

USER MANUAL

MH-5102

10.1" Integrated Pad

Powered By Intel[®] Atom[®]
Processor

MH-5102 M1

MH-5102

10.1” Integrated Pad Powered By Intel[®] Atom[®] Processor

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DISCLAIMER

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

CE NOTICE

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

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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 approved by the party responsible for compliance could void your authority to operate such equipment.

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



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.

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Revision History

The revision history of MH-5102 User Manual is described below:

Version No.	Revision History	Date
1.0	Initial Release	2019/3/28

1 Introduction

This chapter provides the introduction for the MH-5102 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 MH-5102 system. The MH-5102 provides faster processing speed, greater expandability and can handle more tasks than before. This manual is designed to assist you how to install and set up the whole system. It contains 5 chapters and 2 appendixes. Users can configure the system according to their own needs. This user manual is intended for service personnel with strong hardware background. It is not intended for general users.

The following section outlines the structure of this user manual.

Chapter 1 Introduction

This chapter provides the introduction for the MH-5102 system as well as the framework of the user manual.

Chapter 2 Getting Started

This chapter describes the package contents and outlines the system specifications. It also includes the physical illustrations and quick setup for the MH-5102 system. Read the safety reminders carefully on how to take care of your system properly.

Chapter 3 System Configuration

This chapter outlines the locations of the motherboard and daughter board components and their respective functions. You will learn how to set the slide switches and configure the system to meet your own needs.

Chapter 4 Software Utilities

This chapter contains helpful information for proper installations of the Intel Chipset Software Installation Utility, Audio Realtek Driver Utility, G-Sensor Driver Utility, Wi-Fi & Bluetooth Driver Utility, Light Sensor Driver Utility and Hotfix Driver Utility as well as Cash Drawer API function.

Chapter 5 BIOS Setup

This chapter indicates how to change the BIOS configurations.

Appendix A System Assembly Diagrams

This appendix provides the exploded diagrams and part numbers of the MH-5102.

Appendix B Technical Summary

This appendix provides the information about the allocation maps for system resources and System BIOS update procedure.

2 Getting Started

This chapter provides the information for the MH-5102 system. In addition to the MH-5102 Pad, users are also welcome to purchase the optional “Lite Cradle” so you can combine MH-5102 Integrated Pad and Lite Cradle together and place the system set on the desktop for user application needs. This chapter describes the package contents, system diagrams and outlines the system specifications.

The following topics are included:

- Package List
- Pad System Diagrams
- Lite Cradle System Diagrams
- Quick Setup
- Pad Specifications
- Lite Cradle Specifications
- Safety Precautions

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

2.1 Package List

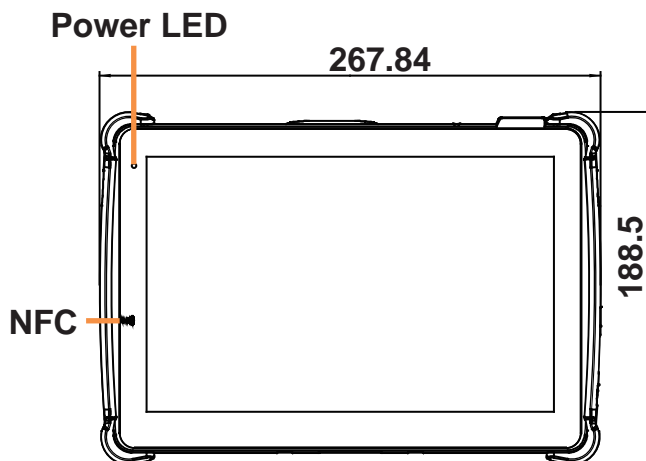
If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

Item	Q'ty
MH-5102 Integrated Pad	1
Quick Reference Guide	1
AC Power Adapter for Pad	1
Hand Strap (optional)	1
Neck Strap (optional)	1
Lite Cradle (optional)	1
Power Adapter for Lite Cradle (optional)	1
Power Cord for Lite Cradle (optional)	1

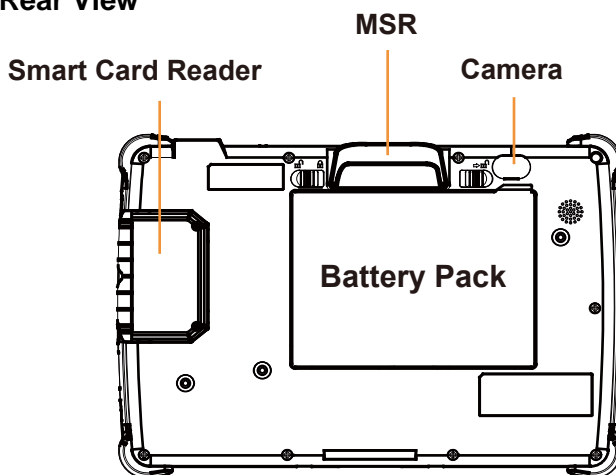
2.2 Pad System Overview

Unit: mm

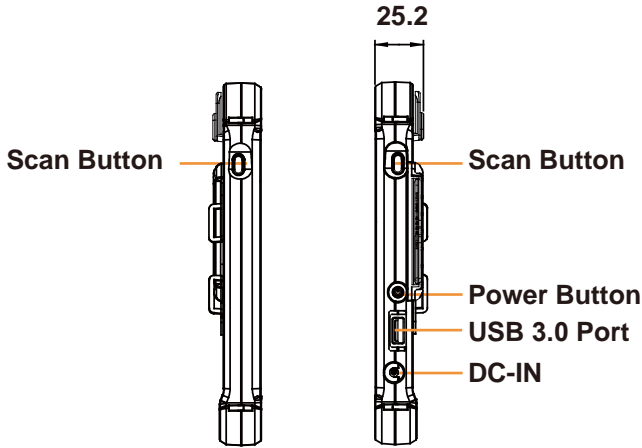
2.2.1 Front View



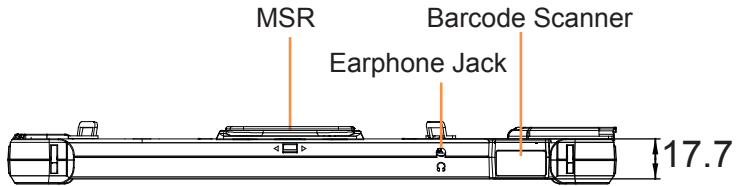
2.2.2 Rear View



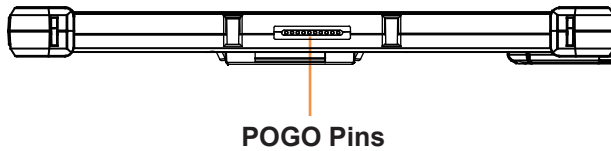
2.2.3 Side View



2.2.4 Top View



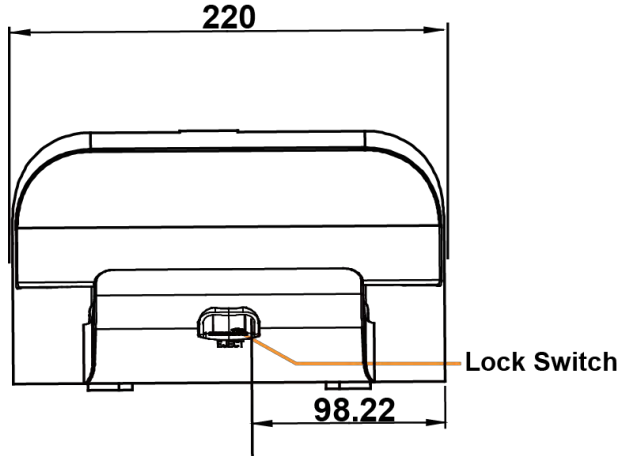
2.2.5 Bottom View



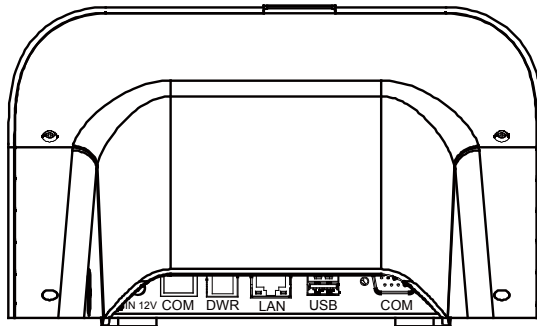
2.3 Lite Cradle System Overview

Unit: mm

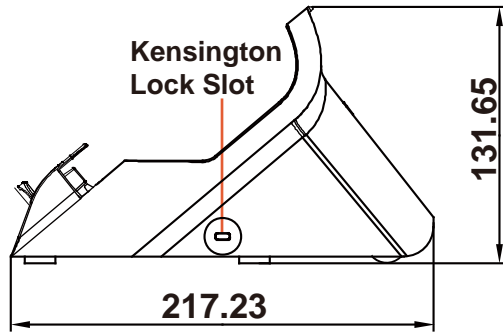
2.3.1 Front View



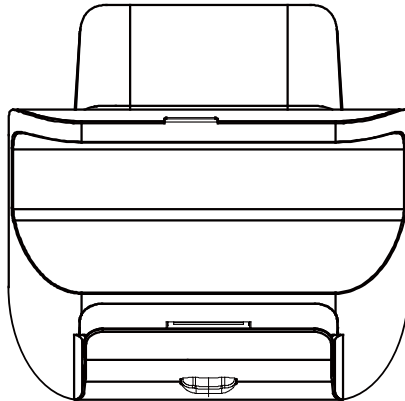
2.3.2 Rear View



2.3.3 Side View

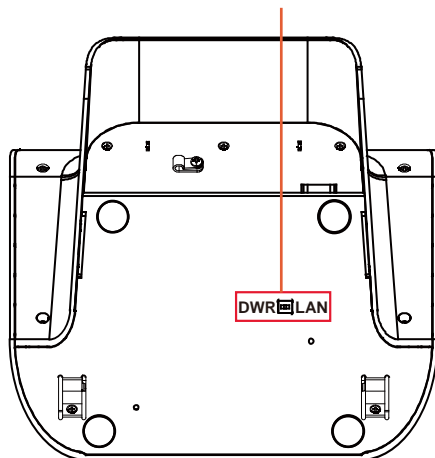


2.3.4 Top View

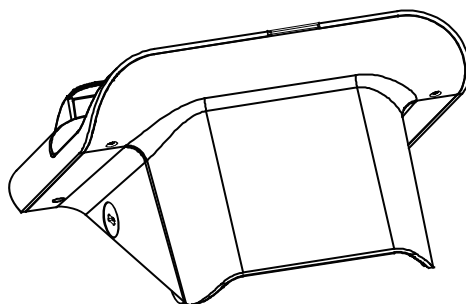
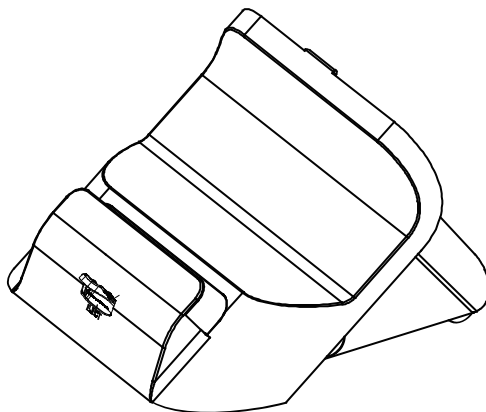


2.3.5 Bottom View

LAN and Cash Drawer Selection



2.3.6 Quarter View




2.4 Quick Setup



2.4.1 Turning the Power On from Pad and Connect to Wi-Fi

Long press the **Power Button** on the right side of the Pad to turn on the system. Connect the Pad to a wireless network via Wi-Fi connection. (Refer to the **Side View** section of Pad for the location of **Power Button**.)

How to Set Up Wi-Fi Connection

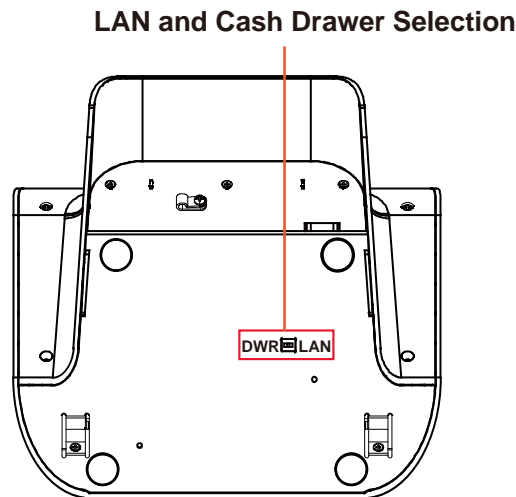
- Step 1.** From the bottom right corner of the screen, tap the ^ icon from the tool tray.
- Step 2.** From the small pop-up window, tap on the Wi-Fi icon  if it shows grey to activate Wi-Fi.
- Step 3.** Select a Wi-Fi network from the list and tap on it.
- Step 4.** Tap the **Connect** button.
- Step 5.** Enter the correct security key for the selected Wi-Fi network and wait for the Wi-Fi connection to establish.

You can also swipe the screen from the right side of the Pad to bring up the **ACTION CENTER** window and select **Network** menu item to enter the Wi-Fi network selection list.

For stability issue, always power off the Pad from Windows 10 OS. Make sure you have closed all the application programs before you close Windows. Tap on  Start icon from the bottom left corner of the Pad and select the displayed  menu icon and select **Shut down** from the selection list to turn off the Pad power.

2.4.2 Turning the Power On and Connect to Local Network from Lite Cradle

Prerequisite: Insert a ball point pen or a pin into the hole of **DWR/LAN** selection switch slot located on the bottom base of the Lite Cradle, and switch it to the **LAN** port location. See the picture below:

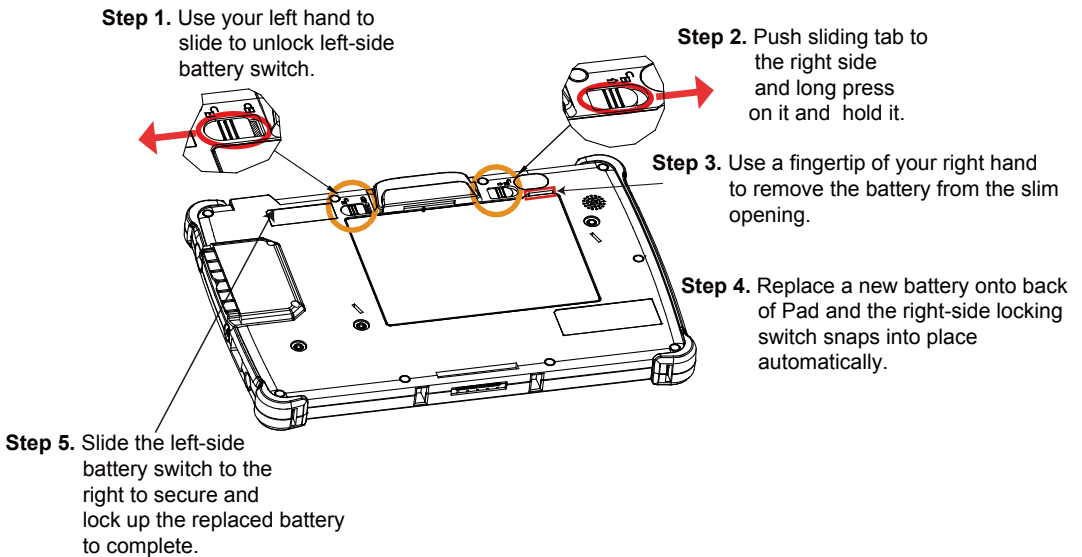


Press the **Power Button** on the right side of the Pad to turn on the system. Connect the Ethernet cable to the **LAN** port on the rear side of the Lite Cradle and the other end of the network cable to a port on your hub, switch or router. (Refer to the **Side View** section of Pad for the location of **Power Button**.) Refer to the **I/O Ports Diagram** section of Lite Cradle for the location of LAN port.

2.4.3 Installing Battery for Pad

Make sure to power off the device first before you start installing the battery.

- Step 1.** Slide to unlock the left-side battery switch with your left hand. See the Figure below.
- Step 2.** Use your left hand to push the right-side sliding tab to the right and long press on it and hold it.
- Step 3.** Use a fingertip of your right hand to remove the battery from the slim opening located under the Camera.
- Step 4.** Replace a new battery onto the back of Pad and the right-side locking switch snaps into place automatically.
- Step 5.** Slide the left-side battery switch to the right to secure and lock up the replaced battery.



Note 1: The factory default battery cycle life guarantees to retain 80 percent of its original capacity after the battery has been charged and discharged for 300 times.

Note 2: Batteries are consumerables and the limited warranty for MH-5102 battery is 1 year only.

Low Battery Indicator

The low battery indicator will show on the LCD screen when the battery is nearly exhausted. When the low battery indicator appears on the tool tray, you should recharge the battery by connecting the power adapter of Pad/Lite Cradle or replace a fully charged battery immediately.

2.4.4 Recharging Battery from Pad

Before you use MH-5102 Pad, follow the instructions below to charge the battery:

- Step 1.** Connect the Pad's AC power adapter to the DC-IN jack located on the right side of the Pad. (Refer to the **Side View** section of Pad for the location of the DC-IN Jack.)
- Step 2.** Plug the other end to an AC power outlet.

MH-5102 Pad battery will then start charging, and the Power LED indicator on the top left corner of the touchscreen will then flash GREEN. After the battery is fully charged, the Power LED indicator will turn to a solid green.

2.4.5 Recharging Battery from Lite Cradle

- Step 1.** Connect the Lite Cradle's AC power adapter to the DC-IN power jack located on the bottom of the Lite Cradle.
- Step 2.** Plug the other end to an AC power outlet.

The Power LED indicator on the top left corner of the touchscreen will then flash GREEN. After the battery is fully charged, the Power LED indicator will turn to a solid green.

2.4.6 Installing Integrated Pad Onto Lite Cradle

- Step 1.** From the bottom side of Pad, align the **two locking tabs** located on both side of the **POGO** pins to their **mating slots** located inside of Lite Cradle base respectively.
- Step 2.** Lock the **two locking tabs** of Pad into their **mating slots** inside the Lite Cradle base and the Pad snaps into place.
- Step 3.** The installation is completed.



2.4.7 Separating Integrated Pad From Lite Cradle

Step 1. Push down the Lock Switch on the front of Lite Cradle.

Step 2. Separate the integrated pad from the lite cradle. See the picture below:



Push down the Lock Switch to eject.

2.4.8 Scanning Barcodes and QR Codes

- Step 1.** Press to turn on the **Scan Button** located on the right/left side of the Pad. (Refer to the **Side View** section of Pad for the location of the **Scan Button**.)
- Step 2.** Point the **Barcode Scanner** at the barcode or QR code that you want to scan and position the light beam on the barcode/QR code. (Refer to the **Top View** section of Pad for the location of the **Barcode Scanner**.)

After the barcode/QR code has been scanned successfully, you will hear one beep sound.

2.4.9 Installing Hand Strap

Step 1. Tighten the two screws of the strap bracket set onto the strap bracket holes on the back cover.

