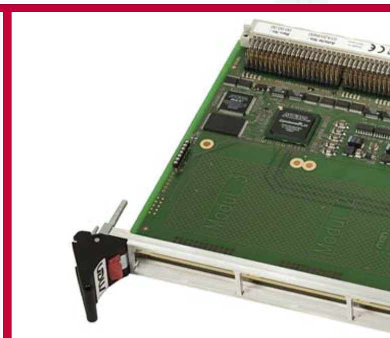
20A203N00 E2 – 2014-01-21

User Manual

A203N - 6U VME64 M-Module™ Carrier Board

Configuration example



A203N - 6U VME64 M-Module™ Carrier Board

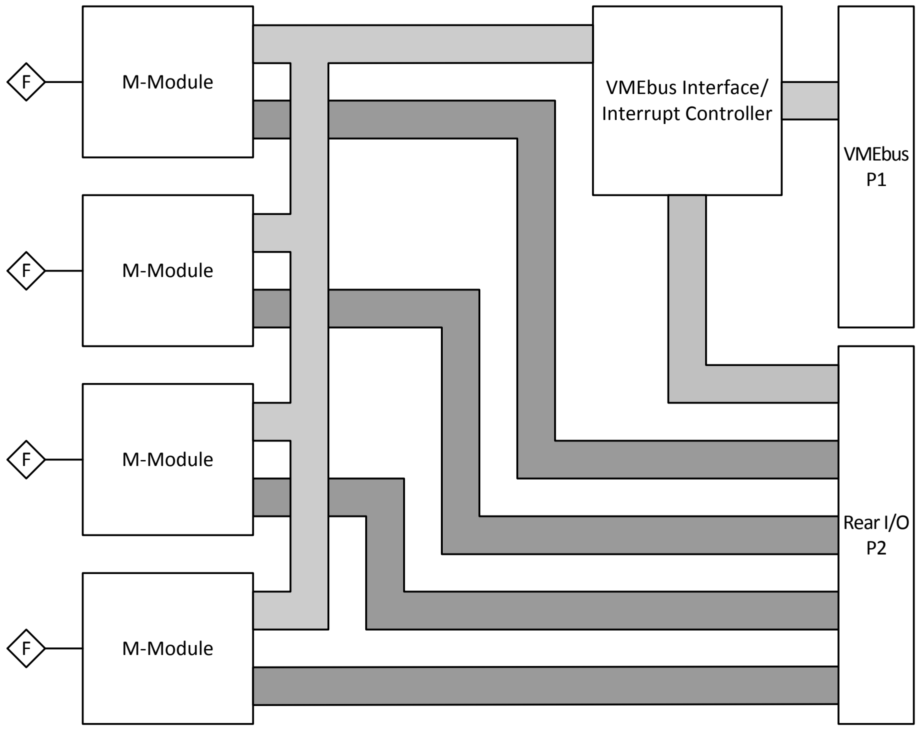
The A203N is an M-Module™ carrier board for universal I/O on the VMEbus, allowing high flexibility in applications such as process and motion control, measurement and instrumentation, communication or special-purpose tasks. The M-Modules™ are screwed tightly on the carrier board, and the board needs only one slot on the VMEbus.

The A203N is a VME64 slave card and supports four D16/D32 M-Modules™ with the signals either at the front or via rear I/O. An interrupt controller handles the M-Modules™ individually.

For rugged requirements the A203N is equipped with a stiffener front panel, allows a standard -40 to +85°C operation temperature and is prepared for conformal coating.

Additionally, the A203N is prepared for DMA transfer support.

Diagram


M-Module
M-Module
M-Module
M-Module
F
F
F
F
VMEbus Interface/
Interrupt Controller
VMEbus
P1
Rear I/O
P2

Technical Data

Mezzanine Slots

- Four M-Module™ slots
- Compliant with M-Module™ standard
- Characteristics: D08, D16, D32, A08, A24, INTA, INTC, TRIGO, TRIGI
- Prepared for DMA16, DMA32
- Prepared for D16 burst, D32 burst

Interrupt Controller

- Interrupt handling individually for each M-Module™

Peripheral Connections

- Via front panel
- Via 160-pin P2 connector (rear I/O)

VMEbus

- Only one slot required on the VMEbus
- Slave
  - D08(EO):D16:D32:A16:A24:A32;BLT, prepared for D16BLT and D32BLT
- Interrupter D08(O):I(7-1)

Electrical Specifications

- Supply voltage/power consumption: +5V (-3%/+5%), typ. 140mA (without M-Modules™)
- MTBF: 274,000h @ 40°C (derived from MIL-HDBK-217F)

Mechanical Specifications

- Dimensions: standard double Eurocard, 233.3mm x 160mm
- Front panel: stiffener panel, aluminum with 2 handles, cut-outs for front connectors of 4 M-Modules™
- Weight: 350g

Environmental Specifications

- Temperature range (operation):
  - -40..+85°C
  - Airflow: min. $10m^3/h$
- Temperature range (storage): -40..+85°C
- Relative humidity range (operation): max. 95% without condensation
- Relative humidity range (storage): max. 95% without condensation
- Altitude: -300m to + 3,000m
- Shock: 15g/11ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/10..150Hz
- Conformal coating on request

Safety

- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

EMC

- Tested according to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst)

Software Support

- M-Module™ drivers for Windows®, VxWorks®, Linux, QNX®, OS-9® as supported
- Basic board driver included in MDIS™ system package for the respective operating system
- For more information on supported operating system versions and drivers see online data sheet.

