NuProg-E

Engineering UFS/EMMC Programmer User Manual

Version 1.4

Table of Contents

Important notice:

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I. Introduction

This user manual is mainly introducing the hardware specifications, applications and the software quick installation. NuProg-E is an engineering programmer that is innovated for programming mass flash storage, such as UFS and eMMC. For UFS, it provides the basic LUN and RPMB read and write as well as the settings for descriptors, attributes and flags. As for eMMC, it supports User Area, Boot 1/2 and RPMB basic read and write; also supports ExtCSD, GPP1~4 partition, read and write, as well as enhanced mode setting. With the high speed USB 3.0, the NuProg-E is the finest programmer for UFS and eMMC development. For more information, please visit our website.
www.dediprog.com/download

II. Product Information

- **High Speed Programming**

  With high speed processor, programming speed will increase greatly.

  UFS Write speeds: 20~50MB/s; Read speeds: 50~80MB/s (Depends on computer and IC performance).

  Time reference: It will only take 25 seconds to program a 1GB file into a Toshiba UFS IC
- **Support UFS and EMMC/EMCP Settings and Programs**
  - **UFS part**
    1. Support Descriptors, Attributes, Flags settings
    2. Support LUN configured and advance settings
    3. RPMB
  - **EMMC part**
    1. Support User Area, Boot1/2 Partition and Extend CSD
    2. Support RPMB, GPP1~4 and Enhanced mode
- **Support all IC package**

  Support standard package of UFS and EMMC (BGA153 (11.5x13mm)) or special package of EMCP.
- **Regular Software Update**
- **Palm Size and Space Saving**

  Dimension: 132 x 75 x 30 mm Weight: 104g
- **Support USB 2.0 and USB 3.0 (Power adapter is required)**

III. System Requirement

CPU:	Intel i5 or Above
OS:	Windows 7 / 8 / 8.1 / 10
USB Port:	USB 2.0 and USB 3.0
Free Dish Space:	At least twice of the programming memory.
CD ROM:	It is necessary for installing the software.

*Since UFS and EMMC have mass volumes, please reserve enough space for buffering.

*Computer performances will affect the read and write of UFS, please choose a computer that has higher CPU and better performance.

IV. Product Descriptions

4.1 Exterior

A. Power Signal Light

B. Operation Lights

C. Programming Socket Sites

D. Start Button

Fig. 4-1

E. Power Connector

F. USB 3.0 Port

Fig. 4-2

A. Power Signal Light

The light indicates the programmer is powered on.

B. Operation Lights

Red LED (Error): Error; programming has failed.
Yellow LED (Busy): The programmer is operating.
Green LED (Pass): Passed; the programming has completed successfully.

C. Programming Socket Sites

Built-in high speed connector, which is for installing the socket adaptor

D. Start Button

Not available now.

E. Power Connector

External power inputs ***(In order to make it more stable, please make sure the power adapter is connected.)***

F. USB 3.0 Port

For connecting programmer with the computer.

4.2 Install Socket Adaptor

Place an IC into the socket adaptor and attach the adaptor to the socket site.

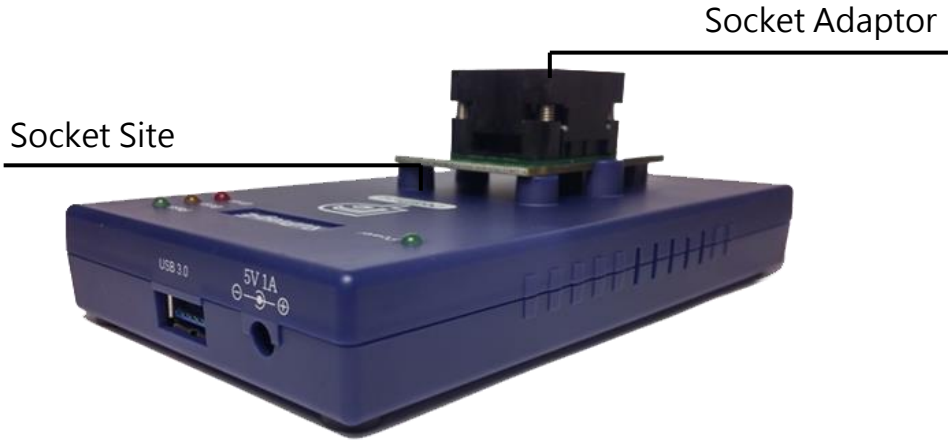


Fig. 4-3

V. Dediware Quick Installation

The software is provided with the purchase of NuProg-E programmer. The newest version will also be available on our website. **www.dediprog.com**

5.1 Software Installation

5.1.1 Install DediWare

Fig. 5-1

5.1.2 When you install NuProg-E software for the first time, please install the USB Driver. Otherwise, the computer will not be able to recognize the programmer.

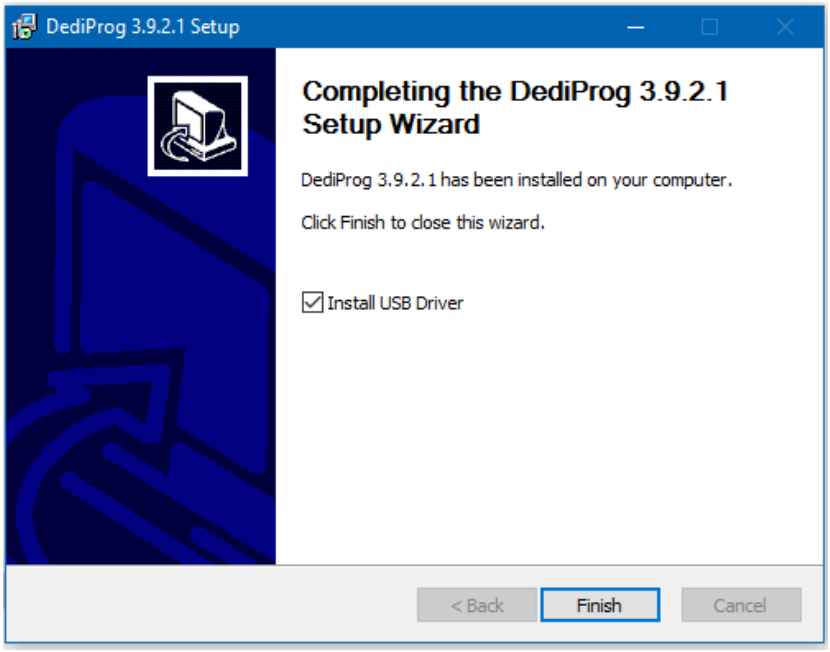


Fig. 5-2

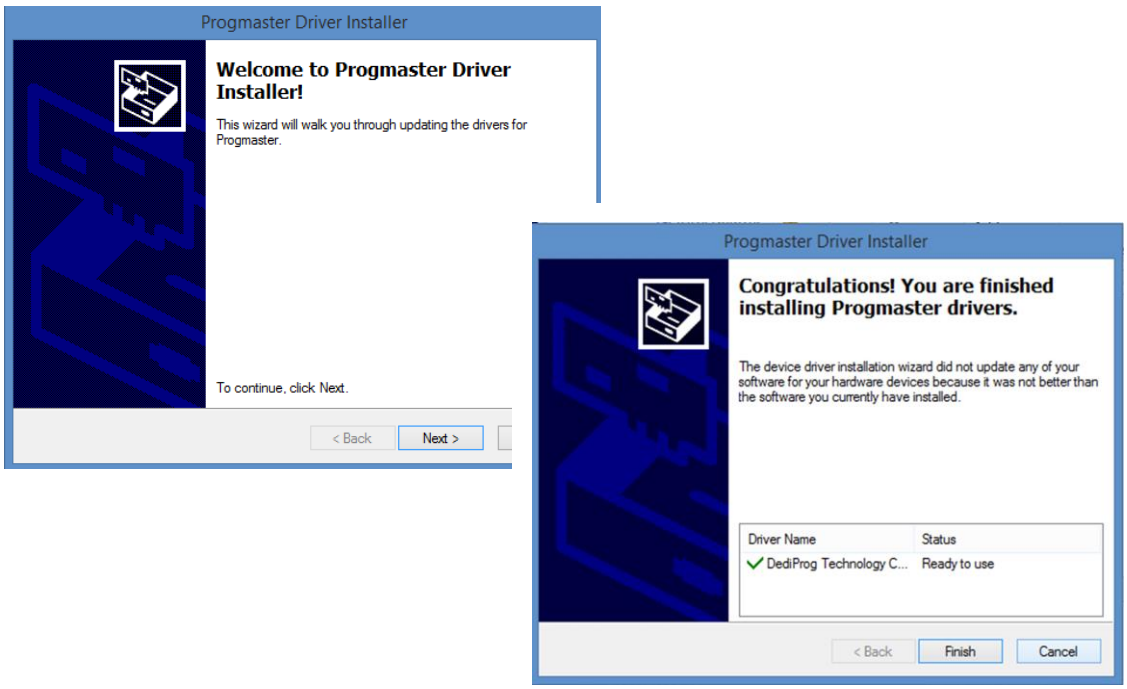


Fig. 5-3

5.1.3 After installation, **Dediware, NuProg_UFS** and **NuProg_eMMC** icons will appear on the desktop. The Dediware icon is for StarProg and ProgMaster series programmer while the NuProg_UFS and NuProg_eMMC are for NuProg-E programming.

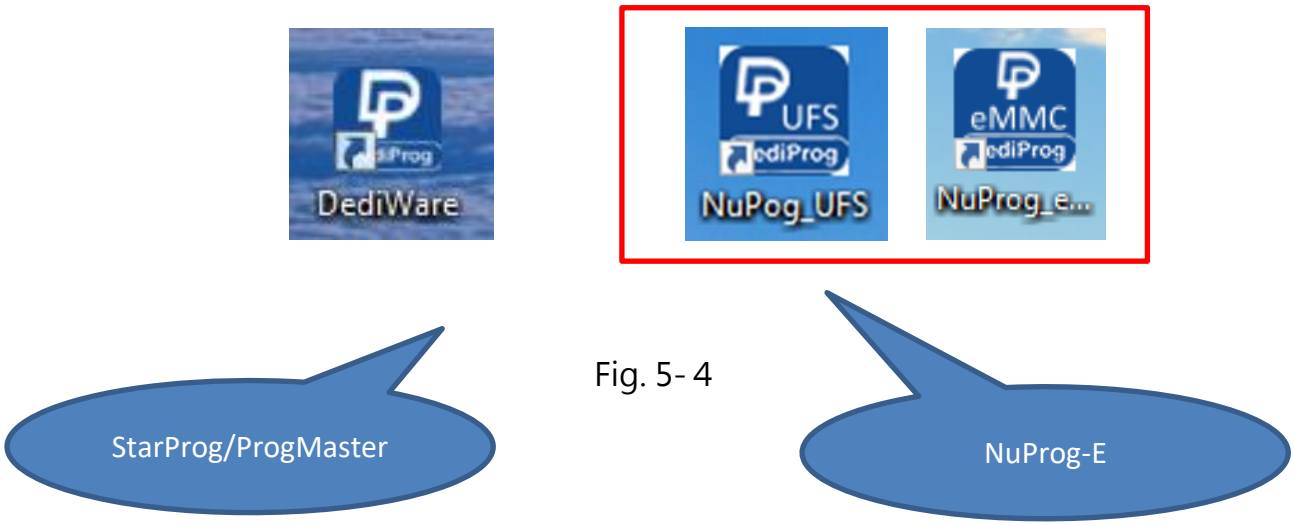


Fig. 5- 4

There is another icon called DediWare_CLI; it is the Command Line software for StarProg Series programmers, so it does not support NuProg series.

Fig. 5-5

5.2 Install NuProg-E Programmer

5.2.1 Place an IC into the socket adaptor and attach it to the socket site.
5.2.2 Connect NuProg-E to the computer (USB 3.0 is recommended).
5.2.3 Once you open Dediware, it will detect a programmer automatically and will be available for programming.

※Using multiple USBs on the same computer may affect the charging currents, so it is REQUIRED to connect the USB with our *power adapter* for stable programming.

