Mass Production Burning

User Guide

Issue **09**

Date **2016-04-19**

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About This Document

Overview

This document describes the mass production burning solution for the Hi3716C V200 and Hi379XX VX00 series platforms, including description of burning images creation, burning methods, and precautions.

Product Version

The following table lists the product versions related to this document:

Product Name	Product Version
Hi3716C	V2XX
Hi3719C	V1XX
Hi3718C	V1XX
Hi3719M	V1XX
Hi3718M	V1XX
Hi3716M	V4XX
Hi3798C	V1XX
Hi3798C	V2XX
Hi3796C	V1XX
Hi3798M	V1XX
Hi3716M	V31X
Hi3110E	V5XX
Hi3716M	V33X

Intended Audience

This document is intended for:

- Technical support engineers
- Software R&D engineers

Change History

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made in previous issues.

Issue 09 (2016-04-19)

This issue is the ninth official release, which incorporates the following changes:

Section 4.1.2 is modified.

Issue 08 (2016-03-10)

This issue is the eighth official release, which incorporates the following changes:

Hi3716M V330 is supported.

Issue 07 (2015-04-30)

This issue is the seventh official release, which incorporates the following changes:

Hi3798C V200, Hi3716M V410, and Hi3716M V420 are supported.

Issue 06 (2015-03-10)

This issue is the sixth official release, which incorporates the following changes:

Hi3110E V500 is supported.

Issue 05 (2015-01-27)

This issue is the fifth official release, which incorporates the following changes:

Chapter 3 Burning the MAC and ID

Section 3.2.1 is modified.

Chapter 4 Mass Production Buning Method

Section 4.1.2.1 is modified.

Issue 04 (2014-11-25)

This issue is the fourth official release, which incorporates the following changes:

Descriptions are added to support Hi3716M V310.

Solution 5 is added in section 1.1.

Issue 03 (2014-09-05)

This issue is the third official release, which incorporates the following changes:

Chapters 3 and 5 and section 4.1.2 are added.

Sections 1.1 and 2.2 are modified.

Descriptions are added to support the Hi379XX series chips.

Issue 02 (2014-03-13)

This issue is the second official release, which incorporates the following changes:

Chapter 2 Using the HiPro

Section 2.3.3 is modified.

Issue 01 (2014-01-20)

This issue is the first official release, which incorporates the following changes:

Chapter 2 Using the HiPro

Section 2.2.1 is modified.

Issue 00B01 (2013-11-05)

This issue is the first draft release.

Contents

Figures

Tables

1 Overview

1.1 Overview

The Hi3716C V200, Hi379XX V100, Hi3716M V310 , and Hi3716M V330 series platforms support three types of storage devices (the SPI flash,   NAND flash, and eMMC). The following lists the corresponding storage solutions for the Hi3716C V200 series platforms.

- SPI flash+NAND flash
- NAND flash
- eMMC

The mass production burning solutions for the Hi3716C V200 and Hi379XX V100 series platforms are based on the three storage solutions.

NOTE

- The Hi3716C V200 series platforms refer to Hi3716C V200, Hi3719C V100, Hi3718C V100, Hi3719M V100, and Hi3718M V100.
- The Hi379XX V100 series platforms refer to Hi3798C V100, Hi3796C V100, and Hi3798M V100.
- Hi3798M V100 does not support the SPI flash and related solutions. Hi3716M V310 , and Hi3716M V330 does not support the eMMC and related solutions.

Solution 1

Burn the boot and Android recovery by using the HiPro-serial, and upgrade a board by using the recovery. This burning solution does not require a burner. Boards are self-burnt in the way described below at a lower speed. Therefore, this solution applies to the small-scale burning.

To burn a board using solution 1, perform the following steps:

Step 1 Burn the boot and Android recovery kernel using the HiPro-serial.

Step 2 Restart the board to enter the recovery mode, run the recovery program to read the update package in the USB flash drive, and update the board.

----End

Solution 2

Burn board images by using burners. This solution requires a NAND or eMMC burner. However, boards are burnt at a faster speed with higher efficiency. Therefore, this solution applies to mass production.

Solution 3

Burn the boot and Android recovery by using a burner, and upgrade a board using the recovery. The SPI Flash burner is low in cost and simple to operate. Therefore, this solution is used in the SPI flash + NAND flash storage solution. For NAND + eMMC storage solution, you are advised to adopt solution 2.

To burn a board using solution 3, perform the following steps:

Step 1 Burn the kernels of the boot and Android recovery.

Step 2 Restart the board to enter the recovery mode.

Step 3 Read the update package in the USB flash drive by running the recovery program to update the board.

----End

Solution 4

Burn board images by using the HiPro-serial. This solution does not require a burner. Boards are self-burnt in the way described below at a lower speed. Therefore, it applies to SPI flash+NAND flash or NAND flash boards.

Solution 5

📖 **NOTE**

This solution applies only to Hi3798M V100.

Burn the boot and Android recovery by using a USB flash drive, and upgrade a board using the recovery.

The Ext4 file system used by the eMMC must be burnt entirely. The burning efficiency is relatively low. Therefore, you are advised to adopt solution 1 for the eMMC.

You can select the solution based on the storage device, cost, and mass production scales.

1.2 Preparing for the Mass Production Burning

Prepare the following files and tools for the mass production burning:

- Prepare the source files to be burnt. The following lists the source files.
  - Boot image
  - Parameter area image
  - Kernel image
  - File system image
- Prepare the HiTool.

- Prepare the HiPro-serial.
- If the HiPro-serial is used, prepare USB flash drives, USB-to-serial cables and USB Hub.

NOTE

If a burner is used, contact the vendor about whether the burner is compatible with the current chip platform.

2 Using the HiPro

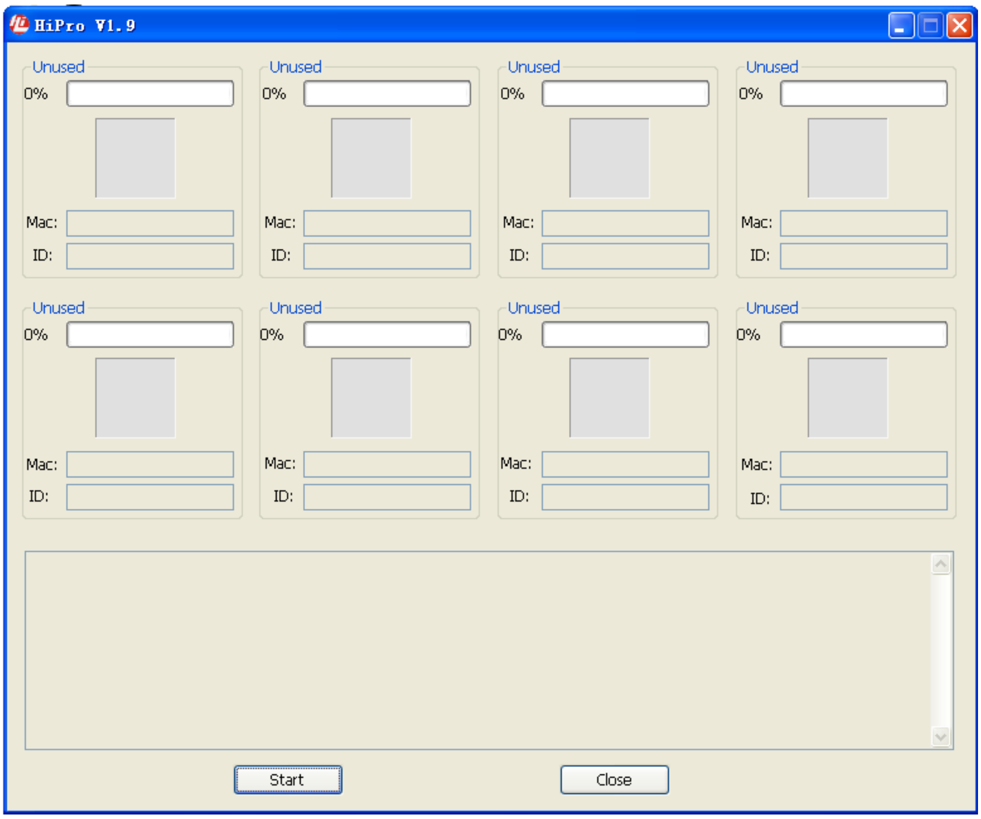
2.1 Introduction to the HiPro

NOTE

Currently, only Hi3716M V310, Hi3716M V330, Hi3716C V200, and Hi379*XX* V100 support the HiPro.

The HiPro burns images to the board by using the USB flash drive or serial port, and it supports the burning of bare dies and a maximum of eight boards at a time.

Figure 2-1 HiPro-serial page on a PC



The HiPro-serial requires the **program** file running on a board to burn the board. The **program** file can be downloaded through a serial port. The **program** file reads the HiPro image stored in the USB flash drive to burn the board.

2.2 Using HiPro-serial

2.2.1 Compiling the program File

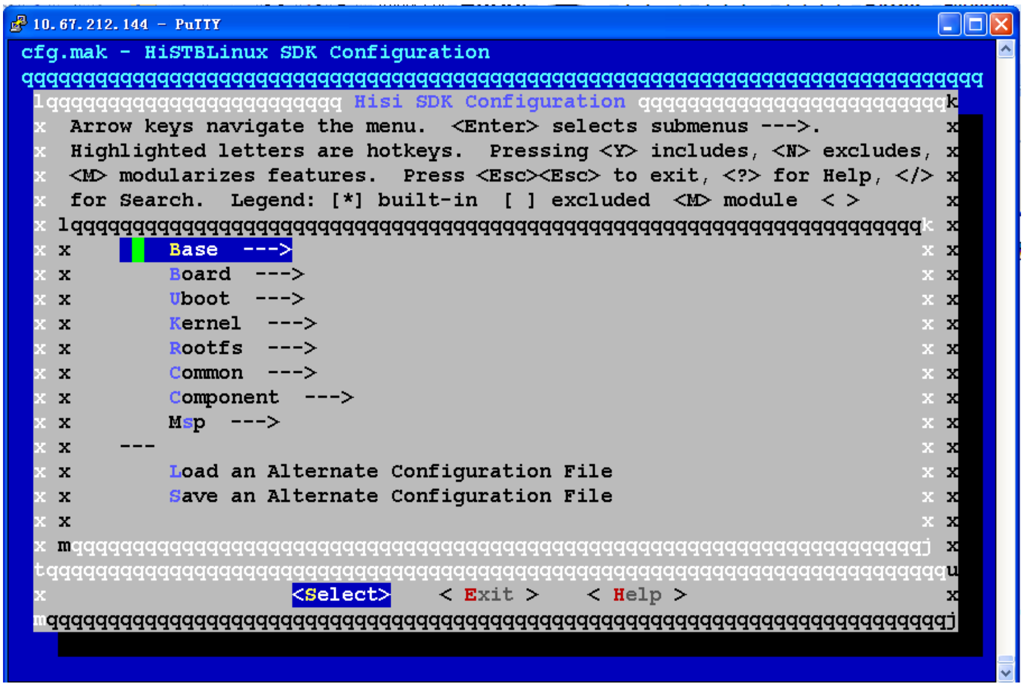
The **program** file must be compiled in the SDK environment. Decompress the SDK software package on a Linux server to go to the SDK root directory and configure the board to be burnt.

2.2.1.1 Linux SDK

The Hi3716C V200 demo board is used as an example. The configuration file of the corresponding Hi3716C V200 board is **hi3716cdmo2b_hi3716cv200Hi3716C V200_cfg.mak**. Run **cp configs/hi3716cdmo2b_hi3716cv200Hi3716C V200_cfg.mak cfg.mak** to change the configuration of the Hi3716C V200 board to that of the Hi3716C V200 demo board. You are advised to back up the **hi3716cdmo2b_hi3716cv200Hi3716C V200_cfg.mak file** and use the backup file to restore the original configuration after the **program** file is generated.

Step 1 Run the **make menuconfig** command to go to the SDK menuconfig home page.

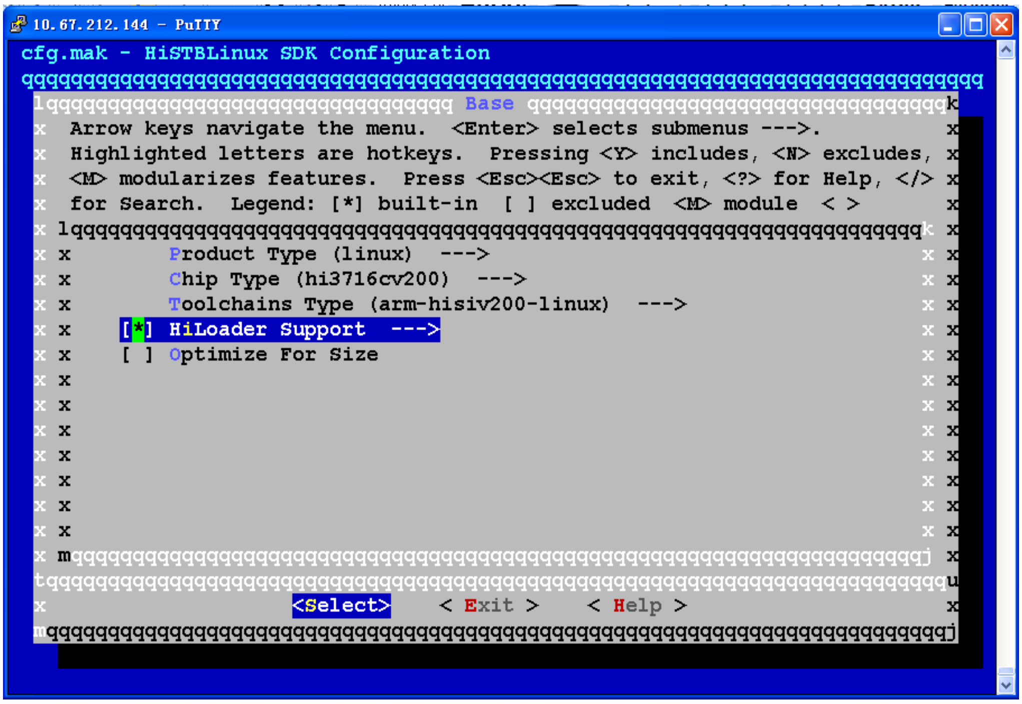
Figure 2-2 SDK menuconfig home page



```
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqqqqqqq Hisi SDK Configuration qqqqqqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.            x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,   x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>   x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >         x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x            Base  --->                                                x x
 x x            Board  --->                                               x x
 x x            Uboot  --->                                               x x
 x x            Kernel  --->                                              x x
 x x            Rootfs  --->                                              x x
 x x            Common  --->                                              x x
 x x            Component  --->                                           x x
 x x            Msp  --->                                                 x x
 x x    ---                                                               x x
 x x            Load an Alternate Configuration File                      x x
 x x            Save an Alternate Configuration File                      x x
 x x                                                                      x x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                    <Select>    < Exit >    < Help >                      x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

Step 2 Select **Base**, press **Enter**, and select **HiLoader Support**.

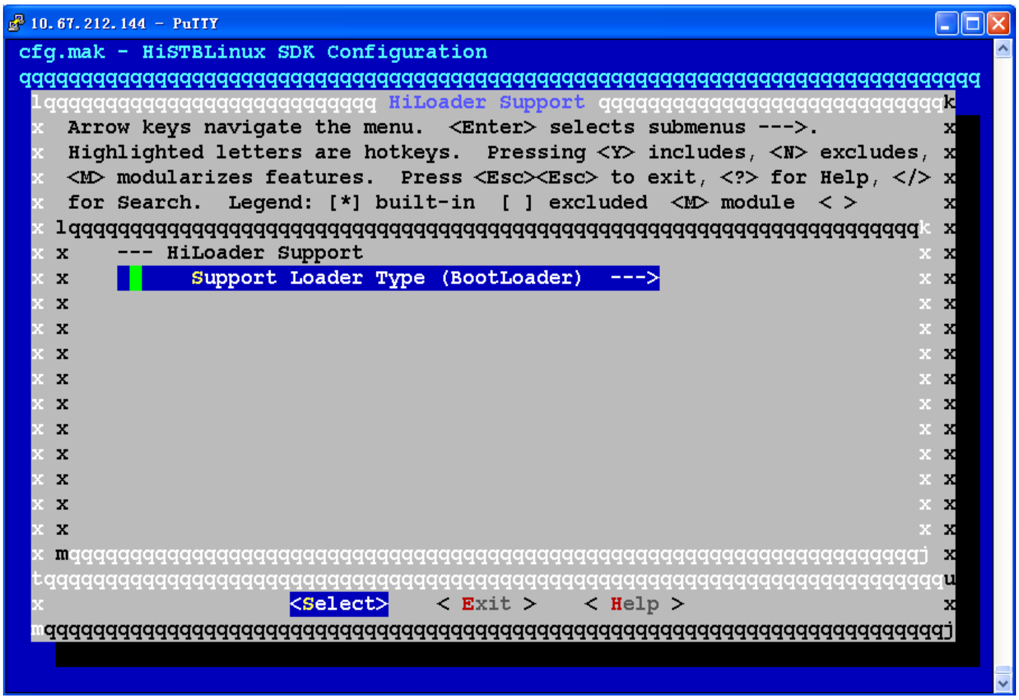
Figure 2-3 Selecting HiLoader Support



```
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq Base qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.          x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes, x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </> x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >       x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x         Product Type (linux)  --->                                  x x
 x x         Chip Type (hi3716cv200)  --->                               x x
 x x         Toolchains Type (arm-hisiv200-linux)  --->                  x x
 x x     [*] HiLoader Support  --->                                      x x
 x x     [ ] Optimize For Size                                           x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                     <Select>    < Exit >    < Help >                    x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

Step 3 Select **HiLoader Support**, press **Enter**, and select **Support Loader Type (BootLoader)**.

Figure 2-4 Selecting BootLoader



```
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqqqqqqqqq HiLoader Support qqqqqqqqqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.          x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes, x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </> x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >       x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x    --- HiLoader Support                                             x x
 x x           Support Loader Type (BootLoader)  --->                    x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
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 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                     <Select>    < Exit >    < Help >                    x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```
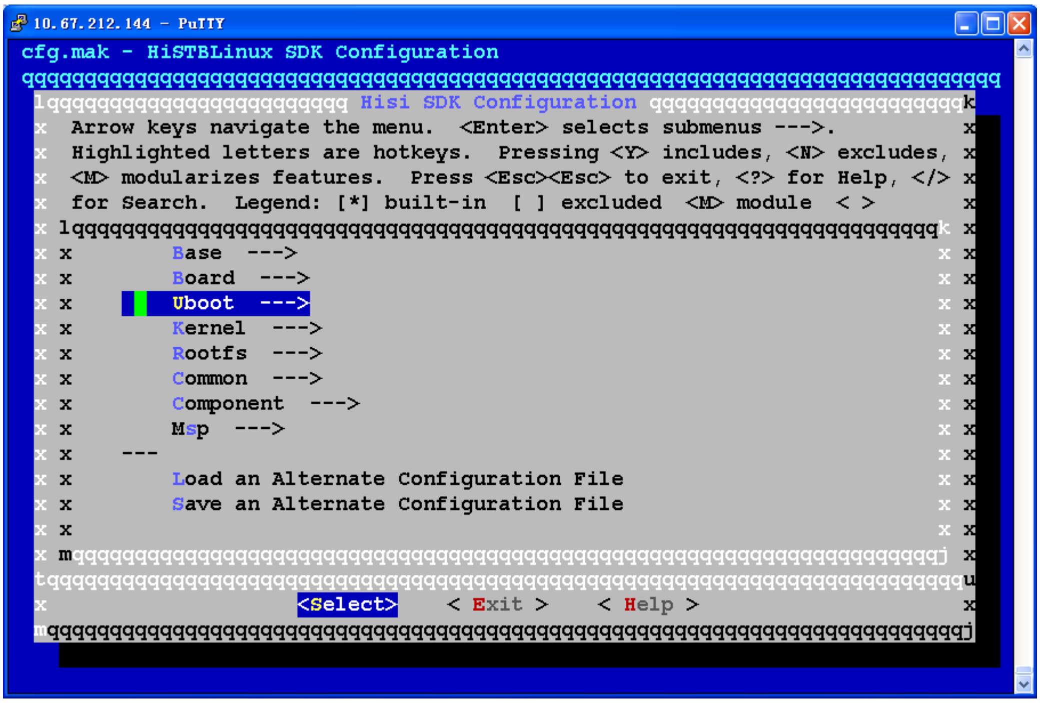

Step 4 Return to the home page and select **Uboot**.

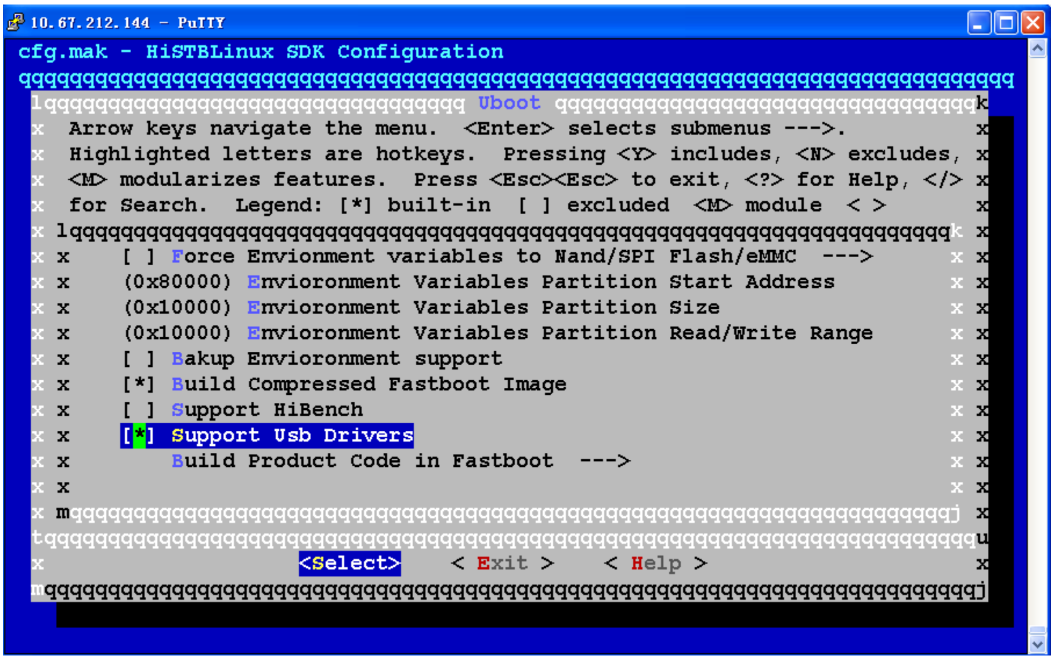
Figure 2-5 Selecting Uboot



```
10.67.212.144 - PuTTY
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqqqqqq Hisi SDK Configuration qqqqqqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.           x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,  x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>  x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >        x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x        Base  --->                                                 x x
 x x        Board  --->                                                x x
 x x        Uboot  --->                                                x x
 x x        Kernel  --->                                               x x
 x x        Rootfs  --->                                               x x
 x x        Common  --->                                               x x
 x x        Component  --->                                            x x
 x x        Msp  --->                                                  x x
 x x    ---                                                            x x
 x x        Load an Alternate Configuration File                       x x
 x x        Save an Alternate Configuration File                       x x
 x x                                                                   x x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                    <Select>    < Exit >    < Help >                      x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

Step 5 Select **Support Usb Drivers**. If the **boot** file of the board is large for you, select **Build Compressed Fastboot Image** to generate a smaller **program** file for saving the downloading time.

