USER MANUAL

PA-A901

POS System Powered by

Intel® 7th / 6th Gen. Core™

Pentium® / Celeron® Processor

PA-A901 M1

PA-A901 Series POS System

With LCD / Touchscreen

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-A901 User Manual is described below:

Version No.	Revision History	Page No.	Date
M1	Initial Release	-	2019/09/09

1 Introduction

This chapter provides the introduction for the PA-A901 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-A901 system. The PA-A901 is an updated system designed to be comparable with the highest performance of IBM AT personal computers. The PA-A901 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-A901 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 main board 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 Management Engine Driver Utility, KMDF Driver Utility (Windows 7 only), LAN Driver Utility, Sound Driver Utility, Microsoft Hotfix kb3211320 and kb3213986 Driver Utility, Utility, and Intel RST Driver Utility (Optional, For Q170 SKU Only).

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

Appendix A System Diagrams
This appendix provides the easy maintenance diagrams, exploded diagrams and part numbers of the PA-A901.

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-A901 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

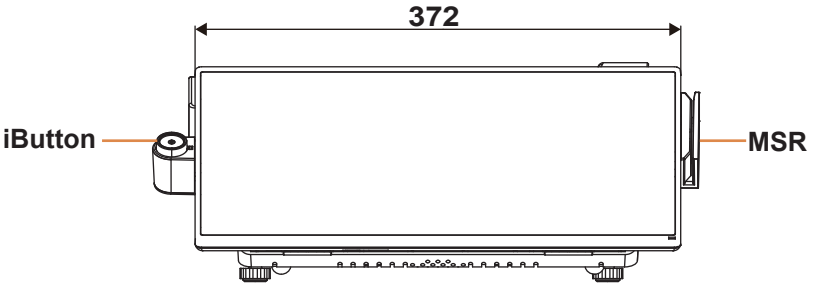
If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

Item	Q'ty
PA-A901	1
Manual / Driver DVD	1
Quick Reference Guide	1
COM Port to RJ45 Cable (L=150mm)	1
AC Power Adapter	1

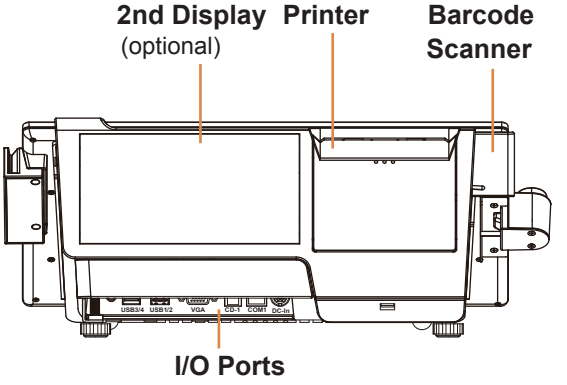
2.2 System Views

2.2.1 Front View

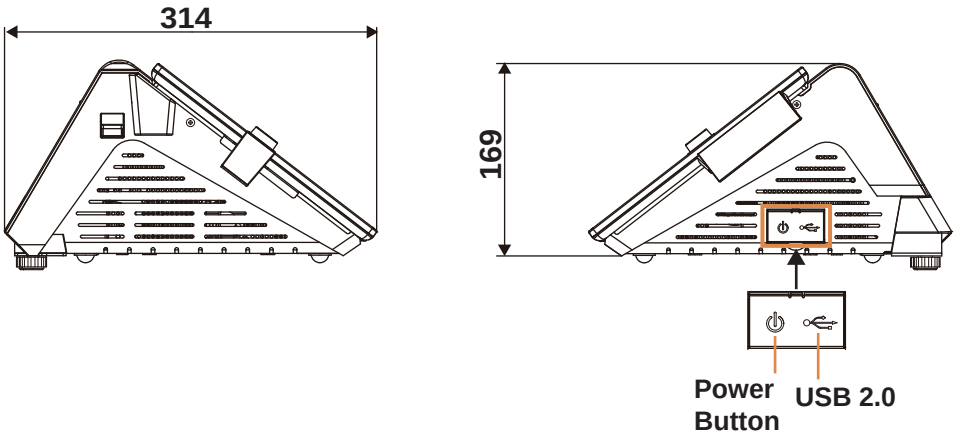
Unit: mm



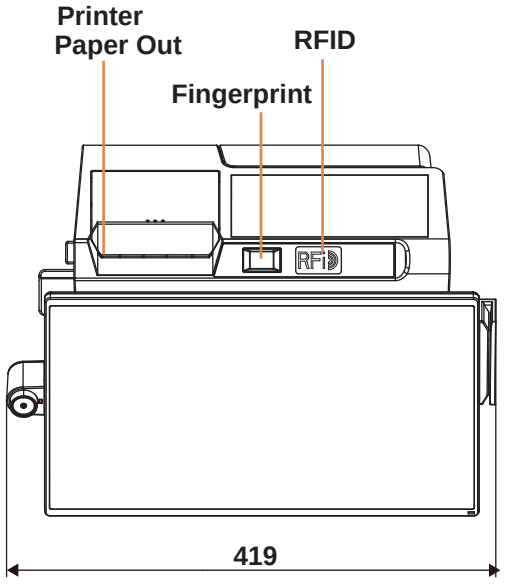
2.2.2 Rear View



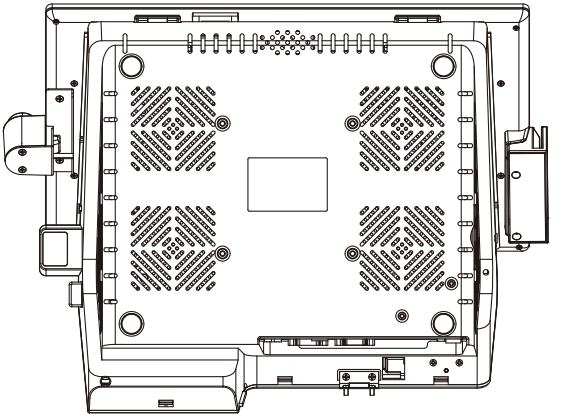
2.2.3 Side View



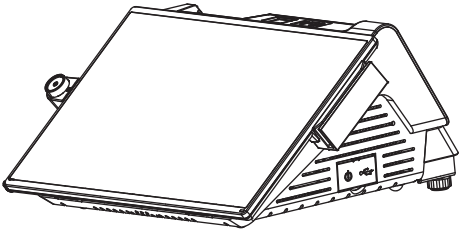
2.2.4 Top View



2.2.5 Bottom View



2.2.6 Quarter View

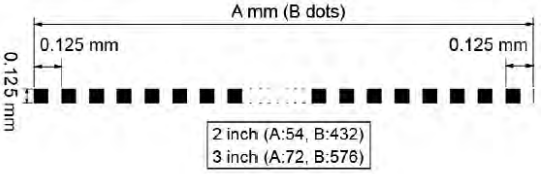


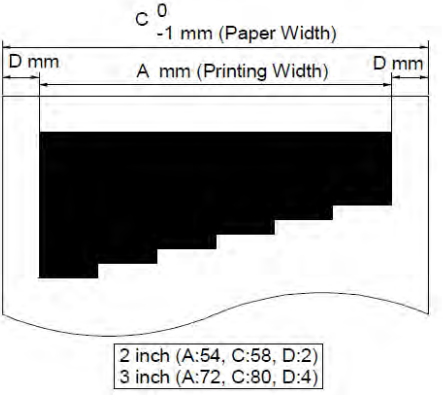
2.3 System Specifications

System		
CPU Support	**Intel® Core™ 7th Gen. Processor**	**Intel® Core™ 6th Gen. Processor**
	➢ Intel® Core™ i5-7500T, TDP 35W ➢ Intel® Core™ i3-7101E, TDP 54W ➢ Intel® Core™ i3-7101TE, TDP 35W ➢ Intel® Pentium® G4560, TDP 54W ➢ Intel® Celeron® G3930TE, TDP 35W	➢ Intel® Core™ i5-6500, TDP 65W ➢ Intel® Core™ i3-6100, TDP 51W ➢ Intel® Celeron® G3900, TDP 65W ➢ Intel® Pentium® G4400, TDP 54W
Core Logic	➢ Intel® H110 Chipset	
Memory	➢ 1 x DDR4 SO-DIMM (1 slot, up to 8GB)	
Network	➢ Gigabit 10/100/1000 Base-T Fast Ethernet	
O.S. Support	➢ Windows 10 ➢ Windows 10 IoT Enterprise ➢ Windows 10 IoT Enterprise for Retail or Thin Client	➢ Windows 10 IoT Enterprise ➢ Windows 10 IoT Enterprise for Retail or Thin Client ➢ Windows Embedded 8.1 Industry Pro ➢ Windows 7 Pro for Embedded Systems ➢ Windows Embedded POSReady 7
Power Supply	➢ 120 ~150 watt power adapter	
Audio	➢ 1 x 2W internal speaker	
BIOS	➢ AMI SPI BIOS, 8Mbits with VGA BIOS	
System Weight	➢ With power adapter approx. 5 kg	
Dimensions (W x H x D)	➢ 372 x 169 x 315mm	
Certificate	➢ FCC / CE	
Storage		
SATA	➢ 1 x 2.5" HDD or SSD	
I/O Ports		
USB	➢ Rear: 2 x USB 2.0 / 2 x USB 3.0 / Side: 1 x USB 2.0	
Serial Ports	➢ 1 x RJ45 + 2 x DB9 (all support +5V/+12V selectable)	
LAN	➢ 1 x RJ45	
VGA	➢ 1 x DB-15 VGA Interface	
Cash Drawer	➢ 1 + 1 (option, with Y cable) x RJ11 (+12V or +24V selectable)	
DC In	➢ 1 x 4-pin DC power jack	

Add-Ons	
Customer Display	➢ VFD, 20 columns and 2 lines, each column is 16 x 16 dots
Printer	2" or 3" easy loading thermal printer with auto-cutter Printer:

Items	Specifications
Printing method	Thermal dot line printing
Printing accuracy	1mm /5M
Paper feed pitch	0.0625 mm
Maximum Paper-Roll thickness	80mm
Total dots per line & Printable dots per line	2inch 432 dots; 3inch 576 dots
Maximum print speed	2inch 200 mm/s; 3inch 170 mm/s
Print width	2inch 54 mm; 3inch 72mm
Paper width	2inch 58 +0/-1 mm; 3inch 80 +0/-1 mm





<table>
<tr><td></td><td>Auto-Cutter:
<table>
<tr><th>Items</th><th>Specifications</th></tr>
<tr><td>Paper cutting method</td><td>Slide cutting</td></tr>
<tr><td>Type of paper cutting</td><td>Full cut and Partial cut (1.5 ± 0.5 mm tab left at the center)</td></tr>
<tr><td>Paper curling tendency</td><td>Fixed blade side and Movable blade side</td></tr>
<tr><td>Minimum paper core diameter</td><td>φ8 mm (paper thickness: 75μm or thin)
φ18 (paper thickness: thicker than 75μm)</td></tr>
<tr><td>Minimum paper cutting length</td><td>10 mm</td></tr>
<tr><td>Cutting processing time</td><td>Approx. 0.5 s/cycle</td></tr>
<tr><td>Cutting frequency</td><td>1 cut/2 s max.</td></tr>
</table>

• Standard Code
CP-437, CP-850, CP-857, CP-737, CP-852, CP-860,CP-862, CP-863, CP-865, CP-866, CP-1250,CP-1251, CP-1252, CP-1253, CP-1254, CP-1257, Katakana

• KANJI
JAPANESE (SHIFT-JIS) Code,
TRADITIONAL CHINESE Code

• International Characters
USA, FRANCE, GERMANY, UK, DENMARK I, SWDEN, ITALY, SPAIN I, JAPAN, NORWAY, DENMARK II, SPAIN II, LATIN AMERICA, KOREA, RUSSIA, SLAVONIC</td></tr>
<tr><td>MSR & iButton</td><td>➢ JIS I or II, ISO Track1+2+3 (PS/2 interface)</td></tr>
<tr><td>Fingerprint</td><td>➢ 8-bit grayscale reader</td></tr>
<tr><td>2nd Display</td><td>➢ 7" TFT LCD, resolution: 1024x600, brightness: 220 cd/m²</td></tr>
<tr><td colspan="2">Display</td></tr>
<tr><td>LCD</td><td>➢ 15.6" TFT LCD</td></tr>
<tr><td>Resolution</td><td>➢ 1366 x 768</td></tr>
<tr><td>Brightness</td><td>➢ 220 cd/m²</td></tr>
<tr><td>Touchscreen</td><td>➢ 15.6" P-CAP touch panel, USB interface</td></tr>
<tr><td>Tilt Angle</td><td>➢ 40 degrees</td></tr>
<tr><td colspan="2">Environment</td></tr>
<tr><td>Operating Temp.</td><td>➢ 0°C ~ 35°C (32°F ~ 95°F)</td></tr>
<tr><td>Storage Temp.</td><td>➢ -5°C ~ 60°C (23°F ~ 140°F)</td></tr>
<tr><td>Humidity</td><td>➢ 20% ~ 90%</td></tr>
</table>

Note: The 7th Gen. Processor supports Win 10 only.

2.4 Safety Precautions

Before operating this system, read the following information carefully to protect your system 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-A901 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
   - Avoid installing your PA-A901 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-A901 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-A901 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

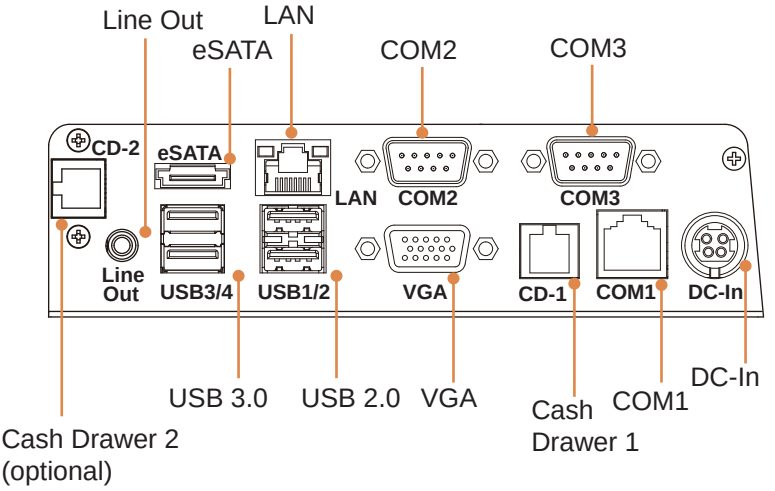
This chapter contains helpful information that describes the jumper and connector settings, component locations, and pin assignment.

The following topics are included:

- System External I/O Ports Diagram
- 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
  - PDAC-9100
  - MB-1030 series
  - MB-1011 & MB-1013
- Setting VFD Board Connectors and Jumpers

3.1 External System I/O Ports Diagram & Pin Assignment

3.1.1 Rear I/O Ports Diagram



3.2 Jumper & Connector Quick Reference Table

JUMPER / CONNECTOR	NAME
COM Port and VGA Connector	COM1, COM_VGA (COM2 + VGA Port) COM3, COM4 (Option), COM3_1, COM4_1, COM5
COM Port RI and Voltage Selection	JP_COM1, JP_COM2, JP_COM3, JP_COM4
i-Button Connector	I-BUT
i-Button Function Selection	JP22, JP23, JP24
LAN & USB Port	LAN, USB0, USB1
Internal USB 2.0 Connector	USB6, USB7, USB8, USB9-1, USB4_1
USB 3.0 Connector	USB2, USB3, eSATA
Cash Drawer Connector	DRW1
Cash Drawer Selection	JP17
Cash Drawer Power Selection	JP16
LED Connector	PWR_LED, HDD_LED (option)
System / CPU Fan Connector	SYS_FAN1, CPU_FAN1
Power Input Connector	PWR_IN1, PWR_IN2
Power Connector	DC24V, DC12V, DC5V
Power Switch Connector	SW1 (option), SW2
External Speaker Connector	SPK1, SPK2 (option)
Speaker Selection	JP13
MSR/Card Reader Connector	PS2_1
SATA & SATA Power Connector	SATA1, SATA2 (option), SATA_PWR1, SATA_PWR2 (option)
Touch Panel and USB9-1 Selection	JP18, JP19
Mini-PCIe Connector	M_PCIE1
Mini-PCIe and USB6 Selection	JP21
EDP Connector (option)	EDP
Configuration / Recovery Selection	JP11
VCCIO / REFIN Selection	JP10
Clear CMOS Data Selection	JCMOS1
General Purpose Input / Output (GPIO) Connector	GPIO1
Audio Jack	LINE-OUT1

3.3 Component Locations Of System Main Board

3.3.1 Top View of System Main Board

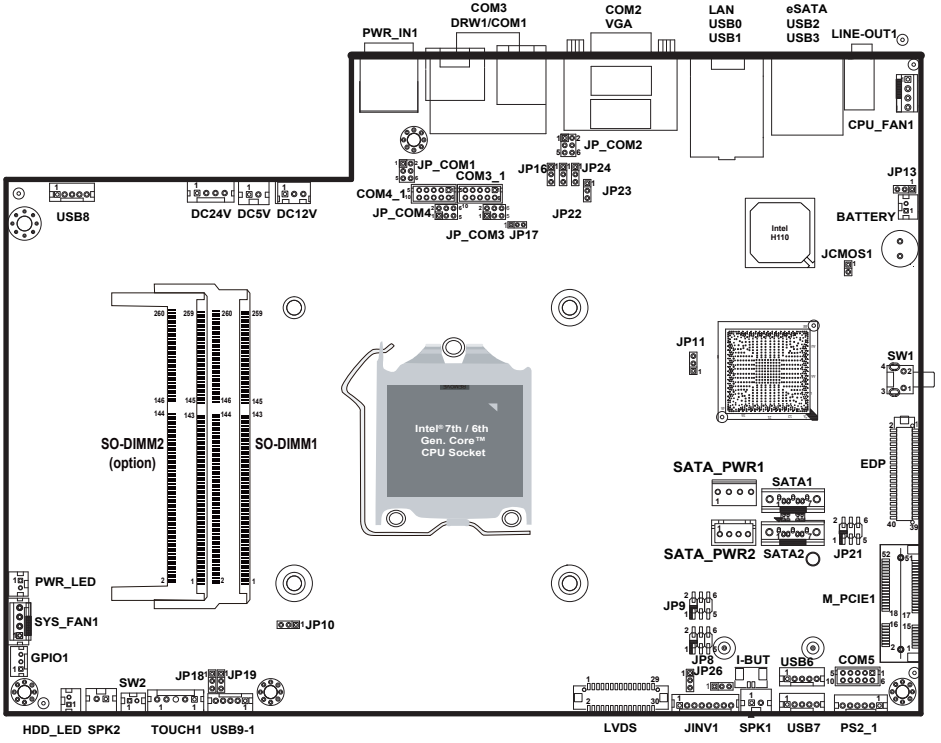
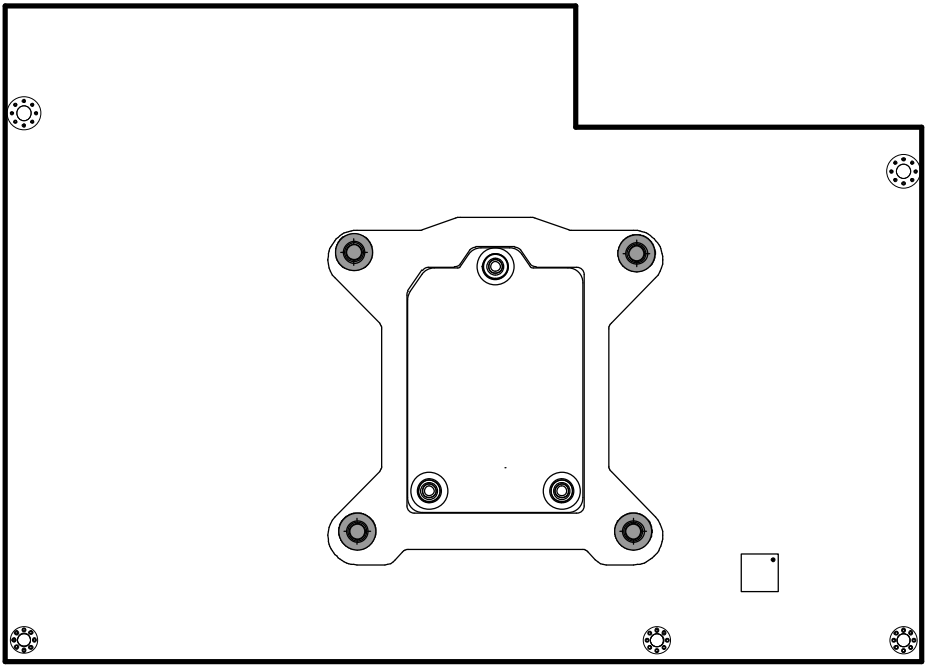


Figure 3-1. Main Board Component Location (Top View)

	**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 PB-6980 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 main board 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



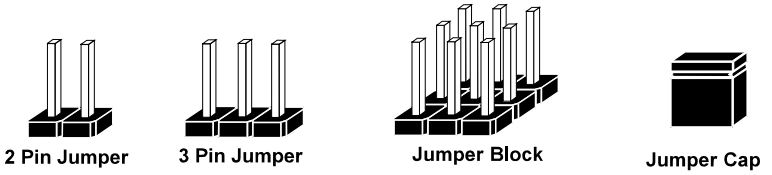
PB-6980 Rear Connector, Jumper and Component Locations

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.

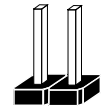
Jumpers & Caps



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.

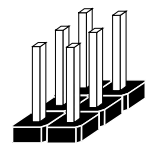
Jumper diagrams

Jumper Cap looks like this

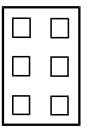


2 pin Jumper looks like this

3 pin Jumper looks like this

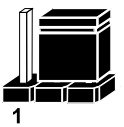


Jumper Block looks like this

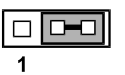


Jumper settings

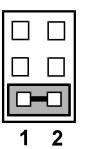
2 pin Jumper closed(enabled)
looks like this



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



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



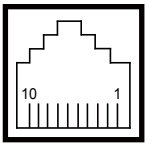
3.5 MAIN BOARD CONNECTORS AND JUMPERS

3.5.1 COM PORT & VGA CONNECTOR

There are multiple COM ports enhanced in this board namely: COM1, COM_VGA (COM2+VGA Port), COM3, COM3_1, COM4 (option), COM4_1 and COM5.

COM1: COM1 Connector
The pin assignments are as follows:

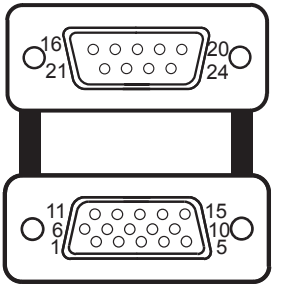
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM1_DCDJ_I	6	COM1_DSRJ_I
2	COM1_RX_I	7	COM1_RTSJ_I
3	COM1_TX_I	8	COM1_CTSJ_I
4	COM1_DTRJ_I	9	COM1_RI_SEL
5	GND	10	NC



COM1

COM_VGA: COM2 & D-Sub 15-pin VGA Connector
The pin assignments are as follows:

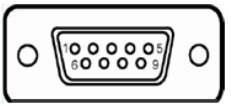
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	RED	13	HSYNC
2	GREEN	14	VSYNC
3	BLUE	15	DDCA CLK
4	NC	16	DCD2
5	GND	17	RXD2
6	GND	18	TXD2
7	GND	19	DTR2
8	GND	20	GND
9	+5V	21	DSR2
10	GND	22	RTS2
11	NC	23	CTS2
12	DDCA DATA	24	RI/+5V/+12V selectable



COM2/ VGA

COM3/COM4 (Option): COM3, COM4 Connector
The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM3_DCDJ_I	6	COM3_DSRJ_I
2	COM3_RX_I	7	COM3_RTSJ_I
3	COM3_TX_I	8	COM3_CTSJ_I
4	COM3_DTRJ_I	9	RI / +5V / +12V selectable
5	GND	-	-

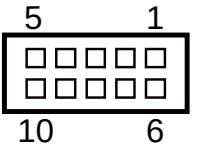


COM3/ COM4 (Option)

COM3 and COM3_1 can't be used simultaneously.
COM4 and COM4_1 can't be used simultaneously.

COM3_1: COM3_1 Connector
The pin assignments are as follows:

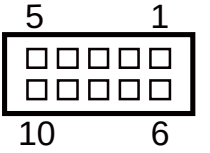
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM3_DCDJ_I	6	COM3_DSRJ_I
2	COM3_RX_I	7	COM3_RTSJ_I
3	COM3_TX_I	8	COM3_CTSJ_I
4	COM3_DTRJ_I	9	COM3_RI_SEL
5	GND	10	NC



COM3_1

COM4_1: COM4_1 Connector
The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM4_DCDJ_I	6	COM4_DSRJ_I
2	COM4_RX_I	7	COM4_RTSJ_I
3	COM4_TX_I	8	COM4_CTSJ_I
4	COM4_DTRJ_I	9	COM4_RI_SEL
5	GND	10	NC

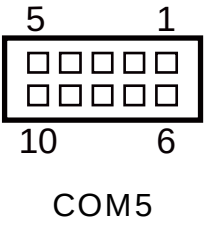


COM4_1

COM5: COM5 Connector

The pin assignments are as follows:

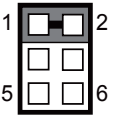
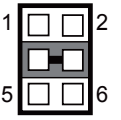
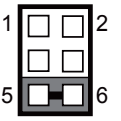
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM5_DCDJ_I	6	COM5_DSRJ_I
2	COM5_RX_I	7	COM5_RTSJ_I
3	COM5_TX_I	8	COM5_CTSJ_I
4	COM5_DTRJ_I	9	VCC5
5	GND	10	NC



COM5

3.5.2 COM PORT RI & VOLTAGE SELECTION

JP_COM1 , JP_COM2, JP_COM3, JP_COM4:

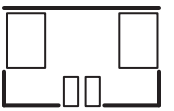
SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
RI	1-2	
VCC12	3-4	
VCC	5-6	

Note: Manufacturing Default is **RI**.

3.5.3 i-BUTTON CONNECTOR (I-BUT)

Connector Location: I-BUT
Description: i-Button Connector
The pin assignments are as follows:

PIN	ASSIGNMENT
1	COM2_DTR_R_I
2	COM2_RXD_R_I



I-BUT

3.5.4 i-BUTTON FUNCTION SELECTION (JP22, JP23, JP24)

Jumper Location: JP22, JP23, JP24
Description: i-Button Function Selection

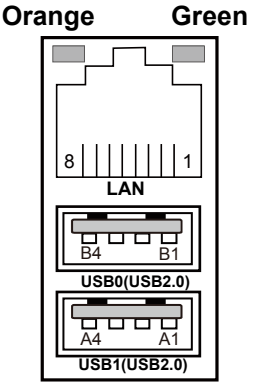
The jumper settings are as follows:

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
COM2	1-2	 JP22/JP23/JP24
i-Button*	2-3	 JP22/JP23/JP24

Note: Manufacturing Default is COM2.
*When these jumpers are set as 'i-Button', the COM2 connector will not function.

3.5.5 LAN & USB PORT (LAN & USB0, USB1)

Port Location: LAN & USB0, USB1
Description: LAN & USB0, USB1 Connector



LAN/ USB0/ USB1

The pin assignments are as follows:
USB0 and USB1: USB 2.0 Connector, USB Type A ports

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC5	B1	VCC5
A2	USB0-	B2	USB1-
A3	USB0+	B3	USB1+
A4	GND	B4	GND

LAN: a Giga LAN RJ-45 port (rear I/O)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	LAN1_MDI0_DP	5	LAN1_MDI2_DP
2	LAN1_MDI0_DN	6	LAN1_MDI2_DN
3	LAN1_MDI1_DP	7	LAN1_MDI3_DP
4	LAN1_MDI1_DN	8	LAN1_MDI3_DN

Left Side LAN LED Indicator

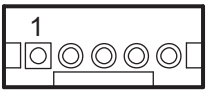
Orange Color Blinking	LAN Message Active
Off	No LAN Message Active

Right Side LAN LED Indicator

Green Color On	10/100Mbps LAN Speed Indicator
Orange Color On	Giga LAN Speed Indicator
Off	No LAN switch / hub connected

3.5.6 Internal USB 2.0 CONNECTOR (USB6, USB7, USB9-1)

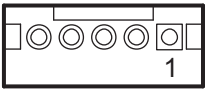
Connector Location: USB6, USB7, USB9-1
Description: Internal USB 2.0 connectors



USB6/ USB7

The pin assignments are as follows:

PIN	ASSIGNMENT
1	5V (Maximum current: 0.5A)
2	D-
3	D+
4	GND
5	GND



USB9-1

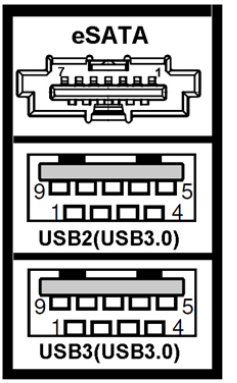
Note:
USB6 signal is shared from "MINI-PCIE" port.
USB6 could be functioned when JP21 are set 1-3, 2-4 [short].

