USER MANUAL

PA-3211

10.1" POS Terminal

Powered by ARM Cortex A-9 Processor

PA-3211 M1

PA-3211 POS System

Powered by ARM Cortex-A9 Processor

DISCLAIMER

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

CE NOTICE

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

FCC NOTICE

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

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

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

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

Contents

Revision History vi

1 Introduction **1-1**

1.1 About This Manual 1-2

2 Getting Started **2-1**

2.1 Package List 2-2

2.2 System Views Without i-Button Module 2-3

2.2.1 Front View 2-3

2.2.2 Rear View 2-3

2.2.3 Top View 2-4

2.2.4 Bottom View 2-5

2.2.5 Quarter View 2-5

2.2.6 Side View 2-6

2.3 System Views With i-Button Module 2-7

2.3.1 Front View 2-7

2.3.2 Rear View 2-7

2.3.3 Top View 2-8

2.3.4 Bottom View 2-9

2.3.5 Quarter View 2-9

2.3.6 Side View 2-10

2.4 System Specifications 2-11

2.5 Safety Precautions 2-13

3 System Configuration **3-1**

3.1 External System I/O Ports Diagram & Pin Assignment 3-2

3.1.1 Rear I/O Ports Diagram 3-2

3.2 Jumper & Connector Quick Reference Table 3-3

3.3 Component Locations Of System Main Board 3-5

3.3.1 Top View of System Main Board 3-5

3.4 How To Set Jumpers 3-7

3.5 Function Buttons and Rear I/O Ports 3-9

3.5.1 Power Button 3-9

3.5.2 Power Input Port 3-9

3.5.3 Cash Drawer Port 3-9

3.5.4 UART3 Connector 3-10

3.5.5 VGA Port 3-10

3.5.6 USB Port 3-11

3.5.7 LAN Port 3-12

3.5.8 MicroSD Port 3-13

3.5.9 Micro USB Port 3-13

3.6 Setting Main Board Connectors and Jumpers 3-14

3.6.1 UART Port Voltage Selection (JP_COM0, JP_COM1, JP_COM2, JP_COM3, JP_COM5) 3-14

3.6.2 External USB 2.0 Port 3-15

3.6.3 Internal USB 2.0 Connectors 3-16

3.6.4 Internal UART Connectors 3-17

3.6.5 Power for Thermal Printer Connector 3-18

3.6.6 Power Connectors (DC 12V, DC 5V) 3-18

3.6.7 Power LED Connectors 3-19

3.6.8 LVDS Connector 3-20

3.6.9 Mini PCIE Connector 3-21

3.6.10 Power Switch Connector 2 3-22

3.6.11 Inverter Connector 3-22

3.6.12 External Speaker Connector 3-23

3.6.13 HD Audio Connector 3-23
3.6.14 I2C Connector 3-24
3.6.15 Inverter Backlight Enable Selection 3-25
3.6.16 Touch Panel Signal Interface Selection 3-25
3.6.17 Mini PCIE USB Selection 3-26
3.6.18 LVDS Panel Input Voltage Selection 3-26
3.6.19 LVDS Voltage Selection 3-27
3.6.20 Inverter Voltage Selection 3-28
3.6.21 Image Detection Selection 3-29
3.6.22 USB1_2 or USB1 Selection 3-30
3.6.23 USB2 or USB2_2 Selection 3-30
3.6.24 Cash Drawer Control Selection (JP8) 3-31
3.6.25 Cash Drawer Control Selection 3-32
3.6.26 Cash Drawer Power Selection 3-33

3.7 Printer Board Component Locations & Pin Assignment 3-34
3.7.1 Printer Board: MB-1030 series 3-34
3.7.1.1 Jumper & Connector Quick Reference Table 3-35
3.7.2 Setting Printer Board Connectors and Jumpers 3-36
3.7.2.1 Power Supply Connector 3-36
3.7.2.2 RS-232 Interface Connector 3-36
3.7.2.3 Thermal Head/Motor/Sensor Connector 3-37
3.7.2.4 Auto-Cutter Connector 3-39
3.7.2.5 Paper-Near-END Sensor Connector 3-39
3.7.2.6 USB Interface Connector 3-40
3.7.2.7 Terminal Assignment Connector 3-40

3.8 VFD Board Component Locations & Pin Assignment 3-41
3.8.1 VFD Board: MB-4103 3-41
3.8.2 Jumper & Connector Quick Reference Table 3-42
3.8.3 Setting MB-4103 VFD Board Connectors and Jumpers 3-43

3.8.3.1 Power Switch Selection 3-43
3.8.3.2 RS-232 Serial Interface Connector 3-44

3.9 MSR Board Component Locations & Pin Assignment 3-45
3.9.1 MB-3013 3-45
3.9.1.1 Information Button Reader 3-45
3.9.1.2 Output Connector 3-45

4 Software Utilities 4-1

4.1 Peripheral Devices 4-2
4.1.1 Printer Board: MB-1030 4-2
4.1.1.1 Commands List 4-2
4.1.1.2 VFD: MB-4103 (RS-232) 4-48
4.1.1.3 Commands List 4-48

4.2 API 4-50
4.2.1 API Package Content 4-50
4.2.2 Programming Guide 4-51
4.2.3 API Reference 4-52
4.2.3.1 Cash Drawer API 4-52
4.2.3.2 VFD API 4-53
4.2.3.3 MSR API 4-54
4.2.3.4 I-Button API 4-57
4.2.3.5 Thermal Printer API 4-60
4.2.3.6 Serial Port API 4-70

4.3 Burning PB-3211 Image 4-73
4.3.1 Installing Firmware Burning Tool 4-74
4.3.2 Entering ADFU Mode for PB-3211 Board 4-79
4.3.3 Burning PB-3211 Image 4-83

Appendix A System Diagrams A-1

Exploded Diagram For System Top Case A-2
System Exploded Diagram A-3
Exploded Diagram For MSR Module A-9
Exploded Diagram For 3-Inch Printer (1) A-10
Exploded Diagram For 3-Inch Printer (2) A-12
Exploded Diagram For 2-Inch Printer (1) A-13
Exploded Diagram For 2-Inch Printer (2) A-15
Exploded Diagram For VFD Module A-16

Revision History

The revision history of PA-3211 User Manual is described below:

Version No.	Revision History	Page No.	Date
M1	Initial Release	-	2017/10/05

1 Introduction

This chapter provides the introduction for the PA-3211 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-3211 system. The PA-3211 is an updated system designed to be comparable with the highest performance of IBM AT personal computers. The PA-3211 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 4 chapters and 1 appendix. 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-3211 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 provides the Commands lists for embedded peripheral devices of the system - printer board and VFD, API Package files, and instructs how to burn the image onto PB-3211 board.

Appendix A System Assembly Diagrams
This appendix provides the exploded diagrams and part numbers of the PA-3211.

2 Getting Started

This chapter provides the information for the PA-3211 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

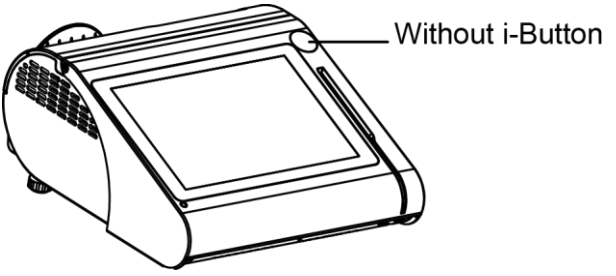
If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

Item	Q'ty
PA-3211	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
Wireless LAN (IEEE 802.11 b/g/n) (Optional)	1
VFD (Optional)	1

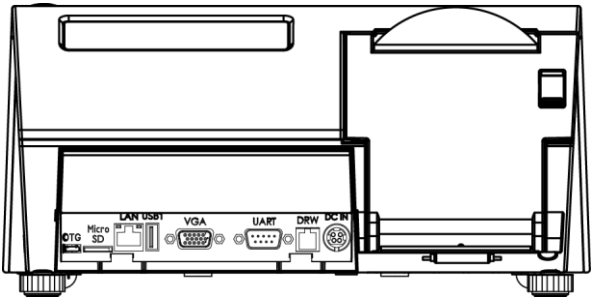
2.2 System Views Without i-Button Module

2.2.1 Front View

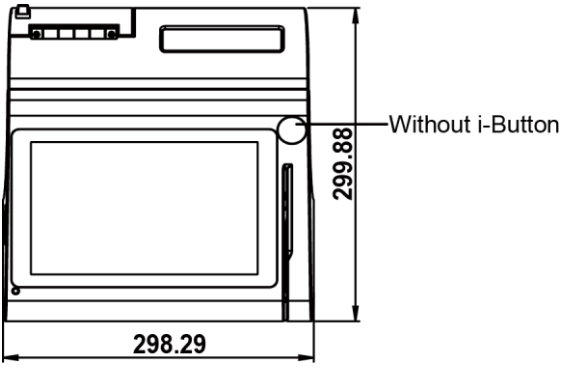
Unit: mm

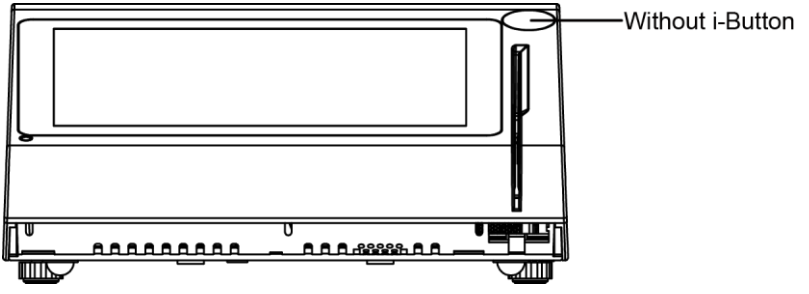


2.2.2 Rear View

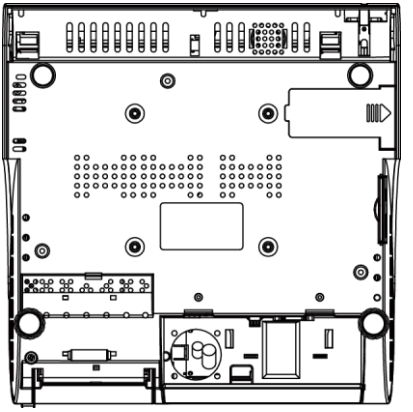


2.2.3 Top View

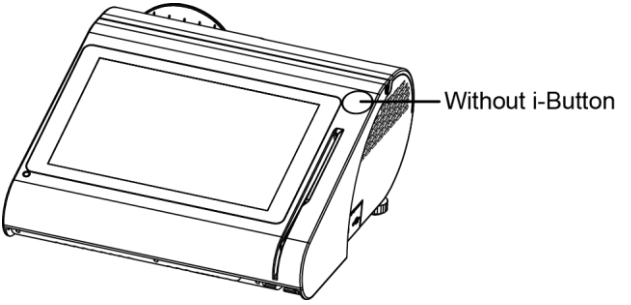




2.2.4 Bottom View

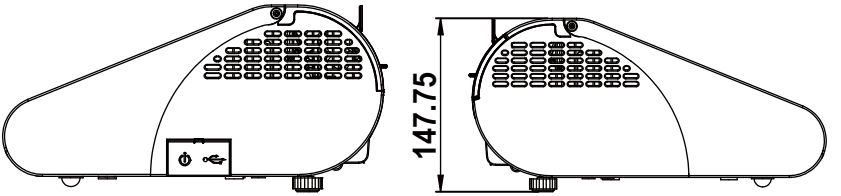


2.2.5 Quarter View



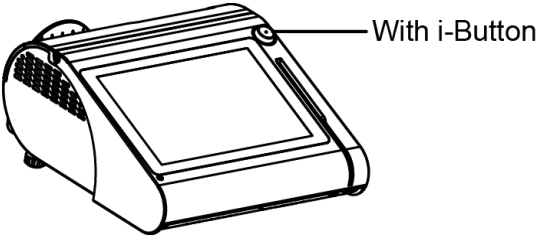
2.2.6 Side View

Unit: mm

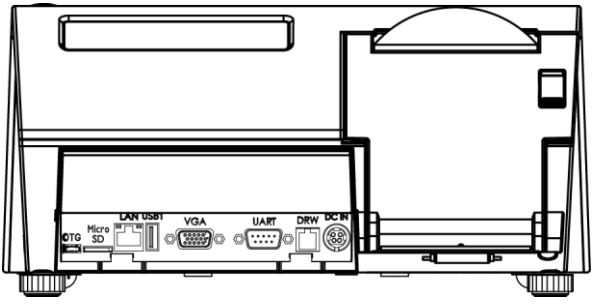


2.3 System Views With i-Button Module

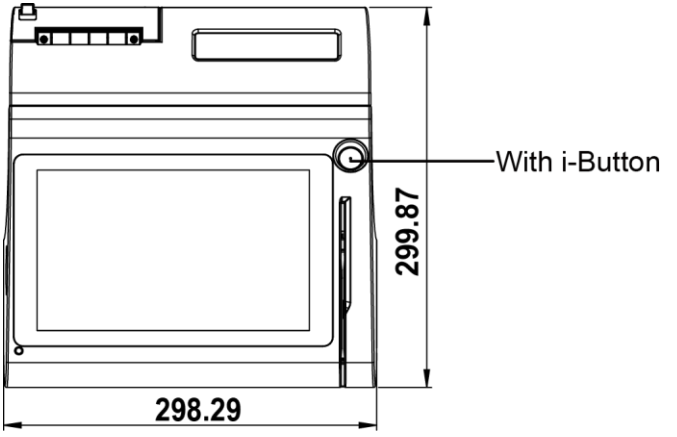
2.3.1 Front View

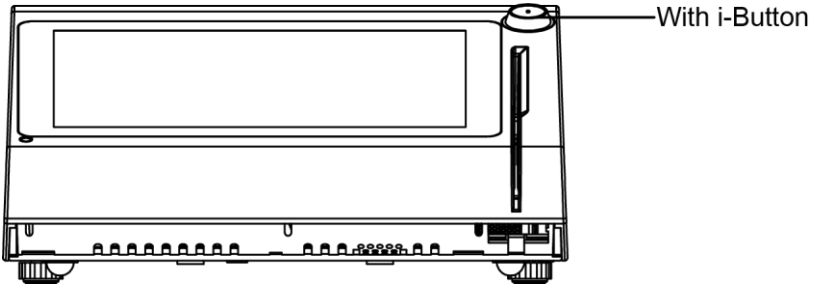


2.3.2 Rear View

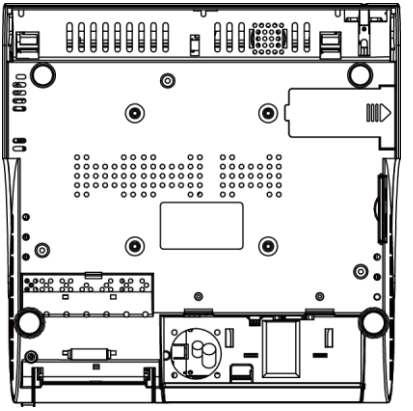


2.3.3 Top View

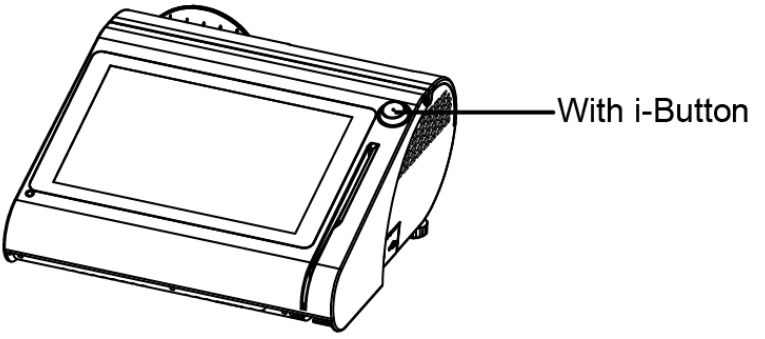




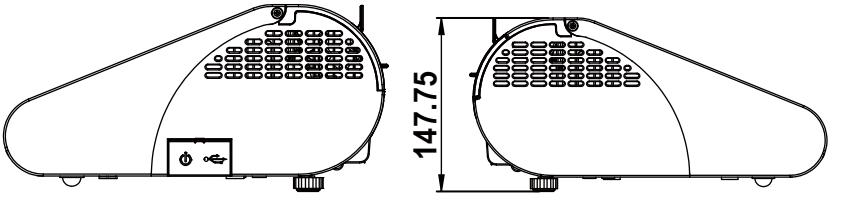
2.3.4 Bottom View



2.3.5 Quarter View



2.3.6 Side View



2.4 System Specifications

System	
CPU Support	➢ ARM Cortex-A9
Memory	➢ DDR3L, 1GB on board
Network	➢ 10/100Mbps Ethernet
Power Supply	➢ 60 Watt power adapter
Audio	➢ 2W speaker
System Weight	➢ with power adaptor approx. 4kg
Dimension (W x H x D)	➢ 300mm x 299mm x 135mm
O.S. Support	➢ Android 5.1
Storage	
Flash	➢ 16GB eMMC on board
I/O Ports	
Standard SDHC	➢ Up to 32GB
USB	➢ 1 x USB 2.0 and 1 x Micro USB for image update only (on rear) ➢ 1 x USB 2.0 on side bezel
Serial Ports	➢ All serial ports support +5V/12V selectable ➢ 1 x DB9 (RX, TX, RTS, CTS) (on rear) ➢ 3 x internal Wafer (RX, TX) for Reserved
LAN	➢ 1 x RJ45
VGA	➢ 1x DB15
Cash Drawer	➢ 1 x RJ11 (+12V or +24V selectable)
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 / UART interface
Printer	➢ 2" or 3" easy loading thermal printer with Auto cutter / USB interface
MSR	➢ ISO I/II/III , JIS I/II/UART interface
Display	
LCD	➢ 10.1" TFT LCD
Resolution	➢ 1280 x 800
Brightness	➢ 400 cd/m²
Touch Screen	➢ 10.1" Capacitive Touch panel
Tilt Angle	➢ 24 ~ 30 degree

Environment	
EMC & Safety	➢ CE / FCC
Operating Temp.	➢ 0°C ~ 35°C (32°F ~ 95°F)
Storage Temp.	➢ -20°C ~ 60°C (-4°F ~ 140°F)
Humidity	➢ 20% ~ 90%

2.5 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-3211 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
   - Avoid installing your PA-3211 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-3211 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-3211 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

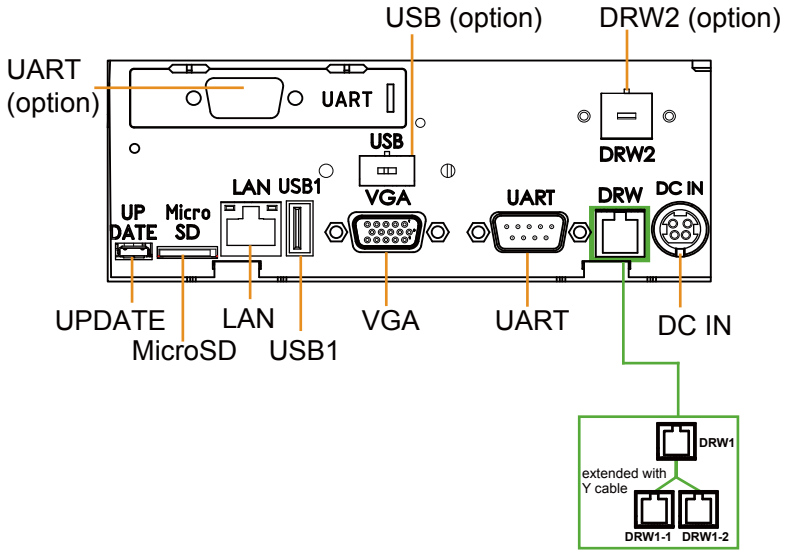
This chapter contains helpful information that describes the jumper and connector settings, component locations, and pin assignment.

