# CAN-USB/400

## USB to Dual-Channel CAN Module with CAN CC or CAN FD Support

***Two High-Speed CAN CC or CAN FD Interfaces for USB***
- *CAN interfaces according to ISO 11898-2 with galvanic isolation*
- *Powered by ISO 16845:2004 certified esd Advanced CAN Controller (esdACC)*
- *Capable of 100 % CAN bus load*

***Robust and Easy to Handle***
- *Power supply by USB*
- *Aluminum case*
- *USB cable included*
- *High retention force USB connector*

***Advanced Diagnostics and Timestamping***
- *Enhanced diagnostic features*
- *Error injection capabilities*
- *High resolution hardware timestamping*
- *Both CAN ports share common time base*

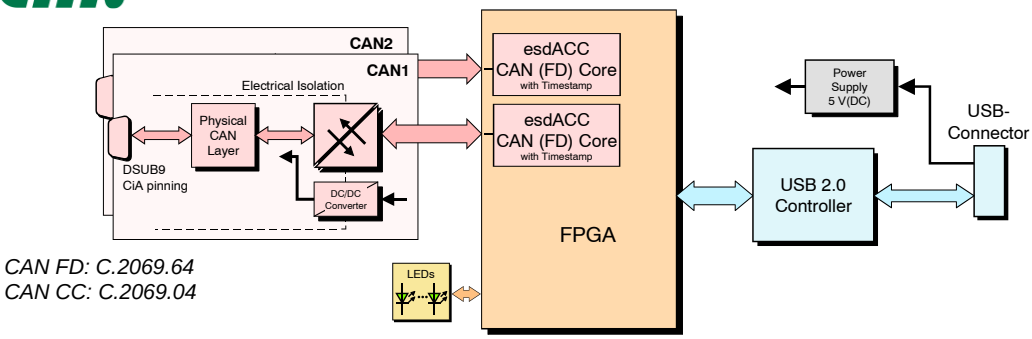
***Optimized Architecture***
*The CAN-USB/400 was developed for CAN communication with minimum latency via USB. For this purpose, USB is connected internally via FIFOs and the data management is controlled by the esd Advanced CAN Controller (esdACC).*


***CAN Interfaces***
*Two independent CAN ports in accordance with ISO 11898-1 offer extensive options for using the CAN bus. Each port has its own ISO 16845:2004 certified esdACC. Depending on the variant, the interface can send and receive ISO-compliant CAN FD and/or CAN 2.0 A/B messages. The CAN FD bit rate range is suitable and validated for up to 8 Mbit/s thanks to the esdACC and the CAN transceivers used.*

***Error Injection Unit***
*esd has developed error injection technology to simplify the testing of fail-safety, diagnostics and optimization of CAN-based systems. This technology makes it possible to inject error situations into the CAN bus during active operation. Multiple trigger conditions and modes offer flexible and extensive options for sending almost any bit pattern to the CAN bus.*

***Software Support***
*esd offers the sophisticated NTCAN-API for accessing the CAN bus via the CAN-USB/400, which provides extensive functions for making the best possible use of the CAN bus. Device drivers and the NTCAN-API for Windows are included. Additional free esd CAN tools (e.g. the interactive CAN bus analysis tool CANreal) for Windows can be downloaded from our website. The tools enable efficient configuration and analysis of CAN applications and networks.*

***CAN-based Protocols***
*In addition, esd offers protocol stacks based on the NTCAN API for easy integration of e.g. CANopen, J1939 and ARINC825. For more information, please ask our sales team.*




*CAN FD: C.2069.64*
*CAN CC: C.2069.04*

*CAN-USB/400-FD side with CAN connectors*

*CAN-USB/400-FD side with USB connector*

***Technical Specifications:***

| | |
|---|---|
| *USB Interface:* | |
| *USB* | *USB 2.0, high-speed 480 Mbit/s* |
| *CAN:* | |
| *Interface* | *2x high-speed CAN (FD) acc. to ISO11898-2, galvanically isolated, CAN CC bit rates from 10 kbit/s up to 1 Mbit/s CAN FD bit rates up to 8 Mbit/s* |
| *CAN controller* | *esdACC according to ISO 11898-1* |
| *General:* | |
| *Power supply* | *Via USB: 5 V* |
| *Ambient temp.* | *Standard range: 0 °C ... +55 °C* |
| *Rel. humidity* | *Max. 90 % (non-condensing)* |
| *Dimensions* | *Approximately 86 mm x 19 mm x 86 mm (excl. connector excess length)* |
| *Connectors* | *CAN: 2x DSUB9 (pin contacts)*<br>*USB: USB2 standard socket type-B, high retention force connector* |

| *Order Information:* | | |
|---|---|---|
| *Hardware* | | *Order No.* |
| *CAN-USB/400-FD* | *2x CAN Flexible Data Rate (CAN FD)* | *C.2069.64* |
| *CAN-USB/400* | *2x CAN Classic (CAN CC)* | *C.2069.04* |
| *Device drivers for Windows are included in delivery free of charge.* | | |
| *Software Support* | | |
| *CANopen Software Stack for Windows* | | *C.1101.06* |
| *J1939 Stack for Windows* | | *C.1130.10* |
| *ARINC825 Stack for Windows* | | *C.1140.06* |
| *Related Articles:* | | |
| *CAN-USB/400-IRIG-B* | *2x CAN CC, 1x IRIG-B, Trigger I/Os, Misc. I/Os* | *C.2069.06* |
| *CAN-USB/400-FD-IRIG-B* | *2x CAN FD, 1x IRIG-B, Trigger I/Os, Misc. I/Os* | *C.2069.66* |



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# CAN-USB/400

## Driven by esdACC (Advanced CAN Controller)

**Basic Product Features:**

- CAN ISO 11898-1:2015 protocol compatibility
- 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:
  - CAN FD: CAN flexible data rate, supports bit rates from 10 kbit/s up to 8 Mbit/s with bit rate switch as well as a payload of up to 64 bytes per frame. It is fully backward compatible with CAN CC.
  - CAN CC: CAN classic also known as CAN 2.0A/B supports bit rates from 10 kbit/s to 1 Mbit/s with a payload of up to 8 bytes per frame.
- 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
- Disable Automatic Retransmission (DAR) (Single-shot transmission)
- Listen only mode (no acknowledge, no active error flags)
- Automatic bit rate detection (hardware supported bit rate detection)
- 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-real-time 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
  - 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 integration with 32-bit microcontroller to further relieve host CPU
- CAN error injection units:
  - Simulating a wide range of error situations on CAN bus, e.g.:
    - ID pollution (100 % bus load on certain CAN ID/priority)
    - Defective sensor (Destroying all CAN messages of a given CAN ID)
  - Different trigger modes
    - Bit pattern match
    - Time triggered
    - Immediate regarding CAN arbitration
    - External
  - 'Cross CAN bus triggering' (event on one CAN bus triggers event on another bus)
- 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 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 esd Advanced CAN Controller please contact our sales team.*



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