DFI



VC900-M8M

NXP i.MX8 Series

ARM-Based In-vehicle System

User's Manual

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Changes after the publication's first release will be based on the product's revision. The website will always provide the most updated information.

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FCC and DOC Statement on Class A

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 residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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About this Manual

This manual can be retrieved from the website.

The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

Warranty

1. Warranty does not cover damages or failures that arises from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.

2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.

3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.

4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

About this Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- 1 x VC900-M8M system unit
- 1 x 3-pole terminal block cable for power input
- 1 x Wall mount bracket/screw pack
- 1 x Quick installation guide

Note: The items are subject to change in the developing stage.
The product and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.

Important:
Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Precautions

- Use the correct DC / AC input voltage range.
- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging in the power cord.
- There is danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent specifications of batteries recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.
- Keep this system away from humid environments.
- Make sure the system is placed or mounted correctly and stably to prevent the chance of dropping or falling may cause damage.
- The openings on the system shall not be blocked and shall be kept in distance from other objects to make sure of proper air ventilation to protect the system from overheating.
- Dress the cables, especially the power cord, so they will not be stepped on, in contact with high temperature surfaces, or cause any tripping hazards.
- Do not place anything on top of the power cord. Use a power cord that has been approved for use with the system and is compliant with the voltage and current ranges required by the system's electrical specifications.
- If the system is to be unused or stored for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- If one of the following occurs, consult a service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated the system.
  - The system has been exposed to moisture.
  - The system is not working properly.
  - The system is physically damaged.
- The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace the outlet.
- Disconnect the system from the electricity outlet before cleaning. Use a damp cloth for cleaning the surface. Do not use liquid or spray detergents for cleaning.
- Before connecting, make sure that the power supply voltage is correct. The device is connected to a power outlet which should be grounded connection.

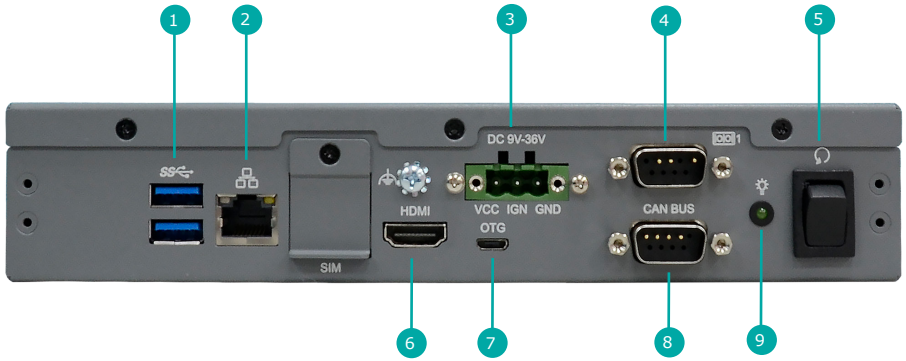
The system may burn fingers while running.

Wait for 30 minutes to handle electronic parts after power off.

Chapter 1 - Introduction

▶ Overview

Front View



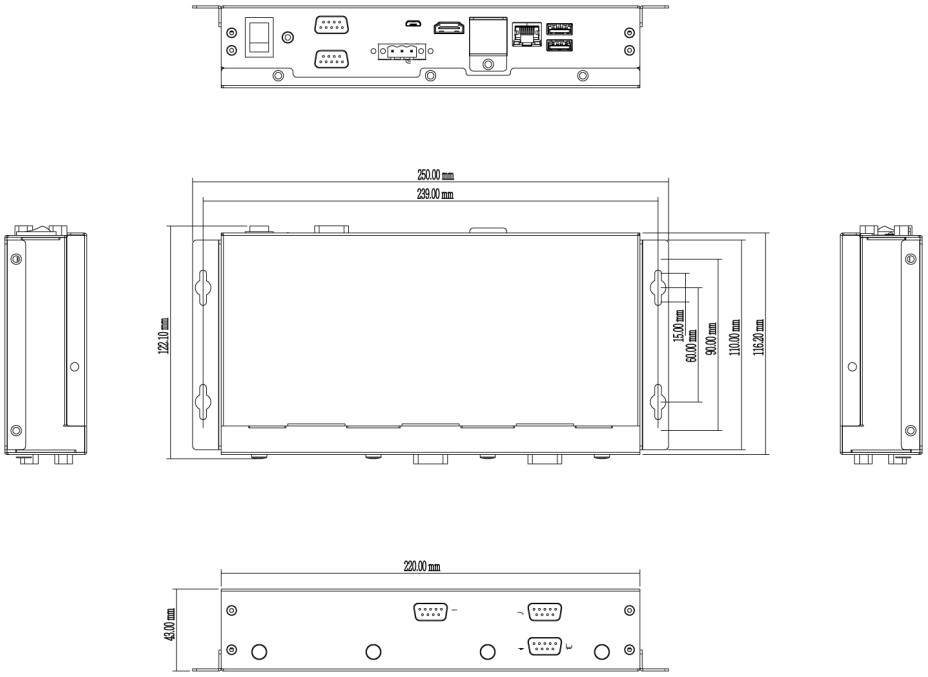
1. USB 3.0
2. LAN
3. Power Input
4. COM 1
5. Reset Button
6. HDMI
7. OTG
8. CAN BUS
9. Status LED

Rear View



10. COM 4
11. COM 2
12. COM 3

▶ Dimensions



▶ Key Features

ARM-Based System:
Support Yocto Linux 2.5 and Android 9.0 (Optional)

Storage Choice:
16GB/64GB eMMC and Micro SD card slot

Rich I/O Connectivity:
1 GbE, 4 COM, 1 CAN Bus, 2 USB 3.0, 1 Micro USB (OTG)

Wide-Voltage:
9~36V vehicle power input with ACC/IGN function

Wide-Temperature:
-20°C~70°C operation without active fan

- The energy efficiency in-vehicle telematics system assists smart vehicles in collecting data, including vehicle speed, engine speed, network packet records, etc., and finally uploads them to cloud storage through 4G synchronously for daily data analysis and services.

▶ Specifications

SYSTEM	Processor	NXP i.MX8M Quad, Cortex-A53 1.3GHz (by model) NXP i.MX8M Dual, Cortex-A53 1.3GHz (by model)
	Memory	On board memory 2GB/4GB (by model) Single channel LPDDR4 up to 3200 MHz
GRAPHICS	Display	1 x HDMI Resolution up to 1920x1080 @ 60 Hz
STORAGE	External	Micro SD card slot
	Internal	eMMC 5.1 16GB on board, support up to 64GB (optional)
EXPANSION	M.2	1 x M.2 2242/3042 B Key (USB 3.1 Gen1), Nano SIM Slot support 1 x M.2 2230 E Key (PCIex1/USB2.0)
SENSOR	Sensor	6 axis IMU (3 Accelerometer + 3 Gyroscope)
LED	Indicators	1 x Status LED
Front I/O	Ethernet	1 x Giga LAN, RJ-45
	Serial	1 x RS-232 (COM1)
	USB	2 x USB 3.0, type A 1 x OTG, micro USB
	Display	1 x HDMI
	Audio	with Amplifier to support 2W speaker (optional) 1 x Line-out & 1 x MIC-in (internal header)
	Buttons	1 x Power reset button
	CANbus	1 x CANbus, DB-9
Rear I/O	Antenna	4 x Antenna holes for LTE 4G, WiFi and GPS
	Serial	1 x RS-232 (TX,RX,RTS,CTS) (COM2) 1 x RS-232 (TX,RX) (COM3) 1 x RS-232/422/485 (TX,RX) (COM4)
POWER	Type	Wide range 9~36V with ACC/IGN function
	Connector	3-pole terminal block
OS SUPPORT	Linux	Yocto Linux 2.5
	Android	Android 9.0 (option)

MECHANISM	Construction	Sheet Metal
	Color	Black
	Mounting	DIN-Rail mount Wall mount
	Dimensions (W x H x D)	200 x 120 x 45mm
	Weight	1.9kg
ENVIRONMENT	Operating Temperature	-20 to 70°C
	Storage Temperature	-40 to 85°C
	Relative Humidity	10 to 90% RH (non-condensing)
STANDARDS AND CERTIFICATIONS	Shock	Operating/non-operating: MIL-STD-810G Method 516.6, Procedure 1
	Vibration	Operating/non-operating: MIL-STD-810G Method 514.6, Category 4
	Certifications	CE, FCC, E-Mark R10

Chapter 2 - Hardware Installations

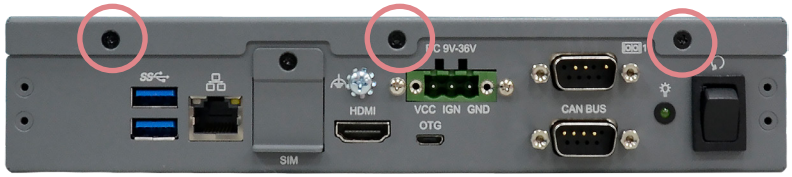
▶ Removing the Chassis Cover

Please observe the following guidelines and follow the instructions to open the system.

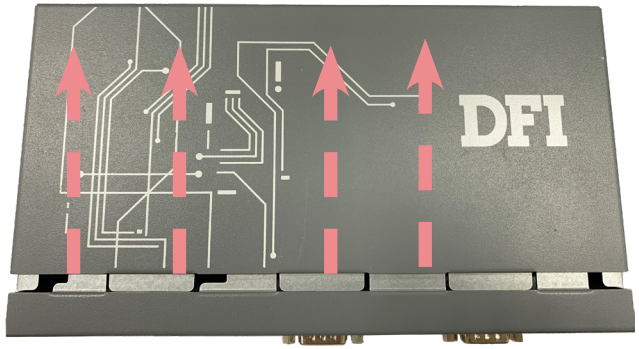
1. Make sure the system and all other peripheral devices connected to it have been powered off.