Product Safety

Electrostatic Discharge (ESD)

Computer boards and components contain electrostatic sensitive devices. Electrostatic discharge (ESD) can damage components. To protect the board and other components against damage from static electricity, you should follow some precautions whenever you work on your computer.

- Power down and unplug your computer system when working on the inside.
- Hold components by the edges and try not to touch the IC chips, leads, or circuitry.
- Use a grounded wrist strap before handling computer components.
- Place components on a grounded antistatic pad or on the bag that came with the component whenever the components are separated from the system.
- Store the board only in its original ESD-protected packaging. Retain the original packaging in case you need to return the board to MEN for repair.

About this Document

This user manual is intended only for system developers and integrators, it is not intended for end users.

It describes the hardware functions of the board, connection of peripheral devices and integration into a system. It also provides additional information for special applications and configurations of the board.

The manual does not include detailed information on individual components (data sheets etc.). A list of literature is given in the appendix.

History

Issue	Comments	Date
E1	First issue	2006-10-19
E2	Changes made to Table 2. Extended address mode	2014-01-21

Conventions

This sign marks important notes or warnings concerning the use of voltages which can lead to serious damage to your health and also cause damage or destruction of the component.

This sign marks important notes or warnings concerning proper functionality of the product described in this document. You should read them in any case.

italics Folder, file and function names are printed in *italics*.

bold **Bold** type is used for emphasis.

`monospace` A `monospaced` font type is used for hexadecimal numbers, listings, C function descriptions or wherever appropriate. Hexadecimal numbers are preceded by "0x".

comment Comments embedded into coding examples are shown in green color.

hyperlink Hyperlinks are printed in blue color.

The globe will show you where hyperlinks lead directly to the Internet, so you can look for the latest information online.

IRQ# /IRQ Signal names followed by "#" or preceded by a slash ("/") indicate that this signal is either active low or that it becomes active at a falling edge.

in/out Signal directions in signal mnemonics tables generally refer to the corresponding board or component, "in" meaning "to the board or component", "out" meaning "coming from it".

Vertical lines on the outer margin signal technical changes to the previous issue of the document.

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Since January 2005 the SMD and manual soldering processes at MEN have already been completely lead-free. Between June 2004 and June 30, 2006 MEN's selected component suppliers have changed delivery to RoHS-compliant parts. During this period any change and status was traceable through the MEN ERP system and the boards gradually became RoHS-compliant.

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The WEEE directive does not apply to fixed industrial plants and tools. The compliance is the responsibility of the company which puts the product on the market, as defined in the directive; components and sub-assemblies are not subject to product compliance.

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Nevertheless, MEN is registered as a manufacturer in Germany. The registration number can be provided on request.

