

SYS-ITX-P-3800

Pico-ITX Intel® Atom™ E3800
Embedded Computer in Aluminum Enclosure with
Dual 10/100/1000 Ethernet, USB, COM

Product Manual



Revision History

Document Version	Last Updated Date	Brief Description of Change
v1.0	7/16/18	Initial release

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Table of Contents

1	Before You Begin	5
1.1	Warnings	5
2	Introduction	5
3	Functionality	5
4	Features	6
5	General Operation	8
5.1	System Block Diagram	8
6	Specifications	9
7	Configuration	10
7.1	Component Layout	10
7.1.1	Rear Connectors	10
7.1.2	Internal Connectors	11
7.2	Watchdog Timer (WDT)	12
7.3	Real-time Clock/Calendar	12
7.4	Connectors	12
7.4.1	PWR - DC Power Input	12
7.4.2	BATT - CMOS Battery Connector (Internal Connector)	12
7.4.3	PWROUT - DC+12V/+5 Voltage Power Output (Internal Connector)	13
7.4.4	FPH - Front Panel Pin Header (Internal Connector)	13
7.4.5	AUDIO - Audio Interface (Internal Connector)	14
7.4.6	COM1 - COM Interface	14
7.4.7	COM2, 3, 4 - COM Interface (Internal Connector)	15
7.4.8	VGA - Analog VGA Display	15
7.4.9	I2C - I2C Interface (Internal Connector)	16
7.4.10	LAN1/LAN2 - LAN 10/100/1000 Ethernet Interface	16
7.4.11	USB1, 2 - USB Interface	17
7.4.12	USB3,4 - USB Interface (Internal Connector)	17
7.4.13	SATA1 - Serial ATA Interface (Internal Connector)	18
7.4.14	MC1/MC2 - PCI Express Mini Card (Internal Connector)	19
7.5	Jumpers	20
7.5.1	JCMOS - CMOS Data Clear	20

8	BIOS Functionality	20
8.1	General Information	20
8.2	Entering Setup	21
8.3	BIOS Setup Menu Navigation	21
8.4	BIOS Screens	21
8.4.1	Main Menu	21
8.4.2	Advanced Menu	23
8.4.3	Security Menu	25
8.4.4	Power Menu	26
8.4.5	Boot Menu	27
8.4.6	Exit Menu	28
8.5	Super I/O Settings	29
8.6	Glossary	31
8.7	Software Description	31
8.7.1	Software Design Specification: UEFI Operating System Support	31
8.7.2	Software Design Specification: Legacy Operating System Support	31
8.7.3	Software Design Specification: Boot Device Configuration	32
8.7.4	Software Design Specification: BIOS Update Mechanisms	32
8.7.5	Software Design Requirements: BIOS Components	32
8.8	BIOS Update with UEFI Shell	33
8.8.1	Scope	33
8.8.2	Process	33
9	Accessories and Cables	34
9.1	Package Contents	34
9.2	Accessory List	34
10	Software Drivers	34
A	Best Practices	35
B	Mechanical Drawings	38
C	Warranty Information	39

1. Before You Begin

Review the warnings in this section and the best practice recommendations (see “Best Practices” on page 35) when using and handling the WinSystems SYS-ITX-P-3800. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SYS-ITX-P-3800 before proceeding.



FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE SYS-ITX-P-3800 AND VOID YOUR WARRANTY.

1.1 Warnings

Only qualified personnel should configure and install the SYS-ITX-P-3800. While observing best practices, pay particular attention to the following:



Avoid Electrostatic Discharge (ESD)

Only handle the circuit board and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.

2. Introduction

This manual provides configuration and usage information for the SYS-ITX-P-3800. If you still have questions, contact Technical Support at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

Refer to the WinSystems website for other accessories (including cable drawings and pinouts) that can be used with your SYS-ITX-P-3800.

3. Functionality

WinSystems' SYS-ITX-P-3800 series enclosed single board computers (SBCs) pack an impressive feature set into small form factor Embedded Pico-ITX design. The SBCs are based on the Intel® E3800 processor family, which provides CPU and graphics performance. The SYS-ITX-P-3800 is a perfect choice for applications requiring low power and Intel performance in a small form factor package with industrial connectors and I/O.

The integrated Intel® Atom™ (formerly Bay Trail-I) platform offers superb performance and product longevity. Available with either an Intel E3825 1.33 GHz dual-core CPU or an E3845 1.91 GHz quad-core CPU, the integrated chipset and graphics engines provide the processing power and graphics capabilities for demanding embedded and IoT applications. The SYS-ITX-P-3800 includes either 2G or 4G DDR3L SDRAM soldered down to the board with a data transfer rate of 1066 MHz when used with the E3825 CPU or 1333 MHz with the E3845 CPU.

Intel's 7th generation (Gen 7) graphics and media encode/decode engine supports DirectX*11, OpenGL 3.0 (OGL 3.0), OpenCL 1.2 (OCL 1.2), and OpenGL ES 2.0.

Considering the small size of the SYS-ITX-P-3800, it is packed with I/O features often lacking from larger single board computers. It includes dual 10/100/1000 Ethernet controllers based on the Intel i211 family with wake on LAN and PXE capabilities, connectivity and controlling network devices. Four USB 2.0 enhanced host ports (two internal) provide additional functionality, and also on board are four RS232 serial ports (three internal).

Expansion options for the SYS-ITX-P-3800 series include one full-size and one half-size Mini Card slot along with the four USB ports. The full-size Mini Card slot supports PCIe x1, mSATA and USB interfaces while the half size supports mSATA and USB interfaces.

The compact all-in-one SYS-ITX-P-3800 single board computer is fully compatible with industry standards featuring technical enhancements for industrial applications and high reliability. It can run Microsoft's Windows 10 variants including Windows 10 IoT Enterprise, and Windows 10 IoT Core, as well as Linux, and some real-time operating systems (RTOS).

The SYS-ITX-P-3800 from WinSystems is a very compact, PC compatible single board computer which is a perfect fit for applications in UAV, energy, medical diagnostics, and industrial control.

4. Features

The SYS-ITX-P-3800 provides the following features:

Single Board Computer

- Intel Atom (formerly Bay Trail-I) E3800 series processor
- Dual core E3825 1.33 GHz processor
- Quad core E3845 1.91 GHz processor

Operating Systems (compatibility)

- Microsoft's Windows 10 IoT Enterprise, IoT Core
- Linux
- Real-time operating systems (RTOS)

Memory

- Up to 4 GB DDR3L system RAM with data transfer rate of 1066 MHz when used with the E3825 processor and 1333 MHz when used with the E3845 processor

Graphics

- Intel Gen7 HD Graphics for Intel Atom processor
- Fast graphics at high resolutions

- Full-HD and 3D graphics acceleration

BIOS

- Insyde UEFI BIOS

Video Interfaces

- VGA output

Ethernet

- Two Intel 10/100/1000 Mbps controllers using Intel i211-AT

Storage

- One full-size PCIe Mini Card slot for mSATA (shared with internal SATA connector)
- One half-size PCIe Mini Card slot for mSATA
- One SATA connector (shared with full-size PCIe Mini Card slot for mSATA) (internal connector)

Serial Interface

- One RS232 COM port (external)
- Three RS232 COM ports (internal connector)

USB

- Two USB 2.0 (external)
- Two USB 2.0 (internal connector)

Bus Expansion

- One full-size Mini Card slot for PCIe/mSATA (auto detection) and USB interface
- One half-size Mini Card slot for mSATA and USB interface

Audio (Internal Connector)

- ALC886 HD audio specification 1.0, two channel sound chipset

Power

- On board +12V

Industrial Operating Temperature

- -20 to +70°C (-4 to +158°F)

Form Factor

- 145 x 88 x 35 mm (5.71 x 3.47 x 1.38 inches)

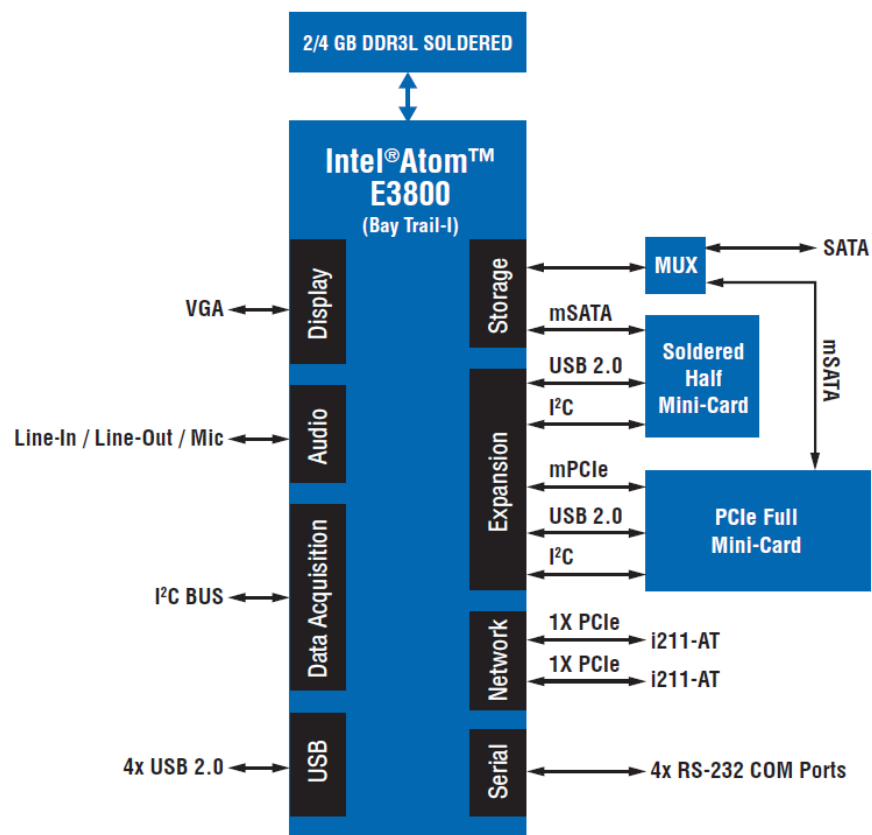
Additional Features

- Performance for industrial IoT applications
- Connectivity and I/O for embedded systems
- Optimized for small form factor designs
- Watchdog timer, 0~255 sec programmable

