User Manual

MIO-2360

Intel® Pentium N4200/Celeron N3350/Atom™ E3940/Atom™ E3900 series Pico-ITX SBC, DDR3L, 24-bit LVDS, VGA/HDMI, 1 GbE, Full-size Mini PCIe, 4 USB, 2 COM, SMBus, mSATA & MIOe

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Enabling an Intelligent Planet

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1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
    – Product name and serial number
    – Description of your peripheral attachments
    – Description of your software (operating system, version, application software, etc.)
    – A complete description of the problem
    – The exact wording of any error messages

Packing List

Before installation, please ensure the following items have been shipped:

Item Part Number

- 1 MIO-2360 SBC
- 1 Startup manual
- Cables

Part Number	Description
1700006291	SATA cable 7P 30 cm w/ right angle
1700022444-01	Audio Cable 2*5P-2.0/JACK*2 20cm
1701200220	COM PORT cable 2*10P-2.0/D-SUB 9P(M)*2 22 cm
1700027546-01	A cable 1*5P-2.0/1*5P-2.0+SATA 15P 15cm MIO-236
1700002172	USB cable 2.0mm pitch USB-A(F) 17cm
1700019705	AT Power cable 12cm

- Heatsink:

1960078695T001	99.5 x 70.5 x 15.7 mm

- Stud & Screw

Part Number	Description
9666226300E	Stud and screw pack, including:
1935031500	Screw R/S D=5.3 H=2 + M3*15L, 4 pcs
1910002596-01	Stud F=M3*10L M=M3*5L B=5 H=19, 4 pcs
193B0204C0	Screw F/S D=3.5 H=0.8 + M2*4L, 2 pcs

Ordering Information

Model Number	Description
MIO-2360N-S1A1E	Intel® Celeron SoC N3350, fanless, LVDS, VGA/HDMI, Gigabit Ethernet, 4 USB, mSATA, SMBus, GPIO, 2 COM, Mini PCIe, MIOe
MIO-2360N-S2A1E	Intel® Pentium SoC N4200, fanless, LVDS, VGA/HDMI, Gigabit Ethernet, 4 USB, mSATA, SMBus, GPIO, 2 COM, Mini PCIe, MIOe
TBD	Intel® Atom™ SoC E3940, fanless, LVDS, VGA/HDMI, Gigabit Ethernet, 4 USB, mSATA, SMBus, GPIO, 2 COM, Mini PCIe, MIOe
TBD	Intel® Atom™ SoC E3930, fanless, LVDS, VGA/HDMI, Gigabit Ethernet, 4 USB, mSATA, SMBus, GPIO, 2 COM, Mini PCIe, MIOe

Optional Accessories

Part No.	Description
1960085302N001	MIO-2360 Heat spreader

Declaration of Conformity

This device complies with the requirements in part 15 of the FCC rules: Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

■ Reorient or relocate the receiving antenna.
■ Increase the separation between the equipment and receiver.
■ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
■ Consult the dealer or an experienced radio/TV technician for help.

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Safety Instructions

1. Read these safety instructions carefully.

2. Keep this User Manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.

7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.

8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.

10. All cautions and warnings on the equipment should be noted.

11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

12. Never pour any liquid into an opening. This may cause fire or electrical shock.

13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

14. If one of the following situations arises, get the equipment checked by service personnel:
    - ■ The power cord or plug is damaged.
    - ■ Liquid has penetrated into the equipment.
    - ■ The equipment has been exposed to moisture.
    - ■ The equipment does not work well, or you cannot get it to work according to the user's manual.
    - ■ The equipment has been dropped and damaged.
    - ■ The equipment has obvious signs of breakage.

15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.

16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

■ To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

■ Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1

General Introduction

This chapter gives background information on the MIO-2360.

Sections include:

■ Introduction

■ Product Features

■ Specifications

1.1 Introduction

MIO-2360 is a MI/O-Ultra SBC (Single Board Computer) with Embedded Intel® Celeron N3350/Atom™ E3940/Atom™ E3930 Processor. The MIO-2360 can support DDR3L memory up to 8 GB, has 2 x USB 3.0 and 4 x USB 2.0 compatible ports, one GbE (up to 1000 Mbps) interface, LVDS and VGA or HDMI support, HD (High Definition) audio, and one full size mini-PCIe and MIOe expansion slot. In addition, MIO-2360 also supports one SATA drive, two COM ports, SMBus, one GPIO and one half size mSATA slot. Advantech's innovative MI/O (multiple I/O) Extension SBC is equipped with flexible multiple I/O to assist integrators in developing optimized solutions.

1.2 Specifications

1.2.1 General Specifications

- ■ **CPU:** Intel® Pentium N4200/Celeron N3350/Atom™ E3940/Atom™ E3930
- ■ **System Chipset** Intel® Celeron/Atom SoC integrated
- ■ **BIOS:** AMI EFI 64 Mbit Flash BIOS
- ■ **System Memory:** DDR3L, 1866 MHz, up to 8 GB
- ■ **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- ■ **Expansion Interface:**
  - – 1 x full size mini-PCIe slot
  - – 1 x MIOe connector: SMBus, 2 x USB3.0, LPC, 2 x PCIe x1, line out, DisplayPort/HDMI*, +5 Vsb/+12 Vsb power, Power On, Reset, SATA*
- ■ **Battery:** Lithium 3 V / 210 mAH

I/O

- ■ **Internal I/O interface:** 2 x USB2.0, 2 x RS-232/422/485, 1 x HD Audio (line in, line out), GPIO, SMBus
- ■ **Rear I/O ports:** 1 x RJ45 Ethernet, 1 x VGA or HDMI, 2 x USB 3.0, 1 x Power connector (or DC jack, supported by request)

Ethernet

- ■ **Controller:** Intel i210 (GbE1)
- ■ **Speed:** 10/100/1000 Mbps
- ■ **Connector:** 1 x RJ45
- ■ **Standard:** Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3z, IEEE 802.ab
- ■ Support wake-on-LAN

Display

- ■ **Controller:** Intel® SoC N3350/E3940/E3930, DirectX 11 and OpenGL3.0 support for VGA and HDMI display output
- ■ **Resolution:**
  - – VGA: Up to 1920 x 1200 at 60Hz
  - – LVDS: 24-bit LVDS, up to 1920 x 1200 at 60Hz
  - – HDMI: Up to 3840 x 2160 at 30Hz

OS support list

OS	
Windows 10 (×64)	Yes
Windows 8.1 (×64)	N/A
Win7/WES7 (×32/×64)	N/A
Windows Embedded CE 7	N/A
Linux	Yes (optional)
VxWorks	N/A
QNX (supported by project)	No

1.2.2 Functional Specifications

Processor

Processor	- Intel® Pentium N4200/Celeron M3350/Atom™ E3940/ Atom™ E3930 - Frequency – N4200/N3350 1.10 GHz – E3930 1.60 GHz – E3940 1.30 GHz - Manufacturing Technology: 14 nm - L2 cache: 2 MB
Memory	- Supports DDR3L 1866 MHz, up to 8 GB - SODIMM Socket: 204-pin SODIMM socket type *1
Graphic Engine	- Directx* 11, OGL 3.0, OCL 1.1, OGL ES 2.0 - Hardware decode/ acceleration: – Encode: H264, MPEG2/4, VC1, WMV9 – Decode: H264, MPEG2
Display	- VGA: 1920 x 1200 @ 60 Hz - HDMI: 3840 x 2160 @ 30Hz - LVDS1: 24-bit, up to 1920 x 1200 @ 60Hz, up to 1440 x 900 @ 60 Hz - Dual independent display: VGA+LVDS+MIOe or HDMI+LVDS+MIOe

Chipset

Control Hub	■ Intel® SoC N3350/E3940/E3930
Audio	■ High Definition Audio (HD) ALC-888S codec ■ Up to 2 channel of PCM (Pulse Code Modulation) audio output ■ Connectors: Line-out, Line-in
PCI-Express Interface	■ 4 PCI-Express x1 Lanes ■ Lane 1 &2: MIOe connector ■ Lane 3: Full-size Mini PCIe connector ■ Lane 4: Intel i210 GbE controller
SATA Interface	■ 1 x mSATA by mini-PCIe socket ■ 1 x SATAIII (Max. Data transfer Rate 600 MB/s)
USB Interface	■ 2 x internal USB ports ■ 2 x rear I/O ports at coastline (two USB 3.0) ■ Transmission speed up to 480 Mbps (USB 2.0) / 5 Gbps (USB 3.0)
Power Management	■ Full ACPI (Advanced Configuration and Power Interface) 3.0 ■ Supports S0, S3, S4, S5 ■ Support Wake on LAN
BIOS	AMI EFI 64 Mbit Flash BIOS via SPI

Others

Ethernet	■ Controller: Intel® i210 (GbE1)
	■ Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3z, IEEE 802.ab
	■ Supports 10/100/1000 Mbps
	■ Connectors: RJ45
	■ LAN1 LED
	   – Link: Green (100Mbps)/ Orange (1000Mbps)
	   – Active: Green (flash)
	■ Support wake on LAN

Serial ports	■ Controller: SMSC SCH 3114 ■ 2 x 232/422/485 serial ports with ESD protection: air gap ± 15 kV, contact ± 8 kV
GPIO	■ Controller: SMSC SCH 3114 ■ 8-Bit (programming) through Super I/O, pin header ■ 5 V tolerance
SMBus	Default is SMBus

1.2.3 Mechanical Specifications

1.2.3.1 Dimensions (mm)
L100 mm x W72 mm (3.9" x 2.8")

1.2.3.2 Height on top (mm)
15.7 mm (Heatsink)

1.2.3.3 Height under bottom (mm)
16.34 mm (Rear I/O USB)

1.2.3.4 Weight (g)
0.47 kg (1.04 lb, weight of total package)

1.2.4 Electrical Specifications

Power Supply Type: Single 12 V DC power input (support DC power hot plug)

1.2.4.1 Power supply Voltage
- Single 12 V input $\pm$ 10%
- Total peripheral power supply output: 5 V @ 3 A for CPU board and MIOe module totally, 12 V @ 2 A for MIOe module

1.2.4.2 Power Consumption
- **Typical in Windows 10 Idle Mode:**
  N3350: 0.41 @ 12V (4.89 W)
  E3940: TBD
  E3930: TBD
- **Max in Windows 10 HCT12 (10 minutes):**
  N3350: 1.09 A @ 12 V (12.90 W)
  E3940: TBD
  E3930: TBD

1.2.4.3 RTC Battery
- **Typical Voltage:** 3.0 V
- **Normal discharge capacity:** 210 mAh

1.2.5 Environmental Specifications

1.2.5.1 Operating Humidity
40 °C @ 95% RH Non-Condensing

1.2.5.2 Operating Temperature
0 ~ 60 °C (32~140 °F)

1.2.5.3 Storage Humidity
60 °C @ 95% RH Non-Condensing

1.2.5.4 Storage Temperature
-40 ~ 85 °C (-40 ~ 185 °F)

1.3 Function Block Diagram

```
                              ┌──────────────────────┐
                              │  DDR3L 1866          │
                              │  SO-DIMM up to 8GB   │
                              └──────────┬───────────┘
                                 Single │ Channel

┌──────────────────────┐  PCIe x1                              DDI    ┌──────────────┐    ┌──────────┐
│ Full-size Mini-PCIe  │◄──────────►                          ◄──────►│ Transmitter  │◄──►│   VGA    │
│                      │  USB2.0                                       └──────────────┘    └──────────┘
└──────────────────────┘◄──────────►                                                    ┌──────────┐
                                                                                         │   HDMI   │
┌──────────────────────┐  SATAIII 600MB/s                                               └──────────┘
│ Half-size mSATA      │◄──────────►      ┌─────────────────┐  eDP   ┌──────────────┐    ┌──────────┐
│                      │  USB2.0          │                 │◄──────►│ Transmitter  │◄──►│ 18/24 bit│
└──────────────────────┘◄──────────►      │  Intel Celeron  │        └──────────────┘    │  LVDS    │
                                          │  Intel Atom     │  DP/HDMI                    └──────────┘
┌──────────────────────┐  SATAIII 600MB/s │  SoC            │◄──────►┌──────────────┐
│ 1 SATAIII            │◄──────────►      │  N3350 / E3940  │  SMBus  │              │
└──────────────────────┘                  │                 │◄──────►│              │
┌──────────────────────┐  USB3.0/USB2.0   │                 │  2 PCIe x1             │
│ 2 USB3.0             │◄──────────►      │                 │◄──────►│              │
└──────────────────────┘                  │                 │  Line-out│   MIOe     │
┌──────────────────────┐  SPI             │                 │◄──────►│              │
│ AMI BIOS             │◄──────────►      │                 │  LPC    │              │
└──────────────────────┘                  │                 │◄──────►│              │
┌──────────┐  ┌──────────────────────┐ HD Audio             │  2 USB3.0             │
│ Line-in  │◄─│ Audio Codec          │◄──────────►          │◄──────►│              │
│ Line-out │  └──────────────────────┘                      │  RESET  │              │
└──────────┘  ┌──────────────────────┐  I²C                 │◄──────►│              │
              │ SMBus/I²C*           │◄──────────►          │ SATAII (optional)     │
              │                      │  SMBus               │◄──────►└──────────────┘
              └──────────────────────┘◄──────────►          │
┌──────────┐  ┌──────────────────────┐  PCIex1              │         ┌──────────────┐
│  RJ45    │◄─│ Intel i210           │◄──────────►          │◄───────►│  2 USB2.0    │
└──────────┘  └──────────────────────┘                      └────┬────┘ └──────────────┘
                                                              LPC │
                                                           ┌──────────────┐  ┌───────────────────────────┐
┌──────────────────────┐                                   │              │◄►│ COM1: RS-232/422/485      │
│ 8-bit GPIO           │◄─────────────────────────────────►│  SUPER I/O   │  │ COM2: RS-232/422/485      │
└──────────────────────┘                                   │              │  └───────────────────────────┘
                                                           └──────────────┘◄►┌───────────────────────────┐
                                                                              │ Watchdog Timer            │
                                                                              └───────────────────────────┘
```

Chapter 2

H/W Installation

This chapter explains the setup procedures of the MIO-2360 hardware, including instructions on setting jumpers and connecting peripherals, as well as switches, indicators and mechanical drawings. Be sure to read all safety precautions before you begin the installation procedure.
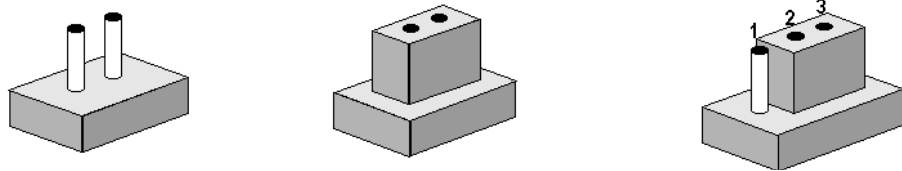
2.1 Jumpers

2.1.1 Jumper Description

Cards can be configured by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.

The jumper settings are schematically depicted in this manual as follows.

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.Generally, you simply need a standard cable to make most connections.

Warning! *To avoid damaging the computer, always turn off the power supply before setting jumpers.*

2.1.2 Jumper List

Table 2.1: Jumper List	
J1	LCD Power / Auto Power on

2.1.3 Jumper Settings

Table 2.2: J1: LCD Power/Auto Power on	
Setting	**Function**
(1-2)	+5V
(3-4) (default)	+3.3V
(5-6) (default)	Auto Power On
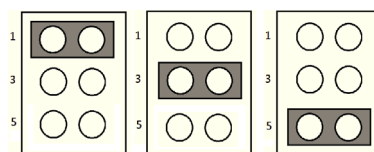
2.2 Connectors

2.2.1 Connector List

CN1	12 V Power Input
CN2	DC JACK (by request)
CN3	12 V Power Input (2 x 3 pin support by request)
CN5	DDR3L SO-DIMM
CN7	GPIO
CN8	HD Audio
CN9	Gigabit Ethernet
CN10	Mini PCIe
CN11	SATA
CN12	mSATA
CN13	COM1/COM2
CN28	Inverter Power/Internal SATA Power
CN15	18/24 bits LVDS Panel
CN16	VGA
CN17	HDMI
CN18	MIOe
CN19	Internal USB 2.0
CN20	External USB 3.0
CN21	SMBus
CN22	Front Panel
CN26	Battery

2.2.2 Connector Settings

2.2.2.1 Battery Connector (BH1)

MIO-2360 supports Lithium 3 V/210 mAH CR2032 battery with wire via battery connector (BH1).

> *Note!* How to clear CMOS: (follow below steps)
>
> 1. Turn off system power
>
> 2. Unplug CR2032 battery cable on BH1
>
> 3. Waiting for 15 sec or short BH1 pin1-2
>
> 4. Connect battery cable on BH1
>
> 5. Turn on system power

2.2.2.2 12 V Power Input Connector (CN1)

Main power connector supports single 12 V input, and there's an optional choice of **DC/Jack (CN2, co-layout with 2pin power connector)**

2.2.2.3 DDRIII SODIMM Socket (CN5)

One 204-pin/H9.2 mm DDRIII DIMM socket supports DDR3L 1866 MHz up to 8 GB.