USB9-1 signal is shared from "MINI-PCIE" port.
USB9-1 could be functioned when JP18, JP19 are set 1-2 [short].

3.5.7 USB 3.0 CONNECTOR (USB2, USB3)

Connector Location: USB2, USB3

Description: USB 3.0 connectors



USB2/ **USB3**

USB2: USB 3.0 connector

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	6	RX2_DP
2	USBP3N	7	GND
3	USBP3P	8	TX3_DN
4	GND	9	TX3_DP
5	RX2_DN	10	-

USB3: USB 3.0 connector

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	6	BP_RX_DP
2	USBP4N	7	GND
3	USBP4P	8	BP_TX_DN
4	GND	9	BP_TX_DP
5	BP_RX_DN	10	-

eSATA (external SATA): a combo eSATA/USB 3.0 connector

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	5	SATA_RXN_2_C
2	SATA_TXP_2_C	6	SATA_RXP_2_C
3	SATA_TXN_2_C	7	GND
4	GND	-	-

eSATA (external Serial Advanced Technology Attachment) is a 7-wire/7-pin technology. The maximum cable length is 6 1/2 feet (2 meters). eSATA and SATA have the same number of wires/pins and their signal formats are the same

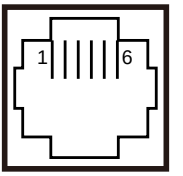
3.5.8 CASH DRAWER CONNECTOR (DRW1)

Connector Location: DRW1

Description: RJ-11 Cash Drawer Connector (+12V/+24V selectable, default: +12V).

DRW1 is used by default.
The pin assignments are as follows:

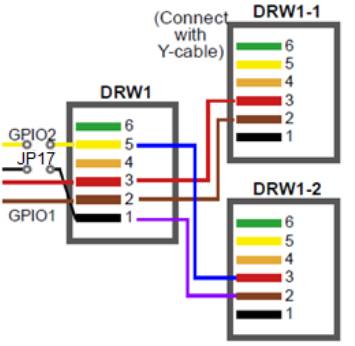
PIN	ASSIGNMENT
1	DRW2 Sense
2	GPIO1 / DRW1
3	DRW1 Sense
4	12V/24V (Max. current 1A)
5	GPIO2 / DRW2
6	GND



DRW1

3.5.9 CASH DRAWER SELECTION (JP17)

JP17: DRW1, DRW1-1, DRW1-2
DRW1 port is used by default. You can add a second port via either of the methods below:



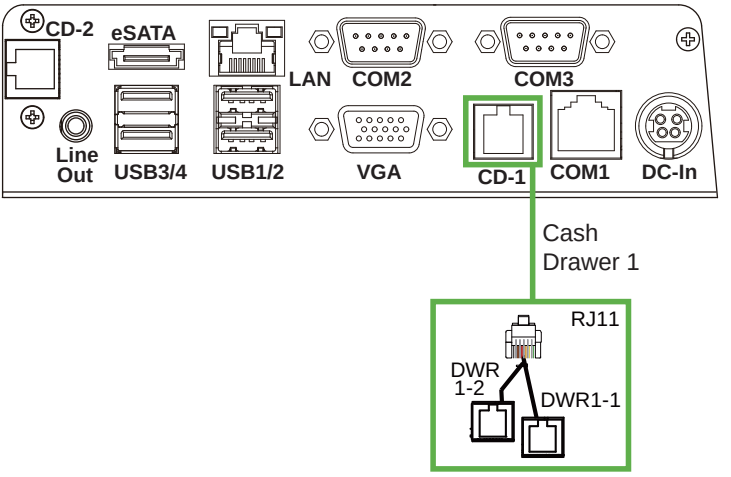
Method 1:
DRW1 includes two groups of GPIO pins.
The second group is normally unused but can be enabled by the jumper. Set the pin header jumper JP17 as 1-2 connected if necessary.

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

JP17: Cash Drawer 2 Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
Casher Drawer 2	1-2	 JP17
Casher Drawer1	2-3	 JP17

Note: Manufacturing Default is **Cash Drawer 1**.



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

SIO Address	
Cash drawer 1	LDN 06, 0x91 bit 4
Cash drawer 2	LDN 06, 0x91 bit 5

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 F81866 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

