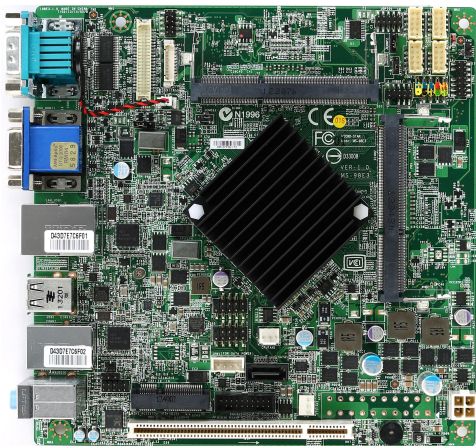


MS-98E3

v1.0 Industrial Computer Board



Copyright Notice

The material in this document is our intellectual property. We take every care in the preparation of this document, but no guarantee is given as to the correctness of its contents. Our products are under continual improvement and we reserve the right to make changes without notice.

Trademarks

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Revision History

Revision	Revision History	Date
v1.0	First Release	2014 / 1

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor.

Safety Instructions

- Always read the safety instructions carefully.
- Keep this User's Manual for future reference.
- Keep this equipment away from humidity.
- Lay this equipment on a reliable flat surface before setting it up.
- The openings on the enclosure are for air convection hence protects the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
- Always Unplug the Power Cord before inserting any add-on card or module.
- All cautions and warnings on the equipment should be noted.
- Never pour any liquid into the opening that could damage or cause electrical shock.
- If any 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 can not get it work according to User's Manual.
 - The equipment has dropped and damaged.
 - The equipment has obvious sign of breakage.
- DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60°C (140°F), IT MAY DAMAGE THE EQUIPMENT.

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

警告使用者:

這是甲類資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。



廢電池請回收

For better environmental protection, waste batteries should be collected separately for recycling special disposal.

CE Conformity

Hereby, we declare that this device is in compliance with the essential safety requirements and other relevant provisions set out in the European Directive.



FCC-A Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.



Notice 1

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2

Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

This device complies with 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.

WEEE (Waste Electrical and Electronic Equipment) Statement

ENGLISH

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life.



DEUTSCH

Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. Wir haben europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

FRANÇAIS

Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

РУССКИЙ

В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы.

ESPAÑOL

Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al término de su período de vida.

NEDERLANDS

De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Elektrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet

meer beschouwd worden als vervuiling. Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus.

SRPSKI

Po Direktivi Evropske unije ("EU") o odbačenju elektronske i električne opreme, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja.

POLSKI

Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne" nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia.

TÜRKÇE

Avrupa Birliği (AB) Karamamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Karamamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektronik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır.

ČESKY

Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti.

MAGYAR

Az Európai Unió („EU”) 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetők lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelesek válnak az ilyen termékek visszavételére azok hasznos élettartama végén.

ITALIANO

In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita.

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NOTE

Chapter 1

Overview

Thank you for choosing the MS-98E3, the excellent industrial computer boards.

Based on the innovative **Intel® Bay Trail** processor for optimal system efficiency, and supports 2 DDR3L 1066/1333 SO-DIMM slots to provide the maximum of 8GB memory capacity.

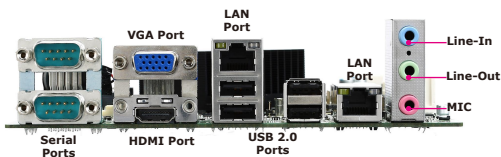
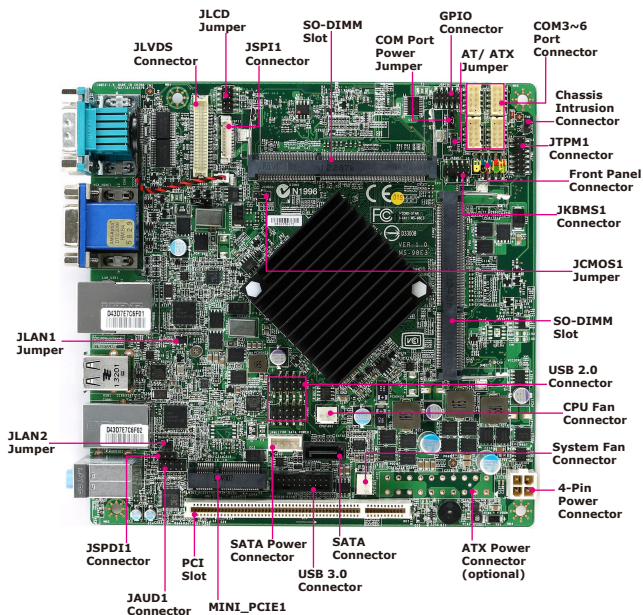
The MS-98E3 is durable under extreme environments and suitable to be applied in every industrial field, such as digital signage, kiosk, gaming, industrial control automation and POS.

