

USER MANUAL

PA-A310

10.1" POS Terminal

Powered by Intel® Celeron®

J3355 / 3455 CPU

PA-A310 M1

***10.1” Fanless POS Terminal
with Intel[®] Celeron[®]
J3355 / 3455 CPU***

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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.

	<p>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.</p>
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	<p>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.</p>
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Revision History

The revision history of PA-A310 User Manual is described below:

Version No.	Revision History	Page No.	Date
M1	Initial Release	-	2019/10/02

1

Introduction

This chapter provides the introduction for the PA-A310 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-A310 system. The PA-A310 is an updated system designed to be comparable with the highest performance of IBM AT personal computers. The PA-A310 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-A310 system. Read the safety reminders carefully on how to take care of your system properly.

Chapter 3 System Configuration

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

Chapter 4 Software Utilities

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

Chapter 5 AMI BIOS Setup

This chapter provides BIOS setup information.

Appendix A System Assembly Diagrams

This appendix provides the exploded diagrams and part numbers of the PA-A310.

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-A310 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

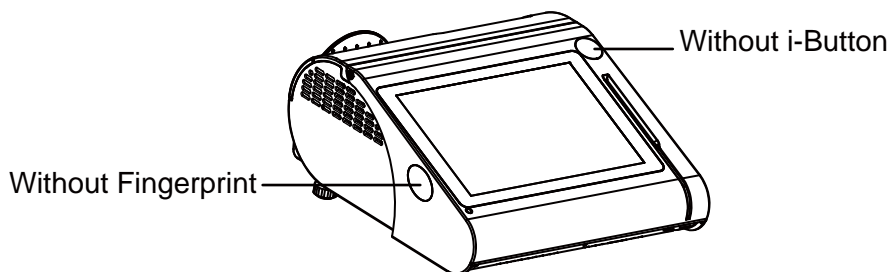
If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

Item	Q'ty
PA-A310	1
Manual / Driver DVD	1
Quick Reference Guide	1
AC Power Cord (Optional)	1
MSR Card Reader (Optional)	1
i-Button + MSR Card Reader (Optional)	1
Barcode Scanner (Optional)	1
Wireless LAN (IEEE 802.11 b+g) (Optional)	1
VFD (Optional)	1

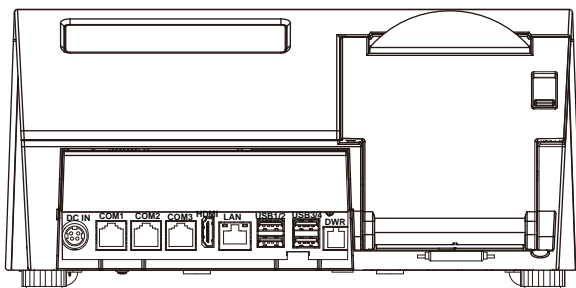
2.2 System Views Without i-Button and Fingerprint Modules

2.2.1 Front View

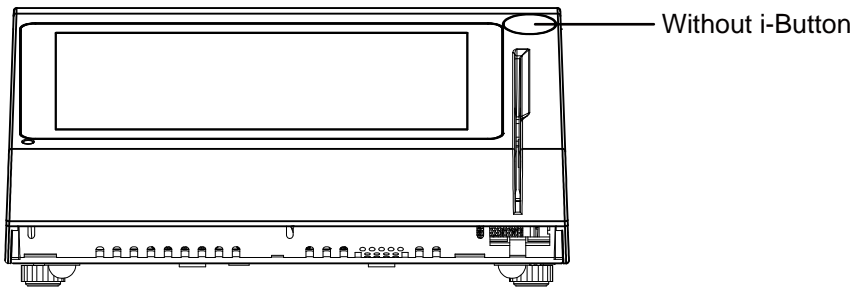
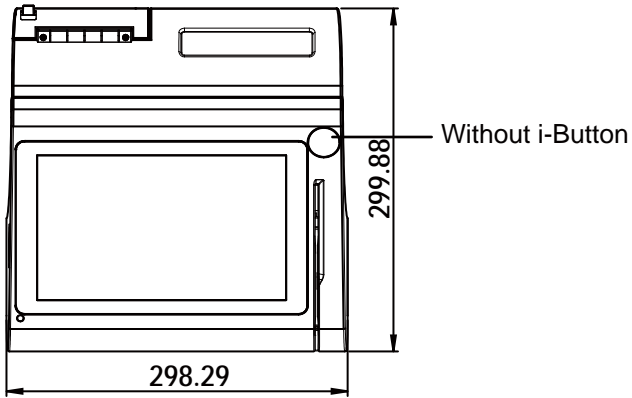
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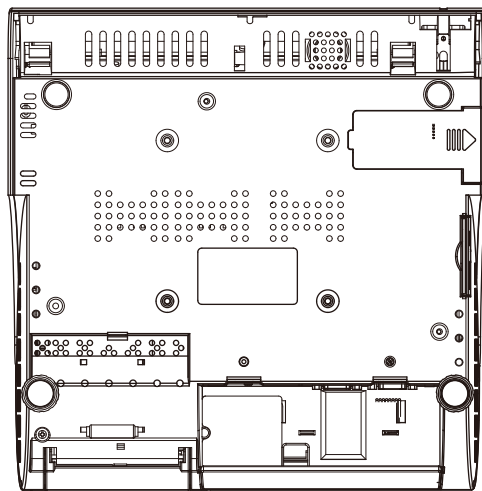
2.2.2 Rear View



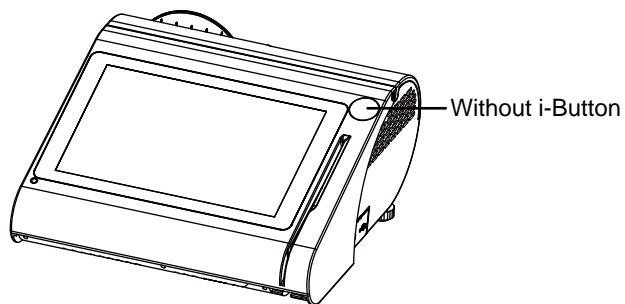
2.2.3 Top View



2.2.4 Bottom View



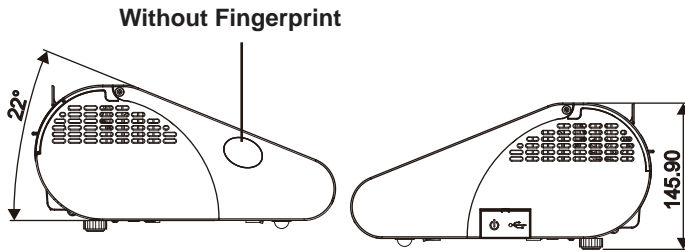
2.2.5 Quarter View



2.2.6 Side View

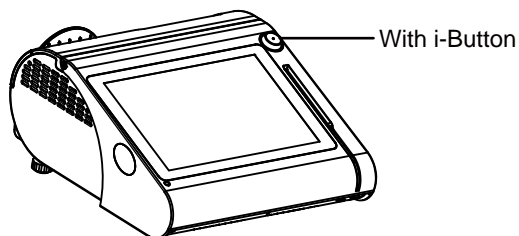
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Without Fingerprint module

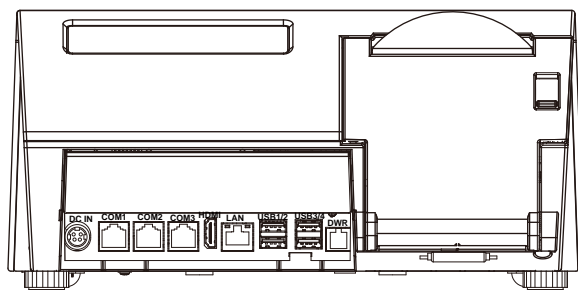


2.3 System Views With i-Button Module

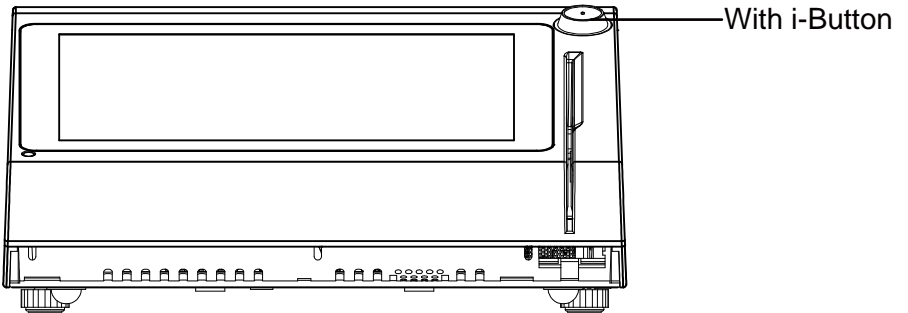
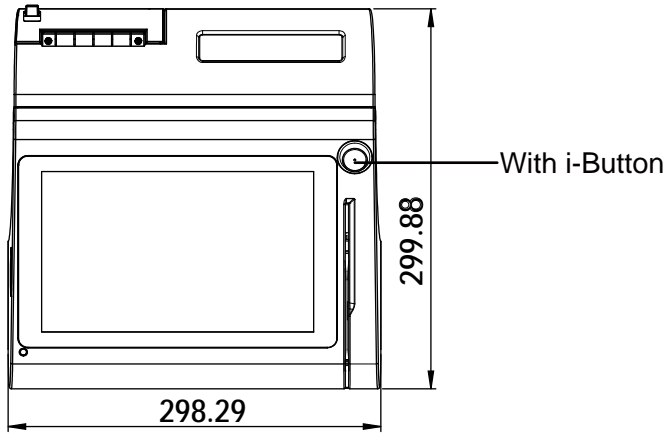
2.3.1 Front View



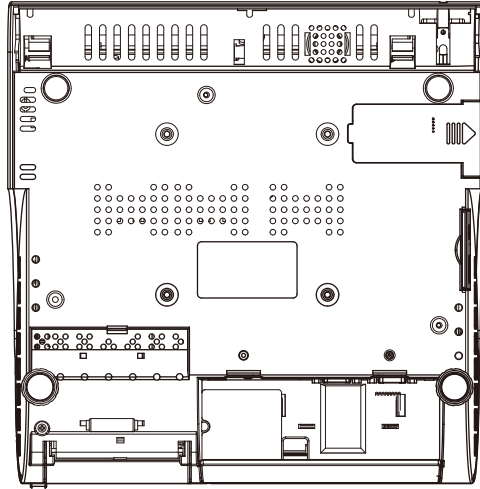
2.3.2 Rear View



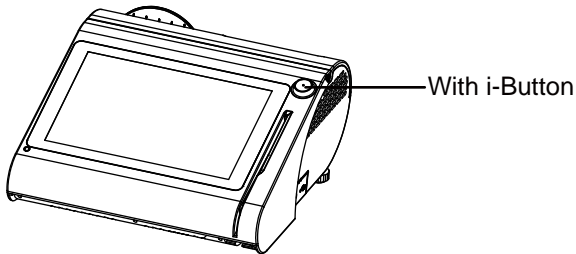
2.3.3 Top View



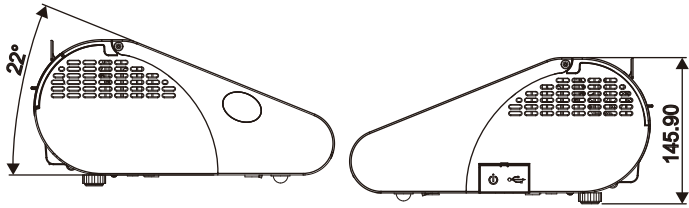
2.3.4 Bottom View



2.3.5 Quarter View

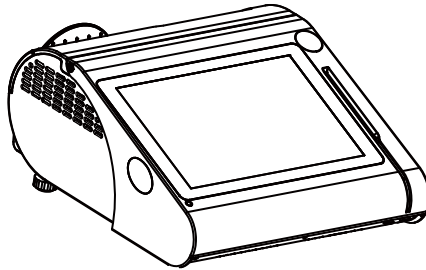


2.3.6 Side View

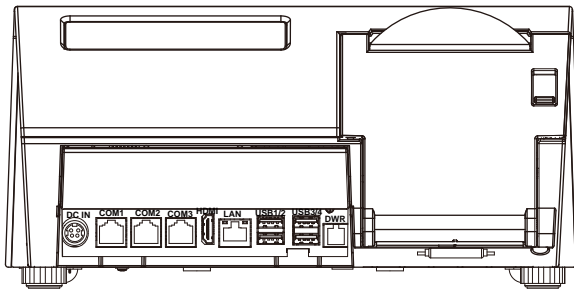


2.4 System Views With Fingerprint Module

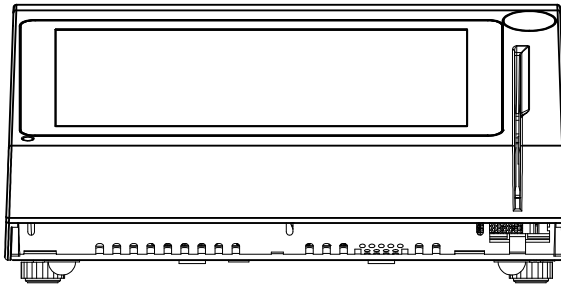
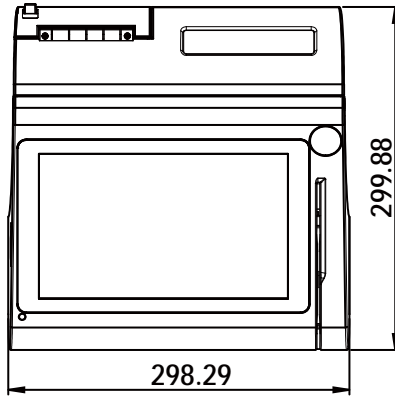
2.4.1 Front View



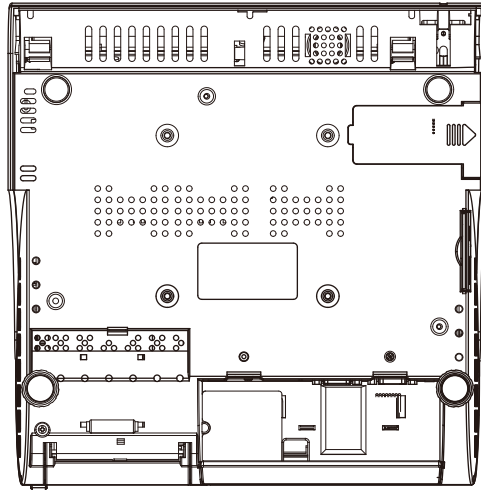
2.4.2 Rear View



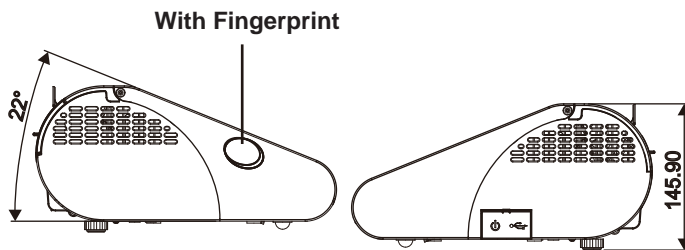
2.4.3 Top View



2.4.4 Bottom View



2.4.5 Side View



2.5 System Specifications

System	
CPU Support	➤ Intel® Celeron® J3355 / 3455 CPU
Memory	➤ 1 x DDR3L SO-DIMM Slot (up to 8GB)
Network	➤ 10/100/1000Mbps Base-T Fast Ethernet
Power Supply	➤ 60~90 Watt power adapter
Audio	➤ 2W speaker
System Weight	➤ with power adaptor approx. 4kg
Dimensions (W x H x D)	➤ 299 x 148 x 300mm
O.S. Support	➤ Windows 10
Storage	
SATA	➤ 1 x 2.5" HDD or SSD ➤ 1 x M.2 2242 (SATAIII interface)
I/O Ports	
USB	➤ Rear: 2 x USB 3.0 + 2 x USB 2.0 (optional) 2 x USB 2.0 + 1 x power USB (+12V/+24V) ➤ 1 x USB 2.0 on side bezel
Serial Ports	➤ 3 x RJ45 (all support +5V/12V selectable)+ 1 (optional) x DB9
LAN	➤ 1 x RJ45
VGA	➤ 1 x DB15
HDMI	➤ 1 x HDMI
Cash Drawer	➤ 1 + 1 (option, with Y cable) x RJ11 (+12V or +24V selectable)
Line Out	➤ 1 (optional) x phone jack
DC IN	➤ 1 x 4-pin DC Power Jack
Peripheral	
Customer Display	➤ VFD, 20 columns and 2 lines, each column is 5 x 7 dots
Printer	➤ 2" or 3" easy loading thermal printer with auto-cutter
MSR & i-Button	➤ JIS-I or II, ISO Track1+2+3 (PS/2 interface)
Fingerprint	➤ 8-bit grayscale reader
Display	
LCD	➤ 10.1" TFT LCD

Resolution	➤ 1280 x 800
Brightness	➤ 400 cd/m ²
Touchscreen	➤ 10.1" Capacitive Touch panel, USB interface (EETI controller)
Tilt Angle	➤ 24 ~ 30 degrees
Environment	
EMC & Safety	➤ CE / FCC
Operating Temp.	➤ 0°C ~ 35°C (32°F ~ 95°F)
Storage Temp.	➤ -5°C ~ 60°C (23°F ~ 140°F)
Humidity	➤ 20% ~ 90%

2.6 Safety Precautions

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

1. Check the Line Voltage
 - The operating voltage for the power supply should be within the range of 100V to 240V AC; otherwise, the system may be damaged.
2. Environmental Conditions
 - Place your PA-A310 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
 - Avoid installing your PA-A310 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-A310 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-A310 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.

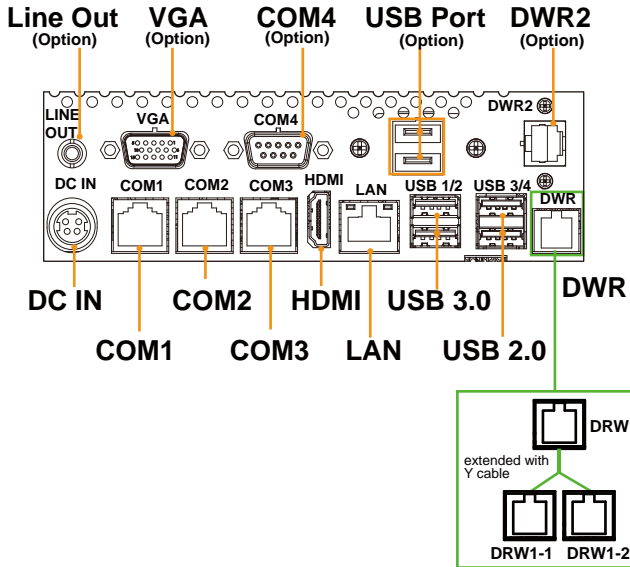
The following topics are included:

- 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
 - MB-1030 series
 - MB-1011 & MB-1013
- Setting VFD Board Connectors and Jumpers
- Setting MSR

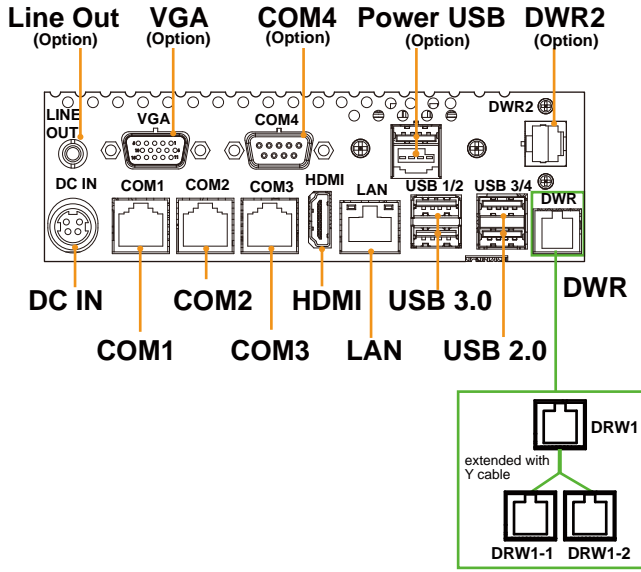
3.1 External System I/O Ports Diagram & Pin Assignment

3.1.1 Rear I/O Ports Diagram

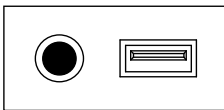
Type 1



Type 2



Side I/O



Power Button USB7

3.2 Jumper & Connector Quick Reference Table

JUMPER Description	NAME
USB2 Port Selection	JP_USB2
USB3 Port Selection	JP_USB3_1, JP_USB3_2
USB5 Port Selection	JP_USB5
LVDS Voltage Selection	JP_VDD1
Force DNX Firmware Load Selection	JP1
Flash Descriptor Override Selection	JP1
Clear CMOS Data Selection	JP3
LVDS Sequence Control Selection	JP4
LVDS Backlight Enable Voltage Selection	JP5
COM4 and i-Button Function Selection	JP6, JP7, JP8
Cash Drawer Control Selection	JP11
Slide Switch for LVDS Resolution Selection	SW1

System CONNECTOR Description	NAME
DC_IN Port (rear I/O)	DC_IN1
COM Ports and Cash Drawer Port (rear I/O)	COM1, COM2, COM3, COM4, DWR1
HDMI Port & VGA Port (rear I/O)	HDMI1, VGA (optional)
LAN Port (rear I/O)	LAN1
Dual USB 3.0 Ports (rear I/O)	USB1
Dual USB 2.0 Ports (rear I/O)	USB3_1
USB 2.0 Port (side I/O)	USB7
COM Connectors	COM1_1, COM2_1, COM4
VGA Connector	JVGA1
USB 2.0 Connectors	USB3_2, USB2, USB5, USB6, JUSB7
HD Audio Connector	JAUD1
LVDS Inverter Connector	JINV1

System CONNECTOR Description	NAME
LVDS Connector	LVDS1
M.2 Wi-Fi Express Slot	M2_E
M.2 SSD Express Slot	M2_M
SATA 3.0 & SATA Power Connectors	SATA1, SATA_PWR1
LPC Connector	JLPC1
Fan Connector	FAN_1
Power Output Connectors	OUT_5V, OUT12V_1, OUT12V_2, OUT_24V
RTC Connector	BAT1
PS/2 (MSR) Connector	PS2
Speaker Connector	JSPK1
Switch LED Connectors	SW2, LED1

3.3 Component Locations Of System Main Board

3.3.1 Top View of System Main Board

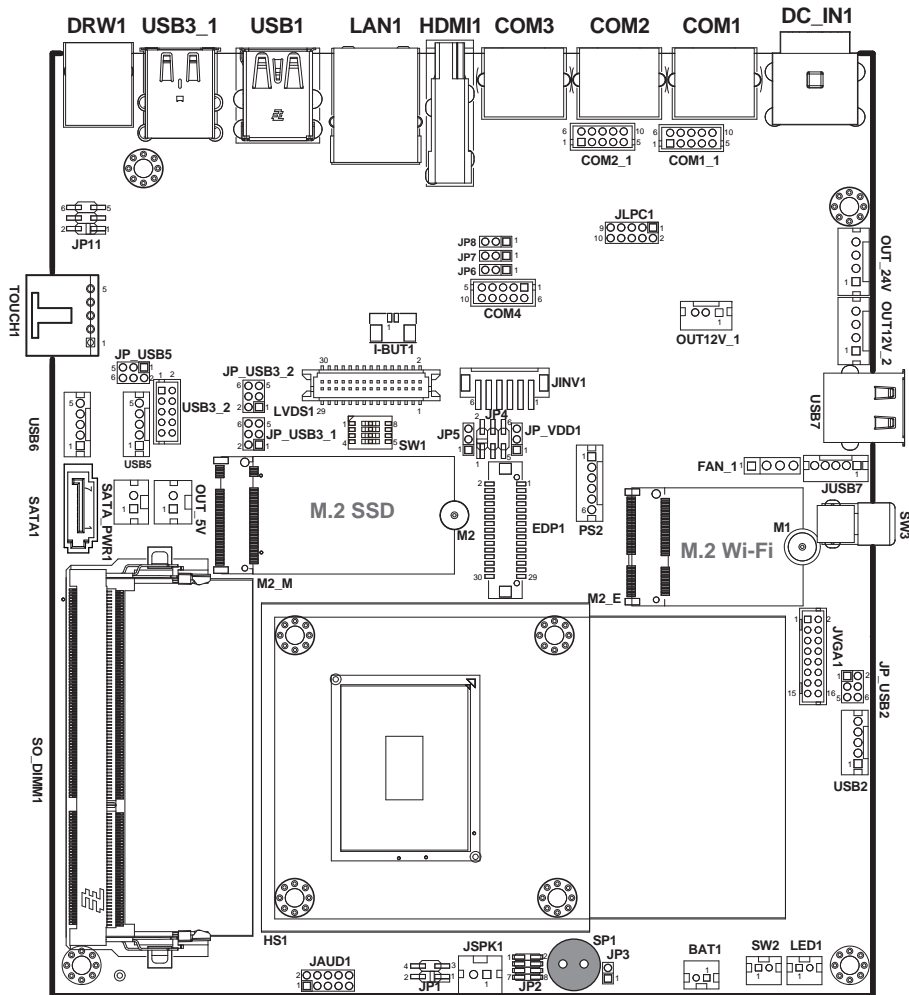



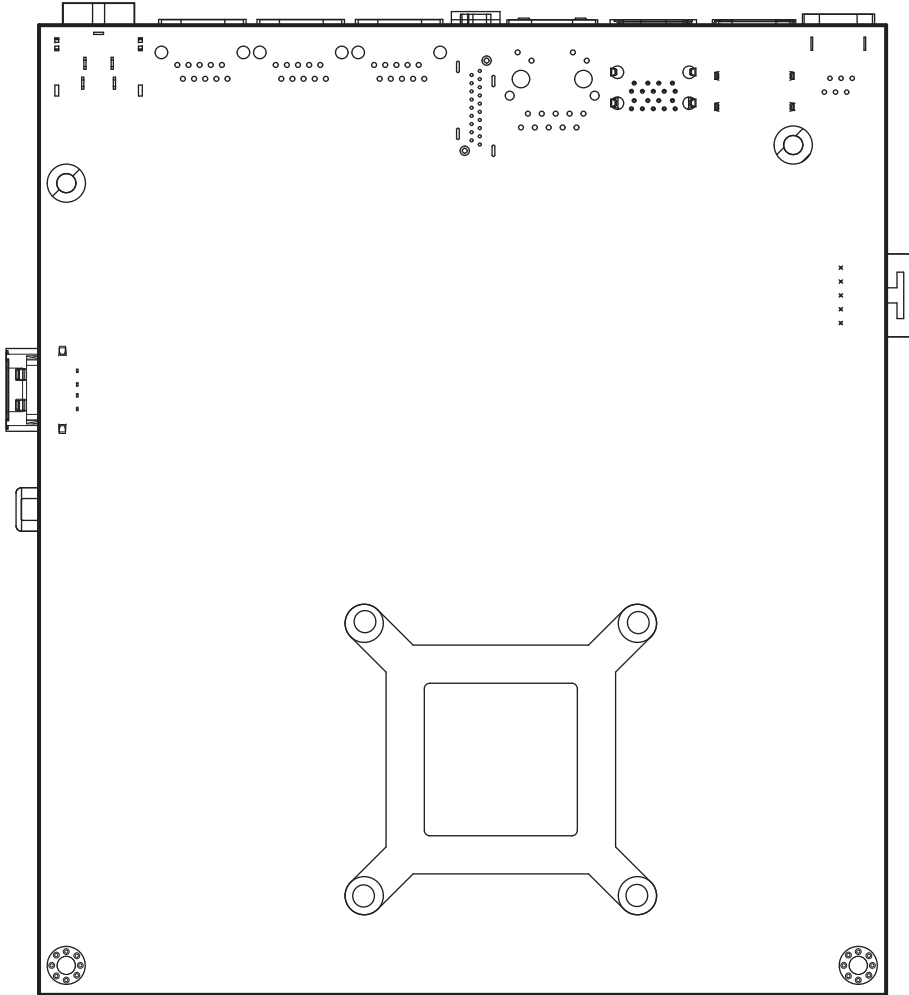


Figure 3-1. Main Board Component Location (Top View)

	<p>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-A900 is properly grounded.</p>
	<p>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.</p>
	<p>CAUTION: Always touch the motherboard components by the edges. Never touch components such as a processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch the main board components.</p>

3.3.2 Bottom View of System Main Board

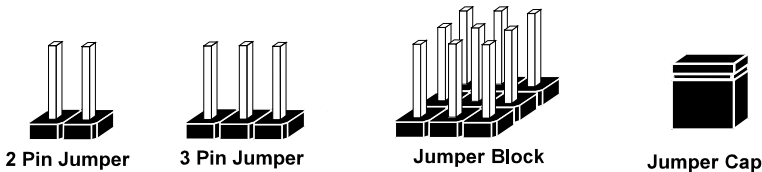


3.4 How To Set Jumpers

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

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

Jumpers & Caps

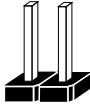


If a jumper has three pins, for example, labeled 1, 2 and 3. You can connect pins 1 and 2 to create one setting and shorting. You can also select to connect pins 2 and 3 to create another setting. The format of the jumper picture will be illustrated throughout this manual. The figure below shows different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

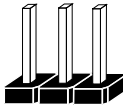
Jumper diagrams



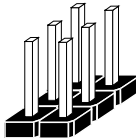
Jumper Cap looks like this



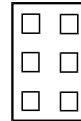
2 pin Jumper looks like this



3 pin Jumper looks like this



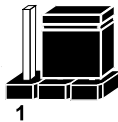
Jumper Block looks like this



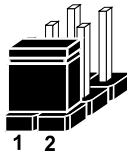
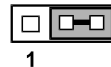
Jumper settings



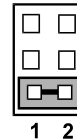
2 pin Jumper closed(enabled)
looks like this



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



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



3.5 Function Buttons and I/O Ports

3.5.1 Power Button

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

ACTION	ASSIGNMENT
Press	0V
Release	+3.3V



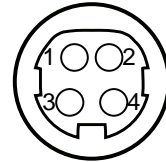
Power Button

3.5.2 DC_IN Port (DC_IN1)

Port Name: DC_IN1

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

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



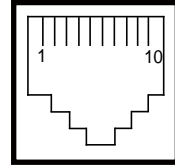
DC_IN1

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

Port Name: COM1, COM2, COM3 (RS-232)

Description: COM Ports (rear I/O)

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

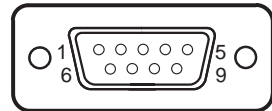


COM1/
COM2/
COM3

Port Name: COM4 (optional)

Description: D-Sub9 Serial Port (rear I/O)

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

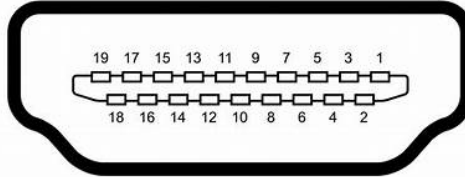


COM4
(optional)

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

Port Name: HDMI1

Description: HDMI Connector (rear I/O)



HDMI1

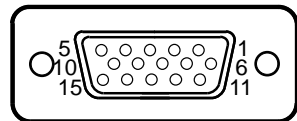
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DP0_HDMI_P2	2	GND
3	DP0_HDMI_N2	4	DP0_HDMI_P1
5	GND	6	DP0_HDMI_N1
7	DP0_HDMI_P0	8	GND
9	DP0_HDMI_N0	10	DP0_HDMI_CLKP
11	GND	12	DP0_HDMI_CLKN
13	NC	14	NC
15	DP0_HDMI_SCL_5V	16	DP0_HDMI_SDA_5V
17	GND	18	VCC5_HDMI
19	DP1_HDMI_HPD_IN	20	-

VGA Port (optional)

Port Name: VGA

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

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



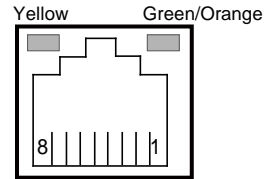
VGA

3.5.5 LAN Port (LAN1)

Port Name: LAN1

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

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



LAN1

LAN LED Status

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

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

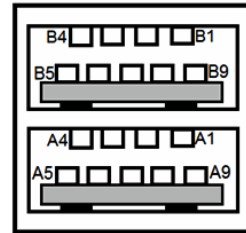
3.5.6 Dual USB 3.0 Ports (USB1)

Connector Location: USB1

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

USB 3.0 signals:

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



USB1

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

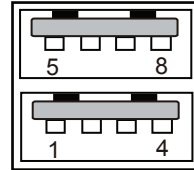
3.5.7 Dual USB 2.0 Ports (USB3_1)

Connector Location: USB3_1

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

USB 2.0 signals:

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



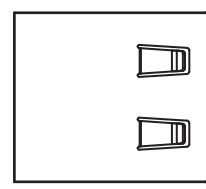
USB3_1

3.5.8 USB 2.0 Port (USB7)

Port Name: USB7

Description: USB 2.0 Port (side I/O)

PIN	ASSIGNMENT
1	VCC5_USB7
2	USB2_P7_DN
3	USB2_P7_DP
4	GND



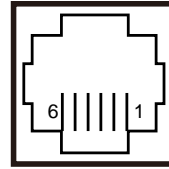
USB7

3.5.9 Cash Drawer Port (DWR1)

Port Name: DWR1

Description: DWR1 is used by default.

