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ES1220.1 CAN Board (4-CH)

User's Guide

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1 Introduction

This section contains information about the basic features and applications of the ES1220.1 CAN Board. A block diagram shows the schematic layout of the board.

Note

Some components of the ES1220.1 CAN Board may be damaged or destroyed by electrostatic discharges. Therefore, keep the board in its storage package until it is installed.
The board may only be taken from the storage package, configured and installed at a working place that is protected against static discharges.

1.1 Features

The ES1220.1 CAN Board is for use as a CAN interface in VMEbus systems. The board has a digital signal processor (DSP) working independently from the main processor of the VME system.

The ES1220.1 CAN Board provides you with four CAN channels each having its own CAN controller. Each controller features CAN drivers that are electrically isolated from the VMEbus.

The DSP enables high data rates and short response times to incoming CAN messages.

The 64 kword virtual dual-ported RAM (DPRAM) provides write/read access for both the VME system processor and the DSP. This memory area allows the exchange of programs and data between the DSP and the system processor.

Optionally, the DSP can use an additional 32 kword EPROM for program storage. This memory area can be write-accessed via a JTAG programming interface.

The board has the following features:

- TMS320F206 digital signal processor
- 64 kword virtual dual-ported RAM as program or data memory
- four CAN controllers
- CAN drivers electrically isolated from the VME bus
- clustering several CAN channels on one internal bus
- front panel ports for four CAN channels
- VMEbus interface
- optional 32 kword EPROM for program or data storage

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The following figure shows the front panel and the position of the connectors.

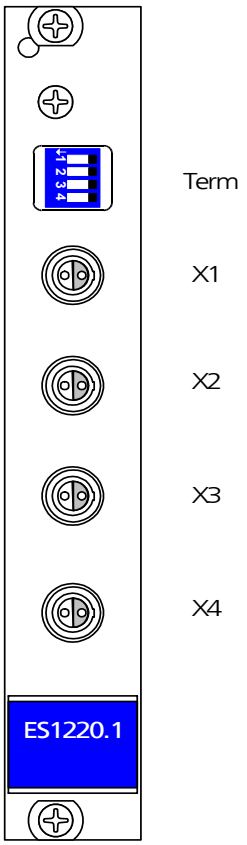


Fig. 1-1 Front Panel

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1.2 Applications

The ES1220.1 CAN Board can be used in VMEbus systems where CAN messages need to be generated and received. The digital signal processor (DSP) allows for flexible message processing independently from the system processor.

Sample applications are:

- simulation of vehicle assemblies with CAN interfaces
- simulation of the vehicle CAN bus
- control of load simulations

1.3 Block Diagram

The following figure shows a block diagram of the ES1220.1 CAN Board.

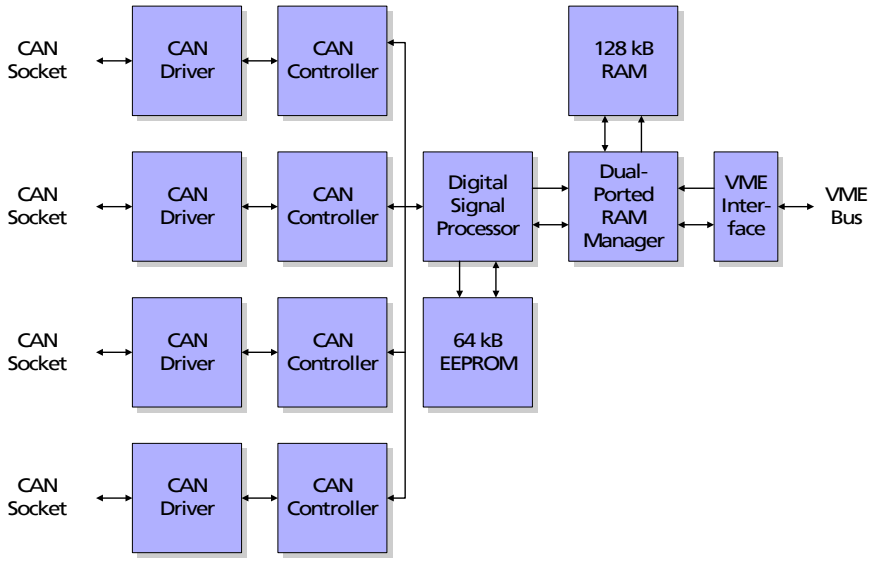


Fig. 1-2 Block Diagram

In the center of the block diagram, you can see the digital signal processor. To the right of the signal processor is the dual-ported RAM manager that allows access to the 128-KB RAM by the DSP and VMEbus. To the left of the DSP, you can see the four CAN controllers and the drivers for the four CAN inputs and outputs.

