

Getting Started Guide

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1. Introduction

This document describes how to get started with the MediaTek X20 Development Board using the release build shipped with the boards.

2. New Features

Specifications listed for the MediaTek X20 Development Board include:

- ❖ Processor — MediaTek X20 (4x Cortex-A53 @ 1.4GHz, 4x Cortex-A53 @ 1.95GHz, 2x Cortex-A72 cores @ 2.5GHz); ARM Mali-T880 GPU
- ❖ Memory/storage:
 - 2GB LPDDR3 RAM
 - 8GB eMMC 5.1
 - MicroSD slot
- ❖ Display — HDMI port for up to 1080p @ 30Hz
- ❖ Wireless:
 - 802.11b/g/n/g WiFi
 - Bluetooth 4.1
 - GPS
- ❖ Other I/O:
 - 2x USB 2.0 host ports
 - Micro-USB 2.0 device port
 - 40-pin low-speed expansion connector (UART, 2x I2C, SPI, 12x GPIO, DC power)
 - 60-pin high-speed expansion connector (4-lane MIPI-DSI, 2-lane + 4-lane MIPI-CSI, 2x I2C, USB)
 - 16-pin analog connector for audio and other analog
- ❖ Dimensions — 85 x 54mm (96Boards Consumer Edition form-factor)
- ❖ Operating system — Android 6.0

3. Pre-installed Android Marshmallow

The MediaTek X20 Development Board is ready to use “out of the box” with a pre-installed version of the Android 6.0.

To get started you will need a power supply, an HDMI monitor, a USB keyboard and a USB mouse.

IMPORTANT NOTES

HDMI EDID display data is used to determine the best display resolution. On monitors and TVs that support 1080p (or 2K) this resolution will be selected. This selected mode will work with most but not all monitors/TVs. See below for further information on what to do if your monitor/TV does not display the UI.

There are limitations on the usage of the USB ports on the MediaTek X20 Development Board. Please refer to the Hardware section in the document for further information.

3.1. Power Supply

The MediaTek X20 Development Board requires an external power supply providing 12V at 2A. (The board will also work with 8V or 18V power supplies). It is also possible to power the board from a USB power supply, this is a feature of the MediaTek X20 Development Board.

The MediaTek X20 Development Board uses an EIAJ-3 DC Jack with an outer diameter 4.75mm and a 1.7mm barrel, center pin positive. Please do not use EIAJ-2 plug that has an outer diameter 4.0mm and a 1.7mm barrel which fits to the the EIAJ-3 DC jack but it will have weak ground connection because of smaller diameter and makes the board unstable.

3.2. Monitor

A standard monitor or TV supporting at least 640*480 resolution is required. Interlaced operation is not currently supported. The maximum resolutions currently supported are 1920*1080p. Information on selecting the resolution is provided below.

3.3. USB Keyboard and Mouse

With two USB-A connectors, the MediaTek X20 Development Board can be equipped with a full sized keyboard and mouse.

3.4. Powering up the board

When the power is applied, there are two ways to start up the board, one is by connecting the USB, the other is to press the power button for about 3 seconds. When the board is booting up, the right hand third yellow User LED will light up corresponding to cpu's activity. After a few seconds the Android System UI will appear on the connected HDMI screen and you could start using your MediaTek X20 Development Board.

3.5. Wireless Network

The MediaTek X20 Development Board includes built-in 2.4GHz IEEE802.11 a/b/g/n WiFi networking. The board also supports the 5GHz band. To use the wireless LAN for the first time (or to switch wireless networks), you should click on the wireless LAN icon from the shortcut menu or through the Wi-Fi option in Settings application. The right hand fifth orange LED will light up indicates wireless network activity. You could configure the network through UI.

3.6. Bluetooth

The MediaTek X20 Development Board includes built-in Bluetooth 4.1 LE support.

To setup a Bluetooth device open the Bluetooth Manager from the shortcut menu or through the Bluetooth option in Settings application. Open the bluetooth and it will automatically start to search for devices, you could click on “Refresh” to search for devices again. You could try with your bluetooth audio or bluetooth keyboard/mouse.

The right hand sixth blue LED will light up indicates bluetooth activity.

3.7. Audio Device

Bluetooth audio devices are supported on MediaTek X20 Development Board. Follow normal procedures of connecting a bluetooth device to connect to your board.

NOTE: HDMI audio is also supported in this release.