5. General Operation

5.1 System Block Diagram

The SYS-ITX-P-3800 Embedded Pico-ITX computer with dual Ethernet provides performance for industrial IoT applications and rugged design for demanding environments with fast, high-resolution graphics, secure data, embedded connectivity, and expansion options. The following figure is a simplified system block diagram of the SYS-ITX-P-3800.



The SYS-ITX-P-3800 features the Intel Atom (Bay Trail) dual core or quad core system on chip (SOC). Its robust design, small size, and extended operational temperature make it ideal for use in industrial IoT applications and embedded systems for industrial controls, transportation, Mil/COTS, and energy markets.

The soldered down memory provided enables up to 4 GB of DDR3L RAM. mSATA support is provided through the full and half-size Mini Card slots. SATA support (internal connector) is also provided.

There are a total of four USB 2.0 ports (two external, and two internal). There are a total of four RS232 serial channels (one external and three internal).

Other features include beep tones for error notification and a watchdog timer supported RTC with optional battery back up.

The SBC is software-compatible with Windows 10, Windows 10 IoT Enterprise, and Windows 10 IoT Core, as well as Linux, and some real-time operating systems.

Drivers are available from the WinSystems website.

6. Specifications

The SYS-ITX-P-3800 adheres to the following specifications and requirements.

Table 1: SYS-ITX-P-3800 specifications

Electrical	
V _{CC}	+12V DC
Models	SYS-ITX-P-38XX-M-0
Processor	Dual and quad core Intel Atom (formerly Bay Trail-I) E3800 series processor <ul style="list-style-type: none"> Dual core E3825 1.33 GHz processor Quad core E3845 1.91 GHz processor
Mechanical	
Dimensions	145 x 88 x 35 mm (5.71 x 3.47 x 1.38 inches)
Weight	549.75g (19.39 oz)
PCB thickness	0.063 in. (1.6 mm)
Environmental	
Temperature ^a	-20 to +70°C (-4 to +158°F)
Humidity (RH)	5% to 95% non-condensing
Mean time between failure (MTBF) ^b	50,000 (hrs)
RoHS compliant	Yes
Operating Systems	
Runs Windows 10, Windows 10 IoT Enterprise, and Windows 10 IoT Core, as well as Linux, and some real-time operating systems.	

a. Requires airflow.

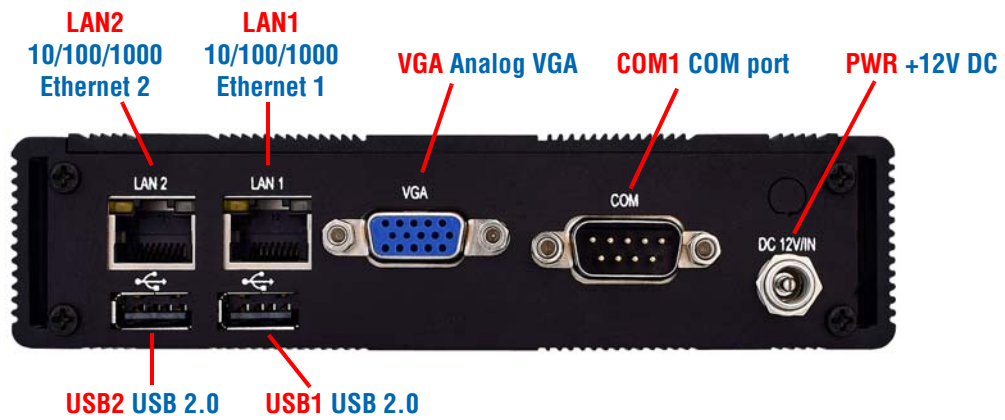
b. A MTBF measurement is based on a statistical sample and is not intended to predict any one specific unit's reliability; thus MTBF is not, and should not be construed as, a warranty measurement.

7. Configuration

This section describes the SYS-ITX-P-3800 connectors and configuration.

7.1 Component Layout

7.1.1 Rear Connectors



7.1.2 Internal Connectors

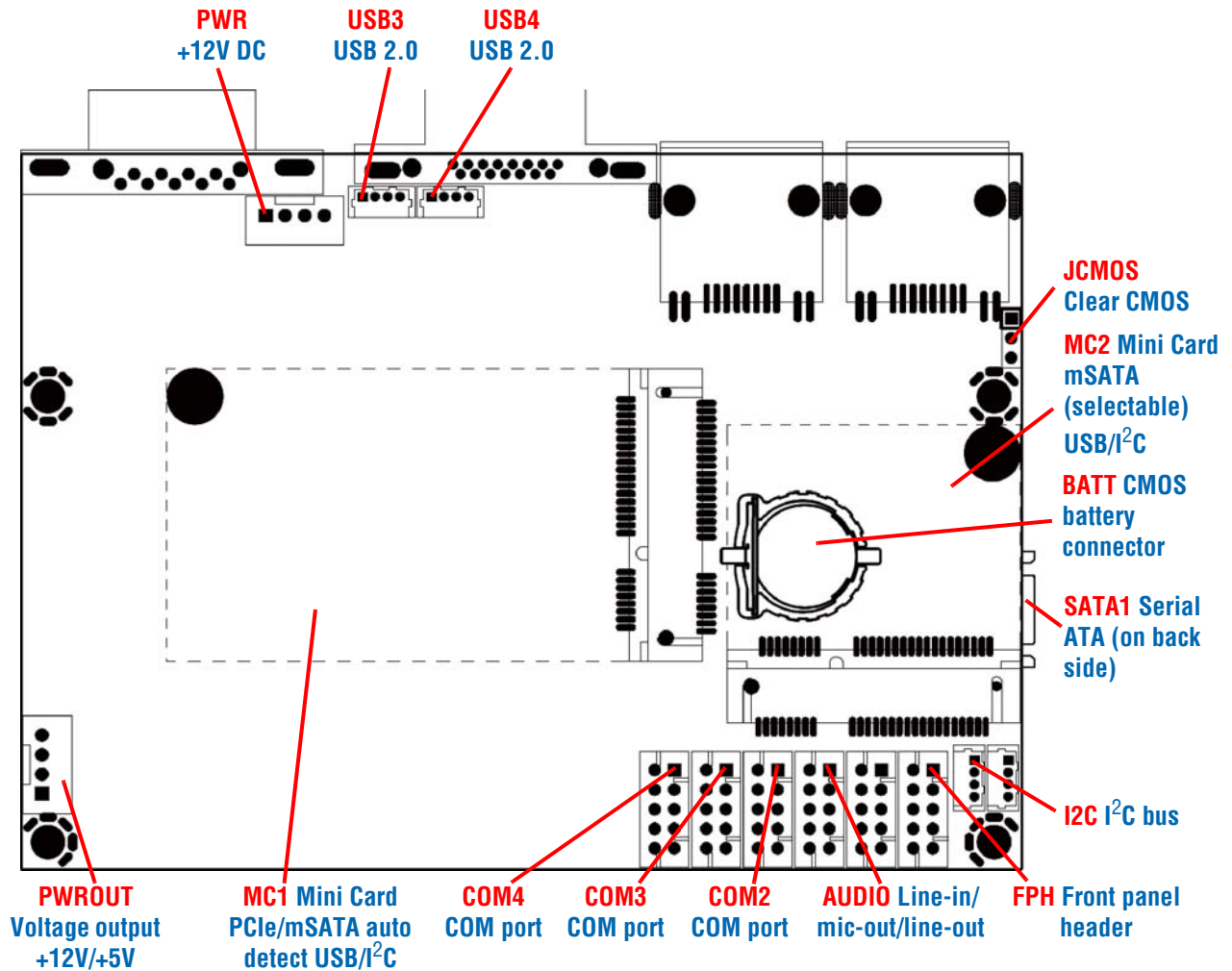


Table 2: Board components

Item	Description	Reference
PWR	+12V DC power input	page 12
BATT	CMOS battery connector	page 12
PWROUT	Voltage output +12V/+5V (internal connector)	page 13
FPH	Front panel header (internal connector)	page 13
AUDIO	Line-in/mic-out/line-out (internal connector)	page 14
COM1	COM port 1	page 14
COM2, 3, 4	COM ports 2-4	page 15
VGA	Analog VGA	page 15
I2C	I ² C bus (internal connector)	page 16
LAN1	10/100/1000 Ethernet 1	page 16
LAN2	10/100/1000 Ethernet 2	page 16
USB1, 2	USB 2.0	page 17
USB3, 4	USB 2.0 (internal connector)	page 17

Table 2: Board components (Continued)

Item	Description	Reference
MC2	PCIe Mini Card express socket PCIe / mSATA (selectable); default is mSATA USB / I ² C	page 19
MC1	PCIe Mini Card express socket PCIe / mSATA auto-detect USB / I ² C	page 19
JCMOS	Clear CMOS jumper	page 20
SATA1	Serial ATA interface (internal connector)	page 18

7.2 Watchdog Timer (WDT)

The SYS-ITX-P-3800 features an advanced watchdog timer (WDT) to guard against software lockups; it resets the system if software does not pet the watchdog within the given time-out period. WinSystems supports the SYS-ITX-P-3800 WDT in the System Management tools for the SYS-ITX-P-3800. Ask your sales representative for details of this software package.