5.3 NuProg_UFS Installation Guide.

5.3.1 Double Click NuProg_UFS icon.

Fig. 5-6

5.3.2 Software Introduction (UFS Part)

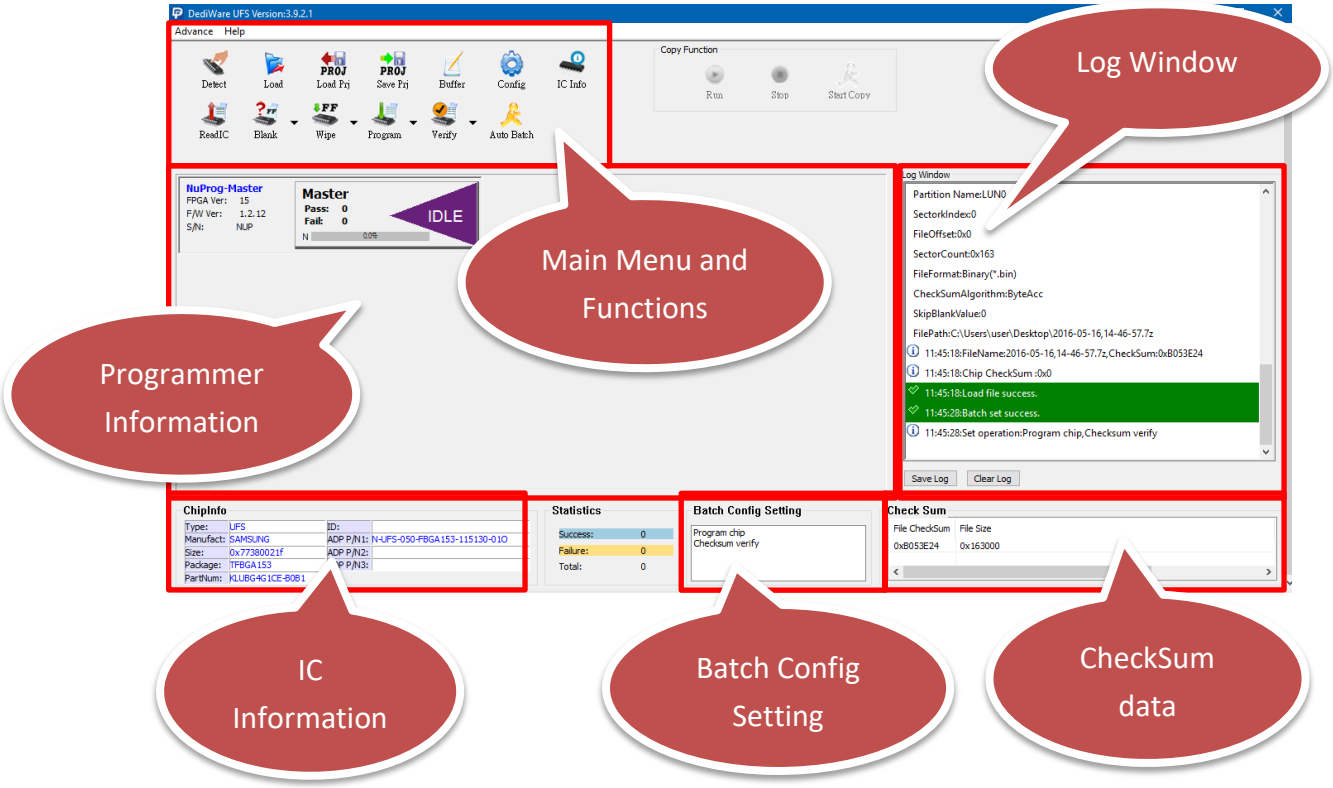


Fig. 5-7

A. Main Menu and Functions

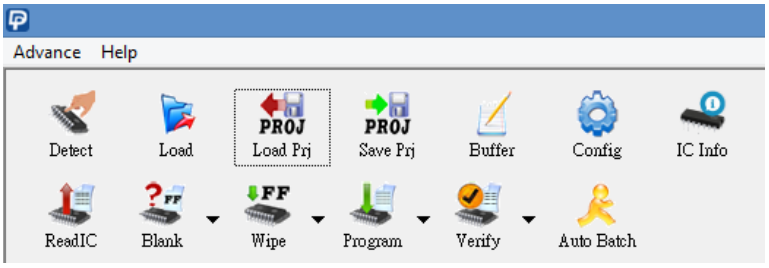


Fig. 5-8

A-1. Main Menu- Advance

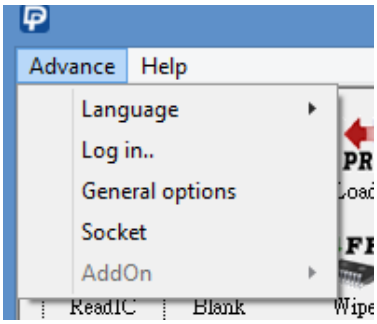


Fig. 5-9

- **Language**: English, Simplified Chinese and Traditional Chinese are provided.
- **Log in:** Set up the IP address for remote controls.
- **General options:** Set up a temporary file for saving buffers. Since large volume IC has a great demand of storage. Therefore, if C drive does not have enough space, please choose other drive.

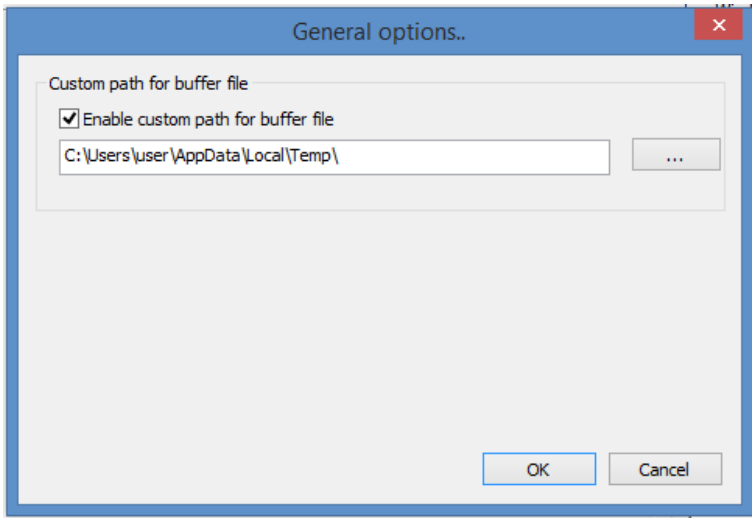


Fig. 5-10

A-2. Main Menu- Help

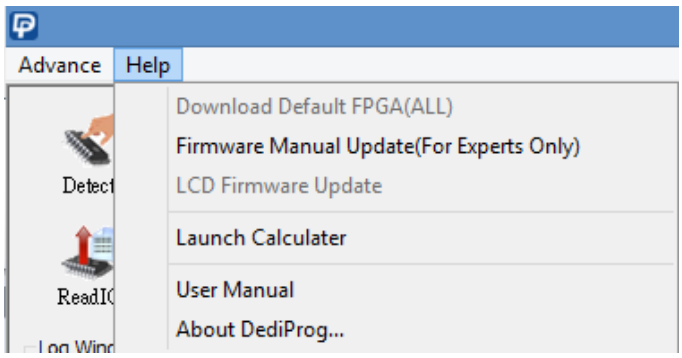


Fig. 5-11

- **Firmware Manual Update:** Update the firmware version of the NuProg-E. Update the firmware and restart the programmer.
- **Launch Calculator:** It opens the calculator.
- **User Manual:** It links to DediProg's user manuals.

A-3. Functions (From Top to Bottom; Left to Right)

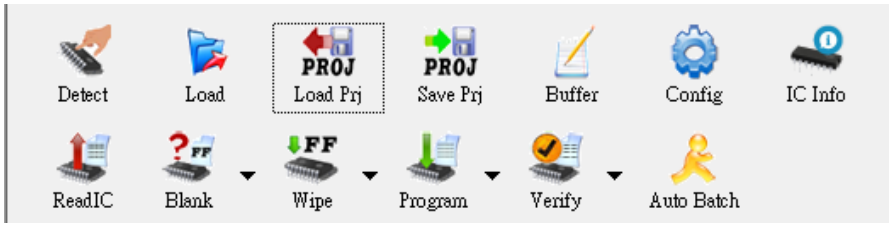


Fig. 5-12

- **Detect:** Detect IC or choose the model number manually. If the data list has the corresponding model number that is supported, software will automatically import the values of the UFS, and the Log will appear as below (Fig. 5-13). If the IC model number that you need are not listed (Fig. 5-14), please feel free to contact us.

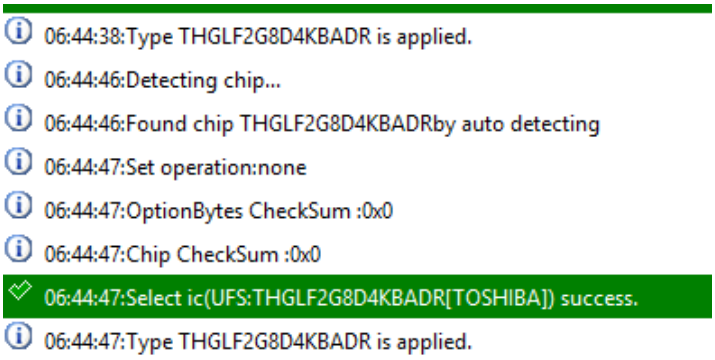


Fig. 5-13

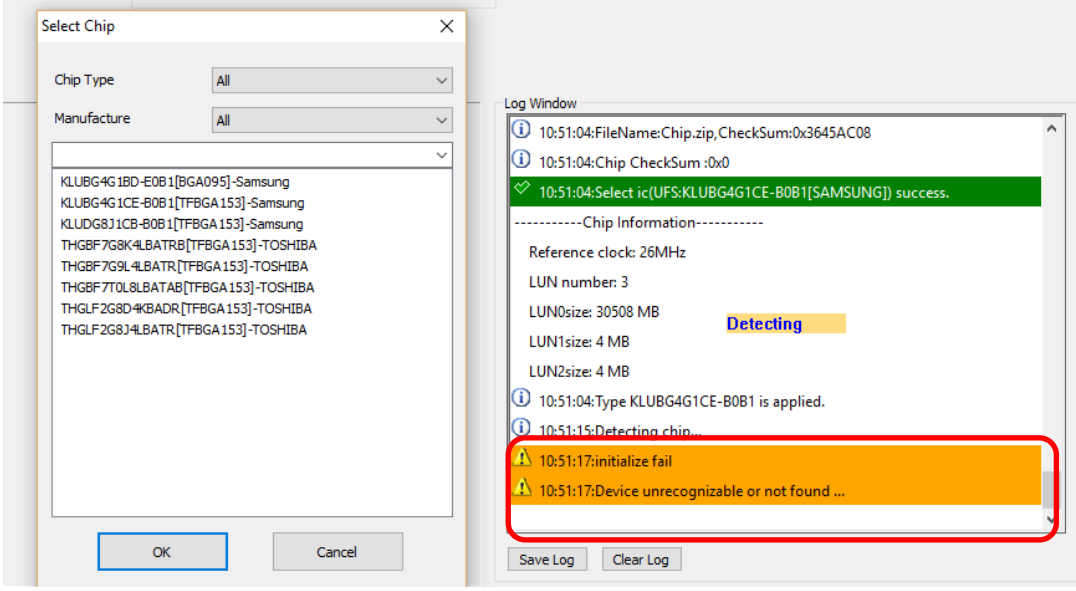


Fig. 5-14

- **Load:** Import the programming file and set the values according to your requirements.

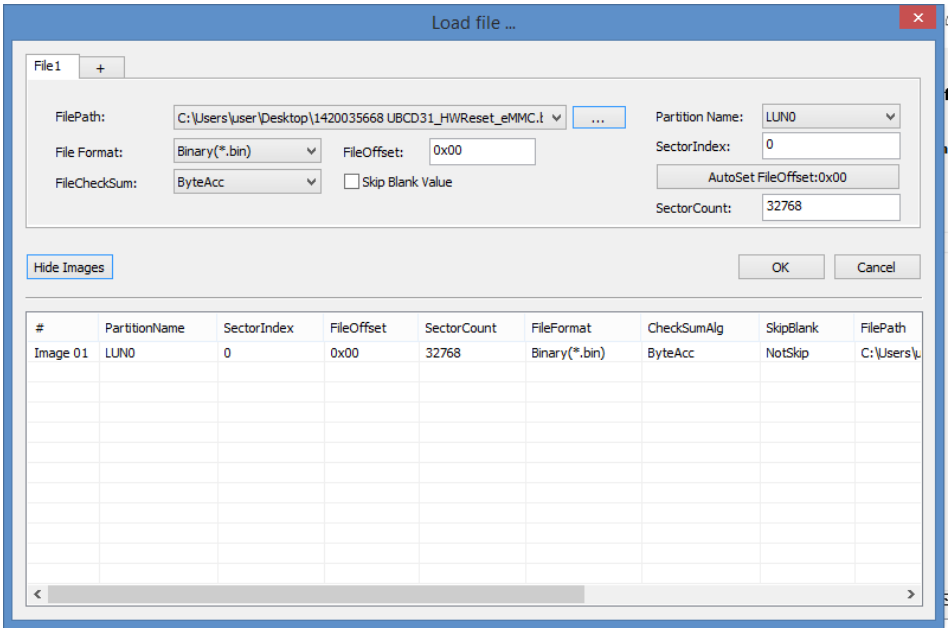


Fig. 5-15

Value Descriptions:

- **File Format:** The format of the programming file.
- **File Checksum:** The file checksum's calculation method.
- **File Offset:** Appoint an address to start loading the buffer.
- **File Path:** Assign a path for the programming file.
- **Skip Blank Value:** Enable this function to analyze and skip the blank data before programming, which will write more efficiently and reduce the programming time.
- **Partition Name:** It depends on the partitioned sections.

  Note: This partition here will only show the amounts and settings according the IC that has been detected.
- **Sector Index:** Set up the sector starting point
- **Sector Count:** Set up total programming sectors.
- **AutoSetFileOffset**: When setting the **Sector Index**, this function can automatically calculate the File Offset.
- **+:** When there is more than one programming file, please press "+" to add the files to the data list.
- **Show Images and Hide Images:** Open and close the data list.

➢ **Load Prj:** Import previous programming files (Not Supported Yet).

➢ **Save Prj:** Save all the settings as a programming file (Not supported yet).

- **Buffer**: Temporary files.

  Select a partition to display the LUN and the related Option values of the UFS.

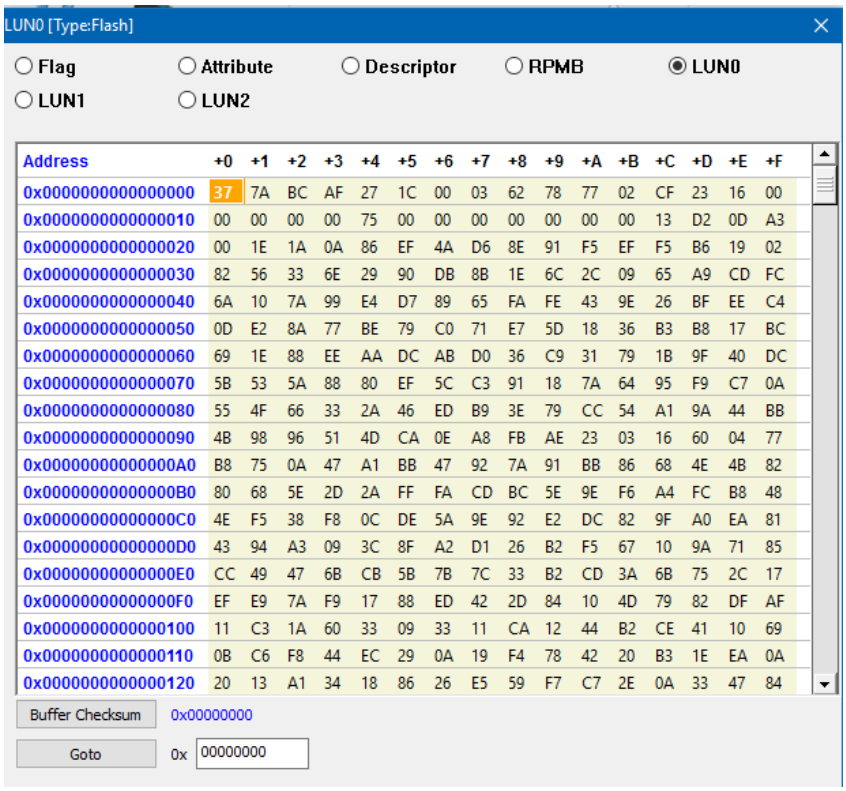


Fig. 5-16

Buffer Checksum: It will calculate the assigned Partition checksum.