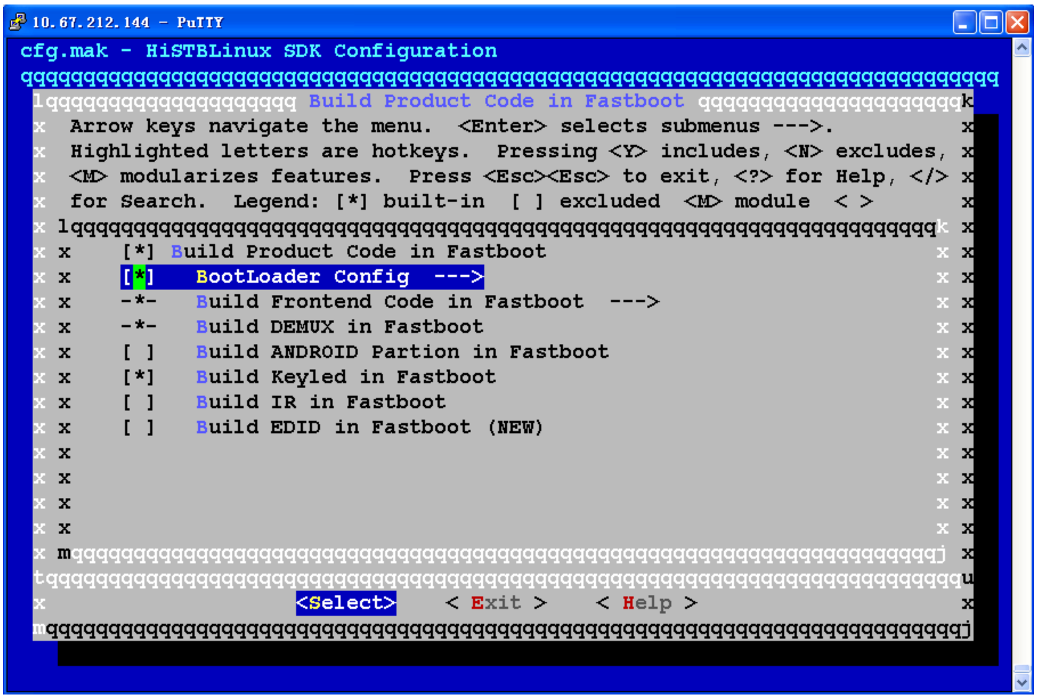
Figure 2-6 Selecting Support Usb Drivers



```
10.67.212.144 - PuTTY
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq Uboot qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.           x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,  x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>  x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >        x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x    [ ] Force Envionment variables to Nand/SPI Flash/eMMC  --->    x x
 x x    (0x80000) Envioronment Variables Partition Start Address       x x
 x x    (0x10000) Envioronment Variables Partition Size                x x
 x x    (0x10000) Envioronment Variables Partition Read/Write Range    x x
 x x    [ ] Bakup Envioronment support                                 x x
 x x    [*] Build Compressed Fastboot Image                            x x
 x x    [ ] Support HiBench                                            x x
 x x    [*] Support Usb Drivers                                        x x
 x x        Build Product Code in Fastboot  --->                       x x
 x x                                                                   x x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                    <Select>    < Exit >    < Help >                      x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

Step 6 Select **Build Product Code in Fastboot**, press **Enter**, and select **BootLoader Config**.

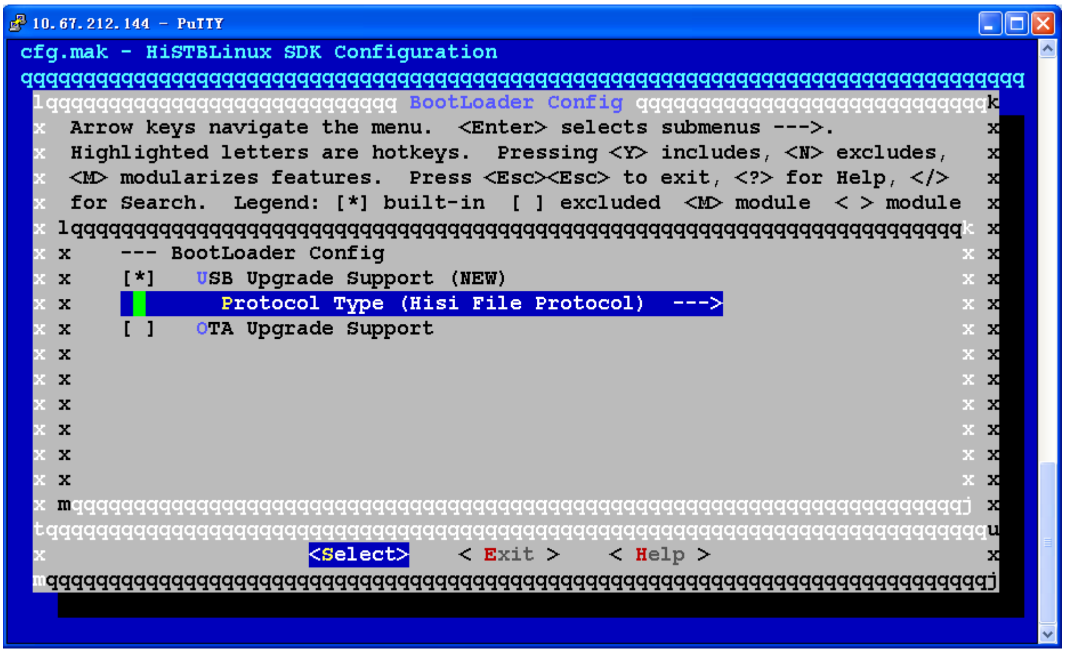
Figure 2-7 Selecting BootLoader Config



```
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqq Build Product Code in Fastboot qqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.          x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes, x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </> x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >       x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x    [*] Build Product Code in Fastboot                             x x
 x x    [*]   BootLoader Config  --->                                  x x
 x x    -*-   Build Frontend Code in Fastboot  --->                    x x
 x x    -*-   Build DEMUX in Fastboot                                  x x
 x x    [ ]   Build ANDROID Partion in Fastboot                        x x
 x x    [*]   Build Keyled in Fastboot                                 x x
 x x    [ ]   Build IR in Fastboot                                     x x
 x x    [ ]   Build EDID in Fastboot (NEW)                             x x
 x x                                                                   x x
 x x                                                                   x x
 x x                                                                   x x
 x x                                                                   x x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                    <Select>    < Exit >    < Help >                     x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

Step 7 Select **Protocol Type (Hisi File Protocol)**.

Figure 2-8 Selecting Hisi File Protocol



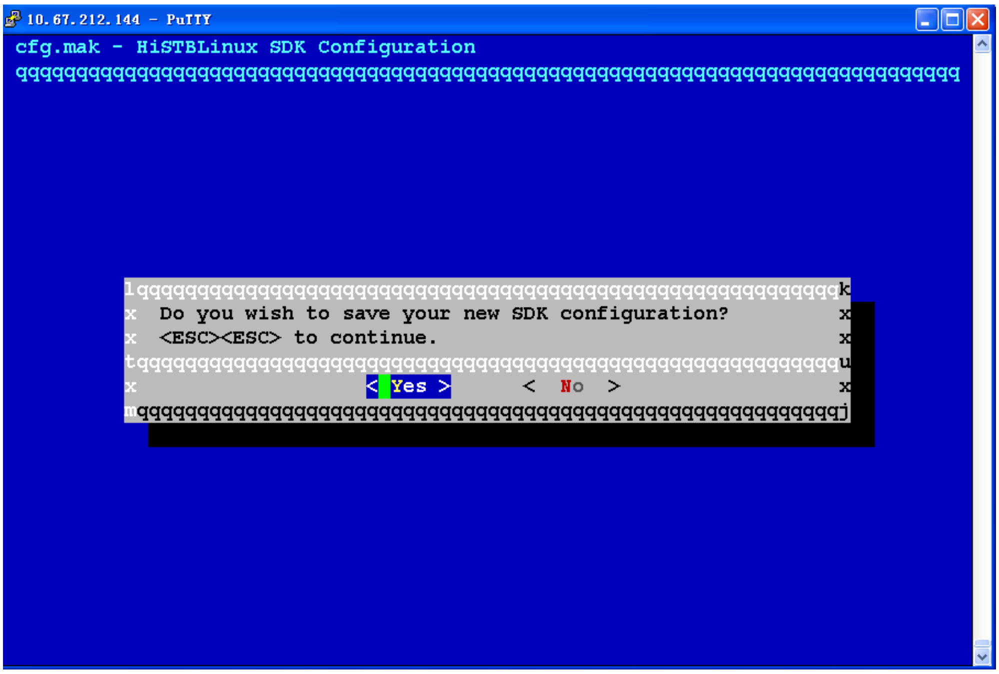
```
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
 lqqqqqqqqqqqqqqqqqqqqqqqqqqqq BootLoader Config qqqqqqqqqqqqqqqqqqqqqqqqqqqqk
 x  Arrow keys navigate the menu.  <Enter> selects submenus --->.            x
 x  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,   x
 x  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>   x
 x  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < > module  x
 x lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk x
 x x    --- BootLoader Config                                            x x
 x x    [*]   USB Upgrade Support (NEW)                                  x x
 x x            Protocol Type (Hisi File Protocol)  --->                 x x
 x x    [ ]   OTA Upgrade Support                                        x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x x                                                                     x x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj x
 tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x                    <Select>    < Exit >    < Help >                       x
 mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

CAUTION

The **OTA Upgrade Support** cannot be selected. If this option is selected in the SDK configuration file by default, you need to deselect it.

Step 8 Exit **menuconfig** and save the configuration.

Figure 2-9 Saving the configuration



```
cfg.mak - HiSTBLinux SDK Configuration
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq

         lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk
         x  Do you wish to save your new SDK configuration?            x
         x  <ESC><ESC> to continue.                                    x
         tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
         x                   < Yes >      <  No  >                     x
         mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

Step 9 Run **make hiboot_clean;make hiboot_install** to compile the **program** file. After the compiling is successful, the corresponding **program.bin** file will be generated in the **tools/windows/HiPro-serial** directory.

----End

2.2.1.2 Android SDK

Run **make hipro** in the Android root directory. After compilation is complete, **program.bin** and **HiPro-serial** are generated in the **out** directory. Take Hi3716C V200 as an example. The tools are generated in **out/target/product/Hi3716CV200/Emmc/** and **out/target/product/Hi3716CV200/Nand**.

2.2.2 Creating a HiPro Image — usb_update.bin

The HiPro images are images packaged in a certain format for board burning, including the boot, kernel, and file system.

The HiPro images are made using the HiTool. The image creations vary according board types. The board types are listed as follows:

- eMMC boards
- SPI flash + NAND flash or NAND flash boards

2.2.2.1 eMMC Boards

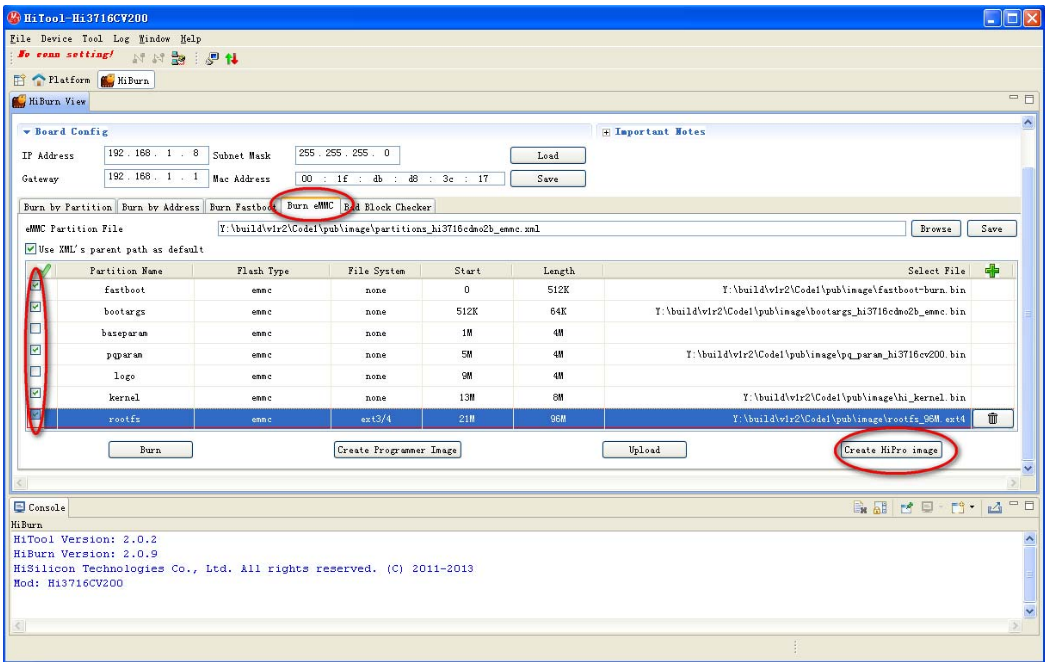
To create a HiPro image for eMMC boards, perform the following steps.

Step 1 Open the HiTool to go to the **HiBurn View** page.

Step 2 Choose **Burn eMMC** and configure the partitions to be burnt or export an .xml partition information file.

Step 3 Click **Create HiPro image**, as shown in Figure 2-10.

Figure 2-10 Creating a HiPro image for eMMC boards



IP Address 192 . 168 . 1 . 8 Subnet Mask 255 . 255 . 255 . 0
Gateway 192 . 168 . 1 . 1 Mac Address 00 : 1f : db : d8 : 3c : 17

eMMC Partition File Y:\build\v1r2\Code1\pub\image\partitions_hi3716cdmo2b_emmc.xml

☑ Use XML's parent path as default

	Partition Name	Flash Type	File System	Start	Length	Select File
☑	fastboot	emmc	none	0	512K	Y:\build\v1r2\Code1\pub\image\fastboot-burn.bin
☑	bootargs	emmc	none	512K	64K	Y:\build\v1r2\Code1\pub\image\bootargs_hi3716cdmo2b_emmc.bin
□	baseparam	emmc	none	1M	4M	
☑	pqparam	emmc	none	5M	4M	Y:\build\v1r2\Code1\pub\image\pq_param_hi3716cv200.bin
□	logo	emmc	none	9M	4M	
☑	kernel	emmc	none	13M	8M	Y:\build\v1r2\Code1\pub\image\hi_kernel.bin
☑	rootfs	emmc	ext3/4	21M	96M	Y:\build\v1r2\Code1\pub\image\rootfs_96M.ext4

```
HiBurn
HiTool Version: 2.0.2
HiBurn Version: 2.0.9
HiSilicon Technologies Co., Ltd. All rights reserved. (C) 2011-2013
Mod: Hi3716CV200
```

Step 4 In the page that is displayed, save the HiPro image and name the image as **usb_update.bin**.

----End

2.2.2.2 SPI Flash+NAND Flash or NAND Flash Boards

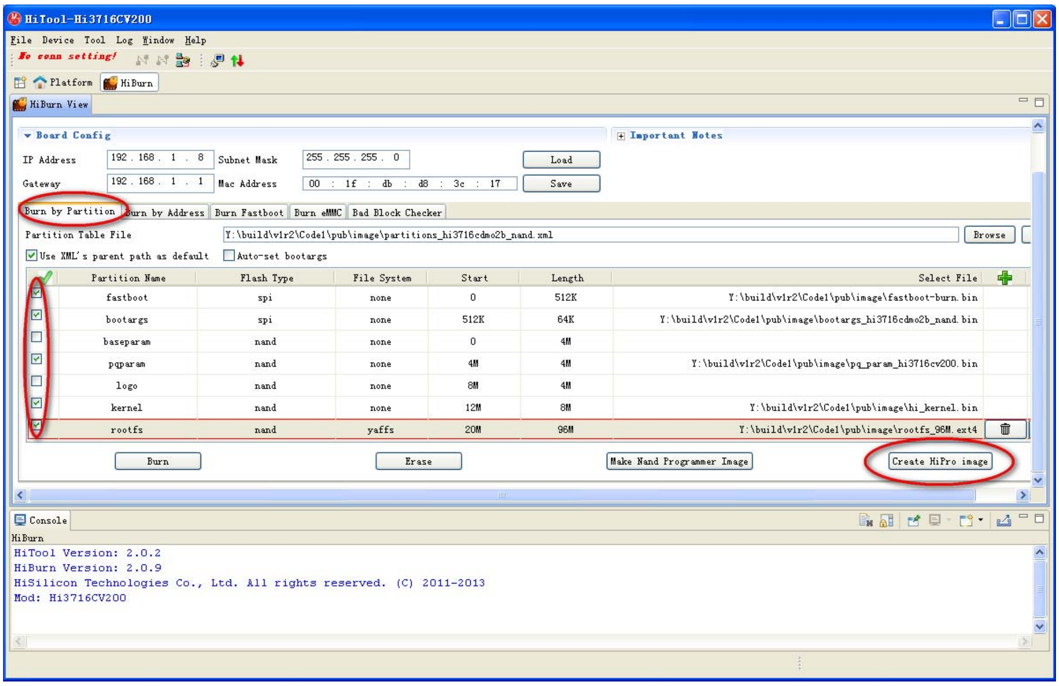
To create a HiPro image for SPI flash+NAND flash or NAND flash boards, perform the following steps.

Step 1 Open the HiTool to go to the **HiBurn View** page.

Step 2 Choose **Burn by Partition** and configure the partitions to be burnt or export an .xml partition information file.

Step 3 Click **Create HiPro image**, as shown in Figure 2-11.

Figure 2-11 Creating a HiPro image for SPI flash+NAND Flash or NAND flash boards



IP Address 192 . 168 . 1 . 8
Subnet Mask 255 . 255 . 255 . 0
Gateway 192 . 168 . 1 . 1
Mac Address 00 : 1f : db : d8 : 3c : 17

Partition Table File Y:\build\v1r2\Code1\pub\image\partitions_hi3716cdmo2b_nand.xml

☑ Use XML's parent path as default ☐ Auto-set bootargs

	Partition Name	Flash Type	File System	Start	Length	Select File
☑	fastboot	spi	none	0	512K	Y:\build\v1r2\Code1\pub\image\fastboot-burn.bin
☑	bootargs	spi	none	512K	64K	Y:\build\v1r2\Code1\pub\image\bootargs_hi3716cdmo2b_nand.bin
☐	baseparam	nand	none	0	4M	
☑	pqparam	nand	none	4M	4M	Y:\build\v1r2\Code1\pub\image\pq_param_hi3716cv200.bin
☐	logo	nand	none	8M	4M	
☑	kernel	nand	none	12M	8M	Y:\build\v1r2\Code1\pub\image\hi_kernel.bin
☑	rootfs	nand	yaffs	20M	96M	Y:\build\v1r2\Code1\pub\image\rootfs_96M.ext4

```
HiBurn
HiTool Version: 2.0.2
HiBurn Version: 2.0.9
HiSilicon Technologies Co., Ltd. All rights reserved. (C) 2011-2013
Mod: Hi3716CV200
```

Step 4 In the page that is displayed, save the HiPro image and name the image as **usb_update.bin**.