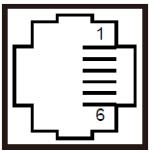
```
;------ Enter to extended function mode ------------------------------------------------------
mov dx, 2eh
mov al, 87h
out dx, al
out dx, al
;------ Select Logical Device 6 of Cash drawer -----------------------------------------
mov al, 07h
out dx, al
inc dx
mov al, 06h
out dx, al
dec dx
;------ 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 DRW2 Port can function only when the optional "Printer Kit" is installed on PA-A901. The DRW2 signals from the printer board (MB-1030, MB-1011, MB-1013, PDAC-9100) can be controlled via relevant commands. The DRW2 port is located at the bottom rear of PA-A901 system as shown below:

Drawer 2 Port View

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	4	+12V
2	Drawer Open	5	NC
3	Drawer Sense	6	GND



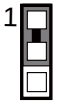
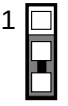
DRW2

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

3.5.10 CASH DRAWER POWER SELECTION (JP16)

Jumper Location: JP16
Description: Cash Drawer Power Selection

The jumper settings are as follows:

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
24V	1-2	 JP16
12V	2-3	 JP16

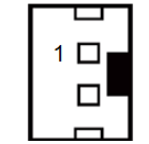
Note: Manufacturing Default is **12V**.

3.5.11 LED CONNECTOR (PWR_LED, HDD_LED)

Connector Location: PWR_LED
Description: Power indication LED Connector

The pin assignments are as follows:

PIN	ASSIGNMENT
1	VCC5
2	GND

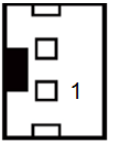


PWR_LED

Connector Location: HDD_LED (option)
Description: HDD indication LED Connector

The pin assignments are as follows:

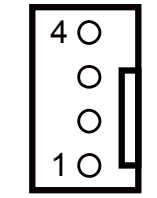
PIN	ASSIGNMENT
1	VCC3_3
2	PCH_SATA_LED_N



HDD_LED (option)

3.5.12 SYSTEM / CPU FAN CONNECTOR (SYS_FAN1, CPU_FAN1)

Connector Location: SYS_FAN1
Description: System Fan Connector 1

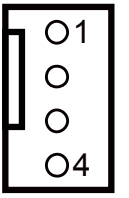


SYS_FAN1

The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	VCC12
3	SYS_FANIN
4	SYS_FANOUT

Connector Location: CPU_FAN1
Description: CPU Fan Connector 1

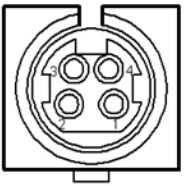


CPU_FAN1

PIN	ASSIGNMENT
1	GND
2	VCC12
3	CPU_FANIN
4	CPU_FANOUT

3.5.13 POWER INPUT CONNECTOR (PWR_IN1, PWR_IN2)

Connector Location: PWR_IN1
Description: Power Input Connector 1



PWR_IN1

The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	GND
3	24VIN
4	24VIN

Connector Location: PWR_IN2
Description: Power Input Connector 2

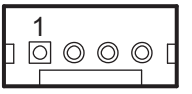
PWR_IN2

The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	24VIN
3	24VIN
4	GND

3.5.14 POWER CONNECTOR (DC24V, DC12V, DC5V)

Connector Location: DC24V
Description: Power for Thermal Printer Connector

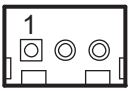


DC24V

The pin assignments are as follows:

PIN	ASSIGNMENT
1	24VIN
2	24VIN
3	GND
4	GND

Connector Location: DC12V
Description: DC 12Voltage Provider Connector

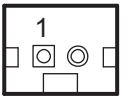


DC12V

The pin assignments are as follows:

PIN	ASSIGNMENT
1	VCC12_GT
2	NC
3	GND

Connector Location: DC5V
Description: DC 5Voltage Provider Connector



DC5V

The pin assignments are as follows:

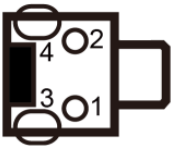
PIN	ASSIGNMENT
1	V_5P0_A
2	GND

3.5.15 POWER SWITCH CONNECTOR (SW1, SW2)

Connector Location: SW1
Description: Power Switch Connector 1

The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	LPC_PWRBTNJ
3	GND
4	GND

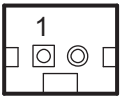


SW1
(option)

Connector Location: SW2
Description: Power Switch Connector 2

The pin assignments are as follows:

PIN	ASSIGNMENT
1	LPC_PWRBTNJ
2	GND



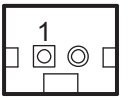
SW2

3.5.16 EXTERNAL SPEAKER CONNECTOR (SPK1, SPK2)

Connector Location: SPK1
Description: External Speaker Connector

The pin assignments are as follows:

PIN	ASSIGNMENT
1	HD_FRONT-OUT1-R
2	HD_FRONT-OUT1-L



SPK1/ SPK2

(option)

Connector Location: SPK2
Description: External Speaker Connector

The pin assignments are as follows:

PIN	ASSIGNMENT
1	HD_FRONT-OUT2-R
2	HD_FRONT-OUT2-L

3.5.17 SPEAKER SELECTION (JP13)

Jumper Location: JP13
Description: SPK1/SPK2 Selection

The jumper settings are as follows:

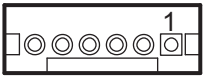
SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
SPK1&SPK2	1-2	 JP13
Only SPK1	Open	 JP13

Note: Manufacturing Default is **SPK1&SPK2**.

3.5.18 MSR/CARD READER CONNECTOR

Connector Location: PS2_1

Description: MSR/Card Reader Connector



PS2_1

The pin assignments are as follows:

PIN	ASSIGNMENT
1	KCLK_KB (Output)
2	KCLK_C (Input)
3	KDAT_C (Input)
4	KDAT_KB (Output)
5	+5V
6	GND

3.5.19 SATA & SATA POWER CONNECTOR (SATA1, SATA2, SATA_PWR1, SATA_PWR2)

Connector Location: SATA1, SATA2 (option)
Description: Serial ATA Connectors

SATA1/
SATA2
(option)

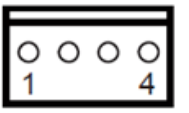
The pin assignments are as follows:

PIN	ASSIGNMENT
1	G1
2	TX+
3	TX-
4	G2
5	RX-
6	RX+
7	G3

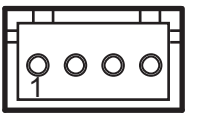
Connector Location: SATA_PWR1, SATA_PWR2 (option)
Description: Serial ATA Power Connectors

The pin assignments are as follows:

PIN	ASSIGNMENT
1	VCC
2	GND
3	GND
4	VCC12



SATA_PWR1

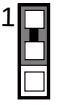


SATA_PWR2
(option)

3.5.20 TOUCH PANEL & USB9-1 SELECTION (JP18, JP19)

Jumper Location: JP18, JP19
Description: Touch Panel and USB9-1 Selection

The jumper settings are as follows:

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
USB9-1 Connector (Capacitor Panel Selection)	1-2	 JP18/JP19

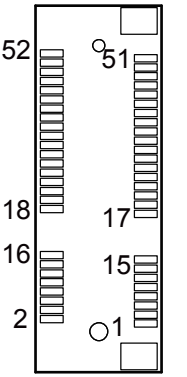
Note: Manufacturing Default is **USB9-1** connector.

3.5.21 Mini-PCIe CONNECTOR (M_PCIE1)

Connector Location: M_PCIE1
Description: MINI PCIE Connector

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	WAKE#	27	GND
2	+3.3V	28	+1.5V
3	Reserved	29	GND
4	GND	30	SMB_CLK
5	Reserved	31	PETn2
6	+1.5V	32	SMB_DATA
7	CLKREQ#	33	PETp2
8	Reserved	34	GND
9	GND	35	GND
10	Reserved	36	USB D-
11	REFCLK1-	37	GND
12	Reserved	38	USB D+
13	REFCLK1+	39	+3.3V
14	Reserved	40	GND
15	GND	41	+3.3V
16	Reserved	42	Reserved
17	Reserved	43	GND
18	GND	44	Reserved
19	Reserved	45	NC
20	Reserved	46	Reserved
21	GND	47	NC
22	PERST#	48	+1.5V
23	PERn0	49	NC
24	+3.3SB	50	GND
25	PERp0	51	Reserved
26	GND	52	+3.3V

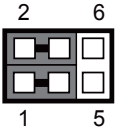
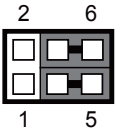


M_PCIE1

3.5.22 Mini-PCIe and USB6 Selection (JP21)

Jumper Location: JP21
Description: Mini-PCIe and USB6 Selection

The selection is as follows:

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
USB signal to USB6 wafer	1-3, 2-4	 JP21
USB signal to mini-PCIe (Disabled)	3-5, 4-6	 JP21

Note: Manufacturing Default is **USB signal to UB6 wafer**.

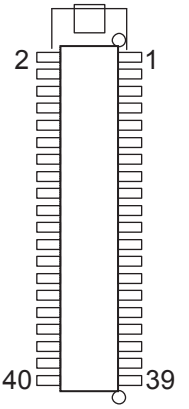
3.5.23 Embedded Display Port (EDP) CONNECTOR (option)

Connector Location: EDP

Description: EDP Connector

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	NC	21	VCC3_3
2	GND	22	NC
3	EDP_TX3_DN	23	GND
4	EDP_TX3_DP	24	GND
5	GND	25	GND
6	EDP_TX2_DN	26	GND
7	EDP_TX2_DP	27	EDP_LVDS_HPD
8	GND	28	GND
9	EDP_TX1_DN	29	GND
10	EDP_TX1_DP	30	GND
11	GND	31	GND
12	EDP_TX0_DN	32	EDP_BKLTEN
13	EDP_TX0_DP	33	EDP_BKLTCTL
14	GND	34	NC
15	EDP_AUX_DP_C	35	NC
16	EDP_AUX_DN_C	36	VCC12
17	GND	37	VCC12
18	VCC3_3	38	VCC12
19	VCC3_3	39	VCC12
20	VCC3_3	40	NC



EDP

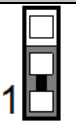
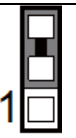
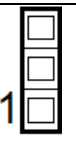
eDP (Embedded DisplayPort) was developed to be used specifically in embedded display applications, such as Notebook and Notepad PCs. eDP is based on the VESA DisplayPort Standard. It aims to define a standardized display panel interface for internal connections; e.g., graphics cards to notebook display panels. It has advanced power-saving features including seamless refresh rate switching. It has become the new mainstream display panel interface for LCD panels with the realized higher resolution.

3.5.24 CONFIGURATION / RECOVERY SELECTION (JP11)

Jumper Location: JP11

Description: Configuration / Recovery Selection

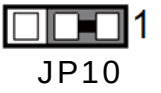
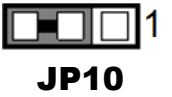
The jumper settings are as follows:

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
Normal	1-2	 JP11
Configure	2-3	 JP11
Recovery	Open	 JP11

3.5.25 VCCIO / REFIN SELECTION (JP10)

Jumper Location: JP10
Description: VCCIO / Refine Selection

The jumper settings are as follows:

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
1.0V	1-2	
0.95V	2-3	

Note: Manufacturing Default is **1.0V**.

3.5.26 CLEAR CMOS DATA SELECTION (JCMOS1)

Jumper Location: JCMOS1
Description: Clear CMOS Data Selection

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
Normal	Open	 JCMOS1
Clear CMOS Data	1-2	 JCMOS1

Note 1: Manufacturing Default is **Normal**.
Note 2: To clear CMOS data, users must power off the computer and set the jumper to "Clear CMOS Data" as shown above. After five to six seconds, set the jumper back to "NC" and power on the computer.

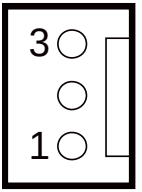
3.5.27 GPIO CONNECTOR (GPIO1)

Connector Location: GPIO1

Description: General Purpose Input / Output Connector

The pin assignments are as follows:

PIN	ASSIGNMENT
1	3.3V(Maximum current: 0.5A)
2	GND
3	GPIO



GPIO1

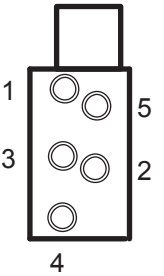
3.5.28 AUDIO JACK (LINE-OUT1)

Connector Location: LINE-OUT1

Description: External audio phone jack port

The pin assignments are as follows:

PIN	ASSIGNMENT
1	HD_GND
2	LINE-OUT-R
3	NC
4	VCC_AUD
5	LINE-OUT-L



LINE-OUT1

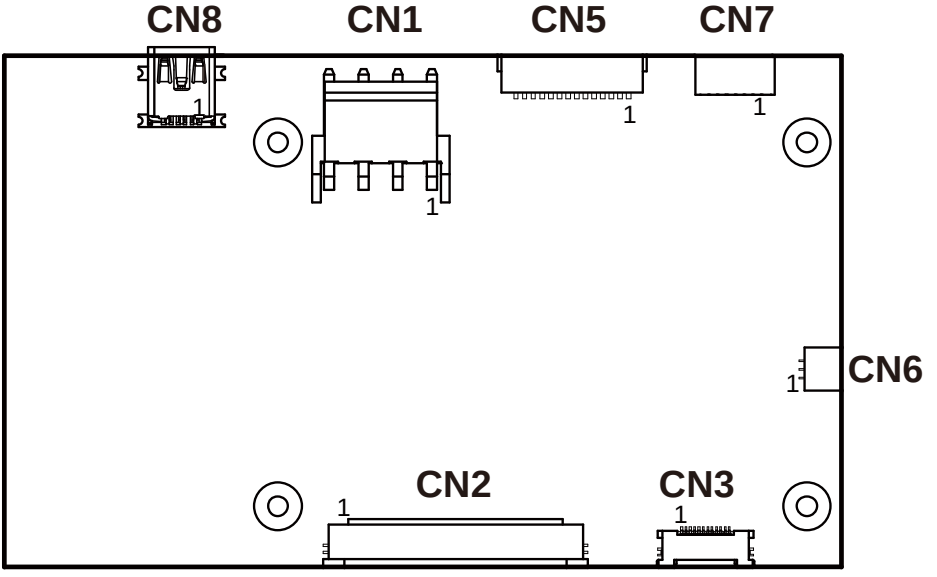
3.6 Setting Printer Board: PDAC-9100

3.6.1 Printer Board Component Locations & Pin Assignment

Operation Precautions

- When you install control board, please pay attention to static electricity control, do not touch parts and circuits, and take the edge of board by hand.
- While plug and pull cable, please keep connecting finger of cable and socket are in a parallel position.
- While plug and pull cable, please ensure the power is off.
- Please notice that no foreign matters close to PCB, in order to avoid short circuit.

3.6.2 Printer Board: PDAC-9100



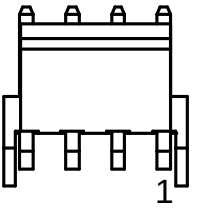
PDAC-9100 Connector Quick Reference Table

Connector	NAME
Power Connector	CN1
TPH, Motor and Sensor Connector	CN2
Auto-Cutter Connector	CN3
Key, Status and Drawer Connector	CN5
Paper Near End Sensor Connector	CN6
Serial Interface Connector	CN7
USB Connector	CN8

3.6.3 Power Connector Pin Assignment

CN1: VH4/3.96mm/90/DIP

PIN	ASSIGNMENT	FUNCTION
1	Vp	+24V
2	Vp	+24V
3	GND	GND
4	GND	GND

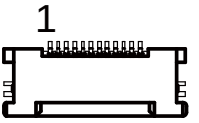


CN1

3.6.4 Auto-Cutter Connector Pin Assignment

CN3: FPC/12pin/0.5mm/Single/90/UP/SMD/DrawerLock

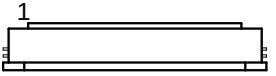
PIN	ASSIGNMENT	FUNCTION
1	N.C.	No Contact
2	Vcs	Power for cutter home position sensor
3	GND	GND
4	CUT_SNS	Cutter home position sensor
5	CUT_OUT22	Auto-cutter motor excitation signal $\overline{B}$
6	CUT_OUT22	Auto-cutter motor excitation signal $\overline{B}$
7	CUT_OUT12	Auto-cutter motor excitation signal A
8	CUT_OUT12	Auto-cutter motor excitation signal $\overline{A}$
9	CUT_OUT21	Auto-cutter motor excitation signal B
10	CUT_OUT21	Auto-cutter motor excitation signal B
11	CUT_OUT11	Auto-cutter motor excitation signal A
12	CUT_OUT11	Auto-cutter motor excitation signal A



CN3

3.6.5 TPH, Motor and Sensor Connector Pin Assignment

CN2: FPC/50pin/0.5mm/Single/90/UP/SMD/DrawerLock



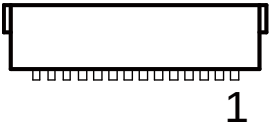
CN2

PIN	ASSIGNMENT	FUNCTION
1	Vp1	Head drive power
2	Vp7	Head drive power
3	Vp2	Head drive power
4	Vp8	Head drive power
5	Vp3	Head drive power
6	Vp9	Head drive power
7	DI	Data in
8	CLK	Asynchronous clock for communication
9	GND1	GND
10	GND8	GND
11	GND2	GND
12	GND9	GND
13	GND3	GND
14	GND10	GND
15	N.C.1	No contact
16	/DST4	Thermal head energizing control signal
17	/DST3	Thermal head energizing control signal
18	Vdd	Logic power
19	TH2_1	Ground power for thermistor
20	TH2_2	Ground power for thermistor
21	TH1	Thermally sensitive resistor input terminal
22	N.C.3	No contact
23	/DST2	Thermal head energizing control signal
24	/DST1	Thermal head energizing control signal
25	GND4	GND
26	GND11	GND
27	GND5	GND
28	GND12	GND
29	GND6	GND
30	GND13	GND
31	/LAT	Data latch
32	Vp10	Head drive power

PIN	ASSIGNMENT	FUNCTION
33	Vp4	Head drive power
34	Vp11	Head drive power
35	Vp5	Head drive power
36	Vp12	Head drive power
37	Vp6	Head drive power
38	N.C.4	No contact
39	PS	Paper out sensor signal
40	Vps	Power for paper out sensor
41	GND7	GND
42	HS	Head up sensor
43	N.C.2	No contact
44	FGS1	GND
45	FGS2	GND
46	N.C.5	No contact
47	$\overline{A}$	Stepping motor excitation signal $\overline{A}$
48	B	Stepping motor excitation signal B
49	A	Stepping motor excitation signal A
50	$\overline{B}$	Stepping motor excitation signal $\overline{B}$

3.6.6 Key, Status and Drawer Connector Pin Assignment

CN5: SH14(14pin/1.0mm/90)SMD

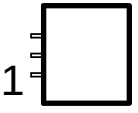


CN5

PIN	ASSIGNMENT	FUNCTION
1	/KEY_FEED	Paper feed signal
2	/KEY_RESET	Reset key signal
3	GND1	GND
4	ST1	Status signal
5	ST2	Status signal
6	ST3	Status signal
7	ST4	Status signal
8	GND2	GND
9	/DRAWER_SNS	Drawer sensor signal
10	/DRAWER_KEY	Drawer switch signal
11	24V	Drawer drive port (voltage terminal)
12	/DRAWER 1	Drawer 1
13	GND3	GND
14	/DRAWER 2	Drawer 2

3.6.7 Paper Near End Sensor Connector Pin Assignment

CN6: DNP/SH3/(3pin/1.0mm/90)SMD



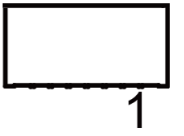
CN6

PIN	ASSIGNMENT	FUNCTION
1	Vns	Power for paper near end sensor
2	PAPER_NEAR-END_SNS	Paper near end sensor signal
3	GND	Ground power for paper near end

3.6.8 Serial Interface Connector Pin Assignment

CN7: SH7(7pin/1.0mm/90)SMD

PIN	Name
1	TxD
2	RxD
3	RTS
4	CTS
5	DTR
6	DSR
7	GND

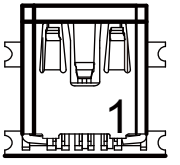


CN7

3.6.9 USB Connector Pin Assignment

CN8: MINI USB 5F SMT B TYPE

PIN	Name
1	VBUS
2	D-
3	D+
4	ID
5	Shield



CN8

3.6.10 Electrical Characteristics

1. Supply voltage: 24V
2. Current consumption (at 24V, maximum simultaneously activated dot is 288, 25°C (77°F))

   Two-part energization mode:
   Mean: Approximately 1.36A
   Peak: Approximately 5A
   Standby Current:
   Mean: 0.3A

3.7 Printer Board: MB-1030 series

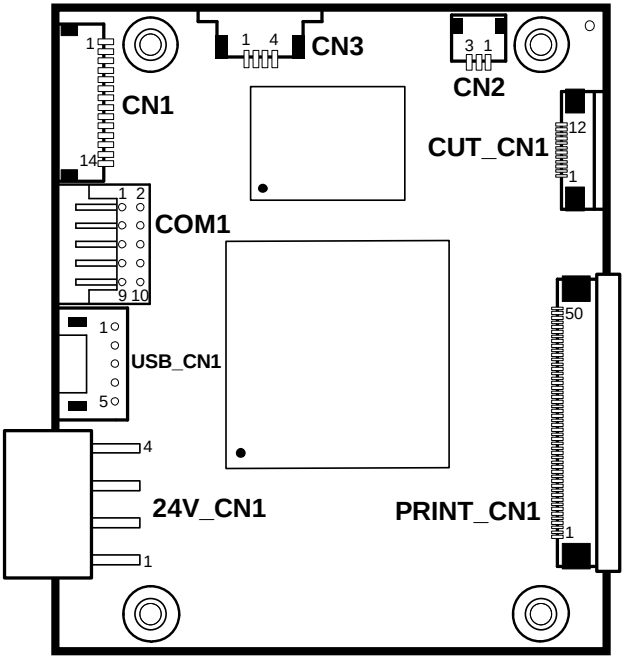


Figure 3-2. MB-1030 Printer Board Component Locations

Jumper & Connector Quick Reference Table

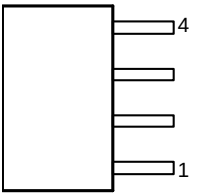
Jumper / Connector	NAME
Power Supply Connector	24V_CN1
RS-232 Interface Connector	COM1
Thermal Head/Motor/Sensor Connector	PRINT_CN1
Auto-Cutter Connector	CUT_CN1
Paper-Near-END Sensor Connector	CN2
USB Interface Connector	USB_CN1
Terminal Assignment Connector	CN1

Setting Printer Board Connectors and Jumpers

3.7.1 Power Supply Wafer (24V_CN1)

Connector Location: 24V_CN1
Description: Power Supply Wafer

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

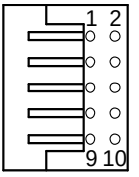


24V_CN1

3.7.2 RS-232 Interface Connector (COM1)

Connector Location: COM1
Description: 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



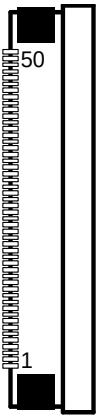
COM1

3.7.3 Thermal Head/Motor/Sensor Connector (PRINT_CN1)

Connector Location: PRINT_CN1

Description: 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



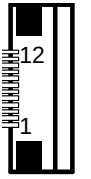
PRINT_CN1

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

3.7.4 Auto-Cutter Connector (CUT_CN1)

Connector Location: CUT_CN1
Description: 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

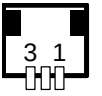


CUT_CN1

3.7.5 Paper-Near-END Sensor Connector (CN2)

Connector Location: CN2
Description: 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

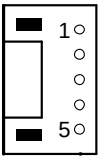


CN2

3.7.6 USB Interface Connector (USB_CN1)

Connector Location: USB_CN1
Description: USB Interface Connector

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

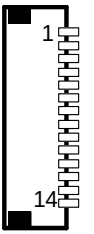


USB_CN1

3.7.7 Terminal Assignment Connector (CN1)

Connector Location: CN1
Description: 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

3.8 Printer Board: MB-1011 & MB-1013

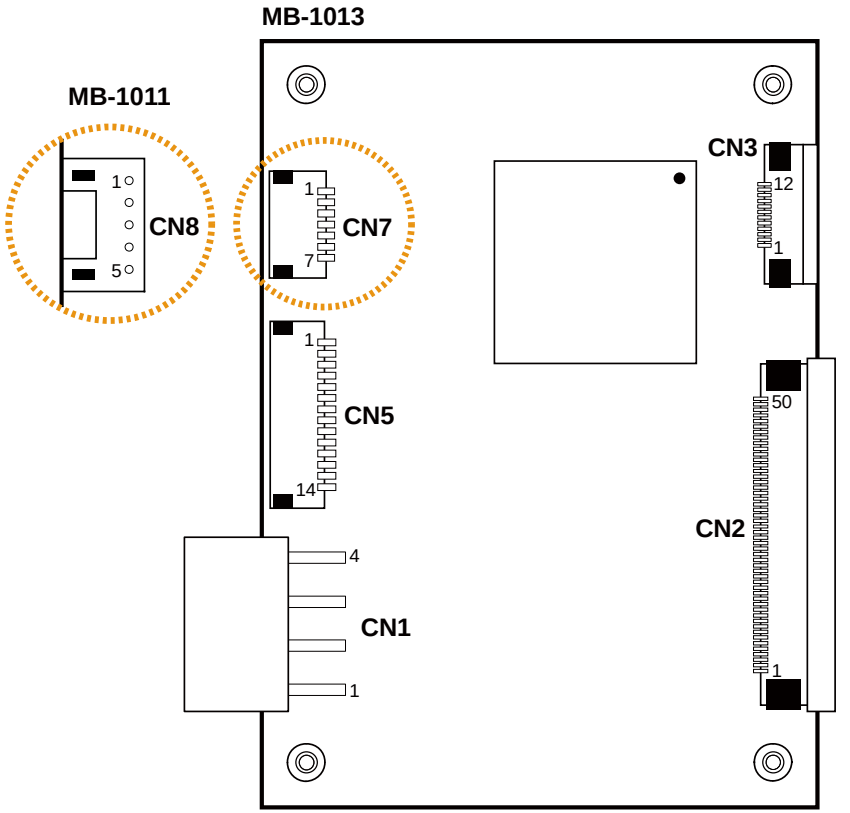


Figure 3-3. MB-1011 & MB-1013 Printer Board Component Locations

Jumper & Connector Quick Reference Table

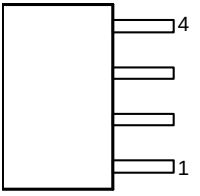
Jumper / Connector	NAME
Power Supply Connector	CN1
RS-232 Interface Connector	CN7
Auto-Cutter Connector	CN3
Thermal Head/Motor/Sensor Connector	CN2
Terminal Assignment Connector	CN5
USB Interface Connector	CN8

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

3.8.1 Power Supply Wafer (CN1)

Connector Location: CN1
Description: Power Supply Wafer

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

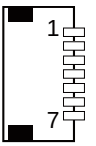


CN1

3.8.2 RS-232 Interface Connector (CN7)

Connector Location: CN7
Description: RS-232 Interface Connector

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



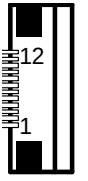
CN7

3.8.3 Auto-Cutter Connector (CN3)

Connector Location: CN3

Description: 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



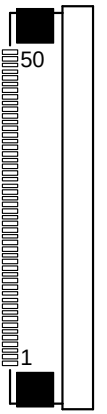
CN3

3.8.4 Thermal Head/Motor/Sensor Connector (CN2)

Connector Location: CN2

Description: 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



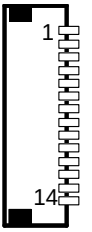
CN2

PIN	ASSIGNMENT	FUNCTION
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

3.8.5 Terminal Assignment Connector (CN5)

Connector Location: CN5
Description: 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

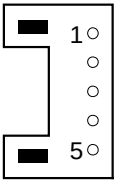


CN5

3.8.6 USB Interface Connector (CN8)

Connector Location: CN8
Description: USB Interface Connector

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



CN8

3.9 VFD Board Component Locations & Pin Assignment

3.9.1 VFD Board: LM730 (option)

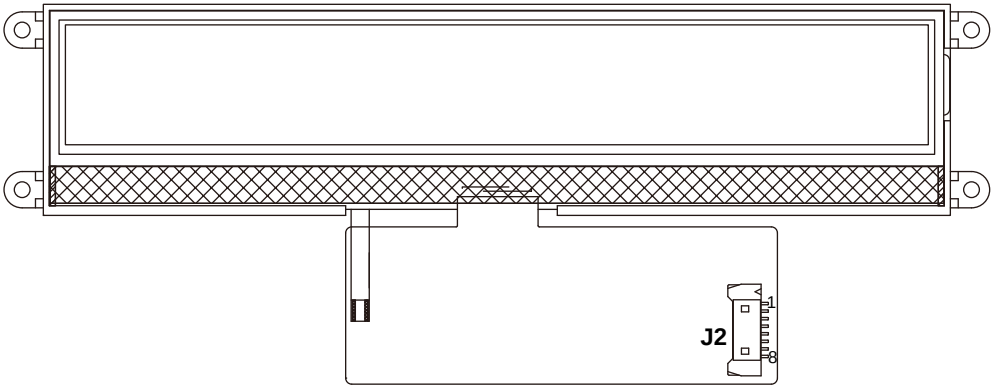


Figure 3-4. LM730 VFD Board Component Locations

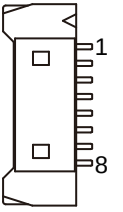
Setting LM730 VFD Board Connectors

3.9.2 RS-232 Connector (J2)

Connector Location: J2

Description: RS-232 Connector

PIN	ASSIGNMENT
1	VD50
2	USB DM
3	USB DP
4	GND
5	SHIELDING
6	USART2 RTS
7	USART2 RX
8	USART2 TX



J2

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® Management Engine Components Installation Utility
- Installing LAN Driver Utility
- Installing Sound Driver Utility
- Installing Microsoft Hotfix kb3211320 and kb3213986 Driver Utility
- Installing KMDF Driver Utility (Windows 7 Only)
- Installing Intel RST Driver Utility (Optional, For Q170 SKU Only)
- Peripheral Devices
  - Printer
  - VFD
- API

4.1 Introduction

Enclosed with the PA-A901 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	OS		
		Win10 (64bit)	Win8.1 (64bit)	Win7/ POSReady7 (32/64bit)
D:\PA-A901 V1.0\Driver\Platform \Main Chip	Intel® Chipset Device Software Installation Utility	✓	✓	✓
D:\PA-A901 V1.0\Driver\Platform \Graphics	Intel® Graphics Driver installation	✓	✓	✓
D:\PA-A901 V1.0\Driver\Platform \Hotfix	Microsoft Hotfix kb3211320 and kb3213986 for Windows10 64-bit critical security update	✓	X	X
D:\PA-A901 V1.0\Driver\Platform \ME	Intel® Management Engine Firmware	✓	✓	✓
D:\PA-A901 V1.0\Driver\Platform \LAN Chip	Intel® Network Connections Software	✓	✓	✓
D:\PA-A901 V1.0\Driver\Platform \Sound Codec	Realtek High Definition Audio driver installation	✓	✓	✓
D:\PA-A901 V1.0\Driver\Platform \Kmdf For Win7	Kernel-Mode Driver Framework for Win7	X	X	✓
D:\PA-A901 V1.0\Driver\Platform \RAID	Intel® Rapid Storage Technology	✓	✓	✓

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) / Windows 8.1 (64bit) / Windows® 7 (POSReady 7) (32/64bit) series, and it should be installed right after the OS installation. Please follow the steps below:

1. Connect the USB DVD-ROM device to PA-A901 and insert the driver disk.
2. Enter the "**Main Chip**" folder where the Chipset driver is located.
3. Click **SetupChipset.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart PA-A901 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-A901 and insert the driver disk.

2 Enter the "Graphics" folder where the Graphics driver is located.

3 Select Windows 10 (64bit) / Windows 8.1 (64bit) / Windows® 7 (POSReady 7) (32/64bit) 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-A901 for the changes to take effect.

4.4 Intel® Management Engine Components Installer Installation

For Windows 7 only. Pre-install Microsoft's Kernel-Mode Driver Framework (KMDF) version 1.11 before you install the Intel® Management Engine Components Installer (ME) in order to avoid errors in Device Manager.

Installation Instructions for Kernel-Mode Driver Framework (KMDF)

To install the Kernel-Mode Driver Framework (KMDF), follow the steps below:

1. Insert the driver disk into a DVD-ROM device.
2. Select Windows 7 (32/64-bit) for your OS platform.
3. (For Windows 7 only) Click the **kmdf-1.11-Win-6.1-x86** file for Windows 32-bit driver installation.
4. (For Windows 7 only) Click the **kmdf-1.11-Win-6.1-x64** file for Windows 64-bit driver installation.

Installation Instructions for Intel® Management Engine Components Installer

1. Connect the USB DVD-ROM device to PA-A901 and insert the driver disk.
2. Select Windows 10 (64bit) / Windows 8.1 (64bit) / Windows 7 (32/64bit) for your OS platform.
3. Enter the **ME** folder where the driver is located.
4. Click **SetupME.exe** file for ME 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-A901 for the changes to take effect.

4.5 Installing LAN Driver Utility

PA-A901 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-A901 and insert the driver disk.
2. Enter the **"LAN Chip"** folder where the LAN driver is located.
3. Click **Autorun.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart PA-A901 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) / Windows 8.1 (64bit) / Windows® 7 (POSReady 7) (32/64bit) series.

To install the Sound Driver, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A901 and insert the driver disk.
2. Enter the **"Sound Codec"** folder where the sound driver is located.
3. Click **Setup.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart PA-A901 for the changes to take effect.

4.7 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-A901 and insert the driver disk.
2. Enter the **Hotfix** folder where the driver is located.
3. Click the **windows10.0-kb3211320-x64** and **windows10.0-kb3213986-x64** files for critical security update.
4. Follow the on-screen instructions to complete the installation.

Once the installation is completed, shut down the system and restart PA-A901 for the changes to take effect.

4.8 Installing Intel RST Driver Utility (Only for Q170, Optional)

Installing RAID Driver Utility

The Intel® Rapid Storage Technology (Intel® RST) driver supports RAID 0, 1 in Q170 SKU for 1 x 2.5" SATAIII HDD/SSD. To install the RAID/RST driver utility, follow the steps below:

1. Connect the USB DVD-ROM device to PA-A901 and insert the driver disk.
2. Enter the **RST** folder where the driver is located.
3. Select Windows 10 (64bit) / Windows 8.1 (64bit) / Windows 7 (32/64bit) / for your OS platform.
4. Click **SetupRST.exe** driver installation 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-A901 for the changes to take effect.

Note: The RAID driver utility is not supported for H110 SKU.

Intel® RapidStorage Technology Option ROM

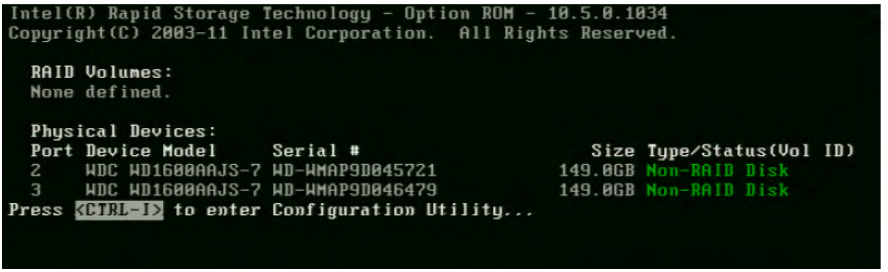
The Intel® Rapid Storage Technology option ROM provides the following:

- Pre-operating system user interface for RAID volume management
- Ability to create, delete and reset RAID volumes
- RAID recovery

Accessing Intel® Rapid Storage Technology Option ROM User Interface

To enter the Intel® Rapid Storage Technology option ROM user interface, press **Ctrl-I** when prompted during the Power-On Self-Test (POST).

Option ROM prompt:



In the user interface, the hard drive(s) and hard drive information listed for your system will differ from the example in the figure below:

Option ROM user interface:

4.9 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.

4.9.1 Printer Board: MB-1030

4.9.1.1 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 Hex. 09 Decimal 9
[Range]	N/A
[Description]	Moves print position to next horizontal tab position. ● This command is ignored if the next tab is not set. ● If the next tab position exceeds the print region, the print position is moved to [print region + 1]. ● The horizontal tab position is set by ESC D (Set/cancel horizontal tab position). ● 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. ● 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 Hex. 0A 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. ● 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 Hex. 0C Decimal 12
[Range]	N/A
[Description]	Prints all buffered data to the print region collectively, then recovers to the standar mode.

	● All buffer data is deleted after printing. ● The print area set by ESC W (Set print region in page mode) is reset to the default setting. ● No paper cut is executed. ● Sets the print position to the beginning of the next line after execution. ● This command is enabled only in page mode.

CR

[Name]	Print and carriage return
[Format]	ASCII CR Hex. 0D 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. ● This command is ignored with serial interface models. ● Sets the print position to the beginning of the next line after execution.

CAN

[Name]	Cancel print data in page mode
[Format]	ASCII CAN Hex. 18 Decimal 24
[Range]	N/A
[Description]	Deletes all print data in the currently set print region in page mode. ● This command is enabled only in page mode. ● 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 Hex. 10 04 n 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: n = 1 : Transmit printer status. n = 2 : Transmit off-line status. 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 Hex. 10 05 n Decimal 16 5 n
[Range]	1 ≤ n ≤ 2
