



High Performance CAN & ARINC 429 Interface to USB

Features

- up to 12 ARINC 429 channels (4Tx/8Rx) per module
- up to 2 CAN2.0A/B / ARINC 825 busses
- 4 Discrete functional pull-down outputs
- Separate A429 Receivers for monitoring A429 Transmit driver outputs
- Integrated A429 ↔ CAN/A825 gateway features
- Support for periodic and asynchronous messages
- Advanced scheduling options
- Error detection and injection
- Time-stamping and Timer Synchronisation
- Lightning protection
- Extended Temperature Range

Description

It is the combination of ARINC 429 and CAN 2.0A/B on a single USB-device that is the unique feature of the mbs Electronic Systems new ÆSyBus CAN429-USB. A total of up to 4 Tx and 8 Rx ARINC 429 channels and 2 CAN 2.0A/B and 4 additional 28V/Open/GND discretes are assembled on a single, compact and ruggedized self-powered USB 2.0 device. Wherever CAN - or ARINC 825 - and ARINC 429 live together ÆSyBus CAN429-USB is the perfect hardware resource to overcome any databus analysis, data recording or gateway challenge with a single device. Fieldservice engineers will appreciate to win one extra USB connection with ÆSyBus CAN429-USB other than having two separate devices.

General Overview

mbs' ÆSyBus CAN429-USB Interface module was designed primarily to support portable applications where ARINC 429 and CAN-bus/ARINC 825 have to be handled simultaneously. It supports any portable application and in particular Aircraft Portable Data Loaders which operate in accordance with ARINC 615-3/-4 and the upcoming ARINC 826 specifications. Despite the emphasis on Data Loading applications the module's high performance and feature rich compact design makes it the ideal choice for many other applications. Especially gateway-applications where ARINC 429 communication has to be mapped into CAN messages – and of course vice versa – are areas where the ÆSyBus CAN429-USB Interface module perfectly fits. Existing test- and integration infrastructures for one or the other can then be used for both.

ARINC 429

ÆSyBus CAN429-USB modules have up to 4 Transmit and 8 Receive channels in a compact, low power, pocket size module which makes it the ideal choice for portable applications.

According to need, the user can select between two methods for transmitting ARINC 429 data.

- Dedicated FIFOs which are ideally suited for asynchronous transmissions, needed for file transfer applications, like data loading. Each FIFO buffers up to 1k ARINC 429 words, which are transmitted as soon as an opportunity occurs with a minimum allowable gap between words.
- Transmit Scheduler and Data Buffer, designed for periodic transmissions. This allows up to 128 individually assigned ARINC 429 words to be scheduled on to each of the 4 transmit channels with repetition rates from 10 ms to 4 seconds. Data is drawn from user assigned locations within the Transmit Data Buffer.

Asynchronous and periodic transmissions mix naturally on to the buses with periodic transmissions taking priority.

All ARINC 429 Receive channels feature Error Detection. Cyclic data buffers are provided for storing Receive data for each channel, prior to it being automatically transferred to applications on the host computers together with the appropriate Write Pointers.

Receive data is Time-Stamped with a 32-bit counter and a microsecond resolution. The counter can also be read directly and its value transferred to host applications with other data.

It is up to the user to maintain a record of the Cyclic Buffer Read Pointers. The concept of using cyclic buffers rather than FIFOs has a tremendous advantage, in that multiple host applications can read the receive data without it being lost, while FIFOs can only be read once before the data disappears.

CAN / ARINC 825

ÆSyBus CAN429-USB provides this convenient high speed distributed interfacing capability for accessing two CAN 2.0A/B channels.

Two different methods are provided for transmitting messages which are designed to simplify various practical interfacing tasks. These methods are:

- Queued Transmissions where message data is placed in a FIFO with a capacity for more than 40 messages
- Scheduled Transmissions which are sent out periodically under hardware control. User only needs to update the messages data in the Transmit Buffer as new data becomes available.

Monitoring of receive and transmitted messages is triggered by reception of Interrupts from the HI-3110 Avionics CAN Controller. The Bus Monitor system then captures relevant Status and Data information which includes a 32-bit Time-Stamp and CAN Bus Status Information. Status and Data captured by the Bus Monitor is automatically transferred to Cyclic Data Buffers. A set of registers are provided where the Write Pointers to the Cyclic Buffers for each channel can be read.

Discrete Output

The module provides four discrete functional pull-down outputs compatible with the type used in aircraft for signalling to an LRU a request to start a data transfer operation.

