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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

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# *J-Link ColdFire* *BDM 26*

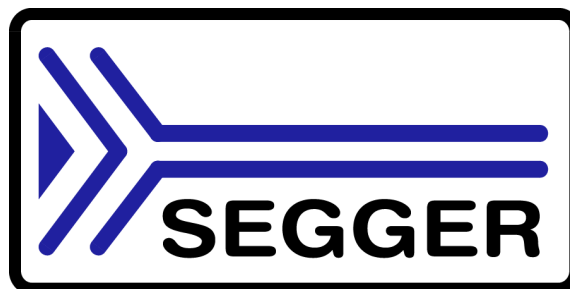
User guide of the  
J-Link ColdFire BDM 26



**Manual Rev. 5**

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## Contact address

SEGGER Microcontroller GmbH & Co. KG

In den Weiden 11  
D-40721 Hilden

Germany

Tel. +49 2103-2878-0

Fax. +49 2103-2878-28

Email: support@segger.com

Internet: <http://www.segger.com>

## Manual versions

This manual describes the latest software version. If any error occurs, please inform us and we will try to assist you as soon as possible.

For further information on topics or routines not yet specified, please contact us.

Revision	Date	By	Explanation
5	081219	AG	Chapter "Flash download" added.
4	080605	AG	Chapter "Working with J-Link": Section "Using J-Link with different debuggers" added.
3	070924	AG	Several spelling corrections.
2	070912	AG	Chapter "Working with J-Link": Section "Command strings" updated, "Supply-PowerDefault" command added.
1	070904	AG	Initial version.

## Software versions

Refers to Release.html for information about the changes of the software versions.

# About this document

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This document describes J-Link ColdFire® BDM 26. It provides an overview over the major features of J-Link ColdFire® BDM 26, gives you some background information about BDM and describes J-Link ColdFire® BDM 26 related software packages available from Segger. Finally, the chapter *Support and FAQs* on page 51 helps to troubleshoot common problems.

For simplicity, we will refer to J-Link ColdFire® BDM 26 as J-Link in this manual.

## Typographic conventions

This manual uses the following typographic conventions:

Style	Used for
Body	Body text.
<b>Keyword</b>	Text that you enter at the command-prompt or that appears on the display (that is system functions, file- or pathnames).
<i>Reference</i>	Reference to chapters, tables and figures or other documents.
<b>GUIElement</b>	Buttons, dialog boxes, menu names, menu commands.

**Table 1.1: Typographic conventions**



**SEGGER Microcontroller GmbH & Co. KG** develops and distributes software development tools and ANSI C software components (middleware) for embedded systems in several industries such as telecom, medical technology, consumer electronics, automotive industry and industrial automation.

SEGGER's intention is to cut software development-time for embedded applications by offering compact flexible and easy to use middleware, allowing developers to concentrate on their application.

Our most popular products are emWin, a universal graphic software package for embedded applications, and embOS, a small yet efficient real-time kernel. emWin, written entirely in ANSI C, can easily be used on any CPU and most any display. It is complemented by the available PC tools: Bitmap Converter, Font Converter, Simulator and Viewer. embOS supports most 8/16/32-bit CPUs. Its small memory footprint makes it suitable for single-chip applications.

Apart from its main focus on software tools, SEGGER develops and produces programming tools for flash microcontrollers, as well as J-Link, a JTAG emulator to assist in development, debugging and production, which has rapidly become the industry standard for debug access to ARM cores.

**Corporate Office:**

<http://www.segger.com>

**United States Office:**

<http://www.segger-us.com>

## EMBEDDED SOFTWARE (Middleware)



**emWin**

**Graphics software and GUI**

emWin is designed to provide an efficient, processor- and display controller-independent graphical user interface (GUI) for any application that operates with a graphical display. Starterkits, eval- and trial-versions are available.



