# ACP-IMX6POS

**Freescale i.MX6 Cortex-A9 Dual Lite/ Quad 1GHz**

# User's manual

**3rd Ed – 11 March 2015**

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## 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

# 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 Module

## 1.3 Document Amendment History

| Revision | Date | Comment |
|----------|------|---------|
| 1$^{st}$ | July 2014 | Initial Release |
| 2$^{nd}$ | November 2014 | Update System Specifications |
| 3$^{rd}$ | March 2015 | Update Block Diagram |

## 1.4 Manual Objectives

This manual describes in detail the Avalue Technology ACP-IMX6POS 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 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 | |
|---|---|
| **CPU** | Freescale i.MX6 Cortex-A9 Dual Lite/ Quad 1GHz |
| **System Memory** | Onboard Up to 1GB(Dual Lite) or 2GB(Quad) DDR3 1066/1333 SDRAM |
| **SSD** | 4~8GB eMMC |
| **G sensor** | Freescale MMA8451 (Optional) |
| **SD Card** | Micro SD Socket x1 |
| **Watchdog Timer** | Freescale i.MX6 Build-in |
| **Expansion** | 1x Mini PCI Express slot (USB signal only)<br>Supported WIFI & 3.5G module<br>SIM card holder onboard<br>Micro SD Socket x1 (in system access window area) |
| **Touch Controller** | Penmount 6000 |
| **RTC** | I2C RTC Intersil ISL1208IB8Z |
| I/O | |
| **Serial Port** | 4 x COM port supported ( 2 x Pin header , 2 x Edge I/O )<br>All Pin 9 supported 5V/12V 1A max output, selected by GPIO.<br>COM1 & 2: RS232/422/485 selected in GPIO, RS232 by Standard.<br>COM3 & 4 Ping header |
| **USB Port** | 1 x dual stack USB 2.0 port<br>1 x USB for USB touch controller<br>1 x USB for mini-PCIe socket<br>3 x USB pin header for optional function<br>USB hub is SMSC USB2517 |
| **Switch** | Pin header for Power Button (The first time auto power on) |
| **Indicator Light** | Front panel right side with PWR/ WIFI/ LAN |
| **Others** | 1 x RJ11 connector for cash drawer<br>(GPO select RJ11 power supply 12V or 24V) |
| Display | |
| **Chipset** | Freescale i.MX6 |
| **Resolution** | Up to 1920 x 1080 |
| **Multiple Display** | VGA + HDMI or LVDS + HDMI<br>VGA signal is converted by Chrontel Ch7055A (Box header) |
| **HDMI** | From Freescale i.MX6 |
| **LCD Interface** | Dual channel 24bit LVDS |

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| | |
|---|---|
| **Audio** | |
| **I2S Codec** | Wolfson WM8962 |
| **Audio Port** | 2Pin Wafer Box P=2.0m x 2 (Speaker out R & L ) (Driver per channel max 2W) |
| **Mic** | 4Pin Wafer Box P=2.0m x 1(Microphone) |
| **Ethernet** | |
| **LAN Chip** | $1^{st}$ LAN => from i.MX6 MAC, PHY is Micrel KSZ9031RNX<br>$2^{nd}$ LAN => Intel 82574L by PCIe interface |
| **Ethernet Interface** | 2 x RJ45 connectors for Dual G LAN |
| **Internal I/O Connectors** | |
| **RTC Battery** | CR2032 Battery with cable |
| **Power ON** | BOX header for Power Button (The first time auto power on) |
| **Reset** | BOX header for Reset Button |
| **Audio** | 2P BOX header x 2 (Speaker out R & L ) (Driver per channel max 2W) |
| **Rear I/O Connectors** | |
| **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 |
| **RJ11** | RJ11 connector x 1 for cash drawer |
| **COM Port** | DB9 male connector x 2 |
| **DC Jack** | Wide range DC 12V to 24V power input by DC Jack connector |
| **Mechanical & Environmental** | |
| **Power Requirement** | TBD |
| **Power Type** | DC 12-24V power input |
| **Operating Temp.** | 0~60 degree C |
| **Storage Temp.** | -40~85 degree C |
| **Operating Humidity** | 12hrs operation dwell time at 40℃/80% Relative Humidity, Non-condensing |
| **Size (L x W)** | 175 x 110mm |
| **Weight** | TBD |

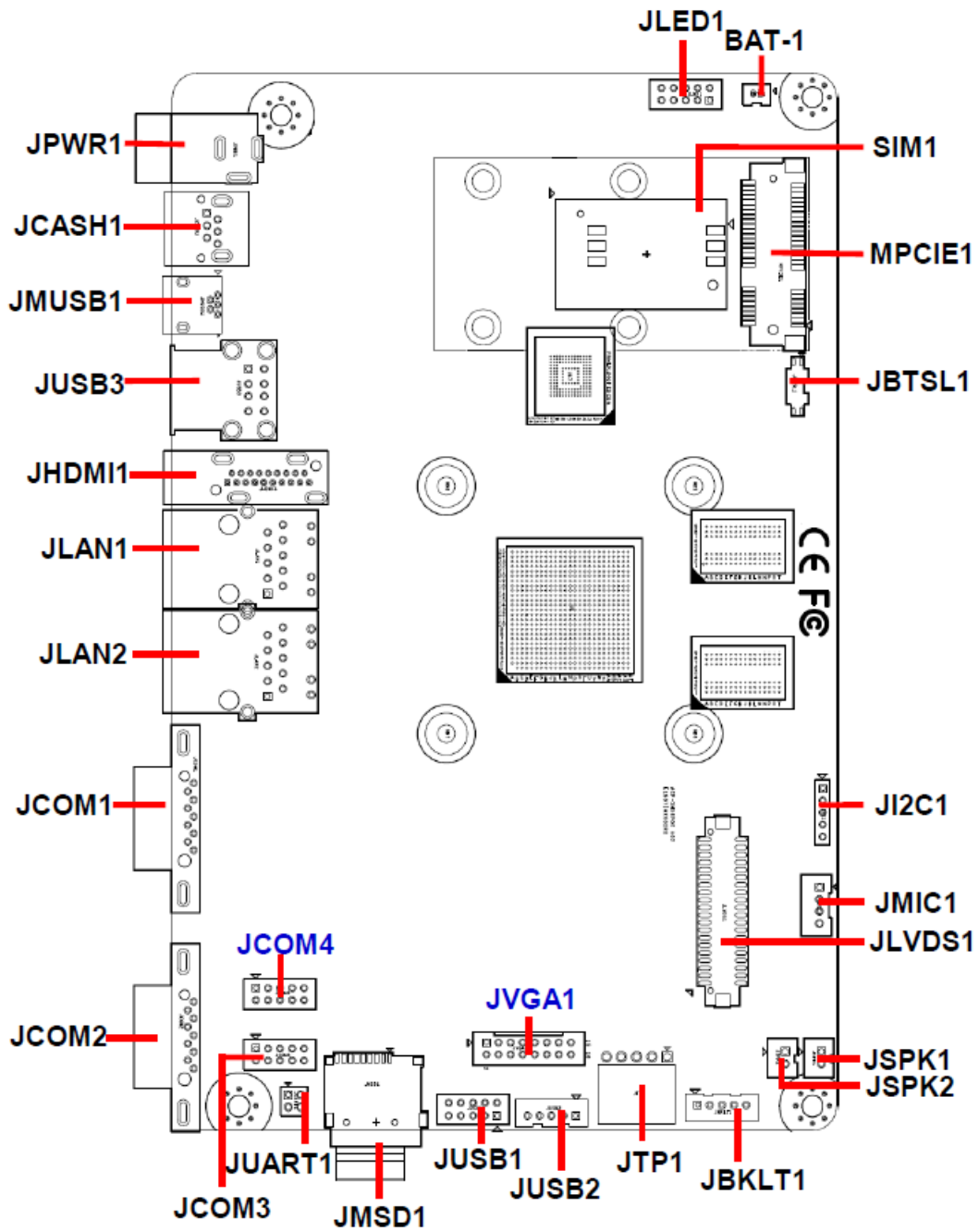**Note:** Specifications are subject to change without notice.

