



Vortex86-6074-L2

Vortex86 PC/104 CPU Module

**with 2S/CRT/LCD/ Dual LAN/Audio/2USB
128MB DRAM Onboard**

User's Manual

(Revision 1.0A)

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Table of Contents

Table of Contents.....	iii
Chapter 0	Startup
0.1	Packing List..... 1
0.2	Specification 2
0.3	Board Dimension 4
Chapter 1	Introduction
1.1	Features 5
1.2	VGA Interface 6
Chapter 2	Installation
2.1	Board Outline 7
2.2	Connectors & Jumpers Location 8
2.3	Connectors & Jumpers Summary 9
2.4	Pin Assignments & Jumper Settings 10
2.5	IRQ Mapping..... 19
2.6	Watchdog Timer 20
Chapter 3	SVGA Setup
3.1	Introduction 23
3.2	Flat Panel BIOS Setting..... 24
3.3	Flat Panel Wiring..... 24
Chapter 4	Network Interface
4.1	Introduction 25
4.2	Software Support..... 25
Warranty	26

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Chapter 0

Startup

0.1 Packing List

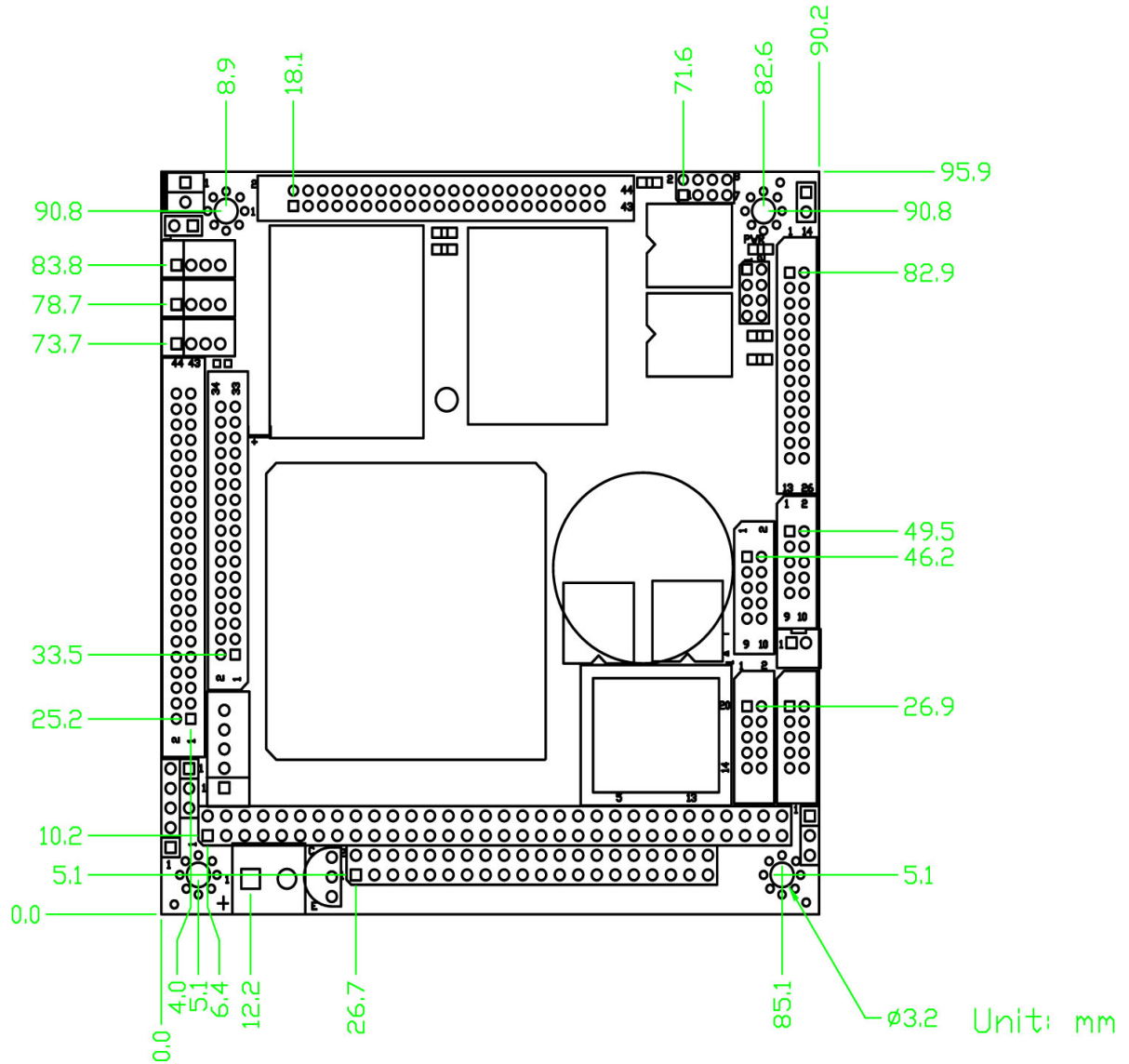
Product Name	Package
Vortex86-6074-L2	<ul style="list-style-type: none">● Embedded Vortex86 CPU All-in-One Board● Manual & Drivers CD x 1● RS232 cable x 2● PRINTER cable x1● FDD cable x 1● IDE cable x 1 (44pin to 40 pin)● VGA cable x 1● Audio cable x 1● USB cable x 1 (USB port x 2)● PS/2 Mouse cable x 1● PS/2 Keyboard cable x1● RJ-45 LAN cable x 2