**embOS**

**Real Time Operating System**

embOS is an RTOS designed to offer the benefits of a complete multitasking system for hard real time applications with minimal resources. The profiling PC tool embOSView is included.



**emFile**

**File system**

emFile is an embedded file system with FAT12, FAT16 and FAT32 support. emFile has been optimized for minimum memory consumption in RAM and ROM while maintaining high speed. Various Device drivers, e.g. for NAND and NOR flashes, SD/MMC and CompactFlash cards, are available.



**emUSB**

**USB device stack**

A USB stack designed to work on any embedded system with a USB client controller. Bulk communication and most standard device classes are supported.

## SEGGER TOOLS

**Flasher**

**Flash programmer**

Flash Programming tool primarily for microcontrollers.

**J-Link**

**JTAG emulator for ARM cores**

USB driven JTAG interface for ARM cores.

**J-Trace**

**JTAG emulator with trace**

USB driven JTAG interface for ARM cores with Trace memory. supporting the ARM ETM (Embedded Trace Macrocell).

**J-Link Related Software**

Add-on software to be used with SEGGER's industry standard JTAG emulator, this includes flash programming software and flash breakpoints.



# Table of Contents

1	Introduction .....	7
1.1	J-Link overview .....	8
1.1.1	Features of J-Link .....	8
1.2	Specifications .....	9
1.2.1	Specifications for J-Link .....	9
1.2.2	Download speed .....	9
1.3	Requirements.....	9
2	Setup.....	11
2.1	Installing the J-Link software and documentation .....	12
2.1.1	Setup procedure.....	13
2.1.2	Verifying correct driver installation.....	14
2.2	Uninstalling the J-Link USB driver .....	16
2.3	Connecting the target system.....	17
2.3.1	Power-on sequence.....	17
2.3.2	Verifying target device connection .....	17
2.3.3	Problems .....	17
3	J-Link related software.....	19
3.1	J-Link related software .....	20
3.1.1	J-Link software and documentation .....	20
3.1.2	List of additional software packages .....	20
3.2	J-Link software and documentation in detail .....	21
3.2.1	J-Link Commander (Command line tool) .....	21
3.3	Additional software packages in detail .....	21
3.3.1	J-Link Software Developer Kit (SDK) .....	21
3.4	Using the J-LinkCF.dll.....	22
3.4.1	What is the JLinkCF.dll?.....	22
3.4.2	Updating the DLL in third-party programs .....	22
3.4.3	Determining the version of JLinkCF.dll .....	22
3.4.4	Determining which DLL is used by a program .....	23
4	Working with J-Link.....	25
4.1	Supported ColdFire® Cores.....	26
4.2	Command strings .....	26
4.2.1	List of available commands .....	26
4.2.2	Using command strings .....	29
4.3	Using J-Link with different debuggers .....	31
4.3.1	Using J-Link with IAR Embedded Workbench for ColdFire®.....	31
4.3.2	Using J-Link with Freescale CodeWarrior for ColdFire® .....	32
5	Flash download.....	33
5.1	Introduction.....	34
5.2	Licensing .....	35
5.3	Supported devices .....	36
5.4	Using flash download with different debuggers.....	37
5.4.1	IAR Embedded Workbench .....	37

6	Hardware .....	39
6.1	BDM Connector .....	40
6.1.1	Pinout.....	41
6.2	How to determine the hardware version .....	42
7	Background information .....	43
7.1	BDM .....	44
7.2	The ColdFire® core .....	45
7.2.1	Processor modes .....	45
7.2.2	Registers .....	45
7.2.3	Breakpoints and watchpoints .....	47
7.3	Flash programming .....	48
7.3.1	How does flash programming via J-Link work ? .....	48
7.3.2	Data download to RAM.....	48
7.3.3	Available options for flash programming .....	48
7.4	J-Link firmware.....	49
7.4.1	Firmware update.....	49
7.4.2	Invalidating the firmware .....	49
8	Support and FAQs .....	51
8.1	Troubleshooting .....	52
8.1.1	General procedure.....	52
8.1.2	Typical problem scenarios .....	52
8.2	Contacting support.....	53
8.3	Frequently Asked Questions.....	54
9	Glossary.....	55
10	Literature and references.....	59

# Chapter 1

## Introduction

---

This chapter gives a short overview about J-Link.