2. Disconnect all power cords and cables.

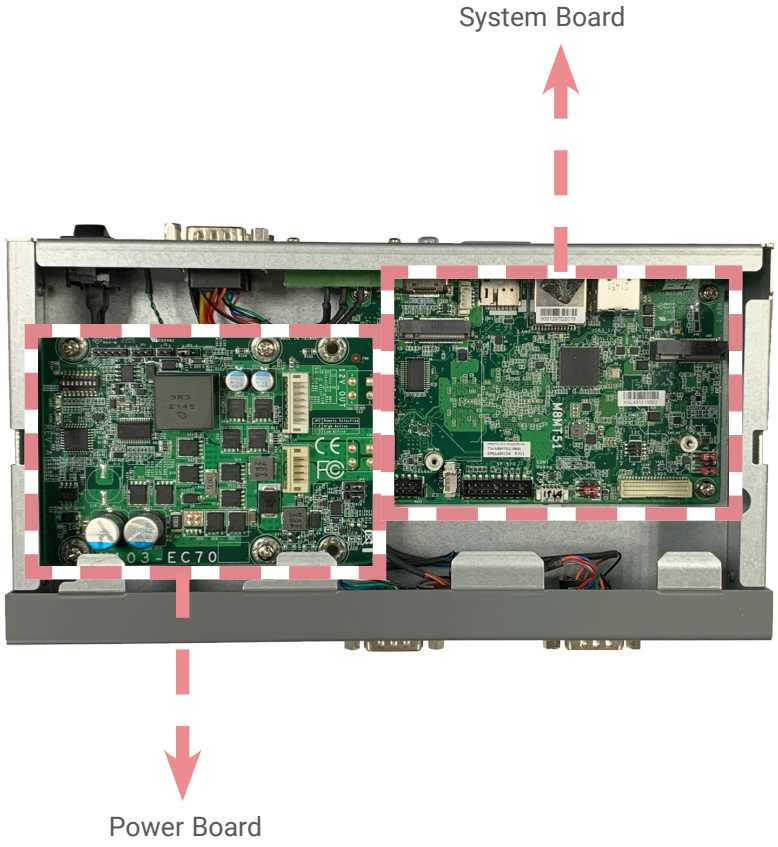
Step 1:
The 3 screws on the side of the system are used to secure the cover to the chassis. Remove the screws and put them in a safe place for later use.



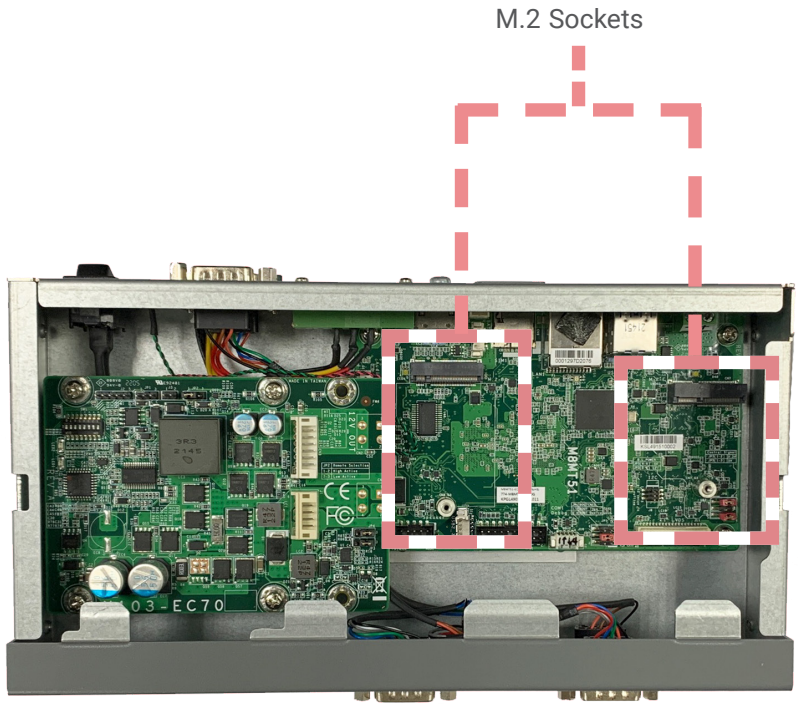
Step 2:
Slide the cover to open the system.



Step 3:
The boards can be easily accessed after the chassis cover is removed.

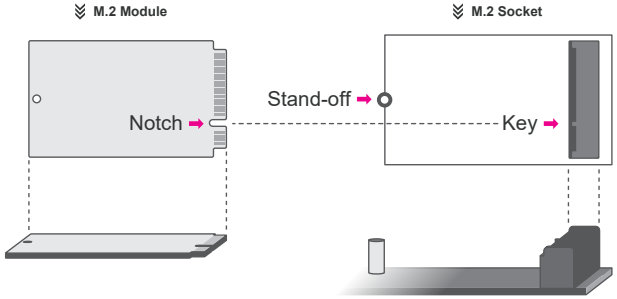


▶ Installing an M.2 Card

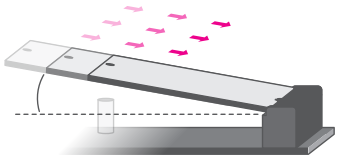


Please follow the steps below to install the card into the socket.

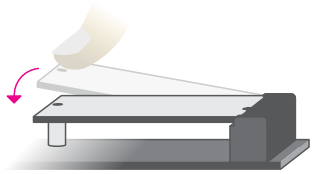
Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.



Step 2:
Press the end of the card far from the socket down until against the stand-off.



Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.



▶ Installing an Antenna

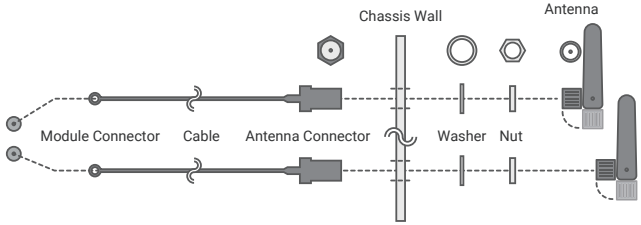
Before installing the antenna, please make sure that the following safety cautions are wellattended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.

Step 1:
There are antenna holes reserved on the right side of the system and by default covered by rubber plugs. Please remove the plug prior to installing an antenna.



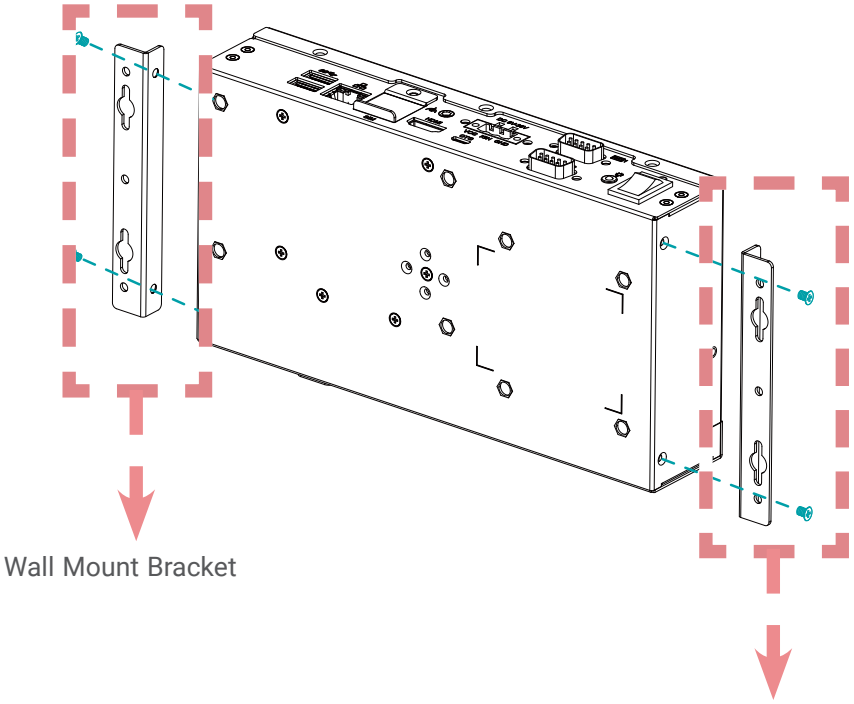
Step 2:
Connect the internal cable to the board's antenna connector, screw the antenna connector through the antenna hole with washers and nuts, and screw on the antenna as illustrated below.



▶ Mounting Options

Wall Mount

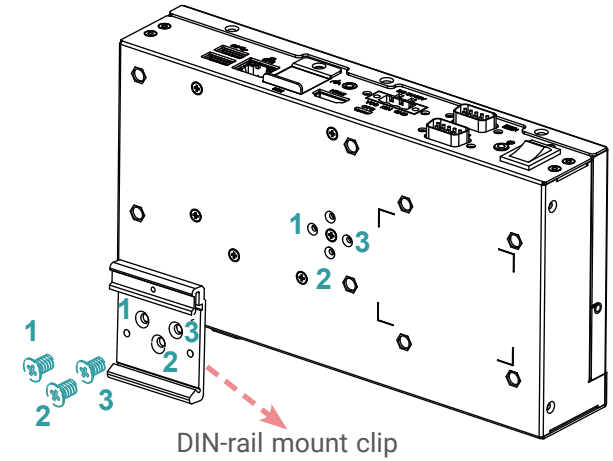
The wall mount kit containing two mounting brackets — purchased as optional items — can be attached to the bottom of the system for mounting onto desired locations, such as walls, stands, or shelves. Locate the mounting holes on the bottom of the system as shown in the photo. Screw on the two brackets onto the system with four screws as illustrated below.

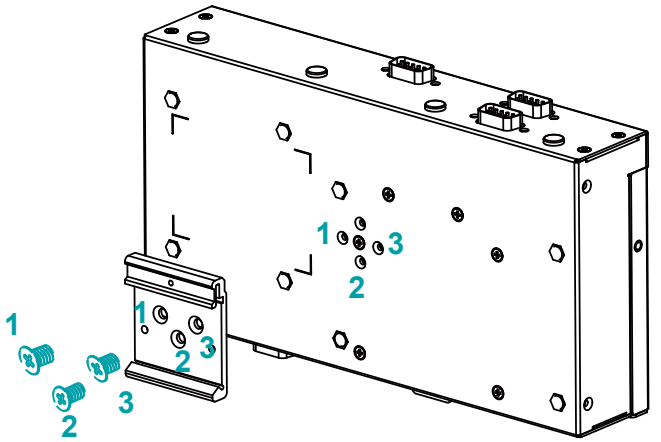


DIN Rail Mount

The DIN Rail Mount kit comes with one DIN Rail clip and screws. Please follow the steps to mount the system onto a DIN Rail.

1. Locate the mounting screws for mounting the din-rail bracket on the chassis cover.
2. Align the mounting holes on the system and then use the screws to secure the DIN-rail mount clip in place.

