

## User's Manual

# Data FLASH Editor

**Editor tool for V850E/ES Data FLASH memory  
image**

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## 1. Introduction

The Data FLASH Editor is a windows based tool that allows to visualize and modify the EEPROM emulation data of a Data FLASH memory image of a V850E/ES microcontroller. The Data FLASH Editor does support memory images in the Intel-hex or Motorola-S record file format. The corresponding memory image can be generated by the Data FLASH Converter or it can be uploaded from a V850E/ES based in-circuit emulator by using the IAR, GHS or NEC debugger.

The Data FLASH Editor supports to view, modify and to save EEPROM emulation data of an existing Data FLASH memory image. In addition, the Data FLASH Editor supports to add or remove EEPROM emulation data entries to respectively from a existing Data FLASH memory image.

### 1.1 Main features of Data FLASH Editor

- .NET Framework 2.0 based application
- User friendly and intuitive windows based graphical user interface.
- Visualization of EEPROM emulation data of a Data FLASH memory image.
- Modification of EEPROM emulation data entries: ADD, MODIFY or REMOVE.
- Loading of Data FLASH memory images generated by the Data FLASH Converter or IAR, GHS, NEC debuggers.
- Restoring of modified EEPROM emulation data to an existing Data FLASH memory image.

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## 2. Documents / References

For more details on the EEPROM emulation concept of the 32-bit Single-Chip V850E/ES microcontroller family and the corresponding tools, please refer also to the documents below.

<b><i>Doc number</i></b>	<b><i>Title</i></b>	<b><i>Doc Type</i></b>
U18005EE1V2AN00	32-bit Single-Chip Microcontrollers V850 EEPROM Emulation Library	Application Note
U18042EE1V2AN00	32-Bit Single-Chip Microcontroller V850 Library for the Data Flash Access Layer	Application Note
U19003EE1V0UM00	Data FLASH Converter Conversion tool for data flash memory image generation	Users Manual

**Table 1: Documents / References**



### **3. Input files / formats**

The Data FLASH Editor does support Data FLASH memory images in the Intel-hex and Motorola-S record file format.

### **4. Output file / formats**

The output format of the Data FLASH Editor is always the same as the chosen input file format of a loaded Data FLASH memory image, the Intel-hex or respectively the Motorola-S record file format.

## 5. EEPROM emulation data

In opposite to a classical EEPROM, where the data is stored on a fixed address and so can always be found on the same location, EEPROM emulation need to store data on changing locations. From the different options to find the data during *Read* operations, the NEC EEPROM emulation uses the way to bundle a certain set of data with one ID, that is then searched in memory on data *Read*. Writing new data sets is easily done, by appending the data to the data pool.

Furthermore, the write granularity differs between real EEPROM and the Data FLASH used for EEPROM emulation. While the EEPROM can usually be written in 8-bit or 16-bit units, the Data FLASH must be written in 32-bit units (+1Bit for the ID-Tag, see below).

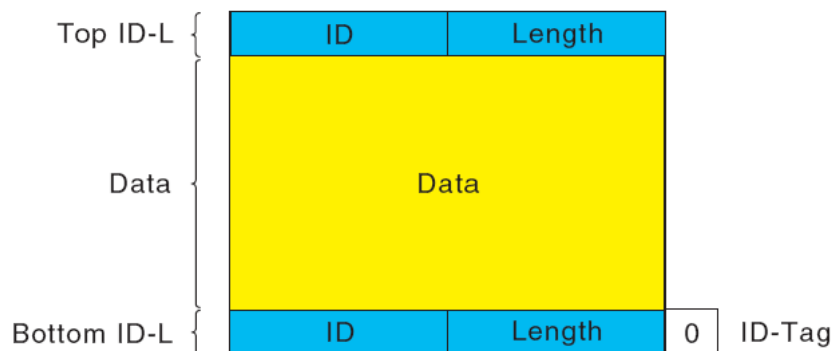


Figure 1: EEPROM Data set Representation

The approach of using IDs to identify a set of data is in-line with AUTOSAR, as well as the ID size of 16 bits and length information of 16 bits.

Differing from Code FLASH with 32-bit width, the currently implemented NEC Data FLASH is 33-bit wide. The 33-rd bit is called the ID-Tag, indicating, that the word is information and not part of the data set itself. The current implementation in the EEPROM emulation layer sets this on the bottom ID-L, while keeping it un-set on the data bits and on the top ID-L. Dedicated hardware on the Data FLASH macro can search for a certain ID by using this ID-Tag.

5.1 Overview

A EEPROM emulation Data FLASH section consists of 3 parts:

- Section Header
- Data Zone
- ID Zone

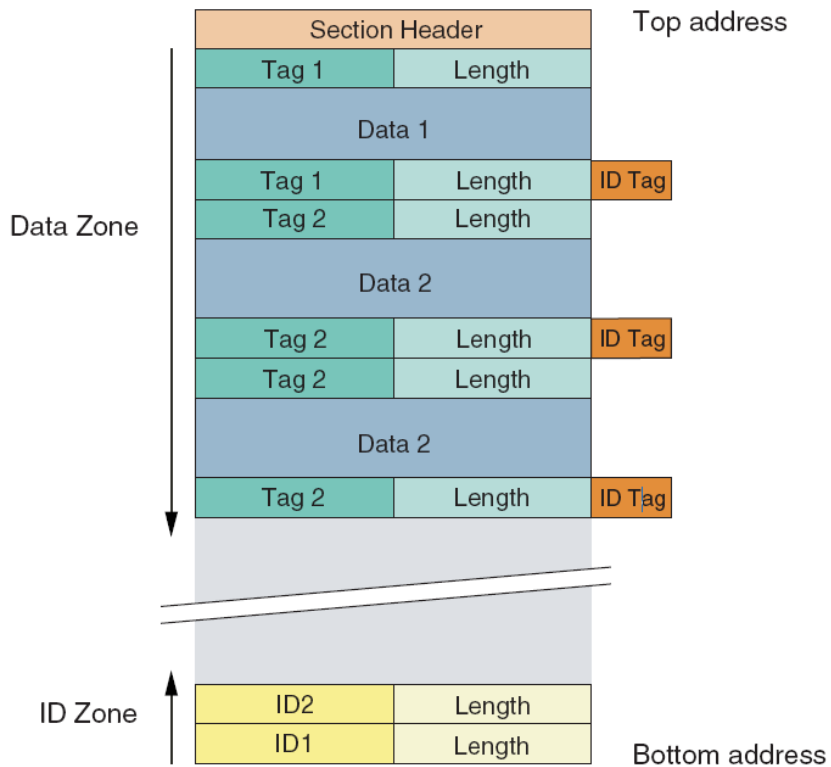


Figure 2: EEPROM Emulation Section Overview

## 5.2 Section Header

Section header size is 16 Bytes (4 Words), where currently 3 words are used to define the current section status.

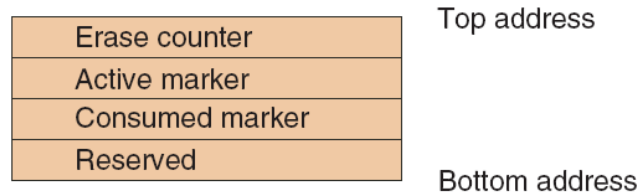


Figure 3: Section Header

The erase counter word consists of the 16-bit counter and a 16-bit inverse value for protection. It describes the number of erase cycles on the data section.

The active marker and / or the consumed marker have the value 0x55555555. The value of a marker which is cleared is 0xFFFFFFFF (Blank Word). The following section states are possible:

The following section states are possible:

→ Prepared:

The section has been erased. In the section header the erase counter is written. Active marker and consumed marker are cleared. This section is ready for activation by a *Refresh* operation.

→ Active:

The section contains the latest data sets. The EEPROM emulation can read and write data to this section. In the section header, additionally to the erase counter, also the active marker is set. Consumed marker is cleared.

