

APU825

USB2.0 Module with
2 CAN CC/CAN FD bus Nodes
ARINC825 compliant
for Testing & Simulation of
Avionic ARINC825 bus Systems

Data
Sheet



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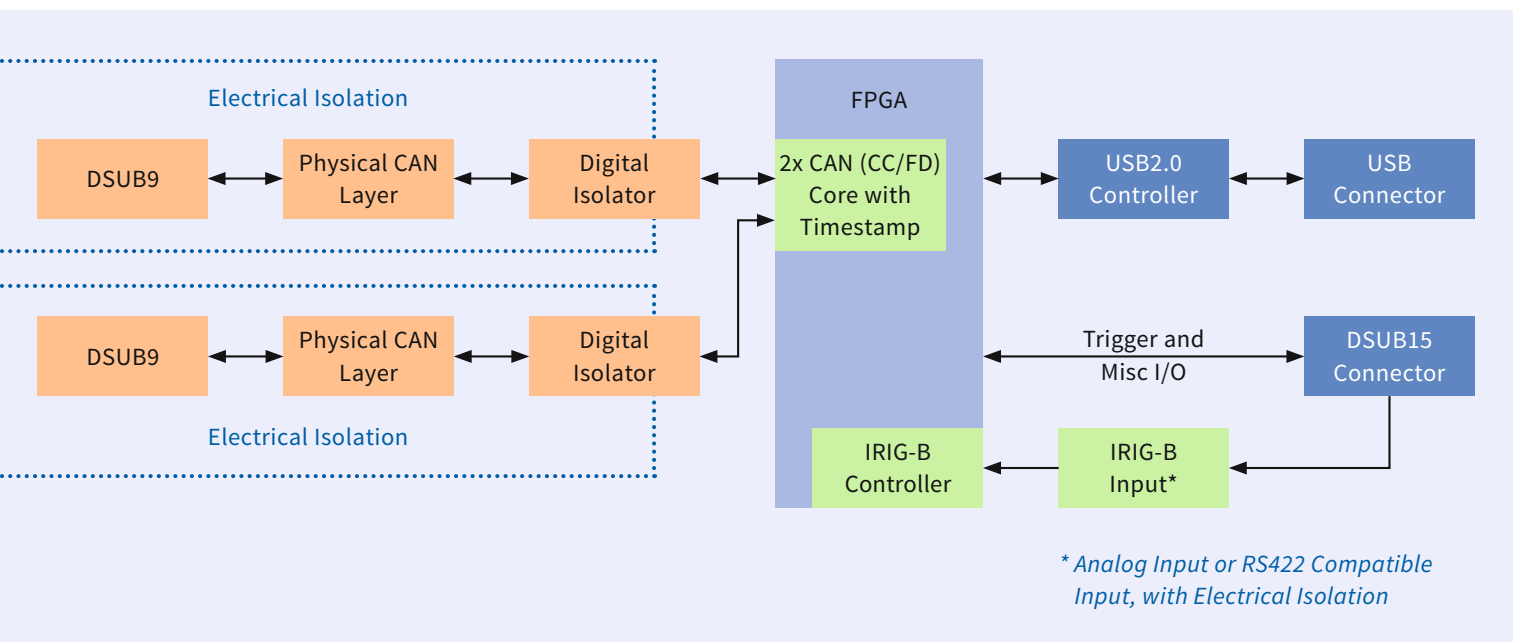
General Features

The ► **APU825 USB2.0 module** can work as an active full functionality ARINC825/CAN (CC/FD) node for testing and simulating applications as well as in 'listening only' mode for monitoring and recording purposes of ► **ARINC825** applications on up to 2 electrically isolated ARINC825/CAN (CC/FD) bus nodes concurrently.

All nodes are in conformance with the ISO11898 standard. They are accessible by software separately and can be used as 2 independent ARINC825/CAN (CC/FD) bus nodes. An onboard IRIG-B time Decoder allows users to accurately synchronize single or multiple modules to a common time source.

The APU825 module consists of FPGA based ARINC825/CAN (CC/FD) interface controllers as well as a FPGA based 32bit microcontroller core and a separate processor for IRIG-B synchronization with high resolution time stamping.

All nodes are operating concurrently at CAN bus high speed bit rate of up to 1Mbit/s in CAN CC and up to 8Mbit/s in CAN FD with the intelligence to process scheduling of ARINC825/CAN (CC/FD) frames in real time onboard to significantly off-load the host processor. The APU825 module operates also with the ► **PBA.pro™** Databus Test and Analysis Tool for Windows.



APU825 Block Diagram



ARINC825/CAN (CC/FD) bus Channel Operation

The APU825 module provides real time simulation of up to 2 ARINC825/CAN (CC/FD) bus nodes concurrently via FPGA based ARINC825/CAN (CC/FD) control engine with an additional 32bit microcontroller. Each ARINC825/CAN (CC/FD) bus operation speed is programmable in the range from 10kbit/s up to 1Mbit/s in accordance with the CAN 2.0B specification and up to 8Mbit/s for CAN FD. Automatic baud rate detection is available. The APU825 supports the 11bit and 29bit message ID operation in ID oriented (Object) mode. A Listening-Only mode is available for chronological monitoring (FIFO mode).

