ESOM-MT-350 USER Manual

Arm-Based MediaTek Genio 350 System on Module

Vecow

1.0.0 Edition 20221115

Record of Revision

Version	Date	Page	Description	Remark
1.00	2022/11/15		Official Release	

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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 it is not installed and used in accordance with the instruction manual, it 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.

CE

The products described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Copyright and Trademarks

Order Information

Part Number	Description
ESOM-MT-350	Arm-Based MediaTek Genio 350 System on Module
ESOM-MT-350-EV	Arm-Based MediaTek Genio 350 SOM Evaluation Kit

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GENERAL INTRODUCTION

1.1 Overview

Vecow ESOM-MT-350 is powered by MediaTek Genio 350 processor that features a quad-core Cortex-A53 processor and integrates with Arm Mali-G52 GPU. The ESOM-MT-350 provides a powerful and efficient performance designed for AIoT applications. Vecow ESOM-MT-350 supports 2GB LPDDR4 memory, Digital display and MIPI DSI display to facilitate advanced multimedia capabilities. Both Android 10 and Yocto 3.1 operating systems are supported for upgradeability and scalability.

1.2 Features

- Quad-core MediaTek Genio 350 processor with quad Arm Cortex-A53 @2.0GHz
- Integrated Mali-G52 GPU and H.265/H.264 FHD video decoding
- Onboard Dual-band 802.11ac Wi-Fi with Bluetooth 5.0
- Onboard 2GB LPDDR4 memory and 16GB eMMC
- Support 4-lane MIPI CSI-2 camera with internal ISP, Full HD Resolution
- Support Digital Display and 4-lane MIPI DSI, Full HD Resolution
- Supports Android 10 and Yocto 3.1 operating system

1.3 Product Specification

1.3.1 Specifications of ESOM-MT-350

System	
Processor	MediaTek Genio 350 Processor with Quad-core Cortex-A53 @2.0GHz
Memory	LPDDR4 SDRAM 2GB
eMMC	16GB eMMC
OS	• Android 10 • Linux Yocto 3.1
I/O Interface	
Internal I/O	2 M.2 Golden Finger
External I/O	• 1 IPEX Connector • 1 Debug Console Port
Graphics	
Graphics Processor	• ARM Mali-G52 high-performance GPU • 3D graphics accelerator processing 1600M pixel/sec @800MHz • Graphics engine supporting OpenGL® ES 3.2, OpenCL ES 2.0, and Vulkan 1.1 hardware acceleration
Video	• Video Encode: HEVC: 1080p@60fps H.264: 1080p@60fps • Video Decode: HEVC: 1080p@60fps H.264: 1080p@60fps • Vision DSP : Supports Cadence Tensilica Vision P6 and HiFi4
Display	• Digital Display : up to 1920 x 1080 • 4-lane MIPI DSI : up to 1920 x 1080
Camera	• Dual 4-lane MIPI CSI-2 • Integrated image signal processor supports 13MP
Audio	
Audio Codec	MediaTek MT6390/6357
Audio Interface	Line-out and Mic-in
Expansion	
USB	• 1 USB 2.0 Host • 1 USB 2.0 OTG
UART	2 UART (2-wire)
SPI	1 SPI
I2C	5 I2C
GPIO	14 GPIO
MSDC	1 MSDC
ADC	1 ADC
PWM	2 PWM
Battery Gauge	1 Battery Gauge

Wireless	
Wi-Fi & BT	• MediaTek MT6631 • Dual band (2.4GHz & 5GHz) single stream Wi-Fi 802.11a/b/g/n/ac RF • Bluetooth 5.0
Power	
Power Input	4.2V DC-in
Mechanical	
Dimension (W x L)	60 mm x 45 mm (2.36" x 1.77")
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.3.2 Specifications of ESOM-MT-350-CB

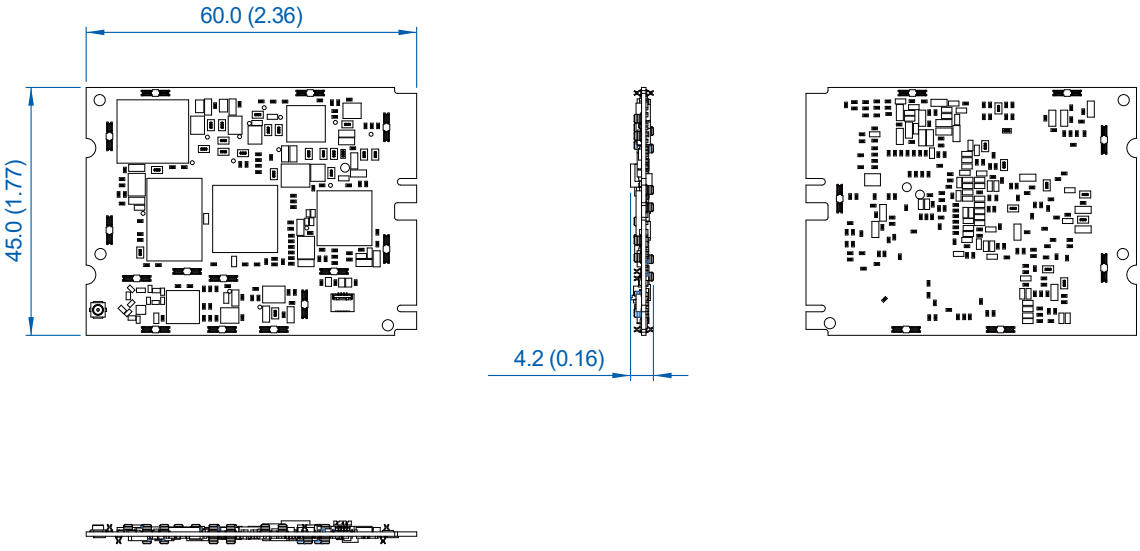
System	
Processor	MediaTek Genio 350 Processor with Quad-core Cortex-A53 @2.0GHz
Memory	LPDDR4 SDRAM 2GB
eMMC	16GB eMMC
OS	• Android 10 • Linux Yocto 3.1
Graphics	
Display	• Digital Display: up to 1920 x 1080 • 4-lane MIPI DSI : 1920 x 1080
Camera	1 4-lane MIPI CSI-2
Ethernet	
LAN 1	• 10/100 Mbps Ethernet LAN, RJ45 Connector
Audio	
Audio Interface	• 2 Audio Jack for Mic-in, Line-out
I/O Interface	
Front I/O	• Power Button • Power LED • 1 Micro USB 2.0 OTG Port • 1 10-bit GPIO Port • 1 Micro SD card slot • 2 Audio Jack
Rear I/O	• Reset Button • 1 RJ45 Ethernet Connector • 2 USB 2.0 Type A • 1 Digital Display • 1 COM RS-232 Connector • 1 IR Receiver • 1 DC-in Power Jack
Internal I/O	• 2 M.2 Connector for SOM Board • 1 MIPI DSI Connector • 1 MIPI CSI-2 Connector • 1 Touch Screen Connector • 1 SIM card Socket • 1 mini PCIe Socket • 1 Mic-in Connector • 2 Speaker Connector • 1 IO Expander Connector (1 I2C, 1 SPI, 1 UART, 12 GPIO) • 1 Battery charger connector
Expansion	
Mini PCIe	1 Mini PCIe for USB/SIM Card
Power	
Power Input	12V DC-in

Mechanical	
Dimension (W x L)	146 mm x 102 mm (5.75" x 4.01")
Environment	
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 85°C
EMC	CE, FCC

1.4 Mechanical Dimension

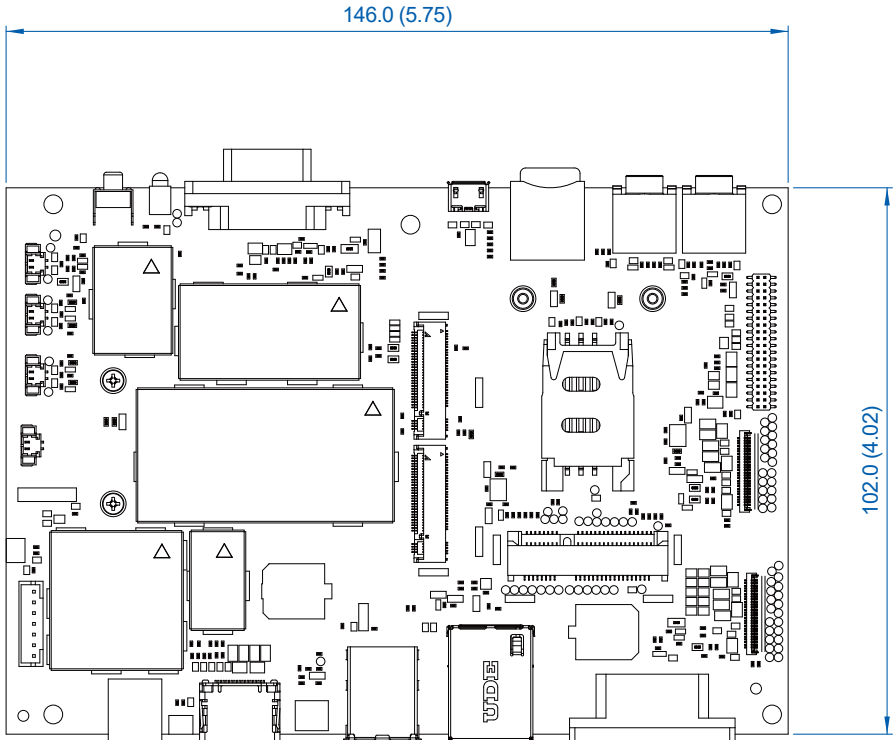
1.4.1 Dimensions of ESOM-MT-350

Unit : mm (inch)



1.4.2 Dimensions of ESOM-MT-500-CB

Unit : mm (inch)



2

GETTING TO KNOW YOUR ESOM-MT-350

2.1 Packing List

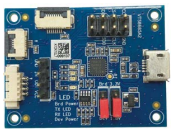
2.1.1 ESOM-MT-350 Packing List

Item	Description	Qty
1	ESOM-MT-350: System on Module with MediaTek Genio 350 quad-core Processor, 2GB LPDDR4 SDRAM, 16GB eMMC	1

2.1.2 ESOM-MT-350-EV Packing List

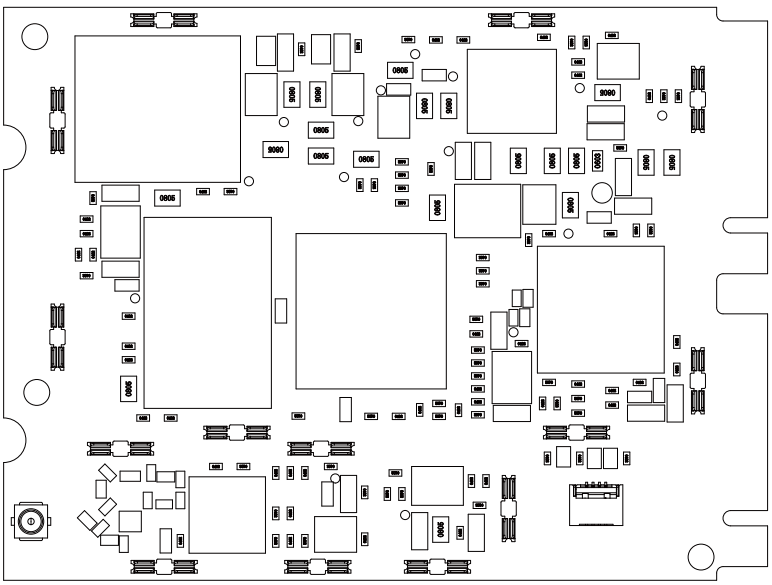
Item	Description	Qty
1	ESOM-MT-350-EV: MediaTek Genio 350 SOM Evaluation Kit	1

