

Revision History

Revision	Date	Description
0.1	Nov 28, 2023	Preliminary version

CONFIDENTIAL

TABLE OF CONTENTS

Privacy Information.....	5
1. Introduction	6
2. Eagle Kit Overview.....	6
3. Getting Started	6
4. Eagle-Kit Programming Accessories	6
5. Eagle Kit Setup.....	7
6. Setting up Eagle Kit in QDL/EDL Mode	9
7. Windows HOST PC Setup	11
8. Windows Host PC QFIL Configuration and Programming	12
9. Ubuntu Host PC Programming.....	19
10. Eagle Kit Boot and Login Verify.....	22
11. Fastboot Programming.....	23

CONFIDENTIAL

TABLE OF FIGURES

Figure 1 MRD5165 Eagle Kit	7
Figure 2 MRD5165 Eagle Kit connection to PC	8
Figure 3 MRD5165 Eagle Kit FORCE-USB SW5 Press	9
Figure 4 MRD5165 Eagle Kit SW5 Hold, Type-C connected and Power Up	10
Figure 5 Flatbuild Package unzip/extract	12
Figure 6 Flat build Package Folder Files	12
Figure 7 QFIL tool Select Port	13
Figure 8 Eagle Kit QDL COM port selection	13
Figure 9 Select Build Type to "Flat Build"	14
Figure 10 Select "FireHose Configuration"	14
Figure 11 Firehose programmer setting configuration	15
Figure 12 RawProgram and Patch configuration	16
Figure 13 Serial Console Programming logs	17
Figure 14 QFIL Flash Download In-Progress	18
Figure 15 QFIL Flash Download Succeed	18
Figure 16 Ubuntu Host PC Flatbuild Package zip file extraction	19
Figure 17 Ubuntu Host PC Eagle Kit QDL mode check	20
Figure 18 Ubuntu Host PC Serial Console Logs	20
Figure 19 Ubuntu Host PC Programming command execution	21
Figure 20 Ubuntu Host PC Program Successfully	21
Figure 21 Ubuntu Host PC Eagle Kit Initial Boot Logs	22
Figure 22 Ubuntu Host PC Eagle Kit Complete Boot and Login Prompt	22
Figure 23 Eagle-Kit fastboot mode set using adb commands	23
Figure 24 Eagle-Kit fastboot mode set using Vol- Key press	24
Figure 25 Eagle-Kit fastboot mode set using Vol- Key press and power up	25
Figure 26 Eagle-Kit fastboot mode flash example	26

Privacy Information

Mistral Solution Private Limited. and/or its affiliated companies – May Contain Trade Secrets and information sensitive to restricted audience.

The content of this document is intended solely for the use of the individual or entity to whom it is addressed and may contain privileged or confidential information. If you are not the intended recipient, you are hereby notified that any dissemination, distribution, copying, or unauthorized use of the information contained herein is strictly prohibited.

By accessing or reviewing this document, you agree to the following.

- To treat its contents with the utmost confidentiality and to take all necessary precautions to prevent unauthorized disclosure. Any unauthorized use, disclosure, or distribution of the information in this document may result in legal action and may be subject to applicable laws.
- Not to engage in or support any activities that are illegal or harmful. Any misuse of this document for purposes contrary to the law or public safety is strictly prohibited.

Mistral Solutions disclaims any responsibility for the consequences of unauthorized access or disclosure of the information contained in this document. Further to this, Mistral solutions disclaims any responsibility for the misuse or illegal distribution of this document. Individuals or entities found to be using or distributing this document for unlawful or harmful activities may be subject to legal action.

If you have received this document in error, please notify the sender immediately and delete the original message and all copies from your system.

Confidential Distribution: Use or distribution of this item, in whole or in part, is prohibited except as expressly permitted by written agreement(s) and/or terms with Mistral Solutions and/or its subsidiaries.

Not to be used, copied, reproduced, or modified in whole or in part, nor its contents revealed in any manner to others without the express written permission of Mistral Solution Private Limited.

For any further information/clarifications please contact

Mistral Solutions Private Limited,
#60 Adarsh Regent, 100 Ft. Ring Road,
Domlur Extension, Bengaluru 560071
Karnataka, India

© 2023–2024 Mistral Solutions Private Limited. and/or its subsidiaries. All rights reserved.

1. Introduction

This document provides the instructions to setting up the Eagle-Kit and procedure to program the Eagle Kit board both on Windows and Ubuntu Host PC.

This document is intended for all users of Eagle-Kit.

2. Eagle Kit Overview

The Mistral MRD5165 Eagle Kit is based on Qualcomm's QRB5165 processor. The MRD5165 Eagle kit provides high-performance compute platform for precise artificial intelligence (AI) and machine-learning inferencing technology to facilitate the accelerated development of innovative, power-efficient, high-computing robots and drones for enterprise, industrial, and professional service applications. It offers readily deployable SDKs, Ubuntu Root-FS and tools for product development to facilitate quick prototyping and proof-of-concept evaluations. Additionally, this kit includes high performance connectivity interfaces making it an ideal platform for connected Eagle device in IOT, Drones and Robotics.

3. Getting Started

The Mistral MRD5165 Eagle Kit offers a versatile platform for product developers to evaluate system functionality, experiment with sample applications, migrate existing applications, create new features, and integrate with a variety of peripheral devices. This kit provides a Linux software environment for application development, with the option to customize and update the system software using a chosen release of the QRB5165 system software.

The Eagle Kit Programming Guide provides an overall description of the hardware setup and Host PC steps to flash the Eagle Kit

4. Eagle-Kit Programming Accessories

Basic Accessories required for Eagle-Kit Programming:

1. DC Adapter
2. Power Chord
3. Custom power cable
4. USB Type-C Cable
5. USB Micro-B Cable

Note: USB Micro-B cable is not part of the kit accessories.

5. Eagle Kit Setup

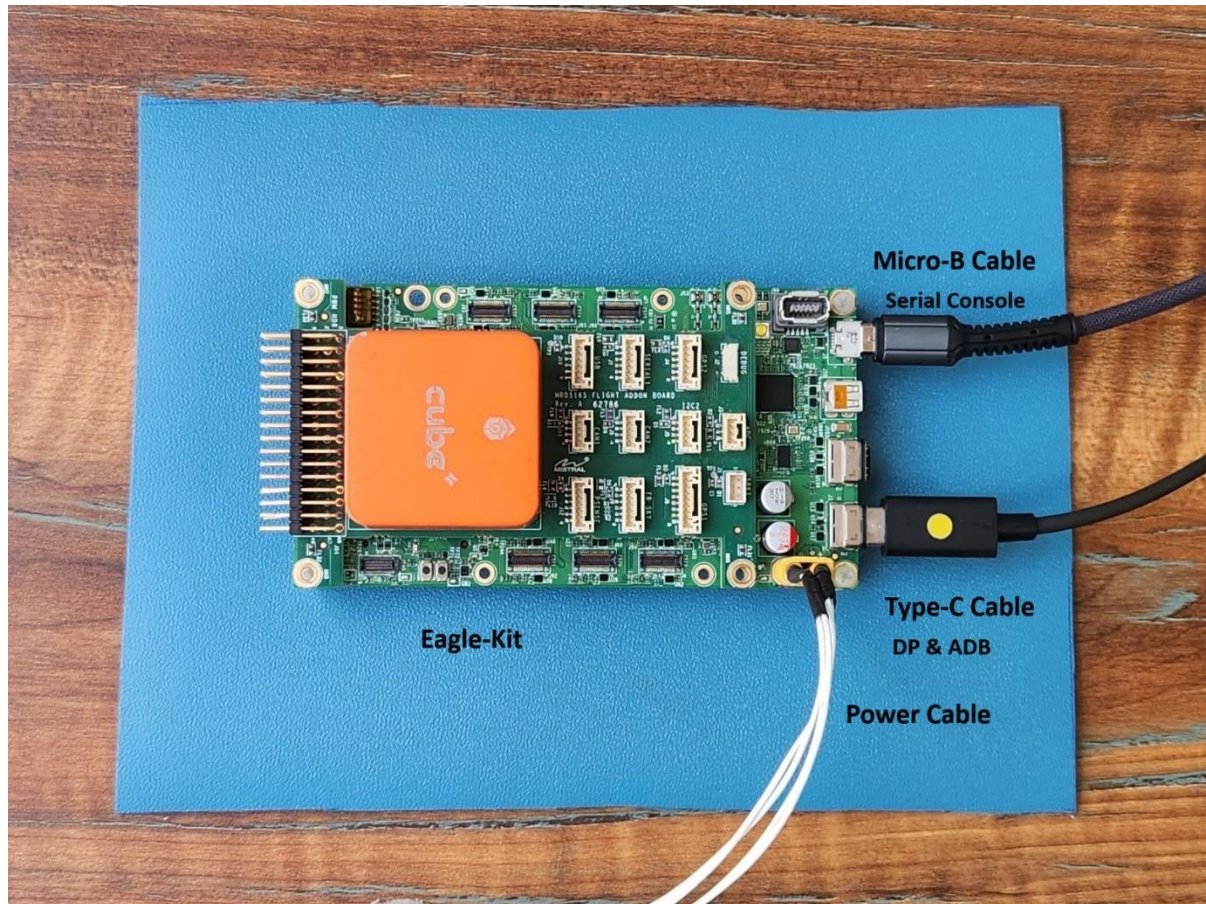


Figure 1 MRD5165 Eagle Kit

1. Connect the DC adapter using Power cable to J1
2. Connect a USB Type-C cable to J103 (adb connection)
3. Connect a Micro-B cable to J5 (Debug console)