Goto: Assign a Buffer address

- **Config:** Programming Settings. It will read the contents of Descriptors/Attribute/Flags from the UFS and display on each window.

- **Batch Setting:** Double click the programming options that are listed in the **Batch Operation box** or click **>>** or **<<** to move the options to the **Operation Selected box**. The AutoBatch will program according to the listed order in the **Operation Selected box**.

  Note: You can add Write Flag and Write Attributes before or after Wipe LUN/Blank Check/Program Chip/Checksum Verify. When executing the Attributes, it is recommended to arrange the Write Attributes to the last step (especially when setting the frequency clock bRefClkFreq of UFS), shown as Fig 5-17.

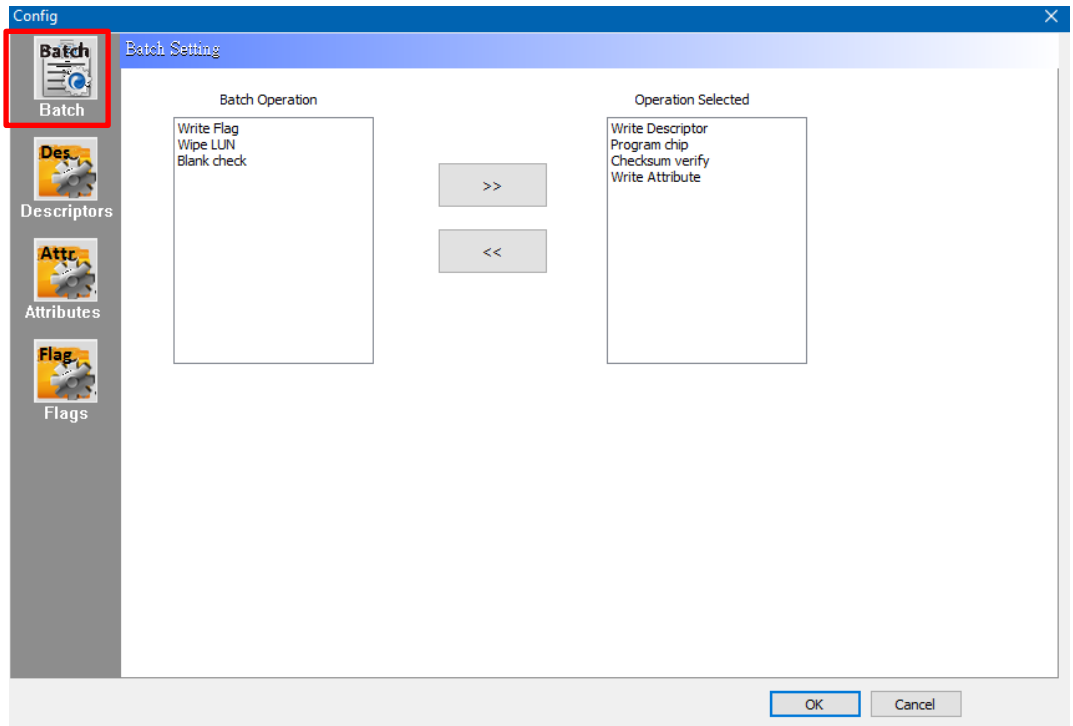


Fig. 5-17

- **Descriptors**: It provides all UFS descriptor settings. Use **Write Descriptor** to write; test read is also available on this page. (Fig 5-18).

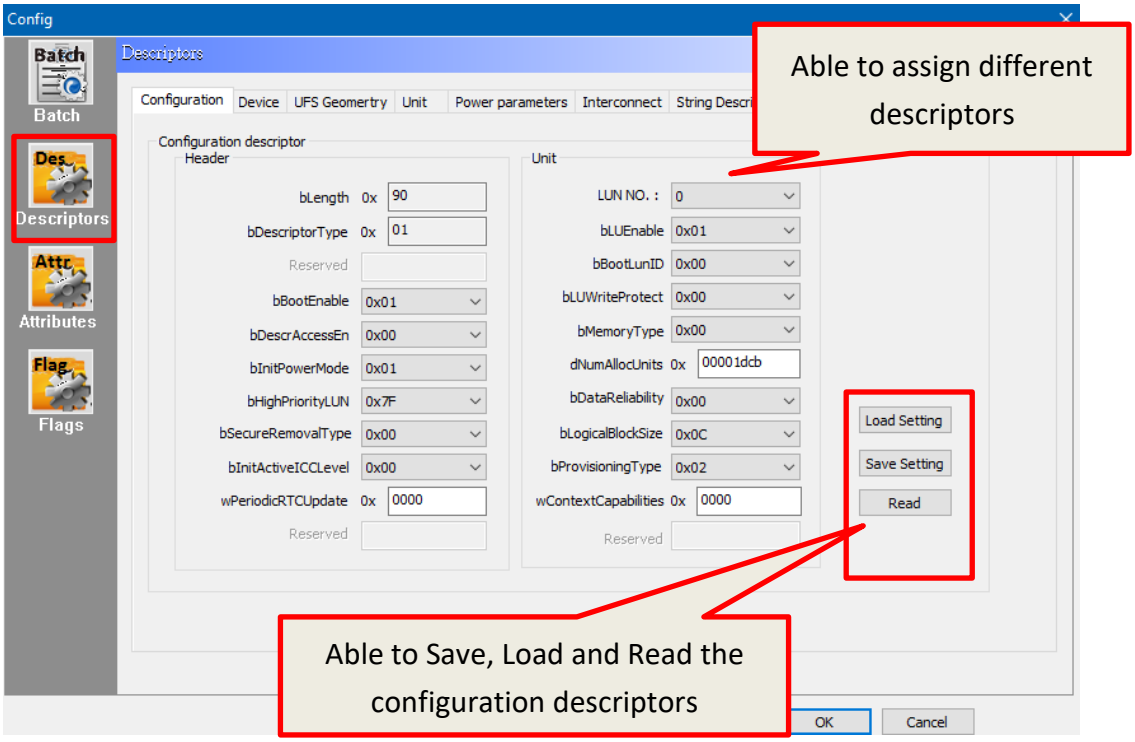


Fig. 5-18

Load Setting: Load the configuration descriptor settings.
Save Setting: Save the configuration descriptor settings.
Read: Read the configuration descriptor settings.

※Only the configuration descriptor can read and write, other descriptors are read-only.
Note: Some descriptor values are one time programming, which cannot change once it is written. Please refer to the UFS datasheet that you use before changing any settings.

- **Attributes**: Provides set up and read for each LUN attribute values. Use **Write Attribute** to write; test read is also available on this page.

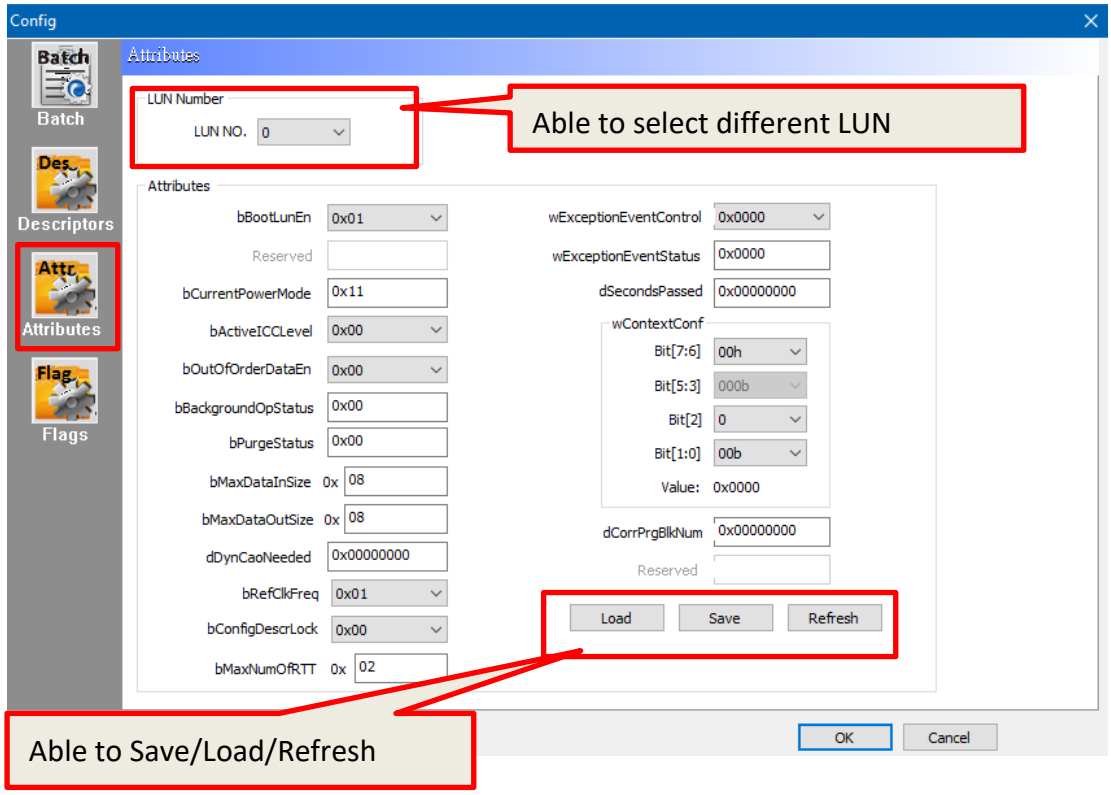


Fig. 5-19

Assign a LUN NO according to your need and **Refresh** to read the attributes, please ensure the information is written correctly, and then save the settings for next time usage.

※Some attribute values are read-only and some can read and write. The values that you can change are the ones that are able to write.
Note: Some attribute values are one time programming, which cannot change once it is written. Please refer to the UFS datasheet that you use before changing any settings.

- **Flags:** Set up the settings and write through the Write Flag; test read is also available on this page.

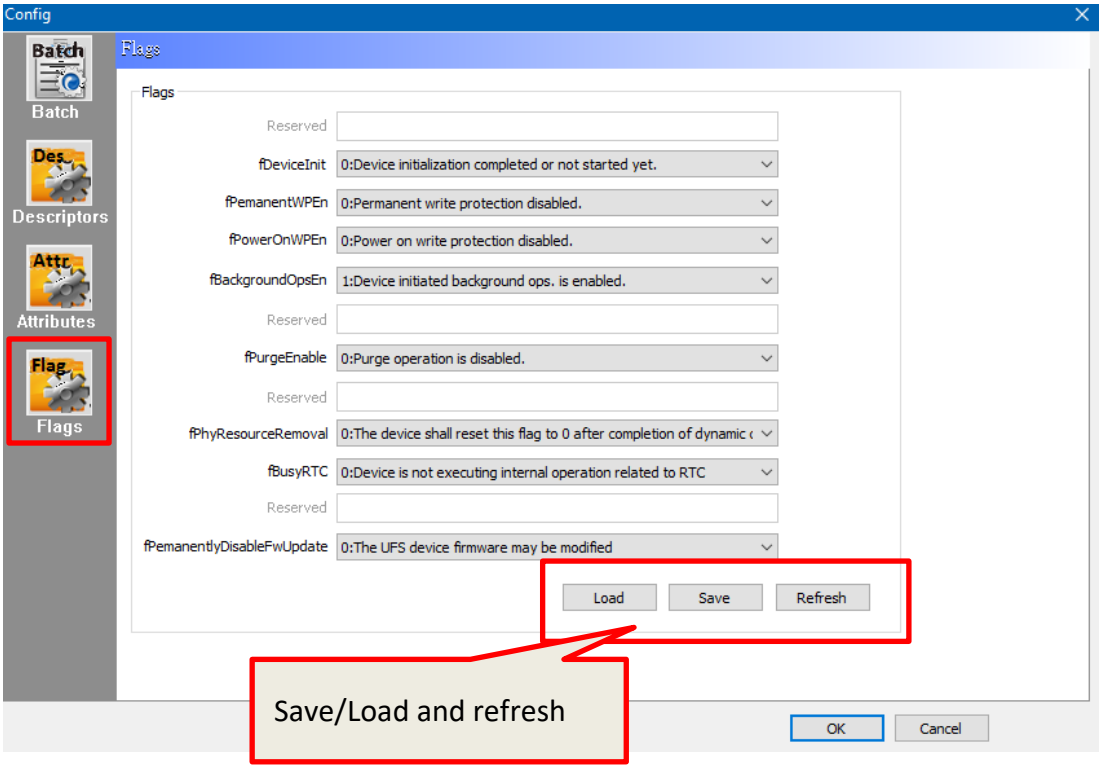


Fig. 5-20

Change the settings according to your needs, and then write through the Write Flag. Refresh the flags and ensure it is written correctly. Save the values for next time usage.

※Some flag values are read-only and some can read and write, the values that you can change are the ones that are able to write.
Note: Some flag values are one time programming, which cannot chang once it is written. Please refer to the UFS datasheet that you use before changing any settings.

- **IC Info:** Chip information and cautions (Not supported yet).
- **ReadIC:** Read and display the IC data.

