WINSYSTEMS®

ITX-P-3800

Pico-ITX Intel Atom® E3800
Single Board Computer with
Dual 10/100/1000 Ethernet, LVDS, Touchscreen, USB, COM

Product Manual

Revision History

Document Version	Last Updated Date	Brief Description of Change
v1.0	7/16/18	Initial release
v1.1	12/2025	Updated Conformal Coating, added Warranty link, updated all links

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1. Before You Begin

Review the warnings in this section and the best practice recommendations (see "Best Practices" on page 46) when using and handling the WinSystems ITX-P-3800. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the ITX-P-3800 before proceeding.

APPLYING CONFORMAL COATING AFTER PURCHASE WILL VOID YOUR WARRANTY. FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE ITX-P-3800 AND VOID YOUR WARRANTY.

1.1 Warnings

Only qualified personnel should configure and install the 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 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 ITX-P-3800.

3. Functionality

WinSystems' ITX-P-3800 series single board computers (SBCs) pack an impressive feature set into small form factor Pico-ITX design. The SBCs are based on the Intel$^®$ E3800 processor family, which provides CPU and graphics performance. The 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 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), OpenGLES 2.0 and multiple display support. The graphics engine along with LVDS (optional eDisplayPort) and on-board touchscreen controller make the ITX-P-3800 a great choice for small human machine interface (HMI) applications.

Considering the small size of the 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 and one USB 3.1 Gen 1 port provide additional functionality and expansion options. Also on-board are four RS232 serial ports.

Expansion options for the 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 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 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 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
- 24/48-bit LVDS
- Dual eDP

Ethernet

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

Storage

- One SATA connector with independent DMA operation supported (shared with full size PCIe Mini Card slot for mSATA)
- One full-size PCIe Mini Card slot for mSATA (shared with SATA connector)
- One half-size PCIe Mini Card slot for mSATA

Serial Interface

- Four RS232 COM ports (RS232/422/485 available as custom option)

USB

- Four USB 2.0
- One USB 3.1 Gen 1

Digital Input/Output

- Four hardware digital inputs
- Four hardware digital outputs

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

- ALC886 HD audio specification 1.0, two channel sound chipset
- Amplifier: TPA2011D1 class-D 2.5 W/4 Ω or 1.5 W/8 Ω chipset

Power

- On board DC +9V to +36V wide range power supply

Industrial Operating Temperature

- -20 to +70°C (-4 to +158°F)

Form Factor

- Pico-ITX form factor 102 x 73 mm (4 x 2.9 inches)

Touch Function

- C8051F321 COM interface touchscreen controller, supports 4, 5, and 8 wire analog resistive touchscreen
- Resolution up to 2048 x 2048

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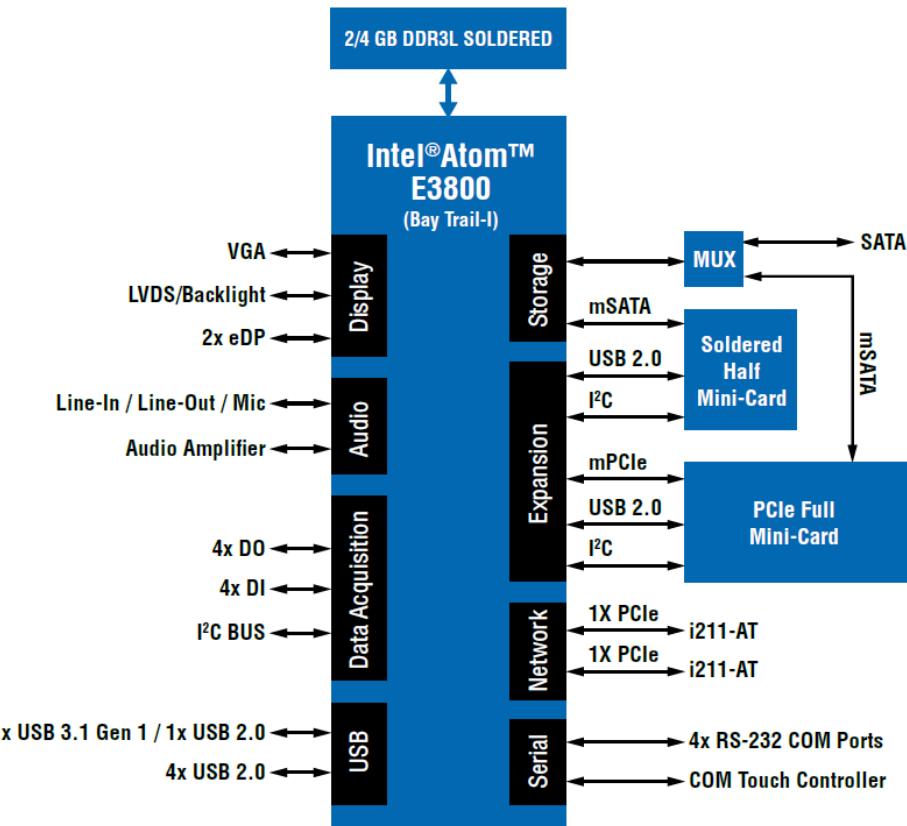
The ITX-P-3800 features the Intel Atom (Bay Trail) dual core or quad core system on chip (SOC). Its robust design, small size, and extended operational temperature make it ideal for use in industrial IoT applications and embedded systems for industrial controls, transportation, Mil/COTS, and energy markets.

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

The VGA and LVDS display interfaces support simultaneous video output. There are a total of four USB 2.0 ports and one USB 3.1 Gen 1 connector which supports an additional USB 2.0 port. There are four RS232 serial channels.

There are four hardware digital inputs and four hardware digital outputs. The digital inputs have a 10 kΩ pull up resistor to +5V by default.

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

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

Drivers are available from the WinSystems website.

6. Specifications

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

Table 1: ITX-P-3800 specifications

Electrical	
V_{CC}	Supports a wide range DC input of 9V to 36V
Models	ITX-P-38XX-M-0
Processor	Dual and quad core Intel Atom (formerly Bay Trail-I) E3800 series processor • Dual core E3825 1.33 GHz processor • Quad core E3845 1.91 GHz processor
Mechanical	
Dimensions	Pico-ITX form factor 102 x 73 mm (4 x 2.9 inches)
Weight	124.28 g (4.38 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 ITX-P-3800 components and configuration.

