# USER MANUAL

## PA-A900

15.6” POS Terminal

Powered by Intel® Celeron®

J3355 / 3455 CPU

**PA-A900 M2**

# *15.6” POS Terminal with Intel ® Celeron® J3355 / 3455 CPU*



**DISCLAIMER**

This user’s manual is meant to assist users in installing and setting up the system. The information contained in this document is subject to change without any notice.

## CE NOTICE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## FCC NOTICE

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.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

| | |
|---|---|
|  | **CAUTION:** Danger of explosion may occur when the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. |

| | |
|---|---|
|  | **WARNING:** Some internal parts of the system may have high electrical voltage. We strongly recommend that only qualified engineers are allowed to service and disassemble the system. If any damages should occur on the system and are caused by unauthorized servicing, it will not be covered by the product warranty. Please operate the LCD and Touchscreen with extra care as they can break easily. |

# Contents

# Revision History

The revision history of PA-A900 User Manual is described below:

| Version No. | Revision History | Page No. | Date |
|---|---|---|---|
| M2 | The description of Section 3.6.21 USB3 Port Selection (JP_USB3_1, JP_USB3_2) has been revised. | 3-40 | 2020/03/27 |
| M1 | Initial Release | - | 2019/10/15 |

# 1 Introduction

This chapter provides the introduction for the PA-A900 system as well as the framework of the user manual.

The following topic is included:

- About This Manual

## 1.1 About This Manual

Thank you for purchasing our PA-A900 system. The PA-A900 is an updated system designed to be comparable with the highest performance of IBM AT personal computers. The PA-A900 provides faster processing speed, greater expandability and can handle more tasks than before. This manual is designed to assist you how to install and set up the whole system. It contains 5 chapters and 2 appendixes. Users can configure the system according to their own needs. This user manual is intended for service personnel with strong hardware background. It is not intended for general users.

The following section describes the structure of this user manual.

***Chapter 1 Introduction***
This chapter introduces the framework of this user manual.

***Chapter 2 Getting Started***
This chapter describes the package contents and system specifications, and illustrates the physical appearances for the PA-A900 system. Read the safety reminders carefully on how to take care of your system properly.

***Chapter 3 System Configuration***
This chapter describes the locations and functions of the system motherboard components. You will learn how to properly configure the connectors and system configuration jumpers on the motherboard and configure the system to meet your own needs.

***Chapter 4 Software Utilities***
This chapter introduces how to install Intel Chipset Software Installation Utility, Graphics Driver Utility, Intel Trusted Execution Engine Driver Utility, LAN Driver Utility, Sound Driver Utility, Microsoft Hotfix kb3211320 and kb3213986 Driver Utility, Serial I/O Driver Utility and Windows 10 I/O Driver Utility.

***Chapter 5 AMI BIOS Setup***
This chapter provides BIOS setup information.

***Appendix A System Assembly Diagrams***
This appendix provides the exploded diagrams and part numbers of the PA-A900.

***Appendix B Technical Summary***
This appendix provides the information about the allocation maps for system resources, Watchdog Timer Configuration and Flash BIOS Update.

# 2 Getting Started

This chapter provides the information for the PA-A900 system. It describes how to set up the system quickly and outlines the system specifications.

The following topics are included:

- Package List
- System Overview
- System Diagrams
- System Specification
- Safety Precautions

**Experienced users can go to Chapter 3 System Configuration on page 3-1 for a quick start.**

## 2.1 Package List

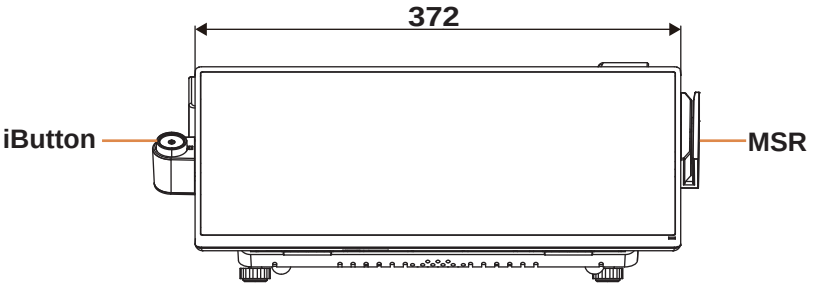
If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

| Item | Q'ty |
|---|---|
| PA-A900 | 1 |
| Manual / Driver DVD | 1 |
| Quick Reference Guide | 1 |
| COM Port to RJ45 Cable (L=150mm) | 1 |
| AC Power Adapter | 1 |

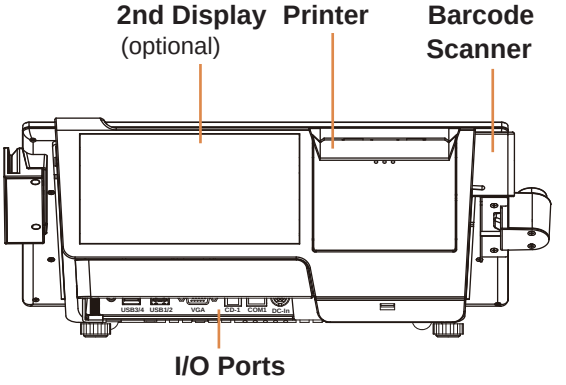
## 2.2 System Views

### 2.2.1 Front View

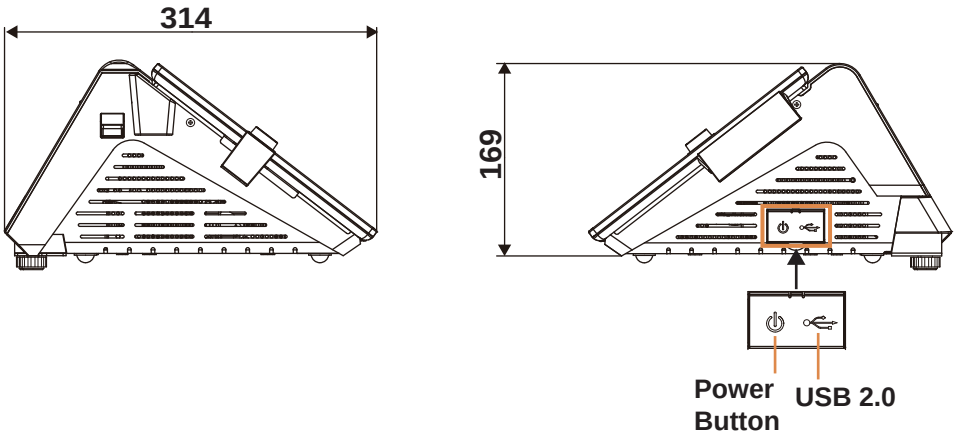
Unit: mm



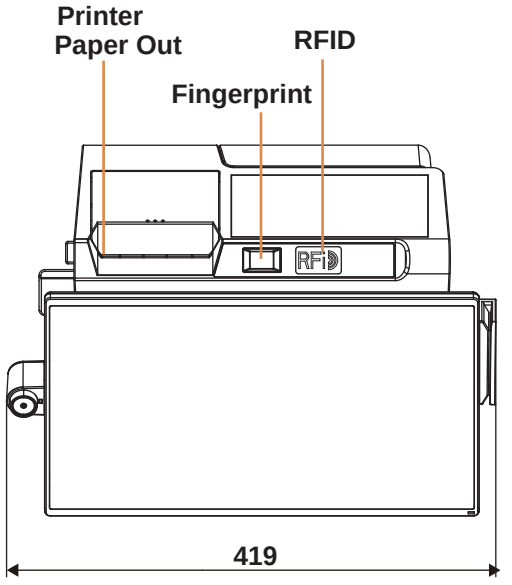

### 2.2.2 Rear View



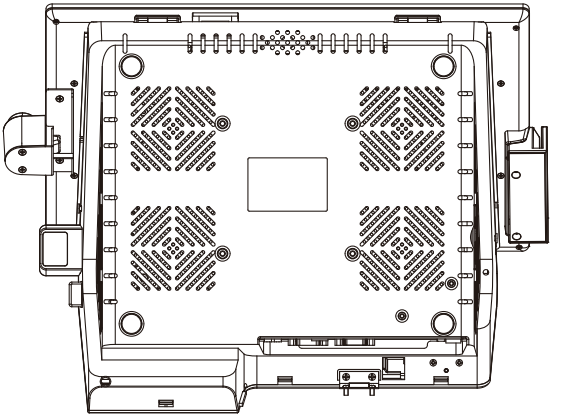
### 2.2.3 Side View



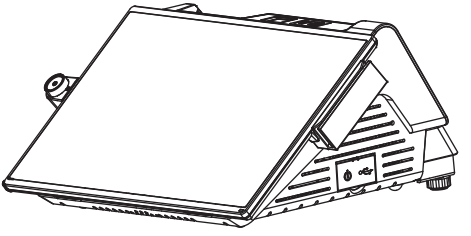

### 2.2.4 Top View



### 2.2.5 Bottom View



### 2.2.6 Quarter View



## 2.3 System Specifications

| | |
|---|---|
| **System** | |
| CPU Support | ➢ Intel® Celeron® J3355 / 3455 CPU |
| Memory | ➢ 1 x DDR3L SO-DIMM Slot (up to 8GB) |
| Network | ➢ 10/100/1000Mbps Base-T Fast Ethernet |
| Power Supply | ➢ 60 ~90 watt power adapter |
| Audio | ➢ 2W speaker |
| System Weight | ➢ with power adaptor approx. 5kg |
| Dimensions (W x H x D) | ➢ 372 x 169 x 315mm |
| O.S. Support | ➢ Windows 10 |
| **Storage** | |
| SATA | ➢ 1 x 2.5" HDD or SSD<br>➢ 1 x M.2 2242 (SATAIII interface) |
| **I/O Ports** | |
| USB | ➢ Rear: 2 x USB 3.0 + 2 x USB 2.0<br>(optional) 2 x USB 2.0 +1 x power USB (+12V/+24V)<br>➢ 1 x USB 2.0 on side bezel |
| Serial Ports | ➢ 3 x RJ45 (all support +5V/12V selectable)+ 1 (optional) x DB9 |
| LAN | ➢ 1 x RJ45 |
| VGA | ➢ 1 x DB15 |
| HDMI | ➢ 1 x HDMI |
| Cash Drawer | ➢ 1 + 1 (option, with Y cable) x RJ11 (+12V or +24V selectable) |
| Audio | ➢ 1 x Line Out phone jack (optional)<br>➢ 1 x Mic-In phone jack (optional) |
| DC IN | ➢ 1 x 4-pin DC Power Jack |
| **Peripheral** | |
| Customer Display | ➢ VFD, 20 columns and 2 lines, each column is 5 x 7 dots |
| Printer | ➢ 2" or 3" easy loading thermal printer with auto-cutter |
| MSR & i-Button | ➢ JIS-I or II, ISO Track1+2+3 (PS/2 interface) |
| Fingerprint | ➢ 8-bit grayscale reader |

| | |
|---|---|
| **Display** | |
| LCD | ➢ 15.6" TFT LCD |
| Resolution | ➢ 1366 x 768 |
| Brightness | ➢ 220 cd/m² |
| Touchscreen | ➢ 15.6" P-CAP touch panel, USB interface |
| Tilt Angle | ➢ 40 degrees |
| **Environment** | |
| EMC & Safety | ➢ CE / FCC |
| Operating Temp. | ➢ 0°C ~ 35°C (32°F ~ 95°F) |
| Storage Temp. | ➢ -5°C ~ 60°C (23°F ~ 140°F) |
| Humidity | ➢ 20% ~ 90% |

## 2.4 Safety Precautions

Before operating this system, read the following information carefully to protect your systems from damages, and extend the life cycle of the system.

1. Check the Line Voltage
   - The operating voltage for the power supply should be within the range of 100V to 240V AC; otherwise, the system may be damaged.

2. Environmental Conditions
   - Place your PA-A900 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
   - Avoid installing your PA-A900 system in extremely hot or cold places.
   - Avoid direct sunlight exposure for a long period of time (for example, in a closed car in summer time. Also avoid the system from any heating device.). Or do not use PA-A900 when it has been left outdoors in a cold winter day.
   - Avoid moving the system rapidly from a hot place to a cold place, and vice versa, because condensation may occur inside the system.
   - Protect your PA-A900 from strong vibrations which may cause hard disk failure.
   - Do not place the system too close to any radio-active device. Radio-active device may cause signal interference.
   - Always shut down the operating system before turning off the power.
3. Handling
   - Avoid placing heavy objects on the top of the system.
   - Do not turn the system upside down. This may cause the hard drive to malfunction.
   - Do not allow any objects to fall into this device.
   - If water or other liquid spills into the device, unplug the power cord immediately.
4. Good Care
   - When the outside case gets stained, remove the stains using neutral washing agent with a dry cloth.
   - Never use strong agents such as benzene and thinner to clean the surface of the case.
   - If heavy stains are present, moisten a cloth with diluted neutral washing agent or alcohol and then wipe thoroughly with a dry cloth.
   - If dust is accumulated on the case surface, remove it by using a special vacuum cleaner for computers.

# 3 System Configuration

This chapter contains helpful information that describes the jumper and connector settings, component locations, and pin assignment.

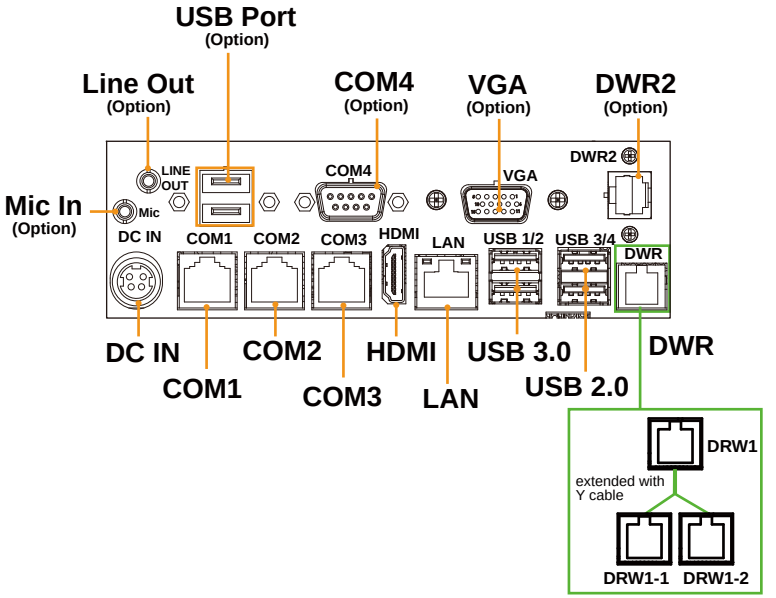
The following topics are included:

- System External I/O Ports Diagrams
- Function Buttons and I/O Ports
- Main Board Component Locations & Jumper Settings
- Setting Jumpers
- Setting Main Board Connectors and Jumpers
- Printer Board Component Locations & Pin Assignment
- Setting Printer Board Connectors and Jumpers
  - MB-1030 series
  - MB-1011 & MB-1013
- Setting VFD Board Connectors and Jumpers
- Setting MSR

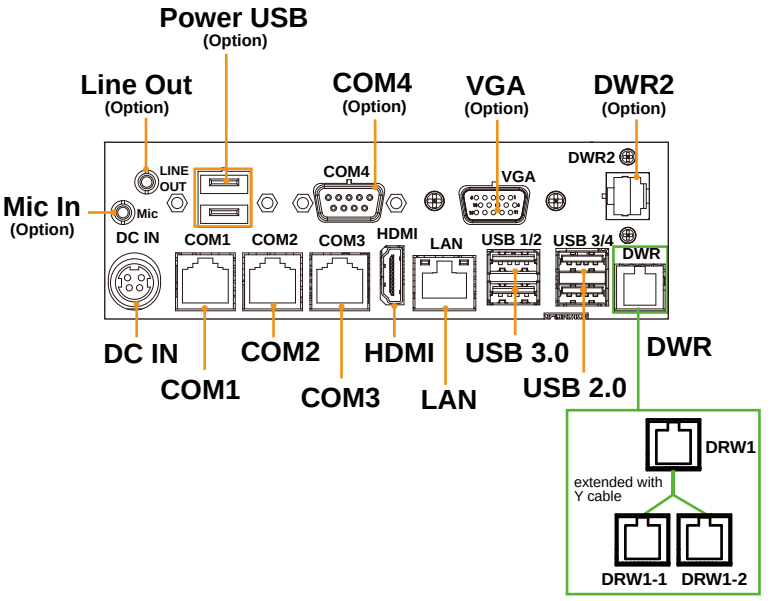
## 3.1 External System I/O Ports Diagrams

### 3.1.1 Rear I/O Ports Diagrams

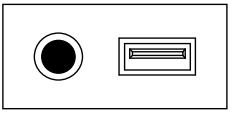
**Type 1**



## Type 2




## Side I/O



**Power Button** **USB7**

## 3.2 Jumper & Connector Quick Reference Table

| JUMPER Description | NAME |
|---|---|
| USB2 Port Selection | JP_USB2 |
| USB3 Port Selection | JP_USB3_1, JP_USB3_2 |
| USB5 Port Selection | JP_USB5 |
| EDP (Embedded Display Port) Voltage Selection | JP_VDD1 |
| Force DNX Firmware Load Selection | JP1 |
| Flash Descriptor Override Selection | JP1 |
| Clear CMOS Data Selection | JP3 |
| COM4 and i-Button Function Selection | JP6, JP7, JP8 |
| Cash Drawer Control Selection | JP11 |

| System CONNECTOR Description | NAME |
|---|---|
| DC_IN Port (rear I/O) | DC_IN1 |
| COM Ports and Cash Drawer Port (rear I/O) | COM1, COM2, COM3, DWR1 |
| HDMI Port (rear I/O) | HDMI1 |
| LAN Port (rear I/O) | LAN1 |
| Dual USB 3.0 Ports (rear I/O) | USB1 |
| Dual USB 2.0 Ports (rear I/O) | USB3_1 |
| USB 2.0 Port (side I/O) | USB7 |
| COM Connectors | COM1_1, COM2_1, COM4 |
| VGA Connector | JVGA1 |
| USB 2.0 Connectors | USB3_2, USB2, USB5, USB6, JUSB7 |
| HD Audio Connector | JAUD1 |
| LVDS Inverter Connector | JINV1 |
| Embedded Display Port (EDP) Connector | EDP1 |
| M.2 Wi-Fi Express Slot | M2_E |
| M.2 SSD Express Slot | M2_M |
| SATA 3.0 & SATA Power Connectors | SATA1, SATA_PWR1 |

| System CONNECTOR Description | NAME |
|---|---|
| LPC Connector | JLPC1 |
| Fan Connector | FAN_1 |
| Power Output Connectors | OUT_5V, OUT12V_1, OUT12V_2, OUT_24V |
| RTC Connector | BAT1 |
| PS/2 (MSR) Connector | PS2 |
| Speaker Connector | JSPK1 |
| Switch LED Connectors | SW2, LED1 |

## 3.3 Component Locations Of System Main Board

### 3.3.1 Top View of System Main Board

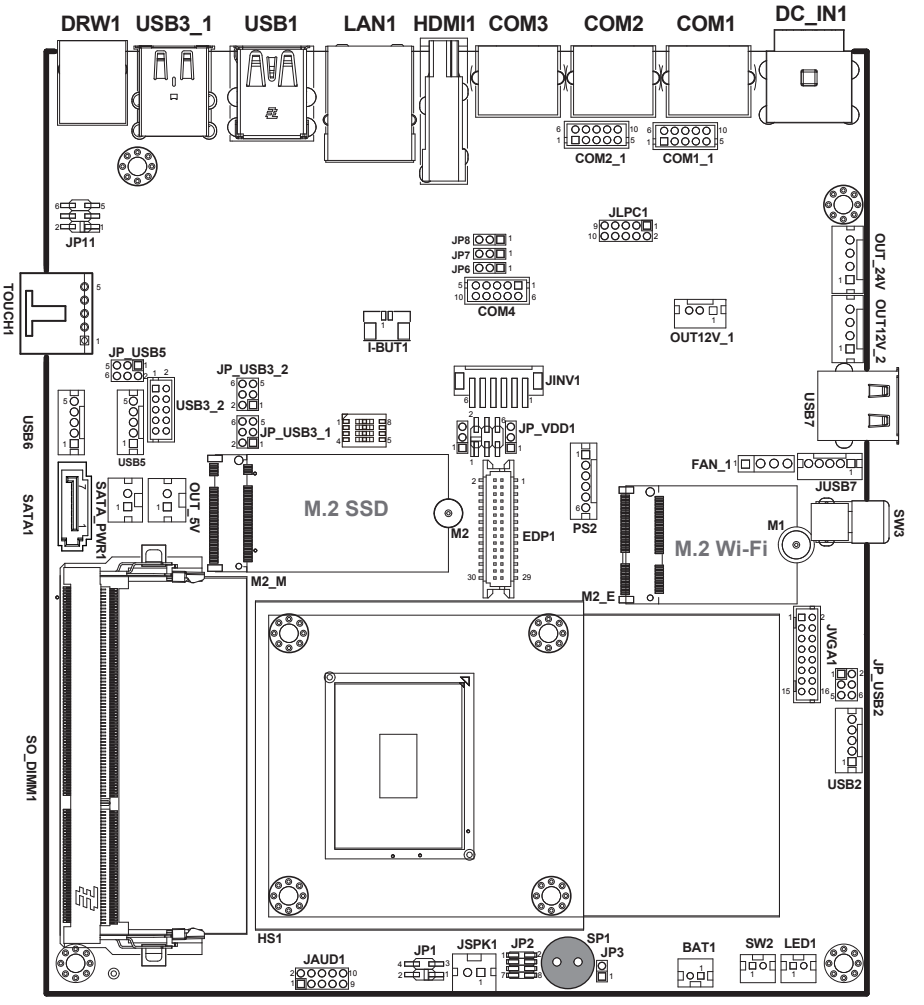
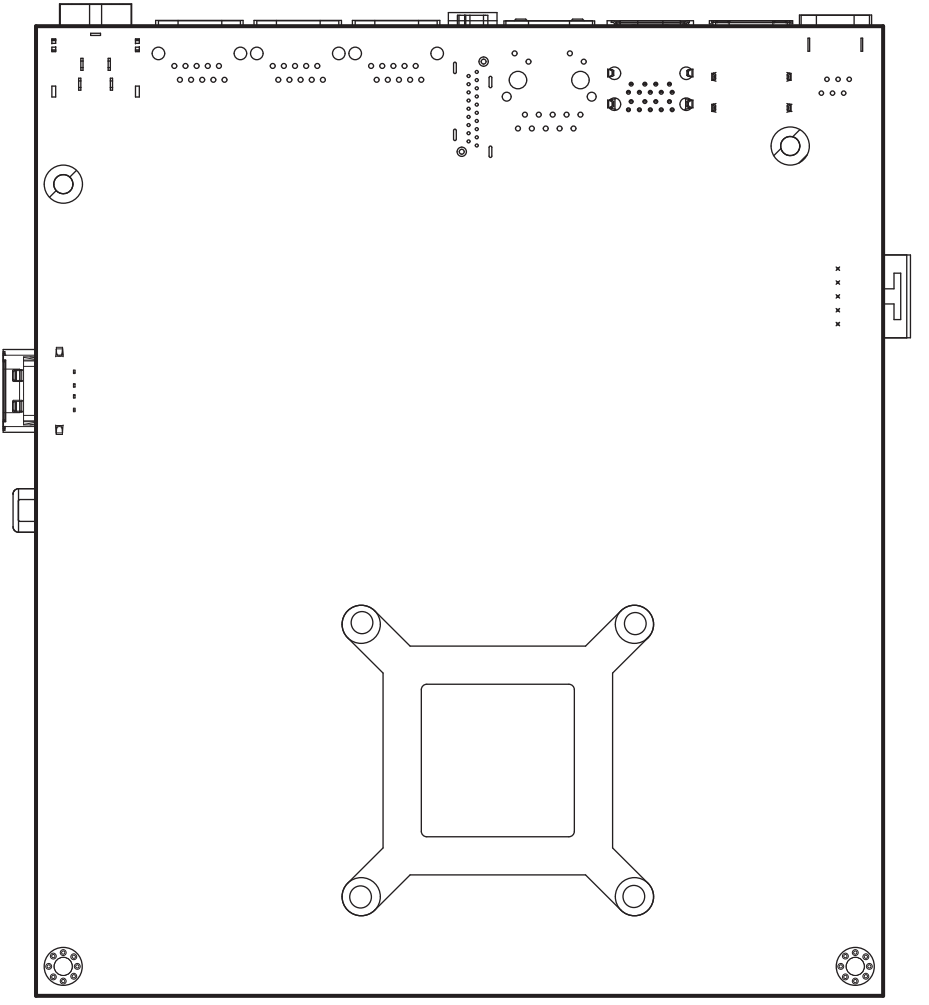



Figure 3-1. Main Board Component Location (Top View)

| | |
|---|---|
|  | **WARNING:** Always disconnect the power cord when you are working with connectors and jumpers on the main board. Make sure both the system and peripheral devices are turned OFF as sudden surge of power could damage sensitive components. Make sure the main board is properly grounded. |
|  | **CAUTION:** Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while you are working on the connectors and jumpers. Use a grounding wrist strap and place all electronic components in any static-shielded devices. |
|  | **CAUTION:** Always touch the motherboard components by the edges. Never touch components such as a processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch the main board components. |

### 3.3.2 Bottom View of System Main Board

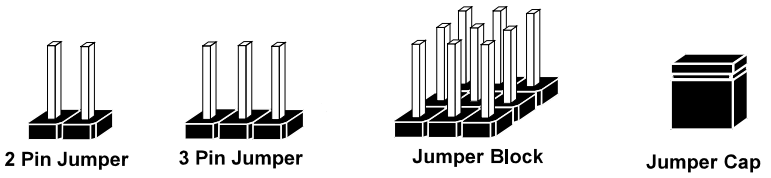


## 3.4 How To Set Jumpers

You can configure your board by setting the jumpers. A jumper consists of two or three metal pins with a plastic base mounted on the card. By using a small plastic "cap", also known as the jumper cap (with a metal contact inside), you are able to connect the pins. So you can configure your hardware settings by "opening" or "closing" jumpers.

Jumpers can be combined into sets that are called jumper blocks. When jumpers are all in the block, you have to put them together to set up the hardware configuration. The figure below shows what this looks like.

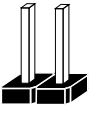
### Jumpers & Caps



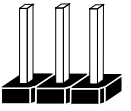

If a jumper has three pins, for example, labeled 1, 2 and 3. You can connect pins 1 and 2 to create one setting and shorting. You can also select to connect pins 2 and 3 to create another setting. The format of the jumper picture will be illustrated throughout this manual. The figure below shows different types of jumpers and jumper settings.

## Jumper diagrams

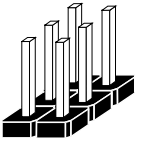
Jumper Cap looks like this



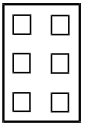
2 pin Jumper looks like this



3 pin Jumper looks like this

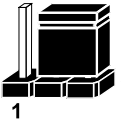


Jumper Block looks like this

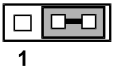


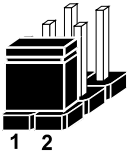
### Jumper settings


2 pin Jumper closed(enabled)
looks like this

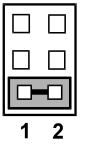




3 pin Jumper
2-3 pin closed(enabled)
looks like this




Jumper Block
1-2 pin closed(enabled)
looks like this



## 3.5 Function Buttons and I/O Ports

### 3.5.1 Power Button

To turn on the system, press the power button on the side of the system briefly.

| ACTION | ASSIGNMENT |
|---|---|
| Press | 0V |
| Release | +3.3V |

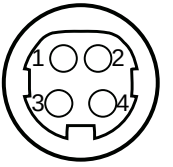
Power Button

### 3.5.2 DC_IN Port (DC_IN1)

**Port Name: DC_IN1**

**Description:** DC Power-In Port (rear I/O)

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | GND | 2 | GND |
| 4 | VIN_24V | 4 | VIN_24V |

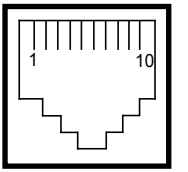



DC_IN1

### 3.5.3 COM Ports (COM1, COM2, COM3, COM4)

**Port Name: COM1, COM2, COM3 (RS-232)**
**Description:** COM Ports (rear I/O)

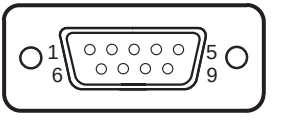
| PIN | ASSIGNMENT |
|---|---|
| 1 | COM1/2/3_DCD |
| 2 | COM1/2/3_RX |
| 3 | COM1/2/3_TX |
| 4 | COM1/2/3_DTR |
| 5 | GND |
| 6 | COM1/2/3_DSR |
| 7 | COM1/2/3_RTS |
| 8 | COM1/2/3_CTS |
| 9 | COM1/2/3_RI_SEL |
| 10 | NC |




COM1/
COM2/
COM3

**Port Name: COM4 (optional)**
**Description:** D-Sub9 Serial Port (rear I/O)

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | COM4_DCD | 6 | COM4_DSR |
| 2 | COM4_RX | 7 | COM4_RTS |
| 3 | COM4_TX | 8 | COM4_CTS |
| 4 | COM4_DTR | 9 | COM4_RI_SEL |
| 5 | GND | - | - |

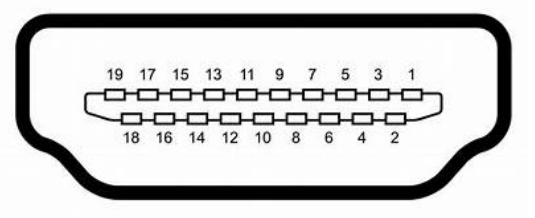



COM4
(optional)

### 3.5.4 HDMI Port (HDMI1) and VGA Port (VGA1, optional)

**Port Name: HDMI1**

**Description:** HDMI Connector (rear I/O)




HDMI1

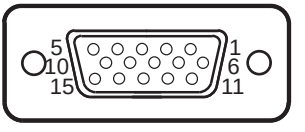
| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | DP0_HDMI_P2 | 2 | GND |
| 3 | DP0_HDMI_N2 | 4 | DP0_HDMI_P1 |
| 5 | GND | 6 | DP0_HDMI_N1 |
| 7 | DP0_HDMI_P0 | 8 | GND |
| 9 | DP0_HDMI_N0 | 10 | DP0_HDMI_CLKP |
| 11 | GND | 12 | DP0_HDMI_CLKN |
| 13 | NC | 14 | NC |
| 15 | DP0_HDMI_SCL_5V | 16 | DP0_HDMI_SDA_5V |
| 17 | GND | 18 | VCC5_HDMI |
| 19 | DP1_HDMI_HPD_IN | 20 | - |

**VGA Port (optional)**

**Port Name: VGA**

**Description:** VGA Port, D-Sub 15-pin (rear I/O)

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | RED | 9 | +5V |
| 2 | GREEN | 10 | GND |
| 3 | BLUE | 11 | NC |
| 4 | NC | 12 | DDCA DATA |
| 5 | GND | 13 | HSYNC |
| 6 | GND | 14 | VSYNC |
| 7 | GND | 15 | DDCA CLK |
| 8 | GND | - | - |

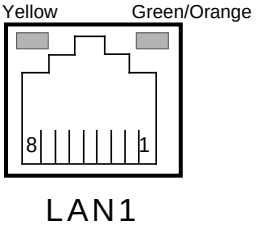



VGA

### 3.5.5 LAN Port (LAN1)

**Port Name: LAN1**

**Description:** LAN RJ-45 Port (rear I/O)




| PIN | ASSIGNMENT |
|---|---|
| 1 | LAN1_MDIP0 |
| 2 | LAN1_MDIN0 |
| 3 | LAN1_MDIP1 |
| 4 | LAN1_MDIP2 |
| 5 | LAN1_MDIN2 |
| 6 | LAN1_MDIN1 |
| 7 | LAN1_MDIP3 |
| 8 | LAN1_MDIN3 |

**LAN LED Status**

There are LAN LED indicators for LAN on the rear panel of the system. By observing their status, you can know the status of the Ethernet connection.

| LAN LED Indicator | Color | Status | Description |
|---|---|---|---|
| Right Side LED | Orange | Blink | Giga LAN connection is activated. |
| | Green | Blink | 10/100Mbps LAN connection is activated. |
| Left Side LED | Yellow | On | LAN switch/hub connected. |

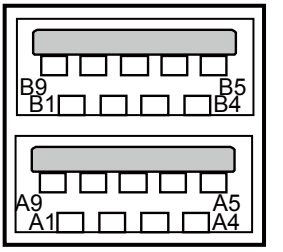
### 3.5.6 Dual USB 3.0 Ports (USB1)

**Connector Location: USB1**

**Description:** Dual USB 3.0 Connectors (rear I/O)

**USB 3.0 signals:**

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| B5 | USB3_RXN0 | - | - |
| B6 | USB3_RXP0 | B4 | GND |
| B7 | GND | B3 | USB2_P0_DP |
| B8 | USB3_TXN0 | B2 | USB2_P0_DN |
| B9 | USB3_TXP0 | B1 | VCC5_USB1 |
| A5 | USB3_RXN1 | - | - |
| A6 | USB3_RXP1 | A4 | GND |
| A7 | GND | A3 | USB2_P1_DP |
| A8 | USB3_TXN1 | A2 | USB2_P1_DN |
| A9 | USB3_TXP1 | A1 | VCC5_USB1 |




USB1

**Note: USB1** is provided with standby power 5V. The other USB ports are without standby power.

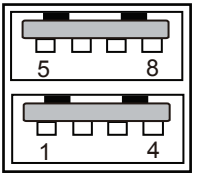
### 3.5.7 Dual USB 2.0 Ports (USB3_1)

**Connector Location: USB3_1**

**Description:** Dual USB 2.0 Connectors (Type A) (Rear I/O)

**USB 2.0 signals:**

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | VCC5_USB3 | 5 | VCC5_USB3 |
| 2 | USB2_P3_DN | 6 | USB2_P4_DN |
| 3 | USB2_P3_DP | 7 | USB2_P4_DP |
| 4 | GND | 8 | GND |



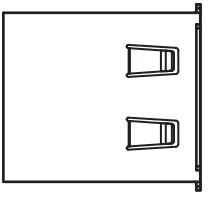

USB3_1

### 3.5.8 USB 2.0 Port (USB7)

**Port Name: USB7**

**Description:** USB 2.0 Port (side I/O)

| PIN | ASSIGNMENT |
|---|---|
| 1 | VCC5_USB7 |
| 2 | USB2_P7_DN |
| 3 | USB2_P7_DP |
| 4 | GND |

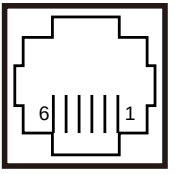


USB7

### 3.5.9 Cash Drawer Port (DWR1)

**Port Name: DWR1**
**Description:** DWR1 is used by default.

| PIN | ASSIGNMENT |
|---|---|
| 1 | GND/OPEN2 |
| 2 | OPEN1 |
| 3 | SENSE1 |
| 4 | 12V/24V |
| 5 | NC/SENSE2 |
| 6 | GND |



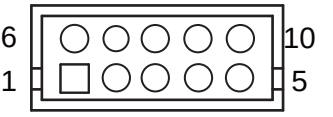

DWR1

## 3.6 Setting Main Board Connectors and Jumpers

### 3.6.1 COM Connectors (COM1_1, COM2_1, COM4)

**Connector Location: COM1_1, COM2_1 (RS-232)**
**Description:** COM Connectors

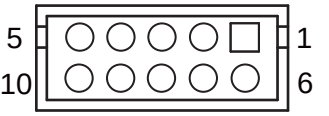
| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | COM1/2_DCD | 6 | COM1/2_DSR |
| 2 | COM1/2_RX | 7 | COM1/2_RTS |
| 3 | COM1/2_TX | 8 | COM1/2_CTS |
| 4 | COM1/2_DTR | 9 | COM1/2_RI_SEL |
| 5 | GND | 10 | NC |



COM1_1/
COM2_1

**Connector Location: COM4 (RS-232)**
**Description:** COM4 Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | COM4_DCD | 6 | COM4_DSR |
| 2 | COM4_RX | 7 | COM4_RTS |
| 3 | COM4_TX | 8 | COM4_CTS |
| 4 | COM4_DTR | 9 | COM4_RI |
| 5 | GND | 10 | NC |



COM4

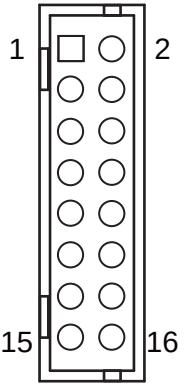
**Note:** COM4 will not function when jumpers JP6, JP7, JP8 are set as **2-3** connected (i-Button). Refer to the **COM4 & i-Button Function Selection** section for details.

### 3.6.2 VGA Connector (JVGA1)

**Connector Location: JVGA1**

**Description:** VGA Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | CRT_RED_LL | 2 | CRT_GREEN_LL |
| 3 | CRT_BLUE_LL | 4 | SPC_R |
| 5 | GND | 6 | GND |
| 7 | GND | 8 | GND |
| 9 | CRT_VCC_L | 10 | GND |
| 11 | SPD_R | 12 | CRT_DDC_DATA_O |
| 13 | CRT_HSYNC_O | 14 | CRT_VSYNC_O |
| 15 | CRT_DDC_CLK_O | 16 | NC |

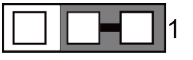



JVGA1

### 3.6.3 COM4 & i-Button Function Selection (JP6, JP7, JP8)

**Jumper Location: JP6, JP7, JP8**

**Description:** COM4 and i-Button Function Selection

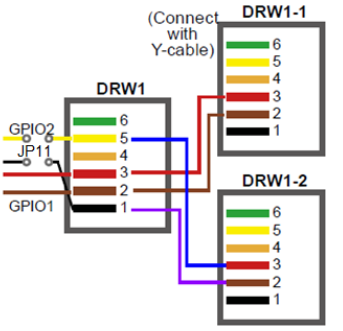
| SELECTION | JUMPER SETTING | JUMPER ILLUSTRATION |
|---|---|---|
| **COM4** | **1-2** ***(Default Setting)*** |   JP6/JP7/JP8 |
| I-BUT | 2-3 |   JP6/JP7/JP8 |

**Note:** COM4 will not function when jumpers JP6, JP7, JP8 are set as **2-3** connected (i-Button). Refer to the **COM4 & i-Button Function Selection** section for details.

### 3.6.4 Cash Drawer Control Selection (JP11)

**JP11:** DRW1, DRW1-1, DRW1-2

DRW1 port is used by default. You can add a second port via either of the methods below:




**Method 1:**

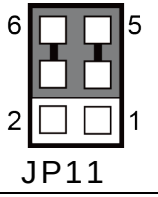
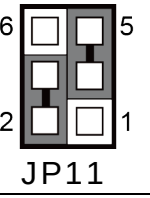
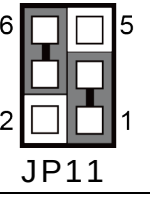
DRW1 includes two groups of GPIO pins. The second group is normally unused but can be enabled by the jumper. Set the pin header jumper JP11 as 1-2 connected if necessary.

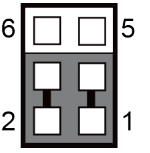
**Method 2:**

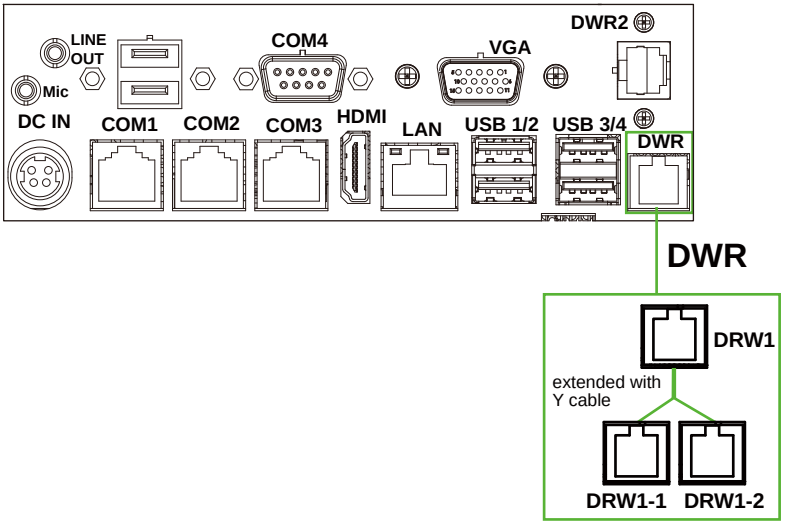
You can split DRW1 into two channels of DRW1-1 & DRW1-2 using the Y-Cable (option).

**Jumper Location: JP11**

**Description:** Cash Drawer Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| **1 Drawer & 12V** | **3-5, 4-6** ***(Default Setting)*** |   |
| 1 Drawer & 24V | 2-4, 3-5 |   |
| 2 Drawers & 12V | 1-3, 4-6 |   |

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| 2 Drawers & 24V | 1-3, 2-4 |   |




**Step 3.**
DRW1, DRW1-1, DRW1-2 shares the same power source.
(Default: 12V).

| SIO Address | |
|---|---|
| Cash drawer 1 | LDN 06, 0x91 bit 2 |
| Cash drawer 2 | LDN 06, 0x91 bit 3 |

**Cash Drawer Configuration**

The I/O port address of the cash drawer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. User must first assign the address of register by writing address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).

**Configuration Sequence**
To program F81966 configuration registers, the following configuration sequence must be followed:
(1) Enter the extended function mode
(2) Configure the configuration registers
(3) Exit the extended function mode

**(1) Enter the extended function mode**
To place the chip into the Extended Function Mode, two successive writes of 0x87 must be applied to Extended Function Enable Registers (EFERs, i.e. 2Eh or 4Eh).

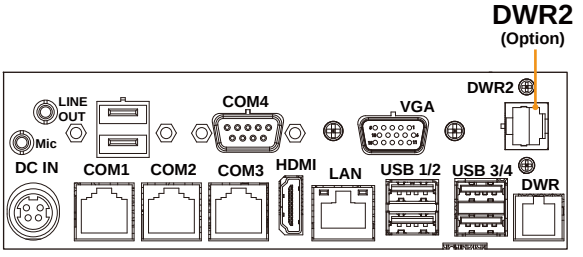
**(2) Configure the configuration registers**
The chip selects the Logical Device and activates the desired Logical Devices through Extended Function Index Register (EFIR) and Extended Function Data Register (EFDR). The EFIR is located at the same address as the EFER, and the EFDR is located at address (EFIR+1). First, write the Logical Device Number (i.e. 0x06) to the EFIR and then write the number of the desired Logical Device to the EFDR. If accessing the Chip (Global) Control Registers, this step is not required. Secondly, write the address of the desired configuration register within the Logical Device to the EFIR and then write (or read) the desired configuration register through the EFDR.