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
- 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



3.2 Jumper & Connector Quick Reference Table

JUMPER Description	NAME
UART0/ UART 1/ UART 2/ UART 3/ UART Port Pin9 Voltage Selection	JP_COM0, JP_COM1, JP_COM2, JP_COM3, JP_COM5
USB1_2 or USB1 Connector Selection	JP_USB1
USB2_2 or USB2 Connector Selection	JP_USB2
Inverter Backlight Enable Selection	JP4
Touch Panel Signal Interface Selection	JP5, JP6
Cash Drawer Power Selection	JP7
Cash Drawer Control Selection	JP8
Mini PCIE USB Selection	JP9, JP10
LVDS Panel Input Voltage Selection	JP14
LVDS Voltage Selection	JP15, JP17
Inverter Power Selection	JP16
Image Detection Selection	JP18

System CONNECTOR Description	NAME
Rear I/O Port Connectors	
DC Power Input Port	DC_IN1
Cash Drawer Port	DRW1 (DRW1-1, DRW1-2)
UART3 Connector (D-Sub 9 pins)	UART3
VGA Port (D-Sub 15 pins)	VGA1
USB 2.0 Port	USB1
LAN Port	CN_LAN1
MicroSD Port	MICRO_SD1
Micro USB Port	UPDATE
Motherboard Connectors	
External USB 2.0 Port (side bezel)	USB2
Internal USB 2.0 Connectors	USB0, USB1_2, USB2_2, USB3, USB4_2, USB5
Internal UART Connectors	UART0, UART1, UART2, UART3_1, UART5
Power for Thermal Printer Connector	OUT_24V
DC12V, DC 5V Power Connectors	OUT_12V, OUT_5V

System CONNECTOR Description	NAME
Power LED Connectors	LED1_1, LED1_2
LVDS Connector	LVDS1
Mini PCIE Connector	M_PCIE
Power Switch Connector	SW2
Inverter Connector	INV1
External Speaker Connector	SPK1
HD Audio Connector	LINE_OUT1
I2C Connector	I2C

3.3 Component Locations Of System Main Board

3.3.1 Top View of System Main Board

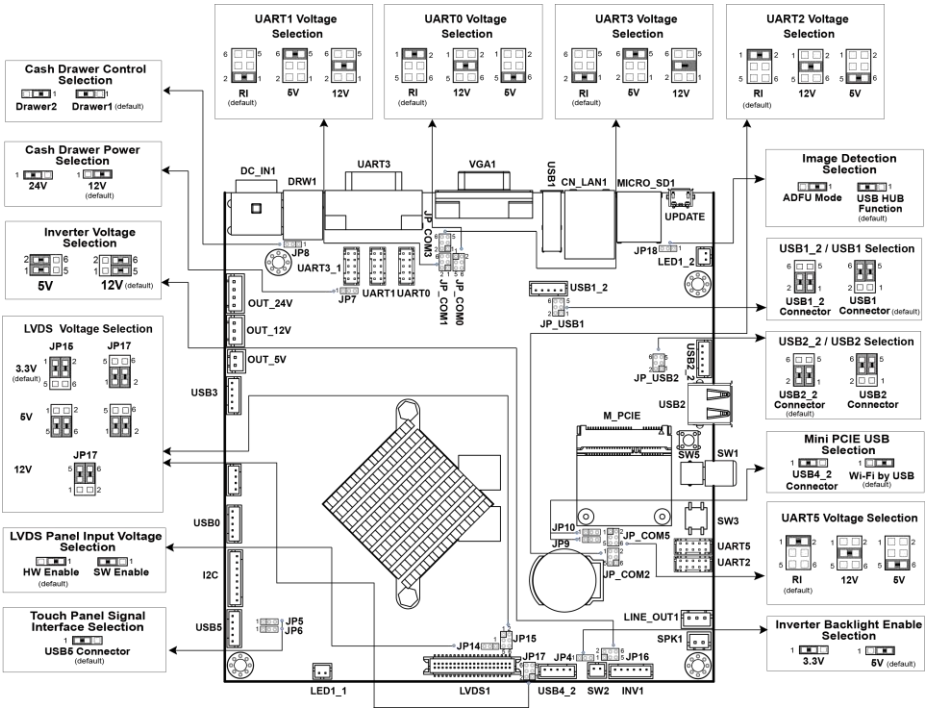


Figure 3-1. Main Board Component Location (Top View)

	**WARNING:** Always disconnect the power cord when you are working with connectors and jumpers on the main board. Make sure both the system and peripheral devices are turned OFF as sudden surge of power could damage sensitive components. Make sure PA-3211 is properly grounded.
	**CAUTION:** Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while you are working on the connectors and jumpers. Use a grounding wrist strap and place all electronic components in any static-shielded devices.

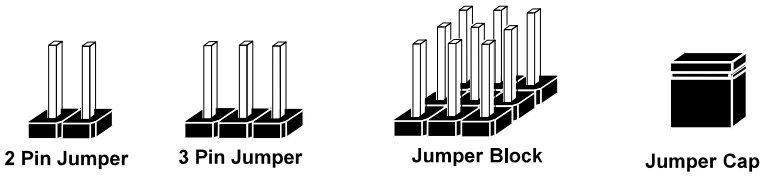
CAUTION: Always touch the motherboard components by the edges. Never touch components such as a processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch the mainboard components.

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.

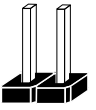
Jumpers & Caps



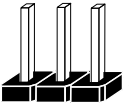
If a jumper has three pins, for example, labeled 1, 2 and 3. You can connect pins 1 and 2 to create one setting and shorting. You can also select to connect pins 2 and 3 to create another setting. The format of the jumper picture will be illustrated throughout this manual. The figure below shows different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

Jumper diagrams

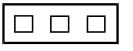
Jumper Cap looks like this

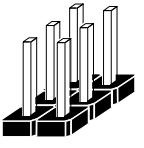


2 pin Jumper looks like this

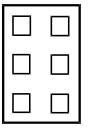


3 pin Jumper looks like this



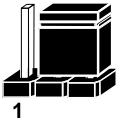


Jumper Block looks like this

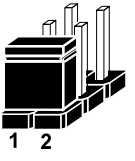


Jumper settings

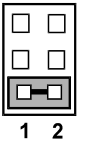
2 pin Jumper closed(enabled)
looks like this



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 Rear I/O Ports

3.5.1 Power Button

Function Button Name: SW1-2
Description: Power Button

SW1-2

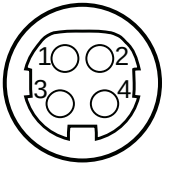
Follow the instructions below to use the power button:

- To turn on the system, press the power button briefly.
- During normal operations, you can press the power button briefly to turn off the panel backlight. When press the power button briefly next time, the LCD backlight will turn on again.
- To turn off the system, press and hold the power button for 2 seconds. Then, the system will ask for your confirmation by prompting a message of power-off.

3.5.2 Power Input Port

Port Name: DC_IN1
Description: DC Power-In Port (rear I/O)

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

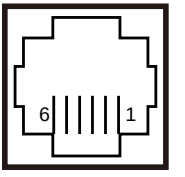


DC_IN1

3.5.3 Cash Drawer Port

Port Name: DRW1
Description: DRW1 is used by default (rear I/O).

PIN	ASSIGNMENT
1	Drwaer2_Open
2	Drawer Open
3	Drawer Sense
4	12V/24V
5	Drawer2_Sensor_R
6	GND



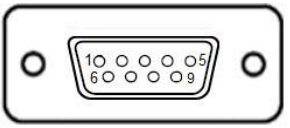
DRW1

3.5.4 UART3 Connector

Port Name: UART3

Description: UART3 Connector, D-SUB 9 pins (rear I/O)

PIN	ASSIGNMENT
1	NC
2	COM3_RXD_R
3	COM3_TXD_R
4	NC
5	GND
6	NC
7	COM3_RTS_R
8	COM3_CTS_R
9	RI / +5V / +12V selectable



UART3

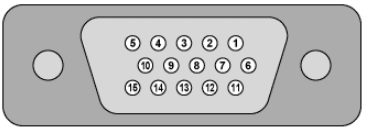
Note: UART3 and UART3_1 can't be used at the same time.

3.5.5 VGA Port

Port Name: VGA1

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	-	-

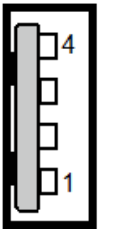


VGA1

3.5.6 USB Port

Port Name: USB1
Description: USB Type A Port (rear I/O)

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

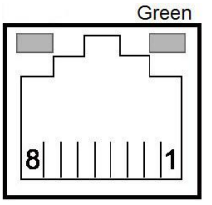


USB1

3.5.7 LAN Port

Port Name: CN_LAN1

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



CN_LAN1

PIN	ASSIGNMENT
1	MDI0+
2	MDI0-
3	MDI1+
4	MDI1-
5	LAN_VCC
6	LAN_VCC
7	TDCT
8	RDCT
9	NC
10	GND

LAN LED Status

There is a LAN LED indicator for LAN on the rear panel of the system. By observing its status, you can know the status of the Ethernet connection.

LAN LED Indicator	Color	Status	Description
Right Side LED	Green	On	10/100Mbps LAN Speed Indicator
		Off	No LAN switch/ hub connected.

3.5.8 MicroSD Port

Port Name: MICRO_SD1

Description: MicroSD Port (rear I/O)

PIN	ASSIGNMENT
1	SD0_D2
2	SD0_D3
3	SD0_CMD
4	SD_VCC
5	SD0_CLK
6	GND
7	SD0_D0
8	SD0_D1
9	CARD_DET
10	GND

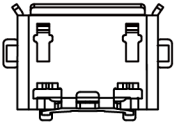
MICRO_SD1

3.5.9 Micro USB Port

Port Name: UPDATE

Description: Image Update Port (rear I/O)

PIN	ASSIGNMENT
1	+5V
2	D-
3	D+
4	DET: high -> ADFU DET: low -> USB HUB
5	GND



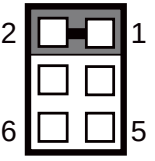
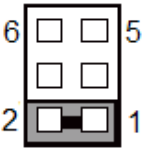
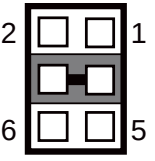
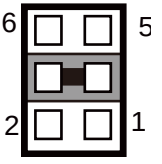
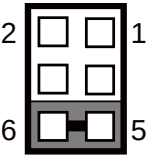
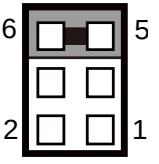
UPDATE

3.6 Setting Main Board Connectors and Jumpers

3.6.1 UART Port Voltage Selection (JP_COM0, JP_COM1, JP_COM2, JP_COM3, JP_COM5)

Jumper Name: JP_COM0, JP_COM1, JP_COM2, JP_COM3, JP_COM5
Description: UART0, UART 1, UART 2, UART 3, UART 5 Port Pin9 RI/5V/12V Selection

JP_COM0, JP_COM1, JP_COM2, JP_COM3, JP_COM5 Pin headers on board. The voltages of UART0, UART1, UART2, UART3, UART5 ports can be adjusted by setting relevant jumpers on board.

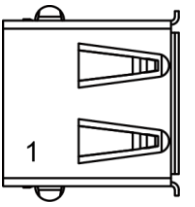
SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION	
RI	**1-2** ***(Default Setting)***	 **JP_COM0 JP_COM2 JP_COM5**	 **JP_COM1 JP_COM3**
+12V	3-4	 **JP_COM0 JP_COM2 JP_COM5**	 **JP_COM1 JP_COM3**
+5V	5-6	 **JP_COM0 JP_COM2 JP_COM5**	 **JP_COM1 JP_COM3**

3.6.2 External USB 2.0 Port

Connector Location: USB2

Description: USB Type A Connector (on side bezel)

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



USB2

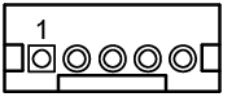
3.6.3 Internal USB 2.0 Connectors

Connector Location: USB0, USB1_2, USB2_2, USB3, USB4_2, USB5
Description: Internal USB 2.0 connectors

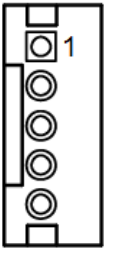
PIN	ASSIGNMENT
1	5V (Maximum current: 0.5A)
2	D-
3	D+
4	GND
5	GND

Notes:

1. USB4_2 signal is shared from "MINI_PCIE" port.
2. USB4_2 could be functioned when JP9, JP10 are set as 1-2 (short) connected.
3. USB5 could be functioned when JP5, JP6 are set as 1-2 (short) connected.



USB1_2/
USB4_2

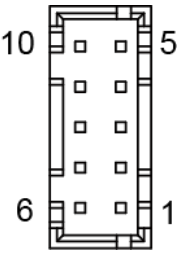


USB0/
USB2_2/
USB3/
USB5

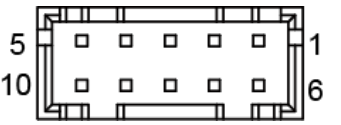
3.6.4 Internal UART Connectors

Connector Location: UART0, UART1, UART2, UART5
Description: Internal UART Connectors (wafer type)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	NC	6	NC
2	COM1_RXD_R	7	NC
3	COM1_TXD_R	8	NC
4	NC	9	COM1_RI_SEL
5	GND	10	NC



UART0/ UART1

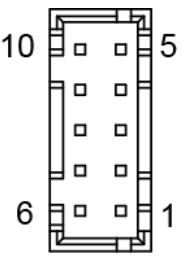


UART2/ UART5

Connector Location: UART3_1
Description: UART Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	NC	6	NC
2	COM1_RXD_R	7	COM1_RTS_R
3	COM1_TXD_R	8	COM1_CTS_R
4	NC	9	RI / +5V / +12V selectable
5	GND	10	NC

Note: UART3 and UART3_1 can't be used at the same time.

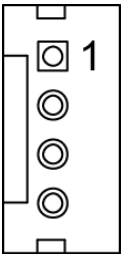


UART3_1

3.6.5 Power for Thermal Printer Connector

Connector Location: OUT_24V
Description: Power for Thermal Printer Connector

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

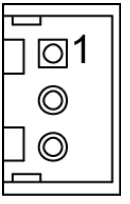


OUT_24V

3.6.6 Power Connectors (DC 12V, DC 5V)

Connector Location: OUT_12V
Description: DC 12V Voltage Provider Connector

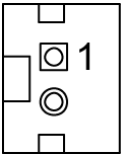
PIN	ASSIGNMENT
1	VCC12
2	NC
3	GND



OUT_12V

Connector Location: OUT_5V
Description: DC 5V Voltage Provider Connector

PIN	ASSIGNMENT
1	V5P0A
2	GND

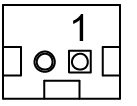


OUT_5V

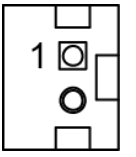
3.6.7 Power LED Connectors

Connector Location: LED1_1, LED1_2
Description: Power indication LED Connector

PIN	ASSIGNMENT
1	VCC5
2	GND



LED1_1



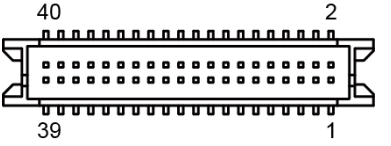
LED1_2

3.6.8 LVDS Connector

Connector Location: LVDS1

Description: LVDS Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	LVDS_VCC	2	LVDS_VCC
3	Panel_reverse1	4	LVDS_VCC
5	GPIOD16/PWM5	6	LVDS_VCC
7	GND	8	GND
9	VLED	10	VLED
11	VLED	12	VLED
13	LVDS_A3_DP	14	LVDS_A3_DN
15	LVDS_CLKA_DP	16	LVDS_CLKA_DN
17	GND	18	GND
19	LVDS_A2_DP	20	LVDS_A2_DN
21	LVDS_A1_DP	22	LVDS_A1_DN
23	GND	24	GND
25	LVDS_A0_DP	26	LVDS_A0_DN
27	LVDS_B3_DP	28	LVDS_B3_DN
29	GND	30	GND
31	LVDS_CLKB_DP	32	LVDS_CLKB_DN
33	LVDS_B2_DP	34	LVDS_B2_DN
35	GND	36	GND
37	LVDS_B1_DP	38	LVDS_B1_DN
39	LVDS_B0_DP	40	LVDS_B0_DN