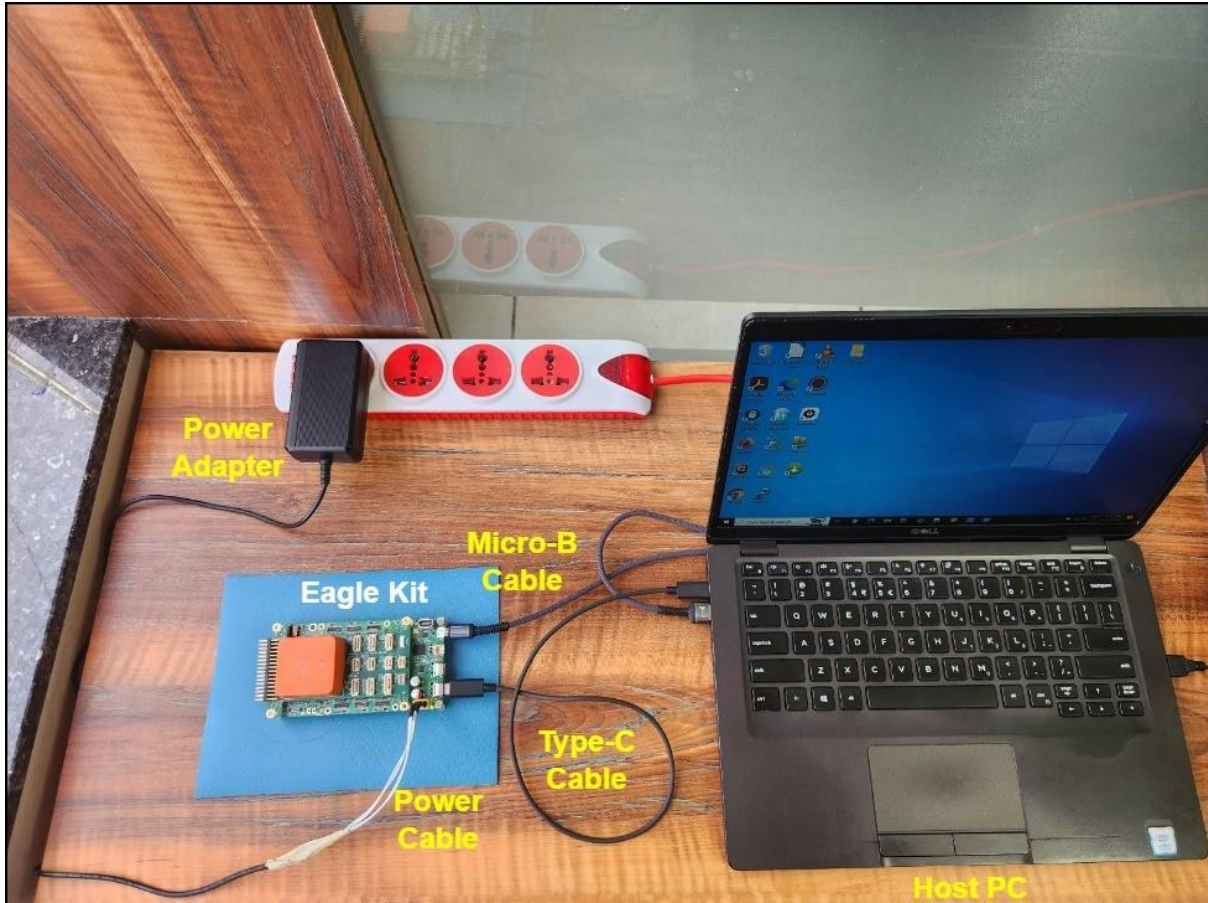


Figure 2 MRD5165 Eagle Kit connection to PC

CONFIDENTIAL

6. Setting up Eagle Kit in QDL/EDL Mode

1. Disconnect the Type-C cable and Power cable from the Eagle Kit
2. Press and hold the Eagle Kit Main Board SW5 (**SDM_FORCE_USB_BOOT**) switch.
3. Connect the Power cable and Power up the Eagle Kit
4. Connect the Type-C cable between Host PC and Eagle Kit
5. Observe the Eagle Kit device presence on the QFIL tool.
QFIL Tool Device Detection entry check: **Qualcomm HS-USB QDLoader 9008 (COMxx)**
6. Connect the Micro-B cable between Eagle kit and Host PC for programming logs.