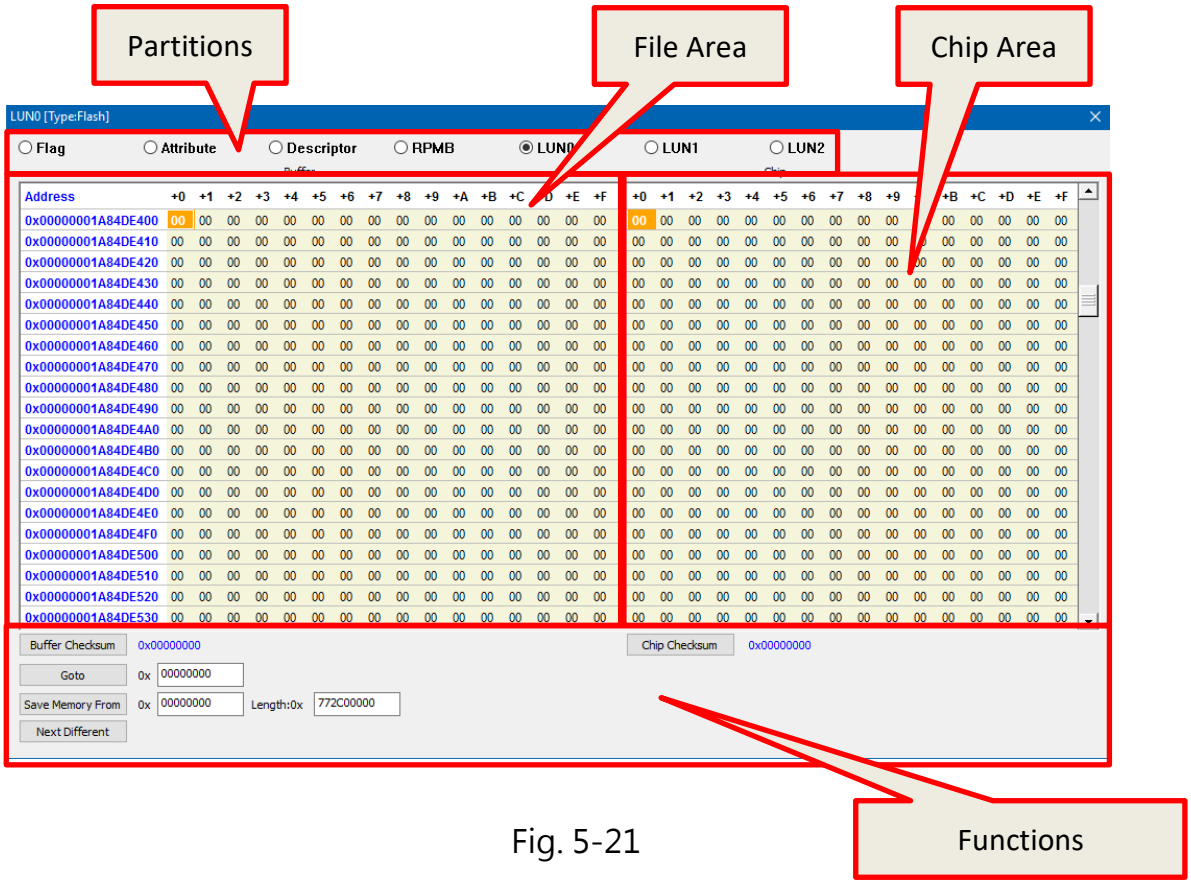


Fig. 5-21

A. Partitions

The partition numbers are configured by the actual LUN partitions of the UFS. Select a partition to display its data.

B. File Area (Buffer)

This area will display the data of the imported files.

C. Chip Area

It will read the actual IC and compare with the file data. The abnormal parts will be high-lighted in red for analysis.

D. Functions

- **Buffer Checksum and Chip Checksum:** Show the buffer checksum and the chip checksum of the partition for verification.
- **Goto:** Enter the number line in order to go to the address for examination.
- **Save Memory:** Saves the actual IC data of the selected partition or select a range to save. However, it is not available to save all the partitions at once.
- **Next Different:** Search and compare the next loaded file and edited file.

➢ **Blank:** Blank IC checks. Select **all** or a LUN

Fig. 5-22

➢ **Wipe**: Erase IC data. Select **all** or a LUN.

Fig. 5-23

- **Program**: Program the data to the IC. Select **all**, one of the LUN, or Descriptors/Attributes/Flags Program.

Fig. 5-24

- **Verify**: Verify and compare the programming file with the IC data. Select **all**, one of the LUN, or Descriptors/Attributes/Flags Program.

Fig. 5-25

- **AutoBatch**: The programming procedure will follow the order listed in the **Batch Settings**, which is in the **Config** window.

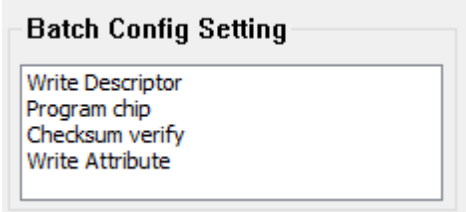


Fig. 5-26

B. LOG Window: *Display and record the entire process and the results.*

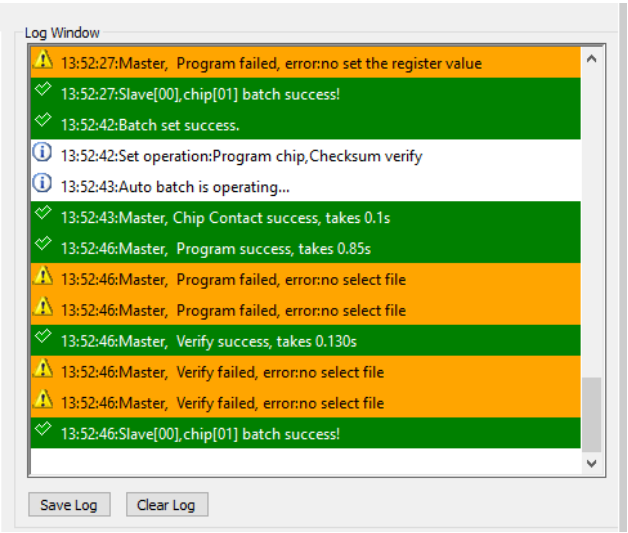


Fig. 5-27

C. Programmer Information: *Display the programmer name, the firmware version and the FPGA version.*

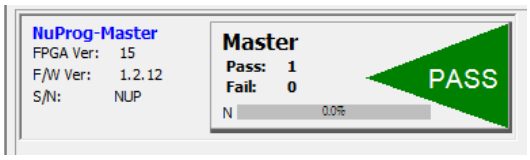


Fig. 5-28

D. *IC Information:* *Display all the data of the selected IC.*

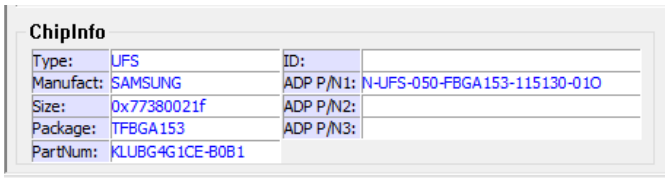


Fig. 5-29

E. *CheckSum Data:* *Display programming file name, file size, corresponding partition, and file checksum.*

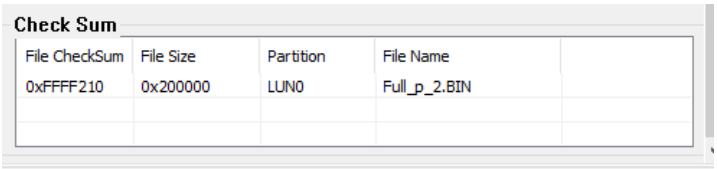


Fig. 5-30

F. *Batch Config Setting:* *It displays the batch settings that are selected in the Config window. When you use AutoBatch, the system will follow the listed order when programming.*

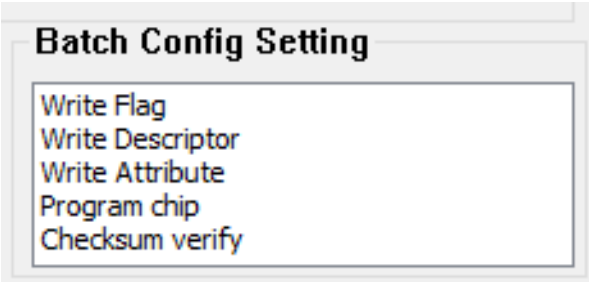


Fig. 5-31

5.3.3 Examples

5.3.3.1 Only update LUN0, LUN1, and LUN2 for the IC that has been initialized, please follow the steps below:

Step 1. Install an IC on the programmer and open the software. The software will automatically detect the IC model and the LUN status.

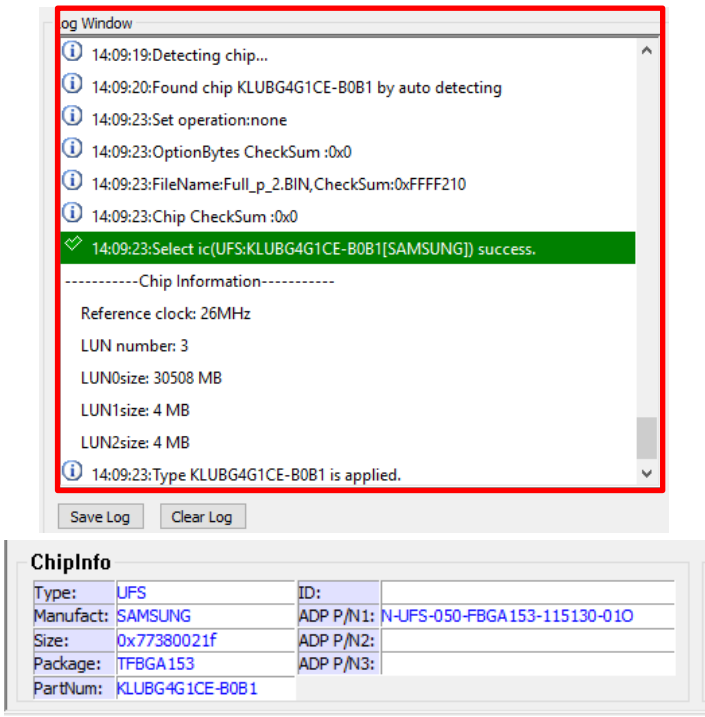


Fig. 5-32

As shown in Fig. 5-33, the LUN of this UFS has been partitioned into three sections and the reference clock is 26MHz.

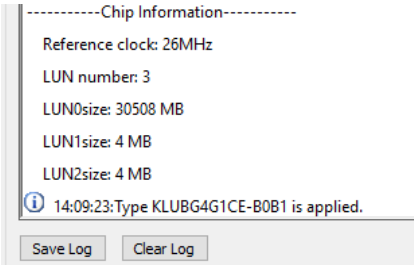


Fig. 5-33

Step 2. Load a programming file: load a programming file to each LUN partition separately (Fig. 5-34). Since LUN0 file is bigger and more dispersed, please select the **Skip Blank Value** to reduce the programming time.

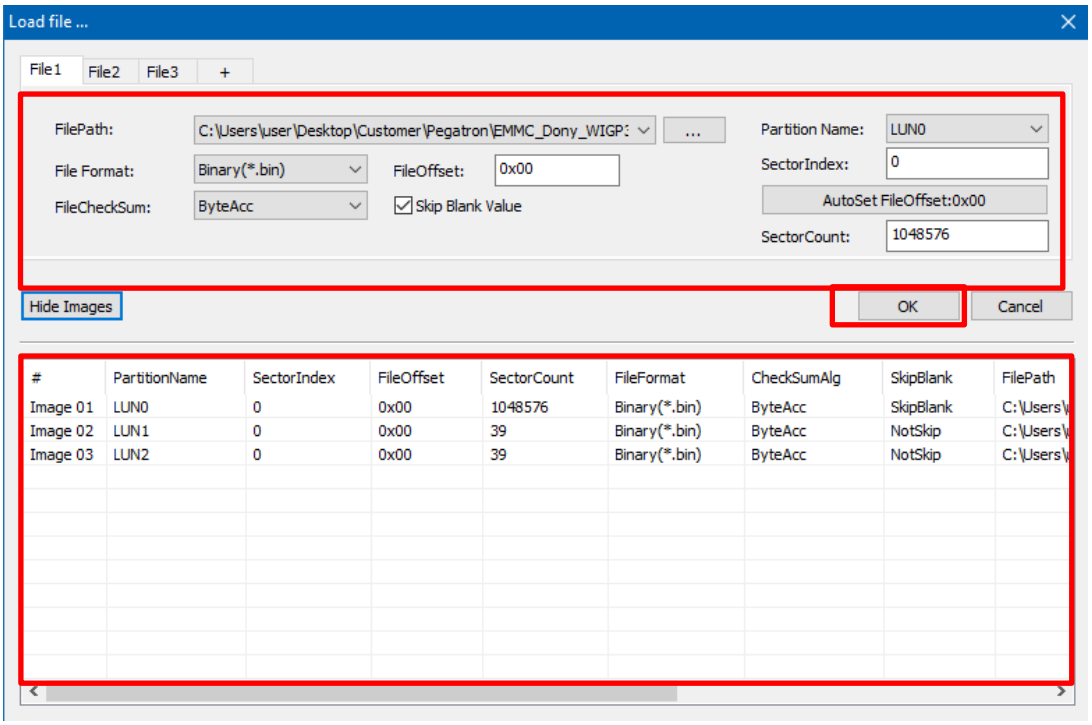


Fig. 5-34

After import a file, the corresponding programming file and the File CheckSum will be shown in the Check Sum Area.

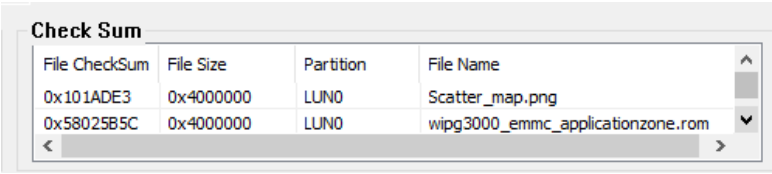


Fig. 5-35

Step 3. For single programming function

In order to re-work IC, please write in the order of **wipe (*Note) > Program > Verify LUN0~2**. If IC has not been programmed yet, then skip **wipe** and start from **Program > Verify**. However, if you need batch programming, please go to **step 4**.