→ Consumed:

The section is full, no more space was available to *Write* new data sets. After activating the next section and copying the latest data sets there, the *Refresh* operation marked the full section consumed. In the section header additionally, to the erase counter and active marker, also the consumed marker is set. Next step is to *Prepare* the section.

→ Invalid:

This is no valid state. During operation it can only occur in case of interruption of a FLASH operation like erase to this section. The section header may contain any other data except as described in the three states before. Also a completely erased FLASH (default factory delivery state) is invalid from EEPROM emulation point of view.

The normal section state transitions are:

Prepared --> Active --> Consumed --> Prepared -->...

### 5.3 ID zone

The ID-zone is a list of IDs of the data sets written to the section so far. The ID-list is dynamically generated during writing new data sets into the section. An ID-List is required in order to simplify and to speed up *Refresh* operations (copying data sets from a full data section to a prepared one). The solution to keep the ID-list dynamically in the EEPROM Emulation FLASH space instead of keeping it statically in the Code FLASH area has been chosen, in order to allow new/added applications to store data sets with new IDs. The ID-zone grows by time in case of writing new data sets with new IDs.

### 5.4 Data zone

The data zone contains the data sets. New data sets are simply appended after the last written data set. So the data zone grows down in the address space. The section is full and a *Refresh* is required, when there is no more enough erased space between ID zone and data zone for the data set to be written.

## 6. Software Installation

The Data FLASH Editor requires a Windows 2000, Windows XP or Windows Vista operating system installed on your personal computer. In addition, the .NET framework 2.0 must be installed on your personal computer to execute the Data FLASH Editor. To start the installation, please run the “setup.exe” installation program. During initialization phase of the setup program a progress bar is shown.

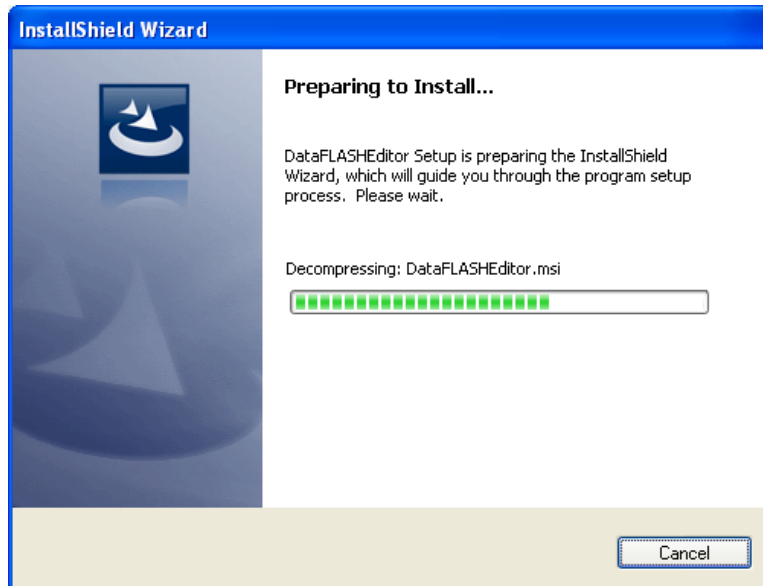


Figure 4: Install preparation

After the setup program has finished initialization a welcome screen appears. Click the Next button to continue the installation.

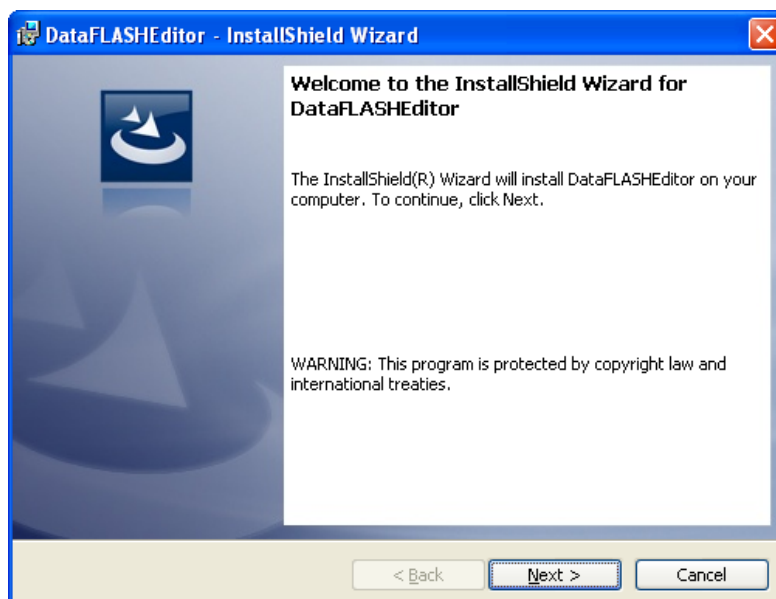


Figure 5: Welcome screen

In the next step of installation, the License Agreement window appears. Please read the Software Program License Agreement carefully. To continue the installation accept the License agreement and click the Next button. If you not accepted the license agreement the installation procedure exits.

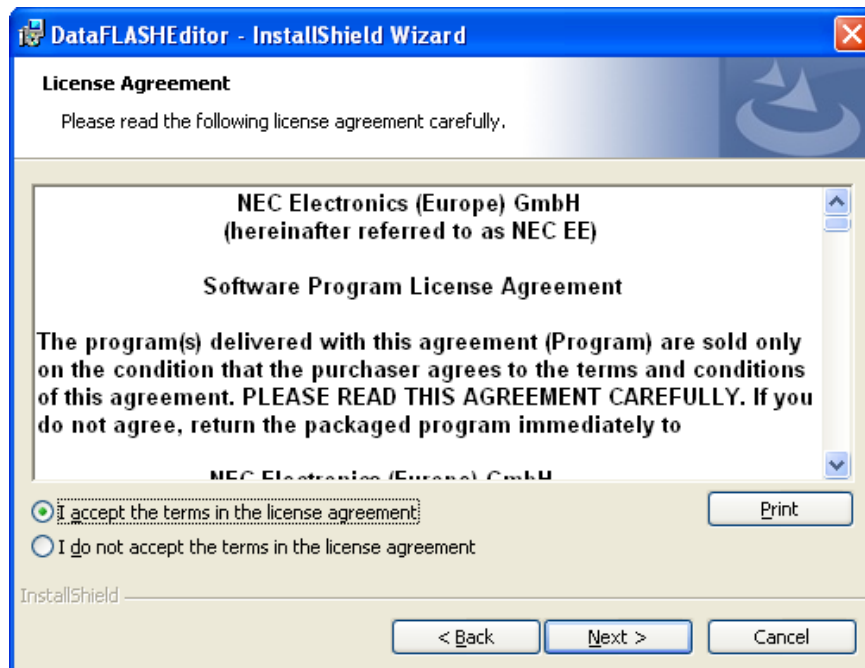


Figure 6: License Agreement window

The Destination Folder window appears. You might exit the installation by clicking the **Cancel** button. You can click the **Change** button to be able to change the installation destination path. Press the **Next** button to proceed with the installation.

