ESOM-MT-500 USER Manual

Arm-Based MediaTek Genio 500 System on Module

Vecow

1.0.0 Edition 20220818

Record of Revision

Version	Date	Page	Description	Remark
1.00	2022/08/18		Official Release	

Disclaimer

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Declaration of Conformity

FCC

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-500	Arm-Based MediaTek Genio 500 System on Module
ESOM-MT-500-EV	Arm-Based MediaTek Genio 500 SOM Evaluation Kit
ESOM-MT-500-EVP	Arm-Based MediaTek Genio 500 SOM Evaluation Kit Plus

Table of Contents

1

GENERAL INTRODUCTION

1.1 Overview

Vecow ESOM-MT-500 is powered by MediaTek Genio 500 processor that integrates quad-core Arm Cortex-A73 and quad-core Cortex-A53 processor. It provides a powerful and efficient performance designed for AIoT applications. Vecow ESOM-MT-500 supports LPDDR4 memory up to 4GB and Digital display and MIPI DSI display to facilitate advanced multimedia capabilities. Both Android 10 and Yocto 2.6 operating systems are supported for upgradeability and scalability.

1.2 Features

- Octa-core MediaTek Genio 500 processor with quad Cortex-A73 and quad Cortex-A53
- Integrated Mali-G72 GPU and H.265/H.264 FHD video
- Onboard 4GB LPDDR4 memory and 16GB eMMC
- Support Digital Display and 4-lane MIPI DSI display Interface, Full HD Resolution
- Support 4-lane MIPI CSI-2 camera with internal ISP, Full UD Resolution
- Supports Android 10 and Yocto 2.6 operating system

1.3 Product Specification

1.3.1 Specifications of ESOM-MT-500

System	
Processor	MediaTek Genio 500 Processor with Quad-core Cortex-A73 @2.0GHz and Quad Cortex-A53 @2.0GHz
Memory	LPDDR4 SDRAM 4GB
eMMC	16GB eMMC
OS	• Android 10 • Linux Yocto 2.6
I/O Interface	
Internal I/O	2 Board to Board Connector
Graphics	
Graphics Processor	• ARM Mali-G72 high-performance GPU • 3D graphics accelerator capable of processing 2400M pixel/sec @ 800MHz • Graphics engine supporting OpenGL® ES 3.0, OpenCL ES1.1, and Vulkan 1.0 hardware acceleration
Video	• Video Encode: H.264: 1080p @30fps • Video Decode: HEVC: 1080p @30fps H.264: 1080p @30fps • Vision DSP : Supports Cadence Tensilica Vision P6 dualcore @500MHz
Display	• Digital Display : 1920 x 1080 @60Hz • 4-lane MIPI DSI : 1920 x 1080
Camera	• 4-lane MIPI CSI-2, up to 5MP • Integrated image signal processor supports 25MP @30fps
Audio	
Audio Codec	MediaTek MT6358
Audio Interface	1 Mic-in, 1 Line-out
Expansion	
USB	1 USB 2.0
UART	2 UART (2-wire)
SPI	1 SPI
I2C	6 I2C
GPIO	12 GPIO

Power	
Power Input	4.2V DC-in
Mechanical	
Dimension (W x L)	70mm x 55mm (2.76" x 2.17")
Environment	
Operating Temperature	0°C to 60°C (32°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 60°C
EMC	CE, FCC

1.3.2 Specifications of ESOM-MT-500-CB

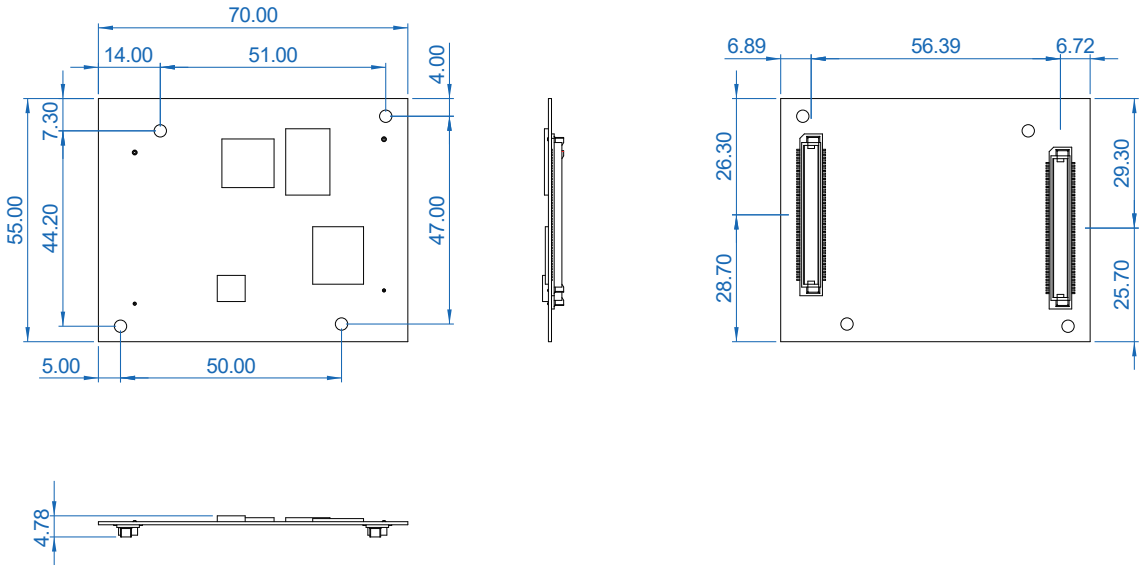
System	
Processor	MediaTek Genio 500 Processor with Quad-core Cortex-A73 @2.0GHz and Quad Cortex-A53 @2.0GHz
Memory	LPDDR4 SDRAM 4GB
OS	• Android 10 • Linux Yocto 2.6
Graphics	
Display	• Digital Display: up to 1920 x 1080 • 4-lane MIPI DSI : 1920 x 1080
Camera	4-lane MIPI CSI-2, up to 5MP
Ethernet	
LAN 1	10/100 Mbps Ethernet LAN, RJ45 Connector
LAN 2	10/100 Mbps Ethernet LAN, RJ45 Connector
Audio	
Audio Interface	1 Audio Jack for 1 Mic-in, 1 Line-out
I/O Interface	
External I/O	• Power Button • Reset Button • 2 RJ45 Connector • 1 USB 2.0 Type A • 1 Micro USB 2.0 OTG Port • 1 Digital Display • 1 Audio Jack
Internal I/O	• 1 2-pin DC-in connector • 2 board to board Connector • 1 Debug Console Port • 1 COM RS-232 Connector • 1 MIPI DSI Connector • 1 MIPI CSI-2 Connector • 1 Touch Screen Connector • 1 SIM card Socket • 1 mini PCIe Socket • 2 Volume Button • 1 Mono Speaker-out Connector • 1 Miscellaneous pin header (1 I2C, 1 SPI, 12 GPIO) • 1 Battery charger connector • 3 IPEX connectors

Internal I/O	• 1 2-pin DC-in connector • 2 board to board Connector • 1 Debug Console Port • 1 COM RS-232 Connector • 1 MIPI DSI Connector • 1 MIPI CSI-2 Connector • 1 Touch Screen Connector • 1 SIM card Socket • 1 mini PCIe Socket • 2 Volume Button • 1 Mono Speaker-out Connector • 1 Miscellaneous pin header (1 I2C, 1 SPI, 12 GPIO) • 1 Battery charger connector • 3 IPEX connectors
Expansion	
Mini PCIe	1 Mini PCIe for USB/SIM Card
Wireless	
Wi-Fi & BT	MediaTek MT7668 • 2x2 Dual-band Wi-Fi 802.11ac with MU-MIMO • Bluetooth 5.0
Mechanical	
Dimension (W x L)	140mm x 100mm (5.51" x 3.94")
Environment	
Operating Temperature	0°C to 60°C (32°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 60°C
EMC	CE, FCC

1.4 Mechanical Dimension

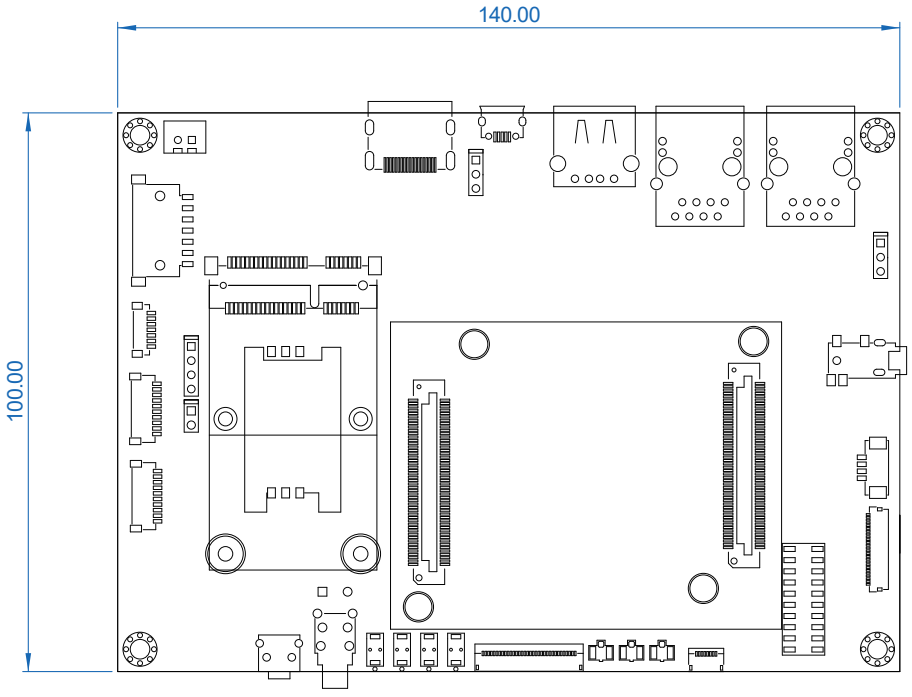
1.4.1 Dimensions of ESOM-MT-500

Unit : mm (inch)