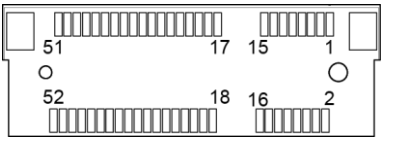


LVDS1

3.6.9 Mini PCIE Connector

Connector Location: M_PCIE

Description: Mini PCIE Connector

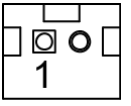


M_PCIE

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GPIOD12/ WL_WAKE	2	V3P3A
3	NC	4	GND
5	NC	6	V1P5S
7	V3P3A	8	V3P3A
9	GND	10	NC
11	NC	12	NC
13	NC	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	GPIOB2/WL_EN
23	NC	24	V3P3A
25	NC	26	GND
27	GND	28	V1P5S
29	GND	30	NC
31	NC	32	NC
33	NC	34	GND
35	GND	36	USB_N
37	GND	38	USB_P
39	V3P3A	40	GND
41	V3P3A	42	GND
43	GND	44	GND
45	NC	46	GND
47	NC	48	V1P5S
49	NC	50	GND
51	NC	52	V3P3A

3.6.10 Power Switch Connector 2

Connector Location: SW2
Description: Power Switch Connector 2

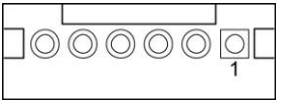


SW2

PIN	ASSIGNMENT
1	CONOFF
2	GND

3.6.11 Inverter Connector

Connector Location: INV1
Description: Inverter Connector



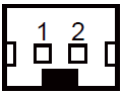
INV1

PIN	ASSIGNMENT
1	VCC12/VCC5 by JP16
2	VCC12/VCC5 by JP16
3	GND
4	BRCTR_INV(Brightness)
5	GND
6	PANLE_BKLTEN_C (Enable) 5V/3.3V by JP4

3.6.12 External Speaker Connector

Connector Location: SPK1
Description: External Speaker Connector

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

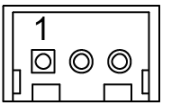


SPK1

3.6.13 HD Audio Connector

Connector Location: LINE_OUT1
Description: HD Audio Connector

PIN	ASSIGNMENT
1	AOUTL
2	GND
3	AOUTR

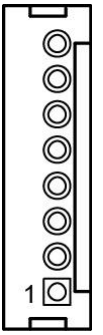


LINE_OUT1

3.6.14 I2C Connector

Connector Location: I2C
Description: I2C Connector

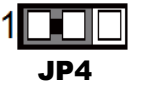
PIN	ASSIGNMENT
1	VCC3_3_LDO
2	GND
3	GND
4	I2CSCL
5	I2CSDA
6	GND
7	INT_18
8	RSTN_3



I2C

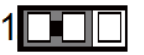
3.6.15 Inverter Backlight Enable Selection

Jumper Name: JP4
Description: Inverter Backlight Enable Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
3.3V	1-2	 **JP4**
5V	**2-3** ***(Default Setting)***	 **JP4**

3.6.16 Touch Panel Signal Interface Selection

Jumper Name: JP5, JP6
Description: Touch Panel Signal Interface Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
USB5 Connector	**1-2** ***(Default Setting)***	 **JP5/JP6**

3.6.17 Mini PCIE USB Selection

Jumper Name: JP9, JP10

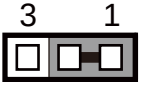
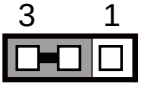
Description: "USB4_2 signal support to" selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
USB signal to USB4_2 wafer	1-2	 **JP9/JP10**
USB signal to mini-PCIE	**2-3** ***(Default Setting)***	 **JP9/JP10**

3.6.18 LVDS Panel Input Voltage Selection

Jumper Name: JP14

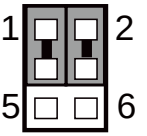
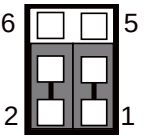
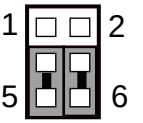
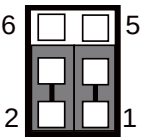
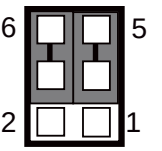
Description: LVDS Panel Input Voltage Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
HW Enable	**1-2** ***(Default Setting)***	 **JP14**
SW Enable	2-3	 **JP14**

3.6.19 LVDS Voltage Selection

Jumper Name: JP15, JP17

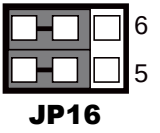
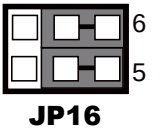
Description: LVDS 3.3V / 5V / 12V Voltage Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION	
3.3V	**1-3, 2-4 (JP15)** **1-3, 2-4 (JP17)** ***(Default Setting)***	 **JP15**	 **JP17**
5V	3-5, 4-6 (JP15) 1-3, 2-4 (JP17)	 **JP15**	 **JP17**
+12V	3-5, 4-6 (JP17)	**-**	 **JP17**

3.6.20 Inverter Voltage Selection

Jumper Name: JP16

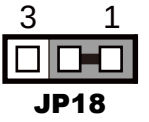
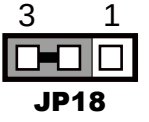
Description: Inverter Voltage Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
5V	**1-3,** **2-4** ***(Default Setting)***	 **JP16**
12V	3-5, 4-6	 **JP16**

3.6.21 Image Detection Selection

Jumper Name: JP18

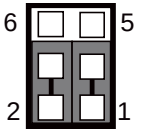
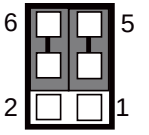
Description: Image Detection Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
ADFU Mode	1-2	 **JP18**
USB HUB Function	**2-3** ***(Default Setting)***	 **JP18**

Note: ADFU stands for **actions device firmware upgrade**.

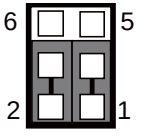
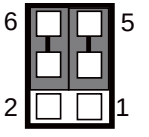
3.6.22 USB1_2 or USB1 Selection

Jumper Name: JP_USB1
Description: USB1_2 or USB1 Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
USB1_2	1-3, 2-4	 **JP_USB1**
USB1	**3-5,** **4-6** ***(Default Setting)***	 **JP_USB1**

3.6.23 USB2 or USB2_2 Selection

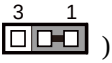
Jumper Name: JP_USB2
Description: USB2 or USB2_2 Connector Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
USB2 Connector	**1-3,** **2-4** ***(Default Setting)***	 **JP_USB2**
USB2_2 Connector	3-5, 4-6	 **JP_USB2**

3.6.24 Cash Drawer Control Selection (JP8)

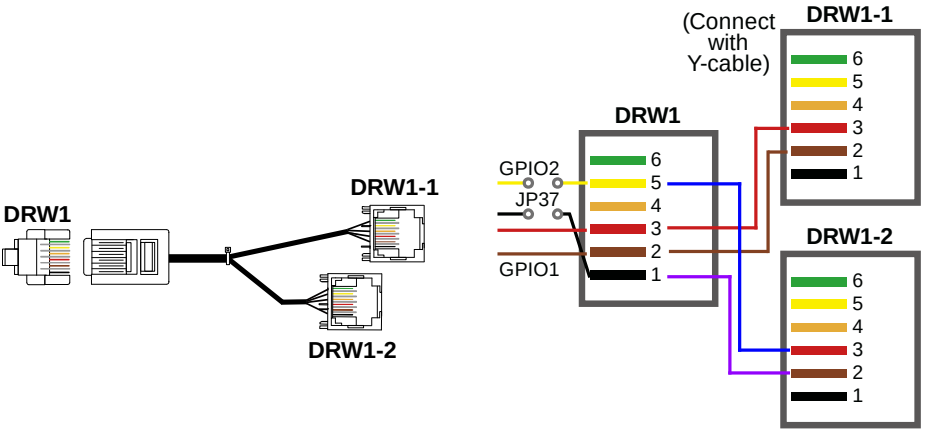
DRW1: RJ-11 Cash Drawer Connector (+12V/+24V selectable, default: +12V). DRW1 is used by default. If you need a second port, adopt either way below:

Cash Drawer1 (DRW1)

Set the pin-header jumper **JP8** as **1-2** connected (

) and use a Y-cable (optional) to enable DRW2 (refer to the **Cash Drawer Control Selection** section for detailed jumper setting).

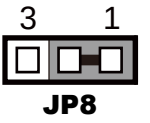
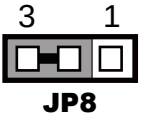
Note: DRW1 includes two groups of GPIO pins. The second group is normally unused but can be enabled by the jumper JP8 if necessary. You can split DRW into two channels of DRW1-1 & DRW1-2 with a Y-cable.
DRW1, DRW1-1, DRW1-2 shares the same power source (refer to the **Cash Drawer Power Selection** section for adjustment, default: 12V).



3.6.25 Cash Drawer Control Selection

Jumper Name: JP8

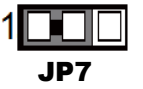
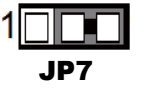
Description: Cash Drawer Control Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
Drawer2	1-2	 JP8
Drawer1	**2-3** ***(Default Setting)***	 JP8

3.6.26 Cash Drawer Power Selection

Jumper Name: JP7

Description: DRW1, DRW1-1, DRW1-2 Power Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
24V	1-2	 **JP7**
12V	**2-3** ***(Default Setting)***	 **JP7**

3.7 Printer Board Component Locations & Pin Assignment

3.7.1 Printer Board: MB-1030 series

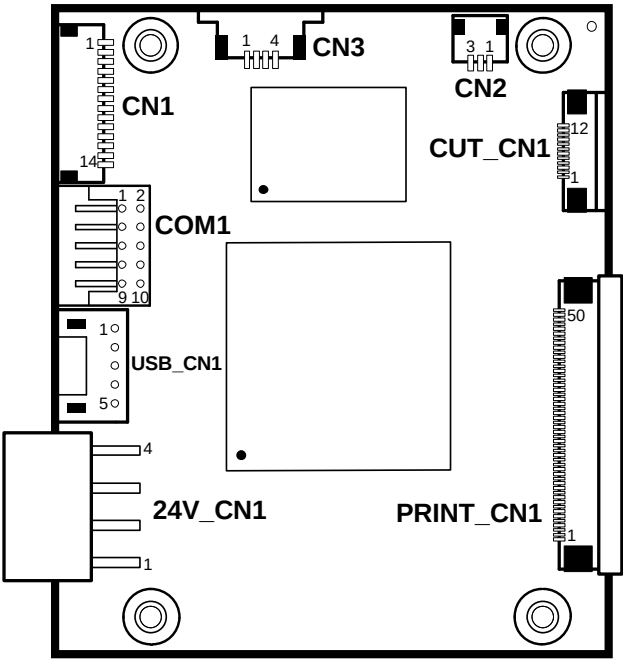


Figure 3-2. MB-1030 Printer Board Component Locations

3.7.1.1 Jumper & Connector Quick Reference Table

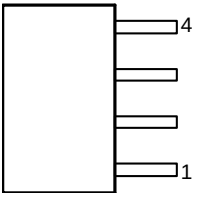
Jumper / Connector	NAME
Power Supply Connector	24V_CN1
RS-232 Interface Connector	COM1
Thermal Head/Motor/Sensor Connector	PRINT_CN1
Auto-Cutter Connector	CUT_CN1
Paper-Near-END Sensor Connector	CN2
USB Interface Connector	USB_CN1
Terminal Assignment Connector	CN1

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

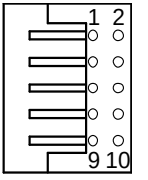


24V_CN1

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

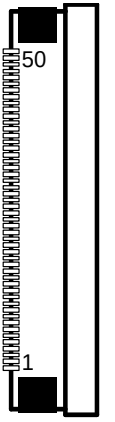


COM1

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



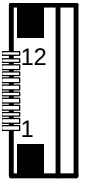
PRINT_CN1

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

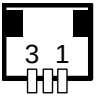


CUT_CN1

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

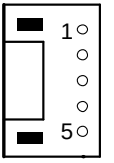


CN2

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+	-	-

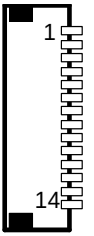


USB_CN1

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

3.8 VFD Board Component Locations & Pin Assignment

3.8.1 VFD Board: MB-4103

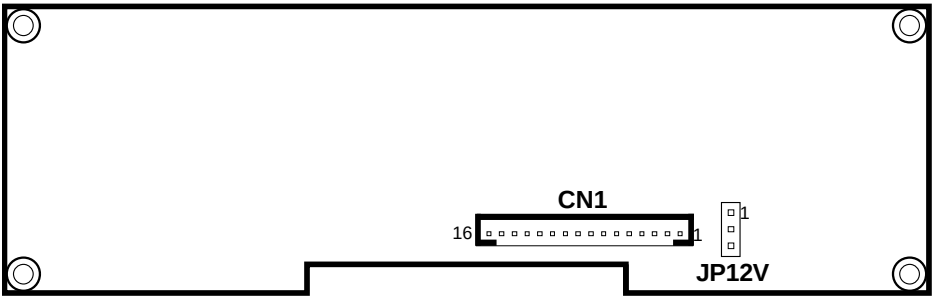


Figure 3-3. MB-4103 VFD Board Component Locations

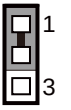
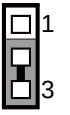
3.8.2 Jumper & Connector Quick Reference Table

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

3.8.3 Setting MB-4103 VFD Board Connectors and Jumpers

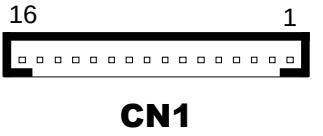
3.8.3.1 Power Switch Selection

JP12V: Power Switch Selection

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

3.9 MSR Board Component Locations & Pin Assignment

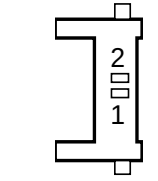
3.9.1 MB-3013

Figure 3-4. MB-3013 MSR Board Component Locations

3.9.1.1 Information Button Reader

I_BUTTON1: Information button reader

PIN	ASSIGNMENT
1	I_B1
2	GND

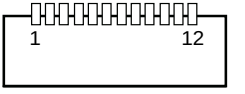


I_BUTTON1

3.9.1.2 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 Commands lists for embedded peripheral devices of the system - printer board and VFD, API and instructs how to burn the image onto PB-3211 board. The following topics are included:

- Peripheral Devices
  - Printer Board (MB-1030) Commands
  - VFD (MB-4103) Commands
- API
- Burning the Image onto PB-3211 Board

4.1 Peripheral Devices

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

4.1.1 Printer Board: MB-1030

4.1.1.1 Commands List

1. Printer Registry Operation

Registry Name	Default Data	Notes
BaudRate	115200	-
BitLength	8	-
Parity	0	-
Stop	1	-

1. Commands List

Standard Commands

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

Kanji Control Commands

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

Other Commands

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

COMMANDS LIST

Standard Commands

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

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

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

Two-dimensional Bar Code Commands

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

Kanji Control Commands

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

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

Command classification

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

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

COMMANDS DETAILS

STANDARD COMMANDS DETAILS

HT

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

LF

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

FF

[Name]	Print and recover to standard mode (in page mode)
[Format]	ASCII FF Hex. 0C Decimal 12
[Range]	N/A
[Description]	Prints all buffered data to the print region collectively, then recovers to the standar mode.

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

CR

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

CAN

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

DLE EOT n

[Name] Real-time status transmission.

[Format]

ASCII	OLE	EOT	n
Hex.	10	04	n
Decimal	16	4	n

[Range] 1 ≤ n ≤ 4

[Description]

Transmits the selected printer status specified by n in real time, according to the following parameters:

n = 1 : Transmit printer status. n = 2 : Transmit off-line status.

n = 3 : Transmit error status. n = 4 : Transmit paper roll sensor status.

n = 1 : Printer status.

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

n = 2 : Off-line status.

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

n = 3 : Error status

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

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

n = 4 : Continuous paper sensor status.

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

DLE ENQ n

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

DLE DC4 n m t

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

ESC FF

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

ESC SP n

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

ESC ! n

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

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

ESC $ nL nH

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

ESC * m nL nH d1…dk

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

ESC - n

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

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

ESC 2

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

ESC 3 n

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

ESC = n

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

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

ESC @

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

ESC D n1…nk NUL

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

ESC E n

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

ESC G n

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

ESC J n

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

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

ESC L

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

ESC M n

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

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

ESC R n

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

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

	16 | User Define

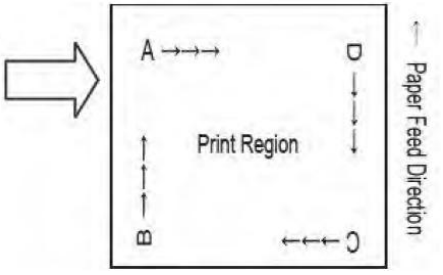
ESC S

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

ESC T n

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

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



ESC V n

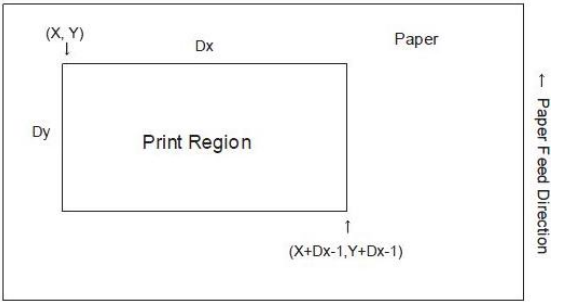
[Name]	Turn 90 degree clockwise rotation mode on/off
[Format]	ASCII ESC V n Hex. 1B 56 n Decimal 27 86 n
[Range]	0 ≤ n≤ 1, 48≤ n ≤49 Initial Value n = 0
[Description]	Specifies or cancels character 90 degree clockwise rotation.