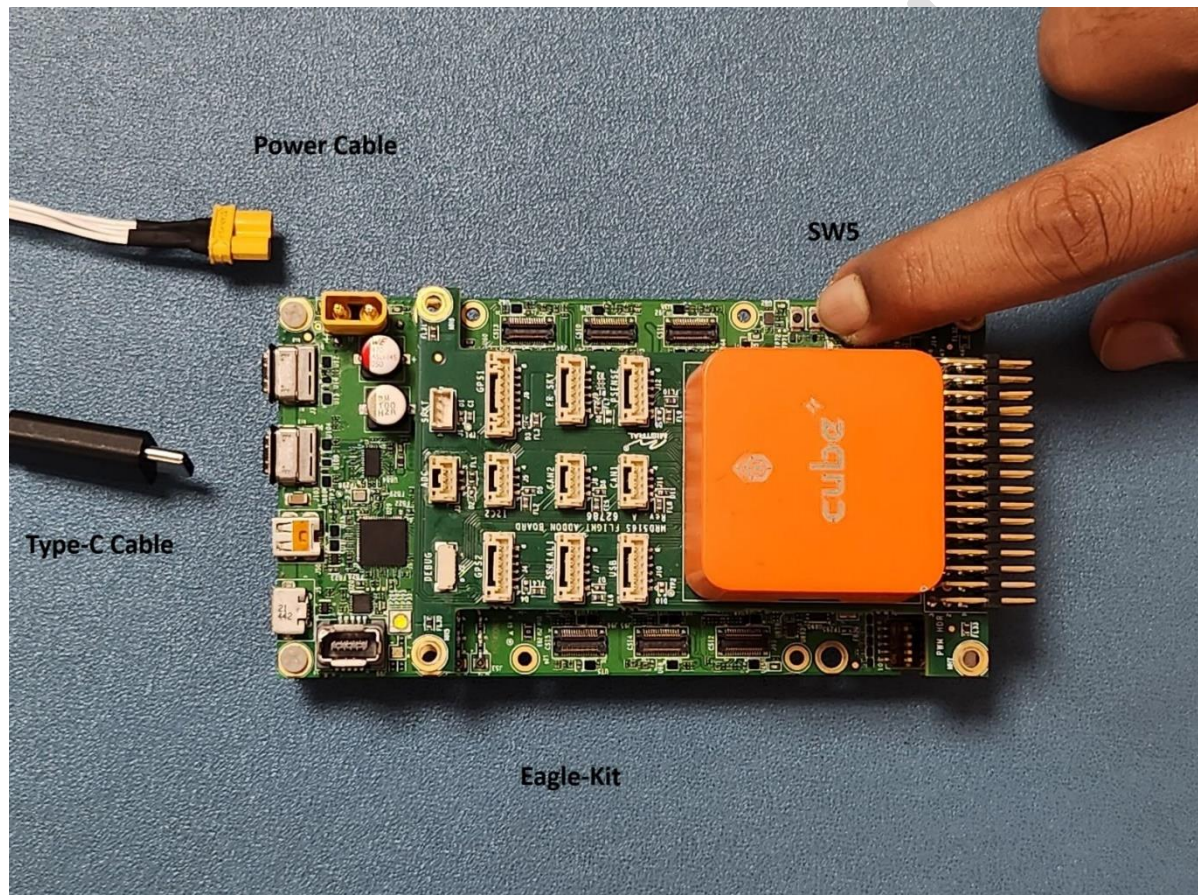


Figure 3 MRD5165 Eagle Kit FORCE-USB SW5 Press

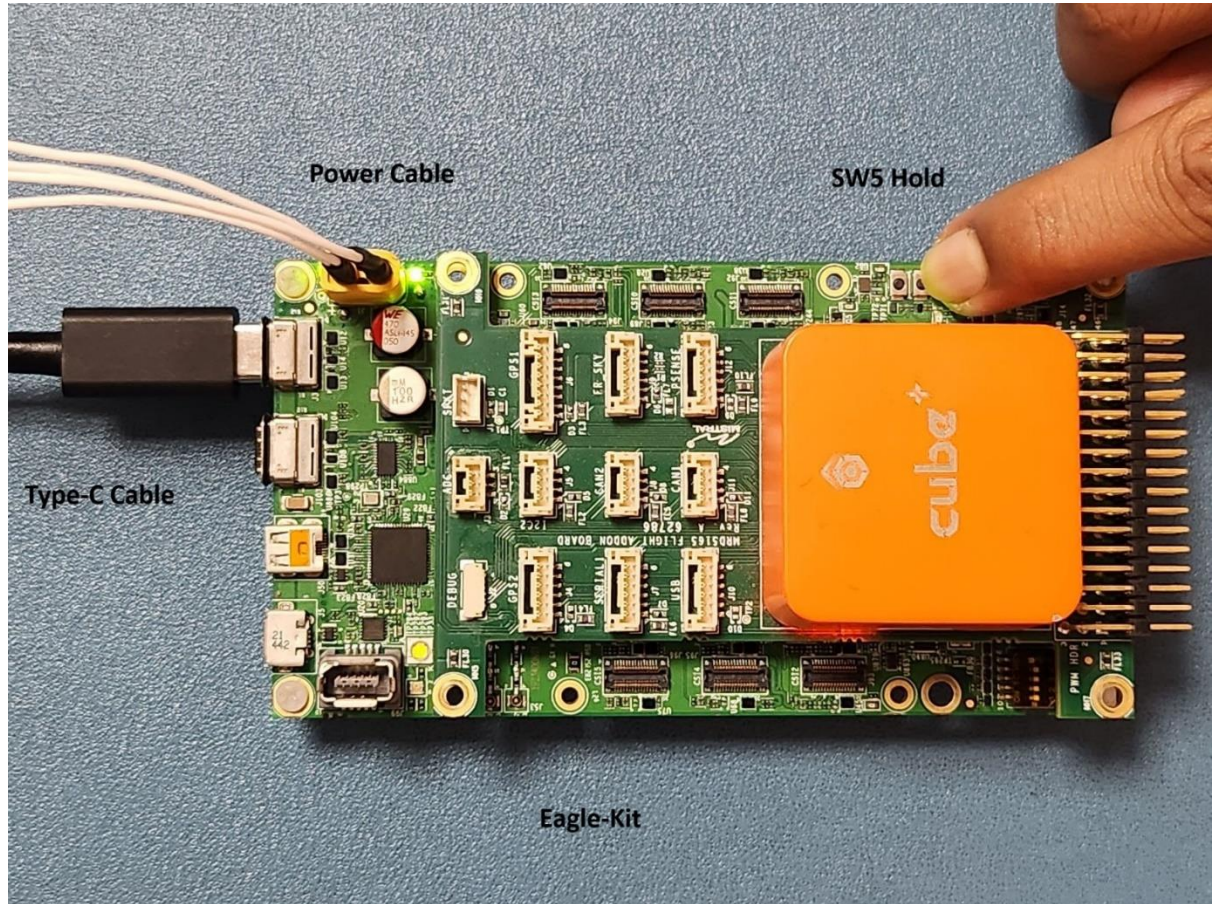


Figure 4 MRD5165 Eagle Kit SW5 Hold, Type-C connected and Power Up

CONFIDENTIAL

7. Windows HOST PC Setup

1. After purchasing the Eagle Kit, please register at the Mistral website to download the most recent flat build Package.
2. Acquire the newest iteration of QDART that includes QFIL tool for the Windows OS from Qualcomm CreatePoint. The link for this is provided below:
<https://createpoint.qti.qualcomm.com/search/#tools/searchArgs/q||QDART||rows||20||sortField||releaseDate||sortOrder||desc>

Note: QDART/QFIL is required if Windows is used as host machine for programming.

3. Download the Qualcomm USB driver from Qualcomm CreatePoint. The link for this is provided below:
<https://createpoint.qti.qualcomm.com/search/#tools/searchArgs/q||USB%20driver||rows||20||sortField||releaseDate||sortOrder||desc>
4. Windows Host PC adb and fastboot installation

Download platform tools for Windows from the link provided below.

