MS-98F1

(v1.x) Industrial Computer Board

Copyright and Trademarks Notice

Revision History

Revision	Date
V1.1	2023/05

Technical Support

If a problem arises with your product and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please visit https://www.msi.com/support/ for further guidance.

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.

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。

Chemical Substances Information

In compliance with chemical substances regulations, such as the EU REACH Regulation (Regulation EC No. 1907/2006 of the European Parliament and the Council), MSI provides the information of chemical substances in products at:

http://www.msi.com/html/popup/csr/evmtprtt_pcm.html

Battery Information

	European Union:
	Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat them in compliance with the local regulations.
廢電池請回收	BSMI: For better environmental protection, waste batteries should be collected separately for recycling or special disposal.
	California, USA: The button cell battery may contain perchlorate material and requires special handling when recycled or disposed of in California. For further information please visit: http://www.dtsc.ca.gov/hazardouswaste/perchlorate/

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

CE Conformity

Hereby, Micro-Star International CO., LTD declares 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 Statement

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. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

Japan JIS C 0950 Material Declaration

A Japanese regulatory requirement, defined by specification JIS C 0950, mandates that manufacturers provide material declarations for certain categories of electronic products offered for sale after July 1, 2006. https://csr.msi.com/global/Japan-JIS-C-0950-Material-Declarations

日本JIS C 0950材質宣言

日本工業規格JIS C 0950により、2006年7月1日以降に販売される特定分野の電気および電子機器について、製造者による含有物質の表示が義務付けられます。

https://csr.msi.com/global/Japan-JIS-C-0950-Material-Declarations

India RoHS

This product complies with the "India E-waste (Management and Handling) Rule 2016" and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers in concentrations exceeding 0.1 weight % and 0.01 weight % for cadmium, except for the exemptions set in Schedule 2 of the Rule.

Turkey EEE Regulation

Conforms to the EEE Regulations of the Republic Of Turkey

Türkiye EEE yönetmeliği

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine Restriction of Hazardous Substances

The equipment complies with requirements of the Technical Regulation, approved by the Resolution of Cabinet of Ministry of Ukraine as of 10 March 2017, № 139, in terms of restrictions for the use of certain dangerous substances in electrical and electronic equipment.

Україна обмеження на наявність небезпечних речовин

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнані, затвердженого постановою Кабінету Міністрів України від 10 березня 2017 р. № 139.

Vietnam RoHS

As from December 1, 2012, all products manufactured by MSI comply with Circular 30/2011/TT-BCT temporarily regulating the permitted limits for a number of hazardous substances in electronic and electric products.

Việt Nam RoHS

Kể từ ngày 01/12/2012, tất cả các sản phẩm do công ty MSI sản xuất tuân thủ Thông tư số 30/2011/TT-BCT quy định tạm thời về giới hạn hàm lượng cho phép của một số hóa chất độc hại có trong các sản phẩm điện, điện tử"

CONTENTS

1 Overview

Thank you for choosing the MS-98F1, an excellent industrial computer board.

Based on the innovative Intel® Celeron quad-core N3700/N3710, N3150/N3160, N3050/N3060, N3000/N3010 SoC for optimal system efficiency, the MS-98F1 supports up to 2 DDR3L 1066/1333/1600 MHz SO-DIMM slots to provide the maximum of 8 GB memory capacity.

In the advanced-level and mid-range market segment, MS-98F1 provides a high-performance solution for today's front-end and general purpose workstation, as well as in the future.

Motherboard Specifications

Processor

- Intel Celeron quad-core stepping C / stepping D CPU
- N3700/N3710
- N3150/N3160
- N3050/N3060
- N3000/N3010

Memory

- 2 x DDR3L 1333/1600 MHz SO-DIMM slots
- Up to 8 GB

LAN

- 2 x Intel i210(Colay i211AT) Gigabit Fast Ethernet controllers (Optional)

SATA

- 1 x SATA 6Gb/s port

Audio

- Realtek ALC887VD audio codec
- 1 x rear audio connector
- 1 x amplifier connector

Graphics

- Graphics integrated in Intel processor

Rear Panel I/O

- 2 x COM ports (COM2&3)(RS232) (Optional)
- 1 x COM port (COM1)(RS232/422/485)
- 1 x DisplayPort
- 4 x USB 3.0 ports
- 2 x RJ45 GbE LAN ports (Optional)
- 1 x Audio connector

Onboard Headers/ Connectors/ Jumpers

- 1 x SATA 6Gb/s port
- 1 x 4-pin SATA power connector
- 2 x 10-pin USB 2.0 headers (4 ports)
- 1 x system fan connector
- 2 x RS232 serial port connectors (COM4 / COM6)
- 1 x RS232/422/485 serial port connector (COM5)
- 1 x 20-pin ATX power connector
- 1 x 4-pin DC power connector
- 1 x mini-PCIE connector (Colay mSATA)
- 1 x mini-PCIE/3G connector
- 1 x parallel port header
- 1 x TPM header
- 1 x eDP connector
- 1 x eDP header
- 2 x LVDS connectors
- 2 x LVDS header
- 1 x GPIO header
- 1 x front panel header
- 1 x S/PDIF-Out header
- 5 x serial port power jumpers
- 1 x clear CMOS jumper
- 1 x chassis intrusion header
- 1 x AT/ATX select jumper
- 1 x PS/2 keyboard/mouose header