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



DWR1

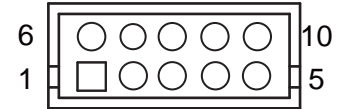
3.6 Setting Main Board Connectors and Jumpers

3.6.1 COM Connectors (COM1_1, COM2_1, COM4)

Connector Location: COM1_1, COM2_1 (RS-232)

Description: COM Connectors

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

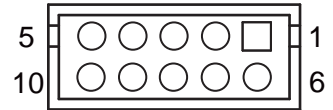


COM1_1/
COM2_1

Connector Location: COM4 (RS-232)

Description: COM4 Connector

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



COM4

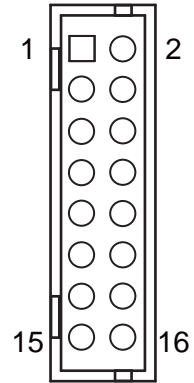
Note: COM4 will not function when jumpers JP6, JP7, JP8 are set as 2-3 connected (i-Button). Refer to the **COM4 & i-Button Function Selection** section for details.

3.6.2 VGA Connector (JVGA1)

Connector Location: JVGA1

Description: VGA Connector

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





JVGA1

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

Jumper Location: JP6, JP7, JP8

Description: COM4 and i-Button Function Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
COM4	1-2 <i>(Default Setting)</i>	 JP6/JP7/JP8
I-BUT	2-3	 JP6/JP7/JP8

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

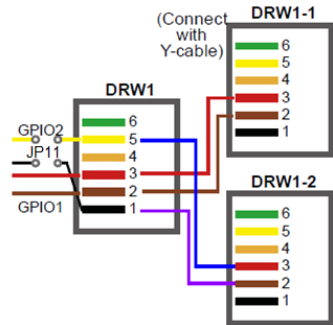
3.6.4 Cash Drawer Control Selection (JP11)

JP11: DRW1, DRW1-1, DRW1-2

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

Method 1:

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



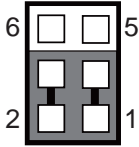
Method 2:

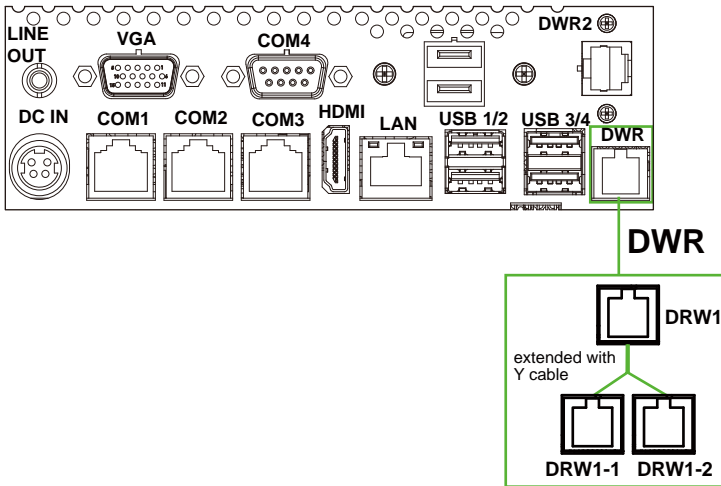
You can split DRW1 into two channels of DRW1-1 & DRW1-2 using the Y-Cable (option).

Jumper Location: JP11

Description: Cash Drawer Selection

Selection	Jumper Setting	Jumper Illustration
1 Drawer & 12V	3-5, 4-6 <i>(Default Setting)</i>	<p>JP11</p>
1 Drawer & 24V	2-4, 3-5	<p>JP11</p>
2 Drawers & 12V	1-3, 4-6	<p>JP11</p>

Selection	Jumper Setting	Jumper Illustration
2 Drawers & 24V	1-3, 2-4	 <p>JP11</p>



Step 3.

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

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

Cash Drawer Configuration

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

Configuration Sequence

To program [F81966](#) configuration registers, the following configuration sequence must be followed:

- (1) Enter the extended function mode
- (2) Configure the configuration registers
- (3) Exit the extended function mode

(1) Enter the extended function mode

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

(2) Configure the configuration registers

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

(3) Exit the extended function mode

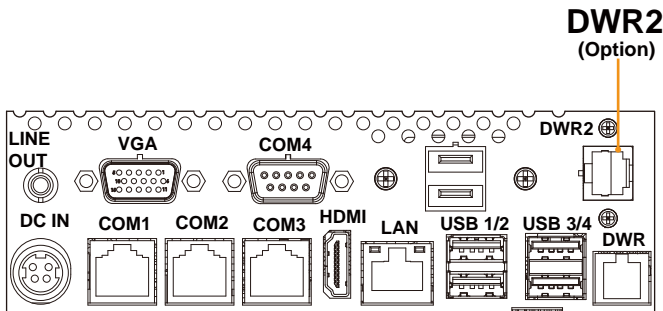
To exit the Extended Function Mode, [writing 0xAA to the EFER](#) is required. Once the chip exits the Extended Function Mode, it is in the normal running mode and is ready to enter the configuration mode.

