eMMC Booting Guide

SD/MMC/eMMC_Boot_GUIDE_V1.0B

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Telechips

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Revision History

Date	Version	Description
2012.03.03	1.0A	Android Ice-cream Sandwich Initial Release
2012.04.19	1.0B	Partition layout change and ums support
2012.05.20	1.0C	FWDN and fastboot erase eMMC

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1 Introduction

This document describes how to configure for eMMC booting in Telechips Android Platform

1.1 Remarks

1. Must have to use FWDN V2.22 or higher version
2. MTP mode not supported
3. SD Erase does not Support, only support eMMC

2 SD/MMC(eMMC) Booting

2.1 Prepare download images

2.1.1 How to configure eMMC or SD boot mode in bootloader

Support two kind of boot mode. Those are SD/MMC boot mode and eMMC boot mode(eMMC Spec 4.4x). SD/MMC Boot mode use various SD,MMC cards. eMMC boot mode is also available for eMMC compatible cards.

To select eMMC boot or SD/MMC boot, please change default built script in bootloader
When you open FEATURE_SDMC_MMC43_BOOT, boot mode is eMMC boot mode. The opposite is SD Boot mode. Default Mode is set to SD Boot mode

!Caution: eMMC Boot mode use the boot partition included in eMMC Specification. But each eMMC manufacturers configure this partition size and this partition size is different between each eMMC Manufactures. So if you want to use eMMC Boot mode, you must have to check this partition size. If boot partition size less than 1MB. It can't use for boot partition. We use boot partition for bootloader and bootloader size is more than 512KB. So please check boot partition size before you decide to use or not.

Location : bootable/bootloader/lk/platform/tcc892x/rules.mk

```
27 ##########################################
28 ##SDMMC DEFINES
29 ##########################################
30 DEFINES += BOOTSD_INCLUDE
31 DEFINES += BOOTSD_BOOT_INCLUDE
32 DEFINES += BOOTSD_KERNEL_INCLUDE
33 #DEFINES += FEATURE_SDMMC_MMC43_BOOT
```

2.2 Make boot-loader for SD/MMC or eMMC booting

1. Change Directory to LK Boot loader

```
$ cd bootable/bootloader/lk
```

2. Compile Boot Loader for TCC892X SD/MMC or eMMC Boot

```
$ make tcc8920_evm_emmc
```

2.3 Kernel build for SD/MMC or eMMC booting

For the eMMC Boot, you must configure the kernel as followings.

```
1) Kernel$ make menuconfig
      Device Drivers -> MMC/SD/SDIO card support ->
   [*]   Telechips SD/MMC Host Controller Driver
   [*]   Support an eMMC
   [*]   Enable TCC SDHC0
   [*]   Enable TCC SDHC1
   [*]   Enable TCC SDHC2
   [ ]   Enable TCC SDHC3
```

2.4 Android system build for SD/MMC or eMMC Booting

1). Execute lunch command in android root
2). Select tcc892xemmc_eng

```
21. full_tcc8920emmc-eng
```

When Android system is compiled, the all images are located in ***out/target/tcc8920*** directory.

3 The Partition Layout.

3.1 The Partition Layout of eMMC for Android system

You should have to understand how to configure eMMC partition layout for Android System, before you download Android system images. See the following table of default eMMC partition layout.

Area	Name	Purpose	FileSystem	Required
Boot	Boot Area	Kernel / Ram Disk	RAW	Mandatory
System	Android System	Android System Area	EXT4	Mandatory
UserData	Android UserData	Android User Data Application / Database	EXT4	Mandatory
Cache	Android Cache	Android Cache Area	EXT4	Mandatory
Recovery	Android Recovery	Recovery Mode Boot Area Recovery Mode Kernel / Ram Disk	RAW	Mandatory
Kpanic	Kpanic	Kernel Panic Log	RAW	Mandatory
Splash	Splash	Boot Screen Image	RAW	Mandatory
Misc	Miscellaneous	Firmware Update Bootloader Flag	RAW	Mandatory
TCC	Telechips Only	Set-top Flash write	RAW	Mandatory
DATA	Data	Mass Storage	VFAT / NTFS	Mandatory

In case of eMMC, userdata partition include application shared memory. And this partition is connected through MTP. By using this structure , the size of userdata can be changed dynamically. If you want to more detail information, please check *Android4.0 Compatibility Definition Document*.