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

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

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

ESC W xL xH yL yH dxL dxH dyL dyH

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

ESC \ nL nH

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

ESC a n

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

ESC c 3 n

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

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

ESC c 4 n

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

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

ESC c 5 n

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

ESC d n

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

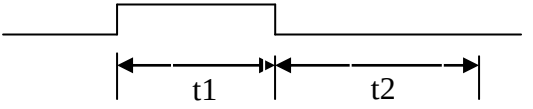
ESC i

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

ESC m

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

ESC p m t1 t2

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

ESC t n

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

ESC { n

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

n	Upside-down mode
0	Turned off
1	Turned on

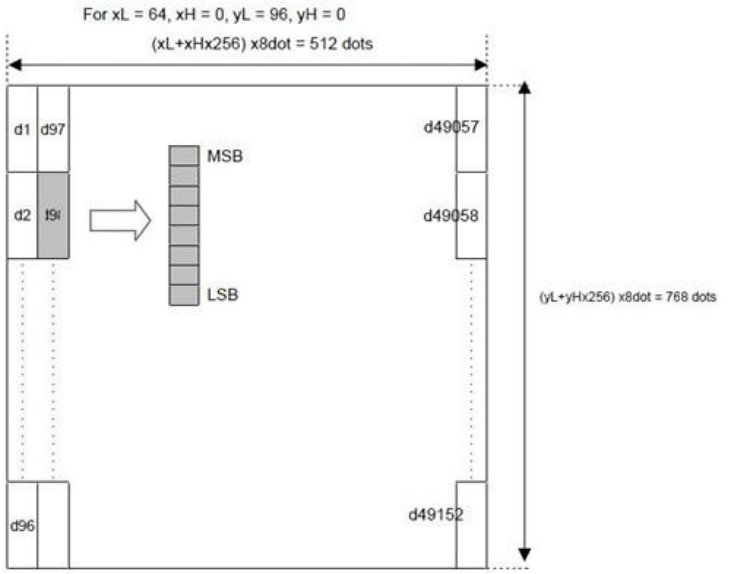
FS p n m

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

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

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

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

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

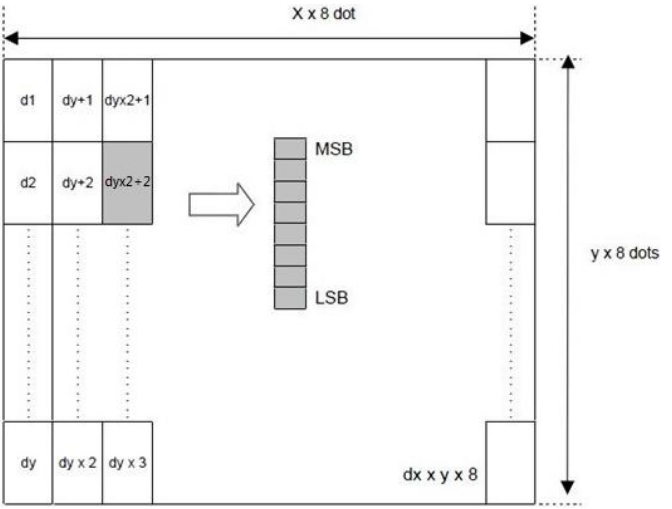
GS ! n

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

GS $ nL nH

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

GS * X Y [d1…d(X x Y x 8)]

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

GS (A pL pH n m

<table>
<tr><td>[Name]</td><td>Execute test print.</td></tr>
<tr><td>[Format]</td><td>ASCII GS (A pL pH n m
Hex. 1D 28 41 pL pH n m
Decimal 29 40 65 pL pH n m</td></tr>
<tr><td>[Range]</td><td>{pL+ (pH×256) } = 2 (pL = 2,pH = 0)
0 ≤ n ≤ 2 , 48 ≤ n ≤ 50
2 ≤ m ≤ 3 , 50 ≤ m ≤ 51</td></tr>
<tr><td>[Description]</td><td>Executes the specified test print.
The following command is ignored in page mode.

Specifies the parameter count following pL and pH in (pL + (pH x 256)) bytes.
n specifies the paper to be tested.
<table>
<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
2 , 50</td><td>Paper Roll</td></tr>
</table>
m specifies a test pattern.
<table>
<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></td></tr>
</table>

GS (K pL pH n m

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

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

GS / m

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

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

GS B n

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

GS H n

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

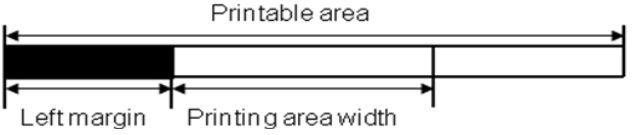
m	**Printing Position**
0, 48	No print
1, 49	Above bar code
2, 50	Below bar code
3, 51	Above and below bar code(both)

GS I n

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

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

GS L nL nH

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

GS P x y

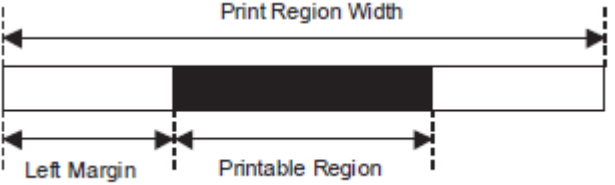
[Name]	Set basic calculated pitch.
[Format]	ASCII GS P x y Hex. 1D 50 x y Decimal 29 80 x y
[Range]	0 ≤ x ≤ 255 0 ≤ y ≤ 255 Initial Value x = 203, y = 203: EPSON targeted model print head 203 DPI
[Description]	Sets the horizontal basic calculated pitch to approximately 25.4/xmm [(1/x) inch], and the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

GS V m

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

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

GS W nL nH

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

GS \ nL nH

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

GS a n

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

[Description]

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

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

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

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

Second byte (printer information)

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

Third byte (paper sensor information)

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

Fourth byte (paper sensor information)

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

GS f n

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

GS h n

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

GS k m d1 … dk NUL.
GS k m n d1 … dk

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

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

2:

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

GS r n

[Name]	Transmit status.
[Format]	ASCII GS r n Hex. 1D 72 n Decimal 29 114 n
[Range]	n = 1, 2, 49, 50

[Description]

Sends the specified status.

Detector Status (n=1,49)

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

Drawer Kick Connector Status (n=2,50)

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

GS v 0 m xL xH yL yH d1 … dk

[Name]

Print raster bit image.

[Format]

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

[Range]

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

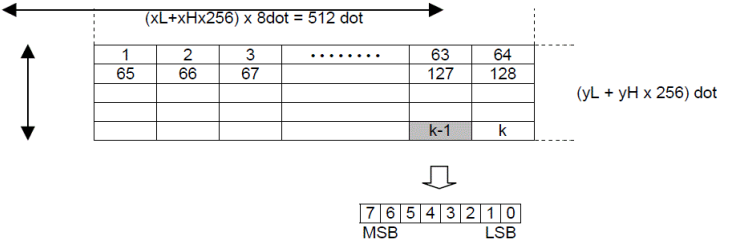
[Description]

Prints raster method bit images using mode m.

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

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

[Ex.:] When xL + xH × 256 = 64



GS w n

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

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

TWO-DIMENSIONAL BAR CODE COMMAND DETAILS

DC2 ; n

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

GS p 1

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

<table><tr><th>Mode</th><th>Hexadecimal</th><th>Mode</th></tr><tr><td>N</td><td>4E</td><td>Numerical mode</td></tr><tr><td>A</td><td>41</td><td>Alphanumeric mode</td></tr><tr><td>B</td><td>42</td><td>8-bit byte mode</td></tr><tr><td>K</td><td>4B</td><td>Kanji mode</td></tr><tr><td>M</td><td>4D</td><td>Mixed mode</td></tr></table>
nl, nh: Specifies the number of data.
Data: Kanji data of the QR Code data should be set by Shift JIS code.</td></tr>
</table>

KANJI CONTROL COMMANDS 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

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

FS .

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

FS S n1 n2

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

FS W n

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

4.1.1.2 VFD: MB-4103 (RS-232)

4.1.1.3 Commands List

1. VFD Registry Operation

Registry Name	Default Data	Notes
BaudRate	9600	-
BitLength	8	-
Parity	0	-
Stop	1	-

COMMANDS DETAILS

Command	Sub-Item (Hex)	Description
HT	09	Move cursor right
BS	08	Move cursor left
US LF	1F 0A	Move cursor up
LF	0A	Move cursor down
US CR	1F 0D	Move cursor to right-most position
CR	0D	Move cursor to left-most position
HOM	0B	Move cursor to home position
US B	1F 42	Move cursor to bottom position
US $ x y	1F 24 x y	Move cursor to specified position 1≦x(column) 20 ; 1≦y(row) ≦2
US C n	1F 43 n	Select/cancel cursor display n=0, canceled ; n=1, selected
CLR	0C	Clear display screen
CAN	18	Clear cursor line
US X n	1F 58 n	Brightness adjustment, 1≦n≦4
US E n	1F 45 n	Blink display screen 0 ≦n ≦255 (n*50msec) ON / (n*50msec) OFF n=0, blinking is canceled n=255, display is turned off
ESC @	1B 40	Initialize display
ESC t n	1B 74 n	Select character code table 0≦n ≦5 (Please refer Chapter 5)
ESC R n	1B 52 n	Select international character set (Please refer to International Font Set Table)
US r n	1F 72 n	Select/cancel reverse character

Command	Sub-Item (Hex)	Description
		n=0, canceled ; n=1, selected
US MD1	1F 01	Specify overwrite mode
US MD2	1F 02	Specify vertical scroll mode
US MD3	1F 03	Specify horizontal scroll mode
US . n	1F 2E n	Specify period display n=display character code
US , n	1F 2C n	Specify comma display n= display character code
US ; n	1F 3B n	Specify semicolon (period+comma) display n= display character code
US # n m	1F 23 n m	Specify display annunciator, turn the annunciator at "m" column on or off n=0,1 (Off, On) ; 0 ≦m ≦ 20
ESC & s n m [a(pl..p7)] (m-n+1)	1B 26 s n m[a(p1..p5)](m-n+1)	Define download characters, S=1; 32≦n≦m≦126 ; a=5 (p1..p5 = pattern1..pattern5)
ESC ? n	1B 3F n	Cancel user-defined characters, 32≦n≦126 (n=character code)
ESC % n	1B 25 n	Select/cancel download character set n=0, canceled ; n=1, selected
ESC W n s (x1 y1 x2 y2)	1B 57 n s (x1 y1 x2 y2)	Specify/cancel the window range n=1,2,3,4 (four windows) ; s=0,1 (disable, enable) 1≦x1≦x2≦20 (column) ; 1≦y1≦y2≦2 (row)
US @	1F 40	Execute self-test
US T h m	1F 54 h m	Display time : 0≦h ≦23; 0≦m≦ 59
US U	1F 55	Display of time counter

4.2 API

4.2.1 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:

Operation System	Android Framework	
Directory	**Contents / File Name**	**Description**
Document	API User Guide A01-3211-000-01-170705.pdf	User Guide
	MB-1030_Command Manual	Printer Command Manual.
	MB-4103_Spec_v1.0_121109	VFD Product Specification
Function DLL		
Directory	**Function**	**File Name**	**Description**
Library	*Cash Drawer*	CashDrawer.jar	Cash Drawer Control jar library
	VFD	VFD.jar	VFD Control jar library
	Ibutton	Ibutton.jar	I-Button jar library
	MSR	MSR.jar	MSR jar library
	Printer	ThermalPrinter.jar	Printer library
	SerialPort	SerialPort.jar	Serial Port library
	SAPI	SAPI.jar	Communication library
Library\x86	IO	libgpio_control.so	IO Control JNI
	Serial	libserial_port.so	Serial Control JNI
Sample Program		
Directory	**Contents / File Name**	**Description**
DemoProject	PA-3222Utility	Cash Drawer VFD Function DemoUtility MSR Function Demo Printer Function Demo

4.2.2 Programming Guide

1. Create a new project in Eclipse.
2. Copy provided JAR file (CashDrawer.jar SAPI.jar VFD.jar) into following path:

libs
- CashDrawer.jar
    - VFD.jar
    - SAPI.jar
    - Msr.jar
    - ThermalPrinter.jar

3. In Libraries tab of the target project's properties, confirm that the JAR file you added (CashDrawer.jar SAPI.jar VFD.jar) is registered in [Java Build Path].If it has not been added, add the JAR file into build path using [Add Jars...].
4. Copy the library file (libeposprint.so) into following path:

Libs
    -x86
|_ libgpio_control.so
|_libserial_port.so

Import Function Declare:
importandroid.VFD.VFD;
importandroid.VFD.Msr;
importandroid.CashDrawer.CashDrawer;
importandroid.ThermalPrinter.ThermalPrinter;

4.2.3 API Reference

4.2.3.1 Cash Drawer API

OpenCashDrawer

Public Boolean OpenCashDrawer(int num);

Purpose Open the cash drawer API.
Value Put Drawer number to Function,
Return True (1) on success, False (0) on failure

Example

```
boolean ControlResult = false;
ControlResult = CDrawer.OpenCashDrawer(1);
if(ControlResult)
                                    //"Cash Drawer Control Success!"
else
//"Cash Drawer Control Failure!"
```

GetCashDrawerStatus

Public Boolean GetCashDrawerStatus (int num);

Purpose Get the cash drawer status.
Value Put Drawer number to Function, then get CashdrawerStatus back.
Return True (1) on success, False (0) on failure False (0)

Example

```
boolean ControlResult = false;
  CashDrawerCDrawer =new CashDrawer();
ControlResult = CDrawer.GetCashDrawerStatus(1);
if(ControlResult)
      //"Cash Drawer Status Open !"
else
      //"Cash Drawer Status Close !"
```

4.2.3.2 VFD API

OpenVFD

Public Boolean OpenVFD(intBuadRate)

Purpose	Open the VFD Port.
Value	Set VFD Baud Rate; MB-4103 default baud rate is 9600;
Return	True (1) on success, False (0) on failure

CloseVFD

Public Boolean CloseVFD();

Purpose	Close the VFD Port.
Return	True (1) on success, False (0) on failure False (0)

SendCommand

Public Boolean SendCommand(byte[] data);

Purpose	Send Command to VFD.
Value	VFD Command Code. ESC/POS Command.
Return	True (1) on success, False (0) on failure False (0)
Example	

VFD – Clear VFD Command (EPSON Command)

```
//Initialize a VFD class instance
VFD VFD_Control = new VFD();
VFD_Control.OpenVFD(9600);
byte[] data = newbyte[1];
data[0] = 0x0C;
VFD_Control.SendCommand(data);
VFD_Control.CloseVFD();
```

4.2.3.3 MSR API

OpenMSR

Public Boolean OpenMSR (intBaudRate)

Purpose	Open theMSR Port.
Value	Set Msr BaudRate; MJR243R baud rate default is 19200;
Return	True (1) on success, False (0) on failure

CloseMSR

Public Boolean CloseMSR( );

Purpose	Close the MSR Port.
Return	True (1) on success, False (0) on failure False (0)

SendCommand

Public Boolean SendCommand (byte[] data);

Purpose	Send Command to MSR.
Value	MsrCommand Code.
Return	True (1) on success, False (0) on failure False (0)
Example	Msr – Send Command to Msr

```
//Initialize a VFD class instance
MsrMsrcontrol = newMsr();
Msrcontrol.OpenMSR(19200);
byte[] data = newbyte[1];
data[0] = 0x0C;
Msrcontrol.SendCommand(data);
```

Receiver Data - Attach

Public Boolean Attach();

Purpose Receive Msr Data
Return True (1) on success, False (0) on failure False (0)
Example Receive Data from MSR.
Before use this function need to implements ObserverInterface.
Observer = Current class.

```
publicclassMsrActivityextends Activity
implementsandroid.Msr.Observer    {
EditTextmReception;
MsrMsrcontrol ;
@Override
protectedvoidonCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_msr);

mReception = (EditText)
findViewById(R.id.EditTextReception);
Msrcontrol = newMsr();
Msrcontrol.OpenMSR(115200);Msrcontrol.Attach(this);
@Override
publicvoid Update(finalbyte[] buffer, finalint size)
{runOnUiThread(new Runnable() {
publicvoid run() {
if (mReception != null) {
mReception.append(new String(buffer, 0, size));
}
}
});
}
}
```

When Close:

```
Msrcontrol.CloseMSR();Msrcontrol.Detach(this);
```

Receiver Data - Detach

Public Boolean Detach();

Purpose Cancel Obsver from Msr Data
Return True (1) on success, False (0) on failure False (0)

Update Event

Public Void Update(final byte[] buffer, final int size);

Purpose Get Msr Data String
Return byte[] buffer = Msr data
int size = buffer count.
Before use this function need to implements Observer Interface.
Observer = Current class.
Example:

```
@Override
publicvoid Update(finalbyte[] buffer, finalint size)
{runOnUiThread(new Runnable() {
publicvoid run() {
if (mReception != null) {
   String MsrString =new String(buffer, 0, size));
}
}
}
```

4.2.3.4 I-Button API

OpenIbtn

Public Boolean OpenIbtn (intBaudRate)

Purpose	Open the Ibutton Port.
Value	Set Ibutton BaudRate; Ibutton baud rate default is 115200;
Return	True (1) on success, False (0) on failure

CloseIbtn

Public Boolean CloseIbtn( );

Purpose	Close the Ibutton Port.
Return	True (1) on success, False (0) on failure False (0)

SendCommand

Public Boolean SendCommand (byte[] data);

Purpose	Send Command to Ibutton.
Value	Ibutton Command Code.
Return	True (1) on success, False (0) on failure False (0)
Example	Ibutton – Send Command to Ibutton

```
//Initialize a Ibutton class instance
Ibutton Ibtncontrol = new Ibutton();
Ibtncontrol.OpenIbtn(115200);
byte[] data = newbyte[1];
data[0] = 0x0C;
Ibtncontrol.SendCommand(data);
```

Receiver Data - Attach

Public Boolean Attach();

Purpose Receive Ibutton Data
Return True (1) on success, False (0) on failure False (0)
Example Receive Data from Ibutton.
Before use this function need to implements ObserverInterface.
Observer = Current class.

```
Public class IbuttonActivity extends Activity implements
android.Ibutton.Observer    {
EditText mReception;
Ibutton Ibtncontrol ;
@Override
Protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_ibutton);

mReception = (EditText)
findViewById(R.id.EditTextReception);
Ibtncontrol = new Ibutton();
Ibtncontrol.OpenIbtn(115200); Ibtncontrol.Attach(this);
@Override
publicvoid Update(finalbyte[] buffer, finalint size)
{runOnUiThread(new Runnable() {
publicvoid run() {
if (mReception != null) {
mReception.append(new String(buffer, 0, size));
}
}
});
}
}
```

When Close:

```
Ibtncontrol.CloseIbtn();Ibtncontrol.Detach(this);
```

Receiver Data - Detach

Public Boolean Detach();

Purpose Cancel Obsver from Ibutton Data
Return True (1) on success, False (0) on failure False (0)

Update Event

Public Void Update(final byte[] buffer, final int size);

Purpose Get Ibutton Data String
Return byte[] buffer = Ibutton data
int size = buffer count.
Before use this function need to implements Observer Interface.
Observer = Current class.
Example:

```
@Override
publicvoid Update(finalbyte[] buffer, finalint size)
{runOnUiThread(new Runnable() {
publicvoid run() {
if (mReception != null) {
   String IbuttonString =new String(buffer, 0, size));
}
}
}
```

4.2.3.5 Thermal Printer API

OpenPrinter

Public Boolean OpenPrinter (intBaudrate)

Purpose	Open theThermal Printer Port.
Value	Set Printer Baud Rate; MB-1030 baud rate default is 115200;
Return	True (1) on success, False (0) on failure

ClosePrinter

Public Boolean ClosePrinter( );

Purpose	Close the Thermal Printer Port.
Return	True (1) on success, False (0) on failure False (0)

CutPaper

Public BooleanCutPaper(int type);

Purpose	Cut paper function.
Value	Type = 1 (Full cut) 2(Partial cut)
Return	True (1) on success, False (0) on failure False (0)

Text

Public BooleanText(String data);

Purpose	Print string data to print.
Value	Data = String data.
Return	True (1) on success, False (0) on failure False (0)
Example	

```
ThermalPrinterPrinter_Control = newThermalPrinter();
Printer_Control.OpenPrinter(115200);
Printer_Control.Text(“123456789”);
Printer_Control.Text(“\n”);
Printer_Control.ClosePrinter();
//P.S If application want to line break. Please use “\n” to
change line.
```

BarcodePrint

Public BooleanBarcodePrint(StringData,intType,intHri,intWidth,int Height);

Purpose Print Barcode.

