



Single Board Computer On



Qualcomm®
snapdragon

SKATE-212 User Manual

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Revision History

Rev No	Date	Major Changes	Author	Approved & Released By
1.0	21-Jun-2017	Initial release	Hardware/Software team	
2.0	28-Aug-2018	GPS, Boot switch changes	Hardware/Software team	

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For immediate assistance contact us at,

For Sales related Queries : salesEDS@kemsys.com

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Table 1: Abbreviations

SBC	Single Board Computer
LPDDR	Low Power Double Data Rate memory
OTG	On-The-Go
eMMC	embedded Multi-Media Controller
SD Card	Secure Digital Card
RDS	Radio Data System
RBDS	Radio Broadcast Data System
BLE	Bluetooth Low Energy
GPU	Graphics Processing Unit
GPS	Global Positioning System
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
QZSS	Quasi-Zenith Satellite System
DSI	Display Serial Interface
CSI	Camera Serial Interface
TBD	To Be Decided
DNI	Do Not Import
DNP	Do Not Populate
ADB	Android Debug Bridge
GPIO	General Purpose Input/output
RTC	Real Time Clock



SKATE-212 – Qualcomm® Snapdragon™ 212 Single Board Computer

1. Introduction

The new SKATE-212, is a member from Kemsys Technologies SKATE BOARD family of Single Board Computers and is powered by the Qualcomm® Snapdragon™ 212 series application processor (APQ8009). SKATE-212 is an ultra-small (90mm x 70mm) development kit features quad core ARM Cortex A7 class computing with easy access to industry standard I/O's which creates the perfect environment for a variety of Android/Linux based applications including digital signage, industrial automation and video conferencing. Unique features include on-board support for Wi-Fi/BLE, HDMI displays, dual-MIPI-CSI cameras, MIPI-DSI, and RJ45 interfaces.

2. Scope of the document

The purpose of this document is to provide detailed information on using the SKATE-212. It also provides detail on flashing the new binary to the board and other debugging details.