3.2 The Partition Size Definition

This layout is only included Mandatory Partition size. The optional partitions are not need for Android system and it used only special purpose.

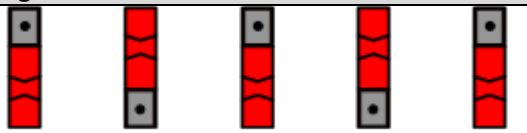
Area	Size	Partition	FileSystem
Boot	10MB	mmcblk0p1	RAW
System	300MB	mmcblk0p2	EXT4
UserData	1024MB (1GB)	mmcblk0p3	EXT4
Extended	Extended	mmcblk0p4	Extended
Cache	150MB	mmcblk0p5	EXT4
Recovery	10MB	mmcblk0p6	RAW
Kpanic	5MB	mmcblk0p7	RAW
Splash	4MB	mmcblk0p8	RAW
Misc	1MB	mmcblk0p9	RAW
TCC	1MB	mmcblk0p10	RAW
DATA	Available Space	mmcblk0p11	VFAT / NTFS

Linux support only 4 primary partition, but we need more than 4 partition. So we set the extended partition. the last 4th partition are extended and remaining 5 partitions are logical partition included in extended.

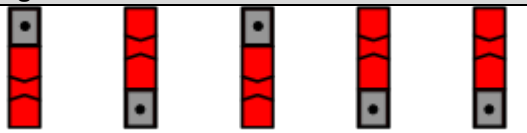
4 How to select Boot Mode.

There are two boot modes. One is SD/MMC, the other is eMMC boot mode. as previous explained, you should have to set correct boot mode for each. If you want to detail information about boot mode. Please see boot mode section on tcc892x Specification Document.

4.1 eMMC Boot Mode

Pin	Value	Figure
BM2	High (1)	
BM1	Low (0)	
BM0	High (1)	
SBM1	Low (0)	
SBM0	High (1)	

