TTC 32S – Safety Control Unit

General Description

The TTC 32S is a compact control unit specially developed for use in cost-sensitive applications or smaller vehicles. The device is based on an Infineon XC22xx microcontroller and supports programming in C (MATLAB Simulink I/O block library available). With its 28 freely configurable I/Os it can be operated with a wide variety of sensors and actuators. The TTC 32S was developed following the international standard EN ISO 13849 and is certified by TÜV NORD. It meets the requirements of functional safety according to Performance Level (PL) d. Six out of the eight PWM outputs offer integrated current measurement. The TTC 32S was specially developed for vehicles and machines used in rugged operating environments and at extreme operating temperatures. The device is protected by a proven, robust and compact housing, specially designed for the automotive industry.

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU dimensions</td>
<td>147 x 92 x 38 mm</td>
</tr>
<tr>
<td>Dimensions for minimum connector release clearance</td>
<td>208 x 92 x 38 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>330 g</td>
</tr>
<tr>
<td>Connector</td>
<td>48 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>40 Vmax</td>
</tr>
<tr>
<td>Max. idle current</td>
<td>≤120 mA</td>
</tr>
<tr>
<td>Standby current</td>
<td>≤1 mA</td>
</tr>
<tr>
<td>Total load current</td>
<td>24 Amax</td>
</tr>
</tbody>
</table>

Standards

- Functional safety: 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
- limited to 40 V by external load dump protection

Ingress protection

- EN 60529 IP67
- ISO 20653 IP69K

Climatic

- ISO 16750-4

Mechanical

- ISO 16750-3

Features

CPU Core

- Infineon XC22xx 16/32 bit CPU running at 80 MHz
- 768 kByte int. Flash, 82 kByte int. RAM, 8 kByte EEPROM

Interfaces

- 2 x CAN, 125 kbit/s up to 1 Mbit/s
- 1 x CAN bus termination, configurable via connector pins

Outputs

- 6 x PWM OUT or digital OUT, up to 3 A, high side switch with current measurement, overload and open load detection, PL c capable
  alternative use
digital timer IN (10 Hz - 10 kHz) or analog IN 0 - 32 V both with integrated Pull-Up
- 2 x PWM OUT or digital OUT, up to 3 A, high side switch with overload detection, open load detection and support for high inrush current loads, PL c capable
  alternative use
digital timer IN (10 Hz - 10 kHz) or analog IN 0 - 32 V, both with integrated pull-up
- 2 x digital OUT, up to 3 A, low side switch used as redundant switch-off path for high side PWM outputs
- 6 x P VG OUT
  15% - 85% BAT+ with PVG valves
  alternative use
voltage OUT 0 V - 75% BAT+ with 10 kOhm low side load or analog IN 0 - 32 V

Inputs

- 4 x digital timer IN (0.1 Hz - 10 kHz), PL c capable if used in pairs
  alternative use
analog IN, 0 – 32 V
  1x rotary encoder
  configurable pull-up/down in digital IN mode
- 4 x analog IN, configurable in software, input functions are PL c capable if used in pairs
  0 – 5 V / 10V IN
  0 – 65 kOhm IN
  up to 25 mA LED control OUT
- 4 x analog IN, configurable in software, input functions are PL c capable if used in pairs
  0 – 5 V / 10V IN
  0 – 25 mA IN
  up to 25 mA LED control OUT
- 2 x analog IN 0 - 32 V, PL c capable if used in pairs
  configurable pull-up/down in digital IN mode

Other

- 1 x sensor supply 5 V, 100 mA
- Internal monitoring of board temperature, sensor supply, K15 input and battery voltage

Software Options

- C programming environment (incl. BSP and driver library)
- MATLAB Simulink I/O block library

All I/Os and interfaces are protected against short circuit to GND and BAT+ and can be configured by software. All analog inputs use 10 bit resolution. All analog voltage inputs can be used as digital inputs with configurable switching levels and hysteresis. Dedicated power supply pins for high side outputs. For safety functions two PL d capable inputs of the same type have to be used in parallel to provide redundancy in case of a failure. Details about the standards can be found in the user manual.
Block Diagram

**Infineon XC22xx**

- **CPU core**
  - 16/32 bit / 80 MHz
  - 82 kB RAM
  - 768 kB Flash

**Interfaces**

1. **Sensor supply**
   - 5 V / 100 mA

2. **HS PWM OUT**
   - up to 3 A with current measurement or digital timer IN
   - 10 Hz – 10 kHz or analog IN

3. **LV digital OUT**
   - up to 3 A for use as safety switch

4. **PVG OUT** or voltage OUT or analog IN

5. **4 K15 Key Switch**
   - digital timer IN
   - 0.1 Hz – 10 kHz or analog IN

6. **LED control OUT**
   - 0-5 V / 0-10 V / 0-25 mA or 0-32 V with configurable Pull-Up/Down

Housing and Connector

- Aluminum die-cast housing
- 48-pin connector, 1 connector chamber
- Mating connector: FCI PPI0001494 or PPI0001495
  - Molex 64320-1311 or 64320-3311

For further information, including price and availability, please contact products@tttech-auto.com.

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