ACP-IMX6POS-B1

NXP i.MX6 Cortex-A9 SBC (B Version)

User's manual

1ˢᵗ Ed – 11 November 2019

FCC Statement

THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.

(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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1. Collect all the information about the problem encountered. (For example, CPU type and speed, Avalue's products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

CONTENT

ACP-IMX6POS-B1 User's Manual

1. Getting Started

1.1 Safety Precautions

Warning!

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

1.2 Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

- 1 x ACP-IMX6POS-B1 Module

1.3 Document Amendment History

Revision	Date	Comment
1st	November 2019	Initial Release

1.4 Manual Objectives

This manual describes in detail the Avalue Technology ACP-IMX6POS-B1 Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to interface with ACP-IMX6POS-B1 series or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

1.5 System Specifications

System	
Mother Board	ACP-IMX6POS(B)
CPU	NXP i.MX6 Cortex-A9 Quad / Dual Lite 1GHz
CPU Cooler (Type)	Aluminum CPU Sink E1961213015000R, Heatsink for CPU 41*41*20mm
Memory	2GB DDR3L
Storage	8G eMMC
Power Supply	DC in 12V~24V
Display	
Chipset	NXP i.MX6
Resolution	Up to 1920x1080
Multiple Display	Quad(VGA+HDMI or LVDS+HDMI or VGA+LVDS) Dual Lite(LVDS+HDMI)
HDMI	From NXP i.MX6
LCD Interface	Dual channel 24bit LVDS
Ethernet	
LAN1	Giga Lan From i.MX6 MAC, PHY is Micrel KSZ9031RNX
LAN2	Giga Lan Intel I210 by PCIe Interface
Ethernet Interface	RJ45 x2
Audio	
I2S Codec	Wolfson WM8962
Audio Port	2Pin Wafer Box P=2.0m x2 (Speaker out R & L) (Driver per channel max 2W)
Mic	4Pin Wafer Box P=2.0m x1(Microphone)
Internal I/O Connectors	
Front panel	JLED1 2 x 5P x1
mini-PCIe socket	MPCIE1 x1
SIM socket	SIM1 x1
OTG jumper	JBTSL1 x1
I2C	JI2C1 x1
MIC	JMIC1 x1
LVDS	JLVDS1 x1
Black Light	JBKLT1 x1
VGA	JVGA1 x1
USB	JUSB2 x1

	JUSB1 x1
Mic or SD socket	JMSD x1
GPIO	JDIO 16bit x1
power input	JPWR2 Pin header 4P power input connector
Speaker	JSPK1 x1
	JSPK2 x1
RS232	JCOM 3&4 x1 as pin header only RS232.
Debug	JUART1 x1
External I/O	
USB	USB Type A Double Deck x 1
LAN	RJ45 connector with indicate LED x 2
HDMI	HDMI connector x 1 (Vertical type)
Mini-USB	Mini-USB connector x 1
COM Port	DB9 male connector x2
	JCOM1&2 can be select from RS232/422/485
	(RS485 auto flow control)
DC Jack	JPWR1 x1
Mechanical & Environmental	
Power Type	12V ~ 24V wide voltage DC input
Power Connector Type	1. DC jack
	2. Pin header 4P power input connector
Weight	TBD
Fanless	Yes
Size (L x W)	175 x 110mm
OS Support (listed in accordance with Intel document)	Android 4.4.2
	Linux Ubuntu 14.04
	Linux Yocto 1.5.1

Note: Specifications are subject to change without notice.

1.6 Architecture Overview – Block Diagram

The following block diagram shows the architecture and main components of ACP-IMX6POS-B1.
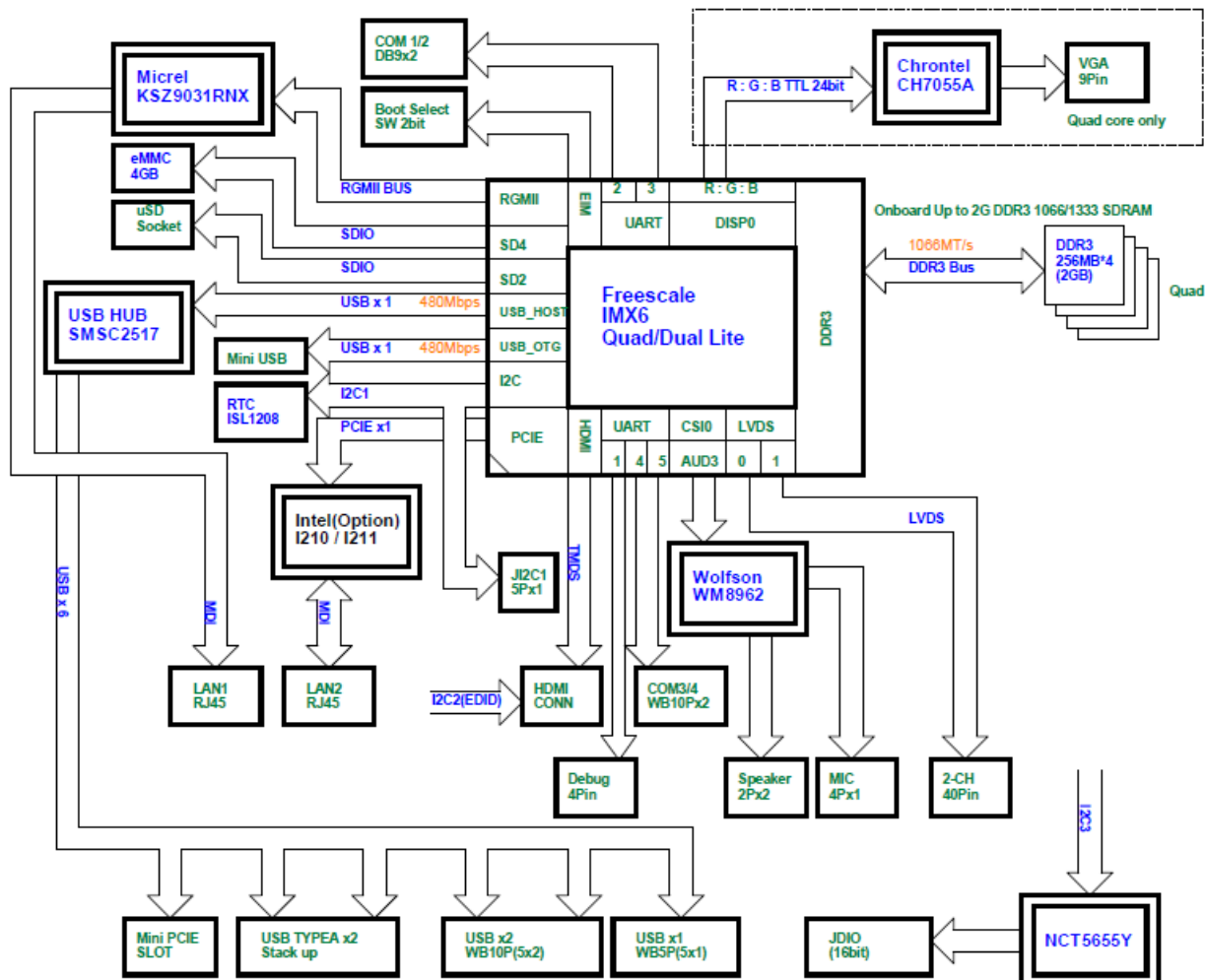
2. Hardware Configuration

