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 TMS 570 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>$V_{\text{max}}$</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>Parameter</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional safety</td>
<td>IEC 61508 SIL2 EN ISO 13849 PL d ISO 25119 AgPL d</td>
</tr>
<tr>
<td>CE-Mark</td>
<td>2014/30/EU 2006/42/EC</td>
</tr>
<tr>
<td>E-Mark</td>
<td>ECE-R10 Rev.4</td>
</tr>
<tr>
<td>EMC</td>
<td>EN 13309 ISO 14982 CISPR 25</td>
</tr>
<tr>
<td>ESD</td>
<td>ISO 10605</td>
</tr>
<tr>
<td>Electrical</td>
<td>ISO 16750-2 ISO 7637-2,-3</td>
</tr>
<tr>
<td>Ingress Protection</td>
<td>EN 60529 IP67 ISO 20653 IP66k9k</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

- 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 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. Fast, 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
- 8 x digital OUT up to 4 A, low side, 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
  - PGV 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

- RAM: 2 MB
- Flash: 32 MB
- FRAM: 32 kB
- RTC

- CAN
- CAN ISOBUS
- LIN
- RS232
- 100BASE-T1 BroadR-Reach®

- 100BASE-T1
- BroadR-Reach®
- CAN
- ISOBUS
- LIN
- RS232

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 7.71 mAh or analog IN
6 digital timer IN 0.1 Hz – 20 kHz or analog IN

Sensor supply 5 V / 500 mA
Sensor supply 5-10 V
HS PWM OUT up to 4 A with current measurement
HS PWM OUT up to 4 A with current measurement or digital timer IN (0.1 Hz – 10 kHz)
HS digital OUT up to 4 A with current sense or LED OUT or analog IN
LS digital OUT up to 4 A with current sense or analog IN
PVG OUT or Voltage OUT or HS digital OUT or LED OUT or analog IN

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

Housing and Connector

Aluminum die-cast housing
154-pin connector

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