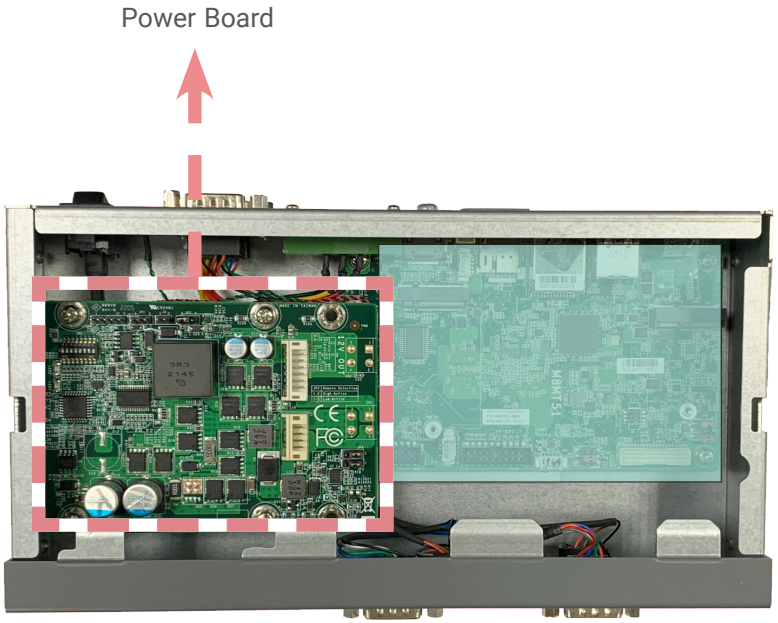


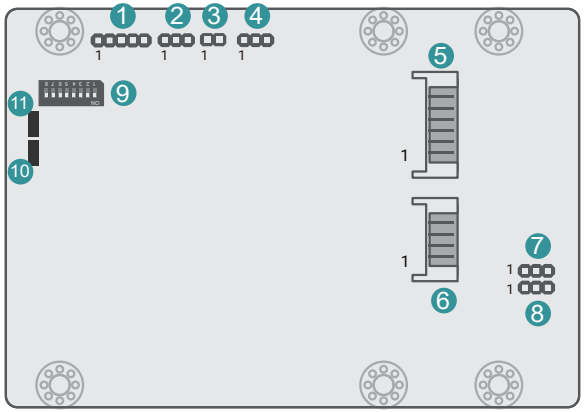


Chapter 3 - System Settings

▶ Board Layout

Power Board

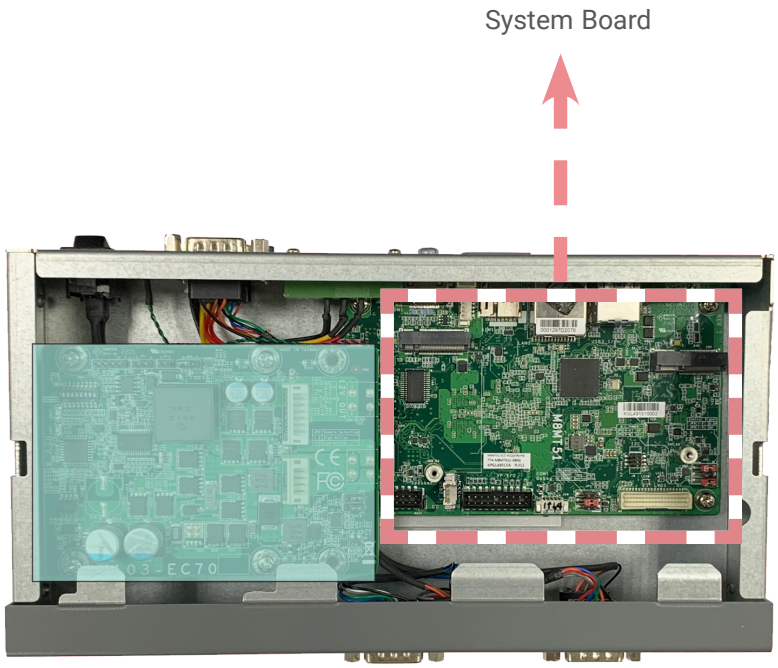


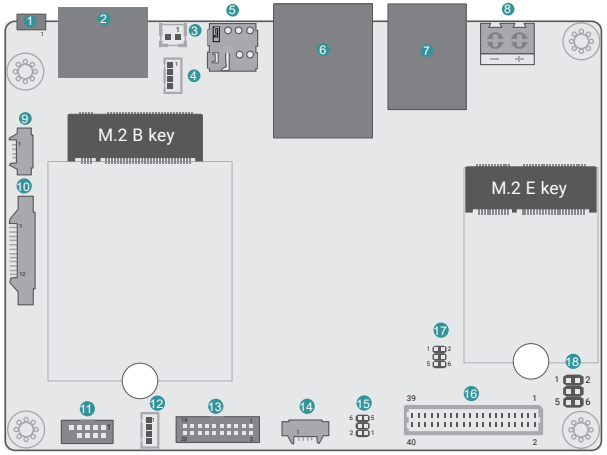


1. ST-Link / SWD
2. MCU Debug
3. Remote Switch
4. Remote Switch High/Low Active
5. 12V DC Out
6. 9V~36V In
7. Host Bus Communication
8. Host Bus Communication
9. SW1
10. LED1(Red): Debug LED for the MCU
11. LED2 (Green): R/W LED

Important:
Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

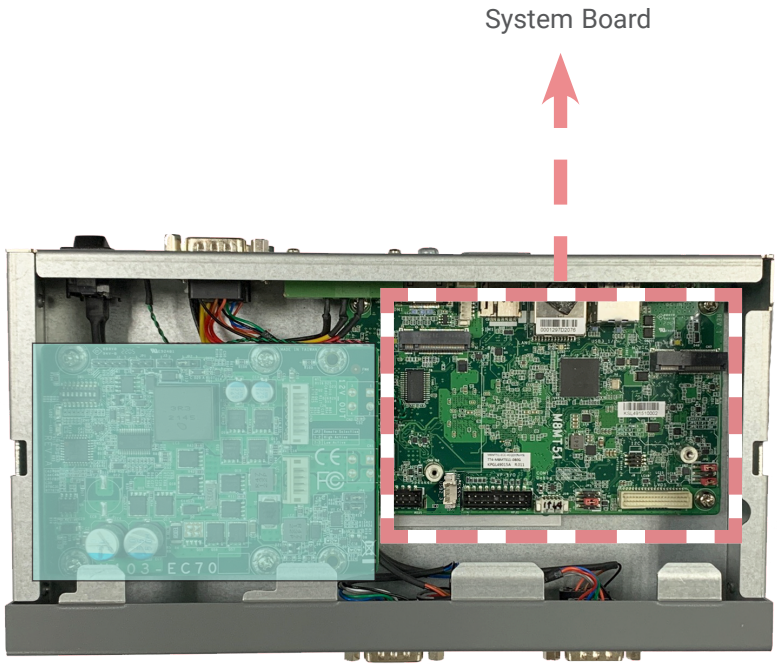
System Board

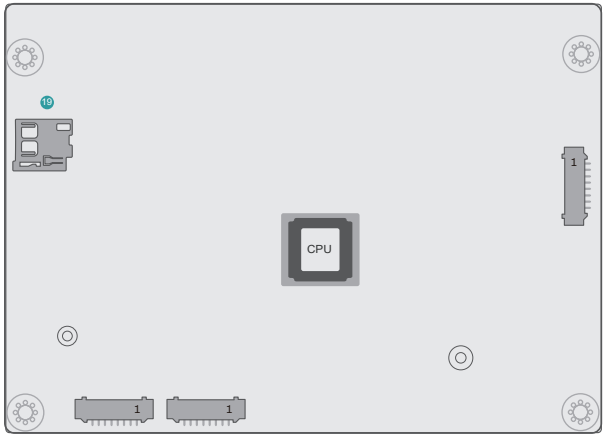




1. USB2_4
2. HDMI
3. Battery
4. Power Link
5. SIM Slot
6. LAN
7. USB3.0
8. DC-IN
9. Audio
10. DIO
11. Speaker
12. USB2_3
13. VP IO
14. COM1 Debug
15. Boot CFG
16. LVDS
17. I2C
18. LED Backlight

System Board - uSD Card Slot

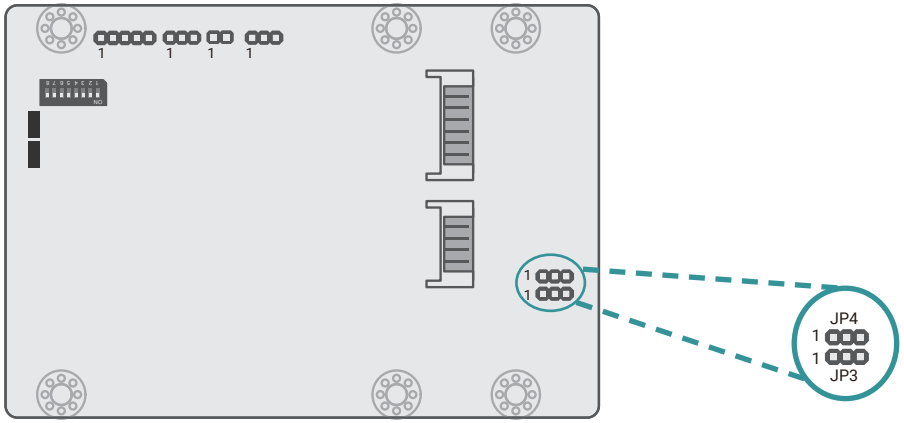




19 uSD Card Slot

▶ Jumper Settings- Power Board

Host Bus Communication (JP3, JP4)



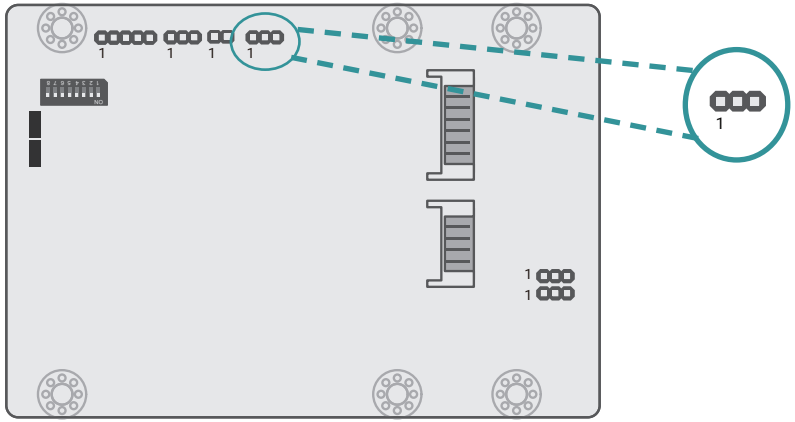


■ 1-2 On: Reserved



■ 2-3 On: TX/RX UART (default)