1.4.2 Dimensions of ESOM-MT-500-CB

Unit : mm (inch)



2

GETTING TO KNOW YOUR ESOM-MT-500

2.1 Packing List

2.1.1 ESOM-MT-500 Packing List

Item	Description	Qty
1	ESOM-MT-500: System on Module with MediaTek Genio 500 octa-core Processor, 4GB LPDDR4 SDRAM, 16GB eMMC	1

2.1.2 ESOM-MT-500-EV Packing List

Item	Description	Qty
1	ESOM-MT-500-EV: MediaTek Genio 500 SOM Evaluation Kit	1

Item	Description	Outlook	Usage	P/N	Qty
1	Heatsink		Heatsink	62-09H0993-1CA	1
2	COM Cable		Cable	61-1300042-100	1
3	DC-IN Cable		Cable	61-1430212-010	1
4	USB to Micro USB Cable		Cable	61-192U2MU-100	1

Item	Description	Outlook	Usage	P/N	Qty
5	Wi-Fi & BT Antenna		Antenna	76-4142EXB-006	1
6	Power Adapter		Power Adaptor	71-7442500-3W4	1
7	Power Cord		Power Cord	71-BPWCDUS-004	1
8	USB Stick		SW Package	81-6PKB000-001	1

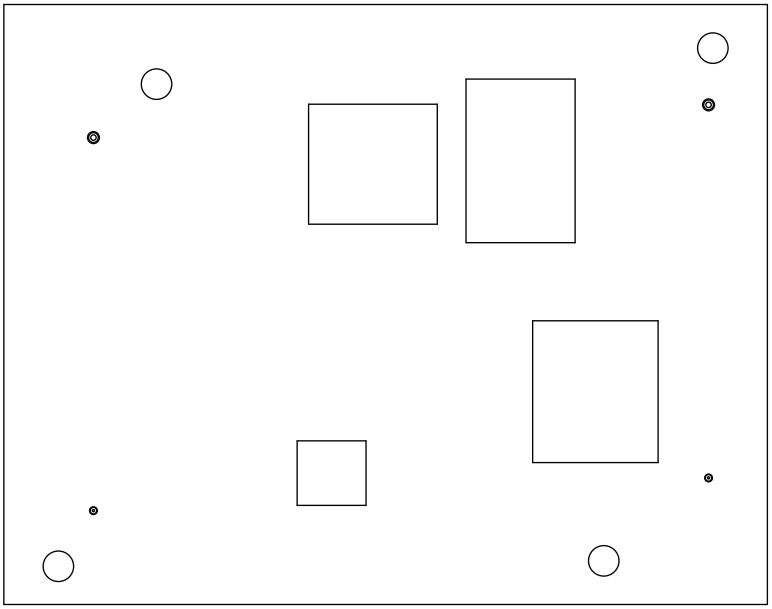
2.1.3 ESOM-MT-500-EVP Packing List

Item	Description	Qty
1	ESOM-MT-500-EVP: MediaTek Genio 500 SOM Evaluation Kit Plus	1

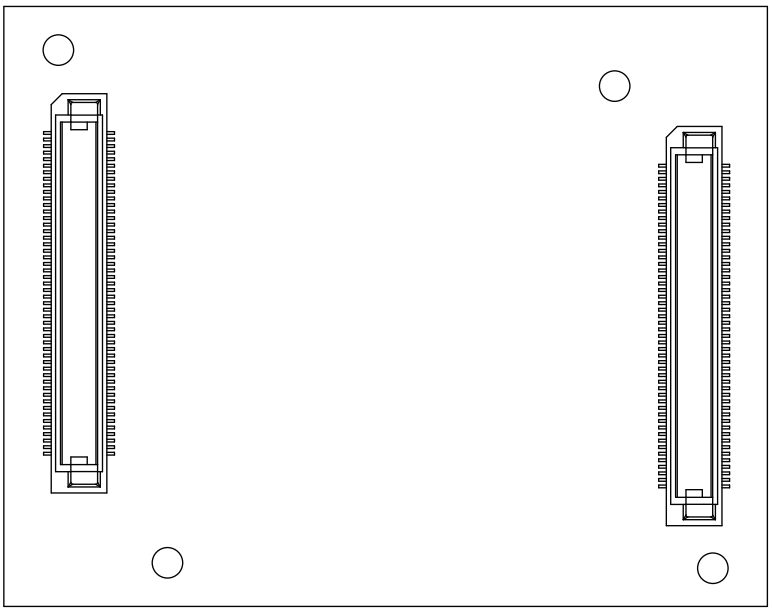
Item	Description	Outlook	Usage	P/N	Qty
1	Heatsink		Heatsink	62-09H0993-1CA	1
2	COM Cable		Cable	61-1300042-100	1
3	DC-IN Cable		Cable	61-1430212-010	1
4	USB to Micro USB Cable		Cable	61-192U2MU-100	1
5	Wi-Fi & BT Antenna		Antenna	76-4142EXB-006	1
6	Power Adapter		Power Adaptor	71-7442500-3W4	1
7	Power Cord		Power Cord	71-BPWCDUS-004	1
8	USB Stick		SW Package	81-6PKB000-001	1
9	5MP CSI-2 Camera		Camera	76-5M12000-009	1
10	10.1” LCD Touch Panel		Panel	74-71M1010-001	1

2.2 ESOM-MT-500 Pinout Table

2.2.1 Top Side View



2.2.2 Bottom Side View



2.2.3 Pinout Table

J8			
Pin No.	Signal Name	Pin No.	Signal Name
1	SPI2_CLK	2	GND
3	GND	4	RDP3_B
5	SPI2_MI	6	RDN3_B
7	SPI2_CSB	8	GND
9	SPI2_MO	10	RDP1_B
11	GND	12	RDN1_B
13	I2S3_DO	14	GND
15	I2S0_BCK	16	RDN2_B
17	GND	18	RDP2_B
19	I2S0_LRCK	20	GND
21	I2S0_DI	22	RCN_B
23	BGF_INT	24	RCP_B
25	32K_MT7668	26	GND
27	GND	28	RDP0_B
29	URXD1	30	RDN0_B
31	UTXD1	32	GND
33	GND	34	CAM_PDN2
35	URXD0	36	CAM_RST2
37	UTXD0	38	EINT_RAMDUMP
39	URTS0	40	GND
41	UCTS0	42	CAM_CLK2
43	GND	44	GND
45	GPIO57	46	GPIO80
47	GPIO56	48	GPIO78
49	GPIO53	50	GPIO77
51	GPIO52	52	GPIO79
53	GPIO55	54	GPIO69
55	GPIO54	56	GPIO70
57	GND	58	AU_VIN2_P
59	MSDC1_DAT1	60	GPIO 59
61	MSDC1_DAT0	62	GPIO177
63	MSDC1_DAT2	64	GPIO71
65	MSDC1_DAT3	66	WIFI_INT
67	GND	68	AU_VIN2_N

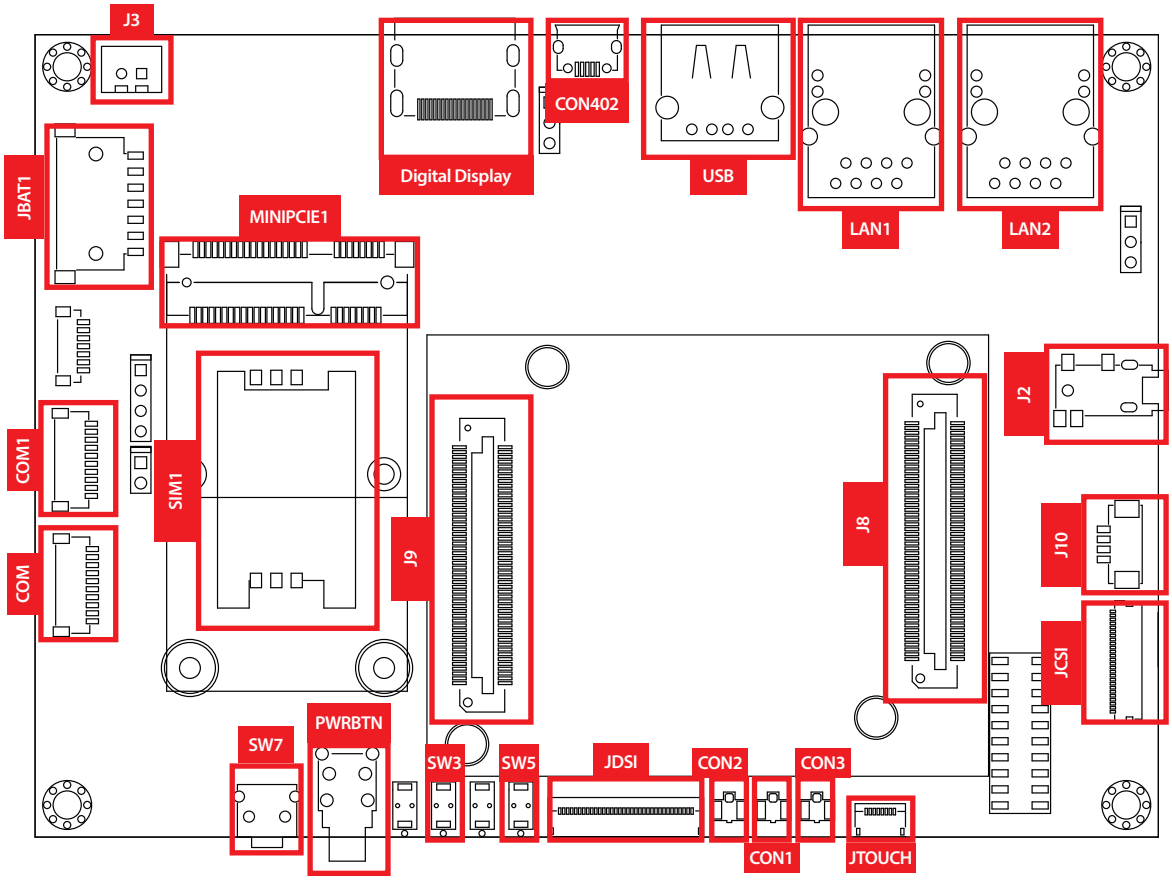
J8			
Pin No.	Signal Name	Pin No.	Signal Name
69	MSDC1_CMD	70	MT7668_PMU_EN
71	GND	72	GPIO72
73	MSDC1_CLK	74	AU_VIN0_N
75	GND	76	AU_VIN0_P
77	USB_P	78	AU_MICBIAS0
79	USB_N	80	SCL5_MT
81	GND	82	SDA5_MT
83	AU_LON	84	GND
85	AU_LOP	86	HOMEKEY_SW
87	GND	88	SYSRSTB
89	HP_MP3R	90	PWRKEY_SW
91	AU_REFN	92	EINT_EAR
93	HP_MP3L	94	HP_EINT
95	GND	96	GND
97	EAR_MIC_P	98	AVSS28_AUD
99	EAR_MIC_N	100	VIO28_PMU