All basic ARINC825/CAN (CC/FD) node functions are implemented in accordance with ► **ISO11898**, CAN 2.0 A/B and CAN FD.

Traffic Generation

APU825 transmitter operation allows users to fully program all relevant fields of the ARINC825/CAN (CC/FD) bus message protocol including an 11bit or 29bit message identifier, RTR bit, data length code and up to 8 user defined data bytes. Synchronization of transmissions across multiple ports is supported.

- Cyclic/Acyclic ID Transmission mode
- Programmable Inter Message Timing available
- Single Shot or Automatic Retry Function if arbitration lost
- Arbitration Lost Notification
- ARINC825/CAN (CC/FD) bus compliant Error Handling
- Message and Error Counters

Operation Modes

The APU825 module provides different operation modes for all 2 ARINC825/CAN (CC/FD) bus nodes. The board basically supports 2 different operational modes, the Object and the FIFO mode.

In the Object mode each configured message ID has a separate buffer where message data and status information are stored in case of receiving IDs. In the Object mode, IDs can also be configured to be transmitted cyclically (scheduled transmission). In the FIFO mode all or selected IDs are time stamped and stored in a FIFO in case of receiving IDs. The FIFO mode can be also used for transmitting IDs by passing the IDs to be sent to a transmit FIFO.

In case of scheduled transmit operation the FIFO mode can be used in parallel e.g. to insert an acyclic transmission of IDs. Independent from the selected modes above the board can be configured to operate in a Listening-Only mode which allows a passive monitoring of an ARINC825/CAN (CC/FD) bus without disturbance of the existing traffic. Furthermore automatic handling of ARINC825/CAN (CC/FD) RTR-Frame is supported via an Auto-Answer mode.

- Object and FIFO Transmit/Receive modes supported
- ARINC825/CAN (CC/FD) bus Listening-Only mode for passive Monitoring
- Data Buffering with Real Time Data updates
- Scheduled Transmission of IDs
- Acyclic Transmission of IDs
- ID oriented dependent Filtering
- Time Stamping of received frames with IRIG-B Time Code 1µs resolution
- Auto-Answer mode for automatic RTR frame handling
- Physical Error Detection, Bit Error, CRC-/Format Error, Bit Stuffing Error
- Event Generation

Physical Bus Interface

The APU825 modules have integrated ARINC825/CAN (CC/FD) bus transceivers which are compliant with the ISO11898-2 high speed specification. The ARINC825/CAN (CC/FD) bus interfaces are electrically isolated by default.

All 2 ARINC825/CAN (CC/FD) nodes are available at the Front I/O provided at 2x 9-way D-Sub (male) connector.

IRIG-B Time Decoder

APU825 modules have an onboard IRIG-B Time Decoder with 1µs resolution and an automatic free-wheeling detection. This allows synchronization of multiple APU825 modules to 1 common IRIG-B time source for the correlation of data across multiple ARINC825/CAN (CC/FD) bus nodes.

Driver Software

The APU825 modules are supplied with an Application Programming Interface (API) and Driver Software compatible with Windows.

Application Software

An ARINC825 Resource Component is available for ► **AIM's PBA.pro™** Databus Test and Analysis Tool including Tx and Rx simulation capabilities, a Chronological Bus Monitor and support for decoding of payload data within ARINC825/CAN (CC/FD) messages.

This allows to implement a powerful ARINC825/CAN (CC/FD) bus analyzer or a complete Test System in conjunction with other AIM Avionics Databus Interfaces and PBA.pro™ supported 3rd party hardware.

Technical Data

System Interface

USB2.0 Interface: 480Mbit USB2.0
Standard Interface

Processors

FPGA based 32bit Microcontroller Core

Encoder/Decoder

FPGA based CAN CC/FD bus Controller Core

- CAN CC: CAN Classic also known as CAN 2.0 A/B supports bit rates from 10 kbit/s to 1 Mbit/s with a payload of up to 8 bytes per frame.
- 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.

Time Tagging

46bit absolute IRIG-B Time Code,
1µs resolution; free-wheeling

Physical Bus Interface

2x ISO11898-2 compliant high speed
Transceivers; each ARINC825/CAN (CC/FD)
bus node is electrically isolated

Front-I/O Interface connector

- 2x 9-way D-Sub (male), providing
2 independent electrically isolated
ARINC825/CAN (CC/FD) bus nodes
(with CiA Pinout)
- 1x 15-way D-Sub (female), providing
IRIG-B Time Code Input (analog
IRIG-B and RS422), Trigger I/O

USB2.0/PCI Interface connector

USB2.0 B type connector

Dimensions

86mm x 19mm x 86mm

Operating Temperature Range

Standard: 0°C to +50°C ambient

Ordering Information

APU825

USB2.0 to ARINC825 module
with 2 ARINC825/CAN bus nodes,
IRIG-B Time Decoder, including
USB cable (occupying 1 USB port)

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