

EFM32xx Internal Flash Memory Instructions Manual

DTS INSIGHT CORPORATION

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1 Introduction

This is a brief manual for writing to on-chip flash memory.

For details of ICE operating instructions, see the microVIEW-PLUS User's Manual (Common Edition) and microVIEW-PLUS User's Manual (MPU-Specific Edition).

2 Supported SLX (ZX) Versions

| Device Model | Supported Versions | |
|--------------|--------------------|-------|
| | SLX600 | ZX600 |
| EFM32Gxx | 2.51 | -- |
| EFM32GGxx | 2.51 | -- |
| EFM32TGxx | 2.51 | -- |
| EFM32LGxx | 2.51 | -- |
| EFM32WGxx | 2.51 | -- |

3 Advance Preparation

3.1 When Debug Lock and Device Erase is Enabled

The ICE cannot be connected if the debug lock is enabled. In case the following error occurred, see Section 9.1 “Flowchart of Action on Error”.

*ICE Error No.fe8: Debug security is valid. The ICE cannot be connected.”
Check the MPU-Specific Settings.

In such cases, release the break setting, and then erase the symbol registration. After that turning on the Forced unsecured on the MPU-specific setting [RESET] dialog box, and then reset the system.

* Please be aware that all data in the internal flash memory is cleared by forced-release.

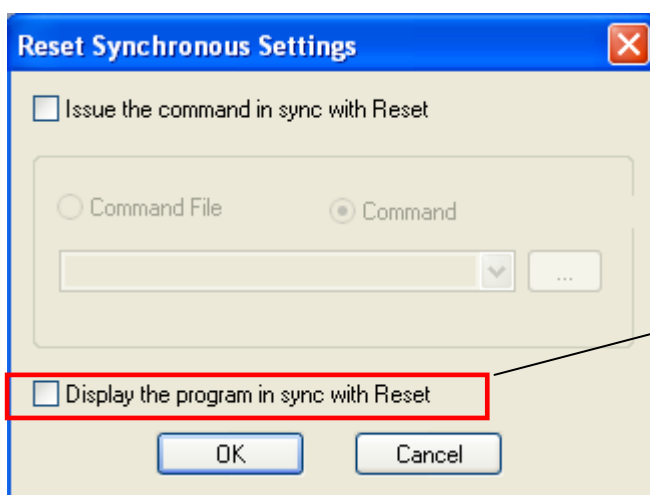
3.2 When Correct Address is not set in the Vector Table

microVIEW-PLUS dumps a reset vector area to display a program (disassemble display) after connecting by reset commands.

In case nothing is recorded in the built-in flash memory (a vector table is 0xFFFFFFFF), 0xFFFFFFFFFE will be dumped and “ICE Error No.f58: Sticky error may occur.”

[Provision]

Right-click the Reset button on the toolbar, and then open the Reset Synchronous Settings dialog box.



Clear the “Display the program in sync with Reset” check box.
(= does not dump by the reset command)

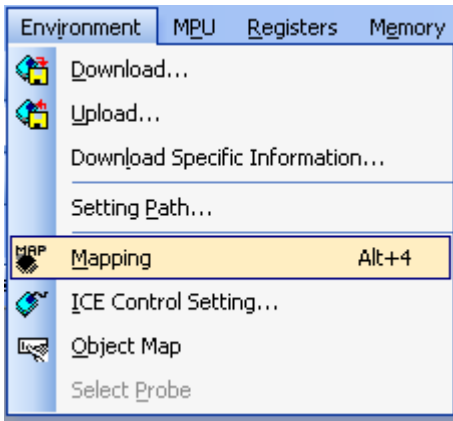
After downloading the program to the internal flash memory (correct vector table values are written), select this check box again.