J9			
Pin No.	Signal Name	Pin No.	Signal Name
1	GND	2	GND
3	JTRST	4	SCL2_MT
5	SPI_CSB_JTMS	6	SDA2_MT
7	GND	8	GND
9	SPI_CLK_JTCK	10	SCL4_MT
11	GND	12	SDA4_MT
13	SPI_MI_JTDO	14	GND
15	SPI_MO_JTDI	16	SCL6
17	GND	18	SDA6
19	KPROW1	20	GND
21	KPCOL0	22	GPIO116
23	KPROW0	24	GPIO120
25	GND	26	GPIO76
27	DSI0_D3N	28	IT66121_SYSRSTN
29	DSI0_D3P	30	IT66121_INT
31	GND	32	GND
33	DSI0_D0N	34	DPI_D0
35	DSI0_D0P	36	DPI_D1
37	GND	38	DPI_D2
39	DSI0_D1N	40	DPI_D3
41	DSI0_D1P	42	DPI_D4
43	GND	44	DPI_D5
45	DSI0_D2P	46	DPI_D6
47	DSI0_D2N	48	DPI_D7
49	GND	50	DPI_D8
51	DSI0_CKP	52	DPI_D9
53	DSI0_CKN	54	DPI_D10
55	GND	56	DPI_D11
57	DSI_TE	58	GND
59	LCM_RST	60	DPI_DE
61	LCD_AVDD_EN	62	GND
63	DISP_PWM	64	DPI_VSYNC
65	GND	66	DPI_HSYNC
67	SDA3_MT	68	GND

J9			
Pin No.	Signal Name	Pin No.	Signal Name
69	SCL3_MT	70	DPI_CK
71	GND	72	GND
73	IDDIG	74	I2S5_BCK
75	GPIO11	76	GND
77	DRVBUS	78	I2S5_LRCK
79	KPCOL2	80	I2S5_DO
81	GPIO151	82	GND
83	GND	84	SDA0_MT
85	GND	86	SCL0_MT
87	GND	88	GND
89	GND	90	SCL1_MT
91	VSYS	92	SDA1_MT
93	VSYS	94	GND
95	VSYS	96	GPIO75
97	VSYS	98	GPIO 60
99	VSYS	100	VBUS

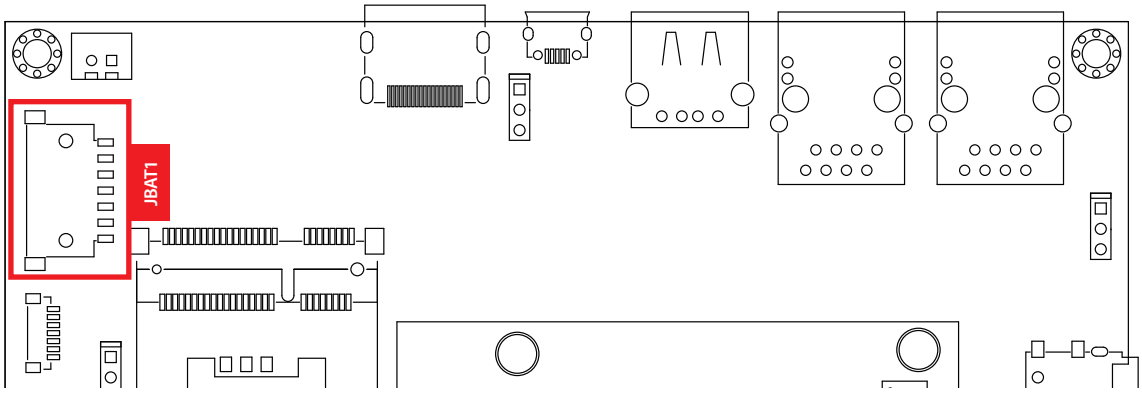
2.3 Carrier Board I/O Connectors

2.3.1 Top View



2.3.2 JBAT1: Battery

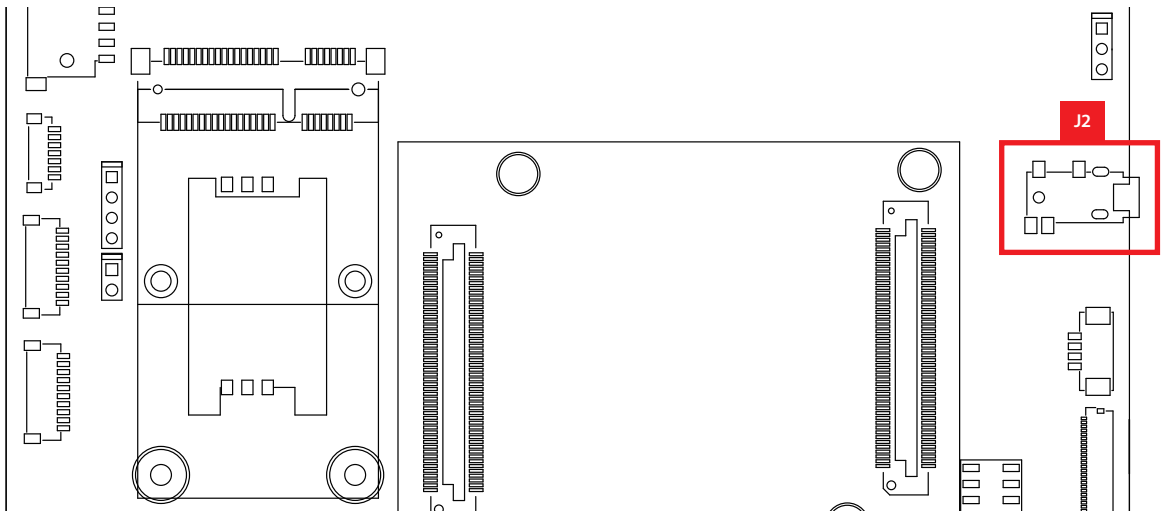
The ESOM-MT-500-CB is equipped with a real-time clock, powered by a lithium battery. To charge the rechargeable lithium battery, there is a battery charger connector, labeled as 'BAT1'. It is recommended that you not replace the lithium battery on your own, but if the battery needs to be changed, please contact the Vecow RMA service team.



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

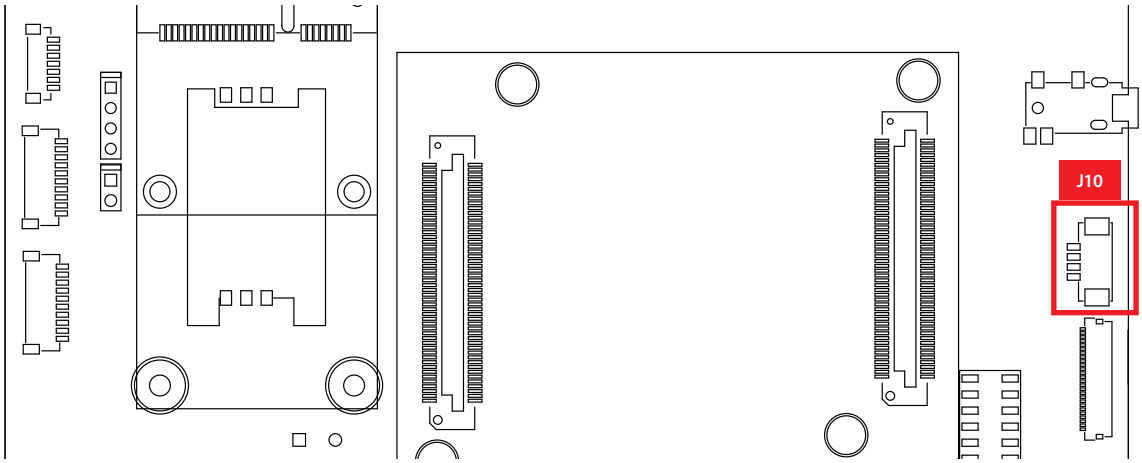
2.3.3 J2: Headphone Jack

There is a 3.5mm headphone jack located on the right side panel. The headphone jack is for connecting to external speakers(Mic-in) or headphones.



2.3.4 J10: Mono Speaker-out Connector

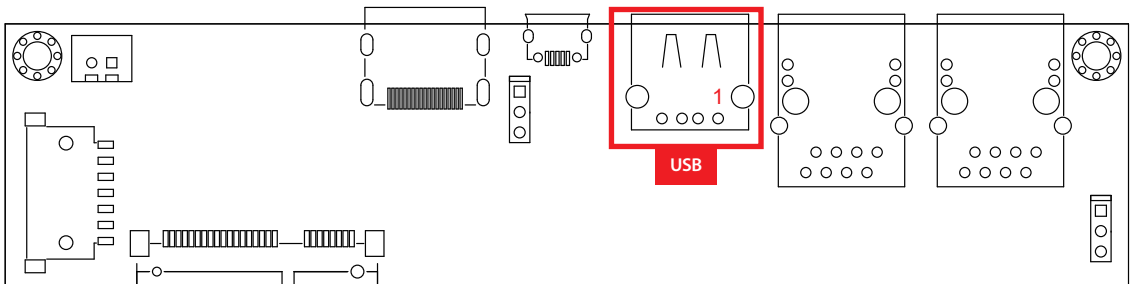
There is a mono speaker-out connector, which connects to the mono speaker. The pinouts of the mono speaker-out connector are shown below.