2.1 Product Overview
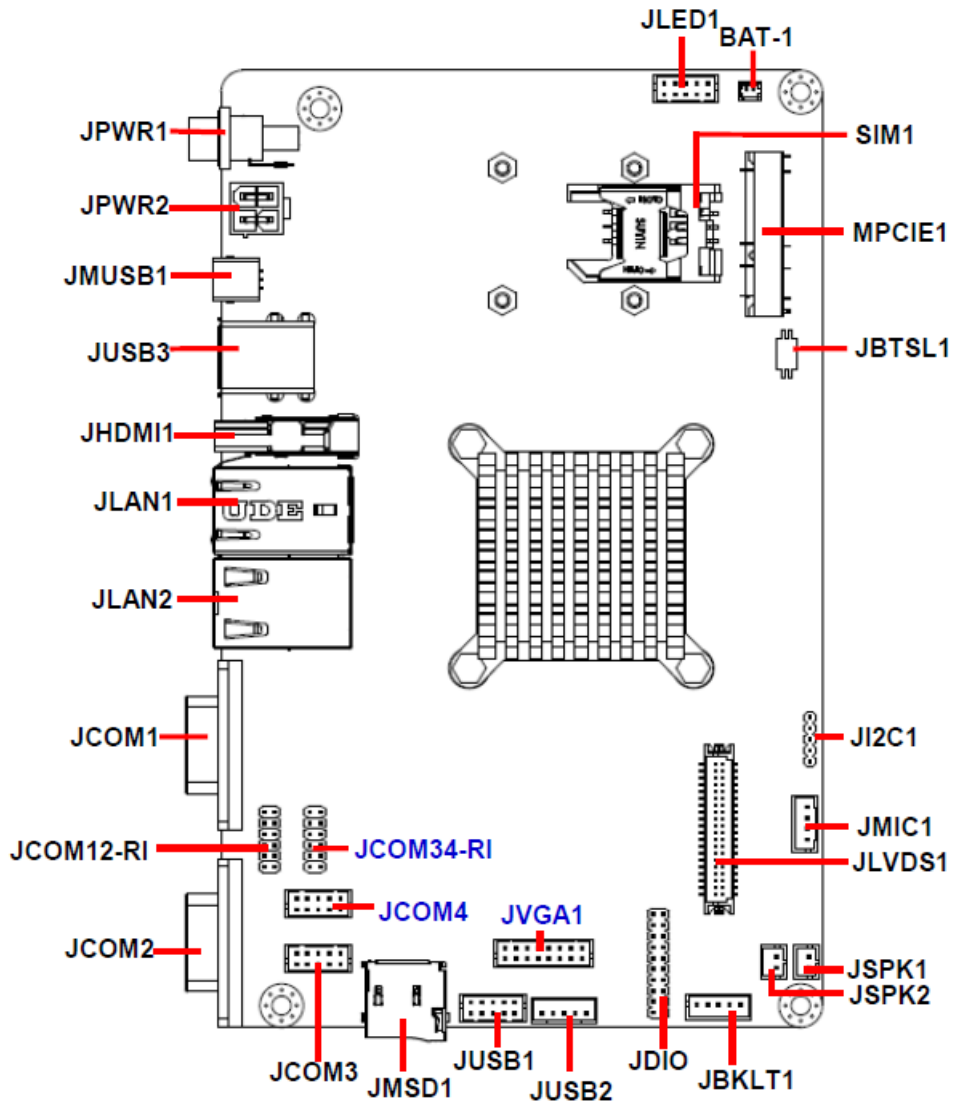
2.2 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

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 two pins.
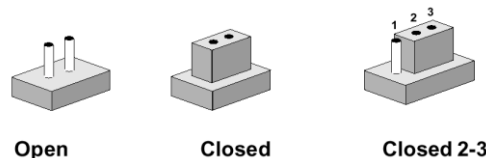
The jumper settings are schematically depicted in this manual as follows:

A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board's jumpers and connectors.

Jumpers

Label	Function	Note
JBTSL1	Boot Mode selector	Switch, 2bit
JCOM12-RI	Serial port 1/2 pin9 signal select	6 x 2 header, pitch 2.00mm
JCOM34-RI	Serial port 3/4 pin9 signal select	6 x 2 header, pitch 2.00mm

Connectors

Label	Function	Note
BAT-1	Battery holder	1 x 2 wafer, pitch 1.25mm
JCOM1/2	Serial port connector 1/2	D-sub 9-pin, male
JCOM3/4	Serial port connector 3/4	5 x 2 wafer, pitch 2.00 mm
JDIO	General purpose I/O connector	10 x 2 header, pitch 2.00 mm
JUSB1	USB connector 1	5 x 2 wafer, pitch 2.00mm

JUSB2	USB connector 2	5 x 1 wafer, pitch 2.00mm
JUSB3	USB connector 3	USB Type-A x2
JMUSB1	Mini USB connector for Boot/Debug	MINI USB-MAB_5P
JPWR1	DC-IN power connector	Power Jack mini din 4P
JPWR2	Power connector	2 x 2 wafer, pitch 4.20 mm
MPCIE1	Mini PCI Express connector	
JLAN1/2	RJ-45 Ethernet connector 1/2	
JVGA1	VGA connector	8 x 2 wafer, pitch 2.00mm
JLED1	LED connector	5 x 2 wafer, pitch 2.00mm
JSPK1	Speaker Out_L connector	2 x 1 wafer, pitch 2.00 mm
JSPK2	Speaker Out_R connector	2 x 1 wafer, pitch 2.00 mm
JLVDS1	LVDS connector	2 x 20 wafer, pitch 1.25 mm
SIM1	SIM Card Slot	SDCARD_9H
JMIC1	Line In, MIC connector	4 x 1 wafer, pitch 2.00mm
JBKLT1	LCD inverter connector	5 x 1 wafer, pitch 2.00mm
JMSD1	Micro SD Card Slot	
JHDMI1	HDMI connector	
JI2C1	I2C device connector	5 x 1 header, pitch 2.00mm