3. SKATE-212 Peripheral Details

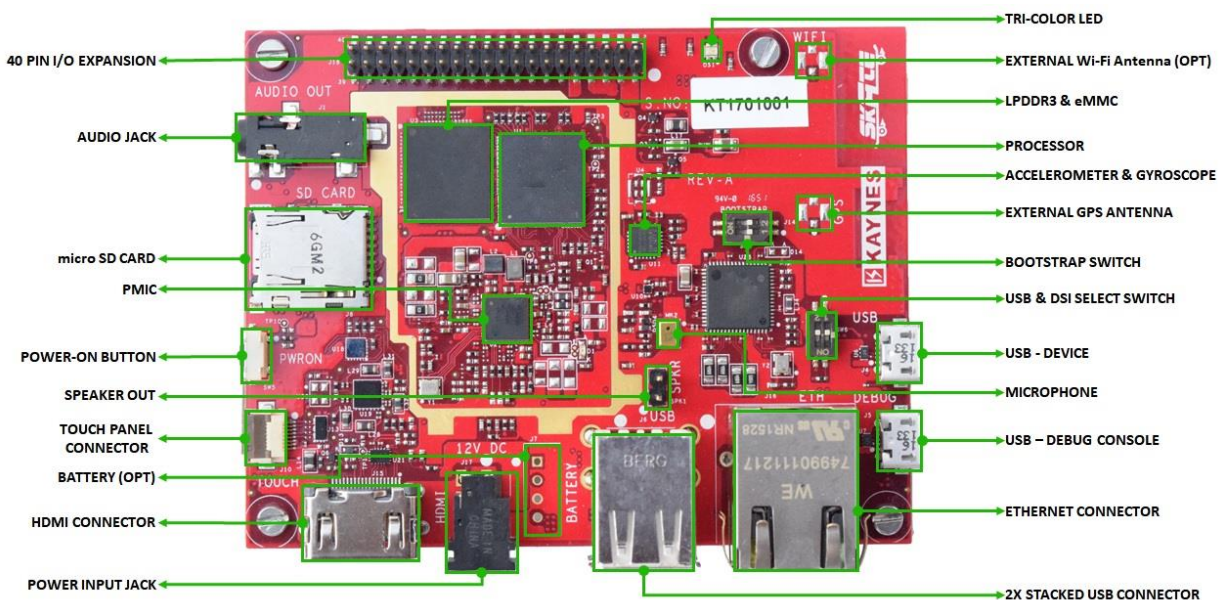


Figure 1: SKATE-212 Peripheral Top View

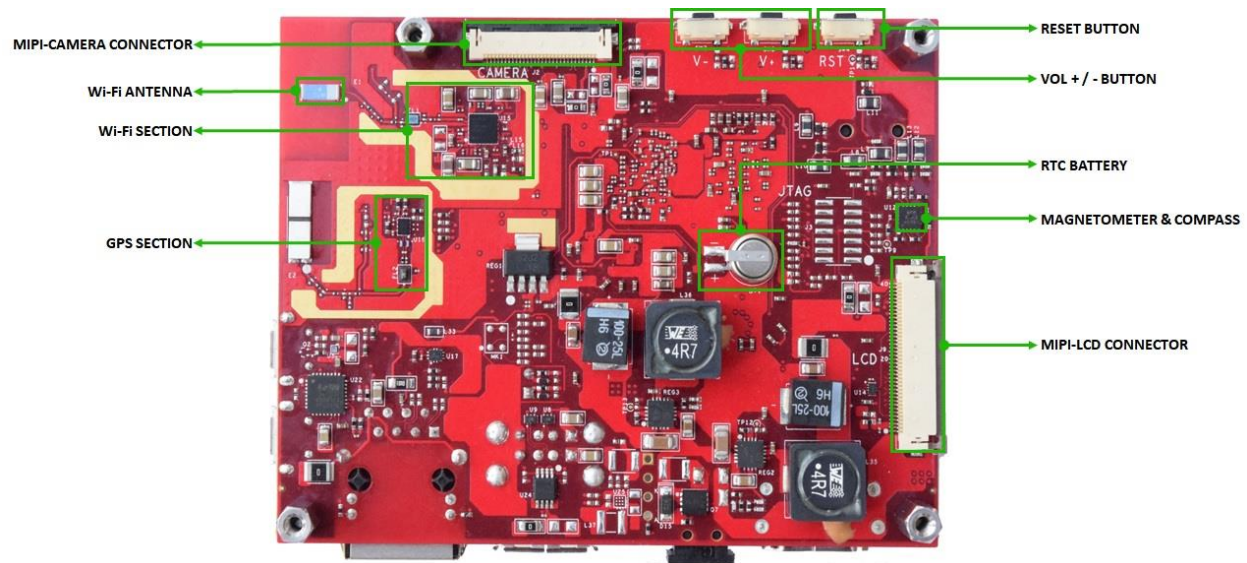


Figure 2: SKATE-212 Peripheral Bottom View

3.1 Handling and Testing

The Skate board is ESD sensitive device, hence safety precautions are mandatory.

1. We recommend you to handle the device under an ESD controlled chamber.
2. Should not touch the development board with a bare hand or dropping on the ground may cause the board permanently damaged.

4. How to setup SKATE-212?

Once the customer gets the SKATE-212 kit, it is recommended to follow the following details to interface power adapter, LCD and micro USB debug cable.

1. Connect the flex cable to the LCD display as shown below. Make sure the blue color of the cable is facing upwards.

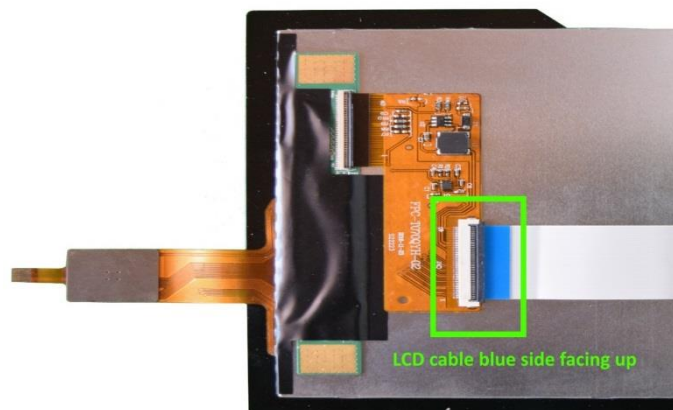


Figure 3: LCD cable connection detail on display

2. Connect the other end of flex LCD cable to SKATE-212 as show below. Make sure the blue color of the LCD cable is facing down while connecting at board side.