Pin No.	Signal Name
1	OUTN_L
2	OUTP_L
3	OUTN_R
4	OUTP_R

2.3.5 USB: USB 2.0 Port

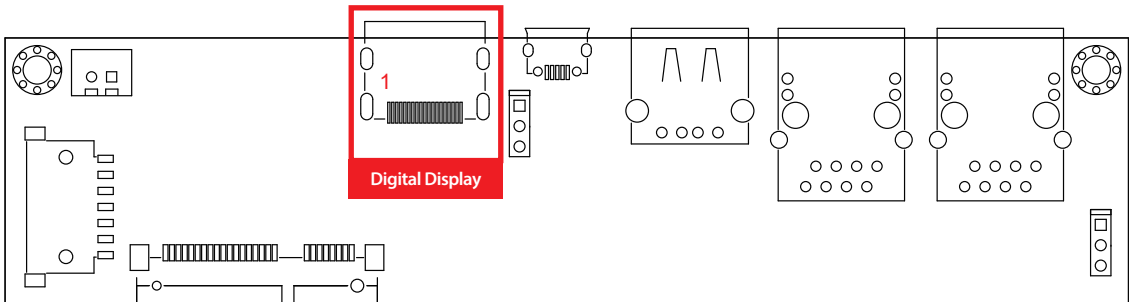
The USB interface supports 480Mbps transfer rate complied with high speed USB specification Rev. 2.0.



Pin No.	Signal Name
1	VCC
2	USB Data -
3	USB Data +
4	GND

2.3.6 HDMI: Digital Display port

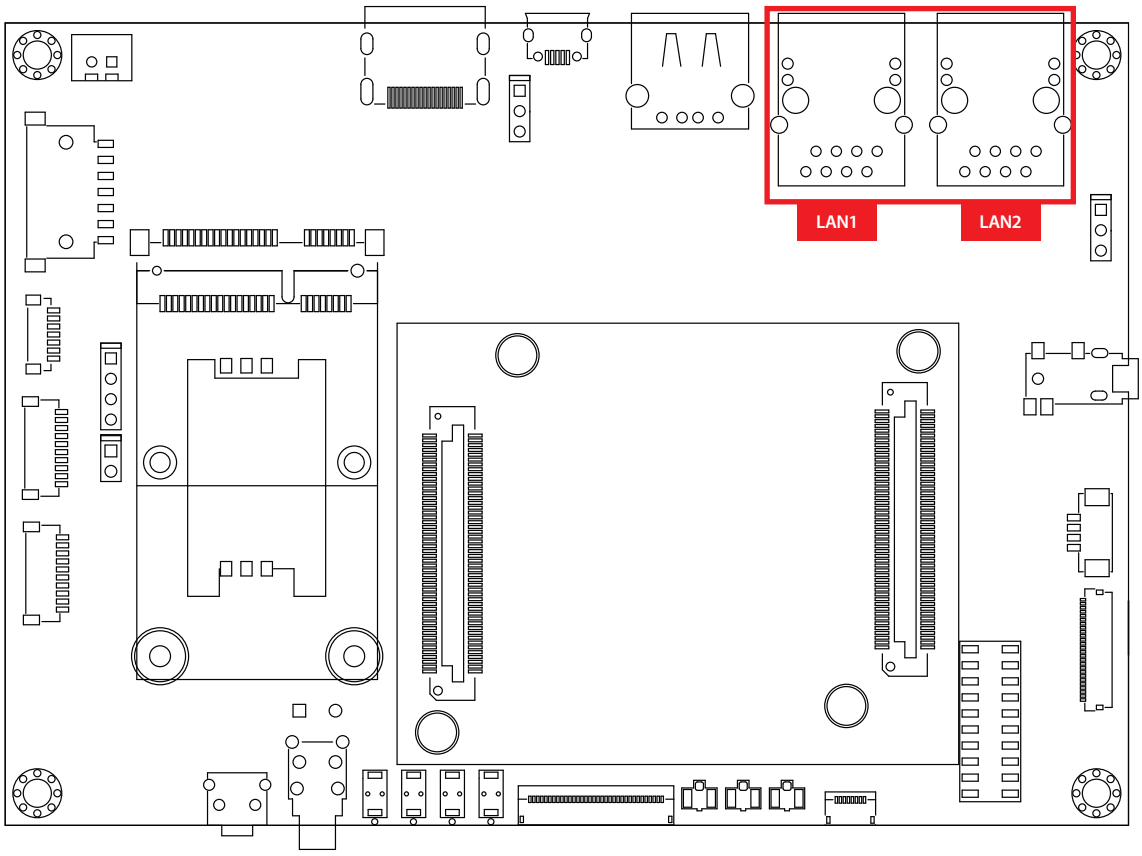
The Digital Display port uses an HDMI Type A receptacle connector to connect High Definition video and digital audio using a single cable.



Pin No.	Signal Name	Pin No.	Signal Name
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+		-

2.3.7 LAN1, LAN2: 10/100Mbps Ethernet Ports

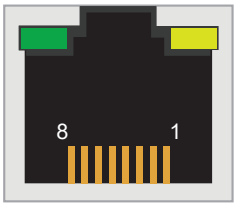
There are two 10/100Mbps Ethernet ports. Each 10/100Mbps Ethernet port uses a RJ-45, which is fully compliant with the IEEE 802.3 (10BASE-T) and 802.3u (100BASE-TX) standards. Using suitable RJ-45 cable, you can connect the ESOM-MT-500-CB to a computer or to any other devices with Ethernet connection, for example, a hub or a switch. The pinouts of the 10/100Mbps Ethernet ports are listed below.



Pin No.	Signal Name
1	E_TX+
2	E_TX-
3	E_RX+
4	REGOUT
5	REGOUT
6	E_RX-
7	-
8	-

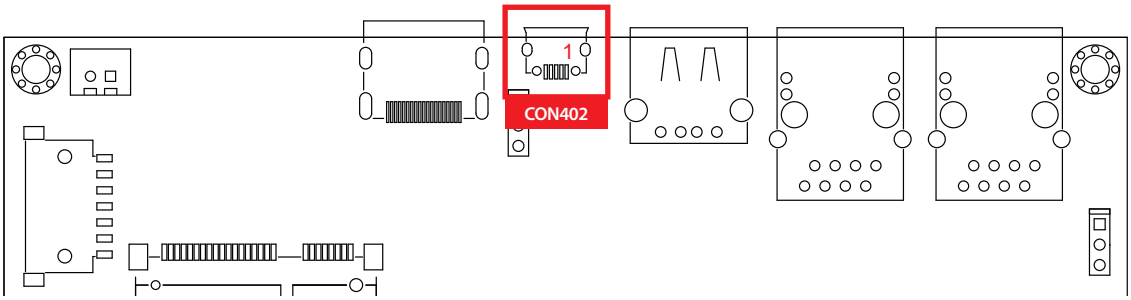
Each LAN port is supported by a standard RJ-45 connector with LED indicators to present active/link/speed statuses of the connection. When the cable is properly connected to a 10Mbps Ethernet network, the right LED indicator twinkling orange and the left one remains off. When the cable is properly connected 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



2.3.8 CON402: Micro USB 2.0

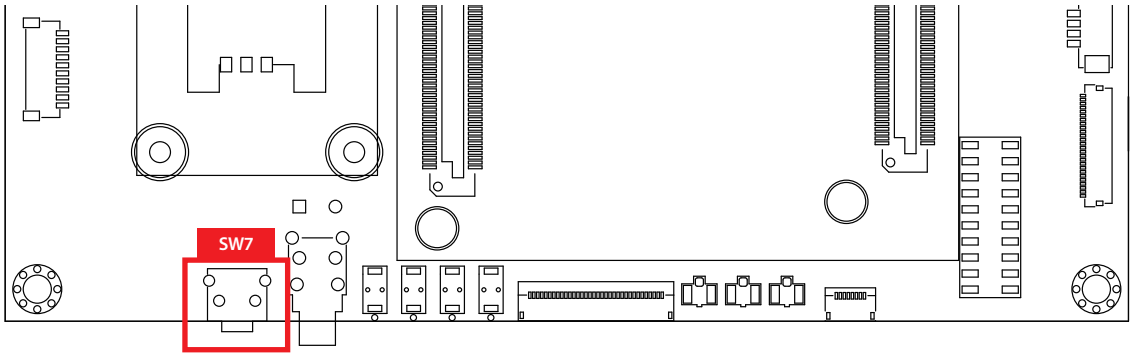
The Micro USB 2.0 port is used for downloading the OS image. The pinouts of the Micro USB 2.0 port are shown below.



Pin No.	Signal Name
1	VBUS
2	USB_DATA-
3	USB_DATA+
4	ID
5	GND

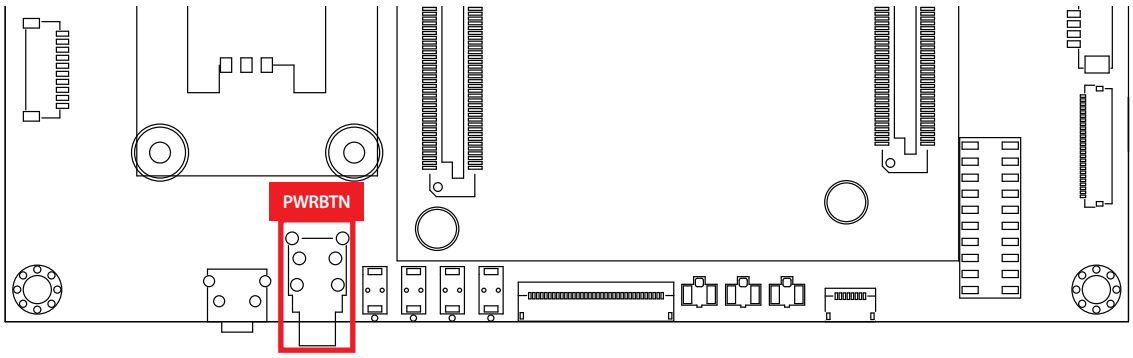
2.3.9 SW7: Reset Button

ESOM-MT-500-CB comes with a reset button. If the system have error or frozen, you can press the Reset button to restart.