4 Setting the Memory Mapping

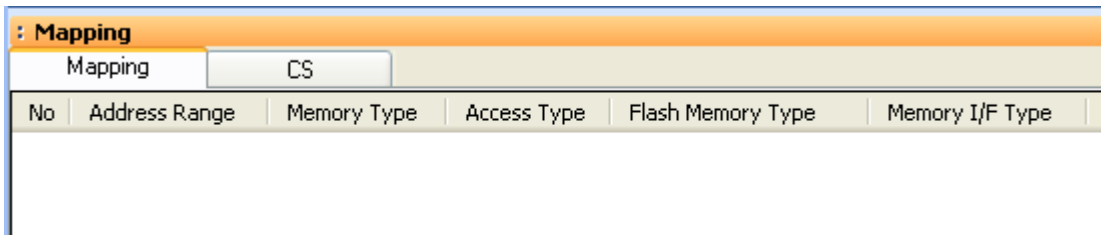
4.1 Setting up Flash Memory Mapping

In case of using the function of download to flash memory or software break, the settings of flash memory mapping is necessary.

Open the memory mapping window by clicking **Environments – Mapping**.

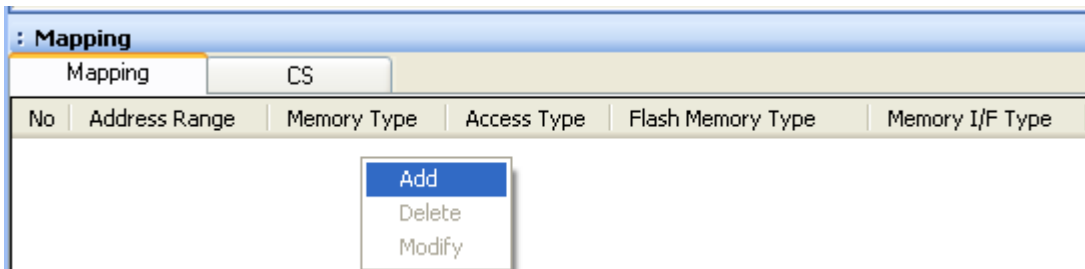


Memory map window as below is opened.

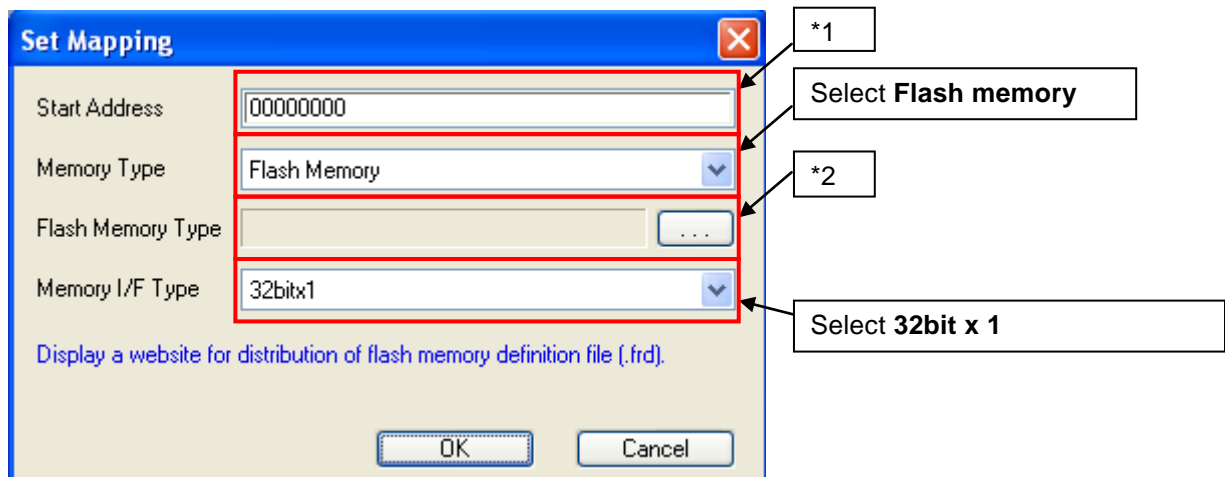


Set the mapping.

Right-click on the memory mapping window, and then select **Add**.



Configure the setting as the example below.



*1: Set the address in accordance with a mapping block.

*2: Select the flash memory definition file (.frd) in accordance with the mapping block.

The following table describes about the mapping blocks, starting addresses, and frd files.