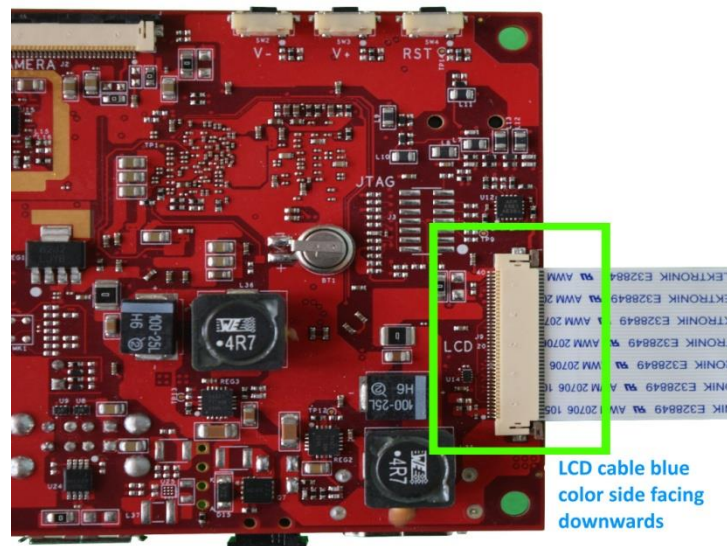


Figure 4: LCD cable connection on SKATE-212

3. Connect the GPS antenna in j14 connector.



Figure 5: GPS antenna connection

4. Connect the DC power adapter rated 12V, 1.5A as received from Kemsys Technologies.

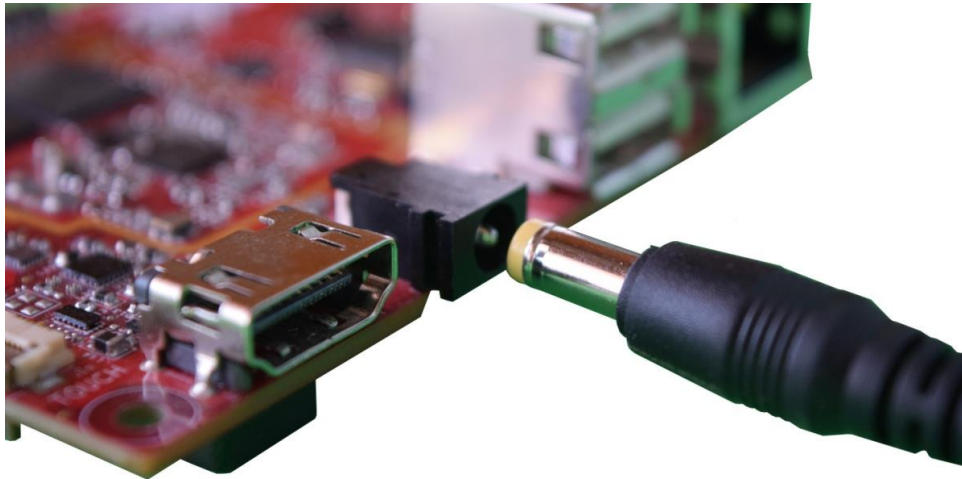


Figure 6: DC jack power adapter connection

5. Additionally debug USB cable can be connected from SKATE-212 to PC for receiving debug logs from device over TeraTerm or Terminal. Make sure the final setup of SKATE-212 is as below.

