BK3633 Efuse应用说明

BK3633 Efuse Application Instructions

V1.1

博通集成电路(上海)股份有限公司
上海市浦东新区张江高科技园区张东路 1387 号 41 幢
电话: 86-21-51086811
www.bekencorp.com

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1. 概述 Overview

1.1. Efuse 是什么 What is Efuse?

Efuse, similar to EEPROM, is a one-time programmable memory. Information is written to it before the chip leaves the factory. The capacity of the efuse memory within a single chip is typically small; some chips have only 128 bits. Efuse can be used to store memory repair data for MEMS (MEM) repair, as well as chip information such as the applicable power supply voltage, chip version number, and production date. After the die is manufactured, it is tested, and the chip information is written to the efuse memory.

Efuse 类似于 EEPROM，是一次性可编程存储器，在芯片出厂之前会被写入信息，在一个芯片中，efuse 的容量通常很小，一些芯片 efuse 只有 128bit。Efuse 可用于存储 MEM repair 的存储修复数据，也可用于存储芯片的信息：如芯片可使用电源电压，芯片的版本号，生产日期。在厂家生产好 die 后，会进行测试，将芯片的信息写到 efuse 中去。

1.2. BK3633 的 Efuse

BK3633 的 Efuse 有 64 个字节，高 32 个字节可供用户自由使用，可在程序中单次写入，多次读出。低 32 个字节供系统控制使用，可用于代码加密，关闭 jtag，关闭 flash 下载。用户编程时要避免写入低 32 字节。

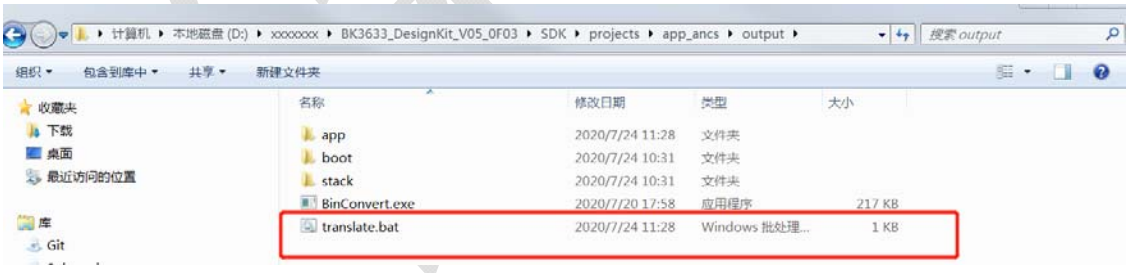
The BK3633's Efuse function has 64 bytes. The high 32 bytes are freely available to the user and can be written to once and read multiple times in the program. The low 32 bytes are used for system control and can be used for code encryption, disabling JTAG, and disabling Flash downloads. Users should avoid writing to the low 32 bytes when programming.

2. 代码加密流程 Code encryption process

2.1. Bin 文件加密 Bin file encryption

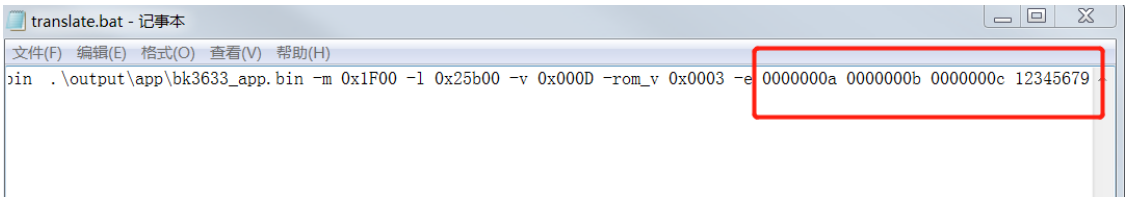
1 在工程 output 文件夹中有 translate.bat 批处理文件，keil 编译完后会调用这个批处理给代码加密。

1. There is a batch file named translate.bat in the project's output folder. Keil will call this batch file to encrypt the code after compilation.