Step 2. Ready to hold the hand strap attached on the strap brackets to lift up the Pad with your hand.

Note: The strap bracket set is pre-installed for easy user installation before the shipment. The strap bracket set includes 2 x strap brackets, 2 x pan head screws (M3 x 6 mm) and 1 x Velcro badge.

2.4.10 Installing Neck Strap

- Step 1.** Insert one end of the provided neck strap through the upper opening of the right-side bumper rubber and adjust to tighten the neck strap.
- Step 2.** Insert another end of the neck strap through the upper opening of the left-side bumper rubber and adjust to tighten the neck strap.
- Step 3.** Put the installed neck strap around your neck to carry the Pad around.

Note: You can also select to put the neck strap through the lower openings of the right-side and left-side bumper rubbers.



2.5 Pad Specifications

Fundamental Spec. (Conform to RoHS Directive)		
Operator Display (LCD)	Type	10.1" IPS display with 1920 x 1200 FHD resolution
	Resolution	WXGA 1920 x 1200 dots
	Brightness	Typical 500 cd/m ²
	Life time of Backlight Lamp	30,000 hours
	Interface	LVDS
Backlight	Type	LED Backlight
Touch Panel	Type	Multi-touch projected capacitive
	Interface	I2C
CPU	BGA on board CPU	Intel Atom [®] x5-Z8550 Processor
Chipset	Intel Platform	Built-in CPU
Memory	DDR3L on Board	1 x 2GB LPDDR3 / 2 x 2GB LPDDR3
PMIC or EC	Type	TI
	Interface	I2C
Charger	Type	TI
	Interface	I2C
Storage (eMMC)	Type	1 x 32GB / 64GB eMMC
	Interface	SDIO
Storage (SD)	Type	MicroSD Slot
	Interface	SDIO
BIOS	Insyde BIOS	SPI Flash ROM
Hardware Monitor	Type	(1) Voltage detection (Battery) (2) CPU & System Temperature detection (3) CPU Temperature over heat warning (4) CPU Temperature over heat shut down
Speaker	Type	1 x 1W Speaker, 1 x Audio Jack (headset microphone)
Wi-Fi + Bluetooth Module IC	Type	802.11 ac/a/b/g/n 2T2R wireless LAN and Bluetooth 4.1 M.2 module
	Interface	Wi-Fi: SDIO / Bluetooth: UART

G-Sensor (Accelerator sensor)	Type	ST
	Interface	I2C
Ambient Light Sensor	-	Yes
LED Indicator	Tri-color Light LED Green / Yellow / Red LED	<p>1. Power LED (Green):</p> <ul style="list-style-type: none"> a. Start OS→constant Green light b. Charging→ flashing Green light c. Full charge→constant Green light <p>2. Alarm LED (Yellow):</p> <ul style="list-style-type: none"> a. 4%< Battery Capacity ≤ 8%→flashing Yellow light b. Battery Capacity < 4% →system turns to Sleep→Yellow Alarm LED turns off. <p>3. Error LED (Red):</p> <ul style="list-style-type: none"> a. S0 unlock battery switch→flashing Red light b. Battery error→flashing Red light
Power Supply	Type	DC 12V/2A/24W or 24V/1A/24W
Operating System	OS	Windows® 10 IoT Enterprise LTSC 2016 OS (64 bits) Windows® 10 professional (64-bits)
Dimensions	W x H x D	259.9 x 175.9 x 17.7mm
Weight	Pad only	770g (without any optional devices attached)
Certificate	-	CE/FCC/TELEC
Battery Pack Operation time	Main battery(1S2P)	8 hours @ 7900mAh
Sub Battery	RTC Battery	160mAh
Battery Pack Charging time	Main battery	Power ON: 5 hours Power OFF: 4 hours
IP Rating	Body unit	IP54 (front panel only)
Drop Impact Resistance	-	1.2m

Temperature	Operating Temperature	0°C ~ 40°C (32°F ~ 104°F)
	Storage Temperature	-20°C ~ 60°C (-4°F ~ 140°F)
Humidity	Operating Humidity	0~90%RH (no condensation)
	Storage Humidity	0~95%RH (no condensation)
Integrated Devices		
Barcode Scanner	Type	Honeywell 2D Barcode scanner
	Interface	UART
4G/GPS Module	Type	4G+GNSS mPCIe full-sized card (band:B1/B3/B5/B7/B8/B20)
	Interface	mPCIe
NFC Module	Type	NXP NPC300 main chip module
	Interface	I2C
Front & Rear Camera	Type	USB 5M pixels camera module with autofocus function
	Interface	USB
MSR Module	Type	Secure head MSR (meet ISO 7811, support AAMVA / JIS II format, support single / dual / triple tracks)
	Interface	USB
Smart Card Reader Module	Type	Smart Card Reader (optional, USB port co-layout with 3G) (meet ISO 7816 & EMV Level 1 & 2 Certification)
	Interface	USB (Co-layout with 3G module)
External I/O Ports		
DC-IN Jack	Type	1 x DC-IN Jack
Cradle Connector	Type	1 x POGO pins (1x10 pins)
USB	Type	1 x Standard USB 3.0 (Type A) for external expansion

SD (Secure Digital)	Type	MicroSD Slot for internal memory expansion
SIM Card Slot	Type	For 4G LTE network services
Audio Jack	Type	1 x Audio Jack (3.5mm)
External Buttons (for side I/O & front panel)		
Power Button	Type	1 x Power Button
Scan Button	Type	2 x Scan buttons (left & right)

2.6 Lite Cradle Specifications

Lite Cradle		
Cradle Connector	Type	1 x POGO pins (1 x 10 pins)
	Interface	USB 2.0/Power/GND
DC-IN Jack	Type	1 x DC 12V IN
USB	Type	2 x Standard USB 2.0 port (Type A)
COM	Type	1 x RJ-45 with 12V/5V/RI
COM	Type	1 x D-Sub 9 with 12V/5V/RI
LAN (10/100 Mbps) or DWR (Cash Drawer)	Type	1 x RJ-45
	Type	1 x RJ-11 with 12V/1A
DIP Switch	-	LAN Port and Cash Drawer selection
Kensington Security Lock Slot	Type	1
Lock Switch	-	Fixing between Integrated Pad and Cradle
AC Power Adapter	Type	1 x 12V/5A/60W AC Power Adapter
Dimensions	L x W x T	220 x 217.23 x 131.65mm
Weight	Lite Cradle only	About 858g

Note: The functions of Ethernet LAN & Cash Drawer are co-layout and can be selected by DIP Switch.

2.7 OS Specifications

OS	Description
Windows [®] 10 IoT Enterprise LTSB 2016	Supports 64 bits
Windows [®] Pro 10	Supports 64 bits

2.8 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 MH-5102 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
 - Avoid installing your MH-5102 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 MH-5102 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.
 - 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 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 about the slide switches & connector settings, and component locations.

The following sections are included:

- Pad Function Buttons and I/O Ports
- Lite Cradle I/O Ports Diagram
- Pad Main Board Component Locations
- Pad Main Board Connectors Quick Reference Table
- Setting Pad Main Board Connectors
- Setting Daughter Board MR-5102RA-1 Connectors for Carrier Board
- Daughter Board MR-5100RA-5 and MR-5100RA-2 Connectors Quick Reference Table
- Setting Daughter Board MR-5100RA-5 Connectors and Jumpers
- Setting Daughter Board MR-5100RA-2 Connectors

3.1 Pad Function Buttons and I/O Ports

3.1.1 Power Button

To turn on the system, press the Power Button on the right side of the Pad briefly.



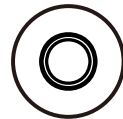
Power Button

ACTION	ASSIGNMENT
Press	0V
Release	+2.8V

3.1.2 DC-IN Port

Port Name: DC-IN

Description: DC Power-In Port. The DC-IN Port is located on the right side of the Pad.



DC-IN

PIN	ASSIGNMENT	PIN	ASSIGNMENT
0	+12V	2	GND
1	+12V	3	GND

3.1.3 USB Port

Port Name: USB1

Description: USB Type A Port (Side I/O)



USB1

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

Note: The USB1 port is provided with Standby power 5V.

3.1.4 Audio Port

Port Name: CN_JACK1

Description: Audio Port located on the top right side of the Pad.



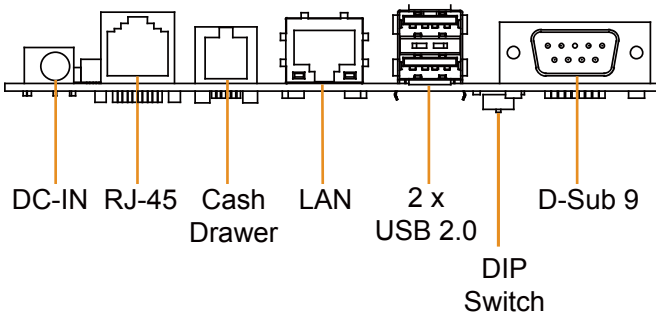
CN_JACK1

PIN	ASSIGNMENT
1	LEFT
2	RIGHT
3	GND
4	MIC
5	HP_DET

3.2 Lite Cradle I/O Ports Diagram

3.2.1 I/O Ports Diagram

The I/O ports are located on the bottom side of the Lite Cradle.



3.3 Pad Main Board Component Locations

3.3.1 Top View of Pad Main Board Component Locations

M/B: MB-5102

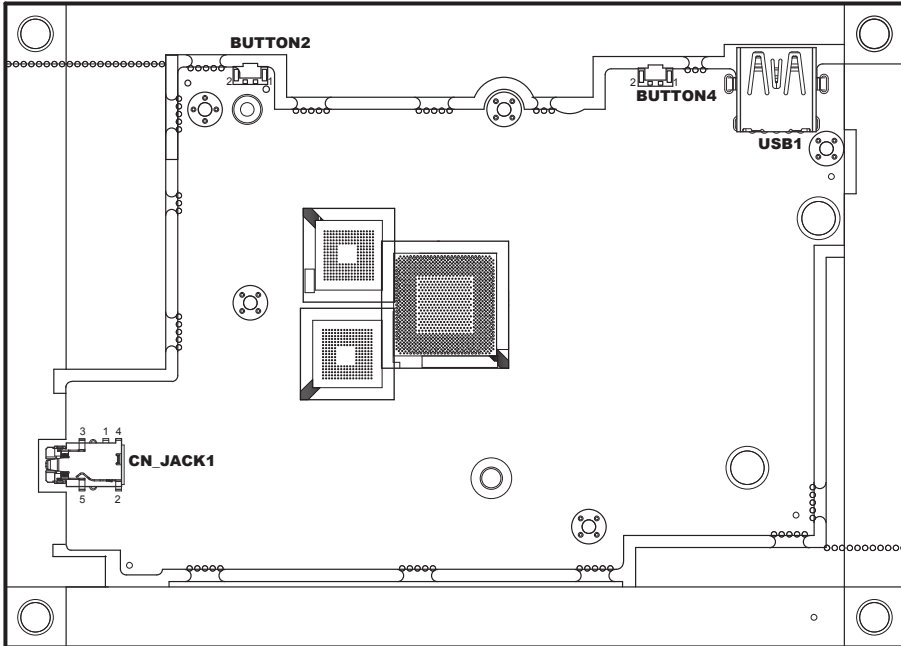




Figure 3-1. MB-5102 Main Board Component Locations (Top View)

	<p>WARNING: Always disconnect the power cord when you are working with the connectors on the main board. Make sure both the system and the external devices are turned OFF as sudden surge of power could ruin sensitive components. Make sure MB-5102 is properly grounded.</p>
	<p>CAUTION: Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while configuring the connectors. Use a grounding wrist strap and place all electronic components in any static-shielded devices.</p>

3.3.2 Bottom View of Pad Main Board Component Locations

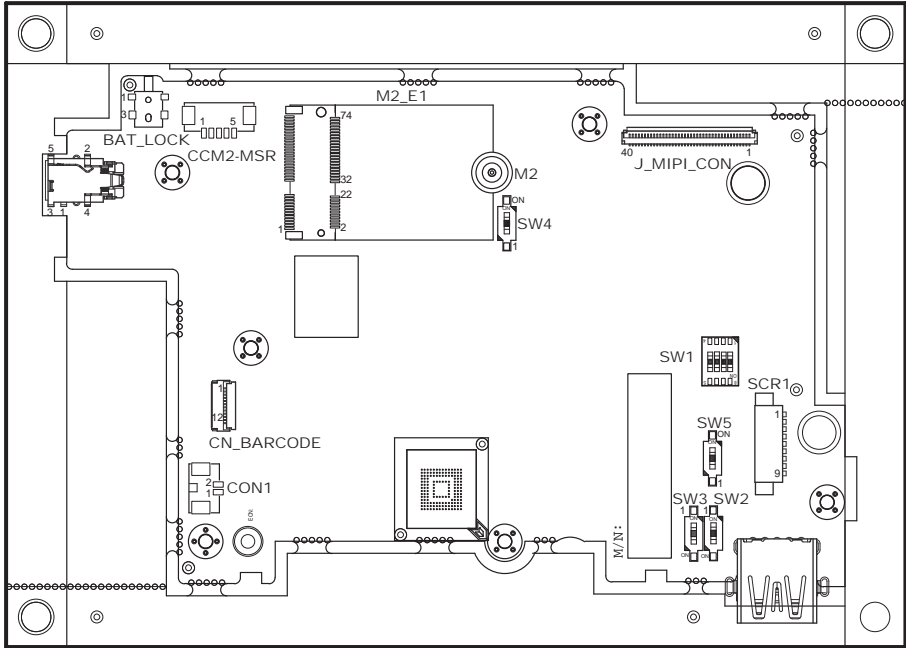


Figure 3-2. MB-5102 Main Board Component Locations (Bottom View)

3.4 Pad Main Board Connectors Quick Reference Table

CONNECTOR Description	Location
Top Side	
Earphone Jack Connector	CN JACK1
Right Barcode Switch Button	BUTTON2
Power Switch Button	BUTTON4
Universal Serial Bus 3.0 Connector	USB1
Rear Side	
MIPI Connector	J_MIPI_CON
Vibrator Connector	CON1
M.2 E Key Connector	M2_E1
Barcode Scanner Connector	CN_BARCODE
Battery Lock Switch Connector	BAT_LOCK
MSR/Front Camera Connector	CCM2-MSR
Smart Card Reader Connector	SCR1

Slide Switch Description	Location
Slide Switch Selection	SW2, SW3, SW4, SW5
Board ID Switch	SW1

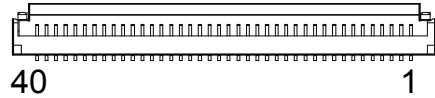
3.5 Setting Pad Main Board Connectors and Slide Switches

3.5.1 MIPI Connector (J_MIPI_CON)

Connector Location: J_MIPI_CON (rear side of main board)

Description: MIPI Connector

PIN	ASSIGNMENT
1	LEDA+
2	LEDA+
3	NC
4	NC
5	NC
6	NC
7	NC
8	NC
9	LEDA-
10	LEDA-
11	GND
12	NC
13	ID_1
14	DIMO
15	NC
16	GND
17	NC
18	NC
19	GND
20	DP3
21	DN3
22	GND
23	DP2
24	DN2
25	GND
26	CLKP
27	CLKN
28	GND
29	DP1
30	DN1
31	GND
32	DP0
33	DN0
34	GND



J_MIPI_CON

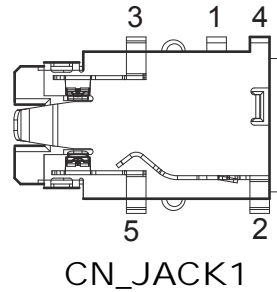
PIN	ASSIGNMENT
35	ID_2
36	NC
37	NC
38	V3P3S_MIPI
39	V3P3S_MIPI
40	NC

3.5.2 Earphone Jack Connector (CN_JACK1)

Connector Location: CN_JACK1 (top side of main board)

Description: Earphone Jack Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
4	MIC	2	RIGHT
1	LEFT	-	-
3	GND	5	HP_DET

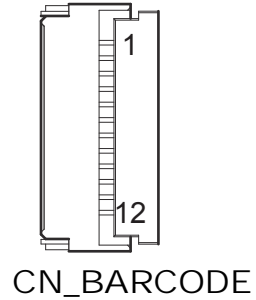


3.5.3 Barcode Scanner Connector (CN_BARCODE)

Connector Location: CN_BARCODE (rear side of main board)

Description: Barcode Scanner Connector

PIN	ASSIGNMENT
1	NC
2	V3P3S/V5P0S
3	GND
4	RXD
5	TXD
6	CTS
7	RTS
8	Power Down
9	Buzzer
10	NC
11	Wake up
12	Trigger

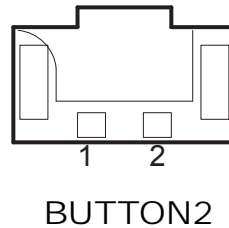


3.5.4 Right Barcode Switch Button (BUTTON2)

Connector Location: BUTTON2 (top side of main board)

Description: Right Barcode Switch Button

PIN	ASSIGNMENT
1	GND
2	SCAN_EN_SW

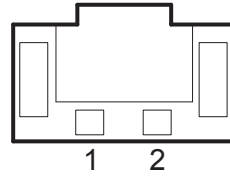


3.5.5 Power Switch Button (BUTTON4)

Connector Location: BUTTON4 (top side of main board)

Description: Power Switch Button

PIN	ASSIGNMENT
1	GND
2	PWRBTN_N



BUTTON4

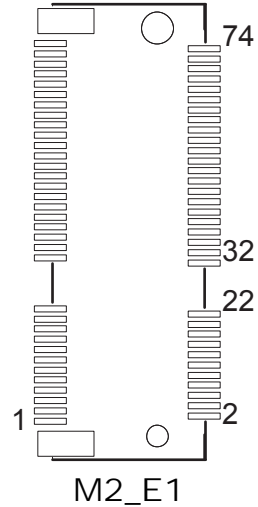
3.5.6 M.2 E_Key Connector (M2_E1)

Connector Location: M2_E1 (rear side of main board)

Description: M.2 E_Key Connector

M.2 E_Key Connector signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	2	V3P3A_WIFI
3	NC	4	V3P3A_WIFI
5	NC	6	TP
7	GND	8	TP
9	SDMMC2_CLK	10	NC
11	SDMMC2_CMD	12	NC
13	SDMMC2_DAT0	14	NC
15	SDMMC2_DAT1	16	TP
17	SDMMC2_DAT2	18	GND
19	SDMMC2_DAT3	20	BT_HOST_WAKE_R
21	SDIO_WAKE	22	UART1_RXD
23	WLAN_ON_N	24	NC
25	NC	26	NC
27	GND	28	NC
29	NC	30	NC
31	NC	32	UART1_TXD
33	GND	34	UART1_CTS
35	PCIE_TXP0	36	UART1_RTS
37	PCIE_TXN0	38	NC
39	GND	40	NC
41	PCIE_RXP0	42	NC
43	PCIE_RXN0	44	NC
45	GND	46	NC
47	PCIE_REFCLK0_P	48	NC
49	PCIE_REFCLK0_N	50	WIFI_SUSCLK
51	GND	52	WLAN_ON_N_R
53	PCIE_CLKREQ0_M2_R	54	DISABLE
55	PCIE_WAKEJ	56	W_DISABLE
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	V3P3A_WIFI
73	NC	74	V3P3A_WIFI
75	GND	-	-