Software

Communication with the ARINC 429, CAN and the Discrete Outputs uses UDP/IP protocol like the MBS ÆSyBus interface modules. This has the advantage, that multiple applications can simultaneously access the device, send messages and receive data. Furthermore, these protocols enjoy a level of support unmatched by any other communication protocol. Almost all development tools and operating systems support UDP/IP protocol. In addition, the ÆSyBus CAN429-USB is supplied with many example software applications in source code which can either be used directly or used as a basis for developing customised software to meet the exact project requirements. An optional Bus Analyser combining ARINC 429 and CAN/ARINC 825 is available.

Functional Specifications

Discrete Output Features

- 4 Discrete functional Pull-down outputs

ÆSyBus CAN429-USB Ordering Information

Part Number	Description
Æ-CAN429-USB-2C4T8R	2 CAN/A825 - 4 Transmit 8 Receive ARINC 429 USB Module with 4 Discrete Outputs
Æ-CAN429-USB-1C2T4R	1 CAN/A825 - 2 Transmit 4 Receive ARINC 429 USB Module with 4 Discrete Outputs

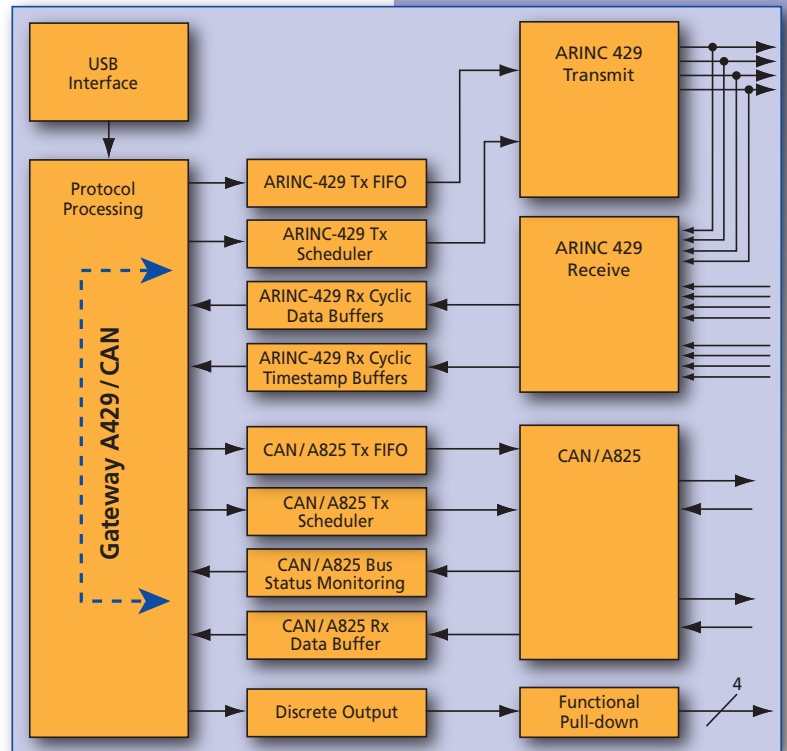


Figure 1: Functional block diagram of the ÆSyBus CAN429-USB. Gateway mapping rules are externally configurable and memorized by the module.

USB Features

- USB Specification 1.1 and 2.0
- USB Full and High Speed operation
- high performance packet transfer

Environmental

- Lightning Protection
- -40°C to +80°C Operation

ARINC 429 Transmit Features

- 2 or 4 Transmit Channels
- Transmit speed select 12.5 k or 100 k bits/s
- Transmit Error insertion
- Transmit FIFOs for asynchronous transmission
- Transmit Scheduling
- Built-In Transmit Driver Loopback

ARINC 429 Receive Features

- 4 or 8 Receive channels
- Receive Error reporting
- Time Stamping of all Receive Data
- Cyclic buffers for receive data and Time Stamps
- User configurable data transfer scheduling to host applications, periodically and/or when necessary.

CAN/A825 Bus Transmit Features

- 1 or 2 CAN 2.0/ARINC 825 Busses (up to 1 Mb/s)
- Queued Transmissions for up to 42 messages
- RTR Transmissions
- Scheduled Transmissions from 1 ms to 16 sec

CAN/A825 Bus Monitor and Receive Features

- 32-bit Time Stamping with 1 microsecond resolution
- Cyclic buffers for receive data, status and Time Stamps
- Automatic data transfer to Host Applications

mbs Electronic Systems GmbH

Friedrichshafener Straße 3
D-82205 Gilching
Tel.: +49 (0) 8105/7756900
Fax: +49 (0) 8151/449646
info@mbs-electronics.com
www.mbs-electronics.com