - 32 MB Flash
  - 32 kB FRAM
  - 5 V / 50 mA
  - 5-10 V
  - 100 BASE-T1
  - BroadR-Reach®
  - CAN
  - CAN ISOBUS
  - LIN
  - RS232

**154-pin connector**

**Housing and Connector**

- Aluminum die-cast housing

For further information, including price and availability, please contact products@ttcontrol.com

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