CPCI-CAN/402-4(-FD)
CompactPCI® Board with 4 CAN or 4 CAN FD Interfaces

CompactPCI Board with Altera® FPGA for 4x CAN FD or 4x CAN via DSUB25

- 4 CAN FD or optional 4 CAN interfaces according to ISO 11898-2
- Bus Mastering and local data management by FPGA
- PCI bus conforms to PCI Local Bus Specification 3.0
- Selectable CAN termination on board
- Supports MSI (Message Signaled Interrupts)

Wide Range of OS Support and Advanced CAN Diagnostic

- Software drivers for Windows® and Linux® included free of charge
- Optional CAN layer 2 software drivers for real-time operating systems
- CANopen®, J1939 and ARINC 825 protocol libraries are available
- ISO 16845:2004 certified esd Advanced CAN Core (esdACC) technology
- High resolution hardware timestamps

Modern Transceiver Technology

- esdACC technology offers highest CAN performance and diagnostic

Customization on Request

- Ext. temperature range: -40° C … +75° C
- IRIG-B input
- Error simulation support
- All signals via Rear I/O (P3)
- 2x CAN FD via DSUB9

CPCI-CAN/402-4(-FD)

Hardware Designs

The CPCI-CAN/402-4 is a CompactPCI board designed for the PCI bus that features four electrically isolated high-speed CAN interfaces according to ISO 11898-2. The DSUB25 CAN connector is located in the front panel. As successor of the CPCI-CAN/402-4 board the CPCI-CAN/402-4-FD comes with four CAN FD interfaces.

CAN Data Management

The independent CAN nets according to ISO 11898-1 are driven by the esdACC (esd Advanced CAN Core) implemented in the Altera FPGA. The FPGA supports Bus Mastering (first-party DMA) to transfer data to the host memory. This results in a reduction of overall latency on servicing I/O transactions in particular at higher data rates and a reduced host CPU load. Due to the usage of MSI (Message Signaled Interrupts) the CPCI-CAN/402-4(-FD) can be operated for example in Hypervisor environments. The CPCI-CAN/402-4(-FD) provides 64-bit hardware timestamp with bit time accuracy.

Software Support[1]

Windows and Linux (NTCAN-API)
The CAN layer 2 drivers for Windows and Linux are included in the scope of delivery.

Realtime OS (NTCAN-API)
CAN layer 2 drivers for QNX, RTX(64), VxWorks® and On Time RTOS-32 can be ordered separately.

Higher Layer Protocols
(Classical CAN application only)
Higher Layer Protocols are available for many operating systems (see order info):
- CANopen Master- and Slave-Stack
- J1939
- ARINC825

Additional free-of-charge esd CAN tools for Windows are downloadable from our website. The tools offer efficient setup and analysis of CAN applications and networks.

Customization on Request

Customized options are available for customized serial production in reasonable quantities. Please contact our sales team for detailed information.

CPCI-CAN/402-4 Successor with CAN FD

The CPCI-CAN/402-4 is not recommended for new designs. (It can still be used in existing systems, e.g. if the drivers shall not be reinstalled.) Use the successor CPCI-CAN/402-4-FD for new projects. It comes with a more powerful FPGA and supports CAN FD. Furthermore, it can also be used in Classical CAN applications, because it is fully backwards compatible with CAN.

(CPCI-CAN/402-4-FD only)
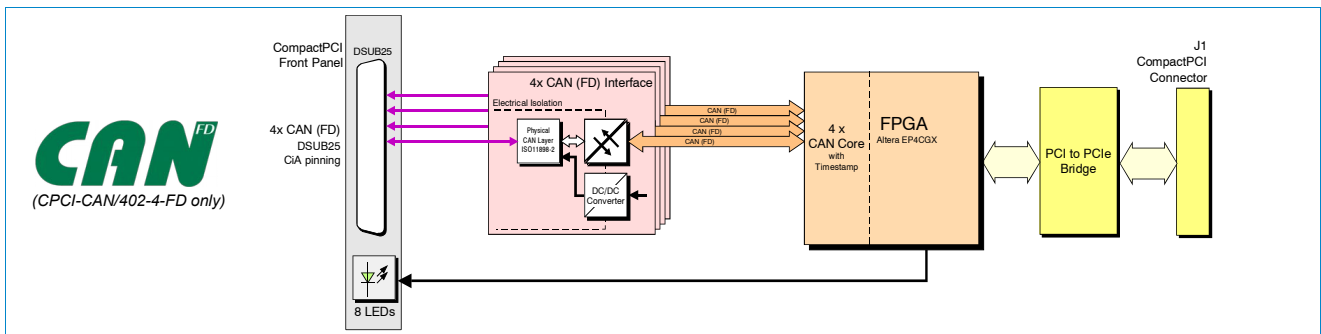
Technical Specifications:

CompactPCI Interface :

Interface	PCI bus according to PCI Local Bus, Specification 3.0, 32 bit 33/66 MHz, 3.3 V (5 V tolerant), Bus Master DMA capability

CAN:

