The Embedded I/O Company

TVME220

4 Slot IndustryPack® VMEbus Carrier

Version 1.1

User Manual

Issue 1.1.1

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TVME220-10R

4 Slot IndustryPack VMEbus Carrier, Back I/O and EMI front panel

Style Conventions

Hexadecimal characters are specified with prefix 0x, i.e. 0x029E (that means hexadecimal value 029E).

For signals on hardware products, an ‚Active Low' is represented by the signal name with # following, i.e. IP_RESET#.

Access terms are described as:

W	Write Only
R	Read Only
R/W	Read/Write
R/C	Read/Clear
R/S	Read/Set

Issue	Description	Date
1.0	First Issue	April 2002
1.1	Additions to Technical Specification	August 2002
1.2	Value correction	October 2002
1.3	Function added to switch S3	September 2004
1.4	Clarification of Interrupt Mapping	November 2004
1.5	Update Technical Specification	April 2005
1.6	New address TEWS LLC	September 2006
1.1.0	New Issue notation	January 2009
1.1.1	General Revision	January 2018

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1 Product Description

The TVME220 is a 6U VMEbus carrier for up to 4 single-size or two double-size IndustryPack (IP) modules. It provides modular, flexible and cost effective I/O solutions for all kinds of applications like process control, medical systems, telecommunication and traffic control.

The TVME220 uses VME64x-compliant connectors to increase the quantity of rear I/O connections beyond that of standard VME. All of the 200 I/O lines from the 4 IP slots are available at the VME64x connectors P0 and P2. The I/O mapping is compliant to the ANSI/VITA 4.1-1996 standard.

Although the rear connectors are VME64x, the electrical interface is standard VME, so that nearly all CPU products still have full access to the IP modules mounted on the TVME220.

Status indicators for IP access, +5V and +/-12V are provided in the EMI shielded front panel.

A set of 16-position rotary switches allows easy configuration of VME Short I/O and Memory addresses. Interrupt routing from the IP slots to the VME IRQ's can be done in two ways: programmable by software or selection of predefined sets by a rotary switch.

The IP power lines are fuse protected by self healing fuses and RF filtered. The operating temperature range is -40°C and +85°C.

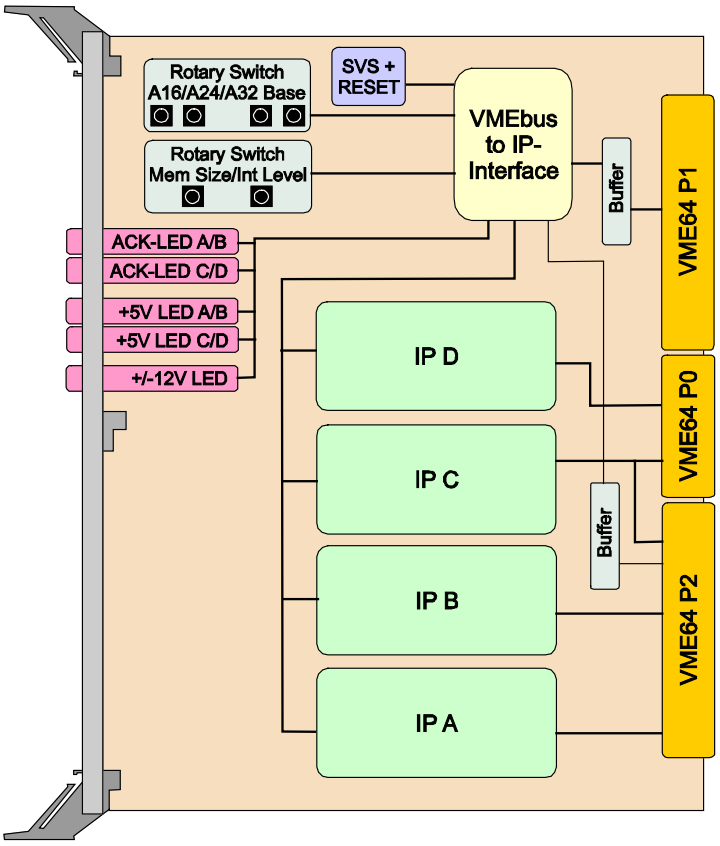


Figure 1-1 : Block Diagram TVME220

Two Transition Modules, TVME001-TM-10R and TVME002-TM-10R are available for easy access to all IP I/O lines.