2.2.2.4 GPIO (General Purpose Input Output) (CN7)

The board supports 8-bit GPIO (5 V tolerance) through GPIO pin header. The 8 digital inputs and outputs can be programmed to read or control devices, with each input or output defined.

2.2.2.5 VGA/ HDMI/ LVDS Interface Connections (CN16/CN17/CN15)

The MIO-2360's display interface support either VGA or HDMI on rear IO and is capable of driving a wide range of flat panel displays, including passive LCD and active LCD displays.The board has three kinds of connector types to support these displays: one is on rear IO supporting either standard CRT VGA monitors or high definition HDMI display and one for LVDS type LCD panels.

CRT display connector (CN16)

The CRT display 15pins connector is a rear I/O connector on coastline used for conventional CRT displays. Resolution: up to 3840 x 2160 at 30Hz.

HDMI display connector (CN17)

MIO-2360 also supports HDMI display output, meet HDMI1.4a specification. Resolution: up to 1920 x 1200 at 60Hz.

LVDS LCD panel connector (CN15)

The board supports single channel 18/24-bit LVDS LCD panel displays via 14*1pin wafer box. Resolution: up to 1400 x 900.

2.2.2.6 Front Panel Connector(CN22)

MIO-2360 integrates below functions as front panel 6-pin connector.

Power button

Supports power on/off button in ATX mode.

Reset

If you install a reset switch, it should be an open single pole switch. Momentarily pressing the switch will activate a reset.

Power LED

Power LED indicator light lit when power is on.

HDD LED

HDD LED indicator for hard disk access is for an active low signal.

2.2.2.7 SATA Connector (CN11)

MIO-2360 features one high performance Serial ATA interfaces. Data transfer rates up to 600 MB/s enabling very fast data and file transfer, and independent DMA operation on two ports.

2.2.2.8 mSATA Connector (CN12)

MIO-2360 provides a full size mini-PCIe socket which integrates SATAIII signals, supports mSATA interface modules.

2.2.2.9 Mini PCIe Connector (CN16)

MIO-2360 supports a full size mini PCIe slot. PCI Express Mini Card (also known as Mini PCI Express, Mini PCIe, and Mini PCI-E) is a replacement for the Mini PCI form factor based on PCI Express. It is developed by the PCI-SIG. The host device supports both PCI Express and USB 2.0 connectivity.

2.2.2.10 USB Connectors (CN19 and CN20)

The board provides four USB (Universal Serial Bus) ports, two are rear I/O on coastline (CN20); and the other two are internal USB ports (CN19). The rear I/O USB port support two USB 3.0 ports. The USB 3.0 ports comply with USB specification Rev.

3.0 which supports 5.0 Gbps transfer rate and backward compatible with USB 2.0 device. This gives complete Plug and Play, and hot attach/detach for up to 127 external devices. Other USB interfaces comply with USB specification Rev. 2.0 which supports 480 Mbps transfer rate and are fuse protected.

2.2.2.11 COM Port Connectors (CN13)

MIO-2360 provides two serial ports in 10 x 2pin pin header. COM1/COM2 is for RS232/422/485 functionality. It provides connections for serial devices or a communication network. The pin assignments for the COM port connector can be found in Appendix.

2.2.2.12 Gigabit Ethernet Connector (CN9)

MIO-2360 uses Intel® i210 Ethernet chip (10/100/1000 Mbps) linked to dedicated PCIe x1 lane via RJ-45 connector.

2.2.2.13 High Definition Audio Interface (CN8)

MIO-2360 provides one 5 x 2 pin box header for audio device. It can support high definition audio stereo by customized audio module that has a codec onboard.

2.2.2.14 MIOe connector (CN18)

MIO-2360 supports MIOe connector to extend flexible I/Os.

Interface

SMBus, 2 x USB3.0, LPC, 2 x PCIe x1, line out, DisplayPort/HDMI*, +5 Vsb/+12 Vsb power, Power On, Reset, SATA*.

Total peripheral power supply output

5 V @ 3 A for CPU board and MI/O Extension module totally, 12 V @ 2 A for MI/O Extension module.

2.2.2.15 Inverter Power/Internal SATA Power Connector (CN28)

The LCD inverter is connected to CN28 via a 5-pin connector to provide +5 V/+12 V power to the LCD display, and 5V power can be provided for 2.5" SATA HDD via CN30. SATA power's current is only sufficient for 2.5" HDD, and LVDS inverter's current is 5 V @ less than 1 A, 12 V @ 500 mA.

2.2.2.16 SMBus Connector (CN21)

MIO-2360 provides SMBus connector for customer connection to SMBus protocol embedded device. Advantech also provide SMBus API allowing developers to interface with an embedded system environment and transfer serial messages using the SMBus protocols, allowing multiple simultaneous device control.

2.3 Mechanical

2.3.1 Jumper and Connector Locations
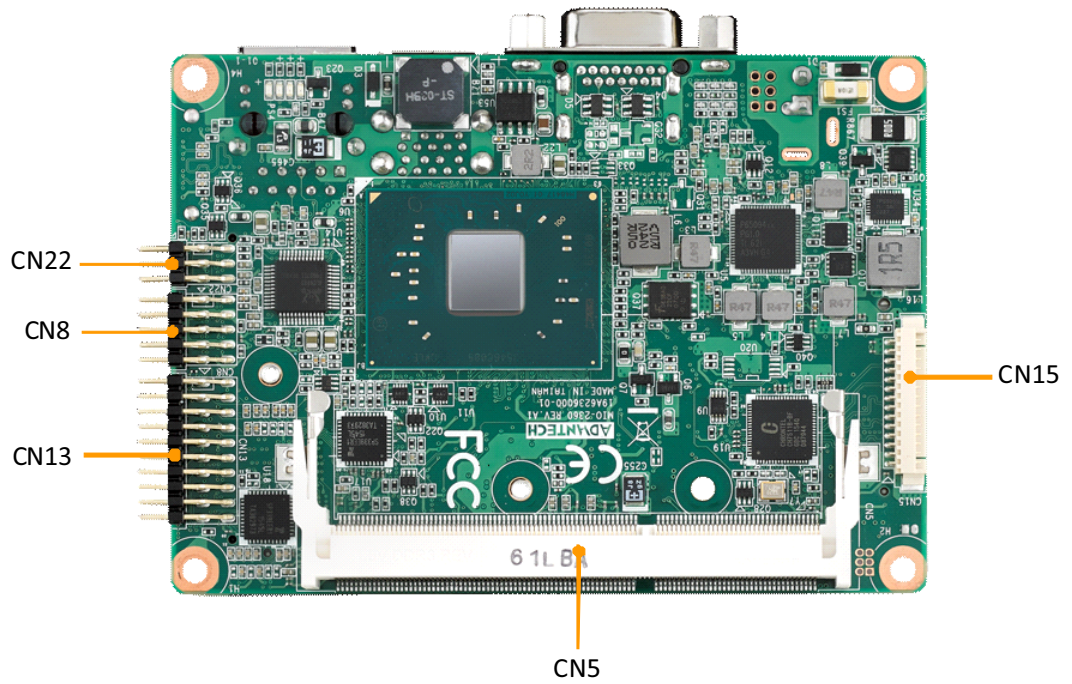
Figure 2.1 Jumper and Connector layout (Top side)
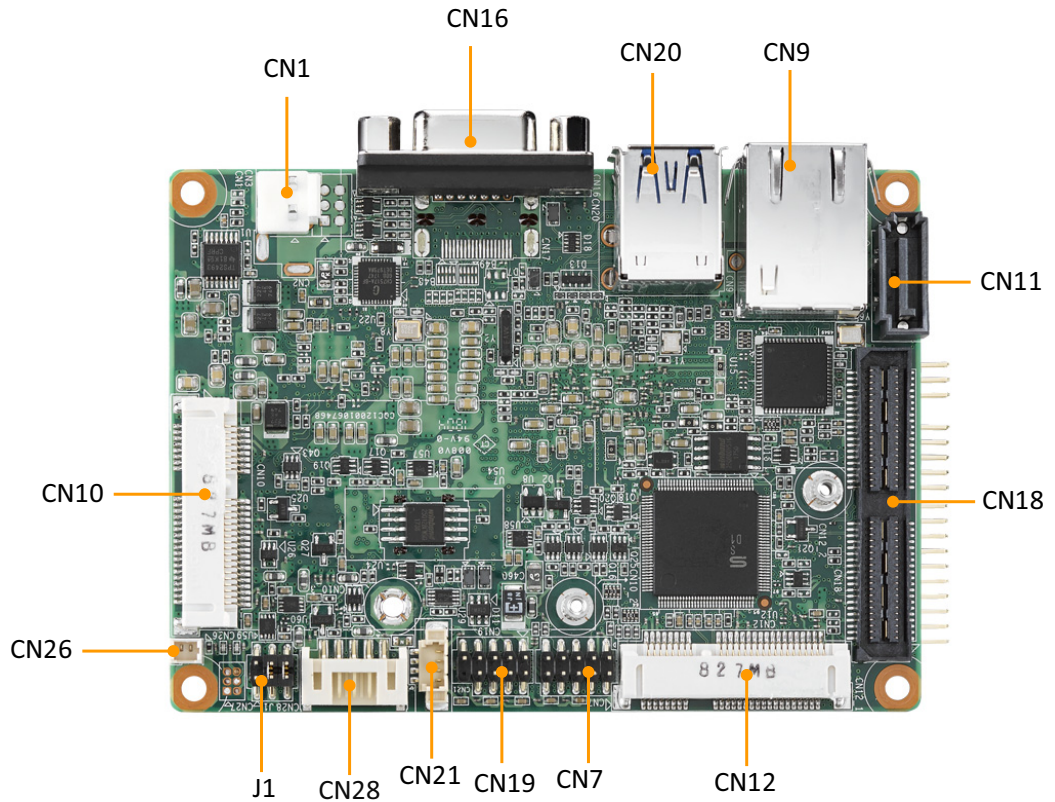
Figure 2.2 Jumper and connector layout (Bottom side)

2.3.2 Board Dimensions

2.3.2.1 CPU Board Drawing
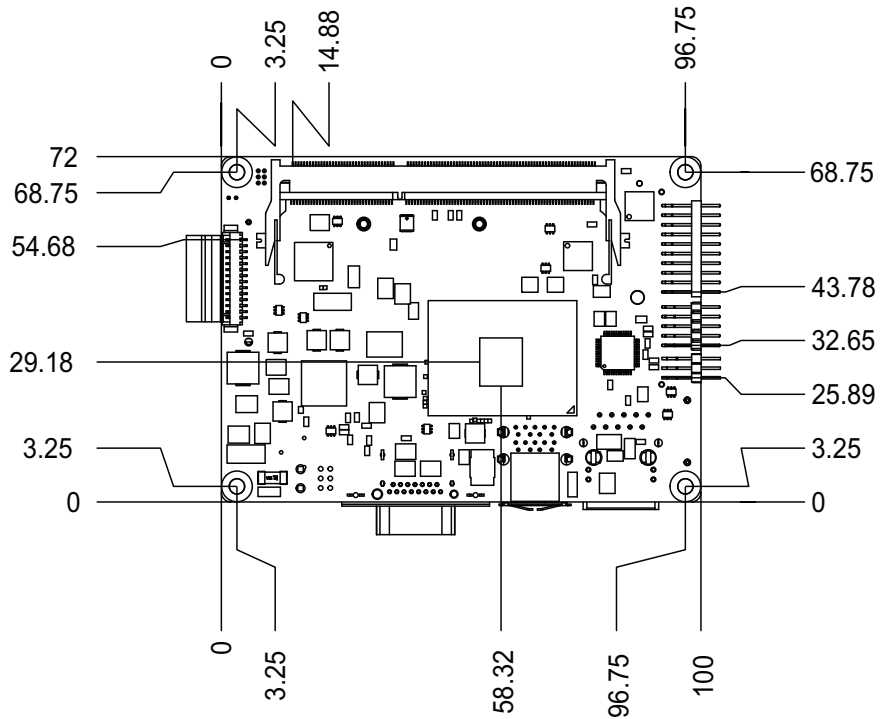
Figure 2.3 MIO-2360 Mechanical Drawing (Top Side)
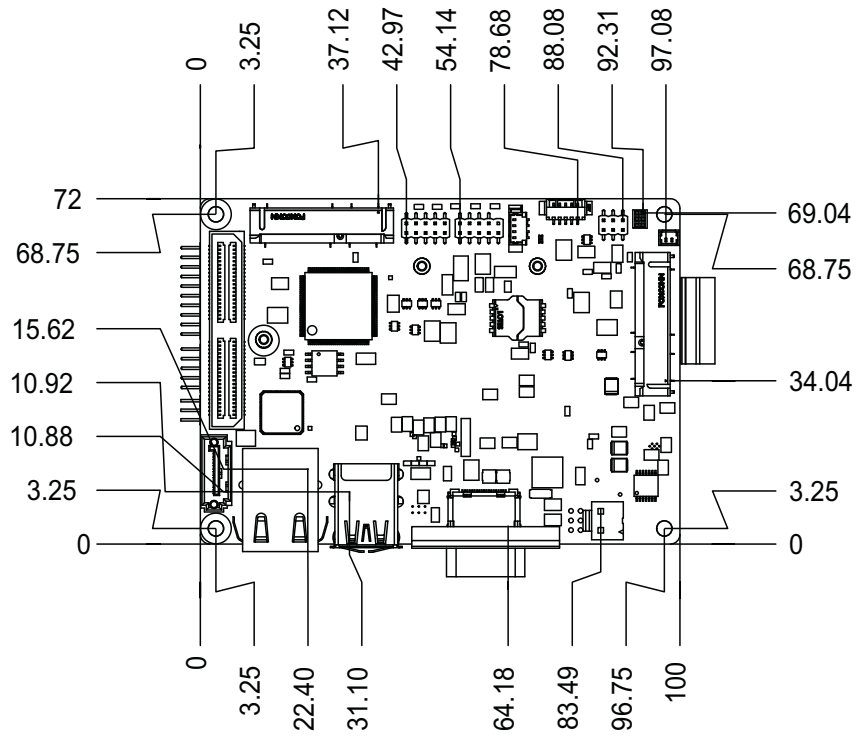
Figure 2.4 MIO-2360 Mechanical Drawing (Bottom Side)
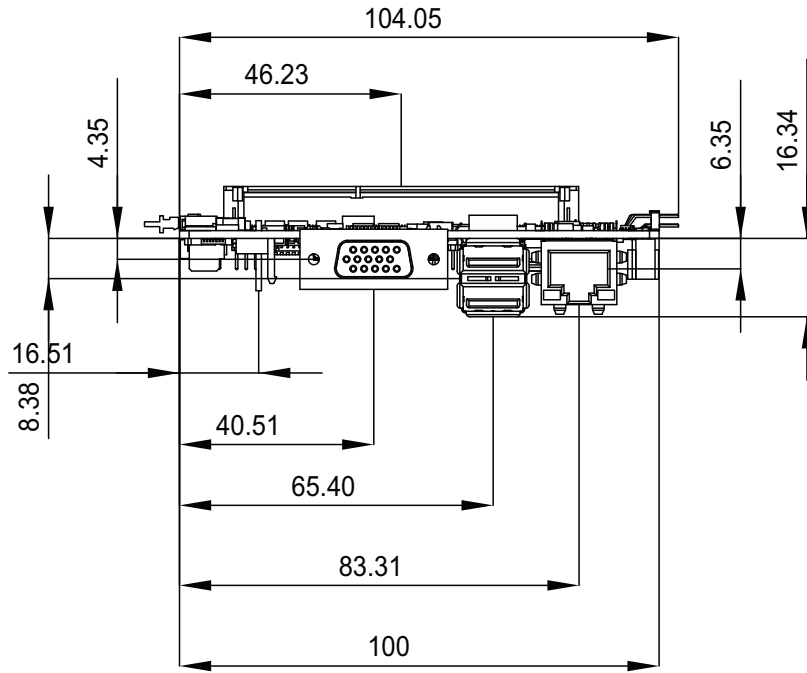
Figure 2.5 MIO-2360 Mechanical Drawing (Side View)
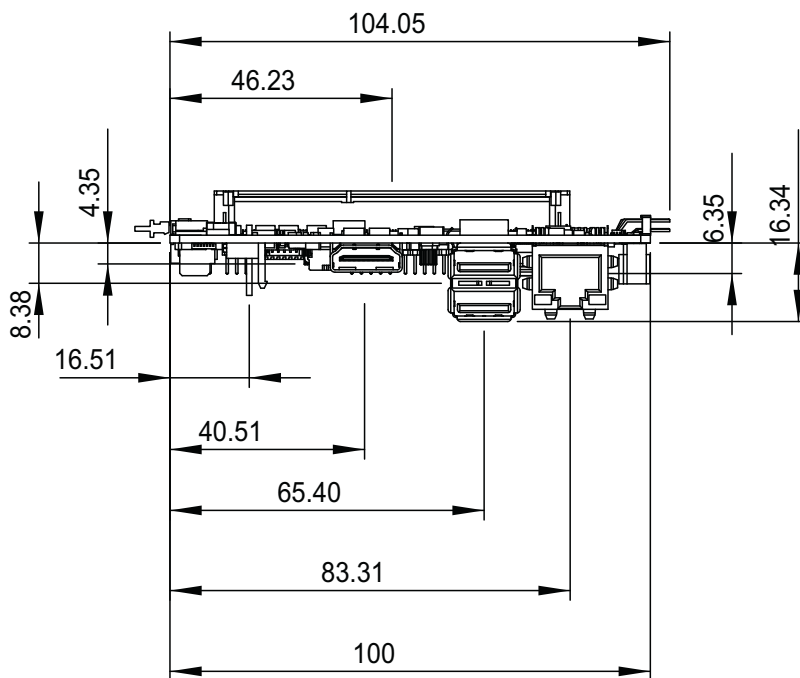
Figure 2.6 MIO-2360 Mechanical Drawing (Side View with Optional HDMI)