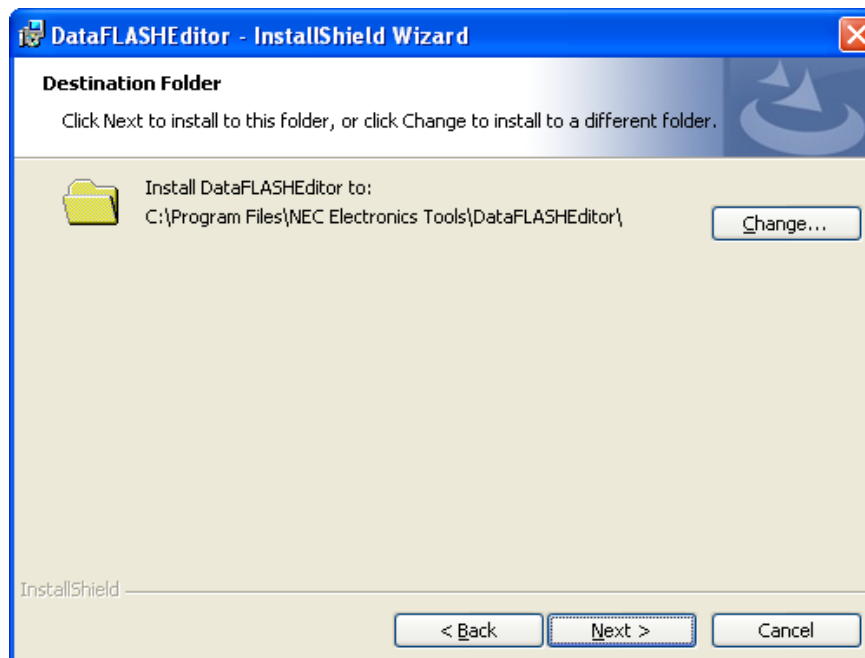


Figure 7: Choose Destination Folder window

After everything has been setup for installation, press the **Install** button to start the copy process and to finalize the installation.

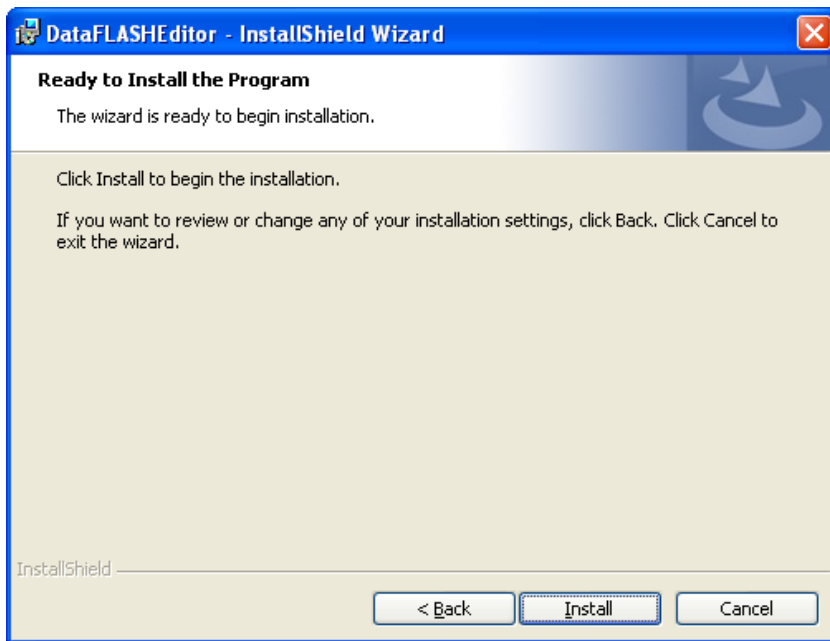


Figure 8: Ready to Install window

On the installation progress window you can follow the installation. You can always abort the installation by pressing the **Cancel** button.

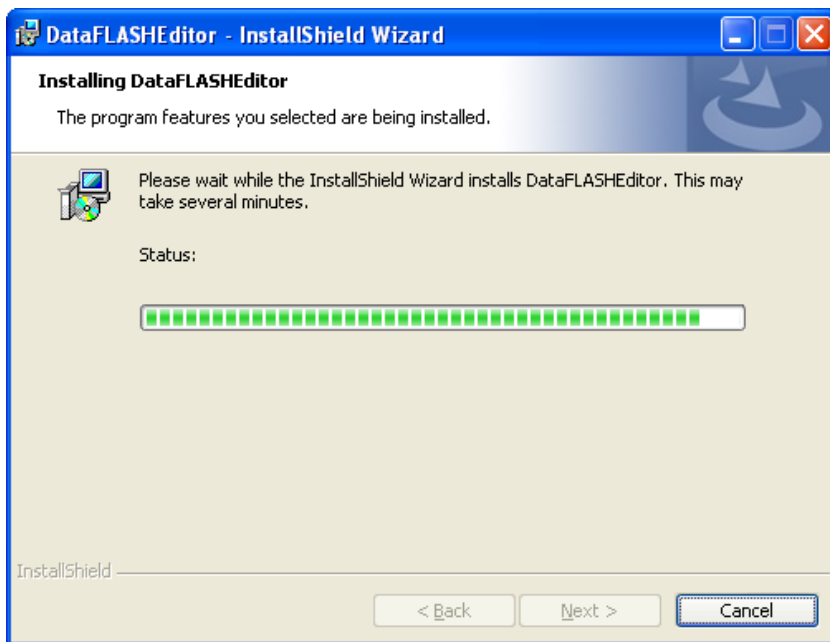


Figure 9: Installation progress window



When the installation is complete, the following message window appears.

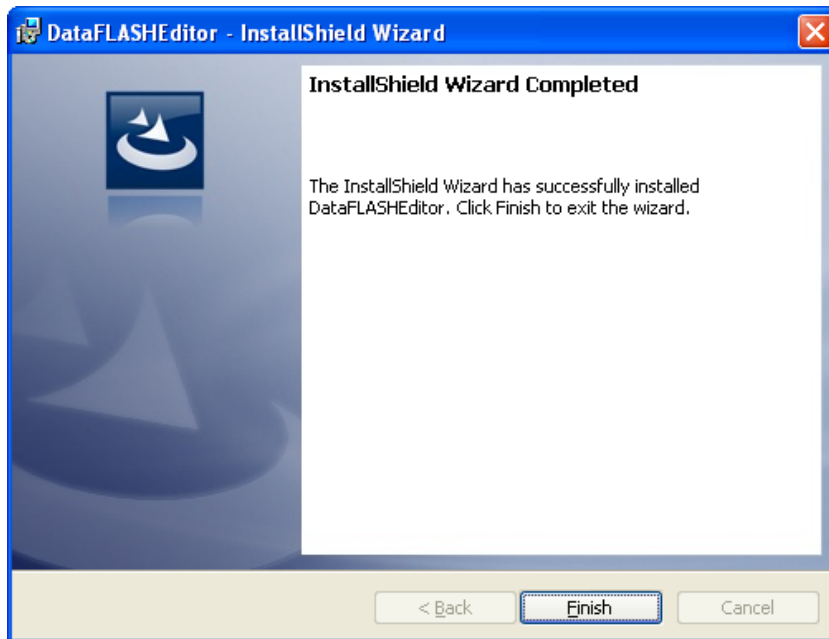


Figure 10: Installation completion window

The program has been installed successfully and an entry has been made into the program menu to start the Data FLASH Editor software.

The installation process is complete now and the setup utility has installed a new program folder which holds the Data FLASH Editor GUI Software and a Data FLASH Editor uninstall icon which allows you to remove the Data FLASH Editor software from your personal computer.

