intelligent control on processor

VEX-6253

DM&P Vortex86EX 400MHz

PC/104 CPU Module

with 1S/2USB/LAN/AD/16-bit x-ISA

128MB DDR3 Onboard

User's Manual

(Revision 1.0A)

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Trademarks Acknowledgment

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Chapter 1

Introduction

1.1 Packing List

Product Name	Package
VEX-6253	Embedded Vortex86EX CPU Board RS232 cable x 1 USB cable x 1 (USB port x 2) LAN cable x 1 PS/2 Mouse cable x 1 PS/2 Keyboard cable x 1 Screw Kit x 1

1.2 Ordering Information

- **VEX-6253** Vortex86EX CPU Module with 128MB DDR3 and 16-bit x-ISA
- **VEX-6253-3GE** Vortex86EX CPU Module with 128MB DDR3, 512MB eMMC onboard and Mini PCI-E 3G module support
- **VEX-6253-5S-S** Vortex86EX CPU Module with 128MB DDR3, 5x RS232(4x TX/RX) and SD Card slot
- **MINIPCIE-9160** Mini PCI-E VGA Module for VEX CPU Module only
- **MINIPCIE-8111F** RTL8111F Mini PCI-E Gigabit LAN Module

1.3 Product Description

The VEX-6253 family of low-power x86 embedded controller is designed to meet PC/104 specification, and integrated with the following features.

- 400 MHz Vortex86EX SoC
- 128MB DDR3 system memory
- 10/100Mbps Ethernet
- 2 USB 2.0 (host)
- Up to 5 serial ports (TX/RX x4)
- Onboard 8MB SPI Flash
- Mini PCI-E interface
- 2 watchdog timer
- Coreboot BIOS
- Single voltage +5V DC
- Support extended operating temperature range of -20°C to +70°C

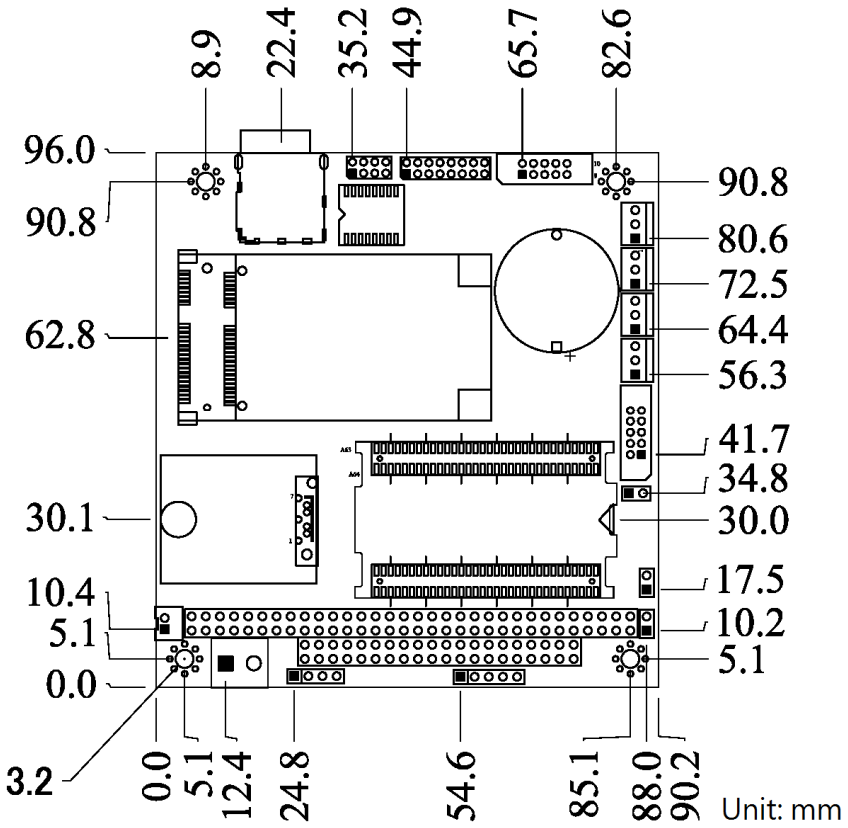
The Vortex86EX series is the newest member of ICOP family with compact size and ultra-low power consumption. It packs 16KB write through 4-way L1 cache, 128KB write through/write back 4-way L2 cache, 2.5Ghz PCI-E Bus, DDR3, ROM controller, I^2C, SPI, Fast Ethernet, FIFO UART, USB2.0 Host, CAN, and SD/SATA controllers.

With DDR3 RAM alongside, 400MHz Vortex86EX delivers equivalent calculating power of familiar DX series. In addition, its distinguishing characteristic of extremely lower power consumption also makes it a great solution for relatively simple application such as data collection.