7.1 Component Layout

7.1.1 Top View

LVDS1 LVDS 18/24 bits

PWR Wide voltage 9V-36V

PWROUT Voltage output +12V/+5V

JVL1 Panel power for LVDS

EDP1 eDP 2Lanes

JVL2 Panel power for eDP

BKLT Backlight power

VGA Analog VGA

LED1 Ethernet1 LED

TOUCH Touch input

JCMOS Clear CMOS

LED2 Ethernet2 LED

USB5 USB 3.0

KBMS PS2 KB/MS

USB6 USB 2.0

USB2 USB 2.0

USB1 USB 2.0

EXBATT External battery

USB3 USB 2.0

USB4 USB 2.0

MC1 Mini Card PCIe/mSATA auto detect USB/I^{2}C

COM1-COM4 COM ports

AUDIO Line-in/mic-out/line-out

FPH Front panel header

DIO 4DI/4DO

I2C I^{2}C bus

AMP Audio amplifier

MC2 Mini Card mSATA (selectable) USB/I^{2}C

BATT CMOS battery connector

LAN2 10/100/1000 Ethernet 2

LAN1 10/100/1000 Ethernet 1

SATA1 Serial ATA (on back side)

Table 2: Board components

Item	Description	Reference
PWR	Wide Voltage for 9V~36V	page 13
BATT	CMOS battery connector	page 13
EXBATT	External battery	page 14
PWROUT	Voltage output +12V/+5V	page 14
FPH	Front panel header	page 15
LVDS1	LVDS 18/24bits	page 16
BKLT	Backlight power	page 17
TOUCH	Touch input	page 17
AUDIO	Line-in/mic-out/line-out	page 19
AMP	Audio amplifier	page 19
COM1, 2, 3, 4	COM ports 1-4	page 20
VGA	Analog VGA	page 20
DIO	4 digital inputs / 4 digital outputs	page 21
I2C	I^2C bus	page 22
LAN1	10/100/1000 Ethernet 1	page 22
LAN2	10/100/1000 Ethernet 2	page 22
LED1	LAN1 LED	page 22
LED2	LAN2 LED	page 22
USB1, 2, 3, 4, 6	USB 2.0	page 23
USB5	USB 3.1 Gen 1	page 23
KBMS	PS2 keyboard/mouse	page 25
MC2	PCIe Mini Card express socket PCIe / mSATA (selectable); default is mSATA USB / I^2C	page 26
MC1	PCIe Mini Card express socket PCIe / mSATA auto-detect USB / I^2C	page 26
EDP1	eDP interface, 2Lanes	page 14
JCMOS	Clear CMOS jumper	page 28
JVL1	Panel power for LVDS	page 29
JVL2	Panel power for eDP	page 29
SATA1	Serial ATA interface (on rear of board)	page 25

7.2 Watchdog Timer (WDT)

The 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 ITX-P-3800 WDT in the System Management tools for the 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

Layout and Pin Reference

PWR: DC 9V~36V 1x4 pin (2.0 mm) connector

pin 1
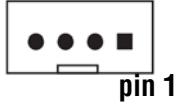
Pin	Description
2,3	DC-IN (12V)
1,4	GND

Matching Connectors

- JST B4B-PH-KL

Cable Housing

- JST PHR-4

7.4.2   BATT - CMOS Battery 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.
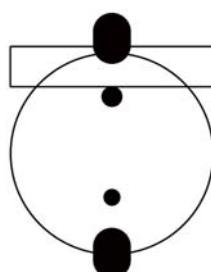
7.4.3 EXBATT - External Battery Power-In

EXBATT: External battery 1x2 pin (1.25 mm) connector

Layout and Pin Reference

pin 1

Pin	Description
1	GND
2	+3V

Matching Connectors

- Molex 053047-0210

Cable Housing

- Molex 51021-0200

7.4.4 PWROUT - DC+12V/+5 Voltage Power Output

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

Layout and Pin Reference

pin 1

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

Matching Connectors

- JST B4B-PH-KL

Cable Housing

- JST PHR-4

7.4.5 FPH - Front Panel Pin Header

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

Layout and Pin Reference

10

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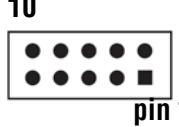
Pin	Description	Pin	Description
1	Power button pin	2	Power button GND
3	Reset pin	4	Reset GND
5	Power LED-	6	Power LED+
7	HDD LED-	8	HDD LED+
9	LAN LED-	10	LAN LED+

Matching Connectors

• JST B10B-PHDSS
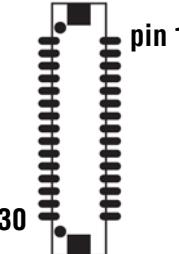
Cable Housing

• JST PHDR-10VS

7.4.6 LVDS1 - LVDS Connector

LVDS1: LVDS 2x15 pin (1.25 mm) connector

Layout and Pin Reference

| LVDS1	Pin	Description	Pin	Description
	1	PWM dimming	2	+5V
	3	+LCD (5V or 3.3V)	4	+LCD (5V or 3.3V)
	5	Channel-1-DATA3+	6	Channel-0-DATA3+
	7	Channel-1-DATA3-	8	Channel-0-DATA3-
	9	Channel-0-DATA2+	10	Channel-0-CLK+
	11	Channel-0-DATA2-	12	Channel-0-CLK-
	13	GND	14	GND
	15	Channel-0-DATA1+	16	Channel-0-DATA0+
	17	Channel-0-DATA1-	18	Channel-0-DATA0-
	19	GND	20	GND
	21	+LCD (5V or 3.3V)	22	+LCD (5V or 3.3V)
	23	Channel-1-DATA2+	24	Channel-1-CLK+
	25	Channel-1-DATA2-	26	Channel-1-CLK-
	27	Channel-1-DATA1+	28	Channel-1-DATA0+
	29	Channel-1-DATA1-	30	Channel-1-DATA0-

Notes:

1. LVDS interface supports two LVDS channels at 18/24 bits.

2. JVL1: LVDS panel +5V/+3.3V (default) voltage select.

3. LVDS1 PIN 1 for panel backlight dimming control.

4. Pin 1 back light dimming control. Provided 200 Hz / 275 Hz / 380 Hz/ 20 kHz / 25 kHz /100 Hz and adjust PWM duty cycle by software program.