[Description]	Responds to requests n specifications from the host in real-time. n specifications are below. n = 1: Recover from the error and start printing from the line where the error occurred. n = 2: Recover from error after clearing the reception buffer and print buffer. 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 Hex. 10 14 n m t Decimal 16 20 n m t
[Range]	n = 1 m = 0,1 1 ≤ t ≤ 8
[Description]	This outputs a signal specified by t to the connector pin specified by m. m = 0: #2 Pin of the drawer kick connector m = 1: #5 Pin of the drawer kick connector 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 Hex. 1B 0C Decimal 27 12
[Range]	N/A
[Description]	Prints all buffered data in the print area collectively in page mode. ● This command is enabled only in page mode. ● Holds the following information after printing. a. Expanded data b. Character print direction selection in page mode (ESC T) c. Set print region (ESC W) in the page mode. d. Character expansion position

ESC SP n

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

ESC ! n

[Name]	Select print mode(s).
[Format]	ASCII ESC ! n Hex. 1B 21 n Decimal 27 33 n
[Range]	0 ≤ n ≤ 255 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 Hex. 1B 24 nL nH 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

<table>
<tr><td>[Name]</td><td>Select bit image mode</td></tr>
<tr><td>[Format]</td><td>ASCII ESC * m nL nH d1...dk
Hex. 1B 2A m nL nH d1...dk
Decimal 27 42 m nL nH d1...dk</td></tr>
<tr><td>[Range]</td><td>m = 0,1,32,33
0 ≤ nL ≤ 255
0 ≤ nH ≤ 3
0 ≤ d ≤ 255</td></tr>
<tr><td>[Description]</td><td>Selects a bit-image mode in mode m for the number of dots specified by nL and nH.
m = 1,33 : (nL+nH×256)<576 (3 inch);(nL+nH×256)<432 (2 inch).
m = 0,32 : (nL+nH×256)<288 (3 inch);(nL+nH×256)<216 (2 inch).
<table>
<tr><th>m</th><th>Mode</th><th>Number of Vert. Dir. Dots</th><th>Density of Vert. Dir. Dots</th><th>Density of Hor. Dir. Dots</th><th>Data Count (k)</th></tr>
<tr><td>0</td><td>8 dot single density</td><td>8</td><td>67 DPI</td><td>101 DPI</td><td>nL+nH×256</td></tr>
<tr><td>1</td><td>8 dot double density</td><td>8</td><td>67 DPI</td><td>203 DPI</td><td>nL+nH×256</td></tr>
<tr><td>32</td><td>24 dot single density</td><td>24</td><td>203 DPI</td><td>101 DPI</td><td>(nL+nH×256) ×3</td></tr>
<tr><td>33</td><td>24 dot double density</td><td>24</td><td>203 DPI</td><td>203 DPI</td><td>(nL+nH×256) ×3</td></tr>
</table>
</td></tr>
</table>

ESC - n

[Name]	Turn underline mode on/off.
[Format]	ASCII ESC - n Hex. 1B 2D n Decimal 27 45 n
[Range]	0 ≤ n ≤ 2 Initial Value n = 0
[Description]	This command enables the print data following it to be printer out underlined. 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 Hex. 1B 32 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 Hex. 1B 33 n Decimal 27 51 n
[Range]	0 ≤ n ≤ 255 Initial Value n = 34
[Description]	This command sets the line spacing using a following rule. Line spacing = n x (vertical or horizontal motion units)

ESC = n

[Name]	Select peripheral device.
[Format]	ASCII ESC = n Hex. 1B 3D n Decimal 27 61 n
[Range]	0 ≤ n ≤ 255 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 @ Hex. 1B 40 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 Hex. 1B 44 n1...nk NUL Decimal 27 68 n1...nk NUL
[Range]	1 ≤ n ≤ 255 0 ≤ k ≤ 32
[Description]	Sets horizontal tab position ● n specifies the column number for setting a horizontal tab position from the left margin or the beginning of the line. ● 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 Hex. 1B 45 n Decimal 27 69 n
[Range]	0 ≤ n ≤ 255 Initial Value n = 0
[Description]	This command turns emphasized mode on or off by toggling the least significant bit of n as followings: When the LSB of n is 0, the emphasized mode is turned off. 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 Hex. 1B 47 n Decimal 27 71 n
[Range]	0 ≤ n ≤ 255 Initial Value n = 0
[Description]	Specifies or cancels double printing. Cancels double printing when n = <*******0>B. Specifies double printing when n = <*******1>B. ● n is effective only when it is the lowest bit. ● This printer is not capable of double printing, so the print is the same as when using emphasized printing. ● This command is enabled for ANK characters

ESC J n

[Name]	Print and feed paper.
[Format]	ASCII ESC J n Hex. 1B 4A n 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]. ● Sets the print position to the beginning of the next line after printing. ● In standard mode, the printer uses the vertical motion unit (*y*). ● In page mode, this command functions as follows, depending on the starting position of the printable area: (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. ● 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 Hex. 1B 4C Decimal 27 76
[Range]	N/A
[Description]	● Enabled only when input with the top of line. ● Invalid when input by page mode. ● Returns to standard mode after the following commands are issued. a. FF (Print and recover to page mode) b. ESC S (Select standard mode) ● 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. ● 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 a. Set space amount: ESC SP, FS S b. Set line feed amount: ESC 2, ESC 3 ● The following commands are enabled only when in page mode. a. ESC V : Specify/cancel character 90 degree clockwise rotation b. ESC a : Position alignment c. ESC { : Specify/cancel upside-down printing d. GS W : Set print region width ● The following command is ignored in page mode. a. GS (A : Test print ● The following commands are invalid in page mode. a. FS p : Print NV bit image b. FS q : Define NV bit image c. GS v 0 : Print raster bit images d. GS L : Set left margin ● Recover to standard mode using ESC @ (initialize printer).

ESC M n

[Name]	Select character font.
[Format]	ASCII ESC M n Hex. 1B 4D n Decimal 27 77 n
[Range]	n = 0, 1 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 Hex. 1B 52 n Decimal 27 82 n
[Range]	0 ≤ n ≤ 16 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

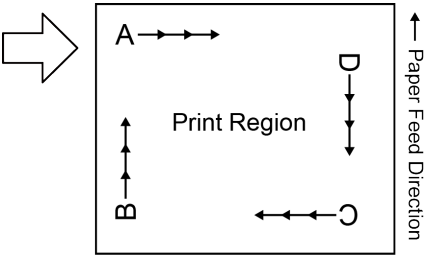
ESC S

[Name]	Select standard mode
[Format]	ASCII ESC S Hex. 1B 53 Decimal 27 83
[Range]	N/A
[Description]	● Valid only when input by page mode. ● All buffer data in page mode is deleted. ● Sets the print position to the beginning of the next line after execution. ● The print area set by ESC W (Set print region in page mode) is reset to the default setting. ● 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 a. ESC SP :Set character right space amount b. FS S :Set Chinese character space amount c. ESC 2 :Set default line spacing d. ESC 3 :Set line spacing ● The following commands are effective only when in standard mode. a. ESC W :Set print region in page mode b. ESC T :Select character print direction in page mode ● The following commands are ignored in standard mode. a. GS $:Specify absolute position for character vertical direction in page Mode b. GS \: :Specify relative position for character vertical direction in page mode ● 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 Hex. 1B 54 n Decimal 27 84 n
[Range]	0 ≤ n ≤ 3, 48 ≤ n ≤ 51 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

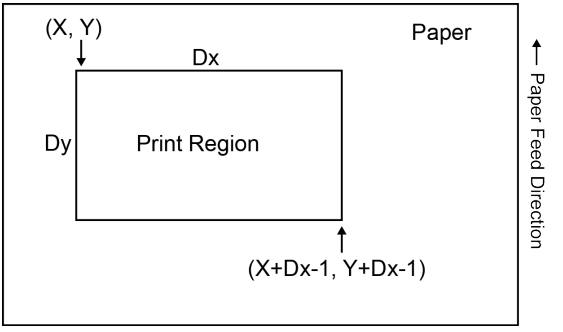
[Name]	Turn 90 degree clockwise rotation mode on/off
[Format]	ASCII ESC V n Hex. 1B 56 n Decimal 27 86 n
[Range]	0 ≤ n≤ 1, 48≤ n ≤49 Initial Value n = 0
[Description]	Specifies or cancels character 90 degree clockwise rotation.

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.

	● This command only affects printing in standard mode. ● In page mode, this command is only effective for the setting. ● 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 Hex. 1B 57 xL xH yL yH dxL dxH dyL dyH Decimal 27 87 xL xH yL yH dxL dxH dyL dyH
[Range]	0 ≤ xL, xH, yL, yH, dxL, dxH, dyL, dyH ≤ 255 However, this excludes dxL = dxH = 0 or dyL = dyH = 0 Initial Value xL = xH = yL = yH = 0
[Description]	Sets the print region position and size. ● Horizontal direction starting point [(xL + xH x 256) x basic calculated pitch] ● Vertical direction starting point [(yL + yH x 256) x basic calculated pitch] ● Horizontal direction length [(dxL + dxH x 256) basic calculated pitch] ● Vertical direction length = [(dyL + dyH x 256) basic calculated pitch] ● (X+Dx-1)<576 (3 inch, basic calculated pitch=1);(X+Dx-1)<432 (2 inch, basic calculated pitch=1) ● (Y+Dy-1)<768 (basic calculated pitch=1); ● 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). ● 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). 

ESC \ nL nH

[Name]	Set relative print position.
[Format]	ASCII ESC \ nL nH Hex. 1B 5C nL nH 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. ● Specifications exceeding the print range are ignored.

ESC a n

[Name]	Select justification.
[Format]	ASCII ESC a n Hex. 1B 61 n Decimal 27 97 n
[Range]	0 ≤ n ≤2 Initial Value n = 0
[Description]	This command specifies position alignment for all data in one line in standard mode, using n as follows: n: Alignment 0: Left alignment 1: Center alignment 2: Right alignment 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 Hex. 1B 63 33 n Decimal 27 99 51 n
[Range]	Specification: 0 ≤ n ≤ 3 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 Hex. 1B 63 34 n Decimal 27 99 52 n
[Range]	Specification: 0 ≤ n ≤ 3 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 Hex. 1B 63 35 n Decimal 27 99 53 n
[Range]	Specification: 0 ≤ n ≤ 255 Initial Value n = 0
[Description]	Toggles the panel switches between enabled and disabled. ● Enables panel switches when n = <*******0>B. ● Disables panel switches when n = <*******1>B. ● n is effective only when it is the lowest bit. ● When disabled, all panel switches are disabled.

ESC d n

[Name]	Print and feed n lines
[Format]	ASCII ESC d n Hex. 1B 64 n Decimal 27 100 n
[Range]	0 ≤ n ≤ 255
[Description]	Prints the data in the print buffer and performs a paper feed of n lines. ● Sets the print position to the beginning of the next line after printing. ● 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 Hex. 1B 69 Decimal 27 105
[Range]	N/A
[Description]	This command executes a full cut of the paper in standard mode

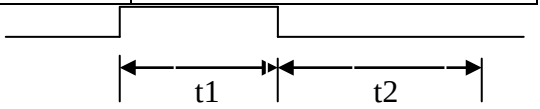
ESC m

[Name]	Partial cut.
[Format]	ASCII ESC m Hex. 1B 6D 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 Hex. 1B 70 m t1 t2 Decimal 27 112 m t1 t2
[Range]	0 ≤ m ≤ 1, 48 ≤ m ≤ 49 0 ≤ t1 ≤ 255 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.

m	Connector Pin
0, 48	Drawer kick connector pin #2
1, 49	Drawer kick connector pin #5



ESC t n

[Name]	Select character code table.
[Format]	ASCII ESC t n Hex. 1B 74 n Decimal 27 116 n
[Range]	0 ≤ n ≤ 8 Initial Value n = 0
[Description]	Select page n of the character code table.

n	**Character set**
0	CP-437
1	Katakana
2	CP-850
3	CP-852
4	CP-860
5	CP-863
6	CP-865
7	CP-1252
8	User Define

ESC { n

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

n	Upside-down mode
0	Turned off
1	Turned on

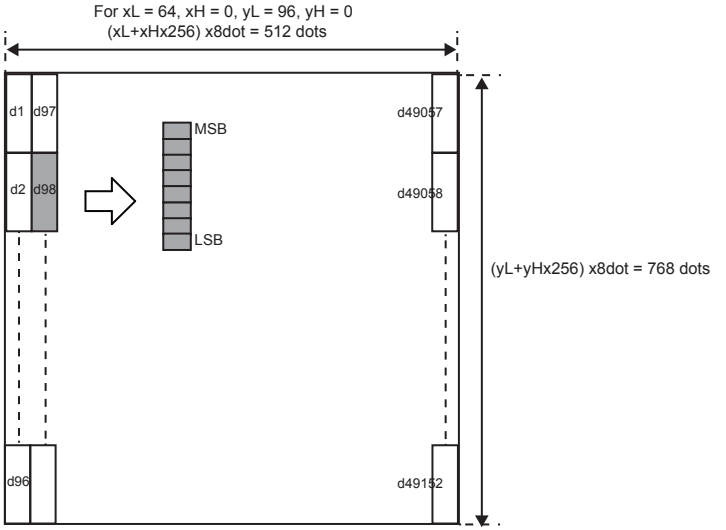
FS p n m

[Name]	Print NV bit image.
[Format]	ASCII FS p n m Hex. 1C 70 n m Decimal 28 112 n m
[Range]	1 ≤ n ≤ 255 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 Hex. 1C 71 n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n Decimal 28 113 n [xL xH yL yH d1…dk]1…[xL xH yL yH d1…dk]n
[Range]	1 ≤ n ≤ 255 1 ≤ (xL + xH ×256) ≤ 54 (0 ≤ xL ≤ 54, xH=0) for 2 inch 1 ≤ (xL + xH ×256) ≤ 72 (0 ≤ xL ≤ 72, xH=0) for 3 inch 1 ≤ (yL + yH ×256) ≤ 96 (0 ≤ yL ≤ 96, yH=0) 0 ≤ d ≤ 255 k = (xL + xH × 256) × (yL + yH × 256) × 8
[Description]	Defines the specified NV bit image. ● n specifies the number of NV bit images to define. ● xL and xH specify the horizontal direction for one NV bit image (xL + xH x 256) x 8 dots. ● yL and yH specify the vertical direction for one NV bit image (yL + yH x 256) x 8 dots. 

GS ! n

[Name] Select character size.

[Format]

ASCII	GS	!	n
Hex.	1D	21	n
Decimal	29	33	n

[Range]

0 ≤ n ≤ 255
(1 ≤ Vertical enlargement ≤ 8, 1 ≤ Horizontal enlargement ≤ 8)
Initial Value n = 0

[Description]

This command selects the character height and width using bits 0 to 3, and bits 4 to 7 respectively as follows:

Bit	Function	Setting
0	Specifies the number of times normal font size in the vertical direction	Refer to Table 2 [Enlarged in vertical direction]
1		
2		
3		
4	Specifies the number of times normal font size in the horizontal direction	Refer to Table 1 [Enlarged in horizontal direction]
5		
6		
7		

Table 1 [Enlarged in horizontal direction]

Hex	Decimal	Enlargement
00	0	1 time(standard)
10	16	2 times
20	32	3 times
30	48	4 times
40	64	5 times
50	80	6 times
60	96	7 times
70	112	8 times

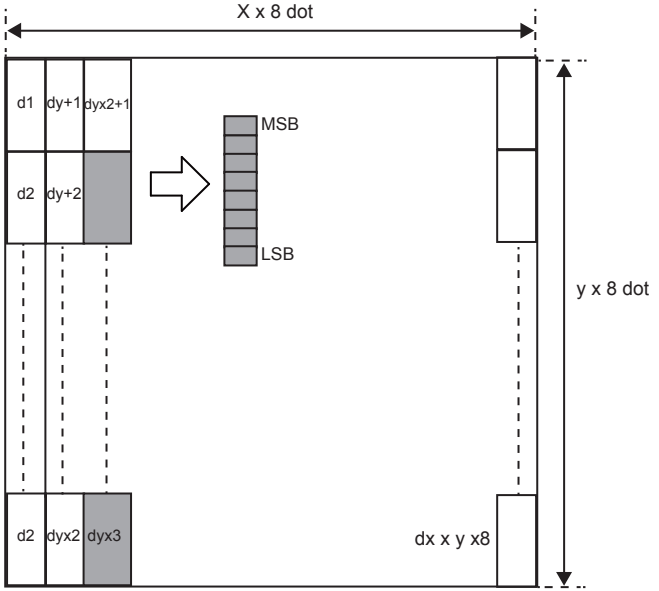
Table 2 [Enlarged in vertical direction]

Hex	Decimal	Enlargement
00	0	1 time(standard)
01	1	2 times
02	2	3 times
03	3	4 times
04	4	5 times
05	5	6 times
06	6	7 times
07	7	8 times

GS $ nL nH

[Name]	Set absolute vertical print position in page mode
[Format]	ASCII GS $ nL nH Hex. 1D 24 nL nH 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. ● When not in page mode, this command is ignored. ● 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)] Hex. 1D 2A X Y [d1…d(X x Y x 8)] Decimal 29 42 X Y [d1…d(X x Y x 8)]
[Range]	1 ≤ X ≤ 54 (for 2 inch) 1 ≤ X ≤ 72 (for 3 inch) 1 ≤ Y ≤ 96 0 ≤ d ≤ 255
[Description]	Defines the download bit image of the number of dots specified by X and Y. ● X specifies the number of bytes in the horizontal direction. ● Y specifies the number of bytes in the vertical direction. ● Horizontal direction dot count is X x 8 dots; Vertical direction dot count is Y x 8 dots ● 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. 

GS (A pL pH n m

[Name]	Execute test print.
[Format]	ASCII GS (A pL pH n m Hex. 1D 28 41 pL pH n m Decimal 29 40 65 pL pH n m
[Range]	{pL+ (pH×256) } = 2 (pL = 2,pH = 0) 0 ≤ n ≤ 2 , 48 ≤ n ≤ 50 2 ≤ m ≤ 3 , 50 ≤ m ≤ 51
[Description]	Executes the specified test print. The following command is ignored in page mode. Specifies the parameter count following pL and pH in (pL + (pH x 256)) bytes. *n* specifies the paper to be tested.

n	Paper Type
0 , 48	Basic sheet (paper roll)
1 , 49 2 , 50	Paper Roll

m specifies a test pattern.

m	Type of Test Print
2 , 50	Printer Status (Self Print)
3 , 51	Rolling Pattern Print

GS (K pL pH n m

[Name]	Set print density.
[Format]	ASCII GS (A pL pH n m Hex. 1D 28 4B pL pH n m Decimal 29 40 75 pL pH n m
[Range]	{pL+ (pH×256) } = 2 (pL = 2,pH = 0) n = 49 250 ≤ m ≤ 255, 0 ≤ m ≤ 6 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 Hex. 1D 2F m 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 Hex. 1D 42 n Decimal 29 66 n
[Range]	0 ≤ n ≤ 255 Initial Value n = 0
[Description]	Specifies or cancels black and white inverted printing. ● Cancels black and white inverted printing when n = <*******0>B. ● Specifies black and white inverted printing when n = <*******1>B. ● n is effective only when it is the lowest bit. ● Internal characters and download characters are targeted for black and white inverted printing. ● This command is effective for ANK and Chinese characters.

GS H n

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

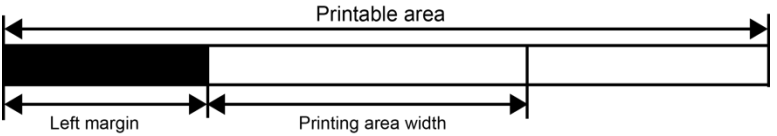
m	Printing Position
0, 48	No print
1, 49	Above bar code
2, 50	Below bar code
3, 51	Above and below bar code(both)

GS I n

[Name]	Transmit printer ID.
[Format]	ASCII GS I n Hex. 1D 49 n 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 Japanese Language Characters: JP_SJIS Chinese Language Characters: CN_GB2312 Korean Language Characters: KO_EUC-KR

GS L nL nH

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

GS P x y

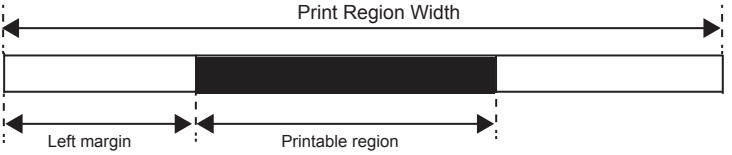
[Name]	Set basic calculated pitch.
[Format]	ASCII GS P x y Hex. 1D 50 x y Decimal 29 80 x y
[Range]	0 ≤ x ≤ 255 0 ≤ y ≤ 255 Initial Value x = 203, y = 203: EPSON targeted model print head 203 DPI
[Description]	Sets the horizontal basic calculated pitch to approximately 25.4/xmm [(1/x) inch], and the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

GS V m

[Name]	Cut paper.
[Format]	ASCII GS V m (n) Hex. 1D 56 m (n) 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 Hex. 1D 57 nL nH Decimal 29 87 nL nH
[Range]	0 ≤ nL ≤ 255, 0 ≤ nH ≤ 255
[Description]	● Sets the print region width specified by nL and nH. ● Print region width is [(nL + nH x 256) x basic calculated pitch]. ● [(nL + nH x 256) x basic calculated pitch] >=24. 

GS \ nL nH

[Name]	Set relative vertical print position in page mode.
[Format]	ASCII GS \ nL nH Hex. 1D 5C nL nH Decimal 29 92 nL nH
[Range]	0 ≤ nL ≤ 255 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. ● When not in page mode, this command is ignored.

GS a n

[Name]

Enable/disable Automatic Status Back (ASB).

[Format]

ASCII	GS	a	n
Hex.	1D	61	n
Decimal	29	97	n

[Range]

0 ≤ n ≤ 255
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 Hex. 1D 66 n Decimal 29 102 n
[Range]	n = 0,1,48,49 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 Hex. 1D 68 n Decimal 29 104 n
[Range]	1 ≤ n ≤ 255 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 Hex. 1D 6B m d1...dk NUL Decimal 29 107 m d1...dk NUL 2. ASCII GS k m n d1... dk Hex. 1D 6B m n d1... dk 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. 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.

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 Hex. 1D 72 n Decimal 29 114 n
[Range]	n = 1, 2, 49, 50
[Description]	Sends the specified status. 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]

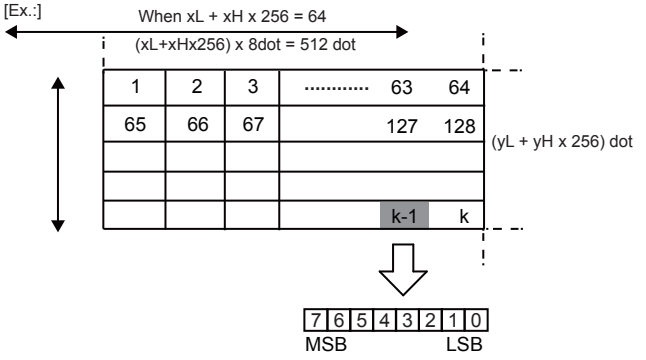
m = 0, m = 48
0 ≤ xL ≤ 54(for 2 inch)
0 ≤ xL ≤ 72(for 3 inch)
0 ≤ xH ≤ 0
0 ≤ yL ≤ 255
0 ≤ yH ≤ 3
0 ≤ d ≤ 255
k = (xL+xH×256) × (yL+yH×256) However, k ≠ 0

[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 Hex. 1D 77 n Decimal 29 119 n
[Range]	1 ≤ n ≤ 6 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 Hex. 12 3B n Decimal 18 59 n
[Range]	2 ≤ n ≤ 16 Initial Value n = 2
[Description]	Specifies a module size of QR Code and Data Matrix. 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]
Hex. 1D 70 01 model e v mode nl nh [data]
Decimal 29 112 01 model e v mode nl nh [data]</td></tr>
<tr><td>[Range]</td><td>model=01, 02
e=4Ch, 4Dh, 51h, 48h
0, 1 ≤ v ≤ 40
mode=4Eh, 41h, 42h, 4Bh, 4Dh
1≤ nh×256+nl≤ 7089</td></tr>
<tr><td>[Description]</td><td>Prints QR Code data based on the specified contents.
model: Specifies a model
e: Selects an error correction level.
’L’ (4CH), ’M’ (4DH), ’Q’ (51H), ’H’ (48H)
v: =0: Automatic selection
(A version is automatically selected depending on the number of input data.)1 ≤ v ≤ 40 Fixed version (up to 14 for model-1)
mode: Specifies a mode of data.

<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>
nl, nh: Specifies the number of data.
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
Hex. 1C 21 n
Decimal 28 33 n</td></tr>
<tr><td>[Range]</td><td>0 ≤ n ≤ 255
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 & Hex. 1C 26 Decimal 28 38
[Range]	N/A
[Description]	Specifies Kanji character mode.

FS - n

<table>
<tr><td>[Name]</td><td>Turn underline mode on/off for Kanji characters</td></tr>
<tr><td>[Format]</td><td>ASCII FS - n
Hex. 1C 2D n
Decimal 28 45 n</td></tr>
<tr><td>[Range]</td><td>0 ≤ n ≤ 2, 48 ≤ n ≤ 50</td></tr>
<tr><td>[Description]</td><td>Specifies or cancels Kanji character underlines.
<table>
<tr><th>n</th><th>Function</th></tr>
<tr><td>0,48</td><td>Cancels Kanji character underline</td></tr>
<tr><td>1,49</td><td>Sets to one-dot width Kanji character underline and specifies Kanji character underlines.</td></tr>
<tr><td>2,50</td><td>Sets to two-dot width Kanji character underline and cancels Kanji character underlines.</td></tr>
</table></td></tr>
</table>

FS .

[Name]	Cancel Kanji character mode.
[Format]	ASCII FS . Hex. 1C 2E 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 Hex. 1C 53 n1 n2 Decimal 28 83 n1 n2
[Range]	0 ≤ n1 ≤ 255, 0 ≤ n2 ≤ 255 Initial Value n1 = 0, n2=0
[Description]	Sets the Kanji character space amount and right space amount. ● Left space amount: n1 x (basic calculated pitch) ● 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 Hex. 1C 57 n Decimal 28 87 n
[Range]	0 ≤ n ≤ 255 Initial Value n = 0
[Description]	Specifies or cancels quadruple size Kanji character. ● Cancels quadruple size when n = <*******0>B. ● Specifies quadruple size when n = <*******1>B. ● n is effective only when it is the lowest bit.

4.9.1.2 OPOS Printer Driver

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

1. Installation

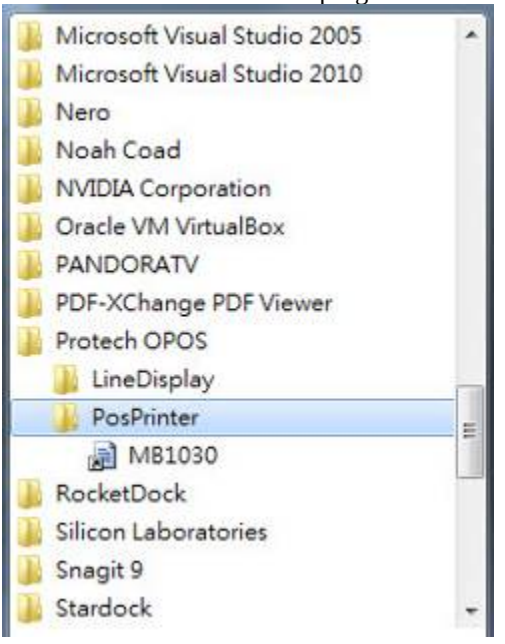
The steps below guide you to install the **MB1030_OposSetup** program.

- 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

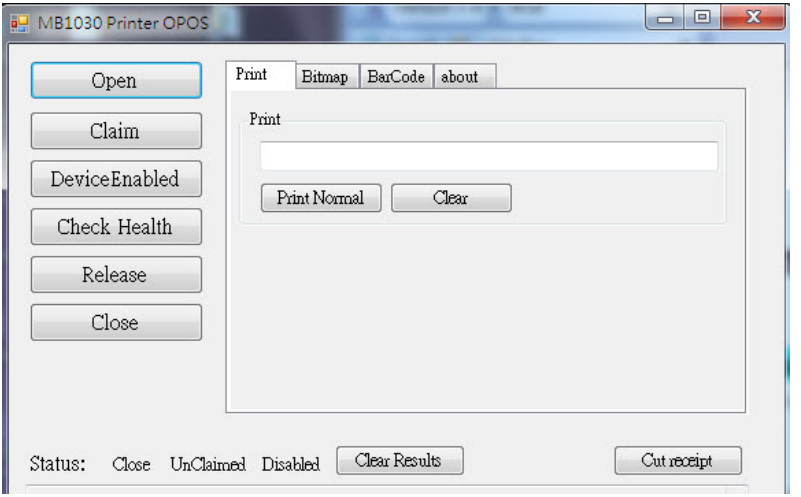
Follow the steps below to load the **MB1030** program:

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



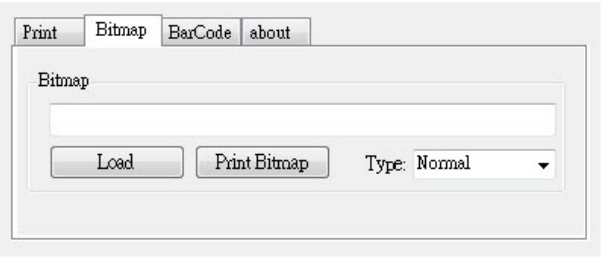
3. OPOS Control Object of MB1030 Program

a.) Print tab buttons:



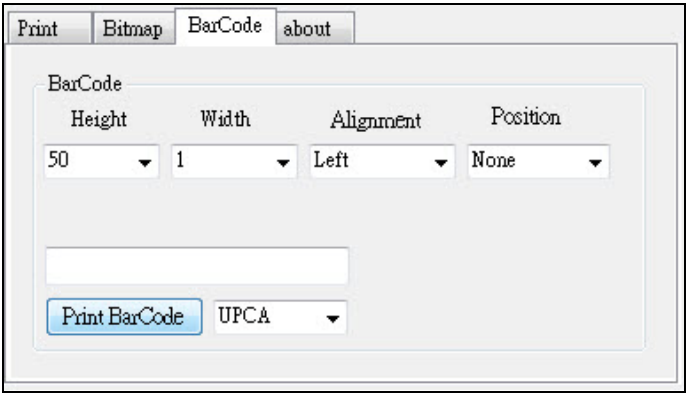
Button/Item	Description
Printer Normal	Print the string.

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. 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

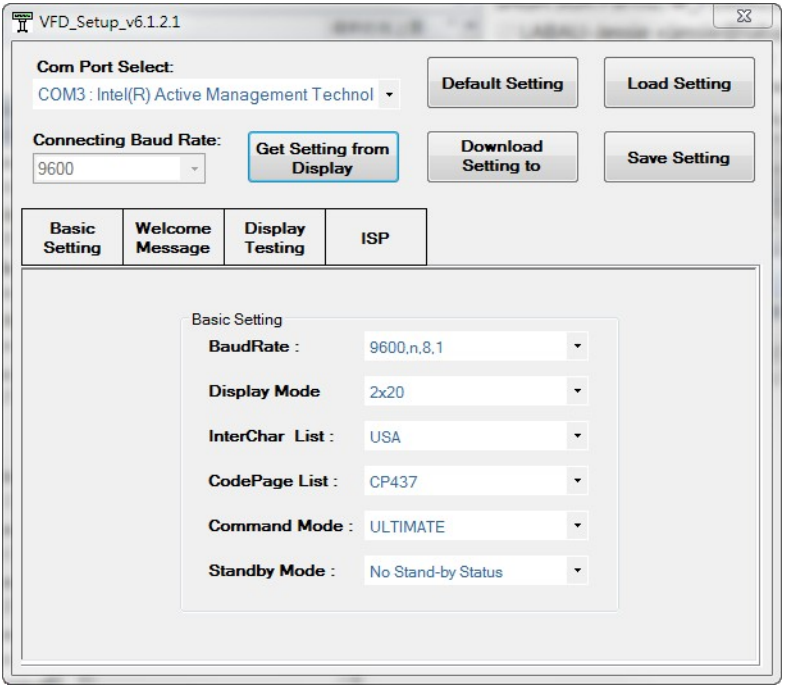
	Category Type	Name	Mutability	OPOS APG Version	Printer .SO
Properties	specific long	RecLineHeight	R/W	1.0	Not Applicable
Properties	specific long	RecLineSpacing	R/W	1.0	Not Applicable
Properties	specific long	RecLineWidth	Read only	1.0	Not Applicable
Properties	specific bool	RecLetterQuality	R/W	1.0	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

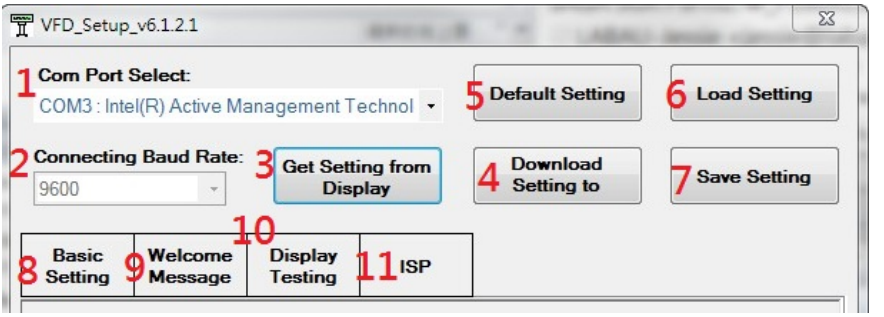
	Category Type	Name	Mutability	OPOS APG Version	Printer .SO
Methods	specific	PrintNormal	_	1.0	Supported
Methods	specific	PrintTwoNormal	_	1.0	Not Applicable
Methods	specific	PrintImmediate	_	1.0	Not Applicable
Methods	specific	BeginInsertion	_	1.0	Not Applicable
Methods	specific	EndInsertion	_	1.0	Not 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

4.9.2 VFD: LM730

4.9.2.1 Set Up AP General Introduction

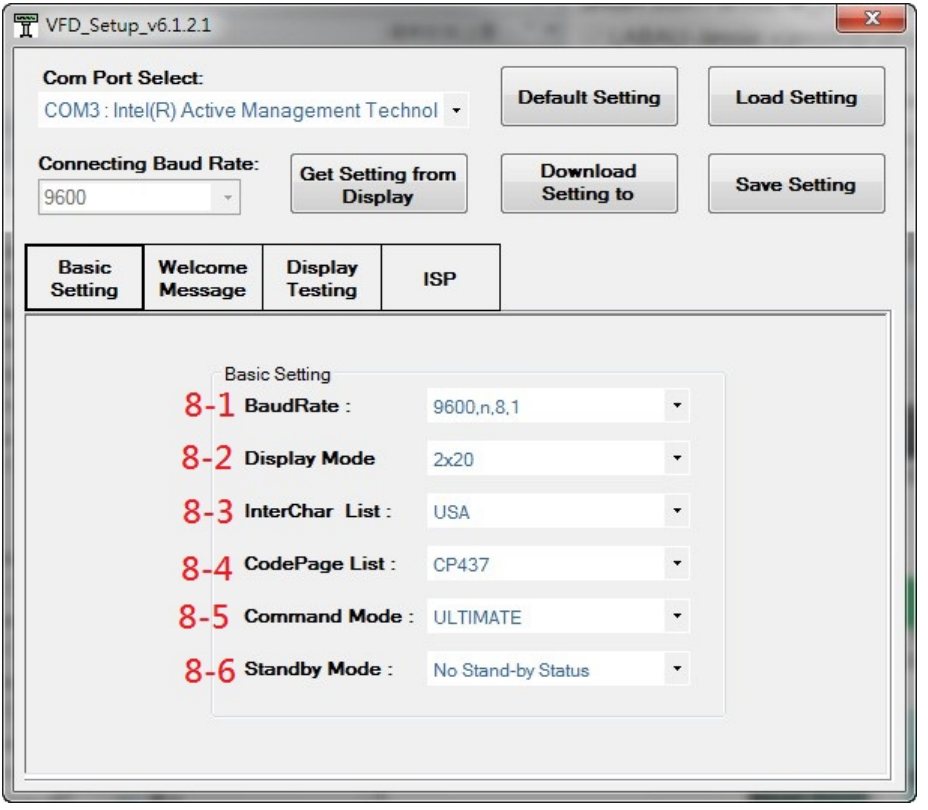
AP Version: v6.1.2.1, User Interface (example)





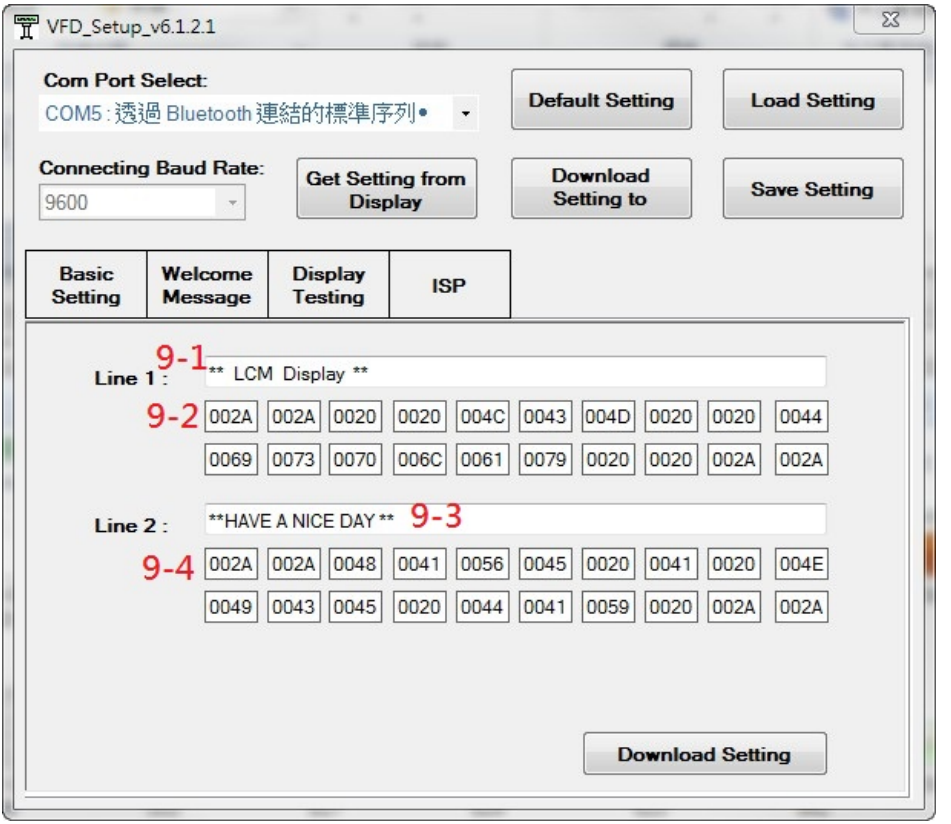
Number	Button	Function Description
1	Com Port Select	Here you can connect this Setup AP with your display by choosing the correct com port position.
2	Baud Rate	Please make sure the Baud Rate setting here is the same with your display.
3	Get Setting	Clicking this to get Setting from Display. You can 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.

4.9.2.2 Set Up AP "Basic Setting" Sheet



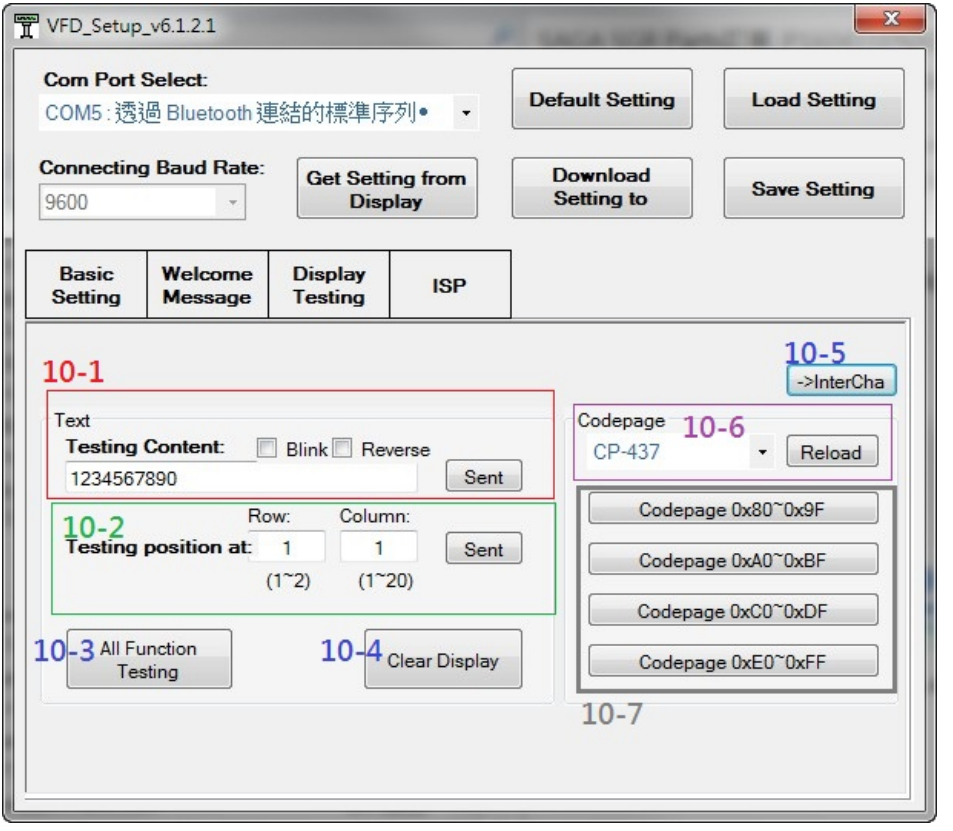
Number	Button	Function Description	
8-1	Baud Rate	9600,n,8,1	19200,n,8,1
8-2	Display Mode	2x20, this display supports 2 Lines, 1st line for 20 Character max. 2nd Line for 40 Character max.	
8-3	Inter Char List	International Character List. Including 17 kinds of Language.	
8-4	CodePage List	Code Page List. Including 34 kinds of Language.	
8-5	Command mode	Display command mode, supports 10 kinds of command. 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.	

4.9.2.3 Set Up AP "Welcome Message" Sheet



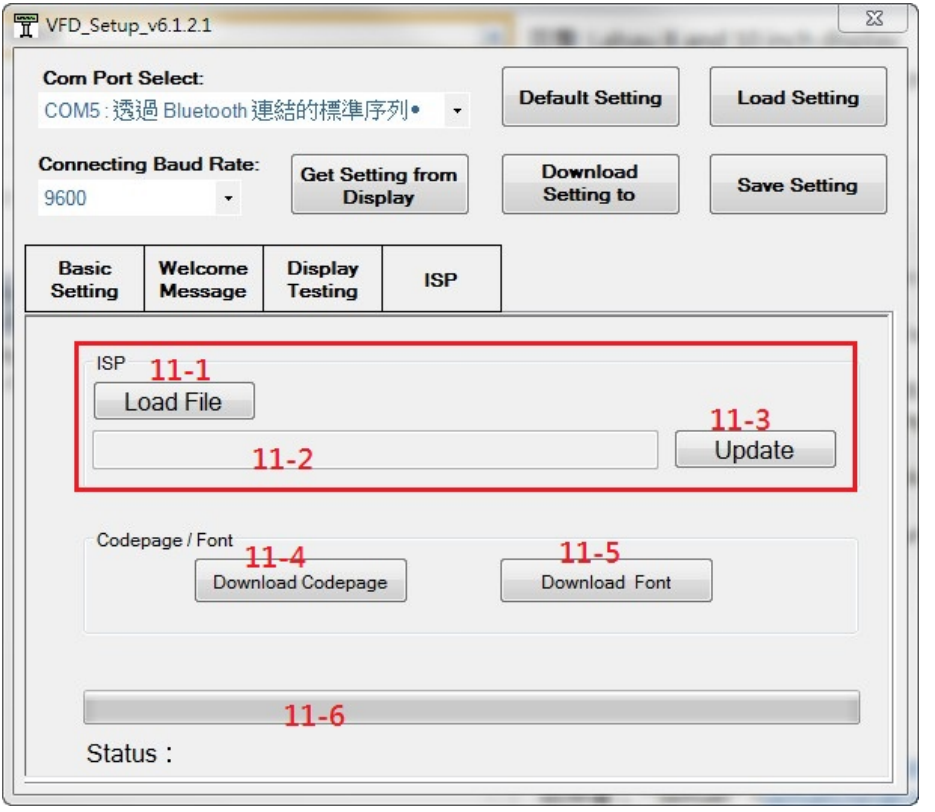
Number	Button	Function Description
9-1	Content insert	You can type in your content for Welcome (Standby) Mode for Line 1 in this column. Max for 20 Characters.
9-2	Hex Mode	You can type in your content "in Hex" for Welcome (Standby) Mode in this column. Max for 20 Characters.
9-3	Content insert	You can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

4.9.2.4 Set Up AP "TEST" Sheet



Number	Button	Function Description
10-1	Text Column	You can freely enter any content here. ● Select “Blink” to show the content you entered and be flashing on the display. ● Select “Reverse” to show the content you entered and in reverse way. For example, green background with white font. Click “Sent” to apply the settings.
10-2	Testing Content	Please go to “10-1” first to enter the testing content. Then enter the column and row position you would like to test here. 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. 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. ● Clicking “Codepage 0xA0~0xBF” to test the position 0xA0~0xBF of the codepage you select in 10-1. ● Clicking “Codepage 0xC0~0xDF” to test the position 0xC0~0xDF of the codepage you select in 10-1. ● Clicking “Codepage 0xE0~0xEF” to test the position 0xE0~0xEF of the codepage you select in 10-1. And you can change the “inter Character List” you would like to testing in 10-7 by clicking 10-5.

4.9.2.5 Set Up AP "ISP" Sheet



Number	Button	Function Description
11-1 11-2 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". 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.

4.10 API

4.10.1 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

4.10.2 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

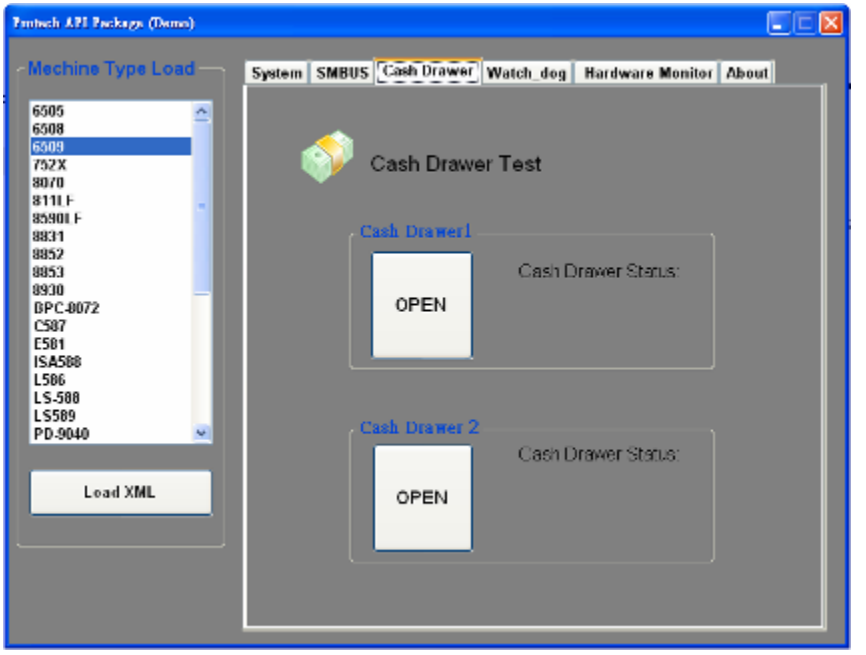
Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean
Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean

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

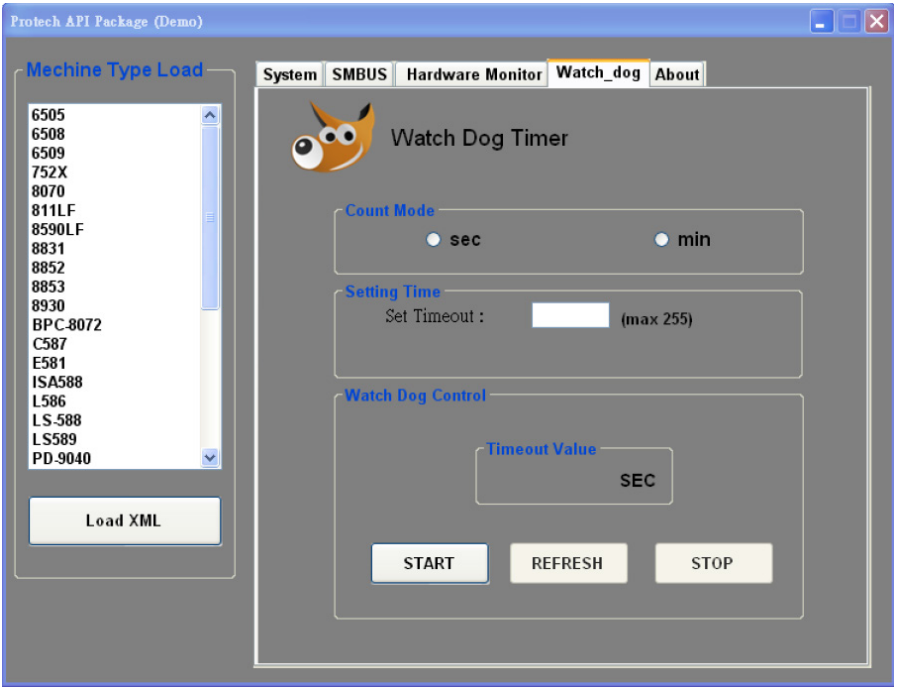
Note: VB.net short = integer VB6

4.10.3 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. • Cash Drawer is closed when the following picture is shown: Cash Drawer Status: **Close** • Cash Drawer is opened when the following picture is shown: Cash Drawer Status: **Open**

4.10.4 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. • **START**: Tap to start the watchdog timer. Meanwhile, the **REFRESH** and **STOP** buttons will be enabled. • **STOP**: Tap to stop the watchdog timer. • **REFRESH**: Tap to restart the watchdog timer.

4.11 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 GetCashDrawerStatus	multilangXML.dll	CashDrawer.dll
Watchdog (WD)	Watchodog_Set Watchodog_Stop Watchdog_SetMinSec Watchdog_Recount		WatchDog.dll
Hardware Monitor	HMWVoltage_Get HMWTemperataure_Get HMWFanSpeed_Get		Hardware Monitor.dll

4.11.1 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
```