Remote Switch High/Low Active (JP2)



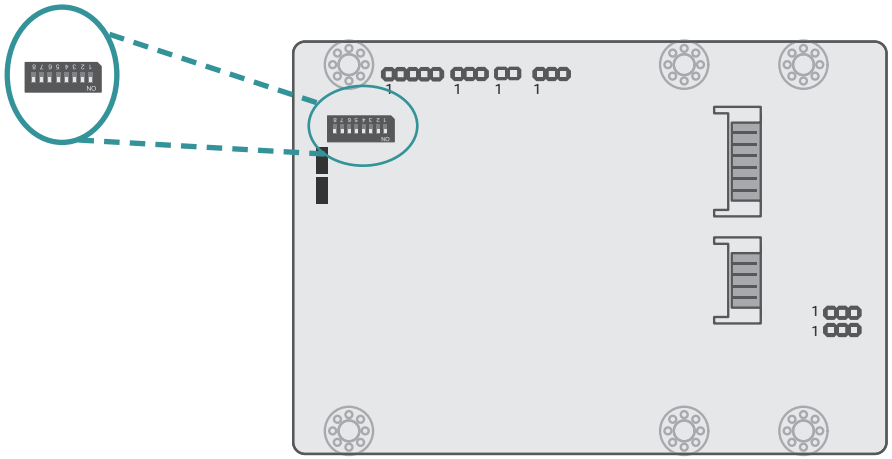


■ 1-2 On: High Active (default)



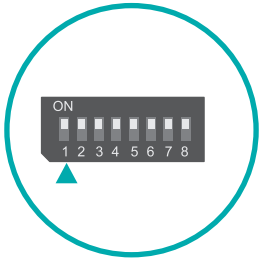
■ 2-3 On: Low Active

SW1



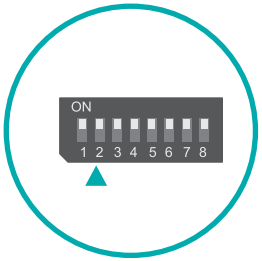
24V / 12V Select

1	Output Voltage
On	12V (default)
Off	24V



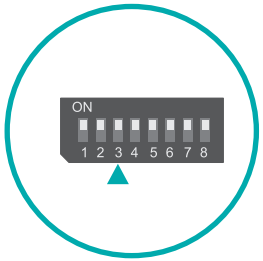
POWER ON Delay Switch

2	Delay On/Off
On	On, delay duration defined by 4 and 5
Off	Off, delay = 3 seconds by default



POWER OFF Delay Switch

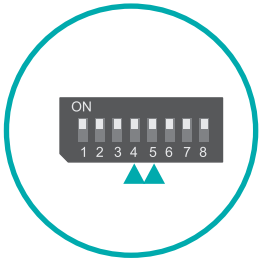
3	Delay On/Off
On	On, delay duration defined by 6, 7, and 8
Off	Off, delay = 0 second by default



Important:
Power-off the system and then unplug the power cord prior to setting the switches. Failure to do so will cause severe damage to the system and components.

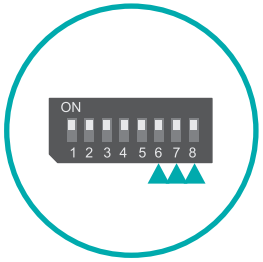
POWER ON Delay Time Select

5	4	Delay Duration
On	On	10 seconds (default)
On	Off	30 seconds
Off	On	1 miniute
Off	Off	5 minutes



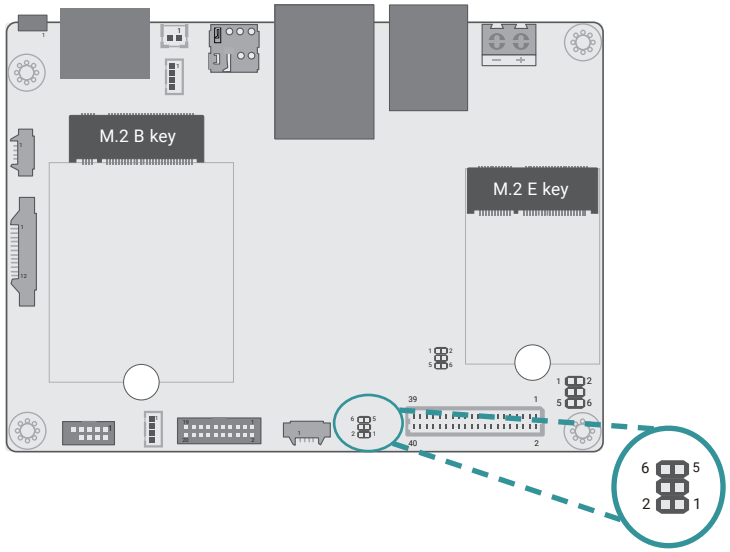
POWER OFF Delay Time Select

8	7	6	Delay Duration
On	On	On	30 seconds (default)
On	On	Off	1 minute
On	Off	On	3 minutes
On	Off	Off	5 minutes
Off	On	On	10 minutes
Off	On	Off	15 minutes
Off	Off	On	30 minutes
Off	Off	Off	1 hour



▶ Jumper Settings- System Board

Boot Config (JP1)



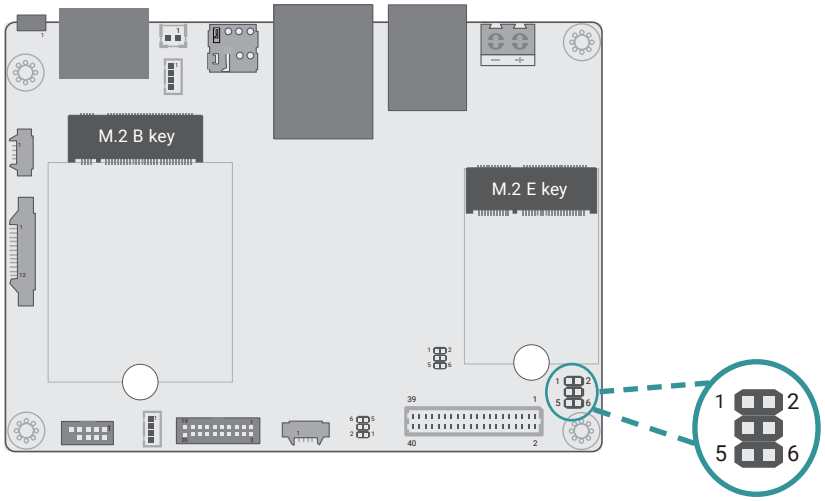


- 1-2 Off: Internal Boot (default)
- 1-2 On: Serial Downloader



- 5-6 Off: EMMC@eSDHC3 (default)
- 5-6 On: uSD@eSDHC2

LED Backlight (JP5)

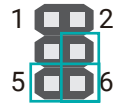


For VEN & VPWM



- 1-2 On: 3.3V (Default)
- 1-3 On: 5V

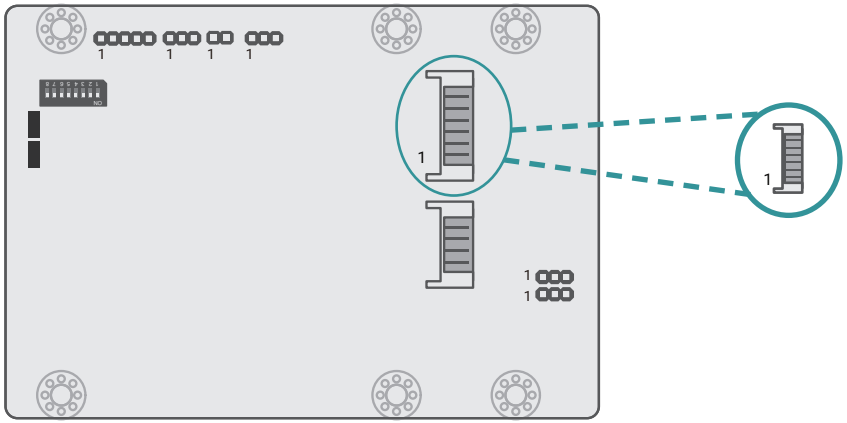
For VLED Backlight



- 5-6 On: Backlight Power 12V (default)
- 4-6 On: Backlight Power 5V

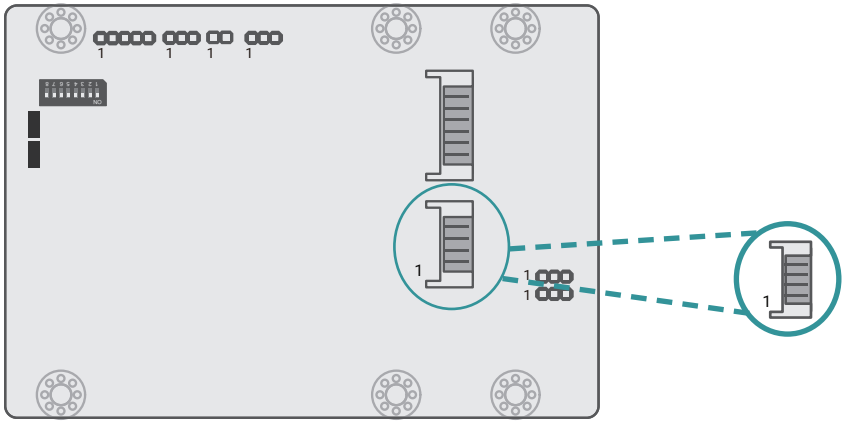
▶ Pin Assignment- Power Board

12V DC-Out (CN3)



Pin	Assignment
1	GND
2	GND
3	Power Button
4	Host TX
5	Host RX
6	12VSB
7	12VSB
8	12VSB

9V~36V In (J1)

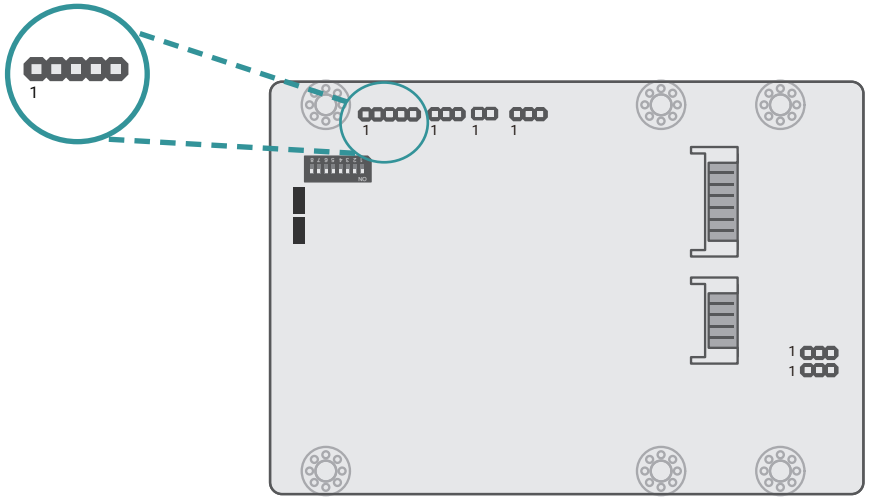


Pin	Assignment
1	V_In
2	V_In
3	Ignition
4	Ignition
5	GND
6	GND

The 9V~36V In box headers are for ignition and power input to the power board, which then converts to 12VDC for output to the system board.