**(3) Exit the extended function mode**
To exit the Extended Function Mode, writing 0xAA to the EFER is required. Once the chip exits the Extended Function Mode, it is in the normal running mode and is ready to enter the configuration mode.

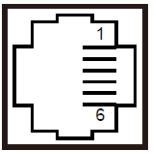
### Code example for open the cash drawer 1

```
;------ Enter to extended function mode ------------------------------------------------------
mov dx, 2eh
mov al, 87h
out dx, al
out dx, al
;------ Select Logical Device 6 of Cash drawer -----------------------------------------
mov al, 07h
out dx, al
inc dx
mov al, 06h
out dx, al
dec dx
;------ Open the Cash drawer 1 ---------------------------------------
mov al, 91h
out dx, al
inc dx
mov al, 04h
out dx, al
;------ Exit the extended function mode ------------------------------------------------------
dec dx
mov al, 0aah
out dx, al
```

**Note:**
The DWR2 Port can function only when the optional "Printer Kit" is installed on PA-A900. The DWR2 signals from the printer board (MB-1030, MB-1011, MB-1013) can be controlled via relevant commands. See the picture below for the location of DWR2 port:



| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | Drawer Open |
| 3 | Drawer Sense |
| 4 | +24V |
| 5 | NC |
| 6 | GND |




DWR2

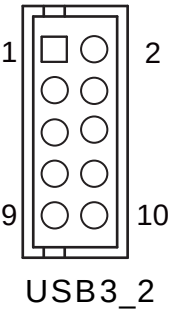
| Control Codes | Hexadecimal Codes | Function |
|---|---|---|
| <DLE EOT> | 10 04 | Real-time status transmission. |
| <DLE DC4> | 10 14 | Real-time output of the specified pulse. |

### 3.6.5 USB 2.0 Connector (USB3_2)

**Connector Location: USB3_2**

**Description:** USB 2.0 Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | VCC5_USB3 | 2 | VCC5_USB3 |
| 3 | USB2_P3_DN | 4 | USB2_P4_DN |
| 5 | USB2_P3_DP | 6 | USB2_P4_DP |
| 7 | GND | 8 | GND |
| 9 | GND | 10 | GND |



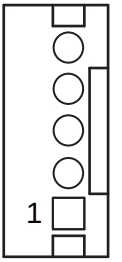

USB3_2

### 3.6.6 USB 2.0 Connectors (USB2, USB5, USB6, JUSB7)

**Connector Location: USB2**

**Description:** USB 2.0 Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | VCC5_USB7 |
| 2 | USB2_P2_DN |
| 3 | USB2_P2_DP |
| 4 | GND |
| 5 | GND |




USB2/
USB5/
USB6

**Connector Location: USB5**

**Description:** USB 2.0 Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | VCC5_USB5 |
| 2 | USB2_P5_DN |
| 3 | USB2_P5_DP |
| 4 | GND |
| 5 | GND |

**Connector Location: USB6**

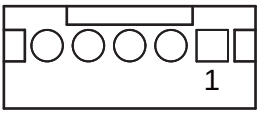
**Description:** USB 2.0 Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | VCC5_USB5 |
| 2 | USB2_P6_DN |
| 3 | USB2_P6_DP |
| 4 | GND |
| 5 | GND |

**Connector Location: JUSB7**

**Description:** USB 2.0 Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | VCC5_USB7 |
| 2 | USB2_P7_DN |
| 3 | USB2_P7_DP |
| 4 | GND |
| 5 | GND |



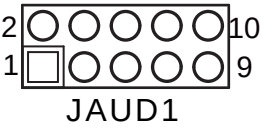

JUSB7

### 3.6.7 HD Audio Connector (JAUD1)

**Connector Location: JAUD1**

**Description:** HD Audio Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | HD_MIC-L | 2 | HD_GND |
| 3 | HD_MIC-R | 4 | PRESENCE_N |
| 5 | LINE-OUT-R | 6 | MIC-JD |
| 7 | HD_GND | 8 | NC |
| 9 | LINE-OUT-L | 10 | LINE-OUT-JD |

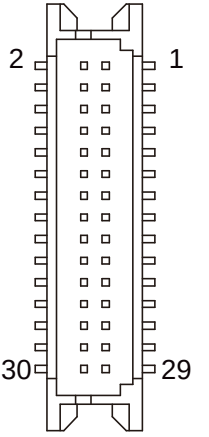


### 3.6.8 Embedded Display Port (EDP) Connector (EDP1)

**Connector Location: EDP1**

**Description:** EDP Connector

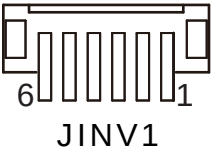
| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | EDP_DCR_EN | 2 | GND |
| 3 | EDP_SELF_TEST | 4 | DDP_ P1 |
| 5 | NC | 6 | DDP_ N1 |
| 7 | EDP_DET | 8 | GND |
| 9 | SOC_BKLTEN | 10 | DDP_ N0 |
| 11 | PANEL_BKLTCTL | 12 | DDP_ P0 |
| 13 | NC | 14 | GND |
| 15 | GND | 16 | DP_AUX_DP |
| 17 | GND | 18 | DP_AUX_DN |
| 19 | V12P0_INV | 20 | GND |
| 21 | V12P0_INV | 22 | NC |
| 23 | V12P0_INV | 24 | GND |
| 25 | V12P0_INV | 26 | LVDS_VCC |
| 27 | GND | 28 | LVDS_VCC |
| 29 | GND | 30 | GND |




EDP1

### 3.6.9 LVDS Inverter Connector (JINV1)

**Connector Location: JINV1**
**Description:** LVDS Inverter Connector



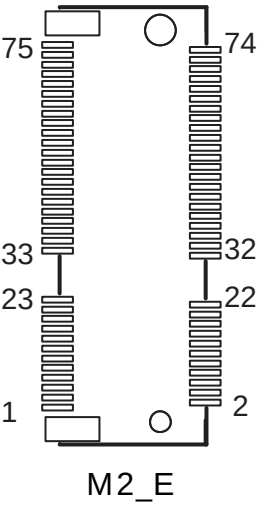

| PIN | ASSIGNMENT |
|---|---|
| 1 | V12P0_INV |
| 2 | V12P0_INV |
| 3 | GND |
| 4 | LVDS_BKLCTL |
| 5 | GND |
| 6 | LVDS_BKLTEN |

### 3.6.10 M.2 Wi-Fi Express Slot (M2_E)

**Connector Location: M2_E**

**Description:** M.2 Wi-Fi Express Slot

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | GND | 2 | V3P3S |
| 3 | USB2_P2_DP | 4 | V3P3S |
| 5 | USB2_P2_DN | 6 | NC |
| 7 | GND | 8 | NC |
| 9 | NC | 10 | NC |
| 11 | NC | 12 | NC |
| 13 | NC | 14 | NC |
| 15 | NC | 16 | NC |
| 17 | NC | 18 | GND |
| 19 | NC | 20 | NC |
| 21 | NC | 22 | NC |
| 23 | NC | 24 | NC |
| 25 | NC | 26 | NC |
| 27 | NC | 28 | NC |
| 29 | NC | 30 | NC |
| 31 | NC | 32 | NC |
| 33 | GND | 34 | NC |
| 35 | PCIE_P1_TXP | 36 | NC |
| 37 | PCIE_P1_TXN | 38 | NC |
| 39 | GND | 40 | NC |
| 41 | PCIE_P1_RXP | 42 | NC |
| 43 | PCIE_P1_RXN | 44 | NC |
| 45 | GND | 46 | NC |
| 47 | M2_PCIE_CLKP | 48 | NC |
| 49 | M2_PCIE_CLKN | 50 | SUSCLK |
| 51 | GND | 52 | WIFI_RST_ |
| 53 | M2_PCIE_CLKREQ | 54 | KILL_BT_N |
| 55 | WAKE_M2_PCIE_N | 56 | KILL_WIFI_N |
| 57 | GND | 58 | NC |
| 59 | NC | 60 | NC |
| 61 | NC | 62 | NC |
| 63 | GND | 64 | NC |
| 65 | NC | 66 | NC |
| 67 | NC | 68 | NC |
| 69 | GND | 70 | NC |
| 71 | NC | 72 | V3P3S |
| 73 | NC | 74 | V3P3S |
| 75 | GND | - | - |



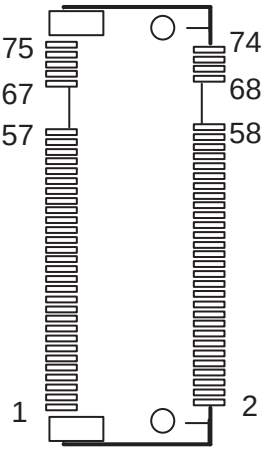

M2_E

### 3.6.11 M.2 SSD Express Slot (M2_M)

**Connector Location: M2_M**

**Description:** M.2 SSD KEY M Slot

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | GND | 2 | V3P3S |
| 3 | GND | 4 | V3P3S |
| 5 | NC | 6 | NC |
| 7 | NC | 8 | NC |
| 9 | NC | 10 | NC |
| 11 | NC | 12 | NC |
| 13 | NC | 14 | NC |
| 15 | NC | 16 | NC |
| 17 | NC | 18 | NC |
| 19 | NC | 20 | NC |
| 21 | GND | 22 | NC |
| 23 | NC | 24 | NC |
| 25 | NC | 26 | NC |
| 27 | GND | 28 | NC |
| 29 | NC | 30 | NC |
| 31 | NC | 32 | NC |
| 33 | GND | 34 | NC |
| 35 | NC | 36 | NC |
| 37 | NC | 38 | SATA_DEVSLP1 |
| 39 | GND | 40 | NC |
| 41 | SATA_RXP1 | 42 | NC |
| 43 | SATA_RXN1 | 44 | NC |
| 45 | GND | 46 | NC |
| 47 | SATA_TXN1 | 48 | NC |
| 49 | SATA_TXP1 | 50 | NC |
| 51 | GND | 52 | NC |
| 53 | NC | 54 | NC |
| 55 | NC | 56 | NC |
| 57 | GND | 58 | NC |
| 59 | NC | 60 | NC |
| 61 | NC | 62 | NC |
| 63 | NC | 64 | NC |
| 65 | NC | 66 | NC |
| 67 | NC | 68 | NC |
| 69 | GND | 70 | V3P3S |
| 71 | GND | 72 | V3P3S |
| 73 | GND | 74 | V3P3S |
| 75 | GND | - | - |

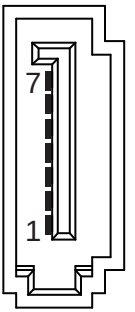



M2_M

### 3.6.12 SATA 3.0 & SATA Power Connectors (SATA1, SATA_PWR1)

**Connector Location: SATA1**
**Description:** Serial ATA 3.0 connector

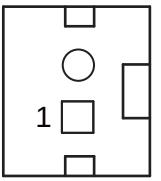
| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | SATA_TXP0 |
| 3 | SATA_TXN0 |
| 4 | GND |
| 5 | SATA_RXN0 |
| 6 | SATA_RXP0 |
| 7 | GND |



SATA1

**Connector Location: SATA_PWR1**
**Description:** HDD Power Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | VCC5 |
| 2 | GND |



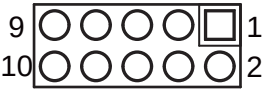
SATA_PWR1

### 3.6.13 LPC Connector (JLPC1)

**Connector Location: JLPC1**

**Description:** Low Pin Count Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | LPC_CLKOUT1 | 2 | GND |
| 3 | LPC_LFRAMEJ | 4 | GND |
| 5 | PMU_PLTRST_N | 6 | LPC_AD0 |
| 7 | LPC_AD3 | 8 | LPC_AD2 |
| 9 | V3P3A | 10 | LPC_AD1 |




JLPC1

### 3.6.14 Fan Connector (FAN_1)

**Connector Location: FAN_1**

**Description:** Fan Connector

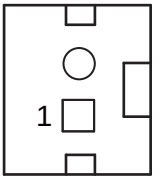
| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | V12P0S |
| 3 | FANIN |
| 4 | FANOUT |


FAN_1

### 3.6.15 Power Output Connectors (OUT_5V, OUT12V_1, OUT12V_2, OUT_24V)

**Connector Location: OUT_5V**
**Description:** Output 5V Wafer

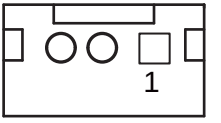
| PIN | ASSIGNMENT |
|---|---|
| 1 | V5P0S |
| 2 | GND |




OUT_5V

**Connector Location: OUT12V_1**
**Description:** Output 12V Wafer

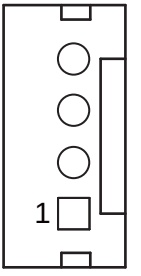
| PIN | ASSIGNMENT |
|---|---|
| 1 | V12P0S |
| 2 | V12P0S |
| 3 | GND |




OUT12V_1

**Connector Location: OUT12V_2**
**Description:** Output 12V Wafer

| PIN | ASSIGNMENT |
|---|---|
| 1 | V12P0S |
| 2 | V12P0S |
| 3 | GND |
| 4 | GND |




OUT12V_2 / OUT24V

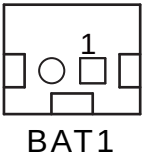
**Connector Location: OUT24V**
**Description:** Output 24V Wafer

| PIN | ASSIGNMENT |
|---|---|
| 1 | VIN_24V |
| 2 | VIN_24V |
| 3 | GND |
| 4 | GND |

### 3.6.16 RTC Connector (BAT1)

**Connector Location: BAT1**
**Description:** RTC Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | VBAT |
| 2 | GND |

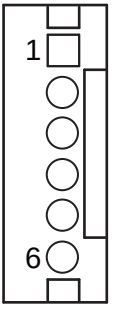


BAT1

### 3.6.17 PS/2 (MSR) Connector (PS2)

**Connector Location: PS2**
**Description:** PS/2 (MSR) Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | NC |
| 2 | KB_CLK |
| 3 | KB_DATA |
| 4 | NC |
| 5 | KBMS_VCC |
| 6 | GND |

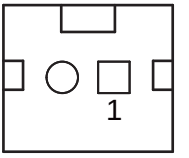


PS2

## 3.6.18 Speaker Connector (JSPK1)

**Connector Location: JSPK1**
**Description:** Speaker Connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | HD_SPK_R |
| 2 | HD_SPK_L |

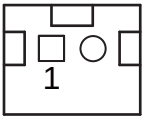



JSPK1

### 3.6.19 Switch LED Connectors (SW2, LED1)

**Connector Location: SW2**
**Description:** Power Button

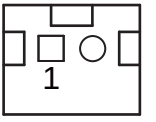
| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | PWRBTNJ |




SW2

**Connector Location: LED1**
**Description:** System Power LED

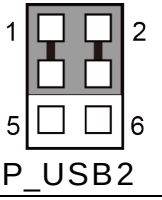
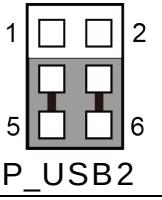
| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | V5P0S |




**LED1**

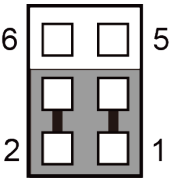
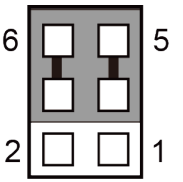
### 3.6.20 USB2 Port Selection (JP_USB2)

**Jumper Location: JP_USB2**
**Description:** USB2 Port Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| M.2 USB | 1-3, 2-4 |  |
| **USB2** | **3-5, 4-6**<br>***(Default Setting)*** |  |

### 3.6.21 USB3 Port Selection (JP_USB3_1, JP_USB3_2)

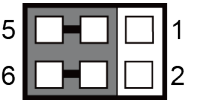
**Jumper Location: JP_USB3_1, JP_USB3_2**
**Description:** USB3 Port Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| **USB3_1**<br>(See Note 1) | **1-3, 2-4**<br>***(Default Setting)*** |  <br>**JP_USB3_1/ JP_USB3_2** |
| USB3_2<br>(See Note 2) | 3-5, 4-6 |  <br>**JP_USB3_1/ JP_USB3_2** |

Note 1: Internal USB3_1 will be disabled.
Note 2: External 2 x USB 2.0 ports will be disabled.

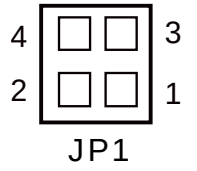
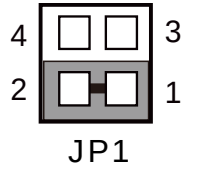
### 3.6.22 USB5 Port Selection (JP_USB5)

**Jumper Location: JP_USB5**
**Description:** USB5 Port Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| **USB5** | **3-5, 4-6** ***(Default Setting)*** |   JP_USB5 |

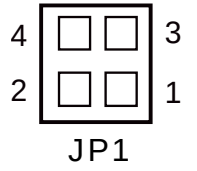
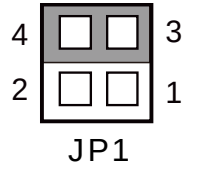
### 3.6.23 Force DNX Firmware Load Selection (JP1)

**Jumper Location: JP1**
**Description:** Force DNX Firmware Load Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| **Normal** | **Open** ***(Default Setting)*** |   |
| Force | 1-2 |   |

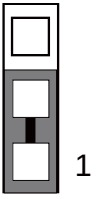
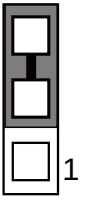
### 3.6.24 Flash Descriptor Override Selection (JP1)

**Jumper Location: JP1**
**Description:** Flash Descriptor Override Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| **Normal** | **Open** ***(Default Setting)*** |   |
| Override | 3-4 |   |

### 3.6.25 EDP (Embedded Display Port) Voltage Selection (JP_VDD1)

**Jumper Location: JP_VDD1**
**Description:** EDP Voltage Selection

| Selection | Jumper Setting | Jumper Illustration |
|---|---|---|
| **3.3V** | **1-2** ***(Default Setting)*** |   JP_VDD1 |
| 5V | 2-3 |   JP_VDD1 |

## 3.6.26 Clear CMOS Data Selection (JP3)

**Jumper Location: JP3**
**Description:** Clear CMOS Data Selection
**Step 1.** Remove the main power of the PC.
**Step 2.** Close JP3 (pins 1-2) for 6 seconds by a cap.
**Step 3.** Remove the cap which is just used on JP3 (1-2), so that JP3 returns to "OPEN".
**Step 4.** Power on the PC and the PC will then auto-reboot for once in order to set SoC's register.
**Step 5**. Done!

| SELECTION | JUMPER SETTING | JUMPER ILLUSTRATION |
|---|---|---|
| **Normal** | **Open** ***(Default Setting)*** |   JP3 |
| Clear CMOS* | 1-2 |   JP3 |

**Note:** Please make sure the main power is off before you clear CMOS data.

## 3.7 Printer Board Component Locations & Pin Assignment

### 3.7.1 Printer Board: MB-1030 series

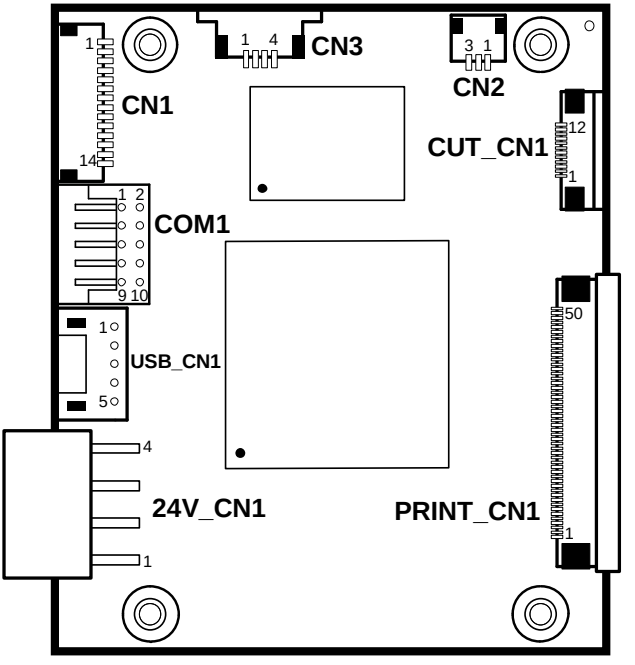



Figure 3-2. MB-1030 Printer Board Component Locations

#### 3.7.1.1 Jumper & Connector Quick Reference Table

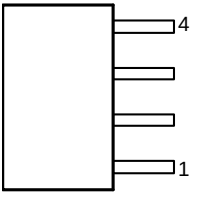
| Jumper / Connector | NAME |
|---|---|
| Power Supply Connector | 24V_CN1 |
| RS-232 Interface Connector | COM1 |
| Thermal Head/Motor/Sensor Connector | PRINT_CN1 |
| Auto-Cutter Connector | CUT_CN1 |
| Paper-Near-END Sensor Connector | CN2 |
| USB Interface Connector | USB_CN1 |
| Terminal Assignment Connector | CN1 |

## 3.7.2 Setting Printer Board Connectors and Jumpers

### 3.7.2.1 Power Supply Connector

**24V_CN1:** Power Supply Wafer

| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | GND |
| 3 | +24V |
| 4 | +24V |

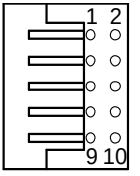



24V_CN1

### 3.7.2.2 RS-232 Interface Connector

**COM1:** RS-232 Interface Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | NC | 6 | DSR /CTS |
| 2 | RXD | 7 | RTS |
| 3 | TXD | 8 | CTS |
| 4 | DTR /RTS | 9 | NC |
| 5 | GND | 10 | NC |

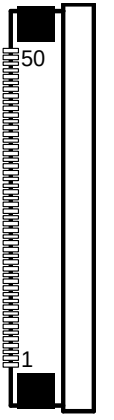



COM1

### 3.7.2.3 Thermal Head/Motor/Sensor Connector

**PRINT_CN1:** Thermal head/motor/sensor connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | 24V | Head drive power |
| 2 | 24V | Head drive power |
| 3 | 24V | Head drive power |
| 4 | 24V | Head drive power |
| 5 | 24V | Head drive power |
| 6 | 24V | Head drive power |
| 7 | DAT | Print data output |
| 8 | CLK | Synchronizing signal for print data transfer |
| 9 | GND | Head GND |
| 10 | GND | Head GND |
| 11 | GND | Head GND |
| 12 | GND | Head GND |
| 13 | GND | Head GND |
| 14 | GND | Head GND |
| 15 | NC | Unused |
| 16 | DST4 | Head strobe signal |
| 17 | DST3 | Head strobe signal |
| 18 | 3.3V | Logic Power |
| 19 | GND | Thermistor GND |
| 20 | GND | Thermistor GND |
| 21 | TH | Thermistor signal |
| 22 | NC | Unused |
| 23 | DST2 | Head strobe signal |
| 24 | DST1 | Head strobe signal |
| 25 | GND | Head GND |
| 26 | GND | Head GND |
| 27 | GND | Head GND |
| 28 | GND | Head GND |
| 29 | GND | Head GND |
| 30 | GND | Head GND |
| 31 | LATCH | Print data latch |
| 32 | 24V | Head drive power |
| 33 | 24V | Head drive power |
| 34 | 24V | Head drive power |



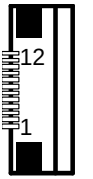

PRINT_CN1

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 35 | 24V | Head drive power |
| 36 | 24V | Head drive power |
| 37 | 24V | Head drive power |
| 38 | NC | Unused |
| 39 | PS | Signal of the out-of-paper sensor |
| 40 | Vps | Power supply of the out-of-paper sensor |
| 41 | GND | GND of the platen position/ out-of-paper sensor |
| 42 | HS | Signal of the platen position sensor |
| 43 | NC | Unused |
| 44 | FG | Frame GND |
| 45 | FG | Frame GND |
| 46 | NC | Unused |
| 47 | 2A | Motor drive signal |
| 48 | 1B | Motor drive signal |
| 49 | 1A | Motor drive signal |
| 50 | 2B | Motor drive signal |

### 3.7.2.4 Auto-Cutter Connector

**CUT_CN1:** Auto-cutter Connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | NC | Unused |
| 2 | Vcs | Power supply of the Home position sensor |
| 3 | GND | GND of the Home position sensor |
| 4 | CUTS | Signal of the Home position sensor |
| 5 | 2B-1 | Auto-cutter motor drive signal |
| 6 | 2B-2 | Auto-cutter motor drive signal |
| 7 | 2A-1 | Auto-cutter motor drive signal |
| 8 | 2A-2 | Auto-cutter motor drive signal |
| 9 | 1B-1 | Auto-cutter motor drive signal |
| 10 | 1B-2 | Auto-cutter motor drive signal |
| 11 | 1A-1 | Auto-cutter motor drive signal |
| 12 | 1A-2 | Auto-cutter motor drive signal |

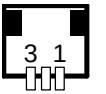



CUT_CN1

### 3.7.2.5 Paper-Near-END Sensor Connector

**CN2:** Paper-near-end sensor connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | Vns | Power supply of the near end sensor |
| 2 | NS | Signal of the near end sensor |
| 3 | GND | GND of the near end sensor |

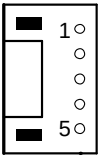



CN2

### 3.7.2.6 USB Interface Connector

**USB_CN1:** USB interface connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | Vbus | 4 | GND |
| 2 | D- | 5 | GND |
| 3 | D+ | - | - |

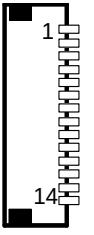



USB_CN1

### 3.7.2.7 Terminal Assignment Connector

**CN1:** Terminal assignment connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | FEED | Feed signal |
| 2 | RESET | Reset signal |
| 3 | GND | GND |
| 4 | ST1 | Status signal |
| 5 | ST2 | Status signal |
| 6 | ST3 | Status signal |
| 7 | ST4 | Status signal |
| 8 | GND | GND |
| 9 | DRS | Drawer sensor signal |
| 10 | DSW | Drawer switch signal |
| 11 | Vdu | Drive terminal for the drawer (Vp side) |
| 12 | GNDdu | Drive terminal for the drawer (GND side) |
| 13 | GND | GND |
| 14 | NC | Unused |




CN1

### 3.7.3 Printer Board: MB-1011 & MB-1013

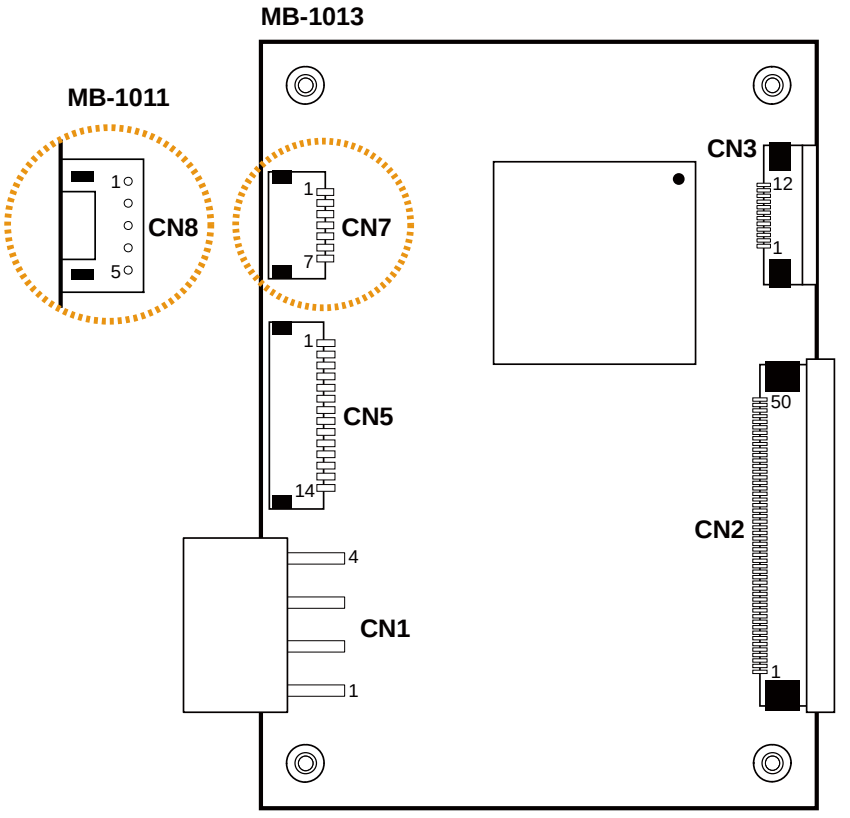



Figure 3-3. MB-1011 & MB-1013 Printer Board Component Locations

### 3.7.3.1 Jumper & Connector Quick Reference Table

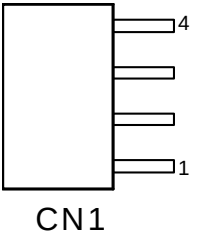
| Jumper / Connector | NAME |
|---|---|
| Power Supply Connector | CN1 |
| RS-232 Interface Connector | CN7 |
| Auto-Cutter Connector | CN3 |
| Thermal Head/Motor/Sensor Connector | CN2 |
| Terminal Assignment Connector | CN5 |
| USB Interface Connector | CN8 |

## 3.7.4 Setting Printer Board Connectors and Jumpers: MB-1011 & MB-1013

### 3.7.4.1 Power Supply Connector

**CN1:** Power supply wafer

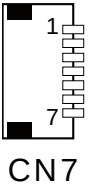
| PIN | ASSIGNMENT |
|---|---|
| 1 | GND |
| 2 | GND |
| 3 | +24V |
| 4 | +24V |




### 3.7.4.2 RS-232 Interface Connector

**CN7:** RS-232 interface connector

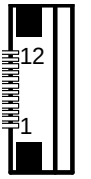
| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | TXD | 5 | DTR |
| 2 | RXD | 6 | DSR |
| 3 | RTS | 7 | GND |
| 4 | CTS | - | - |



### 3.7.4.3 Auto-Cutter Connector

**CN3:** Auto-cutter Connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | NC | Unused |
| 2 | Vcs | Power supply of the Home position sensor |
| 3 | GND | GND of the Home position sensor |
| 4 | CUTS | Signal of the Home position sensor |
| 5 | 2B-1 | Auto-cutter motor drive signal |
| 6 | 2B-2 | Auto-cutter motor drive signal |
| 7 | 2A-1 | Auto-cutter motor drive signal |
| 8 | 2A-2 | Auto-cutter motor drive signal |
| 9 | 1B-1 | Auto-cutter motor drive signal |
| 10 | 1B-2 | Auto-cutter motor drive signal |
| 11 | 1A-1 | Auto-cutter motor drive signal |
| 12 | 1A-2 | Auto-cutter motor drive signal |

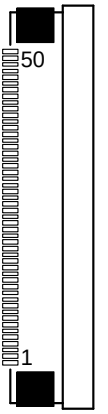


CN3

### 3.7.4.4 Thermal Head/Motor/Sensor Connector

**CN2:** Thermal head/motor/sensor connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | 24V | Head drive power |
| 2 | 24V | Head drive power |
| 3 | 24V | Head drive power |
| 4 | 24V | Head drive power |
| 5 | 24V | Head drive power |
| 6 | 24V | Head drive power |
| 7 | DAT | Print data output |
| 8 | CLK | Synchronizing signal for print data transfer |
| 9 | GND | Head GND |
| 10 | GND | Head GND |
| 11 | GND | Head GND |
| 12 | GND | Head GND |
| 13 | GND | Head GND |
| 14 | GND | Head GND |
| 15 | NC | Unused |



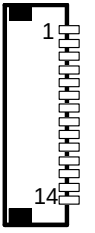
CN2

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 16 | DST4 | Head strobe signal |
| 17 | DST3 | Head strobe signal |
| 18 | 3.3V | Logic Power |
| 19 | GND | Thermistor GND |
| 20 | GND | Thermistor GND |
| 21 | TH | Thermistor signal |
| 22 | NC | Unused |
| 23 | DST2 | Head strobe signal |
| 24 | DST1 | Head strobe signal |
| 25 | GND | Head GND |
| 26 | GND | Head GND |
| 27 | GND | Head GND |
| 28 | GND | Head GND |
| 29 | GND | Head GND |
| 30 | GND | Head GND |
| 31 | LATCH | Print data latch |
| 32 | 24V | Head drive power |
| 33 | 24V | Head drive power |
| 34 | 24V | Head drive power |
| 35 | 24V | Head drive power |
| 36 | 24V | Head drive power |
| 37 | 24V | Head drive power |
| 38 | NC | Unused |
| 39 | PS | Signal of the out-of-paper sensor |
| 40 | Vps | Power supply of the out-of-paper sensor |
| 41 | GND | GND of the platen position/ out-of-paper sensor |
| 42 | HS | Signal of the platen position sensor |
| 43 | NC | Unused |
| 44 | FG | Frame GND |
| 45 | FG | Frame GND |
| 46 | NC | Unused |
| 47 | 2A | Motor drive signal |
| 48 | 1B | Motor drive signal |
| 49 | 1A | Motor drive signal |
| 50 | 2B | Motor drive signal |

### 3.7.4.5 Terminal Assignment Connector

**CN5:** Terminal assignment connector

| PIN | ASSIGNMENT | FUNCTION |
|---|---|---|
| 1 | FEED | Feed signal |
| 2 | RESET | Reset signal |
| 3 | GND | GND |
| 4 | ST1 | Status signal |
| 5 | ST2 | Status signal |
| 6 | ST3 | Status signal |
| 7 | ST4 | Status signal |
| 8 | GND | GND |
| 9 | DRS | Drawer sensor signal |
| 10 | DSW | Drawer switch signal |
| 11 | Vdu | Drive terminal for the drawer (Vp side) |
| 12 | GNDdu | Drive terminal for the drawer (GND side) |
| 13 | GND | GND |
| 14 | NC | Unused |

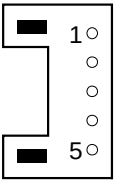


CN5

### 3.7.4.6 USB Interface Connector

**CN8:** USB interface connector

| PIN | ASSIGNMENT |
|---|---|
| 1 | Vbus |
| 2 | D- |
| 3 | D+ |
| 4 | GND |
| 5 | GND |



CN8

## 3.8 VFD Board Component Locations & Pin Assignment

### 3.8.1 VFD Board: MB-4103, LD720

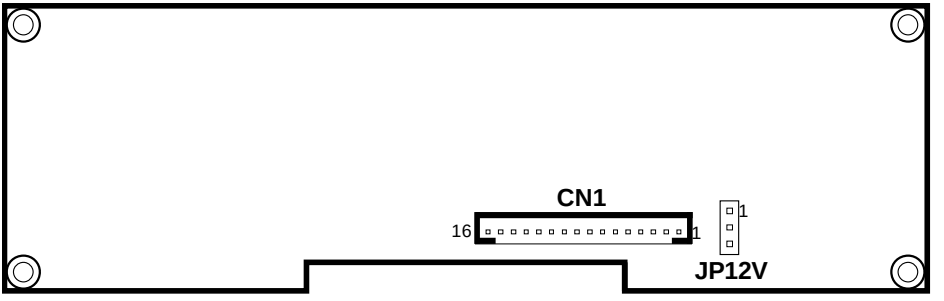



Figure 3-4. MB-4103 & LD720 VFD Board Component Locations

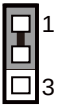
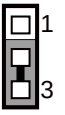
### 3.8.2 Jumper & Connector Quick Reference Table

| Jumper / Connector | NAME |
|---|---|
| Power Switch Selection | JP12V |
| RS-232 Serial Interface Connector | CN1 |

## 3.8.3 Setting MB-4103 & LD720 VFD Board Connectors and Jumpers

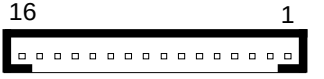
### 3.8.3.1 Power Switch Selection

**JP12V:** Power Switch Selection

| SELECTION | JUMPER SETTING | JUMPER ILLUSTRATION |
|---|---|---|
| OFF | 1-2 |  JP12V |
| **ON** (Default) | 2-3 |  JP12V |

### 3.8.3.2 RS-232 Serial Interface Connector

**CN1:** RS-232 serial interface wafer




CN1

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | GND | 9 | NC |
| 2 | TXD | 10 | NC |
| 3 | RXD | 11 | NC |
| 4 | DTR | 12 | NC |
| 5 | DSR | 13 | NC |
| 6 | RTS | 14 | NC |
| 7 | CTS | 15 | NC |
| 8 | +12V/+5V | 16 | NC |

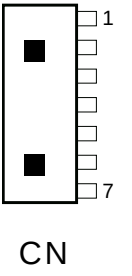
## 3.9 MSR Board Component Locations & Pin Assignment

### 3.9.1 ID TECH


**ID-TECH MSR Board Component Locations**

#### 3.9.1.1 Main Connector

**CN:**




| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | Chassis Ground | 5 | K-CLK<br>(Computer connections) |
| 2 | P-CLK<br>(Keyboard connections) | 6 | K-DATA<br>(Computer connections) |
| 3 | P-DATA<br>(Keyboard connections) | 7 | GND |
| 4 | +5V Vcc | - | - |

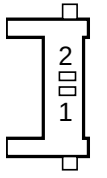
## 3.9.2 MB-3012


Figure 3-5. MB-3012 MSR Board Component Locations

### 3.9.2.1 Information Button Reader

**I_BUTTON1:** Information button reader

| PIN | ASSIGNMENT |
|---|---|
| 1 | I_B1 |
| 2 | GND |

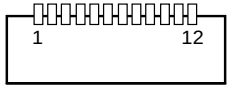



I_BUTTON1

### 3.9.2.2 Output Connector

**IO1:** Output wafer

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|---|---|---|---|
| 1 | CLK_KB | 7 | RX_MSR |
| 2 | CLK_PC | 8 | TX_MSR |
| 3 | DATA_KB | 9 | GND |
| 4 | DATA_PC | 10 | USB_D+_R |
| 5 | +5V | 11 | USB_D-_R |
| 6 | CHASSIS GND | 12 | GND |




IO1

# 4 Software Utilities

This chapter provides the detailed information that guides users to install driver utilities for the system. The following topics are included:

- Installing Intel® Chipset Software Installation Utility
- Installing Graphics Driver Utility
- Installing Intel® Trusted Execution Engine Utility
- Installing LAN Driver Utility
- Installing Sound Driver Utility
- Installing Intel® Serial I/O Utility
- Installing Intel® Windows 10® I/O Utility
- Installing Microsoft Hotfix kb3211320 and kb3213986 Driver Utility
- Peripheral Devices
  - Printer
  - VFD
  - MSR
- API

## 4.1 Introduction

Enclosed with the PA-A900 Series package is our driver utilities contained in a DVD-ROM disk. Refer to the following table for driver locations:

| Filename (Assume that DVD- ROM drive is D :) | Purpose |
|---|---|
| D:\DRIVER\Platform\1_Main Chip\Win10 2016(64-bit) | Intel(R) Chipset Device Software Installation Utility |
| D:\DRIVER\Platform\2_Graphics\ Win10 2016(64-bit) | Intel Graphics Driver installation |
| D:\DRIVER\Platform\3_TXE\Win10 2016(64-bit) | Intel(R) Trusted Execution Engine |
| D:\DRIVER\Platform\4_Sound Codec\Win10 2016(64-bit) | Intel(R) HD Graphics installer |
| D:\DRIVER\Platform\5_LAN Chip\Win10 2016(64-bit) | Intel(R) Network Connections Software |
| D:\DRIVER\Platform\6_Serial IO\Win10 2016(64-bit) | Intel(R) Serial IO Driver |
| D:\DRIVER\Platform\7_IO\Win10 2016(64-bit) | Intel Processor Win10 IO Drivers |
| D:\DRIVER\Platform\8_HotFix\ Win10 2016(64-bit) | Microsoft Hotfix kb3211320 and kb3213986 |

**X : Not support**

**✓: Support**

**Note:** Install the driver utilities immediately after the OS installation is completed.

## 4.2 Installing Intel® Chipset Software Installation Utility Introduction

The Intel® Chipset Software Installation Utility installs Windows *.INF files to the target system. These files outline to the operating system how to configure the Intel chipset components in order to ensure the following features function properly:

- SATA Storage Support (SATA & SATA II)
- USB Support (1.1 & 2.0 & 3.0)
- Identification of Intel® Chipset Components in Device Manager

### 4.2.1 Installing Intel® Chipset Driver

The utility pack is to be installed only for Windows® 10 (64bit), and it should be installed right after the OS installation. Please follow the steps below:

1. Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.
2. Enter the "**Main Chip**" folder where the Chipset driver is located.
3. Select Windows 10 2016 (64-bit) for your OS platform.
4. Click **SetupChipset.exe** file for driver installation.
5. Follow the on-screen instructions to complete the installation.
6. Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.3 Installing Graphics Driver Utility

To install the Graphics driver, follow the steps below:

***1*** Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.

***2*** Enter the “Graphics” folder where the Graphics driver is located.

***3*** Select Windows 10 2016 (64-bit) for your OS platform.

***4*** Click **Setup.exe** file for driver installation.

***5*** Follow the on-screen instructions to complete the installation.

***6*** Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.4 Installing Intel® Trusted Execution Engine Installation Utility

***1*** Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.

***2*** Enter the **TXE** folder where the driver is located.

***3*** Select Windows 10 2016 (64-bit) for your OS platform.

***4*** Click **SetupTXE.exe** file for TXE driver installation.

***5*** Follow the on-screen instructions to complete the installation.

***6*** Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.5 Installing LAN Driver Utility

PA-A900 is enhanced with LAN function that can support various network adapters.

To install the LAN Driver, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.
2. Enter the **"LAN Chip"** folder where the LAN driver is located.
3. Select Windows 10 2016 (64-bit) for your OS platform.
4. Click **PROWinx64(LAN).exe f**ile for driver installation.
5. Follow the on-screen instructions to complete the installation.
6. Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

**For more details on the Installation procedure, please refer to the Readme.txt file found on LAN Driver Utility.**

## 4.6 Installing Sound Driver Utility

The sound function enhanced in this system is fully compatible with Windows® 10 (64bit) series.

To install the Sound Driver, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.
2. Enter the **"Sound Codec"** folder where the sound driver is located.
3. Select Windows 10 2016 (64-bit) for your OS platform.
4. Click **Setup.exe** file for driver installation.
5. Follow the on-screen instructions to complete the installation.
6. Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.7 Installing Intel® Serial I/O Driver Utility

To install the Serial I/O Driver, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.
2. Open the **Serial IO** folder where the driver is located.
3. Select Windows 10 2016 (64-bit) for your OS platform.
4. Click the **SetupSerialIO.exe** file for the driver installation.
5. Follow the on-screen instructions to complete the installation.
6. Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.8 Installing Intel® Windows® 10 I/O Driver Utility

To install the Windows® 10 I/O driver utility, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.
2. Enter the **IO** folder where the driver is located.
3. Select Windows 10 2016 (64-bit) for your OS platform.
4. Click the **Intel_Processor_Win10_IO_Drivers_64Bit.exe** files for the driver installation.
5. Follow the on-screen instructions to complete the installation.

Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.9 Installing Microsoft Hotfix kb3211320 and kb3213986 Driver Utility

To install the Hotfix driver utility, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A900 and insert the driver disk.
2. Enter the **Hotfix** folder where the driver is located.
3. Select Windows 10 2016 (64-bit) for your OS platform.
4. Click the **windows10.0-kb3211320-x64_2abc94fceb4d1cdd908b3bdba473e28e0c061a3d** and **windows10.0-kb3213986-x64_a1f5adacc28b56d7728c92e318d6596d9072aec4** files for critical security update.
5. Follow the on-screen instructions to complete the installation.

Once the installation is completed, shut down the system and restart PA-A900 for the changes to take effect.

## 4.10 Peripheral Devices

The Commands lists and driver installation guide for embedded peripheral devices of the system - printer board and VFD – are explicitly included in this section.

### 4.10.1 Printer Board: MB-1030

#### 4.10.1.1 Commands List

**1. Printer Registry Operation**

| Registry Name | Default Data | Notes |
|---|---|---|
| BaudRate | 115200 | - |
| BitLength | 8 | - |
| Parity | N | - |
| Stop | 1 | - |

1. Commands List

Standard Commands

| Command | RA | RB | Command | RA | RB | Command | RA | RB |
|---|---|---|---|---|---|---|---|---|
| HT | | V | ESC D | | V | GS / | V | V |
| LF | V | V | ESC E | V | V | GS : | | |
| FF | | V | ESC G | | V | GS B | V | V |
| CR | V | V | ESC J | V | V | GS H | V | V |
| CAN | | V | ESC L | | V | GS I | V | V |
| DLE EOT | V | V | ESC M | V | V | GS L | V | V |
| DLE ENQ | | V | ESC c 4 | | V | GS P | V | V |
| DLE DC4 | V | V | ESC c 5 | | V | GS V | V | V |
| ESC FF | | V | ESC d | V | V | GS W | | V |
| ESC SP | V | V | ESC p | V | V | GS \ | | |
| ESC ! | V | V | ESC t | V | V | GS ^ | | |
| ESC $ | V | V | ESC { | V | V | GS a | V | V |
| ESC % | | | FS g 1 | | | GS b | | |
| ESC & | | | FS g 2 | | | GS f | V | V |
| ESC * | | V | FS p | V | V | GS h | V | V |
| ESC | V | V | FS q | V | V | GS k | V | V |
| ESC 2 | V | V | GS ! | V | V | GS r | V | V |
| ESC 3 | V | V | GS $ | | V | GS v 0 | V | V |
| ESC = | V | V | GS * | V | V | GS w | V | V |
| ESC ? | | | GS ( A | V | V | | | |
| ESC @ | V | V | GS ( K | | V | | | |

### Kanji Control Commands

| Command | MB-1030 RA | MB-1030 RB |
|---|---|---|
| FS ! | V | V |
| FS & | V | V |
| FS | | V |
| FS . | V | V |
| FS 2 | | |
| FS C | | |
| FS S | | V |
| FS W | | V |

### Other Commands

| Command | MB-1030 RA | MB-1030 RB |
|---|---|---|
| ESC i | V | V |
| ESC m | V | V |
| DC2 ; | | V |
| GS p 1 | | V |

## COMMANDS LIST

### Standard Commands

| Control Codes | Hexadecimal Codes | Function | Standard Mode | Page Mode |
|---|---|---|---|---|
| <HT> | 09 | Horizontal tab | V | V |
| <LF> | 0A | Print and line feed | V | V |
| <FF> | 0C | Print and recover to standard mode (in page mode) | Ignored | V |
| <CR> | 0D | Print and carriage return | V | V |
| <CAN> | 18 | Cancel print data in page mode | Ignored | V |
| <DLE EOT> | 10 04 | Real-time status transmission | V | V |
| <DLE ENQ> | 10 05 | Real-time request to printer | V | V |
| <DLE DC4> | 10 14 | Real-time output of specified pulse | V | V |
| <ESC FF> | 1B 0C | Print data in page mode | Ignored | V |
| <ESC SP> | 1B 20 | Set right-side character spacing | V | V |
| <ESC !> | 1B 21 | Select print mode(s) | V | V |
| <ESC $> | 1B 24 | Set absolute print position. | V | V |
| <ESC *> | 1B 2A | Select bit image mode | V | V |

| Control Codes | Hexadecimal Codes | Function | Standard Mode | Page Mode |
|---|---|---|---|---|
| <ESC -> | 1B 2D | Turn underline mode on/off. | V | V |
| <ESC 2> | 1B 32 | Select default line spacing | V | V |
| <ESC 3> | 1B 33 | Set line spacing | V | V |
| <ESC => | 1B 3D | Select peripheral device | V | V |
| <ESC @> | 1B 40 | Initialize printer | V | V |
| <ESC D> | 1B 44 | Set horizontal tab position | V | V |
| <ESC E> | 1B 45 | Turn emphasized mode on/off | V | V |
| <ESC G> | 1B 47 | Turn double-strike mode on/off | V | V |
| <ESC J> | 1B 4A | Print and feed paper | V | V |
| <ESC L> | 1B 4C | Select page mode | ◎ | Ignored |
| <ESC M > | 1B 4D | Select character font | V | V |
| <ESC R> | 1B 52 | Select an international character set | V | V |
| <ESC S> | 1B 53 | Select standard mode | Ignored | V |
| <ESC T> | 1B 54 | Select print direction in page mode | ▲ | V |
| <ESC V> | 1B 56 | Turn 90 degree clockwise rotation mode on/off | V | ▲ |
| <ESC W> | 1B 57 | Set printing area in page mode | ▲ | V |
| <ESC \> | 1B 5C | Set relative print position | V | V |
| <ESC a> | 1B 61 | Select justification | ◎ | ▲ |
| <ESC c 3> | 1B 63 33 | Select paper sensor(s) to output paper-end signals | V | V |
| <ESC c 4> | 1B 63 34 | Select paper sensor(s) to stop printing | V | V |
| <ESC c 5> | 1B 63 35 | Enable/disable panel buttons | V | V |
| <ESC d> | 1B 64 | Print and feed n lines | V | V |
| <ESC i> | 1B 69 | Full cut | V | Disabled |
| <ESC m> | 1B 6D | Partial cut | V | Disabled |
| <ESC p> | 1B 70 | General pulse | V | V |
| <ESC t> | 1B 74 | Select character code table | V | V |
| <ESC {> | 1B 7B | Turn upside-down printing mode on/off | ◎ | ▲ |
| <FS p> | 1C 70 | Print NV bit image | V | Disabled |
| <FS q> | 1C 71 | Define NV bit image | ◎ | Disabled |
| <GS !> | 1D 21 | Select character size | | V |
| <GS $> | 1D 24 | Set absolute vertical print position in page mode | Ignored | V |
| <GS *> | 1D 2A | Define download bit images | V | V |
| <GS ( A> | 1D 28 41 | Execute test print | V | Disabled |
| <GS ( K> | 1D 28 4B | Set print density | V | Disabled |
| <GS /> | 1D 2F | Print download bit image | ● | V |

| Control Codes | Hexadecimal Codes | Function | Standard Mode | Page Mode |
|---|---|---|---|---|
| <GS B> | 1D 42 | Turn white/black reverse printing mode on/off | V | V |
| <GS H> | 1D 48 | Select printing position of HRI characters | V | V |
| <GS I> | 1D 49 | Transmit printer ID | V | Disabled |
| <GS L> | 1D 4C | Set left margin | ◎ | Disabled |
| <GS P> | 1D 50 | Set basic calculated pitch | V | V |
| <GS V> | 1D 56 | Cut paper | ◎ | V |
| <GS W> | 1D 57 | Set printing area width | ◎ | ▲ |
| <GS \> | 1D 5C | Set relative vertical print position in page mode | Ignored | |
| <GS a> | 1D 61 | Enable/disable Automatic Status Back (ASB) | V | V |
| <GS f> | 1D 66 | Select font for HRI characters | V | V |
| <GS h> | 1D 68 | Set bar code height | V | V |
| <GS k> | 1D 6B | Print bar code | ● | V |
| <GS r> | 1D 72 | Transmit status | V | V |
| <GS v 0> | 1D 76 30 | Print raster bit image | ● | Disabled |
| <GS w> | 1D 77 | Set bar code width | V | V |

## Two-dimensional Bar Code Commands

| Control Codes | Hexadecimal Code | Function | Standard Mode | Page Mode |
|---|---|---|---|---|
| <DC2 ;> | 12 3B | Specifies a module size of QR Code and Data Matrix | V | V |
| <GS p 1> | 1D 70 01 | Prints QR Code data based on the specified contents | V | V |

## Kanji Control Commands

(when the Japanese, Simplified Chinese, Traditional Chinese, or Korean model is used.)

| Control Codes | Hexadecimal Codes | Function | Standard Mode | Page Mode |
|---|---|---|---|---|
| <FS !> | 1C 21 | Set print mode(s) for Kanji characters | V | V |
| <FS &> | 1C 26 | Select Kanji character mode | V | V |
| <FS -> | 1C 2D | Turn underline mode on/off for Kanji characters | V | V |
| <FS .> | 1C 2E | Cancel Kanji character mode | V | V |
| <FS S> | 1C 53 | Set Kanji character spacing | V | V |
| <FS W> | 1C 57 | Turn quadruple-size mode on/off for Kanji characters | V | V |

Command classification

Executing : Printer executes the command which does not affect the following data.
Setting: Printer uses flags to make settings, and those settings affect the following data.

○: Enabled.
◎: Enabled only when the command is set at the beginning of a line.
●: Enabled only when data is not present in the printer buffer.
▲: Only value setting is possible.
Disabled: Parameters are processed as printable data.
Ignored: All command codes including parameters are ignored and nothing is executed.

# COMMANDS DETAILS

## STANDARD COMMAND DETAILS

### HT

| [Name] | Horizontal tab |
|---|---|
| [Format] | ASCII HT<br>Hex. 09<br>Decimal 9 |
| [Range] | N/A |
| [Description] | Moves print position to next horizontal tab position.<br>● This command is ignored if the next tab is not set.<br>● If the next tab position exceeds the print region, the print position is moved to [print region + 1].<br>● The horizontal tab position is set by ESC D (Set/cancel horizontal tab position).<br>● When the print position is at the [print region + 1] position and this command is received, the current line buffer full is printed and a horizontal tab is executed from the top of the next line.<br>● The initial value of the horizontal tab position is every 8 characters of Font A (the 9th, 17th, 25th positions, etc.) |

### LF

| [Name] | Print and line feed |
|---|---|
| [Format] | ASCII LF<br>Hex. 0A<br>Decimal 10 |
| [Range] | N/A |
| [Description] | Prints the data in the print buffer and performs a line feed based on the set line feed amount.<br>● After execution, makes the top of the line the next print starting position. |

**FF**

| | |
|---|---|
| [Name] | Print and recover to standard mode (in page mode) |
| [Format] | ASCII FF<br>Hex. 0C<br>Decimal 12 |
| [Range] | N/A |
| [Description] | Prints all buffered data to the print region collectively, then recovers to the standar mode.<br>● All buffer data is deleted after printing.<br>● The print area set by ESC W (Set print region in page mode) is reset to the default setting.<br>● No paper cut is executed.<br>● Sets the print position to the beginning of the next line after execution.<br>● This command is enabled only in page mode. |

**CR**

| | |
|---|---|
| [Name] | Print and carriage return |
| [Format] | ASCII CR<br>Hex. 0D<br>Decimal 13 |
| [Range] | N/A |
| [Description] | When an automatic line feed is enabled, this command functions in the same way as LF (print and line feed). When the automatic line feed is disabled, this command is ignored.<br>● This command is ignored with serial interface models.<br>● Sets the print position to the beginning of the next line after execution. |

**CAN**

| | |
|---|---|
| [Name] | Cancel print data in page mode |
| [Format] | ASCII CAN<br>Hex. 18<br>Decimal 24 |
| [Range] | N/A |
| [Description] | Deletes all print data in the currently set print region in page mode.<br>● This command is enabled only in page mode.<br>● Portions included in the currently set print region are also deleted, even if previously set print region data. |

## DLE EOT n

| | |
|---|---|
| [Name] | Real-time status transmission. |
| [Format] | ASCII OLE EOT n<br>Hex. 10 04 n<br>Decimal 16 4 n |
| [Range] | 1 ≤ n ≤ 4 |
| [Description] | Transmits the selected printer status specified by n in real time, according to the following parameters:<br>n = 1 : Transmit printer status. n = 2 : Transmit off-line status.<br>n = 3 : Transmit error status. n = 4 : Transmit paper roll sensor status. |

n = 1 : Printer status.

| Bit | On / Off | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2 | Off | 00 | 0 | Drawer open/close signal is LOW. |
| | On | 04 | 4 | Drawer open/close signal is HIGH. |
| 3 | Off | 00 | 0 | On-line. |
| | On | 08 | 8 | Off-line. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | Not used. Fixed to Off. |
| 6 | Off | 00 | 0 | Not used. Fixed to Off. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

n = 2 : Off-line status.

| Bit | On / Off | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2 | Off | 00 | 0 | Cover is closed. |
| | On | 04 | 4 | Cover is open. |
| 3 | Off | 00 | 0 | Not used. Fixed to Off. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | No paper-end stop. |
| | On | 20 | 32 | Printing stops due to paper end. |
| 6 | Off | 00 | 0 | No error. |
| | On | 40 | 64 | Error occurs. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

n = 3 : Error status

| Bit | On / Off | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | On | 02 | 2 | Not used. Fixed to On. |
| 2 | Off | 00 | 0 | Not used. Fixed to Off. |

| | | | | |
|---|---|---|---|---|
| 3 | Off | 00 | 0 | Not used. Fixed to Off. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | Not used. Fixed to Off. |
| 6 | Off | 00 | 0 | Not used. Fixed to Off. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

n = 4 : Continuous paper sensor status.

| Bit | On / Off | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to Off. |
| 1 | Off | 02 | 2 | Not used. Fixed to On. |
| 2 | Off | 00 | 0 | No paper-near-end stop. |
| | On | 04 | 4 | Printing stops due to paper near end. |
| 3 | Off | 00 | 0 | No paper-near-end stop. |
| | On | 08 | 8 | Printing stops due to paper near end. |
| 4 | On | 10 | 16 | Not used. Fixed to On. |
| 5 | Off | 00 | 0 | No paper-end stop. |
| | On | 20 | 32 | Printing stops due to paper end. |
| 6 | Off | 00 | 0 | No paper-end stop. |
| | On | 40 | 64 | Printing stops due to paper end. |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

## DLE ENQ n

| | |
|---|---|
| [Name] | Real-time request to printer. |
| [Format] | ASCII DLE ENQ n<br>Hex. 10 05 n<br>Decimal 16 5 n |
| [Range] | 1 ≤ n ≤ 2 |
| [Description] | Responds to requests n specifications from the host in real-time. n specifications are below.<br>n = 1: Recover from the error and start printing from the line where the error occurred.<br>n = 2: Recover from error after clearing the reception buffer and print buffer.<br>This command is enabled even when the printer specification is disabled by ESC = (select peripheral devices). |

## DLE DC4 n m t

| [Name] | Real-time output of specified pulse. |
|---|---|
| [Format] | ASCII DLE DC4 n m t<br>Hex. 10 14 n m t<br>Decimal 16 20 n m t |
| [Range] | n = 1<br>m = 0,1<br>1 ≤ t ≤ 8 |
| [Description] | This outputs a signal specified by t to the connector pin specified by m.<br>m = 0: #2 Pin of the drawer kick connector<br>m = 1: #5 Pin of the drawer kick connector<br>On time is set to t x 100 msec; Off time is set to t x 100 msec. |

## ESC FF

| [Name] | Print data in page mode. |
|---|---|
| [Format] | ASCII ESC FF<br>Hex. 1B 0C<br>Decimal 27 12 |
| [Range] | N/A |
| [Description] | Prints all buffered data in the print area collectively in page mode.<br>● This command is enabled only in page mode.<br>● Holds the following information after printing.<br>a. Expanded data<br>b. Character print direction selection in page mode (ESC T)<br>c. Set print region (ESC W) in the page mode.<br>d. Character expansion position |

## ESC SP n

| [Name] | Set right-side character spacing. |
|---|---|
| [Format] | ASCII ESC SP n<br>Hex. 1B 20 n<br>Decimal 27 32 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | This command sets the size of space to right of character.<br>Right space = n × [horizontal motion units]. |

## ESC ! n

| | |
|---|---|
| [Name] | Select print mode(s). |
| [Format] | ASCII ESC ! n<br>Hex. 1B 21 n<br>Decimal 27 33 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | This command selects print mode(s) with bits having following meanings. |

| Bit | On / Off | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Character font A selected. |
| | On | 01 | 1 | Character font B selected. |
| 1 | Off | 00 | 0 | Not used. Fixed to Off. |
| 2 | Off | 00 | 0 | Not used. Fixed to Off. |
| 3 | Off | 00 | 0 | Emphasized mode not selected. |
| | On | 08 | 8 | Emphasized mode selected. |
| 4 | Off | 00 | 0 | Double-height mode not selected |
| | On | 10 | 16 | Double-height mode selected |
| 5 | Off | 00 | 0 | Double-width mode not selected. |
| | On | 20 | 32 | Double-width mode selected. |
| 6 | Off | 00 | 0 | Not used. Fixed to Off. |
| 7 | Off | 00 | 0 | Underline mode not selected. |
| | On | 80 | 128 | Underline mode selected. |

## ESC $ nL nH

| | |
|---|---|
| [Name] | Set absolute print position. |
| [Format] | ASCII ESC $ nL nH<br>Hex. 1B 24 nL nH<br>Decimal 27 36 nL nH |
| [Range] | 0 ≤ (nL + nH x 256) ≤ 65535 (0 ≤ nH ≤ 255, 0 ≤ nL ≤ 255) |
| [Description] | This command specifies the next print starting position in reference to the left edge of the print area. The printing start position is calculated using (nL + nH x 256) x (vertical or horizontal motion units). Specifications exceeding the print range are ignored. |

## ESC * m nL nH d1…dk

| | |
|---|---|
| [Name] | Select bit image mode |
| [Format] | ASCII ESC * m nL nH d1...dk<br>Hex. 1B 2A m nL nH d1...dk<br>Decimal 27 42 m nL nH d1...dk |
| [Range] | m = 0,1,32,33<br>0 ≤ nL ≤ 255<br>0 ≤ nH ≤ 3<br>0 ≤ d ≤ 255 |
| [Description] | Selects a bit-image mode in mode *m* for the number of dots specified by *nL* and *nH*.<br>m = 1,33 : (nL+nH×256)<576 (3 inch);(nL+nH×256)<432 (2 inch).<br>m = 0,32 : (nL+nH×256)<288 (3 inch);(nL+nH×256)<216 (2 inch). |

| m | Mode | Number of Vert. Dir. Dots | Density of Vert. Dir. Dots | Density of Hor. Dir. Dots | Data Count (k) |
|---|---|---|---|---|---|
| 0 | 8 dot single density | 8 | 67 DPI | 101 DPI | nL+nH×256 |
| 1 | 8 dot double density | 8 | 67 DPI | 203 DPI | nL+nH×256 |
| 32 | 24 dot single density | 24 | 203 DPI | 101 DPI | (nL+nH×256) ×3 |
| 33 | 24 dot double density | 24 | 203 DPI | 203 DPI | (nL+nH×256) ×3 |

## ESC - n

| [Name] | Turn underline mode on/off. |
|---|---|
| [Format] | ASCII ESC - n<br>Hex. 1B 2D n<br>Decimal 27 45 n |
| [Range] | 0 ≤ n ≤ 2<br>Initial Value n = 0 |
| [Description] | This command enables the print data following it to be printer out underlined.<br>The underline mode varied depending on the following values of n: |

| n | Function |
|---|---|
| 0 | Turns off underline mode |
| 1 | Turns on underline mode, set at 1-dot thick |
| 2 | Turns on underline mode, set at 2-dot thick |

## ESC 2

| [Name] | Select default line spacing. |
|---|---|
| [Format] | ASCII ESC 2<br>Hex. 1B 32<br>Decimal 27 50 |
| [Range] | N/A |
| [Description] | This command sets the default line spacing The default line spacing is approximately 4.25 mm, which is equivalent to 34 dots. |

## ESC 3 n

| [Name] | Set line spacing. |
|---|---|
| [Format] | ASCII ESC 3 n<br>Hex. 1B 33 n<br>Decimal 27 51 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 34 |
| [Description] | This command sets the line spacing using a following rule.<br>Line spacing = n x (vertical or horizontal motion units) |

## ESC = n

| | |
|---|---|
| [Name] | Select peripheral device. |
| [Format] | ASCII ESC = n<br>Hex. 1B 3D n<br>Decimal 27 61 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 1 |
| [Description] | Selects the peripheral device for which the data is effective from the host computer. |

| Bit | Function | "0" | "1" |
|---|---|---|---|
| 7 | Undefined | | |
| 6 | Undefined | | |
| 5 | Undefined | | |
| 4 | Undefined | | |
| 3 | Undefined | | |
| 2 | Undefined | | |
| 1 | Undefined | | |
| 0 | Printer | Invalid | Valid |

## ESC @

| | |
|---|---|
| [Name] | Initialize printer. |
| [Format] | ASCII ESC @<br>Hex. 1B 40<br>Decimal 27 64 |
| [Range] | N/A |
| [Description] | Clears data from the print buffer and sets the printer to its default settings. |

## ESC D n1…nk NUL

| | |
|---|---|
| [Name] | Set horizontal tab position |
| [Format] | ASCII ESC D n1...nk NUL<br>Hex. 1B 44 n1...nk NUL<br>Decimal 27 68 n1...nk NUL |
| [Range] | 1 ≤ n ≤ 255<br>0 ≤ k ≤ 32 |
| [Description] | Sets horizontal tab position<br>● n specifies the column number for setting a horizontal tab position from the left margin or the beginning of the line.<br>● k indicates the number of horizontal tab positions to be set. |

**ESC E n**

| | |
|---|---|
| [Name] | Turn emphasized mode on / off. |
| [Format] | ASCII ESC E n<br>Hex. 1B 45 n<br>Decimal 27 69 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | This command turns emphasized mode on or off by toggling the least significant bit of n as followings:<br>When the LSB of n is 0, the emphasized mode is turned off.<br>When the LSB of n is 1, the emphasized mode is turned on. |

**ESC G n**

| | |
|---|---|
| [Name] | Turn double-strike mode on/off. |
| [Format] | ASCII ESC G n<br>Hex. 1B 47 n<br>Decimal 27 71 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | Specifies or cancels double printing.<br>Cancels double printing when n = <*******0>B.<br>Specifies double printing when n = <*******1>B.<br>● n is effective only when it is the lowest bit.<br>● This printer is not capable of double printing, so the print is the same as when using emphasized printing.<br>● This command is enabled for ANK characters |

**ESC J n**

| | |
|---|---|
| [Name] | Print and feed paper. |
| [Format] | ASCII ESC J n<br>Hex. 1B 4A n<br>Decimal 27 74 n |
| [Range] | 0 ≤ n ≤ 255 |
| [Description] | This command prints the data in the print buffer and feeds the paper [n X vertical motion unit].<br>● Sets the print position to the beginning of the next line after printing.<br>● In standard mode, the printer uses the vertical motion unit (*y*).<br>● In page mode, this command functions as follows, depending on the starting position of the printable area:<br>(1) When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (*y*) is used. |

| | |
|---|---|
| | (2) When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit (*x*) is used.<br>● The maximum line spacing is 150mm {5.9 inches }. When the setting value exceeds the maximum, it is converted to the maximum automatically. |

## ESC L

| | |
|---|---|
| [Name] | Select page mode |
| [Format] | ASCII ESC L<br>Hex. 1B 4C<br>Decimal 27 76 |
| [Range] | N/A |
| [Description] | ● Enabled only when input with the top of line.<br>● Invalid when input by page mode.<br>● Returns to standard mode after the following commands are issued.<br>a. FF (Print and recover to page mode)<br>b. ESC S (Select standard mode)<br>● Character expansion position has the starting point specified by ESC T (Character print direction selection in page mode) in the printing region designated by the ESC W (Set print region in the page mode) command.<br>● This command switches the settings for the following commands the values of which can be set independently in standard mode and page mode to those for page mode<br>a. Set space amount: ESC SP, FS S<br>b. Set line feed amount: ESC 2, ESC 3<br>● The following commands are enabled only when in page mode.<br>a. ESC V : Specify/cancel character 90 degree clockwise rotation<br>b. ESC a : Position alignment<br>c. ESC { : Specify/cancel upside-down printing<br>d. GS W : Set print region width<br>● The following command is ignored in page mode.<br>a. GS (A : Test print<br>● The following commands are invalid in page mode.<br>a. FS p : Print NV bit image<br>b. FS q : Define NV bit image<br>c. GS v 0 : Print raster bit images<br>d. GS L : Set left margin<br>● Recover to standard mode using ESC @ (initialize printer). |

## ESC M n

| | |
|---|---|
| [Name] | Select character font. |
| [Format] | ASCII ESC M n<br>Hex. 1B 4D n<br>Decimal 27 77 n |
| [Range] | n = 0, 1<br>Initial Value n = 0 |
| [Description] | This command selects ANK character fonts using n as follows: |

| n | Function |
|---|---|
| 0 | Character font A selected |
| 1 | Character font B selected |

## ESC R n

| | |
|---|---|
| [Name] | Select an international character set. |
| [Format] | ASCII ESC R n<br>Hex. 1B 52 n<br>Decimal 27 82 n |
| [Range] | 0 ≤ n ≤ 16<br>Initial Value n = 0 |
| [Description] | This command specifies international characters according to n values. |

| n | Character Set |
|---|---|
| 0 | USA |
| 1 | France |
| 2 | Germany |
| 3 | UK |
| 4 | Denmark I |
| 5 | Sweden |
| 6 | Italy |
| 7 | Spain |
| 8 | Japan |
| 9 | Norway |
| 10 | Denmark II |
| 11 | Spain II |
| 12 | Latin America |
| 13 | Korea |
| 14 | Russia |
| 15 | Slavonic |
| 16 | User Define |

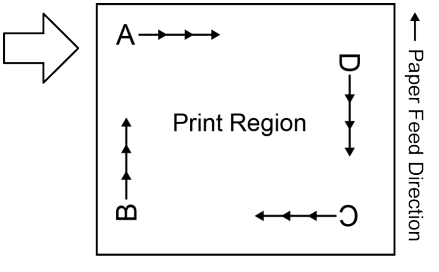
**ESC S**

| | |
|---|---|
| [Name] | Select standard mode |
| [Format] | ASCII ESC S<br>Hex. 1B 53<br>Decimal 27 83 |
| [Range] | N/A |
| [Description] | ● Valid only when input by page mode.<br>● All buffer data in page mode is deleted.<br>● Sets the print position to the beginning of the next line after execution.<br>● The print area set by ESC W (Set print region in page mode) is reset to the default setting.<br>● This command switches the settings for the following commands the values of which can be set independently in standard mode and page mode to those for standard mode<br>a. ESC SP :Set character right space amount<br>b. FS S :Set Chinese character space amount<br>c. ESC 2 :Set default line spacing<br>d. ESC 3 :Set line spacing<br>● The following commands are effective only when in standard mode.<br>a. ESC W :Set print region in page mode<br>b. ESC T :Select character print direction in page mode<br>● The following commands are ignored in standard mode.<br>a. GS $ :Specify absolute position for character vertical direction in page Mode<br>b. GS \: :Specify relative position for character vertical direction in page mode<br>● Standard mode is selected when the power is turned on, the printer is reset or initialized (ESC @). |

## ESC T n

| | |
|---|---|
| [Name] | Select print direction in page mode. |
| [Format] | ASCII ESC T n<br>Hex. 1B 54 n<br>Decimal 27 84 n |
| [Range] | 0 ≤ n ≤ 3, 48 ≤ n ≤ 51<br>Initial Value n = 0 |
| [Description] | Selects the character printing direction and starting point in page mode. |

| n | Print Direction | Starting Point |
|---|---|---|
| 0, 48 | Left to Right | Upper Left (A in the figure below) |
| 1, 49 | Bottom to Top | Lower Left (B in the figure below) |
| 2, 50 | Right to Left | Lower Right (C in the figure below) |
| 3, 51 | Top to Bottom | Upper Right (D in the figure below) |




## ESC V n

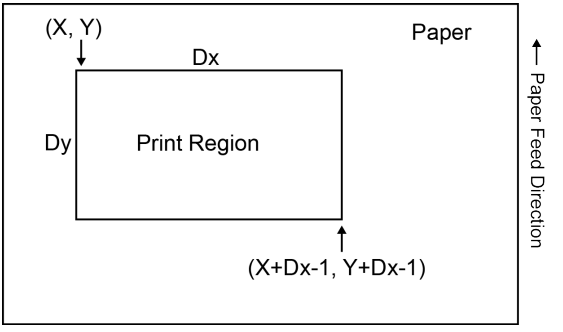
| | |
|---|---|
| [Name] | Turn 90 degree clockwise rotation mode on/off |
| [Format] | ASCII ESC V n<br>Hex. 1B 56 n<br>Decimal 27 86 n |
| [Range] | 0 ≤ n≤ 1, 48≤ n ≤49<br>Initial Value n = 0 |
| [Description] | Specifies or cancels character 90 degree clockwise rotation. |

| n | Function |
|---|---|
| 0, 48 | Turns off 90 degree clockwise rotation mode |
| 1, 49 | Turns on 90 degree clockwise rotation mode |

- Underlines are not applied to characters rotated 90 degrees clockwise even when ESC !,ESC - or FS - commands are given.
- If 90 degree clockwise rotation is specified, double-wide and double-tall commands in the 90 rotation mode enlarges characters in the opposite

| | |
|---|---|
| | directions to double-wide and double-tall commands.<br>● This command only affects printing in standard mode.<br>● In page mode, this command is only effective for the setting.<br>● This command is effective for ANK and Chinese characters. |

## ESC W xL xH yL yH dxL dxH dyL dyH

| | |
|---|---|
| [Name] | Set printing area in page mode |
| [Format] | ASCII ESC W xL xH yL yH dxL dxH dyL dyH<br>Hex. 1B 57 xL xH yL yH dxL dxH dyL dyH<br>Decimal 27 87 xL xH yL yH dxL dxH dyL dyH |
| [Range] | 0 ≤ xL, xH, yL, yH, dxL, dxH, dyL, dyH ≤ 255<br>However, this excludes dxL = dxH = 0 or dyL = dyH = 0<br>Initial Value xL = xH = yL = yH = 0 |
| [Description] | Sets the print region position and size.<br>● Horizontal direction starting point [(xL + xH x 256) x basic calculated pitch]<br>● Vertical direction starting point [(yL + yH x 256) x basic calculated pitch]<br>● Horizontal direction length [(dxL + dxH x 256) basic calculated pitch]<br>● Vertical direction length = [(dyL + dyH x 256) basic calculated pitch]<br>● (X+Dx-1)<576 (3 inch, basic calculated pitch=1);(X+Dx-1)<432 (2 inch, basic calculated pitch=1)<br>● (Y+Dy-1)<768 (basic calculated pitch=1);<br>● If (horizontal starting position + printing area width) exceeds the printable area, the printing area width is automatically set to (horizontal printable area - horizontal starting position).<br>● If (vertical starting position + printing area height) exceeds the printable area, the printing area height is automatically set to (vertical printable area - vertical starting position).<br>  <br> |

**ESC \ nL nH**

| | |
|---|---|
| [Name] | Set relative print position. |
| [Format] | ASCII ESC \ nL nH<br>Hex. 1B 5C nL nH<br>Decimal 27 92 nL nH |
| [Range] | 0 ≤ (nL + nH x 256) ≤ 65535 (0 ≤ nL 255, 0 ≤ nH ≤ 255) |
| [Description] | Specifies the next print starting position with a relative position based on the current position. This sets the position from the current position to [(nL + nH x 256) x basic calculated pitch] for the next print starting position.<br>● Specifications exceeding the print range are ignored. |

**ESC a n**

| | |
|---|---|
| [Name] | Select justification. |
| [Format] | ASCII ESC a n<br>Hex. 1B 61 n<br>Decimal 27 97 n |
| [Range] | 0 ≤ n ≤2<br>Initial Value n = 0 |
| [Description] | This command specifies position alignment for all data in one line in standard mode, using n as follows:<br><br>n: Alignment<br>0: Left alignment<br>1: Center alignment<br>2: Right alignment<br><br>This command has no effect in page mode. |

## ESC c 3 n

| | |
|---|---|
| [Name] | Select paper sensor(s) to output paper-end signals. |
| [Format] | ASCII ESC c 3 n<br>Hex. 1B 63 33 n<br>Decimal 27 99 51 n |
| [Range] | Specification: 0 ≤ n ≤ 3<br>Initial Value n = 0 |
| [Description] | Selects paper out detector that outputs a paper out signal when paper has run out. |

| Bit | Function | "0" | "1" |
|---|---|---|---|
| 7 | Undefined | | |
| 6 | Undefined | | |
| 5 | Undefined | | |
| 4 | Undefined | | |
| 3 | Undefined | | |
| 2 | Undefined | | |
| 1 | Paper roll near end detector | Invalid | Valid |
| 0 | Paper roll near end detector | Invalid | Valid |

## ESC c 4 n

| | |
|---|---|
| [Name] | Select paper sensor(s) to stop printing. |
| [Format] | ASCII ESC c 4 n<br>Hex. 1B 63 34 n<br>Decimal 27 99 52 n |
| [Range] | Specification: 0 ≤ n ≤ 3<br>Initial Value n = 0 |
| [Description] | Selects the paper out detector to stop printing when paper has run out. |

| Bit | Function | "0" | "1" |
|---|---|---|---|
| 7 | Undefined | | |
| 6 | Undefined | | |
| 5 | Undefined | | |
| 4 | Undefined | | |
| 3 | Undefined | | |
| 2 | Undefined | | |
| 1 | Paper roll near end detector | Invalid | Valid |
| 0 | Paper roll near end detector | Invalid | Valid |

**ESC c 5 n**

| [Name] | Enable/disable panel buttons |
|---|---|
| [Format] | ASCII ESC c 5 n<br>Hex. 1B 63 35 n<br>Decimal 27 99 53 n |
| [Range] | Specification: 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | Toggles the panel switches between enabled and disabled.<br>● Enables panel switches when n = <*******0>B.<br>● Disables panel switches when n = <*******1>B.<br>● n is effective only when it is the lowest bit.<br>● When disabled, all panel switches are disabled. |

**ESC d n**

| [Name] | Print and feed n lines |
|---|---|
| [Format] | ASCII ESC d n<br>Hex. 1B 64 n<br>Decimal 27 100 n |
| [Range] | 0 ≤ n ≤ 255 |
| [Description] | Prints the data in the print buffer and performs a paper feed of n lines.<br>● Sets the print position to the beginning of the next line after printing.<br>● Paper is fed approximately 150 mm if the [n x basic calculated pitch] exceeds approximately 150 mm (5.9 inches). |

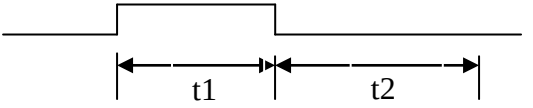
**ESC i**

| [Name] | Full cut. |
|---|---|
| [Format] | ASCII ESC i<br>Hex. 1B 69<br>Decimal 27 105 |
| [Range] | N/A |
| [Description] | This command executes a full cut of the paper in standard mode |

**ESC m**

| [Name] | Partial cut. |
|---|---|
| [Format] | ASCII ESC m<br>Hex. 1B 6D<br>Decimal 27 109 |
| [Range] | N/A |
| [Description] | This command executes a partial cut of the paper with one point uncut in standard mode. |

**ESC p m t1 t2**

| [Name] | General pulse. |
|---|---|
| [Format] | ASCII ESC p m t1 t2<br>Hex. 1B 70 m t1 t2<br>Decimal 27 112 m t1 t2 |
| [Range] | 0 ≤ m ≤ 1, 48 ≤ m ≤ 49<br>0 ≤ t1 ≤ 255<br>0 ≤ t2 ≤ 255 |
| [Description] | This outputs a signal specified by t1 and t2 to the connector pin specified by m. Drawer kick on time is set to t1 x 2 ms; off time is set to t2 x 2 ms.<br><br>m: Connector Pin<br>0, 48: Drawer kick connector pin #2<br>1, 49: Drawer kick connector pin #5<br>  <br> |

**ESC t n**

| [Name] | Select character code table. |
|---|---|
| [Format] | ASCII ESC t n<br>Hex. 1B 74 n<br>Decimal 27 116 n |
| [Range] | 0 ≤ n ≤ 8<br>Initial Value n = 0 |
| [Description] | Select page n of the character code table.<br><br>**n** / **Character set**<br>0 CP-437<br>1 Katakana<br>2 CP-850<br>3 CP-852<br>4 CP-860<br>5 CP-863<br>6 CP-865<br>7 CP-1252<br>8 User Define |

**ESC { n**

| | |
|---|---|
| [Name] | Turns upside-down printing mode on/off. |
| [Format] | ASCII ESC { n<br>Hex. 1B 7B n<br>Decimal 27 123 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | Specifies or cancels upside-down printing.<br>● Cancels upside-down printing when n = <*******0>H.<br>● Specifies upside-down printing when n = <*******1>H.<br>● n is effective only when it is the lowest bit.<br>● This command is effective only when input at the top of the line when standard mode is being used.<br>● This command has no effect in page mode. In page mode, this command is only effective for the setting.<br>● Upside-down printing rotates line data 180 degrees. |

| n | Upside-down mode |
|---|---|
| 0 | Turned off |
| 1 | Turned on |

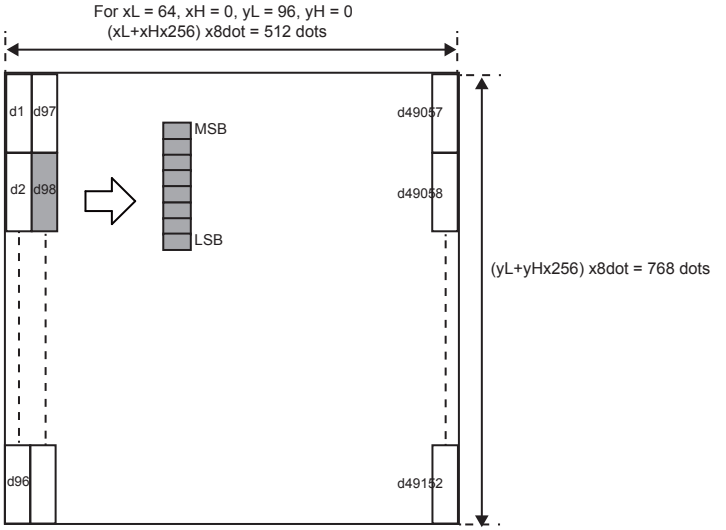
**FS p n m**

| | |
|---|---|
| [Name] | Print NV bit image. |
| [Format] | ASCII FS p n m<br>Hex. 1C 70 n m<br>Decimal 28 112 n m |
| [Range] | 1 ≤ n ≤ 255<br>0 ≤ m ≤ 3, 48 ≤ m ≤ 51 |
| [Description] | Prints NV bit image n using mode m. |

| m | Mode |
|---|---|
| 0, 48 | Normal |
| 1, 49 | Double-width |
| 2, 50 | Double-height |
| 3, 51 | Quadruple |

- n specifies the NV bit image number.
- m specifies the bit-image mode.
- NV bit image is a bit image defined in non-volatile memory by FS q and printed by this command.
- This command is ignored when the specified NV bit image n is undefined.