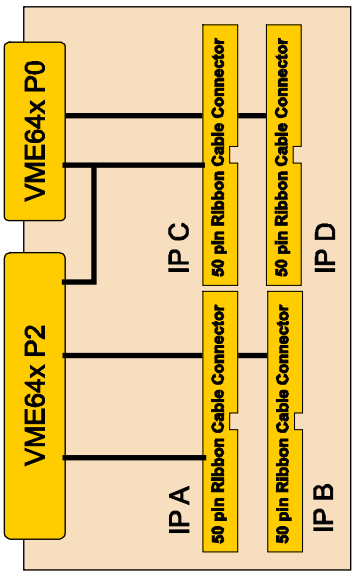


Figure 1-2 : Block Diagram TVME001-TM-10R

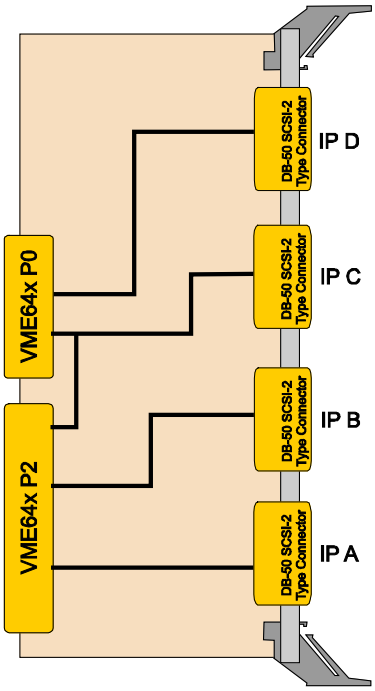


Figure 1-3 : Block Diagram TVME002-TM-10R

2 Technical Specification

VMEbus Slave Interface	VME64 (ANSI/VITA 1-1994) and VME64x (ANSI/VITA 1.1-1997) compliant slave interface
Short I/O	VME A16, D08/16, Address Modifier: 29, 2D Size: 1 Kbytes (256 Bytes / IP)
Standard Memory	VME A24, D08/16, Address Modifier: 39, 3A, 3D, 3E Size: programmable from 32 Kbytes to 2 Mbytes per IP
Extended Memory	VME A32, D08/16, Address Modifier: 09, 0A, 0D, 0E Size: fixed, 8 Mbytes per IP
Interrupts	VME IRQ1-7
IP Interface	ANSI/VITA 4-1995 compliant interface to IndustryPack modules
IP Slots	Four single sized or two double sized IP slots with back I/O
Mapping of IP Interrupts to VMEbus	Programmable by software or selection of predefined sets by a rotary switch
I/O access	ANSI/VITA 4.1-1996 compliant mapping of IP I/O lines to VME64x connectors P0 and P2
DMA **32 MHz** **32 Bit**	Not supported Not supported Not supported
Status LEDs	ACK LED for each IP Slot +5V Power LED for each IP Slot +12V and –12V Power LED
Protection	Self healing fuses and RF-filtering on all IP power lines
Operating Data	
Power Requirements without IP Modules	350mA @ +5V DC 1mA typical@ +12V DC 1mA typical@-12V DC
	Additional Power is required by IP modules
Temperature Range	Operating: – 40°C to + 85°C Storage: – 40°C to + 85°C
MTBF	382000 h MTBF values shown are based on calculation according to MIL-HDBK-217F and MIL-HDBK-217F Notice 2; Environment: G_B 20°C. The MTBF calculation is based on component FIT rates provided by the component suppliers. If FIT rates are not available, MIL-HDBK-217F and MIL-HDBK-217F Notice 2 formulas are used for FIT rate calculation
Weight	310 g
Size	Singe Size 6U Euro Card
Humidity	5 – 95 % non-condensing

Table 2-1 : Technical Specification

3 Configuration

All required configuration of the TVME220 can be done by setting 6 rotary switches. Position of the switches is shown below:

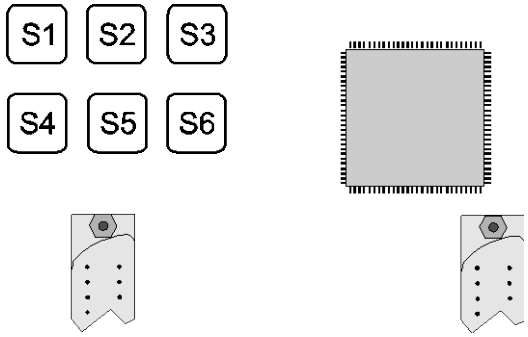


Figure 3-1 : Rotary Switch S1 – S6

Step	Rotary Switch	Function	Default Value
1	S1 / S2	VME A16 Base Address	0x6000
2	S3	Interrupt Mapping	VIPC6xx compatible
3	S4	VME A24/A32 Memory Enable and Memory Size	Disabled
4	S5 / S6	VME A24/A32 Memory Base Address	A24: 0xD00000 A32: 0xD0000000

Table 3-1 : Configuration Steps TVME220

3.1 VME A16 Base Address

The VME A16 Base Address of the TVME220 is set by rotary switch S1 and S2.

