Electronic Systems
mbs

CAN Interface to Gigabit Ethernet

Features

- Four Independent CAN Channels operating at full bus load
- 11/29 bit Identifier
- Four Transmit modes: Queued, Scheduled, Responsive and Direct
- 1000 Mb/s Networked interface supporting up to 10 simultaneous applications on the same or separate computers
- 40-bit Time Stamping with 1 microsecond resolution
- Discrete IO
- Hardware and Software independent interface

Description

mbs' ÆsyBus product range provides Full Duplex Gigabit Ethernet/IP interfacing to various Avionics and Industrial data buses. ÆsyBus-CAN provides this convenient high speed distributed interfacing capability for accessing four CAN bus channels with support for discrete I/O.

A separate document provides more detail on the ÆsyBus concept and how its unique architecture can be exploited to provide a cost effective, distributed interface and processing system with outstanding performance. Many new products are planned to expand this flexible, easy to program family.

CAN

The ÆsyBus CAN / Gigabit Ethernet Interface Module provides four CAN Bus Channels operating with data rates up to 1 Mb/s.

Host applications communicate with the module using Ethernet and UDP/IP protocol, which is supported by all serious computer systems giving a platform-independent connection. Each application first registers with the Module by logging on and when finished, logoff to release resources for other applications. Up to ten separate applications can register with the Module at any one time and access and control its resources.
Four 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.
- **Transmissions in Response to Receive Events** where the reception of a particular message will trigger a predefined transmission
- **Direct Transmissions** where the message for transmission is set for immediate transmission. This type of transmission can be reserved for high priority messages.

Since messages for transmission can occur simultaneously from different sources, arbitration is necessary and the method used is to send the most dominant messages first.

Monitoring of receive and transmitted messages is triggered by reception of Interrupts from the SJA1000 CAN Controller. The Bus Monitor system then captures relevant Status and Data information which includes a 40 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.

The idea is that copies of interesting cyclic buffers are transferred to host memory together with the current Write Pointers. If the user keeps a copy of the Read pointers, then it is a relatively simple mater to capture all monitored data in the order it was recorded. This type of buffer has the

advantage over a conventional FIFO, in that it can be accessed by multiple users, multiple times, without loss of data. A Host Message Scheduler manages the automatic transfer of data to the host computer at regulated intervals, and only when needed.

Software

The choice of Ethernet data bus with UDP/IP protocol provides the user with a freedom unimaginable in the past. No longer is it necessary for a single program to control all of the communication with the interface card. With ÆsyBus- CAN, the user can divide the system into logical parts and implement them in separate applications, on the same computer or on separate computers, attached to the network and these connections can be broken and re-connected while the system is working. No need to switch the system down when connecting a new host to the network.

How about software drivers for my operating system? This is not a problem! All serious operating systems and software development environments provide support for the TCP/IP protocol stack, to which UDP belongs. You can take advantage of all the special tools and classes provided by these systems, to easily connect to the (UDP) user ports on the card, or sending and receiving messages etc.

In addition to the support of readily available software development tools, the ÆsyBus-CAN comes with example software and API written in Visual C# and provided with source code. You don't have to waste time struggling with an unfamiliar programming language and environment. You just continue with your favourite tools, they are almost certain to provide the support you need to access the Ethernet/IP and consequently the ÆsyBus devices. In addition, the ÆsyBus-CAN comes with full documentation and various Window-based utility programs to help you configure IP addresses and check out your network connection.
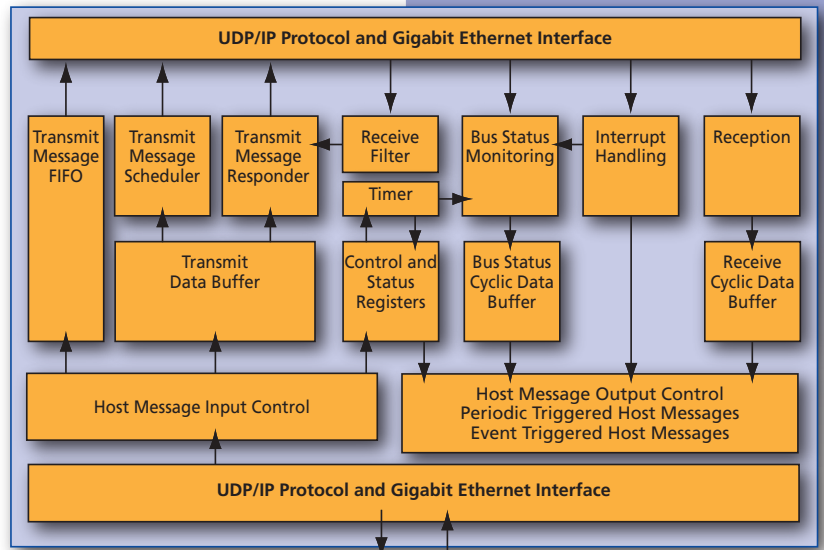
ÆSyBus CAN Ordering Information

Figure 1: The ÆSyBus - CAN provides Hardware Control of Time-Critical Tasks and acts as an automatic periodic Server of Received Data and System Status.

Functional Specifications

General Features
- Gigabit Ethernet Networked Interface
- Support for up to 10 simultaneous applications
- On-board system Timer
- Scheduled data transfer to host computer
- Low latency

CAN Bus Transmit Features
- Four CAN Bus Channels with data rates up to 1 Mb/s
- Queued Transmissions with capacity for 42 messages
- Automatic Transmissions in Response to assigned Receive IDs
- Scheduled Transmissions with repetition rate from 1ms to 16 seconds

CAN Bus Monitor and Receive Features
- 40-bit Time Stamping with 1 microsecond resolution
- Cyclic buffers for receive data, status and Time Stamps
- Automatic data transfer to Host Applications

Discrete I/O Features
- 8 Discrete Outputs and 4 Discrete Inputs

Software
- Application Programming Interface (API) with source code
- Example Software applications with source code
- No special software drivers required. The Module uses the Ethernet and Internet Protocol of the computer.

Part Number	Description
Æ -CAN-4TR-EC	Gigabit Ethernet Gateway to 4 CAN Bus Channels in Eurocard Format
Æ -CAN-4TR-EP	Gigabit Ethernet Gateway to 4 CAN Bus Channels . Stand-alone Module with connector for External Power Input
Æ -CAN-4TR-PoE	Gigabit Ethernet Gateway to 4 CAN Bus Channels . Stand-alone Module with Power over Ethernet (PoE)