CAUTION

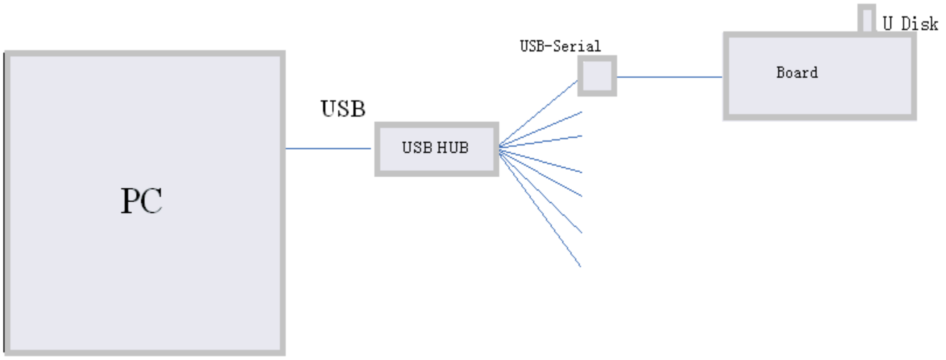
The HiPro image must be named as **usb_update.bin**.

----End

2.2.3 Setting up the Burning Network Environment and Determining Materials

The PC is connected to multiple USB-to-serial cables using a USB Hub, and each USB-to-serial cable is connected to a serial port of the board to be burnt. Download the **program** file through a serial port and burn the image to the board flash memory using the **program** file, as shown in Figure 2-12. If a board has a dongle, the mini USB of the dongle supplies the power for the board, and connect the board to the serial port if you make some cables and a converter.

Figure 2-12 Setting up burning network environment



To set up a stable burning network environment, you are recommended to use materials listed as follows:

- USB flash drive: Kingston DataTraveler 4 GB USB 2.0. If the storage capacity of the USB flash drive is greater than 4 GB, the USB flash drive must be formatted as a 4 GB partition. Only the upgrade package can be stored in the USB flash drive. You can purchase the USB flash drive from http://item.taobao.com/item.htm?spm=a1z10.3.0.72.uPOvap&id=9009181350&.
- USB Hub (must have an independent power supply): SSK Hub

  You can purchase the USB Hub from http://detail.tmall.com/item.htm?spm=a230r.1.10.88&id=14491968034.
- USB-to-serial cable: Z-TEK.

2.2.4 Burning the Board by Using HiPro-serial

Perform the following steps:

Step 1 On the PC running the Windows, delete other partitions on the USB flash drive. Retain only one partition, format the partition as the FAT32 file system, and copy the HiPro image file (**usb_update.bin**) to the USB flash drive root directory. Copy **program.bin** to the directory for storing the HiPro-serial.

CAUTION

The USB flash drive must have only one partition and the partition must be formatted as the FAT32 file system.

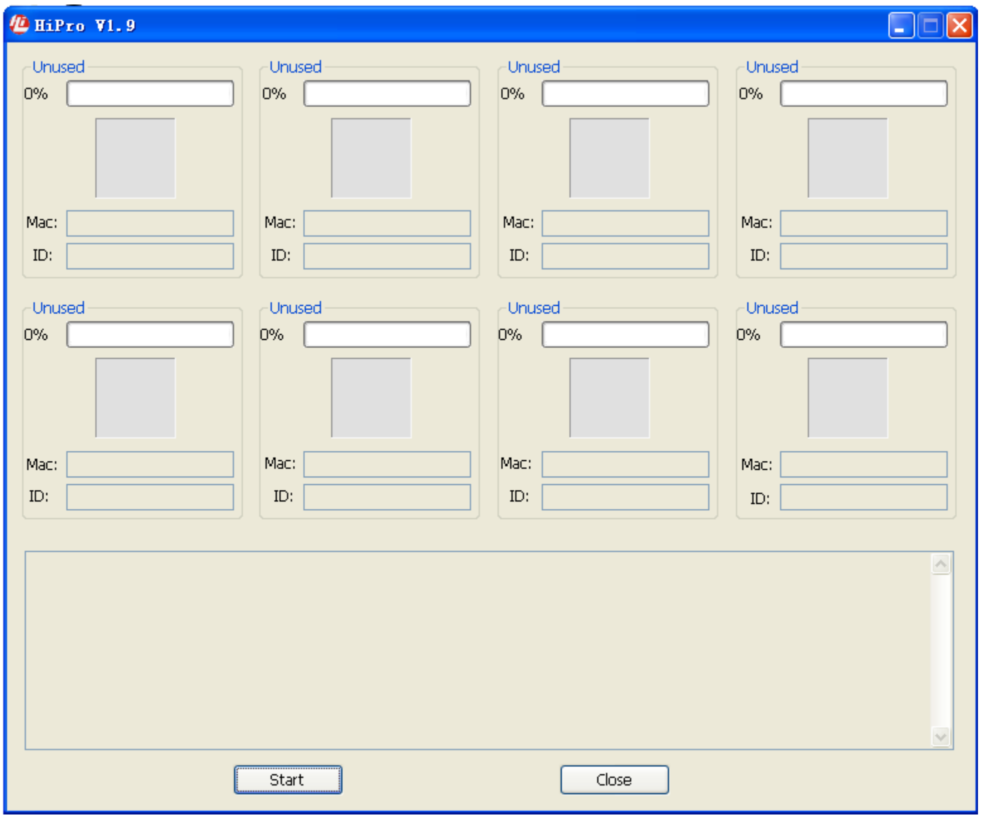
Step 2 Connect the serial port of the PC to that of the board and insert the USB flash drive into the USB port on the board.

CAUTION

Each board requires one USB flash drive and one serial cable. The serial port on the PC can be expanded to multiple serial ports by connecting the serial port on the PC to a USB Hub and connecting the USB Hub to multiple USB-to-serial cables.

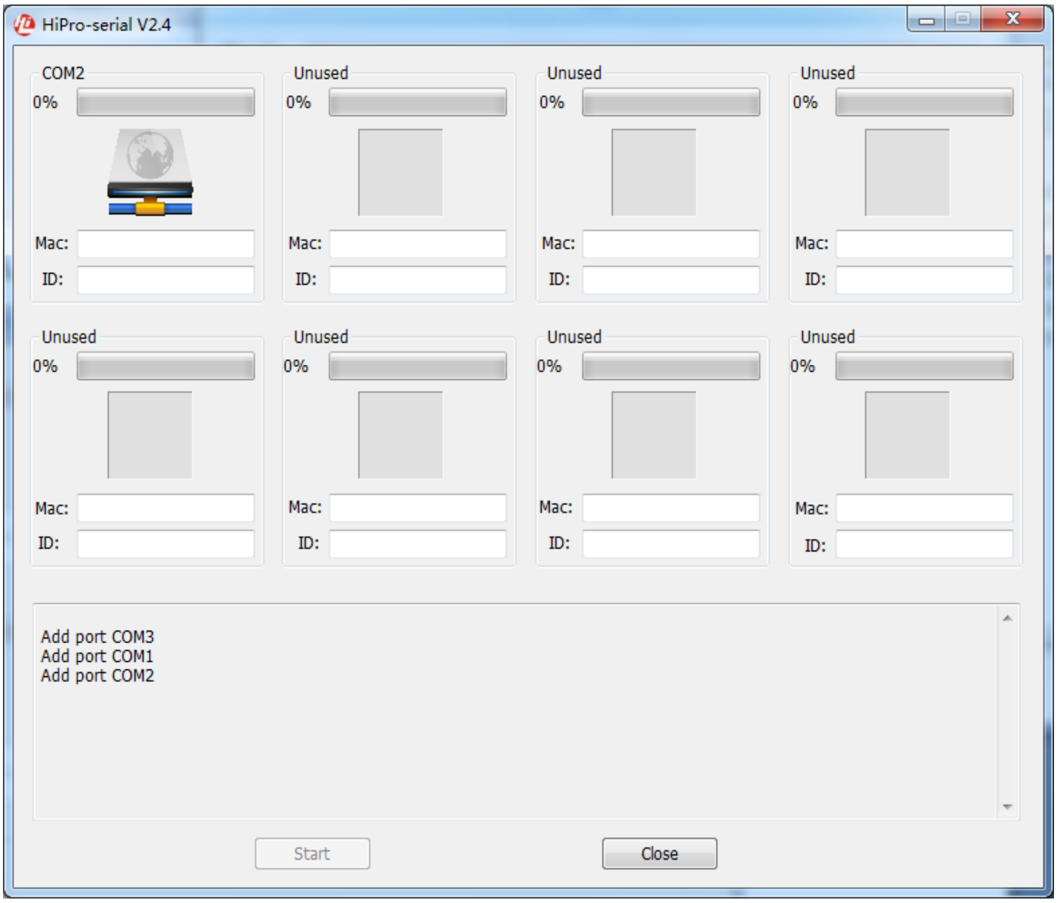
Step 3 On the PC, double-click **HiPro-serial.exe** in the SDK **tools\windows\HiPro-serial\HiPro-serial_XX** directory.

Figure 2-13 HiPro-serial home page



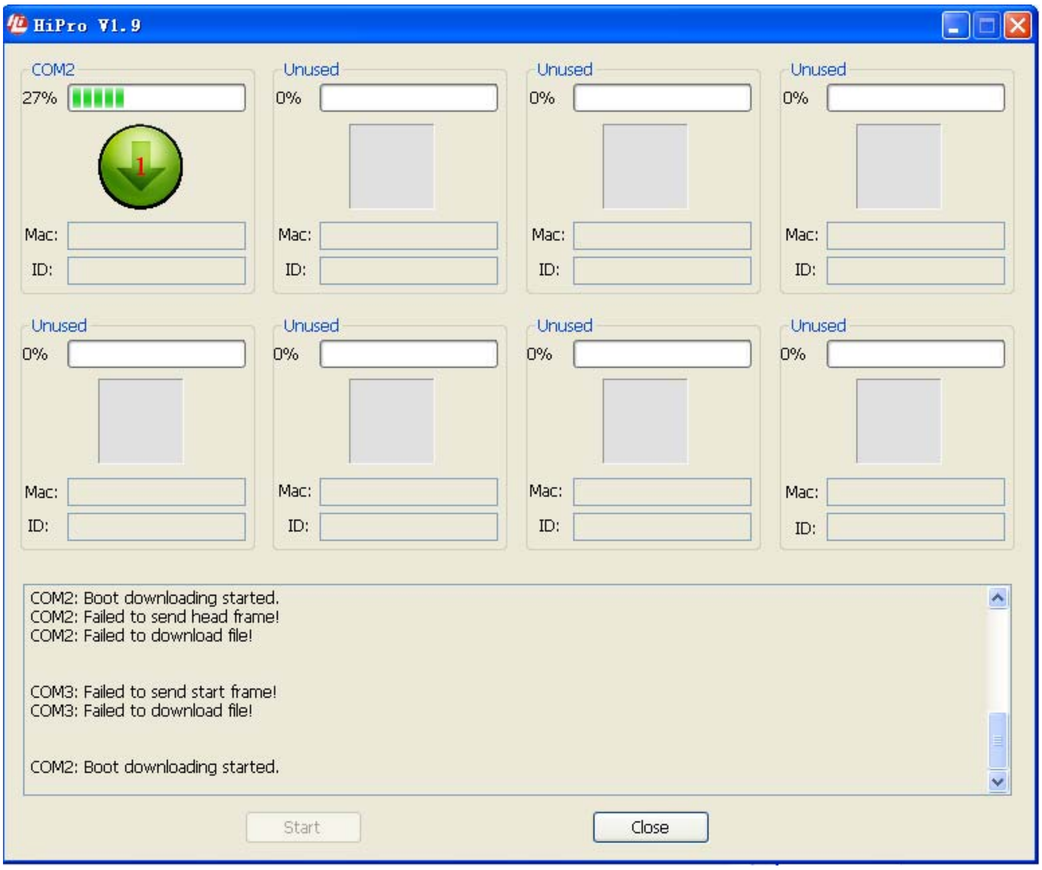
Step 4 Click **Start** and power on the board. The HiPro-serial automatically detects the board that is powered on. If the MAC and ID options are enabled in the configuration file, specify **Mac** and **ID**, as shown in Figure 2-14. If the MAC and ID options are disabled in the configuration file, the HiPro starts to download the program file, as shown in Figure 2-15.

Figure 2-14 Specifying the MAC and ID



```
Add port COM3
Add port COM1
Add port COM2
```

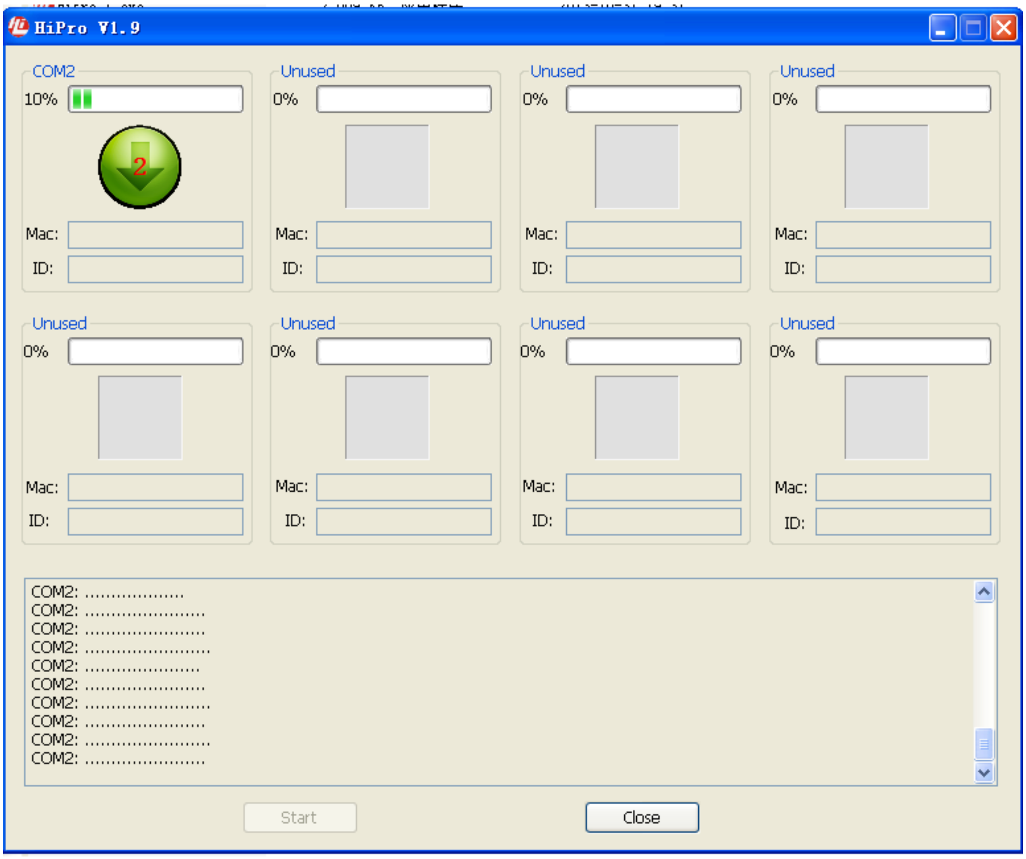
Figure 2-15 Downloading the program file



```
COM2: Boot downloading started.
COM2: Failed to send head frame!
COM2: Failed to download file!


COM3: Failed to send start frame!
COM3: Failed to download file!


COM2: Boot downloading started.
```

After downloading the **program** file, the HiPro-serial scans the USB flash drive and reads the **usb_update.bin** file to burn the board, as shown in Figure 2-16.

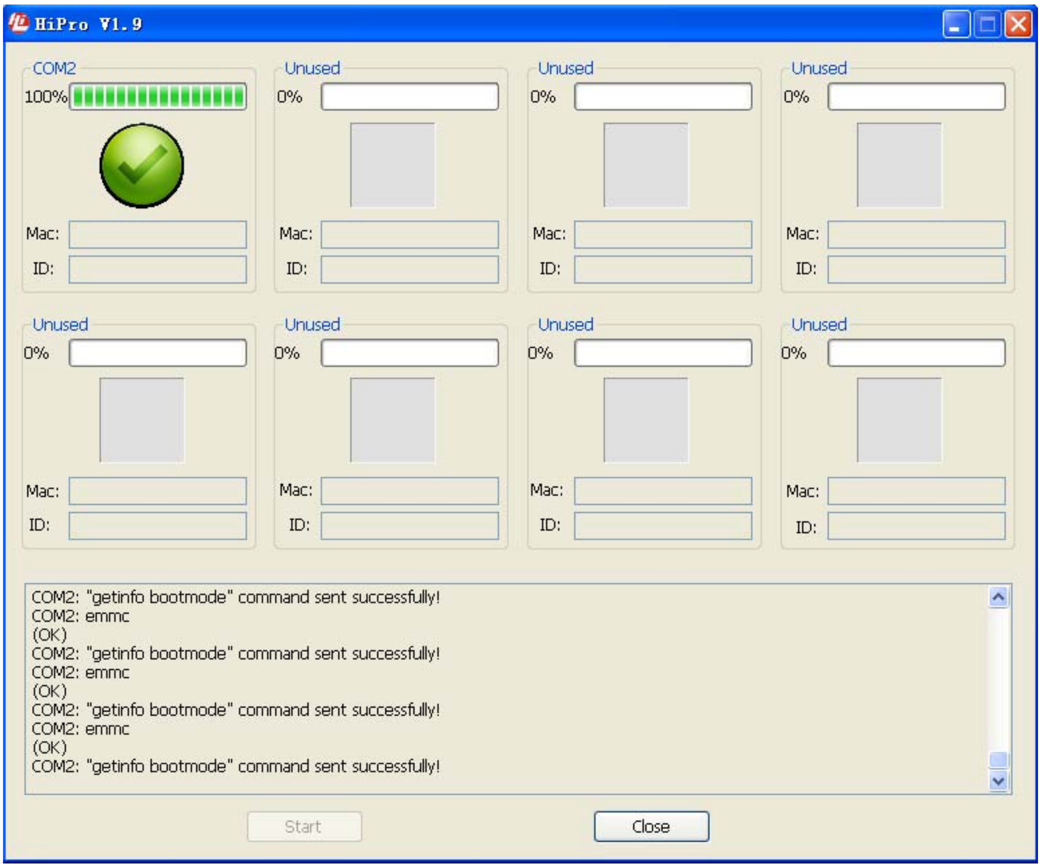
Figure 2-16 Burning the board



```
COM2: ...................
COM2: .......................
COM2: .......................
COM2: ........................
COM2: ......................
COM2: .......................
COM2: ........................
COM2: .......................
COM2: ........................
COM2: .......................
```

The board burning is succeeded, as shown in Figure 2-17.

Figure 2-17 Burning succeeded



```
COM2: "getinfo bootmode" command sent successfully!
COM2: emmc
(OK)
COM2: "getinfo bootmode" command sent successfully!
COM2: emmc
(OK)
COM2: "getinfo bootmode" command sent successfully!
COM2: emmc
(OK)
COM2: "getinfo bootmode" command sent successfully!
```

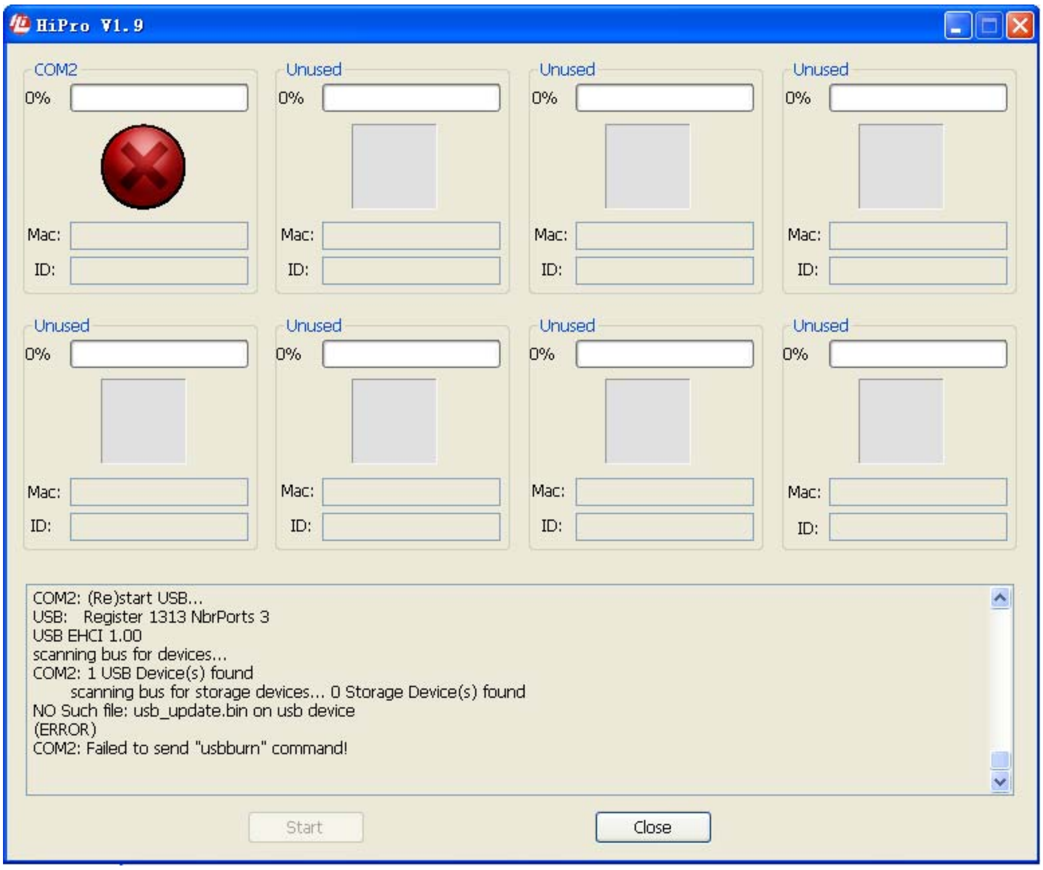
----End

2.3 HiPro-serial FAQs

2.3.1 What Are the Causes for Burning Failures?

If the burning fails, the HiPro-serial displays the information shown in Figure 2-18.