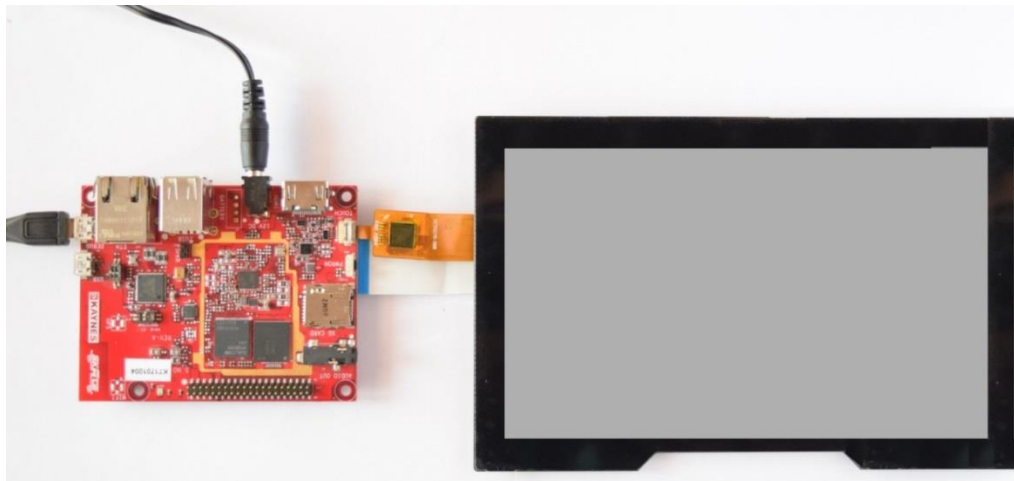


Figure 7: SKATE-212 device setup

6. Once the setup is prepared as specified, power on the device. Device will start to boot, meanwhile the blue LED on board will start to blink and also the debug logs will be printed on debug console. As the device boots, the product logo and boot animation will be displayed.
7. First time boot will take more time, as OS need to setup application and other internals. Once the home screen comes, the device can be accessed through console shell or ADB (for using ADB refer to section 7)

5. DSI display selection Switch

Qualcomm® Snapdragon™ 212 doesn't have an inbuilt HDMI controller. To facilitate, the HDMI interface on our SBC, MIPI – DSI to HDMI bridge convertor has been used. Either direct MIPI-DSI LCD or HDMI can be used at a time.