<https://developer.android.com/tools/releases/platform-tools>

8. Windows Host PC QFIL Configuration and Programming

1. Extract the downloaded flat build zip package.

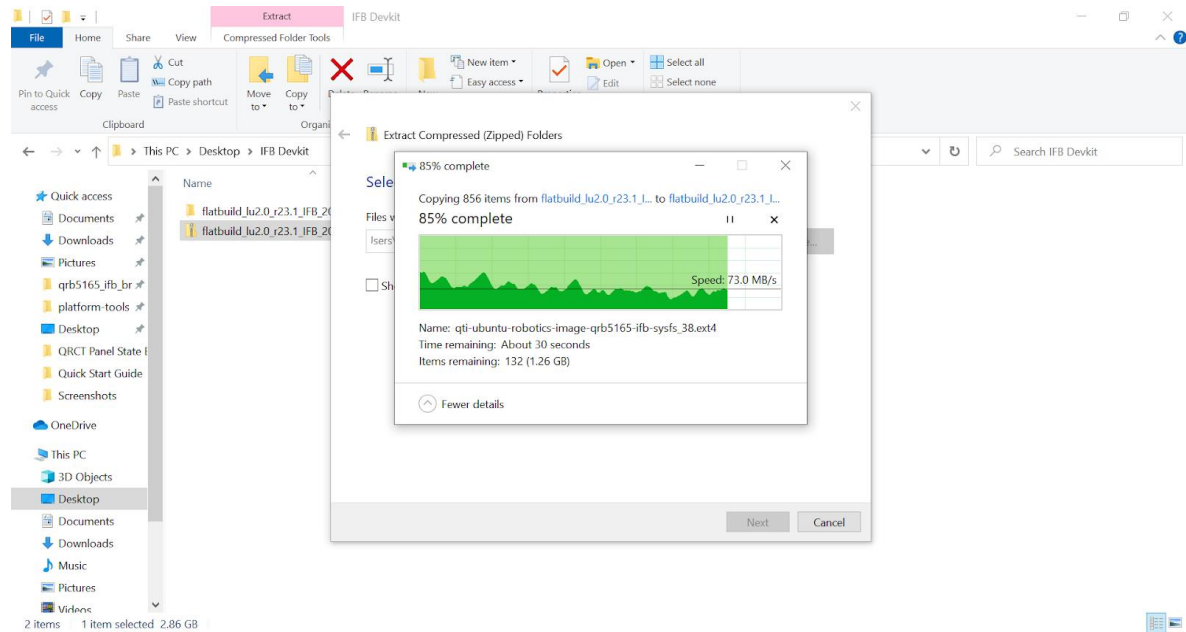


Figure 5 Flatbuild Package unzip/extract

2. Observe the extracted files as below:

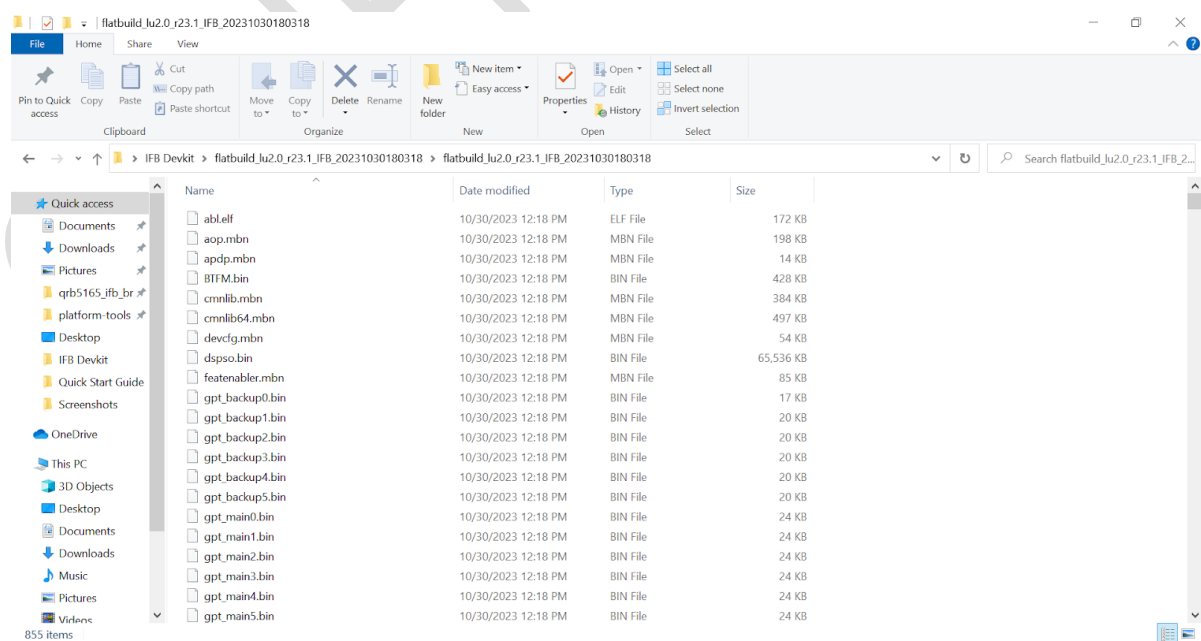


Figure 6 Flat build Package Folder Files

3. Observe and Select the Eagle Kit EDL COM port for programming.

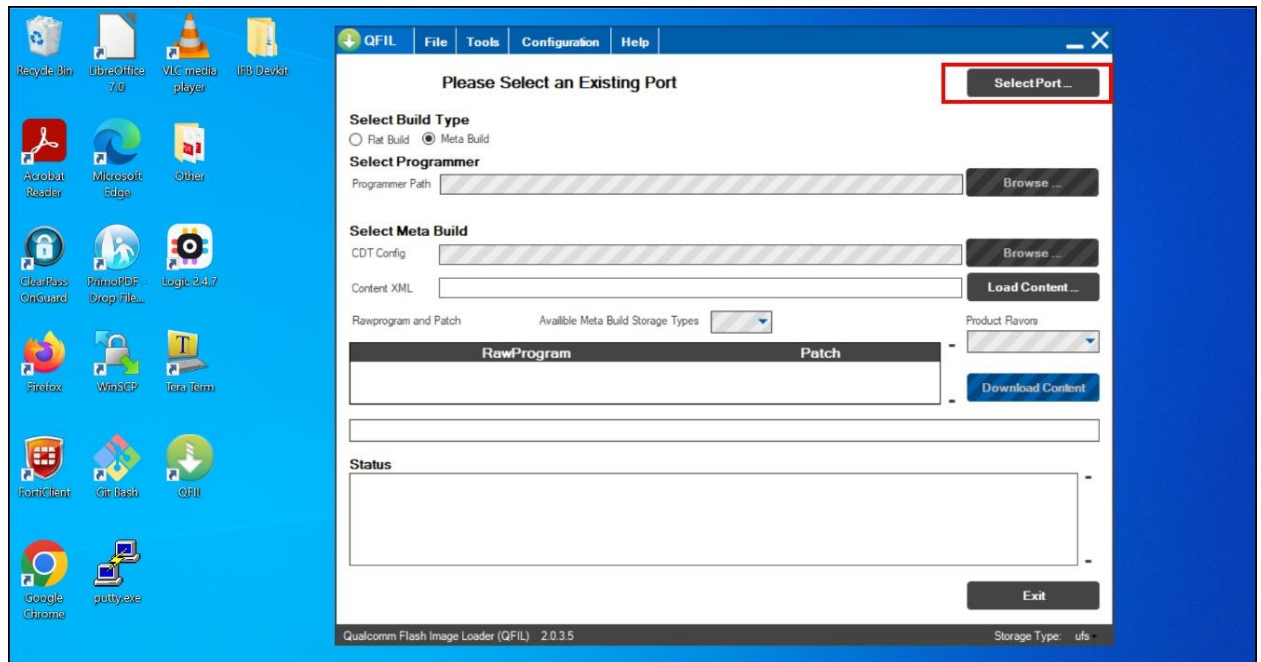


Figure 7 QFIL tool Select Port

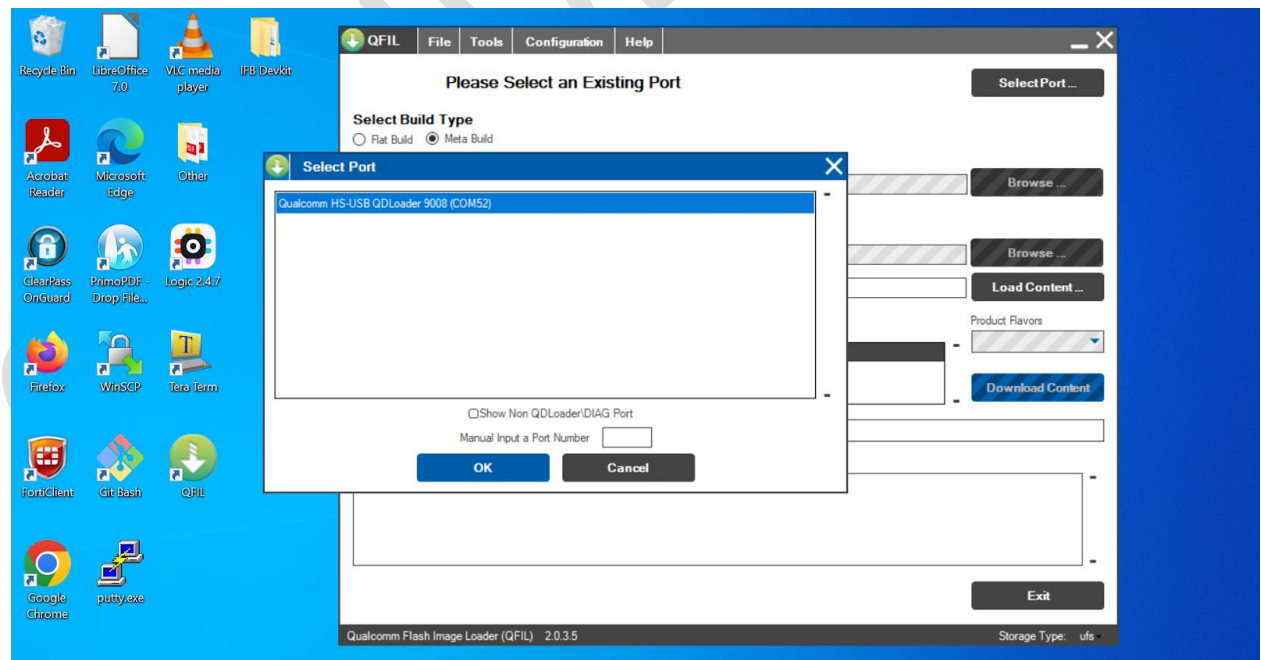


Figure 8 Eagle Kit QDL COM port selection

4. Select Build Type to "Flat Build" In QFIL

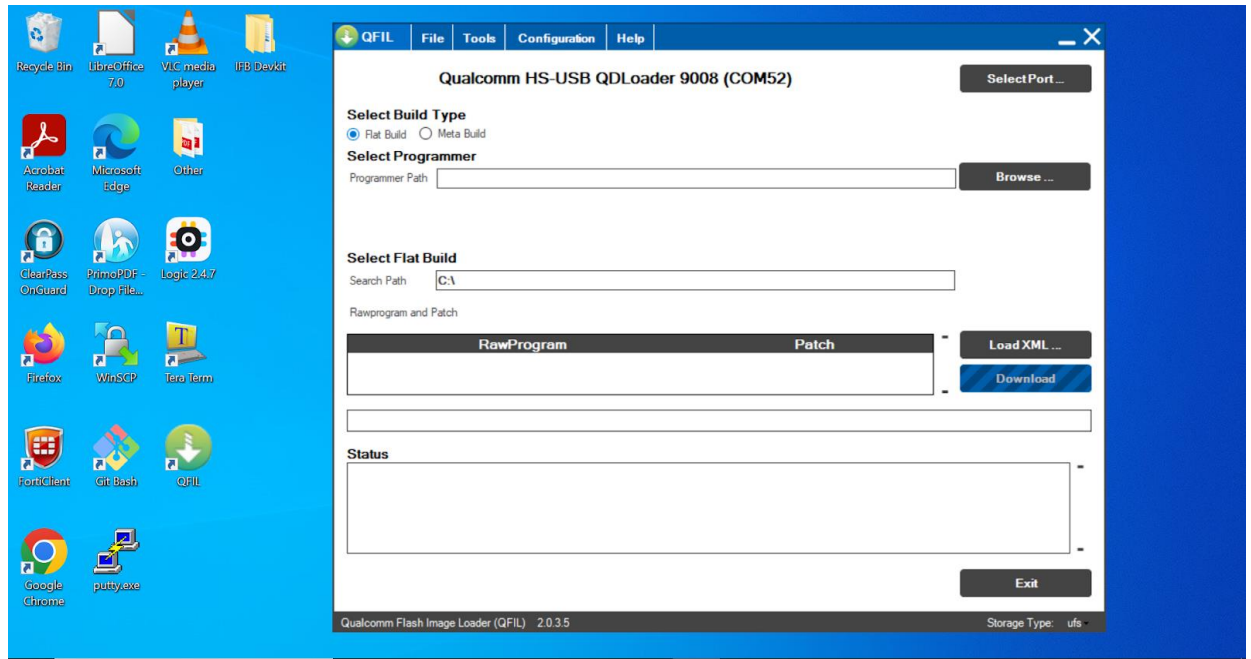


Figure 9 Select Build Type to "Flat Build"

5. Set the QFIL tool Configuration as below: Select Configuration -> FireHose Configuration

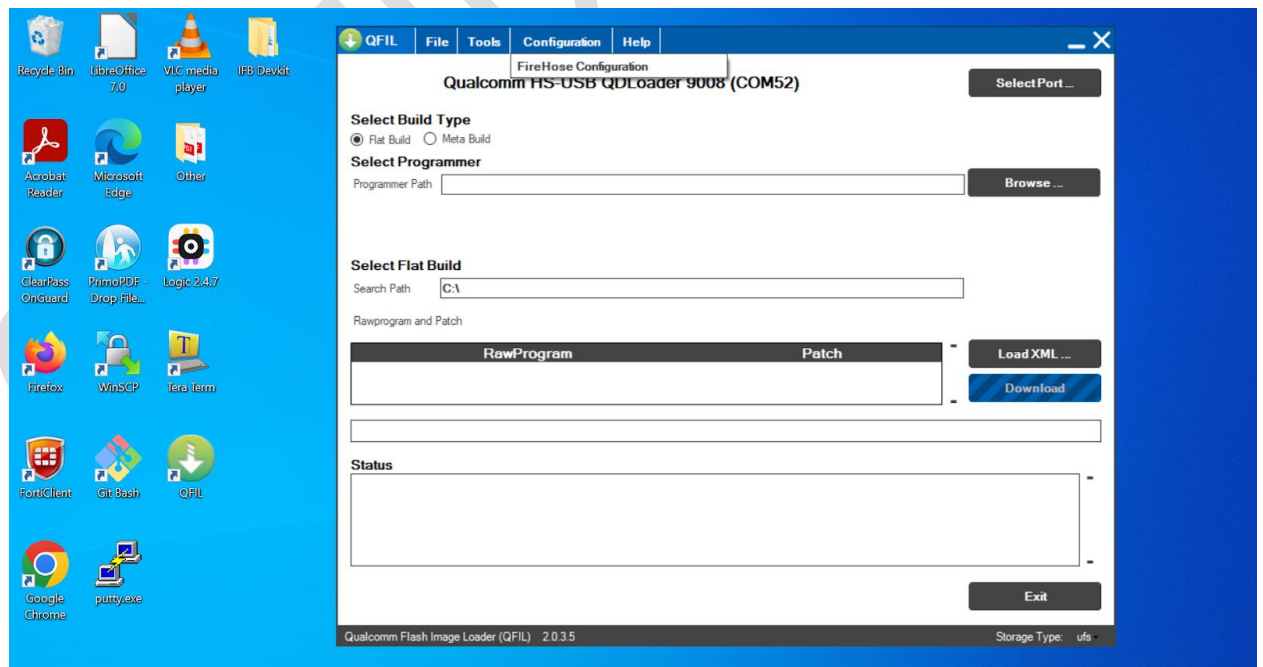


Figure 10 Select "FireHose Configuration"

6. Set the Firehose programmer settings as below:
 - a. Download Protocol: **0 - Sahara**
 - b. Device Type: **ufs**
 - c. Ensure **"Provision"** is unchecked.
 - d. Check the **"Erase All Before Download"** checkbox and click **"OK"**