Matching Connectors

•   Hirose DF13E-30DP-1.25V

Cable Housing

•   Hirose DF13-30DS-1.25C

7.4.7 BKLT - Backlight Panel Power

BKLT: Backlight power 5-pin (2.0 mm) connector

Layout and Pin Reference
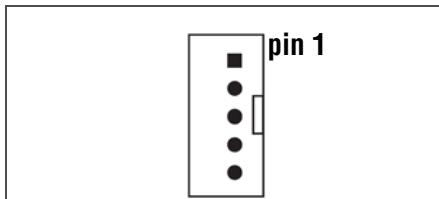
Pin	Description
1	+12V
2	GND
3	PWM dimming
4	ENBKL (3.3V)
5	ENBKL (5V)

Note: Pin 3 back light dimming controls, provided 200 Hz / 275 Hz / 380Hz / 20 kHz / 25 kHz /100 Hz and adjust PWM duty cycle by software program.

Matching Connectors

- JST B5B-PH-KL

Cable Housing

- JST PHR-5

7.4.8 TOUCH - Touchscreen Device

TOUCH: Touchscreen device 2x5 pin (2.0 mm) connector

Layout and Pin Reference
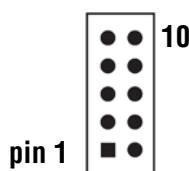
8-wire type pin define

Pin	Description	Pin	Description
1	Bottom	2	Bottom sense
3	Top sense	4	Top
5	Right	6	Right sense
7	Left	8	Left sense
9	GND	10	NC
Note: To configure for 8-wire touch setup, short pins 3 and 4 together.			

4-wire type pin define

Pin	Description	Pin	Description
1	Bottom	2	N/A
3	N/A	4	Top
5	Right	6	N/A
7	Left	8	N/A
9	GND	10	NC
Note: To configure for 4-wire touch setup, short pins 3 and 4 together.			

5-wire type pin define

Pin	Description	Pin	Description
1	UR(H)	2	N/A
3	Sense	4	UL(Y)
5	LR(X)	6	N/A
7	LL(L)	8	N/A
9	GND	10	NC
Note: The Touch upstream can be changed to USB interface, but USB6 will be removed.			

Matching Connectors

- JST B10B-PHDSS

Cable Housing

- JST PHDR-10VS

7.4.9   AUDIO - Audio Interface

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

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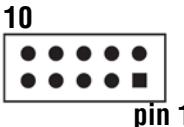
Pin	Description	Pin	Description
1	Line-out-R	2	MIC-IN
3	Line-in-R	4	GND
5	GND	6	SPDIF-OUT
7	Line-in-L	8	+5V
9	Line-out-L	10	MIC-IN

Matching Connectors

- JST B10B-PHDSS

Cable Housing

- JST PHDR-10VS

7.4.10   AMP - Audio Amplifier

AMP: Amplifier line-out right/left channel 4-pin (1.25 mm) connector

Layout and Pin Reference

Pin	Description
1	Left+
2	Left-
3	Right+
4	Right-

Matching Connectors

- Molex 53047-0410

Cable Housing

- Molex 51021-0400

7.4.11 COM1-COM4 - COM Interface

COM1-COM4: 2x5 pin (2.0 mm) connector (RS232 mode)

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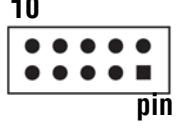
Pin	Description	Pin	Description
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	+5V

Matching Connectors

- JST B10B-PHDSS

Cable Housing

- JST PHDR-10VS

7.4.12 VGA - Analog VGA Display

VGA: Analog VGA 2x5 pin (2.0 mm) connector

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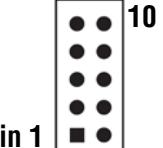
Pin	Description	Pin	Description
1	BLUE	2	GND
3	GND	4	DDC CLOCK
5	GREEN	6	V-SYNC
7	GND	8	H-SYNC
9	RED	10	DDC DATA

Matching Connectors

- JST B10B-PHDSS

Cable Housing

- JST PHDR-10VS

7.4.13 DIO - Digital Input/Output

DIO: DIO 0-3 2x5 pin (2.0 mm) connector

Layout and Pin Reference
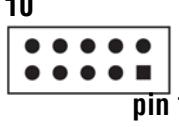
Pin	Description	Pin	Description
1	DI-0	2	DO-3
3	DI-1	4	DO-2
5	DI-2	6	DO-1
7	DI-3	8	DO-0
9	GND	10	+5V
Notes:			
1. By default, there is a 10k ohm pull up resistor to +5V.			
2. Circuit must be isolated to control external devices.			

Matching Connectors

- JST B10B-PHDSS

Cable Housing

- JST PHDR-10VS

7.4.14   I2C - I2C Interface

I2C: I^2C 4-pin (1.25 mm) connector

Layout and Pin Reference

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

Matching Connectors

- Molex 53047-0410

Cable Housing

- Molex 51021-0400
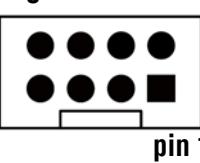
7.4.15   LAN1/LAN2 - LAN 10/100/1000 Ethernet Interface

LAN1: Ethernet port 2x4 pin (2.0 mm) connector

LAN2: Ethernet port 2x4 pin (2.0 mm) connector

Layout and Pin Reference

LAN1/LAN2 10/100/1000 Ethernet 2x4 pin (2.0 mm) 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

Matching Connectors

- JST B8B-PHDSS

Cable Housing

- JST PHDR-08VS0

7.4.16 LED1/LED2 - Ethernet LEDs

LED1/LED2: Ethernet LED indicator 1x4 pin (1.25 mm) connector

Layout and Pin Reference
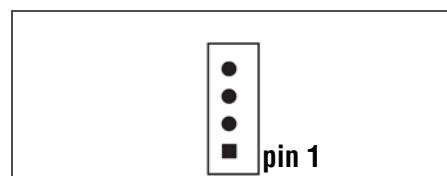
pin 1

Pin	Description
1	VCC
2	Speed 10M
3	Speed 100M
4	Speed 1000M

Matching Connectors

- Molex 53047-0410

Cable Housing

- Molex 51021-0400

7.4.17 USB1-USB6 - USB Interface

USB1: USB 2.0 port 1x4 pin (1.25 mm) connector

USB2: USB 2.0 port 1x4 pin (1.25 mm) connector

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

USB4: USB 2.0 port 1x4 pin (1.25 mm) connector

USB5: USB 3.1 Gen 1 port 1x5 pin (1.25 mm) connector

USB6: USB 2.0 port 1x4 pin (1.25 mm) connector

Layout and Pin Reference

USB1, 2, 3, 4, 6: USB 2.0 port 1x4 pin (1.25 mm) connector
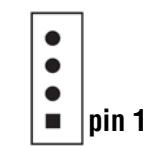
pin 1

Pin	Description
1	+5V
2	DATA-
3	DATA+
4	GND
Note: USB6 signals share with the Touch interface if Touch upstream is using USB interface.	