2.3.2.2 MI/O Module Height Constraint

To avoid mechanical conflict with MI/O-Ultra CPU board, it's recommended to refer to the following drawing for MI/O module height constraints.

unit: mm
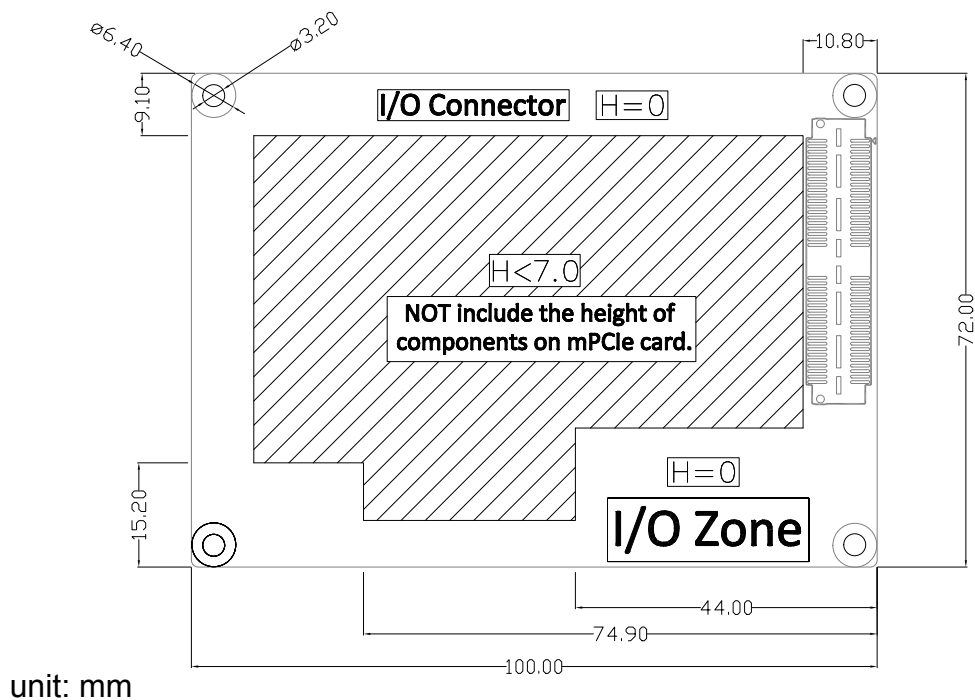
Figure 2.7 MI/O module height constraints

Note!

1. Constraint of components' max. height of MI/O module is based on 16 mm height MIOe connector. If needed, there's a 19 mm height connector as well.
2. The height of the power connector (including cable) on MIO-2360 should be considered when assembling the system or stacking the MI/O module.

2.3.2.3 Another Thermal Solution - Heat Spreader

MIO-2360 has an optional heat spreader to make whole system more compact. Using a heat spreader to conduct heat to your chassis can help a lot when the system is extra compact or has limited space for heat convection. Here are some guidelines for the heat spreader:

1. For best heat conduction, the gap between the chassis and heat spreader should be smaller, the smaller the better.
2. The height of the existing heat spreader is TBD (Advantech P/N: TBD). If you need some other height to fit the chassis better, Advantech can customize it for you. (Please contact our sales for details)
3. Thermal grease and screws are provided in heat spreader kit, thermal grease helps conduct better if the chassis is quite close to heat spreader. Another suggestion is to use a thermal pad if the chassis isn't close enough to the heat spreader. (The gap should be less than 3mm for better heat conduction)

Screw hole of your chassis
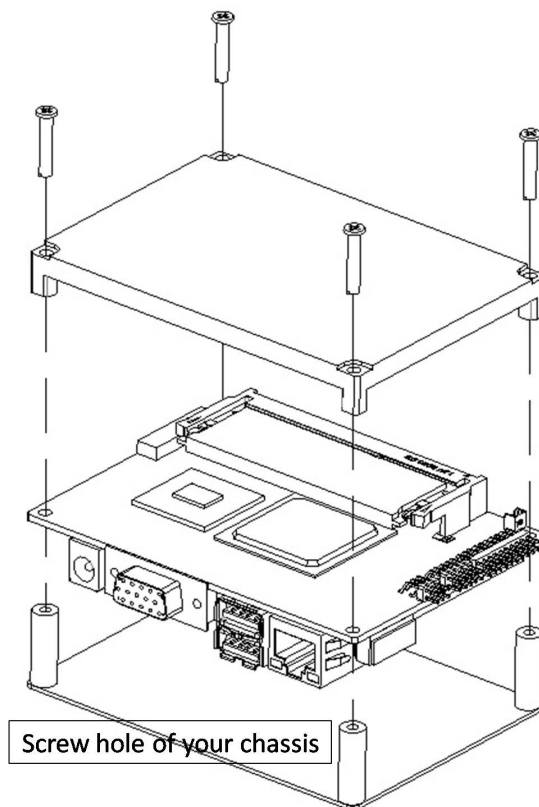
Figure 2.8 Illustration of heat spreader assembly

Chapter   3

BIOS Settings

3.1 BIOS Setup

With the AMIBIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the MIO-2360 BIOS setup screens.

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

  BIOS Information                                          Set the Date. Use Tab to
  BIOS Vendor                    American Megatrends        switch between Date elements.
  Core Version                   5.0.1.2   0.24 x64         Default Ranges:
  Compliancy                     UEFI 2.5; PI 1.4           Year: 2005-2099
  Project Version                MIO 23600000060X023        Months: 1-12
  Build Date and Time            11/30/2016 13:26:37        Days: dependent on month
  Access Level                   Administrator

  Platform firmware Information
  PUNIT FW                       20
  PMC FW                         03.25
  TXE FW                         3.0.11.1131

                                                            ++: Select Screen
  System Date                    [Fri 12/02/2016]           ↑↓: Select Item
  System Time                    [08:54:09]                 Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit

                Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in flash ROM so it retains the Setup information when the power is turned off.

3.2 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press <DEL> and you will immediately be allowed to enter Setup.

3.2.1 Main Setup

When users first enter the BIOS Setup Utility, users will enter the Main setup screen.

Users can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

```
Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
 Main  Advanced  Chipset  Security  Boot  Save & Exit

 BIOS Information                                          Set the Date. Use Tab to
 BIOS Vendor                   American Megatrends         switch between Date elements.
 Core Version                  5.0.1.2   0.24 x64          Default Ranges:
 Compliancy                    UEFI 2.5; PI 1.4            Year: 2005-2099
 Project Version               MIO 23600000060X023        Months: 1-12
 Build Date and Time           11/30/2016 13:26:37        Days: dependent on month
 Access Level                  Administrator

 Platform firmware Information
 PUNIT FW                      20
 PMC FW                        03.25
 TXE FW                        3.0.11.1131

                                                          ↔: Select Screen
 System Date                   [Fri 12/02/2016]           ↑↓: Select Item
 System Time                   [08:54:09]                 Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit

              Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

The main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ **System time / System date**
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-2360 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. Users can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.
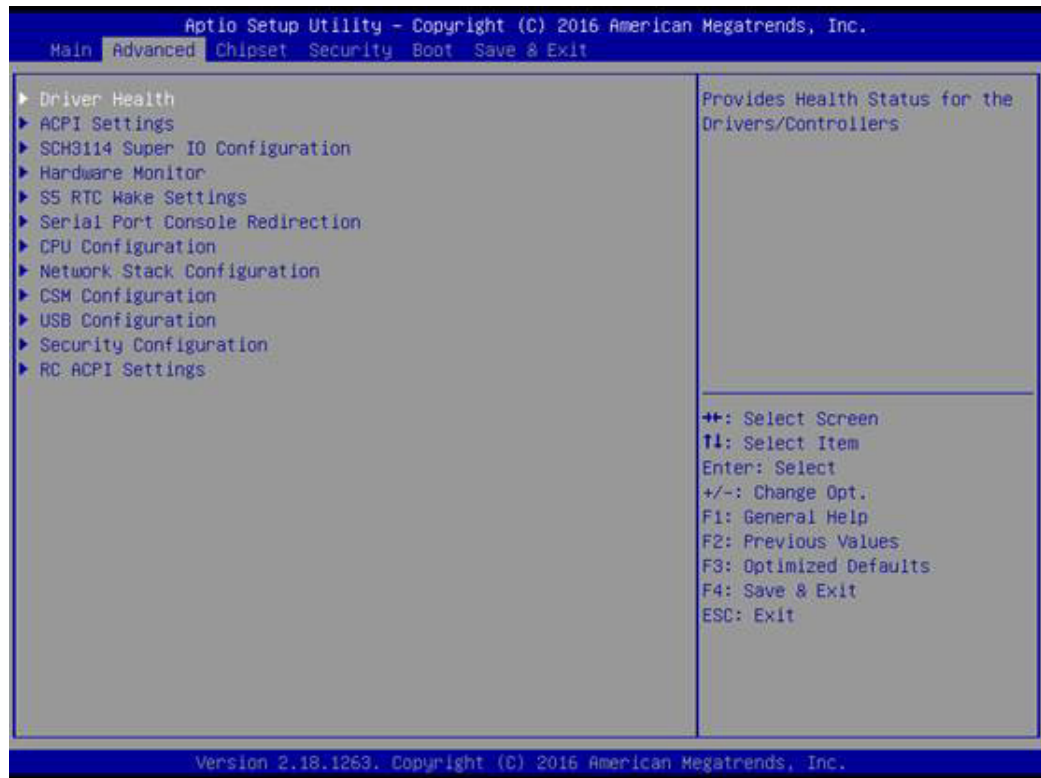
3.2.2.1 Driver Health

Provides health status for the drivers/controllers.

3.2.2.2 ACPI Settings Configuration

■ **Enable ACPI Auto Configuration**
Enable or disable BIOS ACPI auto configuration.

■ **Enable Hibernation**
Enables or disables system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

■ **ACPI Sleep State**
Selects the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

■ **Lock Legacy Resources**
Enables or disables Lock Legacy Resources

3.2.2.3 SCH3114 Super I/O Configuration

■ **Serial Port 1 Configuration**
Set parameters of serial port 1 (COMA).

■ **Serial Port 2 Configuration**
Set parameters of serial port 2 (COMB).

■ **SCH3114 Super IO Configuration (Cont.)**

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Advanced

Serial Port 1 Configuration                                Enable or Disable Serial Port
                                                           (COM)
Serial Port                        [Enabled]
Device Settings                    IO=3F8h; IRQ=4;

Change Settings                    [Auto]

Choose Serial Port Mode            [RS-232]
RS485 AUTO FLOW                    [Disabled]

                                                           ++: Select Screen
                                                           14: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit

            Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```
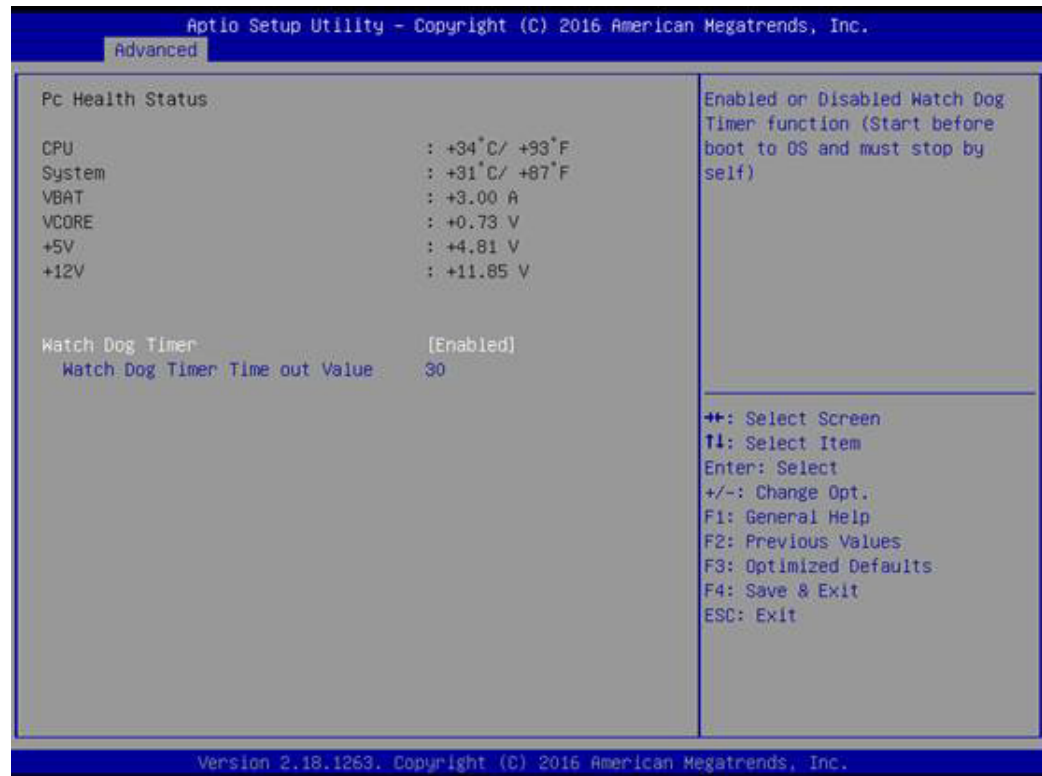
– **Serial Port**

Enable or disable serial port (COM).

– **Change Settings**

Select an optimal settings for Super IO Device.

– **Choose Serial Port Mode**

Change the Serial Port Mode.

– **RS485 AUTO FLOW**

Enable or disable RS485 AUTO FLOW.

3.2.2.4 H/W Monitor

- **PC Health Status**

  This page displays all the information about system temperature/voltage.
- **Watch Dog Timer**

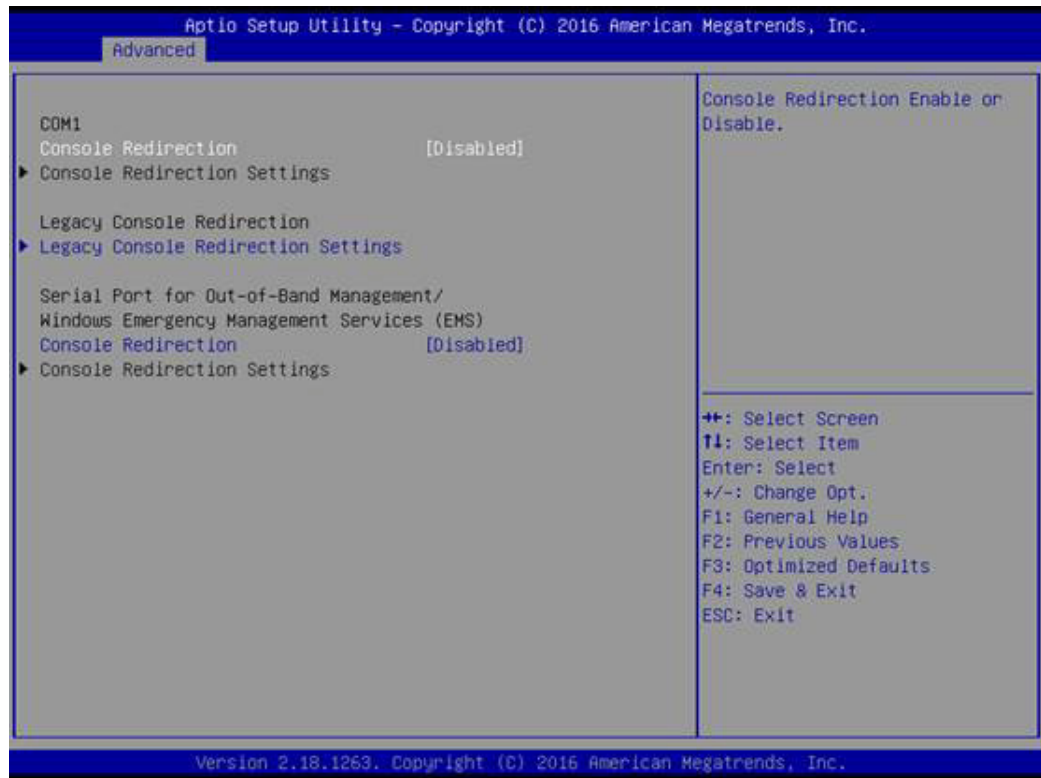 Enable or disable the Watch Dog Timer function.

3.2.2.5 S5 RTC Wake Settings

```
          Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
   Advanced

Wake system from S5                    [Enabled]           Enable or disable System wake
Wake up Day                            0                   on alarm event. Select
Wake up hour                           0                   FixedTime, system will wake on
Wake up minute                         0                   the hr::min::sec specified.
Wake up second                         0                   Select DynamicTime , System
                                                           will wake on the current time
                                                           + Increase minute(s)


                                                           ++: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit



          Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

■ **Wake system with Fixed Time**

Enable or disable System wake on alarm event. Selecting FixedTime, the system will wake on the hr:min:sec specified. Selecting DynamicTime, the system will wake on the current time + Increase minute(s).