## FS q n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n

| | |
|---|---|
| [Name] | Define NV bit image. |
| [Format] | ASCII FS q n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n<br>Hex. 1C 71 n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n<br>Decimal 28 113 n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n |
| [Range] | 1 ≤ n ≤ 255<br>1 ≤ (xL + xH ×256) ≤ 54 (0 ≤ xL ≤ 54, xH=0) for 2 inch<br>1 ≤ (xL + xH ×256) ≤ 72 (0 ≤ xL ≤ 72, xH=0) for 3 inch<br>1 ≤ (yL + yH ×256) ≤ 96 (0 ≤ yL ≤ 96, yH=0)<br>0 ≤ d ≤ 255<br>k = (xL + xH × 256) × (yL + yH × 256) × 8 |
| [Description] | Defines the specified NV bit image.<br>● n specifies the number of NV bit images to define.<br>● xL and xH specify the horizontal direction for one NV bit image (xL + xH x 256) x 8 dots.<br>● yL and yH specify the vertical direction for one NV bit image (yL + yH x 256) x 8 dots.<br>  <br> |

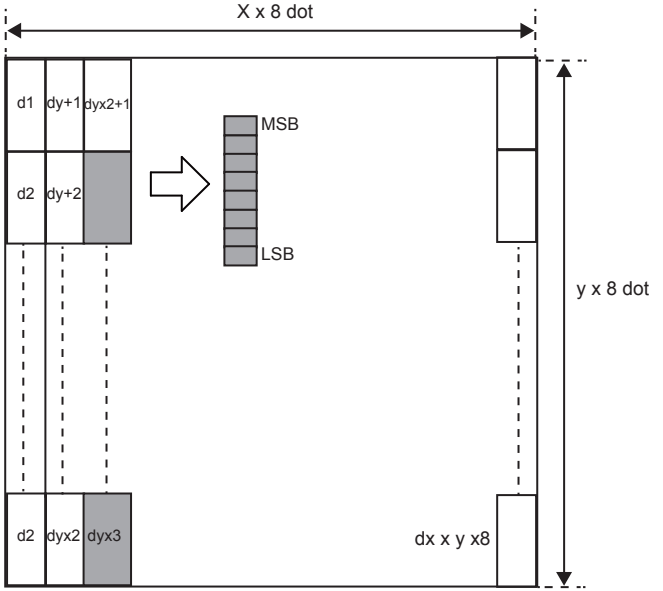
**GS ! n**

<table>
<tr><td>[Name]</td><td>Select character size.</td></tr>
<tr><td>[Format]</td><td>ASCII GS ! n<br>Hex. 1D 21 n<br>Decimal 29 33 n</td></tr>
<tr><td>[Range]</td><td>0 ≤ n ≤ 255<br>(1 ≤ Vertical enlargement ≤ 8, 1 ≤ Horizontal enlargement ≤ 8)<br>Initial Value n = 0</td></tr>
<tr><td>[Description]</td><td>This command selects the character height and width using bits 0 to 3, and bits 4 to 7 respectively as follows:
<table>
<tr><th>Bit</th><th>Function</th><th>Setting</th></tr>
<tr><td>0</td><td rowspan="4">Specifies the number of times normal font size in the vertical direction</td><td rowspan="4">Refer to Table 2<br>[Enlarged in vertical direction]</td></tr>
<tr><td>1</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td><td rowspan="4">Specifies the number of times normal font size in the horizontal direction</td><td rowspan="4">Refer to Table 1<br>[Enlarged in horizontal direction]</td></tr>
<tr><td>5</td></tr>
<tr><td>6</td></tr>
<tr><td>7</td></tr>
</table>
Table 1 [Enlarged in horizontal direction]
<table>
<tr><th>Hex</th><th>Decimal</th><th>Enlargement</th></tr>
<tr><td>00</td><td>0</td><td>1 time(standard)</td></tr>
<tr><td>10</td><td>16</td><td>2 times</td></tr>
<tr><td>20</td><td>32</td><td>3 times</td></tr>
<tr><td>30</td><td>48</td><td>4 times</td></tr>
<tr><td>40</td><td>64</td><td>5 times</td></tr>
<tr><td>50</td><td>80</td><td>6 times</td></tr>
<tr><td>60</td><td>96</td><td>7 times</td></tr>
<tr><td>70</td><td>112</td><td>8 times</td></tr>
</table>
Table 2 [Enlarged in vertical direction]
<table>
<tr><th>Hex</th><th>Decimal</th><th>Enlargement</th></tr>
<tr><td>00</td><td>0</td><td>1 time(standard)</td></tr>
<tr><td>01</td><td>1</td><td>2 times</td></tr>
<tr><td>02</td><td>2</td><td>3 times</td></tr>
<tr><td>03</td><td>3</td><td>4 times</td></tr>
<tr><td>04</td><td>4</td><td>5 times</td></tr>
<tr><td>05</td><td>5</td><td>6 times</td></tr>
<tr><td>06</td><td>6</td><td>7 times</td></tr>
<tr><td>07</td><td>7</td><td>8 times</td></tr>
</table></td></tr>
</table>

**GS $ nL nH**

| | |
|---|---|
| [Name] | Set absolute vertical print position in page mode |
| [Format] | ASCII GS $ nL nH<br>Hex. 1D 24 nL nH<br>Decimal 29 36 nL nH |
| [Range] | 0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255, |
| [Description] | Specifies the character vertical direction position for the data expansion starting position using the absolute position based on the starting point in page mode. The position of the character vertical direction for the next data expansion starting position is the position specified by [(nL + nH x 256) x basic calculated pitch] from the starting point.<br>● When not in page mode, this command is ignored.<br>● Specifications for absolute positions that exceed the specified print range are ignored. |

## GS * X Y [d1…d(X x Y x 8)]

| | |
|---|---|
| [Name] | Define download bit images. |
| [Format] | ASCII GS * X Y [d1…d(X x Y x 8)]<br>Hex. 1D 2A X Y [d1…d(X x Y x 8)]<br>Decimal 29 42 X Y [d1…d(X x Y x 8)] |
| [Range] | 1 ≤ X ≤ 54 (for 2 inch)<br>1 ≤ X ≤ 72 (for 3 inch)<br>1 ≤ Y ≤ 96<br>0 ≤ d ≤ 255 |
| [Description] | Defines the download bit image of the number of dots specified by X and Y.<br>● X specifies the number of bytes in the horizontal direction.<br>● Y specifies the number of bytes in the vertical direction.<br>● Horizontal direction dot count is X x 8 dots; Vertical direction dot count is Y x 8 dots<br>● d indicates the bit-image data. Bits that correspond to the dots to print are 1, and the bits that correspond to the dots that are not printed are 0.<br>  |

## GS ( A pL pH n m

| | |
|---|---|
| [Name] | Execute test print. |
| [Format] | ASCII GS ( A pL pH n m<br>Hex. 1D 28 41 pL pH n m<br>Decimal 29 40 65 pL pH n m |
| [Range] | {pL+ (pH×256) } = 2 (pL = 2,pH = 0)<br>0 ≤ n ≤ 2 , 48 ≤ n ≤ 50<br>2 ≤ m ≤ 3 , 50 ≤ m ≤ 51 |
| [Description] | Executes the specified test print.<br>The following command is ignored in page mode.<br><br>Specifies the parameter count following pL and pH in (pL + (pH x 256)) bytes.<br>*n* specifies the paper to be tested.<br>n \| Paper Type<br>0 , 48 \| Basic sheet (paper roll)<br>1 , 49 \| Paper Roll<br>2 , 50<br>*m* specifies a test pattern.<br>m \| Type of Test Print<br>2 , 50 \| Printer Status (Self Print)<br>3 , 51 \| Rolling Pattern Print |

## GS ( K pL pH n m

| | |
|---|---|
| [Name] | Set print density. |
| [Format] | ASCII GS ( A pL pH n m<br>Hex. 1D 28 4B pL pH n m<br>Decimal 29 40 75 pL pH n m |
| [Range] | {pL+ (pH×256) } = 2 (pL = 2,pH = 0)<br>n = 49<br>250 ≤ m ≤ 255, 0 ≤ m ≤ 6<br>Initial Value m = 0 |
| [Description] | Sets print density |

| m | Print Density |
|---|---|
| 250 | 0.7 |
| 251 | 0.7 |
| 252 | 0.8 |
| 253 | 0.8 |
| 254 | 0.9 |
| 255 | 0.9 |
| 0 | 1.0 |
| 1 | 1.1 |
| 2 | 1.1 |
| 3 | 1.2 |
| 4 | 1.2 |
| 5 | 1.3 |
| 6 | 1.3 |

## GS / m

| | |
|---|---|
| [Name] | Print downloaded bit image. |
| [Format] | ASCII GS / m<br>Hex. 1D 2F m<br>Decimal 29 47 m |
| [Range] | 0 ≤ m ≤ 3, 48 ≤ m ≤ 51 |
| [Description] | This command prints the downloaded bit image defined by GS * according to the mode denoted by m. |

| m | Mode | Vertical dot density(DPI) | Horizontal dot density(DPI) |
|---|---|---|---|
| 0 , 48 | Normal | 203 | 203 |
| 1 , 49 | Double-width | 203 | 101 |
| 2 , 50 | Double-height | 101 | 203 |
| 3 , 51 | Quadruple | 101 | 101 |

**GS B n**

| [Name] | Turn white/black reverse printing mode on/off |
|---|---|
| [Format] | ASCII GS B n<br>Hex. 1D 42 n<br>Decimal 29 66 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | Specifies or cancels black and white inverted printing.<br>● Cancels black and white inverted printing when n = <*******0>B.<br>● Specifies black and white inverted printing when n = <*******1>B.<br>● n is effective only when it is the lowest bit.<br>● Internal characters and download characters are targeted for black and white inverted printing.<br>● This command is effective for ANK and Chinese characters. |

**GS H n**

| [Name] | Select printing position of HRI characters. |
|---|---|
| [Format] | ASCII GS H n<br>Hex. 1D 48 n<br>Decimal 29 72 n |
| [Range] | 0 ≤ n ≤ 3, 48 ≤ n ≤ 51<br>Initial Value n = 0 |
| [Description] | Selects the printing position of HRI characters when printing bar codes. |

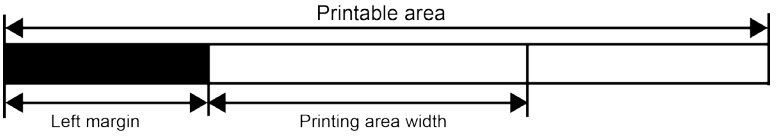
| m | Printing Position |
|---|---|
| 0, 48 | No print |
| 1, 49 | Above bar code |
| 2, 50 | Below bar code |
| 3, 51 | Above and below bar code(both) |

## GS I n

| | |
|---|---|
| [Name] | Transmit printer ID. |
| [Format] | ASCII GS I n<br>Hex. 1D 49 n<br>Decimal 29 73 n |
| [Range] | 1 ≤ n ≤ 3, 49 ≤ n ≤ 51, 65 ≤ n ≤ 69 |
| [Description] | Transmits the printer ID specified by *n* as follows: |

| n | Printer ID Type | Specifications |
|---|---|---|
| 1, 49 | Model ID | MB-1030 or MP-1060 |
| 2, 50 | Type ID | 1030-XX or 1060-XX |
| 3, 51 | ROM Version ID | Depends on the ROM version |
| 65 | Firmware Version | Depends on the firmware version |
| 66 | Manufacturer Name | MB-1030 System or MP-1060 System |
| 67 | Model Name | MB-1030 or MP-1060 |
| 68 | Serial Number | Depends on the serial number |
| 69 | Chinese Character Types | Taiwan Language Characters: TW_BIG5<br>Japanese Language Characters: JP_SJIS<br>Chinese Language Characters: CN_GB2312<br>Korean Language Characters: KO_EUC-KR |

## GS L nL nH

| | |
|---|---|
| [Name] | Set left margin. |
| [Format] | ASCII GS L nL nH<br>Hex. 1D 4C nL nH<br>Decimal 29 76 nL nH |
| [Range] | 0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255<br>Initial Value (nL + nH x 256)=0 (nL=0, nH=0) |
| [Description] | nL and nH set the specified left margin.<br>The left margin is [(nL + nH x 256) x basic calculated pitch].<br>  |

**GS P x y**

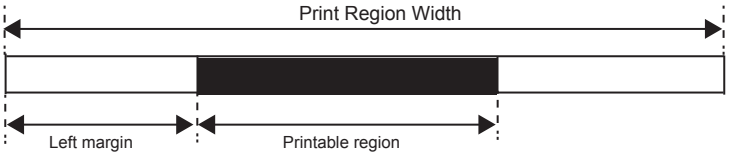
| | |
|---|---|
| [Name] | Set basic calculated pitch. |
| [Format] | ASCII GS P x y<br>Hex. 1D 50 x y<br>Decimal 29 80 x y |
| [Range] | 0 ≤ x ≤ 255<br>0 ≤ y ≤ 255<br>Initial Value x = 203, y = 203: EPSON targeted model print head 203 DPI |
| [Description] | Sets the horizontal basic calculated pitch to approximately 25.4/xmm [(1/x) inch], and the vertical basic calculated pitch to approximately 25.4/ymm [(1/y) inch].<br>x = 0: Returns the horizontal basic calculated pitch to its default value.<br>y = 0: Returns the vertical basic calculated pitch to its default value. |

**GS V m**

| | |
|---|---|
| [Name] | Cut paper. |
| [Format] | ASCII GS V m ( n )<br>Hex. 1D 56 m ( n )<br>Decimal 29 86 m ( n ) |
| [Range] | m = 0,1,48,49,65,66 0 ≤ n ≤ 255 |
| [Description] | Executes specified paper cut. |

| m | Function |
|---|---|
| 0 , 48 | Full cut |
| 1 , 49 | Partial cut (one point uncut) |
| 65 | Feeds paper to (cutting position + [n x basic calculated pitch]) and performs a full cut |
| 66 | Feeds paper to (cutting position + [n x basic calculated pitch]) and performs a partial cut (one point uncut) |

## GS W nL nH

| | |
|---|---|
| [Name] | Set printing area width. |
| [Format] | ASCII GS W nL nH<br>Hex. 1D 57 nL nH<br>Decimal 29 87 nL nH |
| [Range] | 0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255 |
| [Description] | ● Sets the print region width specified by nL and nH.<br>● Print region width is [(nL + nH x 256) x basic calculated pitch].<br>● [(nL + nH x 256) x basic calculated pitch] >=24.<br>  <br> |

## GS \ nL nH

| | |
|---|---|
| [Name] | Set relative vertical print position in page mode. |
| [Format] | ASCII GS \ nL nH<br>Hex. 1D 5C nL nH<br>Decimal 29 92 nL nH |
| [Range] | 0 ≤ nL ≤ 255<br>0 ≤ nH ≤ 255 |
| [Description] | Specifies the character vertical direction position for the data expansion starting position using the relative position based on the current point in page mode. This sets the position moved from the current position to [(nL + nH x 256) x basic calculated pitch] for the next data expanding starting position.<br>● When not in page mode, this command is ignored. |

## GS a n

| | |
|---|---|
| [Name] | Enable/disable Automatic Status Back (ASB). |
| [Format] | ASCII GS a n<br>Hex. 1D 61 n<br>Decimal 29 97 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |

[Description]

Selects the statuses that are targeted for transmission with the automatic status function (ASB: Automatic Status Back).

| Bits | Statuses Targeted for ASB | "0" | "1" |
|---|---|---|---|
| 7 | Undefined | --- | --- |
| 6 | Undefined | --- | --- |
| 5 | Undefined | --- | --- |
| 4 | Undefined | --- | --- |
| 3 | Continuous Paper Detector | Invalid | Valid |
| 2 | Error | Invalid | Valid |
| 1 | ONLINE/OFFLINE Status | Invalid | Valid |
| 0 | Drawer kick connector pin #3 | Invalid | Valid |

The printer information transmitted is comprised of 4 bytes as follows:
First byte(printer information)

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 7 | Off | 00 | 0 | Not used. Fixed to Off |
| 6 | Off | 00 | 0 | Paper is not being fed by the paper feed button |
| | On | 40 | 64 | Paper is being fed by the paper feed button |
| 5 | Off | 00 | 0 | Cover is close |
| | On | 20 | 32 | Cover is open |
| 4 | On | 10 | 16 | Not used. Fixed to On |
| 3 | Off | 00 | 0 | On-line |
| | On | 08 | 8 | Off-line |
| 2 | Off | 00 | 0 | Drawer kick-out connector pin 3 is LOW |
| | On | 04 | 4 | Drawer kick-out connector pin 3 is HIGH |
| 1 | Off | 00 | 0 | Not used. Fixed to Off |
| 0 | Off | 00 | 0 | Not used. Fixed to Off |

Second byte (printer information)

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 7 | Off | 00 | 0 | Not used. Fixed to Off |
| 6 | Off | 00 | 0 | Not used. Fixed to Off |
| 5 | Off | 00 | 0 | Not used. Fixed to Off |
| 4 | Off | 00 | 0 | Not used. Fixed to Off |
| 3 | On | 08 | 8 | Not used. Fixed to Off |
| 2 | On | 04 | 4 | Not used. Fixed to Off |
| 1 | On | 02 | 2 | Not used. Fixed to Off |
| 0 | On | 01 | 1 | Not used. Fixed to Off |

Third byte (paper sensor information)

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 7 | Off | 00 | 0 | Not used. Fixed to Off |
| 6 | Off | 00 | 0 | Not used. Fixed to Off |
| 5 | Off | 00 | 0 | Not used. Fixed to Off |
| 4 | On | 00 | 0 | Not used. Fixed to Off |
| 2,3 | Off | 00 | 0 | Paper end sensor: paper present |
| | On | 0C | 12 | Paper end sensor: no paper present |
| 0,1 | Off | 00 | 0 | Paper near end sensor: paper adequate |
| | On | 03 | 3 | Paper near end sensor: paper near end |

Fourth byte (paper sensor information)

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 7 | Off | 00 | 0 | Not used. Fixed to Off |
| 6 | Off | 00 | 0 | Black mark sensor status |
| 5 | Off | 00 | 0 | Not used. Fixed to Off |
| 4 | Off | 00 | 0 | Not used. Fixed to Off |
| 3 | On | 08 | 8 | Not used. Fixed to On |
| 2 | On | 04 | 4 | Not used. Fixed to On |
| 1 | On | 02 | 2 | Not used. Fixed to On |
| 0 | On | 01 | 1 | Not used. Fixed to On |

## GS f n

| | |
|---|---|
| [Name] | Select font for HRI characters. |
| [Format] | ASCII GS f n<br>Hex. 1D 66 n<br>Decimal 29 102 n |
| [Range] | n = 0,1,48,49<br>Initial Value n = 0 |
| [Description] | Selects the HRI character font when printing bar codes. |

| n | Font |
|---|---|
| 0, 48 | Selects Font A (12 x 24). |
| 1, 49 | Selects Font B (9 x 17). |

## GS h n

| | |
|---|---|
| [Name] | Set bar code height. |
| [Format] | ASCII GS h n<br>Hex. 1D 68 n<br>Decimal 29 104 n |
| [Range] | 1 ≤ n ≤ 255<br>Initial Value n = 162 |
| [Description] | Sets bar code height to n dots. |

## GS k m d1 … dk NUL
## GS k m n d1 … dk

| | |
|---|---|
| [Name] | Print bar code. |
| [Format] | 1. ASCII GS k m d1...dk NUL<br>Hex. 1D 6B m d1...dk NUL<br>Decimal 29 107 m d1...dk NUL<br>2. ASCII GS k m n d1... dk<br>Hex. 1D 6B m n d1... dk<br>Decimal 29 107 m n d1... dk |
| [Range] | 1. 0 ≤ m ≤ 6 The definition region of k and d differ according to the bar code type.<br>2. 65 ≤ m ≤ 73 The definition region of n and d differ according to the bar code type. |
| [Description] | Selects the bar code type and prints bar codes.<br>1: |

| m | Bar Code Type | Defined region of k | Defined region of d |
|---|---|---|---|
| 0 | UPC-A | 11 ≤ k ≤ 12 | 48 ≤ d ≤ 57 |
| 1 | UPC-E | 11 ≤ k ≤ 12 | 48 ≤ d ≤ 57 |
| 2 | JAN13 (EAN13) | 12 ≤ k ≤ 13 | 48 ≤ d ≤ 57 |
| 3 | JAN8 (EAN8) | 7 ≤ k ≤ 8 | 48 ≤ d ≤ 57 |
| 4 | CODE39 | 1 ≤ k ≤ 255 | 48 ≤ d ≤ 57, 65 ≤ d ≤ 90, 32, 36, 37, 43, 45, 46, 47 |
| 5 | ITF | 2 ≤ k ≤ 254 (However, This is an even number.) | 48 ≤ d ≤ 57 |
| 6 | CODABAR | 1 ≤ k ≤ 255 | 48 ≤ d ≤ 57, 65 ≤ d ≤ 68, 36, 43, 45, 46, 47, 58 |

2:

| m | Bar Code Type | Defined region of n | Defined region of d |
|---|---|---|---|
| 65 | UPC-A | 11 ≤ n ≤ 12 | 48 ≤ d ≤ 57 |
| 66 | UPC-E | 11 ≤ n ≤ 12 | 48 ≤ d ≤ 57 |
| 67 | JAN13 (EAN13) | 12 ≤ n ≤ 13 | 48 ≤ d ≤ 57 |
| 68 | JAN8 (EAN8) | 7 ≤ n ≤ 8 | 48 ≤ d ≤ 57 |
| 69 | CODE39 | 1 ≤ n ≤ 255 | 48 ≤ d ≤ 57, 65 ≤ d ≤ 90, 32, 36, 37, 43, 45, 46, 47 |
| 70 | ITF | 2 ≤ n ≤ 254 (However, this is an even number.) | 48 ≤ d ≤ 57 |
| 71 | CODABAR | 1 ≤ n ≤ 255 | 48 ≤ d ≤ 57, 65 ≤ d ≤ 68, 36, 43, 45, 46, 47, 58 |
| 72 | CODE93 | 1 ≤ n ≤ 255 | 0 ≤ d ≤ 127 |
| 73 | CODE128 | 2 ≤ n ≤ 255 | 0 ≤ d ≤ 127 |

## GS r n

| [Name] | Transmit status. |
|---|---|
| [Format] | ASCII GS r n<br>Hex. 1D 72 n<br>Decimal 29 114 n |
| [Range] | n = 1, 2, 49, 50 |
| [Description] | Sends the specified status.<br>Detector Status (n=1,49) |

| Bit | Status | "0" | "1" |
|---|---|---|---|
| 7 | Fixed at 0 | | |
| 6 | Undefined | | |
| 5 | Undefined | | |
| 4 | Fixed at 0 | | |
| 3 | Paper roll end detector | Has Paper | Paper out |
| 2 | Paper roll end detector | Has Paper | Paper out |
| 1 | Paper roll near end detector | Has Paper | Paper out |
| 0 | Paper roll near end detector | Has Paper | Paper out |

Drawer Kick Connector Status (n=2,50)

| Bit | Status | "0" | "1" |
|---|---|---|---|
| 7 | Fixed at 0 | | |
| 6 | Undefined | | |
| 5 | Undefined | | |
| 4 | Fixed at 0 | | |
| 3 | Undefined | | |
| 2 | Undefined | | |
| 1 | Undefined | | |
| 0 | Drawer kick connector pin #3 | "L" | "H" |

## GS v 0 m xL xH yL yH d1 ... dk

**[Name]**

Print raster bit image.

**[Format]**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | GS | v | 0 | m | xL | xH | yL | yH | d1...dk |
| Hex. | 1D | 76 | 30 | m | xL | xH | yL | yH | d1...dk |
| Decimal | 29 | 118 | 48 | m | xL | xH | yL | yH | d1...dk |

**[Range]**

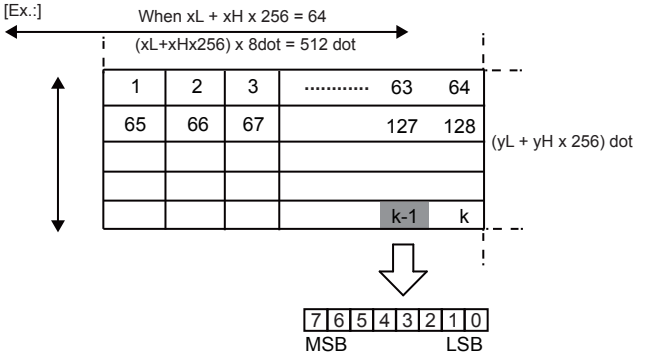
m = 0, m = 48
0 ≤ xL ≤ 54(for 2 inch)
0 ≤ xL ≤ 72(for 3 inch)
0 ≤ xH ≤ 0
0 ≤ yL ≤ 255
0 ≤ yH ≤ 3
0 ≤ d ≤ 255
k = (xL+xH×256) × (yL+yH×256) However, k ≠ 0

**[Description]**

Prints raster method bit images using mode m.

| m | Mode | Density of Vert. Dir. Dots | Density of Hor. Dir. Dots |
|---|---|---|---|
| 0, 48 | Normal Mode | 203 DPI | 203 DPI |

- xL and xH specify the horizontal direction data count for one bit image (xL + xH x 256) in bytes.
- yL and yH specify the vertical direction data count for one bit image (yL + yH x 256) in bytes.



### GS w n

| | |
|---|---|
| [Name] | Set bar code width. |
| [Format] | ASCII GS w n<br>Hex. 1D 77 n<br>Decimal 29 119 n |
| [Range] | 1 ≤ n ≤ 6<br>Initial Value n = 2 |
| [Description] | Sets the bar code horizontal size. |

| n | Multi-level Bar Code Module Width [mm] | Binary Level Bar Code | |
|---|---|---|---|
| | | Fine Element Width[mm] | Thick Element Width[mm] |
| 1 | 0.141 | 0.141 | 0.423 |
| 2 | 0.282 | 0.282 | 0.706 |
| 3 | 0.423 | 0.423 | 1.129 |
| 4 | 0.564 | 0.564 | 1.411 |
| 5 | 0.706 | 0.706 | 1.834 |
| 6 | 0.847 | 0.847 | 2.258 |

## TWO-DIMENSIONAL BAR CODE COMMAND DETAILS

### DC2 ; n

| | |
|---|---|
| [Name] | QR Code Module Size Set |
| [Format] | ASCII DC ; n<br>Hex. 12 3B n<br>Decimal 18 59 n |
| [Range] | 2 ≤ n ≤ 16<br>Initial Value n = 2 |
| [Description] | Specifies a module size of QR Code and Data Matrix.<br>n: The number of dots for one side of the module size. |

## GS p 1

<table>
<tr><td>[Name]</td><td>QR Code Print</td></tr>
<tr><td>[Format]</td><td>ASCII GS p 1 model e v mode nl nh [data]<br>Hex. 1D 70 01 model e v mode nl nh [data]<br>Decimal 29 112 01 model e v mode nl nh [data]</td></tr>
<tr><td>[Range]</td><td>model=01, 02<br>e=4Ch, 4Dh, 51h, 48h<br>0, 1 ≤ v ≤ 40<br>mode=4Eh, 41h, 42h, 4Bh, 4Dh<br>1≤ nh×256+nl≤ 7089</td></tr>
<tr><td>[Description]</td><td>Prints QR Code data based on the specified contents.<br>model: Specifies a model<br>e: Selects an error correction level.<br>’L’ (4CH), ’M’ (4DH), ’Q’ (51H), ’H’ (48H)<br>v: =0: Automatic selection<br>(A version is automatically selected depending on the number of input data.)1 ≤ v ≤ 40 Fixed version (up to 14 for model-1)<br>mode: Specifies a mode of data.<br><br><table><tr><th>Mode</th><th>Hexadecimal</th><th>Mode</th></tr><tr><td>N</td><td>4E</td><td>Numerical mode</td></tr><tr><td>A</td><td>41</td><td>Alphanumeric mode</td></tr><tr><td>B</td><td>42</td><td>8-bit byte mode</td></tr><tr><td>K</td><td>4B</td><td>Kanji mode</td></tr><tr><td>M</td><td>4D</td><td>Mixed mode</td></tr></table><br>nl, nh: Specifies the number of data.<br>Data: Kanji data of the QR Code data should be set by Shift JIS code.</td></tr>
</table>

# KANJI CONTROL COMMAND DETAILS

## FS ! n

<table>
<tr><td>[Name]</td><td>Set print mode(s) for Kanji characters.</td></tr>
<tr><td>[Format]</td><td>ASCII FS ! n<br>Hex. 1C 21 n<br>Decimal 28 33 n</td></tr>
<tr><td>[Range]</td><td>0 ≤ n ≤ 255<br>Initial Value n = 0</td></tr>
<tr><td>[Description]</td><td>Batch specifies the Kanji character print mode.
<table>
<tr><th>Bit</th><th>Function</th><th>“0”</th><th>“1”</th></tr>
<tr><td>7</td><td>Underline</td><td>Off</td><td>On</td></tr>
<tr><td>6</td><td>Undefined</td><td></td><td></td></tr>
<tr><td>5</td><td>Undefined</td><td></td><td></td></tr>
<tr><td>4</td><td>Undefined</td><td></td><td></td></tr>
<tr><td>3</td><td>Double tall expanded</td><td>Off</td><td>On</td></tr>
<tr><td>2</td><td>Expanded wide</td><td>Off</td><td>On</td></tr>
<tr><td>1</td><td>Undefined</td><td></td><td></td></tr>
<tr><td>0</td><td>Undefined</td><td></td><td></td></tr>
</table></td></tr>
</table>

## FS &

| [Name] | Select Kanji character mode. |
|---|---|
| [Format] | ASCII FS &<br>Hex. 1C 26<br>Decimal 28 38 |
| [Range] | N/A |
| [Description] | Specifies Kanji character mode. |

**FS - n**

| [Name] | Turn underline mode on/off for Kanji characters |
|---|---|
| [Format] | ASCII FS - n<br>Hex. 1C 2D n<br>Decimal 28 45 n |
| [Range] | 0 ≤ n ≤ 2, 48 ≤ n ≤ 50 |
| [Description] | Specifies or cancels Kanji character underlines. |

| n | Function |
|---|---|
| 0,48 | Cancels Kanji character underline |
| 1,49 | Sets to one-dot width Kanji character underline and specifies Kanji character underlines. |
| 2,50 | Sets to two-dot width Kanji character underline and cancels Kanji character underlines. |

**FS .**

| [Name] | Cancel Kanji character mode. |
|---|---|
| [Format] | ASCII FS .<br>Hex. 1C 2E<br>Decimal 28 46 |
| [Range] | N/A |
| [Description] | Cancels Kanji character mode. |

**FS S n1 n2**

| [Name] | Set Kanji character spacing |
|---|---|
| [Format] | ASCII FS S n1 n2<br>Hex. 1C 53 n1 n2<br>Decimal 28 83 n1 n2 |
| [Range] | 0 ≤ n1 ≤ 255, 0 ≤ n2 ≤ 255<br>Initial Value n1 = 0, n2=0 |
| [Description] | Sets the Kanji character space amount and right space amount.<br>● Left space amount: n1 x (basic calculated pitch)<br>● Right space amount: n2 x (basic calculated pitch) |

**FS W n**

| [Name] | Turn quadruple-size mode on/off for Kanji characters. |
|---|---|
| [Format] | ASCII FS W n<br>Hex. 1C 57 n<br>Decimal 28 87 n |
| [Range] | 0 ≤ n ≤ 255<br>Initial Value n = 0 |
| [Description] | Specifies or cancels quadruple size Kanji character.<br>● Cancels quadruple size when n = <*******0>B.<br>● Specifies quadruple size when n = <*******1>B.<br>● n is effective only when it is the lowest bit. |

### 4.10.1.2 OPOS Printer Driver

The **MB1030_OposSetup.exe** program sets up the registry information of MSRHK reader for OPOS program uses.

**1. Installation**

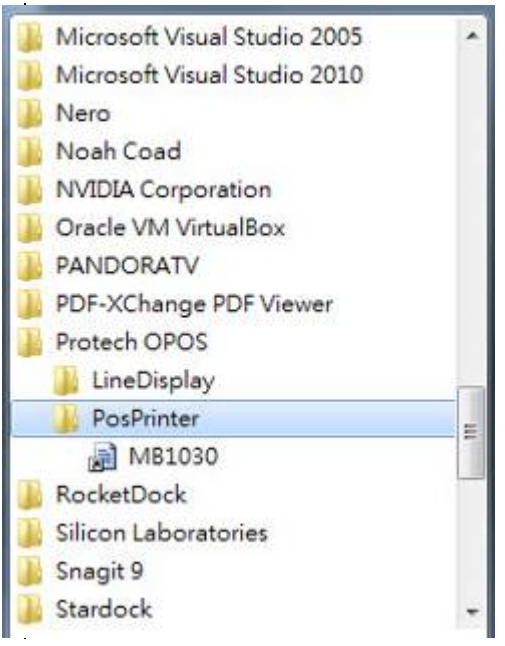
The steps below guide you to install the **MB1030_OposSetup** program.

- Run the setup file **MB1030_OposSetup.exe** located in the Software folder of the DVD.
- This setup also installs the **MB1030** program.
- Follow the wizard instructions to complete the installation.

**2. Launching the Program**

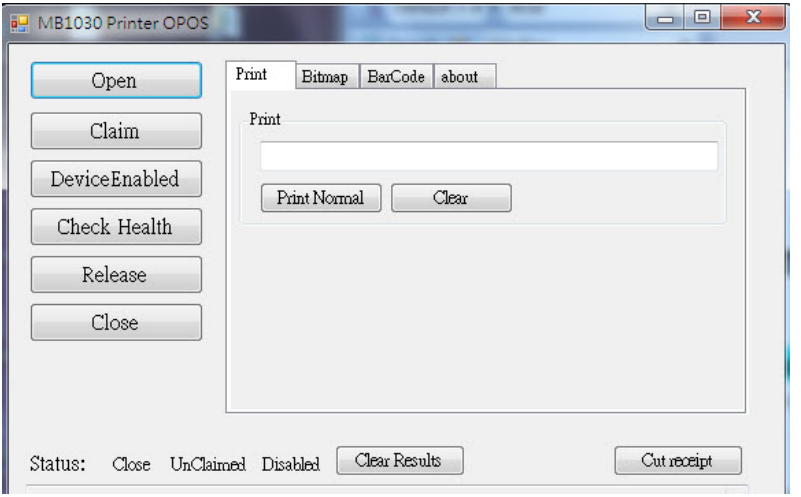
Follow the steps below to load the **MB1030** program:

- Click the *POSPrinter* folder from the path: *Start\Programs\Protech OPOS*.
- Click **MB1030** to launch the program.



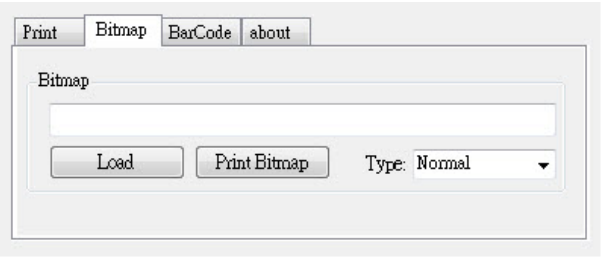
### 3. OPOS Control Object of MB1030 Program

a.) Print tab buttons:



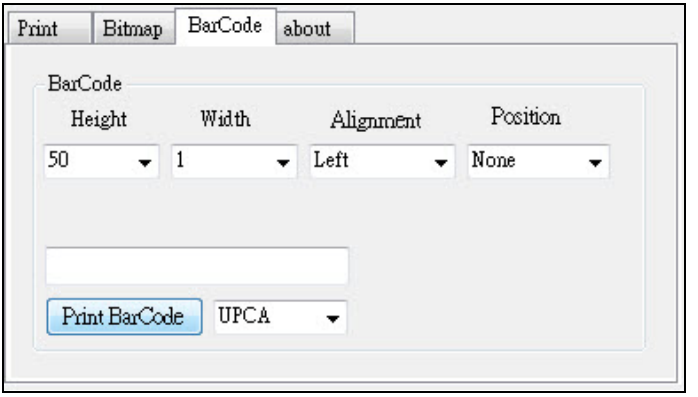

| Button/Item | Description |
|---|---|
| Printer Normal | Print the string. |

b.) Bitmap tab buttons/items:




| Button/Item | Description |
|---|---|
| Load | Load bitmap file. |
| Print Bitmap | Print bitmap file. |
| Type | Normal or Rotate 108˚. |

c.) BarCode tab buttons/items:




| Button/Item | Description |
|---|---|
| Print BarCode | Print the barcode.<br>Supported barcode types: UPCA, UPCE, EAN8, EAN13, ITF, Codabar, Code39, Code93, Code128 |
| Alignment | Left, center or right |
| Position | Print barcode number (None, Above or Below) |

**4. MB1030 type**

| Key Name | Type | Default Value | Note |
|---|---|---|---|
| BaudRate | String | 115200 | UART Baud Rate (default) |
| BitLength | String | 8 | UART Data Bit (default) |
| Parity | String | 0 | UART Parity Bit (default) |
| Port | String | COM4 | UART Port (default) |
| Stop | String | 1 | UART Stop Bit (default) |

## 5. OPOS APIs Support List

| | Category Type | Name | Mutability | OPOS APG Version | Printer .SO |
|---|---|---|---|---|---|
| Properties | common bool | AutoDisable | R/W | 1.2 | Not Applicable |
| Properties | common long | BinaryConversion | R/W | 1.2 | Not Applicable |
| Properties | common long | CapPowerReporting | Read only | 1.3 | Not Applicable |
| Properties | common string | CheckHealthText | Read only | 1.0 | Supported |
| Properties | common bool | Claimed | Read only | 1.0 | Supported |
| Properties | common long | DataCount | Read only | 1.2 | Not Applicable |
| Properties | common bool | DataEventEnabled | Read only | 1.0 | Not Applicable |
| Properties | common bool | DeviceEnabled | R/W | 1.0 | Not Applicable |
| Properties | common bool | FreezeEvents | R/W | 1.0 | Supported |
| Properties | common long | OpenResult | Read only | 1.5 | Supported |
| Properties | common bool | OutputID | Read only | 1.0 | Not Applicable |
| Properties | common bool | PowerNotify | R/W | 1.3 | Not Applicable |
| Properties | common bool | PowerState | Read only | 1.3 | Not Applicable |
| Properties | common long | ResultCode | Read only | 1.0 | Supported |
| Properties | common long | ResultCodeExtended | Read only | 1.0 | Not Applicable |
| Properties | common long | State | Read only | 1.0 | Supported |
| Properties | common string | ControlObject Description | Read only | 1.0 | Not Applicable |
| Properties | common long | ControlObject Version | Read only | 1.0 | Not Applicable |
| Properties | common string | ServiceObject Description | Read only | 1.0 | Supported |
| Properties | common long | ServiceObject Version | Read only | 1.0 | Supported |
| Properties | common string | DeviceDescription | Read only | 1.0 | Supported |
| Properties | common string | ControlObject Description | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapCharacterSet | Read only | 1.1 | Not Applicable |
| Pro.perties | specific bool | CapConcurrentJrnRec | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapConcurrentJrnSlp | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapCoverSensor | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapTransaction | Read only | 1.1 | Not Applicable |
| Properties | specific bool | CapJrnPresent | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapJrn2Color | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapJrnBold | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapJrnCartridgeSensor | Read only | 1.5 | Not Applicable |
| Properties | specific long | CapJrnColor | Read only | 1.5 | Not Applicable |
| Properties | specific long | CapJrnDhigh | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapJrnDwide | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapJrnDwideDhigh | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapJrnEmptySensor | Read only | 1.0 | Not Applicable |

| | Category Type | Name | Mutability | OPOS APG Version | Printer .SO |
|---|---|---|---|---|---|
| Properties | specific long | CapJrnItalic | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapJrnNearEndSensor | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapJrnUnderline | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecPresent | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRec2Color | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecBarCode | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecBitmap | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecBold | Read only | 1.0 | Not Applicable |
| Properties | specific long | CapRecCartridgeSensor | Read only | 1.5 | Not Applicable |
| Properties | specific long | CapRecColor | Read only | 1.5 | Not Applicable |
| Properties | specific bool | CapRecDhigh | Read only | 1.0 | Not Applicable |
| Properties | Specific bool | CapRecDwide | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecDwideDhigh | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecEmptySensor | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecItalic | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecLeft90 | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecMarkFeed | Read only | 1.5 | Not Applicable |
| Properties | specific bool | CapRecNearEndSensor | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecPapercut | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecRight90 | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecRotate180 | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecStamp | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapRecUnderline | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpPresent | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpFullslip | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlp2Color | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpBarCode | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpBitmap | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpBold | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpBothSidesPrint | Read only | 1.5 | Not Applicable |
| Properties | specific long | CapSlpCartridgeSensor | Read only | 1.5 | Not Applicable |
| Properties | specific long | CapSlpColor | Read only | 1.5 | Not Applicable |
| Properties | specific bool | CapSlpDhigh | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpDwide | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpDwideDhigh | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpEmptySensor | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpItalic | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpLeft90 | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpNearEndSensor | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpRight90 | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpRotate180 | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CapSlpUnderline | Read only | 1.0 | Not Applicable |
| Properties | specific bool | AsyncMode | R/W | 1.0 | Not Applicable |

| | Category Type | Name | Mutability | OPOS APG Version | Printer .SO |
|---|---|---|---|---|---|
| Properties | specific long | CartridgeNotify | R/W | 1.5 | Not Applicable |
| Properties | specific long | CharacterSet | R/W | 1.0 | Not Applicable |
| Properties | specific string | CharacterSetList | Read only | 1.0 | Not Applicable |
| Properties | specific bool | CoverOpen | Read only | 1.0 | Not Applicable |
| Properties | specific long | ErrorLevel | Read only | 1.1 | Not Applicable |
| Properties | specific long | ErrorStation | Read only | 1.0 | Not Applicable |
| Properties | specific string | ErrorString | Read only | 1.1 | Not Applicable |
| Properties | specific string | FontTypefaceList | Read only | 1.1 | Not Applicable |
| Properties | specific bool | FlagWhenIdle | R/W | 1.0 | Not Applicable |
| Properties | specific long | MapMode | R/W | 1.0 | Not Applicable |
| Properties | specific long | RotateSpecial | R/W | 1.1 | Not Applicable |
| Properties | specific long | JrnLineChars | R/W | 1.0 | Not Applicable |
| Properties | specific string | JrnLineCharsList | Read only | 1.0 | Not Applicable |
| Properties | specific long | JrnLineHeight | R/W | 1.0 | Not Applicable |
| Properties | specific long | JrnLineSpacing | R/W | 1.0 | Not Applicable |
| Properties | specific long | JrnLineWidth | Read only | 1.0 | Not Applicable |
| Properties | specific bool | JrnLetterQuality | R/W | 1.0 | Not Applicable |
| Properties | specific bool | JrnEmpty | Read only | 1.0 | Not Applicable |
| Properties | specific bool | JrnNearEnd | Read only | 1.0 | Not Applicable |
| Properties | specific long | JrnCartridgeState | Read only | 1.5 | Not Applicable |
| Properties | specific long | JrnCurrentCartridge | R/W | 1.5 | Not Applicable |
| Properties | specific long | RecLineChars | R/W | 1.0 | Not Applicable |
| Properties | specific string | RecLineCharsList | Read only | 1.0 | Not Applicable |

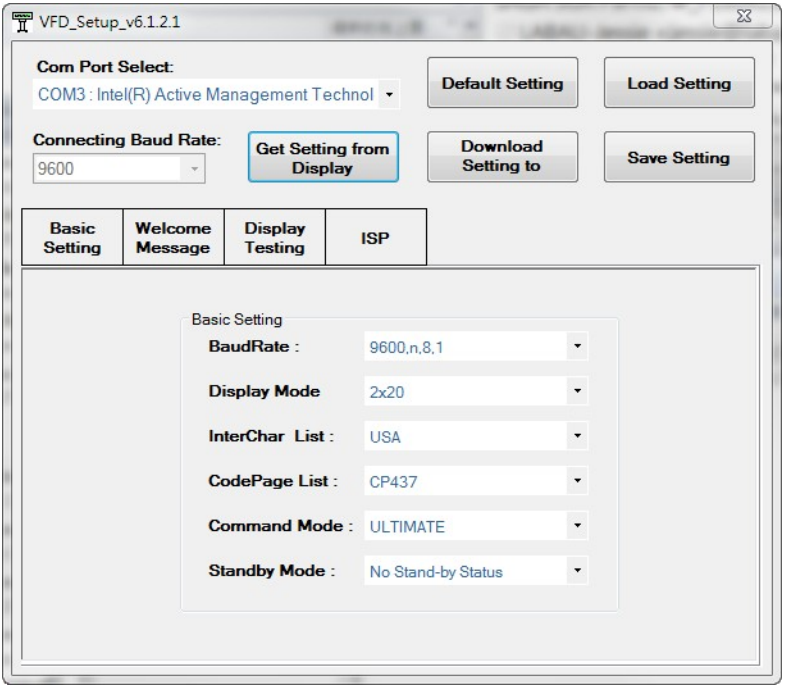
| | Category Type | Name | Mutability | OPOS APG Version | Printer .SO |
|---|---|---|---|---|---|
| Properties | specific long | RecLineHeight | R/W | 1.0 | Not Applicable |
| Properties | specific long | RecLineSpacing | R/W | 1.0 | Not Applicable |
| Properties | specific long | RecLineWidth | Read only | 1.0 | Not Applicable |
| Properties | specific bool | RecLetterQuality | R/W | 1.0 | Not Applicable |
| Properties | specific bool | RecEmpty | Read only | 1.0 | Not Applicable |
| Properties | specific bool | RecNearEnd | Read only | 1.0 | Not Applicable |
| Properties | specific long | RecSidewaysMaxLines | Read only | 1.0 | Not Applicable |
| Properties | specific long | RecSidewaysMaxChars | Read only | 1.0 | Not Applicable |
| Properties | specific long | RecLinesToPaperCut | Read only | 1.0 | Not Applicable |
| Properties | specific string | RecBarCodeRotationList | Read only | 1.1 | Not Applicable |
| Properties | specific long | RecCartridgeState | Read only | 1.5 | Not Applicable |
| Properties | specific long | RecCurrentCartridge | R/W | 1.5 | Not Applicable |
| Properties | specific long | SlpLineChars | R/W | 1.0 | Not Applicable |
| Properties | specific string | SlpLineCharsList | Read only | 1.0 | Not Applicable |
| Properties | specific long | SlpLineHeight | R/W | 1.0 | Not Applicable |
| Properties | specific long | SlpLineSpacing | R/W | 1.0 | Not Applicable |
| Properties | specific long | SlpLineWidth | Read only | 1.0 | Not Applicable |
| Properties | specific bool | SlpLetterQuality | R/W | 1.0 | Not Applicable |
| Properties | specific bool | SlpEmpty | Read only | 1.0 | Not Applicable |
| Properties | specific bool | SlpNearEnd | Read only | 1.0 | Not Applicable |
| Properties | specific long | SlpSidewaysMaxLines | Read only | 1.0 | Not Applicable |
| Properties | specific long | SlpSidewaysMaxChars | Read only | 1.0 | Not Applicable |
| Properties | specific long | SlpMaxLines | Read only | 1.0 | Not Applicable |
| Properties | specific long | SlpLinesNearEndToEnd | Read only | 1.0 | Not Applicable |
| Properties | specific string | SlpBarCodeRotationList | Read only | 1.1 | Not Applicable |
| Properties | specific long | SlpPrintSide | Read only | 1.5 | Not Applicable |
| Properties | specific long | SlpCartridgeState | Read only | 1.5 | Not Applicable |
| Properties | specific long | SlpCurrentCartridge | R/W | 1.5 | Not Applicable |
| Methods | common | Open | - | 1.0 | Supported |
| Methods | common | Close | - | 1.0 | Supported |
| Methods | common | Claim | - | 1.0 | Supported |
| Methods | common | ClaimDevice | - | 1.0 | Supported |
| Methods | common | Release | - | 1.0 | Supported |
| Methods | common | ReleaseDevice | - | 1.0 | Supported |
| Methods | common | CheckHealth | - | 1.0 | Supported |
| Methods | common | ClearInput | - | 1.0 | Not Applicable |
| Methods | common | ClearOutput | - | 1.0 | Not Applicable |
| Methods | common | DirectIO | - | 1.0 | Not Applicable |