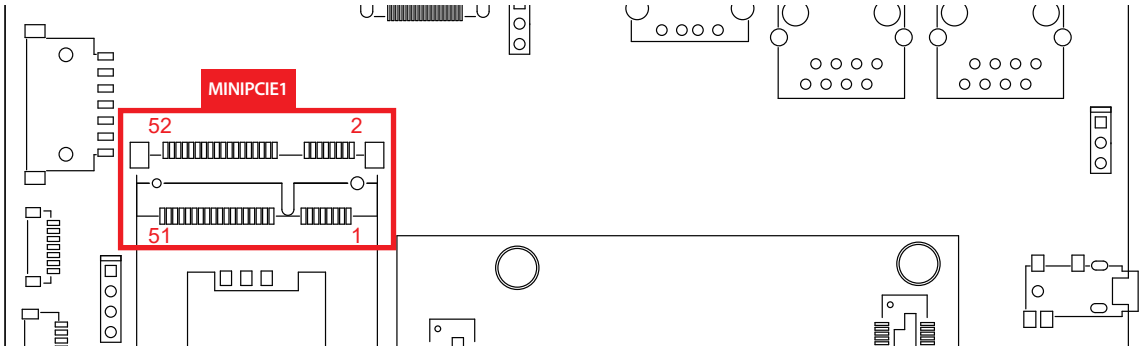
2.3.10 PWRBTN: Power Button

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.



2.3.11 MINIPCIE1: Mini PCIe Slot

The ESOM-MT-350-CB comes with a miniPCIe slot labeled 'MINIPCIE1' for wireless networking. The pinouts of the miniPCIe slot are shown below.

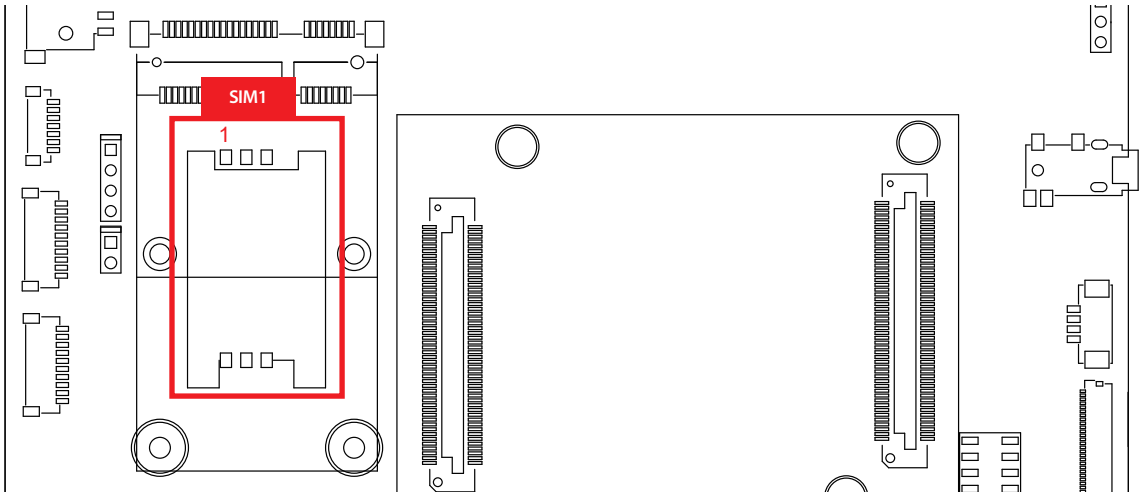


Pin No.	Signal Name	Pin No.	Signal Name
1	Reserved	2	VDD3V3_MPCIE
3	Reserved	4	GND
5	Reserved	6	VDD1V5
7	Reserved	8	USIM VCC
9	GND	10	USIM DATA
11	Reserved	12	USIM CLK
13	Reserved	14	USIM RESET
15	GND	16	USIM VPP
17	Reserved	18	GND
19	Reserved	20	MPCIE_W_DISABLE
21	GND	22	MPCIE_RST_N
23	Reserved	24	VDD3V3_MPCIE
25	Reserved	26	GND

Pin No.	Signal Name	Pin No.	Signal Name
27	GND	28	VDD1V5
29	GND	30	Reserved
31	Reserved	32	Reserved
33	Reserved	34	GND
35	GND	36	MINI_PCIE_USB_DM
37	GND	38	MINI_PCIE_USB_DM
39	VDD3V3_MPCIE	40	GND
41	VDD3V3_MPCIE	42	Reserved
43	GND	44	Reserved
45	Reserved	46	Reserved
47	Reserved	48	VDD1V5
49	Reserved	50	GND
51	Reserved	52	VDD3V3_MPCIE

2.3.12 SIM1: SIM

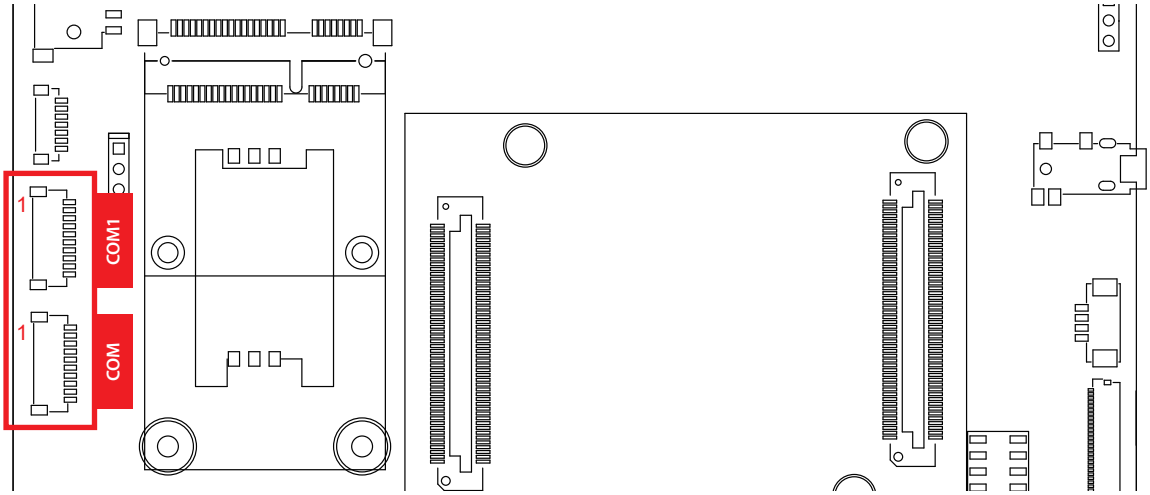
The external Nano SIM card offers wireless communication capability to the system. The pinouts of the SIM card slot are listed below.



Pin No.	Signal Name
1	USIM_VCC_A
2	USIM_RST_A
3	USIM_CLK_A
4	NC
5	GND
6	USIM_VPPSIM_A
7	USIM_DATA_A

2.3.13 COM, COM1: COM Port

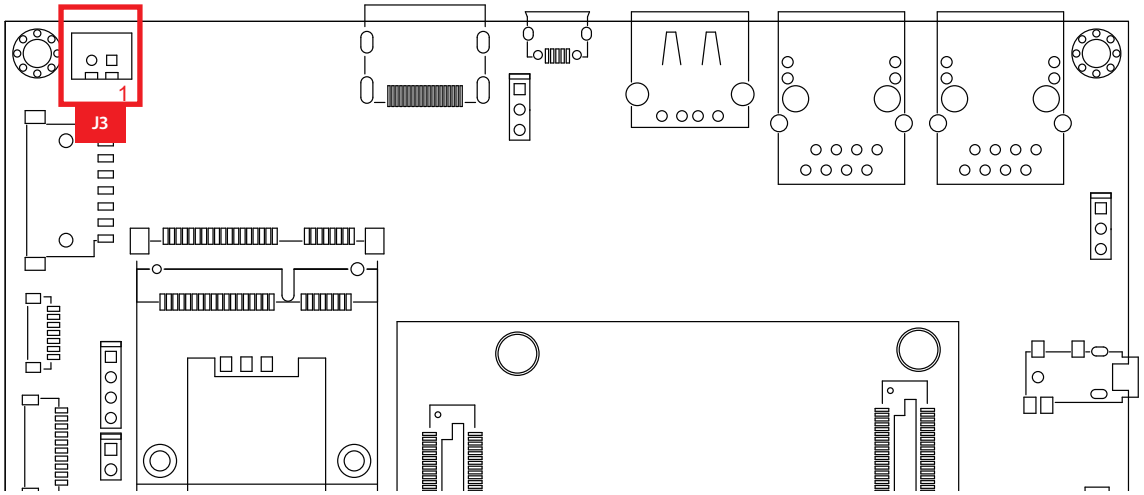
There are two Serial ports (COM, COM1). COM is used for debugging and COM1 can be configured for RS-232 mode. The pin assignments are listed in the following table:



COM		COM1	
Pin No.	Signal Name	Pin No.	Signal Name
1	NC	1	NC
2	COM_RXD0	2	COM_RXD1
3	COM_TXD0	3	COM_TXD1
4	NC	4	NC
5	NC	5	NC
6	GND	6	GND
7	NC	7	NC
8	NC	8	NC
9	NC	9	NC
10	NC	10	NC