Code example for open the cash drawer 1

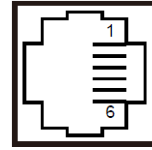
```
;----- Enter to extended function mode -----  
mov dx, 2eh  
mov al, 87h  
out dx, al  
out dx, al  
;----- Select Logical Device 6 of Cash drawer -----  
mov al, 07h  
out dx, al  
inc dx  
mov al, 06h  
out dx, al  
dec dx  
;----- Open the Cash drawer 1 -----  
mov al, 91h  
out dx, al  
inc dx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

Note:

The DWR2 Port can function only when the optional "Printer Kit" is installed on PA-A310. The DWR2 signals from the printer board (MB-1030, MB-1011, MB-1013) can be controlled via relevant commands. See the picture below for the location of DWR2 port:



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



DWR2

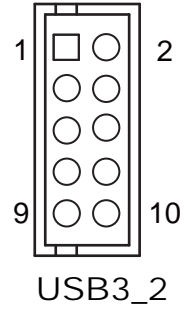
Control Codes	Hexadecimal Codes	Function
<DLE EOT>	10 04	Real-time status transmission
<DLE DC4>	10 14	Real-time output of the specified pulse

3.6.5 USB 2.0 Connector (USB3_2)

Connector Location: USB3_2

Description: USB 2.0 Connector

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

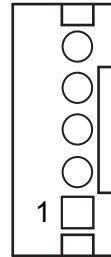


3.6.6 USB 2.0 Connectors (USB2, USB5, USB6, JUSB7)

Connector Location: USB2

Description: USB 2.0 Connector

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



USB2/

USB5/

USB6

Connector Location: USB5

Description: USB 2.0 Connector

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

Connector Location: USB6

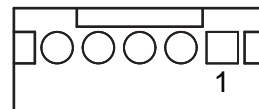
Description: USB 2.0 Connector

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

Connector Location: JUSB7

Description: USB 2.0 Connector

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



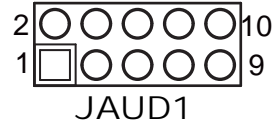
JUSB7

3.6.7 HD Audio Connector (JAUD1)

Connector Location: JAUD1

Description: HD Audio Connector

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

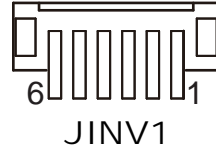


3.6.8 LVDS Inverter Connector (JINV1)

Connector Location: JINV1

Description: LVDS Inverter Connector

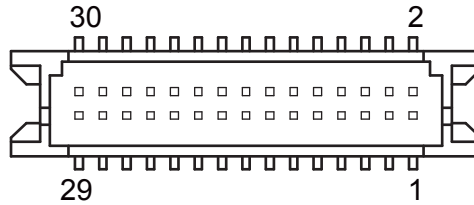
PIN	ASSIGNMENT
1	V12P0_INV
2	V12P0_INV
3	GND
4	LVDS_BKLCTL
5	GND
6	LVDS_BKLTEN



3.6.9 LVDS Connector (LVDS1)

Connector Location: LVDS1

Description: LVDS Connector



LVDS1

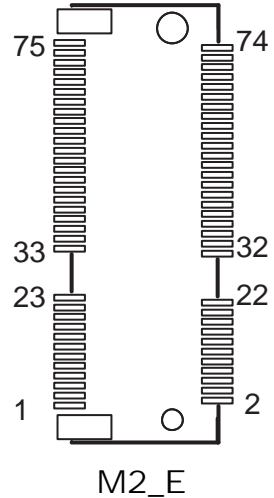
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	LVDS_VCC	2	GND
3	LVDS_CLKB_DN	4	LVDS_CLKB_DP
5	GND	6	LVDS_B2_DN
7	LVDS_B2_DP	8	GND
9	LVDS_B1_DN	10	LVDS_B1_DP
11	LVDS_B3_DP	12	LVDS_B3_DN
13	LVDS_B0_DP	14	LVDS_B0_DN
15	GND	16	LVDS_CLKA_DP
17	LVDS_CLKA_DN	18	GND
19	LVDS_A2_DP	20	LVDS_A2_DN
21	GND	22	LVDS_A1_DP
23	LVDS_A1_DN	24	GND
25	LVDS_A0_DP	26	LVDS_A0_DN
27	LVDS_A3_DP	28	LVDS_A3_DN
29	LVDS_VCC	30	LVDS_VCC

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

Connector Location: M2_E

Description: M.2 Wi-Fi Express Slot

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

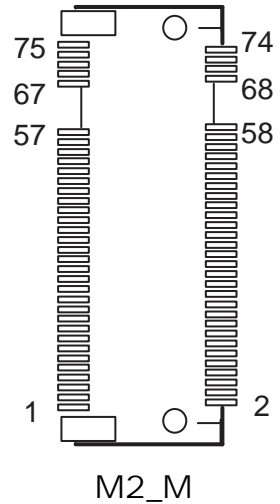


3.6.11 M.2 SSD Express Slot (M2_M)

Connector Location: M2_M

Description: M.2 SSD KEY M Slot

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

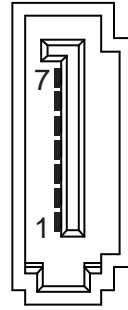


3.6.12 SATA 3.0 & SATA Power Connectors (SATA1, SATA_PWR1)

Connector Location: SATA1

Description: Serial ATA 3.0 connector

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

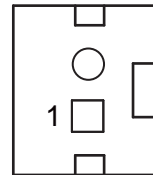


SATA1

Connector Location: SATA_PWR1

Description: HDD Power Connector

PIN	ASSIGNMENT
1	VCC5
2	GND



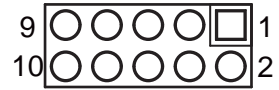
SATA_PWR1

3.6.13 LPC Connector (JLPC1)

Connector Location: JLPC1

Description: Low Pin Count Connector

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



JLPC1

3.6.14 Fan Connector (FAN_1)

Connector Location: FAN_1

Description: Fan Connector

PIN	ASSIGNMENT
1	GND
2	V12P0S
3	FANIN
4	FANOUT



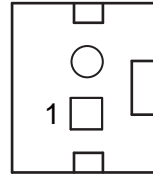
FAN_1

3.6.15 Power Output Connectors (OUT_5V, OUT12V_1, OUT12V_2, OUT24V)

Connector Location: OUT_5V

Description: Output 5V Wafer

PIN	ASSIGNMENT
1	V5P0S
2	GND

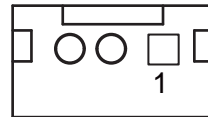


OUT_5V

Connector Location: OUT12V_1

Description: Output 12V Wafer

PIN	ASSIGNMENT
1	V12P0S
2	V12P0S
3	GND

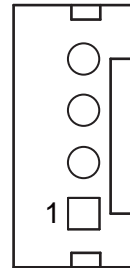


OUT12V_1

Connector Location: OUT12V_2

Description: Output 12V Wafer

PIN	ASSIGNMENT
1	V12P0S
2	V12P0S
3	GND
4	GND



OUT12V_2 /

OUT24V

Connector Location: OUT24V

Description: Output 24V Wafer

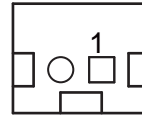
PIN	ASSIGNMENT
1	VIN_24V
2	VIN_24V
3	GND
4	GND

3.6.16 RTC Connector (BAT1)

Connector Location: BAT1

Description: RTC Connector

PIN	ASSIGNMENT
1	VBAT
2	GND



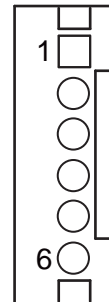
BAT1

3.6.17 PS/2 (MSR) Connector (PS2)

Connector Location: PS2

Description: PS/2 (MSR) Connector

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



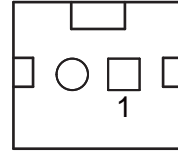
PS2

3.6.18 Speaker Connector (JSPK1)

Connector Location: JSPK1

Description: Speaker Connector

PIN	ASSIGNMENT
1	HD_SPK_R
2	HD_SPK_L



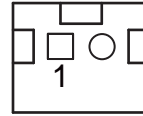
JSPK1

3.6.19 Switch LED Connectors (SW2, LED1)

Connector Location: SW2

Description: Power Button

PIN	ASSIGNMENT
1	GND
2	PWRBTN

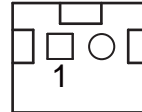


SW2

Connector Location: LED1

Description: System Power LED

PIN	ASSIGNMENT
1	GND
2	V5P0S

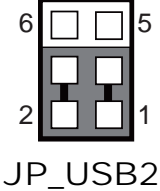
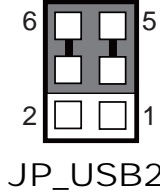


LED1

3.6.20 USB2 Port Selection (JP_USB2)

Jumper Location: JP_USB2

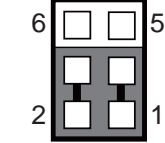
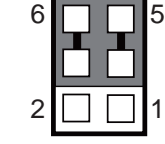
Description: USB2 Port Selection

Selection	Jumper Setting	Jumper Illustration
M.2 USB	1-3, 2-4	 <p>JP_USB2</p>
USB2	<p>3-5, 4-6 <i>(Default Setting)</i></p>	 <p>JP_USB2</p>

3.6.21 USB3 Port Selection (JP_USB3_1, JP_USB3_2)

Jumper Location: JP_USB3_1, JP_USB3_2

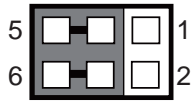
Description: USB3 Port Selection

Selection	Jumper Setting	Jumper Illustration
<p>USB3_1</p>	<p>1-3, 2-4 <i>(Default Setting)</i></p>	 <p>JP_USB3_1/ JP_USB3_2</p>
<p>USB3_2</p>	<p>3-5, 4-6</p>	 <p>JP_USB3_1/ JP_USB3_2</p>

3.6.22 USB5 Port Selection (JP_USB5)

Jumper Location: JP_USB5

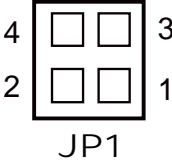
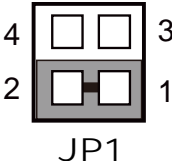
Description: USB5 Port Selection

Selection	Jumper Setting	Jumper Illustration
USB5	3-5, 4-6 <i>(Default Setting)</i>	 <p>JP_USB5</p>

3.6.23 Force DNX Firmware Load Selection (JP1)

Jumper Location: JP1

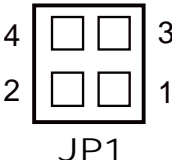
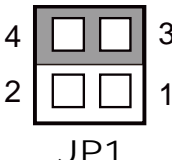
Description: Force DNX Firmware Load Selection

Selection	Jumper Setting	Jumper Illustration
Normal	Open <i>(Default Setting)</i>	 <p>JP1</p>
Force	1-2	 <p>JP1</p>

3.6.24 Flash Descriptor Override Selection (JP1)

Jumper Location: JP1

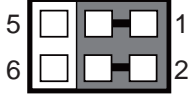
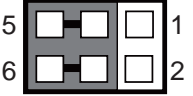
Description: Flash Descriptor Override Selection

Selection	Jumper Setting	Jumper Illustration
Normal	Open <i>(Default Setting)</i>	 <p>JP1</p>
Override	3-4	 <p>JP1</p>

3.6.25 LVDS Sequence Control Selection (JP4)

Jumper Location: JP4

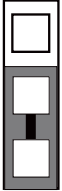

Description: LVDS Sequence Control Selection

Selection	Jumper Setting	Jumper Illustration
<p>From CPU</p>	<p>1-3, 2-4 <i>(Default Setting)</i></p>	 <p>JP4</p>
<p>From CH7511</p>	<p>3-5, 4-6</p>	 <p>JP4</p>

3.6.26 LVDS Backlight Enable Voltage Selection (JP5)

Jumper Location: JP5

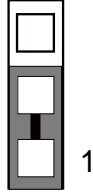
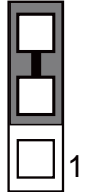
Description: LVDS Backlight Enable Voltage Selection

Selection	Jumper Setting	Jumper Illustration
3.3V	1-2 <i>(Default Setting)</i>	 <p>1 JP5</p>
5V	2-3	 <p>1 JP5</p>

3.6.27 LVDS Voltage Selection (JP_VDD1)

Jumper Location: JP_VDD1

Description: LVDS Voltage Selection

Selection	Jumper Setting	Jumper Illustration
3.3V	1-2 <i>(Default Setting)</i>	 <p>JP_VDD1</p>
5V	2-3	 <p>JP_VDD1</p>






3.6.28 Slide Switch For LVDS Resolution Selection (SW1)

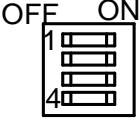
Connector Location: SW1

Description: Slide Switch for LVDS Resolution/Channel/Color Bit Selection

SELECTION	SW1	PIN	SETTING
1200 x 800 1CH/24bit <i>(Default Setting)</i>		1	ON
		2	ON
		3	OFF
		4	ON
1024 x 600 1CH/24bit		1	ON
		2	ON
		3	ON
		4	ON
1024 x 768 1CH/18bit		1	OFF
		2	ON
		3	ON
		4	ON
1024 x 768 1CH/24bit		1	ON
		2	OFF
		3	ON
		4	ON
1280 x 768 1CH/18bit		1	OFF
		2	OFF
		3	ON
		4	ON

SELECTION	SW1	PIN	SETTING
1280 x 960 1CH/24bit		1	OFF
		2	ON
		3	OFF
		4	ON
1280 x 1024 2CH/24bit		1	ON
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/18bit		1	OFF
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/24bit		1	ON
		2	ON
		3	ON
		4	OFF
1440 x 900 2CH/24bit		1	OFF
		2	ON
		3	ON
		4	OFF

SELECTION	SW1	PIN	SETTING
1400 x 1050 2CH/24bit	OFF ON 	1	ON
		2	OFF
		3	ON
		4	OFF
1600 x 900 2CH/24bit	OFF ON 	1	OFF
		2	OFF
		3	ON
		4	OFF
1680 x 1050 2CH/24bit	OFF ON 	1	ON
		2	ON
		3	OFF
		4	OFF
1600 x 1200 2CH/24bit	OFF ON 	1	OFF
		2	ON
		3	OFF
		4	OFF
1920 x 1080 2CH/24bit	OFF ON 	1	ON
		2	OFF
		3	OFF
		4	OFF

SELECTION	SW1	PIN	SETTING
1920 x 1200 2CH/24bit		1	OFF
		2	OFF
		3	OFF
		4	OFF

3.6.29 Clear CMOS Data Selection (JP3)

Jumper Location: JP3

Description: Clear CMOS Data Selection



Step 1. Remove the main power of the PC.

Step 2. Close JP3 (pins 1-2) for 6 seconds by a cap.

Step 3. Remove the cap which is just used on JP3 (1-2), so that JP3 returns to “OPEN”.

Step 4. Power on the PC and the PC will then auto-reboot for once in order to set SoC’s register.

Step 5. Done!

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
Normal	Open <i>(Default Setting)</i>	 JP3
Clear CMOS*	1-2	 JP3

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

3.7 Printer Board Component Locations & Pin Assignment

3.7.1 Printer Board: MB-1030 series

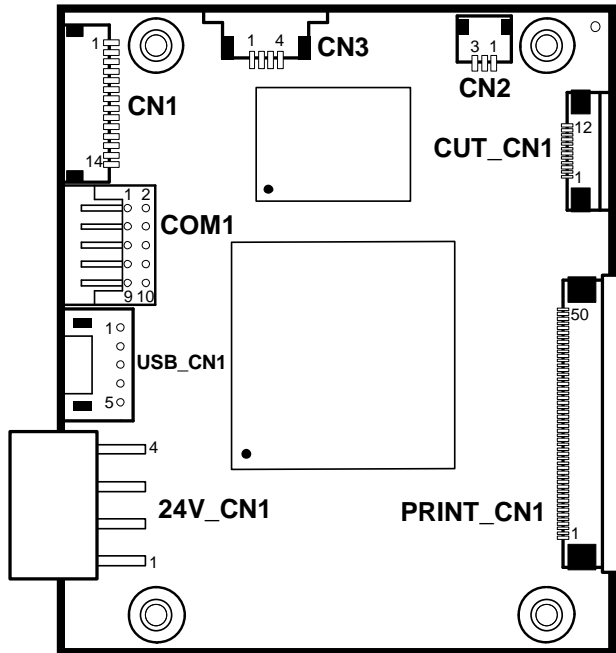


Figure 3-2. MB-1030 Printer Board Component Locations

3.7.1.1 Jumper & Connector Quick Reference Table

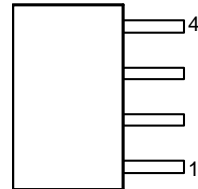
Jumper / Connector	NAME
Power Supply Connector	24V_CN1
RS-232 Interface Connector	COM1
Thermal Head/Motor/Sensor Connector	PRINT_CN1
Auto-Cutter Connector	CUT_CN1
Paper-Near-END Sensor Connector	CN2
USB Interface Connector	USB_CN1
Terminal Assignment Connector	CN1

3.7.2 Setting Printer Board Connectors and Jumpers

3.7.2.1 Power Supply Connector

24V_CN1: Power Supply Wafer

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

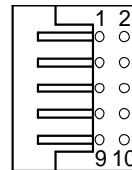


24V_CN1

3.7.2.2 RS-232 Interface Connector

COM1: RS-232 Interface Connector

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

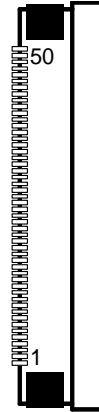


COM1

3.7.2.3 Thermal Head/Motor/Sensor Connector

PRINT_CN1: Thermal head/motor/sensor connector

PIN	ASSIGNMENT	FUNCTION
1	24V	Head drive power
2	24V	Head drive power
3	24V	Head drive power
4	24V	Head drive power
5	24V	Head drive power
6	24V	Head drive power
7	DAT	Print data output
8	CLK	Synchronizing signal for print data transfer
9	GND	Head GND
10	GND	Head GND
11	GND	Head GND
12	GND	Head GND
13	GND	Head GND
14	GND	Head GND
15	NC	Unused
16	DST4	Head strobe signal
17	DST3	Head strobe signal
18	3.3V	Logic Power
19	GND	Thermistor GND
20	GND	Thermistor GND
21	TH	Thermistor signal
22	NC	Unused
23	DST2	Head strobe signal
24	DST1	Head strobe signal
25	GND	Head GND
26	GND	Head GND
27	GND	Head GND
28	GND	Head GND
29	GND	Head GND
30	GND	Head GND
31	LATCH	Print data latch
32	24V	Head drive power
33	24V	Head drive power
34	24V	Head drive power
35	24V	Head drive power



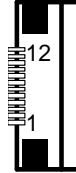
PRINT_CN1

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

3.7.2.4 Auto-Cutter Connector

CUT_CN1: Auto-cutter Connector

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



CUT_CN1

3.7.2.5 Paper-Near-END Sensor Connector

CN2: Paper-near-end sensor connector

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

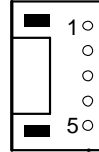


CN2

3.7.2.6 USB Interface Connector

USB_CN1: USB interface connector

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



USB_CN1

3.7.2.7 Terminal Assignment Connector

CN1: Terminal assignment connector

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



CN1

3.7.3 Printer Board: MB-1011 & MB-1013

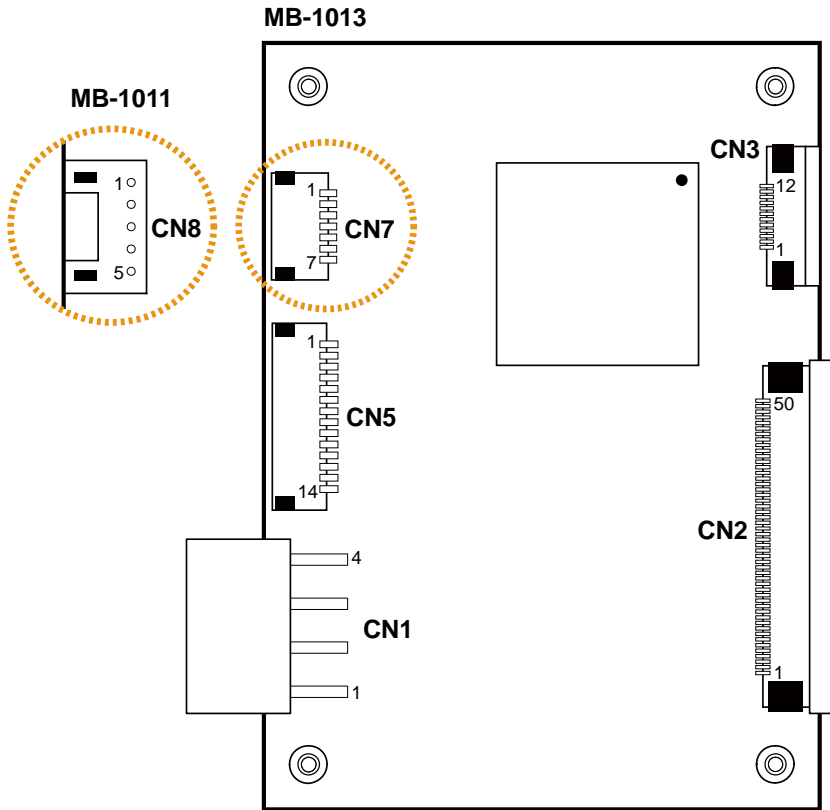


Figure 3-3. MB-1011 & MB-1013 Printer Board Component Locations

3.7.3.1 Jumper & Connector Quick Reference Table

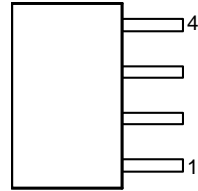
Jumper / Connector	NAME
Power Supply Connector	CN1
RS-232 Interface Connector	CN7
Auto-Cutter Connector	CN3
Thermal Head/Motor/Sensor Connector	CN2
Terminal Assignment Connector	CN5
USB Interface Connector	CN8

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

3.7.4.1 Power Supply Connector

CN1: Power supply wafer

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

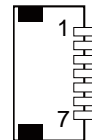


CN1

3.7.4.2 RS-232 Interface Connector

CN7: RS-232 interface connector

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

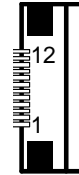


CN7

3.7.4.3 Auto-Cutter Connector

CN3: Auto-cutter Connector

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

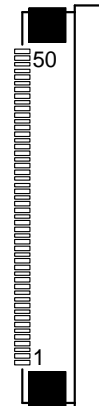


CN3

3.7.4.4 Thermal Head/Motor/Sensor Connector

CN2: Thermal head/motor/sensor connector

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



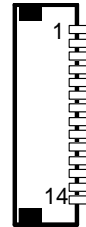
CN2

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

3.7.4.5 Terminal Assignment Connector

CN5: Terminal assignment connector

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

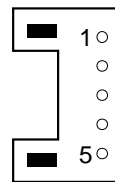


CN5

3.7.4.6 USB Interface Connector

CN8: USB interface connector

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



CN8

3.8 VFD Board Component Locations & Pin Assignment

3.8.1 VFD Board: MB-4103, LD720

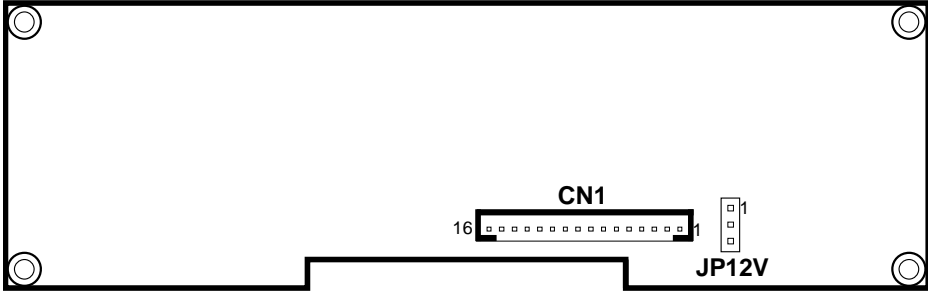


Figure 3-4. MB-4103 & LD720 VFD Board Component Locations

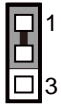
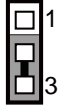
3.8.2 Jumper & Connector Quick Reference Table

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

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

3.8.3.1 Power Switch Selection

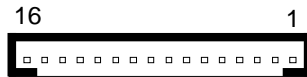
JP12V: Power Switch Selection

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

3.8.3.2 RS-232 Serial Interface Connector

CN1: RS-232 serial interface wafer

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



CN1

3.9 MSR Board Component Locations & Pin Assignment

3.9.1 ID TECH

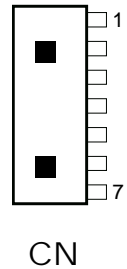


ID-TECH MSR Board Component Locations

3.9.1.1 Main Connector

CN:

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



3.9.2 MB-3012

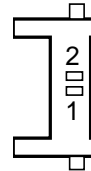


Figure 3-5. MB-3012 MSR Board Component Locations

3.9.2.1 Information Button Reader

I_BUTTON1: Information button reader

PIN	ASSIGNMENT
1	I_B1
2	GND

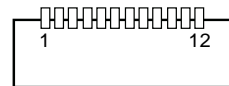


I_BUTTON1

3.9.2.2 Output Connector

IO1: Output wafer

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



IO1

4 Software Utilities

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

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

4.1 Introduction

Enclosed with the PA-A310 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)
D:\PA-A310 V1.0\Driver\Platform\Main Chip	Intel(R) Chipset Device Software Installation Utility	✓
D:\PA-A310 V1.0\Driver\Platform\Graphics	Intel Graphics Driver installation	✓
D:\PA-A310 V1.0\Driver\Platform\Hotfix	Microsoft Hotfix kb3211320 and kb3213986 for Windows10 64-bit critical security update	✓
D:\PA-A310 V1.0\Driver\Platform\TXE	Intel(R) Trusted Execution Engine	✓
D:\PA-A310 V1.0\Driver\Platform\LAN Chip	Intel(R) Network Connections Software	✓
D:\PA-A310 V1.0\Driver\Platform\Sound Codec	Realtek High Definition Audio driver installation	✓
D:\PA-A310 V1.0\Driver\Platform\Serial IO	Intel(R) Serial I/O Driver	✓
D:\PA-A310 V1.0\Driver\Platform\IO	Intel Processor Win10 I/O Drivers	✓

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 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-A310 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-A310 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-A310 and insert the driver disk.
- 2** Enter the “Graphics” folder where the Graphics 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-A310 for the changes to take effect.

4.4 Installing Intel® Trusted Execution Engine Installation Utility

- 1 Connect the USB DVD-ROM device to PA-A310 and insert the driver disk.
- 2 Enter the **TXE** folder where the driver is located.
- 3 Click **SetupTXE.exe** file for TXE 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-A310 for the changes to take effect.

4.5 Installing LAN Driver Utility

PA-A310 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-A310 and insert the driver disk.
- 2 Enter the “LAN Chip” folder where the LAN driver is located.
- 3 Click **PROWinx64(LAN)** zip 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-A310 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 series.

To install the Sound Driver, follow the steps below:

- 1** Connect the USB DVD-ROM device to PA-A310 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-A310 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-A310 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-A310 for the changes to take effect.

4.8 Installing Intel® Serial I/O Driver Utility

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

- 1 Connect the USB DVD-ROM device to PA-A310 and insert the driver disk.
- 2 Open the **Serial IO** folder where the driver is located.
- 3 Click the **SetupSerialIO.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-A310 for the changes to take effect.

4.9 Installing Windows® 10 I/O Driver Utility

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

- 1** Connect the USB DVD-ROM device to PA-A310 and insert the driver disk.
- 2** Open the **IO** folder where the driver is located.
- 3** Click the **Intel_Processor_Win10_IO_Drivers_64Bit** 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-A310 for the changes to take effect.

4.10 Peripheral Devices

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

4.10.1 Printer Board: MB-1030

4.10.1.1 Commands List

1. Printer Registry Operation

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

1. Commands List

Standard Commands

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

Kanji Control Commands

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

Other Commands

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

COMMANDS LIST

Standard Commands

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

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

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

Two-dimensional Bar Code Commands

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

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	√	√
<FS &>	1C 26	Select Kanji character mode	√	√
<FS ->	1C 2D	Turn underline mode on/off for Kanji characters	√	√
<FS .>	1C 2E	Cancel Kanji character mode	√	√
<FS S>	1C 53	Set Kanji character spacing	√	√
<FS W>	1C 57	Turn quadruple-size mode on/off for Kanji characters	√	√

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]	<p>Moves print position to next horizontal tab position.</p> <ul style="list-style-type: none"> • 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]	<p>Prints the data in the print buffer and performs a line feed based on the set line feed amount.</p> <ul style="list-style-type: none"> • 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]	<p>Prints all buffered data to the print region collectively, then recovers to the standard mode.</p>

	<ul style="list-style-type: none"> ● 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]	<p>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.</p> <ul style="list-style-type: none"> ● 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]	<p>Deletes all print data in the currently set print region in page mode.</p> <ul style="list-style-type: none"> ● 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]	$1 \leq n \leq 4$																																																								
[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.																																																								
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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]	$1 \leq n \leq 2$
[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. <ul style="list-style-type: none"> ● This command is enabled only in page mode. ● Holds the following information after printing. <ol style="list-style-type: none"> 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 x [horizontal motion units].

ESC ! n

[Name]	Select print mode(s).																																																																	
[Format]	ASCII ESC ! n Hex. 1B 21 n Decimal 27 33 n																																																																	
[Range]	$0 \leq n \leq 255$ Initial Value n = 0																																																																	
[Description]	<p>This command selects print mode(s) with bits having following meanings.</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>On / Off</th> <th>Hex</th> <th>Decimal</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0</td> <td>Off</td> <td>00</td> <td>0</td> <td>Character font A selected.</td> </tr> <tr> <td>On</td> <td>01</td> <td>1</td> <td>Character font B selected.</td> </tr> <tr> <td>1</td> <td>Off</td> <td>00</td> <td>0</td> <td>Not used. Fixed to Off.</td> </tr> <tr> <td>2</td> <td>Off</td> <td>00</td> <td>0</td> <td>Not used. Fixed to Off.</td> </tr> <tr> <td rowspan="2">3</td> <td>Off</td> <td>00</td> <td>0</td> <td>Emphasized mode not selected.</td> </tr> <tr> <td>On</td> <td>08</td> <td>8</td> <td>Emphasized mode selected.</td> </tr> <tr> <td rowspan="2">4</td> <td>Off</td> <td>00</td> <td>0</td> <td>Double-height mode not selected</td> </tr> <tr> <td>On</td> <td>10</td> <td>16</td> <td>Double-height mode selected</td> </tr> <tr> <td rowspan="2">5</td> <td>Off</td> <td>00</td> <td>0</td> <td>Double-width mode not selected.</td> </tr> <tr> <td>On</td> <td>20</td> <td>32</td> <td>Double-width mode selected.</td> </tr> <tr> <td>6</td> <td>Off</td> <td>00</td> <td>0</td> <td>Not used. Fixed to Off.</td> </tr> <tr> <td rowspan="2">7</td> <td>Off</td> <td>00</td> <td>0</td> <td>Underline mode not selected.</td> </tr> <tr> <td>On</td> <td>80</td> <td>128</td> <td>Underline mode selected.</td> </tr> </tbody> </table>	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.
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ESC \$ nL nH

[Name]	Set absolute print position.
[Format]	ASCII ESC \$ nL nH Hex. 1B 24 nL nH Decimal 27 36 nL nH
[Range]	$0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nH \leq 255, 0 \leq nL \leq 255$)
[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 $(nL + nH \times 256) \times$ (vertical or horizontal motion units). Specifications exceeding the print range are ignored.

ESC * m nL nH d1...dk

[Name]	Select bit image mode					
[Format]	ASCII ESC * m nL nH d1...dk Hex. 1B 2A m nL nH d1...dk Decimal 27 42 m nL nH d1...dk					
[Range]	m = 0,1,32,33 $0 \leq nL \leq 255$ $0 \leq nH \leq 3$ $0 \leq d \leq 255$					
[Description]	Selects a bit-image mode in mode <i>m</i> for the number of dots specified by <i>nL</i> and <i>nH</i> . m = 1,33 : (nL+nHx256)<576 (3 inch);(nL+nHx256)<432 (2 inch). m = 0,32 : (nL+nHx256)<288 (3 inch);(nL+nHx256)<216 (2 inch).					
	m	Mode	Number of Vert. Dir. Dots	Density of Vert. Dir. Dots	Density of Hor. Dir. Dots	Data Count (k)
	0	8 dot single density	8	67 DPI	101 DPI	nL+nHx256
	1	8 dot double density	8	67 DPI	203 DPI	nL+nHx256
	32	24 dot single density	24	203 DPI	101 DPI	(nL+nHx256) x3
33	24 dot double density	24	203 DPI	203 DPI	(nL+nHx256) x3	

ESC - n

[Name]	Turn underline mode on/off.								
[Format]	ASCII ESC - n Hex. 1B 2D n Decimal 27 45 n								
[Range]	$0 \leq n \leq 2$ 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: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>n</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Turns off underline mode</td> </tr> <tr> <td>1</td> <td>Turns on underline mode, set at 1-dot thick</td> </tr> <tr> <td>2</td> <td>Turns on underline mode, set at 2-dot thick</td> </tr> </tbody> </table>	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
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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]	$0 \leq n \leq 255$ 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 <ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> ● 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]. <ul style="list-style-type: none"> ● 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.

	<p>(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.</p> <ul style="list-style-type: none"> ● The maximum line spacing is 150mm {5.9 inches }. When the setting value exceeds the maximum, it is converted to the maximum automatically.
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ESC L

[Name]	Select page mode
[Format]	ASCII ESC L Hex. 1B 4C Decimal 27 76
[Range]	N/A
[Description]	<ul style="list-style-type: none"> ● 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. <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> a. GS (A : Test print ● The following commands are invalid in page mode. <ol style="list-style-type: none"> 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: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>n</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Character font A selected</td> </tr> <tr> <td>1</td> <td>Character font B selected</td> </tr> </tbody> </table>	n	Function	0	Character font A selected	1	Character font B selected
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. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>n</th> <th>Character Set</th> </tr> </thead> <tbody> <tr><td>0</td><td>USA</td></tr> <tr><td>1</td><td>France</td></tr> <tr><td>2</td><td>Germany</td></tr> <tr><td>3</td><td>UK</td></tr> <tr><td>4</td><td>Denmark I</td></tr> <tr><td>5</td><td>Sweden</td></tr> <tr><td>6</td><td>Italy</td></tr> <tr><td>7</td><td>Spain</td></tr> <tr><td>8</td><td>Japan</td></tr> <tr><td>9</td><td>Norway</td></tr> <tr><td>10</td><td>Denmark II</td></tr> <tr><td>11</td><td>Spain II</td></tr> <tr><td>12</td><td>Latin America</td></tr> <tr><td>13</td><td>Korea</td></tr> <tr><td>14</td><td>Russia</td></tr> <tr><td>15</td><td>Slavonic</td></tr> </tbody> </table>	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
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	
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ESC S

[Name]	Select standard mode
[Format]	ASCII ESC S Hex. 1B 53 Decimal 27 83
[Range]	N/A
[Description]	<ul style="list-style-type: none"> ● 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 <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> 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]	$0 \leq n \leq 3, 48 \leq n \leq 51$ Initial Value n = 0															
[Description]	<p>Selects the character printing direction and starting point in page mode.</p> <table border="1"> <thead> <tr> <th>n</th> <th>Print Direction</th> <th>Starting Point</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>Left to Right</td> <td>Upper Left (A in the figure below)</td> </tr> <tr> <td>1, 49</td> <td>Bottom to Top</td> <td>Lower Left (B in the figure below)</td> </tr> <tr> <td>2, 50</td> <td>Right to Left</td> <td>Lower Right (C in the figure below)</td> </tr> <tr> <td>3, 51</td> <td>Top to Bottom</td> <td>Upper Right (D in the figure below)</td> </tr> </tbody> </table>	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)
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]	$0 \leq n \leq 1, 48 \leq n \leq 49$ Initial Value n = 0						
[Description]	<p>Specifies or cancels character 90 degree clockwise rotation.</p> <table border="1"> <thead> <tr> <th>n</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>Turns off 90 degree clockwise rotation mode</td> </tr> <tr> <td>1, 49</td> <td>Turns on 90 degree clockwise rotation mode</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • 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 	n	Function	0, 48	Turns off 90 degree clockwise rotation mode	1, 49	Turns on 90 degree clockwise rotation mode
n	Function						
0, 48	Turns off 90 degree clockwise rotation mode						
1, 49	Turns on 90 degree clockwise rotation mode						

	<p>directions to double-wide and double-tall commands.</p> <ul style="list-style-type: none"> ● 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.
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ESC W xL xH yL yH dxL dxH dyL dyH

[Name]	Set printing area in page mode
[Format]	<p>ASCII ESC W xL xH yL yH dxL dxH dyL dyH</p> <p>Hex. 1B 57 xL xH yL yH dxL dxH dyL dyH</p> <p>Decimal 27 87 xL xH yL yH dxL dxH dyL dyH</p>
[Range]	<p>$0 \leq xL, xH, yL, yH, dxL, dxH, dyL, dyH \leq 255$</p> <p>However, this excludes $dxL = dxH = 0$ or $dyL = dyH = 0$</p> <p>Initial Value $xL = xH = yL = yH = 0$</p>
[Description]	<p>Sets the print region position and size.</p> <ul style="list-style-type: none"> ● Horizontal direction starting point $[(xL + xH \times 256) \times \text{basic calculated pitch}]$ ● Vertical direction starting point $[(yL + yH \times 256) \times \text{basic calculated pitch}]$ ● Horizontal direction length $[(dxL + dxH \times 256) \times \text{basic calculated pitch}]$ ● Vertical direction length $[(dyL + dyH \times 256) \times \text{basic calculated pitch}]$ ● $(X+Dx-1) < 576$ (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). <div style="text-align: center;"> </div>

ESC \ nL nH

[Name]	Set relative print position.
[Format]	ASCII ESC \ nL nH Hex. 1B 5C nL nH Decimal 27 92 nL nH
[Range]	$0 \leq (nL + nH \times 256) \leq 65535$ ($0 \leq nL \leq 255, 0 \leq nH \leq 255$)
[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 $[(nL + nH \times 256) \times \text{basic calculated pitch}]$ for the next print starting position. <ul style="list-style-type: none"> ● 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]	$0 \leq n \leq 2$ Initial Value $n = 0$								
[Description]	This command specifies position alignment for all data in one line in standard mode, using n as follows: <table border="1" style="margin-left: 40px;"> <tr> <td>n</td> <td>Alignment</td> </tr> <tr> <td>0</td> <td>Left alignment</td> </tr> <tr> <td>1</td> <td>Center alignment</td> </tr> <tr> <td>2</td> <td>Right alignment</td> </tr> </table> <p>This command has no effect in page mode.</p>	n	Alignment	0	Left alignment	1	Center alignment	2	Right alignment
n	Alignment								
0	Left alignment								
1	Center alignment								
2	Right alignment								

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: $0 \leq n \leq 3$ 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: $0 \leq n \leq 3$ 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: $0 \leq n \leq 255$ Initial Value n = 0
[Description]	Toggles the panel switches between enabled and disabled. <ul style="list-style-type: none"> ● 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]	$0 \leq n \leq 255$
[Description]	Prints the data in the print buffer and performs a paper feed of n lines. <ul style="list-style-type: none"> ● 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]	$0 \leq m \leq 1, 48 \leq m \leq 49$ $0 \leq t1 \leq 255$ $0 \leq t2 \leq 255$						
[Description]	<p>This outputs a signal specified by t1 and t2 to the connector pin specified by m. Drawer kick on time is set to $t1 \times 2$ ms; off time is set to $t2 \times 2$ ms.</p> <table border="1"> <tr> <td>m</td> <td>Connector Pin</td> </tr> <tr> <td>0, 48</td> <td>Drawer kick connector pin #2</td> </tr> <tr> <td>1, 49</td> <td>Drawer kick connector pin #5</td> </tr> </table>	m	Connector Pin	0, 48	Drawer kick connector pin #2	1, 49	Drawer kick connector pin #5
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]	$0 \leq n \leq 8$ Initial Value n = 0																				
[Description]	<p>Select page n of the character code table.</p> <table border="1"> <thead> <tr> <th>n</th> <th>Character set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>CP-437</td> </tr> <tr> <td>1</td> <td>Katakana</td> </tr> <tr> <td>2</td> <td>CP-850</td> </tr> <tr> <td>3</td> <td>CP-852</td> </tr> <tr> <td>4</td> <td>CP-860</td> </tr> <tr> <td>5</td> <td>CP-863</td> </tr> <tr> <td>6</td> <td>CP-865</td> </tr> <tr> <td>7</td> <td>CP-1252</td> </tr> <tr> <td>8</td> <td>User Define</td> </tr> </tbody> </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
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]	<p>Specifies or cancels upside-down printing.</p> <ul style="list-style-type: none"> ● 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. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>n</th> <th>Upside-down mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Turned off</td> </tr> <tr> <td>1</td> <td>Turned on</td> </tr> </tbody> </table>	n	Upside-down mode	0	Turned off	1	Turned on
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]	<p>Prints NV bit image n using mode m.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>m</th> <th>Mode</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>Normal</td> </tr> <tr> <td>1, 49</td> <td>Double-width</td> </tr> <tr> <td>2, 50</td> <td>Double-height</td> </tr> <tr> <td>3, 51</td> <td>Quadruple</td> </tr> </tbody> </table> <ul style="list-style-type: none"> ● 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. 	m	Mode	0, 48	Normal	1, 49	Double-width	2, 50	Double-height	3, 51	Quadruple
m	Mode										
0, 48	Normal										
1, 49	Double-width										
2, 50	Double-height										
3, 51	Quadruple										

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]	$1 \leq n \leq 255$ $1 \leq (xL + xH \times 256) \leq 54$ ($0 \leq xL \leq 54, xH=0$) for 2 inch $1 \leq (xL + xH \times 256) \leq 72$ ($0 \leq xL \leq 72, xH=0$) for 3 inch $1 \leq (yL + yH \times 256) \leq 96$ ($0 \leq yL \leq 96, yH=0$) $0 \leq d \leq 255$ $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
[Description]	Defines the specified NV bit image. <ul style="list-style-type: none"> ● n specifies the number of NV bit images to define. ● xL and xH specify the horizontal direction for one NV bit image $(xL + xH \times 256) \times 8$ dots. ● yL and yH specify the vertical direction for one NV bit image $(yL + yH \times 256) \times 8$ dots. <div style="text-align: center;"> <p>For $xL = 64, xH = 0, yL = 96, yH = 0$ $(xL+xH \times 256) \times 8 \text{ dot} = 512 \text{ dots}$</p> <p>$(yL+yH \times 256) \times 8 \text{ dot} = 768 \text{ dots}$</p> </div>

GS ! n

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

GS \$ nL nH

[Name]	Set absolute vertical print position in page mode															
[Format]	<table style="border: none;"> <tr> <td>ASCII</td> <td>GS</td> <td>\$</td> <td>nL</td> <td>nH</td> </tr> <tr> <td>Hex.</td> <td>1D</td> <td>24</td> <td>nL</td> <td>nH</td> </tr> <tr> <td>Decimal</td> <td>29</td> <td>36</td> <td>nL</td> <td>nH</td> </tr> </table>	ASCII	GS	\$	nL	nH	Hex.	1D	24	nL	nH	Decimal	29	36	nL	nH
ASCII	GS	\$	nL	nH												
Hex.	1D	24	nL	nH												
Decimal	29	36	nL	nH												
[Range]	$0 \leq nL \leq 255, 0 \leq nH \leq 255,$															
[Description]	<p>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 $[(nL + nH \times 256) \times \text{basic calculated pitch}]$ from the starting point.</p> <ul style="list-style-type: none"> ● 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]	$1 \leq X \leq 54$ (for 2 inch) $1 \leq X \leq 72$ (for 3 inch) $1 \leq Y \leq 96$ $0 \leq d \leq 255$
[Description]	<p>Defines the download bit image of the number of dots specified by X and Y.</p> <ul style="list-style-type: none"> • 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]	<p>Executes the specified test print. The following command is ignored in page mode.</p> <p>Specifies the parameter count following pL and pH in (pL + (pH x 256)) bytes. n specifies the paper to be tested.</p> <table border="1"> <tr> <td>n</td> <td>Paper Type</td> </tr> <tr> <td>0 , 48</td> <td>Basic sheet (paper roll)</td> </tr> <tr> <td>1 , 49</td> <td>Paper Roll</td> </tr> <tr> <td>2 , 50</td> <td></td> </tr> </table> <p>m specifies a test pattern.</p> <table border="1"> <tr> <td>m</td> <td>Type of Test Print</td> </tr> <tr> <td>2 , 50</td> <td>Printer Status (Self Print)</td> </tr> <tr> <td>3 , 51</td> <td>Rolling Pattern Print</td> </tr> </table>	n	Paper Type	0 , 48	Basic sheet (paper roll)	1 , 49	Paper Roll	2 , 50		m	Type of Test Print	2 , 50	Printer Status (Self Print)	3 , 51	Rolling Pattern Print
n	Paper Type														
0 , 48	Basic sheet (paper roll)														
1 , 49	Paper Roll														
2 , 50															
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 <table border="1"> <thead> <tr> <th>m</th> <th>Print Density</th> </tr> </thead> <tbody> <tr><td>250</td><td>0.7</td></tr> <tr><td>251</td><td>0.7</td></tr> <tr><td>252</td><td>0.8</td></tr> <tr><td>253</td><td>0.8</td></tr> <tr><td>254</td><td>0.9</td></tr> <tr><td>255</td><td>0.9</td></tr> <tr><td>0</td><td>1.0</td></tr> <tr><td>1</td><td>1.1</td></tr> <tr><td>2</td><td>1.1</td></tr> <tr><td>3</td><td>1.2</td></tr> <tr><td>4</td><td>1.2</td></tr> <tr><td>5</td><td>1.3</td></tr> <tr><td>6</td><td>1.3</td></tr> </tbody> </table>	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