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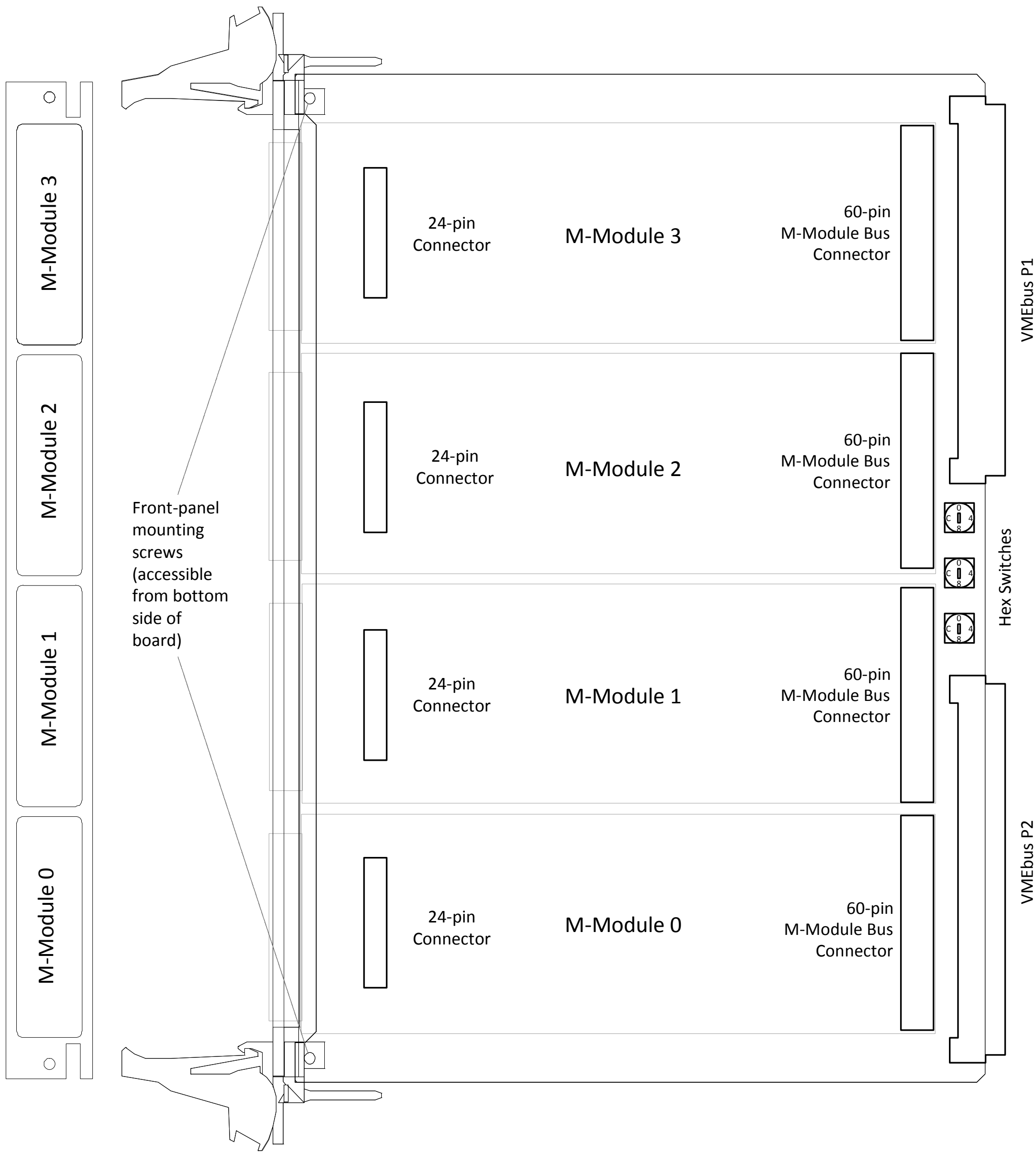
1 Getting Started

This chapter gives an overview of the board and some hints for first installation in a system.

1.1 Map of the Board

Figure 1. Map of the board – front panel and top view



1.2 Integrating the Board into a System

You can use the following hints to install the carrier board into a VMEbus system for the first time and to test proper functioning of the board.

The A203N has an A24/D16/D32 or A16/D16/D32 VMEbus slave interface. If it is required for the board to issue an interrupt via the bus, then the daisy chain must be established through to the A203N.

The carrier board is completely trimmed on delivery. Perform the following procedure without an M-Module installed!

- ☑ Power-down the system.
- ☑ The board is set for A24 accesses, the base address being `0xE00000`. This base address is set using rotary hex switches. It may be necessary to set it to an address with which the master can access the board in A24/D16 mode.
  (If you have to change the base address, please refer to Chapter 3.2.1.1 Setting the Base Address on page 20.)
- ☑ Insert the A203N into your VMEbus system, making sure that the VMEbus connectors are properly aligned.
- ☑ Power-up the system.
- ☑ After power-up, load a suitable debugger.
- ☑ First, attempt to perform a read-word access to the base address plus `0x100`, (i.e. `0xE00100` if the base address was not altered).
  With 32-bit masters it may be necessary to load a register on the master board to set the access mode. In any case you should be aware of the contents of the high-order byte of the 32-bit address. For instance, access may require using address `0xFFE00100` or `0xFCE00100` or any other address (depends on the master board).
- ☑ If a bus error occurs while you are attempting to read, check if the base address is set correctly and whether it is possible for the master to access the VMEbus at all at the selected address and using the correct mode. Then try again.
- ☑ Now attempt to perform a word access to the base address plus `0x102`. Again, no bus error should occur. Write accesses to this memory location should be successful for the right half of the word. For instance, if `0x55` is written to the register it should be possible to read `0xxx55`.
- ☑ You must have completed this test successfully before you begin to integrate an M-Module into the system (see Chapter 1.3 Installing M-Modules on page 15 and description in the respective M-Module user manual).

Note: Interrupts cannot be tested in this simple fashion.

1.3 Installing M-Modules

Perform the following steps to install an M-Module:

☑ Loosen the two front-panel mounting screws at the solder side of the A203N and remove the whole front panel (see Figure 1, Map of the board – front panel and top view, on page 13).

☑ Hold the M-Module over the target slot of the A203N with the component sides facing each other.

☑ Align the 24-pin and 60-pin connectors of the M-Module and carrier board.