MAINBOARD SPECIFICATIONS

Processor	<ul style="list-style-type: none">■ Intel® Dual or Quad-core Bay Trail
Memory	<ul style="list-style-type: none">■ 2 unbuffered non-ECC DDR3L 1066/ 1333 SO-DIMM slots■ Supports the maximum capacity of 8GB
LAN	<ul style="list-style-type: none">■ Intel® WGI210AT GbE controller
Audio	<ul style="list-style-type: none">■ Realtek® ALC887 Codec
Storage	<ul style="list-style-type: none">■ 1 SATA 3Gb/s port
Graphics	<ul style="list-style-type: none">■ Intel® 7th generation (Gen 7) graphics and media encode/decode engine
Back Panel I/O	<ul style="list-style-type: none">■ Back Panel I/O<ul style="list-style-type: none">- 2 Serial (COM) port- 1 D-sub (VGA) port- 1 HDMI port- 2 Gigabit LAN jacks- 4 USB 2.0 ports- 3 flexible audio ports

Onboard Connectors/ Pinheaders	<ul style="list-style-type: none">■ Onboard Connectors/Pinheaders<ul style="list-style-type: none">- 1 SATA 3Gb/s port- 2 USB 2.0 pinheader (for 4 ports)- 1 USB 3.0 pinheader (for 1 ports)- 1 PS2 pinheader- 1 GPIO connector- 4 Serial port connectors- 1 Front Panel pinheader- 1 CPU Fan pinheader- 1 System Fan pinheader- 1 LVDS connector- 1 SPI Debug Port connector- 1 LPC Debug Port connector- 1 Front Audio connector- 1 S/PDIF out pinheader- 1 AT/ATX mode select jumper- 1 Chassis Intrusion pinheader
Slot	<ul style="list-style-type: none">■ 1 PCI slot■ 1 Mini PCIe slot (MSATA type)
Form Factor	<ul style="list-style-type: none">■ Mini-ITX: 17 x 17 cm (6.7 × 6.7 inch)
Environmental	<ul style="list-style-type: none">■ Operating Temperature: 0°C to 60°C<ul style="list-style-type: none">- Humidity: 5% ~ 90% RH, Non-Condensing■ Storage Temperature: -20°C to 80°C<ul style="list-style-type: none">- Humidity: 10% ~ 90% RH, Non-Condensing

LAYOUT



Chapter 2

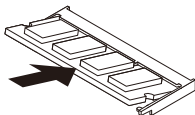
Hardware Setup

This chapter provides you with the information on mainboard hardware configurations. Incorrect setting of jumpers and connectors may damage your mainboard. Please pay special attention not to connect these headers in wrong direction. DO NOT adjust any jumper while the mainboard is powered on.

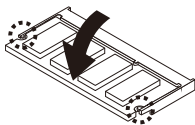
Memory

The SO-DIMM slot is intended for memory modules.

1. Locate the SO-DIMM slot. Align the notch on the DIMM with the key on the slot and insert the DIMM into the slot.



2. Push the DIMM gently downwards until the slot levers click and lock the DIMM in place.



3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.

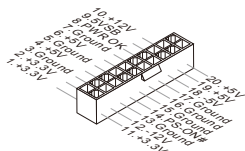
Important

You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.

Power Supply

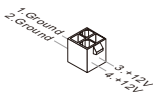
20-Pin Power Connector: ATX1 (optional by model)

This connector allows you to connect to an ATX power supply. To connect to the ATX power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.



4-Pin Power Connector: JPWR1

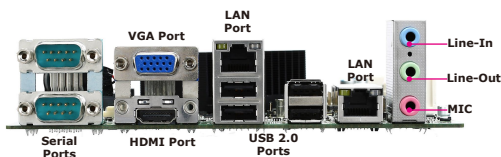
This 12V power connector is used to provide power to the CPU.



Important

Make sure that all the connectors are connected to proper ATX power supplies to ensure stable operation of the mainboard.

BACK PANEL I/O



▶ VGA Port

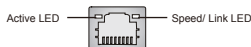
The DB15-pin female connector is provided for monitor.

▶ USB 2.0 Port

The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices.

▶ LAN Port

The standard RJ-45 LAN jack is for connection to the Local Area Network (LAN). You can connect a network cable to it.



		Left LED (Active LED)	Right LED (100M/1000M Speed/ Link LED)
LED Color		Yellow	Green/ Yellow or Orange or Amber
10M Cable Plug-in	No Transmission	Yellow (Light)	OFF
	Transmission	Yellow (Blinking)	OFF
100M Cable Plug-in	No Transmission	Yellow (Light)	Green (Lighting)
	Transmission	Yellow (Blinking)	Green (Lighting)
1000M Cable Plug-in	No Transmission	Yellow (Light)	Yellow/ Orange/ Amber (Lighting)
	Transmission	Yellow (Blinking)	Yellow/ Orange/ Amber (Lighting)

► **Serial Port Connector: COM1/ COM2**

The serial port is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connector. COM1 supports RS-232/422/485.