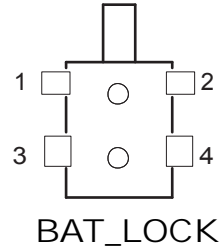


3.5.7 Battery Lock Switch Button (BAT_LOCK)

Connector Location: BAT_LOCK (rear side of main board)

Description: Battery Lock Switch Button

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	2	BAT_LOCK
3	NC	4	NC

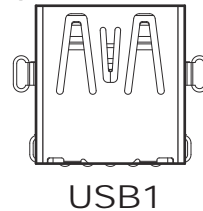


3.5.8 Universal Serial Bus 3.0 Connector (USB1)

Connector Location: USB1 (top side of main board)

Description: USB 3.0 Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC	5	USB3.0_RXDN
2	USB2.0_DN	6	USB3.0_RXDP
3	USB2.0_DP	7	GND
4	GND	8	USB3.0_TXDN
-		9	USB3.0_TXDP

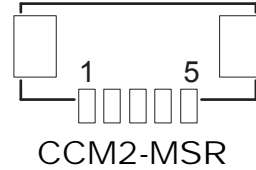


3.5.9 MSR/Front Camera Connector (CCM2-MSR)

Connector Location: CCM2-MSR (rear side of main board)

Description: MSR/Front Camera Connector

PIN	ASSIGNMENT
1	VCC
2	CCM1_DN
3	CCM1_DP
4	GND
5	GND

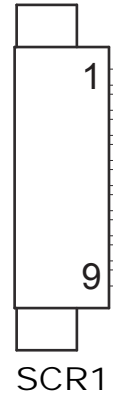


3.5.10 Smart Card Reader Connector (SCR1)

Connector Location: SCR1 (rear side of main board)

Description: Smart Card Reader Connector

PIN	ASSIGNMENT
1	Buck-Boost_VIN
2	Buck-Boost_VIN
3	Buck-Boost_VIN
4	GND
5	SW2/SW3
6	SLP_SOIX_3P3_N
7	DN
8	DP
9	GND

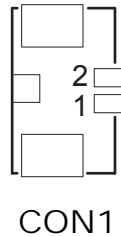


3.5.11 Vibrator Connector (CON1)

Connector Location: CON1 (rear side of main board)

Description: Vibrator Connector

PIN	ASSIGNMENT
1	V3P3A_VB
2	GND



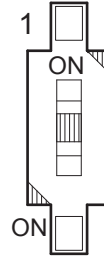
3.5.12 Slide Switch Selection (SW2, SW3, SW4, SW5)

Connector Location: SW2, SW3, SW4, SW5 (rear side of main board)

Description: Slide Switches for MH-5102 standard system

Please configure the settings of SW2, SW3, SW4 and SW5 slide switches as follows:

Slide Switch	Setting
SW2	ON
SW3	OFF
SW4	ON
SW5	ON



SW2 / SW3 /
SW4 / SW5

3.5.13 Board ID Switch (SW1)

Switch Location: SW1 (rear side of main board)

Description: Board ID Switch

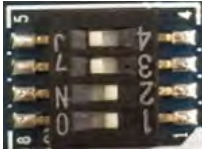
For MB-5102RA-11N BOM, Board ID: 0000



For MB-5102RA-12N BOM, Board ID: 0001



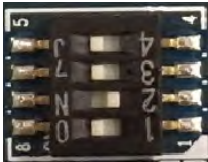
For MB-5102RA-13N BOM, Board ID: 0011



For MB-5102RA-14N BOM, Board ID: 0100



For MB-5102RA-15N BOM, Board ID: 0010



For MB-5102RA-16N BOM, Board ID: 0101



3.6 Pad Daughter Board Reference Table: MR-5102RA-1

MR-5102RA-1 (for Pad Carrier Board)

CONNECTOR Description	Location
Rear Side	
Touchscreen Connector	TOUCH1
NFC Connector	NFC1
MR-5102RA-1 Power Supply Connector from Main Board	SCR_DCN
Mini PCI Express Slot	M_PCIE1
RTC Battery Connector	BAT2
Speaker Connector	SPK1
Battery Connector	BAT1
MCU Firmware Update Connector	JP5
Micro SD Card Connector	J2
CCD Front Webcam Connector	CCM1
SIM Card Connector	SIM1
Top Side	
Left Barcode Switch Button	BUTTON1
DC IN Jack Connector	DC_IN1
Cradle Connector	CRADLE1

3.7 Pad Daughter Board MR-5102RA-1 Connector Locations

3.7.1 Top View of Pad Daughter Board MR-5102RA-1 Component Locations

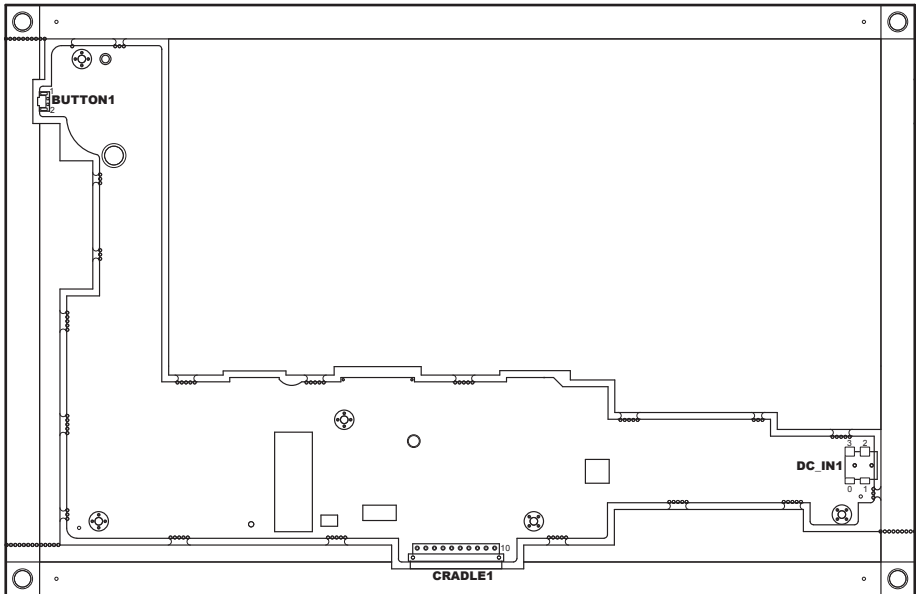




Figure 3-3. MR-5102RA-1 Daughter Board Component Locations (Top View)

	<p>WARNING: Always disconnect the power cord when you are working with the connectors on the main board. Make sure both the system and the external devices are turned OFF as sudden surge of power could ruin sensitive components. Make sure MR-5102RA-1 is properly grounded.</p>
	<p>CAUTION: Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while configuring the connectors. Use a grounding wrist strap and place all electronic components in any static-shielded devices.</p>

3.7.2 Bottom View of Pad Daughter Board MR-5102RA-1
Component Locations

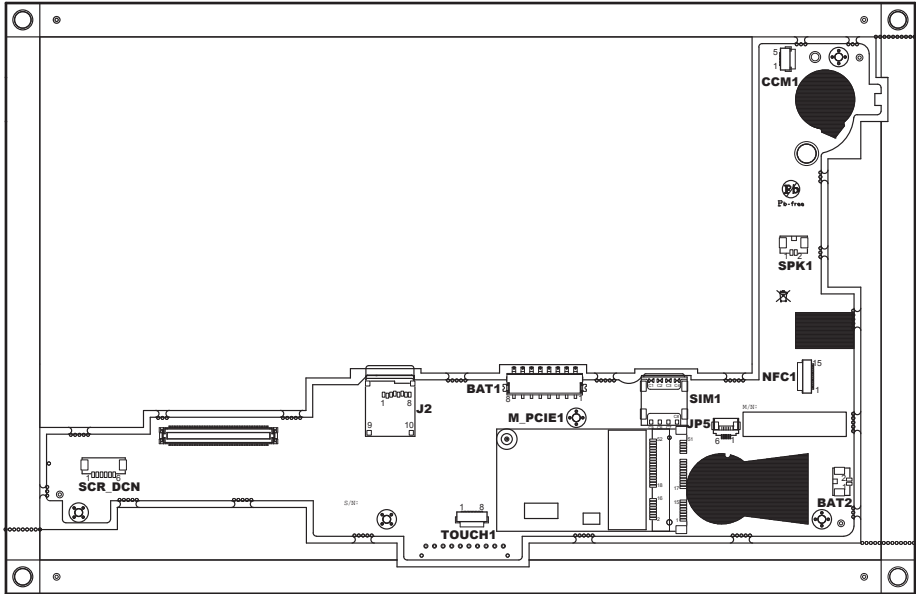


Figure 3-4. MR-5102RA-1 Daughter Board Component Locations (Bottom View)

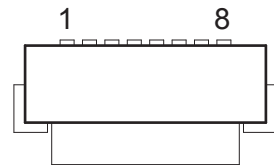
3.8 Setting Pad Daughter Board MR-5102RA-1 Connectors

3.8.1 Touchscreen Connector (TOUCH1)

Connector Location: TOUCH1 (rear side of daughter board MR-5102RA-1)

Description: Touchscreen Connector

PIN	ASSIGNMENT
1	+V3P3_V1P8_TCH
2	GND
3	GND
4	I2C5_Touch_SCL
5	I2C5_Touch_SDA
6	GND
7	TOUCH_INT_N
8	TOUCH_RESET_N



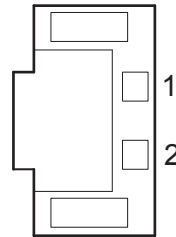
TOUCH1

3.8.2 Left Barcode Switch Button (BUTTON1)

Connector Location: BUTTON1 (top side of daughter board MR-5102RA-1)

Description: Left Barcode Switch Button

PIN	ASSIGNMENT
1	GND
2	SCAN_EN_SW



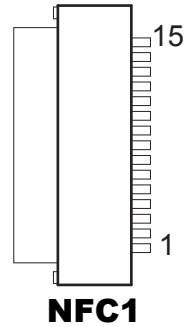
BUTTON1

3.8.3 NFC Connector (NFC1)

Connector Location: NFC1 (rear side of daughter board MR-5102RA-1)

Description: NFC Connector

PIN	ASSIGNMENT
1	V3P3S_NFC
2	GND
3	NC
4	V5P0S
5	NFC_IRQ
6	NC
7	I2C_NFC_SDA_R
8	I2C_NFC_SCL_R
9	GND
10	NFC_WAKE
11	NFC_DOWNLOAD
12	NC
13	V3P3S_NFC
14	+V1P8SX
15	GND

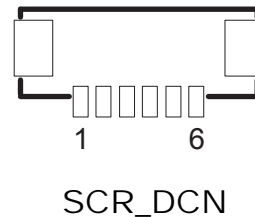


3.8.4 MR-5102RA-1 Power Supply Connector from Main Board (SCR_DCN)

Connector Location: SCR_DCN (rear side of daughter board MR-5102RA-1)

Description: MR-5102RA-1 Power Supply Connector from Main Board

PIN	ASSIGNMENT
1	DCIN
2	DCIN
3	DCIN
4	GND
5	GND
6	GND

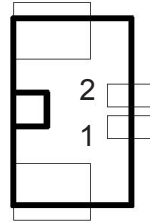


3.8.5 RTC Battery Connector (BAT2)

Connector Location: BAT2 (rear side of daughter board MR-5102RA-1)

Description: RTC Battery Connector

PIN	ASSIGNMENT
1	VCC
2	GND



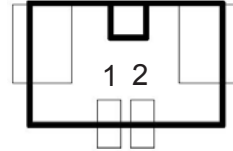
BAT2

3.8.6 Speaker Connector (SPK1)

Connector Location: SPK1 (rear side of daughter board MR-5102RA-1-BOT)

Description: Speaker Connector

PIN	ASSIGNMENT
1	LEFT_SPK
2	RIGHT_SPK



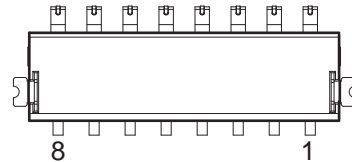
SPK1

3.8.7 Battery Connector (BAT1)

Connector Location: BAT1 (rear side of daughter board MR-5102RA-1)

Description: Battery Connector

PIN	ASSIGNMENT
1	BT+
2	BT+
3	GND
4	BATT_SENSE
5	GND
6	BAT_SCL
7	BAT_SDA
8	GND



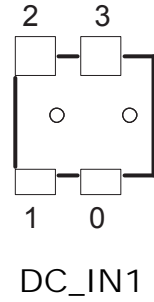
BAT1

3.8.8 DC IN Jack Connector (DC_IN1)

Connector Location: DC_IN1 (top side of daughter board MR-5102RA-1)

Description: DC IN Jack Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
0	DCIN	3	GND
1	DCIN	2	GND

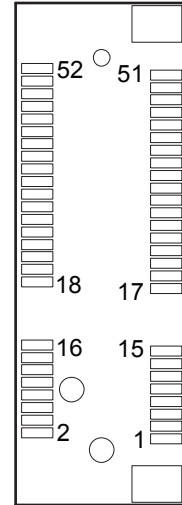


3.8.9 Mini PCI Express Slot (M_PCIE1)

Connector Location: M_PCIE1(rear side of daughter board MR-5102RA-1)

Description: Mini-PCI Express Slot

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	PCIE_WAKEJ	2	V3P3A
3	NC	4	GND
5	NC	6	V1P5S_MINI
7	M_CLKREQJ	8	SIM1_PWR
9	GND	10	SIM1_DATA
11	M_PCIE_CLKN	12	SIM1_CLK
13	M_PCIE_CLKP	14	SIM1_RESET
15	GND	16	SIM1_VPP
17	SIM1_SW2	18	GND
19	SIM1_SW1	20	NC
21	GND	22	PMU_PLTRST_N
23	PCIE_P2_RXN	24	V3_3A
25	PCIE_P2_RXP	26	GND
27	GND	28	V1P5S_MINI
29	GND	30	SMB_3P3_SCL
31	PCIE_P2_TXN	32	SMB_3P3_SDA
33	PCIE_P2_TXP	34	GND
35	GND	36	USB2_P7_DN
37	GND	38	USB2_P7_DP
39	V3P3A	40	GND
41	V3P3A	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	VCC1_5
49	NC	50	GND
51	NC	52	V3P3A



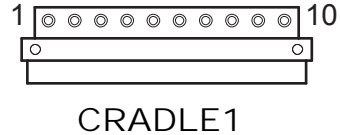
M_PCIE1

3.8.10 Cradle Connector (CRADLE1)

Connector Location: CRADLE1 (top side of daughter board MR-5102RA-1)

Description: Cradle Connector

PIN	ASSIGNMENT
1	GND
2	CRA_DCIN
3	CRA_DCIN
4	GND
5	USB_DP
6	USB_DP
7	USB_DN
8	USB_DN
9	V5P0S
10	GND

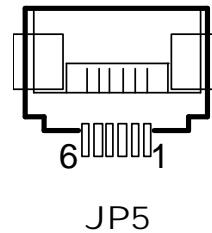


3.8.11 MCU Firmware Update Connector (JP5)

Connector Location: JP5 (rear side of daughter board MR-5102RA-1)

Description: MCU Firmware Update Connector

PIN	ASSIGNMENT
1	MCU_MISO
2	MCU_ADC
3	MCU_SCK
4	MCU_MOSI
5	MCU_RST
6	GND

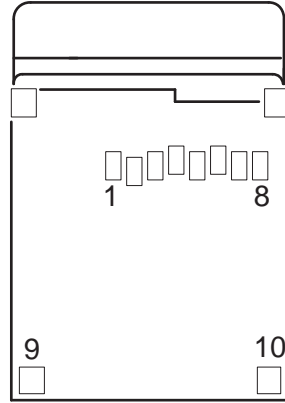


3.8.12 MicroSD Card Connector (J2)

Connector Location: J2 (rear side of daughter board MR-5102RA-1)

Description: MicroSD Card Connector

PIN	ASSIGNMENT
1	SDMMC3_DAT2
2	SDMMC3_DAT3
3	SDMMC3_CMD
4	+V3P3S_SD_SW
5	SDMMC3_CLK
6	GND
7	SDMMC3_DAT0
8	SDMMC3_DAT1
9	SDMMC_CD_N
10	GND



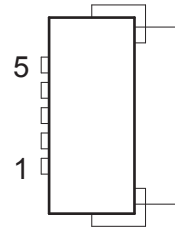
J2

3.8.13 Rear Camera Connector (CCM1)

Connector Location: CCM1 (rear side of daughter board MR-5102RA-1)

Description: Rear Camera Connector

PIN	ASSIGNMENT
1	V5P0
2	DN
3	DP
4	GND
5	GND



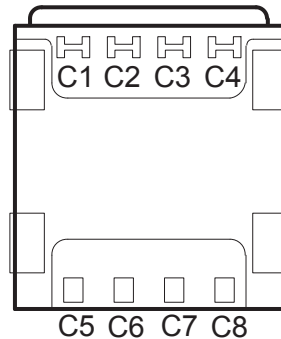
CCM1

3.8.14 SIM Card Connector (SIM1)

Connector Location: SIM1 (rear side of daughter board MR-5102RA-1)

Description: SIM Card Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
C1	VSIM	C5	GND
C2	RST	C6	VPP
C3	CLK	C7	DATA
C4	RSV	C8	RSV



SIM1

3.9 Pad Daughter Board MR-5102RA-3

3.9.1 Top View of Pad Daughter Board MR-5102RA-3

The daughter board MR-5102RA-3 is served as board to board for CPU to carrier board connection.

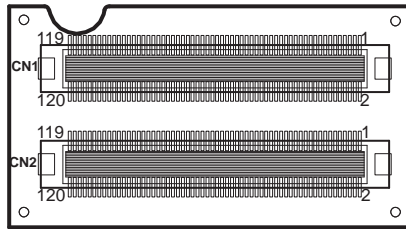


Figure 3-5. MR-5102RA-3 Daughter Board (Top View)

3.10 Pad Daughter Board MR-5102RA-4

3.10.1 Top View of Pad Daughter Board MR-5102RA-4

The daughter board MR-5102RA-4 is served as the Transfer board for Wi-Fi / Bluetooth SiP module connected to M.2 form factor.