## 1.6 Architecture Overview – Block Diagram

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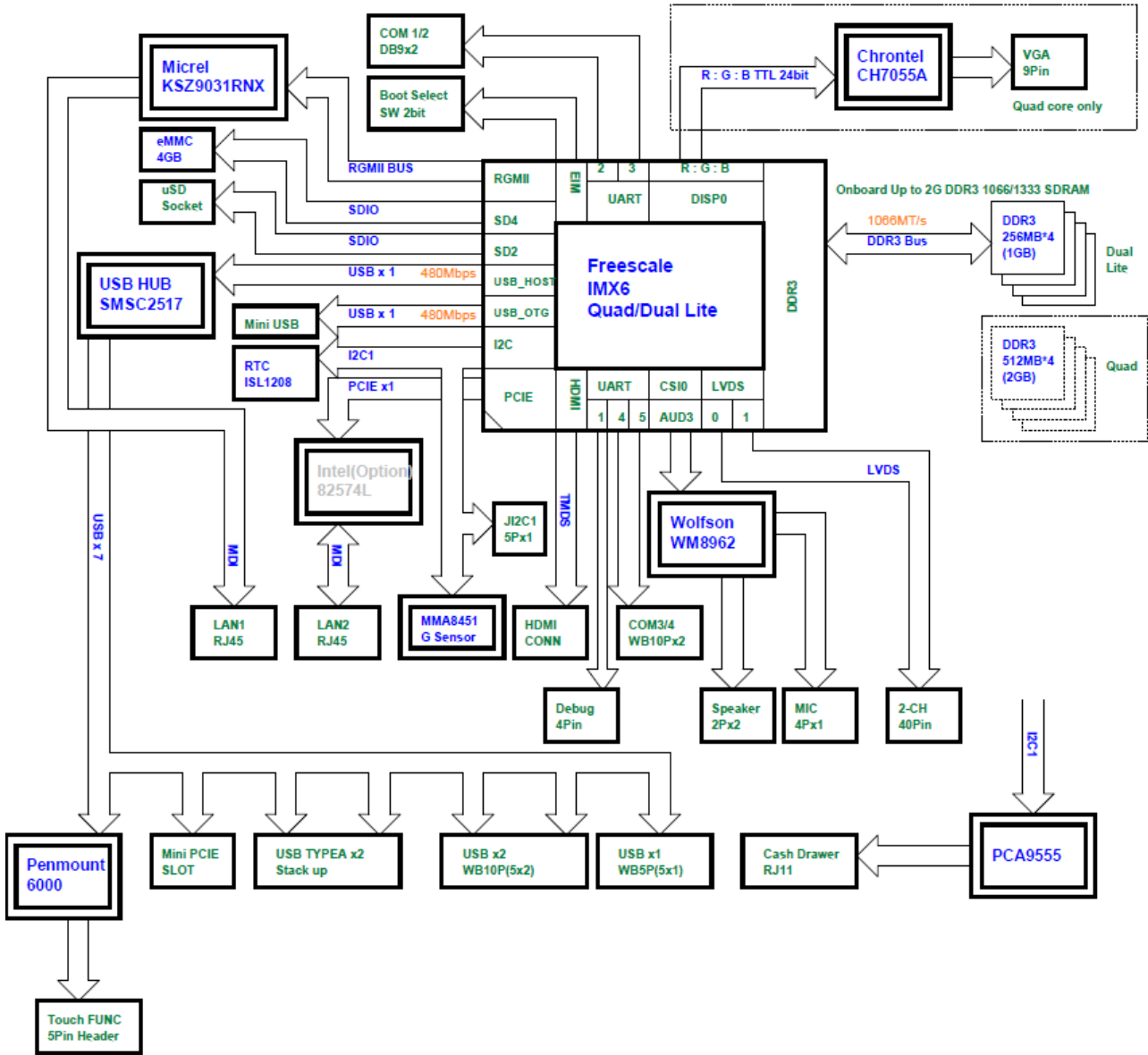
# 2. Hardware Configuration

## 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.
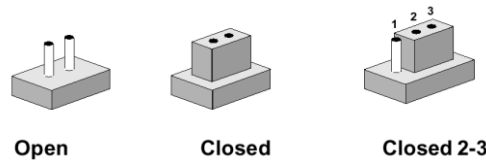


The jumper settings are schematically depicted in this manual as follows:



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 | 3 x 1 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 |
| **JTP1** | Touch Panel connector | 5 x 1 header, pitch 2.54mm |
| **JUSB3** | USB connector 3 | |
| **JUSB1/2** | USB connector 1/2 | 5 x 1 wafer, pitch 2.00mm |
| **JMUSB1** | Mini USB connector for Boot/Debug | MINI USB-MAB_5P |

| | | |
|---|---|---|
| **JPWR1** | DC-IN power connector | Power Jack mini din 4P |
| **MPCIE1** | Mini PCI Express connector | |
| **JCASH1** | Cash Drawer | |
| **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 |
| **JSPK1/2** | Speaker connector 1/2 | 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, Push/Push Type |
| **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 | |
| **JUART1** | Debug UART connector | Debug message output for users development phase only |
| **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)
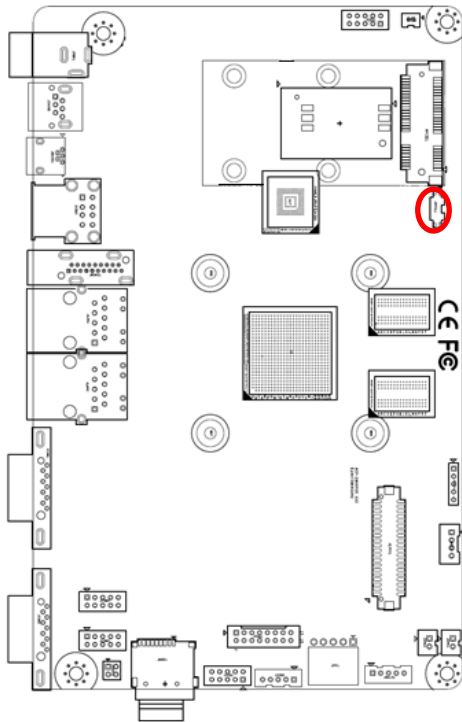


| Mode | Description |
|------|-------------|
|  | OTG load |
|  | eMMC boot |
|  | SD boot |

## 2.3.2    Serial port connector 3/4 (JCOM3/4)
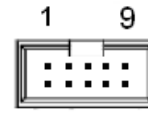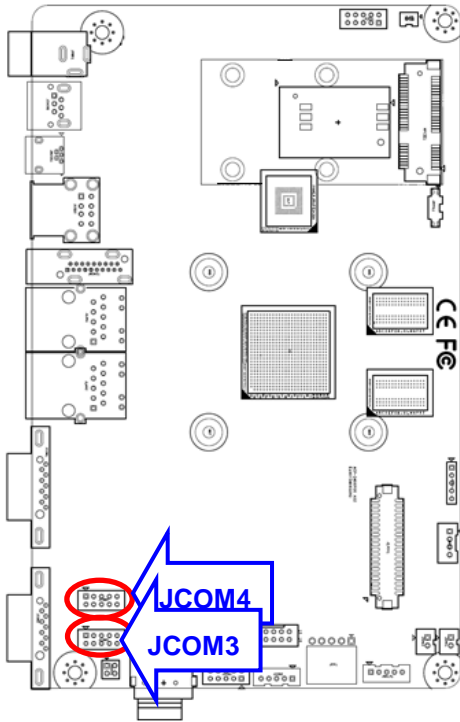
| Signal | PIN | PIN | Signal |
|---|---|---|---|
| COM_DCD# | 1 | 2 | COM_RXD |
| COM_TXD | 3 | 4 | COM_DTR# |
| GND | 5 | 6 | COM_DSR# |
| COM_RTS# | 7 | 8 | COM_CTS# |
| COM_RI_A | 9 | 10 | GND |

## 2.3.3    USB connector 1 (JUSB1)
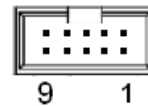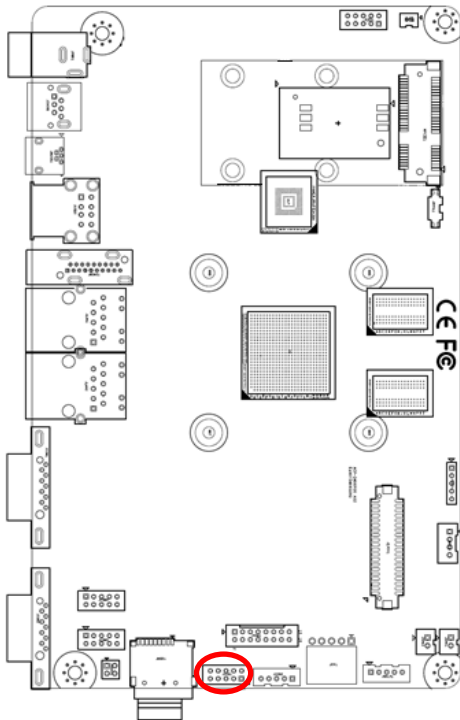
| Signal | PIN | PIN | Signal |
|---|---|---|---|
| +5V | 1 | 2 | +5V |
| USB_NP2 | 3 | 4 | USB_NP1 |
| USB_PP2 | 5 | 6 | USB_PP1 |
| GND | 7 | 8 | GND |
| GND | 9 | 10 | GND |