Interface	4 interfaces according to ISO 11898-2, CPCI-CAN/402-4-FD: Bit rates from 10 Kbit/s up to 5 Mbit/s, CPCI-CAN/402-4: Bit rates from 10 Kbit/s up to 1 Mbit/s
CAN controller	esdACC in EP4CGX Altera FPGA, CPCI-CAN/402-4-FD: According to ISO 11898-1:2015, CPCI-CAN/402-4: According to ISO 11898-1

General:

Ambient temp.	Operation : 0 °C ... +75 °C, Storage: -40°C ... +85 °C
Rel. humidity	Max. 90 %, non-condensing
Power supply	3.3 V / I_{MAX} = 1.1 A
Connectors	Back plane: J1 connector, CAN: 1x DSUB25 (male)
LEDs	CAN status, 1x module status
Dimensions	PCB: 100 mm x 160 mm, Front panel:3U/4HP
Weight	150 g
Conformity	EN 61000-6-2, EN 61000-6-4, EMC, RoHS, CE

Order Information:

Hardware		Order No.
CPCI-CAN/402-4-FD	4x CAN FD via DSUB25 (male)	I.2332.68
CPCI-CAN/402-4	4x CAN via DSUB25 (male)	I.2332.08

Accessories		
CAN/400-4-1C4	Adapter cable DSUB25 female to 4x DSUB9 male, length: 0.5 m	C.2047.19

Software Support [1]

CAN layer 2 drivers for Windows and Linux are included in delivery.
Additional CAN layer 2 object licences including CD/ROM:

CAN-DRV-LCD QNX	C.1101.32
CAN-DRV LCD RTX (incl. RTX64)	C.1101.35
CAN-DRV-LCD VxWorks	C.1101.55
CAN-DRV-LCD On Time RTOS-32	C.1101.45

Higher layer protocols including CD/ROM for Classical CAN:

CANopen-LCD Windows/Linux QNX, RTX, or VxWorks	C.1101.xx
J1939 Stack for Windows or Linux	C.1130.xx
ARINC825-LCD Windows/Linux, QNX, RTX or VxWorks	C.1140.xx

1 For detailed information about driver availability for your operating system please contact our sales team.

CPCI-CAN/402-4(-FD)
Driven by esdACC (Advanced CAN Core)

Basic Product Features:

- CPCI-CAN/402-4: CAN ISO 11898-1 protocol compatibility, CPCI-CAN/402-4-FD: CAN ISO 11898-1:2015

- Tested and certified acc. to ISO CAN Conformance Tests "ISO 16845:2004 Road vehicles - Controller area network (CAN) - Conformance test plan"

- 11-bit and 29-bit CAN IDs

- Supported bit rates:
  CPCI-CAN/402-4: from 10 kbit/s up to 1 Mbit/s
  CPCI-CAN/402-4-FD: from 10 kbit/s up to 5 Mbit/s

- Receive buffer (64 CAN messages)

- Complete access to CAN error counters

- Programmable error warning limit

- Error code capture register

- Error interrupt for each CAN bus error

- Arbitration lost interrupt with detailed bit position

- Listen only mode (no acknowledge, no active error flags)

- Automatic bit rate detection (hardware supported bit rate detection)

- Acceptance filter (4-byte code, 4-byte mask)

- Self reception mode (reception of 'own' messages)

- Busload measurement

Superior esdACC Features [1]:

- Operating system independently programmable via esd's NTCAN-API

- 32-bit register interface optimized for CAN needs
  - Easy to program
  - Transmission and reception of CAN frames with a minimum of register accesses

- RX and TX timestamping (64-bit wide, bit accurate, resolution may vary with input clock, in any case ≤ 62.5 ns, usually 12.5 ns)
  - Timestamping complies with the CiA 603 specification
  - On hardware with IRIG-B interfaces IRIG-B time is used for timestamping

- TX FIFO (16 CAN frames deep)
  - Providing the means to generate 100% busload even with non-realtime operating systems
  - Providing the means for real back-to-back transmission

- Timestamped Tx FIFO (16 CAN frames deep)
  - High priority
  - 64 bit timestamp
  - Bit time accuracy for CAN transmission

- Frame accurate abortion of transmissions with minimum delay
  - e.g. for driver timeouts
  - CPCI-CAN/402-4: ISO11898-1 conform, CPCI-CAN/402-4-FD: ISO11898-1:2015 conform
  - Aborted frames in FIFO won't be blocked by low priority TX

Superior esdACC Features (continued) [1]:

- Hardware timer to provide accurate software timeouts beyond operating system accuracy

- Bus Mastering in RX direction takes the load off host CPU (needs Bus Master capable local bus to host interface)

- Optional different sources for timestamps (e.g. IRIG-B)

- Using FPGA technology provides the option to tailor any feature to any customer's needs, including optional integration with customer's FPGA content

- The esdACC IP core has been verified on Xilinx Spartan and Altera Cyclone FPGAs.

[1] Availability of the Superior esdACC Features depends on the operating system. Please contact our sales team for further information.

For further information on the esdACC IP Core please contact our sales team.