RS-232

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	VCC_COM1	Voltage select setting by JCOMP1

RS-422

PIN	SIGNAL	DESCRIPTION
1	422 TXD-	Transmit Data, Negative
2	422 RXD+	Receive Data, Positive
3	422 TXD+	Transmit Data, Positive
4	422 RXD-	Receive Data, Negative
5	GND	Signal Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

RS-485

PIN	SIGNAL	DESCRIPTION
1	485 TXD-	Transmit Data, Negative
2	NC	No Connection
3	485 TXD+	Transmit Data, Positive
4	NC	No Connection
5	GND	Signal Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

► Audio Ports

These audio connectors are used for audio devices. It is easy to differentiate between audio effects according to the color of audio jacks.

- Line-In (Blue) - Line In, is used for external CD player, tapeplayer or other audio devices.
- Line-Out (Green) - Line Out, is a connector for speakers or headphones.
- Mic (Pink) - Mic, is a connector for microphones.

CONNECTOR

Serial ATA Connector: SATA1

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device.

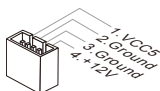


Important

Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during transmission.

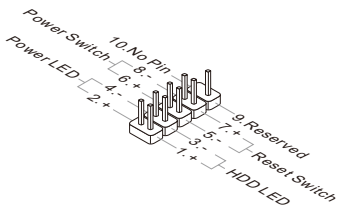
Serial ATA Power Connector: JPW1

This connector provides power to SATA hard drives.



Front Panel Connector: JFP1

These connectors are for electrical connection to the front panel switches and LEDs. The JFP1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.



Fan Power Connector: CPUFAN1 / SYSFAN1

The fan power connectors support system cooling fan with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.

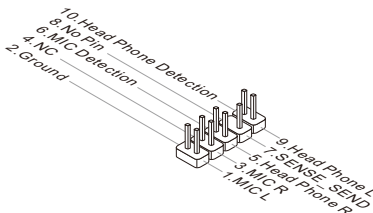


Important

- Please refer to the recommended CPU fans at processor's official website or consult the vendors for proper CPU cooling fan.
- Fan cooler set with 3- or 4-pin power connector are both available for CPUFAN1/ SYSFAN1.

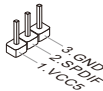
Front Panel Audio Connector: JAUD1

This connector allows you to connect the front audio panel located on your computer case. This connector is compliant with the Intel® Front Panel I/O Connectivity Design Guide.



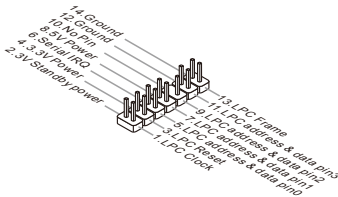
S/PDIF-Out Pinheader: JSPDI1

This connector is used to connect S/PDIF (Sony & Philips Digital Interconnect Format) interface for digital audio transmission.



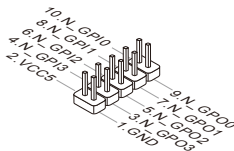
TPM Module Connector: JTPM1

This connector can be used as a debug port.



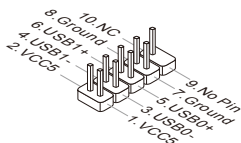
GPIO Connector: JGPIO1

This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.



Front USB Connector: JUSB1/ JUSB2

This connector, compliant with Intel I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as USB HDD, digital cameras, MP3 players, printers, modems and the like.

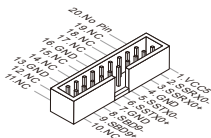


Important

Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

USB 3.0 Connector: J2

The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices. It supports up to 480Mbit/s (Hi-Speed) data transfer rate.



Important

Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

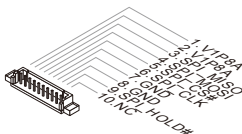
Chassis Intrusion Switch Connector: JCASEI1

This connector connects to the chassis intrusion switch cable. If the chassis is opened, the chassis intrusion mechanism will be activated. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.



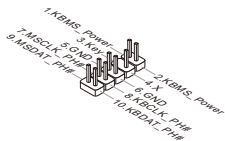
Debug Connector: JSPI1

This connector is provided for engineer debug only.



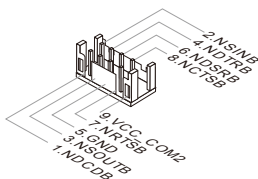
PS/2 Keyboard / Mouse Combo Connector: JKBMS1

This connector is used to connect PS/2 keyboard & mouse.