## 2.3.4 USB connector 2 (JUSB2)
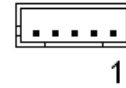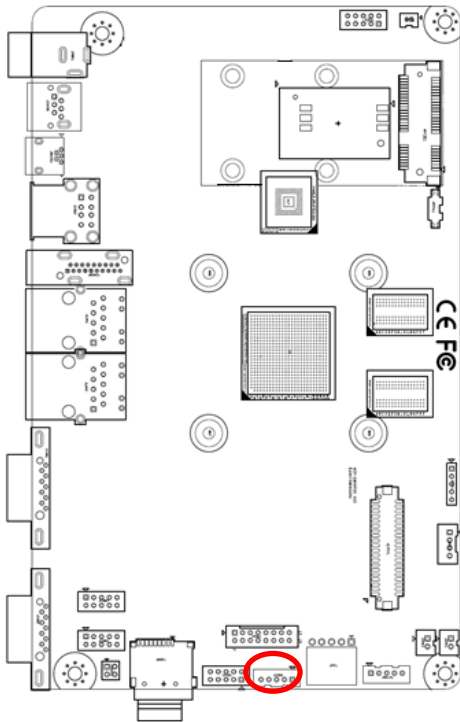


| Signal | PIN |
|--------|-----|
| +5V | 1 |
| USB_NP3 | 2 |
| USB_PP3 | 3 |
| GND | 4 |
| GND | 5 |

## 2.3.5 LED connector (JLED1)
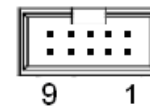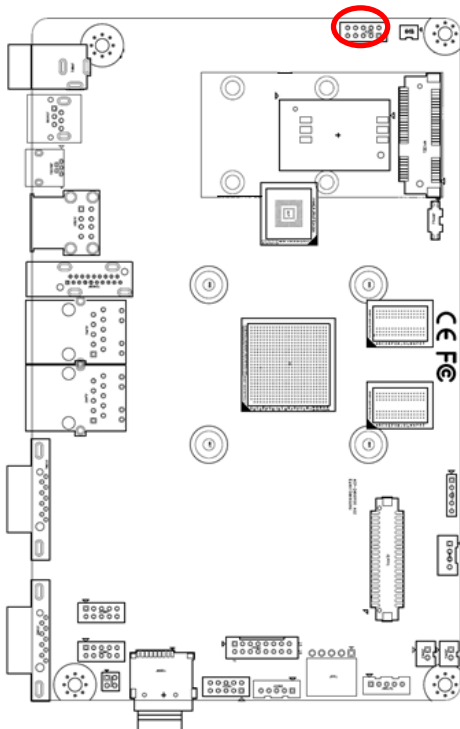


| Signal | PIN |
|--------|-----|
| PWR-LED+ | 1 |
| PWR-LED- | 2 |
| WIFI-LED+ | 3 |
| WIFI-LED- | 4 |
| LAN-LED+ | 5 |
| LAN-LED- | 6 |
| RESET | 7 |
| RESET | 8 |
| ON/OFF | 9 |
| ON/OFF | 10 |

## 2.3.6 Touch Panel connector (JTP1)
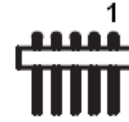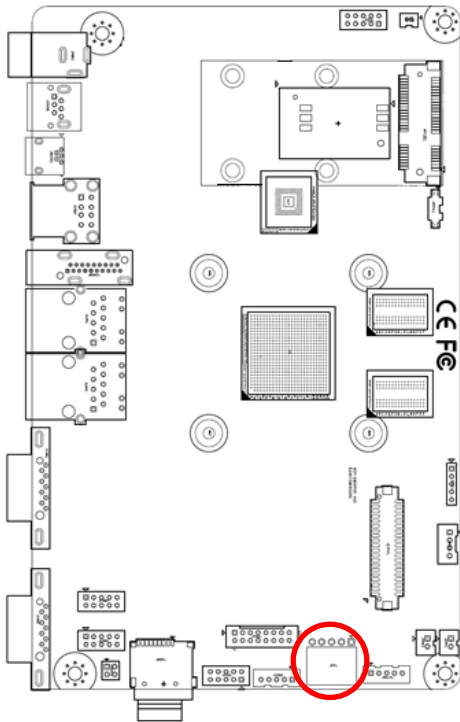




| Signal | PIN |
|--------|-----|
| UL | 1 |
| UR | 2 |
| PROBE | 3 |
| LL | 4 |
| LR | 5 |

## 2.3.7 Speaker connector 1 (JSPK1)
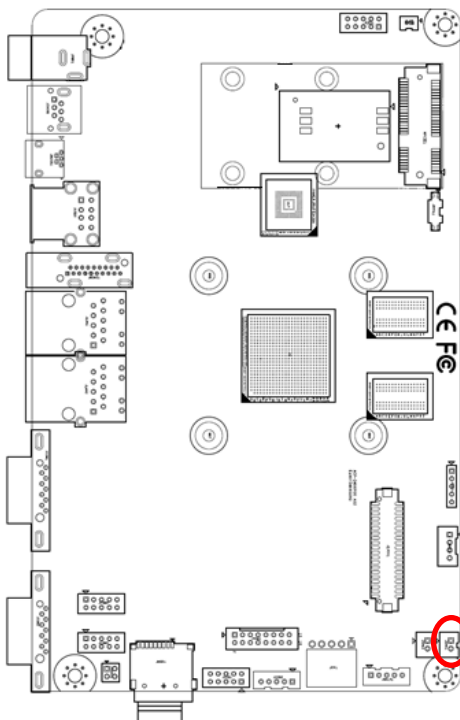




| Signal | PIN |
|--------|-----|
| SPKL_N | 1 |
| SPKL_P | 2 |

### 2.3.8    Speaker connector 2 (JSPK2)
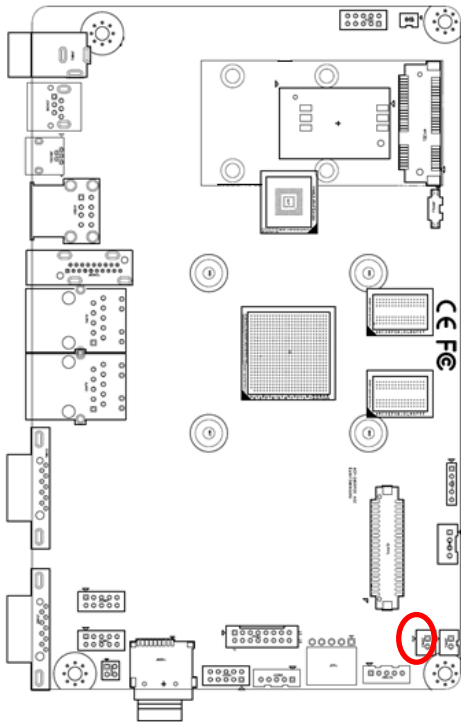
| Signal | PIN |
|--------|-----|
| SPKR_N | 1 |
| SPKR_P | 2 |

### 2.3.9    Line In, MIC connector (JMIC1)
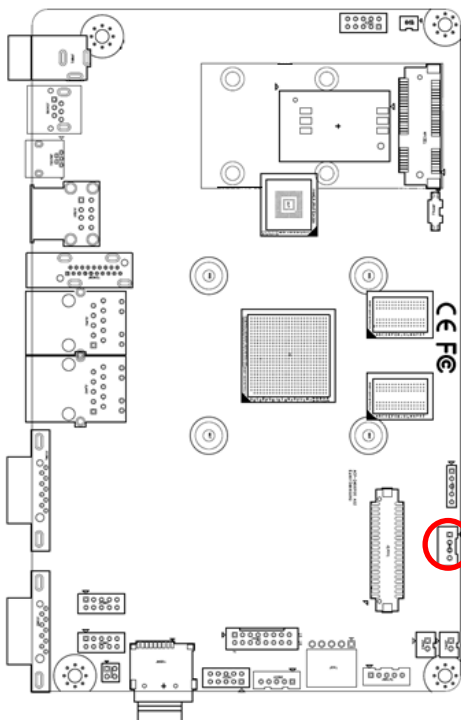
| Signal | PIN |
|--------|-----|
| MIC_DET | 1 |
| MIC_IN | 2 |
| MICBIAS | 3 |
| GND | 4 |

