

## QSPI Flash Guide

To flash ODK3 QSPI includes two folders; One of QSPI JTAG uboot software tools (QSPI flash tools), another one of the Boot image files to be flashed into ODK3 by USB device.

The method uses JTAG to load the Ultrascale+ processor upto an including the uboot bootloader. This then can enumerate a USB mass storage device and perform the steps to erase and program the QSPI on board.

## Setup

Step 1: Copy Boot image files into USB, which including three files: boot.scr, Boot\_Recovery.bin and image.ub



For each device to be programmed:

1. Setting Boot Switches into JTAG mode (SW1,2 both ON), and then connect JTAG and UART cables between ODK3 and Host. Finally, plug in the USB device/hub with USB drive into ODK3. Boot Switcher for JTAG mode show as following Figure 1, and all cable connection show on the following Figure 2:

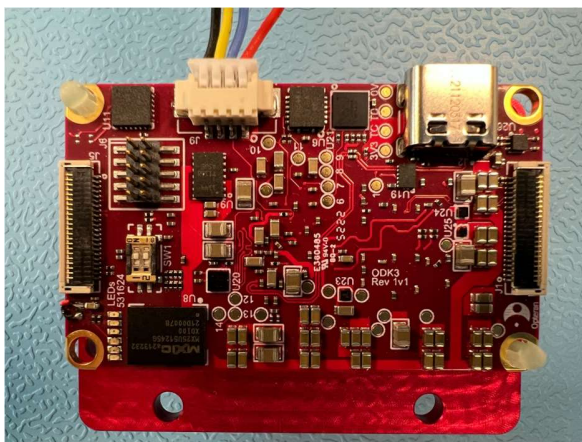


Figure 1

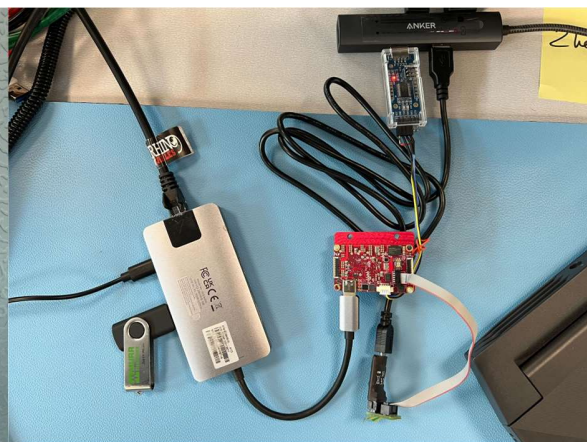
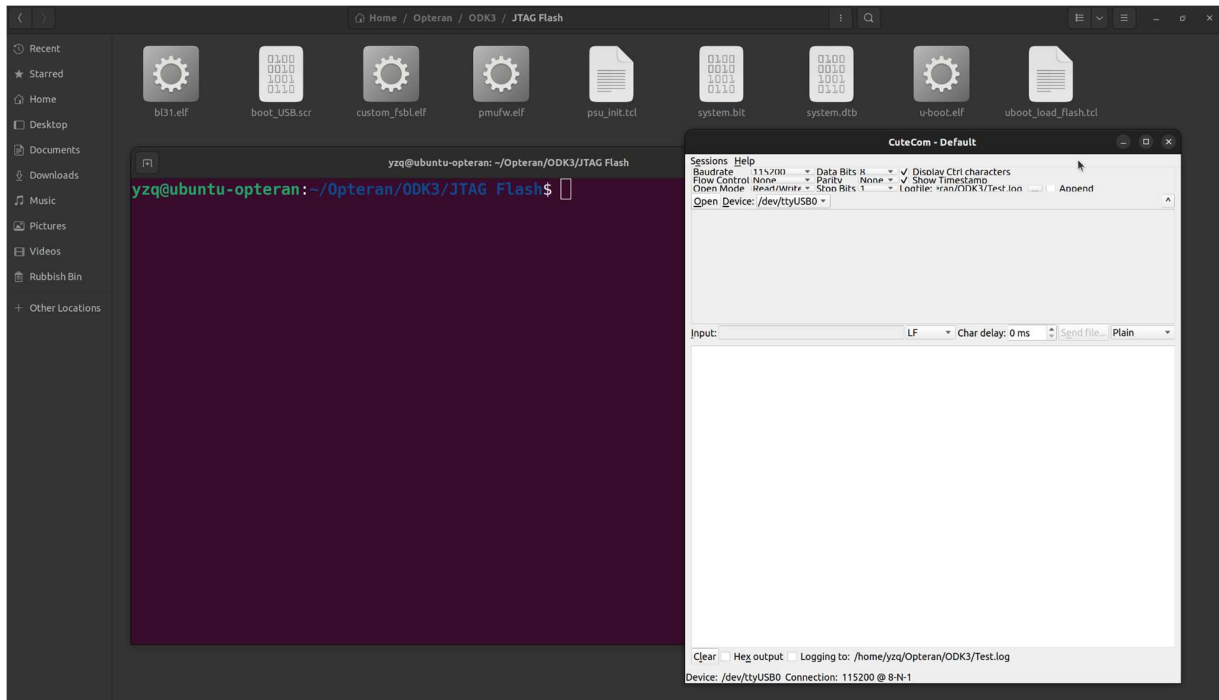
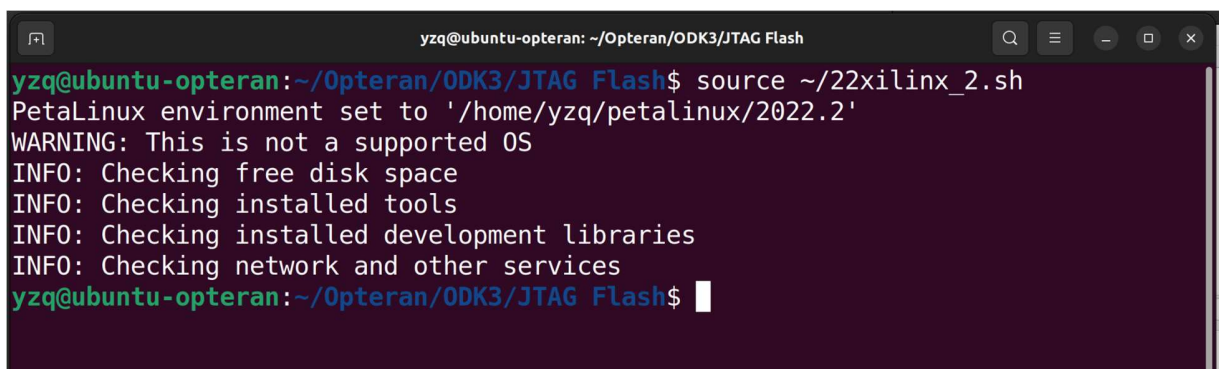


Figure 2

2. Download all flash files, and open a terminal in the fold, and open UART terminal to monitor boot log as well. (For example, UART can be loaded by cutecom on /dev/ttyUSB0)