m	Print Density																												
250	0.7																												
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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. <table border="1"> <thead> <tr> <th>m</th> <th>Mode</th> <th>Vertical dot density(DPI)</th> <th>Horizontal dot density(DPI)</th> </tr> </thead> <tbody> <tr><td>0 , 48</td><td>Normal</td><td>203</td><td>203</td></tr> <tr><td>1 , 49</td><td>Double-width</td><td>203</td><td>101</td></tr> <tr><td>2 , 50</td><td>Double-height</td><td>101</td><td>203</td></tr> <tr><td>3 , 51</td><td>Quadruple</td><td>101</td><td>101</td></tr> </tbody> </table>	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
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]	$0 \leq n \leq 255$ Initial Value n = 0
[Description]	<p>Specifies or cancels black and white inverted printing.</p> <ul style="list-style-type: none"> ● Cancels black and white inverted printing when $n = \langle \text{*****}0 \rangle B$. ● Specifies black and white inverted printing when $n = \langle \text{*****}1 \rangle B$. ● 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.

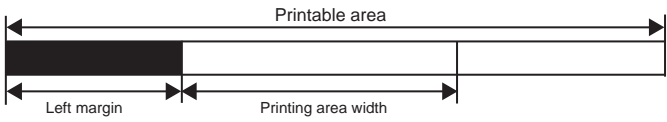
GS H n

[Name]	Select printing position of HRI characters.										
[Format]	ASCII GS H n Hex. 1D 48 n Decimal 29 72 n										
[Range]	$0 \leq n \leq 3, 48 \leq n \leq 51$ Initial Value n = 0										
[Description]	<p>Selects the printing position of HRI characters when printing bar codes.</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>m</th> <th>Printing Position</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>No print</td> </tr> <tr> <td>1, 49</td> <td>Above bar code</td> </tr> <tr> <td>2, 50</td> <td>Below bar code</td> </tr> <tr> <td>3, 51</td> <td>Above and below bar code(both)</td> </tr> </tbody> </table>	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)
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]	$1 \leq n \leq 3, 49 \leq n \leq 51, 65 \leq n \leq 69$		
[Description]	Transmits the printer ID specified by <i>n</i> 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	<u>Taiwan Language Characters: TW_BIG5</u> <u>Japanese Language Characters: JP_SJIS</u> <u>Chinese Language Characters: CN_GB2312</u> <u>Korean Language Characters: KO_EUC-KR</u>

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]	$0 \leq nL \leq 255, 0 \leq nH \leq 255$ Initial Value (nL + nH x 256)=0 (nL=0, nH=0)		
[Description]	<p>nL and nH set the specified left margin. The left margin is [(nL + nH x 256) x basic calculated pitch].</p> 		

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/y (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. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>m</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0 , 48</td> <td>Full cut</td> </tr> <tr> <td>1 , 49</td> <td>Partial cut (one point uncut)</td> </tr> <tr> <td>65</td> <td>Feeds paper to (cutting position + [n x basic calculated pitch]) and performs a full cut</td> </tr> <tr> <td>66</td> <td>Feeds paper to (cutting position + [n x basic calculated pitch]) and performs a partial cut (one point uncut)</td> </tr> </tbody> </table>	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)
m	Function										
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1 , 49	Partial cut (one point uncut)										
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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]	$0 \leq nL \leq 255, 0 \leq nH \leq 255$
[Description]	<ul style="list-style-type: none"> ● Sets the print region width specified by nL and nH. ● Print region width is $[(nL + nH \times 256) \times \text{basic calculated pitch}]$. ● $[(nL + nH \times 256) \times \text{basic calculated pitch}] \geq 24$.

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]	$0 \leq nL \leq 255$ $0 \leq nH \leq 255$
[Description]	<p>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 $[(nL + nH \times 256) \times \text{basic calculated pitch}]$ for the next data expanding starting position.</p> <ul style="list-style-type: none"> ● 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]	<p>Selects the statuses that are targeted for transmission with the automatic status function (ASB: Automatic Status Back).</p> <table border="1"> <thead> <tr> <th>Bits</th> <th>Statuses Targeted for ASB</th> <th>"0"</th> <th>"1"</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>Undefined</td> <td>---</td> <td>---</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>Continuous Paper Detector</td> <td>Invalid</td> <td>Valid</td> </tr> <tr> <td>2</td> <td>Error</td> <td>Invalid</td> <td>Valid</td> </tr> <tr> <td>1</td> <td>ONLINE/OFFLINE Status</td> <td>Invalid</td> <td>Valid</td> </tr> <tr> <td>0</td> <td>Drawer kick connector pin #3</td> <td>Invalid</td> <td>Valid</td> </tr> </tbody> </table> <p>The printer information transmitted is comprised of 4 bytes as follows: First byte(printer information)</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Off/On</th> <th>Hex</th> <th>Decimal</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>Off</td> <td>00</td> <td>0</td> <td>Not used. Fixed to Off</td> </tr> <tr> <td rowspan="2">6</td> <td>Off</td> <td>00</td> <td>0</td> <td>Paper is not being fed by the paper feed button</td> </tr> <tr> <td>On</td> <td>40</td> <td>64</td> <td>Paper is being fed by the paper feed button</td> </tr> <tr> <td rowspan="2">5</td> <td>Off</td> <td>00</td> <td>0</td> <td>Cover is close</td> </tr> <tr> <td>On</td> <td>20</td> <td>32</td> <td>Cover is open</td> </tr> <tr> <td>4</td> <td>On</td> <td>10</td> <td>16</td> <td>Not used. Fixed to On</td> </tr> <tr> <td rowspan="2">3</td> <td>Off</td> <td>00</td> <td>0</td> <td>On-line</td> </tr> <tr> <td>On</td> <td>08</td> <td>8</td> <td>Off-line</td> </tr> <tr> <td rowspan="2">2</td> <td>Off</td> <td>00</td> <td>0</td> <td>Drawer kick-out connector pin 3 is LOW</td> </tr> <tr> <td>On</td> <td>04</td> <td>4</td> <td>Drawer kick-out connector pin 3 is HIGH</td> </tr> <tr> <td>1</td> <td>Off</td> <td>00</td> <td>0</td> <td>Not used. Fixed to Off</td> </tr> <tr> <td>0</td> <td>Off</td> <td>00</td> <td>0</td> <td>Not used. Fixed to Off</td> </tr> </tbody> </table>	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	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
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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. <table border="1" data-bbox="333 439 810 539"> <thead> <tr> <th>n</th> <th>Font</th> </tr> </thead> <tbody> <tr> <td>0, 48</td> <td>Selects Font A (12 x 24).</td> </tr> <tr> <td>1, 49</td> <td>Selects Font B (9 x 17).</td> </tr> </tbody> </table>		n	Font	0, 48	Selects Font A (12 x 24).	1, 49	Selects Font B (9 x 17).
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]	<p>1. ASCII GS k m d1...dk NUL Hex. 1D 6B m d1...dk NUL Decimal 29 107 m d1...dk NUL</p> <p>2. ASCII GS k m n d1... dk Hex. 1D 6B m n d1... dk Decimal 29 107 m n d1... dk</p>																																																																								
[Range]	<p>1. $0 \leq m \leq 6$ The definition region of k and d differ according to the bar code type.</p> <p>2. $65 \leq m \leq 73$ The definition region of n and d differ according to the bar code type.</p>																																																																								
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GS r n

[Name]	Transmit status.																																																																										
[Format]	ASCII	GS	r n																																																																								
	Hex.	1D	72 n																																																																								
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[Range]	n = 1, 2, 49, 50																																																																										
[Description]	<p>Sends the specified status. Detector Status (n=1,49)</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Status</th> <th>"0"</th> <th>"1"</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>Fixed at 0</td> <td></td> <td></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>Fixed at 0</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Paper roll end detector</td> <td>Has Paper</td> <td>Paper out</td> </tr> <tr> <td>2</td> <td>Paper roll end detector</td> <td>Has Paper</td> <td>Paper out</td> </tr> <tr> <td>1</td> <td>Paper roll near end detector</td> <td>Has Paper</td> <td>Paper out</td> </tr> <tr> <td>0</td> <td>Paper roll near end detector</td> <td>Has Paper</td> <td>Paper out</td> </tr> </tbody> </table> <p>Drawer Kick Connector Status (n=2,50)</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Status</th> <th>"0"</th> <th>"1"</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>Fixed at 0</td> <td></td> <td></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>Fixed at 0</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Undefined</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>Undefined</td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>Undefined</td> <td></td> <td></td> </tr> <tr> <td>0</td> <td>Drawer kick connector pin #3</td> <td>"L"</td> <td>"H"</td> </tr> </tbody> </table>			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	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"
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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						
	<ul style="list-style-type: none"> • 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. <p>[Ex.:] When xL + xH x 256 = 64 ←-----→ (xL+xHx256) x 8dot = 512 dot</p> <p>(yL + yH x 256) dot</p> <p>MSB LSB</p>									

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.		
		Binary Level Bar Code	
	n	Multi-level Bar Code Module Width [mm]	Fine Element Width[mm]
			Thick Element Width[mm]
	1	0.141	0.141
	2	0.282	0.282
	3	0.423	0.423
	4	0.564	0.564
	5	0.706	0.706
	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

[Name]	QR Code Print																		
[Format]	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]																		
[Range]	model=01, 02 e=4Ch, 4Dh, 51h, 48h 0, 1 ≤ v ≤ 40 mode=4Eh, 41h, 42h, 4Bh, 4Dh 1 ≤ nh × 256 + nl ≤ 7089																		
[Description]	<p>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.</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Mode</th> <th>Hexadecimal</th> <th>Mode</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>nl, nh: Specifies the number of data. Data: Kanji data of the QR Code data should be set by Shift JIS code.</p>	Mode	Hexadecimal	Mode	N	4E	Numerical mode	A	41	Alphanumeric mode	B	42	8-bit byte mode	K	4B	Kanji mode	M	4D	Mixed mode
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M	4D	Mixed mode																	

KANJI CONTROL COMMAND DETAILS

FS ! n

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

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

[Name]	Turn underline mode on/off for Kanji characters								
[Format]	ASCII FS - n Hex. 1C 2D n Decimal 28 45 n								
[Range]	$0 \leq n \leq 2, 48 \leq n \leq 50$								
[Description]	<p>Specifies or cancels Kanji character underlines.</p> <table border="1"> <thead> <tr> <th>n</th> <th>Function</th> </tr> </thead> <tbody> <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> </tbody> </table>	n	Function	0,48	Cancels Kanji character underline	1,49	Sets to one-dot width Kanji character underline and specifies Kanji character underlines.	2,50	Sets to two-dot width Kanji character underline and cancels Kanji character underlines.
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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. <ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> ● Cancels quadruple size when n = <*****0>B. ● Specifies quadruple size when n = <*****1>B. ● n is effective only when it is the lowest bit.

4.10.1.2 OPOS Printer Driver

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

1. Installation

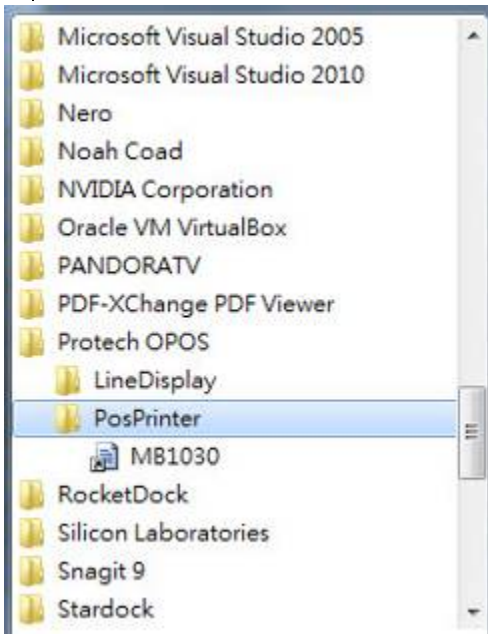
The steps below guide you to install the **MB1030_OposSetup** program.

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

2. Launching the Program

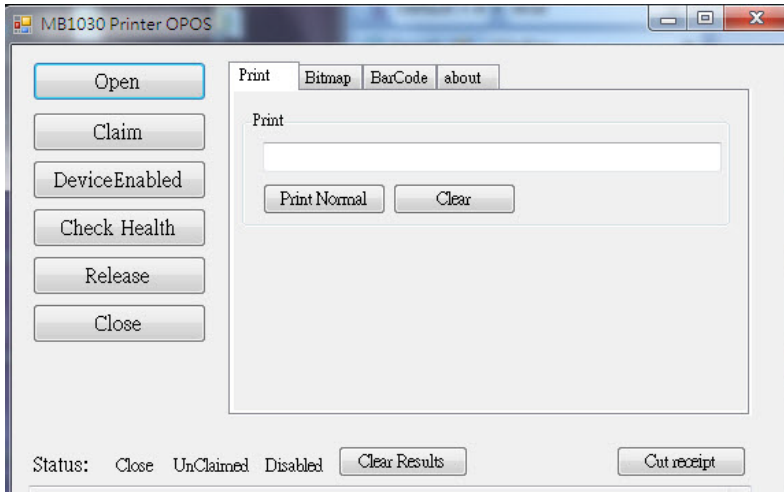
Follow the steps below to load the **MB1030** program:

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



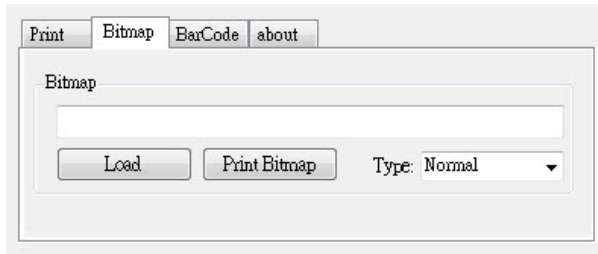
3. OPOS Control Object of MB1030 Program

a.) Print tab buttons:



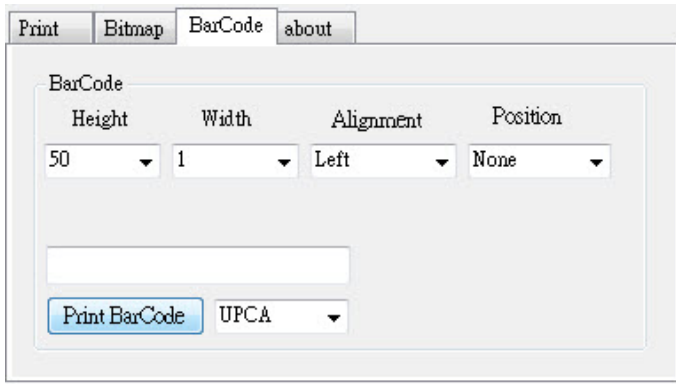
Button/Item	Description
Printer Normal	Print the string.

b.) Bitmap tab buttons/items:



Button/Item	Description
Load	Load bitmap file.
Print Bitmap	Print bitmap file.
Type	Normal or Rotate 108°.

c.) BarCode tab buttons/items:



Button/Item	Description
Print BarCode	Print the barcode. 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
Properties	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

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

4.10.2 VFD: MB-4103 (RS-232)

4.10.2.1 Commands List

1. VFD Registry Operation

Registry Path:

[HKEY_LOCAL_MACHINE\SOFTWARE\OLEforRetail\ServiceOPOS\LineDisplay\
Prox-PMP4000]

Registry Name	Default Data	Notes
Default Value	LineDisplay.PMP4000.1	-
BaudRate	9600	-
BitLength	8	-
Parity	0	-
Port	COM1	-
Stop	1	-

2. OPOS VFD Service Object and Method Relations

Method	Status of Support	Notes
Open	○	-
Close	○	-
ClaimDevice	○	-
ReleaseDevice	○	-
Enable	○	-
Disable	○	-
DisplayText	○	-
DisplayTextAt	○	-
ClearText	○	-

4.10.2.2 OPOS Driver

The **MB4000_OposSetup.exe** program sets up the registry information and example program of VFD for OPOS program uses.

1. Installation

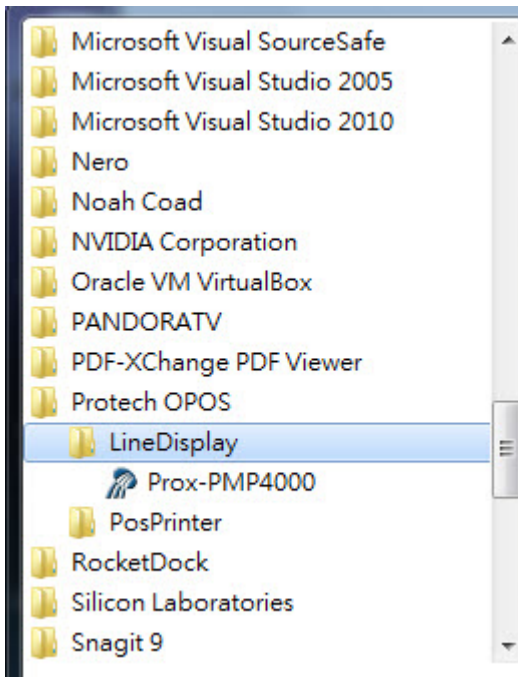
The steps below guide you to install the **MB4000_OposSetup** program:

- Run the **MB4000_OposSetup** setup file
- This setup also installs the **Prox-PMP4000** program.
- Follow the onscreen wizard instructions to complete the installation.

2. Launching the Program

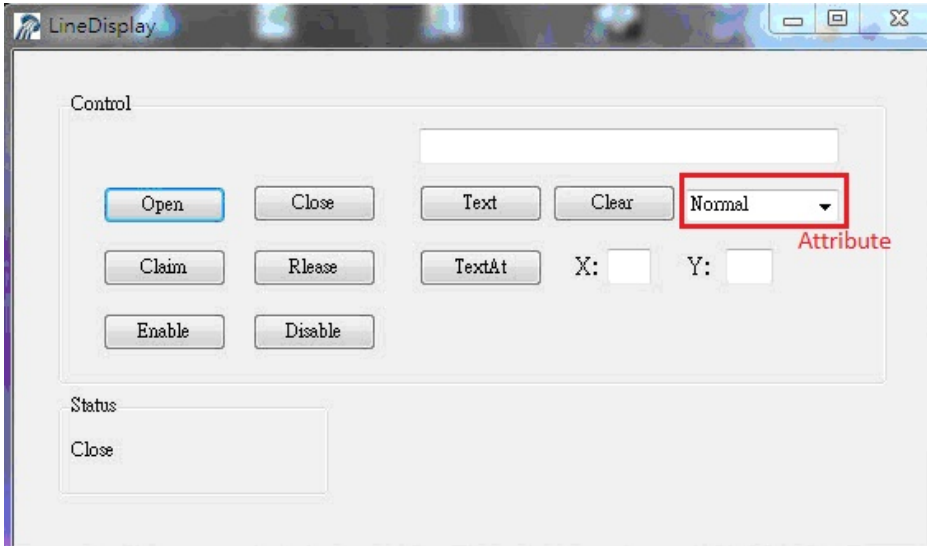
The steps below guide you to load the **Prox-PMP4000** program:

- Click the *LineDisplay* folder from the path: *Start/Programs/Protech OPOS*.
- Click **Prox-PMP4000** to launch the program.



3. OPOS Control Object of Prox-PMP4000 program

Main screen buttons:



Button/Item	Description
Text	Display the text at the current cursor position.
TextAt	Display the string of characters at the point of the specified “y-coordinate” and “x-coordinate”.
Clear	Clear the message shown in the current window.
Attribute	<ul style="list-style-type: none"> • Normal: Display the normal characters on the display screen. • Blink: Enable the display screen to blink. • Reverse: Enable the character printing in reverse black and white. • Blink+Reverse: Enable the display screen to blink and activate the character printing in reverse black and white.

4. MB4103 type

Key Name	Type	Default Value	Note
BaudRate	String	9600	UART Baud Rate (default)
BitLength	String	8	UART Data Bit (default)
Parity	String	0	UART Parity Bit (default)
Port	String	COM1	UART Port (default)
Stop	String	1	UART Stop Bit (default)

5. OPOS APIs Support List

	Category Type	Name	Mutability	OPOS APG Version	VFD .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	Not Applicable
Properties	common long	OpenResult	Read only	1.5	Not Applicable
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	CapBlink	Read only	1.0	Not Applicable
Properties	specific bool	CapBlinkRate	Read only	1.6	Not Applicable
Properties	specific bool	CapBrightness	Read only	1.0	Not Applicable
Properties	specific long	CapCharacterSet	Read only	1.0	Not Applicable
Properties	specific long	CapCursorType	Read only	1.6	Not Applicable
Properties	specific bool	CapCustomGlyph	Read only	1.6	Not Applicable
Properties	specific bool	CapDescriptors	Read only	1.0	Not Applicable
Properties	specific bool	CapHMarquee	Read only	1.0	Not Applicable
Properties	specific bool	CapICharWait	Read only	1.0	Not Applicable
Properties	specific long	CapReadBack	Read only	1.6	Not Applicable
Properties	specific long	CapReverse	Read only	1.6	Not Applicable
Properties	specific bool	CapVMarquee	Read only	1.0	Not Applicable
Properties	specific long	BlinkRate	R/W	1.6	Not Applicable
Properties	specific long	DeviceWindows	Read only	1.0	Not Applicable

	Category Type	Name	Mutability	OPOS APG Version	VFD .SO
Properties	specific long	DeviceRows	Read only	1.0	Not Applicable
Properties	specific long	DeviceColumns	Read only	1.0	Not Applicable
Properties	specific long	DeviceDescriptors	Read only	1.0	Not Applicable
Properties	specific long	DeviceBrightness	R/W	1.0	Not Applicable
Properties	specific long	CharacterSet	R/W	1.0	Not Applicable
Properties	specific string	CharacterSetList	Read only	1.0	Not Applicable
Properties	specific long	CurrentWindow	R/W	1.0	Not Applicable
Properties	specific long	Rows	Read only	1.0	Not Applicable
Properties	specific long	Columns	Read only	1.0	Not Applicable
Properties	specific long	CursorRow	R/W	1.0	Not Applicable
Properties	specific long	CursorColumn	R/W	1.0	Not Applicable
Properties	specific long	CursorType	R/W	1.6	Not Applicable
Properties	specific bool	CursorUpdate	R/W	1.0	Not Applicable
Properties	specific long	MarqueeType	R/W	1.0	Not Applicable
Properties	specific long	MarqueeFormat	R/W	1.0	Not Applicable
Properties	specific long	MarqueeUnitWait	R/W	1.0	Not Applicable
Properties	specific long	MarqueeRepeatWait	R/W	1.0	Not Applicable
Properties	specific long	InterCharacterWait	R/W	1.0	Not Applicable
Properties	specific string	CustomGlyphList	Read only	1.6	Not Applicable
Properties	specific long	GlyphHeight	Read only	1.6	Not Applicable
Properties	specific long	GlyphWidth	Read only	1.6	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	Not Applicable
Methods	common	ClearInput	-	1.0	Not Applicable
Methods	common	ClearOutput	-	1.0	Not Applicable
Methods	common	DirectIO	-	1.0	Not Applicable
Methods	specific	DisplayText	-	1.0	Supported
Methods	specific	DisplayTextAt	-	1.0	Supported
Methods	specific	ClearText	-	1.0	Supported
Methods	specific	ScrollText	-	1.0	Not Applicable
Methods	specific	SetDescriptor	-	1.0	Not Applicable
Methods	specific	ClearDescriptors	-	1.0	Not Applicable

	Category Type	Name	Mutability	OPOS APG Version	VFD .SO
Methods	specific	CreateWindow	-	1.0	Not Applicable
Methods	specific	DestroyWindow	-	1.0	Not Applicable
Methods	specific	RefreshWindow	-	1.0	Not Applicable)
Methods	specific	ReadCharacterAtCursor	-	1.6	Not Applicable
Methods	specific	DefineGlyph	-	1.6	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	-	1.3	Not Applicable

4.10.3 MSR: MB-3102 (PS/2)

4.10.3.1 OPOS Driver

The **MB301X_OposSetup.exe** program sets up the registry information of the MSR reader for OPOS programming use.

1. Installation

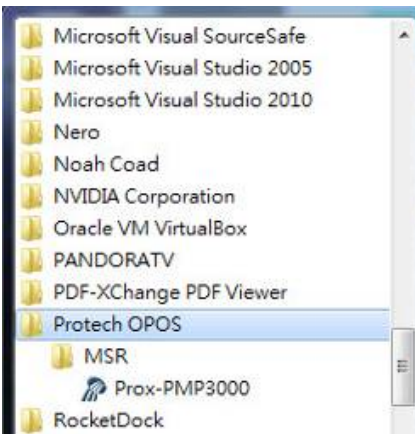
The steps below guide you to install the **MB301X_OposSetup** program.

- Run the **OPOSMSR_Setup.exe** setup file.
- This setup also installs the Prox-PMP3000 program.
- Follow the onscreen wizard instructions to complete the installation.

2. Launching the Program

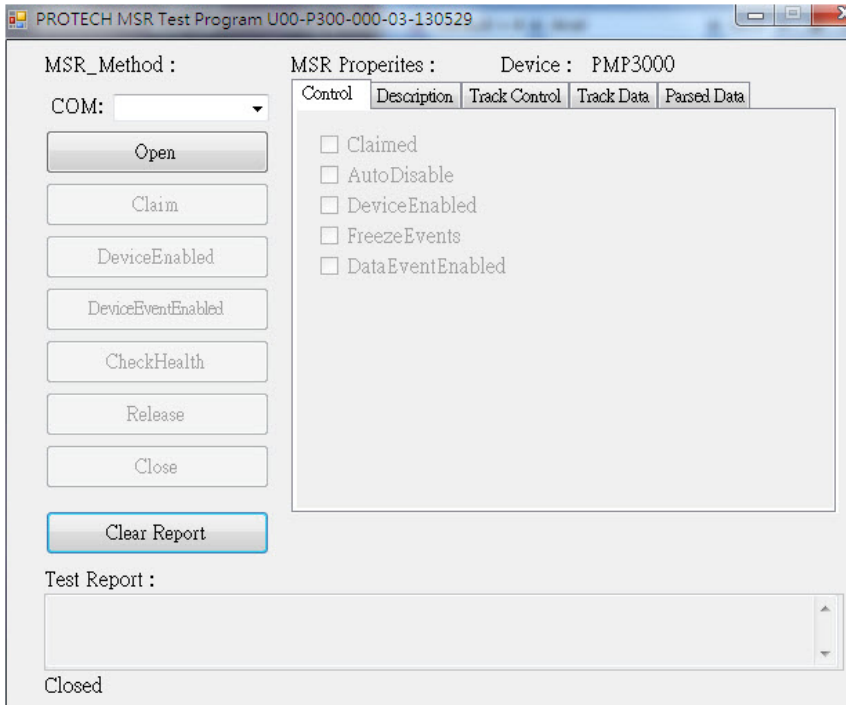
The steps below guide you to load the **Prox-PMP3000** program.

- Click the *MSR* folder from the path: *Start/Programs/Protech OPOS*.
- Click **Prox-PMP3000** to launch the program.



3. Configuration of Prox-PMP3000 program

- a.) Main screen & Control tab items:



Button/Item	Description
COM	Select the COM port number from the drop-down list. (only for UART/USB interface).
AutoDisable	(check box) Check to disable the device automatically when data is received.
FreezeEvents	(check box) Enable to trigger FreezeEvents , and the application will not allow events to be delivered.

b.) Description tab: S.O and C.O information

Control	Description	Track Control	Track Data	Parsed Data
DeviceControlDescription :	OPOS MSR Control 1.6.000 [Public, by CRM/RCS-Dayton]			
DeviceControlVersion :	1006000			
DeviceServiceDescription :	PROTECH OPOS MSR Service Object			
DeviceServiceVersion :	1007550			
PhysicalDeviceDescription :	PROTECH OPOS MSR			
PhysicalDeviceName :	OPOS.PMP3000MSRSO			

c.) Track Control tab items

Control	Description	Track Control	Track Data	Parsed Data
<input checked="" type="checkbox"/> DecodeData			ErrorReportingType :	CARD
<input checked="" type="checkbox"/> ParseDecodeData			TracksToRead :	Tracks123
<input type="checkbox"/> TransmitSentinels				

Button/Item	Description
DecodeData	Set decode data properties applicable.
ParseDecodeData	Set parse decode data properties
TransmitSentinels	Set transmit-sentinels properties
ErrorReporting Type	Card, track
TracksToRead	Track1, track2, track3, tracks12, tracks13, tracks14, tracks23, tracks24, tracks34, tracks123, tracks124, tracks134, tracks234, tracks1234 (Tracks4 is not applicable).

d.) Track Data tab items

Control	Description	Track Control	Track Data	Parsed Data
Track1Data :	<input type="text"/>			
Track1DiscretionaryData :	<input type="text"/>			
Track2Data :	<input type="text"/>			
Track2DiscretionaryData :	<input type="text"/>			
Track3Data :	<input type="text"/>			
Track4Data :	<input type="text"/>			

Button/Item	Description
TracksData	(Row) Display the data of all tracks (Track4 is not applicable).

e.) Parsed Data tab items

Control	Description	Track Control	Track Data	Parsed Data
AccountNumber :	<input type="text"/>			
ExpirationDate :	<input type="text"/>			
FirstName :	<input type="text"/>			
MiddleInitial :	<input type="text"/>			
Surname :	<input type="text"/>			
Title :	<input type="text"/>			
Suffix :	<input type="text"/>			
ServiceCode :	<input type="text"/>			

Button/Item	Description
Parsed Data	Display special properties.

Key Name	Type	Default Value	Note
default	string	PMP3000	OPOS S.O Link

5. OPOS APIs support List

	Category Type	Name	Mutability	OPOS APG Version	VFD .SO
Properties	common bool	AutoDisable	R/W	1.2	Supported
Properties	common long	BinaryConversion	R/W	1.2	Not Applicable
Properties	common long	CapPowerReporting	Read only	1.3	Supported
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	Supported
Properties	common bool	DataEventEnabled	R/W	1.0	Supported
Properties	common bool	DeviceEnabled	R/W	1.0	Supported
Properties	common bool	FreezeEvents	R/W	1.0	Supported
Properties	common long	OpenResult	Read only	1.5	Supported
Properties	common long	OutputID	Read only	1.0	Not Applicable
Properties	common long	PowerNotify	R/W	1.3	Not Applicable
Properties	common long	PowerState	Read only	1.3	Not Applicable
Properties	common long	ResultCode	Read only	1.0	Supported
Properties	common long	ResultCodeExtended	Read only	1.0	Supported
Properties	common long	State	Read only	1.0	Not Applicable
Properties	common string	ControlObject Description	Read only	1.0	Not Applicable
Properties	common long	ControlObjectVersion	Read only	1.0	Not Applicable
Properties	common string	ServiceObject Description	Read only	1.0	Supported
Properties	common long	ServiceObjectVersion	Read only	1.0	Not Applicable
Properties	common string	DeviceDescription	Read only	1.0	Supported
Properties	common string	DeviceName	Read only	1.0	Supported
Properties	specific bool	CapISO	Read only	1.0	Supported
Properties	specific bool	CapJISOne	Read only	1.0	Supported
Properties	specific bool	CapJISTwo	Read only	1.0	Supported
Properties	specific bool	CapTransmitSentinels	Read only	1.5	Supported
Properties	specific long	TracksToRead	R/W	1.0	Supported
Properties	specific bool	DecodeData	R/W	1.0	Not Applicable
Properties	specific bool	ParseDecodeData	R/W	1.0	Supported
Properties	specific long	ErrorReportType	R/W	1.2	Not Applicable
Properties	specific string	Track1Data	Read only	1.0	Supported

	Category Type	Name	Mutability	OPOS APG Version	VFD .SO
Properties	specific string	Track2Data	Read only	1.0	Supported
Properties	specific string	Track3Data	Read only	1.0	Supported
Properties	specific string	Track4Data	Read only	1.5	Not Applicable
Properties	specific string	AccountNumber	Read only	1.0	Supported
Properties	specific string	ExpirationDate	Read only	1.0	Supported
Properties	specific string	Title	Read only	1.0	Supported
Properties	specific string	FirstName	Read only	1.0	Supported
Properties	specific string	MiddleInitial	Read only	1.0	Supported
Properties	specific string	Surname	Read only	1.0	Supported
Properties	specific string	Suffix	Read only	1.0	Supported
Properties	specific string	ServiceCode	Read only	1.0	Supported
Properties	specific binary	Track1 DiscretionaryData	Read only	1.0	Supported
Properties	specific binary	Track2 DiscretionaryData	Read only	1.0	Supported
Properties	specific bool	TransmitSentinels	R/W	1.5	Supported
Methods	common	Open	-	1.0	Supported
Methods	common	Close	-	1.0	Supported
Methods	common	Claim	-	1.0	Supported
Methods	common	ClaimDevice	-	1.5	Supported
Methods	common	Release	-	1.0	Supported
Methods	common	ReleaseDevice	-	1.5	Supported
Methods	common	CheckHealth	-	1.0	Not Applicable
Methods	common	ClearInput	-	1.0	Supported
Methods	common	ClearOutput	-	1.0	Not Applicable
Methods	common	DirectIO	-	1.0	Not Applicable
Events	common	DataEvent	-	1.0	Supported
Events	common	DirectIOEvent	-	1.0	Not Applicable
Events	common	ErrorEvent	-	1.0	Not Applicable
Events	common	OutputCompleteEvent	-	1.0	Not Applicable
Events	common	StatusUpdateEvent	-	1.0	Not Applicable

4.10.4 MSR: GIGA-TMS MJR243 (RS-232)

4.10.4.1 Commands List

1. MSR Registry Operation

Registry Path:

[HKEY_LOCAL_MACHINE\SOFTWARE\OLEforRetail\ServiceOPOS\
MSR\MJR243]

Registry Name	Default Data	Notes
CapISO	1	Capability for reading ISO track data
CapJISOne	1	(reserved)
CapJISTwo	1	(reserved)
CapTransmitSentinels	1	Capability for reading Transmit Sentinels
Debug	0	Enable the tracing and create a log file
Description	GIGATMS MSR POS	Description for SO driver
DeviceName	MJR243	Device Name for CO open
FileName	(NULL)	(reserved)
HardwareProvider	0	(reserved)
Model	MJR243	Device model name
Parity	None	Parity for the communication port
Port	COM4	COM Port
Protocol	Hardware	Communication Control
Baudrate	19200	RS-232 baudrate

2. OPOS MSR Service Object and Method Relations

Method	Status of support by the driver	Notes
Open	○	-
Close	○	-
Claim	○	-
ClaimDevice	○	-
Release	○	-
ReleaseDevice	○	-
ClearInput	○	-
ClearInputProperties	○	-
DataEvent	○	-
Claimed	○	Read only
DataCount	○	Read only
DataEventEnabled	○	R/W
DeviceEnabled	○	R/W
FreezeEvents	○	R/W
OpenResult	○	Read only
ResultCode	○	Read only
ResultCodeExtended	○	Read only
State	○	Read only
ControlObjectDescription	○	Read only
ControlObjectVersion	○	Read only
ServiceObjectDescription	○	Read only
ServiceObjectVersion	○	Read only
DeviceDescription	○	Read only
DeviceName	○	Read only
CapISO	○	Read only
CapTransmitSentinels	○	Read only
AccountNumber	○	Read only
DecodeData	○	R/W
ExpirationDate	○	Read only
FirstName	○	Read only
MiddleInitial	○	Read Only
ParseDecodeData	○	R/W
ServiceCode	○	Read Only
Suffix	○	Read Only
Surname	○	Read Only
Title	○	Read Only
Track1Data	○	Read Only
Track1DiscretionaryData	○	Read Only

Method	Status of support by the driver	Notes
Track2Data	○	Read Only
Track2DiscretionaryData	○	Read Only
Track3Data	○	Read Only
TracksToRead	○	R/W
TransmitSentinels	○	R/W

4.10.4.2 OPOS MSR Register

The **OPOS MSR Register** program sets up the registry information of MSRHK reader for OPOS program usage.

1. Installation

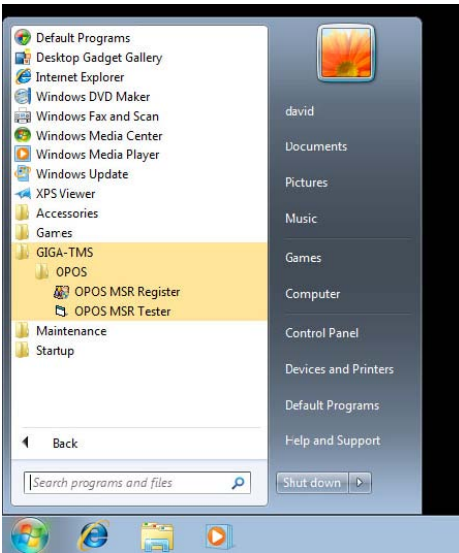
The steps below guides you how to install the **OPOS MSR Register** program.

- Insert the setup DVD
- Run the setup file **OPOSMSR_Setup.exe** located in the Software folder of the DVD.
- This setup also installs the **OPOS MSR Tester** program.
- Follow the onscreen wizard instructions to complete the installation.

2. Launching the Program

The steps below guides you how to load the **OPOS MSR Register** program.

- Click the *OPOS* folder from the path: *Start/Programs/GIGA-TMS*.
- Click **OPOS MSR Register** to launch the program.



3. Configuration of OPOS MSR Register program

a.) Main screen buttons/items:



Button/Item	Description
Control Object	(Check box) Register the OPOSMSR.ocx common control object driver. The item needs to be checked to run the OPOS MSR Tester program.
Service Object	(Left pane) The Service Object driver types. So far only four driver types are supported. Each driver type supports specific MSR readers. Please refer to the OPOS MSR Service Object and Method Relations section for details.
Service Object	(Right pane) The registered MSR with the specified device name.
Reg→	Create a new device name for the selected MSR.
← Unreg	Remove the selected device name from the registry.
Exit	Quit the program.

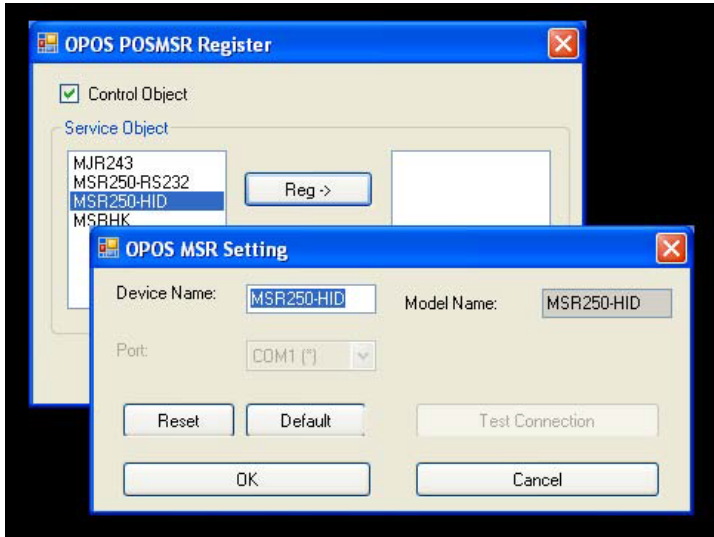
b.) Follow the steps below to register the MSRHK OPOS information:

Step 1: Select an item in the **Service Object** List box from the left pane. Make sure the correct item is selected.

Step 2: Click **Reg→** button

Step 3: In the **OPOS MSR Setting** screen, enter the device name and click **OK**.

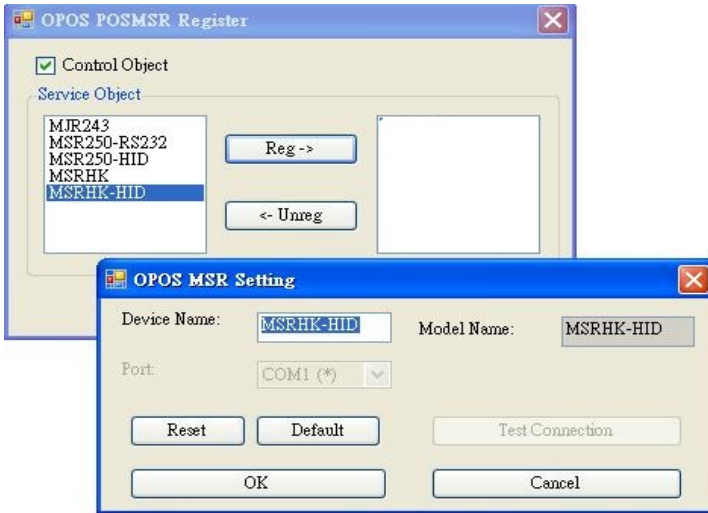
c.) Example 1. MAGTEK USB HID



d.) Example 2. PROMAG MSR/MJR PART-NO, Keyboard mode.



e.) Example 3. PROGRAM MSR PART-NO, HID mode.



If your system doesn't have any other common control driver, click the **Control Object** check box.

Note: To run the OPOPS MSR Tester program, the Control Object must be checked.

4. MJR243 type

Key Name	Type	Default Value	Note
CapISO	string	1	Capability for reading ISO track data
CapJISOne	string	1	(reserved)
CapJISTwo	string	1	(reserved)
CapTransmitSentinels	string	1	Capability for reading Transmit Sentinels
Debug	string	0	Enable the tracing and create a log file.
Description	string	GIGATMS MSR POS	Description for SO driver
DeviceName	string	MJR243	Device Name for CO open
FileName	string	(NULL)	(reserved)
HardwareProvider	string	0	(reserved)
Model	string	MJR243	Device model name
Parity	string	None	Parity for the communication port

Key Name	Type	Default Value	Note
Port	string	COM4	COM Port Number
Protocol	string	Hardware	Communication Control
Baudrate	string	19200	RS-232 baudrate

5. OPOS APIs support list

	Category Type	Name	Mutability	OPOS APG Version	MSR .SO
Properties	common bool	AutoDisable	R/W	1.2	Not Applicable
Properties	common long	BinaryConversion	R/W	1.2	Not Applicable
Properties	common bool	CapCompare FirmwareVersion	Read only	1.9	Not Applicable
Properties	common long	CapPowerReporting	Read only	1.3	Not Applicable
Properties	common bool	CapStatisticsReporting	Read only	1.8	Not Applicable
Properties	common bool	CapUpdateFirmware	Read only	1.9	Not Applicable
Properties	common bool	CapUpdateStatistics	Read only	1.8	Not Applicable
Properties	common string	CheckHealthText	Read only	1.0	Not Applicable
Properties	common bool	Claimed	Read only	1.0	Supported
Properties	common long	DataCount	Read only	1.2	Supported
Properties	common bool	DataEventEnabled	R/W	1.0	Supported
Properties	common bool	DeviceEnabled	R/W	1.0	Supported
Properties	common bool	FreezeEvents	R/W	1.0	Supported
Properties	common long	OpenResult	Read only	1.5	Supported
Properties	common long	OutputID	Read only	1.0	Not Applicable
Properties	common long	PowerNotify	R/W	1.3	Not Applicable
Properties	common long	PowerState	Read only	1.3	Not Applicable
Properties	common long	ResultCode	Read only	1.0	Supported
Properties	common long	ResultCodeExtended	Read only	1.0	Supported
Properties	common long	State	Read only	1.0	Supported
Properties	common string	ControlObject Description	Read only	1.0	Supported
Properties	common long	ControlObjectVersion	Read only	1.0	Supported
Properties	common string	ServiceObject Description	Read only	1.0	Supported
Properties	common long	ServiceObjectVersion	Read only	1.0	Supported
Properties	common string	DeviceDescription	Read only	1.0	Supported
Properties	common string	DeviceName	Read only	1.0	Supported
Properties	specific bool	CapISO	Read only	1.0	Supported
Properties	specific bool	CapJISOne	Read only	1.0	Not Applicable
Properties	specific bool	CapJISTwo	Read only	1.0	Not Applicable
Properties	specific bool	CapTransmit	Read only	1.5	Supported

	Category Type	Name	Mutability	OPOS APG Version	MSR .SO
		Sentinels			
Properties	specific long	CapWriteTracks	Read only	1.1	Not Applicable
Properties	specific string	AccountNumber	Read only	1.0	Supported
Properties	specific bool	DecodeData	R/W	1.0	Supported
Properties	specific long	EncodingMaxLength	Read only	1.1	Not Applicable
Properties	specific long	ErrorReportType	R/W	1.2	Not Applicable
Properties	specific string	ExpirationDate	Read only	1.0	Supported
Properties	specific string	FirstName	Read only	1.0	Supported
Properties	specific string	MiddleInitial	Read only	1.0	Supported
Properties	specific bool	ParseDecodeData	R/W	1.0	Supported
Properties	specific string	ServiceCode	Read only	1.0	Supported
Properties	specific string	Suffix	Read only	1.0	Supported
Properties	specific string	Surname	Read only	1.0	Supported
Properties	specific string	Title	Read only	1.0	Supported
Properties	specific binary	Track1Data	Read only	1.0	Supported
Properties	specific binary	Track1 DiscretionaryData	Read only	1.0	Supported
Properties	specific binary	Track2Data	Read only	1.0	Supported
Properties	specific binary	Track2 DiscretionaryData	-	1.0	Supported
Properties	specific binary	Track3Data	Read only	1.0	Supported
Properties	specific binary	Track4Data	Read only	1.5	Not Applicable
Properties	specific long	TracksToRead	R/W	1	Supported
Properties	specific long	TracksToWrite	R/W	1.1	Not Applicable
Properties	specific bool	TransmitSentinels	R/W	1.5	Supported
Methods	common	Open	-	1	Supported
Methods	common	Close	-	1	Supported
Methods	common	Claim	-	1	Supported
Methods	common	ClaimDevice	-	1.5	Supported
Methods	common	Release	-	1	Supported
Methods	common	ReleaseDevice	-	1.5	Supported
Methods	common	CheckHealth	-	1	Not Applicable
Methods	common	ClearInput	-	1	Supported
Methods	common	ClearInput Properties	-	1.1	Supported
Methods	common	ClearOutput	-	1	Not Applicable
Methods	common	DirectIO	-	1	Not Applicable
Methods	common	Compare FirmwareVersion	-	1.9	Not Applicable

	Category Type	Name	Mutability	OPOS APG Version	MSR .SO
Methods	common	ResetStatistics	-	1.8	Not Applicable
Methods	common	RetrieveStatistics	-	1.8	Not Applicable
Methods	common	UpdateFirmware	-	1.9	Not Applicable
Methods	common	UpdateStatistics	-	1.8	Not Applicable
Events	common	DataEvent	-	1.0	Supported
Events	common	DirectIOEvent	-	1.0	Not Applicable
Events	common	ErrorEvent	-	1.0	Not Applicable
Events	common	OutputCompleteEvent	-	1.0	Not Applicable
Events	common	StatusUpdateEvent	-	1.0	Not Applicable

4.10.4.3 OPOS MSR Tester

The **OPOS MSR Tester** program is used to get the track data of the MSRHK reader via the OPOS driver. Before running the program, make sure the device name registry information for MSRHK reader has been created by OPOS MSR Register program.

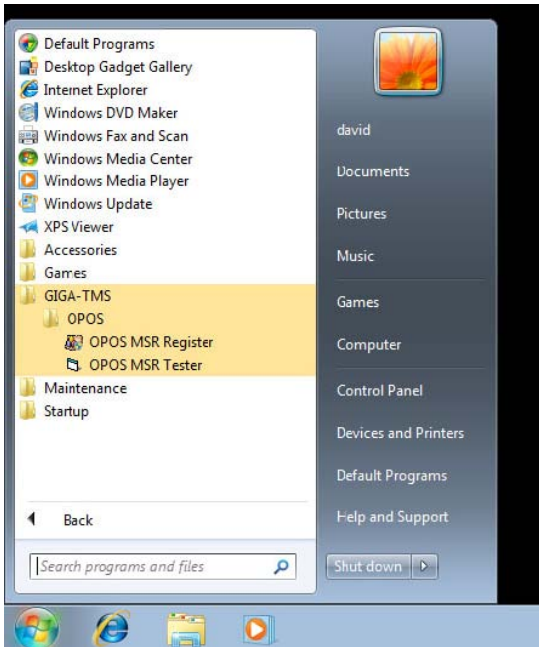
1. Installation

The installation of **OPOS MSR Tester** program goes together with OPOS MSR Register program.

2. Launching the Program

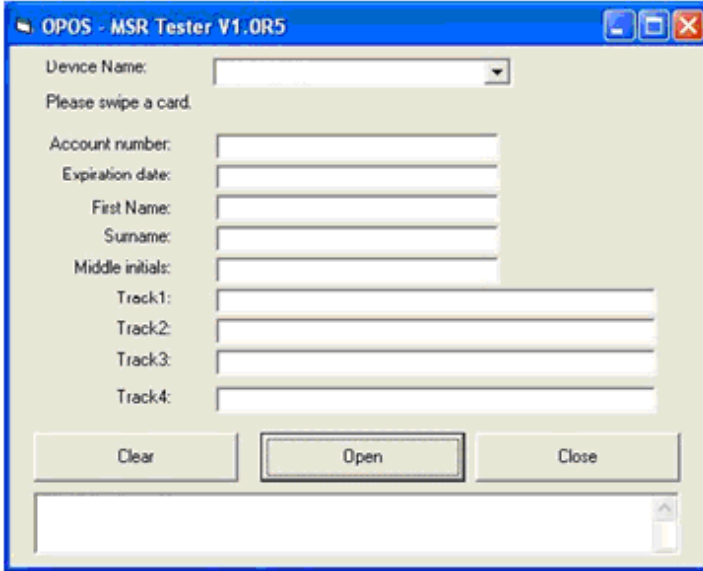
The steps below guide you to load the **OPOS MSR Tester** program.

- Click the *OPOS* folder from the path: *Start\Programs\GIGA-TMS*.
- Click **OPOS MSR Tester** to launch the program.



3. Configuration for OPOS MSR Tester Program

a.) Main screen buttons/items:



Button/Item	Description
Device Name	(Combo box) Enter the device name that will be loaded to the program.
Track Data	(Text boxes) Show the raw and parsed track data.
Clear	(Button) Clear all the track data in the text boxes.
Open	(Button) Open the OPOS driver and ready to get track data.
Close	(Button) Close the OPOS driver.
Message	(Text box) Display the result message of running the OPOS driver.

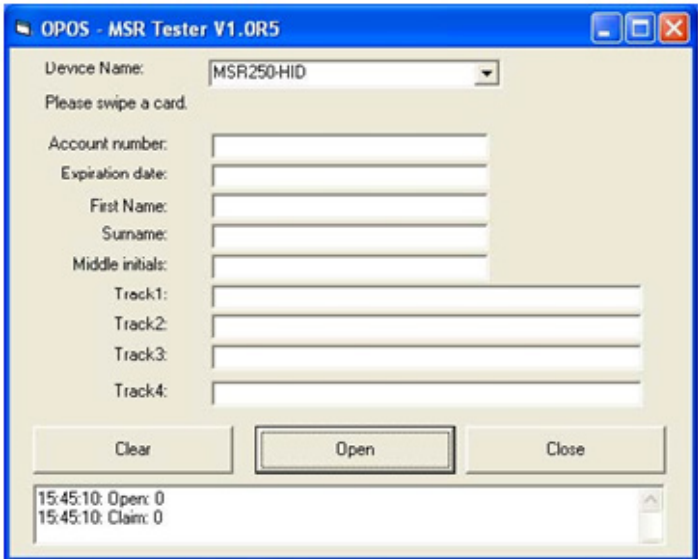
b.) To get the track data using OPOS driver, follow the steps below:

Step 1: Enter the **Device Name**.

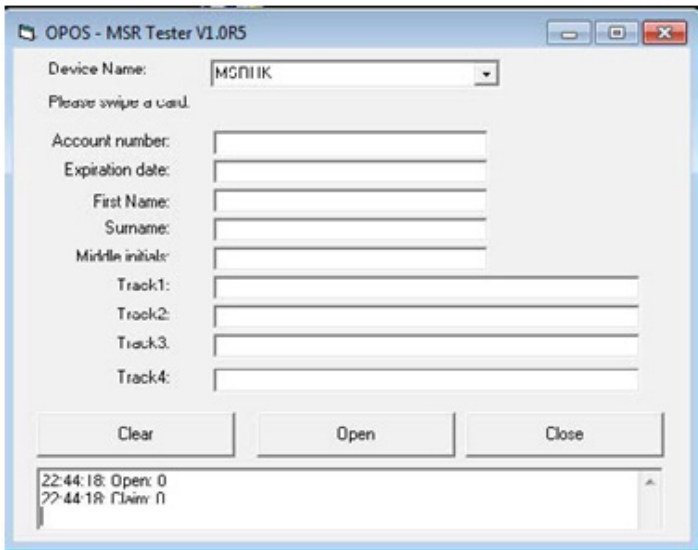
Step 2: Click **Open** button.

Step 3: Swipe the card to get the track data.

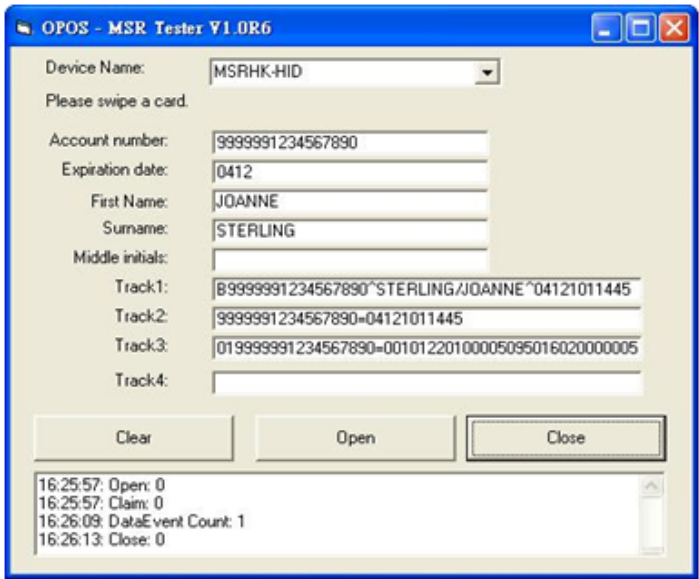
c.) Example 1. MAGTEK USB HID.



d.) Example 2. PROMAG MSR/MJR PART-NO, Keyboard mode



e.) Example 3. PROMAG MSR PART-NO, HID mode



4.11 API

4.11.1 API Package Content

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

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

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

4.11.2 API Procedure

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

Step 1. Declare a function. You may create a module in your project and fill in the function.

Example: Cash drawer

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

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

Step 2. Create a button to call API Function.

a.) Call Cash drawer open event:

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

b.) Detect Cash drawer status:

A timer event can be created.

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

Sample Code

(1) **VB Declaration Method**

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

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

(2) **Call Function**

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

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

(3) **C# Declaration Method**

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

(4) **Call Function**