0.2 Specification (Vortex86-6074-L2)

Features	Vortex86-6074-L2
Chipset	DM&P(SiS) Vortex86™ System-on-Chip CPU–166MHz Real Time Clock with Lithium Battery Backup
BIOS	AMI BIOS
System Memory	128MB SDRAM onboard
Bus Interface	PC/104 Standard Compliant
Watchdog Timer	Software programmable from 4ms to 1hour
VGA	AGP Rev.2.0 compliant Shared system memory up to 32MB (Default 8 MB) Support resolution up to 1,280x1,024 true colors VGA and TFT/LVDS Flat Panel interface support
LAN 1	Realtek 8100B 10/100Mbps Ethernet Controller Half/Full duplex capability
LAN 2	Realtek 8100B 10/100Mbps Ethernet Controller Half/Full duplex capability
Audio	Compliant with AC97 V2.1
I /O Interface	<ul style="list-style-type: none"> ● Enhanced IDE interface ● RS232 port x2 ● RS232/485 port x1 (RS485 with Auto Direction) ● Parallel port x1 ● FDD interface x1 ● USB port x2 (USB 1.1 version)
Connectors	<ul style="list-style-type: none"> ● 2.0mm Ø 44-pin box header for IDE x1 ● 2.0mm Ø 34-pin box header for FDD x1 ● 2.0mm Ø 26-pin box header for Printer x1 ● 2.0mm Ø 10-pin box header for RS-232 x2 ● 2.54mmØ 2-pin header for RS-485 ● 2.0mm Ø 8-pin header for LAN x 2 ● 2.0mm Ø 10-pin box header for USB ● 2.0mm Ø 10-pin box header for VGA ● 2.0mm Ø 44-pin box header for LCD Interface ● 4-pin box header for Audio x 3 (Audio-in,Audio-out, Mic-in) ● 2.54mm 5-pin header for keyboard x 1 ● 2.54mm 5-pin header for Mouse x 1
Flash Disk Support	● 44-pin IDE Flash Disk(EmbedDisk 16MB or above)
Power Requirement	Single Voltage +5V @940 mA

Dimension	90mm X 96mm (3.54" x 3.77 inches)
Weight	140g
Operating Temperature	-20°C ~ +70°C

0.3 Board Dimension



Chapter 1

Introduction

1.1 Features

- **Embedded CPU:** DM&P Vortex86™ System-on-Chip CPU – 166MHz, Real time clock, and watchdog timer.
- **BIOS:** AMI system BIOS
- **DRAM Memory:** Onboard 128MB
- **Bus Interface:** PC/104 Standard Compliant
- **Data Bus:** 64-bit
- **Bus Speeds:** PCI Bus – 33MHz
- **DMA Channels:** 7
- **Interrupt Levels:** 15
- **Enhanced IDE:** supports one port and up to two hard drives or Enhanced IDE devices of PIO mode 4. BIOS enabled/disabled
- **Watchdog Timer:** generates either a RESET, NMI or an IRQ when your application loses control over the system. Optionally the watchdog can trigger a user specified interrupt. The watchdog is configurable from 16 msec. to 512 seconds
- **Real-time Clock:** included in Vortex86 SOC with onboard lithium battery backup . CMOS data backup of BIOS setup and BIOS default.
- **PS/2 Keyboard & Mouse:** Supports PS/2 Keyboard and mouse
- **Serial ports:** Supports high speed RS-232 port x2, high speed RS-232/485 port x1 (jumper selectable). The RS485 interface is Auto Direction.
- **USB ports:** Version 1.1 USB port x2
- **Floppy Disk Drive Interface:** supports up to two floppy drives, 5¼“(360 KB or 1.2 MB) and 3½“(720 KB, 1.44 MB). BIOS enabled / disabled
- **Bi-directional Parallel Port:** supports SPP, EPP and ECP mode. BIOS enabled/disabled