Slot

- 1 x mini-PCI-E / 3G
- 1 x mini-PCI-E (Colay mini-SATA)

Form Factor

- Mini-ITX: 170 mm x 170 mm

Environmental

- Operating Temperature: 0 ~ 60°C
- Storage Temperature: -20 ~ 80°C
- Humidity: 5 ~ 95% RH, non-condensing

Motherboard Layout

eDP Power Jumper

LVDS Power Jumper

COM Port Jumper

LVDS Connectors

eDP Connector

ATX Power Connector

Back Panel

COM Port Jumper

COM Port Jumper

Clear CMOS Jumper

SPI Header

PCIe Slot

Amplifier Connector

SO-DIMM Slots

SIM Holder

TPM Header

PCIe Slot

Parallel Port Header

AT/ATX Jumper

Chassis Intrusion Header

Keyboard/Mouose Connector

S/PDIF-Out Header

SATA Port

GPIO Header

COM Port Connectors

COM Port Jumper

SATA Power Connector

USB Headers

Front Panel Header

System Fan Connector

Serial Port (COM2)

Serial Port (COM3)

RJ45 GbE LAN Port

Line-In Line-Out MIC

Serial Port (COM1)

DisplayPort

USB 3.0 Port

RJ45 GbE LAN Port

(Full SKU)

eDP Power Jumper
LVDS Power Jumper
COM Port Jumper
LVDS Connectors
eDP Connector
DC Power Connector
Back Panel
SO-DIMM Slots
SIM Holder
Clear CMOS Jumper
TPM Header
SPI Header
PCIe Slot
PCIe Slot
Parallel Port Header
AT/ATX Jumper
Amplifier Connector
Chassis Intrusion Header
Keyboard/Mouose Connector
S/PDIF-Out Header
SATA Port
GPIO Header
COM Port Connectors
COM Port Jumper
SATA Power Connector
USB Headers
Front Panel Header
System Fan Connector

Line-Out
MIC
Serial Port (COM1)
DisplayPort
USB 3.0 Port
RJ45 GbE LAN Port

(Low Profile)

2   Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

Components Reference Guide

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.
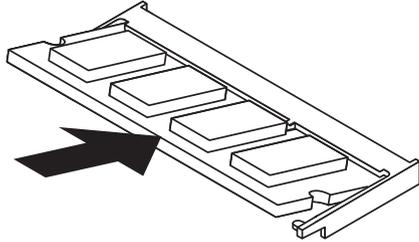
2. Push the DIMM gently downwards until the slot levers click and lock the DIMM in place.
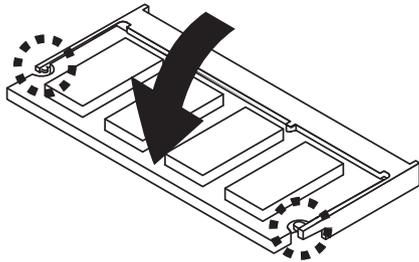
3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.

Important

- *You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.*
- *Users must populate the memory on socket DIMM1 first.*

Power Supply

ATX Power Connector: ATX1

This connector is used to provide power to the motherboard.
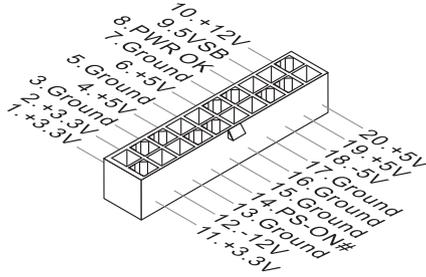
DC Power Connector: PWR1

This DC-In connector provides power input.
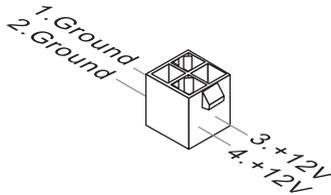
SATA Power Connector: JPW1

This connector is used to provide power to SATA devices.

Important

Make sure that all power connectors are connected to the power supply to ensure stable operation of the motherboard.

Rear Panel I/O
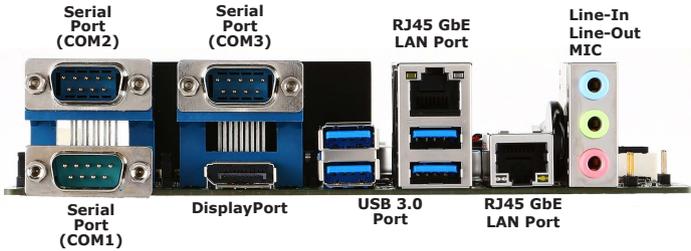
(Full SKU)

(Low Profile)

➤ RS232/422/485 Serial Port

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.

RS232

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 jumper

RS422

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

RS485

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

➤ DisplayPort

DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

➤ USB 3.0 Port

The USB 3.0 port is backward-compatible with USB 2.0 devices and supports data transfer rate up to 5 Gbit/s (SuperSpeed).

➤ **RJ45 GbE LAN Port**

The standard single RJ45 LAN jack is provided for connection to the Local Area Network (LAN). You can connect a network cable to it.