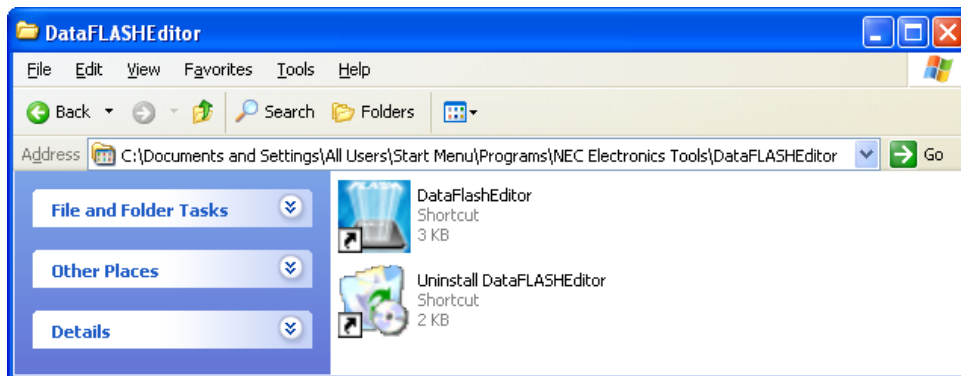


Figure 11: Program folder after installation

### 7. Data FLASH Editor, GUI

The graphical user interface of the Data FLASH Editor allows an easy and an intuitive visualisation and modification of the EEPROM emulation data of a loaded Data FLASH memory image. When starting the Data FLASH Editor GUI a screen similar to the following one will appear. Some commands and functions may be unavailable when the GUI is started for the first time, depending on Data FLASH area definition or the loaded Data FLASH memory image.

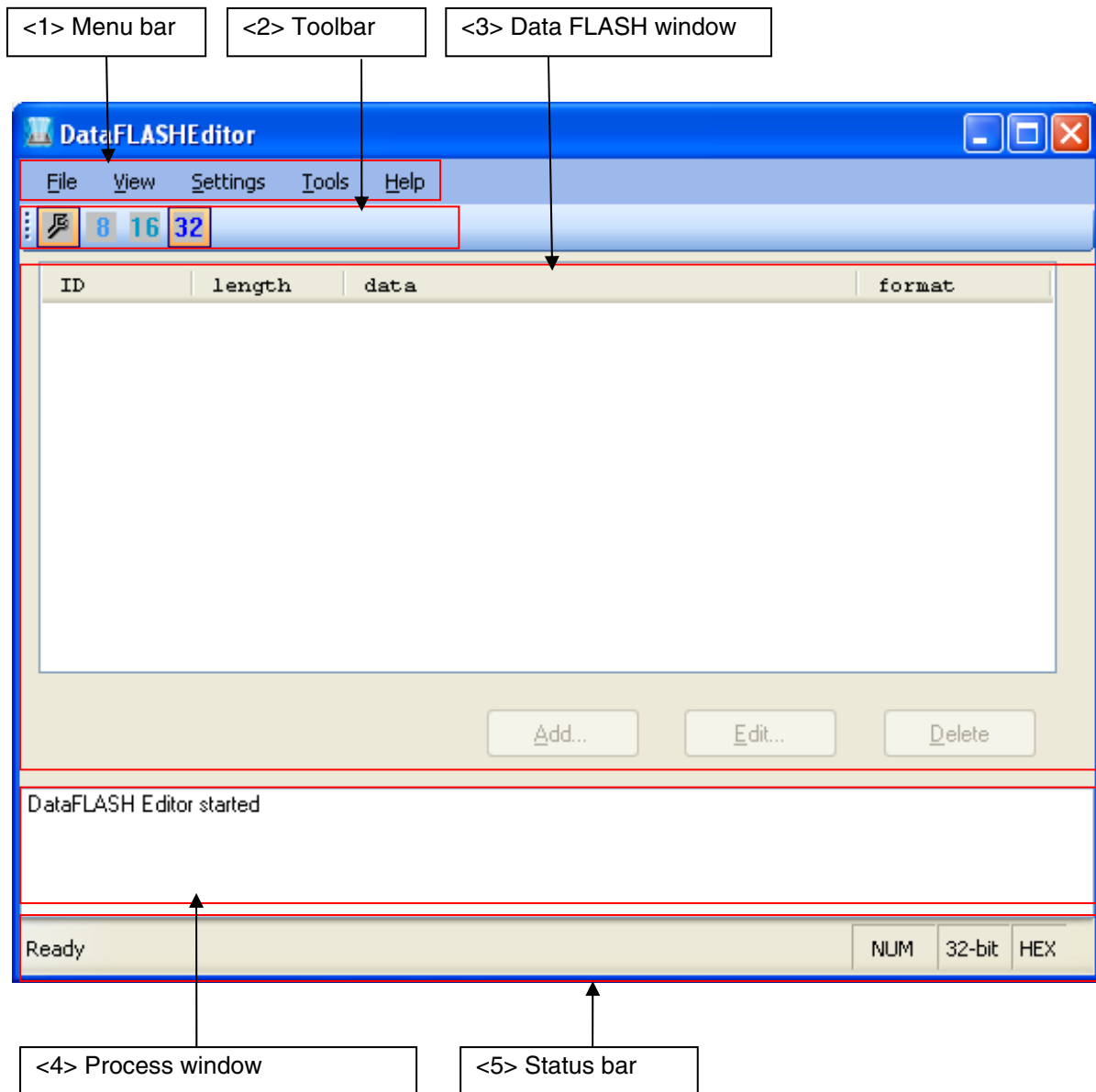


Figure 12: Data FLASH Editor main window

The main window consists of the following areas.

	<b><i>Name</i></b>	<b><i>Displayed items</i></b>
<1>	Menu bar	Menu items executable by the Data FLASH Editor
<2>	Toolbar	Frequently used commands
<3>	Data FLASH window	Shows the EEPROM emulation data of an loaded Data FLASH memory image, allows editing of EEPROM emulation data
<4>	Process window	Shows tool command and process information
<5>	Status bar	Show current status and configuration of the Data FLASH Editor

**Table 2: Main window composition**

## 7.1 Toolbar

The toolbar contains buttons to configure the Data FLASH Editor. The following buttons and corresponding functions are offered by the Data FLASH Editor.





	Setup Data FLASH area
	Display all EEPROM emulation data entries in 8-bit data format (byte format)
	Display all EEPROM emulation data entries in 16-bit data format (half-word format)
	Display all EEPROM emulation data entries in 32-bit data format (word format)

Figure 13: Toolbar Buttons

## 7.2 The Menu

Analogous to the Toolbar the main menu of the Data FLASH Editor allows the configuration and execution of all Data FLASH Editor functions.

### 7.2.1 File menu

By using the **File** menu a Data FLASH memory image can be loaded, stored or if necessary closed. Additionally, the memory mapping of the Data FLASH area can be controlled via the **File** menu.

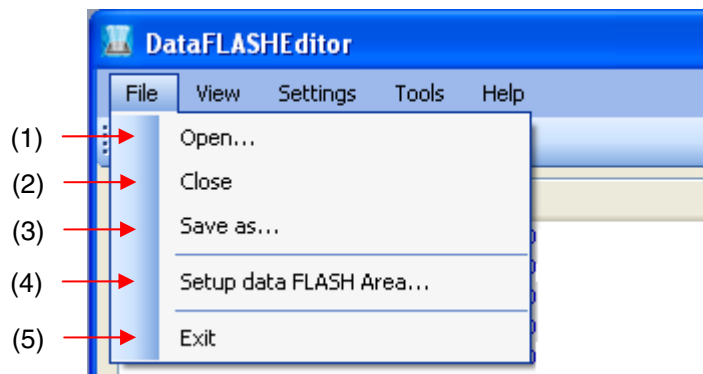


Figure 14: File menu

**(1) Open...**

The **Open...** menu allows selecting and loading an existing Data FLASH memory image by the Data FLASH Editor. After loading the Data FLASH memory image the corresponding Data FLASH entries are shown in the Data FLASH window.