4.11.2 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) 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-A901 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.

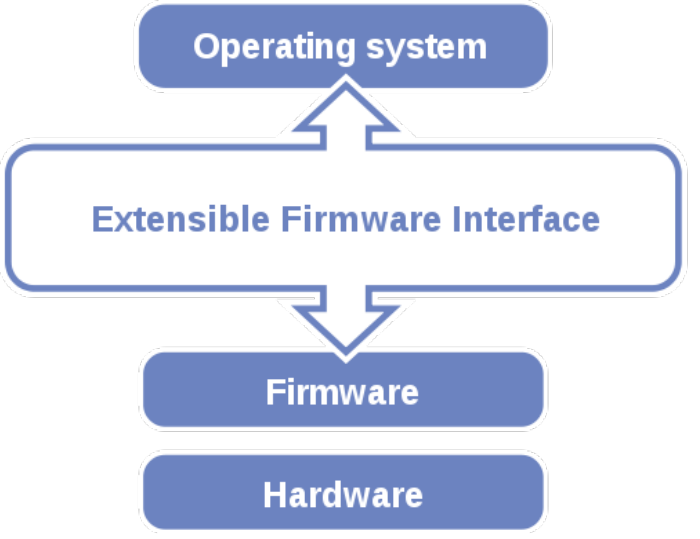


Figure 5-1. Extensible Firmware Interface Diagram

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.

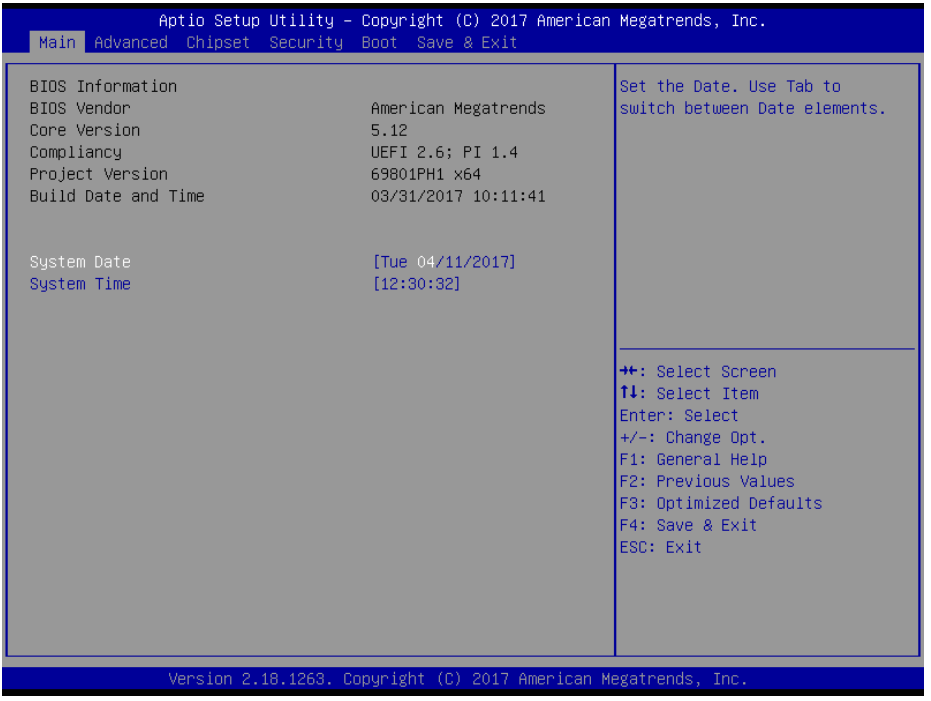
All the menu settings are described in details in this chapter.

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.

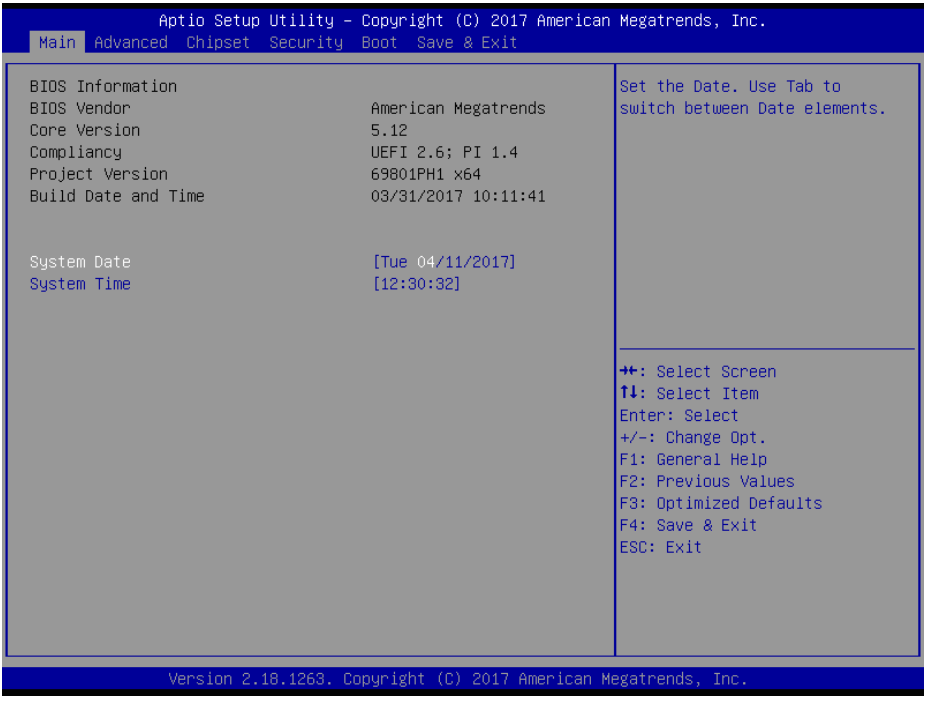
The language of the BIOS setup menu interface and help messages are shown in US English. You may use <↑> or <↓> key to select among the items and press <Enter> to confirm and enter the sub-menu. The following table provides the list of the navigation keys that you can use while operating the BIOS setup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



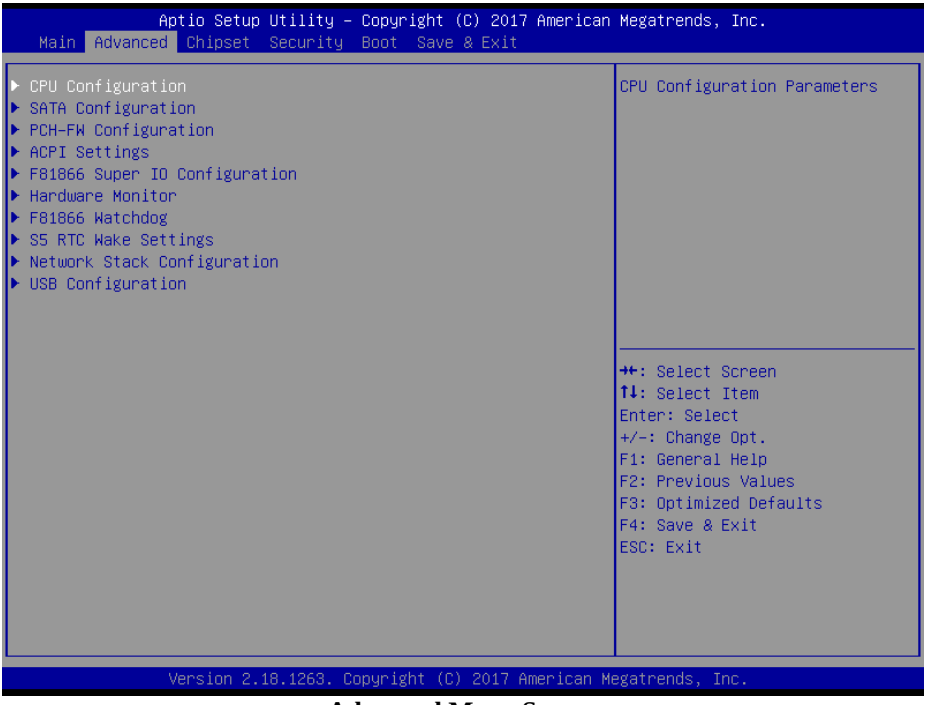
Main Screen

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.
Compliancy	No changeable options	Displays the current UEFI 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.

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*



Advanced Menu Screen

BIOS Setting	Options	Description/Purpose
CPU Configuration	Sub-Menu	CPU Configuration Parameters.
SATA Configuration	Sub-Menu	SATA Device Options Settings.
PCH-FW Configuration	Sub-Menu	Management Engine Technology Parameters.
ACPI Settings	Sub-Menu	System ACPI Parameters.
F81866 Super IO Configuration	Sub-Menu	System Super IO Chip Parameters
Hardware Monitor	Sub-Menu	Monitor hardware status
F81866 Watchdog	Sub-Menu	F81866 Watchdog Parameters.
S5 RTC Wake Settings	Sub-Menu	S5 RTC Wake Settings
Network Stack Configuration	Sub-Menu	Network Stack Settings
USB Configuration	Sub-Menu	USB Configuration Parameters.

5.4.1 Advanced > CPU Configuration

Menu Path *Advanced > CPU Configuration*

CPU Configuration Screen

BIOS Setting	Options	Description/Purpose
Type	No changeable options	Display CPU Model
CPU Signature	No changeable options	Display CPU Signature.
Microcode Patch	No changeable options	CPU Microcode Patch Revision.
CPU Speed	No changeable options	Display the CPU Speed.
Processor Cores	No changeable options	Display number of cores.
VMX	No changeable options	Reports if Intel VT-x Technology is supported by the processor. Previously codenamed "Vanderpool", **VT-x** represents Intel's technology for virtualization on the x86 platform. Utilizing Vanderpool Technology (VT), a VMM (Virtual Machine Monitor) can utilize the additional

BIOS Setting	Options	Description/Purpose
		hardware capabilities.
SMX/TXT	No changeable options	Reports if Intel Secure Mode Extensions Technology is supported by the processor.
64-bit	No changeable options	Reports if the processor supports Intel x86-64 (amd64) implementation.
L1 Data Cache	No changeable options	L1 Data Cache Size
L1 Instruction Cache	No changeable options	L1 Instruction Cache Size
L2 Cache	No changeable options	L2 Cache Size
L3 Cache	No changeable options	L3 Cache Size
L4 Cache	No changeable options	L4 Cache Size
Hyper-Threading	- Disabled - Enabled	When disabled, only one thread per enabled core is enabled.
Active Processor Cores	- All - 1 to n (depend on CPU)	Number of cores to enable in each processor package.
Intel (VMX) Virtualization Technology	- Disabled - Enabled	When enabled, a VMM (Virtual Machine Monitor) can utilize the additional hardware capabilities provided by Vanderpool Technology (VT).

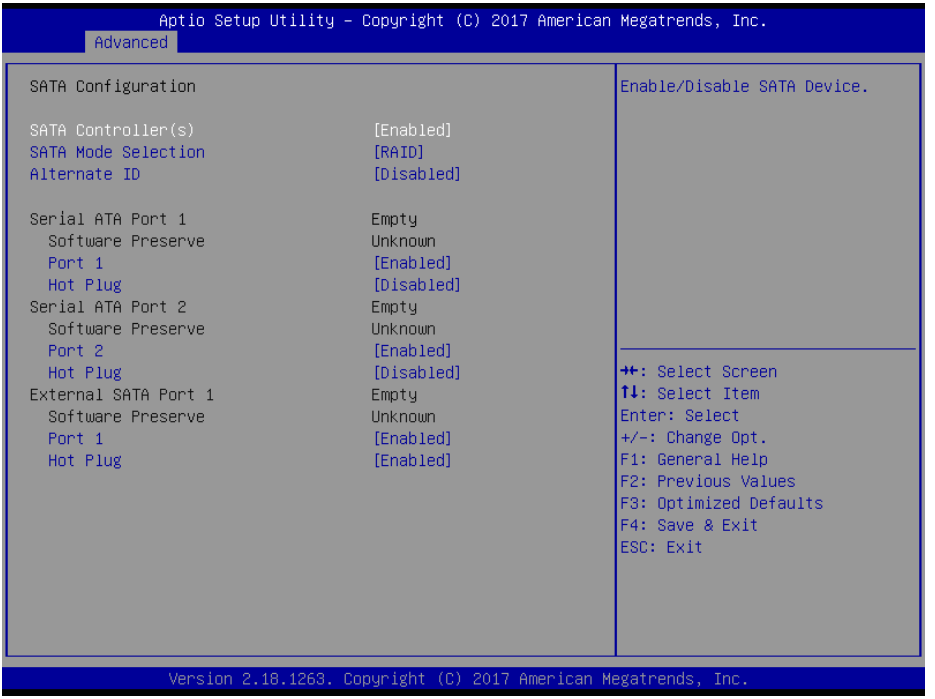
5.4.2 Advanced > SATA Configuration

Menu Path *Advanced > SATA Configuration (AHCI Mode)*

SATA Configuration Screen

BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled - Enabled	Enables or Disables SATA Device.
SATA Mode Selection	- AHCI - RAID	Determines how SATA controller(s) operate.
Serial ATA Port 1 – 2, External SATA Port 1	No changeable options	Displays the SATA device's name.
Software Preserve	No changeable options	Indicates whether the connected SATA device supports Software Setting Preservation (SSP).
Port 1 - 2	- Disabled - Enabled	Enables or Disables SATA Port Device.
Hot Plug	- Disabled - Enabled	Enables or Disables Hot Plug function to designate a SATA port device as hot-pluggable.

Menu Path *Advanced > SATA Configuration (RAID Mode)*

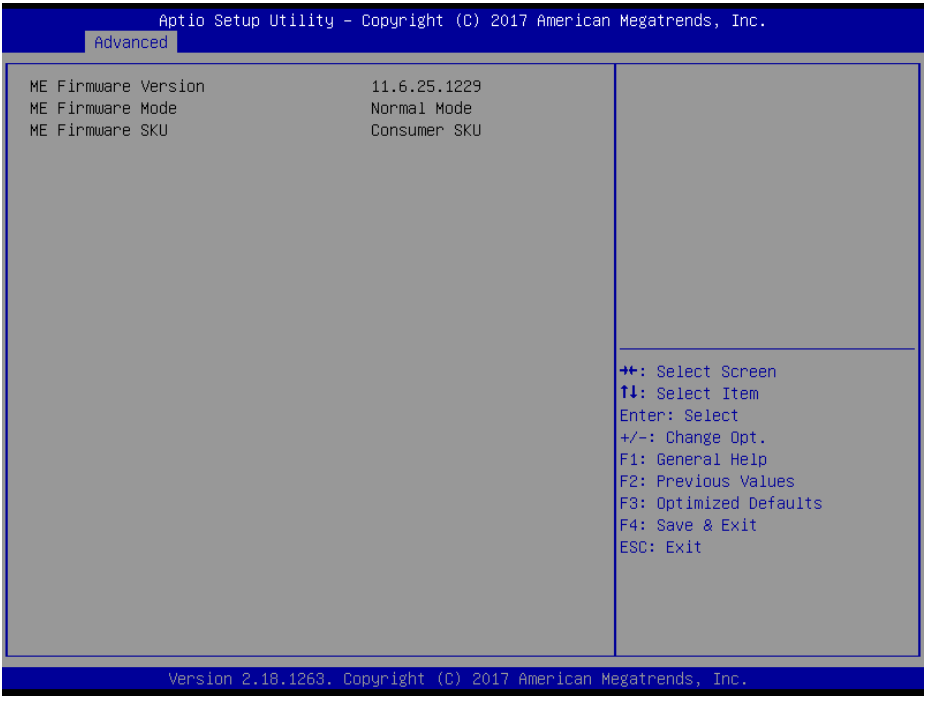


SATA Configuration Screen (RAID, for Q170 only)

BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled - Enabled	Enables or Disables SATA Device.
SATA Mode Selection	- AHCI - RAID	Determines how SATA controller(s) operate.
Alternate ID	- Disabled - Enabled	Reports alternate Device ID.
Serial ATA Port 1 – 2, External SATA Port 1	No changeable options	Displays the SATA device's name.
Software Preserve	No changeable options	Indicates whether the connected SATA device supports Software Setting Preservation (SSP).
Port 1 - 2	- Disabled - Enabled	Enables or Disables SATA Port Device.
Hot Plug	- Disabled - Enabled	Enables or Disables Hot Plug function to designate a SATA port device as hot-pluggable.

5.4.3 Advanced > PCH-FW Configuration

Menu Path *Advanced > PCH-FW Configuration*

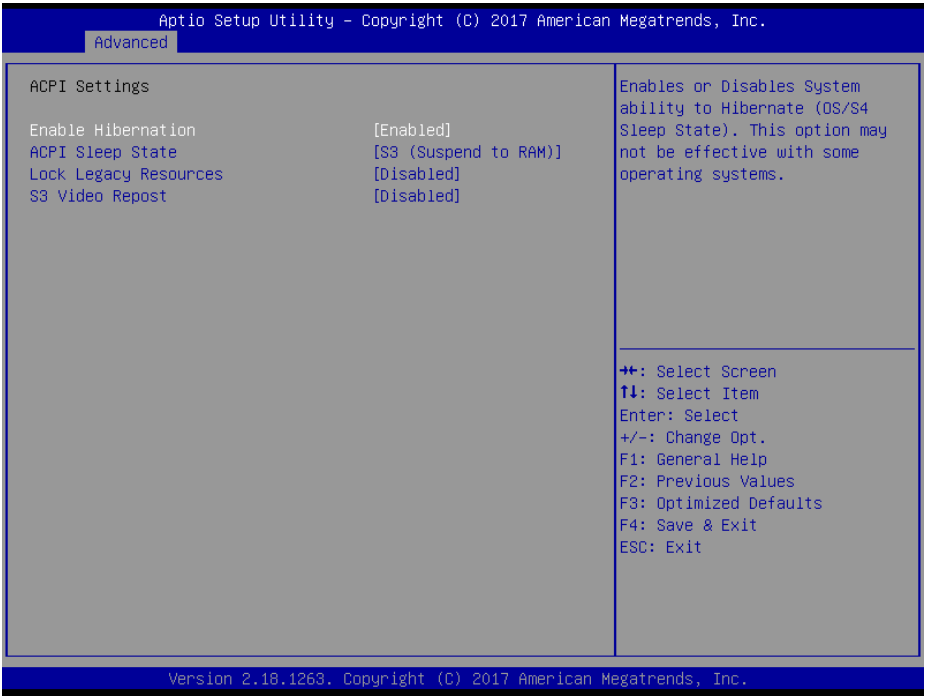


PCH-FW Configuration Screen

BIOS Setting	Options	Description/Purpose
ME FW Version	No changeable options	Displays the ME Firmware Version.
ME Firmware Mode	No changeable options	Displays the ME Firmware Mode.
ME Firmware SKU	No changeable options	Displays the ME Firmware SKU.

5.4.4 Advanced > ACPI Settings

Menu Path *Advanced > ACPI Settings*

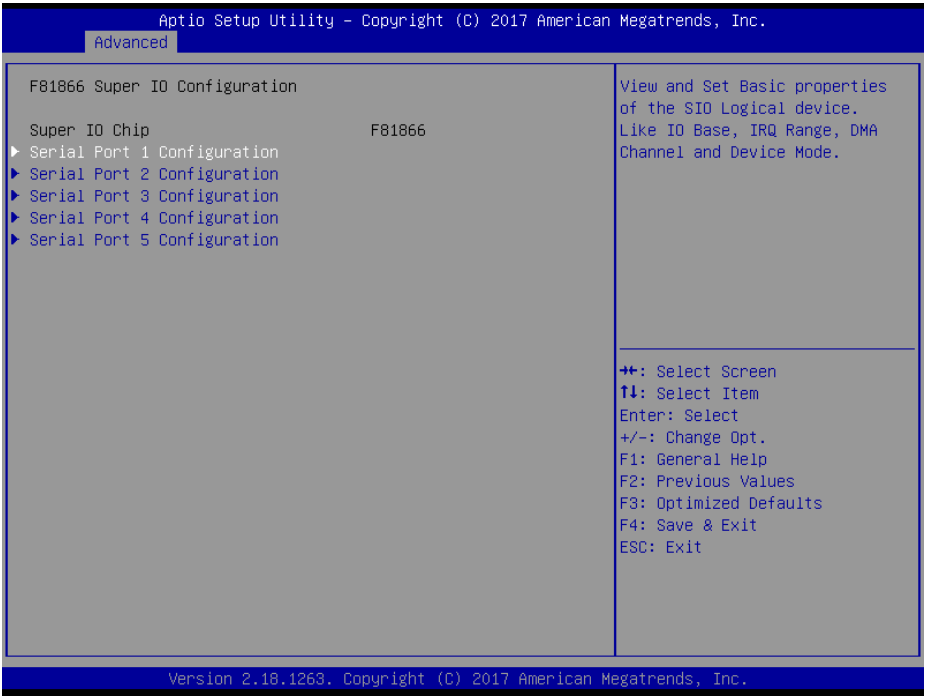


ACPI Settings Screen

BIOS Setting	Options	Description/Purpose
Enable Hibernation	- Disabled - Enabled	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	- Suspend Disabled - S3 (Suspend to RAM)	Selects the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
Lock Legacy Resources	- Disabled - Enabled	Enables or Disables Lock of Legacy Resources.
S3 Video Repost	- Disabled - Enabled	Enables or Disables S3 Video Repost.