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## 2.3.10 LCD inverter connector (JBKLT1)
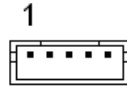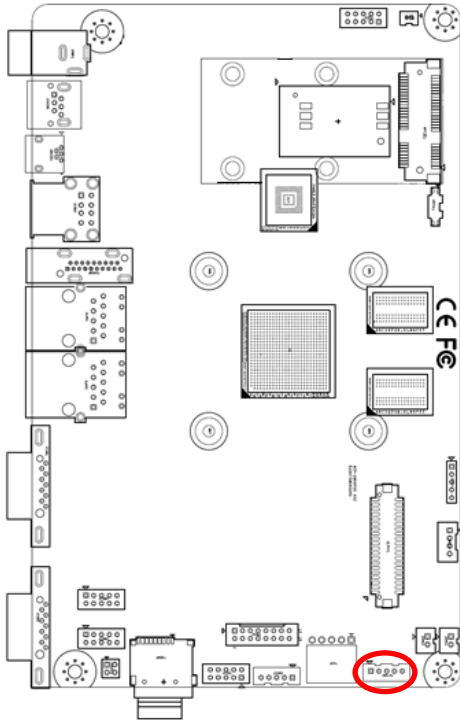


| Signal | PIN |
|---|---|
| +12V | 1 |
| GND | 2 |
| BPEN(3.3V) | 3 |
| BKLCTL(3.3V) | 4 |
| +5V | 5 |

## 2.3.11 VGA connector (JVGA1)
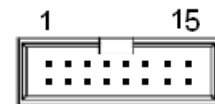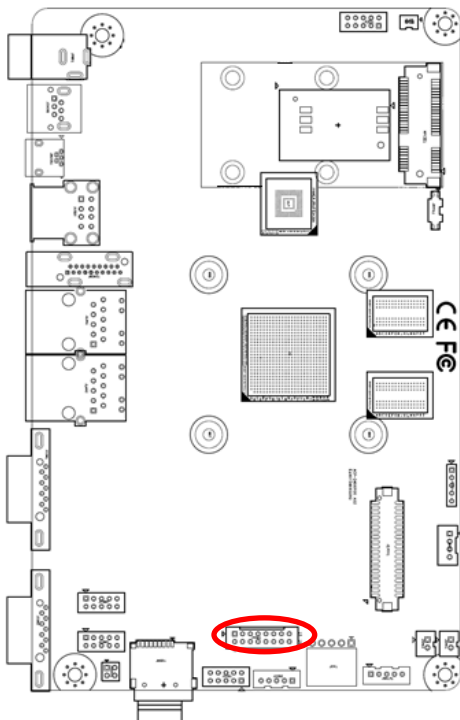


| Signal | PIN | PIN | Signal |
|---|---|---|---|
| +5V | 1 | 2 | VRED |
| GND | 3 | 4 | VGREEN |
| NC | 5 | 6 | VBLUE |
| VDATA | 7 | 8 | NC |
| VHS | 9 | 10 | GND |
| VVS | 11 | 12 | GND |
| VCLK | 13 | 14 | GND |
| GND | 15 | 16 | GND |

### 2.3.12 LVDS connector (JLVDS1)
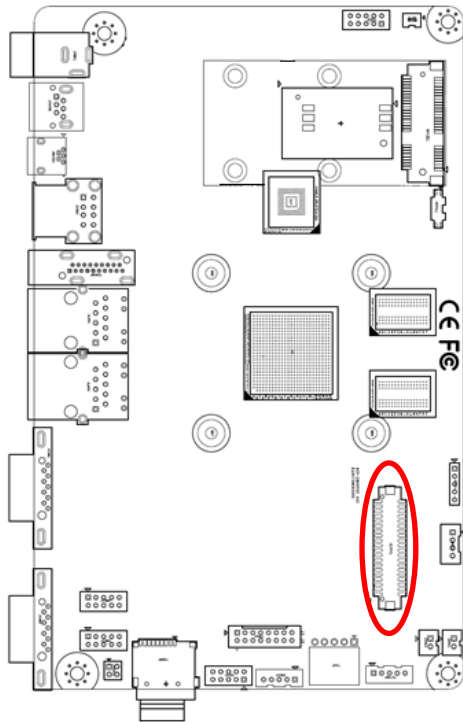
| Signal | PIN | PIN | Signal |
|---|---|---|---|
| +12V | 39 | 40 | +12V |
| GND | 37 | 38 | GND |
| LVDS1_CLK_N | 35 | 36 | LVDS0_CLK_N |
| LVDS1_CLK_P | 33 | 34 | LVDS0_CLK_P |
| GND | 31 | 32 | GND |
| LVDS1_TX3_N | 29 | 30 | LVDS1_TX2_N |
| LVDS1_TX3_P | 27 | 28 | LVDS1_TX2_P |
| GND | 25 | 26 | 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 |

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## 2.3.13 Debug UART connector (JUART1)
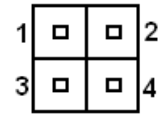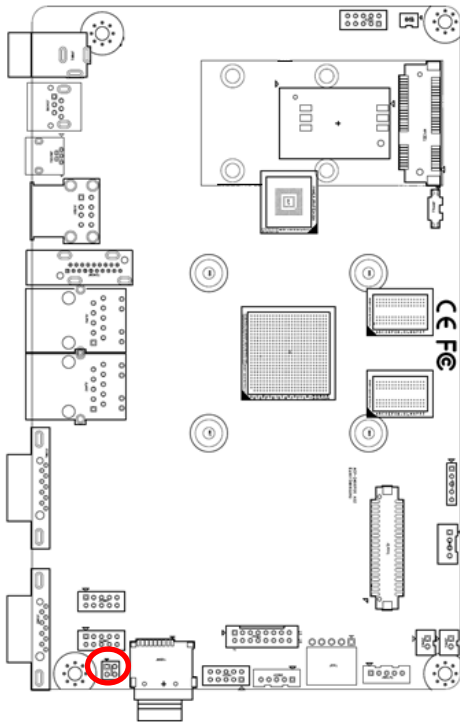
| Signal | PIN | PIN | Signal |
|--------|-----|-----|--------|
| DBG_TX | 1 | 2 | GND |
| DBG_RX | 3 | 4 | GND |