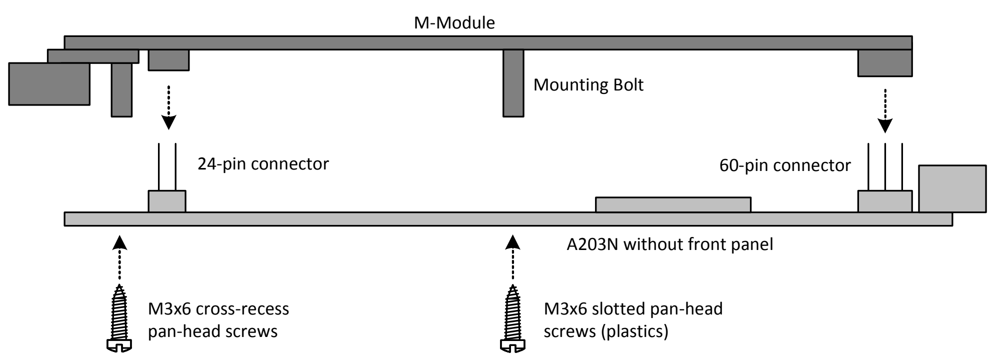
☑ Press the M-Module carefully but firmly on the A203N, making sure that the connectors are properly linked.

☑ Turn the A203N upside down and use four M-Module mounting screws to fasten the M-Module on the solder side of the A203N.

☑ Re-install the front panel of the A203N.

Note: You can order suitable mounting screws from MEN, see MEN's website. In any case, use only the screw types specified in the following figure!

Note: Older M-Modules with a solder side cover may collide with the front panel. If you have any problems, please contact MEN's technical support: support@men.de.



1.4 Installing Driver Software

For a detailed description on how to install driver software please refer to the respective documentation.

You can find any driver software available for download on MEN's website.

2 Address Organization

The A203N can be accessed via VMEbus in A16, A24 or A32 mode. The address windows provide access to internal registers and the M-Module address spaces.

Note: The registers underlaid in gray in the table below exist once but can be accessed at more than one address

Table 1. Address map for normal mode (A16 and A24)

Offset Address	Function	M-Module	VMEbus Data Access Type
0x000.. 0x0FF	M-Module Access A08/D16/D32	0	Depending on M-Module: D08, D16, D32
0x101	M-Module Interrupt Control Register	0	D08, D16
0x103	M-Module Interrupt Vector Register	0	D08, D16
0x107	reserved	0	
0x181	Trigger Data Register	-	D08, D16
0x183	Trigger Direction Register	-	D08, D16
0x203	reserved	0	
0x280.. 0x28B	reserved	0	
0x290.. 0x29B	reserved	0	
0x301	Revision	-	D08, D16
0x303	A32 Slave Address Compare Register	-	D08, D16
0x381	Temperature Sensor Register	-	D08, D16
0x3A0	Flash Address Register	0	D08, D16, D32
0x3A4	Flash Data Register	0	
0x400.. 0x4FF	M-Module Access A08/D16/D32	1	Depending on M-Module: D08, D16, D32
0x501	M-Module Interrupt Control Register	1	D08, D16
0x503	M-Module Interrupt Vector Register	1	D08, D16
0x507	reserved	1	
0x581	Trigger Data Register	-	D08, D16
0x583	Trigger Direction Register	-	D08, D16
0x603	reserved	1	

Offset Address	Function	M-Module	VMEbus Data Access Type
0x680.. 0x68B	reserved	1	
0x690.. 0x69B	reserved	1	
0x701	Revision	-	D08, D16
0x703	A32 Slave Address Compare Register	-	D08, D16
0x781	Temperature Sensor Register	-	D08, D16
0x7A0	Flash Address Register	0	D08, D16, D32
0x7A4	Flash Data Register	0	D08, D16, D32
0x800.. 0x8FF	M-Module Access A08/D16/D32	2	Depending on M-Module: D08, D16, D32
0x901	M-Module Interrupt Control Register	2	D08, D16
0x903	M-Module Interrupt Vector Register	2	D08, D16
0x907	reserved	2	
0x981	Trigger Data Register	-	D08, D16
0x983	Trigger Direction Register	-	D08, D16
0xA03	reserved	2	
0xA80.. 0xA8B	reserved	2	
0xA90.. 0xA9B	reserved	2	
0xB01	Revision	-	D08, D16
0xB03	A32 Slave Address Compare Register	-	D08, D16
0xB81	Temperature Sensor Register	-	D08, D16
0xBA0	Flash Address Register	0	D08, D16, D32
0xBA4	Flash Data Register	0	D08, D16, D32
0xC00.. 0xCFF	M-Module Access A08/D16/D32	3	Depending on M-Module: D08, D16, D32
0xD01	M-Module Interrupt Control Register	3	D08, D16
0xD03	M-Module Interrupt Vector Register	3	D08, D16
0xD07	reserved	3	

Offset Address	Function	M-Module	VMEbus Data Access Type
0xD81	Trigger Data Register	-	D08, D16
0xD83	Trigger Direction Register	-	D08, D16
0xE03	reserved	3	
0xE80.. 0xE8B	reserved	3	
0xE90.. 0xE9B	reserved	3	
0xF01	Revision	-	D08, D16
0xF03	A32 Slave Address Compare Register	-	D08, D16
0xF81	Temperature Sensor Register	-	D08, D16
0xFA0	Flash Address Register	0	D08, D16, D32
0xFA4	Flash Data Register	0	D08, D16, D32

The base address for the above table is set using rotary hex switches. Depending on a jumper you can access the A08 address area of the M-Modules from the VMEbus in A16 (short) or A24 (standard) mode. The A203N supports A24 accesses to the M-Modules.