```
Open cash drawer1  
PortAccess.CashDrawerOpen(0x01); //check cash drawer1 status  
Open cash drawer2  
PortAccess.CashDrawerOpen(0x02); //check cash drawer2 status  
  
Bool bstatus;  
bstatus = PortAccess.GetCashDrawerStatus(0x01);
```

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

VB.NET external function:

```
Declare Function SetMinSec Lib "WatchDog.dll" (ByVal kind As Short,ByVal
delay_time As Short) As Boolean
```

```
Declare Function Stopwatchdog Lib "WatchDog.dll" ( ) As Short
```

```
Declare Function Setwatchdog Lib "WatchDog.dll" (ByVal value As Short) As
Boolean
```

```
Declare Function Digital_Initial Lib "Digital.dll" ( ) As Long
```

```
Declare Function Digital_Set Lib "Digital.dll"(ByVal hex_value As Short) As
Long
```

```
Declare Function Digital_Get Lib "Digital.dll" ( ) As Short
```

```
Declare Function GPIO_Initial Lib "GPIO.dll" ( ) As Long
```

```
Declare Function GPIO_SetPort Lib "GPIO.dll"(ByVal direct As long)
```

```
Declare Function GPIO_Set Lib "GPIO.dll"(ByVal dout_value As long) As
Boolean
```

```
Declare Function GPIO_Get Lib "GPIO.dll" ( ) As Short
```

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

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

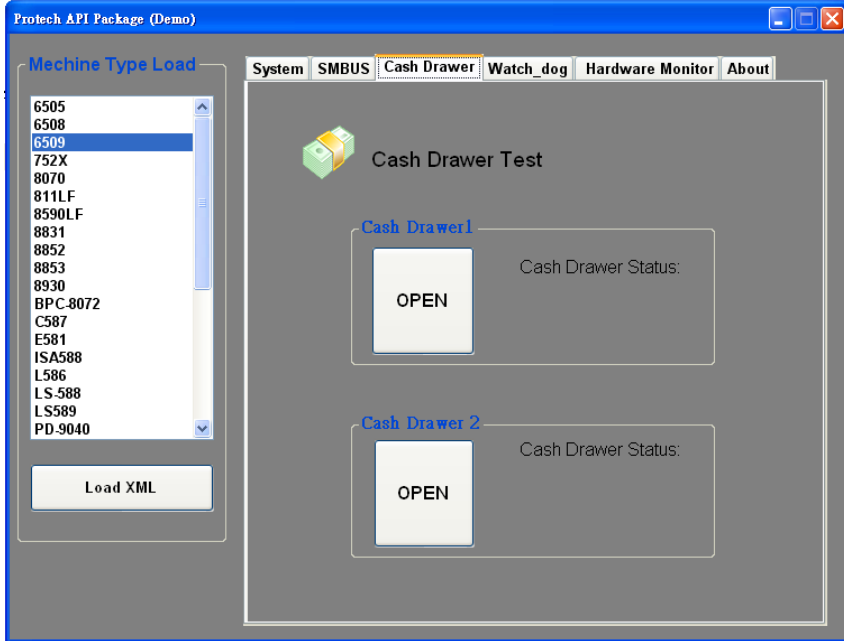
VB 6 external function:

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

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

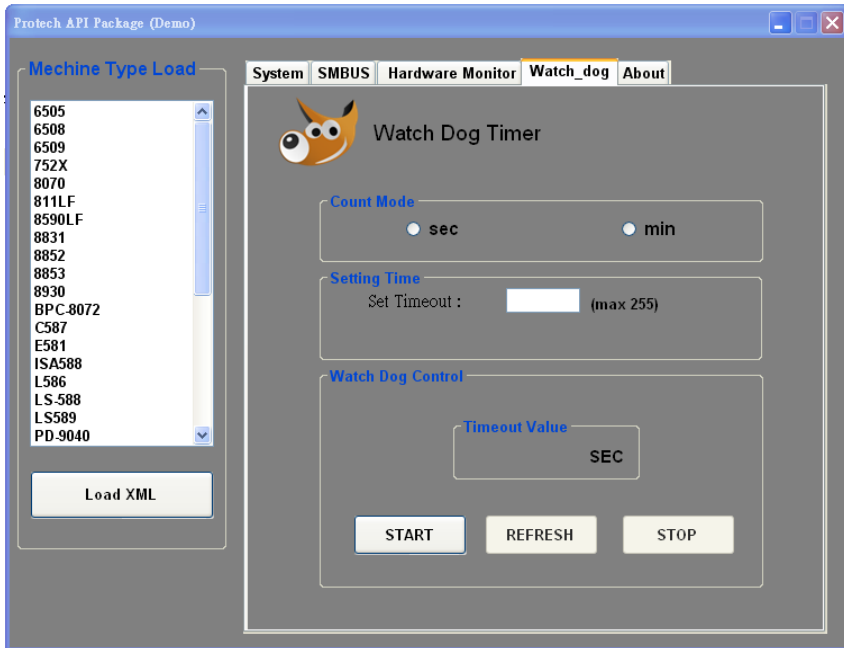
Note: VB.net short = integer VB6

4.11.3 Cash Drawer



Button/Item	Description
OPEN (button)	Tap to open the cash drawer.
Cash Drawer Status	<p>Cash drawer status will be displayed after OPEN is tapped.</p> <ul style="list-style-type: none"> Cash Drawer is closed when the following picture is shown: <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px 0;"> Cash Drawer Status: Close </div> Cash Drawer is opened when the following picture is shown: <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px 0;"> Cash Drawer Status: Open </div>

4.11.4 Watchdog



Button/Item	Description
Count Mode (radio button)	Select second or minute as the time unit of the watchdog timer.
Setting Time	Set the timeout for the watchdog timer. (Maximum value: 255 seconds or minutes)
Watch Dog Control	<ul style="list-style-type: none"> • 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.

4.12 API Function

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

API Function		DLL	
Cash Drawer	CashDrawerOpen GetCashDrawerStatus	multilangXML.dll	CashDrawer.dll
Watchdog (WD)	Watchdog_Set Watchdog_Stop Watchdog_SetMinSec Watchdog_Recount		WatchDog.dll
Hardware Monitor	HMWVoltage_Get HMWTemperataure_Get HMWFanSpeed_Get		Hardware Monitor.dll

4.12.1 Cash Drawer Function

CashDrawerOpen

```
bool CashDrawerOpen (short num_drawer);
```

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

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

GetCashDrawerStatus