3.2.2.6 Serial Port Console Redirection

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
     Advanced

    COM1                                                    Console Redirection Enable or
    Console Redirection               [Disabled]            Disable.
  ▶ Console Redirection Settings

    Legacy Console Redirection
  ▶ Legacy Console Redirection Settings

    Serial Port for Out-of-Band Management/
    Windows Emergency Management Services (EMS)
    Console Redirection               [Disabled]
  ▶ Console Redirection Settings
                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit


              Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

■ **Console Redirection**

This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).

■ **Legacy Console Redirection**

This item allows users to configure the legacy serial redirection port.

■ **Console Redirection**

This item allows users to configure console redirection detail settings.

3.2.2.7 CPU Configuration

- ■ **CPU Configuration**

  Socket specific CPU Information.
- ■ **CPU Power Management**

  CPU Power Management options.
- ■ **Active Processor Cores**

  Number of cores to enable in each processor package.
- ■ **Intel Virtualization Technology**

  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- ■ **Monitor Mwait**

  Enable or disable Monitor Mwait.

■ **CPU Configuration (Cont.)**
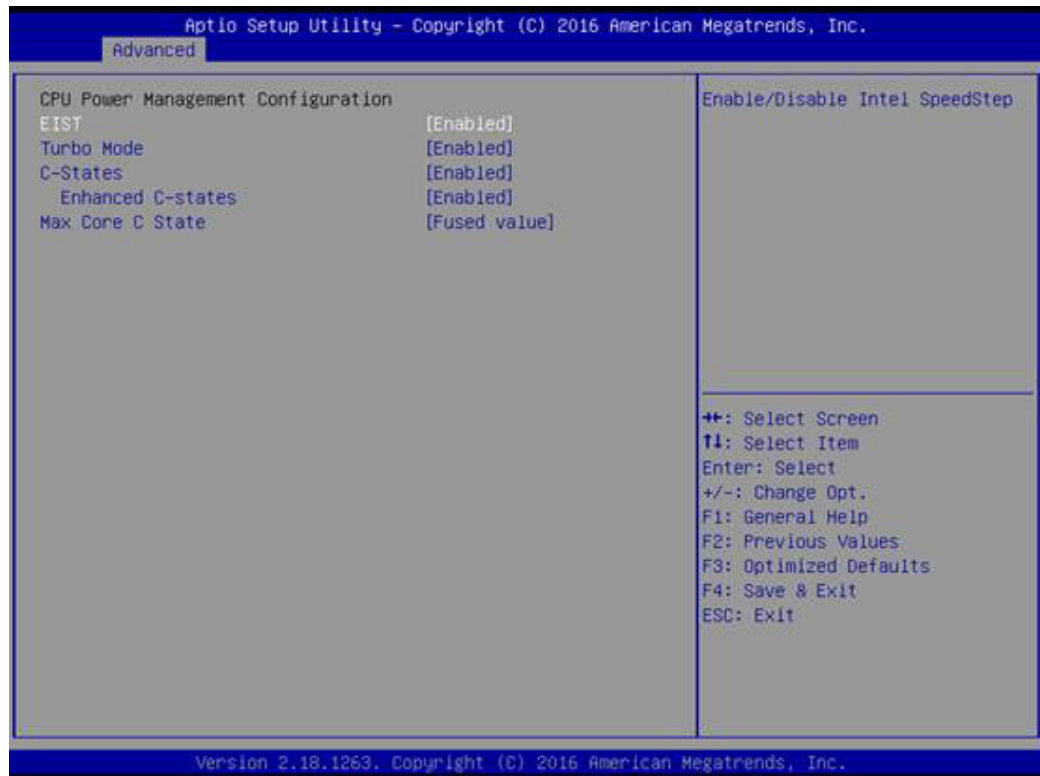
– **EIST**

Enable or disable Intel SpeedStep.

– **Turbo mode**

Turbo Mode.

– **C-States**

Enable or disable C States.

– **Enhanced C-states**

Enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

– **Max Package C State**

Controls the Max Package C State that the processor will support.

3.2.2.8 Network Stack Configuration

■ **Network Stack**

Enable or disable UEFI Network Stack.

■ **Ipv4 PXE Support**

Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created.

■ **Ipv4 HTTP Support**

Enables Ipv4 HTTP boot support. If disabled IPV4 HTTP boot option will not be created.

■ **PXE boot wait time**

Wait time to press ESC key to abort the PXE boot.

■ **Media detect count**

Number of times presence of media will be checked.

3.2.2.9 CSM Configuration
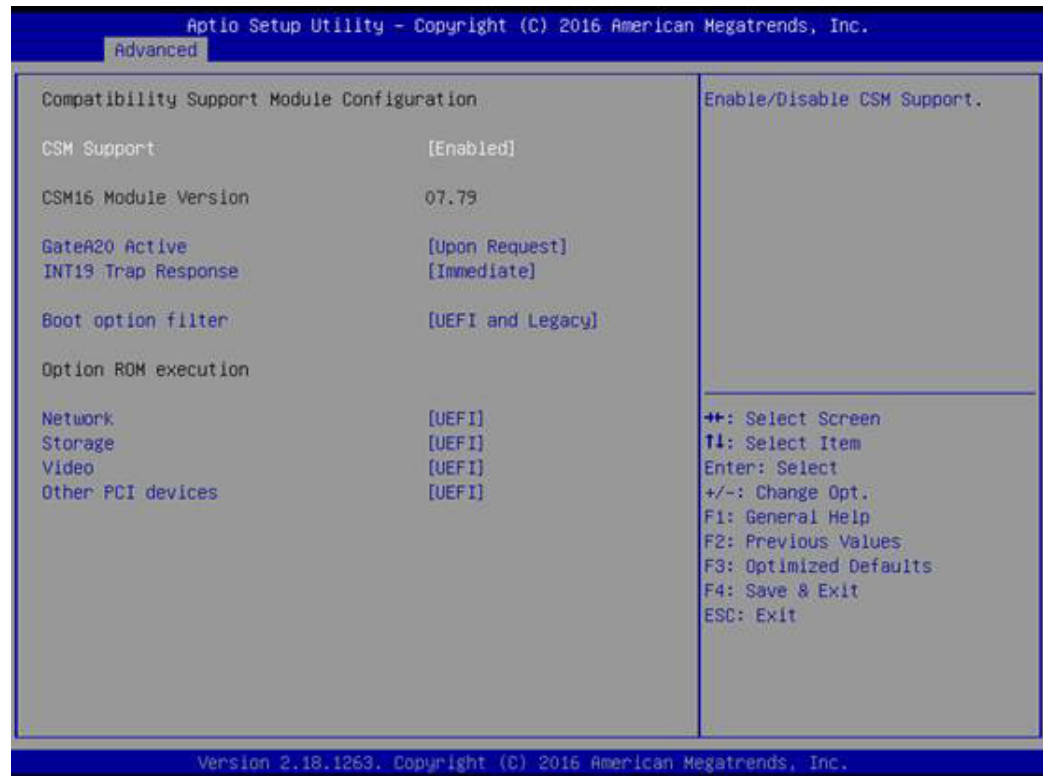
CSM Support for debug purpose

- **CSM Support**

  Enable or disable CSM Support.

- **GateA20 Active**

  UPON REQUEST - GA20 can be disabled using BIOS services. Never disable GA20; this option is useful when any RT code is executed above 1 MB.

- **INT19 Trap Response**

  BIOS reaction on INT19 trapping by Option ROM: IMMEDIATELY - execute the trap right away; POSTPONED - execute the trap during legacy boot.

- **Boot Option Filter**

  This option controls Legacy/UEFI ROMs priority.

- **Network**

  Controls the execution of UEFI and Legacy PXE OpROM.

- **Storage**

  Controls the execution of UEFI and Legacy Storage OpROM.

- **Video**

  Controls the execution of UEFI and Legacy Video OpROM.

- **Other PCI devices**

  Determines OpROM execution policy for devices other than network, storage, or video.

3.2.2.10 USB Configuration

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
        Advanced

   USB Configuration                                      Enables Legacy USB support.
                                                          AUTO option disables legacy
   USB Module Version              16                     support if no USB devices are
                                                          connected. DISABLE option will
   USB Controllers:                                       keep USB devices available
       1 XHCI                                             only for EFI applications.
   USB Devices:
       1 Drive, 2 Keyboards, 1 Mouse, 1 Hub

   Legacy USB Support              [Enabled]
   XHCI Hand-off                   [Enabled]
   USB Mass Storage Driver Support [Enabled]

   USB hardware delays and time-outs:
   USB transfer time-out           [20 sec]               ++: Select Screen
   Device reset time-out           [20 sec]               ↑↓: Select Item
   Device power-up delay           [Auto]                 Enter: Select
                                                          +/-: Change Opt.
   Mass Storage Devices:                                  F1: General Help
   JetFlashTranscend 8GB 8.07      [Auto]                 F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit


                Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

■ **Legacy USB Support**

Enables support for legacy USB. Auto option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

■ **XHCI Hand-Off**

This is a workaround for OS without XHCI hand-off support. The XHCI owner-ship change should be claimed by the XHCI driver.

■ **USB Mass Storage Driver Support**

This item allows you to enable or disable the USB mass storage device support.

■ **Device Reset Time-out**

USB mass storage device start unit command time-out.

■ **Device power-up delay**

Maximum time the device will take before it properly report itself to the host con-troller. "Auto" uses default value: for a Root port it is 100 ms, for a hub port the delay is taken from hub descriptor.

3.2.2.11 Security Configuration
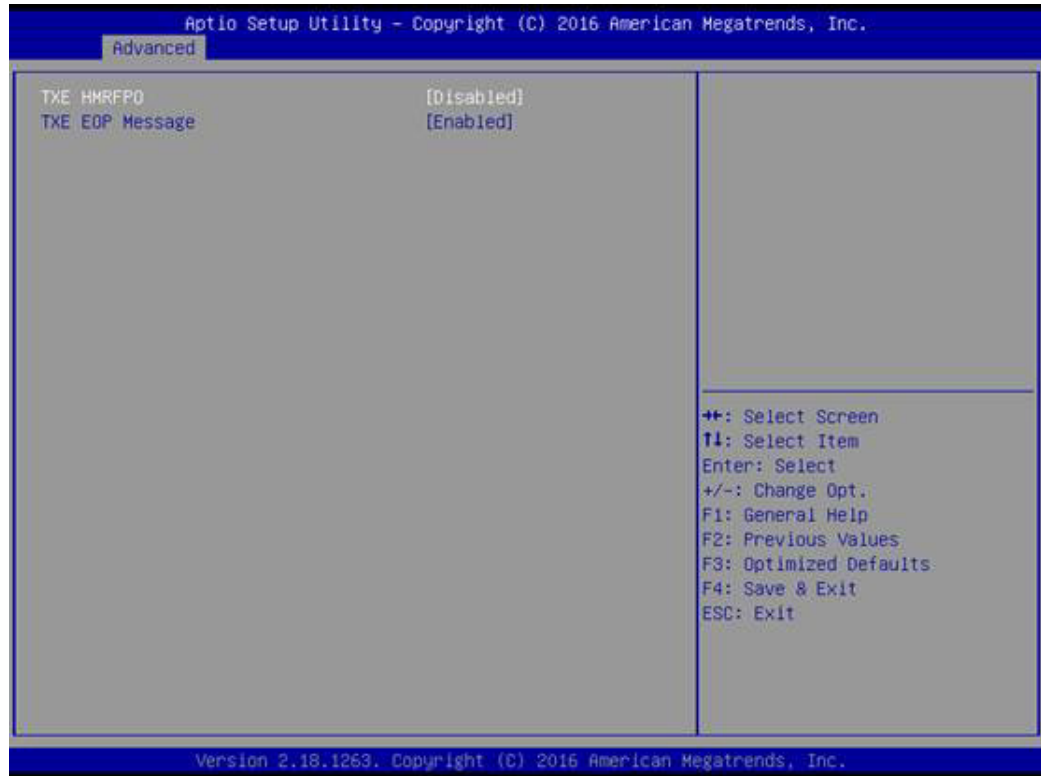
■ **TXE EOP Message**
Send EOP Message before entering the OS.

3.2.2.12 RC ACPI Settings

■ **Native PCIE Enable**

Bit - PCIe native * control\n 0 - ~ hot plug\n 1 - SHPC native hot plug control\n 2 - ~ Power management events\n 3 - PCIe advanced error reporting control\n 4 - PCIe capability structure control\n 5 - Latency tolerance reporting control.

■ **Native ASPM**

Once enable, Vista will control the ASPM support for the device. If disabled, the BIOS will.

3.2.3 Chipset Configuration

■ **North Bridge**

Details for North Bridge items.

■ **South Bridge**

Detail for South Bridge items.

■ **Uncore Configuration**

Detail for uncore items.

■ **South Cluster Configuration**

Detail for south cluster items.

3.2.3.1 North Bridge

■ **Max TOLUD**
Maximum value of TOLUD

3.2.3.2 South Bridge
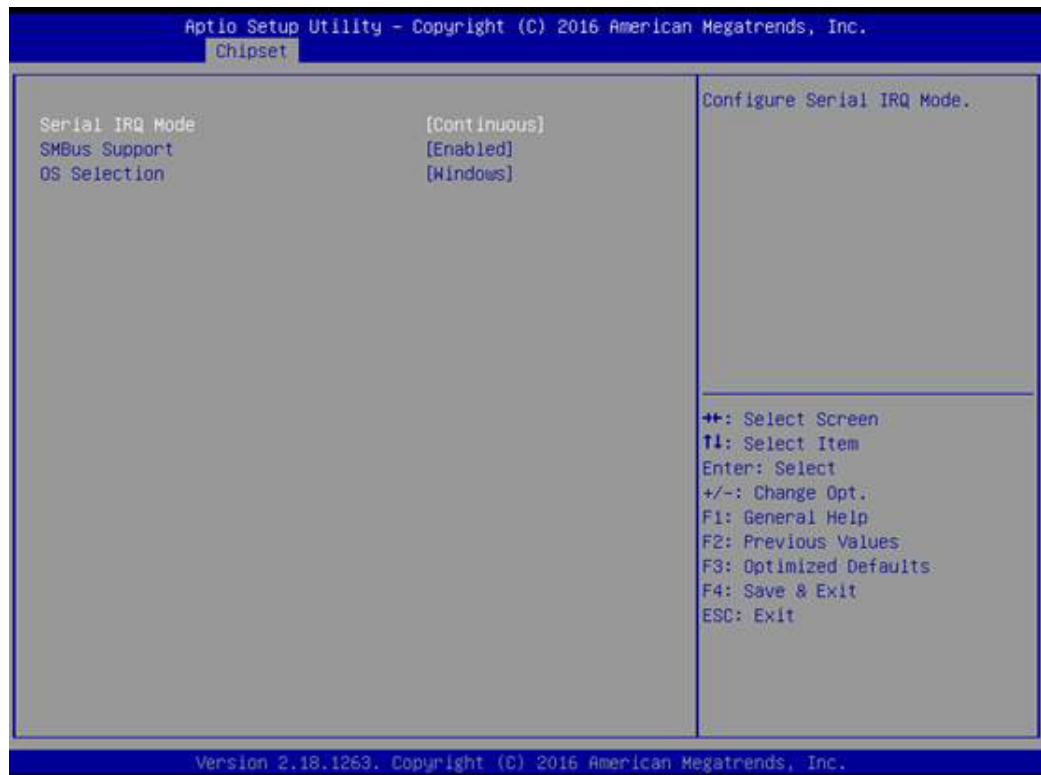
■ **Serial IRQ Mode**
   Configure Serial IRQ Mode.
■ **SMBus Support**
   Enable or disable SMBus support.
■ **OS Selection**
   Select the target OS.