Figure 2-18 Burning failure of HiPro-serial



```
COM2: (Re)start USB...
USB:   Register 1313 NbrPorts 3
USB EHCI 1.00
scanning bus for devices...
COM2: 1 USB Device(s) found
       scanning bus for storage devices... 0 Storage Device(s) found
NO Such file: usb_update.bin on usb device
(ERROR)
COM2: Failed to send "usbburn" command!
```

The failure may be caused by the following reasons:

- The USB flash drive is not formatted as the FAT32 file system.
- The USB flash drive does not contain the **usb_update.bin** file.
- The USB flash drive has more than one partition.
- The serial cable is not connected properly.

2.3.2 How Do I Associates the Serial Ports with the COM Numbers Displayed on the HiPro-serial?

After the HiPro-serial starts, the background software automatic identifies the serial ports that are not occupied. You do not need to specify a serial port. A maximum of eight serial ports can be connected to the board. The serial port number ranging from COM1 to COM8 is displayed on the HiPro-serial page from left to right and from top to bottom.

The operator connects the PC to the boards to be burnt. The HiPro-serial automatically identifies a proper serial port number. You are advised to mark the serial cables so that the operator can obtain the burning status of each board easily by viewing the mapping between the mark on the serial port and the serial port number displayed on the HiPro-serial page.

3 Burning the MAC and ID

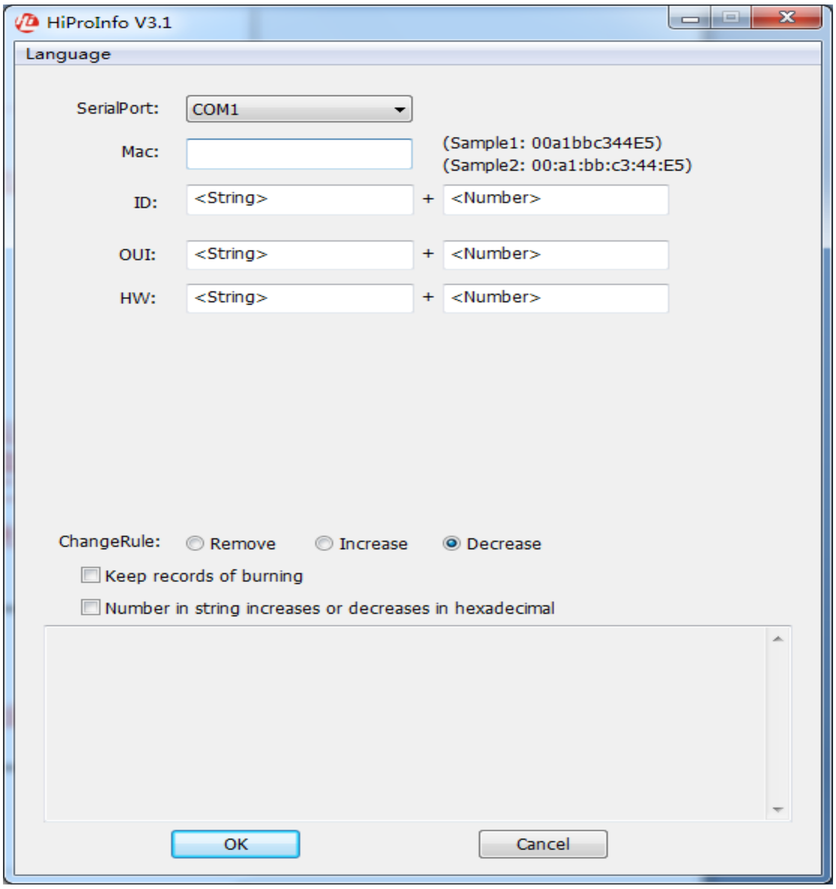
3.1 HiProInfo

NOTE

Currently, only Hi3716M V310, Hi3716M V330, Hi3716C V200, and Hi379*XX* V100 support the HiProInfo.

The HiProInfo is an MAC and ID burning tool. It can be used to burn the MAC and ID over the serial port.

Figure 3-1 HiProinfo (PC end)



HiProInfo V3.1

Language

SerialPort: COM1

Mac:

(Sample1: 00a1bbc344E5)
(Sample2: 00:a1:bb:c3:44:E5)

ID: <String> + <Number>

OUI: <String> + <Number>

HW: <String> + <Number>

ChangeRule: ○ Remove ○ Increase ● Decrease

□ Keep records of burning

□ Number in string increases or decreases in hexadecimal

The HiProInfo requires that the board be a non-bare board. The HiProInfo downloads group data over the serial port, waits for the fastboot to run, and then interacts with the fastboot to burn the MAC and ID.

3.2 HiProInfo Usage

3.2.1 Configurations

Some functions of the HiProInfo can be enabled or disabled. There is a configuration file **BurnConfig.ini** in the directory for storing the HiProInfo. You can modify the configuration options in this file as required before using the HiProInfo. For example, if you want to disable a function, comment out the corresponding configuration by using a semicolon (;).

- **IsCA**: CA board or not

  Set **IsCA** to **0** for a common board and to **1** for a CA board.

⚠ **CAUTION**

Currently only some chips support the CA functions. For details, consult the FAE. When the CA board is burnt, the **ProgrammerforCA.bin** file must exist in the directory for storing the HiProInfo. **ProgrammerforCA.bin** is the **fastboot.bin** generated for the CA version. For details about how to create **ProgrammerforCA.bin**, see chapter 2 in the *Level 2 Security Solution for the HiSilicon Intelligent STB User Guide*. Take the Hi3798M V100 board as an example. The generated file is **out/target/product/Hi3798MV100/Security_L2/MAINTAIN/fastboot.bin**. Rename it **ProgrammerforCA.bin** and put it in the directory for storing the HiProInfo.

- **BoardType**: board type

  The following boards are supported currently (contact the FAE for any update).

  - For Hi3716C V100, set **BoardType** to **0**.
  - For Hi3716M V300, set **BoardType** to **1**.
  - For Hi3716C V200ES, set **BoardType** to **2**.
  - For Hi3712 V100, set **BoardType** to **3**.
  - For Hi3716C V200/Hi3719C V100/Hi3718C V100/Hi3719M V100/Hi3798C V100/Hi3798M V100/Hi3796C V100, set **BoardType** to **4**.
- **MacBurnFlashType**: flash memory type
  - For the NAND flash, set **MacBurnFlashType** to **1**.
  - For the SPI flash, set **MacBurnFlashType** to **2**.
  - For the eMMC flash, set **MacBurnFlashType** to **3**.
- **MacBurnAddress**: burning address
  - For the NAND flash and SPI flash, **MacBurnAddress** is set to **0x3f0000** by default.
  - For the eMMC flash, **MacBurnAddress** is set to **0xc00000** by default.
  - For the CA board, **MacBurnAddress** is set to **0x80000** by default.

⚠ **CAUTION**

If **MacBurnAddress** is incorrectly configured, the burning may fail or data is burnt to the incorrect address. The address must be block-aligned; otherwise, the burning may fail.

- **CfgName**: customized burning information

  For example, the information can be the OUI and HW serial number for the loader upgrade. Records are separated by a single-byte character "|". Each record supports the following two formats:

  - Only customized information. The HiProInfo provides configuration boxes for customization on the UI, and both the ID and MAC support the descending and ascending modes. A maximum of three records are supported.
  - Customized fixed character strings, in the format of *Customized name:Character string*. For example, **CfgName=OUI:123456789|HW**. The HiProInfo directly burns the configured character string 123456789 and does not provide any input box on the UI.

- **ExtraInfo**: extra burning information

  For example, the information can be a shared partition file or other required version information. Records are separated by a single-byte character "|". Each record supports the following three formats:

  - Only offset address. In this case, the HiProInfo provides configuration boxes for the prefix character and ID, and both the ID and MAC support the descending and ascending modes. A maximum of four records are supported.
  - Offset address and character string to be burnt, in the format of *Address:Character string*. The HiProInfo directly writes the character string into the corresponding offset address. For example, to write the software version, configure the parameter as follows: **ExtraInfo=0x1000=versionA|0x2000|0x3000**. The number of entries is not restricted.
  - To burn a file into an offset address, configure the file path in the following format: **ExtraInfo=0x1000:<file:***absolute path*>, for example, **ExtraInfo=0x1000:<file:D:\LoaderDB.bin>**. The file cannot be too large.

⚠ **CAUTION**

The address configured in **ExtraInfo** must be block-aligned; otherwise, the burning may fail.

- **AppLanguage**: default language
  - **1**: Chinese
  - **2**: English

3.2.2 Burning the MAC and ID

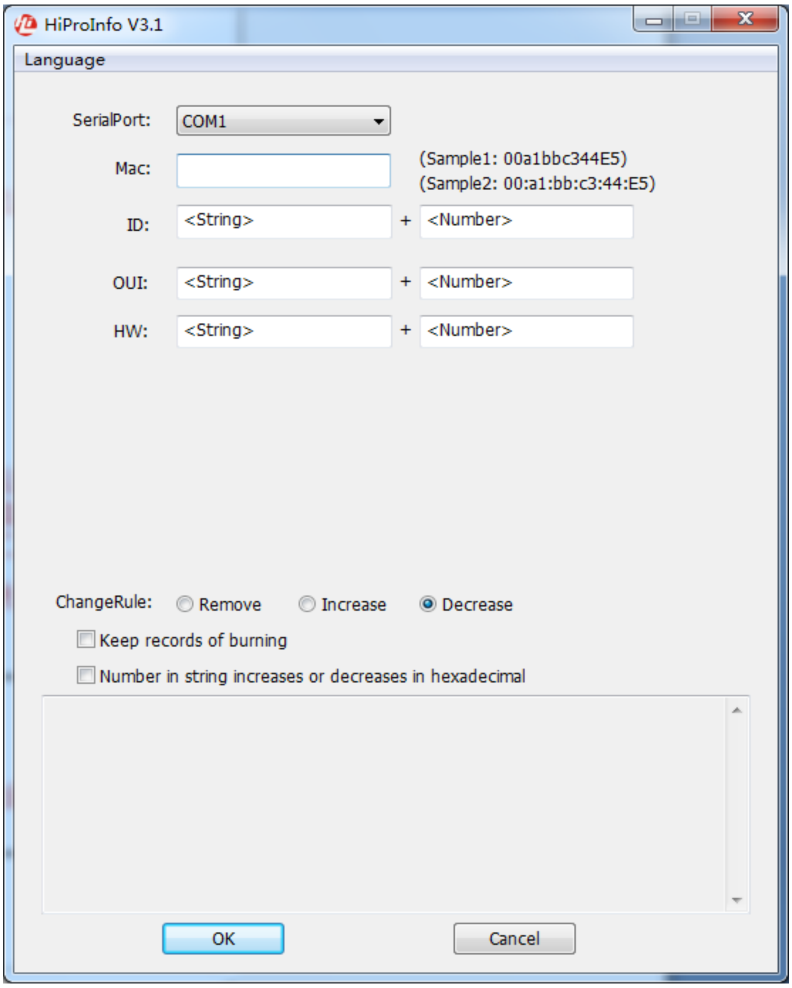
To burn the MAC and ID, perform the following steps:

Step 1 Modify **BurnConfig.ini** in the directory for storing the HiProInfo as required. Note that the configuration file and the HiProInfo must be stored in the same directory.

Step 2 Connect the serial port of the PC to that of the board.

Step 3 On the PC, run **HiProInfo.exe** in **tools\windows\HiProinfo\HiProinfo_XX** of the SDK.

Figure 3-2 Main GUI



SerialPort: COM1

Mac: (Sample1: 00a1bbc344E5) (Sample2: 00:a1:bb:c3:44:E5)

ID: <String> + <Number>

OUI: <String> + <Number>

HW: <String> + <Number>

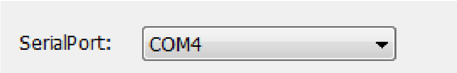
ChangeRule: ○ Remove ○ Increase ● Decrease

□ Keep records of burning

□ Number in string increases or decreases in hexadecimal

Step 4 Select the serial port that has been connected to the serial port of the board. Ensure that the serial port is not being used by other tools; otherwise, an error occurs.

Figure 3-3 Selecting the serial port

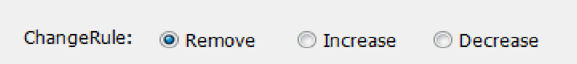


SerialPort: COM4

Step 5 Enter the MAC address, ID, and other information to be burnt. The MAC information is stored and will be loaded automatically next time. For details about the format, see Figure 3-5.

Step 6 Specify the change rule. After burning is successful, the MAC address and ID are automatically updated according to this rule. You can select only one rule.

Figure 3-4 Selecting a change rule



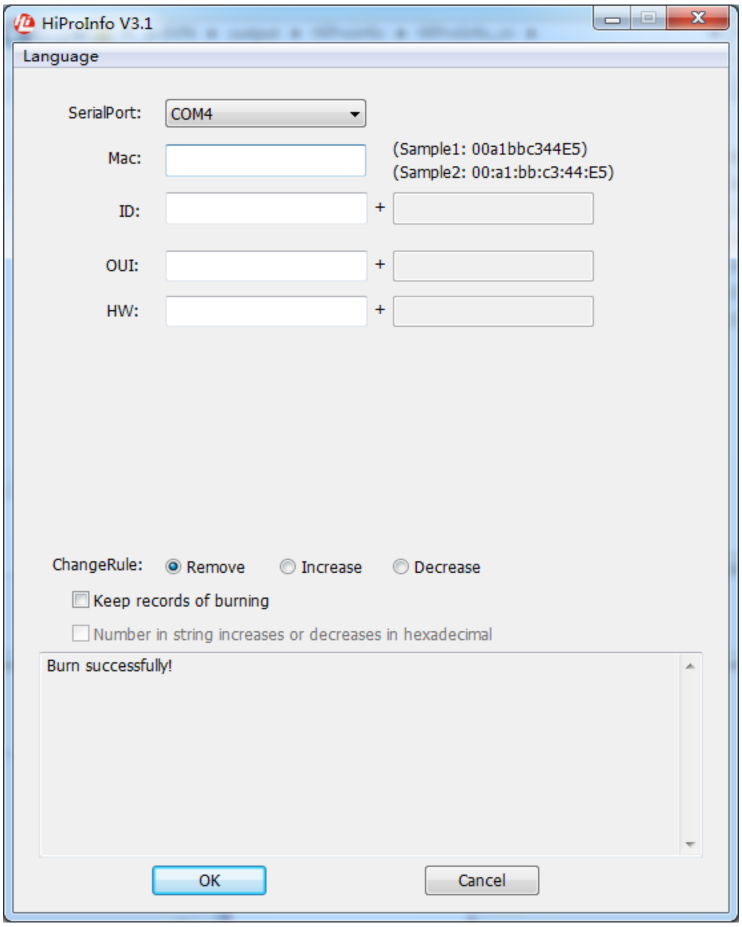
ChangeRule: ● Remove ○ Increase ○ Decrease

Step 7 Select or deselect **Keep records of burning**, and click **OK** to start burning.

CAUTION

The HiProInfo allows you to switch the input box by pressing **Enter**. Pressing **Enter** in the last input box starts burning. Therefore, ensure that all configurations (such as the serial port and change rule) are correct when you press **Enter** in the last input box. The **SerialPort**, **ChangeRule**, and **Keep records of burning** configurations are saved after the HiProInfo is exited, and the configurations are restored when you use the HiProInfo next time.

Figure 3-5 Burning successful



SerialPort: COM4

Mac: (Sample1: 00a1bbc344E5)
(Sample2: 00:a1:bb:c3:44:E5)

ID: +

OUI: +

HW: +

ChangeRule: ● Remove ○ Increase ○ Decrease

□ Keep records of burning

□ Number in string increases or decreases in hexadecimal

Burn successfully!

----End

3.3 Causes of Burning Failures

The burning failure may be caused by the following reasons:

- The serial cable is not connected properly.
- The serial port is being used.
- The board type is configured incorrectly.
- The flash type is configured incorrectly.
- The board is a bare board.

4 Mass Production Burning Method

The SPI flash is usually used with the NAND flash. The following storage solutions are used as an example to describe the mass production burning:

- eMMC
- SPI flash+NAND flash or NAND flash

4.1 eMMC

NOTE

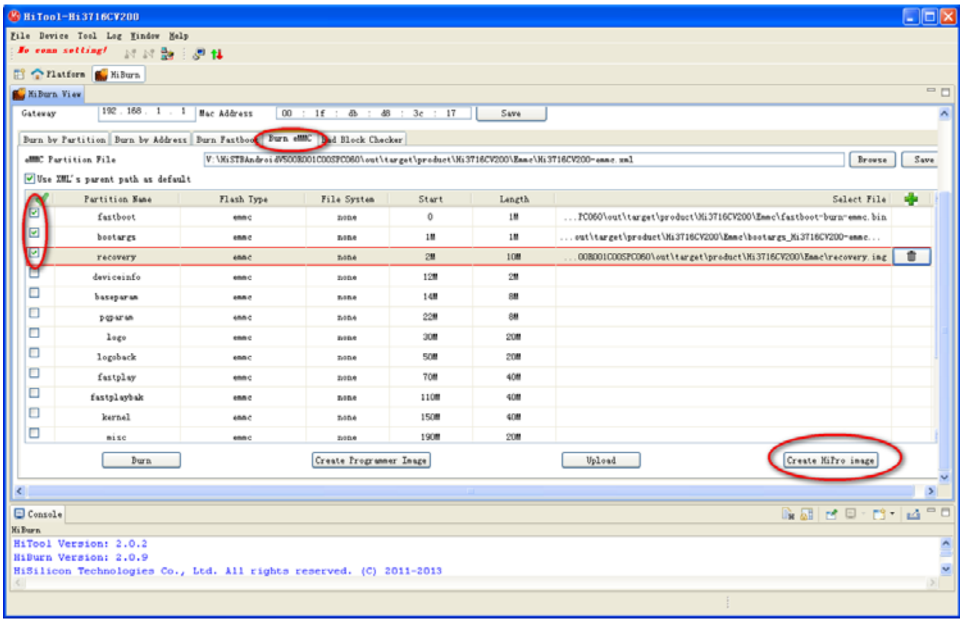
Some chips do not support the eMMC. This section applies only to chips that support the eMMC.

4.1.1 Burning the Boot and Android Recovery Using the HiPro-serial and Upgrading a Board Using the Recovery

To burn the boot and Android recovery, and upgrade a board, perform the following steps:

Step 1 Create an Android recovery HiPro image. Select **fastboot**, **bootargs**, and **recovery** partitions and click **Create HiPro Image**, as shown in Figure 4-1.

Figure 4-1 Creating an Android recovery HiPro image



Gateway 192 . 168 . 1 . 1   Mac Address 00 : 1f : db : 48 : 3c : 17   Save

eMMC Partition File V:\HiSTBAndroidV500R001C00SPC060\out\target\product\Hi3716CV200\Emmc\Hi3716CV200-emmc.xml

☑ Use XML's parent path as default

	Partition Name	Flash Type	File System	Start	Length	Select File
☑	fastboot	emmc	none	0	1M	...PC060\out\target\product\Hi3716CV200\Emmc\fastboot-burn-emmc.bin
☑	bootargs	emmc	none	1M	1M	...out\target\product\Hi3716CV200\Emmc\bootargs_Hi3716CV200-emmc...
☑	recovery	emmc	none	2M	10M	...00R001C00SPC060\out\target\product\Hi3716CV200\Emmc\recovery.img
□	deviceinfo	emmc	none	12M	2M	
□	baseparam	emmc	none	14M	8M	
□	pqparam	emmc	none	22M	8M	
□	logo	emmc	none	30M	20M	
□	logoback	emmc	none	50M	20M	
□	fastplay	emmc	none	70M	40M	
□	fastplaybak	emmc	none	110M	40M	
□	kernel	emmc	none	150M	40M	
□	misc	emmc	none	190M	20M	

```
HiBurn
HiTool Version: 2.0.2
HiBurn Version: 2.0.9
HiSilicon Technologies Co., Ltd. All rights reserved. (C) 2011-2013
```

Step 2 Copy **usb_update.bin** to the root directory of the USB flash drive**.**

Step 3 Copy the Android **update.zip** to the root directory of the USB flash drive.

NOTE

Update.zip is the recovery package for the Android and is compiled on the Android platform by following Android compilation description.

Step 4 Burn the boot and Android recovery kernel using the HiPro-serial.

Step 5 Restart the board to enter the recovery mode. The recovery program reads **update.zip** in the USB flash drive to upgrade the board.

----End

4.1.2 Burning the Boot and Android Recovery Using a USB Flash Drive and Upgrading a Board Using the Recovery

NOTE

This section applies to Hi3798M V100 and Hi3798C V200, take Hi3798C V200 as an example in the following content.

4.1.2.1 Preparations

- Prepare a USB flash drive with the FAT32 file system.

NOTE

The USB card reader, SD-to-USB adapter, USB hard drive, and extended partition USB drive are not supported.

If there are multiple partitions in the USB flash drive, ensure that only one partition contains **update.zip**.

The Kingston USB flash drives can be used. The Kingston DataTraveler 4G USB 2.0 flash drive is recommended because the tests show that its performance is stable.