## 2.3.14 Battery holder (BAT-1)
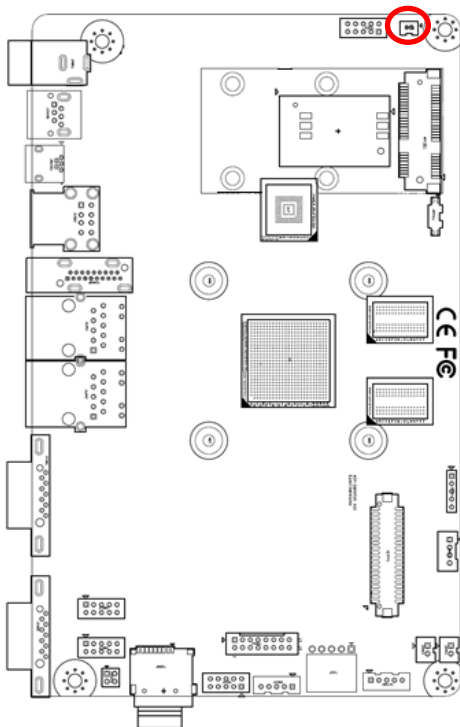
| Signal | PIN |
|--------|-----|
| VBAT | 1 |
| GND | 2 |

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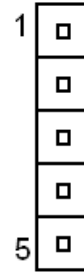
| Signal | PIN |
|---|---|
| CS_+V3.3S | 1 |
| CS_INT# | 2 |
| CS_CLK | 3 |
| CS_DAT | 4 |
| GND | 5 |

# 3. Software User Guide

## 3.1 Download Android Source Code for building image file

Please make a folder for storing the source code first then typing the command below to get started for the source code download.

$ sudo apt-get install git
**$ git clone guest@202.55.227.57:freescale/imx6/Android.git -b 4.4.2-pos**

About Password Please check with Avalue Sales or PM to get password.

## 3.2 Set up for building Android image file

We support to compile u-boot & Kernel on **Ubuntu 12.04** (64bit version), other version of Ubuntu is not currently supported and may have built issues.

Install host packages needed by building code. This document assumes you are using Ubuntu. Not a requirement, but the packages may be named differently and the method of installing them may be different.

1) Please follow up the commands below to install "Oracle JDK6.0" first for building up Android image file.

$ sudo apt-get install python-software-properties
$ sudo add-apt-repository ppa:webupd8team/java
$ sudo apt-get update
$ sudo apt-get install oracle-java6-installer
$ sudo update-alternatives --config java

2) Please follow up the commands below to install the necessary package for build image file.

$ sudo apt-get install git-core gnupg flex bison gperf build-essential \
    zip curl libc6-dev libncurses5-dev x11proto-core-dev gcc g++ \
    libx11-dev:i386 libreadline6-dev:i386 \
    libgl1-mesa-dev g++-multilib mingw32 openjdk-6-jdk tofrodos \
    python-markdown libxml2-utils xsltproc zlib1g-dev:i386 \
    ia32-libs u-boot-tools minicom lib32ncurses5-dev \
    uuid-dev liblzo2-dev libz-dev\

## 3.3 Building up Android image file

You can follow up the steps below to compile Android image file after download the source code.

1. Please move to the folder "Android" then start to compile image file.

```
leo@ubuntu:~/imx6_Android$ ls
Android
leo@ubuntu:~/imx6_Android$ cd Android/
leo@ubuntu:~/imx6_Android/Android$
```

2. Type the command to compile image file.

   $ **./run.sh –j16**

   (**-j number** means multi jobs for more efficiant building, you can add it according to your CPU performance of PC, e.g. mine is "–j16" as below ).

```
~/imx6_Android/Android$ ./run.sh -j16
```

3. You can find the finished image file(**u-boot-6q.bin, u-boot-6solo.bin, system.img, recover.img, boot.img**) as below after compiling on the directory **~/Android/out/target/product/smarc.**

```
leo@ubuntu:~/imx6_Android/Android/out/target/product/smarc$ ls -al
total 314160
drwxrwxr-x  9 leo leo      4096 Jan  2 23:44 .
drwxrwxr-x  3 leo leo      4096 Jan  2 22:09 ..
-rw-rw-r--  1 leo leo        12 Jan  2 22:47 android-info.txt
-rw-r--r--  1 leo leo   4784128 Jan  2 23:34 boot.img
-rw-rw-r--  1 leo leo     29030 Jan  2 22:45 clean_steps.mk
drwxrwxr-x  4 leo leo      4096 Jan  2 23:36 data
-rw-rw-r--  1 leo leo     53886 Jan  2 23:44 installed-files.txt
-rwxr-xr-x  1 leo leo   4593124 Jan  2 22:52 kernel
drwxrwxr-x 14 leo leo      4096 Jan  2 23:44 obj
-rw-rw-r--  1 leo leo       373 Jan  2 22:45 previous_build_config.mk
-rw-rw-r--  1 leo leo    186407 Jan  2 23:34 ramdisk.img
-rw-rw-r--  1 leo leo    701522 Jan  2 23:34 ramdisk-recovery.img
drwxrwxr-x  3 leo leo      4096 Jan  2 23:34 recovery
-rw-r--r--  1 leo leo   5298176 Jan  2 23:34 recovery.img
drwxrwxr-x  8 leo leo      4096 Jan  2 23:33 root
drwxrwxr-x  5 leo leo      4096 Jan  2 23:33 symbols
drwxrwxr-x 12 leo leo      4096 Jan  2 23:33 system
-rw-r--r--  1 leo leo 293601280 Jan  2 23:44 system.img
drwxrwxr-x  3 leo leo      4096 Jan  2 23:19 test
-rwxr-xr-x  1 leo leo    445804 Jan  2 22:47 u-boot-6q.bin
-rwxr-xr-x  1 leo leo    445556 Jan  2 22:46 u-boot-6solo.bin
-rwxr-xr-x  1 leo leo    445804 Jan  2 22:47 u-boot.bin
-rwxr-xr-x  1 leo leo   4593188 Jan  2 22:52 uImage
-rw-r--r--  1 leo leo 134217728 Jan  2 23:37 userdata.img
```