## 1.1 J-Link overview

J-Link is a BDM emulator designed for ColdFire® cores. It connects via USB to a PC running Microsoft Windows 2000, Windows XP, Windows 2003, or Windows Vista. J-Link has a built-in 26-pin BDM connector, which is compatible with the standard 26-pin connector defined by Freescale.

### 1.1.1 Features of J-Link

- USB 2.0 interface
- Easy to use: Fully plug and play compatible
- Any ColdFire® V2/3/4 supported
- Download speed up to 120 Kbytes/second
- Seamless integration into IAR Embedded Workbench
- No power supply required, powered through USB
- 5V Power can be supplied to the target (on pin 1, KS-power)
- Maximum interface speed: 2 MHz (Multilink: 1 MHz)
- Automatic core recognition
- All interface signals can be monitored and target voltage can be measured
- A 26-pin standard connector
- A USB and 26-pin flat cable included
- Wide target voltage range: 1.2V - 5V
- J-Mem (live memory view/edit) included
- A J-Link server (connects J-Link via TCP/IP) included
- A Software Developer Kit (SDK) available: write your own application using J-Link, directly accessing the core
- Flash download: debugger can download into internal ColdFire-flash
- Applications can be debugged in RAM or flash

## 1.2 Specifications

### 1.2.1 Specifications for J-Link

Power Supply	USB powered <50mA
USB Interface	USB 2.0, full speed
Target Interface	BDM 26-pin
Serial Transfer Rate between J-Link and Target	up to 2 MHz
Supported Target Voltage	1.2 - 3.3 V (5V adapter available)
Target supply voltage	4.5V .. 5V (if powered with 5V on USB)
Target supply current	Max. 300mA
Operating Temperature	+5°C ... +60°C
Storage Temperature	-20°C ... +65 °C
Relative Humidity (non-condensing)	<90% rH
Size (without cables)	100mm x 53mm x 27mm
Weight (without cables)	70g
Electromagnetic Compatibility (EMC)	EN 55022, EN 55024
Supported OS	Microsoft Windows 2000 Microsoft Windows XP Microsoft Windows XP x64 Microsoft Windows 2003 Microsoft Windows 2003 x64 Microsoft Windows Vista Microsoft Windows Vista x64

**Table 1.1: J-Link specifications**

### 1.2.2 Download speed

The following table lists performance values (Kbytes/second) for writing to memory (RAM):

Hardware	Memory download
J-Link Rev. 1	120 KBytes/second

**Table 1.2: Download speed differences between hardware revisions**

**Note:** The actual speed depends on various factors, such as BDM frequency, target CPU speed, host system used etc.

## 1.3 Requirements

### Host System

To use J-Link you need a host system running Windows 2000, Windows XP, Windows 2003, or Windows Vista.

### Target System

A ColdFire® target system is required. The system should have a standardized 26-pin connector as defined by Freescale.



# Chapter 2

## Setup

---

This chapter describes the setup procedure required to work with J-Link. Primarily, this includes the installation of the J-Link software and documentation, which also includes a kernel mode J-Link USB driver in your host system.

## 2.1 Installing the J-Link software and documentation

J-Link is shipped with a command line tool, a DLL for using J-Link with Freescale CodeWarrior for ColdFire and J-Link USB driver.

Refer to chapter *J-Link related software* on page 19 for an overview about the J-Link software and its documentation.