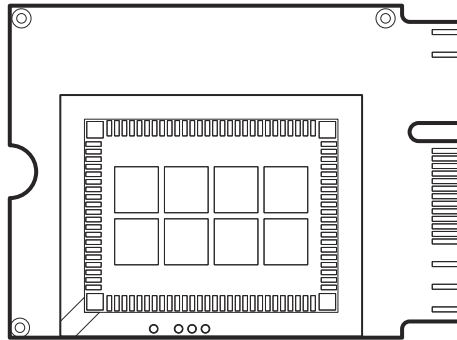


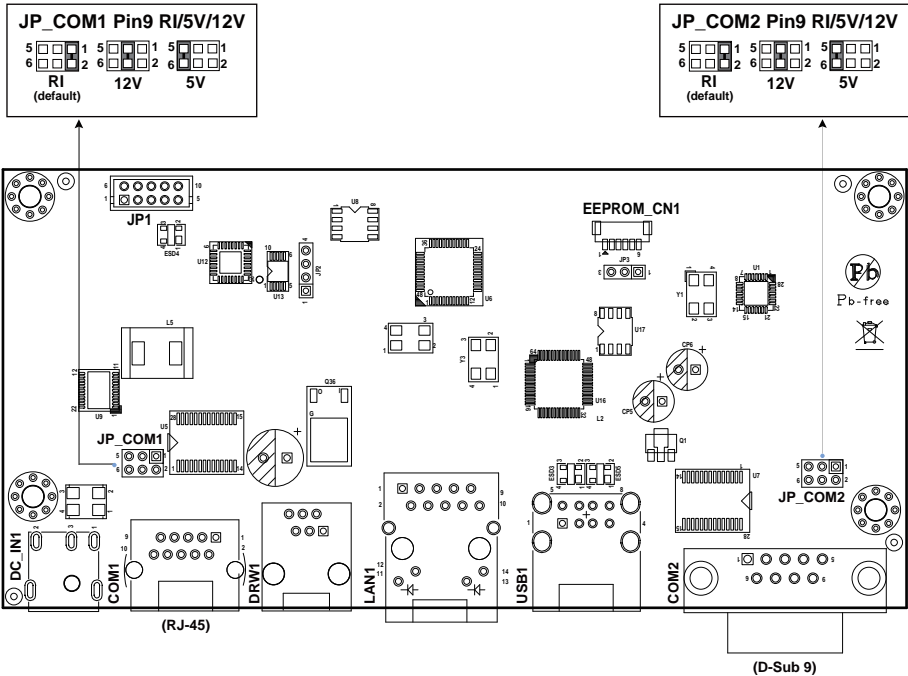
Figure 3-6. MR-5102RA-4 Daughter Board (Top View)

3.11 Daughter Board MR-5100RA-5 and MR-5100RA-2 Connectors Quick Reference Table

JUMPER Description	NAME
COM1 Port Pin9 Definition Selection Guide (MR-5100RA-5)	JP_COM1
COM2 Port Pin9 Definition Selection Guide (MR-5100RA-5)	JP_COM2

CONNECTOR Description	NAME
COM Port Connector (RJ45)	COM1
COM Port Connector (D-Sub 9)	COM2
Universal Serial Bus 2.0 Connector (Dual Layers)	USB1
Cash Drawer Connector	DRW1
Local Area Network Connector	LAN1
DC IN Jack Connector	DC_IN1
LAN Port & Cash Drawer Function Switch (MR-5100RA-5 Bottom Side)	SW1
Lite Cradle Connector (MR-5100RA-2)	CRADLE1

3.11.1 Jumper Settings of Daughter Board MR-5100RA-5



Note: When the Lite Cradle is joined with Integrated Pad, the COM2 and COM3 ports shown on Pad system are actually COM1 and COM2 ports of the daughter board respectively, because the Lite Cradle's COM ports are deployed according to OS Image built by Protech and COM1 port placement has been used by Pad system.

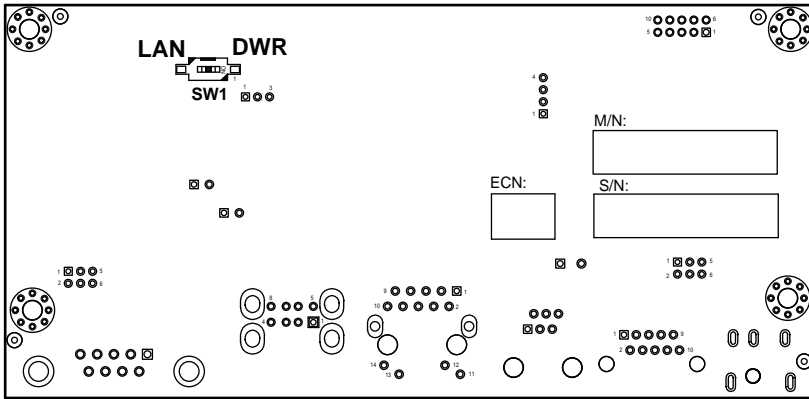


Figure 3-7. MR-5100RA-5 Daughter Board Component Locations (Bottom View)

3.11.2 Daughter Board MR-5100RA-2 Connector Locations

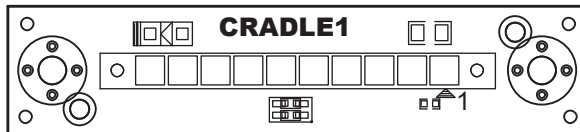


Figure 3-8. MR-5100RA-2 Daughter Board Component Locations (Top View)

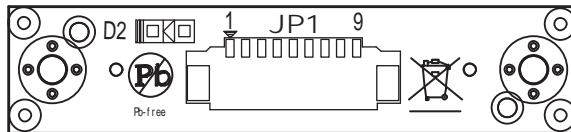



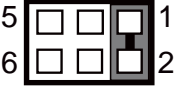
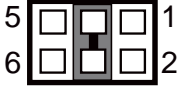
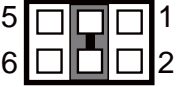
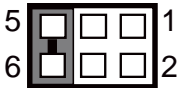
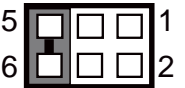
Figure 3-9. MR-5100RA-2 Daughter Board Component Locations (Bottom View)

3.12 Setting Daughter Board MR-5100RA-5 Connectors and Jumpers

3.12.1 COM1, COM2 Port Pin9 Definition Selection Guide

Jumper Location: JP_COM1 and JP_COM2

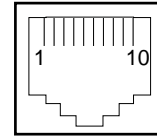
Description: COM1, COM2 Port Pin9 RI/+5V/+12V Selection

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

3.12.2 RJ-45 COM Port (COM1)

COM1(RS-232, RJ-45) Connector Pin Assignment

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI/5V/12V
5	GND	-	



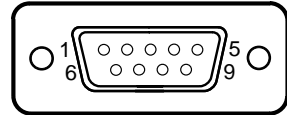
COM1

Note: COM1 Pin 9 is selectable for RI, +5V or +12V by jumper setting. Default setting is RI. Please see “COM1, COM2 Port Pin9 Definition Selection Guide” section for selection details.

3.12.3 D-Sub 9 COM Port (COM2)

COM2(RS-232, D-Sub 9) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI/5V/12V
5	GND	-	



COM2

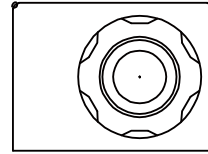
Note: COM2 Pin 9 is selectable for RI, +5V or +12V by jumper setting. Default setting is RI. Please see “COM1, COM2 Port Pin9 Definition Selection Guide” section for selection details.

3.12.4 DC-IN Port (DC_IN1)

Port Name: DC_IN1

Description: DC Power-In Port. The DC-IN Port is located on the bottom side of Lite Cradle.

PIN	ASSIGNMENT
1	VCC12V
2	GND
3	GND



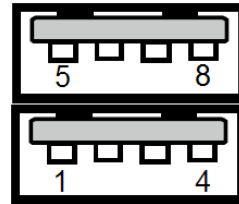
DC_IN1

3.12.5 Dual USB Ports (USB1)

Port Name: USB1

Description: Dual USB 2.0 Type A Connectors

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5V	5	VCC5V
2	USB_DN	6	USB_DN
3	USB_DP	7	USB_DP
4	GND	8	GND



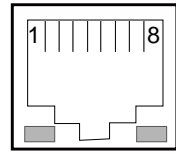
USB1

Note: The top USB 2.0 connector pin assignments are the same as the one below.

3.12.6 Local Area Network (LAN) Port (LAN1)

Port Name: LAN1

Description: a Giga LAN RJ-45 Port



Green/Orange Yellow

LAN1

PIN	ASSIGNMENT
1	MX0+
2	MX0-
3	MX1+
4	MX1-
5	NC
6	NC
7	NC
8	NC

LAN LED Status

There are 2 LAN LED indicators for LAN on the bottom side of the Lite Cradle. By observing their status, you can know the status of the Ethernet connection.

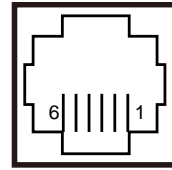
LAN LED Indicator	Color	Status	Description
Left Side LED	Orange	Blink	Giga LAN connection is activated.
	Green	Blink	10/100Mbps LAN connection is activated.
Right Side LED	Green	On	LAN switch/hub connected.

3.12.7 Cash Drawer Port (DRW1)

Port Name: DRW1

Description: RJ-11 Cash Drawer Port

PIN	ASSIGNMENT
1	GND
2	DRAWER_OPEN
3	DRAWER_SENSE
4	VCC12V
5	NC
6	GND

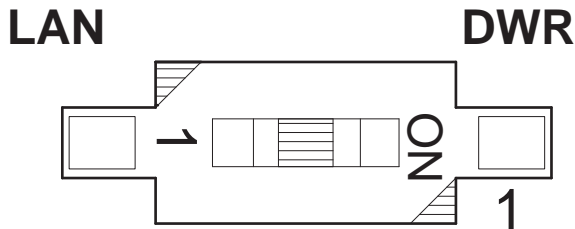


DRW1

3.12.8 LAN Port & Cash Drawer Function Switch (SW1)

Connector Name: SW1

Description: LAN Port and Cash Drawer function selection



SW1

PIN	ASSIGNMENT
1	CASH DRAWER
2	LAN

Note: Users need to use a ball point pen or a pin to toggle the DIP switch.
Default: LAN

3.13 Setting Daughter Board MR-5100RA-2 Connector

3.13.1 Lite Cradle Connector (CRADLE1)

Connector Name: CRADLE1

Description: Lite Cradle Connector



CRADLE1

PIN	ASSIGNMENT
1	GND
2	CRA_DCIN
3	CRA_DCIN
4	GND
5	USB_DP
6	USB_DP
7	USB_DN
8	USB_DN
9	V5P0S
10	GND

4 Software Utilities

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

- Installing Intel[®] Chipset Software Installation Utility
- Installing Audio Realtek Software Installation Utility
- Installing G-Sensor Software Installation Utility
- Installing Wi-Fi & Bluetooth Software Installation Utility
- Installing Light Sensor Software Installation Utility
- Installing Microsoft Hotfix kb3211320 and kb3213986 Driver Utility
- Cash Drawer API Reference

4.1 Introduction

MH-5102 Driver Utilities have been stored in the Integrated Pad system:

File Path: C:\MH-5102_v1.0

Filename (Assume that drive is C:)	Purpose	Win10 64-bit OS
C:\MH-5102_v1.0\DRIVER\ Platform\1_Main Chip \Win10-64Bit	Intel® Chipset Device Software installer	✓
C:\MH-5102_v1.0\DRIVER\ Platform\2_Audio\ Win10-64Bit	Realtek High Definition Audio System Software	✓
C:\MH-5102_v1.0\DRIVER\ Platform\3_G-sensor\ Win10-64Bit	ST Microelectronics 3 Axis Digital Accelerometer Installer	✓
C:\MH-5102_v1.0\DRIVER\ Platform\4_WIFI&BlueTooth\ Win10-64Bit	AMPAK AP6356SDPR Software	✓
C:\ MH-5102_v1.0\DRIVER\ Platform\5_Light Sensor\Win10-64Bit	AL3320A Software	✓
C:\ MH-5102_v1.0\DRIVER\ Platform\6_Hot Fix\Win10-64Bit	Microsoft Hotfix kb3211320 and kb3213986 for Windows10 64-bit critical security update	✓

✓: Support

Note: After the OS installation is completed, the driver utilities will also be installed at the same time.

4.2 Installing Intel® Chipset Software Installation Utility

Introduction

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

- Core PCI and ISAPNP Services
- PCIe Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

The utility pack is to be installed only for Windows® 10 series (64-bit). Please follow the steps below to install:

- 1** Enter the **C:\MH-5102_v1.0 > DRIVER > Platform > 1_Main Chip > Win10-64Bit > cht-t4_win10_x64_ww08_th2_d0_pr2 > Installer > PlatformInstaller** folder where the Chipset driver is located.
- 2** Click **Setup.exe** file for driver installation.
- 3** Follow the on-screen instructions to install the driver.
- 4** Enter the **C:\MH-5102_v1.0 > DRIVER > Platform> 1_Main Chip > Win10-64Bit > cht-t4_win10_x64_ww08_th2_d0_pr2\Installer\SEC Installer** folder.
- 5** Click **SetupTXE.exe** file for driver installation.
- 6** Follow the on-screen instructions to install the driver.
- 7** Once the installation is completed, restart MH-5102 for the changes to take effect.

After the Chipset driver is installed, the following driver utilities will also be installed at the same time:

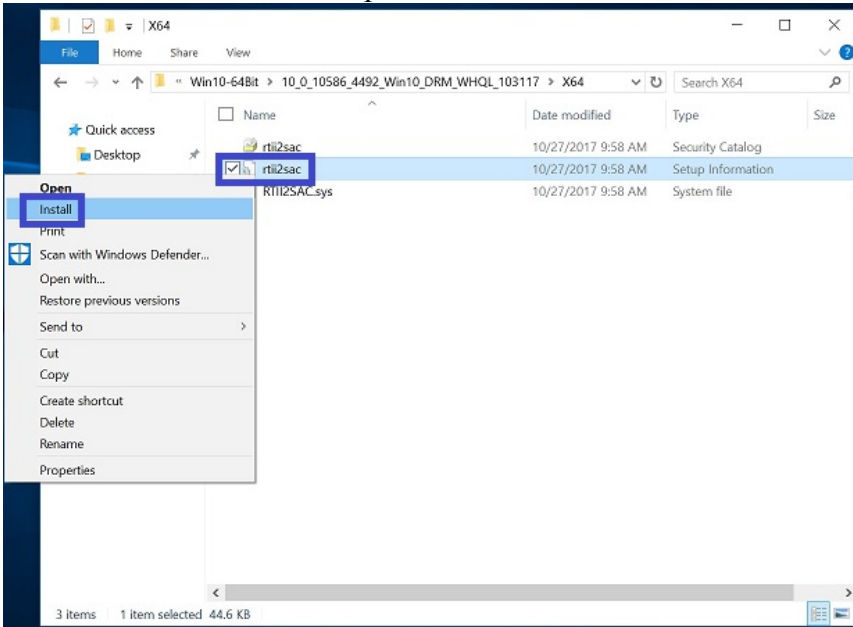
- Audio driver utility
- BM driver utility
- DPTF driver utility
- GFX driver utility
- GPIO driver utility
- GPIOVirtual driver utility
- I2C driver utility
- MBI driver utility
- PMIC driver utility
- Sensor driver utility
- TXEI driver utility
- UART driver utility
- WCE driver utility

For more details on the installation procedure, refer to the **MH-5102 README V1.0.pdf** file located under **C:\MH-5102_v1.0**.

4.3 Installing Audio Realtek Software Installation Utility

After the default Audio driver utility has been installed in the procedure above, it will not function until you have installed Realtek driver utilities. Please follow the steps below:

- 1 Enter the **C:\MH-5102_v1.0 > DRIVER > Platform > 2_Audio > Win10-64Bit > 0_0_10586_4492_Win10_DRM_WHQL_103117\X64** folder where the Audio Realtek driver is located.
- 2 Click the file "**rtii2sac.inf**" and then right-click the mouse and select "**install**" from the drop-down list.



- 3 Once the installation is completed, restart MH-5102 for the changes to take effect, and the audio function can start to work normally.

4.4 Installing G-Sensor Software Installation Utility

The G-Sensor driver utility provided allows users to turn the touchscreen horizontally or vertically. Please follow the steps below to install G-Sensor driver utilities:

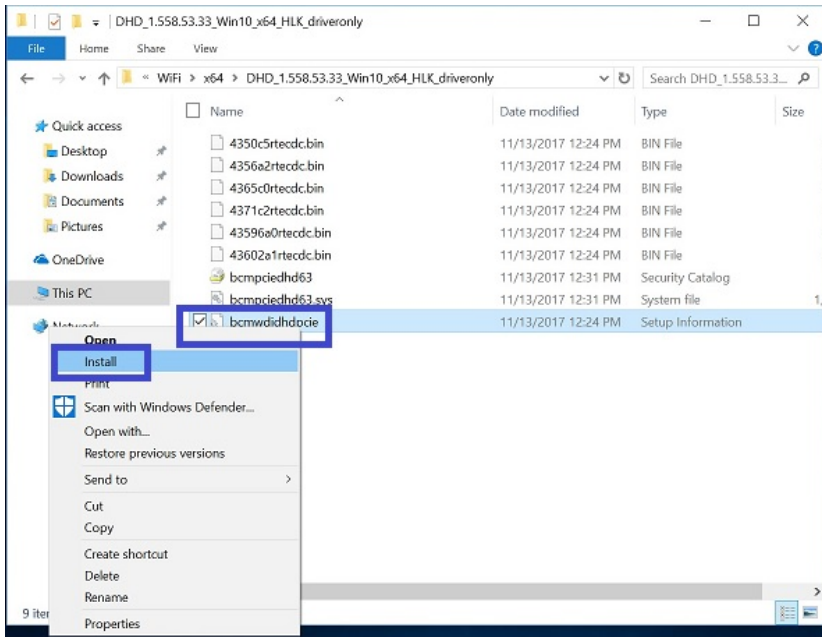
- 1** Enter the **C:\MH-5102_v1.0 >DRIVER > Platform\3_G-sensor\Win10-64Bit\4.22.0080_signed** folder.
- 2** Click **setup.exe** file for driver installation.
- 3** Once the installation is completed, restart MH-5102 for the changes to take effect.

4.5 Installing Wi-Fi and Bluetooth Software Installation Utility

4.5.1 Installing Wi-Fi Software Installation Utility

Please follow the steps below to install Wi-Fi driver utilities:

- 1 Enter the **C:\MH-5102_v1.0 > DRIVER > Platform\4_WIFI&BlueTooth\Win10-64Bit\AP6356SDPR\Wi-Fi\x64\DHD_1.558.53.33_Win10_x64_HLK_driveronly** folder.
- 2 Click the file "**bcmwdidhpcie.inf**" and then right-click the mouse and select "**install**" from the drop-down list.