PS: If you would like to use **Mfgtool** for flashing image file into mainboard, you must put all the files **u-boot-6q.bin, u-boot-6solo.bin, system.img, recover.img, boot.img** under the path "**~\POS-Android-MfgTools\Image\POS\Android**" on MFGTool folder for right detected.
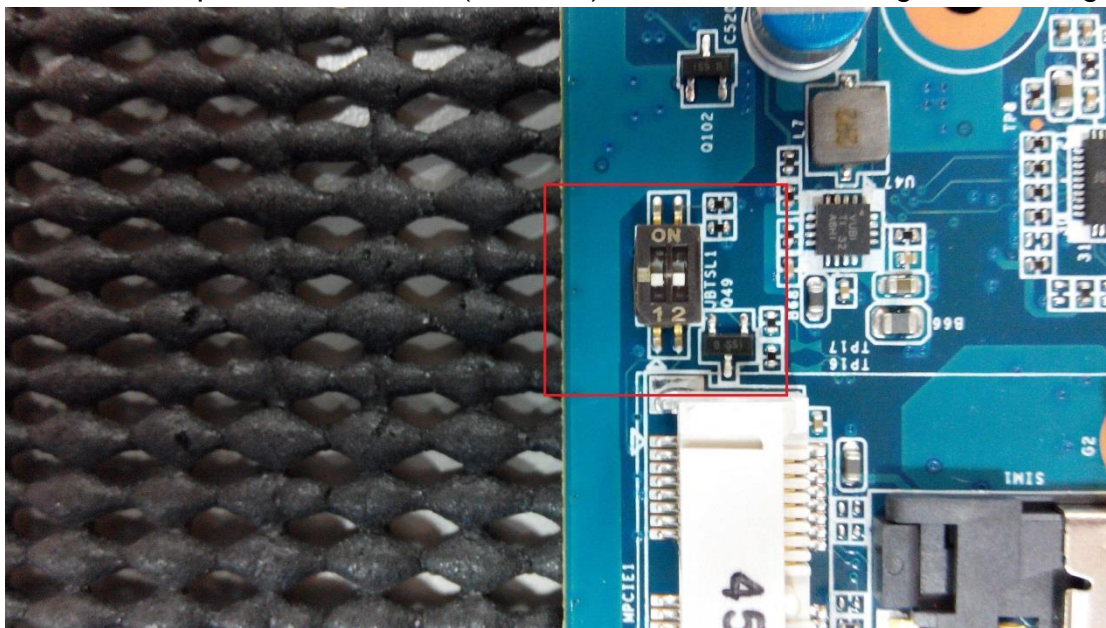
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## 3.4 Use MfgTool to flash Android into onboard eMMC

Manufacturing tool, a successor of ATK, provides a series of new features to power your mass production work. The features like windows style GUI, multiple devices support, explicit status monitoring, versatile functionalities and highly flexible architecture make it a best choice to meet your critical timing, cost and customization requirements.

For using Mfgtool to flash image file into onboard eMMC, please follow up the steps below

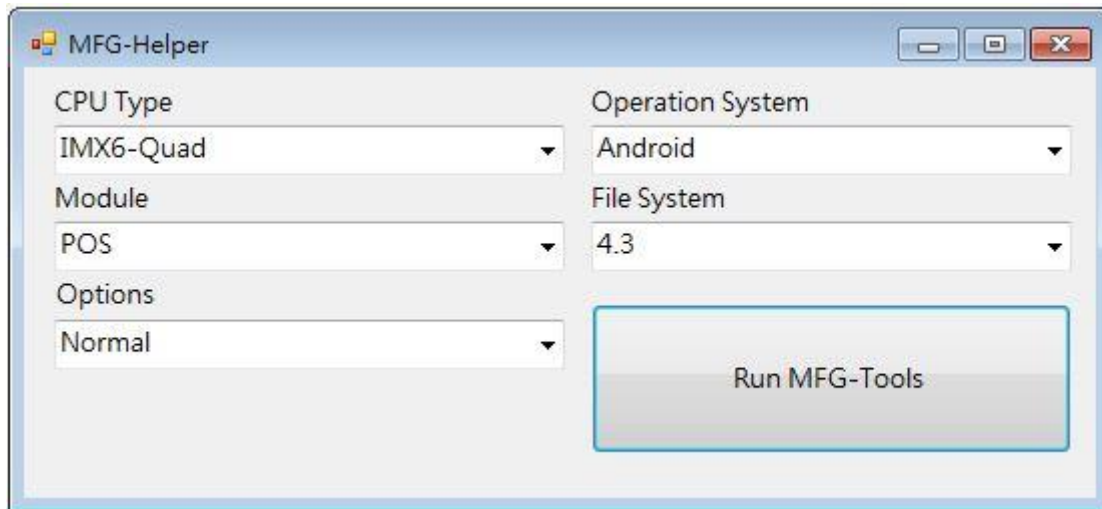1) Please turn off all pins of DIP switch (**JBTSL1**) as below into burning mode of Mfgtool.