2.3 Setting Jumpers & Connectors

2.3.1   Boot mode selector (JBTSL1)
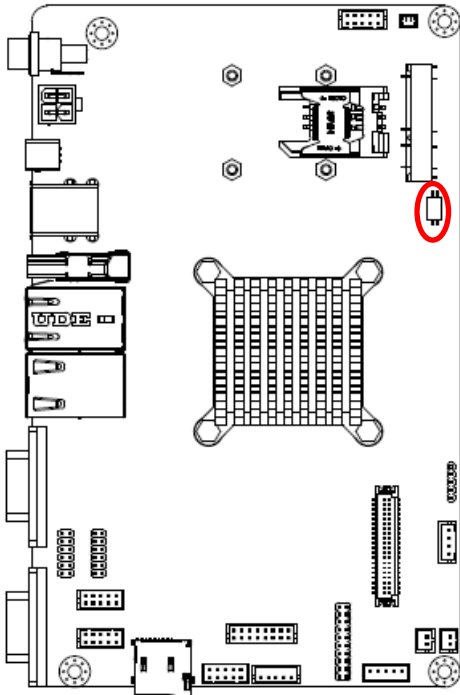
Mode	Description
2 1 on	OTG load
2 1 on	eMMC boot
2 1 on	SD boot

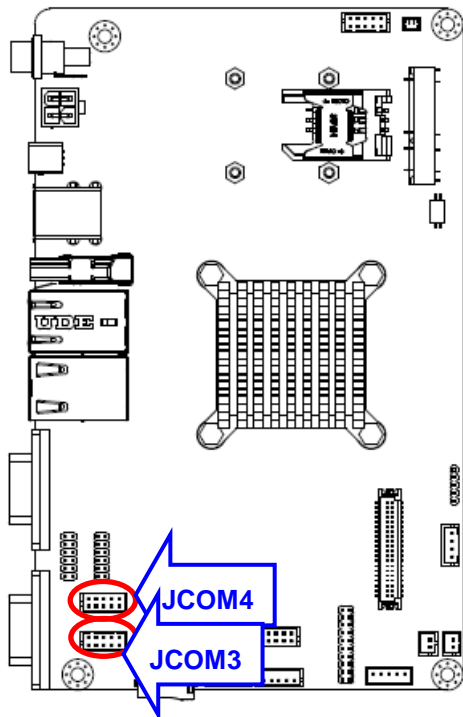### 2.3.2 Serial port 1/2 pin9 signal select (JCOM12-RI)
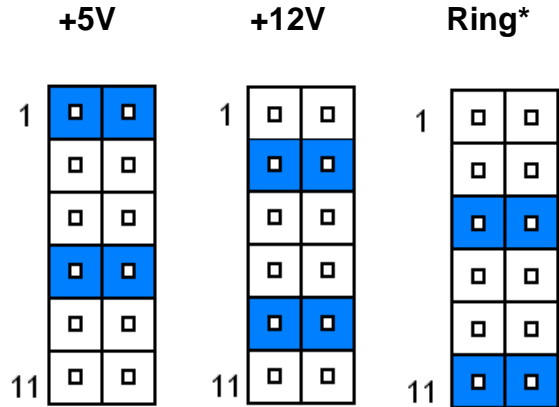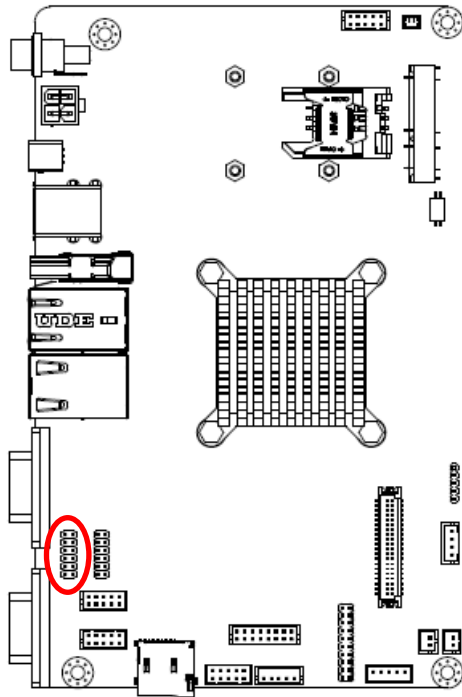
* Default
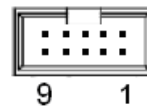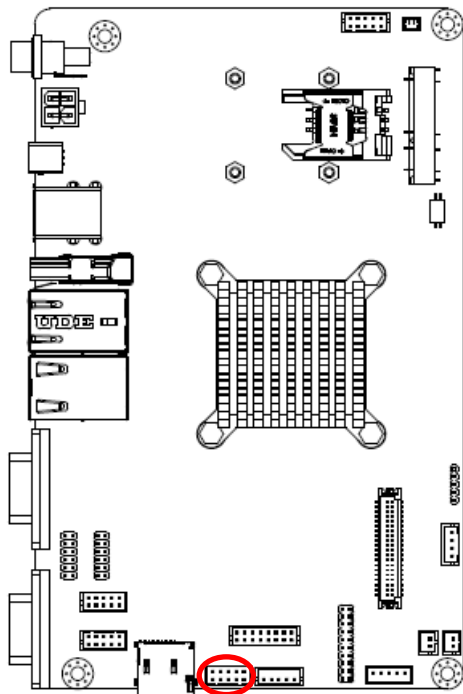
2.3.3 Serial port 3/4 pin9 signal select (JCOM34-RI)
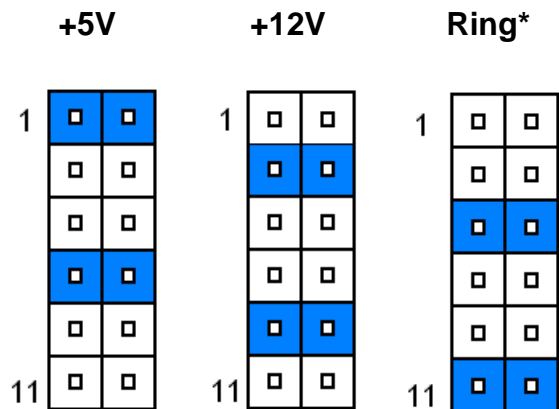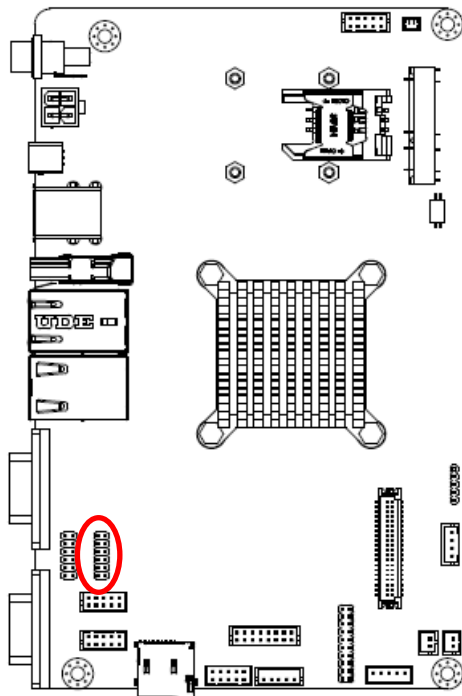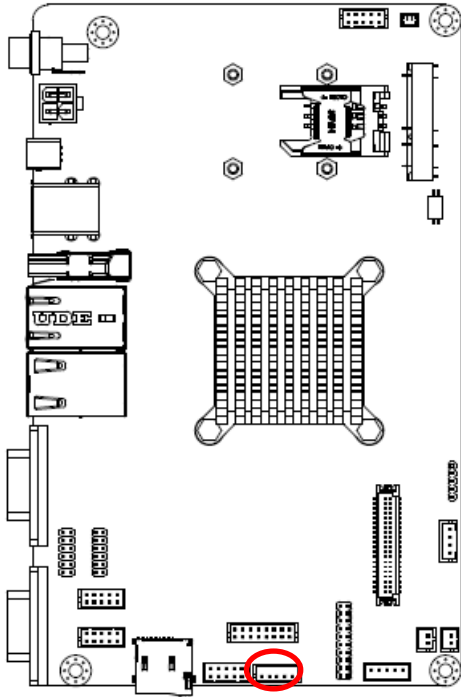