Once Bluetooth sound sink is connected, you can open the Music player from the Applications UI. Create a playlist from your music files. Supported audio formats are .mp3, .ogg and .wav. You should now be able to play from the Music player.

3.8. Other Useful Information

3.8.1. Installing Applications

Before installing any application to your system, you should allow the installation of applications from unknown sources. You can make it by Security option in Settings Application.

3.8.2. File System

MediaTek X20 Development board comes with 8GB for eMMC size.

3.8.3. File System Tri-Cluster Deca-Core

- ❖ Two 2.3-2.5GHz A72 core, responsible for showing the highest performance.
- ❖ Four 1.95GHz A53 core, responsible for balancing performance and power consumption.
- ❖ Four 1.4GHz A53 core, responsible for the low load tasks and power saving.

4. Updating the OS

4.1. Code download path

Updates to 96Boards supported operating systems will be made available at:
(We'll provide the download path later.)

4.2. Compiled method

Step 1. Enter into the root directory of the board code:

```
$ source build/envsetup.sh
```

Step 2. Version information:

full_XXXX-eng for eng version

full_XXXX-userdebug for debug version

full_XXXX-user for user version

```
$ lunch full_XXXX-eng
```

Step 3. Build options:

3.1 Build all

```
$ make -j$(processes number)
```

3.2 Build preloader

```
$ make pl -j$(processes number)
```

3.3 Build lk

```
$ make lk -j$(processes number)
```

3.4 Build kernel

```
$ make kernel -j$(processes number)
```

3.5 Make boot image package

```
$ make bootimage -j$(processes number)
```

3.6 Build android and make system image

```
$ make systemimage -j$(processes number)
```

4.3. Download Images

4.3.1. Necessary Condition

You need prepare 6 components(windows):

- ❖ xflash.exe(win) / xflash(linux)
- ❖ Normal load(Include image files and scatter file etc.)
- ❖ Special images and scatter file
- ❖ lib.cfg.xml
- ❖ fastboot.exe(win) / fastboot command(linux)
- ❖ fastboot command script file

4.3.2. Flash Tool access path

`\vendor\mediatek\proprietary\system\core\xflash`

4.3.3. How to build special images

Execute following commands, build system will automatically create FES folder and come out the special lk.bin, where FES store the needed files for xflash download to target before entering fastboot mode.

```
$ source build/envsetup.sh
```

```
$ lunch full_amt6797_64_open-eng
```

```
$ make -j16 PLATFORM_FASTBOOT_EMPTY_STORAGE=yes -k 2>&1 | tee build.log
```

Then, you can find a folder named FES.

PATH: `\out\target\product\amt6797_64_open\FES`

4.3.4. Download

4.3.4.1. Windows Prepare

- ❖ xflash.exe
`\xflash\bin\win\xflash.exe`
- ❖ Normal load(Include image files and scatter file etc.)
You can put it in anywhere, eg, `\xflash\bin\win\img`
- ❖ Special images and scatter file
You can put it in anywhere, eg, `\xflash\bin\win\FES`. How to build it?
Please see “How to build special images”.
- ❖ lib.cfg.xml

\xflash\bin\win\config

- ❖ fastboot.exe
 \xflash\bin\win, you should put it in normal load folder.
- ❖ fastboot command script file
 Written by yourself, you should put it in normal load folder.

eg: fastboot command script file named xflash.bat

fastboot devices

fastboot flash recovery recovery.img

fastboot flash userdata userdata.img

fastboot reboot

4.3.4.2. Windows Download

Step 1. Make a device to enter fastboot mode

- Prepare special images and corresponding scatter file.
- Run program in command line mode like this:
 xflash.exe enter-fastboot "G:\xflash\bin\win\FES\MT6797_Android_scatter.txt"

```
G:\xflash\bin\win>xflash.exe enter-fastboot "G:\xflash\bin\win\FES\MT6797_Android_scatter.txt"

START.
wait for device.
```

- Then plug in usb to device.
- Xflash will scan and open device COM port and connect it, download some necessary images to devices, then make device to enter fastboot mode.

```
connect boot rom.
boot from preloader.
download required partition images.
#1 write to lk
#2 write to logo
#3 write to tee1
jump to: tee1
END.
```

Step 2. Run fastboot command script file

- You need write a download script.
 Such as xflash.bat
 fastboot devices
 fastboot flash gpt PGPT
 fastboot flash preloader preloader_amt6797_64_open.bin
 fastboot flash recovery recovery.img
 fastboot flash scp1 tinysys-scp.bin
 fastboot flash scp2 tinysys-scp.bin
 fastboot flash lk lk.bin

```
fastboot flash lk2 lk.bin
fastboot flash boot boot.img
fastboot flash logo logo.bin
fastboot flash tee1 trustzone.bin
fastboot flash tee2 trustzone.bin
fastboot flash system system.img
fastboot flash cache cache.img
fastboot flash userdata userdata.img
fastboot reboot
```

- Run the download script, download success.