2) Power on the mainboard then plug the cable from OTG socket to PC.
3) Please click "**MFG-Helper**" under the path
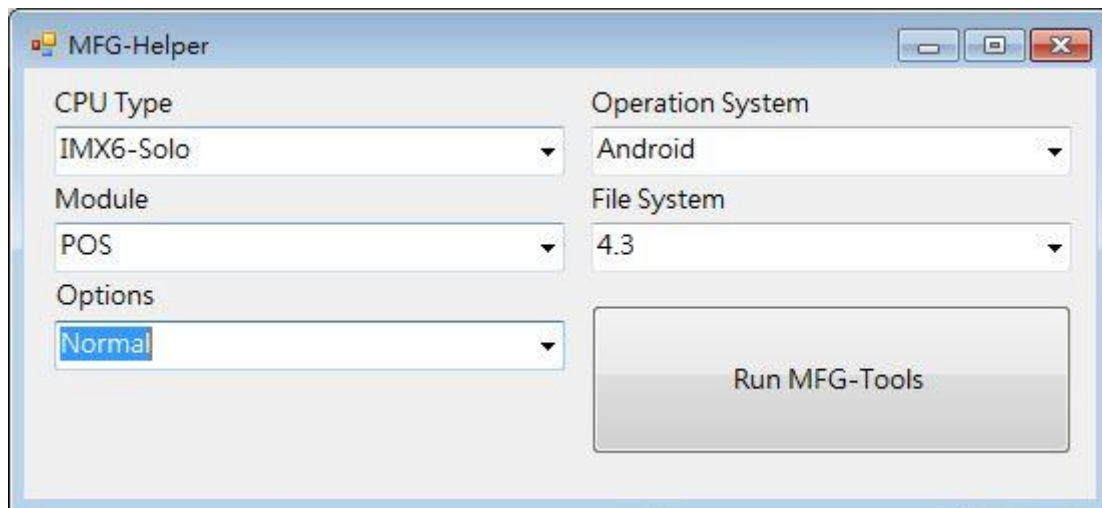   "**~\POS-Android-MfgTools\Mfg-POS\**"
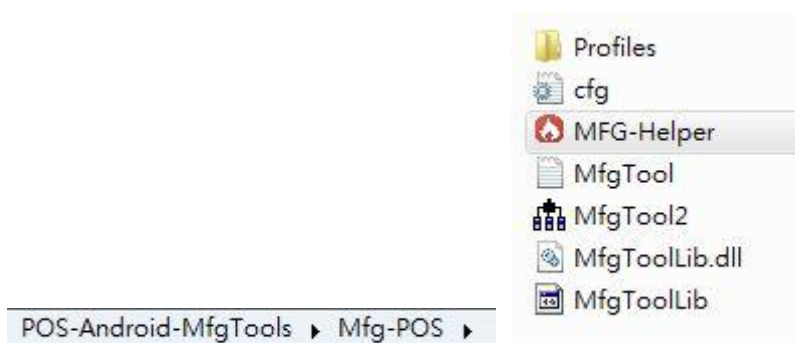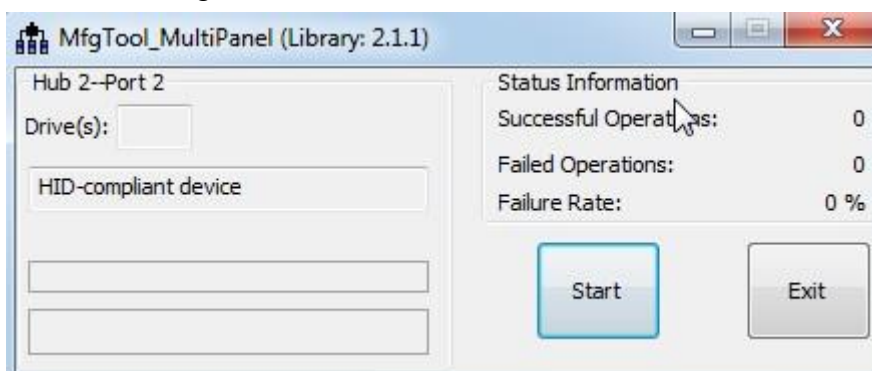
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4) If the CPU of the mainboard is Quadcore version, please select as below, then click "Run MFG-Tools".



4-1) If the CPU of the mainboard is DualLite version, please select as below, then click "Run MFG-Tools".
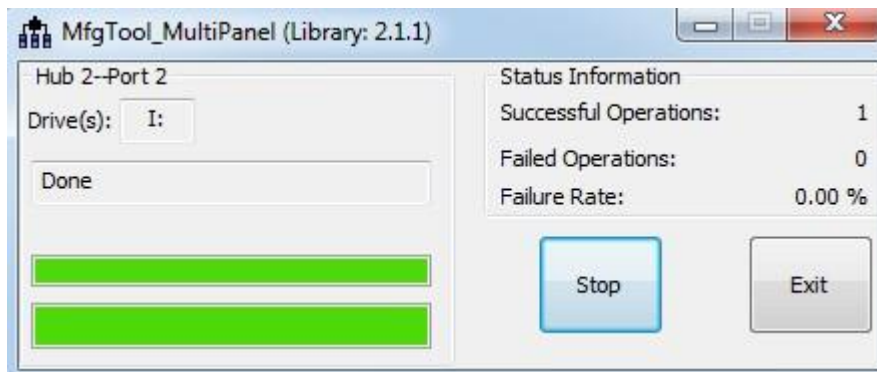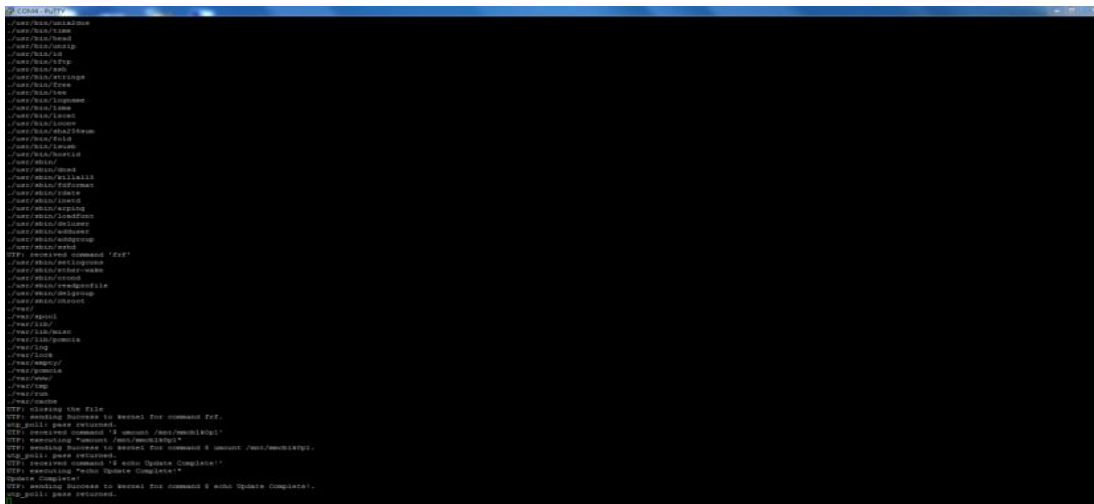


5) Click "**Start**" to flash image file.



6) It will show "Done" after flashing is finish, then click "Stop" and "Exit" to close the screen.



7) You can also get the information from Terminal (debug port→JUART1, baud rate set as **115200**) after flashing is finish



8) Power off the system and turn on pin1 of DIP switch then reboot.