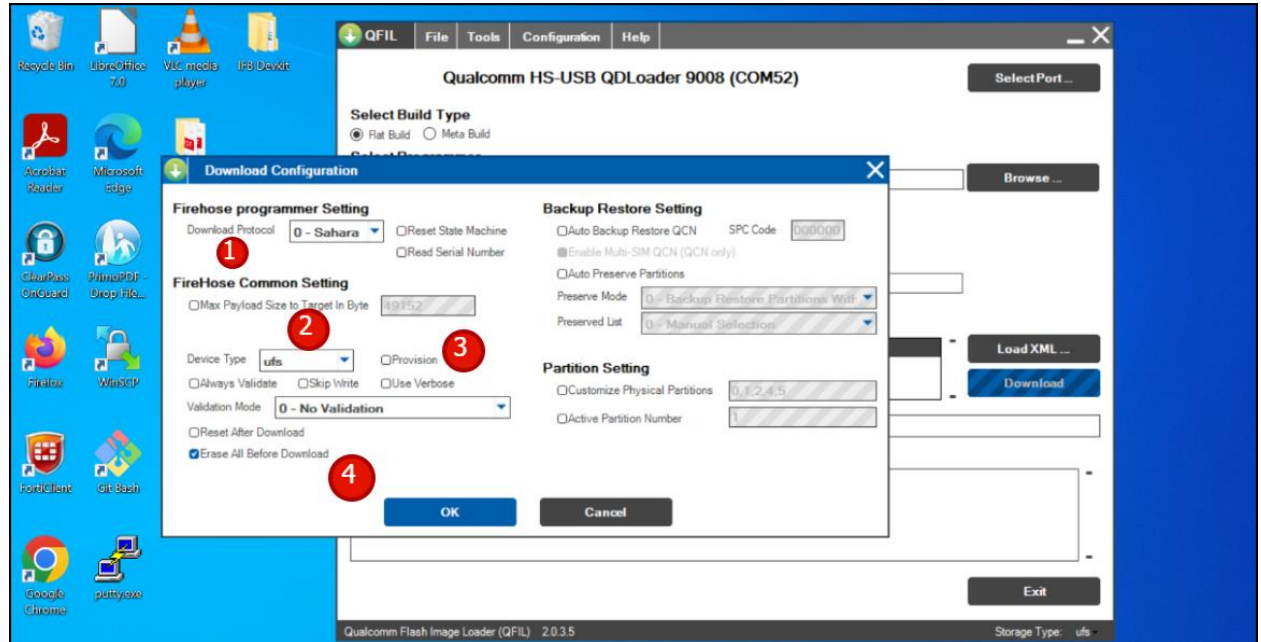


Figure 11 Firehose programmer setting configuration

7. Select QFIL Programmer file and Flat Build package files
 - a. Set the **"Programmer Path"** to file **"prog_firehose_ddr.elf"** from the extracted flatbuild package folder.
 - b. Select all the rawprogram and patch and load from the extracted flatbuild package folder.

```
rawprogram_unsparse0.xml
rawprogram1.xml
rawprogram2.xml
rawprogram3.xml
rawprogram4.xml
rawprogram5.xml
```

```
patch0.xml
patch1.xml
patch2.xml
patch3.xml
patch4.xml
patch5.xml
```

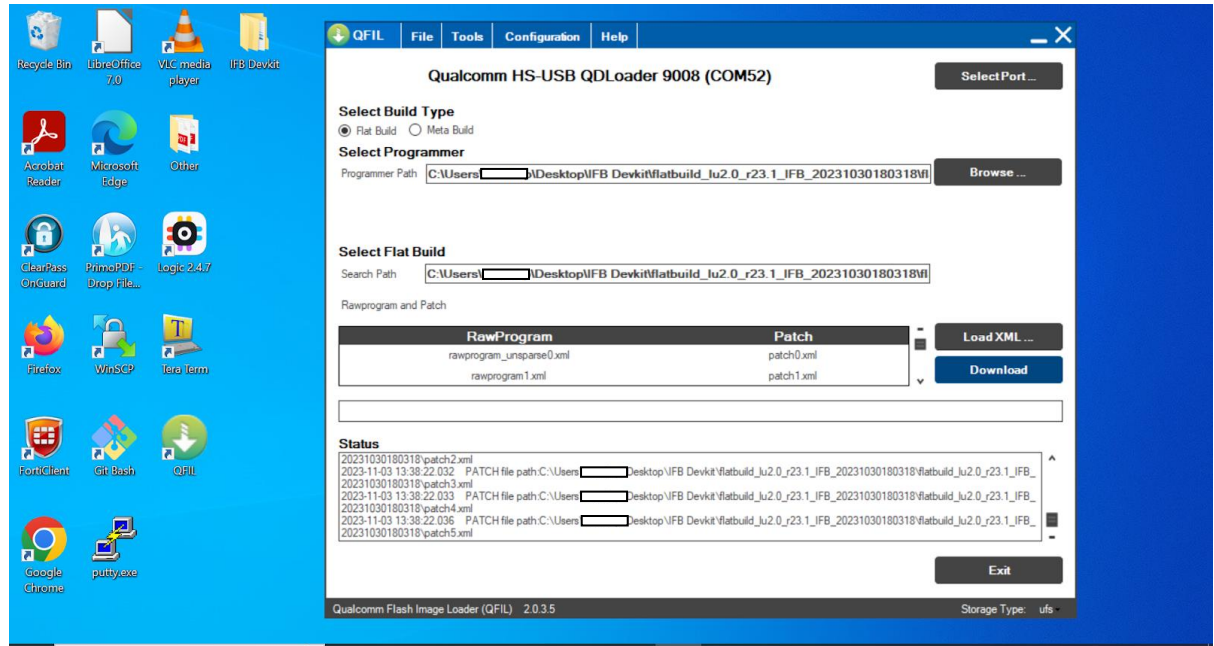


Figure 12 RawProgram and Patch configuration

CONFIDENTIAL

- Observe the Programming logs over debug console too. Open Tera Term with Serial console COM port and set baudrate to 115200.

Expected logs after flash is completed.

```

Format: Log Type - Time(microsec) - Message - Optional Info
Log Type: B - Since Boot(Power On Reset), D - Delta, S - Statistic
S - QC_IMAGE_VERSION_STRING=BOOT.XF.3.2.c2-00012-SM8250-5
S - IMAGE_VARIANT_STRING=Soc8250LAA
S - OEM_IMAGE_VERSION_STRING=d41cf1e6f4fa
S - Boot Interface: USB
S - Secure Boot: Off
S - Boot Config @ 0x00786070 = 0x00000001
S - JTAG ID @ 0x00786130 = 0x0015a0e1
S - OEM ID @ 0x00786138 = 0x00000000
S - Serial Number @ 0x00786134 = 0x450402c1
S - OEM Config Row 0 @ 0x007841e0 = 0x0000000000000000
S - OEM Config Row 1 @ 0x007841e8 = 0x0000000000000000
S - Feature Config Row 0 @ 0x007841f8 = 0x0040200000000400
S - Feature Config Row 1 @ 0x00784200 = 0xc000000000000000
S - Core 0 Frequency, 1516 MHz
S - PBL Patch Ver: 5
S - PBL freq: 600 MHZ
D - 6207 - pbl_apps_init_timestamp
D - 2878668 - bootable_media_detect_timestamp
D - 38084015 - bl_elf_metadata_loading_timestamp
D - 724 - bl_hash_seg_auth_timestamp
D - 98681 - bl_elf_loadable_segment_loading_timestamp
D - 6188 - bl_elf_segs_hash_verify_timestamp
D - 7006 - bl_sec_hash_seg_auth_timestamp
D - 821 - bl_sec_segs_hash_verify_timestamp
D - 34 - pbl_populate_shared_data_and_exit_timestamp
S - 41082344 - PBL, End
B - 40903946 - SBL1, Start
B - 41018962 - SBL1 BUILD @ 12:43:28 on Jul 10 2023
D - 1220 - sb11_hw_init
D - 0 - boot_flash_init
D - 945 - sb11_xblconfig_init
D - 0 - sb11_feature_config_init
D - 0 - boot_config_data_table_default_init
B - 41039031 - Using default CDT
D - 4727 - boot_config_data_table_init
B - 41046869 - CDT Version:3,Platform ID:8,Major ID:1,Minor ID:0,Subtype:0
D - 17294 - sb11_hw_platform_pre_ddr
D - 6344 - pmic DevPrg init
D - 6344 - sb11_hw_pre_ddr_init
D - 0 - boot_dload_handle_forced_dload_timeout
D - 61 - sb11_ddr_set_params
B - 41081914 - Can't detect if LPS or LP4. If it fails to start check build/hardware combo
B - 41106588 - eCDT MRR - Data Starting Address: 0x09066D00

B - 41108876 - DSF version = 156.8.18
B - 41112200 - Manufacturer ID = 1, Device Type = 8
B - 41115769 - Rank 0 size = 8192 MB, Rank 1 size = 0 MB
D - 38826 - sb11_ddr_init
D - 0 - boot_pre_ddi_entry
D - 91 - sb11_do_ddr_training
B - 41132025 - DevProg DDR Entry
B - 41135258 - usb: init start
B - 41138339 - usb: enum_carried_from_pbl
B - 41141267 - usb: HIGH, 0x900e
B - 41145293 - usb: ENUM success
B - 41148526 - usb: vbus_det_pm_unavail
B - 44095222 - usb: host sends ZLP
B - 44300914 - UFS INQUIRY ID: KingstonTX17-128 003A
B - 44304574 - UFS Boot LUN: 0
B - 44636780 - usb: host sends ZLP
B - 44955231 - usb: host sends ZLP
B - 45286308 - usb: host sends ZLP
B - 45602136 - usb: host sends ZLP
B - 45934098 - usb: host sends ZLP
B - 47862186 - usb: host sends ZLP
B - 316071073 - usb: host sends ZLP
B - 319002702 - usb: host sends ZLP