Item	Description	Outlook	Usage	Qty
1	WiFi Antenna		Antenna	1
2	Power Adaptor (PWA-60WP3-WT-12V)		Power Adaptor	1
3	Power Cord		Power Cord	1
4	Power Jack to Terminal Block		Cable	1
5	RTC Battery + 14cm Cable		Battery	1

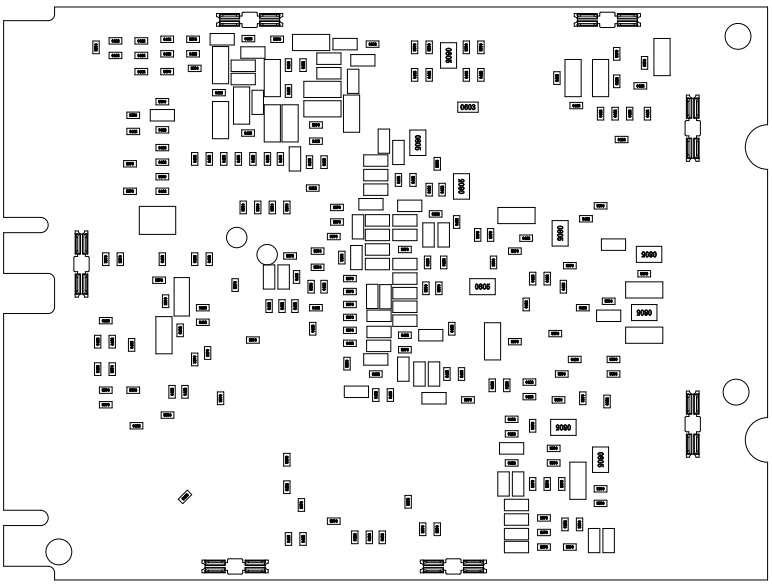
Item	Description	Outlook	Usage	Qty
6	USB Stick		SW Package	1
7	M3x4mm Screws		MiniPCIe Module	1
8	M3x10mm Screws		Securing Carrier Board from Below	5
9	M3x20mm Screws		Securing Carrier Board from Above	5
10	4-pin FFC Cable		From SOM to Debug Board	1
11	UART to USB Debug Board		Debug Board	1
12	7” MIPI DSI LCD Touch Panel		Panel	1
13	MIPI CSI Camera Module		Camera	1

2.2 ESOM-MT-350 Pinout Table

2.2.1 Top Side View



2.2.2 Bottom Side View



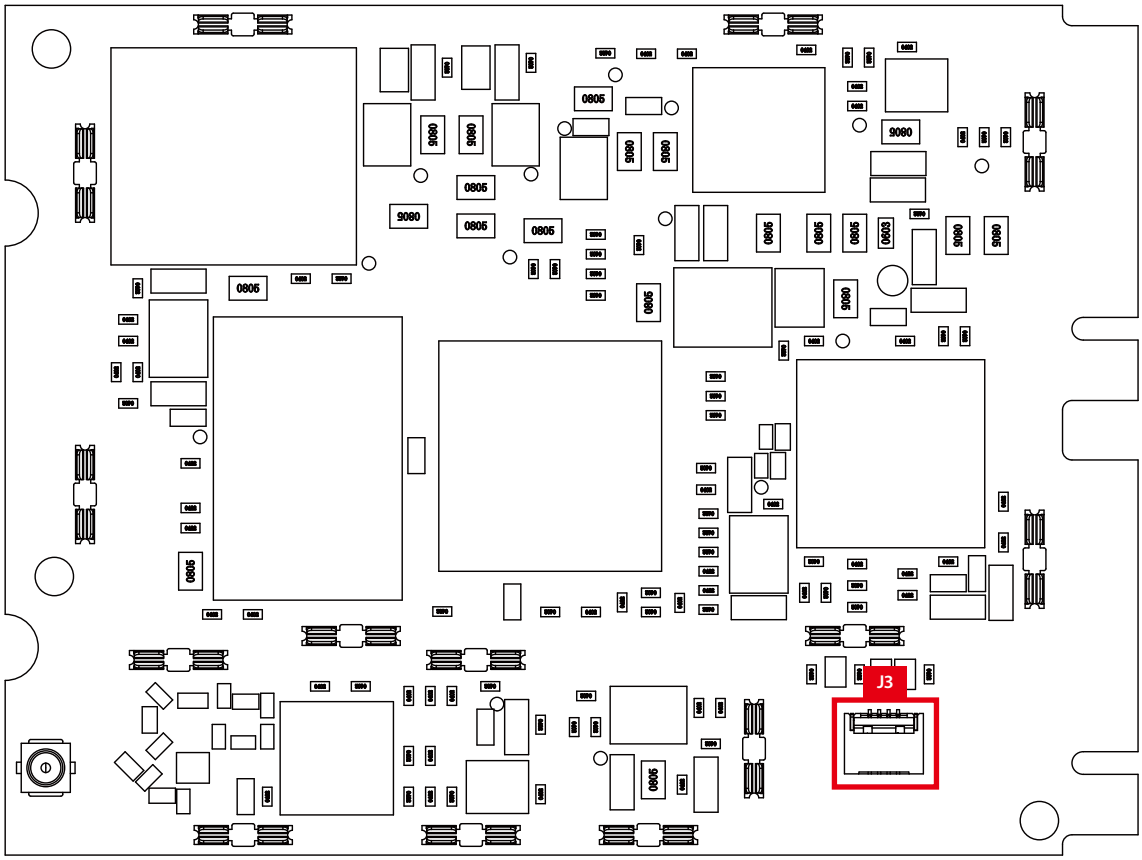
2.2.3 Pinout Table

J1			
Pin No.	Function	Pin No.	Function
1	HDMI_TX_CEC	2	VIN_DC
3	HDMI_TX_DDCSCL	4	HDMI_TX_HPD
5	HDMI_TX_DDCSDA	6	SD_WP
7	I2C2_SDA	8	MSDC1_INSI
9	I2C2_SCL	10	MSDC1_DAT1
11	GND	12	MSDC1_DAT0
13	CSI1B_L1N	14	GND
15	CSI1B_L1P	16	MSDC1_CLK
17	CSI1B_L0N	18	MSDC1_CMD
19	CSI1B_L0P	20	MSDC1_DAT3
21	GND	22	MSDC1_DAT2
23	CSI1A_L2N	24	I2C1_SCL
25	CSI1A_L2P	26	I2C1_SDA
27	GND	28	GPIO_CTP_RST
29	CSI1A_L1N	30	ENIT_CTP_INT
31	CSI1A_L1P	32	GND
33	CSI1A_L0N	34	DSI_D3_P
35	CSI1A_L0P	36	DSI_D3_N
37	GND	38	DSI_D1_P
39	CSI0B_L2N	40	DSI_D1_N
41	CSI0B_L2P	42	GND
43	CSI0B_L0N	44	DSI_CLK_P
45	CSI0B_L0P	46	DSI_CLK_N
47	GND	48	GND
49	CSI0B_L1N	50	DSI_D2_N
51	CSI0B_L1P	52	DSI_D2_P
53	GND	54	DSI_D0_N
55	CSI0A_L0N	56	DSI_D0_P
57	CSI0A_L0P	58	GND
67	CSI0A_L1N	68	LCM_ENN
69	CSI0A_L1P	70	LCM_ENP
71	GND	72	LCM_RST
73	CSI0A_L2N	74	DISP_PWM
75	CSI0A_L2P		

J2			
Pin No.	Function	Pin No.	Function
1	USB_P1_DM	2	AU_VIN1_N
3	USB_P1_DP	4	AU_VIN1_P
5	GND	6	ACCDET
7	USB_P0_DM	8	AU_VIN0_N
9	USB_P0_DP	10	AU_VIN0_P
11	GND	12	AVSS28_AUD
13	USBOTG_VBUS	14	AU_HP_RIGHT
15	USBOTG_ID	16	AU_HP_LEFT
17	USBOTG_DRVVBUS	18	GND
19	GND	20	EXT_GPIO3
21	Gas Gauge CS_N	22	EXT_GPIO2
23	Gas Gauge CS_P	24	EXT_GPIO1
25	Gas Gauge BATSNS	26	SPI_CS
27	I2C0_SDA	28	SPI_MOSI
29	I2C0_SCL	30	SPI_MISO
31	EXT_INT3	32	SPI_CLK
33	EXT_INT2	34	GND
35	EXT_INT1	36	UART2_RXD
37	GND	38	UART2_TXD
39	TX_CH2_P	40	UART1_TXD
41	TX_CH2_M	42	UART1_RXD
43	TX_CH1_P	44	MCU_INT
45	TX_CH1_M	46	MCU_WDI
47	GND	48	SYSRSTB
49	TX_CH0_P	50	MCU_STATUS
51	TX_CH0_M	52	KPCOL0
53	GND	54	EXT_3V3_ENABLE
55	TX_CLK_P	56	EXT_PMIC_EN1
57	TX_CLK_M	58	PWM_A
67	ADC_VIN0	68	PWM_C
69	GND	70	GND
71	VSYS	72	VSYS
73	GND	74	GND
75	VSYS		

