

ICOP-6037VE

**Embedded 5x86 3.5"-size All-in-One CPU
Board**

User' s Manual

(Version 1.0)

Copyright Notice

This document is copyrighted, 2001 by ICOP Technology Inc. All rights are reserved. The information in the manual is subject to change without notice in order to improving products.

No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of the manufacturer.

ICOP Technology Inc. assumes no responsibility for any inaccuracies that may be contained in this document. ICOP Technology Inc. makes no commitment to update or to keep current the information contained in this manual.

**ã Copyright 2001 by ICOP Technology Inc.
All rights reserved. Ver.1.0 2001,
Printed in Taiwan**

Trademarks Acknowledgments

All brand names and trademarks are the properties and registered brands of their respective owners

Table of Contents

Table of Contents

iii

Chapter 0 Startup

0.1 Packing List.....	1
0.2 Specifications.....	2
0.3 Component Location.....	3

Chapter 1 Introduction

1.1 Features.....	4
1.2 Specifications.....	5
1.3 VGA Interface.....	7
1.4 DiskOnChip 2000 Flash Disk.....	8
1.5 Network Interface	9

Chapter 2 Installation

2.1 Jumper Settings.....	10
2.2 Connectors.....	12
2.3 DiskOnChip/Flash ROM Disk	13
2.3.1 Setup a DiskOnChip ® 2000 Flash Disk	13
2.3.2 Setting up a Flash Disk	14
2.4 Watchdog Timer.....	15
2.5 General Purpose I/O.....	19

Chapter 3 SVGA Setup

3.1 Introduction.....	21
3.1.1 Chipset.....	21
3.1.2 Display memory.....	21
3.2 Installation of SVGA driver.....	21
3.2.1 Installation for Windows 3.1	23
3.2.2 Installation for Windows 95/98	25

Chapter 4 Network Interface

4.1 Introduction.....	27
4.2 Software Support.....	28

iii

Warranty

Chapter 0

Startup

0.1 Packing List

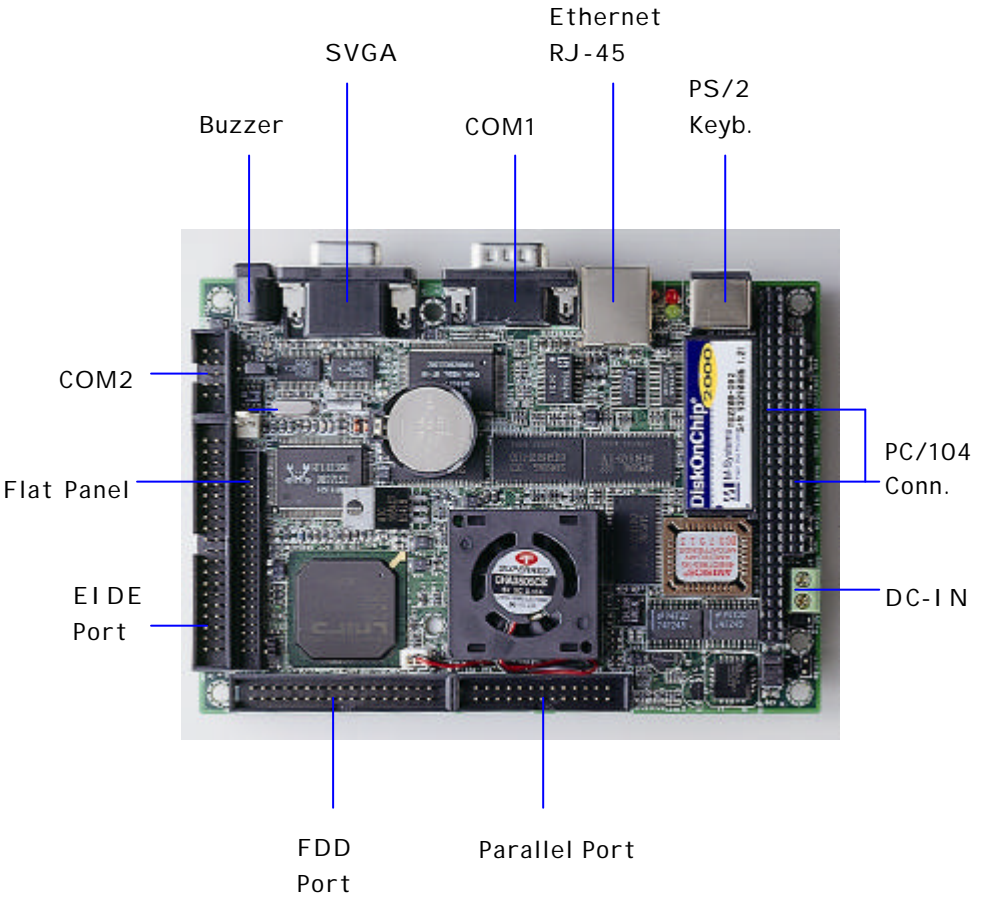
Product Name	Function	Package
ICOP-6037VE	Embedded 5x86 3.5"-size All-in-One CPU Board with VGA/LCD	<ul style="list-style-type: none">● ICOP-6037VE Embedded 5x86 3.5"-size All-in-One CPU Board● Utility and Drivers Diskette x 2● FDD cable x 1● HDD cable x 1● RS232 cable x 2● Printer cable with bracket x 1● AT KB / PS2 Mouse Y-cable x 1● VGA cable x 1