For the four modules a memory area of 0x4000000 bytes is necessary – this large area can be addressed from the VMEbus in A32 mode. The base address can be loaded by software into a register so that no additional hex switch is needed to set it. In extended address mode the following mapping is valid:

Table 2. *Extended address mode (VMEbus A32)*

Offset Address	Function	M-Module	VMEbus Data Access Type
0x0000000.. 0x0FFFFFF	M-Module Access A24/D16/D32	0	Depending on M-Module: D08, D16, D32
0x1000000.. 0x1FFFFFF	M-Module Access A24/D16/D32	1	Depending on M-Module: D08, D16, D32
0x2000000.. 0x2FFFFFF	M-Module Access A24/D16/D32	2	Depending on M-Module: D08, D16, D32
0x3000000.. 0x3FFFFFF	M-Module Access A24/D16/D32	3	Depending on M-Module: D08, D16, D32

3 Functional Description

3.1 Power Supply

Power supply to the logic part is done via the VMEbus connector P1. The necessary voltage is +5V.

For power supply to the logic part the necessary voltages are 3.3V and 1.2V.

3.2 VMEbus Interface

3.2.1 Slave Interface

In short (A16) and standard (A24) mode the A203N occupies an address space of 0x1000 bytes on the VMEbus . These 0x1000 bytes are divided into 4 identical parts. Each 0x400 byte part is assigned to one M-Module slot. 0x100 bytes are used for addressing the module in A08 mode. The remaining 0x300 bytes for each module slot are used to address the interrupt controller. This means that each M-Module on the A203N has the same address mapping. This greatly facilitates writing software since it is only necessary to take into account the base address of the module, and not the base address of the base board as well. Each module has its own interrupt vector register and its own control register.

In extended mode (A32) the A203N occupies an address space of 0x4000000 bytes on the VMEbus .

The VMEbus interface supports the following features:

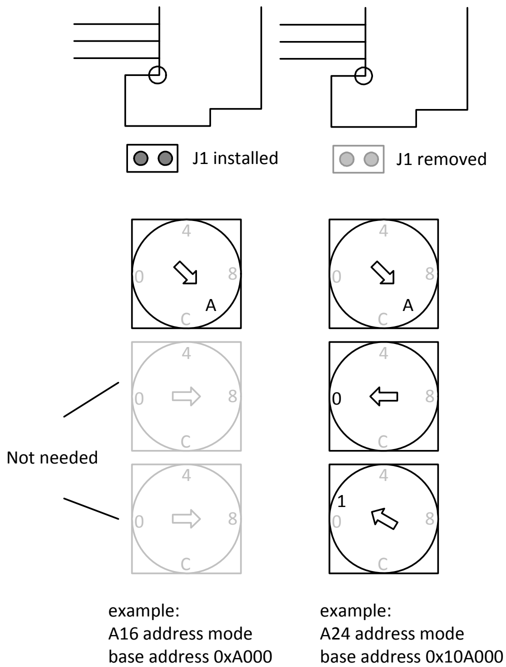
- Slave: A32, A24, A16, D32, D16, D08(EO), D16BLT, D32BLT, D64BLT
- 7-level D08 (O) interrupter, mechanism ROAK and RORA

Note: The board is prepared for DMA accesses.

3.2.1.1 Setting the Base Address

In A16 or A24 VMEbus mode the A203N occupies an area of `0x1000` bytes in the address space. The base address is set using one (A16 mode) or three (A24 mode) rotary hex switches. A jumper defines whether the board is operated in A16 or in A24 mode.

Figure 2. *Address selection using rotary hex switches*



In the A32 address space the board occupies `0x4000000` bytes. In this case the base address is set through software by accessing the A32 Slave Address Compare Register. After reset no access is possible in A32 mode first.