1.4 Specifications

Features	VEX-6253
CPU	DM&P SoC CPU Vortex86EX- 400MHz Real Time Clock with Lithium Battery Backup
Cache	L1:16K I-Cache, 16K D-Cache L2:256KB Cache
BIOS	Coreboot BIOS
Bus Interface	PC/104 Standard Compliant
System Memory	128MB DDR3 Onboard
Watchdog Timer	Software programmable from 30.5μ sec.to 512 sec. x2 sets (Watchdog 1 fully compatible with M6117D)
LAN	Integrated 10/100M Ethernet
I/O Interface	• SATA 7P Connector x1 • RS-232/485 port x1 • USB port x2 (USB 2.0 version) • 8CH A/D port x1 • 10/100Mbps Ethernet port x1
Connectors	• SATA 7P for SATA x 1 • 2.00 mm ∅ 10-pin box header for USB x1 • 2.00 mm ∅ 10-pin box header for RS-232 x1 • 2.00 mm ∅ 8-pin header for Ethernet x 1 • 2.54 mm ∅ 5-pin header for Keyboard/Mouse x1 • 0.80 mm ∅ 52-pin Mini PCI-E connector x1
Flash Disk Support	Onboard 7.5MB SPI Flash Disk (Drive: A) Onboard eMMC 512MB (Optional) SD Card slot (Optional) SATA DOM
Power Requirement	Single Voltage +5V @400mA
Dimension	90.2 X 96mm (3.55 x 3.77 inches)
Weight	63g
Operating Temperature	-20°C ~ +70°C -40°C ~ +85°C (Optional)
Operating System Support	Free DOS, DOS 6.22, PCDOS 7.1, DR-DOS, x-DOS, OS/2, CE6.0, x-Linux, QNX, Vxworks and FreeBSD.

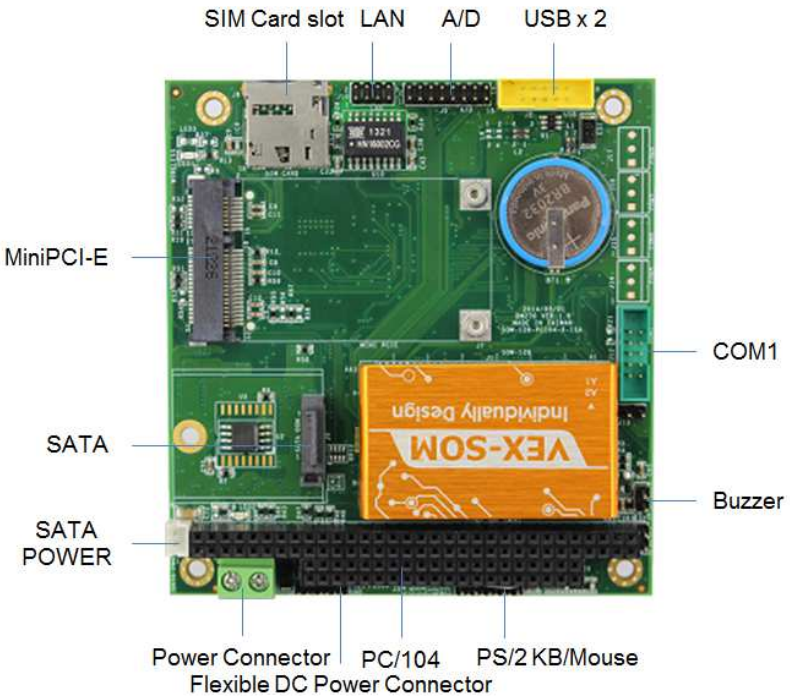
1.5 Board Dimension



Chapter 2

Installation

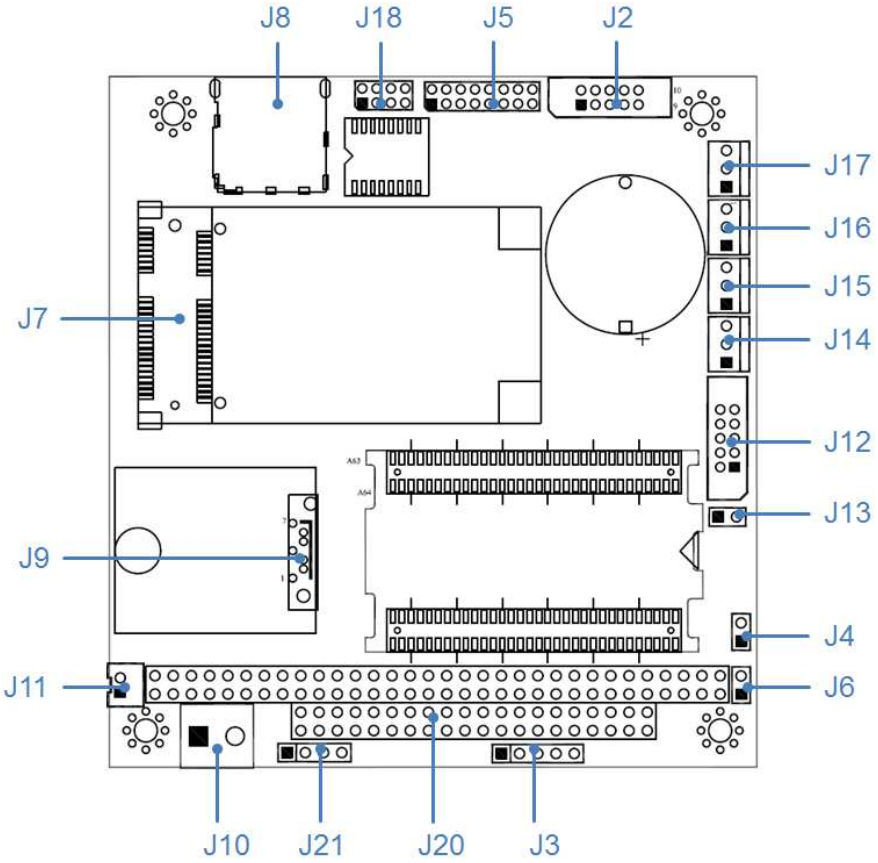
2.1 Board Outline



Note:

1. SIM Card slot is only available on VEX-6253-3GE.
2. Only VEX-6253 has full 16-bit x-ISA support from PC/104 connector. For x-ISA support of VEX-6253-3GE and VEX-6253-5S-S, please check section 2.4 for detail

2.2 Connectors Location



2.3 Connectors & Jumpers Summary

Summary Table

Nbr	Description	Type of Connections	Pin nbrs.
J2	USB	Box Header, 2.00∅, 5x2	10-pin
J3	PS/2 Keyboard/Mouse	Pin Header, 2.54∅,1x5	5-pin
J4	Buzzer	Pin Header, 2.54∅, 1x2	2-pin
J5	A/D	Pin Header, 2.00∅, 8x2	16-pin
J6	Reset	Pin Header, 2.54∅, 1x2	2-pin
J7	Mini PCI-E	Pin Header, 2.0∅, 5x2	10-pin
J8	Micro SIM SOCKET		
J9	SATA DOM	SATA 7P Connector	7-pin
J10	Power Connector	Terminal Block 5.0∅, 2x1	2-pin
J11	SATA DOM Power	Box Header, 2.0∅, 1x2	2-pin
J12	COM1(RS232/485 or TTL/P1)	Box Header, 2.0∅, 5x2	10-pin
J13	COM1 RS232/485 Select	Pin Header, 2.54∅, 1x2	2-pin
J14	COM5(TX/RX)	Molex Header,2.54∅, 3x1	3-pin
J15	COM6(TX/RX)	Molex Header,2.54∅, 3x1	3-pin
J16	COM7(TX/RX)	Molex Header,2.54∅, 3x1	3-pin
J17	COM8(TX/RX)	Molex Header,2.54∅, 3x1	3-pin
J18	10/100 Ethernet LAN	Pin Header, 2.00∅, 4x2	16-pin
J20A	PC104 Connector – 64 pin	Box Header, 2.54∅ 32x2	64-pin
J20B	PC104 Connector – 40 pin	Box Header, 2.54∅ 20x2	40-pin
J21	4P Power Source(Interconnect to PC/104 – **J20**)	Pin Header, 2.54∅ , 4x1	4-pin
LED 1	Wireless LED(Green)	LED-SMD	
LED 2	Power LED(Red)	LED-SMD	
LED 3	eMMC LED(Green)	LED-SMD	

2.4 Pin Assignments & Jumper Settings

J2: USB (1 & 2)

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	LUSBD1-	4	LUSBD2-
5	LUSBD1+	6	LUSBD2+
7	GND	8	GND
9	GGND	10	GGND

J3: PS/2 Keyboard/Mouse

Pin #	Signal Name	Pin #	Signal Name
1	KB/MS CLK	2	KB/MS DAT
3	NC	4	GND
5	VCC		

J4: Buzzer

Pin #	Signal Name	Pin #	Signal Name
1	Buzzer	2	VCC

J5: A/D (See section 2.9 for detail)

Pin #	Signal Name	Pin #	Signal Name
1	ADC_0	2	AGND
3	ADC_1	4	AGND
5	ADC_2	6	AGND
7	ADC_3	8	AGND
9	ADC_4	10	AGND
11	ADC_5	12	AGND
13	ADC_6	14	AGND
15	ADC_7	16	AGND

J6: RESET

Pin #	Signal Name	Pin #	Signal Name
1	RST_SW	2	GND

J7: Mini PCI-E (USBD2 will be occupied while USBD3 been used)

Pin #	Signal Name	Pin #	Signal Name
1	VCC3	2	VCC3
3	NC	4	GND
5	NC	6	TXGP10*
7	NC	8	SIM-VCC*
9	GND	10	SIM-IO*
11	PE0_CLK-	12	SIM-CLK*
13	PE0_CLK+	14	SIM-RST*
15	GND	16	SIM-VPP*
17	NC	18	GND
19	NC	20	W_DIS
21	GND	22	PCIRST-
23	PE0_RX-	24	VCC3
25	PE0_RX+	26	GND
27	GND	28	VCC1.5
29	GND	30	NC
31	XPE0_TX-	32	WAKE_N*
33	XPE0_TX+	34	GND
35	GND	36	LUSBD3-*
37	GND*	38	LUSBD3+*
39	VCC3*	40	GND
41	VCC3*	42	LED_WWAN*
43	GND	44	TGP13*
45	CTS2*	46	TGP16*
47	RTS2*	48	TXGP15*
49	RXD2*	50	GND
51	TXD2*	52	VCC3

***Available when VEX-6253-3GE model is selected**

***MiniPCIE-9160 does not work on VEX-6253-3GE**

J9: SATA DOM

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND		

J10: Power Connector (Terminal Block 5.0mm)

Pin #	Signal Name
1	+5V
2	GND

J11: SATA DOM POWER

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	GND

J12: COM1 RS232 / 485 (Optional: TTL / GPIO-P1)