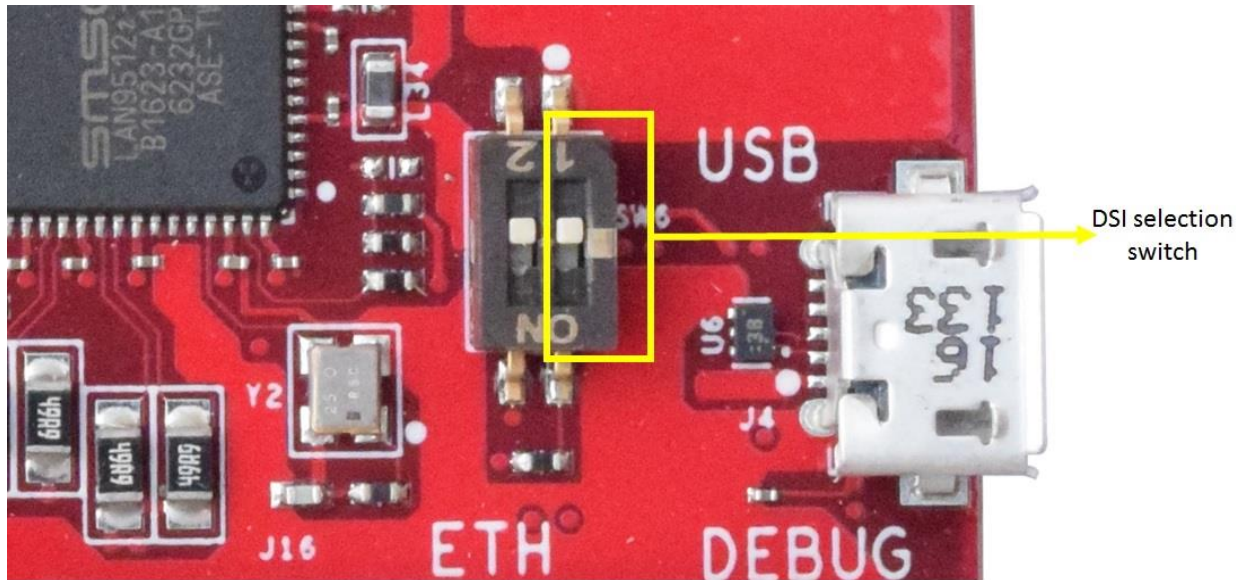


Figure 8: DSI Selection Switch

Table 2: DSI Switch Selection configuration

SW6-1	Display mode
OFF	LCD / HDMI
ON	Forced HDMI

SKATE-212 provides option to select the display either through hardware switch SW6-1 as shown in the image above or based on which display is connected during boot time. It is mandatory to select the required display before the device boot. If HDMI monitor is connected before device is powered on, the device loads HDMI display, else loads LCD display. Hot plug of HDMI is not supported.

6. USB mode Selection Switch

Qualcomm® Snapdragon™ 212 does not have an inbuilt Ethernet controller. To provide Ethernet functionality, the SKATE-212 is modified with a USB to Ethernet & 2X USB host controller. Hence, either USB device or 2X USB host and Ethernet can be used at a time.

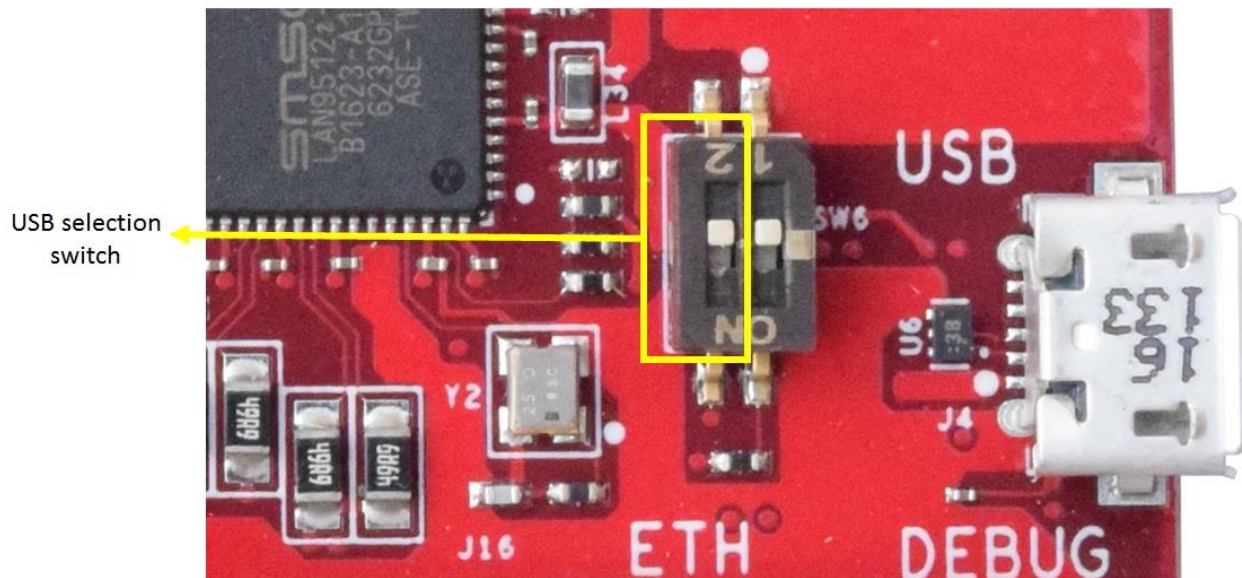


Figure 9: USB SW select

Table 3: USB Switch Selection configuration

SW6-2	USB mode
OFF	High priority USB device mode (for fastboot and adb access)
ON	Forced Eth & 2x USB host

- When SW6-2 is OFF and micro USB port of SKATE-212 connected to PC, the device functions as peripheral mode. With this mode, the device will be accessible for fastboot, adb and MTP from PC. When the cable is removed, the SKATE-212 automatically switches to USB host/Ethernet mode.
- When SW6-2 is ON, the SKATE-212 always works as a USB host mode. User can connect pen drive or access Ethernet functionality.