```
bool GetCashDrawerStatus (short num_drawer);
```

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

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


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

4.12.2 Watch Dog Function

Watchdog_Set

bool Watchdog_Set (int value);

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

Watchdog_SetMinSec

bool Watchdog_SetMinSec (int kind);

Purpose: Set the unit of time as second/minute
Value kind = 1 (Measured in unit of second)
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-A310 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.

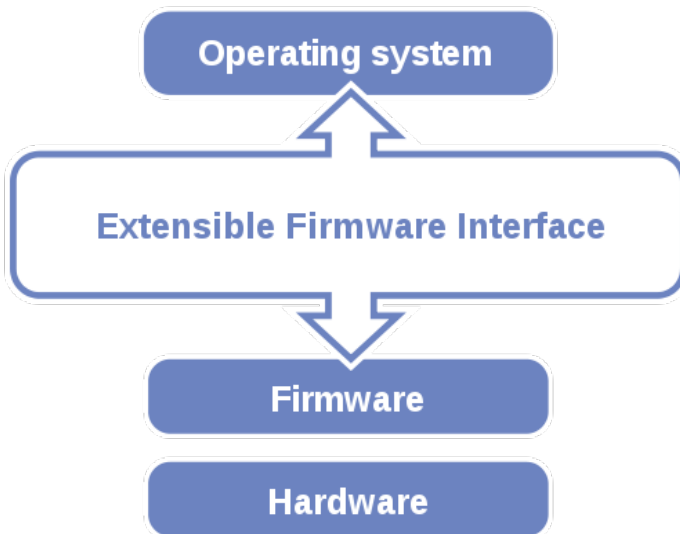


Figure 5-1. Extensible Firmware Interface Diagram

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 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:

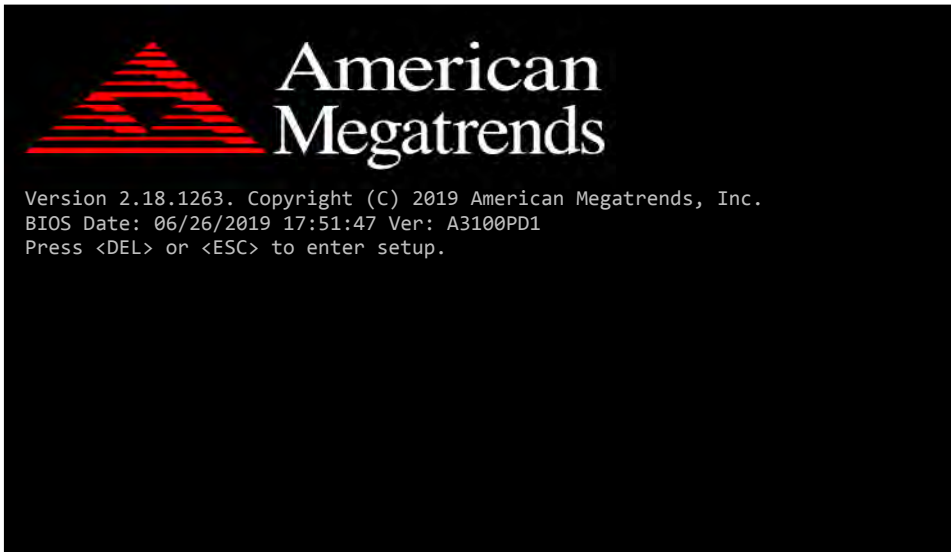
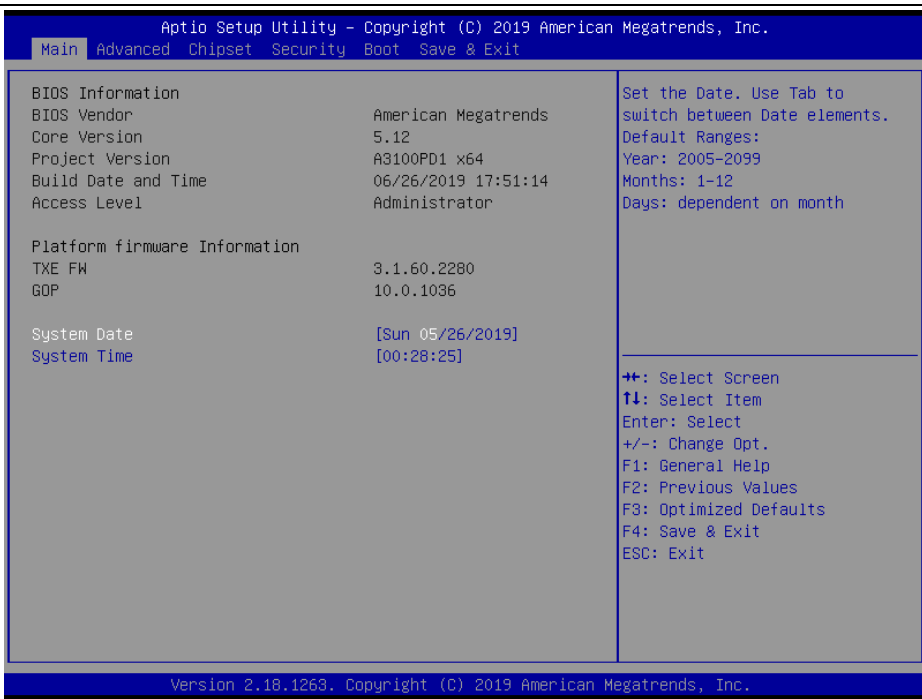


Figure 5-2. POST Screen with AMI Logo

Press **** 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.

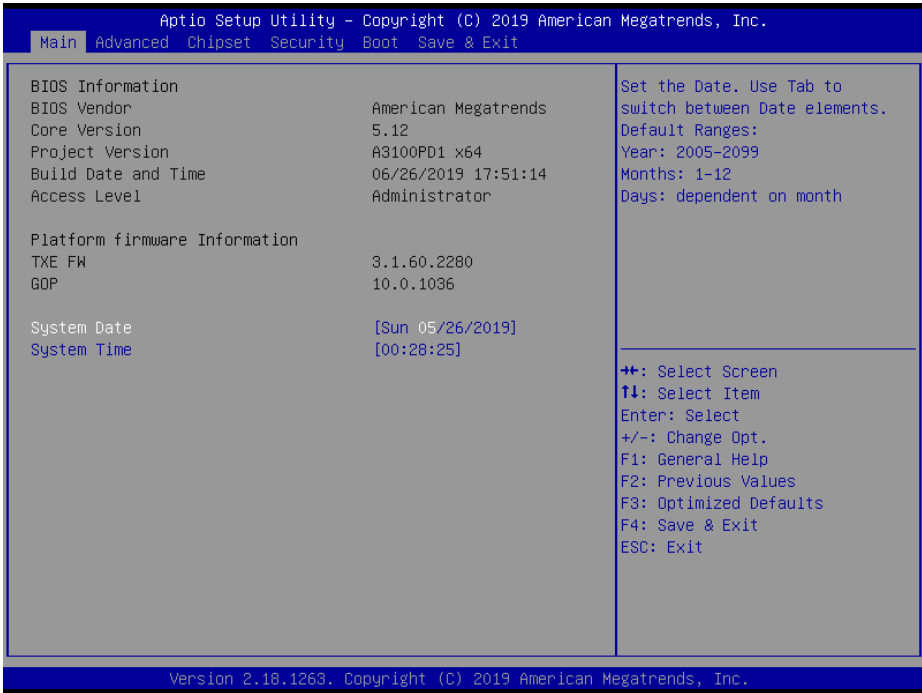
The language of the BIOS setup menu interface and help messages are shown in US English. You may use <↑> or <↓> key to select among the items and press <Enter> to confirm and enter the sub-menu. The following table provides the list of the navigation keys that you can use while operating the BIOS setup 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.
Project Version	No changeable options	Displays the version of the BIOS currently installed on the platform.
Build Date and Time	No changeable options	Displays the date of current BIOS version is built.
Access Level	No changeable options	Displays the Access Level
TXE FW	No changeable options	Displays the TXE firmware version.
GOP	No changeable options	Displays the GOP driver version.

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

5.4 Advanced

Menu Path *Advanced*

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



Advanced Menu Screen

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

5.4.1 Advanced – Trusted Computing

Menu Path *Advanced > Trusted Computing*

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



Trusted Computing Screen

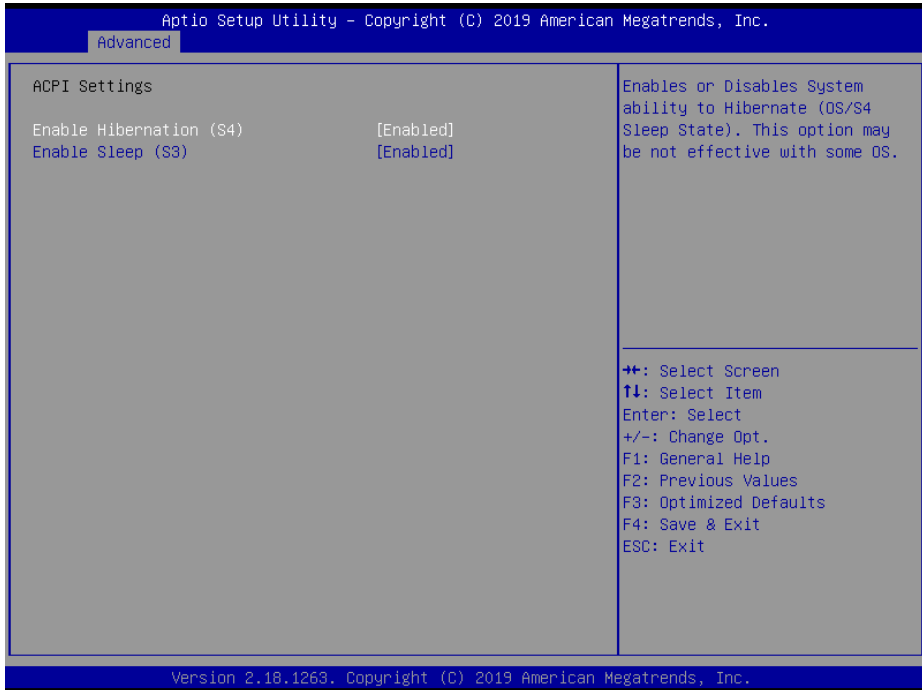
BIOS Setting	Options	Description/Purpose
Security Device Support	- Disabled - Enabled	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Active PCR banks	SHA-1, SHA256	Displays the Security Device.
Available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

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

5.4.2 Advanced – ACPI Settings

Menu Path *Advanced > ACPI Settings*

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

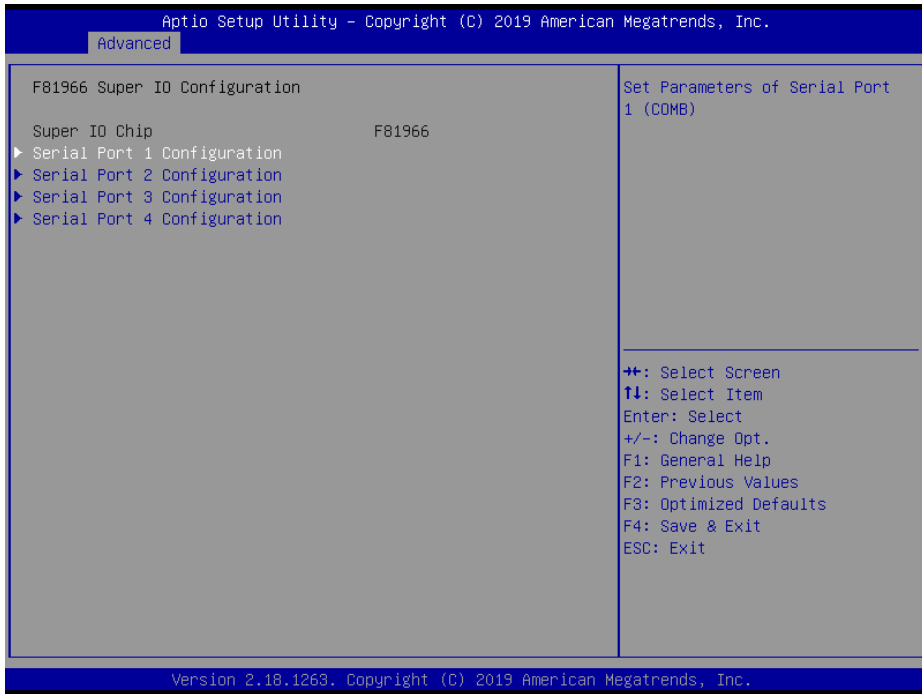


ACPI Settings Screen

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

5.4.3 Advanced – F81966 Super IO Configuration

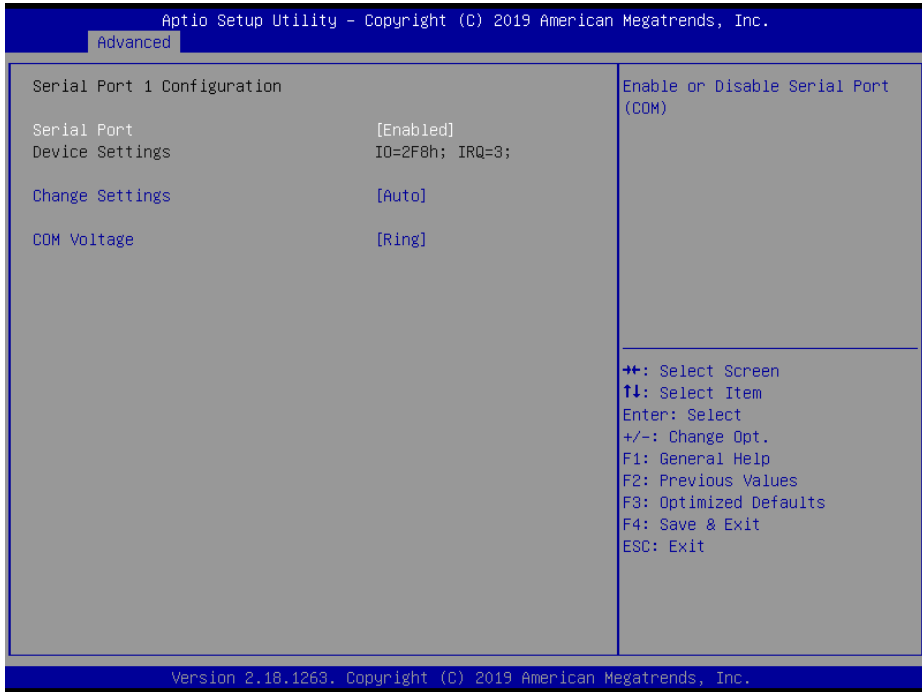
Menu Path *Advanced > F81966 Super IO Configuration*



F81966 Super IO Configuration Screen

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

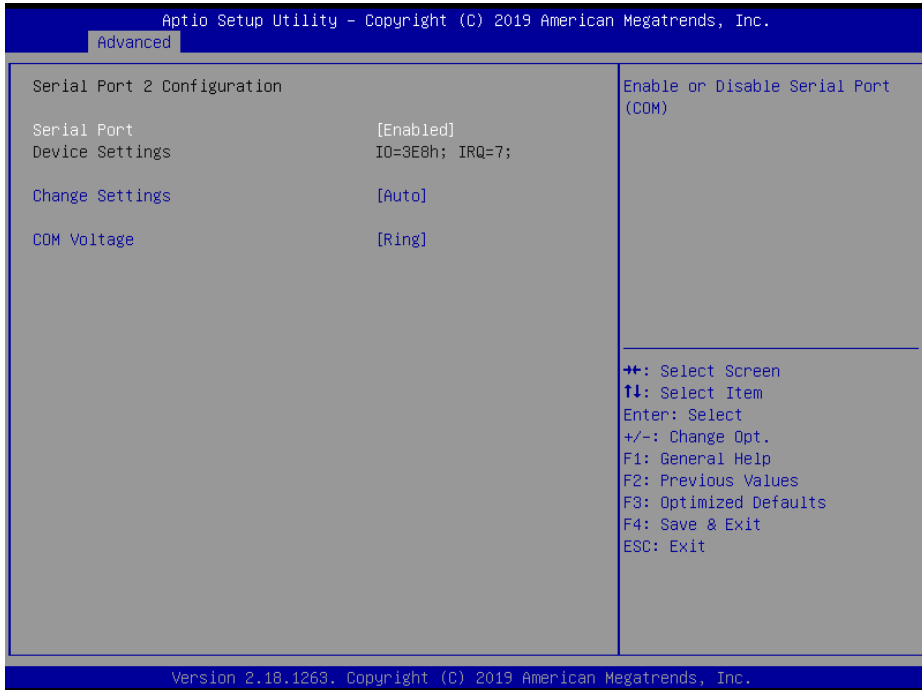
Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 1 Configuration*



Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 1.
Device settings	No changeable options	Displays the current settings of Serial Port 1.
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	Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts.
COM Voltage	- Ring - 12V - 5V	COM Voltage selection.

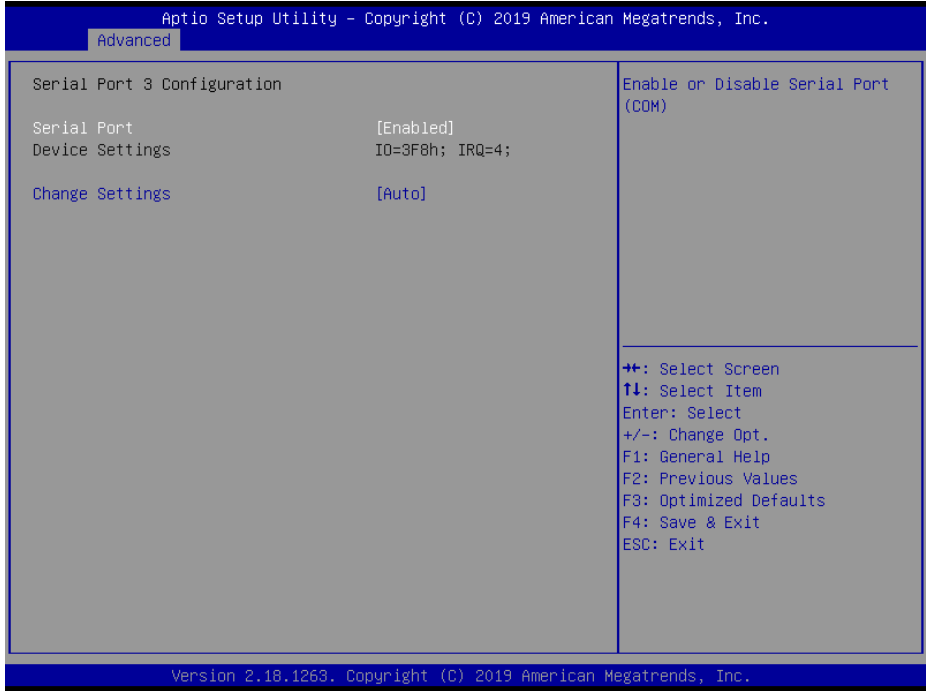
Menu Path *Advanced > F81966 Super IO Configuration >
Serial Port 2 Configuration*



Serial Port 2 Configuration Screen

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

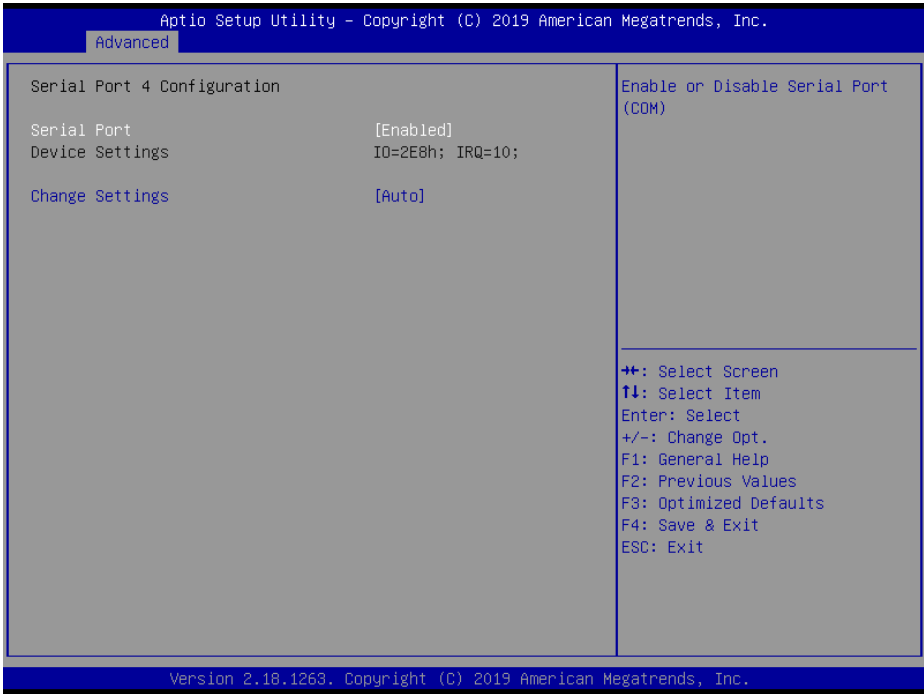
Menu Path *Advanced > F81966 Super IO Configuration >
Serial Port 3 Configuration*



Serial Port 3 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 3.
Device Settings	No changeable options	Displays the current settings of Serial Port 3.
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	Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts.

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



Serial Port 4 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - 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=7; - IO=3F8h; 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	Allows users to change the device resource settings. New settings will be reflected on this setup page after the system restarts.

5.4.4 Advanced – Hardware Monitor

Menu Path *Advanced > Hardware Monitor*

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



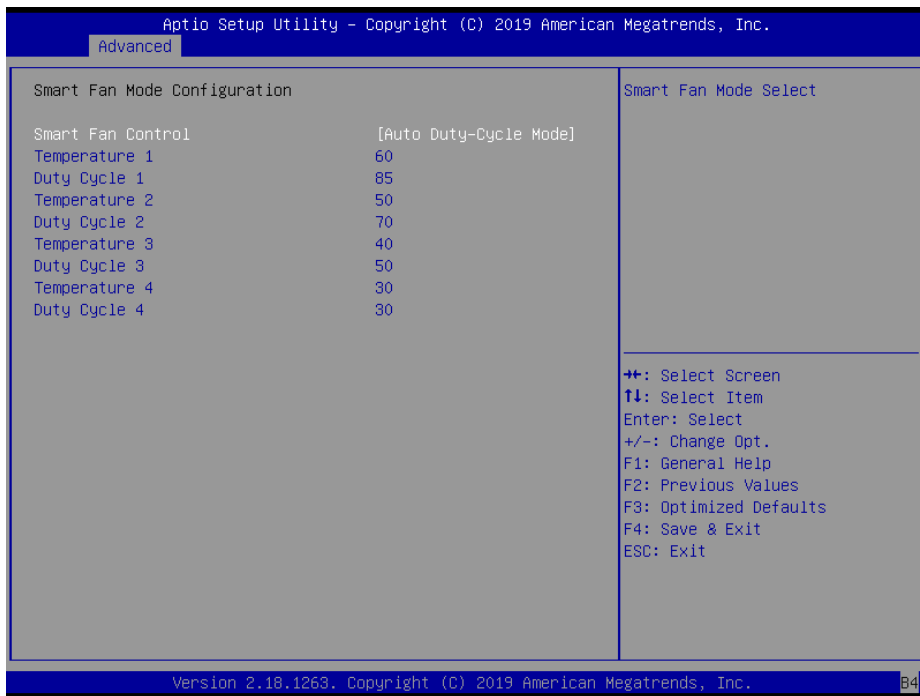
Hardware Monitor Screen

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

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

5.4.4.1 Smart Fan Mode Configuration

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



Smart Fan Mode Configuration Screen

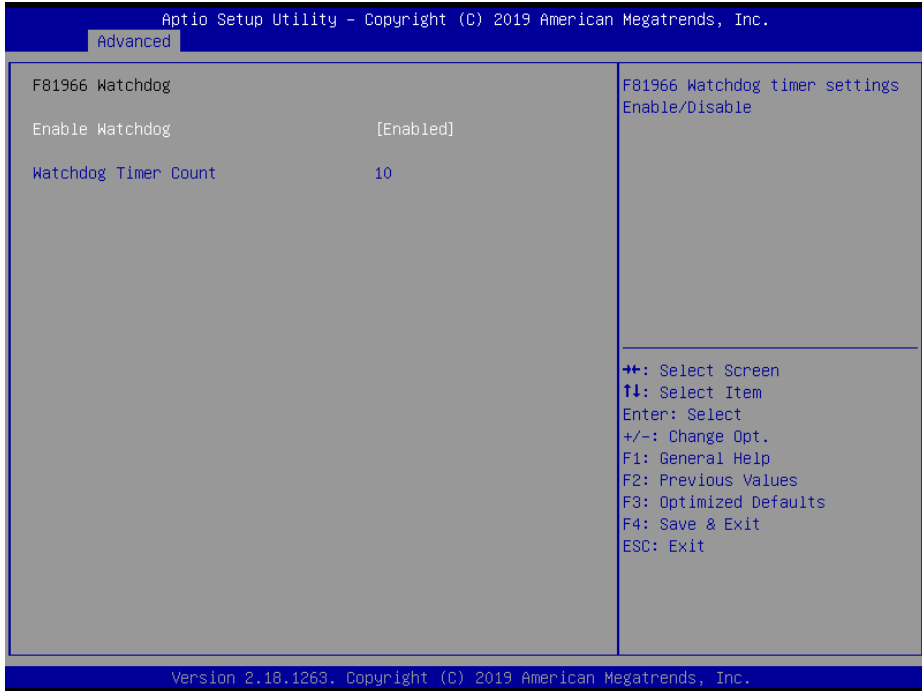
BIOS Setting	Options	Description/Purpose
Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode	Smart Fan Mode selection.
Temperature 1	Numeric	Auto fan speed control. Fan speed will follow different temperature by different duty cycle from 1 to 100.
Duty Cycle 1	Numeric	Auto fan speed control.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

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

5.4.5 Advanced – F81966 Watchdog Configuration

Menu Path *Advanced > F81966 Watchdog*

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



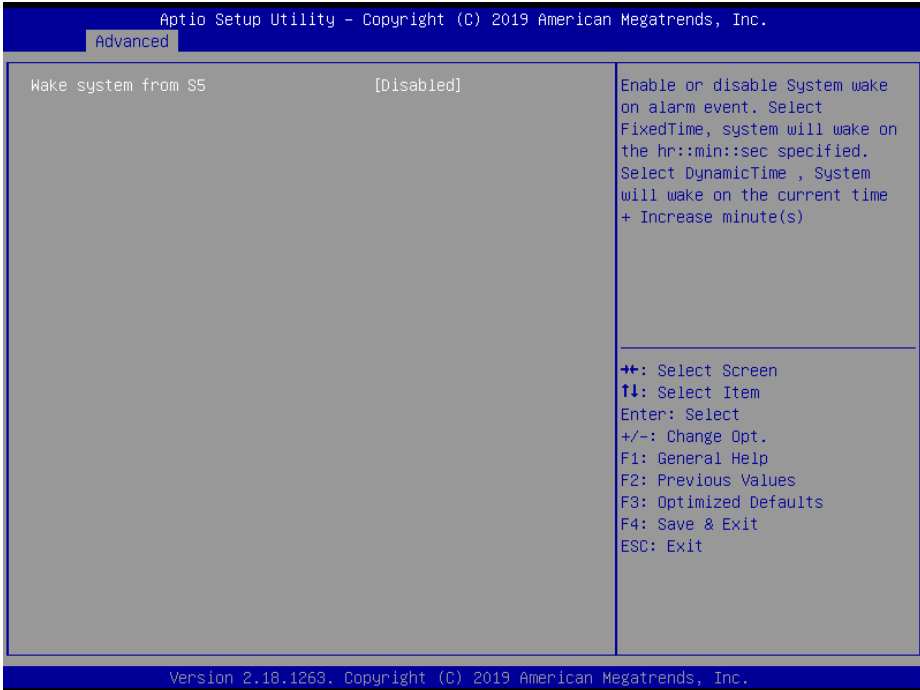
F81966 Watchdog Configuration Screen

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

5.4.6 Advanced – S5 RTC Wake Settings

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

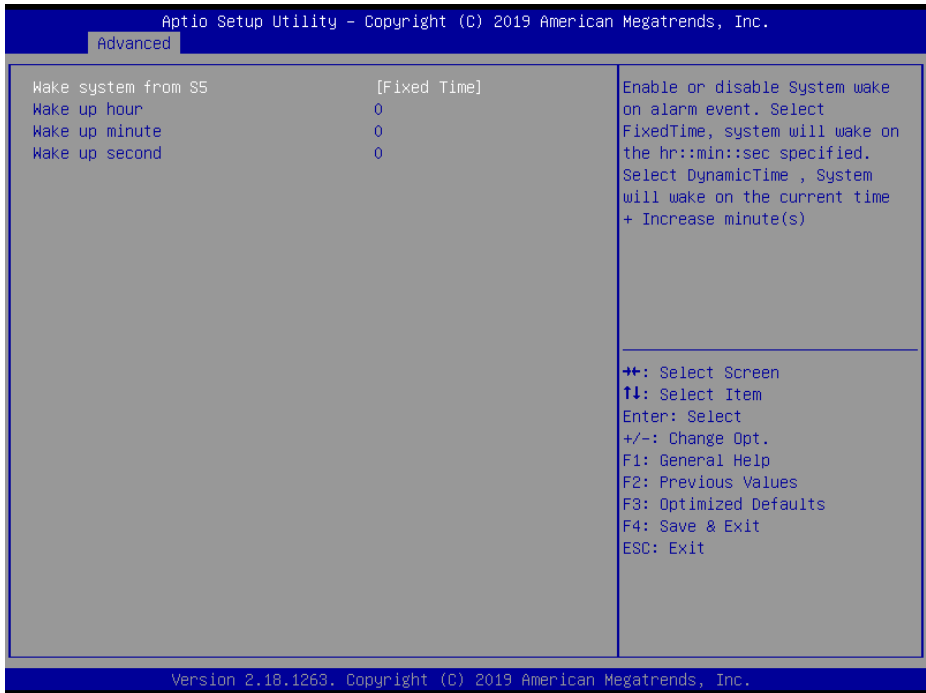
The **S5 RTC Wake Settings** enables/disables the system to wake up at a preset time of a day from S5 State using RTC alarm.



S5 RTC Wake Settings Screen (Disabled)

BIOS Setting	Options	Description/Purpose
Wake system from S5	<ul style="list-style-type: none"> - Disabled - Fixed Time - Dynamic Time 	<p>Allows enabling scheduled S5 to S0 (option enabled).</p> <ul style="list-style-type: none"> • Fixed Time: System will wake on the hr::min::sec specified. • Dynamic Time: System will wake on the current time + Increased minute(s).

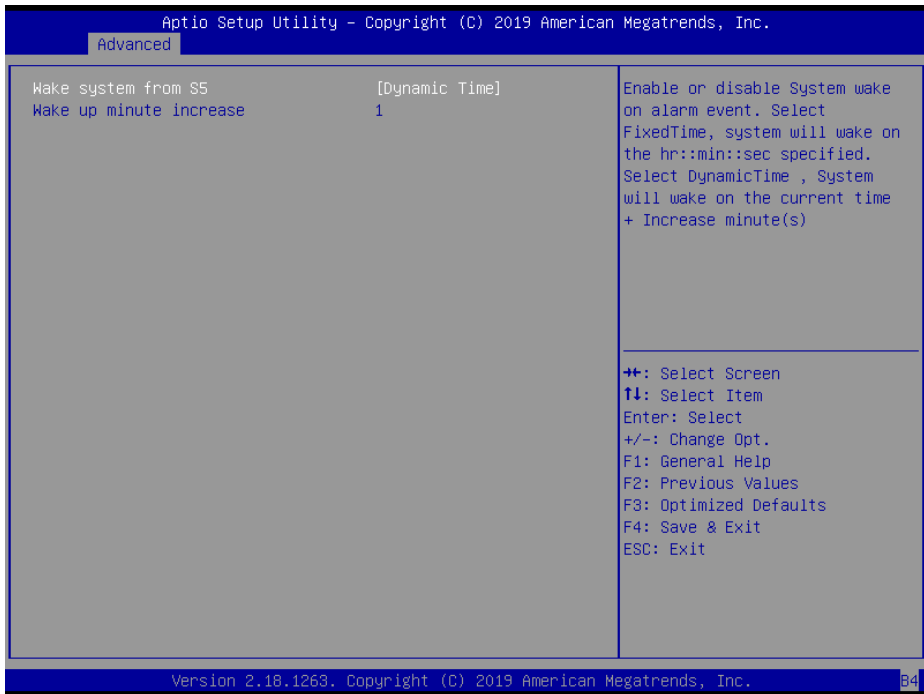
Menu Path *Advanced > S5 RTC Wake Settings (Fixed Time)*



S5 RTC Wake Settings Screen (Fixed Time)

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled - Fixed Time (selected) - Dynamic Time	<ul style="list-style-type: none"> Fixed Time: System will wake on the hr::min::sec specified.
Wake up hour	Multiple options ranging from 0 to 23	Selects 0-23 for Hour. For example, enter 3 for 3am and 15 for 3pm.
Wake up minute	Multiple options ranging from 0 to 59	Selects 0-59 for Minute.
Wake up second	Multiple options ranging from 0 to 59	Selects 0-59 for Second.

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



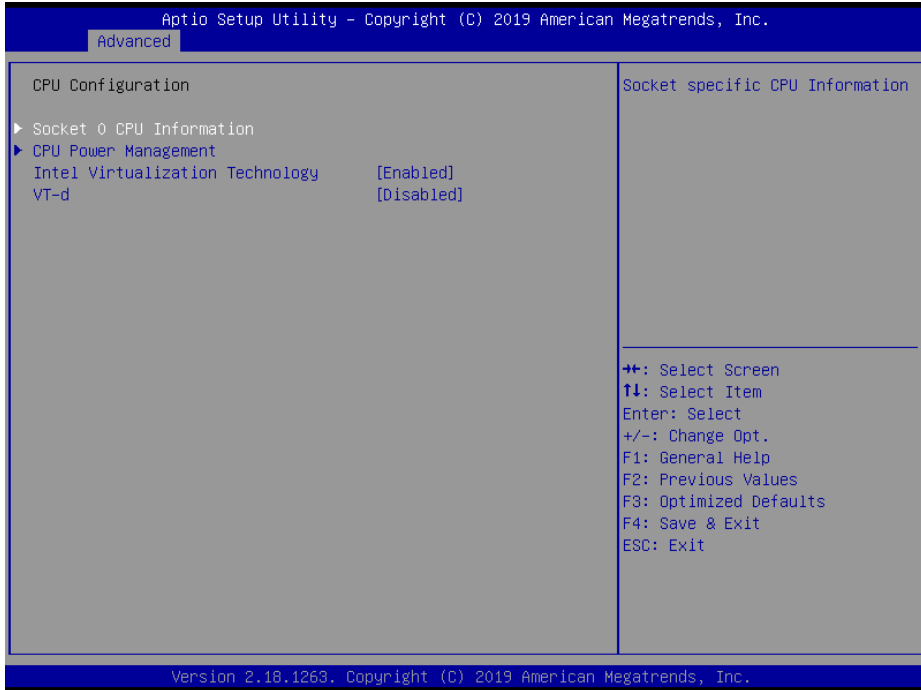
S5 RTC Wake Settings Screen (Dynamic Time)

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled - Fixed Time - Dynamic Time (selected)	<ul style="list-style-type: none"> Dynamic Time: System will wake on the current time + Increased minute(s).
Wake up minute increase	Multiple options ranging from 1 to 5	Specifies a period of time (in minutes) after which the board wakes up from S5 state.

5.4.7 Advanced – CPU Configuration

Menu Path *Advanced > CPU Configuration*

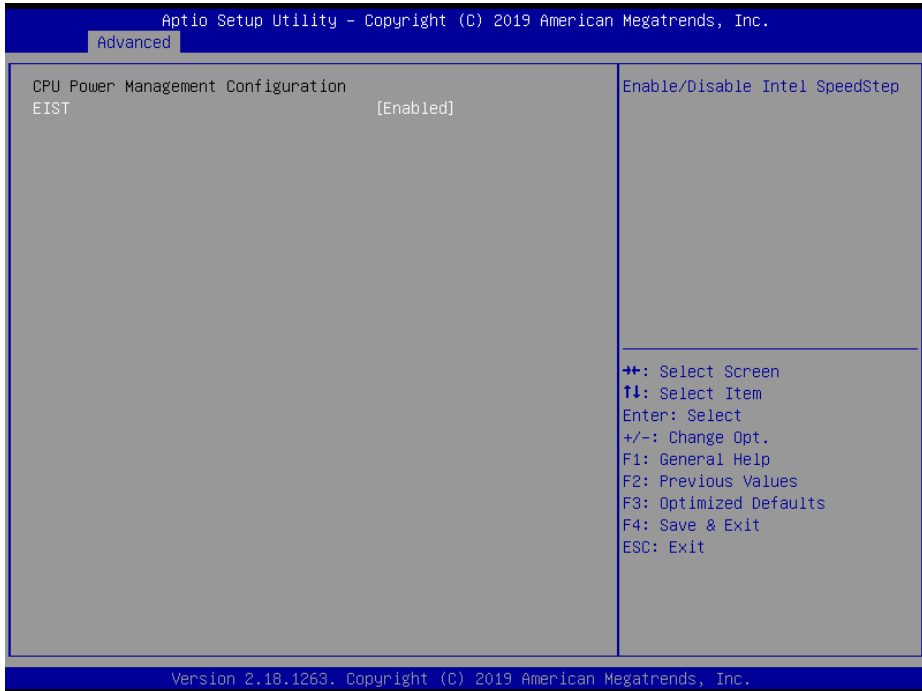
The **CPU Configuration** provides advanced CPU settings and some information about CPU.



CPU Configuration Screen

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

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



CPU Power Management Screen

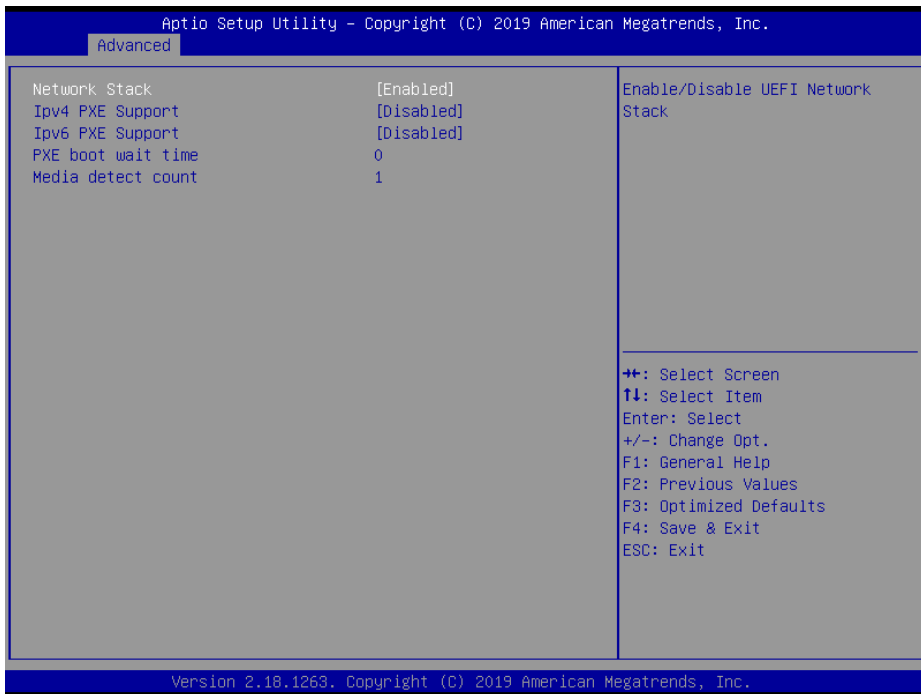
BIOS Setting	Options	Description/Purpose
EIST	- Disabled - Enabled	Enables or Disables Intel SpeedStep.

5.4.8 Advanced – Network Stack Configuration

Menu Path *Advanced > Network Stack Configuration*

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

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



Network Stack Configuration Screen

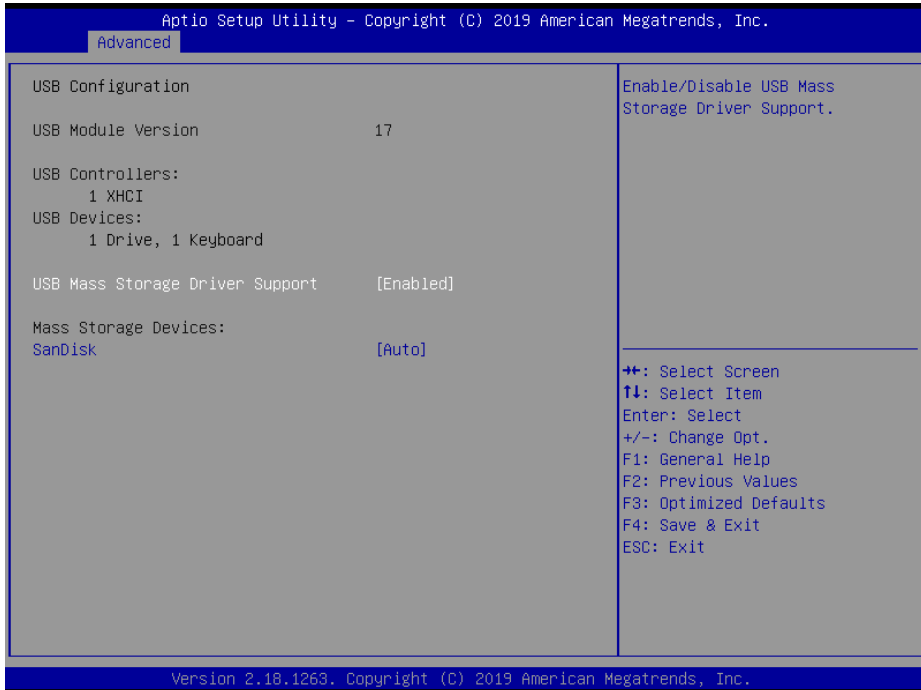
BIOS Setting	Options	Description/Purpose
Network Stack	- Disabled - Enabled	Enables or Disables UEFI Network Stack.
Ipv4 PXE Support	- Disabled - Enabled	Enables Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.

BIOS Setting	Options	Description/Purpose
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)	Number of seconds to wait for PXE boot to abort after the Esc key is pressed.
Media detect count	Numeric (from 1 to 50)	Number of times that the media presence will be checked.

5.4.9 Advanced – USB Configuration

Menu Path *Advanced > USB Configuration*

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



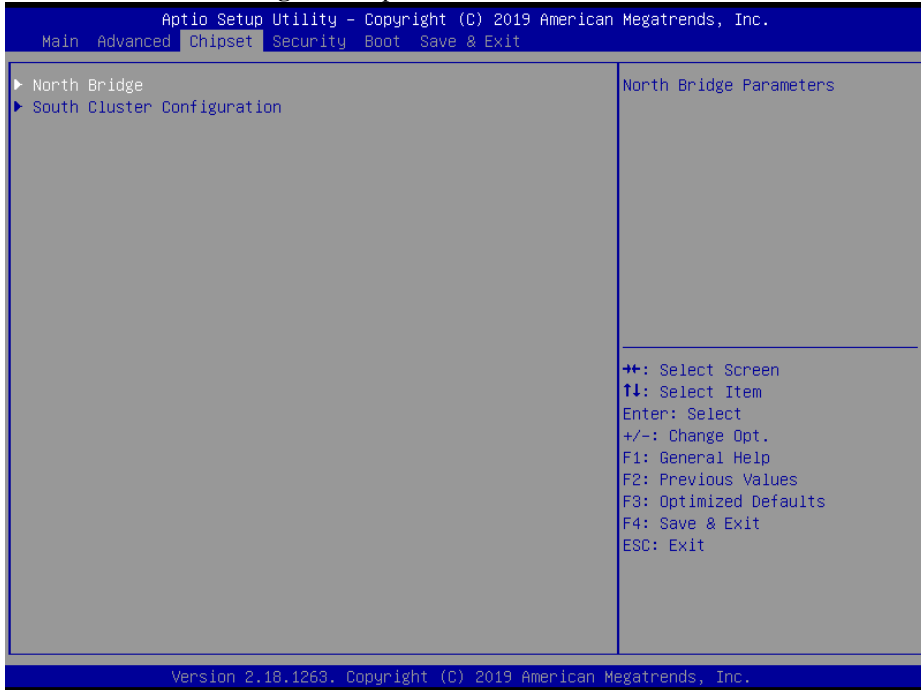
USB Configuration Screen

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

5.5 Chipset

Menu Path *Chipset*

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



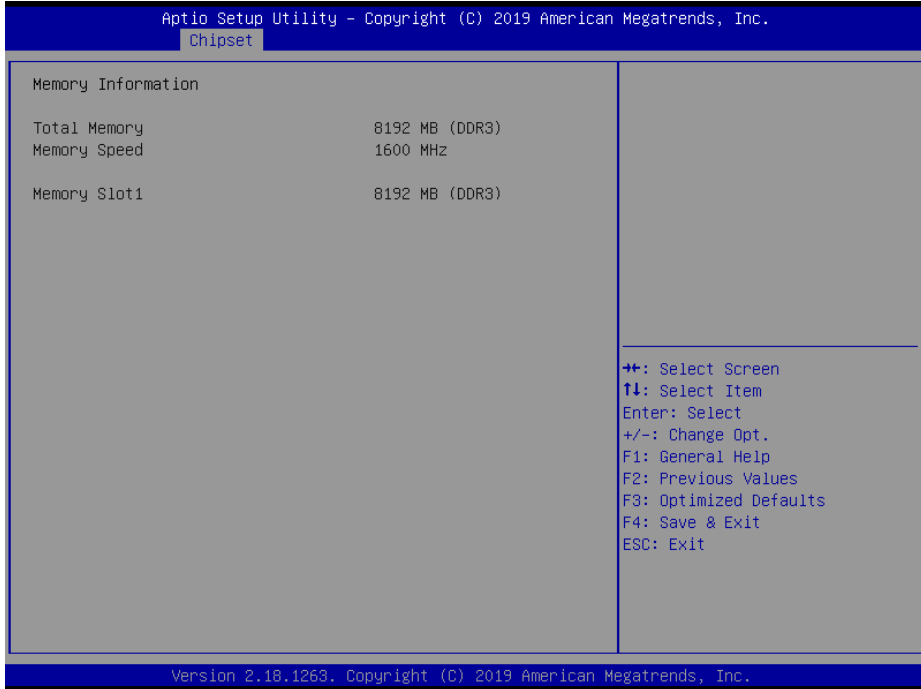
Chipset Screen

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

5.5.1 North Bridge

Menu Path *Chipset > North Bridge*

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

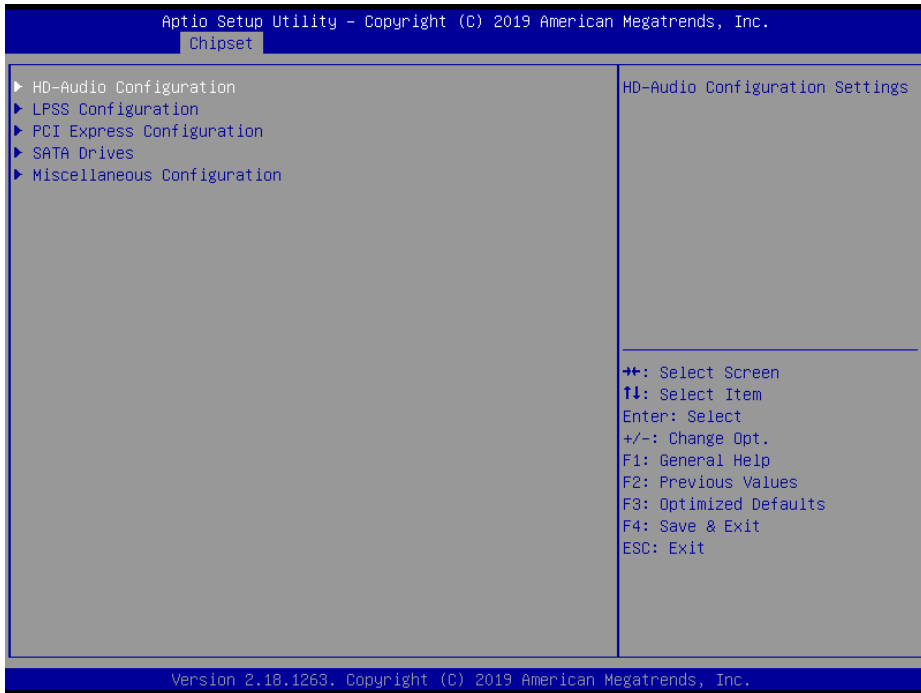


North Bridge Screen

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

5.5.2 South Cluster Configuration

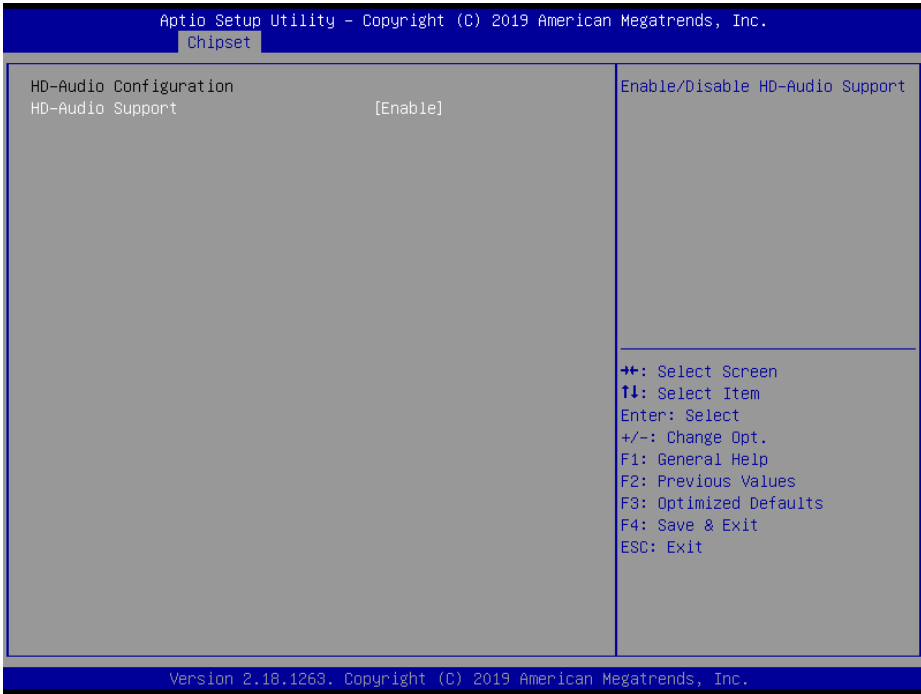
Menu Path *Chipset > South Cluster Configuration*



South Cluster Configuration Screen

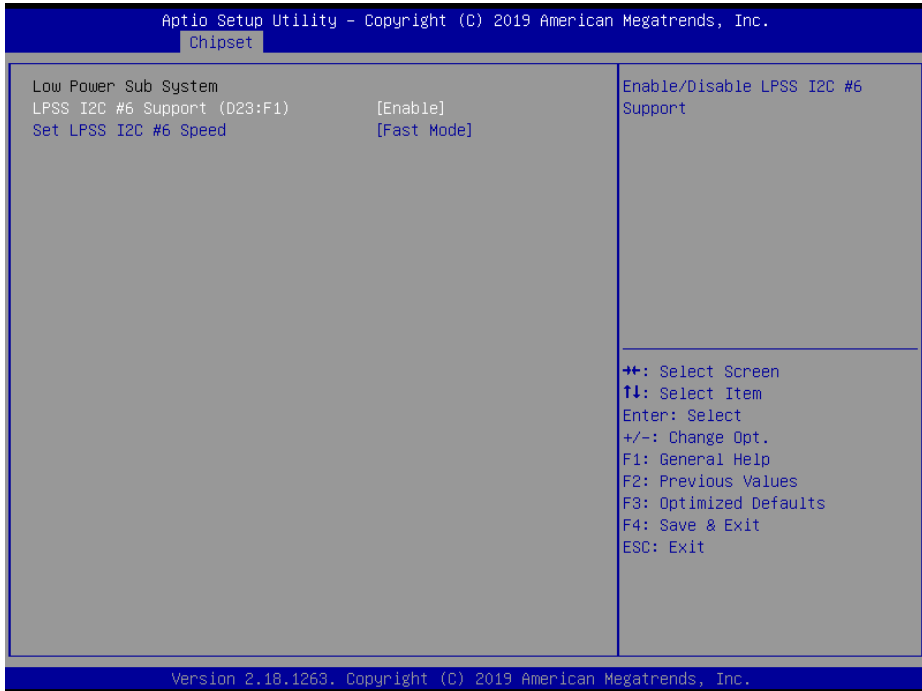
BIOS Setting	Options	Description/Purpose
HD-Audio Configuration	Sub-Menu	HD-Audio Configuration Settings.
LPSS Configuration	Sub-Menu	LPSS Configuration Settings.
PCI Express Configuration	Sub-Menu	PCI Express Configuration Settings.
SATA Drives	Sub-Menu	SATA Device Configuration Settings.
Miscellaneous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

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



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

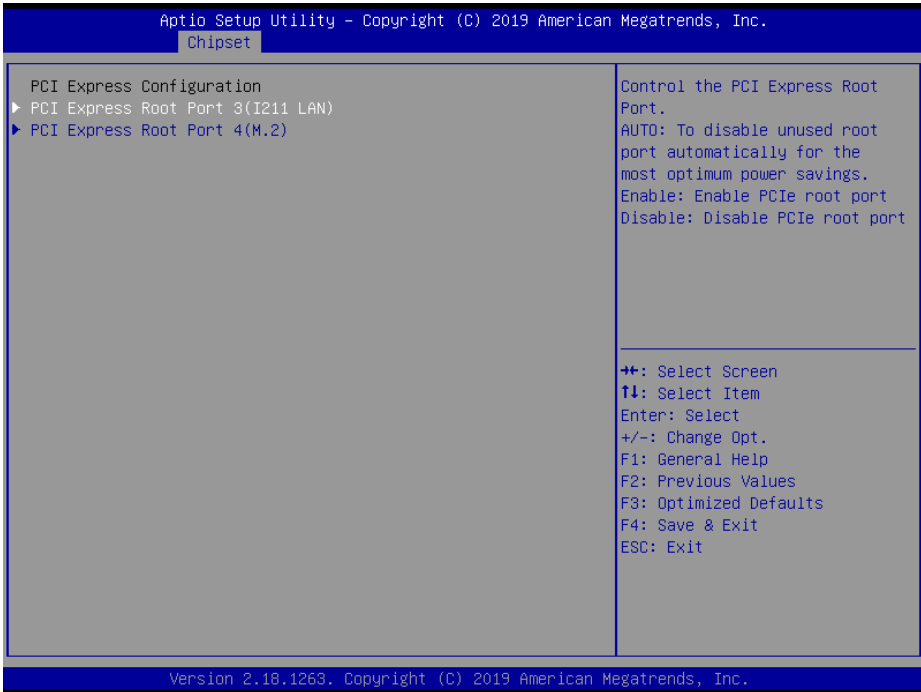
Menu Path *Chipset > South Cluster Configuration > LPSS Configuration*



LPSS Configuration Screen

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

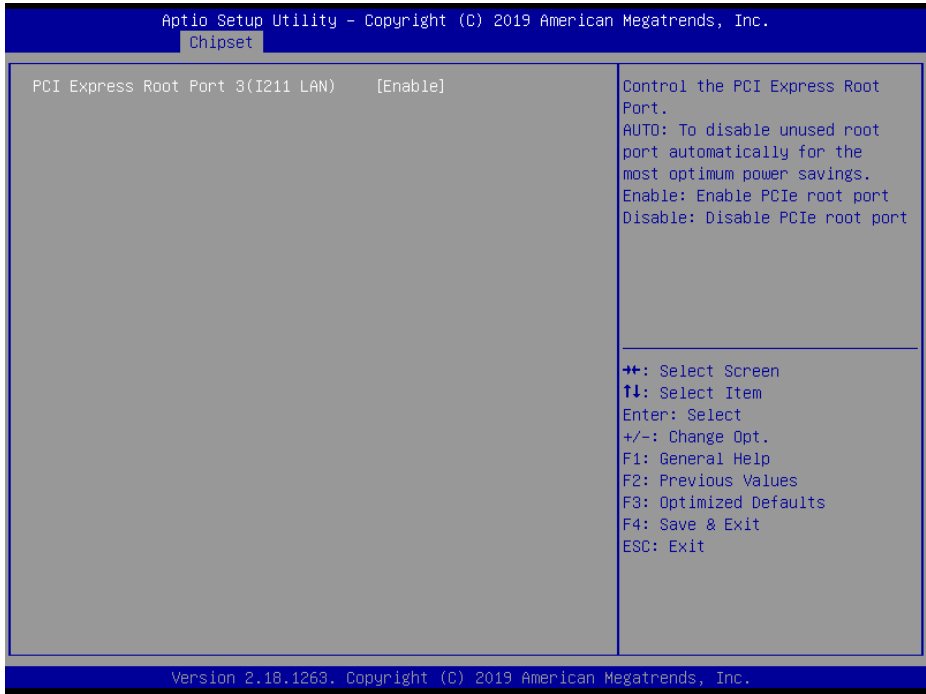
Menu Path *Chipset > South Cluster Configuration > PCI Express Configuration*



PCI Express Configuration Screen

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

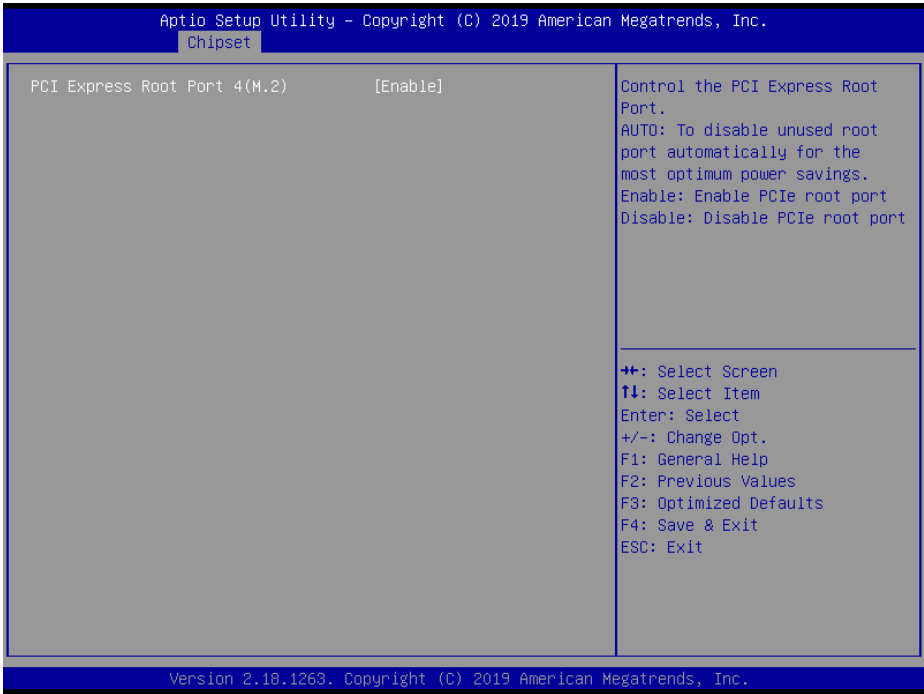
Menu Path *Chipset > South Cluster Configuration > PCI Express Configuration > PCI Express Root Port 3 (I211 LAN)*



PCI Express Root Port 3 (I211 LAN) Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 3 (I211 LAN)	<ul style="list-style-type: none"> - Disabled - Enabled - Auto 	<p>Controls the PCI Express Root Port.</p> <ul style="list-style-type: none"> • Auto: Disables unused root port automatically for the most optimum power savings. • Enabled: Enables PCIe root port. • Disabled: Disables PCIe root port.

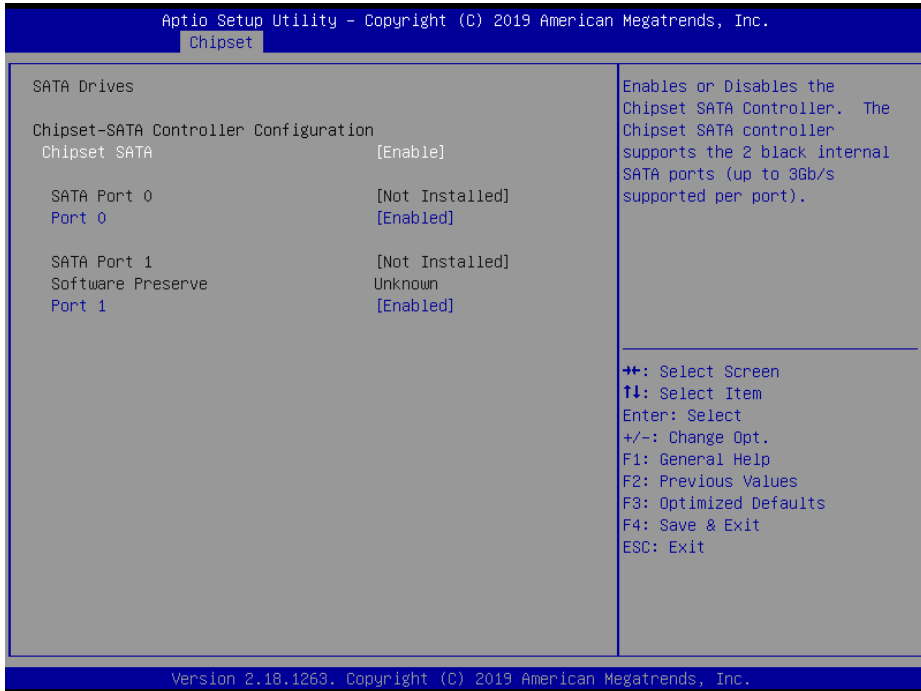
Menu Path *Chipset > South Cluster Configuration > PCI Express Configuration > PCI Express Root Port 4 (M.2)*



PCI Express Root Port 4 (M.2) Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 4 (M.2)	<ul style="list-style-type: none"> - Disabled - Enabled - Auto 	<p>Controls the PCI Express Root Port.</p> <ul style="list-style-type: none"> • Auto: To disable unused root port automatically for the most optimum power savings. • Enabled: Enables PCIe root port. • Disabled: Disables PCIe root port.

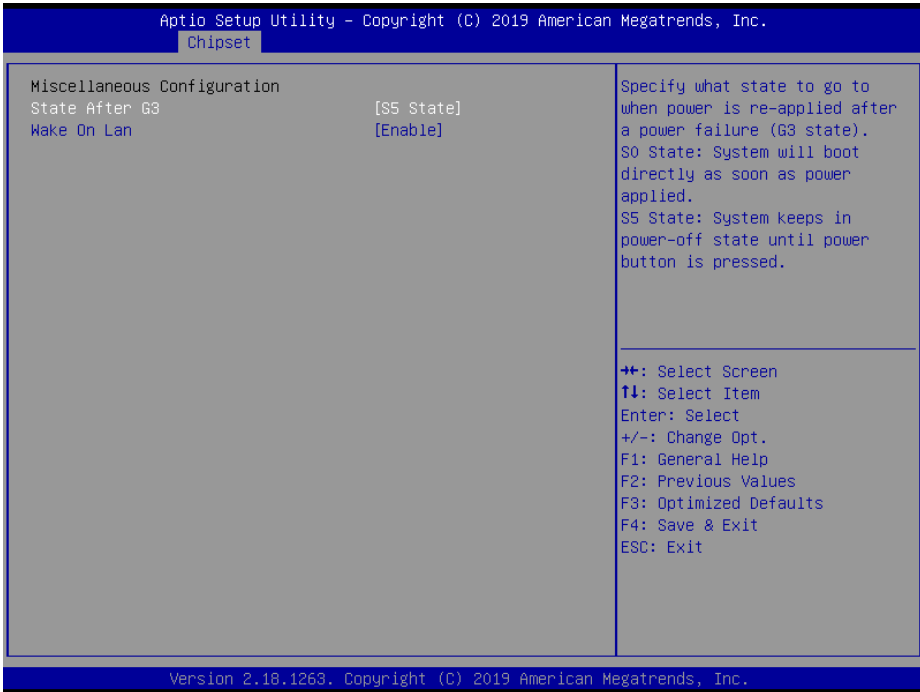