0.2 Specifications

Features	ICOP-6037VE
Chipset	SGS STPC Client, 66/75 MHz
Processor	5x86 CPU on-die
Multi I/O Chip	Winbond W83977F-A, ALi 5113
BIOS	AMI BIOS
Watchdog Timer	From 1 to 64 seconds
Bus Interface	PC/104 standard compliant
Memory	16MB onboard, up to 32MB onboard
Memory Sockets	1
DiskOnChip Socket	1
VGA Chipset	C&T 69000 (2MB)
Display	VGA/LCD
Enhanced IDE Port	1
Floppy Connector	1
Network Chipset	Realtek 8139AS
Network Interface	RJ-45
Serial Port	RS232 X 2 (or RS232 X 1,RS485 X 1)
Parallel Port	1
Power Requirement	+5V @1.6A
Board Weight	300g
Board Size	102mm X 144 mm
Operating Temperature	-20 ~ +60° C

0.3 Component Location

ICOP-6037VE



Chapter 1

Introduction

1.1 Features

- 3.5" -size (144x102 mm) Embedded CPU Module
- PC/104 connector
- SGS STPC Client 5x86 processor with FPU unit
- CRT and Flat Panel Display interface
- 16MB EDO RAM onboard and up to 32MB by expansion
- Enhanced IDE devices and FDD interface
- One Bi-directional Parallel Port
- RS-232/485 interface
- Watchdog timer
- Socket for Flash or DiskOnChip
- Onboard Keyboard, Mouse connector
- Onboard Ethernet, compatible with NE2000
- Single voltage +5 V power connector
- Operating temperature from -20 +60
- Flexible OEM/ODM design

1.2 Specifications

Chipset: SGS ST PC Client, 66/75MHz, 64-bit internal architecture

x86 processor with FPU unit

Enhanced IDE, Scatter/gather and Multi-word DMA

Data Bus: 16-bit

Bus Speeds: ISA - 8.3 MHz, PC/104 - 8.3 MHz

DMA Channels: 7

Interrupt Levels: 15

Watchdog Timer: from 0.5 to 32 seconds

Real-Time clock

BIOS: AMI BIOS

RAM: 16 MB up to 32 MB of EDO DRAM

I/O: Winbond W83977F-A, ALi 5113

two floppy drives

two hard drives or Enhanced IDE devices

one RS-232 port, one RS-232/485 port

Bi-directional Parallel Port

Bus Interface: PC/104

Connector:

External 9-pin D-Type male RS232 connector

External 15-pin D-Type female VGA connector

External 6-pin Mini DIN for AT-keyboard, PS2 Mouse

10-pin box header for RS232 port X 1

25-pin box header for parallel port

50-pin box header for flat panel VGA

2-pin header for RS485 port

34-pin box header for floppy disk drive

40-pin box header for enhanced IDE

One socket for flash ROM or DiskOnChip

RJ-45 connector for 10/100BASE-T

Display:

- Chipset: C&T CHIPS 69000
- Memory: 2MB integrated memory
- Display: resolution up to 1024x768 @ high colors
- Compatibility: VGA, TFT, DSTN, SSTN, EL, Plasma hardware
- OS Support: DOS, Windows, Windows 95/98, Windows NT, Windows CE, QNX, OS/2

LAN: Realtek 8139BL single chip

NE2000 compatible with built in 16 KB RAM buffer

Throughput : 10/100 Mbps

Power Requirements: single voltage +5 V @ 1.6 A

Dimensions: 102 (L) x 144 (W) mm.

Weight: 300g

Operating Temperature: -20~+60 °C

1.3 VGA Interface

The 69000 accelerator extends CHIPS's HiQVideo™ Series of mobile graphics/video accelerated controllers by embedding 2 MBytes of high speed SDRAM into the chip.

The 69000 is the first member of the HiQVideo family to integrate high speed SDRAM frame buffer memory into the chip. Using leading edge embedded memory logic technologies, the 69000 integrates 2 MBytes of SDRAM into the chip. By embedding SDRAM and graphics controller logic on the same die, the 69000 delivers uncompromised performance and at the same time consumes much less power than the discrete solution. The integrated SDRAM supports up to 83MHz operation, which provides up to 664MBytes/second frame buffer bandwidth. The increase in the frame buffer bandwidth enables the 69000 to support high color, high-resolution graphics modes and real-time video acceleration.

The 69000 is a highly integrated graphics/flat panel controller for notebooks, mini-notebook, industrial PC, and palmtop applications. By integrating 2MByte of SDRAM, graphics, flat panel, and CRT control logic on the same die, 69000 delivers superb 2D video performance, consumes minimal power and at the same time reduces the PCB real estate for the graphics subsystem. The 2MByte embedded SDRAM is arranged in a 64-bit configuration. The 69000 supports both Frame AGP and PCI bus which enables a wide range of system platforms.

1.4 DiskOnChip 2000 Flash Disk

Flash Disk DiskOnChip ® 2000

- **Package:** Single Chip FlashDisk in 32-pin DIP JEDEC
- **Capacity:** 1-144 MByte capacity
- **Data Reliability:** ECC/EDC error correction
- **Memory Window:** 8 Kbyte

1.5 Network Interface

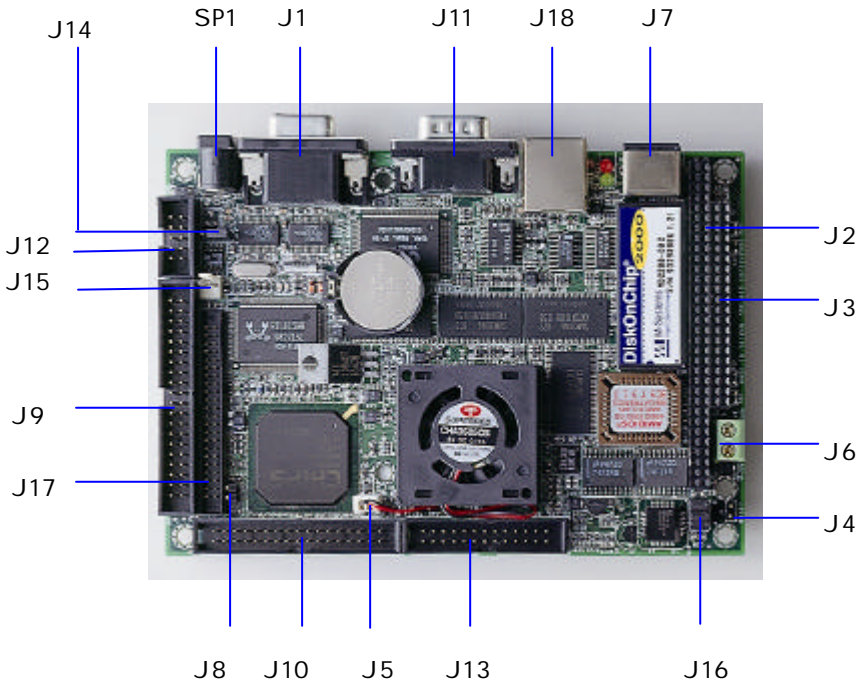
- **Chipset:** Realtek 8139BL single chip
- **Type:** 10/100BASE-T
- **Connectors:** onboard RJ-45 connectors
- **Monitoring LEDs:** network ready indicator, network activity indicator
- **Compatibility:** NE2000