5.4.5 Advanced > F81866 Super IO Configuration

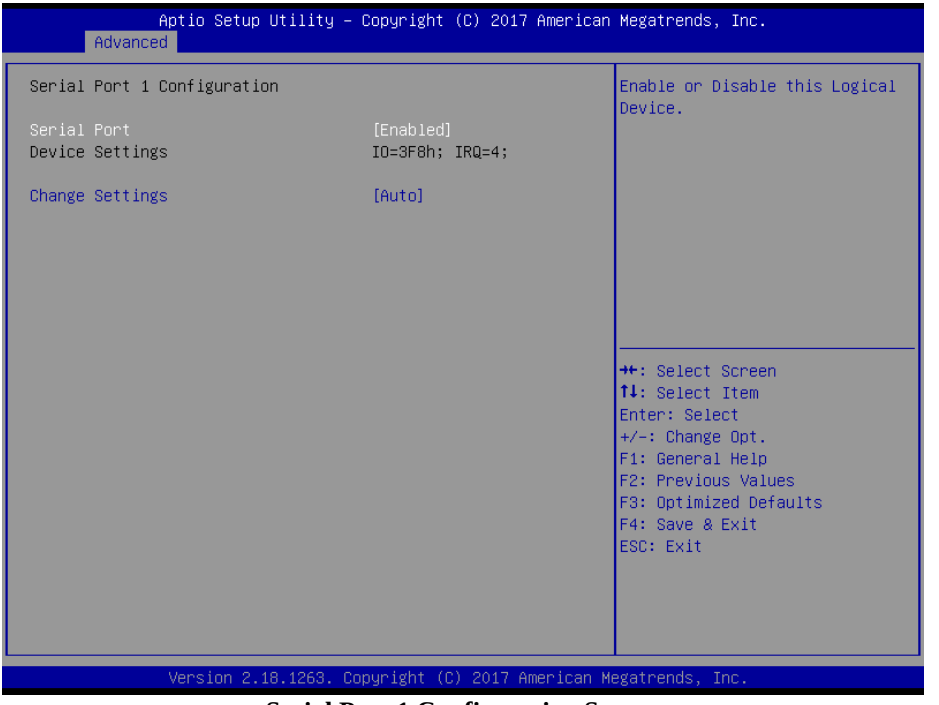
Menu Path *Advanced > F81866 Super IO Configuration*



F81866 Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port 1 Configuration	Sub-Menu	Sets Parameters of Serial Port 1 (COMA)
Serial Port 2 Configuration	Sub-Menu	Sets Parameters of Serial Port 2 (COMB)
Serial Port 3 Configuration	Sub-Menu	Sets Parameters of Serial Port 3 (COMC)
Serial Port 4 Configuration	Sub-Menu	Sets Parameters of Serial Port 4 (COMD)
Serial Port 5 Configuration	Sub-Menu	Sets Parameters of Serial Port 5 (COME)

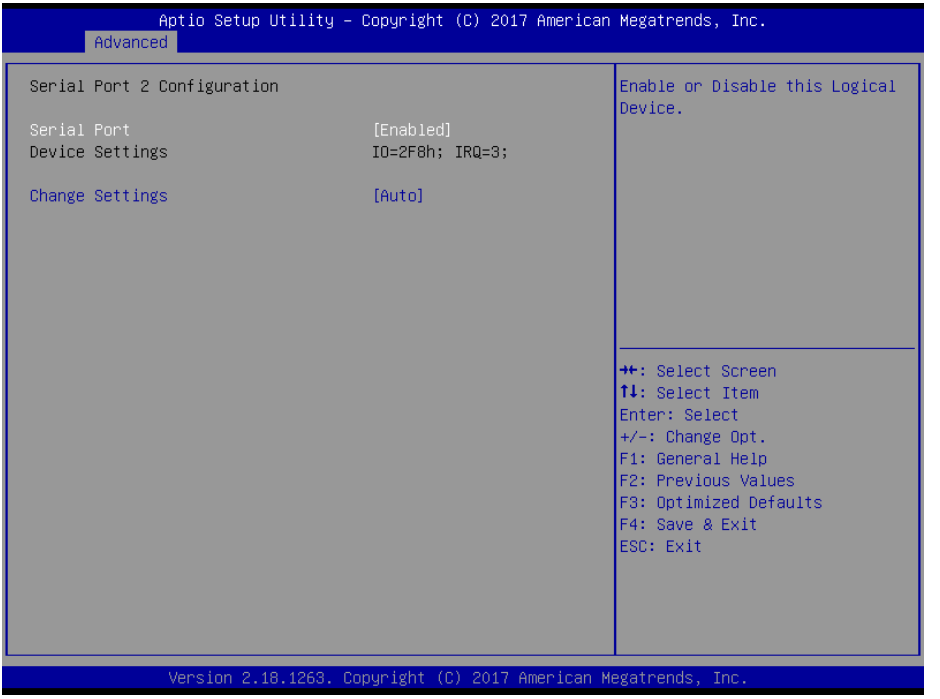
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 1 Configuration*



Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 1.
Device Settings	No changeable options	Displays the current settings of Serial Port 1.
Change Settings	- Auto - IO=3F8h; IRQ=4; - IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 1.

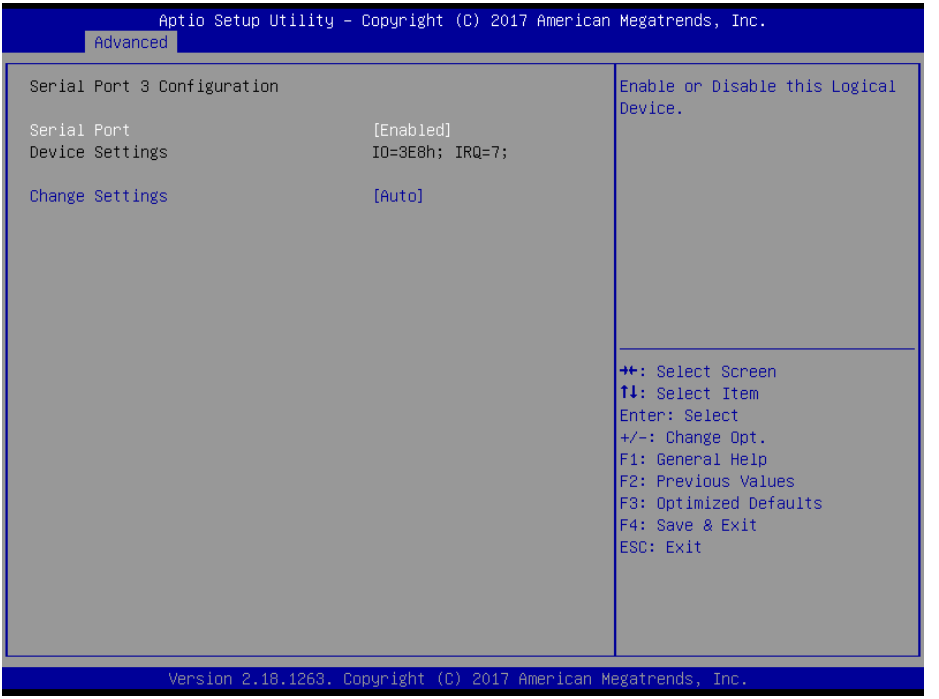
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 2 Configuration*



Serial Port 2 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 2.
Device Settings	No changeable options	Displays the current settings of Serial Port 2.
Change Settings	- Auto - IO=2F8h; IRQ=3; - IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 2.

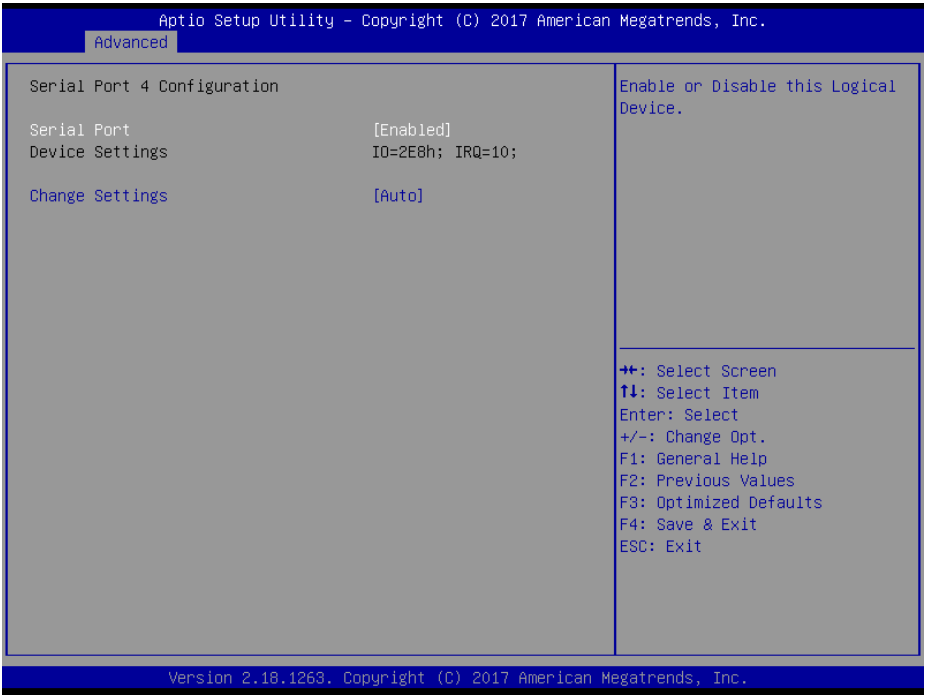
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 3 Configuration*



Serial Port 3 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 3.
Device Settings	No changeable options	Displays the current settings of Serial Port 3.
Change Settings	- Auto - IO=3E8h; IRQ=7; - IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 3.

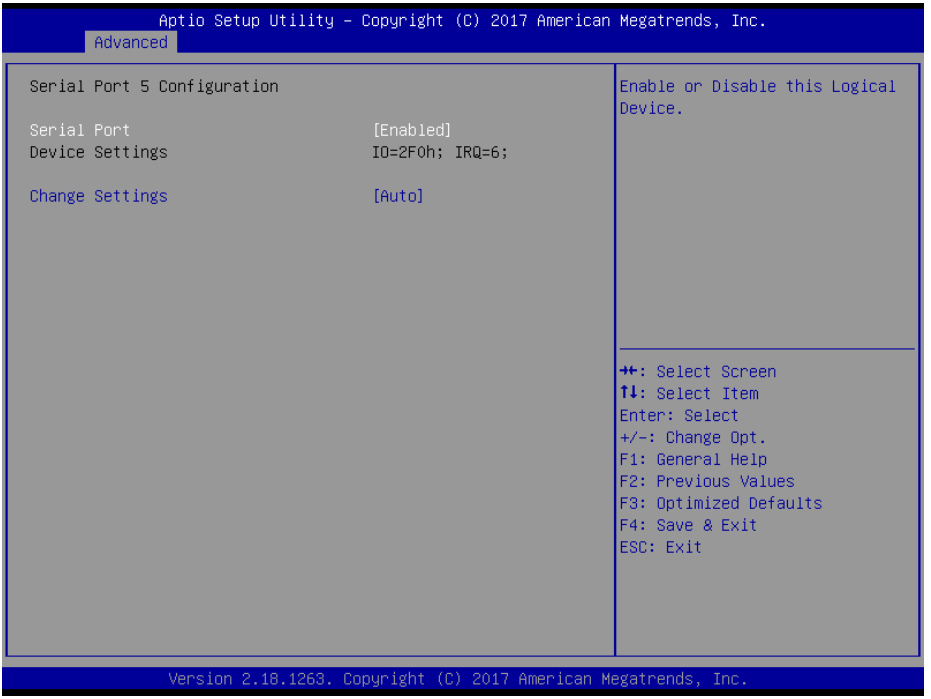
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 4 Configuration*



Serial Port 4 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 4.
Device Settings	No changeable options	Displays the current settings of Serial Port 4.
Change Settings	- Auto - IO=2E8h; IRQ=10; - IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 4.

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 5 Configuration*

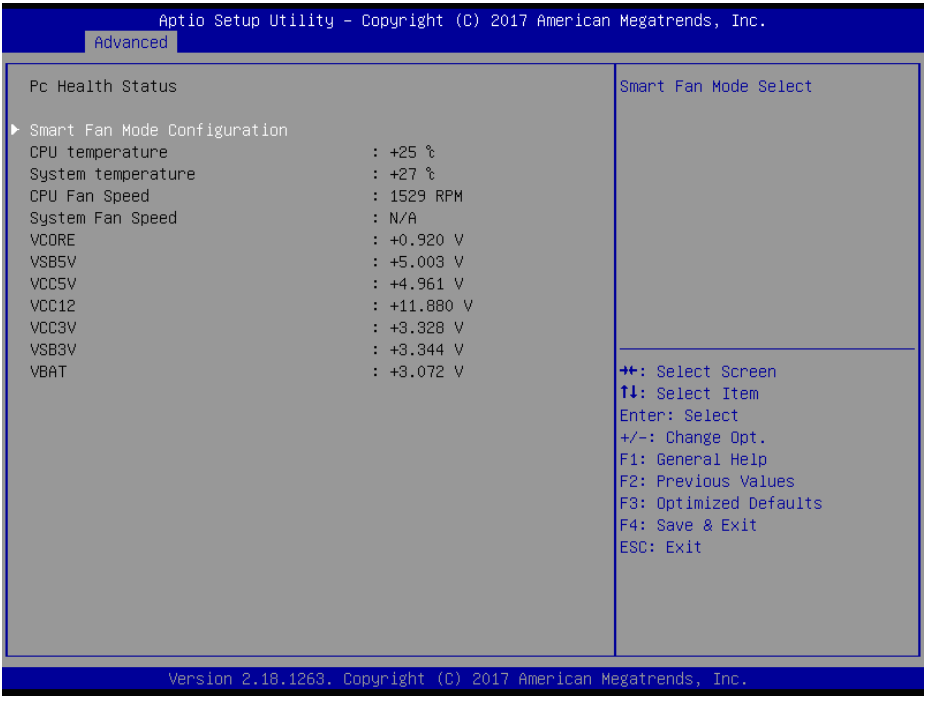


Serial Port 5 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 5.
Device Settings	No changeable options	Displays the current settings of Serial Port 5.
Change Settings	- Auto - IO=2F0h; IRQ=6; - IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 5.

5.4.6 Advanced > Hardware Monitor

Menu Path *Advanced > Hardware Monitor*



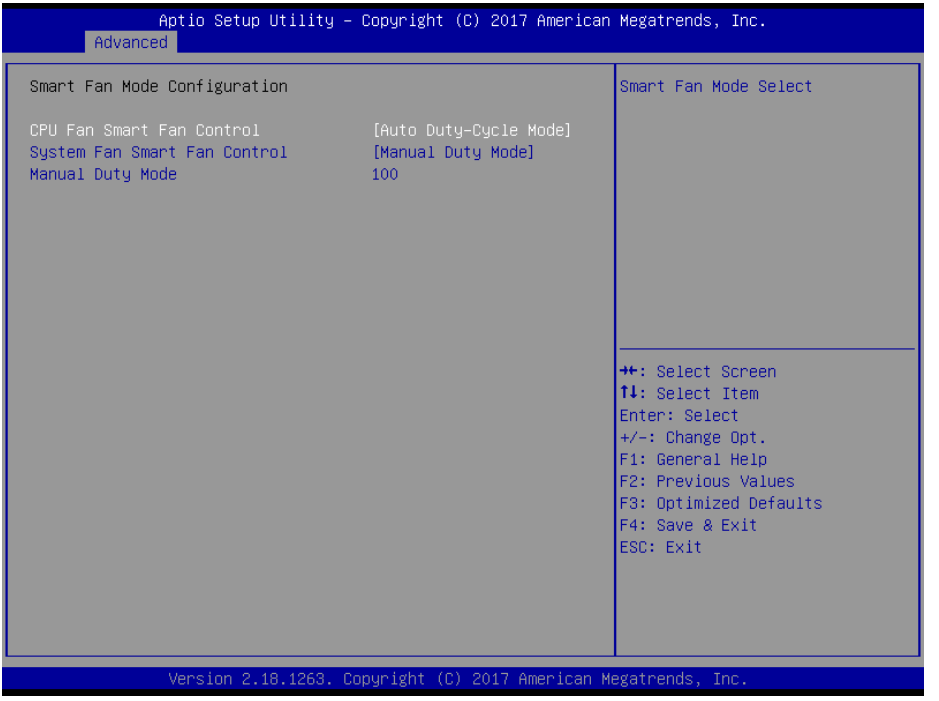
Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
Smart Fan Mode Configuration	Sub-Menu	Smart Fan Mode Select
CPU temperature	No changeable options	Displays the processor's temperature.
System temperature	No changeable options	Displays the system's temperature.
CPU Fan Speed	No changeable options	Displays CPU Fan speed.
System Fan Speed	No changeable options	Displays System Fan speed.
VCORE	No changeable options	Displays voltage level of VCORE in supply.
VSB5V	No changeable options	Displays voltage level of VSB5V in supply.
VCC5V	No changeable options	Displays voltage level of VCC5V in supply.
VCC12	No changeable options	Displays voltage level of VCC12 in supply.
VCC3V	No changeable options	Displays voltage level of VCC3V in supply.
VSB3V	No changeable options	Displays voltage level of VSB3V in supply.

BIOS Setting	Options	Description/Purpose
VBAT	No changeable options	Displays the voltage level of VBAT in supply.

5.4.6.1 Advanced > Hardware Monitor > Smart Fan Mode Configuration

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

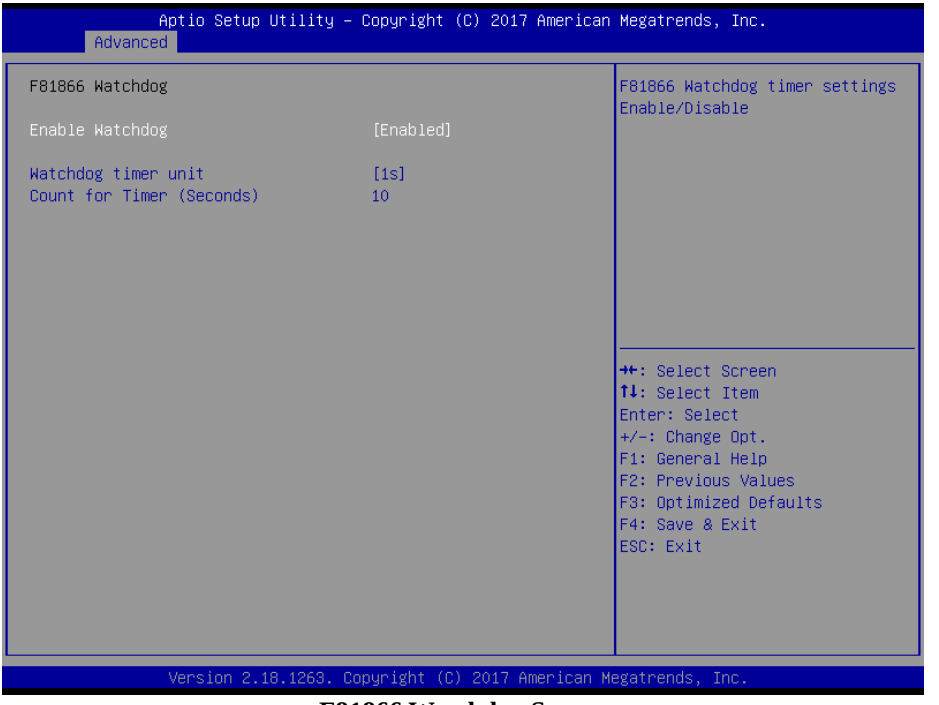


Smart Fan Mode Configuration Screen

BIOS Setting	Options	Description/Purpose
CPU Fan Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode	Smart Fan Mode selection for CPU Fan.
Manual Duty Mode	Numeric (from 1 to 100)	Manual mode fan control. Users can write expected duty cycle (PWM fan type) from 1 to 100.
System Fan Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode	Smart Fan Mode select for System Fan.
Manual Duty Mode	Numeric (from 1 to 100)	Manual mode fan control, user can write expected duty cycle (PWM fan type) 1-100.

5.4.7 Advanced > F81866 Watchdog Configuration

Menu Path *Advanced > F81866 Watchdog Configuration*

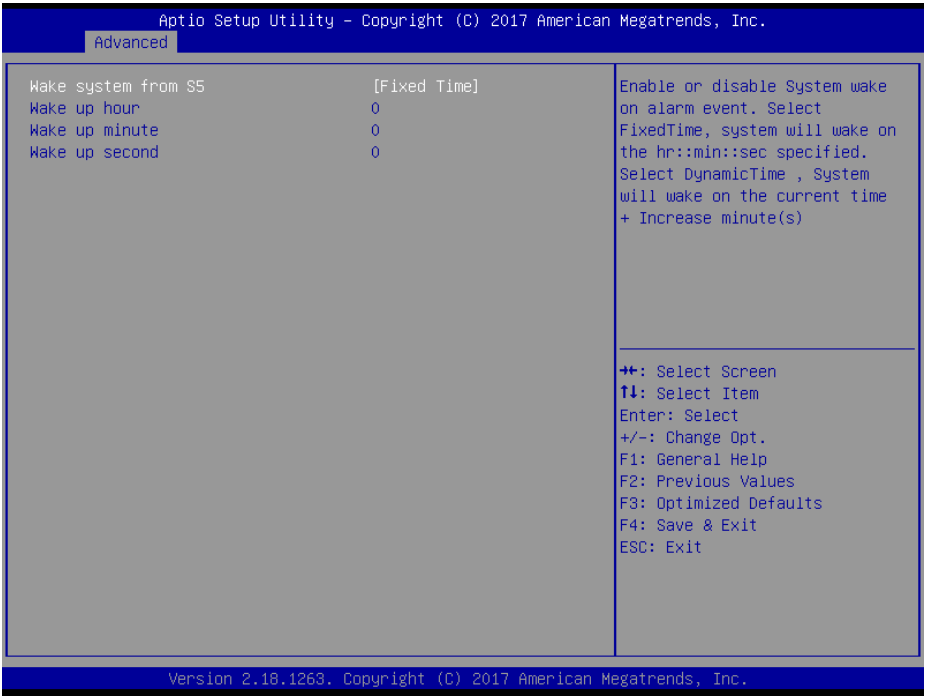


F81866 Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable Watchdog	- Enabled - Disabled	F81866 Watchdog timer settings Enable/Disable.
Watchdog timer unit	- 1s - 60s	Selects 1s (second) or 60s (minute) as the time unit of Watchdog timer.
Count for Timer (Seconds)	Numeric (from 1 to 255)	Sets the timeout for Watchdog timer. (Max. value: 255 seconds or minutes)

5.4.8 Advanced > S5 RTC Wake Settings

Menu Path *Advanced > S5 RTC Wake Settings*



S5 RTC Wake Settings Screen

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled - Fixed Time - Dynamic Time	Enables or disables System wake on alarm event. • **Fixed Time:** The system will wake on the time (hr::min::sec) specified. • **Dynamic Time:** The system will wake on the current time + Increase minute(s).
Wake up hour	Numeric (from 0 to 23)	Enters **0-23** to set the wake-up hour, e.g.: enters 3 for 3 a.m. and 15 for 3 pm
Wake up minute	Numeric (from 0 to 59)	Enters **0-59** to set the wake-up minute.
Wake up second	Numeric (from 0 to 59)	Enters **0-59** to set the wake-up second.
Wake up minute increase	Numeric (from 1 to 5)	Enters **1-5** to set the increased minute(s) for dynamic wake-up time.

5.4.9 Advanced > Network Stack Configuration

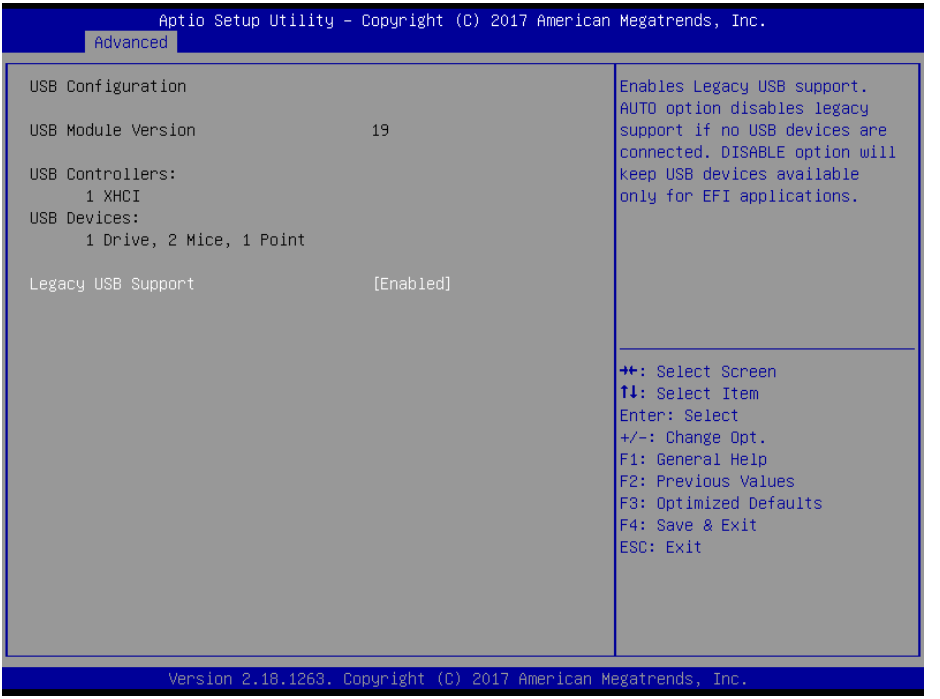
Menu Path *Advanced > Network Stack Configuration*

Network Stack Configuration Screen

BIOS Setting	Options	Description/Purpose
Network Stack	- Disabled - Enabled	Enables or Disables UEFI Network Stack.
Ipv4 PXE Support	- Disabled - Enabled	Enables Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.
Ipv6 PXE Support	- Disabled - 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)	Wait time to press ESC key to abort the PXE boot.
Media detect count	Numeric (from 1 to 50)	Numbers of times presence of media will be checked.

5.4.10 Advanced > USB Configuration

Menu Path *Advanced > USB Configuration*

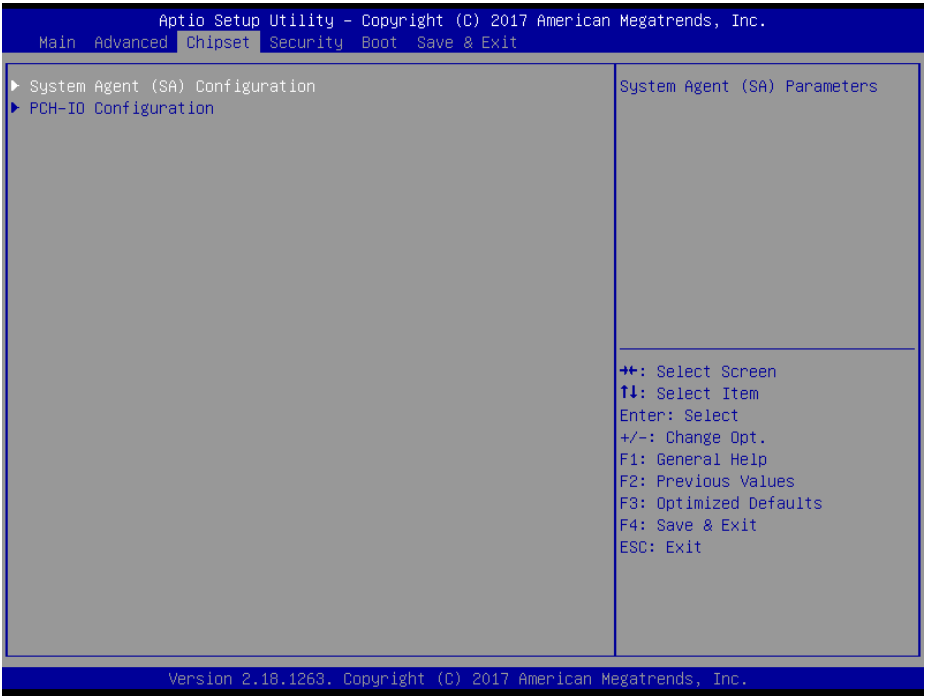


USB Configuration Screen

BIOS Setting	Options	Description/Purpose
Legacy USB Support	- Disabled - Enabled - Auto	Sets to “Enabled” if you want to use USB device in the legacy operating system.

5.5 CHIPSET

Menu Path *Chipset*

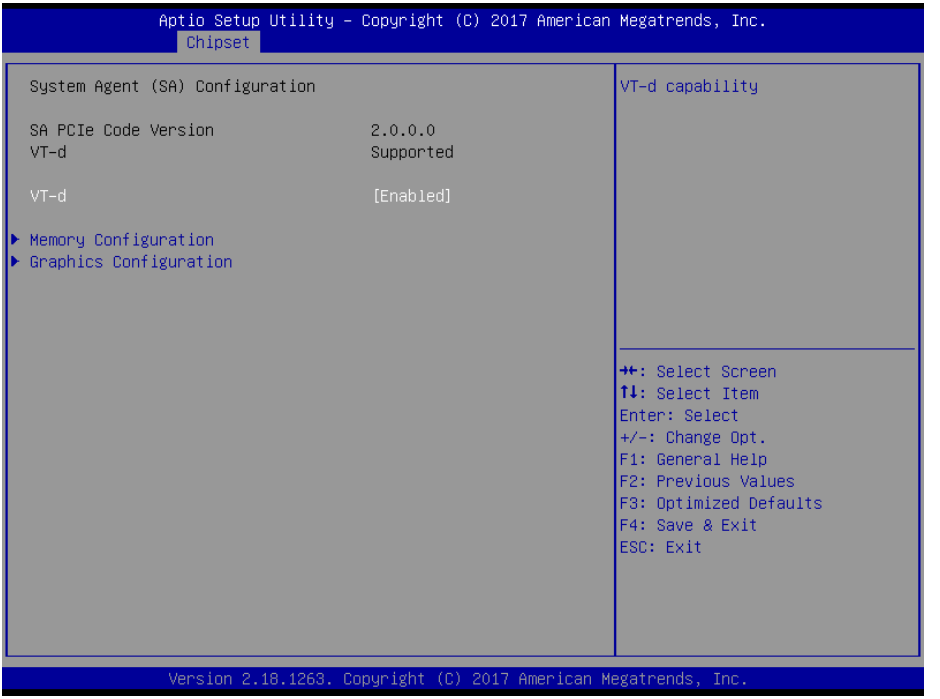


Chipset Screen

BIOS Setting	Options	Description/Purpose
System Agent (SA) Configuration	Sub-Menu	System Agent (SA) Parameters.
PCH-IO Configuration	Sub-Menu	PCH Parameters.