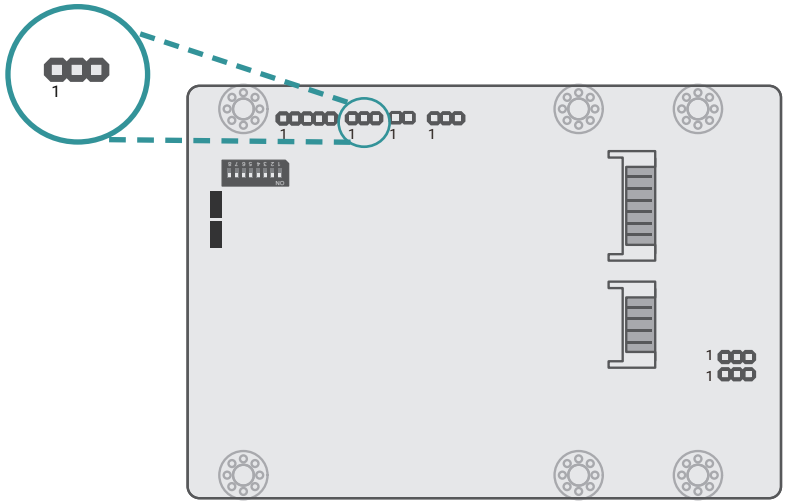
Jumper Settings
Power on/off, delay time, and other power related aspects can be configured via SW1 as previously instructed in this chapter.

MCU Connector (J2)



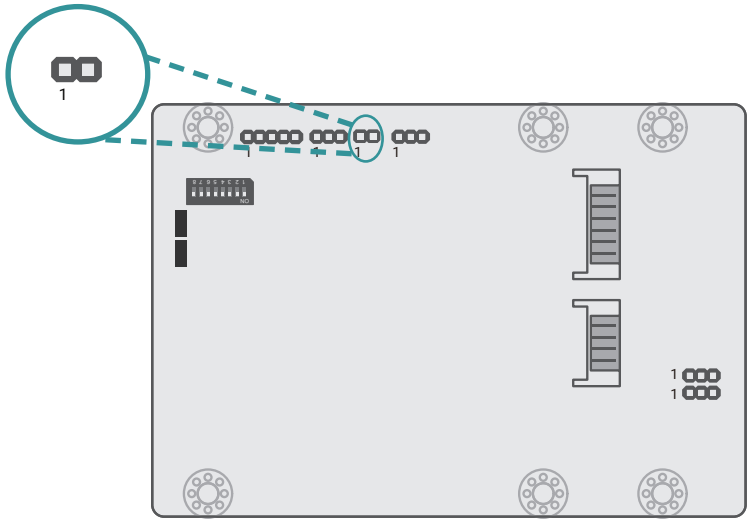
Pin	Assignment
1	3V
2	GND
3	SYS_SWDIO
4	SYS_SWCLK
5	STMCU_RST#

MCU Debug (JP1)



Pin	Assignment
1	UART_TX
2	UART_RX
3	GND

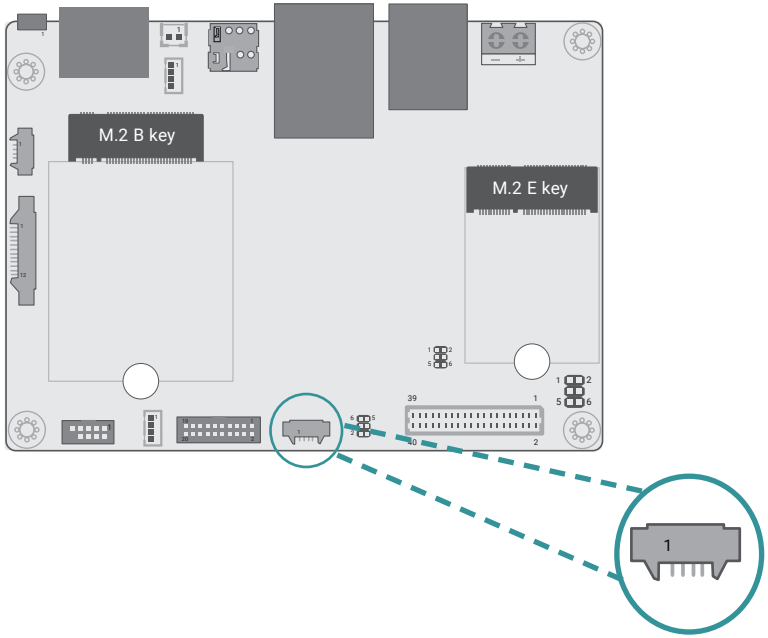
Remote Switch (J3)



Pin	Assignment
1	Power Button
2	GND

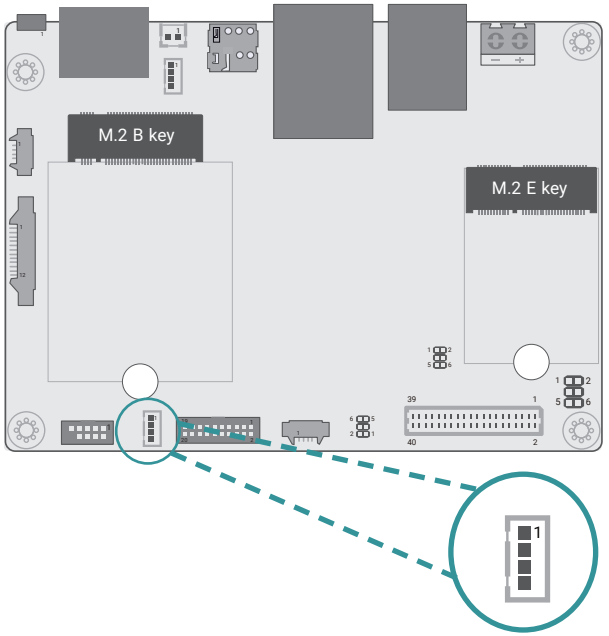
▶ Pin Assignment- System Board

COM1 Debug (J10)



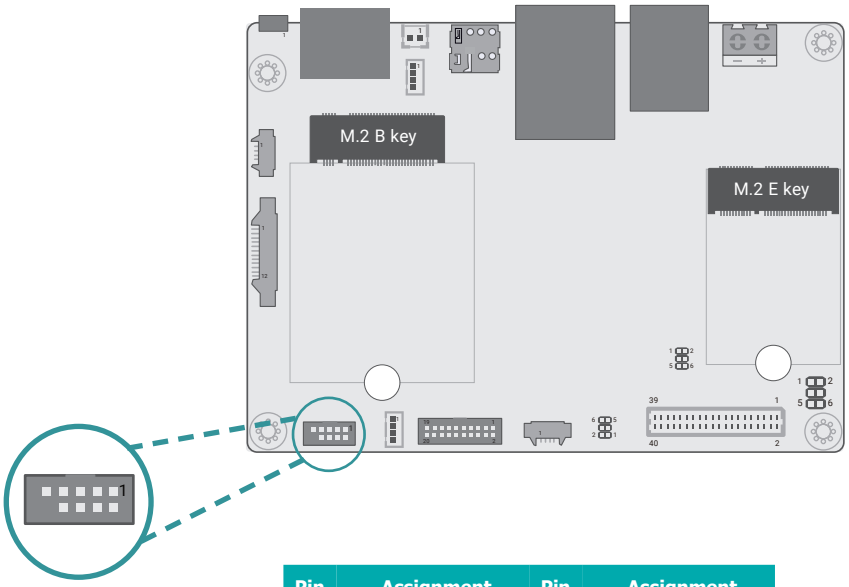
Pin	Assignment
1	+3.3V
2	UART1_RX
3	UART1_TX
4	GND

USB2_3 (UBJ1)



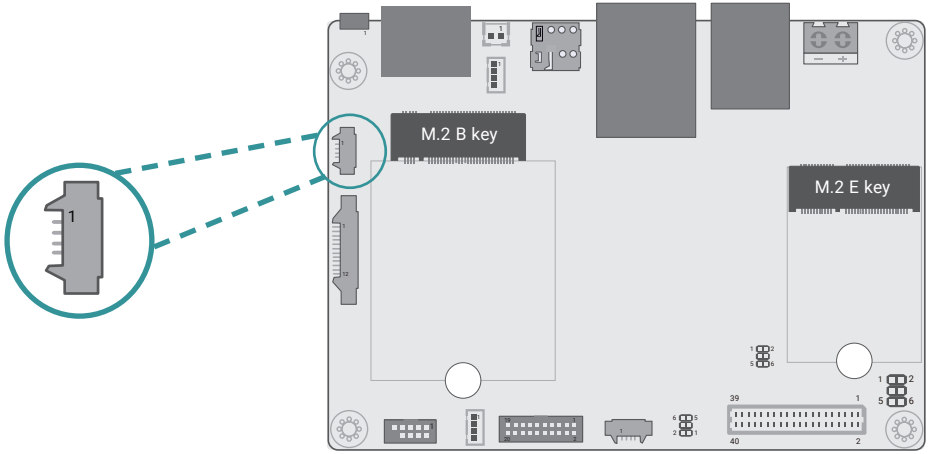
Pin	Assignment
1	+5V
2	USBDN
3	USBDP
4	GND

Speaker (AUJ1)