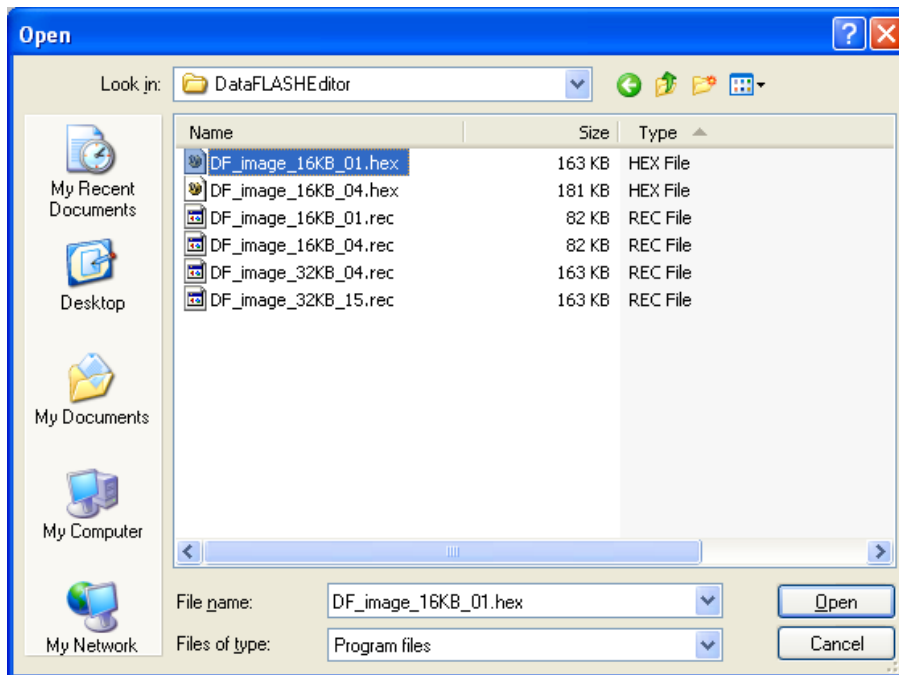
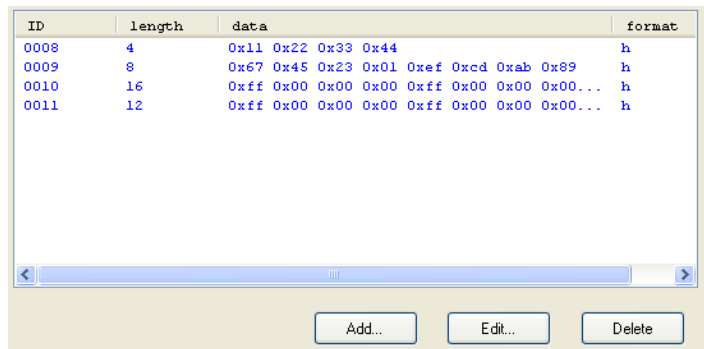


Figure 15: Open dialog

Note: When loading a Data FLASH memory image it must fit to the chosen Data FLASH start address and the Data FLASH size. Otherwise the file loading will be aborted and a corresponding error message is generated.

The most recently used directory a file has been loaded from will be offered in this file open menu. The Data FLASH memory image can be loaded in two different formats, the Intel-hex or Motorola-S record file format.

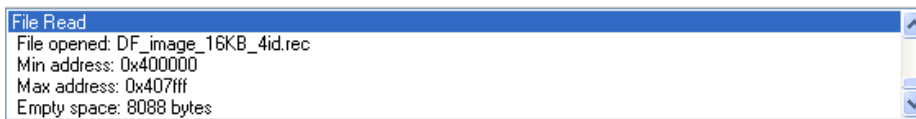
After a Data FLASH memory image is loaded, the corresponding EEPROM emulation data entries, including ID-tag, length and data record information were displayed in the Data FLASH window of the editor.



ID	length	data	format
0008	4	0x11 0x22 0x33 0x44	h
0009	8	0x67 0x45 0x23 0x01 0xef 0xcd 0xab 0x89	h
0010	16	0xff 0x00 0x00 0x00 0xff 0x00 0x00 0x00...	h
0011	12	0xff 0x00 0x00 0x00 0xff 0x00 0x00 0x00...	h

Figure 16: Data FLASH window

Additional to the Data FLASH memory the file reading process and the corresponding file and address map information are displayed in the process window.



File Read
File opened: DF_image_16KB_4id.rec
Min address: 0x400000
Max address: 0x407fff
Empty space: 8088 bytes

Figure 17: Process window

**(2) Close...**

Via the **Close...** menu the working on a Data FLASH memory image can be finished and the corresponding Data FLASH memory image will be closed. In case the Data FLASH memory image was changed a file save dialog offers the possibility to save the last changes.

**(3) Save as...**

The **Save as...** menu allows saving of a modified Data FLASH memory image by the Data FLASH Editor.

#### (4) Setup Data FLASH



The **Setup Data FLASH** menu allows to setup the start address and the size of the Data FLASH area. By selecting this menu item the following dialog window appears and offers the possibility to specify the Data FLASH mapping.

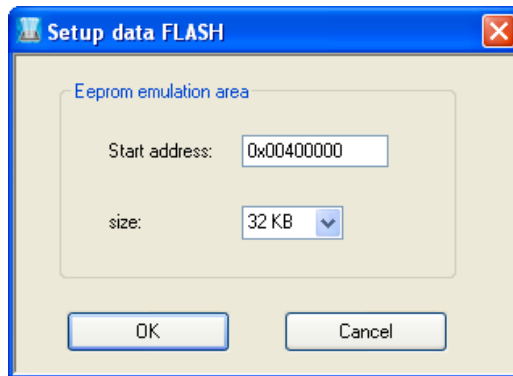


Figure 18: Setup Data FLASH, start address

Within the Setup Data FLASH dialog the start address of the Data FLASH area must be specified. Only hexadecimal input values are permissible. The entered start address should be equal to the physical start address of the Data FLASH area of the corresponding V850E/ES device. The size of the Data FLASH can be specified by the pull-down menu. Supported sizes are 4 KByte, 8 KByte, 16 KByte and 32 KByte.

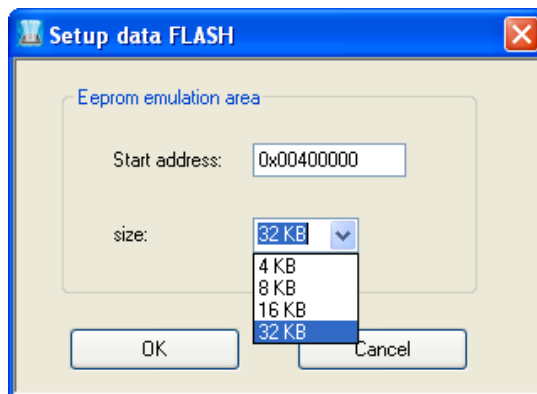


Figure 19: Setup Data FLASH, size



**(5) Exit...**

Via the **Exit...** menu the Data FLASH Editor can be closed. In case the Data FLASH memory image was changed a file save dialog offers the possibility to save the last changes.

In addition, the actual Data FLASH Editor configuration is stored in the "CurrentSettings.xml" configuration file. The configuration file is located in the installation folder of the Data FLASH Editor. By restarting the Data FLASH Editor the latest settings are restored.

Note: Write permissions to the installation folder and to the "CurrentSettings.xml" File are required to allow the storage of the current configuration settings by the Data FLASH Editor.

### 7.2.2 View menu

By using the **View** menu the configuration of the Data FLASH Editor can be changed. The following functions are offered by the View menu.

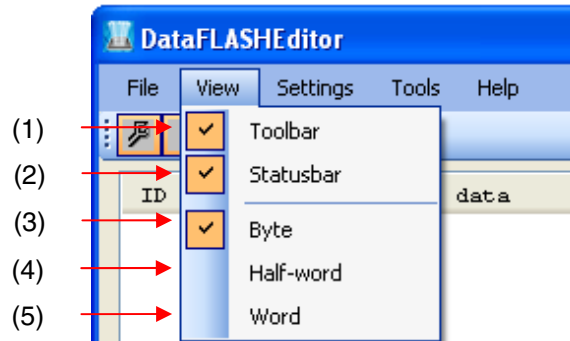


Figure 20: View menu

The functionality of each **View** menu items is described in the following table.