7.3 Real-time Clock/Calendar

A real-time clock is used as the AT-compatible clock/calendar. In addition to the time and date-keeping functions, the system configuration is kept in CMOS RAM contained within the clock section. A battery must be enabled for the real-time clock to retain time and date during a power down.

WinSystems has software available for manipulating the CMOS RTC from a high-level application.

7.4 Connectors

7.4.1 PWR - DC Power Input

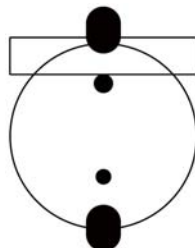
DC in +12V on 5.5 x 2.5 mm barrel connector.

7.4.2 BATT - CMOS Battery Connector (Internal Connector)

BATT: Battery uses Li 3V / 40 mAh (CR1220)

The RTC consumes 2.7 uA when the power adapter is NOT connected.

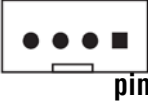
The RTC consumes 0.1 uA when the power adapter is connected.



7.4.3 PWR0UT - DC+12V/+5 Voltage Power Output (Internal Connector)

PWR0UT: +12V/+5V DC voltage output 4 pin (2.0 mm) connector

Layout and Pin Reference



Pin	Description
1	+5V
2	GND
3	GND
4	+12V

Matching Connectors

- JST B4B-PH-KL

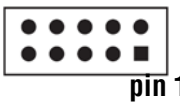
Cable Housing

- JST PHR-4

7.4.4 FPH - Front Panel Pin Header (Internal Connector)

FPH: Front panel header 2x5 pin (2.0 mm) connector

Layout and Pin Reference



Pin	Description	Pin	Description
1	Power button pin	2	Power button GND
3	Reset pin	4	Reset GND
5	Power LED-	6	Power LED+
7	HDD LED-	8	HDD LED+
9	LAN LED-	10	LAN LED+

Matching Connectors

- JST B10B-PHDSS

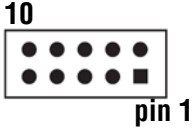
Cable Housing

- JST PHDR-10VS

7.4.5 AUDIO - Audio Interface (Internal Connector)

AUDIO: Line-out/line-in/mic-in/SPDIF-out 2x5 pin (2.0 mm) connector

Layout and Pin Reference



Pin	Description	Pin	Description
1	Line-out-R	2	MIC-IN
3	Line-in-R	4	GND
5	GND	6	SPDIF-OUT
7	Line-in-L	8	+5V
9	Line-out-L	10	MIC-IN

Matching Connectors

- JST B10B-PHDSS

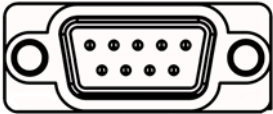
Cable Housing

- JST PHDR-10VS

7.4.6 COM1 - COM Interface

COM1: DB9 connector (RS232 mode)

Layout and Pin Reference

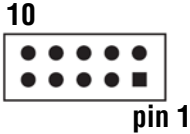


Pin	Description	Pin	Description
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	+5V

7.4.7 COM2, 3, 4 - COM Interface (Internal Connector)

COM2-COM4: 2x5 pin (2.0 mm) connector (RS232 mode)

Layout and Pin Reference



Pin	Description	Pin	Description
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	+5V

Matching Connectors

- JST B10B-PHDSS

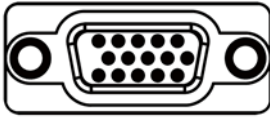
Cable Housing

- JST PHDR-10VS

7.4.8 VGA - Analog VGA Display

VGA: Analog VGA connector

Layout and Pin Reference




Pin	Description	Pin	Description
1	BLUE	2	GND
3	GND	4	DDC CLOCK
5	GREEN	6	V-SYNC
7	GND	8	H-SYNC
9	RED	10	DDC DATA

7.4.9 I2C - I2C Interface (Internal Connector)

I2C: I²C 4-pin (1.25 mm) connector

Layout and Pin Reference

	
Pin	Description
1	+3.3V
2	GND
3	I ² C clock
4	I ² C DATA

Matching Connectors

- Molex 53047-0410

Cable Housing

- Molex 51021-0400

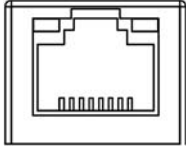
7.4.10 LAN1/LAN2 - LAN 10/100/1000 Ethernet Interface

LAN1 and 2: Ethernet port RJ-45 connector

Layout and Pin Reference

LAN1 - 10/100/1000 RJ-45 connector

LAN2 - 10/100/1000 RJ-45 connector

			
Pin	Description	Pin	Description
1	TR0-/TX-	5	TR1-/RX+
2	TR0+/TX+	6	TR2-/NC-
3	TR2+/NC	7	TR3-/NC
4	TR1+/RX-	8	TR3+/NC

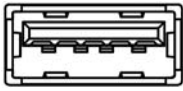
LED1/LED2 - 10/100/1000 Ethernet LED

Speed		10 Mbps			100 Mbps			1000 Mbps		
Indicate	Side	Back		Front	Back		Front	Back		Front
	LED	Link	ACT	ACT	Link	ACT	ACT	Link	ACT	ACT
LAN light		Orange	Orange	Orange	Green	Orange	Orange	Red	Orange	Orange

7.4.11 USB1, 2 - USB Interface

USB1: USB 2.0 type-A external connector

USB2: USB 2.0 type-A external connector

Layout and Pin Reference


Pin	Description
1	+5V
2	DATA-
3	DATA+
4	GND

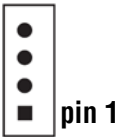
7.4.12 USB3,4 - USB Interface (Internal Connector)

USB3: USB 2.0 port 4-pin (1.25 mm) (internal connector)

USB4: USB 2.0 port 4-pin (1.25 mm) (internal connector)

Layout and Pin Reference

USB3, 4: USB 2.0 port 1x4 pin (1.25 mm) connector

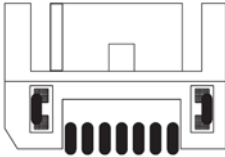


Pin	Description
1	+5V
2	DATA-
3	DATA+
4	GND

7.4.13 SATA1 - Serial ATA Interface (Internal Connector)

SATA1: SATA port 1x7 pin connector

Layout and Pin Reference



Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

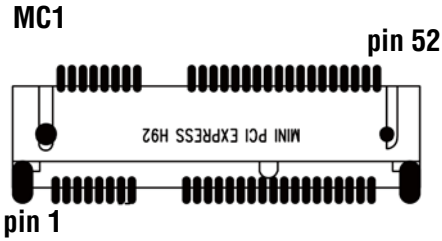
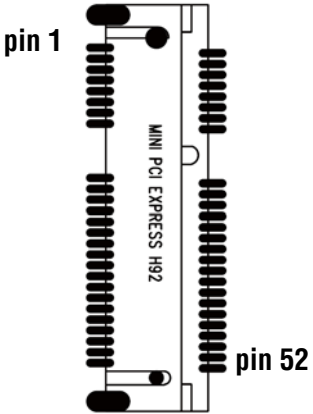
Notes:

1. SATA1 supports SATA 2.0 (3 Gb/sec.).
2. PWROUT provides SATA HDD power +12V, GND, +5V.
3. SATA1 and MC1 share the same SATA channel. Only one can be used at a time.

7.4.14 MC1/MC2 - PCI Express Mini Card (Internal Connector)

- MC1: Full-size Mini Card port 1 (PCIe/mSATA, USB)
- MC2: Half-size Mini Card port 2 (mSATA, USB)

Layout and Pin Reference

	Pin	Description	Pin	Description	
 <p>MC1</p>	1	NC	2	+3.3V	
	3	NC	4	GND	
	5	NC	6	+1.5V	
	7	NC	8	NC	
	9	GND	10	NC	
	11	PCIe-CLK-	12	NC	
	13	PCIe-CLK+	14	NC	
	15	GND	16	NC	
	17	NC	18	GND	
	19	NC	20	NC	
	21	GND	22	Reset	
	 <p>MC2</p>	23	PCIe-RX-/mSATA-RX+	24	+3.3V
		25	PCIe-RX+/mSATA-RX-	26	GND
		27	GND	28	+1.5V
		29	GND	30	SMB-CLK
		31	PCIe-TX-/mSATA-TX-	32	SMB-DATA
		33	PCIe-TX+/mSATA-TX+	34	GND
		35	GND	36	USB-DATA-
		37	GND	38	USB-DATA+
		39	+3.3V	40	GND
		41	+3.3V	42	NC
		43	GND	44	NC
45		NC	46	NC	
47		NC	48	+1.5V	
49		NC	50	GND	
51		mSATA/PCIe detect	52	+3.3V	

Notes:

1. The MC1 will autodetect mSATA/PCIe interface.
2. SATA1 and MC1 share the same SATA channel. Only one can be used at a time. mSATA is default.

