如何读取/修改SAMG55单片机内部的Unique Identifier Area区域的数据

1.读取流程

23.4.3.8 Unique Identifier Area

Each device is programmed with a 2*512-bytes unique identifier area . See Figure 23-1 "Flash Memory Areas".

The sequence to read the unique identifier area is the following:

1. Execute the 'Start Read Unique Identifier' command by writing EEFC_FCR.FCMD with the STUI command. Field EEFC_FCR.FARG is meaningless.
2. Wait until the bit EEFC_FSR.FRDY falls to read the unique identifier area. The unique identifier field is located in the first 128 bits of the Flash memory mapping. The 'Start Read Unique Identifier' command reuses some addresses of the memory plane for code, but the unique identifier area is physically different from the memory plane for code.
3. To stop reading the unique identifier area, execute the 'Stop Read Unique Identifier' command by writing EEFC_FCR.FCMD with the SPUI command. Field EEFC_FCR.FARG is meaningless.
4. When the SPUI command has been executed, the bit EEFC_FSR.FRDY rises. If an interrupt was enabled by setting the bit EEFC_FMR.FRDY, the interrupt line of the interrupt controller is activated.

Note that during the sequence, the software cannot be fetched from the Flash.

参考译文：

读取唯一标识符区域的顺序如下：
1.通过使用STUI命令写入EEFC_FCR.FCMD来执行'Start Read Unique Identifier'命令。字段EEFC_FCR.FARG没有意义。

2.等到EEFC_FSR.FRDY位下降为0以读取唯一标识符区域。唯一标识符字段是位于闪存映射的前128位。 对代码而言"开始读取唯一标识符"命令重用了内存空间的一些地址，但对代码而言唯一标识符区域在物理上是不同于内存空间的。

3.要停止读取唯一标识符区域，请通过写入执行"停止读取唯一标识符"命令带有SPUI命令的EEFC_FCR.FCMD。字段EEFC_FCR.FARG没有意义。
4.执行SPUI命令后，EEFC_FSR.FRDY位会变1。如果启用了中断通过将EEFC_FMR.FRDY位置1，可以激活中断控制器的中断线。
请注意，在序列期间，无法从Flash中获取软件

备注：读数据的流程请参考附件"SAMG55_Trimming_code.zip"中 efc_perform_read_sequence(EFC, EFC_FCMD_STUI, EFC_FCMD_SPUI,unique_id, 32)函数的实现过程。

具体代码实现参考

```c
int main (void)
{
    uint32_t x = 0;

    board_init();

    sysclk_init();
    /* Get the trim value from unique ID area */
    efc_perform_read_sequence(EFC, EFC_FCMD_STUI, EFC_FCMD_SPUI,unique_id, 32);
    trim_value = (unique_id[16]);
    trim_value1 =   (trim_value & 0x0f) << 1;
    supc_set_trim_user(SUPC, trim_value1);
    x = SUPC->SUPC_PWMR;

    while(1);

}
```

读出128个字节的unique_id数据，注意这个32对应于 32*4字节，因为ARM是32位宽的。

获取针对120M的trimmed code Byte[65..64]

将调整好的数据写入SUPC寄存器的相应位置中去。

unique identifer 在flash内的分配图：

8.3.1.5 Unique Identifier

The G55 Flash contains two pages of 512 bytes called unique identifier. These two pages are read-only and cannot be erased even by the Erase pin. Each device integrates its own 128-bit unique identifier. These bits are factory-configured and cannot be changed by the user.

The sequence to read the unique identifier area is described in Section 23.4.3.8 “Unique Identifier Area”.

Some bytes within the unique identifier pages are reserved for the trimming information of the 32 kHz RC oscillator and the internal voltage regulator.

The mapping is as follows:

- Bytes [15..0]: 128 bits for unique identifier
- Bytes [47..16]: Atmel reserved
- Bytes [49..48]: Measured frequency (on tester) of the internal 32 kHz RC when V_{DDIO}= 3.3V (measurement performed at 25°C). These two bytes contain the frequency in hertz.
- Bytes [51..50]: Measured frequency (on tester) of the internal 32 kHz RC when V_{DDIO}= 1.8V (measurement performed at 25°C). These two bytes contain the frequency in hertz.
- Bytes [63..52]: Atmel reserved
- Bytes [65..64]: Trimmed code of the internal regulator which allows the device to run at up to 120 MHz. The four LSB bits must be written in the SUPC_PWMR.ECPWRx.
- Bytes [67..66]: Trimmed code of the internal regulator which allows the device to run at up to 100 MHz. Only the four LSB bits are used. They must be written in the SUPC_PWMR.ECPWRx. It is the default value after reset.
- Bytes [67..511]: Atmel reserved

底层代码流程请参考附件“SAMG55_Trimming_code.zip”