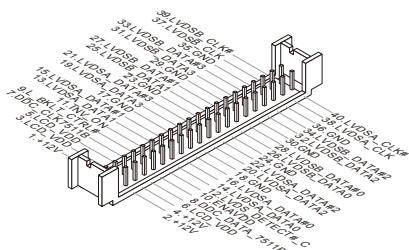
Serial Port Connector: COM3~6

These connectors are 16550A high speed communications port that sends/receives 16 bytes FIFOs.



LVDS Connector: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels. After connecting an LVDS interface flat panel to the JLVDS1, be sure to check the panel datasheet and set the JLCD jumper to proper power voltage.



JUMPER

Clear CMOS Jumper: JCMOS1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, set the jumper to clear data.

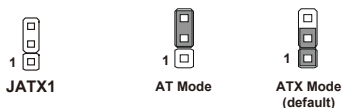


Important

You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

AT/ATX Select Jumper: JATX1

This jumper allows users to select between AT and ATX Mode.

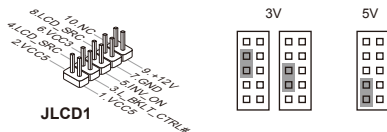


Important

Avoid adjusting the jumper when the system is on; it will damage the board

LVDS Power Jumper: JLCD1

The LVDS power jumper allows users to select the operation voltage of the LVDS flat panel.

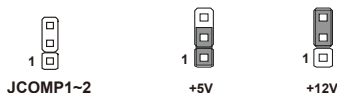


Important

Avoid adjusting the jumper when the system is on; it will damage the board.

COM Port Power Jumper: JCOMP1/ JCOMP2

These jumpers specify the operation voltage of the onboard serial ports.



LAN Port Switch Jumper: JLAN1/ JLAN2

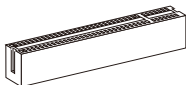
These jumpers are used to Flash EEPROM.



SLOT

PCI (Peripheral Component Interconnect) Slot

The PCI slot supports LAN card, SCSI card, USB card, and other add-on cards that comply with PCI specifications.



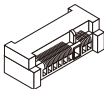
32-bit PCI Slot

Important

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

Mini-PCIe (MSATA) Slot

The slot is provided for wireless LAN card, TV tuner card, Robson NAND Flash card and mSATA devices.



Important

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

NOTE

Chapter 3

BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use.

You may need to run the Setup program when:

- An error message appears on the screen during the system booting up, and requests you to run SETUP.
- You want to change the default settings for customized features.

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press or <F2> key to enter Setup.

PRESS DEL OR F2 TO ENTER SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Important

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

CONTROL KEYS

← →	Select Screen
↑ ↓	Select Item
Enter	Select
+ -	Change Option
F1	General Help
F7	Previous Values
F9	Optimized Defaults
F10	Save & Exit
Esc	Exit


GETTING HELP

After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑ ↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

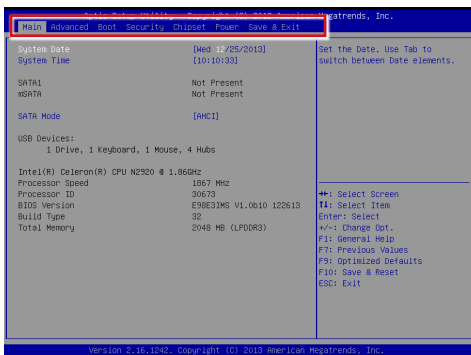
Sub-Menu

If you find a right pointer symbol  appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (↑ ↓) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc>.

GENERAL HELP <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

The Menu Bar



► Main

Use this menu for basic system configurations, such as time, date, etc.

► Advanced

Use this menu to set up the items of special enhanced features.

► Boot

Use this menu to specify the priority of boot devices.

► Security

Use this menu to set supervisor and user passwords.

► Chipset

This menu controls the advanced features of the onboard chipsets.

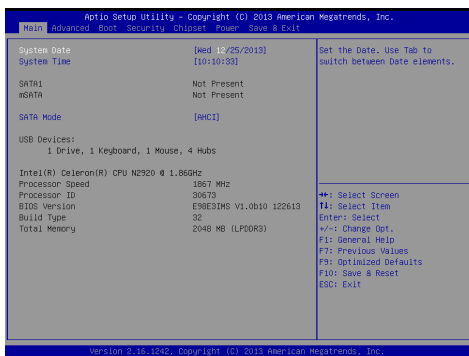
► Power

Use this menu to specify your settings for power management.

► Save & Exit

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

Main



► System Date

This setting allows you to set the system date. The date format is <Day>, <Month> <Date> <Year>.

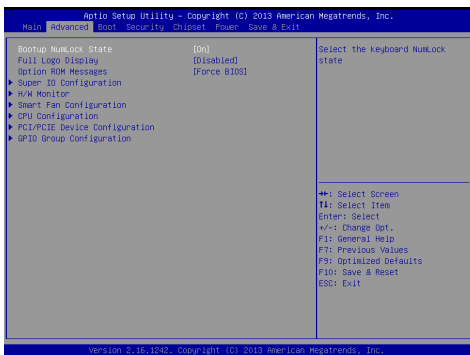
► System Time

This setting allows you to set the system time. The time format is <Hour> <Minute> <Second>.