7.5 Jumpers

7.5.1 JCMOS - CMOS Data Clear

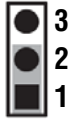

Jumpers can be used to reset the BIOS CMOS settings to the factory default. Enable/disable the clear CMOS function hardware circuit, by placing or removing the jumper from JCMOS as needed.

To reset the BIOS CMOS configuration to the factory default settings:

1. Remove power from the SYS-ITX-P-3800.
2. Find JCMOS.
3. Remove jumpers from pins 1-2.
4. Install jumpers on pins 2-3 and wait five seconds.
5. Replace jumpers back on pins 1-2.

NOTE Do not clear the CMOS except in these circumstances: 1) Troubleshooting; 2) Forgotten password; 3) You fail over-clocking system.

Layout and Pin Reference

 *Normal	 Clear
Pin	Description
*1-2	Normal set
2-3	CMOS data clear

8. BIOS Functionality

8.1 General Information

The SYS-ITX-P-3800 includes a UEFI BIOS from Insyde stored in Flash ROM. Access setup information through the BIOS setup utility to modify basic system configuration. The configuration is stored in CMOS RAM (it is retained during power off). When power is applied to the system, the SYS-ITX-P-3800 communicates with peripheral devices and checks hardware resources against the configuration information stored in the CMOS memory. If during startup an error is detected or the CMOS parameters need to be initially defined, the diagnostic program prompts the user to enter the SETUP program. Some errors are significant enough to cause the startup to fail.

8.2 Entering Setup

To enter setup, apply power to the computer and then press **Del**. You must press the **Del** key when either the splash screen is displayed (during the system power-on self test, POST) or when the **Press Del for Setup message** is displayed. It may take a few seconds before the main setup menu screen is displayed.

Press **Del** to enter the setup.

If the message disappears before responding and you still wish to enter Setup, restart the system by pressing the **RESET** button. It can be also restarted by pressing the **Ctrl**, **Alt**, and **Delete** keys on the keyboard simultaneously.

Press **F1** to run general help or resume.

The BIOS setup program provides a General Help screen. The menu can be easily called up from any menu by pressing **F1**. The Help screen lists all the possible keys to use and the selections for the highlighted item. Press **Esc** to exit the Help screen.

8.3 BIOS Setup Menu Navigation

In the BIOS Setup, use the following keys to navigate the menu options.

Key	Description
Left and right arrows	Select the screen
Up and down arrows	In the main menu, select an option to confirm or to modify.
Enter	Confirm selection.
+ and .	Modify the BIOS parameters for the active option.
F1	General help.
F2	Previous value.
F3	Optimized defaults.
F4	Save and reset.
Esc	Quit the BIOS setup.

8.4 BIOS Screens

The following BIOS screens contain the options and sample settings for the SYS-ITX-P-3800.

Your actual configuration may differ from the screens shown here.

NOTE Use care when modifying BIOS settings.

8.4.1 Main Menu

The Main page of the BIOS displays general information related to the current BIOS build, including the BIOS revision, the build date and time, and processor type.

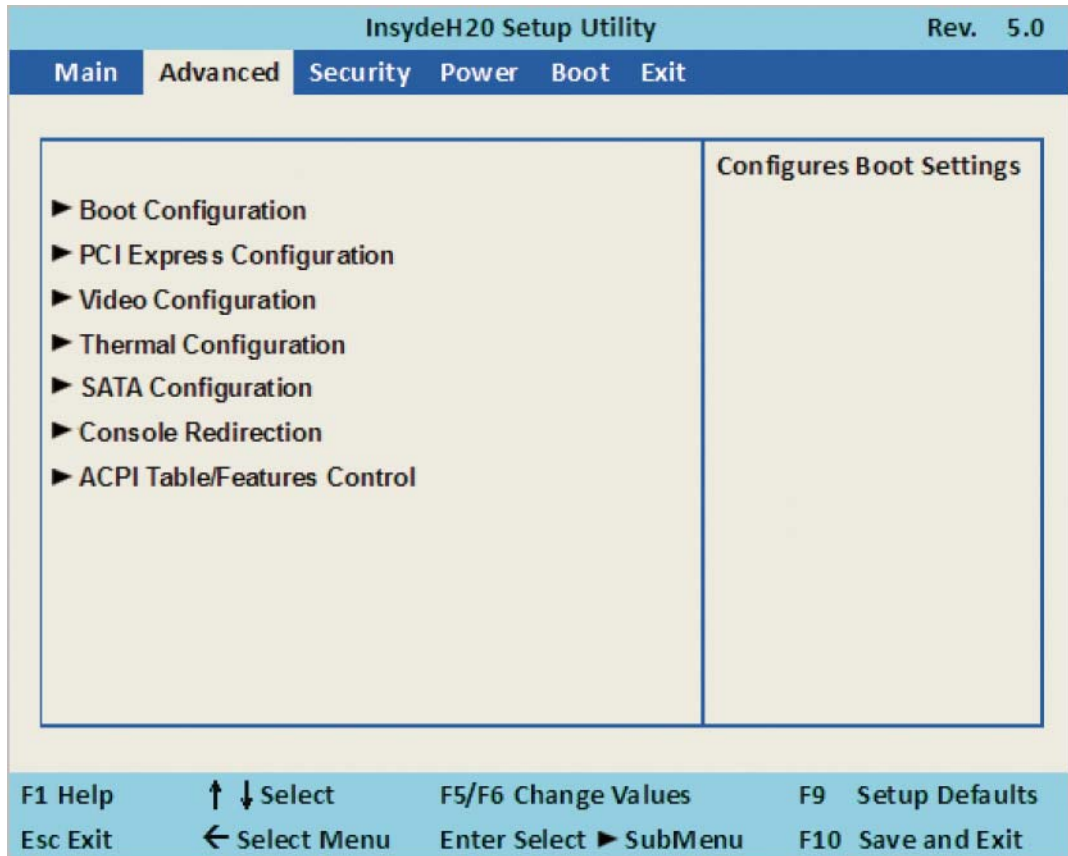
The Main BIOS page also contains information related to the amount and configuration of the system RAM (the type of RAM used in the design).

InsydeH20 Setup Utility		Rev. 5.0
Main	Advanced	Security Power Boot Exit
BIOS Version	SYS-ITX-P-3800	
Build Date	01/19/2015	
Build Time	14:18:04	
Processor Type	Intel(R) Atom(TM) CPU E3845 @ 1.91GHz	
System Memory Speed	1333 MHz	
Cache RAM	2048 KB	
Total Memory	4096 MB	
System Time	[00:00:00]	
System Date	[01/01/2015]	
F1 Help	↑ ↓ Select	F5/F6 Change Values F9 Setup Defaults
Esc Exit	← Select Menu	Enter Select ► SubMenu F10 Save and Exit

- **System Information.** System Information parameters provide information and vary with BIOS version and the specific modules used. The typical format of the information is provided instead of the actual default setting or value.
 - BIOS Version, value format: yymmdd
 - BIOS Build Date, value format mm/dd/yyyy
 - BIOS Build Time, value format hh/mm/ss
 - Processor Type, value Intel(R) Atom(TM) CPU E3800 series
 - System Memory Speed, value 1066 MHz or 1333 MHz
 - L2 Cache RAM, value 2048 KB
 - Total Memory, value up to 4096 MB
- **System Time.** Displays the current time in HH/MM/SS format. To set or change the time, highlight the row using the up/down arrow keys, then highlight the hour, minute, or second by pressing the **Enter** key until the desired value is highlighted with a square block. Use the +/- keys to change the highlighted value.
- **System Date.** Displays the current date in MM/DD/YYYY format. To set or change the date, highlight the row using the up/down arrow keys, then highlight the month, day, or year by pressing the **Enter** key until the desired value is highlighted with a

square block. Use the +/- keys to change the highlighted value, or enter the time using the number keys

8.4.2 Advanced Menu



Boot Configuration

- Select power-on state for **Numlock**. Options are On (default), Off.

PCI Express Configuration

- Control the **PCI Express Root Port** for ports 1, 2, 3, and 4. Options are Enabled (default), Disabled.
- Select **PCI Express Port Speed**. Options are Gen1 (default), Gen2.
- Select **PCIE TXE ROM** support. Options are Disabled (default), Enabled.

Video Configuration

- **Configure CRT as**. Options are CRT (default), Default.
- **Aperture Size**. Options are 128MB, 256MB (default), 512MB.
- **IGD - DVMT Pre-Allocated**. Use this item to select DVMT 5.0 total graphics memory size used by the internal graphics device. Options are 64 (default), 96, 128, 160, 192, 224, 256, 288, 320, 352, 384, 416, 448, 480, 512MB.