USB5: USB 3.1 Gen 1 port 1x5 pin (1.25 mm) connector

NOTE USB6 must be used with USB5 to utilize USB 3.1 Gen 1 speeds.

pin 1

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

Matching Connectors

• USB1, 2, 3, 4, 6: Molex 53047-0410

• USB5: Molex 53047-0510

Cable Housing

• USB1, 2, 3, 4, 6: Molex 51021-0400

• USB5: Molex 51021-0500

7.4.18   SATA1 - Serial ATA Interface

SATA1: SATA port 1x7 pin connector

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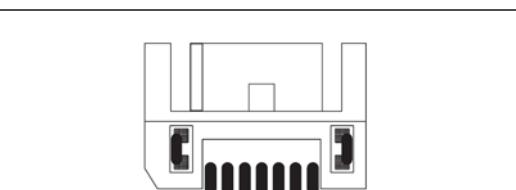
Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

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.

7.4.19   KBMS - PS2 Keyboard/Mouse

KBMS: PS2 keyboard/mouse port 1x6 pin (1.25 mm) connector

Layout and Pin Reference
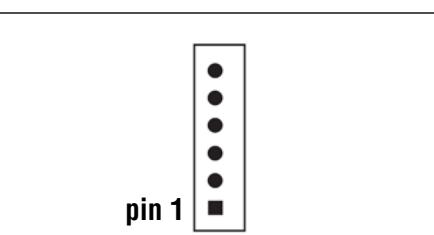
Pin	Description
1	+5V
2	Keyboard data
3	Keyboard clock
4	GND
5	Mouse DATA
6	Mouse clock

Matching Connectors

- Molex 53047-0610

Cable Housing

- Molex 51021-0600

7.4.20 MC1/MC2 - PCI Express Mini Card

- 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
MC1 pin 52 pin 1		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
MC2 pin 1 pin 52		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
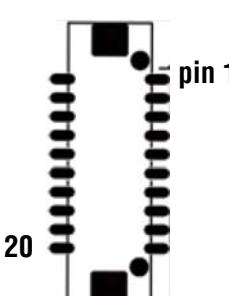
Notes:

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.

7.4.21 eDP1 - eDP Interface

eDP1: eDP 2x10 pin (1.25 mm) connector

Layout and Pin Reference

eDP1	Pin	Description	Pin	Description
	1	Lane-0-DATA-	2	+12V or +5V
	3	Lane-0-DATA+	4	+12V or +5V
	5	Lane-1-DATA-	6	GND
	7	Lane-1-DATA+	8	GND
	9	Backlight enable	10	GND
	11	PWM dimming for eDP	12	GND
	13	I^{2}C data	14	+LCD (5V or 3.3V)
	15	I^{2}C clock	16	+LCD (5V or 3.3V)
	17	eDP Aux+	18	+LCD (5V or 3.3V)
	19	eDP Aux-	20	GND

Notes:

1. The eDP interface supports 2 lanes.

2. JVL2: eDP panel +5V/+3.3V (default) voltage select.

3. eDP1 PIN 9 for panel backlight enable. +5V Level

4. eDP1 PIN 11 for panel backlight dimming control

5. Pin 11 back light dimming control.

Provided 200Hz / 275Hz/ 380 Hz/ 20KHz / 25KHz /100Hz and adjust PWM duty cycle by software program.

6. eDP and LVDS backlight dimming control selectable in BIOS.

Matching Connectors

• Hirose DF13-20DP-1.25V

Cable Housing

• Hirose DF13-20DS-1.25C

7.4.22   Additional Information

NOTE   Use the following procedure to install an M.2 mini card.

To install a mini PCIe/mSATA into MC1 or MC2:

1.   Insert the mini PCIe/mSATA.
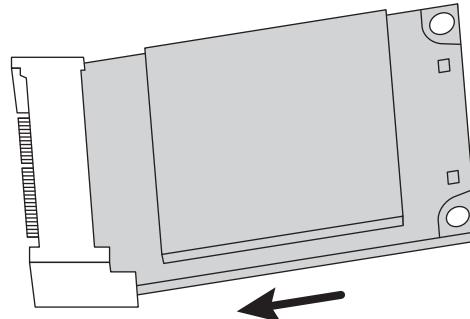
2.   Push the free end of the card toward the circuit board and then secure it
with two (2 mm) screws (WinSystems P/N G527-0000-400).
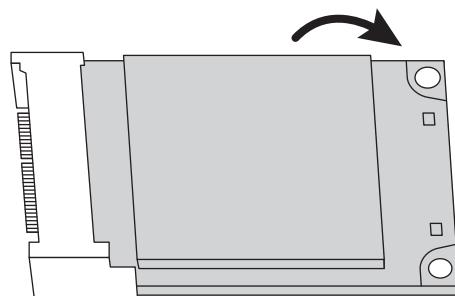
7.5   Jumpers

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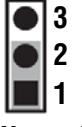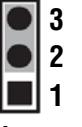
Jumpers can be used to reset the BIOS CMOS settings to the factory default. Enable/
disable the clear CMOS function hardware circuit, by placing or removing the jumper
from JCMOS as needed.

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

1.   Remove power from the 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
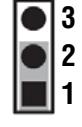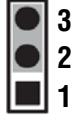
Pin	Description
*1-2	Normal set
2-3	CMOS data clear

7.5.2 JVL1 - LCD Panel Power Select

Select the appropriate VCC setting using this jumper.