2.3.14 J3: DC Power input

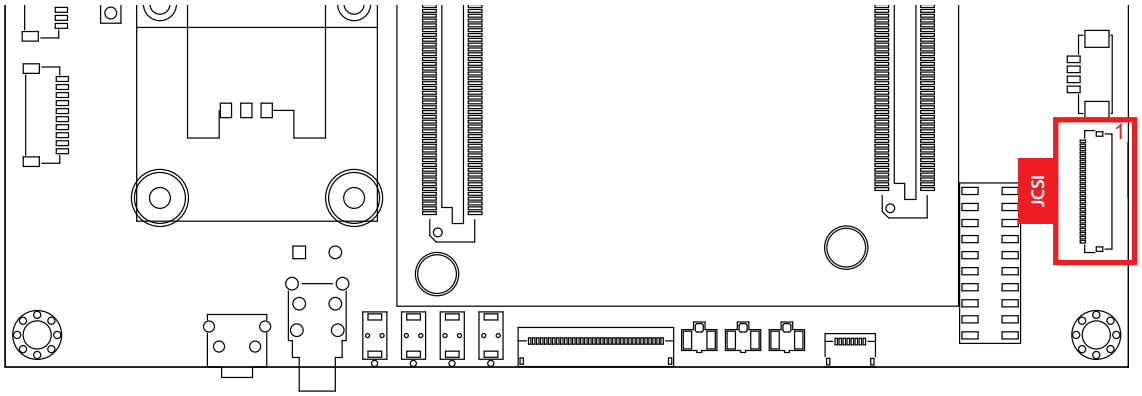
ESOM-MT-500 supports 12V DC power input by wire-to-board connector. The pinouts are listed below.



Pin No.	Signal Name
1	12VIN
2	GND

2.3.15 JCSI: MIPI CSI-2 Connector

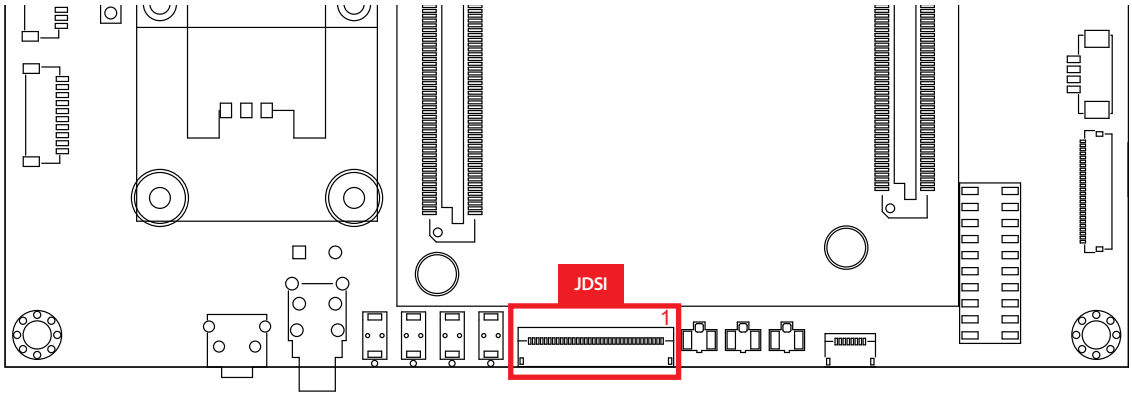
There is a MIPI CSI-2 connector, which is used for connecting the CSI camera. The pin assignments are listed in the following table:



Pin No.	Signal Name	Pin No.	Signal Name
1	RDP0	14	CLKN
2	RDN0	15	GND
3	GND	16	CLK of sensor
4	RDP1_B	17	PDN
5	RDN1_B	18	Reset
6	GND	19	I2C_DATA
7	NC	20	I2C_CLK
8	NC	21	1.8V
9	GND	22	1.5V
10	NC	23	2.8V
11	NC	24	2.8V
12	GND	25	GND
13	CLKP	26	GND

2.3.16 JDSI: MIPI DSI Connector

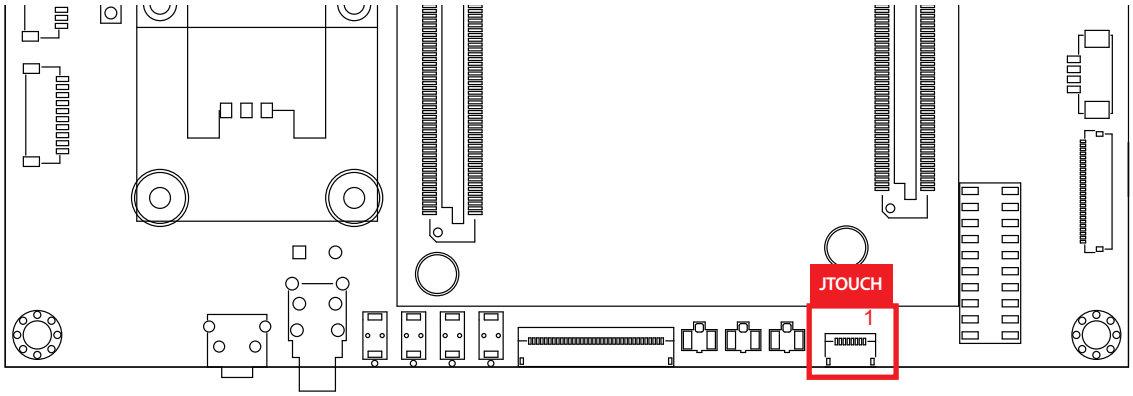
There is a MIPI DSI connector, which is used for connecting the LCD display. The pin assignments are listed in the following table:



Pin No.	Signal Name	Pin No.	Signal Name
1	3.3V	18	GND
2	3.3V	19	DSI_D0P
3	NC	20	DSI_D0N
4	LCD VDDEN	21	GND
5	Backlight_PWM	22	DSI_D3P
6	I2C_DATA	23	DSI_D3N
7	I2C_CLK	24	GND
8	NC	25	GND
9	GND	26	GND
10	DSI_D2P	27	GND
11	DSI_D2N	28	NC
12	GND	29	AGING
13	DSI_D1P	30	NC
14	DSI_D1N	31	Backlight power
15	GND	32	Backlight power
16	DSI_CKP	33	Backlight power
17	DSI_CKN	34	Backlight power

2.3.17 JTOUCH: Touch Screen Connector

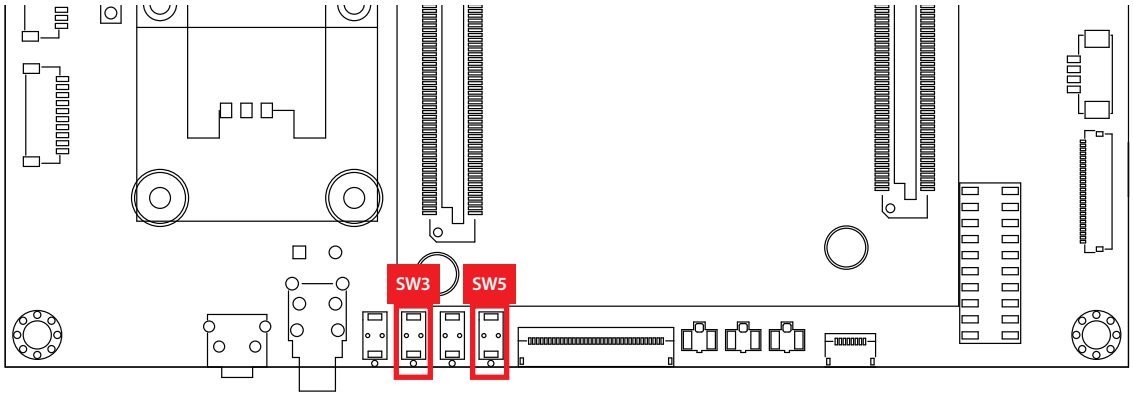
There is a touch screen connector, which is used for connecting the touch screen controller. The pin assignments are listed in the following table:



Pin No.	Signal Name
1	GND
2	NC
3	NC
4	Interrupt
5	I2C_CLK
6	I2C_DATA
7	3.3V
8	Reserved

2.3.18 SW3. SW5: Volume Buttons

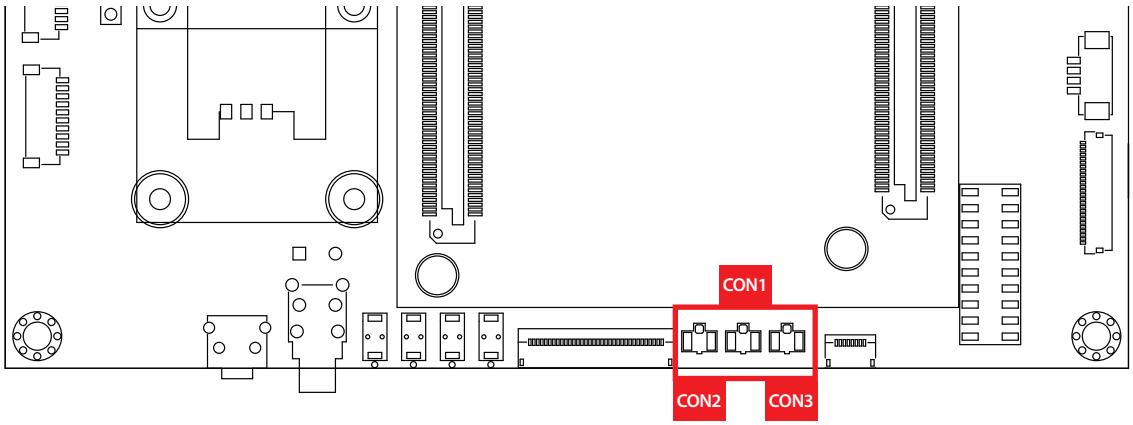
There is two volume buttons which are used to control the volume. The volume up is labeled as ‘SW3’ and the volume down is labeled as ‘SW5’.