Value Data = Send barcode string data to printer.
Type = 1 UPC-A(1)
Type = 2 UPC-E(1)
Type = 3 EAN-13(1)
Type = 4 EAN-8(1)
Type = 5 CODE39(1)
Type = 6 ITF(1)
Type = 7 CODEBAR(1)
Type = 8 UPC-A(2)
Type = 9 UPC-E(2)
Type = 10 EAN-13(2)
Type = 11 EAN-8(2)
Type = 12 CODE39(2)
Type = 13 ITF(2)
Type = 14 CODABAR(2)
Type = 15 CODE93(2)
Type = 16 Code128(2)
Hri =

hri	Printing Position
0	No print
1	Above bar code
2	Below bar code
3,	Above and below bar code(both)

Width = $1 \leq n \leq 6$
Height = $1 \leq n \leq 255$

Return True (1) on success, False (0) on failure False (0)

LoadPicPrinter

Public Bitmap LoadPicPrinter(Bitmap data, boolean Halftone);

Purpose Prepare to load pic sent to printer.
Value Bitmap data (picture data)
Halftone = true or false (Enable or Disable)

Return Return Threshold Pic.

ImagePrinter

Public BooleanImagePrint(Bitmap data);

Purpose Sent bitmap to printer.
Value Bitmap data (Threshold data)
Return True (1) on success, False (0) on failure False (0)

UploadLogo

Public Boolean UploadLogo(Bitmap data);

Purpose Prepare to load logo sent to printer.
Value Bitmap data (picture data)
Return True (1) on success, False (0) on failure False (0)

PrinterLogo

Public Void PrinterLogo();

Purpose Printer Logo Fucntion.

SendCommand

Public Boolean SendCommand (byte[] data);

Purpose	Send command byte to printer.
Value	Command Code. Please refer MP-1030 Command Manual
Return	True (1) on success, False (0) on failure False (0)
Example	

```
ThermalPrinterPrinter_Control = newThermalPrinter();
Printer_Control.OpenPrinter(115200);
byte[] data = newbyte[2];
data[0] = 0x1B;
data[1] = 0x6d;//Partial cut
Printer_Control.SendCommand(data);
Printer_Control.ClosePrinter();
```

GetRealTimeStatus

Public intGetRealTimeStatus(int n);

Purpose Get Real Time Status.

Value Command Code. Please refer MP-1030 Command Manual

Return Real Time Status Byte.

Example

n=2: Off-line status.

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

```
IntRealTimeStatus = 0 ;
ThermalPrinterPrinter_Control = newThermalPrinter();
Printer_Control.OpenPrinter(115200);
RealTimeStatus    = Printer_Control.GetRealTimeStatus(2);
// TODO Detect Status
Printer_Control.ClosePrinter();
```

GetPaperEndEvent

Public intGetPaperEndEvent();

Purpose Get Paper End Status.

Return 0x00 = Response Error 0x01 = Paper End, 0x02 = Paper Normal

```
IntPaperEndStatus= 0 ;
ThermalPrinterPrinter_Control = newThermalPrinter();
Printer_Control.OpenPrinter(115200);
PaperEndStatus= Printer_Control.GetCoverEvent ( );
// TODO Detect Status
if (PaperEndStatus== 1)
{Toast.makeText(PrinterActivity.this,
"Paper End!", Toast.LENGTH_SHORT).show();
}
else
{Toast.makeText(PrinterActivity.this,
"Paper Normal",
Toast.LENGTH_SHORT).show();
}
Printer_Control.ClosePrinter();
```

GetCoverEvent

Public intGetCoverEvent();

Purpose Get Cover Status.

Return 0x00 = Response Error 0x01 = Cover Open , 0x02 = Over Close

```
IntCoverStatus = 0 ;
ThermalPrinterPrinter_Control = newThermalPrinter();
Printer_Control.OpenPrinter(115200);
CoverStatus = Printer_Control.GetCoverEvent ( );
// TODO Detect Status
if (CoverStatus== 1)
{Toast.makeText(PrinterActivity.this,
"Cover Open!",
Toast.LENGTH_SHORT).show();
}
else
{Toast.makeText(PrinterActivity.this,
```

```
"Cover Close!",
Toast.LENGTH_SHORT).show();
}
Printer_Control.ClosePrinter();
```

Receiver Data - Attach

Public Boolean Attach();

Purpose	Receive Printer Data
Return	True (1) on success, False (0) on failure False (0)
Example	Receive Data fromPrinter. Before use this function need to implements Observer Interface. Observer = Current class.

```
publicclassPrinterActivityextends Activity
implementsandroid.ThermalPrinter.Observer    {
ThermalPrinterPrinter_Control;
@Override
protectedvoidonCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_msr);

Printer_Control= newThermalPrinter();
Printer_Control.Attach(this);
If( !Printer_Control.OpenPrinter(115200))
{
      //Port alrady open.
}
@Override
publicvoid Update(finalintDevice, finalintvalue)
{runOnUiThread(new Runnable() {
publicvoid run() {
//Cover
if(Device == 0x01)
{
if(Value==0x01)
      {
//"Cover Open"
}
else
```

```
        {
//"Cover Close"
        }
}
elseif (Device == 0x02)
{
//Paper
        if(Value==0x01)
        {
  //"No Paper Present"
        }
else
        {
//"Paper Present"
        }
}
});
}
}
```

When Close:

```
Printer_Control.ClosePrinter();Printer_Control.Detach(this);
```

Receiver Data - Detach

Public Boolean Detach();

Purpose	Cancel Obsver from Msr Data
Return	True (1) on success, False (0) on failure False (0)

Update Event

Public Void Update(final int Device, final int Value);

Purpose Get Cover & Paper event
Return

Device	0x01(Cover)	0x02 (Paper)
Value	0x01(CoverOpen)	0x01(No Paper Present)
	0x02(CoverClose)	0x02(Paper Present)

GetFWVersion

Public String GetFWVsion();

Purpose Get FW Version
Return FW Version String.

GetCodePageVersion

Public String GetCodePageVersion();

Purpose Get CodePage Version
Return Code Page Version String.

4.2.3.6 Serial Port API

OpenSerialPort

Public Boolean OpenSerialPort (
String PortName,
intBaudRate,
int Parity,
intDatabit,
intStopbit
booleanenRTS)

Purpose Open theSerialPort Port.
Value PortName = /dev/ttyS0 or other port.
BaudRate= Example 9600 or 115200
Parity = None = 0 , Odd = 1 ,Even = 2
Databit= 5,6,7,8
Stopbit= None = 0 , One = 1 ,Two = 2
EnRTS= Flow Control
True = Enable
False = Disable
Return True (1) on success, False (0) on failure

CloseSerialPort

Public Boolean CloseSerialPort( );

Purpose Close the SerialPort Port.
Return True (1) on success, False (0) on failure False (0)

SendCommand

Public Boolean SendCommand (byte[] data);

Purpose	Send Command toSerialPort.
Value	Byte array data.
Return	True (1) on success, False (0) on failure False (0)
Example	SerialPort– Send Command to SerialPort

```
//Initialize a VFD class instance
SP SerialPortcontrol= newSP();
SerialPortcontrol.OpenSerialPort(19200);
byte[] data = newbyte[1];
data[0] = 0x0C;
SerialPortcontrol.SendCommand(data);
```

Receiver Data - Attach

Public Boolean Attach();

Purpose	When class need to receiver serialport data need to use.
Return	True (1) on success, False (0) on failure False (0)
Example	Receive Data from serial port.
	Before use this function need to implements Observer Interface.
	Observer = Current class.

```
SPSerialPortcontrol = newSP();
SerialPortcontrol.OpenSerialPort(19200);SerialPortcontrol.Atta
ch(this);
@Override
publicvoid Update(finalbyte[] buffer, finalint size)
{runOnUiThread(new Runnable() {
publicvoid run() {
if (mReception != null) {
mReception.append(new String(buffer, 0, size));
```

When Close:

```
SerialPortcontrol.CloseSerialPort();SerialPortcontrol.Detach(this);
```

Receiver Data - Detach

Public Boolean Detach();

Purpose Cancel Obsver from SerialPort Data
Return True (1) on success, False (0) on failure False (0)

Update Event

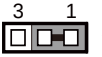
Public Void Update(final byte[] buffer, final int size);

Purpose Get Serial Port Data String
Return byte[] buffer = Serial Portdata
int size = buffer count.
Before use this function need to implements Observer Interface.
Observer = Current class.
Example:

```
@Override
publicvoid Update(finalbyte[] buffer, finalint size)
{runOnUiThread(new Runnable() {
publicvoid run() {
if (mReception != null) {
   String SerialPortRev=new String(buffer, 0, size));
}
}
}
```

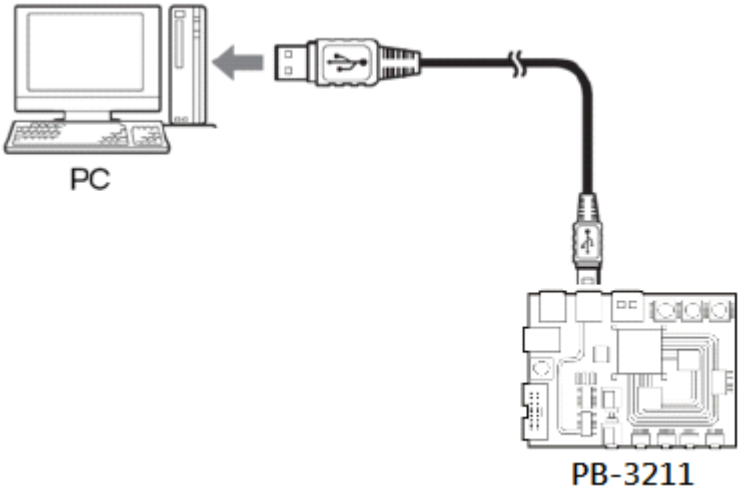
4.3 Burning PB-3211 Image

Prerequisites

1. Connect PB-3211 board and PC using an USB cable.
   The image burning procedure will be performed through the USB data transmission. See the picture below.
2. Set the pin-header jumper **JP18** as **1-2** connected (

) for PB-3211 board to access ADFU mode.

   The PB-3211 board must enter **ADFU** mode before the PB-3211 image can be burned onto the board.

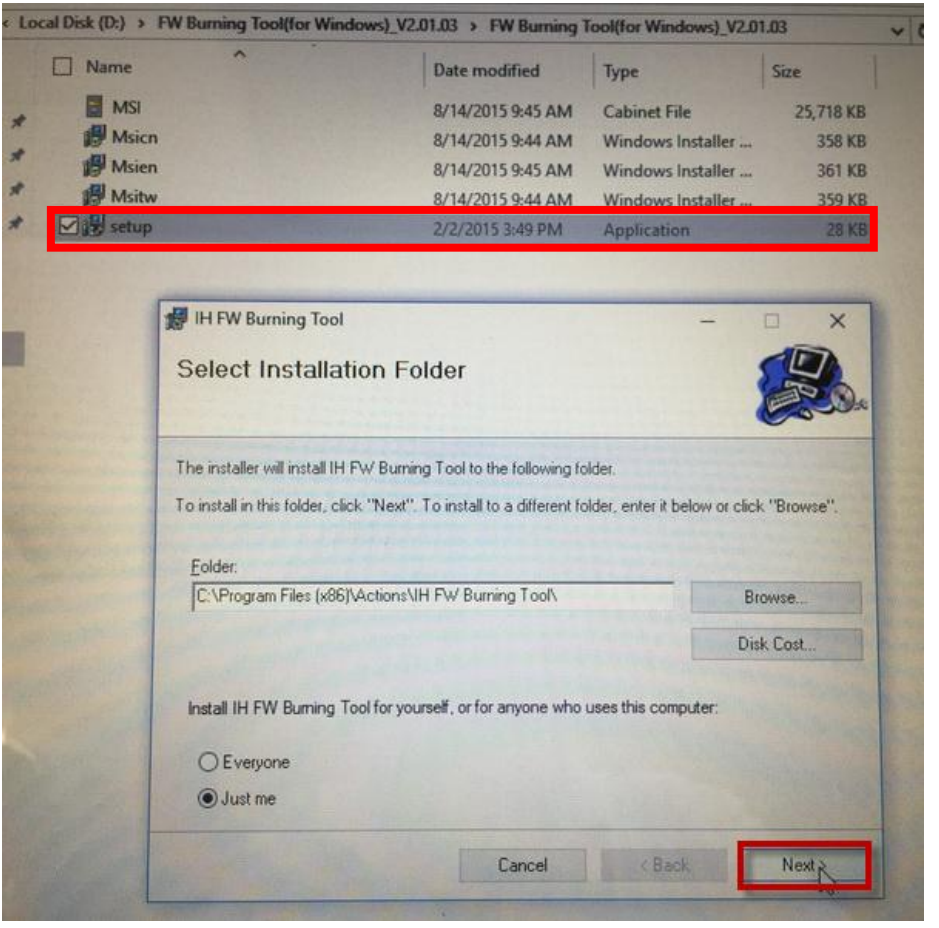


4.3.1 Installing Firmware Burning Tool

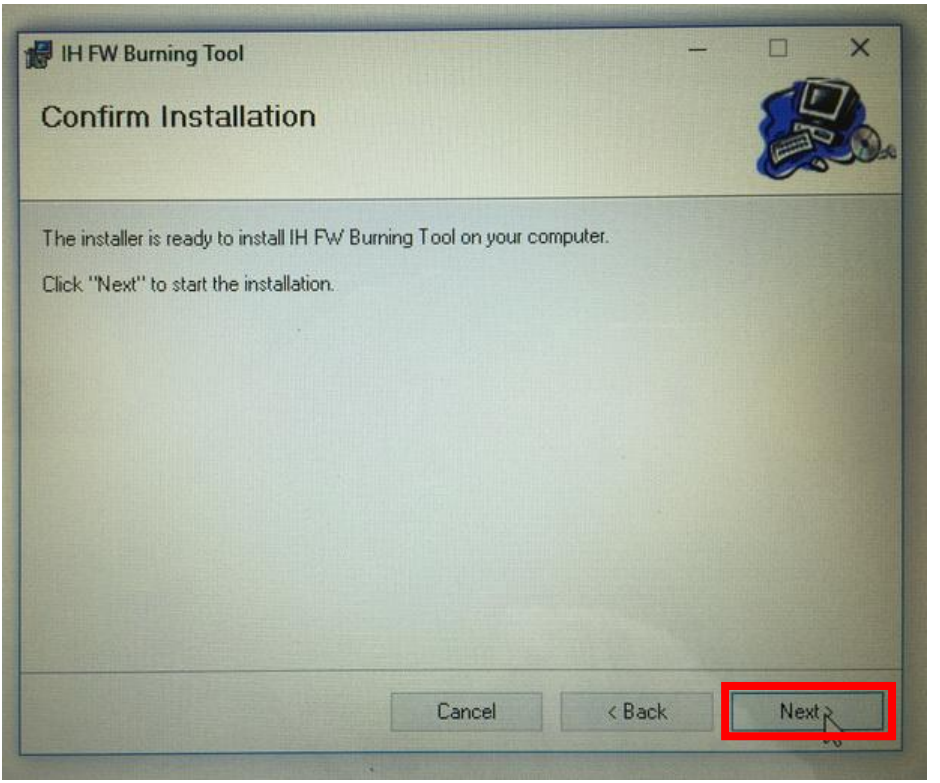
Before you proceed to burn the image onto PB-3211 board, follow the instructions below to install the FW Burning Tool that is compatible with Windows XP, Windows 7 and Windows 8.

Step 1. Click **setup.exe** file to start the installation.
Follow the on-screen instructions that will guide you through the installation procedure.

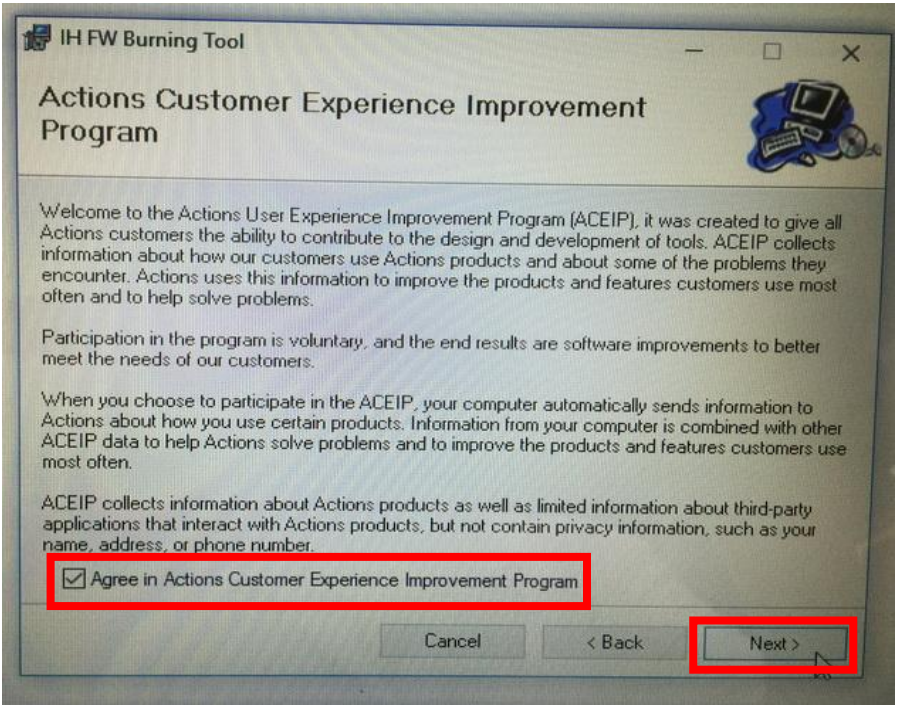
Step 2. Click **Next**.



