TTC 2380 – Powerful Safety Electronic Control Unit

General description
The robust and powerful TTC 2380 mid-sized electronic control solution is equipped with Infineon’s TriCore™ Aurix™ TC377 CPU to fulfill the demanding performance requirements of automotive safety applications.

Protected by a compact and robust housing, the device was especially developed for vehicles used in a rugged operating environment and at extreme operating temperatures. Due to the ISO 26262 ASIL C automotive safety certification, the device is also used in road vehicles.

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU dimensions</td>
<td>170.6 x 232.0 x 42.0 mm</td>
</tr>
<tr>
<td>Dimensions for minimum connector release clearance</td>
<td>70.0 x 182.0 x 50.0 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1220 g</td>
</tr>
<tr>
<td>Connector</td>
<td>2 x 48-pin + 1 x 2-slot HSD</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>Maximum supply current at 12 / 24V without load</td>
<td>200 / 130 mA</td>
</tr>
<tr>
<td>Maximum standby current</td>
<td>&lt;1 mA</td>
</tr>
<tr>
<td>Maximum total load current</td>
<td>45 A</td>
</tr>
</tbody>
</table>

Standards

| Functional safety | IEC 61508 SIL2, EN ISO 13849 PL d, ISO 25119 AgPL d, SRL2 |
| CE-Mark | 2014/30/EU, 2006/42/EC |
| E-Mark | ECE-R10 Rev.6 |
| FCC-Mark | 47 CFR Part 15B, Class A |
| EN 13766 | ISO 14982, CISPR 25 |
| IEC 61000-4-2/-3/-4/-5/-6/-8 |
| ISO 19014 MPL d |
| ISO 10605 |
| ISO 16750-2 |
| ISO 7637-2,-3 |
| EN 60529 IP65 and IP67 |
| ISO 20653 IP6k9k |
| ISO 16750-4 |
| ISO 16750-3 |
| ISO 11783 |

Features

- CPU core
  - 32-Bit Infineon TriCore™ Aurix™ TC377
- 3 cores (2 lockstep cores) running at 300 MHz and memory protection for safety-relevant applications
- Floating-Point Unit and Hardware Security Module
- 992 KB int. SRAM, 6 MB int. Flash
- 16 MB ext. Flash, 256 KB int. EEPROM emulation

Interfaces

- 4 x CAN FD 50 kbit/s up to 2 Mbit/s (1 x CAN with wake-up capability and 1 x CAN ISOBUS)
- 1 x CAN bus termination configurable via connector pins
- 2 x 100BASE-T1 (internal configurable Ethernet switch)
- 4 x SENT with SPC support, 1 x LIN

Outputs

- 18 x PWM OUT up to 1 kHz or digital OUT, up to 4 A (2 x up to 8 A), high side, with current measurement alternative use as digital timer IN (0.1 Hz - 20 kHz), configurable pull-up in groups of 2 or analog IN 12 bit, 0 - 32 V or LED control OUT
- 10 x digital OUT up to 4 A, high side, current sense alternative use as PGV OUT, 10 - 90% of BAT+ or 4 x as voltage OUT 0 - 10 V or LED control OUT or analog IN 12 bit, 0 - 32 V
- 8 x PWM OUT up to 4 kHz, up to 4 A, low side, with current measurement (4 x featuring timer feedback) alternative use as analog IN 12 bit, 0 - 5 V, 0 - 32 V or 4 x as digital timer IN (0.1 Hz - 20 kHz)
- 4 x digital OUT up to 4 A, low side, with current measurement alternative use as analog IN 12 bit, 0 - 5 V, 0 - 32 V
- 1 x emergency stop OUT*, alternative use as analog IN 12 bit, 0 - 32 V
- Option to configure up to 4 x H-bridges for motor control*
- 3 x status LED

Inputs

- 8 x analog IN 12 bit, 0 - 5 V, 0 - 25 mA, 0 - 100 kOhm, LED control
- 8 x digital timer IN (0.1 Hz - 20 kHz), encoder support, configurable pull-up/down, support 7/14 mA current loop speed sensors alternative use as analog IN 12 bit, 0 - 32 V, 0 - 25 mA
- 4 x digital timer IN (0.1 Hz - 20 kHz), encoder support, configurable pull-up alternative use as analog IN 12 bit, 0 - 32 V or SENT interface
- 2 x emergency stop IN*, alternative use as analog IN 12 bit, 0 - 32 V
- Terminal 15 and Wake-Up pin

Sensor supply

- 2 x sensor supply, 5 V, max. 500 mA
- 1 x sensor supply, 5 - 12 V, max. 2.5 W, configurable by SW in 0.5 V steps

All inputs and outputs supporting analog IN can also be used as digital input.
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.
Two independent shut-off groups for PWM output stages.
Details to the standards can be found in the system manual.
* upcoming feature

Software

- C Programming Environment with real-time operating system
- CODESYS® Safety SIL 2 including support for CANopen® Safety Master
Block diagram

Aurix
TC 377

Super-Scalar TriCore
- 32 bit
- 300 MHz / 3 cores
- 992 KB SRAM
- 6 MB Flash
- 256 kB EEPROM emulation
- HSM

IN / OUT

1 ▲ Terminal 15
   Key Switch
2 ▲ Sensor supply
   5 V / 500 mA
3 ▲ CAN FD
4 ▲ CAN FD
5 ▲ ISOBUS
6 ▲ LIN
7 ▲ Ethernet
8 ▲ 100BASE-T1

Sensor supply
5-12 V / max 2.5 W

HS PWM OUT
up to 4 A (2 x up to 8 A) with current measurement
or analog IN 0-32 V

digital timer IN
0.1 Hz – 20 kHz

digital timer IN
7/14 mA or analog IN 0-32 V / 0-25 mA

analog IN
0-5 V / 0-25 mA / 0-100 kOhm / LED control

Wake-Up

emergency stop OUT*

emergency stop IN*

or analog IN 0-32 V

digital timer IN
0.1 Hz – 20 kHz

digital timer IN
7/14 mA or analog IN 0-32 V / 0-25 mA

analog IN
0-5 V / 0-25 mA / 0-100 kOhm / LED control

digital timer IN
0.1 Hz – 20 kHz

or analog IN 0-32 V or SENT

18 ▲ HS PWM OUT
up to 4 A with current measurement
or analog IN 0-32 V or LED out

10 ▲ HS digital OUT
up to 4 A with current sense or
PVG out or
(4 x) Vout 0-10 V or analog IN 0-32 V or LED out

4 ▲ LS PWM OUT
up to 4 A with current measurement
or analog IN 0-5 V / 0-32 V or digital timer IN
0.1 Hz – 20 kHz

4 ▲ LS PWM OUT
up to 4 A with current measurement
or analog IN 0-5 V / 0-32 V

4 ▲ LS digital OUT
up to 4 A with current measurement
or analog IN 0-5V / 0-32 V

Housing and connector

Aluminum die-cast housing
2 x 48-pin connectors
1 x 2-slot HSD connector

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

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