- **IGD - DVMT Total Gfx Mem.** Use this item to select DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device. Options are 128M, 256M (default), MAX.

Thermal Configuration

This value controls the temperature of the ACPI critical trip point, the point where the OS shuts down the system. The default value for the critical trip point is 110°C. The CPU frequency is throttled when it reaches its passive trip point. The default value for the passive trip point is 105°C.

SATA Configuration

- **SATA Controller.** Use this item to Enable or Disable SATA Device. Options are Enabled (default) or Disabled.
- **Chipset SATA Mode.** Determine how SATA controller(s) operate. Options are IDE Mode (default), AHCI Mode.
- **SATA Speed.** Indicates the maximum speed the SATA controller can support. Options are Gen1, Gen2 (default).
 - **IDE Mode. Legacy IDE or Native IDE MODE.** Options are Legacy IDE or Native IDE (default)
 - **SATA Port 0 Connected to an ODD.** Use this item to enable or disable SATA Port0 ODD function Options are Enabled (default) or Disable.
 - **SATA Port 1 Connected to an ODD.** Use this item to enable or disable SATA Port1 ODD function. Options are Enabled (default) or Disable.

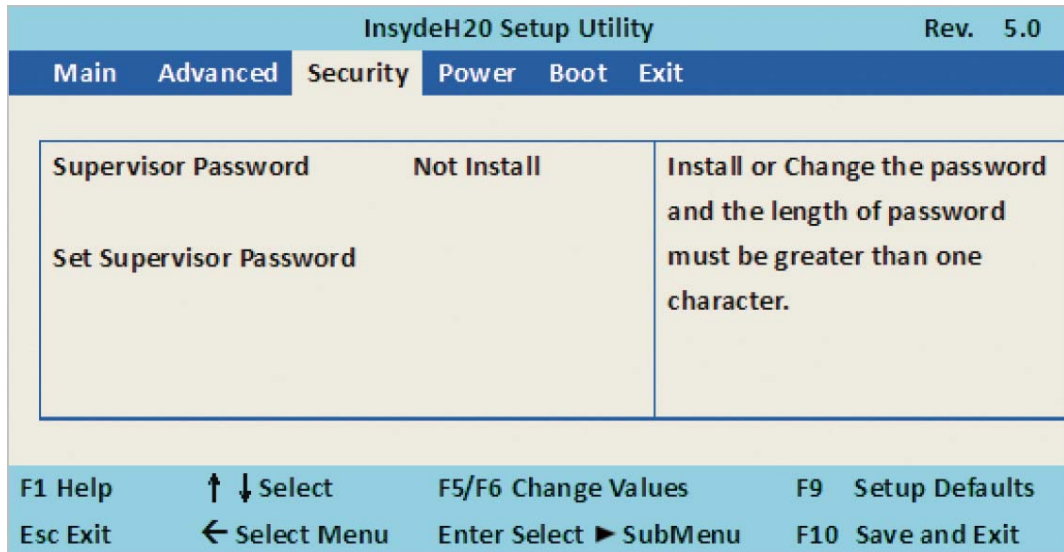
Console Redirection Setup

- **Console Serial Redirect.** Use this item to enable or disable Console Redirection. Options are Enabled, Disabled (default).
- **Text Mode Resolution.** Options are Force 80x25, Force 80x24 (DEL FIRST ROW), Force 80x24 (DEL LAST ROW) (default).
- **Baud Rate.** Options are 115200 (default), 57600, 38400, 19200, 9600, 4800, 2400, 1200.
- **Data Bits.** Options are 8 Bits (default), 7 Bits.
- **Parity.** Options are None (default), Even, Odd.
- **Stop Bits.** Options are 1 Bit (default), 2 Bits.
- **Flow Control.** Options are None (default), RTS/CTS, XON/XOFF.

ACPI Table/Features Control

DSDT - ACPI S3. Select the ACPI sleep state the system enters when the SUSPEND button is pressed. Options are DSDT - ACPI S3 (Suspend to RAM), Enabled, Disabled (default).

8.4.3 Security Menu

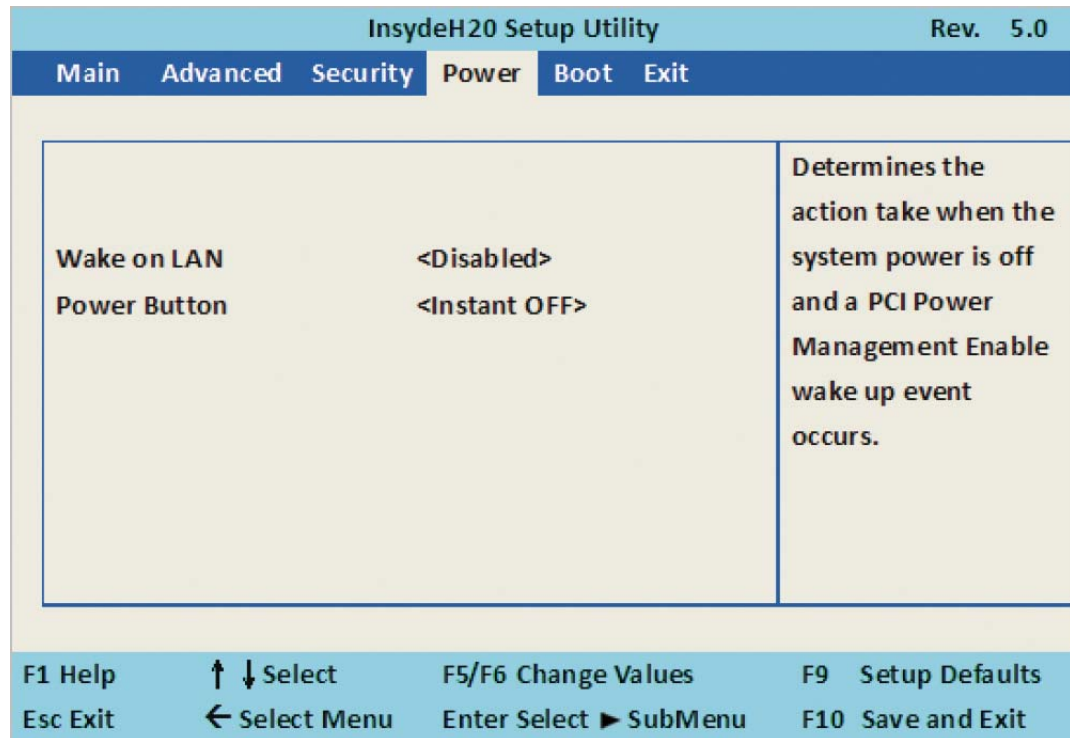


Supervisor Password

To set up a supervisor password:

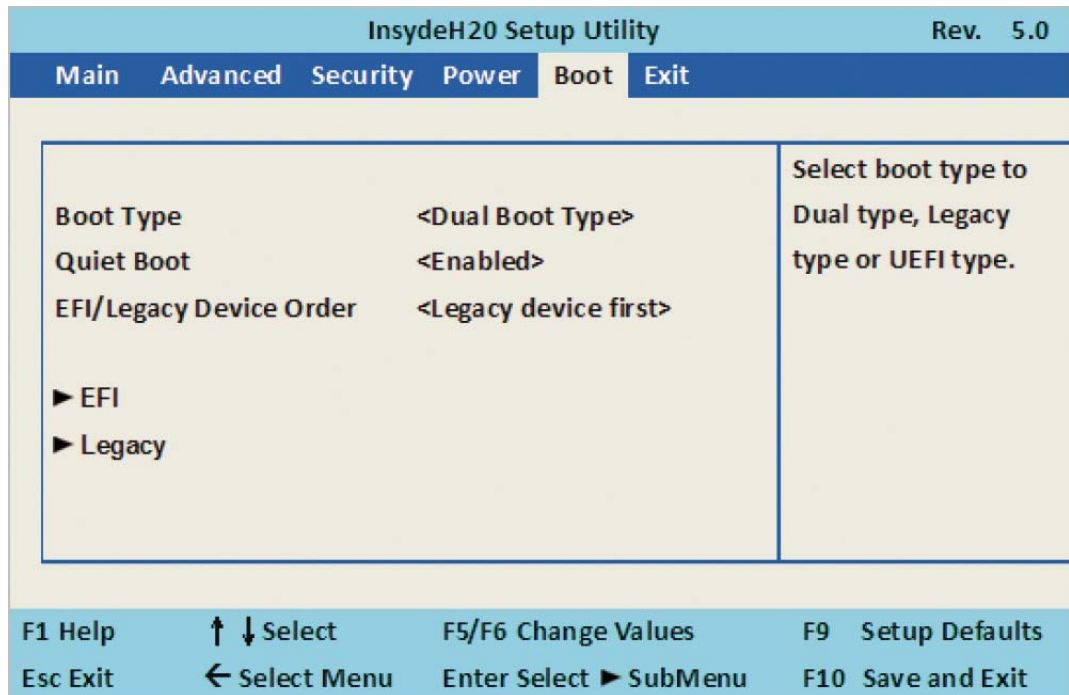
1. Select **Set Supervisor Password**.
A Create New Password dialog opens.
2. Type your desired password using no fewer than 3 characters and no more than 10 characters.
3. Press **Enter**.