1.2 VGA Interface

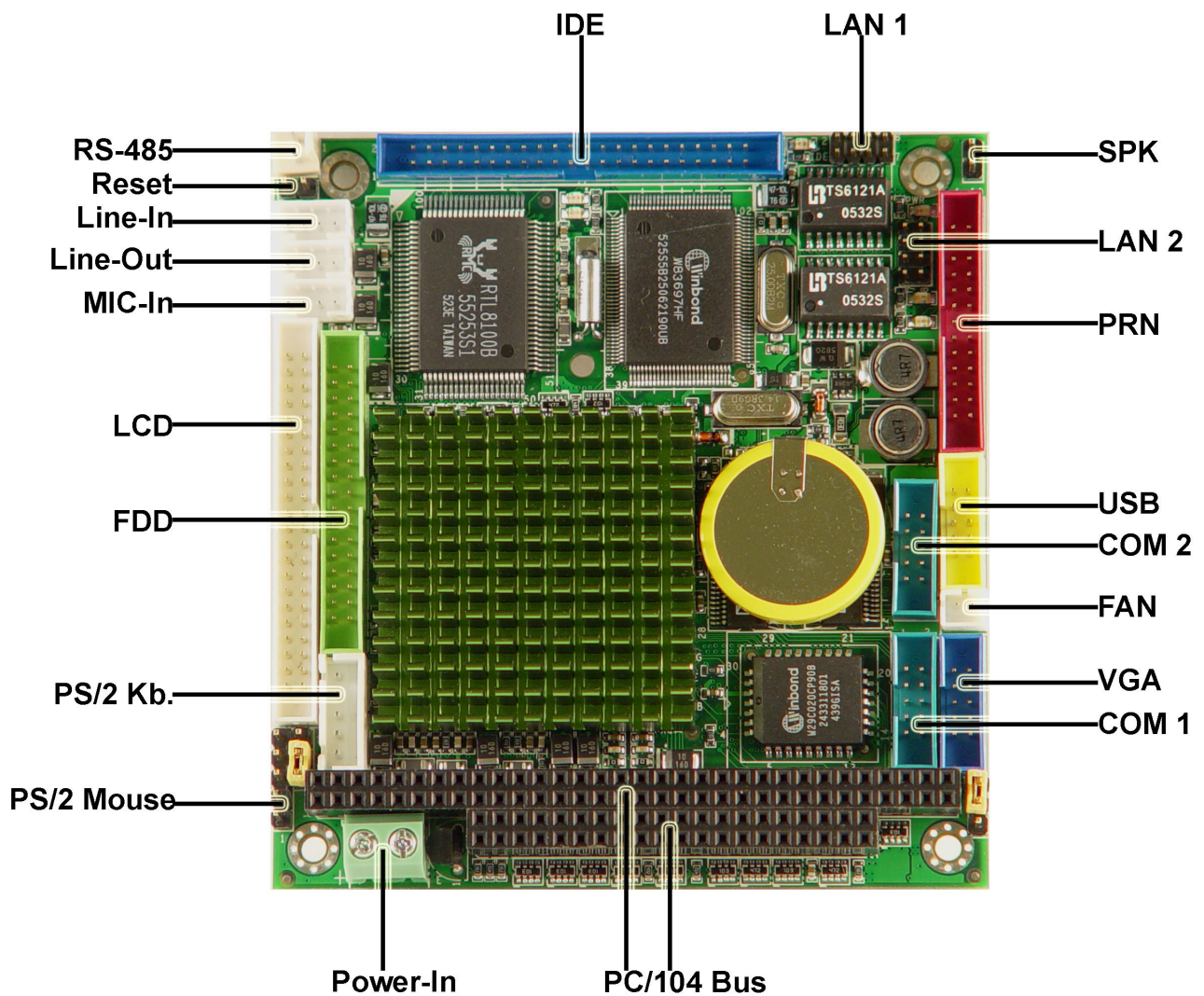
- **Chipset:** DM&P Vortex86™ SOC
- **Memory:** Shared system memory up to 32MB
- **System Bus:** 33-bit PCI bus
- **Panel Data Bus:** 18-bit
- **Display:** CRT and LCD Flat Panel