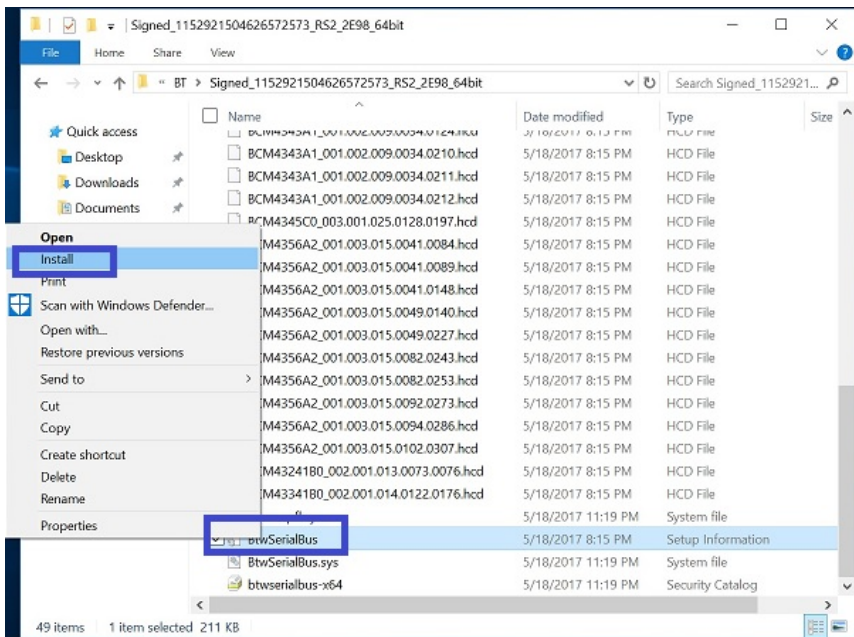


- 3 Follow the on-screen instructions to install the Wi-Fi driver.
- 4 Once the installation is completed, restart MH-5102 for the changes to take effect.

4.5.2 Installing Bluetooth Software Installation Utility

Please follow the steps below to install Bluetooth driver utilities:

- 1 Enter the **C:\MH-5102_v1.0 > DRIVER > Platform\4_WIFI&BlueTooth\Win10-64Bit\AP6356SDPR\BT \Signed_1152921504626572573_RS2_2E98_64bit** folder.
- 2 Click the file "**BtwSerialBus.inf**" and then right-click the mouse and select "**install**" from the drop-down list.



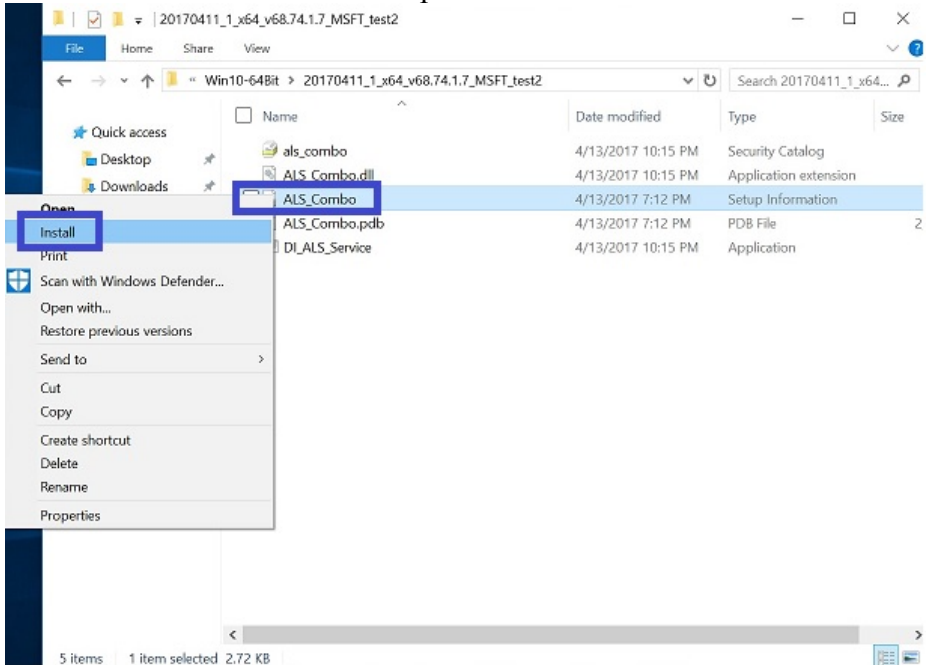
Follow the on-screen instructions to install the Bluetooth driver.

- 3 Once the installation is completed, restart MH-5102 for the changes to take effect.

4.6 Installing Light Sensor Software Installation Utility

Please follow the steps below to install Light Sensor driver utilities:

- 1 Enter the **C:\MH-5102_v1.0 > DRIVER > Platform\5_Light Sensor\Win10-64Bit\20170411_1_x64_v68.74.1.7_MSFT_test 2** folder where the Audio Realtek driver is located.
- 2 Click the file "**ALS_Combo.inf** " and then right-click the mouse and select "**install**" from the drop-down list.



- 3 Once the installation is completed, restart MH-5102 for the changes to take effect, and the audio function can start to work normally.

4.7 Installing Microsoft Hotfix kb3211320 and kb3213986 Driver Utility

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

- 1** Enter the **C:\MH-5102_v1.0 > DRIVER > Platform > 6_Hot Fix > Win10-64Bit** folder.
- 2** Click the **windows10.0-kb3211320-x64** and **windows10.0-kb3213986-x64** files for critical security update.
- 3** Follow the on-screen instructions to complete the installation.
- 4** Once the installation is completed, shut down the system and restart MH-5102 for the changes to take effect.

4.8 Cash Drawer API Function

Init_Drawer	
int Init_Drawer(void);	
Purpose	Initialize the Cash Drawer.
Return	True (1) on success, False (0) on failure
Example	<pre> if (Init_Drawer() > 0) { // "Success!" } else { // "Failure!" } </pre>

Release_Drawer	
int Release_Drawer(void);	
Purpose	Release the Cash Drawer.
Return	True (1) on success, False (0) on failure

Example	<pre> if (Release_Drawer() > 0) { //"Success!" } else { //"Failure!" } </pre>
----------------	--

Drawer_Open	
<pre> int Drawer_Open(unsigned char channel, unsigned char time); </pre>	
Purpose	Open the Cash Drawer.
Value	channel = 0 (Open the Cash Drawer1 <hardware is disabled> channel = 1 (Open the Cash Drawer2) time : Parameter range is 5~50, unit is 10 millisecond. (Time range : 50~500 millisecond)
Return	True (1) on success, False (0) on failure
Example	<pre> if (Drawer_Open(1, 10) == 0) { //"Failure!" } else { //"Success!" } </pre>

Drawer_Status	
int Drawer_Status(void);	
Purpose	Get the cash drawer status.
Return	0x31 -> Drawer is open ; 0x30 -> Drawer is close ; 0x00 -> Failure
Example	<pre> Drawer_ST = Drawer_Status(); if (Drawer_ST == 0x31) { //"Open!" } else if (Drawer_ST == 0x30) { //"Close!" } else { //"Failure!" } </pre>

5 BIOS SETUP

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

- Main Menu
- Advanced Menu
- Security Menu
- Boot Menu
- Exit Menu

5.1 Introduction

The board MH-5102 <Intel® Atom® > uses an Insyde BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the BIOS Setup program, Power-on Self-Test (POST), the PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

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

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

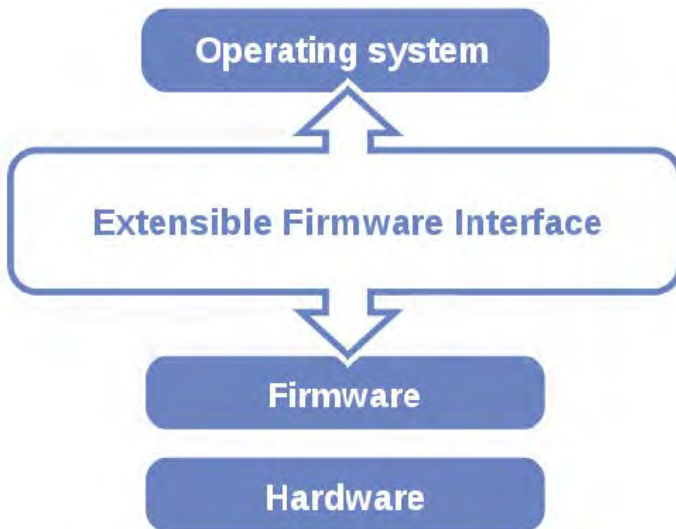


Figure 5-1. Extensible Firmware Interface Diagram

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

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

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

5.2 Accessing Setup Utility

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

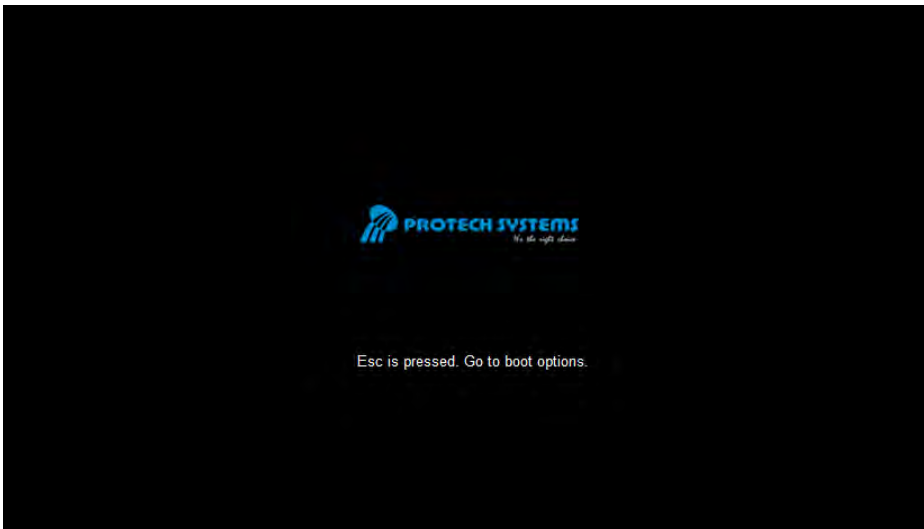
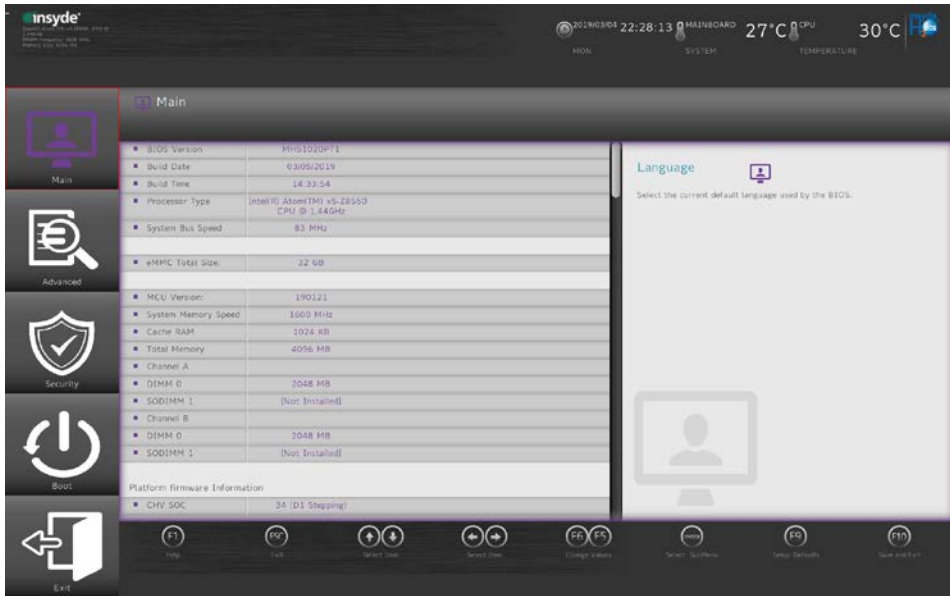


Figure 5-2. POST Screen



Figure 5-3. Front Page Screen

Press <Esc> (the one that shares the decimal point at the bottom of the number keypad) to select SCU icon to access the Setup program. In a moment, the main menu of the Insyde Setup Utility will appear on the screen:



BIOS Setup Menu Initialization Screen

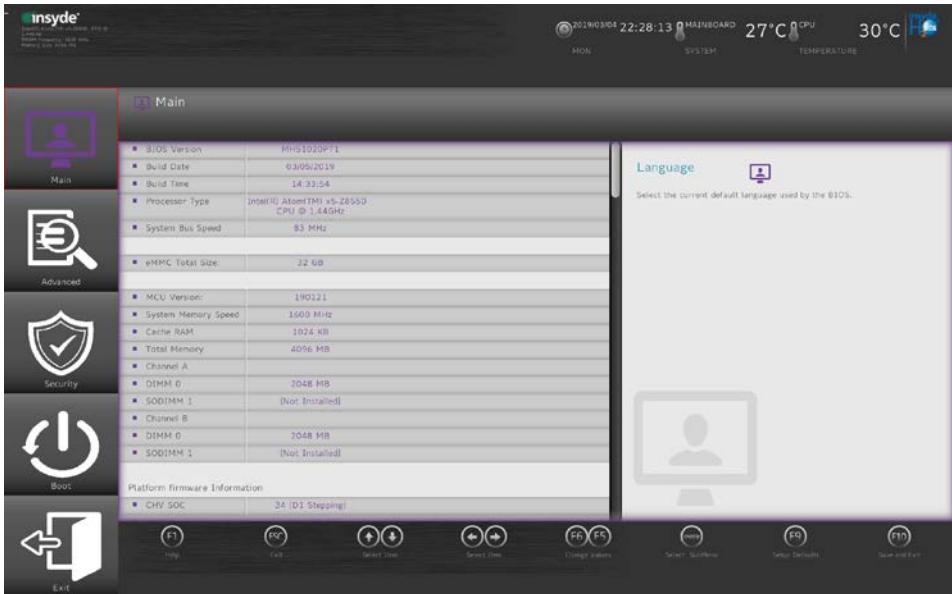
You may move the cursor by <↑> and <↓> keys to highlight the individual menu items. As you highlight each item, a brief description of the highlighted selection will appear at the bottom of the screen.

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

5.3 Main

Menu Path *Main*

The **Main** menu allows you to view the BIOS Information, change the system date and time, and view the user access privilege level. Use tab to switch between date elements. Use <↑> or <↓> arrow keys to highlight the item and enter the value you want in each item.



Main Screen (1)

Main		
BIOS Setting	Options	Description/Purpose
BIOS Version	No changeable options	Displays the BIOS Version.
Build Date	No changeable options	Displays the current Build Date.
Build Time	No changeable options	Displays the current Build Time.
Processor Type	No changeable options	SOC Type on the platform.
System Bus Speed	No changeable options	Displays Bus speed.
eMMC Total Size	No changeable options	Displays the eMMC total size.
MCU Version	No changeable options	Displays the MCU version.
System Memory Speed	No changeable options	Displays Memory Speed.
Cache RAM	No changeable options	Displays Cache RAM size.

Main		
BIOS Setting	Options	Description/Purpose
Total Memory	No changeable options	Displays Total memory size.
Channel A		
DIMM 0	No changeable options	Displays the DIMM 0 channel size.



Main Screen (2)

Main		
BIOS Setting	Options	Description/Purpose
SODIMM 1	No changeable options	Displays the DODIMM 1 size.
Channel B		
SODIMM 0	No changeable options	Displays the DODIMM 0 size.
SODIMM 0	No changeable options	Displays the DODIMM 1 size.
CHV SOC	No changeable options	Displays the CPU's stepping information.
MRC Version	No changeable options	Displays the MRC Version.
PUNIT FW	No changeable options	Displays the PUNIT FW Version.
PMC FW Patch	No changeable options	Displays the PMC FW Patch version.
TXE FW Version	No changeable options	Displays TXE FW Version.
GOP	No changeable options	Displays the GOP version.
Microcode Revision	No changeable options	Displays the Microcode FW version.

Main		
BIOS Setting	Options	Description/Purpose
CPU Flavor	No changeable options	Displays the CPU's flavor type.



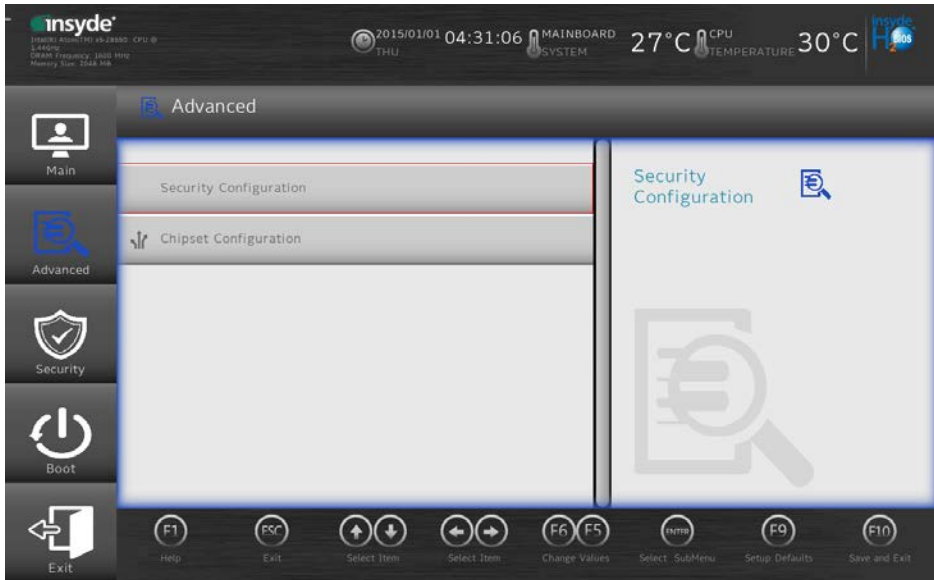
Main Screen (3)

Main		
BIOS Setting	Options	Description/Purpose
Board ID	No changeable options	Displays the Board ID of the SoC.
Fab ID	No changeable options	Displays the Fab ID.
Language	- English - Francais - 中文 - 日文	Selects the current default language used by the BIOS.
System Time	- hour - minute - Second	Specifies the current time.
System Date	- month - day - year	Specifies the current date.
About this Software	No changeable options	Displays this Software information.

5.4 Advanced

Menu Path *Advanced*

This menu provides security configurations and chipset configuration.



Advanced Menu Screen

Advanced		
BIOS Setting	Options	Description/Purpose
Security Configuration	Sub-Menu	Security Configuration.
Chipset Configuration	Sub-Menu	Advanced Chipset Configuration Options.