2.3 ESOM-MT-350 I/O Connectors

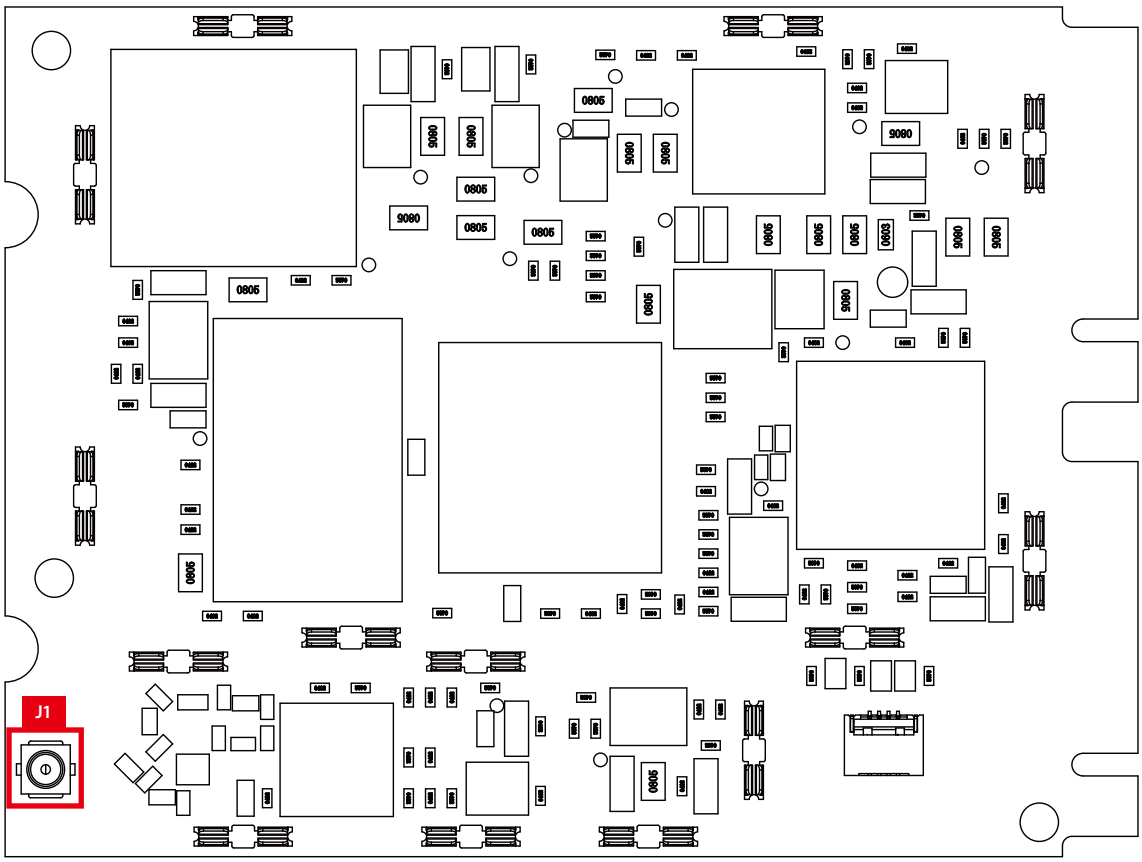
2.3.1 Debug Connector (J3)



There is a UART debug port on ESOM-MT-350. The pinout are listed below.

Pin No.	Function
1	GND
2	UTXD0
3	URXD0
4	VCC_1V8

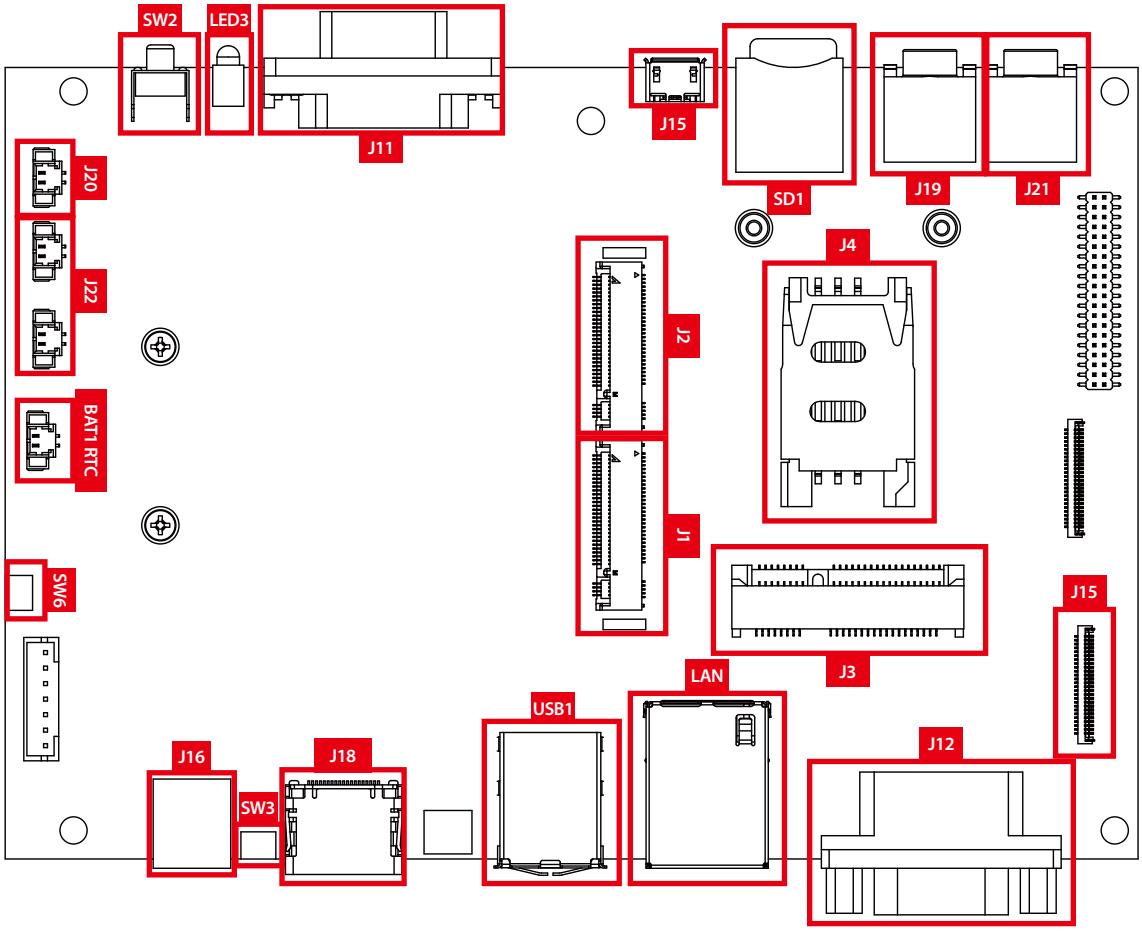
2.3.2 IPEX Connector (J1)



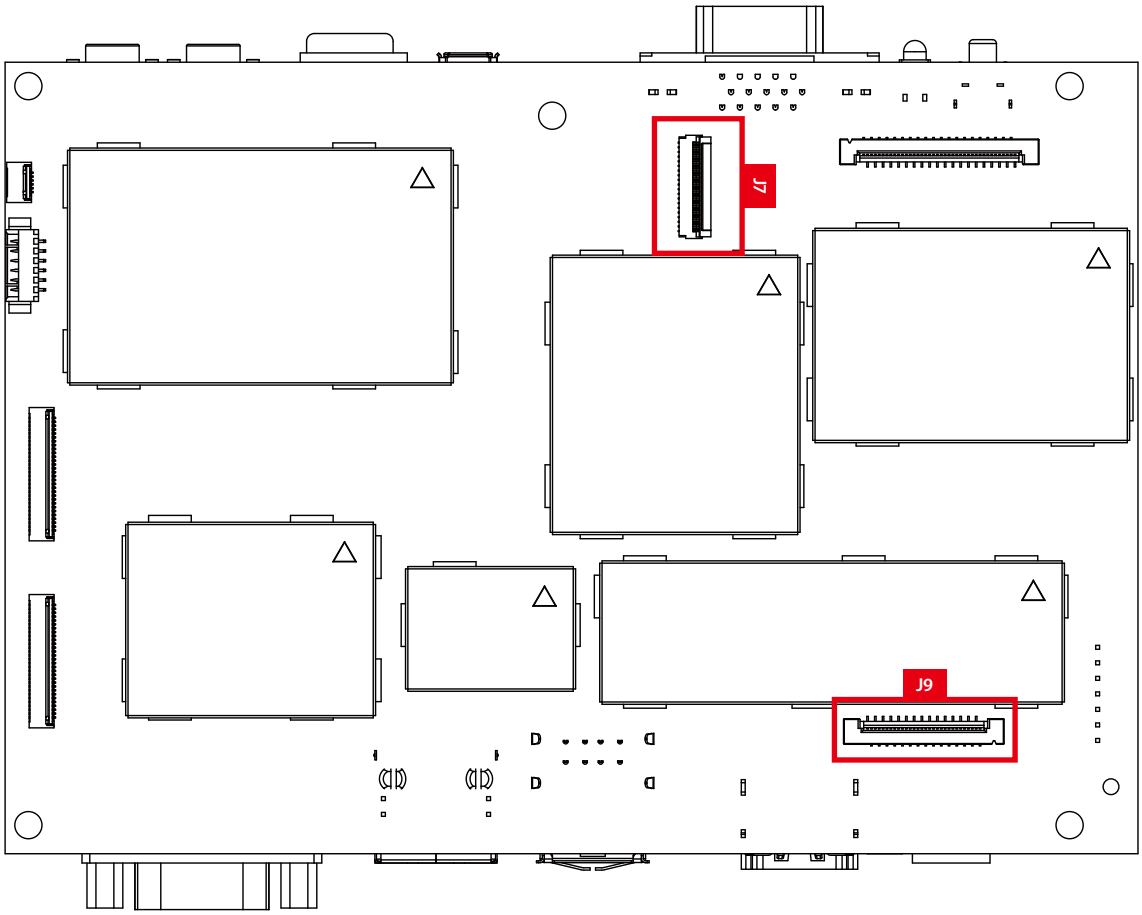
There is an IPEX connector on ESOM-MT-350. It is used for connecting Bluetooth and Wi-Fi antenna.

2.4 Carrier Board I/O Connectors

2.4.1 Top View

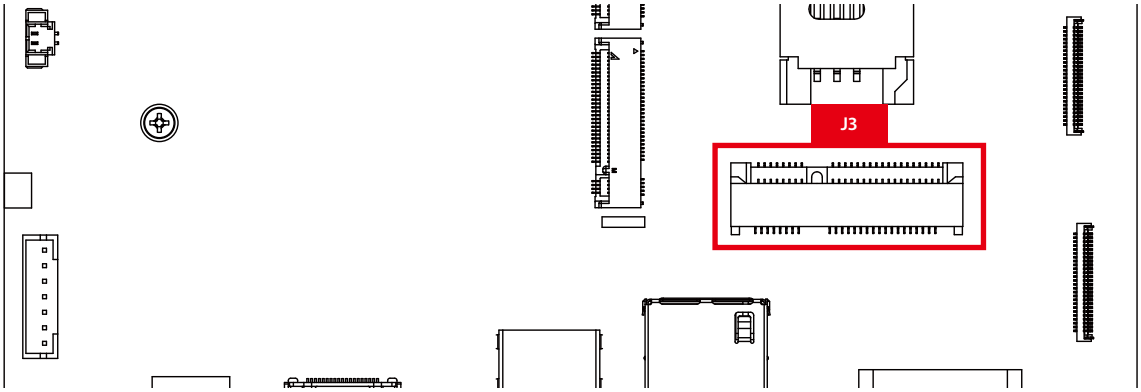


2.4.2 Bottom View



2.4.3 miniPCIe Slot (J3)

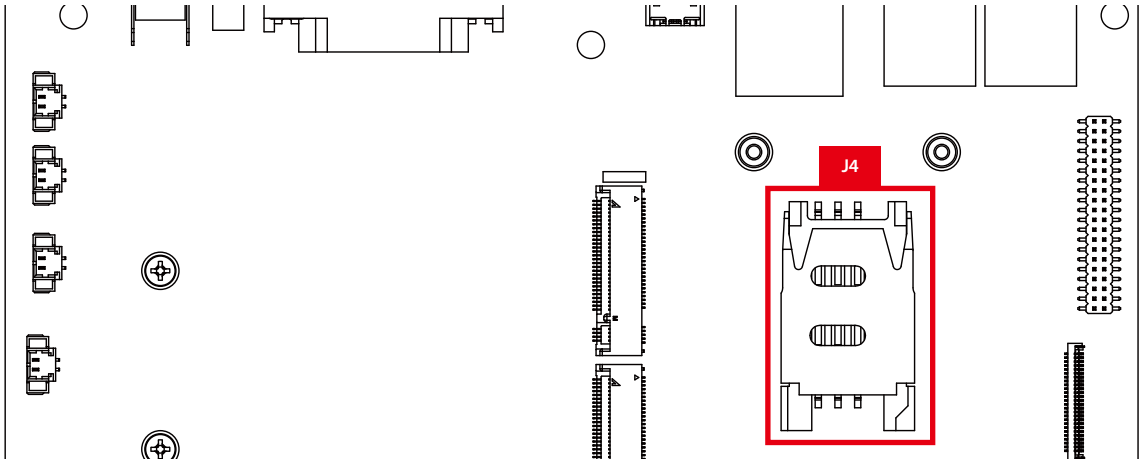
There is a miniPCIe slot on the ESOM-MT-350-CB. It is used for wireless networking options such as a 4G module(EC-25). The pin define are listed in the following table.