```

Figure 13 Serial Console Programming logs

9. Start Programming
 - a. Once all the above steps are done click the QFIL **"Download"** button
 - b. Observe the Download progress bar and status logs

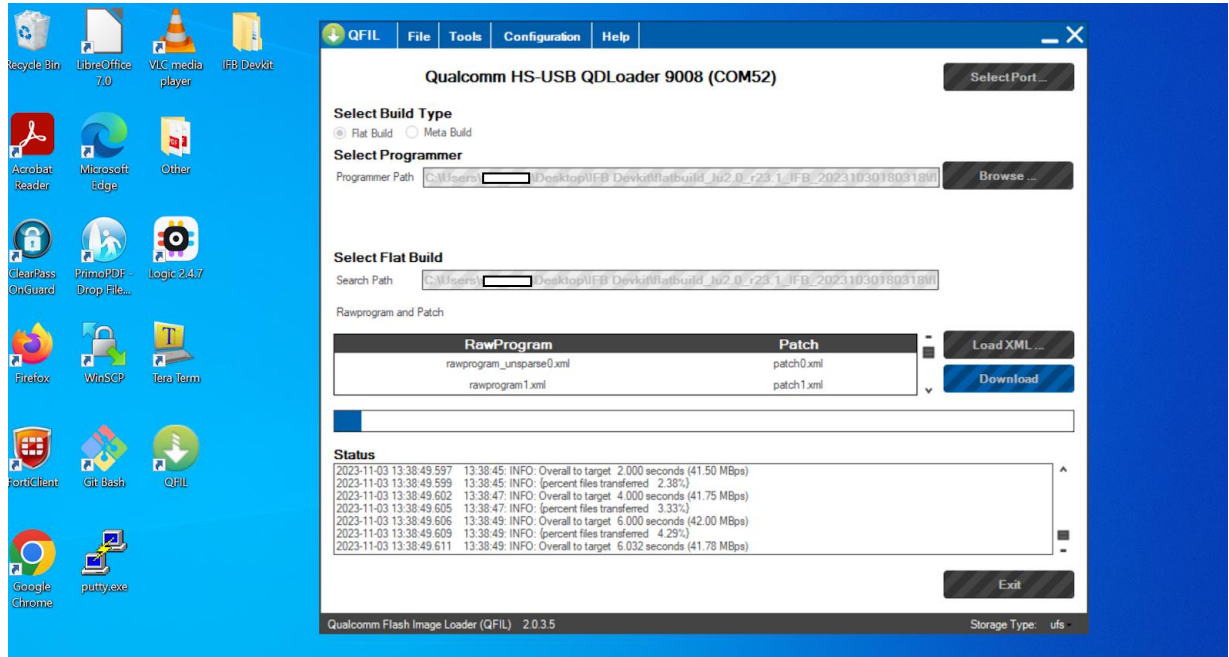


Figure 14 QFIL Flash Download In-Progress

- c. Upon successful completion observe "Download Succeed" and "Finish Download" on status logs.

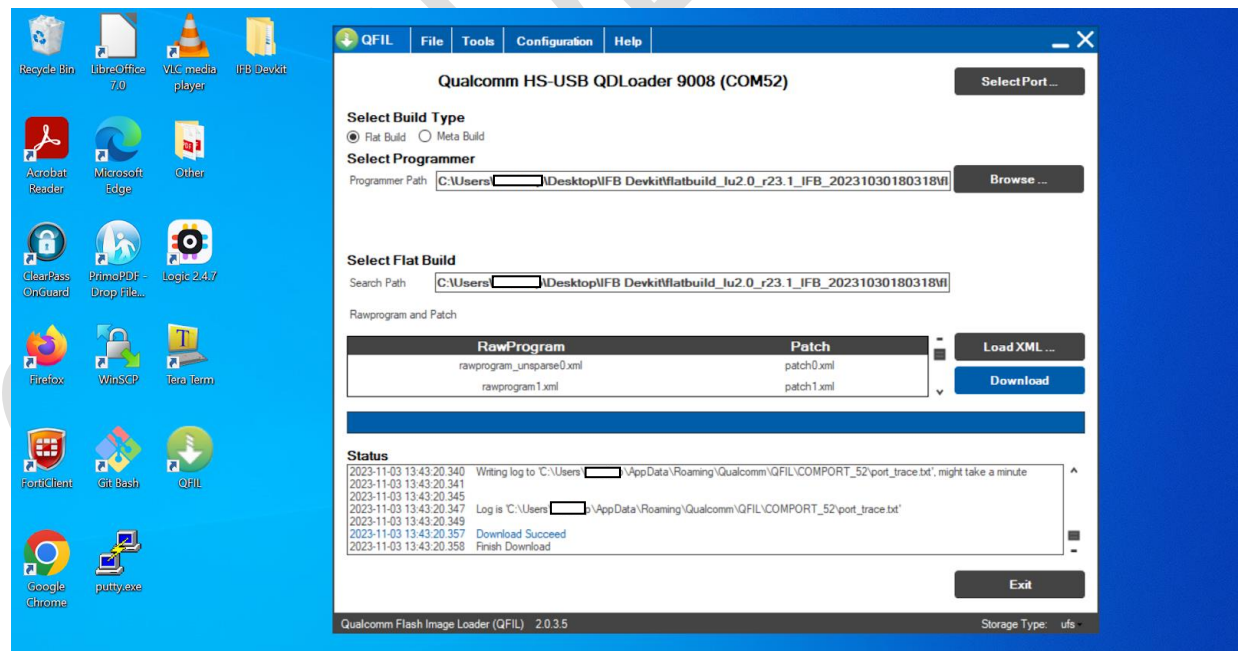


Figure 15 QFIL Flash Download Succeed

9. Ubuntu Host PC Programming

1. Follow the procedure “Setting up Eagle Kit in QDL/EDL Mode” to set the Eagle Kit in EDL mode.
2. Extract the downloaded Flatbuild zip file \$ unzip “flatbuild_package.zip”
3. Ubuntu Host PC adb and fastboot installation
Use the commands below to install adb and fastboot.

```
$ sudo apt-get update
```

```
$ sudo apt-get install android-tools-adb android-tools-fastboot
```

```

~$ unzip flatbuild_lu2.0_r23.1_IFB_20231030180318.zip
Archive: flatbuild_lu2.0_r23.1_IFB_20231030180318.zip
  creating: flatbuild_lu2.0_r23.1_IFB_20231030180318/
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_36.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_729.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/xbl.elf
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_144.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/rawprogram3.xml
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/rawprogram_unsparse0.xml
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_128.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_372.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_576.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_512.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_318.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_108.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_523.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_739.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_340.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_387.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_549.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_788.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_744.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_658.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_107.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_245.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_327.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_540.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_310.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_470.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_13.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_430.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_120.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_19.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_125.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/gpt_backup2.bin
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_722.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_634.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_726.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/rawprogram5.xml
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_103.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_280.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_728.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_160.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_476.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_763.ext4
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/uefi_sec.mbn
  inflating: flatbuild_lu2.0_r23.1_IFB_20231030180318/qti-ubuntu-robotics-image-qrb5165-afb-sysfs_49.ext4

```

Figure 16 Ubuntu Host PC Flatbuild Package zip file extraction

- Verify the Eagle Kit device is in EDL mode

```
$ lsusb
```

Observe Qualcomm device entry mentioned with “(QDL mode)”

```

~$ lsusb
Bus 002 Device 002: ID 05c6:9008 Qualcomm, Inc. Gobi Wireless Modem (QDL mode)
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 003: ID 0bda:565c Realtek Semiconductor Corp. Integrated_Webcam_HD
Bus 001 Device 002: ID 275d:0ba6 USB OPTICAL MOUSE
Bus 001 Device 004: ID 8087:0aaa Intel Corp.
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
~$

```

Figure 17 Ubuntu Host PC Eagle Kit QDL mode check

- Observe the Programming logs over debug console too. Run the minicom command with Serial console device node and set baud rate to 115200.

```
$ sudo minicom -D /dev/ttyUSB0 -b 115200
```