	LED	LED Status	Description
Active LED—[ ]—Speed LED	Active LED	Off	No link
		Yellow	Linked
		Blinking	Data activity
Speed LED—[ ]—Active LED	Speed LED	Off	10 Mbps connection
		Green	100 Mbps connection
		Orange	1 Gbps connection

➤ **Audio Ports (Optional)**

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

Line-In (Blue) - Line In, is used for external CD player, tape-player 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

Fan Power Connector: SYSFAN1

The fan power connector supports 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 motherboard has a System Hardware Monitor chipset onboard, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.

1.GND
2.FAN_POWER
3.FAN_SENSE
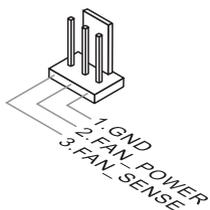
Serial ATA Connector: SATA1

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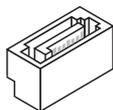
Important

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

GPIO Connector: JGPIO1

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

10.N_GPIO
8.N_GPI1
6.N_GPI2
4.N_GPI3
2.VCC5

9.N_GPO0
7.N_GPO1
5.N_GPO2
3.N_GPO3
1.GND
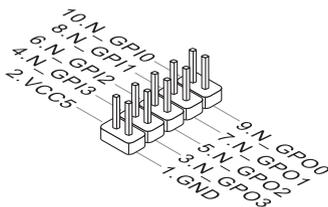
Front Panel Header: JFP1

This front panel connector is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.

Power Switch
Power LED
10. No Pin
8. -
6. +
4. -
2. +
9. Reserved
7. +
5. -
3. -
1. +
Reset Switch
HDD LED
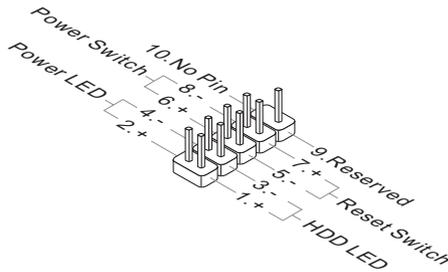
S/PDIF-Out Header: JSPD1

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

3. GND
2. SPDIF
1. VCC
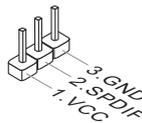
Audio Amplifier Header: JSPK1

The connector is used to connect audio amplifiers to enhance audio performance.

1. AMP_L-
2. AMP_L+
3. AMP_R-
4. AMP_R+
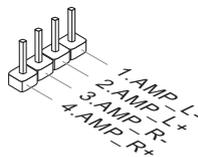
Chassis Intrusion Header: JCASE1

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

2. Ground
1. CINTRU
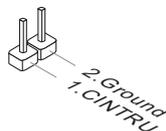
Serial Port Connector: COM5 (RS-232/-422/-485)
Serial Port Connector: COM4/6 (RS-232)

This connector is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. You can attach a serial device to it through an optional serial port bracket.

RS-232
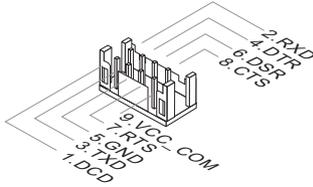
RS-232

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_COM	Power Source

RS-422
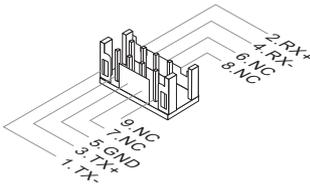
RS-422

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
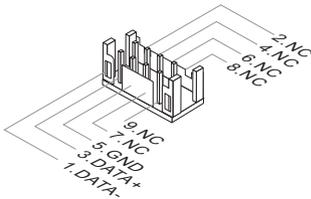
RS-485

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

USB 2.0 Header: 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.
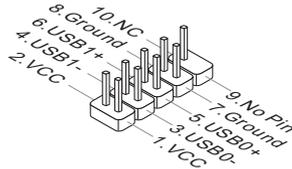
Important

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

LVDS Connector: JLVDS1, JLVDS2

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 JLVDS1/2, be sure to check the panel datasheet and set the LVDS jumper to proper power voltage.
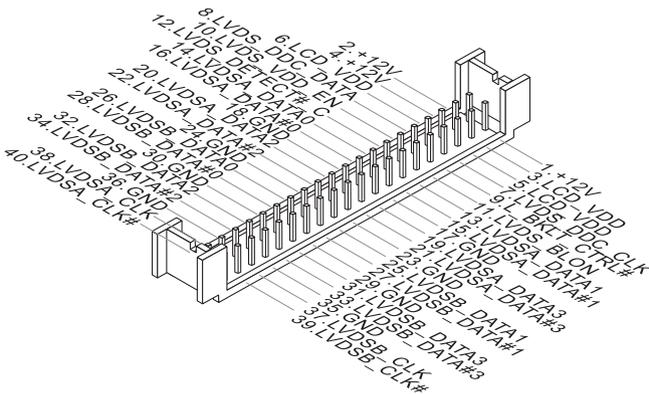
Keyboard/Mouse Connector: JKB/MS1

This connector is provided to connect a keyboard and a mouse.

6. MSC
5. 5VSB
4. KBC
3. MSD
2. GND
1. KBD
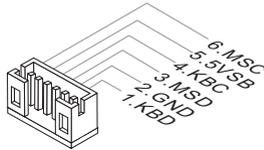
TPM Module Connector: JTPM1

This connector connects to a TPM (Trusted Platform Module) module (optional).
Please refer to the TPM security platform manual for more details.