## 2.1.1 Setup procedure

To install the J-Link software and documentation, follow this procedure:

**Note:** We recommend to check if a newer version of the J-Link software and documentation is available for download before starting the installation. Check therefore the J-Link related download section of our website:

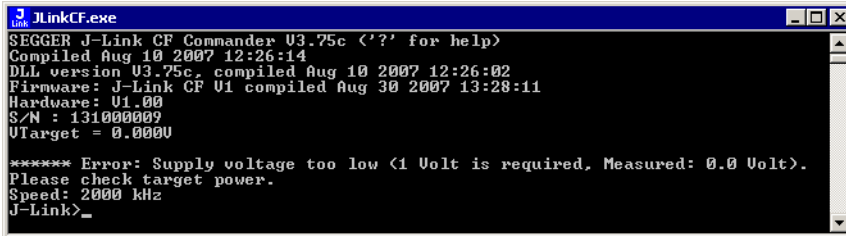
*[http://www.segger.com/download\\_jlink\\_cf.html](http://www.segger.com/download_jlink_cf.html)*

1. Before you connect your J-Link into your computer's USB port, extract J-Link software and documentation package **JLinkCF\_V<VersionNumber>.zip**. The software and documentation package includes the certified J-Link USB driver. Start installing the USB drivers by double clicking **USBdriver/InstallDrivers.exe**.
2. Connect your J-Link via USB with your PC. The J-Link will be identified and after a short period the J-Link LED stops rapidly flashing and stays on permanently.

## 2.1.2 Verifying correct driver installation

To verify the correct installation of the driver, disconnect and reconnect J-Link to the USB port. During the enumeration process which takes about 2 seconds, the LED on J-Link is flashing. After successful enumeration, the LED stays on permanently.

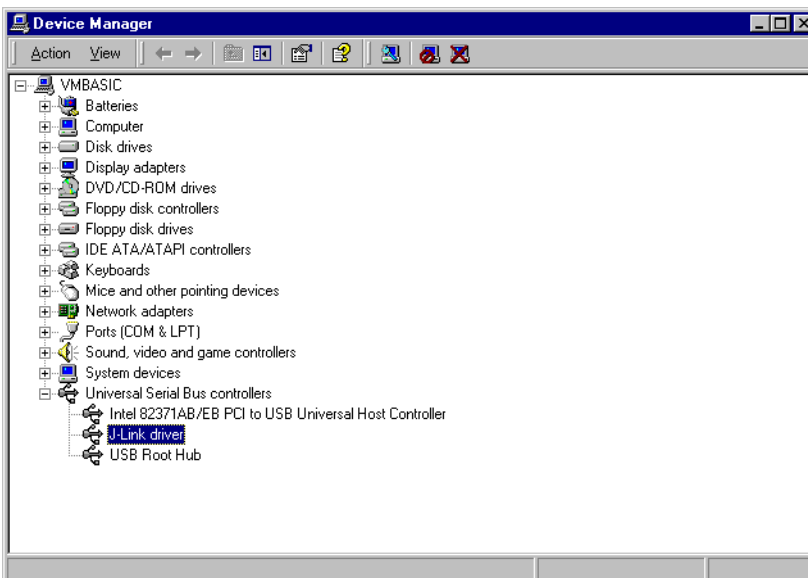
Start the provided example application **JLinkCF.exe**, which should display the compilation time of the J-Link firmware, the serial number, a target voltage of 0.000V, a complementary error message which says that the supply voltage is too low if no target is connected to J-Link, and the speed selection. The screenshot below shows an example.