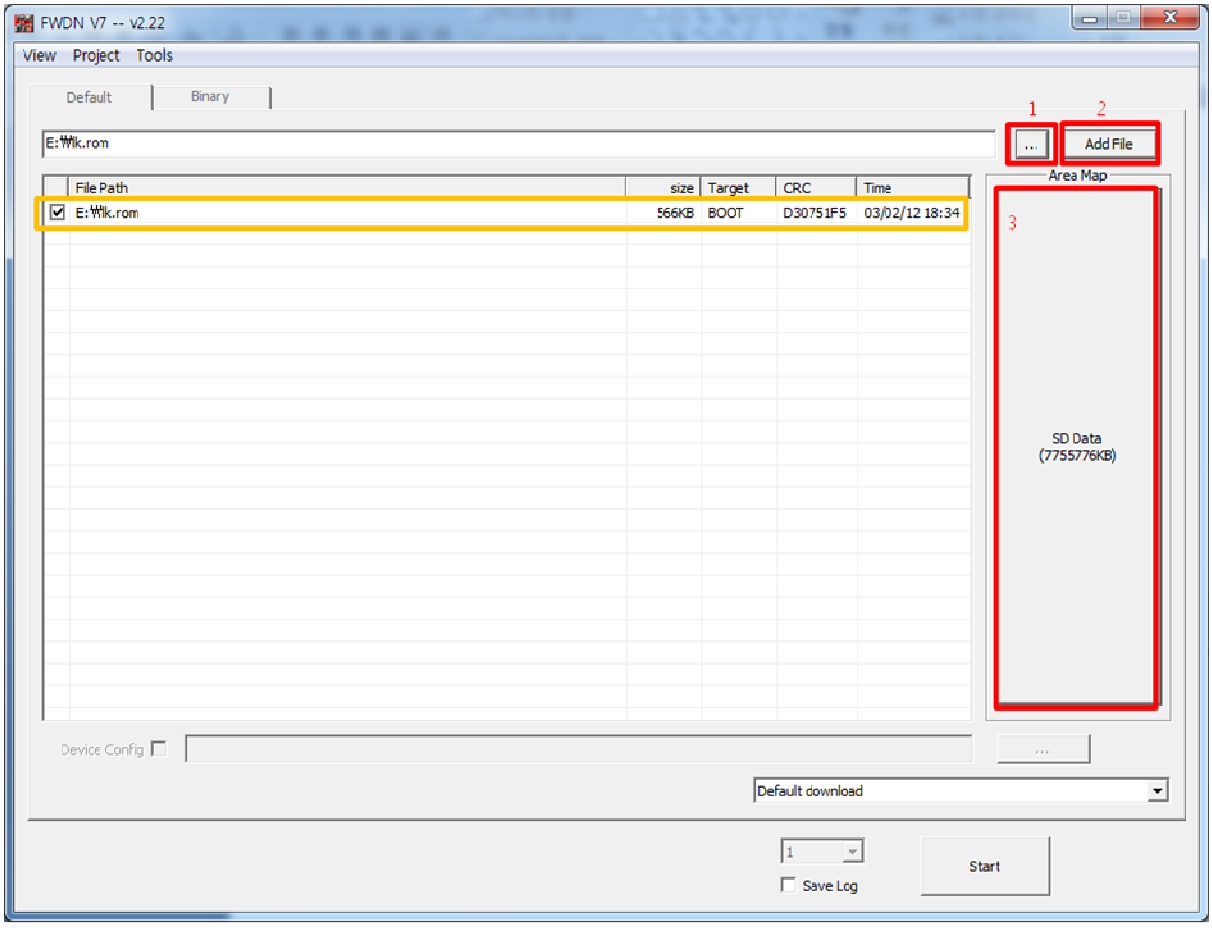
4.2 SD/MMC Boot Mode

Pin	Value	Figure
BM2	High (0)	
BM1	Low (0)	
BM0	High (1)	
SBM1	Low (0)	
SBM0	Low (0)	

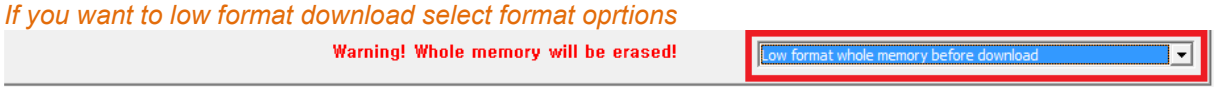
5 Prepare to Download With FWDN

To Download TCC892x Boot Loader And Android system images, you must have to use FWDN V2.22 or Higher Version. This section describes that how to prepare and download images.