Layout and Pin Reference
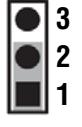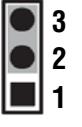
Pin	Description
1-2	+5V
*2-3	+3.3V

7.5.3 JVL2 - eDP Panel Power Select

Select the appropriate VCC setting using this jumper.

Layout and Pin Reference

Pin	Description
1-2	+5V
*2-3	+3.3V

8. BIOS Functionality

8.1 General Information

The 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 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 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          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, min-ute, 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
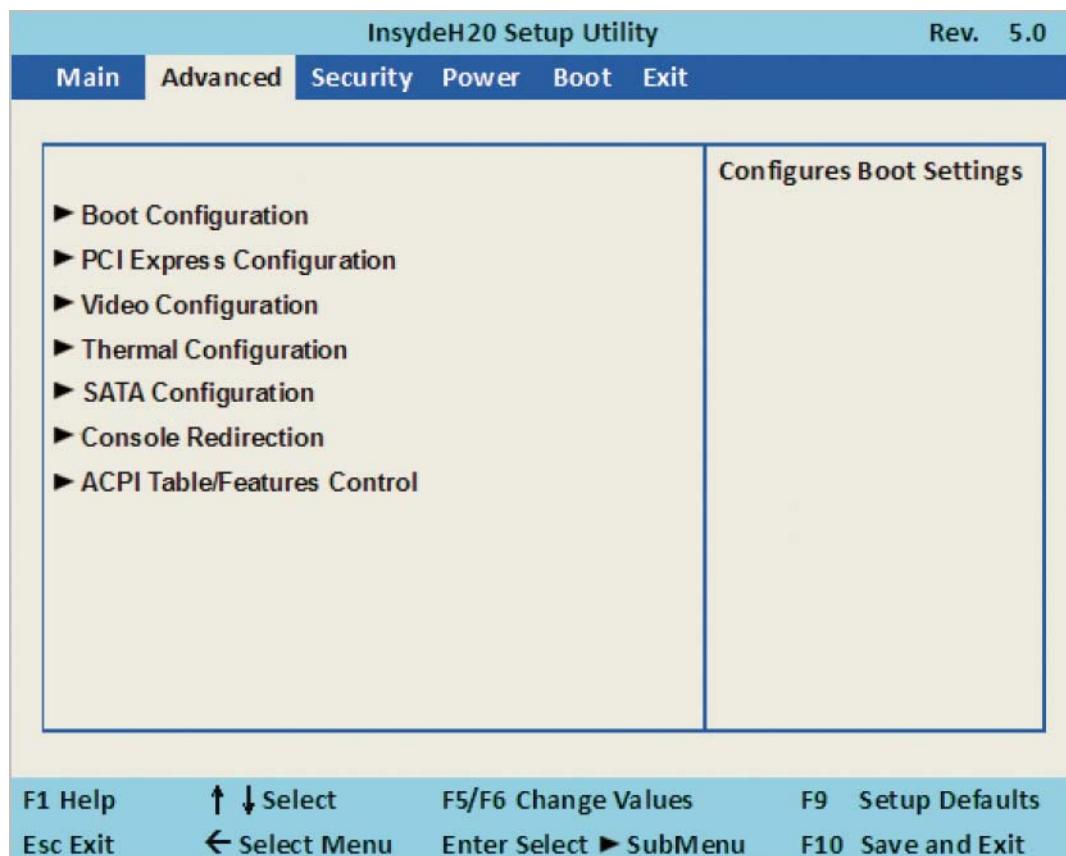
Boot Configuration

- • 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.

- **Display Panel type.** Select panel type on the M/B. Values are LVDS (default), eDP.

- **Dimming Frequency.** Select the panel frequency for dimming to control the back-light. Refer to your panel specification to select a valid frequency. Options are 200 Hz (default), 275 Hz, 380 Hz, 20 kHz, 25 kHz, 100 Hz.

- **Dimming Invert.** Confirm the dimming trigged level in panel spec. Options are Positive (default), Negative.

- **Dimming Ratio.** There are 10 stages for changing panel brightness from 10% to 100% (default).

- **Dimming Safe Mode.** Options:
  - Disable: When power is off, dimming restores to 100% (default)
  - Enable: When power is off, dimming does not restore to 100%

- **Configure LVDS Panel Number as.** Supported panel resolutions:
  - 640 x 480 18 bit
  - 800 x 600 18 bit
  - 1024 x 768 18 bit (default)
  - 800 x 480 18 bit
  - 1024 x 600 18 bit
  - 1280 x 800 18 bit
  - 1366 x 768 18 bit
  - 800 x 600 24 bit
  - 1024 x 768 24 bit
  - 1280 x 800 24 bit
  - 1366 x 768 24 bit
  - 1280 x 1024 48 bit
  - 1440 x 900 48 bit
  - 1600 x 1200 48 bit
  - 1920 x 1080 48 bit

  Note: These resolutions are for LVDS only.

- **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

```
                    InsydeH20 Setup Utility              Rev.  5.0
   Main   Advanced   Security   Power   Boot   Exit


  Supervisor Password         Not Install       Install or Change the password
                                                and the length of password
                                                must be greater than one
  Set Supervisor Password                       character.




F1 Help          ↑↓ Select       F5/F6 Change Values       F9    Setup Defaults
Esc Exit         ← Select Menu    Enter Select ► SubMenu    F10   Save and Exit
```
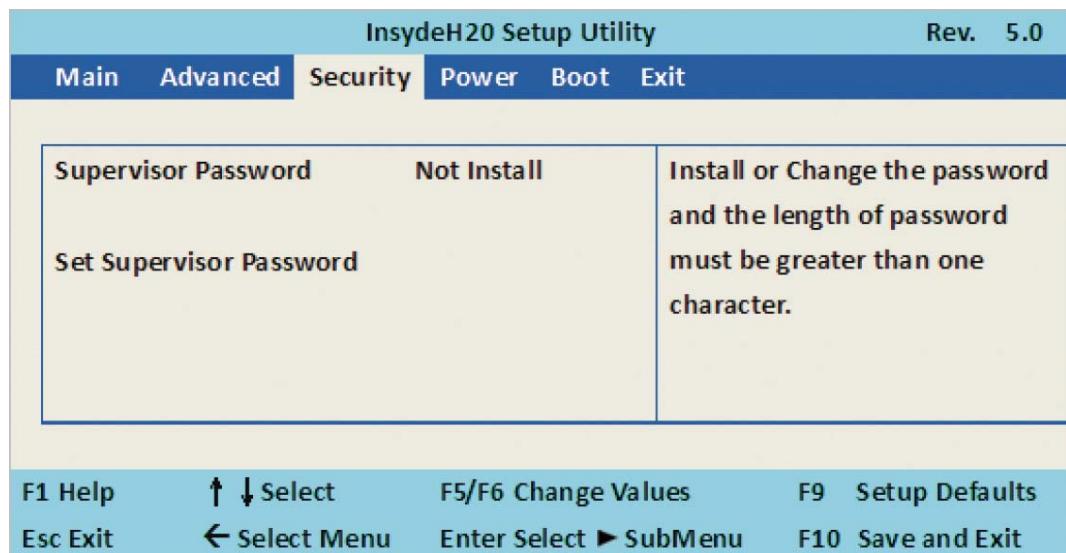
Supervisor Password