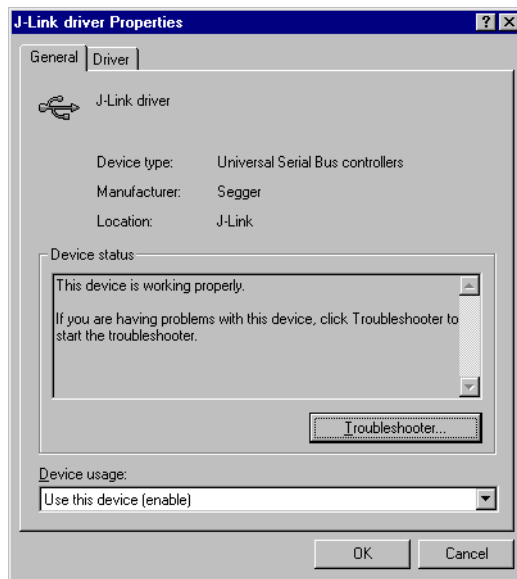
```
JLinkCF.exe
SEGGER J-Link CF Commander V3.75c <'?' for help>
Compiled Aug 10 2007 12:26:14
DLL version V3.75c, compiled Aug 10 2007 12:26:02
Firmware: J-Link CF V1 compiled Aug 30 2007 13:28:11
Hardware: V1.00
S/N : 131000009
VTarget = 0.0000

***** Error: Supply voltage too low (1 Volt is required, Measured: 0.0 Volt).
Please check target power.
Speed: 2000 kHz
J-Link>
```

In addition, you can verify the driver installation by consulting the Windows device manager. If the driver is installed and your J-Link is connected to your computer, the device manager should list the J-Link USB driver as a node below "Universal Serial Bus controllers" as shown in the following screenshot:



Right-click on the driver to open a context menu which contains the command **Properties**. If you select this command, a **J-Link driver Properties** dialog box is opened and should report: **This device is working properly.**



If you experience problems, refer to the chapter *Support and FAQs* on page 51 for help. You can select the **Driver** tab for detailed information about driver provider, version, date and digital signer.





## 2.2 Uninstalling the J-Link USB driver

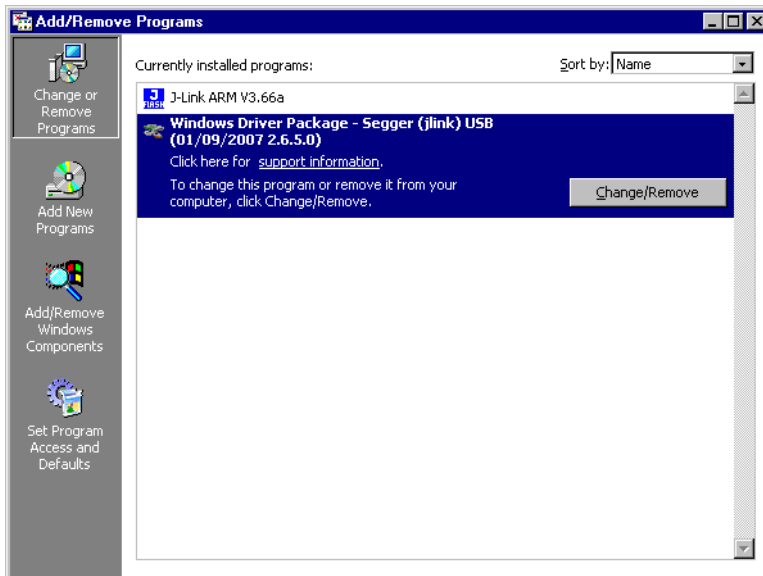
If J-Link is not properly recognized by Windows and therefore does not enumerate, it make sense to uninstall the J-Link USB driver.

This might be the case when:

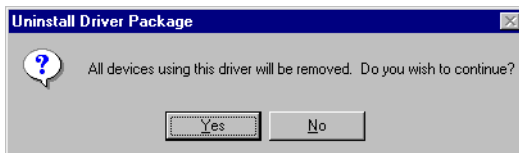
- The LED on the J-Link is rapidly flashing.
- The J-Link is recognized as **Unknown Device** by Windows.