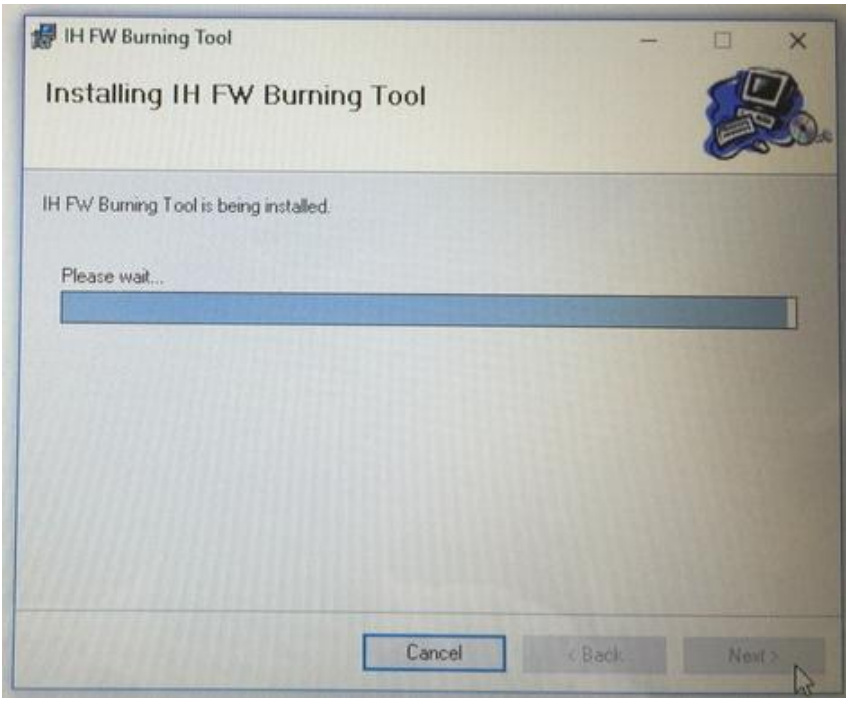
Step 3. Click **Next** to start the installation.



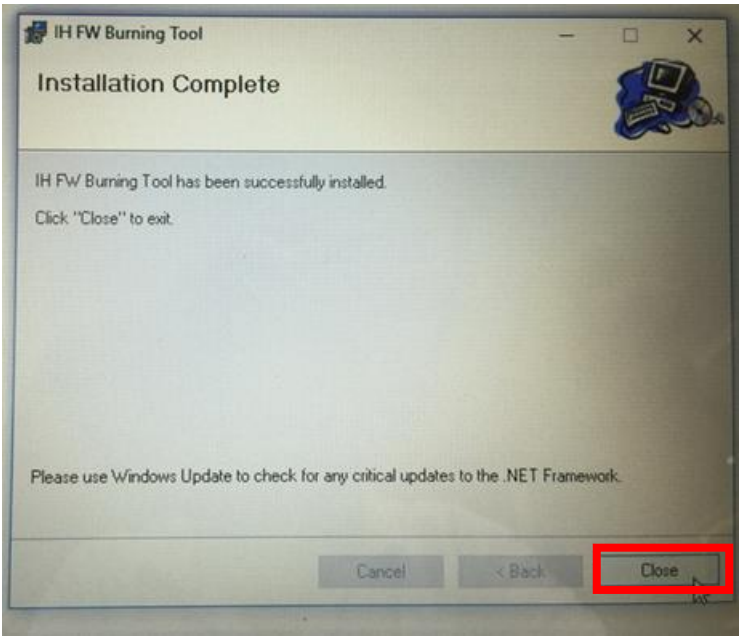
Step 4. Click the checkbox of **Agree in Actions Customer Experience Improvement Program** to accept the program and click **Next** to continue.



Step 5. Please wait while the IH FW Burning tool is being installed onto the PC.



Step 6. After the IH FW burning tool installation is compled, click **Close** to finish.



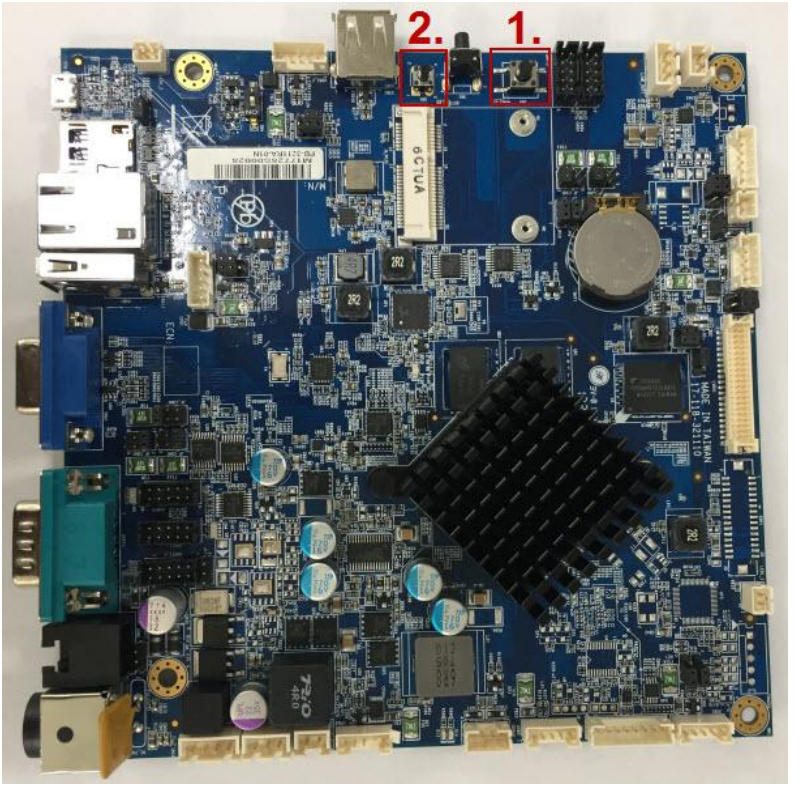
4.3.2 Entering ADFU Mode for PB-3211 Board

PB-3211 board must enter ADFU (Actions Device Firmware Upgrade) mode first before the image can be burned into the board. After PB-3211 enters ADFU mode, the data communications between the PC and PB-3211 board can be achieved via an USB cable and ADFU device will be then detected by the PC.

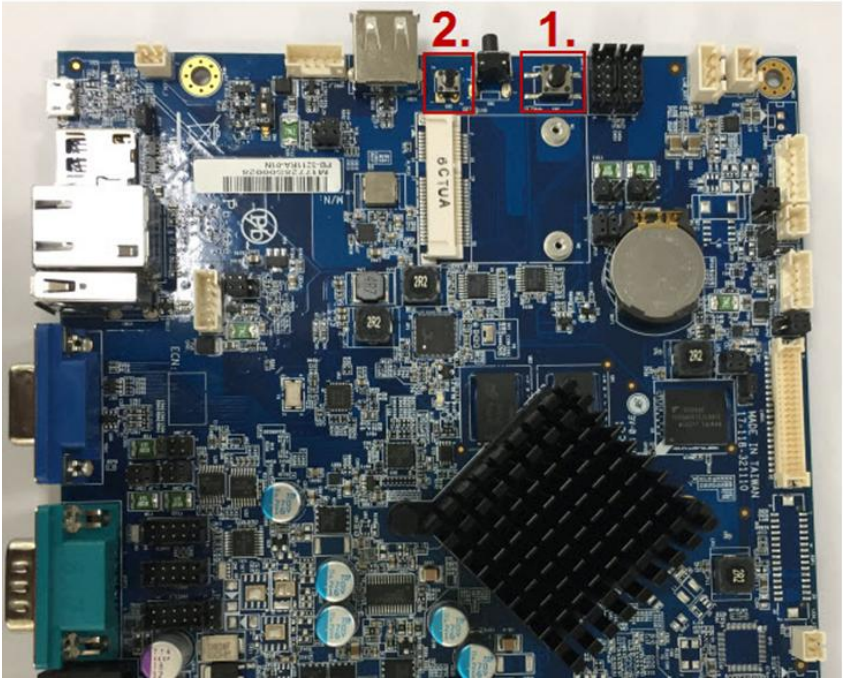
Follow the steps below:

Step 1. Plug the connector of Micro USB cable into PB-3211 board (without DC_IN port connection required), and the red light will turn ON in the center part of the board, indicating the power supply has been injected into the board.

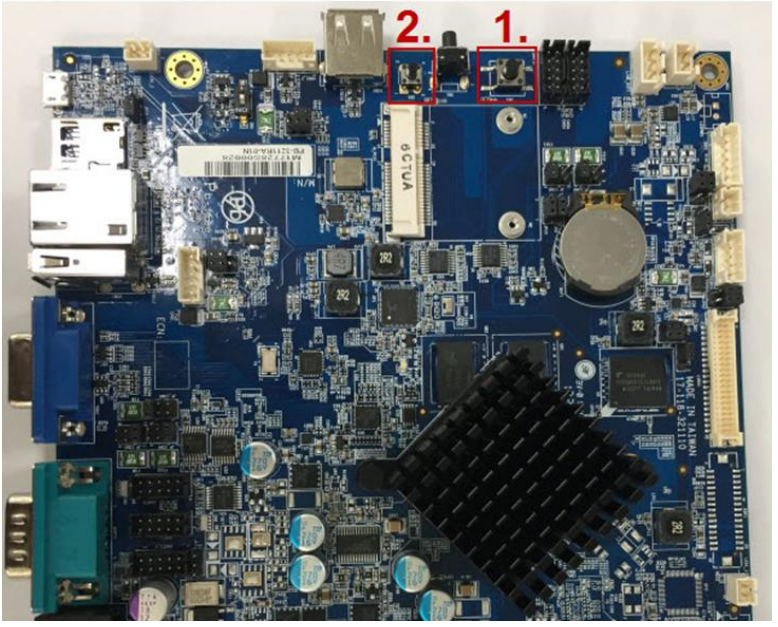
See the following picture for the locations of the **Reset** button (1) and **ADFU** button (2) that need to be pressed later on.



Step 2. Push the button 1 (reset) and button 2 (ADFU) at the same time as shown below:

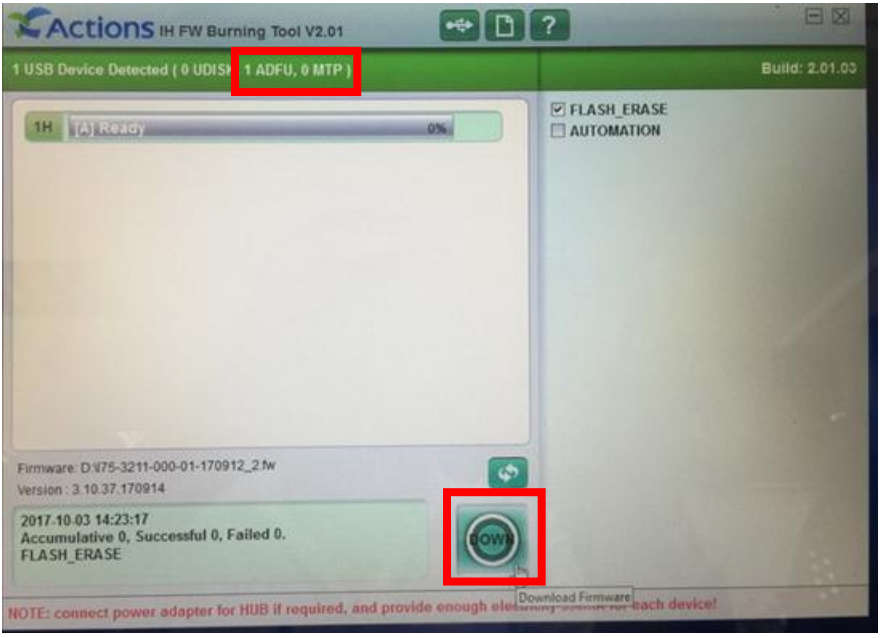


Step 3. Release button 1, and continue to press and hold button 2. (See the picture below.) Release button 2 at last and then PB-3211 board will enter the ADFU mode.



4.3.3 Burning PB-3211 Image

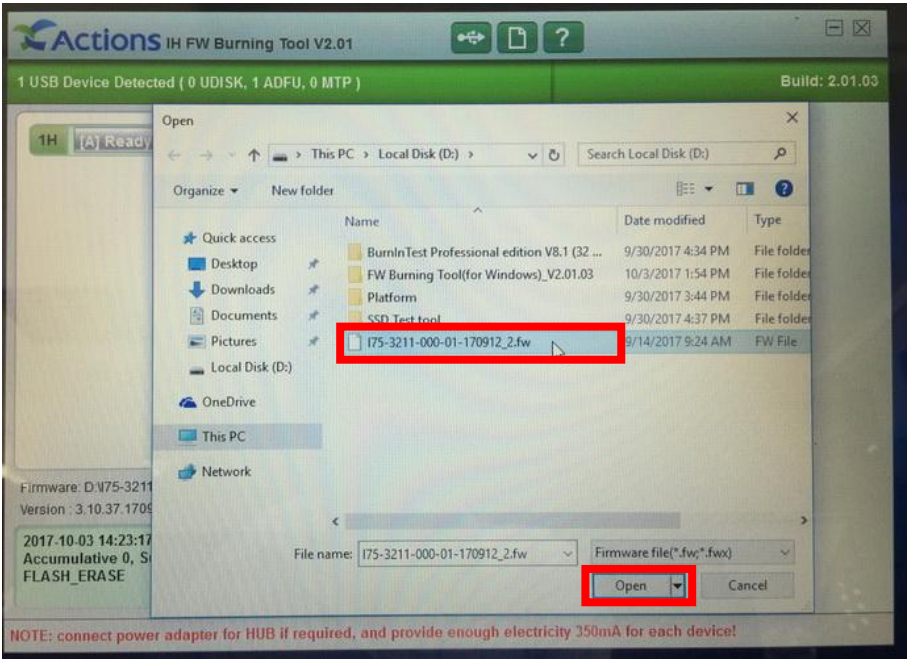
You can see 1 USB device has been detected on the PC.



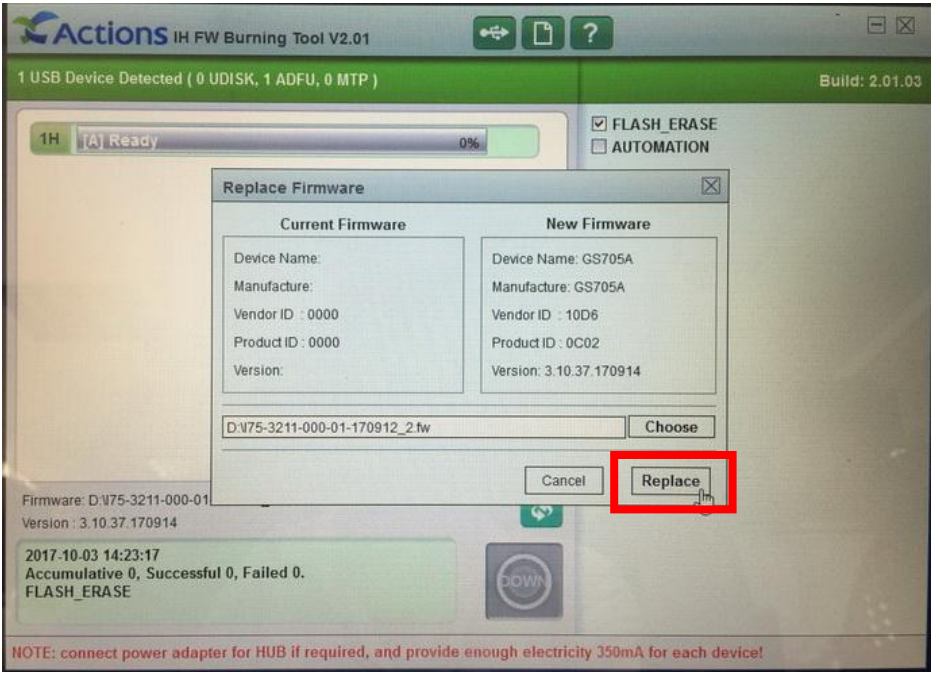
Follow the instructions below:

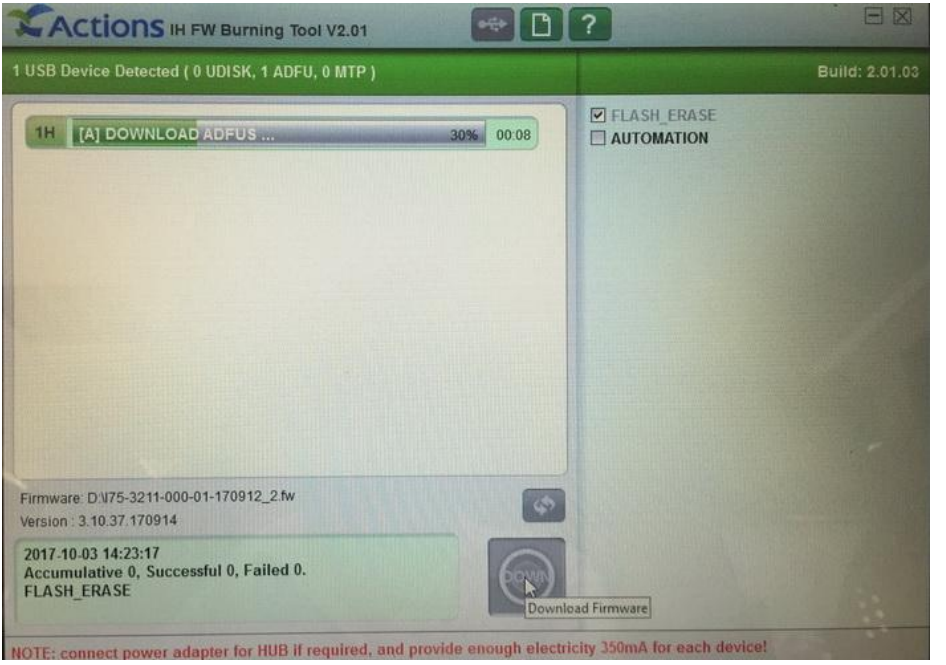
Step 1. Click **DOWN** button located at the bottom of the picture above.