Menu Path *Chipset > South Cluster Configuration > SATA Drives*



SATA Drives Screen

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

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



Miscellaneous Configuration Screen

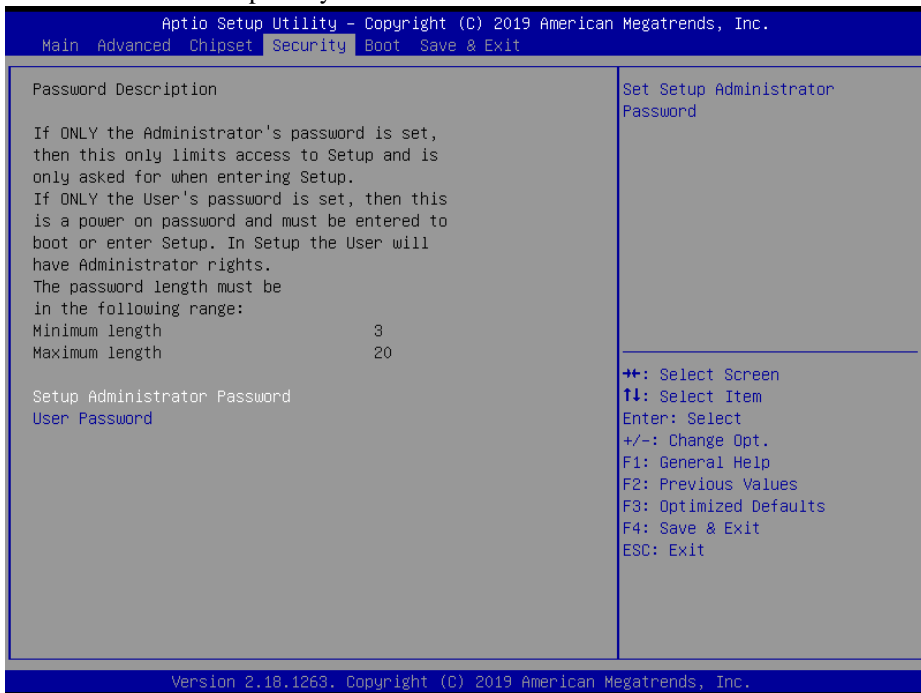
BIOS Setting	Options	Description/Purpose
Restore AC Power Loss	- Power On - Power Off	Specifies the state to go to when the AC power is re-applied following the power failure (G3 state). <ul style="list-style-type: none"> • Power On: System will boot directly as soon as AC power is applied. • Power Off: System will keeps in Power-Off state unless the power button is pressed.
Wake On Lan	- Disabled - Enabled	Enables or Disables the Wake on LAN function.

5.6 Security

Menu Path *Security*

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

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



Security Screen

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

Create an Administrator or User Password

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

Change an Administrator or User Password

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

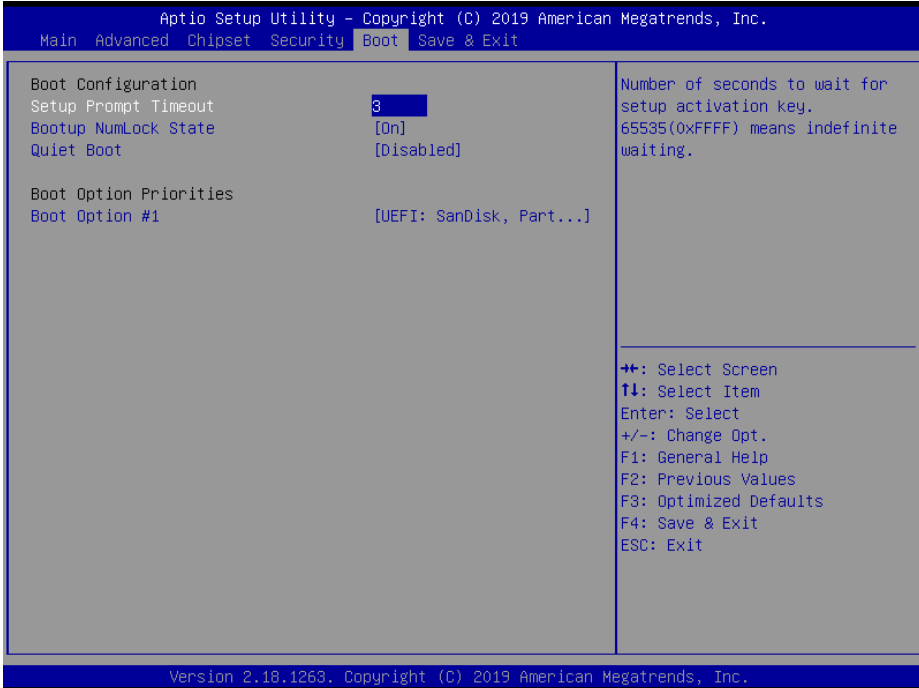
Remove an Administrator or User Password

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

5.7 Boot

Menu Path *Boot*

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



Boot Screen

BIOS Setting	Options	Description/Purpose
Setup Prompt Timeout	Numeric (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.
Boot Option #1~#n	- [Drive(s)] - Disabled	Sets the system boot order.

5.8 Save & Exit

Menu Path *Save & Exit*

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

Save Changed BIOS Settings

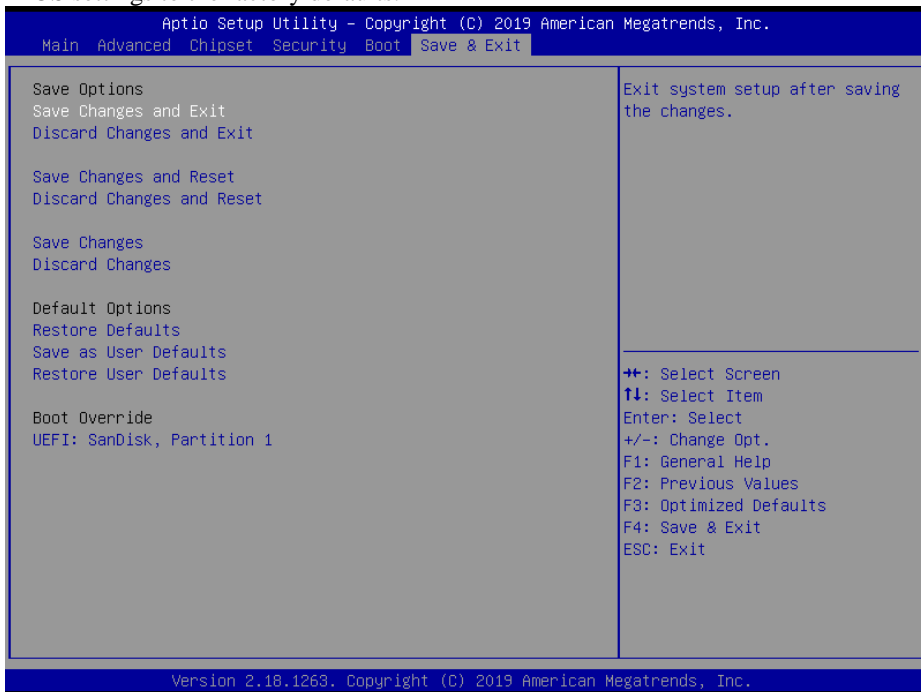
To save and validate the changed BIOS settings, select **Save Changes** from the **Save & Exit** menu to validate the changes and then exit the system. Select **Save Changes and Reset** to validate the changed BIOS settings and then restart the system

Discard Changed BIOS Settings

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

Load User Defaults

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



Save & Exit Screen

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

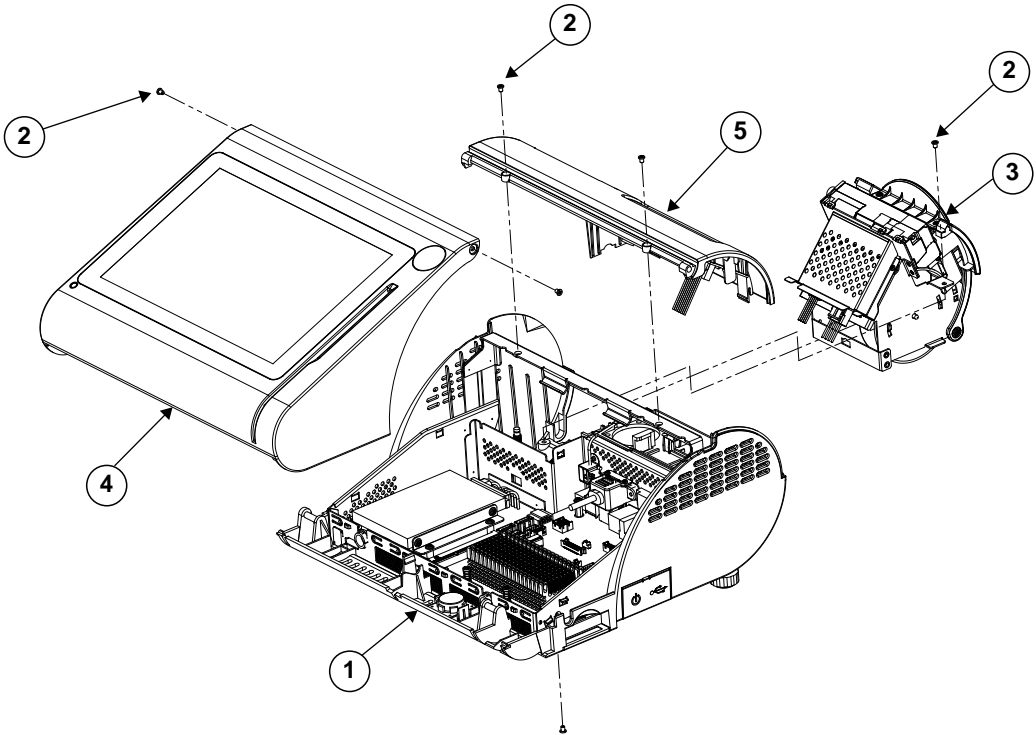
Appendix A System Diagrams

This appendix presents the exploded diagrams of the system as well as the part numbers of the PA-A310 system.

- Exploded Diagram for System Top Case
- System Exploded Diagram
- System LCD Panel Assembly Exploded Diagram
- MSR Module Assembly Exploded Diagram
- HDD Module Assembly Exploded Diagram
- Power USB Module Assembly Exploded Diagram
- RJ11 Module (Cash Drawer 2) Assembly Exploded Diagram
- Exploded Diagrams for Printer
- Exploded Diagram for VFD Module

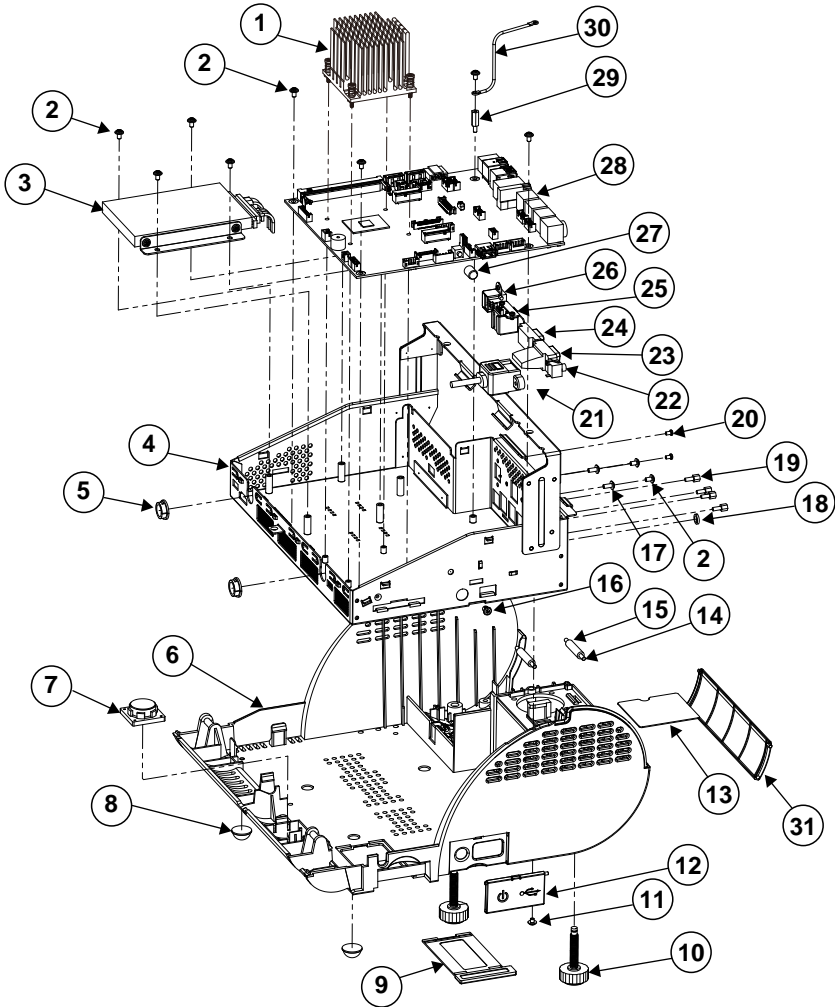
Exploded Diagram For System Top Case

Open the System Top Module



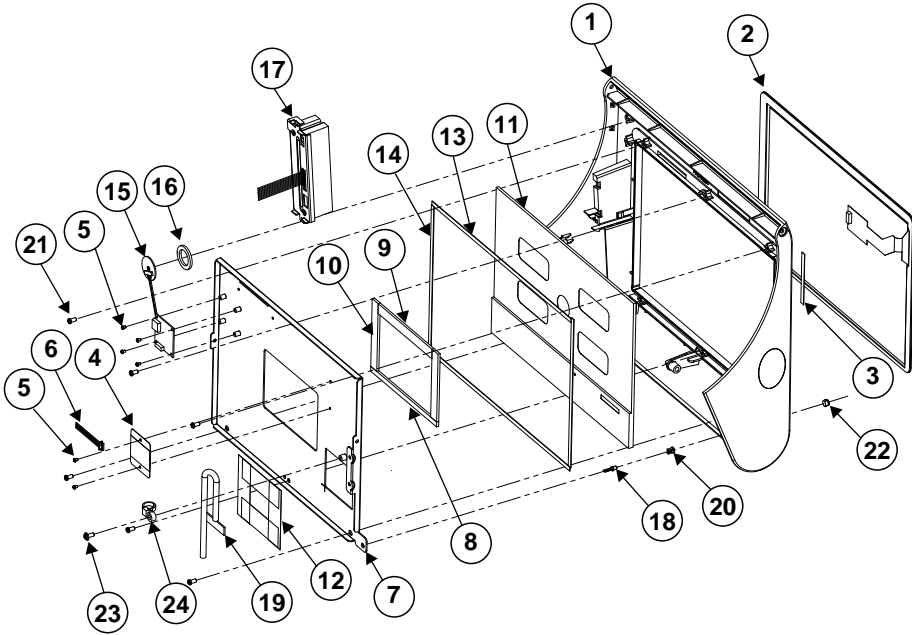
ITEM	Description	Part No.	Q'ty	Remark
1	PA-3222-Bot_Unit	N/A	1	
2	Fillister Head Screw #2 / M3x0.5Px4mm	22-272-30004318	6	
3	PA-3100_Printer_Unit	N/A	1	
4	PA-3211/3222_Top_Unit	N/A	1	
5	PA-3211/3222_VFD_Unit	N/A	1	See Page A-17

System Exploded Diagram



ITEM	Description	Part No.	Q'ty	Remark
1	SP-7147 Heat Sink (60x56x46.2mm)	81-002-16056001	1	
2	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	10	
3	HDD Unit	N/A	1	See Page A-8
4	PA-A310 Inside Box	80-040-03001466	1	
5	Open Closed Bushing (Black)	30-026-04300000	2	
6	PS-3520 BOT(Black)	30-002-12210210	1	
7	PA-3222 Speaker	13-500-08280318	1	
8	Rubber Foot (Φ=15.7x8mm)(Black)	30-004-01500000	2	
9	PS-3100 Mini PCIe Door (Black)	30-007-28110165	1	
10	Handle Head Screw M6x1.0Px35mm, L=12.2	22-289-60035007	2	
11	Round Washer Head Screw M3x0.5Px3mm	22-232-30003311	1	
12	PS-3100 Side Door (Black)	30-007-28210165	1	
13	PA-3170 Fan Holder PC Sheet (Black)	90-056-02100254	1	
14	Round Boss φ 2.9x39L	22-092-29039001	2	
15	PS-3100 Spacer Support (Φ 6x25mm)	30-041-04100165	2	
16	PS-8150A Snap Bushing (Black)	30-026-04100008	1	
17	Round Washer Head Screw #2 / M3x0.5Px7mm	22-232-30007011	2	
18	Sound_Nut	N/A	1	Paired with item 22
19	Hex Cu Boss UNC No.4-40, L=4.8, H=7mm	22-692-40048051	4	
20	Round Head Screw M2.5x0.45Px4mm	22-232-25004011	2	
21	BPC-8072 2-Port USB Cable (10F to USBx2) L=180mm	27-006-20204111	1	
22	Sound-cable_type	N/A	1	
23	d-sub-15p-female	N/A	1	
24	PA-3222 COM D-SUB9 TO FLAT Cable (9M to 10F) L=110mm	27-024-40003031	1	
25	power_usb_unit	N/A	1	See Page A-9
26	rj11_asm	N/A	1	See Page A-10
27	EPC-7510 Switch Expanding Cover	30-001-28100099	1	
28	PA-A900	N/A	1	
29	Hex Cu Boss M3x0.5Px6L, H=12mm	22-258-30012051	1	
30	PS-3100 Ground Cable L=118mm	27-030-16504071	1	
31	PS-3100 I/O Cable Cover (Black)	30-002-28110165	1	

System LCD Panel Assembly Exploded Diagram

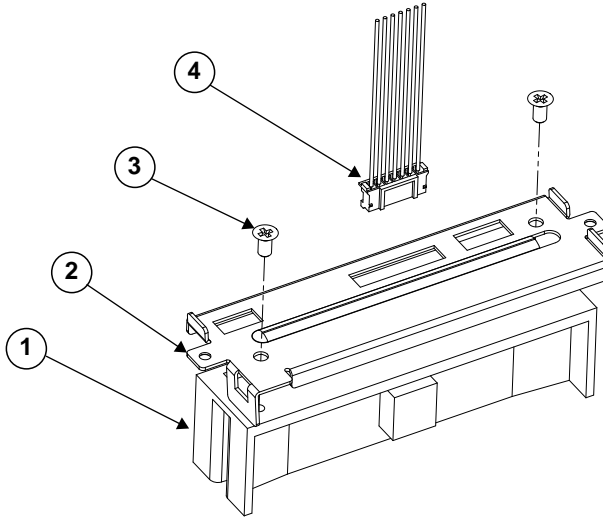


ITEM	Description	Part No.	Q'ty	Remark
1	PA-3211 Top Case NA-NA(Black)	30-001-12410399	1	
2	10.1" Capacitive Touch panel, USB interface	52-380-14143223	1	
3	PA-3222 Double Faced Adhesive Tape (52x4.5x0.25mm)	34-026-04901400	1	
4	PA-3222 Touch PCB Mylar	90-056-02100400	1	
5	Pan Head Screw #1/ M2x0.4Px2.5mm	22-222-20004011	6	
6	PA-3222 Touch USB Cable (4p to 5p) L=400mm	27-016-40008111	1	
7	PA-3222 TM101JDHP03 Holder	80-029-03002400	1	
8	PA-3222 LCD Tape (110x5x2mm)	34-026-06101400	1	
9	PA-3222 LCD Tape (90x10x2mm)	34-026-06103400	1	
10	PA-3222 LCD Tape (70x10x2mm)	34-026-06102400	2	
11	10.1" TFT LCD Panel(LED Backlight),400nits, XGA(1280x800)	52-351-12101028	1	
12	PA-3222 Mylar Tape (Black) (61x20x0.05mm)	94-034-04902400	4	

Appendix A System Diagrams

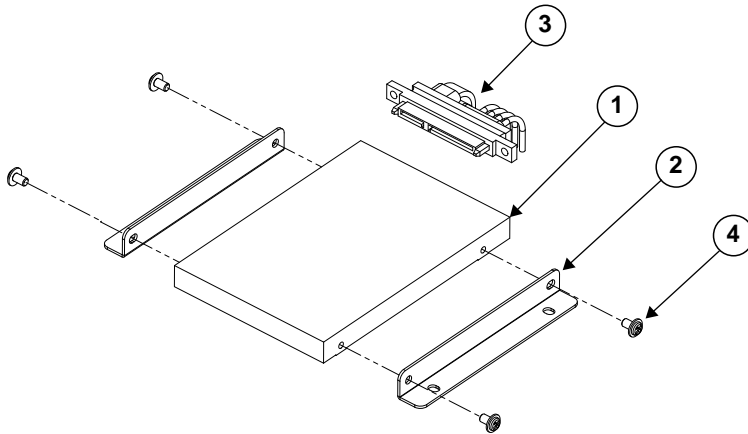
ITEM	Description	Part No.	Q'ty	Remark
13	SP-6012 LCD Poron TB (257x4x0.5mm)	90-013-24200304	2	
14	SP-6012 LCD Poron TB (257x4x0.5mm)	90-013-24200304	2	
15	RFID Device	52-551-00032000	1	
16	PA-3222 RFID EVA(Black) (OD= φ 22mm, ID= φ 15mmx2.0T))	30-013-15100400	1	
17	MSR Unit	N/A	1	See Page A-7
18	PA-3222 Power LED Cable L=400mm (GREEN)	27-018-40008071	1	
19	PA-3222 10.1" LCD Panel Cable L=310mm	27-020-40005111	1	
20	PS-3100 LED Housing (Black)	30-014-04100165	1	
21	PAN Head Screw T3.0x6mm	22-132-30060011	6	
22	LED Light Pipe	30-012-02100000	1	
23	Round Washer Head Screw #2 / M3x0.5Px7mm	22-232-30007011	1	
24	Cable Tie (156x3.6mm)	90-015-04100000	1	

MSR Module Assembly Exploded Diagram



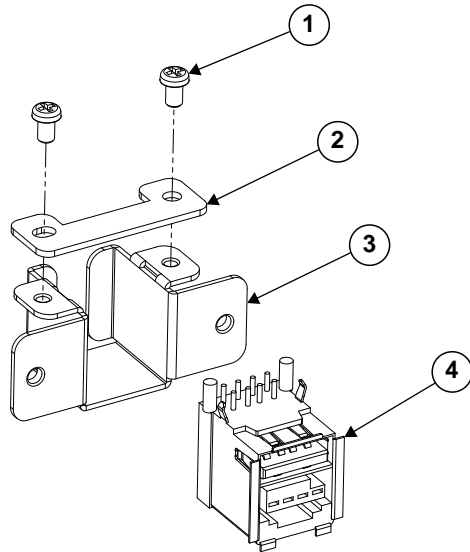
ITEM	Description	Part No.	Q'ty
1	MSR Module,PS2 Interface (w/o Housing & Cable) (ID TECH)	52-151-08333416	1
	MSR PS/2 Interface (Protech)	MB-3012RA-14N	
	MSR PS/2 Interface (COM)	MB-3013RA-14N	
	MSR PS/2 Interface (Protech)	MB-3012RA-B4N	
2	PS-3100 MSR Holder	20-029-03004165	1
3	Flat Head Screw M3x0.5Px6mm(Black)	22-215-30060011	2
4	PA-3222 MSR TO PS/2 For ID TECH(MB) (6p to 7p)L=210mm	27-014-40005031	1
	MB-3012 MSR For PS/2 Cable (6p to 12p) L=210mm (Protech)	27-014-28805111	
	MB-3013 MSR TO COM (MB) (10p to 12p) L=410mm (Protech)	27-014-28909111	
	MB-3012 MSR For PS/2 Cable (6p to 12p) L=210mm	27-014-28805111	

HDD Module Assembly Exploded Diagram



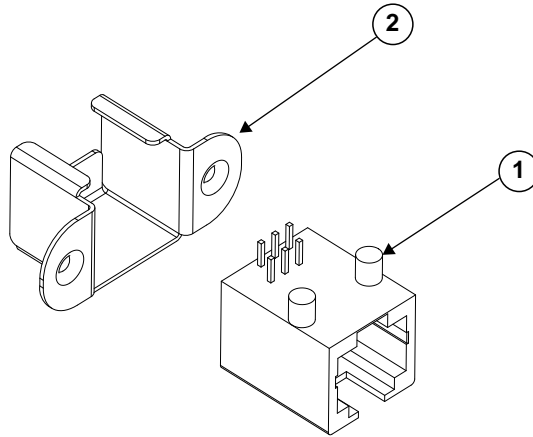
ITEM	Description	Part No.	Q'ty
1	2inch_SATA_HDD	See Order	1
2	PA-3222 HDD Holder	80-029-03001400	2
3	SP-7256 SATA HDD & Power Cable L=180mm+210mm	27-008-41505081	1
4	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	4

Power USB Module Assembly Exploded Diagram



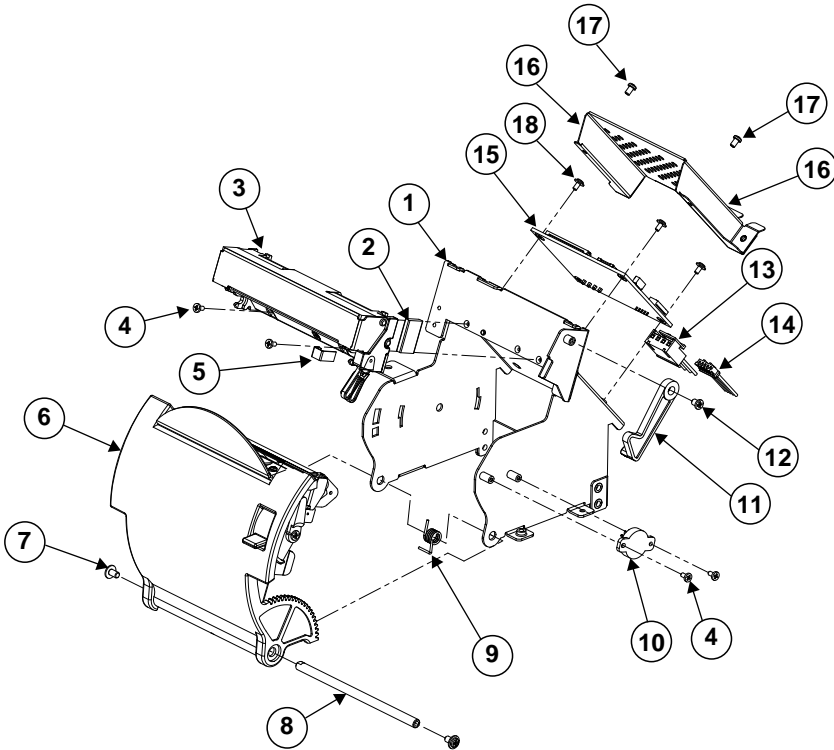
ITEM	Description	Part No.	Q'ty
1	Round Head Screw M2.5x0.45Px4mm	22-232-25004011	2
2	PA-A310 Power USB Holder Lock	80-125-03001466	1
3	PA-A310 Power USB Holder	80-129-03001466	1
4	PA-A310 12V Power USB Cable L=170mm+170mm	27-006-46604114	1
	PA-A310 24V Power USB Cable L=170mm+170mm	27-006-46604115	

RJ11 Module (Cash Drawer 2) Assembly Exploded Diagram



ITEM	Description	Part No.	Q'ty
1	PS-3100 Cash Drawer Cable L=250mm	27-026-16505111	1
2	PS-3100 RJ11 Holder	80-029-03002165	1

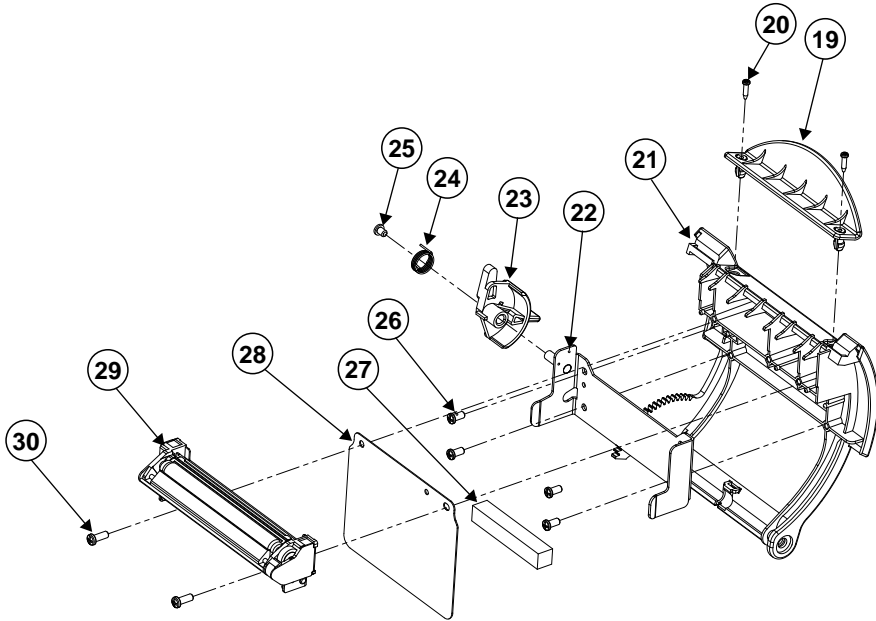
Exploded Diagram For 3-Inch Printer (1)



3-Inch Printer				
ITEM	Description	Part No.	Q'ty	Remark
1	POS-3520 Printer Box	20-040-03001210	1	
2	EMI Shielding Gasket (17x10x3mm)	90-050-31300165	1	
3	SII 3"/24V Thermal Printer (Base Side)	52-701-05017003	1	
4	Fillister Head Screw #1 / M2x0.4Px4mm	22-272-20004011	4	
5	EMI Shielding Gasket (20x5x0.5mm)	90-050-31200165	1	

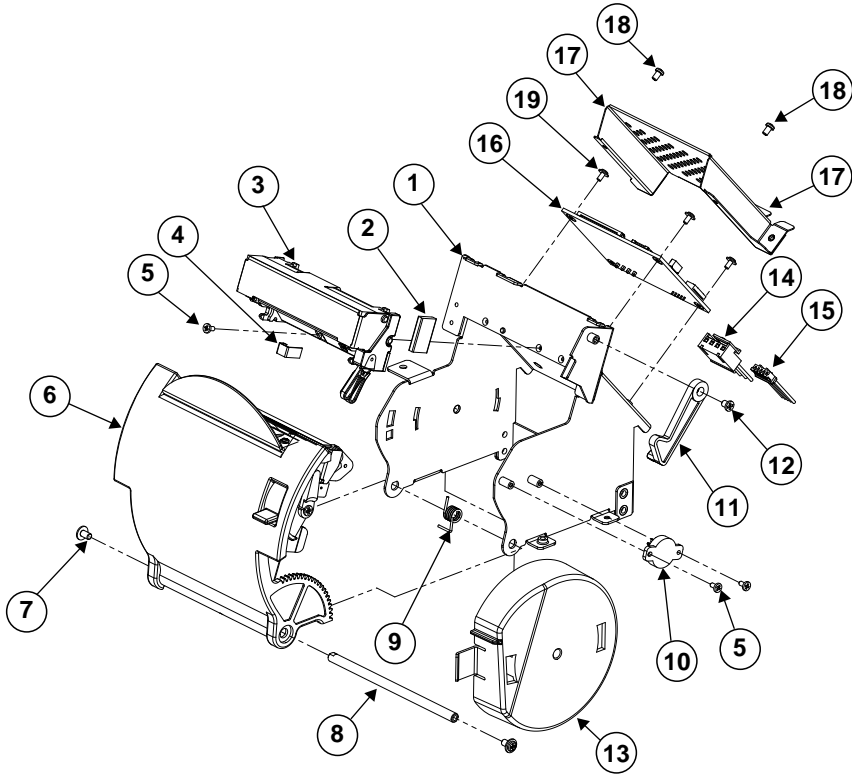
3-Inch Printer				
ITEM	Description	Part No.	Q'ty	Remark
6	ps3100_paper_cover_Unit	N/A	1	See Page A-13 & A-14
7	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	2	
8	PS-3100 Paper Cover Pin	20-004-10011165	1	
9	Rotate Spring (ϕ 7)	23-002-00000701	1	
10	Rotary Damper (Black)	30-022-09110000	1	
11	PS-3100 Printer ADD Arm Cover (Black)	30-002-09110165	1	
12	Fillister Head Screw #2 / M3x0.5Px4mm	22-272-30004318	1	
13	printer_power_cable	N/A	1	
14	PA-3222_printer_cable (USB)	N/A	1	
15	MB-1011RB-11N	MB-1011RB-11N	1	
16	PS-3100 Printer PCB Cover	20-004-03001165	1	
17	Round Head Screw M2.5x0.45Px4mm	22-232-25004011	2	
18	Round Washer Head Screw #1 / M2x0.4Px4mm	22-232-20004311	3	

Exploded Diagram For 3-Inch Printer (2)



3-Inch Printer			
ITEM	Description	Part No.	Q'ty
19	PS-3100 Paper Holder 2 (Black)	30-012-02110165	1
20	PAN Head Screw #1 / T2.0x8mm(Black)	22-125-20008011	2
21	PS-3100 Paper Cover V2 (Black)	30-002-02530165	1
22	PS-3100 Include Holder	20-029-03006165	1
23	PS-3100 Printer Ejector Cover (Black)	30-002-09210165	1
24	Rotate Spring (ϕ 10.2)	23-002-00001021	1
25	Fillister Head Screw #2 / M3x0.5Px4mm	22-272-30004318	1
26	PAN Head Screw T3.0x6mm	22-132-30060011	4
27	PS-3100 2 Inch EVA (8x48x8mm)	90-013-15200165	1
28	PA-3100 3 Inch Add Mylar (79x60x0.5mm)	90-056-02600165	1
29	3" Thermal Printer (Cut Side)	N/A	1
30	PAN Head Screw T3.0x8mm(Black)	22-122-30080011	2

Exploded Diagram For 2-Inch Printer (1)

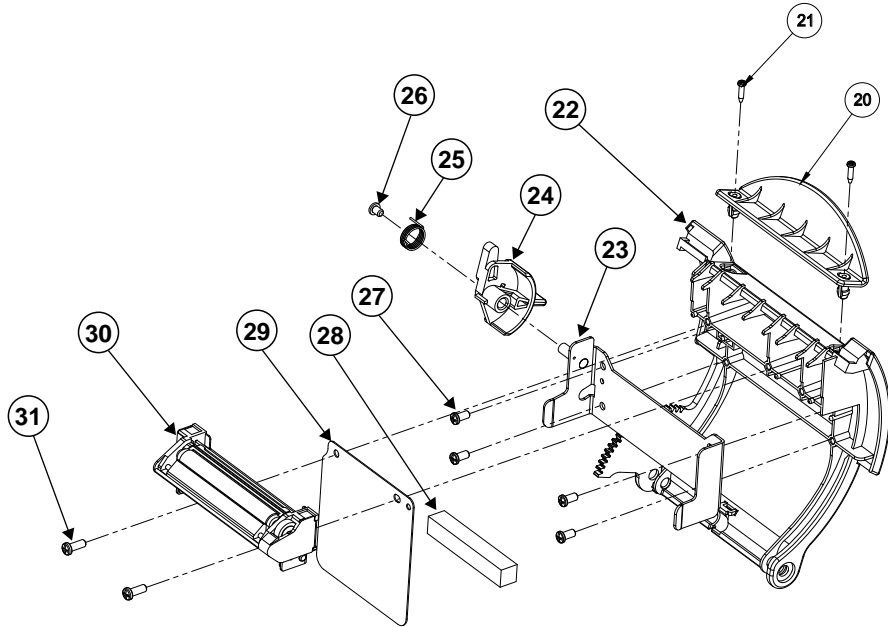


2-Inch Printer				
ITEM	Description	Part No.	Q'ty	Remark
1	POS-3520 Printer Box	20-040-03001210	1	
2	EMI Shielding Gasket (17x10x3mm)	90-050-31300165	1	
3	SII 2"/24V Thermal Printer (Base Side)	52-701-01020003	1	
4	EMI Shielding Gasket (20x5x0.5mm)	90-050-31200165	1	
5	Fillister Head Screw #1 / M2x0.4Px4mm	22-272-20004011	3	
6	ps3100_paper_cover_Unit	N/A	1	See Page A-16
7	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	2	
8	PS-3100 Paper Cover Pin	20-004-10011165	1	

Appendix A System Diagrams

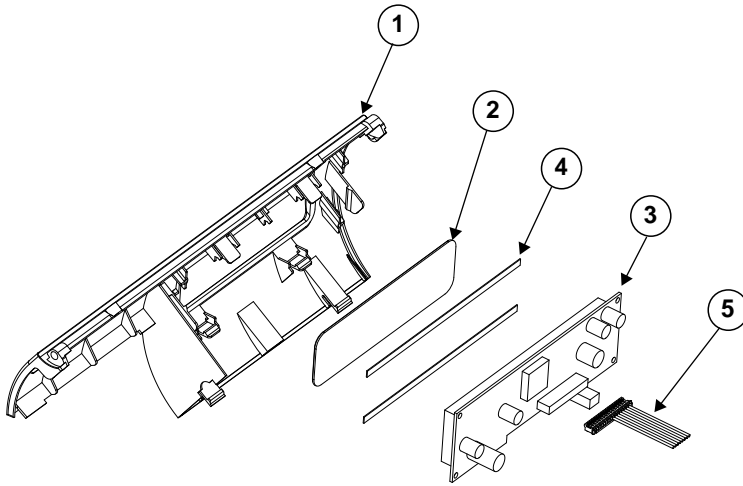
2-Inch Printer				
ITEM	Description	Part No.	Q'ty	Remark
9	Rotate Spring ($\phi 7$)	23-002-00000701	1	
10	Rotary Damper (Black)	30-022-09110000	1	
11	PS-3100 Printer ADD Arm Cover (Black)	30-002-09110165	1	
12	Fillister Head Screw #2 / M3x0.5Px4mm	22-272-30004318	1	
13	PS-3100 Add Paper Wall Cover (Black)	30-002-28310165	1	
14	printer_power_cable	N/A	1	
15	PA-3222_printer_cable (USB)	N/A	1	
16	MB-1011RB-11N	MB-1011RB-11N	1	
17	PS-3100 Printer PCB Cover	20-004-03001165	1	
18	Round Head Screw M2.5x0.45Px4mm	22-232-25004011	2	
19	Round Washer Head Screw #1 / M2x0.4Px4mm	22-232-20004311	3	

Exploded Diagram For 2-Inch Printer (2)



2-Inch Printer			
ITEM	Description	Part No.	Q'ty
20	PS-3100 Paper Holder 2 (Black)	30-012-02110165	1
21	PAN Head Screw #1 / T2.0x8mm(Black)	22-125-20008011	2
22	PS-3100 Paper Cover V2 (Black)	30-002-02530165	1
23	PS-3100 Include Holder	20-029-03006165	1
24	PS-3100 Printer Ejector Cover (Black)	30-002-09210165	1
25	Rotate Spring (ϕ 10.2)	23-002-00001021	1
26	Fillister Head Screw #2 / M3x0.5Px4mm	22-272-30004318	1
27	PAN Head Screw T3.0x6mm	22-132-30060011	4
28	PS-3100 2 Inch EVA (8x48x8mm)	90-013-15200165	1
29	PS-3100 2 Inch Add Mylar2 (60x59x0.5mm)	90-056-02300165	1
30	3" Thermal Printer (Cut Side)	N/A	1
31	PAN Head Screw T3.0x8mm(Black)	22-122-30080011	2