Pin No.	Function	Pin No.	Function
1	Reserved	14	USIM_RST
2	VDD3V3_MPCIE	15	GND
3	Reserved	16	Reserved
4	GND	17	Reserved
5	Reserved	18	GND
6	Reserved	19	Reserved
7	Reserved	20	MPCIE_W_DISABLE
8	USIM_VCC	21	GND
9	GND	22	MPCIE_RST_N
10	USIM_DATA	23	Reserved
11	Reserved	24	VDD3V3_MPCIE
12	USIM_CLK	25	Reserved
13	Reserved	26	GND
27	GND	40	GND
28	Reserved	41	VDD3V3_MPCIE
29	GND	42	WWAN_LED-
30	Reserved	43	GND
31	Reserved	44	USIM_PRESENT
32	Reserved	45	Reserved
33	MPCIE_RST_N	46	Reserved
34	GND	47	Reserved
35	GND	48	VDD1V5
36	MINI_PCIE_USB_DM	49	Reserved
37	GND	50	GND
38	MINI_PCIE_USB_DP	51	Reserved
39	VDD3V3_MPCIE	52	VDD3V3_MPCIE

2.4.4 SIM Card Slot (J4)

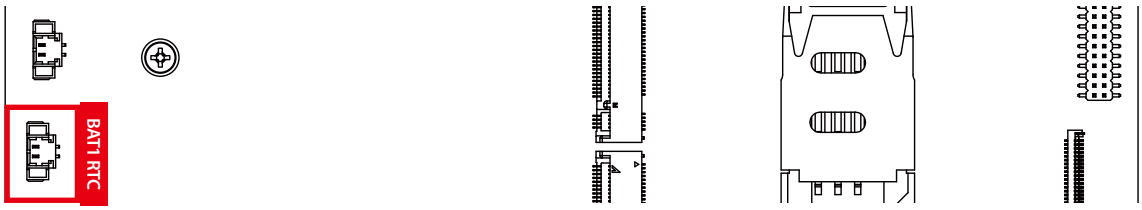
There is a SIM card slot on the ESOM-MT-350-CB. It supports 4G SIM cards, and when a 4G module is installed in the miniPCIe slot.



Pin No.	Function
1	BAT+
2	BAT+
3	I2C_CLK
4	I2C_DATA
5	TH
6	BAT-
7	BAT-

2.4.5 RTC Battery Connector (BAT1 RTC)

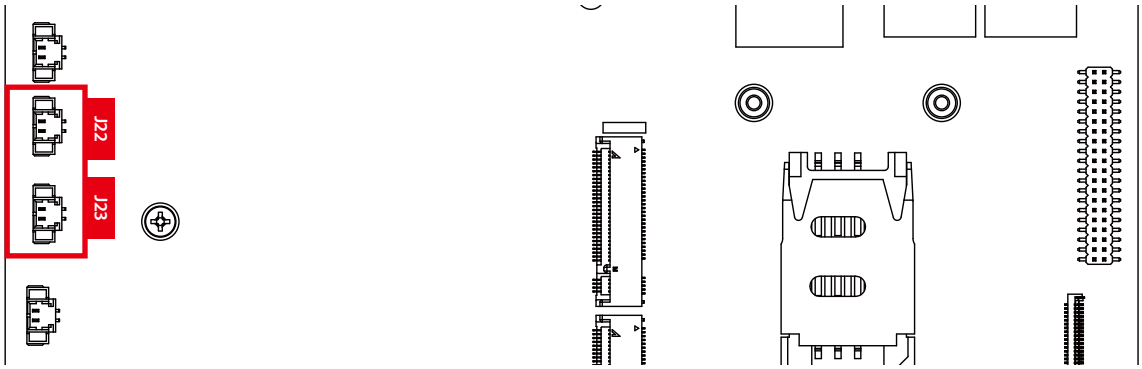
There is a RTC battery connector on the ESOM-MT-350-CB. It can support 3.0V 240mAh dioxide batteries, and provides power to the MCU to maintain the real time clock when the board is not connected to the DC adapter. The pin define are listed in the following table.



Pin No.	Function
1	BAT RTC
2	GND

2.4.6 Speaker Connectors (J22, J23)

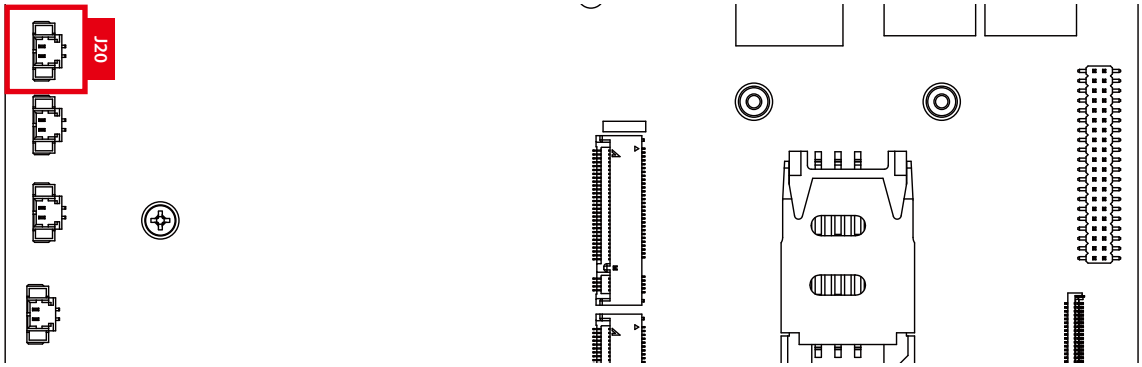
There are two mono speaker-out connectors on the ESOM-MT-350-CB. They are used for connecting mono speakers. The pin define are listed in the following table.



Pin No.	Function	Pin No.	Function
1	SPK_LN	1	SPK_RN
2	SPK_LP	2	SPK_RP

2.4.7 MIC Connector (J20)

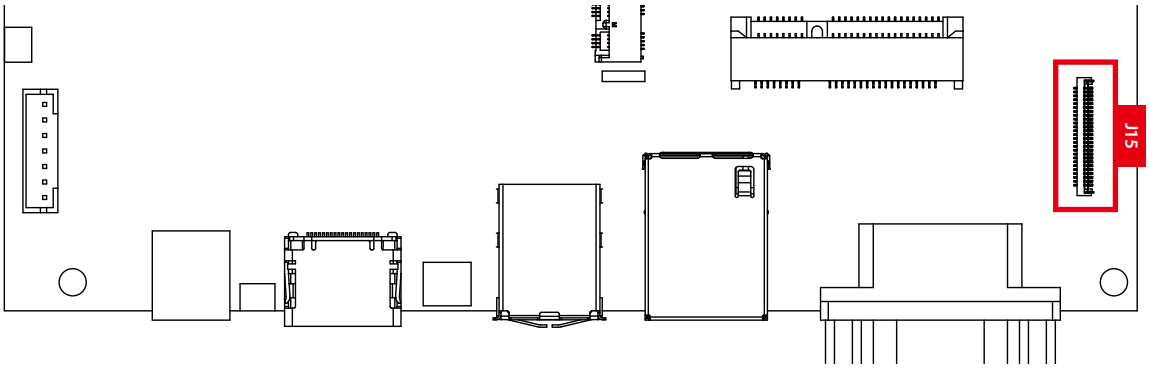
There is a MIC connector on the ESOM-MT-350-CB. It is for collecting the peripheral audio signal. The pin define are listed in the following table.



Pin No.	Function
1	MIC0_N
2	MIC0_P

2.4.8 MIPI CSI 4-Lane Connectors (J15)

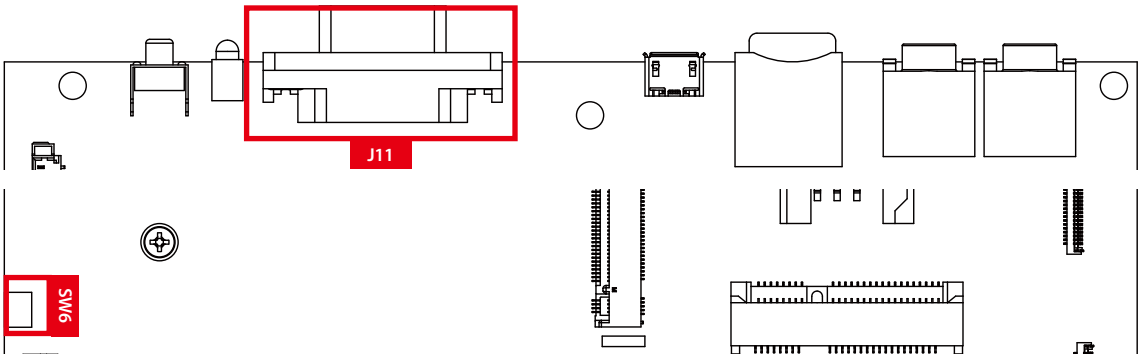
There is a MIPI CSI 4-lane connectors on the ESOM-MT-350-CB for connecting the camera. The pin define are listed in the following table.



Pin No.	Signal	Pin No.	Signal
1	RDN3	14	RDP0
2	RDP3	15	GND
3	GND	16	DOVDD_1.8V
4	RDN2	17	AVDD_2.7V
5	RDP2	18	NC
6	GND	19	DVDD_1.05V
7	CLKN	20	NC
8	CLKP	21	I2C_DATA
9	GND	22	I2C_CLK
10	RDN1	23	GND
11	RDP1	24	CLK of sensor
12	GND	25	Power down N
13	RDN0	26	Reset

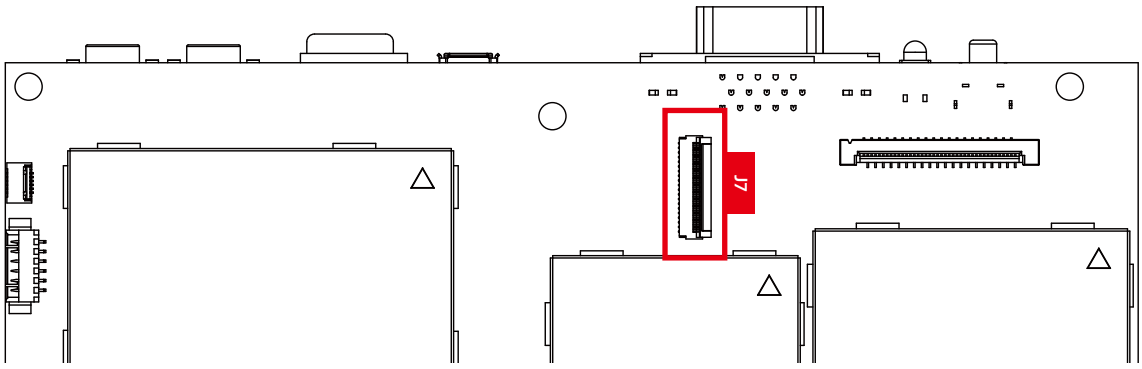
2.4.9 Download Button (SW6, J11)

There is a download button and a download pin on the ESOM-MT-350-CB. The download pin is pin-9 in the DIO connector. They are for entering the firmware download mode. To enter the firmware download mode, connect the USB OTG to a PC, press the button 'SW6', or short 'J11' pin-8 and pin-9, and then press the power button for more than 2 seconds.