5.4.1 Advanced – Security Configuration

Menu Path *Advanced > Security Configuration*



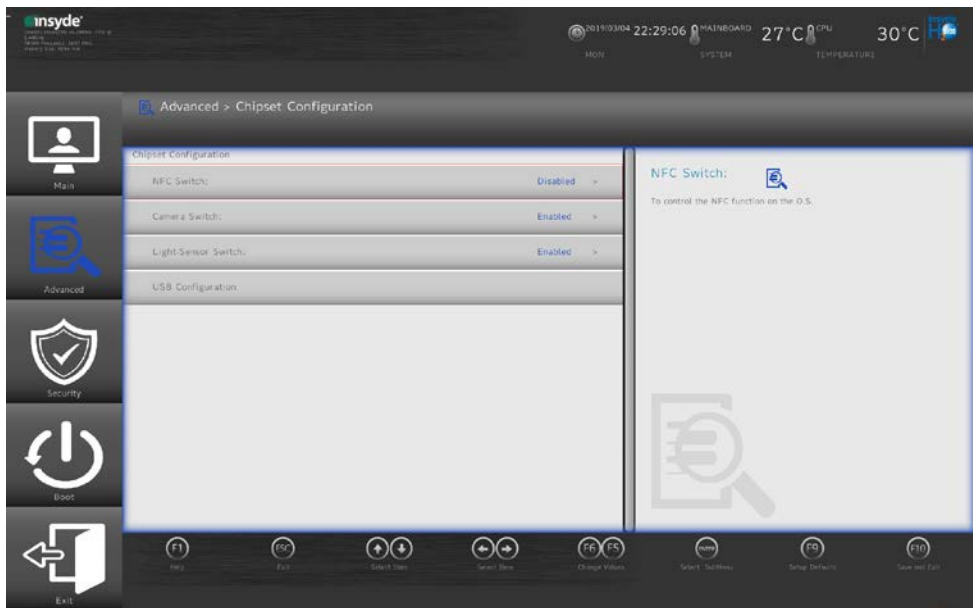
Security Configuration Screen

Advanced > Security Configuration		
BIOS Setting	Options	Description/Purpose
TXE FW Version	No changeable options	TXE FW Version.
TXE FW Capabilities	No changeable options	TXE FW Capabilities.
TXE FW Features	No changeable options	TXE FW Features.
TXE FW OEM Tag	No changeable options	TXE FW OEM Tag.
TXE Firmware Mode	No changeable options	TXE Firmware Mode.
TXE HMRFPO	- Enabled - Disabled	TXE HMRFPO.
TXE Firmware Update	- Enabled - Disabled	TXE Firmware Update.
TXE EOP Message	- Enabled - Disabled	TXE EOP Message.
TXE Unconfiguration Perform	- YES - No	Sends EOP Message before you enter OS.

Advanced > Security Configuration		
BIOS Setting	Options	Description/Purpose
Platform Trust Technology		
Measured Boot	- Enabled - Disabled	Measured Boot.
Target TPM device	- fTPM - dTPM	Target TPM device.

5.4.2 Advanced – Chipset Configuration

Menu Path *Advanced > Chipset Configuration*



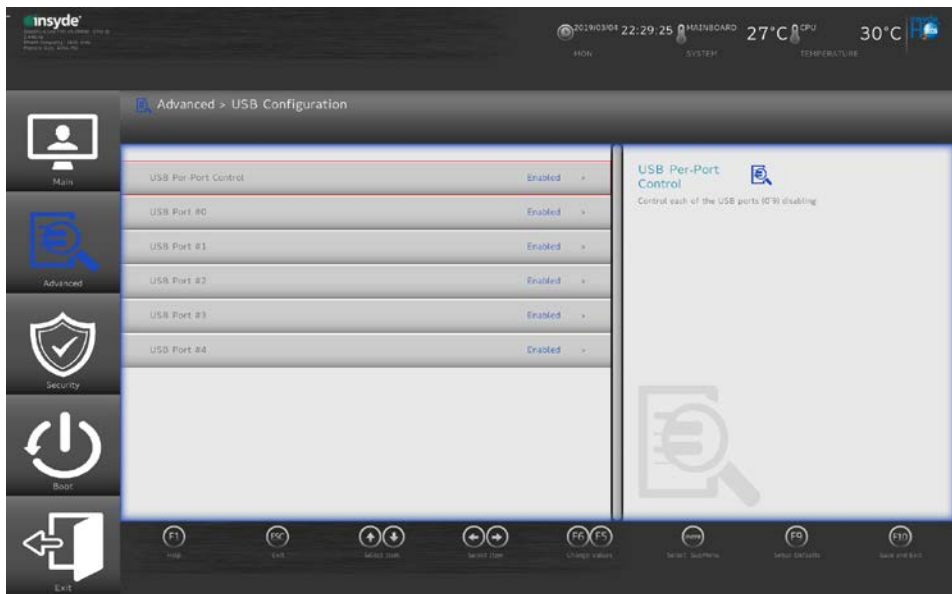
Chipset Configuration Screen

Advanced > Chipset Configuration		
BIOS Setting	Options	Description/Purpose
NFC Switch	- Enabled - Disabled	To control the NFC function on the O.S.
Camera Switch	- Enabled - Disabled	To control camera function on the O.S.

Advanced > Chipset Configuration		
BIOS Setting	Options	Description/Purpose
Light-Sensor Switch	- Enabled - Disabled	To control the Light-Sensor function on the O.S.
USB Configuration	Sub-Menu	USB Configuration Settings.

Advanced – Chipset Configuration – USB Configuration

Menu Path *Advanced > Chipset Configuration > USB Configuration*



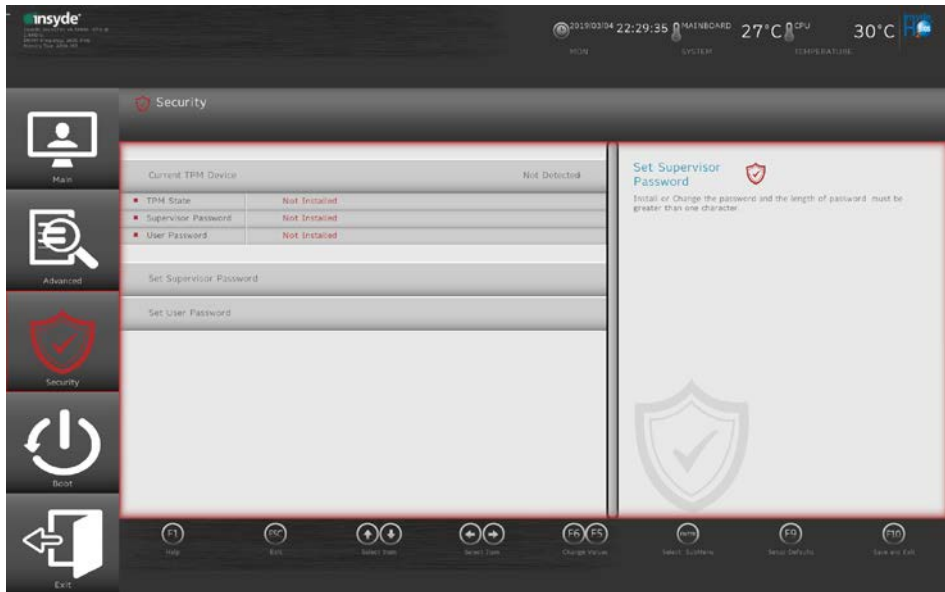
USB Configuration Screen

Advanced > Chipset Configuration > USB Configuration		
BIOS Setting	Options	Description/Purpose
USB Per-Port Control	- Enabled - Disabled	Controls the disabling for each of the USB ports (0 ~ 9).
USB Port #0	- Enabled - Disabled	Disables USB port #0.
USB Port #1	- Enabled - Disabled	Disables USB port #1.
USB Port #2	- Enabled - Disabled	Disables USB port #2.

Advanced > Chipset Configuration > USB Configuration		
BIOS Setting	Options	Description/Purpose
USB Port #3	- Enabled - Disabled	Disables USB port #3.
USB Port #4	- Enabled - Disabled	Disables USB port #4.

5.5 Security

Menu Path *Security*



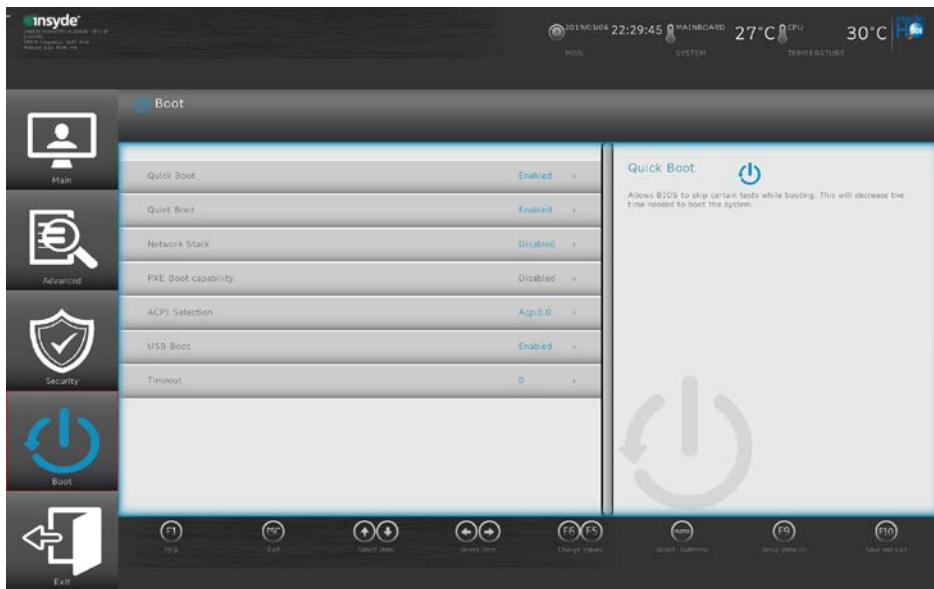
Security Screen

Security		
BIOS Setting	Options	Description/Purpose
Current TPM Device		
TPM State	No changeable options	Displays the TPM state.
Supervisor Password	No changeable options	Displays the Supervisor Password state.
User Password	No changeable options	Displays the User Password state.

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

5.6 Boot

Menu Path *Boot*



Boot Screen

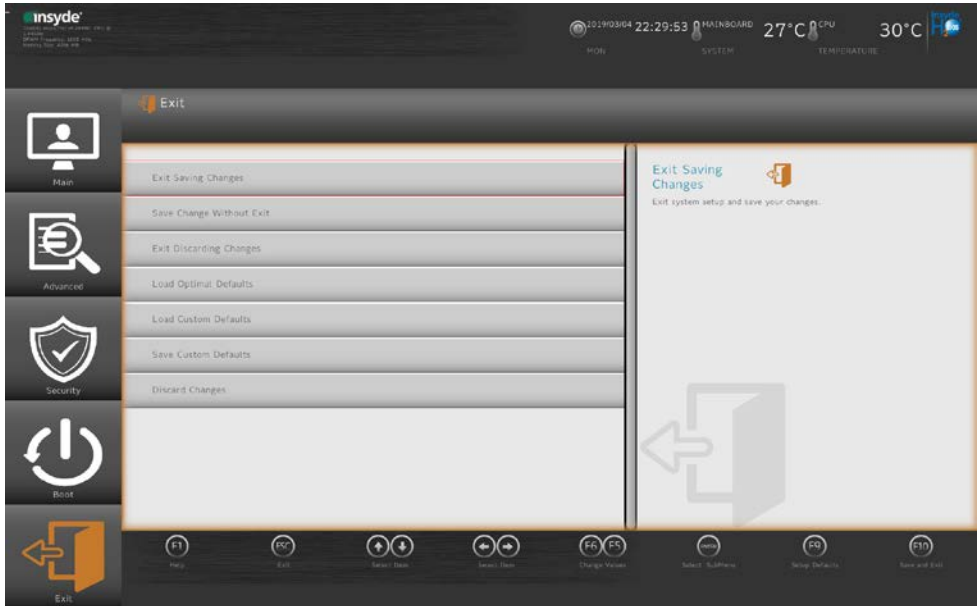
Boot		
BIOS Setting	Options	Description/Purpose
Quick Boot	- Enabled - Disabled	Decreases the time required to boot the system.
Quiet Boot	- Enabled - Disabled	Enables or Disables booting in Text Mode.
Network Stack	- Enabled - Disabled	Network Stack supports Windows 8 BitLocker Unlock / UEFI IPv4/IPv6 PXE/ Legacy PXE OPROM.

Boot		
BIOS Setting	Options	Description/Purpose
PXE Boot capability	- Enabled - Disabled	<ul style="list-style-type: none"> • Disabled: Supports Network Stack. • UEFI PXE: IPv4 / IPv6. • Legacy: Legacy PXE OPROM only.
ACPI Selection	- Acpi 1.0B - Acpi 3.0 - Acpi 4.0 - Acpi 5.0	Selects booting to ACPI
USB Boot	- Enabled - Disabled	Disables or Enables booting to USB boot devices.
Timeout	- second	The number of seconds that the firmware will wait before booting the original default boot selection.

5.7 Exit

Menu Path *Exit*

The **Exit** allows users to save or discard changed BIOS settings as well as load the option and custom defaults for BIOS settings.



Exit Screen

Exit		
BIOS Setting	Options	Description/Purpose
Exit Saving Changes	No changeable options	Exits the system and saves the changes in NVRAM.
Save Change without Exit	No changeable options	Saves your changes without exiting the system.
Exit Discarding Changes	No changeable options	Exits the system without saving any changes configured in BIOS settings.
Load Option Defaults	No changeable options	Loads the optimized defaults for BIOS settings.
Load Custom Defaults	No changeable options	Loads Custom Defaults.
Save Custom Defaults	No changeable options	Saves Custom Defaults.
Discard Changes	No changeable options	Cancels the BIOS settings you have previously configured.

Appendix A System Diagrams

This appendix contains exploded diagrams and part numbers of the Pad and Lite Cradle for MH-5102 system.

The following topics are included:

Exploded Diagrams for Integrated Pad

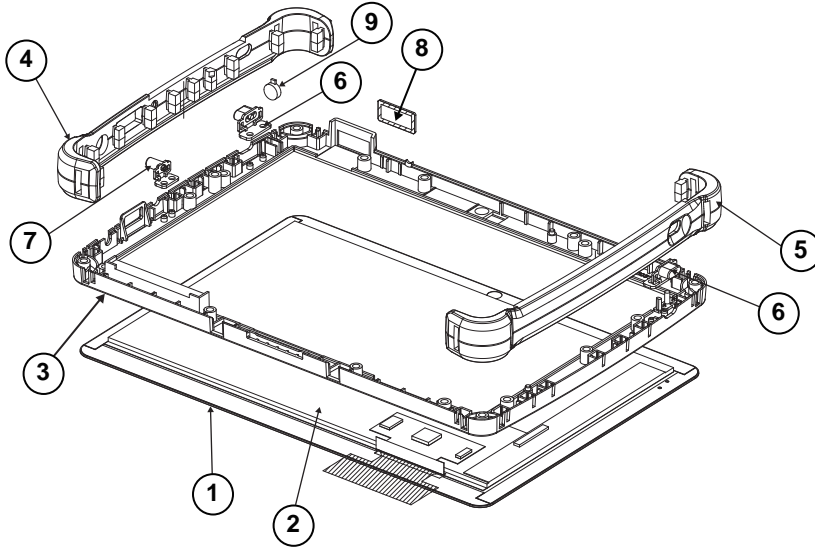
- Exploded Diagram for Top Cover, Touch Panel and Panel Assembly
- Exploded Diagram for Pad PCBA Assembly
- Exploded Diagram for Bottom Cover Assembly
- Exploded Diagram for Camera Module & Barcode Scanner Module Assembly
- Exploded Diagram for Back Cover Assembly
- Exploded Diagram for Smart Card Reader Assembly

Exploded Diagrams for Lite Cradle

- Exploded Diagram for Cradle Top Cover Assembly
- Exploded Diagram for Cradle PCBA & Bottom Cover Assembly

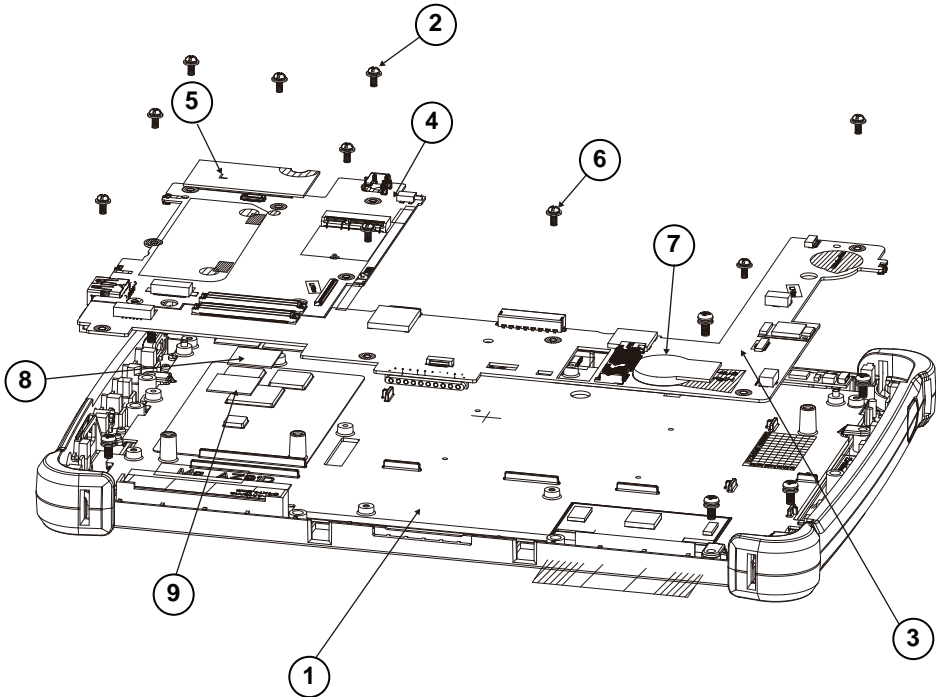
Integrated Pad Exploded Diagrams

Exploded Diagram For Top Cover & Touch Panel & Panel Assembly



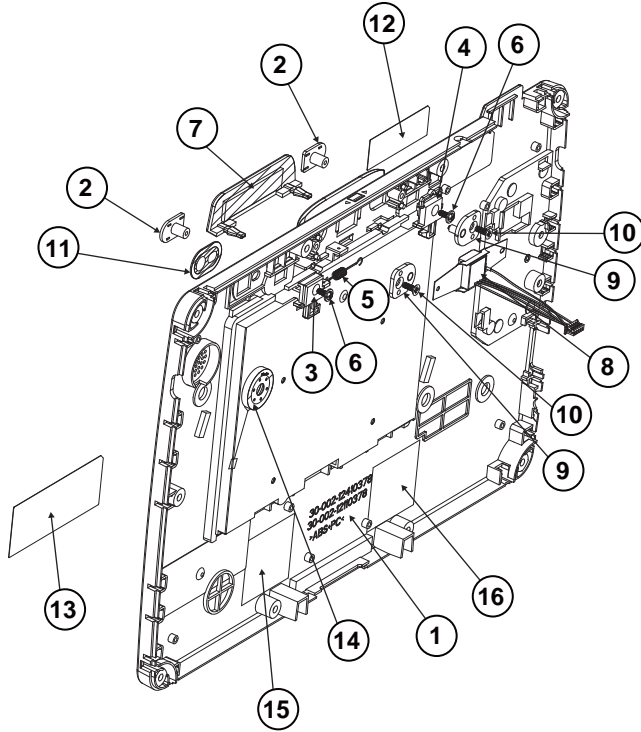
ITEM	Description	Part No.	Q'ty
1	Touch Panel (OCA direct bonding)	52-380-14401831	1
2	LCD Panel (OCA direct bonding)	52-380-14401831	1
3	MH-5102 Top Cover	30-002-12210455	1
4	MH-5100 Bumper Right	30-013-48300378	1
5	MH-5100 Bumper Left	30-013-48200378	1
6	MH-5100 Barcode Button	30-046-28110378	2
7	MH-5100 Power Button	30-002-28310378	1
8	MH-5100 Barcode Lens (Black)	30-021-02230378	1
9	Vibration Motor	27-055-35501071	1