Rotary switch S1 configures A[15:12] of the VME A16 Base Address.

Rotary switch S2 configures A[11:10] of the VME A16 Base Address.

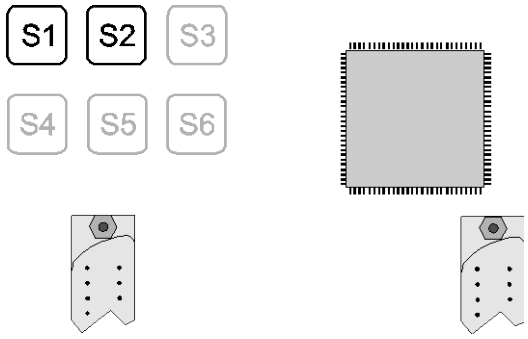
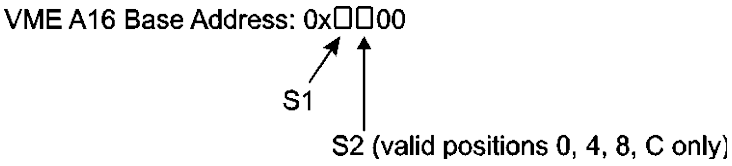


Figure 3-2 : VME A16 Base Address



The default value for the VME A16 Base Address is 0x6000 (S1=6, S2=0).

The TVME220 requires an address space of 1 Kbytes within the VME A16 address space. Each of the four IP slots occupies 256 bytes within this 1 Kbytes VME A16 address space.

The address space for each IP is divided into the following areas: IP I/O space, IP ID space and the IP IRQ and Control Register.

The IP I/O space has a size of 128 bytes. The size of the IP ID space and the IP IRQ and Control Register depends on the position of switch S3:

With S3 = “0” to “7”, the IP IRQ and Control Registers of the TVME220 are accessible, and the size of the IP ID space is 64 bytes. The remaining 64 bytes are occupied by the IP IRQ and Control Registers. If switch S3 = “8” to “F”, the IP IRQ and Control Registers of the TVME220 are not accessible, and the corresponding address range is added to the IP ID space, resulting in a size of 128 bytes for the IP ID space with S3 = “8” to “F”. This configuration is necessary for IP modules that require access to the ID Space above the ID PROM.

See figures below for more details.

VME A16 Base Address	Description	Default
+ 0x0000	I/O Space IP A	0x6000
+ 0x0080	ID Space IP A	0x6080
+ 0x00C0	IRQ and Control Register IP A	0x60C0
+ 0x0100	I/O Space IP B	0x6100
+ 0x0180	ID Space IP B	0x6180
+ 0x01C0	IRQ and Control Register IP B	0x61C0
+ 0x0200	I/O Space IP C	0x6200
+ 0x0280	ID Space IP C	0x6280
+ 0x02C0	IRQ and Control Register IP C	0x62C0
+ 0x0300	I/O Space IP D	0x6300
+ 0x0380	ID Space IP D	0x6380
+ 0x03C0	IRQ and Control Register IP D	0x63C0

Table 3-2 : VME A16 Address Map (S3 = “0” to “7”)

VME A16 Base Address	Description	Default
+ 0x0000	I/O Space IP A	0x6000
+ 0x0080	ID Space IP A	0x6080
+ 0x0100	I/O Space IP B	0x6100
+ 0x0180	ID Space IP B	0x6180
+ 0x0200	I/O Space IP C	0x6200
+ 0x0280	ID Space IP C	0x6280
+ 0x0300	I/O Space IP D	0x6300
+ 0x0380	ID Space IP D	0x6380

Table 3-3 : VME A16 Address Map (S3 = “8” to “F”)

3.2 Interrupts

Each IndustryPack can generate interrupts on two interrupt request lines (INT0 and INT1). The VMEbus offers seven interrupt request levels. IRQ7 has the highest priority, IRQ1 has the lowest priority.

IP interrupt requests can be mapped to any of the 7 VME interrupt request levels. Interrupt routing from the IP slots to the VME IRQs can be done by selection of predefined sets with a rotary switch or programmable by software if S3 is in the range of “0” to “7”.

For more information about fully programmable interrupt mapping please refer to chapter “IP IRQ and Control Register”.