2.4.10 MIPI DSI 4-Lane Connector (J7)

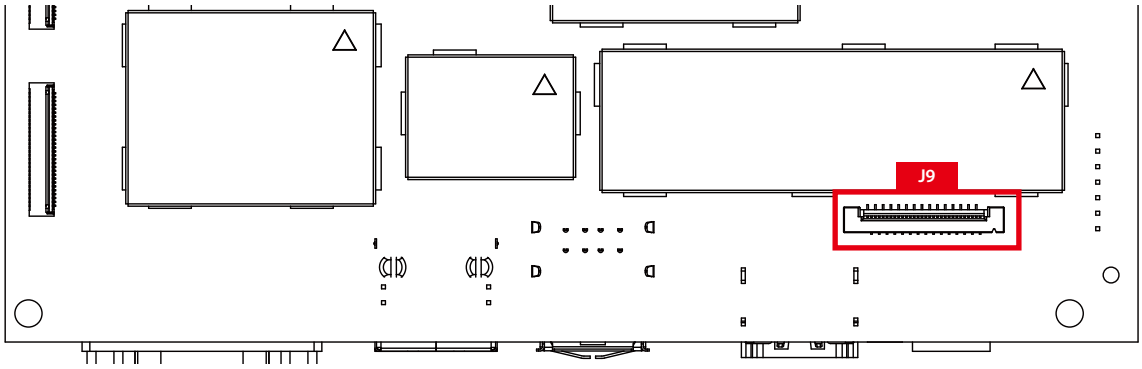
There is a MIPI DSI 4-Lane connector on the bottom side of the ESOM-MT-350-CB. It is for connecting to the MIPI LCD display. The pin define are listed in the following table.



Pin No.	Signal	Pin No.	Signal
1	VCOM_3.15V	2	VDDIO_1.8V
3	VDDIO_1.8V	4	ID
5	RESET	6	STBYB
7	GND	8	MIPI_D0N
9	NC	10	MIPI_D0P
11	GND	12	MIPI_D1N
13	NC	14	MIPI_D1P
15	GND	16	MIPI_D2N
17	NC	18	MIPI_D2P
19	GND	20	MIPI_CLKN
21	NC	22	MIPI_CLKP
23	GND	24	MIPI_D3N
25	NC	26	MIPI_D3P
27	GND	28	NC
29	NC	30	AVDD_9.6V
31	SHLR	32	UPDN
33	VGL_-6V	34	GND
35	VGH_18V	36	LEDK
37	LEDK	38	LEDA
39	LEDA		

2.4.11 7”Touchscreen Connector (J9)

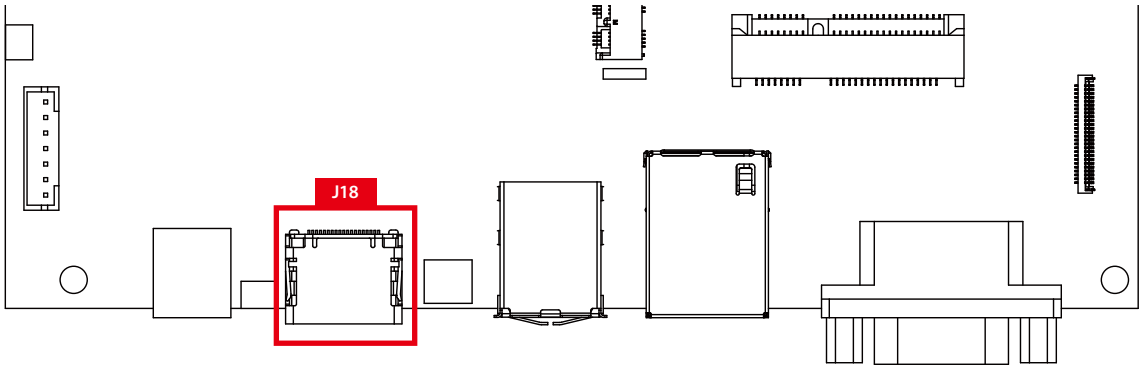
There is a 7” touchscreen connector on the ESOM-MT-350-CB. It is for connecting to the 7” touchscreen. The pin define are listed in the following table.



Pin No.	Signal	Pin No.	Signal
1	GND	2	SENSE09
3	SENSE08	4	SENSE07
5	SENSE06	6	SENSE05
7	SENSE04	8	SENSE03
9	SENSE02	10	SENSE01
11	SENSE00	12	GND
13	GND	14	GND
15	DRIVE14	16	DRIVE13
17	DRIVE12	18	DRIVE11
19	DRIVE10	20	DRIVE09
21	DRIVE08	22	DRIVE07
23	DRIVE06	24	DRIVE05
25	DRIVE04	26	DRIVE03
27	DRIVE02	28	DRIVE01
29	DRIVE00	30	GND

2.4.12 Digital Display Port (J18)

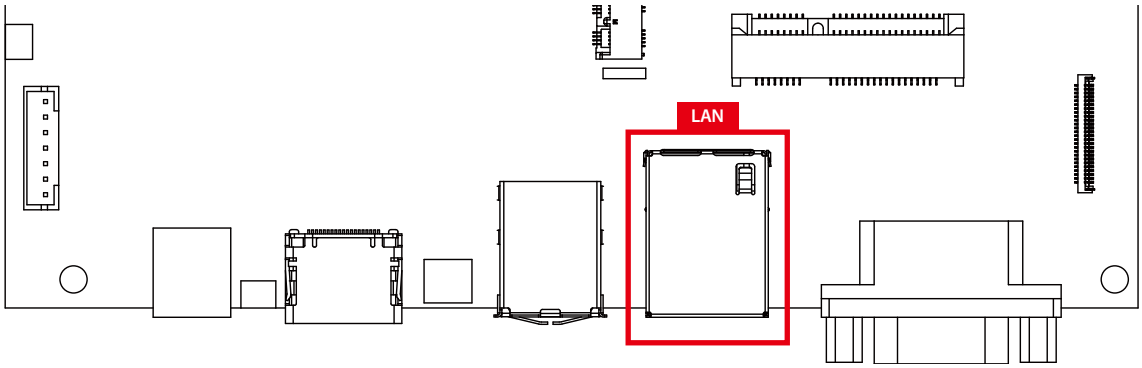
There is a Digital Display port on the back panel. The Digital Display port uses an HDMI Type A receptacle connector to connect High Definition video and digital audio using a single cable. The pin define are listed in the following table.



Pin No.	Definition	Pin No.	Definition
1	D2+	11	GND
2	GND	12	CLK-
3	D2-	13	CEC
4	D1+	14	NC
5	GND	15	DDC_CLK
6	D1-	16	DDC_DATA
7	D0+	17	GND
8	GND	18	HDMI_5V
9	D0-	19	PLUG_DET
10	CLK+		

2.4.13 10/100Mbps Ethernet Port (LAN)

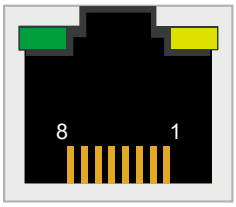
There is one 10/100Mbps Ethernet ports. The 10/100Mbps Ethernet port uses a RJ-45, which is fully compliant with the IEEE 802.3 (10BASE-T) and 802.3u (100BASE-TX) standards. Using suitable RJ-45 cable, you can connect the ESOM-MT-350-CB to a computer or to any other devices with Ethernet connection, for example, a hub or a switch. The pinouts of the 10/100Mbps Ethernet ports are listed below.



Pin No.	Definition
1	TD+
2	TD-
3	RD+
4	NC
5	NC
6	RD-
7	NC
8	NC

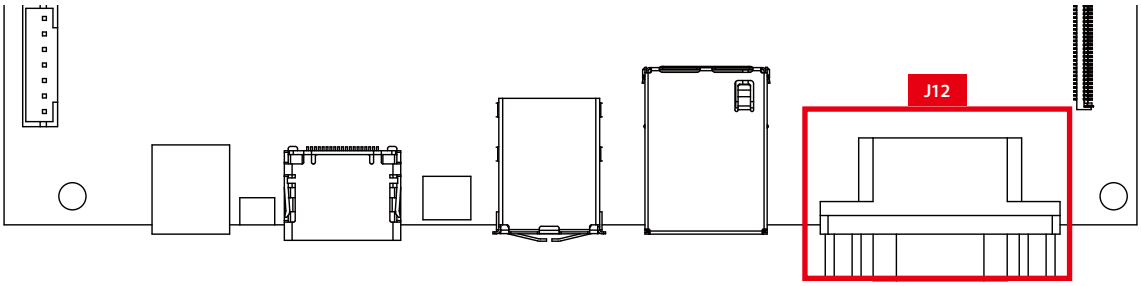
is properly connected to a 100Mbps Ethernet network, the right LED twinkling orange and the left one become solid green.

LED Location	Link off	10Mbps	100Mbps
Right	Off	Twinkling Orange	Twinkling Orange
Left	Off	Off	Solid Green



2.4.14 RS-232 (J12)

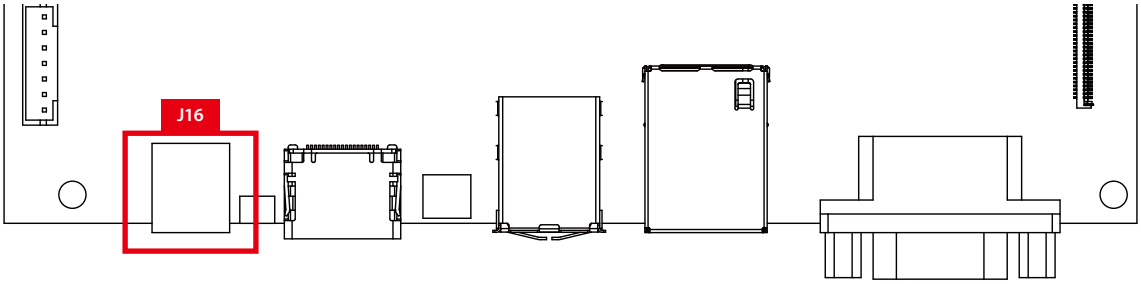
There is a COM (RS-232) port on the back panel of ESOM-MT-350-CB. The COM port supports RS-232 (TX/RX) mode and is used to control peripheral equipment. The pin define are listed in the following table.