Chapter 2

Installation

2.1 Jumper Settings

ICOP-6037VE



J14 RS-232/485 selection for Com2

1-2: RS-232

2-3: RS485

J16 DOC address select

DOC address	1-2	3-4	5-6
C800H (default)	close	close	close
CA00H	close	close	open
CC00H	close	open	close
CE00H	close	open	open
D800H	open	close	close
DA00H	open	close	open
DC00H	open	open	close
DE00H	open	open	open

2.2 Connectors

J1	External D-type CRT VGA Display connector
J2	64-pin PC/104 bus
J3	40-pin PC/104 bus
J4	RESET Switch
J5	Fan connector
J6	DC-IN Power connector
J7	PS2/KBD connector
J8	HDD LED
J9	40-pin IDE connector
J10	34-pin FDD connector
J11	9-pin male RS/232 connector for Com 1
J12	10-pin RS/232 box header for Com 2
J13	26-pin box header for printer port
J15	2-pin RS/485 connector
J17	44-pin LCD connector
J18	LAN RJ45 connector
SP1	BUZZER

2.3 DiskOnChip/Flash ROM Disk

2.3.1 Setup a DiskOnChip® 2000 Flash Disk

Installation Instructions

1. Make sure the ICOP-6026VE is powered OFF
2. Plug the DiskOnChip 2000 device(s) into its socket. Verify the direction is correct (pin 1 of the DiskOnChip 2000 is aligned with pin 1 of the socket)
3. Set address for both DiskOnChip devices (note that the last two settings are for normal Flash devices)
4. Power up the system
5. During power up you may observe the messages displayed by the DiskOnChip 2000 when its drivers are automatically loaded into system' s memory
6. At this stage the DiskOnChip 2000 can be accessed as any disk in the system
7. If the DiskOnChip 2000 is the only disk in the system, it will appear as the first disk (drive C: in DOS)
8. If there are more disks besides the DiskOnChip 2000, the DiskOnChip 2000 will appear by default as the last drive, unless it was programmed as first drive. (please refer to the DiskOnChip 2000 utilities user manual)
9. If you want the DiskOnChip 2000 to be bootable: a - copy the operating system files into the DiskOnChip by using the standard DOS command (for example: sys d:) b - The DiskOnChip should be the only disk in the systems or should be configured as the first disk in the system (c:) using the DUPDATE utility

For more information on DiskOnChip2000 technology, visit M-Systems Web site [http:// www.m-sys.com](http://www.m-sys.com) where you can find Utilities Manual, Data Sheets and Application Notes. In addition, you can find the lasted DiskOnChip 2000 S/W Utilities.

2.3.2 Setting up a Flash Disk

Before you can use the ICOP-6026VE' s Flash disk you will have to initialize it using a software utility called "PC104.EXE". This program can be found on the utility disk in the subdirectory "A:\FLASH"

- Connect a keyboard and floppy disk ICOP-6026VE to the PC/104 bus and boot-up your system.