3.2.1.2 Address Modifiers

The VMEbus has 6 address modifier lines. These lines allow the master to transfer additional binary information to the slave during a data transfer cycle. The lines are used to divide the address space of the VMEbus into several classes. The following codes are permitted for the A203N:

Table 3. *Address modifier codes permitted on A203N*

HEX Code	AM						Function	Comment
	5	4	3	2	1	0		
0x29, 0x2D	H	L	H	X	L	H	Short supervisory and non-privileged data access	J1 installed
0x39, 0x3B, 0x3D, 0x3F	H	H	H	X	L	H	Standard supervisory and non-privileged data access	J1 removed
0x09, 0x0B, 0x0D, 0x0F	H	L	H	X	X	H	Extended supervisory and nonprivileged data access, block transfer	Enabled through software (write access to A32-BASE enables A32)

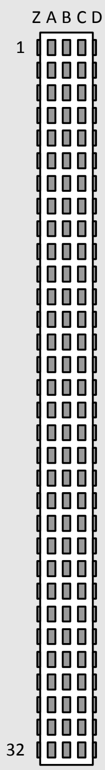
3.2.2 VMEbus Connectors P1 and P2

Connector types:

- 160-pin, 5-row plug, performance level according to DIN41612, part 5
- Mating connector:
  160-pin, 5-row receptacle, performance level according to DIN41612, part 5

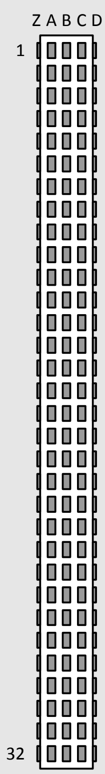
The pin assignment of P1 conforms to the VME64 specification VITA 1-1994 and VME64 Extensions Draft Standard VITA 1.1-199x.

Table 4. *Pin assignment of VME64 connector P1*



	Z	A	B	C	D
1	-	D0	/BBSY	D8	-
2	GND	D1	-	D9	GND
3	-	D2	-	D10	-
4	GND	D3	-	D11	-
5	-	D4	-	D12	-
6	GND	D5	-	D13	-
7	-	D6	-	D14	-
8	GND	D7	-	D15	-
9	-	GND	-	GND	-
10	GND	SYSCLK	/BG3IN	/SYSFAIL	-
11	-	GND	/BG3OUT	/BERR	-
12	GND	/DS1	/BR0	/SYSRESET	-
13	-	/DS0	/BR1	/LWORD	-
14	GND	/WRITE	/BR2	AM5	-
15	-	GND	/BR3	A23	-
16	GND	/DTACK	AM0	A22	-
17	-	GND	AM1	A21	-
18	GND	/AS	AM2	A20	-
19	-	GND	AM3	A19	-
20	GND	/IACK	GND	A18	-
21	-	/IACKIN	-	A17	-
22	GND	/IACKOUT	-	A16	-
23	-	AM4	GND	A15	-
24	GND	A7	/IRQ7	A14	-
25	-	A6	/IRQ6	A13	-
26	GND	A5	/IRQ5	A12	-
27	-	A4	/IRQ4	A11	-
28	GND	A3	/IRQ3	A10	-
29	-	A2	/IRQ2	A9	-
30	GND	A1	/IRQ1	A8	-
31	-	-12V	-	+12V	-
32	GND	+5V	+5V	+5V	-

Table 5. *Pin assignment of VME64 connector P2*



	Z	A	B	C	D
1	-	MOD2-2	+5V	MOD2-1	MOD3-1
2	GND	MOD2-4	GND	MOD2-3	MOD3-2
3	-	MOD2-6	-	MOD2-5	MOD3-3
4	GND	MOD2-8	A24	MOD2-7	MOD3-4
5	MOD2-22	MOD2-10	A25	MOD2-9	MOD3-5
6	GND	MOD2-12	A26	MOD2-11	MOD3-6
7	MOD2-23	MOD2-14	A27	MOD2-13	MOD3-7
8	GND	MOD2-16	A28	MOD2-15	MOD3-8
9	MOD2-24	MOD2-18	A29	MOD2-17	MOD3-9
10	GND	MOD2-20	A30	MOD2-19	MOD3-10
11	-	MOD1-1	A31	MOD2-21	MOD3-11
12	GND	MOD1-3	GND	MOD1-2	MOD3-12
13	-	MOD1-5	+5V	MOD1-4	MOD3-13
14	GND	MOD1-7	D16	MOD1-6	MOD3-14
15	-	MOD1-9	D17	MOD1-8	MOD3-15
16	GND	MOD1-11	D18	MOD1-10	MOD3-16
17	MOD1-22	MOD1-13	D19	MOD1-12	MOD3-17
18	GND	MOD1-15	D20	MOD1-14	MOD3-18
19	MOD1-23	MOD1-17	D21	MOD1-16	MOD3-19
20	GND	MOD1-19	D22	MOD1-18	MOD3-20
21	MOD1-24	MOD1-21	D23	MOD1-20	MOD3-21
22	GND	MOD0-2	GND	MOD0-1	MOD3-22
23	-	MOD0-4	D24	MOD0-3	MOD3-23
24	GND	MOD0-6	D25	MOD0-5	MOD3-24
25	-	MOD0-8	D26	MOD0-7	-
26	GND	MOD0-10	D27	MOD0-9	-
27	-	MOD0-12	D28	MOD0-11	-
28	GND	MOD0-14	D29	MOD0-13	-
29	MOD0-23	MOD0-16	D30	MOD0-15	-
30	GND	MOD0-18	D31	MOD0-17	+5V
31	MOD0-24	MOD0-20	GND	MOD0-19	GND
32	GND	MOD0-22	+5V	MOD0-21	-