4.3.4.3. Linux Prepare

- ❖ xflash
 \xflash\bin\linux\xflash
- ❖ Normal load(Include image files and scatter file etc.)
 You can put it in anywhere, eg, \xflash\bin\linux\img
- ❖ Special images and scatter file
 You can put it in anywhere, eg, \xflash\bin\linux\FES. How to build it?
 Please see “How to build special images”.
- ❖ lib.cfg.xml
 \xflash\bin\linux\config
- ❖ fastboot
 If your OS doesn't support fastboot command, pls install this command first.
- ❖ fastboot command script file
 Written by your self, you should put it in normal load folder.

4.3.4.4. Ubuntu Download

Step 1. Make a device to enter fastboot mode

- Prepare special images and corresponding scatter file.
- Run program in command line mode like this:
 sudo ./xflash enter-fastboot "**/xflash/bin/win/FES/MT6797_Android_scatter.txt"
- Then plug in usb to device.
- Xflash will scan and open device COM port and connect it, download some necessary images to devices, then make device to enter fastboot mode.

Step 2. Run fastboot command script file

- You need write a download script.
 Such as xflash.sh
 #!/bin/bash

 fastboot devices
 fastboot flash gpt PGPT
 fastboot flash preloader preloader_amt6797_64_open.bin

```
fastboot flash recovery recovery.img
fastboot flash scp1 tinysys-scp.bin
fastboot flash scp2 tinysys-scp.bin
fastboot flash lk lk.bin
fastboot flash lk2 lk.bin
fastboot flash boot boot.img
fastboot flash logo logo.bin
fastboot flash tee1 trustzone.bin
fastboot flash tee2 trustzone.bin
fastboot flash system system.img
fastboot flash cache cache.img
fastboot flash userdata userdata.img
fastboot reboot
```

- Run the download script, download success.

5. Board Recovery

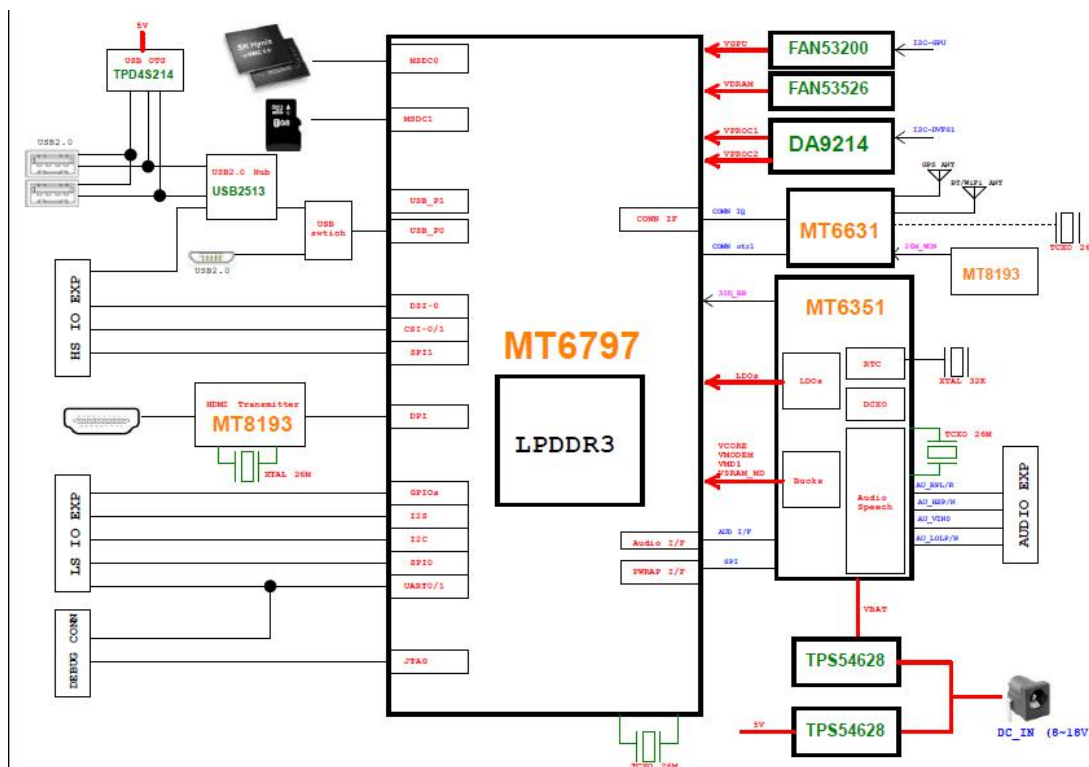
For most users, a board could be “recovered” from a software failure by reloading the operating system using the instructions provided above.