* Default

2.3.4　Serial port connector 3/4 (JCOM3/4)
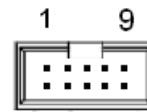
Signal	PIN	PIN	Signal
NC	1	2	COM_RXD
COM_TXD	3	4	NC
GND	5	6	NC
COM_RTS#	7	8	COM_CTS#
COM_RI_A	9	10	GND

2.3.5　USB connector 1 (JUSB1)

Signal	PIN	PIN	Signal
+5V	1	2	+5V
USB_NP2	3	4	USB_NP1
USB_PP2	5	6	USB_PP1
GND	7	8	GND
GND	9	10	GND

2.3.6　USB connector 2 (JUSB2)
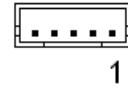
Signal	PIN
+5V	1
USB_NP3	2
USB_PP3	3
GND	4
GND	5

2.3.7　LED connector (JLED1)
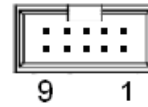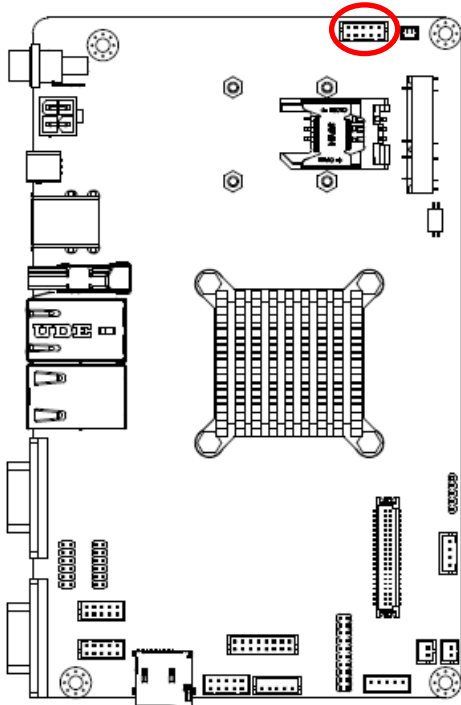
Signal	PIN
PWR-LED+	1
PWR-LED-	2
WIFI-LED+	3
WIFI-LED-	4
LAN-LED+	5
LAN-LED-	6
Reset Switch	7
	8
Power button	9
Switch	10

2.3.8 General purpose I/O connector (JDIO)
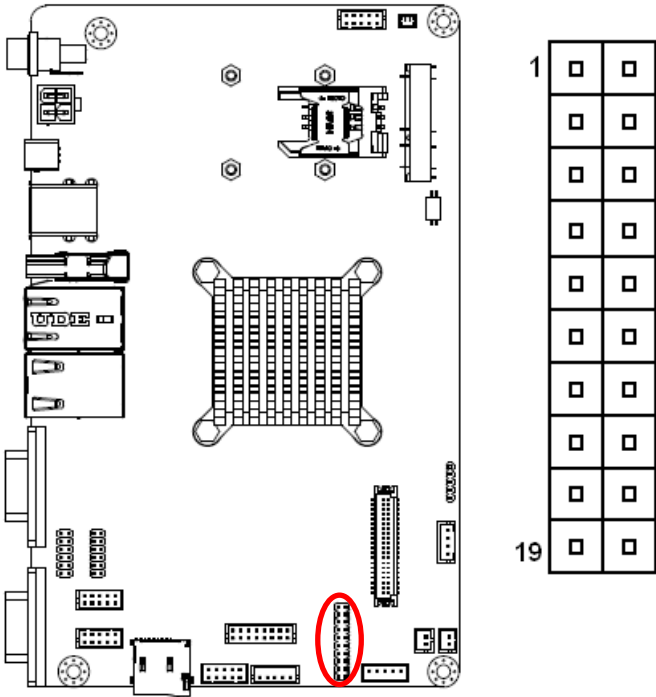
Signal	PIN	PIN	Signal
DI0	1	2	DO0
DI1	3	4	DO1
DI2	5	6	DO2
DI3	7	8	DO3
DI4	9	10	DO4
DI5	11	12	DO5
DI6	13	14	DO6
DI7	15	16	DO7
GPIO_05_I2C3_CLK	17	18	GPIO_06_I2C3_SDA
GND	19	20	+VCC_DIO

2.3.9 Power connector (JPWR2)
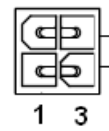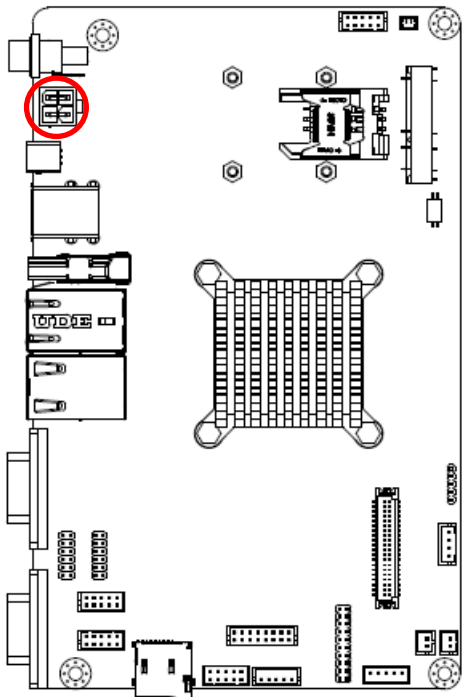
Signal	PIN	PIN	Signal
GND	2	4	+VDC_IN
GND	1	3	+VDC_IN