- **Compliance:**
 - AGP 2.0 / 4X Compliant / Fully DirectX 8 Compliant

Chapter 2

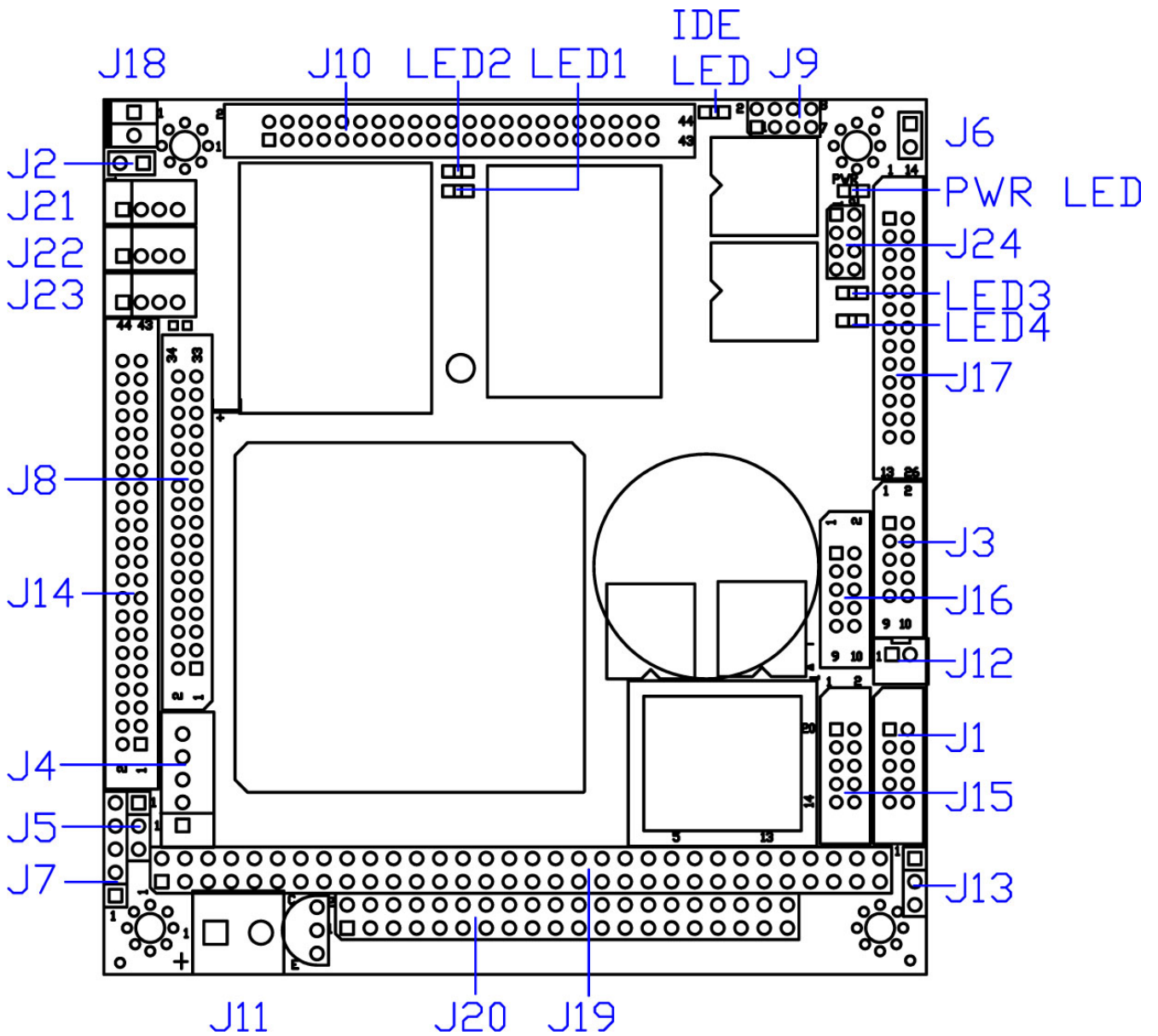
Installation

2.1 Board Outline



2.2 Connectors & Jumpers Location

Solder Side



2.3 Connectors & Jumpers Summary

Summary Table			
Nbr	Description	Type of Connections	Pin nbrs.
J1	VGA	Pin Header, 2.0Ø , 5x2	10-pin
J2	RESET	Pin Header, 2.54Ø, 1x2	2-pin
J3	USB	Box Header, 2.0Ø , 5x2	10-pin
J4	Keyboard	Pin Header, 2.54Ø, 1x5	5-pin
J5	LCD Volts Sel.	Pin Header, 2.54Ø , 3x1	3-pin
J6	Speaker	Pin Header, 2.54Ø , 2x1	2-pin
J7	Mouse	Pin Header, 2.54Ø, 1x5	5-pin
J8	LCD Connector	Box Header, 2.0Ø , 22x2	44-pin
J9	LAN 1	Pin Header, 2.0Ø , 4x2	8-pin
J10	IDE	Box Header, 2.0Ø , 22x2	44-pin
J11	Power Connector	Terminal Block 5.0Ø , 2x1	2-pin
J12	FAN	Molex Header, 2.0Ø , 2x1	2-pin
J13	RS232/RS485 Select (COM 2)	Pin Header, 2.54Ø, 3x1	4-pin
J14	FDD	Pin Header, 2.0Ø , 17x2	34-pin
J15	COM1	Pin Header, 2.0Ø , 5x2	10-pin
J16	COM2	Pin Header, 2.0Ø 5x2	10-pin
J17	PRINT	Pin Header, 2.0Ø , 13x2	26-pin
J18	RS-485	Molex Header, 2.0Ø , 2x1	2-pin
J19	PC104 Connector – 64 pin	Box Header, 2.54Ø 32x2	64 pin
J20	PC104 Connector – 40 pin	Box Header, 2.54Ø 20x2	40-pin
J21	LINE IN	Molex Header, 2.0Ø, 4x1	4-pin
J22	LINE OUT	Molex Header, 2.0Ø, 4x1	4-pin
J23	MIC IN	Molex Header, 2.0Ø, 4x1	4-pin
J24	LAN 2	Pin Header, 2.0Ø , 4x2	8-pin
IDE-LED	IDE Active LED (Yellow)		
LED 1	LAN 1 Link LED (Yellow)		
LED 2	LAN 1 Active LCD (Green)		
LED 3	LAN 2 Link LED (Yellow)		
LED 4	LAN 2 Active LCD (Green)		

2.4 Pin Assignments & Jumper Settings