***Note:** Since UFS is a rewriteable IC, it will take a while to Wipe, so please use it deliberately.

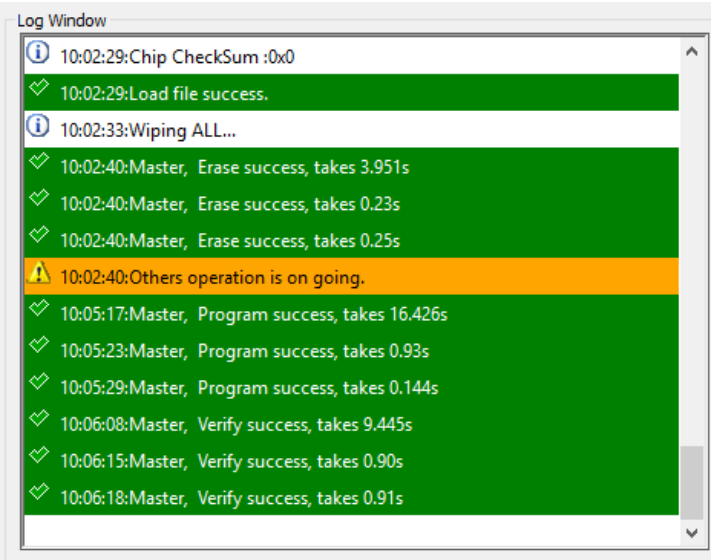


Fig. 5-36

Step 4. Batch Programming

Step4-1. Set up **Batch Setting** in the **Config** window**.** Since you will only need to update the contents of LUN0~2, and the file is bigger than the original IC file, so it is not necessary to set up and program Flag, Attribute, and Descriptor again. Therefore, only need to select Program chip and Checksum verify.

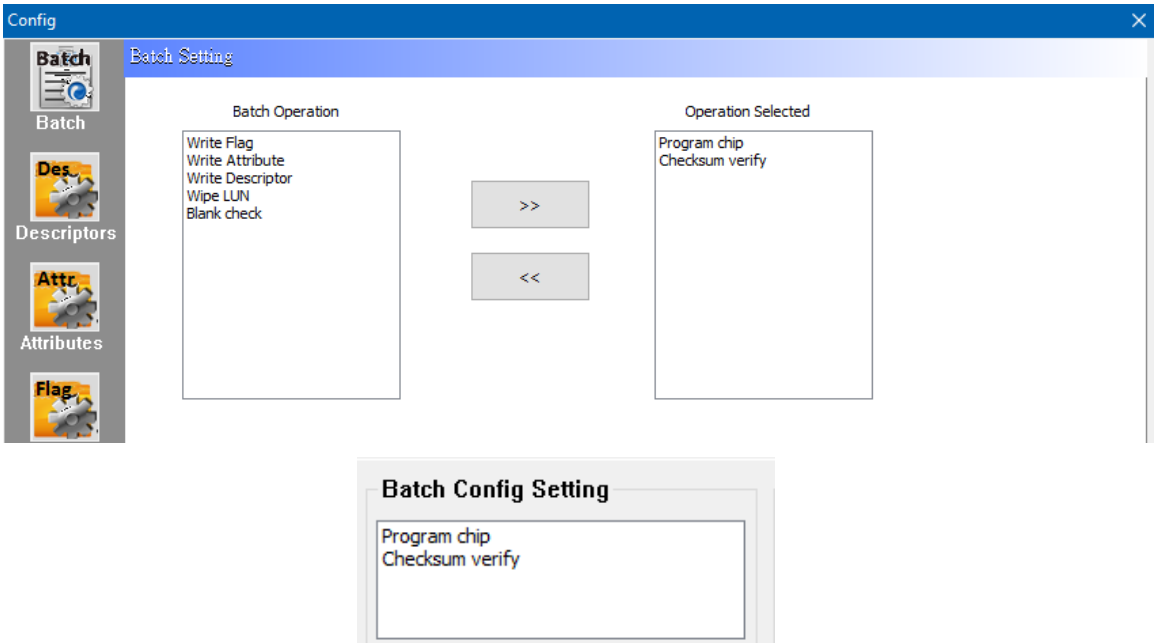


Fig. 5-37

Step 4-2. Click **Auto Batch** to start programming.

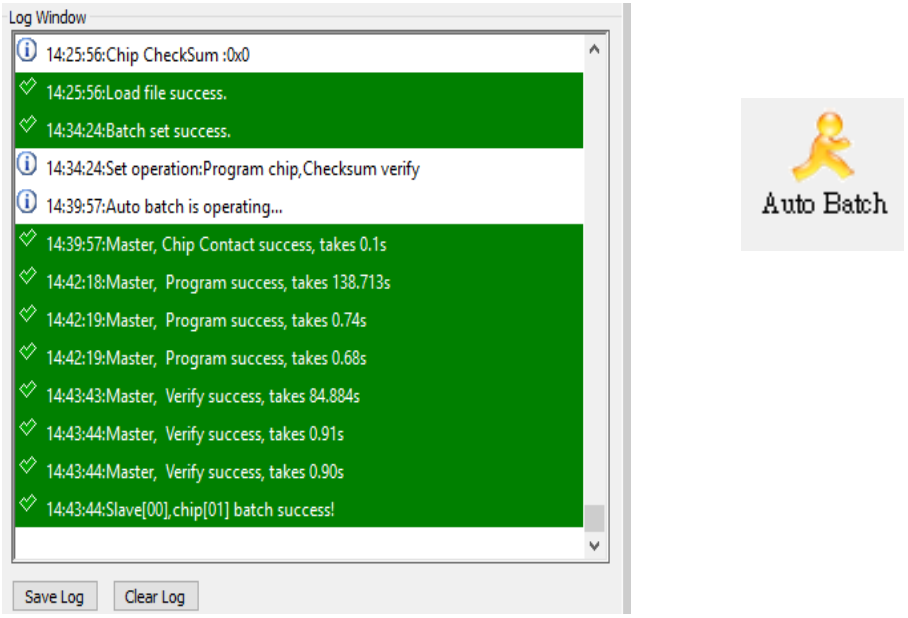


Fig. 5-38

5.3.3.2 If the IC is not initialized, please follow the steps below:

Step 1. If the LUN number still remains at zero (Fig. 5-39) even after the IC and socket are installed, then it might indicates the LUN is unable to write, please partition the LUN first.

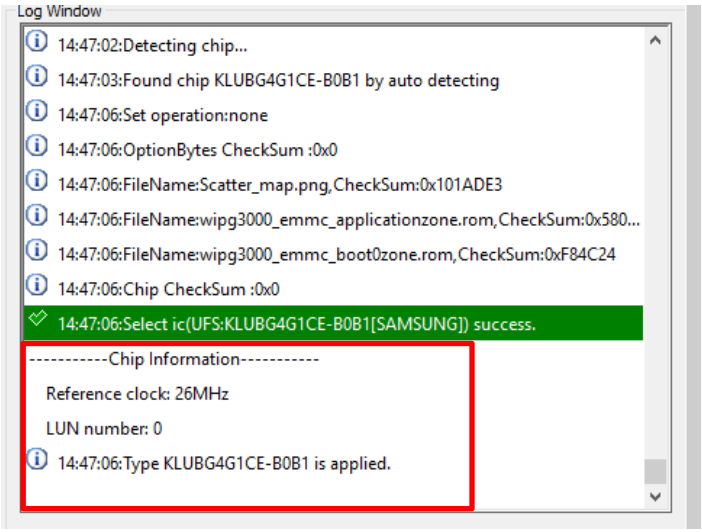


Fig. 5-39

Step 2. When you see a warning message shown as Fig. 5-40, please go to **Descriptors** in the **Config** window, set up the configuration descriptor dialogs, and then partition the UFS and the LUN.

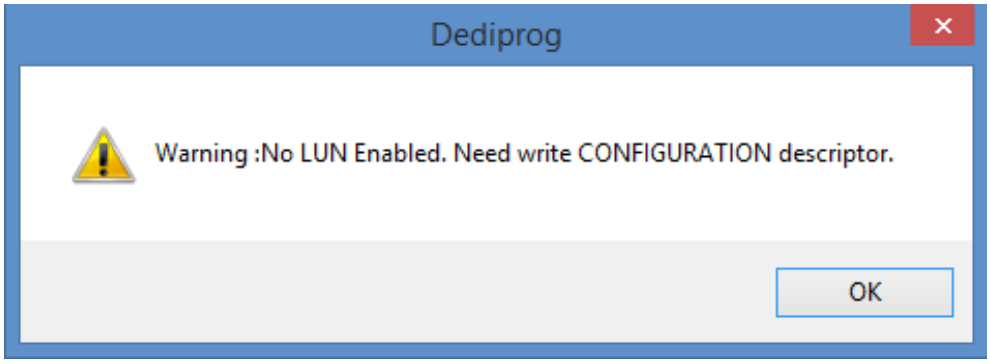


Fig. 5-40

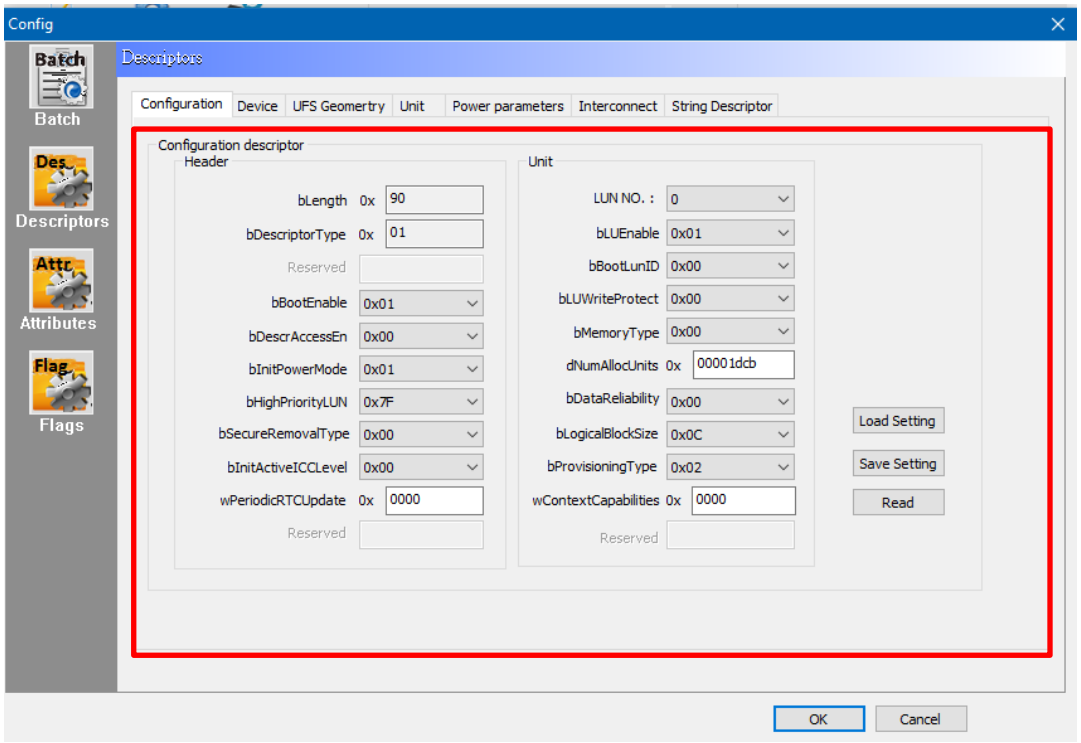


Fig. 5-41

After changing the settings, click **Write Descriptor** to start the programming process, and then **Detect** again; the Chip Information will display the updated status of the LUN.

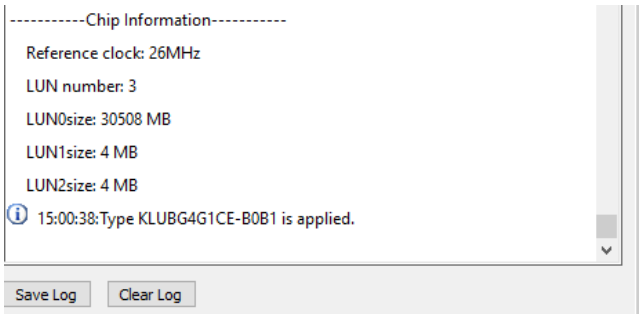


Fig. 5-42

Next, follow the steps in section 5.3.3.1.