► SATA Mode Selection

This setting specifies the SATA controller mode.

Advanced



► Bootup NumLock State

This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad.

► Full Screen Logo Display

This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer's full-screen logo. When it is enabled, the BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

When it is disabled, the BIOS will display the normal POST messages, instead of the full-screen logo.

Please note that enabling this BIOS feature often adds 2-3 seconds of delay to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, it is recommended that you disable this BIOS feature for a faster boot-up time.

► Option ROM Messages

This item is used to determine the display mode when an optional ROM is initialized during POST. When set to [Force BIOS], the display mode used by AMI BIOS is used. Select [Keep Current] if you want to use the display mode of optional ROM.

► Super IO Configuration

Super IO Configuration	
Serial Port 1	[Enabled]
Device Settings	IO=3F8h; IRQ=4;
Change Settings	[Auto]
Mode Select	[RS232]
Serial Port 2	[Enabled]
Device Settings	IO=2F8h; IRQ=3;
Change Settings	[Auto]
Serial Port 3	[Enabled]
Device Settings	IO=3E8h; IRQ=7;
Change Settings	[Auto]
Serial Port 4	[Enabled]
Device Settings	IO=2E8h; IRQ=7;
Change Settings	[Auto]
Serial Port 5	[Enabled]
Device Settings	IO=2F0h; IRQ=7;
Change Settings	[Auto]
Serial Port 6	[Enabled]
Device Settings	IO=2E0h; IRQ=7;
Change Settings	[Auto]
Watch Dog Timer	[Disabled]
FIFO Mode	[128-byte]

► Serial Port 1/ 2/ 3/ 4/ 5/ 6

This setting enables/disables the specified serial port.

► Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

► Mode Select

Select an operation mode for the serial port COM1.

► Watch Dog Timer

You can enable the system watch-dog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

► FIFO Mode

This setting controls the FIFO data transfer mode.

► H/W Monitor

These items display the current status of all monitored hardware devices/components such as voltages, temperatures and all fans' speeds.

Pc Health Status	
CPU temperature	: +33 C
System temperature	: +28 C
CPUFAN1	: N/A
SVSFAN1	: N/A
VCCP	: +0.824 V
VCC3	: +3.363 V
VCC5	: +5.171 V
+12V	: +12.320 V
VCC3V	: +3.296 V
VSB3V	: +3.360 V
VSB5V	: +5.064 V
VBAT	: +3.280 V

► Smart Fan Configuration

Configuration Smart FAN	
Smart FAN1 Function	[40 C]
Min. Speed (%)	[50.0%]
Smart FAN2 Function	[40 C]
Min. Speed (%)	[50.0%]

► Smart FAN1/ Smart FAN2 Function

These settings enable/disable the Smart Fan function. Smart Fan is an excellent feature which will adjust the CPU/system fan speed automatically depending on the current CPU/system temperature, avoiding the overheating to damage your system.

► Min. Speed (%)

These items allow users to select how percentage of speed for the CPUFAN1/ SYSFAN1.

► CPU Configuration

CPU Configuration	
Intel(R) Celeron(R) CPU N2920 @ 1.86GHz	
Processor ID	30673
Microcode Patch	31e
Max CPU Speed	1860 MHz
Processor Cores	4
Intel HT Technology	Not Supported
Intel VT-x Technology	Supported
64-bit	Supported
L2 Cache	1024 KB x 2
L3 Cache	Not Present
Active Processor Cores	[All]
Execute Disable Bit	[Enabled]
Intel Virtualization Technology	[Enabled]
EIST	[Enabled]

► Active Processor Cores

This setting specifies the number of active processor cores.

► Execute Disable Bit

Intel's Execute Disable Bit functionality can prevent certain classes of malicious "buffer overflow" attacks when combined with a supporting operating system. This functionality allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage or worm propagation.

► Intel Virtualization Technology

Virtualization enhanced by Intel Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple "Virtual" systems.

► EIST

EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.

When disabled, the processor will return the actual maximum CPUID input value of the processor when queried.

► PCI/PCIE Device Configuration

PCI Latency Timer	[32 PCI Bus Cycles]
XHCI Mode	[Disabled]
USB 2.0(EHCI) Support	[Enabled]
Legacy USB Support	[Enabled]
Audio Controller	[Enabled]
Launch OnBoard Lan OpRom	[Disabled]
Launch OnBoard Lan OpRom	[Disabled]

► PCI Latency Timer

This item controls how long each PCI device can hold the bus before another takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values.