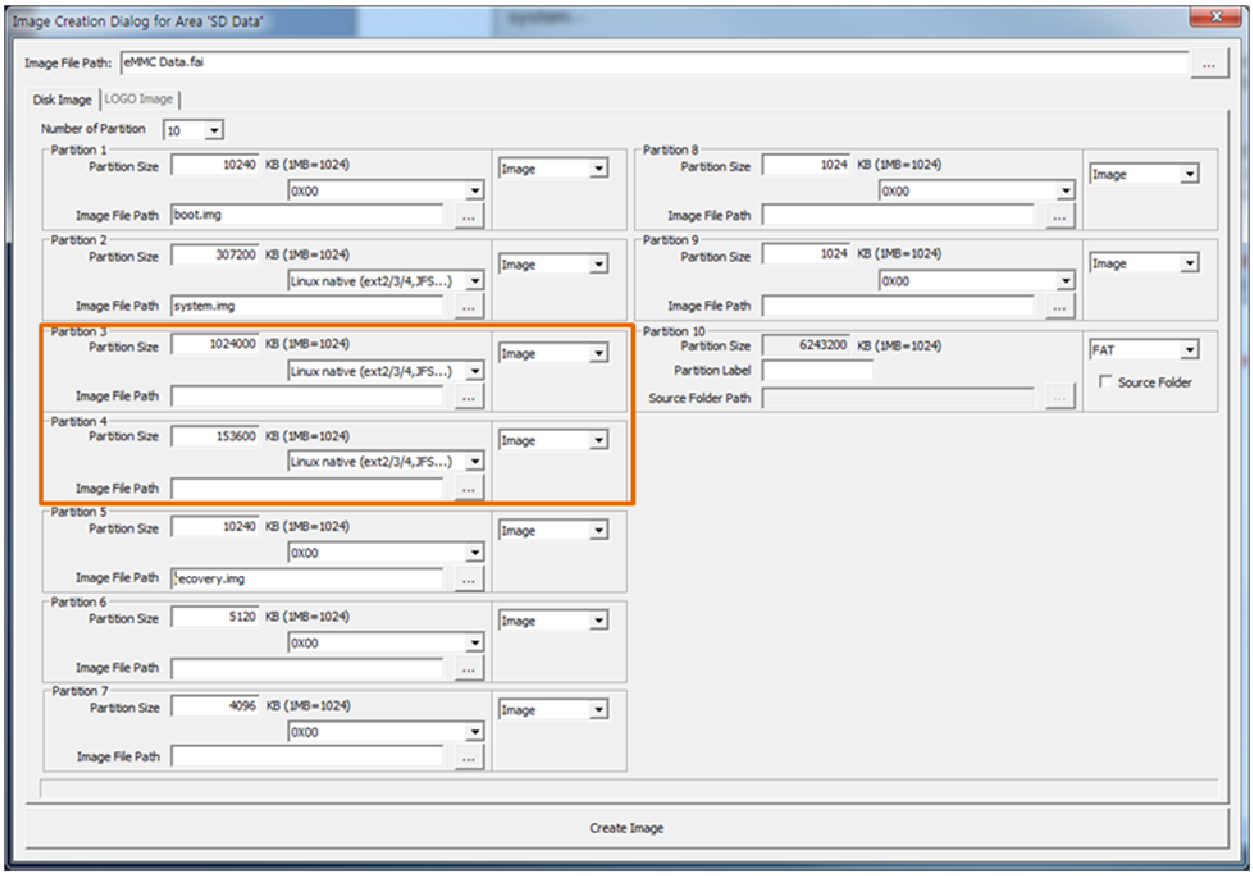
Step 1. Load bootloader to FWDN and then attach target devices on FWDN using usb boot mode. if completely attach tcc892x to FWDN, click ***SD Data Button***



If you want to low format download select format oprtions



Step 2. Prepare download as following images. The partition order is same as partition layout previously describe in section 3. And then click ***Create Image Button***



Notice : you can see partition 3 and partition 4 in the yellow box . those partition image path are empty. Those are userdata partition and cache partition. From Android 4.0(Ice Cream Sandwich) if user data and cache partitions are not formatted ext4 file system, format those partition to ext4 file system.

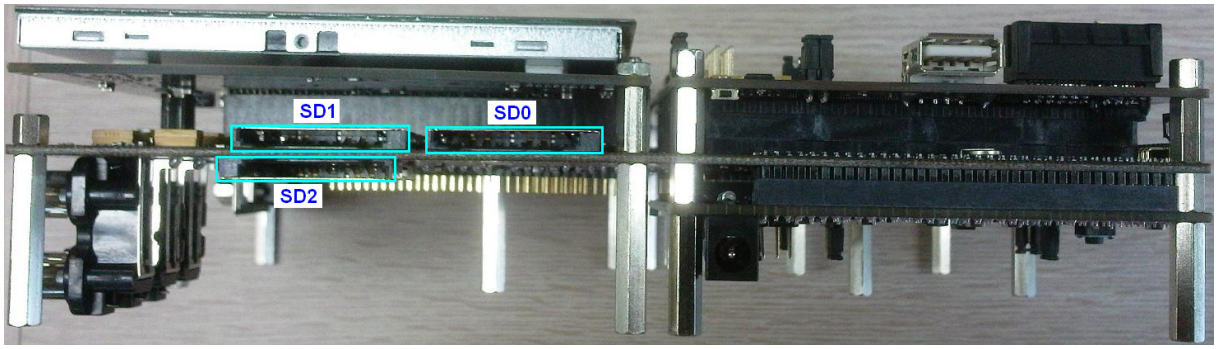
At boot time, if those partitions are not formatted, system will format those partitions. And then reboot system for initializing Android systems. So FWDN does not write any data to that partition if image file path is empty.