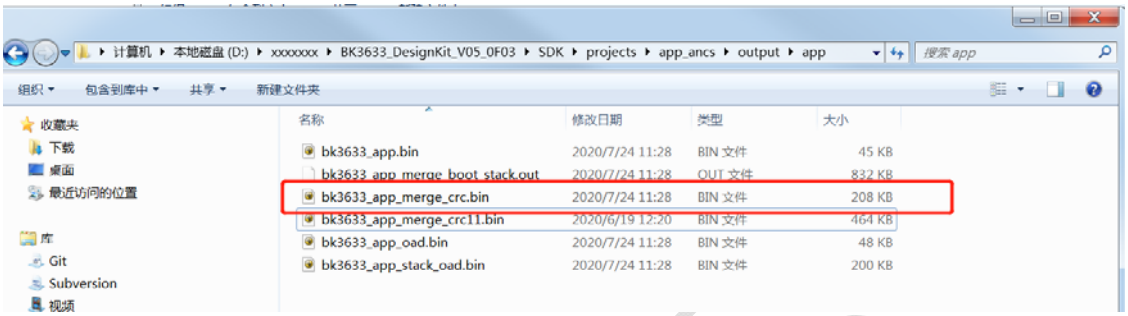
2. Open the batch file and enter the encryption key for the code. This key must be the same as the key entered in efuse when flashing the code later. Remember to save after editing.

2 打开批处理文件，将代码加密的密钥填入其中。这个密钥要和后面烧录代码时填入 efuse 中的密钥保持一致。编辑完后记得保存。



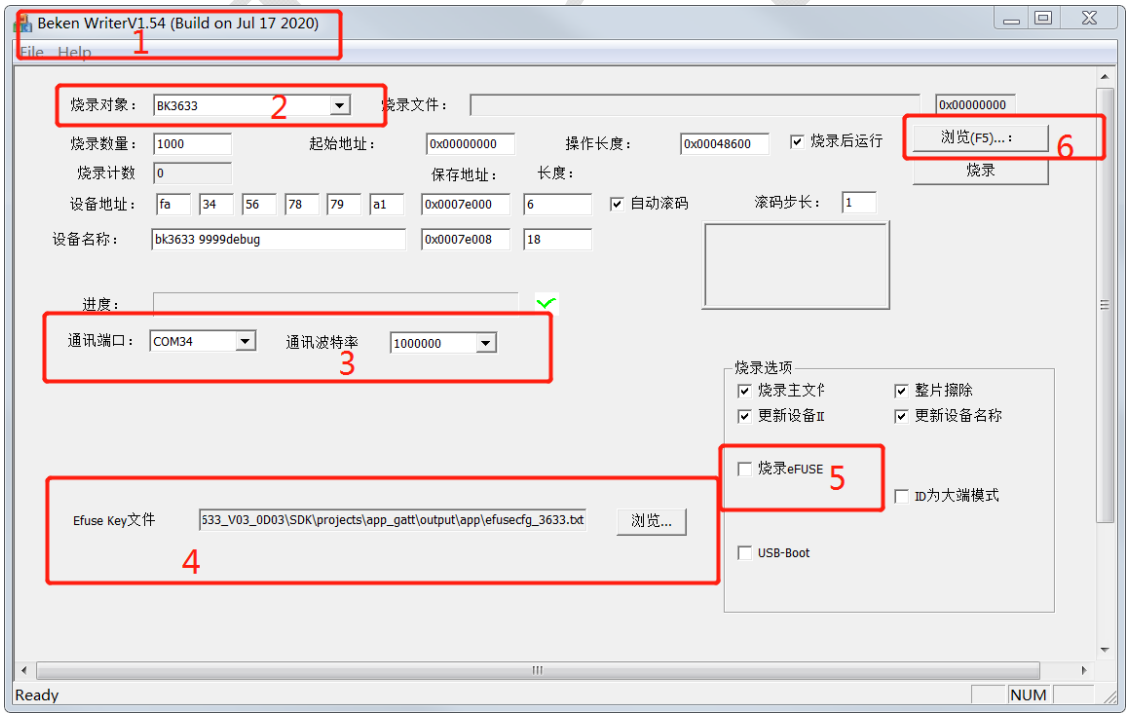
3. After setting the key, compile the project. The generated bin file is the encrypted file. Burning this file using the normal burning method (without burning the key to efuse) will not work.

3 设置好密钥后编译工程，生成的 bin 文件即为加密过后的文件。用普通的烧录方式（不烧密钥到 efuse）烧录这个文件，会跑不起来。



2.2. Bin 文件烧录 Bin file burning

2.2.1. 烧录工具介绍 Introduction to burning tools



① 工具版本号 V1.54，更低的版本可能没有 3633 的 efuse 烧录功能。

The tool version number is V1.54. Lower versions may not have the efuse burning function of 3633.

② 烧录对象选择，下拉选择 3633。

• Select the target to burn to, and choose 3633 from the drop-down menu.

③ 串口号选择，选择烧录用的串口设备端口号，波特率默认 1000000，不需选择。

④下载配置文件，加密 bin 文件的密钥需要填入其中。

⑤ 在代码没有加密时，不需要烧录密钥，这里不要勾选，反之必须勾选。

⑥ 选择需要烧录的文件。

•3 Serial Port Selection: Choose the serial port number for the device being programmed. The baud rate is the default 1000000 and does not need to be selected.