3. Source petalinux tools by command:  
`source /path/to/petalinux/settings.sh`



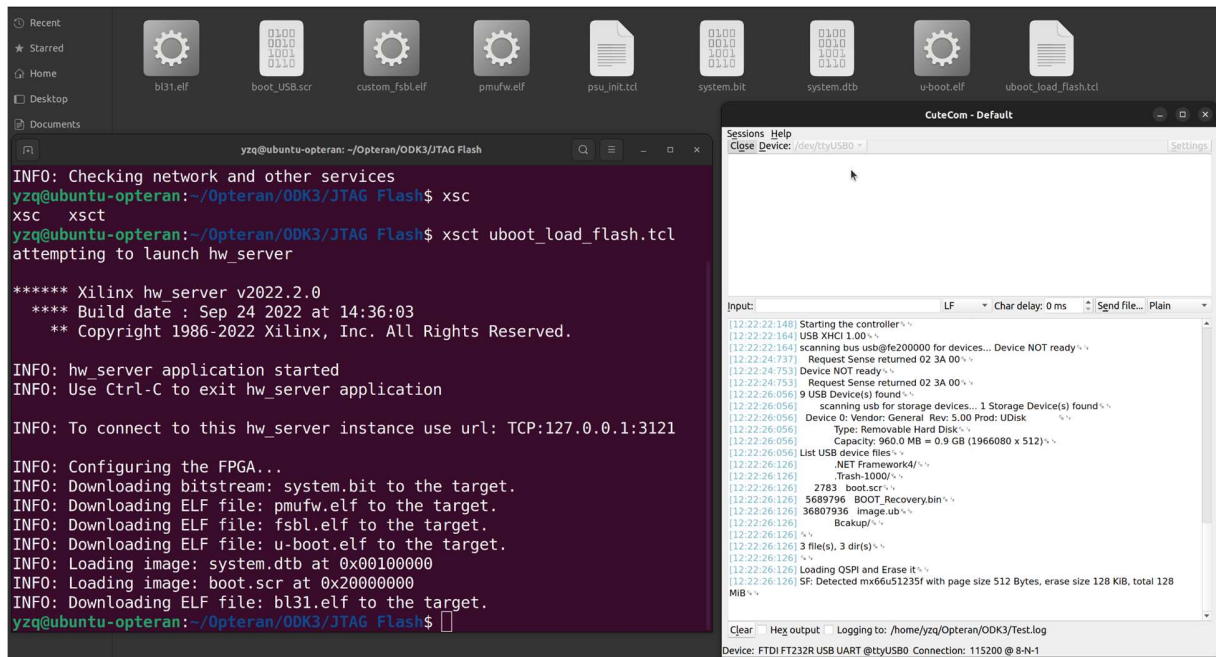
4. Power on the ODK3, and running uboot\_load\_flash.tcl script to automatically flash the boot image from USB to ODK3.

Command:

```
xsct uboot_load_flash.tcl
```



5. UART will show logs about the ODK3 boot steps, it will be totally using 3 mins to flash all USB's three boot images. If there is all right, you will automatically load into petalinux after flash files successfully. You can login and test petalinux with account: petalinux, and password by your setting, root password is "root". (If the flashing processing take long time that more than 5 minis without any UART log response, please do power off and power on ODK3, and do Step 5 again)



The screenshot shows a terminal window on the left and a CUTECom interface on the right. The terminal window displays the following commands and output:

```
yzq@ubuntu-opteran: ~/Opteran/ODK3/JTAG Flash
INFO: Checking network and other services
yzq@ubuntu-opteran:~/Opteran/ODK3/JTAG Flash$ xsc
XSC xsct
yzq@ubuntu-opteran:~/Opteran/ODK3/JTAG Flash$ xsct uboot_load_flash.tcl
attempting to launch hw_server

***** Xilinx hw_server v2022.2.0
**** Build date : Sep 24 2022 at 14:36:03
** Copyright 1986-2022 Xilinx, Inc. All Rights Reserved.

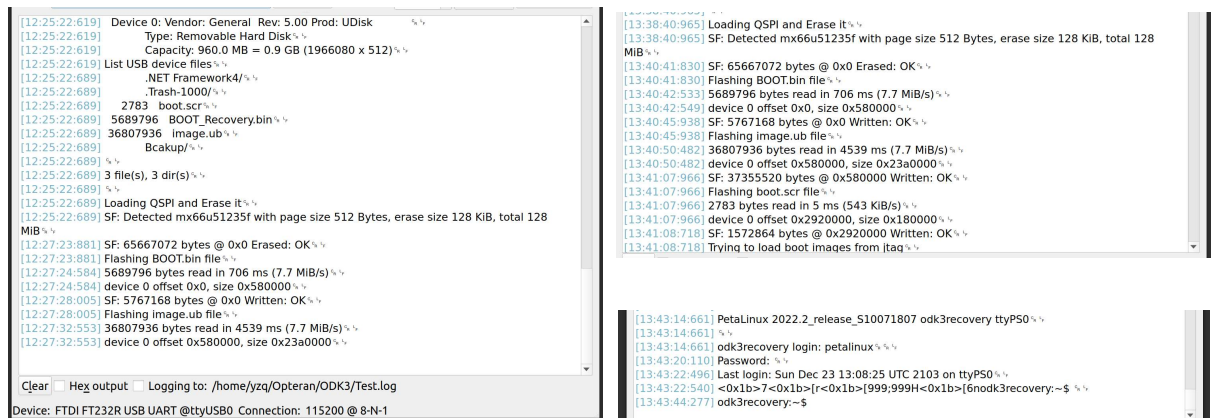
INFO: hw_server application started
INFO: Use Ctrl-C to exit hw_server application

INFO: To connect to this hw_server instance use url: TCP:127.0.0.1:3121

INFO: Configuring the FPGA...
INFO: Downloading bitstream: system.bit to the target.
INFO: Downloading ELF file: pmufw.elf to the target.
INFO: Downloading ELF file: fsbl.elf to the target.
INFO: Downloading ELF file: u-boot.elf to the target.
INFO: Loading image: system.dtb at 0x00100000
INFO: Loading image: boot.scr at 0x20000000
INFO: Downloading ELF file: bl31.elf to the target.
yzq@ubuntu-opteran:~/Opteran/ODK3/JTAG Flash$
```