Pin #	Signal Name	Pin #	Signal Name
1	DCD1 / 1RS485+	2	RXD1 / 1RS485-
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	NC

J13: COM1 RS232 / 485 Select

Pin #	Signal Name
OPEN	RS232
CLOSE	RS485

J14: COM5 (TX/RX, available on VEX-6253-5S-S only)

Pin #	Signal Name
1	TXD5
2	RXD5
3	GND

J15: COM6 (TX/RX, available on VEX-6253-5S-S only)

Pin #	Signal Name
1	TXD6
2	RXD6
3	GND

J16: COM7 (TX/RX, available on VEX-6253-5S-S only)

Pin #	Signal Name
1	TXD7
2	RXD7
3	GND

J17: COM8 (TX/RX, available on VEX-6253-5S-S only)

Pin #	Signal Name
1	TXD8
2	RXD8
3	GND

J18: LAN

Pin #	Signal Name	Pin #	Signal Name
1	LTX+	2	LTX-
3	LRX+	4	NC
5	NC	6	LRX-
7	NC	8	NC

J20A: PC104 Connector – 64pin (For VEX-6253)

Pin #	Signal Name	Pin #	Signal Name
1	IOCHCHK	2	GND
3	SD7	4	RSTDRV
5	SD6	6	VCC
7	SD5	8	IRQ9
9	SD4	10	-5V
11	SD3	12	DRQ2
13	SD2	14	-12V
15	SD1	16	**NC**
17	SD0	18	+12V
19	IOCHRDY	20	GND
21	AEN	22	SMEMW
23	SA19	24	SMEMR
25	SA18	26	IOW
27	SA17	28	IOR
29	SA16	30	**NC**
31	SA15	32	DRQ3
33	SA14	34	DACK1
35	SA13	36	DRQ1
37	SA12	38	REFRESH
39	SA11	40	SYSCLK
41	SA10	42	IRQ7
43	SA9	44	IRQ6
45	SA8	46	IRQ5
47	SA7	48	IRQ4
49	SA6	50	IRQ3
51	SA5	52	**NC**
53	SA4	54	TC
55	SA3	56	BALE
57	SA2	58	VCC
59	SA1	60	OSC
61	SA0	62	GND
63	GND	64	GND

J20B: PC104 Connector – 40pin (For VEX-6253)

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GND
3	MEMCS16	4	SBHE
5	IOCS16	6	SA23
7	IRQ10	8	SA22
9	IRQ11	10	SA21
11	IRQ12	12	SA20
13	IRQ15	14	SA19
15	IRQ14	16	SA18
17	**NC**	18	SA17
19	DRQ0	20	MEMR
21	**NC**	22	MEMW
23	DRQ5	24	SD8
25	**NC**	26	SD9
27	DRQ6	28	SD10
29	**NC**	30	SD11
31	DRQ7	32	SD12
33	**NC**	34	SD13
35	MASTER	36	SD14
37	GND	38	SD15
39	GND	40	NC

J20A: PC104 Connector – 64pin (For VEX-6253-3GE)

Pin #	Signal Name	Pin #	Signal Name
1	IOCHCHK	2	GND
3	SD7	4	RSTDRV
5	SD6	6	VCC
7	SD5	8	IRQ9
9	SD4	10	-5V
11	SD3	12	DRQ2
13	SD2	14	-12V
15	SD1	16	NC
17	SD0	18	+12V
19	IOCHRDY	20	GND
21	AEN	22	SMEMW
23	SA19	24	SMEMR
25	SA18	26	IOW
27	SA17	28	IOR
29	SA16	30	NC
31	SA15	32	DRQ3
33	SA14	34	**NC**
35	SA13	36	DRQ1
37	SA12	38	REFRESH
39	SA11	40	SYSCLK
41	SA10	42	IRQ7
43	SA9	44	IRQ6
45	SA8	46	IRQ5
47	SA7	48	IRQ4
49	SA6	50	IRQ3
51	SA5	52	NC
53	SA4	54	TC
55	SA3	56	BALE
57	SA2	58	VCC
59	SA1	60	OSC
61	SA0	62	GND
63	GND	64	GND

J20B: PC104 Connector – 40pin (For VEX-6253-3GE)

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GND
3	MEMCS16	4	SBHE
5	IOCS16	6	SA23
7	**NC**	8	SA22
9	**NC**	10	SA21
11	IRQ12	12	SA20
13	**NC**	14	SA19
15	IRQ14	16	SA18
17	NC	18	SA17
19	DRQ0	20	MEMR
21	NC	22	MEMW
23	DRQ5	24	**NC**
25	NC	26	**NC**
27	DRQ6	28	**NC**
29	NC	30	**NC**
31	DRQ7	32	**NC**
33	NC	34	**NC**
35	MASTER	36	**NC**
37	GND	38	**NC**
39	GND	40	NC

J20A: PC104 Connector – 64pin (For VEX-6253-5S-S)