This is an example for when using EFM32GG280F1024. Please use an actual model number in accordance with MPU.

| Mapping block | *1 Start address | *2 Flash Memory Type |
|-------------------------|------------------|------------------------------|
| Main | 0x00000000 | EFM32GG280F1204_Main.frd |
| Information (User Data) | 0x0FE00000 | EFM32GG280F1204_UserData.frd |
| Information (Lock Bits) | 0x0FE04000 | EFM32GG280F1204_LockBits.frd |

Notes: Make sure to set the starting address and frd file as described on this table.

4.2 Setting up User RAM for ICE

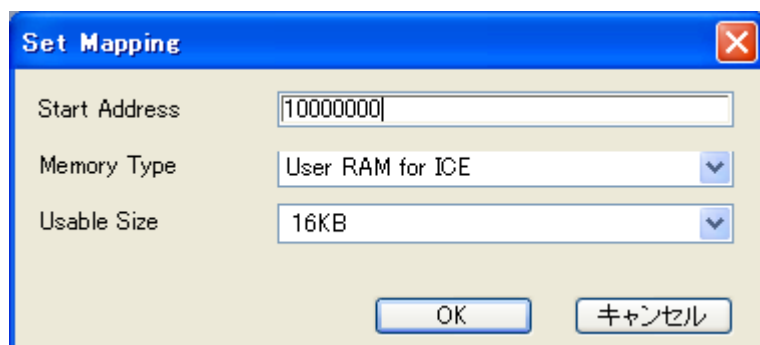
You can increase a download speed for flash memory by mapping a user RAM for ICE.

You can download to serial flash memory without the mapping setting.

For User RAM for ICE, specify an area where ICE can occupy.

The following example is for when setting 16KB from 0x10000000.

For the actual settings, refer to the MPU memory map of yours.



*** Please set 4 KB or more for the usable size.**

5 Erase the Flash Memory

For details, see the microVIEW-PLUS User's Manual (MPU-Specific Edition).

Details of memory mapping settings are described on this manual. Please refer to microVIEW-PLUS User's Manual (MPU-Specific Edition) for other contents.

6 Download to Flash Memory

For details, see the microVIEW-PLUS User's Manual (MPU-Specific Edition).

Details of memory mapping settings are described on this manual. Please refer to microVIEW-PLUS User's Manual (MPU-Specific Edition) for other contents.

6.1 Downloadable Area

EFM32GG flash memory is sectioned as the following table.

You can program the area marked "Yes".

| Block | Start address | Purpose/Name | Size | Supported |
|-------------|---------------|------------------------|-------------|-----------|
| Main | 0x00000000 | User code and data | Max.1024KB | Yes |
| Information | 0x0FE00000 | User Data(UD) | 512B to 2KB | Yes |
| | 0x0FE04000 | Lock Bits(LB) | 512B to 2KB | Yes |
| | 0x0FE08000 | Device Information(DI) | 2KB | No |

Note:

- (1) If you write a certain data that locks the Debug Lock Word when nothing is selected for [Force Setting at Downloading] on the MPU-specific setting [Others] dialog box of microVIEW-PLUS, the connection between ICE and user system will be disconnected when you reset the system.

If you cannot connect the ICE, see Section 9.1 "Flowchart of Action on Error".

The data programming to Debug Lock Word varies depending on the selection of Force Setting at Downloading. For details, see Section 8.2 "Others".

- (2) Device Information area cannot be overwritten due to the specification of MPU.

6.2 Programming when Information (LB) Area is Locked

Depending on the combination of locks, you cannot download.

Erase and software break can be used even when it is locked.

Download is not available with the lock states on the table below.

| Block to be downloaded [Start address] | Lock of Main | Lock of User Data | Lock of Lock Bits | Download | |
|---|-----------------|----------------------|----------------------|------------------|-----|
| | | | | User RAM for ICE | |
| | | | | Yes | N/A |
| Main [0x00000000] | Lock | - | Unlock | ○ * | ○ * |
| | Lock | - | Lock | × * | ○ * |
| Information(User Data) [0x0FE00000] | - | Lock | Unlock | ○ * | ○ * |
| | - | Lock | Lock | × | ○ * |
| Information(Lock Bits) [0x0FE04000] | - | - | Unlock | ○ | ○ |
| | - | - | Lock | × | ○ |

○ = Can do flash downloading

× = Cannot do flash downloading. "ICE Error No.1e44: Unable to erase flash memory block."