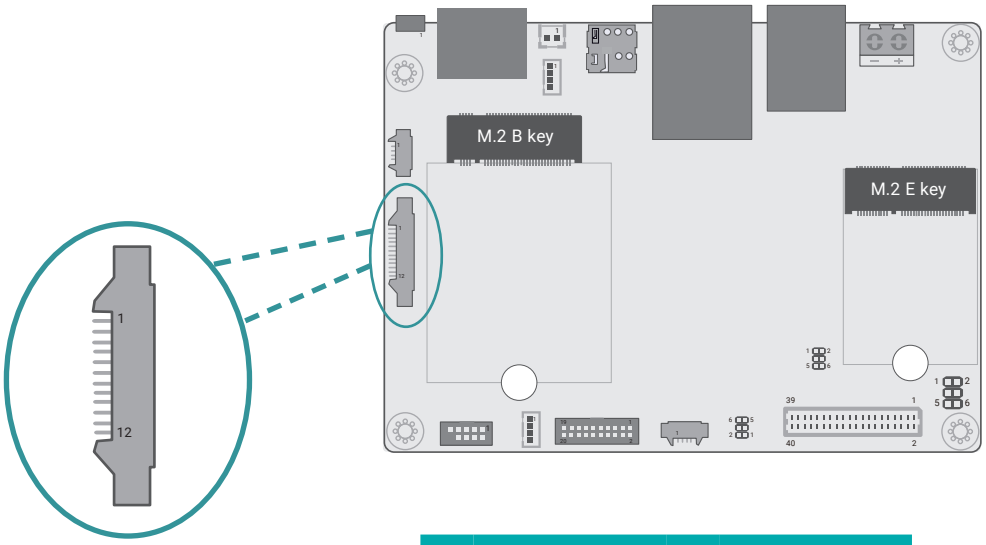
Pin	Assignment	Pin	Assignment
1	NC	2	SPK_R-
3	NC	4	SPK_R+
5	NC	6	SPK_L+
7	NC	8	SPK_L-
9	NC		

Audio (AUJ2)



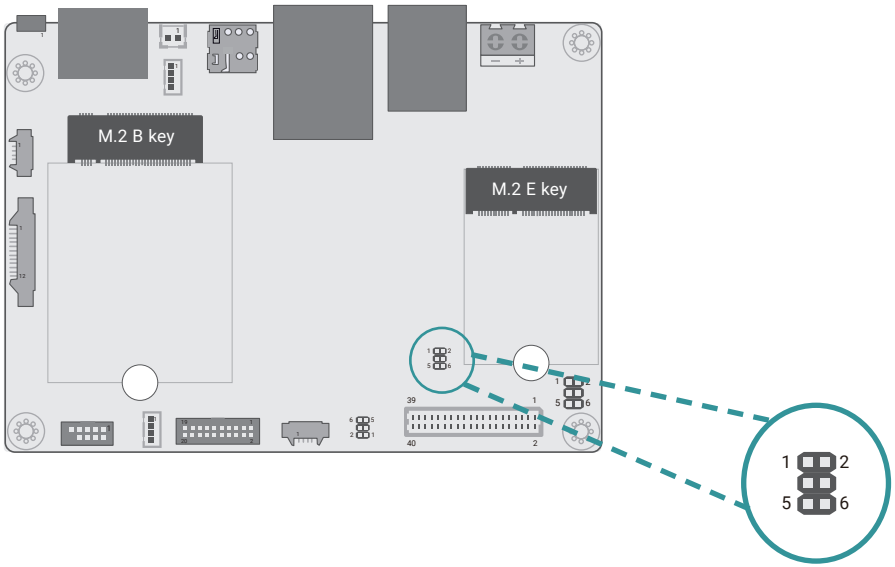
Pin	Assignment
1	LOUT_L
2	LOUT_R
3	AGND
4	MIC_IN

DIO (IOJ1)



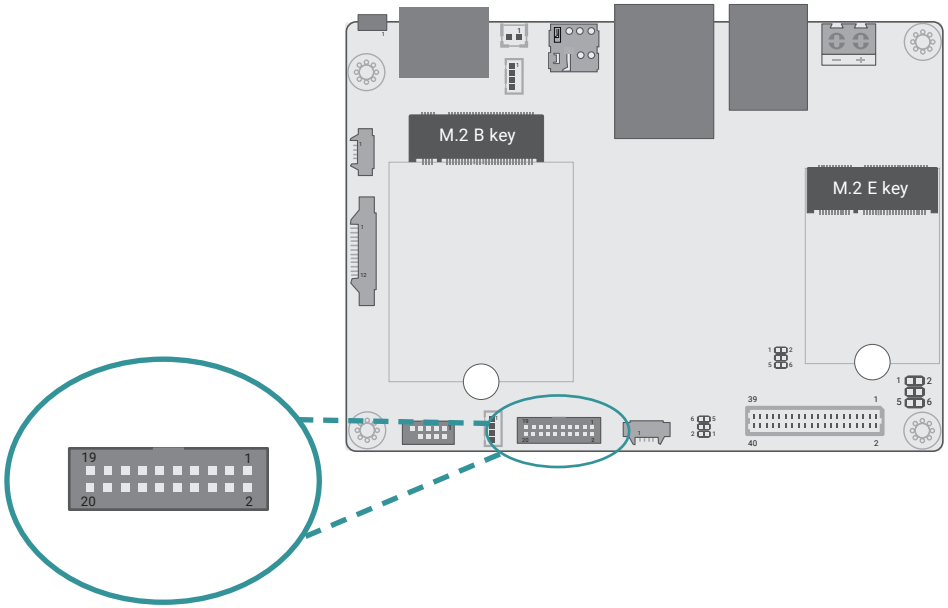
Pin	Assignment	Pin	Assignment
1	DIO0	2	DIO1
3	DIO2	4	DIO3
5	DIO4	6	DIO5
7	DIO6	8	DIO7
9	+5V	10	PWM
11	GND	12	GND

I2C (J8)



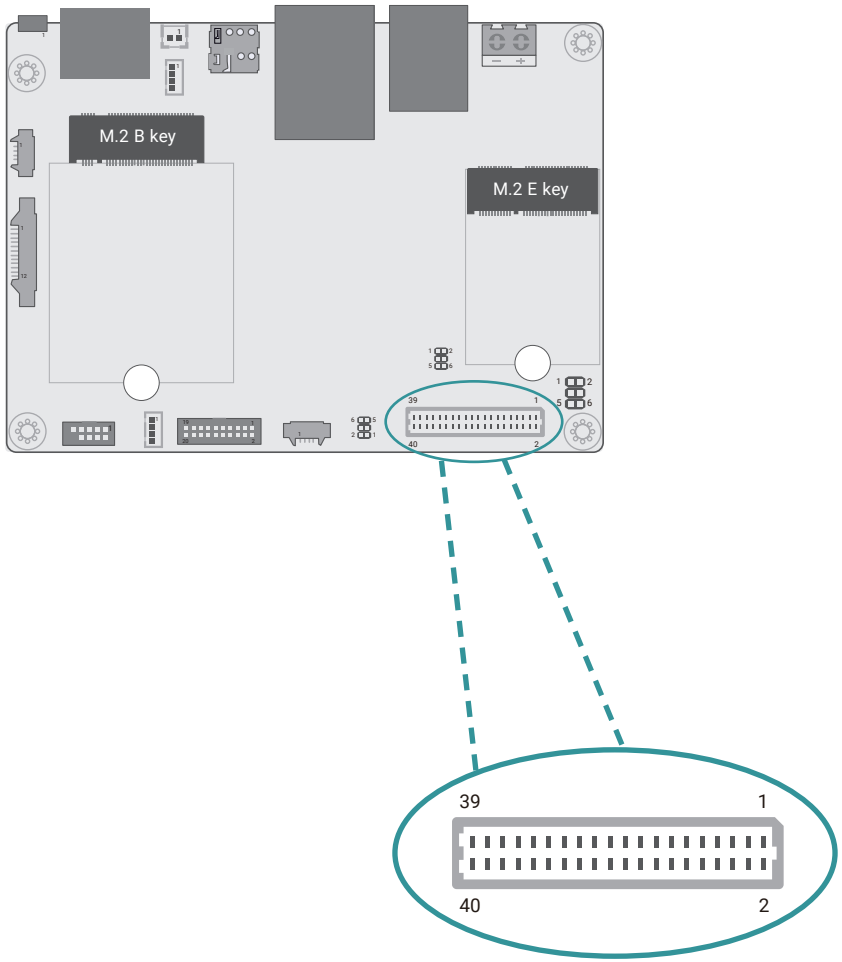
Pin	Assignment	Pin	Assignment
1	+3.3V_TP	2	GND
3	TP_SCL	4	TP_ALT#
5	TP_SDA	6	TP_RST#

VP IO (VPJ1)



Pin	Function	Pin	Function
1	+5V	2	CAN_GND
3	SOUTN3	4	CAN_H
5	LVDS_A2+	6	CAN_L
7	SINN3	8	UR1_TX_232
9	SINN4	10	UR1_RX_232
11	SOUTN4	12	RTSN2
13	DTRN4	14	CTSN2
15	RTSN4	16	SOUTN2
17	CTSN4	18	SINN2
19	GND	20	GND

LVDS (J11)

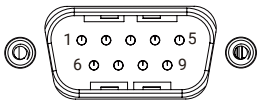


Pin	Function	Pin	Function
1	GND	2	GND
3	LVDS_A2-	4	LVDS_B3+
5	LVDS_A2+	6	LVDS_B3-
7	GND	8	GND
9	LVDS_A3-	10	LVDS_B2+
11	LVDS_A3+	12	LVDS_B2-
13	GND	14	GND
15	LVDS_A0-	16	LVDS_B1+
17	LVDS_A0+	18	LVDS_B1-
19	GND	20	GND
21	LVDS_A1-	22	LVDS_B0+
23	LVDS_A1+	24	LVDS_B0-
25	GND	26	GND
27	LVDS_A_CLK-	28	LVDS_B_CLK-
29	LVDS_A_CLK+	30	LVDS_B_CLK+
31	GND	32	GND
33	GND	34	GND
35	+VDD_3.3V	36	+VDD_5V
37	+VDD_3.3V	38	+VDD_5V
39	+VDD_3.3V	40	+VDD_5V