2.3.10 Speaker Out_L connector (JSPK1)
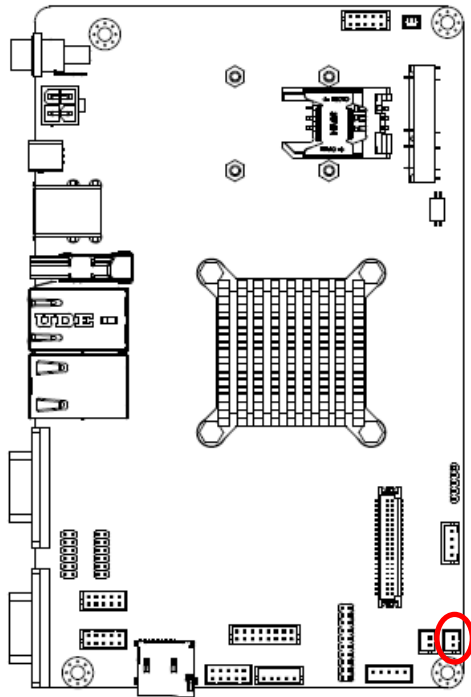
Signal	PIN
SPKL_N	1
SPKL_P	2

2.3.11 Speaker Out_R connector (JSPK2)
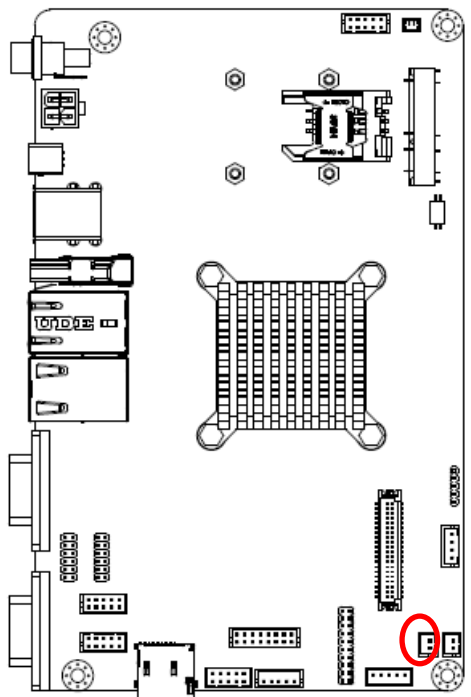
Signal	PIN
SPKR_N	1
SPKR_P	2

2.3.12   Line In, MIC connector (JMIC1)
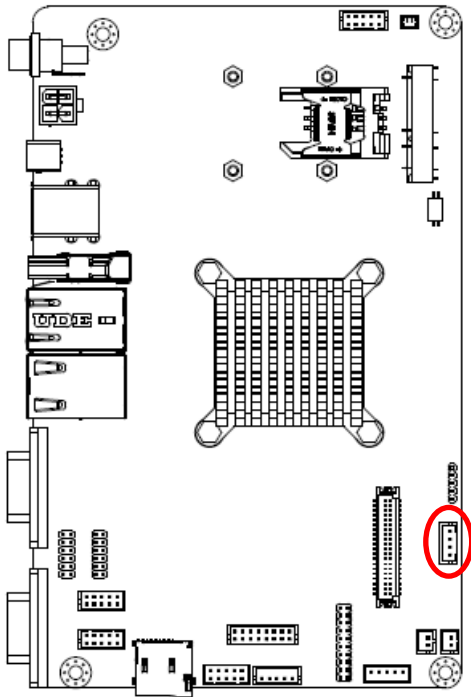
Signal	PIN
MIC_DET	1
MIC_IN	2
MICBIAS	3
GND	4

2.3.13   LCD inverter connector (JBKLT1)
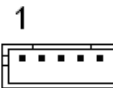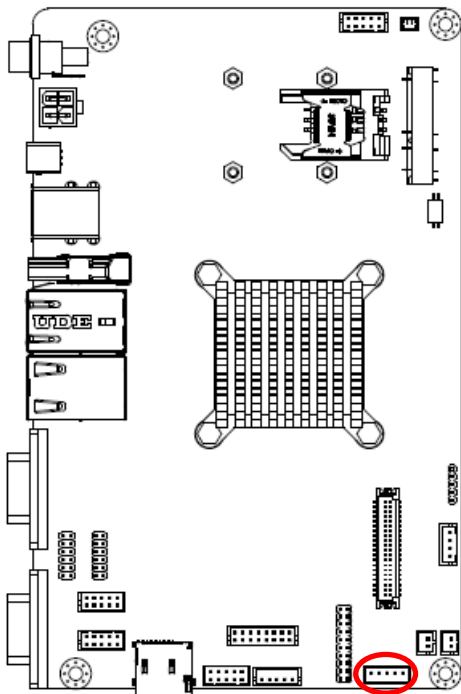
Signal	PIN
+12V	1
GND	2
LVDS_BPEN	3
LVDS_BKLCTL_R	4
+5V	5

2.3.14 VGA connector (JVGA1)
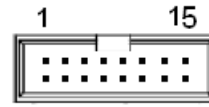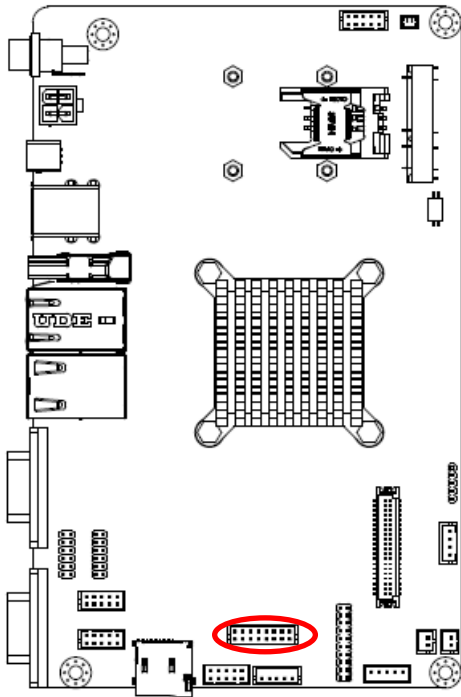
Signal	PIN	PIN	Signal
+5V	1	2	VRED
GND	3	4	VGREEN
NC	5	6	VBLUE
VDATA	7	8	NC
VHS	9	10	GND
VVS	11	12	GND
VCLK	13	14	GND
GND	15	16	GND