J1: VGA

Pin #	Signal Name	Pin #	Signal Name
1	R OUT	2	GND
3	G OUT	4	GND
5	B OUT	6	GND
7	HSYNC	8	GND
9	VSYNCD	10	GND

J2: RESET

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

J3: USB

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	-DATA1	4	-DATA0
5	+DATA1	6	+DATA0
7	GND	8	GND
9	GND	10	GND

J4: Keyboard

Pin #	Signal Name	Pin #	Signal Name
1	KBCLK	2	KBDAT
3	NC	4	GND
5	SB5V		

J5: LCD Volts Sel.

Pin #	Signal Name	Pin #	Signal Name
1-2	+5V	2-3	+3.3V

J6: Speaker

Pin #	Signal Name	Pin #	Signal Name
1	SPKR	2	VCC

J7: Mouse

Pin #	Signal Name	Pin #	Signal Name
1	PMCLK	2	PMDAT
3	NC	4	GND
5	SB5V		

J8: LCD Connector (for 18-bit TFT LCD)

Pin #	Signal Name	Pin #	Signal Name
1	LCDVCC	2	LCDVCC
3	G2	4	G3
5	G4	6	G5
7	-----	8	-----
9	R0	10	R1
11	R2	12	R3
13	R4	14	R5
15	GND	16	-----
17	-----	18	-----
19	-----	20	GND
21	-----	22	-----
23	B0	24	B1
25	B2	26	B3
27	B4	28	B5
29	-----	30	-----
31	G0	32	G1
33	GND	34	GND
35	-----	36	XCLK
37	-----	38	DEN
39	-----	40	HSYNC
41	-----	42	VSYSN
43	-----	44	VDDEN

J9: LAN1

Pin #	Signal Name	Pin #	Signal Name
1	TX+	2	TX-
3	RX+	4	LED0
5	LED0+	6	RX-
7	LED1+	8	LED1

J10: IDE

Pin #	Signal Name	Pin #	Signal Name
1	IDERST-	2	GND
3	IDED7	4	IDED8
5	IDED6	6	IDED9
7	IDED5	8	IDED10
9	IDED4	10	IDED11
11	IDED3	12	IDED12
13	IDED2	14	IDED13
15	IDED1	16	IDED14
17	IDED0	18	IDED15
19	GND	20	NC
21	IDEREQ	22	GND
23	IDEIOW-	24	GND
25	IDEIOR-	26	GND
27	ICHRDY	28	GND
29	IDACK-	30	GND
31	IDEIRQ	32	NC
33	IDESA1	34	CBLID
35	IDESA0	36	IDESA2
37	IDECS-0	38	IDECS-1
39	DASP	40	GND
41	VCC	42	VCC
43	GND	44	NC