14. Ground
12. Ground
10. No Pin
8. 5V Power
6. Serial IRQ
4. 3.3V Power
2. 3V Standby power

13. LPC Frame
11. LPC address & data pin3
9. LPC address & data pin2
7. LPC address & data pin1
5. LPC address & data pin0
3. LPC Reset
1. LPC Clock
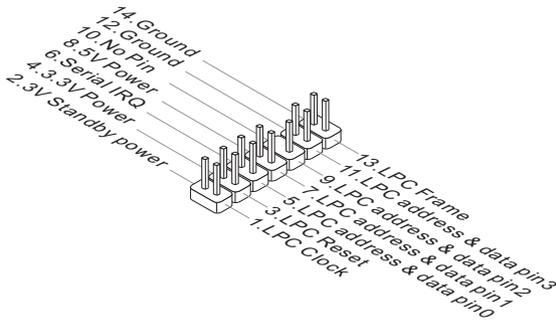
Parallel Port Header: JLPT1

The mainboard provides a 26-pin header for connection to an optional parallel port bracket. The parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.

26. No Pin
24. Ground
22. Ground
20. Ground
18. Ground
16. Ground
14. Ground
12. Ground
10. Ground
8. LPT_SLIN#
6. PINIT#
4. ERR#
2. AFD#

25. SLCT
23. PE
21. BUSY
19. ACK#
17. PRND7
15. PRND6
13. PRND5
11. PRND4
9. PRND3
7. PRND2
5. PRND1
3. PRND0
1. RSTB#
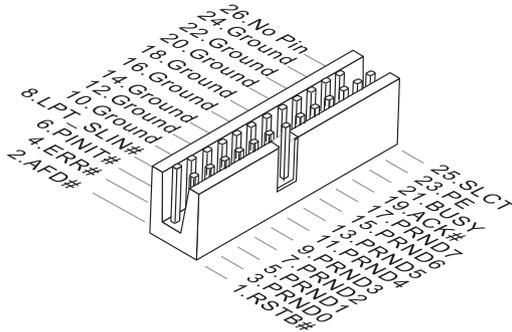
LVDS Power Jumper: JVDD1~JVDD2

The jumper specifies the operation voltage of the LVDS port.

10. NC
8. LCD_SRC
6. VCC3
4. LCD1_SRC
2. +5V

9. GND
7. GND
5. LBKLT_EN_5V
3. BKLT_CTRL_COMM
1. +5V
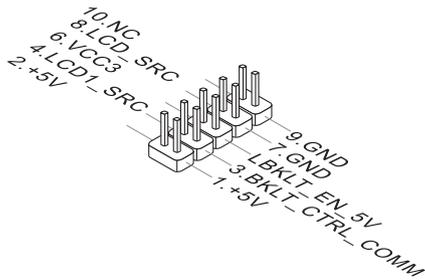
Jumper

Important

Avoid adjusting jumpers when the system is on; it will damage the motherboard.

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.

Normal   Clear CMOS

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 motherboard.

AT/ATX Select Jumper: JATX1

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

ATX   AT

Serial Port Power Jumper: JCOMP1~5

The jumper specifies the operation voltage of the serial port.

JCOM1~2

+5V   +12V

JCOM3

+5V   +12V

JCOM4~5

+5V   +12V
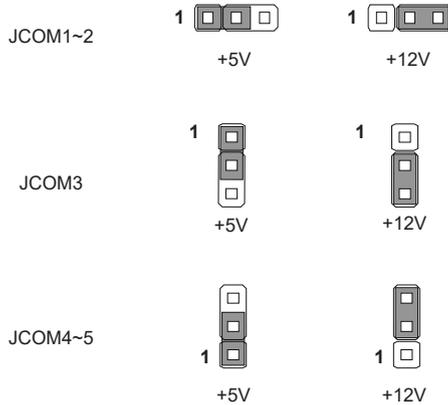
eDP Power Jumper: JEDP_VDD1

The jumper specifies the operation voltage of the eDP port.

+3V   +5V

Slot

Mini-PCIe (Peripheral Component Interconnect Express) Slot

The Mini-PCIe slot is provided for mSATA devices, WiFi modules, Bluetooth modules, TV tuner cards and other Mini-PCIe cards.
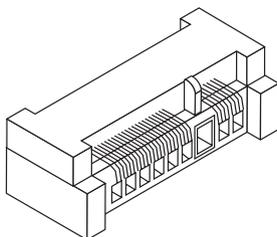
Important

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.

eDP Connector: EDP1

The embedded Display Port abbreviated as eDP specification is a VESA standard. eDP connector consolidates internal and external connection methods to reduce device complexity, supports cross industry applications, and provides performance scalability. The eDP interface supports link-speeds of 1.62 Gbps and 2.7 Gbps on 1, 2 or 4 data lanes.
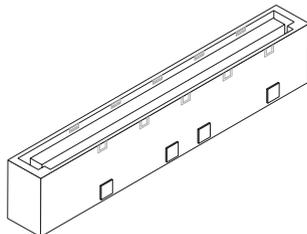
PIN	DESCRIPTION	PIN	DESCRIPTION
1	LCD power (Voltage select by JEDP_VDD1)	23	Complement Signal Link Lane0
2	LCD power (Voltage select by JEDP_VDD1)	24	Ture Signal Link Lane0
3	LCD power (Voltage select by JEDP_VDD1)	25	Ground
4	LCD power (Voltage select by JEDP_VDD1)	26	Ture Siganl Auxiliary channel
5	LCD power (Voltage select by JEDP_VDD1)	27	Complement Signal Auxiliary channel
6	Ground	28	Ground
7	Ground	29	Auxiliary 3.3V power
8	Ground	30	NC
9	Ground	31	+12V power
10	eDP hot plug detect	32	Ground
11	NC	33	Ground
12	NC	34	+5V power
13	Ground	35	Backlight control Clk
14	Complement Signal Link Lane3	36	Backlight control Data
15	Ture Signal Link Lane3	37	Backlight control enable
16	Ground	38	+12V power
17	Complement Signal Link Lane2	39	+3.3V power
18	Ture Signal Link Lane2	40	Ground
19	Ground	41	SMBUS CLK
20	Complement Signal Link Lane1	42	SMBUS DATA
21	Ture Signal Link Lane1	43	NC
22	Ground	44	NC