3.2.3.3 **Uncore Configuration**
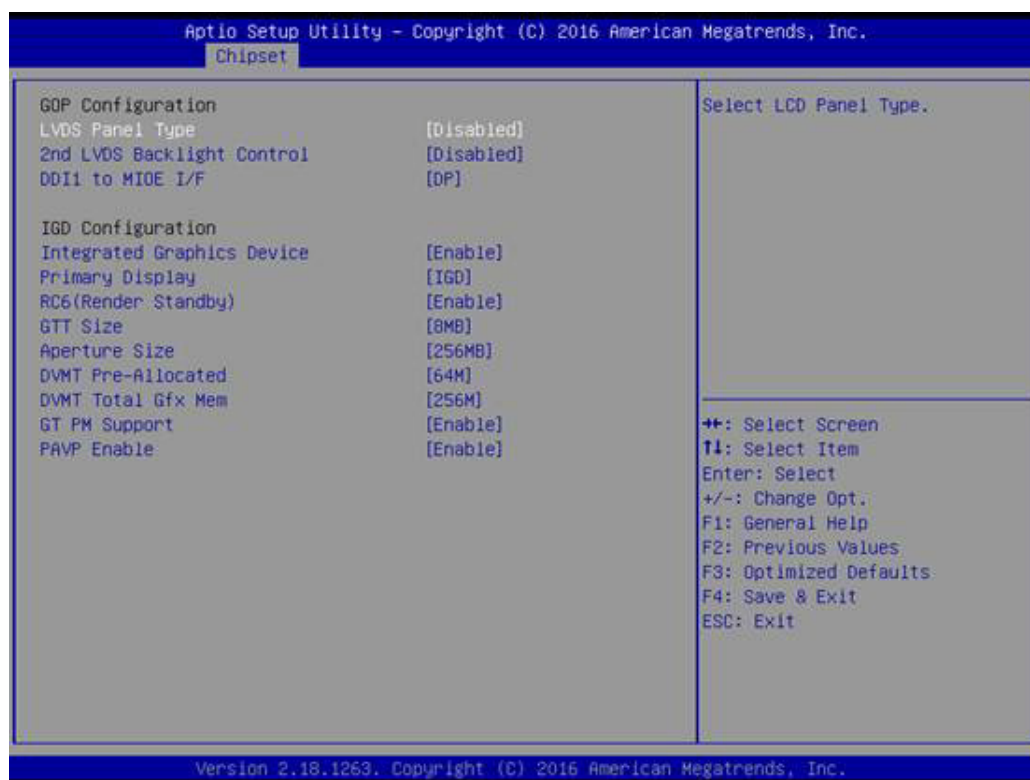
■ **LVDS Panel Type**
   Select LCD Panel Type.
■ **2nd LVDS Backlight Control**
   Switch backlight control for PWM or DC mode.
■ **DDI1 to MIOE I/F**
   Apply to MIOE I/F, e.g.: DB-5000.
■ **Integrated Graphics Device**
   Enable: Enable Integrated Graphics Device (IGD) when selected as the primary video adaptor. Disable: Always disable IGD.
■ **Primary Display**
   Select which of IGD/PCI graphics device should be the primary display.
■ **RC6 (Render Standby)**
   Check to enable render standby support.
■ **GTT Size**
   Select the GTT Size.
■ **Aperture Size**
   Select the Aperture Size.
■ **DVMT Pre-Allocated**

Select DVMT 4.0 Pre-Allocated (UMA) Graphics Memory size used by the Internal Graphics Device.

■ **DVMT Total Gfx Mem**

Select DVMT5.0 Total Graphic Memory size used by the internal graphics device.

■ **GT PM Support**

Enable or disable GT PM Support.

■ **PAVP Enable**

Enable or disable PAVP.

3.2.3.4 South Cluster Configuration

■ **HD-Audio Configuration**

HD-Audio Configuration settings.

■ **PCI Express Configuration**

PCI Express Configuration settings.

■ **SATA Drives**

Press <Enter> to select the SATA Device Configuration Setup options.

■ **USB Configuration**

USB Configuration settings.

■ **Miscellaneous Configuration**

Enable or disable Misc. features.

■ **HD-Audio Configuration**

```
          Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
               Chipset

 HD-Audio Configuration                              Enable/Disable HD-Audio Support
 HD-Audio Support                  [Enable]




                                                     ++: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit




          Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```
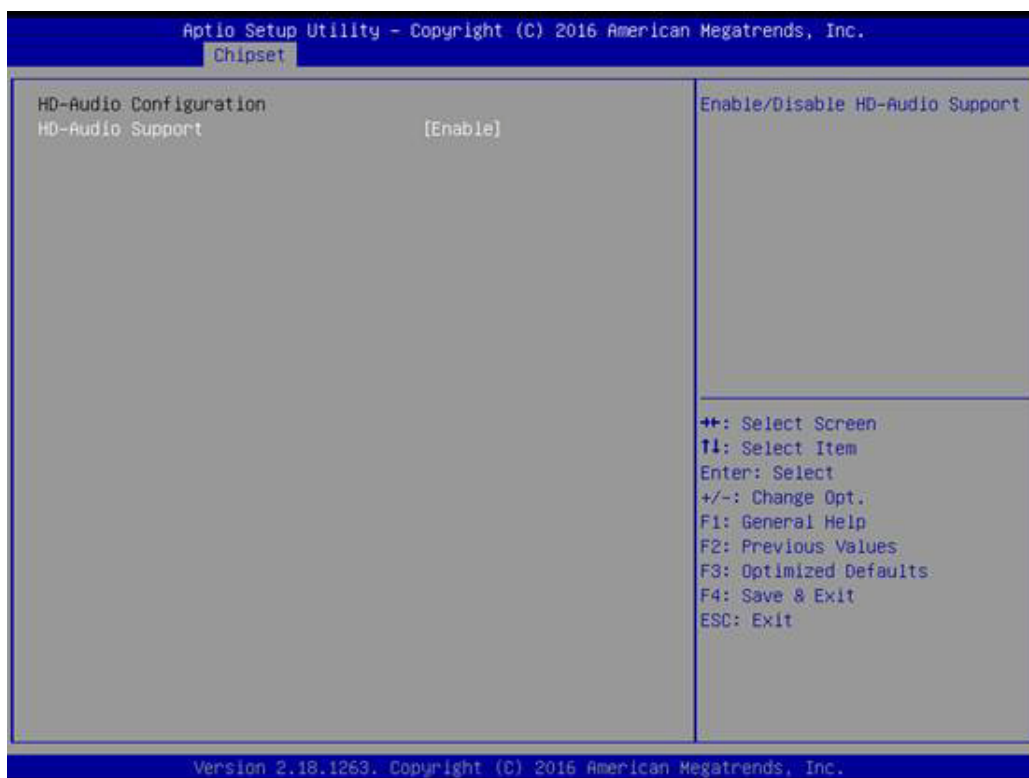
– **HD-Audio Support**
Enable or disable HD-Audio support.

■ **PCI Express Configuration**

```
          Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
               Chipset

 PCI Express Configuration                           Compliance Mode Enable/Disable
 Compliance Mode                   [Disabled]
 ▶ PCI Express Root Port 3
 ▶ PCI Express Root Port 4
 ▶ PCI Express Root Port 5

 PCIE Wake                         [Disabled]

 Onboard LAN1 Controller           [Enable]



                                                     ++: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit




          Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

– **Compliance Mode**

Compliance Mode enable or disable.

– **PCIE Wake**

Enable or disable PCIE to wake the system from S5.

– **Onboard LAN1 Controller**

Select to enable or disable onboard LAN1 Controller.

■ **PCI Express Configuration (Cont.)**

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
          Chipset

 PCI Express Root Port 3            [Enable]              Control the PCI Express Root
 If DISABLED, goto ENABLE first the                       Port.
 ASPM                               [Disable]             AUTO: To disable unused root
 PCIe Speed                         [Auto]                port automatically for the
                                                          most optimum power savings.
                                                          Enable: Enable PCIe root port
                                                          Disable: Disable PCIe root port


                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit


         Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

– **PCI Express Root Port 3**

Control the PCI Express Root Port.

AUTO: To disable unused root port automatically for the most optimum power savings.

Enable: Enable PCIe root port.

Disable: Disable PCIe root port.

– **ASPM**

PCI Express Active State Power Management settings.

– **PCIe Speed**

Configure PCIe Speed.

■ **SATA Drives**

– **Chipset SATA**

Enables or disables the Chipset SATA controller. The Chipset SATA controller supports the 2 black internal SATA ports (up to 3Gb/s supported per port).

– **Aggressive LPM Support**

Enable PCH to aggressively enter link power state.

– **Port 1**

Enable or disable SATA Port.

– **SATA Device Type**

Identify the SATA port is connected to a Solid State Drive or Hard Disk Drive.

■ **USB Configuration**
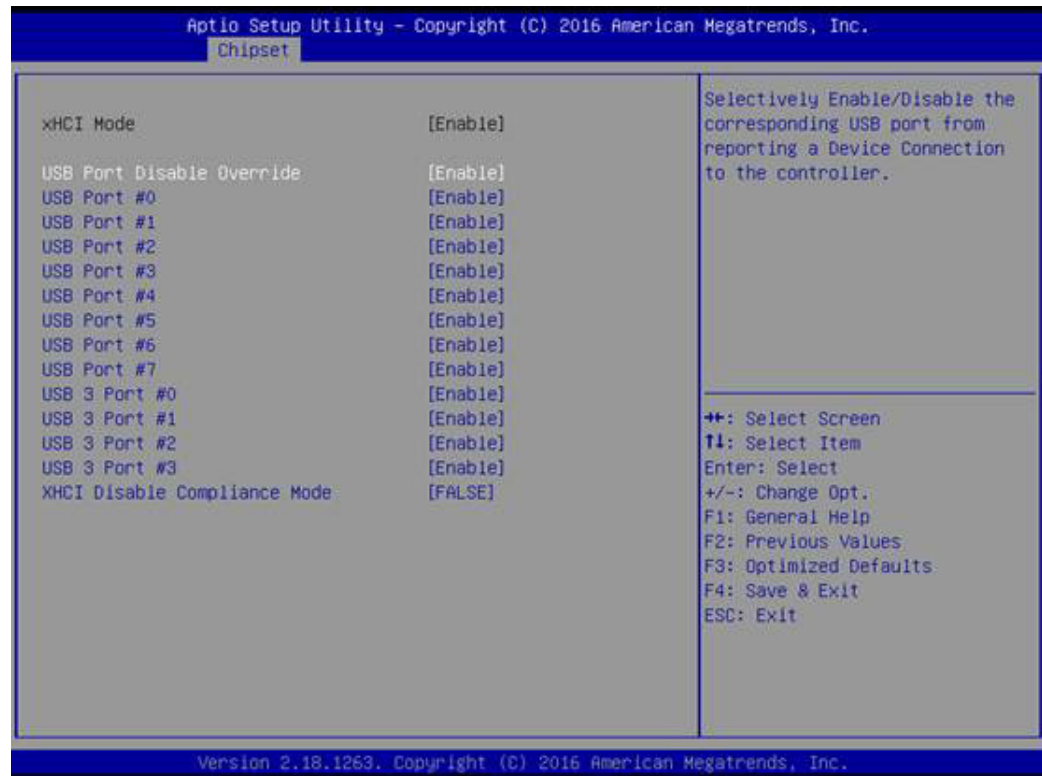
– **xHCI Mode**

Once disabled, XHCI controller would be function disabled, none of the USB devices are detectable and usable during bootup and in the OS. Do not disable it unless for debugging purposes.

– **USB Port Disable Override**

Selectively enable or disable the corresponding USB port from reporting a device connection to the controller.

– **USB Port #0 / USB 3 Port #0**

Enable or disable USB port. Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.

– **XHCI Disable Compliance Mode**

Options to disable XHCI Link Compliance Mode. Default is FALSE to not disable compliance mode. Set TRUE to disable Compliance Mode.

■ **Miscellaneous Configuration**
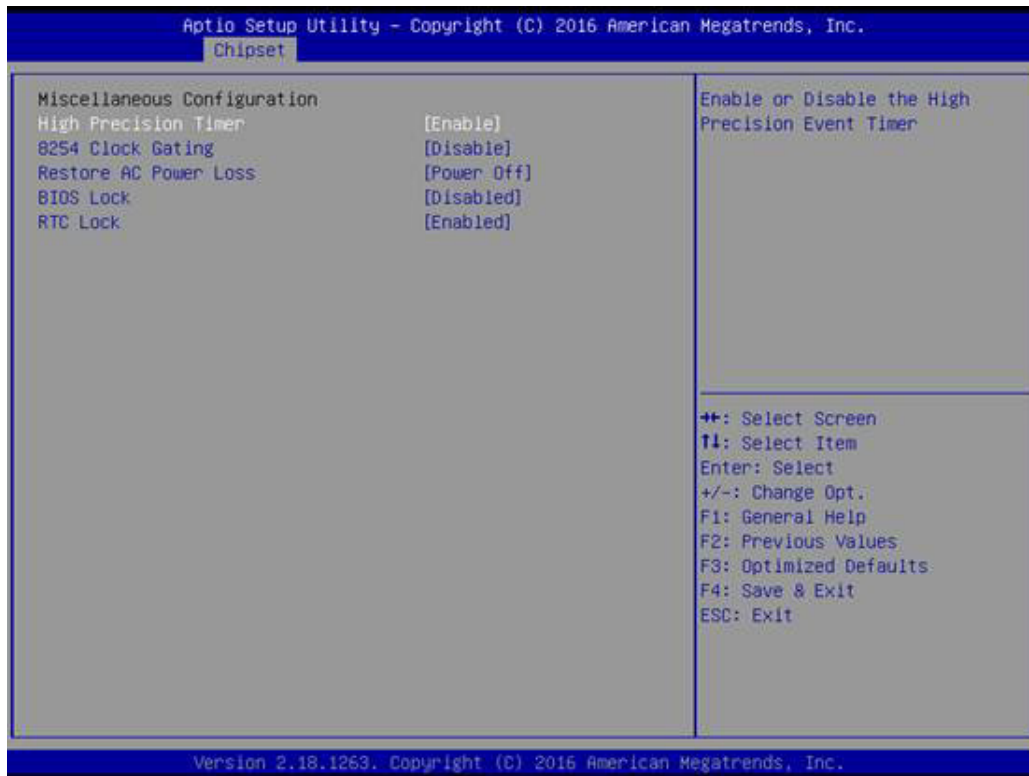
– **High Precision Timer**

Enable or disable the High Precision Event Timer.

– **8254 Clock Gating**

Enable or disable 8254 Clock Gating.

– **Restore AC Power Loss**

Specify what state to go to when power is re-applied after a power failure (G3 state).

Power On: System will boot directly as soon as power is applied.

Power Off: System keeps in power-off state until power button is pressed.

Last State: System will act as its last power states.

– **BIOS Lock**

Enable or disable the SC BIOS Lock enable feature. It is required to be enabled to ensure SMM protection of flash.

– **RTC Lock**

Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.

3.2.4 Security
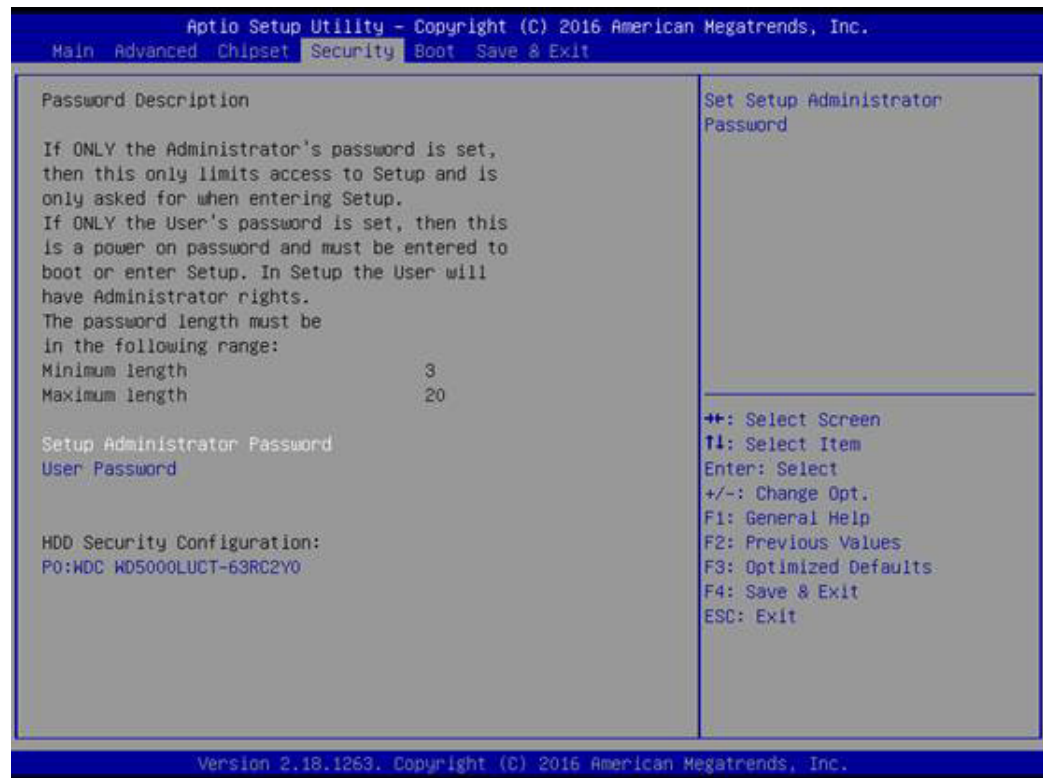
Select Security Setup from the MIO-2360 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

■ **Change Administrator / User Password**

Select this option and press <ENTER> to access the sub menu, and then type in the password.

3.2.5 Boot

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
          Main  Advanced  Chipset  Security  Boot  Save & Exit

        Boot Configuration                                          Number of seconds to wait for
        Setup Prompt Timeout                  1                     setup activation key.
        Bootup NumLock State                  [On]                  65535(0xFFFF) means indefinite
        Quiet Boot                            [Disabled]            waiting.