J11: Power Connector

Pin #	Signal Name
1	SB5V
2	GND

J12: FAN

Pin #	Signal Name
1	VCC
2	GND

J13: RS232/RS485 Select (COM2)

Pin #	Signal Name
1-2	COM2 RS232
2-3	RS485

J14: FDD

Pin #	Signal Name	Pin #	Signal Name
34	DSKCHG\	33	GDN
32	HDSEL\	31	GDN
30	RD\	29	GDN
28	WP\	27	GDN
26	TR0\	25	GDN
24	WG\	23	GDN
22	WD\	21	GDN
20	STEP\	19	GDN
18	DIR\	17	GDN
16	MTR1\	15	GDN
14	DS0\	13	GDN
12	DS1\	11	GDN
10	MTR0\	9	GDN
8	INDEX\	7	GDN
6	NC	5	GDN
4	NC	3	GDN
2	DENSEL	1	GDN

J15: COM1

Pin #	Signal Name	Pin #	Signal Name
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	VCC

J16: COM2

Pin #	Signal Name	Pin #	Signal Name
1	DCD2	2	RXD2
3	TXD2	4	DTR2
5	GND	6	DSR2
7	RTS2	8	CTS2
9	RI2	10	VCC

J17: PRINT

Pin #	Signal Name	Pin #	Signal Name
1	STB-	2	PD0
3	PD1	4	PD2
5	PD3	6	PD4
7	PD5	8	PD6
9	PD7	10	ACK-
11	BUSY	12	PE
13	SLCT	14	AFD-
15	ERR-	16	PRINIT-
17	SLIN-	18	GND
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	GND	--	--

J18: RS-485

Pin #	Signal Name
1	RS485+
2	RS485-

J19: PC104 Connector – 64pin

Pin #	Signal Name	Pin #	Signal Name
1	IOCHCHK *	2	GND
3	SD7	4	RESETDRV
5	SD6	6	+5V
7	SD5	8	IRQ9
9	SD4	10	-5V
11	SD3	12	DRQ2
13	SD2	14	-12V
15	SD1	16	ENDXFR *
17	SD0	18	+12V
19	IOCHRDY	20	(KEY)
21	AEN	22	SMEMW *
23	SA19	24	SMEMR *
25	SA18	26	IOW *
27	SA17	28	IOR *
29	SA16	30	DACK3 *
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	DACK2 *
53	SA4	54	TC
55	SA3	56	SALE
57	SA2	58	+5V
59	SA1	60	OSC
61	SA0	62	GND
63	GND	64	GND

J20: PC104 Connector – 40pin

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GND
3	MEMCS16 *	4	SBHE *
5	IOCS16 *	6	LA23
7	IRQ10	8	LA22
9	IRQ11	10	LA21
11	IRQ12	12	LA20
13	IRQ15	14	LA19
15	IRQ14	16	LA18
17	DACK0 *	18	LA17
19	DRQ0	20	MEMR *
21	DACK5 *	22	MEMW *
23	DRQ5	24	SD8
25	DACK6 *	26	SD9
27	DRQ6	28	SD10
29	DACK7 *	30	SD11
31	DRQ7	32	SD12
33	+5V	34	SD13
35	MASTER *	36	SD14
37	GND	38	SD15
39	GND	40	(KEY)

J21: LINE IN

Pin #	Signal Name
1	LINEIN_R
2	GND
3	GND
4	LINEIN_L

J22: LINE OUT

Pin #	Signal Name
1	LOUTR
2	GND
3	GND
4	LOUTL

J23: MIC IN

Pin #	Signal Name
1	VREFOUT
2	GND
3	GND
4	MIC1

J24: LAN2

Pin #	Signal Name	Pin #	Signal Name
1	TX+	2	TX-
3	RX+	4	LED0
5	LED0+	6	RX-
7	LED1+	8	LED1

2.5 IRQ Mapping

IRQ#	Description
IRQ0	System Timer
IRQ1	Keyboard Controller
IRQ2	Cascade for IRQ8 - 15
IRQ3	Serial Port 2
IRQ4	Serial Port 1
IRQ5	Ethernet 10/100M LAN # 1
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port 1
IRQ8	Real Time Clock
IRQ9	Unassigned
IRQ10	Ethernet 10/100M LAN # 2 & Audio
IRQ11	USB
IRQ12	PS/2 Mouse
IRQ13	Math Coprocessor
IRQ14	Hard Disk Controller
IRQ15	Unassigned

2.6 Watchdog Timer

The watchdog timer work flow of Vortex86 is: If the watchdog timer expires the first time, the expired event will set SFTMR0_STS and timer will reload its initial value and count again. If the timer expire the second time, the expired event will set SFTMR1_STS.