Pin #	Signal Name	Pin #	Signal Name
1	IOCHCHK	2	GND
3	SD7	4	RSTDRV
5	SD6	6	VCC
7	SD5	8	IRQ9
9	SD4	10	-5V
11	SD3	12	DRQ2
13	SD2	14	-12V
15	SD1	16	NC
17	SD0	18	+12V
19	IOCHRDY	20	GND
21	AEN	22	SMEMW
23	SA19	24	SMEMR
25	SA18	26	IOW
27	SA17	28	IOR
29	SA16	30	NC
31	SA15	32	DRQ3
33	SA14	34	**NC**
35	SA13	36	**NC**
37	SA12	38	REFRESH
39	SA11	40	SYSCLK
41	SA10	42	**NC**
43	SA9	44	IRQ6
45	SA8	46	IRQ5
47	SA7	48	IRQ4
49	SA6	50	IRQ3
51	SA5	52	NC
53	SA4	54	**NC**
55	SA3	56	BALE
57	SA2	58	VCC
59	SA1	60	OSC
61	SA0	62	GND
63	GND	64	GND

J20B: PC104 Connector – 40pin (For VEX-6253-5S-S)

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GND
3	MEMCS16	4	SBHE
5	IOCS16	6	SA23
7	NC	8	SA22
9	NC	10	SA21
11	NC	12	SA20
13	NC	14	SA19
15	IRQ14	16	SA18
17	NC	18	SA17
19	DRQ0	20	MEMR
21	NC	22	MEMW
23	DRQ5	24	NC
25	NC	26	NC
27	DRQ6	28	NC
29	NC	30	NC
31	DRQ7	32	NC
33	NC	34	NC
35	MASTER	36	NC
37	GND	38	NC
39	GND	40	NC

J21: 4P Power Source (Interconnect to PC/104 – J20A)

Pin #	Signal Name
1	-5V
2	-12V
3	+12V
4	GND

2.5 System Mapping

2.5.1 VEX-6253

Memory Mapping

Address	Description	Usage
0000:0000-9000:FFFF	System RAM	Yes
A000:0000-A000:FFFF	EGA/VGA Video Memory	
B000:0000-B000:7FFF	MDA RAM, Hercules graphics display RAM	
B000:8000-B000:FFFF	CGA display RAM	
C000:0000-C000:7FFF	EGA/VGA BIOS ROM	
C000:8000-C000:FFFF	Boot ROM enable	
D000:0000-D700:FFFF	Expansion ROM space	
D800:0000-DB00:FFFF	SPI FLASH Emulation Floppy A Enable	Yes
DC00:0000-DF00:FFFF	Expansion ROM space	
E000:0000-E000:FFFF	Motherboard BIOS	Yes
F000:0000-F000:FFFF	Motherboard BIOS	Yes

I/O Mapping

I/O Address	Owner	Usage
0000h - 000Fh	DMA 8237-1	Yes
0010h - 0017h	COM9	
0018h - 001Fh	Empty	
0020h - 0021h	PIC 8259-1	Yes
0022h - 0023h	6117D configuration port	Yes
0024h - 002Dh	Empty	
0030h - 003Fh	Empty	
0040h - 0043h	Timer counter 8254	Yes
0044h - 0047h	Empty	
0048h - 004Bh	PWM counter 8254	Yes
004Ch - 004Dh	Empty	
0050h - 005Fh	Empty	
0060h	Keyboard data port	Yes
0061h	Port B + NMI control port	Yes
0062h - 0063h	8051 download 4K address counter	Yes

0064h	Keyboard status port	Yes
0065h	WatchDog0 reload counter	Yes
0066h	8051 download 8bit data port	Yes
0067h	WatchDog1 reload counter	Yes
0068h - 006Dh	WatchDog1 control register	Yes
006Eh - 006Fh	Empty	
0070h - 0071h	CMOS RAM port	Yes
0072h - 0075h	MTBF counter	Yes
0076h - 0077h	Empty	
0078h	GPIO data port 0	Yes
0079h – 007ch	GPIO data port 1,2,3,4	
007Dh - 007Fh	Empty	
0080h - 008Fh	DMA page register	Yes
0090h - 0091h	Empty	
0092h	System control register	Yes
0093h – 0097h	GPIO direction address Port 6,7,8,9,A	
0098h	GPIO direction address Port 0	Yes
0099h	GPIO direction address Port 1	
009Ah	GPIO direction address Port 2	
009Bh	GPIO direction address Port 3	
009Ch	GPIO direction address port 4	
009Dh	GPIO direction address Port 5	
00A0h - 00A1h	PIC 8259-2	Yes
00A2h - 00BFh	Empty	
00C0h - 00DFh	DMA 8237-2	Yes
00E0h - 00FFh	Empty	
0100h	GPIO data address Port 5	
0101h	GPIO data address Port 6	
0102h	GPIO data address Port 7	
0103h	GPIO data address Port 8	
0104h	GPIO data address Port 9	
0105h	GPIO data address Port A	
0170h - 0177h	IDE1 (IRQ 15)	Yes