        Boot Option Priorities
        Boot Option #1                        [UEFI: Built-in EFI ...]
        Boot Option #2                        [Windows Boot Manage...]
        Boot Option #3                        [UEFI: JetFlashTrans...]
        Fast Boot                             [Disable]

        New Boot Option Policy                [Default]

                                                                    ++: Select Screen
                                                                    ↑↓: Select Item
                                                                    Enter: Select
                                                                    +/-: Change Opt.
                                                                    F1: General Help
                                                                    F2: Previous Values
                                                                    F3: Optimized Defaults
                                                                    F4: Save & Exit
                                                                    ESC: Exit

                Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

■ **Setup Prompt Timeout**

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

■ **Bootup NumLock State**

Select the keyboard NumLock state.

■ **Quiet Boot**

Enables or disables the Quiet Boot option.

■ **Boot Option #1**

Sets the system boot order.

■ **Fast Boot**

Enable or disable Fast Boot features. Most probes are skipped to reduce time during boot.

■ **New Boot Option Policy**

Controls the placement of newly detected UEFI boot options.

3.2.6 Save & Exit

- ■ **Save Changes and Exit**
  This item allows you to exit system setup after saving the changes.
- ■ **Discard Changes and Exit**
  This item allows you to exit system setup without saving any changes.
- ■ **Save Changes and Reset**
  This item allows you to reset the system after saving the changes.
- ■ **Discard Changes and Reset**
  This item allows you to rest system setup without saving any changes.
- ■ **Save Changes**
  This item allows you to save changes done so far to any of the options.
- ■ **Discard Changes**
  This item allows you to discard changes done so far to any of the options.
- ■ **Restore Defaults**
  This item allows you to restore/load default values for all the options.
- ■ **Save as User Defaults**
  This item allows you to save the changes done so far as user defaults.
- ■ **Restore User Defaults**
  This item allows you to restore the user defaults to all the options.
- ■ **Boot Override**
  Boot device select can override your boot priority.

Chapter 4

S/W Introduction & Installation

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft® Windows® embedded technology." We enable Windows embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows embedded software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

4.2.1 Windows 10 Professional

To install the drivers, insert the driver CD into DVD-ROM, select the drivers that need to be installed, then launch setup file under each function folder and follow Driver Setup instructions to complete the process.

4.2.2 Other OS

To install the drivers for another Windows OS or Linux, please browse the CD to run the setup file under the appropriate OS folder (s).

4.3 Value-Added Software Services

Software API: An interface that defines the ways by which an application program may request services from libraries and/or operating systems. Provides not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speeds development, enhances security and offers add-on value for Advantech platforms.

4.3.1 SUSI Introduction

To make hardware easier and more convenient to access for programmers, Advantech has released a suite of API (Application Programming Interface) in the form of a program library. The program Library is called Secured and Unified Smart Interface or SUSI for short.

In modern operating systems, user space applications cannot access hardware directly. Drivers are required to access hardware. User space applications access hardware through drivers. Different operating systems usually define different interface for drivers. This means that user space applications call different functions for hardware access in different operating systems. To provide a uniform interface for accessing hardware, an abstraction layer is built on top of the drivers and SUSI is such an abstraction layer. SUSI provides a uniform API for application programmers to access the hardware functions in different Operating Systems and on different Advantech hardware platforms.

Application programmers can invoke the functions exported by SUSI instead of calling the drivers directly. The benefit of using SUSI is portability. The same set of APIs is defined for different Advantech hardware platforms. Also, the same API set is implemented in different Operating Systems. This user's manual describes some sample programs and the API in SUSI. The hardware functions currently supported by SUSI can be grouped into a few categories including Watchdog, I^2C, SMBus, GPIO, and VGA control. Each category of API in SUSI is briefly described below.

4.3.2 Software APIs

4.3.2.1 The GPIO API

General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. It allows users to monitor the level of signal input or set the output status to switch on/off a device. Our API also provides Programmable GPIO, which allows developers to dynamically set the GPIO input or output status.

4.3.2.2 The SMBus API

The System Management Bus (SMBus) is a two-wire interface defined by Intel Corporation in 1995. It is based on the same principles of operation of I^2C and is used in personal computers and servers for low-speed system management communications. Nowadays, it can be seen in many types of embedded systems. As with other API in SUSI, the SMBus API is available on many platforms including Windows 10.

4.3.2.3 The Display Control API

There are two kinds of VGA control APIs, backlight on/off control and brightness control. Backlight on/off control allows a developer to turn on or off the backlight, and to control brightness smoothly.

1. Brightness Control
   – The Brightness Control API allows a developer to interface with an embedded device to easily control brightness.
2. Backlight Control
   – The Backlight API allows a developer to control the backlight (screen) on/off in an embedded device.

4.3.2.4 The Watchdog API

A watchdog timer (abbreviated as WDT) is a hardware device which triggers an action, e.g. rebooting the system, if the system does not reset the timer within a specific period of time. The WDT API in SUSI provides developers with functions such as starting the timer, resetting the timer, and setting the timeout value if the hardware requires customized timeout values.

4.3.2.5 The Hardware Monitor API

The hardware monitor (abbreviated as HWM) is a system health supervision capability achieved by placing certain I/O chips along with sensors for inspecting the target of interests for certain condition indexes, such as fan speed, temperature and voltage etc.

However, due to the inaccuracy among many commercially available hardware monitoring chips, Advantech has developed a unique scheme for hardware monitoring - achieved by using a dedicated micro-processor with algorithms specifically designed for providing accurate, real-time and reliable data content; helping protect your system in a more reliable manner.

4.3.2.6 The Power Saving API

1. CPU Speed
   – Make use of Intel SpeedStep technology to reduce power consumption. The system will automatically adjust the CPU Speed depending on system loading.
2. System Throttling
   – Refers to a series of methods for reducing power consumption in computers by lowering the clock frequency. APIs allow the user to lower the clock from 87.5% to 12.5%.

4.3.3 SUSI Installation

SUSI supports many different operating systems. Each subsection below describes how to install SUSI and related software on a specific operating system. Please refer to the subsection matching your operating system.

4.3.3.1 Windows 10

In Windows 10, you can install the library, drivers and demo programs onto the platform easily using the installation tool--The SUSI Library Installer. After the installer has executed, the SUSI Library and related files for Windows 10 can be found in the target installation directory. The files are listed in the following table.

Directory	Contents
\Library	■ Susi.lib
	Library for developing the applications on Windows 10.
	■ Susi.dll
	Dynamic library for SUSI on Windows 10.
\Demo	■ SusiDemo.EXE
	Demo program on Windows® 7.
	■ Susi.dll
	Dynamic library for SUSI on Windows 10.
\Demo\SRC	Source code of the demo program on Windows 10.

The following section illustrates the installation process.

Note! *The SUSI Library Installer screen shots shown below are examples only. Your screens may vary depending on your particular version.*

1. Extract Susi.zip.
2. Double-click the "Setup.exe" file.

The installer searches for a previous installation of the SUSI Library. If it locates one, a dialog box opens asking whether you want to modify, repair or remove the software. If a previous version is located, please see the [Maintenance Setup] section. If it is not located, an alternative window appears. Click Next.

4.3.4 SUSI Sample Programs

Sample Programs

The sample programs demonstrate how to incorporate SUSI into your program. The sample programs run in graphics mode in Windows® 7 are described in the subsections below.

Windows Graphics Mode

Each demo application contains an executable file SusiDemo.exe, a shared library Susi.dll and source code within the release package.

SusiDemo.exe is an executable file and it requires the shared library, Susi.dll, to demonstrate the SUSI functions. The source code of SusiDemo.exe must be compiled under Microsoft Visual C++ 6.0 on Windows 10. Developers must add the header file Susi.h and library Susi.lib to their own projects when they want to develop something with SUSI.

SusiDemo.exe

The SusiDemo.exe test application is an application which uses all functions of the SUSI Library. It has five major function blocks: Watchdog, GPIO, SMBus, I^2C and VGA control. The following screen shot appears when you execute SusiDemo.exe. You can click function tabs to select test functions respectively. Some function tabs will not show on the test application if your platform does not support such functions. For a complete support list, please refer to Appendix A. We describe the steps to test all functions of this application.
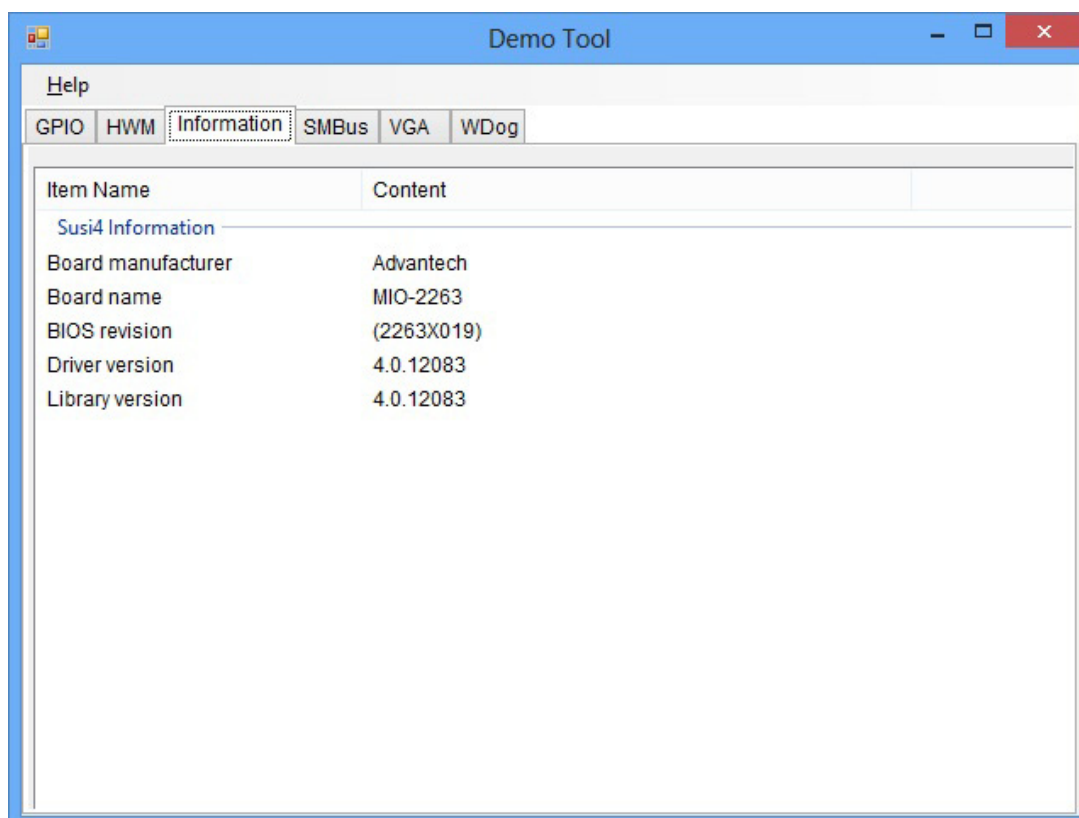
GPIO
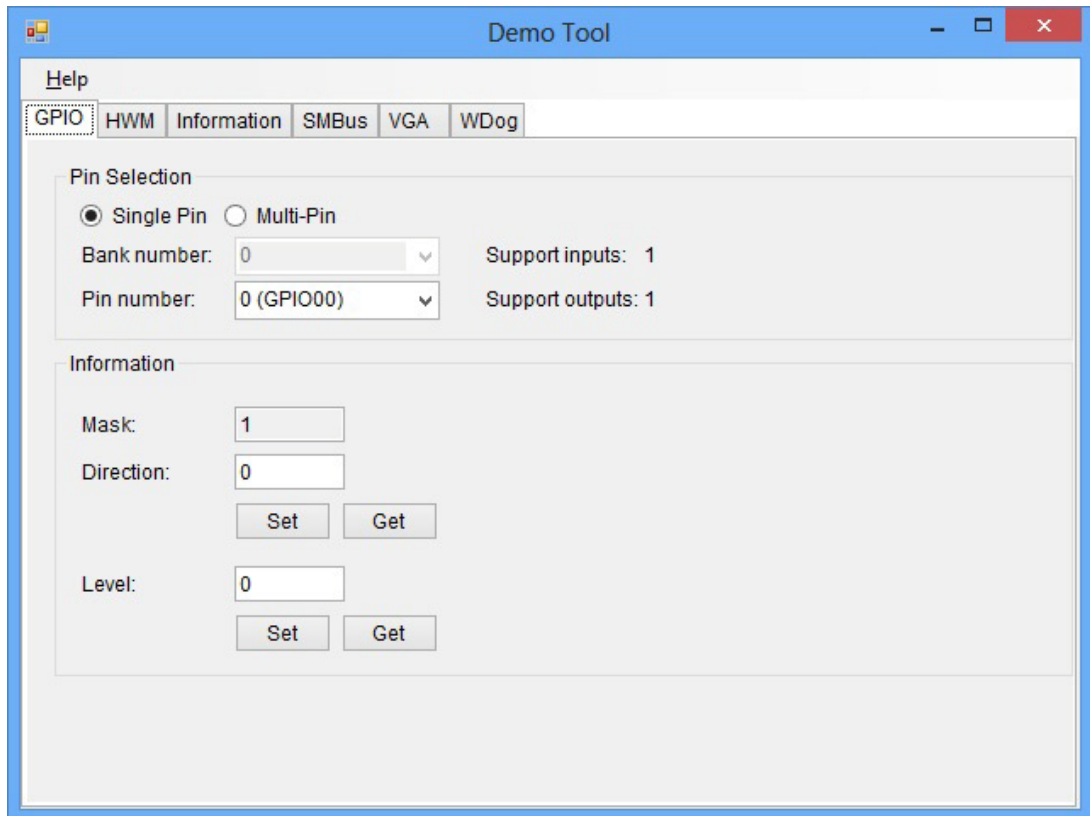
When the application is executed, it will display GPIO information in the GPIO INFORMATION group box. It displays the number of input pins and output pins. You can click the radio button to choose to test either the single pin function or multiple pin functions. The GPIO pin assignments of the supported platforms are located in Appendix B.

■ Test Read Single Input Pin
  – Click the radio button- Single-Pin.
  – Key in the pin number to read the value of the input pin. The Pin number starts from '0'.
  – Click the READ GPIO DATA button and the status of the GPIO pin will be displayed in (R/W) Result field.

■ Test Read Multiple Input Pin
  – Click the radio button- Multi-Pin.
  – Key in the pin number from '0x01' to '0x0F' to read the value of the input pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to read pin 0, 1, and 3, the pin numbers should be '0x0B'.
  – Click READ GPIO DATA button and the statuses of the GPIO pins will be displayed in (R/W) Result field.

■ Test Write Single Output Pin
  – Click the radio button- Single-Pin.
  – Key in the pin numbers you want to write. Pin numbers start from '0'.
  – Key in the value either '0' or '1' in (R/W) Result field to write the output pin you chose above step.
  – Click the WRITE GPIO DATA button to write the GPIO output pin.

■   Test Write Multiple Output Pins
  – Click the radio button- Multi-Pin.
  – Key in the pin number from '0x01' to '0x0F' to choose the multiple pin num-
    bers to write the value of the output pin. The pin numbers are ordered bit-
    wise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if
    you want to write pin 0, 1, and 3, the pin numbers should be '0x0B'.
  – Key in the value in (R/W) Result field from '0x01' to '0x0F' to write the value
    of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for
    GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to set pin 0
    and 1 high, 3 to low, the pin number should be '0x0B/, and then you should
    key in the value '0x0A' to write.
  – Click the WRITE GPIO DATA button to write the GPIO output pins.