Rotary switch S3 can be used to select predefined sets of mapping of the eight IP interrupt requests (two requests per IP slot) to the seven VME interrupt request levels. The mapping selected with S3 = “0” to “7” is mirrored at S3 = “8” to “F”. The difference is that access to the IP IRQ and Control Registers of the TVME220 is only possible in switch position S3 = “0” to “7”. See Chapter “VME A16 Base Address” and Chapter “IP IRQ and Control Register” for more details.

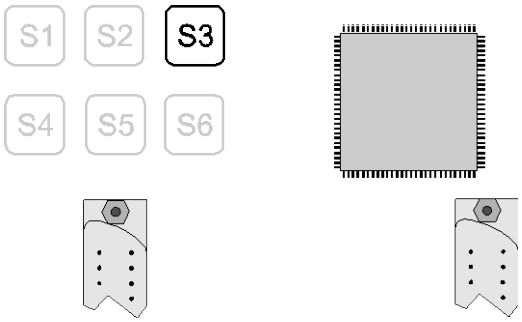


Figure 3-3 : Interrupt Mapping

S3 =	0	1	2	3	4	5…7	8*	9*	A*	B*	C*	D*…F*
IPA, Int0	-	1	4	6	1	reserved	-	1	4	6	1	reserved
IPA, Int1	-	2	5	4	1	reserved	-	2	5	4	1	reserved
IPB, Int0	-	3	2	3	2	reserved	-	3	2	3	2	reserved
IPB, Int1	-	4	1	1	2	reserved	-	4	1	1	2	reserved
IPC, Int0	-	5	4	6	3	reserved	-	5	4	6	3	reserved
IPC, Int1	-	6	5	4	3	reserved	-	6	5	4	3	reserved
IPD, Int0	-	7	2	3	4	reserved	-	7	2	3	4	reserved
IPD, Int1	-	-	1	1	4	reserved	-	-	1	1	4	reserved

“-” = No VME IRQ level mapped to IP INTx

* no access to the IP IRQ and Control registers of the TVME220 , see Chapter 4 and Chapter 3.1 for more details.

Table 3-4 : VME Interrupt Mapping by S3

S3 = “1”, “9” corresponds to the VME Interrupt Mapping of the VIPC6xx

S3 = “2”, “A” corresponds to the VME Interrupt Mapping of the VIPC610-01 (equal to two VIPC310)

S3 = “3”, “B” corresponds to the VME Interrupt Mapping of another version of the VIPC310

The default value for S3 is “1”.

3.3 VME A24/A32 Memory Enable and Memory Size

If VME memory space is not required, switch S4 to “0” (VME A24/A32 memory disabled).

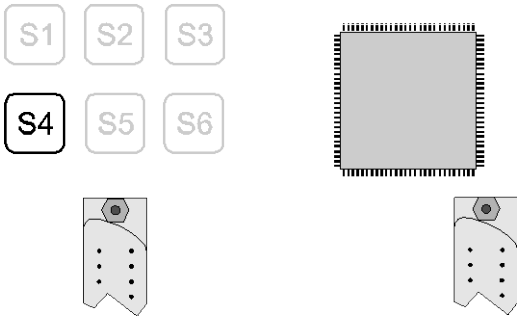


Figure 3-4 : VME A24/A32 Memory Enable and Memory Size

IndustryPack memory is mapped into the VME A24 or VME A32 memory space.

In VME A24 memory space, the memory size can be configured from 32 Kbytes to 2 Mbytes memory per IP slot.

In VME A32 memory space, the memory size is fixed 8 Mbytes per IP slot.

Rotary switch S4 is used to enable/disable VME A24/A32 memory and to select the required VME memory size. Default setting of S4 is “0”, which signifies VME A24/A32 memory is disabled.

Positions “1” to “7” of S4 represent several memory spaces in VME A24, and with S4 = “F”, each IP has an 8 Mbytes memory space in VME A32 address space.

The Memory Spaces for all IPs have the same size. If i.e. one IP requires 128 Kbytes of memory, one IP requires 64 Kbytes of memory and 2 IP require no memory, then S4 must be set to “3”, which selects a VME A24 memory size of 512 Kbytes, 128 Kbytes memory for each IP.