Note: It is mandatory to remove USB device cable before switching SW6-2, otherwise the switching of device/host will not work.

7. GPS antenna

GPS functionality in SKATE-212 is tested with the following antenna specifications.

Table 4: GPS antenna specifications

Manufacturer	Taoglas Limited
Manufacturer Part Number	FXP612.07.0095A

8. Installing adb and fastboot on host PC

Download the android tools (fastboot, adb) for respective OS (Windows/Linux) from <http://tools.android.com/download>. Extract the content of zip to a folder and follow section 7.1 for Windows and 7.2 for Linux.

On the device side, make sure USB debugging option is enabled in the developer option menu as shown below before using adb.

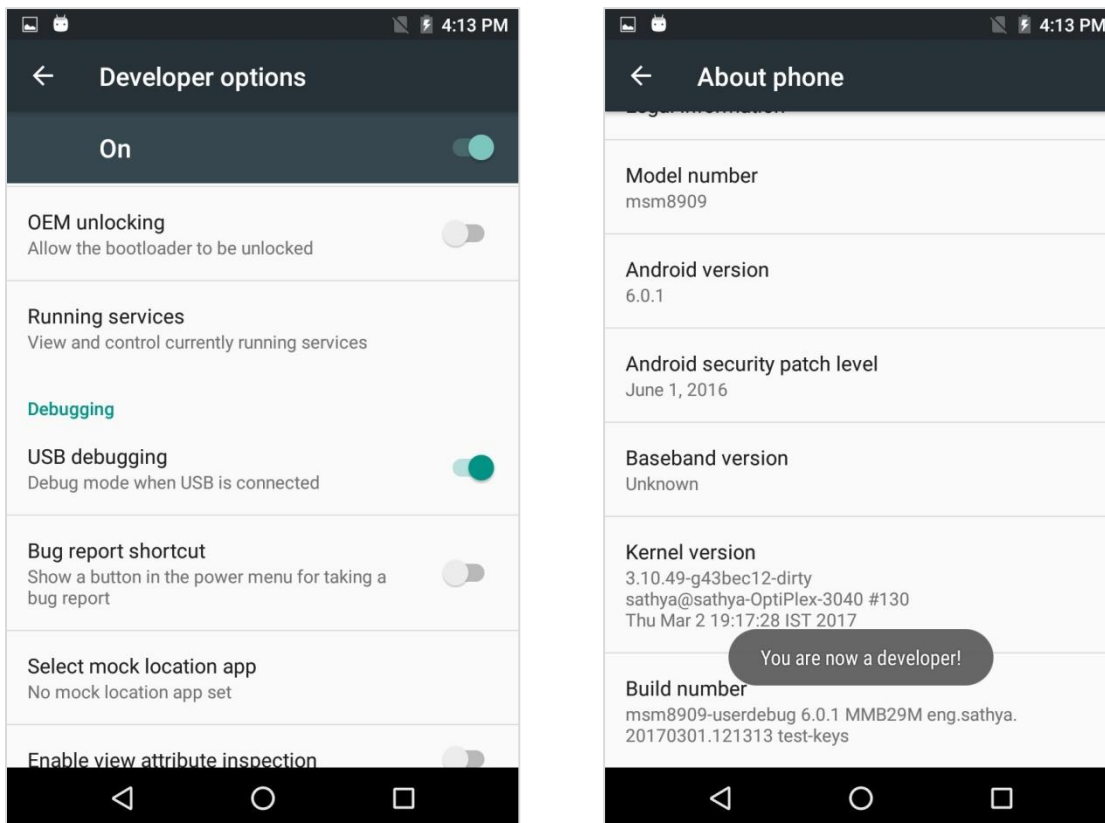


Figure 10: Developer option

8.1 Preparing Windows PC for adb access

Customer is requested to download the adb driver from <http://adbdriver.com/> and install on Windows PC to access the device for adb. After driver installation, open the command prompt and change directory to android tool extracted directory. Run the following command to confirm the device is listed for adb access.

```
adb devices
```