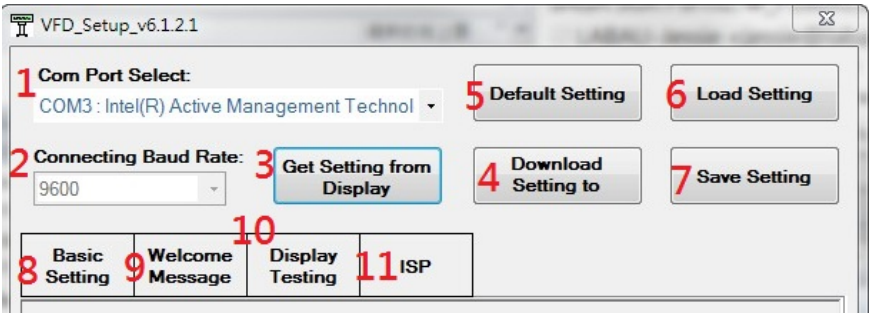
| | Category Type | Name | Mutability | OPOS APG Version | Printer .SO |
|---|---|---|---|---|---|
| Methods | specific | PrintNormal | _ | 1.0 | Supported |
| Methods | specific | PrintTwoNormal | _ | 1.0 | Not Applicable |
| Methods | specific | PrintImmediate | _ | 1.0 | Not Applicable |
| Methods | specific | BeginInsertion | _ | 1.0 | Not Applicable |
| Methods | specific | EndInsertion | _ | 1.0 | Not Applicable |
| Methods | specific | BeginRemoval | _ | 1.0 | Not Applicable |
| Methods | specific | EndRemoval | _ | 1.0 | Not Applicable |
| Methods | specific | CutPaper | _ | 1.0 | Supported |
| Methods | specific | RotatePrint | _ | 1.0 | Supported (only 180) |
| Methods | specific | PrintBarCode | _ | 1.0 | Supported |
| Methods | specific | PrintBitmap | _ | 1.0 | Supported |
| Methods | specific | TransactionPrint | _ | 1.1 | Not Applicable |
| Methods | specific | ValidateData | _ | 1.1 | Not Applicable |
| Methods | specific | SetBitmap | _ | 1.0 | Not Applicable |
| Methods | specific | SetLogo | _ | 1.0 | Not Applicable |
| Methods | specific | ChangePrintSide | _ | 1.5 | Not Applicable |
| Methods | specific | MarkFeed | _ | 1.5 | Not Applicable |
| Events | common | DataEvent | _ | 1.0 | Not Applicable |
| Events | common | DirectIOEvent | _ | 1.0 | Not Applicable |
| Events | common | ErrorEvent | _ | 1.0 | Not Applicable |
| Events | common | OutputComplete Event | _ | 1.0 | Not Applicable |
| Events | common | StatusUpdate Event | _ | 1.0 | Not Applicable |

## 4.10.2 VFD: LM730

### 4.10.2.1 Set Up AP General Introduction

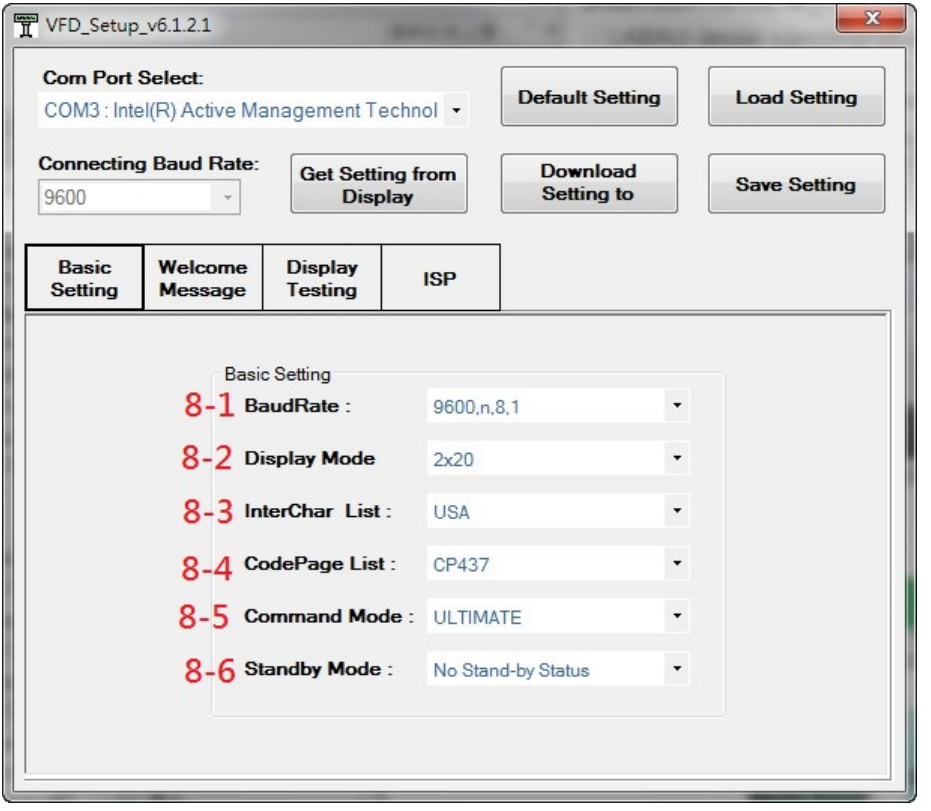
AP Version: v6.1.2.1, User Interface (example)





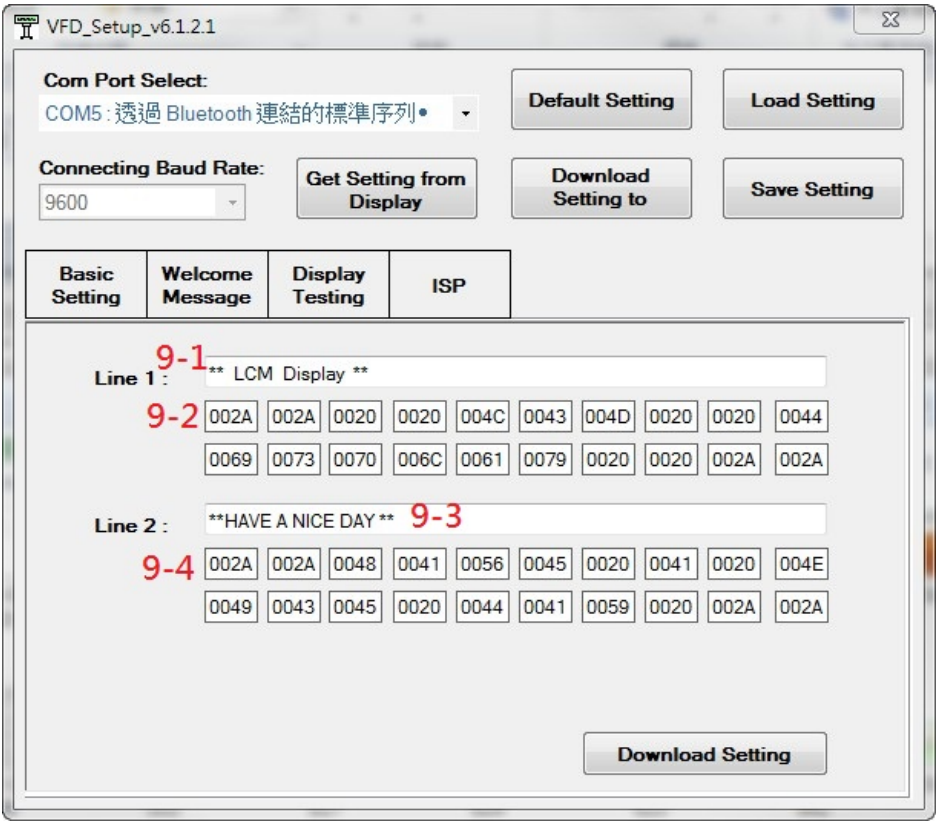

| Number | Button | Function Description |
|---|---|---|
| 1 | Com Port Select | Here you can connect this Setup AP with your display by choosing the correct com port position. |
| 2 | Baud Rate | Please make sure the Baud Rate setting here is the same with your display. |
| 3 | Get Setting | Clicking this to get Setting from Display. You can also use this function to make sure the connection is success. |
| 4 | Download Setting | After you finish all the setting, please click this button to apply all the settings to display. |
| 5 | Set Default | Click here to make this display back to default setting. Before you click this button, please make sure the display is connected to the AP. |
| 6 | Load | You can load back the setting file by clicking this. |
| 7 | Save | You can save all the settings by clicking this, then you would get a setting file. |
| 8 | Basic Setting | In this sheet, you can have most of the basic display setting done. |
| 9 | Welcome Message | In this sheet you can finish all the settings for “Welcome” Mode (Stand-by mode) of display. |
| 10 | Display Testing | In this sheet you can finish the basic function testing of the display. |
| 11 | ISP | When you need to update the Firmware version, please come to this sheet and finish all the settings. |

### 4.10.2.2 Set Up AP "Basic Setting" Sheet



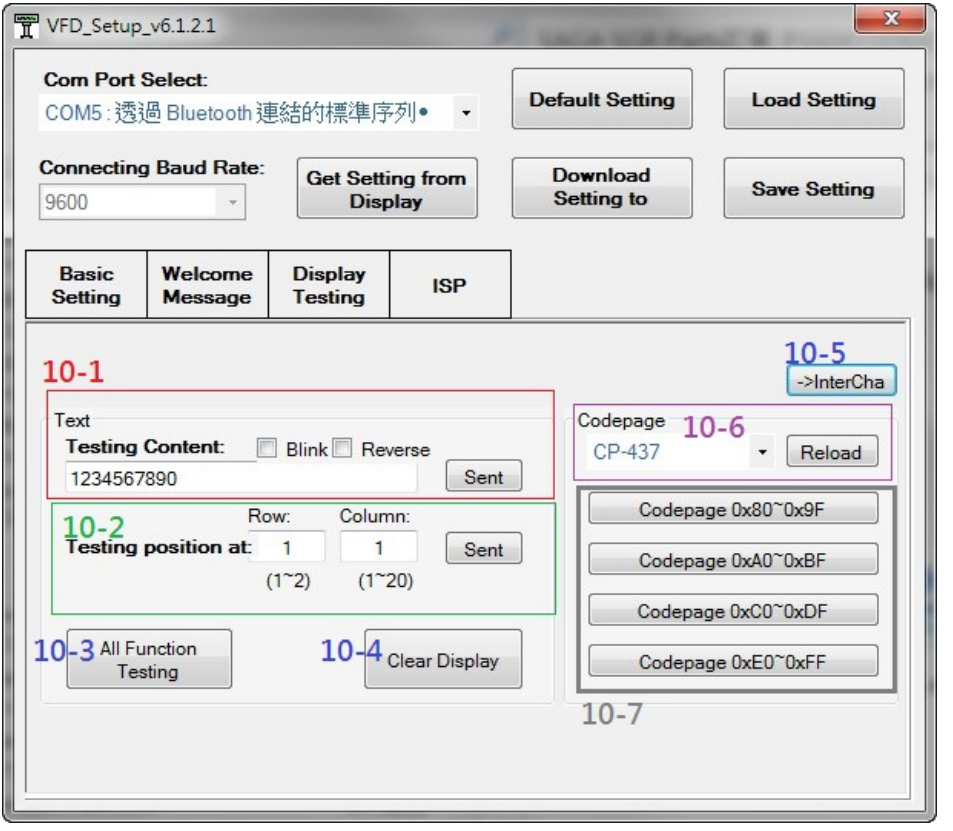
| Number | Button | Function Description | |
|---|---|---|---|
| 8-1 | Baud Rate | 9600,n,8,1 | 19200,n,8,1 |
| 8-2 | Display Mode | 2x20, this display supports 2 Lines,<br>1st line for 20 Character max.<br>2nd Line for 40 Character max. | |
| 8-3 | Inter Char List | International Character List.<br>Including 17 kinds of Language. | |
| 8-4 | CodePage List | Code Page List.<br>Including 34 kinds of Language. | |
| 8-5 | Command mode | Display command mode, supports 10 kinds of command.<br>Including Ultimate, EPSON, UTC Standard, UTC Standard, AEDEX, ADM788, DSP800, CD5220, EMAX, Logic control, LD540 | |
| 8-6 | Standby model | Here you can decide how long this display will get into Standby (Welcome) mode, from 1 minute to 10 minutes for option, or never get into standby mode. | |

### 4.10.2.3 Set Up AP "Welcome Message" Sheet



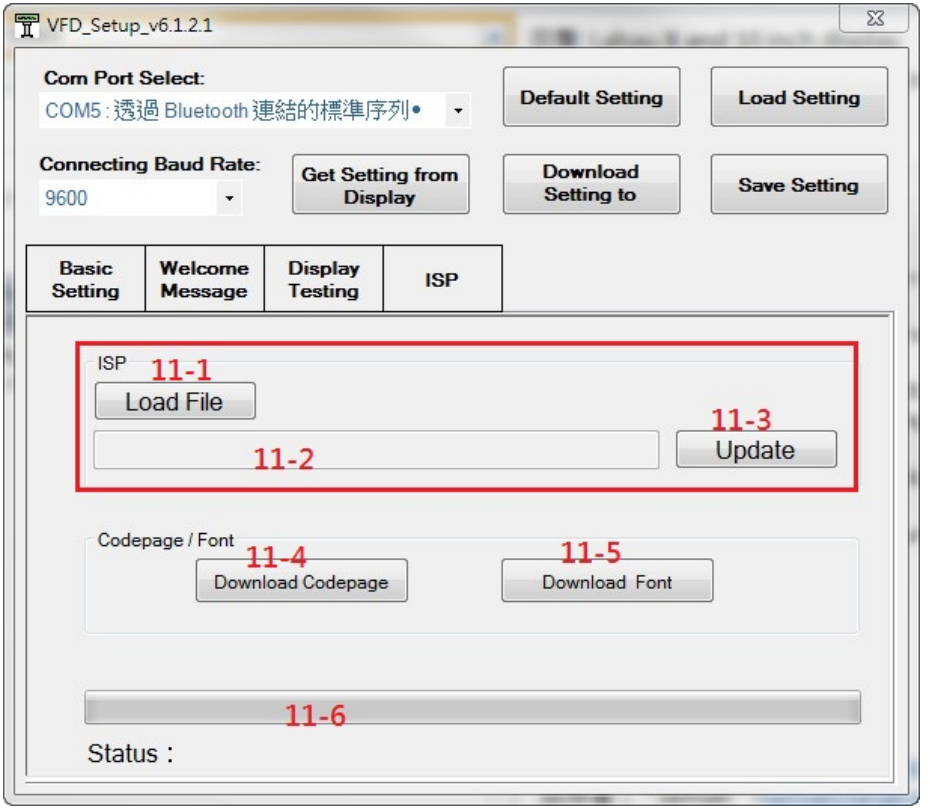

| Number | Button | Function Description |
|---|---|---|
| 9-1 | Content insert | You can type in your content for Welcome (Standby) Mode for Line 1 in this column. Max for 20 Characters. |
| 9-2 | Hex Mode | You can type in your content "in Hex" for Welcome (Standby) Mode in this column. Max for 20 Characters. |
| 9-3 | Content insert | You can type in your content for Welcome (Standby) Mode for Line 2 in this column. Max for 40 Characters. |
| 9-4 | Hex Mode | You can type in your content "in Hex" for Welcome (Standby) Mode in this column. Max for 40 Characters. |

### 4.10.2.4 Set Up AP "TEST" Sheet



| Number | Button | Function Description |
|---|---|---|
| 10-1 | Text Column | You can freely enter any content here.<br>● Select “Blink” to show the content you entered and be flashing on the display.<br>● Select “Reverse” to show the content you entered and in reverse way. For example, green background with white font.<br>Click “Sent” to apply the settings. |
| 10-2 | Testing Content | Please go to “10-1” first to enter the testing content.<br>Then enter the column and row position you would like to test here.<br>Click “Sent” to apply the settings. |
| 10-3 | All Function Testing | All functions testing automatically. |
| 10-4 | Clear Display | Clear all the content you entered. |
| 10-5 | Inter Char | Set up your international Character |
| 10-6 | Codepage | You can change the codepage you would like to test in 10-1.<br>And Click “Reload” to refresh the codepage list. |
| 10-7 | Codepage testing | ● Clicking “Codepage 0x80~0x9F” to test the position 0x80~0x9F of the codepage you select in 10-1.<br>● Clicking “Codepage 0xA0~0xBF” to test the position 0xA0~0xBF of the codepage you select in 10-1.<br>● Clicking “Codepage 0xC0~0xDF” to test the position 0xC0~0xDF of the codepage you select in 10-1.<br>● Clicking “Codepage 0xE0~0xEF” to test the position 0xE0~0xEF of the codepage you select in 10-1.<br>And you can change the “inter Character List” you would like to testing in 10-7 by clicking 10-5. |

### 4.10.2.5 Set Up AP "ISP" Sheet




| Number | Button | Function Description |
|---|---|---|
| 11-1<br>11-2<br>11-3 | Load File | Please insert the Firmware File by clicking "Load File", and then you can see the file path in the column "11-2".<br>And please click "11-3" Update to insert the file. |
| 11-4 | Download Codepage | |
| 11-5 | Download Font | |
| 11-6 | Status | Here you can see the data uploading status here. |

## 4.11 API

### 4.11.1 API Package Content

You can find the enclosed API Package files in the Protech Manual /Driver DVD. Depending on the machine types, the API Package may include the following files:

| Function DLL | | | |
|---|---|---|---|
| **Directory** | **Function** | **File Name** | **Description** |
| **ProxAPI standard** | Cash Drawer | Cash Drawer.dll | Driver to control Cash Drawer |
| | WDT | Watchdog.dll | Driver to control Watchdog |
| | Hardware Monitor | Hardware Monitor.dll | Driver to read hardware data |
| | **multilangXML.dll** | | Driver to open XML file |
| | **Initial.xml** | | XML file to initiate the API Package |
| | **ProxAP.exe** | | API program executable file |
| | XML Files\Model Name*\Initial.xml | | XML file for each model |
| | Version.ini | | Version Information |

| Sample Program | | |
|---|---|---|
| **Directory** | **Contents / File Name** | **Description** |
| **DEMO PROJECT** | DEMO PROJECT\GPIO Sample Code | C# VB6 VB.net Source Code |
| | DEMO PROJECT\Digital Sample Code | C# VB6 VB.net Source Code |
| | DEMO PROJECT\Watchdog Sample Code | C# VB6 VB.net MFC Source Code |

### 4.11.2 API Procedure

Take **VB2005 .NET** for example. Follow the instructions below to perform the API procedure:

**Step 1.** Declare a function. You may create a module in your project and fill in the function.
Example: Cash drawer

```
Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean

Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean
```

**Step 2.** Create a button to call API Function.

a.) Call Cash drawer open event:

```
Private Sub cash_btn1_Click (ByVal Sender As System.Object, ByVal e As System.EventArgs) Handles cash_btn1.Click
CashDrawerOpen(1), "1" specifies the cash drawer 1 port
CashDrawerOpen(2), "2" specifies the cash drawer 2 port
Timer1.start
```

b.) Detect Cash drawer status:

```
A timer event can be created.
Private Sub Timer1_Tick (ByVal Sender As System.Object,ByVal e As System.EventArgs) Handles Timer1.Tick
    Dim Receive_Status1 as Boolean
    Dim Receive_Status2 as Boolean
    Receive_Status1 = CashDrawerOpen(&H1)
    If Receive_Status1 = true then
       Text1.text = "cash drawer1 open"    'enter text into textbox.
Else
Text1.text = "cash drawer1 close"    'enter text into textbox.
End if
'=======================================
    Receive_Status2 = CashDrawerOpen(&H2)
    If Receive_Status2 = true then
       Text2.text = "cash drawer2 open"    'enter text into textbox.
Else
Text2.text = "cash drawer2 close"    'enter text into textbox.
End if
'=======================================
End sub
```

## Sample Code

**(1) VB Declaration Method**

Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean

Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean

**(2) Call Function**

**Open cash drawer:**
CashDrawerOpen(1)
**Open cash drawer1**
CashDrawerOpen(2)
**Open cash drawer2**

**Check cash drawer status:**
Dim receive_status as Boolean
**Check cash drawer1 status**
Receive_Status = CashDrawerOpen(&H1)
**Check cash drawer2 status**
Receive_Status = CashDrawerOpen(&H2)

**(3) C# Declaration Method**

```
Public class PortAccess
{
[DllImport("CashDrawer.dll",EntryPoint = "Initial_CashDrawer")]
Public static extern void Initial_CashDrawer();
[DllImport("CashDrawer.dll",EntryPoint= "GetCashDrawerStatus")]
Public static extern bool GetCashDrawerStatus()
[DllImport("CashDrawer.dll",EntryPoint = "CashDrawerOpen")]
Public static extern bool CashDrawerOpen(short num_drawer);}
```

**(4) Call Function**

**Open cash drawer1**

```
PortAccess.CashDrawerOpen(0x01);          //check cash drawer1 status
```

**Open cash drawer2**

```
PortAccess.CashDrawerOpen(0x02);          //check cash drawer2 status
```

```
Bool bstatus;
bstatus = PortAccess.GetCashDrawerStatus(0x01);
bstatus = PortAccess.GetCashDrawerStatus(0x02); //Before get cash drawer status, need to initial cash drawer first
```

**VB.NET external function:**

Declare Function SetMinSec Lib “WatchDog.dll” (ByVal kind As Short,ByVal delay_time As Short) As Boolean
Declare Function Stopwatchdog Lib “WatchDog.dll” ( ) As Short
Declare Function Setwatchdog Lib “WatchDog.dll” (ByVal value As Short) As Boolean

Declare Function Digital_Initial Lib “Digital.dll” ( ) As Long
Declare Function Digtial_Set Lib “Digital.dll”(ByVal hex_value As Short) As Long
Declare Function Digtial_Get Lib ”Digital.dll” ( ) As Short

Declare Function GPIO_Initial Lib “GPIO.dll” ( ) As Long
Declare Function GPIO_SetPort Lib “GPIO.dll”(ByVal direct As long)
Declare Function GPIO_Set Lib “GPIO.dll”(ByVal dout_value As long) As Boolean
Declare Function GPIO_Get Lib “GPIO.dll”( ) As Short

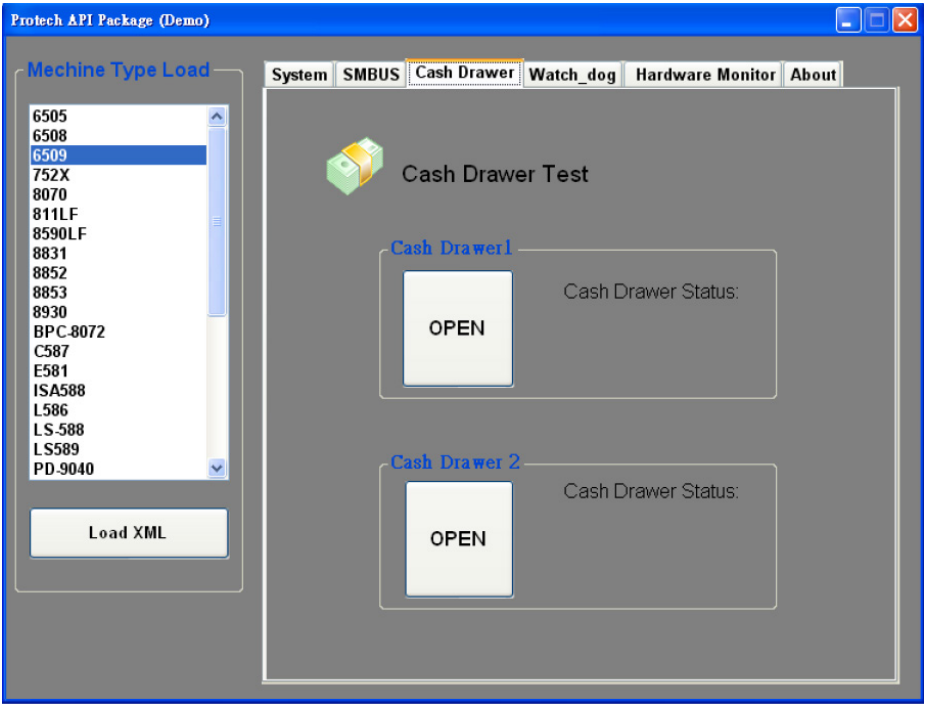
Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean
Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean

**VB 6 external function:**

Declare Function CashDrawerOpen Lib "CashDrawer.dll" (ByVal num_drawer As Integer) As Boolean
Declare Function GetCashDrawerStatus Lib "CashDrawer.dll" (ByVal num_drawer As Integer) As Boolean

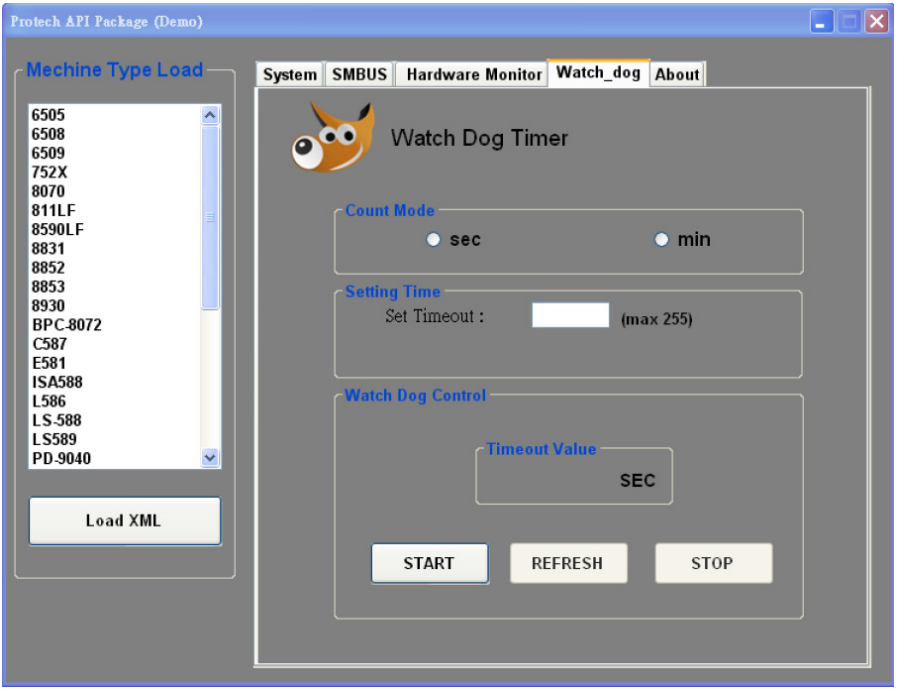
**Note:** VB.net short = integer VB6

### 4.11.3 Cash Drawer




| Button/Item | Description |
|---|---|
| OPEN (button) | Tap to open the cash drawer. |
| Cash Drawer Status | Cash drawer status will be displayed after **OPEN** is tapped.<br>• Cash Drawer is closed when the following picture is shown:<br>Cash Drawer Status:<br>**Close**<br>• Cash Drawer is opened when the following picture is shown:<br>Cash Drawer Status:<br>**Open** |

## 4.11.4 Watchdog




| Button/Item | Description |
|---|---|
| Count Mode (radio button) | Select second or minute as the time unit of the watchdog timer. |
| Setting Time | Set the timeout for the watchdog timer. (Maximum value: 255 seconds or minutes) |
| Watch Dog Control | • **Timeout Value**: Simulation timer of the API program. The running watchdog timeout will be displayed (in seconds). It is not as accurate as a hardware watchdog clock.<br>• **START**: Tap to start the watchdog timer. Meanwhile, the **REFRESH** and **STOP** buttons will be enabled.<br>• **STOP**: Tap to stop the watchdog timer.<br>• **REFRESH**: Tap to restart the watchdog timer. |

## 4.12 API Function

The API program-related sample programs, developed in VB.Net and C#, are provided for easy use of the API Package. Refer to the main API functions listed as below:

| API Function | | DLL | |
|---|---|---|---|
| **Cash Drawer** | CashDrawerOpen<br>GetCashDrawerStatus | multilangXML.dll | CashDrawer.dll |
| **Watchdog (WD)** | Watchodog_Set<br>Watchodog_Stop<br>Watchdog_SetMinSec<br>Watchdog_Recount | | WatchDog.dll |
| **Hardware Monitor** | HMWVoltage_Get<br>HMWTemperataure_Get<br>HMWFanSpeed_Get | | Hardware Monitor.dll |

### 4.12.1 Cash Drawer Function

**CashDrawerOpen**

**bool CashDrawerOpen (short num_drawer);**

Purpose: Open the cash drawer API.
Value: num_drawer = 1 (Open the Cash Drawer1)
num_drawer = 2 (Open the Cash Drawer2)
Return: True (1) on success, False (0) on failure

Example: CashDrawerOpen(0x01); // Open the Cash Drawer1

**GetCashDrawerStatus**

**bool GetCashDrawerStatus (short num_drawer);**

Purpose: Get the cash drawer status.
Value: num_drawer = 1 (Get the Cash Drawer1 status)
num_drawer = 2 (Get the Cash Drawer2 status)
Return: True (1) on success, False (0) on failure

Example: Short data;
data= GetCashDrawerStatus(0x01); // Get the Cash Drawer1 status

```
if (data)
MsgBox("open1");      // Cash Drawer1 status
"Open"
Else
MsgBox("close1");     // Cash Drawer1 status
"Close"
Endif
```

### 4.12.2 Watch Dog Function

**Watchdog_Set**

**bool Watchdog_Set (int value);**

| | |
|---|---|
| Purpose: | Set the timeout for the watchdog timer. |
| Value | value = 0 ~ 255 |
| Return: | True (1) on success, False (0) on failure |

**Watchdog_SetMinSec**

**bool Watchdog_SetMinSec (int kind);**

| | |
|---|---|
| Purpose: | Set the unit of time as second/minute |
| Value | kind = 1 (Measured in unit of second)<br>2 (Measured in unit of minute) |
| Return: | True (1) on success, False (0) on failure |

**Watchdog_Stop**

**bool Watchdog_Stop (void);**

| | |
|---|---|
| Purpose: | Stop the watchdog timer |
| Value | None |
| Return: | True (1) on success, False (0) on failure |

**Watchdog_Recount**

**bool Watchdog_Recount (void);**

| | |
|---|---|
| Purpose: | Restart the watchdog timer |
| Value | None |
| Return: | True (1) on success, False (0) on failure |

# 5 BIOS SETUP

This chapter guides users how to configure the basic system configurations via the BIOS Setup Utilities. The information of the system configuration is saved in BIOS NVRAM so that the Setup information is retained when the system is powered off. The BIOS Setup Utilities consist of the following menu items:

- Main Menu
- Advanced Menu
- Chipset Menu
- Security Menu
- Boot Menu
- Save & Exit Menu

## 5.1 Introduction

The PA-A900 System uses an AMI (American Megatrends Incorporated) Aptio BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the built-in BIOS setup program, Power-On Self-Test (POST), PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

Aptio is AMI's BIOS firmware based on the UEFI (Unified Extensible Firmware Interface) specifications and the Intel Platform Innovation Framework for EFI. The UEFI specification defines an interface between the operating system and platform firmware. The interface consists of data tables that contain platform-related information, boot service calls, and runtime service calls that are available to the operating system and its loader. These elements have combined to provide a standard environment for booting the operating system and running pre-boot applications.

The diagram below shows the Extensible Firmware Interface's location in the software stack.

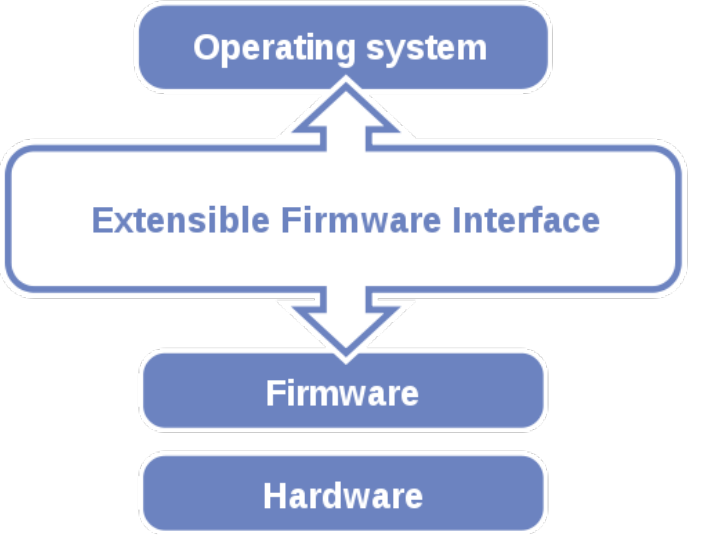



Figure 5-1. Extensible Firmware Interface Diagram

EFI BIOS provides an user interface that allows you to modify hardware configuration, e.g. change the system date and time, enable/disable a system component, determine bootable device priority, set up personal password, etc., which is convenient for engineers to perform modifications and customize the computer system and allows technicians to troubleshoot the occurred errors when the hardware is faulty.

The BIOS setup menu allows users to view and modify the BIOS settings for the computer. After the system is powered on, users can access the BIOS setup menu by pressing <Del> or <Esc> immediately while the POST message is running before the operating system is loading.

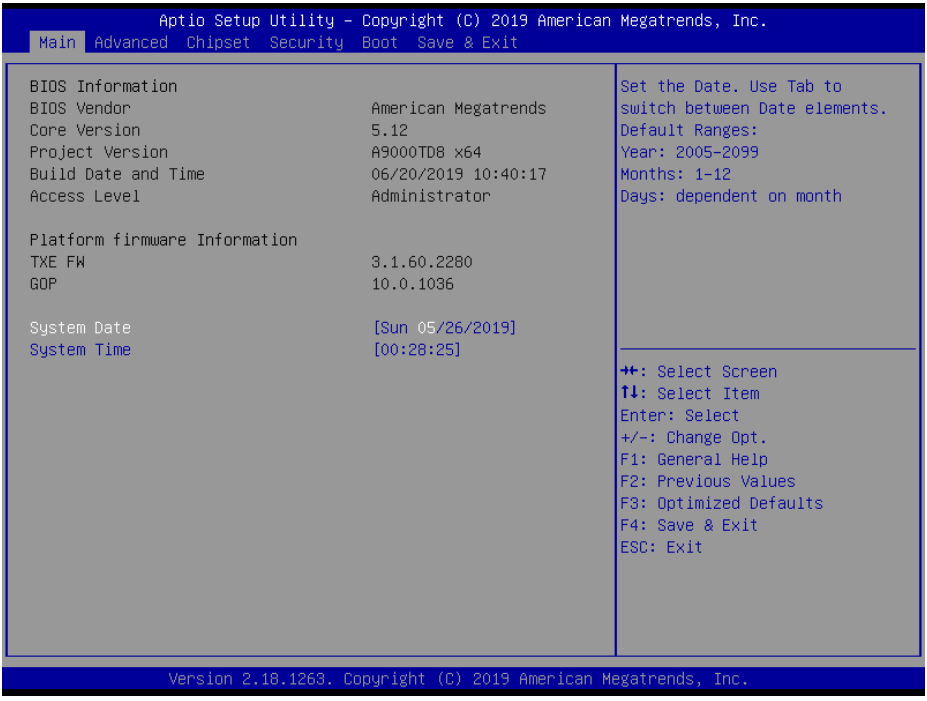
All the menu settings are described in details in this chapter.

## 5.2 Accessing Setup Utility

After the system is powered on, BIOS will enter the Power-On Self-Test (POST) routines and the POST message will be displayed:


Figure 5-2. POST Screen with AMI Logo

Press **<Del>** or **<Esc>** to access the Setup Utility program and the **Main** menu of the Aptio Setup Utility will appear on the screen as below:




**BIOS Setup Menu Initialization Screen**

You may move the cursor by <↑> and <↓> keys to highlight the individual menu items. As you highlight each item, a brief description of the highlighted selection will appear on the right side of the screen.

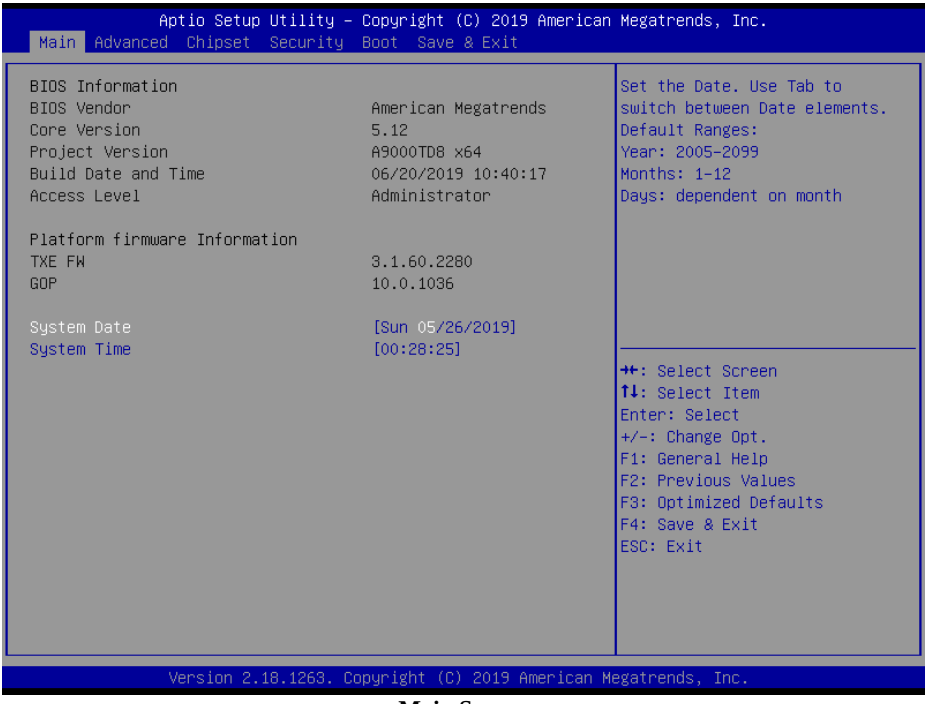
The language of the BIOS setup menu interface and help messages are shown in US English. You may use <↑> or <↓> key to select among the items and press <Enter> to confirm and enter the sub-menu. The following table provides the list of the navigation keys that you can use while operating the BIOS setup menu.

| BIOS Setup Navigation Key | Description |
|---|---|
| <←> and <→> | Select a different menu screen (move the cursor from the selected menu to the left or right). |
| <↑> and <↓> | Select a different item (move the cursor from the selected item upwards or downwards) |
| <Enter> | Execute the command or select the sub-menu. |
| <F2> | Load the previous configuration values. |
| <F3> | Load the default configuration values. |
| <F4> | Save the current values and exit the BIOS setup menu. |
| <Esc> | Close the sub-menu.<br>Trigger the confirmation to exit BIOS setup menu. |

## 5.3 Main

Menu Path *Main*

The **Main** menu allows you to view the BIOS Information, change the system date and time, and view the user access privilege level. Use tab to switch between date elements. Use <↑> or <↓> arrow keys to highlight the item and enter the value you want in each item. This screen also displays the BIOS version (project) and BIOS Build Date and Time.




**Main Screen**

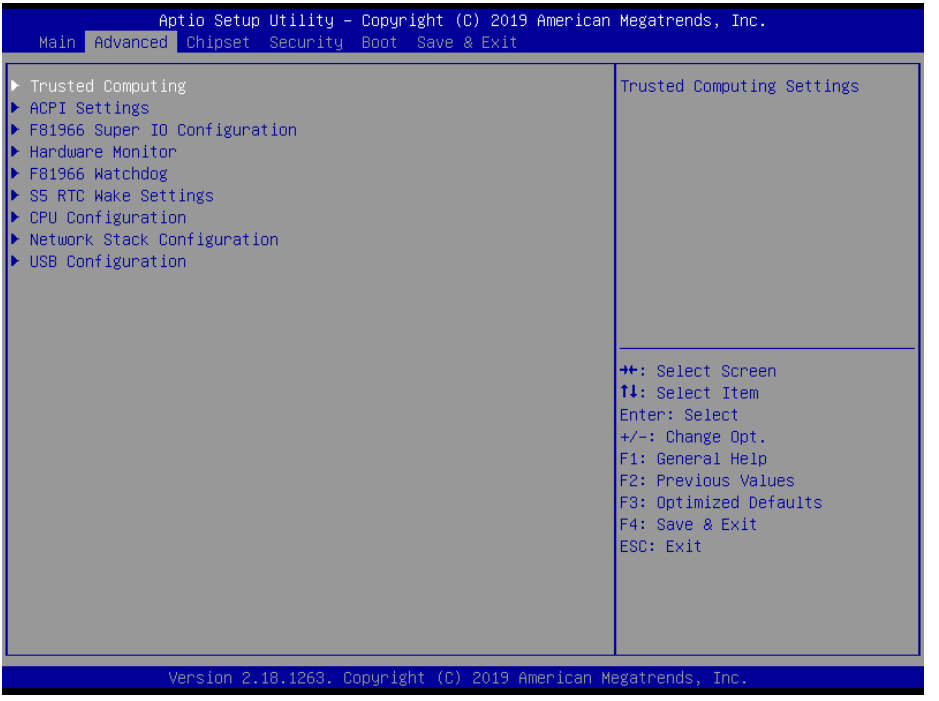
| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| BIOS Vendor | No changeable options | Displays the BIOS vendor. |
| Core Version | No changeable options | Displays the current BIOS core version. |
| Project Version | No changeable options | Displays the version of the BIOS currently installed on the platform. |
| Build Date and Time | No changeable options | Displays the date of current BIOS version is built. |
| Access Level | No changeable options | Displays the Access Level |
| TXE FW | No changeable options | Displays the TXE firmware version. |
| GOP | No changeable options | Displays the GOP driver version |

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| System Date | Month, day, year | Sets the system date. The format is [Day Month/ Date/ Year]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it. The "Day" is automatically changed. |
| System Time | Hour, minute, second | Sets the system time. The format is [Hour: Minute: Second]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it. |

## 5.4 Advanced

Menu Path *Advanced*

This menu provides advanced configurations such as Trusted Computing, ACPI Settings, F81966 Super IO Configuration, Hardware Monitor, F81966 Watchdog, S5 RTC Wake Settings, CPU Configuration, Network Stack Configuration and USB Configuration.