Pin No.	Signal Name
1	GND
2	NC
3	NC
4	Interrupt
5	I2C_CLK
6	I2C_DATA
7	3.3V
8	Reserved

2.3.19 CON1-3: IPEX Connectors

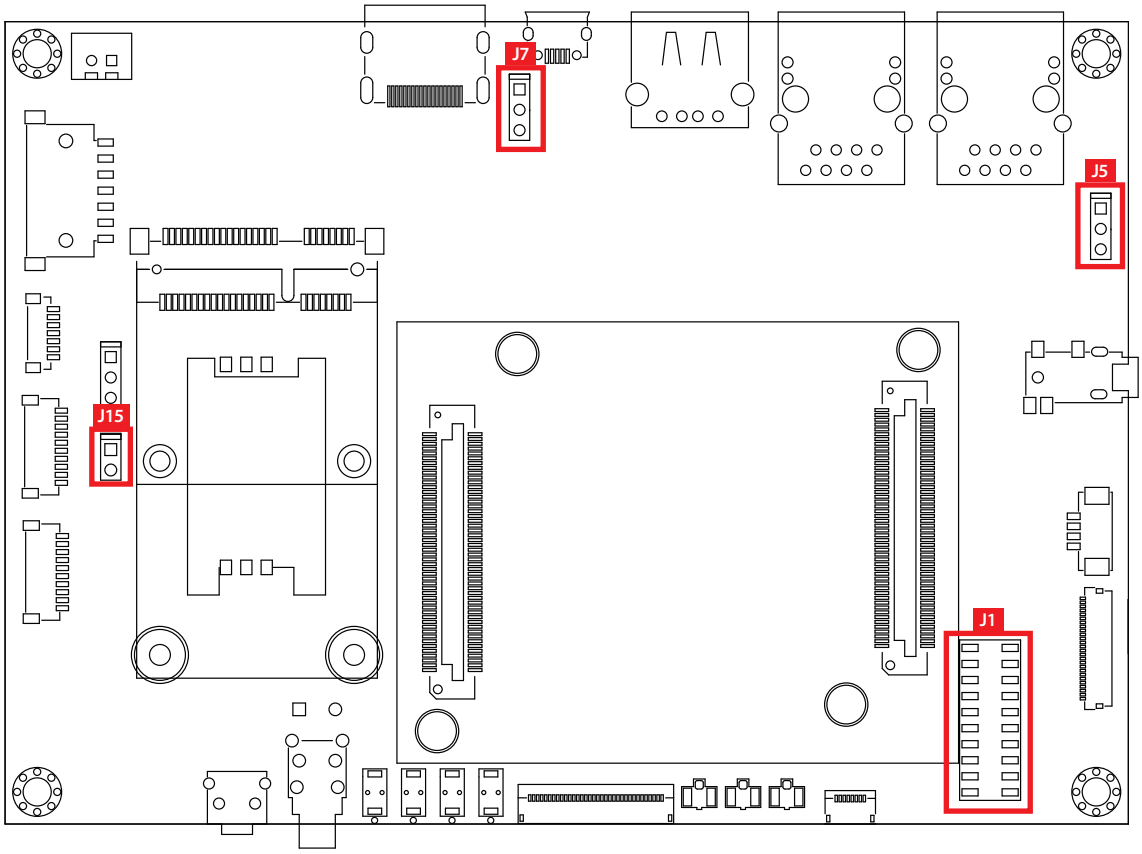
There are three IPEX connectors labeled ’CON1’, ‘CON2’ and ‘CON3’. ‘CON2’ is for Bluetooth antenna and ‘CON1’ and ‘CON3’ are for Wi-Fi antennas.



2.4 Carrier Board Jumpers & Headers

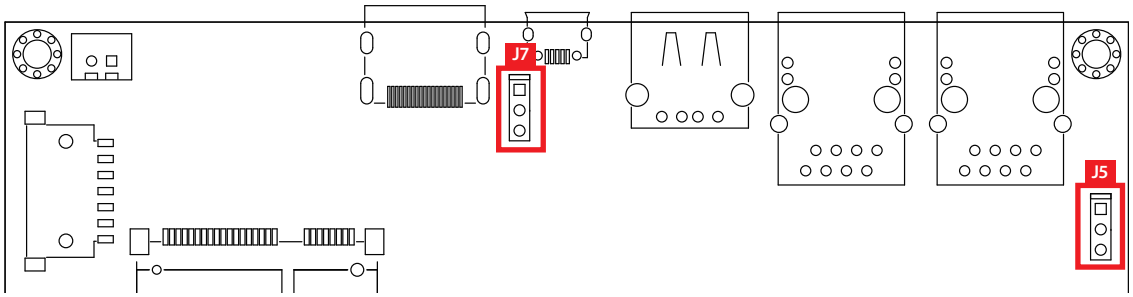
2.4.1 Main Board Jumpers and Headers Location

You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper, you connect the pins with the clip. To "open" a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



2.4.2 J5, J7: OS Image Jumpers

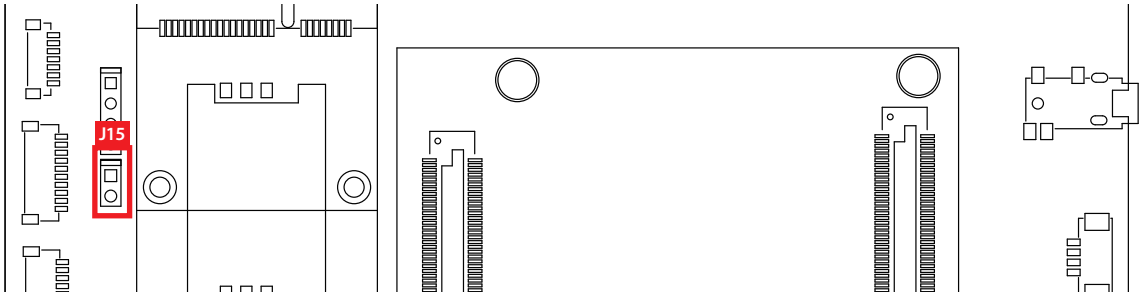
There are two OS image jumpers labeled as ‘J5’ and ‘J7’. They are used to set the Micro USB 2.0 port to a download mode.



	Pin No.	Definition
1 3	1-2	Download mode
	2-3	Normal mode (default)

2.4.3 J15: Watchdog Jumper

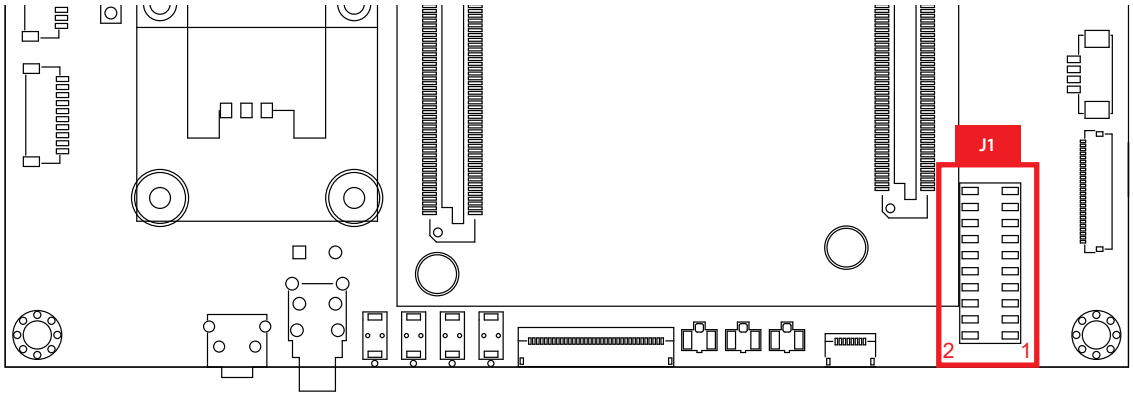
There is a watchdog jumper labeled as ‘J15’, which is used to enable or disable the watchdog function on the board. The watchdog jumper settings are as below.



	Pin No.	Definition
1 2	1-2	Disabled

2.4.4 J1: I2C/SPI/GPIO Pin Header

There is an I²C/SPI/GPIO Pin Header labeled as 'J1', which is used for connecting the I²C, SPI, and 12 GPIO devices. The pin assignments are listed as below.



Pin No.	Signal Name	Pin No.	Signal Name
1	SPI_CLK	2	SPI_CS
3	SPI_MISO	4	SPI_MOSI
5	GPIO79	6	GPIO53
7	GPIO80	8	GPIO54
9	GPIO52	10	GPIO78
11	GPIO77	12	GPIO57
13	I2C_CLK1	14	GPIO56
15	I2C_DATA1	16	GPIO55
17	GND	18	GPIO69
19	1.8V	20	GPIO70

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-500.

3.1 BSP Installation

The following are contents in the BSP package.

Source code folder	Description
ESOM-MT-500-BSP_Android10.zip	Android source code and image
Tool folder	**Description**
Driver_Auto_Installer_EXE.zip UniversalAdbDriverSetup.zip SP_Flash_Tool_exe_Windows.zip.zip	MTK USB cable driver Universal ADB driver MTK SP Flash Tool

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-core gnupg flex bison gperf
build-essential zip curl zlib1g-dev gcc-multilib g++-
multilib libc6-dev-i386 lib32ncurses5-dev x11proto-core-dev
libx11-dev lib32z-dev libgl1-mesa-dev libxml2-utils
xsltproc unzip make python-networkx mingw32 zlib1g-dev:i386
tofrodos libswitch-perl
```

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-500.

3.3.1 Building the Android Image

Type below commands for the image building.