SMBus
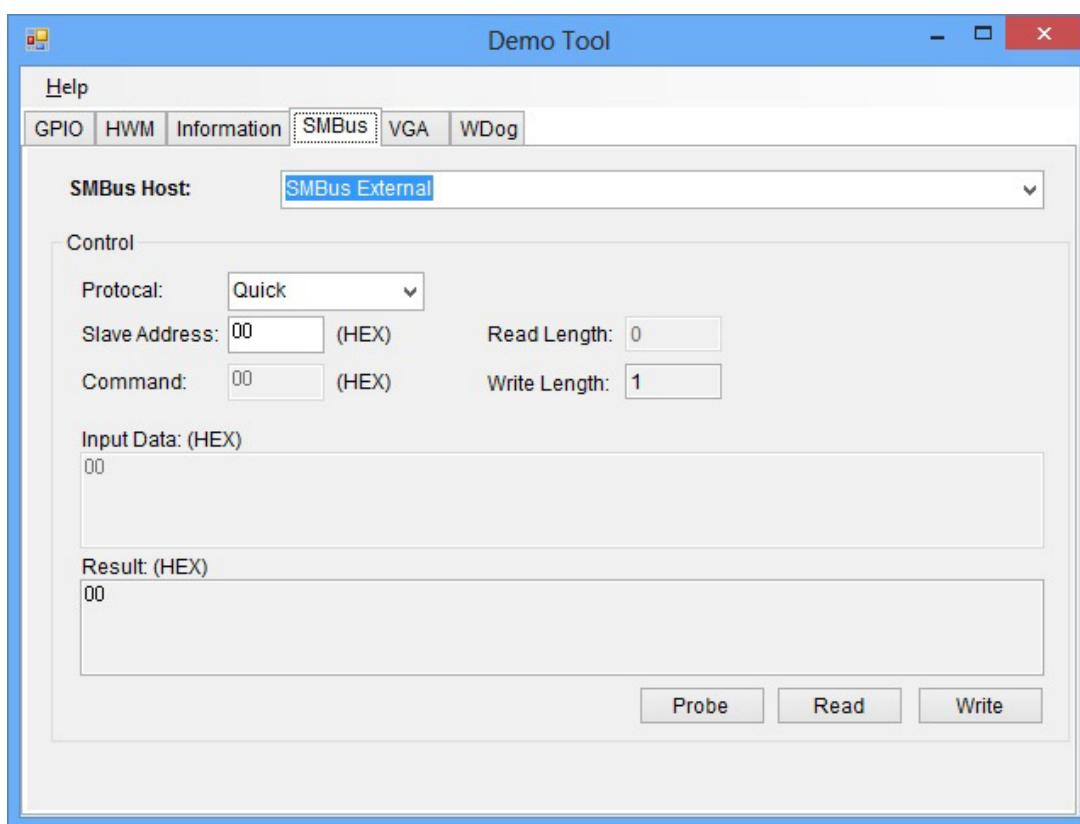
When the application has executed, you can click the radio button to choose to test
each access mode, i.e. Access a byte, Access multiple bytes and Access a word. All
data must be read or written in hexadecimal except the numbers for radio button:
Access multiple bytes mode must be written in decimal. You can test the functional-
ities of the watchdog as follows:

■   Read a byte
  – Click the radio button- Access a byte.
  – Key in the slave device address in the Slave address field.
  – Key in the register offset in the Register Offset field.
  – Click the READ SMBus DATA button and a byte of data from the device will
    be shown on the Result field.

- **Write a byte**
  - Click the radio button- Access a byte.
  - Key in the slave device address in Slave address field.
  - Key in the register offset in Register Offset field.
  - Key the desired data in the Result field to write to the device.
  - Click the WRITE SMBus DATA button and then the data will be written to the device through SMBus.

- **Read a word**
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Click the READ SMBus DATA button and then a word of data from the device will be shown on the Result field.

- **Write a word**
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired data, such as 0x1234, in the Result field to write to the device.
  - Click the WRITE SMBus DATA button and the data will be written to the device through the SMBus.

- **Read Multiple bytes**
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of radio button- Access multiple bytes. The number must be written in decimal.
  - Click the READ SMBus DATA button and then all data from the device will be divided from each other by commas and be shown in the Result field.

- **Write Multiple bytes**
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of the radio button- Access multiple bytes. The number must be written in decimal.
  - Key in all the desired data in the Result field in hexadecimal format, divided by commas, for example, 0x50,0x60,0x7A.
  - Click the WRITE SMBus DATA button and all of the data will be written to the device through the SMBus.

Display Control
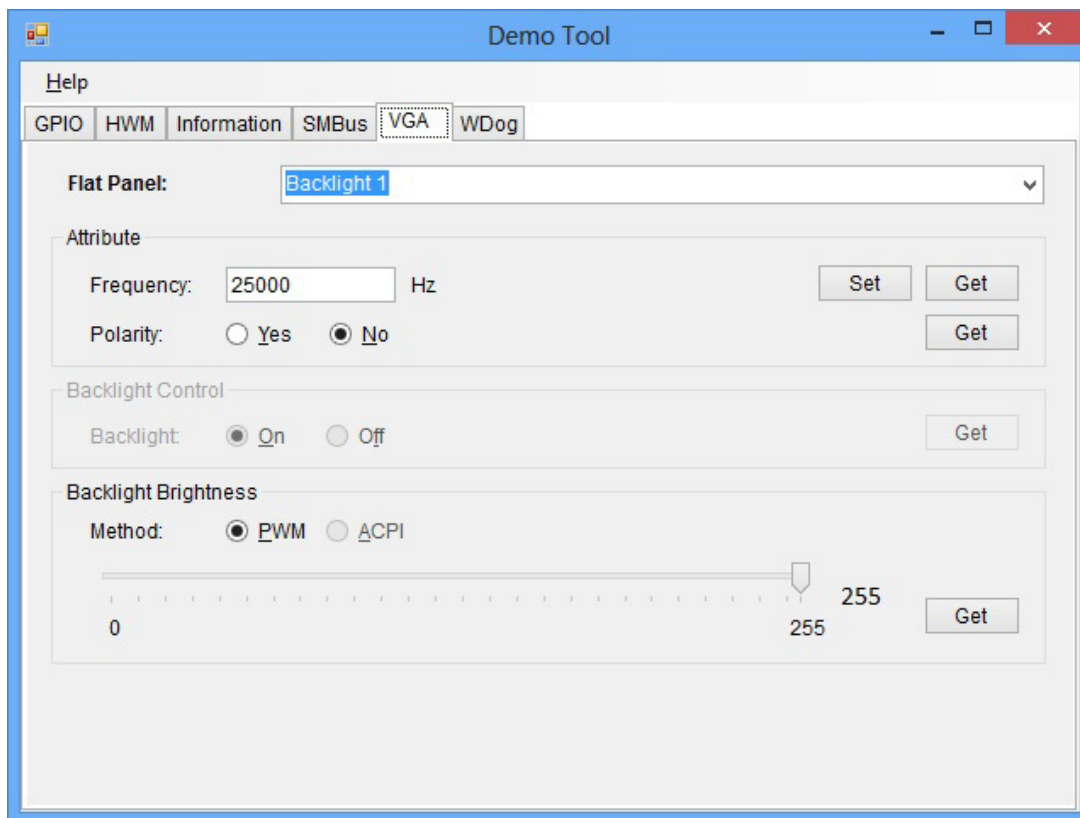
When the application is executed, it will display two blocks of VGA control functions. The application can turn on or turn off the screen shot freely, and it also can tune the brightness of the panels if your platform is being supported. You can test the functionality of VGA control as follows:

■ Screen on/off control
  – Click the radio button ON or push the key F11 to turn on the panel screen.
  – Click the radio button OFF or push the key F12 to turn off the panel screen.
  – The display chip of your platform must be in the support list in Appendix A, or this function cannot work.
■ Brightness control
  – Move the slider in increments, using either the mouse or the direction keys, or click the UP button to increase the brightness.
  – Move the slider in decrements, using either the mouse or the direction keys, or click the DOWN button to decrease the brightness.
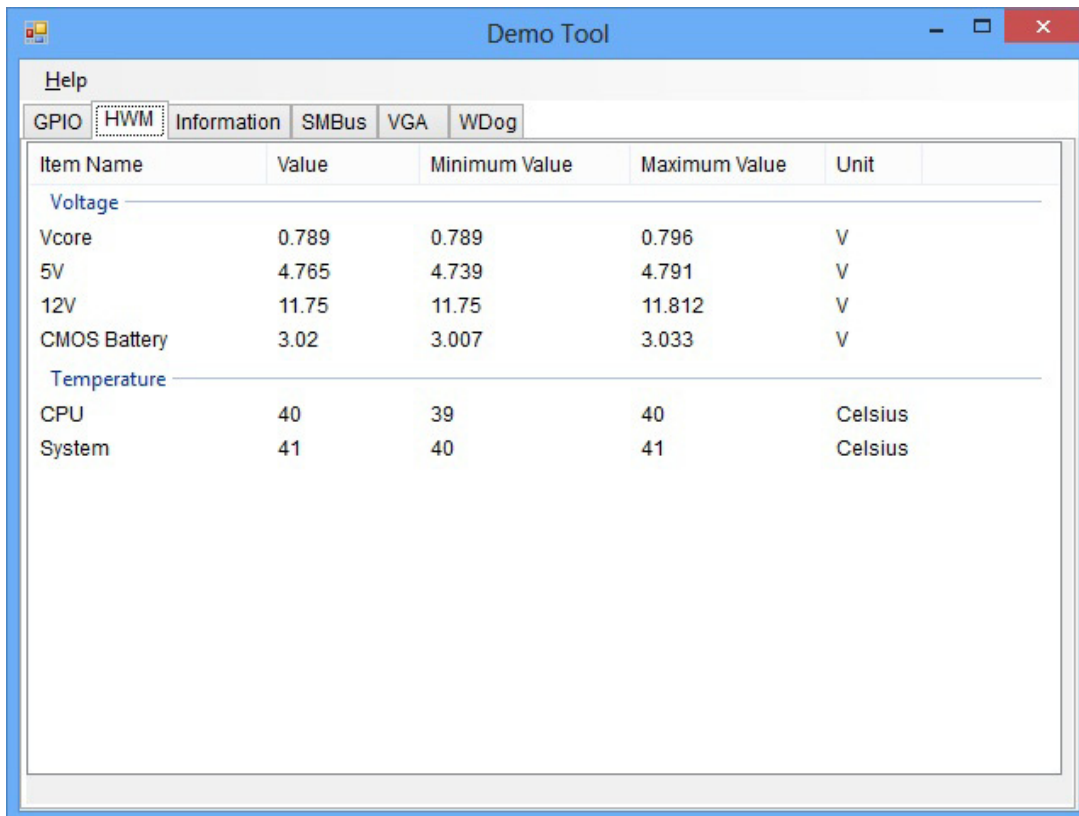
Watchdog
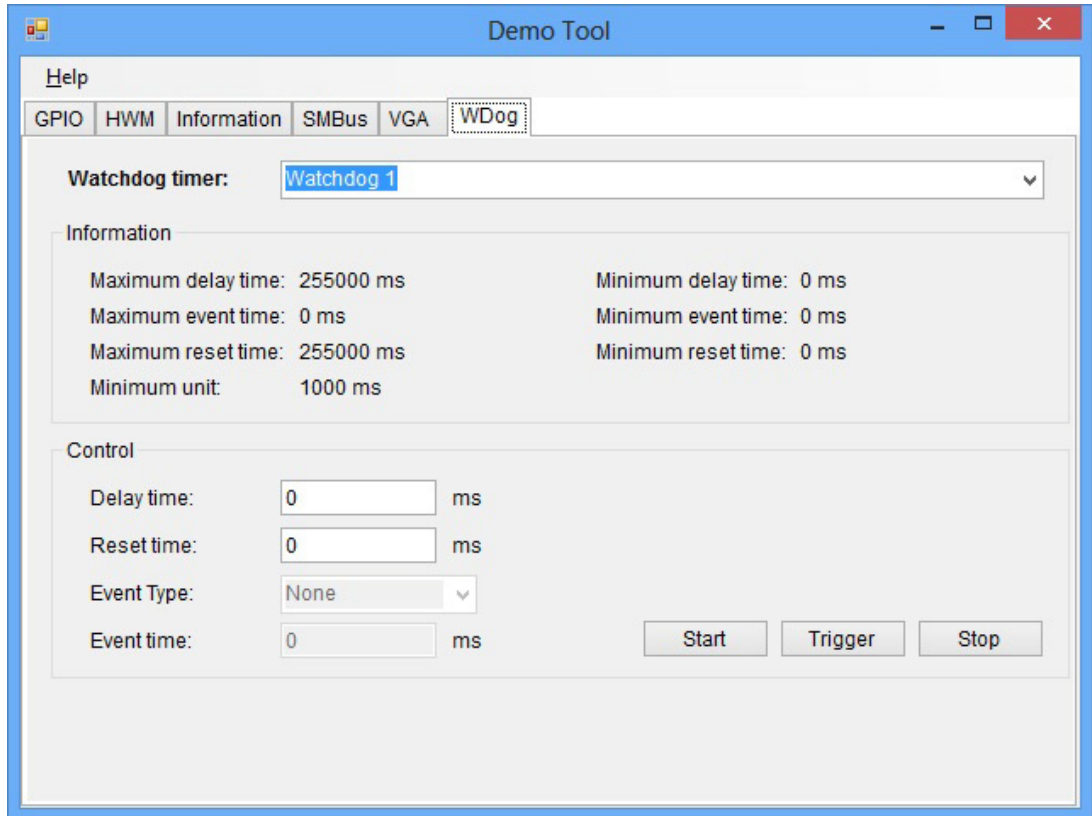
When the application is executed, it will display watchdog information in the WATCH-DOG INFORMATION group box. It displays max timeout, min timeout, and timeout steps in milliseconds. For example, a 1~255 seconds watchdog will have 255000 max timeout, 1000 min timeout, and 1000 timeout steps. You can test the functionality of the watchdog as follows:

- Set the timeout value 3000 (3 sec.) in the SET TIMEOUT field and set the delay value 2000 (2 sec.) in the SET DELAY field, then click the START button. The Timeout Countdown field will countdown the watchdog timer and display 5000 (5 sec.).
- Before the timer counts down to zero, you can reset the timer by clicking the REFRESH button. After you click this button, the Timeout Countdown field will display the value of the SET TIMEOUT field.
- If you want to stop the watchdog timer, just click the STOP button.

Hardware Monitor

Item Name	Value	Minimum Value	Maximum Value	Unit
Voltage				
Vcore	0.789	0.789	0.796	V
5V	4.765	4.739	4.791	V
12V	11.75	11.75	11.812	V
CMOS Battery	3.02	3.007	3.033	V
Temperature				
CPU	40	39	40	Celsius
System	41	40	41	Celsius

(Demo Tool — Help menu; tabs: GPIO, HWM, Information, SMBus, VGA, WDog)

When the Monitor application is executed by clicking the button, hardware monitoring data values will be displayed. If certain data values are not supported by the platform, the correspondent data field will be grayed-out with a value of 0.

For more details on MIO-2360 software API, please contact your dealer or Advantech AE.

Appendix A

PIN Assignments

A.1 Jumper Setting

Table A.1: Jumper List

J1	LCD Power / Auto Power on

A.2 Connectors

Table A.2: Connector list

CN1	12 V Power Input
CN2	DC JACK (by request)
CN3	12 V Power Input (2 x 3 pin support by request)
CN5	DDR3L SO-DIMM
CN7	GPIO
CN8	HD Audio
CN9	Gigabit Ethernet
CN10	Mini PCIe
CN11	SATA
CN12	mSATA
CN13	COM1/COM2
CN28	Inverter Power/Internal SATA Power
CN15	18/24 bits LVDS Panel
CN16	VGA
CN17	HDMI
CN18	MIOe
CN19	Internal USB 2.0
CN20	External USB 3.0
CN21	SMBus
CN22	Front Panel
CN26	Battery

J1: LCD Power/Auto Power On

Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
Setting	**Function**
(1-2)	Panel Voltage Select (+5V)
(3-4) (default)	Panel Voltage Select (+3.3V)
(5-6) (default)	AT Mode Selection
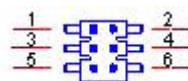
CN1	12 V Power Input
Part Number	1655003962
Footprint	WF_2P_156_D_A3963WV2
Description	WAFER 2P 3.96mm 180D(M) DIP A3963WV2-2P
Pin	Pin Name
1	GND
2	+V12_DC_IN
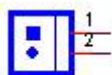
CN2	DC JACK (by request)
Part Number	1652005684-01
Footprint	PJ_3P_SCD556DCS113B00G
Description	DC POWER JACK Screw 3P D2.5 90D(M) DIP SCD556DCS
Pin	Pin Name
1	+V12_DC_IN
2	GND
3	NC
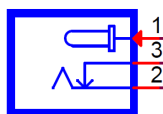
CN3	12V Power Input (2 x 3 pin support by request)
Part Number	1655000025
Footprint	WF_3x2P_79_BOX_D
Description	
Pin	Pin Name
1	GND
2	+V12_DC_IN
3	GND
4	+V12_DC_IN
5	GND
6	+V12_DC_IN
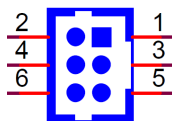
CN6	DDR3L SO-DIMM
Part Number	1651002083
Footprint	DDR3_204P_AS0A626-JA
Description	DDR3 SODIMM H=9.2mm 204P SMD AS0A626-HARN-7H
Pin	Pin Name