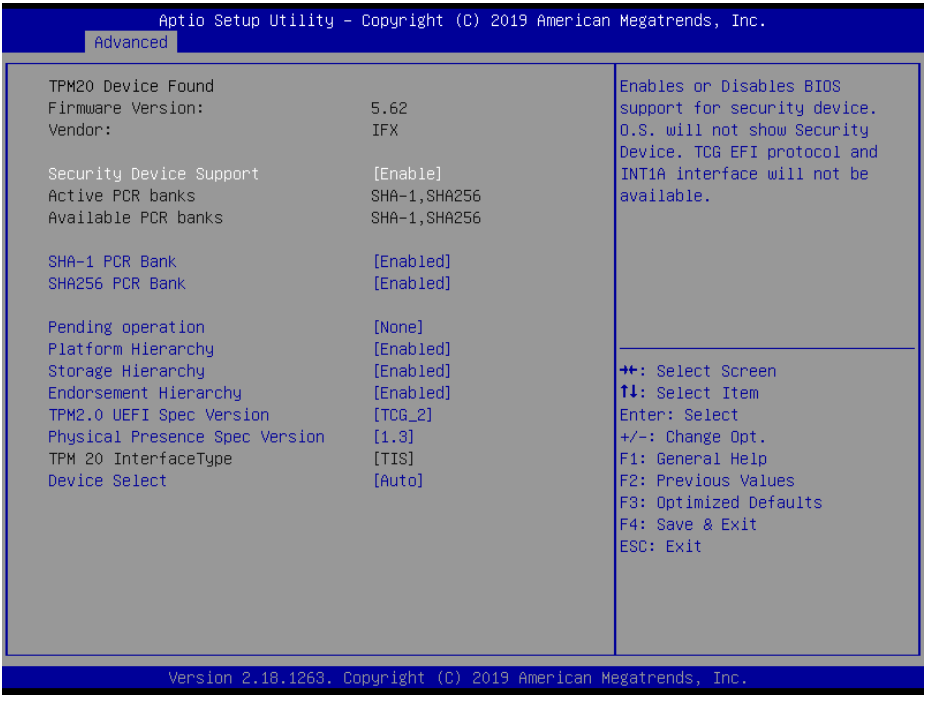

**Advanced Menu Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Trusted Computing | Sub-Menu | Trusted Computing Settings |
| ACPI Settings | Sub-Menu | System ACPI Parameters. |
| F81966 Super IO Configuration | Sub-Menu | System Super IO Chip Parameters |
| Hardware Monitor | Sub-Menu | Monitor hardware status |
| F81966 Watchdog | Sub-Menu | F81966 Watchdog Parameters. |
| S5 RTC Wake Settings | Sub-Menu | Enables the system to wake from S5 using RTC alarm. |
| CPU Configuration | Sub-Menu | CPU Configuration. Parameters. |
| Network Stack Configuration | Sub-Menu | Network Stack Settings |
| USB Configuration | Sub-Menu | USB Configuration Parameters. |

## 5.4.1 Advanced – Trusted Computing

Menu Path *Advanced > Trusted Computing*

The **Trusted Computing** allows users to enable/disable BIOS support for security device. The operating system will not show Security Device. The TCG EFI protocol and INT1A interface will not be available.




**Trusted Computing Screen**

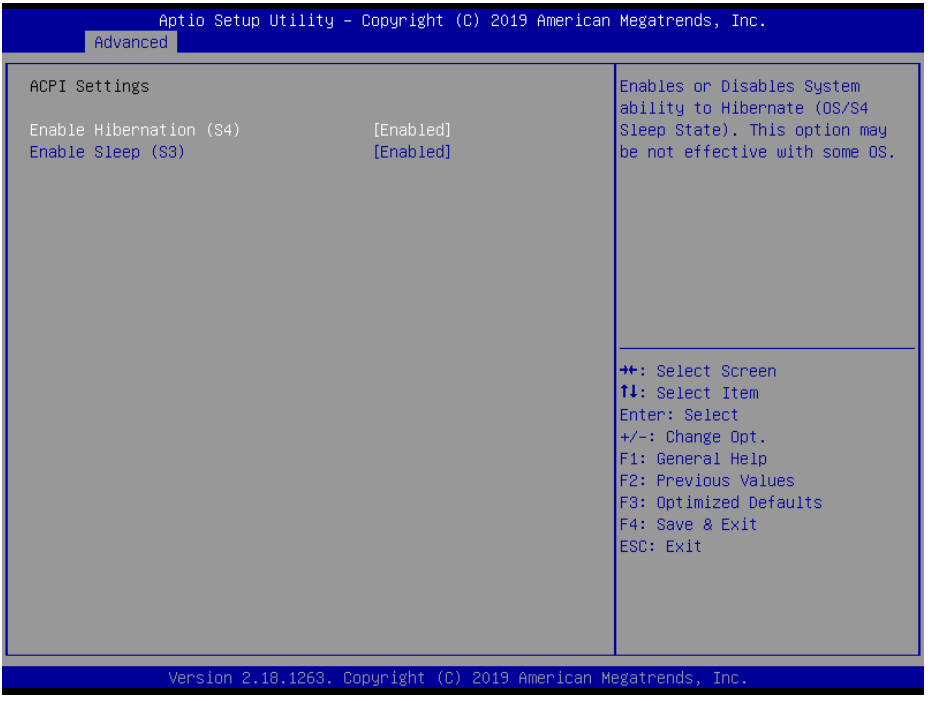
| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Security Device Support | - Disabled<br>- Enabled | Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| Active PCR banks | SHA-1, SHA256 | Displays the Security Device. |
| Available PCR banks | SHA-1, SHA256 | Displays the Security Device. |
| SHA-1 PCR Bank | - Disabled<br>- Enabled | Enables or Disables SHA-1 PCR Bank. |
| SHA256 PCR Bank | - Disabled<br>- Enabled | Enables or Disables SHA256 PCR Bank. |

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Pending operation | - None<br>- TPM Clear | Schedules an Operation for the Security Device.<br>NOTE: Your Computer will reboot during restart in order to change State of Security Device. |
| Platform Hierarchy | - Disabled<br>- Enabled | Enables or Disables Platform Hierarchy. |
| Storage Hierarchy | - Disabled<br>- Enabled | Enables or Disables Storage Hierarchy. |
| Endorsement Hierarchy | - Disabled<br>- Enabled | Enables or Disables Endorsement Hierarchy. |
| TPM2.0 UEFI Spec Version | - TCG_1_2<br>- TCG_2 | Selects the TCG2 Spec Version Support.<br>• **TCG_1_2:** The Compatible mode for Win8/Win10.<br>• **TCG_2:** Support new TCG2 protocol and event format for Win10 or later. |
| Physical Presence Spec Version | - 1.2<br>- 1.3 | Selects to tell O.S. to support PPI Spec Version 1.2 or 1.3.<br>**Note**: Some HCK tests might not support 1.3. |
| TPM 20 InterfaceType | TIS | Displays TPM 20 InterfaceType |
| Device Select | - TPM 1.2<br>- TPM 2.0<br>- Auto | • **TPM 1.2:** Restricts support to TPM 1.2 devices.<br>• **TPM 2.0:** Restricts support to TPM 2.0 devices<br>• **Auto:** Supports both TPM 1.2 and TPM 2.0 with the default setting set to TPM 2.0 devices if not found. TPM 1.2 devices will be enumerated. |

## 5.4.2 Advanced – ACPI Settings

Menu Path *Advanced > ACPI Settings*

The **ACPI Settings** allows users to configure relevant ACPI (Advanced Configuration and Power Management Interface) settings, such as Enable Hibernation (S4) and Enable Sleep (S3).

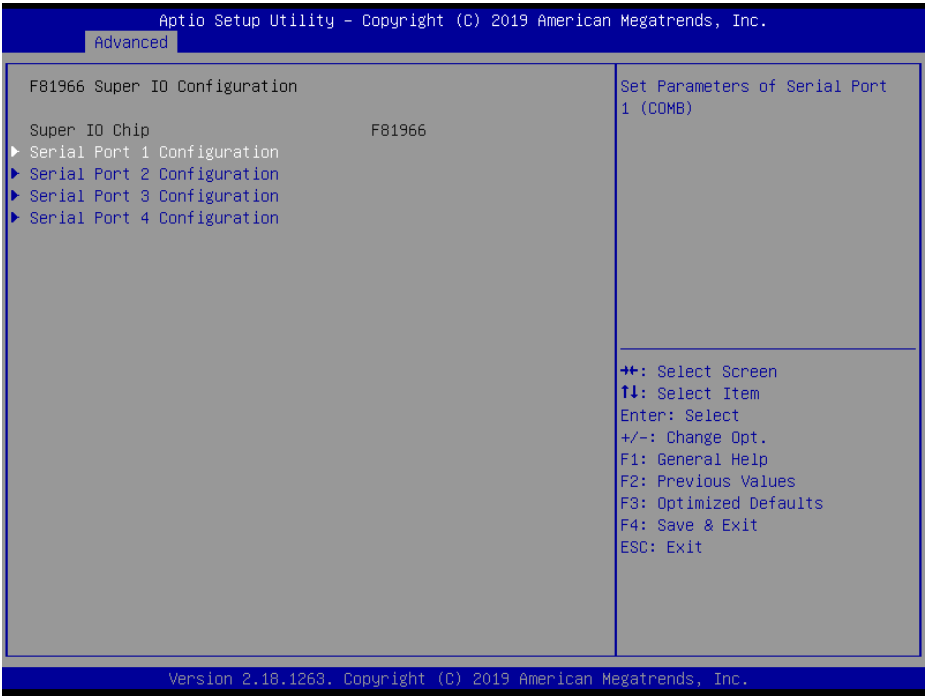



**ACPI Settings Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Enable Hibernation (S4) | - Disabled<br>- Enabled | Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS. |
| Enable Sleep (S3) | - Disabled<br>- Enabled | Enables or Disables System ability to Sleep (OS/S3 Sleep State.) |

## 5.4.3 Advanced – F81966 Super IO Configuration

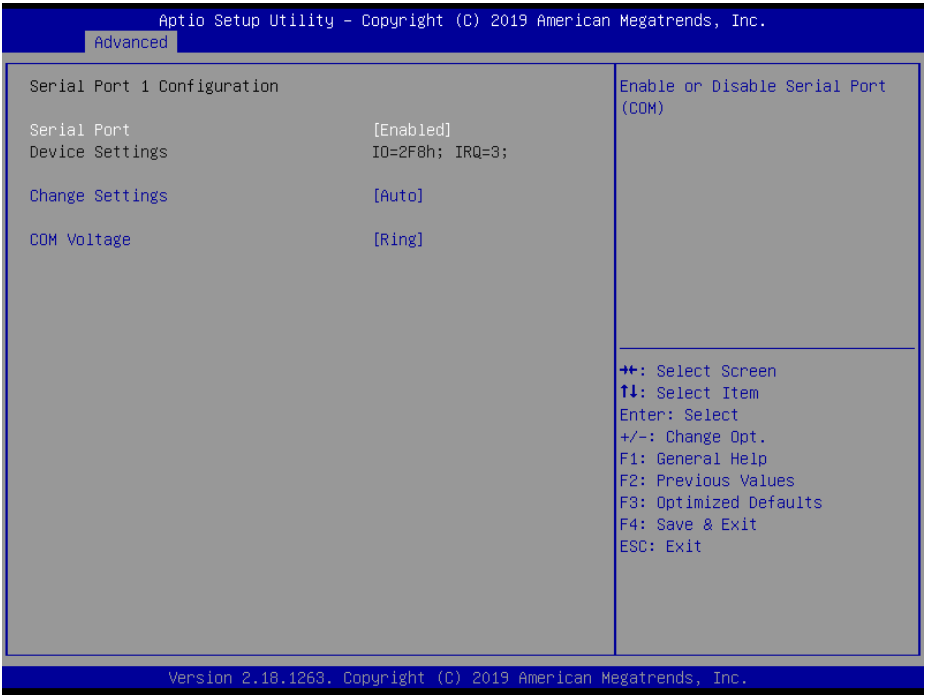
Menu Path *Advanced > F81966 Super IO Configuration*




**F81966 Super IO Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Serial Port 1 Configuration | Sub-Menu | Set Parameters of Serial Port 1 (COMB) |
| Serial Port 2 Configuration | Sub-Menu | Set Parameters of Serial Port 2 (COMC) |
| Serial Port 3 Configuration | Sub-Menu | Set Parameters of Serial Port 3 (COMA) |
| Serial Port 4 Configuration | Sub-Menu | Set Parameters of Serial Port 4 (COMD) |

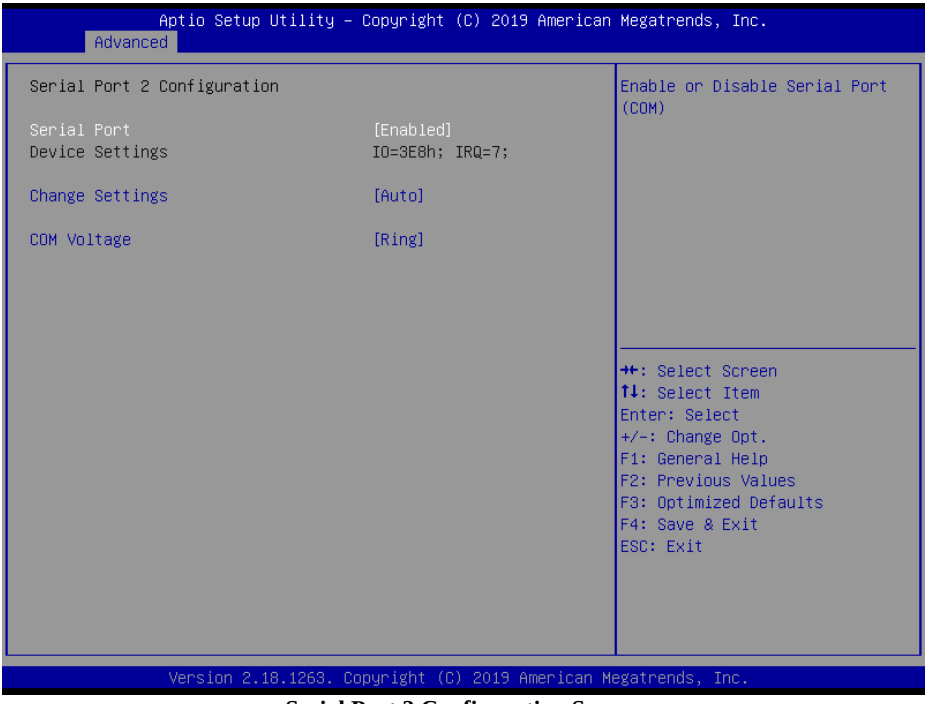
Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 1 Configuration*




**Serial Port 1 Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Serial Port | - Disabled<br>- Enabled | Enables or Disables Serial Port 1. |
| Device settings | No changeable options | Displays the current settings of Serial Port 1. |
| Change Settings | - Auto<br>- IO=2F8h; IRQ=3;<br>- IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12;<br>- IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;<br>- IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;<br>- IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12; | Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts. |
| COM Voltage | - Ring<br>- 12V<br>- 5V | COM Voltage selection. |

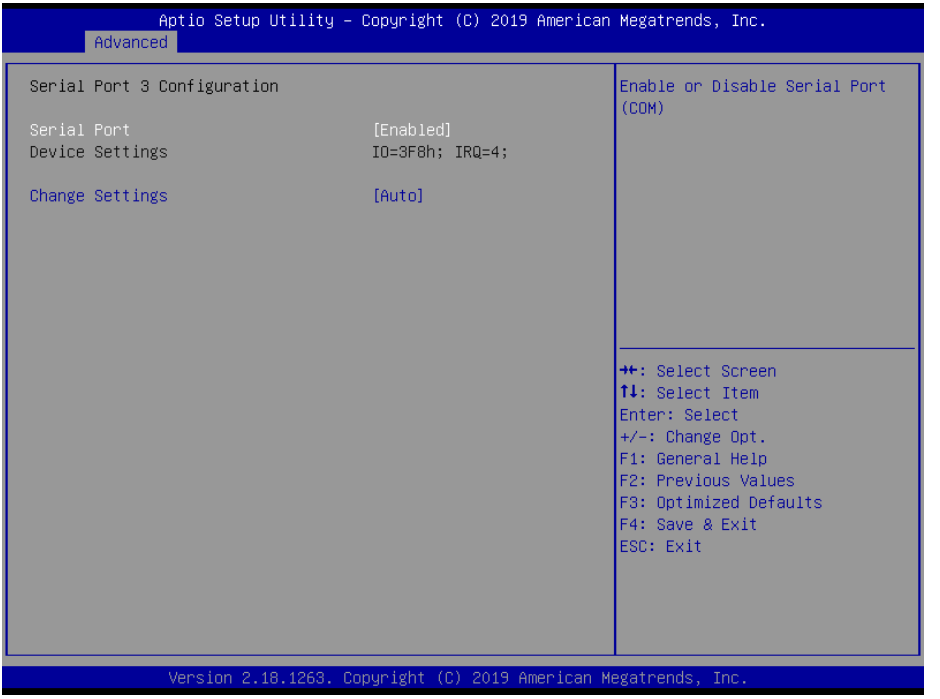
Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 2 Configuration*




**Serial Port 2 Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Serial Port | - Disabled<br>- Enabled | Enables or Disables Serial Port 2. |
| Device Settings | No changeable options | Displays the current settings of Serial Port 2. |
| Change Settings | - Auto<br>- IO=3F8h; IRQ=7;<br>- IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12;<br>- IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;<br>- IO=3E0h; IRQ=3,4,5,6,7,9,10,11,12;<br>- IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12; | Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts. |
| COM Voltage | - Ring<br>- 12V<br>- 5V | COM Voltage selection. |

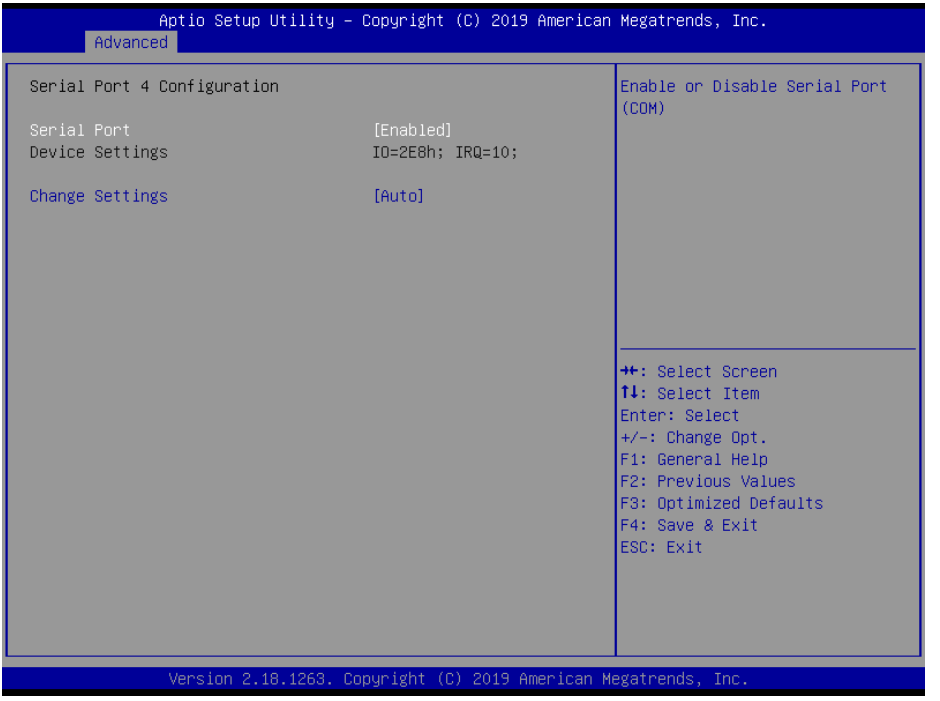
Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 3 Configuration*




**Serial Port 3 Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Serial Port | - Disabled<br>- Enabled | Enables or Disables Serial Port 3. |
| Device Settings | No changeable options | Displays the current settings of Serial Port 3. |
| Change Settings | - Auto<br>- IO=3F8h; IRQ=4;<br>- IO=3F8h; IRQ=3,4,5, 6,7,9,10,11,12;<br>- IO=2F8h; IRQ=3,4,5, 6,7,9,10,11,12;<br>- IO=3E8h; IRQ=3,4,5, 6,7,9,10,11,12;<br>- IO=2E8h; IRQ=3,4,5, 6,7,9,10,11,12; | Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts. |

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 4 Configuration*



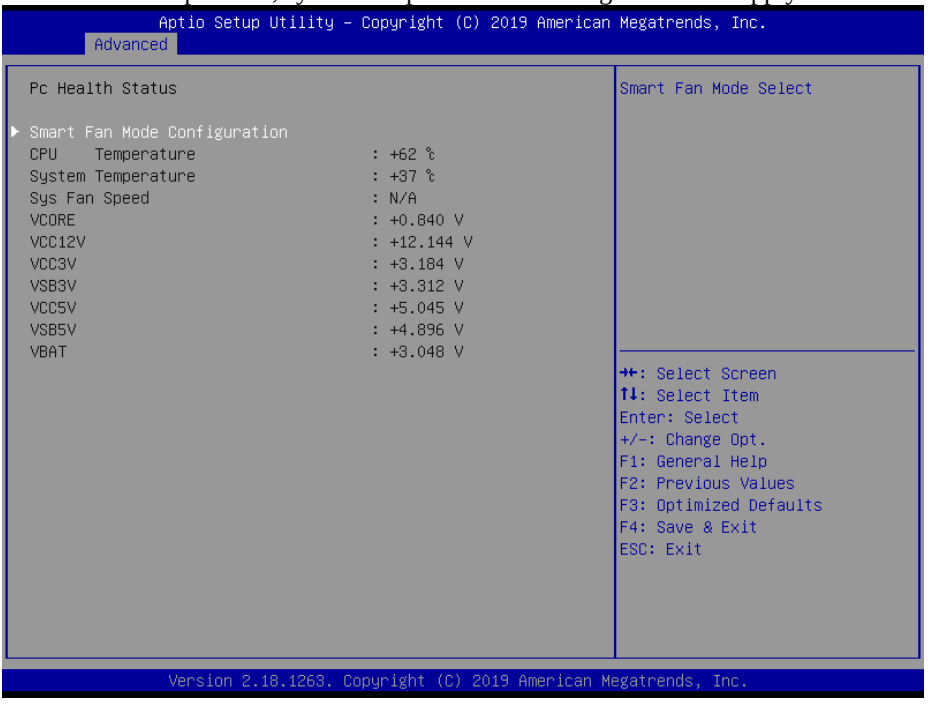

**Serial Port 4 Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Serial Port | - Disabled<br>- Enabled | Enables or Disables Serial Port 4. |
| Device Settings | No changeable options | Displays the current settings of Serial Port 4. |
| Change Settings | - Auto<br>- IO=2E8h; IRQ=7;<br>- IO=3F8h; IRQ=3,4,5, 6,7,9,10,11,12;<br>- IO=2E8h; IRQ=3,4,5, 6,7,9,10,11,12;<br>- IO=2F0h; IRQ=3,4,5, 6,7,9,10,11,12;<br>- IO=2E0h; IRQ=3,4,5, 6,7,9,10,11,12; | Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts. |

## 5.4.4 Advanced – Hardware Monitor

Menu Path *Advanced > Hardware Monitor*

The **Hardware Monitor** allows users to monitor the health and status of the system such as CPU temperature, system temperature and voltage levels in supply.



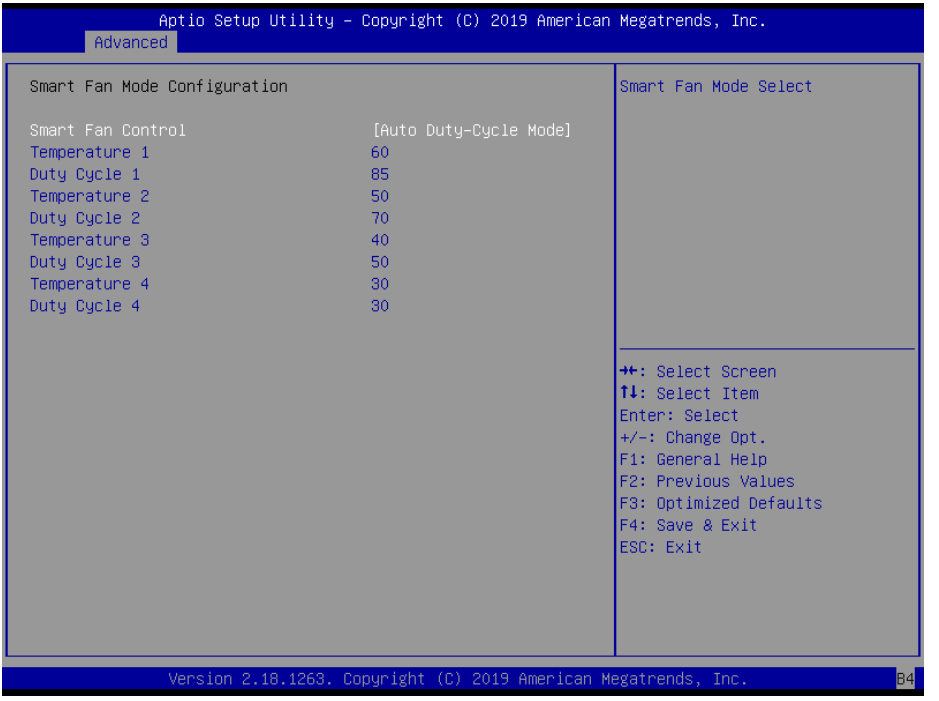

**Hardware Monitor Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Smart Fan Mode Configuration | Sub-Menu | Smart Fan Mode selection. |
| CPU Temperature | No changeable options | Displays the processor's temperature. |
| System Temperature | No changeable options | Displays the system's temperature. |
| Sys Fan Speed | No changeable options | Displays system's speed. |
| VCORE | No changeable options | Detects and displays the voltage level of VCORE in supply. |
| VCC12V | No changeable options | Detects and displays the voltage level of VCC12V in supply. |
| VCC3V | No changeable options | Detects and displays the voltage level of VCC3V in supply. |
| VSB3V | No changeable options | Detects and displays the voltage level of VSB3V in supply. |

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| VCC5V | No changeable options | Detects and displays the voltage level of VCC5V in supply. |
| VSB5V | No changeable options | Detects and displays the voltage level of VSB5V in supply. |
| VBAT | No changeable options | Detects and displays the voltage level of VBAT in supply. |

### 5.4.4.1 Smart Fan Mode Configuration

Menu Path *Advanced > Hardware Monitor > Smart Fan Mode Configuration*




**Smart Fan Mode Configuration Screen**

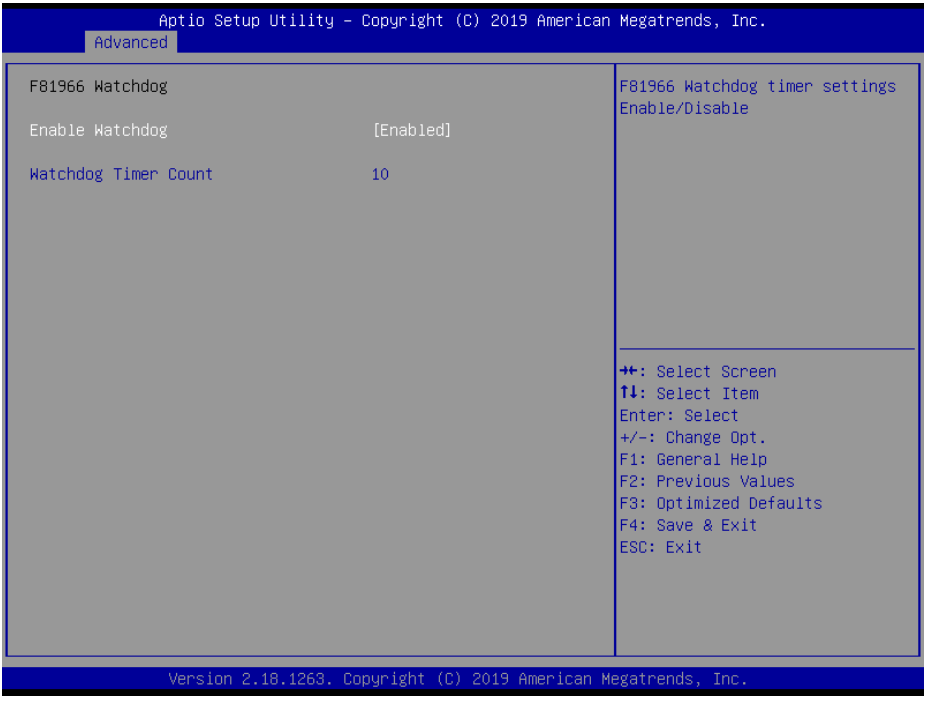
| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Smart Fan Control | - Manual Duty Mode<br>- Auto Duty-Cycle Mode | Smart Fan Mode selection. |
| Temperature 1 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |
| Duty Cycle 1 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Temperature 2 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |
| Duty Cycle 2 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |
| Temperature 3 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |
| Duty Cycle 3 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |
| Temperature 4 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |
| Duty Cycle 4 | Numeric | Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100. |

## 5.4.5 Advanced – F81966 Watchdog Configuration

Menu Path *Advanced > F81966 Watchdog*

If the system hangs or fails to respond, enable the F81966 watchdog function to trigger a system reset via the 255-level watchdog timer.




**F81966 Watchdog Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Enable WatchDog | - Enabled<br>- Disabled | Enables/Disables F81966 Watchdog timer function. |
| Watchdog Timer Count | Numeric | Selects count of watchdog timer.<br>Watchdog Timer = 1sec * Count |

## 5.4.6 Advanced – S5 RTC Wake Settings

Menu Path *Advanced > S5 RTC Wake Settings (Disabled)*

The **S5 RTC Wake Settings** enables/disables the system to wake up at a preset time of a day from S5 State using RTC alarm.


**S5 RTC Wake Settings Screen (Disabled)**

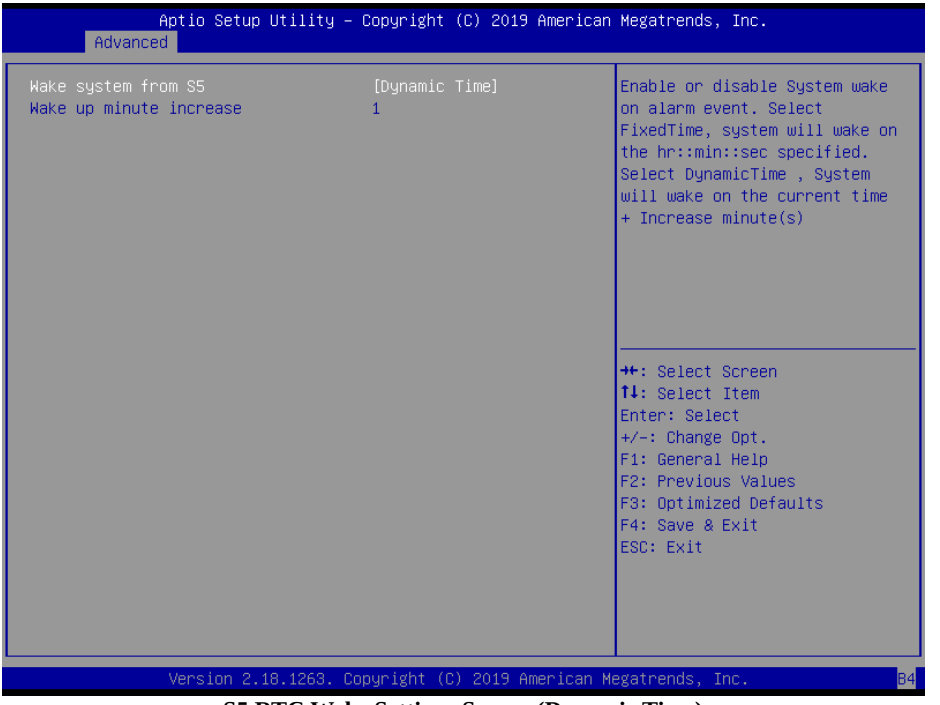
| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Wake system from S5 | - Disabled<br>- Fixed Time<br>- Dynamic Time | Allows enabling scheduled S5 to S0 (option **enabled**).<br>• **Fixed Time:** System will wake on the hr::min::sec specified.<br>• **Dynamic Time:** System will wake on the current time + Increased minute(s). |

Menu Path *Advanced > S5 RTC Wake Settings (Fixed Time)*


**S5 RTC Wake Settings Screen (Fixed Time)**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Wake system from S5 | - Disabled<br>- Fixed Time (selected)<br>- Dynamic Time | • **Fixed Time:** System will wake on the hr::min::sec specified. |
| Wake up hour | Multiple options ranging from 0 to 23 | Selects 0-23for Hour.<br>For example, enter 3 for 3am and 15 for 3pm. |
| Wake up minute | Multiple options ranging from 0 to 59 | Selects 0-59 for Minute. |
| Wake up second | Multiple options ranging from 0 to 59 | Selects 0-59 for Second. |

Menu Path *Advanced > S5 RTC Wake Settings (Dynamic Time)*




**S5 RTC Wake Settings Screen (Dynamic Time)**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Wake system from S5 | - Disabled<br>- Fixed Time<br>- Dynamic Time (selected) | • **Dynamic Time:** System will wake on the current time + Increased minute(s). |
| Wake up minute increase | Multiple options ranging from 1 to 5 | Specifies a period of time (in minutes) after which the board wakes up from S5 state. |

## 5.4.7 Advanced – CPU Configuration

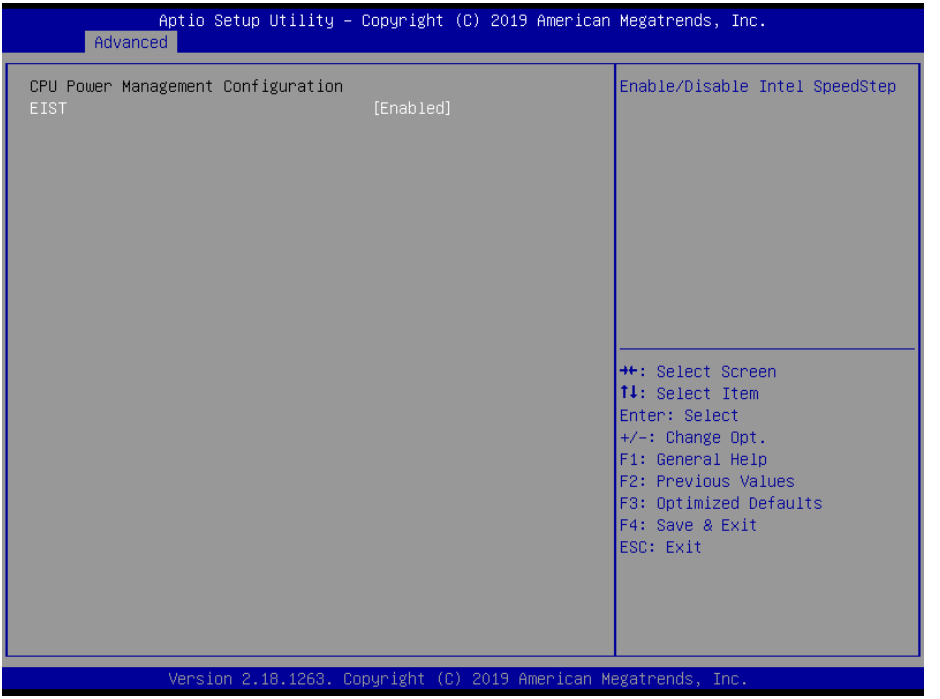
Menu Path *Advanced > CPU Configuration*

The **CPU Configuration** provides advanced CPU settings and some information about CPU.


**CPU Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Socket 0 CPU Information | Sub-Menu | Socket specific CPU Information |
| CPU Power Management | Sub-Menu | CPU Power Management options |
| Intel Virtualization Technology | - Disabled<br>- Enabled | When enabled, a VMM (Virtual Machine Monitor) can utilize the additional hardware capabilities provided by Vanderpool Technology (VT). |
| VT-d | - Disabled<br>- Enabled | Enables or Disables VT-d function. |

Menu Path *Advanced > CPU Configuration > CPU Power Management*




**CPU Power Management Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| EIST | - Disabled<br>- Enabled | Enables or Disables Intel SpeedStep. |

## 5.4.8 Advanced – Network Stack Configuration

Menu Path *Advanced > Network Stack Configuration*

The **Network Stack Configuration** allows users to enable/disable UEFI Network Stack, IPv4/IPv6 PXE (Pre-Boot Execution) support and configure PXE boot wait time and detects the media presence.

PXE allows a workstation to boot from a server on a network prior to booting the operating system on the local hard drive. A PXE-enabled workstation connects its NIC to the LAN via a jumper, which keeps the workstation connected to the network even when the power is turned off.


**Network Stack Configuration Screen**

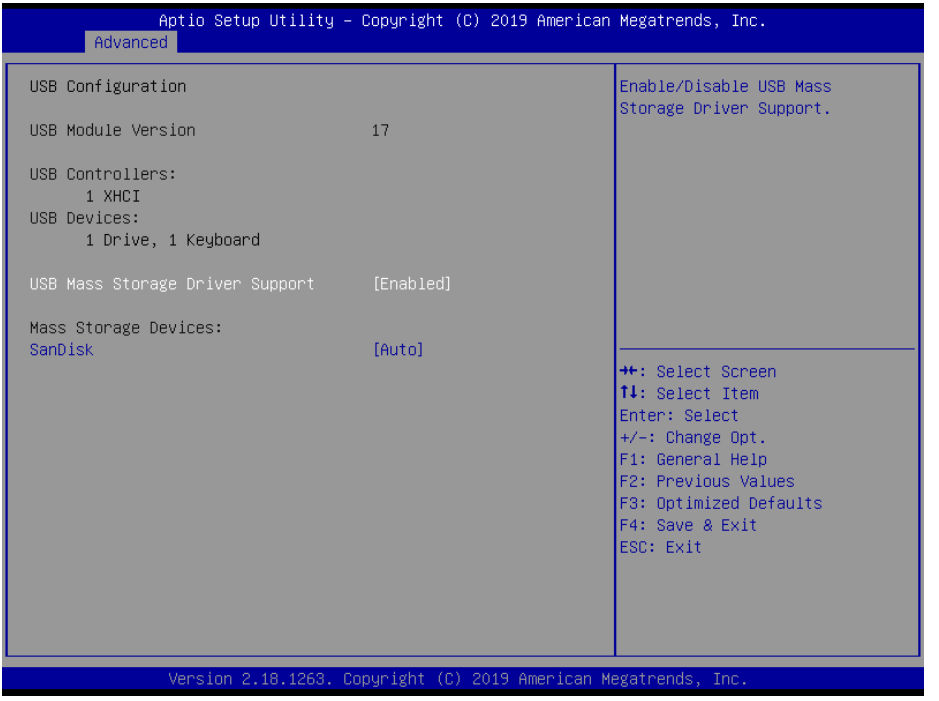
| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Network Stack | - Disabled<br>- Enabled | Enables or Disables UEFI Network Stack. |
| Ipv4 PXE Support | - Disabled<br>- Enabled | Enables Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created. |

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Ipv6 PXE Support | - Disabled<br>- Enabled | Enables Ipv6 PXE Boot Support. If disabled, Ipv6 PXE boot option will not be created. |
| PXE boot wait time | Numeric (from 0 to 5) | Number of seconds to wait for PXE boot to abort after the Esc key is pressed. |
| Media detect count | Numeric (from 1 to 50) | Number of times that the media presence will be checked. |

## 5.4.9 Advanced – USB Configuration

Menu Path *Advanced > USB Configuration*

The **USB Configuration** allows users to configure advanced USB settings such as USB mass storage driver support.




**USB Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| USB Mass Storage Driver Support | - Disabled<br>- Enabled | Enables or Disables USB Mass Storage Driver Support. |

## 5.5 Chipset

Menu Path *Chipset*

This menu allows users to configure advanced Chipset settings such as **North Bridge** and **South Cluster Configuration** parameters.

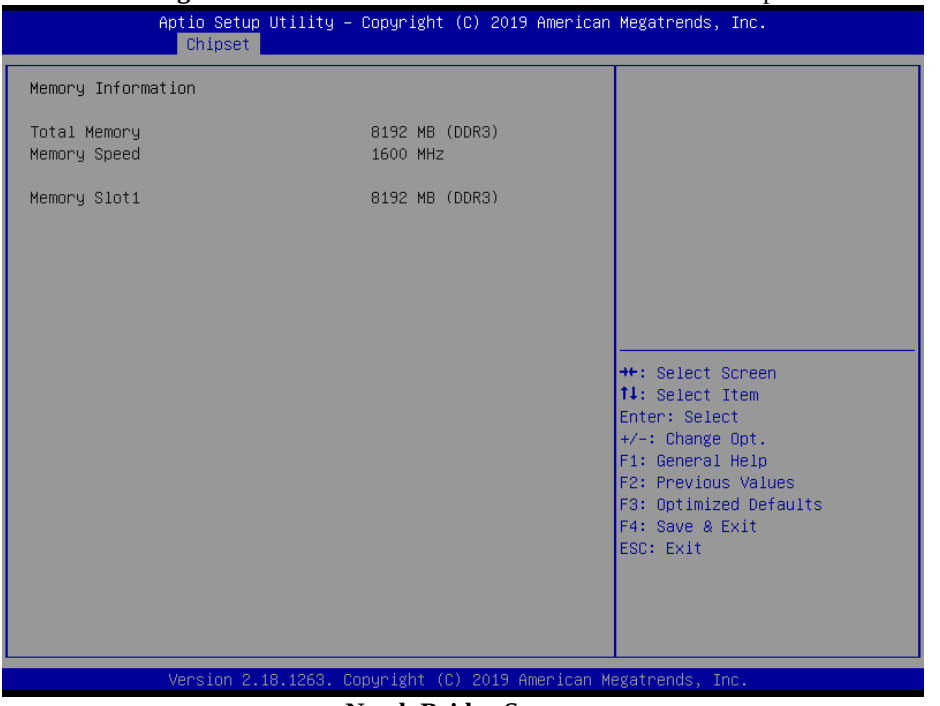

**Chipset Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| North Bridge | Sub-Menu | Sets Parameter for (North Bridge) configuration. |
| South Cluster Configuration | Sub-Menu | South Cluster configuration. |

## 5.5.1 North Bridge

Menu Path *Chipset > North Bridge*

The **North Bridge** allows users to view the DRAM information on the platform.