Value of S4:	VME Memory Size:		
0x0	VME A24/A32 memory disabled		
0x1	A24	128 Kbytes	32 Kbytes / IP
0x2	A24	256 Kbytes	64 Kbytes / IP
0x3	A24	512 Kbytes	128 Kbytes / IP
0x4	A24	1 Mbytes	256 Kbytes / IP
0x5	A24	2 Mbytes	512 Kbytes / IP
0x6	A24	4 Mbytes	1 Mbytes / IP
0x7	A24	8 Mbytes	2 Mbytes / IP
0x8 – 0xE	reserved		
0xF	A32	32 Mbytes	8 Mbytes / IP Slot

Table 3-5 : VME Memory Size by S4

3.4 VME A24/A32 Base Address

The memory space of IndustryPacks is mapped in the VME A24 or VME A32 space.

The memory base address for VME A24 or VME A32 is both set with the switches S5 and S6.

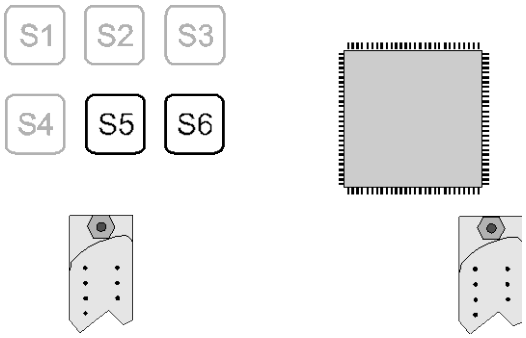
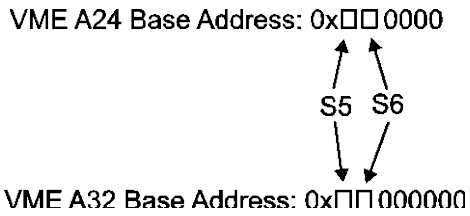


Figure 3-5: VME A24/A32 Base Address

If memory space is located in VME A24, S5 represents A[23:20], and S6 represents A[19:16].

In VME A32, S5 represents [A31:28] and S6 represents A[27:24].



The memory base address of the TVME220 must be set on a boundary, equal to the memory size, as selected by S4! See figure below for details.

The default value for VME A24 base address is 0xD00000 (S5=D, S6=0).

The default value for VME A32 base address is 0xD0000000 (S5=D, S6=0).

TVME220 VME A24/A32 Size		IP Memory Size	IP Slot	IP Memory Location: Mem. Base Address +	VMEbus Address Boundary
A24	128 Kbytes	32 Kbytes 32 Kbytes 32 Kbytes 32 Kbytes	A B C D	0x000000 0x008000 0x010000 0x018000	multiple of 0x020000
A24	256 Kbytes	64 Kbytes 64 Kbytes 64 Kbytes 64 Kbytes	A B C D	0x000000 0x010000 0x020000 0x030000	multiple of 0x040000
A24	512 Kbytes	128 Kbytes 128 Kbytes 128 Kbytes 128 Kbytes	A B C D	0x000000 0x020000 0x040000 0x060000	multiple of 0x080000
A24	1 Mbytes	256 Kbytes 256 Kbytes 256 Kbytes 256 Kbytes	A B C D	0x000000 0x040000 0x080000 0x0C0000	multiple of 0x100000
A24	2 Mbytes	512 Kbytes 512 Kbytes 512 Kbytes 512 Kbytes	A B C D	0x000000 0x080000 0x100000 0x180000	multiple of 0x200000
A24	4 Mbytes	1 Mbytes 1 Mbytes 1 Mbytes 1 Mbytes	A B C D	0x000000 0x100000 0x200000 0x300000	multiple of 0x400000
A24	8 Mbytes	2 Mbytes 2 Mbytes 2 Mbytes 2 Mbytes	A B C D	0x000000 0x200000 0x400000 0x600000	multiple of 0x800000
A32	32 Mbytes	8 Mbytes 8 Mbytes 8 Mbytes 8 Mbytes	A B C D	0x00000000 0x00800000 0x01000000 0x01800000	multiple of 0x02000000

Table 3-6 : VME A24/A32 Address Map

4 IP IRQ and Control Register

If switch S3 is in the range of “0” to “7”, the TVME220 provides a set of two registers for each IP: The IP IRQ Configuration Register and the IP Control Register.

Setting switch S3 to a value of “8” to “F” disables the IP IRQ Register and the IP Control Register. The address range of the IP IRQ and Control Register from “VME A16 Base Address” + “IP Offset” + 0xC0 to 0xFF is then mapped to the ID Space of the corresponding IP module, enlarging the ID Space of each IP module from 64 bytes to 128 bytes.

4.1 IP IRQ Configuration Register

Switch S3 must be in the range of “0” to “7” to access the IP IRQ Configuration Register. The register is divided in 2 equal parts, one for each interrupt. The bits[0, 4] are the LSBs, and the bits[2, 6] are the MSBs of the programmed IRQ level.