3 BIOS Setup

This chapter provides information on the BIOS Setup program and allows users to configure the system for optimal use.
Users may need to run the Setup program when:
- ■ An error message appears on the screen at system startup and requests users to run SETUP.
- ■ Users want to change the default settings for customized features.

Important

- • *Please note that BIOS update assumes technician-level experience.*
- • *As the system BIOS is under continuous update for better system performance, the illustrations in this chapter should be held for reference only.*

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 <DEL> or <F2> key to enter Setup.

<div align="center">Press <DEL> or <F2> to enter SETUP</div>

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
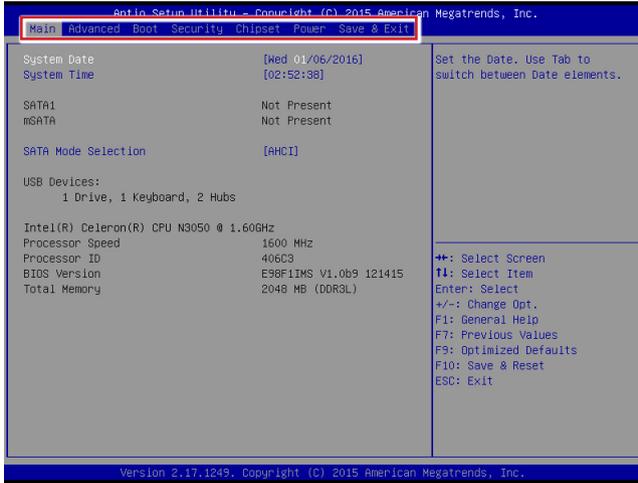
▸ **Main**

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
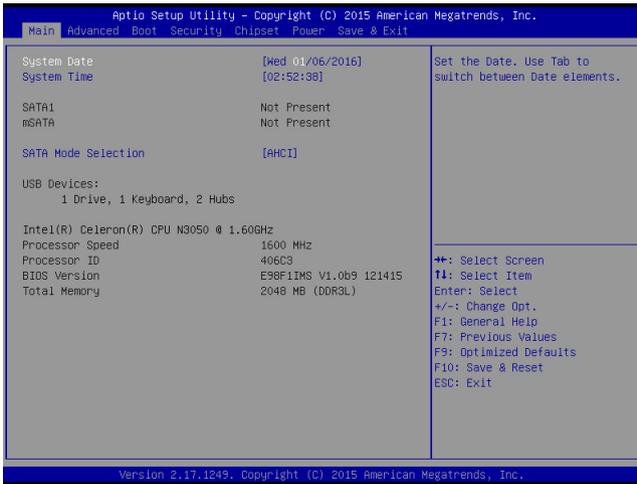
▸ **System Date**

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> <Min-
ute> <Second>.

▸ **SATA Mode Selection**

This setting specifies the SATA controller mode.

Advanced

```
                Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
         Main  Advanced  Boot  Security  Chipset  Power  Save & Exit

    Full Screen Logo Display          [Disabled]              Enables or disables Full
    Bootup NumLock State              [On]                    Screen Logo Display option
    Option ROM Messages               [Force BIOS]
  ▶ Super IO Configuration
  ▶ H/W Monitor
  ▶ Smart Fan Configuration
  ▶ CPU Configuration
  ▶ PCI/PCIE Device Configuration
  ▶ GPIO Group Configuration

                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F7: Previous Values
                                                              F9: Optimized Defaults
                                                              F10: Save & Reset
                                                              ESC: Exit

                Version 2.17.1249. Copyright (C) 2015 American Megatrends, Inc.
```

▶ **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.

▶ **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.

▶ **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**

```
                Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
       Advanced

    Mode Select                    [RS232]                ▲  Watch Dog Timer
    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]
    Mode Select                    [RS232]                   →←: Select Screen
    Serial Port 6                  [Enabled]                 ↑↓: Select Item
     Device Settings               IO=2E0h; IRQ=7;           Enter: Select
     Change Settings               [Auto]                    +/-: Change Opt.
    Parallel Port                  [Enabled]                 F1: General Help
     Device Settings               IO=378h; IRQ=5;           F7: Previous Values
     Change Settings               [Auto]                    F9: Optimized Defaults
     Device Mode                   [STD Printer Mode]        F10: Save & Reset
                                                             ESC: Exit
    FIFO Mode                      [128-byte]
    Shared IRQ Mode                [Level]
    Watch Dog Timer                [Disabled]             ▼

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```

▶ **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 1.

　　▶ **Device Mode**

　　Select an operation mode for the serial port 6.

▶ **FIFO Mode**

This setting controls the FIFO data transfer mode.

▶ **Shared IRQ Mode**

This setting provides the system with the ability to share interrupts among its serial ports.

▶ **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.

▸ **H/W Monitor**

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