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2 Hardware

This section contains a detailed functional description, information about the jumpers and solder straps, the pin allocation of the connectors, and the technical data of the board.

2.1 Functional Description

This section gives you a detailed overview of the features of the ES1220.1 CAN Board. You will find information on the following subjects:

- digital signal processor
- virtual dual-ported RAM
- CAN controller
- CAN driver
- VMEbus interface

2.1.1 Digital Signal Processor

The digital signal processor TMS320F206 is used as the CPU of the ES1220.1 CAN Board. The digital signal processor (DSP) can operate independently from the main processor of the VMEbus system. Data are exchanged between the two processors via a virtual dual-ported RAM. The processing performance of the signal processor is 20 MIPS with a word size of 16 bits. The signal processor has an internal 544-word program or data memory.

The signal processor can be started either from an external EPROM or from the dual-ported RAM. This can be selected by jumpers.

2.1.2 Virtual Dual-Ported RAM

The virtual dual-ported RAM is used for the communication between the main processor of the VMEbus system and the digital signal processor. The two processors can access a shared RAM area of 128 KB (64 kwords) via a dual-ported RAM manager. The dual-ported RAM manager prevents address conflicts and prioritizes the access requests.

The dual-ported RAM can be used both for data and program storage. The program of the signal processor can be loaded from the system processor into the dual-ported RAM; it can then be used to start the DSP.

2.1.3 CAN Controller

The four Intel 82527 CAN controllers of the ES1220.1 CAN Board are responsible for the bus arbitration, the generation of control and check bits, and for sending and receiving the messages independently from the DSP. Each CAN controller provides 14 buffers of eight bytes each. The buffers can be config-

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ured either as send or receive buffers. An additional buffer is available for receiving only. The receipt of CAN message in the individual receive buffers can be controlled by filter masks. The CAN controllers provide diagnostic information on various bus errors via a special bit field.

2.1.4 CAN Drivers

The CAN drivers are responsible for the level adaptation for the CAN bus. They are electrically isolated from the VMEbus.

Using jumpers, several CAN channels can be combined to one internal bus already on the board. This way, the board can simulate several bus members simultaneously. The signals of each CAN channel can optionally be passed via jumpers to the corresponding front panel connector, the internal CAN bus, or both to the front panel and the internal bus.

The ES1220.1 CAN Board provides for each CAN channel a switchable termination resistor. This can be used to connect the board either at the end or in the middle of an existing CAN bus.

2.1.5 VMEbus Interface

For the VMEbus, the board has a slave interface with 16 or 24 address lines and 16 data lines. The base address of the board is set via hex switches. The board occupies an address range of 128 KB.

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2.2 Hardware Configuration

This section contains the information regarding the configuration of the jumpers of the ES1220.1 CAN Board. The jumpers are used to configure the following settings:

- VMEbus base address
- boot program source
- internal CAN bus
- bus termination

The figures below show the position of the jumpers on the component sides of the board.

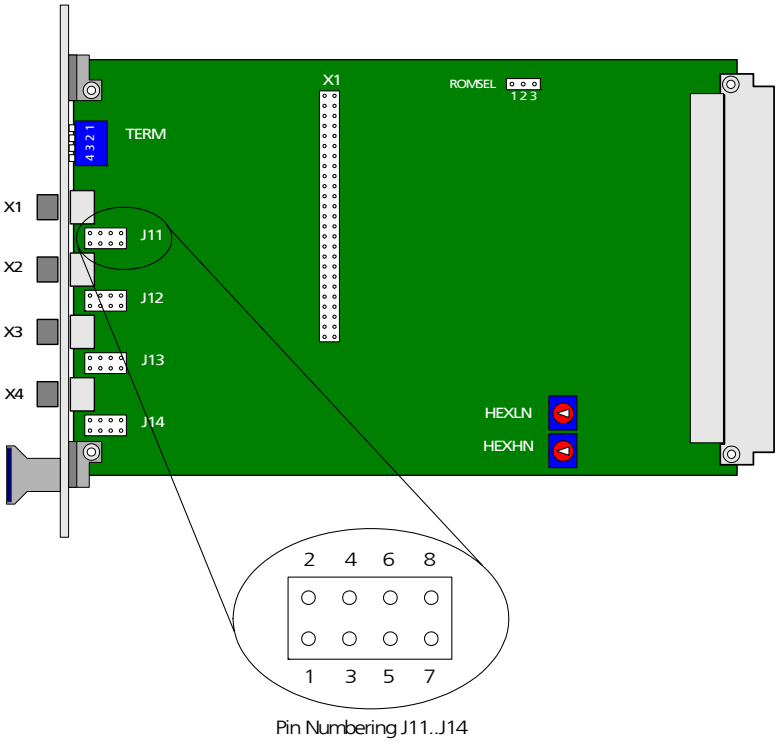


Fig. 2-1 Jumpers (component side)

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2.2.1 Base Address

The base address of the ES1220.1 CAN Board is set via the two hex switches HEXHN and HEXLN.