2.3.15 Battery holder (BAT-1)
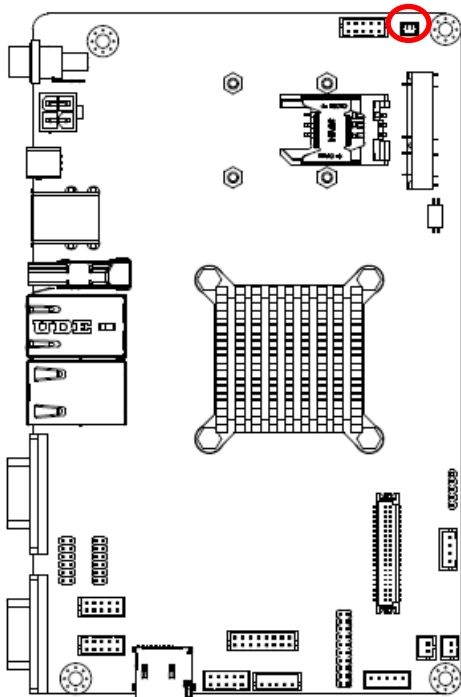
Signal	PIN
+V_BAT	1
GND	2

2.3.16   LVDS connector (JLVDS1)
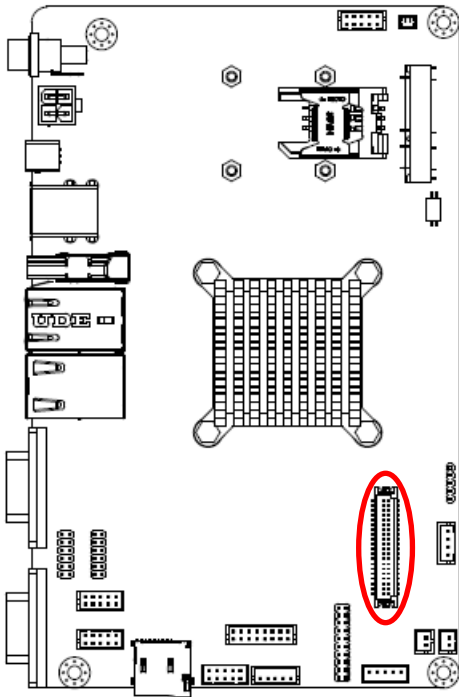
Signal	PIN	PIN	Signal
+12V	39	40	+12V
GND	37	38	GND
LVDS1_CLK_N	35	36	LVDS0_CLK_N
LVDS1_CLK_P	33	34	LVDS0_CLK_P
GND	31	32	GND
LVDS1_TX3_N	29	30	LVDS1_TX2_N
LVDS1_TX3_P	27	28	LVDS1_TX2_P
GND	25	26	GND
LVDS1_TX1_N	23	24	LVDS1_TX0_N
LVDS1_TX1_P	21	22	LVDS1_TX0_P
GND	19	20	GND
LVDS0_TX3_N	17	18	LVDS0_TX2_N
LVDS0_TX3_P	15	16	LVDS0_TX2_P
GND	13	14	GND
LVDS0_TX1_N	11	12	LVDS0_TX0_N
LVDS0_TX1_P	9	10	LVDS0_TX0_P
GND	7	8	GND
LVDS2_DDC_CLK	5	6	LVDS2_DDC_DATA
+3V	3	4	+5V
+3V	1	2	+5V

2.3.17 I2C device connector (JI2C1)
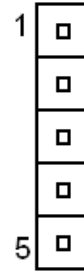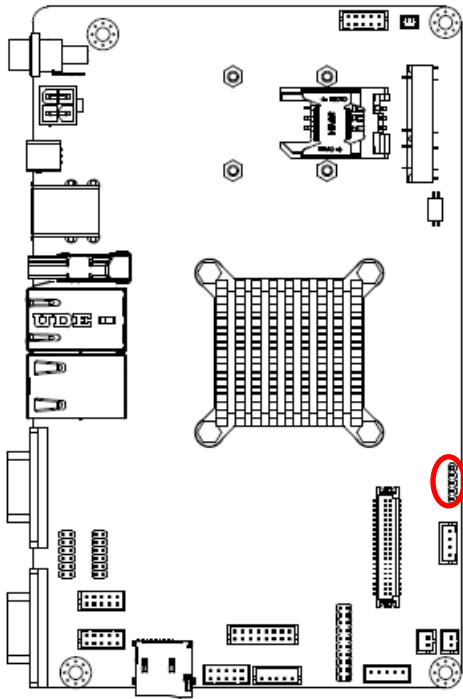
Signal	PIN
CS_+V3.3S	1
CS_INT#	2
CS_CLK	3
CS_DAT	4
GND	5

3. Software User Guide

3.1 Build and install U-boot & Kernel image for ACP-IMX6POS

3.1.1 Requirements

Requirements for the set up of the standalone cross-development environment:

- x86 host system (64-bit)
- recommended free disk space: 25 GB
- recommended memory size: 8 GB
- Ubuntu 14.04 (64-bit)

3.1.2 Setting Up the Standalone Cross-Development Environment

Here you can find instruction to setup development environment for Android source code for ACP-IMX6POS and the way to install it on eMMC. With this guideline, user will be able to setup the system easily and test all the functions with the system.

3.1.2.1   Perform a standard Ubuntu 14.04 (64-bit) installation.

3.1.2.2   Install additional packages:

$ sudo apt-get install gawk wget git-core diffstat unzip texinfo gcc-multilib \
build-essential chrpath   socat   libsdl1.2-dev

$ sudo apt-get install libsdl1.2-dev xterm   sed cvs subversion coreutils texi2html \
docbook-utils python-pysqlite2 help2man make gcc g++ desktop-file-utils \
libgl1-mesa-dev libglu1-mesa-dev mercurial autoconf automake groff curl lzop asciidoc

$ sudo apt-get install u-boot-tools

3.2 Get U-boot & Kernel source code and Complier

3.2.1 Get U-boot & Kernel source code

Please connect Avalue FAE to get source code.

3.2.2 Complier U-boot & Kernel image.

Please unzip the source code in your computer and enter to U-boot & Kernel source code folder.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel$ ls
fsl   kernel   u-boot
```

Enter to "u-boot" folder and type "./run.sh –j4" start to complier u-boot.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/u-boot$ ls
api          common      disk      examples   lib           MAKEALL    net       scripts
arch         config.mk   doc       fs         lib_arm       Makefile   post      snapshot.commit
board        cpu         drivers   include    lib_generic   mkconfig   README    test
boards.cfg   CREDITS     dts       Kbuild     Licenses      nand_spl   run.sh    tools
```

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/u-boot$ ./run.sh –j4
```

After complier finish, there is the "out" folder would be created in u-boot source code folder.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/u-boot$ ls
api          common      disk      examples   lib           MAKEALL    net       run.sh             tools
arch         config.mk   doc       fs         lib_arm       Makefile   out       scripts
board        cpu         drivers   include    lib_generic   mkconfig   post      snapshot.commit
boards.cfg   CREDITS     dts       Kbuild     Licenses      nand_spl   README    test
```

You can find the u-boot image in out folder.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/u-boot/out$ ls
arch      disk       fs        Makefile   source       tools      u-boot_e9697imx60br_emmc.imx   u-boot.map
board     drivers    include   net        System.map   u-boot     u-boot.imx                     u-boot.srec
common    examples   lib       scripts    test         u-boot.bin u-boot.lds
```

Enter to "kernel" folder and type "./run.sh –j4" start to complier kernel.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/kernel$ ls
arch      CREDITS         drivers     include   Kbuild    mm            REPORTING-BUGS   scripts    tools
block     crypto          firmware    init      Kconfig   MAINTAINERS   net              run.sh     security   usr
COPYING   Documentation   fs          ipc       kernel    Makefile      README           samples    sound      virt
```
```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/kernel$ ./run.sh –j4
```

After complier finish, there is the "out" folder would be created in Kernel source code folder.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/kernel$ ls
arch      Documentation   init      lib             out                scripts    virt
block     drivers         ipc       MAINTAINERS     README             security
COPYING   firmware        Kbuild    Makefile        REPORTING-BUGS     sound
CREDITS   fs              Kconfig   mm              run.sh             tools
crypto    include         kernel    net             samples            usr
```

You can find the kernel image in out folder.