*: Without any relation to the downloaded area, the lock for all area is unlocked and **data written in the Information (Lock Bits) area is all deleted if there is any locked area.**

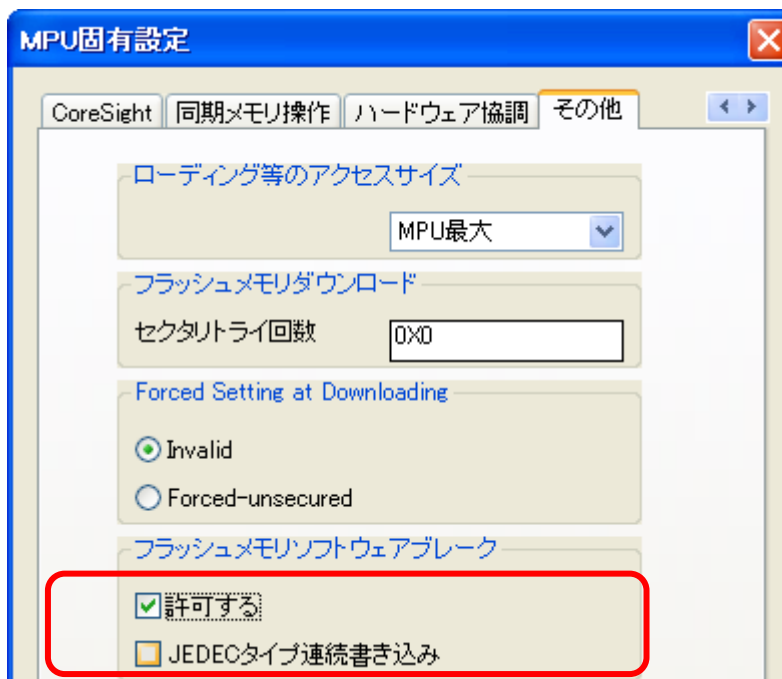
7 Software Break in Flash Memory

For details, see the microVIEW-PLUS User's Manual (MPU-Specific Edition).

Details of memory mapping settings are described on this manual. Please refer to the microVIEW-PLUS User's Manual (MPU-Specific Edition) for other contents.

You are not allowed to set up software break in the flash memory in the initial state. In case you try to set up software break in the flash memory with the disabled status, it results in "ICE Error No. 8c4: Set Software Break Verify Error".

To enable software break setting for flash memory, select the **Enable** check box of S/W Break in Flash Memory on the Others tab of the MPU-Specific Settings dialog box.



Note:

Software break cannot be set in the lock bits area of information block.

If you set it, the following error occurs:

"ICE Error Nofd2: Not the program area. Software break cannot be set."

8 MPU-Specific Settings

This chapter explains about MPU-specific settings for built-in flash memory.

For details on other MPU-specific settings, see the microVIEW-PLUS User's Manual (MPU-Specific Edition).