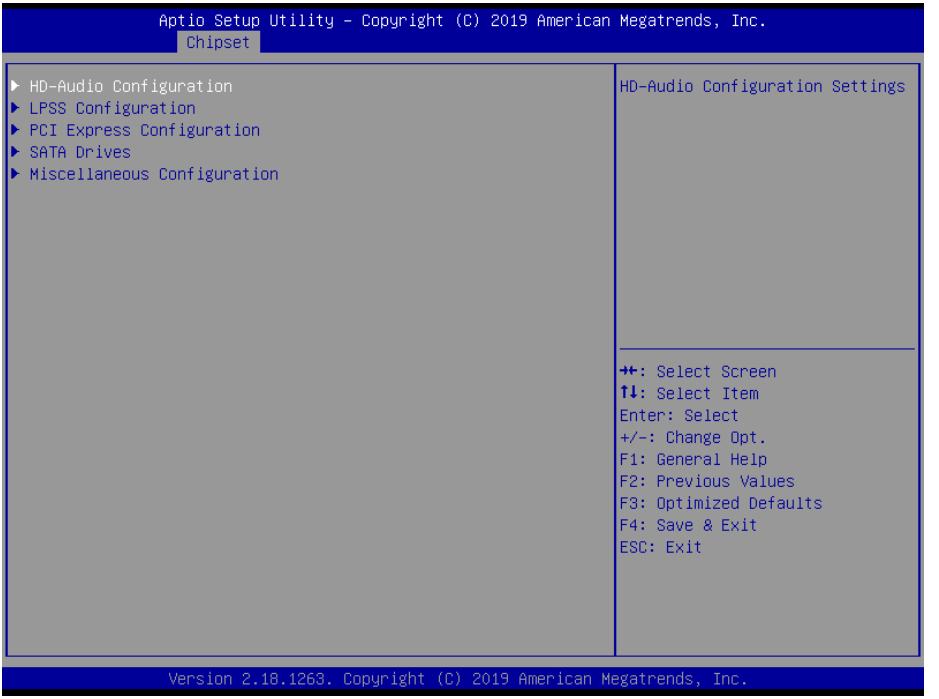



**North Bridge Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Total Memory | No changeable options | Displays the Total Memory. |
| Memory Speed | No changeable options | Displays the speed of Memory. |
| Memory Slot1 | No changeable options | Displays the size of Slot 1. |

## 5.5.2 South Cluster Configuration

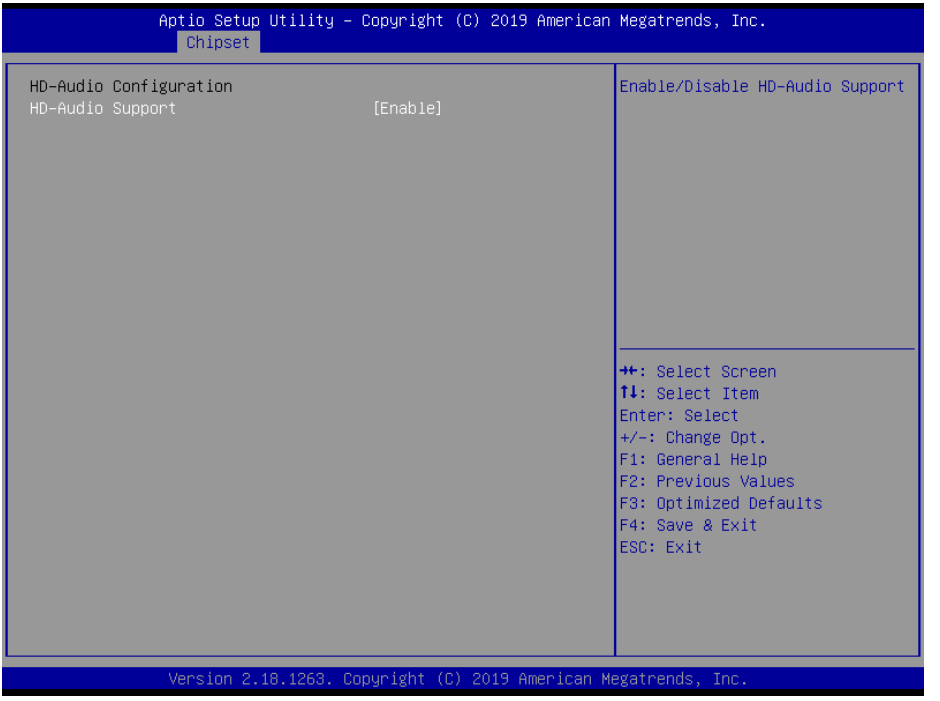
Menu Path *Chipset > South Cluster Configuration*




**South Cluster Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| HD-Audio Configuration | Sub-Menu | HD-Audio Configuration Settings. |
| LPSS Configuration | Sub-Menu | LPSS Configuration Settings. |
| PCI Express Configuration | Sub-Menu | PCI Express Configuration Settings. |
| SATA Drives | Sub-Menu | SATA Device Configuration Settings. |
| Miscellaneous Configuration | Sub-Menu | Miscellaneous Configurations Settings. |

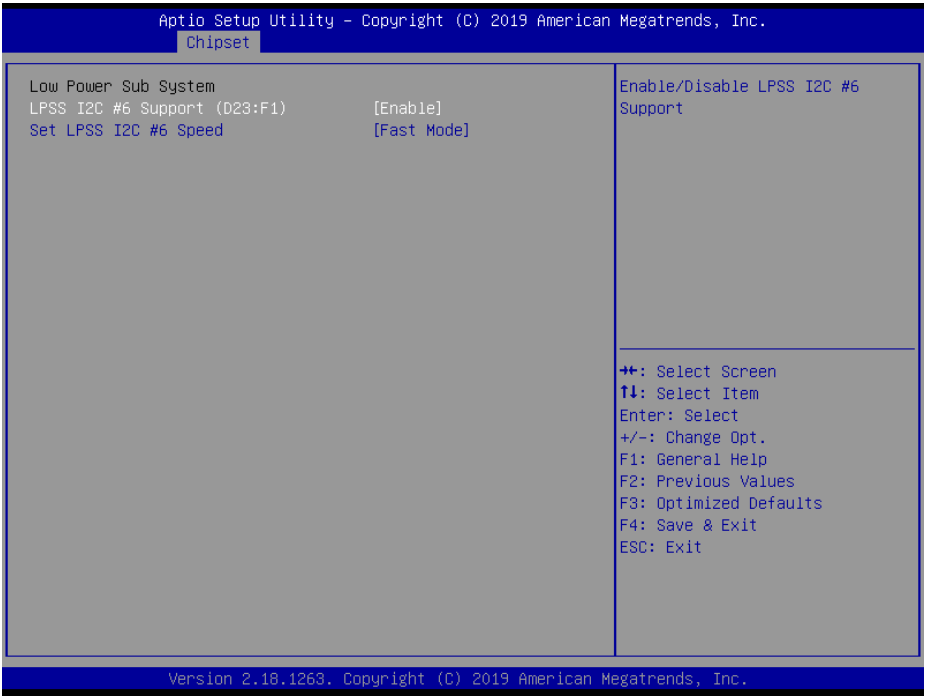
Menu Path *Chipset > South Cluster Configuration > HD-Audio Configuration*




**HD-Audio Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| HD-Audio Support | - Disabled<br>- Enabled | Enables or Disables HD-Audio support. |

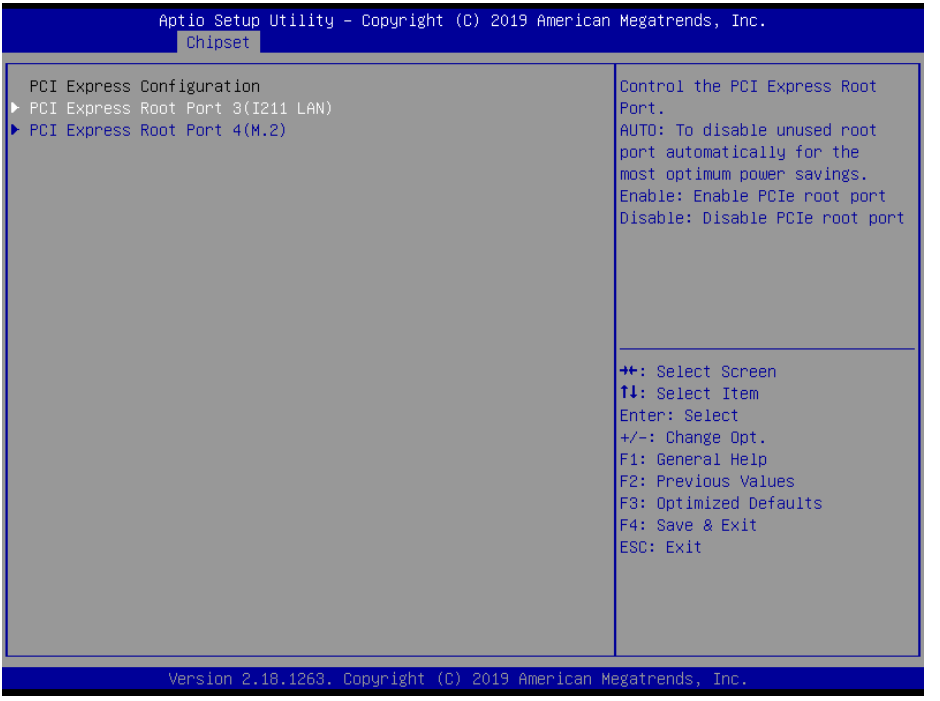
Menu Path *Chipset > South Cluster Configuration > LPSS Configuration*




**LPSS Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| LPSS I2C #6 Support (D23:F1) | - Disabled<br>- Enabled | Enables or Disables LPSS I2C #6 support. |
| Set LPSS I2C #6 Speed | - Standard Mode<br>- Fast Mode<br>- Fast Plus Mode<br>- High Speed Mode | Selects LPSS I2C #6 Speed. |

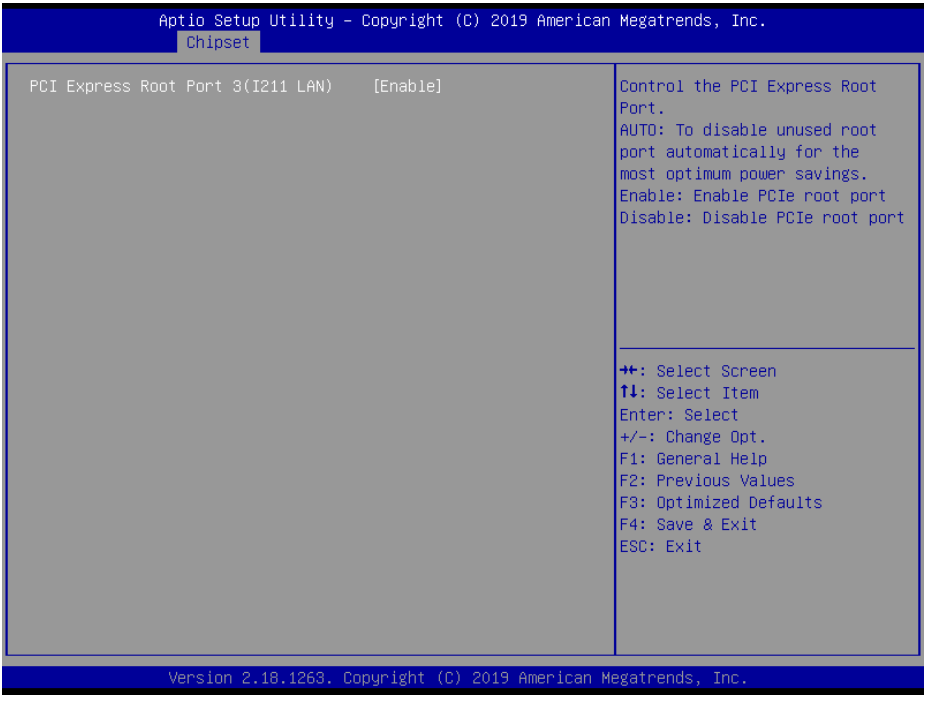
Menu Path *Chipset > South Cluster Configuration > PCI Express Configuration*




**PCI Express Configuration Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| PCI Express Root Port 3 (I211 LAN) | Sub-Menu | PCI Express Root Port 3 (I211 LAN) Settings. |
| PCI Express Root Port 4 (M.2) | Sub-Menu | PCI Express Root Port 4 (M.2) Settings. |

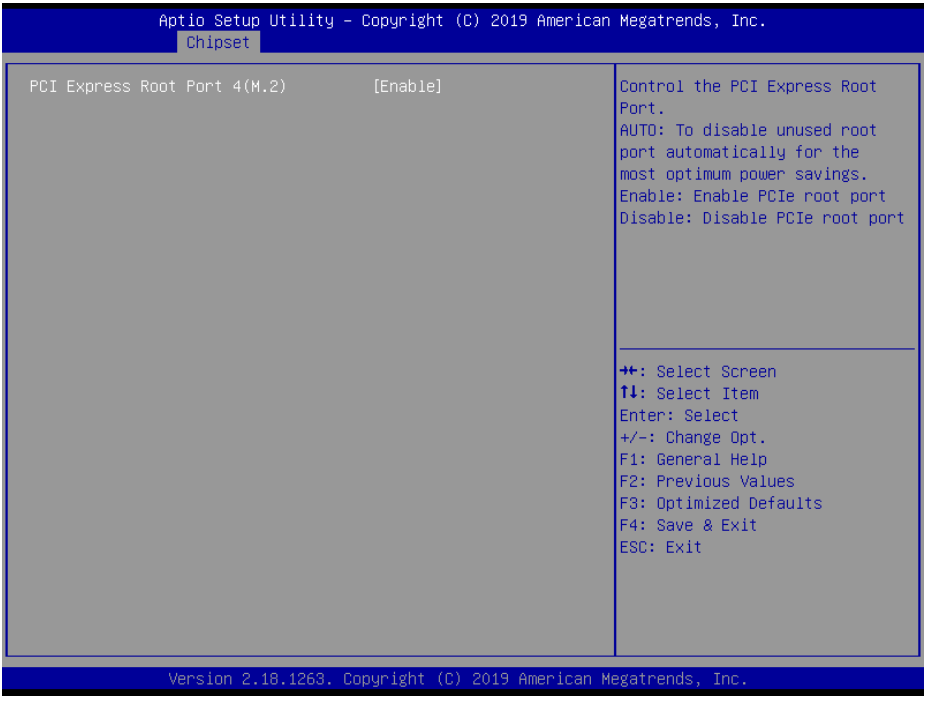
Menu Path *Chipset > South Cluster Configuration > PCI Express Configuration > PCI Express Root Port 3 (I211 LAN)*




**PCI Express Root Port 3 (I211 LAN) Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| PCI Express Root Port 3 (I211 LAN) | - Disabled<br>- Enabled<br>- Auto | Controls the PCI Express Root Port.<br>• **Auto:** Disables unused root port automatically for the most optimum power savings.<br>• **Enabled:** Enables PCIe root port.<br>• **Disabled:** Disables PCIe root port. |

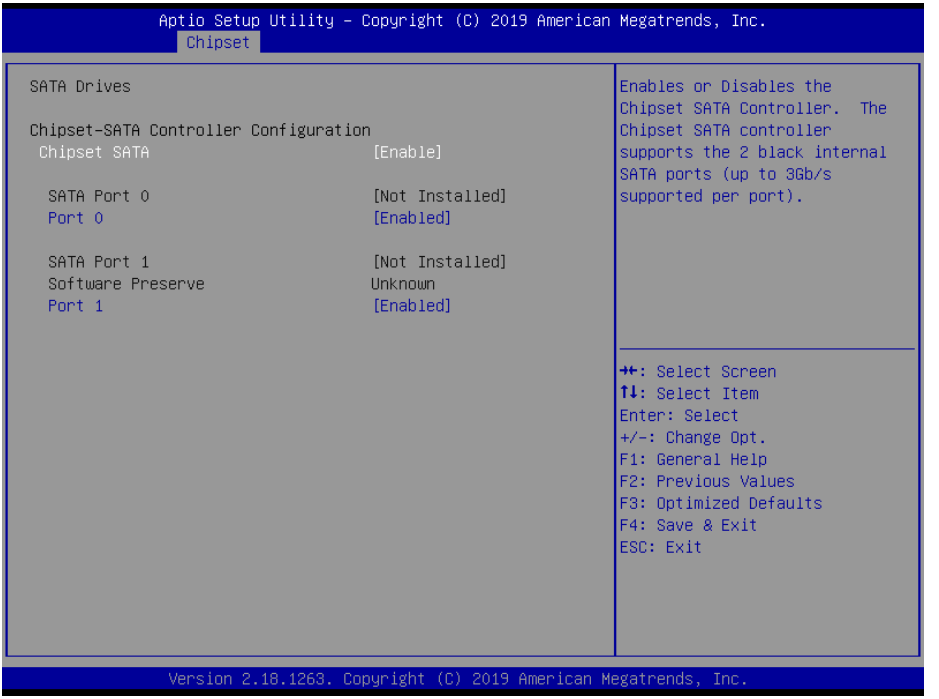
Menu Path *Chipset > South Cluster Configuration > PCI Express Configuration > PCI Express Root Port 4 (M.2)*




**PCI Express Root Port 4 (M.2) Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| PCI Express Root Port 4 (M.2) | - Disabled<br>- Enabled<br>- Auto | Controls the PCI Express Root Port.<br>• **Auto:** To disable unused root port automatically for the most optimum power savings.<br>• **Enabled:** Enables PCIe root port.<br>• **Disabled:** Disables PCIe root port. |

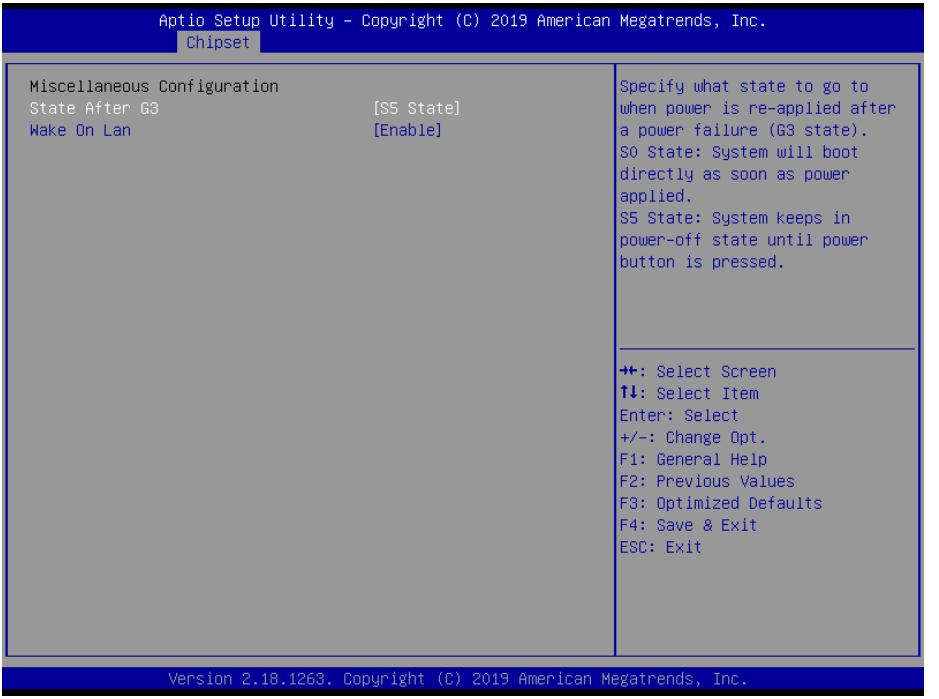
Menu Path *Chipset > South Cluster Configuration > SATA Drives*




**SATA Drives Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Chipset SATA | - Disabled<br>- Enabled | Enables or Disables the Chipset SATA Controller. |
| SATA Port 0 | No changeable options | Displays the connected device on SATA Port 0. |
| Port 0 | - Disabled<br>- Enabled | Enables or Disables SATA Port 0. |
| SATA Port 1 | No changeable options | Display the connected device on SATA Port 1. |
| Port 1 | - Disabled<br>- Enabled | Enable or Disable SATA Port 1. |

Menu Path *Chipset > South Cluster Configuration > Miscellaneous Configuration*




**Miscellaneous Configuration Screen**

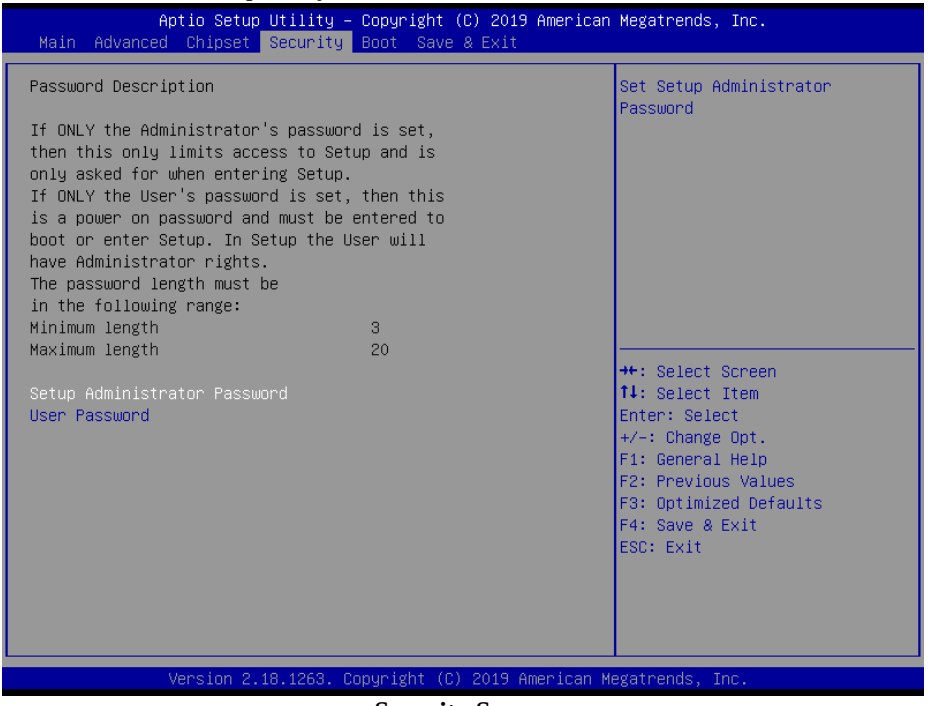
| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Restore AC Power Loss | - Power On<br>- Power Off | Specifies the state to go to when the AC power is re-applied following the power failure (G3 state).<br>• **Power On:** System will boot directly as soon as AC power is applied.<br>• **Power Off:** System will keeps in Power-Off state unless the power button is pressed. |
| Wake On Lan | - Disabled<br>- Enabled | Enables or Disables the Wake on LAN function. |

## 5.6 Security

Menu Path *Security*

From the **Security** menu, you are allowed to create, change or clear the administrator password. You will be asked to enter the configured administrator password before you can access the Setup Utility.

By setting an administrator password, you will prevent other users from changing your BIOS settings. You can configure an Administrator password and then configure a user password. An administrator has much more privileges over the settings in the Setup utility than a user. Heed that a user password does not provide access to most of the features in the Setup utility.




**Security Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Setup Administrator Password | Password can be 3-20 alphanumeric characters. | Specifies the administrator password. |
| User Password | Password can be 3-20 alphanumeric characters. | Specifies the user password. |

**Create an Administrator or User Password**

1. Select the **Administrator Password** / **User Password** option from the Security menu and press <Enter>, and the password dialog entry box appears.
2. Enter the password you want to create. A password can be 3-20 alphanumeric characters. After you have configured the password, press <Enter> to confirm.
3. Type the new password again and press <Enter>.

**Change an Administrator or User Password**

1. Select the **Administrator Password** / **User Password** option from the Security menu and press <Enter>, and the password dialog entry box appears.
2. Select the Administrator Password or User Password that you want to change. A password can be 3-20 alphanumeric characters. After you have changed the password, press <Enter> to confirm.
3. Type the changed password again and press <Enter>.

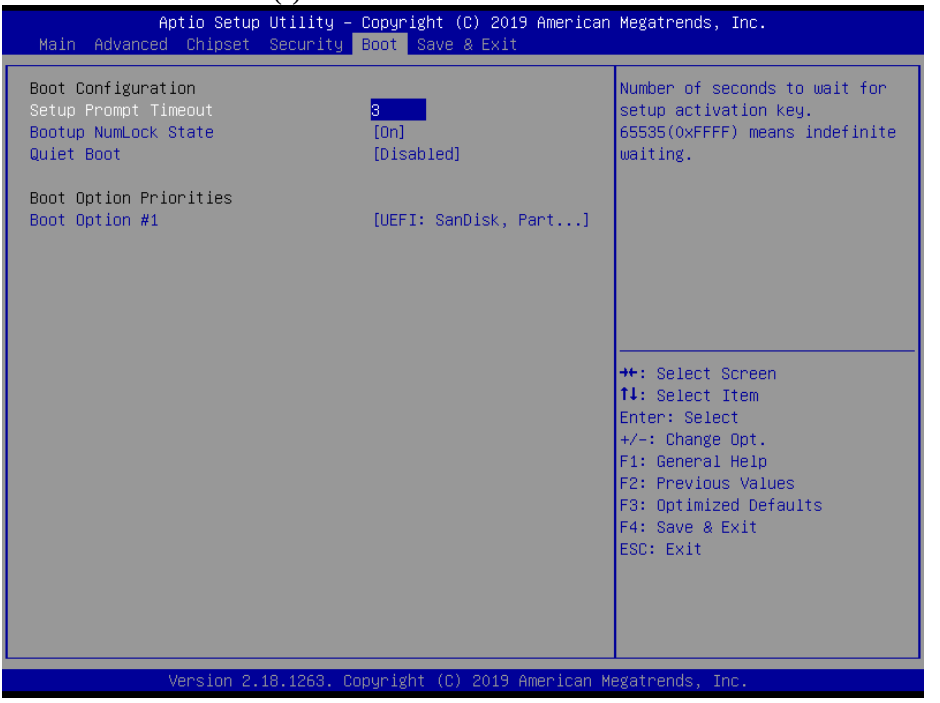
**Remove an Administrator or User Password**

1. Select the **Administrator Password** / **User Password** option from the Security menu and press <Enter>, and the password dialog entry box appears.
2. Select the configured Administrator Password or User Password that you want to delete. Leave the dialog box blank and press <Enter>.
3. Press <Enter> again when the password confirmation box appears.

## 5.7 Boot

Menu Path *Boot*

This menu provides control items for system boot configuration such as setting setup prompt timeout, enabling/disabling quiet boot, and changing the boot order from the available bootable device(s).




**Boot Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Setup Prompt Timeout | Numeric<br>(from 1 to 65535) | Number of seconds to wait for setup activation key. |
| Bootup NumLock State | - On<br>- Off | Specifies the power-on state of the NumLock Key. |
| Quiet Boot | - Disabled<br>- Enabled | Enables or Disables Quiet Boot Options. |
| Boot Option #1~#n | - [Drive(s)]<br>- Disabled | Sets the system boot order. |

## 5.8 Save & Exit

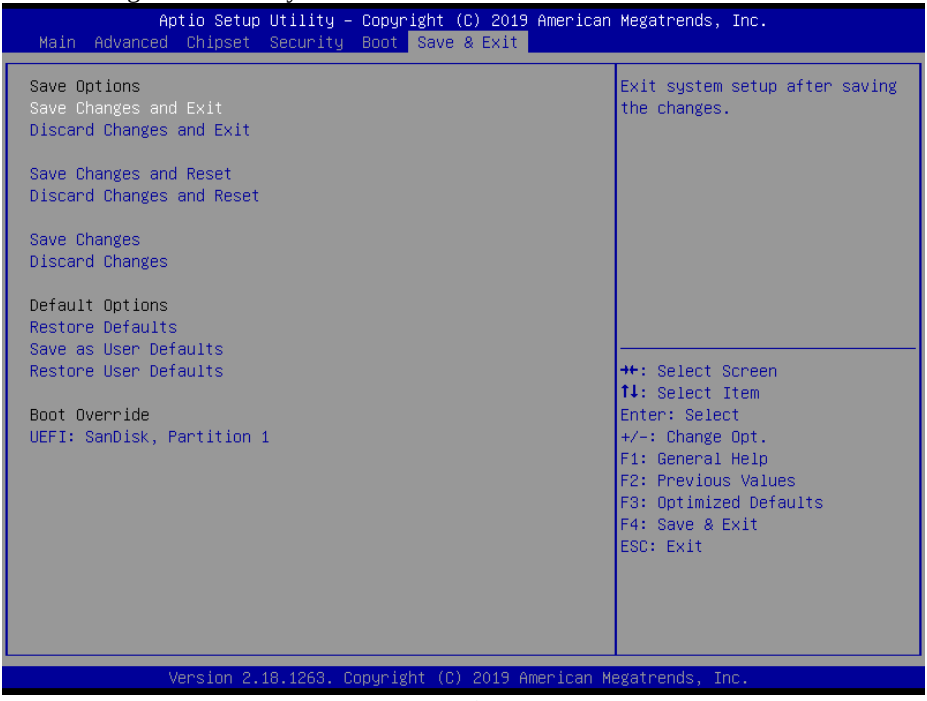
| Menu Path | *Save & Exit* |
|---|---|

The **Save & Exit** allows users to save or discard changed BIOS settings as well as load factory default settings.

**Save Changed BIOS Settings**
To save and validate the changed BIOS settings, select **Save Changes** from the **Save & Exit** menu to validate the changes and then exit the system. Select **Save Changes and Reset** to validate the changed BIOS settings and then restart the system

**Discard Changed BIOS Settings**
To cancel the BIOS settings you have previously configured, select **Discard Changes and Exit** from this menu, or simply press **Esc** to exit the BIOS setup. You can also select **Discard Changes and Reset** to discard any changes you have made and restore the factory BIOS defaults.

**Load User Defaults**
You may simply press **F3** at any time to load the **Optimized Values** which resets all BIOS settings to the factory defaults.




**Save & Exit Screen**

| BIOS Setting | Options | Description/Purpose |
|---|---|---|
| Save Changes and Exit | No changeable options | Exits and saves the changes in NVRAM. |
| Discard Changes and Exit | No changeable options | Exits without saving any changes made in BIOS settings. |
| Save Changes and Reset | No changeable options | Saves the changes in NVRAM and resets. |
| Discard Changes and Reset | No changeable options | Resets without saving any changes made in BIOS settings. |
| Save Changes | No changeable options | Saves the changes done so far to any of the setup options. |
| Discard Changes | No changeable options | Discards the changes done so far to any of the setup options. |
| Restore Defaults | No changeable options | Loads the optimized defaults for BIOS settings. |
| Save as User Defaults | No changeable options | Saves the changes done so far as User Defaults. |
| Restore User Defaults | No changeable options | Restores the User Defaults to all the setup options. |
| Boot Override | - [Drive(s)] | Forces to boot from selected [drive(s)]. |

# Appendix A System Diagrams

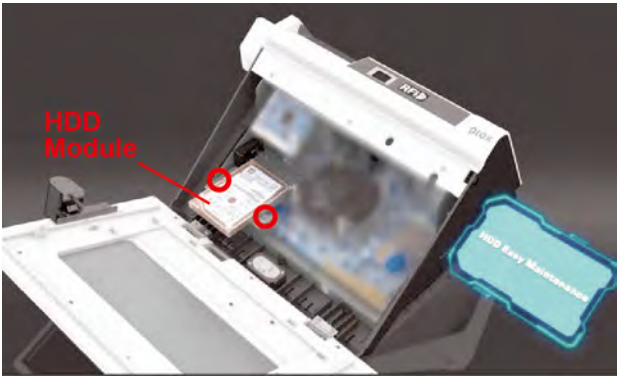
This appendix presents the exploded diagrams of the system as well as the part numbers of the PA-A900 system.

- **HDD Easy Maintenance**
- **PA-A900 System Exploded Diagrams**
  - Exploded Diagram for System Top Case
  - Exploded Diagram for Main Board and Bottom Cover Assembly
  - Printer Module Exploded Diagram
  - Panel Module Exploded Diagram
  - LCD Display and Touch Exploded Diagram
  - 7” VFD Cover Glass Exploded Diagram

## HDD Easy Maintenance

**Step 1.** Unfasten the two screws on both sides of the LCD Display, and open and rotate the LCD Display cover downwards as shown:

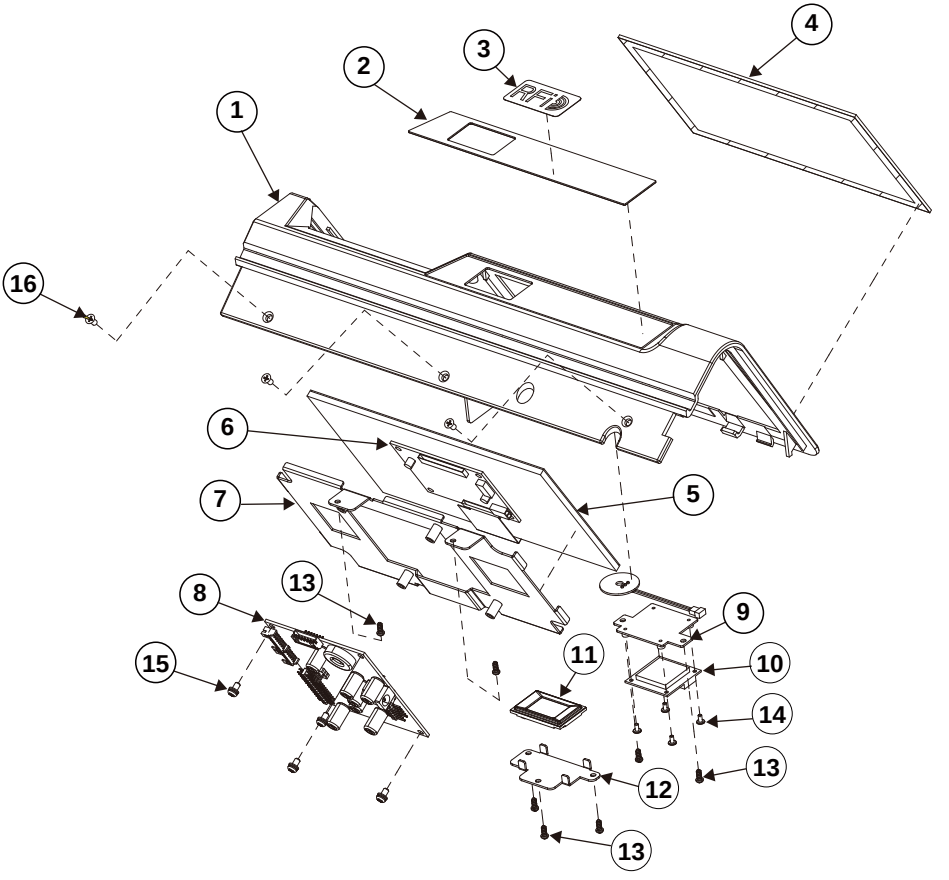
**Step 2.** Remove the 2 screws on the HDD tray as shown:



**Step 3.** Take out the HDD module to complete.

# Exploded Diagram For System Top Case

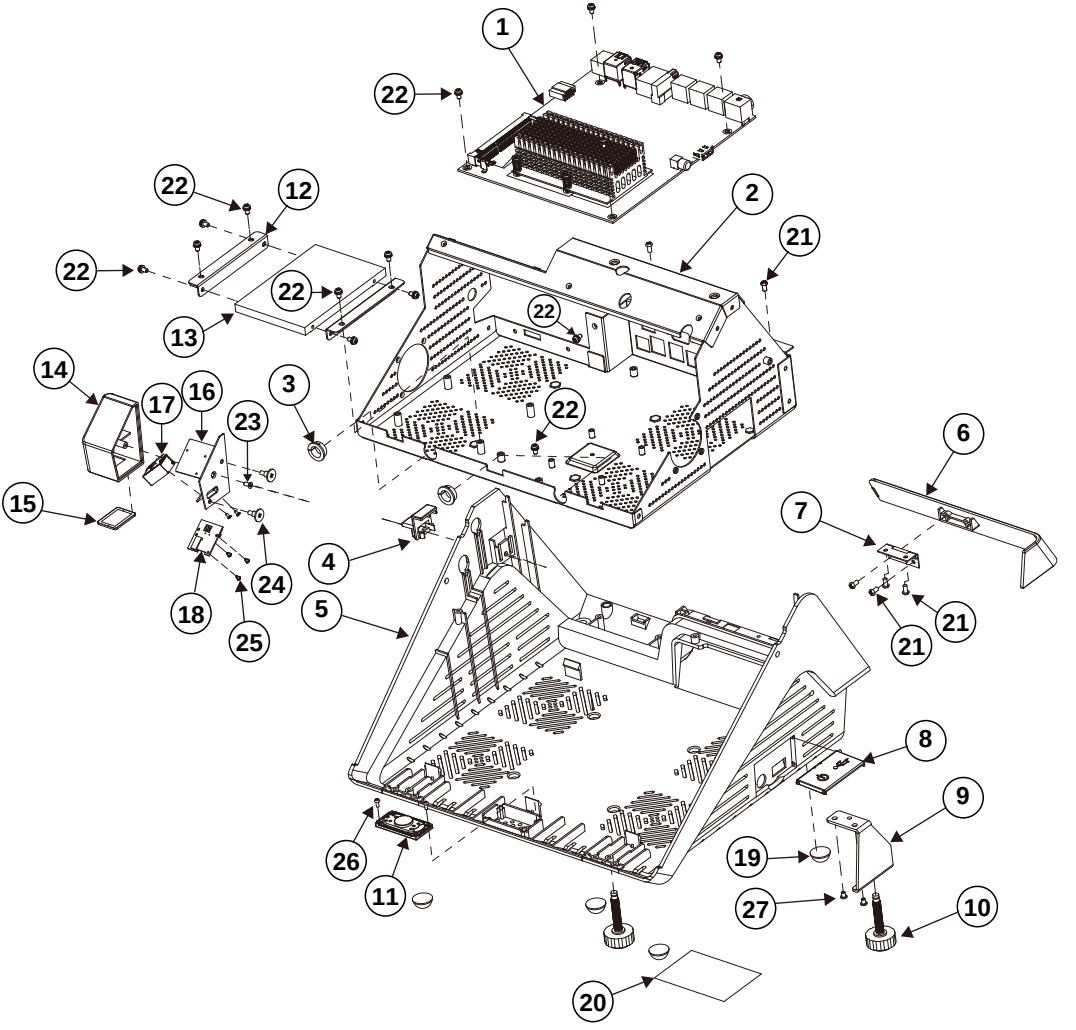
### Open the System Top Module




See the part number and parts list on the next page.

| ITEM | Description | Part No. | Q'ty |
|---|---|---|---|
| 1 | PA-A900 Stand Top Cover (Black) | 30-002-12111477 | 1 |
| | PA-A900 Stand Top Cover (White) | 30-002-12510477 | |
| 2 | PA-A900 Stand Top Name Plate (Black) | 30-056-02100477 | 1 |
| | PA-A900 Stand Top Name Plate (White) | 30-056-02400477 | |
| 3 | PA-3251 RFID Label (39x23mmx2.5R) | 94-017-01602220 | 1 |
| 4 | 7" LCD Panel Cover Glass | 34-024-02301471 | 1 |
| 5 | 7" TFT LCD Panel, 320nits, 1024x600 | 52-351-11070328 | 1 |
| 6 | Driver Board | 52-152-29070366 | 1 |
| 7 | PA-A900 TM070 Bracket | 20-006-03007477 | 1 |
| 8 | PA-A900 AD Board | 52-152-20013366 | 1 |
| 9 | PA-A900 RFID Bracket | 20-006-03006477 | 1 |
| 10 | RFID Reader Module, RS-232 Interface | 52-551-18132000 | 1 |
| 11 | Fingerprint Module, Capacitive Touch | 52-551-00040020 | 1 |
| 12 | PA-A900 Fingerprint Bracket | 20-006-03002477 | 1 |
| 13 | Round Head Screw #1/T2.6x6mm | 22-135-26006011 | 7 |
| 14 | Fillister Head Screw #1/M2x0.4Px4mm | 22-272-20004011 | 4 |
| 15 | Round Head With Spring Washer Screw M3x0.5Px6mm | 22-232-30060211 | 4 |
| 16 | Flat Head Screw M3x0.5Px6mm (Black) | 22-215-30060011 | 3 |

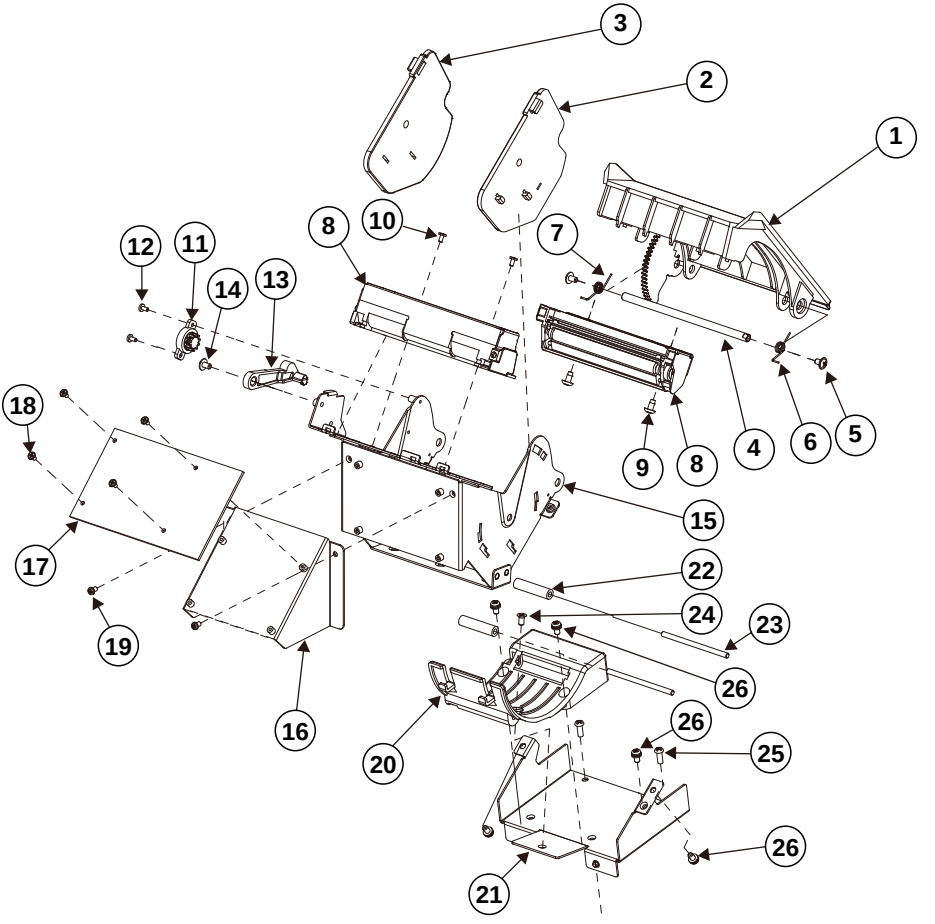
## Exploded Diagram For Main Board and Bottom Cover Assembly




See the part number and parts list on the next page.

| ITEM | Description | Part No. | Q'ty |
|---|---|---|---|
| 1 | PB-A900 Mother Board | PB-A900 | 1 |
| 2 | PA-A900 PC Case A900 | 20-001-03001477 | 1 |
| 3 | Open Closed Bushing (Black) | 30-026-04300000 | 2 |
| 4 | PA-A900 Printer Button (Black) | 30-046-12210477 | 1 |
| | PA-A900 Printer Button (White) | 30-046-12110477 | |
| 5 | PA-A900 Stand Bot Cover (Black) | 30-002-12910477 | 1 |
| | PA-A900 Stand Bot Cover (White) | 30-002-12410477 | |
| 6 | PA-A900 IO Cover (Black) | 30-002-12610477 | 1 |
| | PA-A900 IO Cover (White) | 30-002-12110477 | |
| 7 | PA-A900 Stainless Steel Butterfly Hinge | 20-012-07001471 | 1 |
| 8 | PS-3100 Side Door (Black) | 30-007-28210165 | 1 |
| | PS-3100 Side Door (NKC White) | 30-007-28410165 | |
| 9 | PA-A900 Foot Bracket (w/Paint)(Black) | 20-006-02061477 | 1 |
| | PA-A900 Foot Bracket (w/Paint) (White) | 20-006-02062477 | |
| 10 | Handle Head Screw M6x1.0Px35mm,L=12.2 | 22-289-60035007 | 2 |
| 11 | PA-6222/6225 Speaker Cable L=250mm | 27-021-33505071 | 1 |
| 12 | PA-3222 HDD Holder | 80-029-03001400 | 2 |
| 13 | HDD | N/A | 1 |
| 14 | PA-A900 Scanner Housing (Black) | 30-014-12210477 | 1 |
| | PA-A900 Scanner Housing (White) | 30-014-12110477 | |
| 15 | PA-A900 Scanner Lens (Transparent) | 30-021-10130477 | 1 |
| 16 | PA-A900/A901 Scanner Bracket | 20-206-03001477 | 1 |
| 17 | 2D Scan Engine | 52-820-32960113 | 1 |
| 18 | DC/DC Converter Board for NLS-EM3096V2 2D Scan Engine | 52-152-22000364 | 1 |
| 19 | Rubber Foot (Φ=15.7x8mm)(Black) | 30-004-01500000 | 4 |
| 20 | PA-A900 Rating Label (60x40mm) | 94-017-01901477 | 1 |
| 21 | Round Head Screw #2/T3x6mm | 22-135-30006011 | 6 |
| 22 | Round Head With Spring Washer Screw M3x0.5Px6mm | 22-232-30060211 | 14 |
| 23 | Flat Head Screw #1/T2.6x6mm | 22-112-26006011 | 1 |
| 24 | Fillister Head Screw M3x0.5Px4.8mm | 82-272-30005013 | 2 |
| 25 | Pan Head Screw M1.6x0.35Px3mm | 22-222-16003015 | 5 |
| 26 | Round Head Screw #1/T2.6x6mm | 22-135-26006011 | 2 |

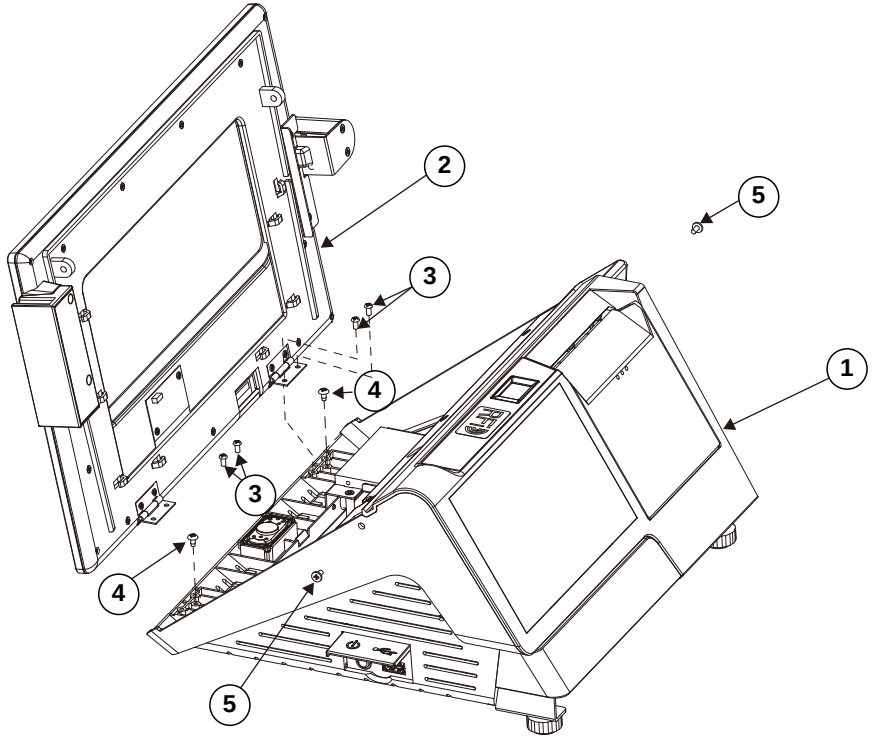
## Exploded Diagram For Printer Module Assembly




See the part number and parts list on the next page.