•4 Download Configuration File: The encryption key for the bin file needs to be entered here.

•5 If the code is not encrypted, you do not need to program the key; do not check this box. Otherwise, you must check it.

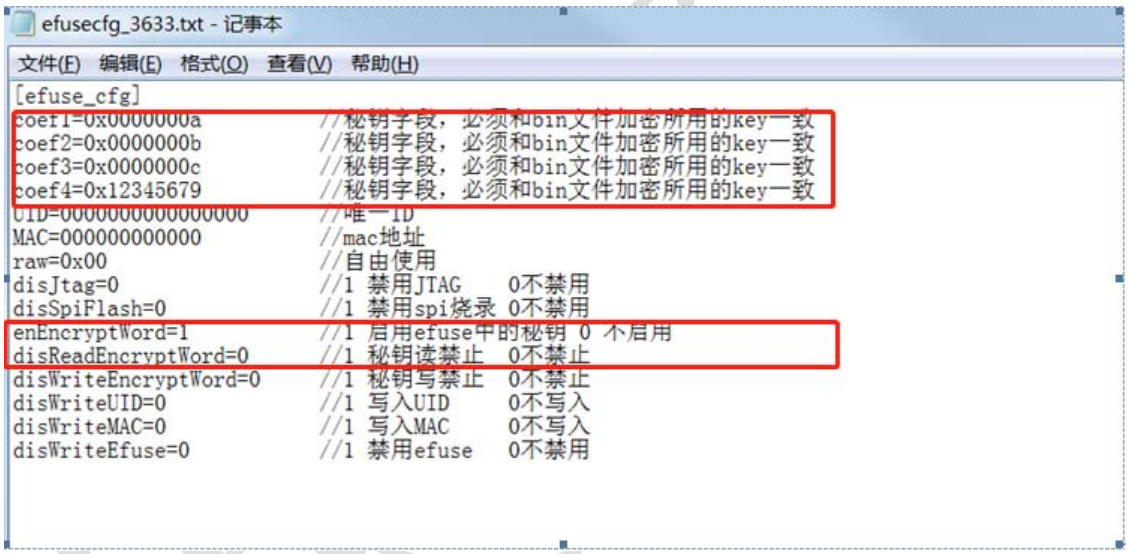
•6 Select the file to be programmed.

2.2.2. 烧录配置文件介绍

Introduction to burning configuration files

烧录配置文件是用来烧录时，配置一些efuse需要写入的字段。如果要烧录efuse，必须选择这个文件,对应加密的相关部分在下图红框部分，其他内容可不做修改。

The configuration file is used to configure certain fields that need to be written to efuse during the flashing process. This file must be selected to flash efuse; the encryption-related sections are shown in the red box in the image below. Other content does not need to be modified.



2.2.3. 烧录

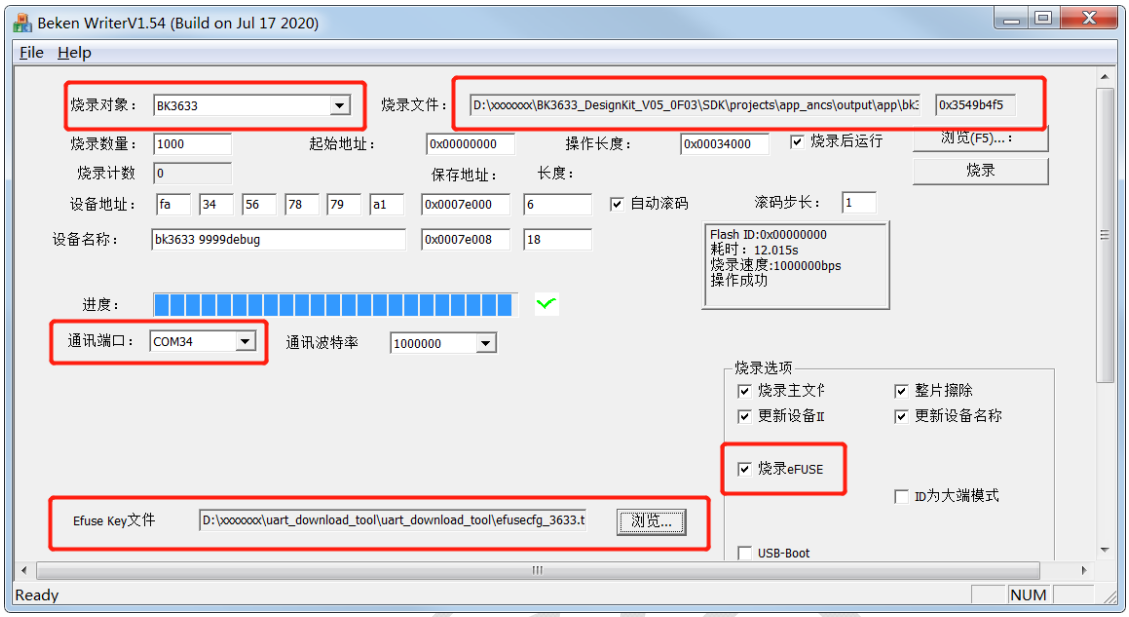
1 连接好硬件，3633 用的 UART1 烧录，检查电脑端的 UART 设备端口号，确保电脑端没有其他 APP 占用此端口号。