Step 3. If create image success press start button. And then start download to target board

6. SD Slot Ussage

5.1 Location of the SD slot at each EVM board

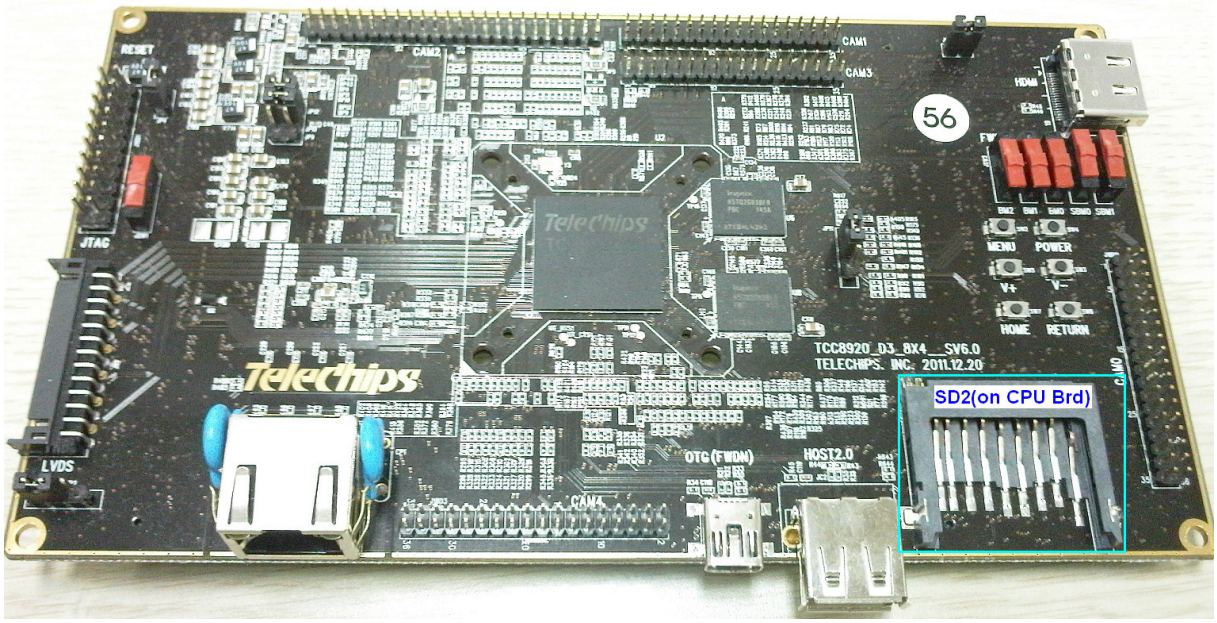
In the TCC892x EVM Board is not using the SD2 slot of Main Board.



[Figure 8.1 Telechips EVM Main Board – Left Side]

5.1.1 TCC8920 EVM Board

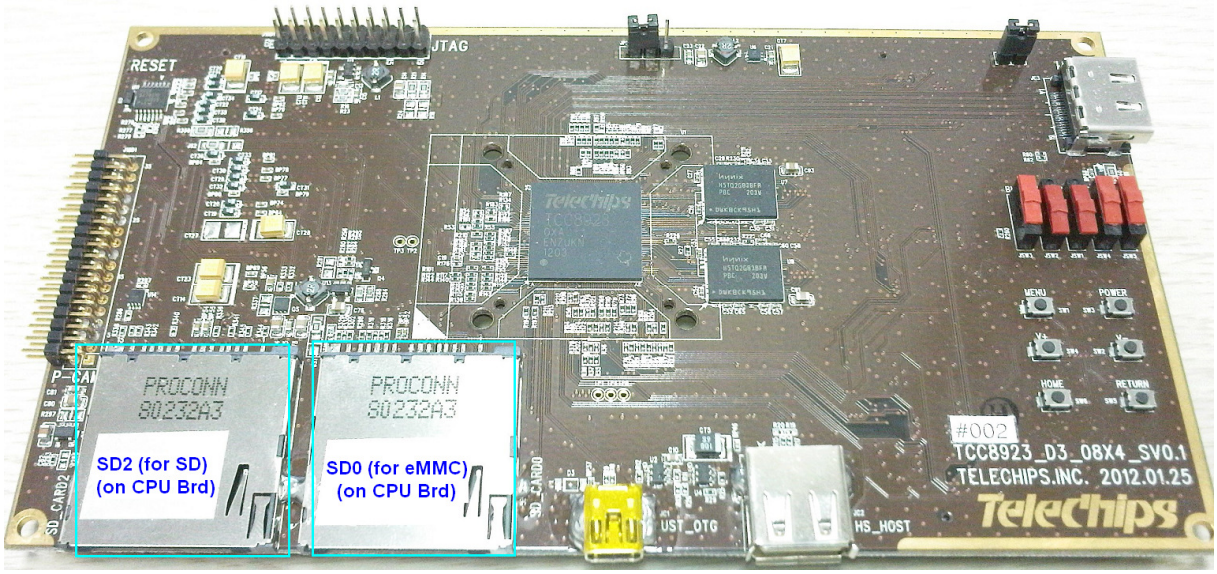
TCC8920 EVM	SD slot	SD + WiFi (Default Setting)	eMMC + SD + WiFi (Optional)
Main Board	SD0	–	eMMC
	SD1	WiFi	WiFi
	SD2	–	–
CPU Board	SD2	SD	SD



