

# Writing the USRP File System Disk Image to a SD Card

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## AN-630

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This application note will provide step-by-step instructions on writing a file system disk image to a SD card using Linux.

- Computer with USB2/3 Interface
- UHD Installation
- microSD card to USB Adapter

To obtain the file system SD card image for your USRP device, run the command in the next step on the host computer with UHD installed and Internet access.

```
$ sudo uhd_images_downloader -t sdimg -t n3xx
```

### Example Output:

```
$ sudo uhd_images_downloader -t sdimg -t n3xx
[INFO] Images destination: /usr/local/share/uhd/images
[INFO] No inventory file found at /usr/local/share/uhd/images/inventory.json. Creating an empty one.
845962 kB / 845962 kB (100%) n3xx_common_sdimg_default-v3.11.1.0.zip
[INFO] Images download complete.
```

```
$ sudo uhd_images_downloader -t sdimg -t e320
```

### Example Output:

```
$ sudo uhd_images_downloader -t sdimg -t e320
[INFO] Images destination: /usr/local/share/uhd/images
[INFO] No inventory file found at /usr/local/share/uhd/images/inventory.json. Creating an empty one.
795674 kB / 795674 kB (100%) e3xx_e320_sdimg_default-v3.13.1.0.zip
[INFO] Images download complete.
```

In the output of the `uhd_images_downloader` command above, the folder destination where the images are saved is printed out.

An alternative method to identify your installation prefix is to run the command:

```
$ uhd_config_info --install-prefix
```

### Example Output:

```
Install prefix: /usr/local
```

The default folder location for FPGA and SD card images is:

```
<UHD_INSTALL_PREFIX>/share/uhd/images/
```

Insert the microSD card into the host computer.

To identify the device where the microSD card is, run the command:

```
dmesg | tail
```

### Example Output (partially truncated for readability):

```
[21265.575488] usb-storage 1-2:1.0: USB Mass Storage device detected
[21266.586983] scsi 0:0:0:0: Direct-Access Generic Mass-Storage 1.11 PQ: 0 ANSI: 2
[21266.588024] sd 0:0:0:0: Attached scsi generic sg0 type 0
[21267.299812] sd 0:0:0:0: [sdb] 31116288 512-byte logical blocks: (15.9 Gb/14.8 GiB)
[21267.302687] sdb: sdb1 sdb2 sdb3 sdb4
```

NOTE: In this specific example configuration, the SD card has been attached to `sdb`.

Another method to finding the device node the disk is attached at is to use the Linux utility `lsblk`:

Example Output:

```
$ lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINT
sdb         8:16    1 14.9G  0 disk
??sdb1     8:17    1   16M  0 part  /media/user/boot
??sdb2     8:18    1   1.9G  0 part  /media/user/primary
??sdb3     8:19    1   1.9G  0 part  /media/user/secondary
??sdb4     8:20    1   11G  0 part  /media/user/data
```

Some operating systems by default will auto-mount the partitions on a block device when it is attached. Before writing a new disk image to the SD card, you should first unmount any mounted partitions. This can be done with the Linux utility `umount` as shown below:

```
$ sudo umount /media/user/data
$ sudo umount /media/user/primary
$ sudo umount /media/user/secondary
$ sudo umount /media/user/boot
```

Running the command `lsblk` again will show these partitions have been unmounted:

Example Output:

```
$ lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINT
sdb         8:16    1 14.9G  0 disk
??sdb1     8:17    1   16M  0 part
??sdb2     8:18    1   1.9G  0 part
??sdb3     8:19    1   1.9G  0 part
??sdb4     8:20    1   11G  0 part
```

**WARNING:** The Linux utility `dd` can cause unrecoverable data loss if the incorrect disk is selected, or if the parameters are input incorrectly. Ensure you have selected the correct input and output parameters for your system configuration.

**NOTE:** You must use a 16 Gb or larger SD card for the N3xx and E320 file system images.

The `<SD_CARD_DEV_NAME>` device node depends on your operating system and which other devices are plugged in. Typical values are `?sdb?` or `mmcblk0?`.

The `<IMAGE>` value will depend upon which file system image you're writing. Examples for the N300/N310 and E320 are listed below:

### N3xx

```
<IMAGE>=/usr/local/share/uhd/images/usrp_n3xx_fs.sdimg
```

### E320

```
<IMAGE>=/usr/local/share/uhd/images/usrp_e320_fs.sdimg
```

Write the disk image with the command:

```
$ sudo dd if=<IMAGE> of=<SD_CARD_DEV_NAME> bs=1M
```

This step of writing the disk image to the SD card can take several minutes to complete.

Example Output:

```
$ sudo dd if=/usr/local/share/uhd/images/usrp_<device>_fs.sdimg of=/dev/sdb bs=1M
15160+0 records in
15160+0 records out
15896412160 bytes (16 Gb, 15 GiB) copied, 1160.93 s, 13.7 MB/s
```

To ensure the disk is synchronized, run the `sync` command:

```
$ sync
```

You can now remove the microSD card from your host computer and insert it into the USRP.

The Linux utility `bmactool` can be used in place of the utility `dd`, and will generally write the SD card image faster, however it is not a standard Linux utility and must be installed on your host system.

```
$ sudo bmactool copy <IMAGE> <SD_CARD_DEV_NAME> --bmap <IMAGE BMAP (*.sdimg.bmap)>
```

```
$ sudo bmactool copy /usr/local/share/uhd/images/usrp_<device>_fs.sdimg /dev/sdb --bmap /usr/local/share/uhd/images/usrp_<device>_fs.sdimg
bmactool: info: block map format version 2.0
bmactool: info: 3875840 blocks of size 4096 (14.8 GiB), mapped 596649 blocks (2.3 GiB or 15.4%)
bmactool: info: copying image '/usr/local/share/uhd/images/usrp_<device>_fs.sdimg' to block device '/dev/sdb' using bmap file '/usr/local/
bmactool: info: 100% copied
bmactool: info: synchronizing '/dev/sdb'
bmactool: info: copying time: 4m 10.3s, copying speed 9.3 MiB/sec
```