Table 6. *Signal mnemonics of VMEbus connector P2*

Signal	Direction	Function
+5V	-	+5V power supply
GND	-	Digital ground
A[31:24]	in	VME64 address lines
D[31:16]	in/out	VME64 data lines
MODy-xx	in/out	Signal *xx* from M-Module y 24-pin rear I/O connector

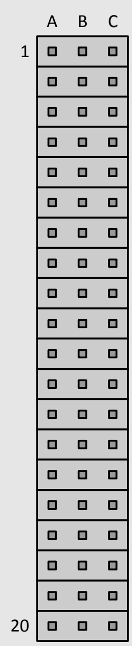
3.3 M-Module Interfaces

A total of four M-Modules can be installed on the A203N. Peripheral equipment may be connected at the front using the M-Module's front connector or at the rear using the carrier board's second VMEbus connector (P2).

3.3.1 M-Module Connector

The signals from the base board are fed to the module via a 60-pin plug connector. This plug connector corresponds to the three-row receptacle connector on the module. However, the A203N also supports M-Modules with two-row 40-pin connectors.

Table 7. *Pin assignment of the 60-pin plug connectors*



	A	B	C
1	/CS	GND	/AS
2	A01	+5V	D16
3	A02	+12V	D17
4	A03	-12V	D18
5	A04	GND	D19
6	A05	/DREQ	D20
7	A06	/DACK	D21
8	A07	GND	D22
9	D08/A16	D00/A08	TRIGA
10	D09/A17	D01/A09	TRIGB
11	D10/A18	D02/A10	D23
12	D11/A19	D03/A11	D24
13	D12/A20	D04/A12	D25
14	D13/A21	D05/A13	D26
15	D14/A22	D06/A14	D27
16	D15/A23	D07/A15	D28
17	/DS1	/DS0	D29
18	/DTACK	/WRITE	D30
19	/IACK	/IRQ	D31
20	/RESET	SYSCLK	/DS2

Connector types:

- Three 20-pin plugs, 2.54mm pitch, square pins ∅ 0.635mm gold
- Mating connector:
  Three 20-pin receptacles, high-precision, 2.54mm pitch, for square pins ∅ 0.635mm gold, 6.9mm height

3.3.2 M-Module Access

The VMEbus slave interface of the A203N allows access to the M-Modules in A08 and A24 M-Module address space.

The M-Module address space (A08 or A24) which will be accessed is determined by the VMEbus address modifiers. If you do an access from the VMEbus in A16 (short) or A24 (standard) mode, the M-Module is accessed in the A08 M-Module address space. The A32 mode (extended) of the VMEbus results in an A24 access to the M-Module. Block transfers from the VMEbus are converted to D16/D32 single cycles to the M-Module. VMEbus 256-byte boundary crossing is not supported.

The base address for short and standard mode is set using rotary hex switches as described above. The base address for extended access is programmed in a register.

A32 Base Address Register (`0x303, 0x703, 0xB03, 0xF03`) (read/write)

15..8	7..4	3..0
-	BASE32	reserved

Default Value: 0x0000

BASE32 Base address for A32 slave window (A31..A28)

- All combinations are supported

The A32 mode can be activated by a write access and cannot be de-activated by a write access but only by reset.

The base address *base* of an M-Module is calculated by the formula

$$base = A203Nbase + modslot \cdot 0x1000000$$

base M-Module base address
A203Nbase Base address of A203N
modslot M-Module slot number on A203N

For every module in A24 mode an address space of 16MB is provided.

The M-Module interface supports the following features:

- 4 M-Module Slots
- MA interface
- A08, A24
- D08, D16, D32
- INTA, INTC
- Prepared for DMA16, DMA32
- TRIGO, TRIGI
- Prepared for D16 burst, D32 burst

3.4 Interrupt Controller

The interrupter has been implemented using a glue logic chip. This chip handles local interrupt sources with the VMEbus. It supports all signals used for the VMEbus interrupt protocol. Interrupt vectors from the local source of the interrupt can be passed on, and the chip also provides the capability of passing a preprogrammed vector. Eight internal registers (four status registers and four vector registers) are provided for general use.

The A203N supports all interrupt lines IRQ1 to IRQ7.

3.4.1 Interrupt Registers

The interrupt controller contains 12 programmable write-read registers. The four control registers control the activity of the chip, the other eight are the vector registers, which contain the vector information for the IACK cycle. A set of three registers is allocated to each module.

Interrupt Control Register (`0x101, 0x501, 0x901, 0xD01`) (read/write)

15..8	7	6	5	4	3	2	1	0
-	IPEND	-	X/IN	IRE	IRAC	IRQ_LEVEL		

Default Value: 0x0000

IPEND Pending interrupt from M-Module
This bit is set if the M-Module generates the interrupt. The bit must be cleared by writing '1' to the register during the interrupt service routine to release the corresponding interrupt line on the VMEbus.