The CUTECom interface shows the following log output:

```
[12:22:22:148] Starting the controller...
[12:22:22:164] USB XHCI 1.00...
[12:22:22:164] scanning bus usb@fe200000 for devices... Device NOT ready...
[12:22:24:737] Request Sense returned 02 3A 00...
[12:22:24:753] Device NOT ready...
[12:22:24:753] Request Sense returned 02 3A 00...
[12:22:26:056] 9 USB Device(s) found...
[12:22:26:056] scanning usb for storage devices... 1 Storage Device(s) found...
[12:22:26:056] Device 0: Vendor: General Rev: 5.00 Prod: UDisk
Type: Removable Hard Disk...
Capacity: 960.0 MB = 0.9 GB (1966080 x 512)...
[12:22:26:056] List USB device files...
[12:22:26:126] .NET Framework4\...
[12:22:26:126] 2783 boot.scr...
[12:22:26:126] 5689796 BOOT_Recovery.bin...
[12:22:26:126] 36807936 Image.ub...
[12:22:26:126] Bcakup...
[12:22:26:126] 3 file(s), 3 dir(s)...
[12:22:26:126] Loading QSPI and Erase It...
[12:22:26:126] SF: Detected mx66u51235f with page size 512 Bytes, erase size 128 KiB, total 128 MiB...
```



The screenshot shows the continuation of the terminal and CUTECom logs. The terminal window displays the following commands and output:

```
yzq@ubuntu-opteran:~/Opteran/ODK3/JTAG Flash$
INFO: Loading image: system.dtb at 0x00100000
INFO: Loading image: boot.scr at 0x20000000
INFO: Downloading ELF file: bl31.elf to the target.
yzq@ubuntu-opteran:~/Opteran/ODK3/JTAG Flash$
```