Step 2. Select and open the intended FW image file (the file name must be in **XXXX.fw** format).

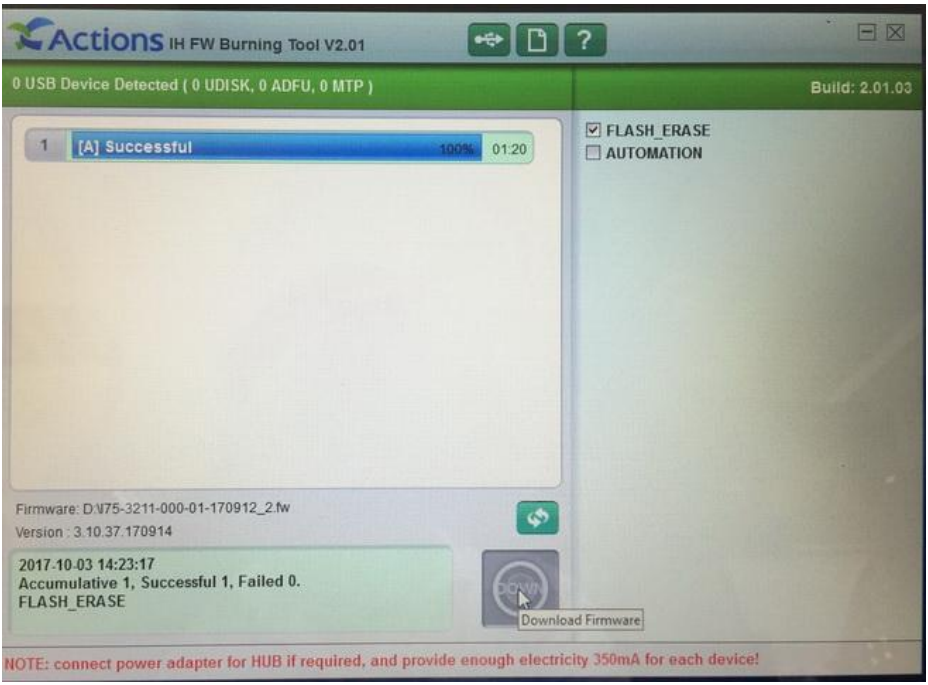


Step 3. Click **Replace** button from the pop-up window below and start the download procedure.




Actions IH FW Burning Tool V2.01
1 USB Device Detected (0 UDISK, 1 ADFU, 0 MTP)
Build: 2.01.03
1H
[A] DOWNLOAD ADFUS ...
30%
00:08
FLASH_ERASE
AUTOMATION
Firmware: D:\I75-3211-000-01-170912_2.fw
Version : 3.10.37.170914
2017-10-03 14:23:17
Accumulative 0, Successful 0, Failed 0.
FLASH_ERASE
Download Firmware
NOTE: connect power adapter for HUB if required, and provide enough electricity 350mA for each device!

After the percentage of the burning process has reached 100%, it indicates the image burning process has finished.



Step 4. Remove the MicroUSB connection from PB-3211 board and plug the power cable into DC_IN port to complete the image burning process.

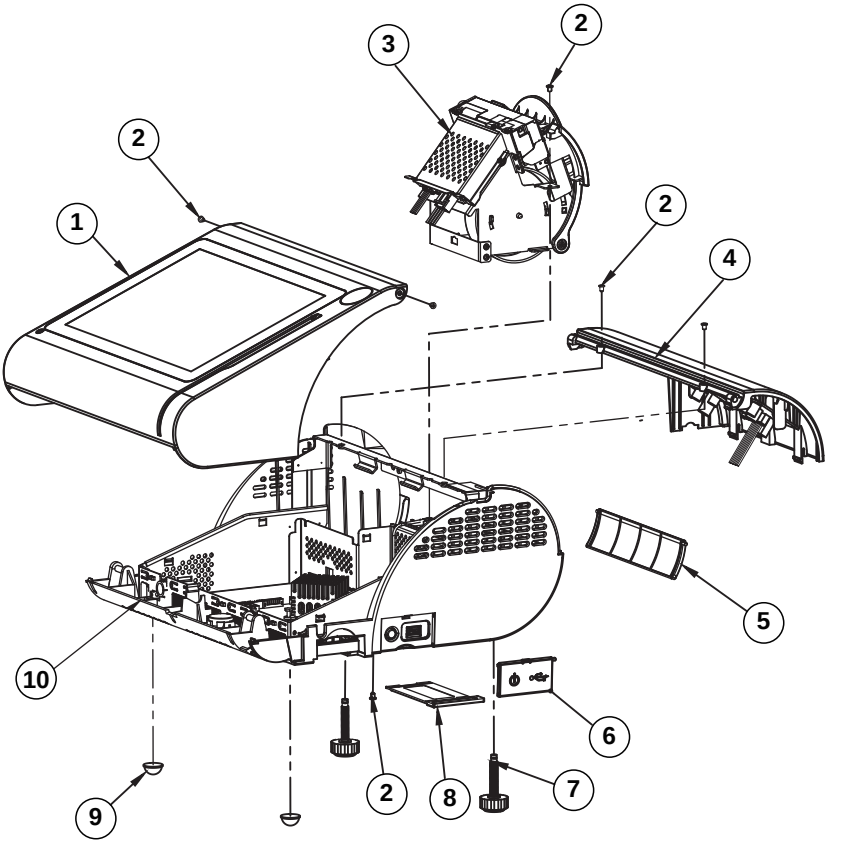
Appendix A System Diagrams

This appendix presents the exploded diagrams of the system as well as the part numbers of the PA-3211 system.

- Exploded Diagram for System Top Case
- System Exploded Diagram
- Exploded Diagram for MSR Module
- Exploded Diagrams for 3-Inch Printer
- Exploded Diagrams for 2-Inch Printer
- Exploded Diagram for VFD Module

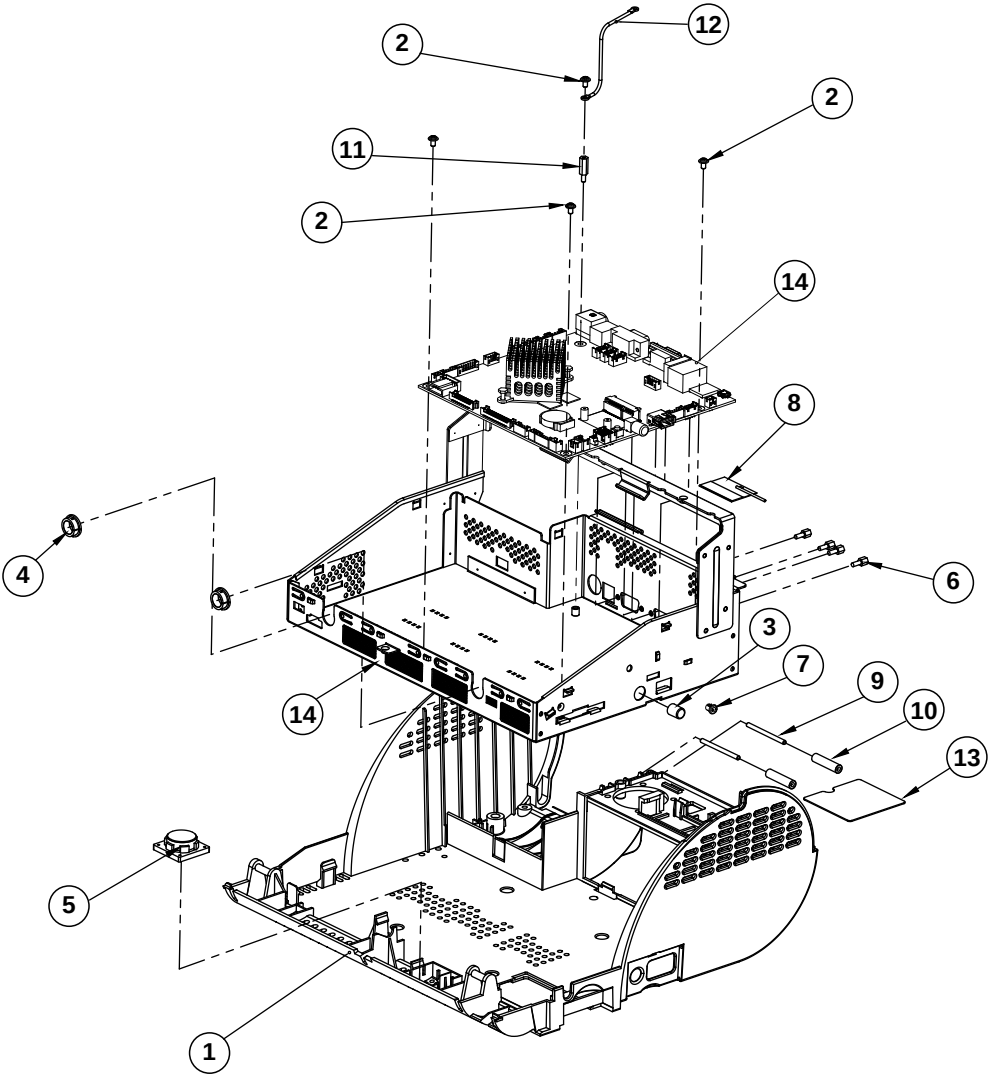
Exploded Diagram For System Top Case

Open the System Top Module



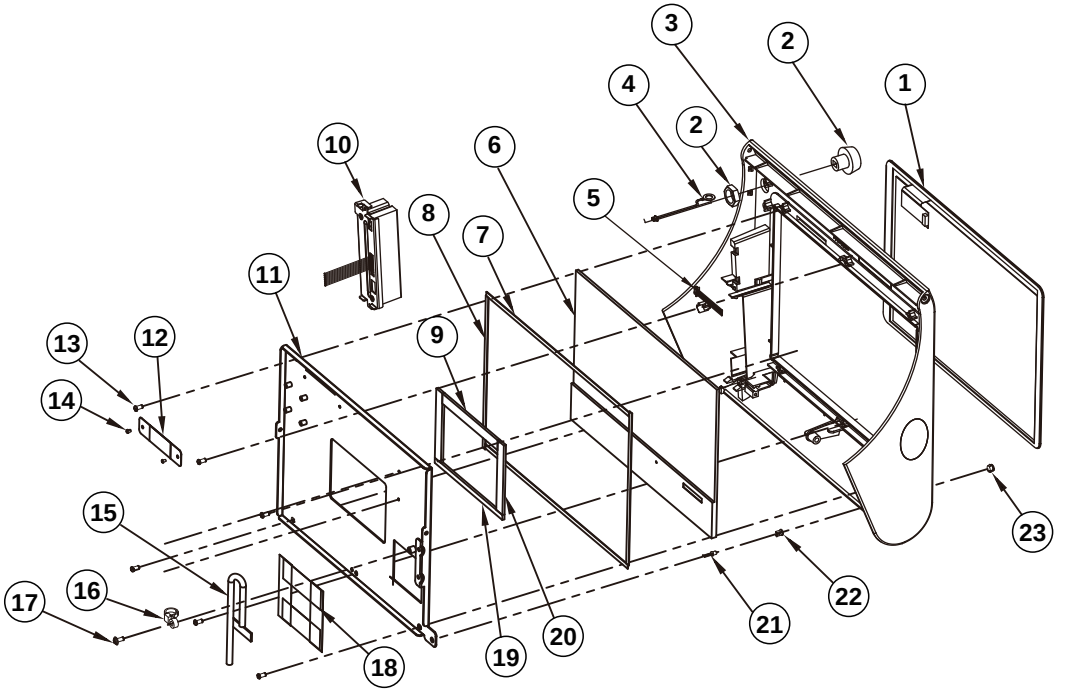
No.	Component Name	P/N No.	Q'ty	Remark
1	PA-3211/3222_TOP Unit	N/A	1	See Page A-5 ~ A-8
2	M3_L4_I_B	22-272-30004318	6	
3	PA-3100_Printer_Unit	N/A	1	See Page A-10 ~ A-15
4	PA-3211/3222_VFD_Unit	N/A	1	See Page A-16
5	PS-3100 I/O Cable Cover (Black)	30-002-28110165	1	
6	PA-3100 Side Door (Black)	30-007-28210165	1	
7	M6 Stand	22-289-60035007	2	
8	mini_pcie_door(Black)	30-007-28110165	1	
9	Rubber Foot (S1608)	30-004-01500000	2	
10	PA-3222-Bot Unit	N/A	1	See Page A-3 ~ A-4

System Exploded Diagram



No.	Component Name	P/N No.	Q'ty
1	Bottom cover (Black)	30-002-12210210	1
2	M3_L5_W_Ni	22-242-30005311	4
3	Switch Cap (HS-10A)	30-001-28100099	1
4	Open Bushing (SA-1013A)	30-026-04300000	2
5	PA-3211_Speaker	13-500-08280318	1
6	HEX CU BOSS	22-692-40048051	4
7	SB-0305	30-026-04100008	1
8	wireless_antenna	27-029-16506071	1
9	roller_pin	22-092-29039001	2
10	roller	30-041-04100165	2
11	BOSS_M3-H12_L6	22-258-30012051	1
12	ground_cable	27-030-16504071	1
13	fan_hole_pc_sheet	90-056-02100254	1
14	PA-3211_inside_box	80-040-03001399	1
15	PB-3211	PB-3211	1

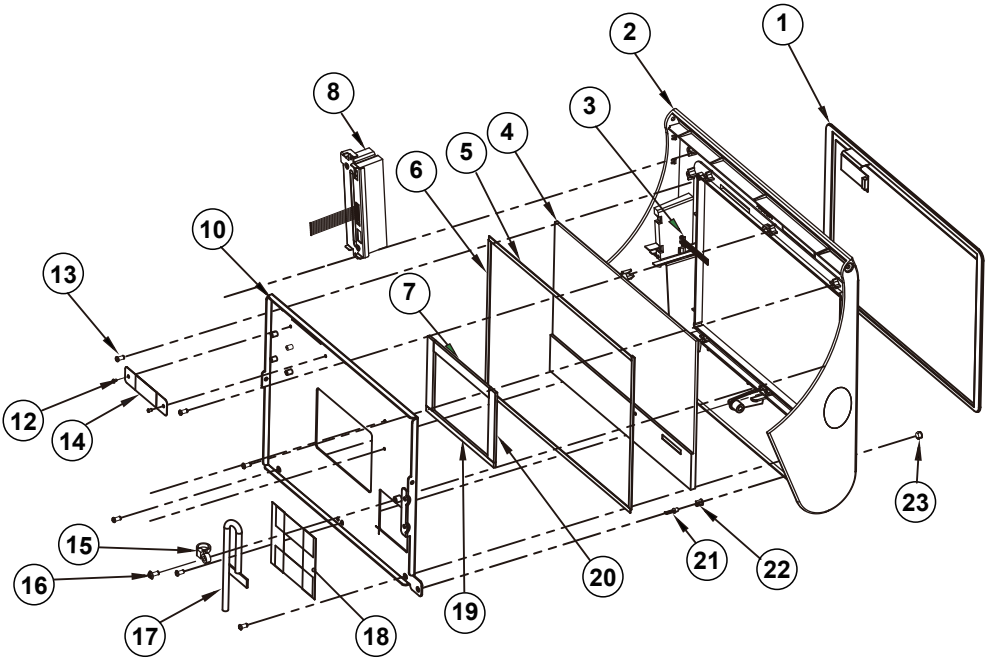
With MSR and i-Button Modules



See next page for the part numbers of the exploded diagram above.

I-N I2C Type				
No.	Component Name	P/N No.	Q'ty	Remark
1	10.1 Touch (I2C Type)	52-380-14169023	1	
2	i-button_IBT200MX	52-551-05200302	1	
3	PA-3211_TOP_CASE_I-N	30-001-12110399	1	
4	PA-3222_I-button_cable	27-022-39912111	1	
5	PA-3211_Touch_Cable	27-016-39907111	1	
6	10.1" Panel (TM101jdhp03)	52-351-12101028	1	
7	LCD PORON	90-013-24200304	2	
8	LCD PORON	90-013-24200304	2	
9	LCD_Tape_90x10x2	34-026-06103400	1	
10	MSR Unit	N/A	1	See Page A-12
11	TM101jdhp03_holder	80-029-03002400	1	
12	Touch_PCB_Mylar-2	90-056-02200400	1	
13	T3_L6_PAN_NI	22-132-30060011	6	
14	M2_L2.5_R_Ni	22-222-20004011	2	
15	PA-3211_LVDS_CABLE	27-020-39908111	1	
16	cable_tie	90-015-04100000	1	
17	M3_L7_W_Ni	22-232-30007011	1	
18	61x20_Tape	94-034-04902400	4	
19	LCD_Tape_110x5x2	34-026-06101400	1	
20	LCD_Tape_70x10x2	34-026-06102400	2	
21	PA-3211_Power_LED	27-018-19704071	1	
22	ϕ3 LED Housing	30-014-04100165	1	
23	Lens (HHP-4F)	30-012-02100000	1	

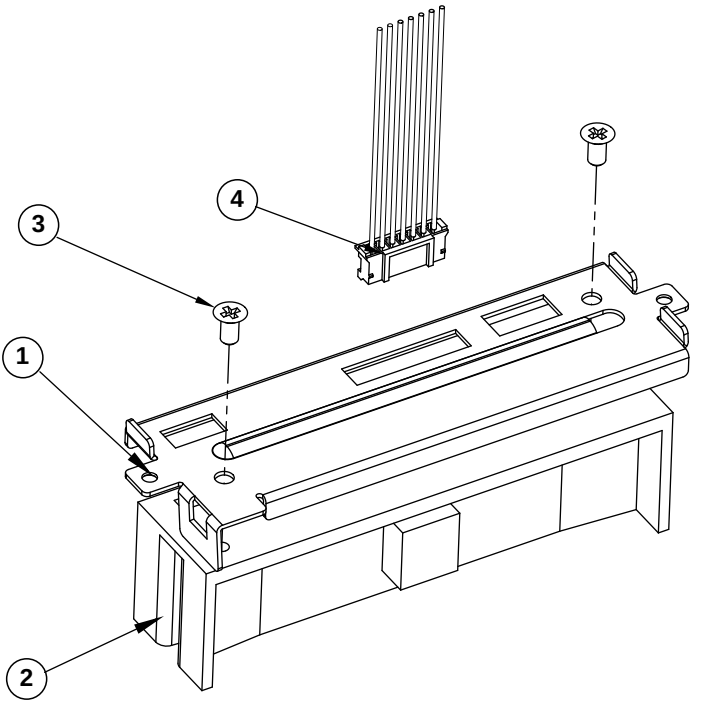
With MSR Module



See next page for the part numbers of the exploded diagram above.