► XHCI Mode

This setting disables/enables the USB XHCI controller. The eXtensible Host Controller Interface (XHCI) is a computer interface specification that defines a register-level description of a Host Controller for Universal Serial bus (USB), which is capable of interfacing to USB 1.0, 2.0, and 3.0 compatible devices. The specification is also referred to as the USB 3.0 Host Controller specification.

► USB 2.0(EHCI) Support

These settings disable/ enable the USB EHCI controller. The Enhanced Host Controller Interface (EHCI) specification describes the register-level interface for a Host Controller for the USB 2.0.

► Legacy USB Support

Set to [Enabled] if you need to use any USB 1.1/2.0 device in the operating system that does not support or have any USB 1.1/2.0 driver installed, such as DOS and SCO Unix.

► Audio Controller

This setting enables/disables the onboard audio controller.

► Launch OnBoard LAN OpRom

These settings enable/disable the initialization of the onboard LAN Boot ROM during bootup. Selecting [Disabled] will speed up the boot process.

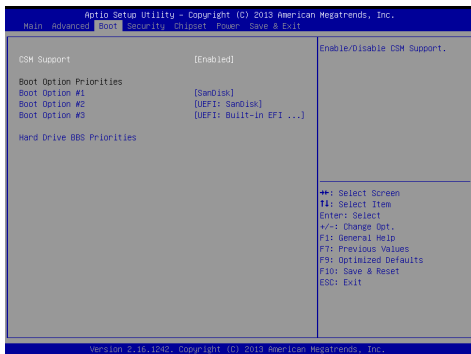
► GPIO Group Configuration

GPIO Group Configuration	
GPIO0	[Low]
GPIO1	[Low]
GPIO2	[Low]
GPIO3	[Low]

► GPO 0~3

These settings control the operation mode of the specified GPIO.

Boot



► CSM Support

This setting allows users to set the device to enable/ disable the legacy BIOS ROM boot.

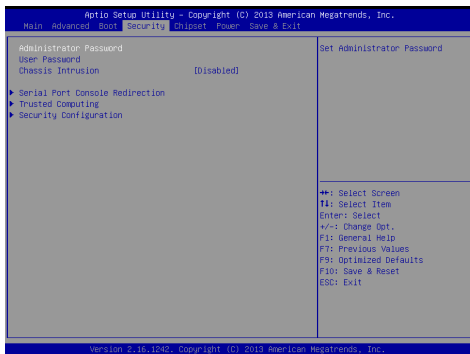
► Boot Option Priorities

This setting allows users to set the sequence of boot devices where BIOS attempts to load the disk operating system.

► Hard Drive BBS Priorities

This setting allows users to set the priority of the specified devices. First press <Enter> to enter the sub-menu. Then you may use the arrow keys (↑ ↓) to select the desired device, then press <+>, <-> or <PageUp>, <Page-Down> key to move it up/down in the priority list.

Security



► Administrator Password

Administrator Password controls access to the BIOS Setup utility.

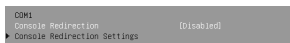
► User Password

User Password controls access to the system at boot and to the BIOS Setup utility.

► Chassis Intrusion

The field enables or disables the feature of recording the chassis intrusion status and issuing a warning message if the chassis is once opened.

► Serial Port Console Redirection



► Console Redirection

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/disables the operation of console redirection. When set to [Enabled], BIOS redirects and sends all contents that should be displayed on the screen to the serial COM port for display on the terminal screen. Besides, all data received from the serial port is interpreted as keystrokes from a local keyboard.

► Console Redirection Settings

COM1 Console Redirection Settings	
Terminal Type	[rANSI]
Bits per second	[115200]
Data Bits	[8]
Parity	[None]
Stop Bits	[1]
Flow Control	[None]
VT-UTF8 Combo Key Support	[Enabled]
Recorder Mode	[Disabled]
Resolution 100x31	[Disabled]
Legacy OS Redirection Resolution	[80x24]
Putty Keypad	[VT100]
Redirection After BIOS POST	[Always Enable]

► Terminal Type

To operate the system's console redirection, you need a terminal supporting ANSI terminal protocol and a RS-232 null modem cable connected between the host system and terminal(s). This setting specifies the type of terminal device for console redirection.

► Bits per second, Data Bits, Parity, Stop Bits

This setting specifies the transfer rate (bits per second, data bits, parity, stop bits) of Console Redirection.

► Flow Control

Flow control is the process of managing the rate of data transmission between two nodes. It's the process of adjusting the flow of data from one device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it.

► VT-UTF8 Combo Key Support

This setting enables/disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

► Recorder Mode, Resolution 100x31

These settings enable/disable the recorder mode and the resolution 100x31.

► Legacy OS Redirection Resolution

This setting specifies the redirection resolution of legacy OS.

► Putty Keypad

PuTTY is a terminal emulator for Windows. This setting controls the numeric keypad for use in PuTTY.