Exploded Diagram For Pad PCBA Assembly



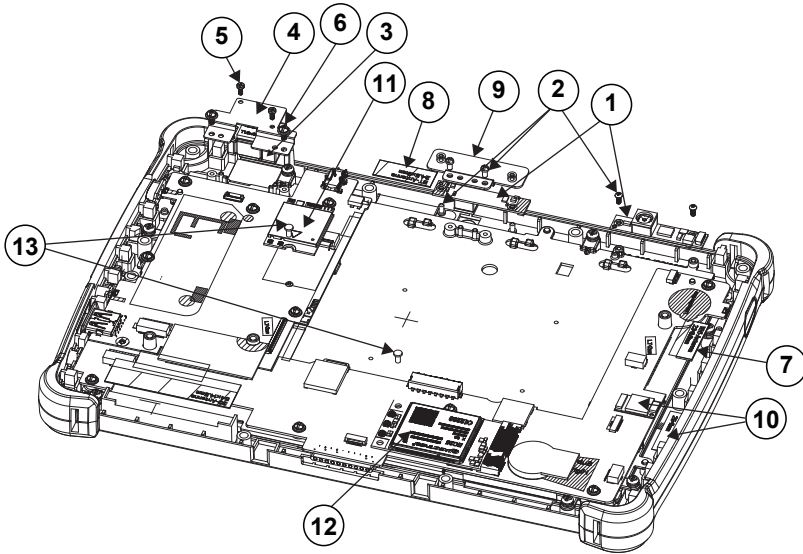
ITEM	Description	Part No.	Q'ty
1	MH-5100 Panel Holder	80-029-34001455	1
2	Round Head With Spring Washer Screw (M2.5x0.45Px6mm)	22-235-25006011	7
3	MH-5102 Carrier PCBA	N/A	1
4	MH-5102 CPU PCBA	N/A	1
5	MH-5102 Board to Board PCBA	N/A	1
6	Round Head With Spring Washer Screw #1 / M2x0.4Px5mm	22-232-20005311	11
7	Sub-Battery	N/A	1
8	Thermal Pad 15x15mm	N/A	3
9	Thermal Pad 10x10mm	81-006-81010003	1

Exploded Diagram For Bottom Cover Assembly



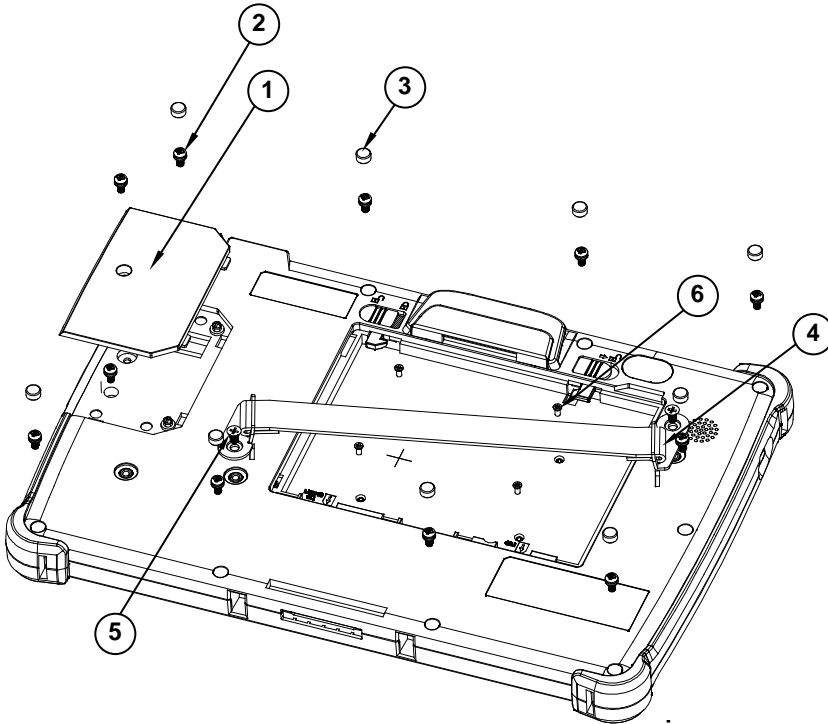
ITEM	Description	Part No.	Q'ty
1	MH-5102 Bottom Cover (Black)	30-002-12110455	1
2	MH-5100 Slide Key	30-002-28310378	2
3	MH-5100 Battery Hook	90-019-04110378	1
4	MH-5100 Battery Hook (Lock)	90-019-04210378	1
5	MH-5100 Battery Lock Spring	23-002-00000332	1
6	Round Washer Head Screw #1/T2.0x5mm	22-132-20005011	2
7	MH-5100 MSR Bumper Rubber	N/A	1
8	MSR Module	52-551-02043910	1
9	PA-8225 MSR Plate Pin	20-005-07001342	2
10	Flat Head Screw#1 / T2.6x6mm	22-112-26006011	2
11	Camera Lens	N/A	1
12	Warning Label	N/A	1
13	Rating Label	N/A	1
14	Speaker	N/A	1
15	4G Antenna AUX	N/A	1
16	4G Antenna MAIN	N/A	1

Exploded Diagram For Camera Module & Barcode Scanner Module Assembly



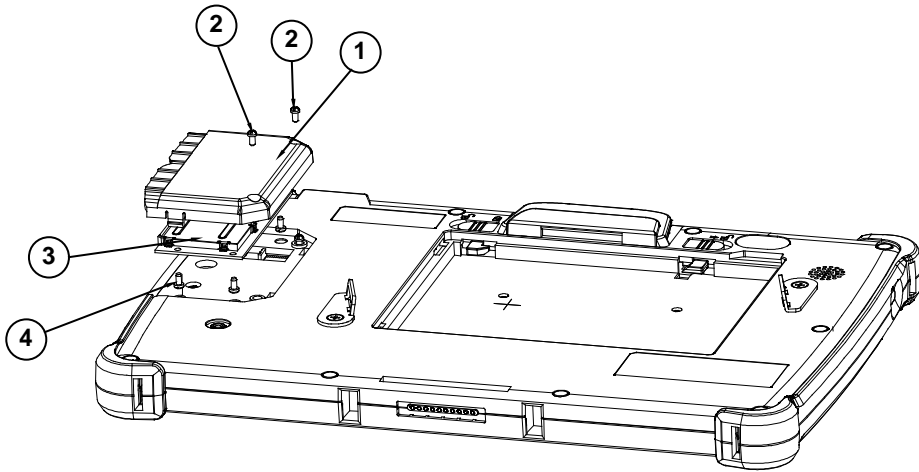
ITEM	Description	Part No.	Q'ty
1	Camera PCBA	N/A	2
2	Round Head Screw $\phi 3.3$ / #1 / M2x0.4Px4mm	22-232-20004811	6
3	Barcode Scanner Module	N/A	1
4	MH-5100 Barcode-Fix-Plate	80-005-03001378	1
5	Fillister Head Screw #0 / T1.7x4mm	22-175-17004011	2
6	Round Head With Spring Washer Screw #1 / M2x0.4Px5mm	22-232-20005311	2
7	Wi-Fi Antenna	N/A	1
8	Bluetooth Antenna	N/A	1
9	MH-5102 Front Camera Bracket	20-106-03001455	1
10	NFC Module & Antenna	N/A	1
11	WIFI Module	N/A	1
12	4G Module	N/A	1
13	Fillister Head Screw #1/M2x0.4Px4mm	22-272-20004011	2

Exploded Diagram For Back Cover Assembly



ITEM	Description	Part No.	Q'ty
1	MH-5100 Decoration Cover	30-002-28110378	1
2	Round Head With Spring Washer Screw (M2.5x0.45Px6mm)	22-235-25006011	11
3	MH-5100 -Screw-Hole-Plug	30-013-06100378	9
4	MH-5100 Strap Bracket	80-006-06001378	2
5	Pan Head Screw M3x0.5Px6mm	22-220-30006011	2
6	M2xL3mm Flat-Head-Screw	22-215-20003011	4

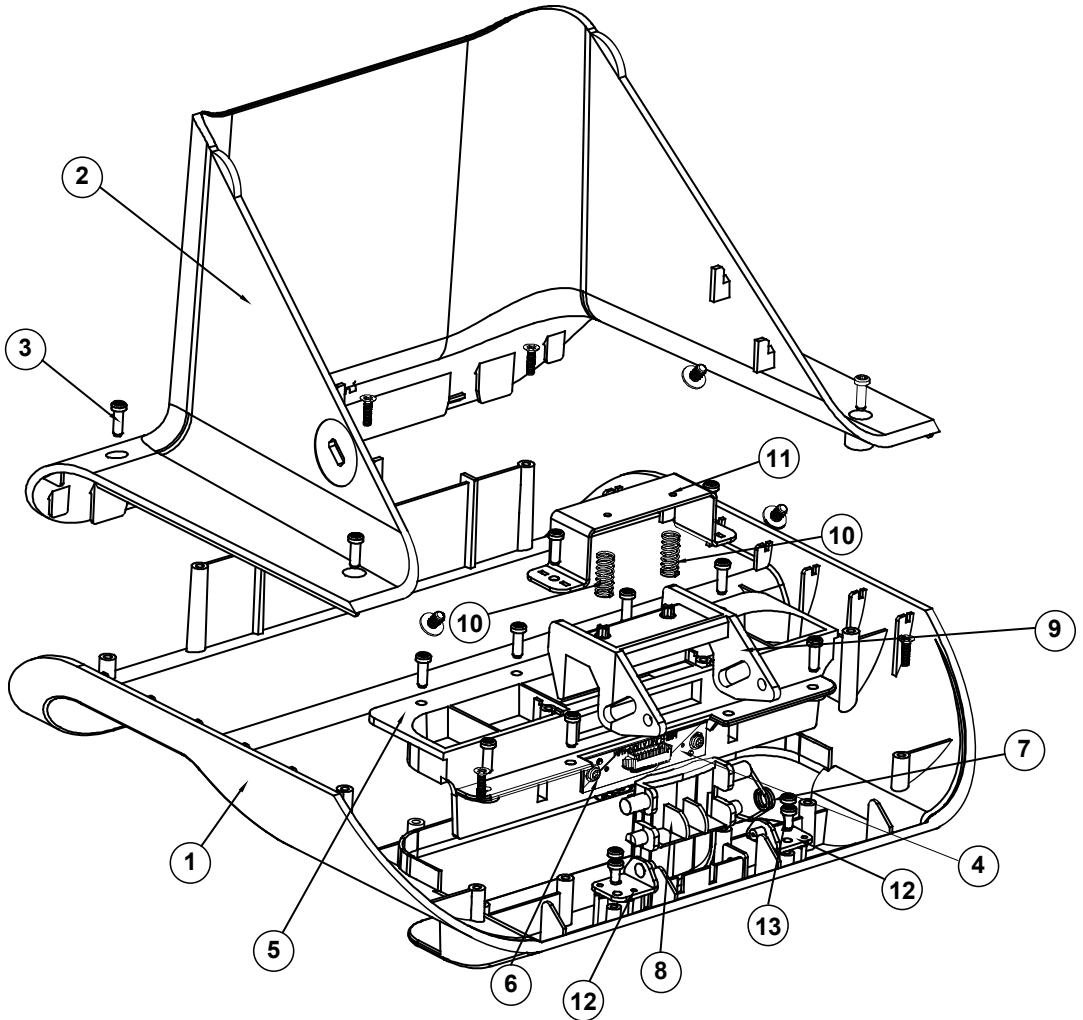
Exploded Diagram For Smart Card Reader Assembly



ITEM	Description	Part No.	Q'ty
1	MH-5100 Smart Card Cover	30-002-28610378	1
2	Round Head Screw $\phi 3.3$ / #1 / M2x0.4Px4mm	22-232-20004811	2
3	Smart Card Module	52-551-16000010	1
4	Pan Head Screw (T2.0x4mm)	22-125-20004011	4

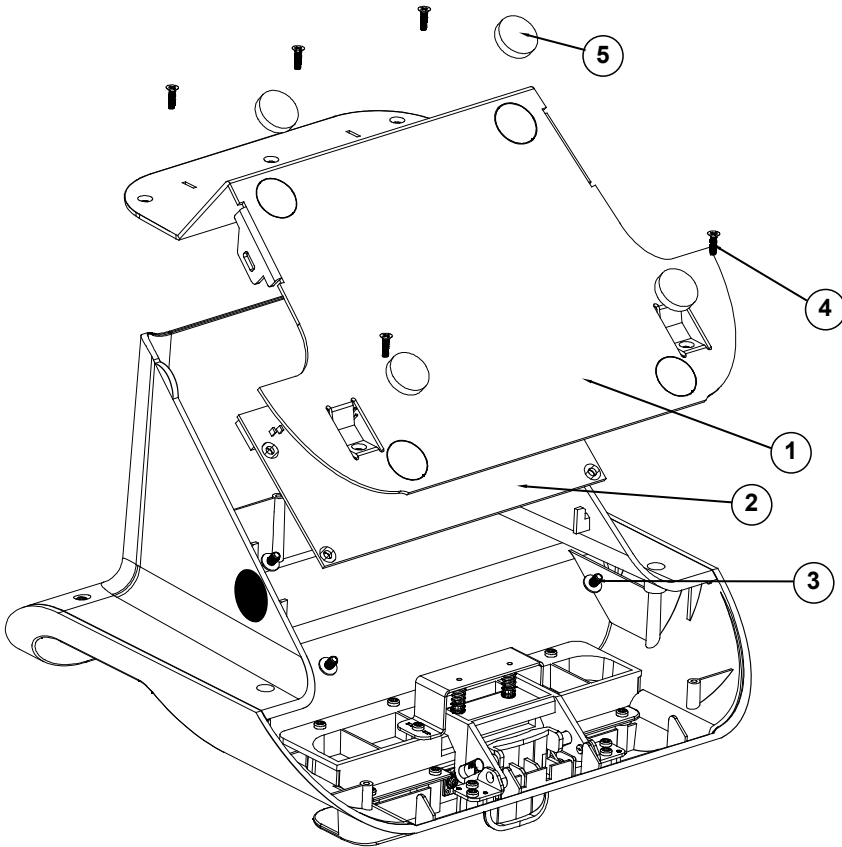
Lite Cradle Exploded Diagrams

Exploded Diagram For Cradle Top Cover Assembly



ITEM	Description	Part No.	Q'ty
1	MH-5102-Lite-Cradle-Top-Cover	30-002-28310378	1
2	MH-5102-Lite-Cradle-Rear-Cover	30-002-28210378	1
3	T2.6xL8mm Pan-Head-Screw	22-135-26008011	14
4	POGO Pin PCBA	10-625-01010025	1
5	MH-5102-Lite-Cradle-Hole-Cover	30-002-28510378	1
6	Pan Head screw (T2.0x4mm)	22-125-20004011	2
7	MH-5102-Lite-Cradle-Ejection-Spring	23-000-00010622	1
8	MH-5102-Lite-Cradle-Lock-Button	30-046-09230378	1
9	MH-5102-Lite-Cradle-Button-Hook	30-046-09130378	1
10	MT-590X Battery Lock Spring	23-000-01000132	2
11	MH-5102-Lite-Cradle-Lock-Spring-Cover	80-004-03001378	1
12	MH-5102-Lite-Cradle-Rotate-Plate	80-005-03002378	2
13	T2.3xL5mm Pan-Head-Screw	22-135-23005011	4

Exploded Diagram For Cradle PCBA & Bottom Cover Assembly



ITEM	Description	Part No.	Q'ty
1	MH-5102-Lite-Cradle-Metal-Plate	80-005-03003378	1
2	Lite Cradle PCBA	N/A	1
3	Round Washer Head Screw (M3x0.5Px6mm)	22-232-30006311	4
4	T2.6xL8mm Flat-Head-Screw	22-115-26008011	5
5	Rubber Foot $\phi=16 \times 3.5 \text{mm}$ (Black)	30-004-06800000	4

Appendix B Technical Summary

This appendix will give you a brief introduction of the allocation maps for MH-5102 resources.