```
$ cd android10
$ source build/envsetup.sh; lunch full_tb8788p1_64_wifi-
userdebug
$ make 2>&1 | tee build.log
```

3.3.2 Replace and Update Firmware

After the compilation, the /android10/out/target/product/tb8788p1_64_wifi/ directory will contain the resulting binaries as shown in the table below.

Binary
preloader_tb8788p1_64_wifi.bin
recovery.img
vbmeta.img
vbmeta_system.img
vbmeta_vendor.img
spmfw-verified.img
scp-verified.img
sspm-verified.img
cam_vpu1-verified.img
cam_vpu2-verified.img
cam_vpu3-verified.img
lk-verified.img
boot.img
logo-verified.bin
dtbo-verified.img
tee-verified.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-500.

4.1 BSP Installation

The following are contents in the BSP package.

Source code folder	Description
ESOM-MT-500-BSP_Yocto26.zip	Yocto source code and image
Tool folder	**Description**
Driver_Auto_Installer_EXE.zip UniversalAdbDriverSetup.zip SP_Flash_Tool_exe_Windows.zip.zip	MTK USB cable driver Universal ADB driver MTK SP Flash Tool

4.1.1 Version Information and Supported Features

- Kernel version: 4.4.146
- Evaluation image: Yocto 2.6
- Development based on MediaTek Yocto 2.6 BSP
- Supports eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports MIPI DSI capacitive touch panel
- AUO 10.1 B101UAN01.7 (1920×1200)
- eGalax I2C touch
- 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

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 120GB 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-dev libegl1-mesa-dev libsdl1.2-dev pylint
xterm gcc g++ libstdc++6 lib32stdc++6 libpulse-dev
libevent-dev ninja-build rpm2cpio
```

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

```
$ wget -O gn http://storage.googleapis.com/chromium-
gn/3fd43e5e0dcc674f0a0c004ec290d04bb2e1 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-500.

4.3.1 Building the Yocto Image

Type the commands below to build the image.

```
$ cd yocto2.6
$ export TEMPLATECONF=${PWD}/meta/meta-mediatek-
mt8385/conf/base/aiv8385-linux.aiot-emmc
$ source meta/poky/oe-init-build-env
$ bitbake mtk-image-openmm-aiv
```

4.3.2 Replace and Update Firmware

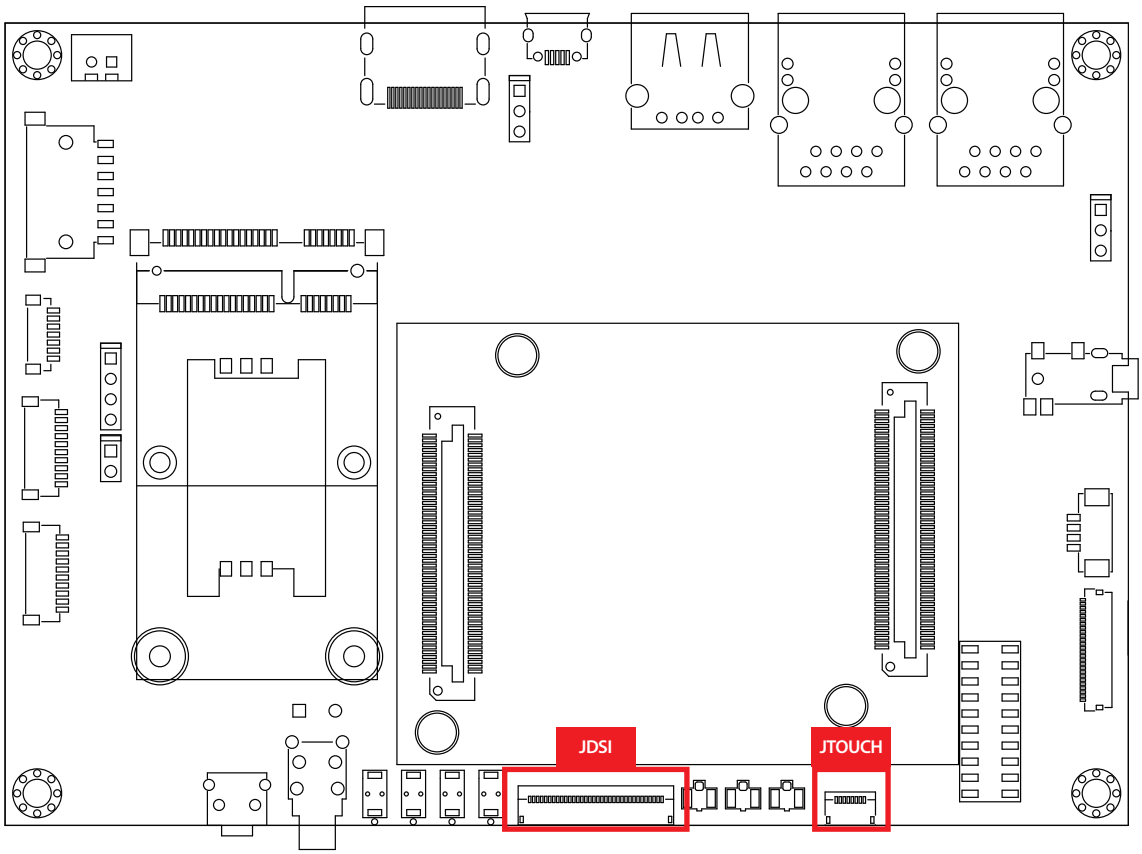
After the compilation, the /yocto2.6/build/tmp/deploy/images/aiv8385-linux.aiot-emmc/ directory will contain the resulting binaries as shown in the table below.

Binary
bl2.img boot.img cam_vpu_a.img cam_vpu_b.img cam_vpu_c.img spmfw.img sspm-fit.img tee.img system.ext4 userdata.ext4

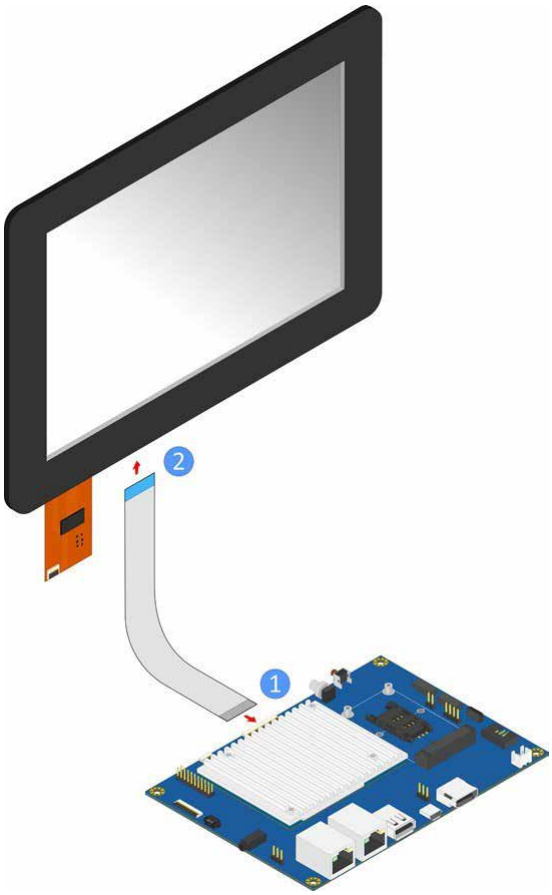
A

APPENDIX A : CONNECTING LCD DISPLAY

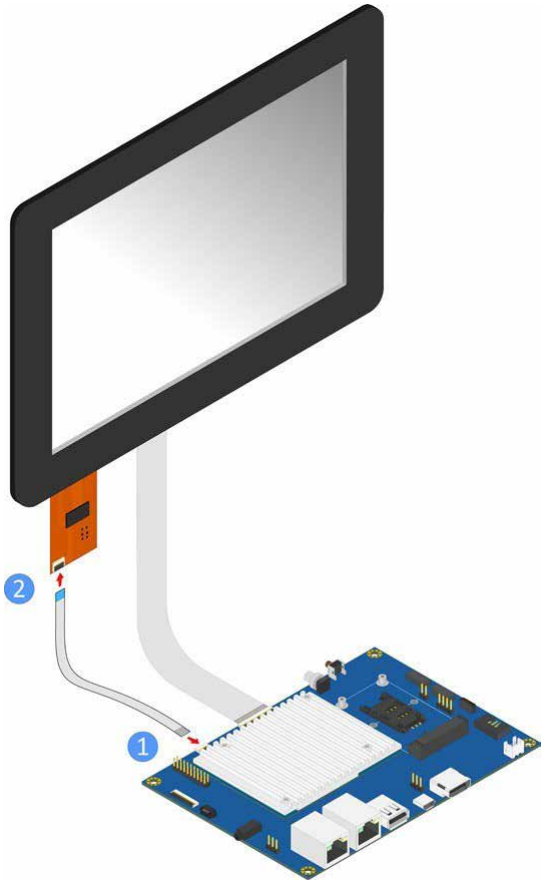
A.1 Function Description



Step 1 Attached the 34-pin FFC cable to the MIPI DSI connector, labeled as ‘JDSI’ on the ESOM-MT-500-CB, AND then attach the other end of the cable to the 10.1’’ TFT-LCD display.



Step 2 Attached the 8-pin FFC cable to the Touch connector, labeled as ‘JTOUCH’ on the ESOM-MT-500-CB, AND then attach the other end of the cable to the 10.1’’ TFT-LCD display.



B

APPENDIX B : POWER CONSUMPTION

Testing Board	ESOM-MT-500
CPU	MediaTek Genio 500 Processor with Quad-core Cortex-A73 @2.0GHz and Quad Cortex-A53 @2.0GHz
Wi-Fi & BT	MediaTek MT7668 • 2x2 Dual-band Wi-Fi 802.11ac with MU-MIMO • Bluetooth 5.0
RAM	LPDDR4 SDRAM, up to 4GB (On Board)
USB-1	USB Mouse HP G1K28AA
Storage	16 GB eMMC
LAN 1 : LAN 9514	100 Mbps
LAN 2 : ASIX AX88772	100 Mbps
Graphics Output	B101UAN01.7 + I101FGT16.4 Touch Panel
Power Source	Chroma 62006P-100-25
Test Program	AnTuTu Stress Test

B.1 MediaTek Genio 500 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	0.3809A	4.5708W	0.7948A	9.5376W

Vecow

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