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

```
                   InsydeH20 Setup Utility              Rev.   5.0
   Main    Advanced   Security   Power   Boot   Exit

                                            Determines the
                                            action take when the
   Wake on LAN             <Disabled>       system power is off
   Power Button           <Instant OFF>     and a PCI Power
                                            Management Enable
                                            wake up event
                                            occurs.




   F1 Help          ↑ ↓ Select       F5/F6 Change Values     F9   Setup Defaults
   Esc Exit         ← Select Menu     Enter Select ▶ SubMenu  F10  Save and Exit
```

- **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

```
              InsydeH20 Setup Utility              Rev.   5.0

 Main    Advanced   Security   Power   Boot   Exit


                                          Select boot type to
                                          Dual type, Legacy
 Boot Type              <Dual Boot Type>   type or UEFI type.
 Quiet Boot             <Enabled>
 EFI/Legacy Device Order    <Legacy device first>


 ► EFI
 ► Legacy



 F1 Help        ↑ ↓ Select        F5/F6 Change Values       F9   Setup Defaults
 Esc Exit       ← Select Menu      Enter Select ► SubMenu    F10  Save and Exit
```
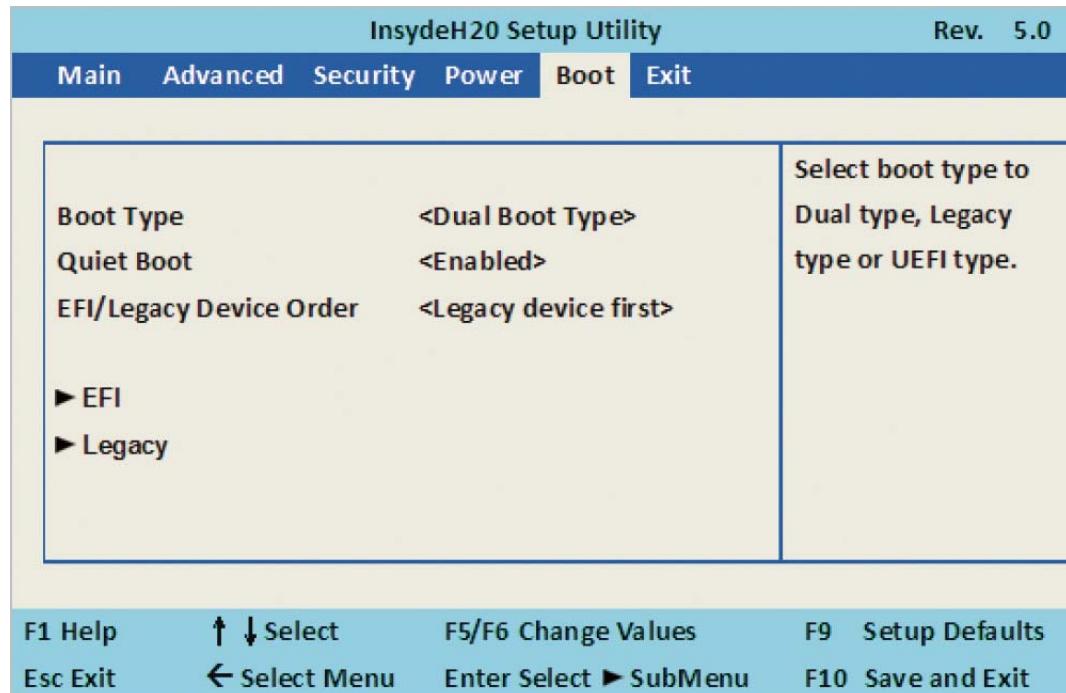
- **Boot Type.** Options are Dual type (default), Legacy boot type, UEFI boot type.

- **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

```
                    InsydeH20 Setup Utility              Rev.   5.0
    Main   Advanced  Security  Power  Boot  Exit


                                                   Exit system setup and
                                                   save your changes.
    Exit Saving Changes
    Save Change Without Exit
    Exit Discarding Changes
    Load Optimal Defaults
    Discard Changes




    F1 Help        ↑ ↓ Select      F5/F6 Change Values    F9   Setup Defaults
    Esc Exit       ← Select Menu    Enter Select ► SubMenu  F10  Save and Exit
```
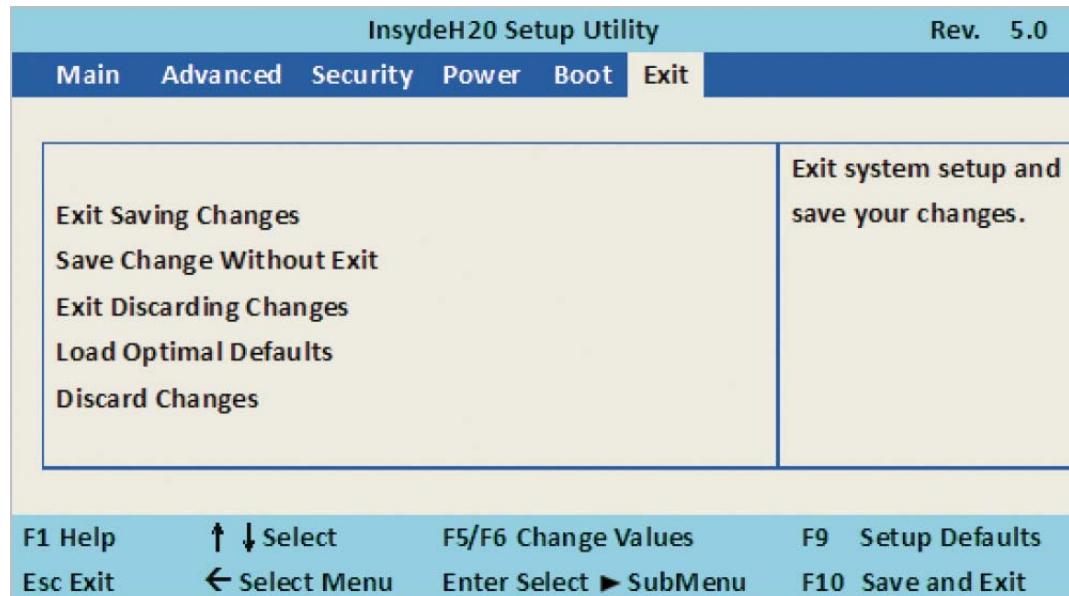
- **Exit Saving Changes.** This item allows the user to reset the system after saving the changes.