(1) Toolbar	Enables / Disables Toolbar
(2) Statusbar	Enables / Disables Statusbar
(3) Byte	Display all EEPROM emulation data entries in 8-bit data format (byte format)
(4) Half-word	Display all EEPROM emulation data entries in 16-bit data format (half-word format)
(5) Word	Display all EEPROM emulation data entries in 32-bit data format (word format)

Table 3: View menu

### 7.2.3 Settings menu

The **Settings** menu controls the format on how a Data FLASH memory image and the corresponding EEPROM emulation data entries should be displayed. Two formats are supported by the Data FLASH Editor, the Decimal and the Hexadecimal format.

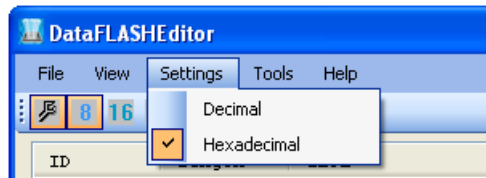


Figure 21: Settings menu

Only by loading a new Data FLASH memory image the selected data format will be taken under consideration. Changing the display format within the Settings menu after a Data FLASH memory was loaded has no influence and does not change the global format of the represented EEPROM emulation data entries. You can change the display format of an individual EEPROM emulation data entry in the **Edit** menu by double-clicking on it or using the “Edit” button within the Data FLASH window.

### 7.2.4 Tools menu

The **Tools** menu controls the refreshing of the active Data FLASH section. In case EEPROM emulation data entries have been modified, remove or added, the “Refresh” function updates the active Data FLASH section and makes the changes valid.

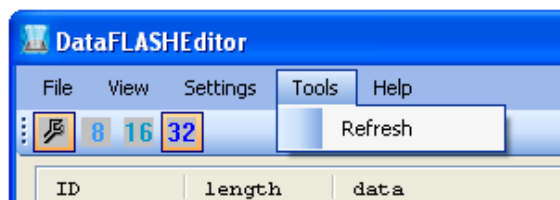


Figure 22: Tools menu

### 7.2.5 Help menu

Clicking the **Help** menu displays the following pull-down menu.

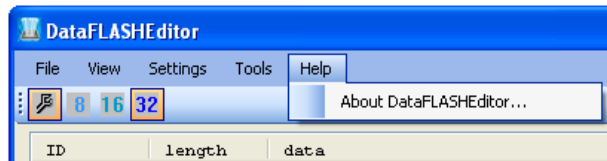


Figure 23: Help menu

The **About DataFLASHEditor...** command opens the “About DataFLASHEditor” window as shown below and indicates the program version.



Figure 24: About Data FLASH Editor window

### 7.3 Data FLASH window

The Data FLASH window visualizes the EEPROM emulation data records of a loaded Data FLASH memory image. The Data FLASH window supports the following functions:

- Display of EEPROM emulation data records, including:
  - ID tag
  - Length information
  - Data
  - Format
  
- Modification of EEPROM emulation data:
  - Adding new EEPROM emulation data record
  - Editing of existing EEPROM emulation data record
  - Deleting existing EEPROM emulation data record

The Data FLASH window is shown in the figure below.

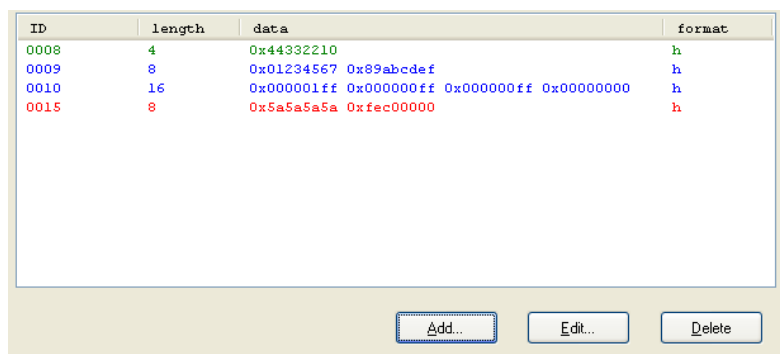


Figure 25: Data FLASH window




The meaning of the different colours of the displayed EEPROM data records can be found in the following table.

BLUE	Original / unchanged EEPROM data record
GREEN	Modified EEPROM data record
RED	Added / new EEPROM data record

Table 4: EEPROM data record colouring

By using the “Refresh” function in the Tools menu, all changes that have been done will be written to the active Data FLASH section. After the active Data FLASH section has been updated successfully, all EEPROM data records are displayed in blue colour.

The functionality of each corresponding Data FLASH window button is described in the following table.

	Add new EEPROM emulation data entry
	Edit existing EEPROM emulation data entry
	Delete existing EEPROM emulation data entry

**Table 5: Data FLASH window buttons**

7.3.1 Add new EEPROM emulation data entry

To add a new EEPROM data record, please press the “Add” button. The following screen does appear.

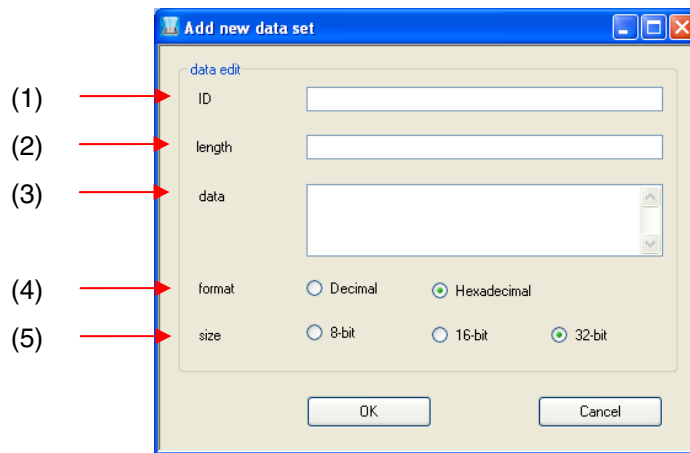


Figure 26: Add new data set menu

The functionality of each **Add** menu item is described in the following table.

(1) ID	Identifier of the data record (ID tag). Only decimal values are supported
(2) Length	Length definition of the data record. The minimum data length is equal to four bytes. The length can be specified in 4 Byte *n steps. Only decimal values are supported.
(3) Data	Specifies the data record, any hexadecimal or decimal value. The data record must fit to the specified Length and format.
(4) Format	Specifies the input and display format of the data record.
(5) Size	Specifies the display size of the data record, the following sizes are supported: → 8-bit data format (byte format) → 16-bit data format (half-word format) → 32-bit data format (word format)

Table 6: Add new data set items

After a new EEPROM emulation data record has been entered, please press the <OK> button.

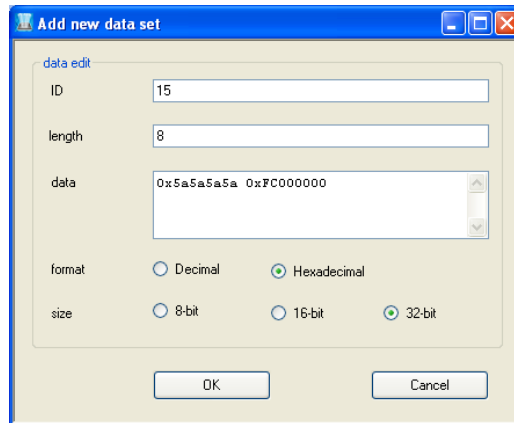


Figure 27: Example 1, add new data set

The new EEPROM data record is now visible, highlighted in red colour, in the Data FLASH window.