8.4.4 Power Menu



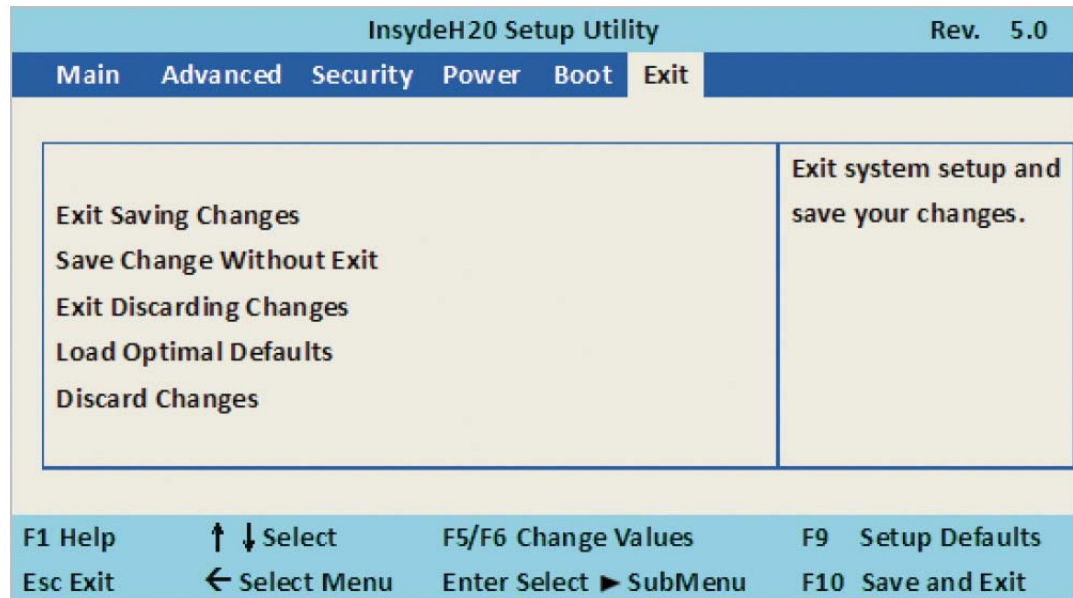
- **Wake on LAN.** Determines the action taken when the system power is off and the PCI power management Enable wake up event occurs. Options are Enabled, Disabled (default).
- **Power Button.** Options are:
 - Instant OFF: The system automatically turns off when the power button is pressed.
 - Delay 4 sec: The system automatically turns off after 4 seconds when the power button is pressed.

8.4.5 Boot Menu



- **Boot Type.** Options are Dual type (default), Legacy boot type, UEFI boot type.
- **Quiet Boot.** Options are Enabled (default), Disabled.
- **EFI/Legacy Device order.** Determine whether the EFI device boots first or the legacy device. Options are EFI device first, Legacy device first (default), smart mode.
 - **Boot Device Priority, Normal Boot Menu.** Select Normal Boot option priority or Advance Boot option priority. Options are Normal (default), Advance.
 - **Boot Type Order.** Setting the boot type priority. The default setting is 1. USB drive 2. Hard Disk Drive 3. CD/DVD ROM drive 4. Others.

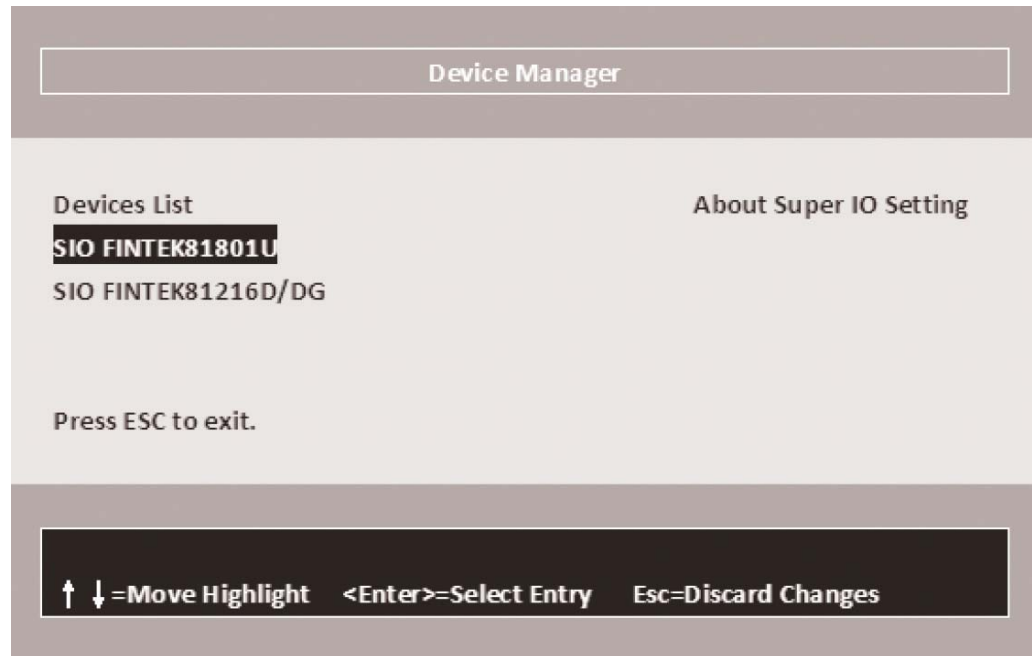
8.4.6 Exit Menu



- **Exit Saving Changes.** This item allows the user to reset the system after saving the changes.
- **Save Change Without Exit.** This item allows the user to save the changes, but doesn't restart.
- **Exit Discard Changes.** This item allows the user to restart the system, but does not save the changes
- **Load Optimal Defaults.** Use this item to restore the optimal default for all of the setup options.
- **Discard Changes.** Use this item to cancel all of the changes to setup options.

8.5 Super I/O Settings

Press the **F10** key during boot up to enter the Super I/O Settings menu.



Serial Port 1/2 Configuration (SIO FINTEK81801U)

- **Serial Port 1/2 Configuration.** Use this item to enable or disable the serial port (COM1 or COM2). Options are Enabled (default), Disabled.
- **Serial Port 1 Base IO Address / Interrupt / Serial Mode.** Use this item to select an I/O address and interrupt for the super IO device. Options are:
 - IO=3F8h; IRQ=4 (default)
 - IO=3E8h; IRQ=3,4
 - IO=2E8h; IRQ=3,4
 - IO=2F8h; IRQ=3,4
- **Serial Port 2 Base IO Address / Interrupt / Serial Mode.** Use this item to select an I/O address and interrupt for the super IO device. Options are:
 - IO=2F8h; IRQ=3(default)
 - IO=2E8h; IRQ=3,4
 - IO=3E8h; IRQ=3,4
 - IO=3F8h; IRQ=3,4
- **Serial Mode.** Options are:
 - RS232 driver (default): When hardware is set to RS232 or RS422 mode, select the RS232 driver.

- RS485 driver: When hardware set to RS485 mode, select the RS485 driver. It is the auto flow function for RS485.
- **Power Failure.** This item specifies whether your system reboots after a power failure or interrupt occurs. Options are:
 - Keep state (default): Restores the system to the status before power failure or interrupt occurred.
 - Always on: Leaves the computer in the power on state.
 - Always off: Leaves the computer in the power off state.

Hardware Monitor

Press [Enter] to view the PC health status. This section shows the status of your CPU, fan, and overall system. This is only available when there is Hardware Monitor function onboard.

Serial Port 3/4 Configuration (SIO FINTEK81216D/DG)

Use this item to enable or disable a serial port (COM3, COM4). Options are Enabled (default), Disabled.

- **Serial Port 3 Base IO Address / Interrupt.** Use this item to select an IO address and interrupt for super IO device. Options are:
 - IO=3E8h; IRQ=10 (default)
 - IO=2F8h; IRQ=3,4,5,6,7,10,11
 - IO=2E8h; IRQ=3,4,5,6,7,10,11
 - IO=3F8h; IRQ=3,4,5,6,7,10,11
 - IO=4F8h; IRQ=3,4,5,6,7,10,11
 - IO=4E8h; IRQ=3,4,5,6,7,10,11
- **Serial Port 4 Base IO Address / Interrupt.** Use this item to select an IO address and interrupt for super IO device. Options are:
 - IO=2E8h; IRQ=10 (default)
 - IO=2F8h; IRQ=3,4,5,6,7,10,11
 - IO=3F8h; IRQ=3,4,5,6,7,10,11
 - IO=3E8h; IRQ=3,4,5,6,7,10,11
 - IO=4F8h; IRQ=3,4,5,6,7,10,11
 - IO=4E8h; IRQ=3,4,5,6,7,10,11
- **Serial Mode.** Options are:
 - RS232 driver (default): When hardware is set to RS232 or RS422 mode, select the RS232 driver.
 - RS485 driver: When hardware set to RS485 mode, select the RS485 driver. It is the auto flow function for RS485.

- **Sharing Mode**
 - Set the sharing mode to ISA if using Linux OS.
 - Set the sharing mode to PCI if using Windows OS (default).