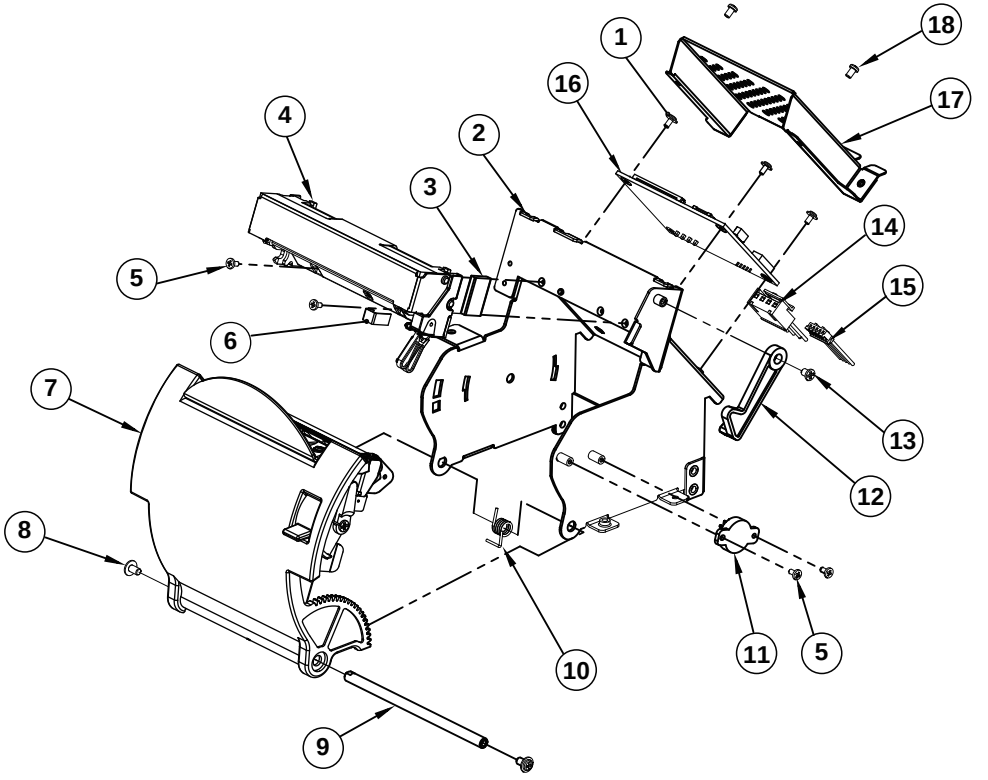
N-N I2C Type				
No.	Component Name	P/N No.	Q'ty	Remark
1	10.1 Touch (I2C Type)	52-380-14169023	1	
2	PA-3211_TOP_CASE_N-N	30-001-12410399	1	
3	PA-3211_Touch_Cable	27-016-39907111	1	
4	10.1" Panel (TM101jdhp03)	52-351-12101028	1	
5	LCD PORON	90-013-24200304	2	
6	LCD PORON	90-013-24200304	2	
7	LCD_Tape_90x10x2	34-026-06103400	1	
8	MSR Unit	N/A	1	See Page A-12
10	TM101jdhp03_holder	80-029-03002400	1	
12	M2_L2.5_R_Ni	22-222-20004011	2	
13	T3_L6_PAN_NI	22-132-30060011	6	
14	Touch_PCB_Mylar-2	90-056-02200400	1	
15	cable_tie	90-015-04100000	1	
16	M3_L7_W_Ni	22-232-30007011	1	
17	PA-3211_LVDS_CABLE	27-020-39908111	1	
18	61x20_Tape	94-034-04902400	4	
19	LCD_Tape_110x5x2	34-026-06101400	1	
20	LCD_Tape_70x10x2	34-026-06102400	2	
21	PA-3211_Power_LED	27-018-19704071	1	
22	ϕ3 LED Housing	30-014-04100165	1	
23	Lens (HHP-4F)	30-012-02100000	1	

Exploded Diagram For MSR Module



No.	Component Name	P/N No.	Q'ty
1	ps3100_msr_holder.sldprt	20-029-03004165	1
2	MSR	See Order	1
3	M3_L6_F_B	22-215-30060011	2
4	PA-3222_msr_cable	See Order	1

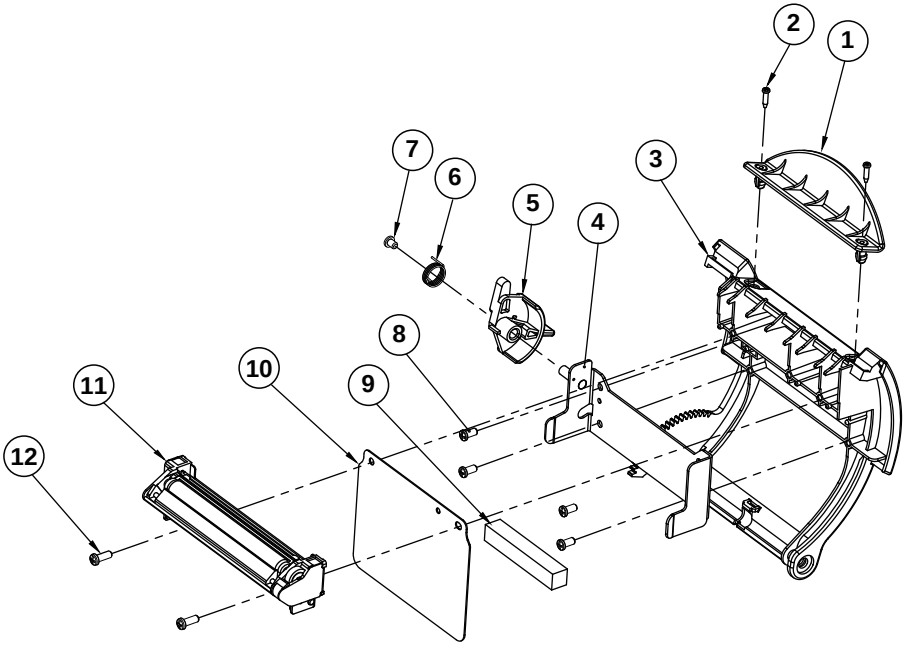
Exploded Diagram For 3-Inch Printer (1)



See next page for the part numbers of the exploded diagram above.

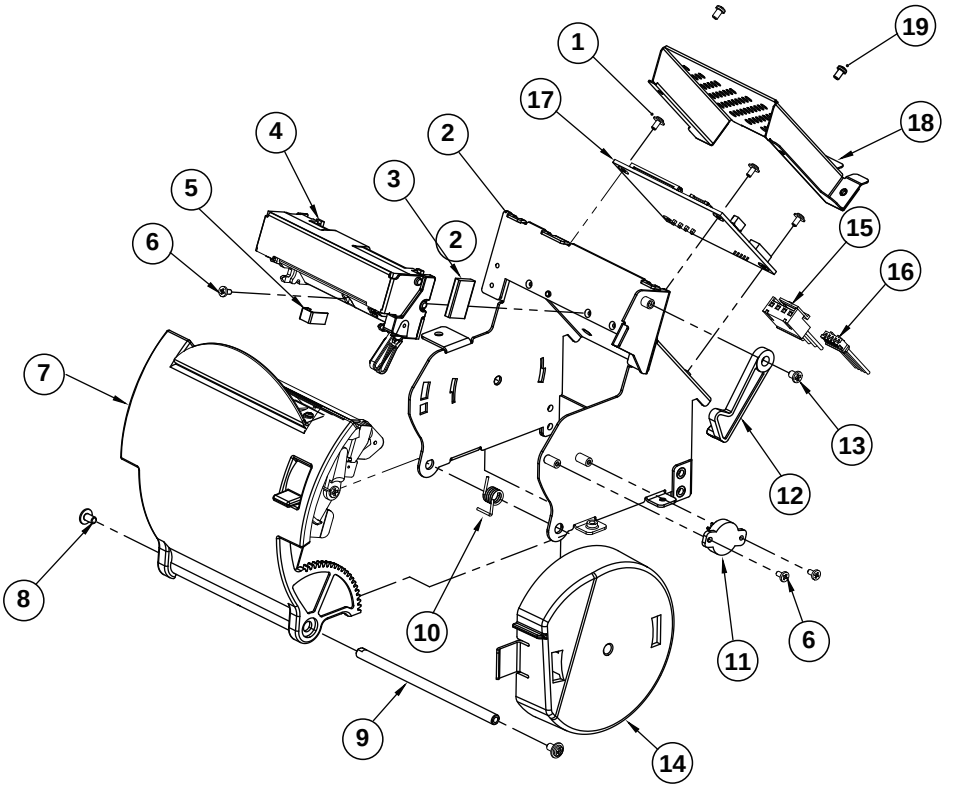
3-Inch Printer				
No.	Component Name	P/N No.	Q'ty	Remark
1	M2_L4_W_Ni	22-232-20004311	3	
2	Printer Box	20-040-03001210	1	
3	EMI_GASKET_17x10x3	90-050-31300165	1	
4	SII 3" Printer (Base Side)	52-701-05017003	1	
5	M2_L4_I_Ni	22-272-20004011	4	
6	EMI_GASKET_20x5x0.5	90-050-31200165	1	
7	ps3100_paper_cover_Unit	N/A	1	See Next Page
8	M3_L5_W_Ni	22-242-30005311	2	
9	paper_cover_pin	20-004-10011165	1	
10	ps3100_spring-1	23-002-00000701	1	
11	pg-13-270p	30-022-09110000	1	
12	printer_add_arm_cover	30-002-09110165	1	
13	M3_L4_I_B	22-272-30004318	1	
14	printer_power_cable	27-012-16502071	1	
15	PA-3222_printer_cable (USB)	27-006-40307111	1	
16	MB-1011RB-11N	MB-1011RB-11N	1	
17	printer_pcb_cover	20-004-03001165	1	
18	M2.5_L4_R_Ni	22-232-25004011	2	

Exploded Diagram For 3-Inch Printer (2)



3-Inch Printer				
No.	Component Name	P/N No.	Q'ty	Remark
1	paper_holder2.sldprt	30-012-02110165	1	
2	T2_L8_R_B	22-125-20008011	2	
3	ps3100_paper_cover_v2	30-002-02530165	1	
4	include_holder	20-029-03006165	1	
5	ps3100_printer_cover_ejector	30-002-09210165	1	
6	ps3100-spring-for_ejector	23-002-00001021	1	
7	M3_L4_I_B	22-272-30004318	1	
8	T3_L6_PAN_NI	22-132-30060011	4	
9	3100_printer_eva	90-013-15200165	1	
10	3inch_add_mylar	90-056-02600165	1	
11	3" Thermal Printer (Cut Side)	N/A	1	
12	T3_L8_R_B	22-122-30080011	2	

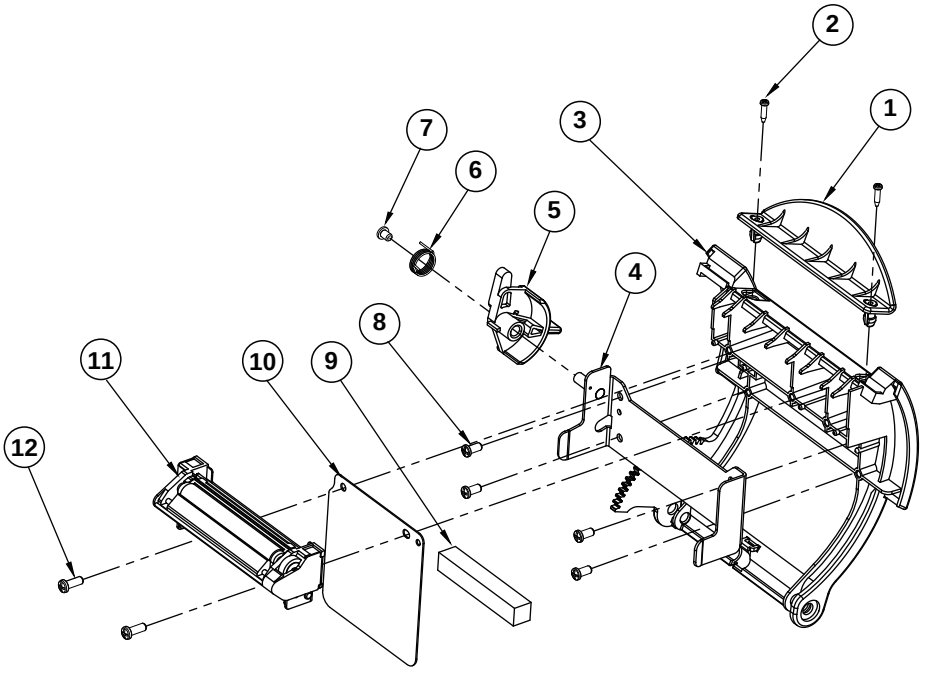
Exploded Diagram For 2-Inch Printer (1)



See next page for the part numbers of the exploded diagram above.

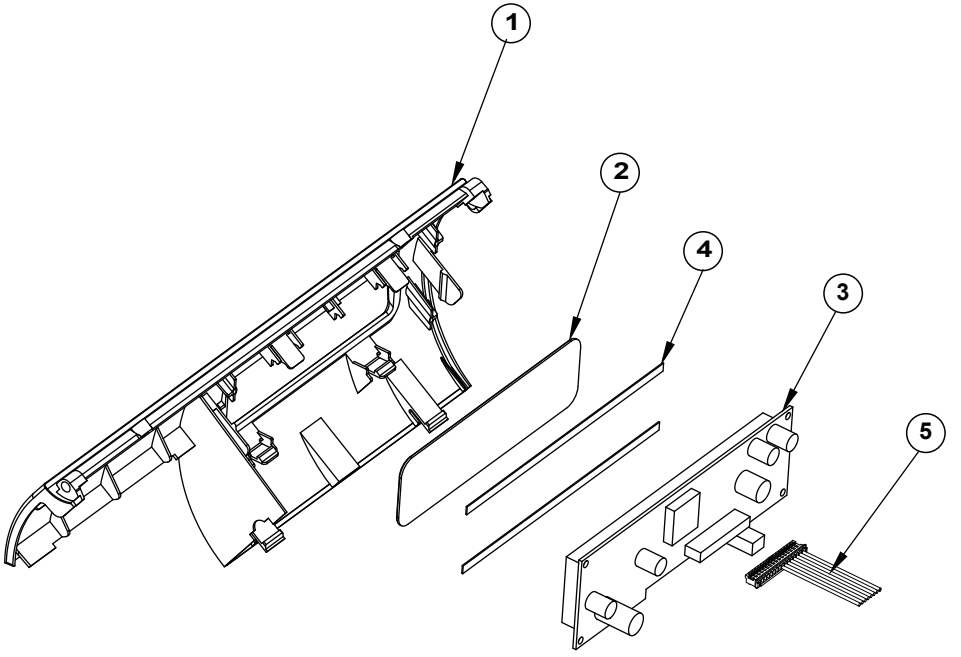
2-Inch Printer				
No.	Component Name	P/N No.	Q'ty	Remark
1	M2_L4_W_Ni	22-232-20004311	3	
2	Printer Box	20-040-03001210	1	
3	EMI_GASKET_17x10x3	90-050-31300165	1	
4	SII 2" Printer (Base Side)	52-701-01020003	1	
5	EMI_GASKET_20x5x0.5	90-050-31200165	1	
6	M2_L4_I_Ni	22-272-20004011	3	
7	ps3100_paper_cover_Unit	N/A	1	See Next Page
8	M3_L5_W_Ni	22-242-30005311	2	
9	paper_cover_pin	20-004-10011165	1	
10	ps3100-spring-1	23-002-00000701	1	
11	pg-13-270p	30-022-09110000	1	
12	printer_add_arm_cover	30-002-09110165	1	
13	M3_L4_I_B	22-272-30004318	1	
14	add_paper_wall_cover	30-002-28310165	1	
15	printer_power_cable	27-012-16502071	1	
16	PA-3222_printer_cable (USB)	27-006-40307111	1	
17	MB-1011RB-11N	MB-1011RB-11N	1	
18	printer_pcb_cover	20-004-03001165	1	
19	M2.5_L4_R_Ni	22-232-25004011	2	

Exploded Diagram For 2-Inch Printer (2)



2-Inch Printer				
No.	Component Name	P/N No.	Q'ty	Remark
1	paper_holder2.sldprt	30-012-02110165	1	
2	T2_L8_R_B	22-125-20008011	2	
3	ps3100_paper_cover_v2	30-002-02530165	1	
4	include_holder	20-029-03006165	1	
5	ps3100_printer_cover_ejector	30-002-09210165	1	
6	ps3100-spring-for_ejector	23-002-00001021	1	
7	M3_L4_I_B	22-272-30004318	1	
8	T3_L6_PAN_NI	22-132-30060011	4	
9	3100_printer_eva	90-013-15200165	1	
10	2inch_add_mylar2	90-056-02300165	1	
11	SII 2"Printer (Cut Side)	N/A	1	
12	T3_L8_R_B	22-122-30080011	2	

Exploded Diagram For VFD Module



No.	Component Name	P/N No.	Q'ty	Remark
1	VFD Cover	30-002-28114165	1	
2	VFD Window Cover	30-002-02230165	1	
3	VFD_Model	MB-4103RA-11N	1	
4	PORON_135x4x0.6	90-013-24100165	2	
5	PA-3222_VFD_CABLE	27-053-23805111	1	