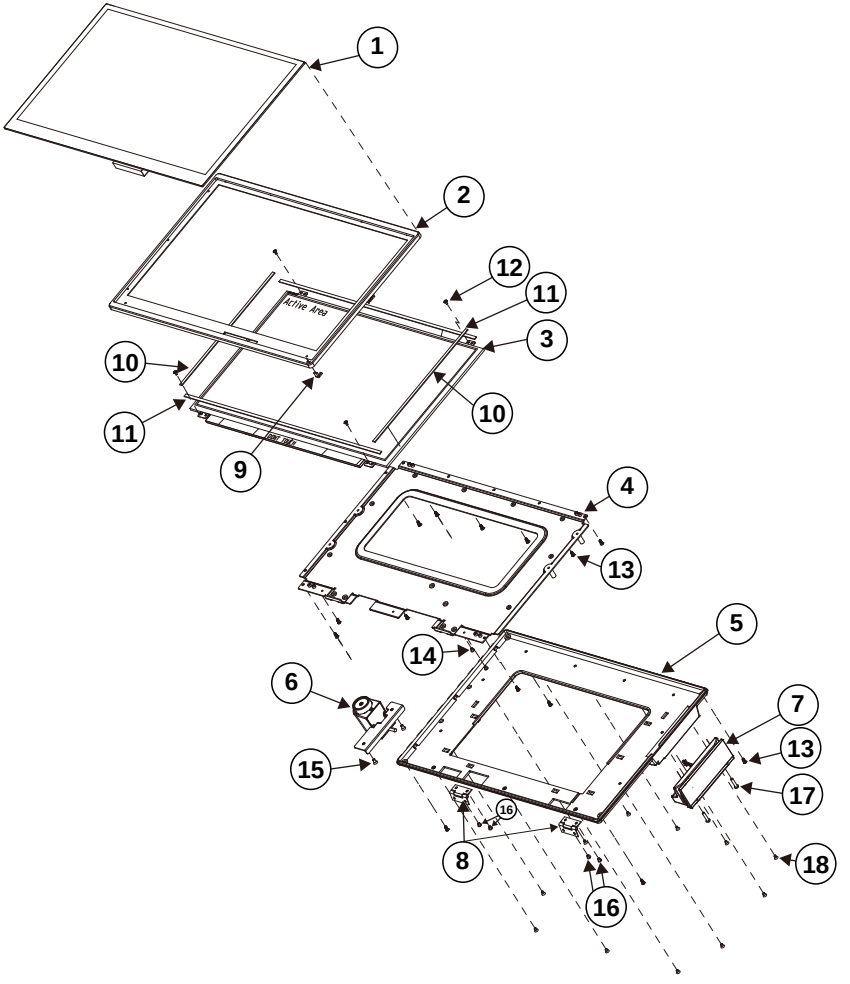
| ITEM | Description | Part No. | Q'ty |
|---|---|---|---|
| 1 | PA-A900 Printer Cover-1 (Black) | 30-002-12710477 | 1 |
| | PA-A900 Printer Cover-1 (White) | 30-002-12210477 | |
| 2 | POS-6600 3IN Side Wall L (Black) | 30-002-28710199 | 1 |
| 3 | POS-6600 3IN Side Wall R (Black) | 30-002-28610199 | 1 |
| 4 | POS-6600 Paper Cover Pin | 20-045-19011199 | 1 |
| 5 | Round Washer Head Screw M3x0.5Px5mm | 22-242-30005311 | 2 |
| 6 | Rotate Spring For Printer L ( $\phi$ 5) | 23-000-06000502 | 1 |
| 7 | Rotate Spring For Printer R ( $\phi$ 5) | 23-000-05000502 | 1 |
| 8 | 3"/24V Thermal Printer Mechanism, Speed:170 mm/sec | 52-701-07017003 | 1 |
| 9 | Pan Head Screw T3.0x8mm(Black) | 22-122-30080011 | 2 |
| 10 | Fillister Head Screw #1/M2x0.4Px4mm | 22-272-20004011 | 2 |
| 11 | Rotary Damper (15gf-cm) (Black) | 90-022-09100314 | 1 |
| 12 | Fillister Head Screw #1/M2x0.4Px4mm | 22-272-20004011 | 2 |
| 13 | POS-6600 Printer Add Arm Cover (Black) | 30-002-09110199 | 1 |
| 14 | Round Washer Head Screw M3x0.5Px5mm | 22-242-30005311 | 1 |
| 15 | POS-6600 Printer Box3 ASSY | 20-040-03002199 | 1 |
| 16 | PA-A900 Printer CB Adapter Bracket | 20-006-03005477 | 1 |
| 17 | HSF, Printer Control Board USB/RS232, with 2D-Barcdoe printing | MB-1030RB-11N | 1 |
| 18 | Fillister Head Screw #1/M2x0.4Px4mm | 22-272-20004011 | 4 |
| 19 | Round Head Screw M2.5x0.45Px4mm | 22-232-25004011 | 2 |
| 20 | PA-A900 3IN Roller Seat (Black) | 30-031-09130477 | 1 |
| 21 | PA-A900 3IN Printer Roller Bracket | 20-006-03001477 | 1 |
| 22 | PS-3100 Spacer Support ( $\Phi$ 6x25mm) | 30-041-04100165 | 2 |
| 23 | POS-6600 Roller Pin | 20-045-19012199 | 2 |
| 24 | Flat Head Screw M3x0.5Px4.5mm (Black) | 22-222-30004011 | 1 |
| 25 | Round Head Screw #2/T3.0x8mm (Black) | 22-135-30008311 | 2 |
| 26 | Round Head With Spring Washer Screw M3x0.5Px6mm | 22-232-30060211 | 5 |

## Panel Module Assembly Exploded Diagram




| ITEM | Description | Part No. | Q'ty |
|---|---|---|---|
| 1 | Host | N/A | 1 |
| 2 | Panel Module | N/A | 1 |
| 3 | Round Head Screw #2/T3x6mm | 22-135-30006011 | 4 |
| 4 | Round Head Screw #2/T3.0x8mm(Black) | 22-135-30008311 | 2 |
| 5 | Fillister Head Screw #2/M3x0.5Px6mm | 22-275-30006011 | 2 |

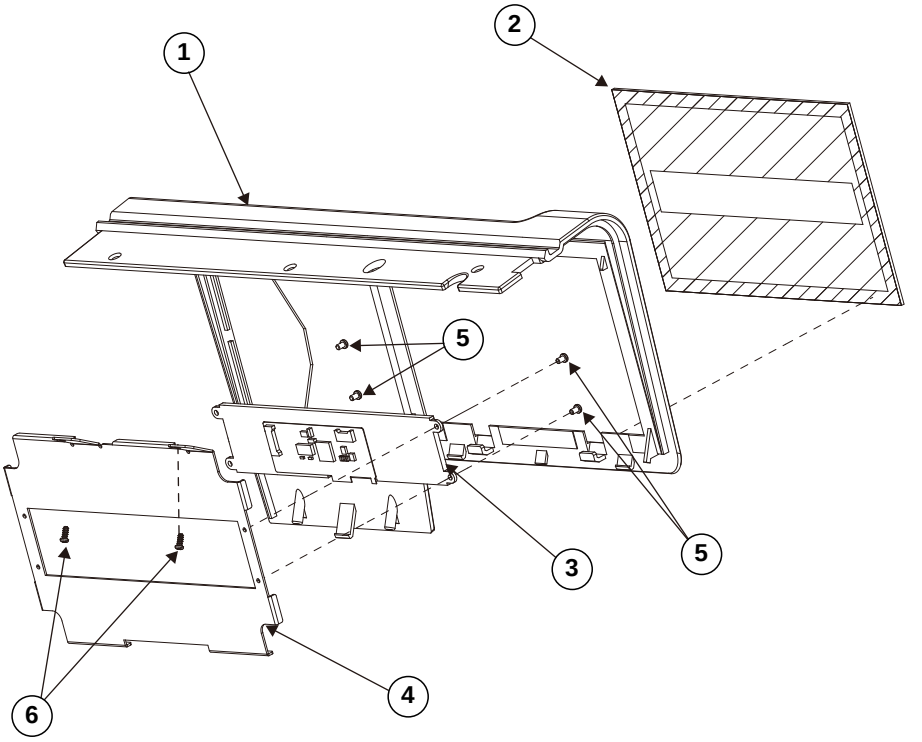
## LCD Display and Touch Assembly Exploded Diagram




See the part number and parts list on the next page.

| ITEM | Description | Part No. | Q'ty |
|---|---|---|---|
| 1 | 15.6" Projected Capacitive Touch Panel (Narrow Bezel) | 52-380-16414501 | 1 |
| 2 | PA-A900 Panel Bezel 15 (White) | 30-003-12110477 | 1 |
| | PA-A900 Panel Bezel 15 (Black) | 30-003-12310477 | |
| 3 | 15.6" TFT LCD Panel (LED Backlight), 16:9 Color, 280nits, HD (1366x768) | 52-351-15002102 | 1 |
| 4 | PA-A900 15-6 LCD Holder | 20-029-03001477 | 1 |
| 5 | PA-A900 Panel Rear 15 (White) | 30-003-12210477 | 1 |
| | PA-A900 Panel Rear15 (Black) | 30-003-12410477 | |
| 6 | I-Button Module | PA-6322RZ-5BB | 1 |
| 7 | MSR Module | PA-A900-GZZ-71A | 1 |
| 8 | PA-A900 Stainless Steel Butterfly Hinge | 20-012-07001471 | 2 |
| 9 | PA-A900 LED Cable L=440mm (Green) | 27-018-47109071 | 1 |
| 10 | PA-A900 Poron V (198x4x0.75mm) | 30-013-24200477 | 2 |
| 11 | PA-A900 Poron H (358x4x0.75mm) | 30-013-24100477 | 2 |
| 12 | Fillister Head Screw #1/M2x0.4Px4mm | 22-272-20004011 | 4 |
| 13 | Round Head Screw #1/T2.6x6mm | 22-135-26006011 | 14 |
| 14 | Fillister Head Screw M3x0.5Px3mm | 22-272-30003011 | 2 |
| 15 | Flat Head Screw #2/M3x0.5Px5mm | 22-215-30005011 | 2 |
| 16 | Pan Head Screw #2/M3x0.5Px4mm | 22-222-30004911 | 4 |
| 17 | Round Head Screw #2/M3x0.5Px14mm | 22-235-30014311 | 2 |
| 18 | Flat Head Screw #1/M2.5x0.45Px4mm | 22-215-25004011 | 11 |

## 7” VFD Cover Glass Exploded Diagram




| ITEM | Description | Part No. | Q’ty |
|---|---|---|---|
| 1 | PA-A900 Stand Top Cover (Black) | 30-002-12111477 | 1 |
| | PA-A900 Stand Top Cover (White) | 30-002-12510477 | |
| 2 | PA-A900 7" VFD Cover Glass | 34-024-02302471 | 1 |
| 3 | PA-A900 LCD Customer Display (w/o Pole & Cable), RS-232 interface | 52-901-40001703 | 1 |
| 4 | PA-A900 LM930 V1 Bracket | 20-006-03004477 | 1 |
| 5 | Round Head Screw M2.5x0.45Px4mm | 22-232-25004011 | 4 |
| 6 | Round Head Screw #1/T2.6x6mm | 22-135-26006011 | 2 |

# Appendix B Technical Summary

This appendix will give you a brief introduction of the allocation maps for the system resources.

The following topics are included:

- Interrupt Map
- I/O Map
- Memory Map
- Configuring WatchDog Timer
- Flash BIOS Update

## Interrupt Map

| IRQ | ASSIGNMENT |
|---|---|
| IRQ 0 | System timer |
| IRQ 3 | Intel SD Host Controller |
| IRQ 4 | Communications Port (COM1) |
| IRQ 6 | Communications Port (COM2) |
| IRQ 7 | Communications Port (COM3) |
| IRQ 8 | System CMOS/real time clock |
| IRQ 10 | Communications Port (COM4) |
| IRQ 14 | Intel(R) Serial IO GPIO Host Controller - INT3452 |
| IRQ 25 | High Definition Audio Controller |
| IRQ 31 | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| IRQ 32 | Intel(R) Serial IO I2C Host Controller - 5AB6 |
| IRQ 54 | Microsoft ACPI-Compliant System |
| IRQ 55 | Microsoft ACPI-Compliant System |
| IRQ 56 | Microsoft ACPI-Compliant System |
| IRQ 57 | Microsoft ACPI-Compliant System |
| IRQ 58 | Microsoft ACPI-Compliant System |
| IRQ 59 | Microsoft ACPI-Compliant System |
| IRQ 60 | Microsoft ACPI-Compliant System |
| IRQ 61 | Microsoft ACPI-Compliant System |
| IRQ 62 | Microsoft ACPI-Compliant System |
| IRQ 63 | Microsoft ACPI-Compliant System |
| IRQ 64 | Microsoft ACPI-Compliant System |
| IRQ 65 | Microsoft ACPI-Compliant System |
| IRQ 66 | Microsoft ACPI-Compliant System |
| IRQ 67 | Microsoft ACPI-Compliant System |
| IRQ 68 | Microsoft ACPI-Compliant System |
| IRQ 69 | Microsoft ACPI-Compliant System |
| IRQ 70 | Microsoft ACPI-Compliant System |
| IRQ 71 | Microsoft ACPI-Compliant System |
| IRQ 72 | Microsoft ACPI-Compliant System |
| IRQ 73 | Microsoft ACPI-Compliant System |
| IRQ 74 | Microsoft ACPI-Compliant System |
| IRQ 75 | Microsoft ACPI-Compliant System |
| IRQ 76 | Microsoft ACPI-Compliant System |
| IRQ 77 | Microsoft ACPI-Compliant System |
| IRQ 78 | Microsoft ACPI-Compliant System |
| IRQ 79 | Microsoft ACPI-Compliant System |
| IRQ 80 | Microsoft ACPI-Compliant System |
| IRQ 81 | Microsoft ACPI-Compliant System |
| IRQ 82 | Microsoft ACPI-Compliant System |
| IRQ 83 | Microsoft ACPI-Compliant System |

| IRQ | ASSIGNMENT |
|---|---|
| IRQ 84 | Microsoft ACPI-Compliant System |
| IRQ 85 | Microsoft ACPI-Compliant System |
| IRQ 86 | Microsoft ACPI-Compliant System |
| IRQ 87 | Microsoft ACPI-Compliant System |
| IRQ 88 | Microsoft ACPI-Compliant System |
| IRQ 89 | Microsoft ACPI-Compliant System |
| IRQ 90 | Microsoft ACPI-Compliant System |
| IRQ 91 | Microsoft ACPI-Compliant System |
| IRQ 92 | Microsoft ACPI-Compliant System |
| IRQ 93 | Microsoft ACPI-Compliant System |
| IRQ 94 | Microsoft ACPI-Compliant System |
| IRQ 95 | Microsoft ACPI-Compliant System |
| IRQ 96 | Microsoft ACPI-Compliant System |
| IRQ 97 | Microsoft ACPI-Compliant System |
| IRQ 98 | Microsoft ACPI-Compliant System |
| IRQ 99 | Microsoft ACPI-Compliant System |
| IRQ 100 | Microsoft ACPI-Compliant System |
| IRQ 101 | Microsoft ACPI-Compliant System |
| IRQ 102 | Microsoft ACPI-Compliant System |
| IRQ 103 | Microsoft ACPI-Compliant System |
| IRQ 104 | Microsoft ACPI-Compliant System |
| IRQ 105 | Microsoft ACPI-Compliant System |
| IRQ 106 | Microsoft ACPI-Compliant System |
| IRQ 107 | Microsoft ACPI-Compliant System |
| IRQ 108 | Microsoft ACPI-Compliant System |
| IRQ 109 | Microsoft ACPI-Compliant System |
| IRQ 110 | Microsoft ACPI-Compliant System |
| IRQ 111 | Microsoft ACPI-Compliant System |
| IRQ 112 | Microsoft ACPI-Compliant System |
| IRQ 113 | Microsoft ACPI-Compliant System |
| IRQ 114 | Microsoft ACPI-Compliant System |
| IRQ 115 | Microsoft ACPI-Compliant System |
| IRQ 116 | Microsoft ACPI-Compliant System |
| IRQ 117 | Microsoft ACPI-Compliant System |
| IRQ 118 | Microsoft ACPI-Compliant System |
| IRQ 119 | Microsoft ACPI-Compliant System |
| IRQ 120 | Microsoft ACPI-Compliant System |
| IRQ 121 | Microsoft ACPI-Compliant System |
| IRQ 122 | Microsoft ACPI-Compliant System |
| IRQ 123 | Microsoft ACPI-Compliant System |
| IRQ 124 | Microsoft ACPI-Compliant System |
| IRQ 125 | Microsoft ACPI-Compliant System |
| IRQ 126 | Microsoft ACPI-Compliant System |

| IRQ | ASSIGNMENT |
|---|---|
| IRQ 127 | Microsoft ACPI-Compliant System |
| IRQ 128 | Microsoft ACPI-Compliant System |
| IRQ 129 | Microsoft ACPI-Compliant System |
| IRQ 130 | Microsoft ACPI-Compliant System |
| IRQ 131 | Microsoft ACPI-Compliant System |
| IRQ 132 | Microsoft ACPI-Compliant System |
| IRQ 133 | Microsoft ACPI-Compliant System |
| IRQ 134 | Microsoft ACPI-Compliant System |
| IRQ 135 | Microsoft ACPI-Compliant System |
| IRQ 136 | Microsoft ACPI-Compliant System |
| IRQ 137 | Microsoft ACPI-Compliant System |
| IRQ 138 | Microsoft ACPI-Compliant System |
| IRQ 139 | Microsoft ACPI-Compliant System |
| IRQ 140 | Microsoft ACPI-Compliant System |
| IRQ 141 | Microsoft ACPI-Compliant System |
| IRQ 142 | Microsoft ACPI-Compliant System |
| IRQ 143 | Microsoft ACPI-Compliant System |
| IRQ 144 | Microsoft ACPI-Compliant System |
| IRQ 145 | Microsoft ACPI-Compliant System |
| IRQ 146 | Microsoft ACPI-Compliant System |
| IRQ 147 | Microsoft ACPI-Compliant System |
| IRQ 148 | Microsoft ACPI-Compliant System |
| IRQ 149 | Microsoft ACPI-Compliant System |
| IRQ 150 | Microsoft ACPI-Compliant System |
| IRQ 151 | Microsoft ACPI-Compliant System |
| IRQ 152 | Microsoft ACPI-Compliant System |
| IRQ 153 | Microsoft ACPI-Compliant System |
| IRQ 154 | Microsoft ACPI-Compliant System |
| IRQ 155 | Microsoft ACPI-Compliant System |
| IRQ 156 | Microsoft ACPI-Compliant System |
| IRQ 157 | Microsoft ACPI-Compliant System |
| IRQ 158 | Microsoft ACPI-Compliant System |
| IRQ 159 | Microsoft ACPI-Compliant System |
| IRQ 160 | Microsoft ACPI-Compliant System |
| IRQ 161 | Microsoft ACPI-Compliant System |
| IRQ 162 | Microsoft ACPI-Compliant System |
| IRQ 163 | Microsoft ACPI-Compliant System |
| IRQ 164 | Microsoft ACPI-Compliant System |
| IRQ 165 | Microsoft ACPI-Compliant System |
| IRQ 166 | Microsoft ACPI-Compliant System |
| IRQ 167 | Microsoft ACPI-Compliant System |
| IRQ 168 | Microsoft ACPI-Compliant System |
| IRQ 169 | Microsoft ACPI-Compliant System |

| IRQ | ASSIGNMENT |
|---|---|
| IRQ 170 | Microsoft ACPI-Compliant System |
| IRQ 171 | Microsoft ACPI-Compliant System |
| IRQ 172 | Microsoft ACPI-Compliant System |
| IRQ 173 | Microsoft ACPI-Compliant System |
| IRQ 174 | Microsoft ACPI-Compliant System |
| IRQ 175 | Microsoft ACPI-Compliant System |
| IRQ 176 | Microsoft ACPI-Compliant System |
| IRQ 177 | Microsoft ACPI-Compliant System |
| IRQ 178 | Microsoft ACPI-Compliant System |
| IRQ 179 | Microsoft ACPI-Compliant System |
| IRQ 180 | Microsoft ACPI-Compliant System |
| IRQ 181 | Microsoft ACPI-Compliant System |
| IRQ 182 | Microsoft ACPI-Compliant System |
| IRQ 183 | Microsoft ACPI-Compliant System |
| IRQ 184 | Microsoft ACPI-Compliant System |
| IRQ 185 | Microsoft ACPI-Compliant System |
| IRQ 186 | Microsoft ACPI-Compliant System |
| IRQ 187 | Microsoft ACPI-Compliant System |
| IRQ 188 | Microsoft ACPI-Compliant System |
| IRQ 189 | Microsoft ACPI-Compliant System |
| IRQ 190 | Microsoft ACPI-Compliant System |
| IRQ 191 | Microsoft ACPI-Compliant System |
| IRQ 192 | Microsoft ACPI-Compliant System |
| IRQ 193 | Microsoft ACPI-Compliant System |
| IRQ 194 | Microsoft ACPI-Compliant System |
| IRQ 195 | Microsoft ACPI-Compliant System |
| IRQ 196 | Microsoft ACPI-Compliant System |
| IRQ 197 | Microsoft ACPI-Compliant System |
| IRQ 198 | Microsoft ACPI-Compliant System |
| IRQ 199 | Microsoft ACPI-Compliant System |
| IRQ 200 | Microsoft ACPI-Compliant System |
| IRQ 201 | Microsoft ACPI-Compliant System |
| IRQ 202 | Microsoft ACPI-Compliant System |
| IRQ 203 | Microsoft ACPI-Compliant System |
| IRQ 204 | Microsoft ACPI-Compliant System |
| IRQ 256 | Microsoft ACPI-Compliant System |
| IRQ 257 | Microsoft ACPI-Compliant System |
| IRQ 258 | Microsoft ACPI-Compliant System |
| IRQ 259 | Microsoft ACPI-Compliant System |
| IRQ 260 | Microsoft ACPI-Compliant System |
| IRQ 261 | Microsoft ACPI-Compliant System |
| IRQ 262 | Microsoft ACPI-Compliant System |
| IRQ 263 | Microsoft ACPI-Compliant System |

| IRQ | ASSIGNMENT |
|---|---|
| IRQ 264 | Microsoft ACPI-Compliant System |
| IRQ 265 | Microsoft ACPI-Compliant System |
| IRQ 266 | Microsoft ACPI-Compliant System |
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| IRQ | ASSIGNMENT |
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| IRQ 307 | Microsoft ACPI-Compliant System |
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| IRQ 350 | Microsoft ACPI-Compliant System |
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| IRQ | ASSIGNMENT |
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| IRQ | ASSIGNMENT |
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| IRQ 436 | Microsoft ACPI-Compliant System |
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| IRQ | ASSIGNMENT |
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| IRQ 479 | Microsoft ACPI-Compliant System |
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| IRQ 509 | Microsoft ACPI-Compliant System |
| IRQ 510 | Microsoft ACPI-Compliant System |
| IRQ 511 | Microsoft ACPI-Compliant System |
| IRQ 1024 | Intel SD Host Controller |
| IRQ 4294967277 | Intel(R) HD Graphics |
| IRQ 4294967278 | Intel(R) I210 Gigabit Network Connection #2 |
| IRQ 4294967279 | Intel(R) I210 Gigabit Network Connection #2 |
| IRQ 4294967280 | Intel(R) I210 Gigabit Network Connection #2 |
| IRQ 4294967281 | Intel(R) I210 Gigabit Network Connection #2 |
| IRQ 4294967282 | Intel(R) I210 Gigabit Network Connection #2 |
| IRQ 4294967283 | Intel(R) I210 Gigabit Network Connection #2 |
| IRQ 4294967284 | Intel(R) I210 Gigabit Network Connection |
| IRQ 4294967285 | Intel(R) I210 Gigabit Network Connection |

| IRQ | ASSIGNMENT |
|---|---|
| IRQ 4294967286 | Intel(R) I210 Gigabit Network Connection |
| IRQ 4294967287 | Intel(R) I210 Gigabit Network Connection |
| IRQ 4294967288 | Intel(R) I210 Gigabit Network Connection |
| IRQ 4294967289 | Intel(R) I210 Gigabit Network Connection |
| IRQ 4294967290 | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| IRQ 4294967291 | Intel(R) Trusted Execution Engine Interface |
| IRQ 4294967292 | Standard SATA AHCI Controller |
| IRQ 4294967293 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| IRQ 4294967294 | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |

## I/O Map

| I/O | ASSIGNMENT |
|---|---|
| 0x00000A00-0x00000A0F | Motherboard resources |
| 0x00000A10-0x00000A1F | Motherboard resources |
| 0x00000A20-0x00000A2F | Motherboard resources |
| 0x0000002E-0x0000002F | Motherboard resources |
| 0x0000004E-0x0000004F | Motherboard resources |
| 0x00000061-0x00000061 | Motherboard resources |
| 0x00000063-0x00000063 | Motherboard resources |
| 0x00000065-0x00000065 | Motherboard resources |
| 0x00000067-0x00000067 | Motherboard resources |
| 0x00000070-0x00000070 | Motherboard resources |
| 0x00000070-0x00000070 | System CMOS/real time clock |
| 0x00000080-0x0000008F | Motherboard resources |
| 0x00000092-0x00000092 | Motherboard resources |
| 0x000000B2-0x000000B3 | Motherboard resources |
| 0x00000680-0x0000069F | Motherboard resources |
| 0x00000400-0x0000047F | Motherboard resources |
| 0x00000500-0x000005FE | Motherboard resources |
| 0x00000600-0x0000061F | Motherboard resources |
| 0x0000164E-0x0000164F | Motherboard resources |
| 0x0000F040-0x0000F05F | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4 |
| 0x0000D000-0x0000DFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| 0x000003F8-0x000003FF | Communications Port (COM1) |
| 0x000002F8-0x000002FF | Communications Port (COM2) |
| 0x000003E8-0x000003EF | Communications Port (COM3) |
| 0x000002E8-0x000002EF | Communications Port (COM4) |
| 0x0000F000-0x0000F03F | Intel(R) HD Graphics |
| 0x0000E000-0x0000EFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |
| 0x00000000-0x0000006F | PCI Express Root Complex |
| 0x00000078-0x00000CF7 | PCI Express Root Complex |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex |
| 0x00000020-0x00000021 | Programmable interrupt controller |
| 0x00000024-0x00000025 | Programmable interrupt controller |
| 0x00000028-0x00000029 | Programmable interrupt controller |
| 0x0000002C-0x0000002D | Programmable interrupt controller |
| 0x00000030-0x00000031 | Programmable interrupt controller |

| I/O | ASSIGNMENT |
|---|---|
| 0x00000034-0x00000035 | Programmable interrupt controller |
| 0x00000038-0x00000039 | Programmable interrupt controller |
| 0x0000003C-0x0000003D | Programmable interrupt controller |
| 0x000000A0-0x000000A1 | Programmable interrupt controller |
| 0x000000A4-0x000000A5 | Programmable interrupt controller |
| 0x000000A8-0x000000A9 | Programmable interrupt controller |
| 0x000000AC-0x000000AD | Programmable interrupt controller |
| 0x000000B0-0x000000B1 | Programmable interrupt controller |
| 0x000000B4-0x000000B5 | Programmable interrupt controller |
| 0x000000B8-0x000000B9 | Programmable interrupt controller |
| 0x000000BC-0x000000BD | Programmable interrupt controller |
| 0x000004D0-0x000004D1 | Programmable interrupt controller |
| 0x0000F090-0x0000F097 | Standard SATA AHCI Controller |
| 0x0000F080-0x0000F083 | Standard SATA AHCI Controller |
| 0x0000F060-0x0000F07F | Standard SATA AHCI Controller |
| 0x00000040-0x00000043 | System timer |
| 0x00000050-0x00000053 | System timer |

## Memory Map

| MEMORY MAP | ASSIGNMENT |
|---|---|
| 0xE0000000-0xEFFFFFFF | Motherboard resources |
| 0xE0000000-0xEFFFFFFF | PCI Express Root Complex |
| 0xFEA00000-0xFEAFFFFF | Motherboard resources |
| 0xFED01000-0xFED01FFF | Motherboard resources |
| 0xFED03000-0xFED03FFF | Motherboard resources |
| 0xFED06000-0xFED06FFF | Motherboard resources |
| 0xFED08000-0xFED09FFF | Motherboard resources |
| 0xFED80000-0xFEDBFFFF | Motherboard resources |
| 0xFED1C000-0xFED1CFFF | Motherboard resources |
| 0xFEE00000-0xFEEFFFFF | Motherboard resources |
| 0x91310000-0x91313FFF | High Definition Audio Controller |
| 0x91000000-0x910FFFFF | High Definition Audio Controller |
| 0x91316000-0x913160FF | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4 |
| 0x91180000-0x911FFFFF | Intel(R) I210 Gigabit Network Connection |
| 0x9117C000-0x9117FFFF | Intel(R) I210 Gigabit Network Connection |
| 0x91100000-0x911FFFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| 0x9131C000-0x9131CFFF | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| 0x9131B000-0x9131BFFF | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| 0xFED00000-0xFED003FF | High precision event timer |
| 0x91300000-0x9130FFFF | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| 0x90000000-0x90FFFFFF | Intel(R) HD Graphics |
| 0x80000000-0x8FFFFFFF | Intel(R) HD Graphics |
| 0x80000000-0x8FFFFFFF | PCI Express Root Complex |
| 0x91200000-0x912FFFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |
| 0x9131A000-0x9131AFFF | Intel(R) Serial IO I2C Host Controller - 5AB6 |
| 0x91319000-0x91319FFF | Intel(R) Serial IO I2C Host Controller - 5AB6 |
| 0x7C000001-0x7FFFFFFF | PCI Express Root Complex |
| 0x7B800001-0x7BFFFFFF | PCI Express Root Complex |
| 0x91321000-0x91321FFF | Intel(R) Trusted Execution Engine Interface |

| MEMORY MAP | ASSIGNMENT |
|---|---|
| 0xD0C00000-0xD0C00653 | Intel(R) Serial IO GPIO Host Controller - INT3452 |
| 0xCFFFF000-0xCFFFFFFF | Intel SD Host Controller |
| 0xCFFFE000-0xCFFFEFFF | Intel SD Host Controller |
| 0x91314000-0x91315FFF | Standard SATA AHCI Controller |
| 0x9131E000-0x9131E0FF | Standard SATA AHCI Controller |
| 0x9131D000-0x9131D7FF | Standard SATA AHCI Controller |
| 0x91280000-0x912FFFFF | Intel(R) I210 Gigabit Network Connection #2 |
| 0x9127C000-0x9127FFFF | Intel(R) I210 Gigabit Network Connection #2 |

## Configuring WatchDog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. User must first assign the address of register by writing address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).

### Configuration Sequence

To program F81966 configuration registers, the following configuration sequence must be followed:

**(1) Enter the extended function mode**

To place the chip into the Extended Function Mode, two successive writes of 0x87 must be applied to Extended Function Enable Registers (EFERs, i.e. 2Eh or 4Eh).

**(2) Configure the configuration registers**

The chip selects the Logical Device and activates the desired Logical Devices through Extended Function Index Register (EFIR) and Extended Function Data Register (EFDR). The EFIR is located at the same address as the EFER, and the EFDR is located at address (EFIR+1). First, write the Logical Device Number (i.e. 0x07) to the EFIR and then write the number of the desired Logical Device to the EFDR. If accessing the Chip (Global) Control Registers, this step is not required. Secondly, write the address of the desired configuration register within the Logical Device to the EFIR and then write (or read) the desired configuration register through the EFDR.

**(3) Exit the extended function mode**

To exit the Extended Function Mode, writing 0xAA to the EFER is required. Once the chip exits the Extended Function Mode, it is in the normal running mode and is ready to enter the configuration mode.

## Code example for watch dog timer

Enable the watchdog timer and set the timeout interval to **30** seconds.

```
; ------------------------- Enter to extended function mode -------------------------------
mov     dx,     2eh
mov     al,     87h
out     dx,     al
out     dx,     al
; ---------------------- Select Logical Device 7 of watchdog timer ---------------------
mov     al,     07h
out     dx,     al
inc     dx
mov     al,     07h
out     dx,     al
;--------------------------------Enable Watch dog feature ----------------------------
mov     al,     030h
out     dx,     al
inc     dx
mov     al,     01h
out     dx,     al
;------------------------------ Enable Watch PME-----------------------------------------
dec     dx
mov     al,     0FAh
out     dx,     al
inc     dx
in      al,     dx
and     al,     51h
out     dx,     al
; ------------------------ Set timeout interval to 30 ---------------------------------------
dec     dx
mov     al,     0F6h
out     dx,     al
inc     dx
mov     al,     1Eh
out     dx,     al
;-------------------Set second as counting unit and start counting ----------------------
dec     dx
mov     al,     0F5h
out     dx,     al
inc     dx
in      al,     dx
and     al,     30h
out     dx,     al
;--------------------------------Exit the extended function mode -------------------------
dec     dx
mov     al,     0AAh
out     dx,     al
```

## Flash BIOS Update

### I. Prerequisites

***1*** Prepare a USB storage device which can save the required files for BIOS update.

***2*** Download and save the BIOS file (e.g. A9000TD8.bin) to the storage device.

***3*** Copy AMI flash utility – AFUEFIx64.exe (v5.12.03) into the storage device. The utility and BIOS file should be saved to the same path.

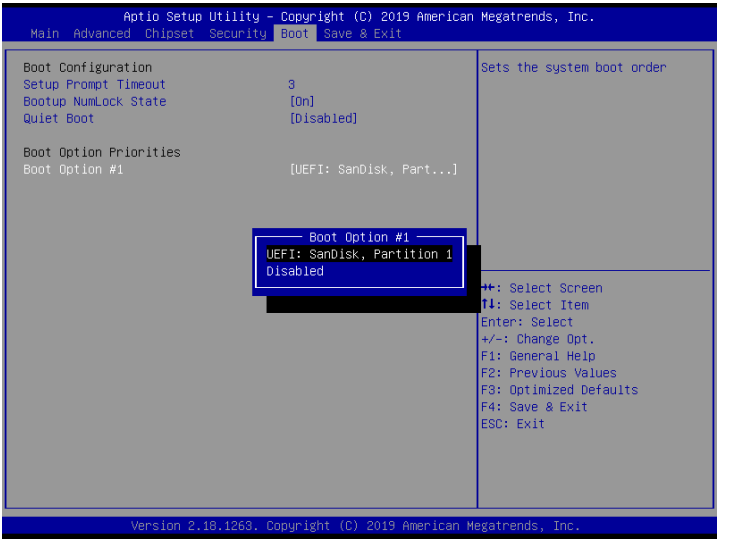
***4*** Make sure the target system can first boot to the bootable device.

(1) Connect the USB storage device.

(2) Turn on the computer and press **<ESC>** or **<DEL>** key during boot to enter BIOS Setup.

(3) Select **[Boot]** menu and set **[UEFI: Built-in EFI Shell]** to be the 1st boot device.

(4) Press **<F4>** key to save the configuration and restart the system to boot into EFI Shell environment.



## II. AFUEFIx64 Command for System BIOS Update

AFUEFIx64.efi is the AMI firmware update utility; the command line is shown as below:

**AFUEFIx64 <ROM File Name> [option1] [option2]….**

Users can type "AFUEFIx64 /?" to see all the definition of each control options. The recommended options for BIOS ROM update include following parameters:

**/P**: Program main BIOS image.

**/B**: Program Boot Block.

**/N**: Program NVRAM.

**/X**: Don't check ROM ID.

## III. BIOS update procedure

***1*** Boot into EFI Shell, change to the path where you put BIOS image and AFUEFIx64.

```
Shell> fs0:
 fs0:\> cd afuefix64
```

***2*** Type "**AFUEFIx64 A90Xxxxx.bin /p /b /n /x"** and press Enter to start the flash procedure. (xxxx means the BIOS revision part, e.g. 0PM1…)

***3*** During the update procedure, you will see the BIOS update process status and its percentage. Beware! Do not turn off system power or reset your computer if the whole procedure are not complete yet, or it may crash the BIOS ROM and make the system unable to boot up next time.

***4*** After the BIOS update procedure is completed, the following messages will display:

```
fs0:\afuefix64> afuefix64 A9000TD8.bin /p /b /n /x

 +-------------------------------------------------------------------------+
 |                    AMI Firmware Update Utility  v5.12.03.2045           |
 |   Copyright (C) 2019 American Megatrends Inc. All Rights Reserved.      |
 +-------------------------------------------------------------------------+
 Reading flash ..... done
 - ME Data Size Checking . ok
 - FFS checksums ......... ok
 - Check RomLayout ......... ok.
 Erasing Boot Block ..... done
 Updating Boot Block ..... done
 Verifying Boot Block ..... done
 Erasing Main Block ..... done
 Updating Main Block ..... done
 Verifying Main Block ..... done
 Erasing NVRAM Block ..... done
 Updating NVRAM Block ..... done
 Verifying NVRAM Block ..... done


 fs0:\afuefix64> _
```

***5*** Restart the system and boot up with the new BIOS configurations.

***6*** The BIOS Update is completed after the system is restarted.

***7*** Reboot the system and verify if the BIOS version shown on the initialization screen has been updated.