Pin No.	Definition
1	NC
2	RXD
3	TXD
4	NC
5	GND
6	NC
7	NC
8	NC
9	MCU_RESET

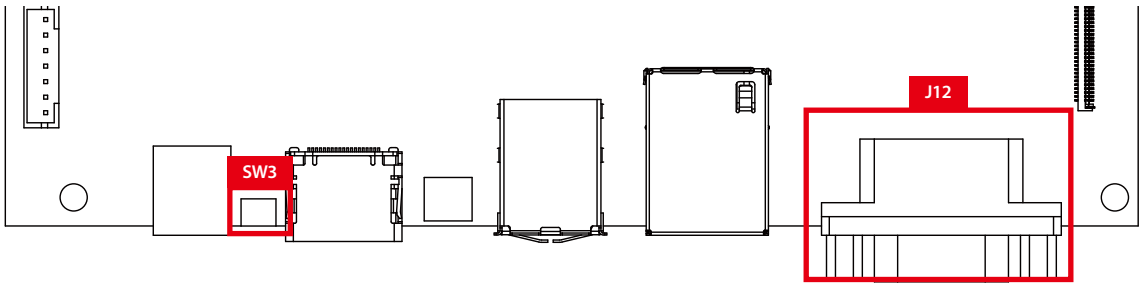
2.4.15 DC Jack (J16)

There is a DC Jack on the rear I/O panel of ESOM-MT-350. The DC Jack is used for suppling 12V-DC power from a compliant adapter.



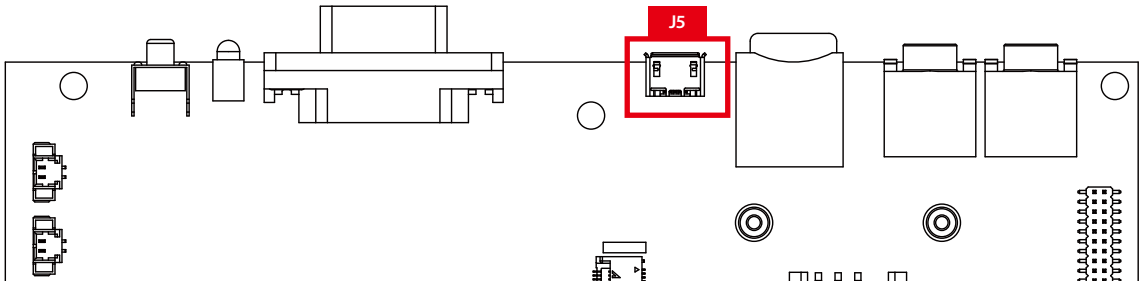
2.4.16 Reset Button and Reset Pin (SW3, J12)

There is a reset button on the back I/O panel on ESOM-MT-350-CB, which allows users to reboot or reset the system forcibly. There is also a MCU reset pin located in the COM connector 'J12' pin-9. The system will power down when the 'J12' pin-5 & pin-9 are shorted.



2.4.17 Micro USB 2.0 (J5)

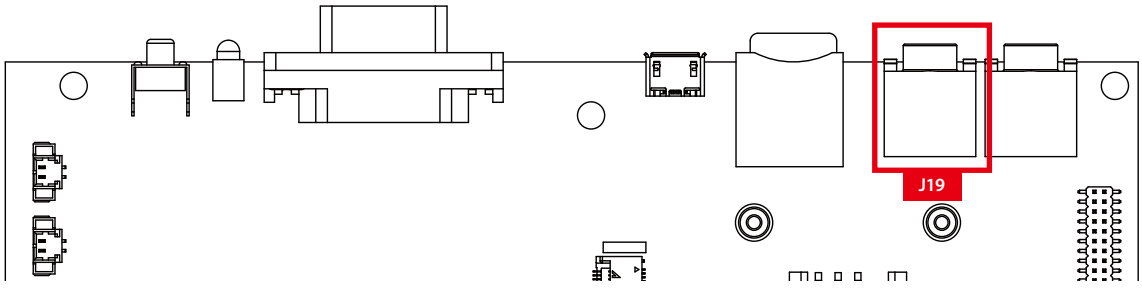
There is a Micro USB 2.0 port on the front panel of ESOM-MT-350-CB. It is used for downloading the OS image. The pin define are listed in the following table.



Pin No.	Definition
1	VBUS
2	D-
3	D+
4	ID
5	GND

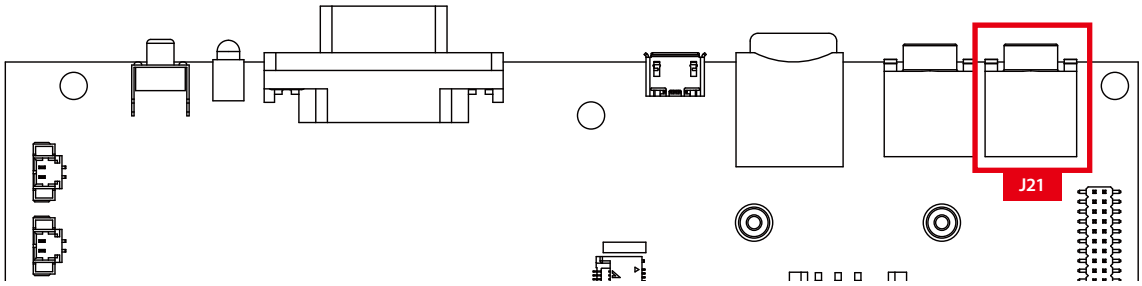
2.4.18 Headphone Jack (J19)

There is a 3.5mm headphone jack located on the front side panel of the ESOM-MT-350-CB. It is used for connecting to external speakers or headphones.



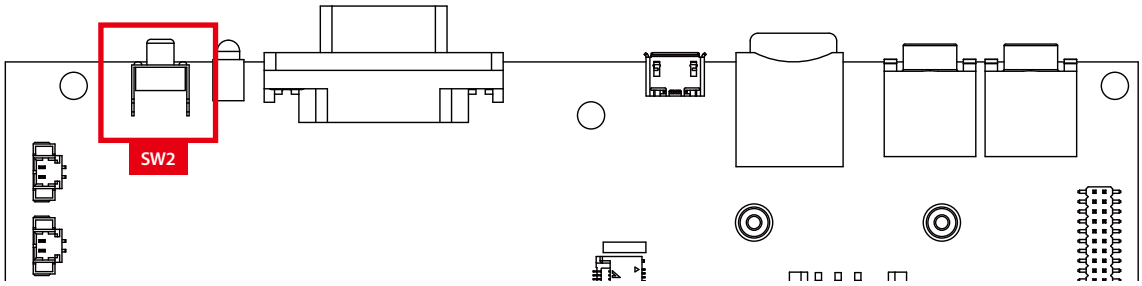
2.4.19 Microphone Jack (J21)

There is a 3.5mm microphone jack located on the front I/O panel of the ESOM-MT-350-CB. It is used for connecting to external microphones.



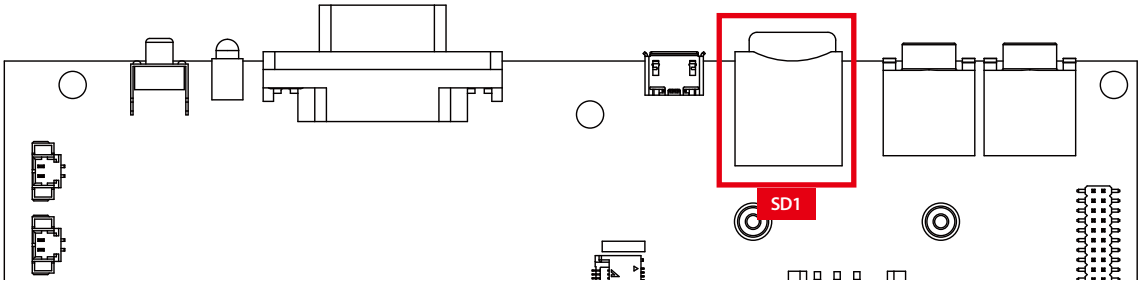
2.4.20 Power Button (SW2)

There is a power button located on the front I/O panel of the ESOM-MT-350-CB. To boot on the system, please quickly press the button once. To shut down the system, please press the button for more than 4 seconds. To suspend the system, quickly press the button once, and while in suspend mode quickly press once to resume.



2.4.21 Micro SD (SD1)

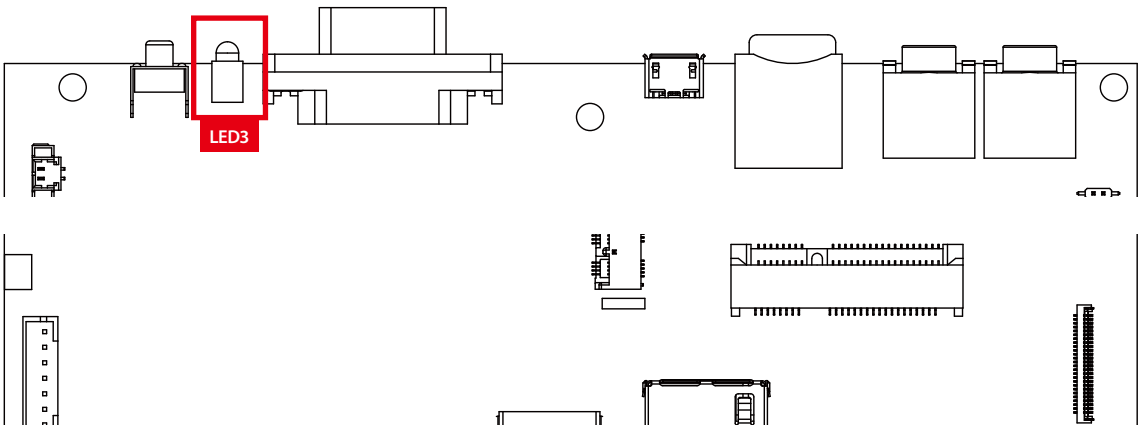
There is a MicroSD Slot on the front I/O panel of ESOM-MT-350-CB. It is used for storage data, pictures, video, audio, documents and so on. The pin define are listed in the following table.



Pin No.	Definition
1	DAT2
2	DAT3
3	CMD
4	VCC
5	CLK
6	GND
7	DAT0
8	DAT1
9	Card detect

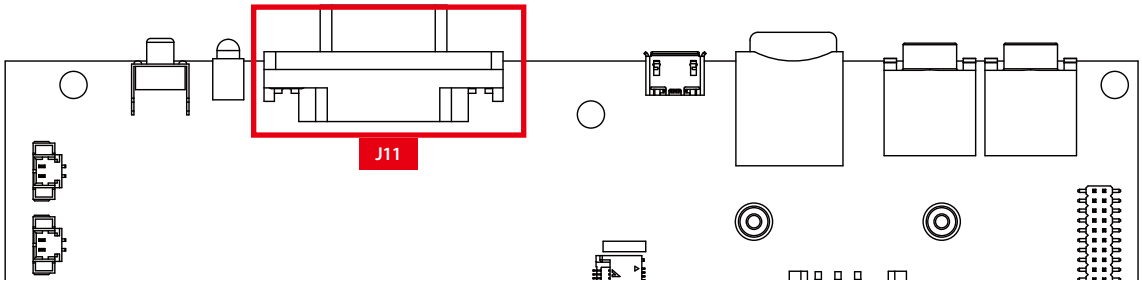
2.4.22 Power LED (LED3)

There is a Power LED on the front I/O panel of ESOM-MT-350-CB. The Power LED is used to indicate power status. The Power LED is on when the system is power on, the Power LED is off when the system is power off or suspend.