IPA IRQ Configuration Register		**VME A16 Base Address + 0x00C1**		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7				
6	IPA, INT1	VME IRQ Level 000 = interrupt is disabled [6:4] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
5			R/W	
4			R/W	
3			R/W	
2	IPA, INT0	VME IRQ Level 000 = interrupt is disabled [2:0] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
1			R/W	
0			R/W	

IPB IRQ Configuration Register		**VME A16 Base Address + 0x01C1**		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7				
6	IPB, INT1	VME IRQ Level 000 = interrupt is disabled [6:4] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
5			R/W	
4			R/W	
3			R/W	
2	IPB, INT0	VME IRQ Level 000 = interrupt is disabled [2:0] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
1			R/W	
0			R/W	

Table 4-1 : IP IRQ Configuration Registers (IP A / IP B)

IPC IRQ Configuration Register		VME A16 Base Address + 0x02C1		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7				
6	IPC, INT1	VME IRQ Level 000 = interrupt is disabled [6:4] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
5			R/W	
4			R/W	
3			R/W	
2	IPC, INT0	VME IRQ Level 000 = interrupt is disabled [2:0] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
1			R/W	
0			R/W	

IPD IRQ Configuration Register		VME A16 Base Address + 0x03C1		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7				
6	IPD, INT1	VME IRQ Level 000 = interrupt is disabled [6:4] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
5			R/W	
4			R/W	
3			R/W	
2	IPD, INT0	VME IRQ Level 000 = interrupt is disabled [2:0] 001 to 111 = VMEbus IRQ-levels IRQ1 to IRQ7	R/W	Depends on S3 jumper setting
1			R/W	
0			R/W	

Table 4-2 : IP IRQ Configuration Registers (IP C / IP D)

4.2 IP Control Register

Four IP Control Registers are located in the VMEbus A16 space. Switch S3 must be in the range of “0” to “7” to access the IP Control Register.

IPA Control Register		VME A16 Base Address + 0x00C3		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7	IP A, Reset	1 = reset is initiated Remains ‘1’, until the IP reset has been completed and is then set to ‘0’ by the on board logic. It can be read to verify the status of the reset.	R/W	0
6	reserved	Carry random information	R	undefined
5	reserved		R	undefined
4	reserved		R	undefined
3	reserved		R	undefined
2	IP A, Error	1 = error signal is active	R	0
1	IP A, INT1	Interrupt status 1 = indicates a pending interrupt request	R	0
0	IP A, INT0		R	0

IPB Control Register		VME A16 Base Address + 0x01C3		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7	IP B, Reset	1 = reset is initiated Remains ‘1’, until the IP reset has been completed and is then set to ‘0’ by the on board logic. It can be read to verify the status of the reset.	R/W	0
6	reserved	Carry random information	R	undefined
5	reserved		R	undefined
4	reserved		R	undefined
3	reserved		R	undefined
2	IP B, Error	1 = error signal is active	R	0
1	IP B, INT1	Interrupt status 1 = indicates a pending interrupt request	R	0
0	IP B, INT0		R	0

Table 4-3 : IP Control Registers (IP A / IP B)

IPC Control Register		VME A16 Base Address + 0x02C3		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7	IP C, Reset	1 = reset is initiated Remains '1', until the IP reset has been completed and is then set to '0' by the on board logic. It can be read to verify the status of the reset.	R/W	0
6	reserved	Carry random information	R	undefined
5	reserved		R	undefined
4	reserved		R	undefined
3	reserved		R	undefined
2	IP C, Error	1 = error signal is active	R	0
1	IP C, INT1	Interrupt status 1 = indicates a pending interrupt request	R	0
0	IP C, INT0		R	0

IPD Control Register		VME A16 Base Address + 0x03C3		
Bit	**Symbol**	**Description**	**Access**	**Reset Value**
7	IP D, Reset	1 = reset is initiated Remains '1', until the IP reset has been completed and is then set to '0' by the on board logic. It can be read to verify the status of the reset.	R/W	0
6	reserved	Carry random information	R	undefined
5	reserved		R	undefined
4	reserved		R	undefined
3	reserved		R	undefined
2	IP D, Error	1 = error signal is active	R	0
1	IP D, INT1	Interrupt status 1 = indicates a pending interrupt request	R	0
0	IP D, INT0		R	0

Table 4-4 : IP Control Registers (IP C / IP D)

5 IP Strobe Signal

The IP strobe signal is an uncommitted line of the IP logic interface, which may be used as an optional input to or output from an IP module. It is reserved for a digital strobe or clock signal related to the functionality of the IP.