Software Watchdog Timer Initial Value: Default Value: FFh

I/O Address	Bit	Access	Description
84Ah	7:0	R/W	Software Watchdog Timer Initial Value Writing to this register will reload the software watchdog timer with the value specified in this register. If the software watchdog timer expires the first time, the expired event will set the SFTMR0_STS and the timer will reload its initial value and count again. If the timer expire the second time, the expired event will set the SFTMR1_STS. The timer value can't be read from this field.

Software Watchdog Timer Control Register: Default Value: 00h

I/O Address	Bit	Access	Description
84Bh	7	R/W	Software Watchdog Timer Counting Enable The software watchdog timer will start to count when this bit is set to one.
	6	RO	Reserved
	5:4	R/W	Software Watchdog Timer Clock Select 00 : 4 ms 01 : 1 second 10 : 1 minute 11 : 1 hour

3:2	R/W	Software Watchdog Timer Expiration Event 1 Routing Select When SFTMR1_STS is set to one, an SMI#/SFTIRQ/PCIRST# will be generated according to the following combination. 00 : No effect 01 : SMI# 10 : SFTIRQ 11 : PCIRST#
1:0	R/W	Software Watchdog Timer Expiration Event 0 Routing Select When SFTMR0_STS is set to one, an SMI#/SFTIRQ/PCIRST# will be generated according to the following combination. 00 : No effect 01 : SMI# 10 : SFTIRQ 11 : PCIRST#

Legacy Event Status Register: Default Value: 00h

I/O Address	Bit	Access	Description
841h	7	R/WC	Software Watch Dog Timer Event 1 Status (SFTMR1_STS) This bit is set when the software watchdog timer expires the second time. This status bit does not have its corresponding enable bit and can survive under PCIRST#.
	6	R/WC	Software Watch Dog Timer Event 0 Status (SFTMR0_STS) This bit is set when the software watchdog timer expires the second time. This status bit does not have its corresponding enable bit and can survive under PCIRST#.

C Example

Those C code for DOS will show you more: ([Download C source code for DOS and execute file](#))

```
#include <conio.h>
#include <stdio.h>
#include <time.h>

void main()
{
    clock_t clk;
    int      nTime = 5;
```

```

/* set time out */
outp(0x84a, nTime);

/* set timer clock to 1 second and "Timer Expiration Event 0/1" to reset system. */
outp(0x84b, 0x9c);

printf("Press any key to stop clearing watchdog timer status...\n");
while(!kbhit())
{
    /* clear "Timer Expiration Event 0/1" bit */
    outp(0x841, 0xc0);
}

getch();

printf("System will be reset after %d seconds.\n", nTime * 4);

clk = clock();
while(!kbhit())
    printf("%2.2fr", (clock() - clk) / CLK_TCK);
}

```

Assembler Example code

```

mov dx,84ah ; set timeout = 20 second
mov al,5
out dx,al
mov dx,84bh ; set timer clock to 1 second and "Timer Expiration Event 0/1" to reset
system.
mov al,9ch
out dx,al

; clearing watchdog timer status
mov dx,841h
mov al,0c0h
out dx,al

```

Chapter 3

SVGA Setup

3.1 Introduction

The VORTEX86-6074 offers high performance/low cost Vortex™ SoC (System on Chip) solution that. Integrates a x86 compatible processor, high performance North Bridge, advanced hardware GUI engine and Super-South Bridge into a single chipset. It also has a built-in VGA controller.