8.6 Glossary

- **Advanced Configuration and Power Interface (ACPI):** Specification that establishes industry standard interfaces enabling OS directed configuration, power management and thermal management of mobile, desktop, and server platforms.
- **Dynamic Video Memory Technology (DVMT):** Allows dynamic allocation of system memory for use as video memory to ensure the most efficient use of available resources in order to maximize 2D/3D graphics performance.
- **Graphics Processing Unit (GPU):** Specialized electronic circuit designed to rapidly manipulate and alter memory to accelerate the creation of images in a frame buffer.
- **Integrated Graphics Device (IGD):** Graphics processor integrated into the Bay Trail SOC. The IGD in the Bay Trail SOC is an Intel 9th Generation GPU, a.k.a. Gen9 GPU.
- **Trusted platform module (TPM):** Secure cryptoprocessor that integrates cryptographic keys into devices.
- **Trusted Execution Engine (TXE):** Computer hardware technology that is used to attest the authenticity of computer platforms and their operating systems. TXE assures that an OS starts in a trusted environment and provides the trusted OS with additional security capabilities. TXE uses a TPM and cryptographic techniques to allow system software and management applications to make trust decisions.
- **Unified Extensible Firmware Interface (UEFI):** Specification that defines a software interface between an operating system and platform firmware. UEFI replaces the Basic Input/Output System (BIOS) firmware interface

8.7 Software Description

This section provides details on the Insyde BIOS components to be used in the implementation of the SYS-ITX-P-3800 BIOS firmware.

8.7.1 Software Design Specification: UEFI Operating System Support

The BIOS supports the booting of the following UEFI compliant OSes:

- Microsoft Windows 10 x32/x64 (including Win10 IoT)
- Ubuntu 16.XX x32/x64

8.7.2 Software Design Specification: Legacy Operating System Support

- Compatibility Support Module (CSM)
- Legacy boot support required
- Legacy option ROM support required

The BIOS supports the booting of the following legacy OS:

- MS-DOS 6

8.7.3 Software Design Specification: Boot Device Configuration

The BIOS supports booting an OS from the following devices:

- USB mass storage device
- Serial ATA (SATA) device
- Network Boot - PXE
- eMMC
- M.2 mass storage device

8.7.4 Software Design Specification: BIOS Update Mechanisms

The BIOS supports the following update mechanisms:

- Software utilities
- Flash recovery via USB mass storage device

8.7.5 Software Design Requirements: BIOS Components

The BIOS includes the following components:

- **Advanced Host Controller Interface (AHCI) support:** Provides SATA host controller functionality.
- **Boot order:** Generates the default boot order on the platform's first boot.
- **Boot/resume from S4 device:** allows the platform to boot from the last S4 hibernated device, disregarding the current boot priority.
- **Fastboot:** Provides optimization of the boot time.
- **Fixed boot order:** Provides infrastructure that allows custom handling of available boot options to meet specific customer needs. Custom boot behavior may include different requests, such as always boot from specific device, default support of various kinds of grouping of boot devices
- **Generic error logging:** Provides support for logging POST and runtime errors to the GPNV area.
- **Keyboard controller emulation** for USB keyboard/mouse.
- **Physical memory testing:** Supports testing of physical memory present in the system.
- RTC registration and ability to handle wakeup from S5 sleep state.

8.8 BIOS Update with UEFI Shell

8.8.1 Scope

The Unified Extensible Firmware Interface (EFI or UEFI for short) is a new model for the interface between operating systems and firmware. It provides a standard environment for booting an operating system and running pre-boot applications.

An optional feature of a UEFI implementation is the ability to boot the system to a built-in shell. The UEFI shell provides a command prompt and a rich set of commands that extend and enhance the UEFI BIOS's capability.

This section describes the process for updating the SYS-ITX-P-3800 BIOS firmware image using the built-in UEFI shell.

8.8.2 Process

1. Insert a USB flash drive containing the BIOS update program into a USB socket on the SYS-ITX-P-3800 platform.
2. Turn on the SYS-ITX-P-3800 and press the **ESC** or **DEL** key during the boot process, which starts the BIOS setup utility.
3. In the BIOS setup utility, use the cursor keys to highlight the **Save & Exit** menu option.
4. Use the cursor keys to select **UEFI: Built-In EFI Shell** from the list of boot devices displayed under the **Boot Override** section.
5. Press **Enter**.

The PX1-C415 executes the built-in UEFI shell, and displays a list of attached storage devices. The USB flash drive shows up in the list; depending on other boot devices attached, it may be listed as **fs0**, **fs1**, etc.

6. From the UEFI shell command prompt, enter the following command where **N** is the number of the fs device representing the USB flash drive:

```
fsN:
```

Example: `fs1:`

The shell prompt changes to indicate that device `fsN` is now the active storage device, e.g., `fs1:`

7. Execute the following command:

```
ls
```

The output of the `ls` command is similar to the display listing available with the Linux or MS-DOS `list` directory command. If the correct storage device was selected in step 6 above, the `ls` command should show the BIOS update program in the directory listing obtained with the `ls` command.

8. Assuming the BIOS update program is named `Update.efi`, enter the following command at the shell command prompt:

```
Update.efi
```

The BIOS update program begins executing.

9. When the update program completes, power cycle the platform to force the new BIOS image to load and execute.
10. Verify BIOS update was successful by comparing displayed BIOS version with version specified in the BIOS update notification.

9. Accessories and Cables

9.1 Package Contents

The following items are included in the package:

- One SYS-ITX-P-3800 Embedded System
- One power cable adapter

9.2 Accessory List

WinSystems cables simplify connection to the SYS-ITX-P-3800. The following table lists available items.

Table 3: Cable specifications

Part Number	Connection	Description
CBL-AUDIO2-J02-06A	See "AUDIO - Audio Interface (Internal Connector)" on page 14	2x5 pin (2.0 mm) to 1x Line Out, 1x Mic In 3.5 mm female audio jacks
CBL-SER1-J02-06A	See "COM2, 3, 4 - COM Interface (Internal Connector)" on page 15	2x5 pin (2.0 mm) to 1x DB-9 connector
CBL-USB1-J02-08A	See "USB3,4 - USB Interface (Internal Connector)" on page 17	1x4 pin (1.25 mm) to 1x USB Type A connector

10. Software Drivers

Go to www.winsystems.com for information on available software drivers.

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the SYS-ITX-P-3800 in a safe, effective manner, that does not damage the board. Read this section carefully.

Power Supply



Avoid Electrostatic Discharge (ESD)

Only handle the circuit board and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.

Power Supply Budget

Evaluate your power supply budget. It is usually good practice to budget twice the typical power requirement for all of your devices.

Zero-load Power Supply

Use a zero-load power supply whenever possible. A zero-load power supply does not require a minimum power load to regulate. If a zero-load power supply is not appropriate for your application, then verify that the single board computer's typical load is not lower than the power supply's minimum load. If the single board computer does not draw enough power to meet the power supply's minimum load, then the power supply does not regulate properly and can cause damage to the SYS-ITX-P-3800.



Use Proper Power Connections (Voltage)

When verifying the voltage, measure it at the power connector on the SYS-ITX-P-3800. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

The SYS-ITX-P-3800 requires +9V to +36V (+/- 5%) to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.

The SYS-ITX-P-3800 has a single power connector at J17. A single 9V-36V DC input and ground is required to power the board.

Power Harness

Minimize the length of the power harness. This reduces the amount of voltage drop between the power supply and the SYS-ITX-P-3800.

Gauge Wire

Use the largest gauge wire that you can. Most connector manufacturers have a maximum gauge wire they recommend for their pins.

Contact Points

Some manufacturers use connectors with gold finish contacts. Gold finish contacts are used exclusively on high-speed connections. Power and lower speed peripheral connectors may use a tin finish as an alternative contact surface. It is critical that the contact material in the mating connectors is matched properly (gold to gold and tin to tin). Contact areas made with dissimilar metals can cause oxidation/corrosion, resulting in unreliable connections.

Pin Contacts

Often the pin contacts used in cabling are not given enough attention. The ideal choice for a pin contact would include a design similar to Molex or Trifurcon designs, which provide three distinct points to maximize the contact area and improve connection integrity in high shock and vibration applications.

Power Down

Make sure that power has been removed from the system before making or breaking any connections.



Power Supply OFF—Always turn off the power supply before connecting to the I/O Module. Do not hot-plug the SYS-ITX-P-3800 on a host platform that is already powered.

I/O Connections OFF—Turn off all I/O connections before connecting them to the embedded computer modules or any I/O cards. Connecting hot signals can cause damage whether the embedded system is powered or not.

Mounting and Protecting the I/O Module

Do not bend or flex the SYS-ITX-P-3800 motherboard—Bending or flexing can cause irreparable damage. Embedded computer modules are especially sensitive to flexing or bending around ball grid array (BGA) devices. BGA devices are extremely rigid by design, and flexing or bending the embedded computer module can cause the BGA to tear away from the printed circuit board.

Mounting holes:

- Never use a drill or any other tool in an attempt to make the holes larger.
- Never use screws with oversized heads. The head could come in contact with nearby components causing a short or physical damage.
- Never use self-tapping screws; they compromise the walls of the mounting hole.
- Never use oversized screws that cut into the walls of the mounting holes.

- Always use all of the mounting holes. By using all of the mounting holes, you provide the support the embedded computer module needs to prevent bending or flexing.

Plug or unplug connectors only on fully mounted boards—Never plug or unplug connectors on a board that is not fully mounted. Many of the connectors fit rather tightly and the force needed to plug or unplug them could cause the embedded computer module to be flexed.