01F0h - 01F7h	IDE0 (IRQ 14)	Yes
0260h – 0267h	COM6 (IRQ 3)	
0268h – 026Fh	COM8 (IRQ 11)	
02E8h - 02EFh	COM4 (IRQ 11)	
02F8h - 02FFh	COM2 (IRQ 3)	
0376h	IDE1 ATAPI device control write only register	Yes
0360h – 0367h	COM5 (IRQ 4)	
0368h – 036Fh	COM7 (IRQ 10)	
0378h - 037Fh	Printer port (IRQ 7，DMA 0)	
03E8h - 03EFh	COM3 (IRQ 10)	
03F0h - 03F7h	Floppy Disk (IRQ 6，DMA 2)	
03F6h	IDE0 ATAPI device control write only register	Yes
03F8h - 03FFh	COM1 (IRQ 4)	Yes
0480h - 048Fh	DMA High page register	Yes
0490h - 0499h	Instruction counter register	Yes
04D0h - 04D1h	8259 Edge / level control register	Yes
0CF8h - 0CFFh	PCI configuration port	Yes
1000h - 10FFh	on board LAN	Yes
FC00h - FC05h	SPI Flash BIOS control register	Yes
FC08h - FC0Dh	External SPI BUS control register (output pin configurable GPIO3[0-3])	Yes

IRQ Mapping

IRQ#	Description	Usage
IRQ0	System Timer	Yes
IRQ1	Keyboard Controller	Yes
IRQ2	Cascade for IRQ8 - 15	
IRQ3	Serial Port 2	
IRQ4	Serial Port 1	Yes
IRQ5	USB / RT0 / RT1 / RT2 / RT3	Yes
IRQ6	Ethernet (10M / 100M)	Yes
IRQ7	CAN Bus / HD Audio / SPI1 / I2C / GPIO0 / GPIO1	Yes
IRQ8	Real Time Clock	Yes
IRQ9	ACPI	Yes
IRQ10	Serial Port 3	

IRQ11	Serial Port 4	
IRQ12	PS2 Mouse	Yes
IRQ13	Math Coprocessor	Yes
IRQ14	Hard Disk Controller#1	Yes
IRQ15	Hard Disk Controller#2 / PIEDIRQ	Yes

DMA Mapping

DMA#	Description	Usage
DMA0		
DMA1		
DMA2	Floppy Disk Controller	
DMA3		
DMA5		
DMA6		
DMA7		

2.5.2 VEX-6253-3GE

Memory Mapping

Address	Description	Usage
0000:0000-9000:FFFF	System RAM	Yes
A000:0000-A000:FFFF	EGA/VGA Video Memory	
B000:0000-B000:7FFF	MDA RAM, Hercules graphics display RAM	
B000:8000-B000:FFFF	CGA display RAM	
C000:0000-C000:7FFF	EGA/VGA BIOS ROM	
C000:8000-C000:FFFF	Boot ROM enable	
D000:0000-D700:FFFF	Expansion ROM space	
D800:0000-DB00:FFFF	SPI FLASH Emulation Floppy A Enable	Yes
DC00:0000-DF00:FFFF	Expansion ROM space	
E000:0000-E000:FFFF	Motherboard BIOS	Yes
F000:0000-F000:FFFF	Motherboard BIOS	Yes

I/O Mapping

I/O Address	Owner	Usage
0000h - 000Fh	DMA 8237-1	Yes
0010h - 0017h	COM9	
0018h - 001Fh	Empty	
0020h - 0021h	PIC 8259-1	Yes
0022h - 0023h	6117D configuration port	Yes
0024h - 002Dh	Empty	
0030h - 003Fh	Empty	
0040h - 0043h	Timer counter 8254	Yes
0044h - 0047h	Empty	
0048h - 004Bh	PWM counter 8254	Yes
004Ch - 004Dh	Empty	
0050h - 005Fh	Empty	
0060h	Keyboard data port	Yes
0061h	Port B + NMI control port	Yes
0062h - 0063h	8051 download 4K address counter	Yes

0064h	Keyboard status port	Yes
0065h	WatchDog0 reload counter	Yes
0066h	8051 download 8bit data port	Yes
0067h	WatchDog1 reload counter	Yes
0068h - 006Dh	WatchDog1 control register	Yes
006Eh - 006Fh	Empty	
0070h - 0071h	CMOS RAM port	Yes
0072h - 0075h	MTBF counter	Yes
0076h - 0077h	Empty	
0078h	GPIO data port 0	Yes
0079h – 007ch	GPIO data port 1,2,3,4	
007Dh - 007Fh	Empty	
0080h - 008Fh	DMA page register	Yes
0090h - 0091h	Empty	
0092h	System control register	Yes
0093h – 0097h	GPIO direction address Port 6,7,8,9,A	
0098h	GPIO direction address Port 0	Yes
0099h	GPIO direction address Port 1	
009Ah	GPIO direction address Port 2	
009Bh	GPIO direction address Port 3	
009Ch	GPIO direction address port 4	
009Dh	GPIO direction address Port 5	
00A0h - 00A1h	PIC 8259-2	Yes
00A2h - 00BFh	Empty	
00C0h - 00DFh	DMA 8237-2	Yes
00E0h - 00FFh	Empty	
0100h	GPIO data address Port 5	
0101h	GPIO data address Port 6	
0102h	GPIO data address Port 7	
0103h	GPIO data address Port 8	
0104h	GPIO data address Port 9	
0105h	GPIO data address Port A	
0170h - 0177h	IDE1 (IRQ 15)	Yes