► Redirection After BIOS POST

This item specifies whether or not the console redirection is run after the Power-On Self Test (POST).

[Always] Redirection is always active. (Some operating systems may not work if this item is set to Always.)

[Boot Loader] Redirection is only active during POST.

[Disabled] Redirection is deactivated.

► Trusted Computing



► Security Device Support

This setting enables/disables BIOS support for security device. When set to [Disable], the OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

► Security Configuration



Intel TXE Configuration

► TXE FW Version

This item displays the TXE firmware version. Read-only.

► TXE

This setting enables/disables the TXE function.

► TXE HMRFPPO

This setting enables/disables the TXE HMRFPPO (Host ME Region Flash Protection Override) function.

► TXE Firmware Update

This setting enables/disables the TXE Firmware Update function.

► TXE EOP Message

This setting enables/disables to send EOP Message Before Enter OS.

Intel Anti-Theft Technology**► Intel AT**

This setting enables/disables Intel Anti-Theft Technology.

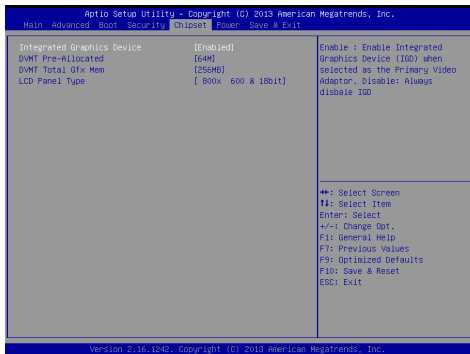
► Intel AT Platform PBA

This setting enables/disables the Pre-Boot Authentication of Intel Anti-Theft Technology.

► Intel AT Platform Suspend Mode

This setting enables/disables the platform suspend mode of Intel Anti-Theft Technology.

Chipset



► Integrated Graphics Device

This setting enables/disables the Integrated Graphics chipset.

► DVMT Pre-Allocated

This setting defines the DVMT pre-allocated memory. Pre-allocated memory is the small amount of system memory made available at boot time by the system BIOS for video. Pre-allocated memory is also known as locked memory. This is because it is "locked" for video use only and as such, is invisible and unable to be used by the operating system.

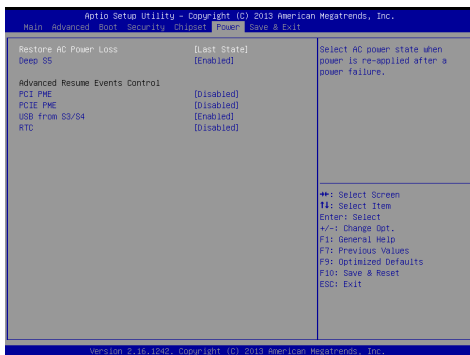
► DVMT Total Gfx Mem

This setting specifies the memory size for DVMT.

► LCD Panel Type

Use the field to select the type of LCD device you use.

Power



► Restore AC Power Loss

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Power Off]	Leaves the computer in the power off state.
[Power On]	Leaves the computer in the power on state.
[Last State]	Restores the system to the previous status before power failure or interrupt occurred.

► Deep S5

The setting enables/disables the Deep S5 power saving mode. Deep S5 is almost the same as G3 Mechanical Off, except that the PSU still supplies power, at a minimum, to the power button to allow return to S0. A full reboot is required. No previous content is retained. Other components may remain powered so the computer can “wake” on input from the keyboard, clock, modem, LAN, or USB device.

Advanced Resume Events Control

► PCIE/PCI PME

This field specifies whether the system will be awakened from power saving modes when activity or input signal of onboard PCIE/ PCI PME is detected.

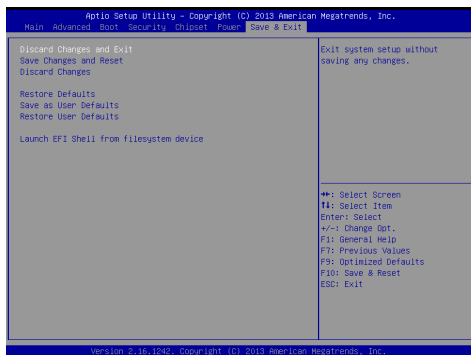
► USB from S3/S4

The item allows the activity of the USB device to wake up the system from S3/S4 sleep state.

► RTC

When [Enabled], you can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

Save & Exit



► Discard Changes and Exit

Abandon all changes and exit the Setup Utility.

► Save Changes and Reset

Save changes to CMOS and reset the system.

► Discard Changes

Abandon all changes.

► Restore Defaults

Use this menu to load the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard.

► Save as User Defaults

Save changes as the user's default profile.

► Restore User Defaults

Restore the user's default profile.