5.3.3.3 If there are only two partitions originally and you want to add a third section, please follow the steps below:

Step 1. Open the software and set up the configuration descriptor in the **Config** window. (Fig. 5-43)

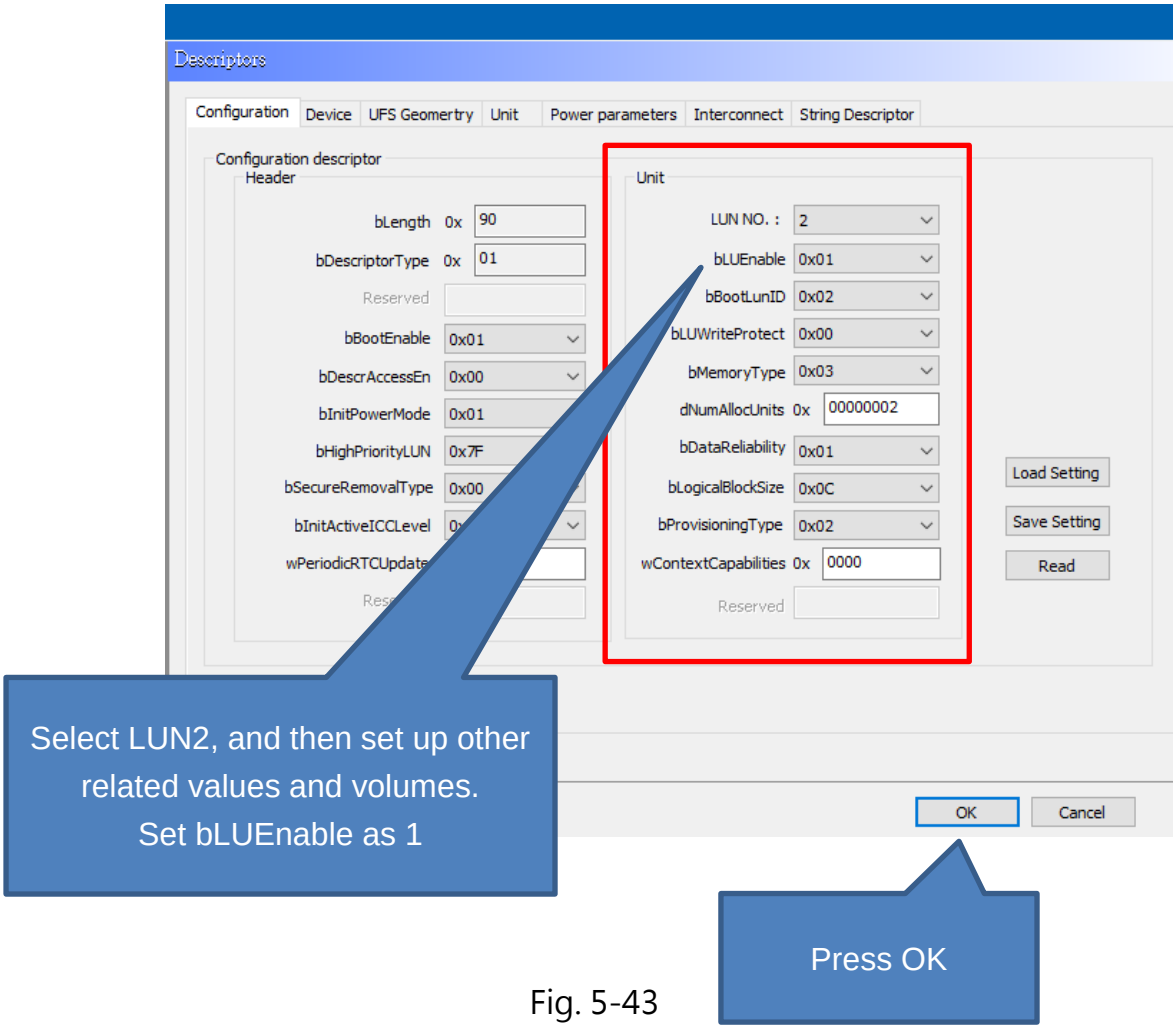


Fig. 5-43

Step 2. Finish set up and Write Descriptor, and then click Detect; the LUN Number will turn to three.

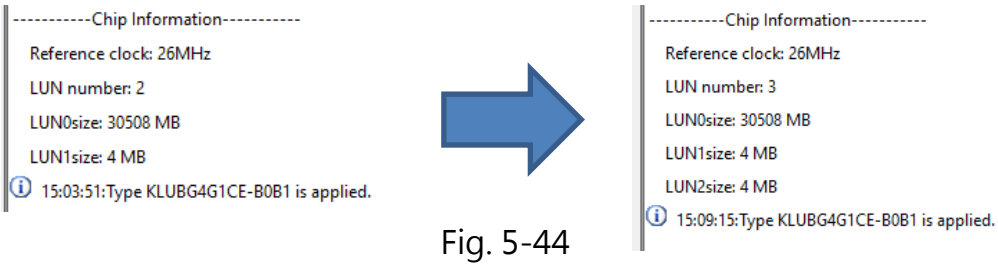


Fig. 5-44

5.3.3.4 Duplicate the bootable master IC to other blank IC through Auto Batch programming.

Step 1. First, insert a master IC. Once the IC has been detected, save the contents of Descriptor/Attributes/Flags/LUN of the master IC.

- Enter Config window, and then save values from the Descriptors, the Attributes, and the Flags (For next time usage).

Fig. 5-45

- Use Save Memory in the read IC to save the LUN.

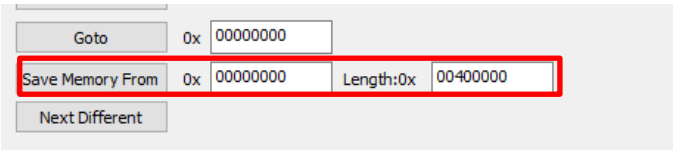
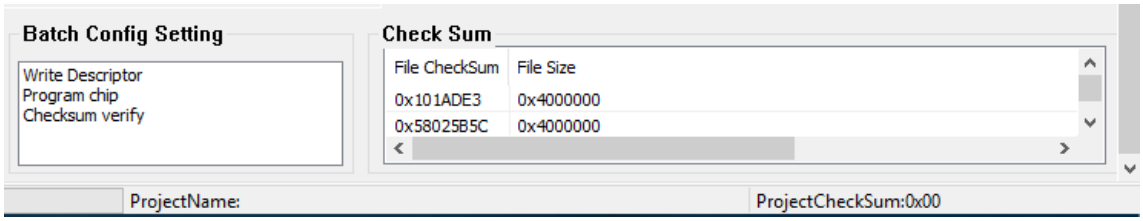


Fig. 5-46

Step 2. Load the images that were saved in the LUN.

Step 3. The batch setting in the Config window should be Write Descriptor > Program > Checksum Verify



If Write Attributes and Write Flags are required, then add it behind Checksum verify.

Step 4. Insert a blank IC and then click Auto Batch to begin LUN partitioning and programming.

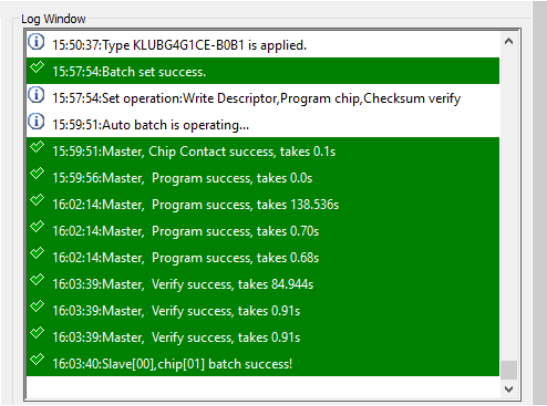


Fig. 5-47

If the image File is already existed, please follow the below steps:

Step 1. Detect master IC, Click Config to read Descriptors/Attributes/Flags and set up the Batch setting.

Step 2. Load the Image file.

Step 3. Insert a blank IC, and then click Auto batch to start programming process.

5.4 Precautions when using NuProg-E (For UFS) software

- Click Config will read the descriptor, attributes, and flags of the IC.
- The loaded Partition Name will be shown as the actual IC partition that has been detected.
- Execute Write Descriptor will format the IC's LUN and the original data will be gone. If descriptor needs to be written during the programming process, please use Write Descriptor instead of Wipe.
- **Wipe** will erase the entire IC data, so it will affect the IC's life span.
- When using Write Attribute's bRefClkFreq value to change the frequency clock of the UFS, it is recommended to arrange it to the last one to write.

5.5 NuProg_eMMC Installation Guide

5.5.1 Double Click the NuProg_eMMC icon.

Fig. 5-48

5.5.2 Software Introduction (eMMC part)

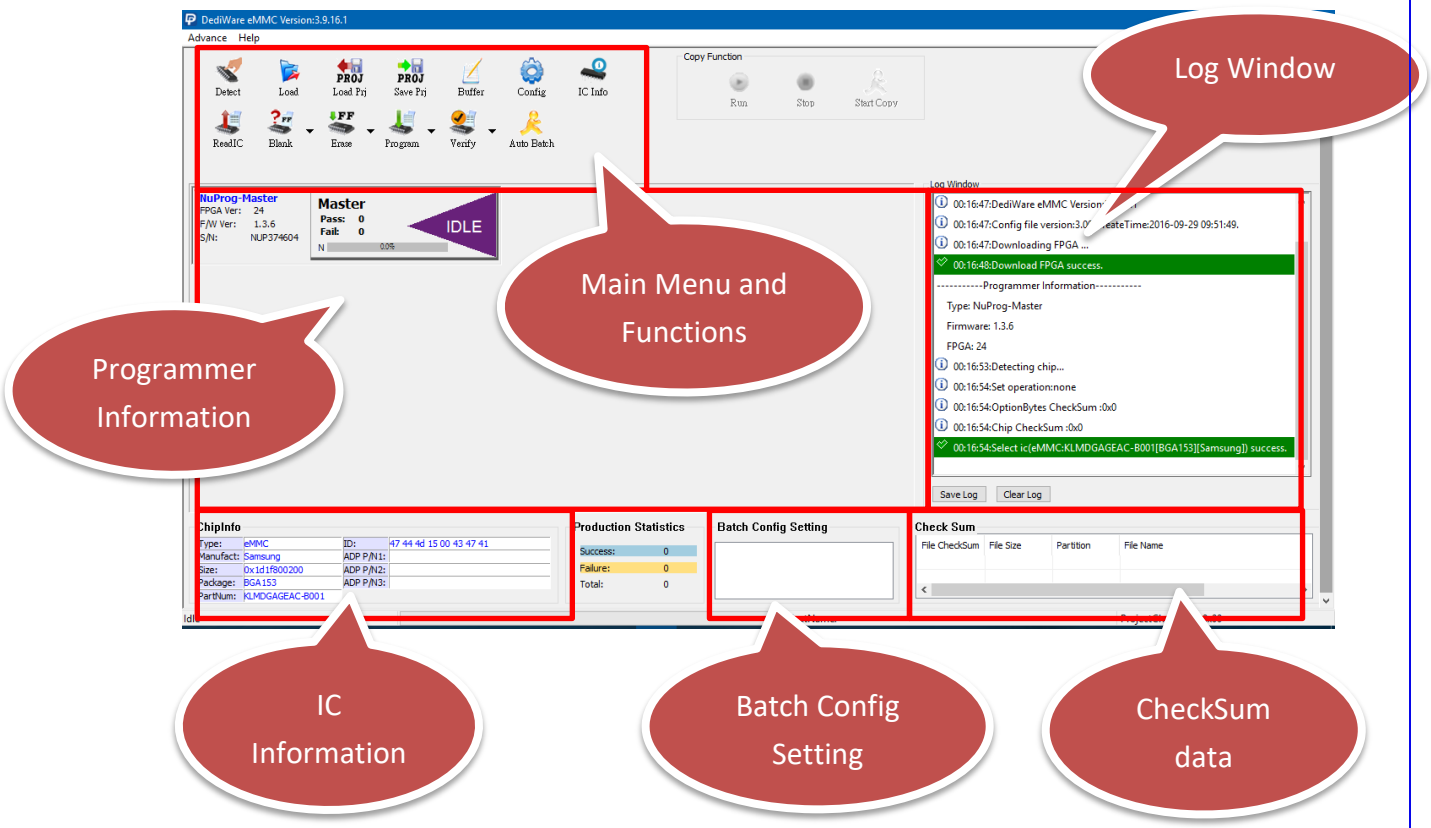


Fig. 5-49

A. Main Menu and Functions

Fig. 5-50

A-1. Main Menu- Advance

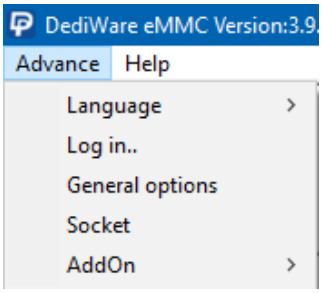


Fig. 5-51

- **Language**: Provide English, Simplified Chinese and Traditional Chinese
- **Log in:** Set up the IP address for remote controls.
- **General options:** Set up a temporary file for saving buffers. Since large volume IC has a great demand of storage. Therefore, if C drive does not have enough space, please choose other drive.

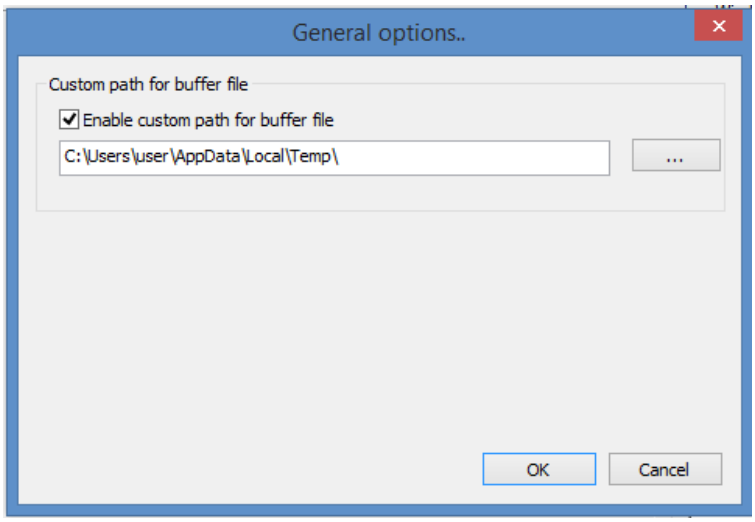


Fig. 5-52

A-2. Main Menu- Help

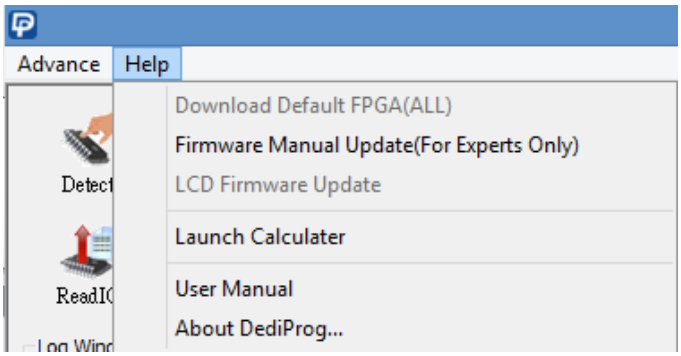


Fig. 5-53

- **Firmware Manual Update:** Update the firmware version of the NuProg-E. Update the firmware and restart the programmer.
- **Launch Calculator:** It opens the calculator.
- **User Manual:** It links to DediProg's user manuals.