- run PC104.EXE (this is a DOS command line utility)

```
ICOP-6026VE FLASH disk initialize program V1.0
```

```
FLASH manufacturer : (1)ATMEL (2)SST
```

```
Input manufacturer number (1,2) : 1
```

```
Input quantity of FLASH (1,2) : 2
```

```
Simulation disk:
```

```
(1)DISK-A (2)DISK-B (3)DISK-C (4)DISK-D
```

```
Input manufacturer number (1,2,3,4) : 1
```

```
FLASH-DISK initialize finish.
```

(Text in bold should be entered by user)

- After running the PC104.EXE configuration program reboot the system, while holding down the left "Ctrl" key. This will bring you to the "Flash Disk Utility"

- "CHANGE CURRENT DISK NUMBER" lets you select the drive you want to assign to the disk, either A, B, C or D

- "CHANGE FLASH DISK SIZE" lets you select the amount of Flash chips that are onboard.

- make selections and reboot the system after closing the program

Your disk can now be formatted and setup with normal DOS commands such as

FORMAT, FDISK, COPY, SYS etc.

Note : when assigning the solid state disk as either C or D, you first have to run FDISK before formatting the drive !

2.4 Watchdog Timer

The onboard watchdog timer can be disabled or enabled by software for either reboot by RESET. Upon boot the watchdog timer is always disabled.

Initialize and start the watchdog timer

Enable the SQW (Square Wave) output

This is done by writing the value 0B (hex) to address 70 (hex)

Out 70H,0BH

Set frequency of SQW generator

The only frequency valid is 1024 Hz,

selected by writing 0A (hex) to address 71 (hex)

Out 71H,0AH

Write time-out period to watchdog timer

The watchdog timer register counts consists of four lower bits:

D3, D2, D1, D0 at address F2 (hex).

D3 is used to enable/disable the watchdog timer itself. Its value should always be

- | | | |
|--------|----|------------|
| 1. bit | D3 | WDT status |
| | 1 | enabled |
| | 0 | disabled |

The three other bits define the actual time-out period :

D2	D1	D0	Time-out (seconds)
0	0	0	NA
0	0	1	64
0	1	0	32
0	1	1	16
1	0	0	8
1	0	1	4
1	1	0	2
1	1	1	1

To write for example : D3 = enable D2,D1,D0 = 1 second :

Out F2H,00001110B

Refresh the Watchdog timer

To refresh the watchdog timer simply reading the value at F2 (hex) is enough.

In AL,F2H

Programming Structure

STEP1

Out 70H,0BH (Enable SQW)

Out 71H,0AH (Set frequency to 1024 Hz)

STEP2

Out F2H,0AH (enable WDT and set time-out)

STEP3

Your application

STEP4

In AL,0F2H (refresh the WDT)

GO BACK TO STEP3

Programming Examples

The following program tests the Watchdog timer under DOS. In the program below the time-out interval is 8 seconds. You can change the interval yourself by editing line 2 of Step 2.

```
.model small
.data
.stack
.code
;step1 initialize the WDT
;step2 select the time out interval of WDT
;09=32 sec,0a=16 sec,0b=8 sec,0c=4 sec,0d=2 sec,0e=1
```

```

sec, 0f=0.5 sec
;main proc
;-----
; step 1 |
;-----
mov al,0bh
out 70h,al
mov al,0ah
out 71h,al
;-----
; step 2 (time-out period) |
;-----
mov al,0bh ;8 sec
out F2h,al
;-----
; return to dos |
;-----
mov ax,4c00h ; dos function
int 21h      ;call return to dos mode
main endp

```

```

main endp
end

```

If the program below is executed within the time-out period of the first program it disables the watchdog timer :

```

.model small
.data
.stack
.code

```

```
;clear WDT
main proc
in al,F2h
;-----.
; return to dos |
;-----.
mov ax,4c00h ; dos function
int 21h      ;call return to dos mode
main endp
end
```

2.5 General Purpose I/O

M6117D supports 16 independent GPOs and GPIs. This group of GPOs does not need external 74LS373 to latch as generate purpose output. Also this group of GPIs do not share signals with the ISA data bus, so no external 74LS245 is required either.

At boot time the state of the GPIO ports can be set in the BIOS.

Go to BIOS Setup' s “ **Advanced Chipset Setup**”

GPIO Sample Program

; Please use TASM to compiler the following program.

; Execute under DOS environment.