```
                            Aptio Setup Utility - Copyright (C) 2013 American
              Advanced

 PC Health Status

 CPU temperature                      : +45 C
 System temperature                   : +26 C

 SYSFAN1 Speed                        : N/A

 VCC_CORE                             : +0.888 V
 VCC5                                 : +5.087 V
 +12V                                 : +12.232 V
 VCC3V                                : +3.392 V
 VSB3V                                : +3.392 V
 VSB5V                                : +5.040 V
 VBAT                                 : +3.152 V
```

▸ **Smart Fan Configuration**
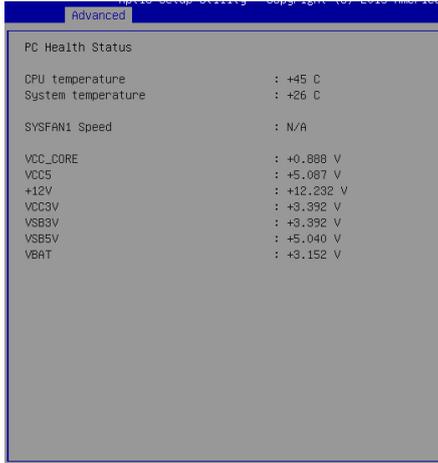
```
                            Aptio Setup Utility - Copyright (C) 2013 American
              Advanced

 Smart FAN Configuration

 Smart SYSFAN Target              [Disabled]
```

▸ **Smart SYSFAN Target**

These setting enables/disables 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.

▶ **CPU Configuration**

```
        Advanced

CPU Configuration

Intel(R) Celeron(R) CPU N3050 @ 1.60GHz
Processor ID                    406C3
Microcode Patch                 35E
Max CPU Speed                   1600 MHz
Processor Cores                 2
64-bit                          Supported
L2 Cache                        1024 kB x 2
L3 Cache                        Not Present

Intel Virtualization Technology  [Enabled]
EIST                             [Enabled]
```

▶ **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**
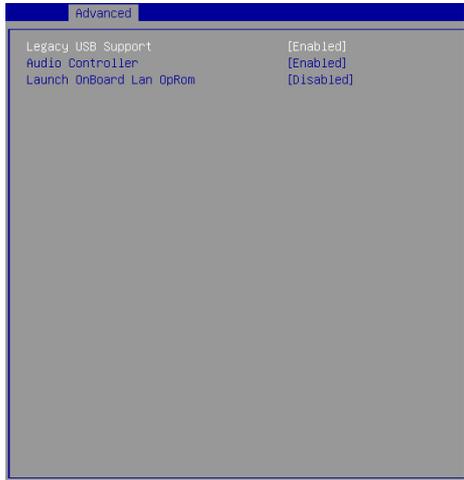
▸ **Legacy USB Support**

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/onchip LAN Boot ROM during bootup. Selecting [Disabled] will speed up the boot process.

▶ **GPIO Group Configuration**

```
                        Advanced

 Configure Special GPIO

 GPO0                              [Low]
 GPO1                              [Low]
 GPO2                              [Low]
 GPO3                              [Low]
```

▶ **GPO0 ~ GPO3**
These settings control the operation mode of the specified GPIO.

Boot
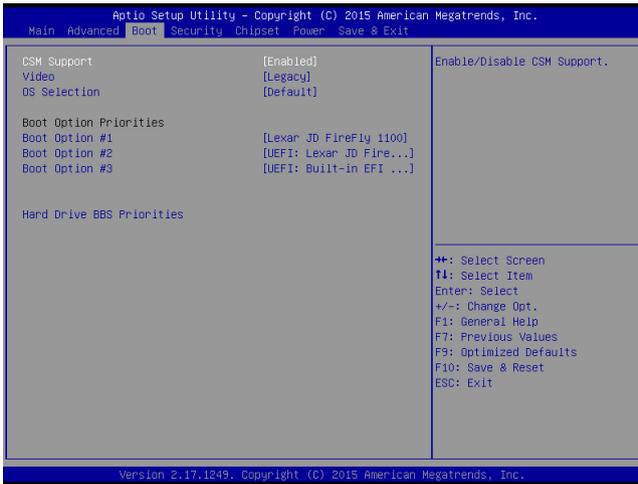
‣ **CSM Support**

This setting enables/disables the support for Compatibility Support Module, a part of the Intel Platform Innovation Framework for EFI providing the capability to support legacy BIOS interfaces.

‣ **Video**

This setting selects the video mode.

‣ **OS Selection**

This setting allows users to select the Operating System.

‣ **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>, <PageDown> key to move it up/down in the priority list.

Security


```
              Aptio Setup Utility – Copyright (C) 2015 American Megatrends, Inc.
  Main  Advanced  Boot  Security  Chipset  Power  Save & Exit

  Administrator Password                               Set Administrator Password
  User Password
  Chassis Intrusion                [Disabled]

  ▶ Trusted Computing
  ▶ Serial Port Console Redirection
  ▶ Security Configuration




                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F7: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Reset
                                                      ESC: Exit


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```

▸ **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.

