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 (EN ISO 13849), AgPL d (ISO 25119 *) and ASIL C (ISO 26262 *).

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**

**Parameter** | **Unit**
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ECU Dimensions | 231.3 x 204.9 x 38.8 mm
Dimensions for minimum connector release clearance | 315.3 x 204.9 x 38.8 mm
Weight | 1200 g
Connector | 154 pins
Operating Temperature | -40 to +85 °C
Operating Altitude | 0 to 4000 m
Supply Voltage | 8 to 32 V
Peak Supply Voltage | 45 V_{max}
Supply Current at 12/24V without load | 400/200 mA_{max}
Standby Current | <1 mA_{max}
Total Load Current | 60 A_{max}

**Standards**

- Functional safety: IEC 61508 SIL2, EN ISO 13849 PL d, ISO 25119 AgPL 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, EN 61000-6-2/-4
- ESD: ISO 10605
- Electrical: ISO 16750-2, ISO 7637-2/-3
- Ingress Protection: EN 60529 IP67, ISO 20653 IP69k
- Climatic: ISO 16750-4, EN 50581
- Mechanical: ISO 16750-3
- ISOBUS: ISO 11783

**Software**

- C-Programming environment
- SAFERTOS® Integration, as extension of C-Programming environment
- 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 BroadA-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

**Software**

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.

* 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

IN / OUT

- 15 Key Switch
- Wake-Up
- 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
- 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

INTERFACES
- IN / OUT
- RAM: 2 MB
- Flash: 32 MB
- FRAM: 32 kB
- RTC
- CAN
- LIN
- RS232
- 100BASE-T1 BroadR-Reach®
- CANopen

Housing and Connector
- Aluminum die-cast housing
- 154-pin connector

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

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