5.5.1 Chipset > System Agent (SA) Configuration

Menu Path *Chipset > System Agent (SA) Configuration*



System Agent (SA) Configuration Screen

BIOS Setting	Options	Description/Purpose
SA PCIe Code Version	No changeable options	Display the SA PCIe Code Version.
VT-d	No changeable options	Indicates whether Intel's VT-d (Virtualization Technology for Directed I/O) capability is supported. ***VT-d*** extends Intel's Virtualization Technology (VT) roadmap by providing hardware assists for virtualization solution, and helps end users improve security and reliability of the systems and also improves performance of I/O devices in virtualized environment.
VT-d	- Disabled - Enabled	Enables or Disables VT-d function.

BIOS Setting	Options	Description/Purpose
Memory Configuration	Sub-Menu	Memory Configuration parameters.
Graphics Configuration	Sub-Menu	Graphics Configuration parameters.

5.5.1.1 Chipset > System Agent (SA) Configuration > Memory Configuration

Menu Path	*Chipset > System Agent (SA) Configuration > Memory Configuration*

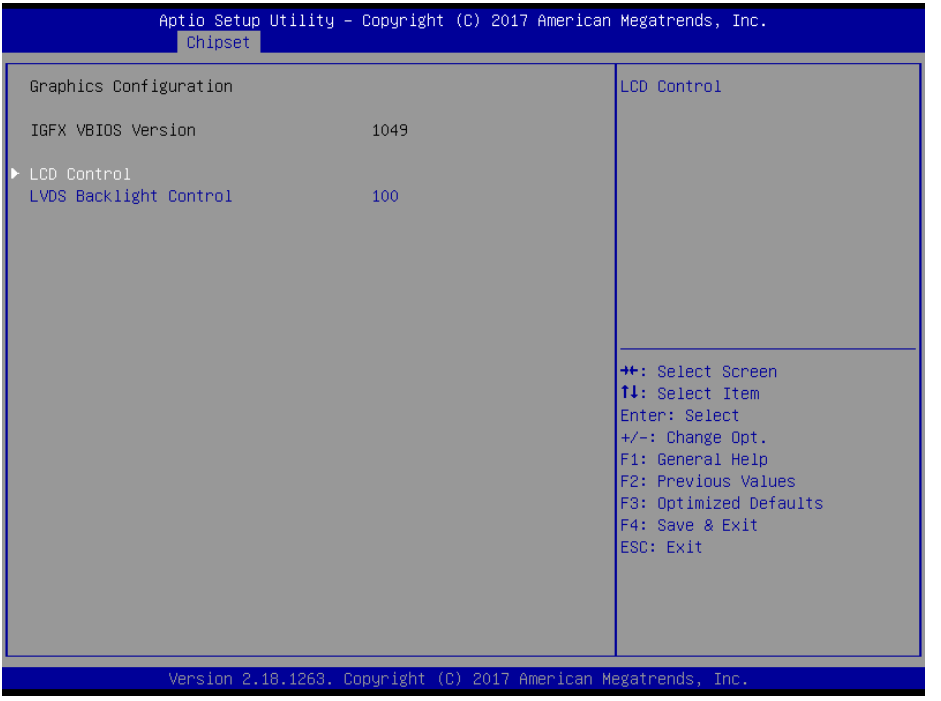
Memory Configuration Screen

BIOS Setting	Options	Description/Purpose
Memory RC Version	No changeable options	Displays the Memory RC Version.
Memory Frequency	No changeable options	Displays the Frequency of Memory.
Total Memory	No changeable options	Displays the Total Memory.

BIOS Setting	Options	Description/Purpose
Memory Timings (tCL-tRCD-tRP-tRAS)	No changeable options	Displays the Memory (RAM) timings and latency. • **CAS Latency (tCL)** - This is the most important memory timing. CAS stands for Column Address Strobe. If a row has already been selected, it tells us how many clock cycles we'll have to wait for a result (after sending a column address to the RAM controller). • **Row Address (RAS) to Column Address (CAS) Delay** (tRCD) - Once we send the memory controller a row address, we'll have to wait this many cycles before accessing one of the row's columns. So, if a row hasn't been selected, this means we'll have to wait tRCD + tCL cycles to get our result from the RAM. • **Row Precharge Time (tRP)** - If we already have a row selected, we'll have to wait this number of cycles before selecting a different row. This means it will take tRP + tRCD + tCL cycles to access the data in a different row. • **Row Active Time (tRAS)** - This is the minimum number of cycles that a row has to be active for to ensure we'll have enough time to access the information that's in it. This usually needs to be greater than or equal to the sum of the previous three latencies (tRAS = tCL + tRCD + tRP).
SO-DIMM#1	No changeable options	Displays the size of SO-DIMM#1.
SO-DIMM#2	No changeable options	Displays the size of SO-DIMM#2.

5.5.1.2 Chipset > System Agent (SA) Configuration > Graphics Configuration

Menu Path	*Chipset > System Agent (SA) Configuration > Graphics Configuration*



Graphics Configuration Screen

BIOS Setting	Options	Description/Purpose
IGFX VBIOS Version	No changeable options	Displays the IGFX VBIOS Version.
LCD Control	Sub-Menu	LCD Control menu.
LVDS Backlight Control	Numeric (from 10 to 100)	Controls the LVDS backlight brightness ranging from 10 to 100 in scale.

Chipset > System Agent (SA) Configuration > Graphics Configuration > LCD Control

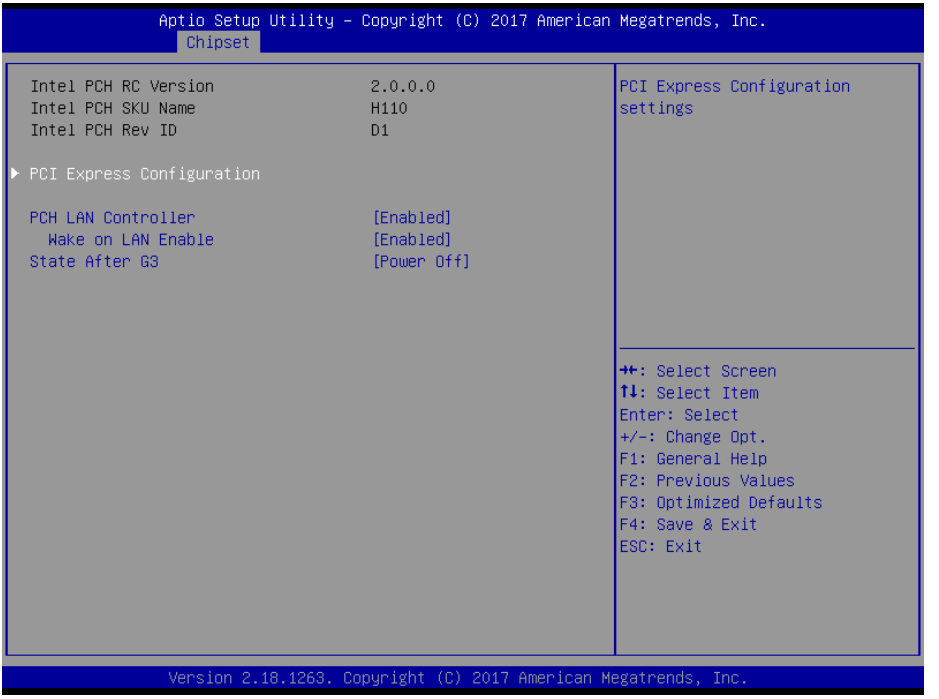
Menu Path	*Chipset > System Agent (SA) Configuration > Graphics Configuration > LCD Control*

LCD Control Screen

BIOS Setting	Options	Description/Purpose
Primary IGFX Boot Display	- VBIOS default - VGA - LVDS	Selects Primary Display Device.
Secondary IGFX Boot Display	- Disabled - VGA - LVDS	Selects Secondary Display Device.

5.5.1.3 Chipset > PCH-IO Configuration

Menu Path *Chipset > PCH-IO Configuration*

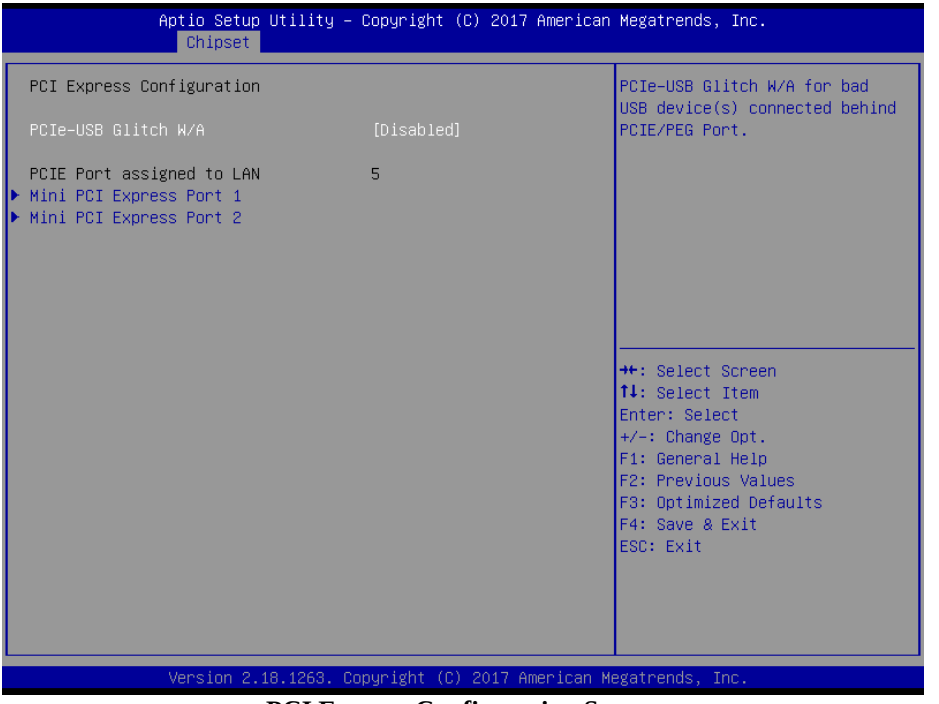


PCH-IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Intel PCH RC Version	No changeable options	Displays the Intel PCH RC Version.
Intel PCH SKU Name	No changeable options	Displays the Intel PCH SKU Name.
Intel PCH Rev ID	No changeable options	Displays the Intel PCH Revision ID.
PCI Express Configuration	Sub-Menu	PCI Express Configuration settings.
PCH LAN Controller	- Disabled - Enabled	Enables or Disables onboard NIC.
Wake On LAN Enable	- Disabled - Enabled	Enables or Disables integrated LAN to wake the system.
State After G3	- Power On - Power Off	Specifies what state to go to when power is re-applied after a power failure (G3 state).

5.5.1.4 Chipset > PCH-IO Configuration > PCI Express Configuration

Menu Path	*Chipset > PCH-IO Configuration > PCI Express Configuration*



PCI Express Configuration Screen

BIOS Setting	Options	Description/Purpose
PCIe-USB Glitch W/A	- Disabled - Enabled	PCIe-USB Glitch W/A for bad USB devices(s) connected behind PCIE/PEG Port.
Mini PCI Express Port 1	Sub-Menu	Mini PCI Express Port 1 settings.
Mini PCI Express Port 2	Sub-Menu	Mini PCI Express Port 2 settings.

Chipset > PCH-IO Configuration > PCI Express Configuration > Mini PCI Express Port 1 Configuration

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > Mini PCI Express Port 1 Configuration*

Mini PCI Express Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Mini PCI Express Port 1	- Disabled - Enabled	Controls the PCI Express Root Port.
ASPM	- Disabled - L0s - L1 - L0sL1 - Auto	Sets the ASPM (Active-State Power Management) Level. The option allows users to set lower power mode that activates when the bus is not being used.
L1 Substates	- Disabled - L1.1 - L1.2 - L1.1 & L1.2	PCI Express L1 Substates settings.
Hot Plug	- Disabled - Enabled	Enables or Disables PCI Express Hot Plug.

BIOS Setting	Options	Description/Purpose
PCIe Speed	- Auto - Gen1 - Gen2 - Gen3	Selects PCI Express Port Speed.
Detect Non-Compliance Device	- Disabled - Enabled	Detects Non-Compliance PCI Express Device. If enabled, it will take longer during POST.

Chipset > PCH-IO Configuration > PCI Express Configuration > Mini PCI Express Port 2 Configuration

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > Mini PCI Express Port 2 Configuration*

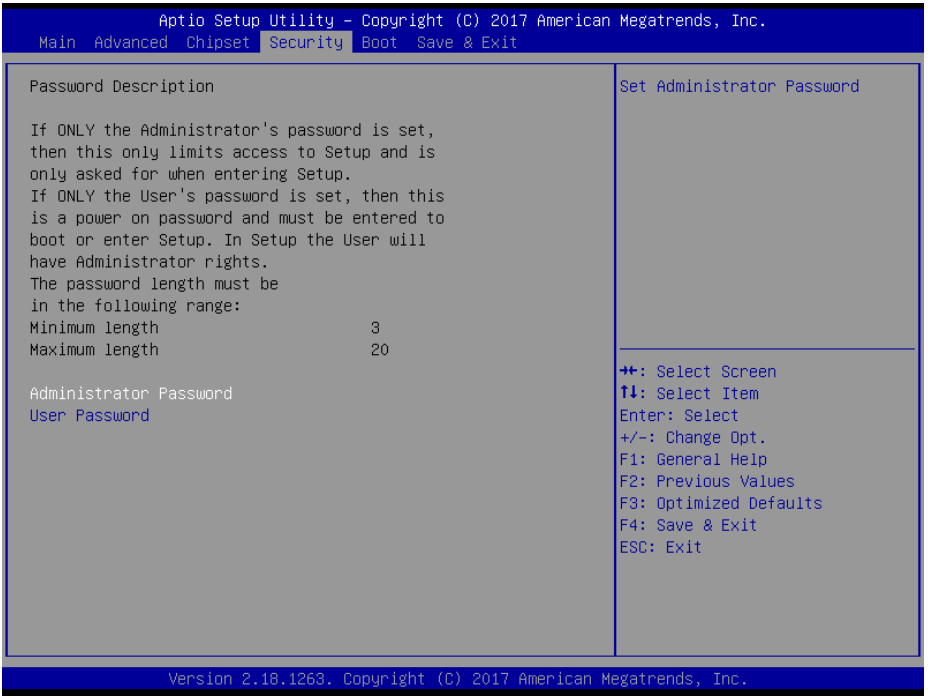
Mini PCI Express Port 2 Configuration Screen

BIOS Setting	Options	Description/Purpose
Mini PCI Express Port 2	- Disabled - Enabled	Controls the PCI Express Root Port.
ASPM	- Disabled - L0s - L1 - L0sL1 - Auto	Sets the ASPM (Active-State Power Management) Level. The option allows users to set lower power mode that activates when the bus is not being used.
L1 Substates	- Disabled - L1.1 - L1.2 - L1.1 & L1.2	PCI Express L1 Substates settings.
Hot Plug	- Disabled - Enabled	Enables or Disables PCI Express Hot Plug.

BIOS Setting	Options	Description/Purpose
PCIe Speed	- Auto - Gen1 - Gen2 - Gen3	Selects PCI Express Port Speed.
Detect Non-Compliance Device	- Disabled - Enabled	Detects Non-Compliance PCI Express Device. If enabled, it will take more time at POST time.

5.6 SECURITY

Menu Path *Security*

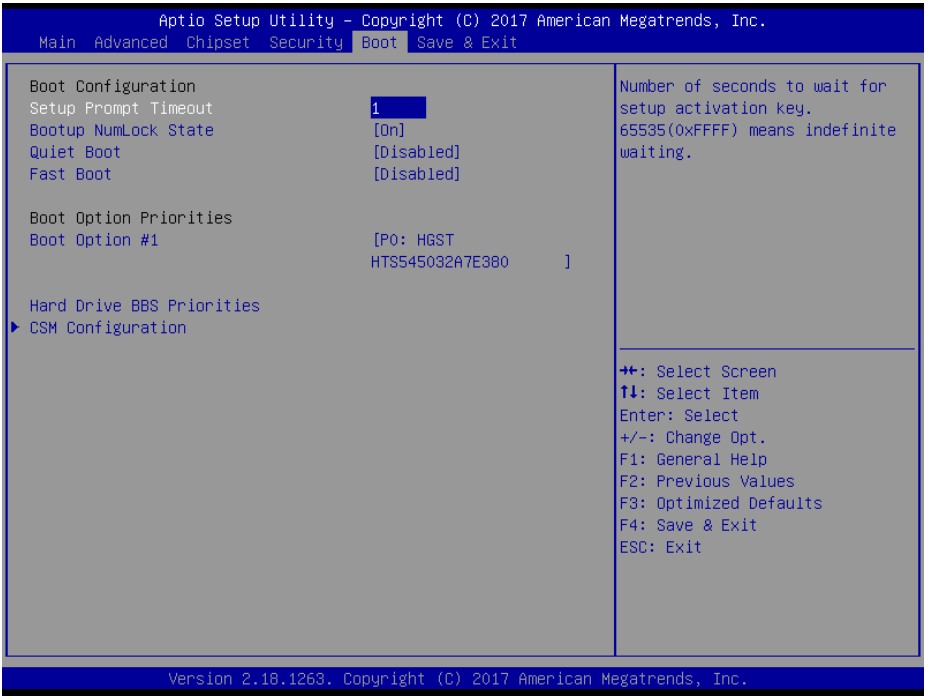


Security Screen

BIOS Setting	Options	Description/Purpose
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.

5.7 BOOT

Menu Path *Boot*



Boot Screen

BIOS Setting	Options	Description/Purpose
Setup Prompt Timeout	Numeric (from 1 to 65535)	Number of seconds to wait for setup activation key.
Bootup NumLock State	- On - Off	Specifies the power-on state of the NumLock Key.
Quiet Boot	- Disabled - Enabled	Enables or Disables Quiet Boot Options
Fast Boot	- Disabled - Enabled	Enables or Disables Fast Boot Options
Boot Option #1~#n	- [Drive(s)] - Disabled	Sets the system boot order.
Hard Drive BBS Priorities	Sub-Menu	Allows users to select boot order of available drive(s)

BIOS Setting	Options	Description/Purpose
CSM Configuration	Sub-Menu	CSM configuration: Enable/Disable, Option ROM execution settings, etc.

5.7.1 Boot - Hard Drive BBS Priorities

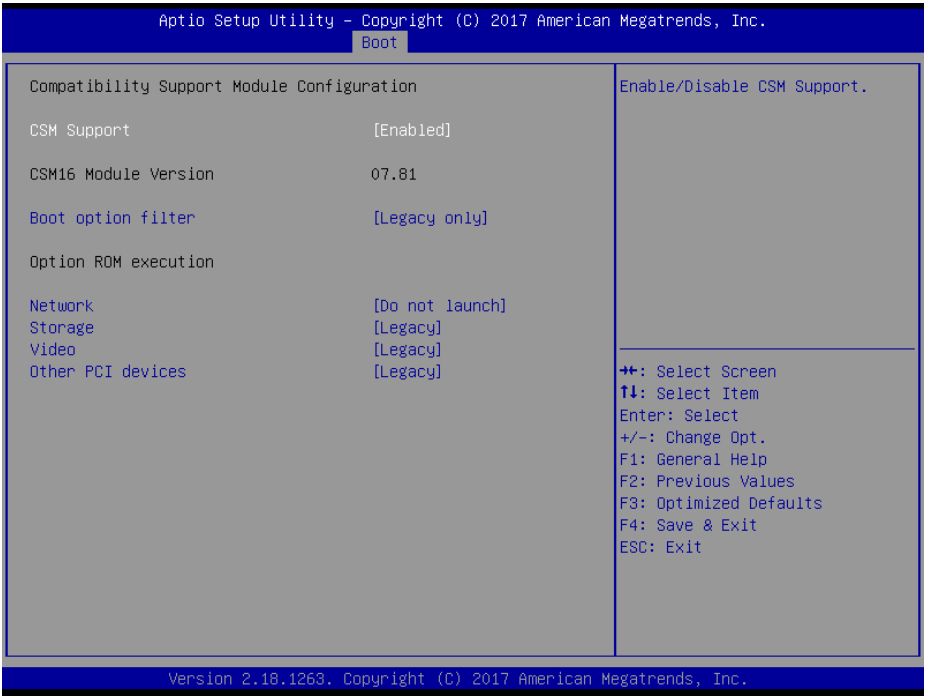
Menu Path *Boot > Hard Drive BBS Priorities*

Hard Drive BBS Priorities Screen

BIOS Setting	Options	Description/Purpose
Boot Option #1~#n	- [Drive(s)] - Enabled	Sets the system boot order for hard drive.

5.7.2 Boot - CSM Configuration

Menu Path *Boot > CSM Configuration*



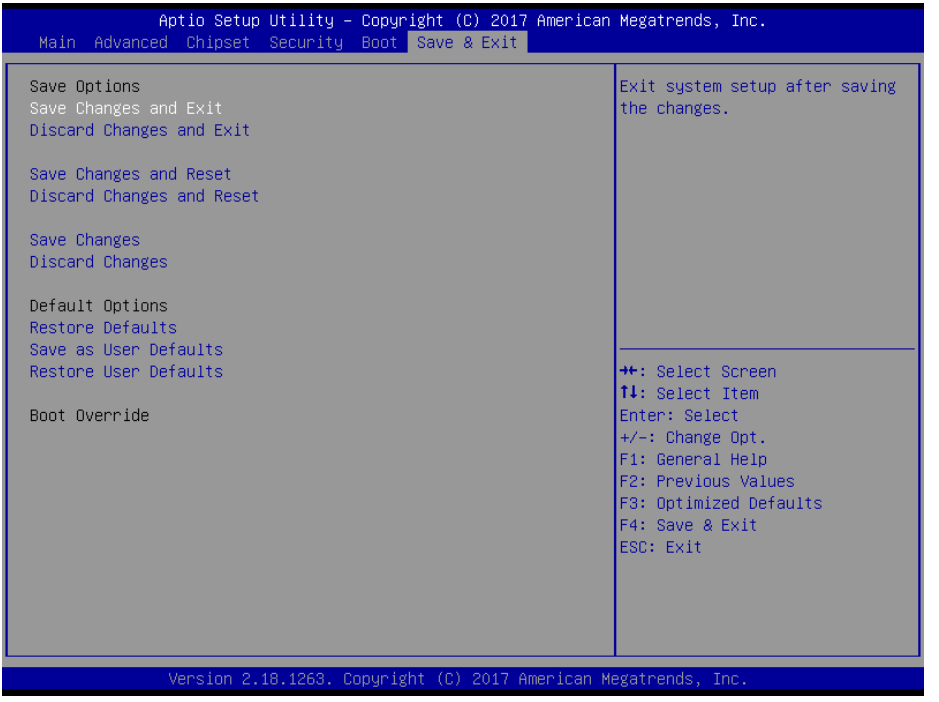
CSM Configuration Screen

BIOS Setting	Options	Description/Purpose
CSM Support	- Disabled - Enabled	Enables or Disables CSM Support.
CSM16 Module Version	No changeable options	Displays the CSM 16 Module version.
Boot option filter	- UEFI and Legacy - Legacy only - UEFI only	This option controls Legacy/UEFI ROMs priority.
Network	- Do not launch - UEFI - Legacy	Controls the execution of UEFI and Legacy PXE OpROM.
Storage	- Do not launch - UEFI - Legacy	Controls the execution of UEFI and Legacy Storage OpROM.
Video	- Do not launch - UEFI - Legacy	Controls the execution of UEFI and Legacy Video OpROM.

BIOS Setting	Options	Description/Purpose
Other PCI devices	- Do not launch - UEFI - Legacy	Determines OpROM execution policy for devices other than Network, Storage or Video.

5.8 SAVE & EXIT

Menu Path *Save & Exit*



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 changes done so far to any of the setup options.

BIOS Setting	Options	Description/Purpose
Discard Changes	No changeable options	Discards 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 easy maintenance diagrams and exploded diagrams of the system as well as the part numbers of the PA-A901 system.

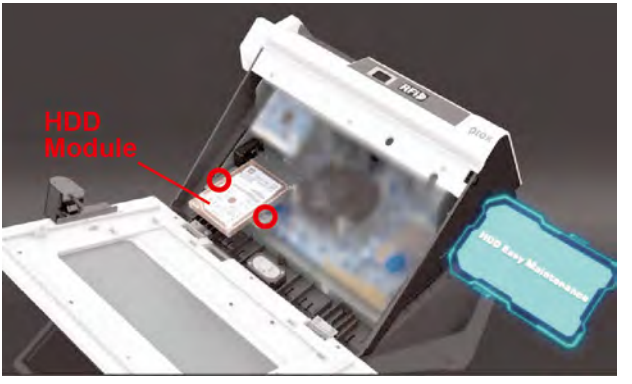
- **HDD Easy Maintenance**

- **PA-A901 Exploded Diagrams**
  - Exploded Diagram for System Top Case
  - Exploded Diagram for Main Board and Bottom Cover Assembly
  - Exploded Diagram
  - Printer 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:

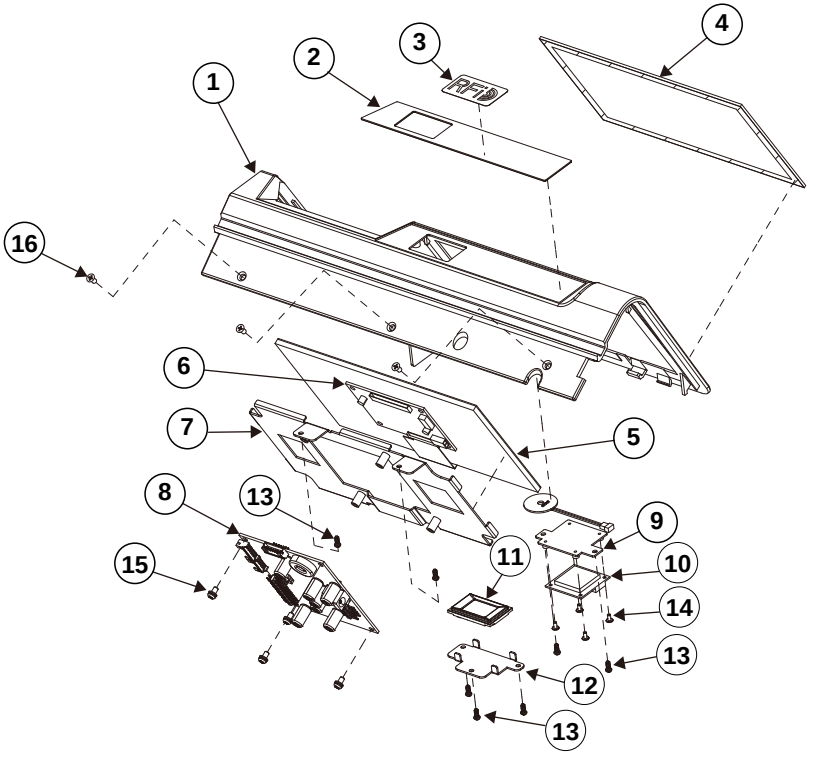
Step 2. Remove the 2 screws on the HDD tray as shown:



Step 3. Take out the HDD module to complete.