Expected logs after flash is completed.

```

Format: Log Type - Time(microsec) - Message - Optional Info
Log Type: B - Since Boot(Power On Reset), D - Delta, S - Statistic
S - QC_IMAGE_VERSION_STRING=BOOT.XF.3.2.c2-00012-SMB250-5
S - IMAGE_VARIANT_STRING=SoC8250LAA
S - OEM_IMAGE_VERSION_STRING=d41cf1e6f4fa
S - Boot Interface: USB
S - Secure Boot: Off
S - Boot Config @ 0x00786070 = 0x00000001
S - JTAG ID @ 0x00786130 = 0x0015a0e1
S - OEM ID @ 0x00786138 = 0x00000000
S - Serial Number @ 0x00786134 = 0x450402c1
S - OEM Config Row 0 @ 0x007841e0 = 0x0000000000000000
S - OEM Config Row 1 @ 0x007841e8 = 0x0000000000000000
S - Feature Config Row 0 @ 0x007841f0 = 0x0040200000000400
S - Feature Config Row 1 @ 0x00784200 = 0xc000000000000000
S - Core 0 Frequency, 1516 MHz
S - PBL Patch Ver: 5
S - PBL Freq: 600 MHz
D - 6207 - pbl_apps_init_timestamp
D - 2878668 - bootable_media_detect_timestamp
D - 30004915 - bl_elf_metadata_loading_timestamp
D - 724 - bl_hash_seg_auth_timestamp
D - 98681 - bl_elf_loadable_segment_loading_timestamp
D - 6188 - bl_elf_segs_hash_verify_timestamp
D - 7006 - bl_sec_hash_seg_auth_timestamp
D - 821 - bl_sec_segs_hash_verify_timestamp
D - 34 - pbl_populate_shared_data_and_exit_timestamp
S - 41082344 - PBL_End
B - 40903946 - SBL1_Start
B - 41018962 - SBL1_BUILD @ 12:43:28 on Jul 10 2023
D - 1220 - sbll_hw_init
D - 0 - boot_flash_init
D - 945 - sbll_xblconfig_init
D - 0 - sbll_feature_config_init
D - 0 - boot_config_data_table_default_init
B - 41039031 - Using default CDT
D - 4727 - boot_config_data_table_init
B - 41046869 - CDT Version:3,Platform ID:8,Major ID:1,Minor ID:0,Subtype:0
D - 17294 - sbll_hw_platform_pre_ddr
D - 6344 - pmic DevPrg init
D - 6344 - sbll_hw_pre_ddr_init
D - 0 - boot_dload_handle_forced_dload_timeout
D - 61 - sbll_ddr_set_params
B - 41081914 - Can't detect if LP5 or LP4. If it fails to start check build/hardware combo
B - 41106588 - eCDT MRR - Data Starting Address: 0x0906000

B - 41108876 - DSF version = 156.8.18
B - 41112200 - Manufacturer ID = 1, Device Type = 8
B - 41115769 - Rank 0 size = 8192 MB, Rank 1 size = 0 MB
D - 38826 - sbll_ddr_init
D - 0 - boot_pre_ddi_entry
D - 91 - sbll_do_ddr_training
B - 41132025 - DevProg DDR Entry
B - 41132059 - usb: init start
B - 41138339 - usb: enum carried from pbl
B - 41141267 - usb: HIGH , 0x900e
B - 41145293 - usb: ENUM success
B - 41148526 - usb: vbus_det pm_unavail
B - 44095222 - usb: host sends ZLP
B - 44300914 - UFS INQUIRY ID: KingstonTX17-128 003A
B - 44304574 - UFS Boot LUN: 0
B - 44636780 - usb: host sends ZLP
B - 44955231 - usb: host sends ZLP
B - 45286308 - usb: host sends ZLP
B - 45602136 - usb: host sends ZLP
B - 45934098 - usb: host sends ZLP
B - 47862186 - usb: host sends ZLP
B - 316071073 - usb: host sends ZLP
B - 319002702 - usb: host sends ZLP

```

Figure 18 Ubuntu Host PC Serial Console Logs

10. Eagle Kit Boot and Login Verify

1. Power up the Eagle Kit normally
2. Observe the Boot logs over Serial Console/Micro-B connection.

```
welcome to minicom 2.7.1
OPTIONS: i18n
Compiled on Dec 23 2019, 02:06:26.
Port /dev/ttyUSB0, 13:58:07
Press CTRL-A Z for help on special keys

Format: Log Type - Time(microsec) - Message - Optional Info
Log Type: B - Since Boot(Power On Reset), D - Delta, S - Statistic
S - QC_IMAGE_VERSION_STRING=BOOT_VF_3.2.ct-00012-sma250-s
S - IMAGE_VARIANT_STRING=oc250LAA
S - OEM_IMAGE_VERSION_STRING=d41cf1ef4fa
S - Boot Interfaces: UFS
S - Secure Boot: Off
S - Boot Config @ 0x00780078 = 0x00000001
S - T1AG ID @ 0x00780130 = 0x0015A001
S - OEM ID @ 0x00780138 = 0x00000000
S - Serial Number @ 0x00780134 = 0x00000000
S - OEM Config Row 0 @ 0x00780100 = 0x0000000000000000
S - OEM Config Row 1 @ 0x00780108 = 0x0000000000000000
S - Feature Config Row 0 @ 0x007801f0 = 0x0004200000000000
S - Feature Config Row 1 @ 0x007801f8 = 0xc000000000000000
S - Core 0 Frequency, 1510 MHz
S - PBL Patch Ver: 5
S - PBL Freq: 600 MHz
D - 6280 - pbl_apps_init_timestamp
D - 102800 - bootable_media_detect_timestamp
D - 1089 - bl_elf_metadata_loading_timestamp
D - 715 - bl_hash_seg_auth_timestamp
D - 6991 - bl_elf_loadable_segment_loading_timestamp
D - 5506 - bl_elf_segs_hash_verify_timestamp
D - 7016 - bl_sec_hash_seg_auth_timestamp
D - 819 - bl_sec_segs_hash_verify_timestamp
D - 34 - pbl_populate_shared_data_and_exit_timestamp
D - 130375 - pbl_end
B - 144143 - SBL1, Start
B - 259555 - SBL1 BUILD @ 15:41:22 on Oct 4 2023
B - 263783 - usb: usb_shared_hs_phy_init: hs phy cfg size , 0xc
D - 10583 - sbli_hw_init
D - 31 - boot_flash_init
B - 452284 - UFS INQUIRY ID: KingstonTK17-128 003A
B - 455883 - UFS Boot LUN: 1
D - 915 - Auth metadata
D - 198159 - sbli_sb1config_init
D - 488 - sbli_feature_config_init
D - 0 - boot_config_data_table_default_init
D - 244 - boot_config_data_table_init
D - 4873259 - CPU Version:3,platform ID:11,Major ID:1,Minor ID:0,Subtype:3
D - 17355 - sbli_hw_platform_pre_ddr
D - 0 - devCFG init
D - 516395 - FW OPT: ENABLE_AUTO_BOOT_OPTIMIZATION
D - 510711 - FW OPT: DISABLE_AUTO_BOOT_OPTIMIZATION
```

Figure 21 Ubuntu Host PC Eagle Kit Initial Boot Logs

Serial Console Login: Username: root Password: oelinux123

```
qrb5165-1fb login:
qrb5165-1fb login:
qrb5165-1fb login: root
Password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.219 aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@qrb5165-1fb:~#
root@qrb5165-1fb:~#
root@qrb5165-1fb:~#
```

Figure 22 Ubuntu Host PC Eagle Kit Complete Boot and Login Prompt

11. Fastboot Programming

1. Host PC setup

a. Windows Host PC adb and fastboot installation

Download platform tools for Windows from the link provided below.

<https://developer.android.com/tools/releases/platform-tools>

b. Ubuntu Host PC adb and fastboot installation

Use the commands below to install adb and fastboot.

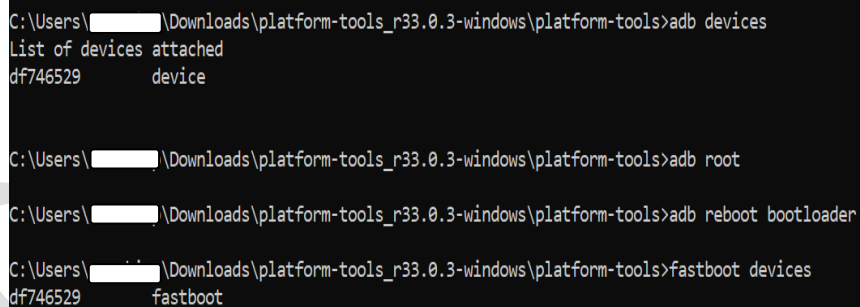
```
$ sudo apt-get update
```

```
$ sudo apt-get install android-tools-adb android-tools-fastboot
```

2. Eagle Kit fastboot mode set

a. Fastboot mode set using adb commands

- Connect the device over adb, verify the device presence in adb mode
\$ adb devices
- Enter as a root user
\$ adb root
- Enter into fastboot mode
\$ adb reboot bootloader
- After few seconds, check the device presence in fastboot mode
\$ fastboot devices



```
C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>adb devices
List of devices attached
df746529    device

C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>adb root

C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>adb reboot bootloader

C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>fastboot devices
df746529    fastboot
```

Figure 23 Eagle-Kit fastboot mode set using adb commands

- b. Fastboot mode set using VOL- key
- Disconnect the Type-C and Power cable
 - Press Vol- Key/SW3 switch