01F0h - 01F7h	IDE0 (IRQ 14)	Yes
0260h – 0267h	COM6 (IRQ 3)	
0268h – 026Fh	COM8 (IRQ 11)	
02E8h - 02EFh	COM4 (IRQ 11)	
02F8h - 02FFh	COM2 (IRQ 3)	Yes
0376h	IDE1 ATAPI device control write only register	Yes
0360h – 0367h	COM5 (IRQ 4)	
0368h – 036Fh	COM7 (IRQ 10)	
0378h - 037Fh	Printer port (IRQ 7，DMA 0)	
03E8h - 03EFh	COM3 (IRQ 10)	
03F0h - 03F7h	Floppy Disk (IRQ 6，DMA 2)	
03F6h	IDE0 ATAPI device control write only register	Yes
03F8h - 03FFh	COM1 (IRQ 4)	Yes
0480h - 048Fh	DMA High page register	Yes
0490h - 0499h	Instruction counter register	Yes
04D0h - 04D1h	8259 Edge / level control register	Yes
0CF8h - 0CFFh	PCI configuration port	Yes
1000h - 10FFh	on board LAN	Yes
FC00h - FC05h	SPI Flash BIOS control register	Yes
FC08h - FC0Dh	External SPI BUS control register (output pin configurable GPIO3[0-3])	Yes

IRQ Mapping

IRQ#	Description	Usage
IRQ0	System Timer	Yes
IRQ1	Keyboard Controller	Yes
IRQ2	Cascade for IRQ8 - 15	
IRQ3	Serial Port 2	
IRQ4	Serial Port 1	Yes
IRQ5	USB / RT0 / RT1 / RT2 / RT3	Yes
IRQ6	Ethernet (10M / 100M)	Yes
IRQ7	CAN Bus / HD Audio / SPI1 / I2C / GPIO0 / GPIO1	Yes
IRQ8	Real Time Clock	Yes
IRQ9	ACPI	Yes
IRQ10	Serial Port 3	

IRQ11	Serial Port 4	
IRQ12	PS2 Mouse	Yes
IRQ13	Math Coprocessor	Yes
IRQ14	Hard Disk Controller#1	Yes
IRQ15	Hard Disk Controller#2 / PIEDIRQ	Yes

DMA Mapping

DMA#	Description	Usage
DMA0		
DMA1		
DMA2	Floppy Disk Controller	
DMA3		
DMA5		
DMA6		
DMA7		

2.5.3 VEX-6253-5S-S

Memory Mapping

Address	Description	Usage
0000:0000-9000:FFFF	System RAM	Yes
A000:0000-A000:FFFF	EGA/VGA Video Memory	
B000:0000-B000:7FFF	MDA RAM, Hercules graphics display RAM	
B000:8000-B000:FFFF	CGA display RAM	
C000:0000-C000:7FFF	EGA/VGA BIOS ROM	
C000:8000-C000:FFFF	Boot ROM enable	
D000:0000-D700:FFFF	Expansion ROM space	
D800:0000-DB00:FFFF	SPI FLASH Emulation Floppy A Enable	Yes
DC00:0000-DF00:FFFF	Expansion ROM space	
E000:0000-E000:FFFF	Motherboard BIOS	Yes
F000:0000-F000:FFFF	Motherboard BIOS	Yes

I/O Mapping

I/O Address	Owner	Usage
0000h - 000Fh	DMA 8237-1	Yes
0010h - 0017h	COM9	
0018h - 001Fh	Empty	
0020h - 0021h	PIC 8259-1	Yes
0022h - 0023h	6117D configuration port	Yes
0024h - 002Dh	Empty	
0030h - 003Fh	Empty	
0040h - 0043h	Timer counter 8254	Yes
0044h - 0047h	Empty	
0048h - 004Bh	PWM counter 8254	Yes
004Ch - 004Dh	Empty	
0050h - 005Fh	Empty	
0060h	Keyboard data port	Yes
0061h	Port B + NMI control port	Yes
0062h - 0063h	8051 download 4K address counter	Yes

0064h	Keyboard status port	Yes
0065h	WatchDog0 reload counter	Yes
0066h	8051 download 8bit data port	Yes
0067h	WatchDog1 reload counter	Yes
0068h - 006Dh	WatchDog1 control register	Yes
006Eh - 006Fh	Empty	
0070h - 0071h	CMOS RAM port	Yes
0072h - 0075h	MTBF counter	Yes
0076h - 0077h	Empty	
0078h	GPIO data port 0	
0079h – 007ch	GPIO data port 1,2,3,4	
007Dh - 007Fh	Empty	
0080h - 008Fh	DMA page register	Yes
0090h - 0091h	Empty	
0092h	System control register	Yes
0093h – 0097h	GPIO direction address Port 6,7,8,9,A	
0098h	GPIO direction address Port 0	
0099h	GPIO direction address Port 1	
009Ah	GPIO direction address Port 2	
009Bh	GPIO direction address Port 3	
009Ch	GPIO direction address port 4	
009Dh	GPIO direction address Port 5	
00A0h - 00A1h	PIC 8259-2	Yes
00A2h - 00BFh	Empty	
00C0h - 00DFh	DMA 8237-2	Yes
00E0h - 00FFh	Empty	
0100h	GPIO data address Port 5	
0101h	GPIO data address Port 6	
0102h	GPIO data address Port 7	
0103h	GPIO data address Port 8	
0104h	GPIO data address Port 9	
0105h	GPIO data address Port A	
0170h - 0177h	IDE1 (IRQ 15)	Yes