To have a clean system and help Windows to reinstall the J-Link driver, follow this procedure:

1. Disconnect J-Link from your PC.
2. Open the **Add/Remove Programs** dialog box (**Start > Settings > Control Panel > Add/Remove Programs**) and select **Windows Driver Package - Segger (jlink) USB** and click the **Change/Remove** button.



3. Confirm the uninstallation process.



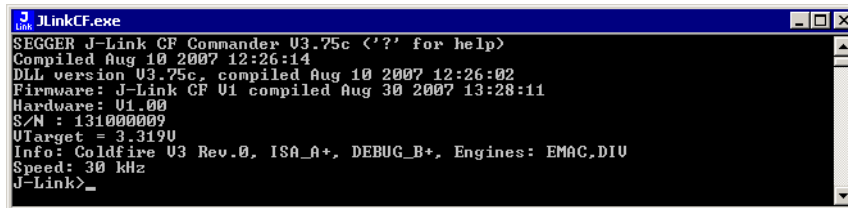
## 2.3 Connecting the target system

### 2.3.1 Power-on sequence

In general, J-Link should be powered on before you connect it with the target device. That means you should first connect J-Link with the host system via USB and then connect J-Link with the target device via BDM. Activate power supply for device after you connected J-Link to it.

### 2.3.2 Verifying target device connection

If the USB driver is working properly and your J-Link is connected with the host system, you can connect J-Link to your target hardware. Then start **JLinkCF.exe** again which should now display the same J-Link related information as above. In addition it should report that it found a BDM target. The screenshot below shows the output of **JLinkCF.exe**. As you can see, it reports a J-Link with one BDM device connected.



```

JLinkCF.exe
SEGGER J-Link CF Commander V3.75c ('?' for help)
Compiled Aug 10 2007 12:26:14
DLL version V3.75c, compiled Aug 10 2007 12:26:02
Firmware: J-Link CF V1 compiled Aug 30 2007 13:28:11
Hardware: U1_00
S/N : 131000009
UTarget = 3.319U
Info: Coldfire V3 Rev.0, ISA_A+, DEBUG_B+, Engines: EMAC,DIU
Speed: 30 kHz
J-Link>_
  
```

### 2.3.3 Problems

If you experience problems with any of the steps described above, read the chapter *Support and FAQs* on page 51 for troubleshooting tips. If you still do not find appropriate help there and your J-Link is an original Segger product, you may contact Segger support via e-mail. Provide the necessary information about your target processor, board etc. and we will try to solve your problem. A checklist of the required information together with the contact information can be found in chapter *Support and FAQs* on page 51 as well.



# Chapter 3

## J-Link related software

---

This chapter describes Segger's J-Link related software portfolio which covers nearly all phases of developing embedded applications.

## 3.1 J-Link related software

### 3.1.1 J-Link software and documentation

J-Link is shipped with J-Link USB driver, a command line tool and a DLL for using J-Link with Freescale CodeWarrior for ColdFire®.

Software	Description
<b>JLinkCF.dll</b>	DLL for using J-Link with third-party programs.
unit_cfz.dll	DLL for using J-Link with Freescale CodeWarrior for ColdFire®. For more information about how to use J-Link with Freescale CodeWarrior for ColdFire® please refer to <i>Using J-Link with Freescale CodeWarrior for ColdFire®</i> on page 32
<b>JLinkCF.exe</b>	Free command-line tool with basic functionality for target analysis.
USBDriver	J-Link USB driver.

**Table 3.1: J-Link related software**

### 3.1.2 List of additional software packages

The software packages listed below are available upon request from [www.segger.com](http://www.segger.com).

Software	Description
J-Link Software Developer Kit (SDK)	The J-Link Software Developer Kit is needed if you want to write your own program with J-Link.