```
jerry@AE-RISC:~/project/Jerry/IMX6/FSL-Kernel/kernel/out$ ls
arch              e9697imx6e2r.dtb   init       modules            net        usr
block             e9697imx6e3r.dtb   ipc        modules.builtin    scripts    vmlinux
crypto            firmware           kernel     modules.order      security   vmlinux.o
drivers           fs                 lib        Module.symvers     sound      zImage_e9697imx60br
e9697imx60br.dtb  headers            Makefile   mx6dlpos.dtb       source
e9697imx6e1r.dtb  include            mm         mx6qpos.dtb        System.map
```

3.3 Flash U-boot & Kernel image to eMMC or MicroSD
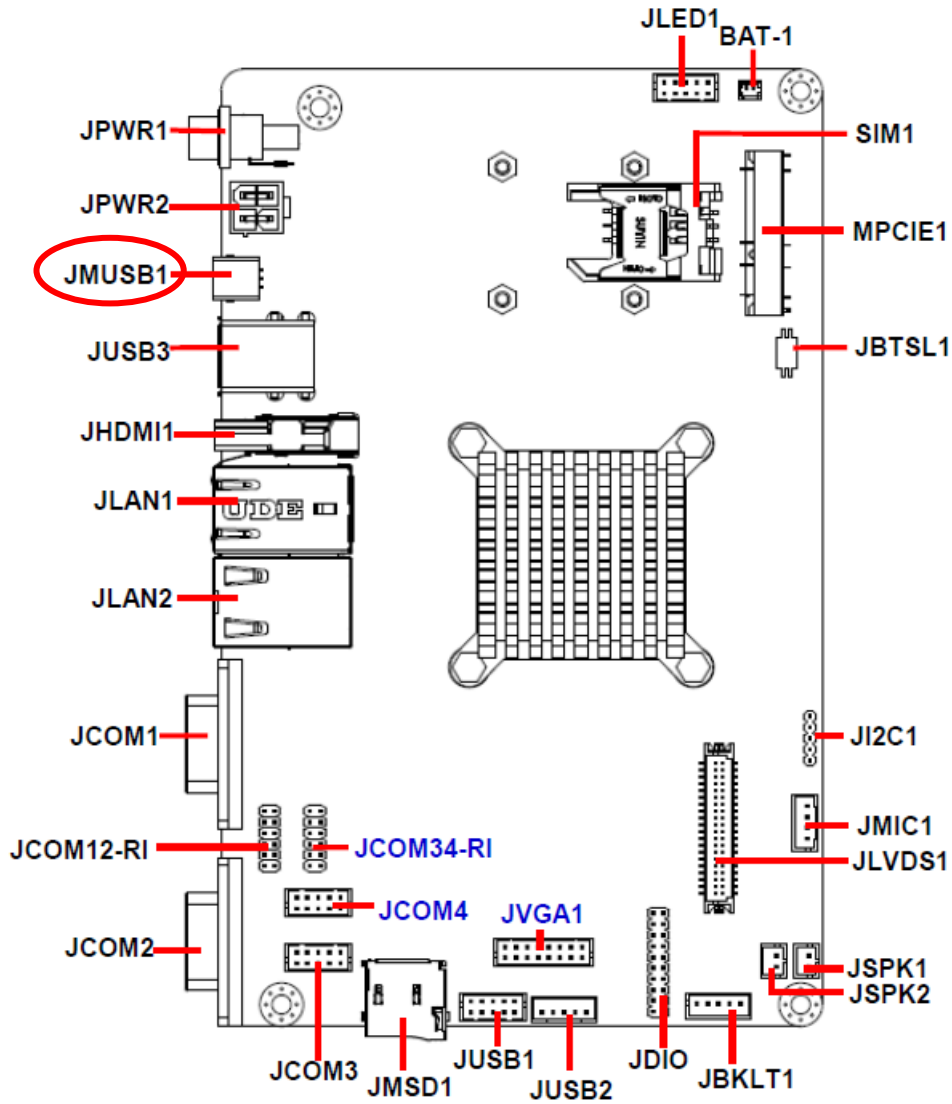
3.3.1 Flash U-boot & Kernel image to eMMC

3.3.1.1 Set the jumper to OTG mode
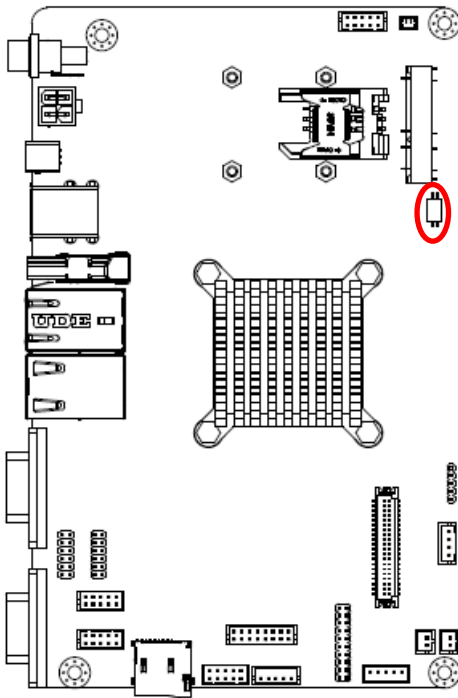
Mode	Description
	OTG load
	eMMC boot
	SD boot

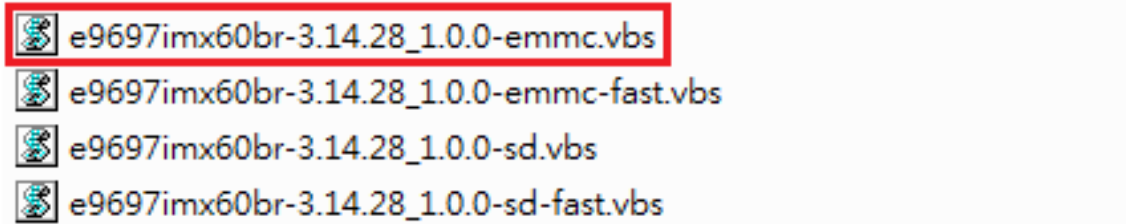3.3.1.2 Connect ACP-IMX6POS-B1 to computer through JMUSB1 by mini USB.

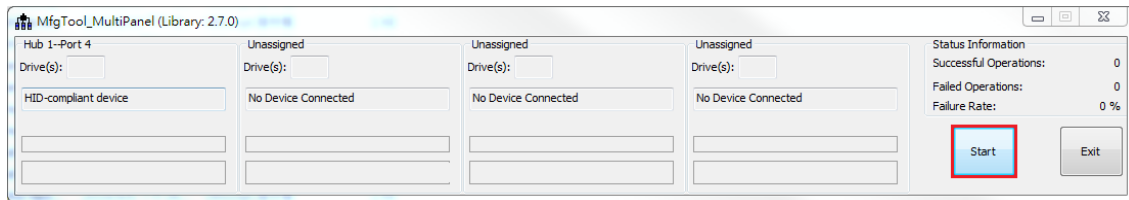### 3.3.2 Get MFG tool

Please connect Avalue FAE to get MFG tool.