01F0h - 01F7h	IDE0 (IRQ 14)	Yes
0260h – 0267h	COM6 (IRQ 3)	Yes
0268h – 026Fh	COM8 (IRQ 11)	Yes
02E8h - 02EFh	COM4 (IRQ 11)	
02F8h - 02FFh	COM2 (IRQ 3)	Yes
0376h	IDE1 ATAPI device control write only register	Yes
0360h – 0367h	COM5 (IRQ 4)	Yes
0368h – 036Fh	COM7 (IRQ 10)	Yes
0378h - 037Fh	Printer port (IRQ 7 , DMA 0)	
03E8h - 03EFh	COM3 (IRQ 10)	
03F0h - 03F7h	Floppy Disk (IRQ 6 , DMA 2)	
03F6h	IDE0 ATAPI device control write only register	Yes
03F8h - 03FFh	COM1 (IRQ 4)	Yes
0480h - 048Fh	DMA High page register	Yes
0490h - 0499h	Instruction counter register	Yes
04D0h - 04D1h	8259 Edge / level control register	Yes
0CF8h - 0CFFh	PCI configuration port	Yes
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IRQ Mapping

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IRQ7	CAN Bus / HD Audio / SPI1 / I2C / GPIO0 / GPIO1	Yes
IRQ8	Real Time Clock	Yes
IRQ9	ACPI	Yes
IRQ10	Serial Port 3	Yes

IRQ11	Serial Port 4	Yes
IRQ12	PS2 Mouse	Yes
IRQ13	Math Coprocessor	Yes
IRQ14	Hard Disk Controller#1	Yes
IRQ15	Hard Disk Controller#2 / PIEDIRQ	Yes

DMA Mapping

DMA#	Description	Usage
DMA0		
DMA1		
DMA2	Floppy Disk Controller	
DMA3		
DMA5		
DMA6		
DMA7		

2.6 Watchdog Timer

There are two watchdog timers in Vortex86SX/DX/DX2/EX CPU. One is compatible with M6117D watchdog timer and the other is new. The M6117D compatible watchdog timer is called WDT0 and new one is called WDT1.

We also provide DOS, Linux and WinCE example for your reference. For more technical support, please visit: http://dmp.com.tw/tech.

2.7 SPI flash (Serial Peripheral Interface)

SPI Flash (Serial Peripheral Interface) offers many benefits including: reduced controller pin count, smaller and simpler PCBs, reduced switching noise, less power consumption, and lower system cost.

If users are considering using a formatted SPI flash to boot the system or emulate SPI flash as Floppy (A: Driver or B: Driver), changing CMOS Setup will be required. Boot up under DOS 6.22, X-DOS, DR-DOS or Free DOS is recommended.

For more technical support, please visit: http://dmp.com.tw/tech.

2.8 A/D (Analog-to-Digital) Converter

Onboard ADC is an 11-bit, 100kS/s analog-to-digital converter. This ADC adopts successive approximation register (SAR) architecture which using a 9-bit charge scaling sub-DAC for MSB and a 2-bit voltage scaling sub-DAC for LSB. The input range is between 0 and VCCA (3.3V).

Features

- 11-bit, 100kS/s SAR A/D Converter
- 8-channel input
- Input signal range: 0V~VCC33A(3.3V)
- Operating voltage range: 2.93V~3.63V
- Operating junction temperature range: -40°C~125°C

Chapter 3

Driver Installation

LAN

The Vortex86EX processor integrates 10/100Mbps Ethernet controller that supports both 10/100BASE-T and allows direct connection to your 10/100Mbps Ethernet based Local Area Network for full interaction with local servers as well as wide area networks such as the Internet.

The controller supports: Half / Full-Duplex Ethernet function to double channel bandwidth, auto media detection.

Operating system support

The VEX-6253 CPU board supports embedded software: Free DOS, DOS 6.22, PCDOS 7.1, DR-DOS, x-DOS, OS/2, Windows CE 6.0, x-Linux, QNX, Vxworks and FreeBSD.

For drivers, please visit DMP official website: http://dmp.com.tw/tech, and if you cannot locate them, please mail us at info@icop.com.tw.

VEX-6253 also supports most of the popular Linux distributions, for more detail information, please also visit DMP official website: http://dmp.com.tw/tech.

Appendix

A. TCP/IP library for DOS real mode

DSock is a TCP/IP library for DOS real mode, which is used by RSIP. It provides simple C functions for programmer to write Internet applications. ICOP also provide Internet examples using DSock: BOOTP/DHCP, FTP server, SMTP client/server, HTTP server, TELNET server, Talk client/server, etc.

DSock provides a lot of example source code. Programmer can add Internet functions to their project easily and save development time. With a utility "MakeROM", programmer also can make a ROM image to fit their application, those examples can be seen in the following Application systems: Mity-Mite Serial Server, Web Camera Tiny Server and RSIP Serial Server.

DSock is free for all ICOP customers who are using M6117D/ Vortex86/ Vortex86SX/ Vortex86DX/ Vortex86DX2/ Vortex86EX CPU. ICOP also provides the business version, software charge required, of DSock for those customers who are using other x86 CPUs.
If you would like to use DSock or business version of DSock, please contact info@icop.com.tw or your regional sales representative.

Please download the trial DSock software and Utilities from our website:
http://www.dmp.com.tw/tech/dmp-lib/dsock/.

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.