- 0 = No interrupt generated
- 1 = M-Module interrupt generated

X/IN External/internal IACK cycle

- 0 = Interrupt ID vector from interrupt vector register will be used for VME IACK cycle
- 1 = VME IACK cycle will be routed to M-Module IACK cycle

IRE Interrupt enable
This bit must be '1' to allow an interrupt to be generated at all. If this bit is '0', no interrupt is triggered on the VMEbus – even though an interrupt from the module is pending.

- 0 = Interrupt disabled
- 1 = Interrupt enabled (activates interrupt line on VMEbus on interrupt level when IPEND = 1)

IRAC Interrupt enable auto clear

- 0 = IRE bit remains unchanged
- 1 = Clears IRE bit upon IACK cycle independent of X/IN (Interrupt request from M-Module and IPEND bit must be cleared additionally to prepare for the next interrupt)

IRQ_LEVEL Interrupt level on VME bus (no other levels are supported)
001 = IRQ Level 1
010 = IRQ Level 2
011 = IRQ Level 3
100 = IRQ Level 4
101 = IRQ Level 5
110 = IRQ Level 6
111 = IRQ Level 7

Interrupt Vector Register (0x103, 0x503, 0x903, 0xD03) (read/write)

15..8	7..0
-	IRQ_ID

Default Value: 0x0000

IRQ_ID Interrupt ID vectors
If the X/IN bit is '0', this vector is generated at D0..D7 during the IACK cycle for the M-Module.
- All combinations are supported

3.5 Trigger Logic

The A203N supports both M-Module trigger lines (TRIGA and TRIGB). The trigger lines are connected in parallel to all modules, i.e. all TRIGA lines are interconnected and all TRIGB lines are interconnected.

There is a direction and a data register, which can be accessed in every module address area.

If you program a line as an output, you can set the state in the data register and reread it. If a line is programmed as an input in the direction register, you read the level of the line in the data register.

Trigger Data Register (`0x181, 0x581, 0x981, 0xD81`) (read/write)

15..8	7..2	1	0
-	-	TRIGB_DAT	TRIGA_DAT

Trigger Direction Register (`0x183, 0x583, 0x983, 0xD83`) (read/write)

15..8	7..2	1	0
-	-	TRIGB_DIR	TRIGA_DIR

TRIGB_DIR Trigger B direction
0 = Input (default value)
1 = Output

TRIGA_DIR Trigger A direction
0 = Input (default value)
1 = Output

3.6 Revision Register

The revision register shows the revision of the FPGA file.

Revision register (`0x301, 0x701, 0xB01, 0xF01`) (read)

15..8	7..0
	REVISION

Default Value: 0x0000

REVISION Revision of the FPGA file
0 = Prototype

3.7 Temperature Sensor

The A203N provides an optional temperature sensor for in-system diagnostics. The LM75 is connected via two-wire I²C interfaces.
The temperature accuracy is -25°C to 100°C ±2°C(max) and -55°C to 125°C ±3°C(max).
The register is accessible in every M-Module address block, but implemented only once. The protocol has to be done by software.

Temperature Sensor Register (`0x381, 0x781, 0xB81, 0xF81`) (read/ write)

15..8	7..3	2	1	0
-	-	OT	SDA	SCL

Default Value: 0x00

OT Overtemperature (active low)

SDA I²C open collector data line
Read Level of SDA pin will be read
Write 0 SDA will be driven to GND
Write 1 SDA will be input (external pull up)

SCL I²C clock

3.8 FPGA Configuration

The onboard glue logic will be loaded by accessing a flash memory. A load PLD will be used to control the Flash accesses. A flash update may be carried out through the VMEbus interface. The command sequence must be done by software.

Flash Address Register (0x3A0, 0x7A0, 0xBA0, 0xFA0) (read/write)

31	30	29..0
RELOAD	DATA_ WIDTH	FLASH_ADDR

Default Value: 0x40000000

RELOAD Directs the load PLD to reload the FPGA
- 0 = Idle
- 1 = Start reload

DATA_WIDTH Flash Data Width
- 0 = 8 bits
- 1 = 16 bits

FLASH_ADDR Flash Address

Flash Data Register (0x3A4, 0x7A4, 0xBA4, 0xFA4) (read/write)

15..8	7..3
High Byte	Low Byte

Default Value: 0x0000

Low byte Active part of data register when DATA_WIDTH = 0

High and low byte Active part of data register when DATA_WIDTH = 1

4 Appendix

4.1 Literature and Web Resources

- A203N data sheet with up-to-date information and documentation:
  www.men.de
- VMEbus General:
  - The VMEbus Specification, 1989
  - The VMEbus Handbook, Wade D. Peterson, 1989

  VMEbus International Trade Association
  www.vita.com
- M-Module Standard:
  ANSI/VITA 12-1996, M-Module Specification;
  VMEbus International Trade Association
  www.vita.com