A-3. Functions (From Top to Bottom; Left to Right)

Fig. 5-54

- **Detect:** Detect IC or choose the model number manually. If the data list has the corresponding model number that is supported, software will automatically import the values of the eMMC and the Log will appear as below (Fig. 5-55). If the IC model number that you need is not listed (Fig. 5-56, please feel free to contact us.

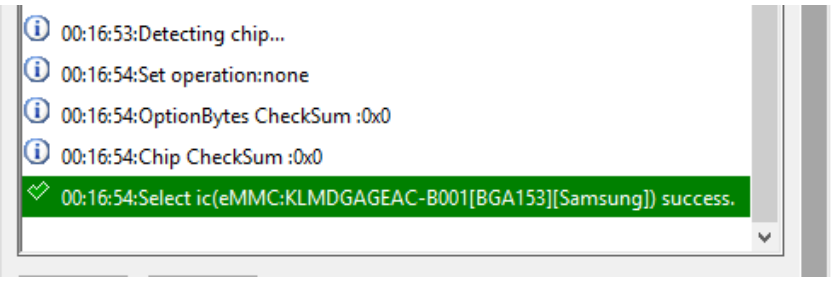


Fig. 5-55

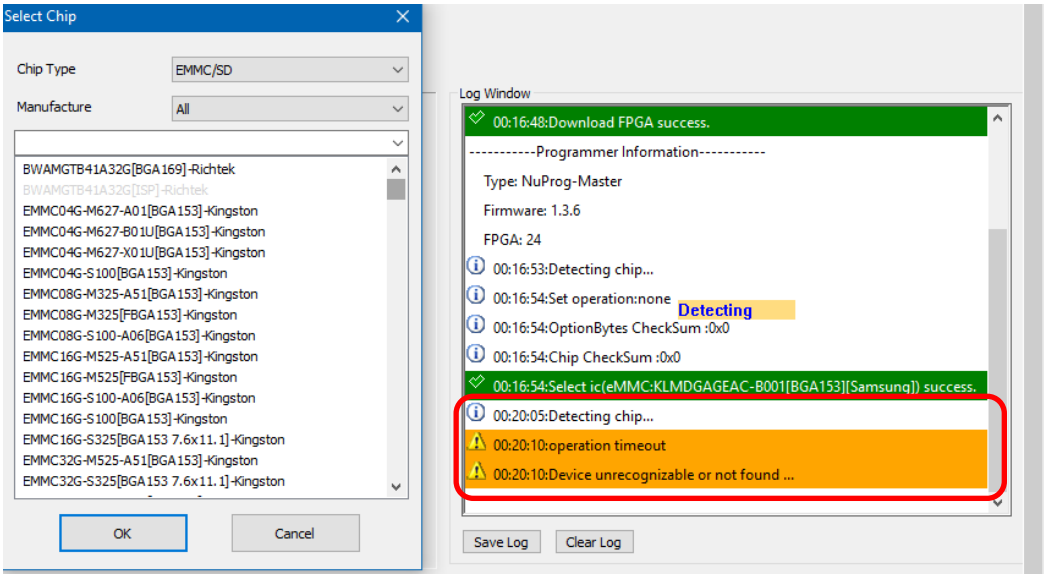


Fig. 5-56

➢ **Load:** Import the programming file and set the values according to your needs.

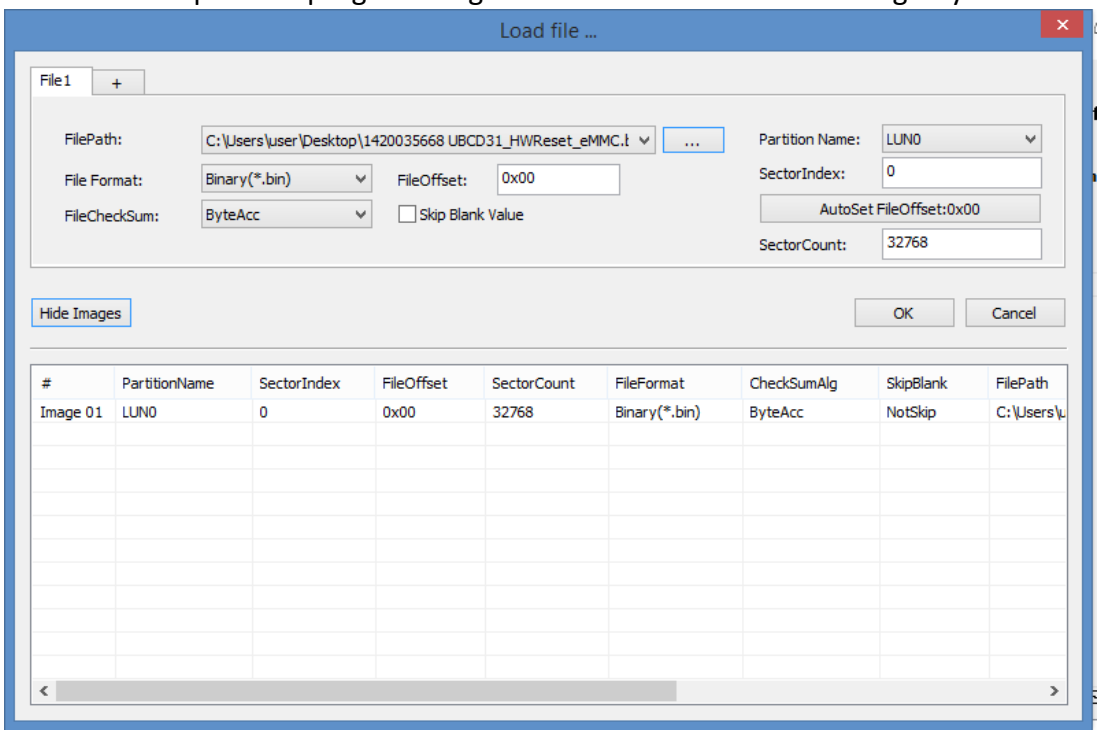


Fig. 5-57

Value Descriptions:

- **File Format:** The format of the programming file.
- **File Checksum:** The file checksum's calculation method.
- **File Offset:** Appoint an address to start loading the buffer.
- **File Path:** Assign the path for the programming file.
- **Skip Blank Value:** Enable this function to analyze and skip the blank data before programming, which will write more efficiently and reduce the programming time.
- **Partition Name:** It depends on the partitioned sections.
  Note: This partition here will only show the amounts and settings according the IC that has been detected.
- **Sector Index:** Set up the sector starting point
- **Sector Count:** Set up total programming sectors.
- **AutoSetFileOffset**: When set up the **Sector Index**, this function can automatically calculate the File Offset.
- **+:** When there is more than one programming file, please press "+" to add the files to the data list.
- **Show Images and Hide Images:** Open and close the data list.

➢ **Load Prj:** Import previous programming files (Not Supported Yet).

➢ **Save Prj:** Save all the settings as a programming file (Not supported yet).

- **Buffer**: Temporary files.

  Choose a partition to fully display its content.

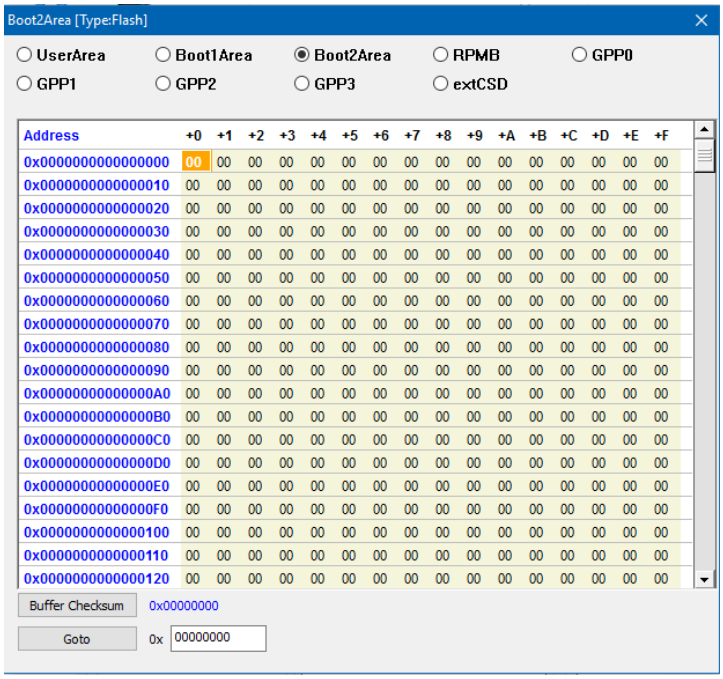


Fig. 5-58

Buffer Checksum: It will calculate the assigned Partition checksum.

Goto: Assign a Buffer address

➢ **Config:** Programming Settings. It will read the contents of Descriptors/Attribute/Flags from the UFS and display on each window.

- **Batch Setting:** Double click the programming options that are listed in the **Batch Operation box** or click **>>** or **<<** to move the options to the **Operation Selected box**. The AutoBatch will program according to the listed order in the **Operation Selected box** (As Fig. 5-59).

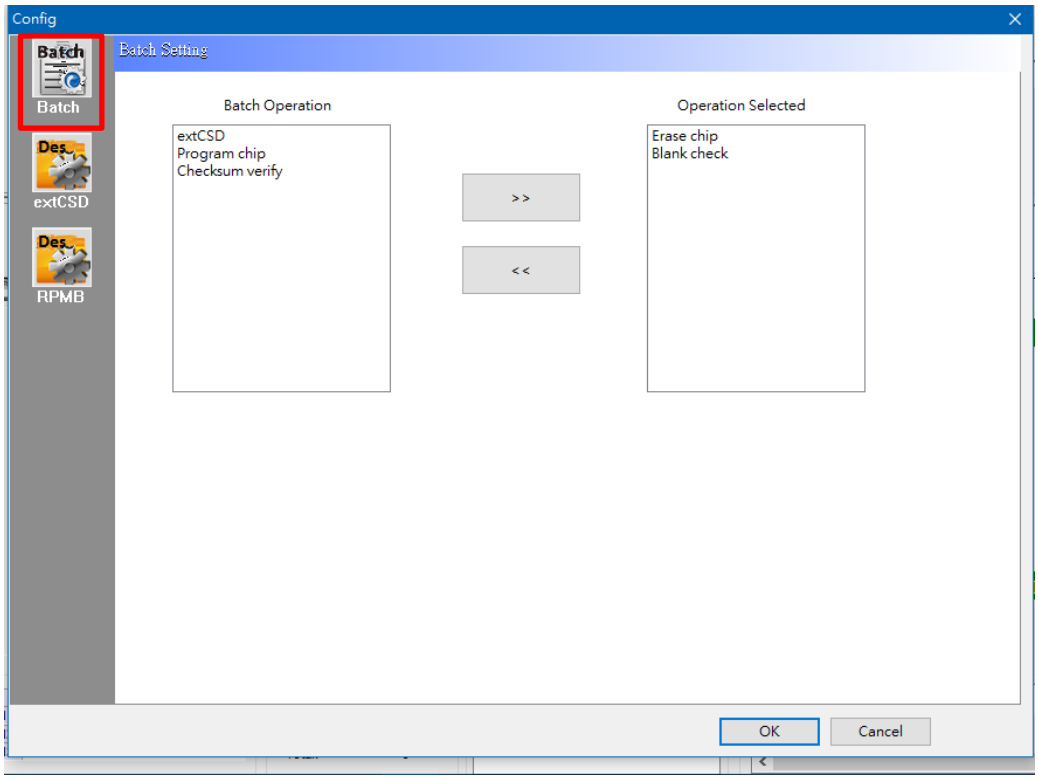


Fig. 5-59

- **Ext CSD Setting:** Provide Extend CSD setting for eMMC. Set up ExtCSD on this page, and then add this option in the Batch Setting.

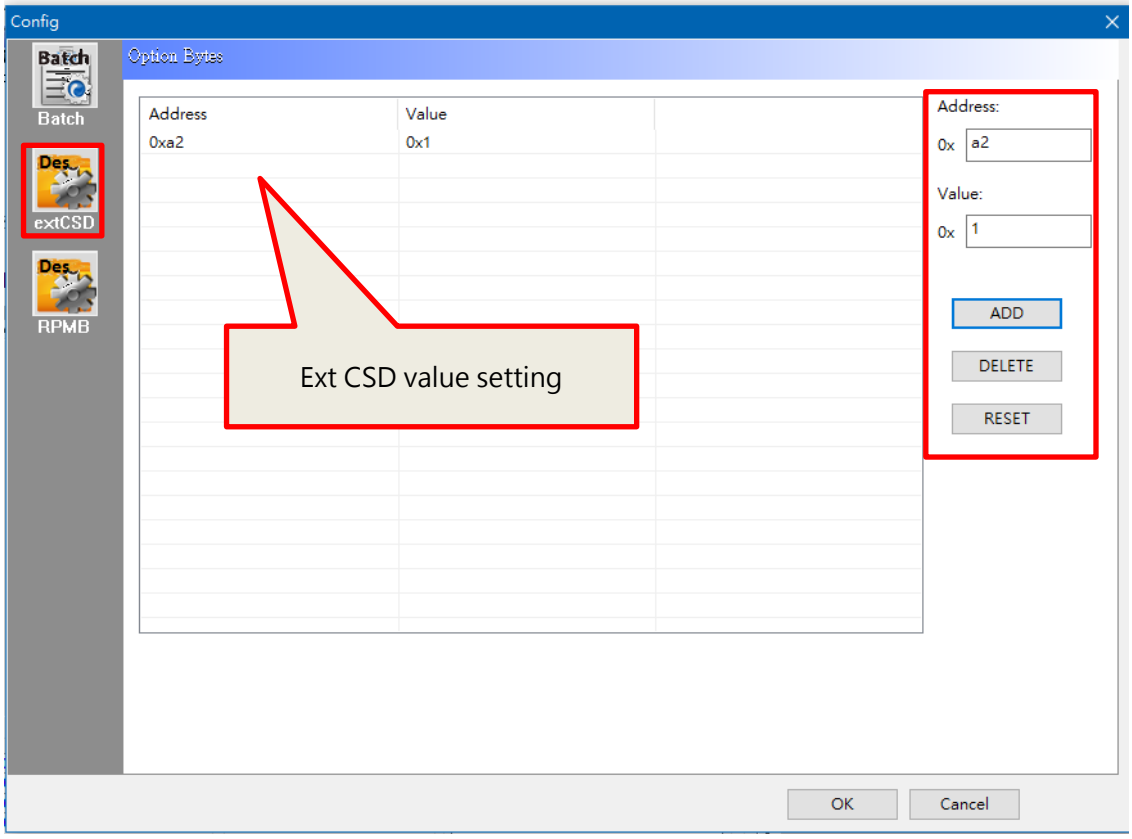


Fig. 5-60

Add: Add a new ExtCSD value to the list.