Strobe signals of each IP slots are accessible on the TVME220 via a 4 pin jumper field.

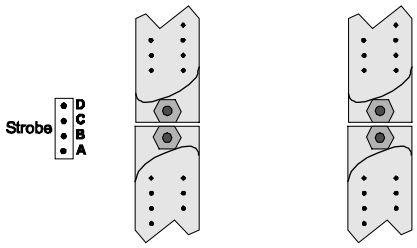


Figure 5-1 : IP Strobe Signal

6 Installation of IndustryPacks

Before installing an IndustryPack, be sure that the power supply for the TVME220 is turned off.

The component is an Electrostatic Sensitive Device (ESD). Use an anti-static mat connected to a wristband when handling or installing the components.

Installing IndustryPacks on the TVME220 is done by simply snapping them into one of the four IP slots. The connectors are keyed, so the IndustryPack can only be installed correctly.

After an IP has been installed it can be secured on the carrier board. This is normally necessary only in high vibration or shock environments.

Screws and spacers are required to fix a single IP on the TVME220. They can be ordered from TEWS TECHNOLOGIES GmbH (Part number: TIPxxx-HK).

7 Front Panel Indicators

7.1 ACK and Power LEDs

For a quick visual inspection the TVME220 offers a total of 10 LEDs in the front panel.

Each IndustryPack has its own “ACK” LED, which is lit for about 200ms whenever an access to the corresponding IP happens.

Function	Label	Color	Description
IP A ACK	A	green	Indicates access to IP A
IP B ACK	B	green	Indicates access to IP B
IP C ACK	C	green	Indicates access to IP C
IP D ACK	D	green	Indicates access to IP D

Table 7-1 : IP ACK LED

Additionally there are 6 green Power LEDs in the front panel of the TVME220:

Function	Label	Color	Description
IP A +5V	+5V A	green	LED = “on”: IP power supply ok
IP B +5V	+5V B	green	
IP C +5V	+5V C	green	
IP D +5V	+5V D	green	
+12V common to all IP	+12V	green	LED = “on”: +12V power ok
-12V common to all IP	-12V	green	LED = “on”: –12V power ok

Table 7-2 : IP Power LED

7.2 Fuses and Filters

All IP slots are fuse protected. The fuses used on the TVME220 are self-healing fuses. For improved performance the TVME220 provides RF filtering and decoupling capacitors on all IP power lines.

8 Pin Assignment

8.1 IP Connectors

The table below shows the complete IP J1 logic interface pin assignments. Some of these signals are not used on the TVME220.

Pin #	Signal	Pin #	Signal	Pin #	Signal	Pin #	Signal
1	GND	2	CLK	26	GND	27	+5V
3	Reset#	4	D0	28	R/W#	29	IDSel#
5	D1	6	D2	30	DMAReq0#	31	MemSel#
7	D3	8	D4	32	DMAReq1#	33	IntSel#
9	D5	10	D6	34	DMAck#	35	IOSel#
11	D7	12	D8	36	Reserved	37	A1
13	D9	14	D10	38	DMAEnd#	39	A2
15	D11	16	D12	40	Error#	41	A3
17	D13	18	D14	42	IntReq0#	43	A4
19	D15	20	BS0#	44	IntReq1#	45	A5
21	BS1#	22	-12V	46	Strobe#	47	A6
23	+12V	24	+5V	48	ACK#	49	Reserved
25	GND			50	GND		

Table 8-1 : IP J1 Logic Interface Pin Assignment

The IP J2 I/O connector routes the IP I/O lines directly to the VMEbus P0 and P2 connector. The I/O mapping is compliant to the ANSI/VITA 4.1-1996 standard. See section VMEbus Connectors for detail.