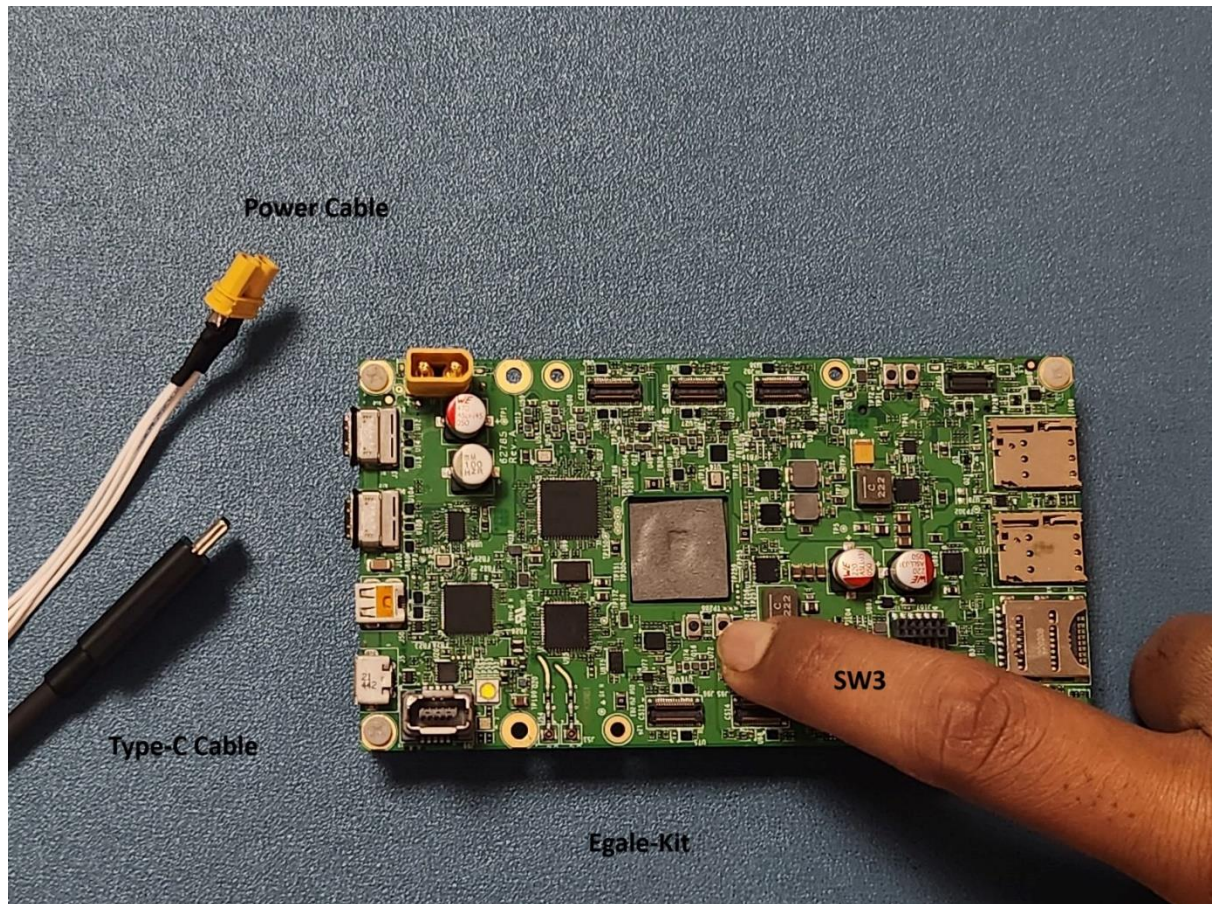


Figure 24 Eagle-Kit fastboot mode set using Vol- Key press

- Hold the VOL- key
- Connect the type-c cable to host pc
- Power up the Eagle Kit

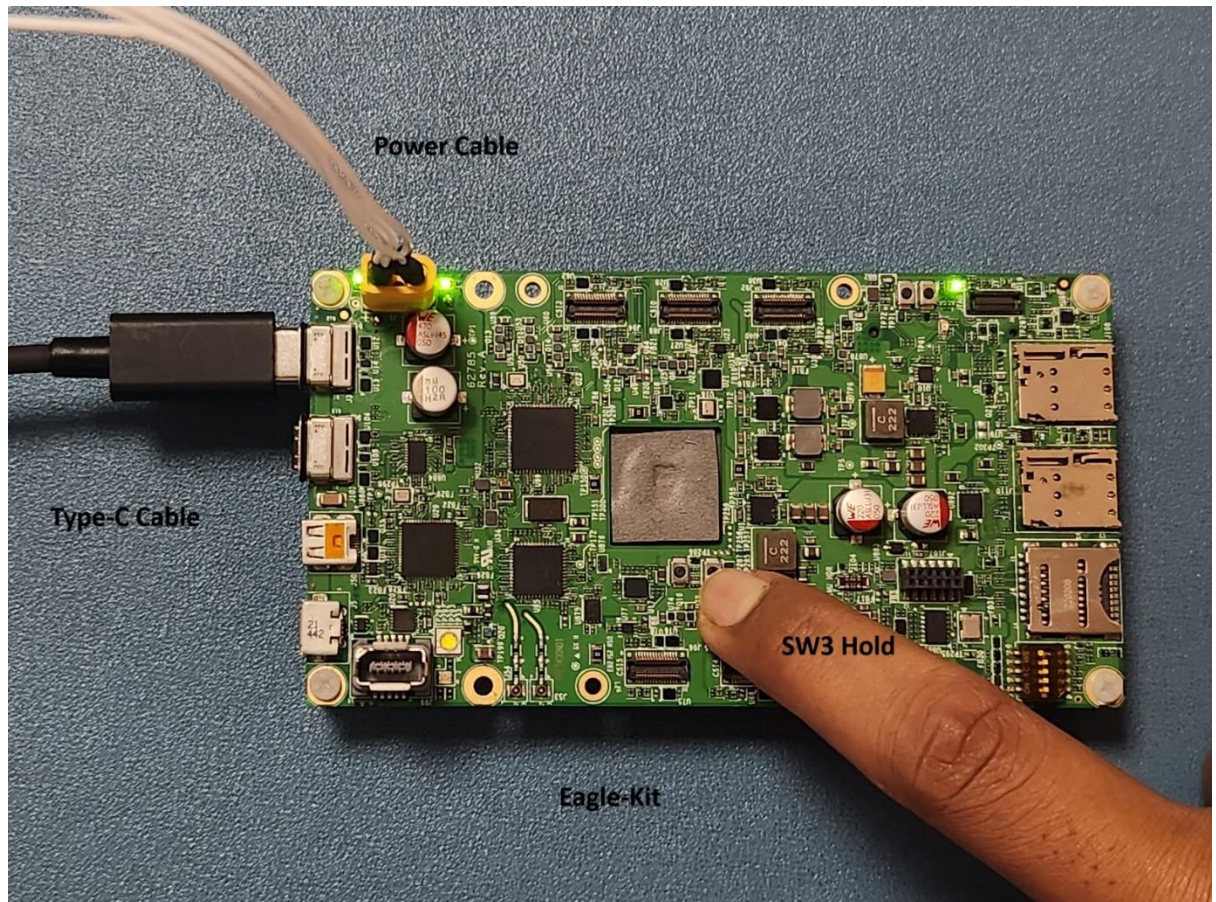


Figure 25 Eagle-Kit fastboot mode set using Vol- Key press and power up

- After few seconds, check the device presence in fastboot mode
\$ fastboot devices

5

3. Fastboot mode programming

Once the device is present in fastboot mode, run the following command for fastboot programming/flashing.

```
$ fastboot flash <partition_name> <file_name>
```

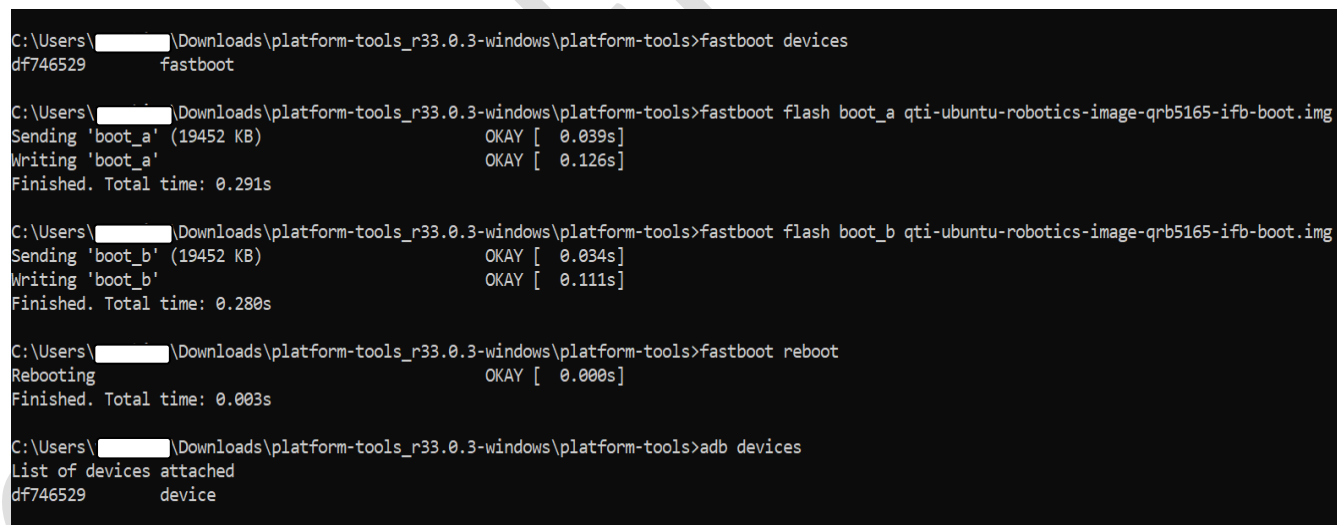
Example: Boot image flash

```
$ fastboot flash boot_a qti-ubuntu-robotics-image-qrb5165-afb-  
boot.img
```

```
$ fastboot flash boot_b qti-ubuntu-robotics-image-qrb5165-afb-  
boot.img
```

Once flash is completed, reboot the device to boot the flashed images

```
$ fastboot reboot
```



```
C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>fastboot devices  
df746529      fastboot  
  
C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>fastboot flash boot_a qti-ubuntu-robotics-image-qrb5165-afb-  
boot.img  
Sending 'boot_a' (19452 KB)      OKAY [  0.039s]  
Writing 'boot_a'                OKAY [  0.126s]  
Finished. Total time: 0.291s  
  
C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>fastboot flash boot_b qti-ubuntu-robotics-image-qrb5165-afb-  
boot.img  
Sending 'boot_b' (19452 KB)      OKAY [  0.034s]  
Writing 'boot_b'                OKAY [  0.111s]  
Finished. Total time: 0.280s  
  
C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>fastboot reboot  
Rebooting                       OKAY [  0.000s]  
Finished. Total time: 0.003s  
  
C:\Users\ [redacted] \Downloads\platform-tools_r33.0.3-windows\platform-tools>adb devices  
List of devices attached  
df746529      device
```

Figure 26 Eagle-Kit fastboot mode flash example