VFD Module Assembly Exploded Diagram



ITEM	Description	Part No.	Q'ty
1	PS-3100 VFD COVER(Black)	30-002-28114165	1
2	PS-3100 VFD Window Cover	30-002-02230165	1
3	VFD Module	MB-4103RA-11N	1
4	S-3100 VFD Poron (135x4x0.6mm)	90-013-24100165	2
5	MB-4103 VFD TO COM Cable (10p to 16p) L=210mm	27-053-23805111	1

Appendix B Technical Summary

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

The following topics are included:

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

Interrupt Map

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

IRQ	ASSIGNMENT
IRQ 71	Microsoft ACPI-Compliant System
IRQ 72	Microsoft ACPI-Compliant System
IRQ 73	Microsoft ACPI-Compliant System
IRQ 74	Microsoft ACPI-Compliant System
IRQ 75	Microsoft ACPI-Compliant System
IRQ 76	Microsoft ACPI-Compliant System
IRQ 77	Microsoft ACPI-Compliant System
IRQ 78	Microsoft ACPI-Compliant System
IRQ 79	Microsoft ACPI-Compliant System
IRQ 80	Microsoft ACPI-Compliant System
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System
IRQ 83	Microsoft ACPI-Compliant System
IRQ 84	Microsoft ACPI-Compliant System
IRQ 85	Microsoft ACPI-Compliant System
IRQ 86	Microsoft ACPI-Compliant System
IRQ 87	Microsoft ACPI-Compliant System
IRQ 88	Microsoft ACPI-Compliant System
IRQ 89	Microsoft ACPI-Compliant System
IRQ 90	Microsoft ACPI-Compliant System
IRQ 91	Microsoft ACPI-Compliant System
IRQ 92	Microsoft ACPI-Compliant System
IRQ 93	Microsoft ACPI-Compliant System
IRQ 94	Microsoft ACPI-Compliant System
IRQ 95	Microsoft ACPI-Compliant System
IRQ 96	Microsoft ACPI-Compliant System
IRQ 97	Microsoft ACPI-Compliant System
IRQ 98	Microsoft ACPI-Compliant System
IRQ 99	Microsoft ACPI-Compliant System
IRQ 100	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
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
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IRQ 121	Microsoft ACPI-Compliant System
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IRQ 124	Microsoft ACPI-Compliant System
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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	ASSIGNMENT
IRQ 131	Microsoft ACPI-Compliant System
IRQ 132	Microsoft ACPI-Compliant System
IRQ 133	Microsoft ACPI-Compliant System
IRQ 134	Microsoft ACPI-Compliant System
IRQ 135	Microsoft ACPI-Compliant System
IRQ 136	Microsoft ACPI-Compliant System
IRQ 137	Microsoft ACPI-Compliant System
IRQ 138	Microsoft ACPI-Compliant System
IRQ 139	Microsoft ACPI-Compliant System
IRQ 140	Microsoft ACPI-Compliant System
IRQ 141	Microsoft ACPI-Compliant System
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IRQ 143	Microsoft ACPI-Compliant System
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IRQ 153	Microsoft ACPI-Compliant System
IRQ 154	Microsoft ACPI-Compliant System
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IRQ 156	Microsoft ACPI-Compliant System
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IRQ 158	Microsoft ACPI-Compliant System
IRQ 159	Microsoft ACPI-Compliant System
IRQ 160	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 161	Microsoft ACPI-Compliant System
IRQ 162	Microsoft ACPI-Compliant System
IRQ 163	Microsoft ACPI-Compliant System
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IRQ 181	Microsoft ACPI-Compliant System
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IRQ 188	Microsoft ACPI-Compliant System
IRQ 189	Microsoft ACPI-Compliant System
IRQ 190	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 191	Microsoft ACPI-Compliant System
IRQ 192	Microsoft ACPI-Compliant System
IRQ 193	Microsoft ACPI-Compliant System
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IRQ 196	Microsoft ACPI-Compliant System
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IRQ 200	Microsoft ACPI-Compliant System
IRQ 201	Microsoft ACPI-Compliant System
IRQ 202	Microsoft ACPI-Compliant System
IRQ 203	Microsoft ACPI-Compliant System
IRQ 204	Microsoft ACPI-Compliant System
IRQ 256	Microsoft ACPI-Compliant System
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IRQ 267	Microsoft ACPI-Compliant System
IRQ 268	Microsoft ACPI-Compliant System
IRQ 269	Microsoft ACPI-Compliant System
IRQ 270	Microsoft ACPI-Compliant System
IRQ 271	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 272	Microsoft ACPI-Compliant System
IRQ 273	Microsoft ACPI-Compliant System
IRQ 274	Microsoft ACPI-Compliant System
IRQ 275	Microsoft ACPI-Compliant System
IRQ 276	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 302	Microsoft ACPI-Compliant System
IRQ 303	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 332	Microsoft ACPI-Compliant System
IRQ 333	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 362	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 392	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 422	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 452	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 482	Microsoft ACPI-Compliant System
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IRQ 511	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 1024	Intel SD Host Controller
IRQ 4294967277	Intel(R) HD Graphics
IRQ 4294967278	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967279	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967280	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967281	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967282	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967283	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967284	Intel(R) I210 Gigabit Network Connection
IRQ 4294967285	Intel(R) I210 Gigabit Network Connection
IRQ 4294967286	Intel(R) I210 Gigabit Network Connection
IRQ 4294967287	Intel(R) I210 Gigabit Network Connection
IRQ 4294967288	Intel(R) I210 Gigabit Network Connection
IRQ 4294967289	Intel(R) I210 Gigabit Network Connection
IRQ 4294967290	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
IRQ 4294967291	Intel(R) Trusted Execution Engine Interface
IRQ 4294967292	Standard SATA AHCI Controller
IRQ 4294967293	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
IRQ 4294967294	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8

Note: These resource information were gathered using Windows 10 (the IRQ could be assigned differently depending on OS).

I/O Map

I/O	ASSIGNMENT
0x0000A00-0x0000A0F	Motherboard resources
0x0000A10-0x0000A1F	Motherboard resources
0x0000A20-0x0000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000070-0x00000070	System CMOS/real time clock
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000400-0x0000047F	Motherboard resources
0x00000500-0x000005FE	Motherboard resources
0x00000600-0x0000061F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x0000F040-0x0000F05F	Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
0x0000D000-0x0000DFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x0000F000-0x0000F03F	Intel(R) HD Graphics

I/O	ASSIGNMENT
0x0000E000-0x0000EFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8
0x00000000-0x0000006F	PCI Express Root Complex
0x00000078-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x0000F090-0x0000F097	Standard SATA AHCI Controller
0x0000F080-0x0000F083	Standard SATA AHCI Controller
0x0000F060-0x0000F07F	Standard SATA AHCI Controller
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

Memory Map

MEMORY MAP	ASSIGNMENT
0xE0000000-0xFFFFFFFF	Motherboard resources
0xE0000000-0xFFFFFFFF	PCI Express Root Complex
0xFE000000-0xFEFFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED06000-0xFED06FFF	Motherboard resources
0xFED08000-0xFED09FFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Motherboard resources
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFFF	Motherboard resources
0x91310000-0x91313FFF	High Definition Audio Controller
0x91000000-0x910FFFFFF	High Definition Audio Controller
0x91316000-0x913160FF	Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
0x91180000-0x911FFFFFF	Intel(R) I210 Gigabit Network Connection
0x9117C000-0x9117FFFF	Intel(R) I210 Gigabit Network Connection
0x91100000-0x911FFFFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
0x9131C000-0x9131CFFF	Intel(R) Serial IO I2C Host Controller - 5AB4
0x9131B000-0x9131BFFF	Intel(R) Serial IO I2C Host Controller - 5AB4
0xFED00000-0xFED003FF	High precision event timer
0x91300000-0x9130FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
0x90000000-0x90FFFFFF	Intel(R) HD Graphics
0x80000000-0x8FFFFFFF	Intel(R) HD Graphics
0x80000000-0x8FFFFFFF	PCI Express Root Complex
0x91200000-0x912FFFFFF	Intel(R) Celeron(R)/Pentium(R)

MEMORY MAP	ASSIGNMENT
	Processor PCI Express Root Port - 5AD8
0x9131A000-0x9131AFFF	Intel(R) Serial IO I2C Host Controller - 5AB6
0x91319000-0x91319FFF	Intel(R) Serial IO I2C Host Controller - 5AB6
0x7C000001-0x7FFFFFFF	PCI Express Root Complex
0x7B800001-0x7BFFFFFF	PCI Express Root Complex
0x91321000-0x91321FFF	Intel(R) Trusted Execution Engine Interface
0xD0C00000-0xD0C00653	Intel(R) Serial IO GPIO Host Controller - INT3452
0xCFFF000-0xCFFFFFFF	Intel SD Host Controller
0xCFFFE000-0xCFFFEFFF	Intel SD Host Controller
0x91314000-0x91315FFF	Standard SATA AHCI Controller
0x9131E000-0x9131E0FF	Standard SATA AHCI Controller
0x9131D000-0x9131D7FF	Standard SATA AHCI Controller
0x91280000-0x912FFFFF	Intel(R) I210 Gigabit Network Connection #2
0x9127C000-0x9127FFFF	Intel(R) I210 Gigabit Network Connection #2

Configuring WatchDog Timer

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

Configuration Sequence

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

(1) Enter the extended function mode

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

(2) Configure the configuration registers

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

(3) Exit the extended function mode

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

Code example for watch dog timer

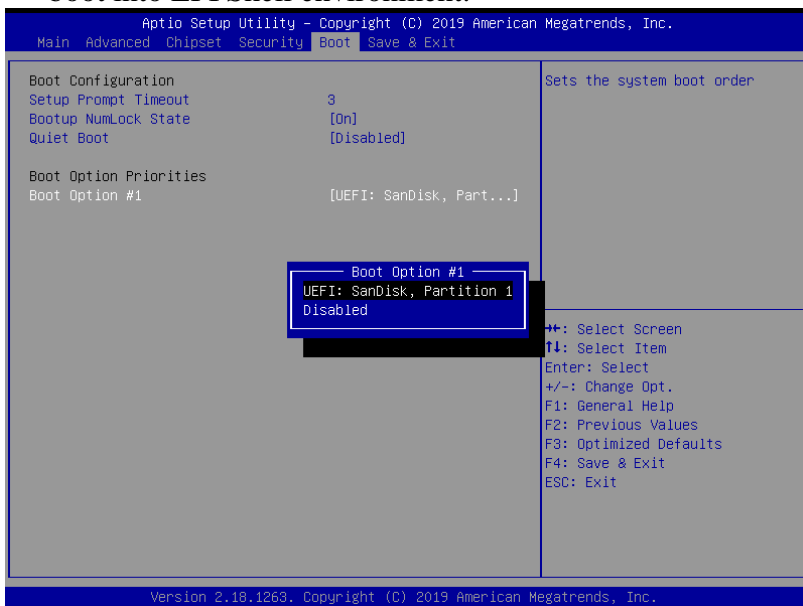
Enable the watchdog timer and set the timeout interval to **30** seconds.

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

Flash BIOS Update

I. Prerequisites

- 1 Prepare a USB storage device which can save the required files for BIOS update.
- 2 Download and save the BIOS file (e.g. A3100PD1.bin) to the storage device.
- 3 Copy AMI flash utility – AFUEFIx64.exe (v5.10.01) 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 key during boot to enter BIOS Setup.
 - (3) Select [Boot] menu and set [UEFI: Built-in EFI Shell] to be the 1st boot device.
 - (4) Press <F4> key to save 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

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

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

- 2** Type "AFUEFIx64 A31Xxxxx.bin /p /b /n /x" and press Enter to start the flash procedure. (xxxx means the BIOS revision part, e.g. OPM1...)
- 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 A3100PD1.bin /p /b /n /x
+-----+
|          AMI Firmware Update Utility  v5.10.01.1670          |
|  Copyright (C) 2019 American Megatrends Inc. All Rights Reserved.  |
+-----+
Reading flash ..... done
- ME Data Size Checking . ok
- FFS checksums ..... ok
- Check RomLayout ..... Ok.
Erasing Boot Block ..... done
Updating Boot Block ..... done
Verifying Boot Block ..... done
Erasing Main Block ..... done
Updating Main Block ..... done
Verifying Main Block ..... done
Erasing NVRAM Block ..... done
Updating NVRAM Block ..... done
Verifying NVRAM Block ..... done
fs0:\afuefix64> _
```

- 5 Restart the system and boot up with the new BIOS configurations.
- 6 The BIOS Update is completed after the system is restarted.
- 7 Reboot the system and verify if the BIOS version shown on the initialization screen has been updated.