2.4.23 DIO Port (J11)

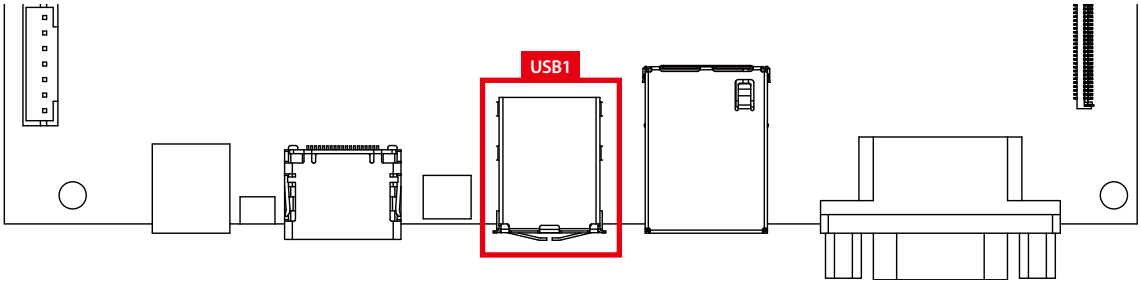
There is a DIO port on the front I/O panel of ESOM-MT-350-CB. It is used for digital input/output control. The pin define are listed in the following table.



Pin No.	Definition
1	DIO GPIO1
2	DIO GPIO2
3	DIO GPIO3
4	DIO GPIO4
5	DIO GPIO5
6	DIO GPIO6
7	DIO GPIO7
8	GND
9	Download Key
10	DIO GPIO8
11	DIO GPIO9
12	DIO GPIO10
13	3.3V power
14	3.3V power
15	GND

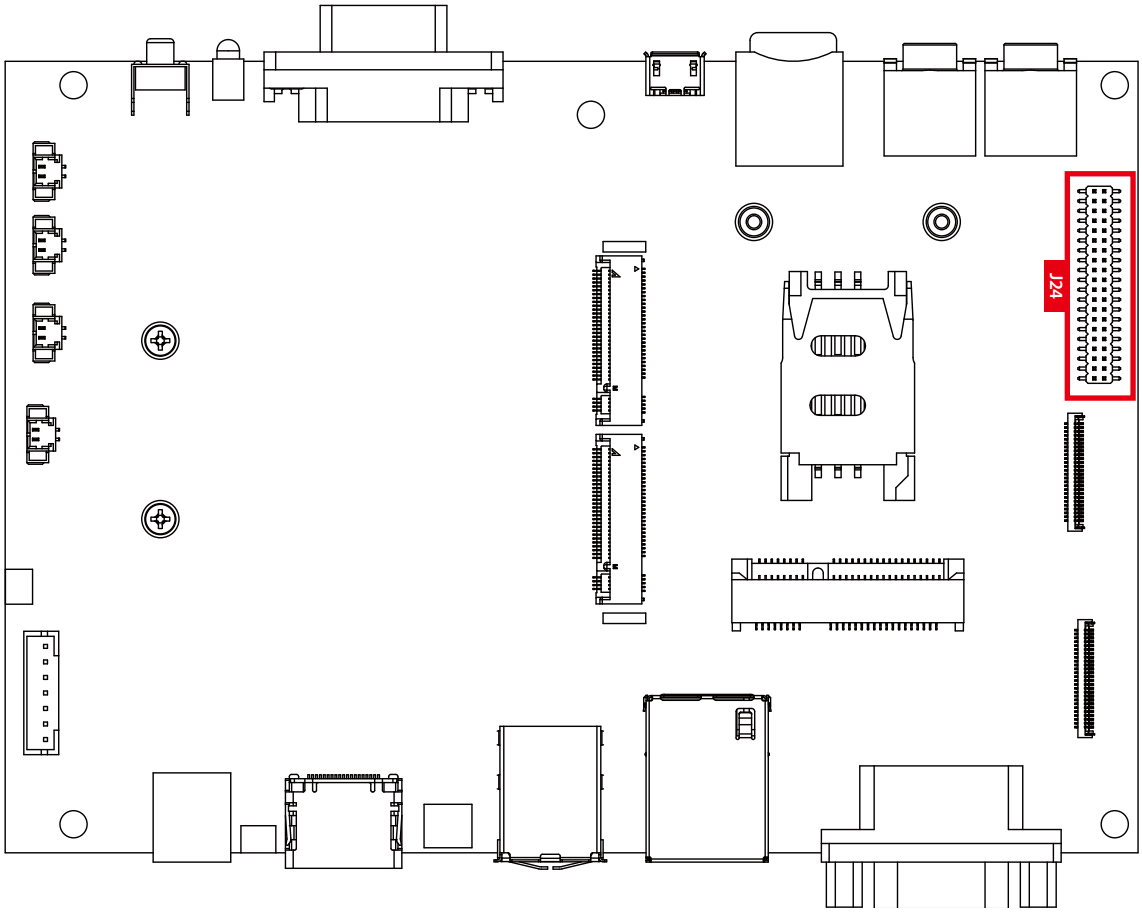
2.4.24 USB 2.0 Ports (USB1)

There are two USB 2.0 ports on the back panel. The USB 2.0 ports provide complete Plug and Play and hot swap capabilities for external devices. The pin define are listed in the following table.



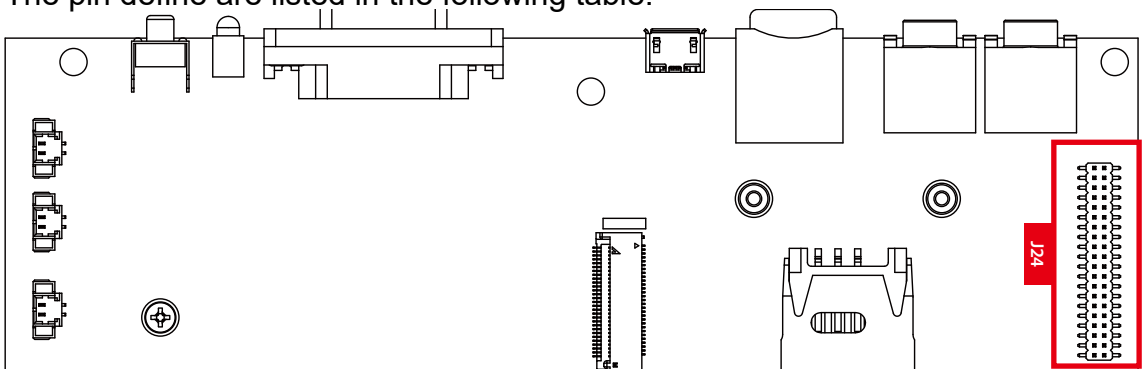
Pin No.	Definition
1	VCC
2	USB data -
3	USB data+
4	GND

2.5 Carrier Board Headers



2.5.1 I/O Expansion Header (J24)

There is an I/O expansion header on the ESOM-MT-350. It is for connecting the I²C, SPI, UART, PWM, ADC, and 5 CPU GPIO +11 I/O expander GPIO devices. The I/O expansion header is compatible with the Raspberry Pi 40-pin connector. The pin define are listed in the following table.



Pin No.	Definition	Pin No.	Definition
1	3V3_VCC	2	5V0_VCC
3	I2C0_SDA	4	5V0_VCC
5	I2C0_SCL	6	GND
7	CPU_EXT_INT2	8	UART2_TXD
9	GND	10	UART2_RXD
11	RPI_GPIO2	12	RPI_GPIO3
13	ADC2_RPI	14	GND
15	CPU_EXT_INT1	16	CPU_EXT_GPIO1
17	3V3_VCC	18	CPU_EXT_GPIO3
19	SPI_MOSI	20	GND
21	SPI_MISO	22	CPU_EXT_GPIO2
23	SPI_CLK	24	SPI_XCS
25	GND	26	NC
27	RPI_GPIO13	28	RPI_GPIO11
29	RPI_GPIO10	30	GND
31	RPI_GPIO12	32	PWM0
33	PWM1	34	GND
35	RPI_GPIO15	36	RPI_GPIO14
37	RPI_GPIO17	38	RPI_GPIO16
39	GND	40	RPI_GPIO18

3

ANDROID SOFTWARE SETUP

Introduction

This Development Guide describes the way to set up the essential development environment, so that users can customize the Android source code and come up with their own image for the ESOM-MT-350. The ESOM-MT-350 Android 10.0 BSP is developed based on the MediaTek Android 10.0 BSP and it enables the hardware features of the ESOM-MT-350.

3.1 BSP Installation

The following are contents in the BSP package.

Source code folder	Description
ESOM-MT-350-BSP_Android10.zip	Android source code and image
Tool folder	**Description**
Android_USB_driver.zip	MTK USB cable driver

3.1.1 Version Information and Supported Features

- Kernel version: 4.14.141
- Evaluation image: Android 10.0
- Development based on MediaTek Android 10.0 BSP
- Supports eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports MIPI DSI capacitive touch panel
- AUO 10.1 B101UAN01.7 (1920×1200)
- Supports COM1 as RS-232 mode (TX/RX) and COM as debug port
- Supports two 10/100Mbps Ethernet
- Supports MediaTek MT6358 Headphone and Mic-in
- Supports MediaTek MT7668 Wi-Fi 802.11ac and Bluetooth 5.0
- Supports EMIO-2574 (SIM7600JC-H) 4G LTE miniPCIe module
- Supports MIPI CSI OV5648 camera module
- Supports MediaTek NeuroPilot AI APU hardware acceleration

3.2 Build Environment Setup

This section describes the way to set up the build environment for development. All instructions are based on Ubuntu 14.04 LTS 64bit.

To make sure the build process is completed successfully, we recommend at least 500GB of disk space and 16GB of combined memory and 20GB swap space on the host machine.

3.2.1 Configuring Linux Host Machine

The first step is to install the OpenJDK 8 using the following commands.

```
$ sudo add-apt-repository ppa:openjdk-r/ppa
$ sudo apt-get update
$ sudo apt-get install openjdk-8-jdk
```

To check the Java version using the following command.

```
$ java –version
openjdk version “1.8.0_141”
OpenJDK Runtime Environment (build 1.8.0_141-8u141-b15-3~14.04-b15)
OpenJDK 64-Bit Server VM (build 25.141-b15, mixed mode
```

The following packages are required for the Android development environment. The required packages can be installed using the commands below.

```
$ sudo apt-get install git repo gnupg flex bison gperf build-essential zip curl xsltproc \
unzip make python-networkx zlib1g-dev:i386 libswitch-perl libc6-dev-i386 \
zlib1g-dev libc6-dev lib32ncurses5-dev lib32z1 x11proto-core-dev libx11-dev \
lib32z1-dev libgl1-mesa-dev g++-multilib tofrodos python-markdown libxml2-utils \
software-properties-common xsltproc libx11-dev:i386 liblz4-tool android-tools-adb \
android-tools-fastboot google-android-build-tools-installer bzip2 libbz2-dev \
libbz2-1.0 libghc-bzlib-dev squashfs-tools pngcrush schedtool dpkg-dev make \
optipng maven python-mako python3-mako python python3 syslinux-utils
```

3.3 Image Build

This section explains how to use the source code to build the image for the firmware installer on the ESOM-MT-350.