▶ **Trusted Computing**

```
                        Security
 Configuration
   Security Device Support        [Enable]
   NO Security Device Found
```

▶ **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.

▶ **Device Select**

This setting allows users to select the security device.

▶ **Serial Port Console Redirection**

```
                        Security
 COM1
 Console Redirection              [Disabled]
 ▶ Console Redirection Settings
```
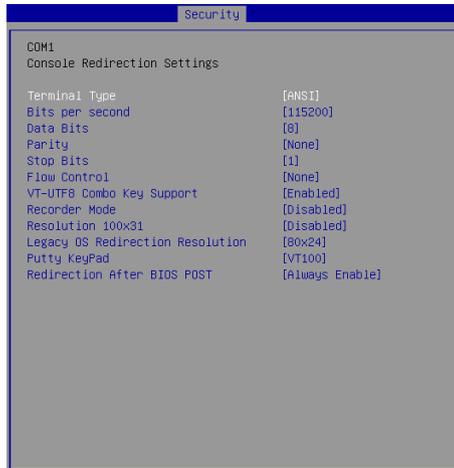
▶ **Console Redirection**

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/disables the operation of console re-direction. 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**

```
                        Security

  COM1
  Console Redirection Settings

  Terminal Type                       [ANSI]
  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 support-ing ANSI terminal protocol and a RS-232 null modem cable connected be-tween 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 be-tween 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 ca-pable 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 setting determines whether or not to keep terminals' console redirection running after the BIOS POST has booted.

▸ **Security Configuration**

▸ **TXE FW Version**

The setting shows the firmware information of the Intel Trusted Execution Engine (TXE).

▸ **TXE HMRFPO**

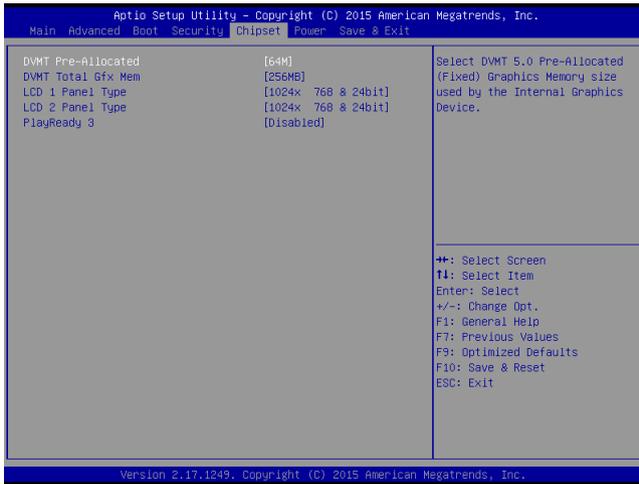The setting enables/disables TXE HMRFPO (Host ME Region Flash Protection Override).

▸ **TXE Firmware Update**

This setting enables/disables TXE FW update.

▸ **TXE EOP Message**

This setting determines whether or not to send EOP (Exchange Online Protection) message before entering OS.

Chipset

```
                  Aptio Setup Utility – Copyright (C) 2015 American Megatrends, Inc.
         Main  Advanced  Boot  Security  Chipset  Power  Save & Exit

   DVMT Pre-Allocated              [64M]                    Select DVMT 5.0 Pre-Allocated
   DVMT Total Gfx Mem              [256MB]                  (Fixed) Graphics Memory size
   LCD 1 Panel Type               [1024x  768 & 24bit]     used by the Internal Graphics
   LCD 2 Panel Type               [1024x  768 & 24bit]     Device.
   PlayReady 3                    [Disabled]




                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F7: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Reset
                                                           ESC: Exit

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```

▸ **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.

▸ **LCD1 Panel Type / LCD1 Panel Type**

This item allows you to set the LCD panel type.

▸ **PlayReady 3** *(for Windows 10 only)*

This setting enables/disables Microsoft's PlayReady 3 technology. PlayReady is a content protection technology from Microsoft that includes encryption, output protection and Digital Rights Management (DRM). Window's PlayReady 3.0 DRM can support 4K content but use more restrictive digital rights management technology to curb illegitimate streams at the same time.

Power
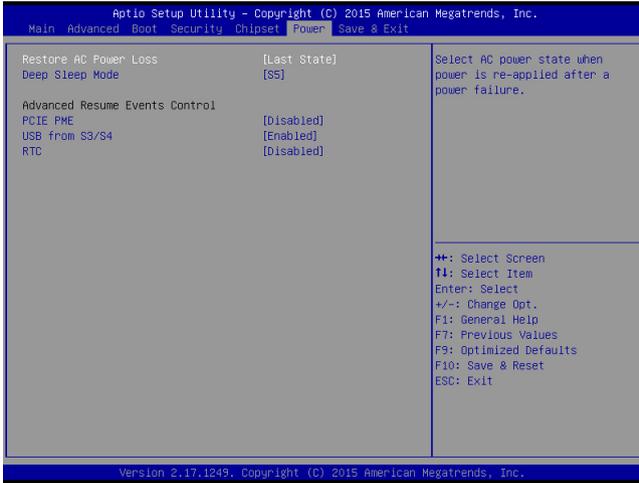
▶ **Restore AC Power Loss**

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 Sleep Mode**

The setting enables/disables the Deep S5 power saving mode. 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 PME**