▶ Pin Assignment- System I/O

COM1

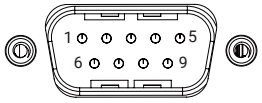




Pin	Assignment
1	---
2	RX
3	TX
4	---
5	GND
6	---
7	---
8	---
9	---

COM2

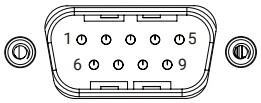




Pin	Assignment
1	---
2	RX
3	TX
4	---
5	GND
6	---
7	RTS
8	CTS
9	---

COM3

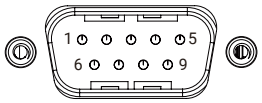




Pin	Assignment
1	---
2	RX
3	TX
4	---
5	GND
6	---
7	---
8	---
9	---

COM4

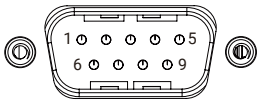




Pin	RS232	RS422	RS485
1	DCD	TX-	Data-
2	RX	TX+	Data+
3	TX	RX+	---
4	DTR	RX-	---
5	GND	GND	GND
6	---	---	---
7	RTS	---	---
8	CTS	---	---
9	---	---	---

CAN Bus



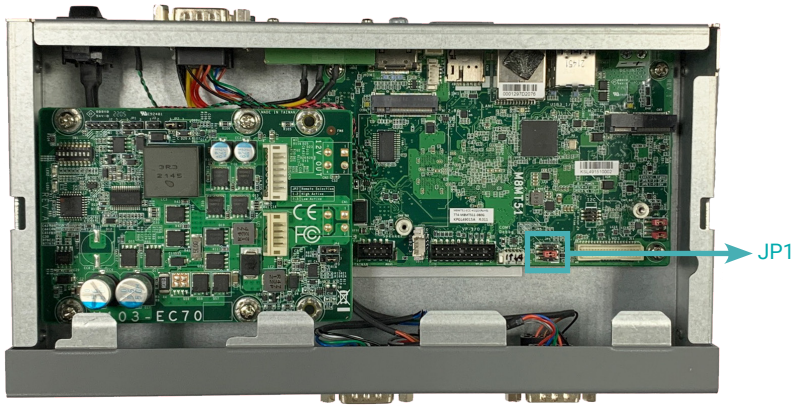


Pin	Assignment
1	VDD CAN_+5V
2	CAN_H
3	CAN_L
4	CAN_GND
5	---
6	---
7	---
8	---
9	---

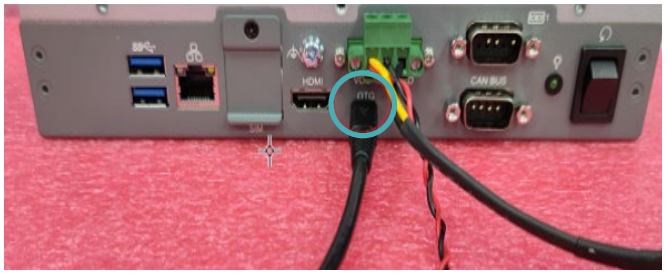
Chapter 4 - Software User Guide

▶ Flash Images into eMMC/SD card using UUU tool

1. Before flashing images into VC900 device via UUU tool, user must configure **BOOTCNFG** to **BOOT Type,** also enter Serial Download mode by plugging one jumper into JP1 (short pin1 and pin2) as picture shown below.

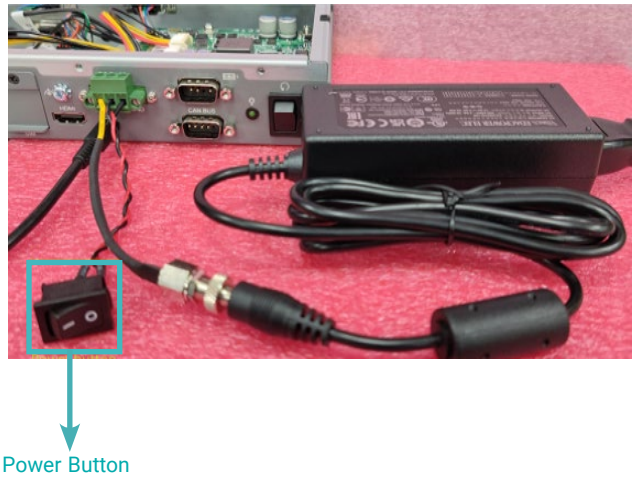


2. Connect Micro USB cable to PC.



3. Connect with **12V** adapter

4. Press power button to turn on VC900



5. • Open the Command Prompt in Windows 10, or open the Terminal in Ubuntu when the necessary preparations are done.
   • Unzip M8MT51_YQ_x_y_nnn_yymmdd_0000.zip image package and enter unzipped image package folder.
   • Execute the following command, then wait for the process to complete.

For Windows 10

Command of flash all images into eMMC

uuu uuu_emmc_M8MT51_uboot-kernel-rootfs-HDMI.uuu
(or uuu_emmc_M8MT51_uboot-kernel-rootfs-LVDS.uuu)

Command of flash necessary images except rootfs image into eMMC

uuu uuu_emmc_M8MT51_uboot-kernel-HDMI.uuu
(or uuu uuu_emmc_M8MT51_uboot-kernel-LVDS.uuu)

The messages of flash image in Windows:

```
C:\work\mfgtools-uuu_M8MT51>uuu uuu_emmc_M8MT51_uboot-kernel-rootfs-HDMI.uuu
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.2.135-0-gacaf035

Success 1    Failure 0

2:1     22/22 [Done                              ] FBK: DONE

C:\work\mfgtools-uuu_M8MT51>
```

For Ubuntu

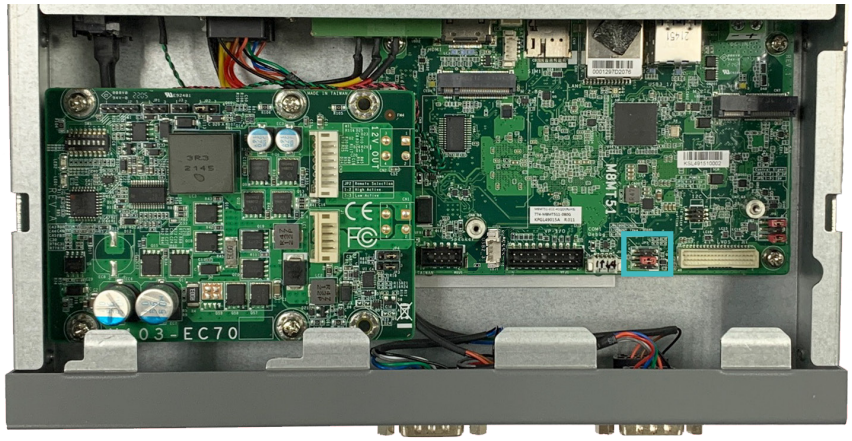
Command of flash all images into eMMC

sudo ./uuu uuu_emmc_M8MT51_uboot-kernel-rootfs-HDMI.uuu
(or sudo ./uuu uuu_emmc_M8MT51_uboot-kernel-rootfs-LVDS.uuu)

Command of flash necessary images except rootfs image into eMMC

sudo ./uuu uuu_emmc_M8MT51_uboot-kernel-HDMI.uuu
(or sudo ./uuu uuu_emmc_M8MT51_uboot-kernel-LVDS.uuu)

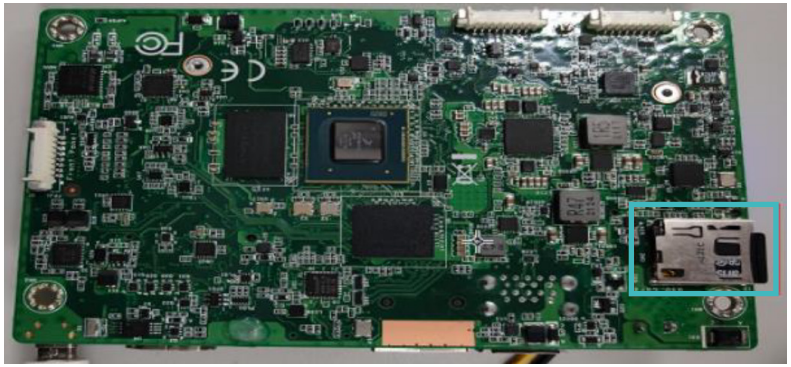
6. • Turn off the device after flashing process completes
   • Switch **BOOTCNFG** to **BOOT Device**, also enter **Normal mode** by removing pin1/pin2 jumper from JP1



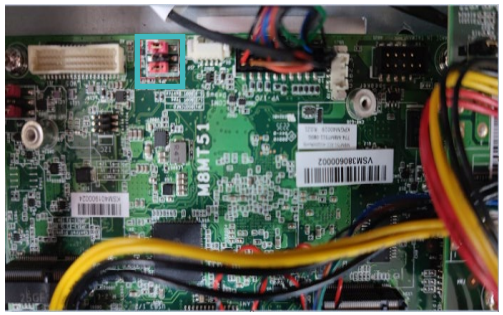
7. Turn on the device

8. Flash Image Into SD Card

8.1 Insert SD card into SD socket on the back side of M8MT51 board.



8.2 Connect JP1 as picture shown below and power on the device to force the device to enter SD card download mode.



8.3 SD card flash commands in Ubuntu

- **Flash u-boot/kernel/rootfs images:**

  $ sudo ./uuu uuu_sdcard_M8MT51_uboot-kernel-rootfs-HDMI.uuu

- **Flash u-boot/kernel images:**

  $ sudo ./uuu uuu_sdcard_M8MT51_uboot-kernel-HDMI.uuu

8.4 SD card flash commands in windows

- **Flash u-boot/kernel/rootfs images:**

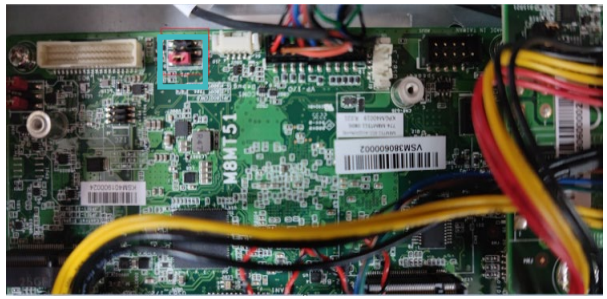
  > uuu uuu_sdcard_M8MT51_uboot-kernel-rootfs-HDMI.uuu

- **Flash u-boot/kernel images:**

  > uuu uuu_sdcard_M8MT51_uboot-kernel-HDMI.uuu

8.5 **SD boot mode configuration**

Connect JP1 as picture shown below and power on the device to force the device to enter SD card boot mode.



▶ Software Features

General Support List

(*) is depended on the NXP support.