8.2 VMEbus Connectors

8.2.1 VMEbus P1 Connector

Pin	Row Z	Row A	Row B	Row C	Row D
1	NC	VME_D0	VME_BBSY#	VME_D8	NC
2	GND	VME_D1	VME_BCLR#	VME_D9	GND
3	NC	VME_D2	VME_ACFAIL#	VME_D10	NC
4	GND	VME_D3	VME_BGIN0#	VME_D11	NC
5	NC	VME_D4	VME_BGOUT0#	VME_D12	NC
6	GND	VME_D5	VME_BGIN1#	VME_D13	NC
7	NC	VME_D6	VME_BGOUT1#	VME_D14	NC
8	GND	VME_D7	VME_BGIN2#	VME_D15	NC
9	NC	GND	VME_BGOUT2#	GND	NC
10	GND	VME_SYSCLK	VME_BGIN3#	VME_SYSFAIL#	NC
11	NC	GND	VME_BGOUT3#	VME_BERR#	NC
12	GND	VME_DS1#	VME_BR0#	VME_SYSRST#	3,3V
13	NC	VME_DS0#	VME_BR1#	VME_LWORD#	NC
14	GND	VME_WRITE#	VME_BR2#	VME_AM5	3,3V
15	NC	GND	VME_BR3#	VME_A23	NC
16	GND	VME_DTACK#	VME_AM0	VME_A22	3,3V
17	NC	GND	VME_AM1	VME_A21	NC
18	GND	VME_AS#	VME_AM2	VME_A20	3,3V
19	NC	GND	VME_AM3	VME_A19	NC
20	GND	VME_IACK#	GND	VME_A18	3,3V
21	NC	VME_IACKIN#	NC	VME_A17	NC
22	GND	VME_IACKOUT#	NC	VME_A16	3,3V
23	NC	VME_AM4	GND	VME_A15	NC
24	GND	VME_A7	VME_IRQ7#	VME_A14	3,3V
25	NC	VME_A6	VME_IRQ6#	VME_A13	NC
26	GND	VME_A5	VME_IRQ5#	VME_A12	3,3V
27	NC	VME_A4	VME_IRQ4#	VME_A11	NC
28	GND	VME_A3	VME_IRQ3#	VME_A10	3,3V
29	NC	VME_A2	VME_IRQ2#	VME_A9	NC
30	GND	VME_A1	VME_IRQ1#	VME_A8	3,3V
31	NC	-12V	NC	+12V	GND
32	GND	+5V	+5V	+5V	NC

Table 8-2 : VMEbus P1 Connector

8.2.2 VMEbus P0 Connector

Pin	Row F	Row E	Row D	Row C	Row B	Row A
1	GND	D5	D4	D3	D2	D1
2	GND	D10	D9	D8	D7	D6
3	GND	D15	D14	D13	D12	D11
4	GND	D20	D19	D18	D17	D16
5	GND	D25	D24	D23	D22	D21
6	GND	D30	D29	D28	D27	D26
7	GND	D35	D34	D33	D32	D31
8	GND	D40	D39	D38	D37	D36
9	GND	D45	D44	D43	D42	D41
10	GND	D50	D49	D48	D47	D46
11	GND	C5	C4	C3	C2	C1
12	GND	C10	C9	C8	C7	C6
13	GND	C15	C14	C13	C12	C11
14	GND	C20	C19	C18	C17	C16
15	GND	C25	C24	C23	C22	C21
16	GND	C30	C29	C28	C27	C26
17	GND	C35	C34	C33	C32	C31
18	GND	C40	C39	C38	C37	C36
19	GND	C45	C44	C43	C42	C41

Table 8-3 : VMEbus P0 Connector

8.2.3 VMEbus P2 Connector

NOTE: The 3.3V supply for Transition- Modules via P2 is limited to 1.0 Ampere.

Pin	Row Z	Row A	Row B	Row C	Row D
1	C46	B41	+5V	B42	C47
2	GND	B43	GND	B44	C48
3	C49	B45	NC	B46	C50
4	GND	B47	VME_A24	B48	B1
5	B2	B49	VME_A25	B50	B3
6	GND	A1	VME_A26	A2	B4
7	B5	A3	VME_A27	A4	B6
8	GND	A5	VME_A28	A6	B7
9	B8	A7	VME_A29	A8	B9
10	GND	A9	VME_A30	A10	B10
11	B11	A11	VME_A31	A12	B12
12	GND	A13	GND	A14	B13
13	B14	A15	+5V	A16	B15
14	GND	A17	NC	A18	B16
15	B17	A19	NC	A20	B18
16	GND	A21	NC	A22	B19
17	B20	A23	NC	A24	B21
18	GND	A25	NC	A26	B22
19	B23	A27	NC	A28	B24
20	GND	A29	NC	A30	B25
21	B26	A31	NC	A32	B27
22	GND	A33	GND	A34	B28
23	B29	A35	NC	A36	B30
24	GND	A37	NC	A38	B31
25	B32	A39	NC	A40	B33
26	GND	A41	NC	A42	B34
27	B35	A43	NC	A44	B36
28	GND	A45	NC	A46	B37
29	B38	A47	NC	A48	B39
30	GND	A49	NC	A50	B40
31	3.3V	3.3V	GND	3,3V	GND
32	GND	+5V	+5V	+5V	VPC

Table 8-4 : VMEbus P2 Connector