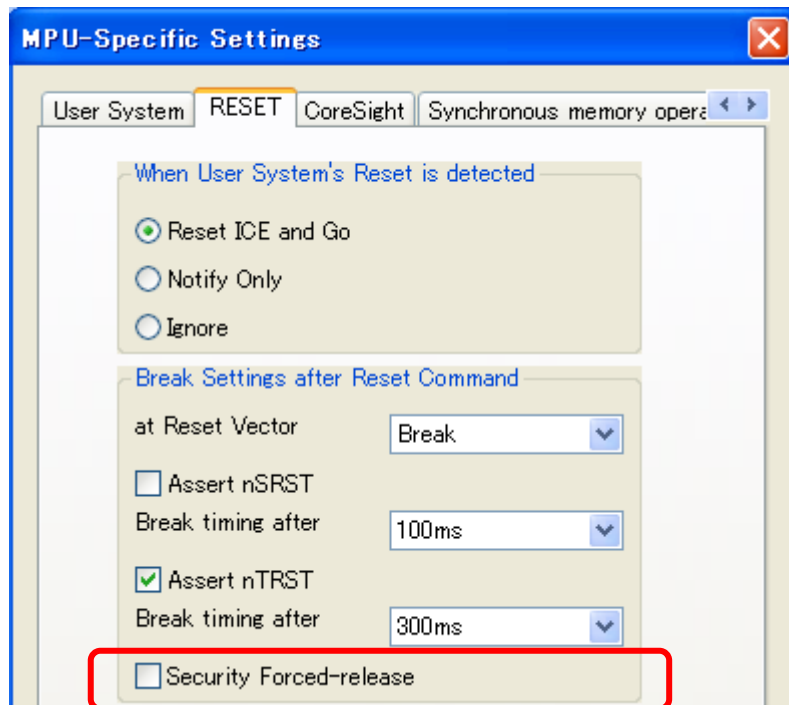
To set up MPU-specific settings, click on MPU menu, and then click the **MPU-specific settings**. Then, the MPU-specific settings window will be opened.

8.1 RESET

Security Forced-release

For EFM32 families, you can disable the debug port by using the setting of information (LB) area within the internal flash memory.

By using this setting, you can control whether to forcibly release the security by reset command. Make sure to execute the reset command after the setting.

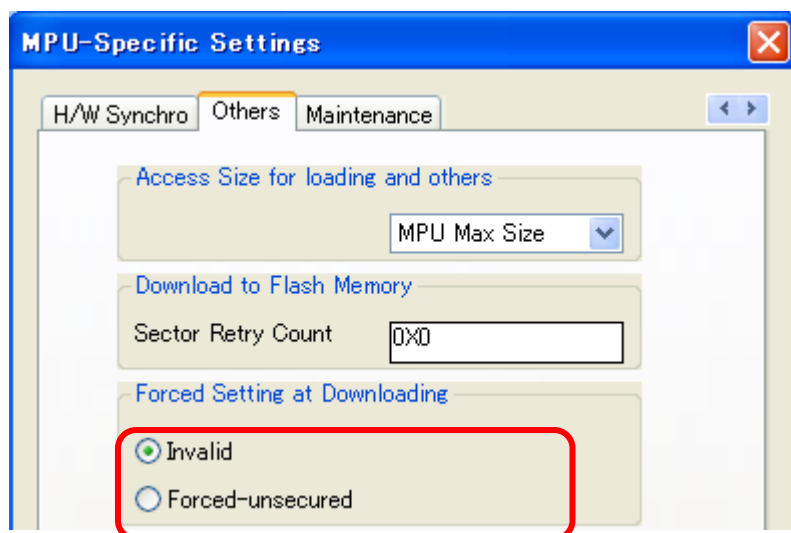


| | |
|--------|---|
| Clear | ICE cannot be connected if a debug lock device is detected. (Default) |
| Select | Forcibly releases the debug lock when executing the reset command. The selection is automatically cleared after the completion of reset command. It does mass erase (erase all data within built-in flash) when releasing. Therefore all data, (including Main area and Flash area settings) is erased. Delete the symbol registration by releasing all break settings before executing the reset command. |

8.2 Others

Forced Setting at Downloading

Controls whether to download data by switching it to data without the security or protection when downloading or erasing data in the sector/block containing the debug lock word within the internal flash memory.



| | |
|----------------------|--|
| Invalid | For all areas, data specified when downloading is written. (Default) |
| Forced-unsecured(*1) | When downloading to Information (LB) area, and if there are sectors or blocks containing the Debug Lock Word (0x0FE041FC) in the download target area, it switches data to values to not to be debug lock. |

*1: adviceLUNA downloads switched values, not the original data. Please be aware this point when debugging the program of ROM sum check.