Component	Name	Base-Line Feature
General	OS Support	Yocto 2.5 (Default Preloaded on eMMC), Kernel 4.14.98 Android 9.0 (Optional), Kernel 4.14.98
Misc	Firmware Upgrade (*)	NXP uuu firmware update tool
	Utilities (*)	Hardware diagnostic utilities

Linux AP/API Support List

(*) is depended on the NXP support.

Component	Description	Detail	Release Schedule
Linux	Yocto 2.5 Kernel 4.14.98	It's an open-source project that delivers a set of tools that create operating system images for embedded Linux systems. Support Wayland demo image only (*).	2021, Q1
Linux AP/API	NXP iMX8M Yocto 2.5 BSP Support Wayland Window Support BitBake build tool	1. All library and utility should support (*). 2. Source code package (support by request).	2021, Q1
	Support I2C, Watchdog, GPIO, LVDS brightness control	Provide support console for i.MX8M platform.	2021, Q1
Android	Android 9.0 - Kernel 4.14.98	Support Demo image.	2021, Q3
Android AP/API	NXP iMX8M Android 9.0 NXP BSP Support Android AOSP launcher Support Android ADB shell Support Android APK install	1. All library, utility and Android apk should support (*). 2. Source code package (support by request).	2021, Q3
	Support GPIO, LVDS brightness control	Provide support console for i.MX8M platform.	2021, Q3

Yocto Support List

(*) is depended on the NXP support.

Component	Support Status
Yocto Version	2.5
Kernel Version	4.14.98
Window System	Wayland without QT5 build
eMMC	Support eMMC boot , eMMC v5.1, Linux ext4 file system
HDMI Video output	Support single display function, need to plug in HDMI cable before power on, resolution 4K@60. Support single display function.
LVDS Panel	Support Panel: AM-1024600DTZQW Support single display function.
LVDS Backlight (PWM)	Support control by Linux device node, level value 0~100.
I2C Touch	Support Touch: ILI2301S+ILIM2V.
Ethernet LAN1	Support "ping", "ifconfig" console commands verify, static IP/DHCP Dynamic IP. Support writeable MAC address (In eMMC). Support Iperf3 bandwidth test tool (Not build-in).
Micro USB 2.0 HOST	1. Support USB HID Keyboard and Mouse Device. 2. Support USB Mass Storage by "mount" console command, EXT3/EXT4/FAT filesystem.
Micro USB 2.0 Device	1. Support connects to PC to update image by NXP iMX.8M uuu tool.
TYPE A USB 3.0 HOST	1. Support USB HID Keyboard and Mouse Device. 2. Support USB Mass Storage by "mount" console command, EXT3/EXT4/FAT filesystem.
I2S-Audio	1. Support system sound output to LINE OUT Connector. 2. Support adjusts sound volume by console command. 3. Support audio plays console command for test play MP3/WAV file (16 bit, 44.1 kHz sample rate, CD quality. 4. Support audio recording console command for test recording WAV file with Mono MIC_IN audio, file store to eMMC.
M.2 2242/3042 B key	Support "lspci" console command for check PCIe card status. Support "lsusb" console command for check PCIe card status. 4GLTE module: Quectel EM06

M.2 2230 E key	Support "lspci" console command for check PCIe card status. Support "lsusb" console command for check PCIe card status. WiFi/BT module: RTL8822CE
UART1 - RS232 (Debug serial port)	Support output Linux Uboot and kernel debug log, use PC serial terminal tool read log (ex. PuTTY), BR 115200.
UART2 - RS232	For M.2 Support DTE mode, BR 115200 with CTS/RTS follow control loopback test, BR 115200 (need DFI Linux user space utility).
UART3 - RS485	Support Loopback test, BR 115200 (need DFI Linux user space utility).
UART4 - RS232	Support DTE mode, BR 115200 with CTS/RTS follow control loopback test, BR 115200 (need DFI Linux user space utility).
UART4 - RS422	Support Loopback test, BR 115200 (need DFI Linux user space utility).
UART4 - RS485	Support Loopback test, BR 115200 (need DFI Linux user space utility).
DIO	Support read input high/low status, set output voltage high/low status, control by Linux device node, 8 pins.
DIO-PWM	Support control by Linux device node.
CAN Bus	Support "cansend", "candump" console commands for test send/read data.
Micro SD Card (SD slot)	Support SD card boot, support SD storage, EXT4/EXT3/FAT filesystem. (Support Kingston, micro SDHC 4GB class 4, 4GB/16GB). For standard product, We don't porting any SDIO module.
Reset / Power on Key	HW control.
I2C-RTC	Support Linux "date -s"and "hwclock -w" console commands to set system time.
I2C-Thermal sensor	Support read device temperature (degrees C) by Linux device node.
Play Video	Support play 4K MPEG4 H.264 and H.265 file (use NXP gstreamer tool).
Watch Dog	Support NXP utility "wdt_driver_test.out"(*) to test Watch Dog reboot function.
Secure Boot	Support(Option)
OS Suspend	Not support suspend.
Package manager	N/A, For standard product, We didn't build in package manager.

Wifi /BT	Support WiFi/BT module: RTL8822CE 1. RTL8822CE WiFi: Support Wifi STA Mode (connect Wifi AP), use ifconfig, wpa_ supplicant console commands, use ping console commands verify WiFi function. Soft AP Mode option. 2. RTL8822CE BT: Support files transfer protocol only (BT OBEX protocol), use obexctl console commands.
LTE and SIM slot	Support 4GLTE module: Quectel EM06 Support data-link only, use ping console commands verify function.
Image Size	1. flash.bin : Around 1.05 MB 2. Image: Around 25.1 MB 3. rootfs.tar.bz2: compressed: Around 481 MB
Free storage size	Around 11.7 GB free space (eMMC size 16GB, around 2.3GB used of 14GB file system size, /dev/root)

Android Support List

(*) is depended on the NXP support.

Component	Support Status
Android Version	9.0
Kernel Version	4.14.98
eMMC	Support eMMC boot , eMMC v5.1, Linux ext4 file system
HDMI Video output	Support single display function, need to plug in HDMI cable before power on, resolution 4K@60. Support single display function.
LVDS Panel	Support Panel: AM-1024600DTZQW Support single display function.
LVDS Backlight (PWM)	Support control by Linux device node, level value 0~100.
I2C Touch	Support Touch: ILI2301S+ILIM2V.
Ethernet LAN1	Support "ping", "ifconfig" console commands verify, static IP/DHCP Dynamic IP. Support fixed MAC address (In eMMC). Support Iperf3 app (Not build-in).
Micro USB 2.0 HOST	1. Support USB HID Keyboard and Mouse Device. 2. Support USB Mass Storage with FAT32/Ext3/Ext4 filesystem.
Micro USB 2.0 Device	1. Support connects to PC to update image by NXP iMX.8M uuu tool.
TYPE A USB 3.0 HOST	1. Support USB HID Keyboard and Mouse Device. 2. Support USB Mass Storage with FAT32/Ext3/Ext4 filesystem.
I2S-Audio	1. Support system sound output to LINE OUT Connector. 2. Support adjusts sound volume by OS setting UI. 3. Support Music app for test play MP3/WAV file (16 bit, 44.1 kHz sample rate, CD quality. 4. Support sound recorder for test recording PCM file with Mono MIC_IN audio, file store to eMMC.
M.2 2242/3042 B key	Support "lspci" console command for check PCIe card status. Support "lsusb" console command for check PCIe card status. 4GLTE module: Quectel EM06
M.2 2230 E key	Support "lspci" console command for check PCIe card status. Support "lsusb" console command for check PCIe card status. WiFi/BT module: RTL8822CE
UART1 - RS232 (Debug serial port)	Support output Linux kernel debug log, use PC serial terminal tool read log (ex. PuTTY), BR 115200.
UART2 - RS232	For M.2 Support DTE mode, BR 115200 with CTS/RTS follow control loopback test (need DFI Android test utility).
UART3 - RS485	Support Loopback test, BR 115200 (need DFI Android test utility).
UART4 - RS232	Support DTE mode, BR 115200 with CTS/RTS follow control loopback test (need DFI Android test utility).
UART4 - RS422	Support Loopback test, BR 115200 (need DFI Android test utility).
UART4 - RS485	Support Loopback test, BR 115200 (need DFI Android test utility).
DIO	Support read input high/low status, set output voltage high/low status, control by Linux device node, 8 pins.
DIO-PWM	Support control by Linux device node.
CAN Bus	Support "cansend", "candump" console commands for test send/read data.
Micro SD Card (SD slot)	Support SD storage with FAT32/Ext3/Ext4 filesystem. (Support Kingston, micro SDHC 4GB class 4, 4GB/16GB). For standard product, We don't port any SDIO module.
Reset / Power on Key	HW control.
I2C-RTC	Support Linux "date -s"and "hwclock -w" console commands to set system time.
I2C-Thermal sensor	Support read device temperature (degrees C) by Linux device node.
Secure Boot	Not Support
Wifi /BT	Support WiFi/BT module: RTL8822CE 1.RTL8822CE WiFi: Support Wifi STA and AP Mode 2.RTL8822CE BT: Support Bluetooth Tethering mode
LTE and SIM slot	Support 4GLTE module: Quectel EM06 Support data-link only.
Android Build Type	ENG Build without SELinux.
Android ADB	Support

Android Factory Reset	Support
Android Fastboot	Support
Android OTA	No Support
Android CTS	No Support
Android GMS/ GTS	No Support
Android Suspend	No support suspend, set never to suspend by default.
UART4 - RS485	Support Loopback test, BR 115200 (need DFI Android test utility).
Preload Android APPs	1. AOSP WebView Browser Tester: Browser APP. 2. AOSP Calculator: Calculator APP. 3. AOSP Calendar: Calendar APP. 4. AOSP Clock: Clock APP, support alarm wake-up. 5. AOSP Contacts: Function not ready. 6. AOSP Email: E-Mail APP. 7. AOSP Gallery: Gallery APP (JPEG). 8. AOSP Music: Play music APP (MP3). 9. AOSP Phone: Function not ready. 10. AOSP Settings: Android Settings APP. 11. AOSP Sound Recorder: Sound Recorder APP. Function not ready, preload for AOSP Audio module test in the future. 12. NXP Ethernet (*): Ethernet settings APP. 13. AOSP Files APP. 14. Cactus Player APP. 15. Camera APP. 16. Search APP.
Image Size	1. u-boot image: Around 1188 KB 2. boot image: Around 50 MB 3. recovery image: Around 7.5 MB 4. system image: Around 1195 MB
Free storage size	1. Data partition: Around 6.98 GB free space 2. System partition: Around 1410 MB free space 3. Cache partition: Around 2238 MB free space