- Copy the compiled **fastboot.bin**, **bootargs.bin**, **recovery.img**, and **update.zip** to the root directory of the USB flash drive.

  The images are stored in the following directory:

  - For the eMMC solution: **out/target/product/Hi3798CV200/Emmc**

4.1.2.2 Operation Procedures

Perform the following steps:

Step 1 Insert the USB flash drive that stores the images into the USB 2.0 port of the board.

Step 2 Press the USB upgrade key and then power on the board.

If the board is empty, you do not need to press any key.

The indicator blinks after 2 to 5 seconds, indicating that the USB upgrade starts.

The indicator is steady on after a few minutes, indicating that the upgrade is complete.

----End

4.1.3 Burning an eMMC Image Using a Burner

To burn an eMMC image using a burner, perform the following steps:

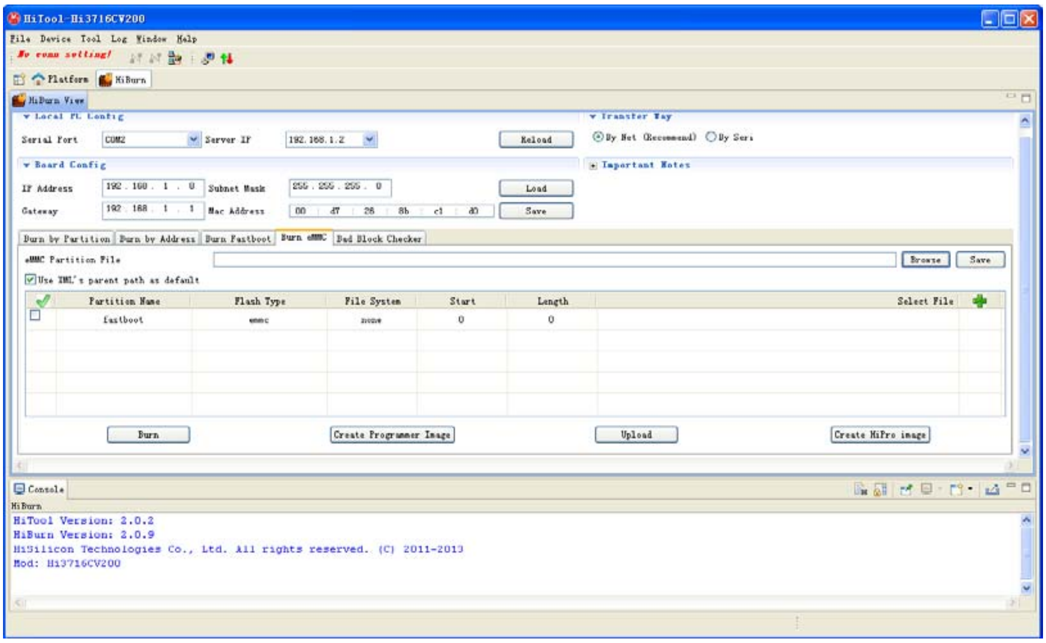
- Generate an eMMC image.
- Set eMMC extended CSD registers.
- Burn the eMMC image using the burner.

4.1.3.1 Generating an eMMC Image

The eMMC image to be burnt can be created using the HiTool.

Step 1 Open the HiTool, choose **HiBurn** > **Burn eMMC**, as shown in Figure 4-2.

Figure 4-2 HiTool page



Serial Port: COM2 Server IP: 192.168.1.2

● By Net (Recommend) ○ By Seri

IP Address: 192.168.1.8 Subnet Mask: 255.255.255.0

Gateway: 192.168.1.1 Mac Address: 00 : d7 : 26 : 8b : c1 : d0

eMMC Partition File:

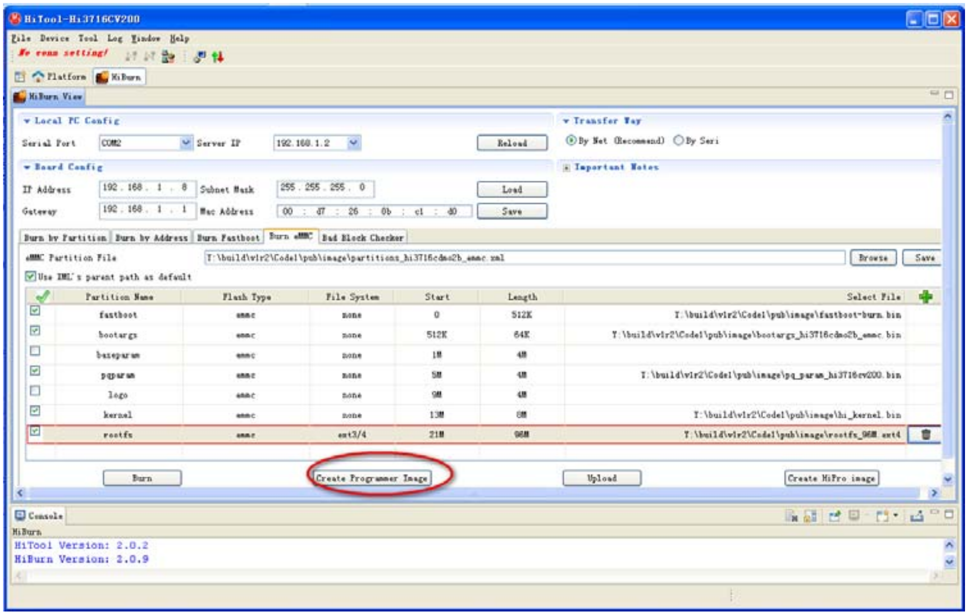
☑ Use XML's parent path as default

	Partition Name	Flash Type	File System	Start	Length	Select File
☐	fastboot	emmc	none	0	0	

```
HiBurn
HiTool Version: 2.0.2
HiBurn Version: 2.0.9
HiSilicon Technologies Co., Ltd. All rights reserved. (C) 2011-2013
Mod: Hi3716CV200
```

Step 2 Configure the partitions or directly import an .xml partition information table, as shown in Figure 4-3.

Figure 4-3 Configuring partitions



Serial Port: COM2 Server IP: 192.168.1.2

● By Net (Recommend) ○ By Seri

IP Address: 192.168.1.8 Subnet Mask: 255.255.255.0

Gateway: 192.168.1.1 Mac Address: 00 : d7 : 26 : 0b : c1 : d0

eMMC Partition File: T:\build\v1r2\Code1\pub\image\partitions_hi3716cdmo2b_emmc.xml

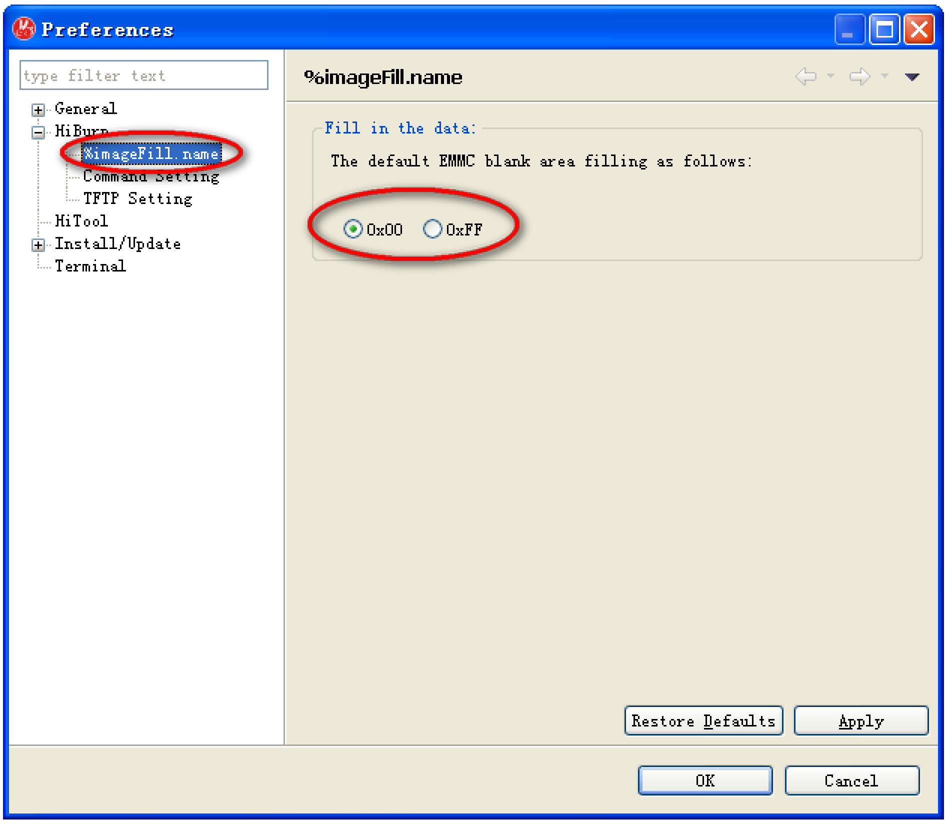
☑ Use XML's parent path as default

	Partition Name	Flash Type	File System	Start	Length	Select File
☑	fastboot	emmc	none	0	512K	T:\build\v1r2\Code1\pub\image\fastboot-burn.bin
☑	bootargs	emmc	none	512K	64K	T:\build\v1r2\Code1\pub\image\bootargs_hi3716cdmo2b_emmc.bin
☐	baseparam	emmc	none	1M	4M	
☑	pqparam	emmc	none	5M	4M	T:\build\v1r2\Code1\pub\image\pq_param_hi3716cv200.bin
☐	logo	emmc	none	9M	4M	
☑	kernel	emmc	none	13M	8M	T:\build\v1r2\Code1\pub\image\hi_kernel.bin
☑	rootfs	emmc	ext3/4	21M	96M	T:\build\v1r2\Code1\pub\image\rootfs_96M.ext4

```
HiBurn
HiTool Version: 2.0.2
HiBurn Version: 2.0.9
```

Step 3 The blank area can be filled with 0x00 or 0xFF based on the used component. You are advised to confirm with the flash memory vendor or burner vendor before configuration to ensure the performance of the burner. On the menu bar of HiTool, choose **Window** > **Preferences**. The **Preferences** page is displayed, as shown in Figure 4-4.

Figure 4-4 eMMC blank area filling configuration



Fill in the data:

The default EMMC blank area filling as follows:

● 0x00 ○ 0xFF

Step 4 Click **Create Programmer Image** and save the image file. (Such as **Hi3716Cv200_eMMC.img**).

----End

4.1.3.2 Setting eMMC Extended CSD Registers

This section describes how to set eMMC registers on the burner operation page before burning.

The Hi3716C V200 and Hi379XX V100 series platforms support the eMMC 4.41 standard. The eMMCs complying with the eMMC 4.41 standard contain BOOT1, BOOT2 and USER DATA partitions and support the n_RST pin and power-off reset. The Hi3716C V200 series platforms boot from the USER DATA partition by default. All image data is burnt to the USER DATA partition. In addition, the eMMC can only be reset using the n_RST pin. Therefore, register values must be configured according to Table 4-1. Otherwise, the board cannot be started.

Table 4-1 eMMC extended CSD register configuration

Extended CSD Register Number	Register Value	Description
179	0x38	This register is used to configure the boot partition. The Hi3716C V200 and Hi379XX V100 series platforms boot from the USER DATA partition by default.
177	0x1	This register is used to configure the eMMC bus width (4-bit for the Hi3716C V200 and Hi379XX V100 series platforms) in the boot mode.
162	0x1	This register is used to configure whether the n_RST pin for the eMMCs is valid. The Hi3716C V200 and Hi379XX V100 series platforms use the n_RST pin by default. Therefore this register is set to **0x1**.

NOTE

- The eMMC extended registers must be configured before burning.
- Some burners do not support the extended CSD register configuration. You need to contact the burner manufacturer to configure the extended CSD registers.
- The settings vary according to different eMMC burners. For details, see the burner user guide at your hand.

4.1.3.3 Burning the eMMC Using the Burner

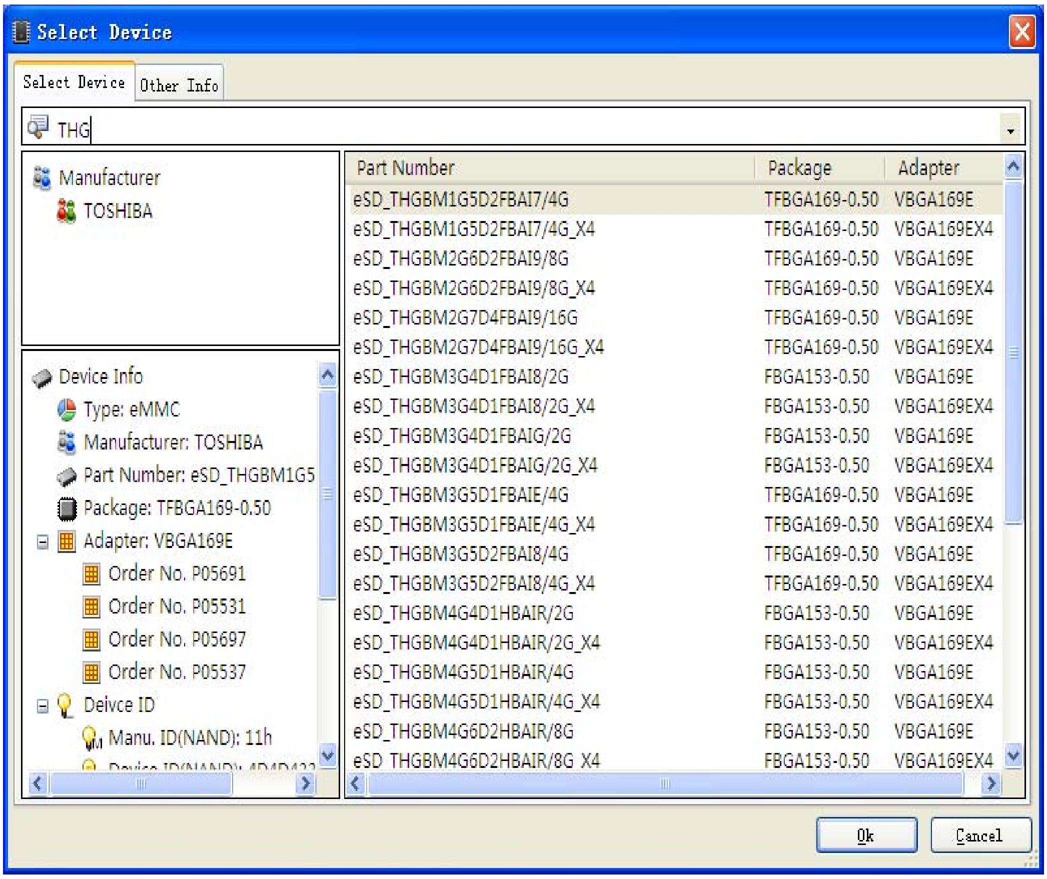
The burning operations vary according to eMMC burner models and manufacturers. For details about how to use the burner, contact the manufacturer.

NOTE

The following describes how to perform burning using the burner of PROSYSTEMS (www.prosystems.com.cn) as an example. The following pictures are the snapshots of the PROSYSTEMS burner.

Step 1 Select an eMMC flash. Select an eMMC flash recommended in the *List of Components Compatible with Hi3716C V200*, as shown in Figure 4-5.

Figure 4-5 Selecting an eMMC flash



THG

Manufacturer
- TOSHIBA

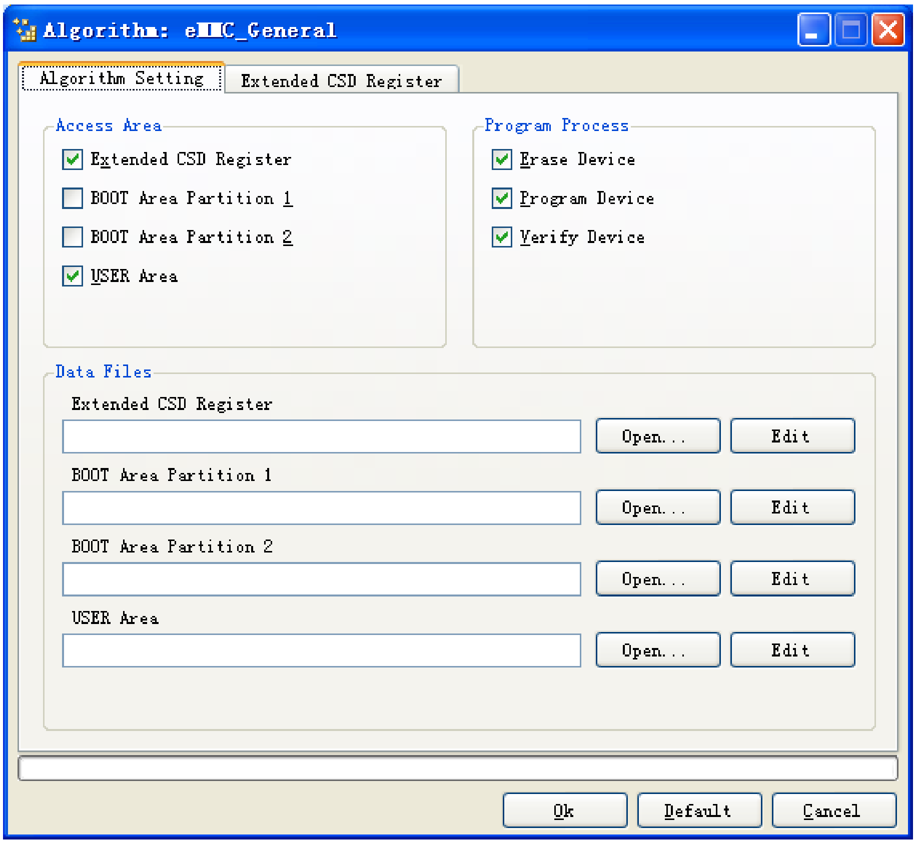
Device Info
- Type: eMMC
- Manufacturer: TOSHIBA
- Part Number: eSD_THGBM1G5
- Package: TFBGA169-0.50
- Adapter: VBGA169E
  - Order No. P05691
  - Order No. P05531
  - Order No. P05697
  - Order No. P05537
- Deivce ID
  - Manu. ID(NAND): 11h

Part Number	Package	Adapter
eSD_THGBM1G5D2FBAI7/4G	TFBGA169-0.50	VBGA169E
eSD_THGBM1G5D2FBAI7/4G_X4	TFBGA169-0.50	VBGA169EX4
eSD_THGBM2G6D2FBAI9/8G	TFBGA169-0.50	VBGA169E
eSD_THGBM2G6D2FBAI9/8G_X4	TFBGA169-0.50	VBGA169EX4
eSD_THGBM2G7D4FBAI9/16G	TFBGA169-0.50	VBGA169E
eSD_THGBM2G7D4FBAI9/16G_X4	TFBGA169-0.50	VBGA169EX4
eSD_THGBM3G4D1FBAI8/2G	FBGA153-0.50	VBGA169E
eSD_THGBM3G4D1FBAI8/2G_X4	FBGA153-0.50	VBGA169EX4
eSD_THGBM3G4D1FBAIG/2G	FBGA153-0.50	VBGA169E
eSD_THGBM3G4D1FBAIG/2G_X4	FBGA153-0.50	VBGA169EX4
eSD_THGBM3G5D1FBAIE/4G	TFBGA169-0.50	VBGA169E
eSD_THGBM3G5D1FBAIE/4G_X4	TFBGA169-0.50	VBGA169EX4
eSD_THGBM3G5D2FBAI8/4G	TFBGA169-0.50	VBGA169E
eSD_THGBM3G5D2FBAI8/4G_X4	TFBGA169-0.50	VBGA169EX4
eSD_THGBM4G4D1HBAIR/2G	FBGA153-0.50	VBGA169E
eSD_THGBM4G4D1HBAIR/2G_X4	FBGA153-0.50	VBGA169EX4
eSD_THGBM4G5D1HBAIR/4G	FBGA153-0.50	VBGA169E
eSD_THGBM4G5D1HBAIR/4G_X4	FBGA153-0.50	VBGA169EX4
eSD_THGBM4G6D2HBAIR/8G	FBGA153-0.50	VBGA169E
eSD_THGBM4G6D2HBAIR/8G_X4	FBGA153-0.50	VBGA169EX4

Step 2 Customize the burning algorithm, as shown in Figure 4-6.

According to the preceding rules, images are burnt to the USER DATA partition. The burning process includes the erasing, programming, and checking operations.