[Figure 8.2 TCC8920 D3 CPU Board]

5.1.2 TCC8923 D3 CPU Board

TCC8923 EVM	SD slot	SD + WiFi (Default Setting)	eMMC + SD + WiFi (Optional)
Main Board	SD0	–	–
	SD1	WiFi	WiFi
	SD2	–	–
CPU Board	SD0	–	eMMC
	SD2	SD	SD

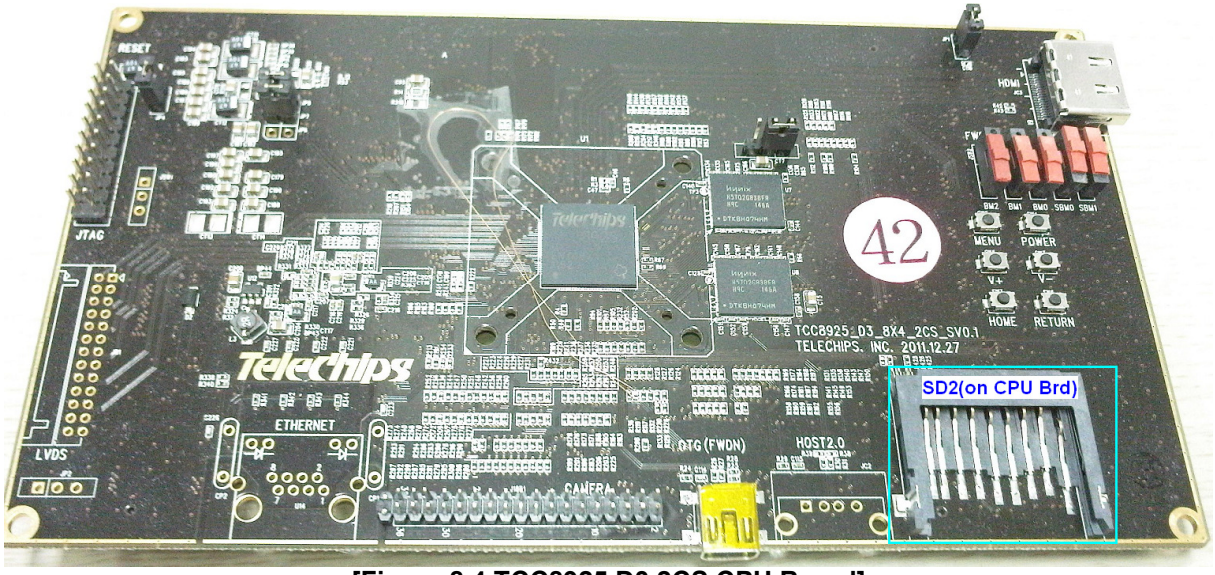


[Figure 8.3 TCC8923 D3 CPU Board]

5.1.3 TCC8925 D3 2CS CPU Board

TCC8925 EVM	SD slot	SD + WiFi (Default Setting)	eMMC + SD + WiFi (Optional)
Main Board	SD0	–	eMMC
	SD1	–	–
	SD2	–	–
CPU Board	SD2	SD	SD

(WiFi is using the USB Host Interface.)



[Figure 8.4 TCC8925 D3 2CS CPU Board]