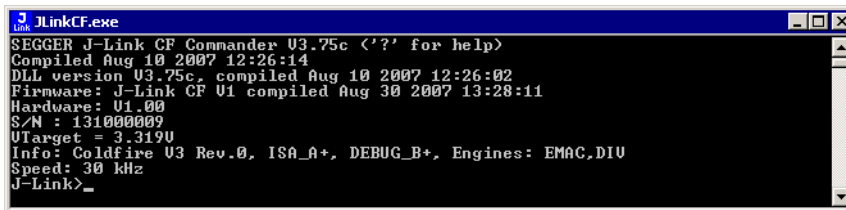
**Table 3.2: J-Link additional software packages**

## 3.2 J-Link software and documentation in detail

The J-Link software documentation can be downloaded from [www.segger.com/download\\_jlink\\_cf.html](http://www.segger.com/download_jlink_cf.html).

### 3.2.1 J-Link Commander (Command line tool)

J-Link Commander (**JLinkCF.exe**) is a tool that can be used for verifying proper installation of the USB driver and to verify the connection to the ColdFire® chip, as well as for simple analysis of the target system. It permits some simple commands, such as memory dump, halt, step and go, as well as some more in-depths analysis of the state of the ColdFire® core.



```

SEGGER J-Link CF Commander V3.75c ('?' for help)
Compiled Aug 10 2007 12:26:14
DLL version V3.75c, compiled Aug 10 2007 12:26:02
Firmware: J-Link CF V1 compiled Aug 30 2007 13:28:11
Hardware: U1.00
S/N : 131000009
UTarget = 3.319U
Info: Coldfire V3 Rev.0, ISA_A+, DEBUG_B+, Engines: EMAC,DIU
Speed: 30 kHz
J-Link>_
  
```

## 3.3 Additional software packages in detail

The packages described in this section are not available for download. If you wish to use one of them, contact SEGGER Microcontroller System directly.

### 3.3.1 J-Link Software Developer Kit (SDK)

The J-Link Software Developer Kit is needed if you want to write your own program with J-Link. The J-Link DLL is a standard Windows DLL typically used from C programs (Visual Basic or Delphi projects are also possible). It makes the entire functionality of J-Link available through its exported functions, such as halting/stepping the ColdFire® core, reading/writing CPU and BDM registers and reading/writing memory. Therefore it can be used in any kind of application accessing a ColdFire® core. The standard DLL does not have API functions for flash programming. However, the functionality offered can be used for programming the flash. In this case, a flash loader is required. The table below lists some of the included files and their respective purpose.

Files	Contents
<b>GLOBAL.h</b> <b>JLinkCFDLL.h</b>	Header files that must be included to use the DLL functions. These files contain the defines, typedef names, and function declarations.
<b>JLinkCFDLL.lib</b>	A Library that contains the exports of the <b>JLinkCF.dll</b> .
<b>JLinkCF.dll</b>	The DLL itself.
<b>Main.c</b>	A example application, which calls some <b>JLinkCF.dll</b> functions.
<b>JLinkCF.dsp</b> <b>JLinkCF.dsw</b>	Project files of the example application. Double-click <b>JLinkCF.dsw</b> to open the project.
<b>JLinkCFDLL.pdf</b>	Extensive documentation (API, example projects etc.).

Table 3.3: J-Link SDK

## 3.4 Using the J-LinkCF.dll

### 3.4.1 What is the JLinkCF.dll?

The J-LinkCF.dll is a standard Windows DLL typically used from C or C++, but also Visual Basic or Delphi projects. It makes the entire functionality of the J-Link available through the exported functions.

The functionality includes things such as halting/stepping the ColdFire® core, reading/writing CPU and BDM registers, and reading/writing memory. Therefore, it can be used in any kind of application accessing a ColdFire® core.

### 3.4.2 Updating the DLL in third-party programs

The **JLinkCF.dll** can be used by any debugger that is designed to work with it. Some debuggers, like the IAR C-SPY® debugger, are usually shipped with the **JLinkCF.dll** already installed. Anyhow it may make sense to replace the included DLL with the latest one available, to take advantage of improvements in the newer version.

