Flashing SD Cards and Creating Raw Images

> ℹ️ This page tells you how to perform some useful SD card operations for i.MX233.

Definitions

Some of this content may be confusing, so here are some definitions to hopefully clear some things up:

imx233_linux.sb - This is an encrypted ELF file that is bootable on i.MX233. It is the end result of what you build in ltib and can be found at rootfs/bin/imx233_linux.sb.

SD-bootable image - This is an image (file) that we create from imx233_linux.sb. We have to massage imx233_linux.sb a little bit when booting from SD. This image is the end result of that massaging. The massaging itself we explain in the section "Creating an SD-bootable image for i.MX233". This image will be located (usually) in the first partition of the SD Card.

rootfs - This is the rootfs (files and directories that make up the rootfs Linux looks for when it boots) that will be located in the ltib directory. We copy it over to partition 2 on the SD Card.   That is explained in the section "Flashing an SD card with an SD-bootable image and rootfs".

raw image - On this page, "raw image" means a single image (or file) that consists of *all* partitions needed for a particular application. It is the end result of gluing the firmware, rootfs, and any storage partitions together. It is handy for rapidly flashing firmware and/or solidifying a "known good" firmware/rootfs pair, among other things. The process of creating a "raw image" is explained in the section "Creating a raw image from an SD Card".

Tools

This page will assume you are using dd with Linux . However, if you already have a raw SD card image and want to flash it to an SD card (AND you don't want to use Linux), you can use ImageWriter.exe for Windows (attached). However, I strongly encourage you to use dd. Also, you need a card reader you plug into a host machine.

Creating an SD-bootable image for i.MX233

This section will tell you how to construct an SD-bootable image in steps.

Build your imx233_linux.sb file

When you tell ltib to go build your imx233 firmware binary, you need to specify a kernel command line. The kernel command line will tell the kernel where to look for your rootfs, among other things. On this page, we are going to place the firmware on partition 1 and the rootfs on partition 2. Assuming you are using the LMS430 touchscreen display for the i.MX233 EVK, the following would be a suitable command line:

```
console=ttyAM0,115200 root=/dev/mmcblk0p2 rw rootwait lcd_panel=lms430 ssp1=mmc
```

To get to the ltib configuration menu for this, do the following:

- ./ltib -c
- Select Package List
- Go down to the first kernel command line and replace it with the above if it is different.
- Finish building.

You may want to confirm you built a fresh imx233_linux.sb by checking the timestamp and your compiler output. You can check that your kernel command line is correct later also, by making sure it reads like the above on the console when you boot.

Create an SD-bootable image from imx233_linux.sb

1. Create the beginnings of the the bootable image (4 blocks of 512 bytes, all zeroes). We'll call this image "mx23.img", however you can name it whatever you want.

```
dd if=/dev/zero of=mx23.img bs=512 count=4
```

2. Append imx233_linux.sb to the next section after the zeroes.

```
dd if=rootfs/boot/imx233_linux.sb of=mx23.img ibs=512 seek=4 conv=sync,notrunc
```

Flashing an SD card with an SD-bootable image and rootfs

Linux requires a rootfs, so the SD-bootable image you built alone is not sufficient to boot Linux. This section will walk you through formatting and flashing the SD card so you can boot Linux off of it. We will erase any existing partitions on the card, then create new partitions for the firmware image and rootfs. If you wanted to, you could create other partitions (like FAT32 or whatever) for storage. If your goal is to create a single raw SD image that contains all partitions (for example for quickly flashing demo images), I suggest making the partitions as small as possible so the raw image can be as small as possible. In other words, your rootfs partition should be made just large enough for the rootfs and any test files you may want to sneak into the rootfs. For example, someone may want to place a sample test video in /usr/.

Steps:

1. Insert your SD card to a card reader on your Linux host. It should enumerate as "/dev/sdx" where "x" could be any letter. For me, it is */dev/sdd*.

> ⊖ Triple check which letter your SD card enumerates as and use that letter. Don't just copy and paste the stuff below or you may mess up some other drive you care about. This is one of those times where Linux will allow you to shoot yourself in the foot.

2. Format the card for usage with the i.MX233.

```
# Start the fdisk utility.
sudo fdisk /dev/sdd

# Print the existing partitions if you want, so you know what you are about to zap.
p

# Check out fdisk's available commands.
m

# Delete all existing partitions (REPEAT 1-N until all are gone).
d
1

# Create a new partition at location 1.
n
p
1
# Press Enter for default.
16MB

# Create another partition.
n
p
2

# Press enter twice _IF_ you want to accept defaults.

# NOTE - If your end goal is to create a raw SD card image, then
#        it is a great idea to use a smaller size for the 2nd partition,
#        just enough for your rootfs and any sample content.  This is
#        the place to specify that, as the default will leave you with
#        the remaining size of the SD card (which could be HUGE).

# Change partition types.
t
1
53
t
2
b

# Write new partitions to card.
w
```

3. Now you are ready to write your SD bootable image to partition 1.

```
sudo dd if=mx23.img of=/dev/sdd1
```

4. Copy over the rootfs to partition 2:

```
# Format the second partition on the SD card for the ext2 filesystem.
sudo mkfs.ext2 /dev/sdd2

# Mount the second partition on the card. (If you do not have the mmc mounting point created yet,
create  one with 'sudo mkdir /mnt/mmc' )
sudo mount /dev/sdd2 /mnt/mmc

# Copy the rootfs to the card.
sudo cp -a rootfs/* /mnt/mmc

# Un-mount all SD card partitions.
sudo umount /dev/sdd*
```

5. Now you are ready to boot the image on the imx23 EVK. Put the SD-card in the EVK socket, set your boot switches to "1001", and turn the EVK on. Note that you will need to have your UART cable plugged into the EVK and a Hyperterminal program running (like Putty), with a baud rate of 115200.

Creating a raw image from an SD card

In this section, we explain how to take some existing firmware/rootfs on an SD card and create a portable raw image you can re-use on different SD cards.

1. Insert your SD card to a card reader on your Linux host. It should enumerate as "/dev/sdx" where "x" could be any letter. For me, it is */dev/sdd*.

2. Copy over the entire image to your hard drive.

```
sudo dd if=/dev/sdd of=my/directory/some_raw_image.img
```

Flashing an SD card with raw image

In this section, we explain how to take a raw image (like the one you may have created in the previous section) and flash it to an SD card.

1. Insert your SD card to a card reader on your Linux host. It should enumerate as "/dev/sdx" where "x" could be any letter. For me, it is */dev/sdd*.

2. Remove all the partitions.

```
# Start the fdisk utility.
sudo fdisk /dev/sdd

# Print the existing partitions if you want, so you know what you are about to zap.
p

# Check out fdisk's available commands.
m

# Delete all existing partitions (REPEAT 1-N until all are gone).
d
1
```

3. Flash the SD card with your raw image.

```
sudo dd if=my/directory/some_raw_image.img of=/dev/sdd
```