2 打开烧录 APP，选择 3633，选择加密好的 bin 文件，选择对应的 UART 端口号，勾选烧录 efuse，选择编辑好的 efuse 配置文件。**（如果烧录没加密的 bin 文件，不要勾选烧录 efuse）。**

2.2.3. Programming

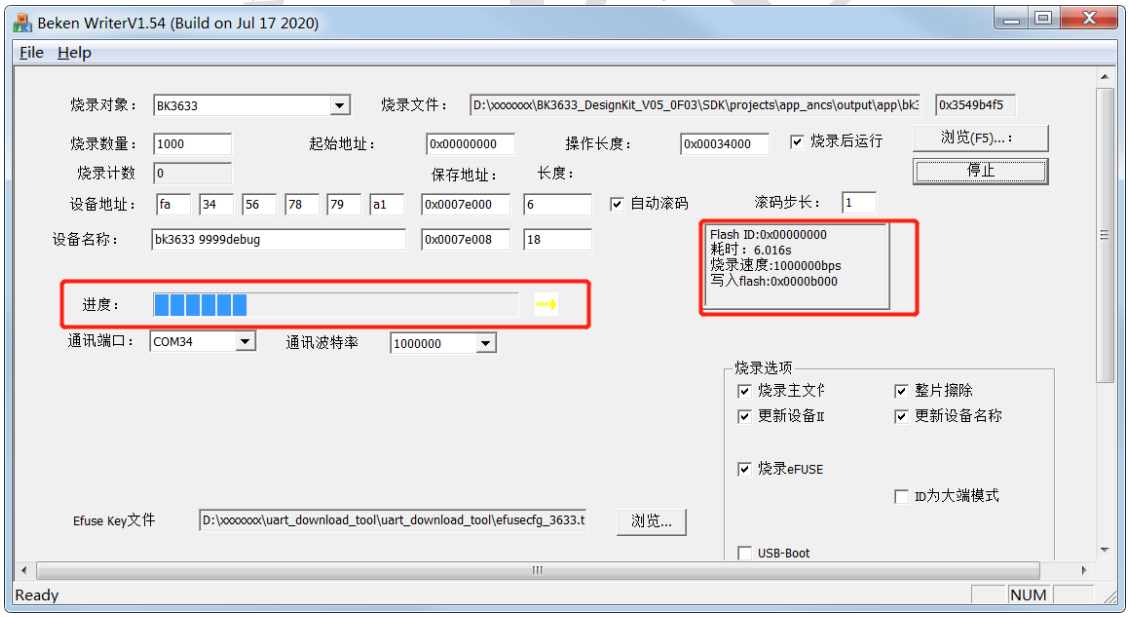
1. Connect the hardware. The 3633 uses UART1 for programming. Check the UART device port number on the computer to ensure that no other app is using this port number.

2. Open the programming app, select 3633, select the encrypted bin file, select the corresponding UART port number, check "Programming efuse," and select the edited efuse configuration file. (If programming an unencrypted bin file, do not check "Programming efuse.")



3 先点击烧录，再把串口板子接到 demo 板上，然后开始烧录。

3. First, click "burn", then connect the serial port board to the demo board, and then start burning.



注：1 efuse 烧录是不可逆的，在勾选了烧录 efuse 后重复烧录 bin 文件会失败。

2 代码是否加密和 efuse 是否烧录对应秘钥必须同步，否则程序起不来。

3 3633 工程默认烧录用 UART1，看打印用 UART2。

Note: 1. EFUSE burning is irreversible. Repeatedly burning the bin file after selecting EFUSE burning will fail.

2. Whether the code is encrypted and whether EFUSE is burned with the corresponding key must be synchronized; otherwise, the program will not start.

3. The 3633 project defaults to using UART1 for burning and UART2 for viewing printouts.