This field specifies whether the system will be awakened from power saving modes when activity or input signal of onboard PCIE PME is detected.
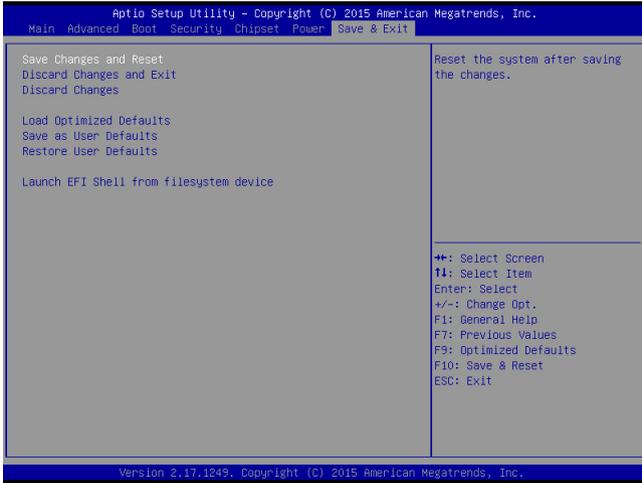
▸ **USB from S3/S4**

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

▸ **RTC**

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

Save & Exit

▶ **Save Changes and Reset**

Save changes to CMOS and reset the system.

▶ **Discard Changes and Exit**

Abandon all changes and exit the Setup Utility.

▶ **Discard Changes**

Abandon all changes.

▶ **Load Optimized Defaults**

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

▶ **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**

This setting helps to launch the EFI Shell application from one of the available file system devices.

Appendix
WDT & GPIO

This appendix provides the sample codes of WDT (Watch Dog Timer) and GPIO (General Purpose Input/ Output).

WDT 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
;Acive 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 UINT
    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
```

GPIO Sample Code

● GPI 0 ~ GPI 3

	GPI 0	GPI 1	GPI 2	GPI 3
IO Address (SMbus Address)	F040h	F040h	F040h	F040h
Slave Address	9Ch	9Ch	9Ch	9Ch
SIO GPIO Register	20h	20h	20h	20h
Bit	4	5	6	7
Sample code	#1			

● GPO 0 ~ GPO 3

	GPO 0	GPO 1	GPO 2	GPO 3
IO Address (SMbus Address)	F040h	F040h	F040h	F040h
Slave Address	9Ch	9Ch	9Ch	9Ch
SIO GPIO Register	20h	20h	20h	20h
Bit	0	1	2	3
Sample code	#2			

```
SMBUS_ADDRESS       equ F040h
SMBUS_ADDRESS02     equ SMBUS_ADDRESS +02h ;set command type and start the operation
SMBUS_ADDRESS03     equ SMBUS_ADDRESS+03h ;set register index
SMBUS_ADDRESS04     equ SMBUS_ADDRESS+04h ;set slave address
SMBUS_ADDRESS05     equ SMBUS_ADDRESS+05h ;set register value
SLAVE_ADDRESS       equ 09Ch
SIO_GPIO2x_Status       equ 020h
SIO_GPIO2x_Data         equ 021h
GPI_0               equ 00000000b
GPO_0               equ 00000001b


----------------------------------------------------------------------------
Sample Code:

#1 : Set GPI 0 status
mov ax, SLAVE_ADDRESS SIO_GPIO2x_Status
mov cl, GPI_0  ;bit1=GPI 0 status

push ax
mov dx, SMBUS_ADDRESS
mov al,1eh ;clear(bit1~4) status
out dx,al
pop ax
```

```
mov dx, SMBUS_ADDRESS03
out dx,al

mov dx, SMBUS_ADDRESS05
mov al,cl
out dx,al

mov al,48h ;set start(bit6=1)and byte data read or write(bit2~4)
xchg al,ah
mov dx, SMBUS_ADDRESS04
out dx,al
xchg al,ah
mov dx, SMBUS_ADDRESS02
out dx,al
```

#2 :
(a)Set GPO 0 status
```
mov ax, SLAVE_ADDRESS SIO_GPIO2x_Status
mov cl, GPO_0  ;bit0=GPO 0 status

push ax
mov dx, SMBUS_ADDRESS
mov al,1eh ;clear(bit1~4) status
out dx,al
pop ax

mov dx, SMBUS_ADDRESS03
out dx,al

mov dx, SMBUS_ADDRESS05
mov al,cl
out dx,al

mov al,48h ;set start(bit6=1)and byte data read or write(bit2~4)
xchg al,ah
mov dx, SMBUS_ADDRESS04
out dx,al
xchg al,ah
mov dx, SMBUS_ADDRESS02
out dx,al
```

(b)Set GPO 0 data

```
mov ax, SLAVE_ADDRESS SIO_GPIO2x_Data
mov cl, GPO_0  ;bit0=GPO 0 data(High=1,Low=0)

push ax
mov dx, SMBUS_ADDRESS
mov al,1eh ;clear(bit1~4) status
out dx,al
pop ax

mov dx, SMBUS_ADDRESS03
out dx,al

mov dx, SMBUS_ADDRESS05
mov al,cl
out dx,al

mov al,48h ;set start(bit6=1)and byte data read or write(bit2~4)
xchg al,ah
mov dx, SMBUS_ADDRESS04
out dx,al
xchg al,ah
mov dx, SMBUS_ADDRESS02
out dx,al
```