Exploded Diagram For System Top Case

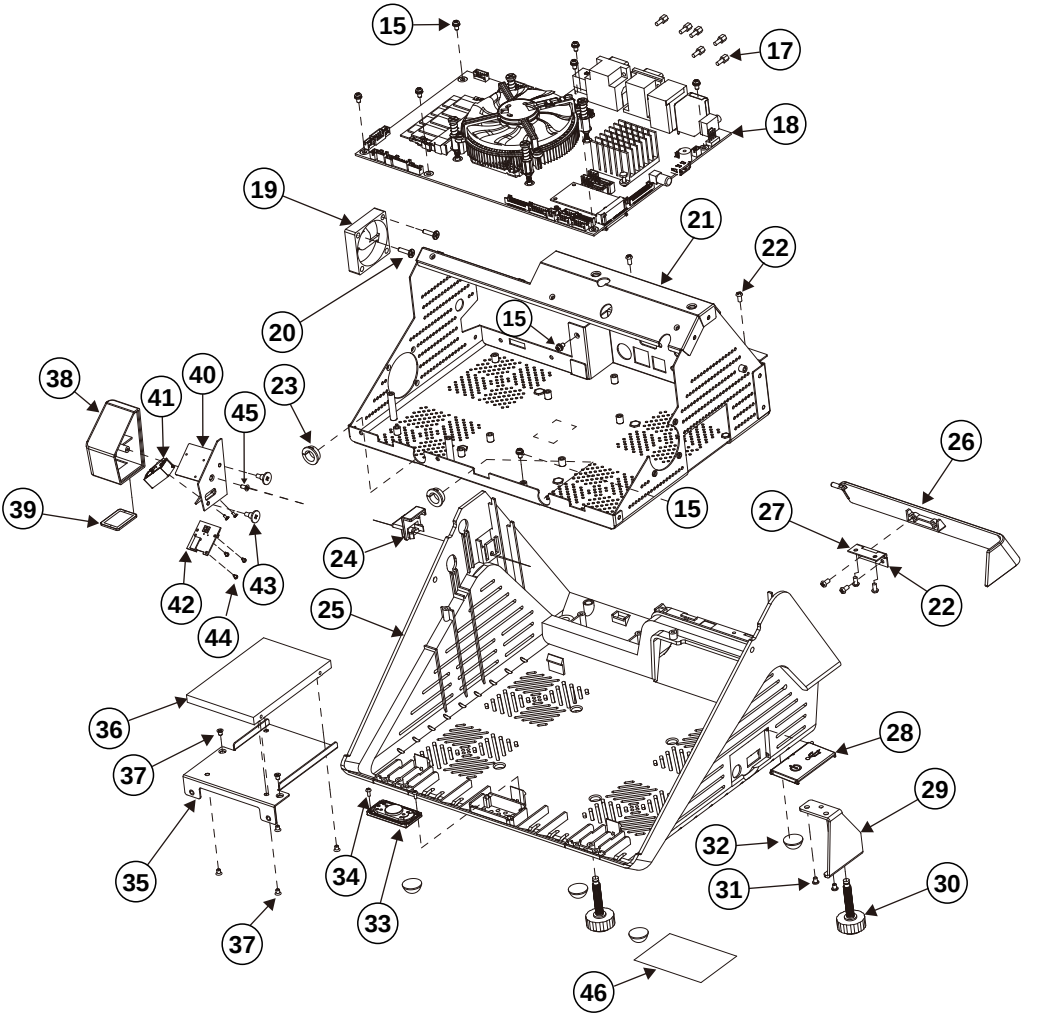
Open the System Top Module



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-A901 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

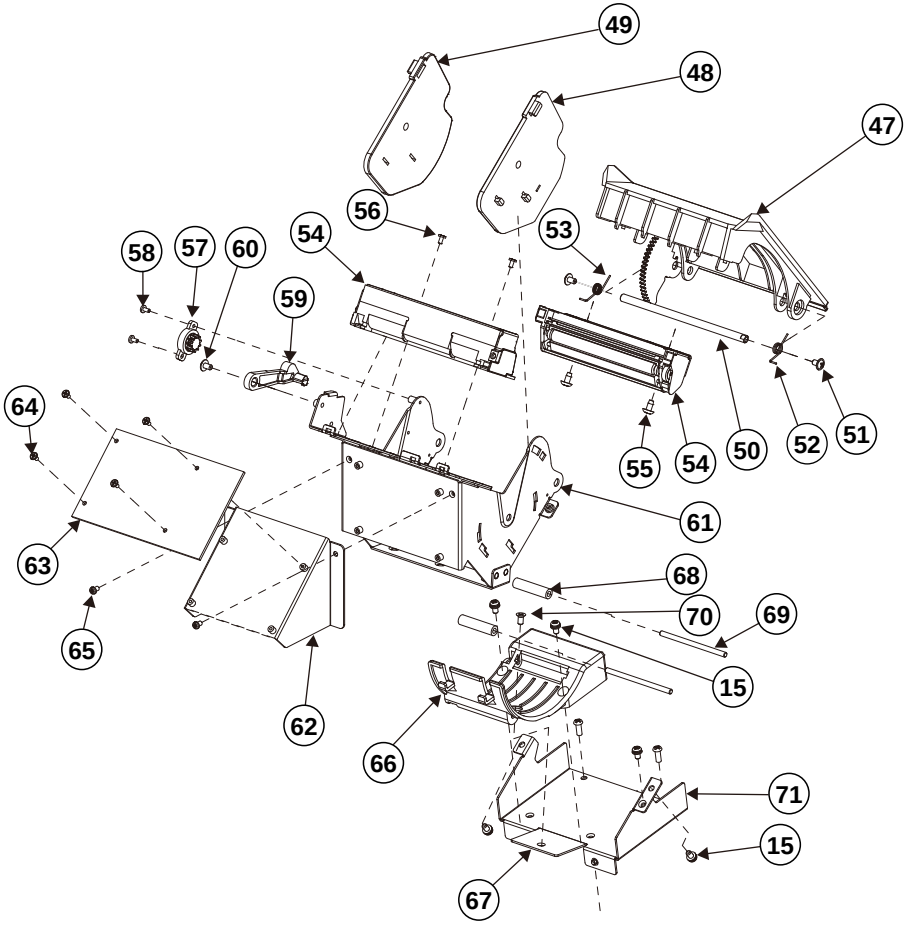
Exploded Diagram For Main Board and Bottom Cover Assembly



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

ITEM	Description	Part No.	Q'ty
15	Round Head With Spring Washer Screw M3x0.5Px6mm	22-232-30060211	8
17	HEX CU BOSS UNC No.4-40,L=4.8,H=7mm	22-392-40048005	6
18	PB-6980 Mother Board	PB-6980RB-C1N	1
19	System Fan (40x40x10.5mm) L=80mm	21-004-04040376	1
20	Fillister Head Screw M3x0.5Px12mm (Black)	22-275-30010011	2
21	PA-A900 PC Case A901	20-001-03002477	1
22	Round Head Screw #2/T3x6mm	22-135-30006011	6
23	Open Closed Bushing (Black)	30-026-04300000	2
24	PA-A900 Printer Button (Black)	30-046-12210477	1
	PA-A900 Printer Button (White)	30-046-12110477	
25	PA-A900 Stand Bot Cover (Black)	30-002-12910477	1
	PA-A900 Stand Bot Cover (White)	30-002-12410477	
26	PA-A900 I/O Cover (Black)	30-002-12610477	1
	PA-A900 I/O Cover (White)	30-002-12110477	
27	PA-A901 Stainless Steel Butterfly Hinge	20-012-07001471	1
28	PS-3100 Side Door (Black)	30-007-28210165	1
	PS-3100 Side Door (NKC White)	30-007-28410165	
29	PA-A900 Foot Bracket (w/Paint)(Black)	20-006-02061477	1
	PA-A900 Foot Bracket (w/Paint)(White)	20-006-02062477	
30	Handle Head Screw M6x1.0Px35mm,L=12.2	22-289-60035007	2
31	Pan Head Screw #2/M3x0.5Px4mm	22-222-30004911	2
32	Rubber Foot (Φ=15.7x8mm)(Black)	30-004-01500000	4
33	PA-6222/6225 Speaker Cable L=250mm	27-021-33505071	1
34	Pan Head Screw T2.0x5mm	22-122-20005011	2
35	PA-A900 HDD Bracket 6980	20-006-03003477	1
36	HDD	N/A	1
37	Flat Head Screw M3x0.5Px4.5mm (Black)	22-222-30004011	6
38	PA-A900 Scanner Housing (Black)	30-014-12210477	1
	PA-A900 Scanner Housing (White)	30-014-12110477	
39	PA-A900 Scanner Lens (Transparent)	30-021-10130477	1
40	PA-A900 Scanner Bracket	20-206-03001477	1
41	2D Scan Engine	52-820-32960113	1
42	DC/DC Converter Board	52-152-22000364	1
43	Fillister Head Screw M3x0.5Px4.8mm	82-272-30005013	2
44	Pan Head Screw M1.6x0.35Px3mm	22-222-16003015	5
45	Flat Head Screw #1/T2.6x6mm	22-112-26006011	1
46	PA-A901 Rating Label (60x40mm)	94-017-01901471	1

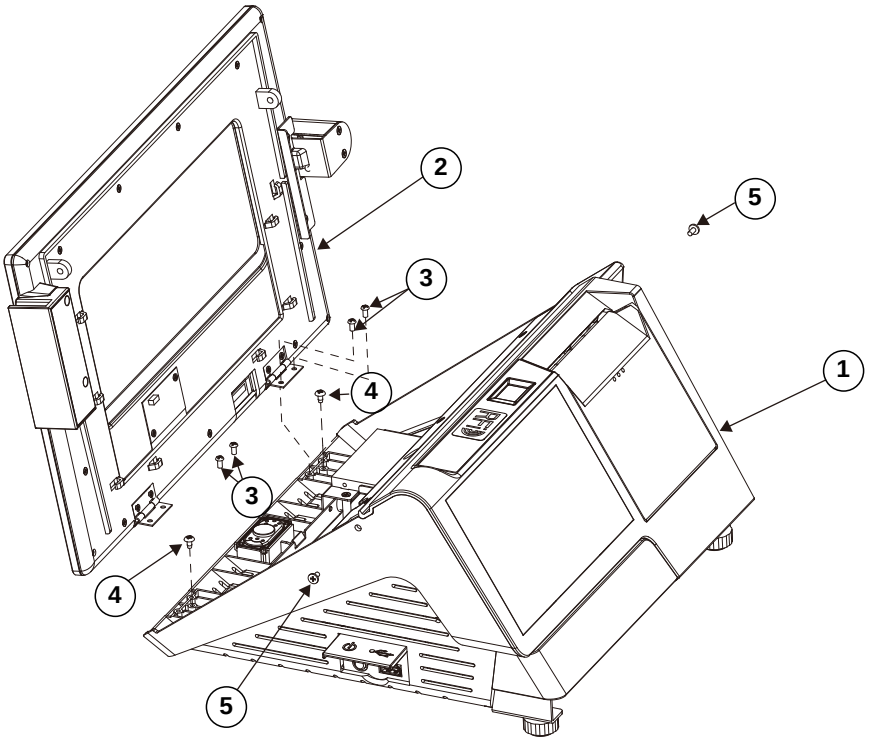
Exploded Diagram For Printer Module Assembly



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

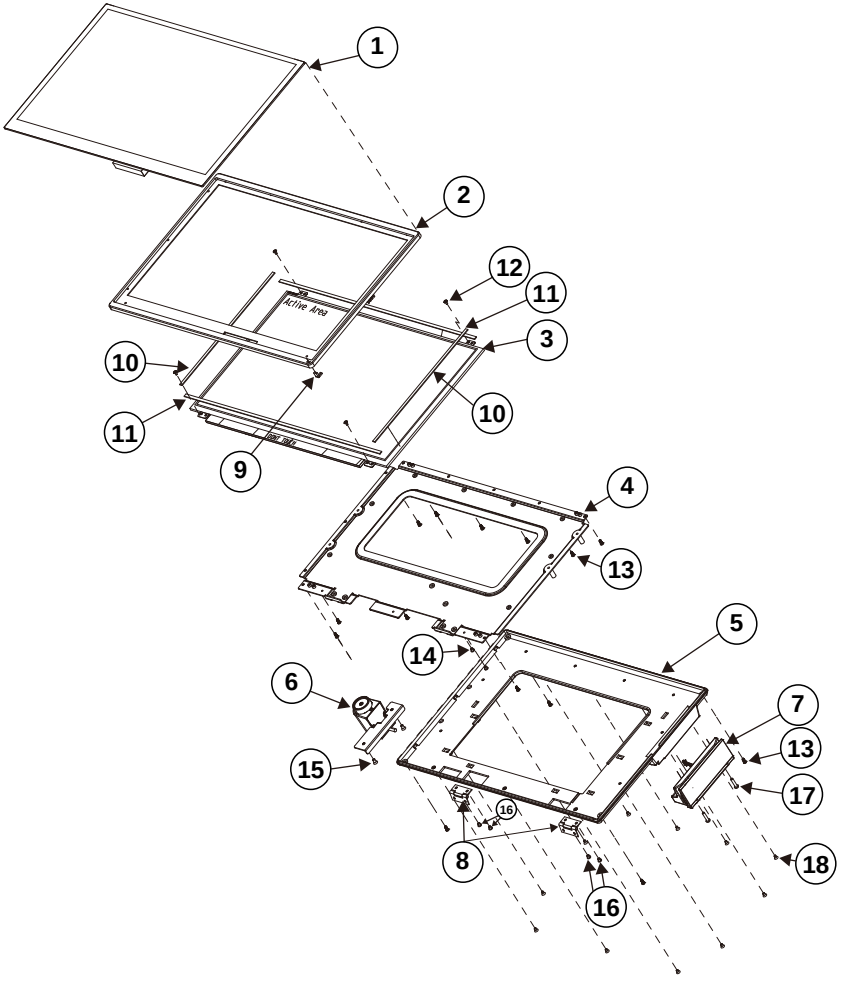
ITEM	Description	Part No.	Q'ty
15	Round Head With Spring Washer Screw M3x0.5Px6mm	22-232-30060211	5
47	PA-A900 Printer Cover-1 (Black)	30-002-12710477	1
	PA-A900 Printer Cover-1 (White)	30-002-12210477	
48	POS-6600 3IN Side Wall L (Black)	30-002-28710199	1
49	POS-6600 3IN Side Wall R (Black)	30-002-28610199	1
50	POS-6600 Paper Cover Pin	20-045-19011199	1
51	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	2
52	Rotate Spring For Printer L (ϕ 5)	23-000-06000502	1
53	Rotate Spring For Printer R (ϕ 5)	23-000-05000502	1
54	3"/24V Thermal Printer Mechanism, Speed:170 mm/sec	52-701-07017003	1
55	Pan Head Screw T3.0x8mm(Black)	22-122-30080011	2
56	Fillister Head Screw #1/M2x0.4Px4mm	22-272-20004011	2
57	Rotary Damper (15gf-cm) (Black)	90-022-09100314	1
58	Fillister Head Screw #1/M2x0.4Px4mm	22-272-20004011	2
59	POS-6600 Printer Add Arm Cover (Black)	30-002-09110199	1
60	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	1
61	POS-6600 Printer Box3 ASSY	20-040-03002199	1
62	PA-A900 Printer CB Adapter Bracket	20-006-03005477	1
63	HSF, Printer Control Board USB/RS232, with 2D-Barcdoe printing	MB-1030RB-11N	1
64	Fillister Head Screw #1/M2x0.4Px4mm	22-272-20004011	4
65	Round Head Screw M2.5x0.45Px4mm	22-232-25004011	2
66	PA-A900 3IN Roller Seat (Black)	30-031-09130477	1
67	PA-A900 3IN Printer Roller Bracket	20-006-03001477	1
68	PS-3100 Spacer Support (Φ 6x25mm)	30-041-04100165	2
69	POS-6600 Roller Pin	20-045-19012199	2
70	Flat Head Screw M3x0.5Px4.5mm (Black)	22-222-30004011	1
71	Round Head Screw #2/T3.0x8mm (Black)	22-135-30008311	2

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

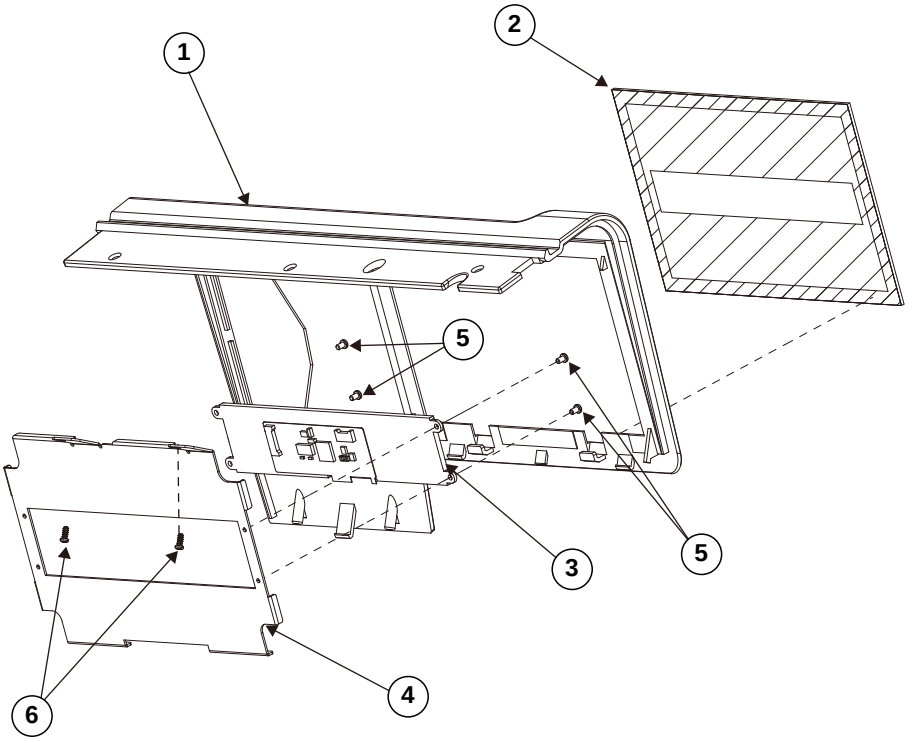
LCD Display and Touch Assembly Exploded Diagram



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-A901-GZZ-71A	1
8	PA-A901 Stainless Steel Butterfly Hinge	20-012-07001471	2
9	PA-A901 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-A901 7" VFD Cover Glass	34-024-02302471	1
3	PA-A901 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

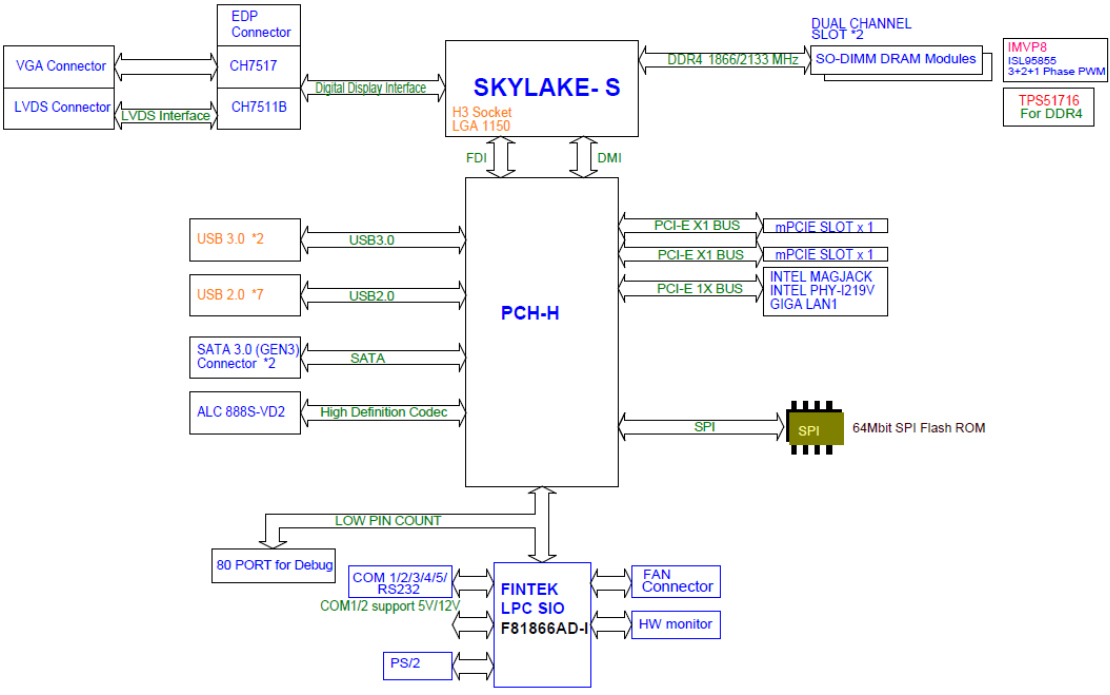
Appendix B Technical Summary

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

The following topics are included:

- Block Diagram
- Interrupt Map
- I/O Map
- Memory Map
- Configuring Watchdog Timer
- Flash BIOS Update

Block Diagram



Interrupt Map

IRQ	ASSIGNMENT
IRQ 0	System timer
IRQ 1	Standard PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 6	Communications Port (COM5)
IRQ 7	Communications Port (COM3)
IRQ 8	System CMOS/real time clock
IRQ 10	Communications Port (COM4)
IRQ 11	Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123
IRQ 11	Intel(R) 100 Series/C230 Series Chipset Family Thermal subsystem - A131
IRQ 13	Numeric data processor
IRQ 14	Motherboard resources
IRQ 16	Standard AHCI 1.0 Serial ATA Controller
IRQ 16	High Definition Audio Controller
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System
IRQ 83	Microsoft ACPI-Compliant System
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	ASSIGNMENT
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 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	ASSIGNMENT
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 170	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
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 4294967294	Intel(R) Ethernet Connection (2) I219-V
IRQ 4294967292	Intel(R) USB 3.0 eXtensible Host Controller
IRQ 4294967293	Intel(R) HD Graphics 510
IRQ 4294967291	Intel(R) Management Engine Interface

Note: These resource information were gathered using Windows 7 (the IRQ could be assigned differently depending on OS).

I/O Map

I/O	ASSIGNMENT
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x0000F090-0x0000F097	Standard AHCI 1.0 Serial ATA Controller
0x0000F080-0x0000F083	Standard AHCI 1.0 Serial ATA Controller
0x0000F060-0x0000F07F	Standard AHCI 1.0 Serial ATA Controller
0x000002F0-0x000002F7	Communications Port (COM5)
0x00000000-0x00000CF7	PCI bus
0x00000D00-0x0000FFFF	PCI bus
0x00000070-0x00000077	System CMOS/real time clock
0x00000070-0x00000077	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000F040-0x0000F05F	Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x00001800-0x000018FE	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x0000FF00-0x0000FFFE	Motherboard resources

I/O	ASSIGNMENT
0x00000800-0x0000087F	Motherboard resources
0x00001854-0x00001857	Motherboard resources
0x000000F0-0x000000F0	Numeric data processor
0x0000F000-0x0000F03F	Intel(R) HD Graphics 510
0x000003B0-0x000003BB	Intel(R) HD Graphics 510
0x000003C0-0x000003DF	Intel(R) HD Graphics 510
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
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
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
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

Memory Map

MEMORY MAP	ASSIGNMENT
0xFED00000-0xFED003FF	High precision event timer
0xDF048000-0xDF049FFF	Standard AHCI 1.0 Serial ATA Controller
0xDF04C000-0xDF04C0FF	Standard AHCI 1.0 Serial ATA Controller
0xDF04B000-0xDF04B7FF	Standard AHCI 1.0 Serial ATA Controller
0xDF040000-0xDF043FFF	High Definition Audio Controller
0xDF020000-0xDF02FFFF	High Definition Audio Controller
0xA0000-0xBFFFF	PCI bus
0xA0000-0xBFFFF	Intel(R) HD Graphics 510
0x90000000-0xDFFFFFFF	PCI bus
0xFD000000-0xFE7FFFFF	PCI bus
0xFD000000-0xFE7FFFFF	Motherboard resources
0xDF044000-0xDF047FFF	Intel(R) 100 Series/C230 Series Chipset Family PMC - A121
0xFED10000-0xFED17FFF	Motherboard resources
0xFED18000-0xFED18FFF	Motherboard resources
0xFED19000-0xFED19FFF	Motherboard resources
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFED20000-0xFED3FFFF	Motherboard resources
0xFED90000-0xFED93FFF	Motherboard resources
0xFED45000-0xFED8FFFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Intel(R) 82802 Firmware Hub Device
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xDFFE0000-0xDFFFFFFF	Motherboard resources
0xDF04A000-0xDF04A0FF	Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123
0xFDAF0000-0xFDAFFFFF	Motherboard resources
0xFDAE0000-0xFDAEFFFF	Motherboard resources
0xFDAC0000-0xFDACFFFF	Motherboard resources
0xDF000000-0xDF01FFFF	Intel(R) Ethernet Connection I219-V
0xDF030000-0xDF03FFFF	Intel(R) USB 3.0 eXtensible Host Controller

MEMORY MAP	ASSIGNMENT
0xFDAD0000-0xFDADFFFF	Motherboard resources
0xFDB00000-0xFDFFFFFF	Motherboard resources
0xFE000000-0xFE01FFFF	Motherboard resources
0xFE036000-0xFE03BFFF	Motherboard resources
0xFE03D000-0xFE3FFFFF	Motherboard resources
0xFE410000-0xFE7FFFFF	Motherboard resources
0xDE000000-0xDEFFFFFF	Intel(R) HD Graphics 510
0xC0000000-0xCFFFFFFF	Intel(R) HD Graphics 510
0xDF04E000-0xDF04EFFF	Intel(R) 100 Series/C230 Series Chipset Family Thermal subsystem - A131
0xFE40F000-0xFE40FFFF	Intel(R) Management Engine Interface

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 second as counting unit -----------------------------------
dec     dx
mov     al,     0F5h
out     dx,     al
inc     dx
in      al,     dx
and     al,     30h
out     dx,     al
; ---------------- Set timeout interval as 30seconds and start counting --------------
dec     dx
mov     al,     0F6h
out     dx,     al
inc     dx
mov     al,     1Eh
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. 69801PH1.bin) to the storage device.

3 Copy AMI flash utility – AFUEFIx64.exe (v5.09.01) 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.

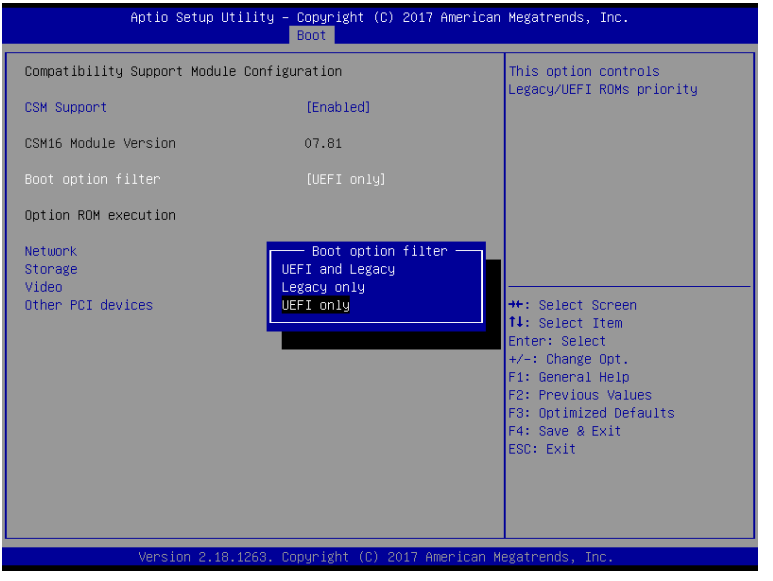
(1) Connect the USB storage device.

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

(3) System will go into the BIOS setup menu.

(4) Select **[Boot]** menu and enter into **[CSM Configuration]** menu.

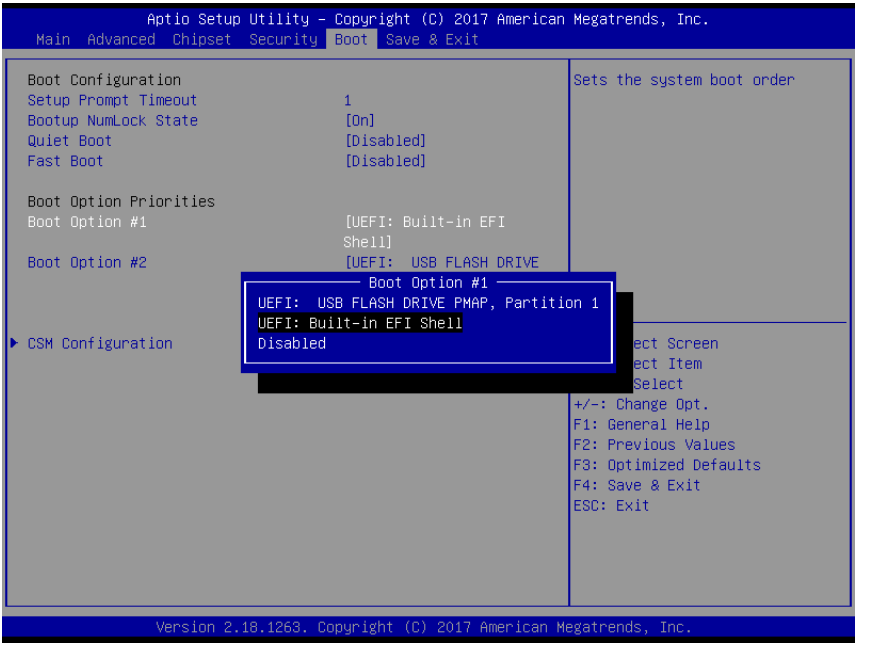
(5) Set **[Boot option filter]** to **[UEFI Only]** and press <F4> key to save the configuration and restart the system.



(6) Press <**ESC**> or <**DEL**> to enter into BIOS setup menu again.

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

(8) 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 6980xxxx.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 system unable to boot up next time.

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

```
fs0:\afuefix64> afuefix64 69801PH1.bin /p /b /n /x

  +-------------------------------------------------------------------+
  |                    AMI Firmware Update Utility  v5.09.01.1317     |
  |   Copyright (C) 2017 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.