- **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.
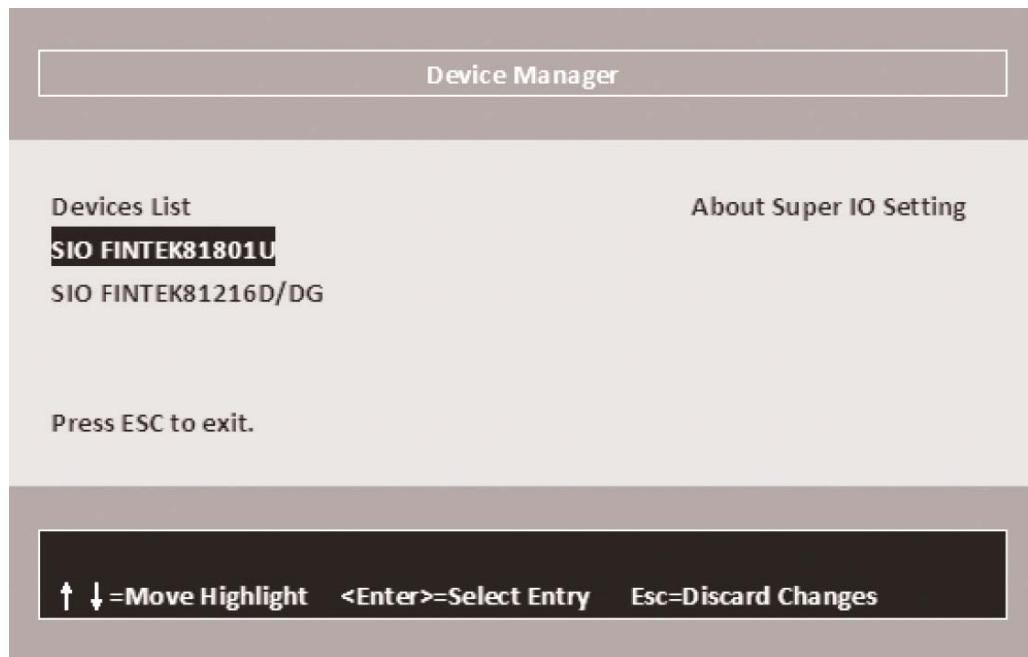
Serial Port 1/2 Configuration (SIO FINTEK81801U)

- **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 3/4/6 Configuration (SIO FINTEK81216D/DG)

Use this item to enable or disable a serial port (COM3, COM4, COM6 for Touch). 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.

- **Serial Port 6 for Touch Base IO Address / Interrupt.** Use this item to select an IO address and interrupt for super IO device. Options are:

- IO=4E8h; 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

- **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 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 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 ITX-P-3800 platform.

2. Turn on the 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 f 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 ITX-P-3800 Pico-ITX main board
- One passive heat spreader
- One power cable adapter
- One power supply

9.2 Accessory List

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

Table 3: Cable specifications

Part Number	Connection	Description
CBL-PWR-J03-04A	See "PWR - DC Power Input" on page 13	1x4 pin (2.0 mm) to 5.5 x 2.5 mm barrel connector
CBL-PANEL-J02-06A	See "FPH - Front Panel Pin Header" on page 15	2x5 pin (2.0 mm) to Power and Reset buttons, as well as Power, HDD, LAN status LEDs
CBL-AUDIO2-J02-06A	See "AUDIO - Audio Interface" on page 19	2x5 pin (2.0 mm) to 1x Line Out, 1x Mic In 3.5 mm female audio jacks
CBL-SER1-J02-06A	See "COM1-COM4 - COM Interface" on page 20	2x5 pin (2.0 mm) to 1x DB-9 connector
CBL-VGA-J02-06A	See "VGA - Analog VGA Display" on page 20	2x5 pin (2.0 mm) to 1x DE-15 connector
CBL-DIO8-J01-06A	See "DIO - Digital Input/Output" on page 21	2x5 pin (2.0 mm) to 2x5 pin (2.0 mm)
CBL-ENET1-J02-06A	See "LAN1/LAN2 - LAN 10/100/1000 Ethernet Interface" on page 22	2x4 pin (2.0 mm) to 2x4 pin (2.0 mm)
ADP-IO-ENET-003A	See "LAN1/LAN2 - LAN 10/100/1000 Ethernet Interface" on page 22	2x4 pin (2.0 mm) to 1x RJ-45 adapter board

Table 3: Cable specifications (Continued)

Part Number	Connection	Description
ADP-IO-ENET-004A	See "LAN1/LAN2 - LAN 10/100/1000 Ethernet Interface" on page 22	2x4 pin (2.0 mm) to 2x RJ-45 adapter board
CBL-LED2-J02-08A	See "LED1/LED2 - Ethernet LEDs" on page 23	1x4 pin (1.25 mm) to 1x4 pin (1.25 mm)
CBL-USB1-J02-08A	See "USB1-USB6 - USB Interface" on page 23	1x4 pin (1.25 mm) to 1x USB Type A connector
CBL-USB1-J03-08A	See "USB1-USB6 - USB Interface" on page 23	1x5 pin (1.25 mm) and 1x4 pin (1.25 mm) to 2x5 pin (1.25 mm)
ADP-IO-USB-003A	See "USB1-USB6 - USB Interface" on page 23	2x5 pin (1.25 mm) to 1x USB 3.1 Gen 1 Type A adapter board
CBL-PS2-J02-05A	See "KBMS - PS2 Keyboard/Mouse" on page 25	1x6 pin (1.25 mm) to PS2 keyboard and PS2 mouse connectors

Standoff kits are available and recommended for use with the ITX-P-3800. The following table lists the items contained in each kit.