Figure 4-6 Customizing the burning algorithm



Access Area

☑ Extended CSD Register

☐ BOOT Area Partition 1

☐ BOOT Area Partition 2

☑ USER Area

Program Process

☑ Erase Device

☑ Program Device

☑ Verify Device

Data Files

Extended CSD Register

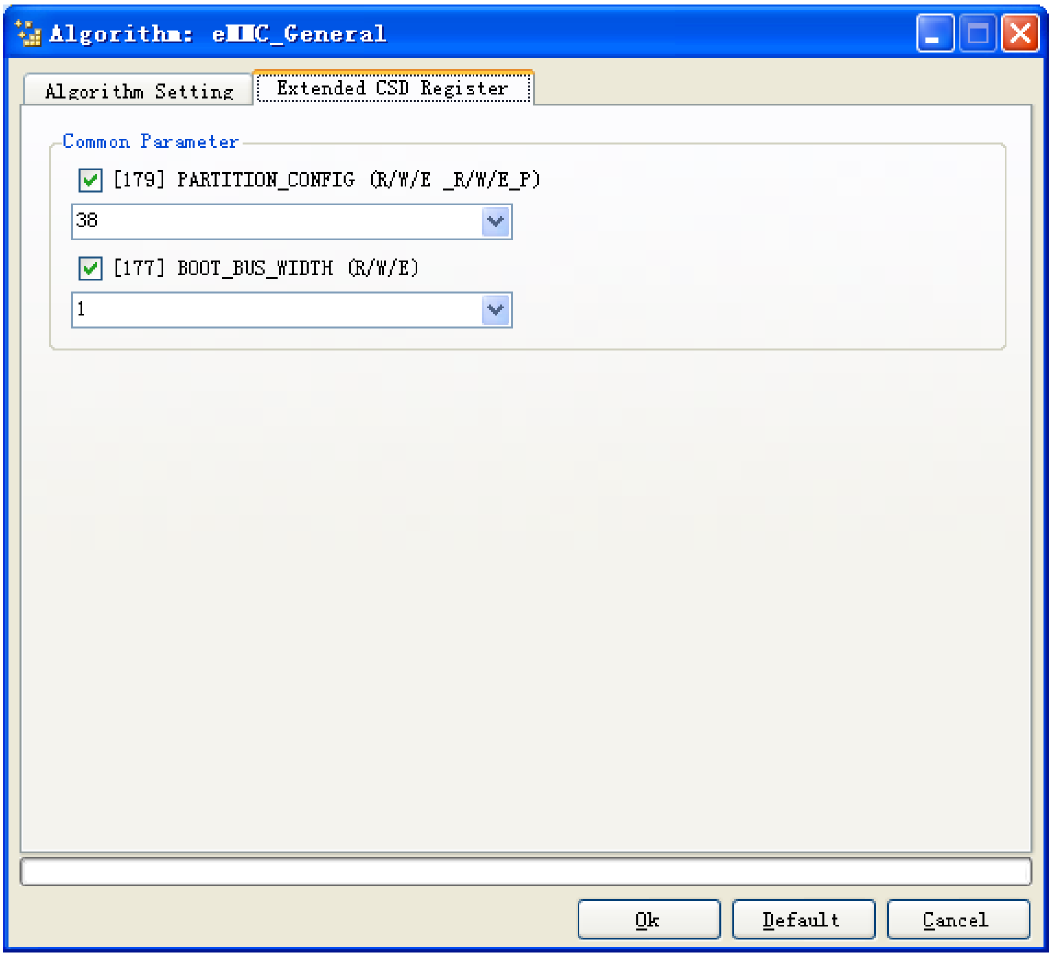
BOOT Area Partition 1

BOOT Area Partition 2

USER Area

Step 3 Set the eMMC extended CSD registers, as shown in Figure 4-7.

Figure 4-7 Setting the eMMC extended CSD registers



☑ [179] PARTITION_CONFIG (R/W/E _R/W/E_P)

38

☑ [177] BOOT_BUS_WIDTH (R/W/E)

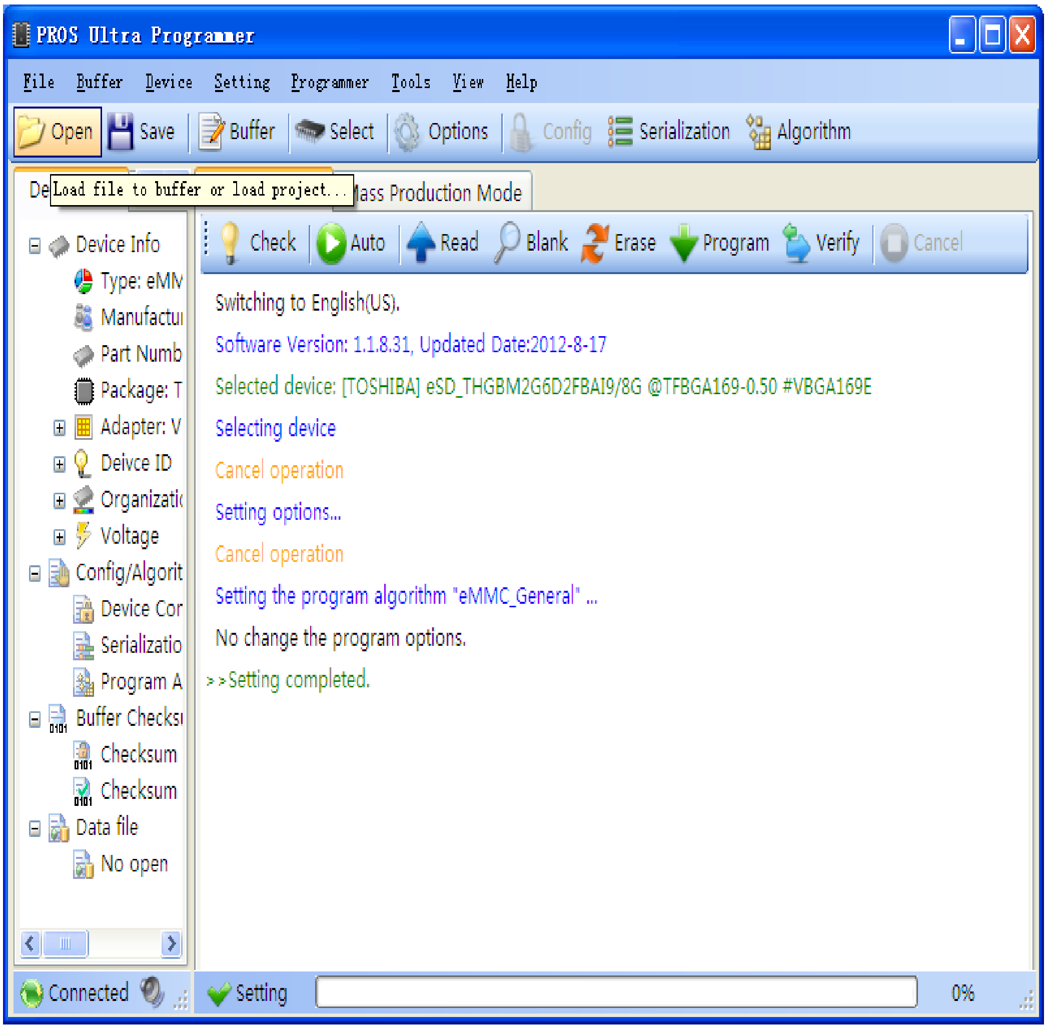
1

NOTE

The burner described in this document cannot configure the number 162 register listed in Table 4-1.

Step 4 Import an image. Click **Open** to import an image to the buffer, as shown in Figure 4-8. The image file is **Hi3716C V200_eMMC.img** generated in section 3.1.2.1 "**Creating the eMMC Image File**".

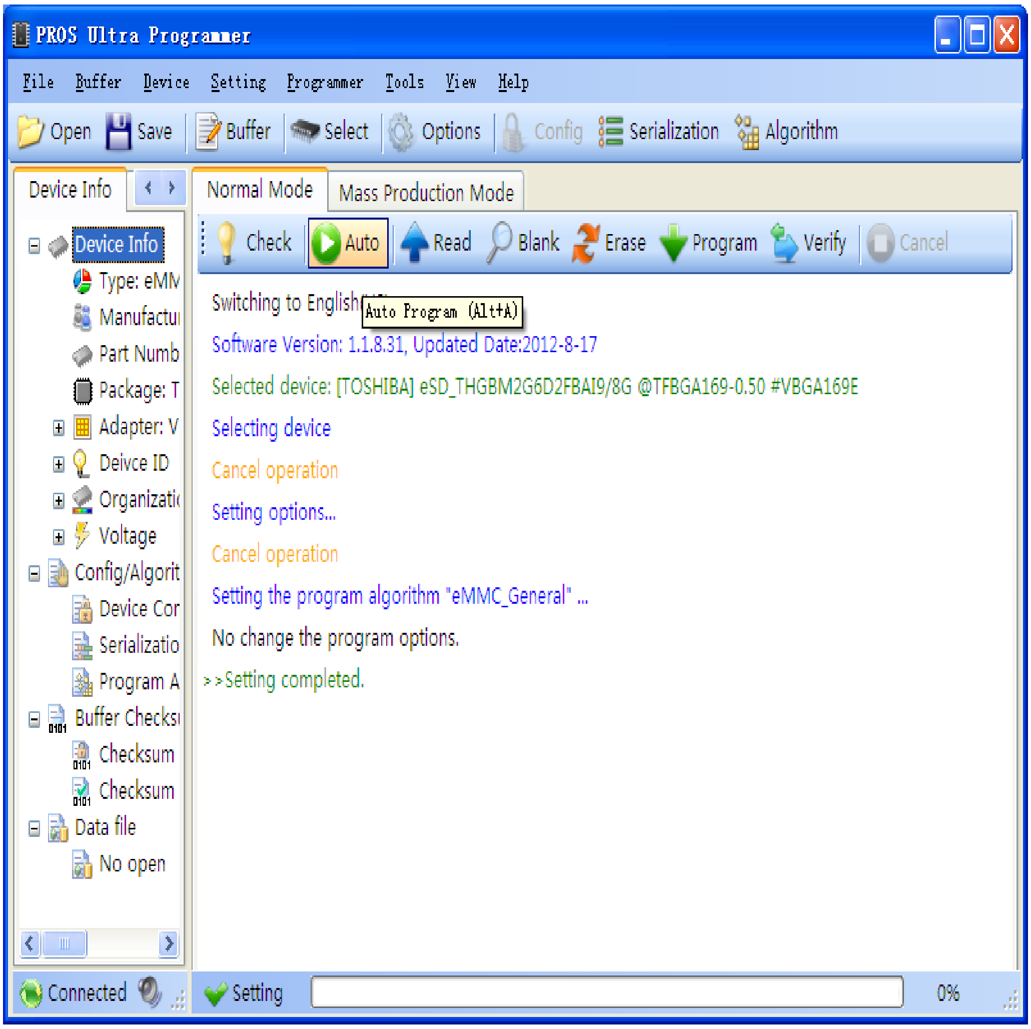
Figure 4-8 Importing the image file



```
Switching to English(US).
Software Version: 1.1.8.31, Updated Date:2012-8-17
Selected device: [TOSHIBA] eSD_THGBM2G6D2FBAI9/8G @TFBGA169-0.50 #VBGA169E
Selecting device
Cancel operation
Setting options...
Cancel operation
Setting the program algorithm "eMMC_General" ...
No change the program options.
>>Setting completed.
```

Step 5 Burn the image, as shown in Figure 4-9.

Figure 4-9 Burning the image



```
Switching to English
Software Version: 1.1.8.31, Updated Date:2012-8-17
Selected device: [TOSHIBA] eSD_THGBM2G6D2FBAI9/8G @TFBGA169-0.50 #VBGA169E
Selecting device
Cancel operation
Setting options...
Cancel operation
Setting the program algorithm "eMMC_General" ...
No change the program options.
>>Setting completed.
```

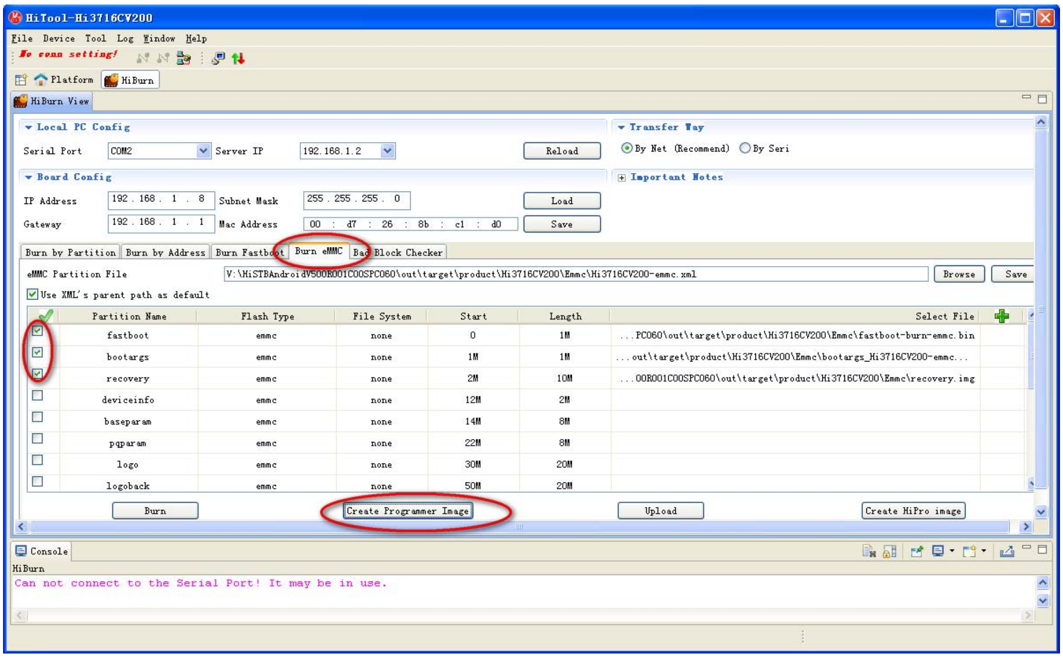
----End

4.1.4 Burning the Boot and Android Recovery Using the Burner and Upgrading a Board Using the Recovery

Perform the following steps:

Step 1 Open the HiTool. On the **HiBurn View** page, click **Burn eMMC**, select **fastboot**, **bootargs**, and **recovery**, and click **Create Programmer Image** to create an Android recovery image (such as **Hi3716Cv200_eMMC_recovery.img**), as shown in Figure 4-10.

Figure 4-10 Creating an Android recovery image



Serial Port: COM2
Server IP: 192.168.1.2

● By Net (Recommend) ○ By Seri

IP Address: 192 . 168 . 1 . 8
Subnet Mask: 255 . 255 . 255 . 0
Gateway: 192 . 168 . 1 . 1
Mac Address: 00 : d7 : 26 : 8b : c1 : d0

eMMC Partition File: V:\HiSTBAndroidV500R001C00SPC060\out\target\product\Hi3716CV200\Emmc\Hi3716CV200-emmc.xml

☑ Use XML's parent path as default

✓	Partition Name	Flash Type	File System	Start	Length	Select File
☑	fastboot	emmc	none	0	1M	...PC060\out\target\product\Hi3716CV200\Emmc\fastboot-burn-emmc.bin
☑	bootargs	emmc	none	1M	1M	...out\target\product\Hi3716CV200\Emmc\bootargs_Hi3716CV200-emmc...
☑	recovery	emmc	none	2M	10M	...00R001C00SPC060\out\target\product\Hi3716CV200\Emmc\recovery.img
□	deviceinfo	emmc	none	12M	2M	
□	baseparam	emmc	none	14M	8M	
□	pqparam	emmc	none	22M	8M	
□	logo	emmc	none	30M	20M	
□	logoback	emmc	none	50M	20M	

```
Can not connect to the Serial Port! It may be in use.
```

Step 2 Burn the **Hi3716Cv200_eMMC_recovery.img** image using the burner. Configure the eMMC extended CSD registers on the burner operation page. For details, see section 4.1.3.2 "Setting eMMC Extended CSD Registers". For details about how to use the burner, contact the manufacturer.

Step 3 Copy the Android **update.zip** to the root directory of the USB flash drive.

Step 4 Restart the board to enter the recovery mode. The recovery program reads **update.zip** in the USB flash drive to upgrade the board.

----End

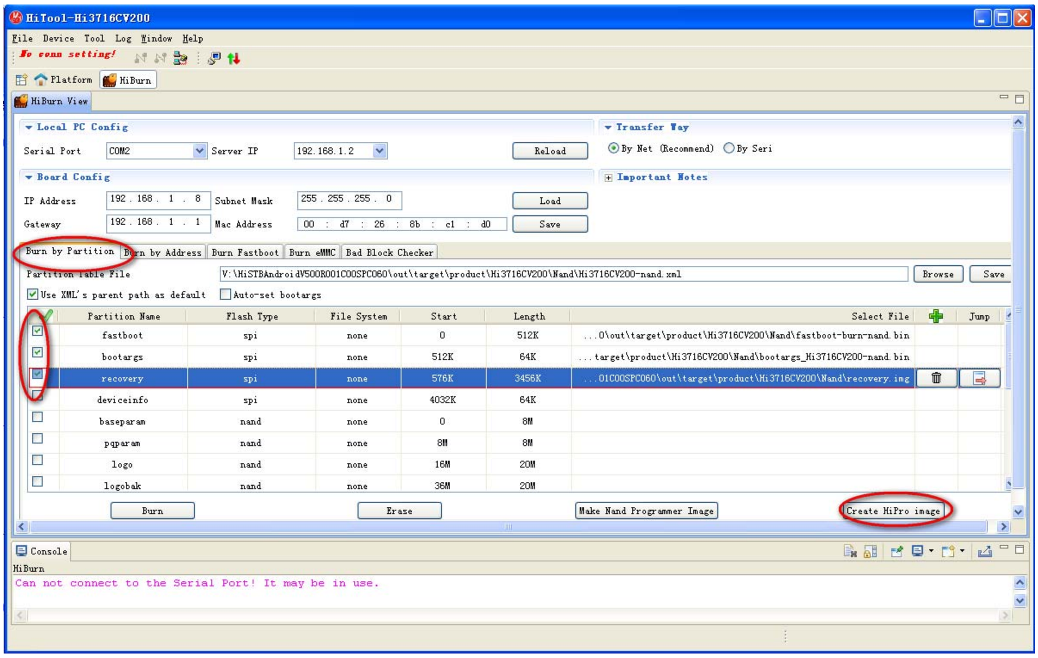
4.2 SPI Flash+NAND Flash or NAND Flash

4.2.1 Burning the Boot and Android Recovery Using the HiPro-serial and Upgrading a Board Using the Recovery

Perform the following steps:

Step 1 Create an Android recovery HiPro image. Select **fastboot**, **bootargs**, and **recovery** partitions and click **Create HiPro Image** to generate **the usb_update.bin** image, as shown in Figure 4-11.

Figure 4-11 Creating an Android recovery HiPro image



Serial Port: COM2
Server IP: 192.168.1.2
● By Net (Recommend) ○ By Seri
IP Address: 192 . 168 . 1 . 8
Subnet Mask: 255 . 255 . 255 . 0
Gateway: 192 . 168 . 1 . 1
Mac Address: 00 : d7 : 26 : 8b : c1 : d0

Partition Table File: V:\HiSTBAndroidV500R001C00SPC060\out\target\product\Hi3716CV200\Nand\Hi3716CV200-nand.xml

☑ Use XML's parent path as default ☐ Auto-set bootargs

	Partition Name	Flash Type	File System	Start	Length	Select File	Jump
☑	fastboot	spi	none	0	512K	...0\out\target\product\Hi3716CV200\Nand\fastboot-burn-nand.bin	
☑	bootargs	spi	none	512K	64K	...target\product\Hi3716CV200\Nand\bootargs_Hi3716CV200-nand.bin	
☑	recovery	spi	none	576K	3456K	...01C00SPC060\out\target\product\Hi3716CV200\Nand\recovery.img	
☐	deviceinfo	spi	none	4032K	64K		
☐	baseparam	nand	none	0	8M		
☐	pqparam	nand	none	8M	8M		
☐	logo	nand	none	16M	20M		
☐	logobak	nand	none	36M	20M		

```
HiBurn
Can not connect to the Serial Port! It may be in use.
```

Step 2 Copy **usb_update.bin** to the root directory of the USB flash drive.

Step 3 Copy the Android **update.zip** to the root directory of the USB flash drive.

Step 4 Burn the boot and Android recovery kernel using the HiPro-serial.

Step 5 Restart the board to enter the recovery mode. The recovery program reads **update.zip** in the USB flash drive to upgrade the board.

----End

4.2.2 Burning a NAND Image Using a Burner

A NAND flash image needs to be converted into the image for the burner by using the HiTool in the SDK.

An SPI flash image is created using the source files provided in the SDK. Contact the manufacturer to obtain the source files.

NOTE

The document describes how to burn a NAND image using the burner.

To burn a NAND image using a burner, perform the following steps:

Step 1 Prepare source files, including a boot image, a parameter area image, a kernel image, and a file system image.

Step 2 Generate a NAND image.

Step 3 Calculate the start address for each file to be burnt and obtain the length of the file to be burnt. For details, see section 4.2.2.4 "Calculating Burning Addresses."

Step 4 Separately burn the partitions in the NAND flash based on the start burning address and burnt file length using the burner. For details about how to use the burner, contact the manufacturer.

----End

The following describes how to create a NAND image and how to calculate the burning address and file length by taking a NAND flash as an example.