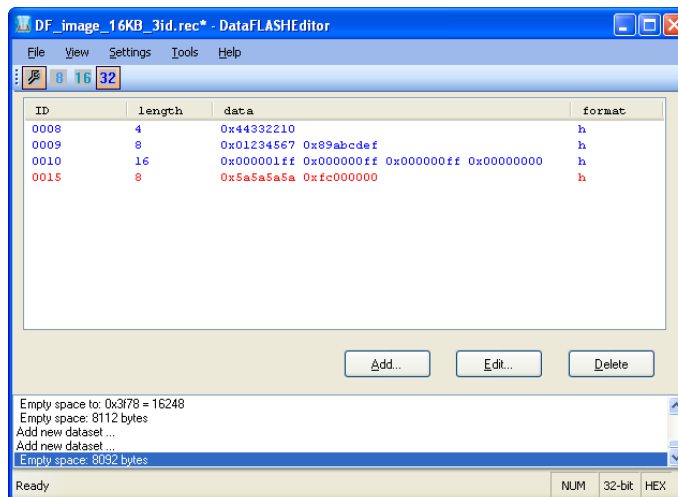


Figure 28: Example 1, Data FLASH window (Add Function)

To make the changing valid and finally add the new EEPROM data record to the active Data FLASH section, please execute the “Refresh” function within the Tools menu.

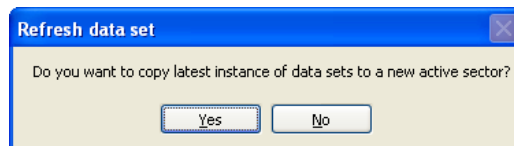


Figure 29: Example 1, refresh data set



After the active Data FLASH section has been updated successfully, the new EEPROM data record is displayed in **blue** colour.

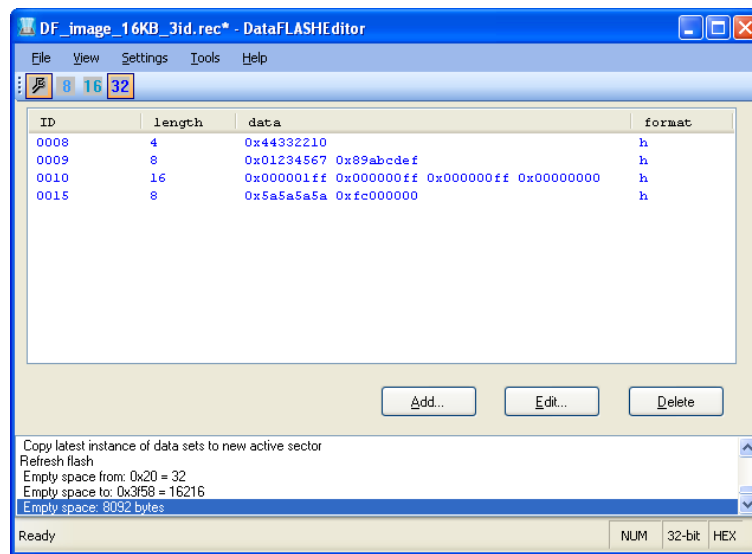


Figure 30: Example 1, added new EEPROM data record

### 7.3.2 Edit EEPROM emulation data entry

To edit an EEPROM data record, please mark the corresponding entry in the Data FLASH window and press the “Edit” button. Analogue to this, you can double-click on the corresponding EEPROM data record. The following screen does appear.

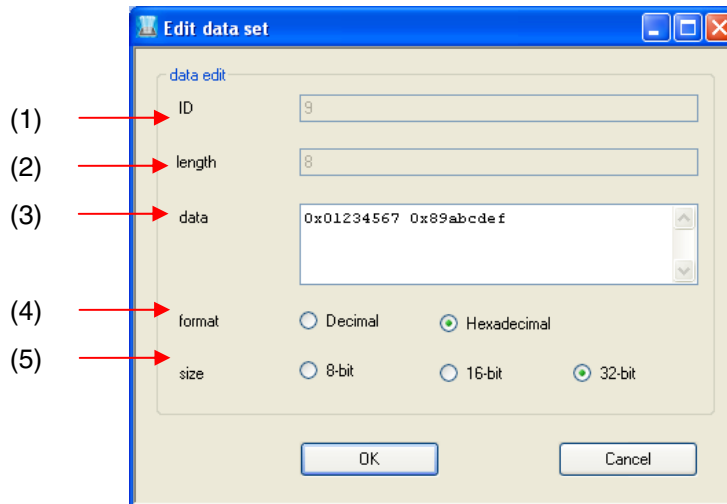


Figure 31: Edit data set menu

The **Edit** menu does only support the modification of the data record, the format and the size. The ID and Length of the corresponding data record can not be changed. The functionality of each **Edit** menu item is described in the following table.

(1) ID	Current identifier of the data record (ID tag). Can not be modified.
(2) Length	Current length of the data record. Can not be modified.
(3) Data	Specifies the data record, any hexadecimal or decimal value. The data record must fit to the specified Length and format.
(4) Format	Specifies the input and display format of the data record.
(5) Size	Specifies the display size of the data record, the following sizes are supported: <ul style="list-style-type: none"> <li>→ 8-bit data format (byte format)</li> <li>→ 16-bit data format (half-word format)</li> <li>→ 32-bit data format (word format)</li> </ul>

Table 7: Edit data set items

After an EEPROM emulation data entry has been modified, please press the <OK> button.

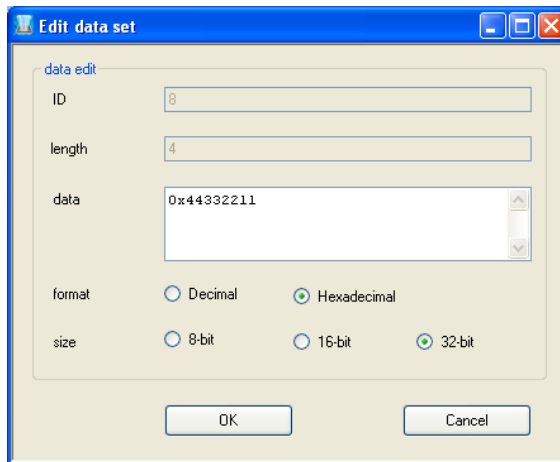


Figure 32: Example 2, edit new data set

The modified EEPROM data record is now visible, highlighted in green colour, in the Data FLASH window.

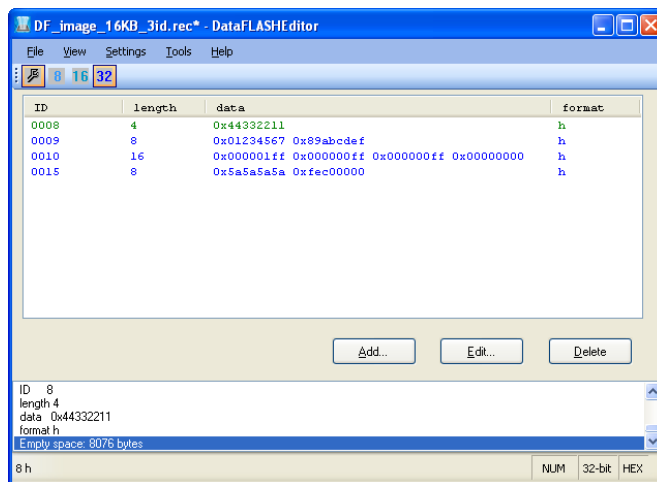


Figure 33: Example 2, Data FLASH window (Edit function)

To make the changing valid and finally add the new EEPROM data record to the active Data FLASH section, please execute the “Refresh” function in the Tools menu.

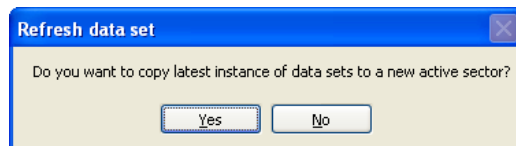


Figure 34: Example 2, refresh data set

After the active Data FLASH section has been updated successfully, the new EEPROM data record is displayed in blue colour.