This will list the android devices as shown in the image below.



```
List of devices attached
* daemon not running. starting it now on port 5037 *
* daemon started successfully *
7ae7b05a    device
```

Figure 11: Windows adb devices output

8.2 Preparing Linux PC for adb access

Before using the device, modify the rules of udev for USB device. Follow the below commands and procedure on terminal for make adb access work on Linux PC.

1. Change the directory by entering below command

```
cd /etc/udev/rules.d/
```

2. Enter the below command to open the rules setting file.

```
sudo vi 50-android.rules
```

3. Once the file is opened, type the below lines. DO NOT COPY from document.

```
#Sooner low-level bootloader
SUBSYSTEM=="usb", ATTR{idVendor}=="18d1",
ATTR{idProduct}=="d00d",MODE="0664", GROUP="plugdev"

# adb composite interface device 9025
SUBSYSTEM=="usb", ATTR{idVendor}=="05C6",
ATTR{idProduct}=="9025", MODE="0664", GROUP="plugdev"
```

4. After making the changes, save the file by entering following command.

```
:wq
```

5. Now the SKATE-212 will be listed in `lsusb` command.

6. Run the following command after changing to android tools extracted directory on Terminal

```
adb devices
```

This will list the device connected to PC for adb access.

9. Fastboot support on SKATE-212

Fastboot is a feature that provides user to perform basic flashing and configuration procedures at the bootloader stage.

9.1 Entering to fastboot mode on SKATE-212

To put the SKATE-212 to fastboot mode, press and hold the Volume Down button while powering on the device (refer to section 3 for understanding about peripherals of SKATE-212).

9.2 Supported fastboot commands on SKATE-212

Following are basic fastboot commands supported in Kemsys Technologies SKATE-212 board.

To flash the android partitions, use the following commands for the respective partitions.

```
fastboot flash boot <full_path_of_boot.img>
fastboot flash system <full_path_of_system.img>
fastboot flash userdata <full_path_of_userdata.img>
fastboot flash persist <full_path_of_persist.img>
fastboot flash recovery <full_path_of_recovery.img>
```

Warning: Customer is requested to do the fastboot flashing with caution. If the device is not booting, try the basic troubleshooting steps specified in section 10.

10. Switching to recovery mode

At some time during development, if the user flashed wrong binary to any of the android partitions (like boot, system, persist, userdata), the device will not boot. At that time, the user can recover the device through recovery mode.

In SKATE-212, to put the device to recovery mode, press and hold Volume up button when powering on the device. This will boot the device to recovery mode showing various recovery menus. For further usage on recovery menus, contact salesEDS@kemsys.com.

11. Basic troubleshooting guides

The below table shows various troubleshooting steps that helps customer to do initial check before contacting for support.

S.No	Issue	Troubleshooting guide
1	Display does not come up after powered on.	<ul style="list-style-type: none">- Flash the default deliverable binaries from Kemsys for SKATE-212 through fastboot.- Make sure the LCD is connected properly as shown in section 5.
2	No prints on debug port	<ul style="list-style-type: none">- Make sure micro USB cable is connected to debug USB port marked on the SKATE-212. Refer to figure 7.- Check whether correct COM port is selected at PC side.
3	Blue LED stops blinking after it was blinking	<ul style="list-style-type: none">- Make sure the board is flashed with Kemsys deliverable binary- Connect the debug USB port to PC- Collect the console log from device using Terminal or Teraterm and share to Kemsys team.
4	USB pen drive is not detected	Refer to section 6 to use USB host mode
5	Ethernet network access is functioning	<ul style="list-style-type: none">- Make sure the SW6 is configured as shown in section 6.- Local firewall may block, try ping to local devices.