The board occupies an address range of 128 KB from the base address.

Note

*Make sure that the address range of the ES1220.1 CAN Board does **not** overlap the address ranges of other boards in your system.*

Switch	Address	Default setting
HEXHN	A23 - A20	$F
HEXLN	A19 - A17	$0

2.2.2 Boot Program Source

Use the jumper ROMSEL to select the source of the boot program for the signal processor.

Note

"Boot from ROM" (pin 2 and 3 bridged) may only be set, if the board is equipped with an appropriate piggyback module.
Without an appropriate piggyback module, there is not boot ROM available to the signal processor.

Pin	Description
1-2	Boot from RAM
2-3	Boot from ROM (default)

2.2.3 Internal CAN Bus

Each CAN channel can be connected via jumpers from the CAN controller either to the internal CAN bus, the front panel connector, or both. There are four jumpers per channel for this purpose.

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The following table shows the allocation of the jumper group to each CAN channel.

Group	CAN channel
J11	Channel 1
J12	Channel 2
J13	Channel 3
J14	Channel 4

The following table shows the function of each jumper within the groups. There is one jumper group for each CAN channel (see Fig. 2-1 on page 9).

Note

*Jumper combinations that are **not** mentioned in the table are **not** allowed and result in failures of the board.*

Jumper	Function
1-2 3-4	Connection from CAN driver to front panel port
5-6 7-8	Connection from CAN driver to internal CAN bus
1-2 3-4 5-6 7-8	Connection from CAN driver to front panel port and internal CAN bus

2.2.4 Bus Termination

For each front panel connector, the board provides a 120 Ω termination impedance that can be enabled or disabled using the "TERM" DIL switch located on the front panel.

Switch	left hand position ("ON")	right hand position
1	CAN channel 1	CAN channel 1

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Switch	left hand position ("ON")	right hand position
2	CAN channel 2 not terminated	CAN channel 2 terminated with 120 Ω
3	CAN channel 3 not terminated	CAN channel 3 terminated with 120 Ω
4	CAN channel 4 not terminated	CAN channel 4 terminated with 120 Ω

2.3 Pin Allocation

This section describes the pin allocations of the ES1220.1 CAN Board.

2.3.1 Connectors X1 to X4

The sockets X1 to X4 contain the ports for the CAN channels 1 to 4.

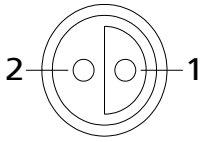


Fig. 2-2 Sockets X1 to X4

Pin	Function	Pin	Function
1	CAN high	2	CAN low

The shields of all 4 inputs are connected - ground has to be provided via the connector cable.

The connectors on the front panel are Lemo EPL.0S.302.HLN, their counterparts are Lemo FFA.0S.302.CLAC.37 (cable diameter 30 - 36 mm), FFA.0S.302.CLAC.44 (cable diameter 35 - 43 mm), or FFA.0S.302.CLAC.50 (cable diameter 44 - 50 mm).

Additional information can be found at http://www.lemo.ch/.

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2.4 Technical Data

This section contains the technical data of the ES1220.1 CAN Board in tabular form.

Digital Signal Processor

Type	TMS32FC206
Cycle time	50 nsec
Word length	16 bits
Program/data storage	544 words internally
EEPROM	32 kwords

CAN Controllers

Number of controllers	4
Type	Intel 82527
Number of input/output buffers	14
Number of input buffers	1
Buffer size	8 bytes
Max. data rate	1 MBaud

CAN Channels

Number of channels	4
Configuration	to front panel connector to internal CAN bus to front panel connector and internal CAN bus
Termination	120 Ω can be added for each front panel connector by DIL switches
Electrical isolation	between VMEbus and CAN driver

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Dual-Ported RAM

Size	64 kwords
Access time	50 nsec 150 nsec with interrupts from VME bus

VMEbus

Type	Slave interface
Address and data lines	24 bits address and 16 bits data
Base address	$000000 to $FE0000 selected by hex switches
Address range	128 KB
Address modifier	Standard or short supervisor/user data

Power Supply

VMEbus mode	5 V DC, ±5 %, max. 700 mA 12 V DC, ±5 %, max. 200 mA

Environmental Conditions

Ambient temperature during operation	0 °C to +70 °C
Storage temperature	-55 °C to +85 °C
Relative humidity	0 to 90 %, no condensation

Connectors

Backplane	96-pin DIN 41612 C
Front panel	four 2-pin Lemo

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Physical Dimensions

Circuit board	100 x 160 mm²
Front panel	Height: 3 U Width: 4 HP (20.3 mm)

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