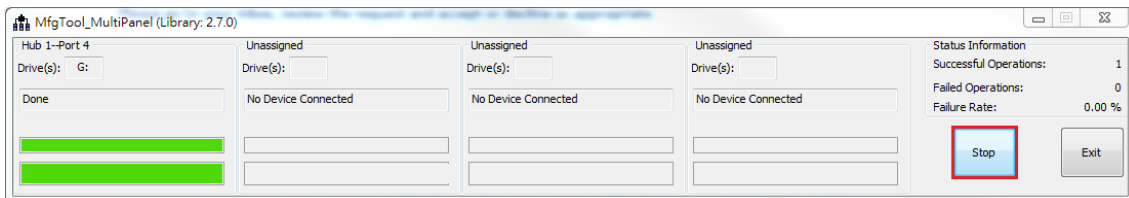### 3.3.3 Flash OS to eMMC by MFG tool

3.3.3.1 Execute vbs file

Please enter to MFG-Tools\vbs and execute xxxxxxxxxxx-3.14.28_1.0.0-emmc.vbs.

After execute xxx-emmc.vbs, please press "Start" to start flash OS.

After flash finish, please press "Stop".

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3.3.3.2 Boot to OS from eMMC

Set the jumper to "eMMC boot" and power on to boot to OS.
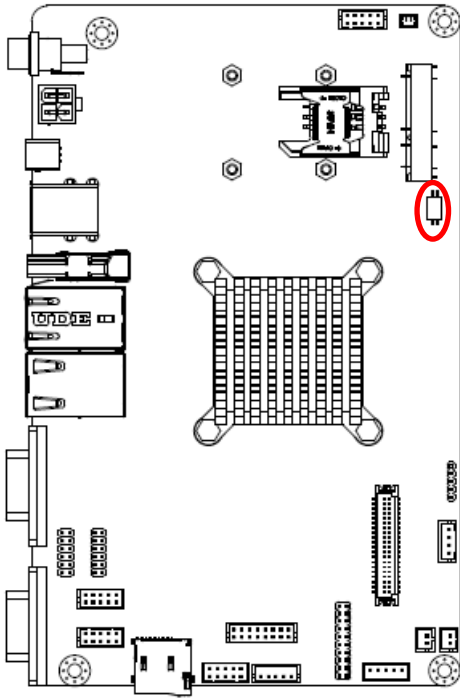
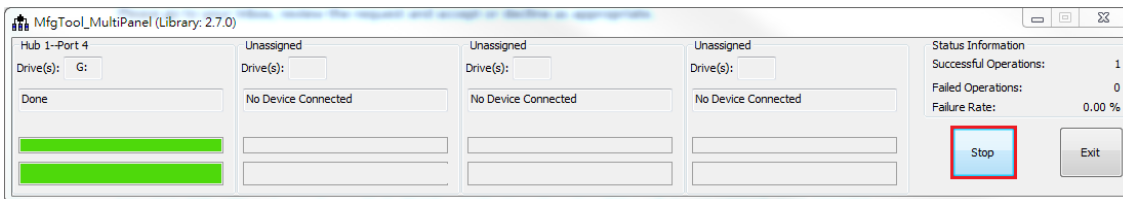| Mode	Description
	OTG load
	eMMC boot
	SD boot

3.3.4 Flash OS to SD card by MFG tool

3.3.4.1 Please enter to MFG-Tools\vbs and execute xxxxxxxxxxx-4.1.15_1.0.0-sd.vbs.
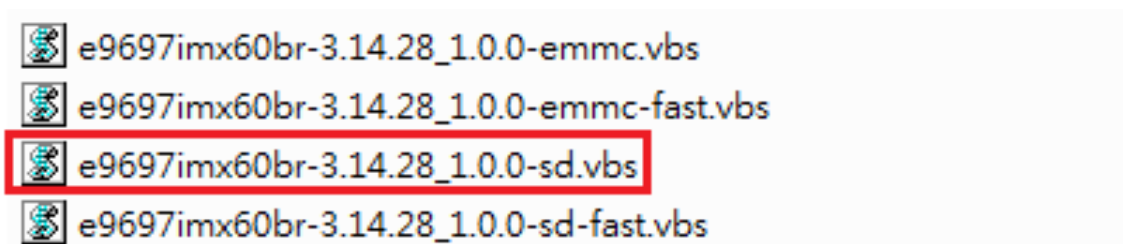
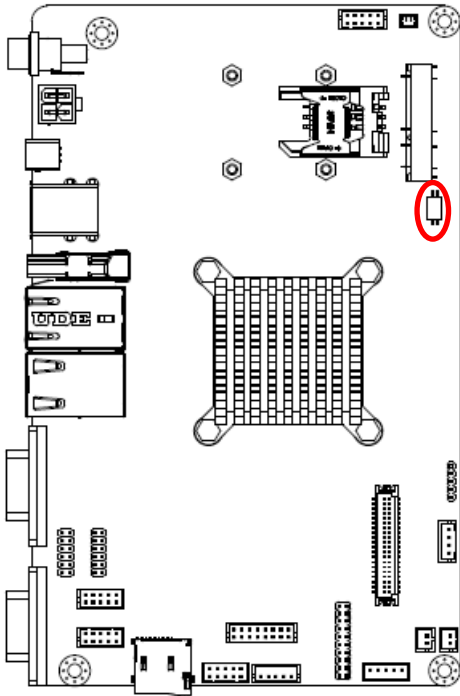After execute xxx-emmc.vbs, please press "Start" to start flash OS.
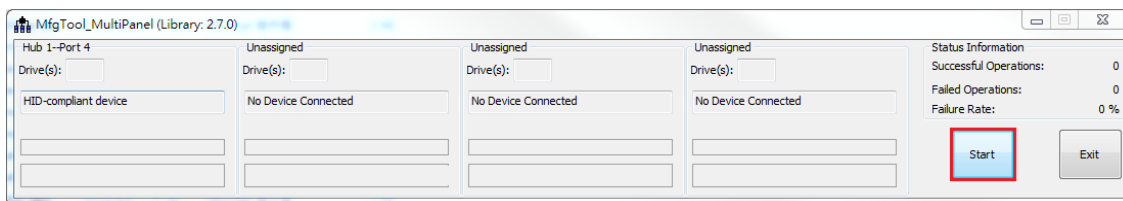
After flash finish, please press "Stop".

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3.3.4.2 Boot to OS from SD card

Set the jumper to "SD boot" and power on to boot to OS.

Mode	Description
	OTG load
	eMMC boot
	SD boot