View the following NAND flash features that are displayed during booting:

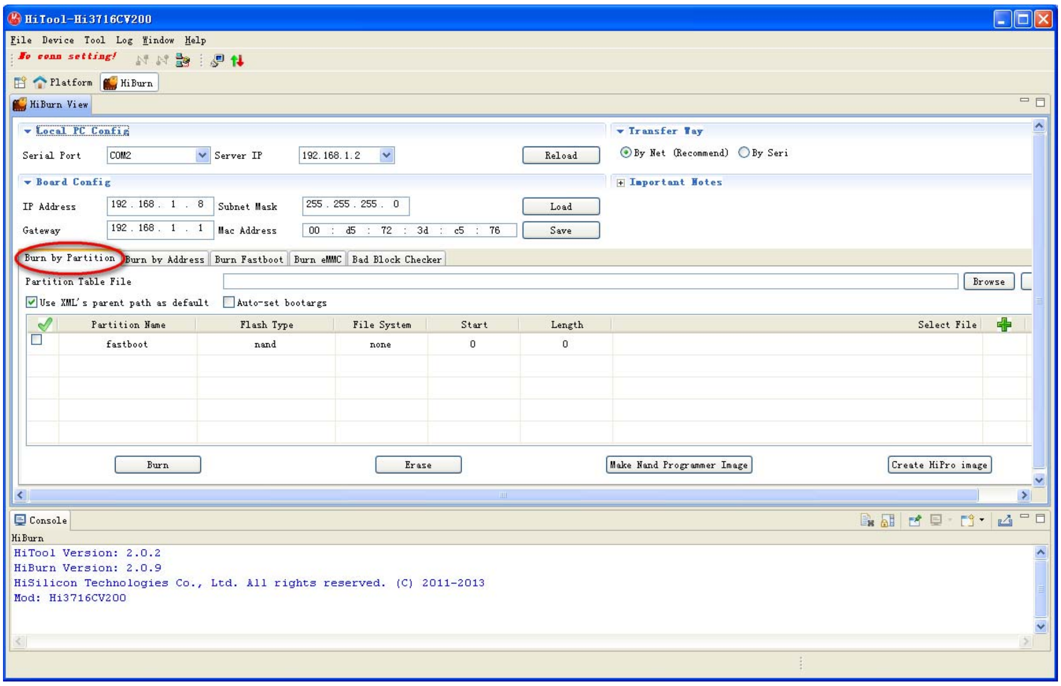
- Capacity: 512 MB
- Block size: 128 KB
- Page size: 2 KB
- Size of the spare area: 64 B (OOB area for short)
- ECC type: 8-bit

4.2.2.2 Generating a NAND Image

The NAND image to be burnt by the burner can be created using the HiTool. The following describes how to create a NAND image for the burner by taking Hi3716C V200 as an example.

Step 1 Open the HiTool, choose **HiBurn** > **Burn by Partition**, as shown in Figure 4-12.

Figure 4-12 HiTool page



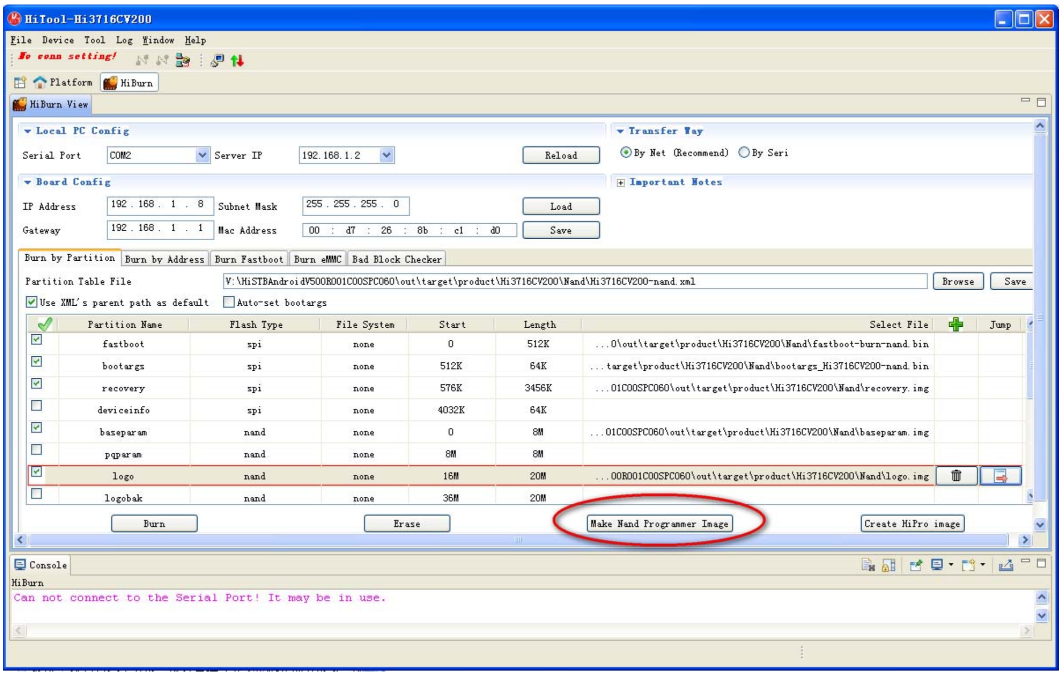
Serial Port: COM2
Server IP: 192.168.1.2
● By Net (Recommend) ○ By Seri
IP Address: 192 . 168 . 1 . 8
Subnet Mask: 255 . 255 . 255 . 0
Gateway: 192 . 168 . 1 . 1
Mac Address: 00 : d5 : 72 : 3d : c5 : 76
Partition Table File:
☑ Use XML's parent path as default ☐ Auto-set bootargs

✓	Partition Name	Flash Type	File System	Start	Length	Select File
☐	fastboot	nand	none	0	0	

```
HiBurn
HiTool Version: 2.0.2
HiBurn Version: 2.0.9
HiSilicon Technologies Co., Ltd. All rights reserved. (C) 2011-2013
Mod: Hi3716CV200
```

Step 2 Configure the partitions or directly import an .xml partition information table, as shown in Figure 4-13.

Figure 4-13 Configuring partitions



Serial Port: COM2
Server IP: 192.168.1.2
● By Net (Recommend) ○ By Seri
IP Address: 192 . 168 . 1 . 8
Subnet Mask: 255 . 255 . 255 . 0
Gateway: 192 . 168 . 1 . 1
Mac Address: 00 : d7 : 26 : 8b : c1 : d0

Partition Table File: V:\HiSTBAndroidV500R001C00SPC060\out\target\product\Hi3716CV200\Nand\Hi3716CV200-nand.xml

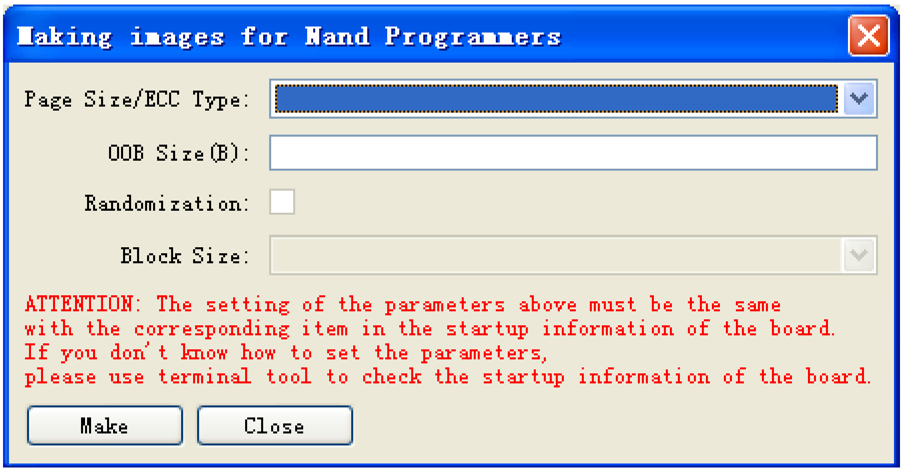
☑ Use XML's parent path as default ☐ Auto-set bootargs

✓	Partition Name	Flash Type	File System	Start	Length	Select File		Jump
☑	fastboot	spi	none	0	512K	...0\out\target\product\Hi3716CV200\Nand\fastboot-burn-nand.bin		
☑	bootargs	spi	none	512K	64K	...target\product\Hi3716CV200\Nand\bootargs_Hi3716CV200-nand.bin		
☑	recovery	spi	none	576K	3456K	...01C00SPC060\out\target\product\Hi3716CV200\Nand\recovery.img		
☐	deviceinfo	spi	none	4032K	64K			
☑	baseparam	nand	none	0	8M	...01C00SPC060\out\target\product\Hi3716CV200\Nand\baseparam.img		
☐	pqparam	nand	none	8M	8M			
☑	logo	nand	none	16M	20M	...00R001C00SPC060\out\target\product\Hi3716CV200\Nand\logo.img		
☐	logobak	nand	none	36M	20M			

Can not connect to the Serial Port! It may be in use.

Step 3 Click **Make Nand Programmer Image**. The **Making images for Nand Programmers** dialog box is displayed, as shown in Figure 4-14.

Figure 4-14 Making images for NAND programmers



Page Size/ECC Type:

OOB Size(B):

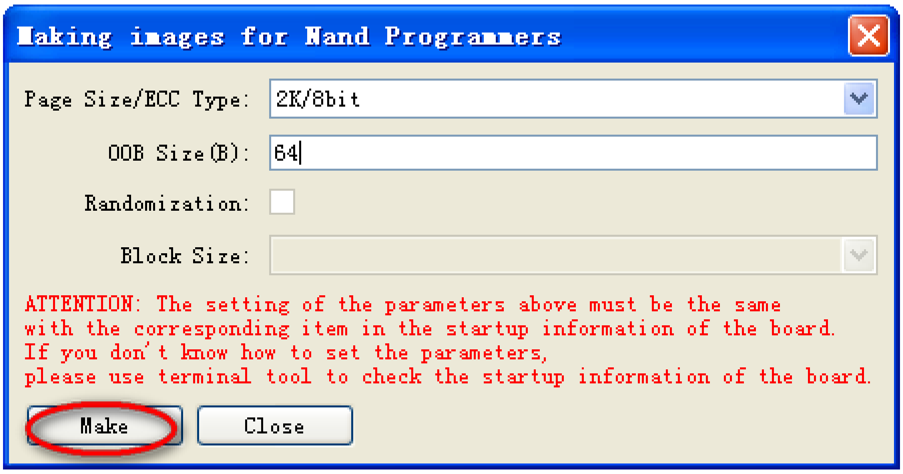
Randomization: ☐

Block Size:

ATTENTION: The setting of the parameters above must be the same
with the corresponding item in the startup information of the board.
If you don't know how to set the parameters,
please use terminal tool to check the startup information of the board.

Step 4 Set **Page size/ECC type** and **OOB area** according to the information displayed during booting. Select **Randomization** if the NAND flash supports randomization, set **Block size,** and click **Make**, as shown in Figure 4-15.

Figure 4-15 Setting the NAND flash properties.



Making images for Nand Programmers

Page Size/ECC Type: 2K/8bit

OOB Size(B): 64

Randomization: □

Block Size:

ATTENTION: The setting of the parameters above must be the same with the corresponding item in the startup information of the board. If you don't know how to set the parameters, please use terminal tool to check the startup information of the board.

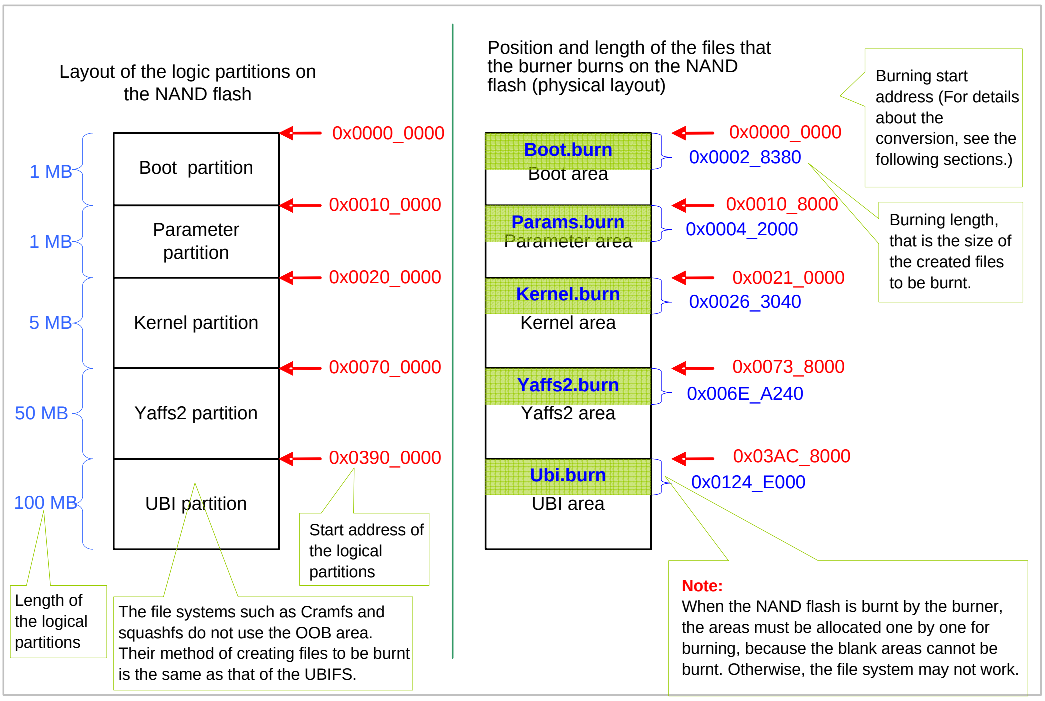
Step 5 Select a path for saving the file. The HiTool automatically generates the corresponding images of the NAND partitions and the name extension .burn is automatically added for each image.

----End

4.2.2.3 Burning Layout

Figure 4-16 describes the layout of the logic partitions and the converted burning files on the NAND flash.

Figure 4-16 Layout of the logical partitions on the NAND flash


Layout of the logic partitions on the NAND flash
1 MB
1 MB
5 MB
50 MB
100 MB
Boot partition
Parameter partition
Kernel partition
Yaffs2 partition
UBI partition
0x0000_0000
0x0010_0000
0x0020_0000
0x0070_0000
0x0390_0000
Start address of the logical partitions
Length of the logical partitions
The file systems such as Cramfs and squashfs do not use the OOB area. Their method of creating files to be burnt is the same as that of the UBIFS.
Position and length of the files that the burner burns on the NAND flash (physical layout)
Boot.burn
Boot area
Params.burn
Parameter area
Kernel.burn
Kernel area
Yaffs2.burn
Yaffs2 area
Ubi.burn
UBI area
0x0000_0000
0x0002_8380
0x0010_8000
0x0004_2000
0x0021_0000
0x0026_3040
0x0073_8000
0x006E_A240
0x03AC_8000
0x0124_E000
Burning start address (For details about the conversion, see the following sections.)
Burning length, that is the size of the created files to be burnt.
Note:
When the NAND flash is burnt by the burner, the areas must be allocated one by one for burning, because the blank areas cannot be burnt. Otherwise, the file system may not work.

NOTE

- The layout of the preceding logical partitions is an example. You need to determine the start address and size of the partitions based on the actual situation.
- The partitions cannot overlap.
- The start address and length of a partition must be an integral multiple of the NAND flash block size.
- The partition size must be greater than the size of the data to be burnt, and certain space must be reserved for the bad blocks.
- The total size of all partitions must be less than the capacity of the NAND flash.
- The method of creating images to be burnt for file systems that do not use the OOB area, such as Cramfs and Squashfs, is the same as that for the kernel.
- The bad blocks are not marked in Figure 4-16. You are advised to use a burner with bad block skipping function. If there is a bad block, the burner skips to the next block.

4.2.2.4 Calculating Burning Addresses

The address visible to the burner is a physical address.

Start address to be burnt = Start address of the logic partition x (Page size of the chip + OOB size of the chip)/Page size of the chip

For the NAND flash shown in Figure 4-16:

Start address to be burnt = Start address of the logic partition x (2 KB + 64 B)/2 KB

Table 4-2 Start burning address and burnt file length

Parti tion	Source File	Start Address of the Logical Partition	Size of the Logical Partition	Converted File	Start Burning Address	Burnt File Length
1	Boot.bin	0x0000_0000	1 MB	Boot.burn	0x0000_0000	0x0002_8380
2	Params.bin	0x0010_0000	1 MB	Params.burn	0x0010_8000	0x0004_2000
3	Kernel.img	0x0020_0000	5 MB	Kernel.burn	0x0021_0000	0x0026_3040
4	rootfs.yaffs2	0x0070_0000	50 MB	Yaffs2.burn	0x0073_8000	0x006E_A240
5	Ubi.img	0x0390_0000	100 MB	Ubi.burn	0x03AC_8000	0x0124_E000

CAUTION

- The burner must burn the area one by one during the NAND flash burning. Do not burn the blank areas. Otherwise, the file system cannot work.
- The burner can burn an area in the NAND flash separately.

The unit of the user partition is page size. The unit of the burner is (page size + OOB area). If the burner wants to use the images in the user partition, the images must be converted. For the NAND flash, the page area and OOB area are the same.

4.2.3 Burning the Boot and Android Recovery Using the Burner and Upgrading a Board Using the Recovery

The SPI flash burner is low in cost. You can use the SPI flash burner to burn the boot and Android recovery, power on the board and enable it to go to the recovery mode, and upgrade the board by running the recovery program. Therefore, for the SPI flash + NAND flash solution, you are advised to use the burning method described in this section. If you have a NAND flash burner, you are advised to burn the NAND flash image using the burner to improve burning efficiency.

Step 1 Burn the boot, bootargs, and recovery partitions using the burner. For details about how to use the burner, contact the manufacturer.

Step 2 Copy the Android **update.zip** to the root directory of the USB flash drive.

Step 3 Restart the board to enter the recovery mode. The recovery program reads **update.zip** in the USB flash drive to upgrade the board.

----End

5 Mass Production Fault Location

⚠ **CAUTION**

This chapter is dedicated for Hi3798M V100.

5.1 CPU Power-On Information

Table 5-1 describes the information displayed during CPU power-on based on the display sequence.

Table 5-1 Normal boot process

SN	Phase	Displayed Information	Description
1	Bootrom	Bootrom start	This is the first displayed information when the CPU is powered on. If this information is not displayed, check the hardware as follows: • Check whether the power supply of the CPU is normal. The 3.3V_standby, 3.3V_MOS, 1.1V_CORE, and 1.1V_CPU power supplies must be normal. Note: Check whether overheating occurs after the CPU is powered on. If yes, turn off the power supplies immediately and check the GND impedance of the four power supplies. • Check whether the 24 MHz system clock oscillates. Measure the voltages at both ends of the crystal oscillator by using the multimeter DC. The voltages should be about 1.65 V (the voltages at the two ends may vary a little). Observe the waveform at both ends of the oscillator by using an oscilloscope. The wave should be a complete 24 MHz sine wave with 3.3 Vp-p • Check whether the serial circuit and serial port are properly

SN	Phase	Displayed Information	Description
			connected. The serial port of the chip uses the CMOS level (3.3 V), and the PC uses the RS232 level. Therefore, pay attention to the design of level conversion circuit. The rate of the serial port receiver/transmitter is set to 115200 bit/s. The number of data bits, stop bits, parity bits, and check bits are set to 8, 1, 0, and 0 respectively. • Check whether the CPU is soldered properly.
2		Boot from the NAND/eMMC/SD	If the boot mode identified by the system is inconsistent with that of the board, check the BOOT_SEL0 and BOOT_SEL1 signals. For details, see the corresponding hardware user guide. • Check whether the external pull-up or pull-down resistors of the BOOT_SEL0 and BOOT_SEL1 pins are correctly configured. For details, see the corresponding hardware user guide. • Check whether the BOOT_SEL0 and BOOT_SEL1 pins are connected to the output component. Data capturing during power-on is affected by the interconnected component.
3		Read eMMC error/Read SD error	If this information is displayed, the system boots from the eMMC/SD card, and an error occurs when the software reads the eMMC/SD status. Check the hardware as follows: • Check whether the eMMC/SD connector is properly soldered (whether solder bridges are formed), and whether the SD card is inserted. • Check whether the power supply of the eMMC/SD card is normal. The power supply should be 3.3 V±5%. • Check whether the serial resistor and pull-up resistor of the eMMC/SD card interface exist, and whether the impedance is normal. • Replace the eMMC/SD with a new one after the boot is burnt.
4		Starting fastboot...	If this information is displayed, the BOOTROM code is successfully executed, and the system will be redirected to the boot code.
5	Fastboot	System startup	If this information is displayed, the CPU starts to execute data in the flash memory. If this information is not displayed, check the following items: • Software Check whether images in the NAND/eMMC/SD card are properly burnt and whether the versions are correct. • Hardware If the system boots from the eMMC/SD card: Check the burnt images because the preceding displayed information has confirmed that the hardware is normal. If the system boots from the NAND flash: Check whether the power supply is normal. The power supply

SN	Phase	Displayed Information	Description
			should be 3.3 V±5%. Check whether the NAND is soldered properly (the NAND pins are dense and solder bridges are often formed) or replace the NAND flash with a new one.
6		*** Not support current start mode	The hardware boot mode has been confirmed in step 2. Therefore, if this information is displayed, the fastboot image burnt in the flash memory mismatches the flash memory. For example, the eMMC is soldered on the board, and the system boots from the eMMC; however, the fastboot image for the SPI or NAND flash is burnt to the eMMC.
7		No information is displayed.	If no information is displayed, the DDR is not properly connected, and DDR initialization fails. Check the following items: • Check whether the used *.reg file during boot compilation matches the current board. For details about the mapping, see the following file: *Linux version directory*/**source/boot/sysreg/read_cn.xls** or *Android version directory*/**device/hisilicon/bigfish/sdk/source/boot/sysreg/read_cn.xls** • Check whether the 1.5 V DDR power supply is normal. Measure the GND impedance of the capacitor for the 1.5 V DDR power to check whether the power is short-circuited. • Verify that the DDR reference voltage is 0.5 VDD±1%. • Verify that the DDR component is soldered properly. • Verify that the core power of the master chip is VDD±5%. • If the matched VTT exists, verify that the VTT voltage is 0.5 VDD±5%. • Check whether the used DDR component is in the compatibility list.
8		SWL DDR training failed/SGA DDR training failed/HGA DDR training failed/HRD DDR training failed/SRD DDR training failed/SWD DDR training failed	If this information is displayed, DDR initialization is complete, but some signals are abnormal due to the connectivity or signal quality. The fault can be located by viewing the subsequent displayed information. • HGA + 00000000: The DDR CK or DQS signal is abnormal. However, you cannot determine which signal is abnormal in this information. Subsequent information is required for locating the fault. You can check the DDR power supply and soldering. • SWL + 0000000*X*. *X* indicates the ID of the DQS signal on the PCB (ranging from 0 to 3). Information about only one DQS signal is displayed. The lower-bit DQS information is displayed in priority. For example, if DQS0 and DQS1 are both faulty, only the information about DQS0 is displayed. If this information is displayed, the CK, DQS*x*, or DQ0 corresponding to the DQS*x* is faulty. You can determine

SN	Phase	Displayed Information	Description
			which DDR is faulty by checking the displayed information. The fault may be caused by the DDR or master chip soldering issue, PCB design, or PCB processing quality. You can locate the problem by replacing the DDR or master chip. • SWD + 0000000*X*: *X* indicates the ID of the DQ signal on the PCB. • SRD + 0000000*X*: *X* indicates the ID of the DQ signal on the PCB. If multiple DQ signals are faulty, only information about one DQ signal is displayed. The lower-bit DQ information is displayed in priority. For example, if DQ6 and DQ10 are both faulty, information about DQ6 is displayed, and information about DQ10 is displayed only after the DQ6 fault is rectified. If this information is displayed, the corresponding DQ (according to the pin name of the master chip) channel is faulty or the signal quality is abnormal. You can scale down the frequency to locate the fault. For details, see section 5.2.1 "DDR Timing Window Information Under the Boot." If the system works properly after frequency scaling, the signal quality is abnormal. Check whether the PCB traces are routed by following the HiSilicon demo board, and whether surrounding GND traces are used for the 2-layer PCB. If the system still cannot work properly after frequency scaling, the connectivity of the corresponding DQ signal is abnormal. Check the PCB quality and soldering of the DDR or master chip. If you need to locate the fault quickly, you are advised to find the faulty DDR based on the displayed information and directly replace it. To locate the DDR issue, do as follows: • Check the board hardware, including the core and DDR power supplies, soldering of the DDR and master chip, and BOM. • View the serial port information to find the faulty DDR. • Scale the frequency to check whether the issue is caused by the connection or signal quality. • Replace the DDR and master chip to verify the soldering, PCB design, and processing quality. For details about the DDR error information, see section 5.2.2 "DDR Error Information."
9		Reg Version: xxxx Reg Time: xxxxx Reg Name: xxxxx	If this information is displayed, DDR initialization is complete, DDR training is normal, and the DDR can work properly.
10		No NAND device found!!!	If this information is displayed, check the board boot mode. If the system boots from the eMMC or SD card, this information is normal.