3.1.1 SoC Chipset

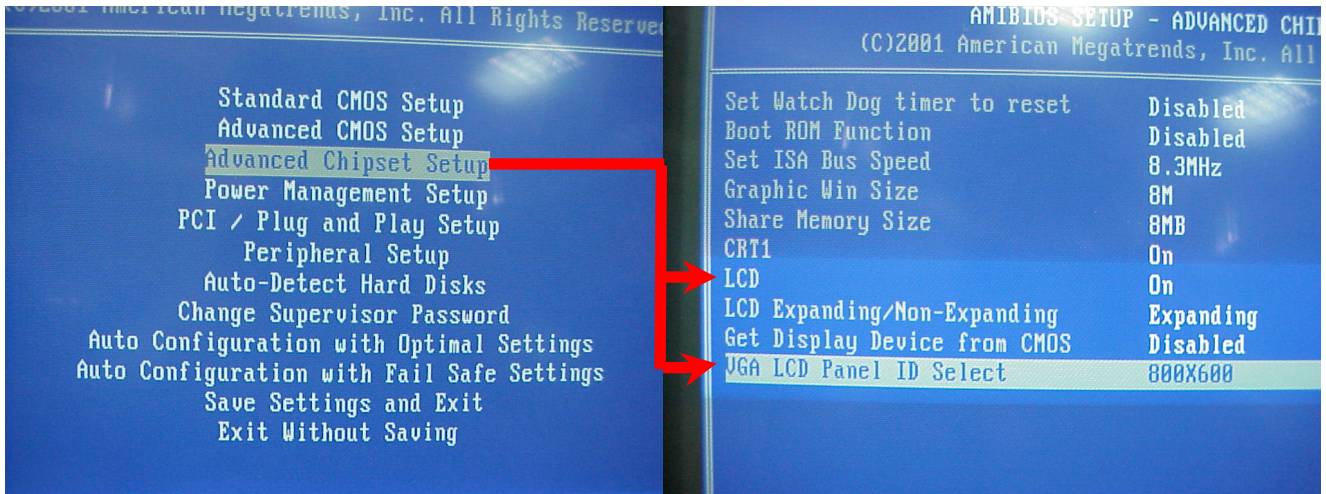
The embedded video uses the integrated Ultra-AGP™ VGA controller for Hardware 2D/video/Graphics Accelerators, this board supports conventional analog CRT monitor or flat panel. It is both AGP 4X / Fully DirectX 8 Compliant. It also provides Monitor / Secondary CRT Monitor output. This video SVGA controller supports conventional analog CRT monitor or flat panel. In addition, it also supports interlaced and non-interlaced analog monitors (color and monochrome VGA) in high-resolution modes while maintaining complete IBM VGA compatibility. Multiple frequency (multi-sync) monitors are handled as if they were analog monitors.

3.1.2 Display memory

The VGA controller can drive CRT displays or color panel displays with resolutions up to 1920 x 1440 at 256 colors (True colors). It supports Shared System Memory up to 32 MB.

3.2 Flat Panel BIOS Setting

The VORTEX86-6074 offers the option in the BIOS Setting to ON/OFF the LCD Flat Panel. Before you connect the LCD Flat Panel to CPU Board, please go to BIOS → Advanced Chipset Setup, to turn “ON” the “LCD”, and select the corresponding resolution on “VGA LCD Panel ID Select”.



3.3 Flat Panel Wiring

Before you connect the LCD Flat Panel with VORTEX86-6074, please make the your LCD Flat Panel is 3.3V or 5V, then place the [J5 \(Jumper 6, see page 12\)](#) on the correct position.

For the Wiring, please refer to page 12, [J8: LCD connector](#). Or mail to info@icop.com.tw if you have any questions.

Chapter 4

Network Interface

4.1 Introduction

The Realtek RTL-8100B 10/100Mbps Ethernet controller board supports both 10/100BASE-T and allows direct connection to your 10/100Mbps Ethernet based Local Area Network for full interaction with local servers, wide area networks such as the Internet.

I/O and IRQ settings can be done by software with the supplied utility software, or it can be set for Plug and Play compatibility. The controller supports: Half / Full-Duplex Ethernet function to double channel bandwidth, auto media detection.

- **Chipset:** Realtek 8100B single chip
- **Type:** 10/100BASE-T
- **Transfer Mode:** Full duplex, doubles effective bandwidth
- **Buffer:** Built-in 16KB RAM Buffer.
- **Connectors:** 8-pin male header , pitch 2.0mm
- **Monitoring LEDs:** network ready indicator, network activity indicator

4.2 Software Support

- On-board EEPROM (93C46) programming
- Setup/Diagnostic program for DOS
- Help utility for easy installation
- RPL boot ROM for Novell Netware, Microsoft NT
- NDIS2 (DOS, OS/2, Lantastic, WFW3.1j;K;K)
- NDIS3, NDIS4, NDIS5 for WIN95, 98, NT3.51, 4.0, 5.0, WFW3.11
- Netware 16-bit ODI driver for DOS, OS/2 and 32-bit ODI driver for Netware 3.x, 4.x, 5.0 Server
- Packet driver for UNIX Client
- SCO Unix driver
- Linux driver

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.