#### 3.4.2.1 Updating the JLinkCF.dll in the IAR Embedded Workbench IDE

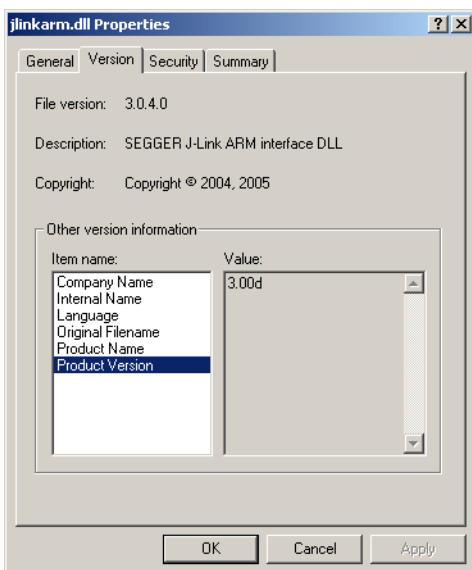
The IAR Embedded Workbench IDE is a high-performance integrated development environment with an editor, compiler, linker, and debugger. The compiler generates very efficient code and is widely used. The IAR Embedded Workbench comes with the **J-LinkCF.dll** in the **cf\bin** subdirectory of the installation directory. To update this DLL, you should backup your original DLL and then replace it with the new one.

Typically, the DLL is located in **C:\Program Files\IAR Systems\Embedded Workbench 5.0\cf\bin\**.

After updating the DLL, it is recommended to verify that the new DLL is loaded as described in *Determining which DLL is used by a program* on page 23.

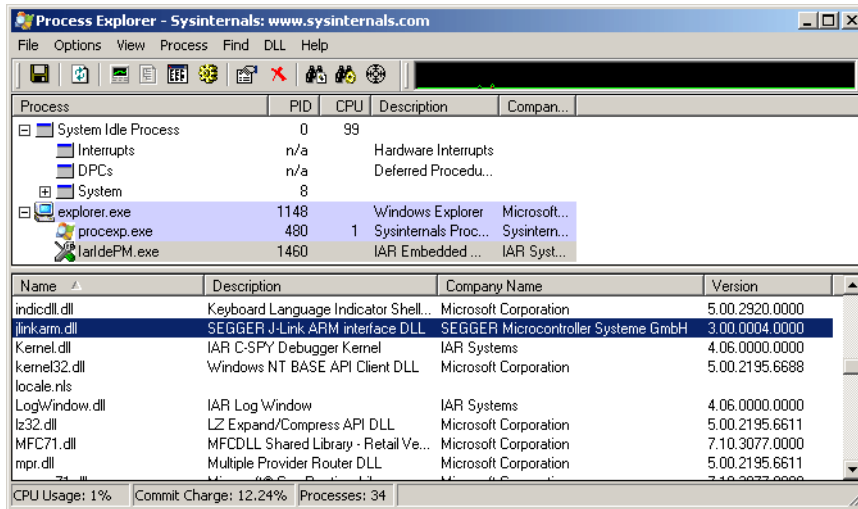
### 3.4.3 Determining the version of JLinkCF.dll

To determine which version of the **JLinkCF.dll** you are facing, the DLL version can be viewed by right-clicking the DLL in windows explorer, and choosing **Properties** from the context menu. Click the **version** tab to display information about the product version.



### 3.4.4 Determining which DLL is used by a program

To verify that the program you are working with is using the DLL you expect it to use, you can investigate which DLLs are loaded by your program with tools like Sysinternals' Process Explorer. It shows you details about the DLLs, used by your program, such as manufacturer and version.



Process Explorer is - at the time of writing - a free utility which can be downloaded from [www.sysinternals.com](http://www.sysinternals.com).





# Chapter 4

## Working with J-Link

---

This chapter describes functionality and how to use J-Link.