Table 4: Standoff kits

Kit	Component	Description	Qty
KIT-PCM-STANDOFF-4 4 pc. nylon hex standoff kit	Standoff	Nylon 0.25" hex, 0.600" long male/female 4-40	4
	Hex nut	Hex nylon 4-40	4
	Screw	Phillips-pan head (PPH) 4-40 x 1/4" stainless steel	4
KIT-PCM-STANDOFF-B-4 4 pc. brass hex standoff kit	Standoff	Brass 5 mm hex, 0.600" long male/female 4-40	4
	Hex nut	4-40 x 0.095 Thick, Nickel Finish	4
	Screw	Phillips-pan head (PPH) 4-40 x 1/4" stainless steel	4

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 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 ITX-P-3800.

Use Proper Power Connections (Voltage)
When verifying the voltage, measure it at the power connector on the ITX-P-3800. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

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

The 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 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 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

Placing the ITX-P-3800 on mounting standoffs—Be careful when placing the ITX-P-3800 on the mounting standoffs. Sliding the board around until the standoffs are visible from the top can cause component damage on the bottom of the board.

Do not bend or flex the ITX-P-3800—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—The mounting holes are plated on the top, bottom, and through the barrel of the hole, and are connected to the embedded computer module's ground plane. Traces are often routed in the inner layers right below, above, or around the 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 ITX-P-3800—Never use star washers or any fastening hardware that cut into the 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

Conformal coating by any source other than WINSYSTEMS voids the product warranty and will not be accepted for repair by WINSYSTEMS. If such a product is sent to WINSYSTEMS for repair, it will be returned at customer expense and no service will be performed. A WINSYSTEMS product conformally coated by WINSYSTEMS will be subject to regular WINSYSTEMS warranty terms and conditions.

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

ITX-P-3800 Mechanical Drawings
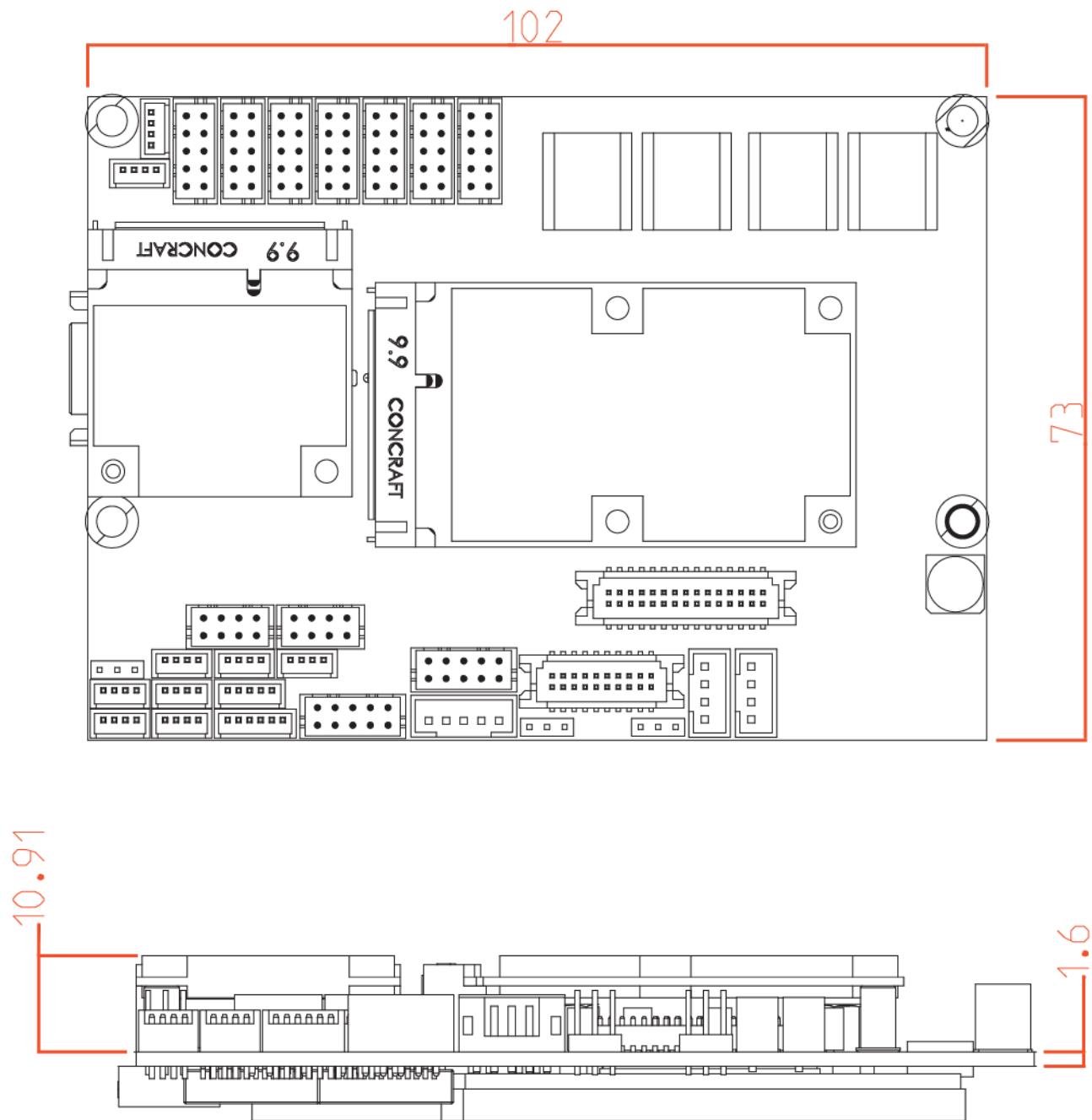
Appendix C. Warranty Information

Full warranty information can be found at https://winsystems.com/company-policies/warranty/.