SN	Phase	Displayed Information	Description
11		MMC/SD controller initialization. No MMC/SD card detect when read 'SDIO_CARD_DETECT' pin.	If this information is displayed, check the board boot mode. • If the system boots from the NAND flash, this information is normal. • If the system boots from the eMMC or SD card, the SDIO_CARD_DETECT pin is not connected properly. • Verify that the level of the SDIO_CARD_DETECT pin is low and the pull-down resistor exists. • Check whether SDIO_CARD_DETECT is short-circuited with the 3.3 V power supply due to solder bridges.
12		*** irq: data abort *** irq: undefined instruction *** irq: prefetch abort	If this information is displayed, the cause may be the following: • Data read from the flash memory is incorrect. You may need to reburn the software and check whether the boot version is correct. • The DDR is abnormal, and data in the DDR is incorrect. This issue seldom occurs. It is complicated. You can locate the fault by scaling the DDR frequency, checking the power supplies (core power, VDD_DDR, and VTT), soldering, and quality of the PCB board, or replacing the DDR.

Table 5-2 HiTools burning processing

SN	Phase	Displayed Information	Description
1	Bootrom	Bootrom start	This is the first displayed information when the CPU is powered on. If this information is not displayed, check the hardware as follows: • Check whether the power supply of the CPU is normal. The 3.3V_standby, 3.3V_MOS, 1.1V_CORE, and 1.1V_CPU power supplies must be normal. Note: Check whether overheating occurs after the CPU is powered on. If yes, turn off the power supplies immediately and check the GND impedance of the four power supplies. • Check whether the 24 MHz system clock oscillates. Measure the voltages at both ends of the crystal oscillator by using the multimeter DC. The voltages should be about 1.65 V (the voltages at the two ends may vary a little). Observe the waveform at both ends of the oscillator by using an oscilloscope. The wave should be a complete 24 MHz sine wave with 3.3 Vp-p. • Check whether the serial circuit and serial port are properly connected. The serial port of the chip uses the CMOS level (3.3 V), and the PC uses the RS232 level. Therefore, pay attention to the design of level conversion circuit. The rate of

SN	Phase	Displayed Information	Description
			the serial port receiver/transmitter is set to 115200 bit/s. The number of data bits, stop bits, parity bits, and check bits are set to 8, 1, 0, and 0 respectively. • Check whether the CPU is soldered properly.
2		Boot from NAND/eMMC/SD	If the boot mode identified by the system is inconsistent with that of the board, check the BOOT_SEL0 and BOOT_SEL1 signals. For details, see the corresponding hardware user guide. • Check whether the external pull-up or pull-down resistors of the BOOT_SEL0 and BOOT_SEL1 pins are correctly configured. For details, see the corresponding hardware user guide. • Check whether the BOOT_SEL0 and BOOT_SEL1 pins are connected to the output component. Data capturing during power-on is affected by the interconnected component.
3		Read eMMC error/Read SD error	If this information is displayed, the system boots from the eMMC/SD card, and an error occurs when the software reads the eMMC/SD status. Check the hardware as follows: • Check whether the eMMC/SD connector is properly soldered (whether solder bridges are formed), and whether the SD card is inserted. • Check whether the power supply of the eMMC/SD card is normal. The power supply should be 3.3 V±5%. • Check whether the serial resistor and pull-up resistor of the eMMC/SD card interface are properly powered on, and whether the impedance is normal. • Replace the eMMC/SD with a new one after the boot is burnt.
4		#######	"#" indicates that the serial port starts to download data. "###" indicates that the download progress is less than 10% (the percentage is displayed in normal cases). In this case, the DDR channel is abnormal, and you can check as follows: • Check whether the used *.reg file during boot compilation matches the current board. For details about the mapping, see the following: *Linux version directory*/**source/boot/sysreg/read_cn.xls** *Android version directory*/**device/hisilicon/bigfish/sdk/source/boot/sysreg/read_cn.xls** • Verify that the 1.5 V DDR power supply is normal. Measure the GND impedance of the capacitor for the 1.5 V DDR power to check whether the power is short-circuited. • Verify that the DDR reference voltage is 0.5 VDD±1%. • Verify that the DDR component is soldered properly. • Verify that the core power of the master chip is VDD±5%.

SN	Phase	Displayed Information	Description
			• If the matched VTT exists, verify that the VTT voltage is 0.5 VDD±5%. • Check whether the used DDR component is in the compatibility list.
5		SWL DDR training failed/SGA DDR training failed/HGA DDR training failed/HRD DDR training failed/SRD DDR training failed/SWD DDR training failed	If this information is displayed, DDR initialization is complete, but some signals are abnormal due to the connection or signal quality. • HGA + 00000000: The DDR CK or DQS signal is abnormal. However, you cannot determine which signal is abnormal in this information. Subsequent information is required for locating the fault. You can check the DDR power supply and soldering. • SWL + 0000000*X*. *X* indicates the ID of the DQS signal on the PCB (ranging from 0 to 3). Information for only one DQS signal is displayed. The lower-bit DQS information is displayed in priority. For example, if DQS0 and DQS1 are both faulty, only the information about DQS0 is displayed. If this information is displayed, the CK, DQS*x*, or DQ0 corresponding to the DQS*x* is faulty. You can determine which DDR is faulty by checking the displayed information. The fault may be caused by the DDR or master chip soldering issue, PCB design, or PCB processing quality. You can locate the problem by replacing the DDR or master chip. • SWD + 0000000*X*: *X* indicates the ID of the DQ signal on the PCB. • SRD + 0000000*X*: *X* indicates the ID of the DQ signal on the PCB. • If multiple DQ signals are faulty, only information about one DQ signal is displayed. The lower-bit DQ information is displayed in priority. For example, if DQ6 and DQ10 are both faulty, information about DQ6 is displayed, and information about DQ10 is displayed only after the DQ6 fault is rectified. • If this information is displayed, the corresponding DQ (according to the pin name of the master chip) channel is faulty or the signal quality is abnormal. You can scale down the frequency to locate the fault. For details, see section 5.2.1 "DDR Timing Window Information Under the Boot." • If the system works properly after frequency scaling, the signal quality is abnormal. Check whether the PCB traces are routed by following the HiSilicon demo board, and whether surrounding GND traces are used for the 2-layer PCB. • If the system still cannot work properly after frequency scaling, the connectivity of the corresponding DQ signal is abnormal. Check the PCB quality and soldering of the DDR or master chip. • If you need to locate the fault quickly, you are advised to

SN	Phase	Displayed Information	Description
			find the faulty DDR based on the displayed information and directly replace it. To locate the DDR issue, do as follows: • Check the board hardware, including the core and DDR power supplies, soldering of the DDR and master chip, and BOM. • View the serial port information to find the faulty DDR. • Scale the frequency to check whether the issue is caused by the connection or signal quality. • Replace the DDR and master chip to verify the soldering, PCB design, and processing quality. • For details about the DDR error information, see section 5.2.2 "DDR Error Information."
6	Fastboot	System startup	If this information is displayed, the fastboot has been downloaded to the DDR and started to be executed. If the download progress is 100% but this information is not displayed (seldom occurs), locate the fault as follows: • Check whether the fastboot version and *.reg file match the board, including the numbers of PCB layers and DDRs. • Check whether the VDD_CPU and VDD_CORE voltages are normal. • Scale down the DDR frequency to check whether the issue is caused by the DDR. If yes, go to step 4.
7		*** Not support current start mode	The hardware boot mode has been confirmed in step 2. Therefore, if this information is displayed, the fastboot image burnt in the flash memory mismatches the flash memory. For example, the eMMC is soldered on the board, and the system boots from the eMMC. However, the fastboot image for the SPI or NAND flash is burnt to the eMMC.
8		No information is displayed.	If no information is displayed, the DDR is not properly connected, and DDR initialization fails. Check the following items: • Check whether the used *.reg file during boot compilation matches the current board. For details about the mapping, see the *SDK directory*/**source/boot/sysreg/read_cn.xls**. • Verify that the 1.5 V DDR power supply is normal. Measure the GND impedance of the capacitor for the 1.5 V DDR power to check whether the power is short-circuited. • Verify that the DDR component is soldered properly. • Verify that the core power of the master chip is VDD±5%.
9		Reg Version: xxxx Reg Time: xxxxx Reg Name: xxxxx	This information is meaningless.

SN	Phase	Displayed Information	Description
10		No NAND device found!!!	If this information is displayed, check the board boot mode. • If the system boots from the eMMC or SD card, this information is normal. • If the system boots from the NAND flash, check the NAND flash circuit on the board.
11		MMC/SD controller initialization. No MMC/SD card detect when read `SDIO_CARD_DETECT` pin.	If this information is displayed, check the board boot mode. • If the system boots from the NAND flash, this information is normal. • If the system boots from the eMMC or SD card, the SDIO_CARD_DETECT pin is not connected properly. • Verify that the level of the SDIO_CARD_DETECT pin is low and the pull-down resistor exists. • Check whether SDIO_CARD_DETECT is short-circuited with the VDD power supply due to solder bridges.
12		*** irq: data abort *** irq: undefined instruction *** irq: prefetch abort	If this information is displayed, the cause may be the following: • Data read from the flash memory is incorrect. You may need to reburn the software and check whether the boot version is correct. • The DDR is abnormal, and data in the DDR is incorrect. This issue seldom occurs. It is complicated. You can locate the fault by scaling the DDR frequency, checking the power supplies (core power, VDD_DDR, and VTT), soldering, and quality of the PCB board, or replacing the DDR.

5.2 DDR Training Information

The DDR training is the embedded DDR timing auto-adaptive algorithm on the HiSilicon platform. It has the following functions:

- Adapts to the optimal DDR timing window during power-on.
- Displays the DDR timing window under the boot.
- Displays the DDR error information.

5.2.1 DDR Timing Window Information Under the Boot

Enter **ddr training** in the fastboot command line. Information shown in Figure 5-1 and Figure 5-2 is displayed.

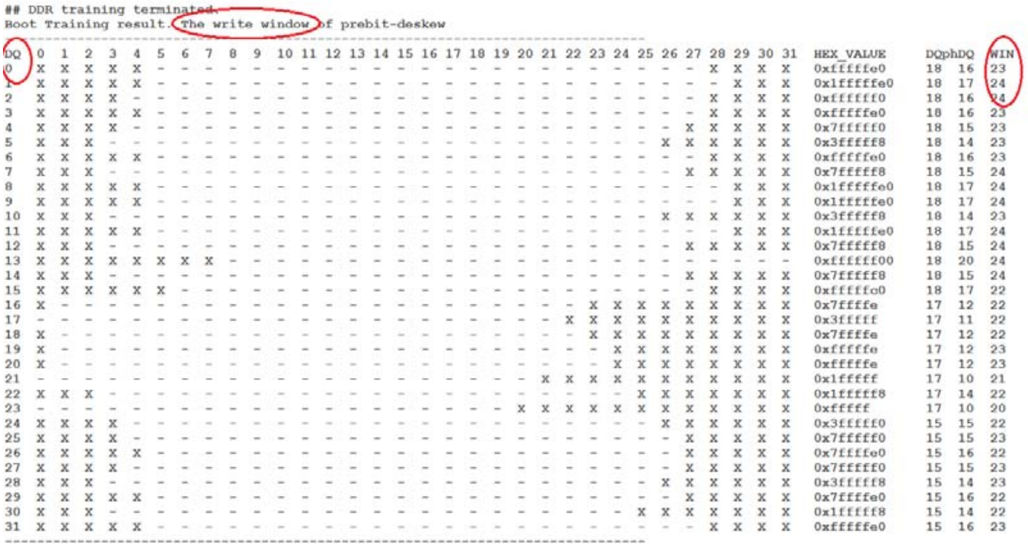
- Write window and read window: write timing window and read timing window of the DDR
- **DQ** column: 0–31 correspond to DQ0–DQ31, indicating the 32 bits of the DDR. The 32-bit DQ signals map to the line-out pins of the master chip. The DDR pins of the master chip vary according to the PCB layers (2-layer PCB or 4-layer PCB). For details, see the symbols in the schematic diagram of the release package.

- **WIN** column: global timing window of the corresponding DQ signal. The larger the value, the better. The value must be greater than or equal to 14.
- - indicates that the DDR timing window is OK.

  X indicates that the DDR timing window fails.

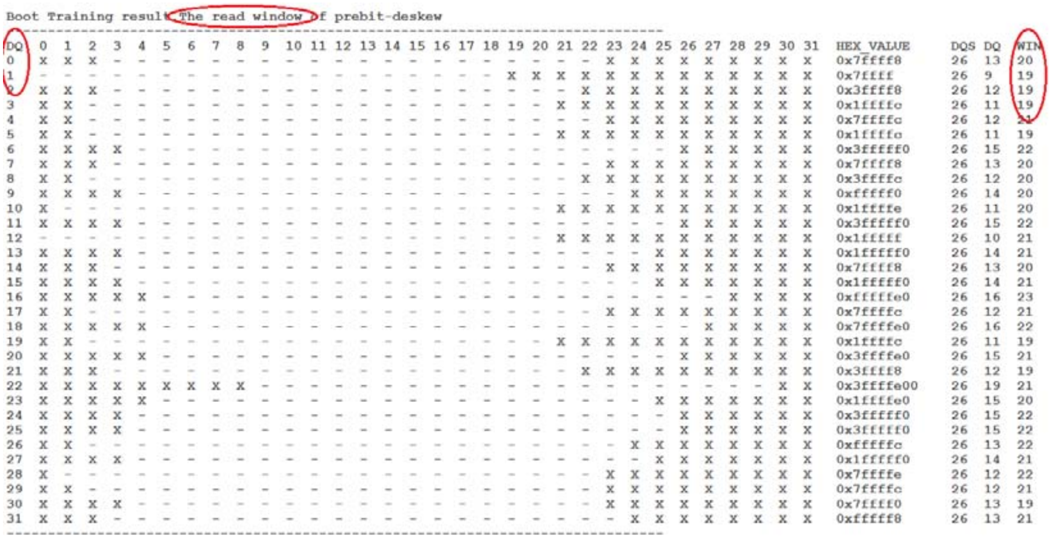
  More "-" for each DQ indicate a better timing window. However, if the timing window is shifted leftwards or rightwards too much, you need to check the fastboot version.

Figure 5-1 Write window



```
## DDR training terminated.
Boot Training result. The write window of prebit-deskew
---------------------------------------------------------------------------------------------
DQ  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31  HEX_VALUE   DQphDQ  WIN
0   X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xfffffe0   18  16  23
1   X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  0x1fffffe0  18  17  24
2   X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xffffff0   18  16  24
3   X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xfffffe0   18  16  23
4   X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7fffff0   18  15  23
5   X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff8   18  14  23
6   X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xfffffe0   18  16  23
7   X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7fffff8   18  15  24
8   X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  0x1fffffe0  18  17  24
9   X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  0x1fffffe0  18  17  24
10  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff8   18  14  23
11  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  0x1fffffe0  18  17  24
12  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7fffff8   18  15  24
13  X  X  X  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  0xffffff00  18  20  24
14  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7fffff8   18  15  24
15  X  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xfffffc0   18  17  22
16  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffffe    17  12  22
17  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  0x3fffff    17  11  22
18  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffffe    17  12  22
19  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  0xfffffe    17  12  23
20  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  0xfffffe    17  12  23
21  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  0x1fffff    17  10  21
22  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  0x1fffff8   17  14  22
23  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  X  0xfffff     17  10  20
24  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff0   15  15  22
25  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7fffff0   15  15  23
26  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7ffffe0   15  16  22
27  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7fffff0   15  15  23
28  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff8   15  14  23
29  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7ffffe0   15  16  22
30  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  0x1fffff8   15  14  22
31  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xfffffe0   15  16  23
---------------------------------------------------------------------------------------------
```

Figure 5-2 Read window



```
Boot Training result. The read window of prebit-deskew
---------------------------------------------------------------------------------------------
DQ  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31  HEX_VALUE   DQS DQ  WIN
0   X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffff8    26  13  20
1   -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  X  X  0x7ffff     26  9   19
2   X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  0x3ffff8    26  12  19
3   X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  0x1ffffc    26  11  19
4   X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffffc    26  12  21
5   X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  0x1ffffc    26  11  19
6   X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff0   26  15  22
7   X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffff8    26  13  20
8   X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  0x3ffffc    26  12  20
9   X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  0xfffff0    26  14  20
10  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  0x1ffffe    26  11  20
11  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff0   26  15  22
12  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  0x1fffff    26  10  21
13  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  0x1fffff0   26  14  21
14  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffff8    26  13  20
15  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  0x1fffff0   26  14  21
16  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  0xfffffe0   26  16  23
17  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffffc    26  12  21
18  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  0x7ffffe0   26  16  22
19  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  X  0x1ffffc    26  11  19
20  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3ffffe0   26  15  21
21  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  X  0x3ffff8    26  12  19
22  X  X  X  X  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  0x3ffffe00  26  19  21
23  X  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  0x1ffffe0   26  15  20
24  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff0   26  15  22
25  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  0x3fffff0   26  15  22
26  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  0xfffffc    26  13  22
27  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  0x1fffff0   26  14  21
28  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffffe    26  12  22
29  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffffc    26  12  21
30  X  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  X  0x7ffff0    26  13  19
31  X  X  X  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  X  X  X  X  X  X  X  X  0xfffff8    26  13  21
---------------------------------------------------------------------------------------------
```

5.2.2 DDR Error Information

During the process when the HiTools is used to burn images or the fastboot is started, the DDR training algorithm checks the DDR system and displays information if errors occur.

- Software write leveling error information: SWL + 0000000*X*. *X* indicates the corresponding byte.
- Software DQS gating error information: SGA + 0000000*X*. *X* indicates the corresponding byte.
- Hardware DQS gating error information: HGA + 00000000. The specific DQS signal cannot be identified.
- Hardware read dataeye error information: HRD + 00000000. The specific DQ signal cannot be identified.
- Software read dataeye error information: SRD + 0000000*X*. *X* indicates the first error DQ signal.
- Software write dataeye error information: SWD + 0000000*X*. *X* indicates the first error DQ signal.

If the preceding error information is displayed, the connection between the DQS/DQ signals of the DDR and master chip is abnormal or the signal quality is poor, and therefore the board cannot be started properly.

To ensure that the system can run properly after startup, the HiSilicon solution imposes requirements on the DDR timing windows during DDR self-check when the system is started. The test data shows that if the level of the DDR timing window is greater than or equal to 12, the DDR system can run properly. Therefore, the DDR training algorithm displays "DDR training failed, result: 00000004" if the levels of some DQ timing windows are less than 12 during DDR self-check upon system power-on.

This function can be disabled by setting bit 31 of the configuration register with the address of 0xf80000d0 to 1 in the fastboot table. After the fastboot is recompiled and burnt, the system can be started normally. Enter **ddr training** in the fastboot command line to view details about the DDR timing windows and locate the fault that the DQ timing is small.