► Launch EFI Shell from filesystem device

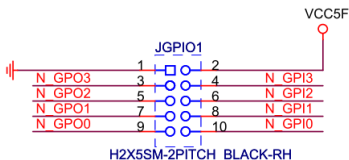
Press Enter to execute the EFI Shell immediately.

Chapter 4

System Resources

This chapter provides information on system resources.

GPIO sample code



● GPI 0 ~ GPI 3

	GPI 0	GPI 1	GPI 2	GPI 3				
IO Address								
SIO GPIO Register	82h	82h	82h	82h				
Bit	0	1	2	3				
Sample code	#1							

● GPO 0 ~ GPO 3

	GPO 0	GPO 1	GPO 2	GPO 3				
IO Address								
SIO GPIO Register	81h	81h	81h	81h				
Bit	4	5	6	7				
Sample code	#2							

```

SIO_INDEX_Port      equ    04Eh
SIO_DATA_Port       equ    04Fh
SIO_UnLock_Value    equ    087h
SIO_Lock_Value      equ    0AAh
SIO_LDN_GPIO        equ    06h
GPI_REG             equ    082h
GPO_REG             equ    081h
GPI_ADD             equ    000h
GPO_ADD             equ    000h
GPO_0               equ    00010000b

```

Sample Code:

#1 : Get GPI 0 status

; Enable config mode

```

mov    dx, SIO_INDEX_Port
mov    al, SIO_UnLock_Value
out    dx, al
jmp    short $+2          ;io_delay

```

```

    jmp     short $+2           ;Io_delay
    out     dx, al
; Switch GPIO Configuration for SIO LDN 0x06
    mov     dx, SIO_INDEX_Port
    mov     al, 07h
    out     dx, al
    mov     dx, SIO_DATA_Port
    mov     al, SIO_LDN_GPIO
    out     dx, al
; Get GPI 0 Pin Status Register
    mov     dx, SIO_INDEX_Port
    mov     al, GPI_REG
    out     dx, al
    mov     dx, SIO_DATA_Port
    in      al, dx
    ;al bit0 = GPI 0 status
; Exit SIO
    mov     dx, SIO_INDEX_Port
    mov     al, SIO_Lock_Value
    out     dx, al

#2 : Set GPO 0 status to high
; Enable config mode
    mov     dx, SIO_INDEX_Port
    mov     al, SIO_UnLock_Value
    out     dx, al
    jmp     short $+2           ;Io_delay
    jmp     short $+2           ;Io_delay
    out     dx, al
; Switch GPIO Configuration for SIO LDN 0x06
    mov     dx, SIO_INDEX_Port
    mov     al, 07h
    out     dx, al
    mov     dx, SIO_DATA_Port
    mov     al, SIO_LDN_GPIO
    out     dx, al
; Set GPO 0 Pin to High
    mov     dx, SIO_INDEX_Port
    mov     al, GPO_REG
    out     dx, al
    mov     dx, SIO_DATA_Port
    in      al, dx
    or      al, GPO_0
    out     dx, al
    ;al bit4 = GPO 0 status
; Exit SIO
    mov     dx, SIO_INDEX_Port
    mov     al, SIO_Lock_Value
    out     dx, al

```

Watch Dog Timer Sample Code

```

SIO_INDEX_Port    equ 04Eh
SIO_DATA_Port     equ 04Fh
SIO_UnLock_Value  equ 087h
SIO_Lock_Value    equ 0AAh
WatchDog_LDN      equ 007h
WDT_UNIT          equ 60h      ;60h=second, 68h=minute, 40h=Disabled watchdog timer
WDT_Timer         equ 30      ;ex. 30 seconds

```

Sample code:

```

;Enable config mode
mov dx, SIO_INDEX_Port
mov al, SIO_UnLock_Value
out dx, al
jmp short $+2      ;Io_delay
jmp short $+2      ;Io_delay
out dx, al

```

```

;Change to WDT
mov dx, SIO_INDEX_Port
mov al, 07h
out dx, al
mov dx, SIO_DATA_Port
mov al, WatchDog_LDN
out dx, al

```

```

;Active WDT
mov dx, SIO_INDEX_Port
mov al, 30h
out dx, al
mov dx, SIO_DATA_Port
in al, dx
or al, 01h
out dx, al

```

```

;set timer
mov dx, SIO_INDEX_Port
mov al, 0F6h
out dx, al
mov dx, SIO_DATA_Port
mov al, WDT_Timer
out dx, al

```

```

;set UINIT
mov dx, SIO_INDEX_Port
mov al, 0F5h
out dx, al
mov dx, SIO_DATA_Port
mov al, WDT_UNIT
out dx, al

```

```

;enable reset
mov dx, SIO_INDEX_Port
mov al, 0FAh
out dx, al
mov dx, SIO_DATA_Port
in al, dx
or al, 01h
out dx, al

```

```

;close config mode
mov dx, SIO_INDEX_Port
mov al, SIO_Lock_Value
out dx, al

```