CN7	GPIO
Part Number	1653005261
Footprint	HD_5x2P_79
Description	PIN HEADER 5x2P 2.0mm 180D(M) SMD 21N22050
Pin	Pin Name
1	+V5SB
2	GPIO4
3	GPIO0
4	GPIO5
5	GPIO1
6	GPIO6
7	GPIO2
8	GPIO7
9	GPIO3
10	GND
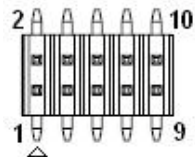
CN8	HD Audio
Part Number	1653003719
Footprint	HD_5x2P_79_RA_21N22050
Description	PIN HEADER 5x2P 2.00mm 90D(M) SMD 21N22050
Pin	Pin Name
1	LOUTR
2	LINR
3	GND
4	GND
5	LOUTL
6	LINL
7	GND
8	GND
9	MIC1R
10	MIC1L
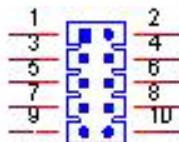
CN9	Gigabit Ethernet
Part Number	1652004356
Footprint	RJ45_14P_RT7-194AAM1A
Description	PHONE JACK RJ45 14P 90D(F) DIP RT7-194AAM1A
Pin	Pin Name
1	BI_DA+(GHz)
2	BI_DA-(GHz)
3	BI_DB+(GHz)
4	BI_DC+(GHz)
5	BI_DC-(GHz)
6	BI_DB-(GHz)
7	BI_DD+(GHz)
8	BI_DD-(GHz)
H3	GND
H4	GND
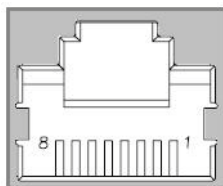
CN10	Mini PCIe
Part Number	1654002538
Footprint	FOX_AS0B226-S68K7F
Description	MINI PCI E 52P 6.8mm 90D SMD AS0B226-S68Q-7H
Pin	Pin Name
1	WAKE#
2	+V3.3SB
3	NC
4	GND
5	NC
6	+V1.5
7	CLKREQ_MINI
8	+VUM_PWR
9	GND
10	UIM_DATA
11	CLK_MINI_PCIE-
12	UIM_CLK
13	CLK_MINI_PCIE+
14	UIM_RESET
15	GND
16	+VUIN_VPP
17	NC
18	GND
19	NC
20	WIFI1_DISABLE#
21	GND
22	PLTRST#
23	mPCIE_RX-
24	+V3.3SB
25	mPCIE_RX+
26	GND
27	GND
28	+V1.5
29	GND
30	SMB_STB_CLK
31	mPCIE_TX-
32	SMB_STB_DAT
33	mPCIE_TX+
34	GND
35	GND
36	USB D-
37	GND
38	USB D+
39	+V3.3SB
40	GND
41	+V3.3SB
42	NC

43	GND
44	NC
45	NC
46	NC
47	NC
48	+V1.5
49	NC
50	GND
51	NC
52	+V3.3SB
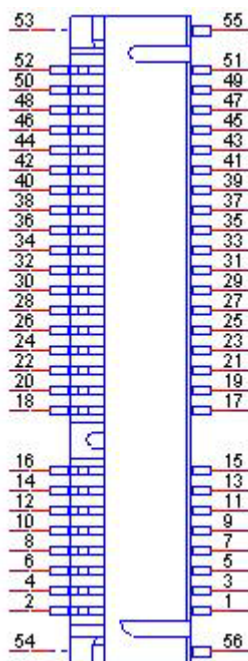
CN11	SATA
Part Number	1654011616-01
Footprint	SATA_7P_WATF-07DBN6SB1U
Description	
Pin	Pin Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND
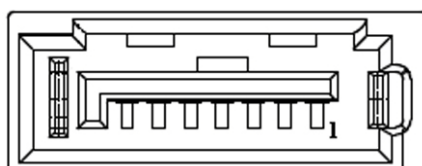
CN12	mSATA
Part Number	1654002538
Footprint	FOX_AS0B226-S68K7F
Description	MINI PCI E 52P 6.8mm 90D SMD AS0B226-S68Q-7H
Pin	Pin Name
1	WAKE#
2	+3.3V
3	NC
4	GND
5	NC
6	+V1.5
7	NC
8	NC
9	GND
10	NC
11	NC
12	NC
13	NC
14	NC
15	GND
16	NC
17	NC
18	GND
19	NC
20	WIFI2_DISABLE#
21	GND
22	PLTRST#
23	mSATA_RX+
24	+3.3V
25	mSATA_RX-
26	GND
27	GND
28	+V1.5
29	GND
30	SMB_STB_CLK
31	mSATA_TX-
32	SMB_STB_DAT
33	mSATA_TX+
34	GND
35	GND
36	USB D-
37	GND
38	USB D+
39	+3.3V
40	GND
41	+3.3V
42	NC

43	GND
44	NC
45	NC
46	NC
47	NC
48	+V1.5
49	NC
50	GND
51	NC
52	+3.3V
53	NC
54	NC
55	GND
56	GND
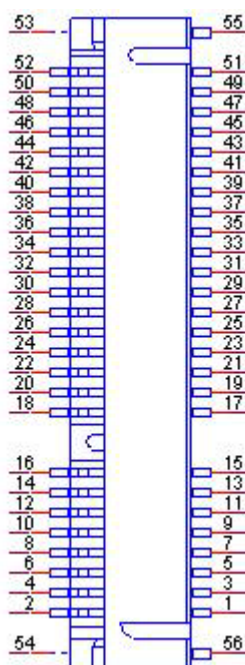
CN13	COM1/COM2
Part Number	1653003720
Footprint	HD_10x2P_79_RA
Description	PIN HEADER 10x2P 2.00mm 90D(M) SMD 21N22050-20J1
Pin	Pin Name
1	DCD1#
2	DSR1#
3	RXD1
4	RTS1#
5	TXD1
6	CTS1#
7	DTR1#
8	RI1#

Pin	Pin Name
9	GND
10	GND
11	DCD2#
12	DSR2#
13	RXD2
14	RTS2#
15	TXD2
16	CTS2#
17	DTR2#
18	RI2#
19	GND
20	GND
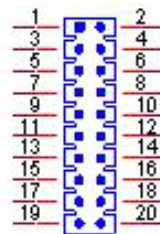
CN28	Inverter Power/Internal SATA power
Part Number	1655004163
Footprint	WF_5P_79_BOX_RA_H201
Description	
Pin	Pin Name
1	+12V
2	GND
3	ENABKL
4	VBR
5	+5V
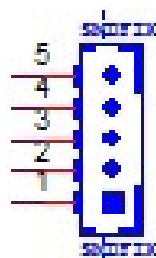
CN15	18/24 bits LVDS Panel
Part Number	1655000753
Footprint	WF14P_49_BOX_RA_85204-14001
Description	WAFER BOX 14x1P 1.25mm 90D(M) SMD 85204-14001
Pin	Pin Name
1	GND
2	GND
3	LVDS1_0_CLK-
4	LVDS1_0_CLK+
5	LVDS1_0_D3-
6	LVDS1_0_D3+
7	LVDS1_0_D2-
8	LVDS1_0_D2+
9	LVDS1_0_D1-
10	LVDS1_0_D1+
11	LVDS1_0_D0-
12	LVDS1_0_D0+
13	+V_LCD
14	+V_LCD
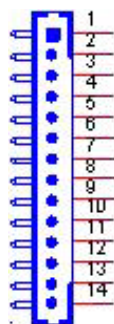
CN16	VGA
Part Number	1654011261-01
Footprint	DBVGA-VF5MS
Description	
Pin	Pin Name
1	VGA_z_R
2	VGA_z_G
3	VGA_z_B
4	VGA_z_SPC
5	GND
6	GND_RGB
7	GND_RGB
8	GND_RGB
9	+V5_VGA
10	GND
11	VGA_z_SPD
12	VGA_z_DDAT
13	VGA_z_HS
14	VGA_z_VS
15	VGA_z_DCLK
16	NC
17	NC
18	GND_IO
19	GND_IO
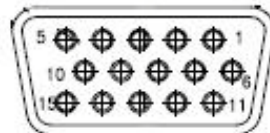
CN17	HDMI
Part Number	00
Footprint	HDMI_19P_QJ51191-LFB4-7F
Description	
Pin	Pin Name
1	HDMI_TX2+
2	GND
3	HDMI_TX2-
4	HDMI_TX1+
5	GND
6	HDMI_TX1-
7	HDMI_TX0+
8	GND
9	HDMI_TX0-
10	HDMI_CLK+
11	GND
12	HDMI_CLK-
13	NC
14	NC
15	HDMI_DCLK
16	HDMI_DDAT
17	GND
18	+V5_HDMI-HPD
19	DDP0_HPD
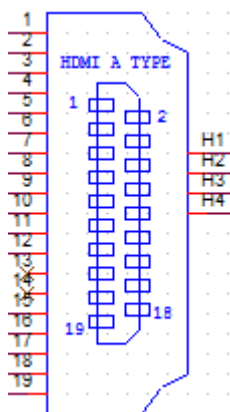
CN18	MIOe
Part Number	00A00001150
Footprint	MIOE_CPUSIDE
Description	
Pin	Pin Name
1	GND
2	GND
3	PCIE_RX0+
4	PCIE_TX+
5	PCIE_RX0-
6	PCIE_TX0-
7	GND
8	GND
9	PCIE_RX1+
10	PCIE_TX1+
11	PCIE_RX1-
12	PCIE_TX1-
13	GND
14	GND
15	USB1_SSRX+
16	USB1_SSTX+
17	USB1_SSRX-
18	USB1_SSTX-
19	GND
20	GND
21	SATA_RX+
22	SATA_TX+
23	SATA_RX-
24	SATA_TX-
25	GND
26	GND
27	PCIE_CLK+
28	LOUTL
29	PCIE_CLK-
30	LOUTR
31	GND
32	AGND
33	SMB_STB_CLK
34	GND
35	SMB_STB_DAT
36	USB3_D+
37	PCIE_WAKE#
38	USB3_D-
39	RESET#
40	GND
41	PowerOn
42	CLK33M

43	NC
44	LPC_AD0
45	DDP_HPD
46	LPC_AD1
47	GND
48	LPC_AD2
49	DDP_AUX+/DDC_CLK
50	LPC_AD3
51	DDP_AUX-/DDC_DAT
52	NC
53	GND
54	LPC_SERIRQ
55	DDP_D0+
56	LPC_FRAME#
57	DDP_D0-
58	GND
59	GND
60	USB0_D+
61	DDP_D1+
62	USB0_D-
63	DDP_D1-
64	GND
65	GND
66	USB0_SSTX+
67	DDP_D2+
68	USB0_SSTX-
69	DDP_D2-
70	GND
71	GND
72	USB0_SSRX+
73	DDP_D3+
74	USB0_SSRX-
75	DDP_D3-
76	GND
77	GND
78	USB_OC#
79	+12VSB
80	+12VSB
83	GND
84	GND
85	GND
86	GND
87	+5VSB
88	+5VSB
89	+5VSB
90	+5VSB
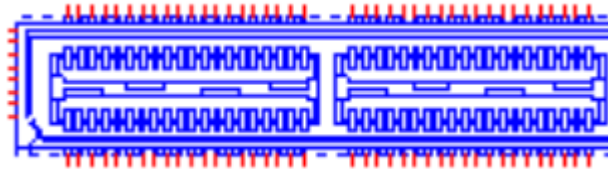
CN19	Internal USB 2.0
Part Number	1653005260
Footprint	HD_5x2P_79_N10
Description	PIN HEADER 2x5P 2.0mm 180D(M) SMD 21N22050
Pin	Pin Name
1	+5V
2	+5V
3	A_D-
4	B_D-
5	A_D+
6	B_D+
7	GND
8	GND
9	GND
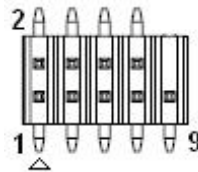
CN20	External USB 3.0
Part Number	1654012030-01
Footprint	USB_9X2P_USB5-18F5-BNR0-10
Description	
Pin	Pin Name
1	+5V
2	D-_0
3	D+_0
4	GND
5	USB0_SSRX-
6	USB0_SSRX+
7	GND
8	USB0_SSTX-
9	USB0_SSTX+
10	+5V
11	D-_1
12	D+_1
13	GND

14	USB1_SSRX-
15	USB1_SSRX+
16	GND
17	USB1_SSTX-
18	USB1_SSTX+
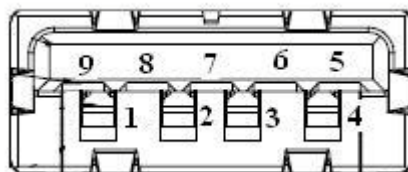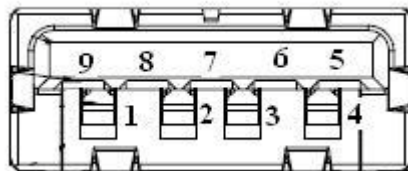
CN21	**SMBus**
Part Number	1655904020
Footprint	FPC4V-125M
Description	WAFER 4P 1.25mm 180D(M) SMD 85205-04001
Pin	Pin Name
1	GND
2	SMB1_DAT
3	SMB1_CLK
4	+V5
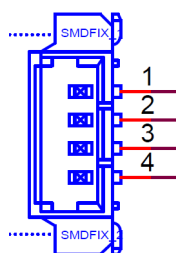
CN22	Front Panel
Part Number	1653004883
Footprint	HD_3x2P_79_RA_21N22050
Description	PIN HEADER 2x3P 2.00mm 90D(M) SMD 21N22050-06J10
Pin	Pin Name
1	Power Button
2	PWR LED
3	GND
4	PWR LED
5	Reset Button
6	SATA LED
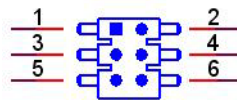
CN26	Battery
Part Number	1655902032
Footprint	WHL2V-125
Description	WAFER BOX 2P 1.25mm 180D(M) DIP 53047-0210
Pin	Pin Name
1	+VBAT
2	GND

Appendix **B**

WDT & GPIO

B.1 Watchdog Timer Sample Code

Watchdog function:

```
The SCH3114 Runtime base I/O address is A00h
Setting WatchDog time value location at offset 66h
If set value "0", it is mean disable WatchDog function.
Superio_GPIO_Port = A00h
mov dx,Superio_GPIO_Port + 66h
mov al,00h
out dx,al
.model small
.486p
.stack 256
.data
SCH3114_IO EQU A00h
.code
org 100h
.STARTup
;========================================================
;47H
;enable WDT function bit [0]=0Ch
;========================================================
mov dx,SCH3114_IO + 47h
mov al,0Ch
out dx,al
;========================================================
;65H
;bit [1:0]=Reserved
;bit [6:2]Reserve=00000
;bit [7] WDT time-out Value Units Select
;Minutes=0 (default) Seconds=1
;========================================================
mov dx,SCH3114_IO + 65h;
mov al,080h
out dx,al
;========================================================
;66H
;WDT timer time-out value
;bit[7:0]=0~255
;========================================================
mov dx,SCH3114_IO + 66h
mov al,01h
out dx,al
;========================================================
;bit[0] status bit R/W
;WD timeout occurred =1;WD timer counting = 0
```

```
;========================================================
mov dx,SCH3114_IO + 68h
mov al,01h
out dx,al
.exit
END
```

B.2 GPIO Sample Code

```
The SCH3114 Runtime base I/O address is A00h
.model small
.486p
.stack 256
.data
SCH3114_IO EQU A00h
.code
org 100h
.STARTup
;========================================================
; Configuration GPIO as GPI or GPO by below register:
; GPIO0 = 23H, GPIO4 = 27H
; GPIO1 = 24H, GPIO5 = 29H
; GPIO2 = 25H, GPIO6 = 2AH
; GPIO3 = 26H, GPIO7 = 2BH
; Set 00H as output type, set 01H as input type
;========================================================
;========================================================
; Register 4BH configuration GPO value as high or low:
; 1 = HIGH
; 0 = LOW
;========================================================
mov dx,SCH3114_IO + 23h      ;GPIO 0
mov al,00h                          ;Set GPIO 0 as output type
out dx,al
mov dx,SCH3114_IO + 4Bh
mov al,01h                          ;Set GPIO 0 as high value.
out dx,al
.exit
END
```

Appendix C

System Assignments

C.1 System I/O Ports

Addr. Range (Hex)	Device
Table C.1: System I/O Ports	
20–2D	Interrupt Controller
2E – 2F	Motherboard resources
30 – 3D	Interrupt Controller
40 – 43	System timer
4E – 4F	Motherboard resources
50 – 53	System timer
61 – 67	Motherboard resources
70 - 7F	System CMOS/real time clock
80 - 92	Motherboard resources
A0 – B1	Interrupt Controller
B2 – B3	Motherboard resources
B4 – BD	Interrupt Controller
2F8 – 2FF	COM2
3F8 – 3FF	COM1
400 – 47F	Motherboard resources
4D0 – 4D1	Interrupt Controller
500-AFF	Motherboard resources
F000-F03F	Intel® HD Graphics
F040-F05F	SM Bus Controller

C.2 1st MB Memory Map

Addr. Range (Hex)	Device
Table C.2: 1st MB Memory Map	
80000000-90FFFFFF	Intel® HD Graphics
9141B000-9141BFFF	Intel® Trusted Execution Engine Interface
D0C00000-D0C7FFFF	Intel® Serial IO GPIO Host Controller
FED01000-FED1CFFF	Motherboard resources

C.3 Interrupt Assignments

Table C.3: Interrupt assignments	
Interrupt#	**Interrupt Source**
NMI	Parity error detected
IRQ0	System timer
IRQ1	Using SERIRQ, Keyboard Emulation
IRQ2	Slave controller INTR output
IRQ3	Communications Port (COM2)
IRQ4	Communications Port (COM1)
IRQ5	Available
IRQ6	Available
IRQ7	Available
IRQ8	Internal RTC or HPET
IRQ9	Microsoft ACPI-Compliant System
IRQ10	Available
IRQ11	Available
IRQ12	Available
IRQ13	Numeric data processor
IRQ14	Intel® Serial IO GPIO Host Controller
IRQ15	Available

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