9 Notes & Points

9.1 Flowchart of Action on Error

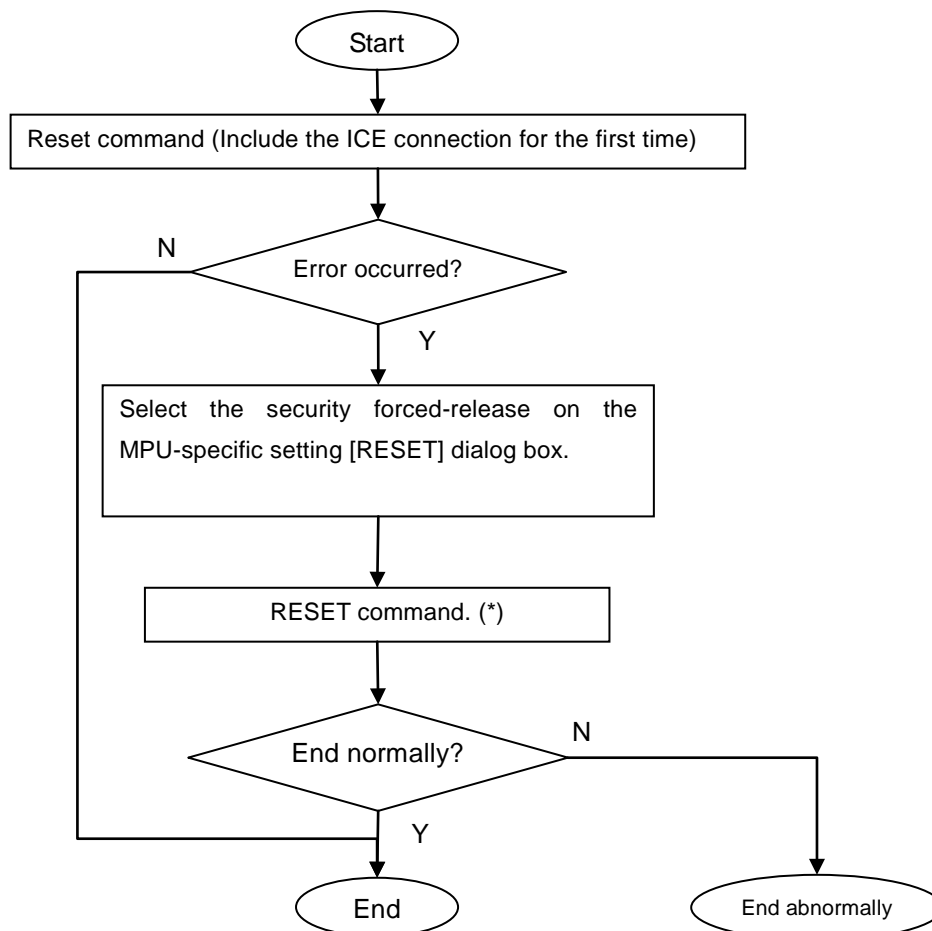
The ICE cannot be connected if debug lock word is in debug lock state.

In case the following error occurred, the debug lock may be locked. See the flowchart below and take an action for error.

*ICE Error No.fe8: MPU debug security is valid. The ICE cannot be connected.”

Check the MPU-Specific Settings.

RAM is initialized, and mass erase (all data in the internal flash memory is cleared) is executed when releasing the security.



*: It does mass erase (erase all data within built-in flash) when releasing. Therefore all data in Flash area is erased. Delete the symbol registration by releasing all break settings before executing the reset command.

9.2 Lock of Information (Lock Bits) Area

Even though it is locked, data in the information (Lock Bits) area (0x0FE04000 to 0x0FE047FF) can be erased by using a sector erase function of microVIEW-PLUS.

Lock in all area is released after the erasing.

9.3 Watchdog Timer

You can write in the flash memory even if WDT (Watchdog Timer) is enabled.

WDT is temporarily disabled by an internal process of ICE while the flash memory is written.

(After the writing, it is automatically restored.)

However, please do not lock the WDOG control register.

Because of the specification of the chip, you cannot unlock it until you reset it.

9.4 Error at Downloading

Setting of the flash memory programming definition file (.frd) may be wrong if the following error occurred when downloading.

“ICE Error No.1e45: Flash memory programming error”

Check the mapping setting by referring to the Section 4.1 “Setting up Flash Memory Mapping”.