Delete: Delete all the selected ExtCSD value.

Reset: Clean up all ExtCSD values.

※ The address and the values will be in hexadecimal. In addition, Ext CSD will write in the listed order, therefore, set up Ext CSD for User Area's GPP and Enhanced setting according the JEDEC standard.

- **RPMB:** Since RPMB needs a set of Key to read and write normally, so set up the RPMB key on this page.

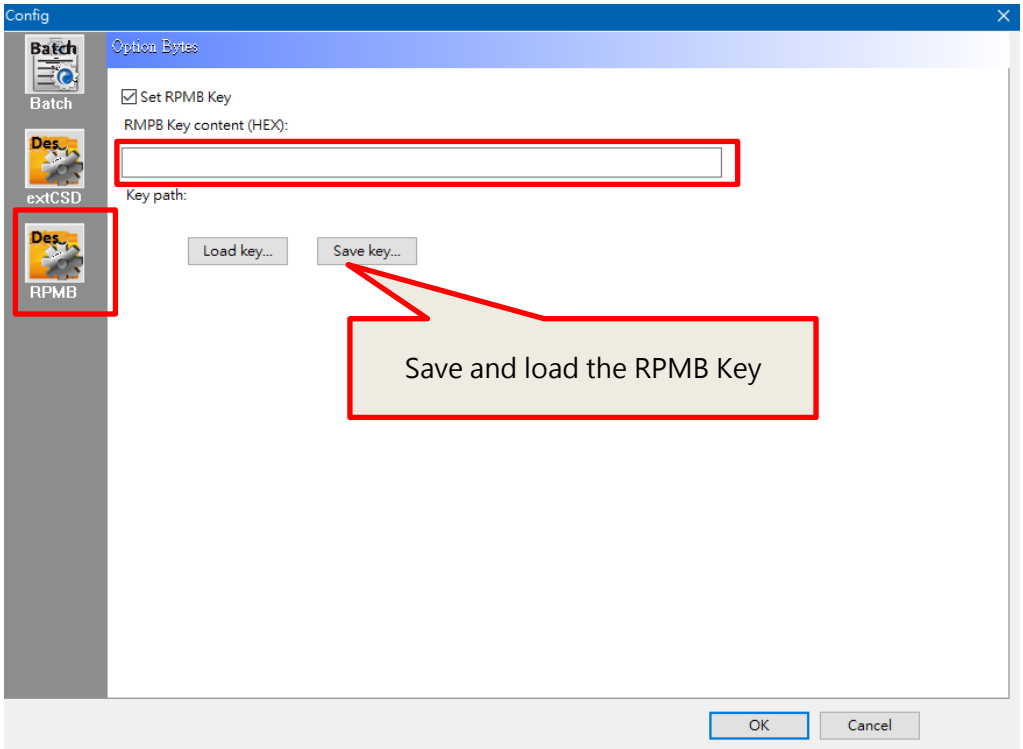


Fig. 5-61

- **IC Info:** Chip information and cautions. (Not supported yet)
- **ReadIC:** Read and display the IC data.

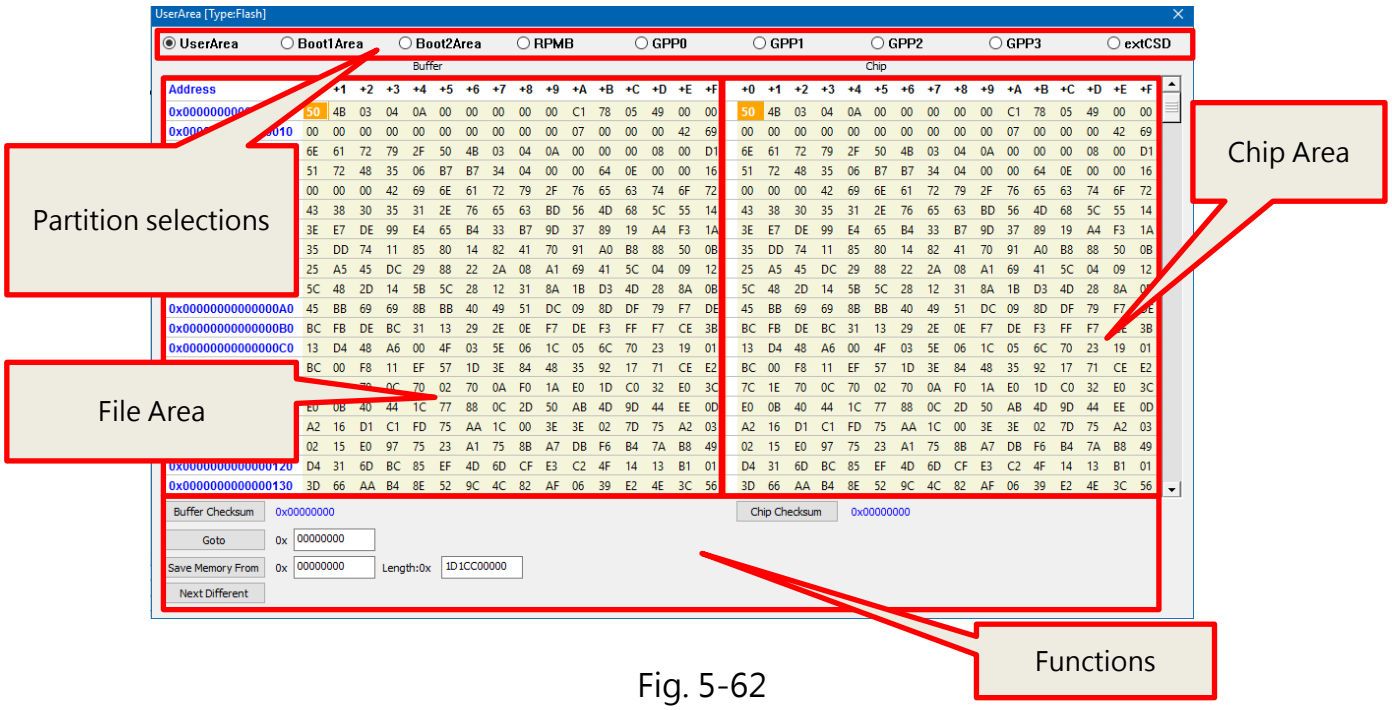


Fig. 5-62

A. Partitions

It will configure according the actual partition of eMMC, and then you switch to see different partitions.

B. File Area (Buffer)

This area will display the data of the imported files.

C. Chip Area

It will read the actual IC and compare with the file data. The abnormal parts will be high-lighted in red for analysis.

D. Functions

- **Buffer Checksum and Chip Checksum:** Show the buffer checksum and the chip checksum of the partition for verification.
- **Goto:** Enter the number line in order to go to the address for examination.
- **Save Memory:** Save the actual IC data of the selected partition or select a range to save. However, it is not available to save all the partitions at once.
- **Next Different:** Search and compare the next different file.

➢ **Blank:** Blank IC checks. Select **all** or choose one of the partitions.

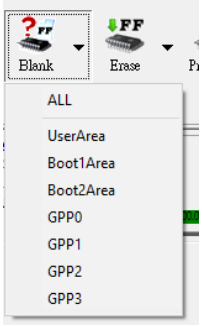


Fig. 5-63

➢ **Erase:** Erase IC data. Select **all** or choose one of the partitions.

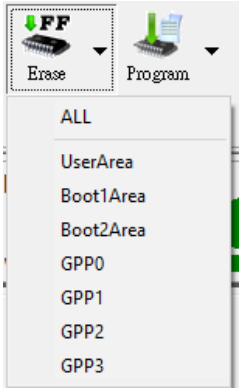


Fig. 5-64

- **Program:** Program the project file to the IC. Select **all** or choose one of the partitions.

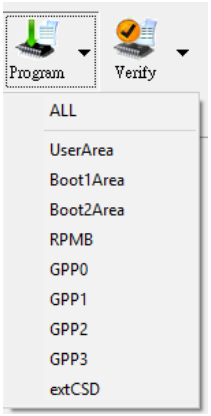


Fig. 5-65

- **Verify:** Verify and compare the project file with the IC. Select **all** or choose one of the partitions.

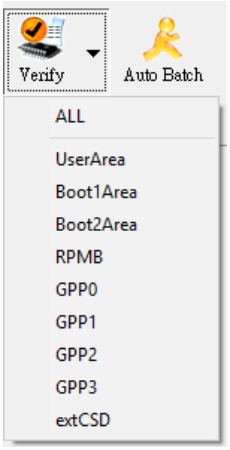


Fig. 5-66

- **Auto Batch:** It will program according to the listed order in the Batch Setting, which is in the Config window.

B. LOG Window: *Display and record the entire process and the results.*

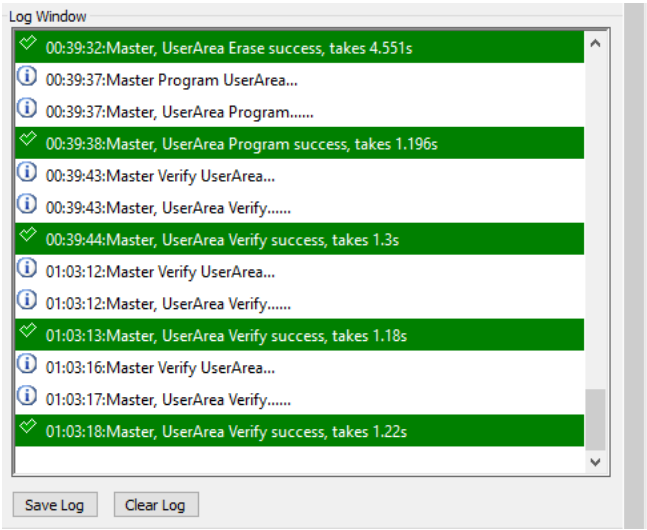


Fig. 5-67

C. Programmer Information: *Display the programmer name, the firmware version and the FPGA version, and the serial number.*

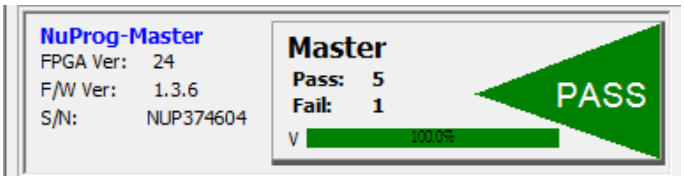


Fig. 5-68

D. IC Information: *Display the part number and the relate information according to the selected chip.*

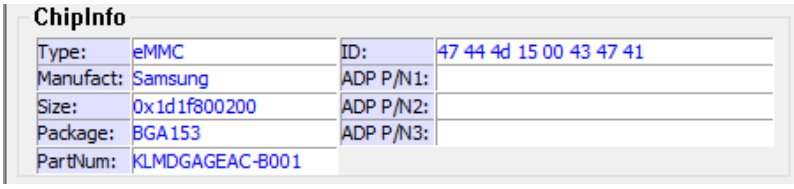


Fig. 5-69

E. CheckSum Data: *Display project file name, file size, corresponding partition and file CheckSum.*

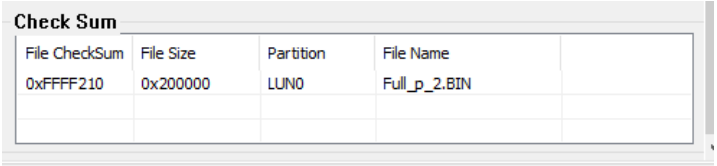


Fig. 5-70

F. Batch Setting: *The Batch setting is in the Config window, and AutoBatch will program in the listed order.*

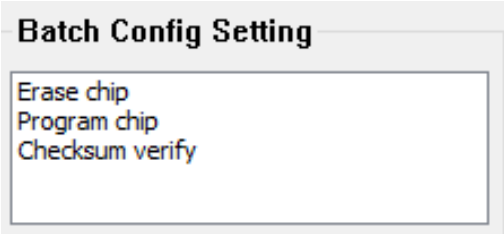


Fig. 5-71

VI. Revised Edition

Date	Versions	Changed
2015/11/26	1.0	First Edition ※EMMC description will be available in next edition.
2016/04/26	1.1	Photos Changed.
2016/08/17	1.2	Software Images and some contents
2016/10/2	1.3	Added eMMC instruction
2017/12/10	1.4	Added some notes to the power adaptors and modified company information.

DediProg Technology Co., Ltd

Taiwan Headquarter TEL: 886-2-2790-7932 FAX: 886-2-2790-7916
4F., No.7, Ln. 143, Xinming Rd., Neihu Dist., Taipei City 114, Taiwan

China Office TEL: 86-21-5160-0157
Room 518, Building 66, Lane1333, Xinlong Road, Vanke Hongqiao CBD.Min Hang District, Shanghai, P.R.C. 201101

U. S. Office TEL: 1-909-274-8860
209 E Baseline RD, Suite E208 #8, Tempe, AZ, 85283, USA

Technical Support: **support@dediprog.com** Sales Support: **sales@dediprog.com**