3.3.1 Building the Android Image

Type below commands for the image building.

```
$ cd android10

$ source build/envsetup.sh; lunch full_aiot8365p3_64_bsp-userdebug

$ make 2>&1 | tee build.log
```

3.3.2 Replace and Update Firmware

After the compilation, the /android10/out/target/product/ aiot8365p3_64_bsp/ directory will contain the resulting binaries as shown in the table below.

Binary
preloader_aiot8365p3_64_bsp.bin
GPT.img
cam_vpu1.img
cam_vpu2.img
cam_vpu3.img
lk.img
boot.img
recovery.img
logo.bin
dtbo.img
tee.img
vbmeta.img
vbmeta_system.img
vbmeta_vendor.img
super.img
cache.img
userdata.img

4

YOCTO SOFTWARE SETUP

Introduction

This Development Guide describes the way to set up the essential development environment, so that users can customize the Yocto source code and come up with their own image for the ESOM-MT-350.

4.1 BSP Installation

The following are contents in the BSP package.

Source code folder	Description
ESOM-MT-350-BSP_Yocto31.zip	Yocto source code and image
Tool folder	**Description**
Android_USB_driver.zip	MTK USB cable driver

4.1.1 Version Information and Supported Features

- Kernel version: 4.14.87
- Evaluation image: Yocto 3.1
- Development based on MediaTek Yocto 3.1 BSP
- Supports eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports MIPI DSI capacitive touch panel
- ShenZhen K&D 7" KD070D54-39NH-B018-A (1024x600)
- Silead GSL1680 I2C touch
- Supports COM port as a RS-232 mode (TX/RX)
- Supports 10/100Mbps Ethernet
- Supports MediaTek MT6357 Line-out and Mic-in
- Supports MediaTek MT6631 Wi-Fi 802.11ac and Bluetooth 5.0
- Supports EC25 4G LTE miniPCIe module
- Supports MIPI CSI IMX135 camera module

4.2 Build Environment Setup

This section describe the way to set up the build environment for development. All instructions are based on Ubuntu 14.04 LTS 64bit.

To make sure the build process is completed successfully, we recommend at least 150GB of disk space, 16GB of combined memory, and 15GB swap space on the host machine.

4.2.1 Configuring Linux Host Machine

The following packages are required for the Yocto development environment. The required packages can be installed using the commands below:

```
$ sudo apt-get install gawk wget git-core diffstat unzip
texinfo gcc-multilib bash build-essential chrpath socat
cpio python python3 python3-pip python3-pexpect xz-utils
debianutils iputils-ping python-git python3-jinja2
libgl1-mesa libsdl1.2-dev pylint3 xterm gcc g++ tar
libpulse-dev libevent-dev ninja-build rpm2cpio python3-ply libc-dev-bin
```

The following gn tools are required and can be installed using the commands below:

```
$ wget -O gn http://storage.googleapis.com/chromium-gn/3fd43e5e0dcc6
74f0a0c004ec290d04bb2e1 c60e
$ sudo chmod 777 gn
$ sudo mv gn /usr/bin/
```

4.3 Image Build

This section explains how to use the source code to build the image for the firmware installer on the ESOM-MT-350.

4.3.1 Building the Yocto Image

Type the commands below to build the image.

```
$ cd yocto3.1

$ export TEMPLATECONF=${PWD}/meta/meta-mediatek-mt8365/conf/base/aiv8365m1v1-aiot-emmc

$ source meta/poky/oe-init-build-env

$ bitbake mtk-core-image-aiv8365
```

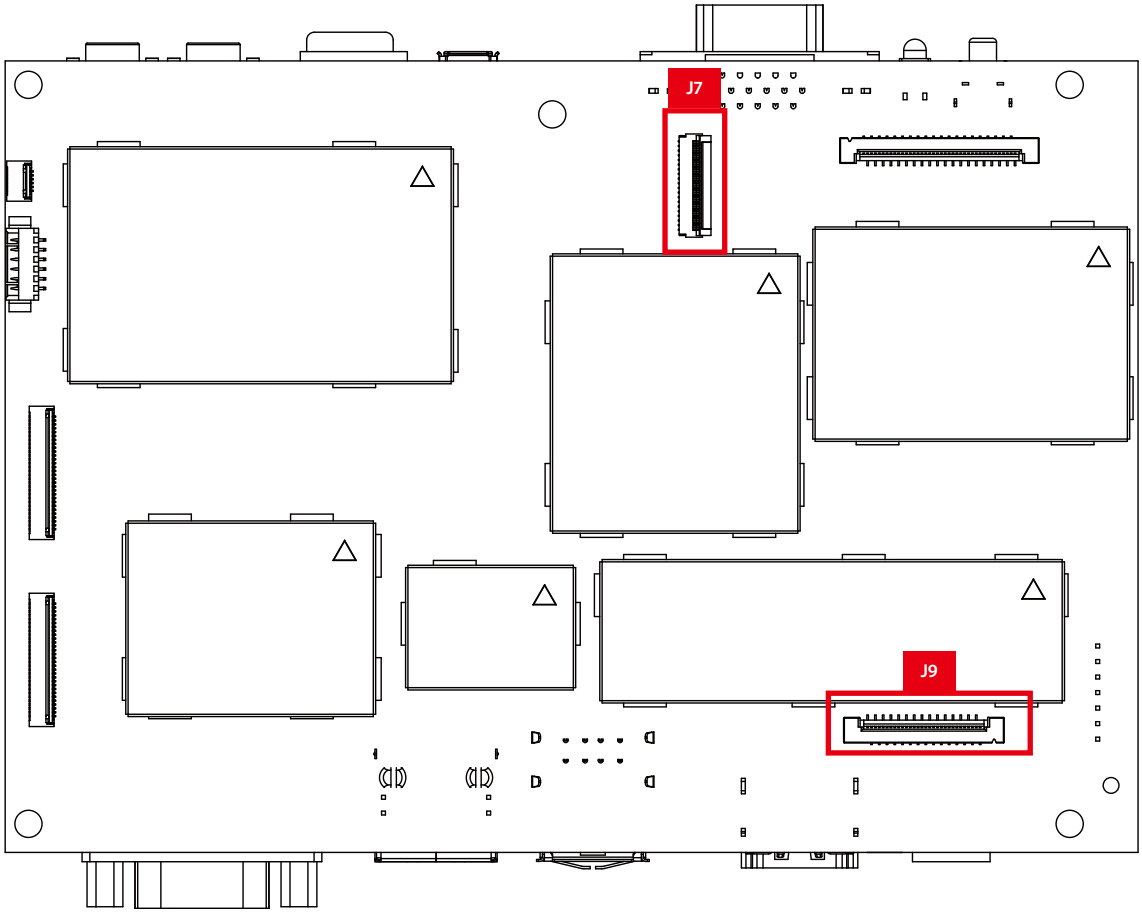
4.3.2 Replace and Update Firmware

After the compilation, the /yocto2.6/build/tmp/deploy/images/aiv8385-linux.aiot-emmc/ directory will contain the resulting binaries as shown in the table below.

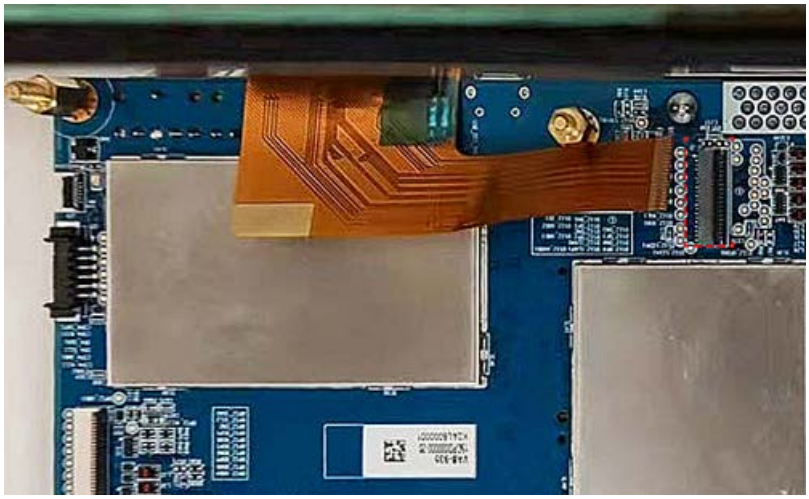
Binary
MBR_EMMC bl2.img boot.img lk.bin tee.img system.img userdata.ext4

A

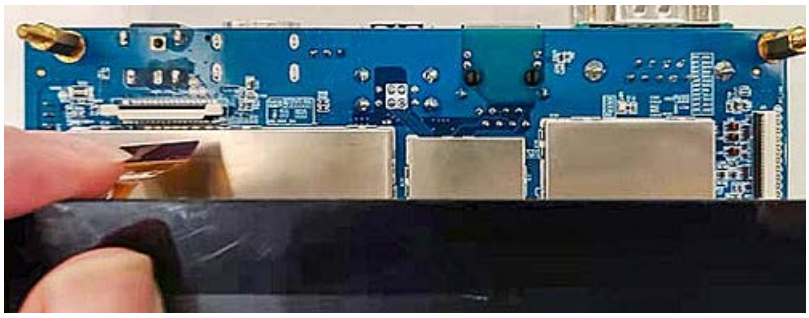
APPENDIX A : CONNECTING LCD DISPLAY



Step 1 Attached the 39-pin FFC cable to the MIPI DSI connector, labeled as ‘J7’ on the ESOM-MT-350-CB, and then attached the other end of the cable to the 7’’ MIPI LCD display.



Step 2 Attached the 30-pin FFC cable of the 7” touchscreen to the connector labeled ‘J9’ on the ESOM-MT-350-CB, as shown in the diagram below.



B

APPENDIX B : POWER CONSUMPTION

Testing Board	ESOM-MT-350
CPU	MediaTeK Genio 350 Quad-Core Cortex A53 @ 2.0 GHz
RAM	2GB (1GB/4GB Optional) LPDDR4 SDRAM
Storage	16GB EMMC5.1 Flash
Realtek RTL8152BNI-VB-CG USB2.0	10/100M
Graphics Output	ShenZhen K&D 7" KD070D54-39NH-B018-A (1024x600)
Power Source	Chroma 62006P-100-25
Test Program	AnTuTu Stress Test

B.1 MediaTek Genio 350 Processor

Power on and boot to Android 10

CPU	Power Input	Android 10			
		idle status CPU		Stress Test	
		Max Current	Max Consumption	Max Current	Max Consumption
	12V	0.1696A	2.0453W	0.2845A	3.4055W

Vecow

For further support information, please visit www.vecow.com