The CUTECom interface shows the following log output:

```
[12:25:22:619] Device 0: Vendor: General Rev: 5.00 Prod: UDisk
Type: Removable Hard Disk...
Capacity: 960.0 MB = 0.9 GB (1966080 x 512)...
[12:25:22:619] List USB device files...
[12:25:22:689] .NET Framework4\...
[12:25:22:689] .Trash-1000\...
[12:25:22:689] 2783 boot.scr...
[12:25:22:689] 5689796 BOOT_Recovery.bin...
[12:25:22:689] 36807936 Image.ub...
[12:25:22:689] Bcakup...
[12:25:22:689] 3 file(s), 3 dir(s)...
[12:25:22:689] Loading QSPI and Erase It...
[12:25:22:689] SF: Detected mx66u51235f with page size 512 Bytes, erase size 128 KiB, total 128 MiB...
[12:27:23:881] SF: 65667072 bytes @ 0x0 Erased: OK...
[12:27:23:881] Flashing BOOT.bin file...
[12:27:24:584] 5689796 bytes read in 706 ms (7.7 MiB/s)...
[12:27:24:584] device 0 offset 0x0, size 0x580000...
[12:27:28:005] SF: 5767168 bytes @ 0x0 Written: OK...
[12:27:28:005] Flashing Image.ub file...
[12:27:32:553] 36807936 bytes read in 4539 ms (7.7 MiB/s)...
[12:27:32:553] device 0 offset 0x580000, size 0x23a0000...
[13:38:40:965] Loading QSPI and Erase It...
[13:38:40:965] SF: Detected mx66u51235f with page size 512 Bytes, erase size 128 KiB, total 128 MiB...
[13:40:41:830] SF: 65667072 bytes @ 0x0 Erased: OK...
[13:40:41:830] Flashing BOOT.bin file...
[13:40:42:533] 5689796 bytes read in 706 ms (7.7 MiB/s)...
[13:40:42:549] device 0 offset 0x0, size 0x580000...
[13:40:45:938] SF: 5767168 bytes @ 0x0 Written: OK...
[13:40:45:938] Flashing Image.ub file...
[13:40:50:482] 36807936 bytes read in 4539 ms (7.7 MiB/s)...
[13:40:50:482] device 0 offset 0x580000, size 0x23a0000...
[13:41:07:966] SF: 37355520 bytes @ 0x580000 Written: OK...
[13:41:07:966] Flashing boot.scr file...
[13:41:07:966] 2783 bytes read in 5 ms (543 KiB/s)...
[13:41:07:966] device 0 offset 0x2920000, size 0x180000...
[13:41:08:718] SF: 1572864 bytes @ 0x2920000 Written: OK...
[13:41:08:718] Trying to load boot images from itaq...
[13:43:14:661] Petalinux 2022.2_release_S10071807 odk3recovery ttyP50...
[13:43:14:661] ...
[13:43:20:110] odk3recovery login: petalinux...
[13:43:20:110] Password: ...
[13:43:22:496] Last login: Sun Dec 23 13:08:25 UTC 2103 on ttyP50...
[13:43:22:540] <0x1b>7<0x1b>[r<0x1b>[999;999H<0x1b>[6nodk3recovery:~$ ...
[13:43:44:277] odk3recovery:~$
```

6. Power off and change the Boot Switcher into QSPI mode, and power on ODK3 to enjoy petalinux on the UART terminal (Due to QSPI petalinux is a RAM root file system now, so it is can't saving any change and even if you password). Boot Switcher for QSPI mode (SW1-OFF, SW2-ON) show as following Figure 1, and petalinux running show on the following Figure 2:



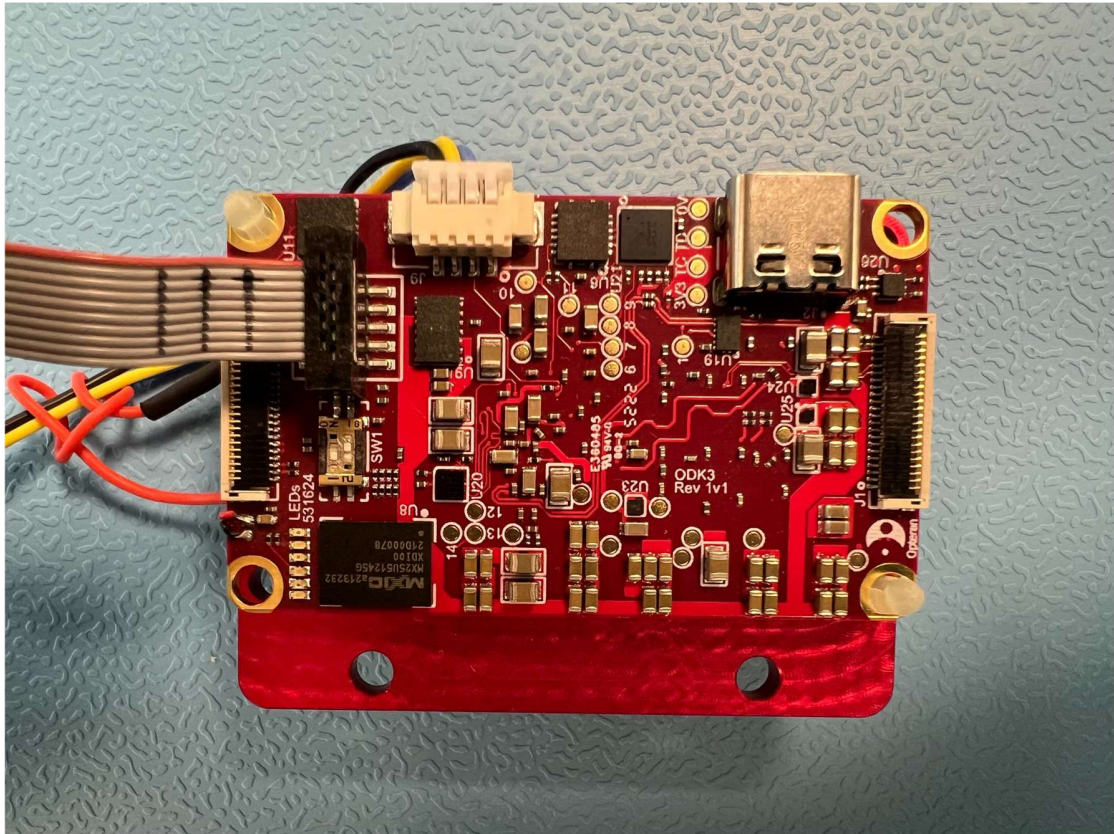


Figure 1

```

yzq@ubuntu-opteran: ~
yzq@ubuntu-opteran: ~ 129x34

PetaLinux 2022.2 release_S10071807 odk3recovery ttyPS0

odk3recovery login: [ 10.756651] usb 1-1.2: new high-speed USB device number 4 using xhci-hcd
[ 10.914705] usb 1-1.2: New USB device found, idVendor=2109, idProduct=2817, bcdDevice= 3.c4
[ 10.923059] usb 1-1.2: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 10.930375] usb 1-1.2: Product: USB2.0 Hub
[ 10.935603] usb 1-1.2: Manufacturer: VIA Labs, Inc.
[ 10.996547] hub 1-1.2:1.0: USB hub found
[ 11.000652] hub 1-1.2:1.0: 4 ports detected
[ 11.497438] xilinx-video amba_pl@vcap_v_demosaic_0: /amba_pl@vcap_v_demosaic_0/ports/port@0 initialization failed
[ 11.508099] xilinx-video amba_pl@vcap_v_demosaic_0: DMA initialization failed
[ 12.100643] usb 1-1.2.2: new high-speed USB device number 5 using xhci-hcd
[ 12.276119] usb 1-1.2.2: New USB device found, idVendor=2109, idProduct=0102, bcdDevice= 2.a9
[ 12.284654] usb 1-1.2.2: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 12.292141] usb 1-1.2.2: Product: USB-C Hub Device
[ 12.298149] usb 1-1.2.2: Manufacturer: VIA Technologies Inc.
[ 12.304586] usb 1-1.2.2: SerialNumber: 0000000000000001
[ 12.318188] xilinx-video amba_pl@vcap_v_demosaic_0: /amba_pl@vcap_v_demosaic_0/ports/port@0 initialization failed
[ 12.328859] xilinx-video amba_pl@vcap_v_demosaic_0: DMA initialization failed

odk3recovery login: petalinux
You are required to change your password immediately (administrator enforced).
New password:
Retype new password:
[ 40.319306] vfat filesystem being remounted at /run/systemd/unit-root/run/media/sda supports timestamps until 2107 (0x1039144)
[ 40.357148] vfat filesystem being remounted at /run/systemd/unit-root/run/media/sda supports timestamps until 2107 (0x1039144)
[ 40.517064] audit: type=1006 audit(4227858435.740:2): pid=621 uid=0 old-auid=4294967295 auid=1000 tty=(none) old-ses=429496721
[ 40.529692] audit: type=1300 audit(4227858435.740:2): arch=c00000b7 syscall=64 success=yes exit=4 a0=8 a1=ffffd1f37ca0 a2=4 a)
[ 40.556313] audit: type=1327 audit(4227858435.740:2): proctitle="(systemd)"

odk3recovery:~$ uname -a
Linux odk3recovery 5.15.36-xilinx-v2022.2 #1 SMP Mon Oct 3 07:50:07 UTC 2022 aarch64 GNU/Linux
odk3recovery:~$
CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.8 | VT102 | Offline | ttyUSB0

```

Figure 2

**ALL STEPS COMPLETE**