;

.286

.model small

.code

mov al,13h ; Unlock configuration register.

out 22h,al ;

mov al,0c5h ;

out 23h,al ;

mov al,4eh ; Enable GPIO[7-0] is output pin.

out 22h,al ;

mov al,0ffh ; If AL fill “FF”, then
; GPIO[7-0] set as output pin.

out 23h,al ; User can be set logic “1”
; of OUT direction.

mov al,4fh ; Enable GPIO[15-8] is input pin

out 22h,al ;

mov al,00 ; If AL fill “00”, then
; GPIO[15-8] set as input pin.

out 23h,al ; User can be set logic “0”

```

; of IN direction.
mov al,47h ; Output data port.
out 22h,al ;
mov al,55h ; Example data out value is 55h,
; to output pin
out 23h,al ; GPIO[7-0]. So user can
; repeat this loop.
mov al,46h ; If GPIO[7-0] is set input direction, then data
out 22h,al ; input port is 46h.
in al,23h ; Example data input value
; from data input GPIO[7-0]
mov al,4ch ; Input data port
out 22h,al ;
in al,23h ; Read data from GPIO[15-8]
; into AL register.
mov al,4dh ; If GPIO[15-8] is set output
; direction, then data
out 22h,al ; output port is 4d.
mov al,55h ; output data value is 55h.
out 23h,al ; Example data output value
; to data input GPIO[15-8]
..... continue program
end

```


Chapter 3

SVGA Setup

3.1 Introduction

The ICOP-6037VE has an on-board VGA/LCD interface. The specifications and features are described as follows:

The ICOP-6037E has an on-board VGA interface. The specifications and features are described as follows:

3.1.1 Chipset

The ICOP-6037VE uses a C&T CHIPS 69000 for its VGA/LCD controller, which supports conventional analog CRT monitors and flat panel. In addition, it supports a wide variety of color and monochrome SS, DSTN, TFT, EL and Plasma panels.

The ICOP-6037E uses a SGS Thomson STPC for its SVGA controller, which supports conventional analog CRT monitors. 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 (multisync) monitors are handled as if they were analog monitors.

3.1.2 Display memory

ICOP-6037VE uses 2 MB memory, the VGA/LCD controller can drive CRT displays or color flat panel displays with resolutions up to 1024 x 768 at high colors.

ICOP-6037E uses 512 K ~ 1 MB system share memory, the VGA controller can drive CRT displays or color panel displays with resolutions up to 1024 x 768 at 256 colors.

3.2 Installation of SVGA driver

Complete the following steps to install the SVGA driver. Follow those procedures in the flow chart that apply to the operating system which you are using within your ICOP-603X.

Important: The following windows illustrations are examples only. You

must follow the flow chart instructions and pay attention to the instructions which then appear on your screen.

3.2.1 Installation for Windows 3.1

1.

- a. Insert the CD/disk into the CD-ROM/ FDD drive.
- b. Select "Main" in Program Manager.
- c. Double click the "Windows Setup" icon.
- d. Select "Change System Setting" in Options.
- e. Select "Other display (Requires utilities disk)" in display.

2.

- a. Type in the path of the VGA Win31 (driver A:\ or D:\).

3.

- a. During the installation, you can choose the resolution and colors you want to use.
- b. Press "OK".

4.

- a. Type the path of the Win31 source code.
- b. Press "OK".

5.

- a. Win31 VGA driver.
- b. Press "OK".

6.

- a. Type the path of the Win31 source.
- b. Press "OK" to finish.

7.

- a. When Windows asks you to restart, select "Continue".

8.

- a. Before you restart Windows, insert the following system.ini file into the Windows directory: [display] Redundancy = off (**ICOP-6037E**)

9.

a.Restart Windows.

3.2.2 Installation for Windows 95/98

1.

- a. Select "Start" , "Settings" , "Control Panel" , "Display" , "Settings".
- b. Press "Advanced Properties".

2.

- a. Choose the "Adapter" label.
- b. Press the "Change..." button.

3.

- a. Press the "Have Disk" button.

4.