Avoid cutting the SYS-ITX-P-3800—Never use star washers or any fastening hardware that cut into the SYS-ITX-P-3800.

Avoid over-tightening of mounting hardware—Causing the area around the mounting holes to compress could damage interlayer traces around the mounting holes.

Use appropriate tools—Always use tools that are appropriate for working with small hardware. Large tools can damage components around the mounting holes.

Avoid conductive surfaces—Never allow the embedded computer module to be placed on a conductive surface. Many embedded systems use a battery to back up the clock-calendar and CMOS memory. A conductive surface such as a metal bench can short the battery causing premature failure.

Conformal Coating

Applying conformal coating to a WinSystems product does not in itself void the product warranty, if it is properly removed prior to return. Coating can change thermal characteristics and impedes our ability to test, diagnose, and repair products. Any coated product sent to WinSystems for repair will be returned at customer expense and no service will be performed.

Operations/Product Manuals

Every single board computer has an Operations manual or Product manual.

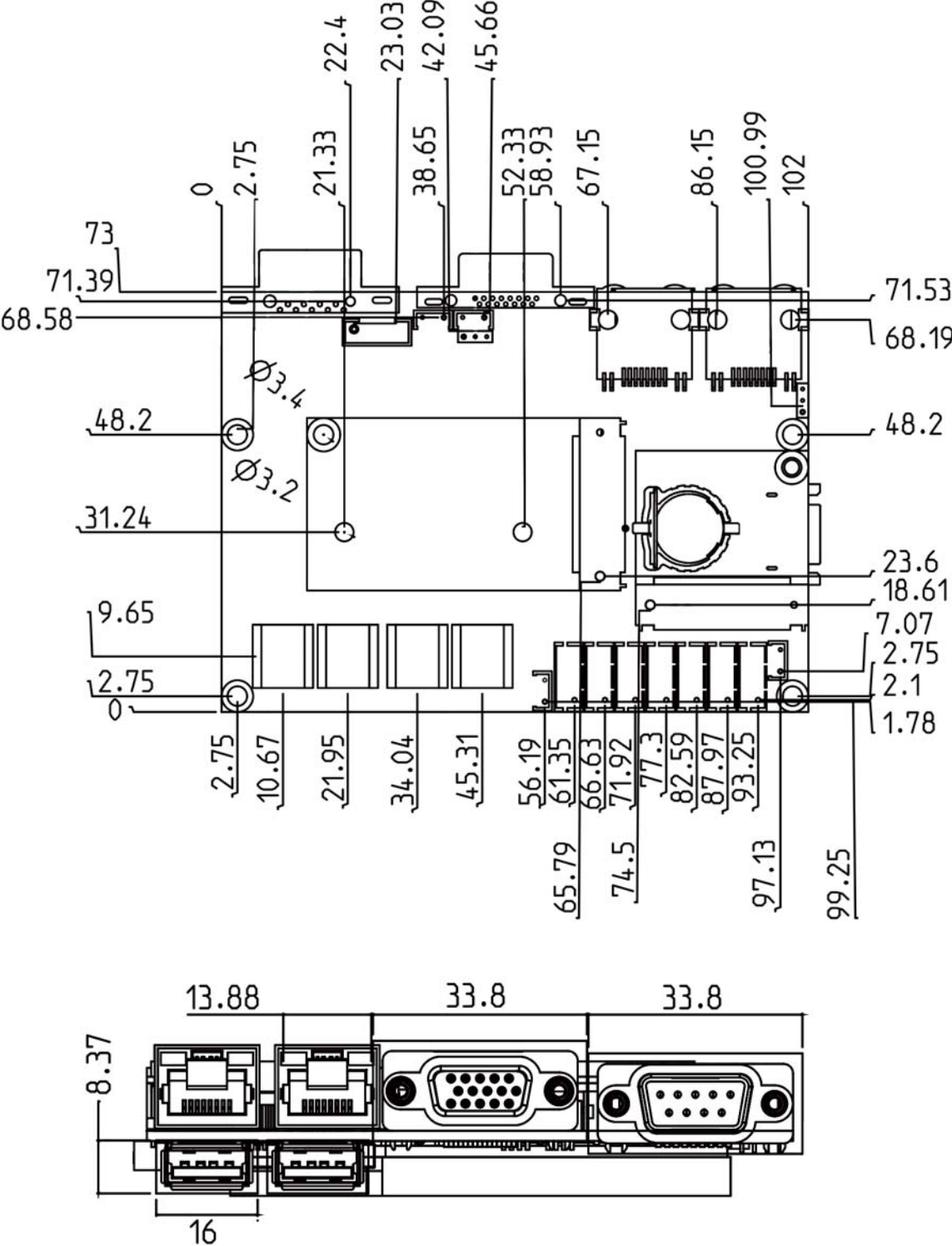
Periodic Updates—Operations/Product manuals are updated often. Periodically check the WinSystems website (<http://www.winsystems.com>) for revisions.

Check Pinouts—Always check the pinout and connector locations in the manual before plugging in a cable. Many I/O modules have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.

Contact an Applications Engineer—If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact a WinSystems Applications Engineer at +1-817-274-7553.

Appendix B. Mechanical Drawings

SYS-ITX-P-3800 Mechanical Drawings



Appendix C. Warranty Information

WinSystems warrants that for a period of two (2) years from the date of shipment, any Products and Software purchased or licensed hereunder which have been developed or manufactured by WinSystems shall be free of any defects and shall perform substantially in accordance with WinSystems' specifications therefor. With respect to any Products or Software purchased or licensed hereunder which have been developed or manufactured by others, WinSystems shall transfer and assign to Customer any warranty of such manufacturer or developer held by WinSystems, provided that the warranty, if any, may be assigned. The sole obligation of WinSystems for any breach of warranty contained herein shall be, at its option, either (i) to repair or replace at its expense any materially defective Products or Software, or (ii) to take back such Products and Software and refund the Customer the purchase price and any license fees paid for the same. Customer shall pay all freight, duty, broker's fees, insurance, charges and other fees and charges for the return of any Products or Software to WinSystems under this warranty. WinSystems shall pay freight and insurance charges for any repaired or replaced Products or Software thereafter delivered to Customer within the United States. All fees and costs for shipment outside of the United States shall be paid by Customer. The foregoing warranty shall not apply to any Products or Software which have been subject to abuse, misuse, vandalism, accident, alteration, neglect, unauthorized repair or improper installation.

THERE ARE NO WARRANTIES BY WINSYSTEMS EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WINSYSTEMS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES FOR LOSS OF DATA, PROFITS OR GOODWILL. WINSYSTEMS' MAXIMUM LIABILITY FOR ANY BREACH OF THIS AGREEMENT OR OTHER CLAIM RELATED TO ANY PRODUCTS, SOFTWARE, OR THE SUBJECT MATTER HEREOF, SHALL NOT EXCEED THE PURCHASE PRICE OR LICENSE FEE PAID BY CUSTOMER TO WINSYSTEMS FOR THE PRODUCTS OR SOFTWARE OR PORTION THEREOF TO WHICH SUCH BREACH OR CLAIM PERTAINS.

Title to the Products shall remain vested in WinSystems until complete payment is made by Customer. Title to any Software shall remain vested in WinSystems, or WinSystems' licensor from whom WinSystems has obtained marketing rights, both before, during and after the term of the License. Nonpayment when due of the purchase price for any Products or the License fees for any Software, or, if applicable, taxes and/or the cost of any freight and insurance for any Products and/or Software, shall entitle WinSystems to take possession of the Products and/or Software without notice to Customer or prejudice to WinSystems' rights under contract or any other legal remedy.

Until title to the Products pass in accordance with the provision set out above, except with the prior written approval of WinSystems, no Products shall be modified, altered, moved or in any way assigned, sublet, mortgaged or charged nor may Customer part with possession of all or part of the same.

There are no understandings, agreements or representations, express or implied, other than those set forth herein. This Order embodies the entire agreement between the parties and may be waived, amended or supplemented only by a written instrument executed jointly by WinSystems and Customer as evidenced only by the signature of duly authorized officers of each party. The foregoing terms and conditions of any order which may be issued by Customer for the purchase of Products or licensing of Software hereunder.

In the event this Order is placed in the hands of an attorney or collection agency by WinSystems to collect any sums due hereunder to WinSystems, Customer shall pay all reasonable attorney's fees, expenses, collection and court costs incurred by WinSystems.

THIS AGREEMENT SHALL BE GOVERNED AND CONSTRUED UNDER THE TEXAS UNIFORM COMMERCIAL CODE AND THE APPLICABLE LAWS OF THE STATE OF TEXAS. THE PARTIES ACKNOWLEDGE THAT ANY ACTION BROUGHT HEREUNDER SHALL ONLY BE BROUGHT IN A COURT OF COMPETENT JURISDICTION IN TARRANT COUNTY, TEXAS.

Warranty Service

1. To obtain service under this warranty, obtain a return authorization number. In the United States, contact the WinSystems Service Center for a return authorization number. Outside the United States, contact your local sales agent for a return authorization number.
2. You must send the product postage prepaid and insured. You must enclose the products in an anti-static bag to protect from damage by static electricity. WinSystems is not responsible for damage to the product due to static electricity.