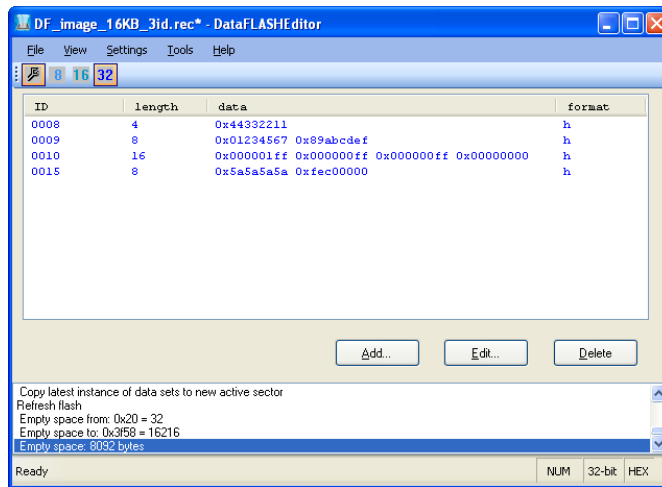


Figure 35: Example 2, modified EEPROM data record

### 7.3.3 Delete EEPROM emulation data entry

To delete an EEPROM data record, please mark the corresponding entry in the Data FLASH window and press the “Delete” button.

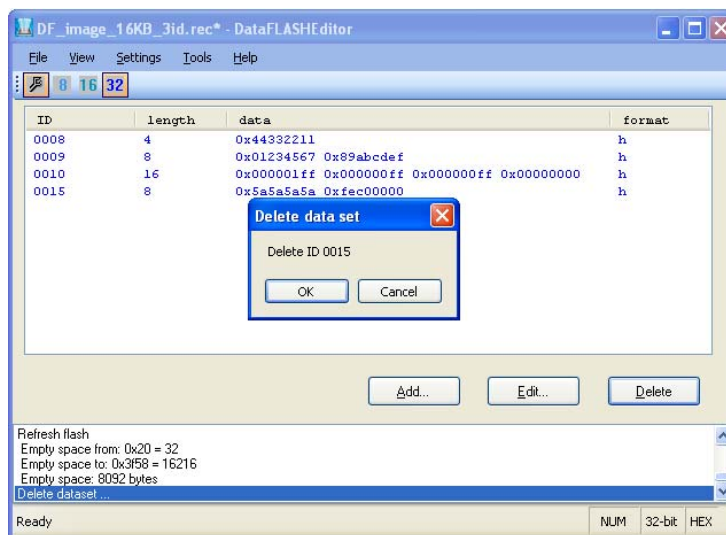


Figure 36: Delete data set

To delete the selected EEPROM data record, please press the <OK> button. To remove the selected EEPROM data record finally from the active Data FLASH selection, please execute the “Refresh” function in the Tools menu.

7.4 Process window

The process window shows the executed tool commands and process information. Additionally it stores the command history. You can use the scroll bar to navigate through the command history.

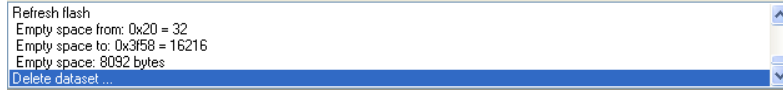
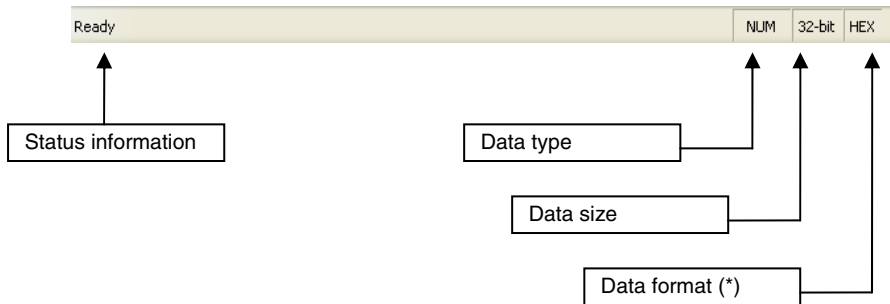


Figure 37: Process window

7.5 Status bar

The status bar shows the actual status and configuration of the Data FLASH Editor.



(\*) = Only by loading a new Data FLASH memory image the selected data format will be taken under consideration. Changing the display format within the Settings menu after a Data FLASH memory was loaded has no influence and does not change the global format of the represented EEPROM emulation data entries. You can change the display format of an individual EEPROM emulation data entry in the **Edit** menu by double-clicking on it or using the "Edit" button within the Data FLASH window.

Figure 38: Status bar

## 8. Error Messages

Error messages will be output in the error dialog boxes of the Data FLASH Editor.

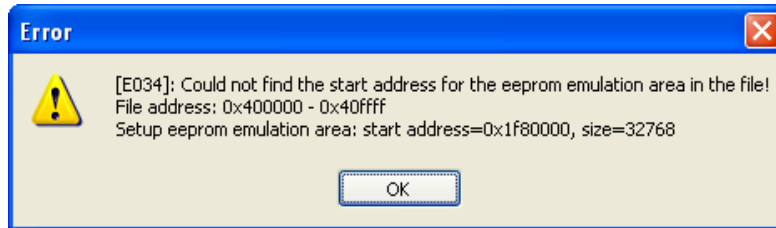


Figure 39: Error message, dialog box

The following table shows the error messages generated by the Data FLASH Editor.

<b>Error Number</b>	<b>Message / Description</b>
[E002]	Could not open FLASH file!
[E003]	Could not read FLASH file!
[E004]	Could not save FLASH file!
[E005]	Could not read program settings XML file!
[E006]	Could not write program settings XML file!
[E008]	The FLASH file contains checksum error!
[E009]	The FLASH file contains unknown lines!
[E010]	The FLASH file contains wrong Intel HEX lines!
[E011]	The FLASH file contains wrong Motorola SREC lines!
[E012]	The FLASH file contains wrong information!
[E013]	The data record could not be found!
[E014]	Active flash sector error when searching sector 0!
[E015]	Active flash sector error when searching sector 1!
[E016]	The active flash sector could not be found!
[E017]	Error during memory copy!
[E018]	FLASH file do not include data for RecordID <id>!
[E019]	The RecordID <id> has been deleted. A refresh is needed before it can be used again!
[E020]	The RecordID <id> is already used!
[E021]	Illegal character, must be an integer value, use digits 0-9!
[E022]	Error during decimal conversion, element=<id>!
[E023]	Error during hexadecimal conversion, element=<id>!
[E024]	The new data set does not fit in current flash!
[E025]	Problem to update empty flash space size!
[E026]	The length must be 4-65532
[E027]	Error when ID should be inserted!
[E028]	Error when data should be inserted!
[E029]	No inactive sector found!
[E030]	The sector is consumed and needs to be erased!
[E031]	The sector is already active!
[E032]	The length must be a multiple of 4!
[E033]	Error the data is not valid, element=<id>!
[E034]	Could not find the start address for the eeprom emulation area in the file! File address: <id1> - <id2> Setup eeprom emulation area: start address=<id3>, size=<id4>
[E035]	Could not find the complete eeprom emulation area in the file! File address: <id1> - <id2> Setup eeprom emulation area: start address=<id3>, size=<id4>
[E036]	The id must be a value from 1 to 65535!
[E037]	The file data exceeds the configured eeprom emulation area! File address: <id1> - <id2> Setup eeprom emulation area: start address=<id3>, size=<id4>
[E038]	The file is too big. Please only import the data flash area!
[E040]	Wrong data FLASH base address specified. Please insert data FLASH base address as hexadecimal value! (for instance, Base address: 0x001F8000)
[E041]	Wrong data FLASH base address specified. The value has been updated according to alignment rules!
[E042]	A data set must be selected!
[E043]	Illegal start address!

Table 8: Error Messages

[ Memo ]