The following topics are included:

- Interrupt Map
- I/O Map
- Memory Map
- DMA (Direct Memory Access) Map
- System BIOS Update Procedure

Interrupt Map

IRQ	Assignment
IRQ 0	System timer
IRQ 4	Communications Port (COM1)
IRQ 8	High precision event timer
IRQ 24	Intel SST Audio Device (WDM)
IRQ 25	Intel SST Audio Device (WDM)
IRQ 26	Intel SST Audio Device (WDM)
IRQ 27	Intel SST Audio Device (WDM)
IRQ 28	Intel SST Audio Device (WDM)
IRQ 29	Intel SST Audio Device (WDM)
IRQ 32	Intel(R) Serial IO I2C ES Controller
IRQ 33	Intel(R) Serial IO I2C ES Controller
IRQ 34	Intel(R) Serial IO I2C ES Controller
IRQ 35	Intel(R) Serial IO I2C ES Controller
IRQ 36	Intel(R) Serial IO I2C ES Controller
IRQ 37	Intel(R) Serial IO I2C ES Controller
IRQ 38	Intel(R) Serial IO I2C ES Controller
IRQ 39	Intel(R) Serial IO UART Controller
IRQ 40	Intel(R) Serial IO UART Controller
IRQ 41	Intel(R) Serial IO SPI Controller
IRQ 42	Intel(R) Serial IO DMA Controller
IRQ 43	Intel(R) Serial IO DMA Controller
IRQ 45	Intel SD Host Controller
IRQ 46	Intel SD Host Controller
IRQ 47	Intel SD Host Controller
IRQ 48	Intel Serial IO GPIO Controller
IRQ 49	Intel Serial IO GPIO Controller
IRQ 50	Intel Serial IO GPIO Controller
IRQ 54	Microsoft ACPI-Compliant System
IRQ 55	Microsoft ACPI-Compliant System
IRQ 56	Microsoft ACPI-Compliant System
IRQ 57	Microsoft ACPI-Compliant System
IRQ 58	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 59	Microsoft ACPI-Compliant System
IRQ 60	Microsoft ACPI-Compliant System
IRQ 61	Microsoft ACPI-Compliant System
IRQ 62	Microsoft ACPI-Compliant System
IRQ 63	Microsoft ACPI-Compliant System
IRQ 64	Microsoft ACPI-Compliant System
IRQ 65	Microsoft ACPI-Compliant System
IRQ 66	Microsoft ACPI-Compliant System
IRQ 67	Microsoft ACPI-Compliant System
IRQ 68	Microsoft ACPI-Compliant System
IRQ 69	Microsoft ACPI-Compliant System
IRQ 70	Microsoft ACPI-Compliant System
IRQ 71	Microsoft ACPI-Compliant System
IRQ 72	Microsoft ACPI-Compliant System
IRQ 73	Microsoft ACPI-Compliant System
IRQ 74	Microsoft ACPI-Compliant System
IRQ 75	Microsoft ACPI-Compliant System
IRQ 76	Microsoft ACPI-Compliant System
IRQ 77	Microsoft ACPI-Compliant System
IRQ 78	Microsoft ACPI-Compliant System
IRQ 79	Microsoft ACPI-Compliant System
IRQ 80	Microsoft ACPI-Compliant System
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System
IRQ 83	Microsoft ACPI-Compliant System
IRQ 84	Microsoft ACPI-Compliant System
IRQ 85	Microsoft ACPI-Compliant System
IRQ 86	Microsoft ACPI-Compliant System
IRQ 87	Microsoft ACPI-Compliant System
IRQ 88	Microsoft ACPI-Compliant System
IRQ 89	Intel(R) Serial IO SPI Controller

IRQ	Assignment
IRQ 89	Microsoft ACPI-Compliant System
IRQ 90	Intel(R) Serial IO SPI Controller
IRQ 90	Microsoft ACPI-Compliant System
IRQ 91	Microsoft ACPI-Compliant System
IRQ 91	Intel Serial IO GPIO Controller
IRQ 92	Microsoft ACPI-Compliant System
IRQ 93	Microsoft ACPI-Compliant System
IRQ 94	Microsoft ACPI-Compliant System
IRQ 95	Microsoft ACPI-Compliant System
IRQ 96	Microsoft ACPI-Compliant System
IRQ 97	Microsoft ACPI-Compliant System
IRQ 98	Microsoft ACPI-Compliant System
IRQ 99	Microsoft ACPI-Compliant System
IRQ 100	Microsoft ACPI-Compliant System
IRQ 101	Microsoft ACPI-Compliant System
IRQ 102	Microsoft ACPI-Compliant System
IRQ 103	Microsoft ACPI-Compliant System
IRQ 104	Microsoft ACPI-Compliant System
IRQ 105	Microsoft ACPI-Compliant System
IRQ 106	Microsoft ACPI-Compliant System
IRQ 107	Microsoft ACPI-Compliant System
IRQ 108	Microsoft ACPI-Compliant System
IRQ 108	Intel Serial IO GPIO Controller
IRQ 109	Microsoft ACPI-Compliant System
IRQ 110	Microsoft ACPI-Compliant System
IRQ 111	Microsoft ACPI-Compliant System
IRQ 112	Microsoft ACPI-Compliant System
IRQ 113	Microsoft ACPI-Compliant System
IRQ 114	Microsoft ACPI-Compliant System
IRQ 115	Microsoft ACPI-Compliant System
IRQ 116	Microsoft ACPI-Compliant System
IRQ 117	Microsoft ACPI-Compliant System
IRQ 118	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 119	Microsoft ACPI-Compliant System
IRQ 120	Microsoft ACPI-Compliant System
IRQ 121	Microsoft ACPI-Compliant System
IRQ 122	Microsoft ACPI-Compliant System
IRQ 123	Microsoft ACPI-Compliant System
IRQ 124	Microsoft ACPI-Compliant System
IRQ 125	Microsoft ACPI-Compliant System
IRQ 126	Microsoft ACPI-Compliant System
IRQ 127	Microsoft ACPI-Compliant System
IRQ 128	Microsoft ACPI-Compliant System
IRQ 129	Microsoft ACPI-Compliant System
IRQ 130	Microsoft ACPI-Compliant System
IRQ 131	Microsoft ACPI-Compliant System
IRQ 132	Microsoft ACPI-Compliant System
IRQ 133	Microsoft ACPI-Compliant System
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IRQ 135	Microsoft ACPI-Compliant System
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IRQ 140	Microsoft ACPI-Compliant System
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IRQ 144	Microsoft ACPI-Compliant System
IRQ 145	Microsoft ACPI-Compliant System
IRQ 146	Microsoft ACPI-Compliant System
IRQ 147	Microsoft ACPI-Compliant System
IRQ 148	Microsoft ACPI-Compliant System
IRQ 149	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 150	Microsoft ACPI-Compliant System
IRQ 151	Microsoft ACPI-Compliant System
IRQ 152	Microsoft ACPI-Compliant System
IRQ 153	Microsoft ACPI-Compliant System
IRQ 154	Microsoft ACPI-Compliant System
IRQ 155	Microsoft ACPI-Compliant System
IRQ 156	Microsoft ACPI-Compliant System
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IRQ 174	Microsoft ACPI-Compliant System
IRQ 175	Microsoft ACPI-Compliant System
IRQ 176	Microsoft ACPI-Compliant System
IRQ 177	Microsoft ACPI-Compliant System
IRQ 178	Microsoft ACPI-Compliant System
IRQ 179	Microsoft ACPI-Compliant System
IRQ 180	Microsoft ACPI-Compliant System
IRQ 181	Microsoft ACPI-Compliant System
IRQ 182	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 183	Microsoft ACPI-Compliant System
IRQ 184	Microsoft ACPI-Compliant System
IRQ 185	Microsoft ACPI-Compliant System
IRQ 186	Microsoft ACPI-Compliant System
IRQ 187	Microsoft ACPI-Compliant System
IRQ 188	Microsoft ACPI-Compliant System
IRQ 189	Microsoft ACPI-Compliant System
IRQ 190	Microsoft ACPI-Compliant System
IRQ 191	Microsoft ACPI-Compliant System
IRQ 192	Microsoft ACPI-Compliant System
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IRQ 200	Microsoft ACPI-Compliant System
IRQ 201	Microsoft ACPI-Compliant System
IRQ 202	Microsoft ACPI-Compliant System
IRQ 203	Microsoft ACPI-Compliant System
IRQ 204	Microsoft ACPI-Compliant System
IRQ 256	Microsoft ACPI-Compliant System
IRQ 257	Microsoft ACPI-Compliant System
IRQ 258	Microsoft ACPI-Compliant System
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IRQ 260	Microsoft ACPI-Compliant System
IRQ 261	Microsoft ACPI-Compliant System
IRQ 262	Microsoft ACPI-Compliant System
IRQ 263	Microsoft ACPI-Compliant System
IRQ 264	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 265	Microsoft ACPI-Compliant System
IRQ 266	Microsoft ACPI-Compliant System
IRQ 267	Microsoft ACPI-Compliant System
IRQ 268	Microsoft ACPI-Compliant System
IRQ 269	Microsoft ACPI-Compliant System
IRQ 270	Microsoft ACPI-Compliant System
IRQ 271	Microsoft ACPI-Compliant System
IRQ 272	Microsoft ACPI-Compliant System
IRQ 273	Microsoft ACPI-Compliant System
IRQ 274	Microsoft ACPI-Compliant System
IRQ 275	Microsoft ACPI-Compliant System
IRQ 276	Microsoft ACPI-Compliant System
IRQ 277	Microsoft ACPI-Compliant System
IRQ 278	Microsoft ACPI-Compliant System
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IRQ 281	Microsoft ACPI-Compliant System
IRQ 282	Microsoft ACPI-Compliant System
IRQ 283	Microsoft ACPI-Compliant System
IRQ 284	Microsoft ACPI-Compliant System
IRQ 285	Microsoft ACPI-Compliant System
IRQ 286	Microsoft ACPI-Compliant System
IRQ 287	Microsoft ACPI-Compliant System
IRQ 288	Microsoft ACPI-Compliant System
IRQ 289	Microsoft ACPI-Compliant System
IRQ 290	Microsoft ACPI-Compliant System
IRQ 291	Microsoft ACPI-Compliant System
IRQ 292	Microsoft ACPI-Compliant System
IRQ 293	Microsoft ACPI-Compliant System
IRQ 294	Microsoft ACPI-Compliant System
IRQ 295	Microsoft ACPI-Compliant System
IRQ 296	Microsoft ACPI-Compliant System
IRQ 297	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 298	Microsoft ACPI-Compliant System
IRQ 299	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 329	Microsoft ACPI-Compliant System
IRQ 330	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 362	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 393	Microsoft ACPI-Compliant System
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IRQ	Assignment
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IRQ	Assignment
IRQ 457	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 490	Microsoft ACPI-Compliant System
IRQ 491	Microsoft ACPI-Compliant System
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IRQ 509	Microsoft ACPI-Compliant System
IRQ 510	Microsoft ACPI-Compliant System
IRQ 511	Microsoft ACPI-Compliant System
IRQ 1024	Intel(R) Dynamic Platform & Thermal Framework Generic Participant Driver
IRQ 1025	Intel SST Audio Device (WDM)
IRQ 1031	Broadcom Serial Bus Driver over UART Bus Enumerator
IRQ 1032	Realtek I2S Audio Codec
IRQ 1033	Intel(R) Power Management IC Device
IRQ 1034	HID Button over Interrupt Driver
IRQ 1035	HID Button over Interrupt Driver
IRQ 1036	HID Button over Interrupt Driver

IRQ	Assignment
IRQ 1037	HID Button over Interrupt Driver
IRQ 1038	HID Button over Interrupt Driver
IRQ 1039	Intel(R) Dynamic Platform & Thermal Framework Generic Participant Driver
IRQ 1040	Intel(R) Dynamic Platform & Thermal Framework Ambient Participant Driver
IRQ 1041	Intel SD Host Controller
IRQ 1042	I2C HID Device
IRQ 4294967288	Intel(R) HD Graphics
IRQ 4294967289	Intel(R) Dynamic Platform & Thermal Framework Processor Participant Driver
IRQ 4294967290	Broadcom 802.11ac Wireless PCIE Full Dongle Adapter
IRQ 4294967291	Intel(R) Trusted Execution Engine Interface
IRQ 4294967292	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
IRQ 4294967293	Intel(R) Imaging Signal Processor 2401
IRQ 4294967294	PCI Express Root Port

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

I/O Map

I/O Map	Assignment
0x00000000-0x0000006F	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x0000004E-0x0000004F	Motherboard resources
0x00000050-0x00000053	System timer
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000070-0x00000070	System CMOS/real time clock
0x00000078-0x000000CF	PCI Express Root Complex
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B2-0x000000B3	Motherboard resources
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000003F8-0x000003FF	Communications Port (COM1)

I/O Map	Assignment
0x00000400-0x0000047F	Motherboard resources
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000500-0x000005FE	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00001000-0x0000103F	Intel(R) HD Graphics

Memory Map

Memory Map	Assignment
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFE000000-0xFEFFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED06000-0xFED06FFF	Motherboard resources
0xFED08000-0xFED09FFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Intel Serial IO GPIO Controller
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFFFF	Motherboard resources
0x91D38000-0x91D38FFF	Motherboard resources
0x91D36000-0x91D36FFF	Motherboard resources
0x91D34000-0x91D34FFF	Motherboard resources
0x91D23000-0x91D23FFF	Motherboard resources
0x91D21000-0x91D21FFF	Motherboard resources
0x91D1F000-0x91D1FFFF	Motherboard resources
0x91D1D000-0x91D1DFFF	Motherboard resources
0x91D1B000-0x91D1BFFF	Motherboard resources
0x91D19000-0x91D19FFF	Motherboard resources
0x91D32000-0x91D32FFF	Motherboard resources
0x91D30000-0x91D30FFF	Motherboard resources
0x91D2E000-0x91D2EFFF	Motherboard resources
0x91D2C000-0x91D2CFFF	Motherboard resources
0x91D2A000-0x91D2AFFF	Motherboard resources
0x91D28000-0x91D28FFF	Motherboard resources
0x91D26000-0x91D26FFF	Motherboard resources
0x91D24000-0x91D24FFF	Motherboard resources

Memory Map	Assignment
0x91400000-0x91407FFF	Broadcom 802.11ac Wireless PCIE Full Dongle Adapter
0x91000000-0x913FFFFF	Broadcom 802.11ac Wireless PCIE Full Dongle Adapter
0x91000000-0x913FFFFF	PCI Express Root Port
0x91D31000-0x91D31FFF	Intel(R) Serial IO I2C ES Controller
0x91D2F000-0x91D2FFFF	Intel(R) Serial IO I2C ES Controller
0x91D2D000-0x91D2DFFF	Intel(R) Serial IO I2C ES Controller
0x91D2B000-0x91D2BFFF	Intel(R) Serial IO I2C ES Controller
0x91D29000-0x91D29FFF	Intel(R) Serial IO I2C ES Controller
0x91D27000-0x91D27FFF	Intel(R) Serial IO I2C ES Controller
0x91D25000-0x91D25FFF	Intel(R) Serial IO I2C ES Controller
0x91D22000-0x91D22FFF	Intel(R) Serial IO UART Controller
0x91D20000-0x91D20FFF	Intel(R) Serial IO UART Controller
0x91D1E000-0x91D1EFFF	Intel(R) Serial IO SPI Controller
0x91D1C000-0x91D1CFFF	Intel(R) Serial IO SPI Controller
0x91D1A000-0x91D1AFFF	Intel(R) Serial IO SPI Controller
0xFED00000-0xFED003FF	High precision event timer
0x90000000-0x90FFFFFF	Intel(R) HD Graphics
0x80000000-0x8FFFFFFF	Intel(R) HD Graphics
0x80000000-0x8FFFFFFF	PCI Express Root Complex
0x91800000-0x91BFFFFF	Intel(R) Imaging Signal Processor 2401
0x91D10000-0x91D13FFF	Intel(R) Serial IO DMA Controller
0x91D14000-0x91D17FFF	Intel(R) Serial IO DMA Controller
0x91D18000-0x91D18FFF	Intel(R) Dynamic Platform & Thermal Framework Processor Participant Driver
0x91D00000-0x91D0FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
0xFED88000-0xFED8FFFF	Intel Serial IO GPIO Controller
0xFED90000-0xFED97FFF	Intel Serial IO GPIO Controller
0xFED98000-0xFED9FFFF	Intel Serial IO GPIO Controller
0xFEDA0000-0xFEDA7FFF	Intel Serial IO GPIO Controller

Memory Map	Assignment
0x91600000-0x917FFFFF	Intel SST Audio Device (WDM)
0x91D33000-0x91D33FFF	Intel SST Audio Device (WDM)
0x91C00000-0x91CFFFFFFF	Intel(R) Trusted Execution Engine Interface
0x91500000-0x915FFFFFFF	Intel(R) Trusted Execution Engine Interface
0xFF000000-0xFFFFFFFF	Legacy device
0xE00000D0-0xE00000DF	Intel(R) Sideband Fabric Device
0x91D39000-0x91D39FFF	Intel SD Host Controller
0x91D37000-0x91D37FFF	Intel SD Host Controller

DMA Map

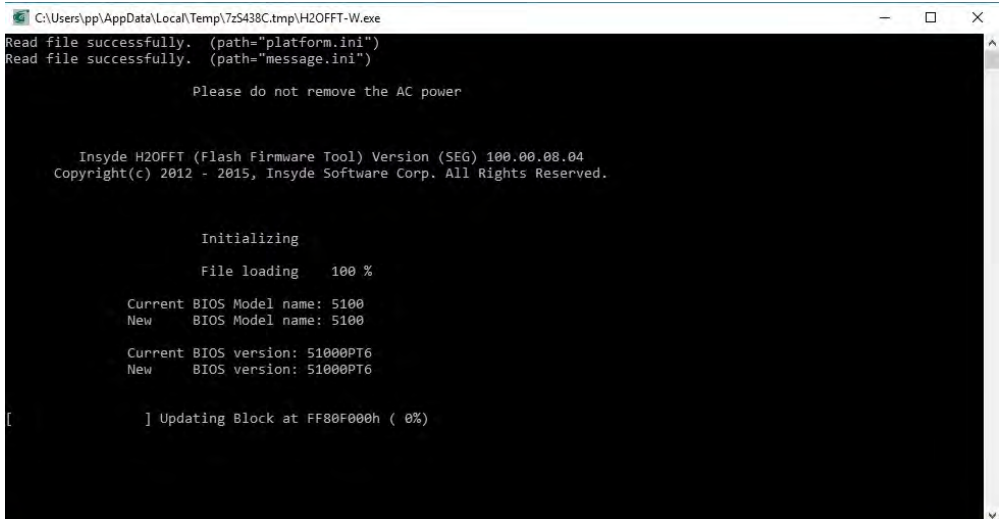
DMA Map	Assignment
Channel 0	Intel(R) Serial IO I2C ES Controller
Channel 0	Intel(R) Serial IO I2C ES Controller
Channel 0	Intel(R) Serial IO SPI Controller
Channel 1	Intel(R) Serial IO I2C ES Controller
Channel 1	Intel(R) Serial IO I2C ES Controller
Channel 1	Intel(R) Serial IO SPI Controller
Channel 2	Intel(R) Serial IO I2C ES Controller
Channel 2	Intel(R) Serial IO I2C ES Controller
Channel 2	Intel(R) Serial IO UART Controller
Channel 3	Intel(R) Serial IO I2C ES Controller
Channel 3	Intel(R) Serial IO I2C ES Controller
Channel 3	Intel(R) Serial IO UART Controller
Channel 4	Intel(R) Serial IO I2C ES Controller
Channel 4	Intel(R) Serial IO I2C ES Controller
Channel 4	Intel(R) Serial IO UART Controller
Channel 5	Intel(R) Serial IO I2C ES Controller

DMA Map	Assignment
Channel 5	Intel(R) Serial IO I2C ES Controller
Channel 5	Intel(R) Serial IO UART Controller
Channel 6	Intel(R) Serial IO I2C ES Controller
Channel 6	Intel(R) Serial IO SPI Controller
Channel 7	Intel(R) Serial IO I2C ES Controller
Channel 7	Intel(R) Serial IO SPI Controller
Channel 8	Intel(R) Serial IO SPI Controller
Channel 9	Intel(R) Serial IO SPI Controller

System BIOS Update Procedure

System BIOS Update from O.S.

- 1 Prepare a bootable media (e.g. USB storage device) which can boot the system to UEFI64 prompt.
- 2 Download and save the BIOS file (e.g. [5100PT6.exe](#)) to the bootable device.
- 3 Press the Power Button to boot up the system into the O.S. with USB storage device (Windows 10 64 bits)
- 4 Run the BIOS file (e.g. [5100PT6.exe](#)) in USB storage device on O.S (Windows 10 64 bits)
- 5 During the update procedure, you will see the BIOS update process status and its percentage. Beware! Do not turn off system power or reset your computer if the whole update procedure is not complete yet; otherwise, it may crash the BIOS ROM and the system will be unable to boot up next time.
- 6 After the BIOS update procedure is completed, the following message will display (e.g. Updating Block at FFFFFFFFh (100%)):



```
C:\Users\pp\AppData\Local\Temp\7zS438C.tmp\H2OFFT-W.exe
Read file successfully. (path="platform.ini")
Read file successfully. (path="message.ini")

Please do not remove the AC power

Insyde H2OFFT (Flash Firmware Tool) Version (SEG) 100.00.08.04
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      Initializing
      File loading  100 %

Current BIOS Model name: 5100
New      BIOS Model name: 5100

Current BIOS version: 51000PT6
New      BIOS version: 51000PT6

[      ] Updating Block at FF80F000h ( 0%)
```