- a. Insert the disc(or diskette) into the CD-ROM(or floppy) drive.
- b. Type " (driver A:\ or D:\) 95".
- b. Press "OK".

5.

- a. Select the highlighted item.
- b. Click the "OK" button.

6.

- a. SGS-Thomson STPC appears in the adapter label. **(ICOP-6037E)**
- a. C&T CHIPS 69000 appears in the adapter label. **(ICOP-6037VE)**
- b. Click the "Apply" button.

7.

- a. Press "Yes" to reboot.

8.

- a. Repeat Step 1 on the previous page of this manual.

The "UMA config" label appears in "Display".

- b. Adjust resolution and color.

9.

- a. Click the "UMA Config" label.
- b. Adjust the refresh rate and display type.
- c. Press "OK" to exit.

10.

- a. Press "Yes" to set set the monitor type.

11.

- a. Select "Standard", "Super VGA 800 x 600", or "XGA".
- b. Press the "OK" button.

12.

- a. Choose "Restart" to reboot.

Chapter 4

Network Interface

4.1 Introduction

The Realtek RTL8139B(L) is a highly integrated and cost-effective single-chip Fast Ethernet controller that provides 32-bit performance, PCI bus master capability, and full compliance with IEEE 802.3u 100Base-T specifications and IEEE 802.3x Full Duplex Flow Control. It also supports Advanced Configuration Power management Interface (ACPI), PCI power management for modern operating systems that is capable of Operating System Directed Power Management (OSPM) to achieve the most efficient power management. The RTL8139BL is suitable for the applications of CardBus or mobile with built-in network controller. The CIS data can be stored in either 93C56 EEPROM or expansion ROM. The RTL8139B is suitable for 5V signaling environment only, such as modern Desktop environment.

Besides the ACPI feature, the RTL8139B(L) also supports remote wake-up (including Magic Packet, LinkChg, and Microsoft wake-up frame) in both ACPI and APM environments. Especially, the RTL8139B(L) is capable of performing internal reset whenever there is (auxiliary) power applied to. Once the auxiliary power is on whereas the main power still remains off, the RTL8139B(L) is ready and is waiting for the Magic packet or LinkChnage to wake the system up. Also, the LWAKE pin provides 4 different output signals including active high, active low, positive pulse, and negative pulse. The versatility of the RTL8139B(L) LWAKE pin satisfies all kinds of motherboards with Wake-On-LAN (WOL) function. The RTL8139B(L) also supports Analog Auto-Powerdown, that is, the analog part of the

RTL8139B(L) can be shut down temporarily according to the user's requirement or when the RTL8139B(L) is in power down states with the wakeup function disabled. Besides, when the analog part is shut down and the IsolateB pin is low (i.e. the main power is off), then both the analog and digital parts stop functioning and the RTL8139B(L) will achieve the most power saving and consume extremely minor power.

The PCI Vital Product Data (VPD) is also supported to provide the information that uniquely identifies hardware (i.e., the RTL8139B(L) net card). The information may consist of part number, serial number, and other detailed information, and so on.

For sake of cost-down, the RTL8139B(L) is capable of applying 20MHz crystal as its internal clock source. The 50MHz OSC is still supported, too.

The RTL8139B(L) keeps network maintenance cost low and eliminates usage barriers. It is the easiest way to upgrade a network from 10 to 100Mbps. It also supports full-duplex operation, making possible 200Mbps of bandwidth at no additional cost. The RTL8139B(L) is highly integrated and requires no "glue" logic or external memory. It includes an interface for a boot ROM and can be used in diskless workstations, providing maximum network security and ease of management.

4.2 Software Support

Setup/Diagnostic Program for DOS/Windows

NDIS2 (DOS, OS/2, Lantastic, WFW3.1.....)

NDIS3, NDIS4, NDIS5 for Win95, 98, NT 3.51, 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

FreeBSD

UnixWare 7.0

Help Utility for Easy Installation

Support DMI

RPL Boot ROM for Novell Netware, Microsoft NT

PXE Boot ROM

Test Program for Mass Production

Win CE

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, or inability 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.