6. Hardware Notes

6.1. Schematics and Hardware Manual

❖ Schematics

Please refer to the document *MediaTek X20 Development Board-SCH.pdf* for the details.



❖ Hardware Manual

Please refer to the document *MediaTek X20 Development Board-Hardware Manual.pdf* for the details.

6.2. CPU Load

The current supplied Linux 3.18-based kernel supports the thermal protection framework and DVFS. If the thermal setpoint of the SoC is reached, the 2*A72/2.5GHz will reduce the core frequencies intelligently or shut down to reduce the power consumption. In an extreme case thermal shutoff will occur if DVFS has not been effective at reducing the SoC temperature to an acceptable level.

Higher performance may be obtained by using forced air (fan) cooling on the MediaTek X20 Development Board.

6.3. HDMI Port

The HDMI port on MediaTek X20 Development Board supports TVs and Monitors with an HDMI interface at display resolutions of 1920*1080 pixels down to 640*480 pixels. Note that interlaced display modes are not currently supported. **The mobile SoC used on the MediaTek X20 Development Board does not have sufficiently flexible clocking arrangements to support all possible HDMI timings specified by monitors.**

Note also that these modes are preferred and will be tried (in this order) first if they exist in EDID:

Resolution	Ratio	Usually on
1920*1080	16:9	TV
1280*720	16:9	TV
720*480	4:3	Monitor

6.4. USB Ports

There are multiple USB ports on the MediaTek X20 Development Board:

- ❖ One microUSB OTG port on the front edge of the board
- ❖ Two Type A USB 2.0 host ports on the front edge of the board
- ❖ One USB 2.0 host port on the high-speed expansion bus

Please read the document *MediaTek X20 Development Board-Hardware Manual.pdf* for more information on the following hardware restrictions:

- ❖ The microUSB OTG port may be used (in host or slave mode) or the Type A host ports may be used. They may not both be used simultaneously. If a cable is inserted into the OTG port then the Type A ports and the expansion bus port will be automatically disabled.
- ❖ For the microUSB OTG port a single Low Speed (1.5Mbit/sec), Full Speed (12Mbit/sec) or High Speed (480Mbit/sec) device is supported.
- ❖ For the USB host ports all attached USB devices must be one of the following two options:
 - Low Speed (1.5Mbit/sec) and Full Speed (12Mbit/sec) devices, or
 - High Speed devices (480Mbit/sec)

If a mixture of High Speed and Low/Full speed devices are attached the devices will not operate correctly. This also applies if any hubs are attached to the ports.

The reason for this limitation is that USB 2.0 split transfers are not supported by the mobile-targeted SoC hardware USB implementation.

In order to address this limitation the USB ports are by default configured into Low/Full speed operation.

A switch is provided to change between USB 2.0 and USB Hub.

7. Known Issues

The following are known issues on the current release.

1. Not Yet Supported

- ❖ Expansion bus audio. (At present Bluetooth audio and HDMI are supported)
- ❖ Some video formats are not decoded in Android, and will not be played with the current release.
- ❖ HDMI display sometimes goes off when in AOSP.

2. Apple Bluetooth Keyboards/Mice/Trackpads do not work.

This is under the current investigation.

3. Hot plugging an SD card may not work on some UHS class 1 SD cards on AOSP build.

4. Display sleep may not always work on AOSP build.

8. Appendices Information

The MediaTek X20 Development Board has the forum on 96boards.org, the forum site is: <http://www.96boards.org/forums/>. And you also could use the forum of itself, the forum site is: <http://net.njerp.com/discuss/>. If you can't find a pre-existing thread that addresses your issue, start your own and let the community help out!

To report new issues with the MediaTek X20 Development Board, please commit it directly on the forum site.